

MOSFET - Power, Single N-Channel, TOLL

80 V, 0.79 mΩ, 457 A

NVBL50D8N08X

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
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Synchronous Rectification (SR) in DC-DC and AC-DC
- Primary Switch in Isolated DC-DC Converter
- Motor Drives
- 48 V Battery Switch
- Battery Management System

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

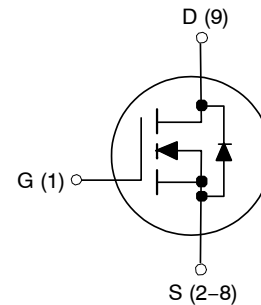
Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	80	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C = 25^\circ\text{C}$	457
		$T_C = 100^\circ\text{C}$	323
Power Dissipation	P_D	325	W
Pulsed Drain Current	I_{DM}	$T_C = 25^\circ\text{C}$, $t_p = 100 \mu\text{s}$	1629
Pulsed Source Current (Body Diode)			I_{SM}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	$^\circ\text{C}$
Source Current (Body Diode)	I_S	547	A
Single Pulse Avalanche Energy ($I_{PK} = 103 \text{ A}$)	E_{AS}	530	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. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Actual continuous current will be limited by thermal & electromechanical application board design.
3. E_{AS} of 530 mJ is based on started $T_J = 25^\circ\text{C}$, $I_{AS} = 103 \text{ A}$, $V_{DD} = 64 \text{ V}$, $V_{GS} = 10 \text{ V}$, 100% avalanche tested.

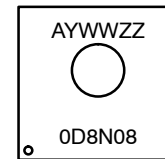
$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
80 V	0.79 mΩ @ 10 V	457 A

N-CHANNEL MOSFET



H-PSOF8L
CASE 100CU

MARKING DIAGRAM



- A = Assembly Location
- Y = Year
- WW = Work Week
- ZZ = Assembly Lot Code
- 0D8N08 = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping†
NVBL50D8N08XTXG	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.

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Table 1. THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.46	°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
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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°C		35.5		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 80\text{ V}, T_J = 25^\circ\text{C}$			2	μA
		$V_{DS} = 80\text{ V}, T_J = 125^\circ\text{C}$			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	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 80\text{ A}, T_J = 25^\circ\text{C}$		0.69	0.79	mΩ
Gate Threshold Voltage		$V_{GS} = V_{DS}, I_D = 720\text{ }\mu\text{A}, T_J = 25^\circ\text{C}$	2.4		3.6	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(th)} / \Delta T_J$	$V_{GS} = V_{DS}, I_D = 720\text{ }\mu\text{A}$		-7.95		mV/°C
Forward Transconductance	g_{FS}	$V_{DS} = 10\text{ V}, I_D = 80\text{ A}$		485		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C_{iss}	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		12920		pF
Output Capacitance	C_{oss}			3670		
Reverse Transfer Capacitance	C_{rss}			55		
Output Charge	Q_{oss}			262		nC
Total Gate Charge	$Q_{G(tot)}$	$V_{DD} = 40\text{ V}, I_D = 80\text{ A}, V_{GS} = 6\text{ V}$		109		
		$V_{DD} = 40\text{ V}, I_D = 80\text{ A}, V_{GS} = 10\text{ V}$		174		
Threshold Gate Charge	$Q_{G(th)}$			34		
Gate-to-Source Charge	Q_{gs}			54		
Gate-to-Drain Charge	Q_{gd}			32		
Gate Plateau Voltage	V_{gp}			4.6		
Gate Resistance	R_g	$f = 1\text{ MHz}$		0.5		Ω

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$t_{d(on)}$	Resistive Load, $V_{GS} = 0/10\text{ V}$, $V_{DD} = 64\text{ V}, I_D = 80\text{ A}, R_G = 2.5\text{ }\Omega$		35		ns
Rise Time	t_r			15		
Turn-Off Delay Time	$t_{d(off)}$			74		
Fall Time	t_f			20		

