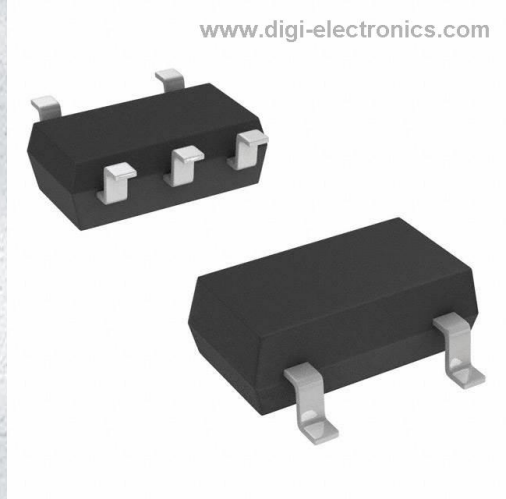
NC7SZ38P5 Datasheet



DiGi Electronics Part Number	NC7SZ38P5-DG
Manufacturer	onsemi
Manufacturer Product Number	NC7SZ38P5
Description	IC GATE NAND 1CH 2-INP SC70-5
Detailed Description	NAND Gate IC 1 Channel Open Drain SC-70-5

https://www.DiGi-Electronics.com

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
NC7SZ38P5	onsemi
Series:	Product Status:
7SZ	Discontinued at Digi-Key
Logic Type:	Number of Circuits:
NAND Gate	1
Number of Inputs:	Features:
2	Open Drain
Voltage - Supply:	Current - Quiescent (Max):
1.65V ~ 5.5V	2 µA
Current - Output High, Low:	Input Logic Level - Low:
-, 32mA	-
Input Logic Level - High:	Max Propagation Delay @ V, Max CL:
-	4.3ns @ 5V, 50pF
Operating Temperature:	Mounting Type:
-40°C ~ 85°C	Surface Mount
Supplier Device Package:	Package / Case:
SC-70-5	5-TSSOP, SC-70-5, SOT-353
Base Product Number:	
7SZ38	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8542.39.0001	

DATA SHEET
www.onsemi.com

TinyLogic UHS 2-Input NAND Gate, Open Drain Output
NC7SZ38

Description

The NC7SZ38 is a single 2−Input NAND gate with open drain output stage from **onsemi**'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 output are high impedance when V_{CC} is 0 V. Inputs tolerate voltages up to 5.5 V, independent of V_{CC} when in the high impedance state. The open drain output stage tolerates voltages up to 6 V independent of V_{CC} when in the high impedance state.

Features

- Ultra−High Speed: t_{PD} = 2.2 ns (Typical) into 50 pF at 5 V V_{CC}
- Open Drain Output Stage for OR Tied Applications
- High Output Sink Drive: ±24 mA at 3 V V_{CC}
- Broad V_{CC} Operating Range: 1.65 V to 5.5 V
- Matches Performance of LCX 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 SOT23−5, SC−74A and SC−88A Packages
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

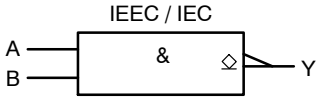
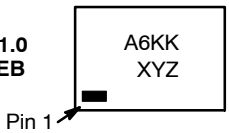


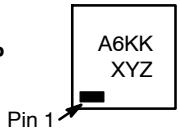
Figure 1. Logic Symbol

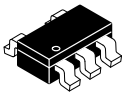
MARKING DIAGRAMS

SIP6 1.45x1.0
CASE 127EB

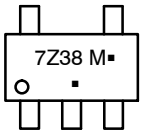


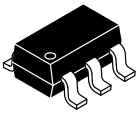
UDFN6
1.0X1.0, 0.35P
CASE 517DP



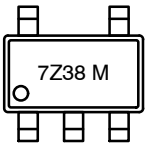


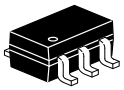
SC−74A
CASE 318BQ



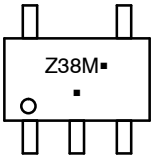


SOT23−5
CASE 527AH





SC−88A
CASE 419A−02



A6, 7Z38, Z38 = Specific Device Code
KK = 2−Digit Lot Run Traceability Code
XY = 2−Digit Date Code Format
Z = Assembly Plant Code
M = Data Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or position may vary depending upon manufacturing location.

