



## 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.

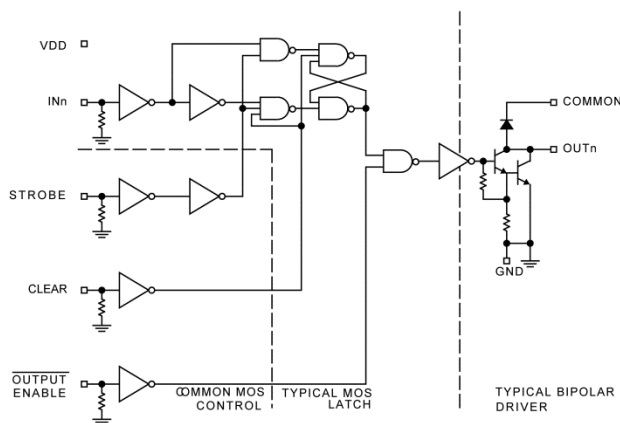
Data input rates are greatly improved in these devices. With a 5V supply, they will typically operate at better than 5MHz. With a 12V supply, significantly higher speeds are obtained. The CMOS inputs are compatible with standard CMOS, PMOS, and NMOS circuits. TTL or DTL circuits may require the use of 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](http://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

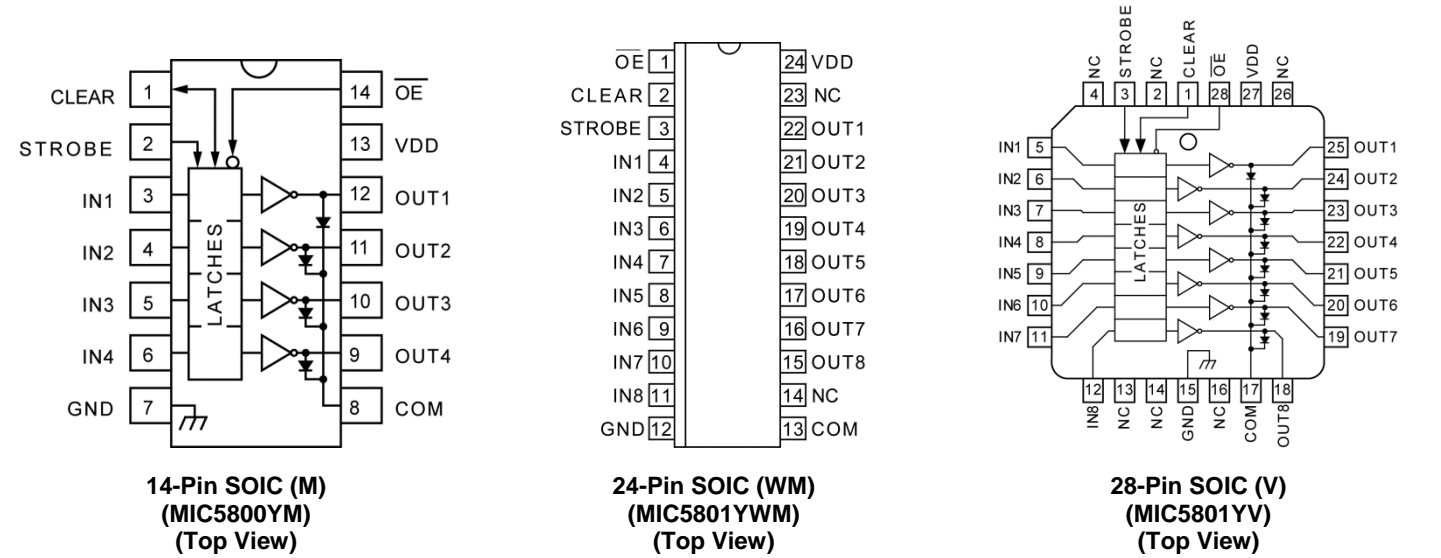
#### Functional Diagram



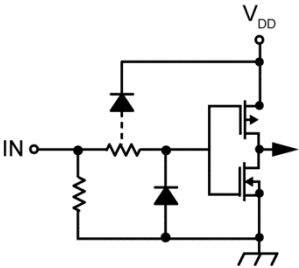
Ordering Information

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



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.