SOURCE-TO-DRAIN DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$I_S = 80\text{ A}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$		0.8		V
		$I_S = 80\text{ A}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$		0.66		
Reverse Recovery Time	t_{rr}	$V_{GS} = 0\text{ V}, I_S = 80\text{ A}$ $di/dt = 1000\text{ A}/\mu\text{s}, V_{DD} = 64\text{ V}$		57		ns
Charge Time	t_a			26		
Discharge Time	t_b			31		
Reverse Recovery Charge	Q_{rr}			650		

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

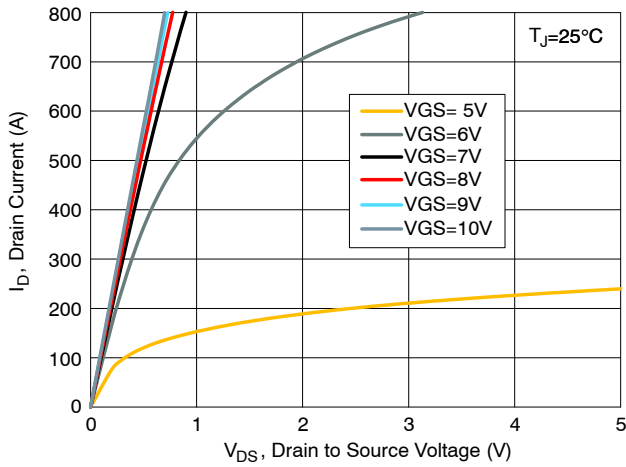


Figure 1. On-Region Characteristics

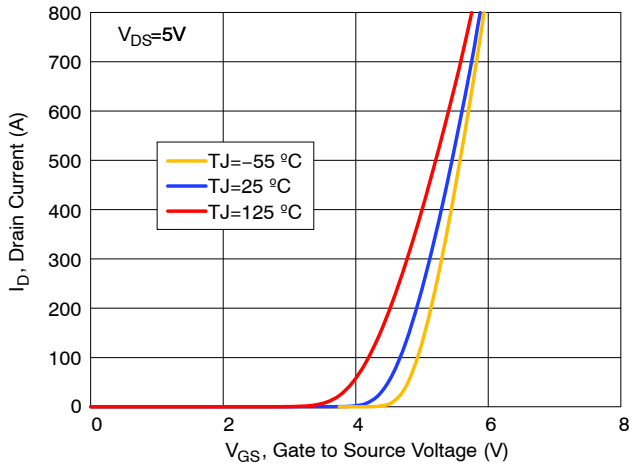


Figure 2. Transfer Characteristics

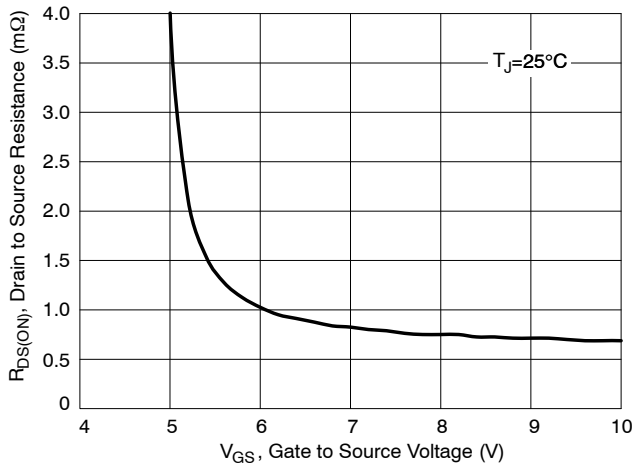


Figure 3. On-Resistance vs. Gate Voltage

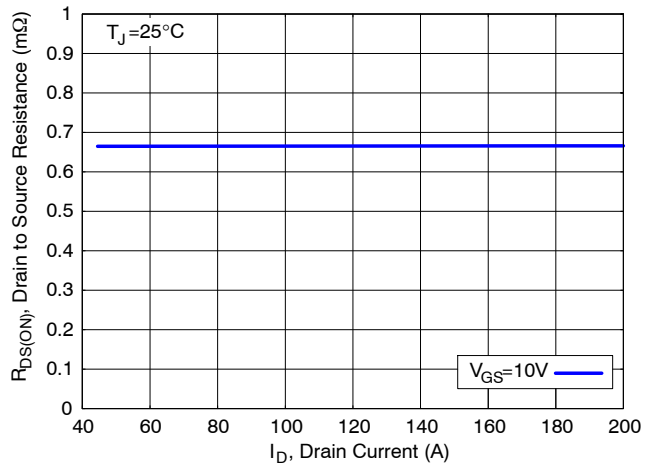


Figure 4. On-Resistance vs. Drain Current

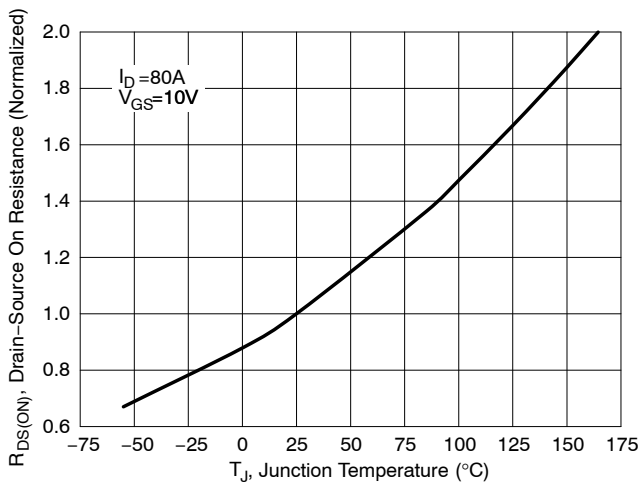


Figure 5. Normalized On-Resistance vs. Junction Temperature

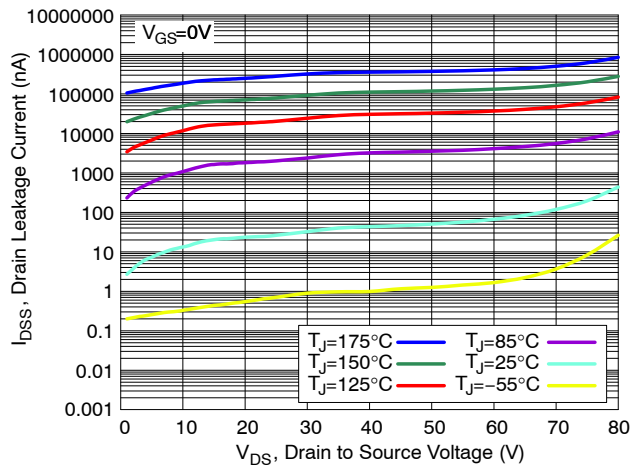


Figure 6. Drain Leakage Current vs. Drain Voltage

