

# TinyLogic UHS 1-of-2 Non-Inverting De-multiplexer with 3-STATE Deselected Output NC7SZ18

## Description

The NC7SZ18 is a 1-of-2 non-inverting demultiplexer. The device will buffer the data on the A pin and pass to either output Y<sub>0</sub> or Y<sub>1</sub> dependent on whether state of the select pin (S) is LOW or HIGH respectively. The deselected output will be placed into a high impedance state. 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<sub>CC</sub> operating range. The device is specified to operate over the 1.65 V to 5.5 V V<sub>CC</sub> operating range. The inputs and outputs are high impedance when V<sub>CC</sub> is 0 V. Inputs tolerate voltages up to 5.5 V independent of V<sub>CC</sub> operating range.

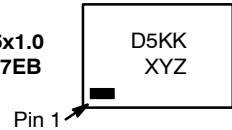
## Features

- Ultra High-Speed: t<sub>PD</sub> = 2.5 ns Typical at 5 V V<sub>CC</sub>
- High Impedance Output when Deselected
- Broad V<sub>CC</sub> Operating Range: 1.65 V to 5.50 V
- 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
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

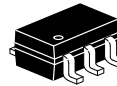
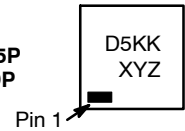
## MARKING DIAGRAMS



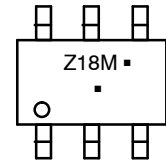
SIP6 1.45x1.0  
CASE 127EB



UDFN6  
1.0X1.0, 0.35P  
CASE 517DP



SC-88  
CASE 419B-02



D5, Z18 = Specific Device Code  
 KK = 2-Digit Lot Run Traceability Code  
 XY = 2-Digit Date Code Format  
 Z = Assembly Plant Code  
 M = Date Code  
 ▪ = Pb-Free Package

(Note: Microdot may be in either location)

## ORDERING INFORMATION

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

# NC7SZ18

## Pin Configurations

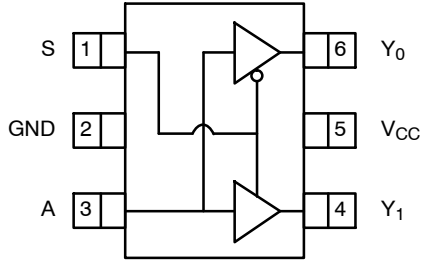


Figure 1. SC-88 (Top View)

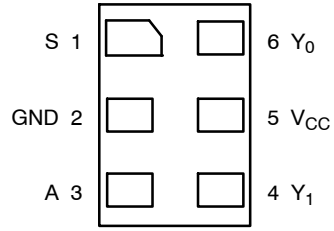
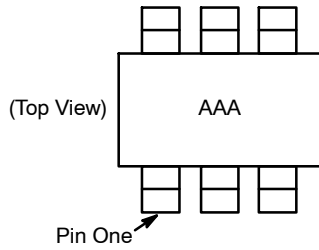


Figure 2. MicroPak (Top Through View)



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 3. Pin 1 Orientation

### PIN DEFINITIONS

Pin # SC-88	Pin # MicroPak	Name	Description
1	1	S	Data Input
2	2	GND	Ground
3	3	A	Demultiplexer Data
4	4	Y <sub>1</sub>	Output
5	5	V <sub>CC</sub>	Supply Voltage
6	6	Y <sub>0</sub>	Output

### FUNCTION TABLE

Inputs		Output	
S	A	Y <sub>0</sub>	Y <sub>1</sub>
L	L	L	Z
L	H	H	Z
H	L	Z	L
H	H	Z	H

