

MOSFET - Power, Single N-Channel, TOLL

60 V, 0.75 mΩ, 470 A



ON Semiconductor®

www.onsemi.com

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 ($T_J = 25^\circ\text{C}$ 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 $R_{\theta JC}$ (Note 2)	Steady State	$T_C = 25^\circ\text{C}$	I_D	470 A
		$T_C = 25^\circ\text{C}$	P_D	314 W
Power Dissipation $R_{\theta JC}$ (Note 2)	Steady State	$T_A = 25^\circ\text{C}$	I_D	54 A
		$T_A = 25^\circ\text{C}$	P_D	4.2 W
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^\circ\text{C}$	I_D	54 A
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^\circ\text{C}$	P_D	4.2 W
Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	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	260	A
Single Pulse Drain-to-Source Avalanche Energy ($I_{L(pk)} = 40 \text{ A}$)		E_{AS}	800	mJ
Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ\text{C}$

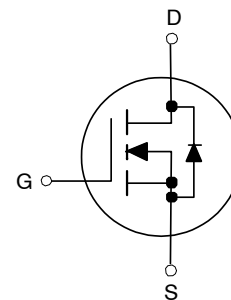
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State (Note 2)	$R_{\theta JC}$	0.48	$^\circ\text{C}/\text{W}$
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	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.

$V_{(BR)DSS}$	$R_{DS(ON) MAX}$	$I_D MAX$
60 V	0.75 mΩ @ 10 V	470 A
	1.2 mΩ @ 6 V	



H-PSOF8L
CASE 100CU

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	$V_{(BR)DSS}$	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{V}$	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = 661 \mu\text{A}, \text{ref to } 25^\circ\text{C}$		26.5		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60 \text{V}, V_{GS} = 0 \text{V}$	$T_J = 25^\circ\text{C}$		10	μA
			$T_J = 125^\circ\text{C}$		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	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 661 \mu\text{A}$	2.0	2.8	4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(th)}/T_J$	$I_D = 661 \mu\text{A}, \text{ref to } 25^\circ\text{C}$		9.8		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10 \text{V}, I_D = 80 \text{A}$		0.56	0.75	m Ω
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 6 \text{V}, I_D = 66 \text{A}$		0.85	1.20	m Ω
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 & CAPACTIANCES

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	$Q_{G(tot)}$	$V_{GS} = 10 \text{V}, V_{DS} = 30 \text{V}, I_D = 80 \text{A}$		170		nC
Threshold Gate Charge	$Q_{G(th)}$			39		nC
Gate-to-Source Charge	Q_{gs}			62		nC
Gate-to-Drain Charge	Q_{gd}			16		nC
Total Gate Charge	$Q_{G(tot)}$	$V_{GS} = 6 \text{V}, V_{DS} = 30 \text{V}, I_D = 80 \text{A}$		69		nC

SWITCHING CHARACTERISTICS, $V_{GS} = 10 \text{V}$ (Note 3)

Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10 \text{V}, V_{DS} = 30 \text{V}, I_D = 80 \text{A}, R_G = 6 \Omega$		37		ns
Rise Time	t_r			57		ns
Turn-Off Delay Time	$t_{d(off)}$			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

