

NTUD3128N

Small Signal MOSFET

20 V, 200 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
- These are Pb-Free Devices

Applications

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

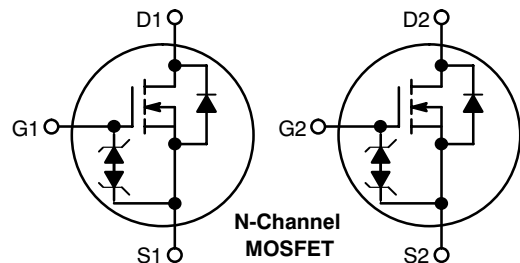
MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

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	$T_A = 25^\circ\text{C}$	I_D	160
				$T_A = 85^\circ\text{C}$
	$t \leq 5 \text{ s}$	$T_A = 25^\circ\text{C}$		200
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	P_D	125
				$t \leq 5 \text{ s}$
Pulsed Drain Current		$t_p = 10 \mu\text{s}$	I_{DM}	800
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$
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	$^\circ\text{C}$

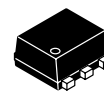
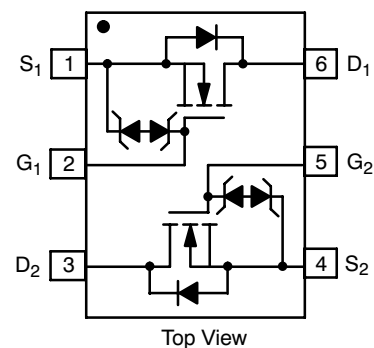
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Surface-mounted on FR4 board using the minimum recommended pad size, 1 oz Cu.
2. Pulse Test: pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ Max}$
20 V	3.0 Ω @ 4.5 V	0.2 A
	4.0 Ω @ 2.5 V	
	6.0 Ω @ 1.8 V	
	10 Ω @ 1.5 V	

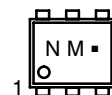


PINOUT: SOT-963



SOT-963
CASE 527AA

MARKING DIAGRAM



- N = Specific Device Code
- M = Date Code
- = Pb-Free Package

ORDERING INFORMATION

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

NTUD3128N

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	1000	$^{\circ}\text{C}/\text{W}$
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 ($T_J = 25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 5\text{ V}$	$T_J = 25^{\circ}\text{C}$		50	nA
			$T_J = 85^{\circ}\text{C}$		200	
		$V_{GS} = 0\text{ V}, V_{DS} = 16\text{ V}$	$T_J = 25^{\circ}\text{C}$		100	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 5.0\text{ V}$			100	nA

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	0.4		1.0	V
Drain-to-Source On Resistance	$R_{DS(ON)}$	$V_{GS} = 4.5\text{ V}, I_D = 100\text{ mA}$		1.5	3.0	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 50\text{ mA}$		2.0	4.0	
		$V_{GS} = 1.8\text{ V}, I_D = 20\text{ mA}$		3.0	6.0	
		$V_{GS} = 1.5\text{ V}, I_D = 10\text{ mA}$		4.0	10	
		$V_{GS} = 1.2\text{ V}, I_D = 1.0\text{ mA}$		5.5		
Forward Transconductance	g_{FS}	$V_{DS} = 5.0\text{ V}, I_D = 125\text{ mA}$		0.35		S
Source-Drain Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_D = 10\text{ mA}$		0.6	1.0	V

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C_{ISS}	$f = 1.0\text{ MHz}, V_{GS} = 0\text{ V}$ $V_{DS} = 15\text{ V}$		9.0		pF
Output Capacitance	C_{OSS}			3.0		
Reverse Transfer Capacitance	C_{RSS}			2.2		

SWITCHING CHARACTERISTICS, $V_{GS} = 4.5\text{ V}$ (Note 4)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 4.5\text{ V}, V_{DD} = 10\text{ V}, I_D = 200\text{ mA},$ $R_G = 2.0\ \Omega$		15		ns
Rise Time	t_r			24		
Turn-Off Delay Time	$t_{d(OFF)}$			90		
Fall Time	t_f			60		

4. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES

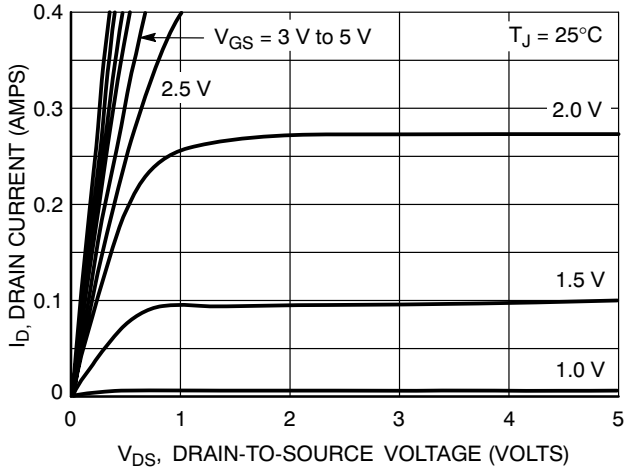


Figure 1. On-Region Characteristics

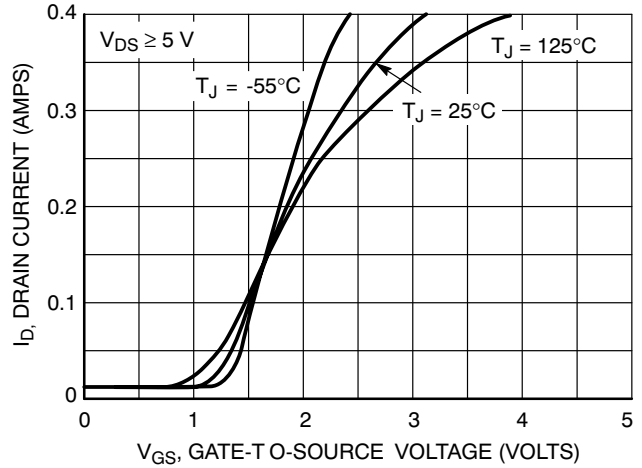


Figure 2. Transfer Characteristics

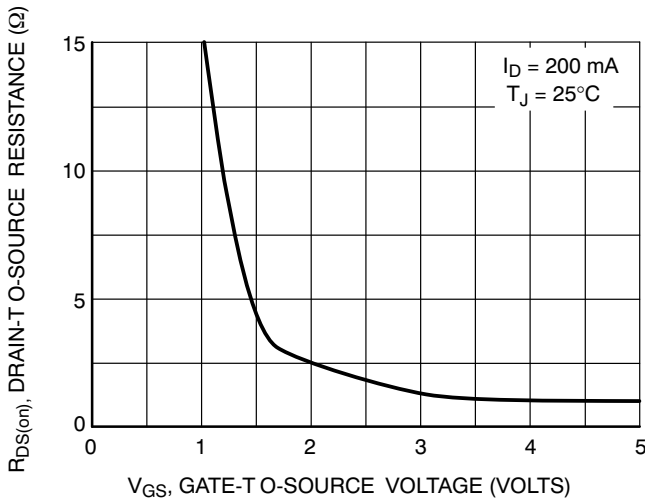


Figure 3. On-Resistance vs. Gate Voltage

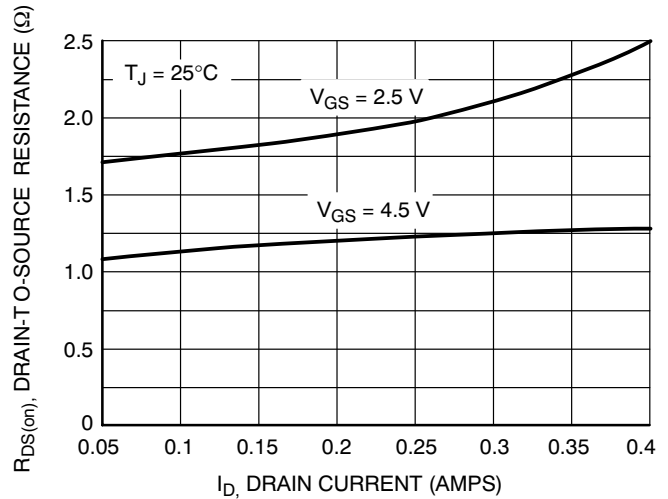


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

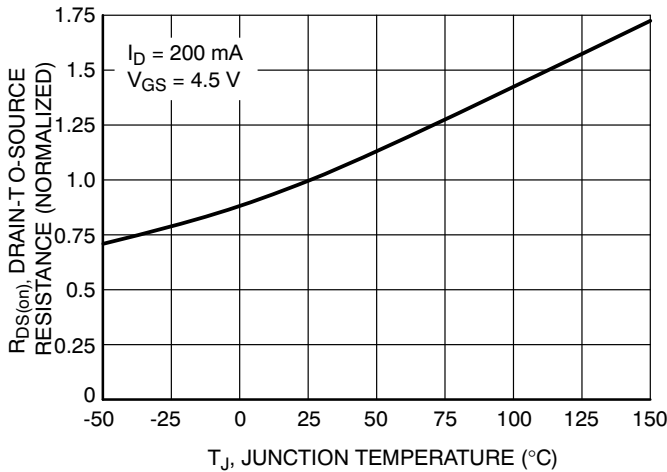


Figure 5. On-Resistance Variation with Temperature

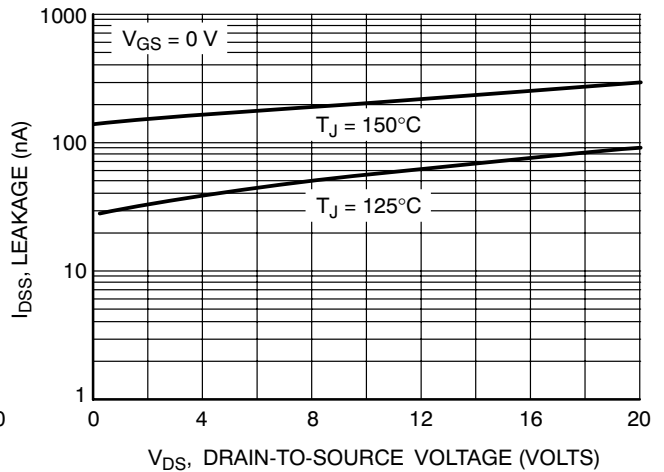


Figure 6. Drain-to-Source Leakage Current vs. Voltage

NTUD3128N

TYPICAL PERFORMANCE CURVES

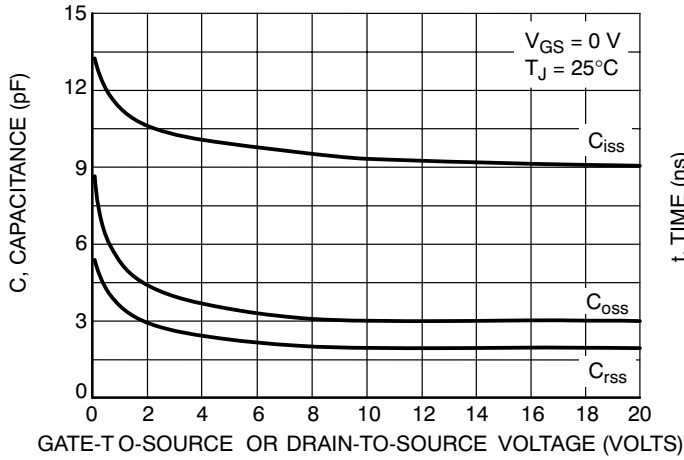


Figure 7. Capacitance Variation

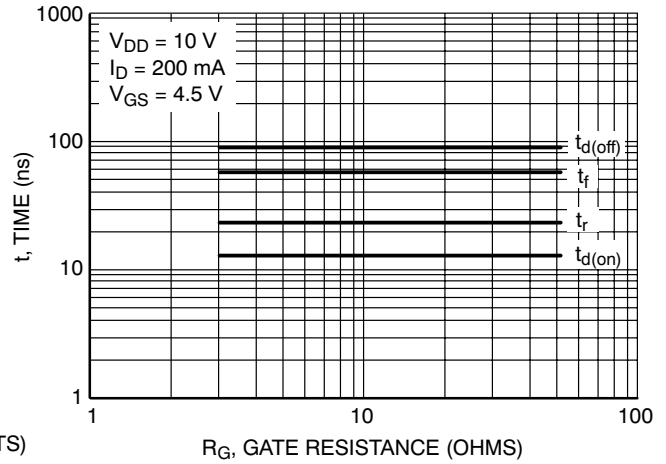


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

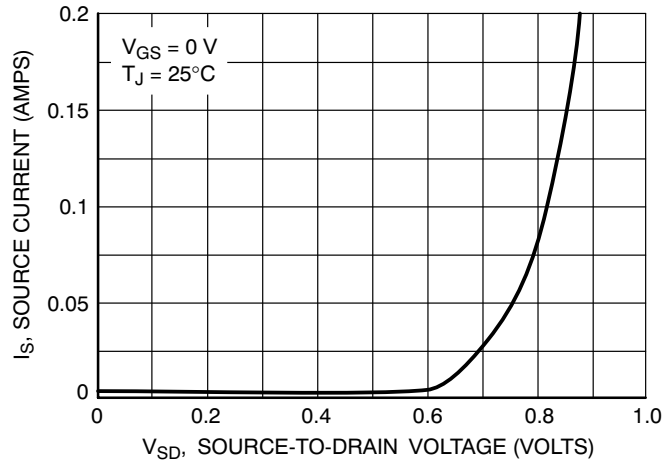


Figure 9. Diode Forward Voltage vs. Current

