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MIC5800/5801

4/8-Bit Parallel-Input Latched Drivers

General Description

The MIC5800/5801 latched drivers are high-voltage, high-current integrated circuits comprised of four or eight CMOS data latches, a bipolar Darlington transistor driver for each latch, and CMOS control circuitry for the common CLEAR, STROBE, and OUTPUT ENABLE functions.

The bipolar/MOS combination provides an extremely low-power latch with maximum interface flexibility. MIC5800 contains four latched drivers; MIC5801 contains eight latched drivers.

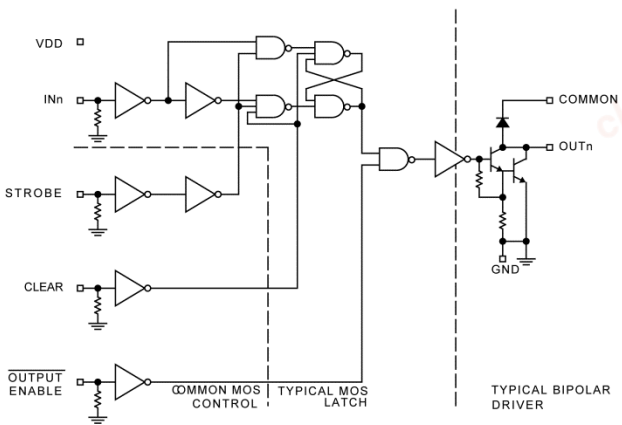
Data input rates are greatly improved in these devices. With a 5V supply, they will typically operate at better than 5MHz. With a 12V supply, significantly higher speeds are obtained. The CMOS inputs are compatible with standard CMOS, PMOS, and NMOS circuits. TTL or DTL circuits may require the use of appropriate pull-up resistors. The bipolar outputs are suitable for use with relays, solenoids, stepping motors, LED or incandescent displays, and other high-power loads. Both units have open-collector outputs and integral diodes for inductive load transient suppression. The output transistors are capable of sinking 500mA and will sustain at least 50V in the OFF state. Because of limitations on package power dissipation, the simultaneous operation of all drivers at maximum rated current can only be accomplished by a reduction in duty cycle. Outputs may be paralleled for higher load current capability.

Datasheets and support documentation are available on Micrel's web site at: www.micrel.com.

Features

- 4.4MHz Minimum Data Input Rate
- High-Voltage, Current Sink Outputs
- Output Transient Protection
- CMOS, PMOS, NMOS, and TTL Compatible Inputs
- Internal Pull-Down Resistors
- Low-Power CMOS Latches

Functional Diagram

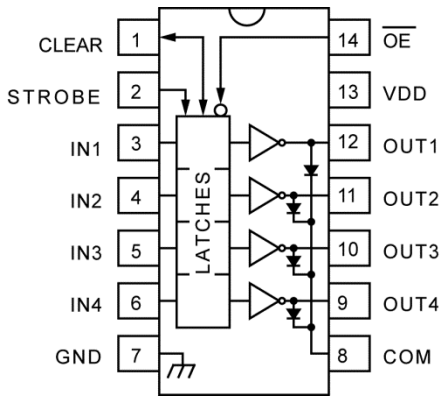


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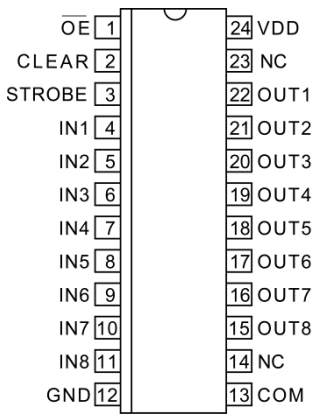
Ordering Information

Part Number	Junction Temperature Range	Package	Pb-Free
MIC5800YM	–40°C to +85°C	14-Pin SOIC	√
MIC5801YV	–40°C to +85°C	28-Pin PLCC	√
MIC5801YWM	–40°C to +85°C	24-Pin Wide SOIC	√

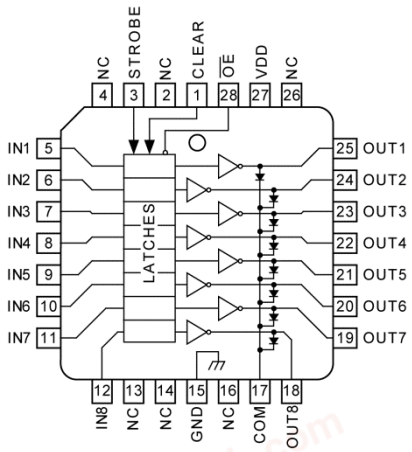
Pin Configuration



14-Pin SOIC (M)
(MIC5800YM)
(Top View)