## 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.

**Absolute Maximum Ratings<sup>(1)</sup>**

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 <sup>(3)</sup>	ESD Sensitive

**Operating Ratings<sup>(2)</sup>**

Package Power Dissipation, $P_D$	
MIC5800 SOIC	1.0W
Derate above $T_A = +25^\circ\text{C}$	8.5mW/°C
MIC5801 PLCC	2.25W
Derate above $T_A = +25^\circ\text{C}$	18.2mW/°C
MIC5801 Wide SOIC	1.4W
Derate above $T_A = +25^\circ\text{C}$	11mW/°C
Operating Temperature Range ( $T_A$ )	-40°C to +85°C

**Electrical Characteristics<sup>(4)</sup>**

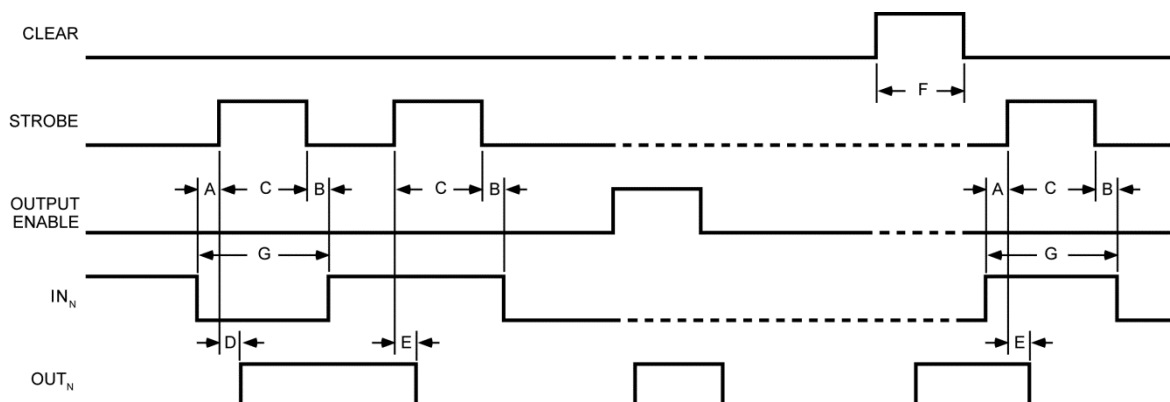
$V_{DD} = 5V$ ,  $T_A = 25^\circ\text{C}$ ,  $V_A \leq +85^\circ\text{C}$ , unless otherwise noted.

Symbol	Parameter	Condition	Limits			Units
			Min.	Typ.	Max.	
$I_{CEX}$	Output Leakage Current	$V_{CE} = 50V$ , $T_A = +25^\circ\text{C}$			50	$\mu\text{A}$
		$V_{CE} = 50V$ , $T_A = +70^\circ\text{C}$			100	
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	$I_C = 100\text{mA}$		0.9	1.1	V
		$I_C = 200\text{mA}$		1.1	1.3	
		$I_C = 350\text{mA}$ , $V_{DD} = 7.0V$		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		k $\Omega$
		$V_{DD} = 10V$	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	$\mu\text{A}$
		$V_{DD} = 5V$ , Outputs Open, Inputs = 0V		50	100	
$I_R$	Clamp Diode Leakage Current	$V_R = 50V$ , $T_A = +25^\circ\text{C}$			50	$\mu\text{A}$
		$V_R = 50V$ , $T_A = +70^\circ\text{C}$			100	
$V_F$	Clamp Diode Forward Voltage	$I_F = 350\text{mA}$		1.7	2.0	V

**Notes:**

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

## Timing Diagram



## Timing Conditions

( $T_A = +25^\circ\text{C}$ , Logic Levels are  $V_{DD}$  and Ground,  $V_{DD} = 5\text{V}$ )

