NTNS3164NZ

Small Signal MOSFET

20 V, 361 mA, Single N−Channel, SOT−883 (XDFN3) 1.0 x 0.6 x 0.4 mm Package

ON Semiconductor®

http://onsemi.com

Features

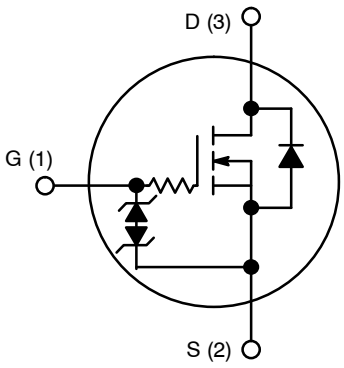
- Single N−Channel MOSFET
- Ultra Low Profile SOT−883 (XDFN3) 1.0 x 0.6 x 0.4 mm for Extremely Thin Environments Such as Portable Electronics
- Low $R_{DS(on)}$ Solution in the Ultra Small 1.0 x 0.6 mm Package
- 1.5 V Gate Drive
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- High Side Switch
- High Speed Interfacing
- Level Shift and Translate
- Optimized for Power Management in Ultra Portable Solutions

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D Max
20 V	0.7 Ω @ 4.5 V	361 mA
	1.0 Ω @ 2.5 V	
	2.0 Ω @ 1.8 V	
	4.0 Ω @ 1.5 V	

N−CHANNEL MOSFET

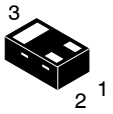


MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

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	361	mA
		T_A = 85°C		260	
	t ≤ 5 s	T_A = 25°C		427	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	155	mW
	t ≤ 5 s			217	
Pulsed Drain Current	t_p = 10 μs		I_{DM}	1082	mA
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°C
Source Current (Body Diode) (Note 2)			I_S	129	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C

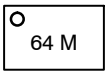
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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



SOT−883 (XDFN3)
CASE 506CB

MARKING DIAGRAM



64 = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
NTNS3164NZT5G	SOT−883 (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.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Ambient − Steady State (Note 3)	$R_{\theta JA}$	806	°C/W
Junction−to−Ambient − t ≤ 5 s (Note 3)	$R_{\theta JA}$	575	

3. Surface−mounted on FR4 board using the minimum recommended pad size, or 2 mm^2, 1 oz Cu.

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

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
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			23		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 20 V	T_J = 25°C			1	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±5 V				±10	μA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		0.4		1.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				1.8		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 200 mA			0.5	0.7	Ω
		V_{GS} = 2.5 V, I_D = 100 mA			0.7	1.0	
		V_{GS} = 1.8 V, I_D = 50 mA			1.0	2.0	
		V_{GS}= 1.5 V, I_D = 10 mA			1.2	4.0	
Forward Transconductance	g_{FS}	V_{DS} = 5 V, I_D = 200 mA			1.26		S
Source−Drain Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 100 mA			0.75	1.2	V
CHARGES & CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, freq = 1 MHz, V_{DS} = 10 V			24		pF
Output Capacitance	C_{OSS}				5.0		
Reverse Transfer Capacitance	C_{RSS}				3.4		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 10 V; I_D = 200 mA			0.8		nC
Threshold Gate Charge	$Q_{G(TH)}$				0.1		
Gate−to−Source Charge	Q_{GS}				0.2		
Gate−to−Drain Charge	Q_{GD}				0.1		
SWITCHING CHARACTERISTICS, VGS = 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 Ω			10		ns
Rise Time	t_r				11		
Turn−Off Delay Time	$t_{d(OFF)}$				67		
Fall Time	t_f				31		

4. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

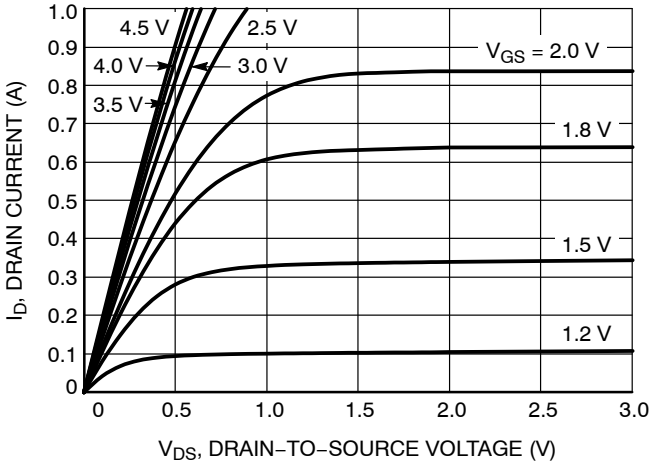


Figure 1. On−Region Characteristics

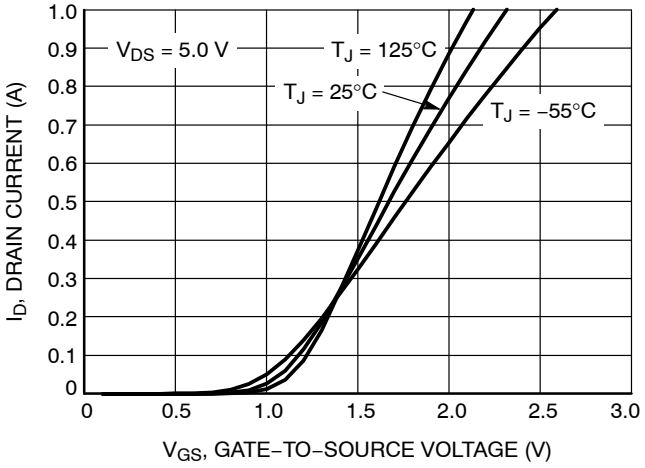


Figure 2. Transfer Characteristics

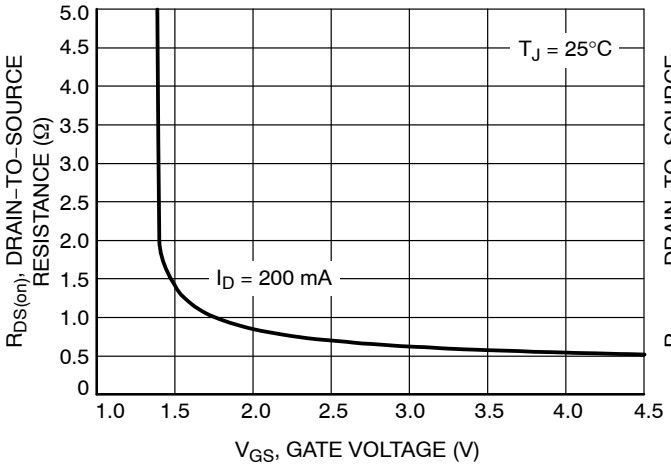


Figure 3. On−Resistance vs. Gate−to−Source Voltage

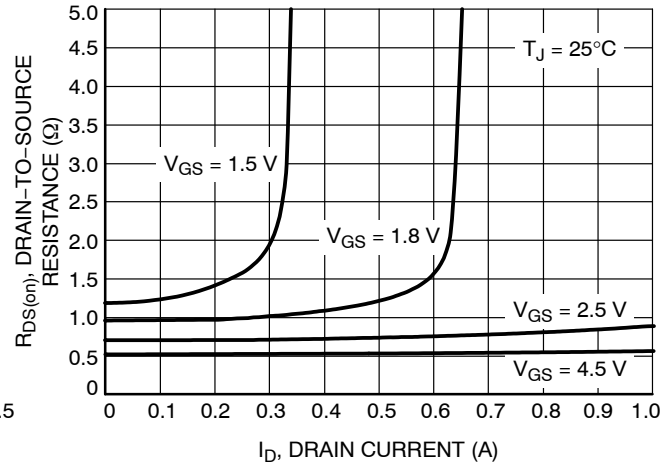


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

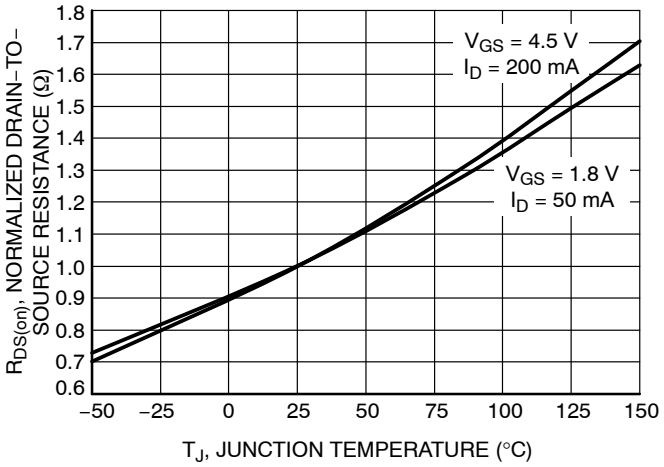


Figure 5. On−Resistance Variation with Temperature

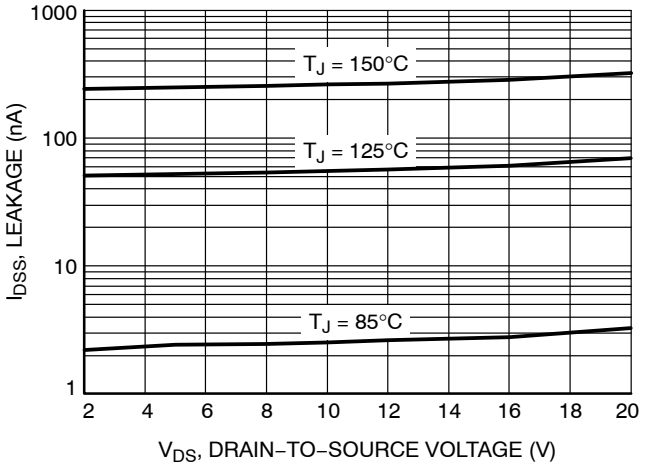


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

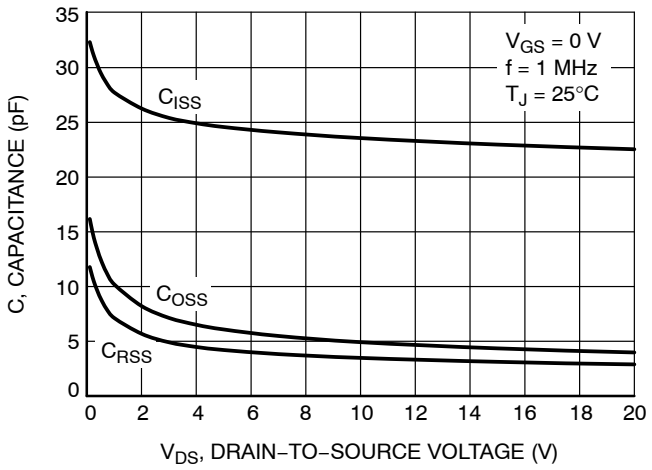


Figure 7. Capacitance Variation

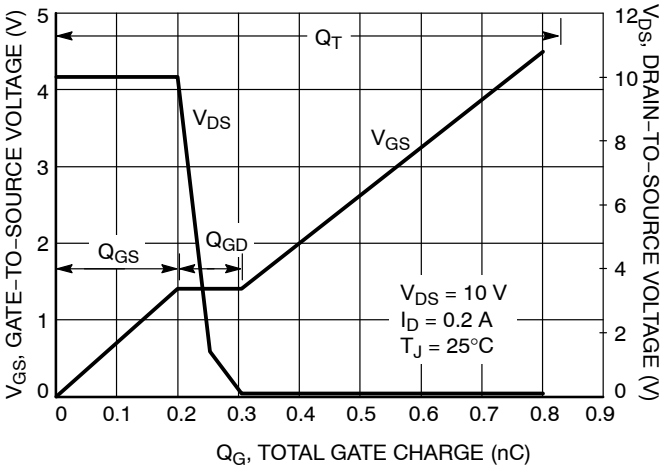


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

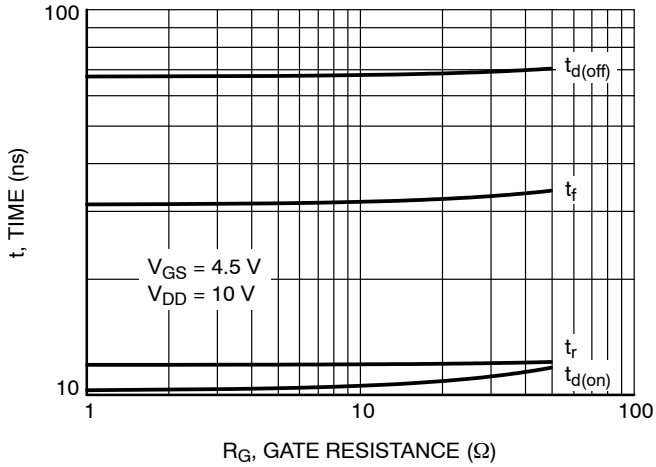


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

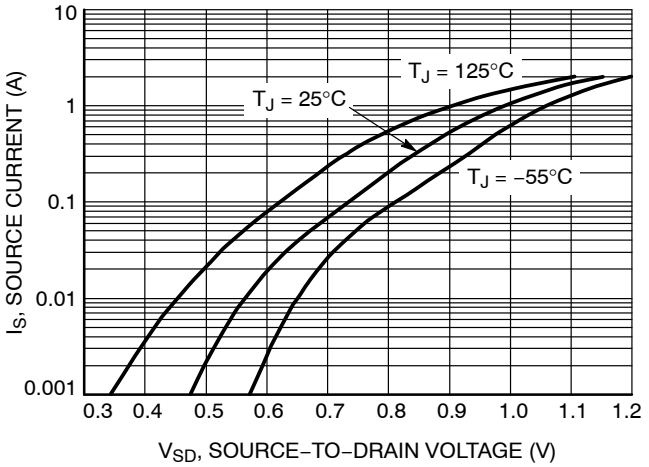


Figure 10. Diode Forward Voltage vs. Current

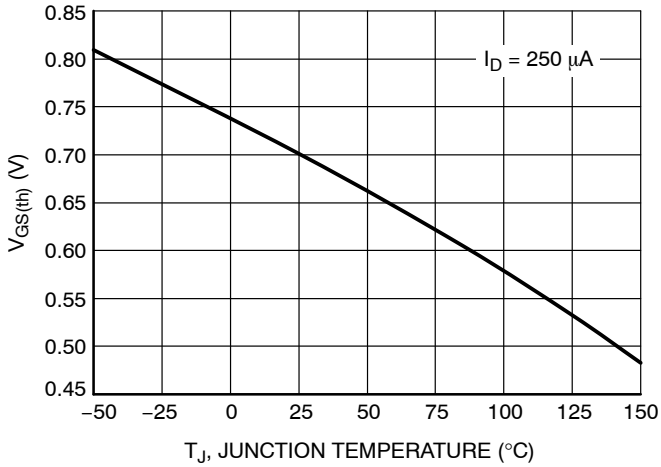


Figure 11. Threshold Voltage

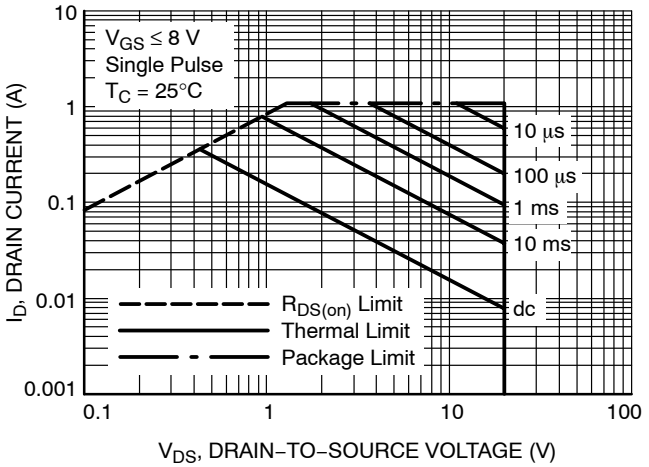


Figure 12. Maximum Rated Forward Biased Safe Operating Area

TYPICAL CHARACTERISTICS

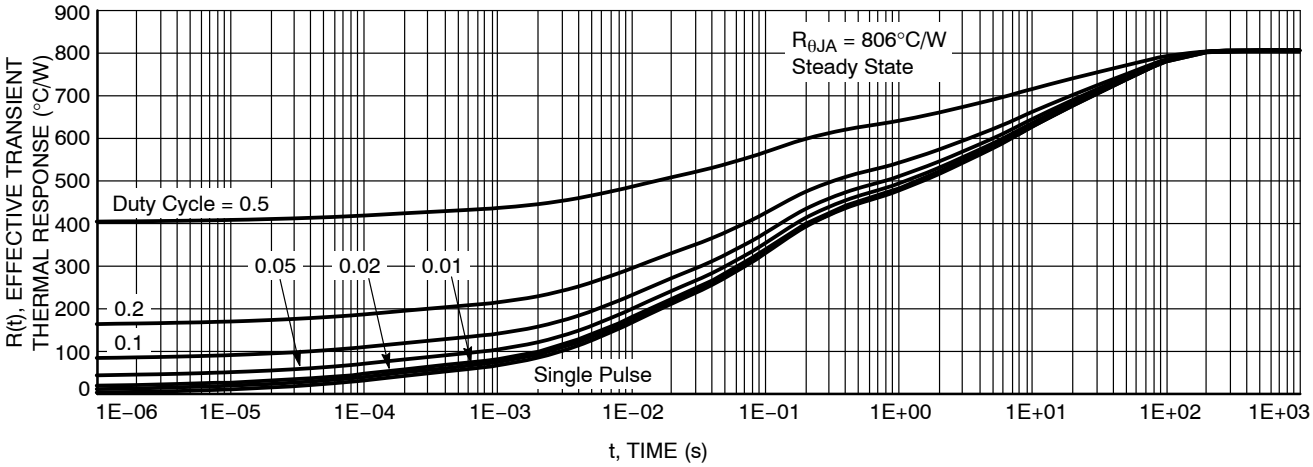
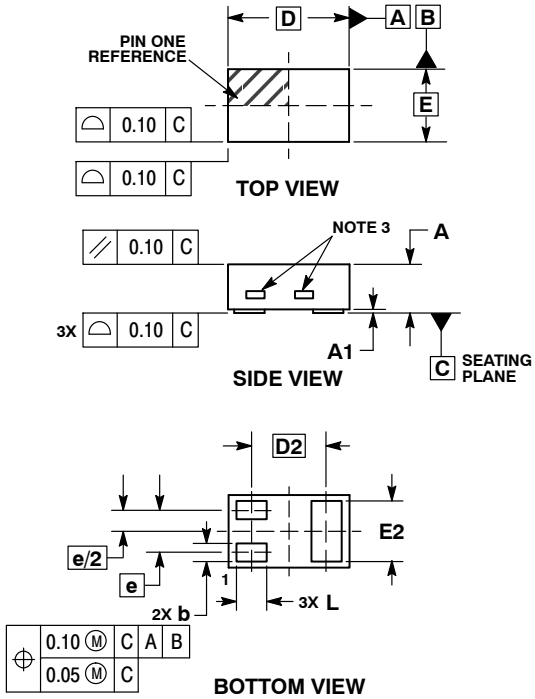


Figure 13. FET Thermal Response

PACKAGE DIMENSIONS

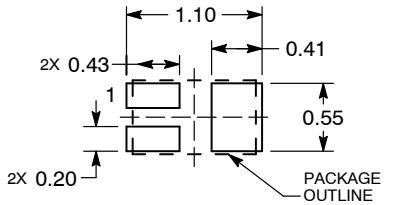
SOT−883 (XDFN3), 1.0x0.6, 0.35P
CASE 506CB
ISSUE A



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. EXPOSED COPPER ALLOWED AS SHOWN.

	MILLIMETERS	
DIM	MIN	MAX
A	0.340	0.440
A1	0.000	0.030
b	0.075	0.200
D	0.950	1.075
D2	0.620 BSC	
e	0.350 BSC	
E	0.550	0.675
E2	0.425	0.550
L	0.170	0.300

RECOMMENDED SOLDER FOOTPRINT*



DIMENSIONS: MILLIMETERS

*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:
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