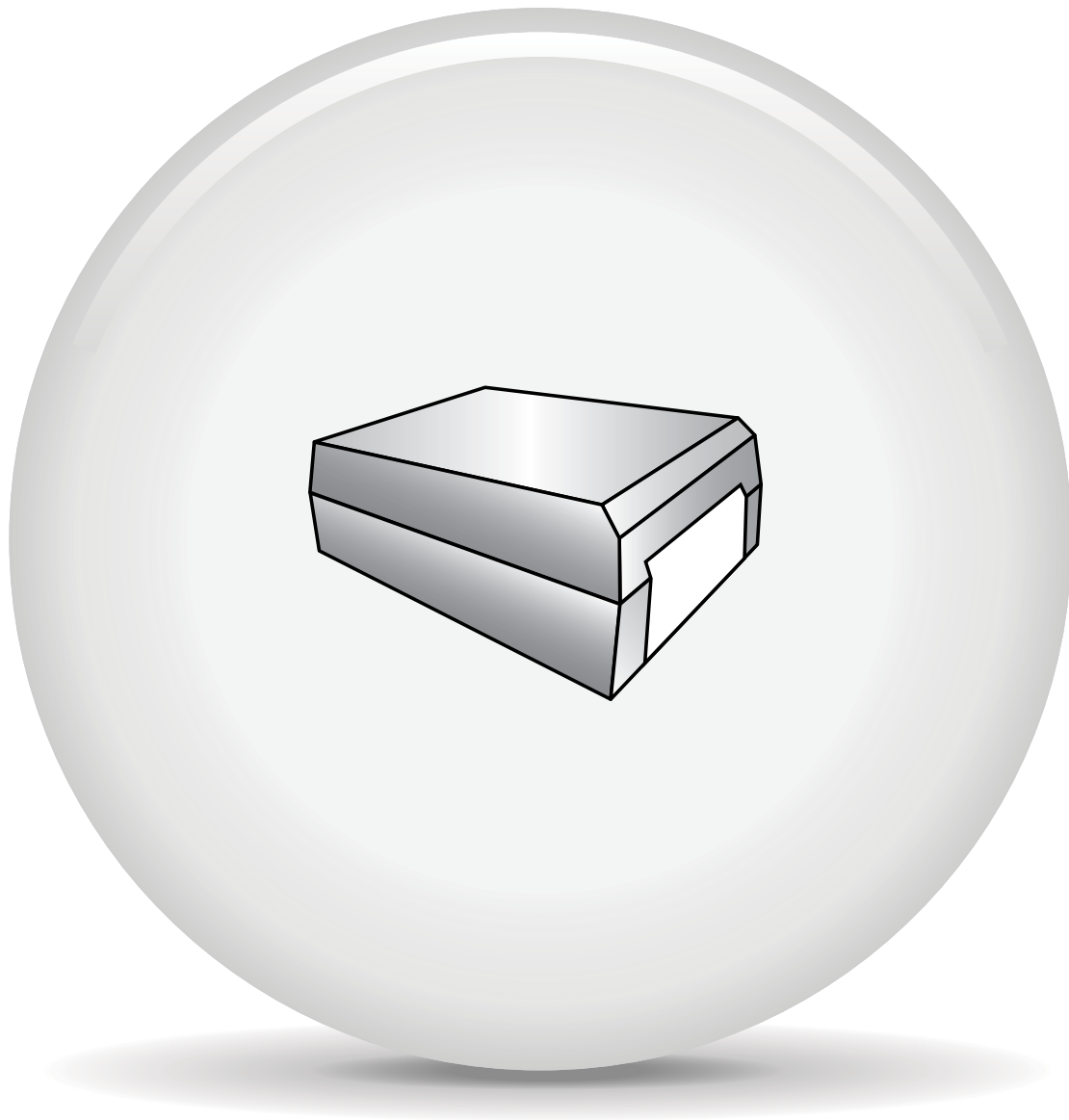


# Tantalum Surface Mount Capacitors

Standard Tantalum



One world. One KEMET.

The Capacitance Company  
**KEMET**  
CHARGED.®

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# One world. One source. One KEMET.

No bouncing from supplier to supplier to find what you need. No multiple web sites and phone calls to get answers.

When you partner with KEMET, our entire global organization seamlessly provides you with the coordinated action and service you need. We're your single, integrated source for capacitance solutions worldwide, offering 95% of possible dielectric solutions, to cover practically any application. With new, innovative products year after year after year. Global availability. Full design collaboration, with fast custom design and prototyping to give your new products a competitive edge. Plus consistent quality, reliability and on-time delivery.

All from one company that's easy to work with and totally dedicated to your success. For anything to do with capacitance, call *The Capacitance Company* – KEMET.



## Looking for a hassle-free source for 95% of possible dielectric solutions?

KEMET is the place for one-stop dielectric shopping. We offer our customers the broadest selection of capacitor technologies in the industry, including tantalum, ceramic, aluminum, electrolytic, film and paper.

But the range of products is only the beginning. You simply won't find an electronic components manufacturer more determined to find new technological solutions to customer problems, or more committed to product quality and on-time delivery – in every case, lowering your total cost of ownership as much as we possibly can. It's how we've helped customers succeed for more than 90 years. And it's how we're helping them succeed today.



# We're everywhere you need us to be.

## AMERICA

Canada  
Mexico  
USA

## EMEA

Bulgaria  
Finland  
France  
Germany  
Italy  
Portugal  
Sweden  
Switzerland  
United Kingdom

## ASIA-PACIFIC

China  
Hong Kong  
India  
Indonesia  
Japan  
Malaysia  
Singapore  
Taiwan

The next time you board an airplane, boot up your computer or read about a breakthrough medical device, a piece of our technology is likely involved. KEMET customers include nearly all of the world's major electronics original equipment manufacturers, manufacturing services companies and electronics distributors. High Reliability versions of our capacitors are even in outer space, part of every important military and aerospace effort of the past 60 years, from the first Telstar satellite and Apollo 11 to the Patriot missile, International Space Station and Mars Pathfinder.

Our sales offices can't be quite as ubiquitous as our products, but we do pride ourselves on being where you need us. This map shows you our sales offices around the world.

As you can see, we're not only easy to work with, we're easy to find. And we're more than ready to be your single source capacitance solutions supplier.

One world. One source. One KEMET.



## *Why The Capacitance Company* is also the “Easy-To-Buy-From” company.

When you choose KEMET, you'll enjoy a level of responsiveness you just won't get from any other component manufacturer. You simply won't find an electronic components manufacturer more passionate about customer service. Our innovative service offerings and superior localized support are known throughout the industry, powered by our global, customer-focused sales organization and worldwide logistics capabilities. We're 100% committed to serving any customer, anywhere, and meeting customer needs when they need to be met.

Whether you need rush samples, technical assistance, in-person consultations or accelerated custom design, design collaboration and prototype services, we have a solution. If it's anything to do with capacitance, we can help – and help fast.



## Working to make a better world.

At KEMET, we're proud to work with customers to develop products that truly make the world a better, safer, more connected place to live – from hand-held devices to automotive systems to the greenest energy technology.

As a company, KEMET is dedicated to economically, environmentally and socially sustainable development. We've adopted the Electronic Industry Code of Conduct (EICC), addressing all aspects of corporate responsibility. All of our commercial-grade products are available in RoHS-compliant versions with Pb-free terminations. Our manufacturing facilities have won numerous environmental excellence awards and recognitions. And our supply chain is certified to be sourced from areas that are neither environmentally protected nor under conflict.

After all, we believe that doing the right thing is in everyone's interest.



## Which capacitor is right for you?

As The Capacitance Company, we make over 95% of possible dielectric solutions – the broadest selection of capacitor technologies in the industry. By offering a wide variety of dielectrics, dimensions, voltages, temperature characteristics and terminations, KEMET capacitors satisfy an expansive range of customer requirements and applications.

In fact, if the capacitor you need hasn't been invented, it's only because you haven't asked. We can quickly develop custom products and carry out early-stage manufacturing through our accelerated collaboration services. Available through our global innovation and manufacturing centers around the world, accelerated collaboration brings together the necessary people, equipment and facilities together to get the job done, on time and in budget.

Of course, when you're under pressure to design smaller and smaller products with greater and greater functionality, there's no time for the traditional back-and-forth with your suppliers. With KEMET, you get direct contact to the engineers and other professionals who can help you successfully solve your design problems, and in record time. We deal personally with customers to ascertain the new part types needed for their next-generation products. In many cases, we can go from start to samples in only four months.

We've helped some of the world's most prominent electronics companies slash time to market and gain significant windows of competitive advantage. We can do the same for you, too.



## Overview

The KEMET T491 Series, designed specifically for today's highly automated surface mount processes and equipment, is the leading choice for surface mount designs. The T491 combines KEMET's proven solid tantalum technology, acclaimed and respected throughout the world, with the latest in materials, processes and automation, resulting in unsurpassed total performance and value.

This product meets or exceeds the requirements of EIA Standard 535BAAC. The physical outline and dimensions of this series conform to this global standard. Five low profile case sizes are available in the T491 Series. The R/2012–12, S/3216–12 and T/3528–12 case sizes have a maximum height of 1.2 mm. The U/6032–15 size has a maximum height of 1.5 mm, and the V/7343–20 has a maximum height of 2.0 mm.

The T491 standard terminations are 100% matte tin and provide excellent wetting characteristics and compatibility with today's surface mount solder systems. Tin/lead (Sn/Pb) terminations are available upon request for any part number. Gold-plated terminations are also available for use with conductive epoxy attachment processes. The symmetrical terminations offer total compliancy to provide the thermal and mechanical stress relief required with today's technology. Lead frame attachments to the tantalum pellet are made via a microprocessor-controlled welding operation, and a high temperature silver epoxy adhesive system.

Standard packaging of these devices is tape and reel in accordance with EIA 481–D. This system provides perfect compatibility with all tape-fed placement units.

## Benefits

- Meets or exceeds EIA Standard 535BAAC
- Taped and reeled per EIA 481–D
- Symmetrical, compliant terminations
- Optical gold-plated terminations
- Laser-marked case
- 100% surge current test on C, D, E, U, V, X sizes
- Halogen free epoxy
- Capacitance 0.1  $\mu$ F to 1,000  $\mu$ F
- Tolerance  $\pm$ 10%,  $\pm$ 20%
- Voltage 2.5 – 50 VDC
- Extended range values
- Low profile case sizes
- RoHS Compliant and lead-free terminations  
(See [www.kemet.com](http://www.kemet.com) for transition information)
- Operating temperature: -55°C to +125°C

## Applications

Typical applications include decoupling and filtering in industrial and automotive end applications such as DC/DC converters, portable electronics, telecommunications, and control units.



## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

| T               | 491        | X   | 157  | K                     | 020  | A                   | T   |                                    |
|-----------------|------------|---|--|-----------------------|--|---------------------|---|------------------------------------|
| Capacitor Class | Series     | Case Size   | Capacitance Code (pF)  | Capacitance Tolerance | Voltage  | Failure Rate/Design | Lead Material   | Packaging (C-Spec)                 |
| T = Tantalum    | Industrial | A = 3216-18<br>B = 3528-21<br>C = 6032-28<br>D = 7343-31<br>E = 7260-38<br>R = 2012-12<br>S = 3216-12<br>T = 3528-12<br>U = 6032-15<br>V = 7343-20<br>X = 7343-43 | First two digits represent significant figures. Third digit specifies number of zeros. | K = ±10%<br>M = ±20%  | 2R5 = 2.5 V<br>003 = 3 V<br>004 = 4 V<br>006 = 6.3 V<br>010 = 10 V<br>016 = 16 V<br>020 = 20 V<br>025 = 25 V<br>035 = 35 V<br>050 = 50 V | A = N/A             | T = 100% Matte Tin (Sn) Plated*<br>H = Standard Solder Coated (SnPb 5% Pb minimum)<br>G = Gold Plated (A, B, C, D, X only)<br>N = Non-Magnetic 100% Tin (Sn)<br>M = Non-Magnetic (SnPb) | Blank = 7" Reel<br>7280 = 13" Reel |

## Performance Characteristics

| Item                    | Performance Characteristics                         |
|-------------------------|---|
| Operating Temperature   | -55°C to 125°C                                      |
| Rated Capacitance Range | 0.1 – 1,000 µF @ 120 Hz/25°C                        |
| Capacitance Tolerance   | K Tolerance (10%), M Tolerance (20%)                |
| Rated Voltage Range     | 2.5 – 50 V  |
| DF (120 Hz)             | Refer to Part Number Electrical Specification Table |
| ESR (100 kHz)           | Refer to Part Number Electrical Specification Table |
| Leakage Current         | ≤ 0.01 CV (µA) at Rated Voltage after 5 minutes     |

## Qualification

| Test                       | Condition  | Characteristics |  |       |                             |          |  |
|----------------------------|--|-----------------|--|-------|-----------------------------|----------|--|
| Endurance                  | 85°C @ rated voltage, 2,000 hours<br>125°C @ 2/3 rated voltage, 2,000 hours  | Δ C/C           | Within ±10% of initial value   |       |                             |          |  |
|                            |  | DF              | Within initial limits  |       |                             |          |  |
|                            |  | DCL             | Within 1.25 x initial limit  |       |                             |          |  |
|                            |  | ESR             | Within initial limits  |       |                             |          |  |
| Storage Life               | 125°C @ 0 volts, 2,000 hours   | Δ C/C           | Within ±10% of initial value   |       |                             |          |  |
|                            |  | DF              | Within initial limits  |       |                             |          |  |
|                            |  | DCL             | Within 1.25 x initial limit  |       |                             |          |  |
|                            |  | ESR             | Within initial limits  |       |                             |          |  |
| Thermal Shock              | MIL–STD–202, Method 107, Condition B, mounted, -55°C to 125° C, 1,000 cycles   | Δ C/C           | Within ±5% of initial value  |       |                             |          |  |
|                            |  | DF              | Within initial limits  |       |                             |          |  |
|                            |  | DCL             | Within 1.25 x initial limit  |       |                             |          |  |
|                            |  | ESR             | Within initial limits  |       |                             |          |  |
| Temperature Stability      | Extreme temperature exposure at a succession of continuous steps at +25°C, -55°C, +25°C, +85°C, +125°C, +25°C.         | +25°C           | -55°C  | +85°C | +125°C                      |          |  |
|                            |  | Δ C/C           | IL*  | ±10%  | ±10%                        | ±20%     |  |
|                            |  | DF              | IL   | IL    | 1.5 x IL                    | 1.5 x IL |  |
|                            |  | DCL             | IL   | n/a   | 10 x IL                     | 12 x IL  |  |
|                            |  | Surge Voltage   | 25°C and 85°C, 1.32 x rated voltage 1,000 cycles (125°C, 1.2 x rated voltage). | Δ C/C | Within ±5% of initial value |          |  |
|                            |  |                 |  | DF    | Within initial limits       |          |  |
| DCL                        | Within initial limits  |                 |  |       |                             |          |  |
| ESR                        | Within initial limits  |                 |  |       |                             |          |  |
| Mechanical Shock/Vibration | MIL–STD–202, Method 213, Condition I, 100 G peak<br>MIL–STD–202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak | Δ C/C           | Within ±10% of initial value   |       |                             |          |  |
|                            |  | DF              | Within initial limits  |       |                             |          |  |
|                            |  | DCL             | Within initial limits  |       |                             |          |  |

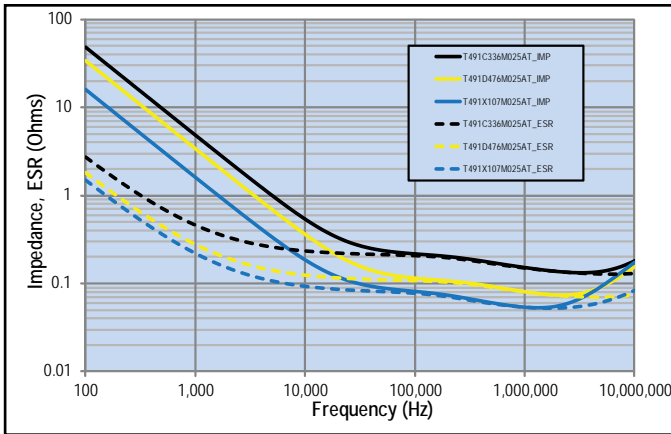
\*IL = Initial limit

## Certification

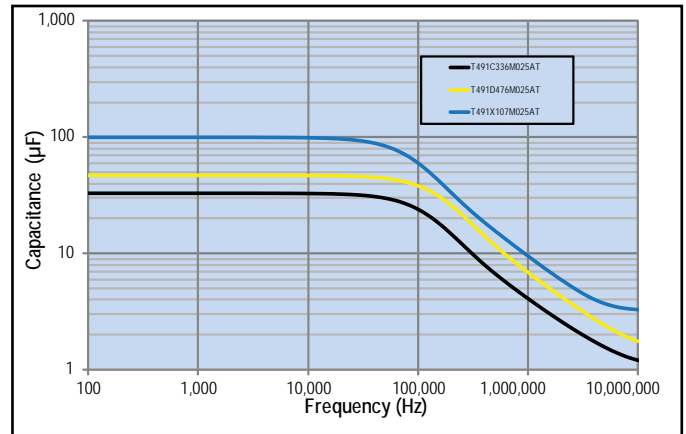
KEMET's Internal Qualification Plan for this Tantalum series of capacitors follows AEC–Q200 guidelines. Standard catalog part types ordered without a specific automotive designator, i.e., suffix AUTO or four digit customer specific designator (C-Spec), are not considered KEMET Automotive Grade tantalum capacitors.

