NC7WZ16

TinyLogic UHS Dual Buffer

Description

The NC7WZ16 is a dual buffer 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 very broad V_{CC} operating range. The device is specified to operate over the 1.65 V to 5.5 V V_{CC} 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 voltage.

Features

- Ultra−High Speed: t_{PD} 2.4 ns (Typical) into 50 pF at 5 V V_{CC}
- High Output Drive: ±24 mA at 3 V V_{CC}
- Broad V_{CC} Operating Range: 1.65 V to 5.5 V
- Matches Performance of LCX when Operated at 3.3 V V_{CC}
- 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

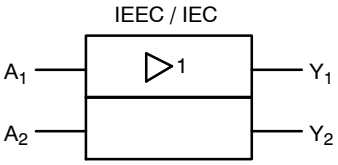

Figure 1. Logic Symbol

ON Semiconductor®

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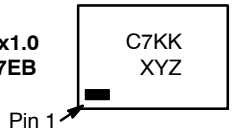
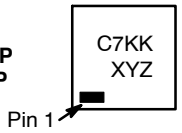
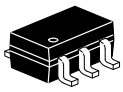
MARKING DIAGRAMS

SIP6 1.45x1.0
CASE 127EB

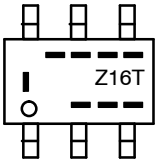


UDFN6
1.0X1.0, 0.35P
CASE 517DP





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



C7, Z16	= 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.

Pin Configurations

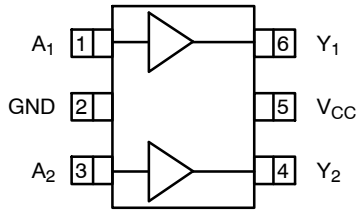


Figure 2. SC70 (Top View)

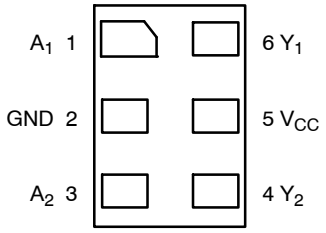
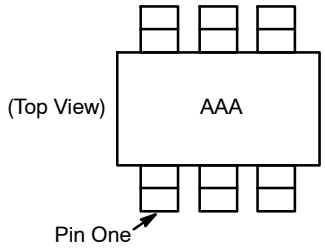


Figure 3. MicroPak (Top Through View)



NOTES:
1. AAA represents product code top mark (see ordering table).
2. Orientation of Top Mark determines Pin One location. Read the top product code 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	A_1	Input
2	2	GND	Ground
3	3	A_2	Input
4	4	Y_2	Output
5	5	V_{CC}	Supply Voltage
6	6	Y_1	Output

FUNCTION TABLE (Y = A)

Inputs	Output
A	**Y**
L	L
H	H

H = HIGH Logic Level
L LOW Logic Level

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} < 0 V	−	−50	mA
I_{OK}	DC Output Diode Current	V_{OUT} < 0 V	−	−50	mA
I_{OUT}	DC Output Source / Sink Current		−	±50	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current		−	±100	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_r, t_f	Input Rise and Fall Times	V_{CC} = 1.8 V, 2.5 V ±0.2 V	0	20	ns/V
		V_{CC} = 3.3 V ±0.3 V	0	10	
		V_{CC} = 5.5 V ±0.5 V	0	5	
T_A	Operating Temperature		−40	+125	°C
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.