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 5.

NC7SZ38

Pin Configurations

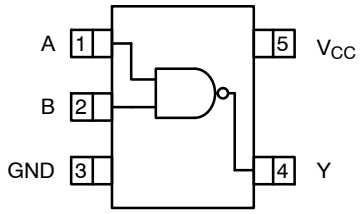


Figure 2. SOT23−5, SC−88A and SC−74A (Top View)

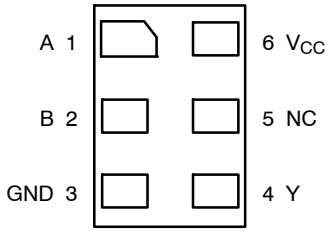


Figure 3. MicroPak (Top Through View)

PIN DEFINITIONS

Pin # SC−88A / SC−74A/ SOT23−5	Pin # MicroPak	Name	Description
1	1	A	Input
2	2	B	Input
3	3	GND	Ground
4	4	Y	Output
5	6	V_{CC}	Supply Voltage
	5	NC	No Connect

FUNCTION TABLE

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

H = HIGH Logic Level
L = LOW Logic Level
*H = High Impedance Output State, Open Drain

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 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 in Still Air	SC−74A / SOT23−5	−	390	mW
		SC−88A	−	332	
		MicroPak−6	−	812	
		MicroPak2™−6	−	812	
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	5.5	V
	Supply Voltage Data Retention		1.50	5.5	
V_{IN}	Input Voltage		0	5.5	V
V_{OUT}	Output Voltage		0	5.5	V
T_A	Operating Temperature		−40	+85	°C
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} = 5.0 V ±0.5 V	0	5	
θ_{JA}	Thermal Resistance	SC−74A / SOT23−5	−	320	°C/W
		SC−88A	−	377	
		MicroPak−6	−	154	
		MicroPak2−6	−	154	

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.

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

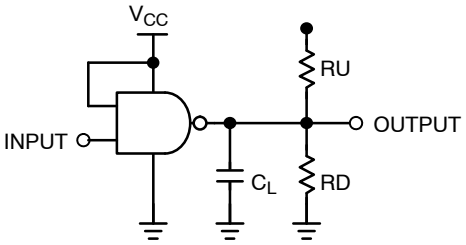
DC ELECTICAL CHARACTERISTICS

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 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}	
I_{LKG}	HIGH Level Output Leakage	5.50	V_{IN} = V_{IL}, V_{OUT} = V_{CC} or GND	–	–	±5	–	±10	μA
V_{OL}	LOW Level Output Voltage	1.65	V_{IN} = V_{IH} or 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	–	0.80	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	5.50	V_{IN} = 5.5 V, GND	–	–	±1	–	±10	μA
I_{OFF}	Power Off Leakage Current	0	V_{IN} or V_{OUT} = 5.5 V	–	–	1	–	10	μA
I_{CC}	Quiescent Supply Current	5.50	V_{IN} = 5.5 V, GND	–	–	2	–	20	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_{PZL}	Propagation Delay (Figure 4, 5)	1.65	C_L = 50 pF, RU = 500 Ω, RD = 500 Ω, V_{IN} = 2 · V_{CC}	–	6.5	12.7	–	13.2	ns
		1.80		–	5.4	10.5	–	11.0	
		2.50 ±0.20		–	3.5	7.0	–	7.5	
		3.30 ±0.30		–	2.8	5.0	–	5.2	
		5.00 ±0.50		–	2.2	4.3	–	4.5	
t_{PLZ}		1.65	C_L = 50 pF, RU = 500 Ω, RD = 500 Ω, V_{IN} = 2 · V_{CC}	–	5.5	12.7	–	13.2	ns
		1.80		–	4.6	10.5	–	11.0	
		2.50 ±0.20		–	3.0	7.0	–	7.5	
		3.30 ±0.30		–	2.1	5.0	–	5.2	
		5.00 ±0.50		–	1.3	4.3	–	4.5	
C_{IN}	Input Capacitance	0.00		–	4.0	–	–	–	pF
C_{OUT}	Output Capacitance	0.00		–	5.0	–	–	–	pF
C_{PD}	Power Dissipation Capacitance (Note 2) (Figure 6)	3.30		–	5.1	–	–	–	pF
		5.00		–	7.3	–	–	–	

