

DS1489/DS1489A Quad Line Receiver

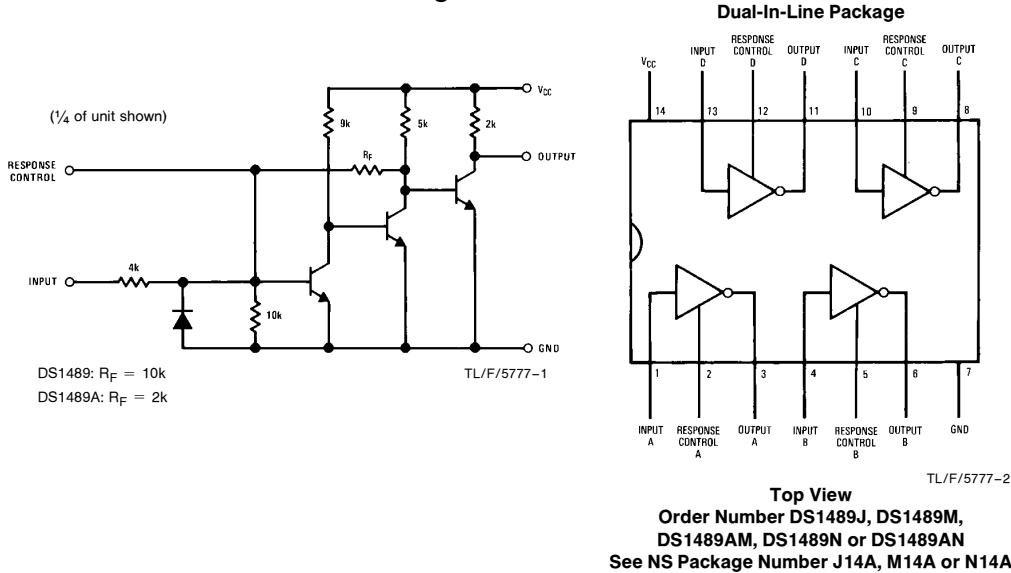
General Description

The DS1489/DS1489A are quad line receivers designed to interface data terminal equipment with data communications equipment. They are constructed on a single monolithic silicon chip. These devices satisfy the specifications of EIA Standard RS-232D. The DS1489/DS1489A meet and exceed the specifications of MC1489/MC1489A and are pin-for-pin replacements.

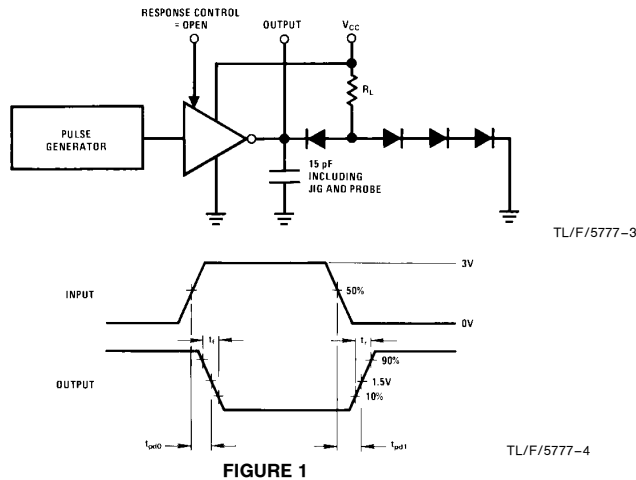
Features

- Four separate receivers per package
- Programmable threshold
- Built-in input threshold hysteresis
- "Fail safe" operating mode: high output for open inputs
- Inputs withstand $\pm 30V$

Schematic and Connection Diagrams



AC Test Circuit and Voltage Waveforms



Absolute Maximum Ratings (Note 1)

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

Power Supply Voltage	10V
Input Voltage Range	± 30V
Output Load Current	20 mA
Power Dissipation (Note 2)	1W
Operating Temperature Range	0°C to +75°C
Storage Temperature Range	−65°C to +150°C

Maximum Power Dissipation* at 25°C

Cavity Package	1308 mW
Molded DIP Package	1207 mW
SO Package	1042 mW

Lead Temperature (Soldering, 4 sec.) 260°C

*Derate cavity package 8.7 mW/°C above 25°C; derate molded DIP package 9.7 mW/°C above 25°C; derate SO package 8.33 mW/°C above 25°C.

Electrical Characteristics (Notes 2, 3 and 4)

DS1489/DS1489A: The following apply for $V_{CC} = 5.0V \pm 1\%$, $0^\circ C \leq T_A \leq +75^\circ C$ unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Units	
V_{TH}	Input High Threshold Voltage	$V_{OUT} \leq 0.45V$, $I_{OUT} = 10\text{ mA}$	DS1489	$T_A = 25^\circ C$	1.0	1.25	1.5	V
					0.9		1.6	V
		DS1489A	$T_A = 25^\circ C$	1.75	2.00	2.25	V	
					1.55		2.40	V
V_{TL}	Input Low Threshold Voltage	$V_{OUT} \geq 2.5V$, $I_{OUT} = -0.5\text{ mA}$		$T_A = 25^\circ C$	0.75	1.00	1.25	V
					0.65		1.35	V
I_{IN}	Input Current			$V_{IN} = +25V$	+3.6	+5.6	+8.3	mA
				$V_{IN} = -25V$	−3.6	−5.6	−8.3	mA
				$V_{IN} = +3V$	+0.43	+0.53		mA
				$V_{IN} = -3V$	−0.43	−0.53		mA
V_{OH}	Output High Voltage	$I_{OUT} = -0.5\text{ mA}$	$V_{IN} = 0.75V$	2.6	3.8	5.0	V	
			Input = Open	2.6	3.8	5.0	V	
V_{OL}	Output Low Voltage	$V_{IN} = 3.0V$, $I_{OUT} = 10\text{ mA}$			0.33	0.45	V	
I_{SC}	Output Short Circuit Current	$V_{IN} = 0.75V$			−3.0		mA	
I_{CC}	Supply Current	$V_{IN} = 5.0V$			14	26	mA	
P_d	Power Dissipation	$V_{IN} = 5.0V$			70	130	mW	

Switching Characteristics $V_{CC} = 5V$, $T_A = 25^\circ C$

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{pd1}	Input to Output "High" Propagation Delay	$R_L = 3.9k$, (Figure 1) (AC Test Circuit)		28	85	ns
t_{pd0}	Input to Output "Low" Propagation Delay	$R_L = 390\Omega$, (Figure 1) (AC Test Circuit)		20	50	ns
t_r	Output Rise Time	$R_L = 3.9k$, (Figure 1) (AC Test Circuit)		110	175	ns
t_f	Output Fall Time	$R_L = 390\Omega$, (Figure 1) (AC Test Circuit)		9	20	ns

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: Unless otherwise specified min/max limits apply across the 0°C to +75°C temperature range for the DS1489 and DS1489A.

Note 3: All currents into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted. All values shown as max or min on absolute value basis.

Note 4: These specifications apply for response control pin = open.

Typical Characteristics $V_{CC} = 5.0V$, $T_A = +25^\circ C$ unless otherwise noted

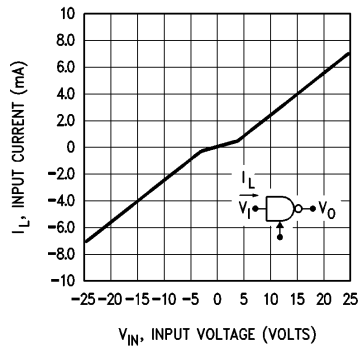


FIGURE 2. Input Current

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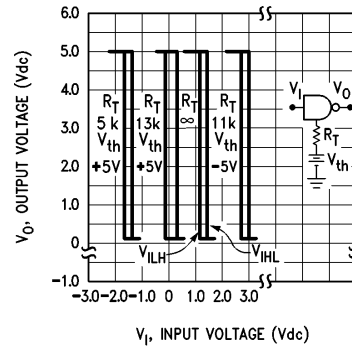


FIGURE 3. DS1489 Input Threshold Voltage Adjustment

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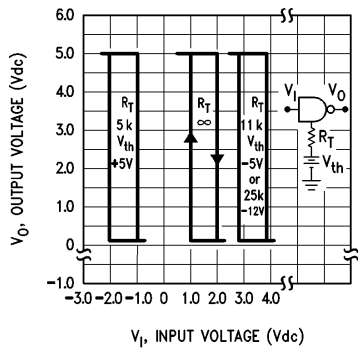


FIGURE 4. DS1489A Input Threshold Voltage Adjustment

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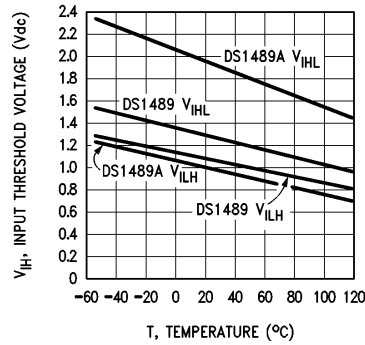


