

Trench Power MOSFET

NTJS3157N

20 V, 4.0 A, Single N-Channel, SC-88

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
- Pb-Free Packages are Available

Applications

- DC-DC Conversion
- Low Side Load Switch
- Cell Phones, Computing, Digital Cameras, MP3s and PDAs

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

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)	I_D	$T_A = 25^\circ\text{C}$ Steady State	3.2	A
		$T_A = 85^\circ\text{C}$	2.3	
		$t \leq 5$ s $T_A = 25^\circ\text{C}$	4.0	
Power Dissipation (Note 1)	P_D	1.0	W	
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	I_{DM}	10	A
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	$^\circ\text{C}$	

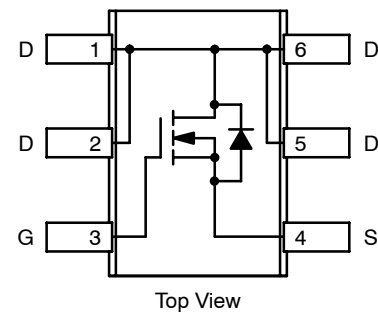
THERMAL RESISTANCE RATINGS (Note 1)

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

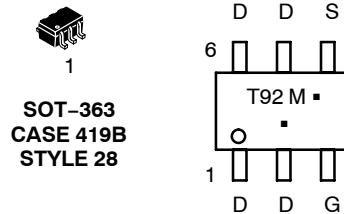
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

SC-88 (SOT-363)



MARKING DIAGRAM & PIN ASSIGNMENT



T92 = Device Code
M = Date Code
▪ = Pb-Free Package
(Note: Microdot may be in either location)



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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			V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J			-4.0		
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 4.0 A V _{GS} = 2.5 V, I _D = 3.6 A V _{GS} = 1.8 V, I _D = 2.0 A		45	60	mΩ
				55	70	
				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

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