

# MOSFET - Power, Single N-Channel, TOLL

## 80 V, 0.79 mΩ, 457 A

### NTBLS0D8N08X

#### Features

- Low  $Q_{RR}$ , Soft Recovery Body Diode
- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low  $Q_G$  and Capacitance to Minimize Driver Losses
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### Typical Applications

- Synchronous Rectification (SR) in DC-DC and AC-DC
- Primary Switch in Isolated DC-DC Converter
- Motor Drives

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

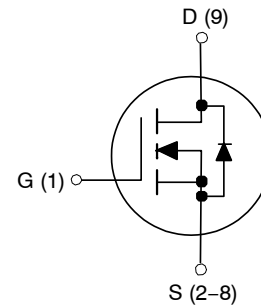
Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	80	V
Gate-to-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C = 25^\circ\text{C}$	457
		$T_C = 100^\circ\text{C}$	323
Power Dissipation	$P_D$	325	W
Pulsed Drain Current	$I_{DM}$	$T_C = 25^\circ\text{C}, t_p = 100 \mu\text{s}$	1629
Pulsed Source Current (Body Diode)			$I_{SM}$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +175	$^\circ\text{C}$
Source Current (Body Diode)	$I_S$	547	A
Single Pulse Avalanche Energy ( $I_{PK} = 103 \text{ A}$ )	$E_{AS}$	530	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.

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. Actual continuous current will be limited by thermal & electromechanical application board design.
3.  $E_{AS}$  of 530 mJ is based on started  $T_J = 25^\circ\text{C}$ ,  $I_{AS} = 103 \text{ A}$ ,  $V_{DD} = 64 \text{ V}$ ,  $V_{GS} = 10 \text{ V}$ , 100% avalanche tested.

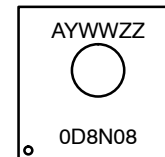
$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
80 V	0.79 mΩ @ 10 V	457 A

#### N-CHANNEL MOSFET



H-PSOF8L  
CASE 100CU

#### MARKING DIAGRAM



- A = Assembly Location
- Y = Year
- WW = Work Week
- ZZ = Assembly Lot Code
- 0D8N08 = Specific Device Code

#### ORDERING INFORMATION

Device	Package	Shipping†
NTBLS0D8N08X	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.

# NTBLS0D8N08X

**Table 1. THERMAL CHARACTERISTICS**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.46	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	43	

