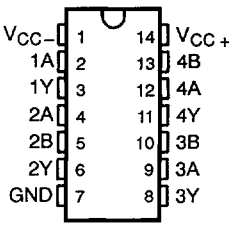
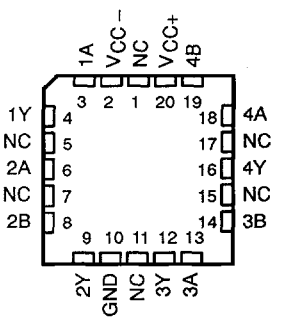
- **Meets Specifications of EIA RS-232-C**
- **Designed to Be Interchangeable With Motorola MC1488**
- **Current-Limited Output: 10 mA Typ**
- **Power-Off Output Impedance: 300 Ω Min**
- **Slew Rate Control by Load Capacitor**
- **Flexible Supply Voltage Range**
- **Input Compatible With Most TTL Circuits**

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



SN55188 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

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.

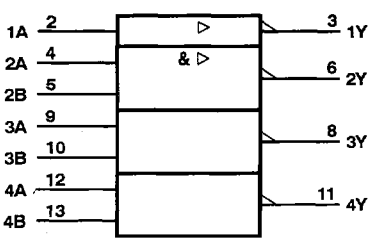
The and SN55188 is characterized for operation over the full military temperature range of –55°C to 125°C. The MC1488 and SN75188 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE
(drivers 2 through 4)

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

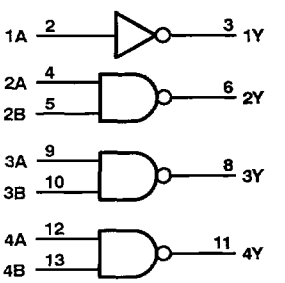
H = high level, L = low level,
X = irrelevant

logic symbol†



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

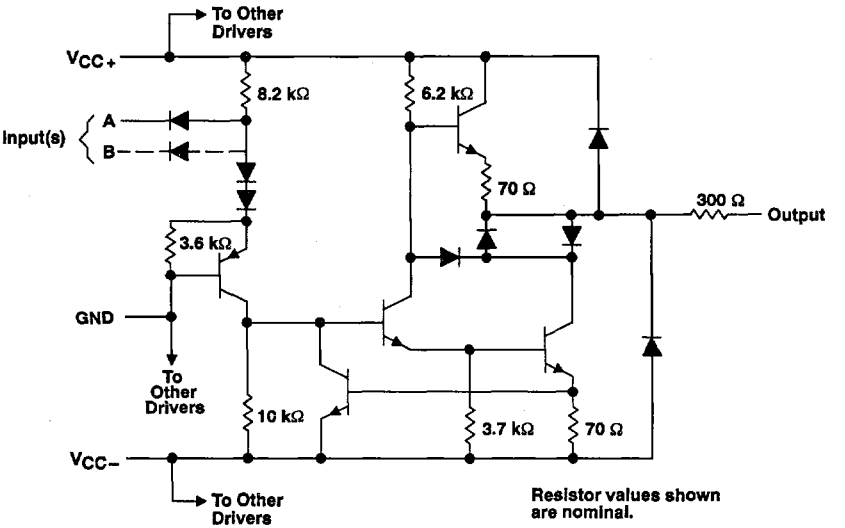
logic diagram (positive logic)



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

Pin numbers shown are for the D and N packages.

