

MOSFET - Power, Single N-Channel, TOLL

100 V, 1.5 mΩ, 300 A

NVBL51D5N10MC

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

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	100	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current $R_{\theta JC}$ (Notes 1, 3)	I_D	300	A
		214	
Power Dissipation $R_{\theta JC}$ (Note 1)	P_D	331	W
		165	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	I_D	35.5	A
		25.1	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	P_D	4.5	W
		2.3	
Pulsed Drain Current	I_{DM}	900	A
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	°C
Source Current (Body Diode)	I_S	255	A
Single Pulse Drain-to-Source Avalanche Energy ($I_{L(pk)} = 27.1$ A)	E_{AS}	1652	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260	°C

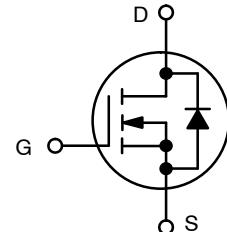
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State	$R_{\theta JC}$	0.45	°C/W
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	33	

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 mm², 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.

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
100 V	1.5 mΩ @ 10 V	300 A

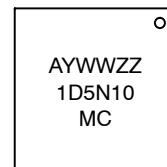


N-CHANNEL MOSFET



H-PSOF8L
CASE 100CU

MARKING DIAGRAM



A = Assembly Location

Y = Year

WW = Work Week

ZZ = Lot Traceability

1D5N10MC = Specific Device Code

ORDERING INFORMATION

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

NVBLS1D5N10MC

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$		100			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(\text{BR})\text{DSS}}/T_J$				60		$\text{mV}/^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{GS}} = 0 \text{ V}$, $V_{\text{DS}} = 100 \text{ V}$	$T_J = 25^\circ\text{C}$		10		μA
			$T_J = 125^\circ\text{C}$			100	
Gate-to-Source Leakage Current	I_{GSS}	$V_{\text{DS}} = 0 \text{ V}$, $V_{\text{GS}} = 20 \text{ V}$				100	nA

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{GS}} = V_{\text{DS}}$, $I_D = 799 \mu\text{A}$		2.0		4.0	V
Threshold Temperature Coefficient	$V_{\text{GS}(\text{TH})}/T_J$				-9.3		$\text{mV}/^\circ\text{C}$
Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10 \text{ V}$	$I_D = 80 \text{ A}$		1.2	1.5	$\text{m}\Omega$
Forward Transconductance	g_{FS}	$V_{\text{DS}} = 10 \text{ V}$, $I_D = 80 \text{ A}$			230		S

CHARGES AND CAPACITANCES

Input Capacitance	C_{ISS}	$V_{\text{GS}} = 0 \text{ V}$, $f = 1 \text{ MHz}$, $V_{\text{DS}} = 50 \text{ V}$		10100		pF
Output Capacitance	C_{OSS}			5100		
Reverse Transfer Capacitance	C_{RSS}			84		
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = 10 \text{ V}$, $V_{\text{DS}} = 50 \text{ V}$; $I_D = 80 \text{ A}$		131		nC
Threshold Gate Charge	$Q_{\text{G}(\text{TH})}$			25		
Gate-to-Source Charge	Q_{GS}			49		
Gate-to-Drain Charge	Q_{GD}			21		
Plateau Voltage	V_{GP}			5		V

SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	$t_{\text{d}(\text{ON})}$	$V_{\text{GS}} = 10 \text{ V}$, $V_{\text{DS}} = 50 \text{ V}$, $I_D = 80 \text{ A}$, $R_{\text{G}} = 6 \Omega$		39		ns
Rise Time	t_r			71		
Turn-Off Delay Time	$t_{\text{d}(\text{OFF})}$			83		
Fall Time	t_f			90		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{\text{GS}} = 0 \text{ V}$, $I_S = 80 \text{ A}$	$T_J = 25^\circ\text{C}$		0.81	1.3	V
			$T_J = 125^\circ\text{C}$		0.68		
Reverse Recovery Time	t_{RR}	$V_{\text{GS}} = 0 \text{ V}$, $dI_S/dt = 100 \text{ A}/\mu\text{s}$, $I_S = 71 \text{ A}$			110		ns
Reverse Recovery Charge	Q_{RR}				143		nC
Charge Time	t_a				49		ns
Discharge Time	t_b				62		ns

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. Pulse Test: pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.
5. Switching characteristics are independent of operating junction temperatures.