**Table 2. ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit		
<b>OFF CHARACTERISTICS</b>								
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}, T_J = 25^\circ\text{C}$	80			V		
Drain-to-Source Breakdown Voltage Temperature Coefficient	$\Delta V_{(BR)DSS} / \Delta T_J$	$I_D = 1\text{ mA}$ , Referenced to $25^\circ\text{C}$		35.5		mV/°C		
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 80\text{ V}, T_J = 25^\circ\text{C}$			2	μA		
		$V_{DS} = 80\text{ V}, T_J = 125^\circ\text{C}$			250			
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA		
<b>ON CHARACTERISTICS</b>								
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 80\text{ A}, T_J = 25^\circ\text{C}$		0.69	0.79	mΩ		
		$V_{GS} = 6\text{ V}, I_D = 71\text{ A}, T_J = 25^\circ\text{C}$		1	1.26			
Gate Threshold Voltage		$V_{GS} = V_{DS}, I_D = 720\text{ }\mu\text{A}, T_J = 25^\circ\text{C}$	2.4		3.6	V		
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(th)} / \Delta T_J$	$V_{GS} = V_{DS}, I_D = 720\text{ }\mu\text{A}$		-7.95		mV/°C		
Forward Transconductance	$g_{FS}$	$V_{DS} = 10\text{ V}, I_D = 80\text{ A}$		485		S		
<b>CHARGES, CAPACITANCES &amp; GATE RESISTANCE</b>								
Input Capacitance	$C_{iss}$	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		12920		pF		
Output Capacitance	$C_{oss}$			3670				
Reverse Transfer Capacitance	$C_{rss}$			55				
Output Charge	$Q_{oss}$	$V_{DD} = 40\text{ V}, I_D = 80\text{ A}, V_{GS} = 6\text{ V}$ $V_{DD} = 40\text{ V}, I_D = 80\text{ A}, V_{GS} = 10\text{ V}$		262		nC		
Total Gate Charge	$Q_{G(tot)}$		$V_{DD} = 40\text{ V}, I_D = 80\text{ A}, V_{GS} = 6\text{ V}$		109			
			$V_{DD} = 40\text{ V}, I_D = 80\text{ A}, V_{GS} = 10\text{ V}$		174			
Threshold Gate Charge	$Q_{G(th)}$				34			
Gate-to-Source Charge	$Q_{gs}$				54			
Gate-to-Drain Charge	$Q_{gd}$				32			
Gate Plateau Voltage	$V_{gp}$				4.6			V
Gate Resistance	$R_g$		$f = 1\text{ MHz}$		0.5			Ω
<b>SWITCHING CHARACTERISTICS</b>								
Turn-On Delay Time	$t_{d(on)}$	Resistive Load, $V_{GS} = 0/10\text{ V}$ , $V_{DD} = 40\text{ V}, I_D = 80\text{ A}, R_G = 2.5\text{ }\Omega$		34		ns		
Rise Time	$t_r$			15				
Turn-Off Delay Time	$t_{d(off)}$			70				
Fall Time	$t_f$			20				
<b>SOURCE-TO-DRAIN DIODE CHARACTERISTICS</b>								
Forward Diode Voltage	$V_{SD}$	$I_S = 80\text{ A}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$		0.8		V		
		$I_S = 80\text{ A}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$		0.66				
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0\text{ V}, I_S = 80\text{ A}$ $di/dt = 1000\text{ A}/\mu\text{s}, V_{DD} = 40\text{ V}$		48		ns		
Charge Time	$t_a$			27				
Discharge Time	$t_b$			49				
Reverse Recovery Charge	$Q_{rr}$			464			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.

TYPICAL CHARACTERISTICS

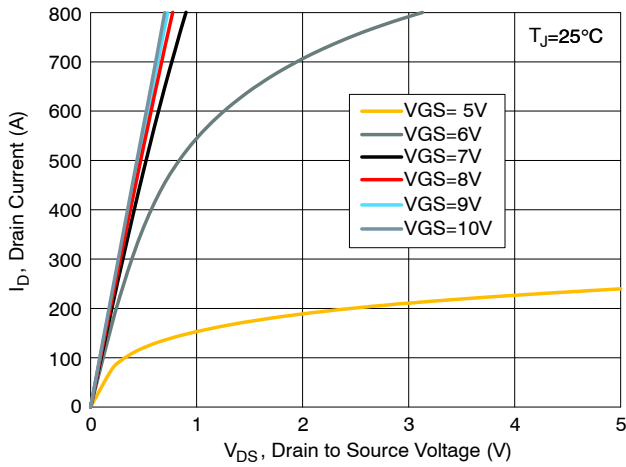


Figure 1. On-Region Characteristics

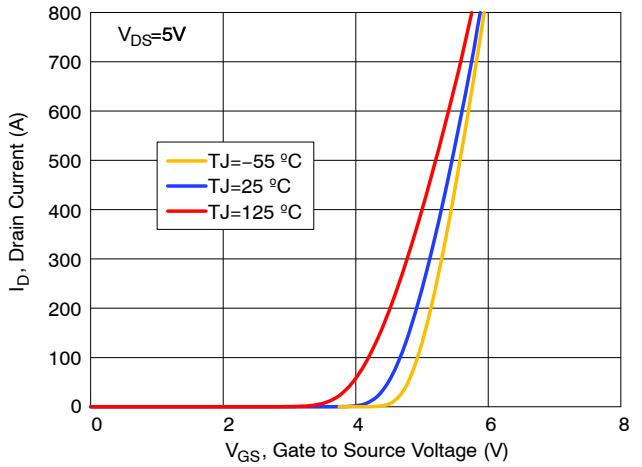


Figure 2. Transfer Characteristics

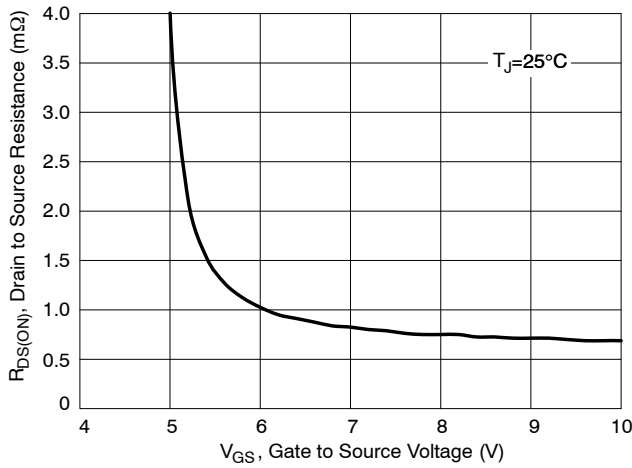


Figure 3. On-Resistance vs. Gate Voltage

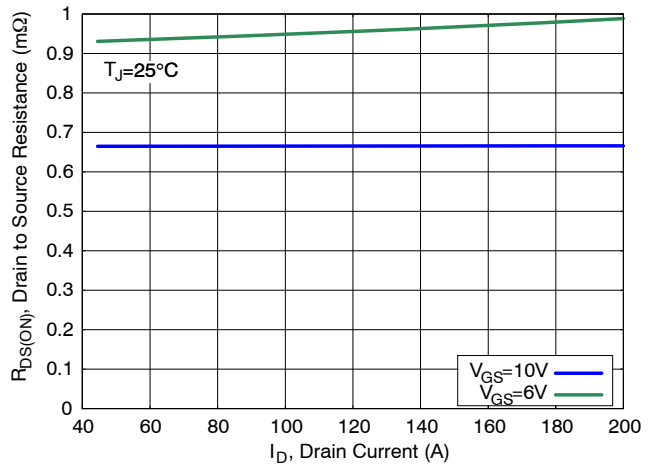


Figure 4. On-Resistance vs. Drain Current

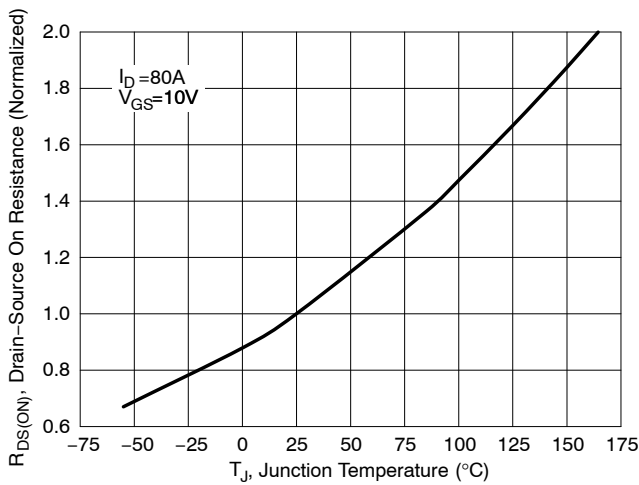


Figure 5. Normalized On-Resistance vs. Junction Temperature

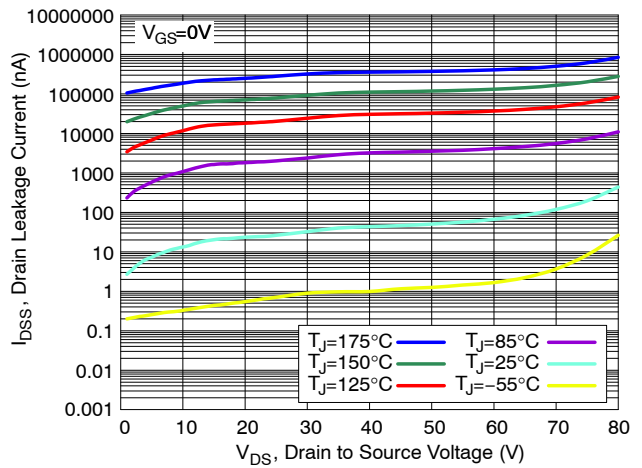


Figure 6. Drain Leakage Current vs. Drain Voltage

# NTBLS0D8N08X

## TYPICAL CHARACTERISTICS

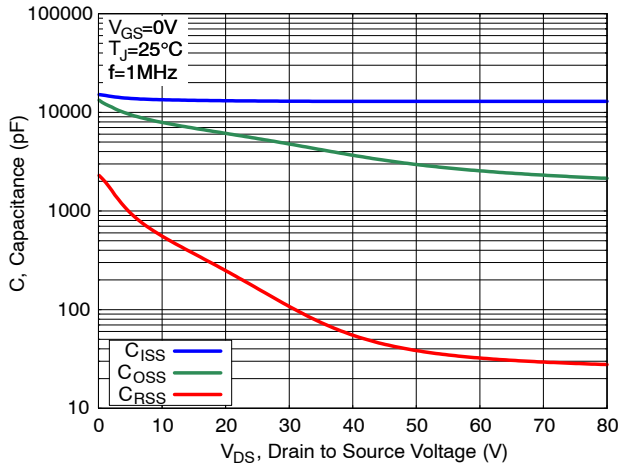


Figure 7. Capacitance Characteristics

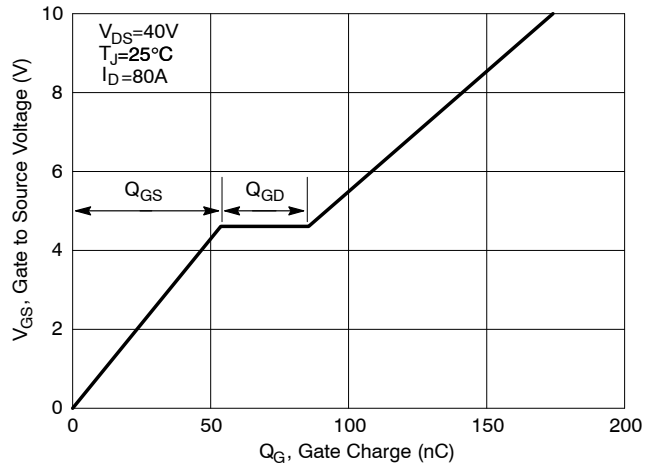


Figure 8. Gate Charge Characteristics

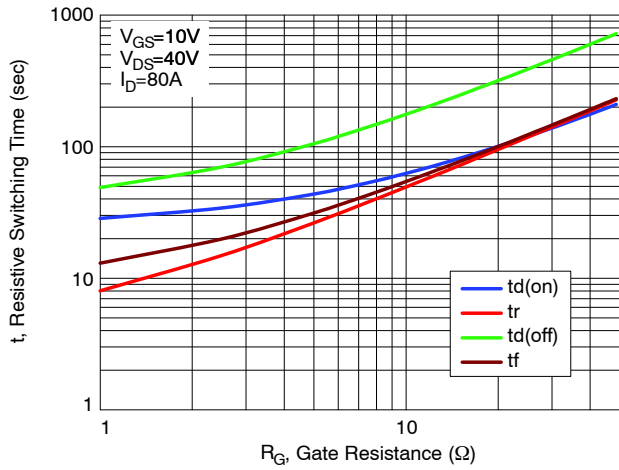


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

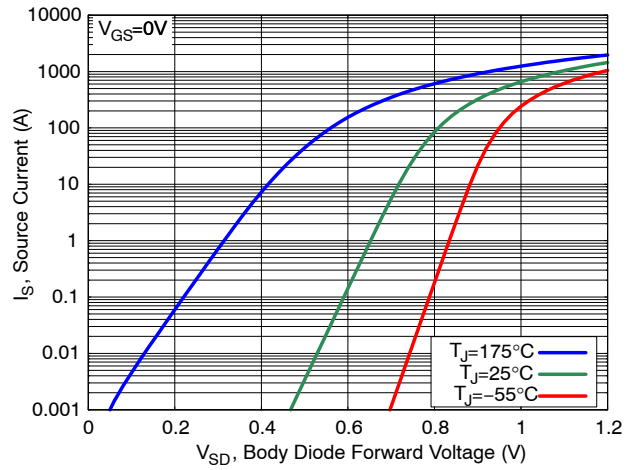


Figure 10. Diode Forward Characteristics

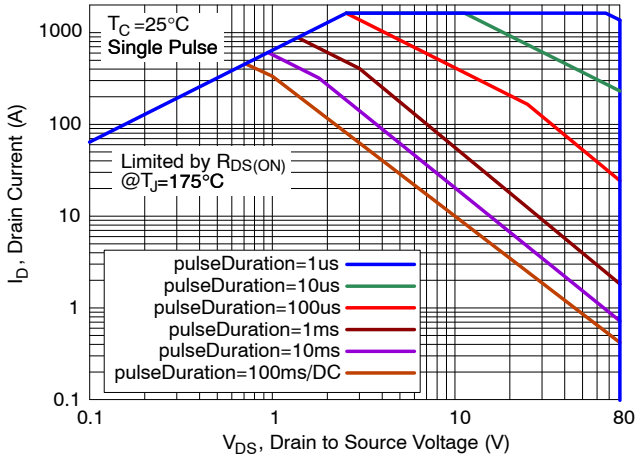


Figure 11. Safe Operating Area (SOA)

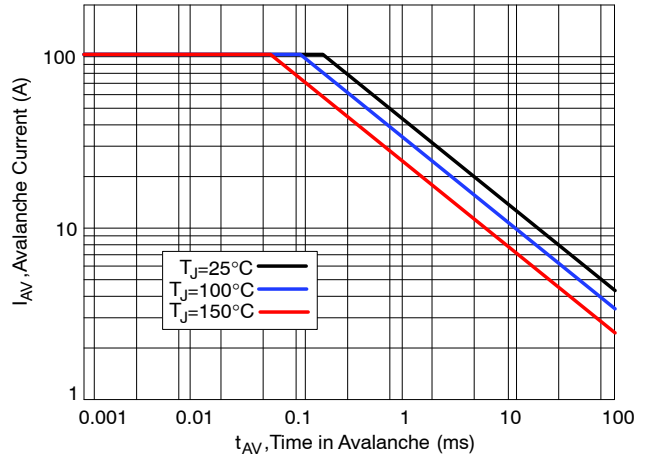
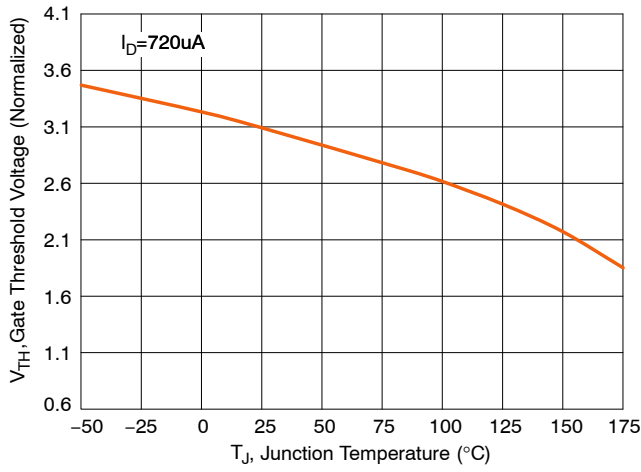


