MOTOROLA

MC3488A

Dual EIA-423/EIA-232D Line Driver

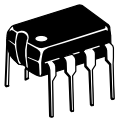
The MC3488A dual is single–ended line driver has been designed to satisfy the requirements of EIA standards EIA–423 and EIA–232D, as well as CCITT X.26, X.28 and Federal Standard FIDS1030. It is suitable for use where signal wave shaping is desired and the output load resistance is greater than 450 ohms. 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_{EE} Supply
- Second Source μA9636A

DUAL
EIA–423/EIA–232D
DRIVER

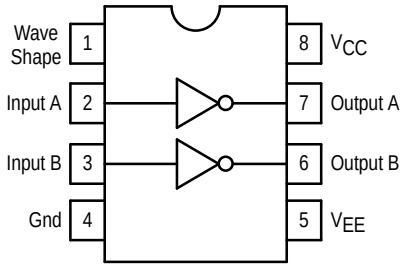
SEMICONDUCTOR
TECHNICAL DATA



P1 SUFFIX
PLASTIC PACKAGE
CASE 626

D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO–8)

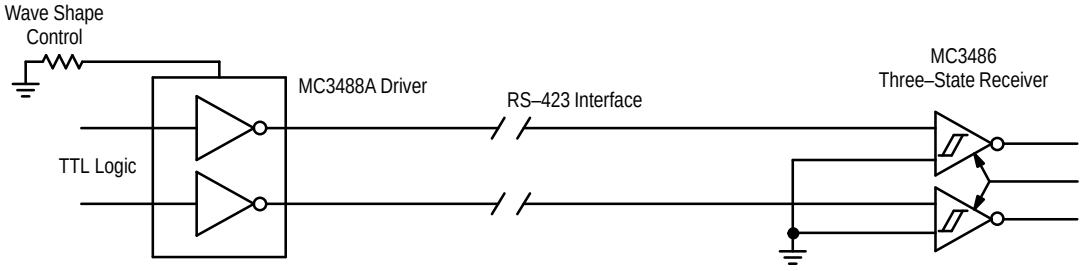
PIN CONNECTIONS



ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC3488AP1	T_A = 0 to +70°C	Plastic DIP
MC3488AD		SO–8

Simplified Application



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	kΩ

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	–	–	μA
Input Current – High Logic State (V_{IH} = 2.4 V) (V_{IH} = 5.5 V)	 I_{IH1} I_{IH2}	 – –	 – –	 10 100	μA
Input Clamp Diode Voltage (I_{IK} = – 15 mA)	V_{IK}	– 1.5	–	–	V
Output Voltage – Low Logic State (R_L = ∞) EIA–423 (R_L = 3.0 kΩ) EIA–232D (R_L = 450 Ω) EIA–423	V_{OL}	 – 6.0 – 6.0 – 6.0	 – – –	 – 5.0 – 5.0 – 4.0	V
Output Voltage – High Logic State (R_L = ∞) EIA–423 (R_L = 3.0 kΩ) EIA–232D (R_L = 450 Ω) EIA–423	V_{OH}	 5.0 5.0 4.0	 – – –	 6.0 6.0 6.0	V
Output Resistance ($R_L \geq$ 450 Ω)	R_O	–	25	50	Ω
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 ≤ V_O ≤ 6.0 V)	I_{ox}	– 100	–	100	μA
Power Supply Currents (R_W = 100 kΩ, R_L = ∞, $V_{IL} \leq V_{in} \leq V_{IH}$)	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.

TRANSITION TIMES (Unless otherwise noted, C_L = 30 pF, f = 1.0 kHz, V_{CC} = – V_{EE} = 12.0 V ± 10%, T_A = 25°C, R_L = 450 Ω. Transition times measured 10% to 90% and 90% to 10%)

Characteristic	Symbol	Min	Typ	Max	Unit
Transition Time, Low–to–High State Output	t_{TLH}				µs
(R_W = 10 kΩ)		0.8	–	1.4	
(R_W = 100 kΩ)		8.0	–	14	
(R_W = 500 kΩ)		40	–	70	
(R_W = 1000 kΩ)		80	–	140	
Transition Time, High–to–Low State Output	t_{THL}				µs
(R_W = 10 kΩ)		0.8	–	1.4	
(R_W = 100 kΩ)		8.0	–	14	
(R_W = 500 kΩ)		40	–	70	
(R_W = 1000 kΩ)		80	–	140	

