

# NTND31211PZ

## MOSFET – Dual, P-Channel, Small Signal, XLLGAS6, 0.65mm x 0.90mm x 0.4mm

**-20 V, -127 mA**



ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

### Features

- Dual P-Channel MOSFET
- Offers a Low  $R_{DS(ON)}$  Solution in the Ultra Small 0.65 mm x 0.90 mm Package
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Small Signal Load Switch
- Analog Switch
- High Speed Interfacing
- Optimized for Power Management in Ultra Portable Products

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

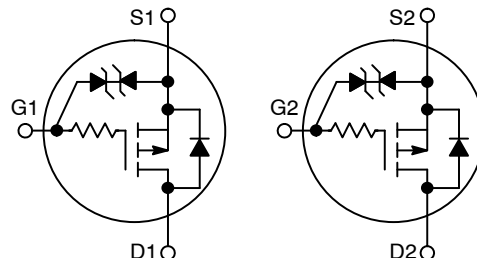
Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			$V_{DSS}$	-20	V
Gate-to-Source Voltage			$V_{GS}$	$\pm 8$	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	-127	mA
		$T_A = 85^\circ\text{C}$		-91	
	$t \leq 5$ s	$T_A = 25^\circ\text{C}$		-146	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	$P_D$	125	mW
	$t \leq 5$ s			166	
Pulsed Drain Current			$t_p = 10$ $\mu\text{s}$	$I_{DM}$	-488 mA
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 those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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  $\leq 2\%$

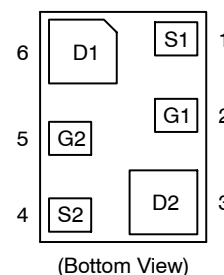
$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	$I_D$ Max
-20 V	5.0 $\Omega$ @ -4.5 V	-127 mA
	6.0 $\Omega$ @ -2.5 V	
	7.0 $\Omega$ @ -1.8 V	
	10.0 $\Omega$ @ -1.5 V	

### P-Channel MOSFET

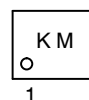


XLLGA6  
Case 713AC

### PINOUT DIAGRAM



### MARKING DIAGRAM



K = Specific Device Code  
M = Date Code

### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

# NTND31211PZ

## THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient (Note 3) Steady State $t \leq 5$ s	$R_{\theta JA}$	998 751	$^{\circ}\text{C/W}$

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
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### OFF CHARACTERISTICS

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

### ON CHARACTERISTICS

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	$R_{DS(ON)}$	$V_{GS} = -4.5$ V, $I_D = -100$ mA		2.1	5.0	$\Omega$
		$V_{GS} = -2.5$ V, $I_D = -50$ mA		2.7	6.0	
		$V_{GS} = -1.8$ V, $I_D = -20$ mA		3.4	7.0	
		$V_{GS} = -1.5$ V, $I_D = -10$ mA		4.2	10.0	
Forward Transconductance	$g_{FS}$	$V_{DS} = -5.0$ V, $I_D = -125$ mA		0.35		S
Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0$ V, $I_S = -10$ mA		-0.6	-1.0	V

### CAPACITANCES

Input Capacitance	$C_{ISS}$	$V_{GS} = 0$ V, $f = 1$ MHz, $V_{DS} = -15$ V		12.8		pF
Output Capacitance	$C_{OSS}$			2.8		
Reverse Transfer Capacitance	$C_{RSS}$			2.0		

### SWITCHING CHARACTERISTICS, $V_{GS} = 4.5$ V

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -4.5$ V, $V_{DD} = -15$ V, $I_D = -200$ mA, $R_G = 2.0$ $\Omega$		37		ns
Rise Time	$t_r$			71		
Turn-Off Delay Time	$t_{d(OFF)}$			280		
Fall Time	$t_f$			171		

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NTND31211PZTAG	XLLGA6 (Pb-Free)	8000 / Tape & Reel

<sup>†</sup>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.

