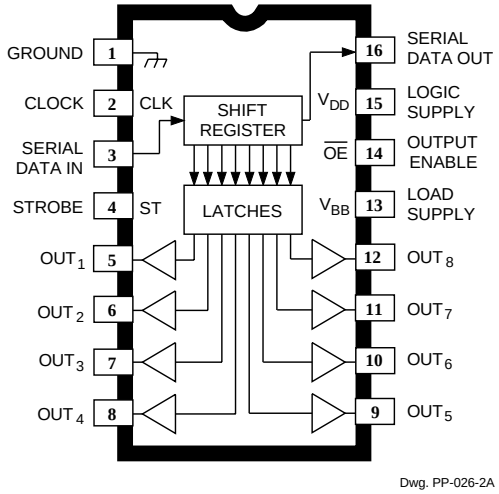
5890 AND 5891

Data Sheet 26182.12C

BIMOS II 8-BIT SERIAL-INPUT, LATCHED SOURCE DRIVERS



Dwg. PP-026-2A

Note the suffix 'A' devices (DIP) and the suffix 'LW' devices (SOIC) are electrically identical and share a common terminal number assignment.

ABSOLUTE MAXIMUM RATINGS
at T_A = +25°C

Output Voltage, V_{OUT}
(UCN5890A & UCN5890LW) ..... **80 V**
(UCN5891A & UCN5891LW) ..... **50 V**
Logic Supply Voltage Range,
V_{DD} ..... **4.5 V to 15 V**
Driver Supply Voltage Range, V_{BB}
(UCN5890A/LW) ..... **20 V to 80 V**
(UCN5891A/LW) ..... **5.0 V to 50 V**
Input Voltage Range,
V_{IN} ..... **-0.3 V to V_{DD} + 0.3 V**
Continuous Output Current,
I_{OUT} ..... **-500 mA**
Allowable Package Power Dissipation,
P_D ..... **See Graph**
Operating Temperature Range,
T_A ..... **-20°C to +85°C**
Storage Temperature Range,
T_S ..... **-55°C to +150°C**

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

Frequently applied in non-impact printer systems, the UCN5890A, UCN5890LW, UCN5891A, and UCN5891LW are BiMOS II serial-input, latched source (high-side) drivers. The octal, high-current smart-power ICs merge an 8-bit CMOS shift register, associated CMOS latches, and CMOS control logic (strobe and output enable) with sourcing power Darlington outputs. Typical applications include multiplexed LED and incandescent displays, relays, solenoids, and similar peripheral loads to a maximum of -500 mA per output.

Except for output voltage ratings, these smart high-side driver ICs are equivalent. The UCN5890A/LW are rated for operation with load supply voltages of 20 V to 80 V and a minimum output sustaining voltage of 50 V. The UCN5891A/LW are optimized for operation with supply voltages of 5 V to 50 V (35 V sustaining).

BiMOS II devices have higher data-input rates than the original BiMOS circuits. With a 5 V supply, they will operate to at least 3.3 MHz. At 12 V, higher speeds are possible. The CMOS inputs are compatible with standard CMOS and NMOS logic levels. TTL circuits may require the use of appropriate pull-up resistors to ensure a proper input-logic high. A CMOS serial data output, allows cascading these devices in multiple drive-line applications required by many dot matrix, alphanumeric, and bar graph displays.

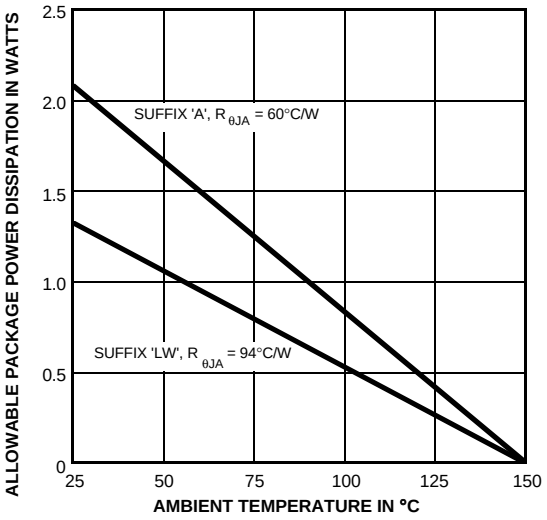
Suffix 'A' devices are supplied in a standard dual in-line plastic package with copper lead frame for enhanced package power dissipation characteristics. Suffix 'LW' devices are supplied in a standard wide-body SOIC package for surface-mount applications. Similar driver, featuring reduced output saturation voltage, are the UCN5895A and A5895SLW. Complementary, 8-bit serial-input, latched sink drivers are the Series UCN5820A.

