

MOSFET - Power, Single P-Channel -40 V, 25 mΩ, -32 A

NVTYS025P04M8L

Features

- Small Footprint (3.3 x 3.3 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- 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 $R_{\theta JC}$ (Notes 1, 2, 3, 4)	I_D	-32	A
		-22.75	
Power Dissipation $R_{\theta JC}$ (Notes 1, 2, 3)	P_D	44.1	W
		22	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 3, 4)	I_D	-9.4	A
		-6.7	
Power Dissipation $R_{\theta JA}$ (Notes 1, 3)	P_D	3.8	W
		1.9	
Pulsed Drain Current	I_{DM}	171	A
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	°C
Source Current (Body Diode)	I_S	36.7	A
Single Pulse Drain-to-Source Avalanche Energy ($I_{L(pk)} = 3.7 \text{ A}$)	E_{AS}	67.1	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260	°C

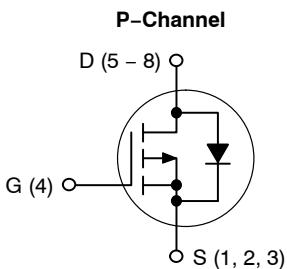
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS (Note 1)

Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State (Note 3)	$R_{\theta JC}$	3.4	°C/W
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	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. Ψ_{si} (Ψ) is used as required per JESD51-12 for packages in which substantially less than 100% of the heat flows to single case surface.
3. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
4. Continuous DC current rating. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
-40 V	25 mΩ @ -10 V	-32 A
	40 mΩ @ -4.5 V	



LFPAK8
3.3x3.3
CASE 760AD

MARKING DIAGRAM



025P04M8L = Specific Device Code

A = Assembly Location

WL = Wafer Lot

Y = Year

W = Work Week

(Note: Microdot may be in either location)

ORDERING INFORMATION

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

NVTYS025P04M8L

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
-----------	--------	----------------	-----	-----	-----	------

OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}, I_D = -250 \mu\text{A}$	-40			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{GS}} = 0 \text{ V}, V_{\text{DS}} = -40 \text{ V}$	$T_J = 25^\circ\text{C}$		-10	μA
			$T_J = 125^\circ\text{C}$		-1000	
Gate-to-Source Leakage Current	I_{GSS}	$V_{\text{DS}} = 0 \text{ V}, V_{\text{GS}} = \pm 20 \text{ V}$			± 100	nA

ON CHARACTERISTICS (Note 5)

Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{GS}} = V_{\text{DS}}, I_D = -255 \mu\text{A}$	-1.0		-3	V
Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -10 \text{ V}, I_D = -25 \text{ A}$		17.5	25	$\text{m}\Omega$
		$V_{\text{GS}} = -4.5 \text{ V}, I_D = -15 \text{ A}$		24.1	40	

CHARGES AND CAPACITANCES

Input Capacitance	C_{iss}	$V_{\text{GS}} = 0 \text{ V}, f = 1.0 \text{ MHz}, V_{\text{DS}} = -25 \text{ V}$		1080		pF
Output Capacitance	C_{oss}			367		
Reverse Transfer Capacitance	C_{rss}			13		
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = -10 \text{ V}, V_{\text{DS}} = -20 \text{ V}, I_D = -25 \text{ A}$		16		nC
Threshold Gate Charge	$Q_{\text{G}(\text{TH})}$			1		
Gate-to-Source Charge	Q_{GS}			3.4		
Gate-to-Drain Charge	Q_{GD}			1.6		

SWITCHING CHARACTERISTICS (Note 6)

Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{GS}} = -10 \text{ V}, V_{\text{DS}} = -20 \text{ V}, I_D = -25 \text{ A}$		6		ns
Rise Time	t_r			3		
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$			60		
Fall Time	t_f			21		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{\text{GS}} = 0 \text{ V}, I_S = -25 \text{ A}$	$T_J = 25^\circ\text{C}$		-0.95	-1.2	V
			$T_J = 125^\circ\text{C}$		-0.84		
Reverse Recovery Time	t_{RR}	$V_{\text{GS}} = 0 \text{ V}, dI_S/dt = 100 \text{ A}/\mu\text{s}, I_S = -25 \text{ A}$			30		ns
Charge Time	t_a				15		
Discharge Time	t_b				15		
Reverse Recovery Charge	Q_{RR}				15		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.

5. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$.