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	x	OFF
1	1	0	0	x	ON
x	x	1	x	x	OFF
x	x	x	1	x	OFF
x	0	0	0	ON	ON
x	0	0	0	OFF	OFF

x = Irrelevant

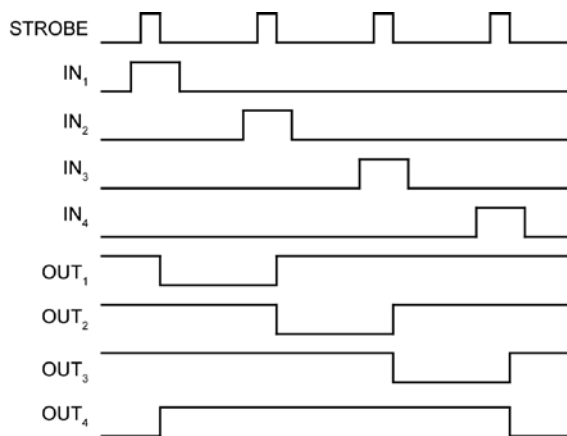
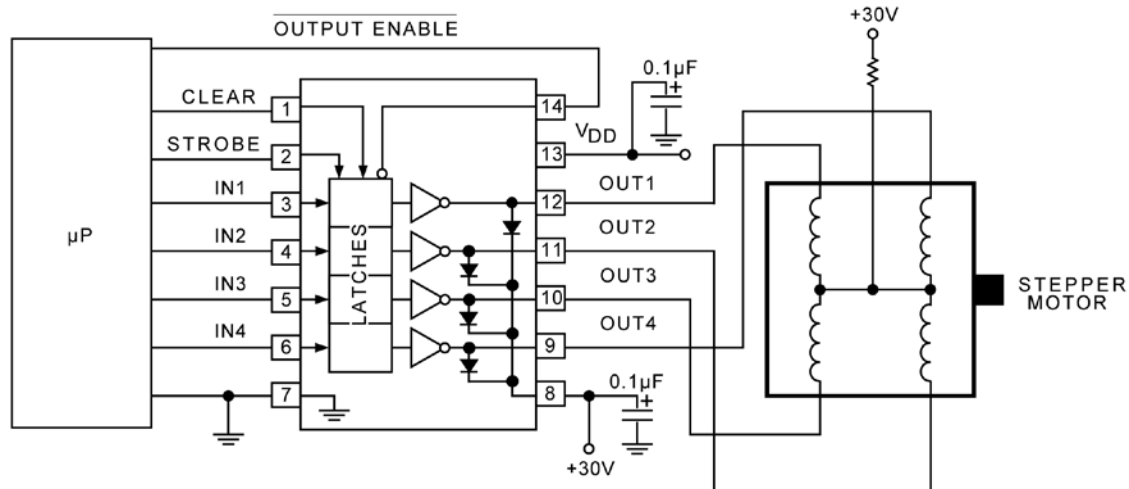
t-1 = Previous output state

t = Present output state

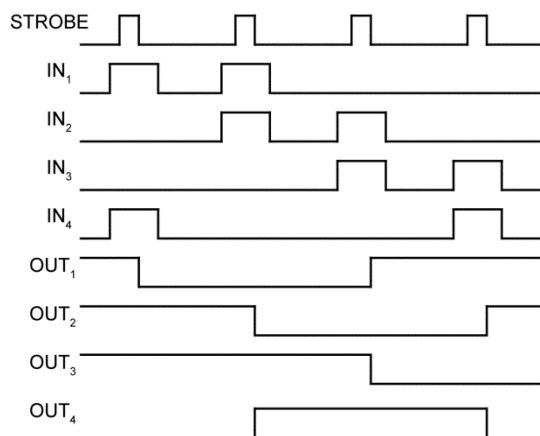
Information present at an input is transferred to its latch when the STROBE is high. A high CLEAR input will set all latches to the output OFF condition regardless of the data or STROBE input levels. A high /OE will set all outputs to the off condition, regardless of any other input conditions. When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

