NTZS3151P

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
- This is a Pb−Free Device

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 (Note 1)	Steady State	T_A = 25°C	I_D	−860	mA
		T_A = 70°C		−690	
Power Dissipation (Note 1)	Steady State		P_D	170	mW
Continuous Drain Current (Note 1)	t ≤ 5 s	T_A = 25°C	I_D	−950	mA
		T_A = 70°C		−760	
Power Dissipation (Note 1)	t ≤ 5 s		P_D	210	mW
Pulsed Drain Current	t_p = 10 μs		I_{DM}	−4.0	A
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

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.

THERMAL RESISTANCE RATINGS

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

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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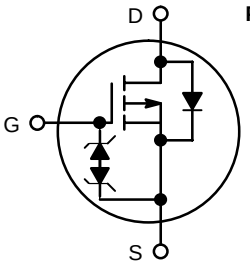
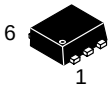
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D Max
−20 V	120 mΩ @ −4.5 V	−950 mA
	144 mΩ @ −2.5 V	
	195 mΩ @ −1.8 V	



P−Channel MOSFET

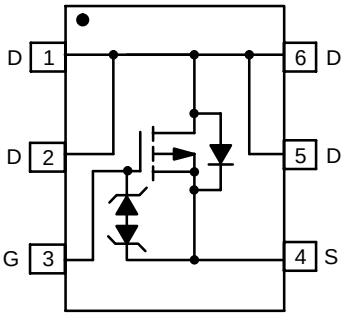


SOT−563−6
CASE 463A

MARKING DIAGRAM

TX = Specific Device Code
D = Date Code

PINOUT: SOT−563



Top View

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 noted.)

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	$V_{(BR)DSS}/T_J$				−13		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V	T_J = 25°C			−1.0	μA
		V_{DS} = −20 V	T_J = 125°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		−0.45		−1.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				2.4		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = −4.5 V, I_D = −950 mA			120	150	mΩ
		V_{GS} = −4.5 V, I_D = −770 mA			112	142	
		V_{GS} = −2.5 V, I_D = −670 mA			144	200	
		V_{GS} = −1.8 V, I_D = −200 mA			195	240	
Forward Transconductance	g_{FS}	V_{DS} = −10 V, I_D = −810 mA			3.1		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = −16 V			458		pF
Output Capacitance	C_{OSS}				61		
Reverse Transfer Capacitance	C_{RSS}				38		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −4.5 V, V_{DS} = −10 V; I_D = −770 mA			5.6		nC
Threshold Gate Charge	$Q_{G(TH)}$				0.6		
Gate−to−Source Charge	Q_{GS}				0.9		
Gate−to−Drain Charge	Q_{GD}				1.2		
SWITCHING CHARACTERISTICS (Note 3)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = −4.5 V, V_{DD} = −10 V, I_D = −950 mA, R_G = 6.0 Ω			5.0		ns
Rise Time	t_r				12		
Turn−Off Delay Time	$t_{d(OFF)}$				23.7		
Fall Time	t_f				18		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = −360 mA	T_J = 25°C		−0.64	−0.9	V
			T_J = 125°C		−0.5		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = −360 mA			10.5		ns

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°C unless otherwise noted)

