NTJS4151P

Trench Power MOSFET

−20 V, −4.2 A, Single P−Channel, SC−88

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°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	

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, 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).

ON Semiconductor®

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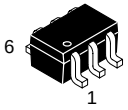
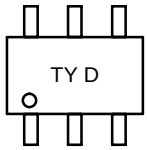
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D Max
−20 V	47 mΩ @ −4.5 V	−4.2 A
	70 mΩ @ −2.5 V	
	180 mΩ @ −1.8 V	

MARKING DIAGRAM

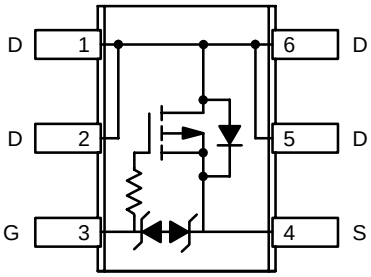


SC−88
(SOT 363)
CASE 419B



TY = Device Code
D = Date Code

SC−88
(SOT−363)



Top View

ORDERING INFORMATION

Device	Package	Shipping†
NTJS4151PT1	SC−88	3000 Units/Reel
NTJS4151PT1G	SC−88 (Pb−Free)	3000 Units/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.

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} = −16 V, V_{DS} = 0 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

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

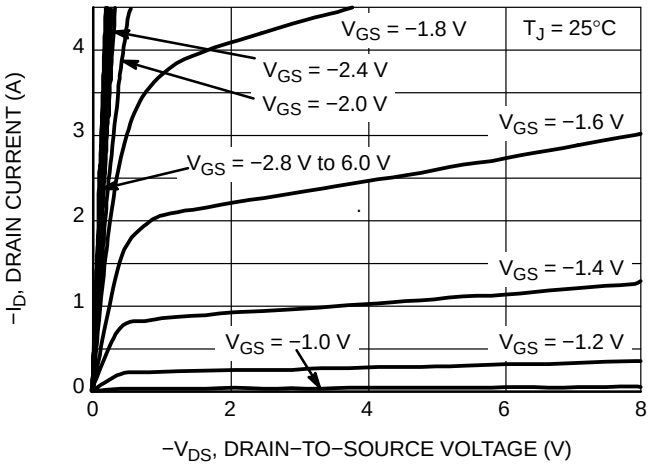


Figure 1. On−Region Characteristics

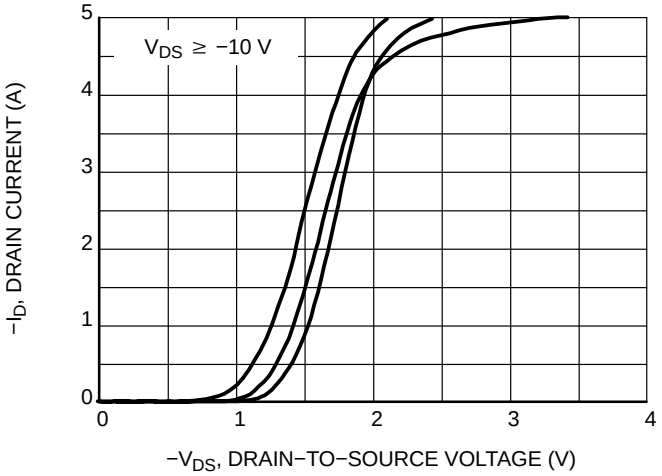


Figure 2. On−Region Characteristics

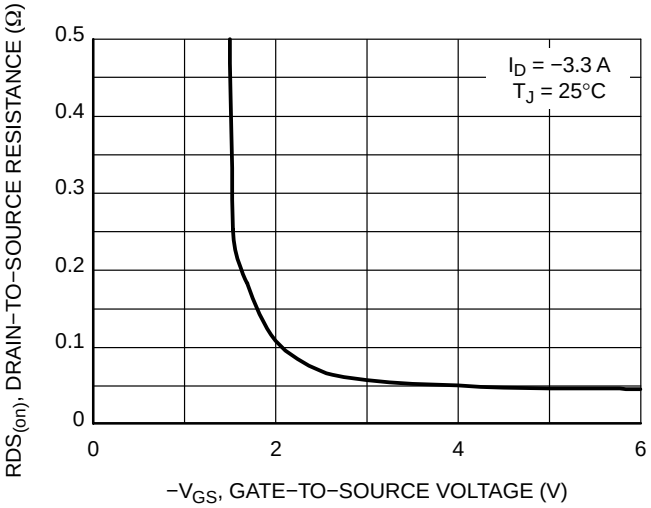


Figure 3. On−Resistance versus Gate−to−Source Voltage

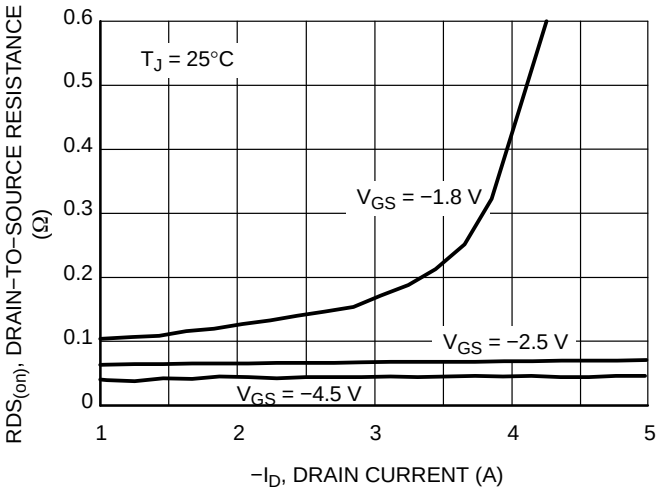


Figure 4. On−Resistance versus Drain Current and Gate Voltage

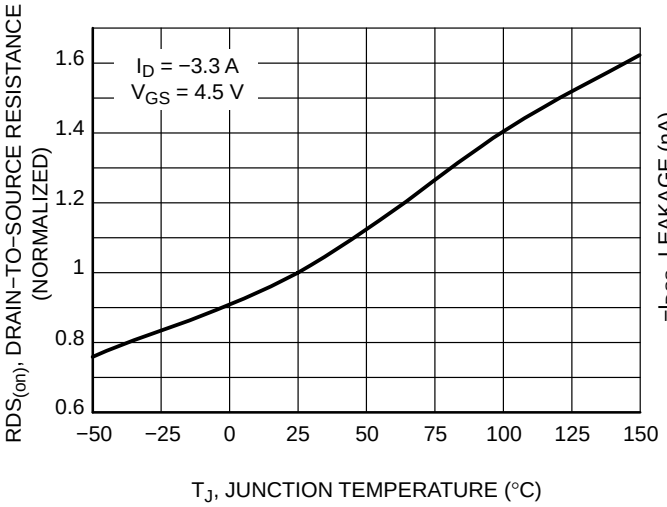


Figure 5. On−Resistance Variation with Temperature

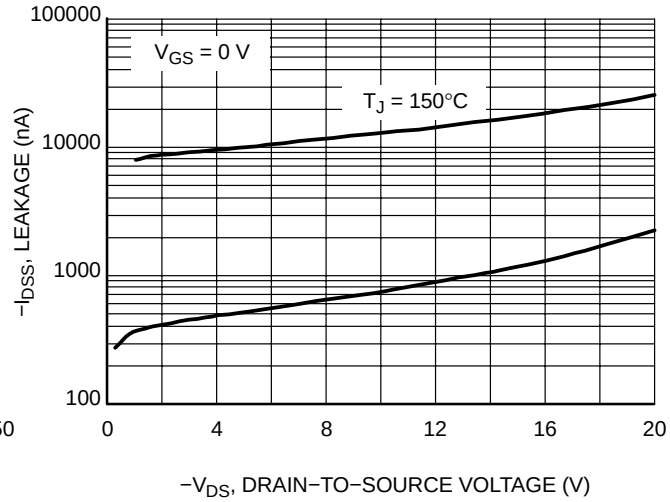


Figure 6. Drain−to−Source Leakage Current versus Voltage

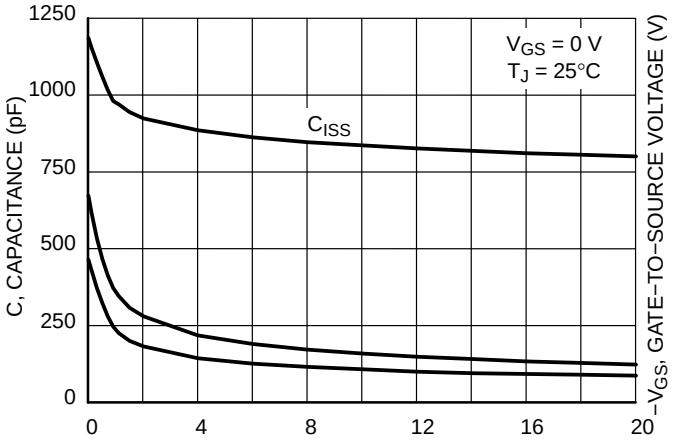


