

# ON Semiconductor

## Is Now



To learn more about onsemi™, please visit our website at  
[www.onsemi.com](http://www.onsemi.com)

onsemi and **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 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. Other names and brands may be claimed as the property of others.

# MOSFET - Power, Single N-Channel, PQFN8 100 V, 7.6 mΩ, 110 A



## NTMFS7D8N10G

### Features

- Wide SOA for Linear Mode Operation
- Low  $R_{DS(on)}$  to Minimize Conduction Loss
- High Peak UIS Current Capability for Ruggedness
- Small Footprint (5x6 mm) for Compact Design
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Typical Applications

- 48 V Hot Swap System, Load Switch, Soft Start, E-Fuse

### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ , Unless otherwise specified)

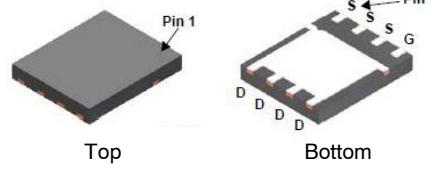
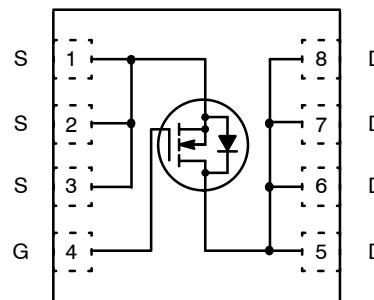
Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		$V_{DSS}$	100	V
Gate-to-Source Voltage		$V_{GS}$	$\pm 20$	V
Continuous Drain Current $R_{\theta JC}$ (Note 2)	Steady State	$I_D$	110	A
Power Dissipation $R_{\theta JC}$ (Note 2)		$P_D$	187	W
Continuous Drain Current $R_{\theta JA}$ (Note 1, 2)	Steady State	$I_D$	14	A
Power Dissipation $R_{\theta JA}$ (Note 1, 2)		$P_D$	3	W
Pulsed Drain Current	$T_A = 25^\circ\text{C}$ , $t_p = 10 \mu\text{s}$	$I_{DM}$	1656	A
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to +175	$^\circ\text{C}$
Source Current (Body Diode)		$I_S$	155	A
Single Pulse Drain-to-Source Avalanche Energy ( $I_{AV} = 70 \text{ A}$ , $L = 0.1 \text{ mH}$ )		$E_{AS}$	245	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.

1. Surface-mounted on FR4 board using 1 in<sup>2</sup> pad size, 1 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.

$V_{SSS}$	$R_{SS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
100 V	7.6 mΩ @ 10 V	110 A

### N-Channel MOSFET



PQFN8 5x6  
CASE 483AF

### MARKING DIAGRAM



7D8N10 = Specific Device Code  
 A = Assembly Location  
 Y = Year  
 W = Work Week  
 ZZ = Lot Traceability

### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

# NTMFS7D8N10G

## THERMAL CHARACTERISTICS

Symbol	Parameter	Max	Unit
$R_{\theta JC}$	Junction-to-Case – Steady State	0.8	°C/W
$R_{\theta JA}$	Junction-to-Ambient – Steady State	50	

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
-----------	--------	-----------------	-----	-----	-----	------

### OFF CHARACTERISTICS

Drain – to – Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	100			V
Drain – to – Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS} / T_J$	$I_D = 250 \mu\text{A}$ , ref to 25°C		87.9		mV/°C
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0 \text{ V}$ , $V_{DS} = 80 \text{ V}$	$T_J = 25^\circ\text{C}$		1	μA
			$T_J = 125^\circ\text{C}$		100	
Gate – to – Source Leakage Current	$I_{GSS}$	$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 20 \text{ V}$			±100	nA

### ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$ , $I_D = 254 \mu\text{A}$	2.0		4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)} / T_J$	$I_D = 254 \mu\text{A}$ , ref to 25°C		-9.4		mV/°C
Drain – to – Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 48 \text{ A}$		5.6	7.6	mΩ
Forward Transconductance	$g_{FS}$	$V_{DS} = 5 \text{ V}$ , $I_D = 48 \text{ A}$		37		S
Gate–Resistance	$R_G$	$T_A = 25^\circ\text{C}$		0.33		Ω

