

## **MOSFET – Power, Single N-Channel**

**40 V, 342 A, 0.81 mΩ**

**NTMJS0D9N04C**

## 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
- LFPAK8 Package, Industry Standard
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

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

Symbol	Parameter			Value	Unit		
$V_{DSS}$	Drain-to-Source Voltage			40	V		
$V_{GS}$	Gate-to-Source Voltage			20	V		
$I_D$	Continuous Drain Current $R_{\theta JC}$ (Notes 1, 3)	Steady State	$T_C = 25^\circ\text{C}$	342	A		
			$T_C = 100^\circ\text{C}$	242			
$P_D$	Power Dissipation $R_{\theta JC}$ (Note 1)		$T_C = 25^\circ\text{C}$	180	W		
			$T_C = 100^\circ\text{C}$	90			
$I_D$	Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	Steady State	$T_A = 25^\circ\text{C}$	52	A		
			$T_A = 100^\circ\text{C}$	37			
$P_D$	Power Dissipation $R_{\theta JA}$ (Notes 1, 2)		$T_A = 25^\circ\text{C}$	4.2	W		
			$T_A = 100^\circ\text{C}$	2.1			
$I_{DM}$	Pulsed Drain Current	$T_A = 25^\circ\text{C}$ , $t_p = 10 \mu\text{s}$		900	A		
$T_J$ , $T_{stg}$	Operating Junction and Storage Temperature Range			-55 to +175	°C		
$I_S$	Source Current (Body Diode)			150	A		
$E_{AS}$	Single Pulse Drain-to-Source Avalanche Energy ( $I_{L(pk)} = 33 \text{ A}$ )			1945	mJ		
$T_L$	Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			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

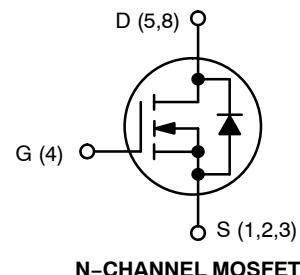
Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Junction-to-Case – Steady State	0.83	°C/W
$R_{\theta JA}$	Junction-to-Ambient – Steady State (Note 2)	35.9	

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  $650 \text{ mm}^2$ , 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.

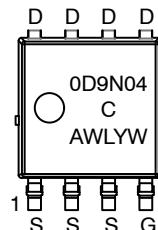
<b>V<sub>(BR)DSS</sub></b>	<b>R<sub>D(S(ON)) MAX</sub></b>	<b>I<sub>D MAX</sub></b>
40 V	0.81 mΩ @ 10 V	342 A



**LFPAK8  
CASE 760AA**



## MARKING DIAGRAM



0D9N04C = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
Y = Year  
W = Work Week

## OBDELIBING INFORMATION

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

# NTMJS0D9N04C

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

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
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## OFF CHARACTERISTICS

$V_{(\text{BR})\text{DSS}}$	Drain-to-Source Breakdown Voltage	$V_{\text{GS}} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	40			V
$V_{(\text{BR})\text{DSS}/T_J}$	Drain-to-Source Breakdown Voltage Temperature Coefficient			14		$\text{mV}/^\circ\text{C}$
$I_{\text{DSS}}$	Zero Gate Voltage Drain Current	$V_{\text{GS}} = 0 \text{ V}$ , $V_{\text{DS}} = 40 \text{ V}$	$T_J = 25^\circ\text{C}$		10	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		250	
$I_{\text{GSS}}$	Gate-to-Source Leakage Current	$V_{\text{DS}} = 0 \text{ V}$ , $V_{\text{GS}} = 20 \text{ V}$			100	nA

## ON CHARACTERISTICS (Note 6)

$V_{\text{GS}(\text{TH})}$	Gate Threshold Voltage	$V_{\text{GS}} = V_{\text{DS}}$ , $I_D = 250 \mu\text{A}$	2.0		4.0	V
$V_{\text{GS}(\text{TH})/T_J}$	Threshold Temperature Coefficient			7.4		$\text{mV}/^\circ\text{C}$
$R_{\text{DS}(\text{on})}$	Drain-to-Source On Resistance	$V_{\text{GS}} = 10 \text{ V}$	$I_D = 50 \text{ A}$	0.68	0.81	$\text{m}\Omega$
$g_{\text{FS}}$	Forward Transconductance	$V_{\text{DS}} = 15 \text{ V}$	$I_D = 50 \text{ A}$	400		S

