

NVMYS3D5N04C

MOSFET – Power, Single N-Channel

40 V, 3.3 mΩ, 102 A

Features

- Small Footprint (5x6 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- LFPK4 Package, Industry Standard
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V _{DSS}	40	V
Gate-to-Source Voltage			V _{GS}	±20	V
Continuous Drain Current R _{θJC} (Notes 1, 3)	Steady State	T _C = 25°C	I _D	102	A
		T _C = 100°C		72	
Power Dissipation R _{θJC} (Note 1)		T _C = 25°C	P _D	68	W
		T _C = 100°C		34	
Continuous Drain Current R _{θJA} (Notes 1, 2, 3)	Steady State	T _A = 25°C	I _D	24	A
		T _A = 100°C		17	
Power Dissipation R _{θJA} (Notes 1, 2)		T _A = 25°C	P _D	3.6	W
		T _A = 100°C		1.8	
Pulsed Drain Current	T _A = 25°C, t _p = 10 μs		I _{DM}	554	A
Operating Junction and Storage Temperature Range			T _J , T _{stg}	–55 to +175	°C
Source Current (Body Diode)			I _S	65	A
Single Pulse Drain-to-Source Avalanche Energy (I _{L(pk)} = 7.0 A)			E _{AS}	215	mJ
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 MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State	$R_{\theta JC}$	2.2	$^\circ\text{C/W}$
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	39	

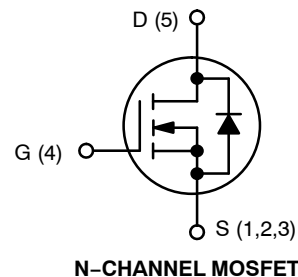
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.



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$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
40 V	3.3 mΩ @ 10 V	102 A

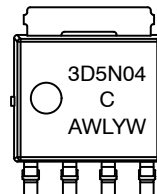


N-CHANNEL MOSFET



LFPK4
CASE 760AB

MARKING DIAGRAM



3D5N04C = Specific Device Code
A = Assembly Location
WL = Wafer Lot
Y = Year
W = Work Week

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

NVMYS3D5N04C

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			22		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 40\text{ V}$	$T_J = 25^\circ\text{C}$		10	μA
			$T_J = 125^\circ\text{C}$		100	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}$			100	nA

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 60\text{ }\mu\text{A}$	2.5		3.5	V
Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			-7.8		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 50\text{ A}$		2.7	3.3	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = 15\text{ V}, I_D = 50\text{ A}$		93		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 25\text{ V}$		1600		μF
Output Capacitance	C_{OSS}			830		
Reverse Transfer Capacitance	C_{RSS}			28		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 10\text{ V}, V_{DS} = 20\text{ V}; I_D = 50\text{ A}$		23		nC
Threshold Gate Charge	$Q_{G(TH)}$			5.1		
Gate-to-Source Charge	Q_{GS}			9.0		
Gate-to-Drain Charge	Q_{GD}			3.5		
Plateau Voltage	V_{GP}			5.3		V

SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DS} = 20\text{ V}, I_D = 50\text{ A}, R_G = 2.5\text{ }\Omega$		10		ns
Rise Time	t_r			47		
Turn-Off Delay Time	$t_{d(OFF)}$			19		
Fall Time	t_f			3.0		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V},$ $I_S = 50\text{ A}$	$T_J = 25^{\circ}\text{C}$		0.9	1.2	V
			$T_J = 125^{\circ}\text{C}$		0.78		
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s},$ $I_S = 50\text{ A}$			37		ns
Charge Time	t_a				18		
Discharge Time	t_b				19		
Reverse Recovery Charge	Q_{RR}				23		nC

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.