# NTND31211PZ

## TYPICAL CHARACTERISTICS

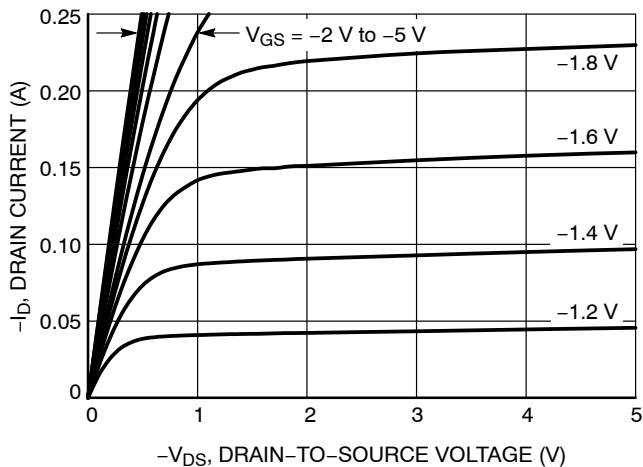


Figure 1. On-Region Characteristics

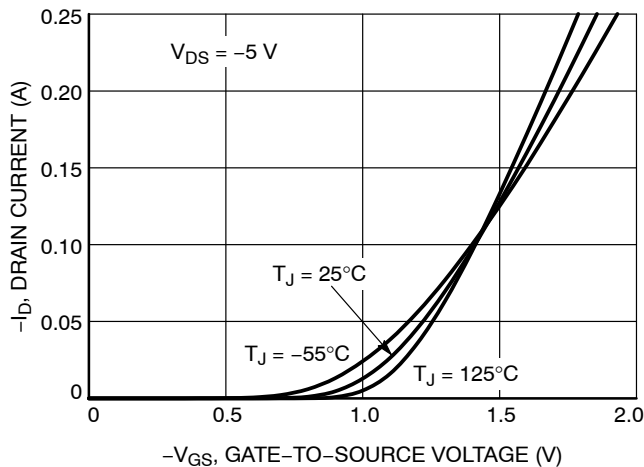


Figure 2. Transfer Characteristics

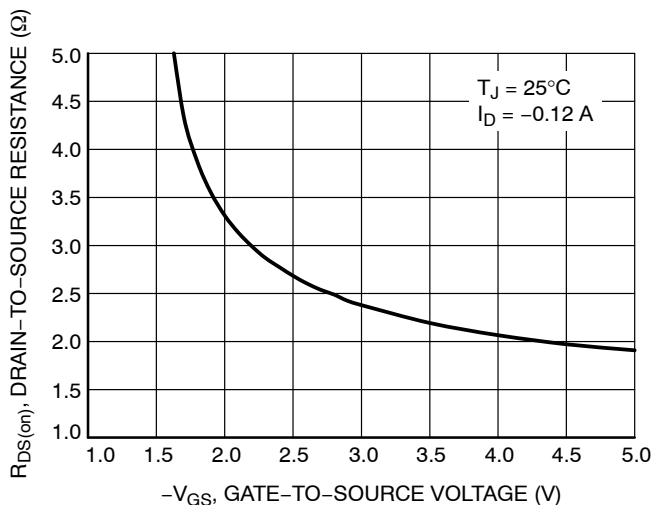


Figure 3. On-Resistance vs. Gate-to-Source Voltage

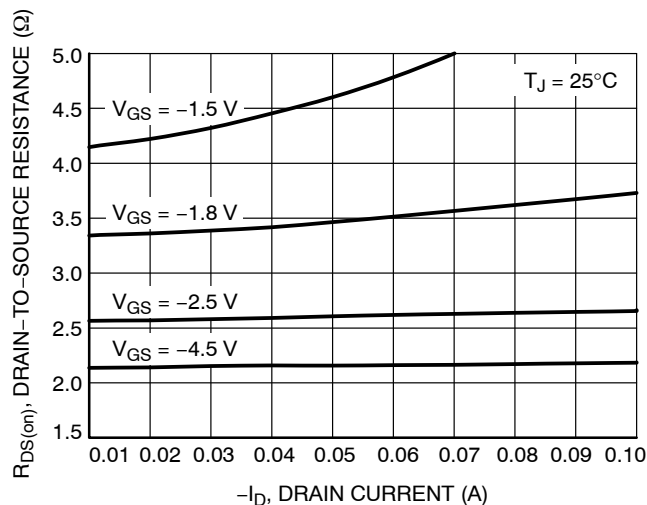


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

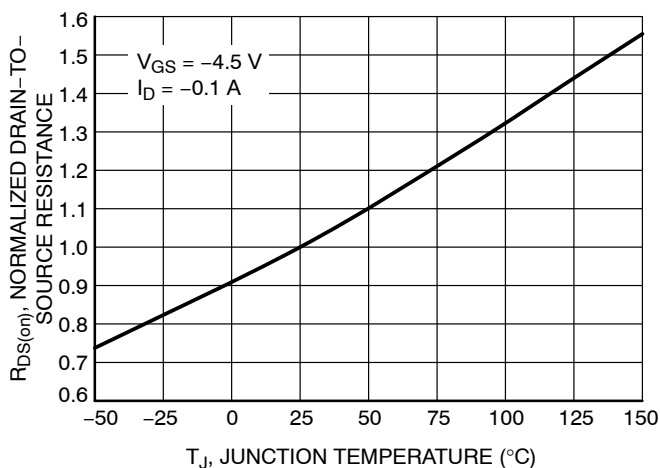


Figure 5. On-Resistance Variation with Temperature

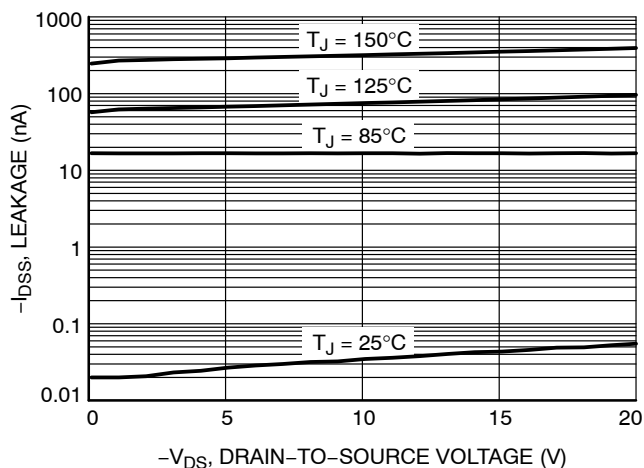


Figure 6. Drain-to-Source Leakage Current vs. Voltage