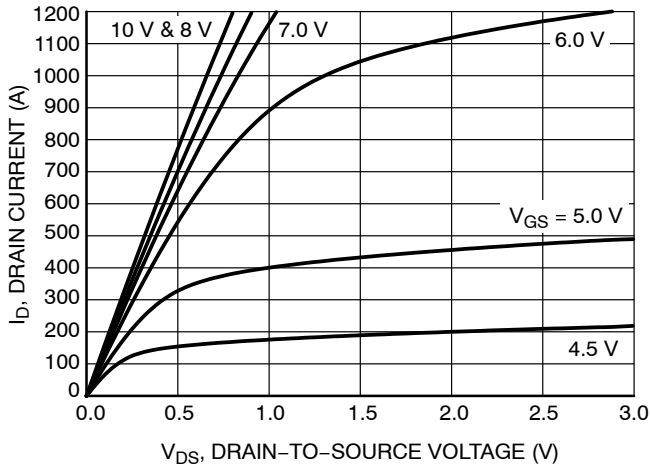


Figure 1. On-Region Characteristics

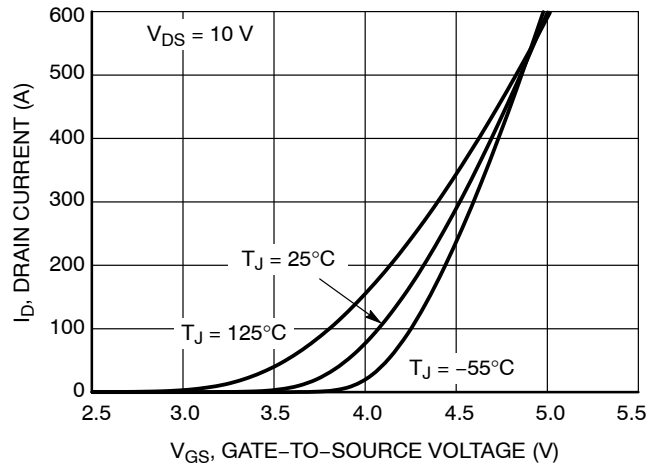


Figure 2. Transfer Characteristics

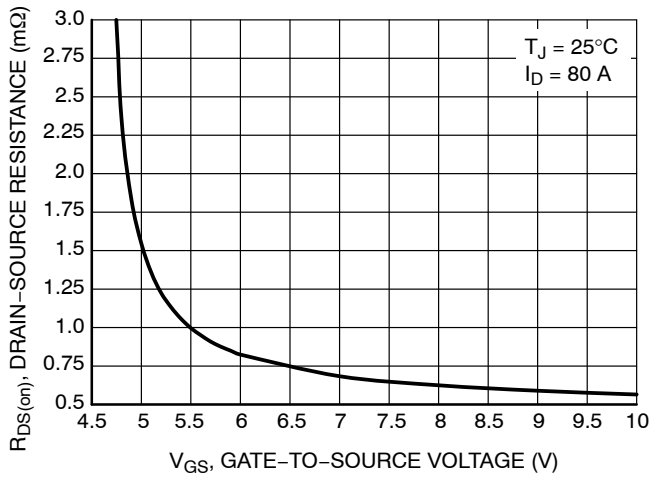


Figure 3. On-Resistance vs. V_{GS}

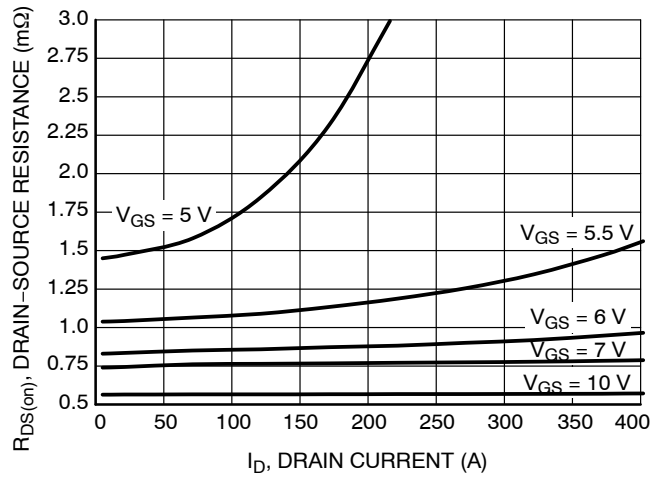


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

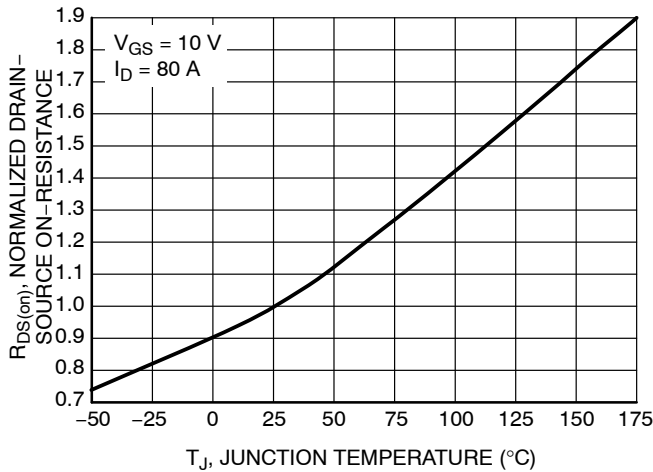


Figure 5. On-Resistance Variation with Temperature