## Typical Application

### MIC5800 Unipolar Stepper-Motor Drive

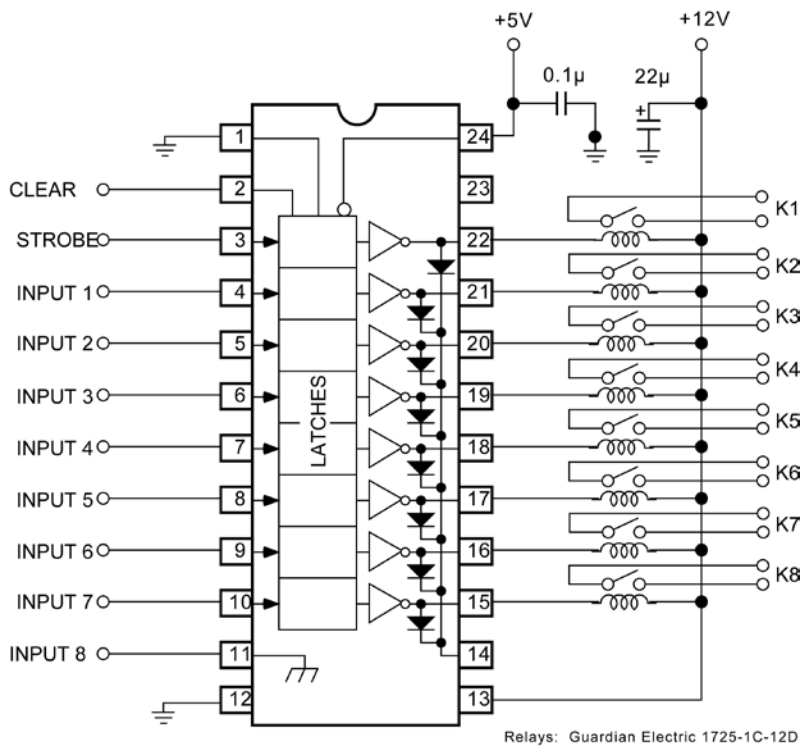


Unipolar Wave Drive

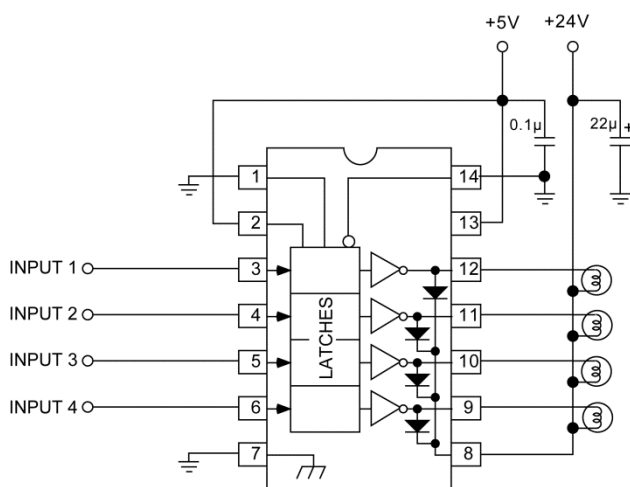


Unipolar 2-Phase Drive

## Typical Applications



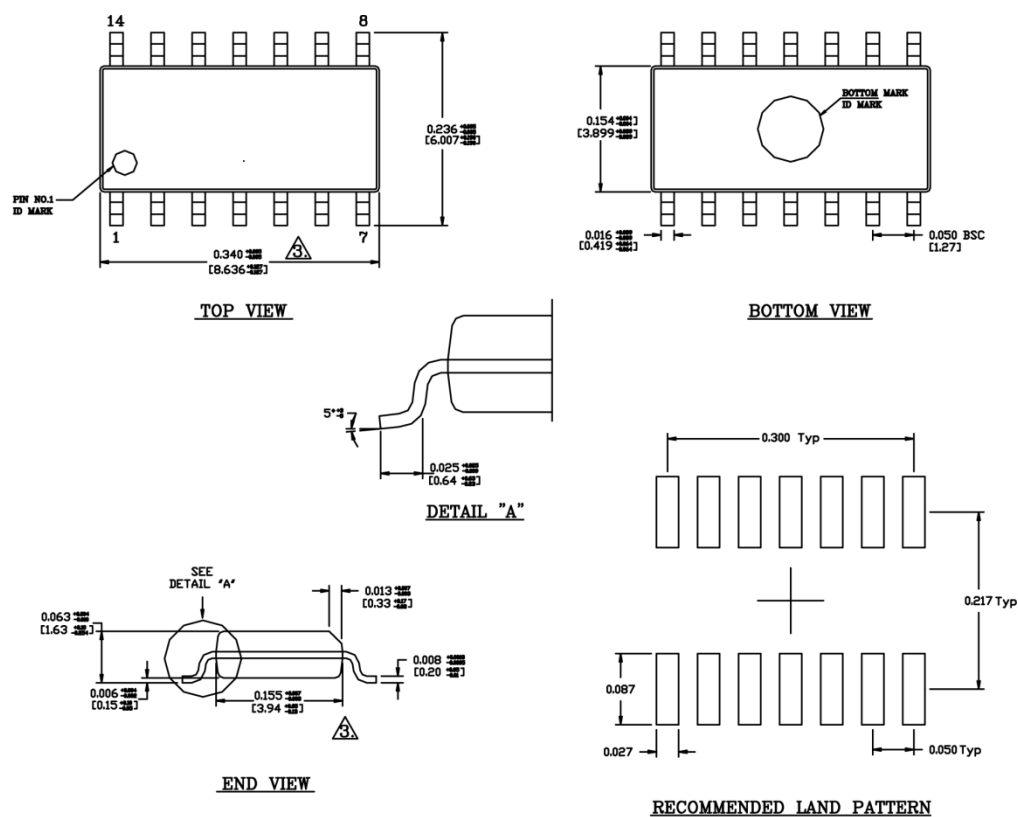
