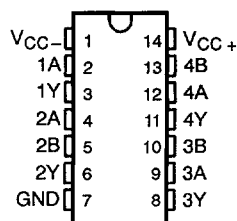


MC1488, SN55188, SN75188 QUAD LINE DRIVERS

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- Meets Specifications of EIA RS-232-C
- Designed to Be Interchangeable With Motorola MC1488
- Current-Limited Output: 10 mA Typ
- Power-Off Output Impedance: 300 Ω Min
- Slew Rate Control by Load Capacitor
- Flexible Supply Voltage Range
- Input Compatible With Most TTL Circuits

SN55188 . . . J OR W PACKAGE
MC1488, SN75188 . . . D OR N PACKAGE
(TOP VIEW)



description

The MC1488, SN55188, and SN75188 are monolithic quad line drivers designed to interface data terminal equipment with data communications equipment in conformance with EIA Standard RS-232-C using a diode in series with each supply-voltage terminal as shown under typical applications.

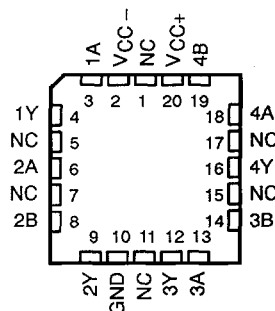
The and SN55188 is characterized for operation over the full military temperature range of -55°C to 125°C . The MC1488 and SN75188 are characterized for operation from 0°C to 70°C .

FUNCTION TABLE
(drivers 2 through 4)

A	B	Y
H	H	L
L	X	H
X	L	H

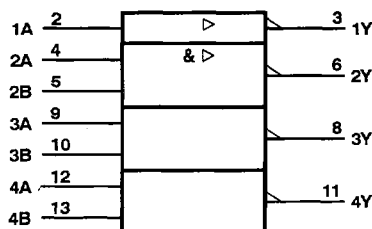
H = high level, L = low level,
X = irrelevant

SN55188 . . . FK PACKAGE
(TOP VIEW)



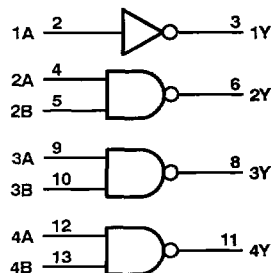
NC — No internal connection

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



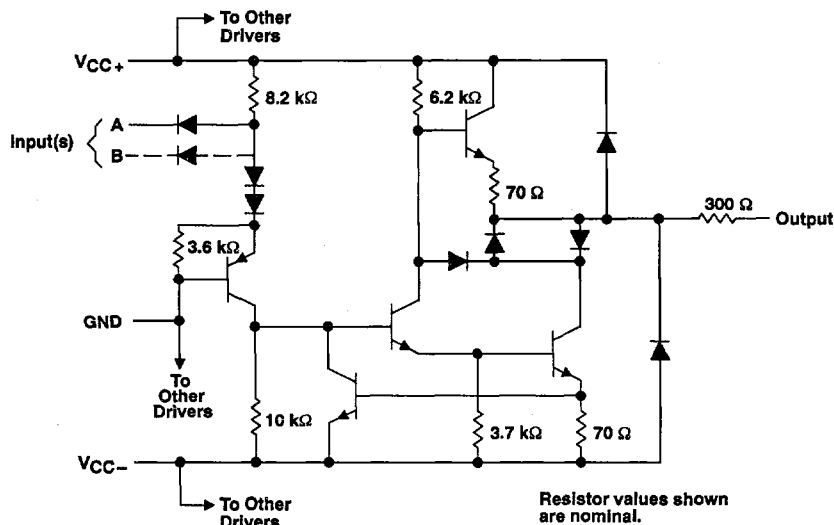
Positive logic
 $Y = \bar{A}$ (driver 1)
 $Y = \bar{A}\bar{B}$ or $\bar{A} + \bar{B}$ (drivers 2 thru 4)

Pin numbers shown are for the D and N packages.