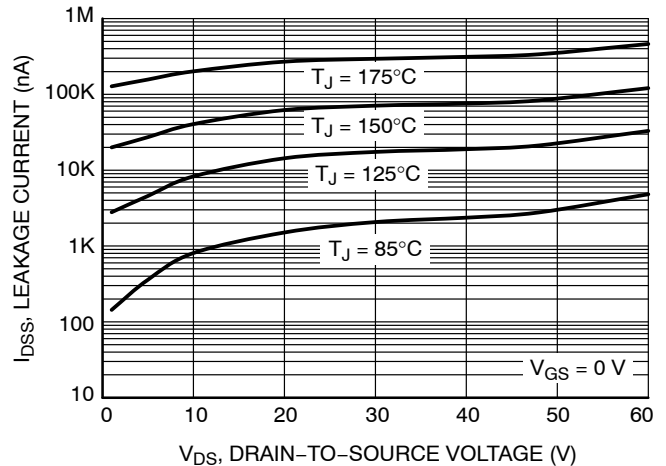


Figure 6. Drain-to-Source Leakage Current vs. Voltage

NTBLS0D7N06C

TYPICAL CHARACTERISTICS

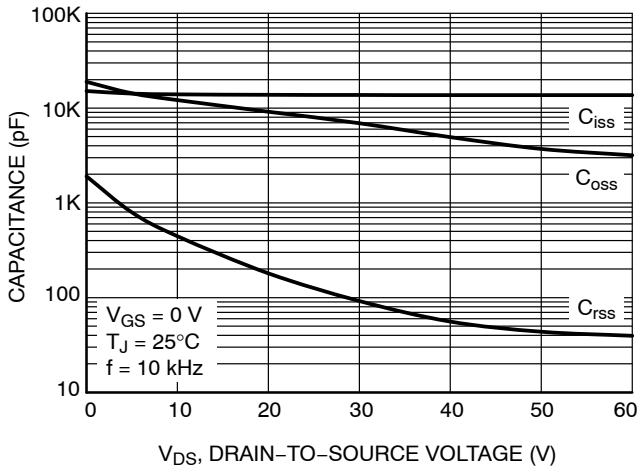


Figure 7. Capacitance Variation

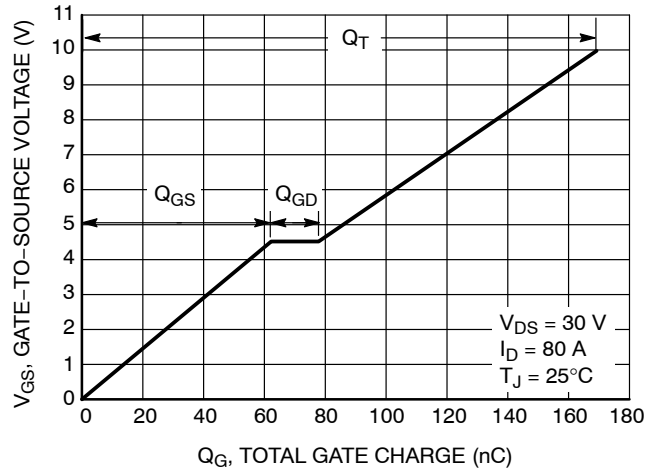


Figure 8. Gate-to-Source Voltage vs. Total Gate Charge

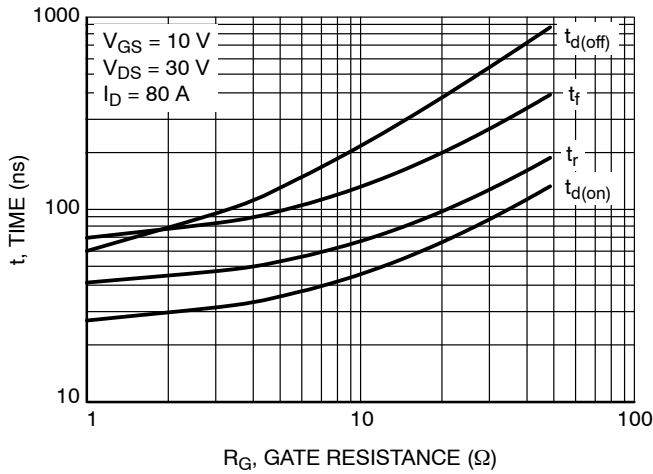


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

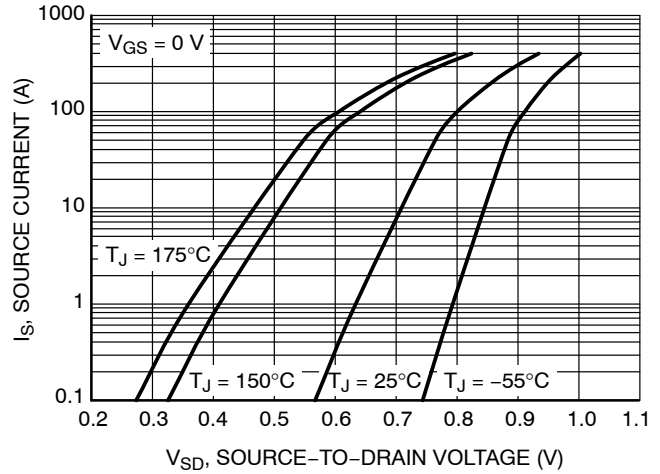


