

# MOSFET - Power, Single N-Channel, TOLL



ON Semiconductor®

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## NTBLS1D5N08MC 80 V, 1.53 mΩ, 298 A

### Features

- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low  $Q_G$  and Capacitance to Minimize Driver Losses
- Lowers Switching Noise/EMI
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Power Tools, Battery Operated Vacuums
- UAV/Drones, Material Handling
- BMS/Storage, Home Automation

### 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 $R_{\theta JC}$ (Note 2)	Steady State	$T_C = 25^\circ\text{C}$	$I_D$	298	A
		$T_C = 25^\circ\text{C}$	$P_D$	250	W
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	32	A
		$T_A = 25^\circ\text{C}$	$P_D$	2.9	W
Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	$I_{DM}$	4487	A	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$	
Source Current (Body Diode)		$I_S$	192	A	
Single Pulse Drain-to-Source Avalanche Energy ( $I_{L(pk)} = 31 \text{ A}, L = 3 \text{ mH}$ )		$E_{AS}$	1441	mJ	
Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260	$^\circ\text{C}$	

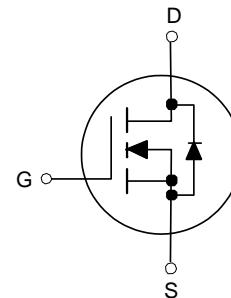
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State (Note 2)	$R_{\theta JC}$	0.5	$^\circ\text{C/W}$
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	43	

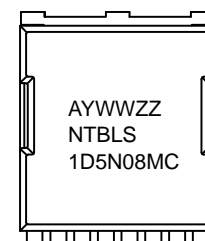
1. Surface-mounted on FR4 board using a 1 in<sup>2</sup> pad size, 1 oz. Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
80 V	1.53 mΩ @ 10 V	298 A
	3.7 mΩ @ 6 V	



MO-299A  
TOLL  
CASE 100CU

### MARKING DIAGRAM



NTBLS1D5N08MC = Specific Device Code  
 A = Assembly Location  
 Y = Year  
 WW = Work Week  
 ZZ = Lot Traceability

### ORDERING INFORMATION

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

# NTBLS1D5N08MC

**Table 1. ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units	
<b>OFF CHARACTERISTICS</b>							
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	80	-	-	V	
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = 250 \mu\text{A}, \text{ref to } 25^\circ\text{C}$	-	78	-	mV/ $^\circ\text{C}$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 80 \text{ V}, V_{GS} = 0 \text{ V}$	$T_J = 25^\circ\text{C}$	-	-	1	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$	-	-	100	$\mu\text{A}$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$	-	-	$\pm 100$	nA	
<b>ON CHARACTERISTICS</b> (Note 3)							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 710 \mu\text{A}$	2.0	3.0	4.0	V	
Negative Threshold Temperature Coefficient	$V_{GS(th)}/T_J$	$I_D = 710 \mu\text{A}, \text{ref to } 25^\circ\text{C}$	-	-8.3	-	mV/ $^\circ\text{C}$	
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10 \text{ V}, I_D = 80 \text{ A}$	-	1.30	1.53	m $\Omega$	
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 6 \text{ V}, I_D = 63 \text{ A}$	-	2.0	3.7	m $\Omega$	
Forward Transconductance	$g_{FS}$	$V_{DS} = 5 \text{ V}, I_D = 80 \text{ A}$	-	220	-	S	
Gate-Resistance	$R_G$	$T_A = 25^\circ\text{C}$	-	0.7	-	$\Omega$	
<b>CHARGES &amp; CAPACTIANCES</b>							
Input Capacitance	$C_{iss}$	$V_{GS} = 0 \text{ V}, V_{DS} = 40 \text{ V}, f = 1 \text{ MHz}$	-	8170	-	pF	
Output Capacitance	$C_{oss}$		-	3025	-	pF	
Reverse Transfer Capacitance	$C_{rss}$		-	82	-	pF	
Total Gate Charge	$Q_{G(tot)}$	$V_{GS} = 10 \text{ V}, V_{DS} = 40 \text{ V}, I_D = 80 \text{ A}$	-	111	-	nC	
Threshold Gate Charge	$Q_{G(th)}$		-	22	-		
Gate-to-Source Charge	$Q_{gs}$		-	35	-		
Gate-to-Drain Charge	$Q_{gd}$		-	23	-		
Output Charge	$Q_{oss}$		-	166	-		
Sync Charge	$Q_{sync}$		-	94	-		
Plateau Voltage	$V_P$		-	5	-	V	
<b>SWITCHING CHARACTERISTICS, <math>V_{GS} = 10 \text{ V}</math></b> (Note 3)							
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10 \text{ V}, V_{DS} = 40 \text{ V}, I_D = 80 \text{ A}, R_G = 6 \Omega$	-	38	-	ns	
Rise Time	$t_r$		-	34	-	ns	
Turn-Off Delay Time	$t_{d(off)}$		-	74	-	ns	
Fall Time	$t_f$		-	37	-	ns	
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>							
Forward Diode Voltage	$V_{SD}$	$I_S = 80 \text{ A}, V_{GS} = 0 \text{ V}$	$T_J = 25^\circ\text{C}$	-	0.8	1.3	V
		$I_S = 80 \text{ A}, V_{GS} = 0 \text{ V}$	$T_J = 125^\circ\text{C}$	-	0.7	-	V
Reverse Recovery Time	$t_{rr}$	$I_F = 40 \text{ A}, di/dt = 300 \text{ A}/\mu\text{s}$	-	19	-	nS	
Reverse Recovery Charge	$Q_{rr}$		-	42	-	nC	
Reverse Recovery Time	$t_{rr}$	$I_F = 40 \text{ A}, di/dt = 1000 \text{ A}/\mu\text{s}$	-	17	-	nS	
Reverse Recovery Charge	$Q_{rr}$		-	121	-	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.

