NTJS3151P

Trench Power MOSFET

12 V, 3.3 A, Single P−Channel, ESD Protected SC−88

Features

- Leading Trench Technology for Low $R_{DS(ON)}$ Extending Battery Life
- SC−88 Small Outline (2x2 mm, SC70−6 Equivalent)
- Gate Diodes for ESD Protection
- Pb−Free Packages are Available

Applications

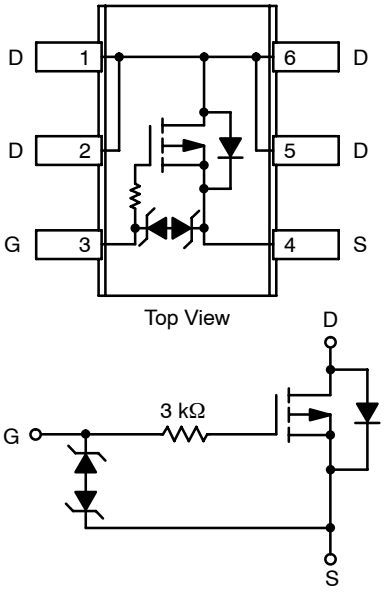
- High Side Load Switch
- Cell Phones, Computing, Digital Cameras, MP3s and PDAs

ON Semiconductor®

http://onsemi.com

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max
−12 V	45 mΩ @ −4.5 V	−3.3 A
	67 mΩ @ −2.5 V	
	133 mΩ @ −1.8 V	

SC−88 (SOT−363)



MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Parameter			Symbol	Value	Units
Drain−to−Source Voltage			V_{DSS}	−12	V
Gate−to−Source Voltage			V_{GS}	±12	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25 °C	I_D	−2.7	A
		T_A = 85 °C		−2.0	
	t ≤ 5 s	T_A = 25 °C		−3.3	
Power Dissipation (Note 1)	Steady State	T_A = 25 °C	P_D	0.625	W
Pulsed Drain Current		t_p = 10 μs	I_{DM}	−8.0	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°C
Source Current (Body Diode)			I_S	−0.8	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C

THERMAL RESISTANCE RATINGS (Note 1)

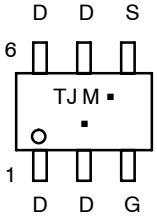
Parameter	Symbol	Max	Units
Junction−to−Ambient − Steady State	$R_{\theta JA}$	200	°C/W
Junction−to−Ambient − t ≤ 5 s	$R_{\theta JA}$	141	
Junction−to−Lead − Steady State	$R_{\theta JL}$	102	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

MARKING DIAGRAM & PIN ASSIGNMENT

SC−88/SOT−363
CASE 419B
STYLE 28



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

(Note: Microdot may be in either location)

ORDERING INFORMATION

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

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		−12			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				10		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = −9.6 V, V_{DS} = 0 V	T_J = 25°C			−1.0	μA
			T_J = 125°C		−2.5		
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 = 100 μA		−0.40			V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				3.4		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = −4.5 V, I_D = −3.3 A			45	60	mΩ
		V_{GS} = −2.5 V, I_D = −2.9 A			67	90	
		V_{GS} = −1.8 V, I_D = −1.0 A			133	160	
Forward Transconductance	g_{FS}	V_{GS} = −10 V, I_D = −3.3 A			15		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = −12 V			850		pF
Output Capacitance	C_{OSS}				170		
Reverse Transfer Capacitance	C_{RSS}				110		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −4.5 V, V_{DS} = −5.0 V, I_D = −3.3 A			8.6		nC
Gate−to−Source Charge	Q_{GS}				1.3		
Gate−to−Drain Charge	Q_{GD}				2.2		
Gate Resistance	R_G				3000		Ω
SWITCHING CHARACTERISTICS (Note 3)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = −4.5 V, V_{DD} = −6.0 V, I_D = −1.0 A, R_G = 6.0 Ω			0.86		μs
Rise Time	t_r				1.5		
Turn−Off Delay Time	$t_{d(OFF)}$				3.5		
Fall Time	t_f				3.9		
DRAIN−SOURCE DIODE CHARACTERISTICS (Note 2)							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = −3.3 A	T_J = 25°C		−0.85	−1.2	V
			T_J = 125°C		−0.7		

