NTNS3A91PZ

Small Signal MOSFET

−20 V, −223 mA, Single P−Channel, 0.62 x 0.62 x 0.4 mm XLLGA3 Package

Features

- Single P−Channel MOSFET
- Ultra Small and Thin Package (0.62 x 0.62 x 0.4 mm)
- Low $R_{DS(on)}$ Solution in 0.62 x 0.62 mm Package
- 1.5 V Gate Voltage Rating
- 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°C unless otherwise stated)

Parameter			Symbol	Value	Units
Drain-to-Source Voltage			V_{DSS}	−20	V
Gate-to-Source Voltage			V_{GS}	±8.0	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	−223	mA
		T_A = 85°C		−161	
	t ≤ 5 s	T_A = 25°C		−240	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	121	mW
	t ≤ 5 s	T_A = 25°C		140	
Pulsed Drain Current		t_p = 10 μs	I_{DM}	−669	mA
Operating Junction and Storage Temperature			T_J, T_{STG}	-55 to 150	°C
Source Current (Body Diode)			I_S	−121	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.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Units
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	1035	°C/W
Junction-to-Ambient – t ≤ 5 s (Note 1)	$R_{\theta JA}$	895	

1. Surface Mounted on FR4 Board using the minimum recommended pad size, (or 2 mm^2), 1 oz Cu.
2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

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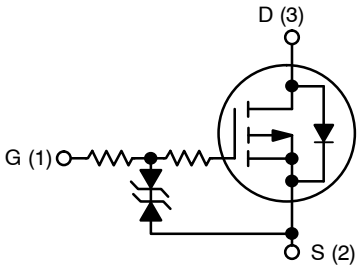
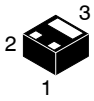
MOSFET

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
−20 V	1.6 Ω @ −4.5 V	−223 mA
	2.4 Ω @ −2.5 V	
	3.3 Ω @ −1.8 V	
	4.5 Ω @ −1.5 V	

P−Channel MOSFET



MARKING DIAGRAM



XLLGA3
CASE 713AB

D = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
NTNS3A91PZT5G	XLLGA3 (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.

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = −250 μA		−20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = −250 μA, ref to 25°C			11		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = −20 V	T_J = 25°C			−1.0	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±8.0 V				±2.0	μA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = −250 μA		−0.4		−1.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				2.1		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	V_{GS} = −4.5 V, I_D = −100 mA			1.1	1.6	Ω
		V_{GS} = −2.5 V, I_D = −50 mA			1.5	2.4	
		V_{GS} = −1.8 V, I_D = −20 mA			2.0	3.3	
		V_{GS} = −1.5 V, I_D = −10 mA			2.5	4.5	
Forward Transconductance	g_{FS}	V_{DS} = −5 V, I_D = −100 mA			0.41		S
Source−Drain Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = −10 mA			−0.6	−1.0	V
CHARGES & CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 10 kHz, V_{DS} = −15 V			41		pF
Output Capacitance	C_{OSS}				4.6		
Reverse Transfer Capacitance	C_{RSS}				4.1		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −4.5 V, V_{DS} = −15 V, I_D = −200 mA			1.1		nC
Threshold Gate Charge	$Q_{G(TH)}$				0.1		
Gate−to−Source Charge	Q_{GS}				0.2		
Gate−to−Drain Charge	Q_{GD}				0.23		
SWITCHING CHARACTERISTICS, VGS = 4.5 V (Note 3)							
Turn-On Delay Time	$t_{d(ON)}$	V_{GS} = −4.5 V, V_{DD} = −15 V, I_D = −200 mA, R_G = 2 Ω			41		ns
Rise Time	t_r				97		
Turn-Off Delay Time	$t_{d(OFF)}$				571		
Fall Time	t_f				286		

