

NTZD5110N

Small Signal MOSFET 60 V, 310 mA, Dual N-Channel with ESD Protection, SOT-563

Features

- Low $R_{DS(on)}$ Improving System Efficiency
- Low Threshold Voltage
- ESD Protected Gate
- Small Footprint 1.6 x 1.6 mm
- These are Pb-Free Devices

Applications

- Load/Power Switches
- Driver Circuits: Relays, Lamps, Displays, Memories, etc.
- Battery Management/Battery Operated Systems
- Cell Phones, Digital Cameras, PDAs, Pagers, etc.

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted.)

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		V_{DSS}	60	V	
Gate-to-Source Voltage		V_{GS}	± 20	V	
Continuous Drain Current (Note 1)	Steady State	I_D	$T_A = 25^\circ\text{C}$	294	mA
			$T_A = 85^\circ\text{C}$		
Power Dissipation (Note 1)	Steady State	P_D	250	mW	
Continuous Drain Current (Note 1)	$t \leq 5\text{ s}$	I_D	$T_A = 25^\circ\text{C}$	310	mA
			$T_A = 85^\circ\text{C}$	225	
Power Dissipation (Note 1)	$t \leq 5\text{ s}$	P_D	280	mW	
Pulsed Drain Current	$t_p = 10\ \mu\text{s}$	I_{DM}	590	mA	
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$	
Source Current (Body Diode)		I_S	350	mA	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ\text{C}$	
Gate-Source ESD Rating (HBM, Method 3015)		ESD	900	V	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	500	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – $t \leq 5\text{ s}$ (Note 1)		447	

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.

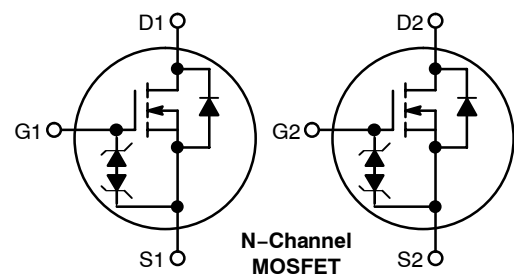
1. Surface mounted on FR4 board using 1 in sq pad size (Cu. area = 1.127 in sq [1 oz] including traces).



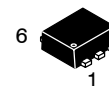
ON Semiconductor®

<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D Max
60	1.6 Ω @ 10 V	310 mA
	2.5 Ω @ 4.5 V	



MARKING DIAGRAM

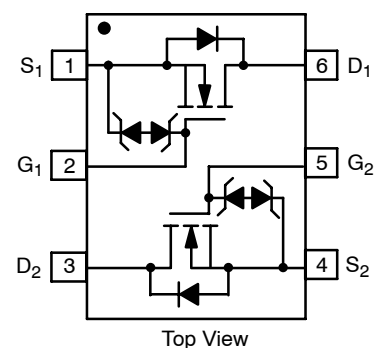


SOT-563-6
CASE 463A



S7 = Specific Device Code
D = Date Code

PINOUT: SOT-563



ORDERING INFORMATION

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

NTZD5110N

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60	-	-	V	
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	-	-	71	-	mV/°C	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}$ $V_{DS} = 60\text{ V}$	$T_J = 25^\circ\text{C}$	-	-	1.0	μA
			$T_J = 125^\circ\text{C}$	-	-	500	
		$V_{GS} = 0\text{ V}$ $V_{DS} = 50\text{ V}$	$T_J = 25^\circ\text{C}$	-	-	100	nA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	± 10	μA	
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$	-	-	450	nA	
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 5.0\text{ V}$	-	-	150	nA	

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	1.0	-	2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	-	-	4.0	-	mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 500\text{ mA}$	-	1.19	1.6	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 200\text{ mA}$	-	1.33	2.5	
Forward Transconductance	g_{FS}	$V_{DS} = 5.0\text{ V}, I_D = 200\text{ mA}$	-	80	-	S