2. Pulse Test: pulse width ≤ 300μs, duty cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

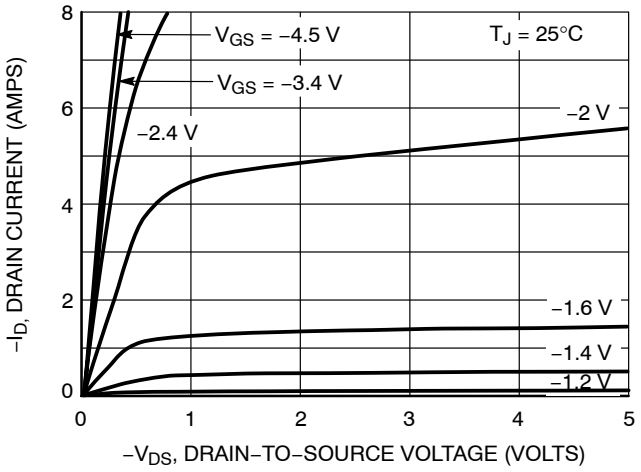


Figure 1. On−Region Characteristics

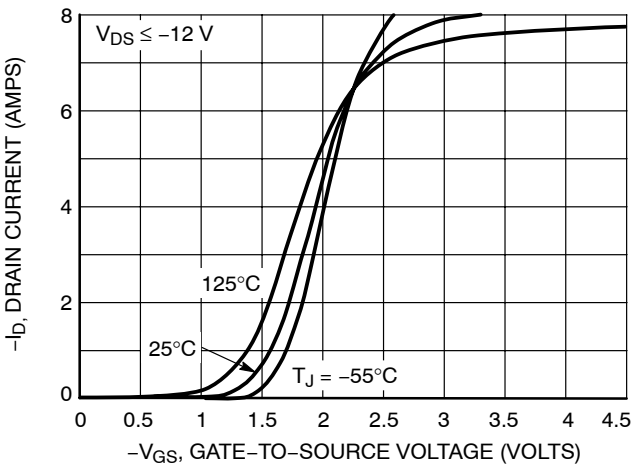


Figure 2. Transfer Characteristics

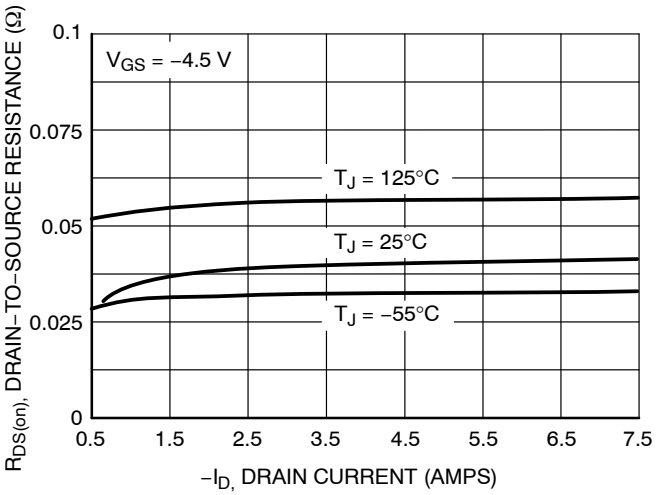


Figure 3. On−Resistance vs. Drain Current and Temperature

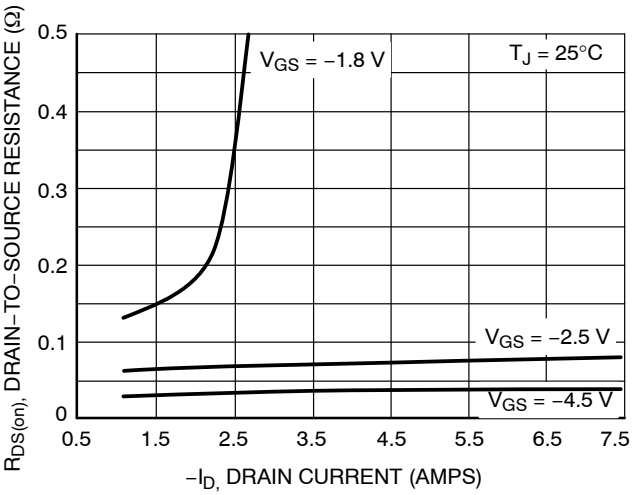


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

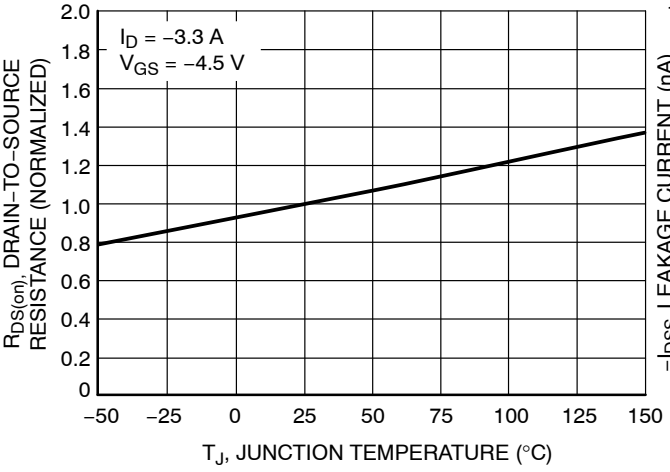


Figure 5. On−Resistance Variation with Temperature

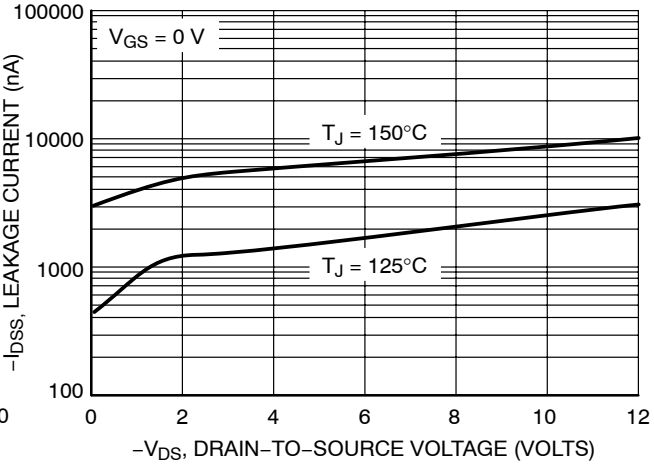


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

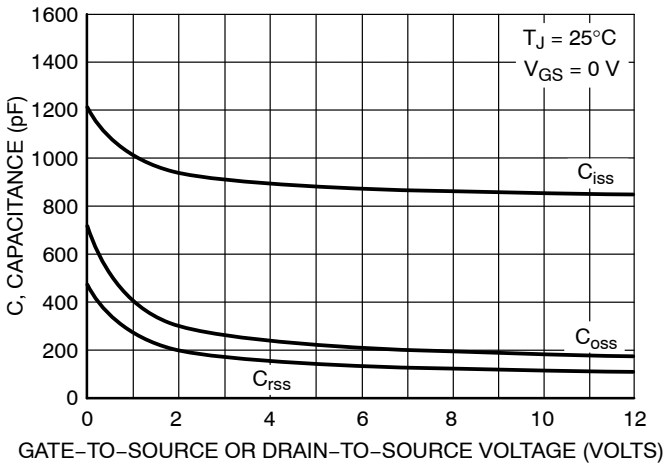


