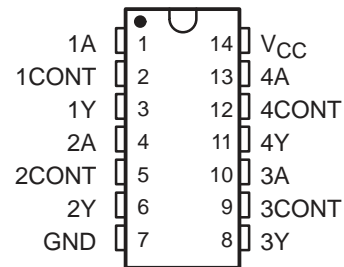


# MC1489, MC1489A, SN55189, SN55189A, SN75189, SN75189A QUADRUPLE LINE RECEIVERS

SLLS095D – SEPTEMBER 1973 – REVISED OCTOBER 1998

- Input Resistance . . . 3 k $\Omega$  to 7 k $\Omega$
- Input Signal Range . . .  $\pm 30$  V
- Operate From Single 5-V Supply
- Built-In Input Hysteresis (Double Thresholds)
- Response Control that Provides:  
Input Threshold Shifting  
Input Noise Filtering
- Meet or Exceed the Requirements of  
TIA/EIA-232-F and ITU Recommendation  
V.28
- Fully Interchangeable With Motorola™  
MC1489 and MC1489A

SN55189, SN55189A . . . J OR W PACKAGE  
MC1489, MC1489A, SN75189, SN75189A  
D, N, OR NS† PACKAGE  
(TOP VIEW)



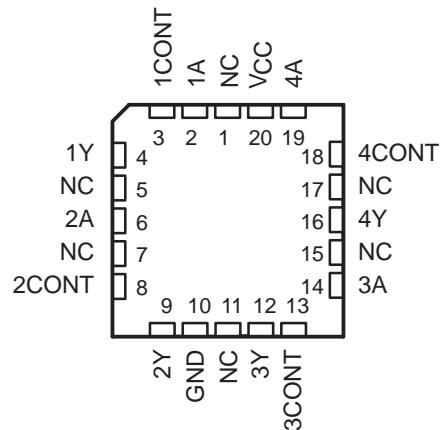
† The NS package is only available left-end taped and reeled.  
For SN75189, order SN75189NSR.

## description

These devices are monolithic low-power Schottky quadruple line receivers designed to satisfy the requirements of the standard interface between data-terminal equipment and data-communication equipment as defined by TIA/EIA-232-F. A separate response-control (CONT) terminal is provided for each receiver. A resistor or a resistor and bias-voltage source can be connected between this terminal and ground to shift the input threshold levels. An external capacitor can be connected between this terminal and ground to provide input noise filtering.

The SN55189 and SN55189A are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The MC1489, MC1489A, SN75189, and SN75189A are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN55189, SN55189A . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

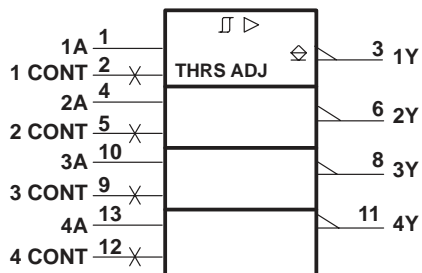
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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

# MC1489, MC1489A, SN55189, SN55189A, SN75189, SN75189A QUADRUPLE LINE RECEIVERS

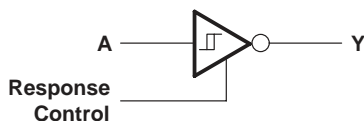
SLLS095D – SEPTEMBER 1973 – REVISED OCTOBER 1998

## logic symbol†

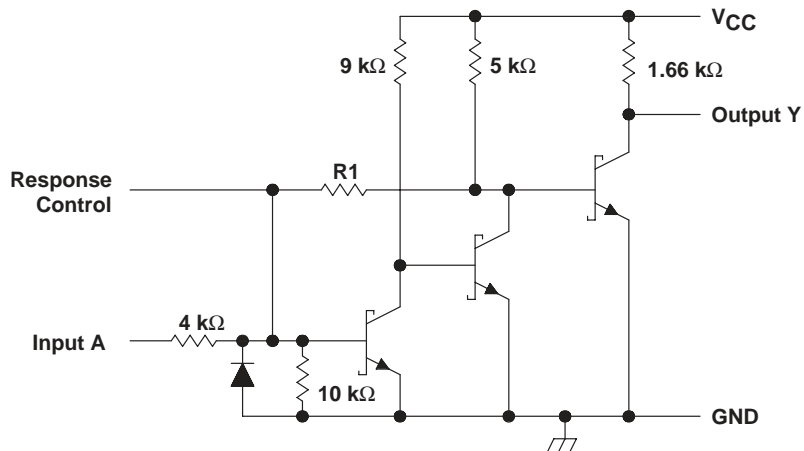


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for the D, J, N, NS, and W packages.