H = HIGH Logic Level  
 L = LOW Logic Level  
 X = 3-STATE

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## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Min	Max	Unit
V <sub>CC</sub>	Supply Voltage		-0.5	6.5	V
V <sub>IN</sub>	DC Input Voltage		-0.5	6.5	V
V <sub>OUT</sub>	DC Output Voltage		-0.5	6.5	V
I <sub>IK</sub>	DC Input Diode Current	V <sub>IN</sub> < 0 V	-	-50	mA
I <sub>OK</sub>	DC Output Diode Current	V <sub>OUT</sub> < 0 V	-	-50	mA
I <sub>OUT</sub>	DC Output Current		-	±50	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current		-	±100	mA
T <sub>STG</sub>	Storage Temperature Range		-65	+150	°C
T <sub>J</sub>	Junction Temperature Under Bias		-	+150	°C
T <sub>L</sub>	Junction Lead Temperature (Soldering, 10 Seconds)		-	+260	°C
P <sub>D</sub>	Power Dissipation at +85°C	SC-88	-	332	mW
		MicroPak-6	-	812	
		MicroPak2™-6	-	812	
ESD	Human Body Model, JEDEC: JESD22-A114		-	2000	V
	Charge Device Model, JEDEC: JESD22-C101		-	1000	

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 <sub>CC</sub>	Supply Voltage Operating		1.65	5.5	V
	Supply Voltage Data Retention		1.5	5.5	
V <sub>IN</sub>	Input Voltage		0	5.5	V
V <sub>OUT</sub>	Output Voltage		0	V <sub>CC</sub>	V
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Times	V <sub>CC</sub> at 1.8 V ±0.15 V, 2.5 V ±0.2 V	0	20	ns/V
		V <sub>CC</sub> at 3.3 V ±0.3 V	0	10	
		V <sub>CC</sub> at 5.0 V ±0.5 V	0	5	
T <sub>A</sub>	Operating Temperature		-40	+85	°C
θ <sub>JA</sub>	Thermal Resistance	SC-88	-	377	°C/W
		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.

# NC7SZ18

## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	Conditions	T <sub>A</sub> = +25°C			T <sub>A</sub> = -40 to +85°C		Unit
				Min	Typ	Max	Min	Max	
V <sub>IH</sub>	HIGH Level Input Voltage	1.65 to 1.95		0.65 V <sub>CC</sub>	-	-	0.75 V <sub>CC</sub>	-	V
		2.30 to 5.50		0.70 V <sub>CC</sub>	-	-	0.70 V <sub>CC</sub>	-	
V <sub>IL</sub>	LOW Level Input Voltage	1.65 to 1.95		-	-	0.25 V <sub>CC</sub>	-	0.25 V <sub>CC</sub>	V
		2.30 to 5.50		-	-	0.30 V <sub>CC</sub>	-	0.30 V <sub>CC</sub>	
V <sub>OH</sub>	HIGH Level Output Voltage	1.65	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , I <sub>OH</sub> = -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 <sub>OH</sub> = -4 mA	1.29	1.52	-	1.29	-	
		2.30	I <sub>OH</sub> = -8 mA	1.90	2.15	-	1.90	-	
		3.00	I <sub>OH</sub> = -16 mA	2.40	2.80	-	2.40	-	
		3.00	I <sub>OH</sub> = -24 mA	2.30	3.68	-	2.30	-	
		4.50	I <sub>OH</sub> = -32 mA	3.80	4.20	-	3.80	-	
V <sub>OL</sub>	LOW Level Output Voltage	1.65	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , I <sub>OL</sub> = 100 μA	-	0.00	0.10	-	0.10	V
		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 <sub>OL</sub> = 4 mA	-	0.08	0.24	-	0.24	
		2.30	I <sub>OL</sub> = 8 mA	-	0.10	0.30	-	0.30	
		3.00	I <sub>OL</sub> = 16 mA	-	0.15	0.40	-	0.40	
		3.00	I <sub>OL</sub> = 24 mA	-	0.22	0.55	-	0.55	
		4.50	I <sub>OL</sub> = 32 mA	-	0.22	0.55	-	0.55	
I <sub>IN</sub>	Input Leakage Current	1.65 to 5.5	V <sub>IN</sub> = 5.5 V, GND	-	-	±0.1	-	±1.0	μA
I <sub>OZ</sub>	3-STATE Output Leakage	1.65 to 5.5	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , 0 < V <sub>OUT</sub> ≤ 5.5 V	-	-	±0.5	-	±5.0	μA
I <sub>OFF</sub>	Power Off Leakage Current	0	V <sub>IN</sub> or V <sub>OUT</sub> = 5.5 V	-	-	1	-	10	μA
I <sub>CC</sub>	Quiescent Supply Current	1.65 to 5.5	V <sub>IN</sub> = 5.5 V, GND	-	-	1	-	10	μA