3. Unused inputs must be held HIGH or LOW. They may not float.

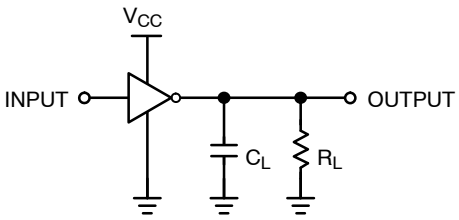
DC ELECTICAL CHARACTERISTICS

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 Control Input Voltage	1.65 to 1.95			0.65 V_{CC}	–	–	0.65 V_{CC}	–	V
		2.3 to 5.5			0.70 V_{CC}	–	–	0.70 V_{CC}	–	
V_{IL}	LOW Level Control Input Voltage	1.65 to 1.95			–	–	0.35 V_{CC}	–	0.35 V_{CC}	V
		2.3 to 5.5			–	–	0.30 V_{CC}	–	0.30 V_{CC}	
V_{OH}	HIGH Level Output Voltage	1.65	V_{IN} = V_{IH}	I_{OH} = −100 μA	1.55	1.65	–	1.55	–	V
		1.80			1.70	1.80	–	1.70	–	
		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	–	1.21	–	
		2.30		I_{OH} = −8 mA	1.90	2.14	–	1.90	–	
		3.00		I_{OH} = −16 mA	2.40	2.75	–	2.40	–	
		3.00		I_{OH} = −24 mA	2.30	2.62	–	2.30	–	
		4.50		I_{OH} = −32 mA	3.80	4.13	–	3.80	–	
V_{OL}	LOW Level Output Voltage	1.65	V_{IN} = V_{IL}	I_{OL} = 100 μA	–	0.00	0.10	–	0.10	V
		1.80			–	0.00	0.10	–	0.10	
		2.30			–	0.00	0.10	–	0.10	
		3.00			–	0.00	0.10	–	0.10	
		4.50			–	0.00	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	–	0.16	0.40	–	0.40	
		3.00		I_{OL} = 24 mA	–	0.24	0.55	–	0.55	
		4.50		I_{OL} = 32 mA	–	0.25	0.55	–	0.55	
I_{IN}	Input Leakage Current	1.65 to 5.5		0 ≥ V_{IN} ≥ 5.5 V	–	–	±0.1	–	±1.0	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	–	–	1.0	–	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 (Figure 5, 6)	1.65	C_L = 15 pF, R_L = 1 MΩ	–	5.5	9.6	–	10.6	ns
		1.80		–	4.6	8.0	–	8.8	
		2.50 ±0.20		–	3.0	5.2	–	5.8	
		3.30 ±0.30		–	2.3	3.6	–	4.0	
		5.00 ±0.50		–	1.8	2.9	–	3.2	
		3.30 ±0.30	C_L = 50 pF, R_L = 500 Ω	–	3.0	4.6	–	5.1	
		5.00 ±0.50		–	2.4	3.8	–	4.2	
C_{IN}	Input Capacitance	0		–	2.5	–	–	–	pF
C_{PD}	Power Dissipation Capacitance (Note 4) (Figure 7)	3.30		–	10	–	–	–	pF
		5.00		–	12	–	–	–	

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

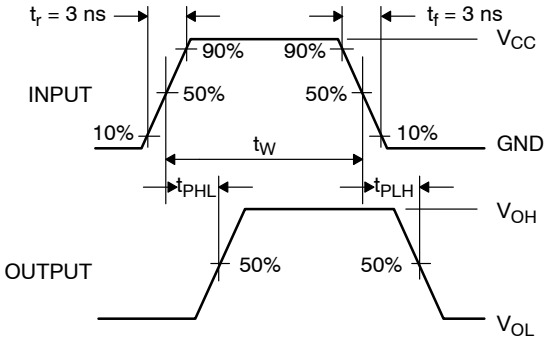
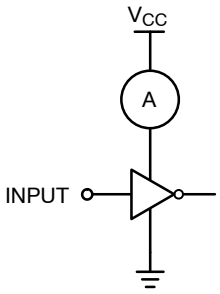


Figure 6. AC Waveforms



NOTE:
6. Input = AC Waveform; $t_r = t_f$ = 1.8 ns; PRR = 10 MHz; Duty Cycle = 50%.