CHARGES AND CAPACITANCES

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz},$ $V_{DS} = 20\text{ V}$	-	24.5	-	pF
Output Capacitance	C_{OSS}		-	4.2	-	
Reverse Transfer Capacitance	C_{RSS}		-	2.2	-	
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V};$ $I_D = 200\text{ mA}$	-	0.7	-	nC
Threshold Gate Charge	$Q_{G(TH)}$		-	0.1	-	
Gate-to-Source Charge	Q_{GS}		-	0.3	-	
Gate-to-Drain Charge	Q_{GD}		-	0.1	-	

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DD} = 30\text{ V},$ $I_D = 200\text{ mA}, R_G = 10\ \Omega$	-	12	-	ns
Rise Time	t_r		-	7.3	-	
Turn-Off Delay Time	$t_{d(OFF)}$		-	63.7	-	
Fall Time	t_f		-	30.6	-	

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V},$ $I_S = 200\text{ mA}$	$T_J = 25^\circ\text{C}$	-	0.8	1.2	V
			$T_J = 85^\circ\text{C}$	-	0.7	-	

2. Surface-mounted on FR4 board using 1 in. sq. pad size (Cu. area = 1.127 in sq [1 oz] including traces).

3. Pulse Test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

4. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

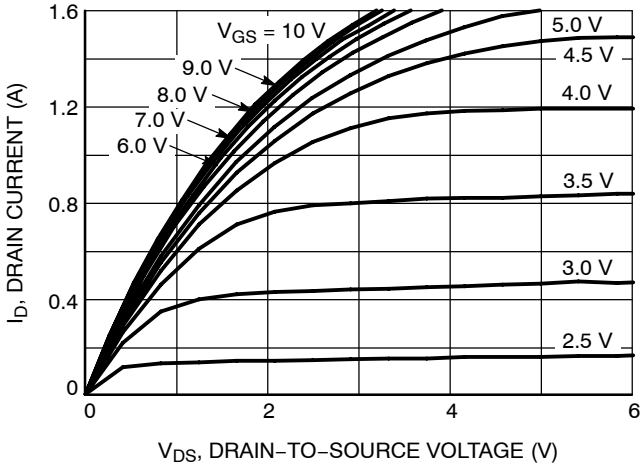


Figure 1. On-Region Characteristics

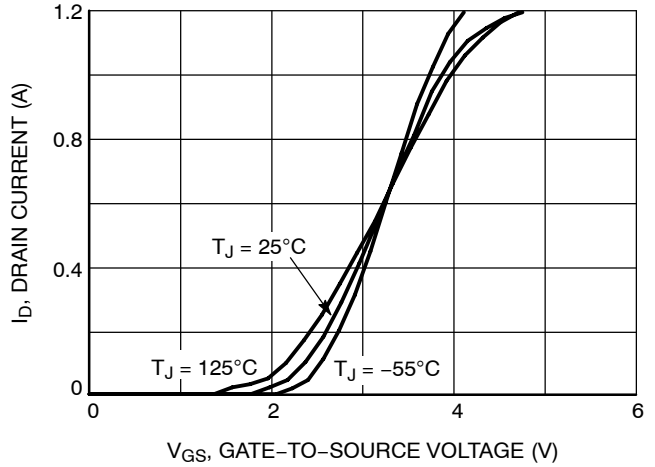


Figure 2. Transfer Characteristics

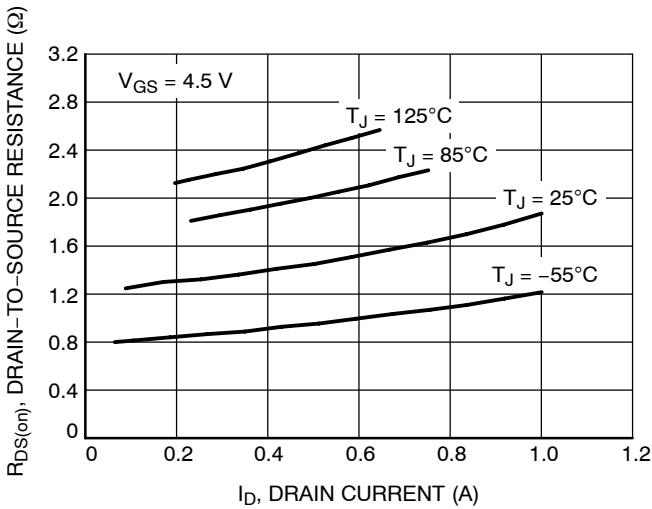


Figure 3. On-Resistance vs. Drain Current and Temperature

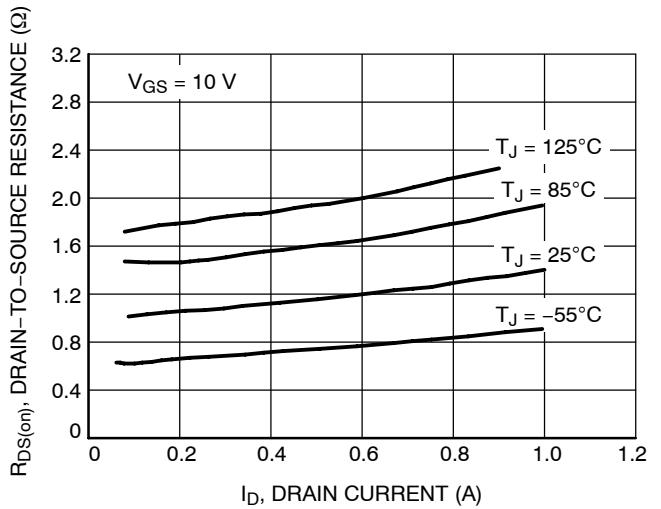


Figure 4. On-Resistance vs. Drain Current and Temperature

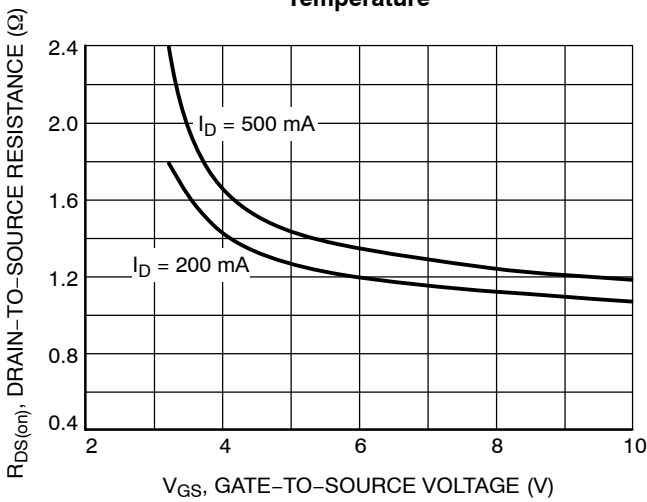


Figure 5. On-Resistance vs. Gate-to-Source Voltage

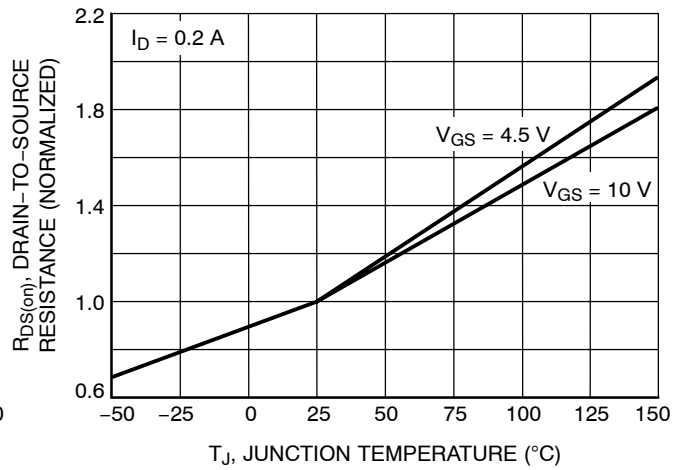


Figure 6. On-Resistance Variation with Temperature

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TYPICAL CHARACTERISTICS