6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

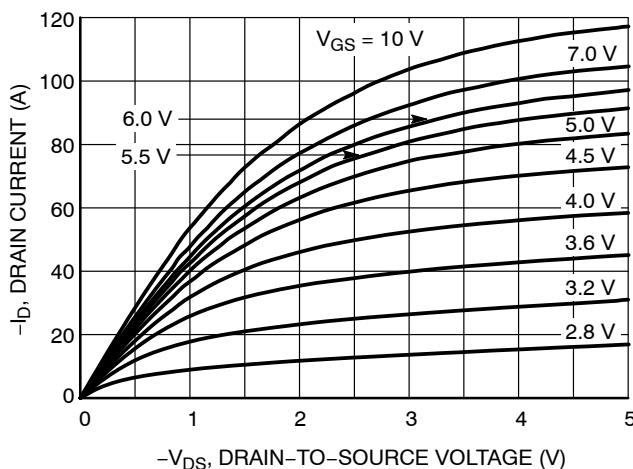


Figure 1. On-Region Characteristics

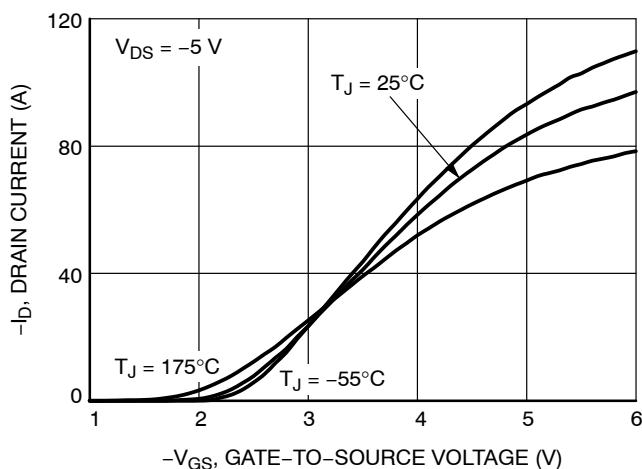


Figure 2. Transfer Characteristics

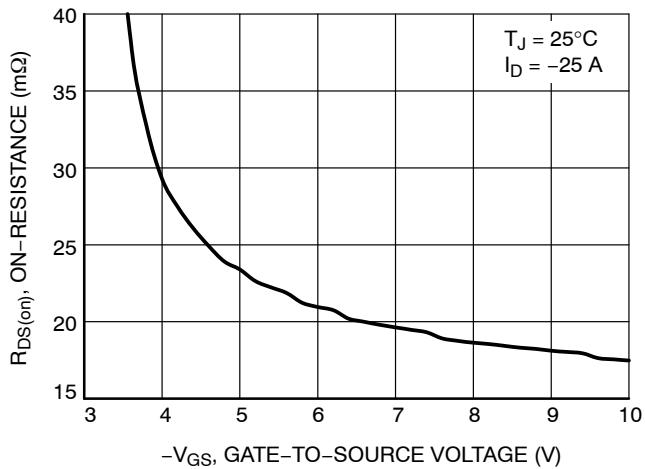