### CHARGES & CAPACITANCES

Input Capacitance	$C_{ISS}$	$V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$ , $V_{DS} = 50 \text{ V}$		6180		pF
Output Capacitance	$C_{OSS}$			624.5		
Reverse Transfer Capacitance	$C_{RSS}$			99		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 10 \text{ V}$ , $V_{DS} = 50 \text{ V}$ , $I_D = 48 \text{ A}$		92		nC
Gate-to-Source Charge	$Q_{GS}$			35		
Gate-to-Drain Charge	$Q_{GD}$			26		
Plateau Voltage	$V_{GP}$			6		V

### SWITCHING CHARACTERISTICS (Note 3)

Turn – On Delay Time	$t_{d(ON)}$	$V_{GS} = 10 \text{ V}$ , $V_{DS} = 50 \text{ V}$ , $I_D = 48 \text{ A}$ , $R_G = 4.7 \Omega$		32		ns
Rise Time	$t_r$			24		
Turn – Off Delay Time	$t_{d(OFF)}$			51		
Fall Time	$t_f$			14		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0 \text{ V}$ , $I_S = 48 \text{ A}$	$T_J = 25^\circ\text{C}$		0.84		V
			$T_J = 125^\circ\text{C}$		0.73		
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0 \text{ V}$ , $dI_S/dt = 300 \text{ A}/\mu\text{s}$ , $I_S = 24 \text{ A}$			42		ns
Reverse Recovery Charge	$Q_{RR}$				177		
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0 \text{ V}$ , $dI_S/dt = 1000 \text{ A}/\mu\text{s}$ , $I_S = 24 \text{ A}$			33		ns
Reverse Recovery Charge	$Q_{RR}$				411		

