RE46C141

CMOS Photoelectric Smoke Detector ASIC with Interconnect

Features

- Internal Power On Reset
- Low Quiescent Current Consumption
- ESD Protection on all Pins
- Interconnect up to 40 Detectors
- Temporal Horn Pattern
- Low Battery and Chamber Test
- Compatible with Motorola, Inc. MC145012DWR2
- UL®-Recognized per File S24036
- Packaging: 16-Lead PDIP, 16-Lead SOIC, 16-Lead SOIC (Wide)

General Description

The RE46C141 is a low-power CMOS photoelectric-type smoke detector IC. With minimal external components this circuit will provide all the required features for a photoelectric-type smoke detector.

The design incorporates a gain-selectable photo amplifier for use with an infrared emitter/detector pair.

An internal oscillator strobes power to the smoke detection circuitry for 100 µs every 8.1s to keep standby current to a minimum. If smoke is sensed the detection rate is increased to verify an alarm condition. A High Gain mode is available for push button chamber testing.

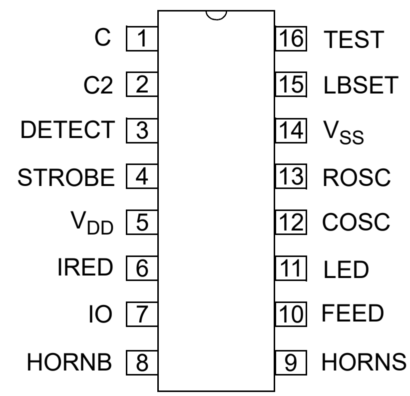
A check for a low battery condition and chamber integrity is performed every 32s while in standby. The temporal horn pattern supports the NFPA 72® (National Fire Alarm and Signaling Code®) emergency evacuation signal.

An interconnect pin allows multiple detectors to be connected such that when one units alarms, all units will sound.

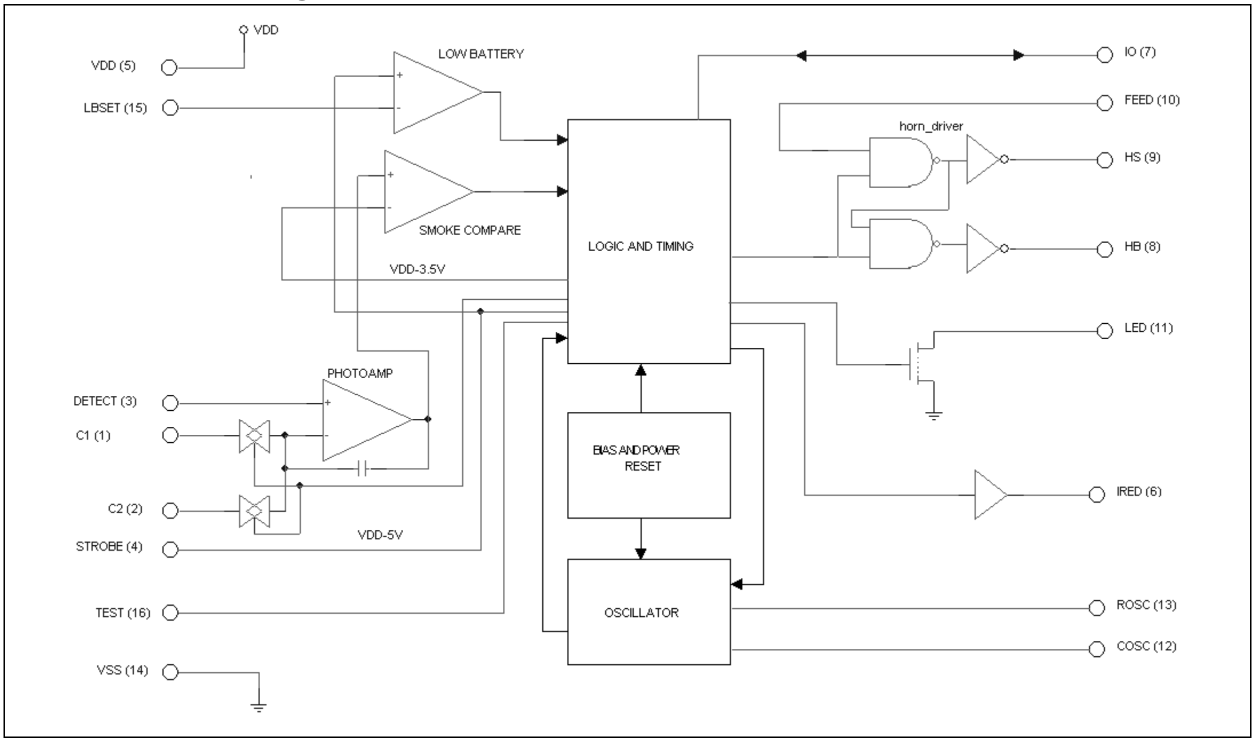
The RE46C141 is recognized by UL LLC for use in smoke detectors that comply with specification UL217 and UL268.

Package Types

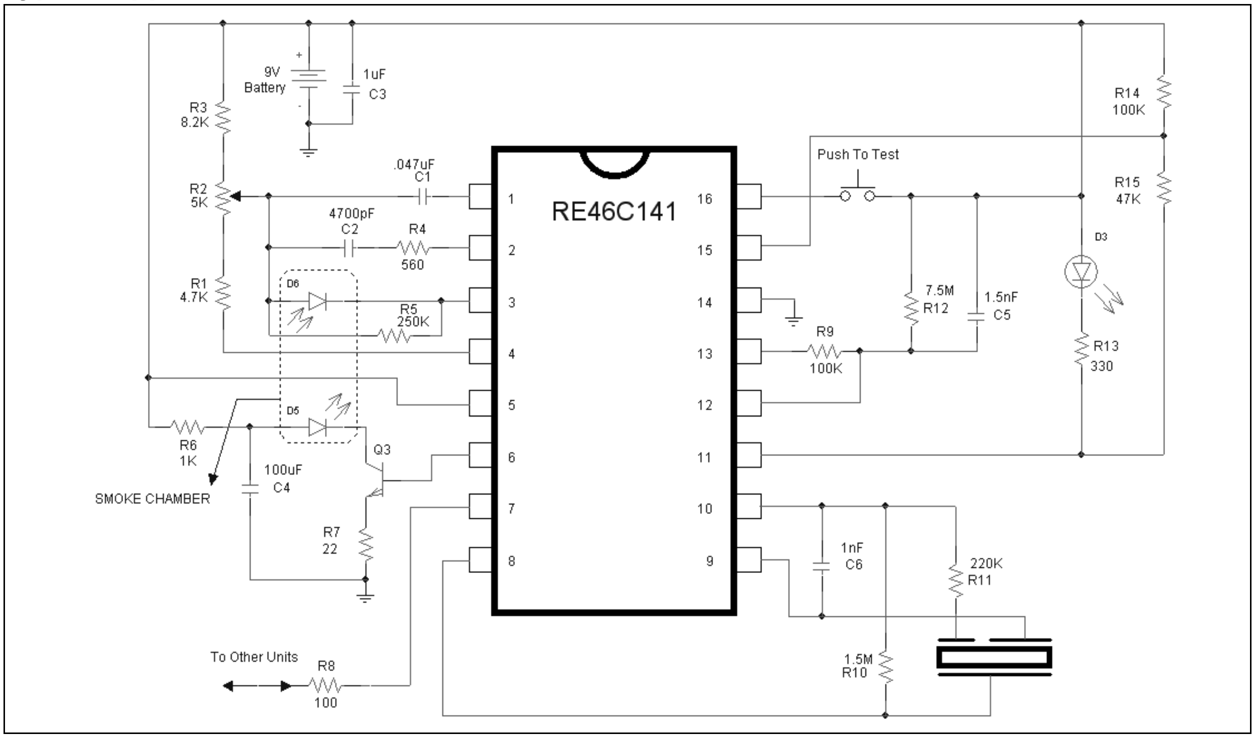
RE46C141
16-Lead PDIP
16-Lead SOIC
16-Lead SOIC (Wide)



