

MOSFET - Power, Single N-Channel, TOLL

100 V, 1.5 mΩ, 300 A

NVBLS1D5N10MC

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)	Steady State	$T_C = 25^{\circ}\text{C}$	I_D	300	A
		$T_C = 100^{\circ}\text{C}$		214	
Power Dissipation $R_{\theta JC}$ (Note 1)		$T_C = 25^{\circ}\text{C}$	P_D	331	W
		$T_C = 100^{\circ}\text{C}$		165	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	Steady State	$T_A = 25^{\circ}\text{C}$	I_D	35.5	A
		$T_A = 100^{\circ}\text{C}$		25.1	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)		$T_A = 25^{\circ}\text{C}$	P_D	4.5	W
		$T_A = 100^{\circ}\text{C}$		2.3	
Pulsed Drain Current	$T_A = 25^{\circ}\text{C}$, $t_p = 10\text{ }\mu\text{s}$		I_{DM}	900	A
Operating Junction and Storage Temperature Range			T_J , T_{stg}	-55 to +175	$^{\circ}\text{C}$
Source Current (Body Diode)			I_S	255	A
Single Pulse Drain-to-Source Avalanche Energy ($I_{L(pk)} = 27.1\text{ A}$)			E_{AS}	1652	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	$^{\circ}\text{C}$

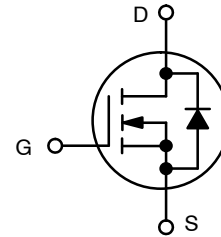
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State	$R_{\theta JC}$	0.45	$^\circ\text{C/W}$
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

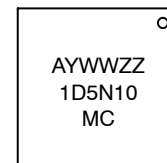


N-CHANNEL MOSFET



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.

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

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 V, I _D = 250 μA	100			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J			60		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 100 V			10	μA
					100	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = 20 V			100	nA

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 799 μA	2.0		4.0	V
Threshold Temperature Coefficient	V _{GS(TH)} /T _J			-9.3		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 80 A		1.2	1.5	mΩ
Forward Transconductance	g _{FS}	V _{DS} = 10 V, I _D = 80 A		230		S

CHARGES AND CAPACITANCES

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 50 V		10100		pF
Output Capacitance	C _{OSS}			5100		
Reverse Transfer Capacitance	C _{RSS}			84		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 50 V; I _D = 80 A		131		nC
Threshold Gate Charge	Q _{G(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 _{d(ON)}	V _{GS} = 10 V, V _{DS} = 50 V, I _D = 80 A, R _G = 6 Ω		39		ns
Rise Time	t _r			71		
Turn-Off Delay Time	t _{d(OFF)}			83		
Fall Time	t _f			90		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 80 A	T _J = 25°C		0.81	1.3	V
			T _J = 125°C		0.68		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 71 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 ≤ 300 μs, duty cycle ≤ 2%.