FIGURE 5. Input Threshold Voltage vs Temperature

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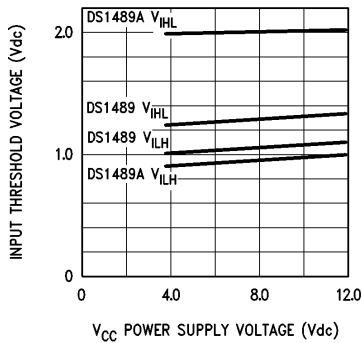


FIGURE 6. Input Threshold vs Power Supply Voltage

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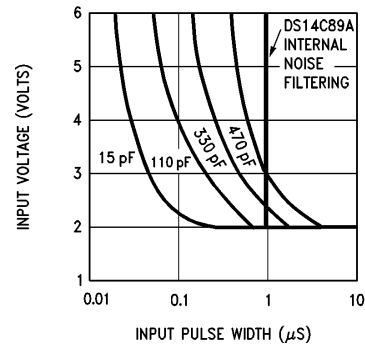
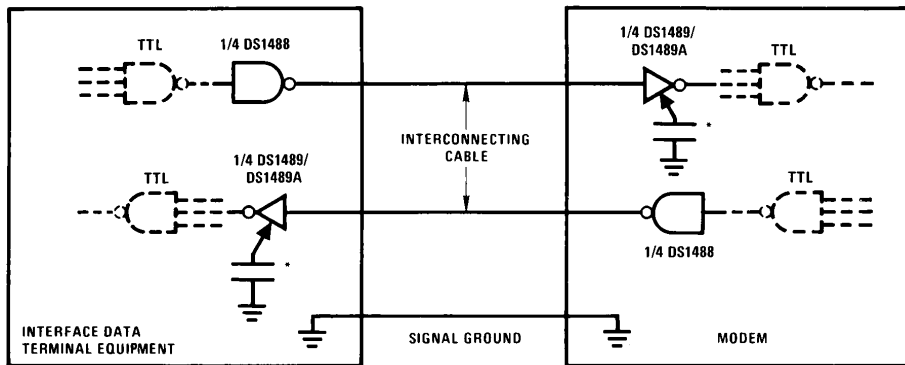


FIGURE 7. Noise Rejection vs Capacitance for DS1489A

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Typical Application Information

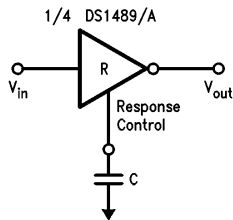


*Optional for noise filtering.

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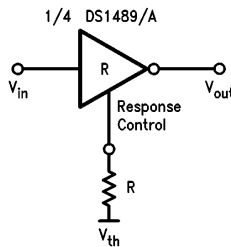
Applications Using the Response Control Pin

Noise Filter (See Figure 7)



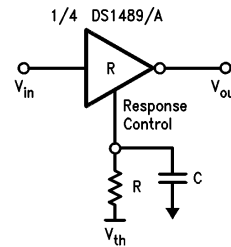
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Threshold Shift (See Figures 3 and 4)



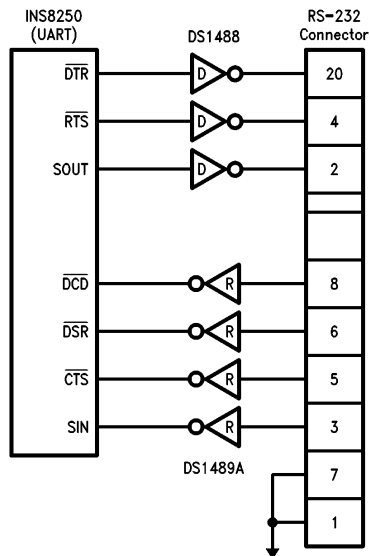
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Noise Filter and Threshold Shift (See Figures 3, 4 and 7)



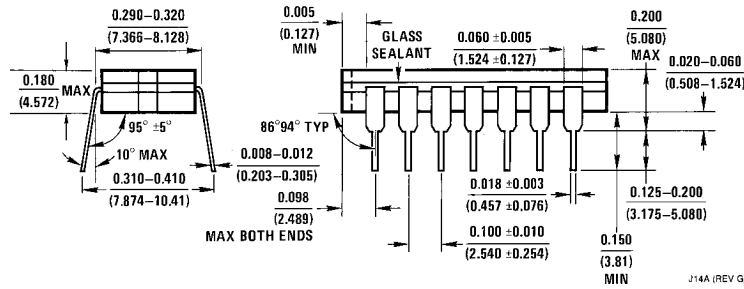
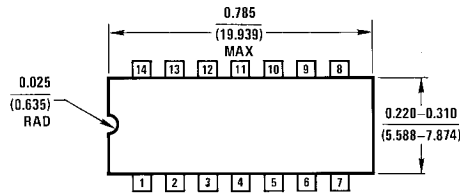
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Application of DS148, DS1489A and INS8250

