

# MC3488A

## 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  $\Omega$ . Output slew rates are adjustable from 1.0  $\mu$ s to 100  $\mu$ s 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.

### Features

- 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  $V_{EE}$  Supply
- Second Source  $\mu$ A9636A
- Pb-Free Packages are Available



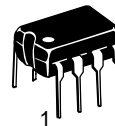
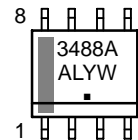
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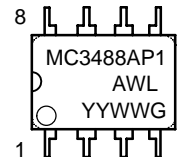
### MARKING DIAGRAMS



SOIC-8  
D SUFFIX  
CASE 751



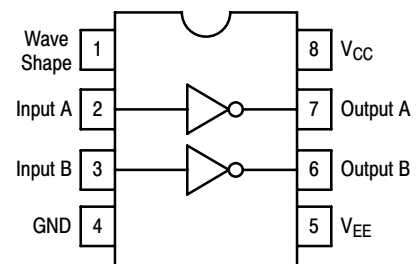
PDIP-8  
P1 SUFFIX  
CASE 626



A = Assembly Location  
L, WL = Wafer Lot  
Y, YY = Year  
W, WW = Work Week  
▪ or G = Pb-Free Package

(Note: Microdot may be in either location)

### PIN CONNECTIONS



### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

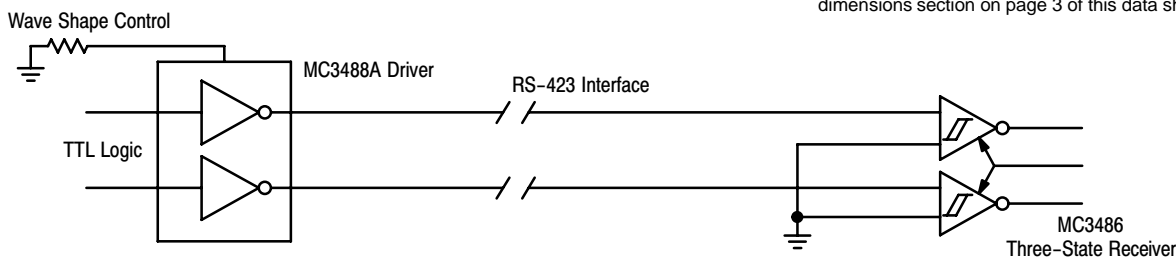


Figure 1. Simplified Application

# 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

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Devices should not be operated at these values. The "Electrical Characteristics" provide conditions for actual device operation.

## 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

2. One output shorted at a time.  
3. No  $V_{EE}$  diode required.

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**TRANSITION TIMES** (Unless otherwise noted,  $C_L = 30$  pF,  $f = 1.0$  kHz,  $V_{CC} = -V_{EE} = 12.0$  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 ( $R_W = 10$ k $\Omega$ ) ( $R_W = 100$ k $\Omega$ ) ( $R_W = 500$ k $\Omega$ ) ( $R_W = 1000$ 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 ( $R_W = 10$ k $\Omega$ ) ( $R_W = 100$ k $\Omega$ ) ( $R_W = 500$ k $\Omega$ ) ( $R_W = 1000$ k $\Omega$ )	$t_{THL}$	0.8 8.0 40 80		1.4 14 70 140	$\mu\text{s}$

## ORDERING INFORMATION

Device	Operating Temperature Range	Package	Shipping <sup>†</sup>
MC3488AD	$T_A = 0$ to $+70^\circ\text{C}$	SOIC-8	98 Units / Rail
MC3488ADG		SOIC-8 (Pb-Free)	98 Units / Rail
MC3488ADR2		SOIC-8	1000 / Tape & Reel
MC3488ADR2G		SOIC-8 (Pb-Free)	1000 / Tape & Reel
MC3488AP1		PDIP-8	50 Units / Rail
MC3488AP1G		PDIP-8 (Pb-Free)	50 Units / Rail