5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

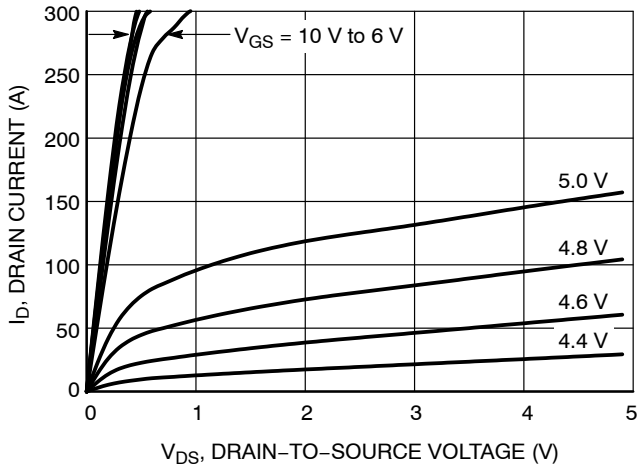


Figure 1. On-Region Characteristics

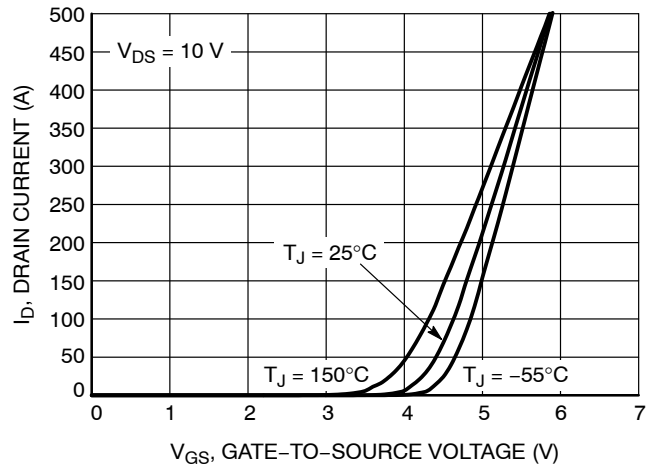


Figure 2. Transfer Characteristics

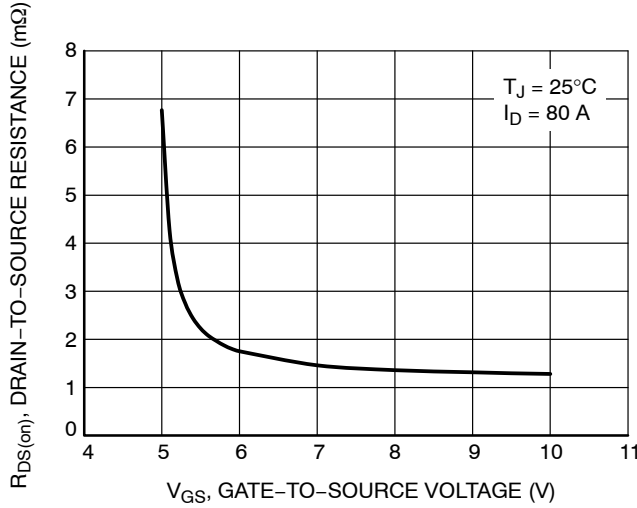


