



# Dual EIA-423/EIA-232D Line Driver

The MC3488A dual is single-ended line driver has been designed to satisfy the requirements of EIA standards EIA-423 and EIA-232D, as well as CCITT X.26, X.28 and Federal Standard FIDS1030. It is suitable for use where signal wave shaping is desired and the output load resistance is greater than 450 ohms. Output slew rates are adjustable from 1.0 μs to 100 μs by a single external resistor. Output level and slew rate are insensitive to power supply variations. Input undershoot diodes limit transients below ground and output current limiting is provided in both output states.

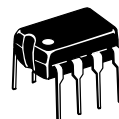
The MC3488A has a standard 1.5 V input logic threshold for TTL or NMOS compatibility.

- PNP Buffered Inputs to Minimize Input Loading
- Short Circuit Protection
- Adjustable Slew Rate Limiting
- MC3488A Equivalent to 9636A
- Output Levels and Slew Rates are Insensitive to Power Supply Voltages
- No External Blocking Diode Required for V<sub>EE</sub> Supply
- Second Source μA9636A

## MC3488A

### DUAL EIA-423/EIA-232D DRIVER

#### SEMICONDUCTOR TECHNICAL DATA

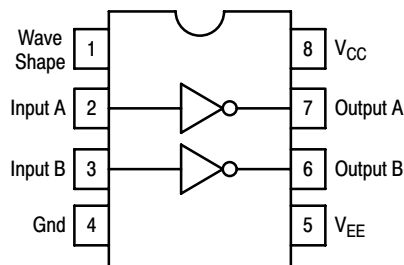


**P1 SUFFIX**  
PLASTIC PACKAGE  
CASE 626

**D SUFFIX**  
PLASTIC PACKAGE  
CASE 751  
(SO-8)



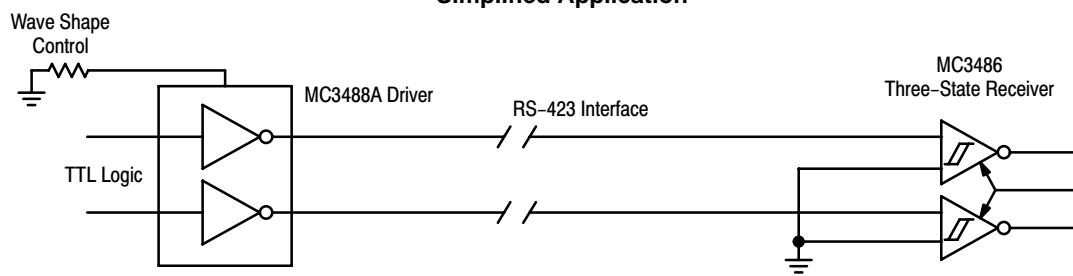
#### PIN CONNECTIONS



#### ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC3488AP1	T <sub>A</sub> = 0 to +70°C	Plastic DIP
MC3488AD		SO-8

#### Simplified Application



# MC3488A

## MAXIMUM RATINGS (Note 1)

Rating	Symbol	Value	Unit
Power Supply Voltages	$V_{CC}$ $V_{EE}$	+ 15 – 15	V
Output Current Source Sink	$I_{O+}$ $I_{O-}$	+ 150 – 150	mA
Operating Ambient Temperature	$T_A$	0 to + 70	°C
Junction Temperature Range	$T_J$	150	°C
Storage Temperature Range	$T_{stg}$	– 65 to + 150	°C

## RECOMMENDED OPERATING CONDITIONS

Characteristic	Symbol	Min	Typ	Max	Unit
Power Supply Voltages	$V_{CC}$ $V_{EE}$	10.8 – 13.2	12 – 12	13.2 – 10.8	V
Operating Temperature Range	$T_A$	0	25	70	°C
Wave Shaping Resistor	$R_{WS}$	10	–	1000	k $\Omega$

## TARGET ELECTRICAL CHARACTERISTICS (Unless otherwise noted, specifications apply over recommended operating conditions)