## Electrical Characteristics

ESR vs. Frequency

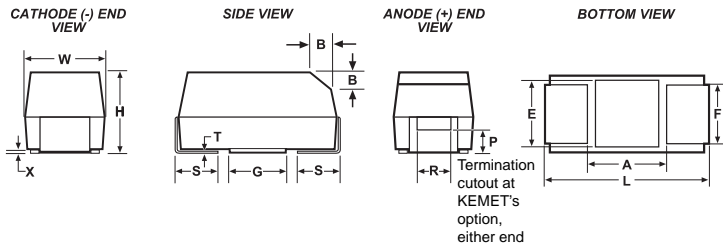


Capacitance vs. Frequency



## Dimensions – Millimeters (Inches)

Metric will govern



| Case Size |         | Component                  |                            |                            |                    |                    |                         |                              |            |            |             |            |            |            |  |
|-----------|---------|----------------------------|----------------------------|----------------------------|--------------------|--------------------|-------------------------|------------------------------|------------|------------|-------------|------------|------------|------------|--|
| KEMET     | EIA     | L*                         | W*                         | H*                         | F* ±0.1<br>±(.004) | S* ±0.3<br>±(.012) | B* ±0.15<br>(Ref) ±.006 | X (Ref)                      | P (Ref)    | R (Ref)    | T (Ref)     | A (Min)    | G (Ref)    | E (Ref)    |  |
| A         | 3216-18 | 3.2 ±0.2<br>(0.126 ±0.008) | 1.6 ±0.2<br>(0.063 ±0.008) | 1.6 ±0.2<br>(0.063 ±0.008) | 1.2 (.047)         | 0.8 (.031)         | 0.4 (.016)              | 0.10 ±0.10<br>(0.004 ±0.004) | 0.4 (.016) | 0.4 (.016) | 0.13 (.005) | 1.4 (.055) | 1.1 (.043) | 1.3 (.051) |  |
| B         | 3528-21 | 3.5 ±0.2<br>(0.138 ±0.008) | 2.8 ±0.2<br>(0.110 ±0.008) | 1.9 ±0.2<br>(0.075 ±0.008) | 2.2 (.087)         | 0.8 (.031)         | 0.4 (.016)              | 0.10 ±0.10<br>(0.004 ±0.004) | 0.5 (.020) | 1.0 (.039) | 0.13 (.005) | 1.1 (.043) | 1.8 (.071) | 2.2 (.087) |  |
| C         | 6032-28 | 6.0 ±0.3<br>(0.236 ±0.03)  | 3.2 ±0.3<br>(0.126 ±0.012) | 2.5 ±0.3<br>(0.098 ±0.012) | 2.2 (.087)         | 1.3 (.051)         | 0.5 (.020)              | 0.10 ±0.10<br>(0.004 ±0.004) | 0.9 (.035) | 1.0 (.039) | 0.13 (.005) | 3.1 (.122) | 2.8 (.110) | 2.4 (.094) |  |
| D         | 7343-31 | 7.3 ±0.3<br>(0.287 ±0.012) | 4.3 ±0.3<br>(0.169 ±0.012) | 2.8 ±0.3<br>(0.110 ±0.012) | 2.4 (.094)         | 1.3 (.051)         | 0.5 (.020)              | 0.10 ±0.10<br>(0.004 ±0.004) | 0.9 (.035) | 1.0 (.039) | 0.13 (.005) | 3.8 (.150) | 3.5 (.138) | 3.5 (.138) |  |
| X         | 7343-43 | 7.3 ±0.3<br>(0.287 ±0.012) | 4.3 ±0.3<br>(0.169 ±0.012) | 4.0 ±0.3<br>(0.157 ±0.012) | 2.4 (.094)         | 1.3 (.051)         | 0.5 (.020)              | 0.10 ±0.10<br>(0.004 ±0.004) | 1.7 (.067) | 1.0 (.039) | 0.13 (.005) | 3.8 (.150) | 3.5 (.138) | 3.5 (.138) |  |
| E         | 7360-38 | 7.3 ±0.3<br>(0.287 ±0.012) | 6.0 ±0.3<br>(0.236 ±0.012) | 3.6 ±0.2<br>(0.142 ±0.008) | 4.1 (.161)         | 1.3 (.051)         | 0.5 (.020)              | 0.10 ±0.10<br>(.004 ±.004)   | n/a        | n/a        | 0.13 (.005) | 3.3 (.129) | 3.5 (.138) | 3.5 (.138) |  |
| R         | 2012-12 | 2.0 ±0.2<br>(0.079 ±0.008) | 1.3 ±0.2<br>(0.051 ±0.008) | 1.2 (.047)                 | 0.9 (.035)         | 0.5 (.020)         | n/a                     | 0.05 (.002)                  | n/a        | n/a        | 0.13 (.005) | 0.8 (.031) | 0.5 (.020) | 0.8 (.031) |  |
| S         | 3216-12 | 3.2 ±0.2<br>(0.126 ±0.008) | 1.6 ±0.2<br>(0.063 ±0.008) | 1.2 (.047)                 | 1.2 (.047)         | 0.8 (.031)         | n/a                     | 0.05 (.002)                  | n/a        | n/a        | 0.13 (.005) | 1.4 (.055) | 1.1 (.043) | 1.3 (.051) |  |
| T         | 3528-12 | 3.5 ±0.2<br>(0.138 ±0.008) | 2.8 ±0.2<br>(0.110 ±0.008) | 1.2 (.047)                 | 2.2 (.087)         | 0.8 (.031)         | n/a                     | 0.05 (.002)                  | n/a        | n/a        | 0.13 (.005) | 2.1 (.083) | 1.8 (.071) | 2.2 (.087) |  |
| U         | 6032-15 | 6.0 ±0.3<br>(0.236 ±0.012) | 3.2 ±0.2<br>(0.110 ±0.008) | 1.5 (.059)                 | 2.2 (.087)         | 1.3 (.051)         | n/a                     | 0.05 (.002)                  | n/a        | n/a        | 0.13 (.005) | 3.1 (.122) | 2.8 (.110) | 2.4 (.094) |  |
| V         | 7343-20 | 7.3 ±0.3<br>(0.287 ±0.012) | 4.3 ±0.3<br>(0.169 ±0.012) | 2.0 (.079)                 | 2.4 (.094)         | 1.3 (.051)         | n/a                     | 0.05 (.002)                  | n/a        | n/a        | 0.13 (.005) | 3.8 (.150) | 3.5 (.138) | 3.5 (.138) |  |

Notes: (Ref) – Dimensions provided for reference only. No dimensions are provided for B, P or R because low profile cases do not have a bevel or a notch.

\* MIL-C-55365/8 specified dimensions

Table 1 – Ratings &amp; Part Number Reference

| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |
|---------------|-----------|-------------------------|------------------------------|--------------------------------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------|------------------------------|--------------------------------|
|               |           |                         |                              |                                      |                                |                                | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C |                                |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| 2.5           | 100       | T/3528-12               | T491T107(1)2R5A(2)           | 2.5                                  | 24.0                           | 3.9                            | 134                              | 121                         | 54                           | 1                              |
| 2.5           | 220       | D/7343-31               | T491D227(1)2R5A(2)           | 5.5                                  | 8.0                            | 0.3                            | 707                              | 636                         | 283                          | 1                              |
| 3             | 33        | A/3216-18               | T491A336(1)003A(2)           | 1.0                                  | 6.0                            | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 4             | 3.3       | A/3216-18               | T491A335(1)004A(2)           | 0.5                                  | 6.0                            | 8.0                            | 97                               | 87                          | 39                           | 1                              |
| 4             | 4.7       | A/3216-18               | T491A475(1)004A(2)           | 0.5                                  | 6.0                            | 8.0                            | 97                               | 87                          | 39                           | 1                              |
| 4             | 6.8       | A/3216-18               | T491A685(1)004A(2)           | 0.5                                  | 6.0                            | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 4             | 6.8       | S/3216-12               | T491S685(1)004A(2)           | 0.5                                  | 6.0                            | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 4             | 10        | B/3528-21               | T491B106(1)004A(2)           | 0.5                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 4             | 10        | A/3216-18               | T491A106(1)004A(2)           | 0.5                                  | 6.0                            | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 4             | 10        | S/3216-12               | T491S106(1)004A(2)           | 0.5                                  | 6.0                            | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 4             | 10        | R/2012-12               | T491R106(1)004A(2)           | 0.5                                  | 8.0                            | 10.0                           | 50                               | 45                          | 20                           | 1                              |
| 4             | 15        | B/3528-21               | T491B156(1)004A(2)           | 0.6                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 4             | 15        | A/3216-18               | T491A156(1)004A(2)           | 0.6                                  | 6.0                            | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 4             | 15        | T/3528-12               | T491T156(1)004A(2)           | 0.6                                  | 6.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 4             | 15        | S/3216-12               | T491S156(1)004A(2)           | 0.6                                  | 10.0                           | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 4             | 22        | C/6032-28               | T491C226(1)004A(2)           | 0.9                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 4             | 22        | B/3528-21               | T491B226(1)004A(2)           | 0.9                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 4             | 22        | A/3216-18               | T491A226(1)004A(2)           | 0.9                                  | 6.0                            | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 4             | 22        | T/3528-12               | T491T226(1)004A(2)           | 0.9                                  | 6.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 4             | 22        | S/3216-12               | T491S226(1)004A(2)           | 0.9                                  | 10.0                           | 10.0                           | 77                               | 69                          | 31                           | 1                              |
| 4             | 33        | C/6032-28               | T491C336(1)004A(2)           | 1.3                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 4             | 33        | U/6032-15               | T491U336(1)004A(2)           | 1.3                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 4             | 33        | B/3528-21               | T491B336(1)004A(2)           | 1.3                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 4             | 33        | A/3216-18               | T491A336(1)004A(2)           | 1.3                                  | 6.0                            | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 4             | 33        | T/3528-12               | T491T336(1)004A(2)           | 1.3                                  | 8.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 4             | 47        | C/6032-28               | T491C476(1)004A(2)           | 1.9                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 4             | 47        | U/6032-15               | T491U476(1)004A(2)           | 1.9                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 4             | 47        | B/3528-21               | T491B476(1)004A(2)           | 1.9                                  | 6.0                            | 3.0                            | 168                              | 151                         | 67                           | 1                              |
| 4             | 47        | A/3216-18               | T491A476(M)004A(2)           | 1.9                                  | 12.0                           | 2.5                            | 173                              | 156                         | 69                           | 1                              |
| 4             | 47        | T/3528-12               | T491T476(M)004A(2)           | 1.9                                  | 12.0                           | 6.0                            | 108                              | 97                          | 43                           | 1                              |
| 4             | 68        | D/7343-31               | T491D686(1)004A(2)           | 2.7                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 4             | 68        | C/6032-28               | T491C686(1)004A(2)           | 2.7                                  | 6.0                            | 1.6                            | 262                              | 236                         | 105                          | 1                              |
| 4             | 68        | U/6032-15               | T491U686(1)004A(2)           | 2.7                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 4             | 68        | B/3528-21               | T491B686(1)004A(2)           | 2.7                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 4             | 68        | A/3216-18               | T491A686(1)004A(2)           | 2.7                                  | 30.0                           | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 4             | 100       | D/7343-31               | T491D107(1)004A(2)           | 4.0                                  | 8.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 4             | 100       | C/6032-28               | T491C107(1)004A(2)           | 4.0                                  | 8.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 4             | 100       | U/6032-15               | T491U107(1)004A(2)           | 4.0                                  | 10.0                           | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 4             | 100       | B/3528-21               | T491B107(M)004A(2)           | 4.0                                  | 8.0                            | 0.9                            | 307                              | 276                         | 123                          | 1                              |
| 4             | 100       | A/3216-18               | T491A107(M)004A(2)           | 4.0                                  | 30.0                           | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 4             | 100       | T/3528-12               | T491T107(M)004A(2)           | 4.0                                  | 30.0                           | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 4             | 150       | D/7343-31               | T491D157(1)004A(2)           | 6.0                                  | 8.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 4             | 150       | U/6032-15               | T491U157(1)004AT             | 6.0                                  | 8.0                            | 1.3                            | 263                              | 237                         | 105                          | 1                              |
| 4             | 150       | V/7343-20               | T491V157(1)004A(2)           | 6.0                                  | 8.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 4             | 150       | C/6032-28               | T491C157(1)004A(2)           | 6.0                                  | 8.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 4             | 150       | B/3528-21               | T491B157(M)004A(2)           | 6.0                                  | 12.0                           | 2.0                            | 206                              | 185                         | 82                           | 1                              |
| 4             | 220       | V/7343-20               | T491V227(1)004A(2)           | 8.8                                  | 8.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 4             | 220       | B/3528-21               | T491B227(M)004A(2)           | 8.8                                  | 18.0                           | 0.5                            | 412                              | 371                         | 165                          | 1                              |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin (Sn), M = Non-Magnetic (SnPb). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |
|---------------|-----------|-------------------------|------------------------------|--------------------------------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------|------------------------------|--------------------------------|
|               |           |                         |                              |                                      |                                |                                | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C |                                |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum |                                  |                             |                              | Reflow Temperature<br>≤ 260 °C |
| 4             | 220       | C/6032-28               | T491C227(1)004AT             | 8.8                                  | 15.0                           | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 4             | 220       | D/7343-31               | T491D227(1)004AT             | 8.8                                  | 8.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 4             | 220       | W/7343-15               | T491W227(1)004AT             | 8.8                                  | 8.0                            | 0.8                            | 474                              | 427                         | 190                          | 1                              |
| 4             | 330       | D/7343-31               | T491D337(1)004A(2)           | 13.2                                 | 8.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 4             | 330       | V/7343-20               | T491V337(1)004A(2)           | 13.2                                 | 12.0                           | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 4             | 330       | C/6032-28               | T491C337(1)004A(2)           | 13.2                                 | 10.0                           | 0.9                            | 350                              | 315                         | 140                          | 1                              |
| 4             | 330       | X/7343-43               | T491X337(1)004AT             | 13.2                                 | 8.0                            | 0.8                            | 454                              | 409                         | 182                          | 1                              |
| 4             | 470       | X/7343-43               | T491X477(1)004A(2)           | 18.8                                 | 8.0                            | 0.5                            | 574                              | 517                         | 230                          | 1                              |
| 4             | 470       | D/7343-31               | T491D477(1)004A(2)           | 18.8                                 | 8.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 4             | 680       | X/7343-43               | T491X687(1)004A(2)           | 27.2                                 | 12.0                           | 0.5                            | 574                              | 517                         | 230                          | 1                              |
| 4             | 680       | D/7343-31               | T491D687(1)004A(2)           | 27.2                                 | 12.0                           | 0.5                            | 548                              | 493                         | 219                          | 1                              |
| 4             | 1000      | X/7343-43               | T491X108(1)004A(2)           | 40.0                                 | 12.0                           | 0.5                            | 574                              | 517                         | 230                          | 1                              |
| 4             | 1000      | E/7260-38               | T491E108(M)004A(2)           | 40.0                                 | 15.0                           | 0.2                            | 1000                             | 900                         | 400                          | 1                              |
| 6.3           | 2.2       | R/2012-12               | T491R225(1)006A(2)           | 0.5                                  | 6.0                            | 25.0                           | 32                               | 29                          | 13                           | 1                              |
| 6.3           | 2.2       | A/3216-18               | T491A225(1)006A(2)           | 0.5                                  | 6.0                            | 8.0                            | 97                               | 87                          | 39                           | 1                              |
| 6.3           | 3.3       | A/3216-18               | T491A335(1)006A(2)           | 0.5                                  | 6.0                            | 8.0                            | 97                               | 87                          | 39                           | 1                              |
| 6.3           | 4.7       | A/3216-18               | T491A475(1)006A(2)           | 0.5                                  | 6.0                            | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 6.3           | 4.7       | S/3216-12               | T491S475(1)006A(2)           | 0.5                                  | 6.0                            | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 6.3           | 6.8       | B/3528-21               | T491B685(1)006A(2)           | 0.5                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 6.3           | 6.8       | A/3216-18               | T491A685(1)006A(2)           | 0.5                                  | 6.0                            | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 6.3           | 6.8       | S/3216-12               | T491S685(1)006A(2)           | 0.5                                  | 6.0                            | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 6.3           | 6.8       | R/2012-12               | T491R685(1)006A(2)           | 0.5                                  | 8.0                            | 15.0                           | 41                               | 37                          | 16                           | 1                              |
| 6.3           | 10        | B/3528-21               | T491B106(1)006A(2)           | 0.6                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 6.3           | 10        | A/3216-18               | T491A106(1)006A(2)           | 0.6                                  | 6.0                            | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 6.3           | 10        | T/3528-12               | T491T106(1)006A(2)           | 0.6                                  | 6.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 6.3           | 10        | S/3216-12               | T491S106(1)006A(2)           | 0.6                                  | 10.0                           | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 6.3           | 10        | R/2012-12               | T491R106(1)006A(2)           | 0.6                                  | 8.0                            | 10.0                           | 50                               | 45                          | 20                           | 1                              |
| 6.3           | 15        | C/6032-28               | T491C156(1)006A(2)           | 0.9                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 6.3           | 15        | B/3528-21               | T491B156(1)006A(2)           | 0.9                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 6.3           | 15        | A/3216-18               | T491A156(1)006A(2)           | 0.9                                  | 6.0                            | 3.5                            | 146                              | 131                         | 58                           | 1                              |
| 6.3           | 15        | T/3528-12               | T491T156(1)006A(2)           | 0.9                                  | 6.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 6.3           | 15        | S/3216-12               | T491S156(1)006A(2)           | 0.9                                  | 15.0                           | 10.0                           | 77                               | 69                          | 31                           | 1                              |
| 6.3           | 22        | C/6032-28               | T491C226(1)006A(2)           | 1.4                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 6.3           | 22        | U/6032-15               | T491U226(1)006A(2)           | 1.4                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 6.3           | 22        | B/3528-21               | T491B226(1)006A(2)           | 1.4                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 6.3           | 22        | A/3216-18               | T491A226(1)006A(2)           | 1.4                                  | 6.0                            | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 6.3           | 22        | T/3528-12               | T491T226(1)006A(2)           | 1.4                                  | 8.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 6.3           | 33        | C/6032-28               | T491C336(1)006A(2)           | 2.1                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 6.3           | 33        | U/6032-15               | T491U336(1)006A(2)           | 2.1                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 6.3           | 33        | B/3528-21               | T491B336(1)006A(2)           | 2.1                                  | 6.0                            | 3.0                            | 168                              | 151                         | 67                           | 1                              |
| 6.3           | 33        | A/3216-18               | T491A336(1)006A(2)           | 2.1                                  | 12.0                           | 2.5                            | 173                              | 156                         | 69                           | 1                              |
| 6.3           | 33        | T/3528-12               | T491T336(1)006A(2)           | 2.1                                  | 12.0                           | 6.0                            | 108                              | 97                          | 43                           | 1                              |
| 6.3           | 47        | D/7343-31               | T491D476(1)006A(2)           | 3.0                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 6.3           | 47        | C/6032-28               | T491C476(1)006A(2)           | 3.0                                  | 6.0                            | 1.6                            | 262                              | 236                         | 105                          | 1                              |