Functional Block Diagram



Typical Applications



Note 1: C3 should be located as close as possible to the device power pins.

2: C3 is typical for an alkaline battery. This capacitance should be increased to 4.7 µF or greater for a carbon battery.

3: R10, R11 and C6 are typical values and may be adjusted to maximize sound pressure.

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†, ‡

Supply Voltage (V_{DD}) .... +12.5V

Input Voltage Range Except FEED, IO (V_{IN}) .... -0.3V to V_{DD} +0.3V

FEED Input Voltage Range (V_{INFD}) .... -10V to +22V

IO Input Voltage Range (V_{IO1} .... -0.3V to +17V

Input Current except FEED (I_{IN}) .... ±10 mA

Operating Temperature (T_A) .... -25°C to +75°C

Storage Temperature (T_{STG}) .... -55°C to +125°C

Maximum Junction Temperature (T_J) .... +150°C

† **Notice**: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions, above those indicated in the operational listings of this specification, is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

‡ **Notice:** This product utilizes CMOS technology with static protection; however proper ESD prevention procedures should be used when handling this product. Damage can occur when exposed to extremely high static electrical charge.

DC ELECTRICAL CHARACTERISTICS

Electrical Specifications: Unless otherwise indicated, all parameters apply at Typical Application, T_A = -25°C to +75°C, V_{DD} = 9V							
Parameter	**Sym.**	**Test Pin**	**Min.**	**Typ.**	**Max.**	**Units**	**Conditions**
Supply Voltage	V_{DD}	5	6	—	12	V	Operating
Supply Current	I_{DD1}	5	—	4	6	µA	Configured as in Figure Typical Applications, COSC = V_{SS}
	I_{DD2}	5	—	5.5	8	µA	Configured as in Figure Typical Applications, VDD = 12V, COSC = VSS
	I_{DD3}	5	—	—	2	mA	Configured as in Figure Typical Applications, STROBE on, IRED off, V_{DD} = 12V
	I_{DD4}	5	—	—	3	mA	Configured as in Figure Typical Applications, STROBE on, IRED on, V_{DD} = 12V, Note 1
Input Voltage High	V_{IH1}	10	6.2	4.5	—	V	FEED
	V_{IH2}	7	3.2	—	—	V	No Local Alarm, IO as an Input
	V_{IH4}	16	8.5	—	—	V	TEST
Input Voltage Low	V_{IL1}	10	—	4.5	2.7	V	FEED
	V_{IL2}	7	—	—	1.5	V	No Local Alarm, IO as an Input
	V_{IL4}	16	—	—	7	V	TEST
Input Leakage Low	I_{IL1}	1,2,3	—	—	-100	nA	V_{DD} = 12V, COSC = 12V, STROBE active
	I_{IL2}	12,15	—	—	-100	nA	V_{DD} = 12V, V_{IN} = V_{SS}
	I_{IL3}	16	—	—	-1	µA	V_{DD} = 12V, V_{IN} = V_{SS}
	I_{LFD}	10	—	—	-50	µA	FEED = -10V
Input Leakage High	I_{IH1}	1,2	—	—	100	nA	V_{DD} = 12V, V_{IN} = V_{DD}, STROBE active
	I_{IH2}	3,12,15	—	—	100	nA	V_{DD} = 12V, V_{IN} = V_{DD}
	I_{HFD}	10	—	—	50	µA	FEED = 22V
Input Pull Down Current	I_{PD1}	16	0.25	—	10	µA	V_{IN} = V_{DD}
	I_{PDIO1}	7	20	—	80	µA	V_{IN} = V_{DD}
	I_{PDIO2}	7	—	—	140	µA	V_{IN} = 17V, V_{DD} = 12V
Output Leakage Current Low	I_{OZL1}	11,13	—	—	-1	µA	Output OFF, Output = V_{SS}
Output Leakage Current High	I_{OZH1}	11,13	—	—	1	µA	Output OFF, Output = V_{DD}

Note 1: Does not include Q3 emitter current.

2: Not production tested.

3: Typical values are for design information and are not guaranteed. Limits over the specified temperature range are not production tested and are based on characterization data.

DC ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Specifications: Unless otherwise indicated, all parameters apply at Typical Application, T_A = -25°C to +75°C, V_{DD} = 9V

Parameter	Sym.	Test Pin	Min.	Typ.	Max.	Units	Conditions
Output Voltage Low	V_{OL1}	8,9	—	—	1	V	I_{OL} = 16 mA, V_{DD} = 6.5V
	V_{OL2}	13	—	0.5	—	V	I_{OL} = 5 mA, V_{DD} = 6.5V
	V_{OL3}	11	—	—	0.6	V	I_{OL} = 10 mA, V_{DD} = 6.5V
Output Voltage High	V_{OH1}	8,9	5.5	—	—	V	I_{OH} = -16 mA, V_{DD} = 6.5V
Output Current	I_{IOH1}	7	-4	—	-16	mA	Alarm, V_{IO} = V_{DD} - 2V or V_{IO} = 0V
	I_{IODMP}	7	5	—	—	mA	At Conclusion of Local Alarm or Test, V_{IO} = 1V
Low Battery Alarm Voltage	V_{LB}	5	6.9	7.2	7.5	V	R14 = 100 kΩ, R15 = 47 kΩ
Output Voltage	V_{STOF}	4	V_{DD} - 0.1	—	—	V	STROBE OFF, V_{DD} = 12V, I_{OUT} = -1 µA
	V_{STON}	4	V_{DD} - 5.3	V_{DD} - 5	V_{DD} - 4.7	V	STROBE ON, V_{DD} = 9V, I_{OUT} = 100 µA to 500 µA
	V_{IREDOF}	6	—	—	0.1	V	IRED OFF, V_{DD} = 12V, I_{OUT} = 1 µA
	V_{IREDON}	6	2.25	3.1	3.75	V	IRED ON, V_{DD} = 9V, I_{OUT} = 0 mA to -6 mA, T_A = 25C
Common Mode Voltage	V_{CM1}	1,2,3	0.5	—	V_{DD} - 2	V	Local smoke, Push to Test or Chamber Test, Note 2
Smoke Comparator Reference	V_{REF}	-	V_{DD} - 3.85	—	V_{DD} - 3.15	V	Internal Reference
Temperature Coefficient	TC_{ST}	4	—	0.01	—	%/ºC	V_{DD} = 6V to 12V, STROBE Output Voltage
	TC_{IRED}	6	—	0.3	—	%/ºC	V_{DD} = 6V to 12V, IRED Output Voltage
Line Regulation	ΔV_{STON}	4,5	—	-50	—	dB	Active, V_{DD} = 6V to 12V
Line Regulation	ΔV_{IREDON}	6,5	—	-30	—	dB	Active, V_{DD} = 6V to 12V

Note 1: Does not include Q3 emitter current.

