

MOSFET – Power, P-Channel with ESD Protection -60 V, -482 mA

NVNJWS5K0P061L

Features

- ESD Protected Gate
- Wettable Flank for Enhanced Optical Inspection
- AEC-Q101 Qualified and PPAP Capable
- This is a Pb-Free Device

Applications

- Small Signal Load Switch

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 _{θJC} (Note 1)	Steady State	T _C = 25°C	I _D	-482	mA
		T _C = 100°C		-341	
Power Dissipation R _{θJC} (Note 1)	Steady State	T _C = 25°C	P _D	2617	mW
		T _C = 100°C		1309	
Continuous Drain Current R _{θJA} (Note 1)	Steady State	T _A = 25°C	I _D	-357	mA
		T _A = 100°C		-253	
Power Dissipation R _{θJA} (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}	-3.66	A	
Operating Junction and Storage Temperature Range		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.

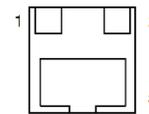
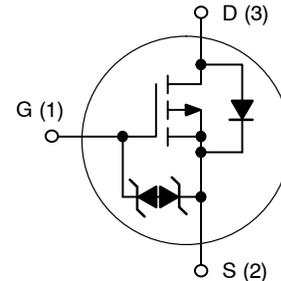
THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Ambient – Steady State	R _{θJA}	104	°C/W
Junction-to-Case – Steady State	R _{θJC}	57.31	

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

V _{(BR)DSS}	R _{DS(on)} MAX	I _D Max
-60 V	5 Ω @ -10 V	-482 mA
	6 Ω @ -4.5 V	

P-CHANNEL MOSFET



XDFNW3
CASE 521AC

5K = Specific Device Code
M = Month Code

MARKING DIAGRAM



ORDERING INFORMATION

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

NVNJWS5K0P061L

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = -250\ \mu\text{A}$, ref to 25°C		-81		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = -60\text{ V}$	$T_J = 25^\circ\text{C}$		-1	μA
			$T_J = 125^\circ\text{C}$		-500	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 10	μA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\ \mu\text{A}$	-1		-3	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			4.5		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -100\text{ mA}$		2.4	5	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -100\text{ mA}$		3.4	6	
Forward Transconductance	g_{FS}	$V_{DS} = -5\text{ V}, I_D = -100\text{ mA}$		0.26		S

CHARGES AND CAPACITANCES

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = -25\text{ V}$		29		pF
Output Capacitance	C_{OSS}			4.2		
Reverse Transfer Capacitance	C_{RSS}			2.4		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -5\text{ V}, V_{DS} = -25\text{ V}, I_D = -100\text{ mA}$		1.0		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.2		
Gate-to-Source Charge	Q_{GS}			0.4		
Gate-to-Drain Charge	Q_{GD}			0.3		

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = -5\text{ V}, V_{DD} = -48\text{ V}, I_D = -100\text{ mA}, R_G = 1\ \Omega$		26		ns
Rise Time	t_r			57		
Turn-Off Delay Time	$t_{d(off)}$			31		
Fall Time	t_f			43		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = -100\text{ mA}$	$T_J = 25^\circ\text{C}$		-0.79	-1.2	V
			$T_J = 125^\circ\text{C}$		-0.65		

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 $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

