

# NTNUS3171PZ

## MOSFET – Single P-Channel, Small Signal, SOT-1123, 1.0 x 0.6 mm

**-20 V, -200 mA**



**ON Semiconductor®**

<http://onsemi.com>

### Features

- Single P-Channel MOSFET
- Offers a Low  $R_{DS(on)}$  Solution in the Ultra Small 1.0 x 0.6 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

- High Side Switch
- High Speed Interfacing
- Optimized for Power Management in Ultra Portable Equipment

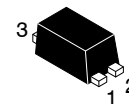
### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	-20	V
Gate-to-Source Voltage	$V_{GS}$	$\pm 8$	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	-150
		$T_A = 85^\circ\text{C}$	-110
		$t \leq 5 \text{ s}$ , $T_A = 25^\circ\text{C}$	-200
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	-125
		$t \leq 5 \text{ s}$	-200
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	$I_{DM}$	-600
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.

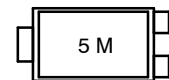
1. Surface-mounted on FR4 board using the minimum recommended pad size, or 2 mm<sup>2</sup>, 1 oz Cu.
2. Pulse Test: pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ Max}$
-20 V	3.5 $\Omega$ @ -4.5 V	-0.20 A
	4.0 $\Omega$ @ -2.5 V	
	5.5 $\Omega$ @ -1.8 V	
	7.0 $\Omega$ @ -1.5 V	



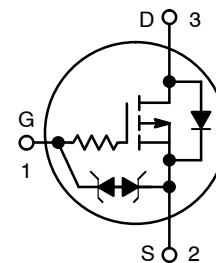
**SOT-1123  
CASE 524AA**

### MARKING DIAGRAM



- 5 = Specific Device Code (Rotated 90° Clockwise)
- M = Date Code

### P-Channel MOSFET



### ORDERING INFORMATION

Device	Package	Shipping†
NTNUS3171PZT5G	SOT-1123 (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 Specification Brochure, BRD8011/D.

# NTNUS3171PZ

## 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)	$R_{\theta JA}$	600	

3. Surface-mounted on FR4 board using the minimum recommended pad size, or 2 mm<sup>2</sup>, 1 oz Cu.

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
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	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = -5.0\text{ V}$   $T_J = 25^\circ\text{C}$			-50	nA
		$V_{GS} = 0\text{ V}, V_{DS} = -5.0\text{ V}$   $T_J = 85^\circ\text{C}$			-100	
		$V_{GS} = 0\text{ V}, V_{DS} = -16\text{ V}$   $T_J = 25^\circ\text{C}$			-200	
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 5.0\text{ V}$			$\pm 100$	nA

## ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\ \mu\text{A}$	-0.4	-0.7	-1.0	V
Drain-to-Source On Resistance	$R_{DS(ON)}$	$V_{GS} = -4.5\text{ V}, I_D = -100\text{ mA}$		2.0	3.5	$\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -50\text{ mA}$		2.6	4.0	
		$V_{GS} = -1.8\text{ V}, I_D = -20\text{ mA}$		3.4	5.5	
		$V_{GS} = -1.5\text{ V}, I_D = -10\text{ mA}$		4.0	7.0	
		$V_{GS} = -1.2\text{ V}, I_D = -1.0\text{ mA}$		6.0		
Forward Transconductance	$g_{FS}$	$V_{DS} = -5.0\text{ V}, I_D = -125\text{ mA}$		0.26		S
Source-Drain Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = -200\text{ mA}$	-0.5		-1.4	V

## CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	$C_{ISS}$	$f = 1\text{ MHz}, V_{GS} = 0\text{ V}$ $V_{DS} = -15\text{ V}$		13		pF
Output Capacitance	$C_{OSS}$			3.4		
Reverse Transfer Capacitance	$C_{RSS}$			1.6		

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

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -4.5\text{ V}, V_{DD} = -15\text{ V},$ $I_D = -200\text{ mA}, R_G = 2.0\ \Omega$		30		ns
Rise Time	$t_r$			56		
Turn-Off Delay Time	$t_{d(OFF)}$			196		
Fall Time	$t_f$			145		

4. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

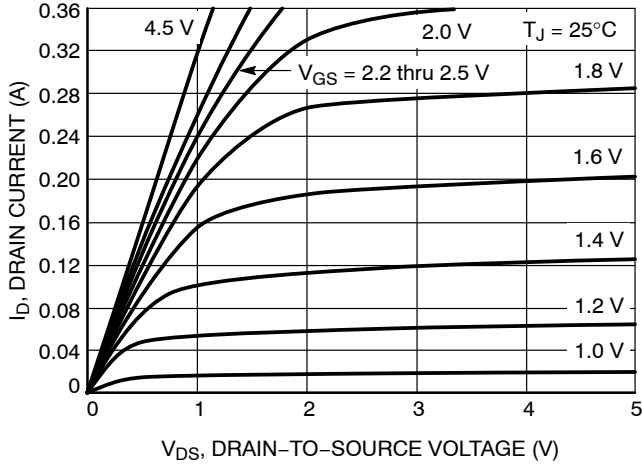


Figure 1. On-Region Characteristics

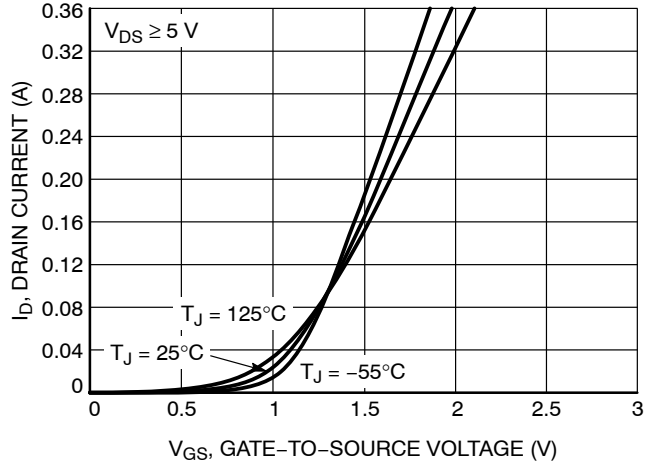


Figure 2. Transfer Characteristics

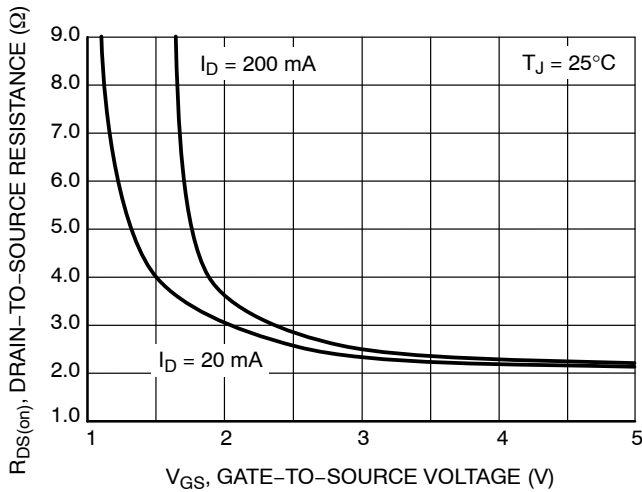


Figure 3. On-Resistance vs. Gate Voltage

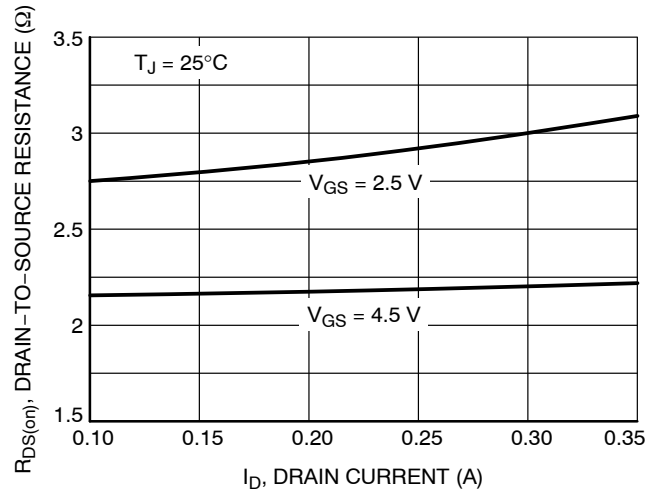


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

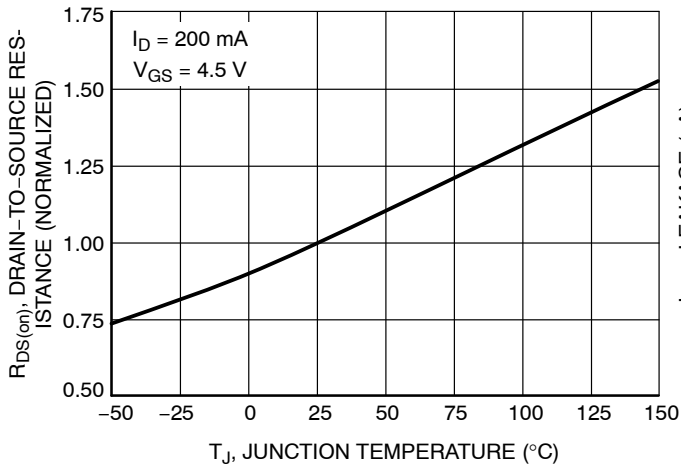


Figure 5. On-Resistance Variation with Temperature

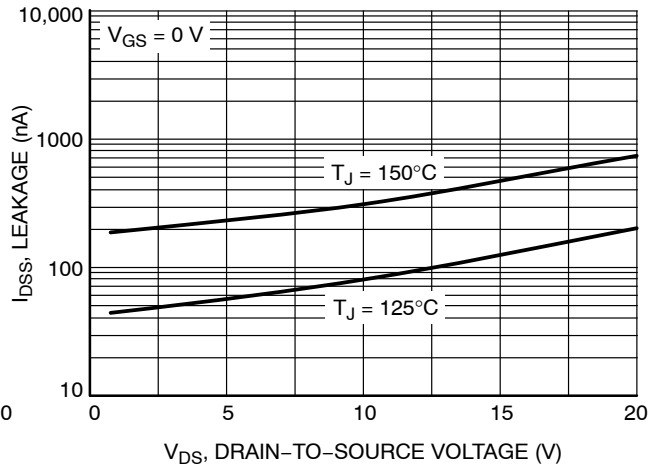


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

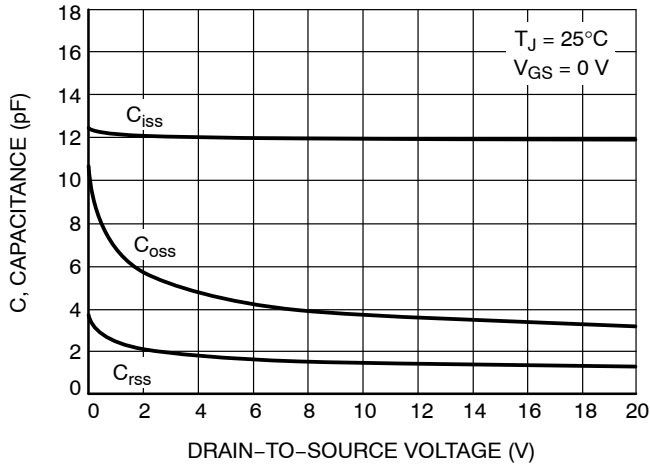


Figure 7. Capacitance Variation