2: Not production tested.

3: Typical values are for design information and are not guaranteed. Limits over the specified temperature range are not production tested and are based on characterization data.

AC ELECTRICAL CHARACTERISTICS

Electrical Specifications: Unless otherwise indicated, all parameters apply at T_A = -25°C to 75°C, V_{DD} = 9V, V_{SS} = 0V, Component Values from Figure Typical Applications; R9 = 100 kΩ, R12 = 7.5 MΩ, C5 = 1.5 nF							
Parameter	**Sym.**	**Test Pin**	**Min.**	**Typ.**	**Max.**	**Units**	**Conditions**
Oscillator Period	T_{POSC}	12	7.1	7.9	8.6	ms	No Alarm Condition, Note 2
LED and STROBE On Time	T_{ON1}	11,4	7.1	7.9	8.6	ms	Operating
LED Period	T_{PLED1}	11	28.8	32.4	35.2	s	Standby, No Alarm
	T_{PLED2}	11	0.45	0.5	0.55	s	Local Alarm Condition
	T_{PLED4}	11	LED IS NOT ON			s	Remote Alarm Only
STROBE and IRED Pulse Period	T_{PER1}	4,6	7.3	8.1	8.8	s	Standby, No Alarm
	T_{PER1A}	4,6	1.8	2	2.2	s	Standby, After 1 Valid Smoke Sample
	T_{PER1B}	4,6	0.9	1	1.1	s	Standby, After 2 Consecutive Valid Smoke Samples
	T_{PER2}	4,6	0.9	1	1.1	s	In Local Alarm (3 Consecutive Valid Smoke Samples)
	T_{PER3}	4,6	7.3	8.1	8.8	s	In Remote Alarm
	T_{PER4}	4,6	—	250	—	ms	Pushbutton Test
	T_{PER5}	4,6	28.8	—	35.2	s	Chamber Test or Low Battery Test, No Alarms
IRED On Time	T_{ON2}	6	94	104	115	µs	Operating, Note 2
Horn On Time	T_{HON1}	8,9	450	500	550	ms	Operating, Alarm Condition, Note 1
	T_{HON2}	8,9	7.1	7.9	8.6	ms	Low Battery or Failed Chamber Test, No Alarm
Horn Off Time	T_{HOF1}	8,9	450	500	550	ms	Operating, Alarm Condition, Note 1
	T_{HOF2}	8,9	1.35	1.5	1.65	s	Operating, Alarm Condition, Note 1
	T_{HOF3}	8,9	28.8	32.4	35.2	s	Low Battery or Failed Chamber Test, No Alarm
IO Charge Dump Duration	T_{IODMP}	7	0.68	—	1.1	s	At Conclusion of Local Alarm or Test
IO Delay	T_{IODLY1}	7	—	0	—	s	From Start of Local Alarm to IO Active
IO Filter	T_{IOFILT}	7	—	—	450	ms	IO pulse width guaranteed to be filtered. IO as Input, No Local Alarm
Remote Alarm Delay	TI_{ODLY2}	7	0.9	—	1.65	s	No Local Alarm, From IO Active Horn Active

Note 1: See Figure 1-1 and Figure 1-2 for Horn Temporal Pattern.

2: T_{POSC} and T_{ON2} are 100% production tested. All other timing is guaranteed by functional testing.