2. 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:
3. C_L includes load and stray capacitance.
Input PRR = 10 MHz t_w = 500 ns.

Figure 4. AC Test Circuit

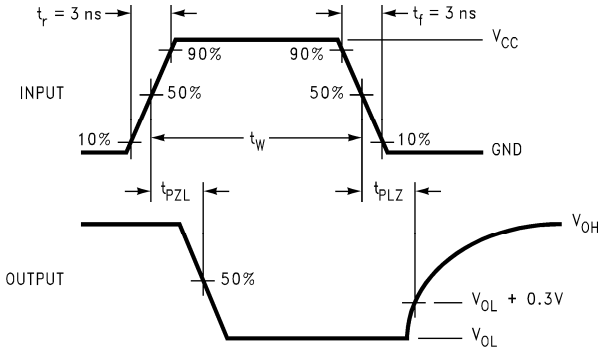
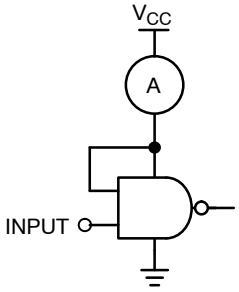


Figure 5. AC Waveforms



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

Figure 6. Test Circuit

DEVICE ORDERING INFORMATION

Device	Top Mark	Packages	Shipping†
NC7SZ38M5X	7Z38	SC−74A	3000 / Tape & Reel
NC7SZ38P5X	Z38	SC−88A	3000 / Tape & Reel
NC7SZ38L6X	A6	SIP6, MicroPak	5000 / Tape & Reel
NC7SZ38FHX	A6	UDFN6, MicroPak2	5000 / Tape & Reel

DISCONTINUED (Note 5)

NC7SZ38M5X−L22090	7Z38	SOT23−5	3000 / Tape & Reel
NC7SZ38P5X−L22057	Z38	SC−88A	3000 / Tape & Reel
NC7SZ38L6X−L22175	A6	SIP6, MicroPak	5000 / Tape & Reel
NC7SZ38FHX−L22175	A6	UDFN6, MicroPak2	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.