Figure 1. Test Circuit and Waveforms for Transition Times

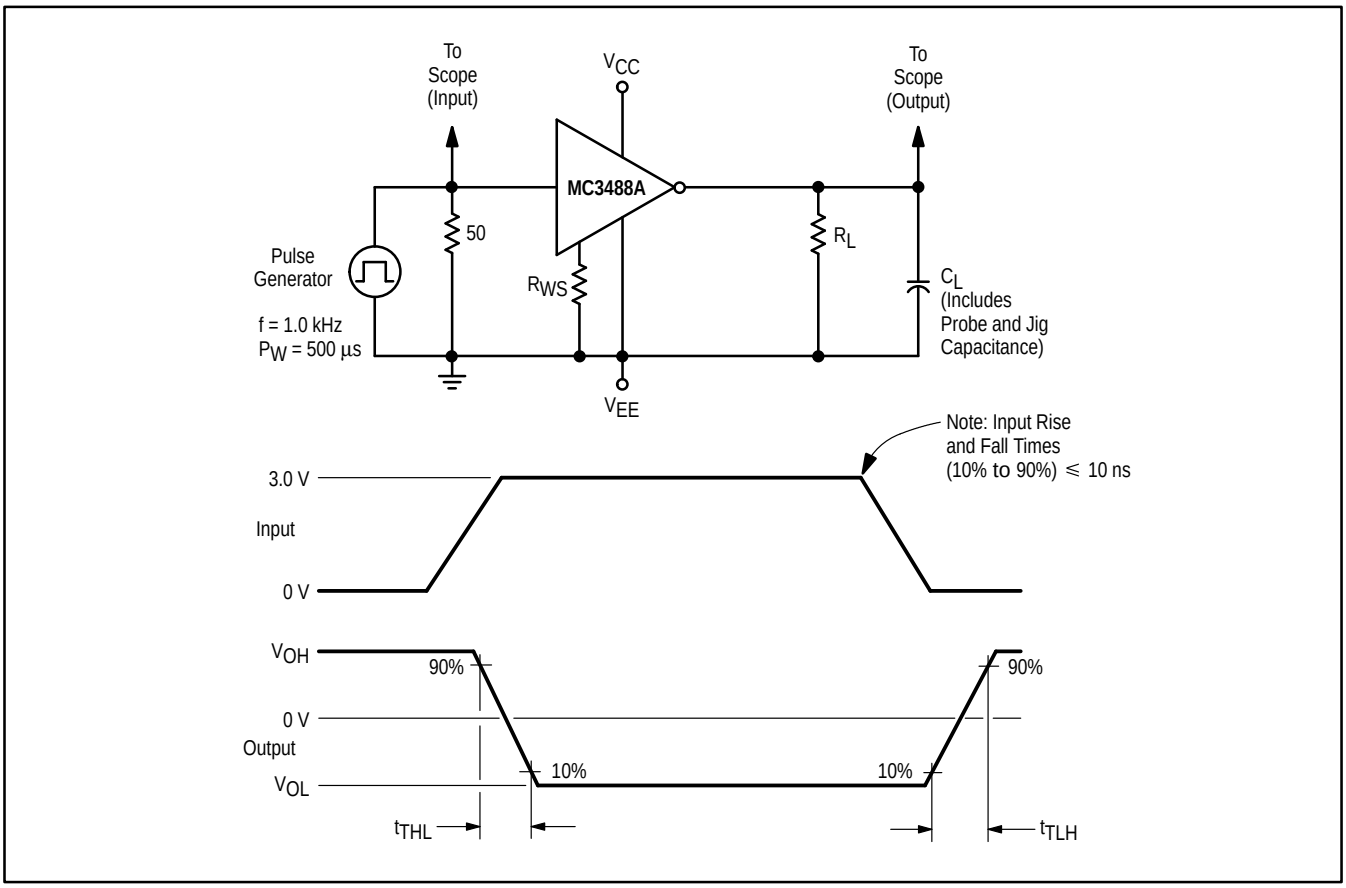


Figure 2. Output Transition Times versus Wave Shape Resistor Value

