MOSFET – Power, Single, P-Channel, Trench, SC-88

-20 V, -4.2 A

NTJS4151P

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

SC−88 (SOT−363)

Top View

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
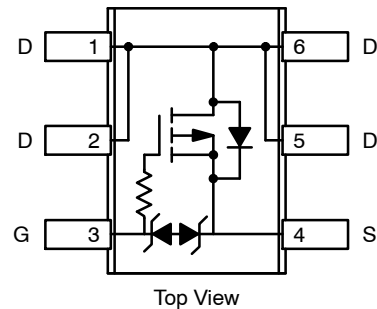
MARKING DIAGRAM & PIN ASSIGNMENT

SC−88/SOT−363
CASE 419B

TY = Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

MAXIMUM RATINGS (T_J = 25°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 °C	I_D	−3.3	A
		T_A = 85 °C		−2.4	
	t ≤ 5 s	T_A = 25 °C		−4.2	
Power Dissipation (Note 1)	Steady State	T_A = 25 °C	P_D	1.0	W
Pulsed Drain Current	t_p = 10 μs		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 ≤ 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.
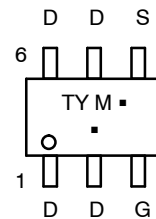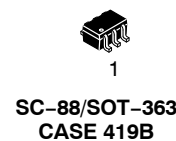
1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).

ORDERING INFORMATION

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

NTJS4151P

ELECTRICAL CHARACTERISTICS (T_J=25°C unless otherwise stated)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = −250 µA		−20			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				−12		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = −16 V	T_J = 25°C			−1.0	µA
			T_J = 85°C			−5.0	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±4.5 V				±1.5	µA
		V_{DS} = 0 V, V_{GS} = ±12 V				±10	mA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = −250 µA		−0.40		−1.2	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				4.0		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = −4.5 V, I_D = −3.3 A			47	60	mΩ
		V_{GS} = −2.5 V, I_D = −2.3 A			70	85	
		V_{GS} = −1.8 V, I_D = −1.0 A			180	205	
Forward Transconductance	g_{FS}	V_{GS} = −10 V, I_D = −3.3 A			12		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = −10 V			850		pF
Output Capacitance	C_{OSS}				160		
Reverse Transfer Capacitance	C_{RSS}				110		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −4.5 V, V_{DS} = −10 V, I_D = −3.3 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	$t_{d(ON)}$	V_{GS} = −4.5 V, V_{DD} = −10 V, I_D = −1.0 A, R_G = 6.0 Ω			0.85		µs
Rise Time	t_r				1.7		
Turn−Off Delay Time	$t_{d(OFF)}$				2.7		
Fall Time	t_f				4.2		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = −1.3 A, T_J = 25°C			−0.75	−1.2	V
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/µs, I_S = −1.3 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 ≤ 300 µs, duty cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

