

# MOSFET - Power, Single N-Channel, TOLL 80 V, 1.1 mΩ, 299 A NTBLS1D1N08X

## Features

- Low  $Q_{RR}$ , Soft Recovery Body Diode
- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low  $Q_G$  and Capacitance to Minimize Driver Losses
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

## Applications

- Synchronous Rectification (SR) in DC-DC and AC-DC
- Primary Switch in Isolated DC-DC Converter
- Motor Drives

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

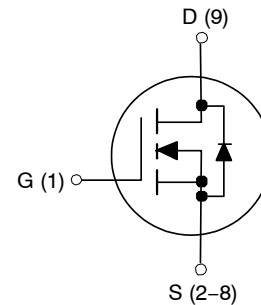
Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		$V_{DSS}$	80	V
Gate-to-Source Voltage		$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$T_C = 25^{\circ}\text{C}$	$I_D$	299	A
	$T_C = 100^{\circ}\text{C}$		211	
Power Dissipation	$T_C = 25^{\circ}\text{C}$	$P_D$	197	W
Pulsed Drain Current	$T_C = 25^{\circ}\text{C}$ , $t_p = 100\text{ }\mu\text{s}$	$I_{DM}$	1925	A
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to +175	$^{\circ}\text{C}$
Continuous Source-Drain Current (Body Diode)		$I_S$	332	A
Single Pulse Avalanche Energy ( $I_{PK} = 94\text{ A}$ )		$E_{AS}$	441	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260	$^{\circ}\text{C}$

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.

1. Surface mounted on FR4 board using a 1 in<sup>2</sup>, 1 oz. Cu pad
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
3.  $E_{AS}$  of 441 mJ is based on started  $T_J = 25^\circ\text{C}$ ,  $I_{AS} = 94 \text{ A}$ ,  $V_{DD} = 64 \text{ V}$ ,  $V_{GS} = 10 \text{ V}$ , 100% avalanche tested.

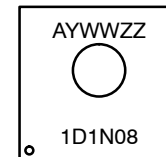
$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
80 V	1.1 mΩ @ 10 V	299 A

## N-CHANNEL MOSFET



H-PSOF8L  
CASE 100CU

## MARKING DIAGRAM



A = Assembly Location  
Y = Year  
WW = Work Week  
ZZ = Assembly Lot Code  
1D1N08 = Specific Device Code

## ORDERING INFORMATION

Device	Package	Shipping†
NTBLS1D1N08XTXG	H-PSOF8L (Pb-Free)	2000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# NTBLS1D1N08X

**Table 1. THERMAL CHARACTERISTICS**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.76	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	43	