ORDERING INFORMATION

Device	Package	Shipping [†]
NTUD3128NT5G	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.

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

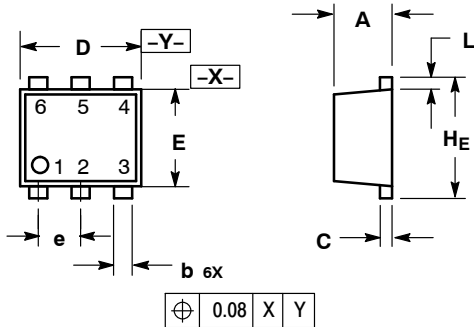
ON Semiconductor®



SOT-963
CASE 527AA-01
ISSUE D

DATE 30 JUL 2008

SCALE 4:1



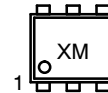
NOTES:

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	NOM	MAX	MIN	NOM	MAX
A	0.40	0.45	0.50	0.016	0.018	0.020
b	0.10	0.15	0.20	0.004	0.006	0.008
C	0.05	0.10	0.15	0.002	0.004	0.006
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

- | | | |
|--|---|--|
| <p>STYLE 1:
PIN 1. EMITTER 1
2. BASE 1
3. COLLECTOR 2
4. EMITTER 2
5. BASE 2
6. COLLECTOR 1</p> | <p>STYLE 2:
PIN 1. EMITTER 1
2. EMITTER2
3. BASE 2
4. COLLECTOR 2
5. BASE 1
6. COLLECTOR 1</p> | <p>STYLE 3:
PIN 1. CATHODE 1
2. CATHODE 1
3. ANODE/ANODE 2
4. CATHODE 2
5. CATHODE 2
6. ANODE/ANODE 1</p> |