**MIC5801 Relay Driver**



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

**MIC5800 Incandescent/Halogen Lamp Driver**

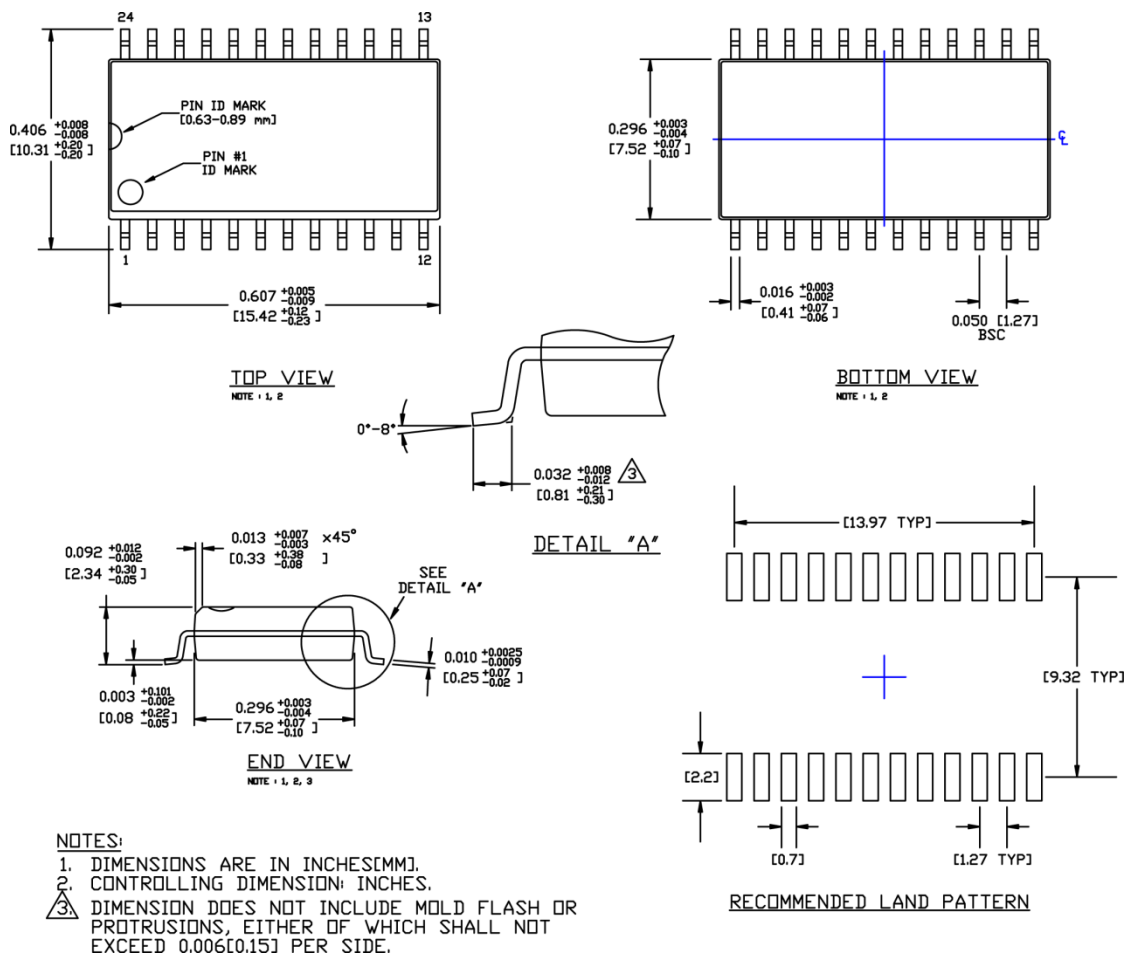
## Package Information and Recommended Landing Pattern<sup>(6)</sup>