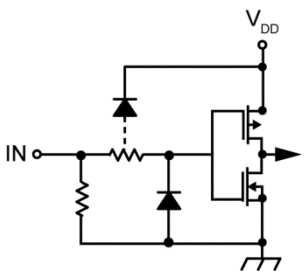


24-Pin SOIC (WM)
(MIC5801YWM)
(Top View)



28-Pin SOIC (V)
(MIC5801YV)
(Top View)

Typical Input



MIC5800 Pin Description

Pin Number	Pin Name	Pin Function
1	CLEAR	Resets all latches and turns all outputs OFF (open).
2	STROBE	Input strobe pin. Loads output latches when high.
3 – 6	INn	Parallel inputs, 1 through 4.
7	GND	Logic and Output Ground pin.
8	COM	Transient suppression diode common cathode pin.
9 – 12	OUTn	Parallel outputs, 4 through 1.
13	VDD	Logic Supply Voltage.
14	/OE	Output Enable. When low outputs are active. When high, outputs are inactive and device is reset from a fault condition. An undervoltage condition emulates a high OE input.

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MIC5801 Pin Description

Pin Number SOIC	Pin Number PLCC	Pin Name	Pin Function
1	28	/OE	Output Enable. When low outputs are active. When high, outputs are inactive and device is reset from a fault condition. An undervoltage condition emulates a high OE input.
2	1	CLEAR	Resets all latches and turns all outputs OFF (open).
3	3	STROBE	Input strobe pin. Loads output latches when high.
4 – 11	5 – 12	INn	Parallel inputs, 1 through 8.
12	15	GND	Logic and Output Ground pin.
13	17	COM	Transient suppression diode common cathode pin.
14, 23	2, 4, 13, 14, 16, 26	NC	No Connection. Leave floating.
15 – 22	18 – 25	OUTn	Parallel outputs, 8 through 1.
24	27	VDD	Logic Supply Voltage.

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Absolute Maximum Ratings[1]

Output Voltage (V_{CE}) ..... +50V
Supply Voltage (V_{DD}) ..... +15V
Input Voltage Range (V_{IN}) ..... –0.3V to V_{DD} +0.3V
Storage Temperature Range (T_S) ..... –65°C to +125°C
Continuous Collector Current (I_C) 500mA
ESD Rating[3] ..... ESD Sensitive

Operating Ratings[2]

Package Power Dissipation, P_D
MIC5800 SOIC 1.0W
Derate above T_A = +25°C ..... 8.5mW/°C
MIC5801 PLCC 2.25W
Derate above T_A = +25°C ..... 18.2mW/°C
MIC5801 Wide SOIC 1.4W
Derate above T_A = +25°C ..... 11mW/°C
Operating Temperature Range (T_A) ..... –40°C to +85°C

Electrical Characteristics[4]

V_{DD} = 5V, T_A = 25°C, $V_A \le$ +85°C, unless otherwise noted.

