

## Quad Line Driver/Receiver

### GENERAL DESCRIPTION

The XR-1488 is a monolithic quad line driver designed to interface data terminal equipment with data communications equipment in conformance with the specifications of EIA Standard No. RS232C. This extremely versatile integrated circuit can be used to perform a wide range of applications. Features such as output current limiting, independent positive and negative power supply driving elements, and compatibility with all DTL and TTL logic families greatly enhance the versatility of the circuit.

The XR-1489A is a monolithic quad line receiver designed to interface data terminal equipment with data communications equipment. The XR-1489A quad receiver along with its companion circuit, the XR-1488 quad driver, provide a complete interface system between DTL or TTL logic levels and the RS232C defined voltage and impedance levels.

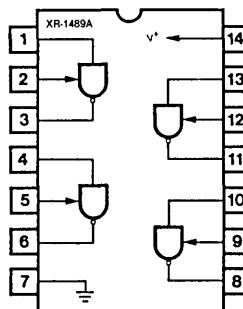
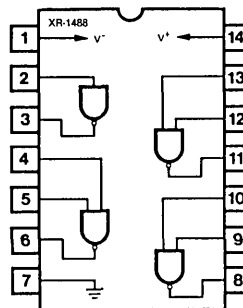
### ABSOLUTE MAXIMUM RATINGS

Power Supply		
XR-1488		$\pm 15$ Vdc
XR-1489A		+10 Vdc
Power Dissipation		
Ceramic Package		1000 mW
Derate above +25°C		6.7 mW/°C
Plastic Package		650 mW/°C
Derate above +25°C		5 mW/°C

### ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-1488N	Ceramic	0°C to +70°C
XR-1488P	Plastic	0°C to +70°C
XR-1489AN	Ceramic	0°C to +70°C
XR-1489AP	Plastic	0°C to +70°C

### FUNCTIONAL BLOCK DIAGRAMS



### SYSTEM DESCRIPTION

The XR-1488 and XR-1489A are a matched set of quad line drivers and line receivers designed for interfacing between TTL/DTL and RS232C data communication lines.

The XR-1488 contains four independent split supply line drivers, each with a  $\pm 10$  mA current limited output. For RS232C applications, the slew rate can be reduced to the 30 V/ $\mu$ S limit by shunting the output to ground with a 410 pF capacitor. The XR-1489A contains four independent line receivers, designed for interfacing RS232C to TTL/DTL. Each receiver features independently programmable switching thresholds with hysteresis, and input protection to  $\pm 30$  V. The output can typically source 3 mA and sink 20 mA.

# XR-1488/1489A

## ELECTRICAL CHARACTERISTICS

Test Conditions: ( $V^+ = +9.0 \pm 1\% \text{ Vdc}$ ,  $V^- = -9.0 \pm 1\% \text{ Vdc}$ ,  $T_A = 0^\circ\text{C}$  to  $+70^\circ\text{C}$ , unless otherwise noted)

PARAMETERS	XR-1488 LIMITS			UNITS	CONDITIONS
	MIN	TYP	MAX		
Forward Input Current		1.0	1.6	mA	$V_{in} = 0 \text{ Vdc}$
Reverse Input Current			10	$\mu\text{A}$	$V_{in} = +5.0 \text{ Vdc}$
Output Voltage High $V^+ = +9.0 \text{ Vdc}$ , $V^- = -9.0 \text{ Vdc}$ $V^+ = +13.2 \text{ Vdc}$ , $V^- = -13.2 \text{ Vdc}$	+6.0 +9.0	+7.0 +10.5		Vdc	$V_{in} = 0.8 \text{ Vdc}$ , $R_L = 3.0 \text{ k}\Omega$
Output Voltage Low $V^+ = +9.0 \text{ Vdc}$ , $V^- = -9.0 \text{ Vdc}$ $V^+ = +13.2 \text{ Vdc}$ , $V^- = -13.2 \text{ Vdc}$	-6.0 -9.0	-7.0 -10.5		Vdc	$V_{in} = 1.9 \text{ Vdc}$ , $R_L = 3.0 \text{ k}\Omega$
Positive Output Short-Circuit Current	+6.0	+10	+12	mA	
Negative Output Short-Circuit Current	-6.0	-10	-12	mA	
Output Resistance $V^+ = V^- = 0$	300			Ohms	$ V_o  = \pm 2.0 \text{ V}$
Positive Supply Current ( $R_L = \infty$ ) $V_{in} = 1.9 \text{ Vdc}$ , $V^+ = +9.0 \text{ Vdc}$ $V_{in} = 0.8 \text{ Vdc}$ , $V^+ = +9.0 \text{ Vdc}$ $V_{in} = 1.9 \text{ Vdc}$ , $V^+ = +12 \text{ Vdc}$ $V_{in} = 0.8 \text{ Vdc}$ , $V^+ = +12 \text{ Vdc}$ $V_{in} = 1.9 \text{ Vdc}$ , $V^+ = +15 \text{ Vdc}$ $V_{in} = 0.8 \text{ Vdc}$ , $V^+ = +15 \text{ Vdc}$		+15 +4.5 +19 +5.5	+20 +6.0 +25 +7.0 +34 +12	mA	
Negative Supply Current ( $R_L = \infty$ ) $V_{in} = 1.9 \text{ Vdc}$ , $V^- = -9.0 \text{ Vdc}$ $V_{in} = 0.8 \text{ Vdc}$ , $V^- = -9.0 \text{ Vdc}$ $V_{in} = 1.9 \text{ Vdc}$ , $V^- = -12 \text{ Vdc}$ $V_{in} = 0.8 \text{ Vdc}$ , $V^- = -12 \text{ Vdc}$ $V_{in} = 1.9 \text{ Vdc}$ , $V^- = -15 \text{ Vdc}$ $V_{in} = 0.8 \text{ Vdc}$ , $V^- = -15 \text{ Vdc}$		-13 0 -18 0	-17 0 -23 0 -34 -2.5	mA	
Power Dissipation $V^+ = 9.0 \text{ Vdc}$ , $V^- = -9.0 \text{ Vdc}$ $V^+ = 12 \text{ Vdc}$ , $V^- = 12 \text{ Vdc}$			333 576	mW	
<b>Switching Characteristics</b> ( $V^+ = +9.0 \pm 1\% \text{ Vdc}$ , $V^- = -9.0 \pm 1\% \text{ Vdc}$ , $T_A = +25^\circ\text{C}$ )					
Propagation Delay time ( $t_{pd}^+$ )		150	200	ns	$Z_L = 3.0\text{k}$ and $15 \text{ pF}$
Fall Time		45	75	ns	$Z_L = 3.0\text{k}$ and $15 \text{ pF}$
Propagation Delay Time ( $t_{pd}^-$ )		65	120	ns	$Z_L = 3.0\text{k}$ and $15 \text{ pF}$
Rise Time		55	100	ns	$Z_L = 3.0\text{k}$ and $15 \text{ pF}$