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

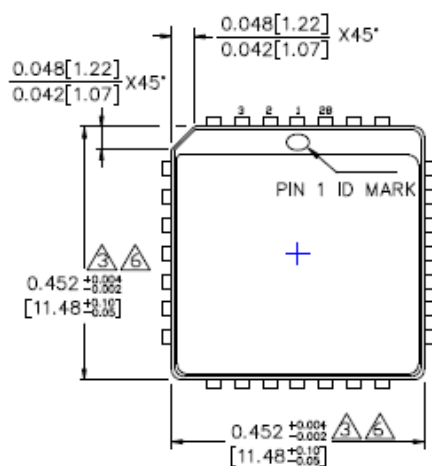
### 14-Pin SOIC (M)

# Package Information and Recommended Landing Pattern<sup>(6)</sup> (Continued)

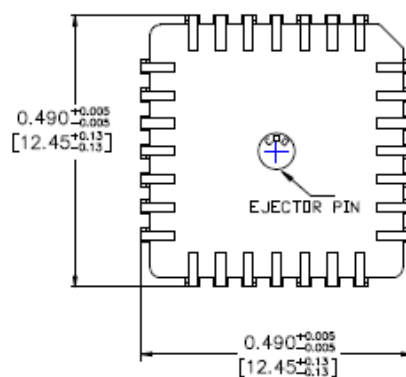


**24-Pin Wide SOIC (WM)**

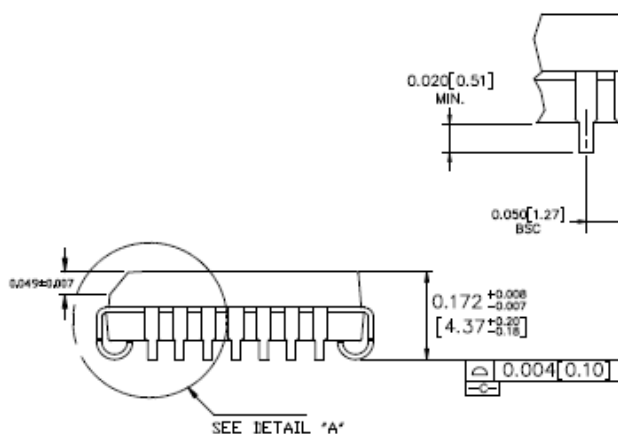
## Package Information and Recommended Landing Pattern<sup>(6)</sup> (Continued)



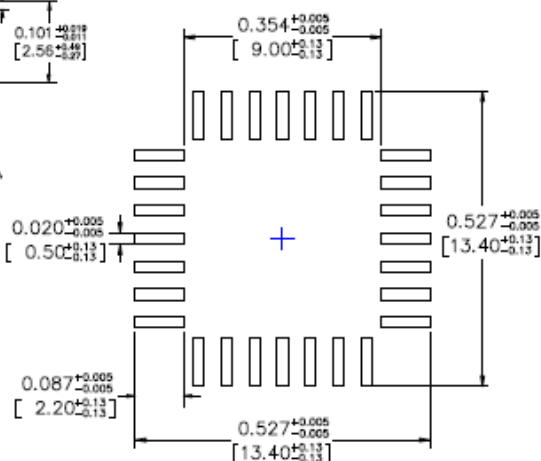
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN

## 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](http://www.micrel.com).

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