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# MOSFET - Power, Single N-Channel, TOLL

## 80 V, 1.7 mΩ, 203 A

## NTBLS1D7N08H

### 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 and are RoHS Compliant

### Typical 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 $R_{\theta JC}$ (Notes 1, 3)	Steady State	$T_C = 25^{\circ}\text{C}$	$I_D$	203	A
		$T_C = 100^{\circ}\text{C}$		143	
Power Dissipation $R_{\theta JC}$ (Note 1)	Steady State	$T_C = 25^{\circ}\text{C}$	$P_D$	167	W
		$T_C = 100^{\circ}\text{C}$		83	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	Steady State	$T_A = 25^{\circ}\text{C}$	$I_D$	29	A
		$T_A = 100^{\circ}\text{C}$		21	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^{\circ}\text{C}$	$P_D$	3.5	W
		$T_A = 100^{\circ}\text{C}$		1.7	
Pulsed Drain Current	$T_C = 25^{\circ}\text{C}$ , $t_p = 100\text{ }\mu\text{s}$		$I_{DM}$	1173	A
Operating Junction and Storage Temperature Range			$T_J$ , $T_{stg}$	-55 to +175	$^{\circ}\text{C}$
Source Current (Body Diode)			$I_S$	139	A
Single Pulse Drain-to-Source Avalanche Energy ( $I_{L(pk)} = 27\text{ A}$ )			$E_{AS}$	1093.5	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.

### THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State (Note 1)	$R_{\theta JC}$	0.9	$^\circ\text{C/W}$
Junction-to-Ambient – Steady State (Notes 1, 2)	$R_{\theta JA}$	43	

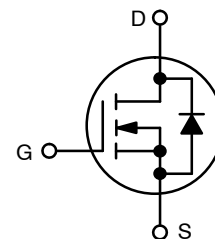
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 650 mm<sup>2</sup>, 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.



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$V_{(BR)DS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
80 V	1.7 mΩ @ 10 V	203 A

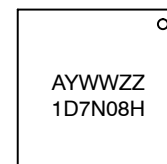


N-CHANNEL MOSFET



TOLL  
CASE 100CU

### MARKING DIAGRAM



1D7N08H = 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.

# NTBLS1D7N08H

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	80			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			57		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = 80\text{ V}$	$T_J = 25^\circ\text{C}$		10	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		250	
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}$			100	nA

### ON CHARACTERISTICS

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 479\text{ }\mu\text{A}$	2.0	2.9	4.0	V
Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	$I_D = 479\text{ }\mu\text{A}$ , ref to $25^\circ\text{C}$		-7.3		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 80\text{ A}$		1.29	1.7	m $\Omega$
		$V_{GS} = 6\text{ V}, I_D = 43\text{ A}$		1.76	2.6	
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{ V}, I_D = 80\text{ A}$		271		S

### CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 40\text{ V}$		7675		pF
Output Capacitance	$C_{OSS}$			1059		
Reverse Transfer Capacitance	$C_{RSS}$			41		
Gate-Resistance	$R_G$			0.6		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 10\text{ V}, V_{DS} = 40\text{ V}; I_D = 80\text{ A}$		121		nC
Threshold Gate Charge	$Q_{G(TH)}$			19		
Gate-to-Source Charge	$Q_{GS}$			32		
Gate-to-Drain Charge	$Q_{GD}$			29		
Plateau Voltage	$V_{GP}$			4.5		V
Output Charge	$Q_{OSS}$	$V_{GS} = 0\text{ V}, V_{DD} = 40\text{ V}$		149		nC

### SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DS} = 40\text{ V}, I_D = 80\text{ A}, R_G = 6\text{ }\Omega$		29		ns
Rise Time	$t_r$			25		
Turn-Off Delay Time	$t_{d(OFF)}$			89		
Fall Time	$t_f$			35		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 80\text{ A}$	$T_J = 25^\circ\text{C}$		0.82	1.2	V
			$T_J = 125^\circ\text{C}$		0.69		
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}, I_S = 43\text{ A}$		73			ns
Reverse Recovery Charge	$Q_{RR}$			138			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.

4. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

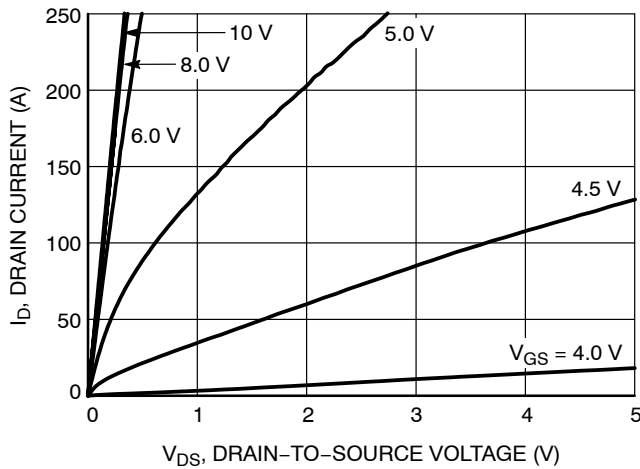


Figure 1. On-Region Characteristics

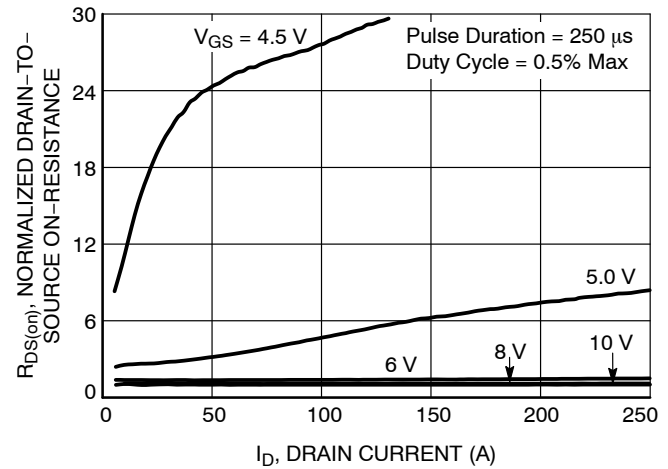


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

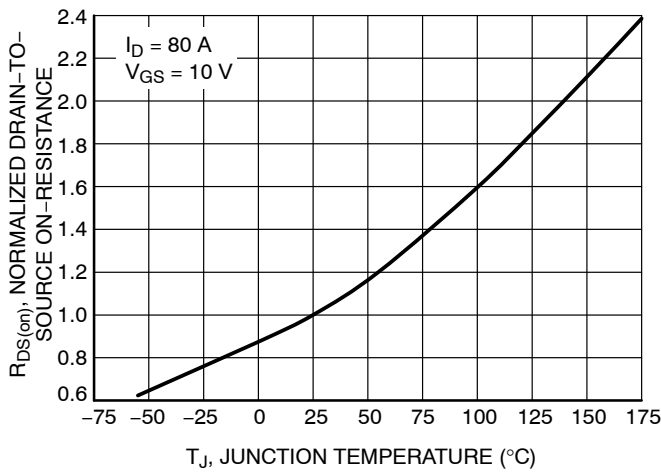


Figure 3. Normalized On-Resistance vs. Junction Temperature

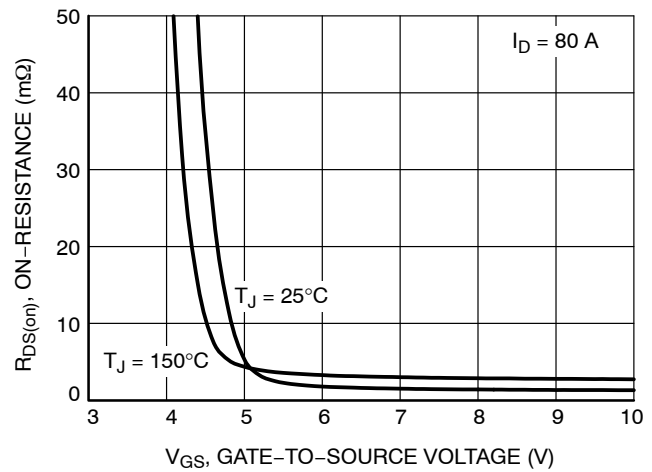


Figure 4. On-Resistance vs. Gate-to-Source Voltage

