

MOSFET – Power, Single, N-Channel, TOLL

60 V, 0.75 mΩ, 470 A

NTBLS0D7N06C

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

Typical Applications

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

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		V _{DSS}	60	V	
Gate-to-Source Voltage		V _{GS}	±20	V	
Continuous Drain Current R _{θJC} (Note 2)	Steady State	T _C = 25°C	I _D	470	A
Power Dissipation R _{θJC} (Note 2)	Steady State	T _C = 25°C	P _D	314	W
Continuous Drain Current R _{θJA} (Notes 1, 2)	Steady State	T _A = 25°C	I _D	54	A
Power Dissipation R _{θJA} (Notes 1, 2)	Steady State	T _A = 25°C	P _D	4.2	W
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	260	A	
Single Pulse Drain-to-Source Avalanche Energy (I _{L(pk)} = 40 A)		E _{AS}	800	mJ	
Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s)		T _L	260	°C	

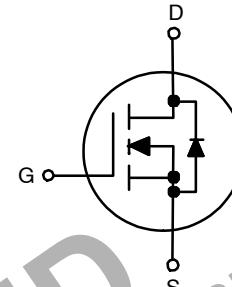
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State (Note 2)	R _{θJC}	0.48	°C/W
Junction-to-Ambient – Steady State (Note 2)	R _{θJA}	36	

1. Surface-mounted on FR4 board using a 1 in² pad size, 2 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 _{D(on) MAX}	I _{D MAX}
60 V	0.75 mΩ @ 10 V	
	1.2 mΩ @ 6 V	470 A



ORDERING INFORMATION

Device	Package	Shipping [†]
NTBLS0D7N06C	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 Specification Brochure, BRD8011/D.

NTBLS0D7N06C

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units	
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	60			V	
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(\text{BR})\text{DSS}/T_J}$	$I_D = 661 \mu\text{A}$, ref to 25°C		26.5		$\text{mV}/^\circ\text{C}$	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60 \text{ V}, V_{GS} = 0 \text{ V}$		10		μA	
		$T_J = 25^\circ\text{C}$			100	μA	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = 20 \text{ V}$			100	nA	
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{GS} = V_{DS}, I_D = 661 \mu\text{A}$	2.0	2.8	4.0	V	
Negative Threshold Temperature Coefficient	$V_{GS(\text{th})/T_J}$	$I_D = 661 \mu\text{A}$, ref to 25°C		9.8		$\text{mV}/^\circ\text{C}$	
Drain-to-Source On Resistance	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}, I_D = 80 \text{ A}$		0.56	0.75	$\text{m}\Omega$	
Drain-to-Source On Resistance	$R_{DS(\text{on})}$	$V_{GS} = 6 \text{ V}, I_D = 66 \text{ A}$		0.85	1.20	$\text{m}\Omega$	
Forward Transconductance	g_{FS}	$V_{DS} = 10 \text{ V}, I_D = 80 \text{ A}$		310		S	
Gate-Resistance	R_G	$T_A = 25^\circ\text{C}$		0.6		Ω	
CHARGES & CAPACITANCES							
Input Capacitance	C_{iss}	$V_{GS} = 0 \text{ V}, V_{DS} = 30 \text{ V}, f = 10 \text{ kHz}$		13730		pF	
Output Capacitance	C_{oss}			6912		pF	
Reverse Transfer Capacitance	C_{rss}			92		pF	
Total Gate Charge	$Q_{G(\text{tot})}$			170		nC	
Threshold Gate Charge	$Q_{G(\text{th})}$			39		nC	
Gate-to-Source Charge	Q_{gs}			62		nC	
Gate-to-Drain Charge	Q_{gd}			16		nC	
Total Gate Charge	$Q_{G(\text{tot})}$	$V_{GS} = 6 \text{ V}, V_{DS} = 30 \text{ V}, I_D = 80 \text{ A}$		102		nC	
SWITCHING CHARACTERISTICS, $V_{GS} = 10 \text{ V}$ (Note 3)							
Turn-On Delay Time	$t_{\text{d(on)}}$	$V_{GS} = 10 \text{ V}, V_{DS} = 30 \text{ V}, I_D = 80 \text{ A}, R_G = 6 \Omega$		37		ns	
Rise Time	t_r			57		ns	
Turn-Off Delay Time	$t_{\text{d(off)}}$			146		ns	
Fall Time	t_f			105		ns	
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	$I_S = 80 \text{ A}, V_{GS} = 0 \text{ V}$	$T_J = 25^\circ\text{C}$		0.79	1.2	V
		$I_S = 80 \text{ A}, V_{GS} = 0 \text{ V}$	$T_J = 125^\circ\text{C}$		0.66		V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0 \text{ V}, dI_S/dt = 100 \text{ A}/\mu\text{s}, I_S = 66 \text{ A}$		132		ns	
Charge Time	t_a			64		ns	
Discharge Time	t_b			68		ns	
Reverse Recovery Charge	Q_{rr}			386		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

