

Dual Unbuffered Inverter NL27WZU04

The NL27WZU04 is a high performance dual unbuffered inverter operating from a 1.65 to 5.5 V supply.

Features

- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Input Overvoltage Tolerant up to 5.5 V
- I_{OFF} Supports Partial Power Down Protection
- Source/Sink 24 mA at 3.0 V
- Available in SC-88, SC-74 and UDFN6 Packages
- Chip Complexity < 100 FETs
- –Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC–Q100 Qualified and PPAP Capable
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

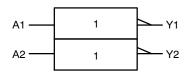
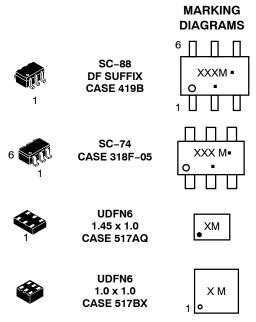


Figure 1. Logic Symbol



X, 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.

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 7 of this data sheet.

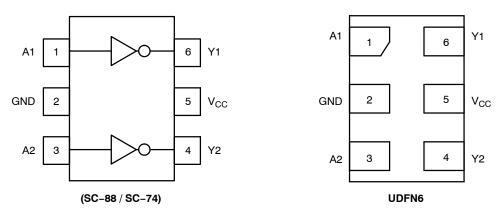


Figure 2. Pinout (Top View)

PIN ASSIGNMENT

Pin	Function
1	A1
2	GND
3	A2
4	Y2
5	V _{CC}
6	Y1

FUNCTION TABLE

A Input	Y Output
L	Н
Н	L

MAXIMUM RATINGS

Symbol	Characteristics		Value	Unit
V _{CC}	DC Supply Voltage		-0.5 to +6.5	V
V _{IN}	DC Input Voltage		-0.5 to +6.5	٧
V _{OUT}	DC Output Voltage		-0.5 to V _{CC} + 0.5	V
I _{IK}	DC Input Diode Current	V _{IN} < GND	-50	mA
I _{OK}	DC Output Diode Current		±50	mA
l _{out}	DC Output Source/Sink Current		±50	mA
I _{CC} or I _{GND}	DC Supply Current per Supply Pin or Ground Pin	±100	mA	
T _{STG}	Storage Temperature Range		-65 to +150	°C
TL	Lead Temperature, 1 mm from Case for 10 secs		260	°C
TJ	Junction Temperature Under Bias		+150	°C
θ_{JA}	Thermal Resistance (Note 2)	SC-88 SC-74 UDFN6	377 320 154	°C/W
P _D	Power Dissipation in Still Air	SC-88 SC-74 UDFN6	332 300 812	mW
MSL	Moisture Sensitivity		Level 1	-
F _R	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	-
V _{ESD}	ESD Withstand Voltage (Note 3)	Human Body Model Charged Device Model	2000 1000	V
I _{Latchup}	Latchup Performance (Note 4)		±100	mA

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.

- 1. Applicable to devices with outputs that may be tri-stated.
- Applicable to devices with outputs that may be the stated.
 Measured with minimum pad spacing on an FR4 board, using 10mm-by-1inch, 2 ounce copper trace no air flow per JESD51-7.
 HBM tested to ANSI/ESDA/JEDEC JS-001-2017. CDM tested to EIA/JESD22-C101-F. JEDEC recommends that ESD qualification to EIA/JESD22-A115-A (Machine Model) be discontinued per JEDEC/JEP172A.
- 4. Tested to EIA/JESD78 Class II.

RECOMMENDED OPERATING CONDITIONS

Symbol	Characteristics			Max	Unit
V_{CC}	Positive DC Supply Voltage		1.65	5.5	V
V _{IN}	DC Input Voltage		0	5.5	V
V _{OUT}	DC Output Voltage		0	V _{CC}	
T _A	Operating Temperature Range		-55	+125	°C
t _r , t _f		$C_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$ $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$ $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$ $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	0 0 0	20 20 10 5	ns/V