3. Switching characteristics are independent of operating junction temperatures

# NTBLS1D5N08MC

## TYPICAL CHARACTERISTICS

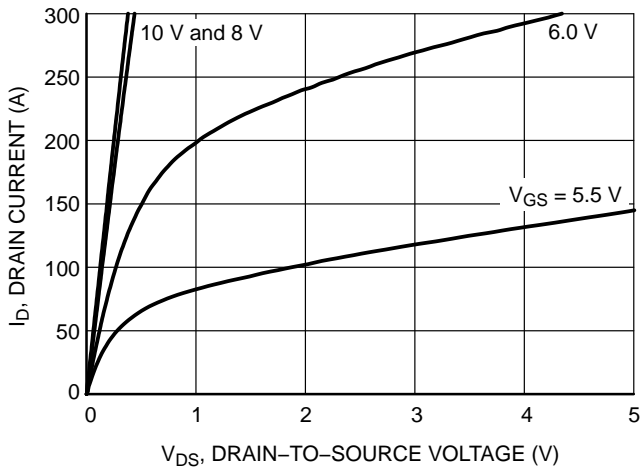


Figure 1. On-Region Characteristics

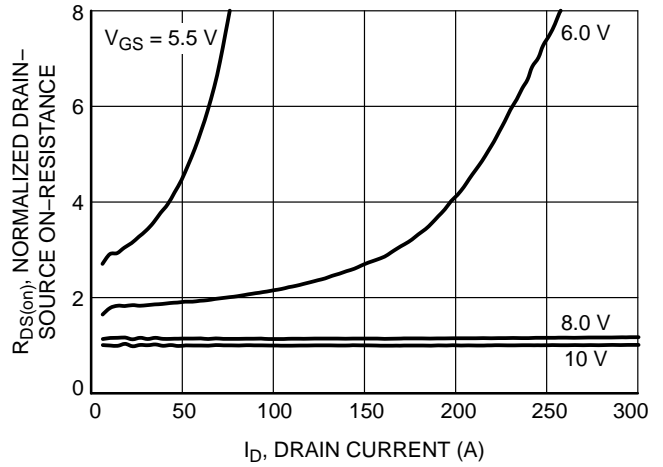


Figure 2.  $R_{DS(on)}$  Normalized vs.  $I_D$

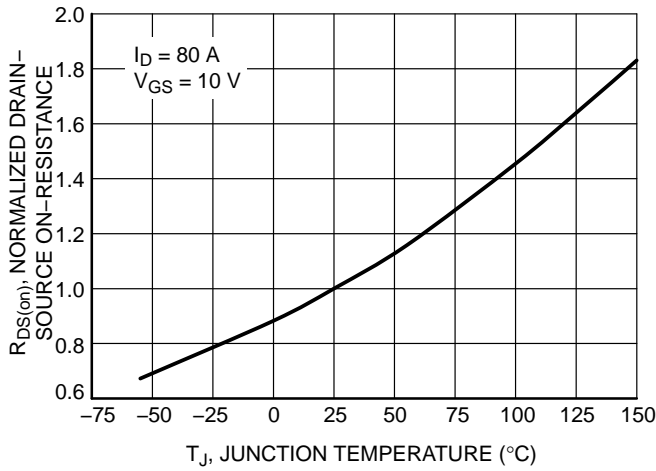


