

MOSFET – Power, Single, P-Channel, Trench, SC-88 -20 V, -4.2 A

NTJS4151P

Features

- Leading Trench Technology for Low $R_{DS(ON)}$ Extending Battery Life
- SC-88 Small Outline (2x2 mm) for Maximum Circuit Board Utilization, Same as SC-70-6
- Gate Diodes for ESD Protection
- Pb-Free Package is Available

Applications

- High Side Load Switch
- Cell Phones, Computing, Digital Cameras, MP3s and PDAs

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V_{DSS}	-20	V
Gate-to-Source Voltage			V_{GS}	± 12	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ C$	I_D	-3.3	A
		$T_A = 85^\circ C$		-2.4	
	$t \leq 5\text{ s}$	$T_A = 25^\circ C$		-4.2	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ C$	P_D	1.0	W
Pulsed Drain Current		$t_p = 10\text{ }\mu\text{s}$	I_{DM}	-10	A
Operating Junction and Storage Temperature			T_J, T_{STG}	-55 to 150	°C
Source Current (Body Diode)			I_S	-1.3	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C
ESD	Human Body Model (HBM)		ESD	4000	V

THERMAL RESISTANCE RATINGS (Note 1)

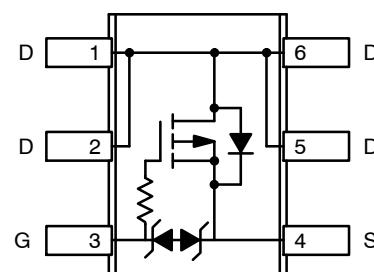
Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State	$R_{\theta JA}$	125	°C/W
Junction-to-Ambient – $t \leq 5$ s	$R_{\theta JA}$	75	
Junction-to-Lead – Steady State	$R_{\theta JL}$	45	

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. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).

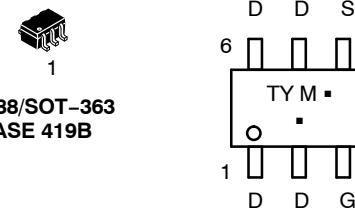
$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max
-20 V	47 m Ω @ -4.5 V	-4.2 A
	70 m Ω @ -2.5 V	
	180 m Ω @ -1.8 V	

SC-88 (SOT-363)



Top View

MARKING DIAGRAM & PIN ASSIGNMENT



TY = Device Code
M = Date Code
■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$ unless otherwise stated)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}, I_D = -250 \mu\text{A}$	-20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(\text{BR})\text{DSS}/T_J}$			-12		$\text{mV}/^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{GS}} = 0 \text{ V}, V_{\text{DS}} = -16 \text{ V}$	$T_J = 25^\circ\text{C}$		-1.0	μA
			$T_J = 85^\circ\text{C}$		-5.0	
Gate-to-Source Leakage Current	I_{GSS}	$V_{\text{DS}} = 0 \text{ V}, V_{\text{GS}} = \pm 4.5 \text{ V}$			± 1.5	μA
			$V_{\text{DS}} = 0 \text{ V}, V_{\text{GS}} = \pm 12 \text{ V}$		± 10	mA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{GS}} = V_{\text{DS}}, I_D = -250 \mu\text{A}$	-0.40		-1.2	V
Negative Threshold Temperature Coefficient	$V_{\text{GS}(\text{TH})/T_J}$			4.0		$\text{mV}/^\circ\text{C}$
Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -4.5 \text{ V}, I_D = -3.3 \text{ A}$		47	60	$\text{m}\Omega$
		$V_{\text{GS}} = -2.5 \text{ V}, I_D = -2.3 \text{ A}$		70	85	
		$V_{\text{GS}} = -1.8 \text{ V}, I_D = -1.0 \text{ A}$		180	205	
Forward Transconductance	g_{FS}	$V_{\text{GS}} = -10 \text{ V}, I_D = -3.3 \text{ A}$		12		S