Figure 7. I_{CCD} Test Circuit

DEVICE ORDERING INFORMATION

Device	Top Mark	Packages	Shipping†
NC7WZ16P6X	Z16	6−Lead SC70, EIAJ SC−88a, 1.25 mm Wide	3000 / Tape & Reel
NC7WZ16L6X	C7	6−Lead MicroPak, 1.00 mm Wide	5000 / Tape & Reel
NC7WZ16FHX	C7	6−Lead, MicroPak2, 1x1 mm Body, .35 mm Pitch	5000 / Tape & Reel

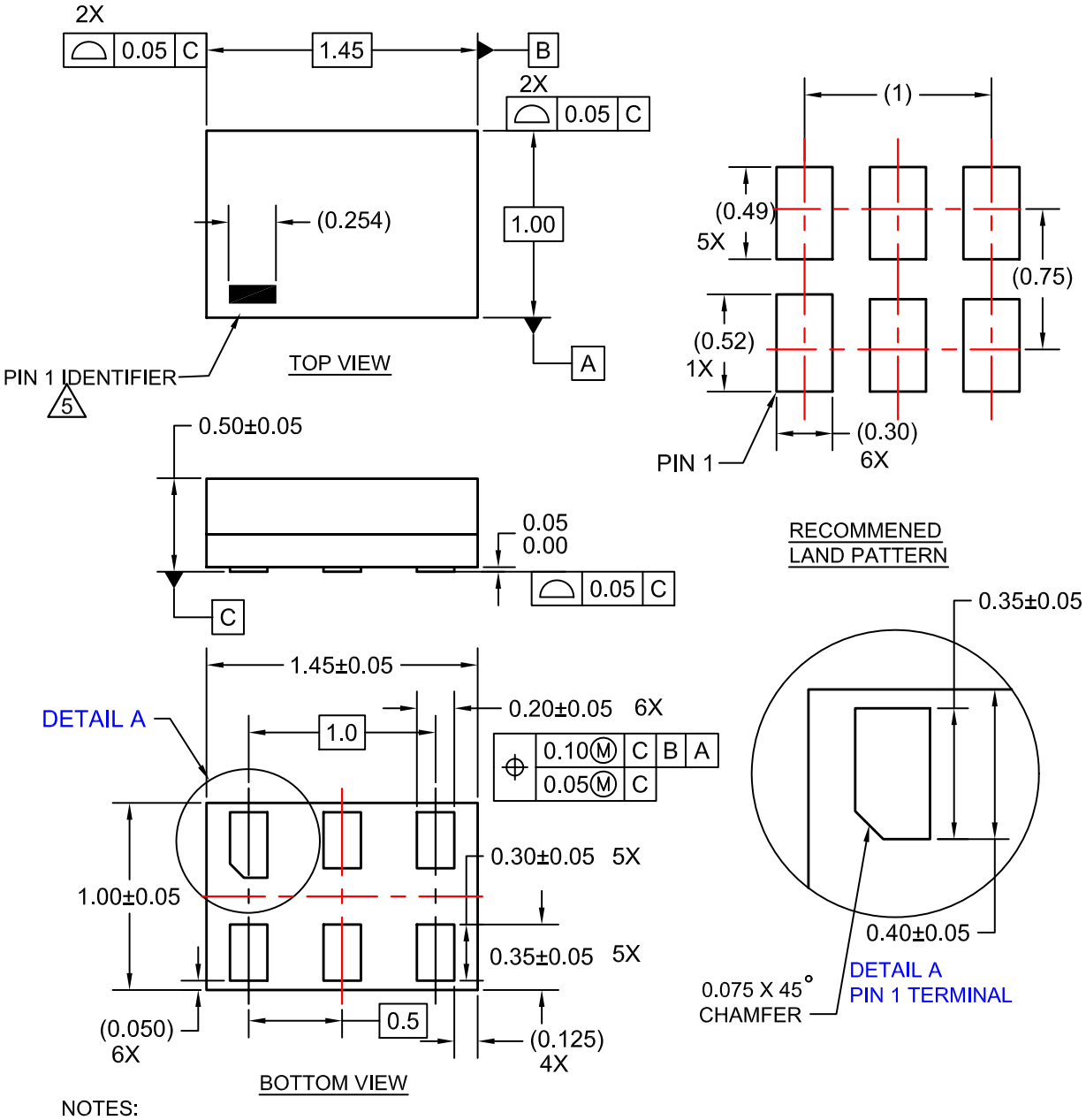
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®