| 6.3           | 47        | U/6032-15               | T491U476(1)006A(2)           | 3.0                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 6.3           | 47        | V/7343-20               | T491V476(1)006AT             | 3.0                                  | 6.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 6.3           | 47        | B/3528-21               | T491B476(1)006A(2)           | 3.0                                  | 6.0                            | 2.0                            | 206                              | 185                         | 82                           | 1                              |
| 6.3           | 47        | A/3216-18               | T491A476(M)006A(2)           | 3.0                                  | 12.0                           | 3.5                            | 146                              | 131                         | 58                           | 1                              |
| 6.3           | 47        | T/3528-12               | T491T476(1)006A(2)           | 3.0                                  | 24.0                           | 4.4                            | 126                              | 113                         | 50                           | 1                              |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin (Sn), M = Non-Magnetic (SnPb). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |
|---------------|-----------|-------------------------|------------------------------|--------------------------------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------|------------------------------|--------------------------------|
|               |           |                         |                              |                                      |                                |                                | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C |                                |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| 6.3           | 68        | D/7343-31               | T491D686(1)006A(2)           | 4.3                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 6.3           | 68        | C/6032-28               | T491C686(1)006A(2)           | 4.3                                  | 6.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 6.3           | 68        | U/6032-15               | T491U686(1)006A(2)           | 4.3                                  | 10.0                           | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 6.3           | 68        | V/7343-20               | T491V686(1)006AT             | 4.3                                  | 6.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 6.3           | 68        | B/3528-21               | T491B686(1)006A(2)           | 4.3                                  | 8.0                            | 0.9                            | 307                              | 276                         | 123                          | 1                              |
| 6.3           | 68        | A/3216-18               | T491A686(1)006A(2)           | 4.3                                  | 30.0                           | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 6.3           | 100       | D/7343-31               | T491D107(1)006A(2)           | 6.3                                  | 8.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 6.3           | 100       | V/7343-20               | T491V107(1)006A(2)           | 6.3                                  | 8.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 6.3           | 100       | C/6032-28               | T491C107(1)006A(2)           | 6.3                                  | 8.0                            | 0.9                            | 350                              | 315                         | 140                          | 1                              |
| 6.3           | 100       | M/3528-15               | T491M107(1)006AT             | 6.3                                  | 20.0                           | 1.0                            | 346                              | 311                         | 138                          | 1                              |
| 6.3           | 100       | U/6032-15               | T491U107(1)006A(2)           | 6.3                                  | 10.0                           | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 6.3           | 100       | B/3528-21               | T491B107(1)006A(2)           | 6.3                                  | 15.0                           | 3.0                            | 168                              | 151                         | 67                           | 1                              |
| 6.3           | 150       | B/3528-21               | T491B157M006A(2)             | 9.5                                  | 15.0                           | 3.0                            | 168                              | 151                         | 67                           | 1                              |
| 6.3           | 150       | D/7343-31               | T491D157(1)006A(2)           | 9.5                                  | 8.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 6.3           | 150       | C/6032-28               | T491C157(1)006A(2)           | 9.5                                  | 8.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 6.3           | 150       | V/7343-20               | T491V157(1)006A(2)           | 9.5                                  | 8.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 6.3           | 150       | U/6032-15               | T491U157(1)006AT             | 9.5                                  | 8.0                            | 0.6                            | 387                              | 348                         | 155                          | 1                              |
| 6.3           | 150       | W/7343-15               | T491W157(1)006AT             | 9.5                                  | 8.0                            | 0.8                            | 474                              | 427                         | 190                          | 1                              |
| 6.3           | 220       | X/7343-43               | T491X227(1)006A(2)           | 13.9                                 | 8.0                            | 0.7                            | 486                              | 437                         | 194                          | 1                              |
| 6.3           | 220       | D/7343-31               | T491D227(1)006A(2)           | 13.9                                 | 8.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 6.3           | 220       | C/6032-28               | T491C227(M)006A(2)           | 13.9                                 | 10.0                           | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 6.3           | 220       | V/7343-20               | T491V227(1)006A(2)           | 13.9                                 | 12.0                           | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 6.3           | 220       | W/7343-15               | T491W227(1)006AT             | 13.9                                 | 8.0                            | 0.8                            | 474                              | 427                         | 190                          | 1                              |
| 6.3           | 330       | V/7343-20               | T491V337(1)006AT             | 20.8                                 | 8.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 6.3           | 330       | X/7343-43               | T491X337(1)006A(2)           | 20.8                                 | 8.0                            | 0.4                            | 642                              | 578                         | 257                          | 1                              |
| 6.3           | 330       | D/7343-31               | T491D337(1)006A(2)           | 20.8                                 | 8.0                            | 0.4                            | 612                              | 551                         | 245                          | 1                              |
| 6.3           | 330       | E/7260-38               | T491E337(1)006A(2)           | 20.8                                 | 8.0                            | 0.5                            | 632                              | 569                         | 253                          | 1                              |
| 6.3           | 470       | X/7343-43               | T491X477(1)006A(2)           | 29.6                                 | 10.0                           | 0.4                            | 642                              | 578                         | 257                          | 1                              |
| 6.3           | 470       | D/7343-31               | T491D477(M)006A(2)           | 29.6                                 | 12.0                           | 0.4                            | 612                              | 551                         | 245                          | 1                              |
| 6.3           | 470       | E/7260-38               | T491E477(1)006A(2)           | 29.6                                 | 10.0                           | 0.4                            | 707                              | 636                         | 283                          | 1                              |
| 6.3           | 680       | X/7343-43               | T491X687(1)006A(2)           | 42.8                                 | 15.0                           | 0.6                            | 524                              | 472                         | 210                          | 1                              |
| 6.3           | 680       | E/7260-38               | T491E687(M)006A(2)           | 42.8                                 | 12.0                           | 0.5                            | 632                              | 569                         | 253                          | 1                              |
| 6.3           | 1000      | X/7343-43               | T491X108(1)006AT             | 63.0                                 | 15.0                           | 0.6                            | 524                              | 472                         | 210                          | 1                              |
| 10            | 1.5       | A/3216-18               | T491A155(1)010A(2)           | 0.5                                  | 6.0                            | 8.0                            | 97                               | 87                          | 39                           | 1                              |
| 10            | 2.2       | B/3528-21               | T491B225(1)010A(2)           | 0.5                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 10            | 2.2       | A/3216-18               | T491A225(1)010A(2)           | 0.5                                  | 6.0                            | 8.0                            | 97                               | 87                          | 39                           | 1                              |
| 10            | 3.3       | A/3216-18               | T491A335(1)010A(2)           | 0.5                                  | 6.0                            | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 10            | 3.3       | S/3216-12               | T491S335(1)010A(2)           | 0.5                                  | 6.0                            | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 10            | 3.3       | R/2012-12               | T491R335(1)010A(2)           | 0.5                                  | 8.0                            | 15.0                           | 41                               | 37                          | 16                           | 1                              |
| 10            | 4.7       | B/3528-21               | T491B475(1)010A(2)           | 0.5                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 10            | 4.7       | A/3216-18               | T491A475(1)010A(2)           | 0.5                                  | 6.0                            | 5.0                            | 122                              | 110                         | 49                           | 1                              |
| 10            | 4.7       | S/3216-12               | T491S475(1)010A(2)           | 0.5                                  | 6.0                            | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 10            | 4.7       | R/2012-12               | T491R475(1)010A(2)           | 0.5                                  | 8.0                            | 10.0                           | 50                               | 45                          | 20                           | 1                              |
| 10            | 6.8       | B/3528-21               | T491B685(1)010A(2)           | 0.7                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 10            | 6.8       | A/3216-18               | T491A685(1)010A(2)           | 0.7                                  | 6.0                            | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 10            | 6.8       | T/3528-12               | T491T685(1)010A(2)           | 0.7                                  | 6.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 10            | 6.8       | S/3216-12               | T491S685(1)010A(2)           | 0.7                                  | 10.0                           | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 10            | 10        | C/6032-28               | T491C106(1)010A(2)           | 1.0                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 10            | 10        | B/3528-21               | T491B106(1)010A(2)           | 1.0                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin (Sn), M = Non-Magnetic (SnPb). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |
|---------------|-----------|-------------------------|------------------------------|--------------------------------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------|------------------------------|--------------------------------|
|               |           |                         |                              |                                      |                                |                                | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C |                                |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| 10            | 10        | A/3216-18               | T491A106(1)010A(2)           | 1.0                                  | 6.0                            | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 10            | 10        | T/3528-12               | T491T106(1)010A(2)           | 1.0                                  | 6.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 10            | 10        | S/3216-12               | T491S106(1)010A(2)           | 1.0                                  | 10.0                           | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 10            | 10        | R/2012-12               | T491R106(1)010A(2)           | 1.0                                  | 24.0                           | 30.0                           | 29                               | 26                          | 12                           | 1                              |
| 10            | 15        | C/6032-28               | T491C156(1)010A(2)           | 1.5                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 10            | 15        | U/6032-15               | T491U156(1)010A(2)           | 1.5                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 10            | 15        | B/3528-21               | T491B156(1)010A(2)           | 1.5                                  | 6.0                            | 2.8                            | 174                              | 157                         | 70                           | 1                              |
| 10            | 15        | A/3216-18               | T491A156(1)010A(2)           | 1.5                                  | 8.0                            | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 10            | 15        | T/3528-12               | T491T156(1)010A(2)           | 1.5                                  | 8.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 10            | 22        | C/6032-28               | T491C226(1)010A(2)           | 2.2                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 10            | 22        | U/6032-15               | T491U226(1)010A(2)           | 2.2                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 10            | 22        | B/3528-21               | T491B226(1)010A(2)           | 2.2                                  | 6.0                            | 2.4                            | 188                              | 169                         | 75                           | 1                              |
| 10            | 22        | A/3216-18               | T491A226(M)010A(2)           | 2.2                                  | 10.0                           | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 10            | 22        | T/3528-12               | T491T226(1)010A(2)           | 2.2                                  | 12.0                           | 8.0                            | 94                               | 85                          | 38                           | 1                              |
| 10            | 33        | D/7343-31               | T491D336(1)010A(2)           | 3.3                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 10            | 33        | V/7343-20               | T491V336(1)010A(2)           | 3.3                                  | 6.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 10            | 33        | C/6032-28               | T491C336(1)010A(2)           | 3.3                                  | 6.0                            | 1.6                            | 262                              | 236                         | 105                          | 1                              |
| 10            | 33        | U/6032-15               | T491U336(1)010A(2)           | 3.3                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 10            | 33        | B/3528-21               | T491B336(1)010A(2)           | 3.3                                  | 6.0                            | 1.8                            | 217                              | 195                         | 87                           | 1                              |
| 10            | 33        | T/3528-12               | T491T336(1)010A(2)           | 3.3                                  | 24.0                           | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 10            | 33        | A/3216-18               | T491A336(1)010A(2)           | 3.3                                  | 15.0                           | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 10            | 47        | D/7343-31               | T491D476(1)010A(2)           | 4.7                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 10            | 47        | V/7343-20               | T491V476(1)010A(2)           | 4.7                                  | 6.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 10            | 47        | C/6032-28               | T491C476(1)010A(2)           | 4.7                                  | 6.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 10            | 47        | U/6032-15               | T491U476(1)010A(2)           | 4.7                                  | 10.0                           | 2.2                            | 202                              | 182                         | 81                           | 1                              |
| 10            | 47        | B/3528-21               | T491B476(1)010A(2)           | 4.7                                  | 8.0                            | 1.0                            | 292                              | 263                         | 117                          | 1                              |
| 10            | 68        | D/7343-31               | T491D686(1)010A(2)           | 6.8                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 10            | 68        | V/7343-20               | T491V686(1)010A(2)           | 6.8                                  | 6.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 10            | 68        | C/6032-28               | T491C686(1)010A(2)           | 6.8                                  | 6.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 10            | 68        | W/7343-15               | T491W686(1)010AT             | 6.8                                  | 6.0                            | 1.2                            | 387                              | 348                         | 155                          | 1                              |
| 10            | 68        | U/6032-15               | T491U686(1)010A(2)           | 6.8                                  | 10.0                           | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 10            | 68        | B/3528-21               | T491B686(M)010A(2)           | 6.8                                  | 10.0                           | 3.0                            | 168                              | 151                         | 67                           | 1                              |
| 10            | 100       | D/7343-31               | T491D107(1)010A(2)           | 10.0                                 | 8.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 10            | 100       | U/6032-15               | T491U107(1)010AT             | 10.0                                 | 8.0                            | 0.7                            | 359                              | 323                         | 144                          | 1                              |
| 10            | 100       | W/7343-15               | T491W107(1)010AT             | 10.0                                 | 8.0                            | 0.8                            | 474                              | 427                         | 190                          | 1                              |
| 10            | 100       | C/6032-28               | T491C107(1)010A(2)           | 10.0                                 | 8.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 10            | 100       | V/7343-20               | T491V107(1)010A(2)           | 10.0                                 | 8.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 10            | 150       | X/7343-43               | T491X157(1)010A(2)           | 15.0                                 | 8.0                            | 0.7                            | 486                              | 437                         | 194                          | 1                              |
| 10            | 150       | D/7343-31               | T491D157(1)010A(2)           | 15.0                                 | 8.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 10            | 150       | C/6032-28               | T491C157(1)010A(2)           | 15.0                                 | 10.0                           | 0.9                            | 350                              | 315                         | 140                          | 1                              |
| 10            | 150       | V/7343-20               | T491V157(1)010A(2)           | 15.0                                 | 8.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 10            | 220       | X/7343-43               | T491X227(1)010A(2)           | 22.0                                 | 8.0                            | 0.5                            | 574                              | 517                         | 230                          | 1                              |
| 10            | 220       | D/7343-31               | T491D227(1)010A(2)           | 22.0                                 | 8.0                            | 0.5                            | 548                              | 493                         | 219                          | 1                              |
| 10            | 330       | D/7343-31               | T491D337(M)010A(2)           | 33.0                                 | 10.0                           | 0.5                            | 548                              | 493                         | 219                          | 1                              |
| 10            | 330       | X/7343-43               | T491X337(1)010A(2)           | 33.0                                 | 10.0                           | 0.5                            | 574                              | 517                         | 230                          | 1                              |
| 10            | 330       | E/7260-38               | T491E337(1)010A(2)           | 33.0                                 | 10.0                           | 0.5                            | 632                              | 569                         | 253                          | 1                              |
| 10            | 470       | X/7343-43               | T491X477(1)010A(2)           | 47.0                                 | 10.0                           | 0.2                            | 908                              | 817                         | 363                          | 1                              |
| 10            | 470       | E/7260-38               | T491E477(M)010A(2)           | 47.0                                 | 12.0                           | 0.5                            | 632                              | 569                         | 253                          | 1                              |
| 16            | 1         | A/3216-18               | T491A105(1)016A(2)           | 0.5                                  | 4.0                            | 10.0                           | 87                               | 78                          | 35                           | 1                              |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin (Sn), M = Non-Magnetic (SnPb). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.



