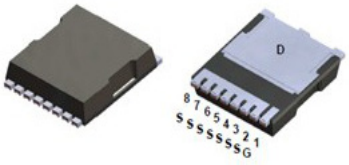
NVBLS0D7N04M8

MOSFET – Power, Single, N-Channel

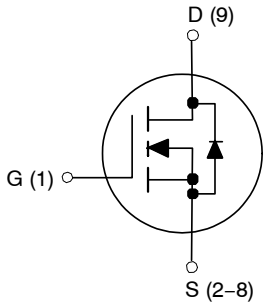
40 V, 240 A, 0.75 mΩ

ON Semiconductor®

www.onsemi.com



MO−299A
CASE 100CU



Features

- Typical $R_{DS(on)}$ = 0.59 mΩ at V_{GS} = 10 V, I_D = 80 A
- Typical $Q_{g(tot)}$ = 144 nC at V_{GS} = 10 V, I_D = 80 A
- UIS Capability
- AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free and are RoHS Compliant

MAXIMUM RATINGS T_J = 25°C unless otherwise noted

Parameter	Symbol	Ratings	Units
Drain−to−Source Voltage	V_{DSS}	40	V
Gate−to−Source Voltage	V_{GS}	±20	V
Drain Current − Continuous (V_{GS} = 10) (Note 1) T_C = 25°C	I_D	240	A
Pulsed Drain Current T_C = 25°C		See Figure 4	
Single Pulse Avalanche Energy (Note 2)	E_{AS}	737	mJ
Power Dissipation	P_D	357	W
Derate Above 25°C		2.38	W/°C
Operating and Storage Temperature	T_J, T_{STG}	−55 to +175	°C
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	0.42	°C/W
Maximum Thermal Resistance, Junction−to−Ambient (Note 3)	$R_{\theta JA}$	43	°C/W

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.

1. Current is limited by bondwire configuration.
2. Starting T_J = 25°C, L = 0.36 mH, I_{AS} = 64 A, V_{DD} = 40 V during inductor charging and V_{DD} = 0 V during time in avalanche.
3. $R_{\theta JA}$ is the sum of the junction−to−case and case−to−ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design, while $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in^2 pad of 2 oz copper.

ORDERING INFORMATION

Device	Package	Marking
NVBLS0D7N04M8TXG	MO−299A (Pb−Free)	0D7N04M8

© Semiconductor Components Industries, LLC, 2018

Table 1. ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
OFF CHARACTERISTICS							
B_{VDSS}	Drain−to−Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V		40	–	–	V
I_{DSS}	Drain−to−Source Leakage Current	V_{DS} = 40 V, V_{GS} = 0 V	T_J = 25°C	–	–	1	μA
			T_J = 175°C (Note 4)	–	–	1	mA
I_{GSS}	Gate−to−Source Leakage Current	V_{GS} = ±20 V		–	–	±100	nA
ON CHARACTERISTICS							
$V_{GS(th)}$	Gate−to−Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA		2.0	3.3	4.0	V
$R_{DS(on)}$	Drain−to−Source On Resistance	I_D = 80 A, V_{GS} = 10 V	T_J = 25°C	–	0.59	0.75	mΩ
DYNAMIC CHARACTERISTICS							
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz		–	12000	–	pF
C_{oss}	Output Capacitance			–	3300	–	pF
C_{rss}	Reverse Transfer Capacitance			–	440	–	pF
R_g	Gate Resistance	f = 1 MHz		–	3.3	–	Ω
$Q_{g(ToT)}$	Total Gate Charge at 10 V	V_{GS} = 0 to 10 V	V_{DD} = 32 V, I_D = 80 A	–	144	188	nC
$Q_{g(th)}$	Threshold Gate Charge	V_{GS} = 0 to 2 V		–	22	26	nC
Q_{gs}	Gate−to−Source Gate Charge			–	66	–	nC
Q_{gd}	Gate−to−Drain “Miller” Charge			–	16	–	nC
SWITCHING CHARACTERISTICS							
t_{on}	Turn−On Time	V_{DD} = 20 V, I_D = 80 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		–	–	162	ns
$t_{d(on)}$	Turn−On Delay			–	42	–	ns
t_r	Rise Time			–	73	–	ns
$t_{d(off)}$	Turn−Off Delay			–	83	–	ns
t_f	Fall Time			–	50	–	ns
t_{off}	Turn−Off Time			–	–	279	ns
DRAIN−SOURCE DIODE CHARACTERISTICS							
V_{SD}	Source−to−Drain Diode Voltage	I_{SD} = 80 A, V_{GS} = 0 V		–	–	1.25	V
		I_{SD} = 40 A, V_{GS} = 0 V		–	–	1.2	V
t_{rr}	Reverse−Recovery Time	I_F = 80 A, dI_{SD}/d_t = 100 A/μs, V_{DD} = 32 V		–	111	129	ns
Q_{rr}	Reverse−Recovery Charge			–	178	214	nC

