MIC58P01

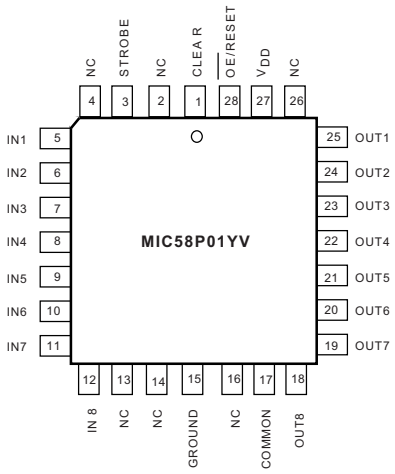
8-Bit Parallel-Input Protected Latched Driver

Features

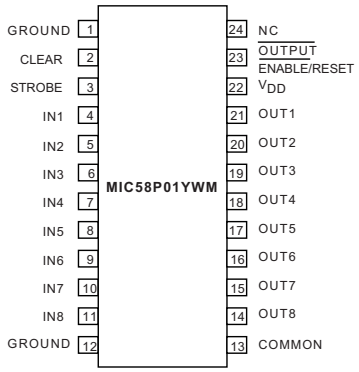
- 4.4 MHz Minimum Data Input Rate
- High-Voltage, High-Current Outputs
- Per-Output Overcurrent Shutdown (500 mA Typical)
- Undervoltage Lockout
- Thermal Shutdown
- Output Transient Protection Diodes
- CMOS, PMOS, NMOS, and TTL Compatible Inputs
- Internal Pull-Down Resistors
- Low-Power CMOS Latches

Package Types

MIC58P01
28-Lead PLCC (V)
(Top View)



MIC58P01
24-Lead SOIC (WM)
(Top View)



General Description

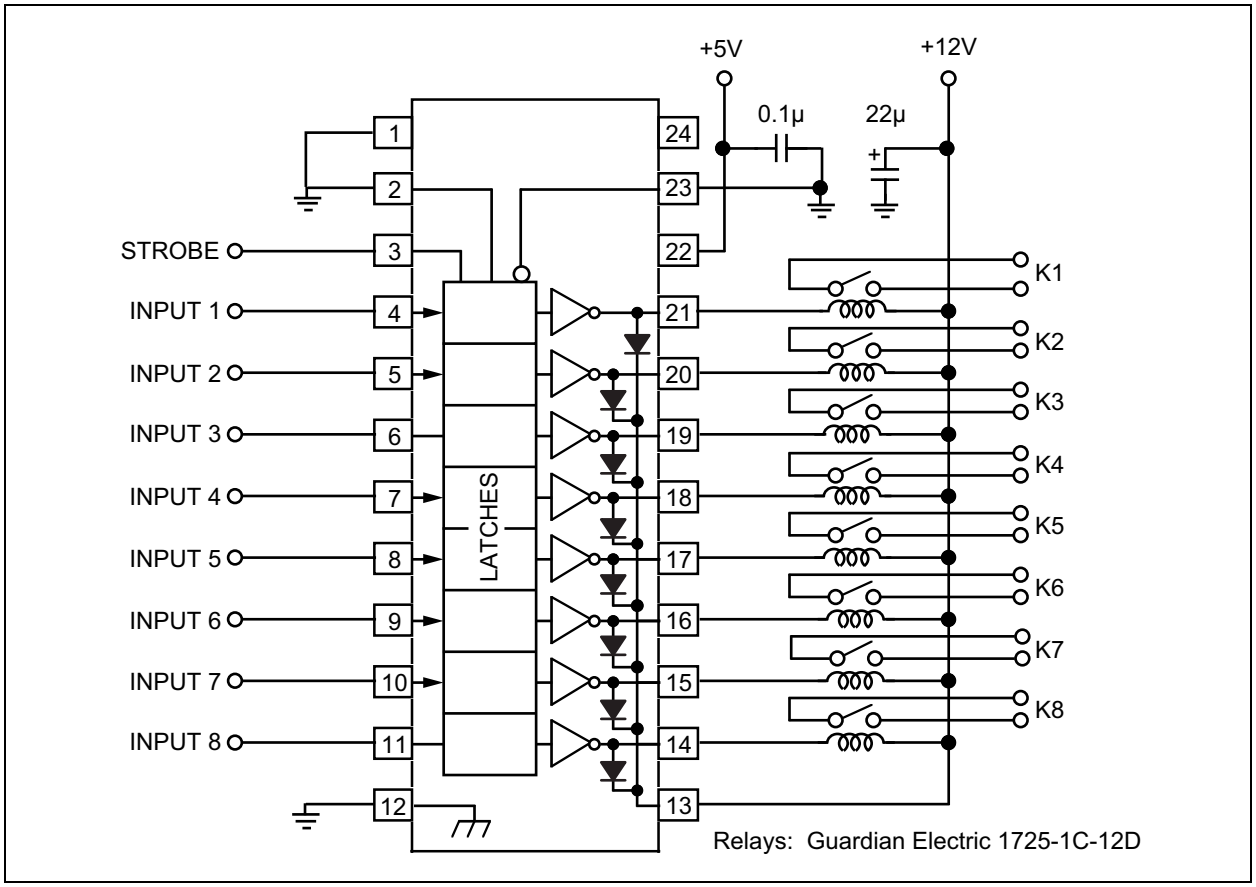
The MIC58P01 parallel-input latched driver is a high-voltage (80V), high-current (500 mA) integrated circuit comprised of eight CMOS data latches, a bipolar Darlington transistor driver for each latch, and CMOS control circuitry for the common CLEAR, STROBE, and OUTPUT ENABLE functions. Similar to the MIC5801, additional protection circuitry supplied on this device includes thermal shutdown, undervoltage lockout (UVLO), and overcurrent shutdown.