**Table 2. ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}, T_J = 25^\circ\text{C}$	80			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$\Delta V_{(BR)DSS} / \Delta T_J$	$I_D = 1\text{ mA}$ , Referenced to $25^\circ\text{C}$		33		mV/°C
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 80\text{ V}, T_J = 25^\circ\text{C}$			1.0	$\mu\text{A}$
		$V_{DS} = 80\text{ V}, T_J = 125^\circ\text{C}$			250	
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
ON CHARACTERISTICS						
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 95\text{ A}, T_J = 25^\circ\text{C}$		0.95	1.1	mΩ
		$V_{GS} = 6\text{ V}, I_D = 47\text{ A}, T_J = 25^\circ\text{C}$		1.4		
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 475\text{ }\mu\text{A}, T_J = 25^\circ\text{C}$	2.4		3.6	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(th)} / \Delta T_J$	$V_{GS} = V_{DS}, I_D = 475\text{ }\mu\text{A}$		-7		mV/°C
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{ V}, I_D = 95\text{ A}$		294		S
CHARGES, CAPACITANCES & GATE RESISTANCE						
Input Capacitance	$C_{ISS}$	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		8620		pF
Output Capacitance	$C_{OSS}$			2460		
Reverse Transfer Capacitance	$C_{RSS}$			37		
Output Charge	$Q_{OSS}$			175		
Total Gate Charge	$Q_{G(tot)}$	$V_{DD} = 40\text{ V}, I_D = 95\text{ A}, V_{GS} = 10\text{ V}$		120		
Threshold Gate Charge	$Q_{G(th)}$			26		
Gate-to-Source Charge	$Q_{GS}$			40		
Gate-to-Drain Charge	$Q_{GD}$			19		
Gate Plateau Voltage	$V_{GP}$			4.7		V
Gate Resistance	$R_G$		$f = 1\text{ MHz}$		0.67	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(on)}$	Resistive Load, $V_{GS} = 0/10\text{ V}$ , $V_{DD} = 40\text{ V}, I_D = 95\text{ A}, R_G = 2.5\text{ }\Omega$		22		ns
Rise Time	$t_r$			118		
Turn-Off Delay Time	$t_{d(off)}$			40		
Fall Time	$t_f$			152		
SOURCE-TO-DRAIN DIODE CHARACTERISTICS						
Forward Diode Voltage	$V_{SD}$	$I_S = 95\text{ A}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$		0.83	1.2	V
		$I_S = 95\text{ A}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$		0.67		
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0\text{ V}, I_S = 95\text{ A}$ $di/dt = 1000\text{ A}/\mu\text{s}, V_{DD} = 40\text{ V}$		32		ns
Charge Time	$t_a$			17		
Discharge Time	$t_b$			15		
Reverse Recovery Charge	$Q_{RR}$				297	