## logic diagram (positive logic)



## schematic (each receiver)



	MC1489 SN55189 SN75189	MC1489A SN55189A SN75189A
R1	8.4 kΩ	1.84 kΩ

Resistor values shown are nominal.

# MC1489, MC1489A, SN55189, SN55189A, SN75189, SN75189A QUADRUPLE LINE RECEIVERS

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## absolute maximum ratings over operating free-air temperature (unless otherwise noted)†

Supply voltage, $V_{CC}$ (see Note 1)	10 V
Input voltage, $V_I$	$\pm 30$ V
Output voltage, $I_O$	20 mA
Continuous total power dissipation	See Dissipation Rating Table
Operating free-air temperature range, $T_A$ : SN55189, SN55189A	–55°C to 125°C
MC1489, MC1489A, SN75189, SN75189A	0°C to 70°C
Storage temperature range, $T_{stg}$	–65°C to 150°C
Case temperature for 60 seconds, FK package	260°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J or W package	300°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D, N, or NS package	260°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltage values are with respect to the network ground terminal.

**DISSIPATION RATING TABLE**

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 125^\circ\text{C}$ POWER RATING
D	950 mW	7.6 mW/°C	608 mW	N/A
FK	1375 mW	11.0 mW/°C	880 mW	275 mW
J‡	1375 mW	11.0 mW/°C	880 mW	275 mW
N	1150 mW	9.2 mW/°C	736 mW	N/A
NS	625 mW	4.0 mW/°C	445 mW	N/A
W	1000 mW	8.0 mW/°C	640 mW	200 mW

‡ In the J package, SN55189 and SN55189A chips are either silver glass or alloy mounted.

## recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, $V_{CC}$	4.5	5	5.5	V
Input voltage, $V_I$	–25		25	V
High-level output current, $I_{OH}$			–0.5	mA
Low-level output current, $I_{OL}$			10	mA
Operating free-air temperature, $T_A$	0		70	°C



# MC1489, MC1489A, SN55189, SN55189A, SN75189, SN75189A QUADRUPLE LINE RECEIVERS

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electrical characteristics over operating free-air temperature range,  $V_{CC} = 5\text{ V} \pm 1\%$  (unless otherwise noted)

PARAMETER	TEST FIGURE	TEST CONDITIONS†		SN55189 SN55189A			MC1489, MC1489A SN75189 SN75189A			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
$V_{IT+}$ Positive-going input threshold voltage	1	'89	$T_A = 25^\circ\text{C}$	1	1.3	1.5	1	1.3	1.5	V
			$T_A = 0^\circ\text{C to } 70^\circ\text{C}$				0.9	1.6		
			$T_A = -55^\circ\text{C to } 125^\circ\text{C}$	0.6	1.9					
		'89A	$T_A = 25^\circ\text{C}$	1.75	1.9	2.25	1.75	1.9	2.25	
			$T_A = 0^\circ\text{C to } 70^\circ\text{C}$				1.55	2.25		
			$T_A = -55^\circ\text{C to } 125^\circ\text{C}$	1.30	2.65					
$V_{IT-}$ Negative-going input threshold voltage	1	'89, '89A	$T_A = 25^\circ\text{C}$	0.75	1.0	1.25	0.75	1.0	1.25	V
			$T_A = 0^\circ\text{C to } 70^\circ\text{C}$				0.65	1.25		
			$T_A = -55^\circ\text{C to } 125^\circ\text{C}$	0.35	1.6					
$V_{OH}$ High-level output voltage	1	$V_I = 0.75\text{ V}, I_{OH} = -0.5\text{ mA}$		2.6	4	5	2.6	4	5	V
		Input open, $I_{OH} = -0.5\text{ mA}$		2.6	4	5	2.6	4	5	
$V_{OL}$ Low-level output voltage	1	$V_I = 3\text{ V}, I_{OL} = 10\text{ mA}$		0.2		0.45	0.2		0.45	V
$I_{IH}$ High-level input current	2	$V_I = 25\text{ V}$		3.6	8.3		3.6	8.3		mA
		$V_I = 3\text{ V}$		0.43			0.43			
$I_{IL}$ Low-level input current	2	$V_I = -25\text{ V}$		-3.6	-8.3		-3.6	-8.3		mA
		$V_I = -3\text{ V}$		-0.43			-0.43			
$I_{OS}$ Short-circuit output current	3			-3		-3				mA
$I_{CC}$ Supply current	2	$V_I = 5\text{ V},$ Outputs open		20		26	20		26	mA