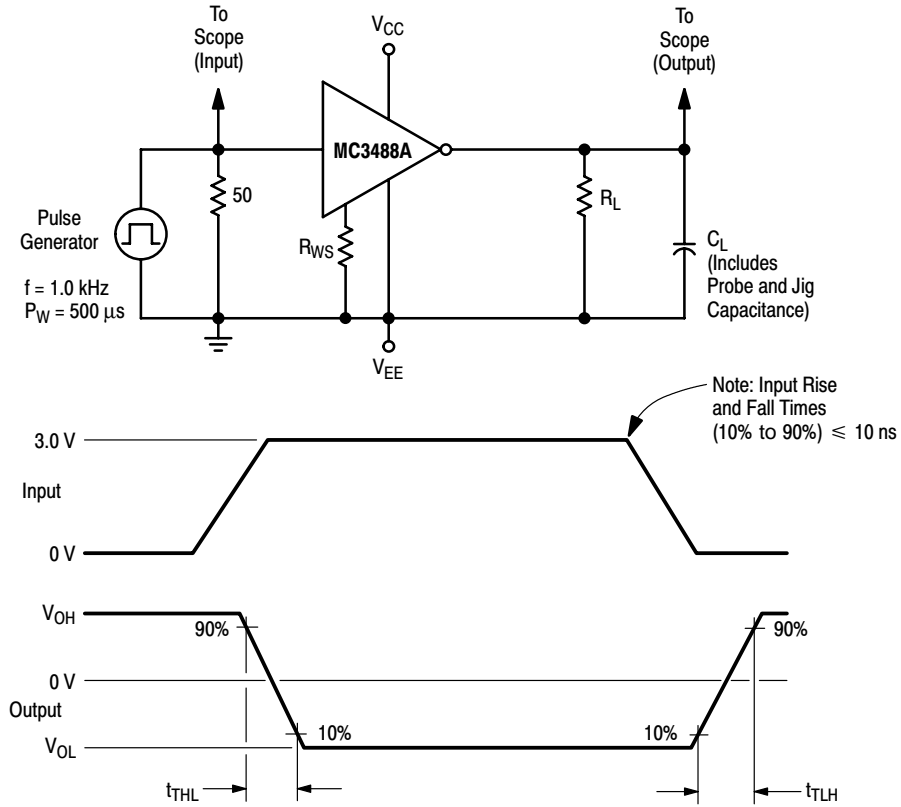
Characteristic	Symbol	Min	Typ	Max	Unit
Input Voltage – Low Logic State	$V_{IL}$	–	–	0.8	V
Input Voltage – High Logic State	$V_{IH}$	2.0	–	–	V
Input Current – Low Logic State ( $V_{IL} = 0.4$ V)	$I_{IL}$	– 80	–	–	$\mu$ A
Input Current – High Logic State ( $V_{IH} = 2.4$ V) ( $V_{IH} = 5.5$ V)	$I_{IH1}$ $I_{IH2}$	– –	– –	10 100	$\mu$ A
Input Clamp Diode Voltage ( $I_{IK} = -15$ mA)	$V_{IK}$	– 1.5	–	–	V
Output Voltage – Low Logic State ( $R_L = \infty$ ) EIA-423 ( $R_L = 3.0$ k $\Omega$ ) EIA-232D ( $R_L = 450$ $\Omega$ ) EIA-423	$V_{OL}$	– 6.0 – 6.0 – 6.0	– – –	– 5.0 – 5.0 – 4.0	V
Output Voltage – High Logic State ( $R_L = \infty$ ) EIA-423 ( $R_L = 3.0$ k $\Omega$ ) EIA-232D ( $R_L = 450$ $\Omega$ ) EIA-423	$V_{OH}$	5.0 5.0 4.0	– – –	6.0 6.0 6.0	V
Output Resistance ( $R_L \geq 450$ $\Omega$ )	$R_O$	–	25	50	$\Omega$
Output Short-Circuit Current (Note 2) ( $V_{in} = V_{out} = 0$ V) ( $V_{in} = V_{IH(Min)}$ , $V_{out} = 0$ V)	$I_{OSH}$ $I_{OSL}$	– 150 + 15	– –	– 15 + 150	mA
Output Leakage Current (Note 3) ( $V_{CC} = V_{EE} = 0$ V, $-6.0$ V $\leq V_o \leq 6.0$ V)	$I_{ox}$	– 100	–	100	$\mu$ A
Power Supply Currents ( $R_W = 100$ k $\Omega$ , $R_L = \infty$ , $V_{IL} \leq V_{in} \leq V_{IH}$ )	$I_{CC}$ $I_{EE}$	– – 18	– –	+ 18 –	mA