4. Pulse Test: pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

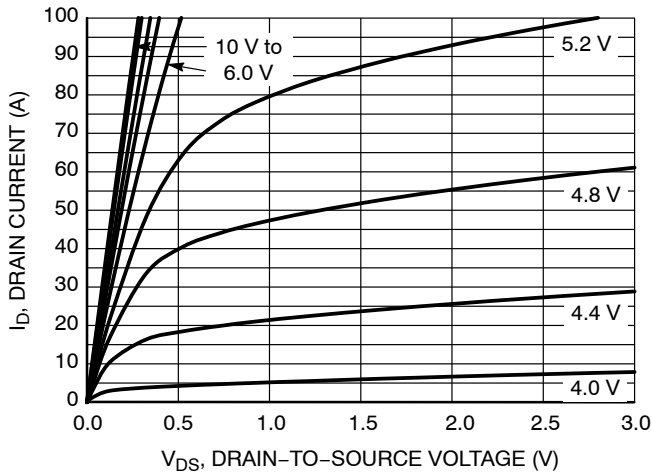


Figure 1. On-Region Characteristics

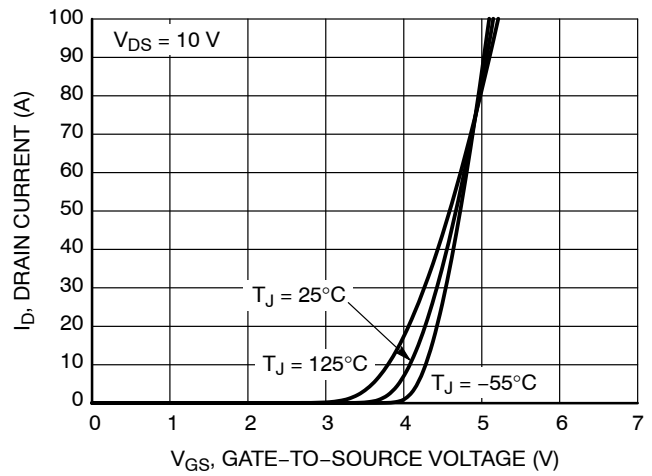


Figure 2. Transfer Characteristics

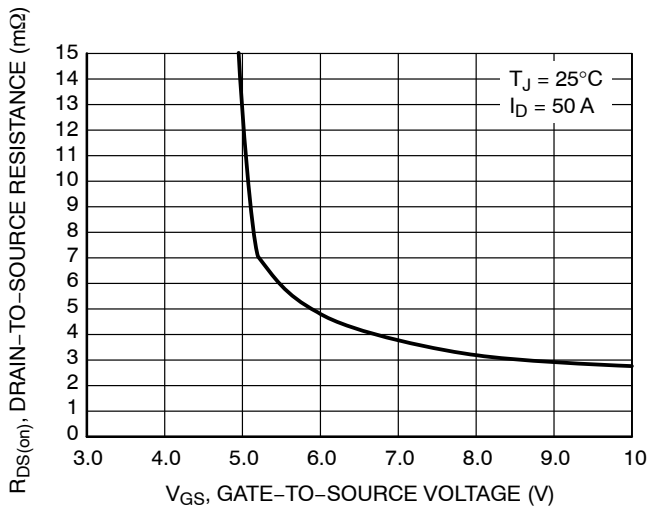


Figure 3. On-Resistance vs. Gate-to-Source Voltage

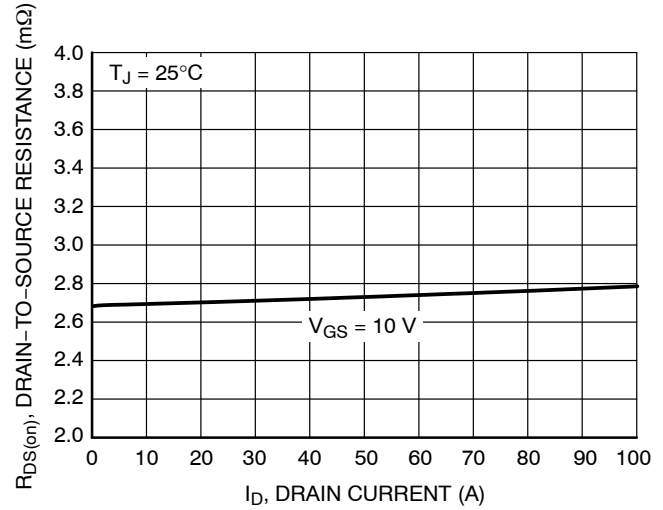


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

