

MC7800, MC7800A, MC7800AE, NCV7800



ON Semiconductor®

1.0 A Positive Voltage Regulators

These voltage regulators are monolithic integrated circuits designed as fixed-voltage regulators for a wide variety of applications including local, on-card regulation. These regulators employ internal current limiting, thermal shutdown, and safe-area compensation. With adequate heatsinking they can deliver output currents in excess of 1.0 A. Although designed primarily as a fixed voltage regulator, these devices can be used with external components to obtain adjustable voltages and currents.

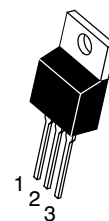
- Output Current in Excess of 1.0 A
- No External Components Required
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe-Area Compensation
- Output Voltage Offered in 1.5%, 2% and 4% Tolerance
- Available in Surface Mount D²PAK-3, DPAK-3 and Standard 3-Lead Transistor Packages
- NCV Prefix for Automotive and Other Applications Requiring Site and Control Changes
- Pb-Free Packages are Available

MAXIMUM RATINGS (T_A = 25°C, unless otherwise noted)

Rating	Symbol	Value			Unit
		369C	221A	936	
Input Voltage (5.0 - 18 V) (24 V)	V _I	35 40			Vdc
Power Dissipation	P _D	Internally Limited			W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	92	65	Figure 15	°C/W
Thermal Resistance, Junction-to-Case	R _{θJC}	5.0	5.0	5.0	°C/W
Storage Junction Temperature Range	T _{stg}	-65 to +150			°C
Operating Junction Temperature	T _J	+150			°C

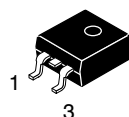
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

*This device series contains ESD protection and exceeds the following tests:
Human Body Model 2000 V per MIL_STD_883, Method 3015.
Machine Model Method 200 V.



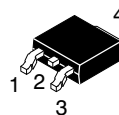
TO-220-3
T SUFFIX
CASE 221AB

Heatsink surface
connected to Pin 2.



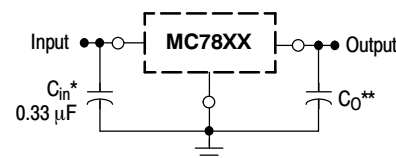
Pin 1. Input
2. Ground
3. Output
D²PAK-3
D2T SUFFIX
CASE 936

Heatsink surface (shown as terminal 4 in
case outline drawing) is connected to Pin 2.



DPAK-3
DT SUFFIX
CASE 369C

STANDARD APPLICATION



A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

XX, These two digits of the type number indicate nominal voltage.

* C_{in} is required if regulator is located an appreciable distance from power supply filter.

** C_O is not needed for stability; however, it does improve transient response. Values of less than 0.1 μF could cause instability.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 23 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 30 of this data sheet.

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ELECTRICAL CHARACTERISTICS ($V_{in} = 10\text{ V}$, $I_O = 500\text{ mA}$, $T_J = T_{low}$ to 125°C (Note 1), unless otherwise noted)

Characteristic	Symbol	MC7805B, NCV7805			MC7805C			Unit
		Min	Typ	Max	Min	Typ	Max	
Output Voltage ($T_J = 25^\circ\text{C}$)	V_O	4.8	5.0	5.2	4.8	5.0	5.2	Vdc
Output Voltage ($5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$, $P_D \leq 15\text{ W}$) $7.0\text{ Vdc} \leq V_{in} \leq 20\text{ Vdc}$ $8.0\text{ Vdc} \leq V_{in} \leq 20\text{ Vdc}$	V_O	- 4.75	- 5.0	- 5.25	4.75 -	5.0 -	5.25 -	Vdc
Line Regulation (Note 4) $7.5\text{ Vdc} \leq V_{in} \leq 20\text{ Vdc}$, 1.0 A $8.0\text{ Vdc} \leq V_{in} \leq 12\text{ Vdc}$	Reg_{line}	- -	5.0 1.3	100 50	- -	0.5 0.8	20 10	mV
Load Regulation (Note 4) $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ $5.0\text{ mA} \leq I_O \leq 1.5\text{ A}$ ($T_A = 25^\circ\text{C}$)	Reg_{load}	- -	1.3 0.15	100 50	- -	1.3 1.3	25 25	mV
Quiescent Current	I_B	-	3.2	8.0	-	3.2	6.5	mA
Quiescent Current Change $7.0\text{ Vdc} \leq V_{in} \leq 25\text{ Vdc}$ $5.0\text{ mA} \leq I_O \leq 1.0\text{ A}$ ($T_A = 25^\circ\text{C}$)	ΔI_B	- -	- -	- 0.5	- -	0.3 0.08	1.0 0.8	mA
Ripple Rejection $8.0\text{ Vdc} \leq V_{in} \leq 18\text{ Vdc}$, $f = 120\text{ Hz}$	RR	-	68	-	62	83	-	dB
Dropout Voltage ($I_O = 1.0\text{ A}$, $T_J = 25^\circ\text{C}$)	$V_I - V_O$	-	2.0	-	-	2.0	-	Vdc
Output Noise Voltage ($T_A = 25^\circ\text{C}$) $10\text{ Hz} \leq f \leq 100\text{ kHz}$	V_n	-	10	-	-	10	-	$\mu\text{V}/V_O$
Output Resistance $f = 1.0\text{ kHz}$	r_O	-	0.9	-	-	0.9	-	$\text{m}\Omega$
Short Circuit Current Limit ($T_A = 25^\circ\text{C}$) $V_{in} = 35\text{ Vdc}$	I_{SC}	-	0.2	-	-	0.6	-	A
Peak Output Current ($T_J = 25^\circ\text{C}$)	I_{max}	-	2.2	-	-	2.2	-	A
Average Temperature Coefficient of Output Voltage	TCV_O	-	-0.3	-	-	-0.3	-	$\text{mV}/^\circ\text{C}$