4. The maximum value is specified by design at T_J = 175°C. Product is not tested to this condition in production.

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.

Typical Characteristics

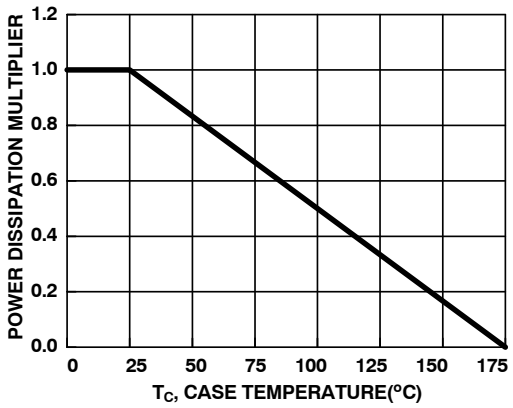


Figure 1. Normalized Power Dissipation vs. Case Temperature

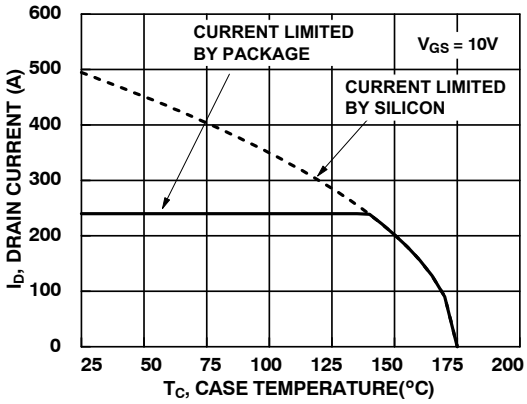


