Small Signal MOSFET

-20 V, -950 mA, P-Channel SOT-563

Features

- Low R_{DS(on)} Improving System Efficiency
- Low Threshold Voltage
- Small Footprint 1.6 x 1.6 mm
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Load/Power Switches
- Battery Management
- Cell Phones, Digital Cameras, PDAs, Pagers, etc.

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted.)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage	V _{DSS}	-20	V		
Gate-to-Source Voltage			V_{GS}	±8.0	V
Continuous Drain Current	Steady	$T_A = 25^{\circ}C$	_	-860	mA
(Note 1)	State	T _A = 70°C	l _D	-690	
Power Dissipation (Note 1)	Steady State		P _D	170	mW
Continuous Drain Current	t ≤ 5 s		I_	-950	mA
(Note 1)	T _A =	T _A = 70°C	I _D	-760	
Power Dissipation (Note 1)	t≤	≤ 5 s	P _D	210	mW
Pulsed Drain Current	t _p =	10 μs	I _{DM}	-4.0	Α
Operating Junction and Storage Temperature			T _J , T _{STG}	–55 to 150	°C
Source Current (Body Diode)			I _S	-360	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T _L	260	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient - Steady State (Note 1)	$R_{\theta JA}$	720	°C/W
Junction-to-Ambient – $t \le 5 s$ (Note 1)	$R_{\theta JA}$	600	

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).

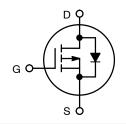


ON Semiconductor®

http://onsemi.com

V _{(BR)DSS}	R _{DS(on)} Typ	I _D Max
	120 mΩ @ -4.5 V	
-20 V	144 mΩ @ –2.5 V	–950 mA
	195 mΩ @ –1.8 V	

P-Channel MOSFET



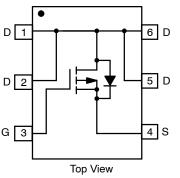


TX = Specific Device Code M = Date Code

= Pb-Free Package

(Note: Microdot may be in either location)

PINOUT: SOT-563



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}C$ unless otherwise noted.)

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	$V_{GS} = 0 \text{ V}, I_D = -250 \mu\text{A}$		-20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J				-13		mV/°C
Zero Gate Voltage Drain Current		V _{GS} = 0 V	T _J = 25°C			-1.0	μΑ
	I _{DSS}	V _{DS} = -20 V	T _J = 125°C			-5.0	1
Gate-to-Source Leakage Current	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 8.0 \text{ V}$				±100	nA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	V _{GS(TH)}	$V_{GS} = V_{DS}, I_D$	= -250 μA	-0.45		-1.0	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J				2.4		mV/°C
Drain-to-Source On Resistance		$V_{GS} = -4.5 \text{ V}, I_D = -950 \text{ mA}$			120	150	mΩ
		$V_{GS} = -4.5 \text{ V}, I_{D}$	= -770 mA		112	142	-
	R _{DS(on)}	$V_{GS} = -2.5 \text{ V}, I_D = -670 \text{ mA}$			144	200	_
		$V_{GS} = -1.8 \text{ V}, I_D = -200 \text{ mA}$			195	240	
Forward Transconductance	9FS	$V_{DS} = -10 \text{ V}, I_{D} = -810 \text{ mA}$			3.1		S
CHARGES AND CAPACITANCES	•					•	
Input Capacitance	C _{ISS}				458		pF
Output Capacitance	C _{OSS}	V _{GS} = 0 V, f = V _{DS} = -1			61		
Reverse Transfer Capacitance	C _{RSS}	- 53			38		1
Total Gate Charge	Q _{G(TOT)}				5.6		nC
Threshold Gate Charge	Q _{G(TH)}	$V_{GS} = -4.5 \text{ V}, V_{E}$ $I_{D} = -770$	os = -10 V;		0.6		1
Gate-to-Source Charge	Q_{GS}	ip – -170	, IIIA		0.9		1
Gate-to-Drain Charge	Q_{GD}				1.2		1
SWITCHING CHARACTERISTICS (Note	3)						
Turn-On Delay Time	t _{d(ON)}				5.0		ns
Rise Time	t _r	V_{GS} = -4.5 V, V_{DD} = -10 V, I_D = -950 mA, R_G = 6.0 Ω			12		1
Turn-Off Delay Time	t _{d(OFF)}				23.7		7
Fall Time	t _f				18		1
DRAIN-SOURCE DIODE CHARACTER	ISTICS						
Forward Diode Voltage		V _{GS} = 0 V,	T _J = 25°C		-0.64	-0.9	V
	V_{SD}	$I_{S} = -360 \text{ mA}$	T _J = 125°C		-0.5		1
Reverse Recovery Time	t _{RR}	$V_{GS} = 0 \text{ V, dl}_S/\text{dt} = 100 \text{ A/}\mu\text{s,}$ $I_S = -360 \text{ mA}$			10.5		ns