CHARGES AND CAPACITANCES

Input Capacitance	C_{ISS}	$V_{\text{GS}} = 0 \text{ V}, f = 1.0 \text{ MHz}, V_{\text{DS}} = -10 \text{ V}$		850		pF
Output Capacitance	C_{OSS}			160		
Reverse Transfer Capacitance	C_{RSS}			110		
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = -4.5 \text{ V}, V_{\text{DS}} = -10 \text{ V}, I_D = -3.3 \text{ A}$		10		nC
Gate-to-Source Charge	Q_{GS}			1.5		
Gate-to-Drain Charge	Q_{GD}			2.8		

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	$t_{\text{d}(\text{ON})}$	$V_{\text{GS}} = -4.5 \text{ V}, V_{\text{DD}} = -10 \text{ V}, I_D = -1.0 \text{ A}, R_{\text{G}} = 6.0 \Omega$		0.85		μs
Rise Time	t_r			1.7		
Turn-Off Delay Time	$t_{\text{d}(\text{OFF})}$			2.7		
Fall Time	t_f			4.2		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{\text{GS}} = 0 \text{ V}, I_S = -1.3 \text{ A}, T_J = 25^\circ\text{C}$		-0.75	-1.2	V
Reverse Recovery Time	t_{RR}	$V_{\text{GS}} = 0 \text{ V}, dI_S/dt = 100 \text{ A}/\mu\text{s}, I_S = -1.3 \text{ A}$		63		ns
Charge Time	T_a			9.0		
Discharge Time	T_b			54		
Reverse Recovery Charge	Q_{RR}			0.23		nC

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.