TYPICAL CHARACTERISTICS

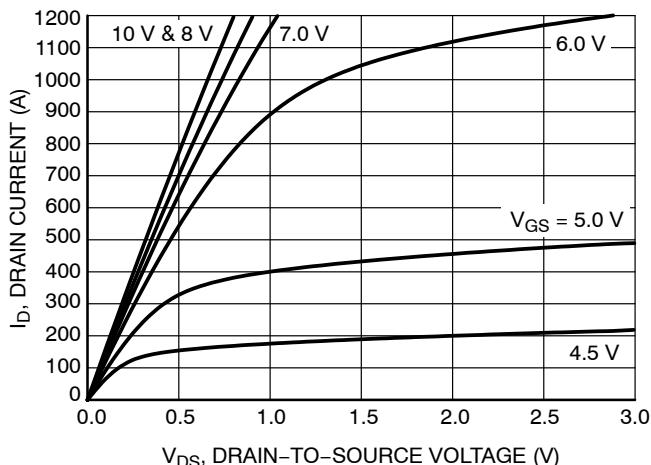


Figure 1. On-Region Characteristics

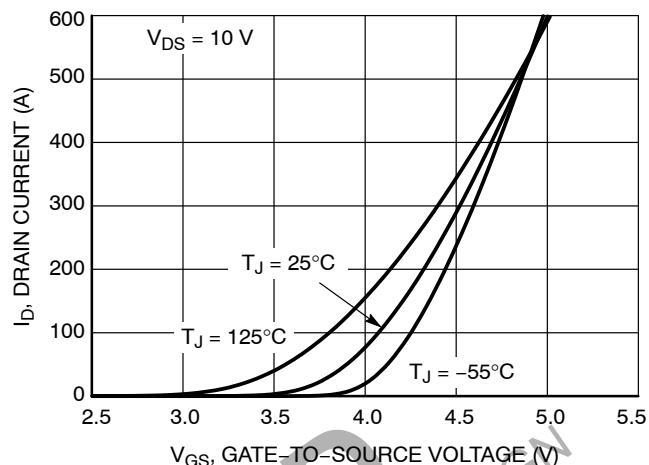


Figure 2. Transfer Characteristics

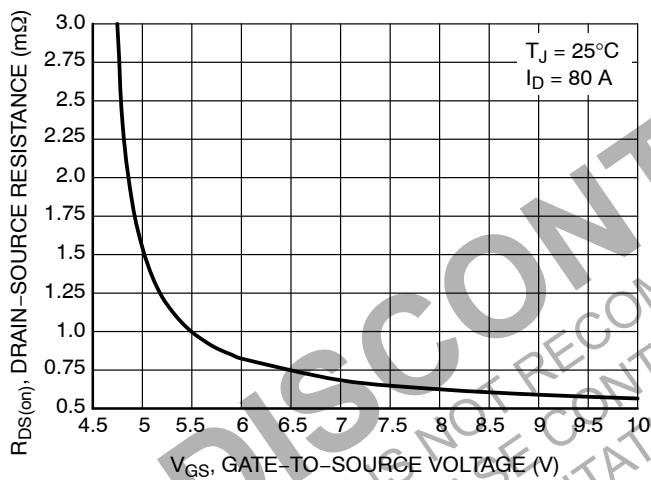
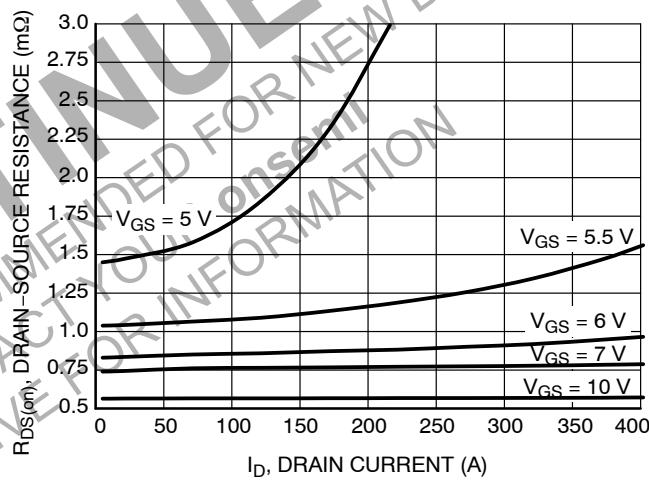
Figure 3. On-Resistance vs. V_{GS} 

