

# 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)

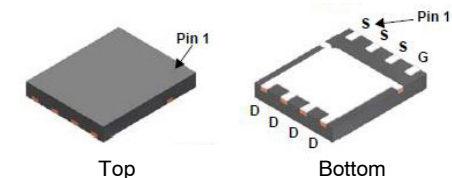
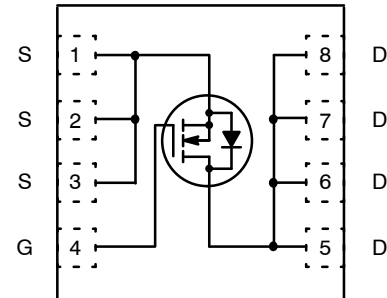
Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			$V_{DSS}$	100	V
Gate-to-Source Voltage			$V_{GS}$	$\pm 20$	V
Continuous Drain Current $R_{\theta JC}$ (Note 2)	Steady State	$T_C = 25^{\circ}\text{C}$	$I_D$	110	A
Power Dissipation $R_{\theta JC}$ (Note 2)			$P_D$	187	W
Continuous Drain Current $R_{\theta JA}$ (Note 1, 2)	Steady State	$T_A = 25^{\circ}\text{C}$	$I_D$	14	A
Power Dissipation $R_{\theta JA}$ (Note 1, 2)			$P_D$	3	W
Pulsed Drain Current	$T_A = 25^{\circ}\text{C}$ , $t_p = 10\text{ }\mu\text{s}$		$I_{DM}$	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.

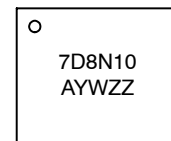
$V_{SSS}$	$R_{SS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
100 V	7.6 mΩ @ 10 V	110 A

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

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

### ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 254\text{ }\mu\text{A}$	2.0		4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)} / T_J$	$I_D = 254\text{ }\mu\text{A}$ , ref to $25^\circ\text{C}$		-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	m $\Omega$
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		$\Omega$

### 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	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DS} = 50\text{ V}, I_D = 48\text{ A}, R_G = 4.7\text{ }\Omega$		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			nC
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			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.