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

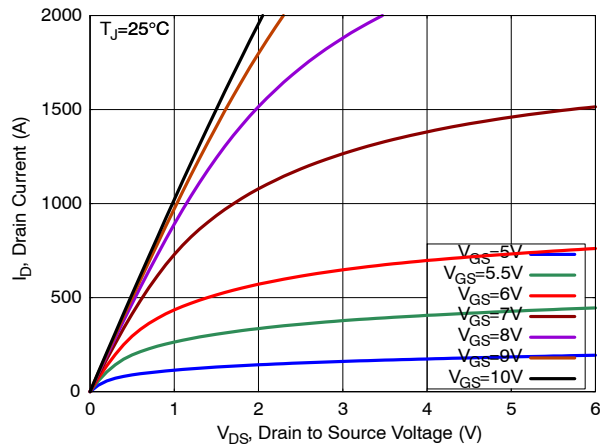


Figure 1. On-Region Characteristics

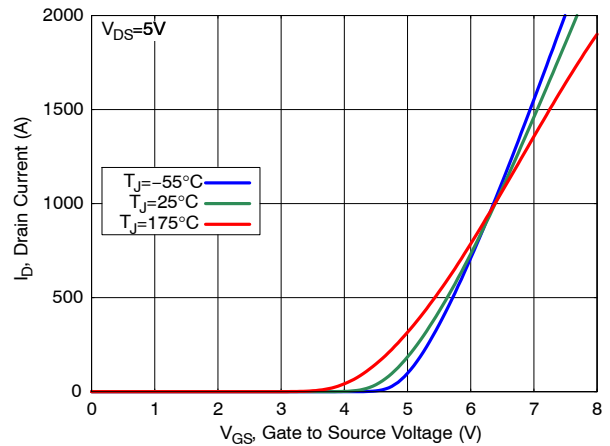


Figure 2. Transfer Characteristics

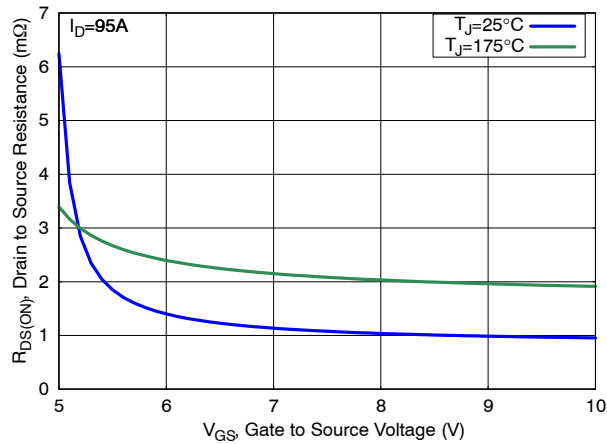


Figure 3. On-Resistance vs. Gate Voltage

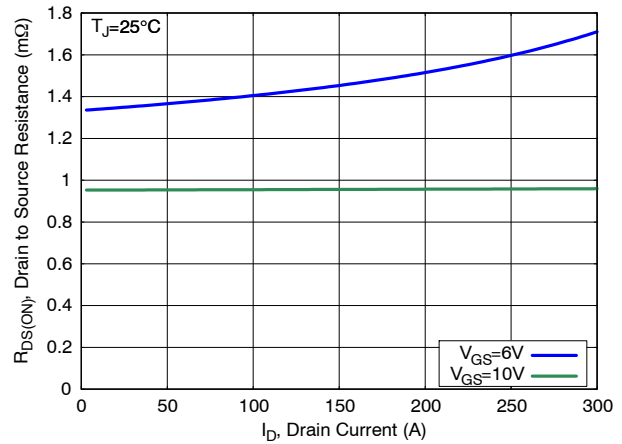


Figure 4. On-Resistance vs. Drain Current

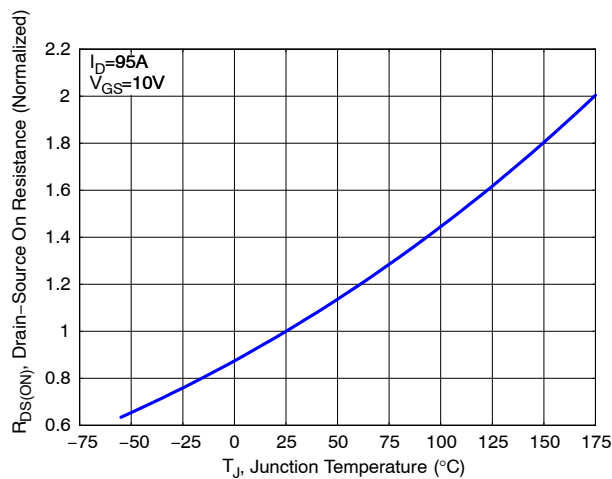


Figure 5. Normalized On-Resistance vs. Junction Temperature

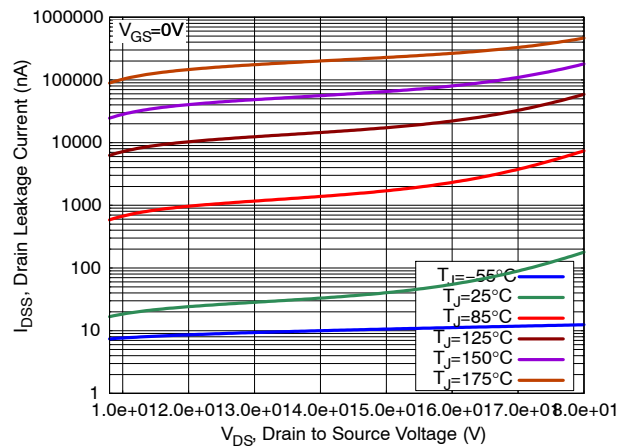