FEATURES

- 50 V or 80 V Source Outputs
- Output Current to -500 mA
- Output Transient-Suppression Diodes
- To 3.3 MHz Data-Input Rate
- Low-Power CMOS Logic and Latches

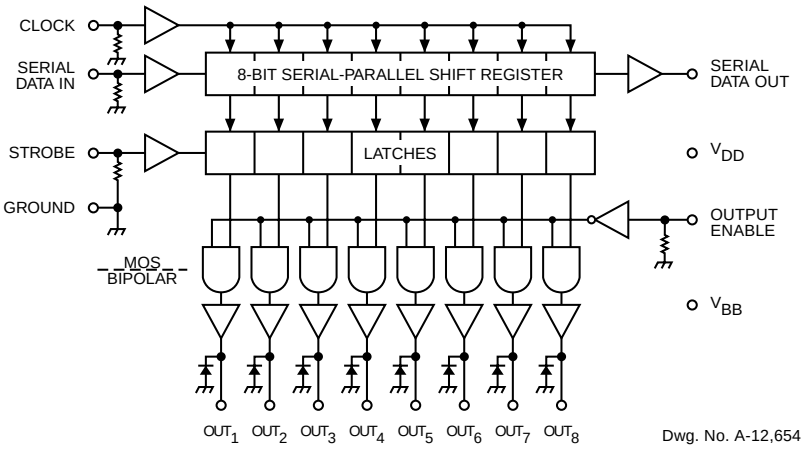
Always order by complete part number, e.g., UCN5891LW .

5890 AND 5891
8-BIT SERIAL-INPUT, LATCHED SOURCE DRIVERS



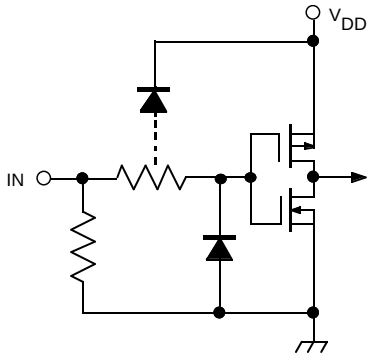
Dwg. GP-018C

FUNCTIONAL BLOCK DIAGRAM



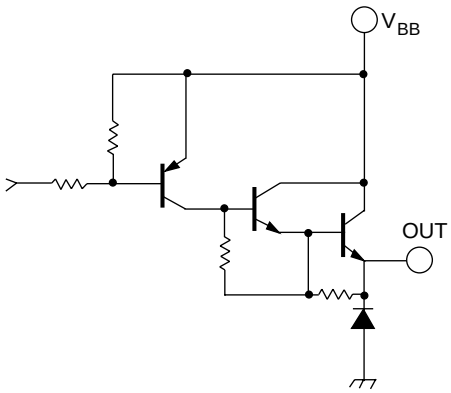
Dwg. No. A-12,654

TYPICAL INPUT CIRCUIT



Dwg. EP-010-4A

TYPICAL OUTPUT DRIVER



Dwg. No. A-12,648

Number of Outputs On at I_{OUT} = -200 mA	UCN5890/91A Max. Allowable Duty Cycle at T_A of		
	50°C	60°C	70°C
8	53%	47%	41%
7	60%	54%	48%
6	70%	64%	56%
5	83%	75%	67%
4	100%	94%	84%
3	100%	100%	100%
2	100%	100%	100%
1	100%	100%	100%

Number of Outputs On at I_{OUT} = -200 mA	UCN5890/91LW Max. Allowable Duty Cycle at T_A of		
	50°C	60°C	70°C
8	40%	35%	31%
7	45%	41%	36%
6	53%	48%	42%
5	62%	56%	50%
4	80%	71%	62%
3	100%	96%	84%
2	100%	100%	100%
1	100%	100%	100%

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ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_{BB} = 80 V (UCN5890A/LW) or 50 V (UCN5891A/LW), V_{DD} = 5 V and 12 V (unless otherwise noted).