The bipolar/CMOS combination provides an extremely low-power latch with maximum interface flexibility. The MIC58P01 has open-collector outputs capable of sinking 500 mA and integral diodes for inductive load transient suppression with a minimum output breakdown voltage rating of 80V (50V sustaining). The drivers may be connected in parallel for higher load current capability.

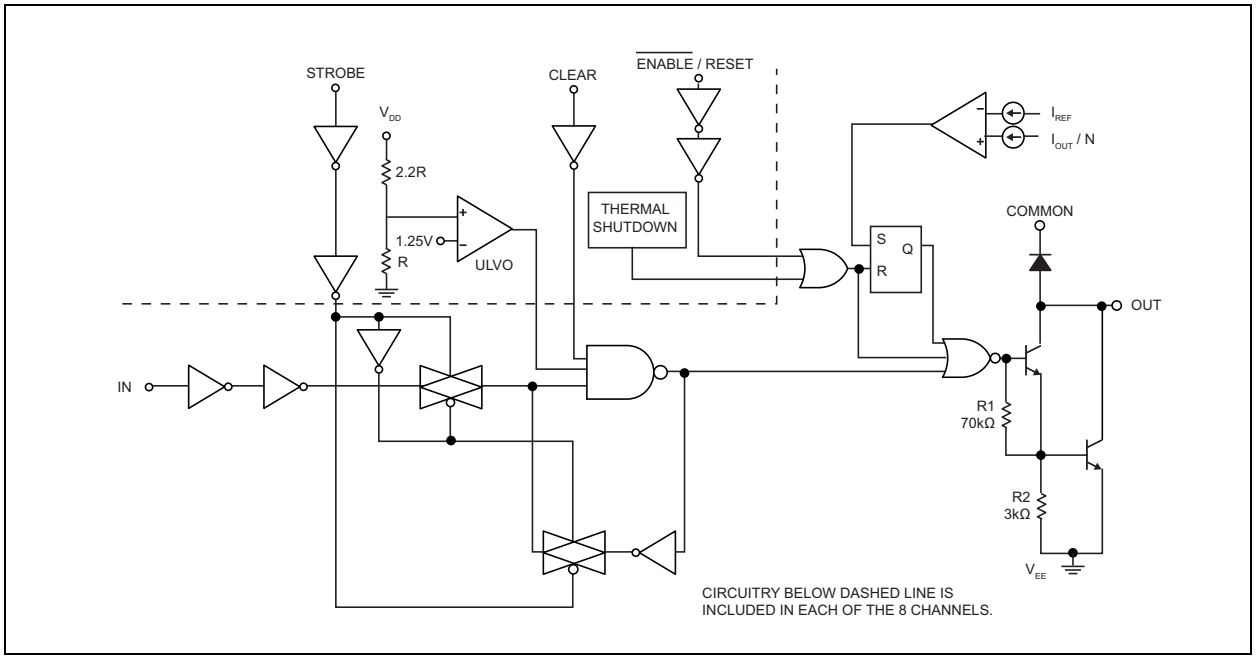
With a 5V logic supply, the MIC58P01 will typically operate at better than 5 MHz. With a 12V logic supply, significantly higher speeds are obtained. The CMOS inputs are compatible with standard CMOS, PMOS, and NMOS circuits. TTL circuits may require pull-up resistors.