Figure 3. On-Resistance vs. Gate-to-Source Voltage

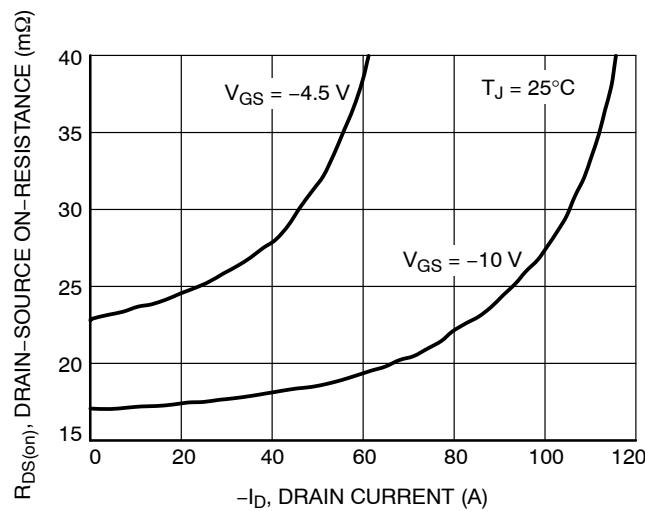


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

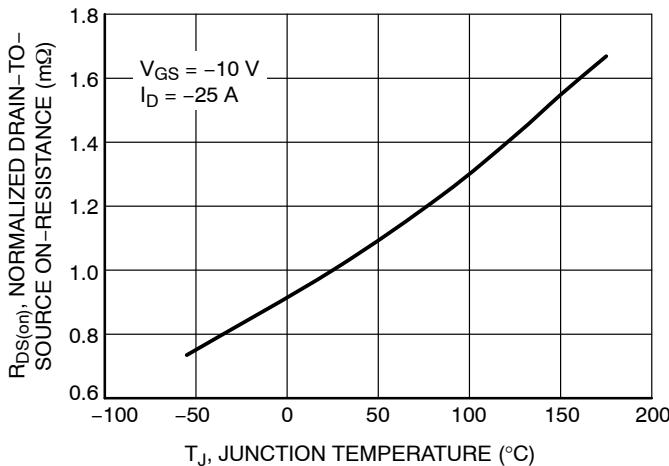


Figure 5. On-Resistance Variation with Temperature

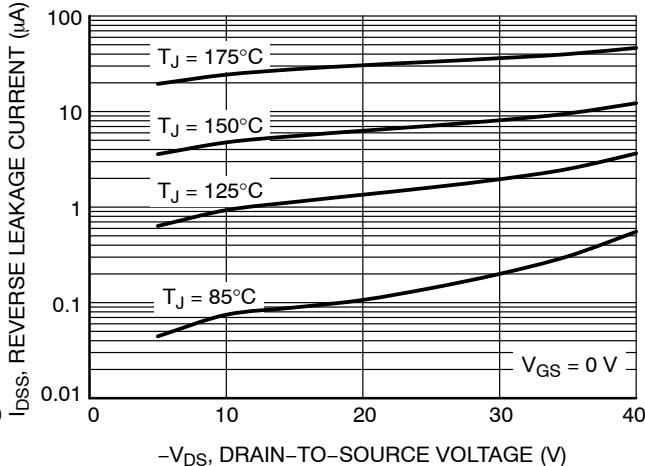