† All characteristics are measured with the response-control terminal open.

‡ All typical values are at  $V_{CC} = 5\text{ V}, T_A = 25^\circ\text{C}$ .

switching characteristics,  $V_{CC} = 5\text{ V}, C_L = 15\text{ pF}, T_A = 25^\circ\text{C}$

PARAMETER	TEST FIGURE	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$ Propagation delay time, low- to high-level output	4	$R_L = 3.9\text{ k}\Omega$	25		85	ns
$t_{PHL}$ Propagation delay time, high- to low-level output		$R_L = 390\ \Omega$	25		50	
$t_{TLH}$ Transition time, low- to high-level output		$R_L = 3.9\text{ k}\Omega$	120	175		ns
$t_{THL}$ Transition time, high- to low-level output		$R_L = 390\ \Omega$	10	20		



PARAMETER MEASUREMENT INFORMATION†

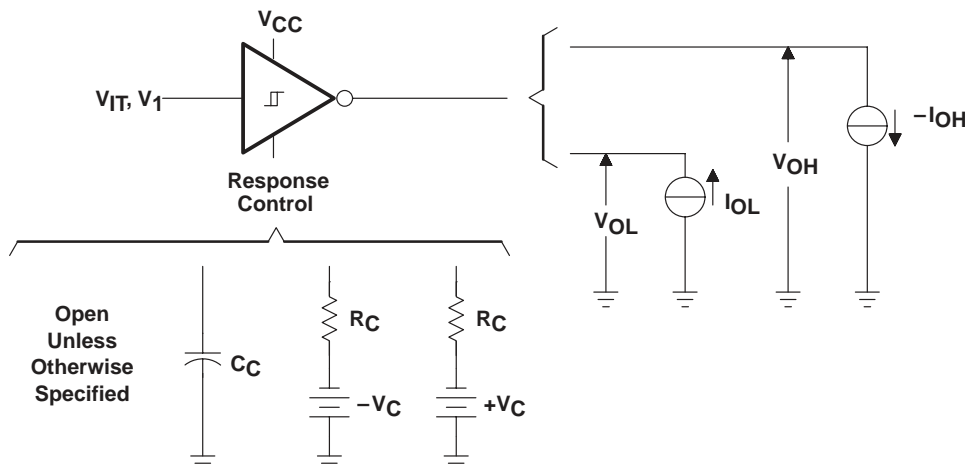
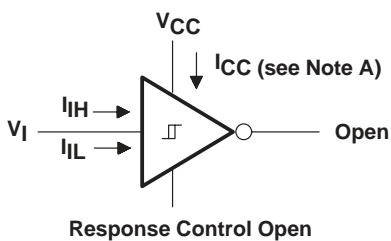


Figure 1.  $V_{IT+}$ ,  $V_{IT-}$ ,  $V_{OH}$ ,  $V_{OL}$



NOTE A:  $I_{CC}$  is tested for all four receivers simultaneously.