NVBLS1D5N10MC

TYPICAL CHARACTERISTICS

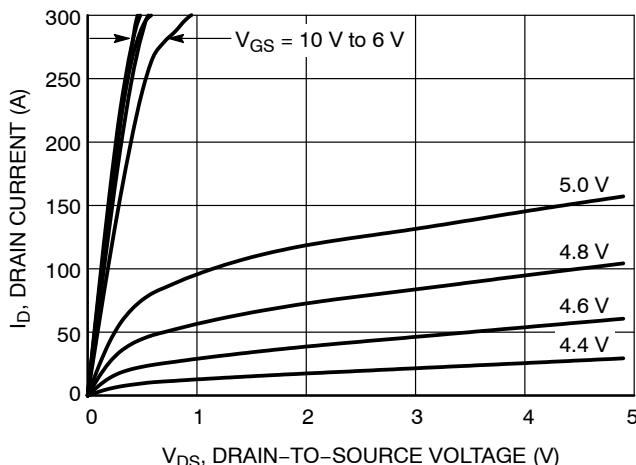


Figure 1. On-Region Characteristics

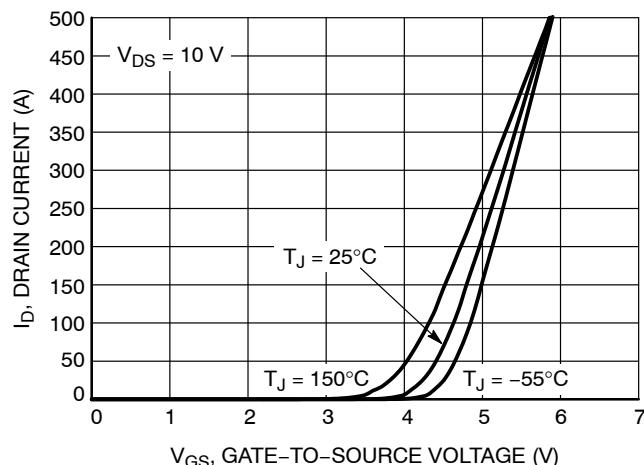


Figure 2. Transfer Characteristics

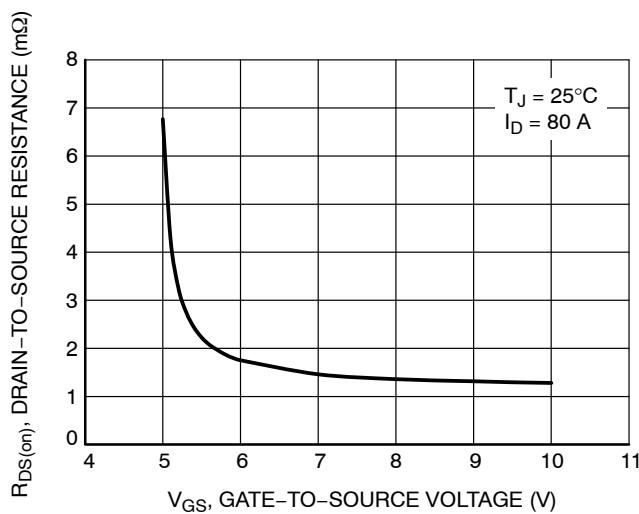


