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Jameco Part Number 889612

## DS14C89A

### Quad CMOS Receiver

#### General Description

The DS14C89A, pin-for-pin compatible to the DS1489A/MC1489A, is a quad receiver designed to interface data terminal equipment (DTE) with data circuit-terminating equipment (DCE). These devices translate levels conforming to EIA-232E and CCITT V.28 standards to TTL/CMOS logic levels.

The device is fabricated in low threshold CMOS metal gate technology. The device provides very low power consumption compared to their bipolar equivalents: 900  $\mu$ A (DS14C89A) versus 26 mA (DS1489A).

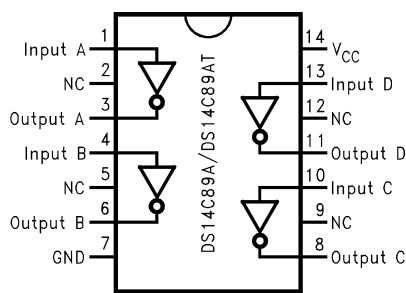
The DS14C89A provides on chip noise filtering which eliminates the need for external response control filter capacitors.

When replacing the DS1489A with the DS14C89A, the response control filter pins can be tied high, low, or not connected.

#### Features

- Meets EIA/TIA-232-E and CCITT V.28 Standards
- Failsafe - Output High for Open Input
- LOW Power consumption
- On chip noise filter
- Available in SOIC Package

#### Connection Diagram



01110601

**Order Number DS14C89AN, DS14C89AM,**  
**See NS Package Number M14A, N14A**

**Absolute Maximum Ratings** (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

|                                               |                                |
|-----------------------------------------------|--------------------------------|
| $V_{CC}$                                      | +6V                            |
| Input Voltage                                 | -30V to +30V                   |
| Receiver Output Voltage                       | ( $V_{CC}$ ) +0.3V to GND-0.3V |
| Junction Temperature                          | +150°C                         |
| Continuous Power Dissipation @ +25°C (Note 2) |                                |
| N Package                                     | 1513 mW                        |
| M Package                                     | 1063 mW                        |
| Lead Temp.                                    |                                |

(Soldering 4 seconds)

+260°C

Storage Temp. Range

-65°C to +150°C

ESD Rating  $\geq 1.8$  kV, Typically  $\geq 2$  kV(HMB, 1.5 k $\Omega$ , 100 pF)**Recommended Operating Conditions**

|                                    | Min  | Max  | Units |
|------------------------------------|------|------|-------|
| $V_{CC}$ (GND = 0V)                | +4.5 | +5.5 | V     |
| Operating Free Air Temp. ( $T_A$ ) |      |      |       |
| DS14C89A                           | 0    | +75  | °C    |

**Electrical Characteristics**

Over recommended operating conditions, unless otherwise specified

| Symbol          | Parameter                | Conditions                                                            |                                              | Min   | Typ  | Max  | Units |
|-----------------|--------------------------|-----------------------------------------------------------------------|----------------------------------------------|-------|------|------|-------|
| V <sub>TH</sub> | Input High Threshold     |                                                                       |                                              | 1.3   |      | 2.7  | V     |
| V <sub>TL</sub> | Input Low Threshold      |                                                                       |                                              | 0.5   |      | 1.9  | V     |
| V <sub>HY</sub> | Typical Input Hysteresis |                                                                       |                                              |       | 1.0  |      | V     |
| I <sub>IN</sub> | Input Current            | V <sub>IN</sub> = +25V                                                | V <sub>CC</sub> = +4.5V to +5.5V             | 3.6   |      | 8.3  | mA    |
|                 |                          | V <sub>IN</sub> = -25V                                                |                                              | -3.6  |      | -8.3 | mA    |
|                 |                          | V <sub>IN</sub> = +3V                                                 |                                              | 0.43  |      | 1.0  | mA    |
|                 |                          | V <sub>IN</sub> = -3V                                                 |                                              | -0.43 |      | -1.0 | mA    |
|                 |                          | V <sub>IN</sub> = +15V                                                | V <sub>CC</sub> = 0V (Power-Off)<br>(Note 4) | 2.14  |      | 5.0  | mA    |
|                 |                          | V <sub>IN</sub> = -15V                                                |                                              | -2.14 |      | -5.0 | mA    |
|                 |                          | V <sub>IN</sub> = +3V                                                 |                                              | 0.43  |      | 1.0  | mA    |
|                 |                          | V <sub>IN</sub> = -3V                                                 |                                              | -0.43 |      | -1.0 | mA    |
| V <sub>OH</sub> | Output High Voltage      | V <sub>IN</sub> = V <sub>TL</sub> (min)                               | I <sub>OUT</sub> = -3.2 mA                   | 2.8   | 4.0  |      | V     |
|                 |                          |                                                                       | I <sub>OUT</sub> = -20μA                     | 3.5   | 4.7  |      | V     |
| V <sub>OL</sub> | Output Low Voltage       | V <sub>IN</sub> = V <sub>TH</sub> (max)<br>I <sub>OUT</sub> = +3.2 mA |                                              |       | 0.15 | 0.4  | V     |
| I <sub>CC</sub> | Supply Current           | No Load, V <sub>IN</sub> = 2.7V or 0.5V                               |                                              |       | 0.5  | 900  | μA    |

**AC Electrical Characteristics** (Note 3)Over recommended operating conditions, unless otherwise specified,  $C_I = 50$  pF

| Symbol    | Parameter                       | Conditions                          | Min | Typ | Max | Units   |
|-----------|---------------------------------|-------------------------------------|-----|-----|-----|---------|
| $t_{PLH}$ | Propagation Delay Low to High   | Input Pulse Width $\geq 10$ $\mu s$ |     | 3.5 | 6.5 | $\mu s$ |
| $t_{PHL}$ | Propagation Delay High to Low   | Input Pulse Width $\geq 10$ $\mu s$ |     | 3.2 | 6.5 | $\mu s$ |
| $t_{SK}$  | Typical Propagation Delay Skew  |                                     |     | 400 |     | ns      |
| $t_r$     | Output Rise Time                |                                     |     | 40  | 300 | ns      |
| $t_f$     | Output Fall Time                |                                     |     | 40  | 300 | ns      |
| $t_{nw}$  | Pulse Width assumed to be Noise |                                     |     |     | 1.0 | $\mu s$ |

**Note 1:** "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The tables of "Electrical Characteristics" specify conditions for device operation.

**Note 2:** Derate N Package 12.1 mW/°C, and M Package 8.5 mW/°C above +25°C.

**Note 3:** AC input waveforms for test purposes:  $t_r = t_f = 200$  ns,  $V_{IH} = +3V$ ,  $V_L = -3V$ ,  $f = 20$  KHz.

**Note 4:** Under the power-off supply conditions it is assumed that the power supply potential drops to zero (0V) and is replaced by a low impedance or short circuit to ground.

## Parameter Measurement Information

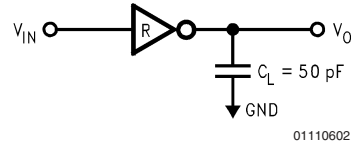


FIGURE 1. Receiver Load Circuit

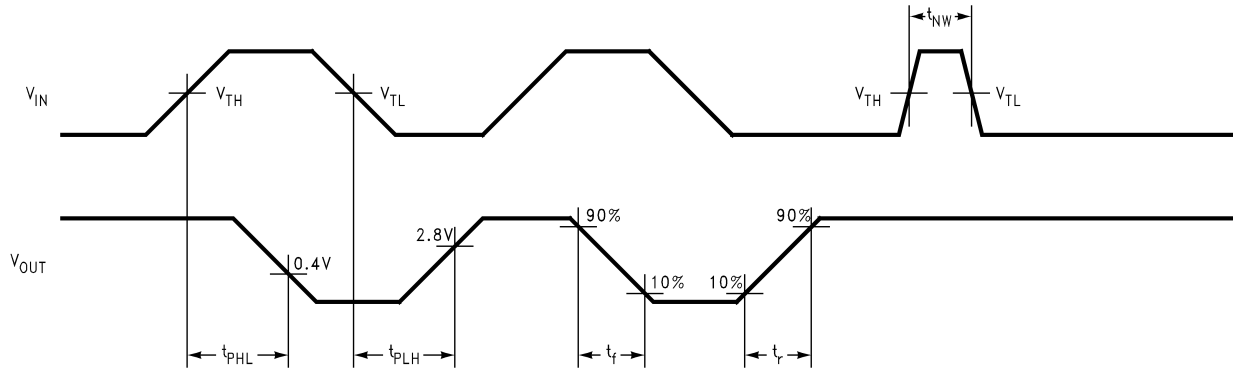


FIGURE 2. Receiver Switching Waveform (Note 3)