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

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

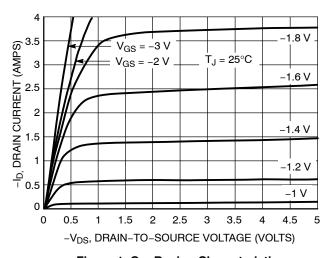


Figure 1. On-Region Characteristics

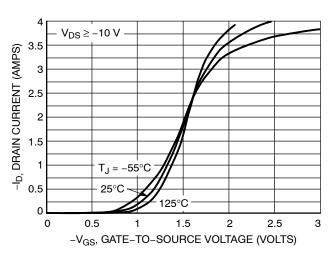


Figure 2. Transfer Characteristics

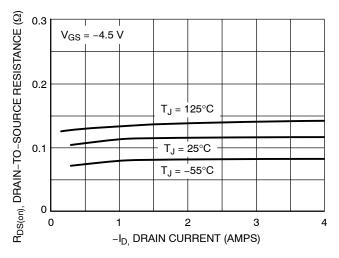


Figure 3. On-Resistance vs. Drain Current and Temperature

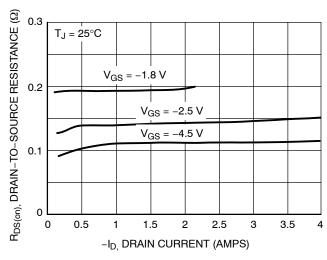


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

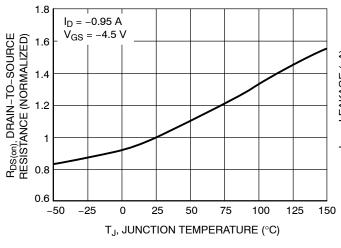


Figure 5. On–Resistance Variation with Temperature

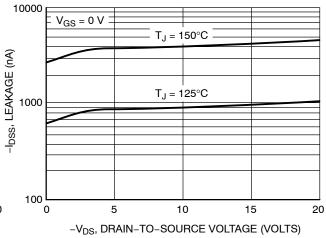
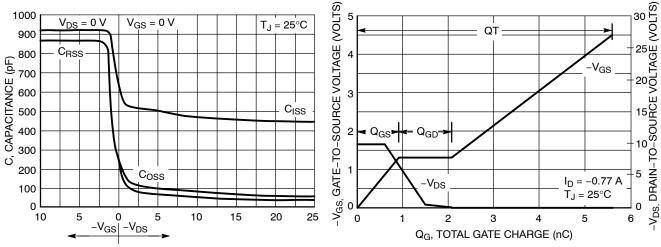


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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



GATE-TO-SOURCE OR DRAIN-TO-SOURCE VOLTAGE (VOLTS)

Figure 7. Capacitance Variation

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

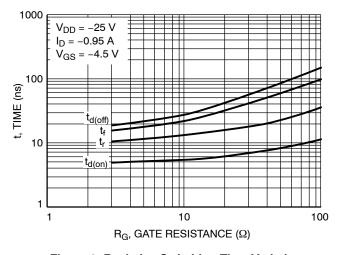


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

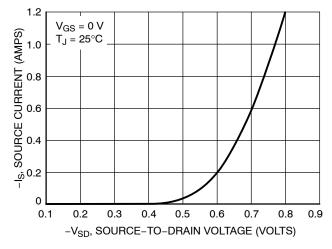


Figure 10. Diode Forward Voltage vs. Current

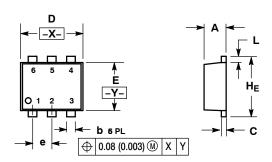
ORDERING INFORMATION

Device	Package	Shipping		
NTZS3151PT1G	SOT-563 (Pb-Free)	4000 / Tape & Reel		
NTZS3151PT1H	SOT-563 (Pb-Free)	4000 / Tape & Reel		
NTZS3151PT5G	SOT-563 (Pb-Free)	8000 / 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.

PACKAGE DIMENSIONS

SOT-563, 6 LEAD CASE 463A **ISSUE F**

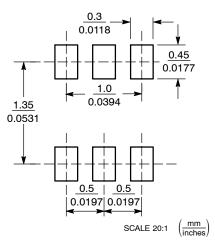


NOTES:

- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- 2. CONTROLLING DIMENSION: MILLIMETERS
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

	MILLIMETERS			INCHES			
DIM	MIN	NOM	MAX	MIN	NOM	MAX	
Α	0.50	0.55	0.60	0.020	0.021	0.023	
p	0.17	0.22	0.27	0.007	0.009	0.011	
၁	0.08	0.12	0.18	0.003	0.005	0.007	
D	1.50	1.60	1.70	0.059	0.062	0.066	
Е	1.10	1.20	1.30	0.043	0.047	0.051	
е	0.5 BSC		C	.02 BS0			
L	0.10	0.20	0.30	0.004	0.008	0.012	
He	1.50	1.60	1.70	0.059	0.062	0.066	

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.

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