NTJS4151P

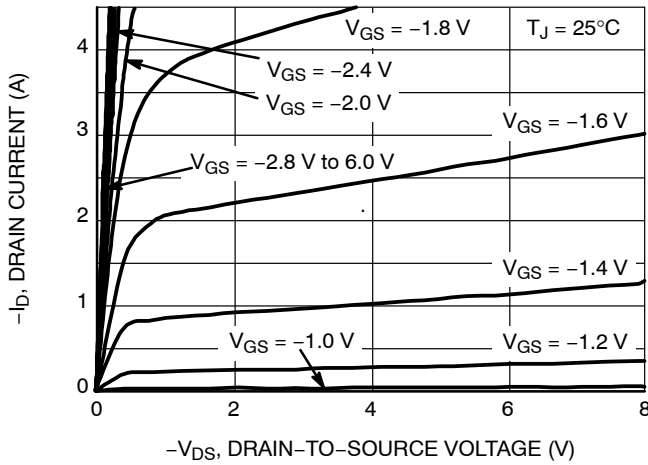## TYPICAL CHARACTERISTICS

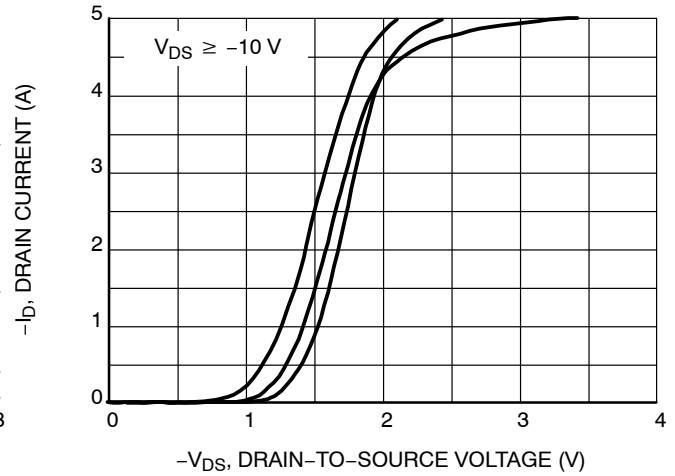**Figure 1. On−Region Characteristics**
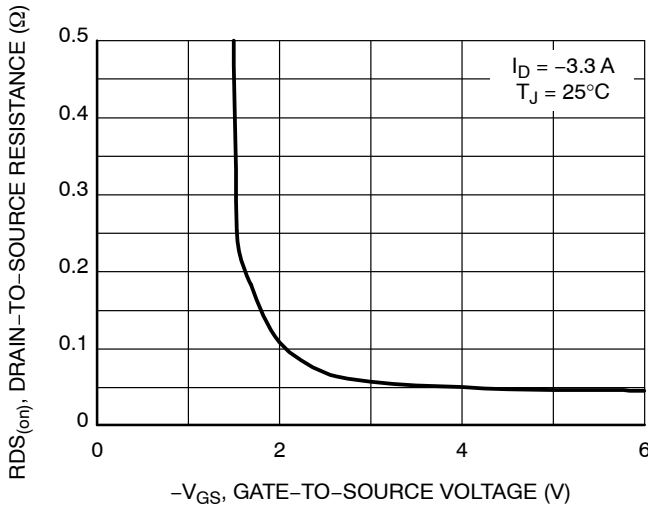

Figure 2. On−Region Characteristics

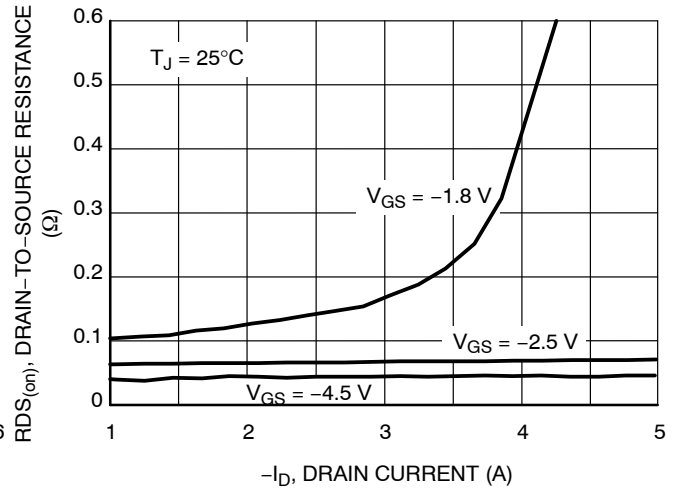**Figure 3. On−Resistance versus
Gate−to−Source Voltage**

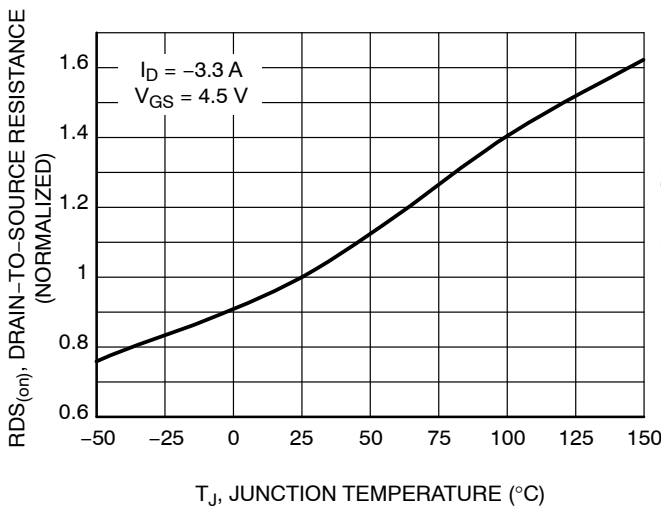**Figure 4. On−Resistance versus Drain Current
and Gate Voltage**