## CHARGES, CAPACITANCES & GATE RESISTANCE

$C_{\text{ISS}}$	Input Capacitance	$V_{\text{GS}} = 0 \text{ V}$ , $f = 1 \text{ MHz}$ , $V_{\text{DS}} = 20 \text{ V}$		7400		pF
$C_{\text{OSS}}$	Output Capacitance			4600		
$C_{\text{RSS}}$	Reverse Transfer Capacitance			127		
$Q_{\text{G}(\text{TOT})}$	Total Gate Charge	$V_{\text{GS}} = 10 \text{ V}$ , $V_{\text{DS}} = 32 \text{ V}$ ; $I_D = 50 \text{ A}$		117		nC
$Q_{\text{G}(\text{TH})}$	Threshold Gate Charge			18		
$Q_{\text{GS}}$	Gate-to-Source Charge			29		
$Q_{\text{GD}}$	Gate-to-Drain Charge			28		
$V_{\text{GP}}$	Plateau Voltage			4.3		V

## SWITCHING CHARACTERISTICS (Note 7)

$t_{\text{d}(\text{ON})}$	Turn-On Delay Time	$V_{\text{GS}} = 10 \text{ V}$ , $V_{\text{DS}} = 32 \text{ V}$ , $I_D = 50 \text{ A}$ , $R_G = 2.5 \Omega$		20		ns
$t_r$	Rise Time			14		
$t_{\text{d}(\text{OFF})}$	Turn-Off Delay Time			71		
$t_f$	Fall Time			26		

## DRAIN-SOURCE DIODE CHARACTERISTICS

$V_{\text{SD}}$	Forward Diode Voltage	$V_{\text{GS}} = 0 \text{ V}$ , $I_S = 50 \text{ A}$	$T_J = 25^\circ\text{C}$		0.8	1.2	V
			$T_J = 125^\circ\text{C}$		0.6		
$t_{\text{RR}}$	Reverse Recovery Time	$V_{\text{GS}} = 0 \text{ V}$ , $dI_S/dt = 100 \text{ A}/\mu\text{s}$ , $I_S = 50 \text{ A}$			82		ns
$t_a$	Charge Time				54		
$t_b$	Discharge Time				28		
$Q_{\text{RR}}$	Reverse Recovery Charge				148		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  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

5. Switching characteristics are independent of operating junction temperatures.

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.