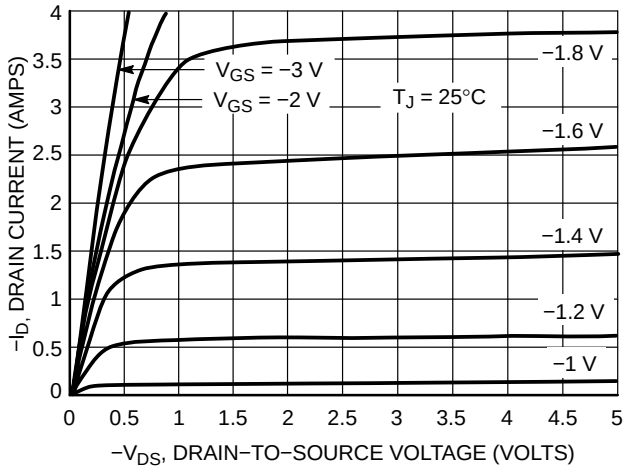


Figure 1. On−Region Characteristics

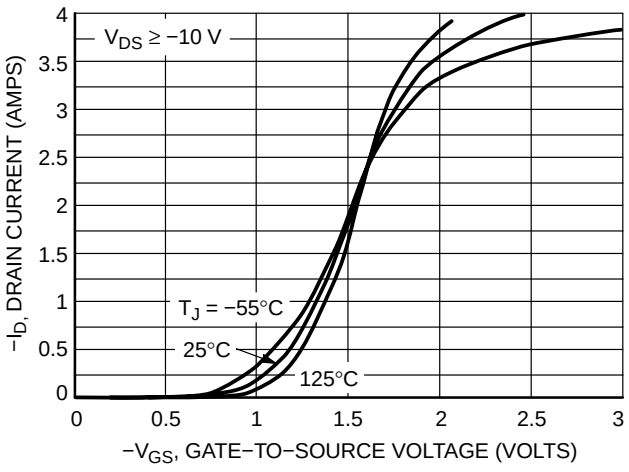


Figure 2. Transfer Characteristics

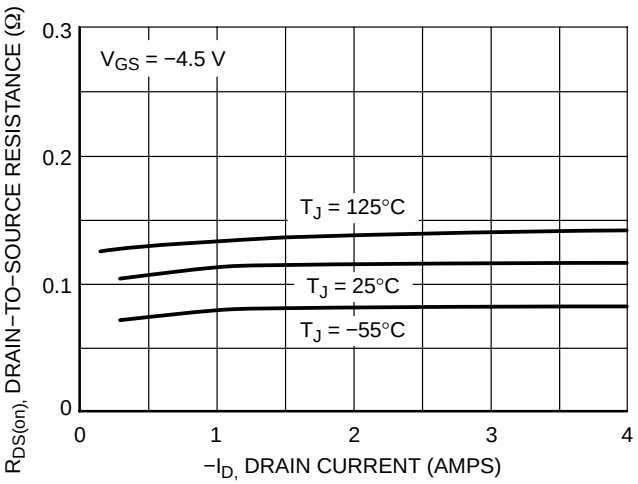


Figure 3. On−Resistance vs. Drain Current and Temperature

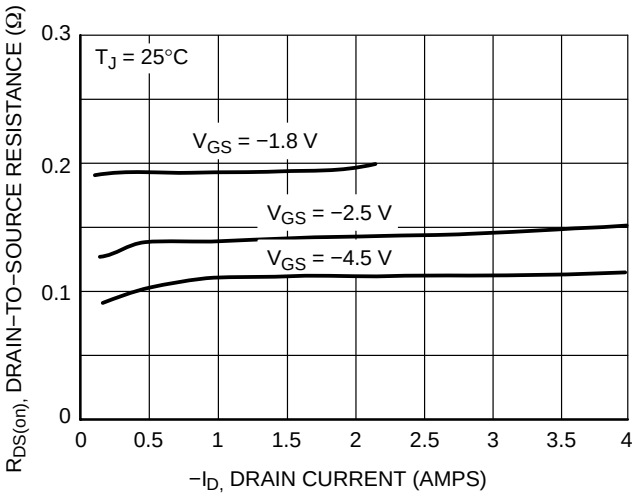


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

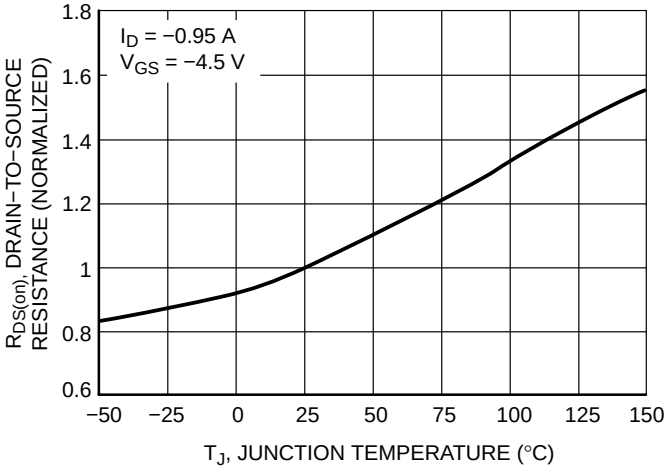


Figure 5. On−Resistance Variation with Temperature

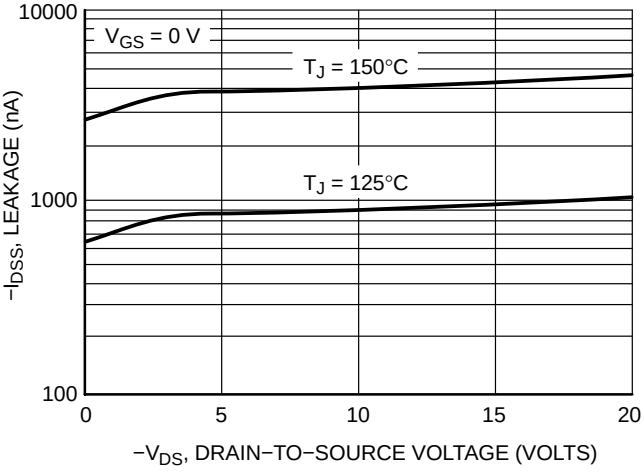


Figure 6. Drain−to−Source Leakage Current vs. Voltage