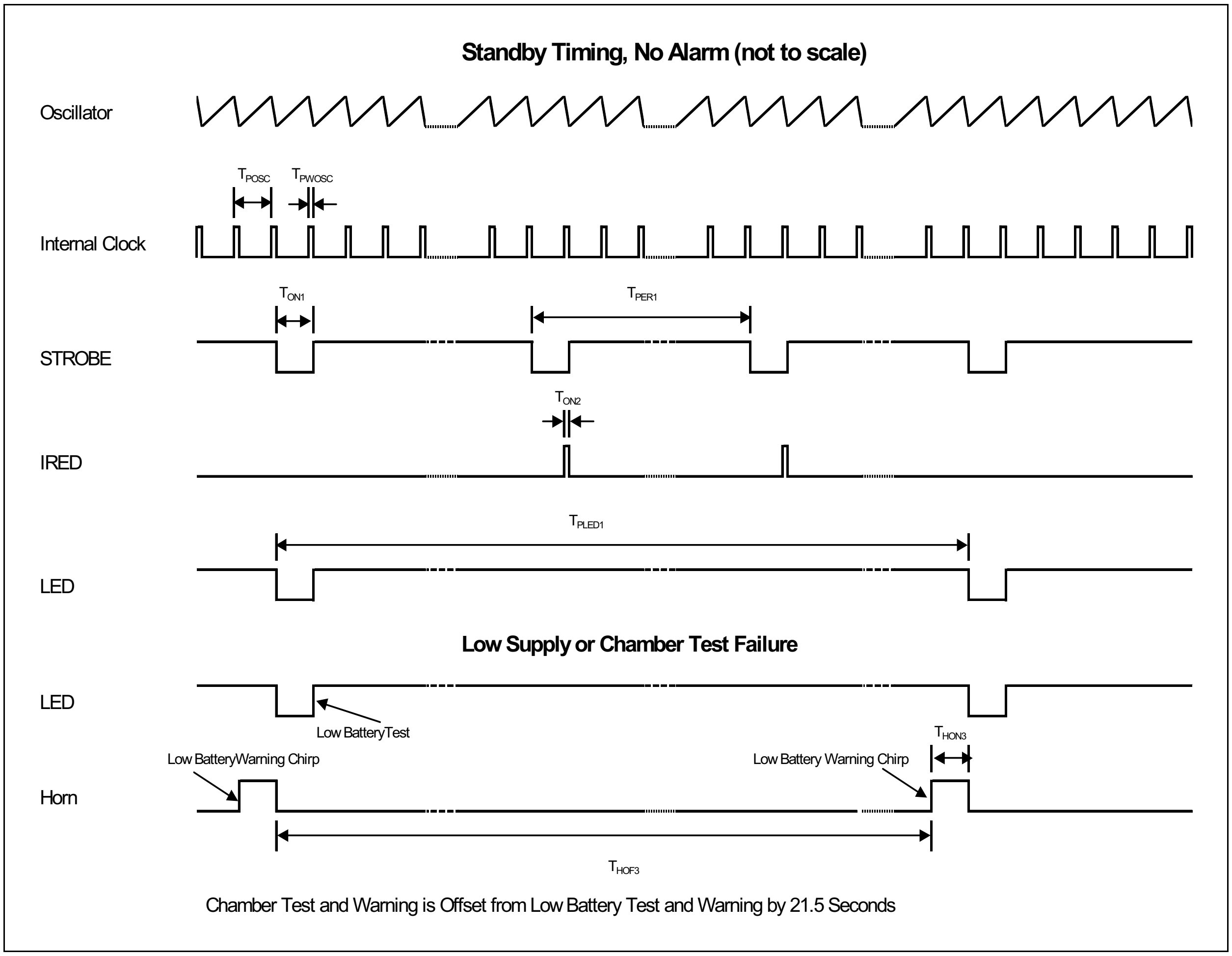


FIGURE 1-1: *Standby Timing Diagram.*

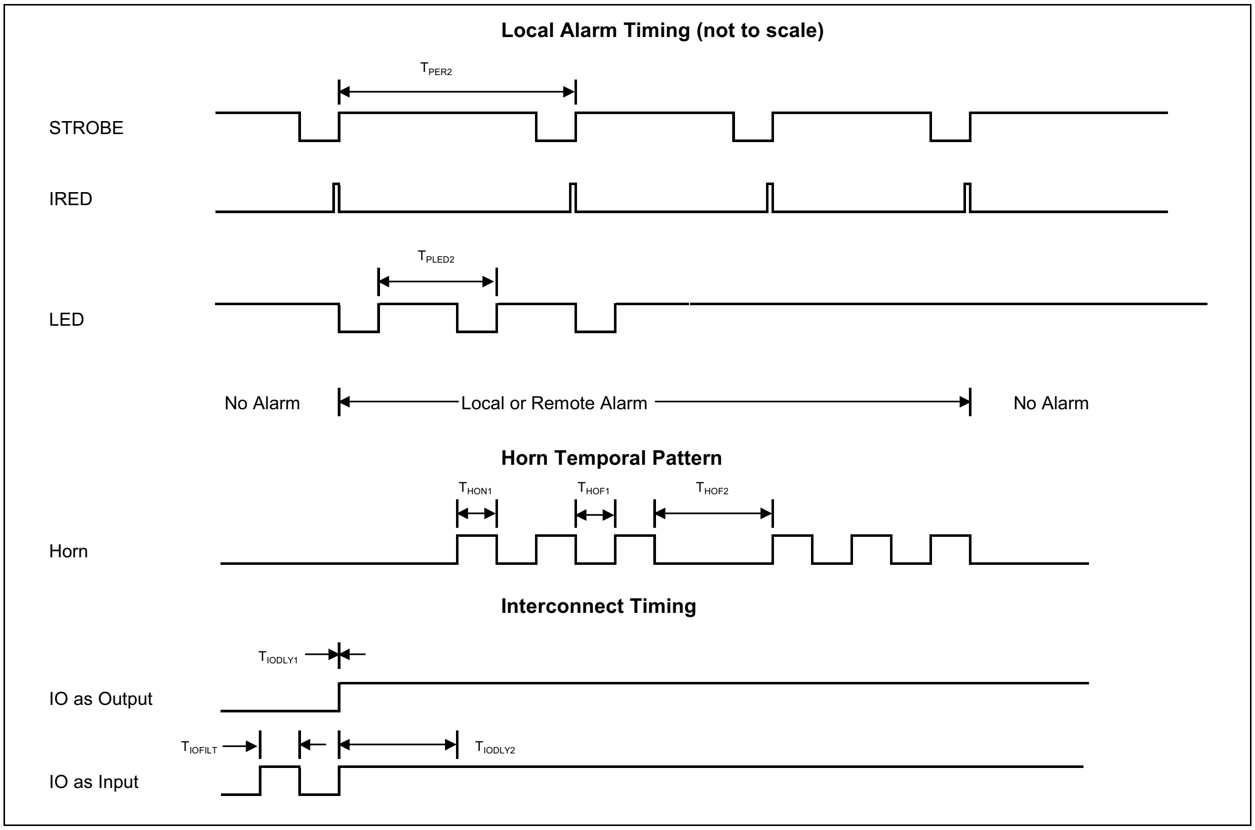


FIGURE 1-2: *Local Alarm Timing Diagram.*

Note 1:	Smoke is not sampled when the horn is active. Horn cycle is self-completing in local alarm, but not in remote alarm.
2:	Low battery warning chirp is suppressed in local or remote alarm.
3:	IO Dump active only in local alarm, inactive in external alarm.

2.0 PIN DESCRIPTIONS

TABLE 2-1: PIN FUNCTION TABLE

Pin	Symbol	DESCRIPTION
1	C1	The capacitor connected to this pin sets the photo amplifier gain (high) for the push-to-test and chamber sensitivity test. The size of this capacitor depends on the chamber background reflections. A = 1 + (C1/10), where C1 is in pF. The gain should be < 10000.
2	C2	The capacitor connected to this pin sets the photo amplifier gain (normal) during standby. The value of this capacitor depends on the smoke sensitivity required. A = 1 + (C2/10), where C2 is in pF.
3	DETECT	Positive input to the photo amplifier. This input is normally connected to the cathode of an external photo diode operated at zero bias.
4	STROBE	Regulated output voltage of V_{DD} - 5, which is active during a test for smoke. This output is the negative side of the photo amplifier circuitry.
5	V_{DD}	Connect to the positive supply voltage
6	IRED	Provides a regulated pulsed output voltage pre-driver for the infrared emitter. This output usually drives the base of an NPN transistor.
7	IO	This bidirectional pin provides the capability to interconnect many detectors in a single system. This pin has an internal pull-down device.
8	HB	This pin is connected to the metal electrode of a piezoelectric transducer.
9	HS	HS is a complementary output to HB and connects to the ceramic electrode of the piezoelectric transducer.
10	FEED	Usually connected to the feedback electrode through a current limiting resistor. When not used, this pin must be connected to either V_{DD} or V_{SS}.
11	LED	Open drain NMOS output used to drive a visible LED.
12	COSC	A capacitor connected to this pin with parallel resistor sets the internal clock low time, which is approximately the clock period.
13	ROSC	A resistor between this pin and pin 12 (COSC) sets the internal clock high time. This also sets the IRED pulse width (100 - 200 μs).
14	V_{SS}	Connect to the negative supply voltage.
15	LBSET	This input is connected to a V_{DD} reference voltage to set the low battery warning voltage.
16	TEST	This input is used to invoke two test modes. This input has an internal pull-down.

3.0 CIRCUIT DESCRIPTION AND APPLICATION NOTES

Note:	All timing references are nominal. See **Section 1.0 “Electrical Characteristics”** for limits.