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

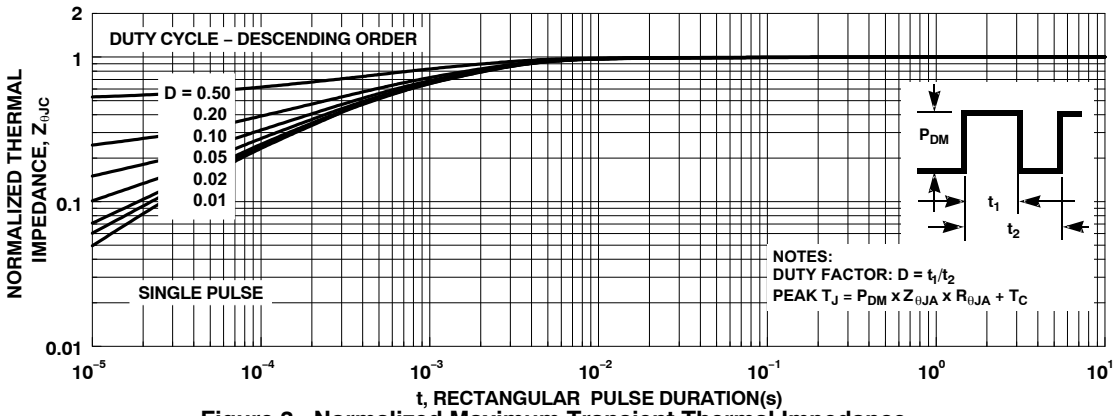


Figure 3. Normalized Maximum Transient Thermal Impedance

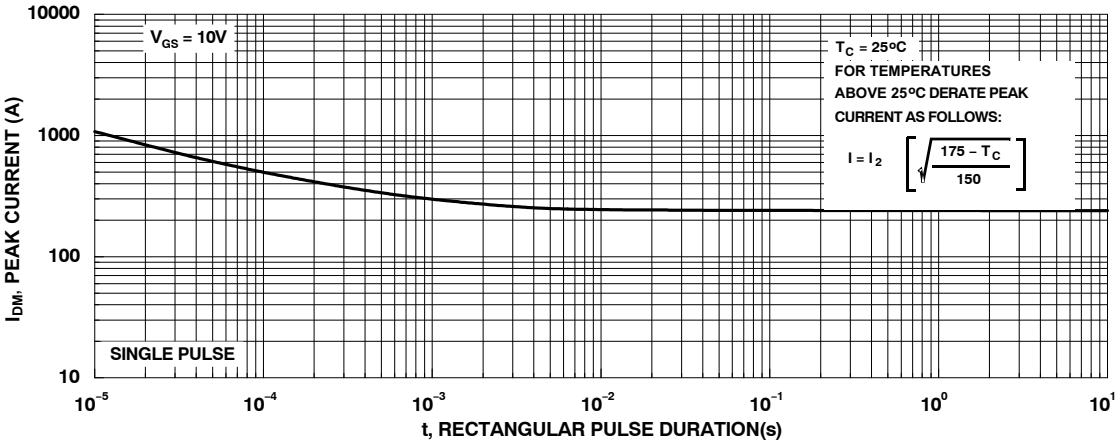


Figure 4. Peak Current Capability

Typical Characteristics

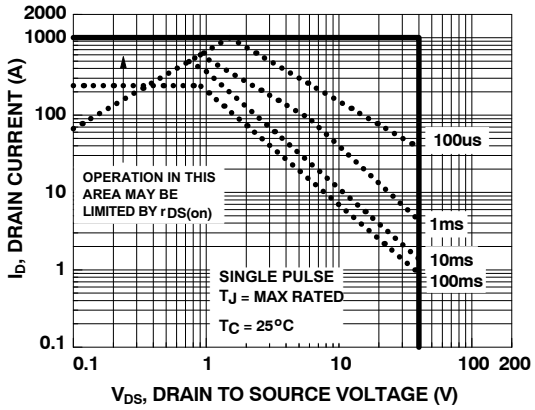
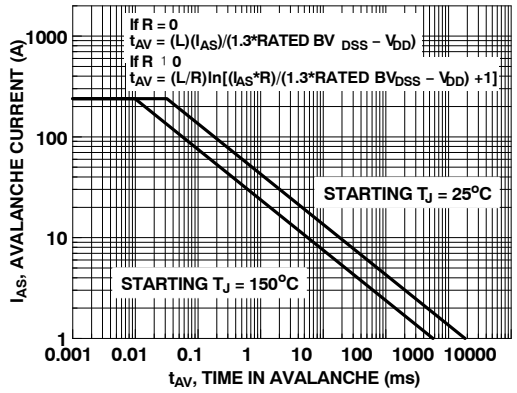