Figure 3. On-Resistance vs. Gate-to-Source Voltage

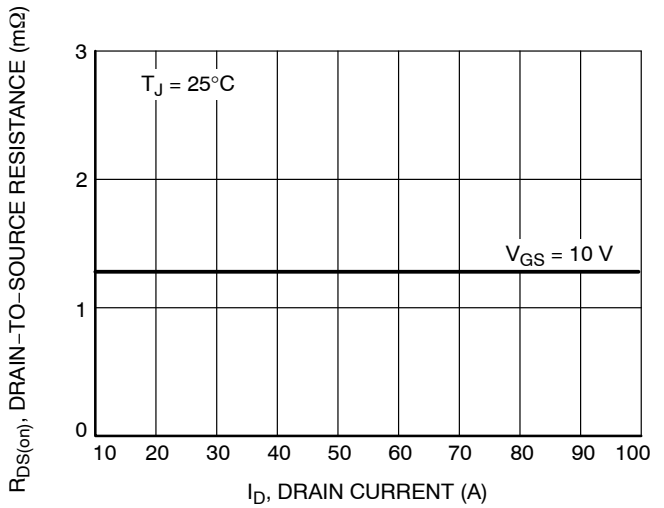


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

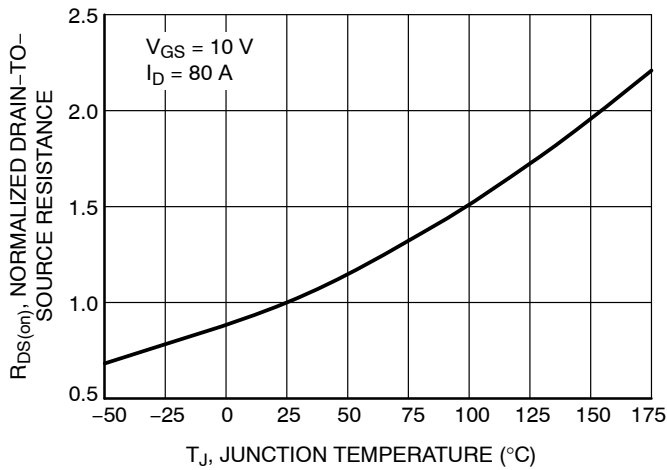


Figure 5. On-Resistance Variation with Temperature

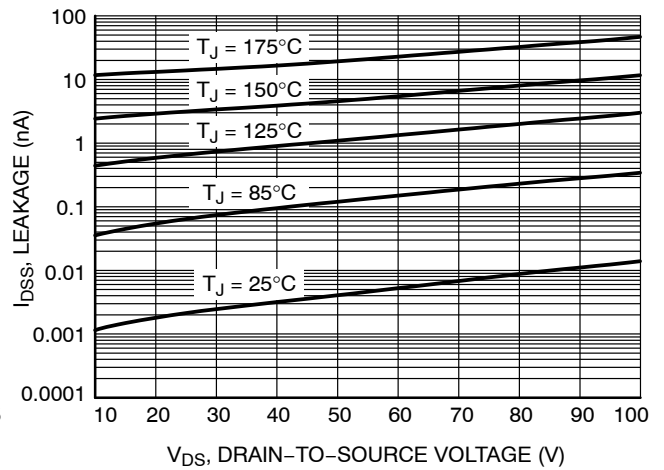