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TYPICAL CHARACTERISTICS

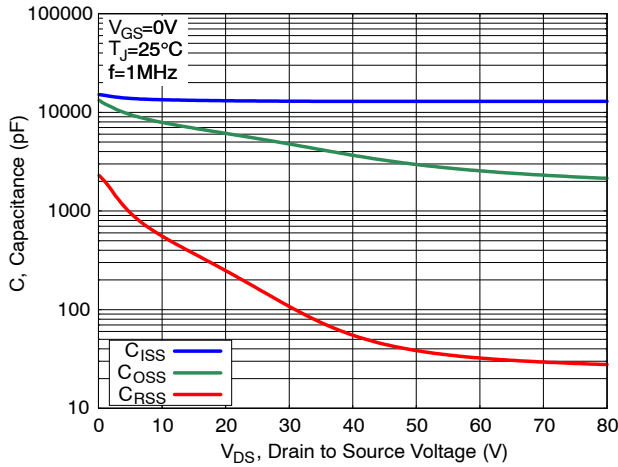


Figure 7. Capacitance Characteristics

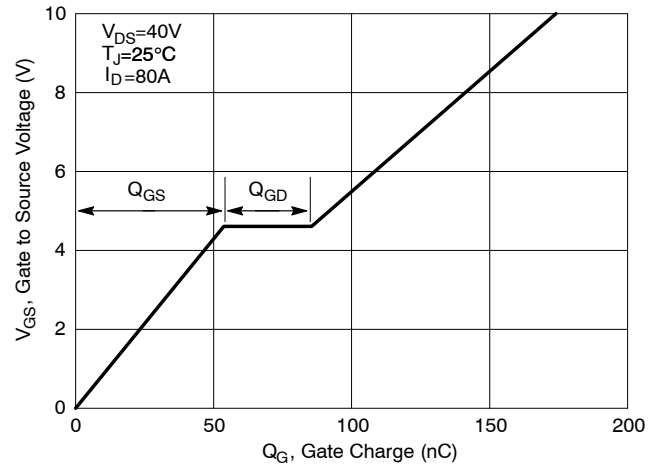


Figure 8. Gate Charge Characteristics

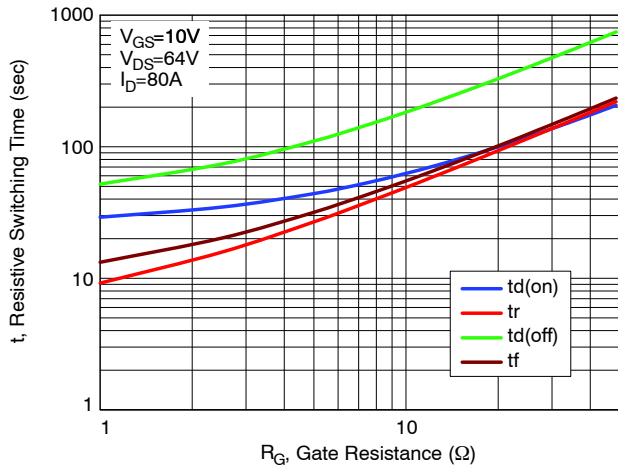


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

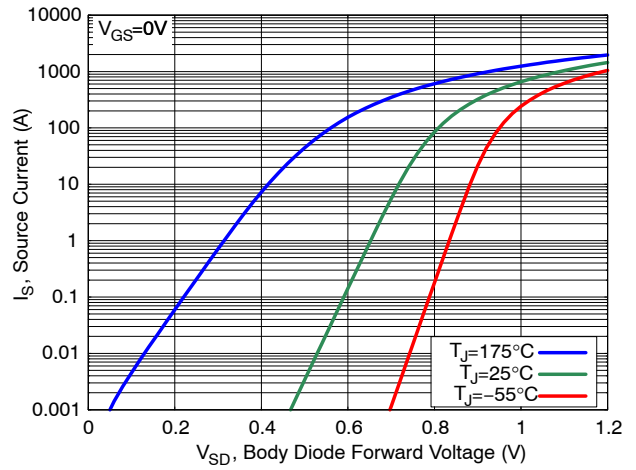


Figure 10. Diode Forward Characteristics

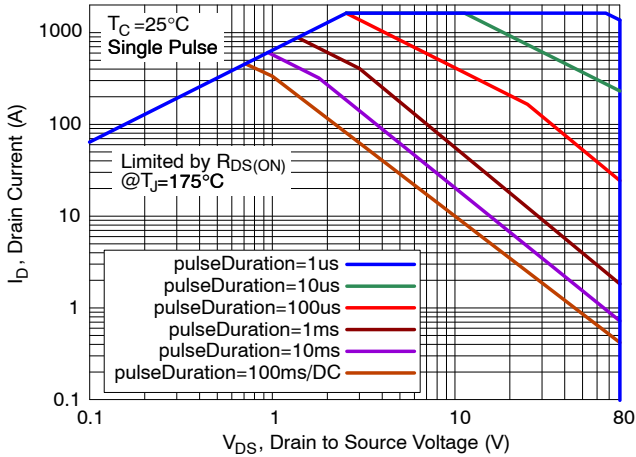


Figure 11. Safe Operating Area (SOA)