2. Pulse Test: pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

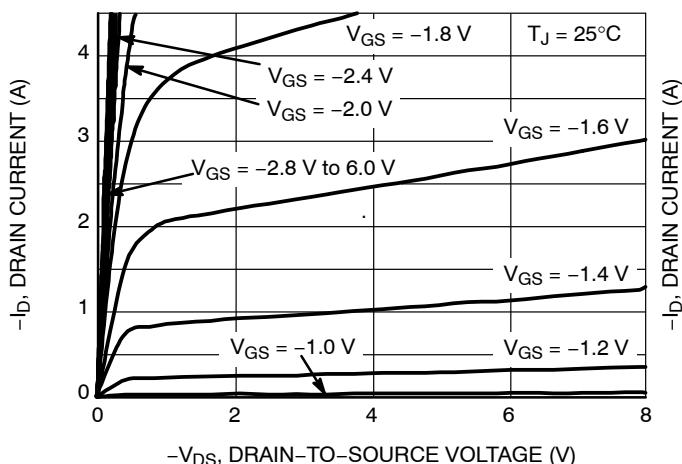


Figure 1. On-Region Characteristics

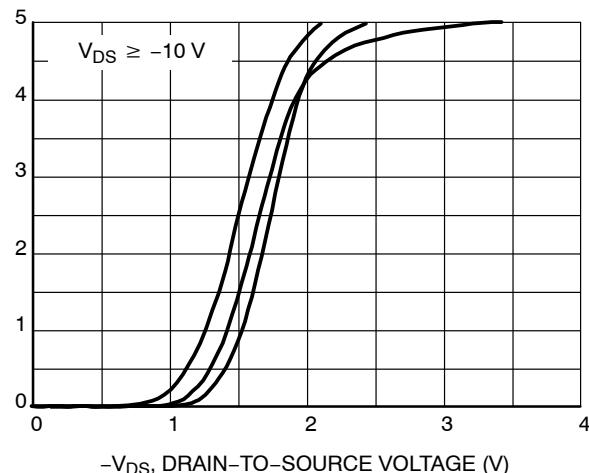


Figure 2. On-Region Characteristics

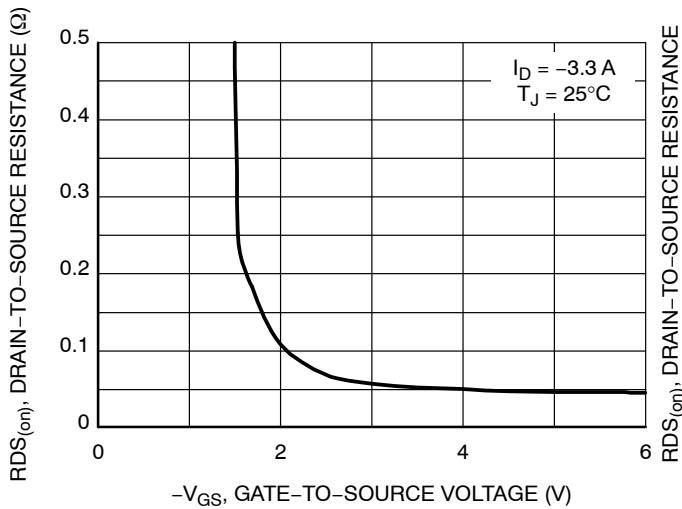


Figure 3. On-Resistance versus Gate-to-Source Voltage

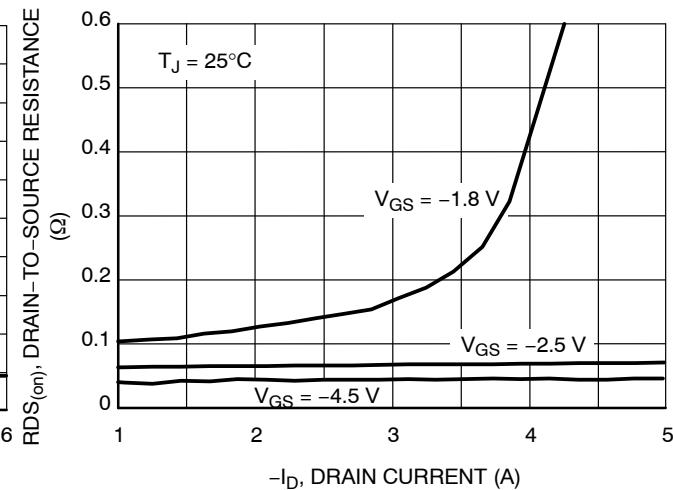


Figure 4. On-Resistance versus Drain Current and Gate Voltage

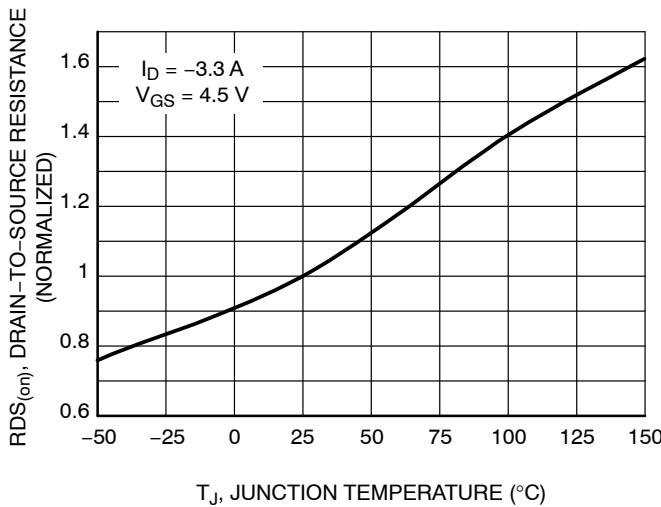