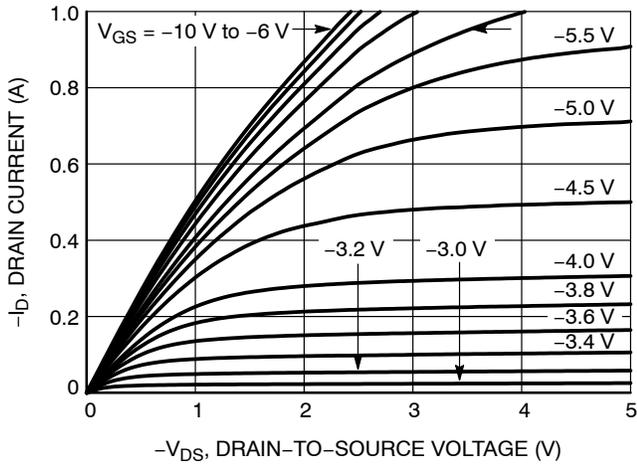


Figure 1. On-Region Characteristics

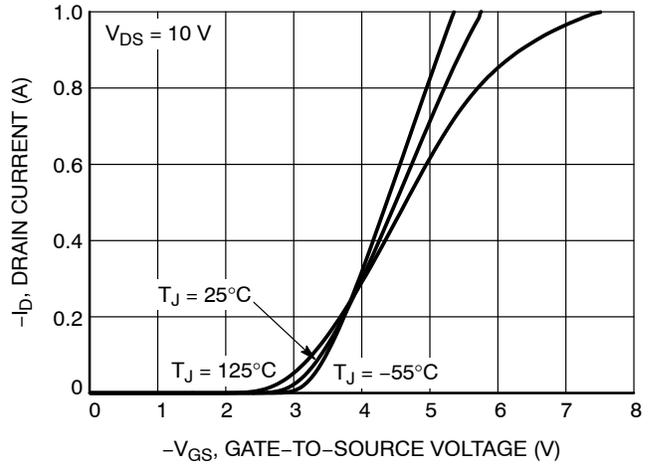


Figure 2. Transfer Characteristics

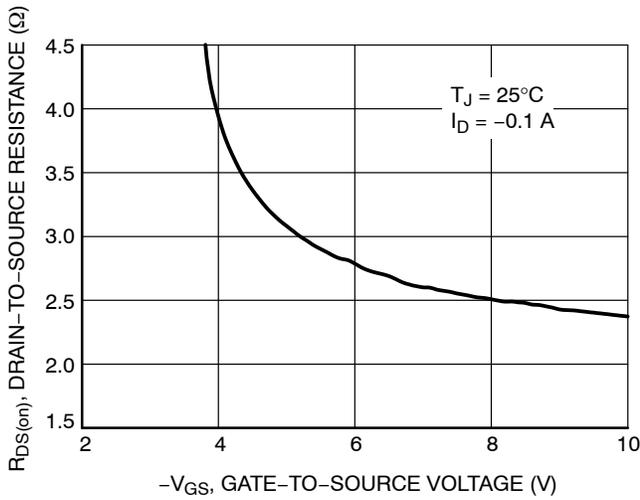


Figure 3. On-Resistance vs. Gate-to-Source Voltage

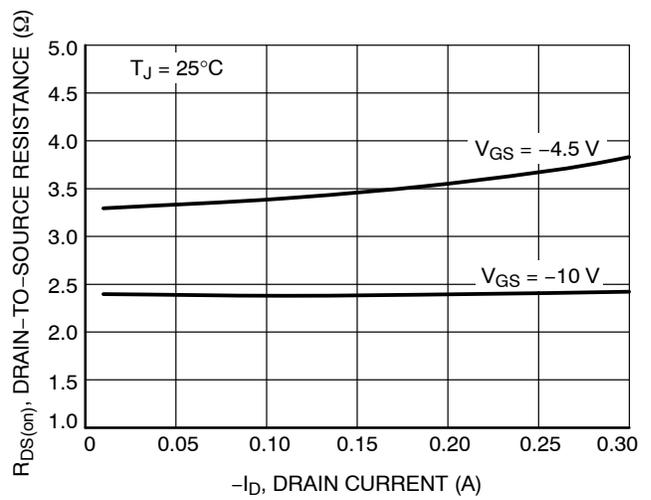


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

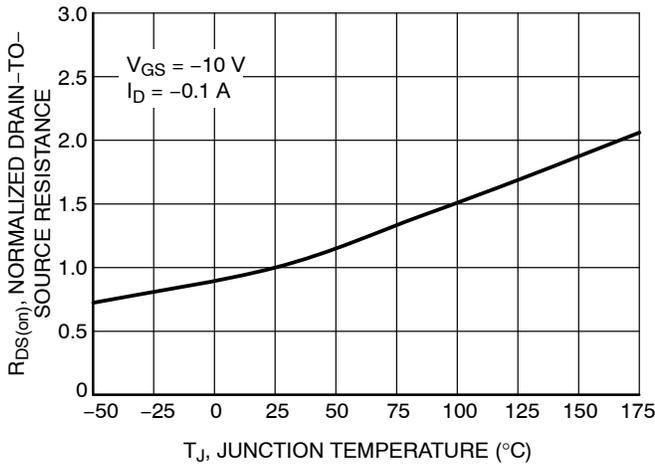


Figure 5. On-Resistance Variation with Temperature

