NTUD3170NZ

Small Signal MOSFET

20 V, 220 mA, Dual N−Channel, 1.0 mm x 1.0 mm SOT−963 Package

ON Semiconductor®

http://onsemi.com

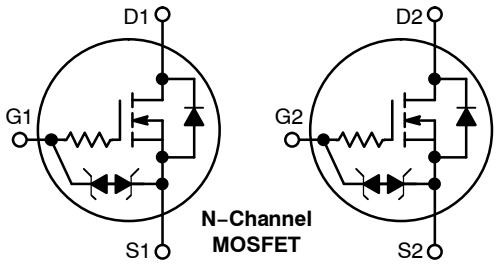
Features

- Dual N−Channel MOSFET
- Offers a Low $R_{DS(ON)}$ Solution in the Ultra Small 1.0 x 1.0 mm Package
- 1.5 V Gate Voltage Rating
- Ultra Thin Profile (< 0.5 mm) Allows It to Fit Easily into Extremely Thin Environments such as Portable Electronics
- This is a Pb−Free Device

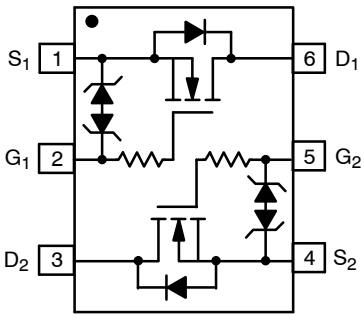
Applications

- General Purpose Interfacing Switch
- Optimized for Power Management in Ultra Portable Equipment
- Analog Switch

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D Max
20 V	1.5 Ω @ 4.5 V	0.22 A
	2.0 Ω @ 2.5 V	
	3.0 Ω @ 1.8 V	
	4.5 Ω @ 1.5 V	



PINOUT: SOT−963



Top View

MAXIMUM RATINGS (T_J = 25°C unless otherwise specified)

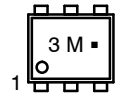
Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	20	V
Gate−to−Source Voltage			V_{GS}	±8	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	220	mA
		T_A = 85°C		160	
	t ≤ 5 s	T_A = 25°C		280	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	125	mW
	t ≤ 5 s			200	
Pulsed Drain Current		t_p = 10 μs	I_{DM}	800	mA
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°C
Source Current (Body Diode) (Note 2)			I_S	200	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C

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 the minimum recommended pad size, 1 oz Cu.
2. Pulse Test: pulse width ≤300 μs, duty cycle ≤2%

SOT−963
CASE 527AD

MARKING DIAGRAM



3 = Specific Device Code
M = Date Code
▪ = Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Ambient − Steady State (Note 3)	$R_{\theta JA}$	1000	°C/W
Junction−to−Ambient − t = 5 s (Note 3)		600	

3. Surface−mounted on FR4 board using the minimum recommended pad size, 1 oz Cu.

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

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
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 5 V	T_J = 25°C			50	nA
			T_J = 85°C			200	nA
		V_{GS} = 0 V, V_{DS} = 16 V	T_J = 25°C			100	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±5.0 V				±100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		0.4		1.0	V
Drain−to−Source On Resistance	$R_{DS(ON)}$	V_{GS} = 4.5 V, I_D = 100 mA			0.75	1.5	Ω
		V_{GS} = 2.5 V, I_D = 50 mA			1.0	2.0	
		V_{GS} = 1.8 V, I_D = 20 mA			1.4	3.0	
		V_{GS} = 1.5 V, I_D = 10 mA			1.8	4.5	
		V_{GS} = 1.2 V, I_D = 1.0 mA			2.8		
Forward Transconductance	g_{FS}	V_{DS} = 5.0 V, I_D = 125 mA			0.48		S
Source−Drain Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 mA			0.6	1.0	V
CAPACITANCES							
Input Capacitance	C_{ISS}	f = 1.0 MHz, V_{GS} = 0 V V_{DS} = 15 V			12.5		pF
Output Capacitance	C_{OSS}				3.6		
Reverse Transfer Capacitance	C_{RSS}				2.6		
SWITCHING CHARACTERISTICS, V_{GS} = 4.5 V (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DD} = 10 V, I_D = 200 mA, R_G = 2.0 Ω			16.5		ns
Rise Time	t_r				25.5		
Turn−Off Delay Time	$t_{d(OFF)}$				142		
Fall Time	t_f				80		

4. Switching characteristics are independent of operating junction temperatures.

ORDERING INFORMATION

Device	Package	Shipping†
NTUD3170NZT5G	SOT−963 (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.

