

## DS1489/DS1489A Quad Line Receiver

Check for Samples: [DS1489](#), [DS1489A](#)

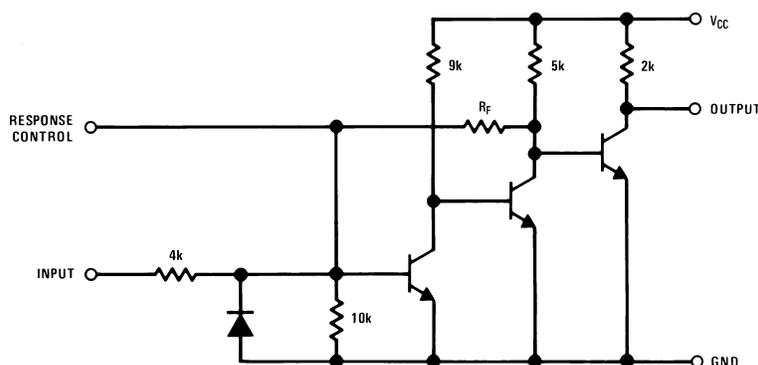
### FEATURES

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

### 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.

### Schematic and Connection Diagrams



( $\frac{1}{4}$  of unit shown)

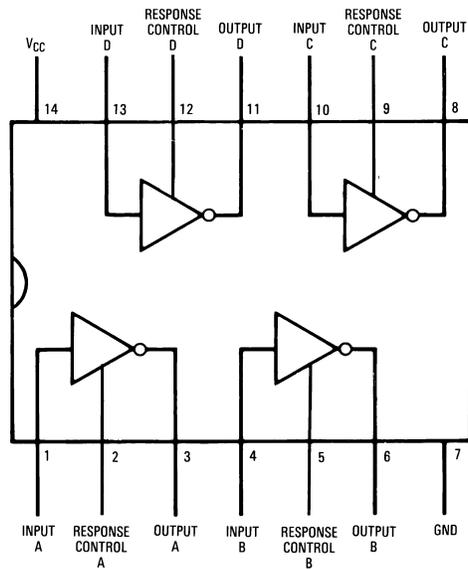
DS1489:  $R_F = 10k$

DS1489A:  $R_F = 2k$



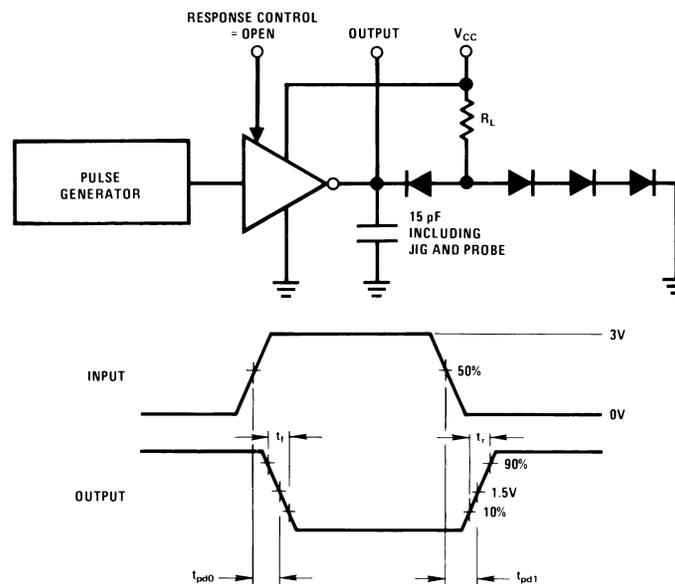
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**Figure 1. Top View  
Dual-In-Line or Small-Out Line Package**

## AC Test Circuit and Voltage Waveforms



**Figure 2.**



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

**Absolute Maximum Ratings <sup>(1)</sup>**

Power Supply Voltage	10V
Input Voltage Range	±30V
Output Load Current	20 mA
Power Dissipation <sup>(2)</sup>	1W
Operating Temperature Range	0°C to +75°C
Storage Temperature Range	-65°C to +150°C
Maximum Power Dissipation <sup>(3)</sup> at 25°C	
Molded DIP Package	1207 mW
SO Package	1042 mW
Lead Temperature (Soldering, 4 sec.)	260°C

- (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.
- (2) Unless otherwise specified min/max limits apply across the 0°C to +75°C temperature range for the DS1489 and DS1489A.
- (3) Derate molded DIP package 9.7 mW/°C above 25°C; derate SO package 8.33 mW/°C above 25°C.