Each of these eight outputs has an independent overcurrent shutdown of 500 mA. Upon current shutdown, the affected channel will turn off until V_{DD} is cycled or the ENABLE/RESET pin is pulsed high. Current pulses less than 2 µs will not activate current shutdown. Temperatures above 165°C will shut down all outputs. The UVLO circuit disables the outputs at low V_{DD}; hysteresis of 0.5V is provided.

Typical Application Circuit



Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Output Voltage (V_{CE}) ..... +80V
Logic Supply Voltage (V_{DD}) ..... +15V
Input Voltage Range (V_{IN}) ..... –0.3V to V_{DD} + 0.3V
Maximum Operating Ambient Temperature ($T_{A(MAX)}$) ..... +85°C
Minimum Operating Ambient Temperature ($T_{A(MIN)}$) ..... –55°C
ESD Rating (Note 1) ..... ESD Sensitive

Operating Ratings ††

Package Power Dissipation (P_D)
MIC58P01YV 1.6W
Derate above T_A = +25°C ..... 16 mW/°C
MIC58P01YWM 1.4W
Derate above T_A = +25°C ..... 14 mW/°C

† Notice: Exceeding the absolute maximum ratings may damage the device.

†† Notice: The device is not guaranteed to function outside its operating ratings.

Note 1: Microchip CMOS devices have input-static protection, but are susceptible to damage when exposed to extremely high static electrical charges.

ELECTRICAL CHARACTERISTICS

Electrical Characteristics: V_{DD} = 5V, T_A = +25°C, unless otherwise noted. Note 1

Parameter	Sym.	Min.	Typ.	Max.	Units	Conditions
Output Leakage Current	I_{CEX}	—	—	50	µA	V_{CE} = 80V, T_A = +25°C
		—	—	100		V_{CE} = 80V, T_A = +70°C
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	0.9	1.1	V	I_C = 100 mA
		—	1.1	1.3		I_C = 200 mA
		—	1.3	1.6		I_C = 350 mA
Input Voltage (Low)	$V_{IN(0)}$	—	—	1.0	V	—
Input Voltage (High)	$V_{IN(1)}$	10.5	—	—	V	V_{DD} = 12V
		8.5	—	—		V_{DD} = 10V
		3.5	—	—		V_{DD} = 5V, Note 2
Input Resistance	R_{IN}	50	200	—	kΩ	V_{DD} = 12V
		50	300	—		V_{DD} = 10V
		50	600	—		V_{DD} = 5V

Note 1: Specification for packaged product only.

2: Operation of these devices with standard TTL or DTL may require the use of appropriate pull-up resistors to ensure a minimum logic “1”.

3: Undervoltage Lockout is guaranteed to release device at no more than 4.5V, and disable the device at no less than 3.0V.

ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: V_{DD} = 5V, T_A = +25°C, unless otherwise noted. Note 1

Parameter	Sym.	Min.	Typ.	Max.	Units	Conditions
Supply Current	$I_{DD(1ON)}$	—	3.3	4.5	mA	One Driver ON, V_{DD} = 12V, Outputs Open
		—	3.1	4.5		One Driver ON, V_{DD} = 10V, Outputs Open
		—	2.4	3.6		One Driver ON, V_{DD} = 5V, Outputs Open
	$I_{DD(ON)}$	—	6.4	10.0	mA	All Drivers ON, V_{DD} = 12V, Outputs Open
		—	6.0	9.0		All Drivers ON, V_{DD} = 10V, Outputs Open
		—	4.7	7.5		All Drivers ON, V_{DD} = 5V, Outputs Open
	$I_{DD(OFF)}$	—	3.0	4.5	mA	All Drivers OFF, V_{DD} = 12V, Outputs Open, Inputs = 0V
		—	2.2	3.6		All Drivers OFF, V_{DD} = 5V, Outputs Open, Inputs = 0V
Clamp Diode Leakage Current	I_R	—	—	50	µA	V_R = 80V, T_A = +25°C
		—	—	100		V_R = 80V, T_A = +70°C
Overcurrent Threshold	I_{LIM}	—	500	—	mA	Per Output
Start-Up Voltage	V_{SU}	3.5	4.0	4.5	V	Note 3
Minimum Operating V_{DD}	$V_{DD(MIN)}$	3.0	3.5	4.0	V	—
Clamp Diode Forward Voltage	V_F	—	1.7	2.0	V	I_F = 350 mA
Thermal Shutdown	—	—	165	—	°C	—
Thermal Shutdown Hystersis	—	—	10	—	°C	—

Note 1: Specification for packaged product only.