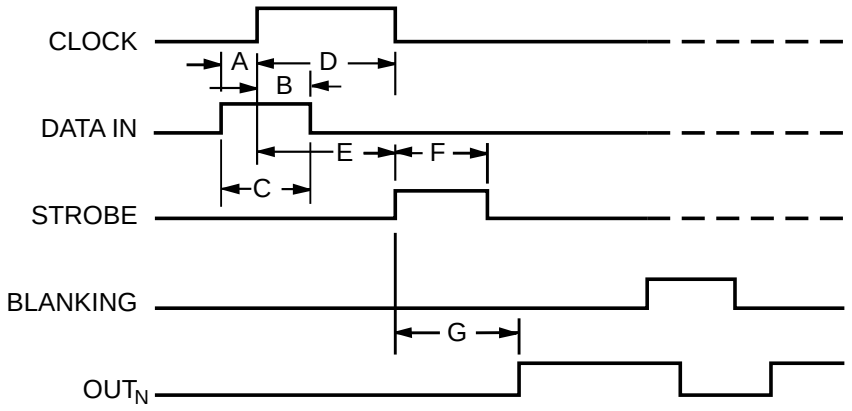
Characteristic	Symbol	V_{BB}	Test Conditions	Limits		
				Min.	Max.	Units
Output Leakage Current	I_{CEX}	Max.	T_A = +25°C	—	-50	µA
			T_A = +70°C	—	-100	µA
Output Saturation Voltage	$V_{CE(SAT)}$	50 V	I_{OUT} = -100 mA	—	1.8	V
			I_{OUT} = -225 mA	—	1.9	V
			I_{OUT} = -350 mA	—	2.0	V
Output Sustaining Voltage	$V_{CE(sus)}$	Max.	I_{OUT} = -350 mA, L = 2 mH, UCN5891A/LW	35	—	V
			I_{OUT} = -350 mA, L = 2 mH, UCN5890A/LW	50	—	V
Input Voltage	$V_{IN(1)}$	50 V	V_{DD} = 5.0 V	3.5	5.3	V
			V_{DD} = 12 V	10.5	12.3	V
	$V_{IN(0)}$	50 V	V_{DD} = 5 V to 12 V	-0.3	+0.8	V
Input Current	$I_{IN(1)}$	50 V	V_{DD} = V_{IN} = 5.0 V	—	50	µA
			V_{DD} = V_{IN} = 12 V	—	240	µA
Input Impedance	Z_{IN}	50 V	V_{DD} = 5.0 V	100	—	kΩ
			V_{DD} = 12 V	50	—	kΩ
Max. Clock Frequency	f_c	50 V		3.3*	—	MHz
Serial Data Output Resistance	R_{OUT}	50 V	V_{DD} = 5.0 V	—	20	kΩ
			V_{DD} = 12 V	—	6.0	kΩ
Turn-On Delay	t_{PLH}	50 V	Output Enable to Output, I_{OUT} = -350 mA	—	2.0	µs
Turn-Off Delay	t_{PHL}	50 V	Output Enable to Output, I_{OUT} = -350 mA	—	10	µs
Supply Current	I_{BB}	50 V	All outputs on, All outputs open	—	10	mA
			All outputs off	—	200	µA
	I_{DD}	50 V	V_{DD} = 5 V, All outputs off, Inputs = 0 V	—	100	µA
			V_{DD} = 12 V, All outputs off, Inputs = 0 V	—	200	µA
			V_{DD} = 5 V, One output on, All Inputs = 0 V	—	1.0	mA
			V_{DD} = 12 V, One output on, All Inputs = 0 V	—	3.0	mA
Diode Leakage Current	I_R	Max.	T_A = +25°C	—	50	µA
			T_A = +70°C	—	100	µA
Diode Forward Voltage	V_F	Open	I_F = 350 mA	—	2.0	V

NOTES: Turn-off delay is influenced by load conditions. Systems applications well below the specified output loading may require timing considerations for some designs, i.e., multiplexed displays or when used in combination with sink drivers in a totem pole configuration.

Positive (negative) current is defined as going into (coming out of) the specified device pin.

* Operation at a clock frequency greater than the specified minimum value is possible but not warranteed.