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 ELECTRICAL CHARACTERISTICS

			V _{CC}	T,	4 = 25°(-55°C ≤ T	_A ≤ 125°C	
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Units
V _{IH}	High-Level Input		1.65 to 1.95	0.85 V _{CC}	_	_	0.85 V _{CC}	_	V
	Voltage		2.3 to 5.5	0.80 V _{CC}	-	-	0.80 V _{CC}	_	
V_{IL}	Low-Level Input		1.65 to 1.95	-	_	0.15 V _{CC}	-	0.15 V _{CC}	V
	Voltage		2.3 to 5.5	-	-	0.20 V _{CC}	-	0.20 V _{CC}	
V _{ОН}	High-Level Output Voltage	$\begin{split} V_{IN} &= \text{GND} \\ I_{OH} &= -100 \ \mu\text{A} \\ I_{OH} &= -4 \ \text{mA} \\ I_{OH} &= -8 \ \text{mA} \\ I_{OH} &= -12 \ \text{mA} \\ I_{OH} &= -16 \ \text{mA} \\ I_{OH} &= -24 \ \text{mA} \\ I_{OH} &= -32 \ \text{mA} \\ \end{split}$	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5	V _{CC} - 0.1 1.29 1.9 2.2 2.4 2.3 3.8	V _{CC} 1.4 2.1 2.4 2.7 2.5 4.0	- - - - -	V _{CC} - 0.1 1.29 1.9 2.2 2.4 2.3 3.8	- - - - -	V
V _{OL}	Low-Level Output Voltage	$\begin{split} &V_{IN} = V_{CC} \\ &I_{OL} = 100 \; \mu\text{A} \\ &I_{OL} = 4 \; \text{mA} \\ &I_{OL} = 8 \; \text{mA} \\ &I_{OL} = 12 \; \text{mA} \\ &I_{OL} = 16 \; \text{mA} \\ &I_{OL} = 24 \; \text{mA} \\ &I_{OL} = 32 \; \text{mA} \end{split}$	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5	- - - -	- 0.08 0.2 0.22 0.28 0.38 0.42	0.1 0.24 0.3 0.4 0.4 0.55 0.55	- - - -	0.1 0.24 0.3 0.4 0.4 0.55	V
I _{IN}	Input Leakage Current	V _{IN} = 5.5 V or GND	1.65 to 5.5	-	_	±0.1	-	±1.0	μΑ
I _{OFF}	Power Off Leakage Current	V _{IN} = 5.5 V	0	-	_	1.0	-	10	μΑ
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5		-	1.0		10	μΑ

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

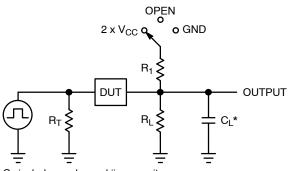
AC ELECTRICAL CHARACTERISTICS

				Т	A = 25°	С	-55°C ≤ T	_A ≤ 125°C	
Symbol	Parameter	Condition	V _{CC} (V)	Min	Тур	Max	Min	Max	Units
t _{PLH}	t _{PLH} Propagation Delay Input A to Y (Figure 3 and 4)	$R_L = 1 \text{ M}\Omega$, $C_L = 15 \text{ pF}$	1.65 to 1.95	_	5.5	9.8	_	11.0	ns
^L PHL		$R_L = 1 \text{ M}\Omega$, $C_L = 15 \text{ pF}$	2.3 to 2.7	-	3.3	5.7	_	6.3	
		$R_L = 1 \text{ M}\Omega$, $C_L = 15 \text{ pF}$	3.0 to 3.6	_	2.7	4.1	_	4.5	
	$R_L = 500 \Omega, C_L = 50 pF$ $R_L = 1 M\Omega, C_L = 15 pF$ 4		_	4.0	6.4	_	7.0		
		$R_L = 1 \text{ M}\Omega$, $C_L = 15 \text{ pF}$	4.5 to 5.5	_	2.2	3.3	-	3.6	
		$R_L = 500 \Omega, C_L = 50 pF$		-	3.4	5.6	-	6.2	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Units
C _{IN}	Input Capacitance	$V_{CC} = 5.5 \text{ V}, V_{IN} = 0 \text{ V or } V_{CC}$	2.5	pF
C _{OUT}	Output Capacitance	$V_{CC} = 5.5 \text{ V}, V_{IN} = 0 \text{ V or } V_{CC}$	4.0	pF
C _{PD}	Power Dissipation Capacitance (Note 5)	10 MHz, V_{CC} = 5.5 V, V_{IN} = 0 V or V_{CC}	4.0	pF

^{5.} C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$. C_{PD} is used to determine the no–load dynamic power consumption; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.



