NC7SZ157

TinyLogic UHS 2-Input Non-Inverting Multiplexer

ON Semiconductor®

www.onsemi.com

Description

The NC7SZ157 is a single, high performance, 2−to−1 CMOS non−inverting multiplexer from ON Semiconductor's Ultra−High Speed series of TinyLogic. The device is fabricated with advanced CMOS technology to achieve ultra high speed with high output drive while maintaining low static power dissipation over a broad V_{CC} operating range. The device is specified to operate over the 1.65 V to 5.5 V V_{CC} operating range. The inputs and outputs are high impedance when V_{CC} is 0 V. Inputs tolerate voltages up to 5.5 V independent of V_{CC} operating range.

Features

- Broad V_{CC} Operating Range: 1.65 V to 5.5 V
- Ultra High−Speed
- Power Down High−Impedance Inputs / Outputs
- Over−Voltage Tolerance Inputs Facilitate 5 V to 3 V Translation
- Proprietary Noise / EMI Reduction Circuitry
- Ultra−Small MicroPak™ Packages
- Space−Saving SC70 Package
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

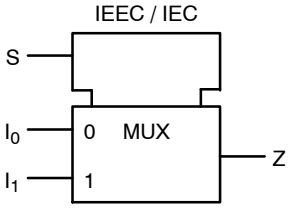
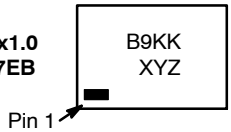


Figure 1. Logic Symbol

MARKING DIAGRAMS

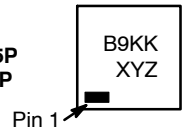


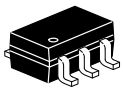
SIP6 1.45x1.0
CASE 127EB



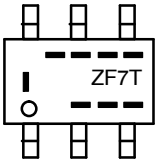


UDFN6
1.0X1.0, 0.35P
CASE 517DP





SC−88
(SC−70 6 Lead)
1.25x2
CASE 419AD−01



B9, ZF7	= Specific Device Code
KK	= 2−Digit Lot Run Traceability Code
XY	= 2−Digit Date Code Format
Z	= Assembly Plant Code
▬▬▬	= Year Coding Scheme
▮▪▬	= Plant Code Identifier
T	= Die Run Code
▬▬	= Eight−Week Datacoding Scheme

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 6 of this data sheet.

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Pin Configurations

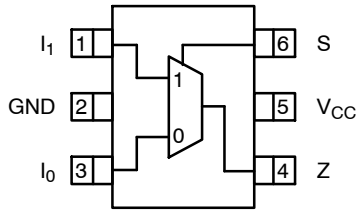


Figure 2. SC70 (Top View)

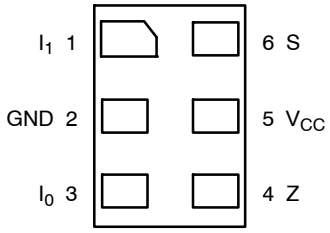
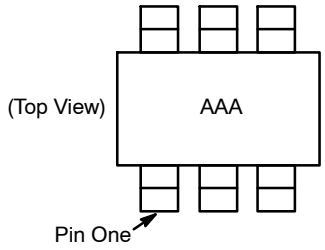


Figure 3. MicroPak (Top Through View)



NOTES:
1. AAA represents product code top mark (*see Ordering Information*).
2. Orientation of top mark determines pin one location.
3. Reading the top mark left to right, pin one is the lower left pin.

Figure 4. Pin 1 Orientation

PIN DEFINITIONS

Pin # SC70	Pin # MicroPak	Name	Description
1	1	I_1	Data Input
2	2	GND	Ground
3	3	I_0	Data Input
4	4	Z	Output
5	5	V_{CC}	Supply Voltage
6	6	S	Control Input

FUNCTION TABLE

Inputs			Output
S	**I_1**	**I_0**	**$Z = (I_0) \cdot (S) + (I_1) \cdot (S)$**
L	X	L	L
L	X	H	H
H	L	X	L
H	H	X	H