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

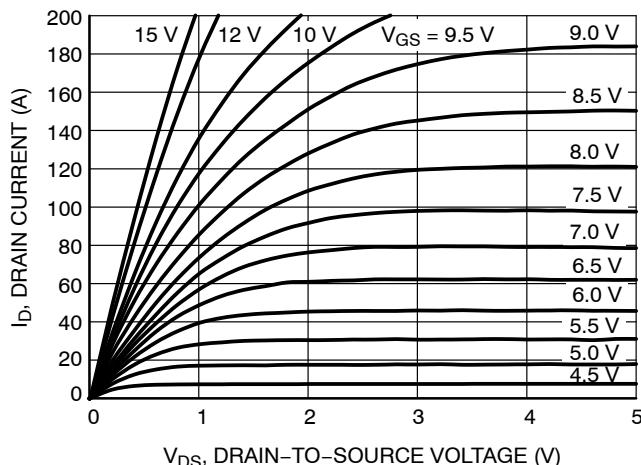


Figure 1. On-Region Characteristics

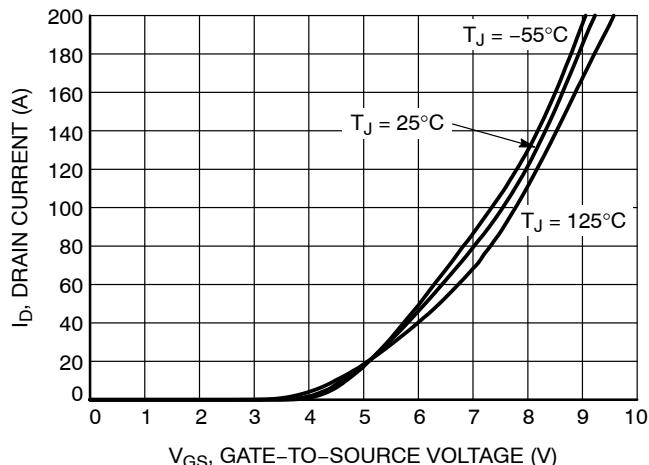


Figure 2. Transfer Characteristics

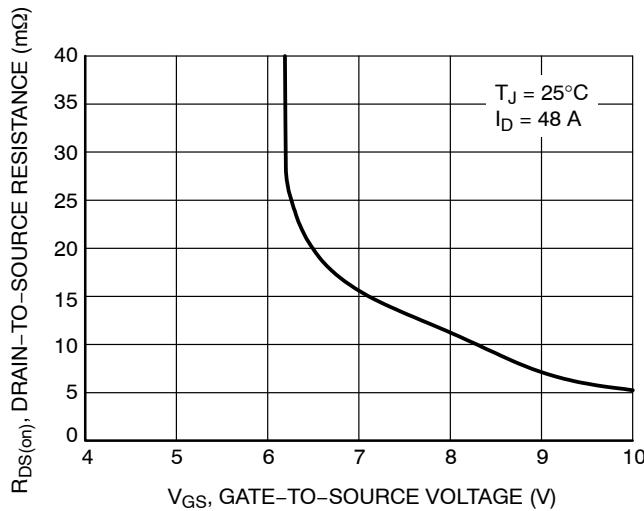


Figure 3. On-Resistance vs. Gate-to-Source Voltage

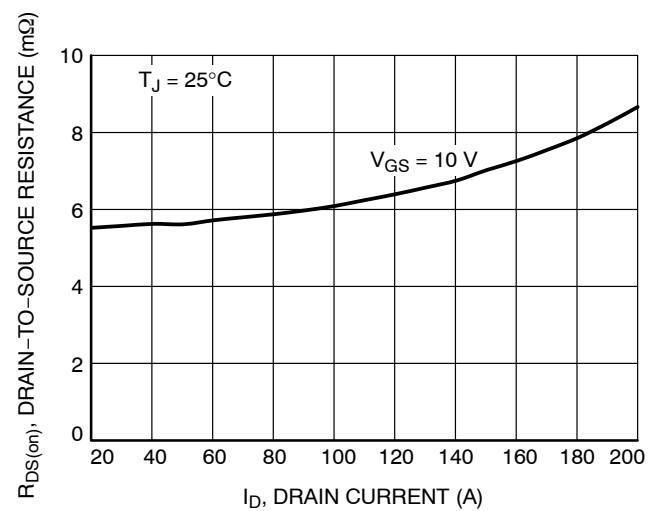