Figure 3. On-Resistance vs. Gate-to-Source Voltage

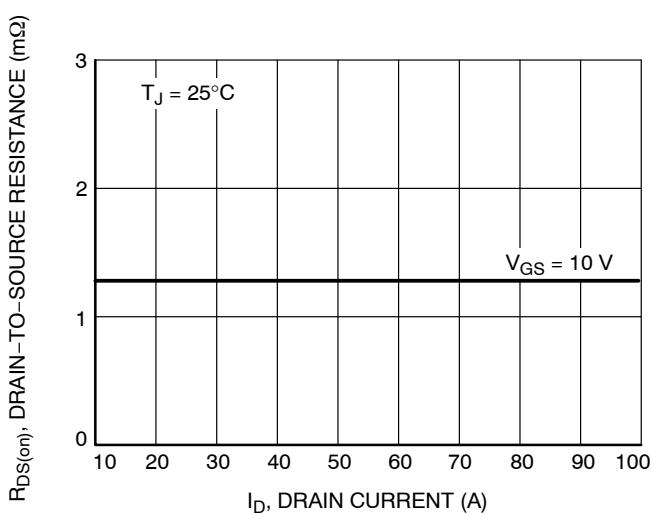


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

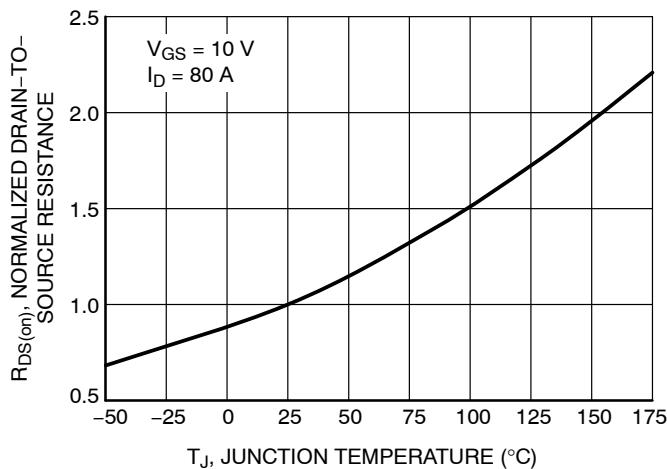


Figure 5. On-Resistance Variation with Temperature

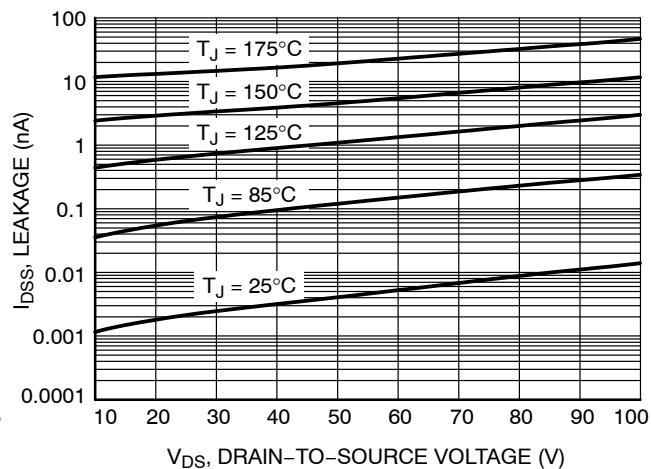
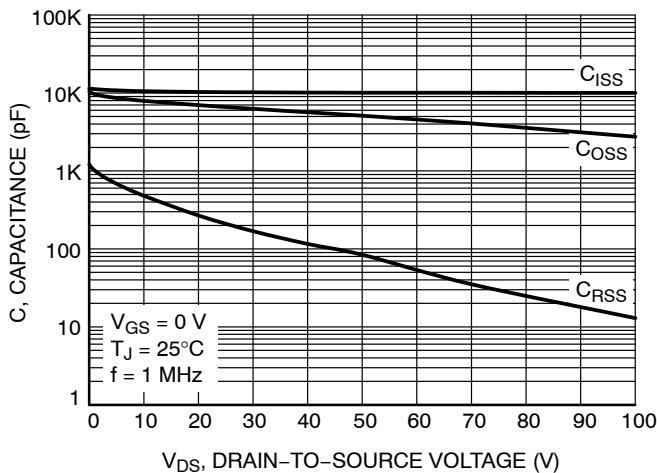
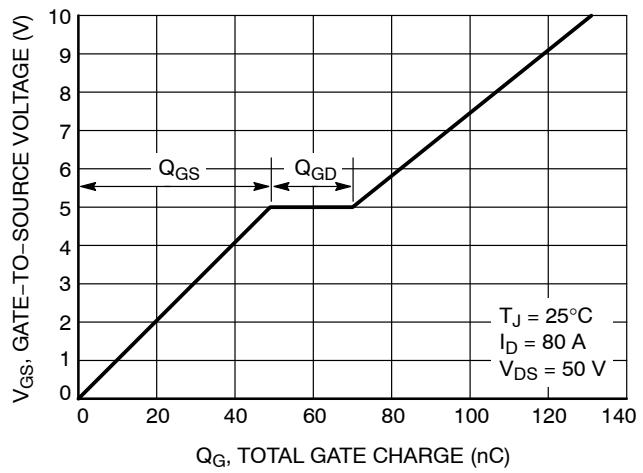
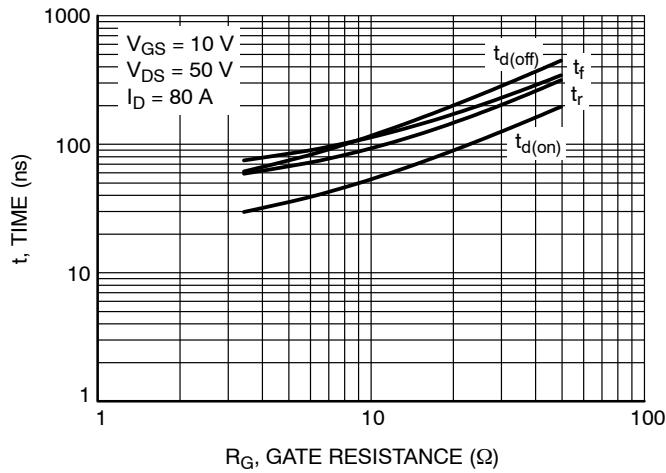
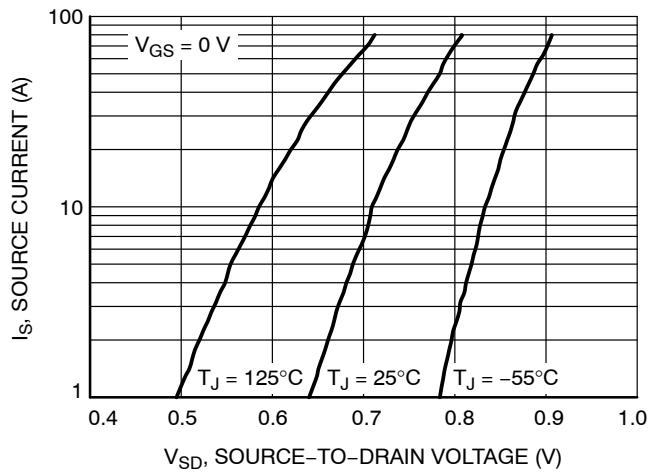
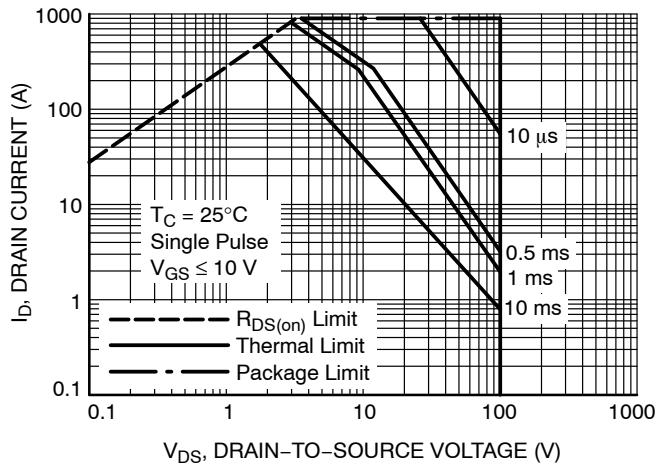
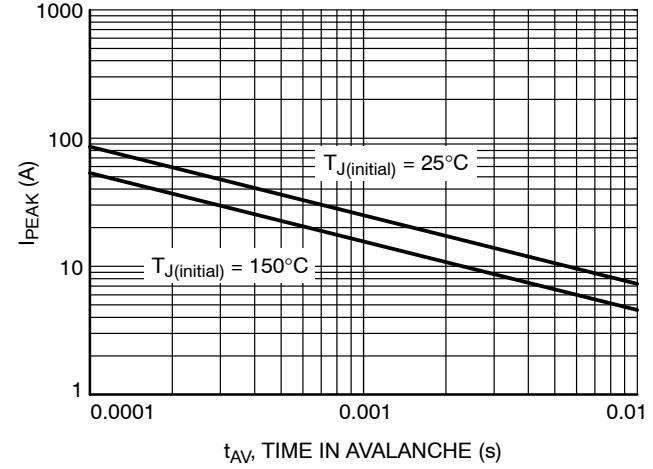


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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

NVBLS1D5N10MC

TYPICAL CHARACTERISTICS

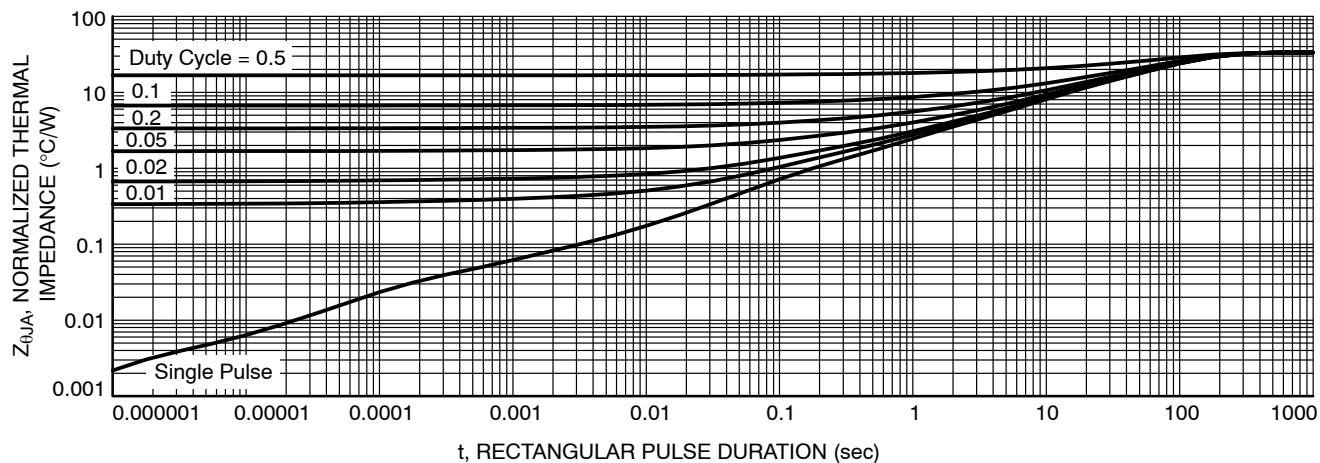


Figure 13. Transient Thermal Impedance

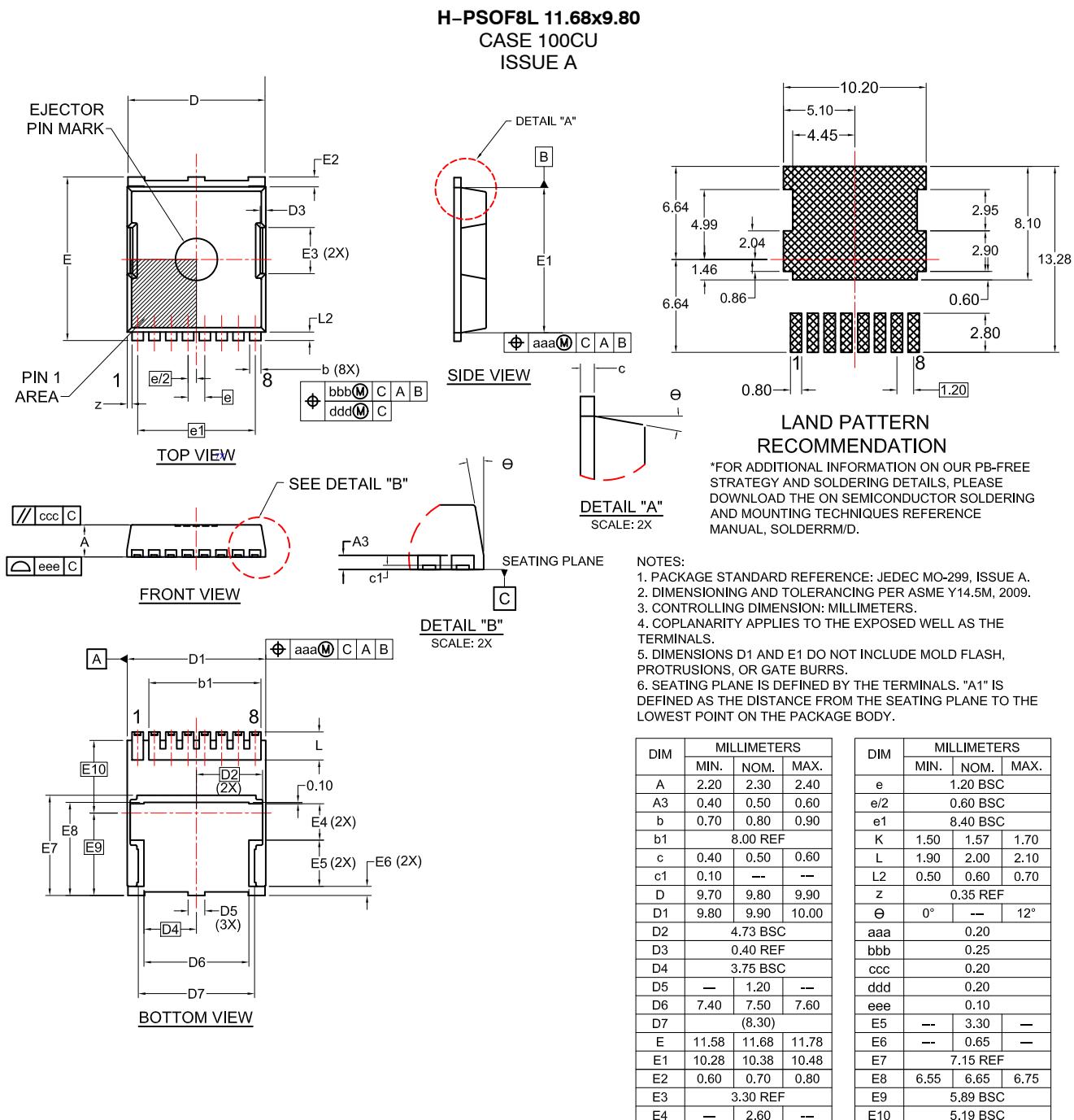
DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NVBLS1D5N10MCTXG	1D5N10MC	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.

NVBL1D5N10MC

PACKAGE DIMENSIONS



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