| <p>STYLE 4:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR</p> | <p>STYLE 5:
PIN 1. CATHODE
2. CATHODE
3. ANODE
4. ANODE
5. CATHODE
6. CATHODE</p> | <p>STYLE 6:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE</p> |
| <p>STYLE 7:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE</p> | <p>STYLE 8:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN</p> | <p>STYLE 9:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1</p> |
| <p>STYLE 10:
PIN 1. CATHODE 1
2. N/C
3. CATHODE 2
4. ANODE 2
5. N/C
6. ANODE 1</p> | | |

GENERIC MARKING DIAGRAM*

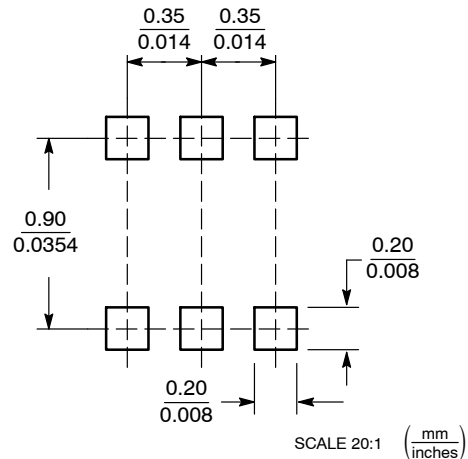


X = Specific Device Code
M = Month Code

*This information is generic. Please refer to device data sheet for actual part marking.

Pb-Free indicator, "G" or microdot "▪", may or may not be present.

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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