MC1488, SN55188, SN75188 QUAD LINE DRIVERS

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schematic (each driver)



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

	SN55188	MC1488 SN75188	UNIT
Supply voltage, V_{CC+} , at (or below) 25°C free-air temperature (see Notes 1 and 2)	15	15	V
Supply voltage, V_{CC-} , at (or below) 25°C free-air temperature (see Notes 1 and 2)	-15	-15	V
Input voltage range	-15 to 7	-15 to 7	V
Output voltage range	-15 to 15	-15 to 15	V
Continuous total power dissipation (see Note 2)	See Dissipation Rating Table		
Operating free-air temperature range	-55 to 125	0 to 70	°C
Storage temperature range	-65 to 150	-65 to 150	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	D or N package	260	°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	

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

2. For operation above 25°C free-air temperature, refer to the maximum supply voltage curve, Figure 6. In the FK and J packages, SN55188 chips are alloy mounted.

DISSIPATION RATING TABLE

PACKAGE	$T_A = 25^\circ\text{C}$ 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	—
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	—
W	1000 mW	8.0 mW/°C	640 mW	200 mW

MC1488, SN55188, SN75188 QUAD LINE DRIVERS

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recommended operating conditions

	SN55188			MC1488, SN75188			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC+}	7.5	9	15	7.5	9	15	V
Supply voltage, V_{CC-}	-7.5	-9	-15	-7.5	-9	-15	V
High-level input voltage, V_{IH}	1.9			1.9			V
Low-level input voltage, V_{IL}			0.8			0.8	V
Operating free-air temperature, T_A	-55		125	0		70	°C

electrical characteristics over operating free-air temperature range, $V_{CC\pm} = \pm 9$ V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		SN55188			MC1488, SN75188			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{OH} High-level output voltage	$V_{IL} = 0.8$ V, $R_L = 3$ k Ω	$V_{CC+} = 9$ V, $V_{CC-} = -9$ V		6	7		6	7		V
		$V_{CC+} = 13.2$ V, $V_{CC-} = -13.2$ V		9	10.5		9	10.5		
V_{OL} Low-level output voltage	$V_{IH} = 1.9$ V, $R_L = 3$ k Ω	$V_{CC+} = 9$ V, $V_{CC-} = -9$ V			-7‡	-6		-7	-6	V
		$V_{CC+} = 13.2$ V, $V_{CC-} = -13.2$ V			-10.5‡	-9		-10.5	-9	
I_{IH} High-level input current	$V_I = 5$ V					10			10	μ A
I_{IL} Low-level input current	$V_I = 0$				-1	-1.6		-1	-1.6	mA
$I_{OS(H)}$ Short-circuit output current at high level§	$V_I = 0.8$ V,	$V_O = 0$		-4.6	-9	-13.5	-6	-9	-12	mA
$I_{OS(L)}$ Short-circuit output current at low level§	$V_I = 1.9$ V,	$V_O = 0$		4.6	9	13.5	6	9	12	mA
r_o Output resistance, power off	$V_{CC+} = 0$, $V_O = -2$ V to 2 V	$V_{CC-} = 0$,		300			300			Ω
I_{CC+} Supply current from V_{CC+}	$V_{CC+} = 9$ V, No load	All inputs at 1.9 V		15	20		15	20		mA
		All inputs at 0.8 V		4.5	6		4.5	6		
	$V_{CC+} = 12$ V, No load	All inputs at 1.9 V		19	25		19	25		
		All inputs at 0.8 V		5.5	7		5.5	7		
	$V_{CC+} = 15$ V, No load, $T_A = 25^\circ\text{C}$	All inputs at 1.9 V			34			34		
		All inputs at 0.8 V			12			12		
I_{CC-} Supply current from I_{CC-}	$V_{CC-} = -9$ V, No load	All inputs at 1.9 V		-13	-17		-13	-17		mA
		All inputs at 0.8 V			-0.5			-0.015		
	$V_{CC-} = -12$ V, No load	All inputs at 1.9 V		-18	-23		-18	-23		
		All inputs at 0.8 V			-0.5			-0.015		
	$V_{CC-} = -15$ V, No load, $T_A = 25^\circ\text{C}$	All inputs at 1.9 V			-34			-34		
		All inputs at 0.8 V			-2.5			-2.5		
P_D Total power dissipation	$V_{CC+} = 9$ V, No load	$V_{CC-} = -9$ V,				333			333	mW
	$V_{CC+} = 12$ V, No load	$V_{CC-} = -12$ V,				576			576	

† All typical values are at $T_A = 25^\circ\text{C}$.

‡ The algebraic convention in which the less positive (more negative) limit is designated as minimum, is used in this data sheet for logic voltage levels only, e.g., if -6 V is a maximum, the typical value is a more negative voltage.

§ Not more than one output should be shorted at a time.