# NTND31211PZ

## TYPICAL CHARACTERISTICS

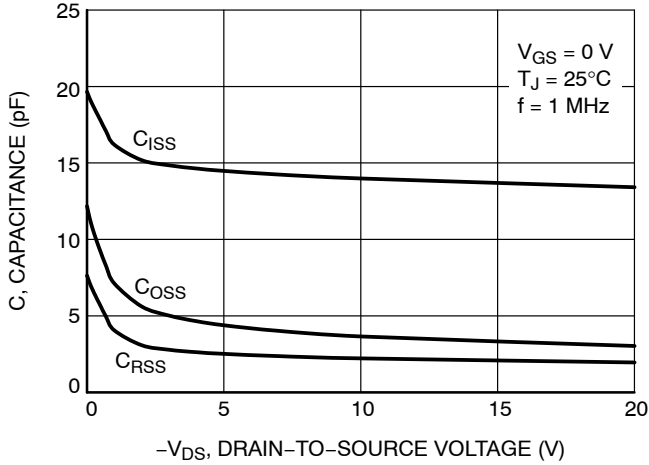


Figure 7. Capacitance Variation

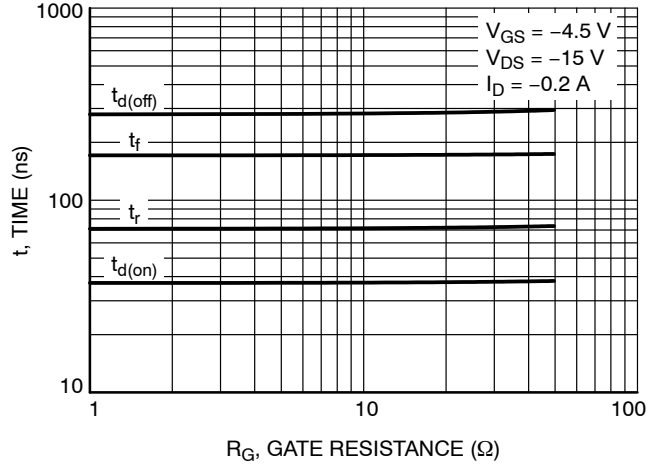


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

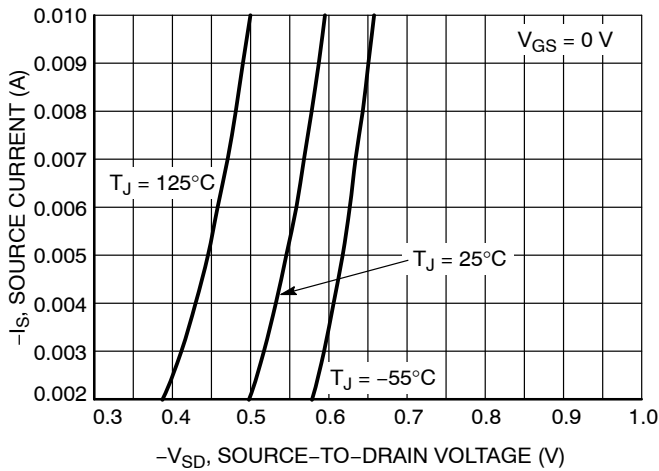


Figure 9. Diode Forward Voltage vs. Current

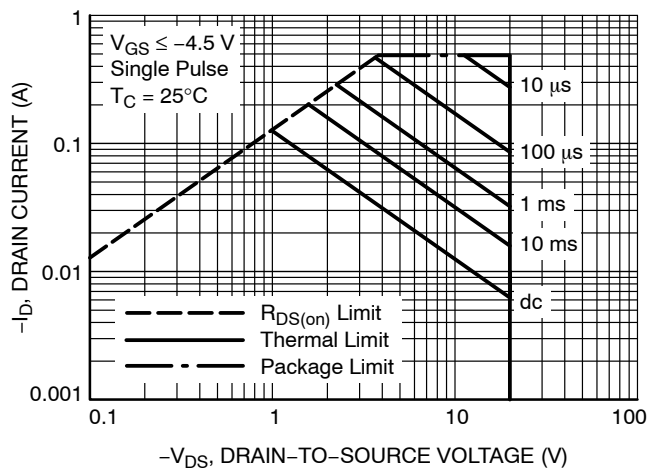


Figure 10. Maximum Rated Forward Biased Safe Operating Area

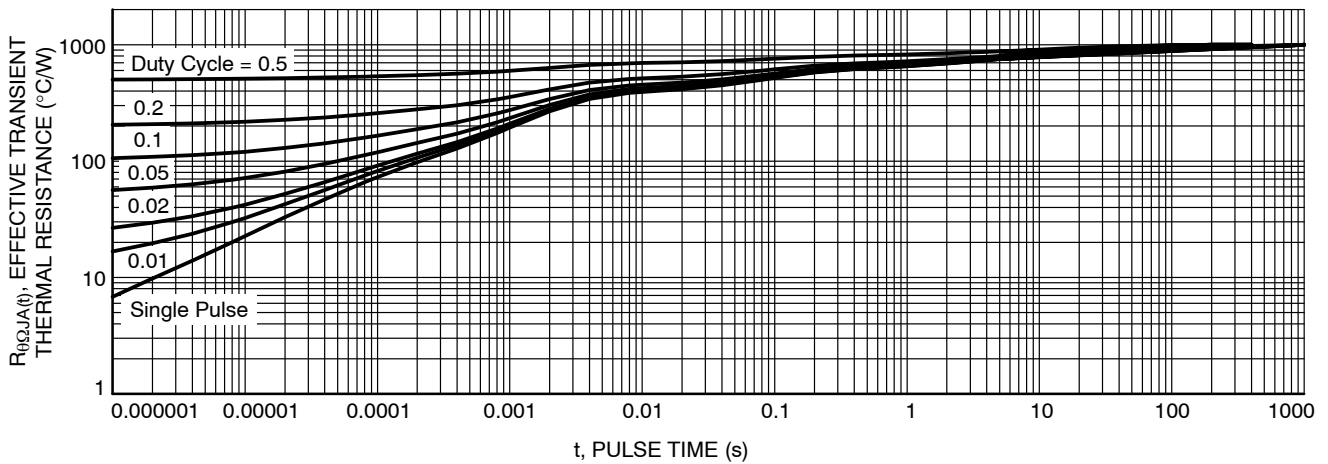
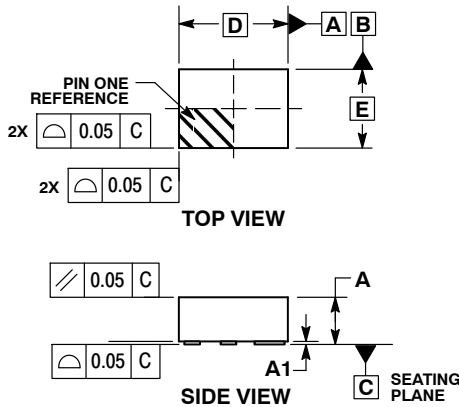


Figure 11. Thermal Response