Table 1 – Ratings &amp; Part Number Reference cont'd

| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |
|---------------|-----------|-------------------------|------------------------------|--------------------------------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------|------------------------------|--------------------------------|
|               |           |                         |                              |                                      |                                |                                | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C |                                |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| 16            | 1.5       | A/3216-18               | T491A155(1)016A(2)           | 0.5                                  | 6.0                            | 8.0                            | 97                               | 87                          | 39                           | 1                              |
| 16            | 2.2       | A/3216-18               | T491A225(1)016A(2)           | 0.5                                  | 6.0                            | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 16            | 2.2       | S/3216-12               | T491S225(1)016A(2)           | 0.5                                  | 6.0                            | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 16            | 2.2       | R/2012-12               | T491R225(1)016A(2)           | 0.5                                  | 8.0                            | 25.0                           | 32                               | 29                          | 13                           | 1                              |
| 16            | 3.3       | B/3528-21               | T491B335(1)016A(2)           | 0.5                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 16            | 3.3       | A/3216-18               | T491A335(1)016A(2)           | 0.5                                  | 6.0                            | 5.0                            | 122                              | 110                         | 49                           | 1                              |
| 16            | 4.7       | C/6032-28               | T491C475(1)016A(2)           | 0.8                                  | 6.0                            | 2.4                            | 214                              | 193                         | 86                           | 1                              |
| 16            | 4.7       | B/3528-21               | T491B475(1)016A(2)           | 0.8                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 16            | 4.7       | A/3216-18               | T491A475(1)016A(2)           | 0.8                                  | 6.0                            | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 16            | 4.7       | T/3528-12               | T491T475(1)016A(2)           | 0.8                                  | 6.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 16            | 6.8       | C/6032-28               | T491C685(1)016A(2)           | 1.1                                  | 6.0                            | 1.9                            | 241                              | 217                         | 96                           | 1                              |
| 16            | 6.8       | B/3528-21               | T491B685(1)016A(2)           | 1.1                                  | 6.0                            | 2.5                            | 184                              | 166                         | 74                           | 1                              |
| 16            | 6.8       | A/3216-18               | T491A685(1)016A(2)           | 1.1                                  | 6.0                            | 3.5                            | 146                              | 131                         | 58                           | 1                              |
| 16            | 10        | C/6032-28               | T491C106(1)016A(2)           | 1.6                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 16            | 10        | U/6032-15               | T491U106(1)016A(2)           | 1.6                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 16            | 10        | B/3528-21               | T491B106(1)016A(2)           | 1.6                                  | 6.0                            | 2.8                            | 174                              | 157                         | 70                           | 1                              |
| 16            | 10        | A/3216-18               | T491A106(1)016A(2)           | 1.6                                  | 8.0                            | 7.0                            | 104                              | 94                          | 42                           | 1                              |
| 16            | 10        | T/3528-12               | T491T106(1)016A(2)           | 1.6                                  | 8.0                            | 8.0                            | 94                               | 85                          | 38                           | 1                              |
| 16            | 15        | C/6032-28               | T491C156(1)016A(2)           | 2.4                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 16            | 15        | U/6032-15               | T491U156(1)016A(2)           | 2.4                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 16            | 15        | B/3528-21               | T491B156(1)016A(2)           | 2.4                                  | 6.0                            | 2.5                            | 184                              | 166                         | 74                           | 1                              |
| 16            | 15        | A/3216-18               | T491A156(1)016A(2)           | 2.4                                  | 8.0                            | 3.5                            | 146                              | 131                         | 58                           | 1                              |
| 16            | 22        | D/7343-31               | T491D226(1)016A(2)           | 3.5                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 16            | 22        | C/6032-28               | T491C226(1)016A(2)           | 3.5                                  | 6.0                            | 1.6                            | 262                              | 236                         | 105                          | 1                              |
| 16            | 22        | U/6032-15               | T491U226(1)016A(2)           | 3.5                                  | 10.0                           | 3.0                            | 173                              | 156                         | 69                           | 1                              |
| 16            | 22        | B/3528-21               | T491B226(1)016A(2)           | 3.5                                  | 6.0                            | 2.2                            | 197                              | 177                         | 79                           | 1                              |
| 16            | 33        | D/7343-31               | T491D336(1)016A(2)           | 5.3                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 16            | 33        | C/6032-28               | T491C336(1)016A(2)           | 5.3                                  | 6.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 16            | 33        | U/6032-15               | T491U336(1)016A(2)           | 5.3                                  | 12.0                           | 3.0                            | 173                              | 156                         | 69                           | 1                              |
| 16            | 33        | B/3528-21               | T491B336(1)016A(2)           | 5.3                                  | 8.0                            | 2.1                            | 201                              | 181                         | 80                           | 1                              |
| 16            | 47        | D/7343-31               | T491D476(1)016A(2)           | 7.5                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 16            | 47        | V/7343-20               | T491V476(1)016A(2)           | 7.5                                  | 6.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 16            | 47        | C/6032-28               | T491C476(1)016A(2)           | 7.5                                  | 6.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 16            | 68        | V/7343-20               | T491V686(1)016A(2)           | 10.9                                 | 6.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 16            | 68        | C/6032-28               | T491C686(1)016A(2)           | 10.9                                 | 6.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 16            | 68        | W/7343-15               | T491W686(1)016A(2)           | 10.9                                 | 6.0                            | 0.8                            | 474                              | 427                         | 190                          | 1                              |
| 16            | 68        | D/7343-31               | T491D686(1)016A(2)           | 10.9                                 | 6.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 16            | 68        | C/6032-28               | T491C686(1)016A(2)           | 10.9                                 | 12.0                           | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 16            | 100       | X/7343-43               | T491X107(1)016A(2)           | 16.0                                 | 8.0                            | 0.7                            | 486                              | 437                         | 194                          | 1                              |
| 16            | 100       | C/6032-28               | T491C107(1)016A(2)           | 16.0                                 | 10.0                           | 1.0                            | 332                              | 299                         | 133                          | 1                              |
| 16            | 100       | V/7343-20               | T491V107(1)016A(2)           | 16.0                                 | 12.0                           | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 16            | 100       | D/7343-31               | T491D107(1)016A(2)           | 16.0                                 | 8.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 16            | 150       | X/7343-43               | T491X157(1)016A(2)           | 24.0                                 | 8.0                            | 0.5                            | 574                              | 517                         | 230                          | 1                              |
| 16            | 150       | D/7343-31               | T491D157(1)016A(2)           | 24.0                                 | 12.0                           | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 16            | 220       | X/7343-43               | T491X227(1)016A(2)           | 35.2                                 | 10.0                           | 0.5                            | 574                              | 517                         | 230                          | 1                              |
| 16            | 220       | D/7343-31               | T491D227(1)016A(2)           | 35.2                                 | 15.0                           | 0.9                            | 408                              | 367                         | 163                          | 1                              |
| 16            | 220       | E/7260-38               | T491E227(1)016A(2)           | 35.2                                 | 7.2                            | 0.9                            | 471                              | 424                         | 188                          | 1                              |
| 20            | 0.47      | R/2012-12               | T491R474(1)020A(2)           | 0.5                                  | 4.0                            | 35.0                           | 27                               | 24                          | 11                           | 1                              |
| 20            | 0.68      | A/3216-18               | T491A684(1)020A(2)           | 0.5                                  | 4.0                            | 12.0                           | 79                               | 71                          | 32                           | 1                              |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin (Sn), M = Non-Magnetic (SnPb). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |
|---------------|-----------|-------------------------|------------------------------|--------------------------------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------|------------------------------|--------------------------------|
|               |           |                         |                              |                                      |                                |                                | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C |                                |
| VDC           | µF        | KEMET/EIA               | (See below for part options) | µAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| 20            | 1         | A/3216-18               | T491A105(1)020A(2)           | 0.5                                  | 4.0                            | 9.0                            | 91                               | 82                          | 36                           | 1                              |
| 20            | 1         | S/3216-12               | T491S105(1)020A(2)           | 0.5                                  | 6.0                            | 18.0                           | 58                               | 52                          | 23                           | 1                              |
| 20            | 1         | R/2012-12               | T491R105(1)020A(2)           | 0.5                                  | 6.0                            | 20.0                           | 35                               | 32                          | 14                           | 1                              |
| 20            | 1.5       | A/3216-18               | T491A155(1)020A(2)           | 0.5                                  | 6.0                            | 6.5                            | 107                              | 96                          | 43                           | 1                              |
| 20            | 1.5       | S/3216-12               | T491S155(1)020A(2)           | 0.5                                  | 6.0                            | 15.0                           | 63                               | 57                          | 25                           | 1                              |
| 20            | 2.2       | B/3528-21               | T491B225(1)020A(2)           | 0.5                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 20            | 2.2       | A/3216-18               | T491A225(1)020A(2)           | 0.5                                  | 0.6                            | 7.0                            | 104                              | 94                          | 42                           | 1                              |
| 20            | 2.2       | R/2012-12               | T491R225(1)020A(2)           | 0.5                                  | 8.0                            | 8.0                            | 56                               | 50                          | 22                           | 1                              |
| 20            | 3.3       | B/3528-21               | T491B335(1)020A(2)           | 0.7                                  | 6.0                            | 3.0                            | 168                              | 151                         | 67                           | 1                              |
| 20            | 3.3       | A/3216-18               | T491A335(1)020A(2)           | 0.7                                  | 6.0                            | 4.5                            | 129                              | 116                         | 52                           | 1                              |
| 20            | 3.3       | T/3528-12               | T491T335(1)020A(2)           | 0.7                                  | 6.0                            | 5.0                            | 118                              | 106                         | 47                           | 1                              |
| 20            | 4.7       | C/6032-28               | T491C475(1)020A(2)           | 0.9                                  | 6.0                            | 2.4                            | 214                              | 193                         | 86                           | 1                              |
| 20            | 4.7       | B/3528-21               | T491B475(1)020A(2)           | 0.9                                  | 6.0                            | 3.0                            | 168                              | 151                         | 67                           | 1                              |
| 20            | 4.7       | A/3216-18               | T491A475(1)020A(2)           | 0.9                                  | 6.0                            | 4.0                            | 137                              | 123                         | 55                           | 1                              |
| 20            | 6.8       | C/6032-28               | T491C685(1)020A(2)           | 1.4                                  | 6.0                            | 1.9                            | 241                              | 217                         | 96                           | 1                              |
| 20            | 6.8       | U/6032-15               | T491U685(1)020A(2)           | 1.4                                  | 6.0                            | 1.9                            | 218                              | 196                         | 87                           | 1                              |
| 20            | 6.8       | B/3528-21               | T491B685(1)020A(2)           | 1.4                                  | 6.0                            | 2.5                            | 184                              | 166                         | 74                           | 1                              |
| 20            | 6.8       | A/3216-18               | T491A685(M)020A(2)           | 1.4                                  | 8.0                            | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 20            | 10        | C/6032-28               | T491C106(1)020A(2)           | 2.0                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 20            | 10        | U/6032-15               | T491U106(1)020A(2)           | 2.0                                  | 6.0                            | 1.8                            | 224                              | 202                         | 90                           | 1                              |
| 20            | 10        | B/3528-21               | T491B106(1)020A(2)           | 2.0                                  | 6.0                            | 2.1                            | 201                              | 181                         | 80                           | 1                              |
| 20            | 10        | A/3216-18               | T491A106(M)020A(2)           | 2.0                                  | 10.0                           | 5.0                            | 122                              | 110                         | 49                           | 1                              |
| 20            | 15        | D/7343-31               | T491D156(1)020A(2)           | 3.0                                  | 6.0                            | 1.0                            | 387                              | 348                         | 155                          | 1                              |
| 20            | 15        | B/3528-21               | T491B156(1)020AT             | 3.0                                  | 6.0                            | 2.5                            | 184                              | 166                         | 74                           | 1                              |
| 20            | 15        | C/6032-28               | T491C156(1)020A(2)           | 3.0                                  | 6.0                            | 1.7                            | 254                              | 229                         | 102                          | 1                              |
| 20            | 22        | D/7343-31               | T491D226(1)020A(2)           | 4.4                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 20            | 22        | V/7343-20               | T491V226(1)020A(2)           | 4.4                                  | 6.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 20            | 22        | C/6032-28               | T491C226(1)020A(2)           | 4.4                                  | 6.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 20            | 22        | B/3528-21               | T491B226(1)020A(2)           | 4.4                                  | 8.0                            | 4.0                            | 146                              | 131                         | 58                           | 1                              |
| 20            | 33        | D/7343-31               | T491D336(1)020A(2)           | 6.6                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 20            | 33        | C/6032-28               | T491C336(M)020A(2)           | 6.6                                  | 6.0                            | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 20            | 33        | V/7343-20               | T491V336(1)020A(2)           | 6.6                                  | 8.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 20            | 33        | B/3528-21               | T491B336(M)020A(2)           | 6.6                                  | 10.0                           | 4.0                            | 146                              | 131                         | 58                           | 1                              |
| 20            | 47        | C/6032-28               | T491C476(M)020A(2)           | 9.4                                  | 10.0                           | 0.9                            | 350                              | 315                         | 140                          | 1                              |
| 20            | 47        | X/7343-43               | T491X476(1)020AT             | 9.4                                  | 6.0                            | 0.8                            | 454                              | 409                         | 182                          | 1                              |
| 20            | 47        | D/7343-31               | T491D476(1)020A(2)           | 9.4                                  | 6.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 20            | 68        | X/7343-43               | T491X686(1)020A(2)           | 13.6                                 | 6.0                            | 0.7                            | 486                              | 437                         | 194                          | 1                              |
| 20            | 68        | D/7343-31               | T491D686(1)020A(2)           | 13.6                                 | 8.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 20            | 100       | X/7343-43               | T491X107(1)020A(2)           | 20.0                                 | 8.0                            | 0.5                            | 574                              | 517                         | 230                          | 1                              |
| 20            | 100       | D/7343-31               | T491D107(1)020AT             | 20.0                                 | 8.0                            | 0.9                            | 408                              | 367                         | 163                          | 1                              |
| 20            | 100       | E/7260-38               | T491E107(1)020A(2)           | 20.0                                 | 8.0                            | 0.5                            | 632                              | 569                         | 253                          | 1                              |
| 20            | 150       | X/7343-43               | T491X157(1)020A(2)           | 30.0                                 | 10.0                           | 0.5                            | 574                              | 517                         | 230                          | 1                              |
| 25            | 0.33      | A/3216-18               | T491A334(1)025A(2)           | 0.5                                  | 4.0                            | 15.0                           | 71                               | 64                          | 28                           | 1                              |
| 25            | 0.47      | A/3216-18               | T491A474(1)025A(2)           | 0.5                                  | 4.0                            | 14.0                           | 73                               | 66                          | 29                           | 1                              |
| 25            | 0.68      | A/3216-18               | T491A684(1)025A(2)           | 0.5                                  | 4.0                            | 10.0                           | 87                               | 78                          | 35                           | 1                              |
| 25            | 1         | B/3528-21               | T491B105(1)025A(2)           | 0.5                                  | 4.0                            | 5.0                            | 130                              | 117                         | 52                           | 1                              |
| 25            | 1         | A/3216-18               | T491A105(1)025A(2)           | 0.5                                  | 4.0                            | 8.0                            | 97                               | 87                          | 39                           | 1                              |
| 25            | 1         | S/3216-12               | T491S105(1)025A(2)           | 0.5                                  | 6.0                            | 18.0                           | 58                               | 52                          | 23                           | 1                              |
| 25            | 1.5       | B/3528-21               | T491B155(1)025A(2)           | 0.5                                  | 6.0                            | 5.0                            | 130                              | 117                         | 52                           | 1                              |
| VDC           | µF        | KEMET/EIA               | (See below for part options) | µAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin (Sn), M = Non-Magnetic (SnPb). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |
|---------------|-----------|-------------------------|------------------------------|--------------------------------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------|------------------------------|--------------------------------|
|               |           |                         |                              |                                      |                                |                                | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C |                                |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| 25            | 1.5       | A/3216-18               | T491A155(1)025A(2)           | 0.5                                  | 6.0                            | 7.5                            | 100                              | 90                          | 40                           | 1                              |
| 25            | 1.5       | R/2012-12               | T491R155(1)025A(2)           | 0.5                                  | 8.0                            | 8.0                            | 56                               | 50                          | 22                           | 1                              |
| 25            | 2.2       | C/6032-28               | T491C225(1)025A(2)           | 0.6                                  | 6.0                            | 3.5                            | 177                              | 159                         | 71                           | 1                              |
| 25            | 2.2       | A/3216-18               | T491A225(1)025A(2)           | 0.6                                  | 6.0                            | 7.0                            | 104                              | 94                          | 42                           | 1                              |
| 25            | 2.2       | B/3528-21               | T491B225(1)025A(2)           | 0.6                                  | 6.0                            | 4.5                            | 137                              | 123                         | 55                           | 1                              |
| 25            | 3.3       | C/6032-28               | T491C335(1)025A(2)           | 0.8                                  | 6.0                            | 2.5                            | 210                              | 189                         | 84                           | 1                              |
| 25            | 3.3       | A/3216-18               | T491A335(1)025A(2)           | 0.8                                  | 6.0                            | 7.0                            | 104                              | 94                          | 42                           | 1                              |
| 25            | 3.3       | B/3528-21               | T491B335(1)025A(2)           | 0.8                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 25            | 4.7       | C/6032-28               | T491C475(1)025A(2)           | 1.2                                  | 6.0                            | 2.4                            | 214                              | 193                         | 86                           | 1                              |
| 25            | 4.7       | B/3528-21               | T491B475(1)025A(2)           | 1.2                                  | 6.0                            | 1.5                            | 238                              | 214                         | 95                           | 1                              |
| 25            | 4.7       | A/3216-18               | T491A475(M)025A(2)           | 1.2                                  | 8.0                            | 6.0                            | 112                              | 101                         | 45                           | 1                              |
| 25            | 6.8       | C/6032-28               | T491C685(1)025A(2)           | 1.7                                  | 6.0                            | 1.9                            | 241                              | 217                         | 96                           | 1                              |
| 25            | 6.8       | D/7343-31               | T491D685(1)025A(2)           | 1.7                                  | 6.0                            | 1.8                            | 289                              | 260                         | 116                          | 1                              |
| 25            | 6.8       | B/3528-21               | T491B685(1)025A(2)           | 1.7                                  | 8.0                            | 2.8                            | 174                              | 157                         | 70                           | 1                              |
| 25            | 10        | D/7343-31               | T491D106(1)025A(2)           | 2.5                                  | 6.0                            | 1.0                            | 387                              | 348                         | 155                          | 1                              |
| 25            | 10        | C/6032-28               | T491C106(1)025A(2)           | 2.5                                  | 6.0                            | 1.5                            | 271                              | 244                         | 108                          | 1                              |
| 25            | 10        | B/3528-21               | T491B106(1)025A(2)           | 2.5                                  | 8.0                            | 3.0                            | 168                              | 151                         | 67                           | 1                              |
| 25            | 15        | D/7343-31               | T491D156(1)025A(2)           | 3.8                                  | 6.0                            | 1.0                            | 387                              | 348                         | 155                          | 1                              |
| 25            | 15        | V/7343-20               | T491V156(1)025AT             | 3.8                                  | 6.0                            | 1.0                            | 354                              | 319                         | 142                          | 1                              |
| 25            | 15        | C/6032-28               | T491C156(1)025A(2)           | 3.8                                  | 6.0                            | 1.5                            | 271                              | 244                         | 108                          | 1                              |
| 25            | 15        | B/3528-21               | T491B156(1)025A(2)           | 3.8                                  | 8.0                            | 4.0                            | 146                              | 131                         | 58                           | 1                              |
| 25            | 22        | D/7343-31               | T491D226(1)025A(2)           | 5.5                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 25            | 22        | C/6032-28               | T491C226(1)025A(2)           | 5.5                                  | 6.0                            | 1.4                            | 280                              | 252                         | 112                          | 1                              |
| 25            | 22        | V/7343-20               | T491V226(1)025A(2)           | 5.5                                  | 6.0                            | 0.7                            | 423                              | 381                         | 169                          | 1                              |
| 25            | 33        | X/7343-43               | T491X336(1)025A(2)           | 8.3                                  | 6.0                            | 0.7                            | 486                              | 437                         | 194                          | 1                              |
| 25            | 33        | D/7343-31               | T491D336(1)025A(2)           | 8.3                                  | 6.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 25            | 33        | C/6032-28               | T491C336(1)025A(2)           | 8.3                                  | 10.0                           | 1.2                            | 303                              | 273                         | 121                          | 1                              |
| 25            | 47        | X/7343-43               | T491X476(1)025A(2)           | 11.8                                 | 6.0                            | 0.7                            | 486                              | 437                         | 194                          | 1                              |
| 25            | 47        | D/7343-31               | T491D476(1)025A(2)           | 11.8                                 | 10.0                           | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 25            | 68        | X/7343-43               | T491X686(M)025A(2)           | 17.0                                 | 8.0                            | 0.7                            | 486                              | 437                         | 194                          | 1                              |
| 25            | 68        | D/7343-31               | T491D686(M)025A(2)           | 17.0                                 | 10.0                           | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 25            | 100       | X/7343-43               | T491X107(1)025A(2)           | 25.0                                 | 8.0                            | 0.3                            | 742                              | 668                         | 297                          | 1                              |
| 35            | 0.1       | A/3216-18               | T491A104(1)035A(2)           | 0.5                                  | 4.0                            | 20.0                           | 61                               | 55                          | 24                           | 1                              |
| 35            | 0.15      | A/3216-18               | T491A154(1)035A(2)           | 0.5                                  | 4.0                            | 19.0                           | 63                               | 57                          | 25                           | 1                              |
| 35            | 0.22      | A/3216-18               | T491A224(1)035A(2)           | 0.5                                  | 4.0                            | 18.0                           | 65                               | 59                          | 26                           | 1                              |
| 35            | 0.33      | A/3216-18               | T491A334(1)035A(2)           | 0.5                                  | 4.0                            | 15.0                           | 71                               | 64                          | 28                           | 1                              |
| 35            | 0.47      | B/3528-21               | T491B474(1)035A(2)           | 0.5                                  | 4.0                            | 8.0                            | 103                              | 93                          | 41                           | 1                              |
| 35            | 0.47      | A/3216-18               | T491A474(1)035A(2)           | 0.5                                  | 4.0                            | 12.0                           | 79                               | 71                          | 32                           | 1                              |
| 35            | 0.68      | B/3528-21               | T491B684(1)035A(2)           | 0.5                                  | 4.0                            | 6.5                            | 114                              | 103                         | 46                           | 1                              |
| 35            | 0.68      | A/3216-18               | T491A684(1)035A(2)           | 0.5                                  | 4.0                            | 8.0                            | 97                               | 87                          | 39                           | 1                              |
| 35            | 1         | B/3528-21               | T491B105(1)035A(2)           | 0.5                                  | 4.0                            | 5.0                            | 130                              | 117                         | 52                           | 1                              |
| 35            | 1         | A/3216-18               | T491A105(1)035A(2)           | 0.5                                  | 4.0                            | 7.5                            | 100                              | 90                          | 40                           | 1                              |
| 35            | 1.5       | A/3216-18               | T491A155(1)035A(2)           | 0.5                                  | 6.0                            | 7.0                            | 104                              | 94                          | 42                           | 1                              |
| 35            | 1.5       | C/6032-28               | T491C155(1)035A(2)           | 0.5                                  | 6.0                            | 4.5                            | 156                              | 140                         | 62                           | 1                              |
| 35            | 1.5       | B/3528-21               | T491B155(1)035A(2)           | 0.5                                  | 6.0                            | 5.0                            | 130                              | 117                         | 52                           | 1                              |
| 35            | 2.2       | C/6032-28               | T491C225(1)035A(2)           | 0.8                                  | 6.0                            | 3.5                            | 177                              | 159                         | 71                           | 1                              |
| 35            | 2.2       | A/3216-18               | T491A225(1)035AT             | 0.8                                  | 6.0                            | 4.5                            | 129                              | 116                         | 52                           | 1                              |
| 35            | 2.2       | B/3528-21               | T491B225(1)035A(2)           | 0.8                                  | 6.0                            | 4.0                            | 146                              | 131                         | 58                           | 1                              |
| 35            | 3.3       | C/6032-28               | T491C335(1)035A(2)           | 1.2                                  | 6.0                            | 2.5                            | 210                              | 189                         | 84                           | 1                              |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin (Sn), M = Non-Magnetic (SnPb). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings &amp; Part Number Reference cont'd

| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |
|---------------|-----------|-------------------------|------------------------------|--------------------------------------|--------------------------------|--------------------------------|----------------------------------|-----------------------------|------------------------------|--------------------------------|
|               |           |                         |                              |                                      |                                |                                | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C |                                |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| 35            | 3.3       | B/3528-21               | T491B335(1)035A(2)           | 1.2                                  | 6.0                            | 3.5                            | 156                              | 140                         | 62                           | 1                              |
| 35            | 4.7       | D/7343-31               | T491D475(1)035A(2)           | 1.6                                  | 6.0                            | 1.5                            | 316                              | 284                         | 126                          | 1                              |
| 35            | 4.7       | B/3528-21               | T491B475(1)035AT             | 1.6                                  | 6.0                            | 3.1                            | 166                              | 149                         | 66                           | 1                              |
| 35            | 4.7       | C/6032-28               | T491C475(1)035A(2)           | 1.6                                  | 6.0                            | 2.2                            | 224                              | 202                         | 90                           | 1                              |
| 35            | 6.8       | D/7343-31               | T491D685(1)035A(2)           | 2.4                                  | 6.0                            | 1.3                            | 340                              | 306                         | 136                          | 1                              |
| 35            | 6.8       | V/7343-20               | T491V685(1)035AT             | 2.4                                  | 6.0                            | 1.2                            | 323                              | 291                         | 129                          | 1                              |
| 35            | 6.8       | C/6032-28               | T491C685(1)035A(2)           | 2.4                                  | 6.0                            | 1.8                            | 247                              | 222                         | 99                           | 1                              |
| 35            | 10        | D/7343-31               | T491D106(1)035A(2)           | 3.5                                  | 6.0                            | 1.0                            | 387                              | 348                         | 155                          | 1                              |
| 35            | 10        | C/6032-28               | T491C106(M)035A(2)           | 3.5                                  | 6.0                            | 1.6                            | 262                              | 236                         | 105                          | 1                              |
| 35            | 10        | V/7343-20               | T491V106(1)035A(2)           | 3.5                                  | 6.0                            | 2.0                            | 250                              | 225                         | 100                          | 1                              |
| 35            | 15        | X/7343-43               | T491X156(1)035A(2)           | 5.3                                  | 6.0                            | 0.9                            | 428                              | 385                         | 171                          | 1                              |
| 35            | 15        | C/6032-28               | T491C156(1)035AT             | 5.3                                  | 6.0                            | 1.4                            | 280                              | 252                         | 112                          | 1                              |
| 35            | 15        | D/7343-31               | T491D156(1)035A(2)           | 5.3                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 35            | 22        | X/7343-43               | T491X226(1)035A(2)           | 7.7                                  | 6.0                            | 0.7                            | 486                              | 437                         | 194                          | 1                              |
| 35            | 22        | D/7343-31               | T491D226(1)035A(2)           | 7.7                                  | 6.0                            | 0.7                            | 463                              | 417                         | 185                          | 1                              |
| 35            | 33        | X/7343-43               | T491X336(1)035A(2)           | 11.6                                 | 6.0                            | 0.6                            | 524                              | 472                         | 210                          | 1                              |
| 35            | 47        | X/7343-43               | T491X476(1)035A(2)           | 16.5                                 | 8.0                            | 0.6                            | 524                              | 472                         | 210                          | 1                              |
| 35            | 47        | E/7260-38               | T491E476(1)035A(2)           | 16.5                                 | 10.0                           | 0.5                            | 632                              | 569                         | 253                          | 1                              |
| 50            | 0.1       | A/3216-18               | T491A104(1)050A(2)           | 0.5                                  | 4.0                            | 20.0                           | 61                               | 55                          | 24                           | 1                              |
| 50            | 0.15      | B/3528-21               | T491B154(1)050A(2)           | 0.5                                  | 4.0                            | 16.0                           | 73                               | 66                          | 29                           | 1                              |
| 50            | 0.15      | A/3216-18               | T491A154(1)050A(2)           | 0.5                                  | 4.0                            | 15.0                           | 71                               | 64                          | 28                           | 1                              |
| 50            | 0.22      | B/3528-21               | T491B224(1)050A(2)           | 0.5                                  | 4.0                            | 14.0                           | 78                               | 70                          | 31                           | 1                              |
| 50            | 0.22      | A/3216-18               | T491A224(1)050AT             | 0.5                                  | 4.0                            | 18.0                           | 65                               | 59                          | 26                           | 1                              |
| 50            | 0.33      | B/3528-21               | T491B334(1)050A(2)           | 0.5                                  | 4.0                            | 10.0                           | 92                               | 83                          | 37                           | 1                              |
| 50            | 0.47      | C/6032-28               | T491C474(1)050A(2)           | 0.5                                  | 4.0                            | 8.0                            | 117                              | 105                         | 47                           | 1                              |
| 50            | 0.47      | B/3528-21               | T491B474(1)050A(2)           | 0.5                                  | 4.0                            | 9.0                            | 97                               | 87                          | 39                           | 1                              |
| 50            | 0.68      | C/6032-28               | T491C684(1)050A(2)           | 0.5                                  | 4.0                            | 7.0                            | 125                              | 113                         | 50                           | 1                              |
| 50            | 0.68      | B/3528-21               | T491B684(1)050A(2)           | 0.5                                  | 4.0                            | 8.0                            | 103                              | 93                          | 41                           | 1                              |
| 50            | 1         | A/3216-18               | T491A105(1)050A(2)           | 0.5                                  | 4.0                            | 7.0                            | 104                              | 94                          | 42                           | 1                              |
| 50            | 1         | C/6032-28               | T491C105(1)050A(2)           | 0.5                                  | 4.0                            | 5.5                            | 141                              | 127                         | 56                           | 1                              |
| 50            | 1         | B/3528-21               | T491B105(1)050A(2)           | 0.5                                  | 6.0                            | 6.0                            | 119                              | 107                         | 48                           | 1                              |
| 50            | 1         | V/7343-20               | T491V105(1)050A(2)           | 0.5                                  | 4.0                            | 6.0                            | 144                              | 130                         | 58                           | 1                              |
| 50            | 1.5       | D/7343-31               | T491D155(1)050A(2)           | 0.8                                  | 6.0                            | 3.5                            | 207                              | 186                         | 83                           | 1                              |
| 50            | 1.5       | C/6032-28               | T491C155(1)050A(2)           | 0.8                                  | 6.0                            | 4.5                            | 156                              | 140                         | 62                           | 1                              |
| 50            | 2.2       | D/7343-31               | T491D225(1)050A(2)           | 1.1                                  | 6.0                            | 2.5                            | 245                              | 221                         | 98                           | 1                              |
| 50            | 2.2       | C/6032-28               | T491C225(1)050A(2)           | 1.1                                  | 6.0                            | 3.0                            | 191                              | 172                         | 76                           | 1                              |
| 50            | 3.3       | C/6032-28               | T491C335(1)050AT             | 1.7                                  | 6.0                            | 2.5                            | 210                              | 189                         | 84                           | 1                              |
| 50            | 3.3       | D/7343-31               | T491D335(1)050A(2)           | 1.7                                  | 6.0                            | 2.0                            | 274                              | 247                         | 110                          | 1                              |
| 50            | 4.7       | D/7343-31               | T491D475(1)050A(2)           | 2.4                                  | 6.0                            | 1.4                            | 327                              | 294                         | 131                          | 1                              |
| 50            | 6.8       | X/7343-43               | T491X685(1)050A(2)           | 3.4                                  | 6.0                            | 1.0                            | 406                              | 365                         | 162                          | 1                              |
| 50            | 6.8       | D/7343-31               | T491D685(1)050A(2)           | 3.4                                  | 6.0                            | 1.0                            | 387                              | 348                         | 155                          | 1                              |
| 50            | 10        | X/7343-43               | T491X106(M)050A(2)           | 5.0                                  | 6.0                            | 0.7                            | 486                              | 437                         | 194                          | 1                              |
| 50            | 10        | D/7343-31               | T491D106(1)050A(2)           | 5.0                                  | 6.0                            | 0.8                            | 433                              | 390                         | 173                          | 1                              |
| 50            | 15        | X/7343-43               | T491X156(1)050A(2)           | 7.5                                  | 8.0                            | 0.7                            | 486                              | 437                         | 194                          | 1                              |
| 50            | 22        | X/7343-43               | T491X226(1)050A(2)           | 11.0                                 | 10.0                           | 0.6                            | 524                              | 472                         | 210                          | 1                              |
| VDC           | μF        | KEMET/EIA               | (See below for part options) | μAmps +20°C<br>Maximum/<br>5 Minutes | % @ +20°C<br>120 Hz<br>Maximum | Ω @ 20°C<br>100 kHz<br>Maximum | (mArms)<br>100 kHz<br>25°C       | (mArms)<br>100 kHz<br>+85°C | (mArms)<br>100 kHz<br>+125°C | Reflow Temperature<br>≤ 260 °C |
| Rated Voltage | Rated Cap | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                           | DF                             | ESR                            | Maximum Allowable Ripple Current |                             |                              | Moisture Sensitivity           |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.

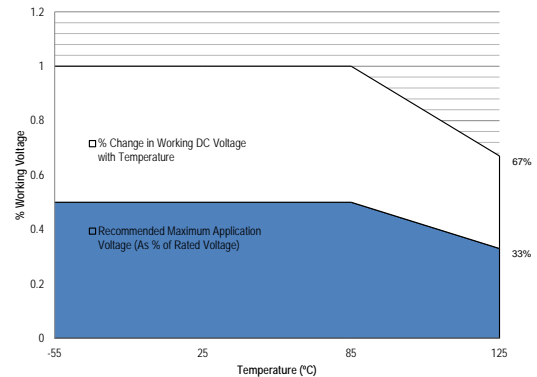
(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum), N = Non-Magnetic 100% Tin (Sn), M = Non-Magnetic (SnPb). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

## Recommended Voltage Derating Guidelines

| -55°C to 125°C                                  |                        |                |
|---|------------------------|----------------|
| % Change in Working DC Voltage with Temperature | 50% of V <sub>R</sub>  | V <sub>R</sub> |
| Recommended Maximum Application Voltage         | 100% of V <sub>R</sub> | V <sub>R</sub> |



## Ripple Current/Ripple Voltage

| KEMET Series and Case Code | EIA Case Code | Maximum Power Dissipation (P max) mWatts @ 25°C w/+20°C Rise |
|----------------------------|---------------|--|
| A                          | 3216-18       | 75   |
| B                          | 3528-21       | 85   |
| C                          | 6032-28       | 110  |
| D                          | 7343-31       | 150  |
| X                          | 7343-43       | 165  |
| E                          | 7260-38       | 200  |
| T428P                      | 7260-38       | 325  |
| R                          | 2012-12       | 25   |
| S                          | 3216-12       | 60   |
| T                          | 3528-12       | 70   |
| U                          | 6032-15       | 90   |
| V                          | 7343-20       | 125  |
| T510X                      | 7343-43       | 270  |
| T510E                      | 7260-38       | 285  |

| Temperature Compensation Multipliers for Maximum Power Dissipation |      |       |
|--|------|-------|
| ≤ 25°C   | 85°C | 125°C |
| 1.00   | 0.90 | 0.40  |

*T* = Environmental Temperature

Using the P max of the device, the maximum allowable rms ripple current or voltage may be determined.

$$I(max) = \sqrt{P_{max}/R}$$

$$E(max) = \sqrt{P_{max} \cdot R}$$

*I* = rms ripple current (amperes)

*E* = rms ripple voltage (volts)

*P max* = maximum power dissipation (watts)

*R* = ESR at specified frequency (ohms)

## Reverse Voltage

Solid tantalum capacitors are polar devices and may be permanently damaged or destroyed if connected with the wrong polarity. The positive terminal is identified on the capacitor body by a stripe plus in some cases a beveled edge. A small degree of transient reverse voltage is permissible for short periods per the table. The capacitors should not be operated continuously in reverse mode, even within these limits.

| Temperature | Permissible Transient Reverse Voltage |
|-------------|---------------------------------------|
| 25°C        | 15% of Rated Voltage                  |
| 85°C        | 5% of Rated Voltage                   |
| 125°C       | 1% of Rated Voltage                   |

Table 2 – Land Dimensions/Courtyard

| KEMET          | Metric Size Code | Density Level A:<br>Maximum (Most) Land Protrusion (mm) |      |      |       |      | Density Level B:<br>Median (Nominal) Land Protrusion (mm) |      |      |      |      | Density Level C:<br>Minimum (Least) Land Protrusion (mm) |      |      |      |      |
|----------------|------------------|---|------|------|-------|------|---|------|------|------|------|--|------|------|------|------|
|                |                  | X   | Y    | C    | V1    | V2   | X   | Y    | C    | V1   | V2   | X  | Y    | C    | V1   | V2   |
| Case           | EIA              |   |      |      |       |      |   |      |      |      |      |  |      |      |      |      |
| A              | 3216-18          | 1.35  | 2.15 | 1.45 | 6.10  | 2.80 | 1.25  | 1.75 | 1.35 | 5.00 | 2.30 | 1.15   | 1.35 | 1.25 | 4.10 | 2.00 |
| B              | 3528-21          | 2.35  | 2.15 | 1.45 | 6.10  | 4.00 | 2.25  | 1.75 | 1.35 | 5.00 | 3.50 | 2.15   | 1.35 | 1.25 | 4.10 | 3.20 |
| C              | 6032-28          | 2.35  | 2.65 | 2.60 | 8.90  | 4.40 | 2.25  | 2.25 | 2.50 | 7.80 | 3.90 | 2.15   | 1.85 | 2.40 | 6.90 | 3.60 |
| D              | 7343-31          | 2.55  | 3.75 | 2.70 | 10.20 | 5.50 | 2.45  | 3.35 | 2.60 | 9.10 | 5.00 | 2.35   | 2.95 | 2.50 | 8.20 | 4.70 |
| E <sup>1</sup> | 7260-38          | 4.25  | 2.65 | 3.20 | 10.10 | 7.20 | 4.15  | 2.25 | 3.30 | 9.40 | 6.70 | 4.05   | 1.85 | 3.00 | 8.10 | 6.40 |
| R              | 2012-12          | 1.05  | 1.80 | 1.00 | 4.80  | 2.40 | 0.95  | 1.45 | 0.90 | 3.80 | 1.90 | 0.85   | 1.05 | 0.80 | 2.90 | 1.60 |
| S <sup>2</sup> | 3216-12          | 1.35  | 2.15 | 1.45 | 6.10  | 2.80 | 1.25  | 1.75 | 1.35 | 5.00 | 2.30 | 1.15   | 1.35 | 1.25 | 4.10 | 2.00 |
| T              | 3528-12          | 2.35  | 2.15 | 1.45 | 6.10  | 4.00 | 2.25  | 1.75 | 1.35 | 5.00 | 3.50 | 2.15   | 1.35 | 1.25 | 4.10 | 3.20 |
| U              | 6032-15          | 2.35  | 2.65 | 2.60 | 8.90  | 4.40 | 2.25  | 2.25 | 2.50 | 7.80 | 3.90 | 2.15   | 1.85 | 2.40 | 6.90 | 3.60 |
| V              | 7343-20          | 2.55  | 3.75 | 2.70 | 10.20 | 5.50 | 2.45  | 3.35 | 2.60 | 9.10 | 5.00 | 2.35   | 2.95 | 2.50 | 8.20 | 4.70 |
| X <sup>1</sup> | 7343-43          | 2.55  | 3.75 | 2.70 | 10.20 | 5.50 | 2.45  | 3.35 | 2.60 | 9.10 | 5.00 | 2.35   | 2.95 | 2.50 | 8.20 | 4.70 |

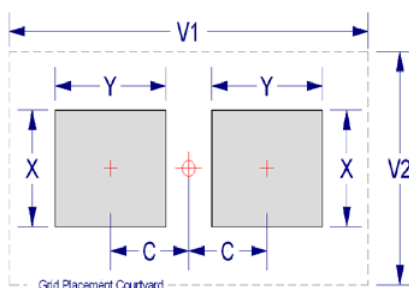
*Density Level A: For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*

*Density Level B: For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*

*Density Level C: For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC Standard 7351 (IPC-7351).*

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## Soldering Process

KEMET’s families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET’s recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J–STD–020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Note that although the X/7343–43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. “Wiping” the edges of a chip and heating the top surface is not recommended.

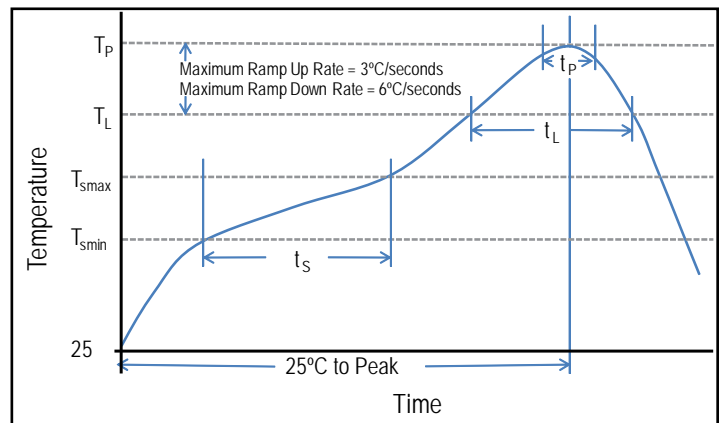
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

| Profile Feature                                       | SnPb Assembly       | Pb-Free Assembly    |
|---|---------------------|---------------------|
| <b>Preheat/Soak</b>                                   |                     |                     |
| Temperature Minimum ( $T_{smin}$ )                    | 100°C               | 150°C               |
| Temperature Maximum ( $T_{smax}$ )                    | 150°C               | 200°C               |
| Time ( $t_s$ ) from $T_{smin}$ to $T_{smax}$          | 60 – 120 seconds    | 60 – 120 seconds    |
| Ramp-up Rate ( $T_L$ to $T_P$ )                       | 3°C/seconds maximum | 3°C/seconds maximum |
| Liquidous Temperature ( $T_L$ )                       | 183°C               | 217°C               |
| Time Above Liquidous ( $t_L$ )                        | 60 – 150 seconds    | 60 – 150 seconds    |
| Peak Temperature ( $T_P$ )                            | 220°C*<br>235°C**   | 250°C*<br>260°C**   |
| Time within 5°C of Maximum Peak Temperature ( $t_p$ ) | 20 seconds maximum  | 30 seconds maximum  |
| Ramp-down Rate ( $T_P$ to $T_L$ )                     | 6°C/seconds maximum | 6°C/seconds maximum |
| Time 25°C to Peak Temperature                         | 6 minutes maximum   | 8 minutes maximum   |

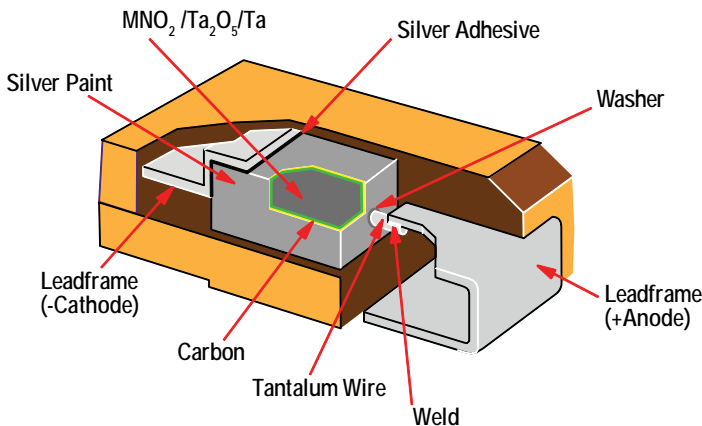
Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.