Figure 10. Diode Forward Voltage vs. Current

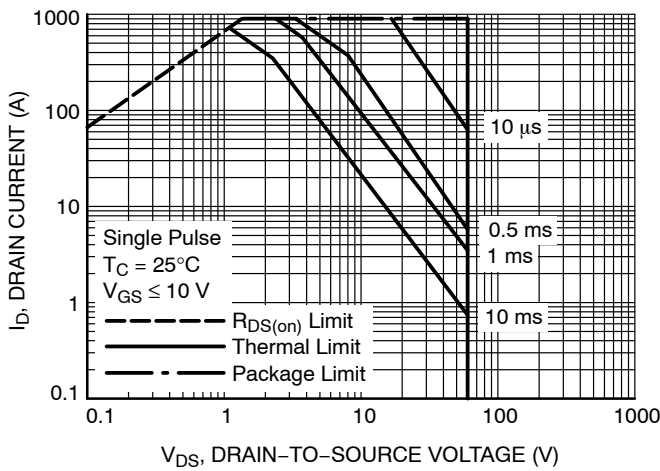


Figure 11. Maximum Rated Forward Biased Safe Operating Area

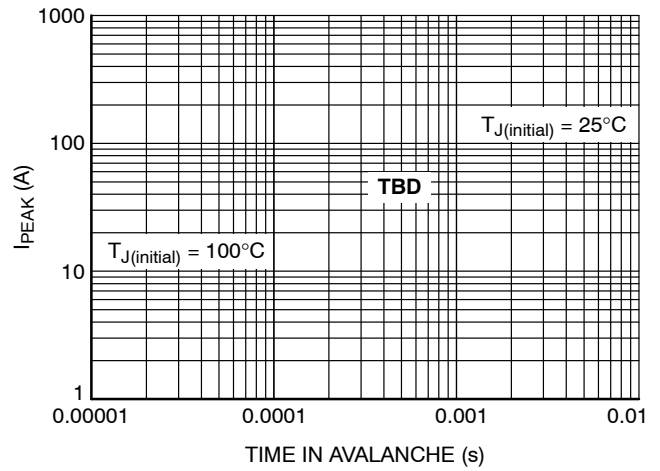


Figure 12. Peak Power

NTBLS0D7N06C

TYPICAL CHARACTERISTICS

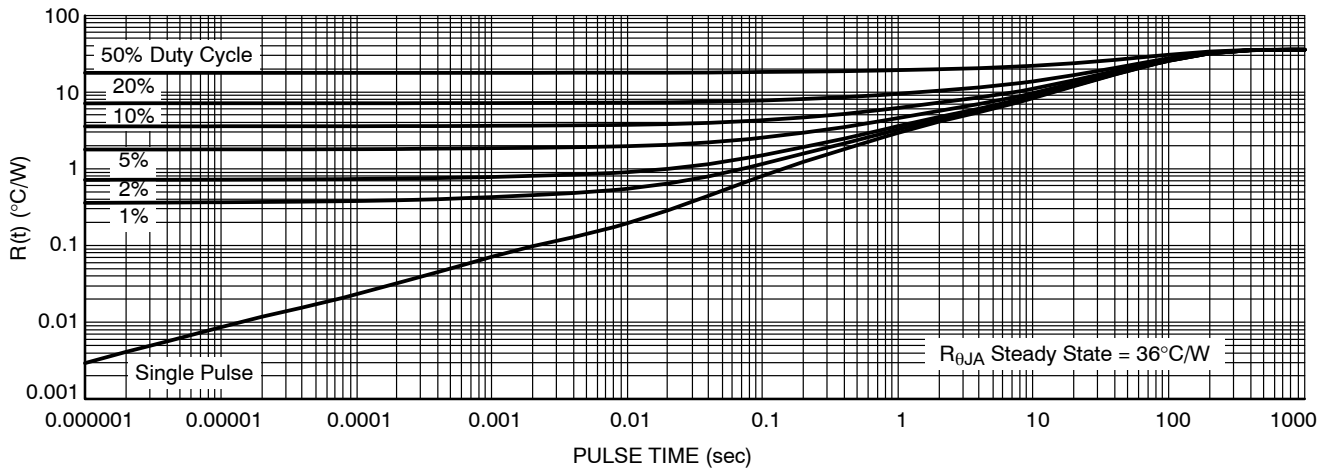
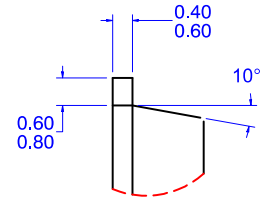
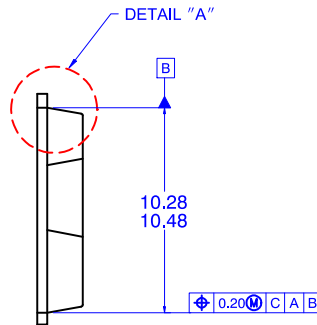
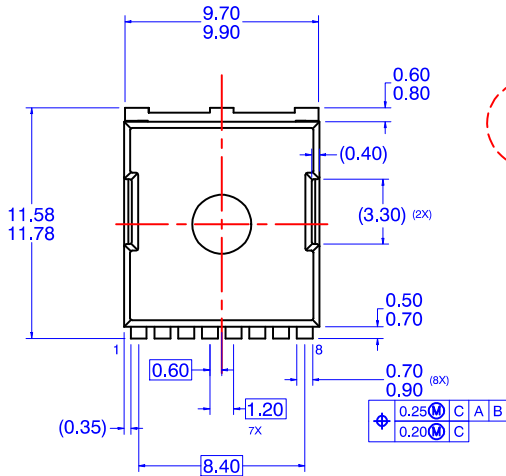