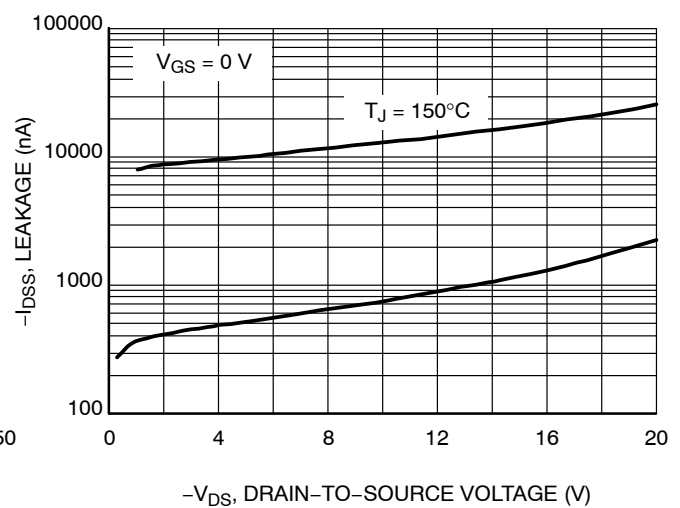**Figure 5. On−Resistance Variation with
Temperature**

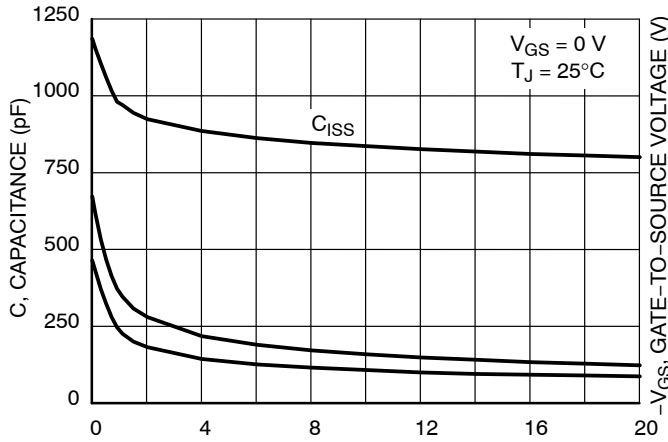**Figure 6. Drain−to−Source Leakage Current
versus Voltage**