Figure 6. Drain Leakage Current vs. Drain Voltage

# NTBLS1D1N08X

## TYPICAL CHARACTERISTICS

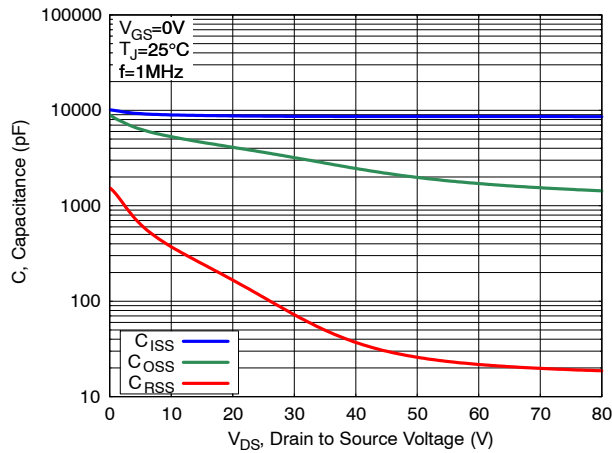


Figure 7. Capacitance Characteristics

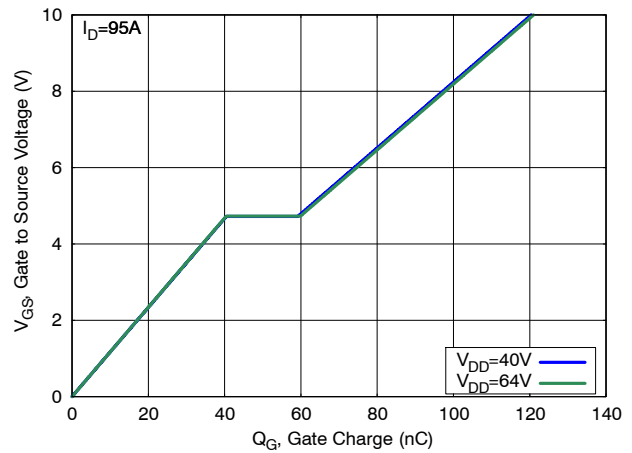


Figure 8. Gate Charge Characteristics

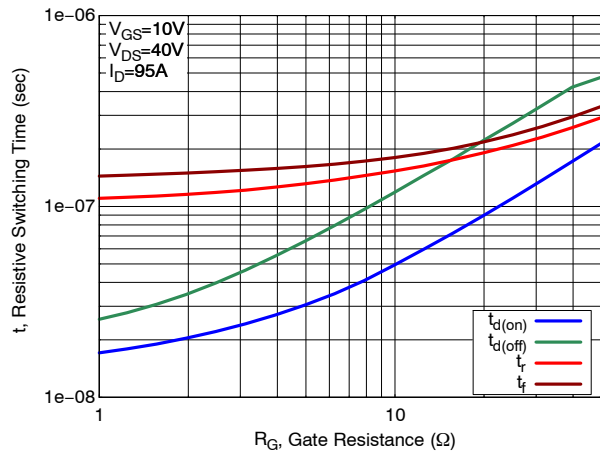


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

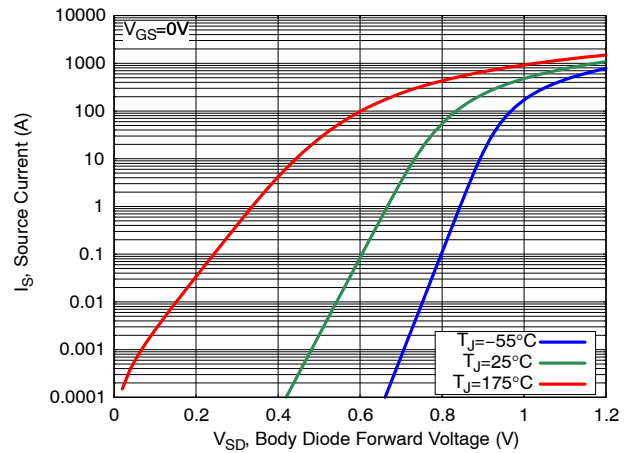


Figure 10. Diode Forward Characteristics

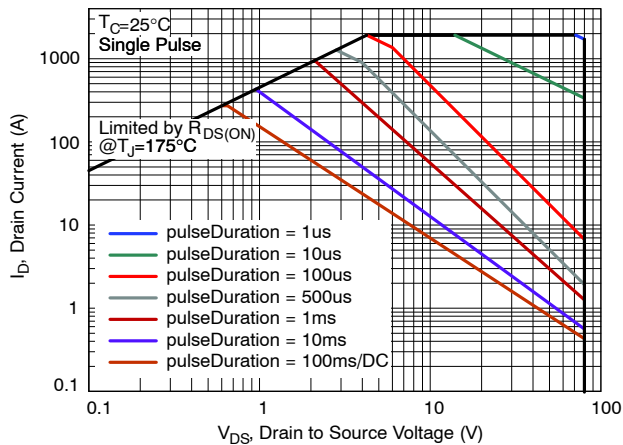


Figure 11. Safe Operating Area (SOA)