# XR-1488/1489A

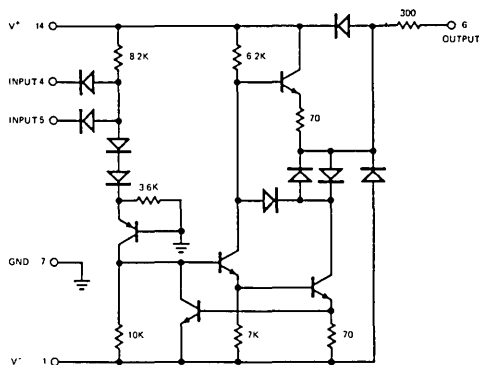
## ELECTRICAL CHARACTERISTICS

**Test Conditions:** Response control pin is open. ( $V^+ = +5.0 \text{ Vdc} \pm 1\%$ ,  $T_A = 0^\circ\text{C}$  to  $+75^\circ\text{C}$ , unless otherwise noted)

PARAMETERS	XR-1489 LIMITS			UNITS	CONDITIONS
	MIN	TYP	MAX		
Positive Input Current $V_{in} = +25 \text{ Vdc}$ $V_{in} = +3.0 \text{ Vdc}$	3.6 0.43		8.3	mA	
Negative Input Current $V_{in} = -25 \text{ Vdc}$  $V_{in} = -3.0 \text{ Vdc}$	-3.6  -0.43		- 8.3	mA	
Input Turn-On Threshold Voltage $T_A = +25^\circ\text{C}$ , $V_{OL} \leq 0.45 \text{ V}$	1.75	1.95	2.25	Vdc	
Input Turn-Off Threshold Voltage $T_A = +25^\circ\text{C}$ , $V_{OH} \geq 2.5 \text{ V}$	0.75	0.8	1.25	Vdc	$I_L = -0.5 \text{ mA}$
Output Voltage High $V_{in} = 0.75 \text{ V}$ Input Open Circuit	2.6 2.6	4.0 4.0	5.0 5.0	Vdc	$I_L = -0.5 \text{ mA}$
Output Voltage Low		0.2	0.45	Vdc	$V_{in} = 3.0 \text{ V}$ , $I_L = 10 \text{ mA}$
Output Short-Circuit Current		3.0		mA	
Power Supply Current		20	26	mA	$V_{in} = +5.0 \text{ Vdc}$
Power Dissipation		100	130	mW	$V_{in} = +5.0 \text{ Vdc}$
<b>Switching Characteristics (<math>V^+ = 5.0 \text{ Vdc} \pm 1\%</math>, <math>T_A = +25^\circ\text{C}</math>)</b>					
Propagation Delay Time ( $t_{PLH}$ )		25	85	ns	$R_L = 3.9 \text{ k}\Omega$
Rise Time		120	175	ns	$R_L = 3.9 \text{ k}\Omega$
Propagation Delay Time ( $t_{PHL}$ )		25	50	ns	$R_L = 390 \text{ k}\Omega$
Fall Time		10	20	ns	$R_L = 390 \text{ k}\Omega$

## EQUIVALENT SCHEMATIC DIAGRAMS

XR-1488



XR-1489A