Figure 7. Capacitance Variation

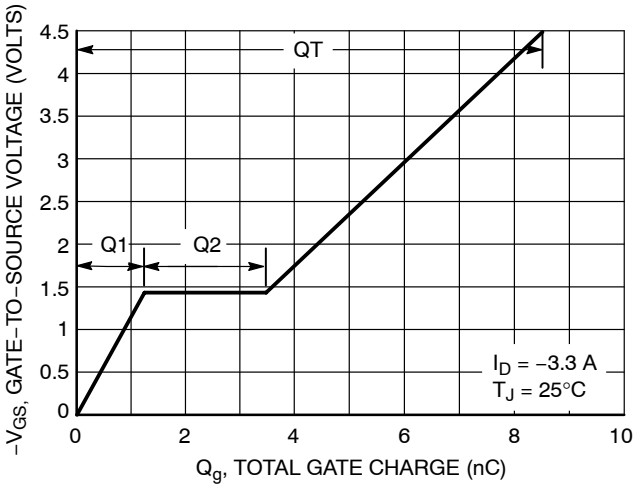


Figure 8. Gate−to−Source Voltage vs. Total Gate Charge

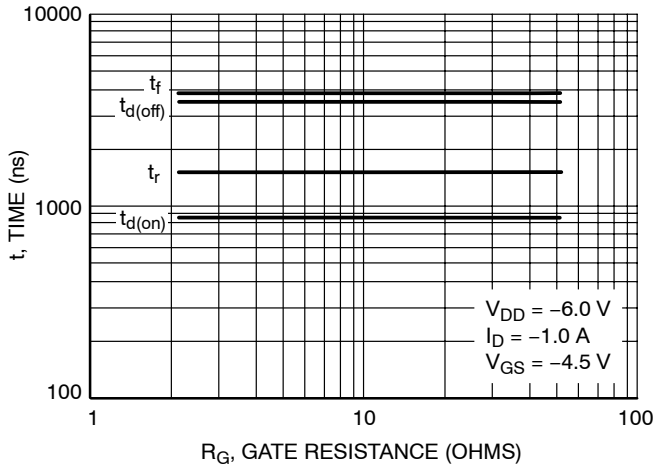


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

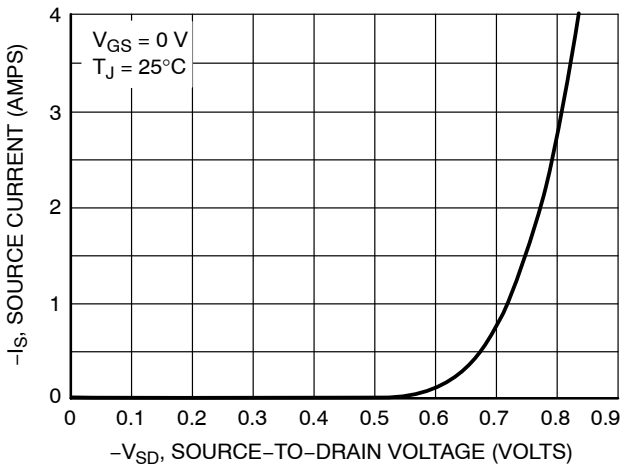


Figure 10. Diode Forward Voltage vs. Current

ORDERING INFORMATION

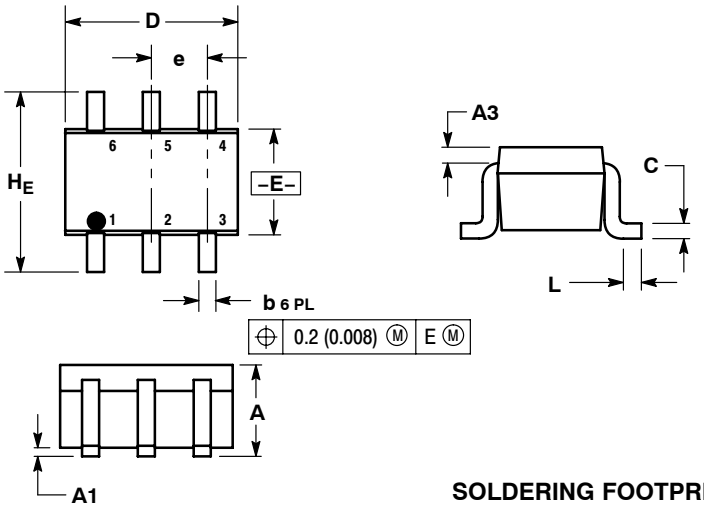
Device	Package	Shipping†
NTJS3151PT1	SC−88	3000 Tape & Reel
NTJS3151PT1G	SC−88 (Pb−Free)	3000 Tape & Reel
NTJS3151PT2	SC−88	3000 Tape & Reel
NTJS3151PT2G	SC−88 (Pb−Free)	3000 Tape & Reel

†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.

NTJS3151P

PACKAGE DIMENSIONS

SC−88/SC70−6/SOT−363