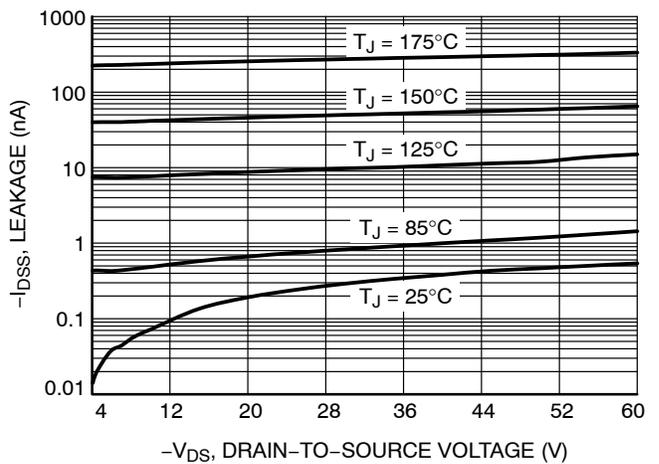


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL CHARACTERISTICS

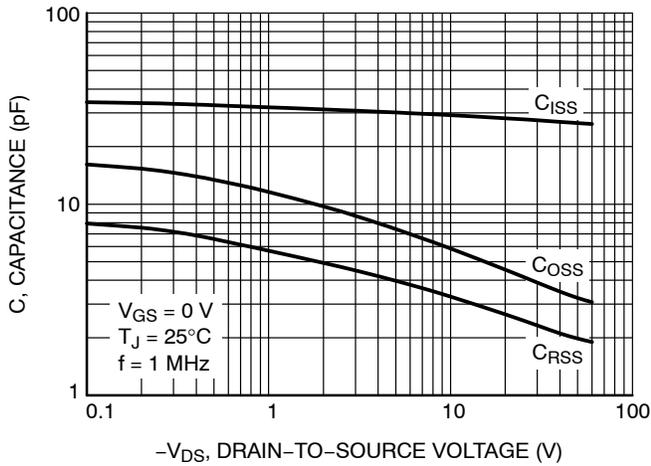


Figure 7. Capacitance Variation

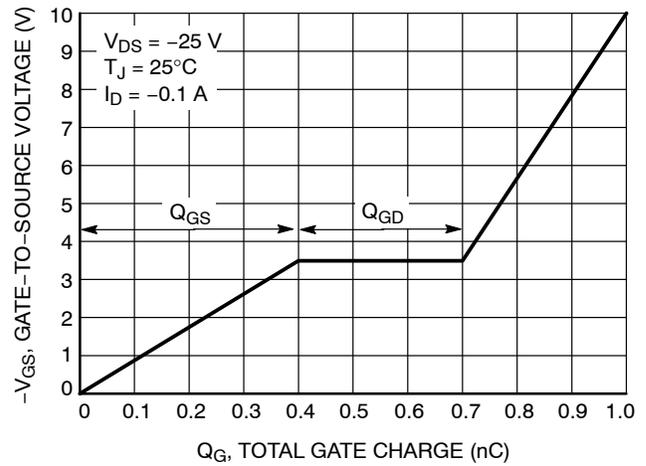


Figure 8. Gate-to-Source Voltage vs. Total Charge

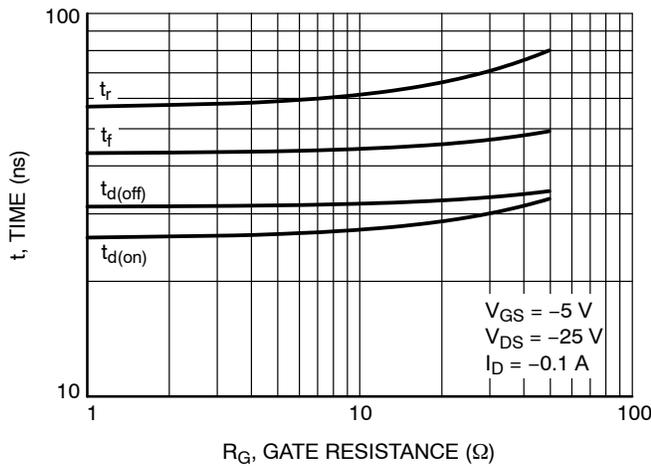


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

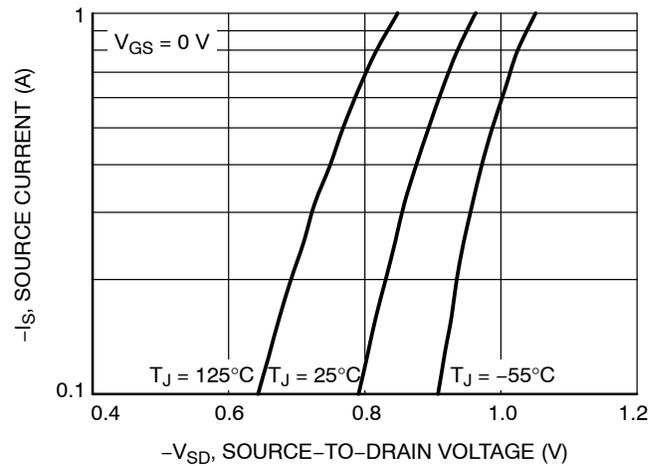