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

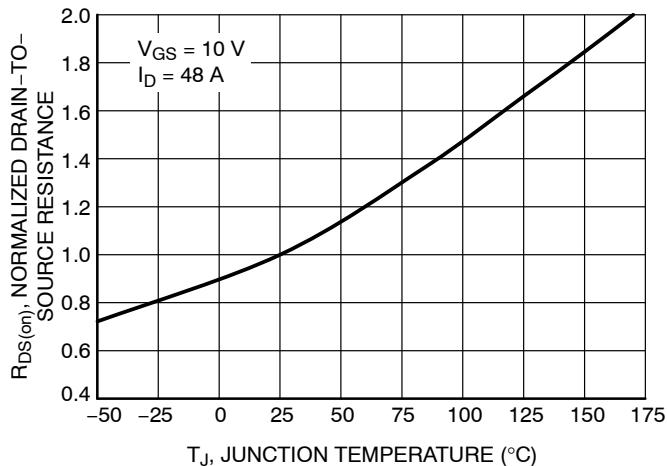


Figure 5. On-Resistance Variation with Temperature

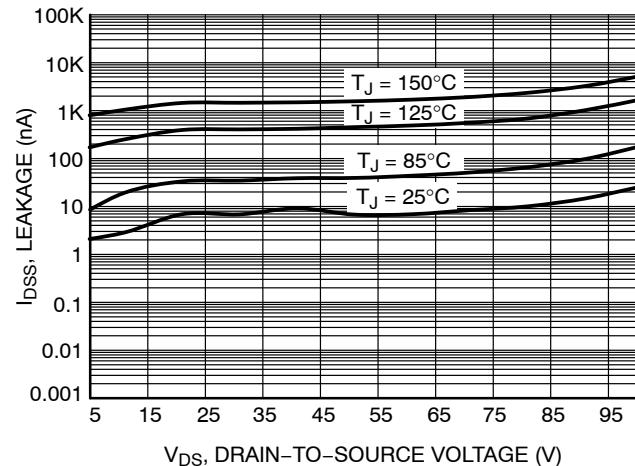


Figure 6. Drain-to-Source Leakage Current vs. Voltage

## TYPICAL CHARACTERISTICS

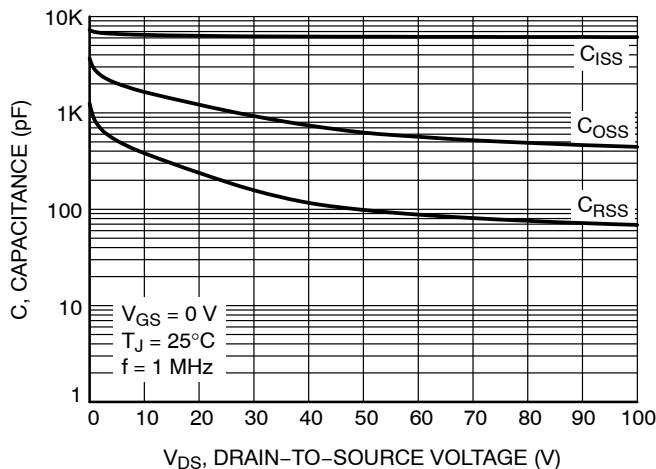


Figure 7. Capacitance Variation

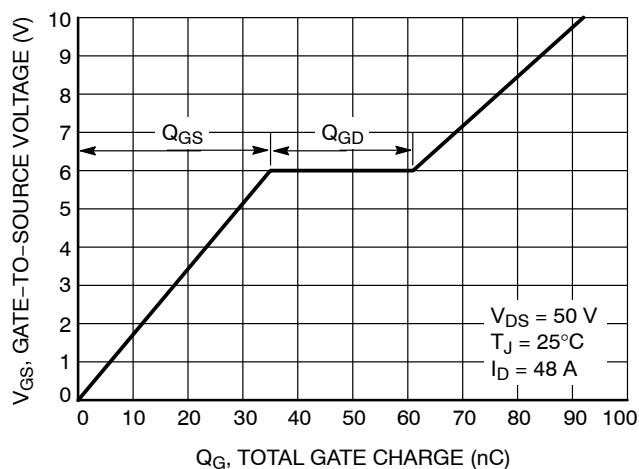


Figure 8. Gate-to-Source Voltage vs. Total Charge

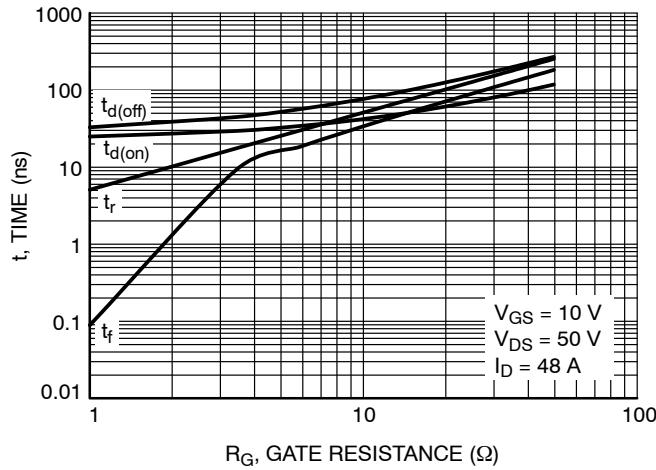


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

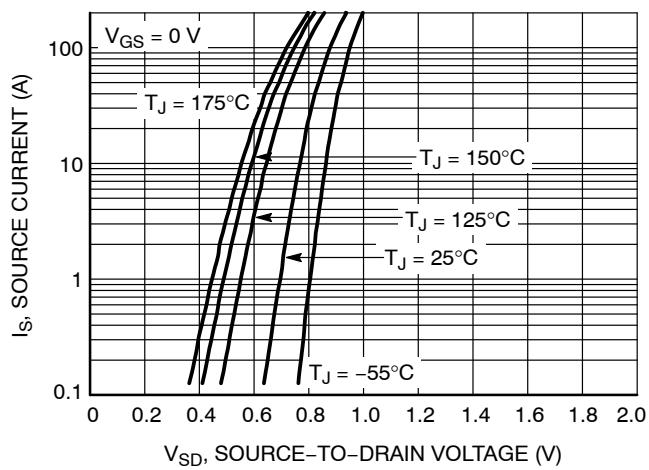


Figure 10. Diode Forward Voltage vs. Current

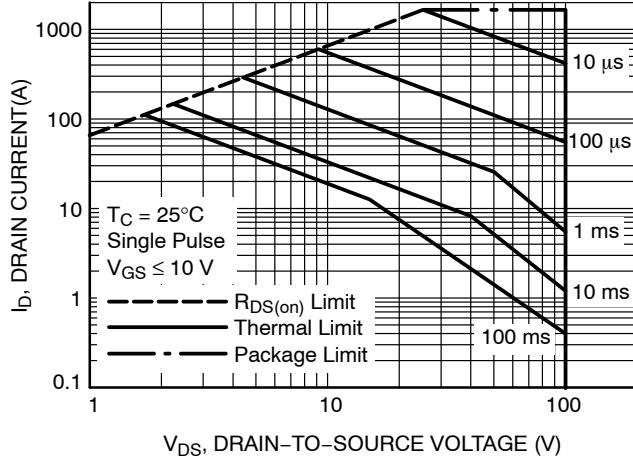
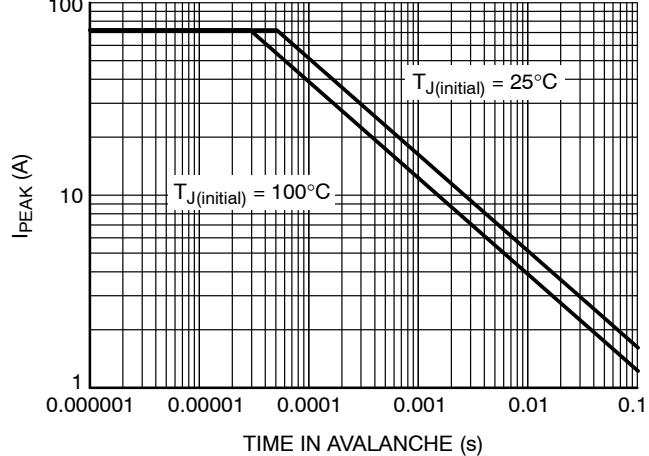
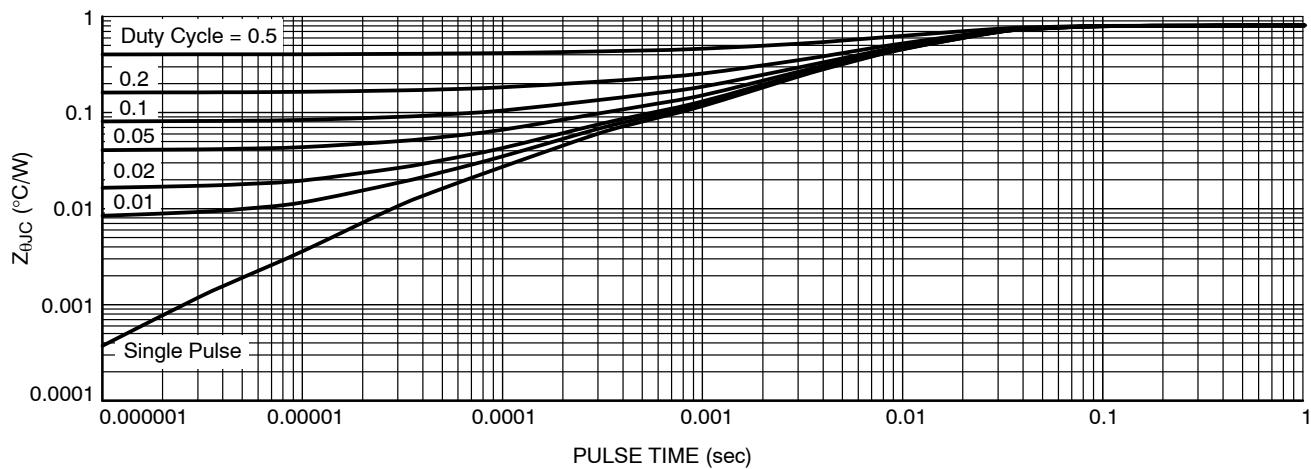