## Typical Application Information

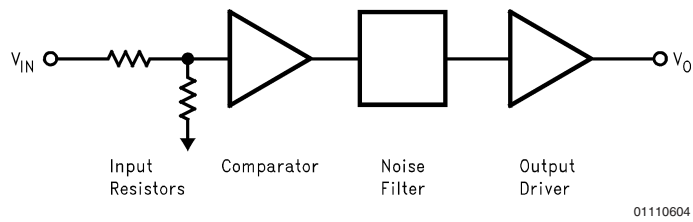


FIGURE 3. Receiver Block Diagram

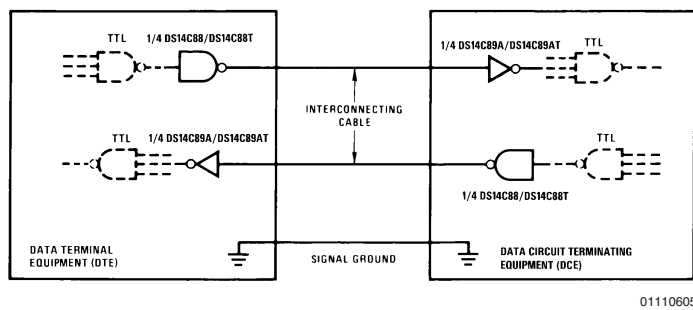
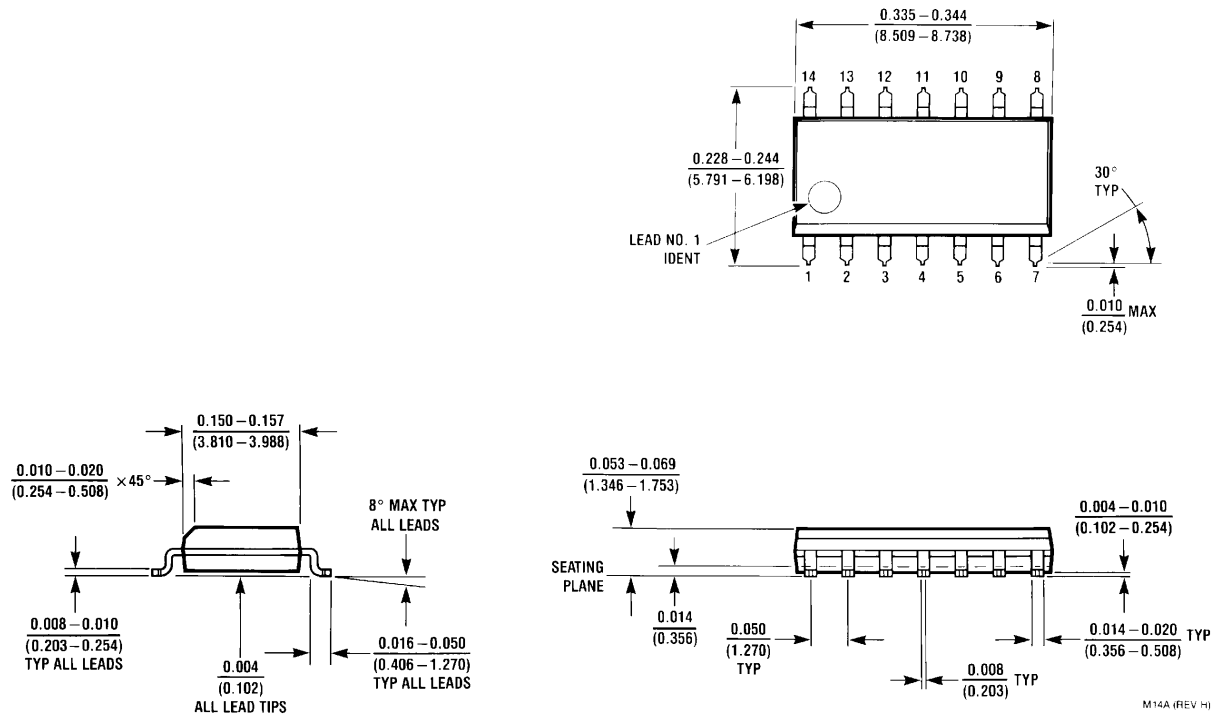
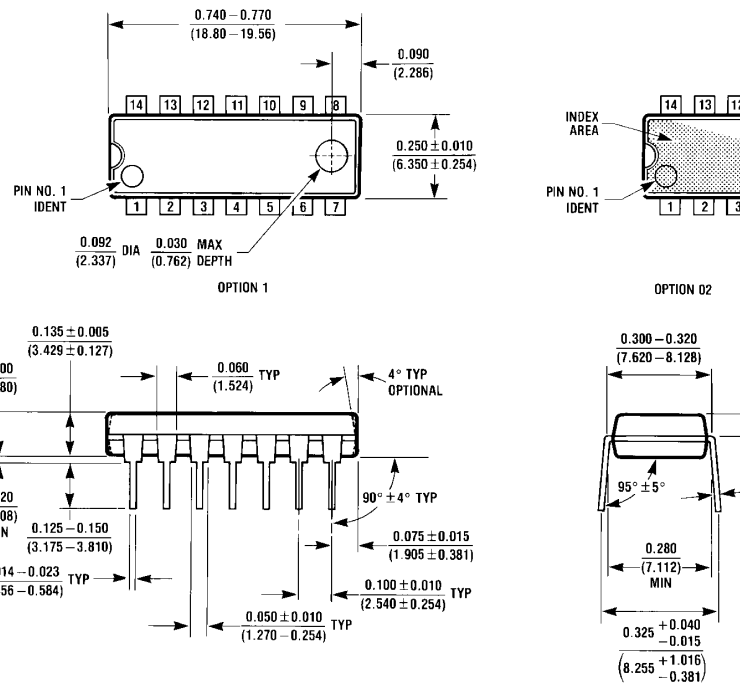


FIGURE 4. EIA-232D Data Transmission

# Physical Dimensions inches (millimeters) unless otherwise noted



Order Number DS14C89AM  
NS Package Number M14A



Order Number DS14C89AN  
NS Package Number N14A

## Notes

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**National Semiconductor**  
Asia Pacific Customer  
Support Center  
Email: [ap.support@nsc.com](mailto:ap.support@nsc.com)

**National Semiconductor**  
Japan Customer Support Center  
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Email: [jpn.feedback@nsc.com](mailto:jpn.feedback@nsc.com)  
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