Figure 5. On-Resistance Variation with Temperature

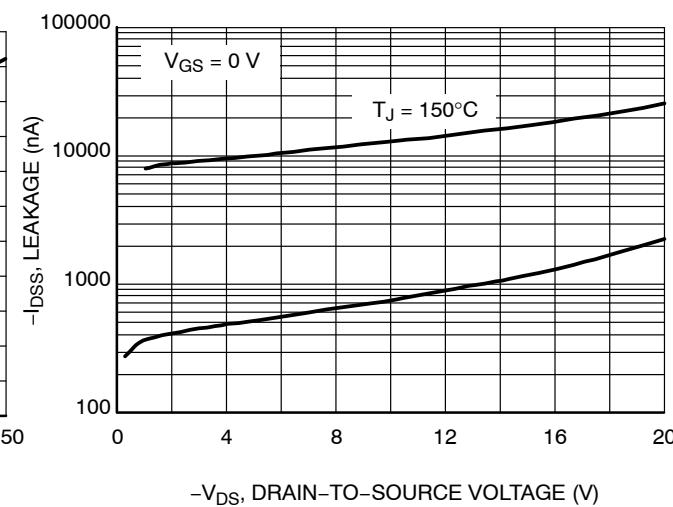


Figure 6. Drain-to-Source Leakage Current versus Voltage

TYPICAL CHARACTERISTICS

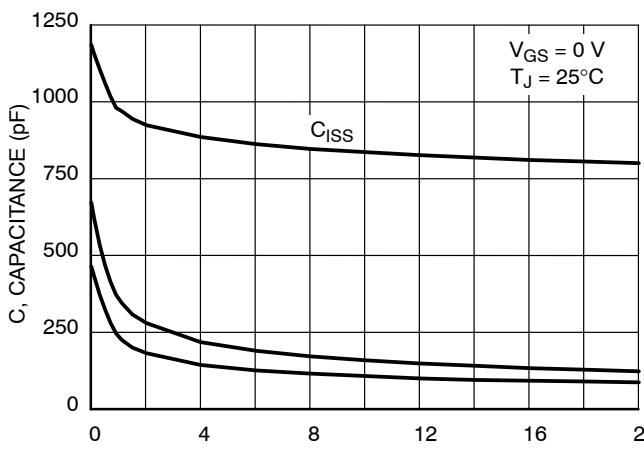


Figure 7. Capacitance Variation

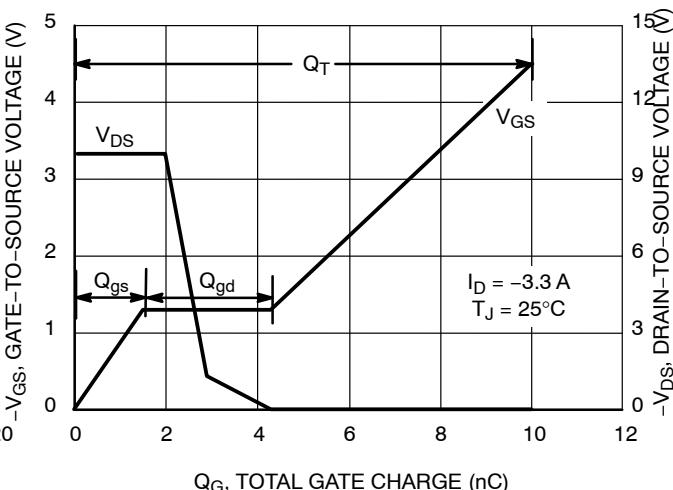


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

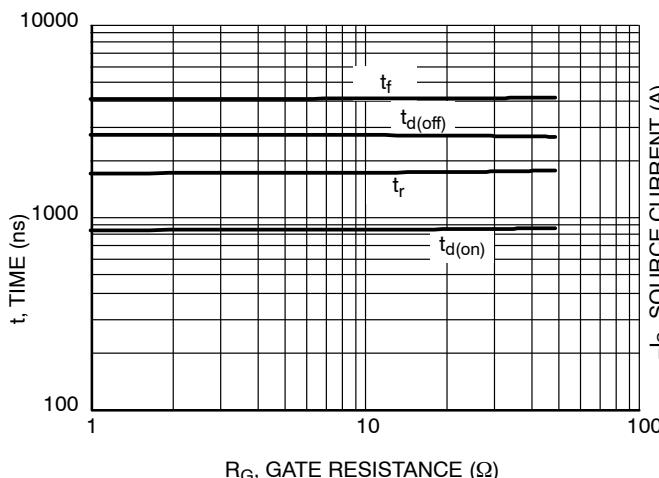
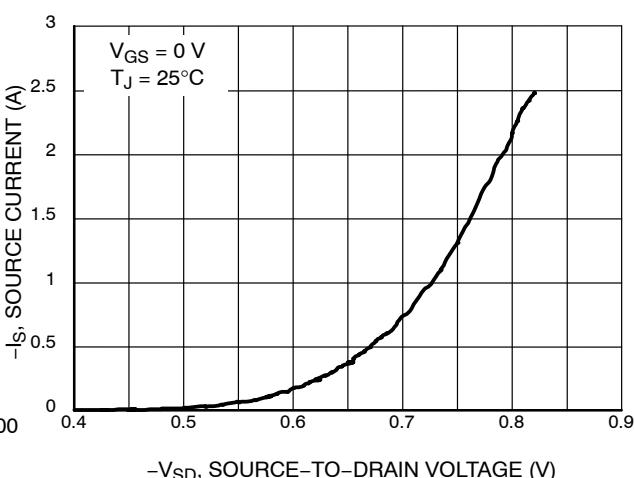
Figure 9. Resistive Switching Time Variation
Gate Resistance

Figure 10. Diode Forward Voltage versus Current

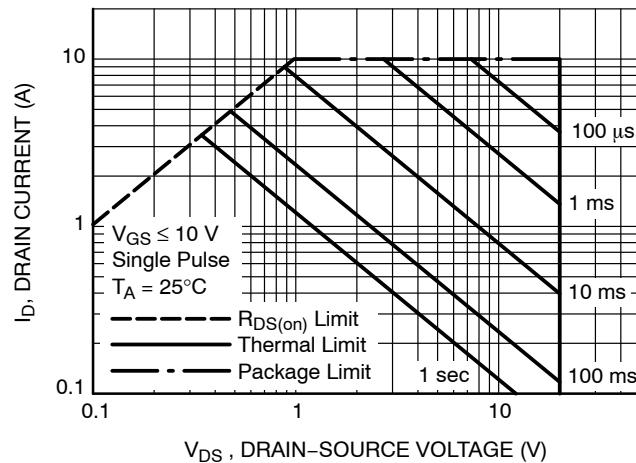


Figure 11. Safe Operating Area

NTJS4151P

Table 1. ORDERING INFORMATION

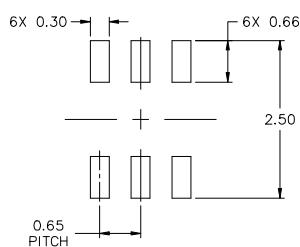
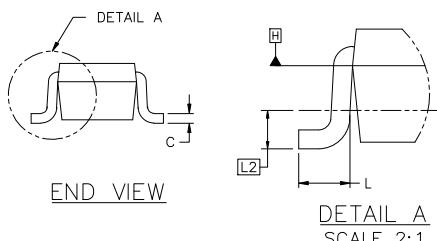
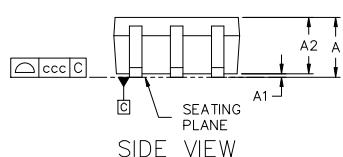
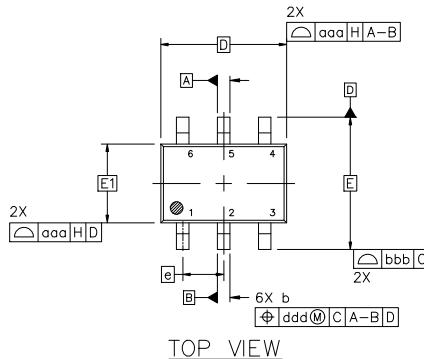
Part Number	Marking (XX)	Package	Shipping [†]
NTJS4151PT1	TY	SC-88	3000 / Tape & Reel
NTJS4151PT1G	TY	SC-88 (Pb-Free)	3000 / Tape & Reel

[†]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.



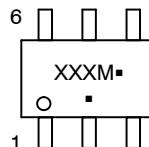
SC-88 2.00x1.25x0.90, 0.65P
CASE 419B-02
ISSUE Z

DATE 18 APR 2024



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

**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.

STYLES ON PAGE 2

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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. Collector 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. Iout 2. Gnd 3. Gnd 4. Vcc 5. Ven 6. Vref	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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