3.1 Standby Internal Timing

With the external components specified in Figure Typical Applications for ROSC and COSC, the internal oscillator has a nominal period of 7.9 ms. Normally, the analog circuitry is powered down to minimize standby current (typically 4 µA at 9V). Once every 8.1 seconds, the detection circuitry (normal gain) is powered up for 7.9 ms. Prior to the completion of the 7.9 ms period, the IRED pulse is active for 100 µs. At the conclusion of the 7.9 ms period, the photo amplifier is compared to an internal reference to determine the chamber status and it is latched. If a smoke condition is present, the period to the next detection decreases and additional checks are made. Three consecutive smoke detections cause the device to go into alarm and the horn circuit and interconnect become active.

Once every 32 seconds, the status of the battery voltage is checked. This status is checked and latched at the conclusion of the LED pulse. In addition, once every 32 seconds the chamber test is activated and, using the high gain mode (capacitor C1), a check of the chamber is made by amplifying background reflections. If either the low battery or the photo chamber test fails, the horn chirps for 7.9 ms every 32 seconds.

The oscillator period is determined by the values of R9, R12 and C5 (see Figure Typical Applications). The oscillator period is T = TR + TF, where TR = 0.6931 x R12 x C5 and TF = 0.6931 x R9 x C5.

3.2 Smoke Detection Circuitry

A comparator analyzes the photo amp output against an internal reference voltage. If the required number of consecutive smoke conditions is met, then the device goes into local alarm and the horn becomes active. In local alarm, the C2 gain is internally increased by ~10% to provide alarm hysteresis.

3.3 Push to Test Operation

If the TEST input pin is activated (V_{IH}), then, after one internal clock cycle, the smoke detection rate increases to once every 250 ms. In this mode, the high gain capacitor C1 is selected and background reflections are used to simulate a smoke condition. After the required consecutive detections, the device goes into a local alarm condition. When the TEST input is deactivated (V_{IL}) and after one clock cycle, the normal gain capacitor C1 is selected.

The detection rate continues at once every 250 ms until three consecutive no-smoke conditions are detected. At this point, the device returns to standby timing.

3.4 LED Operation

In standby, the LED is pulsed on for 7.9 ms every 32 seconds. In a local alarm condition or the push-to-test alarm, the LED pulse frequency is increased to once every 0.5s. In the case of a remote alarm, the LED does not activate.

3.5 Interconnect Operation

The bidirectional IO pin allows for interconnection of multiple detectors. In a local alarm condition, this pin is driven high immediately through a constant current source. Shorting this output to ground does not cause excessive current. The IO is ignored as an input during a local alarm.

The IO pin also has an NMOS discharge device that is active for 1s after the conclusion of any type of local alarm. This device helps to quickly discharge any capacitance associated with the interconnect line.

If a remote active high signal is detected, the device goes into remote alarm and the horn becomes active. Internal protection circuitry allows for the signaling unit to have a higher supply voltage than the signaled unit without excessive current draw.

The interconnect input has a 500 ms nominal digital filter. This allows for interconnection to other types of alarms (carbon monoxide for example) that can have a pulsed interconnect signal.

3.6 Low Battery and Chamber Test

While in standby, an internal reference is compared to the voltage divided V_{DD} supply. Low battery status is latched at the conclusion of the LED pulse. The horn chirps for 7.9 ms every 32s, until the low battery condition no longer exists. In standby, a chamber test is also performed every 32 seconds, by switching to the high-gain capacitor C1 and sensing the photo chamber background reflections. Two consecutive chamber test failures also cause the horn to chirp for 7.9 ms every 32 seconds. The low battery chirp occurs next to the LED pulse and the failed chamber test chirps 16.2 seconds later. The low battery and chamber tests are not performed in a local or remote alarm condition. The low battery alarm threshold is approximately equal to ((5*R15)/R14) + 5, where R15 and R16 are in the same units.

3.7 Diagnostic Mode

In addition to the normal function of the TEST input, a special Diagnostic mode is available for the calibration and testing of the smoke detector. Taking the TEST pin below V_{SS} and sourcing ~240 µA out of the pin for one clock cycle enables the Diagnostic mode. In the Diagnostic mode, some of the pin functions are redefined (see Table 3-1). In addition in this mode, STROBE is always enabled and the IRED is pulsed at the clock rate of 7.9 ms nominal.

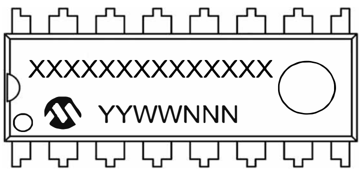
TABLE 3-1: PIN FUNCTIONS IN DIAGNOSTIC MODE

Pin	Symbol	Description
7	IO	Disabled as an output. A high on this pin directs the photo amplifier output to pin C1 (1) or C2 (2), determined by the level on LBSET (15). Amplification occurs during the IRED active time.
15	LBSET	If IO is high, then this pin controls the gain capacitor that is used. If LBSET is low, then normal gain is selected and the photo amplifier output appears on C1 (1). If LBSET is high, then high gain is selected and the photo amplifier output is on C2 (2).
10	FEED	If LBSET (15) is low, then taking this input high enables hysteresis, which is a nominal 10% gain increase in normal gain mode.
12	COSC	If desired, this pin can be driven by an external clock.
8	HORNB	This pin becomes the smoke integrator output. A high level indicates that an alarm condition has been detected.
11	LED	The LED pin is used as a low battery indicator. For V_{DD} above the low battery threshold the open drain NMOS is off. If V_{DD} falls below the threshold, the NMOS turns on.

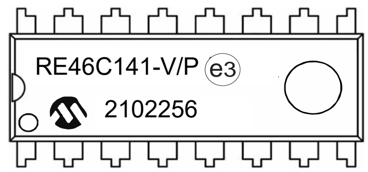
4.0 PACKAGING INFORMATION

4.1 Package Marking Information[1]

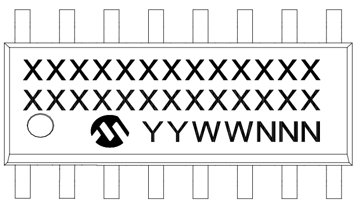
16-Lead PDIP (300 mil)



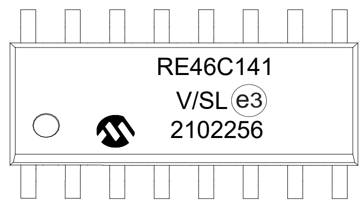
Example:



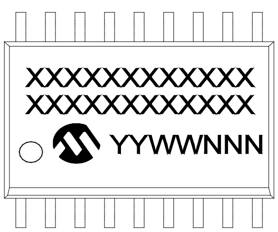
16-Lead Narrow SOIC (3.90 mm)



Example:



16-Lead Wide SOIC (7.50 mm)