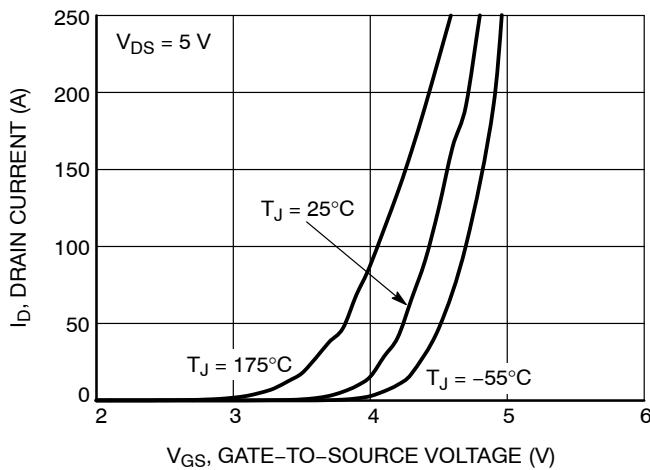


Figure 5. Transfer Characteristics

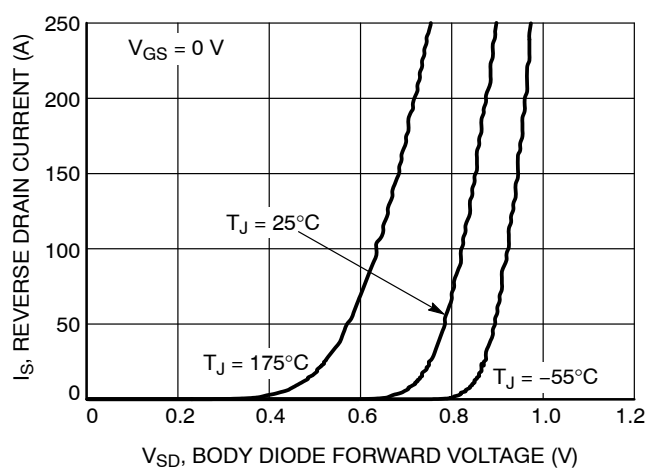


Figure 6. Source-to-Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS

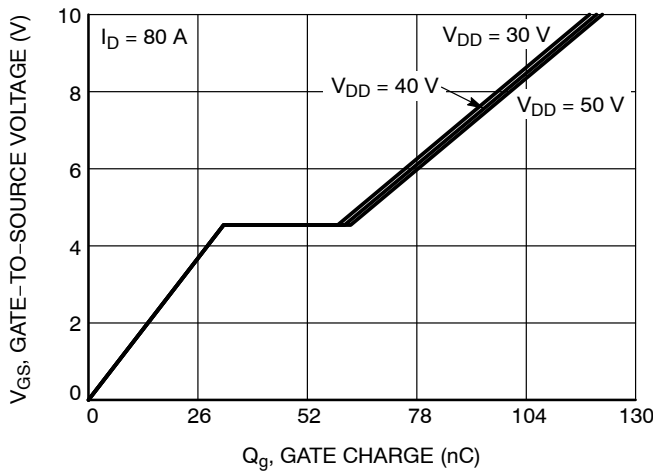


Figure 7. Gate Charge Characteristics

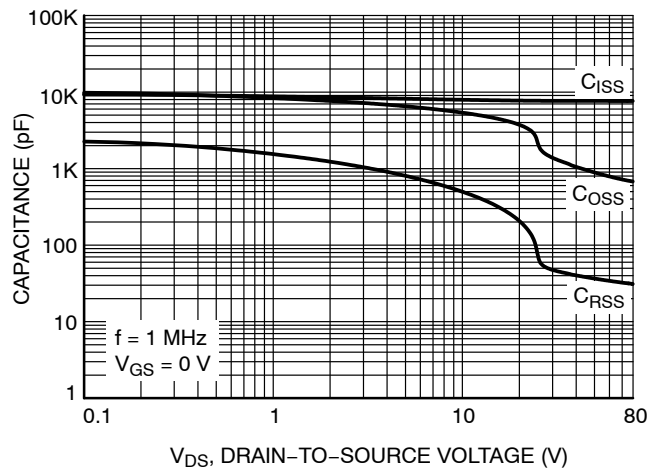


Figure 8. Capacitance vs. Drain-to-Source Voltage

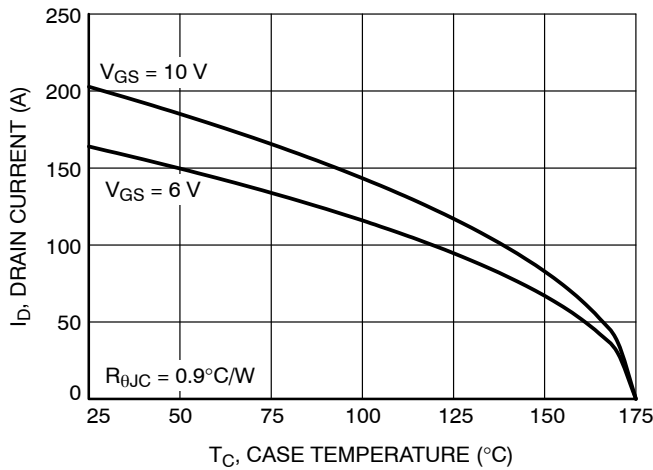