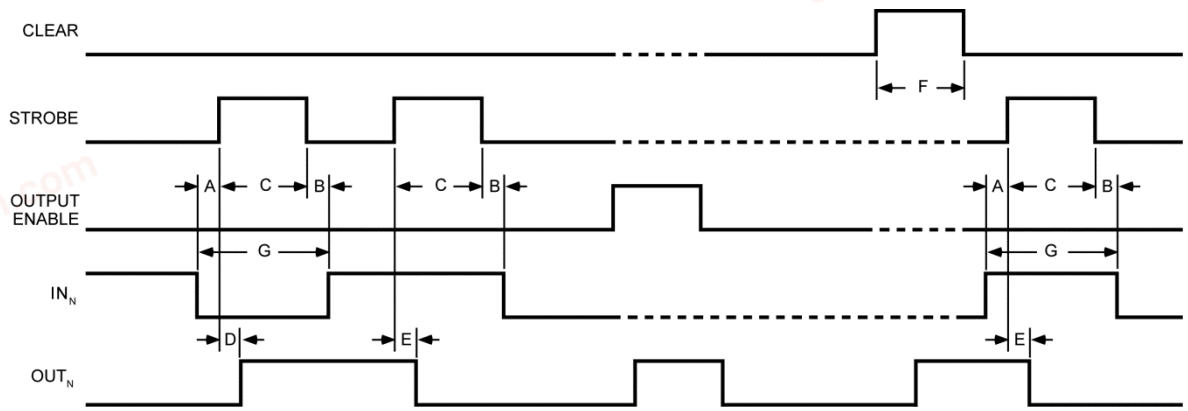
Symbol	Parameter	Condition	Limits			Units
			Min.	Typ.	Max.	
I_{CEX}	Output Leakage Current	V_{CE} = 50V, T_A = +25°C			50	µA
		V_{CE} = 50V, T_A = +70°C			100	
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	I_C = 100mA		0.9	1.1	V
		I_C = 200mA		1.1	1.3	
		I_C = 350mA, V_{DD} = 7.0V		1.3	1.6	
$V_{IN(0)}$	Input Voltage (Low)				1.0	V
$V_{IN(1)}$	Input Voltage (High)	V_{DD} = 12V	10.5			
		V_{DD} = 10V	8.5			
		V_{DD} = 5V, Note 5	3.5			
R_{IN}	Input Resistance	V_{DD} = 12V	50	200		kΩ
		V_{DD} = 10V	50	300		
		V_{DD} = 5V	50	600		
$I_{DD(ON)}$ (Each Stage)	Supply Current ON (Each Stage)	V_{DD} = 12V, Outputs Open		1.0	2.0	mA
		V_{DD} = 10V, Outputs Open		0.9	1.7	
		V_{DD} = 5V, Outputs Open		0.7	1.0	
$I_{DD(OFF)}$ (Total)	Supply Current OFF (Total)	V_{DD} = 12V, Outputs Open, Inputs = 0V			200	µA
		V_{DD} = 5V, Outputs Open, Inputs = 0V		50	100	
I_R	Clamp Diode Leakage Current	V_R = 50V, T_A = +25°C			50	µA
		V_R = 50V, T_A = +70°C			100	
V_F	Clamp Diode Forward Voltage	I_F = 350mA		1.7	2.0	V

Notes:

1. Exceeding the absolute maximum ratings may damage the device.
2. The device is not guaranteed to function outside its operating ratings.
3. Micrel CMOS devices have input-static protection but are susceptible to damage when exposed to extremely high static electrical charges.
4. Specification for packaged product only.
5. Operation of these devices with standard TTL or DTL may require the use of appropriate pull-up resistors to insure a minimum logic “1”.

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Timing Diagram



Timing Conditions

(T_A = +25°C, Logic Levels are V_{DD} and Ground, V_{DD} = 5V)

A. Minimum data active time before strobe enabled (data set-up time) 50ns

B. Minimum data active time after strobe disabled (data hold time) 50ns

C. Minimum strobe pulse width 125ns

D. Typical time between strobe activation and output on to off transition 500ns

E. Typical time between strobe activation and output off to on transition 500ns

F. Minimum clear pulse width 300ns

G. Minimum data pulse width 225ns

Truth Table

IN$_N$	Strobe	Clear	/OE	OUT$_N$	
				t–1	t
0	1	0	0	×	OFF
1	1	0	0	×	ON
×	×	1	×	×	OFF
×	×	×	1	×	OFF
×	0	0	0	ON	ON
×	0	0	0	OFF	OFF