2: Operation of these devices with standard TTL or DTL may require the use of appropriate pull-up resistors to ensure a minimum logic “1”.

3: Undervoltage Lockout is guaranteed to release device at no more than 4.5V, and disable the device at no less than 3.0V.

TRUTH TABLE

IN_N	Strobe	Clear	Output Enable	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

Legend: 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 OUTPUT ENABLE will set all outputs to the OFF condition, regardless of any other input conditions. When the OUTPUT ENABLE is low, the outputs depend on the state of their respective latches. If current shutdown is activated, the OUTPUT ENABLE must be pulsed high to restore operation. Overtemperature faults are not latched and require no reset pulse.

TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Maximum Operating Temperature Range	T_A	–55	—	+85	°C	—
Storage Temperature Range	T_S	–65	—	+125	°C	—
Operating Temperature Range	T_A	–40	—	+85	°C	—

Note 1: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e., T_A, T_J, θ_{JA}). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +125°C rating. Sustained junction temperatures above +125°C can impact the device reliability.

2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

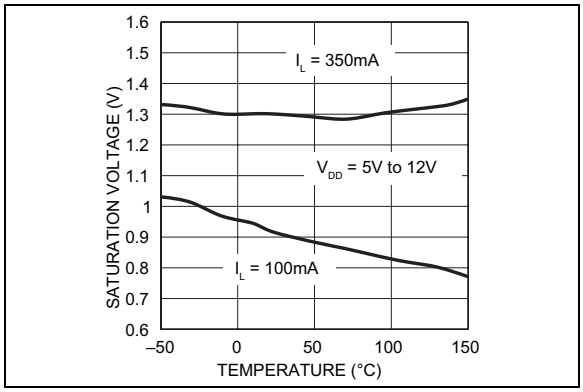


FIGURE 2-1: *Output Saturation Voltage vs. Temperature.*