5890 AND 5891
8-BIT SERIAL-INPUT, LATCHED SOURCE DRIVERS



Dwg. No. A-12,649A

TIMING REQUIREMENTS

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

A. Minimum Data Active Time Before Clock Pulse (Data Set-Up Time) ..... **75 ns**

B. Minimum Data Active Time After Clock Pulse (Data Hold Time) ..... **75 ns**

C. Minimum Data Pulse Width ..... **150 ns**

D. Minimum Clock Pulse Width ..... **150 ns**

E. Minimum Time Between Clock Activation and Strobe ..... **300 ns**

F. Minimum Strobe Pulse Width ..... **100 ns**

G. Typical Time Between Strobe Activation and Output Transistion ..... **500 ns**

Timing is representative of a 3.3 MHz clock. Higher speeds may be attainable with increased supply voltage; operation at high temperatures will reduce the specified maximum clock frequency.

Serial Data present at the input is transferred to the shift register on the logic "0" to logic "1" transition of the CLOCK input pulse. On succeeding CLOCK pulses, the registers shift data information towards the SERIAL DATA OUTPUT. The SERIAL DATA must appear at the input prior to the rising edge of the CLOCK input waveform.

Information present at any register is transferred to the respective latch when the STROBE is high (serial-to-parallel conversion). The latches will continue to accept new data as long as the STROBE is held high. Applications where the latches are bypassed (STROBE tied high) will require that the OUTPUT ENABLE input be high during serial data entry.

When the OUTPUT ENABLE input is high, all of the output buffers are disabled (off) without affecting the information stored in the latches or shift register. With the OUTPUT ENABLE input low, the outputs are controlled by the state of their respective latches.

TRUTH TABLE

Serial Data Input	Clock Input	Shift Register Contents						Serial Data Output	Strobe Input	Latch Contents						Output Enable	Output Contents					
		I_1	I_2	I_3	...	I_{N-1}	I_N			I_1	I_2	I_3	...	I_{N-1}	I_N		I_1	I_2	I_3	...	I_{N-1}	I_N
H	↑	H	R_1	R_2	...	R_{N-2}	R_{N-1}	R_{N-1}														
L	↑	L	R_1	R_2	...	R_{N-2}	R_{N-1}	R_{N-1}														
X	↓	R_1	R_2	R_3	...	R_{N-1}	R_N	R_N														
		X	X	X	...	X	X	X	L	R_1	R_2	R_3	...	R_{N-1}	R_N							
		P_1	P_2	P_3	...	P_{N-1}	P_N	P_N	H	P_1	P_2	P_3	...	P_{N-1}	P_N	L	P_1	P_2	P_3	...	P_{N-1}	P_N
							X	X	X	...	X	X	H	L	L	L	...	L		L		

L = Low Logic Level H = High Logic Level X = Irrelevant P = Present State R = Previous State

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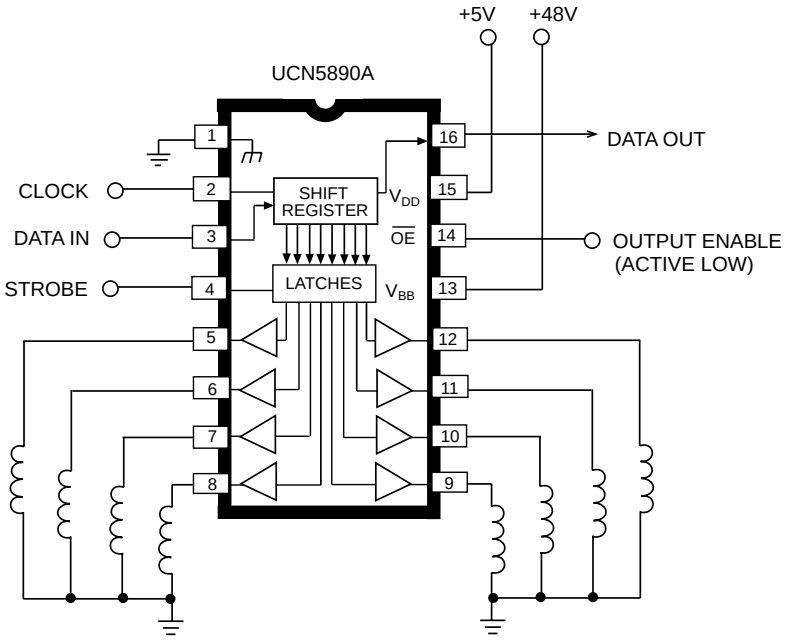
TYPICAL APPLICATION
SOLENOID OR RELAY DRIVER