# NC7SZ18

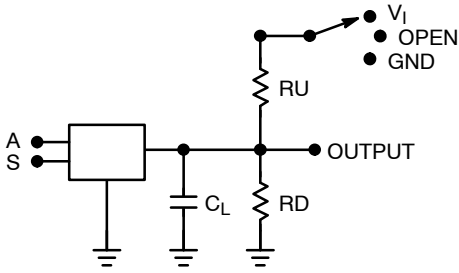
## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	Conditions	T <sub>A</sub> = +25°C			T <sub>A</sub> = -40 to +85°C		Unit	
				Min	Typ	Max	Min	Max		
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay A to (Y <sub>0</sub> or Y <sub>1</sub> ) (Figure 4, 6)	1.80 ±0.15	C <sub>L</sub> = 15 pF, R <sub>D</sub> = 1 MΩ, V <sub>1</sub> = OPEN	-	6.3	10.1	-	10.5	ns	
		2.50 ±0.20		-	3.6	5.7	-	6.0		
		3.30 ±0.30		-	2.7	4.0	-	4.3		
		5.00 ±0.50		-	2.0	3.1	-	3.3		
		3.30 ±0.30	C <sub>L</sub> = 50 pF, R <sub>D</sub> = 500 Ω, V <sub>1</sub> = OPEN	-	3.4	4.9	-	5.4	ns	
		5.00 ±0.50		-	2.5	3.9	-	4.2		
t <sub>PZL</sub> , t <sub>PHZ</sub>	Output Enable Time (Figure 4, 6)	1.80 ±0.15	C <sub>L</sub> = 50 pF, R <sub>D</sub> , R <sub>U</sub> = 500 Ω, V <sub>1</sub> = GND for t <sub>PZH</sub> V <sub>1</sub> = V <sub>IN</sub> for t <sub>PZL</sub> V <sub>IN</sub> = 2 x V <sub>CC</sub>	-	6.9	12.0	-	12.5	ns	
		2.50 ±0.20		-	4.2	6.8	-	7.3		
		3.30 ±0.30		-	3.2	5.0	-	5.5		
		5.00 ±0.50		-	2.5	4.0	-	4.3		
	Output Disable Time (Figure 4, 6)	1.80 ±0.15	C <sub>L</sub> = 50 pF, R <sub>D</sub> , R <sub>U</sub> = 500 Ω, V <sub>1</sub> = GND for t <sub>PZH</sub> V <sub>1</sub> = V <sub>IN</sub> for t <sub>PZL</sub> V <sub>IN</sub> = 2 x V <sub>CC</sub>	-	6.0	10.0	-	10.5	ns	
		2.50 ±0.20		-	4.0	6.8	-	7.1		
		3.30 ±0.30		-	2.9	4.9	-	5.3		
		5.00 ±0.50		-	1.8	3.5	-	3.7		
	C <sub>IN</sub>	Input Capacitance	0		-	2.5	-	-	-	pF
	C <sub>OUT</sub>	Output Capacitance	0		-	4.0	-	-	-	pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 4) (Figure 5)	3.30		-	16.0	-	-	-	pF	
		5.00		-	19.5	-	-	-		

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

# NC7SZ18

## AC Loading and Waveforms



- NOTES:  
 5.  $C_L$  includes load and stray capacitance.  
 6. Input PRR = 1.0 MHz,  $t_W = 500$  ns.