Figure 9. Drain Current vs. Case Temperature

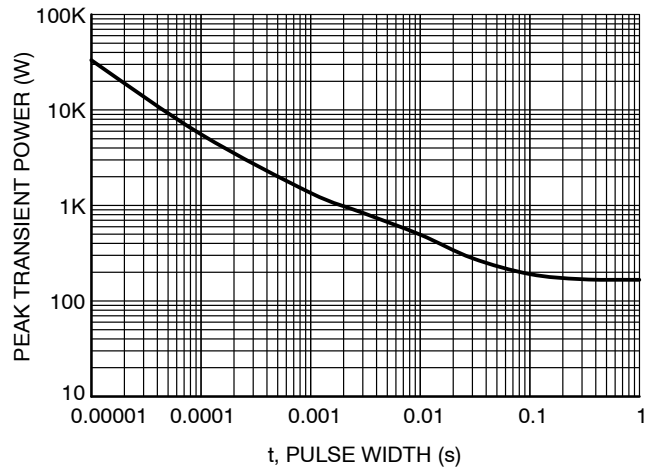


Figure 10. Peak Power

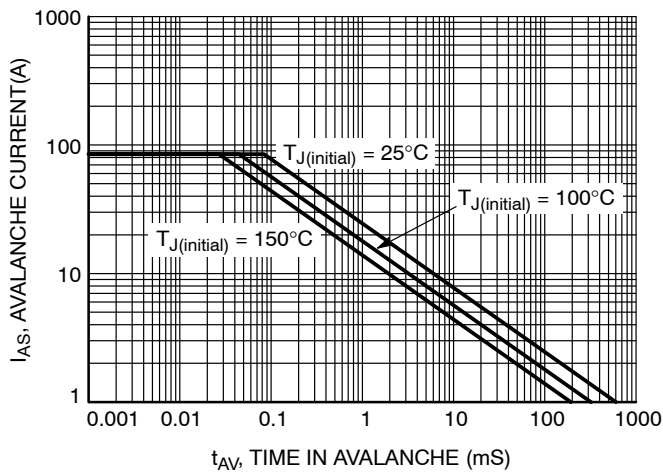


Figure 11. Unclamped Inductive Switching Capability

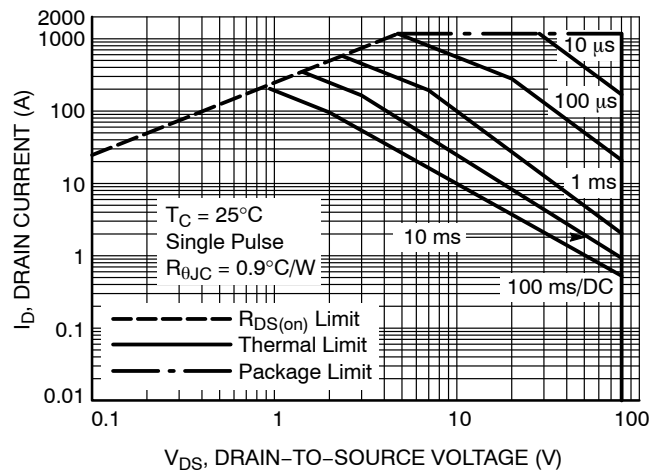


Figure 12. Forward Bias Safe Operating Area

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## TYPICAL CHARACTERISTICS

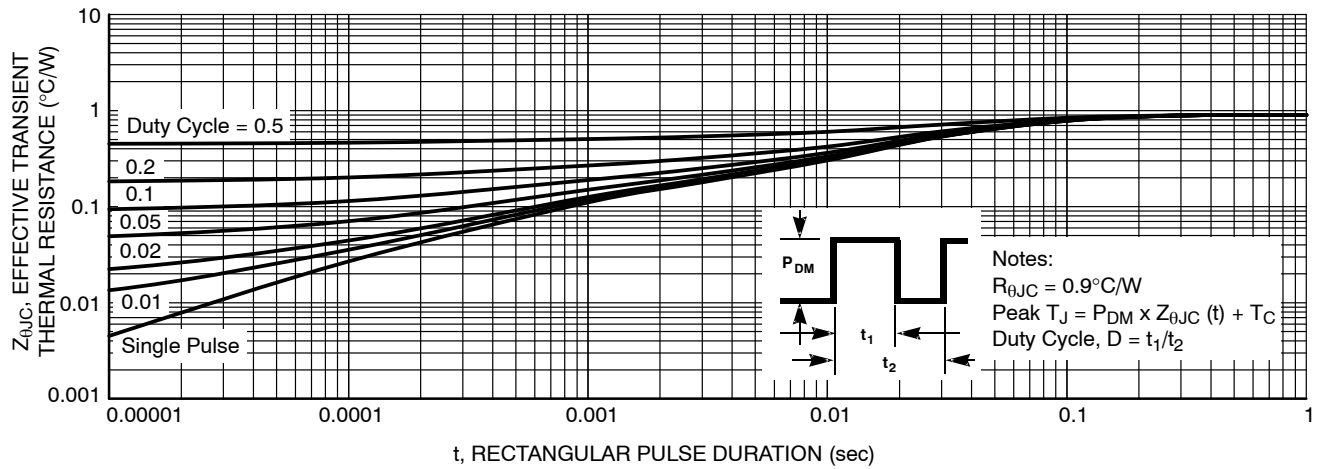