Figure 3.  $R_{DS(on)}$  vs. Junction Temperature

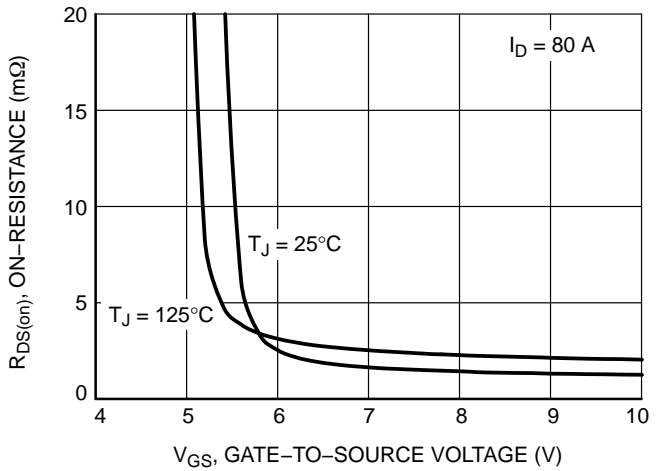


Figure 4. On-Resistance vs. Gate-to-Source Voltage

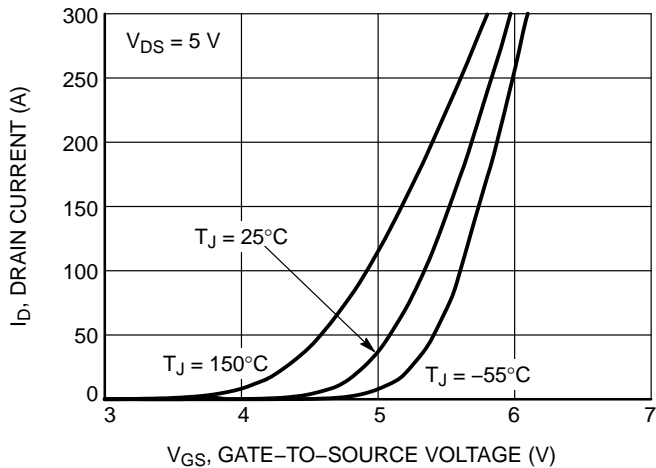


Figure 5. Drain Current vs. Gate-to-Source Voltage

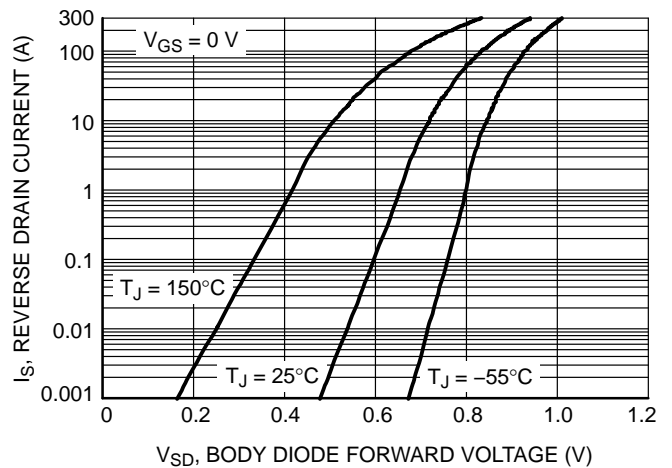


Figure 6. Reverse Drain Current vs. Body Diode Forward Voltage