\*Case Size D, E, P, Y, and X

\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z

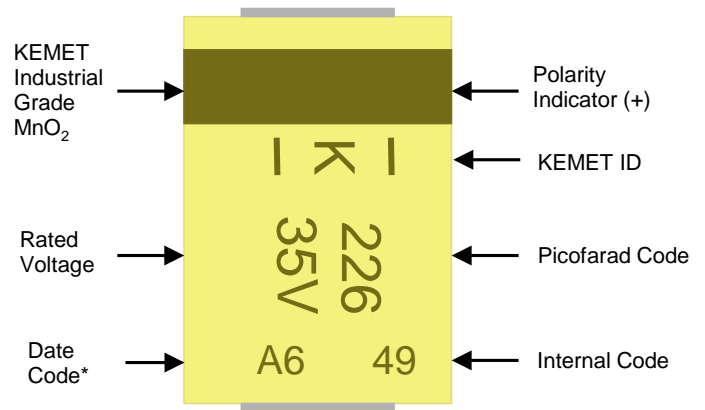
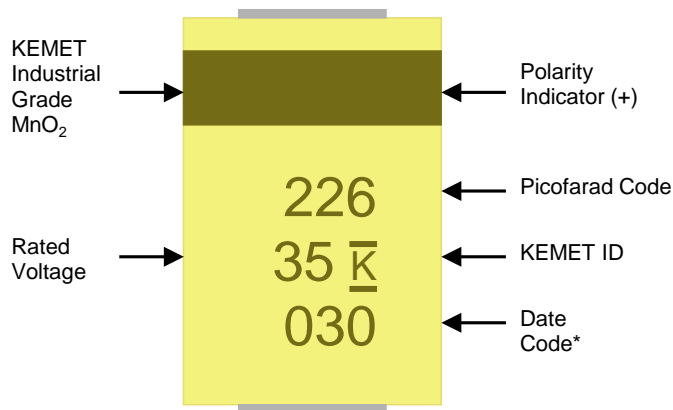


## Construction



## Capacitor Marking

### C, D, X Case Sizes



\* 030 = 30<sup>th</sup> week of 2010

| Date Code *  |  |
|--|--|
| 1 <sup>st</sup> digit = Last number of Year                  | 9 = 2009<br>0 = 2010<br>1 = 2011<br>2 = 2012<br>3 = 2013<br>4 = 2014               |
| 3 <sup>rd</sup> and 4 <sup>th</sup> digit = Week of the Year | 01 = 1 <sup>st</sup> week of the Year to<br>52 = 52 <sup>nd</sup> week of the Year |

| Date Code* |         |         |
|------------|---------|---------|
| Year       | Month   |         |
| X = 2009   | 1 = Jan | 7 = Jul |
| A = 2010   | 2 = Feb | 8 = Aug |
| B = 2011   | 3 = Mar | 9 = Spt |
| C = 2012   | 4 = Apr | O = Oct |
| D = 2013   | 5 = May | N = Nov |
| E = 2014   | 6 = Jun | D = Dec |

## Storage

Tantalum chip capacitors should be stored in normal working environments. While the chips themselves are quite robust in other environments, solderability will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. In addition, packaging materials will be degraded by high temperature— reels may soften or warp and tape peel force may increase. KEMET recommends that maximum storage temperature not exceed 40°C and maximum storage humidity not exceed 60% relative humidity. Temperature fluctuations should be minimized to avoid condensation on the parts and atmospheres should be free of chlorine and sulphur bearing compounds. For optimized solderability chip stock should be used promptly, preferably within three years of receipt.



## Overview

The KEMET T489 Series provides DC leakage current that is 25% lower than the commercial T491 Series. The T489 series also offers improved reliability, low ESR options and meets or exceeds the requirements of EIA standard 535BAAC. The T489 standard terminations are available in 100% matte tin and provide excellent wetting characteristics and compatibility with today's surface mount solder systems. Tin/lead (Sn/Pb)

terminations are available upon request for any part number. Gold-plated terminations are also available for use with conductive epoxy attachment processes. Standard packaging of these devices is tape and reel in accordance with EIA 481-D. This system provides perfect compatibility with all tape-fed placement units.

## Benefits

- DC Leakage at 0.0075 CV
- Improved reliability: 0.50%/1,000 hours, 85°C, rated voltage
- Low ESR options available
- Meets or exceeds EIA standard 535BAAC
- Taped and reeled per EIA 481-D
- Symmetrical, compliant terminations
- Laser-marked case
- Halogen-free epoxy
- Capacitance values of 0.1  $\mu$ F to 470  $\mu$ F
- Tolerances of  $\pm 10\%$  and  $\pm 20\%$
- Voltage rating of 6.3 – 50 VDC
- RoHS Compliant and lead-free terminations
- Operating temperature range of -55°C to +125°C

## Applications

Typical applications include decoupling and filtering in industrial and automotive high end applications.



## Environmental Compliance

RoHS Compliant (6/6) according to Directive 2002/95/EC when ordered with 100% Sn solder.



RoHS Compliant

## SPICE

For a detailed analysis of specific part numbers, please visit [www.kemet.com](http://www.kemet.com) for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

## Ordering Information

| T               | 489                   | B   | 156  | M                     | 16  | A                   | T  | E800   |
|-----------------|-----------------------|---|--|-----------------------|---|---------------------|--|--|
| Capacitor Class | Series                | Case Size   | Capacitance Code (pF)  | Capacitance Tolerance | Voltage   | Failure Rate/Design | Lead Material  | ESR  |
| T = Tantalum    | Low DC Leakage Series | A = 3216-18<br>B = 3528-21<br>C = 6032-28<br>D = 7343-31<br>X = 7343-43 | First two digits represent significant figures. Third digit specifies number of zeros. | K = ±10%<br>M = ±20%  | 006 = 6.3 V<br>010 = 10 V<br>016 = 16 V<br>020 = 20 V<br>025 = 25 V<br>035 = 35 V<br>050 = 50 V | A = N/A             | T = 100% Matte Tin (Sn) Plated<br>H = Standard Solder Coated (SnPb 5% Pb minimum)<br>G = Gold Plated | Last three digits specify ESR in mΩ.<br>(800 = 800 mΩ) |

## Performance Characteristics

| Item                    | Performance Characteristics  |
|-------------------------|--|
| Operating Temperature   | -55°C to 125°C   |
| Rated Capacitance Range | 0.10 µF to 470 µF @ 120 Hz/25°C  |
| Capacitance Tolerance   | K Tolerance (±10%), M Tolerance (±20%)                                   |
| Rated Voltage Range     | 6.3 – 50 V   |
| DF(120 Hz)              | Refer to Part Number Electrical Specification                            |
| ESR (100 kHz)           | Refer to Part Number Electrical Specification                            |
| Leakage Current         | ≤ 0.0075 CV (µA) at rated voltage after 5 minutes                        |
| Reliability             | 0.50% / 1,000 hours at 85°C, V <sub>r</sub> with 0.1 Ω series resistance |

## Qualification

| Test                       | Condition   | Characteristics |                              |       |          |          |
|----------------------------|---|-----------------|------------------------------|-------|----------|----------|
| Endurance                  | 85°C @ rated voltage, 2,000 hours<br>125°C @ 2/3 rated voltage, 2,000 hours   | Δ C/C           | Within ±10% of initial value |       |          |          |
|                            |   | DF              | Within initial limits        |       |          |          |
|                            |   | DCL             | Within 1.25 x initial limit  |       |          |          |
|                            |   | ESR             | Within initial limits        |       |          |          |
| Storage Life               | 125°C @ 0 volts, 2,000 hours  | Δ C/C           | Within ±10% of initial value |       |          |          |
|                            |   | DF              | Within initial limits        |       |          |          |
|                            |   | DCL             | Within 1.25 x initial limit  |       |          |          |
|                            |   | ESR             | Within initial limits        |       |          |          |
| Thermal Shock              | MIL–STD–202, Method 107, Condition B, mounted, -55°C to 125° C, 1,000 cycles  | Δ C/C           | Within ±5% of initial value  |       |          |          |
|                            |   | DF              | Within initial limits        |       |          |          |
|                            |   | DCL             | Within 1.25 x initial limit  |       |          |          |
|                            |   | ESR             | Within initial limits        |       |          |          |
| Temperature Stability      | Extreme temperature exposure at a succession of continuous steps at +25°C, -55°C, +25°C, +85°C, +125°C, +25°C           | +25°C           | -55°C                        | +85°C | +125°C   |          |
|                            |   | Δ C/C           | IL*                          | ±10%  | ±10%     | ±20%     |
|                            |   | DF              | IL                           | IL    | 1.5 x IL | 1.5 x IL |
|                            |   | DCL             | IL                           | n/a   | 10 x IL  | 12 x IL  |
|                            |   | Δ C/C           | Within ±5% of initial value  |       |          |          |
|                            |   | DF              | Within initial limits        |       |          |          |
| Surge Voltage              | 25°C and 85°C, 1.32 x rated voltage 1,000 cycles (125°C, 1.2 x rated voltage)   | DCL             | Within initial limits        |       |          |          |
|                            |   | ESR             | Within initial limits        |       |          |          |
|                            |   | Δ C/C           | Within ±10% of initial value |       |          |          |
|                            |   | DF              | Within initial limits        |       |          |          |
| Mechanical Shock/Vibration | MIL–STD–202, Method 213, Condition I, 100 G peak.<br>MIL–STD–202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak | Δ C/C           | Within ±10% of initial value |       |          |          |
|                            |   | DF              | Within initial limits        |       |          |          |
|                            |   | DCL             | Within initial limits        |       |          |          |

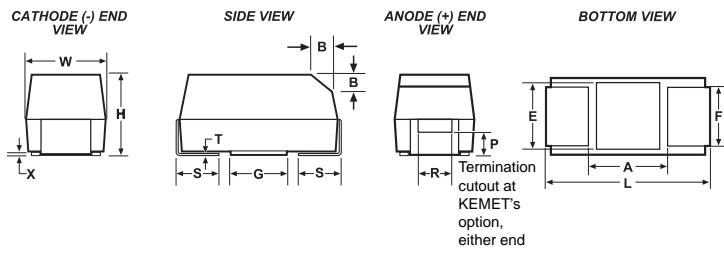
\*IL = Initial limit

## Certification

KEMET's Internal Qualification Plan for this Tantalum series of capacitors follows AEC–Q200 guidelines. Standard catalog part types ordered without a specific automotive designator, i.e., suffix AUTO or four digit customer specific designator (C Spec), are not considered KEMET Automotive Grade tantalum capacitors.

## Dimensions – Millimeters (Inches)

Metric will govern



| Case Size |         | Component                  |                           |                          |                    |                    |                         |                             |            |            |             |             |            |            |
|-----------|---------|----------------------------|---------------------------|--------------------------|--------------------|--------------------|-------------------------|-----------------------------|------------|------------|-------------|-------------|------------|------------|
| KEMET     | EIA     | L*                         | W*                        | H*                       | F* ±0.1<br>±(.004) | S* ±0.3<br>±(.012) | B* ±0.15<br>(Ref) ±.006 | X (Ref)                     | P (Ref)    | R (Ref)    | T (Ref)     | A (Min)     | G (Ref)    | E (Ref)    |
| A         | 3216-18 | 3.2 ±0.2<br>(0.126 ±0.008) | 1.6 ±0.2<br>(.063 ±0.008) | 1.6 ±0.2<br>(.063 ±.008) | 1.2 (.047)         | 0.8 (.031)         | 0.4 (.016)              | 0.10 ± 0.10<br>(.004 ±.004) | 0.4 (.016) | 0.4 (.016) | 0.13 (.005) | 1.4 (.055)  | 1.1 (.043) | 1.3 (.051) |
| B         | 3528-21 | 3.5 ±0.2<br>(0.138 ±0.008) | 2.8 ±0.2<br>(.110 ±0.008) | 1.9 ±0.2<br>(.075 ±.008) | 2.2 (.087)         | 0.8 (.031)         | 0.4 (.016)              | 0.10 ± 0.10<br>(.004 ±.004) | 0.5 (.020) | 1.0 (.039) | 0.13 (.005) | 1.1 (0.043) | 1.8 (.071) | 2.2 (.087) |
| C         | 6032-28 | 6.0 ±0.3<br>(0.236 ±0.03)  | 3.2 ±0.3<br>(.126 ±0.012) | 2.5 ±0.3<br>(.098 ±.012) | 2.2 (.087)         | 1.3 (.051)         | 0.5 (.020)              | 0.10 ± 0.10<br>(.004 ±.004) | 0.9 (.035) | 1.0 (.039) | 0.13 (.005) | 3.1 (.122)  | 2.8 (.110) | 2.4 (.094) |
| D         | 7343-31 | 7.3 ±0.3<br>(0.287 ±0.012) | 4.3 ±0.3<br>(.169 ±0.012) | 2.8 ±0.3<br>(.110 ±.012) | 2.4 (.094)         | 1.3 (.051)         | 0.5 (.020)              | 0.10 ± 0.10<br>(.004 ±.004) | 0.9 (.035) | 1.0 (.039) | 0.13 (.005) | 3.8 (.150)  | 3.5 (.138) | 3.5 (.138) |
| X         | 7343-43 | 7.3 ±0.3<br>(0.287 ±0.012) | 4.3 ±0.3<br>(.169 ±0.012) | 4.0 ±0.3<br>(.157 ±.012) | 2.4 (.094)         | 1.3 (.051)         | 0.5 (.020)              | 0.10 ± 0.10<br>(.004 ±.004) | 1.7 (.067) | 1.0 (.039) | 0.13 (.005) | 3.8 (.150)  | 3.5 (.138) | 3.5 (.138) |

\* MIL-C-55365/8 specified dimensions

Table 1 – Ratings & Part Number Reference

| Rated Voltage | Rated Capacitance | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                          | DF                             | Standard ESR                     |             | Low ESR                          |             |
|---------------|-------------------|-------------------------|------------------------------|-------------------------------------|--------------------------------|----------------------------------|-------------|----------------------------------|-------------|
|               |                   |                         |                              |                                     |                                | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code |
| VDC           | μF                | KEMET/EIA               | (See below for part options) | μA @ +25°C<br>Maximum/<br>5 Minutes | % @ +25°C<br>120 Hz<br>Maximum | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code |
| 6.3           | 10                | B/3528-21               | T489B106(1)006A(2)           | 0.5                                 | 6.0                            | 3000                             | E3K0        |                                  |             |
| 6.3           | 15                | A/3216-18               | T489A156(1)006A(2)           | 0.7                                 | 6.0                            | 2030                             | E2K0        | 1500                             | E1K5        |
| 6.3           | 22                | C/6032-28               | T489C226(1)006A(2)           | 1.0                                 | 6.0                            | 2000                             | E2K0        |                                  |             |
| 6.3           | 47                | B/3528-21               | T489B476(1)006A(2)           | 2.1                                 | 6.0                            | 1620                             | E1K6        | 500                              | E500        |
| 6.3           | 150               | B/3528-21               | T489B157(1)006A(2)           | 7.1                                 | 15.0                           | 3000                             | E3K0        |                                  |             |
| 6.3           | 100               | C/6032-28               | T489C107(1)006A(2)           | 4.5                                 | 6.0                            | 440                              | E440        |                                  |             |
| 6.3           | 150               | C/6032-28               | T489C157(1)006A(2)           | 6.8                                 | 8.0                            | 500                              | E500        | 300                              | E300        |
| 6.3           | 100               | D/7343-31               | T489D107(1)006A(2)           | 4.7                                 | 8.0                            | 800                              | E800        |                                  |             |
| 6.3           | 150               | D/7343-31               | T489D157(1)006A(2)           | 6.8                                 | 6.0                            | 400                              | E400        | 150                              | E150        |
| 6.3           | 220               | D/7343-31               | T489D227(1)006A(2)           | 9.9                                 | 8.0                            | 360                              | E360        | 150                              | E150        |
| 6.3           | 470               | X/7343-43               | T489X477(1)006A(2)           | 21.0                                | 8.0                            | 250                              | E250        | 200                              | E200        |
| 10            | 2.2               | A/3216-18               | T489A225(1)010A(2)           | 0.3                                 | 6.0                            | 7000                             | E7K0        |                                  |             |
| 10            | 4.7               | A/3216-18               | T489A475(1)010A(2)           | 0.4                                 | 6.0                            | 2900                             | E2K9        |                                  |             |
| 10            | 6.8               | A/3216-18               | T489A685(1)010A(2)           | 0.5                                 | 6.0                            | 2650                             | E2K6        |                                  |             |
| 10            | 6.8               | B/3528-21               | T489B685(1)010A(2)           | 0.5                                 | 6.0                            | 3000                             | E3K0        |                                  |             |
| 10            | 10                | A/3216-18               | T489A106(1)010A(2)           | 0.8                                 | 6.0                            | 2200                             | E2K2        | 1800                             | E1K8        |
| 10            | 15                | B/3528-21               | T489B156(1)010A(2)           | 1.1                                 | 6.0                            | 2030                             | E2K0        |                                  |             |
| 10            | 15                | C/6032-28               | T489C156(1)010A(2)           | 1.1                                 | 6.0                            | 2000                             | E2K0        |                                  |             |
| 10            | 22                | B/3528-21               | T489B226(1)010A(2)           | 1.7                                 | 6.0                            | 1880                             | E1K8        | 700                              | E700        |
| 10            | 33                | B/3528-21               | T489B336(1)010A(2)           | 2.5                                 | 6.0                            | 1000                             | E1K0        | 650                              | E650        |
| 10            | 33                | C/6032-28               | T489C336(1)010A(2)           | 2.5                                 | 6.0                            | 590                              | E590        |                                  |             |
| 10            | 33                | D/7343-31               | T489D336(1)010A(2)           | 2.5                                 | 6.0                            | 1100                             | E1K1        |                                  |             |
| 10            | 47                | C/6032-28               | T489C476(1)010A(2)           | 3.5                                 | 6.0                            | 540                              | E540        |                                  |             |
| 10            | 47                | D/7343-31               | T489D476(1)010A(2)           | 3.5                                 | 6.0                            | 400                              | E400        |                                  |             |
| 10            | 68                | C/6032-28               | T489C686(1)010A(2)           | 5.1                                 | 6.0                            | 490                              | E490        |                                  |             |
| 10            | 100               | C/6032-28               | T489C107(1)010A(2)           | 7.5                                 | 8.0                            | 500                              | E500        |                                  |             |
| 10            | 100               | D/7343-31               | T489D107(1)010A(2)           | 7.5                                 | 6.0                            | 440                              | E440        | 150                              | E150        |
| 10            | 150               | D/7343-31               | T489D157(1)010A(2)           | 11.0                                | 8.0                            | 400                              | E400        | 150                              | E150        |
| 10            | 220               | D/7343-31               | T489D227(1)010A(2)           | 16.5                                | 8.0                            | 500                              | E500        |                                  |             |
| 10            | 330               | X/7343-43               | T489X337(1)010A(2)           | 25.0                                | 8.0                            | 300                              | E300        | 100                              | E100        |
| 16            | 1                 | A/3216-18               | T489A105(1)016A(2)           | 0.3                                 | 6.0                            | 10000                            | E10K        |                                  |             |
| 16            | 2.2               | A/3216-18               | T489A225(1)016A(2)           | 0.3                                 | 6.0                            | 4550                             | E4K5        | 3500                             | E3K5        |
| 16            | 3.3               | B/3528-21               | T489B335(1)016A(2)           | 0.4                                 | 6.0                            | 4500                             | E4K5        |                                  |             |
| 16            | 4.7               | B/3528-21               | T489B475(1)016A(2)           | 0.6                                 | 6.0                            | 3160                             | E3K1        |                                  |             |
| 16            | 6.8               | B/3528-21               | T489B685(1)016A(2)           | 0.8                                 | 6.0                            | 2650                             | E2K6        |                                  |             |
| 16            | 6.8               | C/6032-28               | T489C685(1)016A(2)           | 0.8                                 | 6.0                            | 2500                             | E2K5        |                                  |             |
| 16            | 10                | B/3528-21               | T489B106(1)016A(2)           | 1.2                                 | 6.0                            | 2200                             | E2K2        |                                  |             |
| 16            | 10                | C/6032-28               | T489C106(1)016A(2)           | 1.2                                 | 6.0                            | 2000                             | E2K0        |                                  |             |
| 16            | 15                | B/3528-21               | T489B156(1)016A(2)           | 1.8                                 | 6.0                            | 2030                             | E2K0        | 800                              | E800        |
| 16            | 22                | B/3528-21               | T489B226(1)016A(2)           | 2.6                                 | 6.0                            | 1100                             | E1K1        | 600                              | E600        |
| 16            | 22                | C/6032-28               | T489C226(1)016A(2)           | 2.6                                 | 6.0                            | 700                              | E700        | 350                              | E350        |
| 16            | 22                | D/7343-31               | T489D226(1)016A(2)           | 2.6                                 | 6.0                            | 1100                             | E1K1        |                                  |             |
| 16            | 33                | C/6032-28               | T489C336(1)016A(2)           | 4.0                                 | 6.0                            | 590                              | E590        |                                  |             |
| 16            | 47                | C/6032-28               | T489C476(1)016A(2)           | 5.6                                 | 6.0                            | 540                              | E540        | 350                              | E350        |
| 16            | 47                | D/7343-31               | T489D476(1)016A(2)           | 5.6                                 | 6.0                            | 540                              | E540        | 200                              | E200        |
| 16            | 68                | D/7343-31               | T489D686(1)016A(2)           | 8.2                                 | 6.0                            | 490                              | E490        | 150                              | E150        |
| 16            | 100               | D/7343-31               | T489D107(1)016A(2)           | 12.0                                | 6.0                            | 440                              | E440        | 150                              | E150        |
| 16            | 150               | D/7343-31               | T489D157(1)016A(2)           | 18.0                                | 12.0                           | 700                              | E700        |                                  |             |
| VDC           | μF                | KEMET/EIA               | (See below for part options) | μA @ +25°C<br>Maximum/<br>5 Minutes | % @ +25°C<br>120 Hz<br>Maximum | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code |
| Rated Voltage | Rated Capacitance | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                          | DF                             | Standard ESR                     |             | Low ESR                          |             |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings & Part Number Reference cont'd