Test	Switch Position	C _L , pF	R_L, Ω	R ₁ , Ω	
t _{PLH} / t _{PHL}	Open	See AC Characteristics Table			
t _{PLZ} / t _{PZL}	2 x V _{CC}	50	500	500	
t _{PHZ} / t _{PZH}	GND	50	500	500	

X = Don't Care

 C_L includes probe and jig capacitance R_T is Z_{OUT} of pulse generator (typically 50 $\Omega)$

f = 1 MHz

Figure 3. Test Circuit

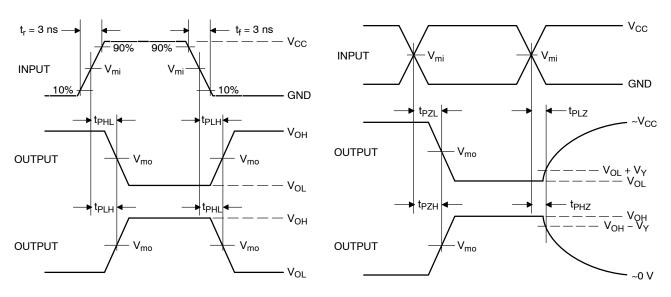


Figure 4. Switching Waveforms

		V _r		
V _{CC} , V	V _{mi} , V	t _{PLH} , t _{PHL}	t _{PZL} , t _{PLZ} , t _{PZH} , t _{PHZ}	V _Y , V
1.65 to 1.95	V _{CC} /2	V _{CC} /2	V _{CC} /2	0.15
2.3 to 2.7	V _{CC} /2	V _{CC} /2	V _{CC} /2	0.15
3.0 to 3.6	V _{CC} /2	V _{CC} /2	V _{CC} /2	0.3
4.5 to 5.5	V _{CC} /2	V _{CC} /2	V _{CC} /2	0.3

DEVICE ORDERING INFORMATION

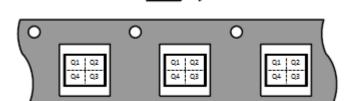
Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping [†]
NL27WZU04DFT2G	SC-88	M6	Q4	3000 / Tape & Reel
NL27WZU04DFT2G-Q*	SC-88	M6	Q4	3000 / Tape & Reel
NL27WZU04DBVT1G	SC-74	M6	Q4	3000 / Tape & Reel
NL27WZU04MU1TCG (In Development)	UDFN6, 1.45 x 1.0, 0.5P	TBD	Q4	3000 / Tape & Reel
NL27WZU04MU3TCG (In Development)	UDFN6, 1.0 x 1.0, 0.35P	TBD	Q4	3000 / 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.

*-Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP

Pin 1 Orientation in Tape and Reel

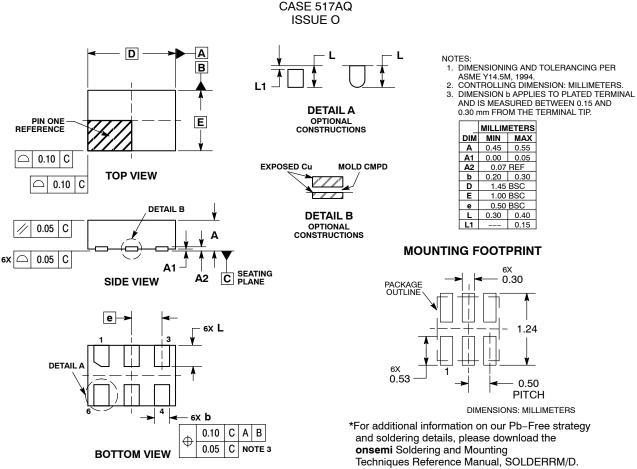
Direction of Feed



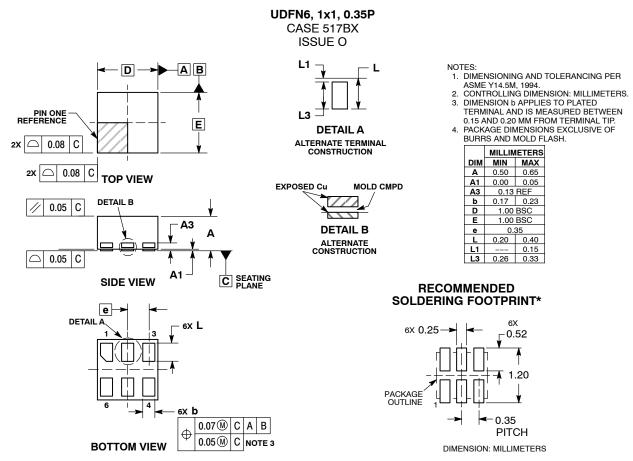
Capable.

PACKAGE DIMENSIONS

UDFN6, 1.45x1.0, 0.5P CASE 517AQ



PACKAGE DIMENSIONS



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





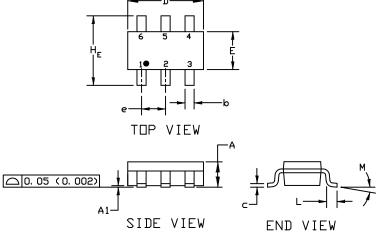
SC-74 CASE 318F ISSUE P

DATE 07 OCT 2021

NOTES:

- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
- 2. CONTROLLING DIMENSION: INCHES
- MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.