Figure 13. Transient Thermal Impedance

### DEVICE ORDERING INFORMATION

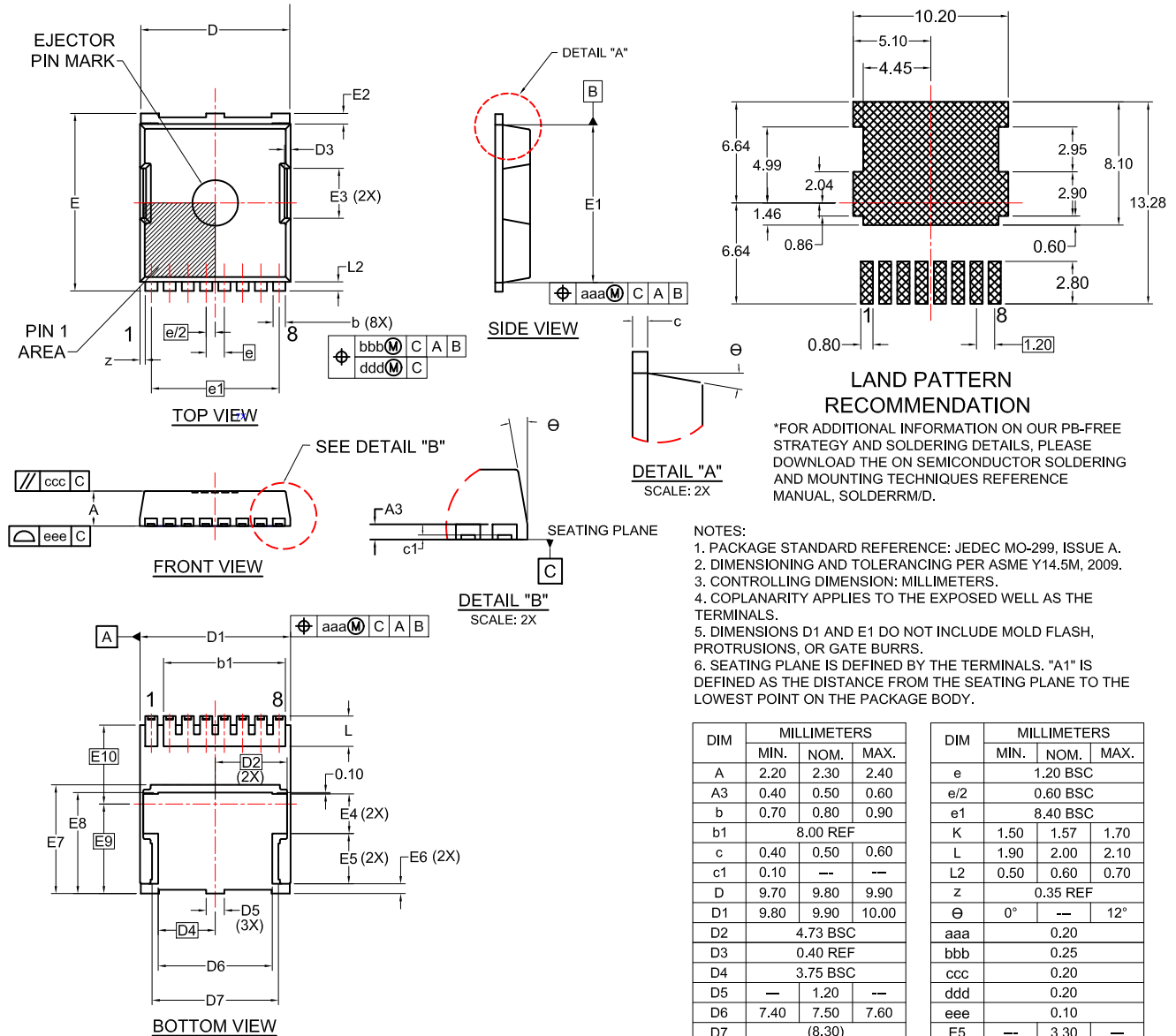
Device	Marking	Package	Shipping <sup>†</sup>
NTBLS1D7N08H	1D7N08H	M0-299A (Pb-Free)	2000 / Tape & Reel

<sup>†</sup>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.

# NTBLS1D7N08H


## PACKAGE DIMENSIONS

**H-PSOF8L 11.68x9.80**  
CASE 100CU  
ISSUE A



DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
A3	0.40	0.50	0.60
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)		
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	--

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
e	1.20 BSC		
e/2	0.60 BSC		
e1	8.40 BSC		
K	1.50	1.57	1.70
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		
E5	--	3.30	--
E6	--	0.65	--
E7	7.15 REF		
E8	6.55	6.65	6.75
E9	5.89 BSC		
E10	5.19 BSC		

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