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

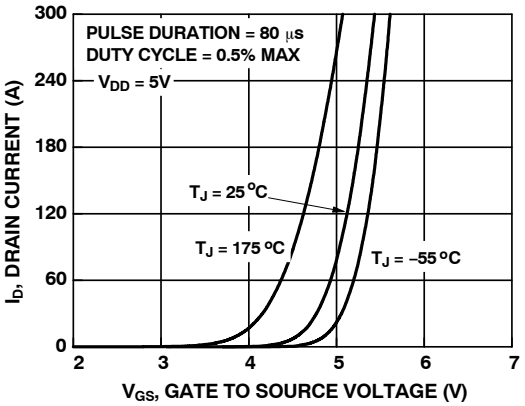


Figure 7. Transfer Characteristics

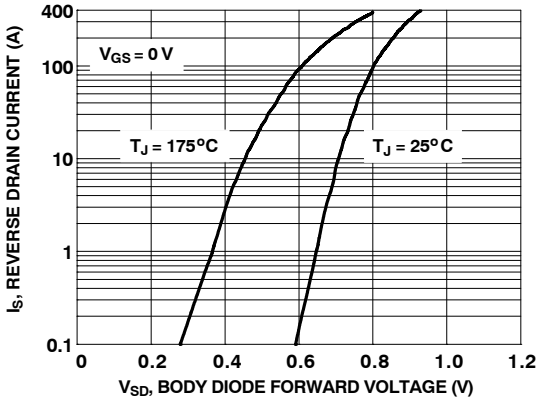


Figure 8. Forward Diode Characteristics

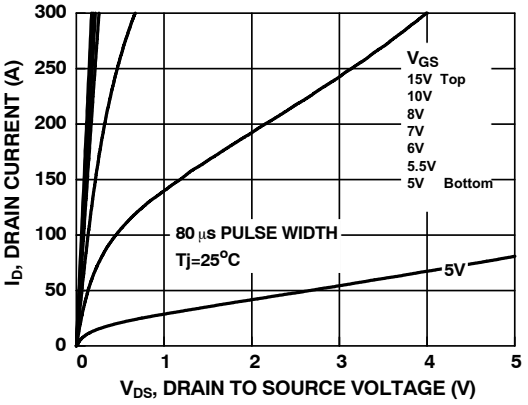


Figure 9. Saturation Characteristics

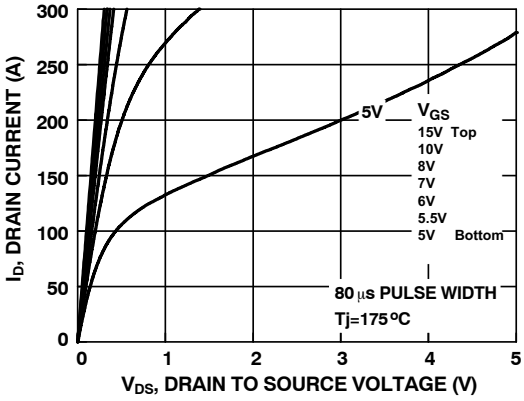


Figure 10. Saturation Characteristics

Typical Characteristics

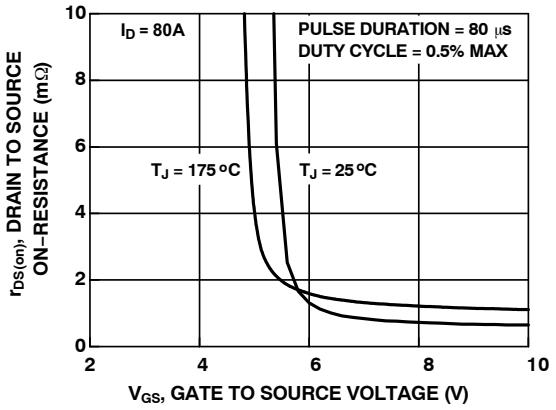


Figure 11. R_{DSON} vs. Gate Voltage

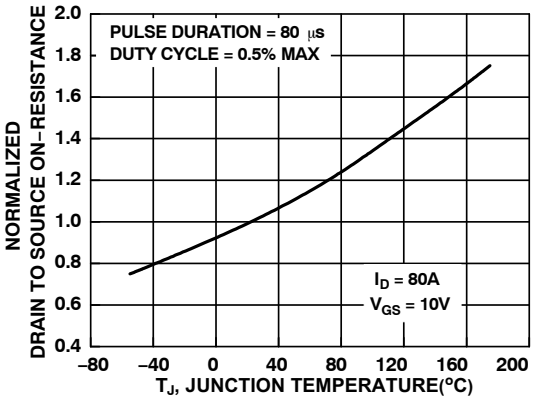


Figure 12. Normalized R_{DSON} vs. Junction Temperature