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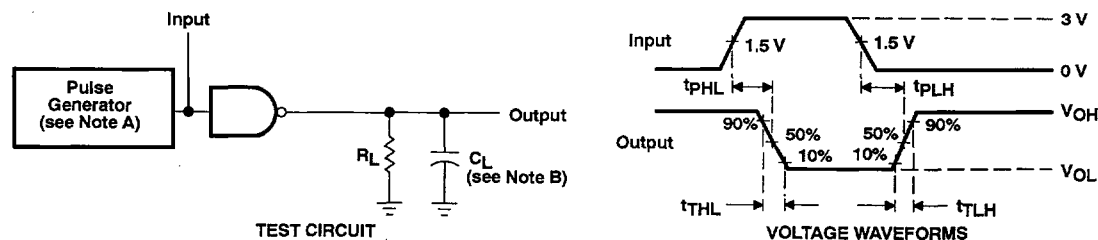
switching characteristics, $V_{CC\pm} = \pm 9\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH} Propagation delay time, low-to-high-level output	$R_L = 3\text{ k}\Omega$, $C_L = 15\text{ pF}$, See Figure 1		220	350	ns
t_{PHL} Propagation delay time, high-to-low-level output			100	175	ns
t_{TLH} Transition time, low-to-high-level output†			55	100	ns
t_{THL} Transition time, high-to-low-level output†			45	75	ns
t_{TLH} Transition time, low-to-high-level output‡	$R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$, See Figure 1		2.5		μs
t_{THL} Transition time, high-to-low-level output‡			3.0		μs

† Measured between 10% and 90% points of output waveform.

‡ Measured between 3 V and -3 V points on the output waveform (EIA RS-232-C conditions).

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The pulse generator has the following characteristics: $t_w = 0.5\text{ }\mu\text{s}$, $\text{PRR} \leq 1\text{ MHz}$, $Z_O = 50\text{ }\Omega$.