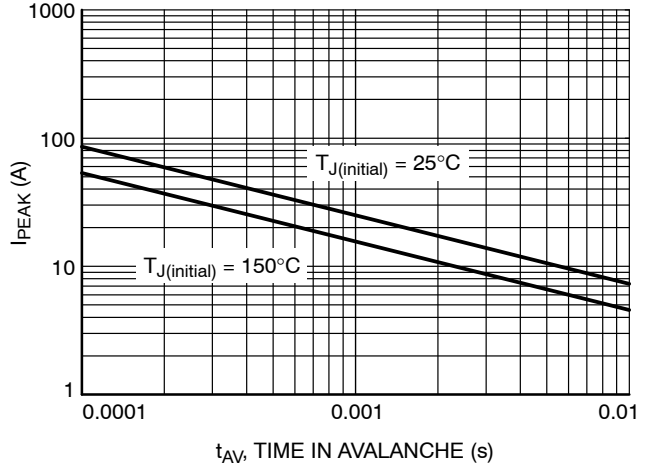
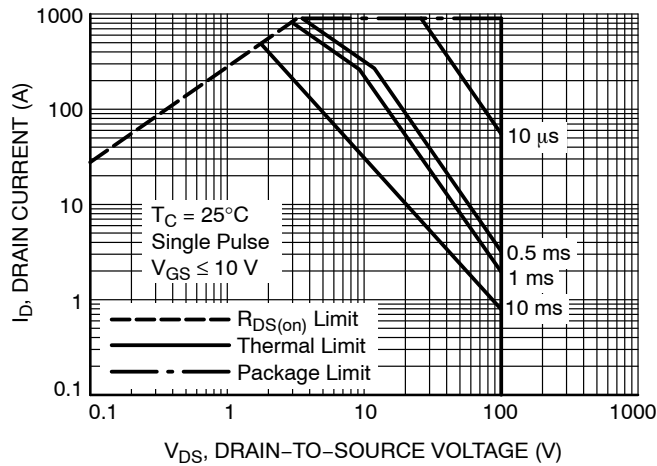
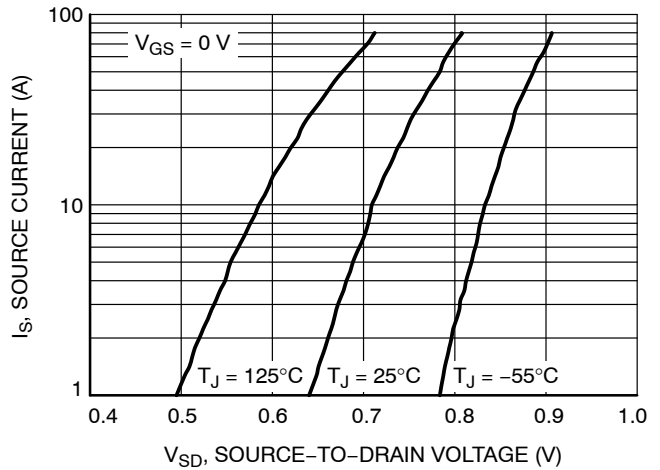
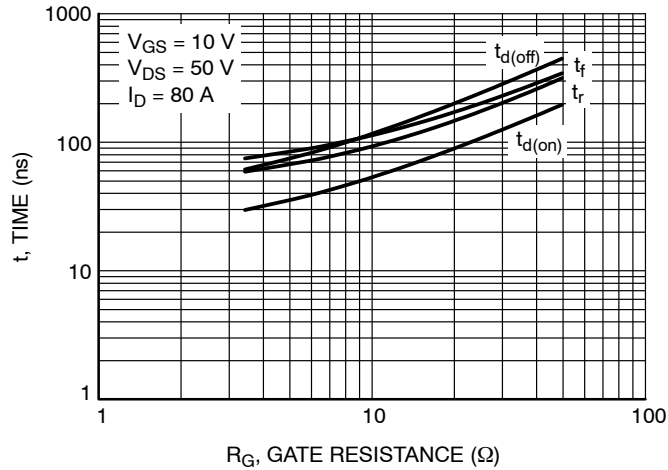
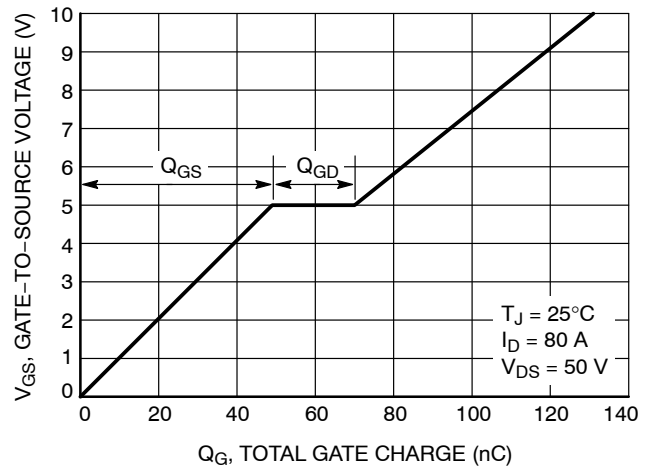
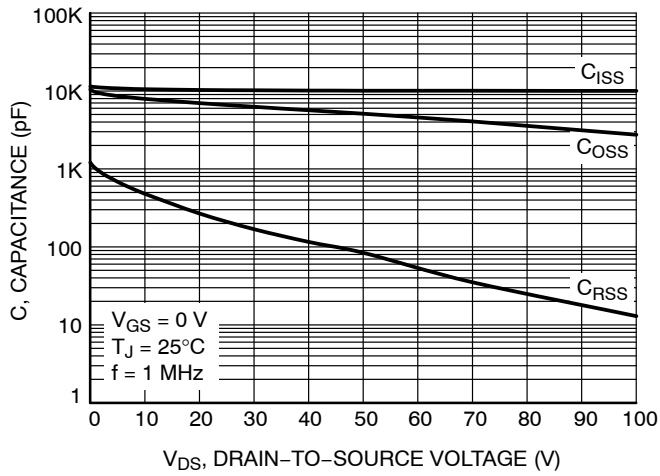