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	$T_A \leq 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 125°C$ 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

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 kΩ	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 kΩ	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	μA
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°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°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	

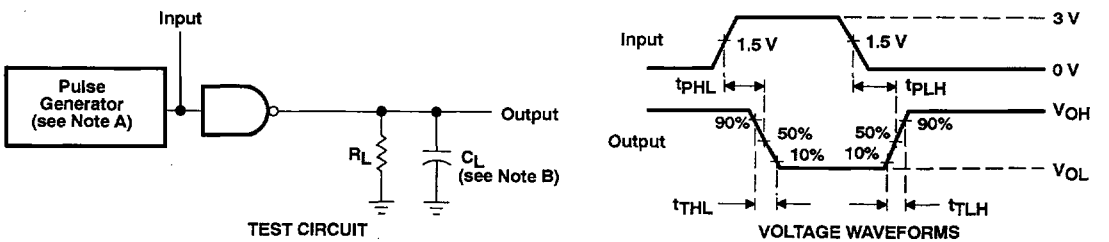
† All typical values are at T_A = 25°C.
‡ The algebraic convention in which the less positive (more negative) limit is designated as minimum, is used in this data sheet for logic voltage levels only, e.g., if −6 V is a maximum, the typical value is a more negative voltage.
§ Not more than one output should be shorted at a time.

switching characteristics, $V_{CC\pm}$ = ±9 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output	R_L = 3 kΩ, C_L = 15 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 kΩ to 7 kΩ, C_L = 2500 pF, 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 μs, PRR ≤ 1 MHz, Z_O = 50 Ω.
B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS†