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

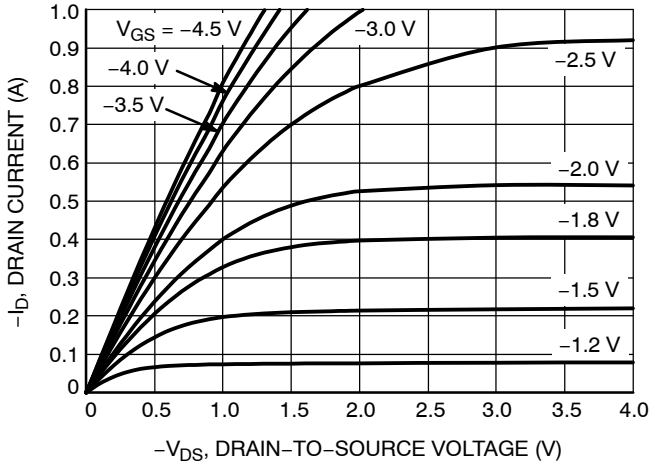


Figure 1. On−Region Characteristics

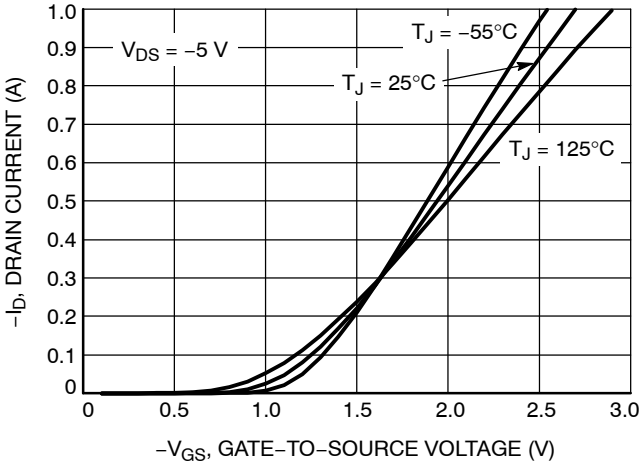


Figure 2. Transfer Characteristics

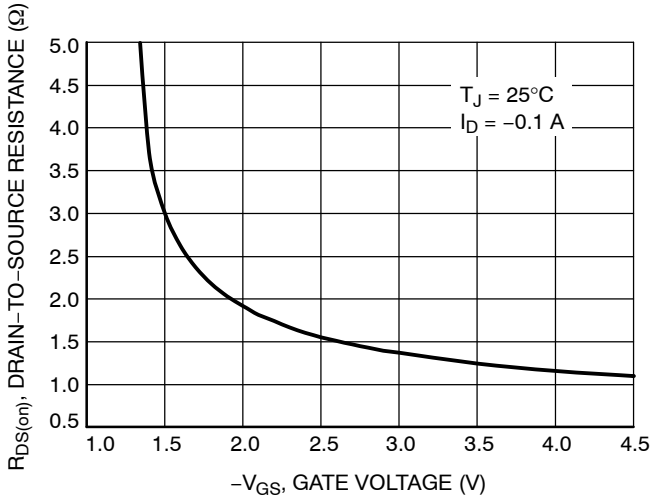


Figure 3. On−Resistance vs. Gate−to−Source Voltage

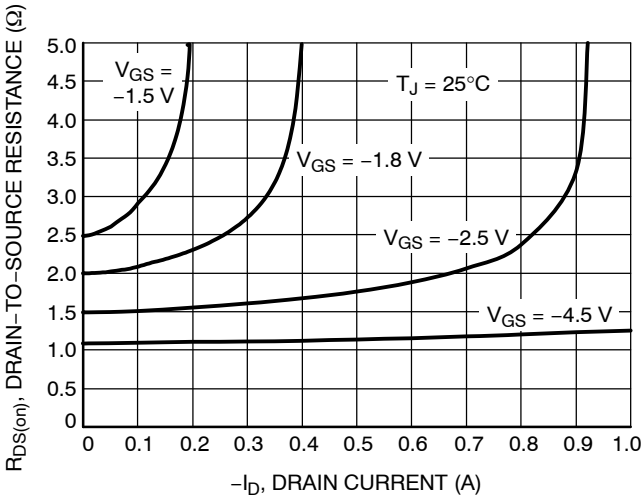


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

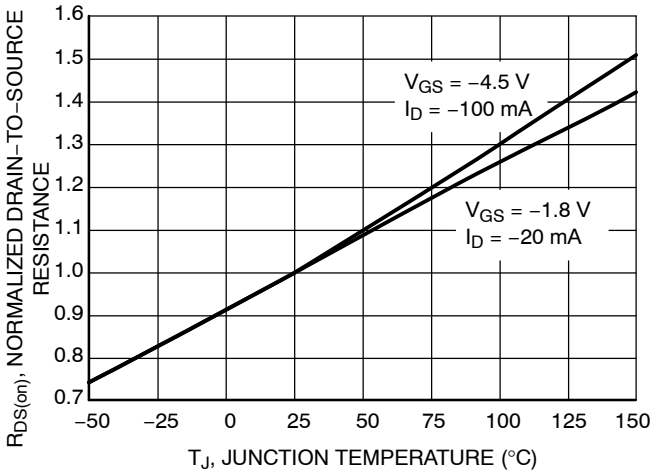


Figure 5. On Resistance Variation with Temperature

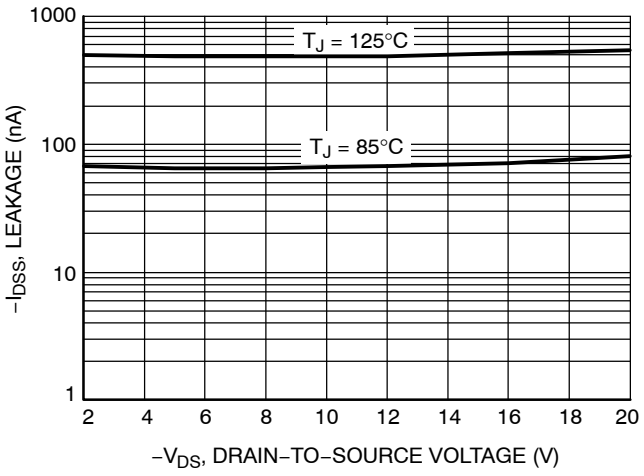


