NTNS1K5N021Z

MOSFET – Single, N-Channel, Small Signal, XDFN3, 0.62 x 0.42 x 0.4 mm

20 V, 220 mA

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Features

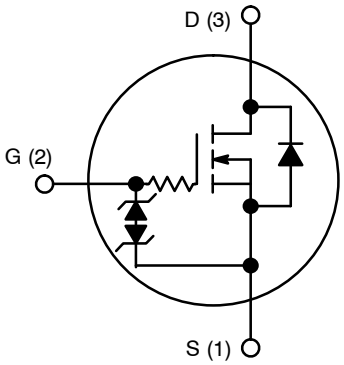
- Low Profile Ultra Small Package, XDFN3 (0.62 x 0.42 x 0.4 mm) for Extremely Space−Constrained Applications
- 1.5 V Gate Drive
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Small Signal Load Switch
- High Speed Interfacing
- Level Shift

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D Max
20 V	1.5 Ω @ 4.5 V	220 mA
	1.8 Ω @ 3.3 V	
	2.2 Ω @ 2.5 V	
	3.3 Ω @ 1.8 V	
	5.0 Ω @ 1.5 V	

N−CHANNEL MOSFET



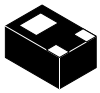
MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

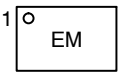
Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	20	V
Gate−to−Source Voltage			V_{GS}	±8	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	220	mA
		T_A = 85°C		158	
	t ≤ 5 s	T_A = 25°C		253	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	125	mW
	t ≤ 5 s			166	
Pulsed Drain Current	t_p = 10 μs		I_{DM}	846	mA
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°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	°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, or 2 mm^2, 1 oz Cu.
2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%

MARKING DIAGRAM





XDFN3
CASE 711BH

E = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
NTNS1K5N021ZTCG	XDFN3 (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.

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THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Ambient − Steady State (Note 3)	$R_{\theta JA}$	998	°C/W
Junction−to−Ambient − t ≤ 5 s (Note 3)	$R_{\theta JA}$	751	

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
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 5 V	T_J = 25°C			50	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 16 V	T_J = 25°C			100	nA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±5 V				±100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		0.4		1.0	V
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 100 mA			0.8	1.5	Ω
		V_{GS} = 3.3 V, I_D = 100 mA			1.0	1.8	
		V_{GS} = 2.5 V, I_D = 50 mA			1.1	2.0	
		V_{GS} = 1.8 V, I_D = 20 mA			1.4	3.0	
		V_{GS}= 1.5 V, I_D = 10 mA			1.8	4.5	
Forward Transconductance	g_{FS}	V_{DS} = 5 V, I_D = 125 mA			0.48		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, freq = 1 MHz, V_{DS} = 15 V			12.3		pF
Output Capacitance	C_{OSS}				3.4		
Reverse Transfer Capacitance	C_{RSS}				2.5		
SWITCHING CHARACTERISTICS, VGS = 4.5 V (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DD} = 15 V, I_D = 200 mA, R_G = 2 Ω			16.5		ns
Rise Time	t_r				25.5		
Turn−Off Delay Time	$t_{d(OFF)}$				142		
Fall Time	t_f				80		

4. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

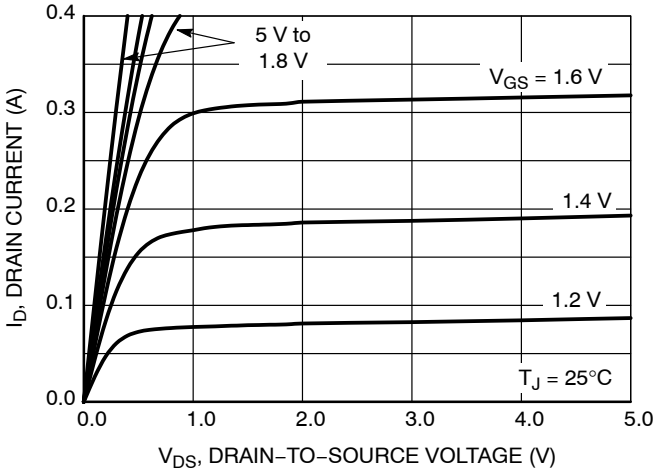


Figure 1. On−Region Characteristics

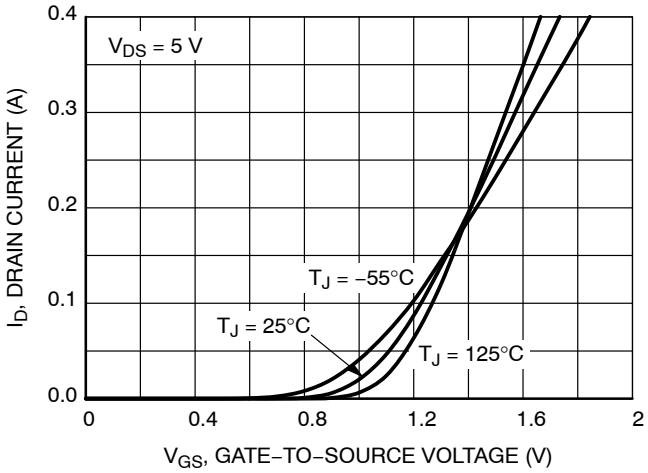


Figure 2. Transfer Characteristics

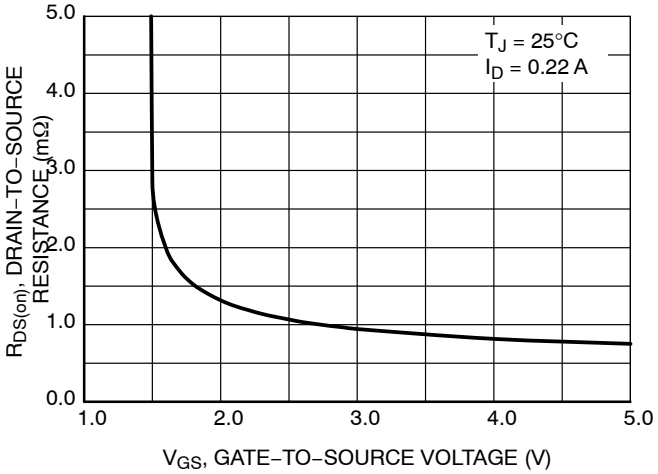


Figure 3. On−Resistance vs. Gate−to−Source Voltage

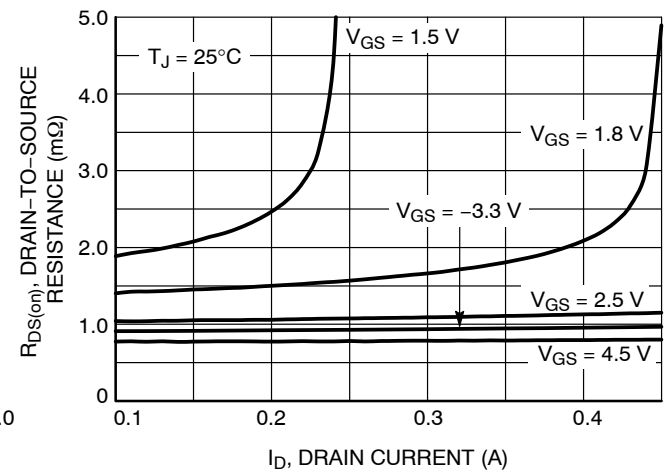