VOLTAGE TRANSFER CHARACTERISTICS

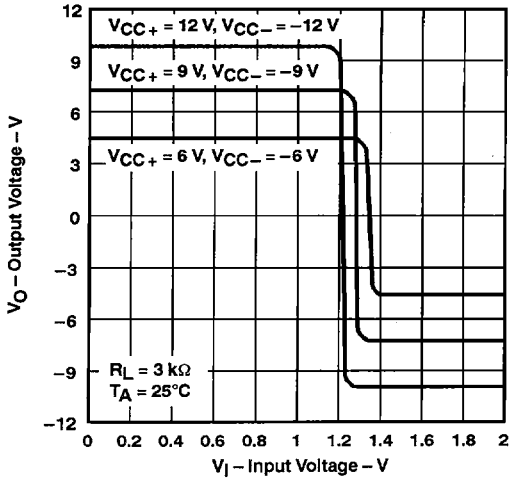


Figure 2

OUPUT CURRENT
vs
OUTPUT VOLTAGE

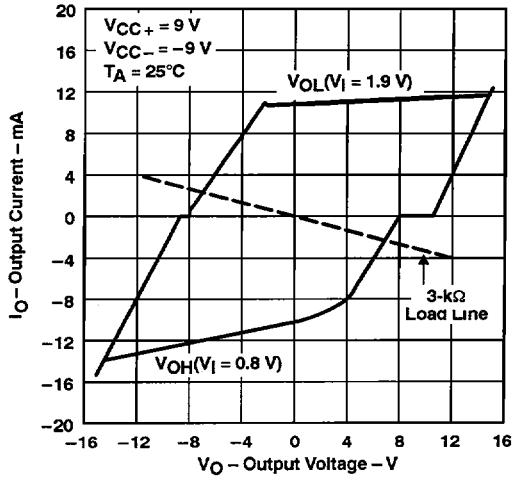


Figure 3

SHORT-CIRCUIT OUTPUT CURRENT
vs
FREE-AIR TEMPERATURE

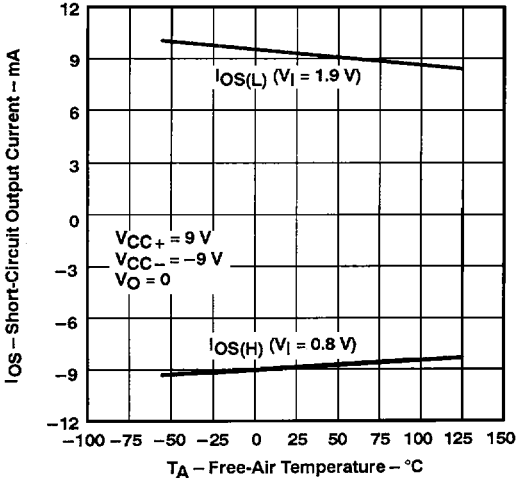


Figure 4

SLEW RATE
vs
LOAD CAPACITANCE

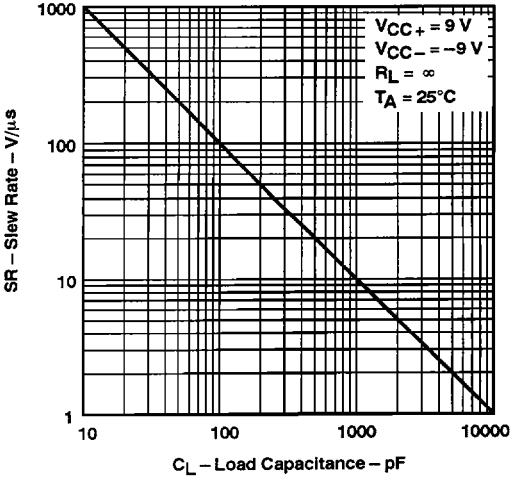


Figure 5

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

THERMAL INFORMATION†

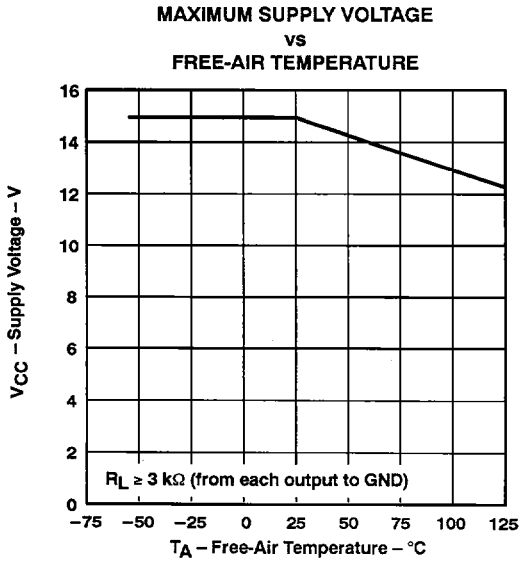


Figure 6

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

APPLICATION INFORMATION

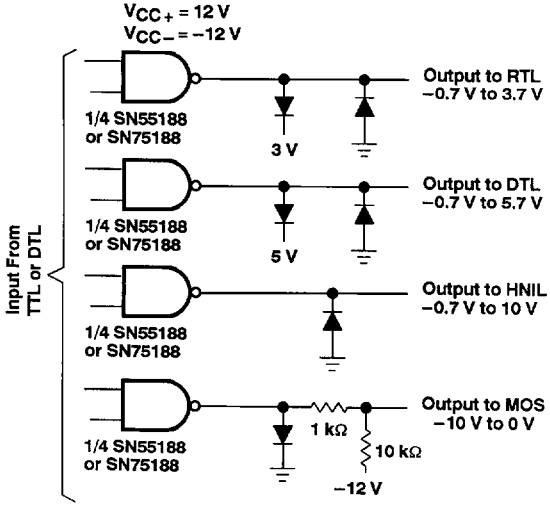


Figure 7. Logic Translator Applications

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 ± 15 V and the power supplies are at low and provide low-impedance paths to ground.

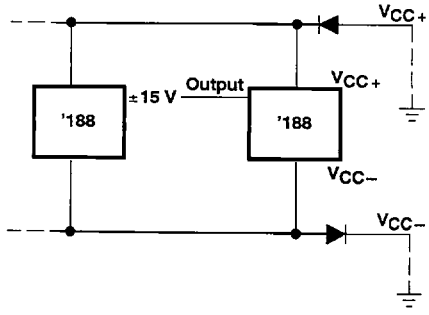


Figure 8. Power Supply Protection to Meet Power-Off Fault Conditions of EIA Standard RS-232-C