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL CHARACTERISTICS



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TYPICAL CHARACTERISTICS

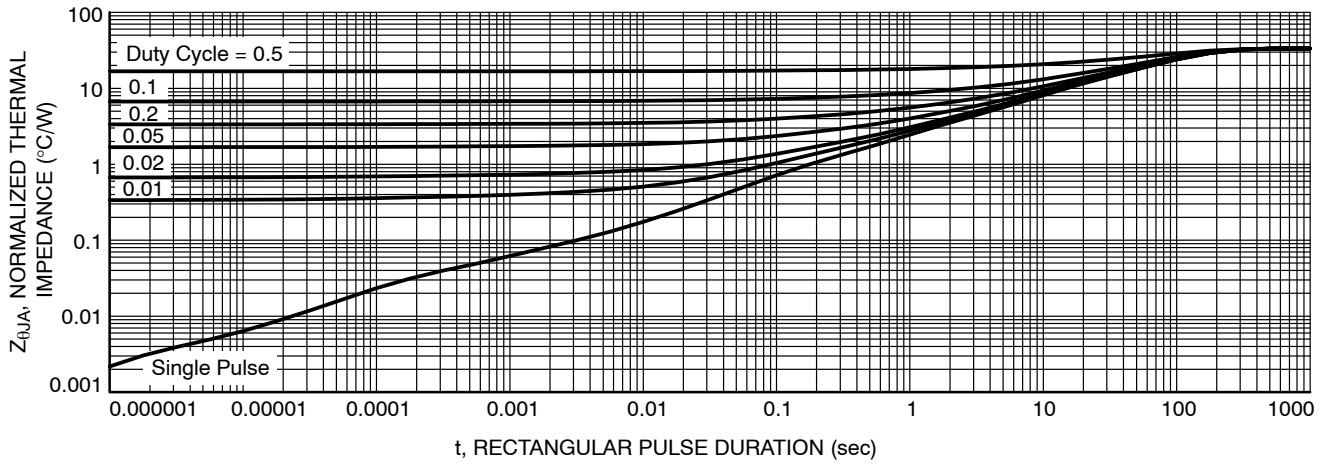


Figure 13. Transient Thermal Impedance

DEVICE ORDERING INFORMATION

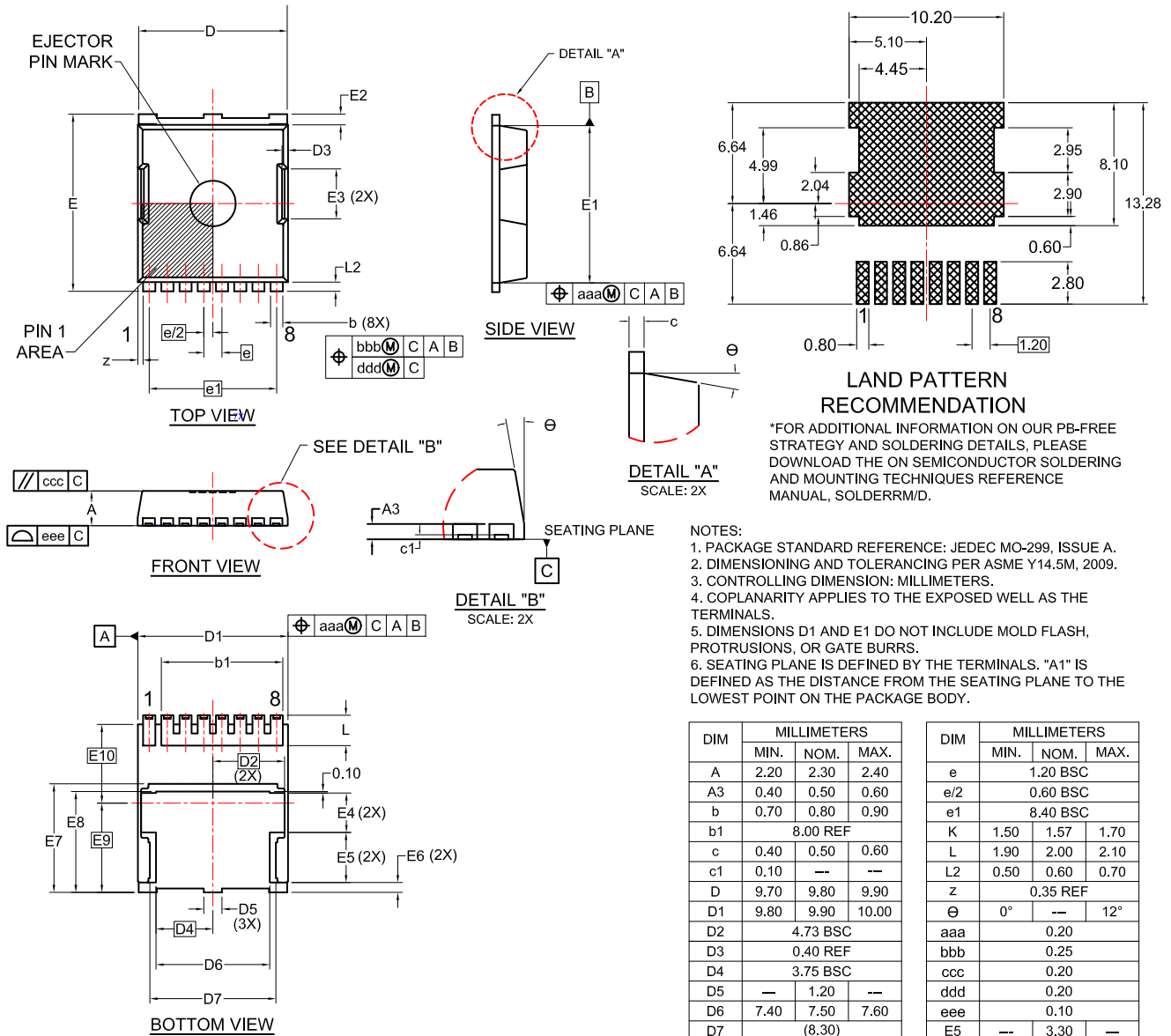
Device	Marking	Package	Shipping [†]
NVBLS1D5N10MCTXG	1D5N10MC	H-PSOF8L (Pb-Free)	2000 / Tape & Reel

[†]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.

NVBS1D5N10MC

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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