Figure 11. Maximum Rated Forward Biased Safe Operating Area

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

# NTMFS7D8N10G

## TYPICAL CHARACTERISTICS



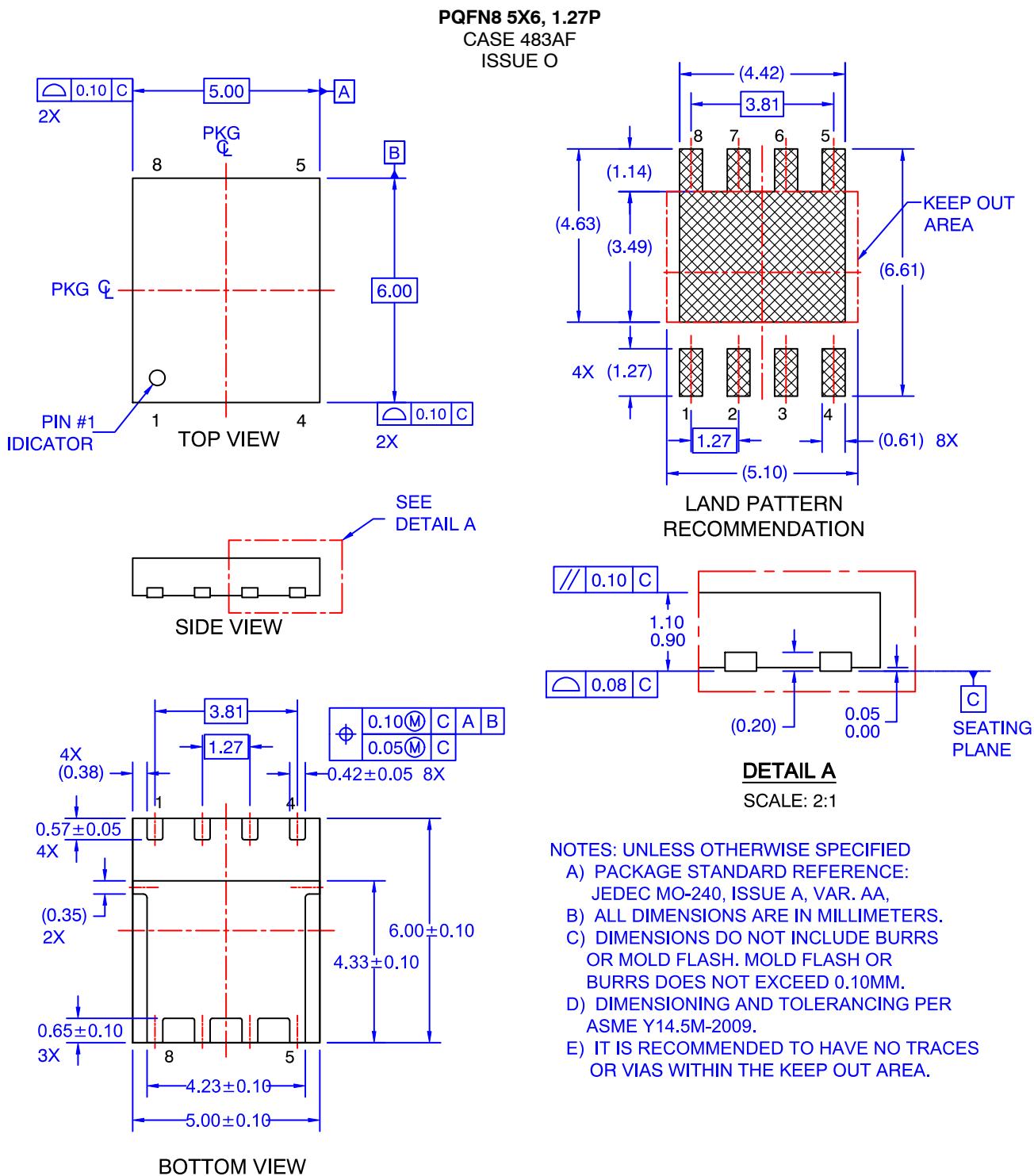
**Figure 13. Thermal Characteristics**

## ORDERING INFORMATION

Device	Device Marking	Package	Shipping <sup>†</sup>
NTMFS7D8N10G	7D8N10	PQFN8 5x6 (Pb-Free/Halogen Free)	3000 / Tape & Reel

<sup>†</sup>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.

## PACKAGE DIMENSIONS



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](http://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](mailto:orderlit@onsemi.com)

ON Semiconductor 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