H = HIGH Logic Level
L = LOW Logic Level
X = Don't Care

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Min	Max	Unit
V_{CC}	Supply Voltage		−0.5	6.5	V
V_{IN}	DC Input Voltage		−0.5	6.5	V
V_{OUT}	DC Output Voltage		−0.5	6.5	V
I_{IK}	DC Input Diode Current	$V_{IN} \le 0.5$ V	–	−50	mA
I_{OK}	DC Output Diode Current	$V_{OUT} \le -0.5$ V	–	−50	mA
I_{OUT}	DC Output Current		–	±50	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current		–	±50	mA
T_{STG}	Storage Temperature Range		−65	+150	°C
T_J	Junction Temperature Under Bias		–	+150	°C
T_L	Junction Lead Temperature (Soldering, 10 Seconds)		–	+260	°C
P_D	Power Dissipation at +85°C	SC70−6	–	190	mW
		MicroPak−6	–	327	
		MicroPak2™−6	–	327	
ESD	Human Body Model, JEDEC: JESD22−A114		–	4000	V
	Charge Device Model, JEDEC: JESD22−C101		–	2000	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage Operating		1.65	5.50	V
	Supply Voltage Data Retention		1.50	5.50	
V_{IN}	Input Voltage		0	5.5	V
V_{OUT}	Output Voltage		0	V_{CC}	V
T_A	Operating Temperature		−40	+85	°C
t_r, t_f	Input Rise and Fall Times	V_{CC} at 1.8 V ±0.15 V, 2.5 V ±0.2 V	0	20	ns/V
		V_{CC} at 3.3 V ±0.3 V	0	10	
		V_{CC} at 5.0 V ±0.5 V	0	5	
θ_{JA}	Thermal Resistance	SC70−6	–	659	°C/W
		MicroPak	–	382	
		MicroPak2	–	382	°C/W

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

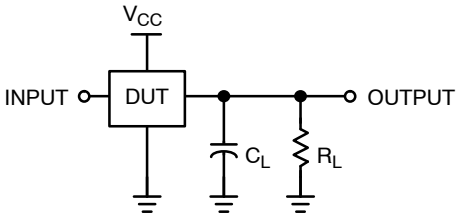
DC ELECTICAL CHARACTERISTICS

Symbol	Parameter	V_{CC} (V)	Conditions		T_A = +25°C			T_A = −40 to +85°C		Unit
					Min	Typ	Max	Min	Max	
V_{IH}	HIGH Level Input Voltage	1.65 to 1.95			0.65 V_{CC}	–	–	0.65 V_{CC}	–	V
		2.30 to 5.50			0.70 V_{CC}	–	–	0.70 V_{CC}	–	
V_{IL}	LOW Level Input Voltage	1.65 to 1.95			–	–	0.35 V_{CC}	–	0.35 V_{CC}	V
		2.30 to 5.50			–	–	0.30 V_{CC}	–	0.30 V_{CC}	
V_{OH}	HIGH Level Output Voltage	1.65	V_{IN} = V_{IL} or V_{IH}	I_{OH} = −100 μA	1.55	1.65	–	1.55	–	V
		2.30			2.20	2.30	–	2.20	–	
		3.00			2.90	3.00	–	2.90	–	
		4.50			4.40	4.50	–	4.40	–	
		1.65		I_{OH} = −4 mA	1.29	1.52	–	1.29	–	
		2.30		I_{OH} = −8 mA	1.90	2.15	–	1.90	–	
		3.00		I_{OH} = −16 mA	2.40	2.80	–	2.40	–	
		3.00		I_{OH} = −24 mA	2.30	3.68	–	2.30	–	
		4.50		I_{OH} = −32 mA	3.90	4.20	–	3.80	–	
V_{OL}	LOW Level Output Voltage	1.65	V_{IN} = V_{IL} or V_{IH}	I_{OL} = 100 μA	–	0	0.10	–	0.10	V
		2.30			–	0	0.10	–	0.10	
		3.00			–	0	0.10	–	0.10	
		4.50			–	0	0.10	–	0.10	
		1.65		I_{OL} = 4 mA	–	0.08	0.24	–	0.24	
		2.30		I_{OL} = 8 mA	–	0.10	0.30	–	0.30	
		3.00		I_{OL} = 16 mA	–	0.15	0.40	–	0.40	
		3.00		I_{OL} = 24 mA	–	0.22	0.55	–	0.55	
		4.50		I_{OL} = 32 mA	–	0.22	0.55	–	0.55	
I_{IN}	Input Leakage Current	1.65 to 5.5		V_{IN} = 5.5 V, GND	–	–	±0.1	–	±1	μA
I_{OFF}	Power Off Leakage Current	0		V_{IN} or V_{OUT} = 5.5 V	–	–	1.0	–	10	μA
I_{CC}	Quiescent Supply Current	1.65 to 5.50		V_{IN} = 5.5 V, GND	–	–	–	–	10	μA

