

NTJS3157N

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

20 V, 4.0 A

Features

- Leading Trench Technology for Low $R_{DS(ON)}$ Extending Battery Life
- Fast Switching for Increased Circuit Efficiency
- SC-88 Small Outline (2 x 2 mm) for Maximum Circuit Board Utilization, Same as SC-70-6
- These are Pb-Free Devices

Applications

- DC-DC Conversion
- Low 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}	± 8.0	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	I_D	A
		$T_A = 85^\circ\text{C}$	3.2	
	$t \leq 5\text{ s}$	$T_A = 25^\circ\text{C}$	2.3	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	P_D	1.0
Pulsed Drain Current		$t_p = 10\text{ }\mu\text{s}$	I_{DM}	10
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$
Source Current (Body Diode)		I_S	1.6	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS (Note 1)

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State	$R_{\theta JA}$	125	$^\circ\text{C/W}$
Junction-to-Ambient – $t \leq 5\text{ s}$	$R_{\theta JA}$	80	
Junction-to-Lead – Steady State	$R_{\theta JL}$	45	

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).

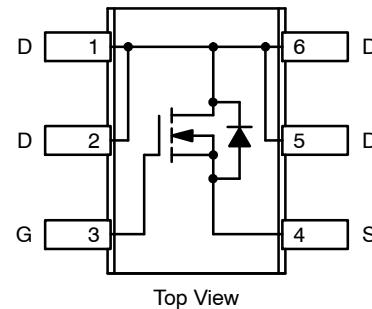
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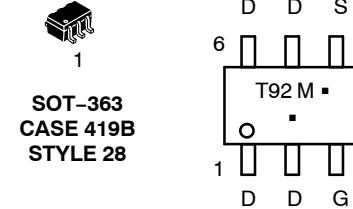
$V_{(BR)DSS}$	$R_{DS(on)}\text{ Typ}$	$I_D\text{ Max}$
20 V	45 m Ω @ 4.5 V	4.0 A
	55 m Ω @ 2.5 V	
	70 m Ω @ 1.8 V	

SC-88 (SOT-363)



Top View

MARKING DIAGRAM & PIN ASSIGNMENT



T92 = 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.

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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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}	V _{GS} = 0 V, I _D = 250 μA		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} = ±8.0 V			±100	nA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250 μA	0.40		1.0	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 = 4.0 A		45	60	mΩ
		V _{GS} = 2.5 V, I _D = 3.6 A		55	70	
		V _{GS} = 1.8 V, I _D = 2.0 A		70	85	
Forward Transconductance	g _{FS}	V _{GS} = 10 V, I _D = 3.2 A		9.0		S

CHARGES AND CAPACITANCES

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 10 V		500		pF
Output Capacitance	C _{OSS}			75		
Reverse Transfer Capacitance	C _{RSS}			60		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 10 V, I _D = 3.2 A		6.9	15	nC
Gate-to-Source Charge	Q _{GS}			1.0		
Gate-to-Drain Charge	Q _{GD}			1.8		

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t _{d(on)}	V _{GS} = 4.5 V, V _{DD} = 10 V, I _D = 0.5 A, R _G = 6.0 Ω		6.0	15	ns
Rise Time	t _r			12	25	
Turn-Off Delay Time	t _{d(off)}			21	45	
Fall Time	t _f			11	25	

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 1.6 A	T _J = 25°C		0.7	1.0	V
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 1.6 A			15		ns
Charge Time	T _a				12		
Discharge Time	T _b				3.0		
Reverse Recovery Charge	Q _{RR}				5.0		nC

