QUAD LINE DRIVER — MC1488

DESCRIPTION

The MC1488 is a quad line driver which converts standard DTL/TTL input logic levels through one stage of inversion to output levels which meet EIA Standard No. RS-232C and CCITT Recommendation V.24.

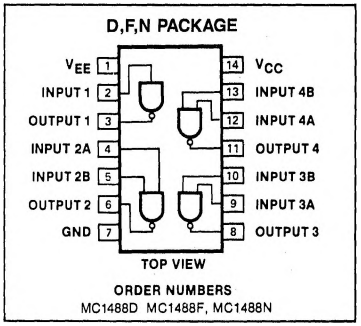
FEATURES

- **Current limited output: ±10mA Typ**
- **Power-off source impedance: 300Ω Min**
- **Simple slew rate control with external capacitor**
- **Flexible operating supply range**
- **Inputs are DTL/TTL compatible**

APPLICATIONS

- **Computer port driver**
- **Digital transmission over long lines**
- **Slew rate control**
- **TTL/DTL to MOS translation**

PIN CONFIGURATION

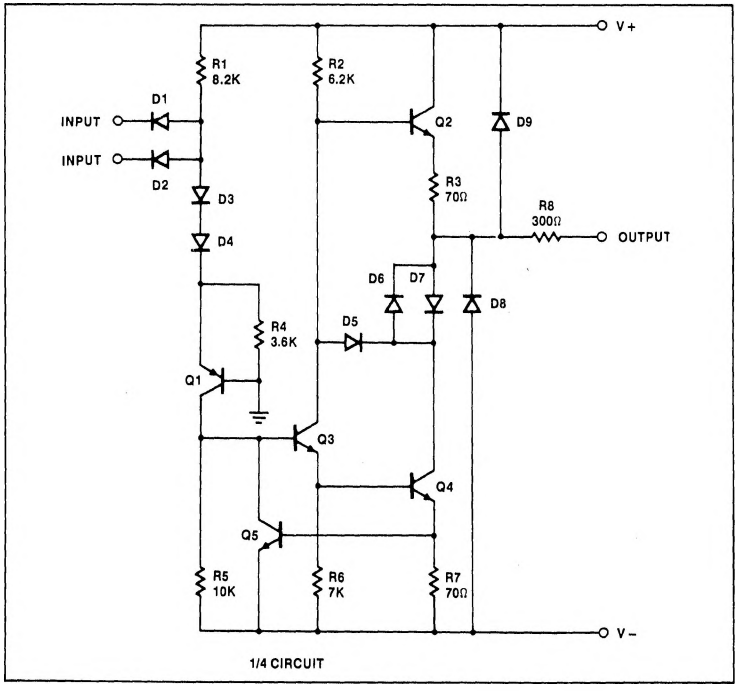


ORDER NUMBERS
MC1488D MC1488F, MC1488N

ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply voltage V+	+15	V
V-	-15	V
Input voltage (V_{IN})	$-15 \leq V_{IN} \leq 7.0$	V
Output voltage	±15	V
Power dissipation:		
F package	1000	mW
N package	800	mW
Operating temperature range	0 to +75	°C
Storage temperature range	-65 to +150	°C
Lead temperature (soldering, 10sec)	300	°C

CIRCUIT SCHEMATIC



DC ELECTRICAL CHARACTERISTICS

$V+ = +9.0V \pm 1\%$, $V- = -9.0V \pm 1\%$, $T_A = 0°C$ to $+75°C$ unless otherwise specified.
All typicals are for $V+ = 9.0V$, $V- = -9.0V$, and $T_A = 25°C$.*