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

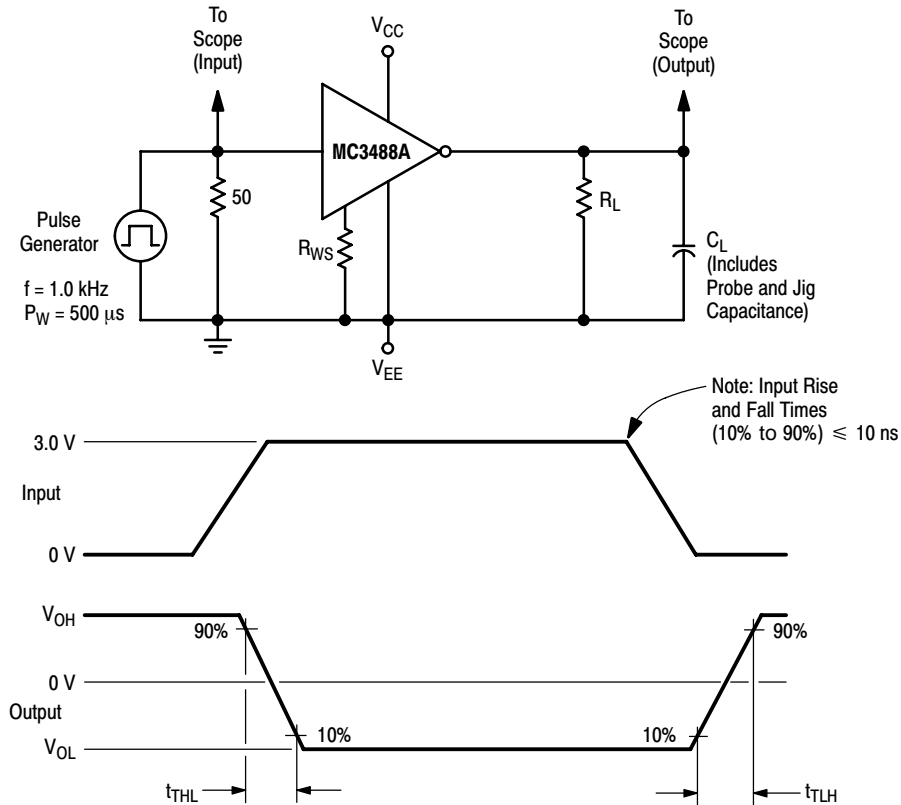


Figure 2. Test Circuit and Waveforms for Transition Times

# MC3488A

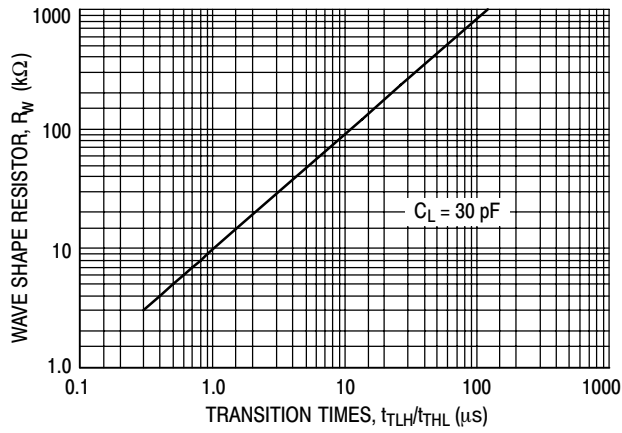


Figure 3. Output Transition Times versus Wave Shape Resistor Value

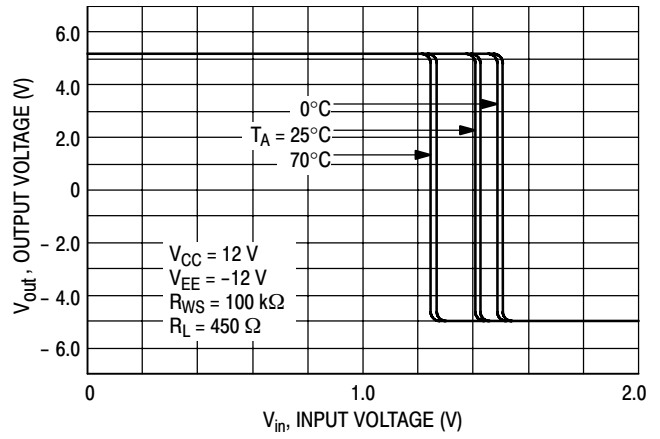


Figure 4. Input/Output Characteristics versus Temperature

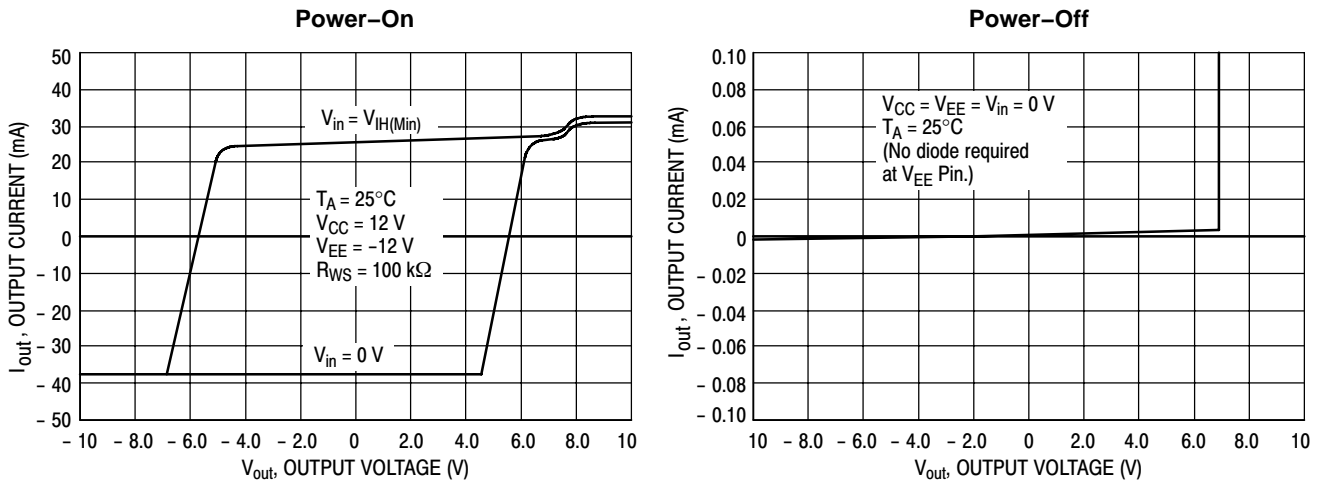


Figure 5. Output Current versus Output Voltage