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

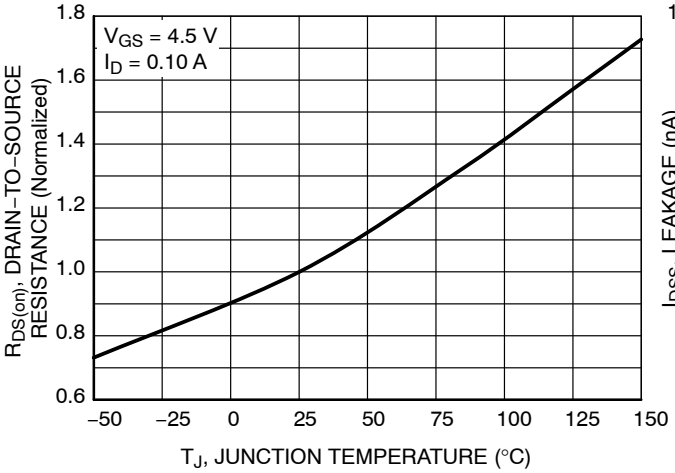


Figure 5. On−Resistance Variation with Temperature

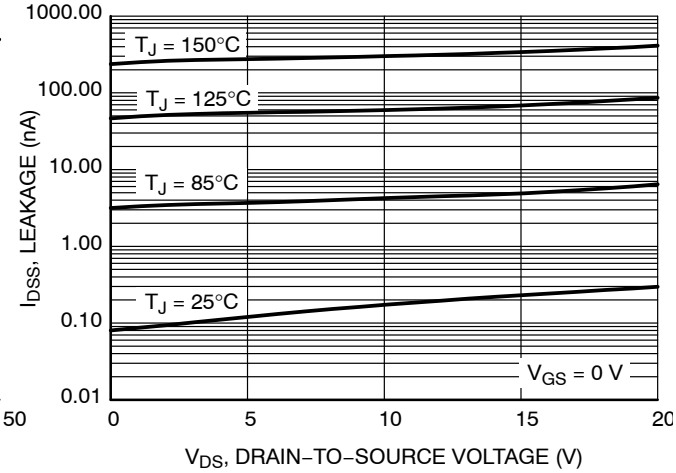


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

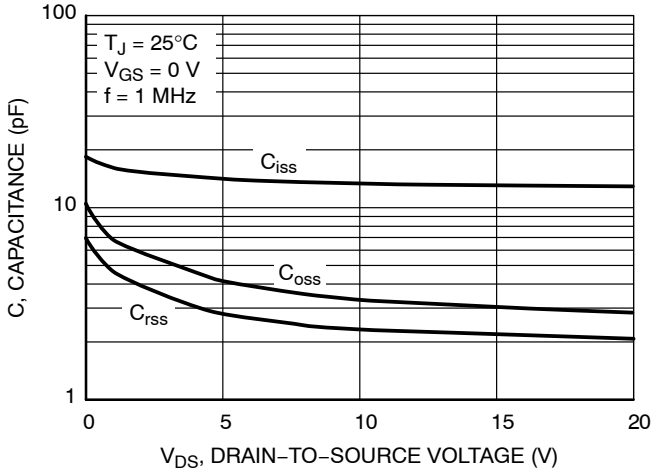


Figure 7. Capacitance Variation

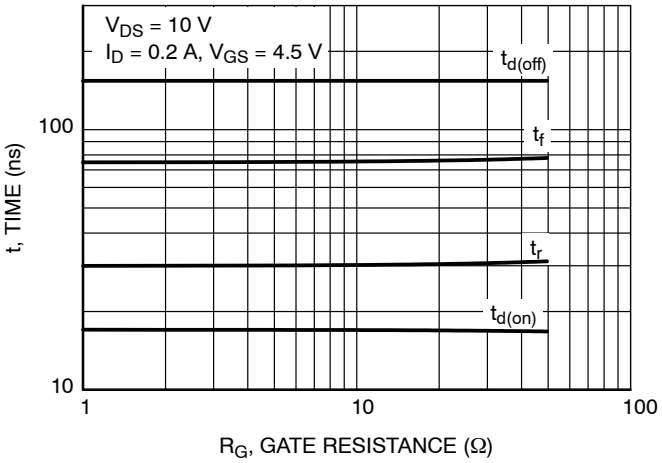