**NOTES:** 1. Devices should not be operated at these values. The "Electrical Characteristics" provide conditions for actual device operation.  
 2. One output shorted at a time.  
 3. No  $V_{EE}$  diode required.

# MC3488A

**TRANSITION TIMES** (Unless otherwise noted,  $C_L = 30 \text{ pF}$ ,  $f = 1.0 \text{ kHz}$ ,  $V_{CC} = -V_{EE} = 12.0 \text{ V} \pm 10\%$ ,  $T_A = 25^\circ\text{C}$ ,  $R_L = 450 \Omega$ .  
Transition times measured 10% to 90% and 90% to 10%)

Characteristic	Symbol	Min	Typ	Max	Unit
Transition Time, Low-to-High State Output ( $R_W = 10 \text{ k}\Omega$ ) ( $R_W = 100 \text{ k}\Omega$ ) ( $R_W = 500 \text{ k}\Omega$ ) ( $R_W = 1000 \text{ k}\Omega$ )	$t_{TLH}$	0.8 8.0 40 80	— — — —	1.4 14 70 140	$\mu\text{s}$
Transition Time, High-to-Low State Output ( $R_W = 10 \text{ k}\Omega$ ) ( $R_W = 100 \text{ k}\Omega$ ) ( $R_W = 500 \text{ k}\Omega$ ) ( $R_W = 1000 \text{ k}\Omega$ )	$t_{THL}$	0.8 8.0 40 80	— — — —	1.4 14 70 140	$\mu\text{s}$