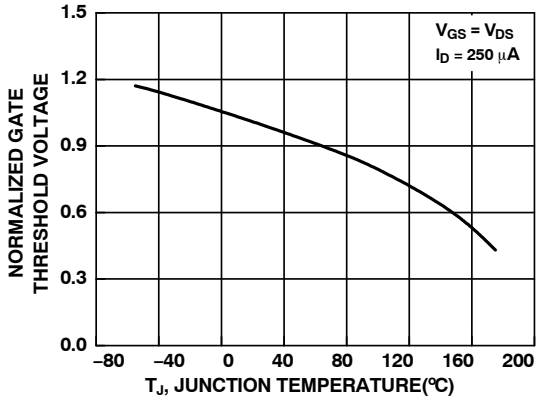


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

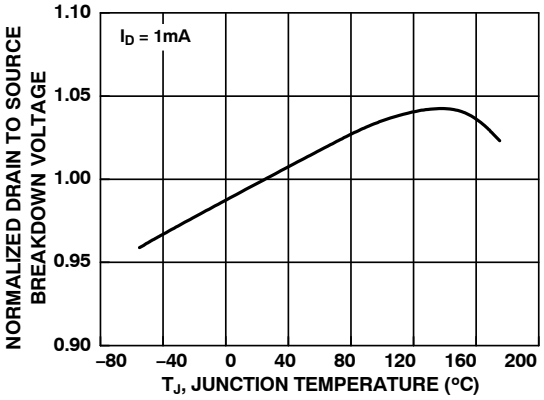


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

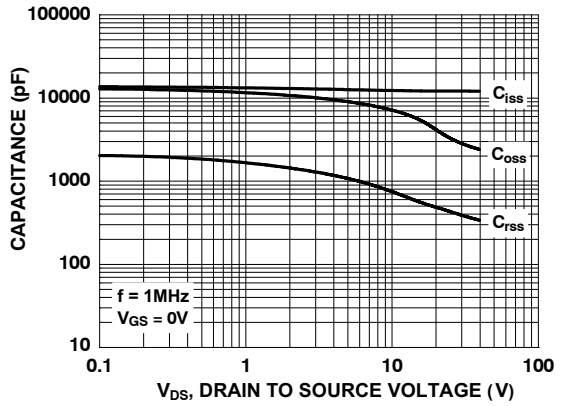


Figure 15. Capacitance vs. Drain to Source Voltage

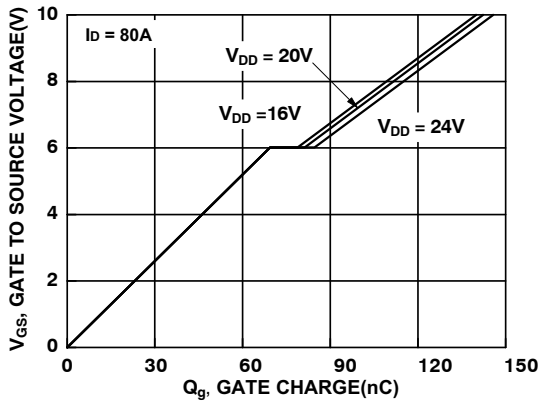
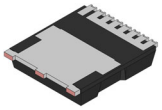


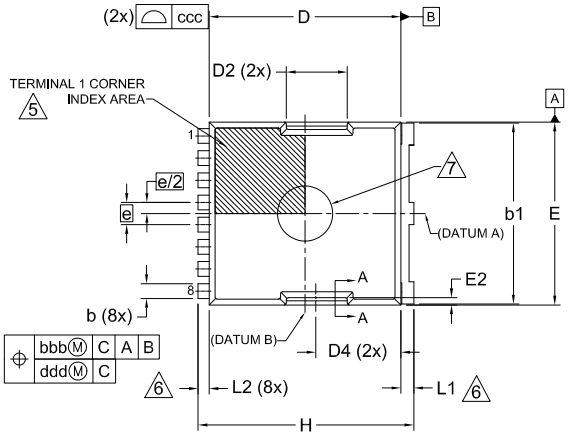
Figure 16. Gate Charge vs. Gate to Source Voltage

PowerTrench is a registered trademark of Semiconductor Components Industries, LLC.