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

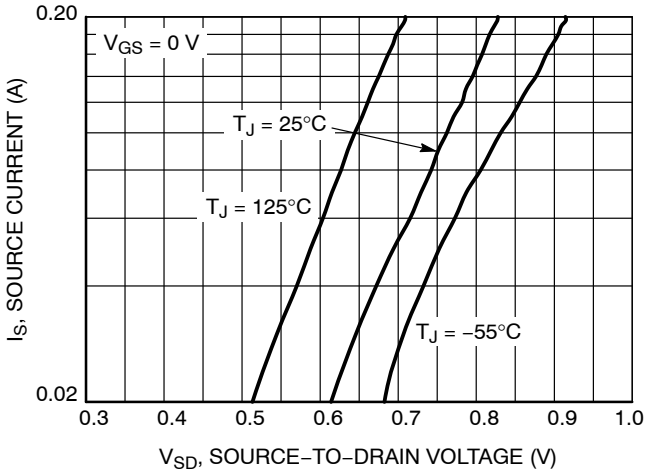


Figure 9. Diode Forward Voltage vs. Current

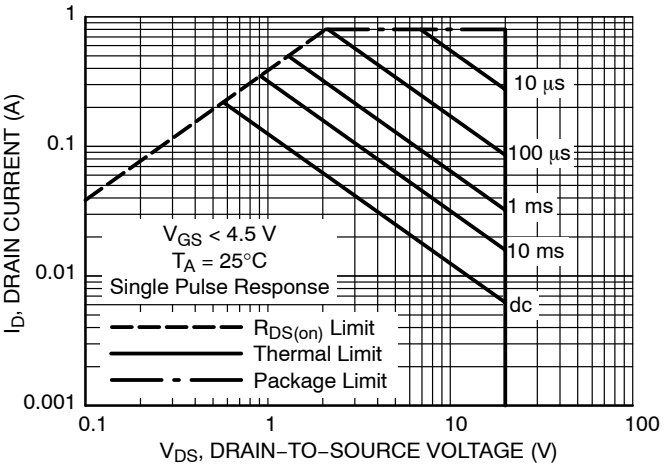


Figure 10. Maximum Rated Forward Biased Safe Operating Area

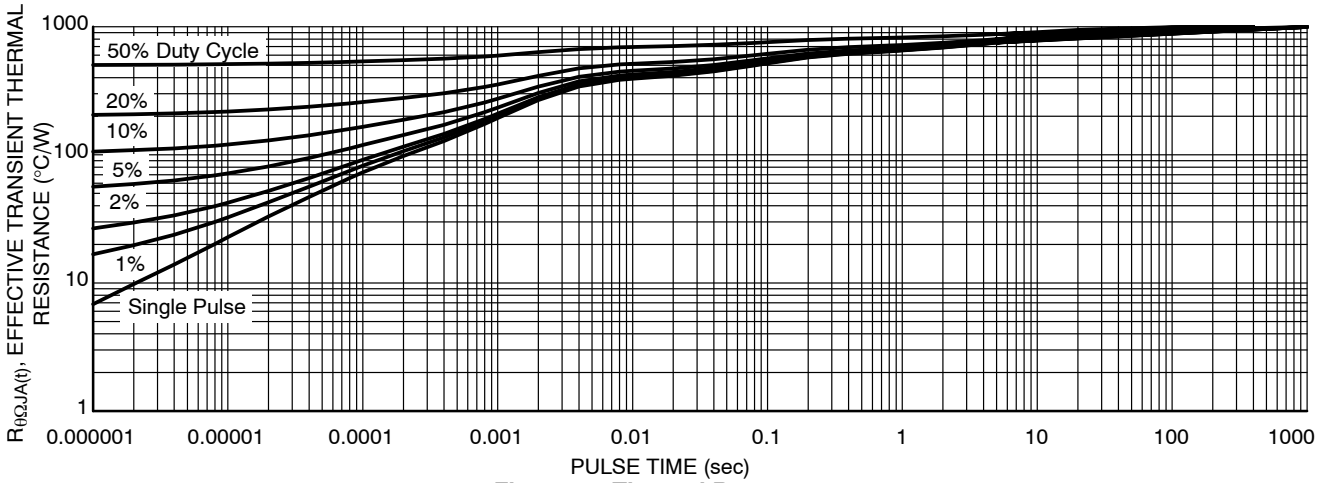
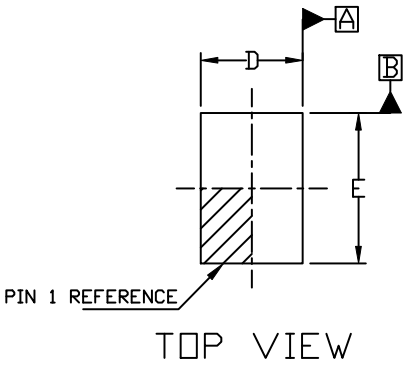