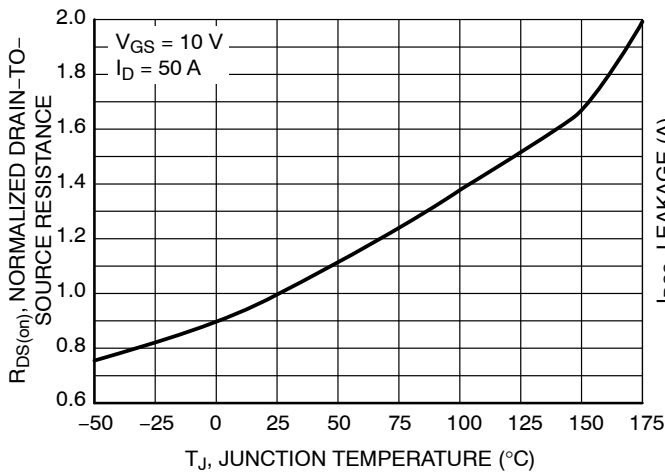


Figure 5. On-Resistance Variation with Temperature

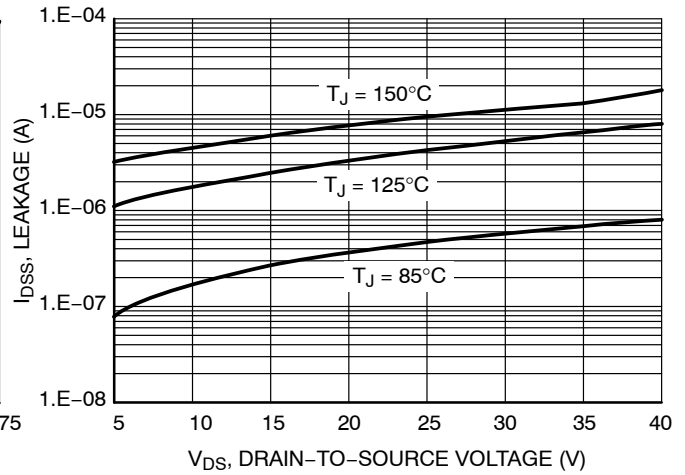


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

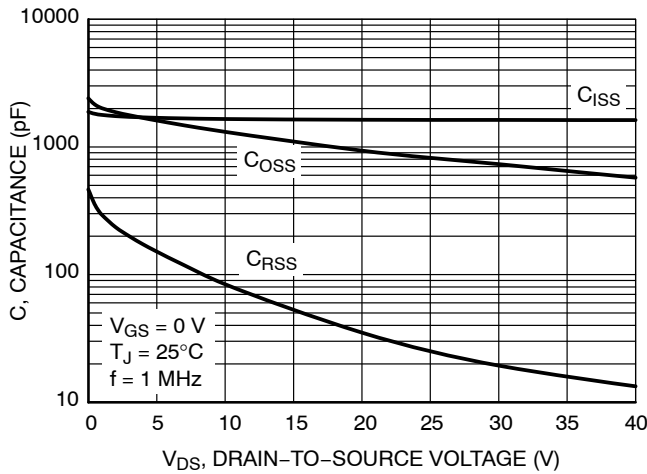


Figure 7. Capacitance Variation

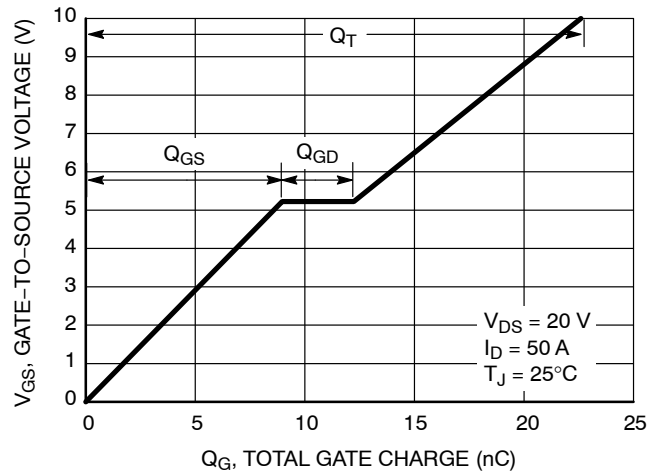


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