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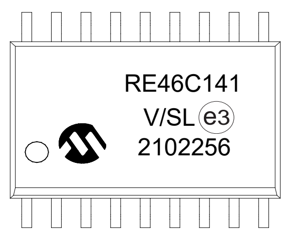
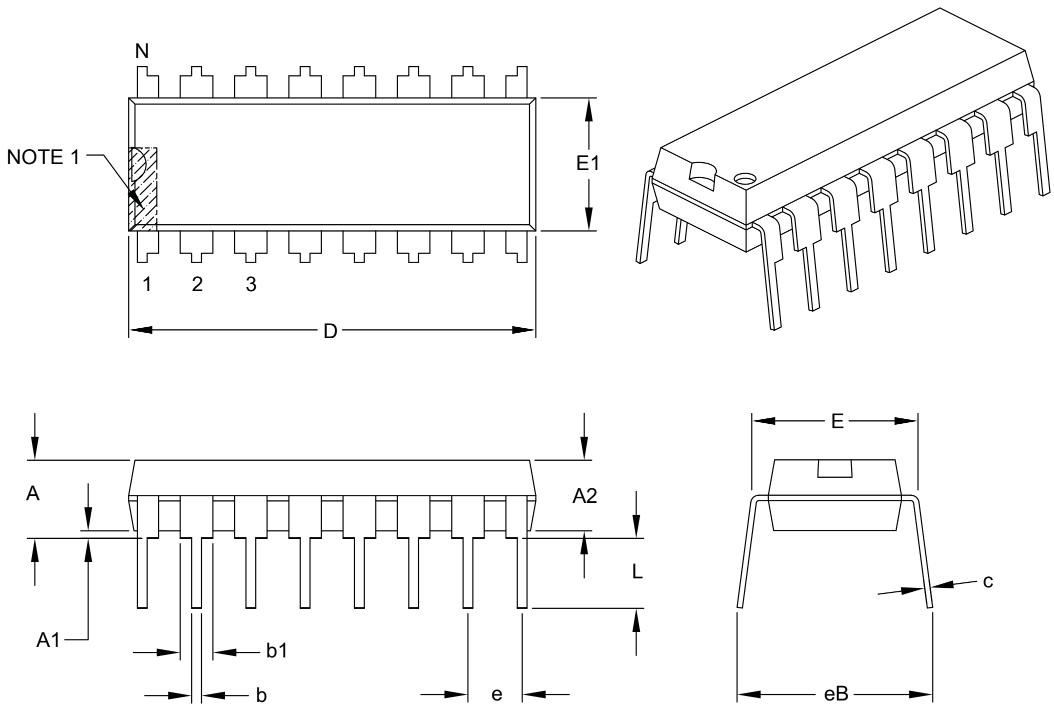


Legend:	XX...X	Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.

Note 1: 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.

16-Lead Plastic Dual In-Line (P) – 300 mil Body [PDIP]

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



Unit		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pin	N		16	
Pitch	e		.100 BSC	
Top to Seating Plane	A	–	–	.210
Molded Package Thickness	A2	.115	.130	.195
Base to Seating Plane	A1	.015	–	–
Shoulder to Shoulder Width	E	.290	.310	.325
Molded Package Width	E1	.240	.250	.280
Overall Length	D	.735	.755	.775
Tip to Seating Plane	L	.115	.130	.150
Lead Thickness	c	.008	.010	.015
Upper Lead Width	b1	.045	.060	.070
Lower Lead Width	b	.014	.018	.022
Overall Row Spacing §	eB	–	–	.430

Notes:

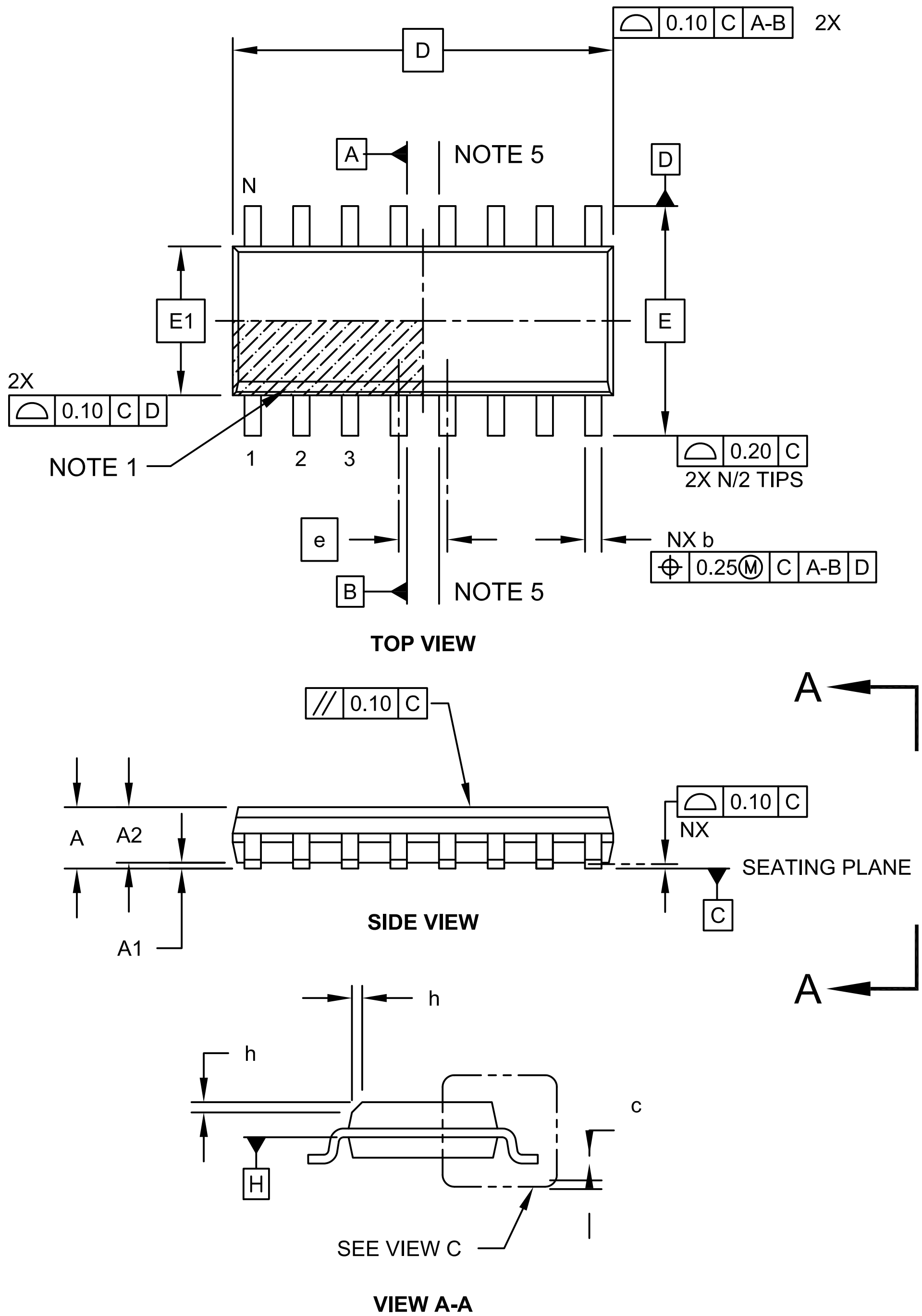
1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-017B