Figure 11. Thermal Response

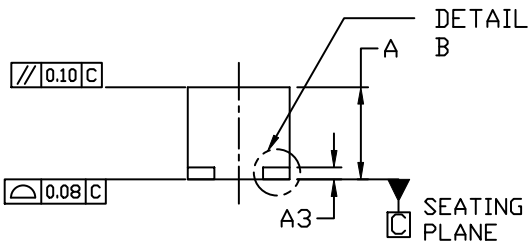
SCALE 8:1

XDFN3 0.42x0.62, 0.3P
CASE 711BH
ISSUE A

DATE 29 APR 2018



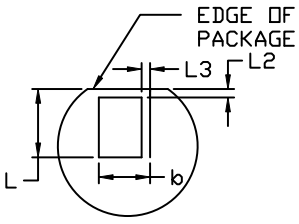
TOP VIEW



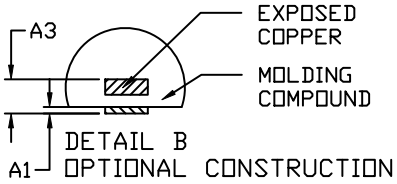
SIDE VIEW

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b AND b1 APPLIES TO THE PLATED TERMINALS AND IS MEASURED BETWEEN 0.20 AND 0.25 FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE PLATED TERMINALS.

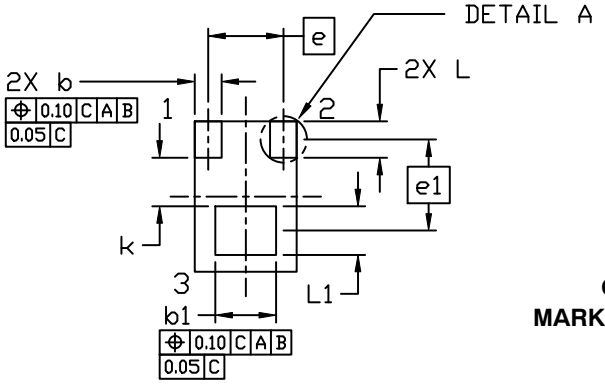


DETAIL A
OPTIONAL CONSTRUCTION



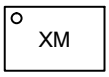
DETAIL B
OPTIONAL CONSTRUCTION

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.33	0.38	0.43
A1	---	---	0.07
A3		0.13 REF	
b	0.05	0.11	0.17
b1	0.20	0.25	0.30
D	0.32	0.42	0.52
E	0.52	0.62	0.72
e		0.30 BSC	
e1		0.38 BSC	
L	0.09	0.15	0.21
L1	0.15	0.20	0.25
L2	---	---	0.03
L3	---	---	0.03
k		0.20 REF	



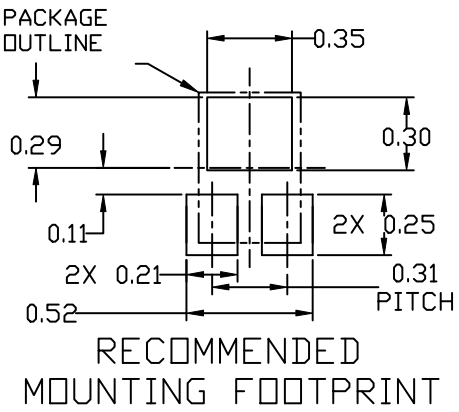
BOTTOM VIEW

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”, may or not be present. Some products may not follow the Generic Marking.



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DESCRIPTION:	**XDFN3 0.42x0.62, 0.3P**	**PAGE 1 OF 1**

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