PARAMETER	TEST CONDITIONS		LIMITS Min	LIMITS Typ	LIMITS Max	UNIT
Logic "0" input current	$V_{IN} = 0V$			-1.0	-1.6	mA
Logic "1" input current	$V_{IN} = +5.0V$			.005	10.0	μA
High level output voltage	$R_L = 3.0k\Omega$, $V_{IN} = 0.8V$	$V+ = 9.0V$, $V- = -9.0V$	6.0	7.0		V
		$V+ = 13.2V$, $V- = -13.2V$	9.0	10.5		V
Low level output voltage	$R_L = 3.0k\Omega$, $V_{IN} = 1.9V$	$V+ = 9.0V$, $V- = -9.0V$	-6.0	-6.8		V
		$V+ = 13.2V$, $V- = -13.2V$	-9.0	-10.5		V
High level output Short-circuit current	$V_{OUT} = 0V$, $V_{IN} = 0.8V$		-6.0	-10.0	-12.0	mA
Low level output Short-circuit current	$V_{OUT} = 0V$, $V_{IN} = 1.9V$		5.0	10.0	12.0	mA
Output resistance	$V+ = V- = 0V$, $V_{OUT} = \pm 2V$		300			Ω
Positive supply current (output open)	$V_{IN} = 1.9V$	$V+ = 9.0V$, $V- = -9.0V$		15.0	20.0	mA
		$V+ = 12V$, $V- = -12V$		19.0	25.0	mA
		$V+ = 15V$, $V- = -15V$		25.0	34.0	mA
	$V_{IN} = 0.8V$	$V+ = 9.0V$, $V- = -9.0V$		4.5	6.0	mA
		$V+ = 12V$, $V- = -12V$		5.5	7.0	mA
		$V+ = 15V$, $V- = -15V$		8.0	12.0	mA
Negative supply current (output open)	$V_{IN} = 1.9V$	$V+ = 9.0V$, $V- = -9.0V$		-13.0	-17.0	mA
		$V+ = 12V$, $V- = -12V$		-18.0	-23.0	mA
		$V+ = 15V$, $V- = -15V$		-25.0	-34.0	mA
	$V_{IN} = 0.8V$	$V+ = 9.0V$, $V- = -9.0V$		-1	-15	μA
		$V+ = 12V$, $V- = -12V$		-1	-15	μA
		$V+ = 15V$, $V- = -15V$		-.01	-2.5	mA
Power dissipation	$V+ = 9.0V$, $V- = -9.0V$			252	333	mW
	$V+ = 12V$, $V- = -12V$			444	576	mW
Propagation delay to "1" (t_{pd1})	$R_L = 3.0k\Omega$, $C_L = 15pF$, $T_A = 25°C$			275	560	ns
Propagation delay to "0" (t_{pd0})	$R_L = 3.0k\Omega$, $C_L = 15pF$, $T_A = 25°C$			70	175	ns
Rise time (t_r)	$R_L = 3.0k\Omega$, $C_L = 15pF$, $T_A = 25°C$			75	100	ns
Fall time (t_f)	$R_L = 3.0k\Omega$, $C_L = 15pF$, $T_A = 25°C$			40	75	ns

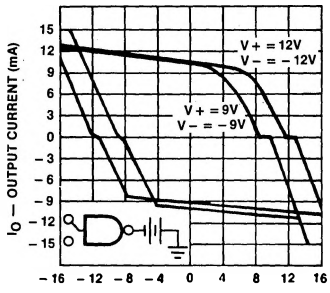
NOTE

*Voltage values shown are with respect to network ground terminal. Positive current is defined as current into the referenced pin.

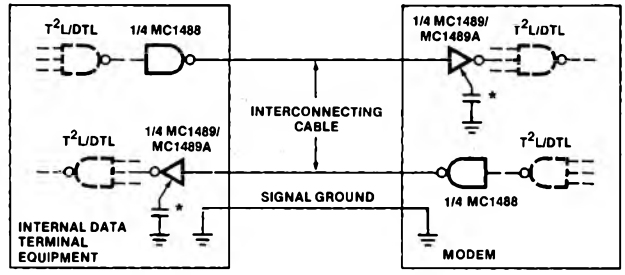
QUAD LINE DRIVER — MC1488

TYPICAL PERFORMANCE CHARACTERISTICS

OUTPUT VOLTAGE AND CURRENT-LIMITING CHARACTERISTICS

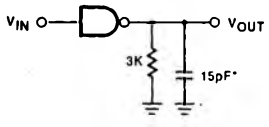


RS232C DATA TRANSMISSION



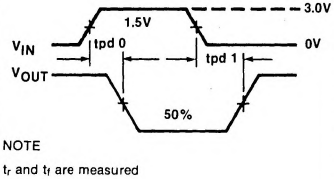
NOTE
*Optional for noise filtering

AC LOAD CIRCUIT



NOTE
*C_L includes probe and jig capacitance.

SWITCHING WAVEFORMS



NOTE
t_r and t_f are measured between 10% and 90% of the output waveform

APPLICATIONS

By connecting a capacitor to each driver output the slew rate can be controlled utilizing the output current limiting characteristics of the MC1488. For a set slew rate the appropriate capacitor value may be calculated using the following relationship

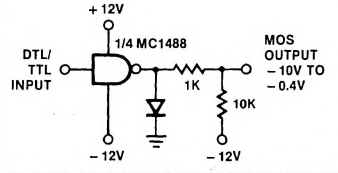
$$C = I_{SC}\,(\Delta T/\Delta V)$$

where C is the required capacitor, I_{SC} is the short circuit current value, and $\Delta V/\Delta T$ is the slew rate.

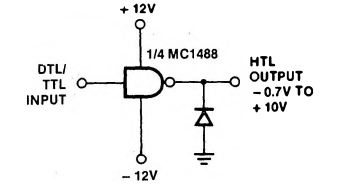
RS232C specifies that the output slew rate must not exceed 30V per microsecond. Using the worst case output short circuit current of 12mA in the above equation, calculations result in a required capacitor of 400pF connected to each output.

TYPICAL APPLICATIONS

DTL/TTL-TO-MOS TRANSLATOR



DTL/TTL-TO-HTL TRANSLATOR



DTL/TTL-TO-RTL TRANSLATOR