16-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

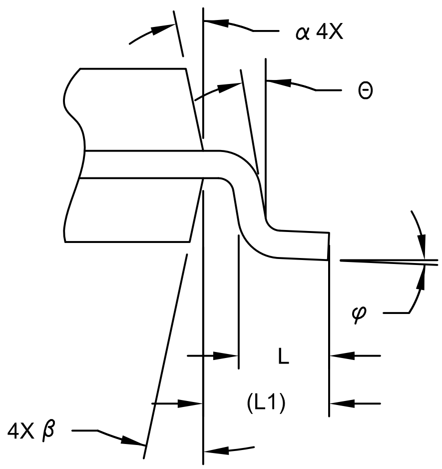
Note:	For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



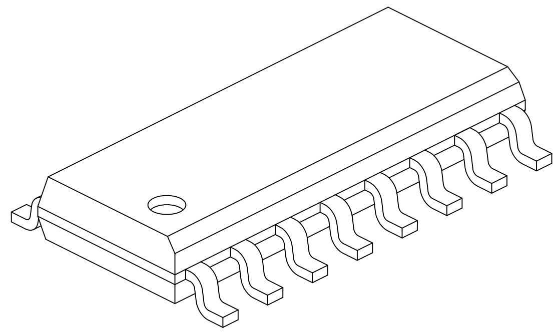
Microchip Technology Drawing No. C04-108C Sheet 1 of 2

16-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

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



VIEW C



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		16	
Pitch	e		1.27 BSC	
Overall Height	A	-	-	1.75
Molded Package Thickness	A2	1.25	-	-
Standoff §	A1	0.10	-	0.25
Overall Width	E		6.00 BSC	
Molded Package Width	E1		3.90 BSC	
Overall Length	D		9.90 BSC	
Chamfer (Optional)	h	0.25	-	0.50
Foot Length	L	0.40	-	1.27
Footprint	L1		1.04 REF	
Lead Angle	Θ	0°	-	-
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.10	-	0.25
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

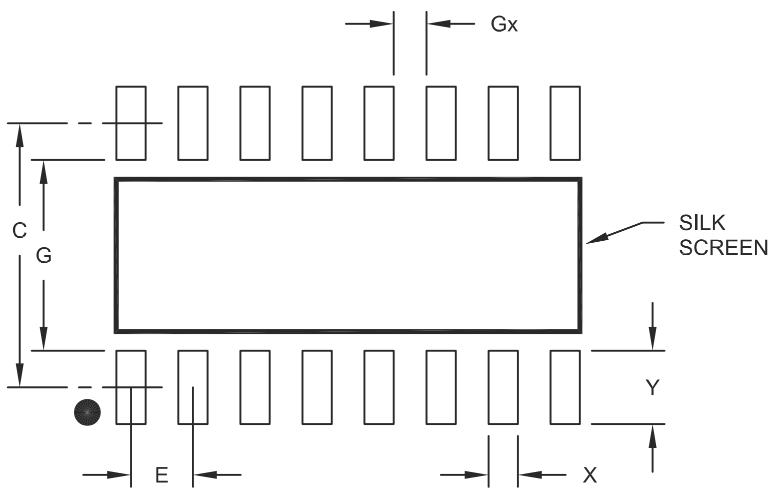
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.

   REF: Reference Dimension, usually without tolerance, for information purposes only.
5. Datums A & B to be determined at Datum H.

Microchip Technology Drawing No. C04-108C Sheet 2 of 2

16-Lead Plastic Small Outline (SL) - Narrow, 3.90 mm Body [SOIC]

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



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	1.27 BSC		
Contact Pad Spacing	C		5.40	
Contact Pad Width	X			0.60
Contact Pad Length	Y			1.50
Distance Between Pads	Gx	0.67		
Distance Between Pads	G	3.90		

Notes:

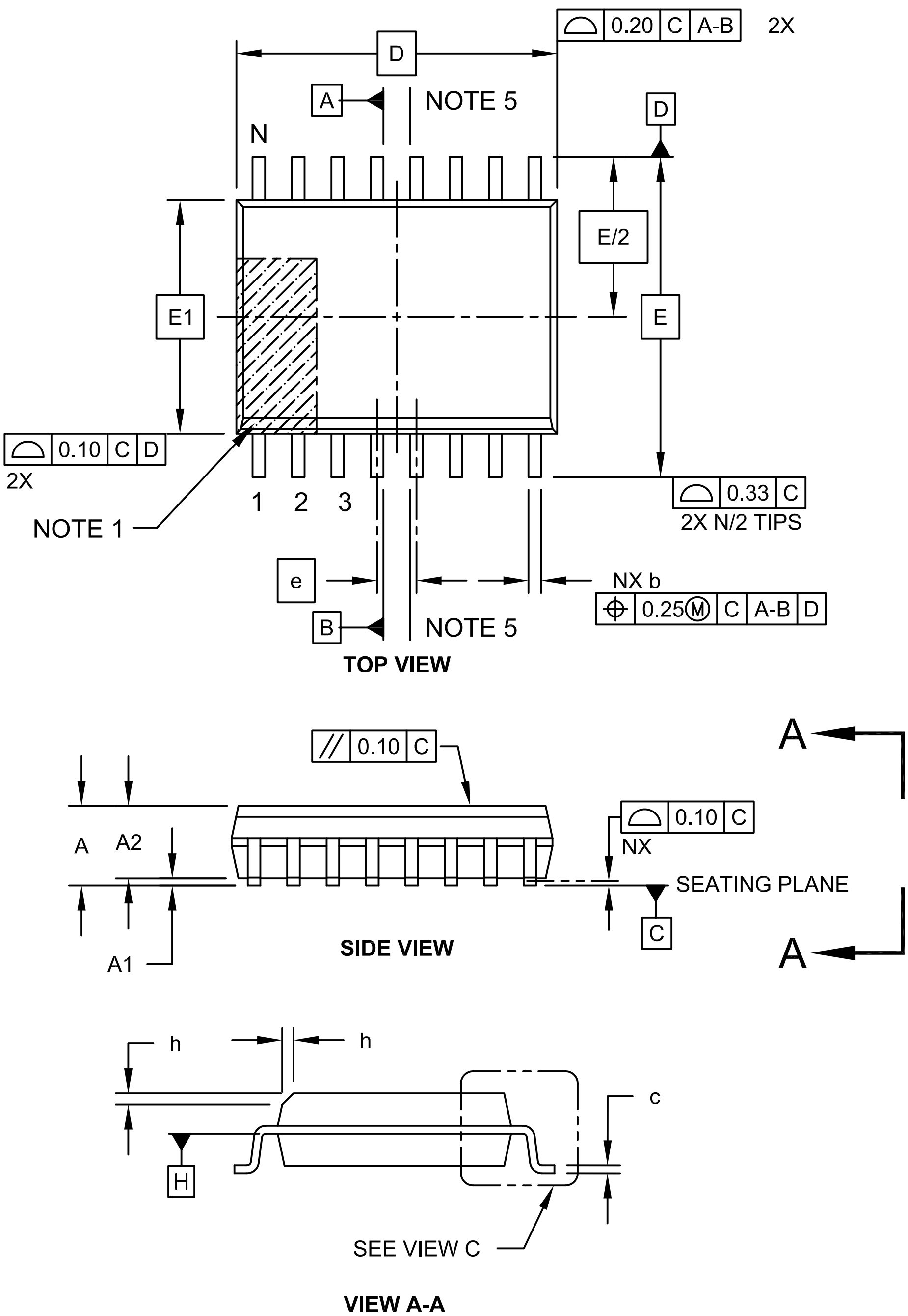
1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2108A