# NTBLS1D5N08MC

## TYPICAL CHARACTERISTICS

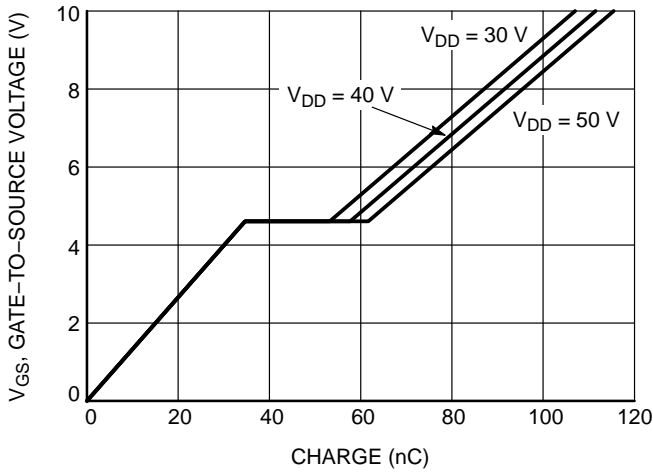


Figure 7. Gate Charge

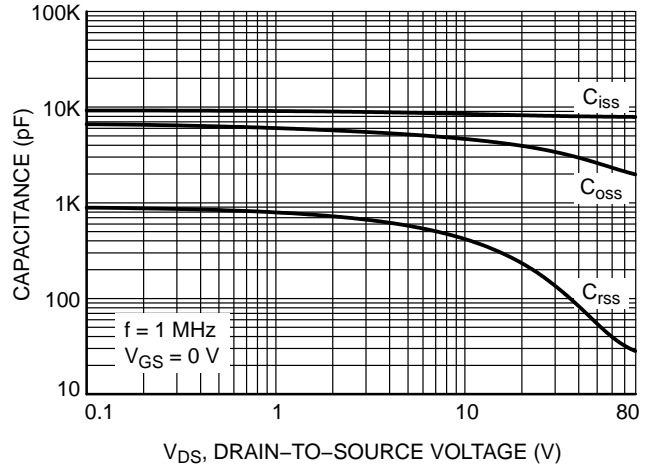


Figure 8. Capacitance Variation

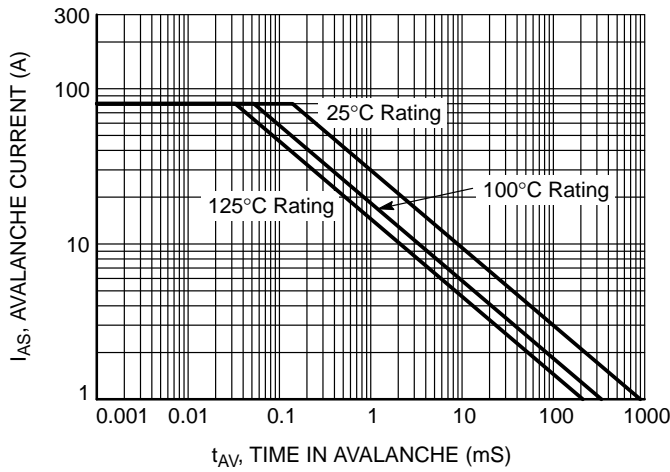


Figure 9. UIL

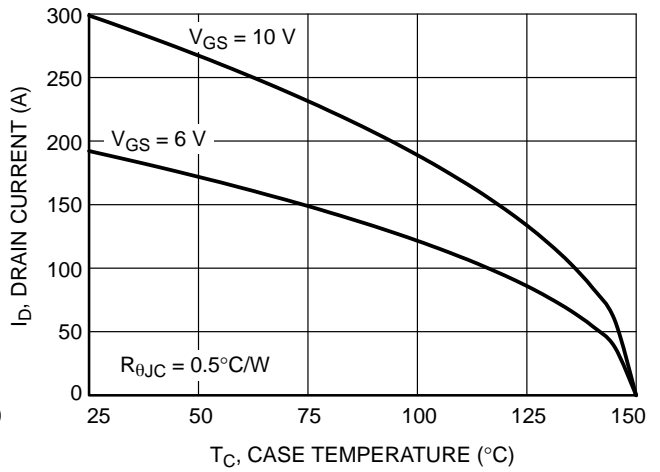


Figure 10. Drain Current vs. Case Temperature

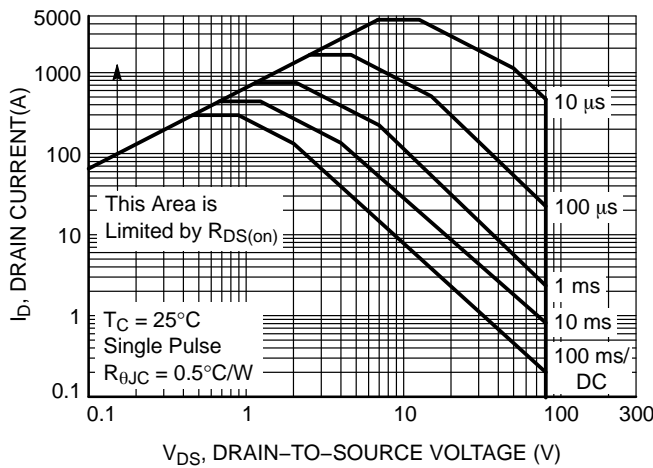