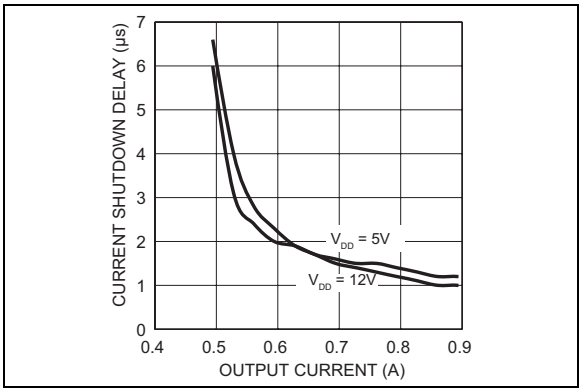


FIGURE 2-4: *Current Shutdown Delay vs. Output Current.*

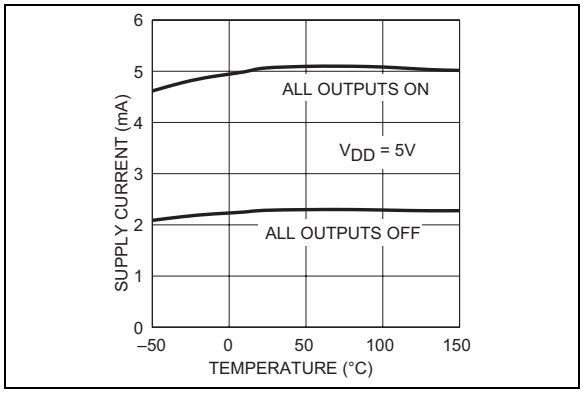


FIGURE 2-2: *Supply Current vs. Temperature.*

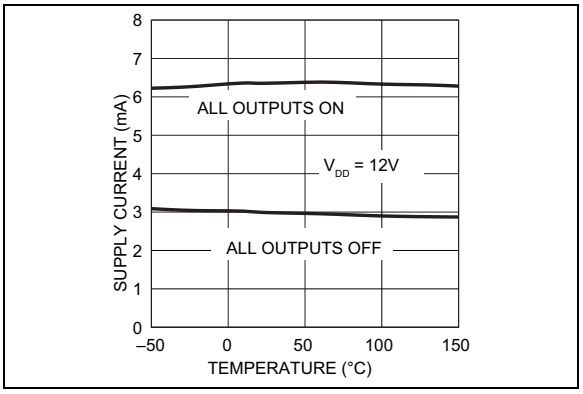


FIGURE 2-5: *Supply Current vs. Temperature.*

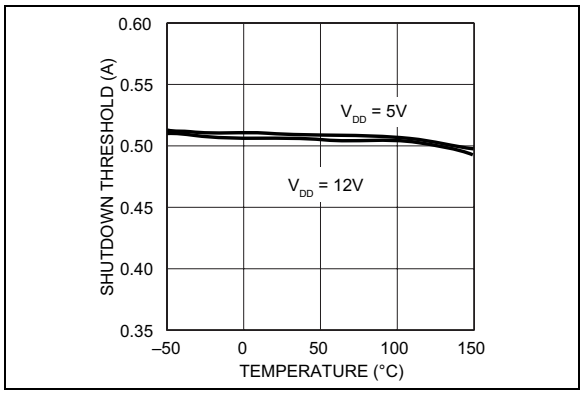


FIGURE 2-3: *Current Shutdown Threshold vs. Temperature.*

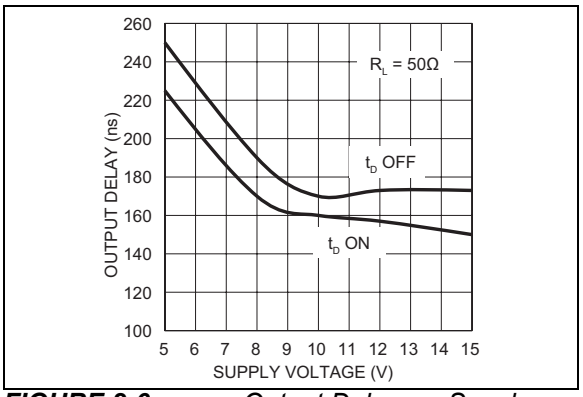


FIGURE 2-6: *Output Delay vs. Supply Voltage.*

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 3-1.

TABLE 3-1: PIN FUNCTION TABLE

Pin Number PLCC	Pin Number SOIC	Pin Name	Description
1	2	CLEAR	Resets all Latches and turns all outputs OFF (open).
3	3	STROBE	Input Strobe Pin. Loads output latches when High.
5, 6, 7, 8, 9, 10, 11, 12	4, 5, 6, 7, 8, 9, 10, 11	IN_N	Parallel Inputs, 1 through 8.
15	1, 12	GROUND	Logic and Output Ground pin.
17	13	COMMON	Transient suppression diode common cathode pin.
18, 19, 20, 21, 22, 23, 24, 25	14, 15, 16, 17, 18, 19, 20, 21	OUT_N	Parallel Outputs, 8 through 1.
27	22	V_{DD}	Logic Supply voltage.
28	23	$\overline{\text{OUTPUT ENABLE}}$/ RESET	When Low, Outputs are active. When High, outputs are inactive and device is reset from a fault condition. An undervoltage condition emulates a high $\overline{OE}$ output.
2, 4, 13, 14, 16, 26	24	NC	No connect.

