DS1489/DS1489A Quad Line Receiver

Check for Samples: DS1489, DS1489A

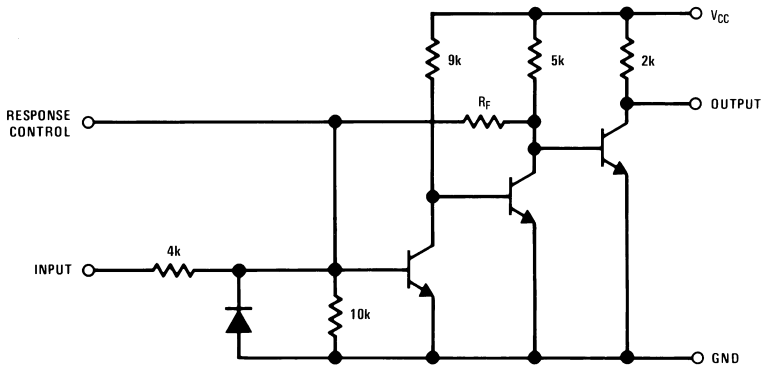
FEATURES

- **Four separate receivers per package**
- **Programmable threshold**
- **Built-in input threshold hysteresis**
- **"Fail safe" operating mode: high output for open inputs**
- **Inputs withstand ±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



(¼ of unit shown)
DS1489: R_F = 10k
DS1489A: R_F = 2k

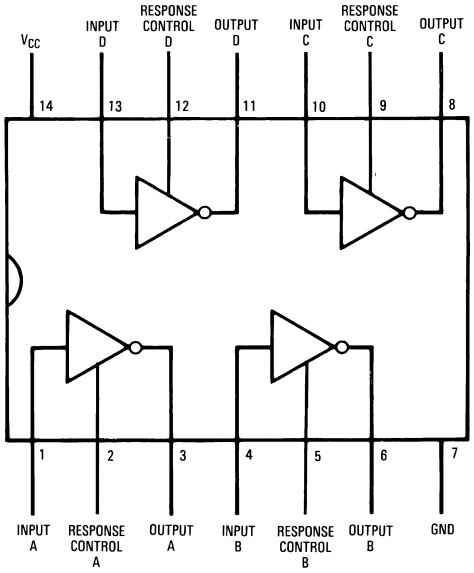


Figure 1. Top View
Dual-In-Line or Small-Out Line Package

AC Test Circuit and Voltage Waveforms

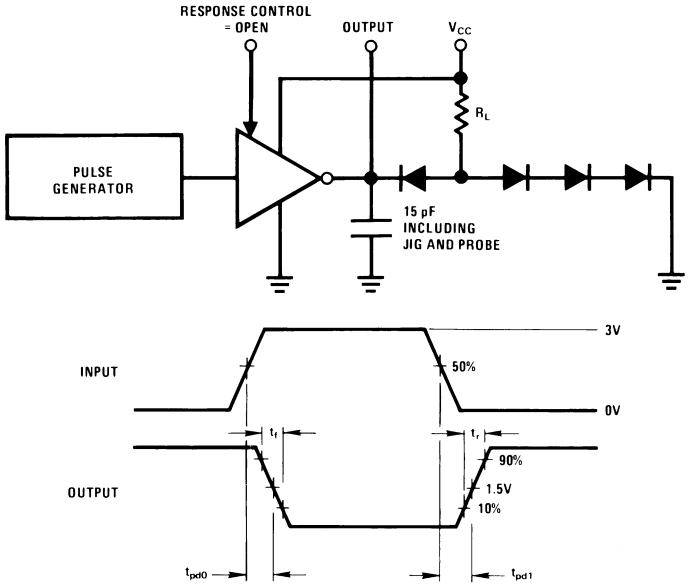


Figure 2.

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 (1)

Power Supply Voltage	10V
Input Voltage Range	±30V
Output Load Current	20 mA
Power Dissipation (2)	1W
Operating Temperature Range	0°C to +75°C
Storage Temperature Range	−65°C to +150°C
Maximum Power Dissipation (3) 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 ±1%, 0°C ≤ T_A ≤ +75°C unless otherwise specified.

Symbol	Parameter	Conditions			Min	Typ	Max	Units
V_{TH}	Input High Threshold Voltage	V_{OUT} ≤ 0.45V,	DS1489	T_A = 25°C	1.0	1.25	1.5	V
		I_{OUT} = 10 mA			0.9		1.6	V
			DS1489A	T_A = 25°C	1.75	2.00	2.25	V
					1.55		2.40	V
V_{TL}	Input Low Threshold Voltage	V_{OUT} ≥ 2.5V,		T_A = 25°C	0.75	1.00	1.25	V
		I_{OUT} = −0.5 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 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 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°C to +75°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°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 = 390Ω, (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 = 390Ω, (Figure 2) (AC Test Circuit)		9	20	ns