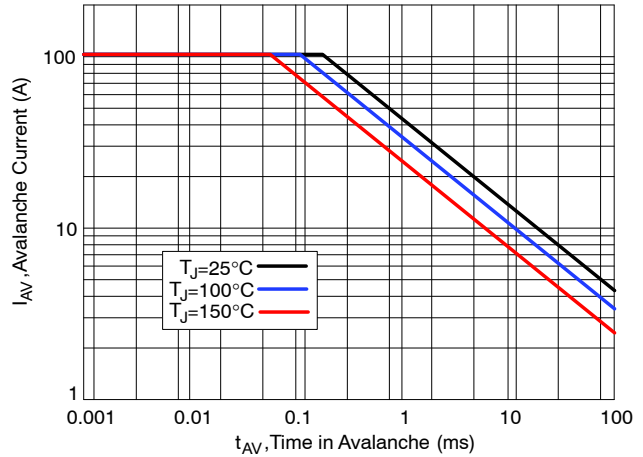


Figure 12. Avalanche Current vs. Pulse Time (UIS)

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TYPICAL CHARACTERISTICS

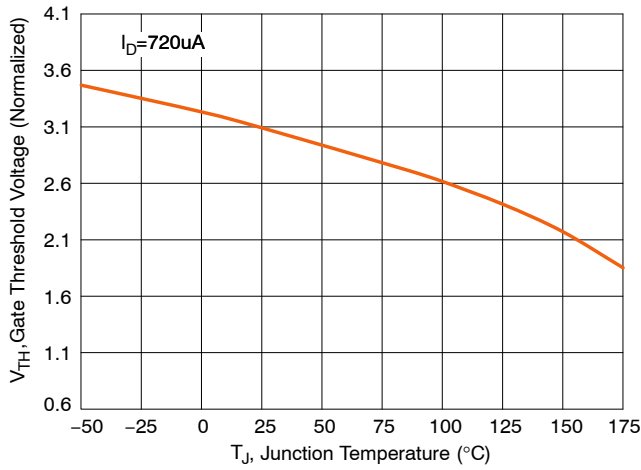


Figure 13. Gate Threshold Voltage vs. Junction Temperature

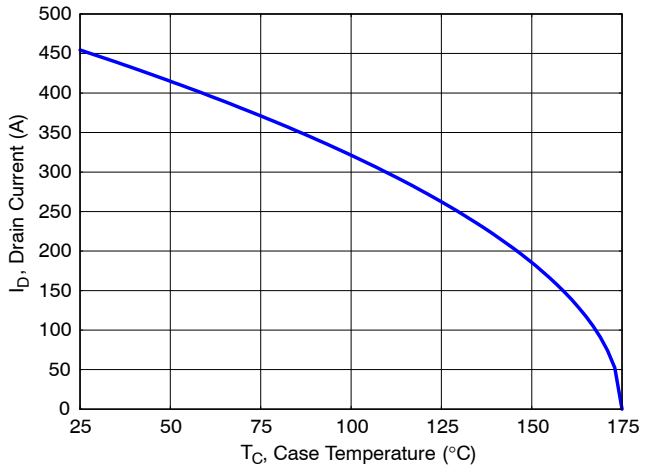


Figure 14. Maximum Current vs. Case Temperature

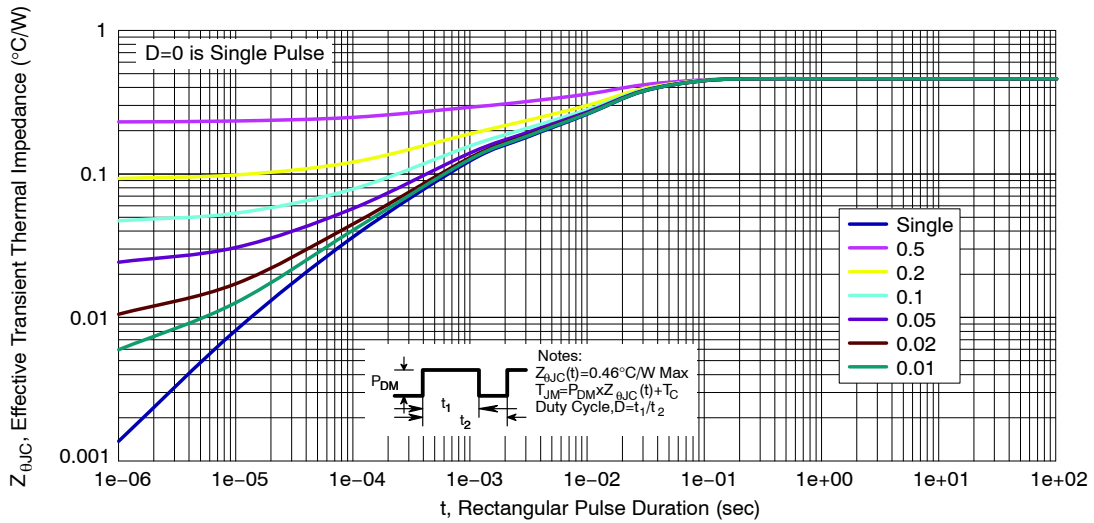


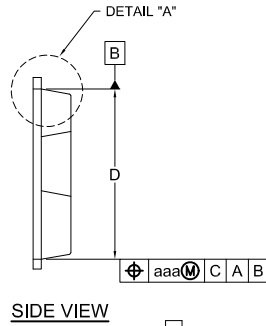
Figure 15. Transient Thermal Response

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



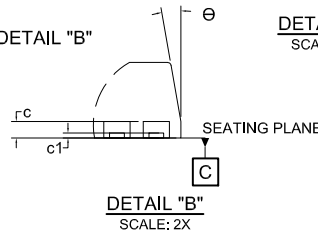
H-PSOF8L 11.68x9.80
CASE 100CU
ISSUE C

DATE 22 MAY 2023



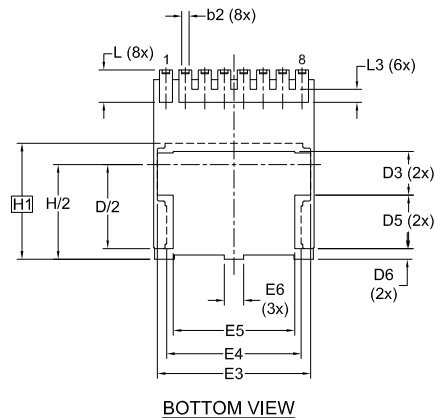
LAND PATTERN RECOMMENDATION

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

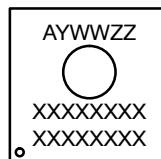


NOTES:

1. PACKAGE STANDARD REFERENCE: JEDEC MO-299, ISSUE A.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
3. CONTROLLING DIMENSION: MILLIMETERS.
4. COPLANARITY APPLIES TO THE EXPOSED WELL AS THE TERMINALS.
5. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
6. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.



GENERIC MARKING DIAGRAM*



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

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
c1	0.10	—	—
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	9.36	9.46	9.56

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
E4	8.20	8.30	8.40
E5	7.40	7.50	7.60
E6	1.10	1.20	1.30
e	1.20 BSC		
e/2	0.60 BSC		
e1	8.40 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
theta	0°	—	12°
aaa	0.20		
bbb	0.25		
ccc	0.20		
ddd	0.20		
eee	0.10		

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "a", may or may not be present. Some products may not follow the Generic Marking.

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