Figure 11. Maximum Rated Forward Biased Safe Operating Area

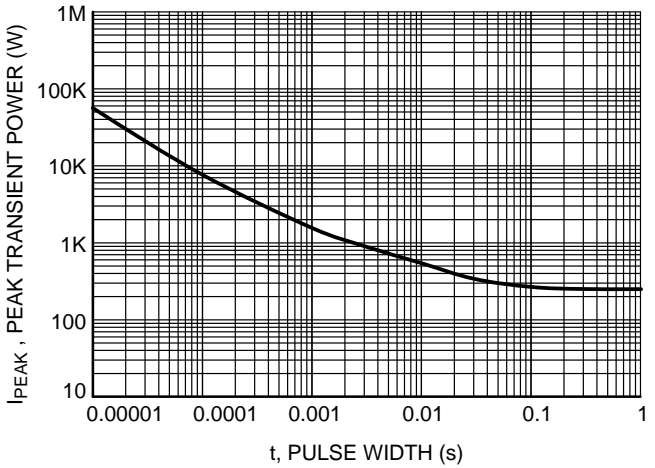
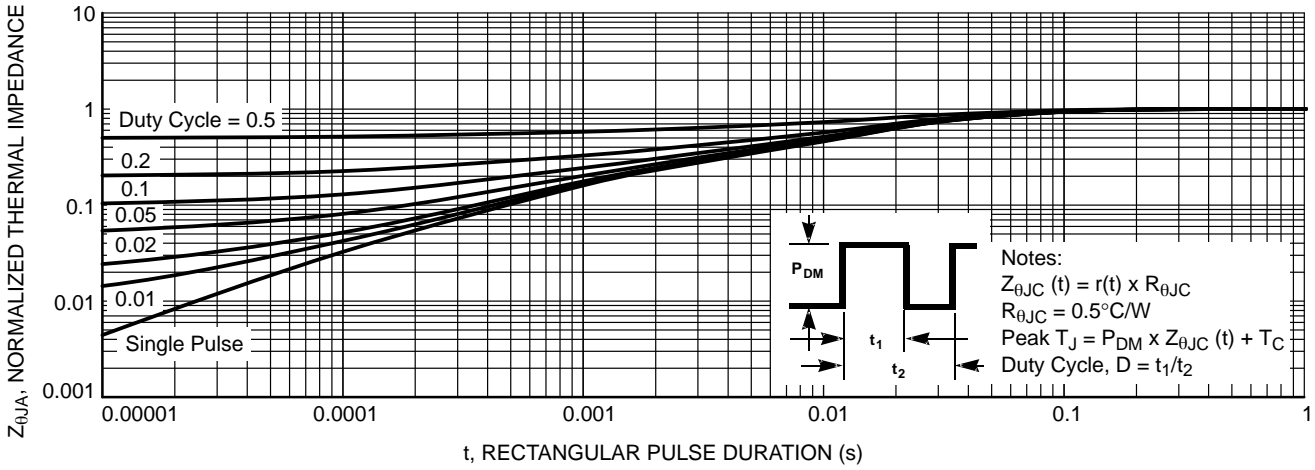


Figure 12. Peak Power

# NTBLS1D5N08MC

## TYPICAL CHARACTERISTICS



### DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping†
NTBLS1D5N08MC	NTBLS 1D5N08MC	M0-299A (Pb-Free)	2000 / Tape & Reel

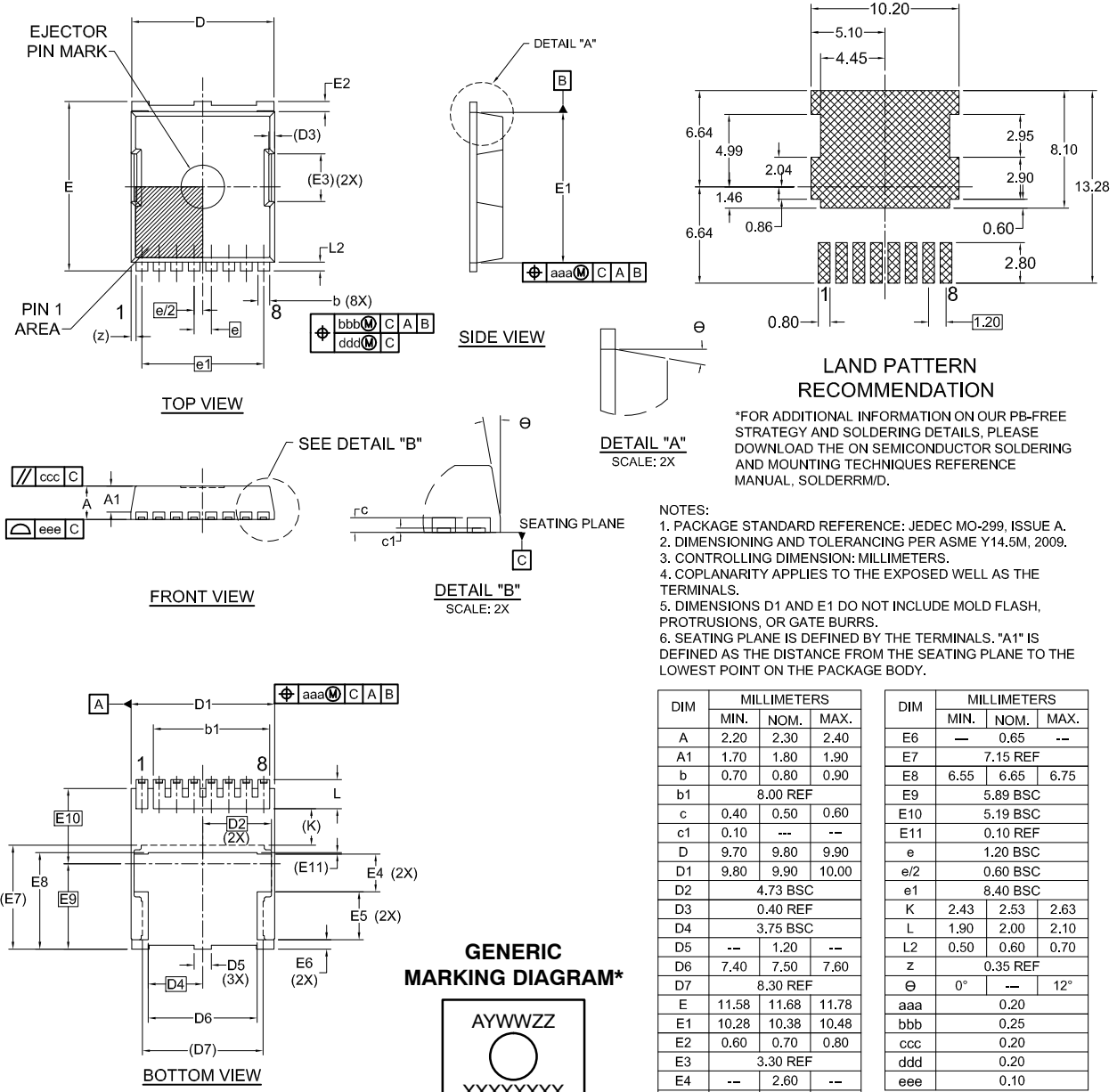
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

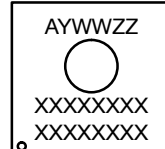


## H-PSOF8L 11.68x9.80 CASE 100CU ISSUE B

DATE 20 MAY 2022



### 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	8.00 REF		
c	0.40	0.50	0.60
c1	0.10	---	---
D	9.70	9.80	9.90
D1	9.80	9.90	10.00
D2	4.73 BSC		
D3	0.40 REF		
D4	3.75 BSC		
D5	---	1.20	---
D6	7.40	7.50	7.60
D7	8.30 REF		
E	11.58	11.68	11.78
E1	10.28	10.38	10.48
E2	0.60	0.70	0.80
E3	3.30 REF		
E4	---	2.60	---
E5	---	3.30	---

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
E6	---	0.65	---
E7	7.15 REF		
E8	6.55	6.65	6.75
E9	5.89 BSC		
E10	5.19 BSC		
E11	0.10 REF		
e	1.20 BSC		
e/2	0.60 BSC		
e1	8.40 BSC		
K	2.43	2.53	2.63
L	1.90	2.00	2.10
L2	0.50	0.60	0.70
z	0.35 REF		
θ	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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