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

7. Switching characteristics are independent of operating junction temperatures.

## TYPICAL CHARACTERISTICS

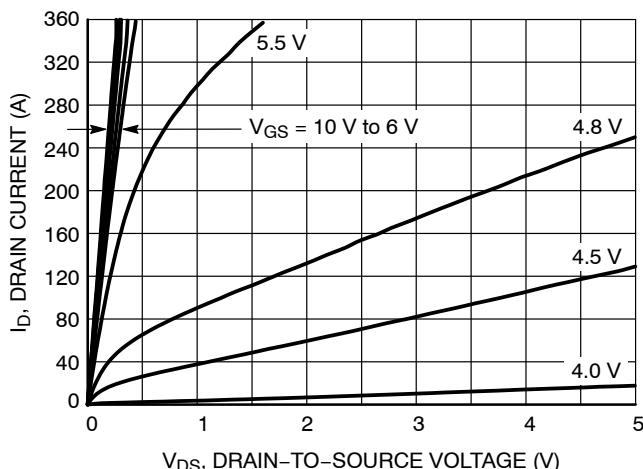


Figure 1. On-Region Characteristics

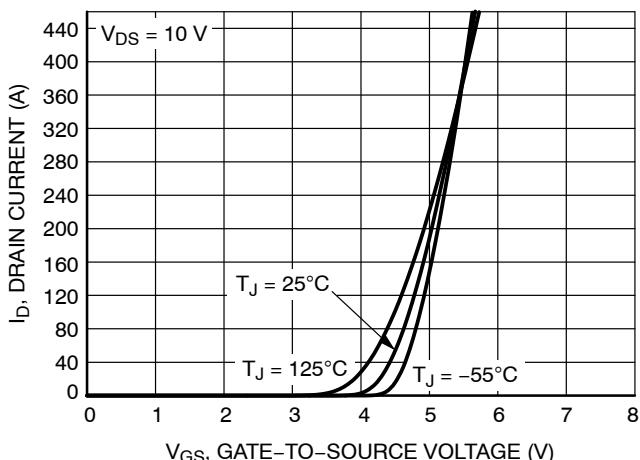


Figure 2. Transfer Characteristics

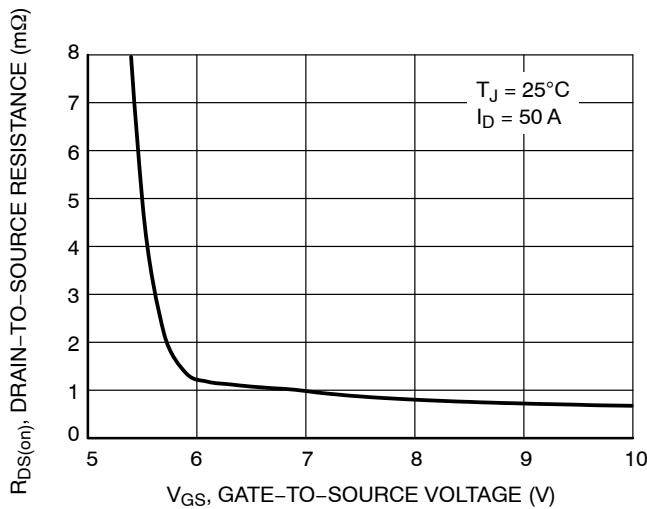


Figure 3. On-Resistance vs. Gate-to-Source Voltage

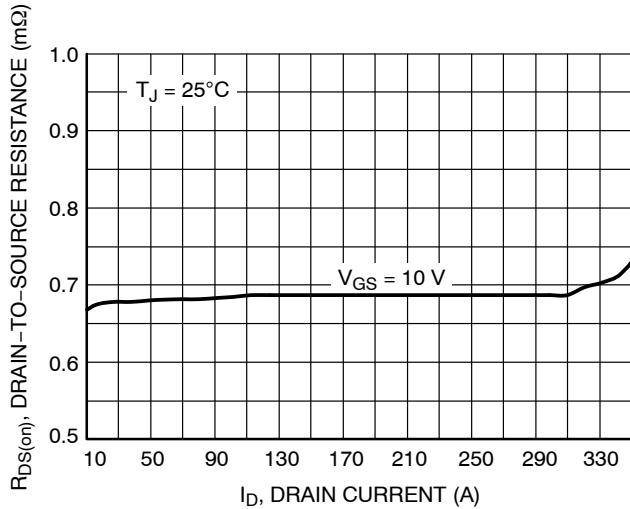


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

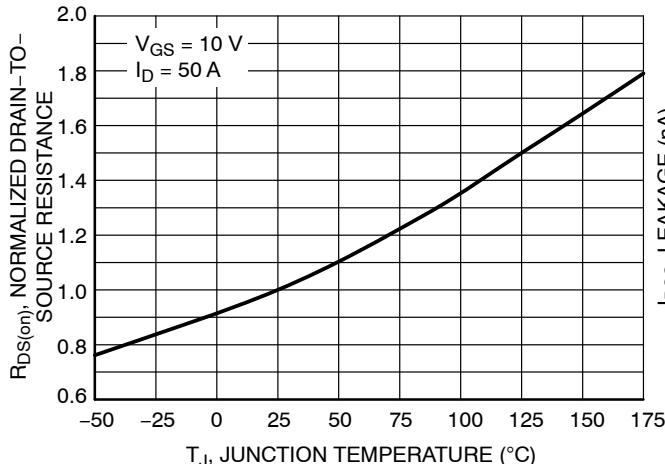


Figure 5. On-Resistance Variation with Temperature

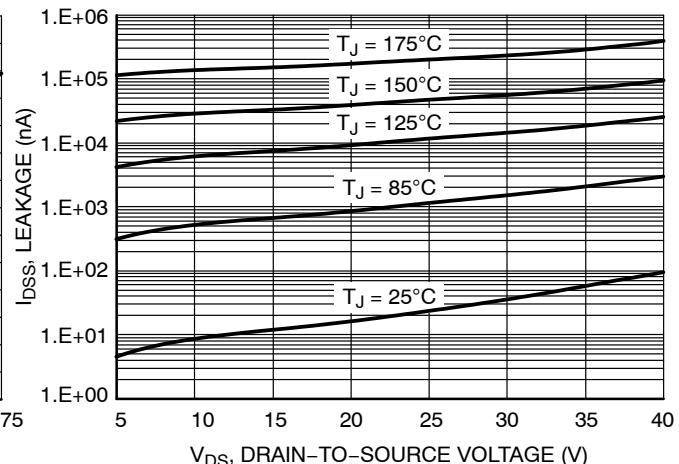