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

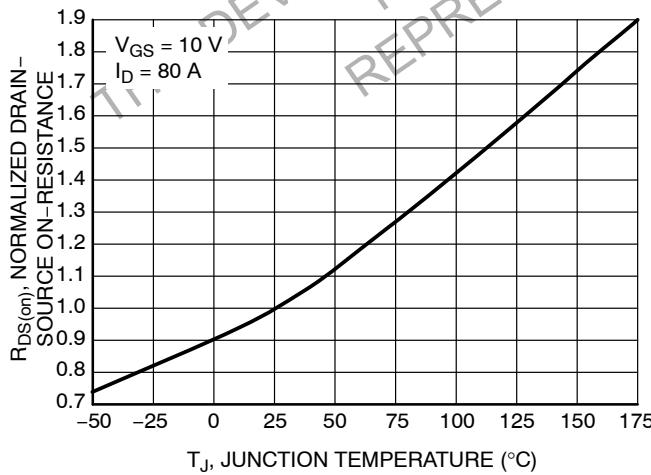


Figure 5. On-Resistance Variation with Temperature

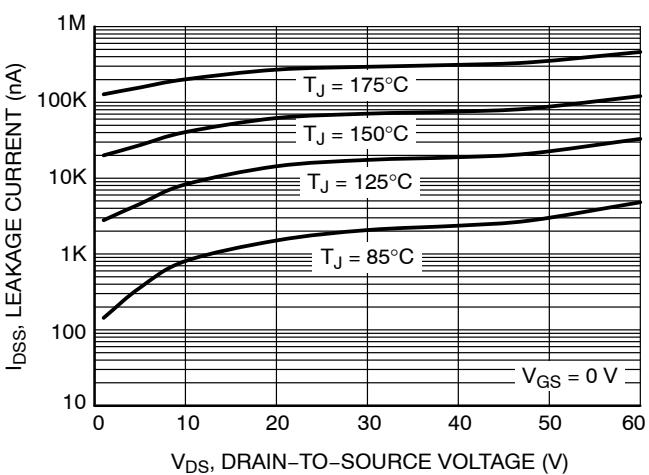


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

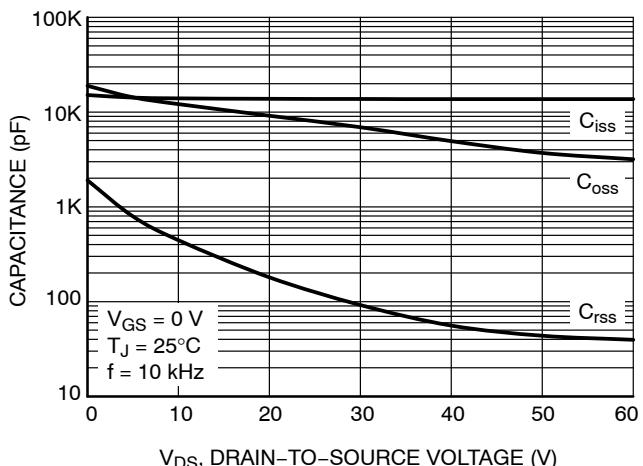


Figure 7. Capacitance Variation

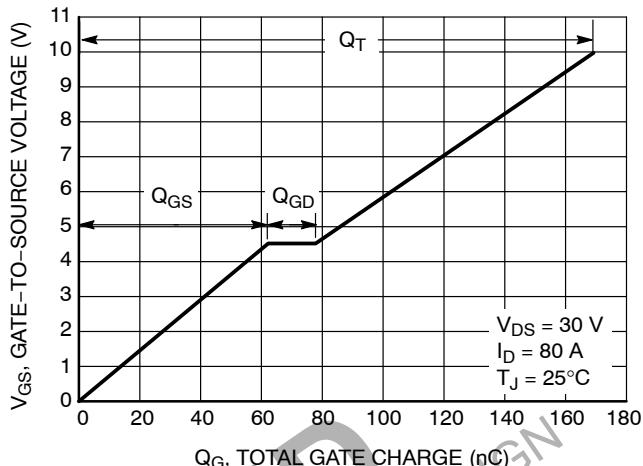