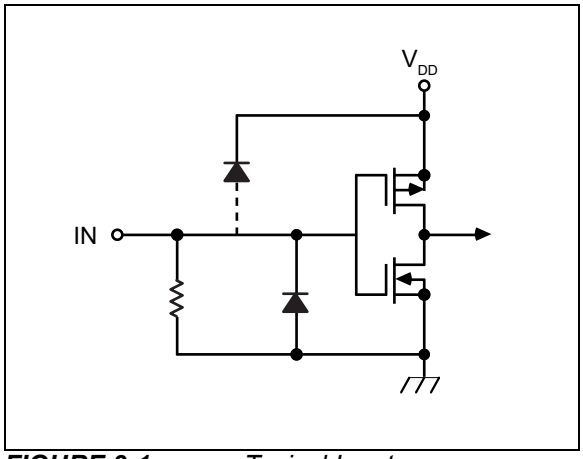


FIGURE 3-1: *Typical Input.*

4.0 TIMING

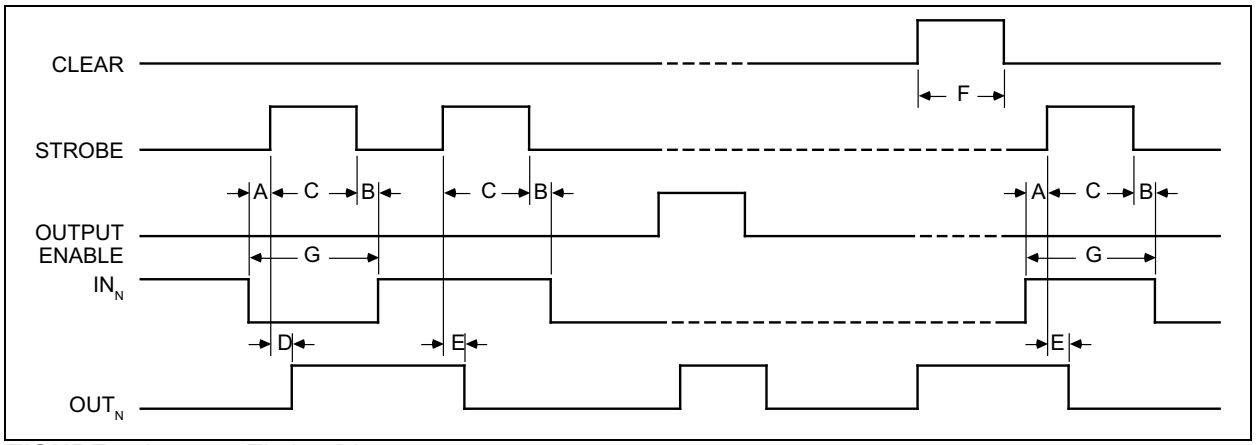


FIGURE 4-1: *Timing Diagram.*

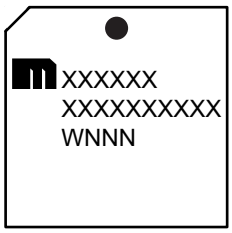
TABLE 4-1: TIMING CONDITIONS

Characteristics: T_A = +25°C; Logic levels are V_{DD} and Ground; V_{DD} = 5V.			
Condition	**Min.**	**Typ.**	**Max.**
Minimum data active time before strobe enabled (data set-up time)	50 ns	—	—
Minimum data active time after strobe disabled (data hold time)	50 ns	—	—
Minimum strobe pulse width	125 ns	—	—
Typical time between strobe activation and output on to off transition	—	500 ns	—
Typical time between strobe activation and output off to on transition	—	500 ns	—
Minimum clear pulse width	300 ns	—	—
Minimum data pulse width	225 ns	—	—