AC ELECTRICAL CHARACTERISTICS

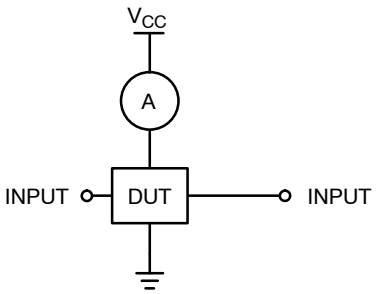
Symbol	Parameter	V_{CC} (V)	Conditions	T_A = +25°C			T_A = −40 to +85°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH}, t_{PHL}	Propagation Delay S to Z (Figure 5, 6)	1.80 ±0.15	C_L = 15 pF, R_L = 1 MΩ,	–	6.0	11.5	–	12.0	ns
		2.50 ±0.20		–	3.5	6.1	–	6.5	
		3.30 ±0.30		–	2.6	4.1	–	4.5	
		5.00 ±0.50		–	1.9	3.2	–	3.5	
	Propagation Delay I_n to Z (Figure 5, 6)	1.80 ±0.15	C_L = 15 pF, R_L = 1MΩ,	–	5.9	10.0	–	10.5	
		5.00 ±0.50		–	3.5	5.8	–	6.1	
		3.30 ±0.30		–	2.6	3.9	–	4.2	
		5.00 ±0.50		–	1.9	3.1	–	3.3	
	Propagation Delay S to Z (Figure 5, 6)	3.30 ±0.30	C_L = 50 pF, R_L = 500 Ω,	–	3.2	4.8	–	5.2	
		5.00 ±0.50		–	2.4	3.8	–	4.1	
	Propagation Delay I_n to Z (Figure 5, 6)	3.30 ±0.30	C_L = 50 pF, R_L = 500 Ω,	–	3.2	4.6	–	5.0	
		5.00 ±0.50		–	2.4	3.7	–	4.0	
C_{IN}	Input Capacitance	0.00		–	2	–	–	–	pF
C_{PD}	Power Dissipation Capacitance (Note 4) (Figure 7)	3.30		–	14	–	–	–	pF
		5.00		–	17	–	–	–	

4. C_{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I_{CCD}) at no output loading and operating at 50% duty cycle. C_{PD} is related to I_{CCD} dynamic operating current by the expression: $I_{CCD} = (C_{PD})\ (V_{CC})\ (f_{IN}) + (I_{CC}static)$.



NOTE:
5. C_L includes load and stray capacitance; inputs PRR = 1.0 MHz, t_W = 500 ns.

Figure 5. AC Test Circuit



NOTE:
6. Input = AC Waveform; PRR = Variable; Duty Cycle = 50%.