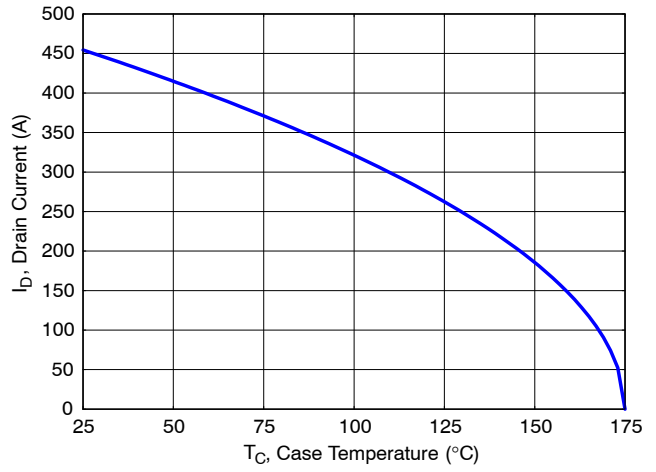
Figure 12. Avalanche Current vs. Pulse Time (UIS)

# NTBLS0D8N08X

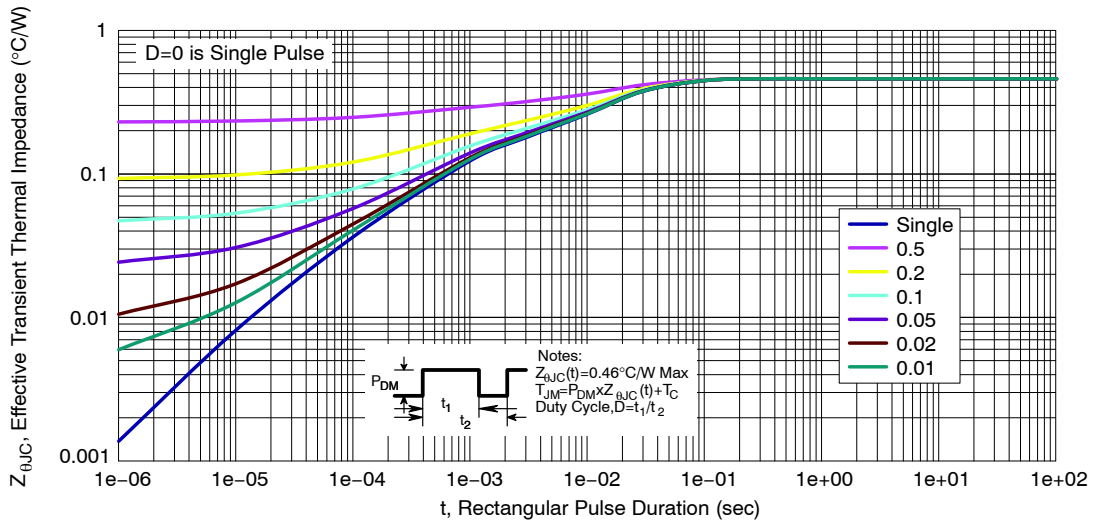
## TYPICAL CHARACTERISTICS



**Figure 13. Gate Threshold Voltage vs. Junction Temperature**



**Figure 14. Maximum Current vs. Case Temperature**

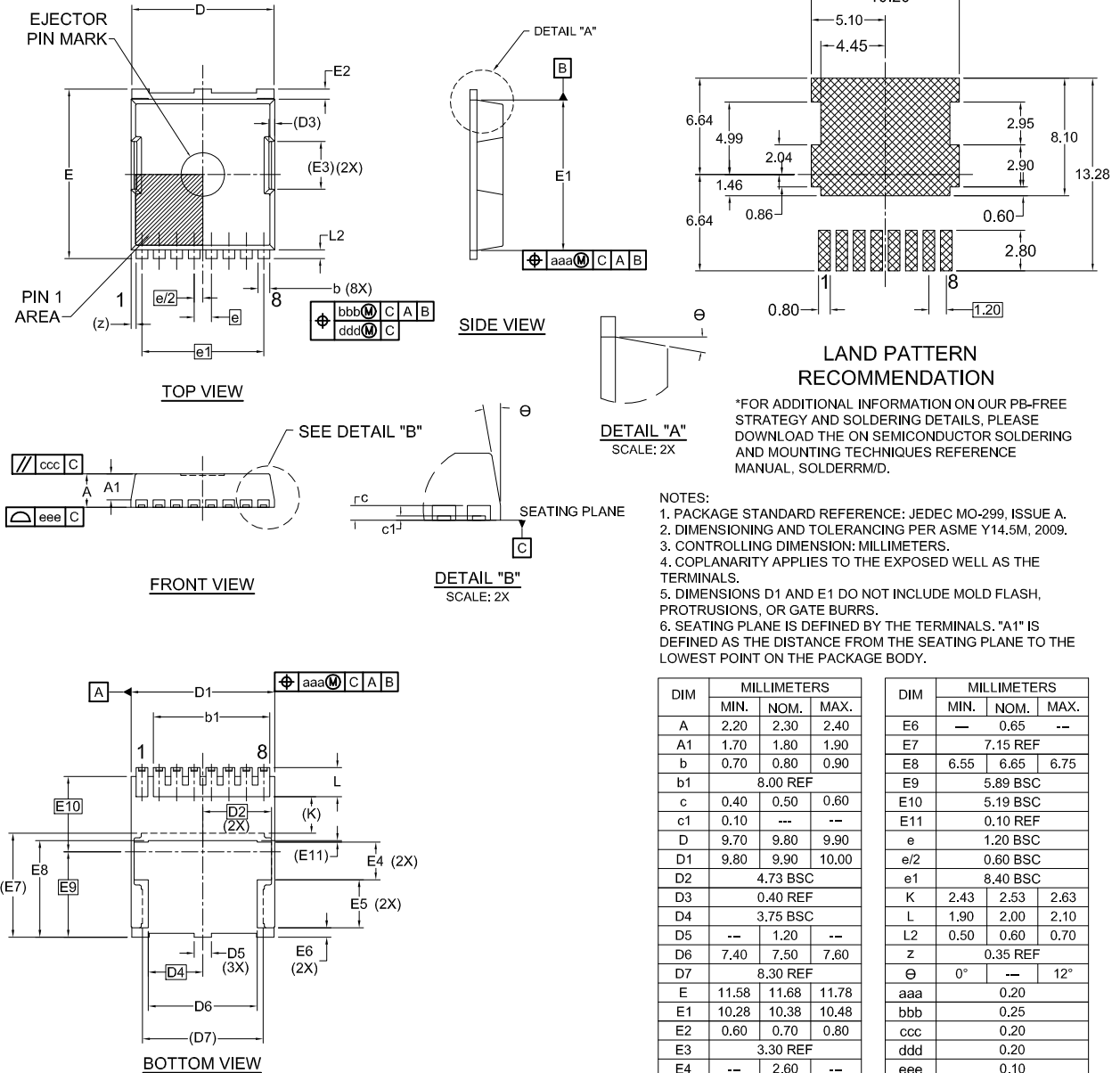


**Figure 15. Transient Thermal Response**

# NTBLS0D8N08X

## PACKAGE DIMENSIONS

H-PSOF8L 11.68x9.80  
CASE 100CU  
ISSUE B



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	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 REF		
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	---
E5	---	3.30	---

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
E6	---	0.65	---
E7	7.15 REF		
E8	6.55	6.65	6.75
E9	5.89 BSC		
E10	5.19 BSC		
E11	0.10 REF		
e	1.20 BSC		
e/2	0.60 BSC		
e1	8.40 BSC		
K	2.43	2.53	2.63
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		

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Email Requests to: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**onsemi Website:** [www.onsemi.com](http://www.onsemi.com)

### TECHNICAL SUPPORT

**North American Technical Support:**

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

**Europe, Middle East and Africa Technical Support:**

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative