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MOSFET - Power, Single N-Channel, TOLL

80 V, 1.7 mΩ, 241.3 A

NVBLS1D7N08H

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- AEC−Q101 Qualified and PPAP Capable
- Lowers Switching Noise/EMI
- These Devices are Pb−Free and are RoHS Compliant

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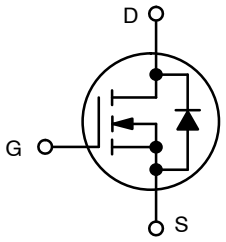
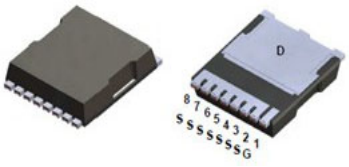
$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
80 V	1.7 mΩ @ 10 V	241.3 A



N−CHANNEL MOSFET



TOLL
CASE 100CU

MAXIMUM RATINGS (T_J = 25°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 $R_{\theta JC}$ (Notes 1, 3)	Steady State	T_C = 25°C	I_D	241.3	A
		T_C = 100°C		170.6	
Power Dissipation $R_{\theta JC}$ (Note 1)		T_C = 25°C	P_D	237.5	W
		T_C = 100°C		118.7	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	Steady State	T_A = 25°C	I_D	33	A
		T_A = 100°C		23.3	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)		T_A = 25°C	P_D	4.4	W
		T_A = 100°C		2.2	
Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		I_{DM}	900	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)			I_S	197.9	A
Single Pulse Drain−to−Source Avalanche Energy ($I_{L(pk)}$ = 21 A)			E_{AS}	1172	mJ
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°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)	$R_{\theta JC}$	0.63	°C/W
Junction−to−Ambient − Steady State (Notes 1, 2)	$R_{\theta JA}$	33.8	

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^2, 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.

MARKING DIAGRAM

A = Assembly Location
Y = Year
WW = Work Week
ZZ = Lot Traceability
1D7N08H = Specific Device Code

ORDERING INFORMATION

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

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		80			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				57		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 80 V	T_J = 25°C			10	μA
			T_J = 125°C			250	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 20 V				100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 479 μA		2.0	2.9	4.0	V
Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	I_D = 479 μA, ref to 25°C			−7.3		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 80 A		1.29	1.7	mΩ
Forward Transconductance	g_{FS}	V_{DS} =5 V, I_D = 80 A			271		S
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 40 V			7675		pF
Output Capacitance	C_{OSS}				1059		
Reverse Transfer Capacitance	C_{RSS}				41		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 40 V; I_D = 80 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
SWITCHING CHARACTERISTICS (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DS} = 40 V, I_D = 80 A, R_G = 6 Ω			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 V, I_S = 80 A	T_J = 25°C		0.82	1.2	V
			T_J = 125°C		0.69		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dIS/dt = 100 A/μs, I_S = 43 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

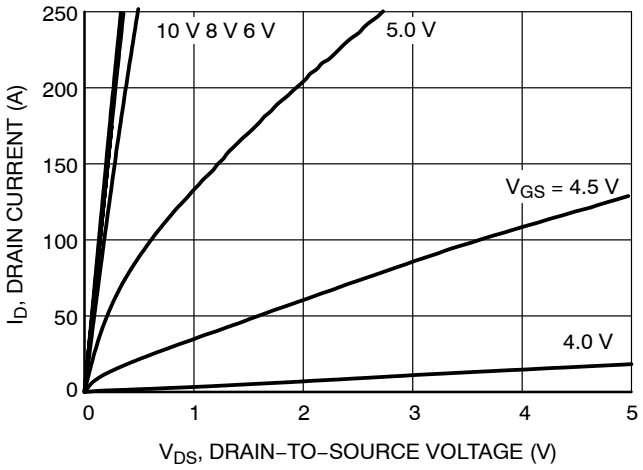


Figure 1. On−Region Characteristics

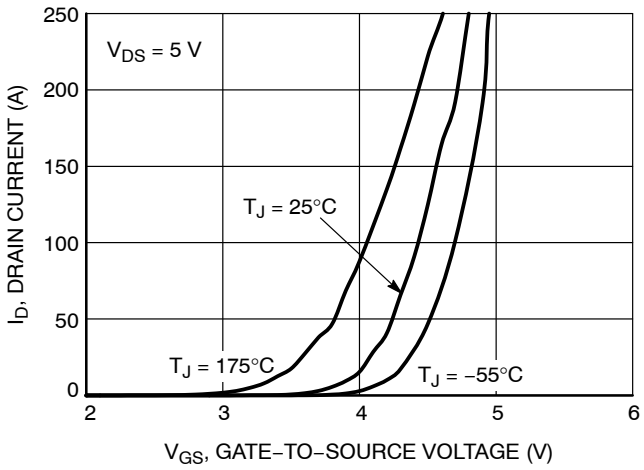


Figure 2. Transfer Characteristics

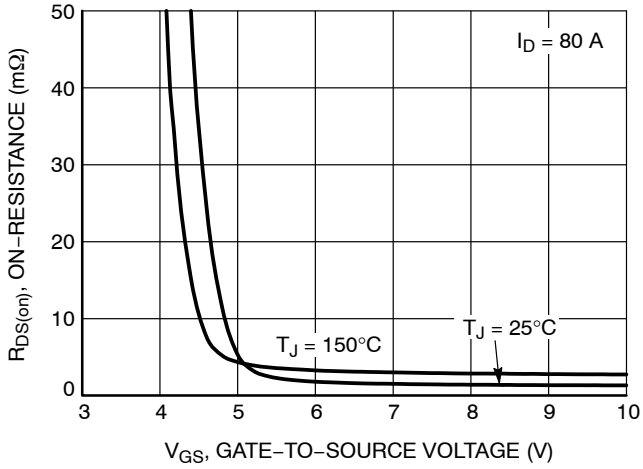


Figure 3. On−Resistance vs. Gate−to−Source Voltage

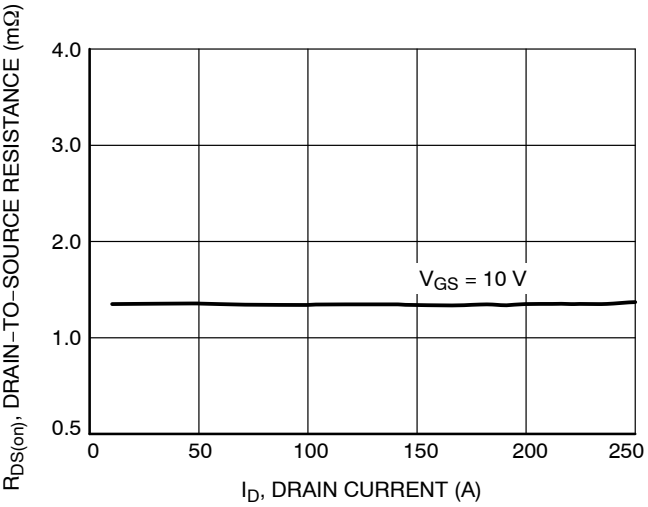


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

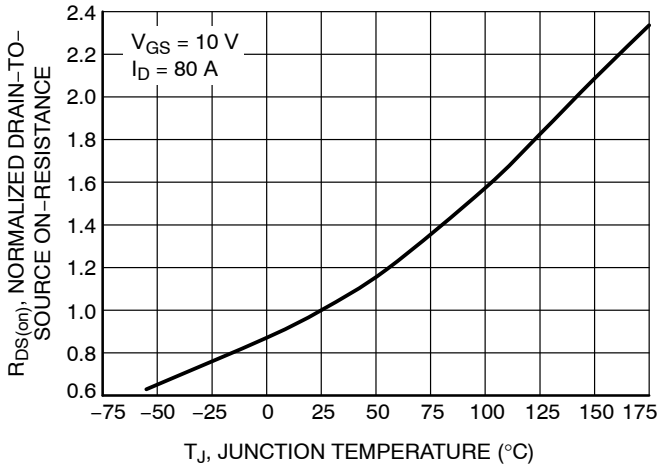


Figure 5. On−Resistance Variation with Temperature

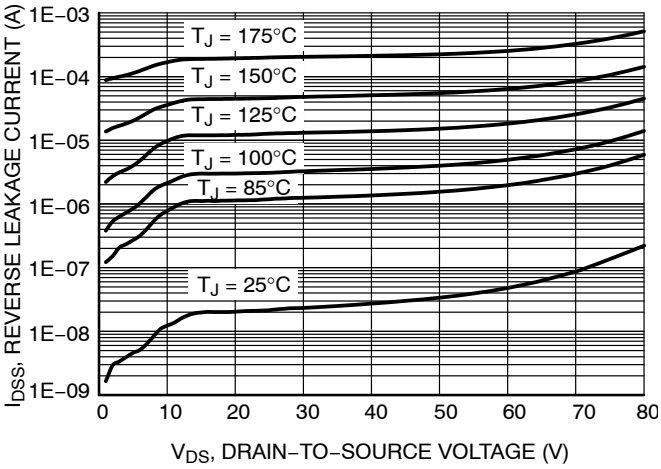


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

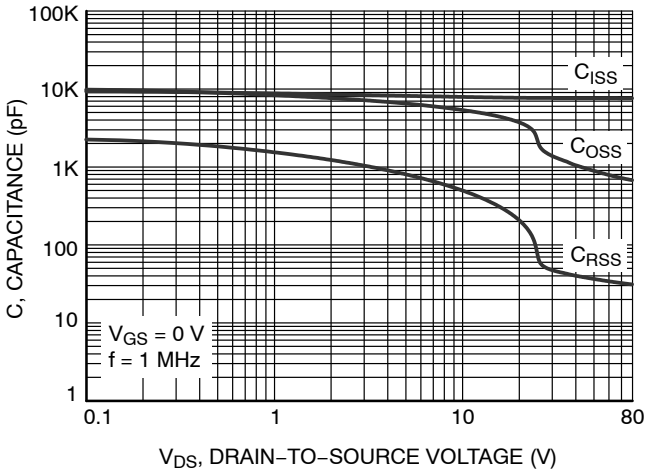


Figure 7. Capacitance Variation

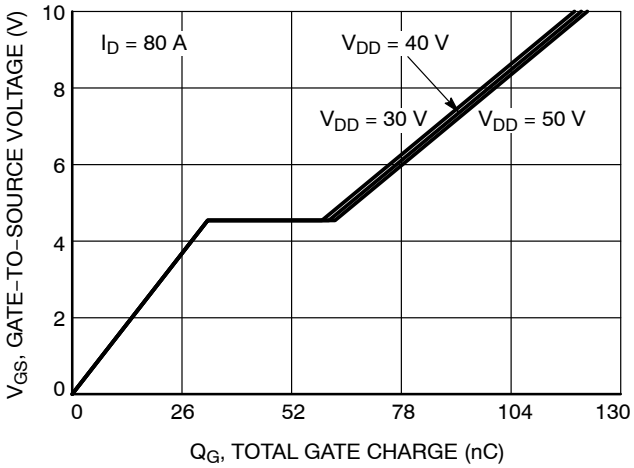


Figure 8. Gate−to−Source Voltage vs. Total Charge

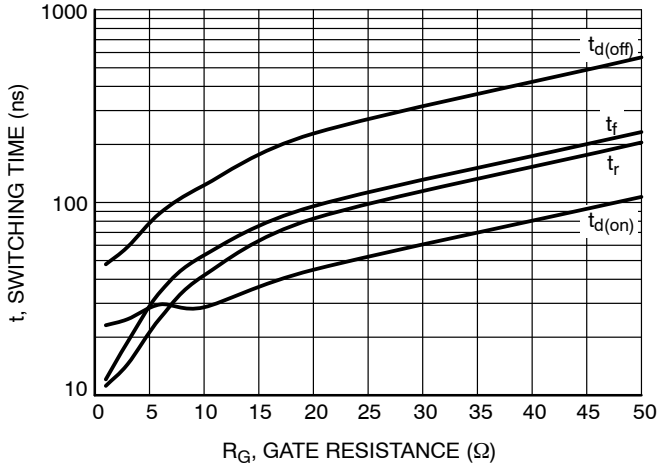


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

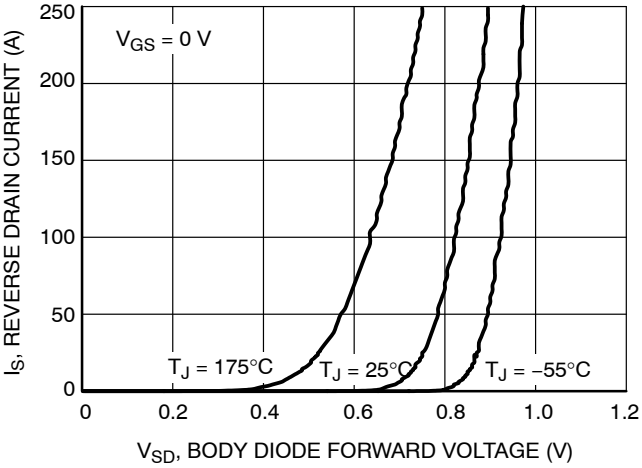


Figure 10. Diode Forward Voltage vs. Current

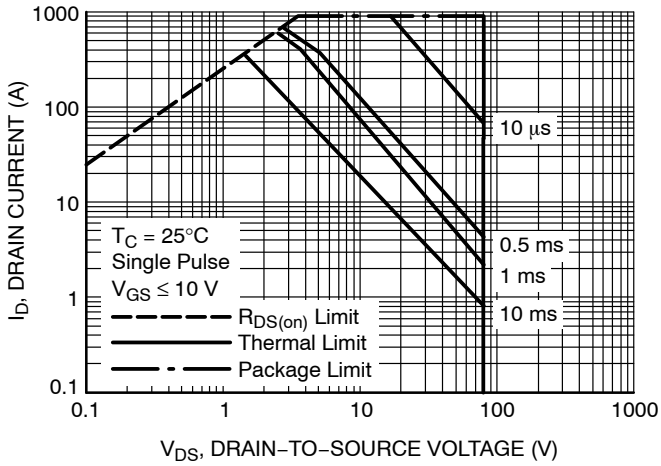


Figure 11. Maximum Rated Forward Biased Safe Operating Area

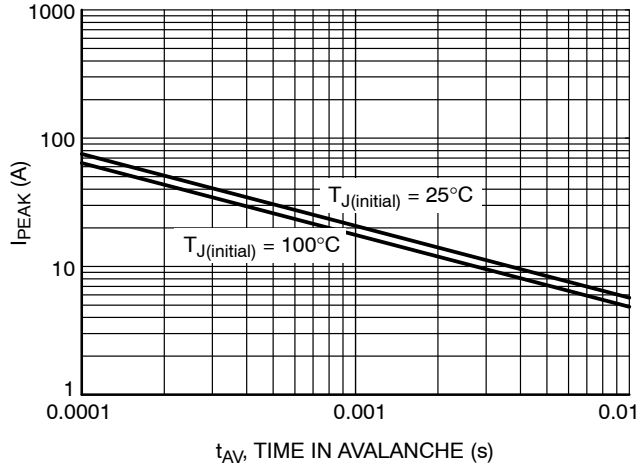


Figure 12. Maximum Drain Current vs. Time in Avalanche

TYPICAL CHARACTERISTICS

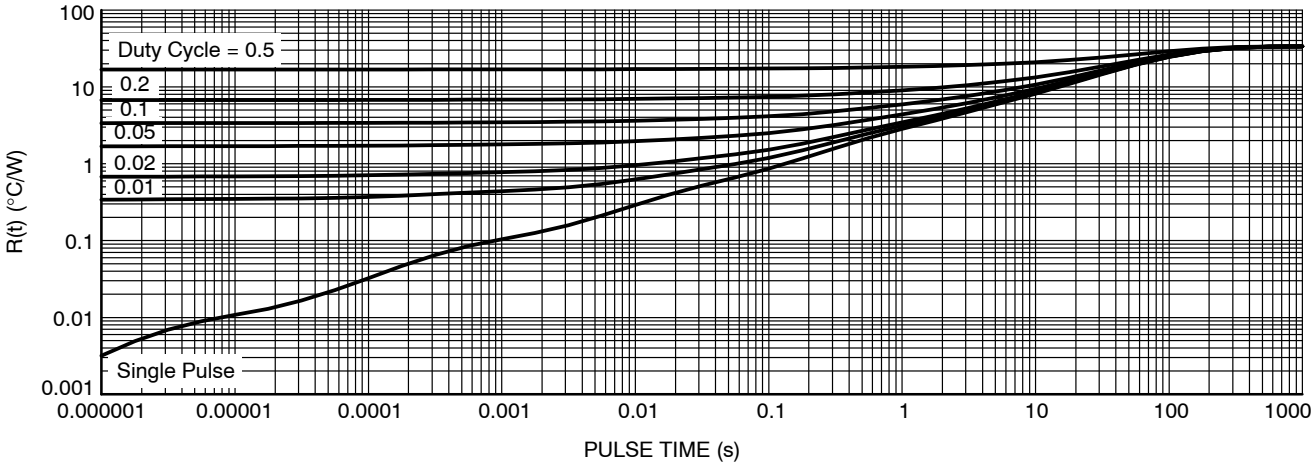


Figure 13. Transient Thermal Impedance

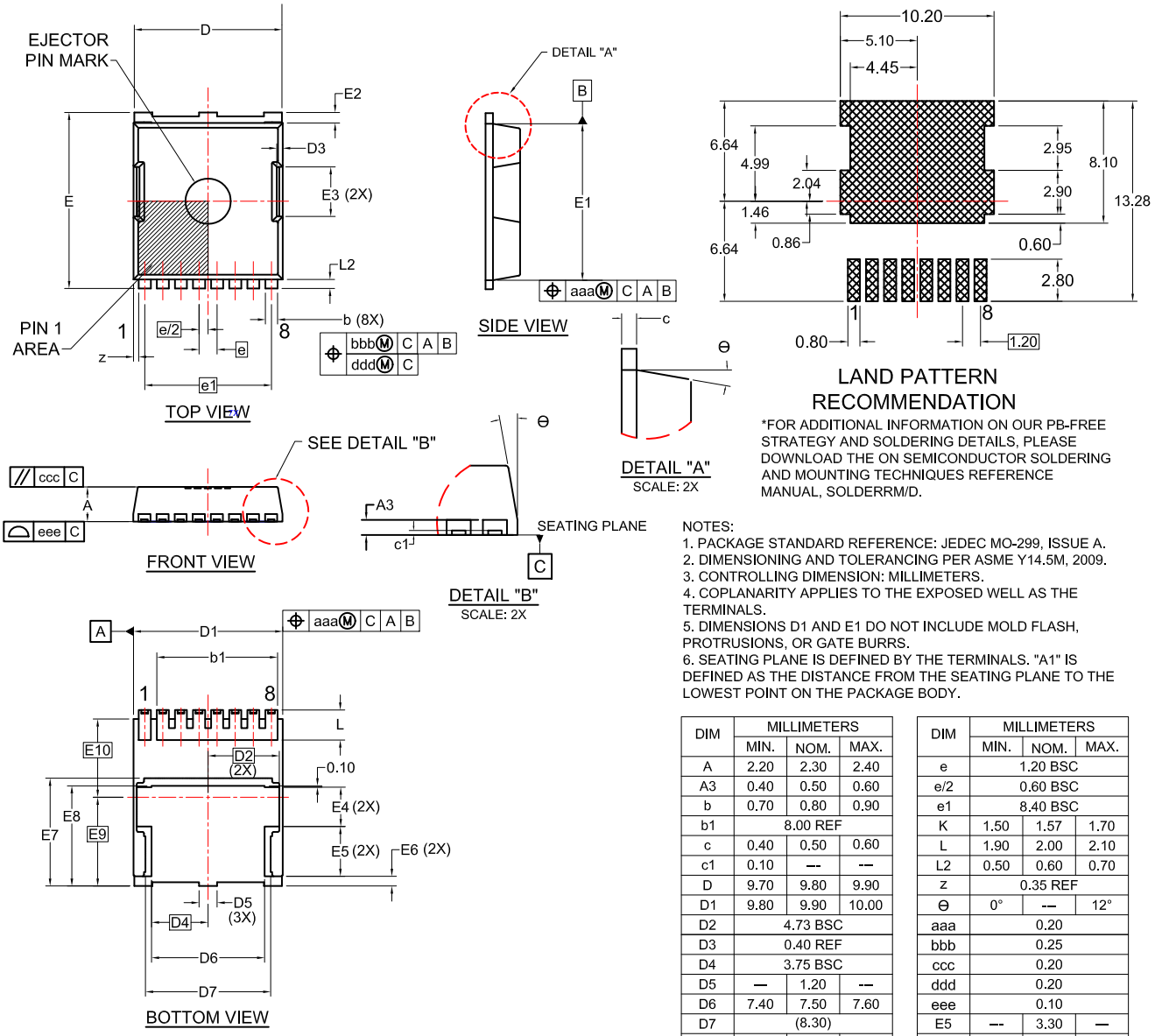
DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping†
NVBLS1D7N08H	1D7N08H	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 Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

H−PSOF8L 11.68x9.80
CASE 100CU
ISSUE A



*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.

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	

PUBLICATION ORDERING INFORMATION

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