Figure 4. AC Test Circuit

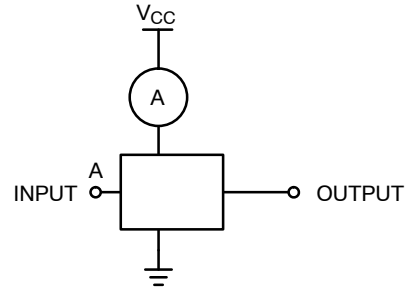


Figure 5.  $I_{CCD}$  Test Circuit

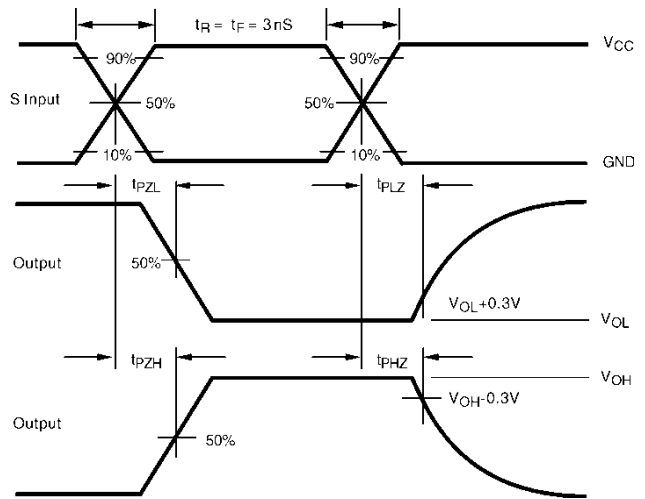
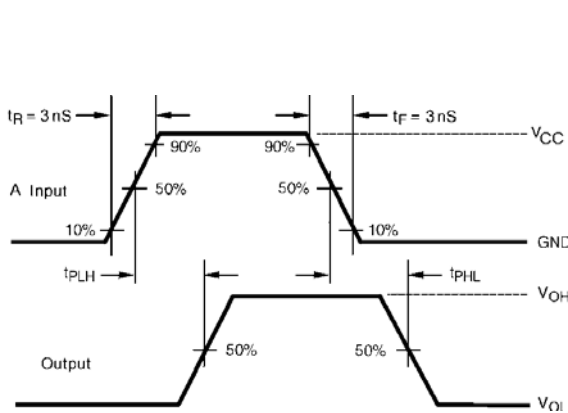


Figure 6. AC Waveforms

## ORDERING INFORMATION

Device	Top Mark	Packages	Shipping <sup>†</sup>
NC7SZ18P6X	Z18	SC-88	3000 / Tape & Reel
NC7SZ18P6X-L22347	Z18	SC-88	3000 / Tape & Reel
NC7SZ18L6X	D5	SIP6, MicroPak	5000 / Tape & Reel
NC7SZ18L6X-L22175	D5	SIP6, MicroPak	5000 / Tape & Reel
NC7SZ18FHX	D5	UDFN6, MicroPak2	5000 / Tape & Reel
NC7SZ18FHX-L22175	D5	UDFN6, MicroPak2	5000 / Tape & Reel

<sup>†</sup>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:

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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<b>DESCRIPTION:</b>	<b>SIP6 1.45X1.0</b>	<b>PAGE 1 OF 1</b>

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# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



1  
SCALE 2:1

SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE Y

DATE 11 DEC 2012



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
  4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
  5. DATUMS A AND B ARE DETERMINED AT DATUM H.
  6. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
  7. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.10	---	---	0.043
A1	0.00	---	0.10	0.000	---	0.004
A2	0.70	0.90	1.00	0.027	0.035	0.039
b	0.15	0.20	0.25	0.006	0.008	0.010
C	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.070	0.078	0.086
E	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2	0.15 BSC			0.006 BSC		
aaa	0.15			0.006		
bbb	0.30			0.012		
ccc	0.10			0.004		
ddd	0.10			0.004		

### GENERIC MARKING DIAGRAM\*



- XXX = Specific Device Code
- M = Date Code\*
- = Pb-Free Package

(Note: Microdot may be in either location)

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

### STYLES ON PAGE 2

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**SC-88/SC70-6/SOT-363**  
**CASE 419B-02**  
**ISSUE Y**