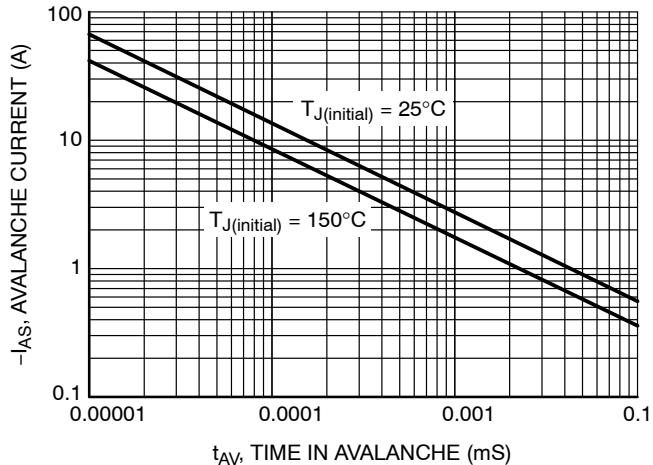
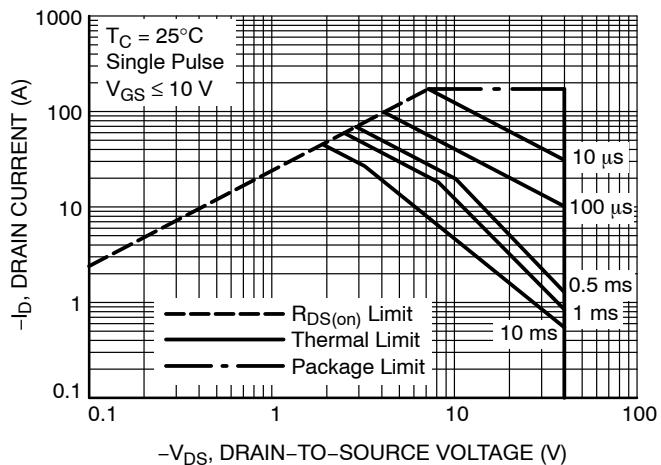
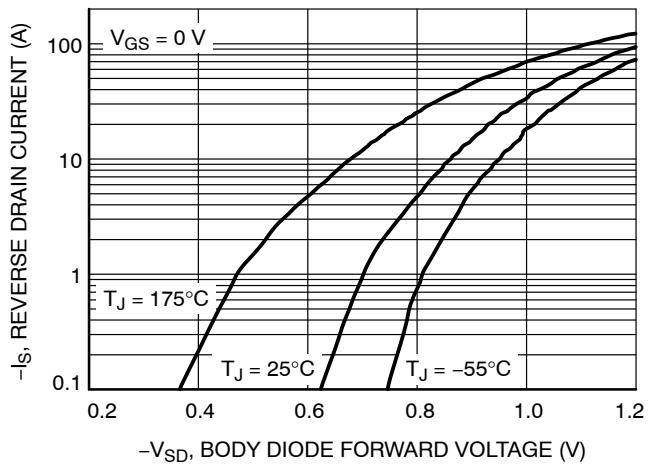
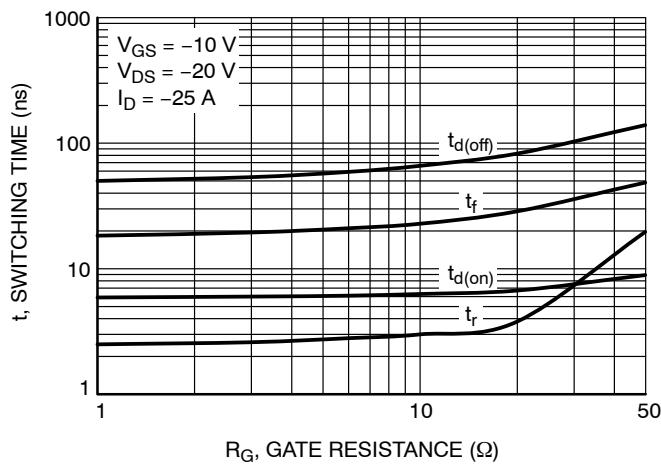
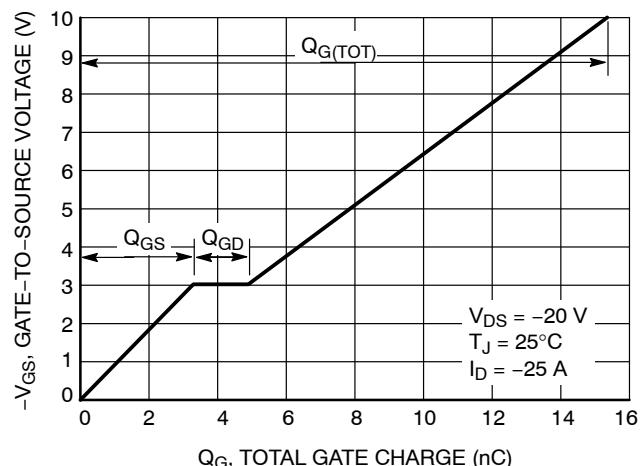
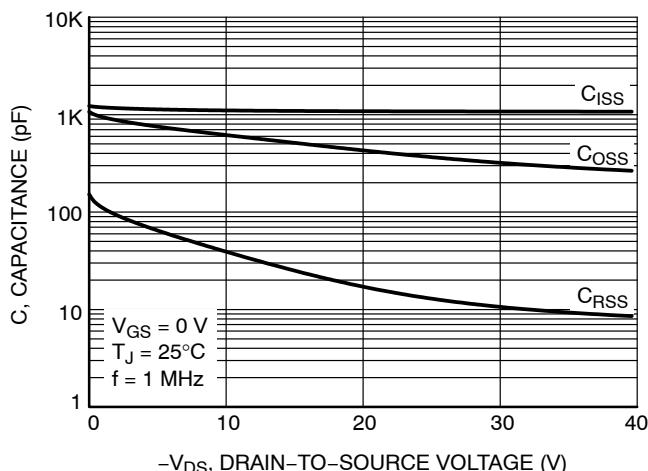
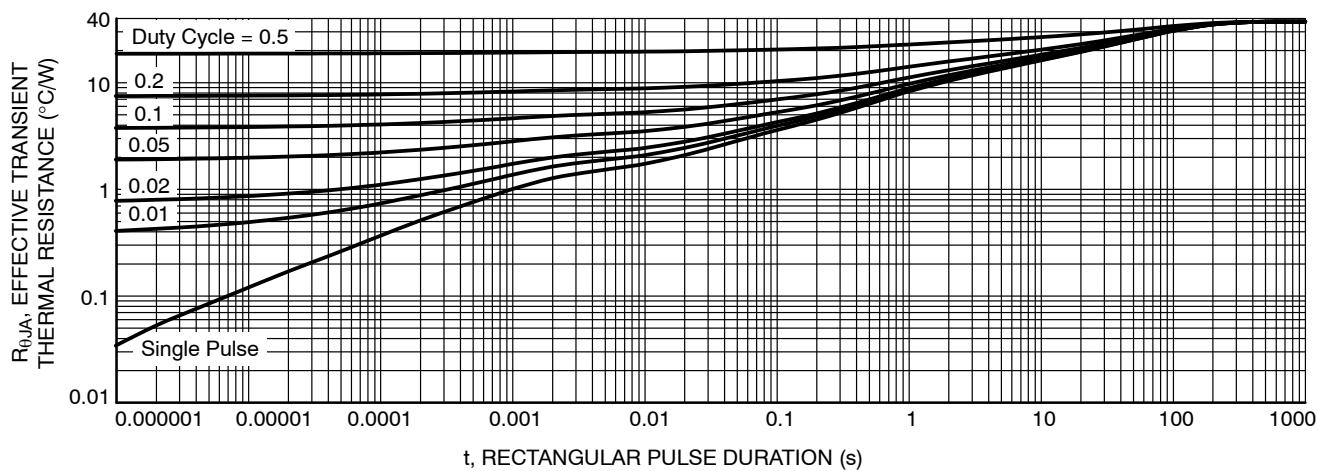


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS**Figure 13. Thermal Response****DEVICE ORDERING INFORMATION**

Device	Marking	Package	Shipping [†]
NVTYS025P04M8LTWG	025P 04M8L	LFPAK33 (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.

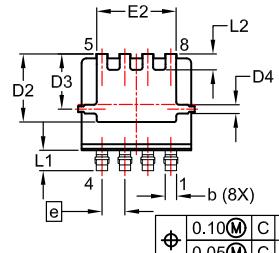
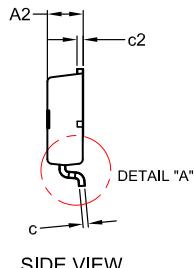
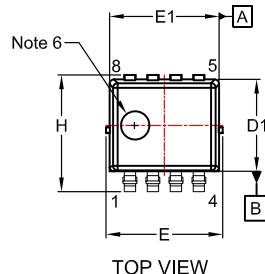


LFPAK8 3.3x3.3, 0.65P

CASE 760AD

ISSUE E

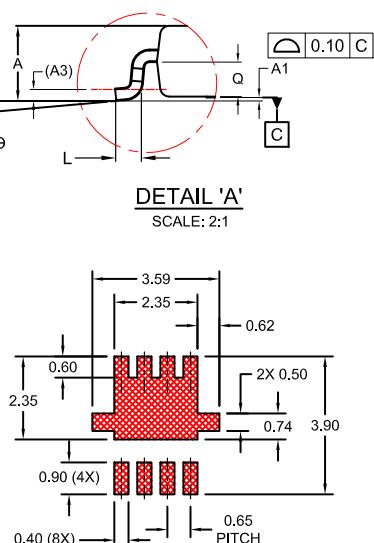
DATE 16 NOV 2020



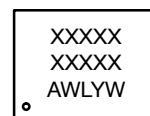
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.95	1.05	1.15
A1	0.00	0.05	0.10
A2	0.95	1.00	1.05
A3	0.15 REF		
b	0.27	0.32	0.37
c	0.12	0.17	0.22
c2	0.12	0.17	0.22
D1	2.50	2.60	2.70
D2	1.82	1.92	2.02
D3	1.46	1.56	1.66
D4	0.20	0.25	0.30
E	3.20	3.30	3.40
E1	3.00	3.10	3.20
E2	2.15	2.25	2.35
e	0.65 BSC		
H	3.20	3.30	3.40
L	0.25	0.37	0.50
L1	0.48	0.58	0.68
L2	0.35	0.45	0.55
Q	0.45	0.50	0.55
Θ	0°	4°	8°

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS OR BURRS SHALL NOT EXCEED 0.150mm PER SIDE.
4. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
6. OPTIONAL MOLD FEATURE.

LAND PATTERN
RECOMMENDATION

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

GENERIC
MARKING DIAGRAM*

XXXX = 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. Pb-Free indicator, "G" or microdot "", may or may not be present. Some products may not follow the Generic Marking.

DOCUMENT NUMBER:	98AON05544H	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	LFPAK8 3.3x3.3, 0.65P	PAGE 1 OF 1

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **ONSEMI**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales