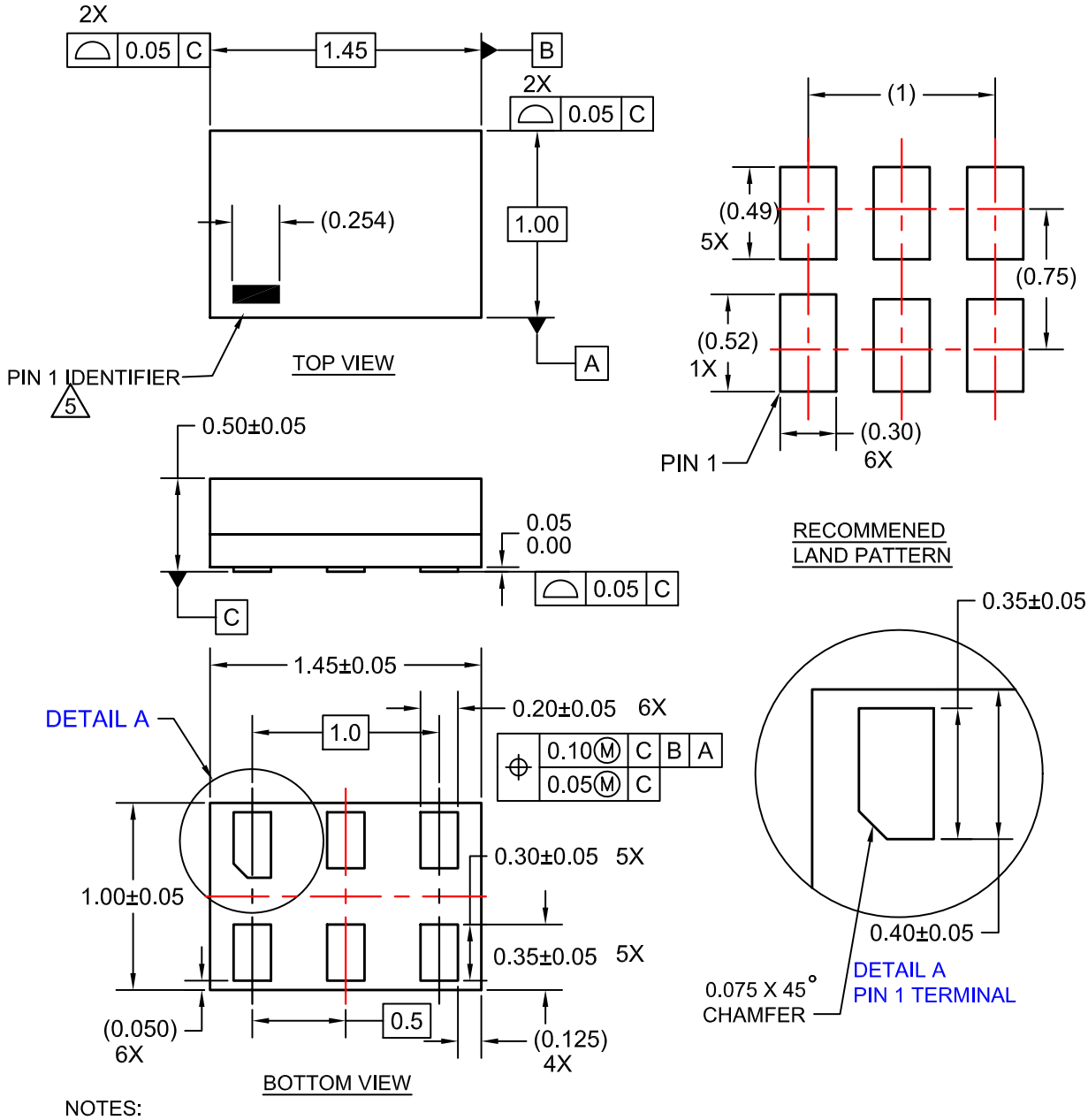
5. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.

onsemi

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

SIP6 1.45X1.0
CASE 127EB
ISSUE O

DATE 31 AUG 2016

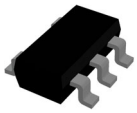


NOTES:

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.

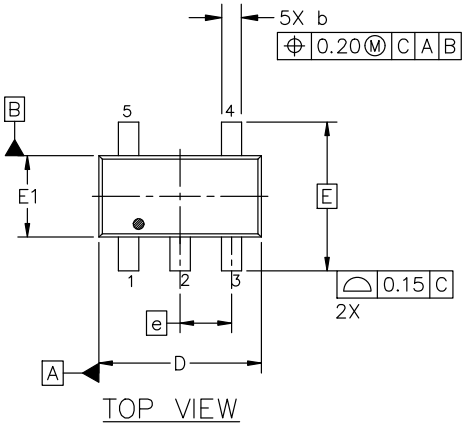
DOCUMENT NUMBER:	**98AON13590G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	**SIP6 1.45X1.0**	**PAGE 1 OF 1**