× = Irrelevant

t–1 = Previous output state

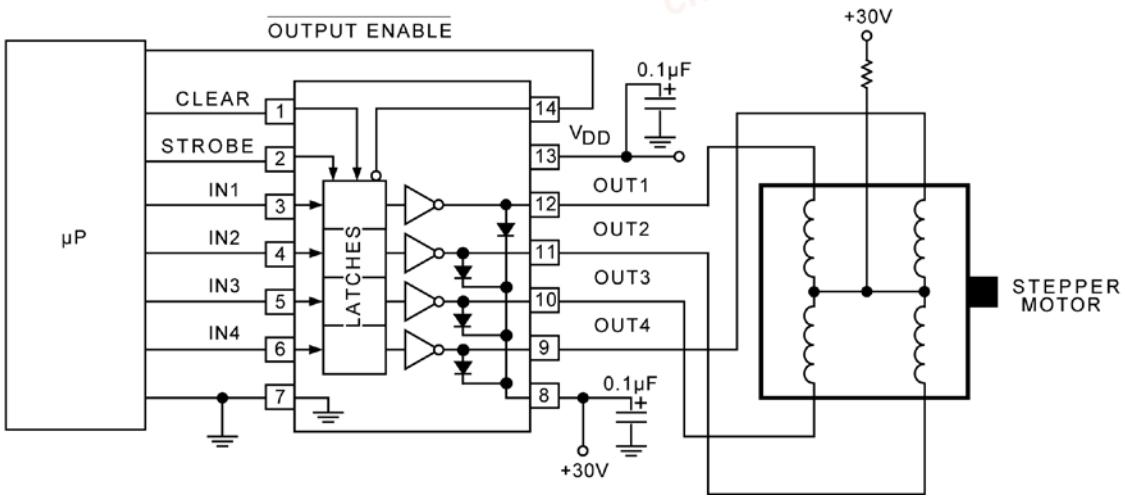
t = Present output state

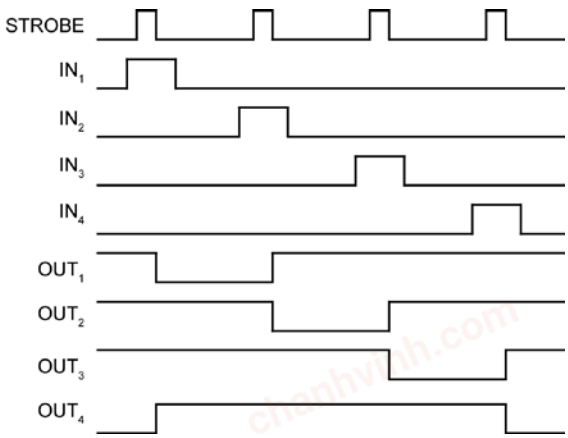
Information present at an input is transferred to its latch when the STROBE is high. A high CLEAR input will set all latches to the output OFF condition regardless of the data or STROBE input levels. A high /OE will set all outputs to the off condition, regardless of any other input conditions. When the /OE is low, the outputs depend on the state of their respective latches.

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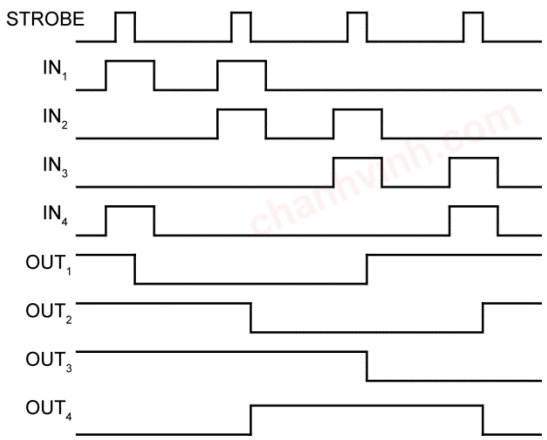
Typical Application