| Rated Voltage | Rated Capacitance | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                          | DF                             | Standard ESR                     |             | Low ESR                          |             |
|---------------|-------------------|-------------------------|------------------------------|-------------------------------------|--------------------------------|----------------------------------|-------------|----------------------------------|-------------|
|               |                   |                         |                              |                                     |                                | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code |
| VDC           | μF                | KEMET/EIA               | (See below for part options) | μA @ +25°C<br>Maximum/<br>5 Minutes | % @ +25°C<br>120 Hz<br>Maximum | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code |
| 20            | 1                 | A/3216-18               | T489A105(1)020A(2)           | 0.3                                 | 4.0                            | 6630                             | E6K6        |                                  |             |
| 20            | 1.5               | A/3216-18               | T489A155(1)020A(2)           | 0.3                                 | 6.0                            | 5460                             | E5K4        |                                  |             |
| 20            | 2.2               | A/3216-18               | T489A225(1)020A(2)           | 0.3                                 | 6.0                            | 4550                             | E4K5        |                                  |             |
| 20            | 3.3               | A/3216-18               | T489A335(1)020A(2)           | 0.5                                 | 6.0                            | 3740                             | E3K7        | 3500                             | E3K5        |
| 20            | 3.3               | B/3528-21               | T489B335(1)020A(2)           | 0.5                                 | 6.0                            | 3740                             | E3K7        |                                  |             |
| 20            | 4.7               | B/3528-21               | T489B475(1)020A(2)           | 0.7                                 | 6.0                            | 3160                             | E3K1        |                                  |             |
| 20            | 6.8               | B/3528-21               | T489B685(1)020A(2)           | 1.0                                 | 6.0                            | 2650                             | E2K6        |                                  |             |
| 20            | 6.8               | C/6032-28               | T489C685(1)020A(2)           | 1.0                                 | 6.0                            | 2000                             | E2K0        |                                  |             |
| 20            | 10                | B/3528-21               | T489B106(1)020A(2)           | 1.5                                 | 6.0                            | 2200                             | E2K2        | 1000                             | E1K0        |
| 20            | 10                | C/6032-28               | T489C106(1)020A(2)           | 1.5                                 | 6.0                            | 800                              | E800        | 500                              | E500        |
| 20            | 15                | C/6032-28               | T489C156(1)020A(2)           | 2.3                                 | 6.0                            | 720                              | E720        | 400                              | E400        |
| 20            | 15                | D/7343-31               | T489D156(1)020A(2)           | 2.3                                 | 6.0                            | 1100                             | E1K1        |                                  |             |
| 20            | 22                | D/7343-31               | T489D226(1)020A(2)           | 3.3                                 | 6.0                            | 650                              | E650        | 300                              | E300        |
| 20            | 33                | C/6032-28               | T489C336(1)020A(2)           | 5.0                                 | 6.0                            | 590                              | E590        | 300                              | E300        |
| 20            | 33                | D/7343-31               | T489D336(1)020A(2)           | 5.0                                 | 6.0                            | 590                              | E590        | 250                              | E250        |
| 20            | 47                | D/7343-31               | T489D476(1)020A(2)           | 7.1                                 | 6.0                            | 540                              | E540        | 200                              | E200        |
| 20            | 68                | D/7343-31               | T489D686(1)020A(2)           | 10.0                                | 6.0                            | 490                              | E490        | 200                              | E200        |
| 20            | 100               | X/7343-43               | T489X107(1)020A(2)           | 15.0                                | 6.0                            | 300                              | E300        | 150                              | E150        |
| 25            | 0.47              | A/3216-18               | T489A474(1)025A(2)           | 0.3                                 | 4.0                            | 9530                             | E9K5        | 7000                             | E7K0        |
| 25            | 0.68              | A/3216-18               | T489A684(1)025A(2)           | 0.3                                 | 4.0                            | 7980                             | E7K9        |                                  |             |
| 25            | 1                 | A/3216-18               | T489A105(1)025A(2)           | 0.3                                 | 4.0                            | 6630                             | E6K6        |                                  |             |
| 25            | 2.2               | B/3528-21               | T489B225(1)025A(2)           | 0.4                                 | 6.0                            | 4550                             | E4K5        |                                  |             |
| 25            | 3.3               | B/3528-21               | T489B335(1)025A(2)           | 0.6                                 | 6.0                            | 3740                             | E3K7        | 2000                             | E2K0        |
| 25            | 4.7               | B/3528-21               | T489B475(1)025A(2)           | 0.9                                 | 6.0                            | 3160                             | E3K1        | 1000                             | E1K0        |
| 25            | 6.8               | B/3528-21               | T489B685(1)025A(2)           | 1.3                                 | 6.0                            | 1500                             | E1K5        | 1000                             | E1K0        |
| 25            | 6.8               | C/6032-28               | T489C685(1)025A(2)           | 1.3                                 | 6.0                            | 1070                             | E1K0        | 600                              | E600        |
| 25            | 10                | C/6032-28               | T489C106(1)025A(2)           | 1.9                                 | 6.0                            | 800                              | E800        | 600                              | E600        |
| 25            | 10                | D/7343-31               | T489D106(1)025A(2)           | 1.9                                 | 6.0                            | 1200                             | E1K2        |                                  |             |
| 25            | 15                | C/6032-28               | T489C156(1)025A(2)           | 2.8                                 | 6.0                            | 720                              | E720        |                                  |             |
| 25            | 15                | D/7343-31               | T489D156(1)025A(2)           | 2.8                                 | 6.0                            | 720                              | E720        | 300                              | E300        |
| 25            | 22                | D/7343-31               | T489D226(1)025A(2)           | 4.1                                 | 6.0                            | 650                              | E650        | 300                              | E300        |
| 25            | 33                | D/7343-31               | T489D336(1)025A(2)           | 6.2                                 | 6.0                            | 590                              | E590        | 400                              | E400        |
| 25            | 47                | D/7343-31               | T489D476(1)025A(2)           | 8.8                                 | 6.0                            | 540                              | E540        | 250                              | E250        |
| 35            | 0.1               | A/3216-18               | T489A104(1)035A(2)           | 0.3                                 | 4.0                            | 20000                            | E20K        |                                  |             |
| 35            | 0.22              | A/3216-18               | T489A224(1)035A(2)           | 0.3                                 | 4.0                            | 13710                            | E13K        |                                  |             |
| 35            | 0.33              | A/3216-18               | T489A334(1)035A(2)           | 0.3                                 | 4.0                            | 11280                            | E11K        |                                  |             |
| 35            | 1                 | A/3216-18               | T489A105(1)035A(2)           | 0.3                                 | 4.0                            | 6630                             | E6K6        | 3000                             | E3K0        |
| 35            | 1                 | B/3528-21               | T489B105(1)035A(2)           | 0.3                                 | 4.0                            | 3400                             | E3K4        | 2000                             | E2K0        |
| 35            | 1.5               | B/3528-21               | T489B155(1)035A(2)           | 0.4                                 | 6.0                            | 5460                             | E5K4        | 2500                             | E2K5        |
| 35            | 2.2               | B/3528-21               | T489B225(1)035A(2)           | 0.6                                 | 6.0                            | 4550                             | E4K5        | 2000                             | E2K0        |
| 35            | 3.3               | B/3528-21               | T489B335(1)035A(2)           | 0.9                                 | 6.0                            | 3740                             | E3K7        |                                  |             |
| 35            | 3.3               | C/6032-28               | T489C335(1)035A(2)           | 0.9                                 | 6.0                            | 1840                             | E1K8        | 800                              | E800        |
| 35            | 4.7               | C/6032-28               | T489C475(1)035A(2)           | 1.2                                 | 6.0                            | 1410                             | E1K4        | 600                              | E600        |
| 35            | 4.7               | D/7343-31               | T489D475(1)035A(2)           | 1.2                                 | 6.0                            | 1500                             | E1K5        |                                  |             |
| 35            | 6.8               | C/6032-28               | T489C685(1)035A(2)           | 1.8                                 | 6.0                            | 1070                             | E1K0        | 600                              | E600        |
| 35            | 6.8               | D/7343-31               | T489D685(1)035A(2)           | 1.8                                 | 6.0                            | 1300                             | E1K3        |                                  |             |
| 35            | 10                | C/6032-28               | T489C106(1)035A(2)           | 2.6                                 | 6.0                            | 800                              | E800        | 600                              | E600        |
| 35            | 10                | D/7343-31               | T489D106(1)035A(2)           | 2.6                                 | 6.0                            | 800                              | E800        | 400                              | E400        |
| 35            | 15                | D/7343-31               | T489D156(1)035A(2)           | 3.9                                 | 6.0                            | 720                              | E720        | 350                              | E350        |
| VDC           | μF                | KEMET/EIA               | (See below for part options) | μA @ +25°C<br>Maximum/<br>5 Minutes | % @ +25°C<br>120 Hz Maximum    | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code |
| Rated Voltage | Rated Capacitance | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                          | DF                             | Standard ESR                     |             | Low ESR                          |             |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.

(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

Table 1 – Ratings & Part Number Reference cont'd

| Rated Voltage | Rated Capacitance | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                          | DF                             | Standard ESR                     |             | Low ESR                          |             |
|---------------|-------------------|-------------------------|------------------------------|-------------------------------------|--------------------------------|----------------------------------|-------------|----------------------------------|-------------|
|               |                   |                         |                              |                                     |                                | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code |
| VDC           | μF                | KEMET/EIA               | (See below for part options) | μA @ +25°C<br>Maximum/<br>5 Minutes | % @ +25°C<br>120 Hz<br>Maximum | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code |
| 35            | 22                | D/7343-31               | T489D226(1)035A(2)           | 5.8                                 | 6.0                            | 650                              | E650        | 300                              | E300        |
| 50            | 0.22              | A/3216-18               | T489A224(1)050A(2)           | 0.3                                 | 4.0                            | 7500                             | E7K5        | 7000                             | E7K0        |
| 50            | 0.33              | A/3216-18               | T489A334(1)050A(2)           | 0.3                                 | 4.0                            | 7000                             | E7K0        |                                  |             |
| 50            | 0.68              | B/3528-21               | T489B684(1)050A(2)           | 0.3                                 | 4.0                            | 4000                             | E4K0        | 2000                             | E2K0        |
| 50            | 1                 | C/6032-28               | T489C105(1)050A(2)           | 0.4                                 | 4.0                            | 3000                             | E3K0        |                                  |             |
| 50            | 1.5               | C/6032-28               | T489C155(1)050A(2)           | 0.6                                 | 6.0                            | 2500                             | E2K5        | 1500                             | E1K5        |
| 50            | 2.2               | C/6032-28               | T489C225(1)050A(2)           | 0.8                                 | 6.0                            | 1700                             | E1K7        | 1000                             | E1K0        |
| 50            | 2.2               | D/7343-31               | T489D225(1)050A(2)           | 0.8                                 | 4.5                            | 2000                             | E2K0        | 1200                             | E1K2        |
| 50            | 3.3               | D/7343-31               | T489D335(1)050A(2)           | 1.2                                 | 4.5                            | 1100                             | E1K1        | 800                              | E800        |
| 50            | 4.7               | D/7343-31               | T489D475(1)050A(2)           | 1.8                                 | 4.5                            | 900                              | E900        | 600                              | E600        |
| 50            | 6.8               | D/7343-31               | T489D685(1)050A(2)           | 2.6                                 | 4.5                            | 700                              | E700        |                                  |             |
| VDC           | μF                | KEMET/EIA               | (See below for part options) | μA @ +25°C<br>Maximum/<br>5 Minutes | % @ +25°C<br>120 Hz Maximum    | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code | mΩ @ +25°C<br>100 kHz<br>Maximum | E-Spec Code |
| Rated Voltage | Rated Capacitance | Case Code/<br>Case Size | KEMET Part Number            | DC Leakage                          | DF                             | Standard ESR                     |             | Low ESR                          |             |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates Capacitance tolerance.

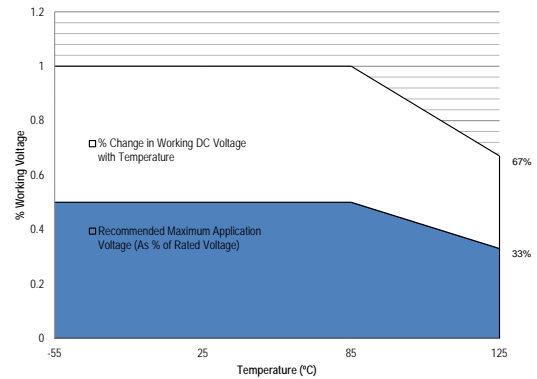
(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, G = Gold Plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates Termination Finish.

Refer to Ordering Information for additional detail.

Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

## Recommended Voltage Derating Guidelines

| -55°C to 125°C                                  |                        |                |
|---|------------------------|----------------|
| % Change in Working DC Voltage with Temperature | 50% of V <sub>R</sub>  | V <sub>R</sub> |
| Recommended Maximum Application Voltage         | 100% of V <sub>R</sub> | V <sub>R</sub> |



## Ripple Current/Ripple Voltage

| KEMET Series and Case Code | EIA Case Code | Maximum Power Dissipation (P max) mWatts @ 25°C w/+20°C Rise |
|----------------------------|---------------|--|
| A                          | 3216-18       | 75   |
| B                          | 3528-21       | 85   |
| C                          | 6032-28       | 110  |
| D                          | 7343-31       | 150  |
| X                          | 7343-43       | 165  |
| E                          | 7260-38       | 200  |
| T428P                      | 7260-38       | 325  |
| R                          | 2012-12       | 25   |
| S                          | 3216-12       | 60   |
| T                          | 3528-12       | 70   |
| U                          | 6032-15       | 90   |
| V                          | 7343-20       | 125  |
| T510X                      | 7343-43       | 270  |
| T510E                      | 7260-38       | 285  |

| Temperature Compensation Multipliers for Maximum Power Dissipation |      |       |
|--|------|-------|
| ≤ 25°C   | 85°C | 125°C |
| 1.00   | 0.90 | 0.40  |

*T* = Environmental Temperature

Using the P max of the device, the maximum allowable rms ripple current or voltage may be determined.

$$I(max) = \sqrt{P_{max}/R}$$

$$E(max) = \sqrt{P_{max} \cdot R}$$

*I* = rms ripple current (amperes)

*E* = rms ripple voltage (volts)

*P max* = maximum power dissipation (watts)

*R* = ESR at specified frequency (ohms)



## Reverse Voltage

Solid tantalum capacitors are polar devices and may be permanently damaged or destroyed if connected with the wrong polarity. The positive terminal is identified on the capacitor body by a stripe plus in some cases a beveled edge. A small degree of transient reverse voltage is permissible for short periods per the table. The capacitors should not be operated continuously in reverse mode, even within these limits.

| Temperature | Permissible Transient Reverse Voltage |
|-------------|---------------------------------------|
| 25°C        | 15% of Rated Voltage                  |
| 85°C        | 5% of Rated Voltage                   |
| 125°C       | 1% of Rated Voltage                   |

Table 2 – Land Dimensions/Courtyard

| KEMET          | Metric Size Code | Density Level A:<br>Maximum (Most) Land Protrusion (mm) |     |      |      |      | Density Level B:<br>Median (Nominal) Land Protrusion (mm) |      |      |      |      | Density Level C:<br>Minimum (Least) Land Protrusion (mm) |      |      |      |      |      |      |
|----------------|------------------|---|-----|------|------|------|---|------|------|------|------|--|------|------|------|------|------|------|
|                |                  | Case  | EIA | X    | Y    | C    | V1  | V2   | X    | Y    | C    | V1   | V2   | X    | Y    | C    | V1   | V2   |
| A              | 3216-18          |   |     | 1.35 | 2.15 | 1.45 | 6.10  | 2.80 | 1.25 | 1.75 | 1.35 | 5.00   | 2.30 | 1.15 | 1.35 | 1.25 | 4.10 | 2.00 |
| B              | 3528-21          |   |     | 2.35 | 2.15 | 1.45 | 6.10  | 4.00 | 2.25 | 1.75 | 1.35 | 5.00   | 3.50 | 2.15 | 1.35 | 1.25 | 4.10 | 3.20 |
| C              | 6032-28          |   |     | 2.35 | 2.65 | 2.60 | 8.90  | 4.40 | 2.25 | 2.25 | 2.50 | 7.80   | 3.90 | 2.15 | 1.85 | 2.40 | 6.90 | 3.60 |
| D              | 7343-31          |   |     | 2.55 | 3.75 | 2.70 | 10.20   | 5.50 | 2.45 | 3.35 | 2.60 | 9.10   | 5.00 | 2.35 | 2.95 | 2.50 | 8.20 | 4.70 |
| E <sup>1</sup> | 7260-38          |   |     | 4.25 | 2.65 | 3.20 | 10.10   | 7.20 | 4.15 | 2.25 | 3.30 | 9.40   | 6.70 | 4.05 | 1.85 | 3.00 | 8.10 | 6.40 |
| R              | 2012-12          |   |     | 1.05 | 1.80 | 1.00 | 4.80  | 2.40 | 0.95 | 1.45 | 0.90 | 3.80   | 1.90 | 0.85 | 1.05 | 0.80 | 2.90 | 1.60 |
| S <sup>2</sup> | 3216-12          |   |     | 1.35 | 2.15 | 1.45 | 6.10  | 2.80 | 1.25 | 1.75 | 1.35 | 5.00   | 2.30 | 1.15 | 1.35 | 1.25 | 4.10 | 2.00 |
| T              | 3528-12          |   |     | 2.35 | 2.15 | 1.45 | 6.10  | 4.00 | 2.25 | 1.75 | 1.35 | 5.00   | 3.50 | 2.15 | 1.35 | 1.25 | 4.10 | 3.20 |
| U              | 6032-15          |   |     | 2.55 | 3.75 | 2.70 | 10.20   | 5.50 | 2.45 | 3.35 | 2.60 | 9.10   | 5.00 | 2.35 | 2.95 | 2.50 | 8.20 | 4.70 |
| V              | 7343-20          |   |     | 2.55 | 3.75 | 2.70 | 10.20   | 5.50 | 2.45 | 3.35 | 2.60 | 9.10   | 5.00 | 2.35 | 2.95 | 2.50 | 8.20 | 4.70 |
| X <sup>1</sup> | 7343-43          |   |     | 2.55 | 3.75 | 2.70 | 10.20   | 5.50 | 2.45 | 3.35 | 2.60 | 9.10   | 5.00 | 2.35 | 2.95 | 2.50 | 8.20 | 4.70 |

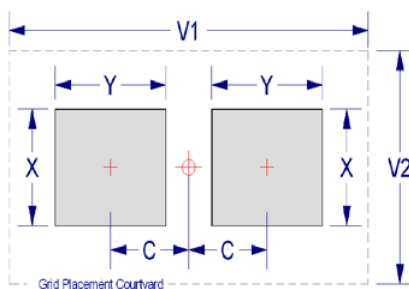
*Density Level A: For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.*

*Density Level B: For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.*

*Density Level C: For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC Standard 7351 (IPC-7351).*

<sup>1</sup> Height of these chips may create problems in wave soldering.