5.0 PACKAGING INFORMATION

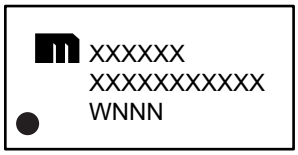
5.1 Package Marking Information

28-Lead PLCC*

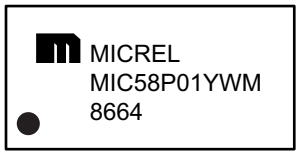


Example

24-Lead SOICW*



Example

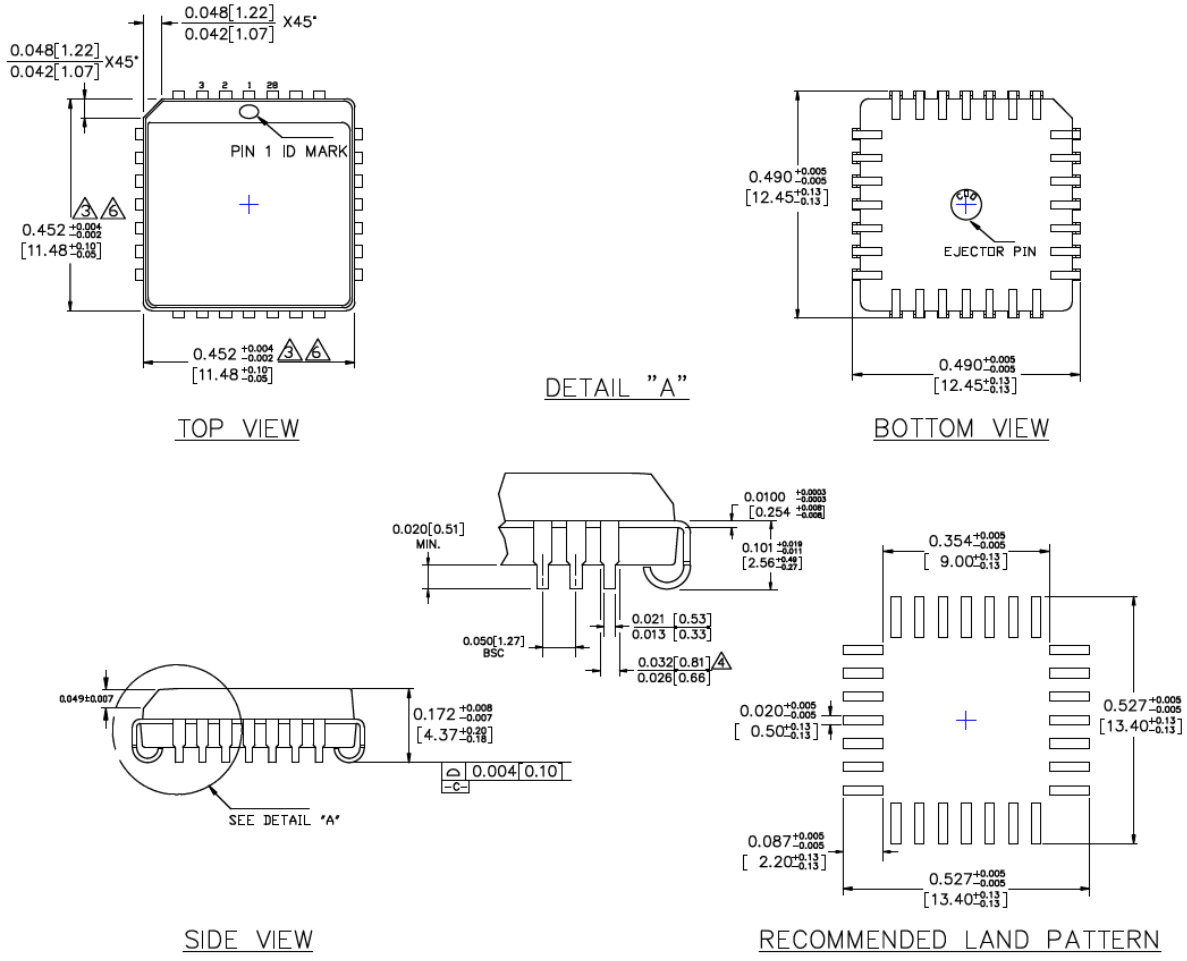


Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.
	●, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).
Note:	In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.	
	Underbar (_) and/or Overbar (¯) symbol may not be to scale.	