MIC5800 Unipolar Stepper-Motor Drive





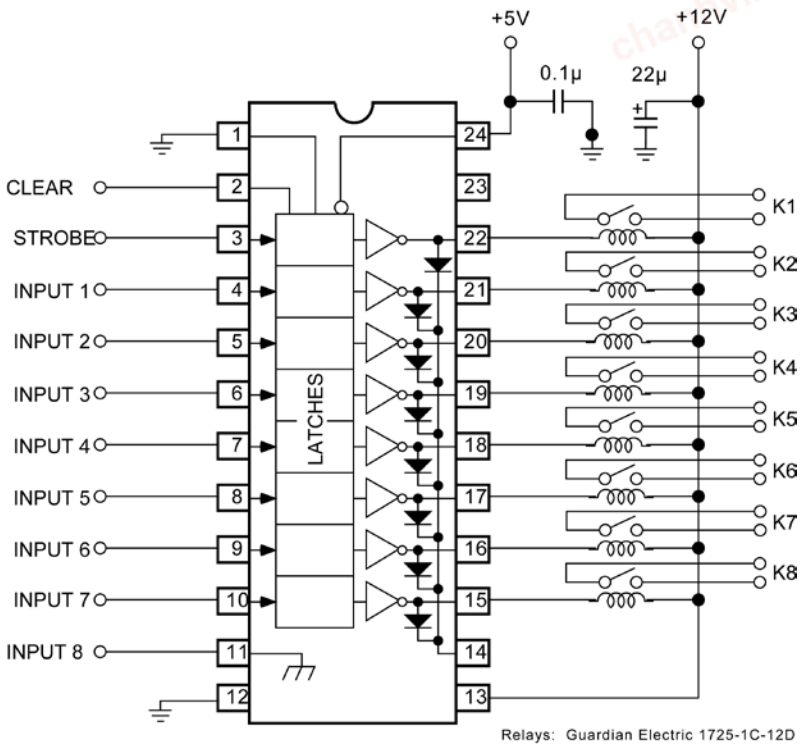
Unipolar Wave Drive



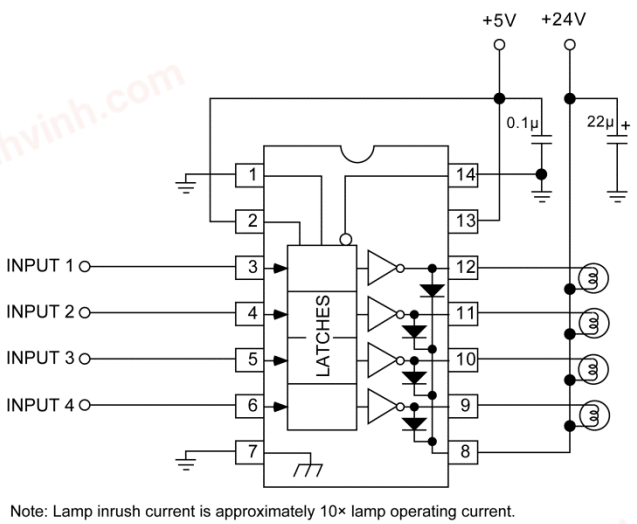
Unipolar 2-Phase Drive

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Typical Applications



MIC5801 Relay Driver

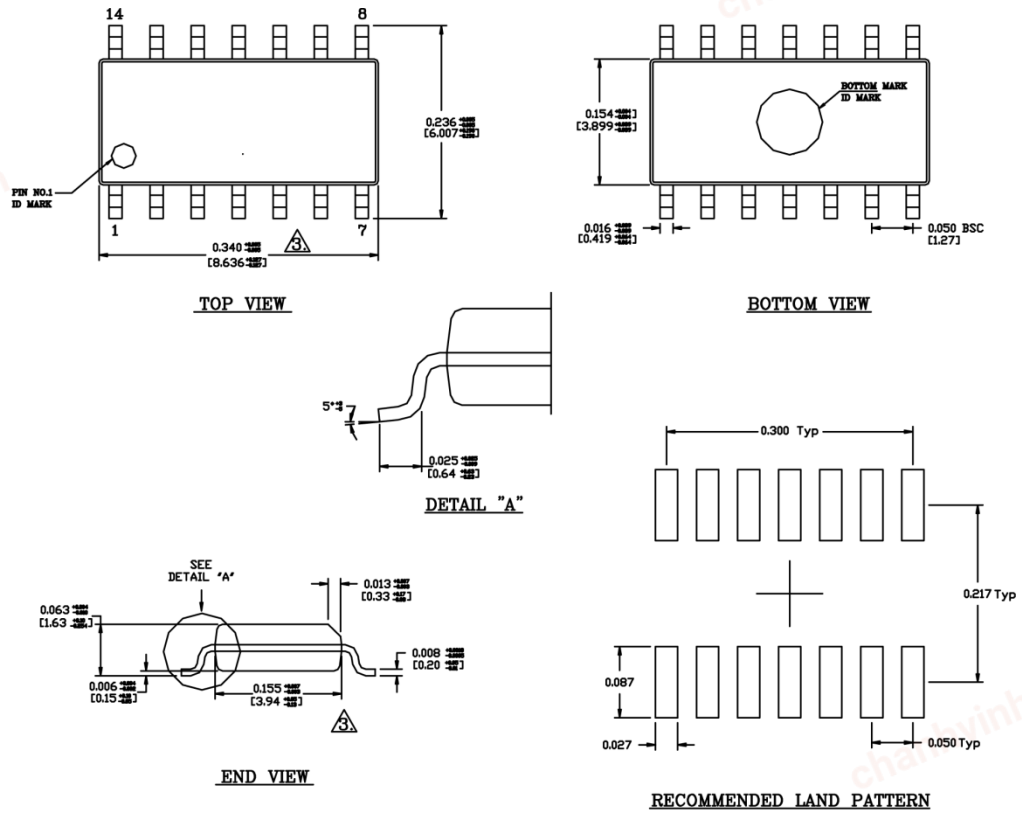


Note: Lamp inrush current is approximately 10× lamp operating current.