Figure 7. I_{CCD} Test Circuit

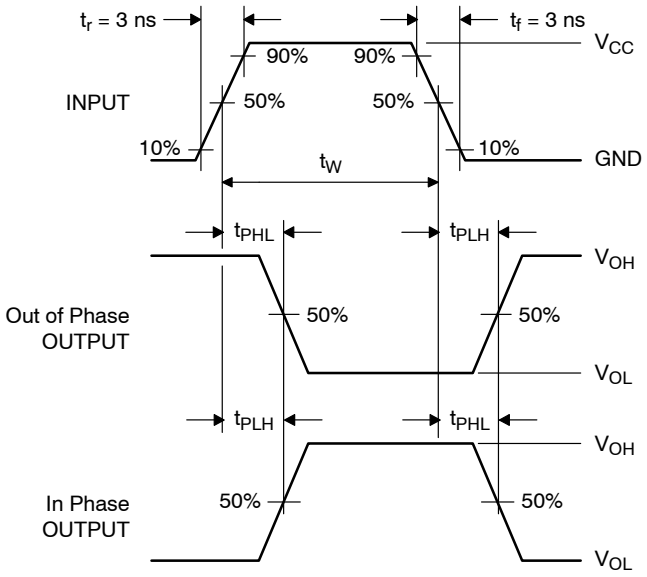


Figure 6. AC Waveforms

DEVICE ORDERING INFORMATION

Device	Top Mark	Packages	Shipping†
NC7SZ157P6X	ZF7	6−Lead SC70, EIAJ SC−88, 1.25 mm Wide	3000 / Tape & Reel
NC7SZ157L6X	B9	6−Lead MicroPak, 1.00 mm Wide	5000 / Tape & Reel
NC7SZ157FHX	B9	6−Lead, MicroPak2, 1x1 mm Body, .35 mm Pitch	5000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

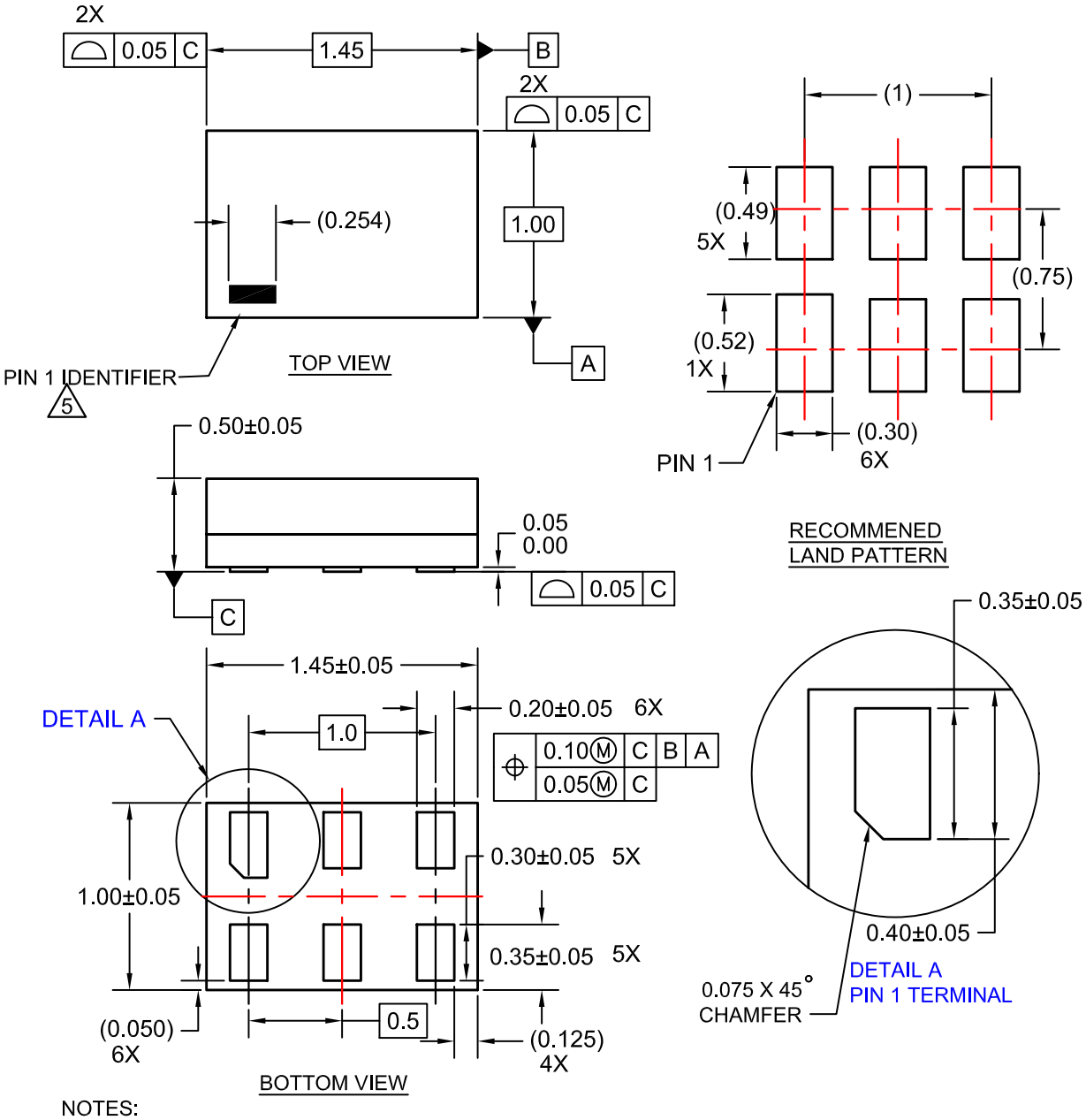
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MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®