Typical Characteristics

V_{CC} = 5.0V, T_A = +25°C unless otherwise noted

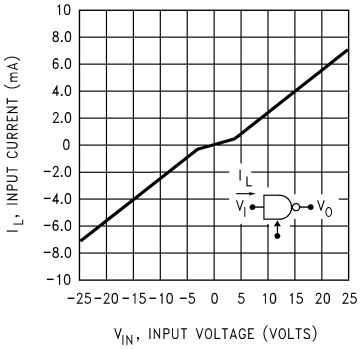


Figure 3. Input Current

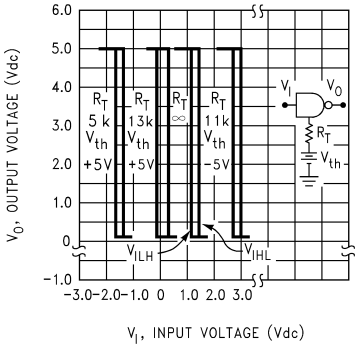


Figure 4. DS1489 Input Threshold Voltage Adjustment

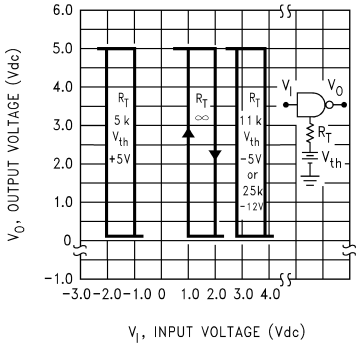


Figure 5. DS1489A Input Threshold Voltage Adjustment

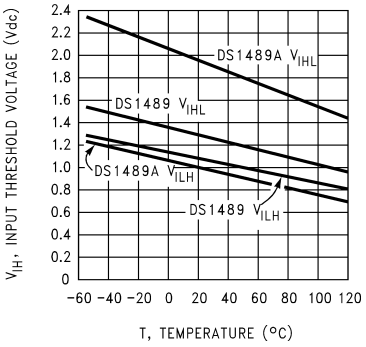


Figure 6. Input Threshold Voltage vs Temperature

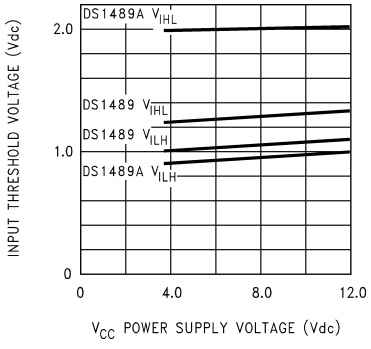


Figure 7. Input Threshold vs Power Supply Voltage

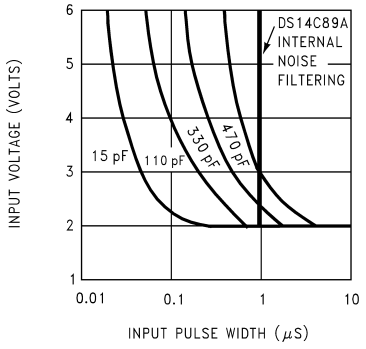
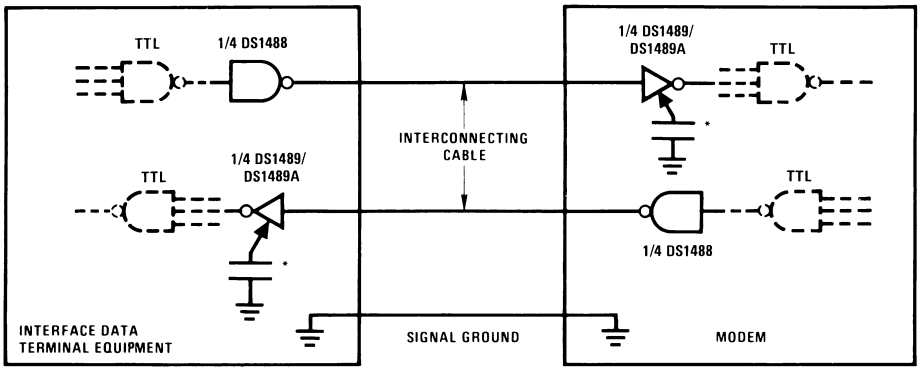


Figure 8. Noise Rejection vs Capacitance for DS1489A

Typical Application Information



*Optional for noise filtering.

Figure 9. Applications Using the Response Control Pin

Figure 10. Noise Filter
See Figure 8

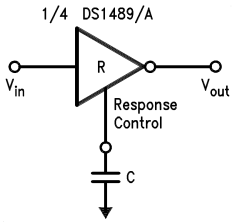


Figure 11. Threshold Shift
See Figure 4 Figure 5

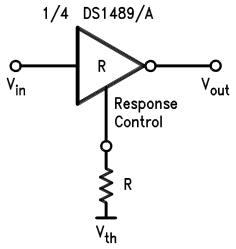


Figure 12. Noise Filter and Threshold Shift
See Figure 4 Figure 5 Figure 8

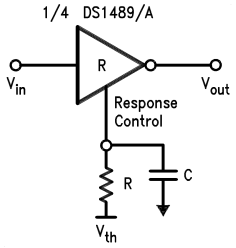
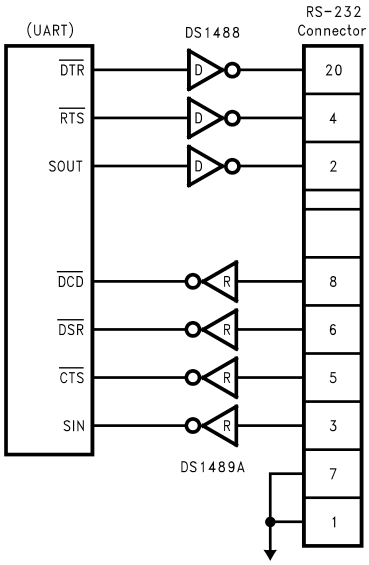


Figure 13. Application of DS1488, DS1489A and UART



IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265