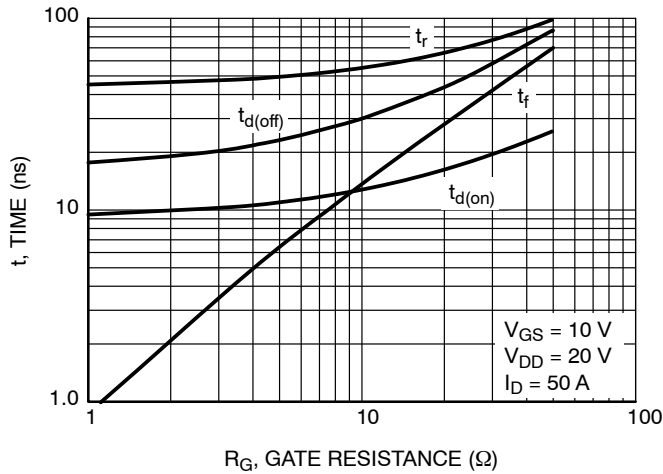


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

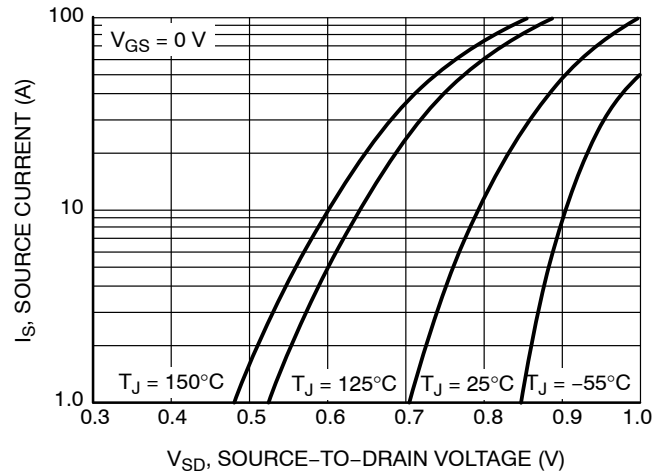


Figure 10. Diode Forward Voltage vs. Current

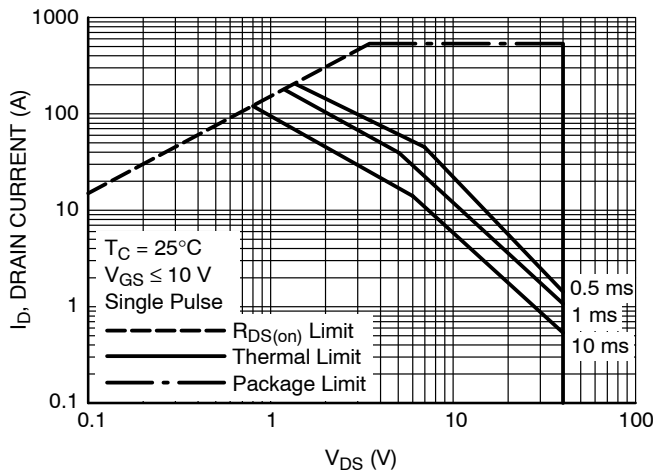


Figure 11. Safe Operating Area

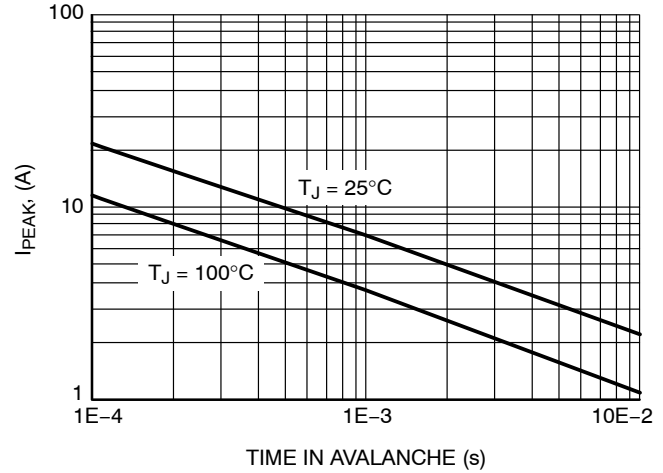


Figure 12. I_{PEAK} vs. Time in Avalanche

NVMYS3D5N04C

TYPICAL CHARACTERISTICS

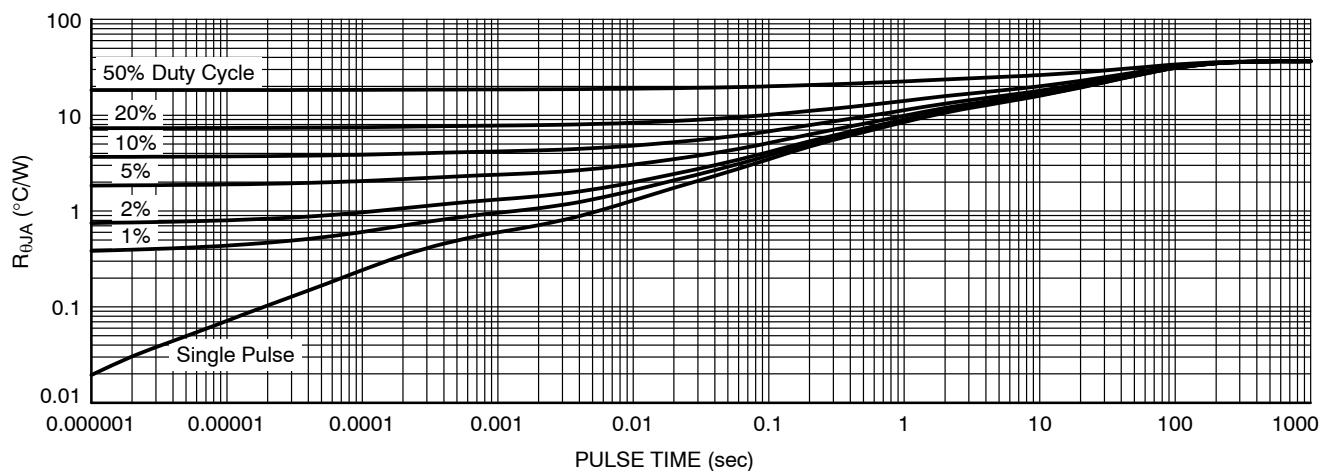


Figure 13. Thermal Characteristics

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NVMYS3D5N04CTWG	3D5N04C	LFPAK4 (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.

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

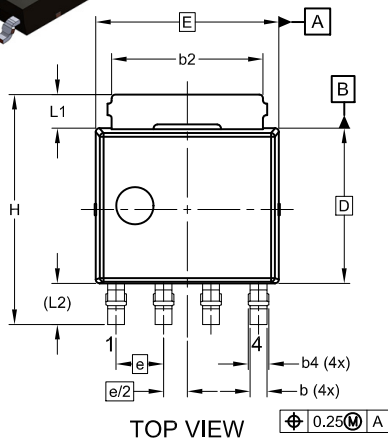
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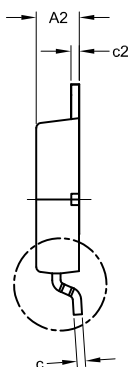
LFP4K4 4.90x4.15x1.15MM, 1.27P