**Figure 1. Test Circuit and Waveforms for Transition Times**

# MC3488A

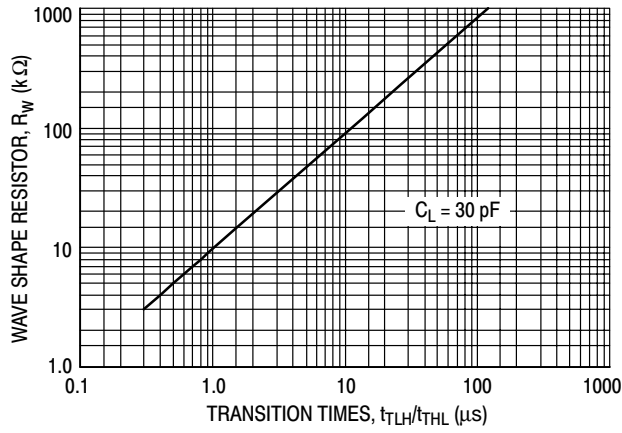


Figure 2. Output Transition Times versus Wave Shape Resistor Value

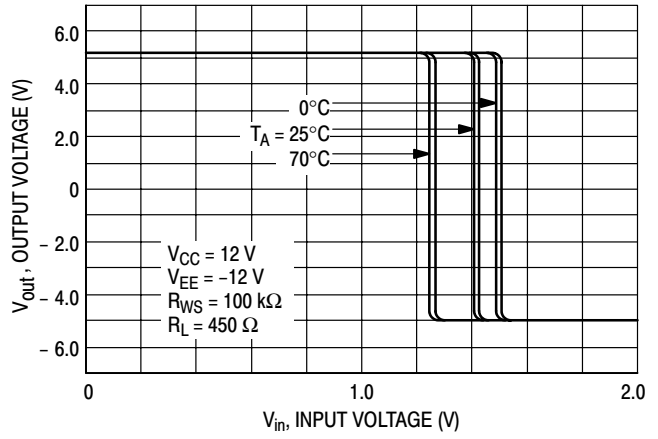


Figure 3. Input/Output Characteristics versus Temperature

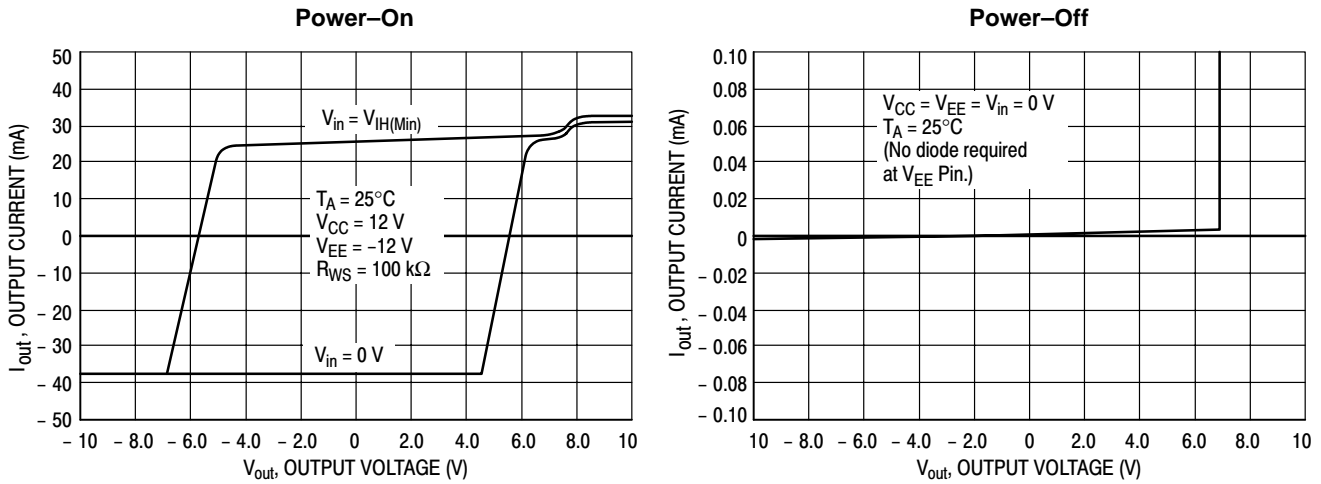


Figure 4. Output Current versus Output Voltage

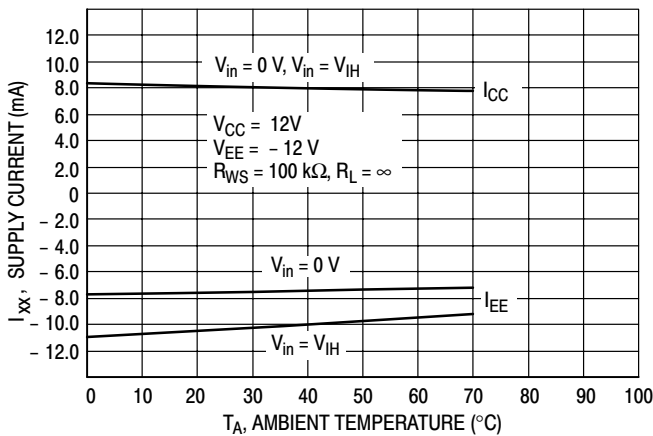


Figure 5. Supply Current versus Temperature

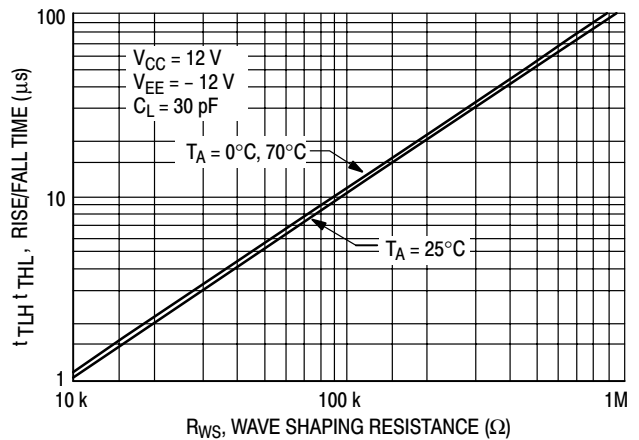
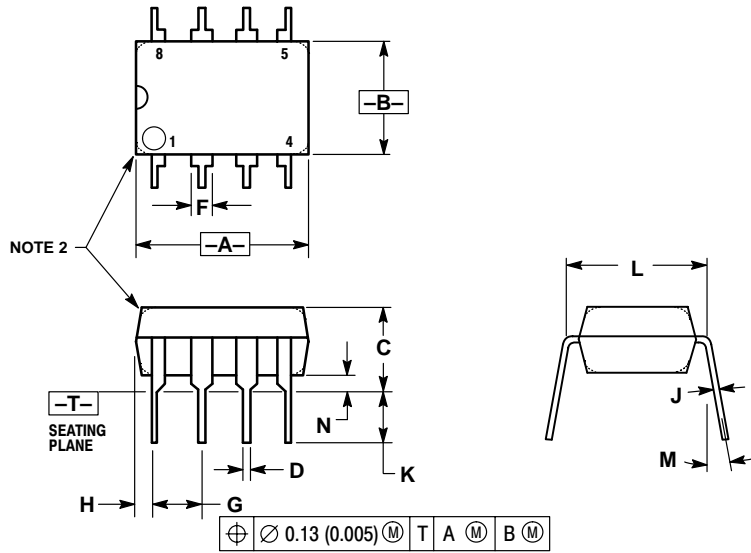


Figure 6. Rise/Fall Time versus  $R_{WS}$

# MC3488A

## PACKAGE DIMENSIONS

P1 SUFFIX  