<sup>2</sup> Land pattern geometry is too small for silkscreen outline.



## Soldering Process

KEMET's families of surface mount capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J-STD-020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

Note that although the X/7343-43 case size can withstand wave soldering, the tall profile (4.3 mm maximum) dictates care in wave process development.

Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

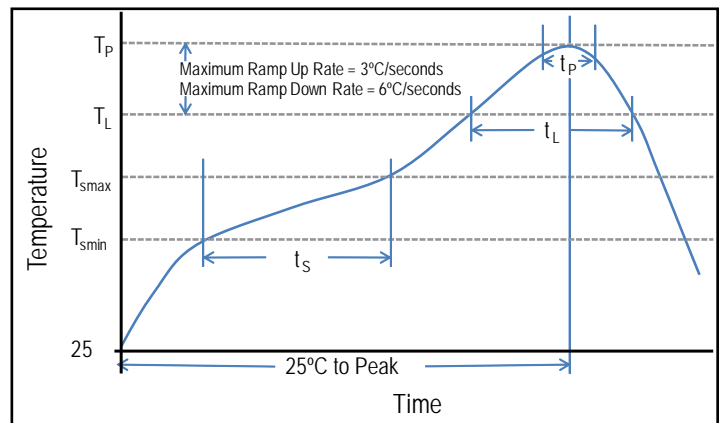
During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

| Profile Feature                                       | SnPb Assembly       | Pb-Free Assembly    |
|---|---------------------|---------------------|
| Preheat/Soak  |                     |                     |
| Temperature Minimum ( $T_{smin}$ )                    | 100°C               | 150°C               |
| Temperature Maximum ( $T_{smax}$ )                    | 150°C               | 200°C               |
| Time ( $t_s$ ) from $T_{smin}$ to $T_{smax}$          | 60 – 120 seconds    | 60 – 120 seconds    |
| Ramp-up Rate ( $T_L$ to $T_P$ )                       | 3°C/seconds maximum | 3°C/seconds maximum |
| Liquidous Temperature ( $T_L$ )                       | 183°C               | 217°C               |
| Time Above Liquidous ( $t_L$ )                        | 60 – 150 seconds    | 60 – 150 seconds    |
| Peak Temperature ( $T_P$ )                            | 220°C*<br>235°C**   | 250°C*<br>260°C**   |
| Time within 5°C of Maximum Peak Temperature ( $t_p$ ) | 20 seconds maximum  | 30 seconds maximum  |
| Ramp-down Rate ( $T_P$ to $T_L$ )                     | 6°C/seconds maximum | 6°C/seconds maximum |
| Time 25°C to Peak Temperature                         | 6 minutes maximum   | 8 minutes maximum   |

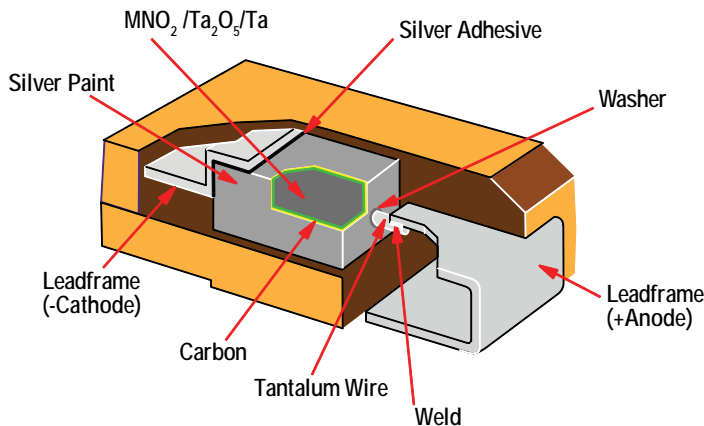
Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.

\*Case Size D, E, P, Y, and X

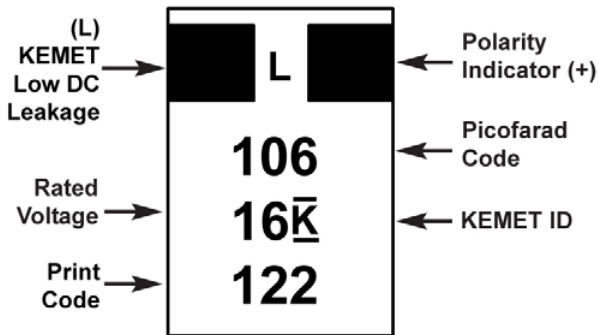
\*\*Case Size A, B, C, H, I, K, M, R, S, T, U, V, W, and Z



## Construction



## Capacitor Marking



## Storage

Tantalum chip capacitors should be stored in normal working environments. While the chips themselves are quite robust in other environments, solderability will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. In addition, packaging materials will be degraded by high temperature—reels may soften or warp and tape peel force may increase. KEMET recommends that maximum storage temperature not exceed 40°C and maximum storage humidity not exceed 60% relative humidity. Temperature fluctuations should be minimized to avoid condensation on the parts and atmospheres should be free of chlorine and sulphur bearing compounds. For optimized solderability chip stock should be used promptly, preferably within three years of receipt.

## Tape & Reel Packaging Information

KEMET's molded tantalum and aluminum chip capacitor families are packaged in 8 and 12 mm plastic tape on 7" and 13" reels in accordance with *EIA Standard 481-1: Embossed Carrier Taping of Surface Mount Components for Automatic Handling*. This packaging system is compatible with all tape-fed automatic pick-and-place systems.



**Table 3 – Packaging Quantity**

| Case Code |         | Tape Width (mm) | 7" Reel* | 13" Reel* |
|-----------|---------|-----------------|----------|-----------|
| KEMET     | EIA     |                 |          |           |
| R         | 2012-12 | 8               | 2,500    | 10,000    |
| I         | 3216-10 | 8               | 3,000    | 12,000    |
| S         | 3216-12 | 8               | 2,500    | 10,000    |
| T         | 3528-12 | 8               | 2,500    | 10,000    |
| M         | 3528-15 | 8               | 2,000    | 8,000     |
| U         | 6032-15 | 12              | 1,000    | 5,000     |
| L         | 6032-19 | 12              | 1,000    | 5,000     |
| W         | 7343-15 | 12              | 1,000    | 3,000     |
| Z         | 7343-17 | 12              | 1,000    | 3,000     |
| V         | 7343-20 | 12              | 1,000    | 3,000     |
| A         | 3216-18 | 8               | 2,000    | 9,000     |
| B         | 3528-21 | 8               | 2,000    | 8,000     |
| C         | 6032-28 | 12              | 500      | 3,000     |
| D         | 7343-31 | 12              | 500      | 2,500     |
| Y         | 7343-40 | 12              | 500      | 2,000     |
| X         | 7343-43 | 12              | 500      | 2,000     |
| E/T428P   | 7260-38 | 12              | 500      | 2,000     |
| H         | 7360-20 | 12              | 1,000    | 2,500     |

\* No C-Spec required for 7" reel packaging. C-7280 required for 13" reel packaging.

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

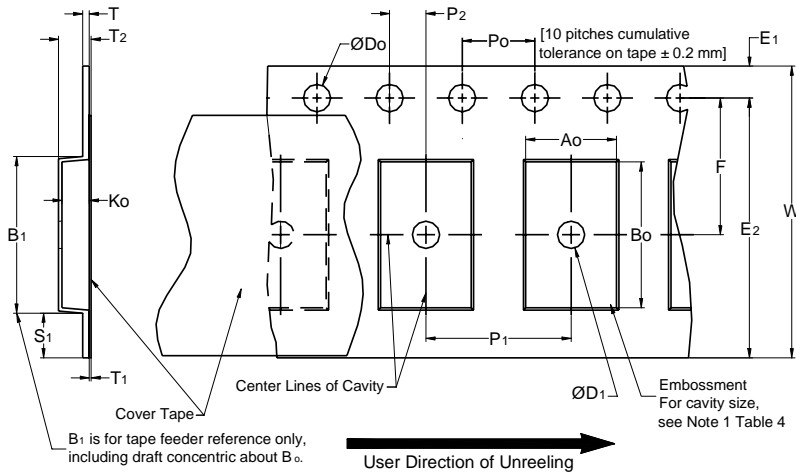


Table 4 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

| Constant Dimensions — Millimeters (Inches) |   |                         |  |   |   |                       |                         |                    |                  |
|--|---|-------------------------|--|---|---|-----------------------|-------------------------|--------------------|------------------|
| Tape Size                                  | $D_0$                                       | $D_1$ Minimum<br>Note 1 | $E_1$                                    | $P_0$                                   | $P_2$                                   | R Reference<br>Note 2 | $S_1$ Minimum<br>Note 3 | T Maximum          | $T_1$ Maximum    |
| 8 mm                                       | $1.5 +0.10/-0.0$<br>( $0.059 +0.004/-0.0$ ) | 1.0<br>(0.039)          | $1.75 \pm 0.10$<br>( $0.069 \pm 0.004$ ) | $4.0 \pm 0.10$<br>( $0.157 \pm 0.004$ ) | $2.0 \pm 0.05$<br>( $0.079 \pm 0.002$ ) | 25.0<br>(0.984)       | 0.600<br>(0.024)        | 0.600<br>(0.024)   | 0.100<br>(0.004) |
| 12 mm                                      |   | 1.5<br>(0.059)          |  |   |   | 30<br>(1.181)         |                         |                    |                  |
| 16 mm                                      |   |                         |  |   |   |                       |                         |                    |                  |
| Variable Dimensions — Millimeters (Inches) |   |                         |  |   |   |                       |                         |                    |                  |
| Tape Size                                  | Pitch                                       | $B_1$ Maximum<br>Note 4 | $E_2$ Minimum                            | F                                       | $P_1$                                   | $T_2$ Maximum         | W Maximum               | $A_0, B_0$ & $K_0$ |                  |
| 8 mm                                       | Single (4 mm)                               | 4.35<br>(0.171)         | 6.25<br>(0.246)                          | $3.5 \pm 0.05$<br>( $0.138 \pm 0.002$ ) | $4.0 \pm 0.10$<br>( $0.157 \pm 0.004$ ) | 2.5<br>(0.098)        | 8.3<br>(0.327)          | Note 5             |                  |
| 12 mm                                      | Single (4 mm) &<br>Double (8 mm)            | 8.2<br>(0.323)          | 10.25<br>(0.404)                         | $5.5 \pm 0.05$<br>( $0.217 \pm 0.002$ ) | $8.0 \pm 0.10$<br>( $0.315 \pm 0.004$ ) | 4.6<br>(0.181)        | 12.3<br>(0.484)         |                    |                  |
| 16 mm                                      | Triple (12 mm)                              | 12.1<br>(0.476)         | 14.25<br>(0.561)                         | $5.5 \pm 0.05$<br>( $0.217 \pm 0.002$ ) | $8.0 \pm 0.10$<br>( $0.315 \pm 0.004$ ) | 4.6<br>(0.181)        | 16.3<br>(0.642)         |                    |                  |

- The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.
- The tape, with or without components, shall pass around R without damage (see Figure 5).
- If  $S_1 < 1.0$  mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481–D, paragraph 4.3, section b).
- $B_1$  dimension is a reference dimension for tape feeder clearance only.
- The cavity defined by  $A_0$ ,  $B_0$  and  $K_0$  shall surround the component with sufficient clearance that:
  - the component does not protrude above the top surface of the carrier tape.
  - the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
  - rotation of the component is limited to 20° maximum for 8 and 12 mm tapes and 10° maximum for 16 mm tapes (see Figure 2).
  - lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape and to 1.0 mm maximum for 16 mm tape (see Figure 3).
  - see Addendum in EIA Standard 481–D for standards relating to more precise taping requirements.

## Packaging Information Performance Notes

1. Cover Tape Break Force: 1.0 Kg minimum.
2. Cover Tape Peel Strength: The total peel strength of the cover tape from the carrier tape shall be:

| Tape Width   | Peel Strength                    |
|--------------|----------------------------------|
| 8 mm         | 0.1 to 1.0 Newton (10 to 100 gf) |
| 12 and 16 mm | 0.1 to 1.3 Newton (10 to 130 gf) |

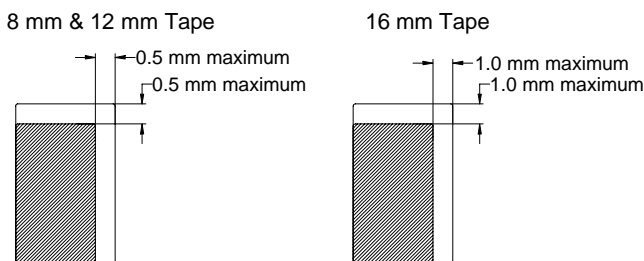
The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.

3. Labeling: Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. Refer to EIA Standards 556 and 624.

### Figure 2 – Maximum Component Rotation



### Figure 3 – Maximum Lateral Movement



### Figure 4 – Bending Radius



Figure 5 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 5 – Reel Dimensions

Metric will govern

| Constant Dimensions – Millimeters (Inches) |   |                                       |  |   |
|--|---|---------------------------------------|--|---|
| Tape Size                                  | A   | B Minimum                             | C                                      | D Minimum   |
| 8 mm                                       | 178 ±0.20<br>(7.008 ±0.008)<br>or<br>330 ±0.20<br>(13.000 ±0.008) | 1.5<br>(0.059)                        | 13.0 +0.5/-0.2<br>(0.521 +0.02/-0.008) | 20.2<br>(0.795)                                   |
| 12 mm                                      |   |                                       |  |   |
| 16 mm                                      |   |                                       |  |   |
| Variable Dimensions – Millimeters (Inches) |   |                                       |  |   |
| Tape Size                                  | N Minimum   | W <sub>1</sub>                        | W <sub>2</sub> Maximum                 | W <sub>3</sub>                                    |
| 8 mm                                       | 50<br>(1.969)   | 8.4 +1.5/-0.0<br>(0.331 +0.059/-0.0)  | 14.4<br>(0.567)                        | Shall accommodate tape width without interference |
| 12 mm                                      |   | 12.4 +2.0/-0.0<br>(0.488 +0.078/-0.0) | 18.4<br>(0.724)                        |   |
| 16 mm                                      |   | 16.4 +2.0/-0.0<br>(0.646 +0.078/-0.0) | 22.4<br>(0.882)                        |   |

Figure 6 – Tape Leader & Trailer Dimensions

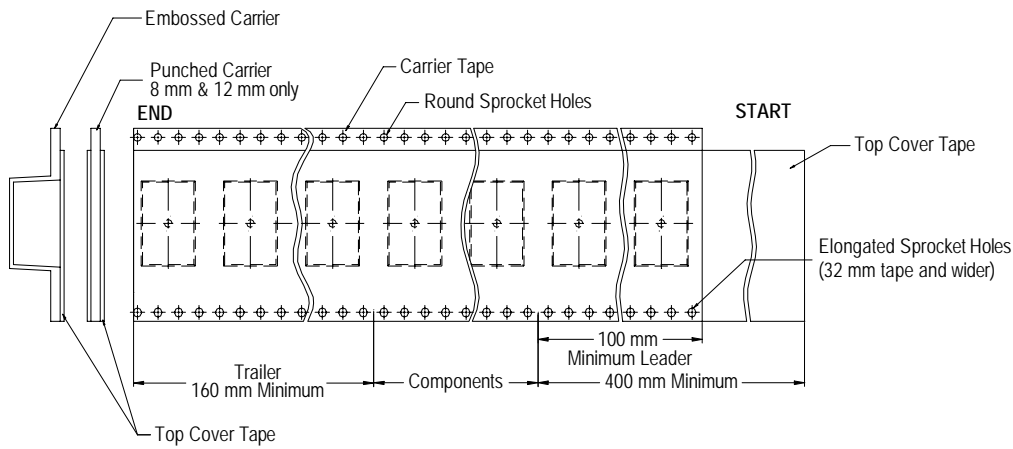


Figure 7 – Maximum Camber





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| Tools                          |   |
|--------------------------------|---|
| Resource                       | Location  |
| Configure A Part: CapEdge      | <a href="http://capacitoredge.kemet.com">http://capacitoredge.kemet.com</a> |
| SPICE & FIT Software           | <a href="http://www.kemet.com/spice">http://www.kemet.com/spice</a>         |
| Search Our FAQs: KnowledgeEdge | <a href="http://www.kemet.com/keask">http://www.kemet.com/keask</a>         |

| Product Information                                  |   |
|--|---|
| Resource   | Location  |
| Products   | <a href="http://www.kemet.com/products">http://www.kemet.com/products</a>                 |
| Technical Resources (Including Soldering Techniques) | <a href="http://www.kemet.com/technicalpapers">http://www.kemet.com/technicalpapers</a>   |
| RoHS Statement                                       | <a href="http://www.kemet.com/rohs">http://www.kemet.com/rohs</a>                         |
| Quality Documents                                    | <a href="http://www.kemet.com/qualitydocuments">http://www.kemet.com/qualitydocuments</a> |

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| Resource                | Location  |
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| Engineering Kit Request | <a href="http://www.kemet.com/kits">http://www.kemet.com/kits</a>     |

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| Contact Us         | <a href="http://www.kemet.com/contact">http://www.kemet.com/contact</a>             |
| Investor Relations | <a href="http://www.kemet.com/ir">http://www.kemet.com/ir</a>                       |
| Call Us            | 1-877-MyKEMET   |
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