TYPICAL CHARACTERISTICS

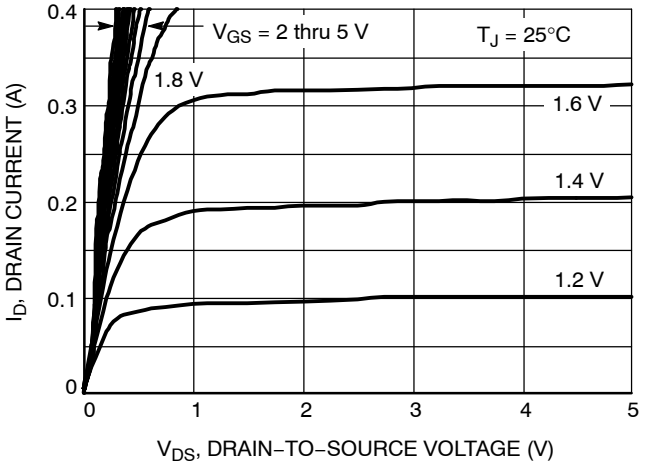


Figure 1. On−Region Characteristics

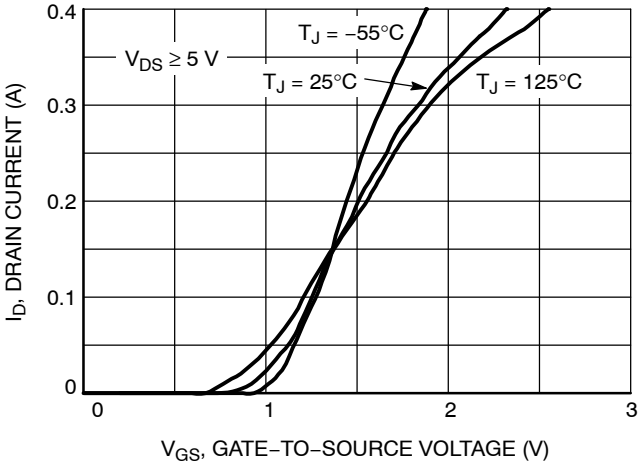


Figure 2. Transfer Characteristics

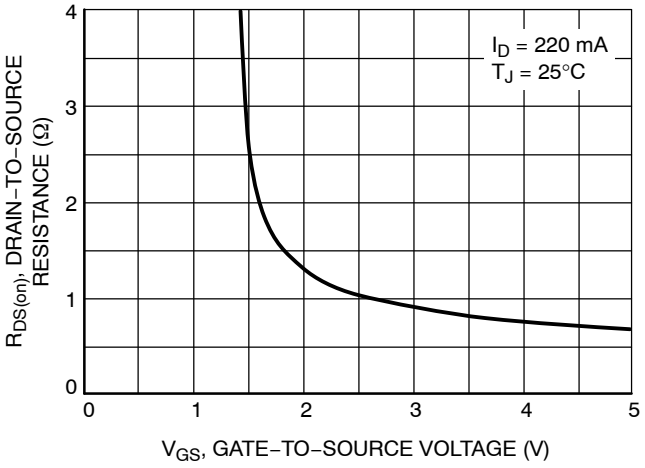


Figure 3. On−Resistance vs. Gate Voltage

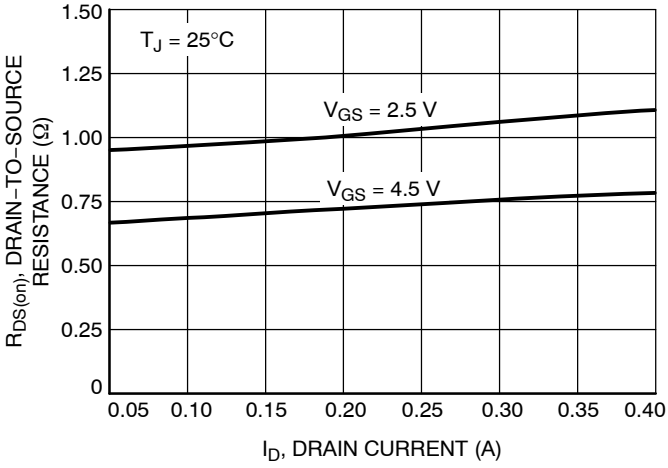


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

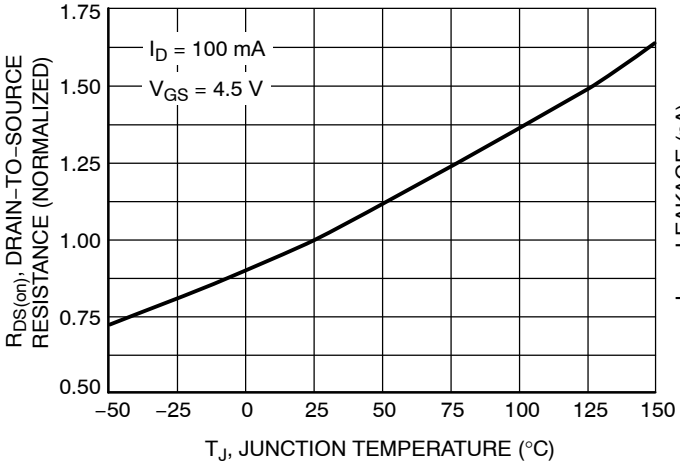


Figure 5. On−Resistance Variation with Temperature

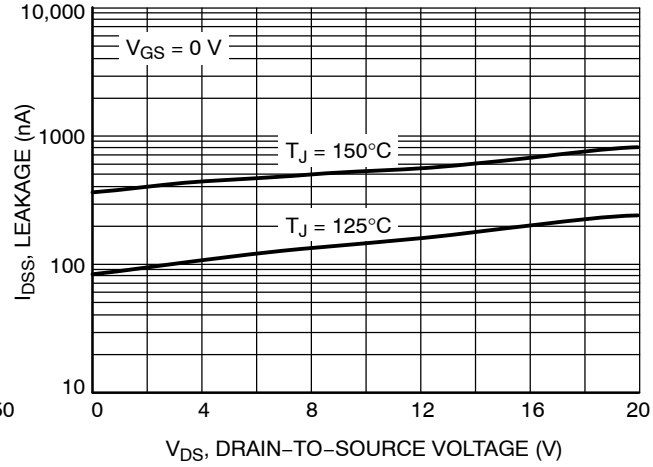