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

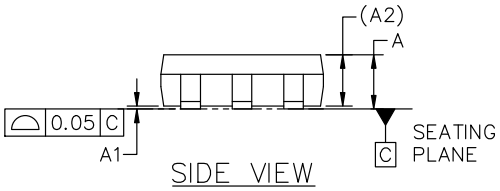


SC−74A−5 3.00x1.50x0.95, 0.95P
CASE 318BQ
ISSUE C

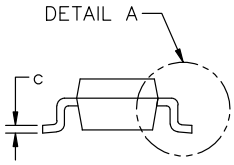
DATE 26 FEB 2024



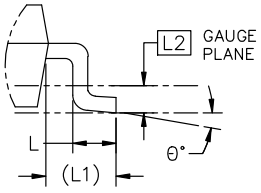
TOP VIEW



SIDE VIEW



END VIEW



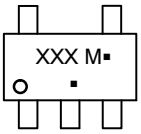
DETAIL "A"
SCALE 2:1

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5−2018.
2. ALL DIMENSION ARE IN MILLIMETERS (ANGLES IN DEGREES).
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OF GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.01	0.18	0.10
A2		0.95 REF.	
b	0.25	0.37	0.50
c	0.10	0.18	0.26
D	2.85	3.00	3.15
E		2.75 BSC	
E1	1.35	1.50	1.65
e		0.95 BSC	
L	0.20	0.40	0.60
L1		0.62 REF.	
L2		0.25 BSC	
θ	0°	5°	10°

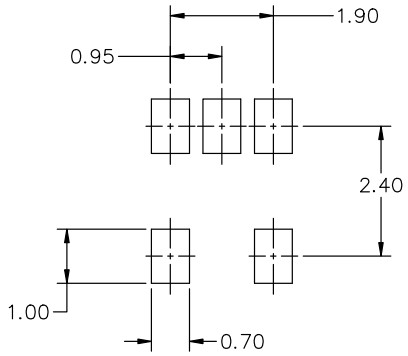
GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "G" or microdot " ▪", may or may not be present. Some products may not follow the Generic Marking.



RECOMMENDED MOUNTING FOOTPRINT*

* FOR ADDITIONAL INFORMATION ON OUR Pb−FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

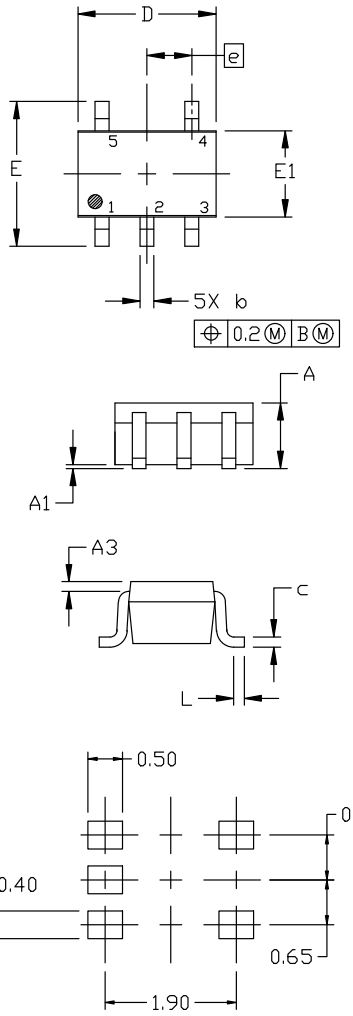
DOCUMENT NUMBER:	**98AON66279G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	**SC−74A−5 3.00x1.50x0.95, 0.95P**		**PAGE 1 OF 1**

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

SCALE 2:1

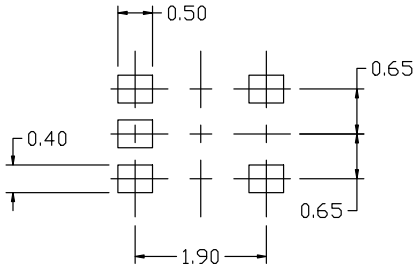
SC−88A (SC−70−5/SOT−353)
CASE 419A−02
ISSUE M

DATE 11 APR 2023



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. 419A−01 OBSOLETE. NEW STANDARD 419A−02
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.1016MM PER SIDE.

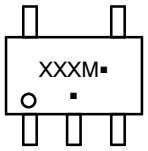
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.80	0.95	1.10
A1	---	---	0.10
A3	0.20 REF		
b	0.10	0.20	0.30
c	0.10	---	0.25
D	1.80	2.00	2.20
E	2.00	2.10	2.20
E1	1.15	1.25	1.35
e	0.65 BSC		
L	0.10	0.15	0.30



RECOMMENDED
MOUNTING FOOTPRINT

* For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

STYLE 1:
PIN 1. BASE
2. EMITTER
3. BASE
4. COLLECTOR
5. COLLECTOR

STYLE 2:
PIN 1. ANODE
2. EMITTER
3. BASE
4. COLLECTOR
5. CATHODE

STYLE 3:
PIN 1. ANODE 1
2. N/C
3. ANODE 2
4. CATHODE 2
5. CATHODE 1

STYLE 4:
PIN 1. SOURCE 1
2. DRAIN 1/2
3. SOURCE 1
4. GATE 1
5. GATE 2

STYLE 5:
PIN 1. CATHODE
2. COMMON ANODE
3. CATHODE 2
4. CATHODE 3
5. CATHODE 4

STYLE 6:
PIN 1. EMITTER 2
2. BASE 2
3. EMITTER 1
4. COLLECTOR
5. COLLECTOR 2/BASE 1

STYLE 7:
PIN 1. BASE
2. EMITTER
3. BASE
4. COLLECTOR
5. COLLECTOR

STYLE 8:
PIN 1. CATHODE
2. COLLECTOR
3. N/C
4. BASE
5. EMITTER

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. ANODE
5. ANODE

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

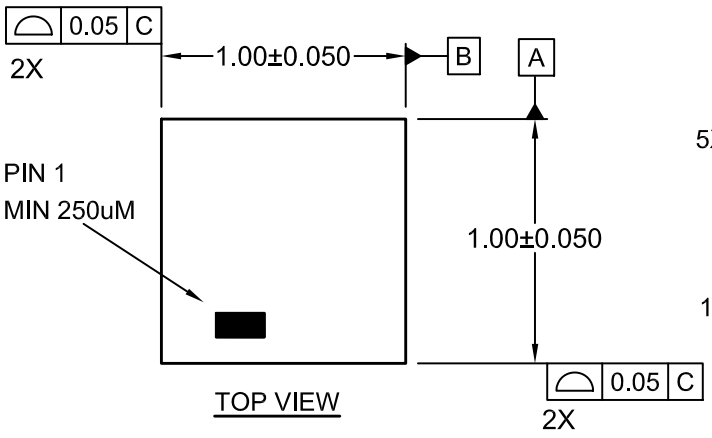
DOCUMENT NUMBER:	**98ASB42984B**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**SC−88A (SC−70−5/SOT−353)**	**PAGE 1 OF 1**