Dwg. No. A-12,548

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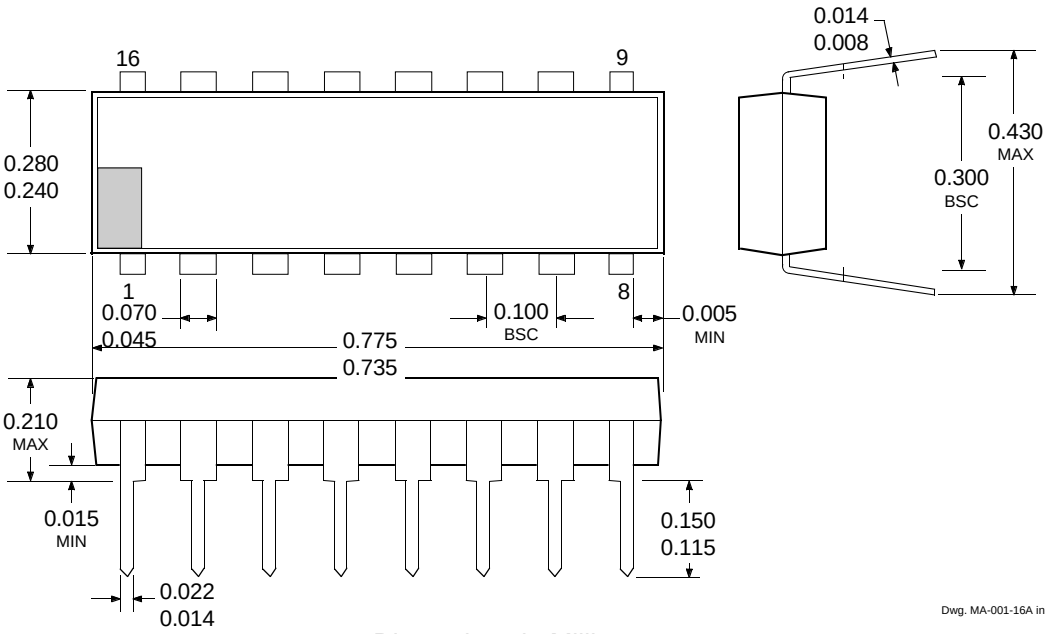
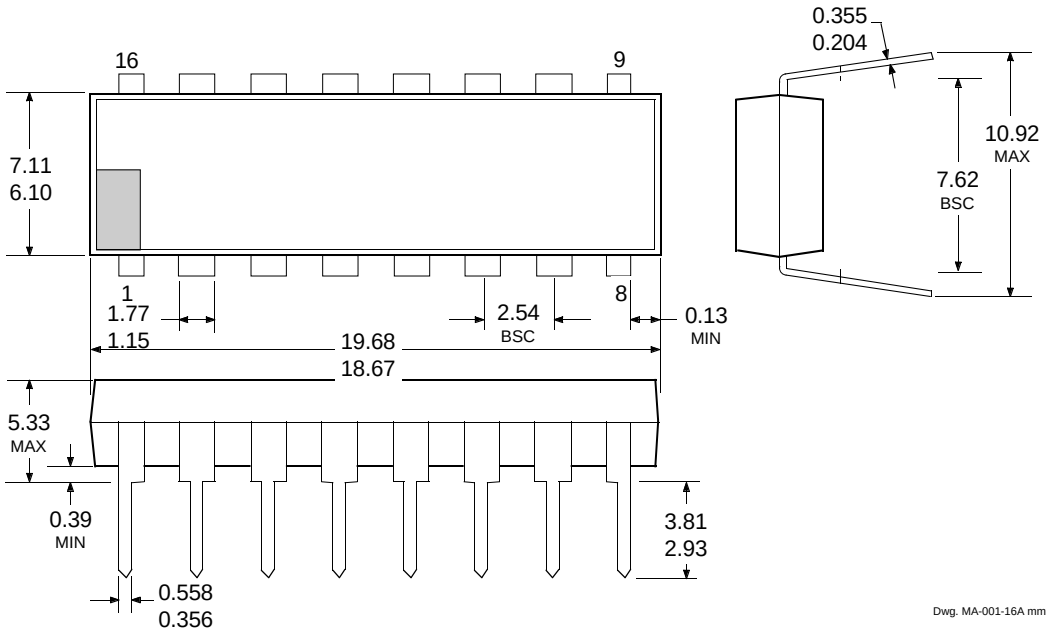
UCN5890A and UCN5891A

Dimensions in Inches
(controlling dimensions)



Dwg. MA-001-16A in

Dimensions in Millimeters
(for reference only)



Dwg. MA-001-16A mm

NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.
2. Lead spacing tolerance is non-cumulative.
3. Lead thickness is measured at seating plane or below.
4. Supplied in standard sticks/tubes of 25 devices.