B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS†

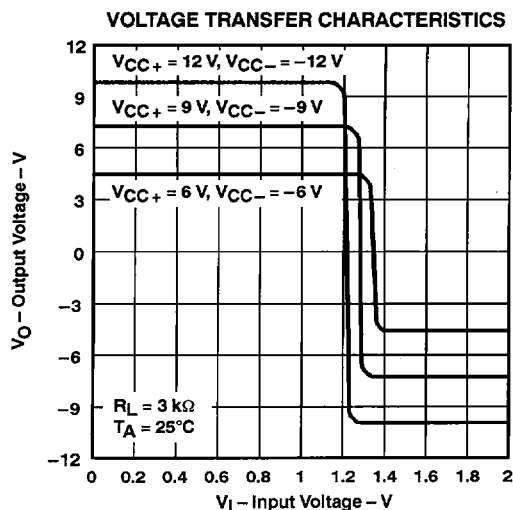


Figure 2

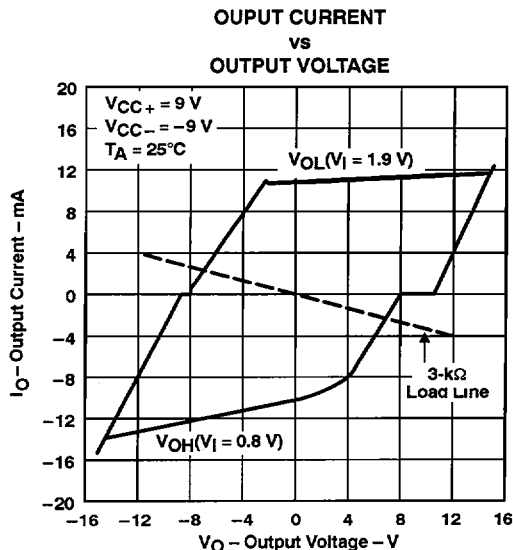


Figure 3

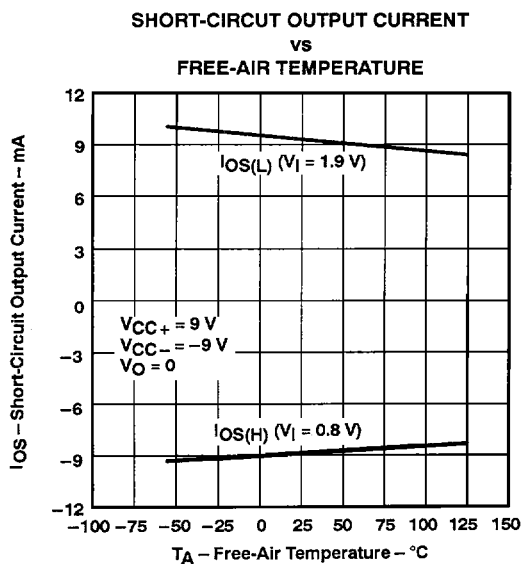


Figure 4

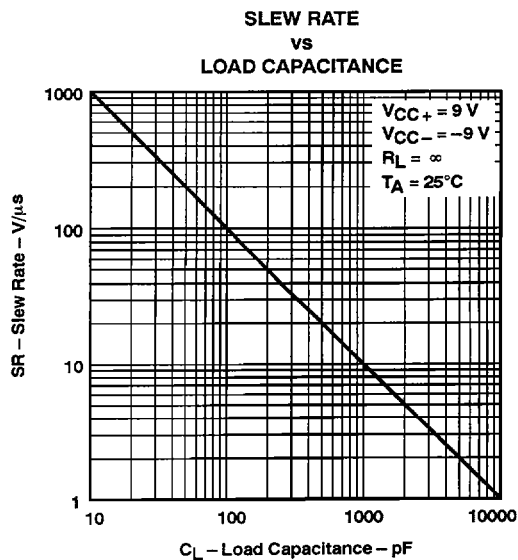


Figure 5

† Data for temperatures below 0°C and above 70°C are applicable to SN55188 circuit only.

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THERMAL INFORMATION†

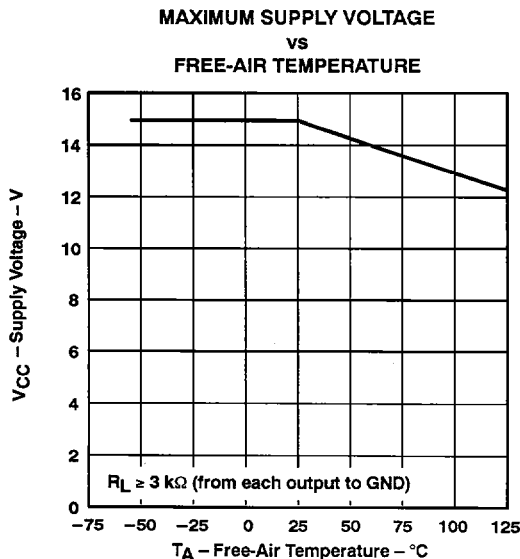


Figure 6

APPLICATION INFORMATION

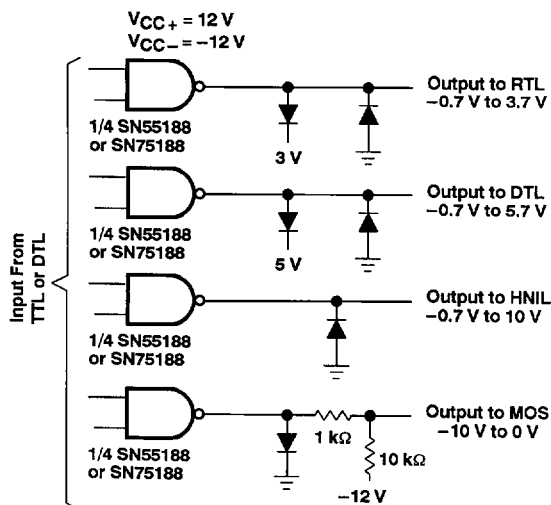


Figure 7. Logic Translator Applications

Diodes placed in series with the V_{CC+} and V_{CC-} leads will protect the SN55188/SN75188 in the fault condition in which the device outputs are shorted to $\pm 15\text{ V}$ and the power supplies are at low and provide low-impedance paths to ground.

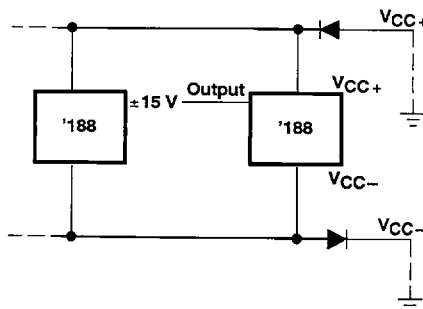


Figure 8. Power Supply Protection to Meet Power-Off Fault Conditions of EIA Standard RS-232-C