16-Lead Plastic Small Outline (OE) - Wide, 7.50 mm Body [SOIC]

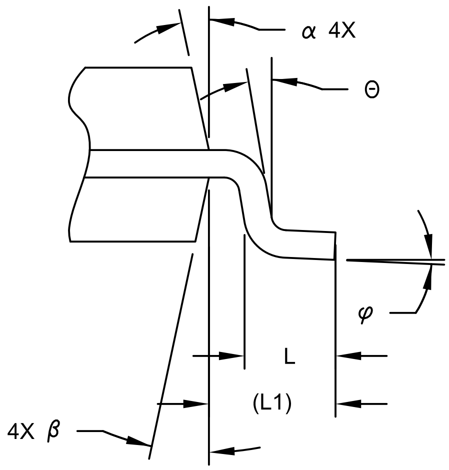
Note:	For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



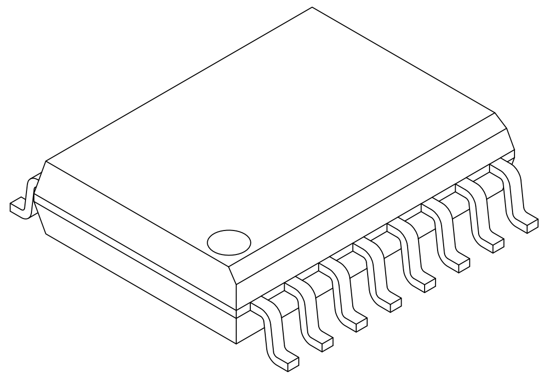
Microchip Technology Drawing C04-102C Sheet 1 of 2

16-Lead Plastic Small Outline (OE) - Wide, 7.50 mm Body [SOIC]

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



VIEW C



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	16		
Pitch	e	1.27 BSC		
Overall Height	A	-	-	2.65
Molded Package Thickness	A2	2.05	-	-
Standoff §	A1	0.10	-	0.30
Overall Width	E	10.30 BSC		
Molded Package Width	E1	7.50 BSC		
Overall Length	D	10.30 BSC		
Chamfer (Optional)	h	0.25	-	0.75
Foot Length	L	0.40	-	1.27
Footprint	L1	1.40 REF		
Lead Angle	Θ	0°	-	-
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.20	-	0.33
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

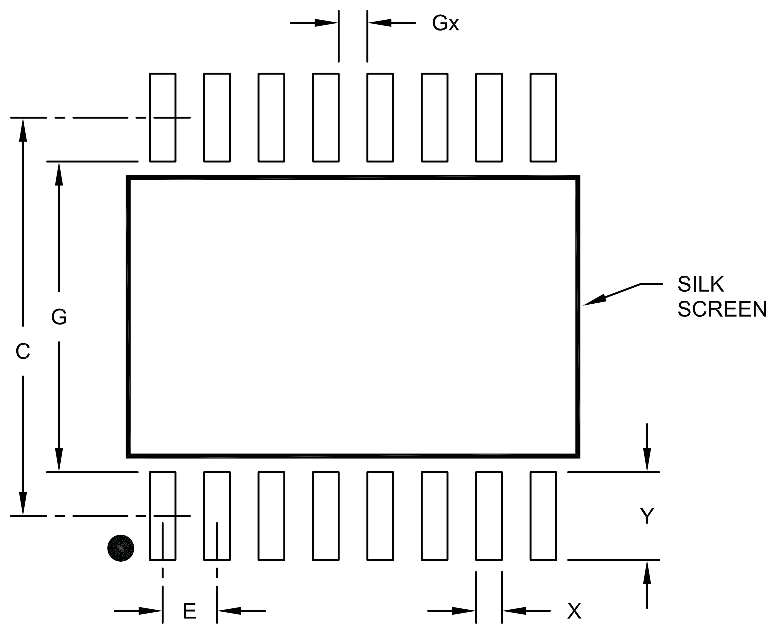
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.

   REF: Reference Dimension, usually without tolerance, for information purposes only.
5. Datums A & B to be determined at Datum H.

Microchip Technology Drawing No. C04-102C Sheet 2 of 2

16-Lead Plastic Small Outline (OE) – Wide, 7.50 mm Body [SOIC] Land Pattern

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



RECOMMENDED LAND PATTERN

	Units	MILLIMETERS		
	Dimension Limits	MIN	NOM	MAX
Contact Pitch	E	1.27 BSC		
Contact Pad Spacing	C		9.30	
Contact Pad Width	X			0.60
Contact Pad Length	Y			2.05
Distance Between Pads	Gx	0.67		
Distance Between Pads	G	7.25		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2102A

NOTES:

APPENDIX A: REVISION HISTORY

Revision C (June 2021)

- Updated document to latest Microchip formatting.
- Added **Section 4.0 "Packaging Information"**.
- Updated **Table AC Electrical Characteristics**.

Revision B (2009)

- Replaced RE46C141 from R&E International.

Revision A

- Initial release of this document.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	X	XX	[X][(1)]	F
Device	Package	Number of Pins	Tape and Reel Option	Lead-Free

Device:	RE46C141	
Package:	S = SOIC SW = SOIC (Wide) E = PDIP	
Tape and Reel Option:	Blank = Standard packaging (tube or tray) T = Tape and Reel[(1)]	
Lead-Free:	F = Lead-Free	

Examples:

a) RE46C141E16F = 16LD PDIP, Standard Packaging, Lead-Free.

b) RE46C141S16F = 16LD SOIC, Standard Packaging, Lead-Free

c) RE46C141SW16F = 16LD SOIC (Wide), Standard Packaging, Lead-Free

d) RE46C141S16TF = 16LD SOIC, Tape and Reel, Lead-Free

e) RE46C141SW16TF = 16LD SOIC (Wide), Tape and Reel, Lead-Free

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:

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- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods being used in attempts to breach the code protection features of the Microchip devices. We believe that these methods require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Attempts to breach these code protection features, most likely, cannot be accomplished without violating Microchip's intellectual property rights.
- Microchip is willing to work with any customer who is concerned about the integrity of its code.
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