Figure 2.  $I_{iH}$ ,  $I_{iL}$ ,  $I_{CC}$

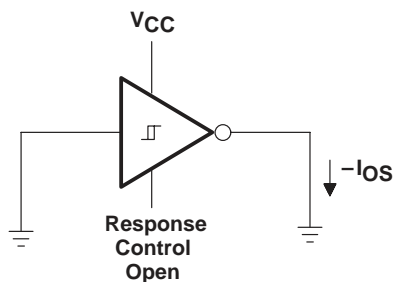


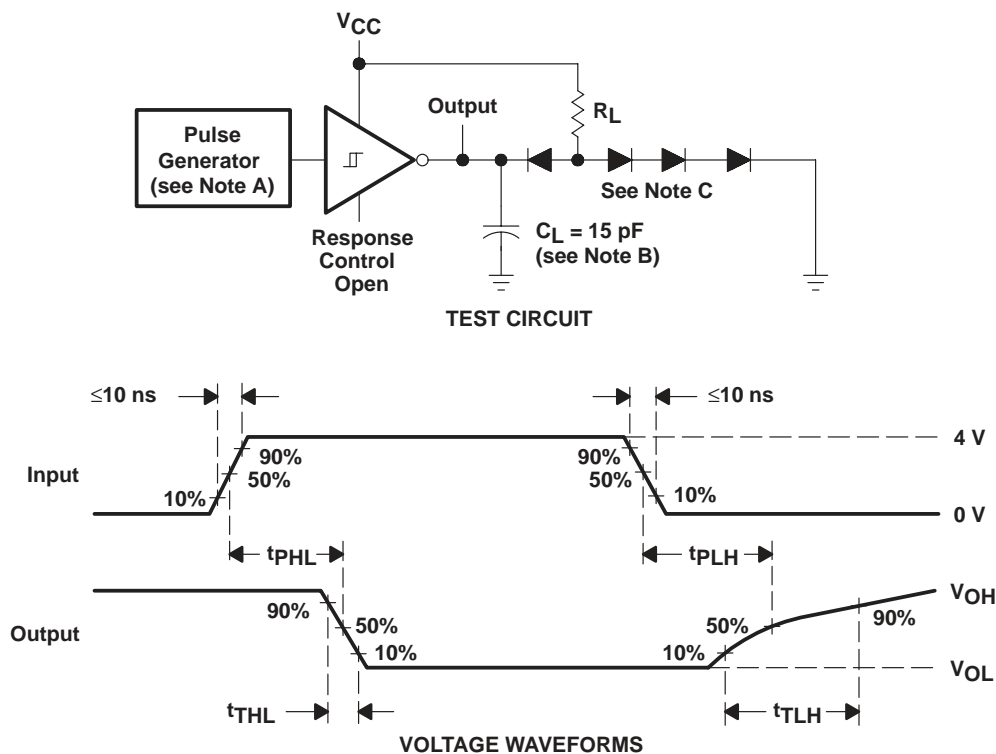
Figure 3.  $I_{OS}$

† Arrows indicate actual direction of current flow. Current into a terminal is a positive value.

# MC1489, MC1489A, SN55189, SN55189A, SN75189, SN75189A QUADRUPLE LINE RECEIVERS

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## PARAMETER MEASUREMENT INFORMATION



- NOTES: A. The pulse generator has the following characteristics:  $Z_O = 50 \Omega$ ,  $t_w = 500 \text{ ns}$ .  
 B.  $C_L$  includes probe and jig capacitances.  
 C. All diodes are 1N3064 or equivalent.