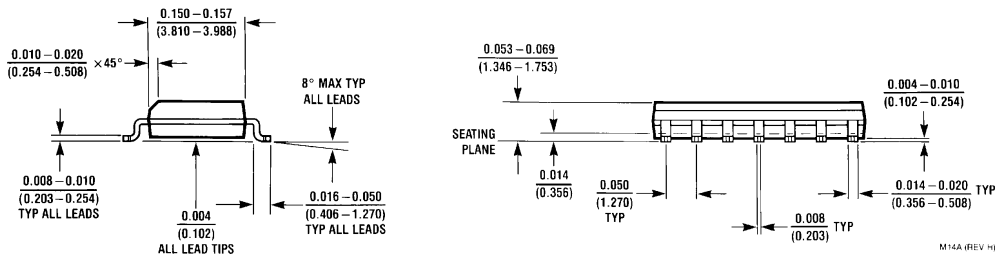
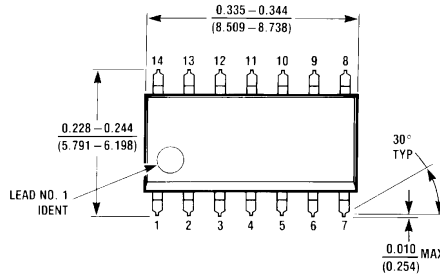


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Physical Dimensions inches (millimeters)

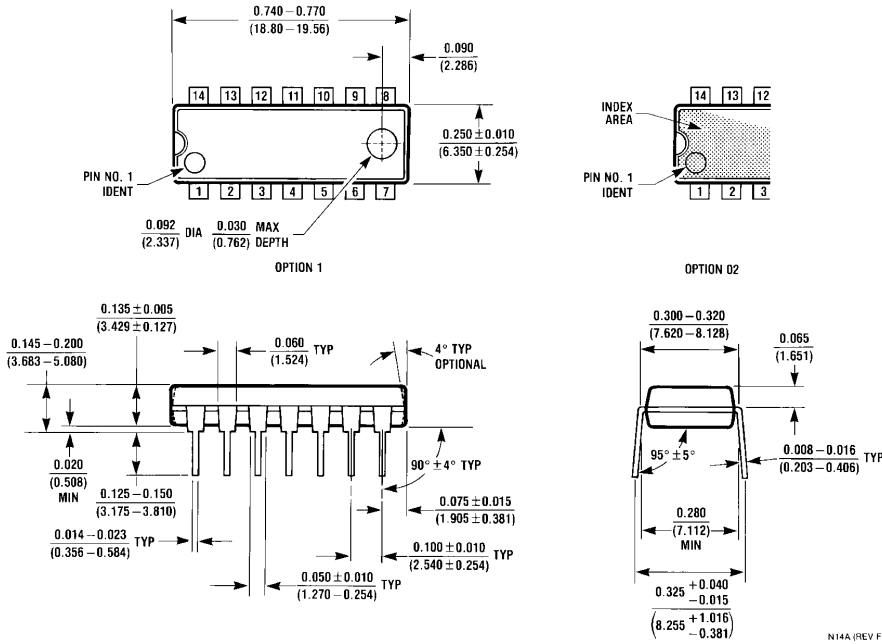


Ceramic Dual-In-Line Package (J)
Order Number DS1489J
NS Package Number J14A



SO Package (M)
Order Number DS1489M or DS1489AM
NS Package Number M14A

Physical Dimensions inches (millimeters) (Continued)



Molded Dual-In-Line Package (N)
Order Number DS1489N or DS1489AN
NS Package Number N14A

N14A (REV F)

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National Semiconductor Corporation
 1111 West Bardin Road
 Arlington, TX 76017
 Tel: 1(800) 272-9959
 Fax: 1(800) 737-7018

<http://www.national.com>

National Semiconductor Europe

Fax: +49 (0) 180-530 85 86
 Email: europe.support@nsc.com
 Deutsch Tel: +49 (0) 180-530 85 85
 English Tel: +49 (0) 180-532 78 32
 Français Tel: +49 (0) 180-532 93 58
 Italiano Tel: +49 (0) 180-534 16 80

National Semiconductor Hong Kong Ltd.

19th Floor, Straight Block,
 Ocean Centre, 5 Canton Rd.
 Tsimshatsui, Kowloon
 Hong Kong
 Tel: (852) 2737-1600
 Fax: (852) 2736-9960

National Semiconductor Japan Ltd.

Tel: 81-043-299-2308
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