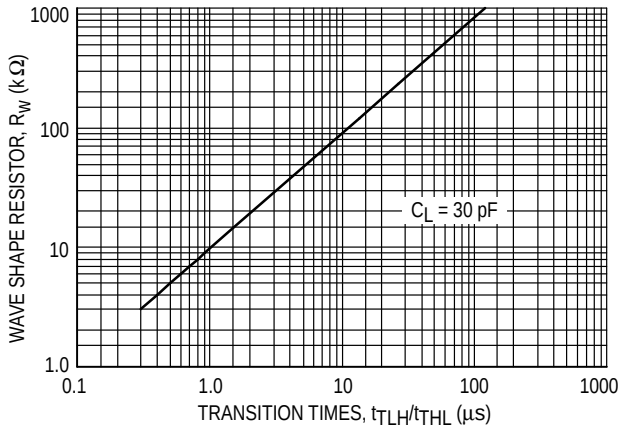


Figure 3. Input/Output Characteristics versus Temperature

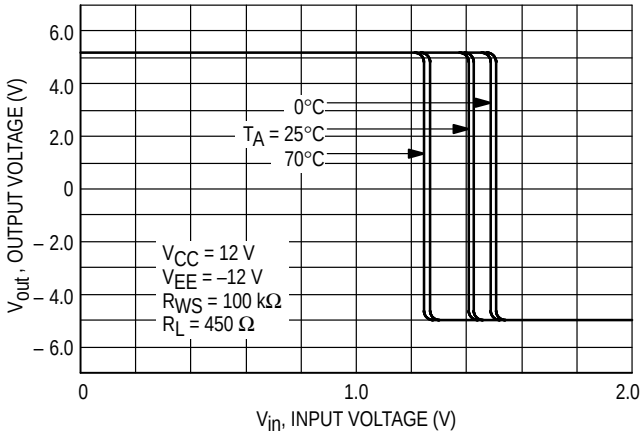
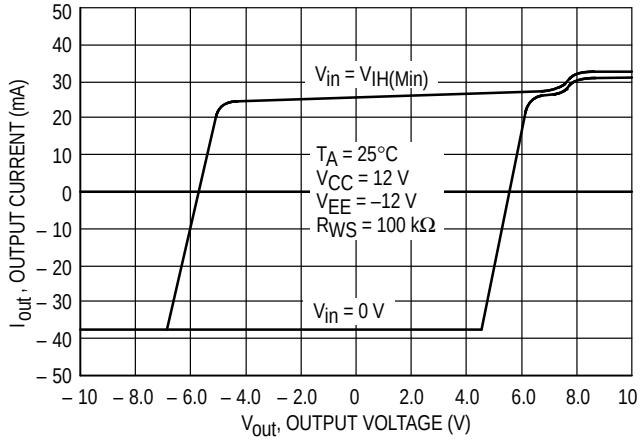