NTJS4151P

TYPICAL CHARACTERISTICS

Figure 7. Capacitance Variation
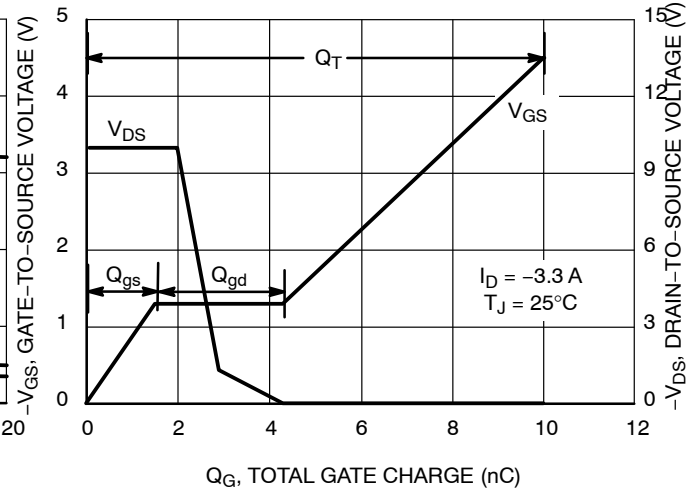
Figure 8. Gate–to–Source and Drain–to–Source Voltage versus Total Charge
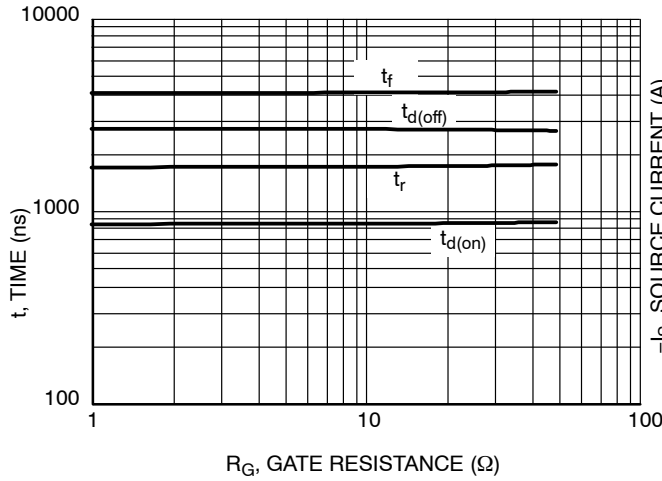
Figure 9. Resistive Switching Time Variation Gate Resistance
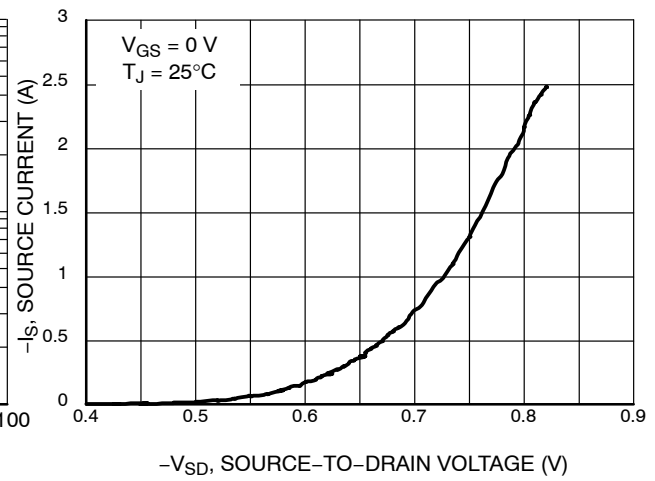
Figure 10. Diode Forward Voltage versus Current
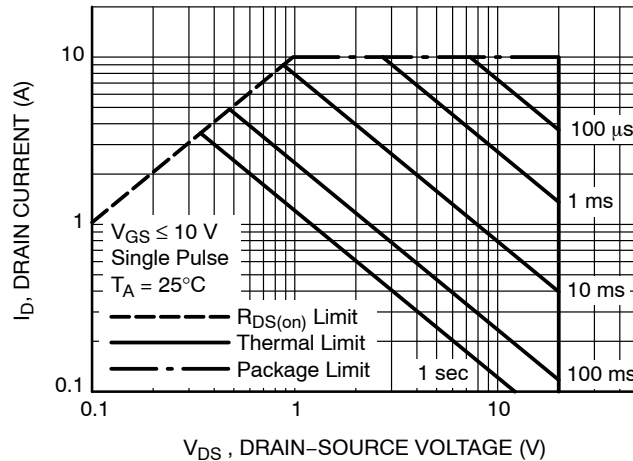
Figure 11. Safe Operating Area

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

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5−2018.
2. ALL DIMENSION ARE IN 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.

TOP VIEW

SIDE VIEW

END VIEW
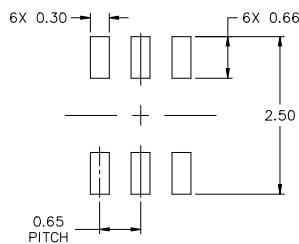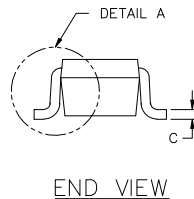
DETAIL A
SCALE 2:1

RECOMMENDED MOUNTING FOOTPRINT*

6X 0.30   6X 0.66
2.50
0.65 PITCH

* 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*

6

XXXM▪

1
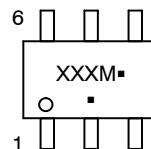
XXX = Specific Device Code
M = Date Code*
▪ = Pb−Free Package

(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.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	−−−	−−−	1.10
A1	0.00	−−−	0.10
A2	0.70	0.90	1.00
b	0.15	0.20	0.25
c	0.08	0.15	0.22
D	2.00 BSC		
E	2.10 BSC		
E1	1.25 BSC		
e	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		

STYLES ON PAGE 2

DOCUMENT NUMBER:	98ASB42985B		
DESCRIPTION:	SC−88 2.00x1.25x0.90, 0.65P		PAGE 1 OF 2

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.

DOCUMENT NUMBER:	98ASB42985B	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−88 2.00x1.25x0.90, 0.65P		PAGE 2 OF 2

ADDITIONAL INFORMATION

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Technical Library: www.onsemi.com/design/resources/technical–documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales

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