# NTND31211PZ

## PACKAGE DIMENSIONS

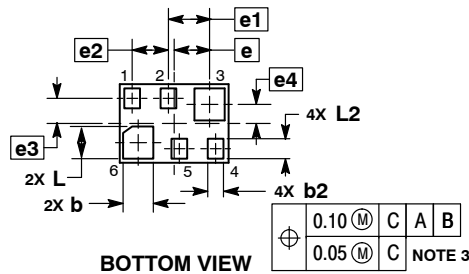
XLLGA6 0.90x0.65  
CASE 713AC  
ISSUE O



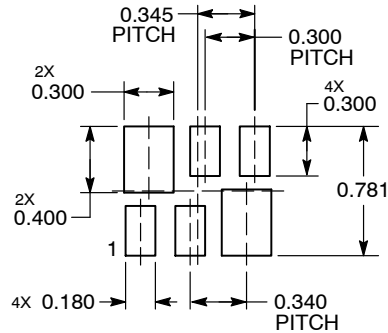
**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. POSITIONAL TOLERANCE APPLIES TO ALL SIX LEADS.

DIM	MILLIMETERS	
	MIN	MAX
A	0.340	0.440
A1	0.000	0.050
b	0.200	0.300
b2	0.080	0.180
D	0.900 BSC	
E	0.650 BSC	
e	0.295 BSC	
e1	0.340 BSC	
e2	0.300 BSC	
e3	0.208 BSC	
e4	0.158 BSC	
L	0.215	0.315
L2	0.115	0.215



### RECOMMENDED 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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