CASE 419B−02
ISSUE W

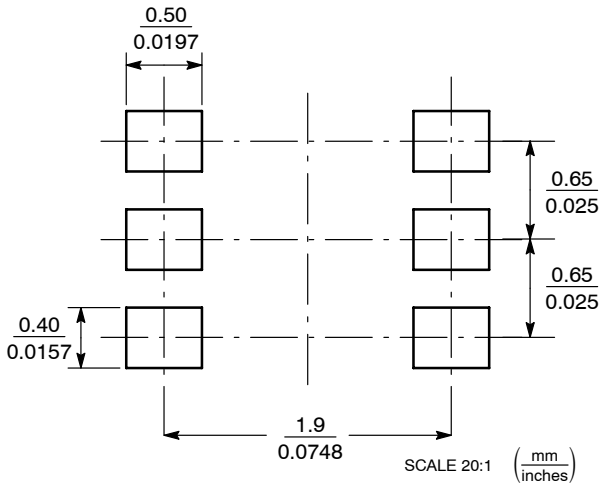


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B−01 OBSOLETE, NEW STANDARD 419B−02.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
H_E	2.00	2.10	2.20	0.078	0.082	0.086

STYLE 28:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082−1312 USA
Phone: 480−829−7710 or 800−344−3860 Toll Free USA/Canada
Fax: 480−829−7709 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2−9−1 Kamimeguro, Meguro−ku, Tokyo, Japan 153−0051
Phone: 81−3−5773−3850

ON Semiconductor Website: http://onsemi.com

Order Literature: http://www.onsemi.com/litorder

For additional information, please contact your local Sales Representative.