MIC5800 Incandescent/Halogen Lamp Driver

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Package Information and Recommended Landing Pattern[6]

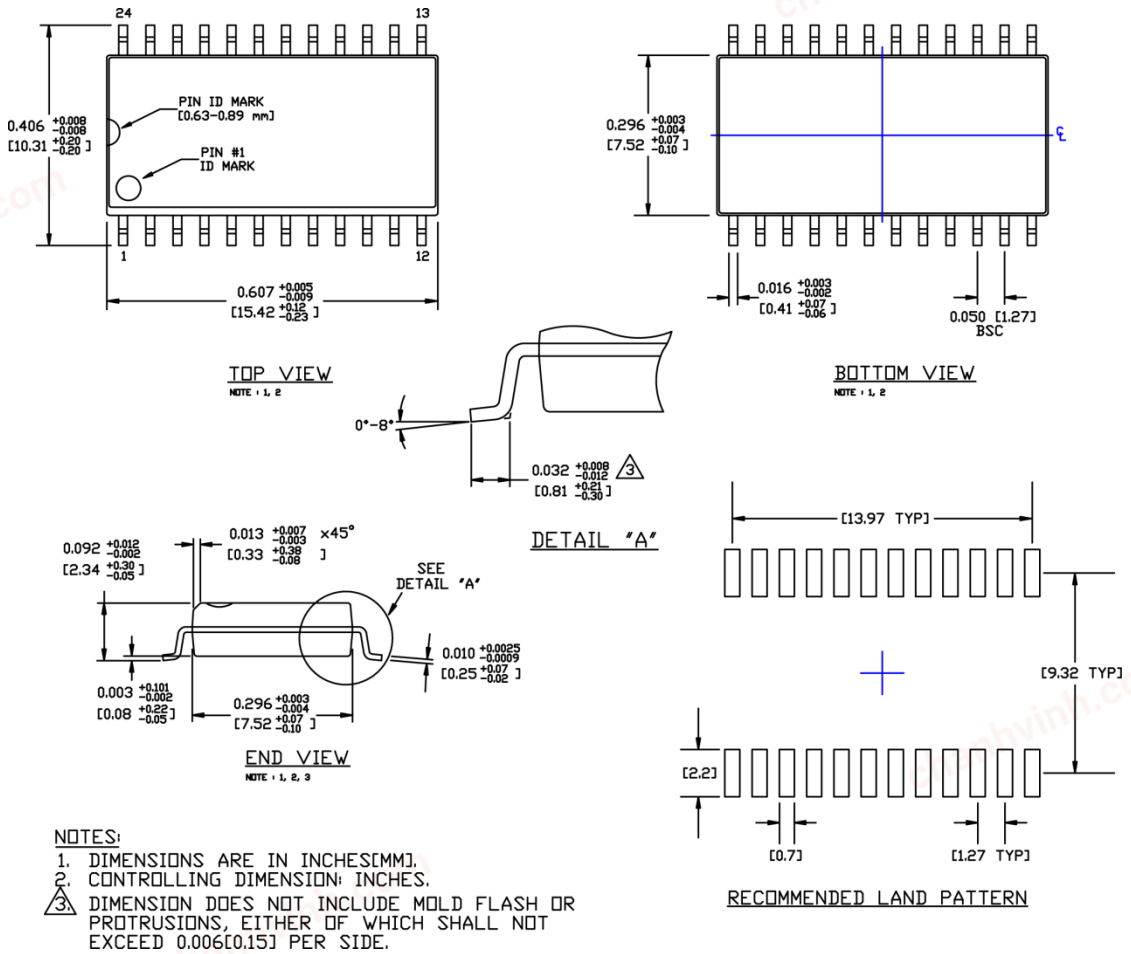


NOTES:
1. DIMENSIONS ARE IN INCHES [MILLIMETER].
2. CONTTROLLING DIMENSION: INCHES.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.010 [0.25] PER SIDE.