SIP6 1.45X1.0
CASE 127EB
ISSUE O

DATE 31 AUG 2016



NOTES:

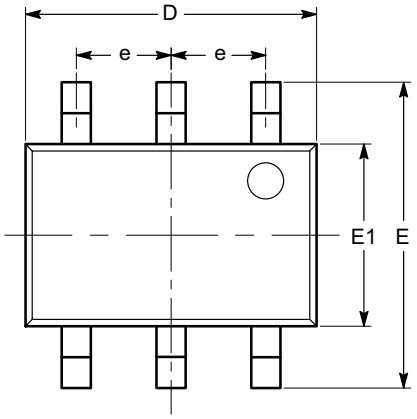
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3. DRAWING CONFORMS TO ASME Y14.5M-2009
4. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY OTHER LINE IN THE MARK CODE LAYOUT.

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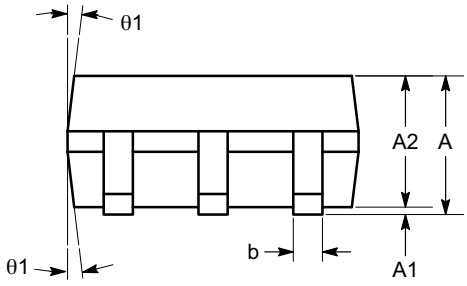
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CASE 419AD−01
ISSUE A

DATE 07 JUL 2010

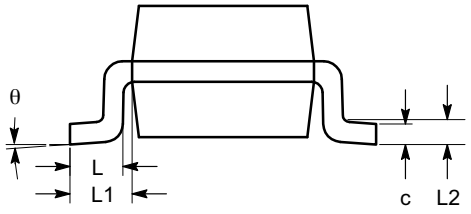


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	0.80		1.10
A1	0.00		0.10
A2	0.80		1.00
b	0.15		0.30
c	0.10		0.18
D	1.80	2.00	2.20
E	1.80	2.10	2.40
E1	1.15	1.25	1.35
e		0.65 BSC	
L	0.26	0.36	0.46
L1		0.42 REF	
L2		0.15 BSC	
θ	0°		8°
θ1	4°		10°



SIDE VIEW



END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MO-203.