Figure 13. Thermal Characteristics (Junction-to-Ambient)

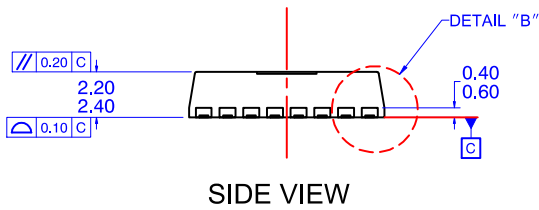
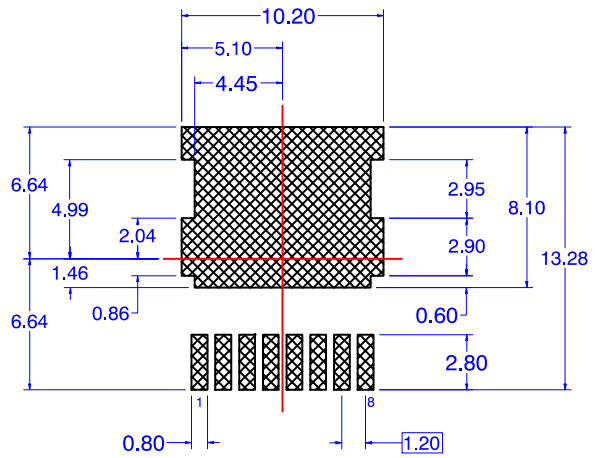
NTBLS0D7N06C

PACKAGE DIMENSIONS

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

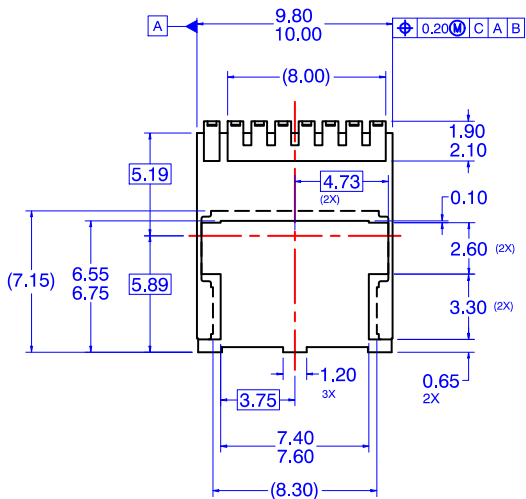


DETAIL "A"

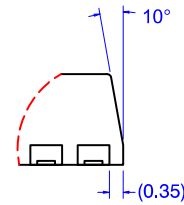


SIDE VIEW

LAND PATTERN RECOMMENDATION




BOTTOM VIEW



DETAIL "B"

- NOTES: UNLESS OTHERWISE SPECIFIED
- PACKAGE STANDARD REFERENCE: JEDEC MO-299, ISSUE A, DATED NOVEMBER 2009.
 - ALL DIMENSIONS ARE IN MILLIMETERS.
 - DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
 - DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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 ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor 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 ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor 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

ON Semiconductor Website: 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