Figure 8. Gate-to-Source Voltage vs. Total Gate Charge

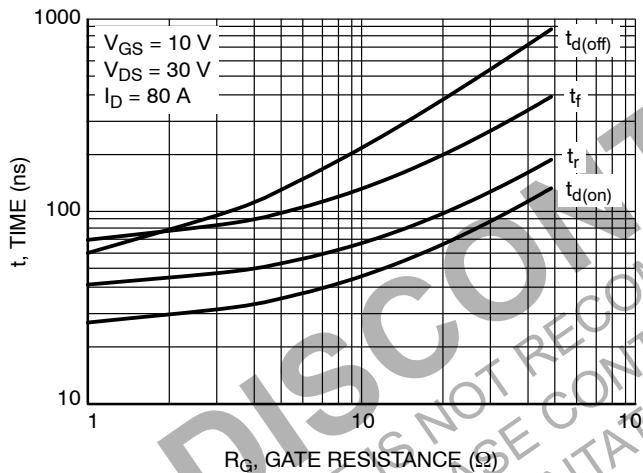


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

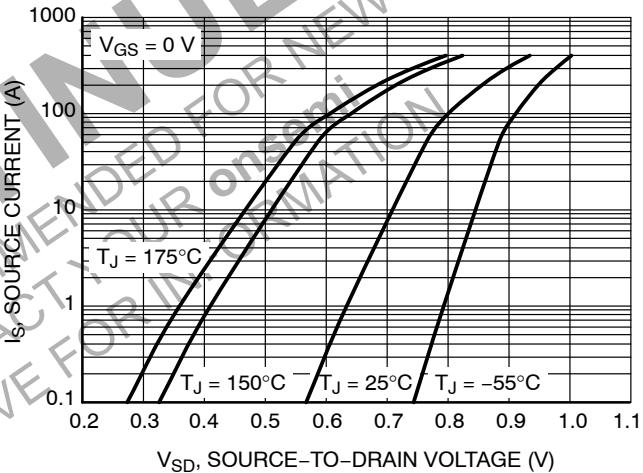


Figure 10. Diode Forward Voltage vs. Current

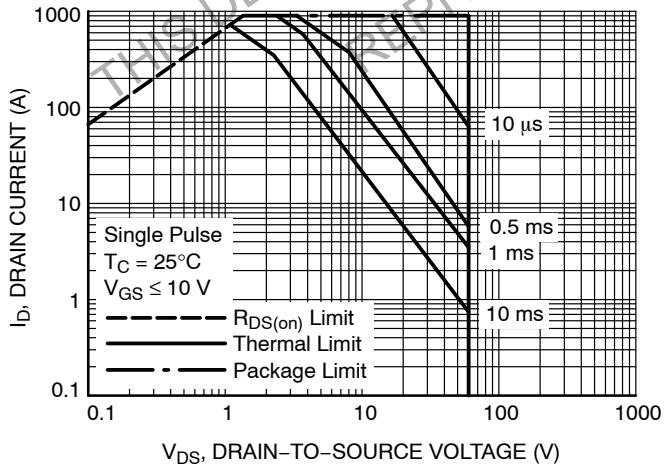
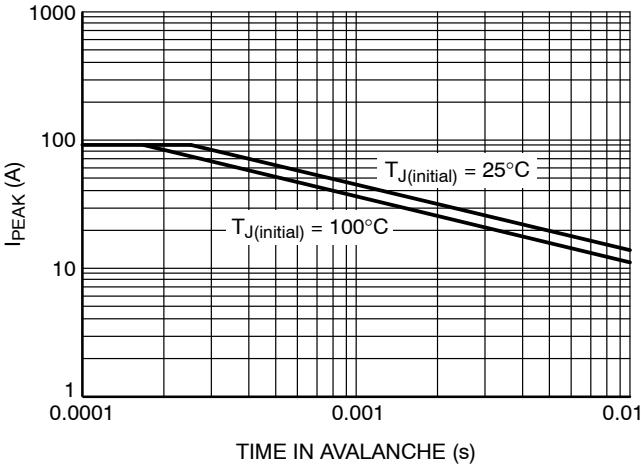


Figure 11. Maximum Rated Forward Biased Safe Operating Area

Figure 12. I_{PEAK} vs. Time in Avalanche

TYPICAL CHARACTERISTICS

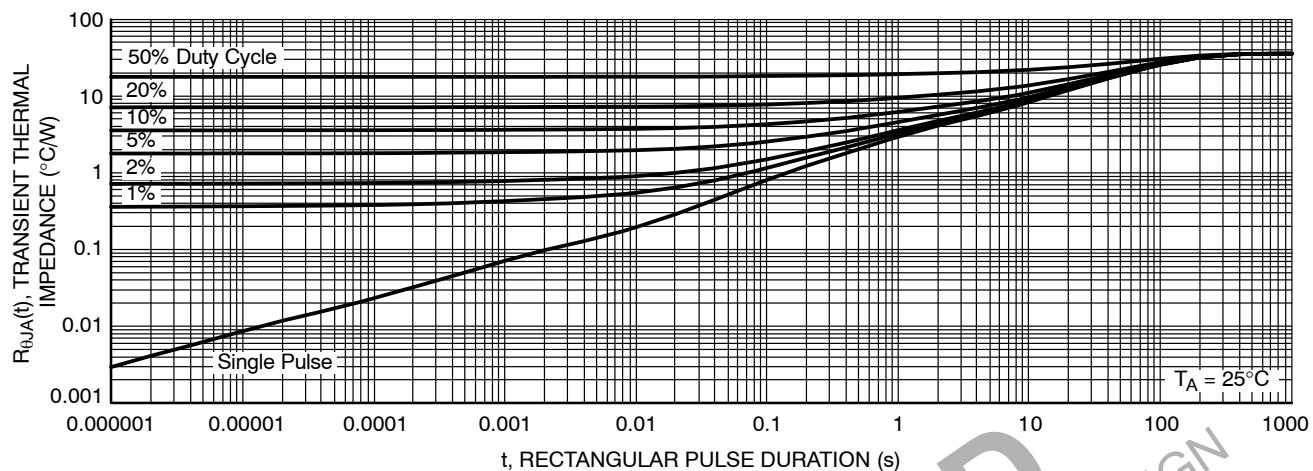


Figure 13. Thermal Response (Junction-to-Ambient)