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

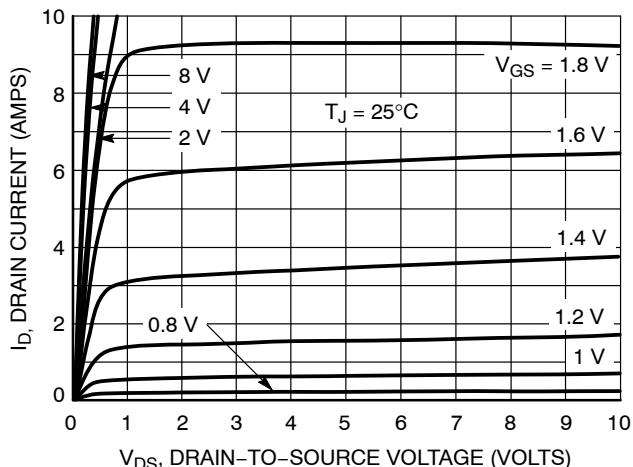


Figure 1. On-Region Characteristics

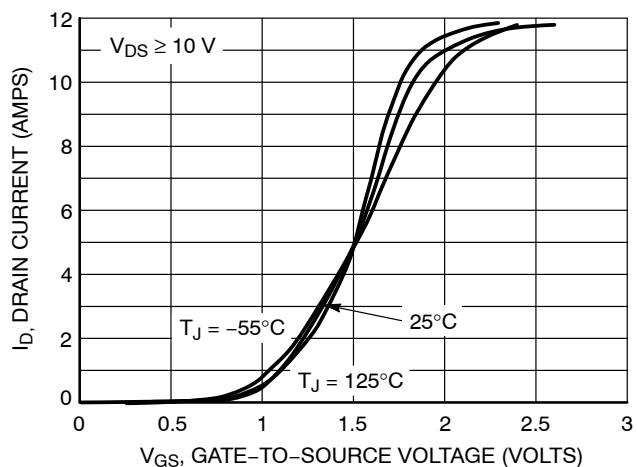


Figure 2. Transfer Characteristics

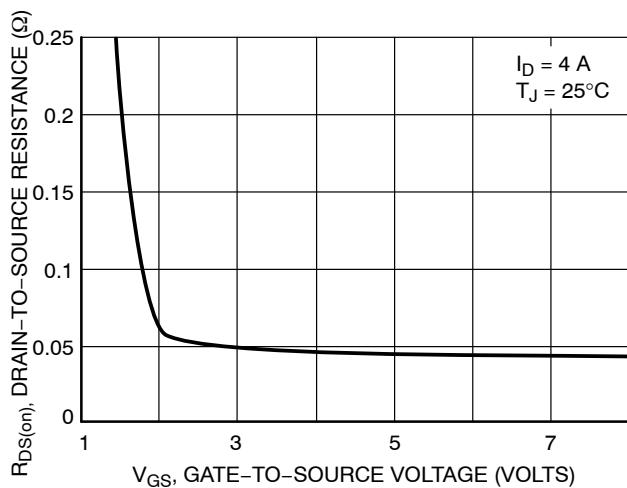


Figure 3. On-Resistance vs. Gate-to-Source Voltage

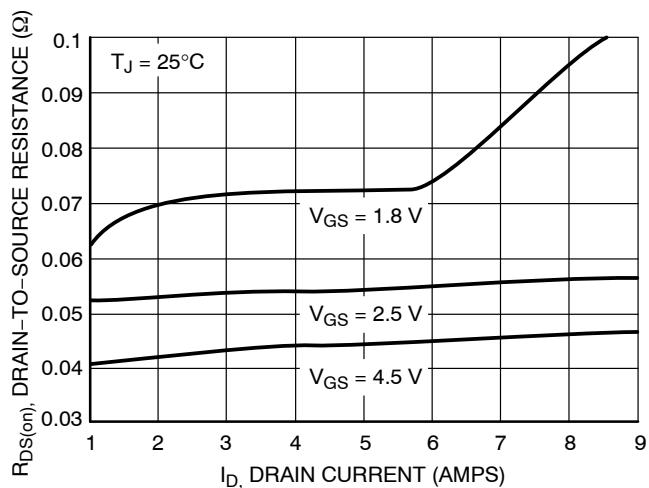


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

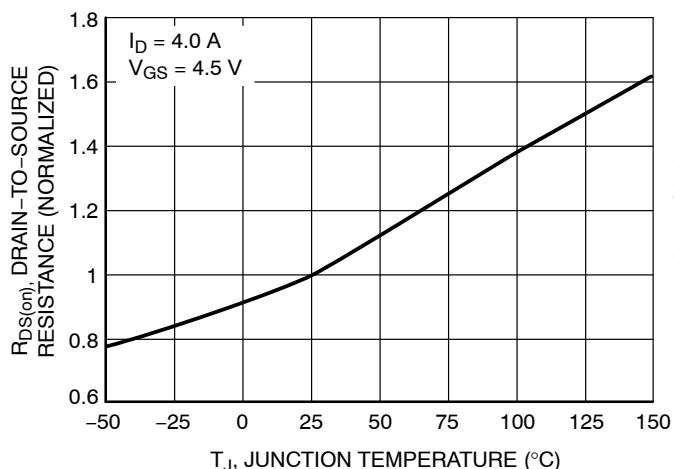


Figure 5. On-Resistance Variation with Temperature

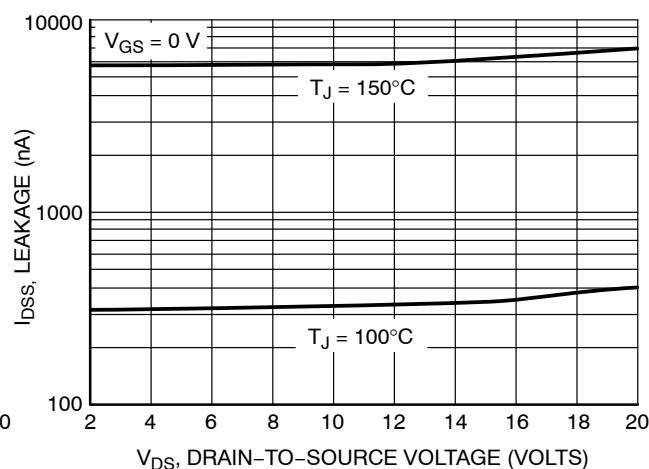


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