- $T_{low} = 0^\circ\text{C}$ for MC78XXC, MC78XXAC,
= -40°C for NCV78XX, MC78XXB, MC78XXAB, and MC78XXAEB
- Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

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DEFINITIONS

Line Regulation - The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

Load Regulation - The change in output voltage for a change in load current at constant chip temperature.

Maximum Power Dissipation - The maximum total device dissipation for which the regulator will operate within specifications.

Quiescent Current - That part of the input current that is not delivered to the load.

Output Noise Voltage - The rms ac voltage at the output, with constant load and no input ripple, measured over a specified frequency range.

Long Term Stability - Output voltage stability under accelerated life test conditions with the maximum rated voltage listed in the devices' electrical characteristics and maximum power dissipation.

ORDERING INFORMATION

Device	Nominal Voltage	Operating Temperature Range	Package	Shipping [†]
MC7805ABD2T	5.0 V	T _J = -40°C to +125°C	D ² PAK	50 Units /Rail
MC7805ABD2TG			D ² PAK (Pb-free)	50 Units /Rail
MC7805ABD2TR4			D ² PAK	800 / Tape & Reel
MC7805ABD2TR4G			D ² PAK (Pb-free)	800 / Tape & Reel
MC7805ABT			TO-220	50 Units /Rail
MC7805ABTG			TO-220 (Pb-free)	50 Units /Rail
MC7805ACD2T		T _J = 0°C to +125°C	D ² PAK	50 Units /Rail
MC7805ACD2TG			D ² PAK (Pb-free)	50 Units /Rail
MC7805ACD2TR4			D ² PAK	800 / Tape & Reel
MC7805ACD2TR4G			D ² PAK (Pb-free)	800 / Tape & Reel
MC7805ACT			TO-220	50 Units /Rail
MC7805ACTG			TO-220 (Pb-free)	50 Units /Rail
MC7805BD2T		T _J = -40°C to +125°C	D ² PAK	50 Units /Rail
MC7805BD2TG			D ² PAK (Pb-free)	50 Units /Rail
MC7805BD2TR4			D ² PAK	800 / Tape & Reel
MC7805BD2TR4G			D ² PAK (Pb-free)	800 / Tape & Reel
MC7805BDT			DPAK	75 Units / Rail
MC7805BDTG			DPAK (Pb-free)	75 Units / Rail
MC7805BDTRK			DPAK	2500 / Tape & Reel
MC7805BDTRKG			DPAK (Pb-free)	2500 / Tape & Reel

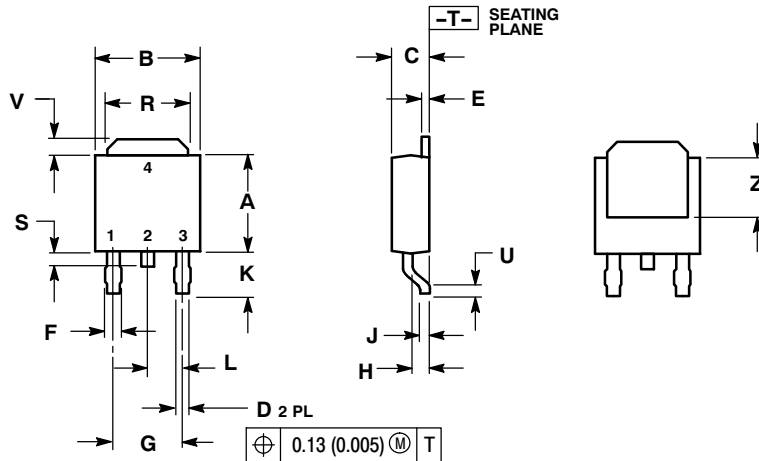
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NCV devices: T_{low} = -40°C, T_{high} = +125°C. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

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PACKAGE DIMENSIONS

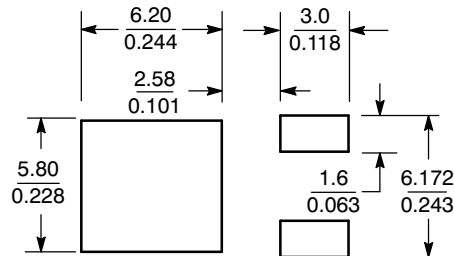
DPAK-3
DT SUFFIX
CASE 369C-01
ISSUE O



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.22
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.180	0.215	4.57	5.45
S	0.025	0.040	0.63	1.01
U	0.020	---	0.51	---
V	0.035	0.050	0.89	1.27
Z	0.155	---	3.93	---

SOLDERING FOOTPRINT*



SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.