Figure 6. Drain-to-Source Leakage Current vs. Voltage

## TYPICAL CHARACTERISTICS (continued)

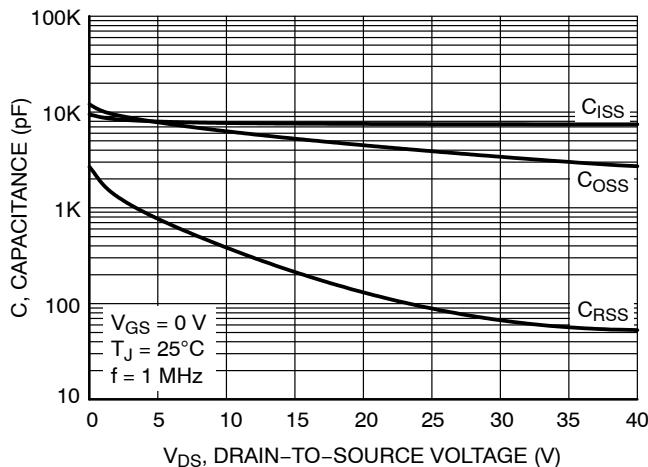


Figure 7. Capacitance Variation

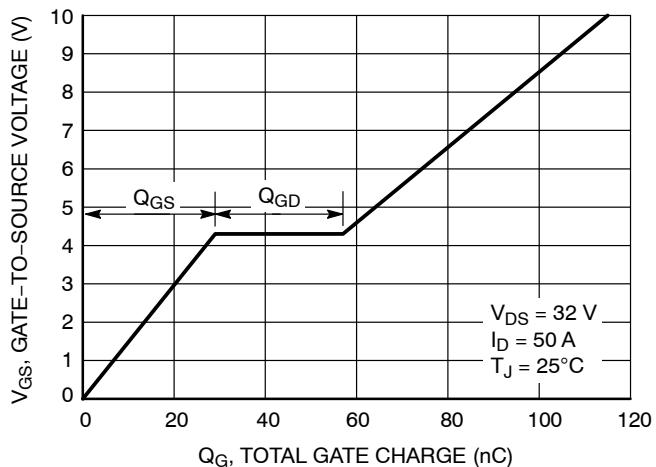


Figure 8. Gate-to-Source Voltage vs. Total Charge

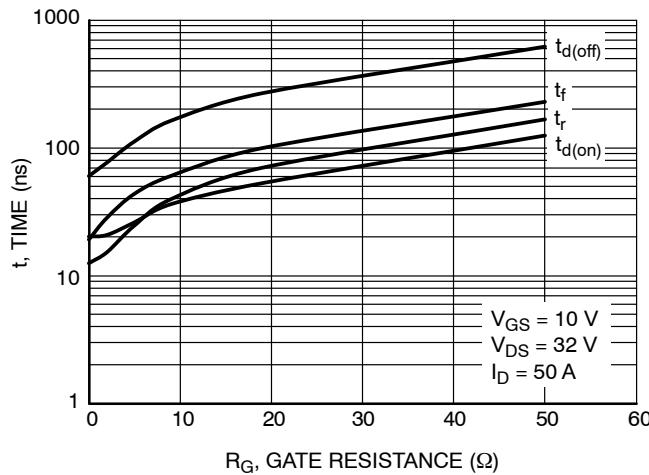


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

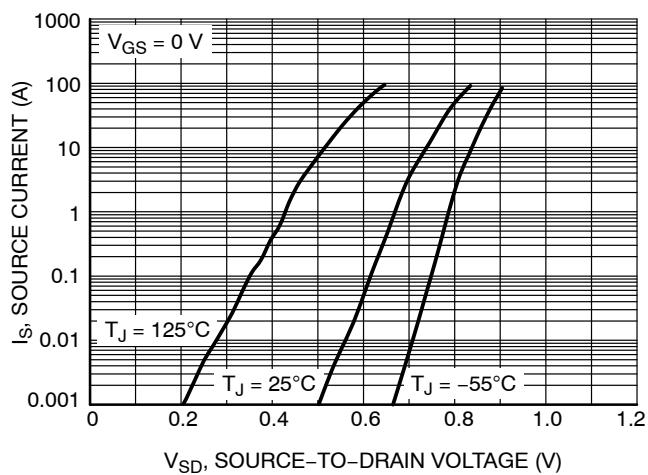


Figure 10. Diode Forward Voltage vs. Current

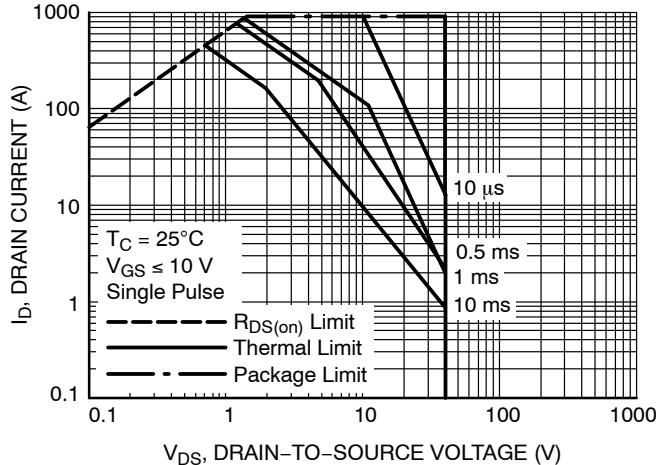


Figure 11. Maximum Rated Forward Biased Safe Operating Area

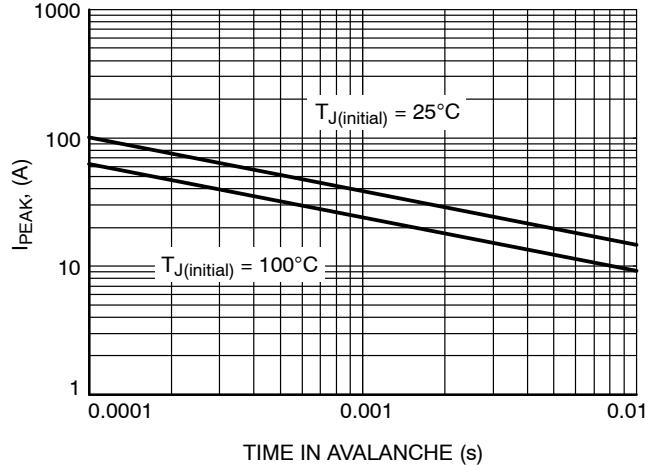


Figure 12. Maximum Drain Current vs. Time in Avalanche

## TYPICAL CHARACTERISTICS (continued)

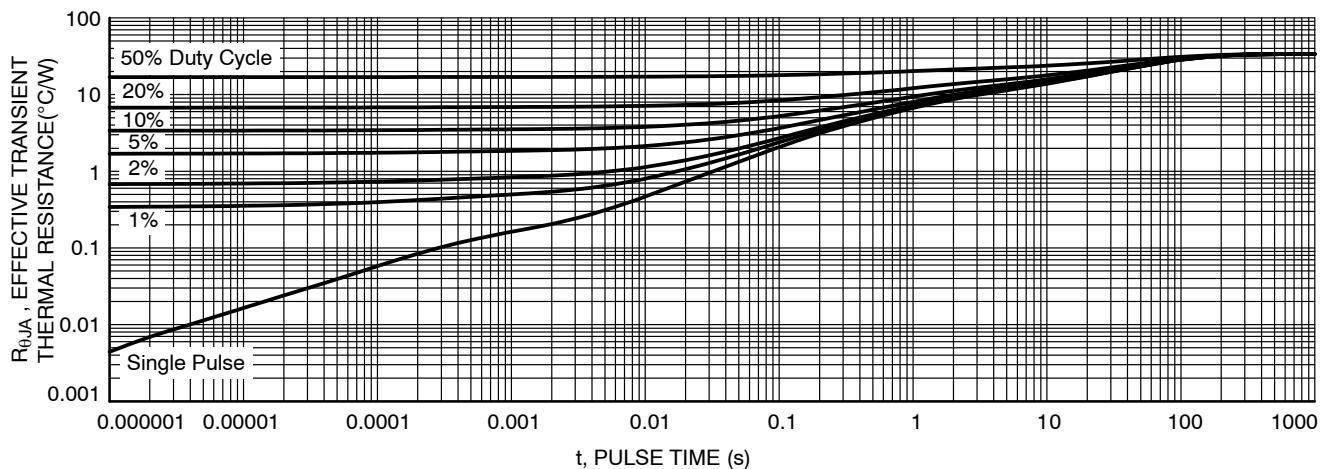


Figure 13. Thermal Characteristics

## DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping <sup>†</sup>
NTMJS0D9N04CTWG	0D9N04C	LFPAK8 (Pb-Free)	3,000 / Tape & Reel

<sup>†</sup>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](#).

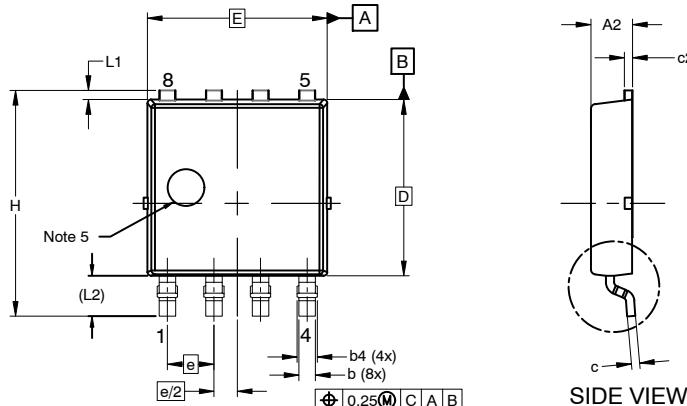


## LFPAK8 4.90x4.80x1.12MM, 1.27P

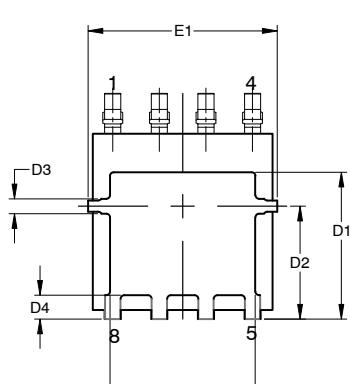
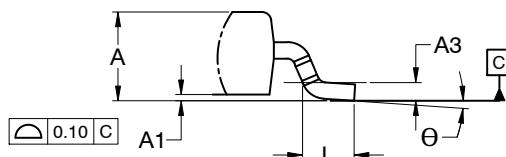
CASE 760AA

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DATE 22 APR 2024

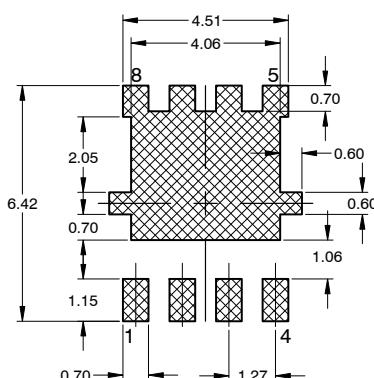


TOP VIEW



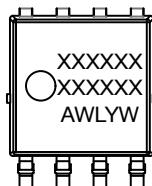
BOTTOM VIEW

DETAIL 'A'



MILLIMETERS			
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
b4	0.45	0.55	0.65
c	0.19	0.22	0.25
c2	0.19	0.22	0.25
D	4.70	4.80	4.90
D1	3.80	4.00	4.20
D2	2.98	3.08	3.18
D3	0.30	0.40	0.50
D4	0.55	0.65	0.75
E	4.80	4.90	5.00
E1	5.05	5.15	5.25
E2	3.91	3.96	4.01
e	1.27 BSC		
e/2	0.635 BSC		
H	6.00	6.15	6.30
L	0.50	0.70	0.90
L1	0.15	0.25	0.35
L2	1.10 REF		
θ	0°	4°	8°

\*FOR ADDITIONAL INFORMATION ON OUR  
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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.

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DESCRIPTION:	LFPAK8 4.90x4.80x1.12MM, 1.27P	PAGE 1 OF 1

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