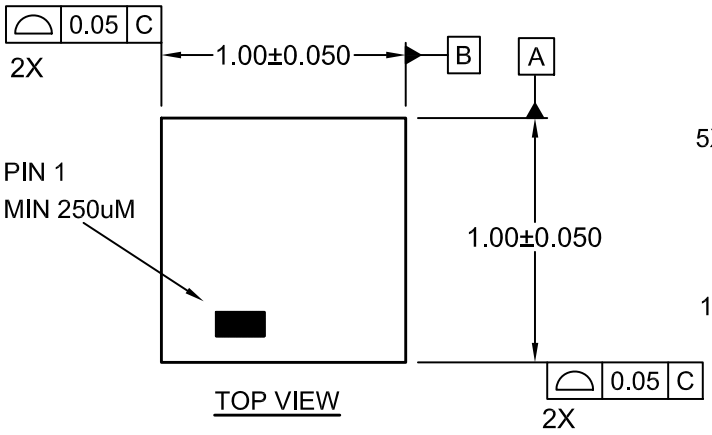
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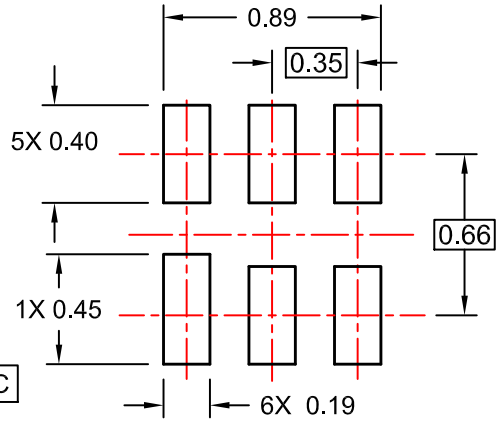
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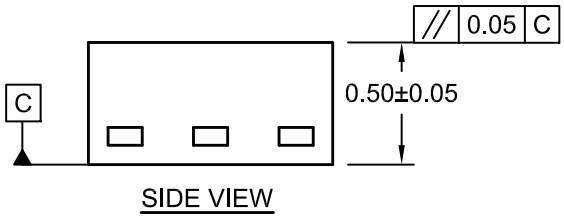
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CASE 517DP
ISSUE O

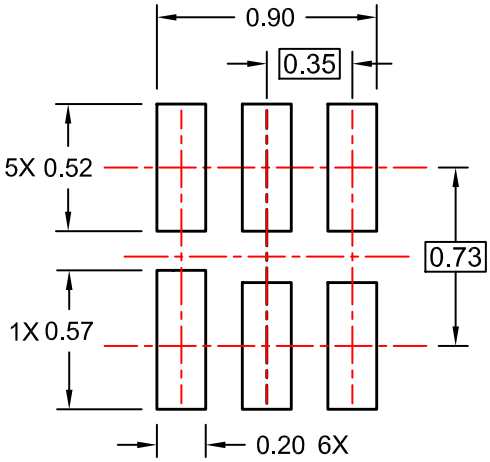
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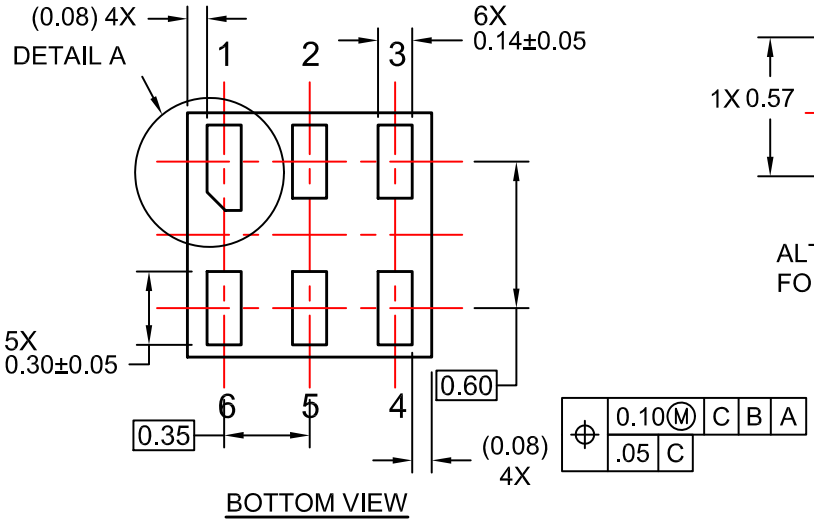


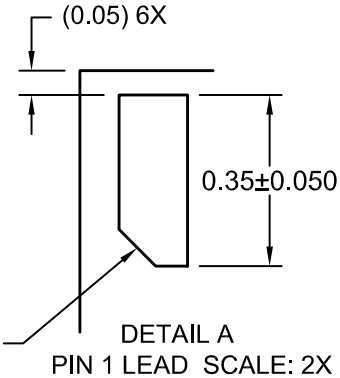
RECOMMENDED LAND PATTERN
FOR SPACE CONSTRAINED PCB





ALTERNATIVE LAND PATTERN
FOR UNIVERSAL APPLICATION





NOTES:

A. COMPLIES TO JEDEC MO-252 STANDARD
B. DIMENSIONS ARE IN MILLIMETERS.
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