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

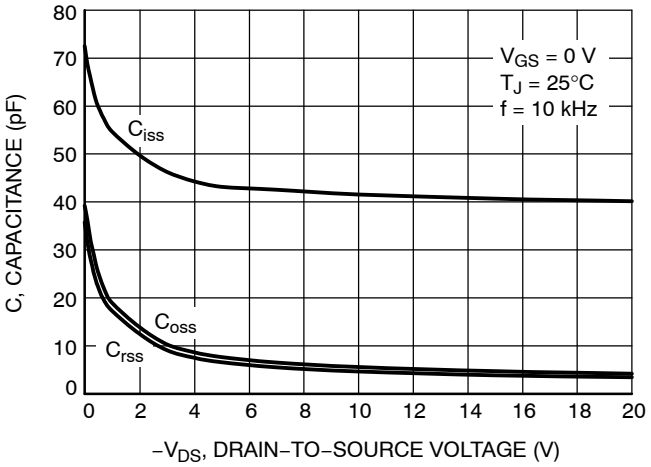


Figure 7. Capacitance Variation

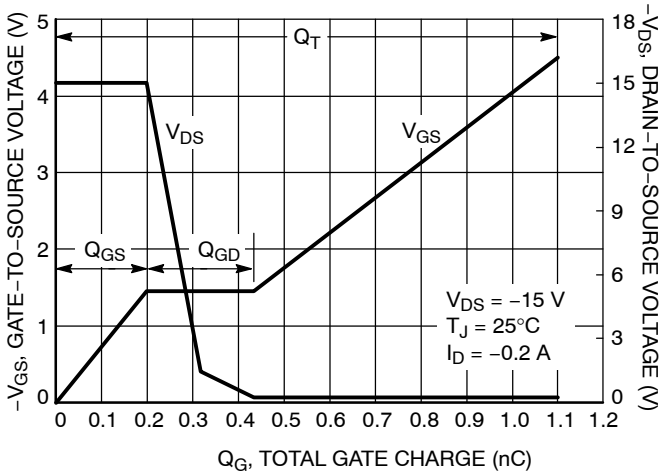


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

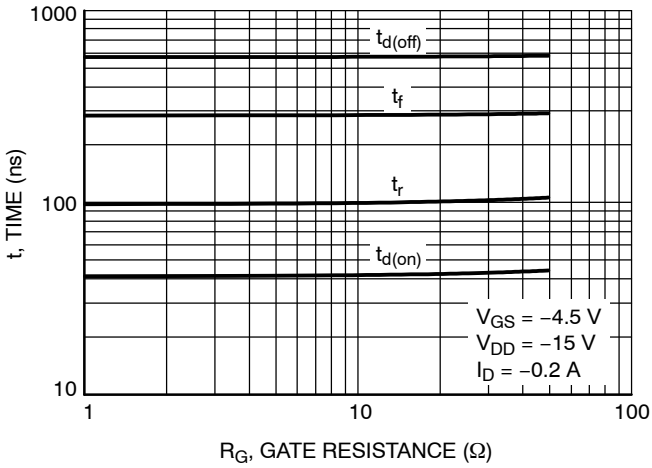


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

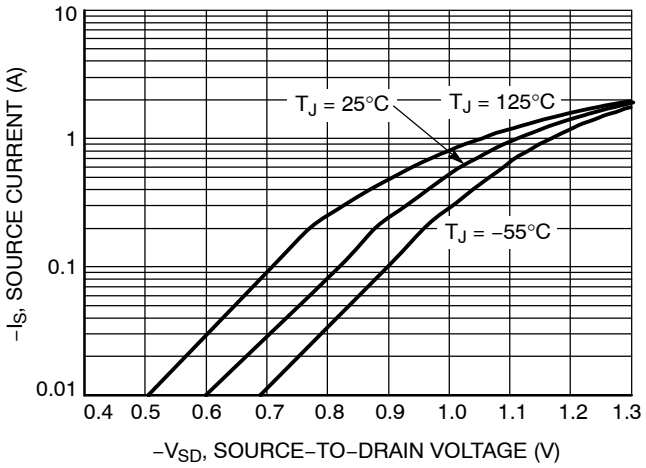


Figure 10. Diode Forward Voltage vs. Current

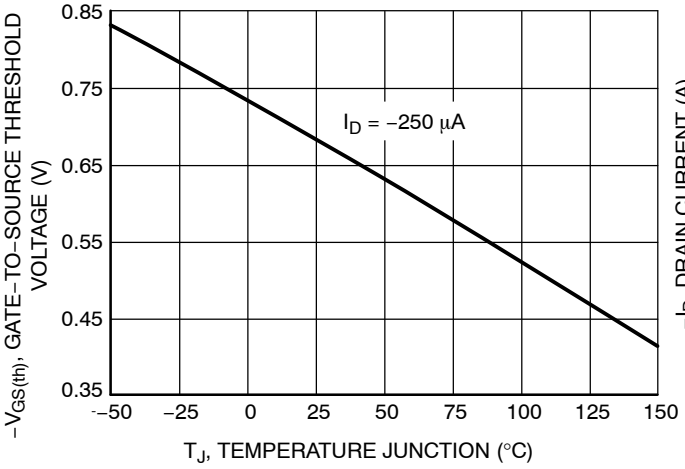


Figure 11. Threshold Voltage

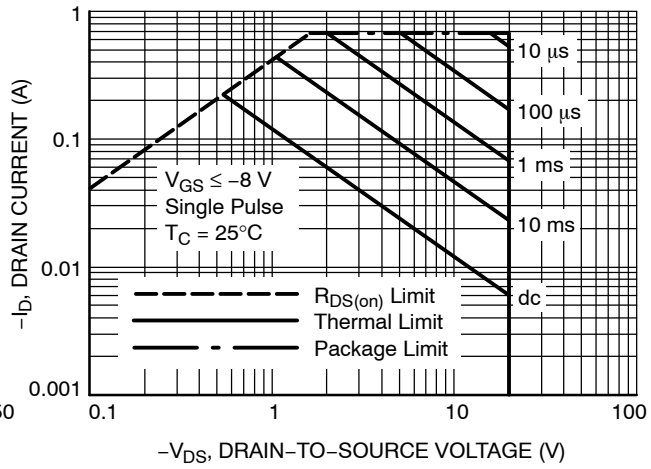