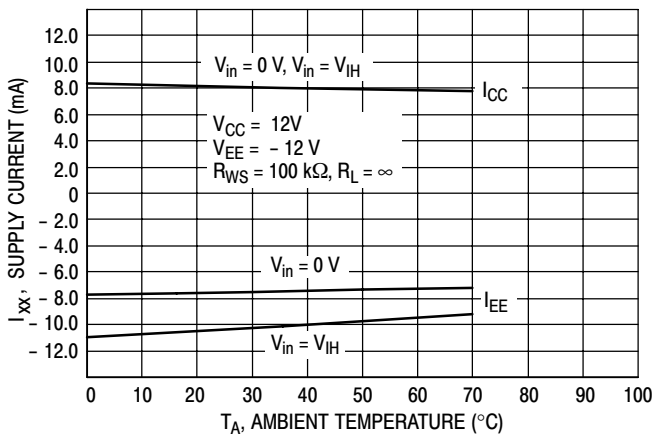


Figure 6. Supply Current versus Temperature

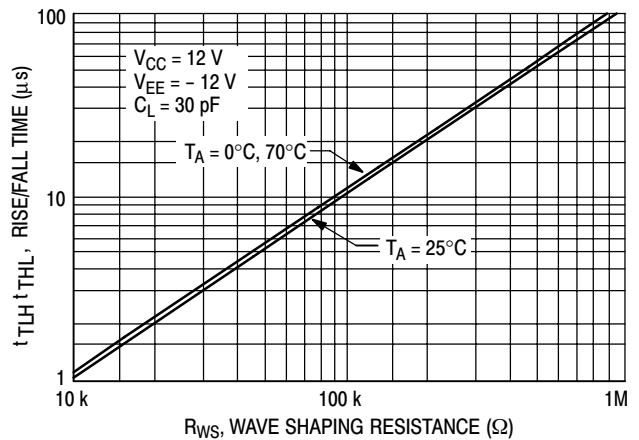
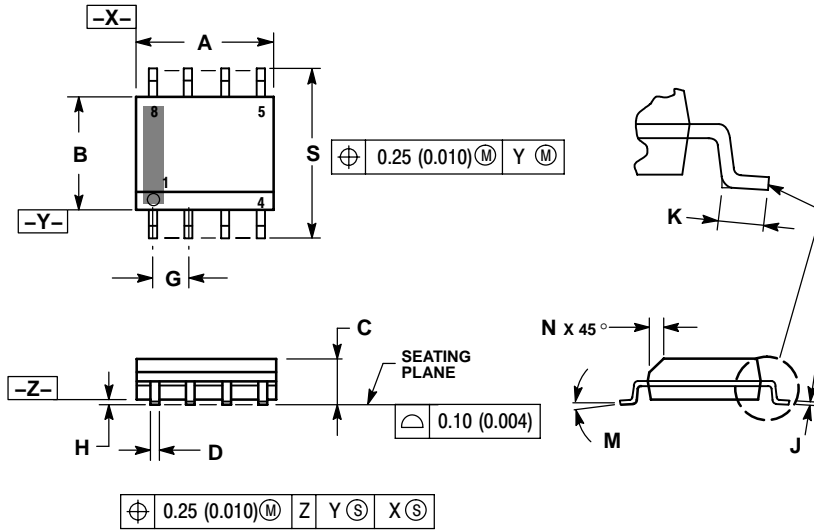


Figure 7. Rise/Fall Time versus  $R_{ws}$

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## PACKAGE DIMENSIONS

SOIC-8 NB  
D SUFFIX  
PLASTIC PACKAGE  
CASE 751-07  
ISSUE AH

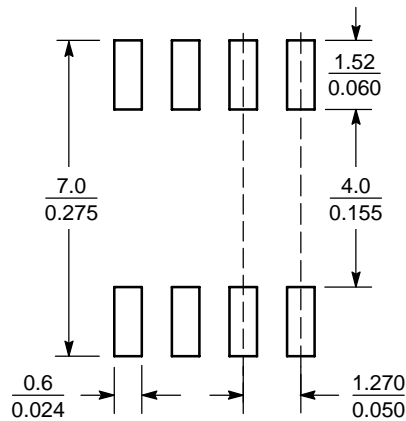