Figure 4. Test Circuit and Voltage Waveforms

# MC1489, MC1489A, SN55189, SN55189A, SN75189, SN75189A QUADRUPLE LINE RECEIVERS

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## TYPICAL CHARACTERISTICS

SN65189, SN75189  
OUTPUT VOLTAGE  
vs  
INPUT VOLTAGE

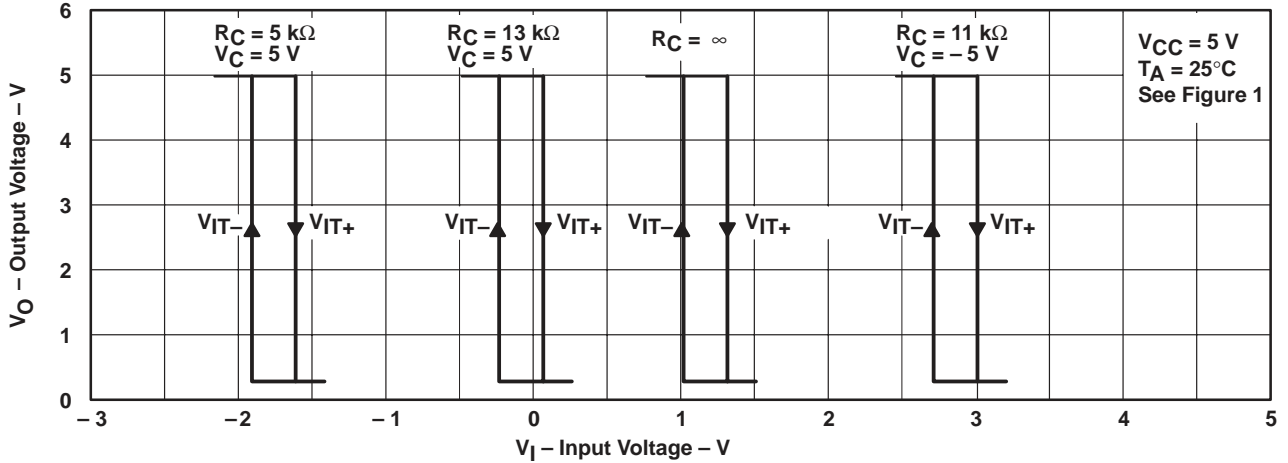


Figure 5

SN65189A, SN75189A  
OUTPUT VOLTAGE  
vs  
INPUT VOLTAGE