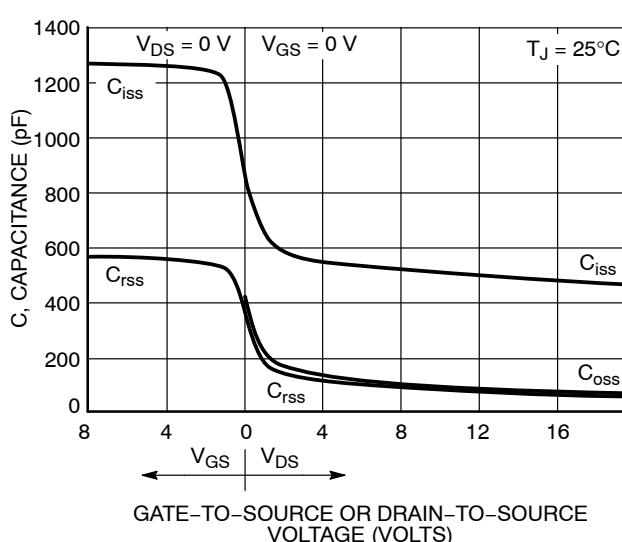


Figure 7. Capacitance Variation

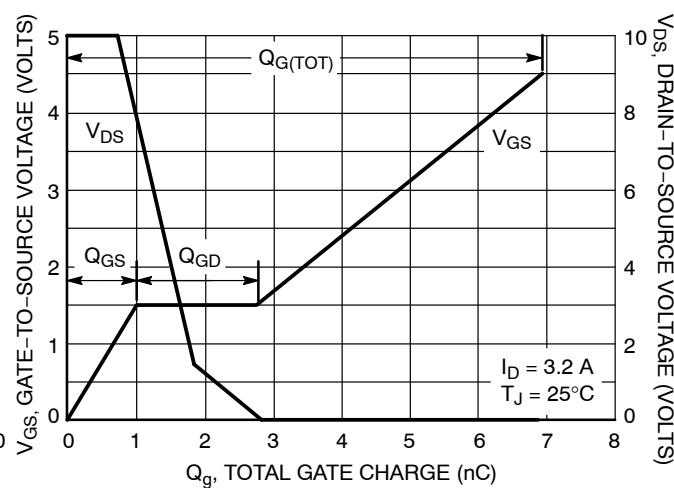


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

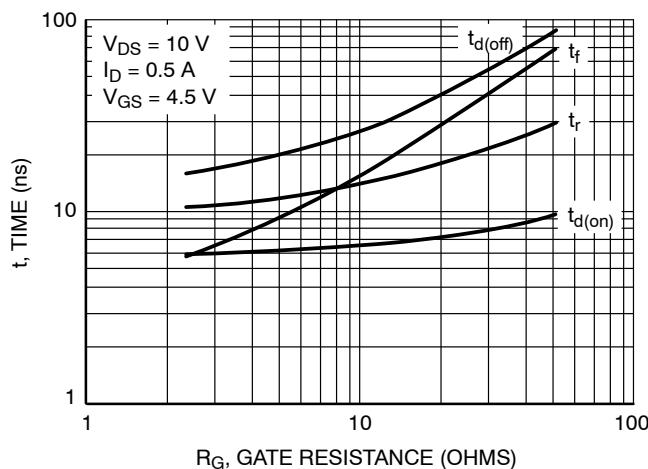


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

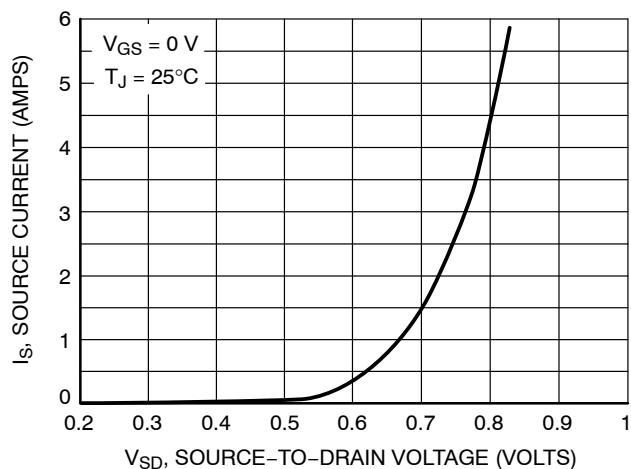


Figure 10. Diode Forward Voltage vs. Current

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ORDERING INFORMATION

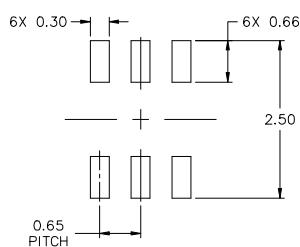
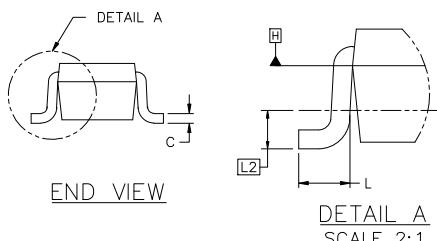
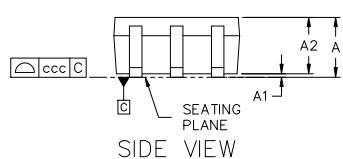
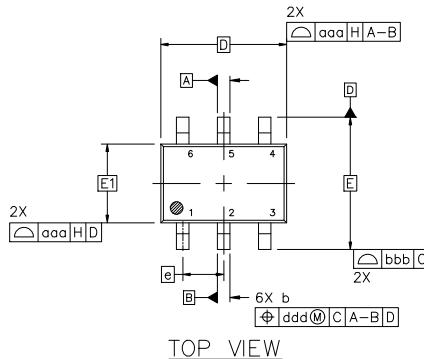
Device	Package	Shipping [†]
NTJS3157NT1G	SC-88 (Pb-Free)	3000 / Tape & Reel
NTJS3157NT2G	SC-88 (Pb-Free)	3000 / Tape & Reel

[†]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.



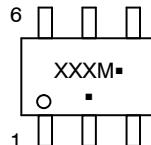
SC-88 2.00x1.25x0.90, 0.65P
CASE 419B-02
ISSUE Z

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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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. 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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