Figure 12. Maximum Rated Forward Biased Safe Operating Area

TYPICAL CHARACTERISTICS

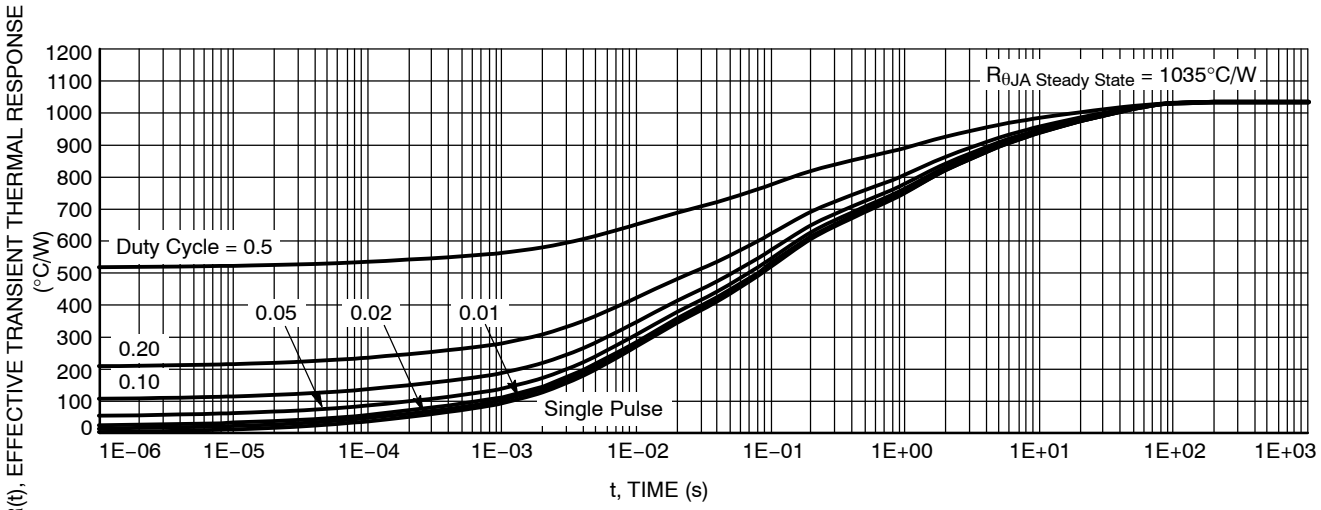
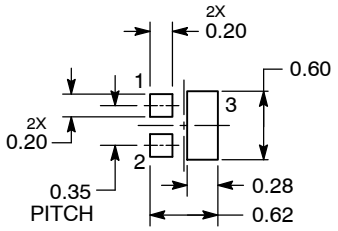


Figure 13. FET Thermal Response

MINIMUM RECOMMENDED SOLDER FOOTPRINT*

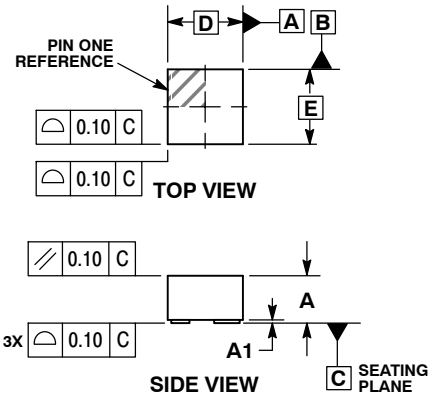


DIMENSIONS: MILLIMETERS

*Dependent upon end user capabilities, this footprint could be used as a minimum.

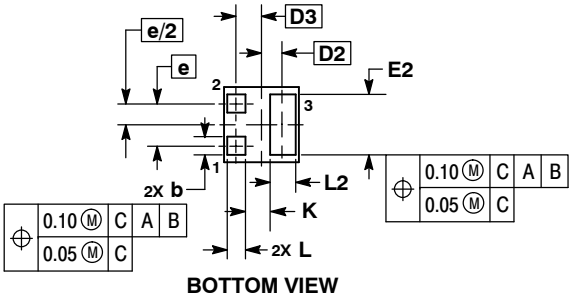
PACKAGE DIMENSIONS

XLLGA3, 0.62x0.62, 0.35P
CASE 713AB
ISSUE O

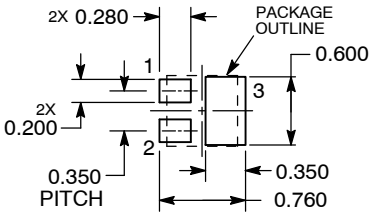


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.340	0.440
A1	0.000	0.030
b	0.100	0.200
D	0.620 BSC	
D2	0.175 BSC	
D3	0.205 BSC	
E	0.620 BSC	
E2	0.400	0.600
e	0.350 BSC	
K	0.200 REF	
L	0.090	0.210
L2	0.110	0.310



RECOMMENDED SOLDER FOOTPRINT*



DIMENSIONS: MILLIMETERS

*Additional information concerning board mounting for this package may be found in Document AND9099/D, “Board Level Application Note for XLLGA 3-Lead 0.62x0.62 Package”.
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

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