**NOTES:**

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.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

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

### SOLDERING FOOTPRINT\*



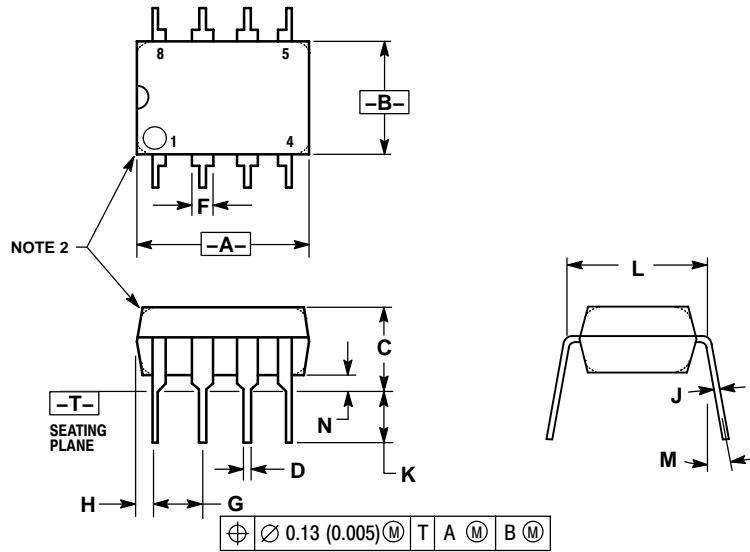
SCALE 6:1 (mm/inches)

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# MC3488A

## PACKAGE DIMENSIONS

PDIP-8  
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°	---	10°
N	0.76	1.01	0.030	0.040

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