TITLE

28 LEAD PLCC PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING #	PLCC-28LD-PL-1	UNIT	INCH [MM]



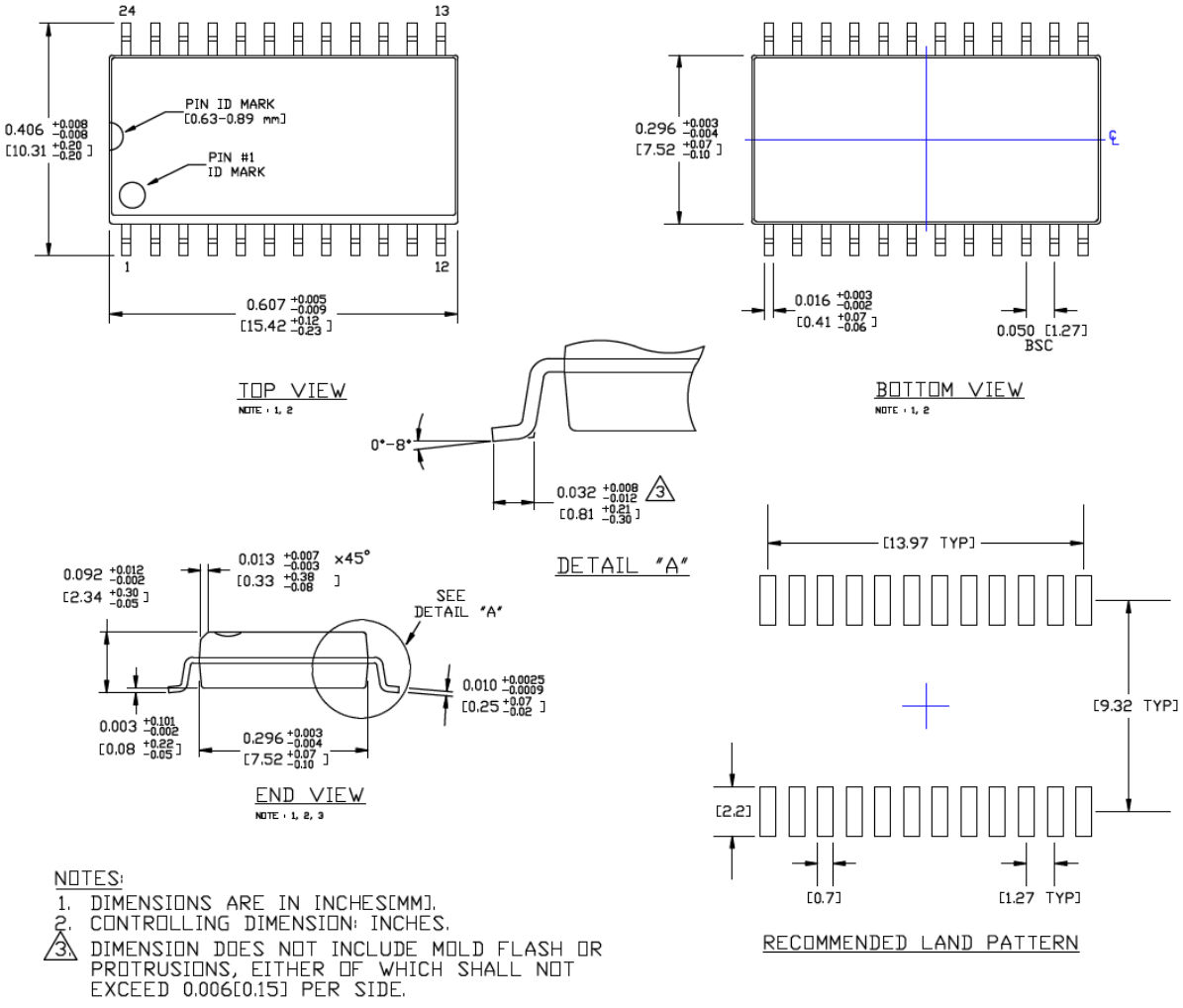
NOTES:
1. DIMENSIONS ARE IN INCHES [MM].
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.008 [0.203].
4. LEAD DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION.
5. MAXIMUM AND MINIMUM SPECIFICATIONS ARE INDICATED AS FOLLOWS : MAX/MIN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

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

TITLE

24 LEAD SOICW PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING #	SOICW-24LD-PL-1	UNIT	INCH [MM]



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 0.006[0.15] PER SIDE.

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (February 2019)

- Converted Micrel document MIC58P01 to Microchip data sheet template DS20006159A.
- Minor grammatical text changes throughout.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

Device	X	XX	-XX
Part No.	Junction Temp. Range	Package	Media Type

Device:	MIC58P01:	8-Bit Parallel Input Protected Latched Driver
Junction Temperature Range:	Y =	–40°C to +85°C, Industrial
Package:	V =	28-Lead PLCC
	WM =	24-Lead Wide SOIC
Media Type:	<blank>=	38/Tube (PLCC Package)
	<blank>=	31/Tube (SOIC Package)
	TR =	750/Reel (PLCC Package)
	TR =	1,000/Reel (SOIC Package)

Examples:

a) MIC58P01YV: MIC58P01, –40°C to +85°C Temperature Range, 28-Lead PLCC, 38/Tube

b) MIC58P01YV-TR: MIC58P01, –40°C to +85°C Temperature Range, 28-Lead PLCC, 750/Reel

c) MIC58P01YWM: MIC58P01, –40°C to +85°C Temperature Range, 24-Lead Wide SOIC, 31/Tube

d) MIC58P01YWM-TR: MIC58P01, –40°C to +85°C Temperature Range, 24-Lead Wide SOIC, 1,000/Reel

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

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