Figure 10. Diode Forward Voltage vs. Current

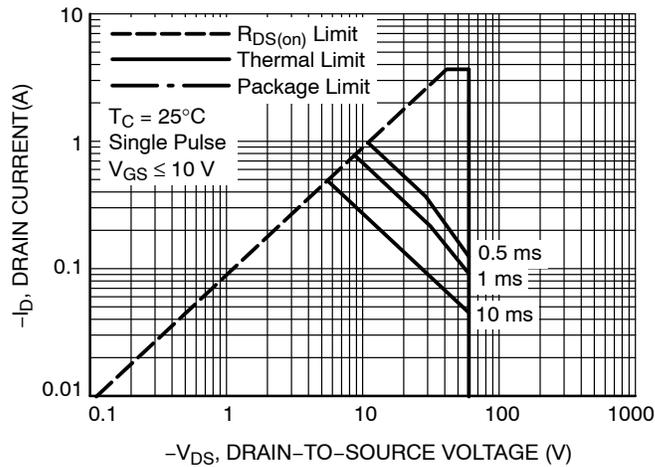


Figure 11. Maximum Rated Forward Biased Safe Operating Area

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TYPICAL CHARACTERISTICS

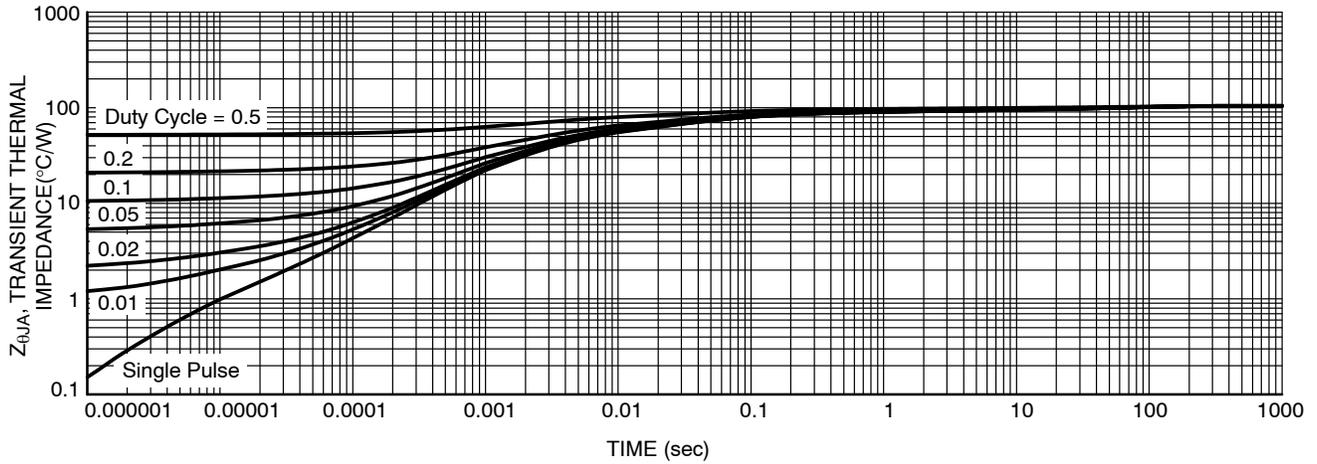


Figure 12. Thermal Response

Table 1. ORDERING INFORMATION

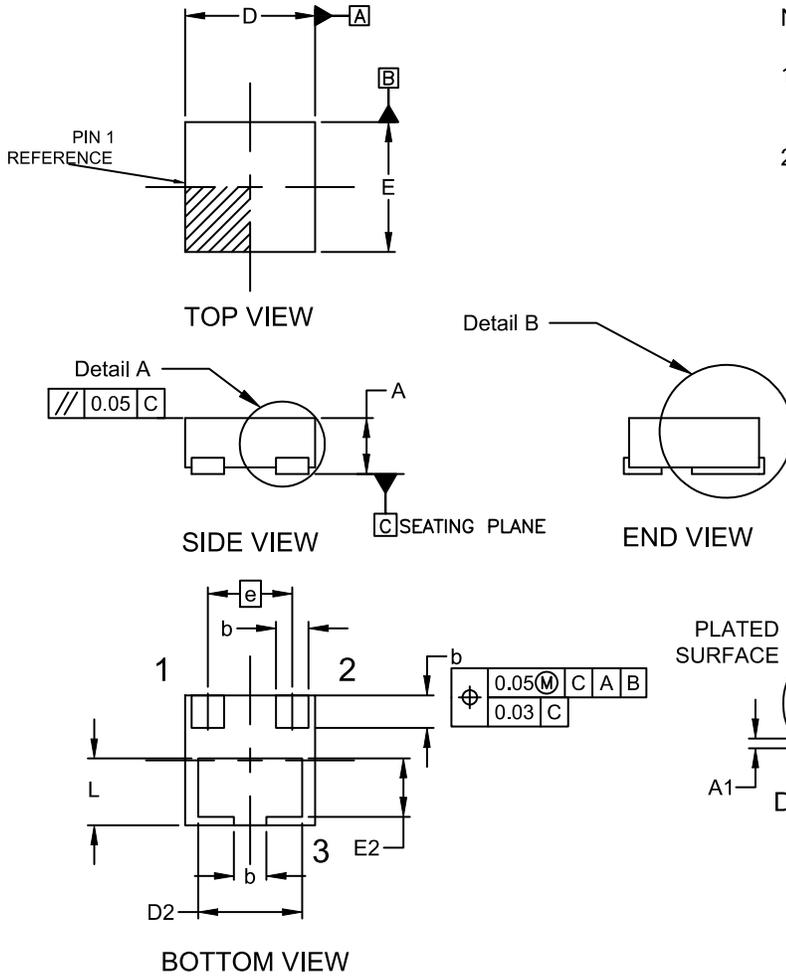
Part Number	Marking	Package	Shipping [†]
NVNJWS5K0P061LTAG	5K	XDFNW3 (Pb-Free)	3000 / Tape & Reel

[†]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.

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PACKAGE DIMENSIONS

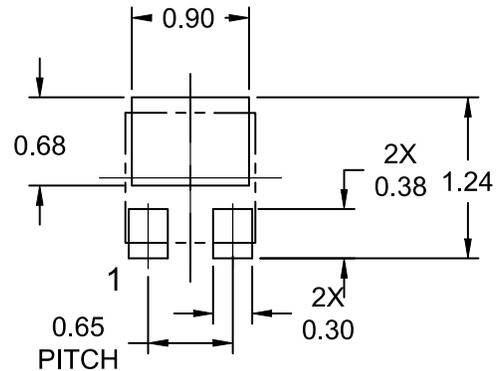
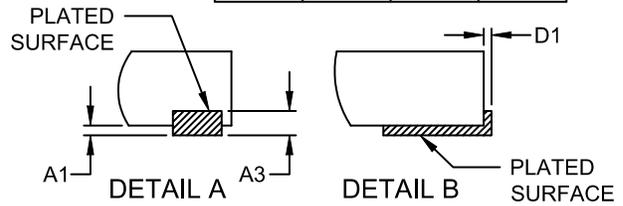
XDFNW3 1x1, 0.65P
CASE 521AC
ISSUE A



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



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.

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