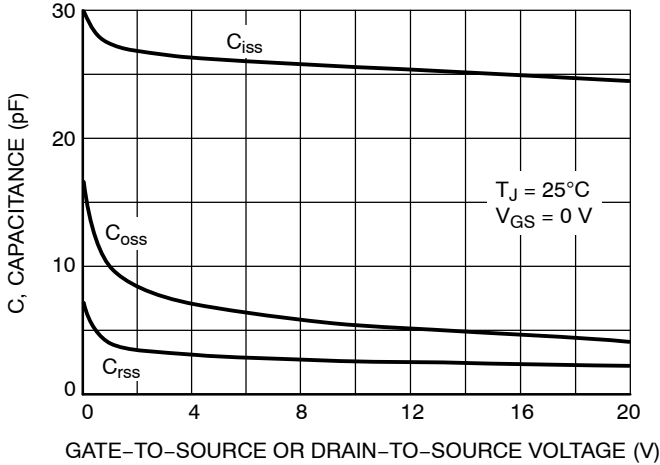


Figure 7. Capacitance Variation

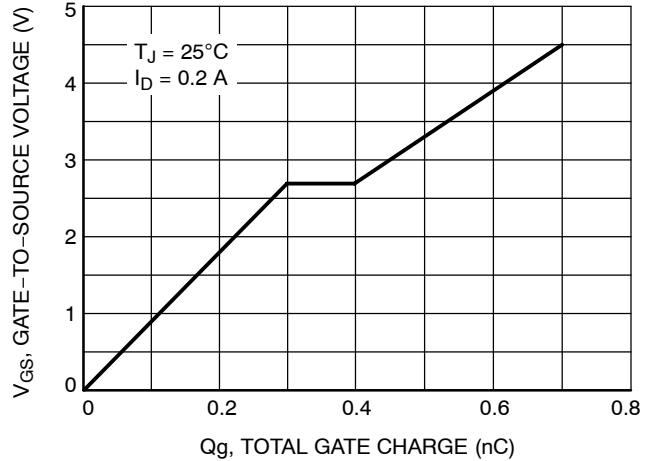


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

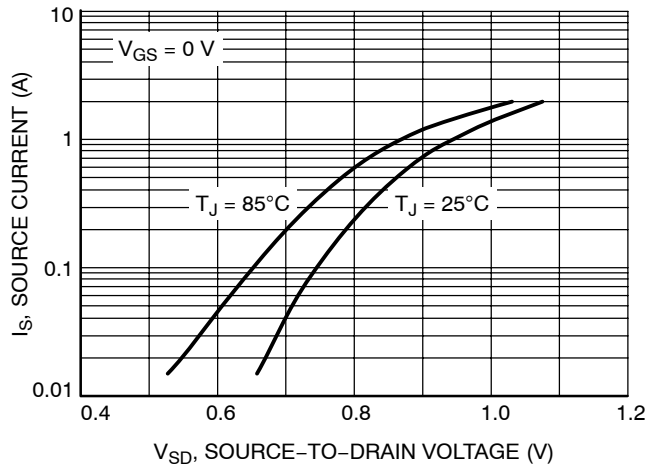


Figure 9. Diode Forward Voltage vs. Current

ORDERING INFORMATION

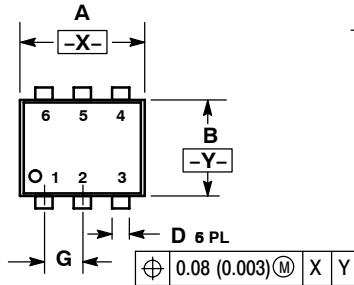
Device	Package	Shipping
NTZD5110NT1	SOT-563	3000 / Tape & Reel
NTZD5110NT1G	SOT-563 (Pb-Free)	3000 / Tape & Reel

†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.

NTZD5110N

PACKAGE DIMENSIONS

SOT-563, 6 LEAD
CASE 463A-01
ISSUE D

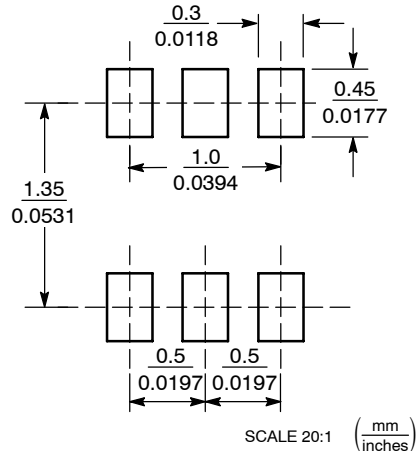


NOTES:

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.

DIM	MILLIMETERS		INCHES	
	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.

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