 PLASTIC PACKAGE  
 CASE 626-05  
 ISSUE L



NOTES:

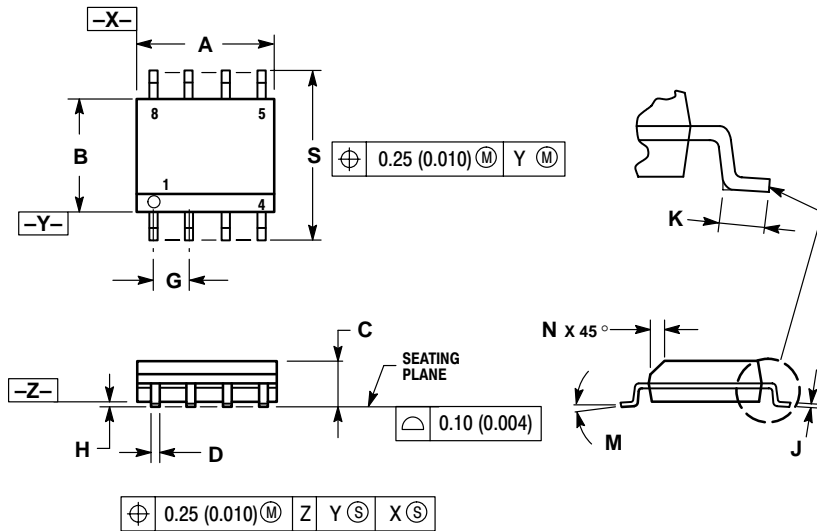
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.40	10.16	0.370	0.400
B	6.10	6.60	0.240	0.260
C	3.94	4.45	0.155	0.175
D	0.38	0.51	0.015	0.020
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	0.76	1.27	0.030	0.050
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	---		10°	
N	0.76	1.01	0.030	0.040

# MC3488A

## PACKAGE DIMENSIONS

**D SUFFIX**  
**PLASTIC PACKAGE**  
**CASE 751-07**  
**ISSUE W**



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

**Notes**

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