CASE 760AB
ISSUE D

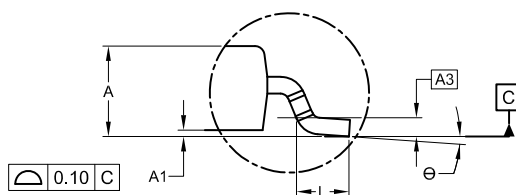
DATE 22 MAY 2024



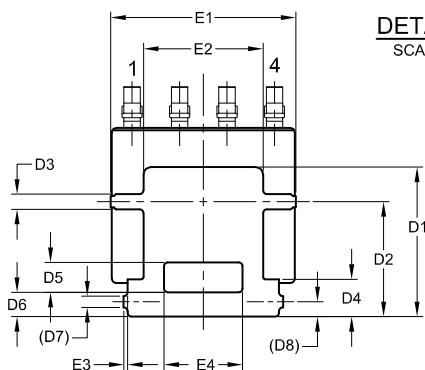
TOP VIEW



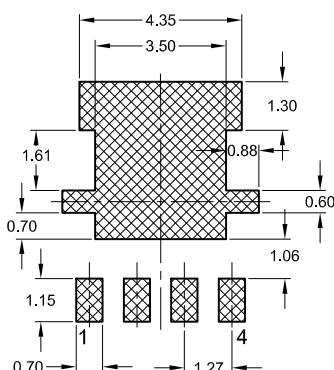
SIDE VIEW



DETAIL 'A'
SCALE: 2:1



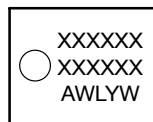
BOTTOM VIEW



RECOMMENDED LAND PATTERN

*FOR ADDITIONAL INFORMATION ON OUR
PB-FREE STRATEGY AND SOLDERING
DETAILS, PLEASE DOWNLOAD THE ONSEMI
SOLDERING AND MOUNTING TECHNIQUES
REFERENCE MANUAL, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



XXXXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot
Y = Year
W = Work Week

*This information is generic. Please refer
to device data sheet for actual part
marking. Some products may not follow
the Generic Marking.

NOTES:

1. DIMENSIONING AND TOLERANCING
PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION:
MILLIMETERS.
3. DIMENSIONS D AND E DO NOT INCLUDE
MOLD FLASH, PROTRUSIONS, OR
BURRS. MOLD FLASH PROTRUSIONS
OR GATE BURRS SHALL NOT EXCEED
0.150mm PER SIDE.
4. DIMENSIONS D AND E ARE
DETERMINED AT THE OUTERMOST
EXTREMES OF THE PLASTIC BODY.

MILLIMETER			
DIM	MIN	NOM	MAX
A	1.10	1.20	1.30
A1	0.00	0.08	0.15
A2	1.10	1.15	1.20
A3	0.25 BSC		
b	0.40	0.45	0.50
b2	3.80	4.10	4.40
b4	0.45	0.55	0.65
c	0.19	0.22	0.25
c2	0.19	0.22	0.25
D	4.15 BSC		
D1	3.80	4.00	4.20
D2	3.00	3.10	3.20
D3	0.30	0.40	0.50
D4	0.90	1.00	1.10
D5	0.70	0.80	0.90
D6	0.55	0.65	0.75
D7	0.31 REF		
D8	0.40 REF		
E	4.90 BSC		
E1	4.85	4.95	5.05
E2	3.10	3.20	3.30
E3	0.00	0.10	0.20
E4	2.00	2.10	2.20
e	1.27 BSC		
e/2	0.635 BSC		
e1	0.40 REF		
H	6.00	6.15	6.30
L	0.50	0.70	0.90
L1	0.80	0.90	1.00
L2	1.10 REF		
Θ	0°	4°	8°

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DESCRIPTION: LFP4K4 4.90x4.15x1.15MM, 1.27P

PAGE 1 OF 1

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