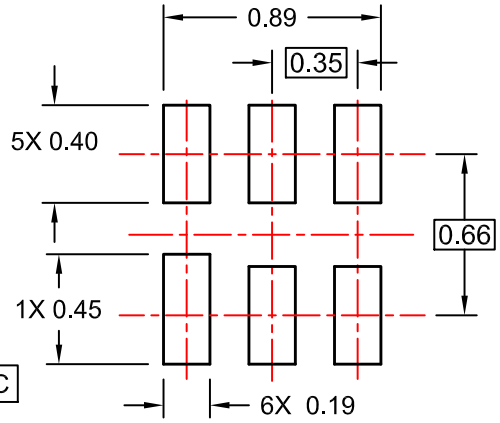
onsemi

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

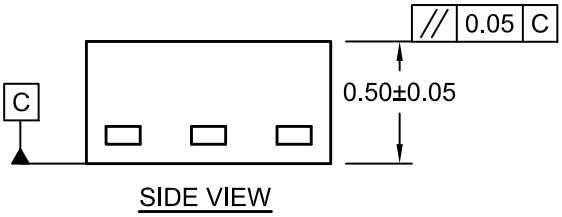
UDFN6 1.0X1.0, 0.35P
CASE 517DP
ISSUE O

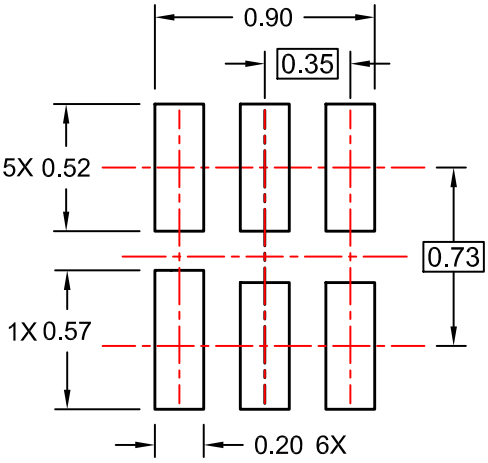
DATE 31 AUG 2016



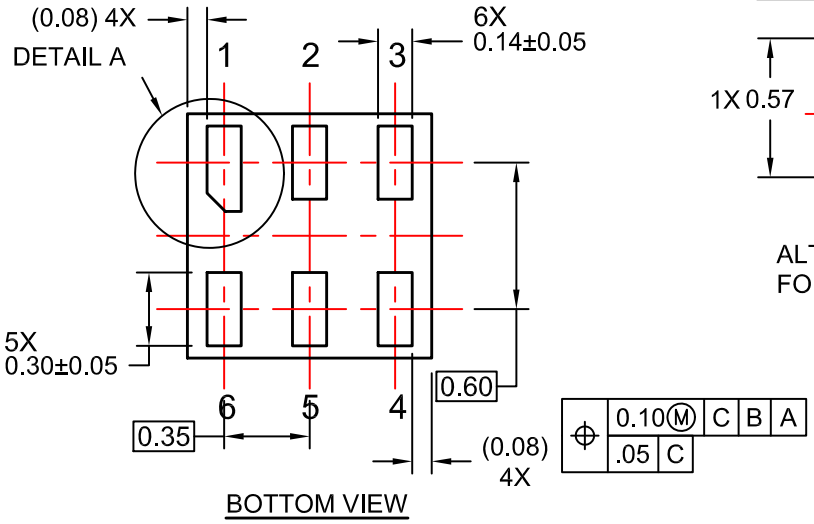


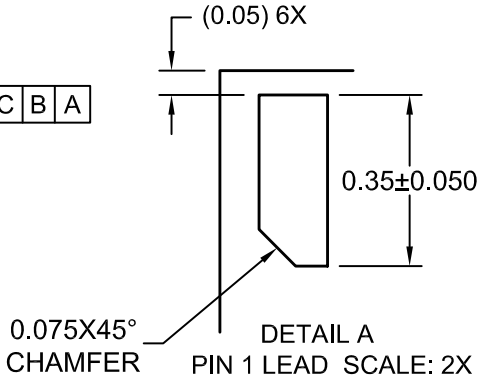
RECOMMENDED LAND PATTERN
FOR SPACE CONSTRAINED PCB





ALTERNATIVE LAND PATTERN
FOR UNIVERSAL APPLICATION



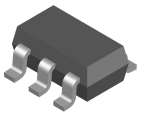


NOTES:

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

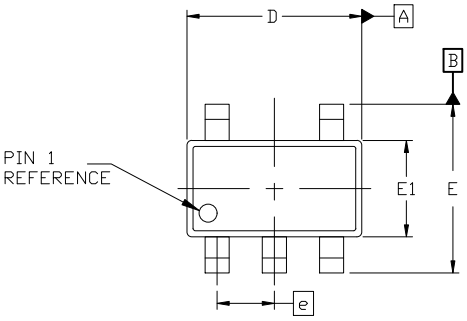
DOCUMENT NUMBER:	**98AON13593G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	**UDFN6 1.0X1.0, 0.35P**	**PAGE 1 OF 1**