DATE 11 DEC 2012

<b>STYLE 1:</b> PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	<b>STYLE 2:</b> CANCELLED	<b>STYLE 3:</b> CANCELLED	<b>STYLE 4:</b> PIN 1. CATHODE 2. CATHODE 3. COLLECTOR 4. EMITTER 5. BASE 6. ANODE	<b>STYLE 5:</b> PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	<b>STYLE 6:</b> PIN 1. ANODE 2 2. N/C 3. CATHODE 1 4. ANODE 1 5. N/C 6. CATHODE 2
<b>STYLE 7:</b> PIN 1. SOURCE 2 2. DRAIN 2 3. GATE 1 4. SOURCE 1 5. DRAIN 1 6. GATE 2	<b>STYLE 8:</b> CANCELLED	<b>STYLE 9:</b> PIN 1. EMITTER 2 2. EMITTER 1 3. COLLECTOR 1 4. BASE 1 5. BASE 2 6. COLLECTOR 2	<b>STYLE 10:</b> PIN 1. SOURCE 2 2. SOURCE 1 3. GATE 1 4. DRAIN 1 5. DRAIN 2 6. GATE 2	<b>STYLE 11:</b> PIN 1. CATHODE 2 2. CATHODE 2 3. ANODE 1 4. CATHODE 1 5. CATHODE 1 6. ANODE 2	<b>STYLE 12:</b> PIN 1. ANODE 2 2. ANODE 2 3. CATHODE 1 4. ANODE 1 5. ANODE 1 6. CATHODE 2
<b>STYLE 13:</b> PIN 1. ANODE 2. N/C 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	<b>STYLE 14:</b> PIN 1. VREF 2. GND 3. GND 4. IOUT 5. VEN 6. VCC	<b>STYLE 15:</b> PIN 1. ANODE 1 2. ANODE 2 3. ANODE 3 4. CATHODE 3 5. CATHODE 2 6. CATHODE 1	<b>STYLE 16:</b> PIN 1. BASE 1 2. EMITTER 2 3. COLLECTOR 2 4. BASE 2 5. EMITTER 1 6. COLLECTOR 1	<b>STYLE 17:</b> PIN 1. BASE 1 2. EMITTER 1 3. COLLECTOR 2 4. BASE 2 5. EMITTER 2 6. COLLECTOR 1	<b>STYLE 18:</b> PIN 1. VIN1 2. VCC 3. VOUT2 4. VIN2 5. GND 6. VOUT1
<b>STYLE 19:</b> PIN 1. IOUT 2. GND 3. GND 4. V CC 5. V EN 6. V REF	<b>STYLE 20:</b> PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. EMITTER 5. COLLECTOR 6. COLLECTOR	<b>STYLE 21:</b> PIN 1. ANODE 1 2. N/C 3. ANODE 2 4. CATHODE 2 5. N/C 6. CATHODE 1	<b>STYLE 22:</b> PIN 1. D1 (i) 2. GND 3. D2 (i) 4. D2 (c) 5. VBUS 6. D1 (c)	<b>STYLE 23:</b> PIN 1. Vn 2. CH1 3. Vp 4. N/C 5. CH2 6. N/C	<b>STYLE 24:</b> PIN 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE
<b>STYLE 25:</b> PIN 1. BASE 1 2. CATHODE 3. COLLECTOR 2 4. BASE 2 5. EMITTER 6. COLLECTOR 1	<b>STYLE 26:</b> PIN 1. SOURCE 1 2. GATE 1 3. DRAIN 2 4. SOURCE 2 5. GATE 2 6. DRAIN 1	<b>STYLE 27:</b> PIN 1. BASE 2 2. BASE 1 3. COLLECTOR 1 4. EMITTER 1 5. EMITTER 2 6. COLLECTOR 2	<b>STYLE 28:</b> PIN 1. DRAIN 2. DRAIN 3. GATE 4. SOURCE 5. DRAIN 6. DRAIN	<b>STYLE 29:</b> PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE/ANODE 6. CATHODE	<b>STYLE 30:</b> PIN 1. SOURCE 1 2. DRAIN 2 3. DRAIN 2 4. SOURCE 2 5. GATE 1 6. DRAIN 1

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.

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

DATE 31 AUG 2016



- 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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