Figure 4. Output Current versus Output Voltage

Power–On



Power–Off

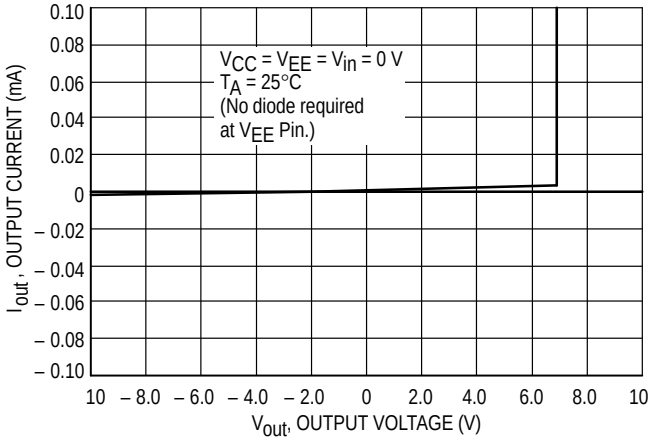


Figure 5. Supply Current versus Temperature

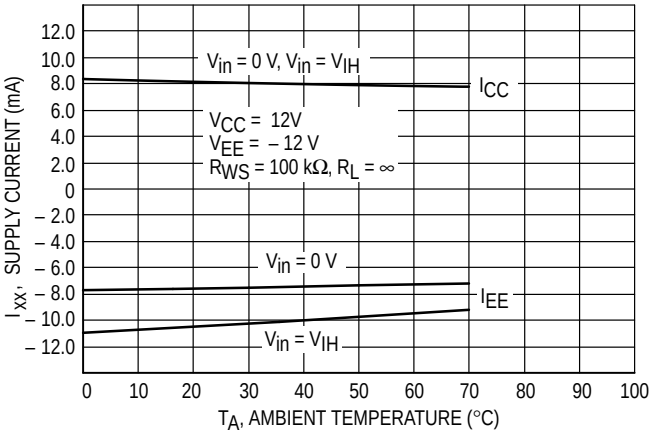
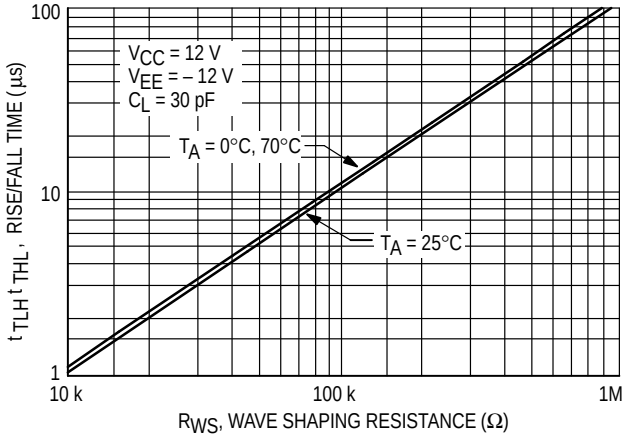
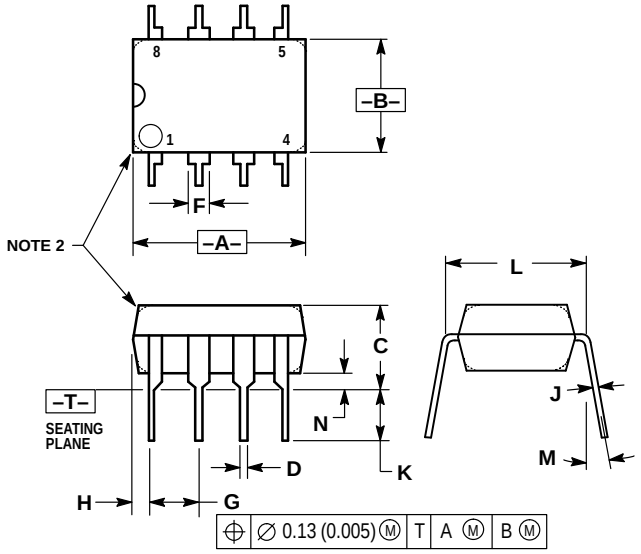


Figure 6. Rise/Fall Time versus R_{WS}



OUTLINE DIMENSIONS

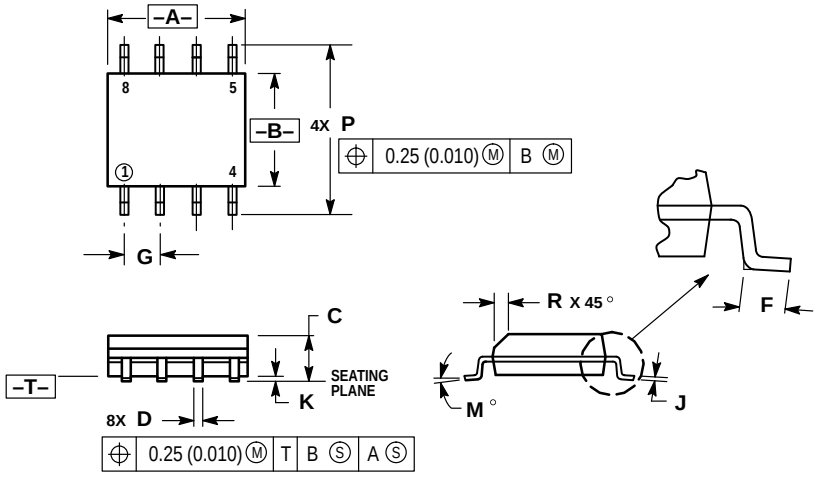
P1 SUFFIX
PLASTIC PACKAGE
CASE 626–05
ISSUE K



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.

	MILLIMETERS		INCHES	
DIM	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

D SUFFIX
PLASTIC PACKAGE
CASE 751–05
(SO–8)
ISSUE N



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS 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.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.18	0.25	0.007	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

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