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

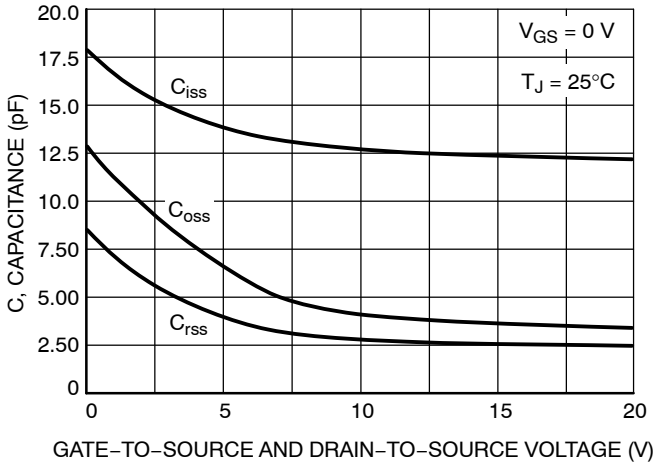


Figure 7. Capacitance Variation

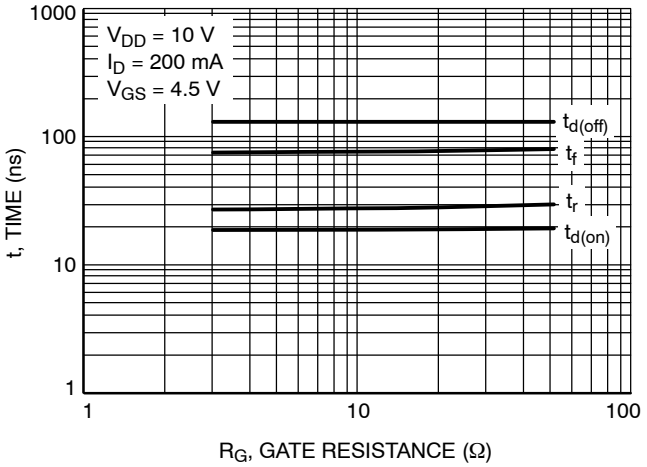


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

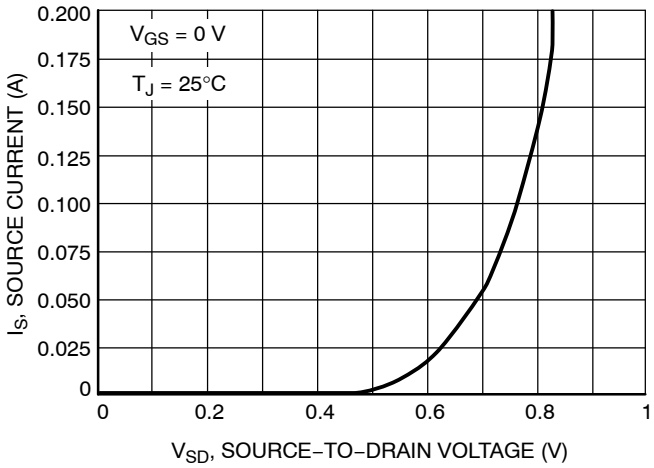
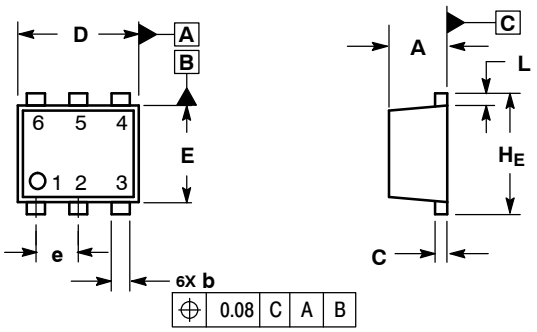


Figure 9. Diode Forward Voltage vs. Current

PACKAGE DIMENSIONS

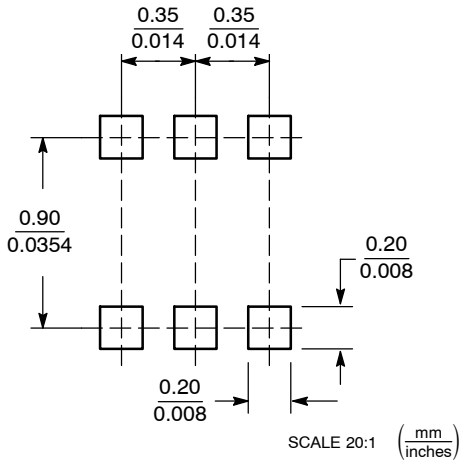
SOT−963
CASE 527AD−01
ISSUE D



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.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.34	0.37	0.40			
b	0.10	0.15	0.20	0.004	0.006	0.008
C	0.07	0.12	0.17	0.003	0.005	0.007
D	0.95	1.00	1.05	0.037	0.039	0.041
E	0.75	0.80	0.85	0.03	0.032	0.034
e	0.35 BSC			0.014 BSC		
L	0.05	0.10	0.15	0.002	0.004	0.006
H_E	0.95	1.00	1.05	0.037	0.039	0.041

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

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5773−3850

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative