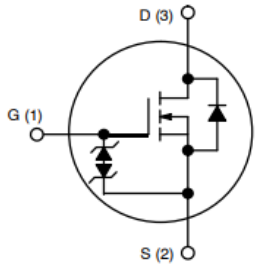
MOSFET – Power, N-Channel With ESD Protection
60 V, 853 mA
NVNJWS1K6N061L

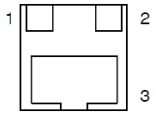
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D Max
60 V	1.6 Ω @ 10 V	853 mA
	2.5 Ω @ 4.5 V	

Features
- Low $R_{DS(on)}$ and Low Gate Threshold
- Low Input Capacitance
- ESD Protected Gate
- Wettable Flank for Enhanced Optical Inspection
- AEC−Q101 Qualified and PPAP Capable
- This is a Pb−Free Device

Applications
- Low Side Load Switch
- DC−DC Converters (Buck and Boost Circuits)

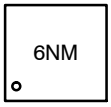
N−CHANNEL MOSFET





XDFNW3
CASE 521AC

MARKING DIAGRAM



6N = Specific Device Code
M = Month Code

ORDERING INFORMATION
See detailed ordering and shipping information on page 5 of this data sheet.

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	60	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	I_D	853	mA
		T_C = 100°C		603	
Power Dissipation $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	P_D	2617	mW
		T_C = 100°C		1309	
Continuous Drain Current $R_{\theta JA}$ (Note 1)	Steady State	T_A = 25°C	I_D	632	mA
		T_A = 100°C		447	
Power Dissipation $R_{\theta JA}$ (Note 1)	Steady State	T_A = 25°C	P_D	1437	mW
		T_A = 100°C		718	
Pulsed Drain Current	t_p = 10 μs		I_{DM}	6.47	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 175	°C
Source Current (Body Diode)			I_S	2.181	A
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.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Ambient – Steady State	$R_{\theta JA}$	104	°C/W
Junction−to−Case – Steady State	$R_{\theta JC}$	57.31	

1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).

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		60			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			87		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 60 V	T_J = 25°C			1.0	μA
			T_J = 125°C			500	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±10	μA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.0		2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				−4.3		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 500 mA			1.2	1.6	Ω
		V_{GS} = 4.5 V, I_D = 200 mA			1.5	2.5	
Forward Transconductance	g_{FS}	V_{DS} = 5 V, I_D = 200 mA			0.48		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 20 V			26		pF
Output Capacitance	C_{OSS}				4.4		
Reverse Transfer Capacitance	C_{RSS}				2.5		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 25 V, I_D = 200 mA			0.9		nC
Threshold Gate Charge	$Q_{G(TH)}$				0.2		
Gate−to−Source Charge	Q_{GS}				0.3		
Gate−to−Drain Charge	Q_{GD}				0.28		
SWITCHING CHARACTERISTICS (Note 3)							
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = 4.5 V, V_{DD} = 25 V, I_D = 200 mA, R_G = 25 Ω			22		ns
Rise Time	t_r				34		
Turn−Off Delay Time	$t_{d(off)}$				34		
Fall Time	t_f				32		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 200 mA	T_J = 25°C		0.8	1.2	V
			T_J = 125°C		0.64		

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.

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES

(T_J = 25°C unless otherwise noted)

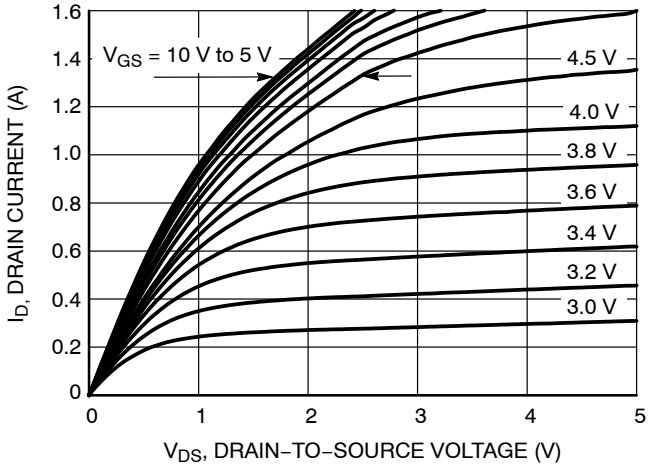


Figure 1. On−Region Characteristics

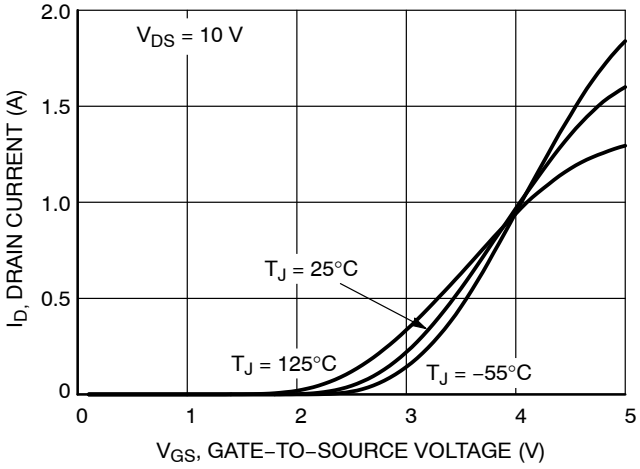


Figure 2. Transfer Characteristics

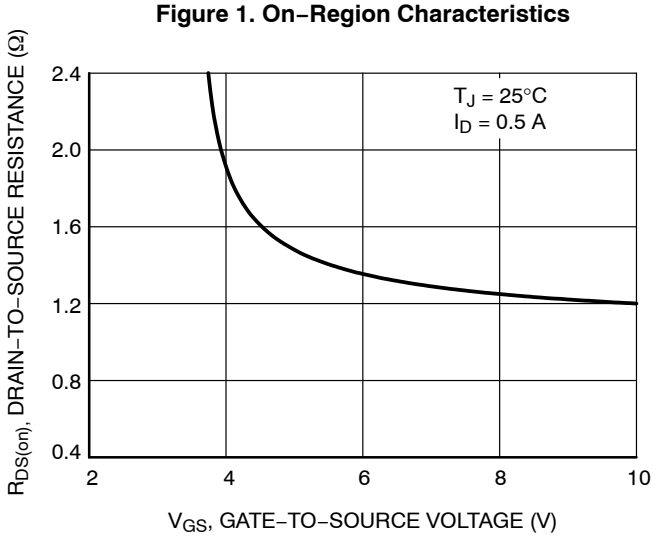


Figure 3. On−Resistance vs. Gate−to−Source Voltage

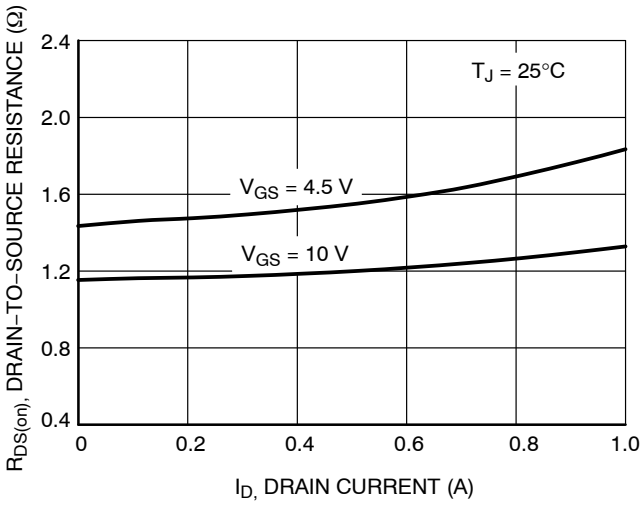


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

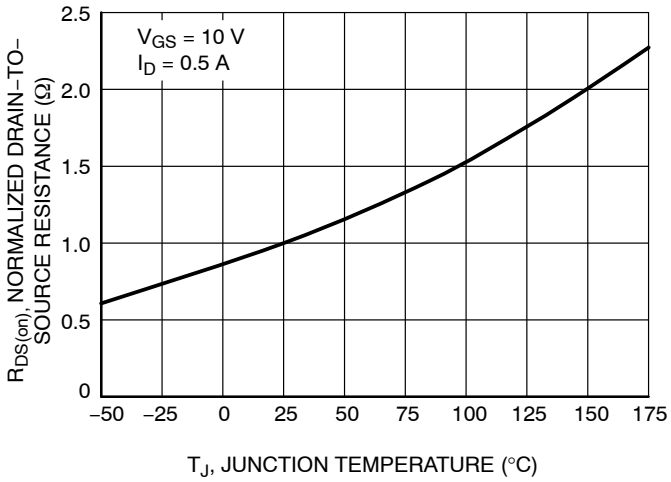


Figure 5. On−Resistance Variation with Temperature

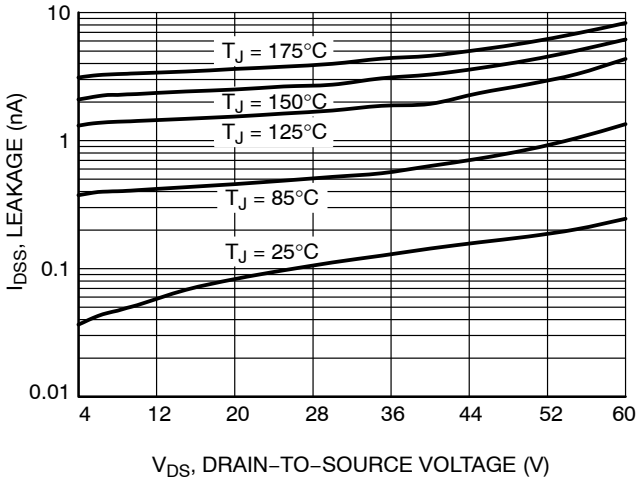


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES

(T_J = 25°C unless otherwise noted)

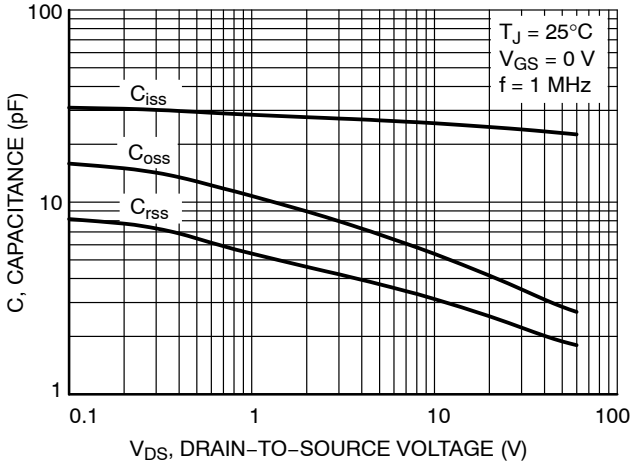


Figure 7. Capacitance Variation

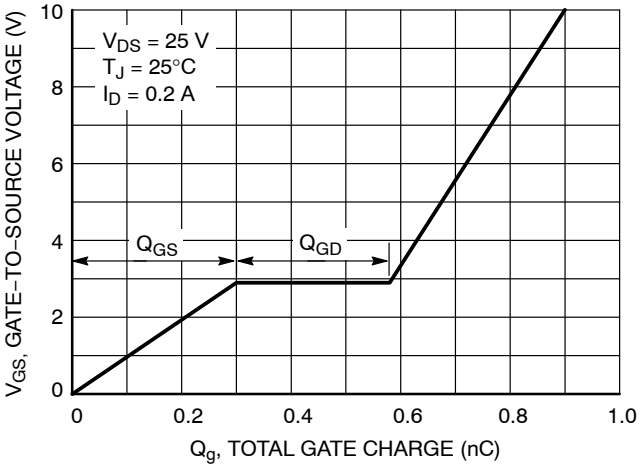


Figure 8. Gate−to−Source vs. Total Charge

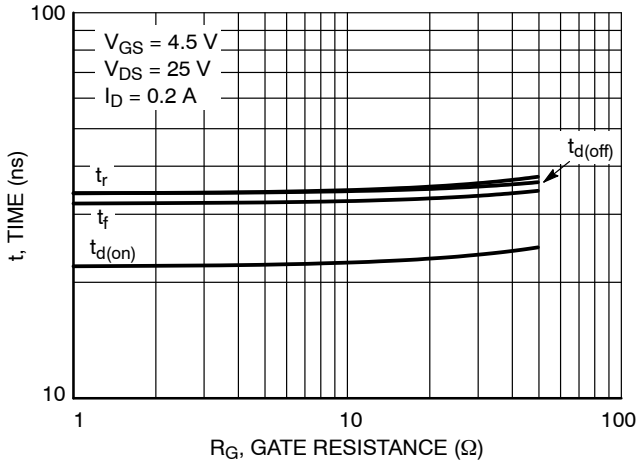


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

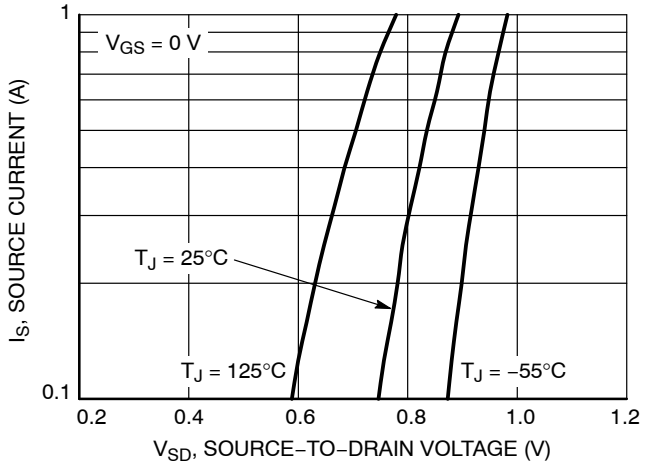


Figure 10. Diode Forward Voltage vs. Current

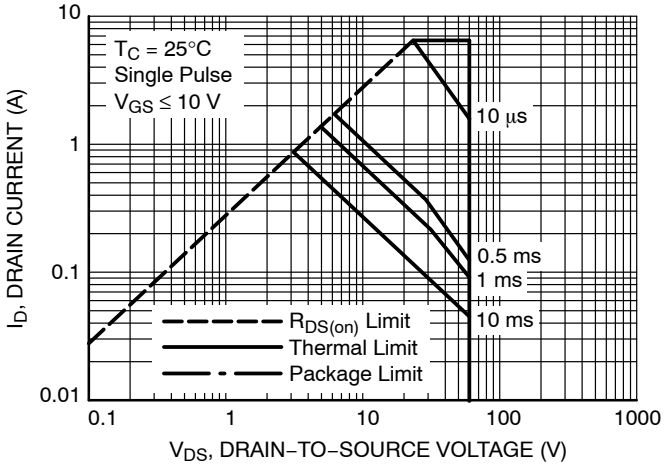


Figure 11. Maximum Rated Forward Biased Safe Operating Area

TYPICAL PERFORMANCE CURVES

(T_J = 25°C unless otherwise noted)