**Electrical Characteristics** (1) (2) (3)

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	$V_{OUT} \leq 0.45V$ ,	DS1489	$T_A = 25^{\circ}C$	1.0	1.25	1.5	V	
					$I_{OUT} = 10\text{ mA}$	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	$V_{OUT} \geq 2.5V$ ,		$T_A = 25^{\circ}C$	0.75	1.00	1.25	V	
					$I_{OUT} = -0.5\text{ mA}$	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	

- (1) Unless otherwise specified min/max limits apply across the  $0^{\circ}C$  to  $+75^{\circ}C$  temperature range for the DS1489 and DS1489A.  
(2) 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.  
(3) These specifications apply for response control pin = open.

### Switching Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$t_{pd1}$	Input to Output "High"	$R_L = 3.9k$ , (Figure 2) (AC Test Circuit)		28	85	ns
	Propagation Delay					
$t_{pd0}$	Input to Output "Low"	$R_L = 390\Omega$ , (Figure 2) (AC Test Circuit)		20	50	ns
	Propagation Delay					
$t_r$	Output Rise Time	$R_L = 3.9k$ , (Figure 2) (AC Test Circuit)		110	175	ns
$t_f$	Output Fall Time	$R_L = 390\Omega$ , (Figure 2) (AC Test Circuit)		9	20	ns