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

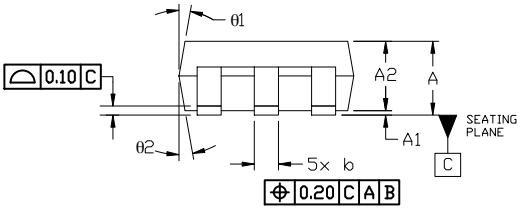


SOT−23, 5 Lead
CASE 527AH
ISSUE A

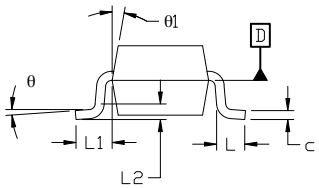
DATE 09 JUN 2021



TOP VIEW



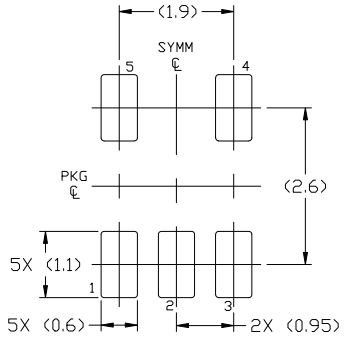
SIDE VIEW



END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 19894
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.25 PER SIDE. D AND E1 DIMENSIONS ARE DETERMINED AT DATUM D.
5. DIMENSION 'b' DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08mm TOTAL IN EXCESS OF THE 'b' DIMENSION AT MAXIMUM MATERIAL CONDITION. MINIMUM SPACE BETWEEN PROTRUSION AND AN ADJACENT LEAD SHALL NOT BE LESS THAN 0.07mm.

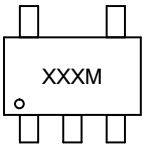
	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
A	0.90	—	1.45
A1	0.00	—	0.15
A2	0.90	1.15	1.30
b	0.30	—	0.50
c	0.08	—	0.22
D	2.90 BSC		
E	2.80 BSC		
E1	1.60 BSC		
e	0.95 BSC		
L	0.30	0.45	0.60
L1	0.60 REF		
L2	0.25 REF		
θ	0°	4°	8°
θ1	0°	10°	15°
θ2	0°	10°	15°



RECOMMENDED MOUNTING FOOTPRINT

For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	**SOT−23, 5 LEAD**		**PAGE 1 OF 1**

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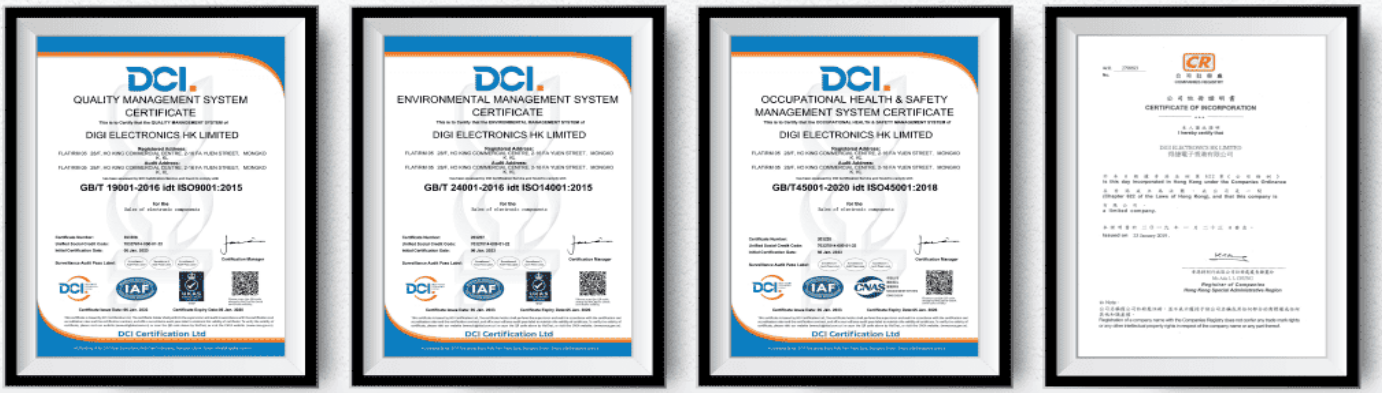

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