14-Pin SOIC (M)

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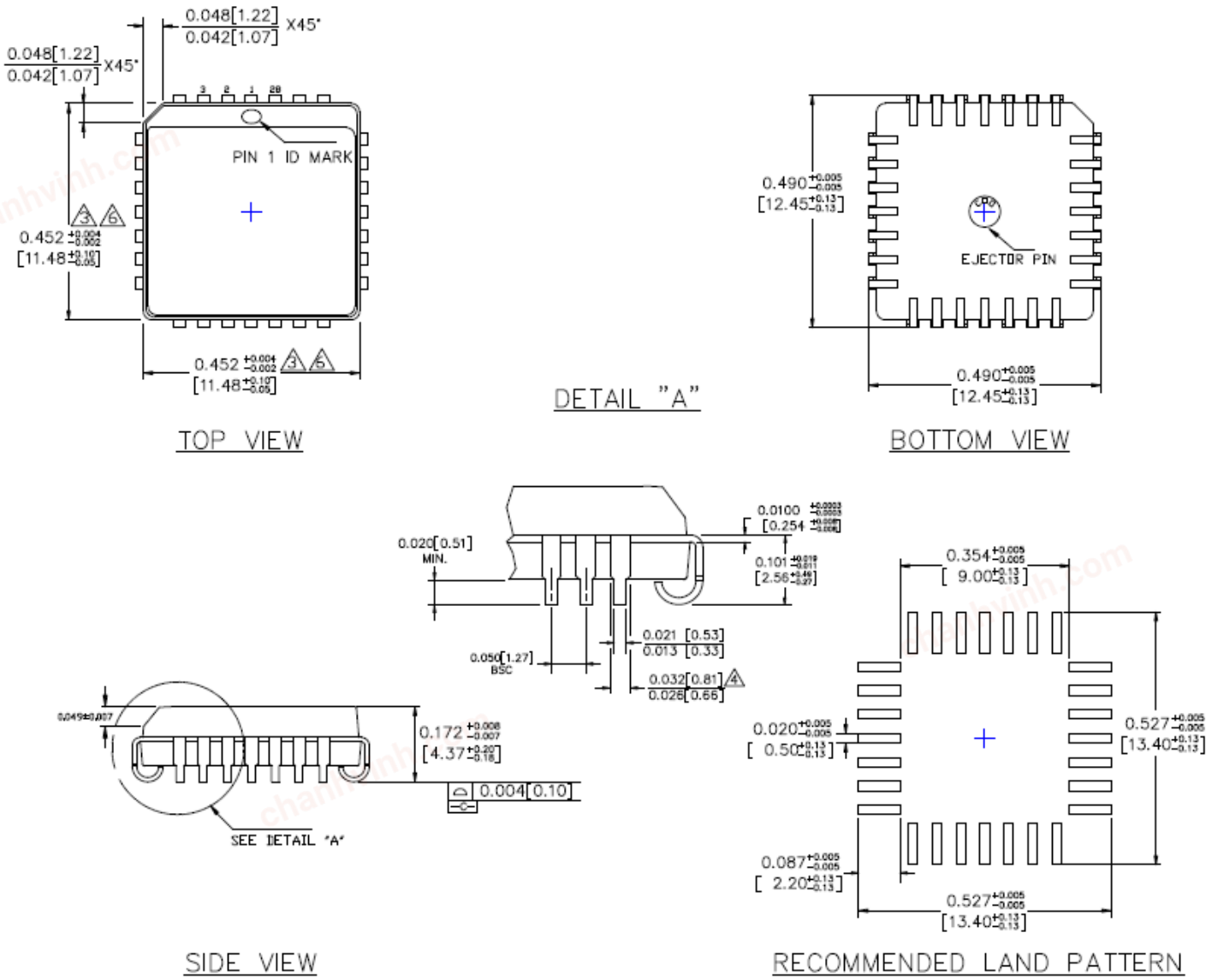
Package Information and Recommended Landing Pattern[6] (Continued)



24-Pin Wide SOIC (WM)

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Package Information and Recommended Landing Pattern[6] (Continued)



NOTES:
1. DIMENSIONS ARE IN INCHES [MM].
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.008 [0.203].
4. LEAD DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION.
5. MAXIMUM AND MINIMUM SPECIFICATIONS ARE INDICATED AS FOLLOWS : MAX/MIN
6. PACKAGE TOP DIMENSION MAY BE SLIGHTLY SMALLER THAN BOTTOM DIMENSION.

28-Pin PLCC (V)

Note:

6. Package information is correct as of the publication date. For updates and most current information, go to www.micrel.com.

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