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UCN5890LW and UCN5891LW

Dimensions in Inches
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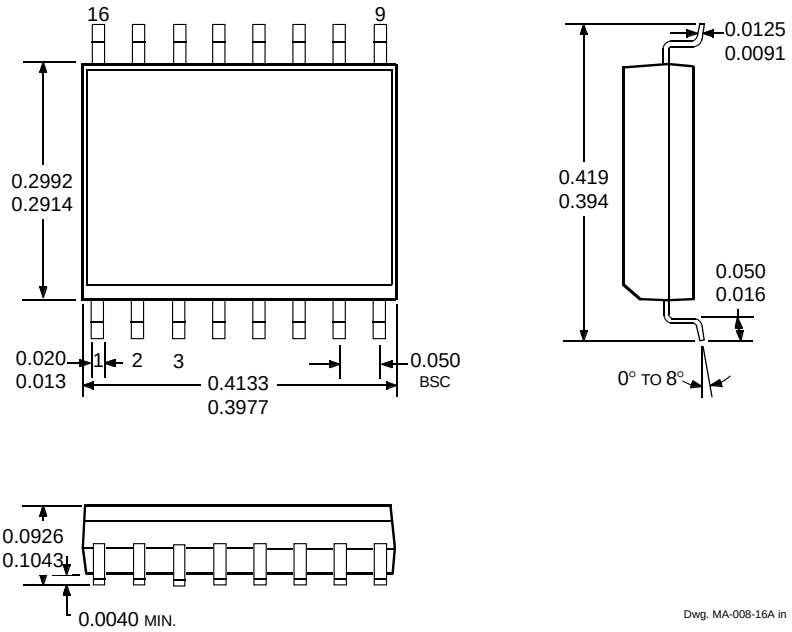
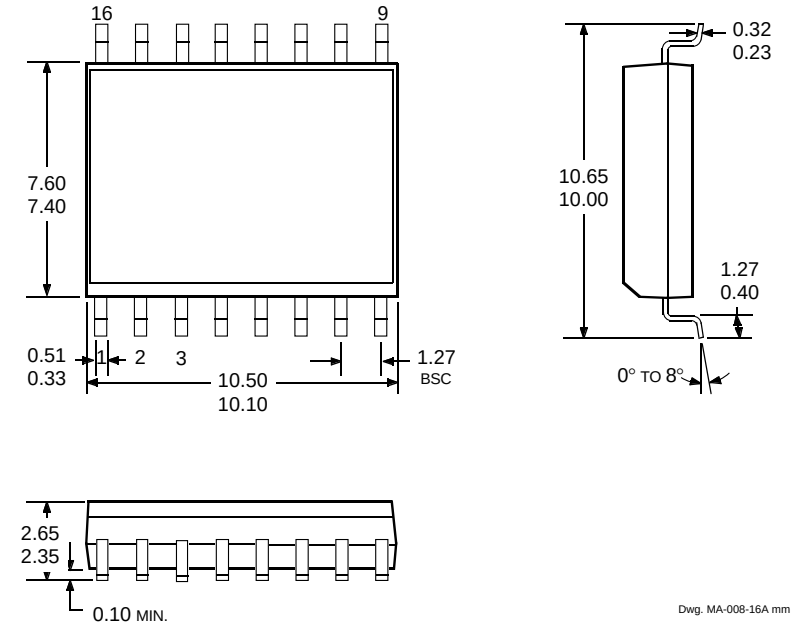


Dwg. MA-008-16A in

Dimensions in Millimeters
(controlling dimensions)



Dwg. MA-008-16A mm

NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.
2. Lead spacing tolerance is non-cumulative.
3. Supplied in standard sticks/tubes of 47 devices or add "TR" to part number for tape and reel.