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

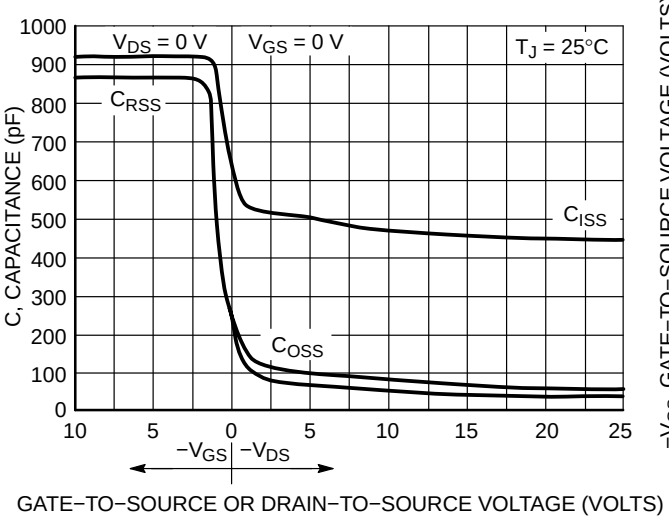


Figure 7. Capacitance Variation

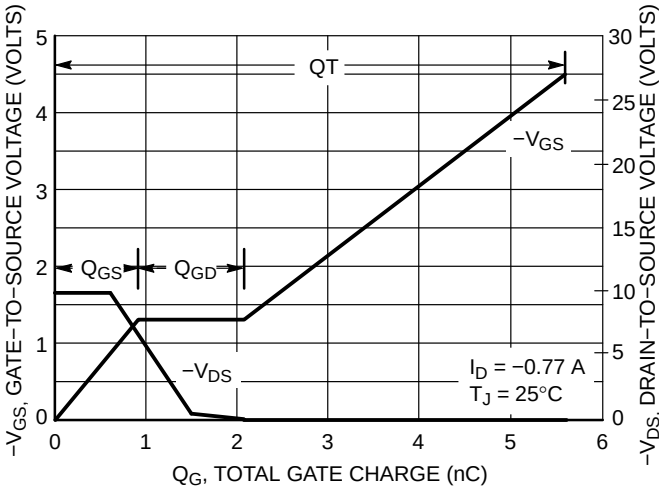


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

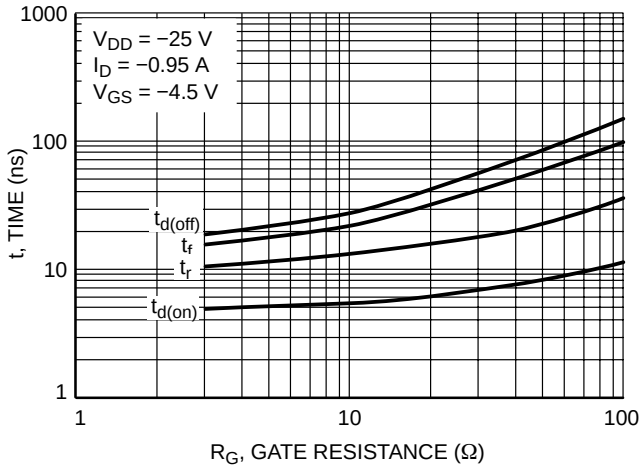


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

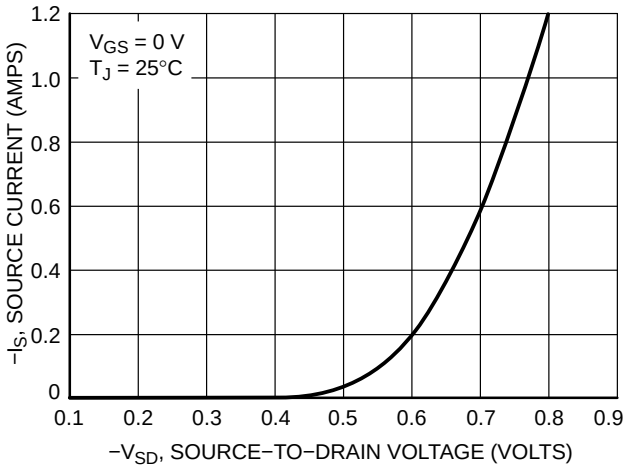


Figure 10. Diode Forward Voltage vs. Current

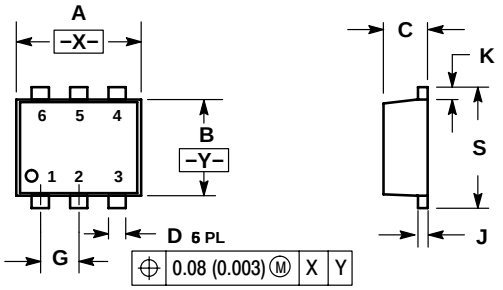
ORDERING INFORMATION

Device	Package	Shipping
NTZS3151PT1G	SOT−563 (Pb−Free)	4000 / Tape & Reel
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

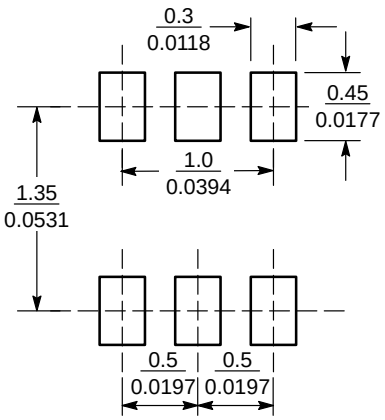
SOT−563, 6 LEAD
CASE 463A−01
ISSUE C



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	MAX	MIN	MAX
A	1.50	1.70	0.059	0.067
B	1.10	1.30	0.043	0.051
C	0.50	0.60	0.020	0.024
D	0.17	0.27	0.007	0.011
G	0.50 BSC		0.020 BSC	
J	0.08	0.18	0.003	0.007
K	0.10	0.30	0.004	0.012
S	1.50	1.70	0.059	0.067

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 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

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