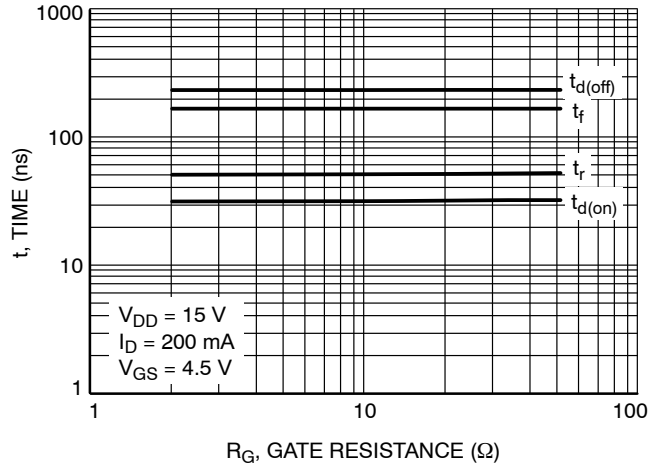


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

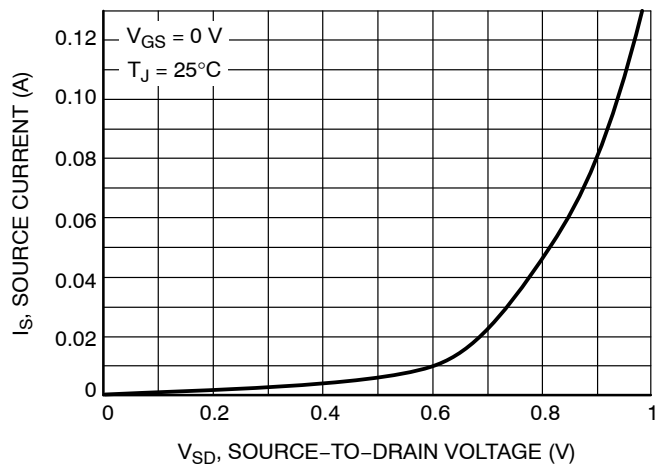
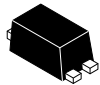


Figure 9. Diode Forward Voltage vs. Current

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

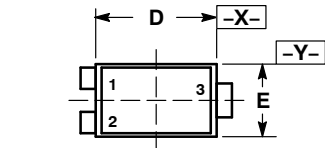
ON Semiconductor®



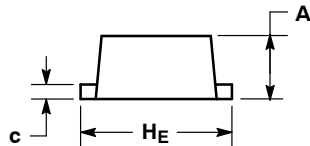
SCALE 8:1

SOT-1123  
CASE 524AA  
ISSUE C

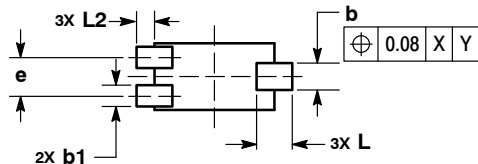
DATE 29 NOV 2011



TOP VIEW

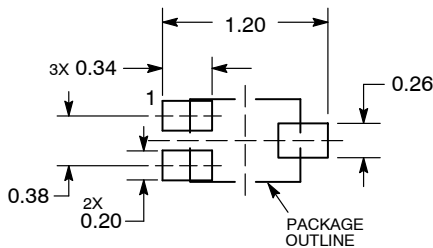


SIDE VIEW



BOTTOM VIEW

### SOLDERING FOOTPRINT\*



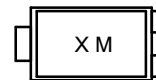
DIMENSIONS: MILLIMETERS

### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS	
	MIN	MAX
A	0.34	0.40
b	0.15	0.28
b1	0.10	0.20
c	0.07	0.17
D	0.75	0.85
E	0.55	0.65
e	0.35	0.40
HE	0.95	1.05
L	0.185	REF
L2	0.05	0.15

### GENERIC MARKING DIAGRAM\*



X = Specific Device Code  
M = Date 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.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLE 1: PIN 1. BASE 2. EMITTER 3. COLLECTOR	STYLE 2: PIN 1. ANODE 2. N/C 3. CATHODE	STYLE 3: PIN 1. ANODE 2. ANODE 3. CATHODE	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. ANODE	STYLE 5: PIN 1. GATE 2. SOURCE 3. DRAIN
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