SIP6 1.45X1.0
CASE 127EB
ISSUE O

DATE 31 AUG 2016



NOTES:

1. CONFORMS TO JEDEC STANDARD MO-252 VARIATION UAAD
2. DIMENSIONS ARE IN MILLIMETERS
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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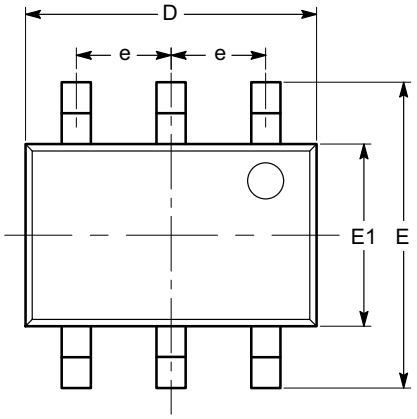
DESCRIPTION:	**SIP6 1.45X1.0**	**PAGE 1 OF 1**

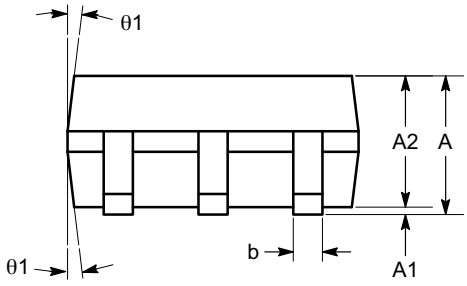
SC−88 (SC−70 6 Lead), 1.25x2
CASE 419AD−01
ISSUE A

DATE 07 JUL 2010

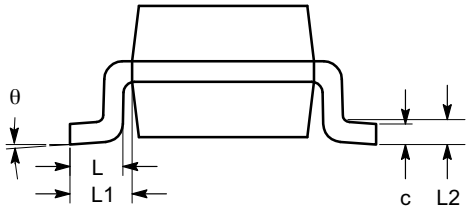


TOP VIEW

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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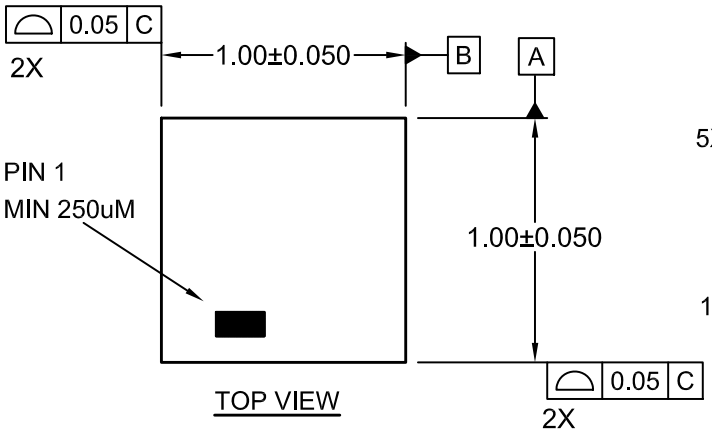
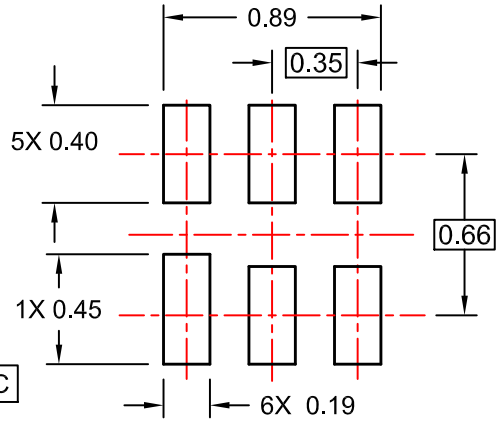
DESCRIPTION:	**SC−88 (SC−70 6 LEAD), 1.25X2**	**PAGE 1 OF 1**

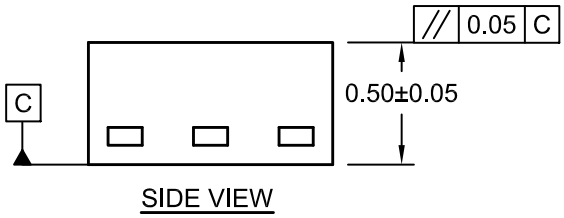
UDFN6 1.0X1.0, 0.35P
CASE 517DP
ISSUE O

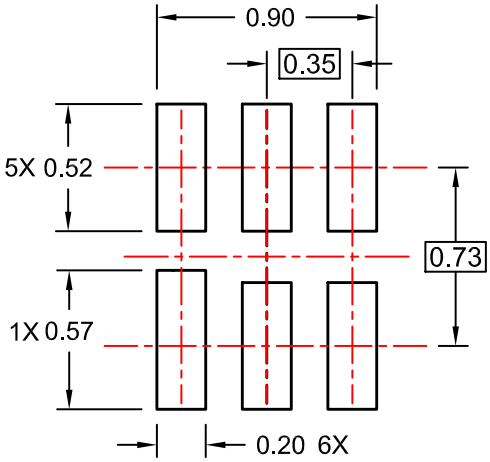
DATE 31 AUG 2016



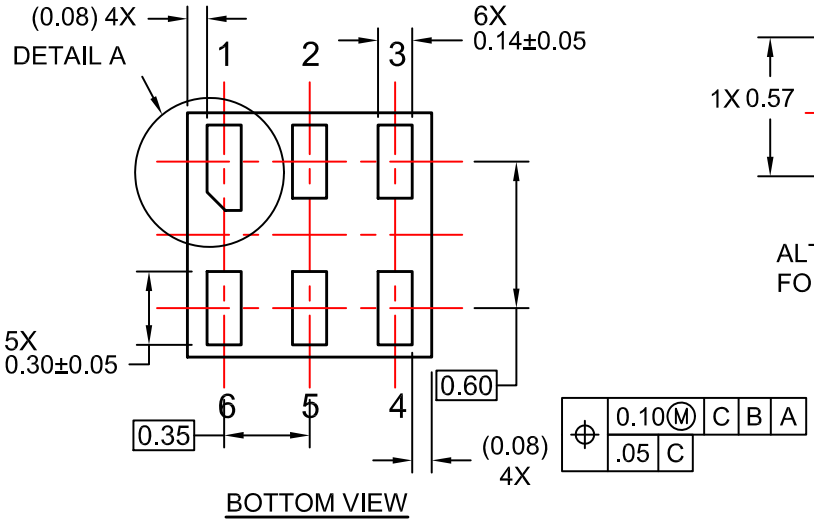


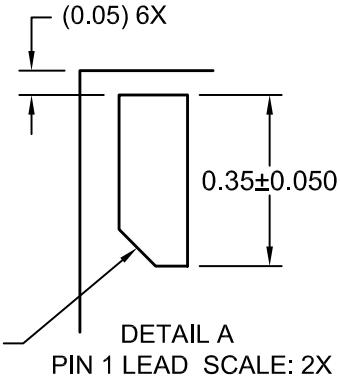
RECOMMENDED LAND PATTERN
FOR SPACE CONSTRAINED PCB





ALTERNATIVE LAND PATTERN
FOR UNIVERSAL APPLICATION





NOTES:

A. COMPLIES TO JEDEC MO-252 STANDARD
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009

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DESCRIPTION:	**UDFN6 1.0X1.0, 0.35P**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

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Phone: 011 421 33 790 2910

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For additional information, please contact your local Sales Representative

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