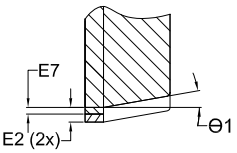


H−PSOF8L 11.68x9.80x2.30, 1.20P
CASE 100CU
ISSUE F

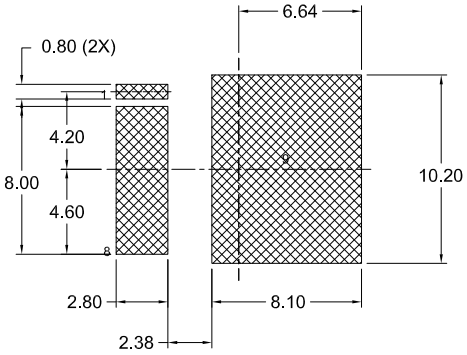
DATE 30 JUL 2024



TOP VIEW

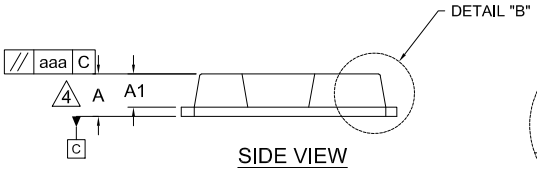


SECTION "A-A"
SCALE: 2X

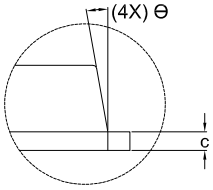


LAND PATTERN RECOMMENDATION

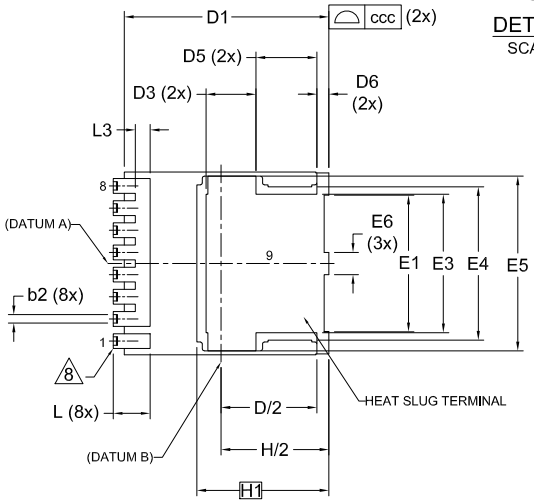
*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.



SIDE VIEW



DETAIL "B"
SCALE: 2X



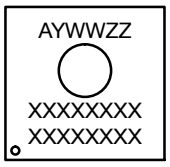
BOTTOM VIEW

NOTES:
1. PACKAGE STANDARD REFERENCE: JEDEC MO-299, ISSUE B.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
3. "e" REPRESENTS THE TERMINAL PITCH.
4. THIS DIMENSION INCLUDES ENCAPSULATION THICKNESS "A1", AND PACKAGE BODY THICKNESS, BUT DOES NOT INCLUDE ATTACHED FEATURES, e.g.,EXTERNAL OR CHIP CAPACITORS. AN INTEGRAL HEATSLUG IS NOT CONSIDERED AS ATTACHED FEATURE.
5. A VISUAL INDEX FEATURE MUST BE LOCATED WITHIN THE HATCHED AREA.
6. DIMENSIONS b1,L1,L2 APPLY TO PLATED TERMINALS.
7. THE LOCATION AND SIZE OF EJECTOR MARKS ARE OPTIONAL.
8. THE LOCATION AND NUMBER OF FUSED LEADS ARE OPTIONAL.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
A1	1.70	1.80	1.90
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b2	0.35	0.45	0.55
c	0.40	0.50	0.60
D	10.28	10.38	10.48
D/2	5.09	5.19	5.29
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D3	2.60	2.70	2.80
D4	4.45	4.55	4.65
D5	3.20	3.30	3.40
D6	0.55	0.65	0.75
E	9.80	9.90	10.00
E1	7.30	7.40	7.50
E2	0.30	0.40	0.50
E3	7.40	7.50	7.60
E4	8.20	8.30	8.40

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
E5	9.36	9.46	9.56
E6	1.10	1.20	1.30
E7	0.15	0.18	0.21
e	1.20 BSC		
e/2	0.60 BSC		
H	11.58	11.68	11.78
H/2	5.74	5.84	5.94
H1	7.15 BSC		
L	1.90	2.00	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	0.70	0.80	0.90
Θ	10° REF		
Θ1	10° REF		
aaa	0.20		
bbb	0.25		
ccc	0.20		
ddd	0.20		
eee	0.10		

GENERIC MARKING DIAGRAM*



A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code
XXXX = Specific Device Code

*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:	**98AON13813G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**H−PSOF8L 11.68x9.80x2.30, 1.20P**	**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