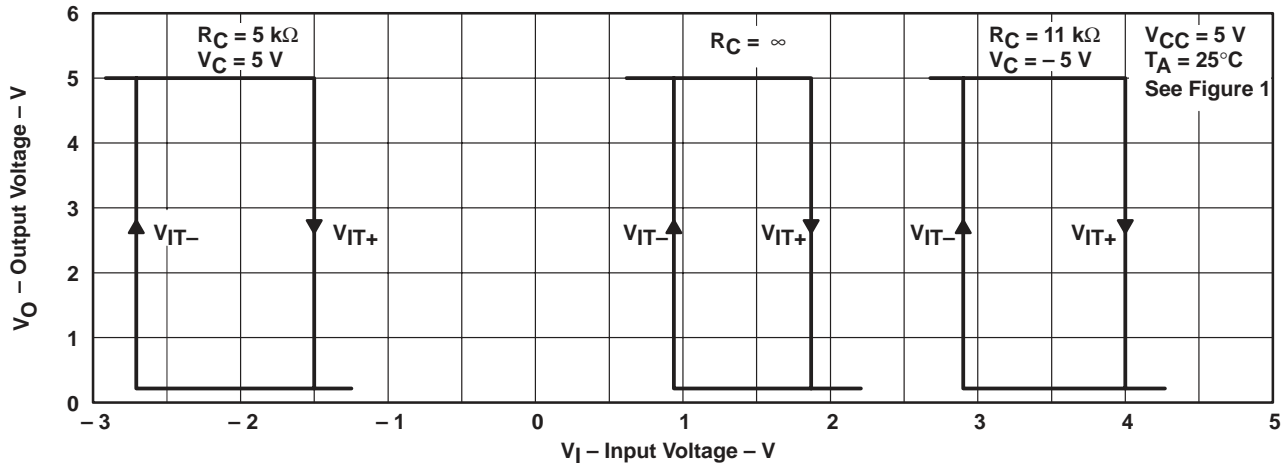


Figure 6

# MC1489, MC1489A, SN55189, SN55189A, SN75189, SN75189A QUADRUPLE LINE RECEIVERS

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## TYPICAL CHARACTERISTICS†

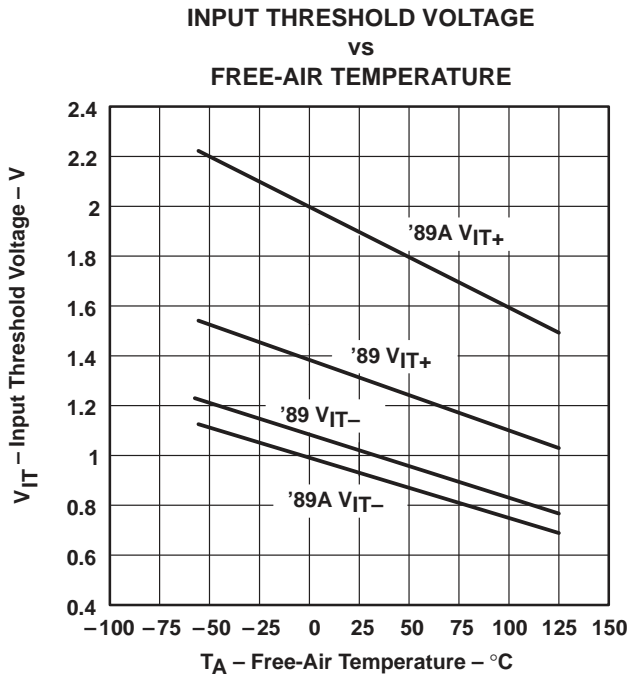


Figure 7

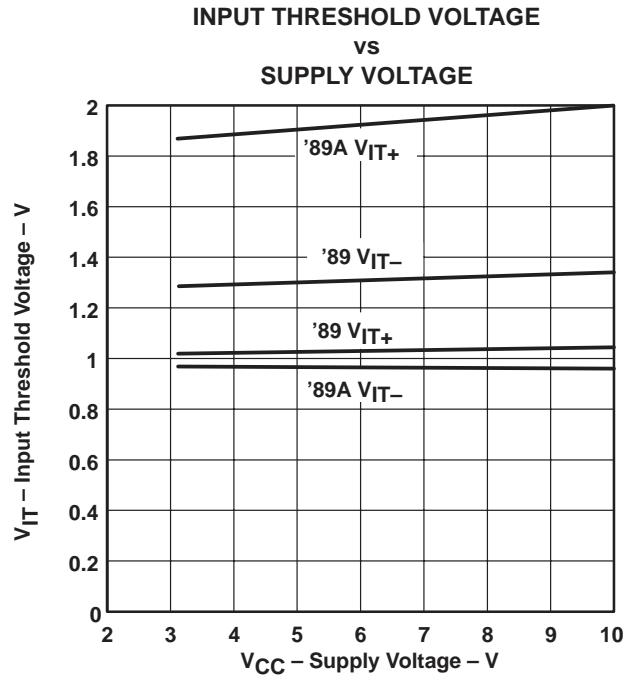
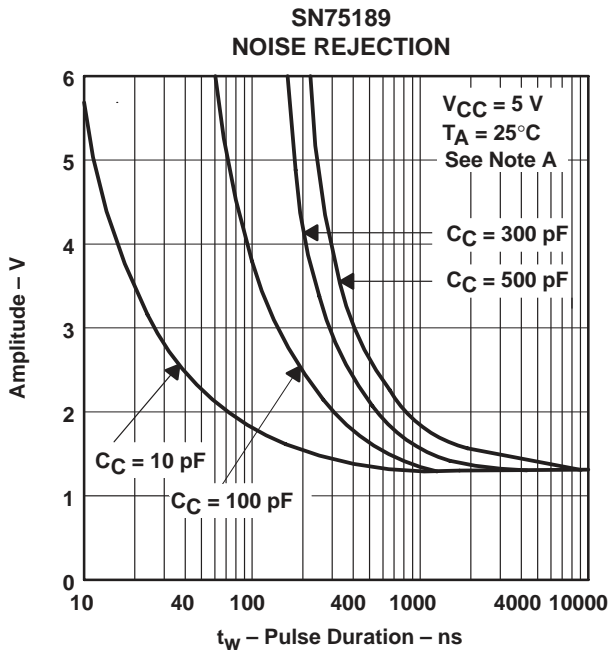
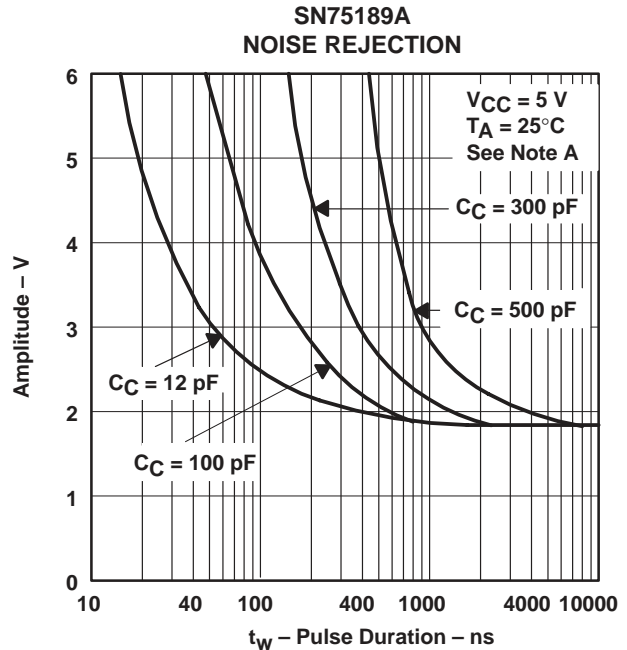


Figure 8



NOTE A: Maximum amplitude of a positive-going pulse that, starting from 0 V, will not cause a change in the output level.

Figure 9



NOTE A: Maximum amplitude of a positive-going pulse that, starting from 0 V, will not cause a change in the output level.

Figure 10

† Data for free-air temperatures below 0°C and above 70°C are applicable to SN55189 and SN55189A circuits only.



TYPICAL CHARACTERISTICS

INPUT CURRENT  
vs  
INPUT VOLTAGE

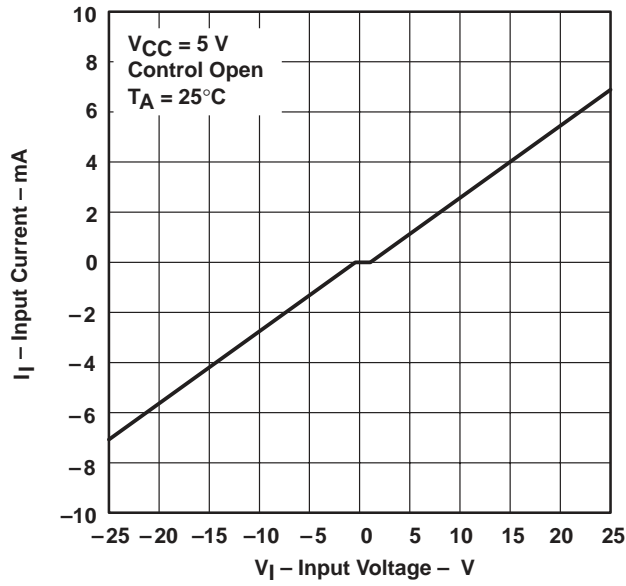


Figure 11

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PRODUCT FOLDER | PRODUCT INFO: [FEATURES](#) | [DESCRIPTION](#) | [DATASHEETS](#) | [PRICING/AVAILABILITY/PKG](#) | [APPLICATION NOTES](#) | [MORE LITERATURE](#)

SN55189A, Quadruple Line Receiver  
DEVICE STATUS: ACTIVE

PARAMETER NAME	SN55189A	SN75189A
Receivers Per Package	4	4
Supply Voltage(s) (V)	5	5
Receiver tpd (ns)		85
ICC (max) (mA)		26
Footprint	MC1489	MC1489

#### FEATURES

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- Input Resistance...3 k  $\Omega$  to 7 k  $\Omega$
- Input Signal Range... $\pm$ 30 V
- Operate From Single 5-V Supply
- Built-In Input Hysteresis (Double Thresholds)
- Response Control that Provides:
  - Input Threshold Shifting
  - Input Noise Filtering
- Meet or Exceed the Requirements of TIA/EIA-232-F and ITU Recommendation V.28
- Fully Interchangeable With Motorola™ MC1489 and MC1489A

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#### DESCRIPTION

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These devices are monolithic low-power Schottky quadruple line receivers designed to satisfy the requirements of the standard interface between data-terminal equipment and data-communication equipment as defined by TIA/EIA-232-F. A separate response-control (CONT) terminal is provided for each receiver. A resistor or a resistor and bias-voltage source can be connected between this terminal and ground to shift the input threshold levels. An external capacitor can be connected between this terminal and ground to provide input noise filtering.

The SN55189 and SN55189A are characterized for operation over the full military temperature range of -55°C to 125°C. The MC1489, MC1489A, SN75189, and SN75189A are characterized for operation from 0°C to 70°C.

#### TECHNICAL DOCUMENTS

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#### DATASHEET

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Full datasheet in Acrobat PDF: [sn55189a.pdf](#) (149 KB,Rev.D) (Updated: 10/28/1998)

#### APPLICATION NOTES

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- [Analog Applications Journal \(Rev. A\)](#) (SLYT010A - Updated: 03/17/2000)
- [Interface Circuits for TIA/EIA-232-F \(Rev. A\)](#) (SLLA037A - Updated: 09/19/2002)
- [Low-Voltage, Single-Supply 232-Standard Interface Solutions \(Rev. A\)](#) (SLLA083A - Updated: 09/19/2000)

- [Signaling Rate versus Transfer Rate](#) (SLLA098 - Updated: 03/01/2001)

[MORE LITERATURE](#)

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- [Enhanced Plastic Portfolio Brochure](#) (SGZB004, 387 KB - Updated: 08/19/2002)
- [QML Class V Space Products Military Brief \(Rev. A\)](#) (SGZN001A, 257 KB - Updated: 10/07/2002)

[PRICING/ AVAILABILITY/ PKG](#)

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DEVICE INFORMATION Updated Daily								TI INVENTORY STATUS As Of 09:00 AM GMT, 17 Apr 2003			REPORTED DISTRIBUTOR INVENTORY As Of 09:00 AM GMT, 17 Apr 2003		
ORDERABLE DEVICE	STATUS	PACKAGE TYPE   PINS	TEMP (°C)	DSCC NUMBER	PRODUCT CONTENT	BUDGETARY PRICING QTY   \$US	STD PACK QTY	IN STOCK	IN PROGRESS QTY   DATE	LEAD TIME	DISTRIBUTOR COMPANY   REGION	IN STOCK	PURCHASE
5962-86888022A	ACTIVE	<a href="#">LCCC (FK)</a>   20	-55 TO 125		<a href="#">View Contents</a>	1KU   9.90	1	<a href="#">201*</a>		7 WKS	<a href="#">Avnet</a>   Americas	16	<a href="#">BUY NOW</a>
5962-8688802CA	ACTIVE	<a href="#">CDIP (J)</a>   14	-55 TO 125		<a href="#">View Contents</a>	1KU   2.12	1	<a href="#">146*</a>	279   06 May	7 WKS	<a href="#">Avnet</a>   Americas	259	<a href="#">BUY NOW</a>
									75   12 May		<a href="#">Avnet-SILICA</a>   Europe	89	<a href="#">BUY NOW</a>
5962-8688802DA	ACTIVE	<a href="#">CFP (W)</a>   14	-55 TO 125		<a href="#">View Contents</a>	1KU   16.02	1	<a href="#">187*</a>		7 WKS	None Reported <a href="#">View Distributors</a>		
SN55189AJ	ACTIVE	<a href="#">CDIP (J)</a>   14	-55 TO 125		<a href="#">View Contents</a>	1KU   1.79	1	<a href="#">970*</a>	694   06 May	7 WKS	<a href="#">Avnet</a>   Americas	262	<a href="#">BUY NOW</a>
									200   12 May		<a href="#">Avnet-SILICA</a>   Europe	106	<a href="#">BUY NOW</a>
									300   23 May				
SNJ55189AFK	ACTIVE	<a href="#">LCCC (FK)</a>   20	-55 TO 125	5962-86888022A	<a href="#">View Contents</a>	1KU   9.90	1	<a href="#">410*</a>		7 WKS	None Reported <a href="#">View Distributors</a>		
SNJ55189AJ	ACTIVE	<a href="#">CDIP (J)</a>   14	-55 TO 125	5962-8688802CA	<a href="#">View Contents</a>	1KU   2.12	1	<a href="#">21*</a>		7 WKS	<a href="#">Avnet-SILICA</a>   Europe	275	<a href="#">BUY NOW</a>
SNJ55189AW	ACTIVE	<a href="#">CFP (W)</a>   14	-55 TO 125	5962-8688802DA	<a href="#">View Contents</a>	1KU   16.02	1	<a href="#">219*</a>		7 WKS	<a href="#">Rochester Electronics</a>   Americas	32	<a href="#">BUY NOW</a>

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