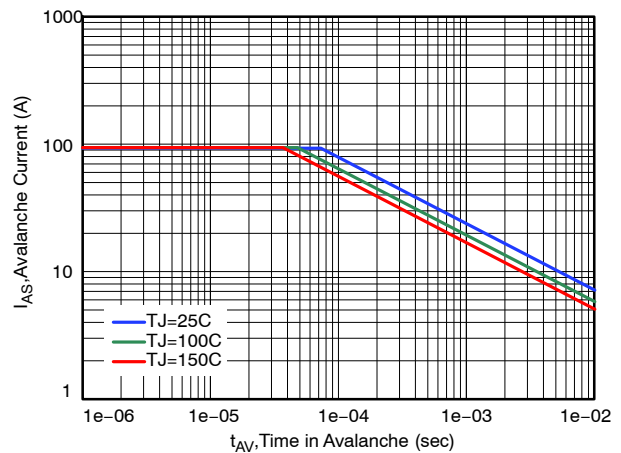


Figure 12. Avalanche Current vs. Pulse Time (UIS)

# NTBLS1D1N08X

## TYPICAL CHARACTERISTICS

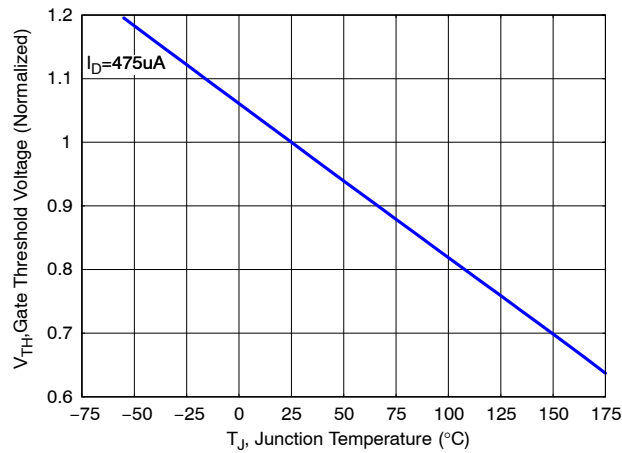


Figure 13. Gate Threshold Voltage vs. Junction Temperature

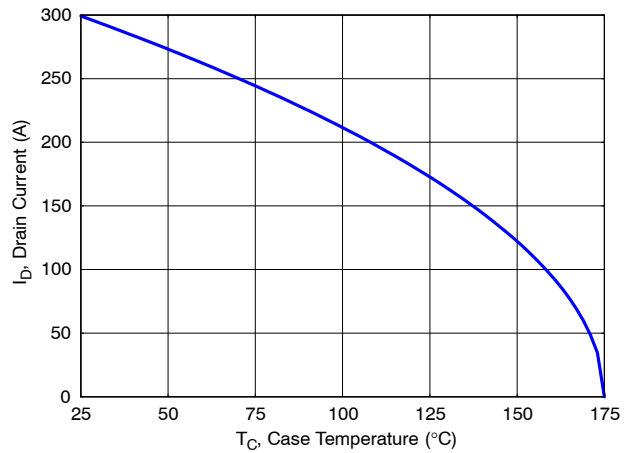


Figure 14. Maximum Current vs. Case Temperature

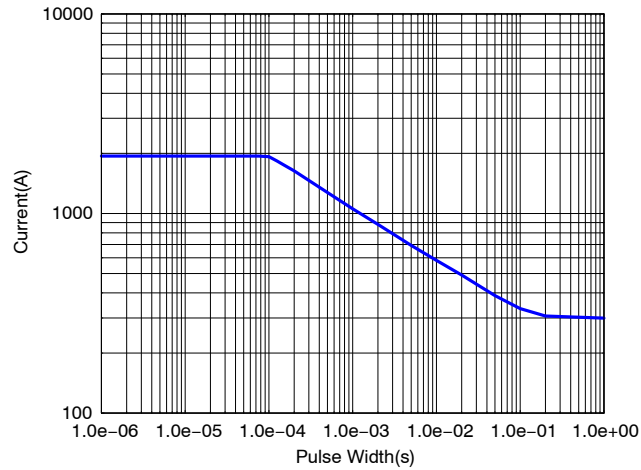


Figure 15. IDM vs. Pulse Width

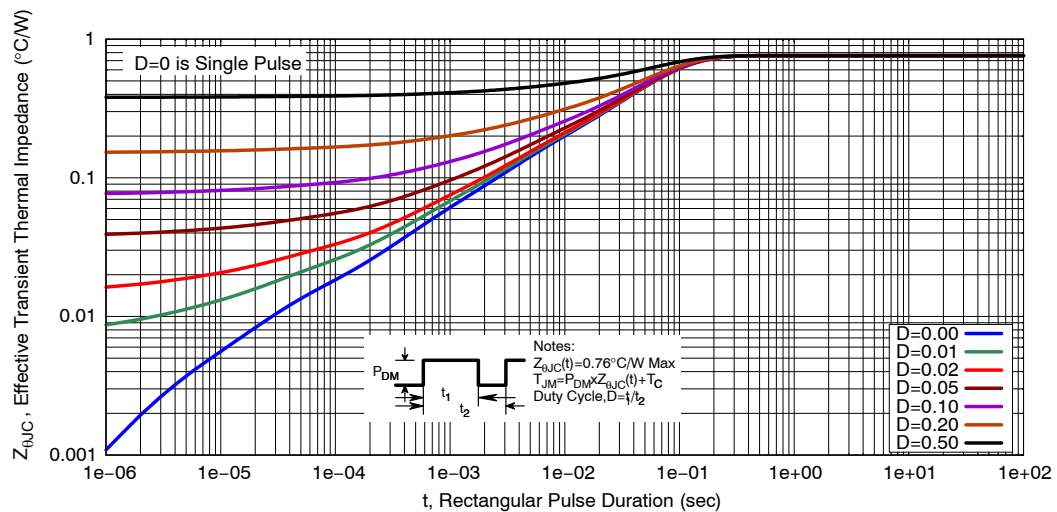


Figure 16. Transient Thermal Response



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