### Typical Characteristics

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

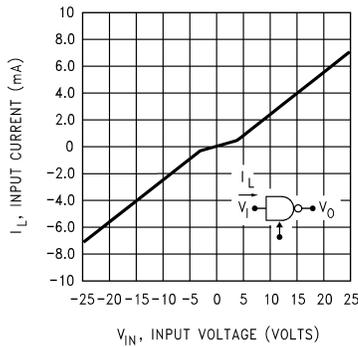


Figure 3. Input Current

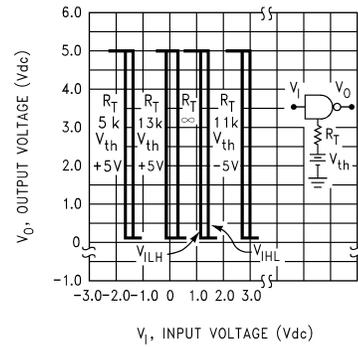


Figure 4. DS1489 Input Threshold Voltage Adjustment

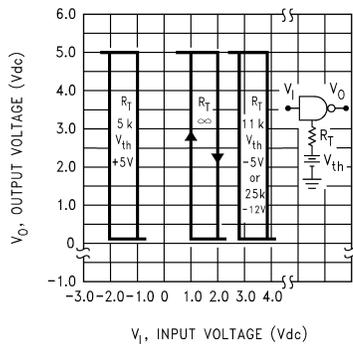


Figure 5. DS1489A Input Threshold Voltage Adjustment

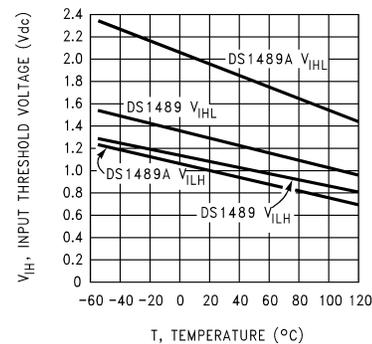


Figure 6. Input Threshold Voltage vs Temperature

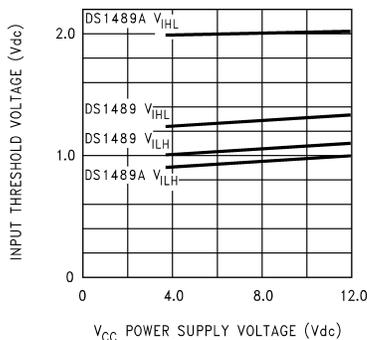


Figure 7. Input Threshold vs Power Supply Voltage

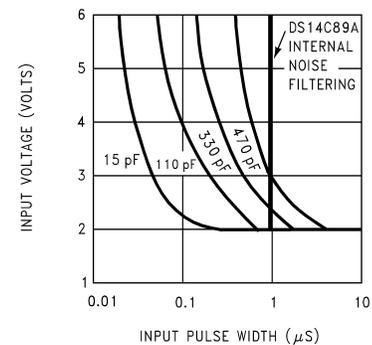
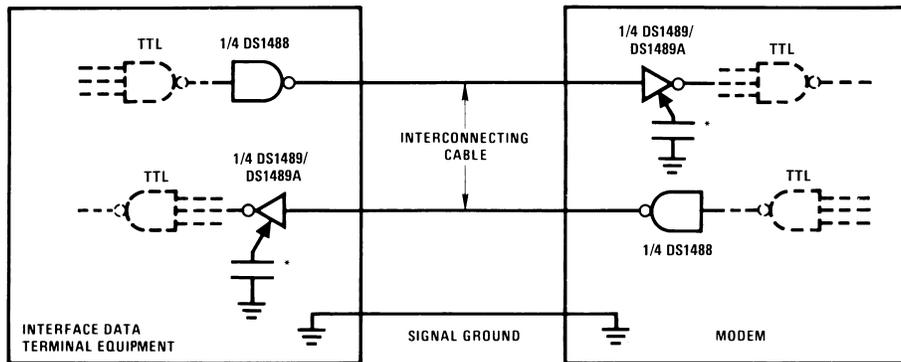


Figure 8. Noise Rejection vs Capacitance for DS1489A

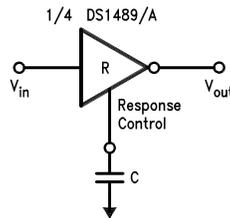
## Typical Application Information



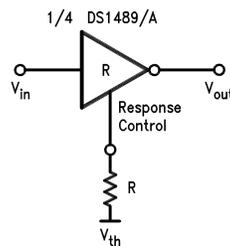
\*Optional for noise filtering.

**Figure 9. Applications Using the Response Control Pin**

**Figure 10. Noise Filter**  
See [Figure 8](#)



**Figure 11. Threshold Shift**  
See [Figure 4](#) [Figure 5](#)



**Figure 12. Noise Filter and Threshold Shift**  
See [Figure 4](#) [Figure 5](#) [Figure 8](#)

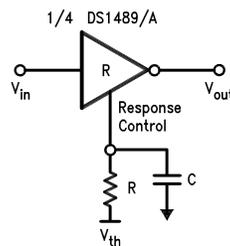
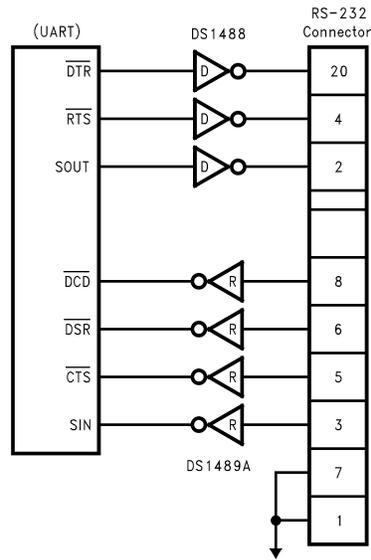


Figure 13. Application of DS1488, DS1489A and UART



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