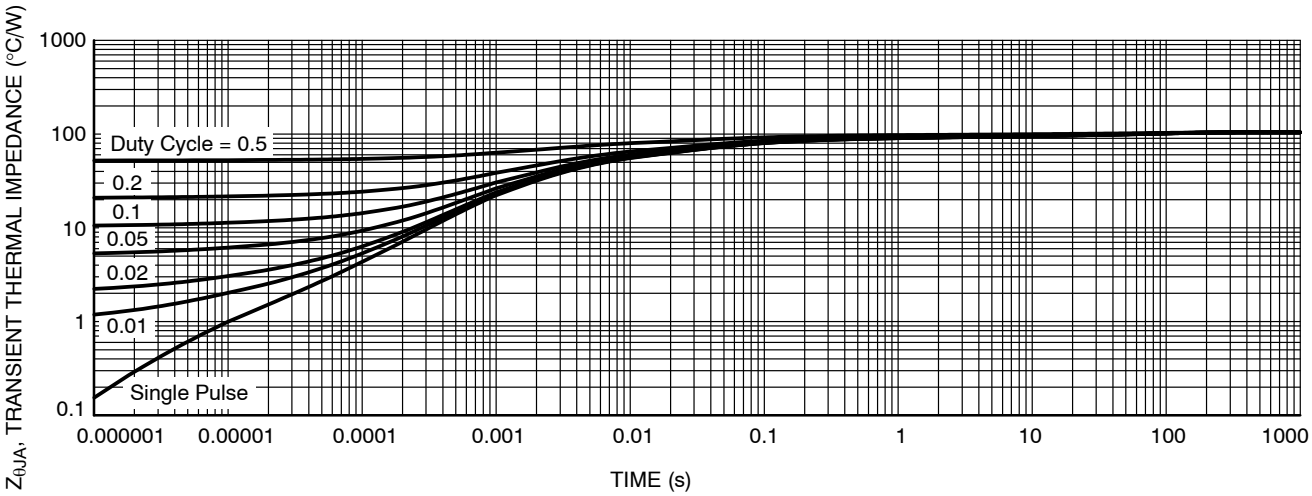


Figure 12. Junction−to−Case Transient Thermal Response

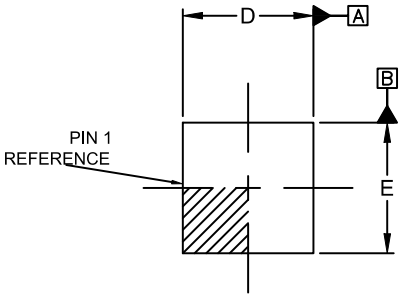
Table 1. ORDERING INFORMATION

Part Number	Marking	Package	Shipping†
NVNJWS1K6N061LTAG	6N	XDFNW3 (Pb−Free)	3000 / Tape & Reel

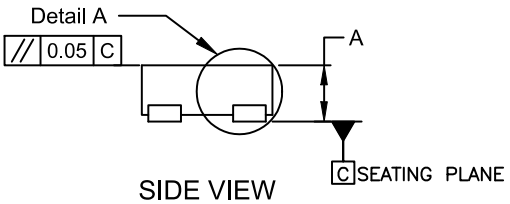
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

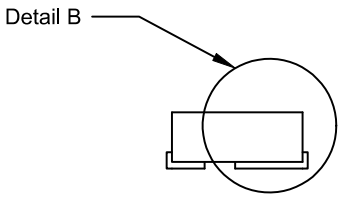
XDFNW3 1x1, 0.65P
CASE 521AC
ISSUE A



TOP VIEW



SIDE VIEW

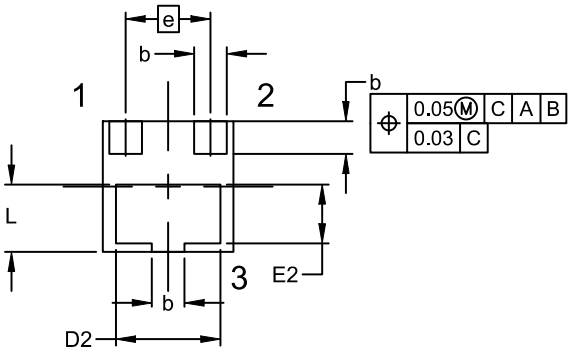


END VIEW

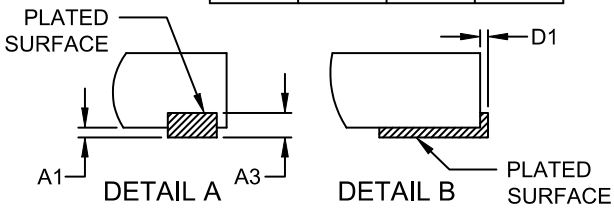
NOTES:

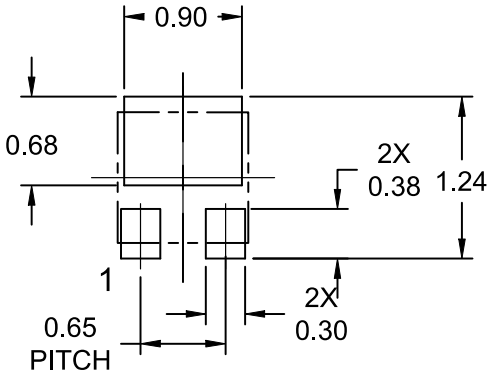
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.32	0.38	0.44
A1	0.00	---	0.04
A3	0.125 REF		
b	0.20	0.25	0.30
D	0.90	1.00	1.10
D1	0.00	---	0.04
D2	0.75	0.80	0.85
E	0.90	1.00	1.10
E2	0.40	0.45	0.50
e	0.65 BSC		
L	0.465	0.515	0.565



BOTTOM VIEW





RECOMMENDED
MOUNTING 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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

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Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative

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