DATE 30 JUL 2024

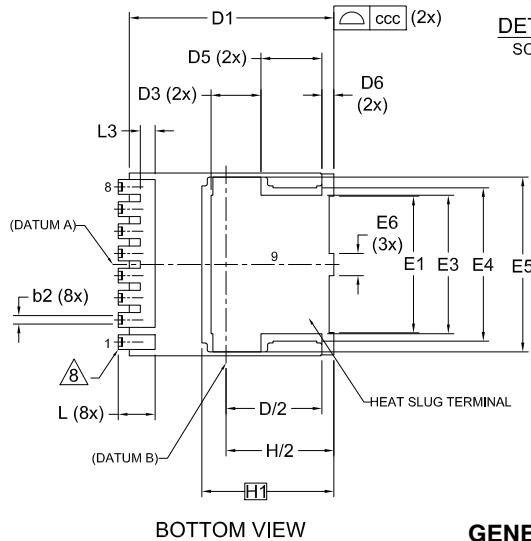


\*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.



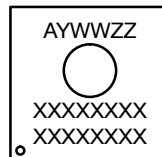
NOTES:

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.



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.

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		

DOCUMENT NUMBER: 98AON13813G

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DESCRIPTION: H-PSOF8L 11.68x9.80x2.30, 1.20P

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