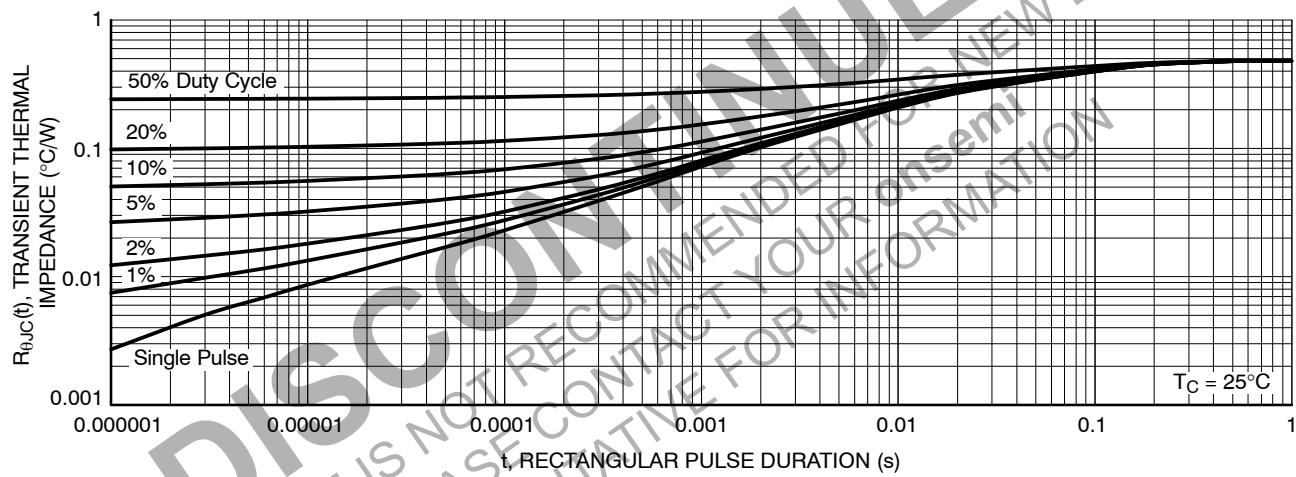
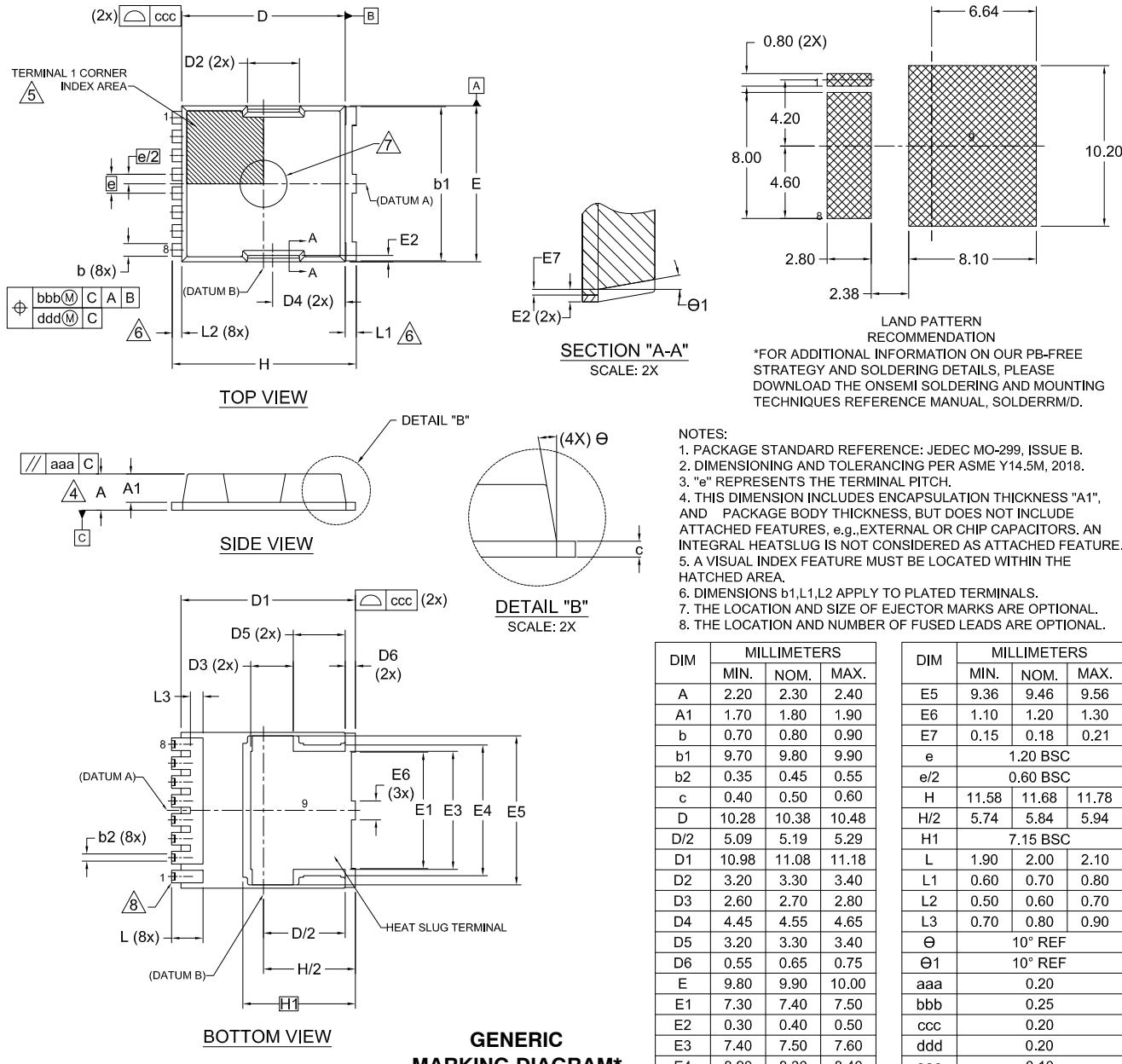


Figure 14. Thermal Response



H-PSOF8L 11.68x9.80x2.30, 1.20P
CASE 100CU
ISSUE F

DATE 30 JUL 2024



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	9.70	9.80	9.90
b2	0.35	0.45	0.55
c	0.40	0.50	0.60
D	10.28	10.38	10.48
D/2	5.09	5.19	5.29
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D3	2.60	2.70	2.80
D4	4.45	4.55	4.65
D5	3.20	3.30	3.40
D6	0.55	0.65	0.75
E	9.80	9.90	10.00
E1	7.30	7.40	7.50
E2	0.30	0.40	0.50
E3	7.40	7.50	7.60
E4	8.20	8.30	8.40
Θ	10° REF		
$\Theta 1$	10° REF		
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 "■", may or may not be present. Some products may not follow the Generic Marking.

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