Figure 7. Capacitance Variation

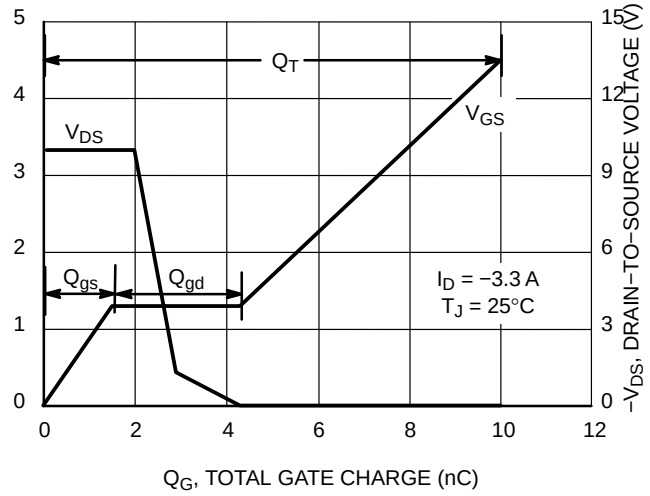


Figure 8. Gate−to−Source and Drain−to−Source Voltage versus Total Charge

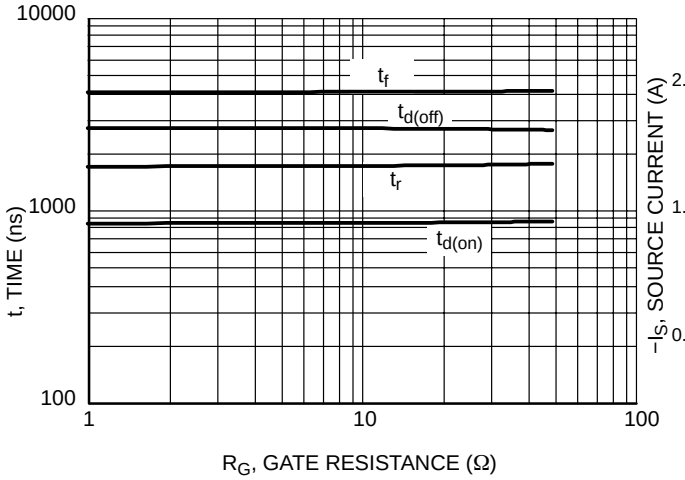


Figure 9. Resistive Switching Time Variation Gate Resistance

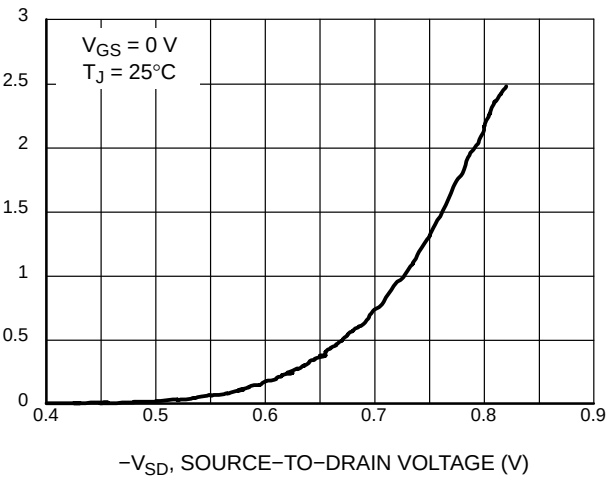
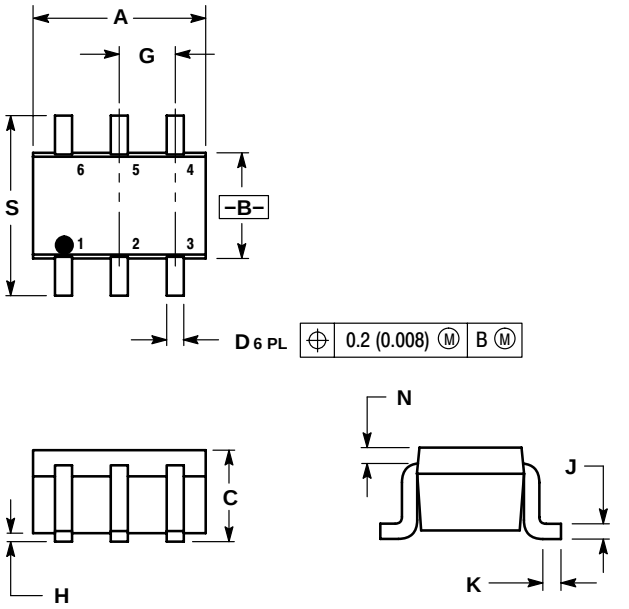


Figure 10. Diode Forward Voltage versus Current

PACKAGE DIMENSIONS

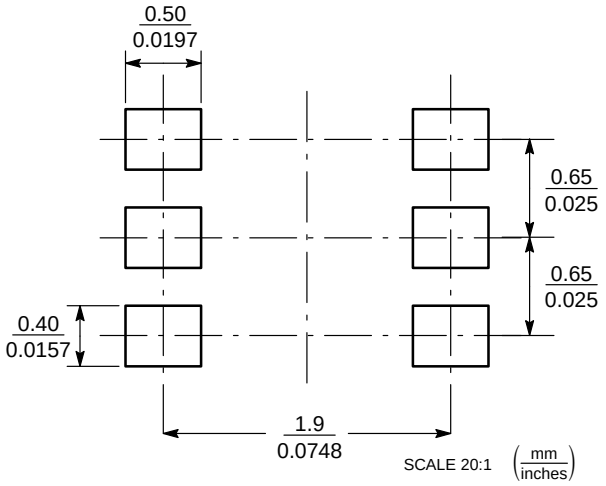
SC−88 (SOT−363)
CASE 419B−02
ISSUE U



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

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	−−−	0.004	−−−	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

SOLDERING FOOTPRINT*



SC−88/SC70−6/SOT−363

*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

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