	MILLIMETERS			INCHES			
DIM	MIN.	N□M.	MAX.	MIN.	N□M.	MAX.	
Α	0. 90	1. 00	1. 10	0. 035	0. 039	0. 043	
A1	0. 01	0. 06	0.10	0. 001	0. 002	0. 004	
b	0. 25	0. 37	0. 50	0. 010	0. 015	0. 020	
c	0.10	0. 18	0. 26	0. 004	0. 007	0. 010	
D	2. 90	3. 00	3. 10	0. 114	0. 118	0. 122	
Ε	1. 30	1. 50	1. 70	0. 051	0. 059	0. 067	
e	0. 85	0. 95	1. 05	0. 034	0. 037	0. 041	
HE	2. 50	2. 75	3. 00	0. 099	0. 108	0. 118	
L	0. 20	0. 40	0. 60	0. 008	0. 016	0. 024	
М	0*		10*	0*		10*	



GENERIC MARKING DIAGRAM*



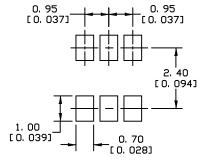
XXX = Specific Device Code

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.



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

SOLDERING FOOTPRINT

STYLE 1:	STYLE 2:	STYLE 3:	STYLE 4:	STYLE 5:	STYLE 6:
PIN 1. CATHODE	PIN 1. NO CONNECTION	PIN 1. EMITTER 1	PIN 1. COLLECTOR 2	PIN 1. CHANNEL 1	PIN 1. CATHODE
2. ANODE	2. COLLECTOR	2. BASE 1	2. EMITTER 1/EMITTER 2	2. ANODE	ANODE
CATHODE	3. EMITTER	COLLECTOR 2	3. COLLECTOR 1	CHANNEL 2	CATHODE
4. CATHODE	4. NO CONNECTION	4. EMITTER 2	4. EMITTER 3	CHANNEL 3	CATHODE
5. ANODE	COLLECTOR	5. BASE 2	BASE 1/BASE 2/COLLECTOR 3	CATHODE	CATHODE
CATHODE	6. BASE	COLLECTOR 1	6. BASE 3	CHANNEL 4	CATHODE
STYLE 7: PIN 1. SOURCE 1 2. GATE 1 3. DRAIN 2 4. SOURCE 2 5. GATE 2 6. DRAIN 1	STYLE 8: PIN 1. EMITTER 1 2. BASE 2 3. COLLECTOR 2 4. EMITTER 2 5. BASE 1 6. COLLECTOR 1	STYLE 9: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	STYLE 10: PIN 1. ANODE/CATHODE 2. BASE 3. EMITTER 4. COLLECTOR 5. ANODE 6. CATHODE	STYLE 11: PIN 1. EMITTER 2. BASE 3. ANODE/CATHOD 4. ANODE 5. CATHODE 6. COLLECTOR	Ē

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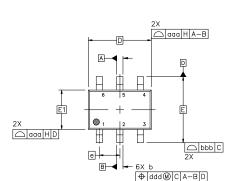
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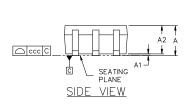
SC-88 2.00x1.25x0.90, 0.65P CASE 419B-02 **ISSUE Z**

DATE 18 APR 2024



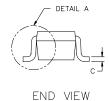
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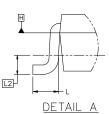
- DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
- ALL DIMENSION ARE IN MILLIMETERS.
- DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20
- DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
 DATUMS A AND B ARE DETERMINED AT DATUM H.
- DIMENSIONS 6 AND C APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP. 6.
- DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION 6 AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

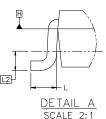


6X 0.30 -

TOP VIEW







GENERIC MARKING DIAGRAM*



DIM	MIN.	NOM.	MAX.
Α			1.10
A1	0.00		0.10
A2	0.70	0.90	1.00
b	0.15	0.20	0.25
С	0.08	0.15	0.22
D	2.00 BSC		
E	2.10 BSC		
E1	1.25 BSC		
е	0.65 BSC		
L	0.26	0.36	0.46
L2	0.15 BSC		
aaa	0.15		
bbb	0.30		
ccc	0.10		
ddd	0.10		

MILLIMETERS

RECOMMENDED MOUNTING FOOTPRINT*

6X 0.66

2.50

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

XXX = Specific Device Code

= 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.

STYLES ON PAGE 2

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DESCRIPTION:	SC-88 2.00x1.25x0.90, 0.65P		PAGE 1 OF 2	

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SC-88 2.00x1.25x0.90, 0.65P CASE 419B-02 ISSUE Z

DATE 18 APR 2024

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