# NTMFS7D8N10G

## TYPICAL CHARACTERISTICS

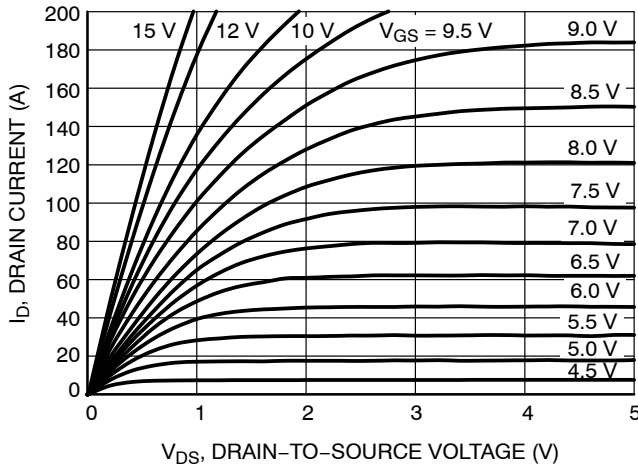


Figure 1. On-Region Characteristics

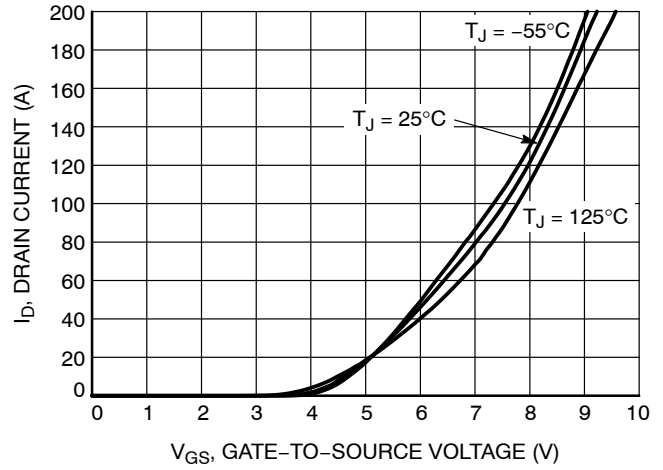


Figure 2. Transfer Characteristics

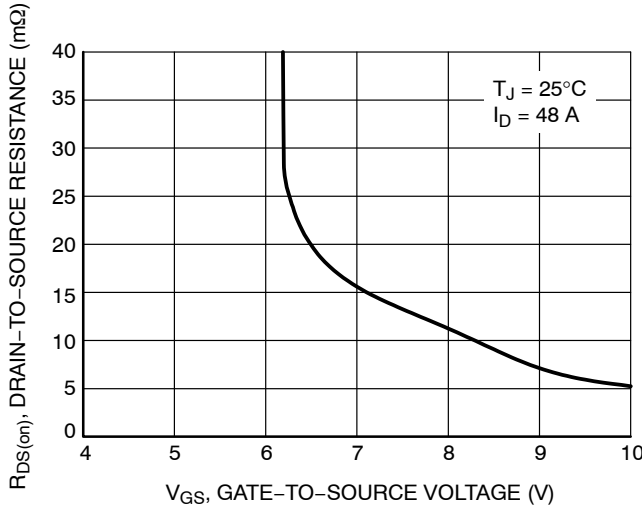


Figure 3. On-Resistance vs. Gate-to-Source Voltage

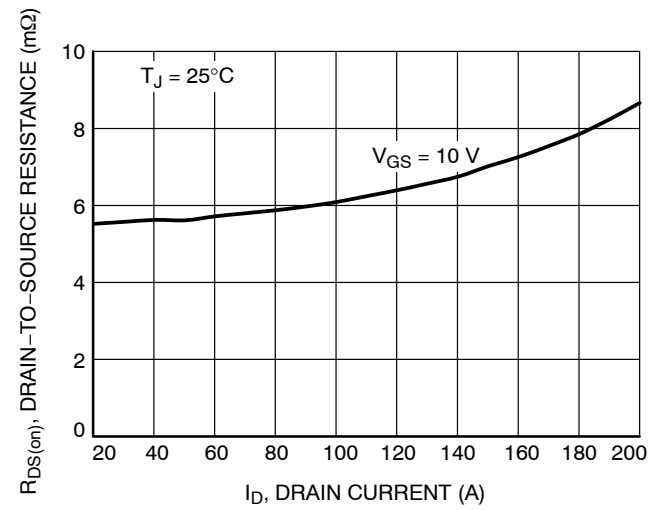


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

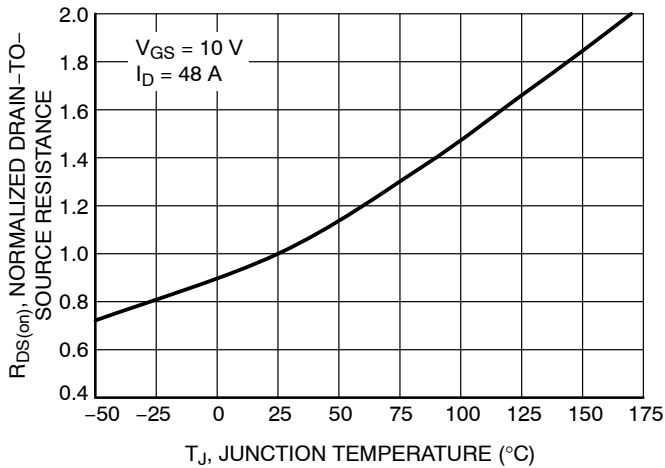


Figure 5. On-Resistance Variation with Temperature

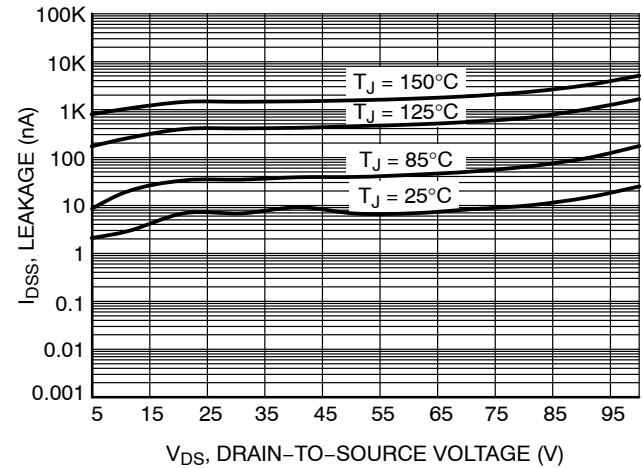


Figure 6. Drain-to-Source Leakage Current vs. Voltage

# NTMFS7D8N10G

## TYPICAL CHARACTERISTICS

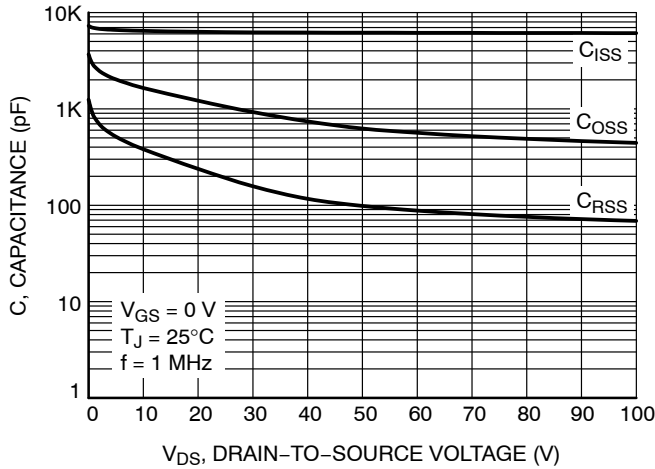


Figure 7. Capacitance Variation

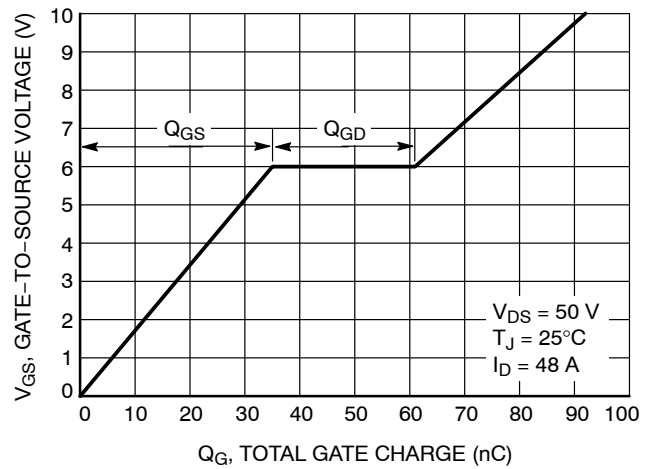


Figure 8. Gate-to-Source Voltage vs. Total Charge

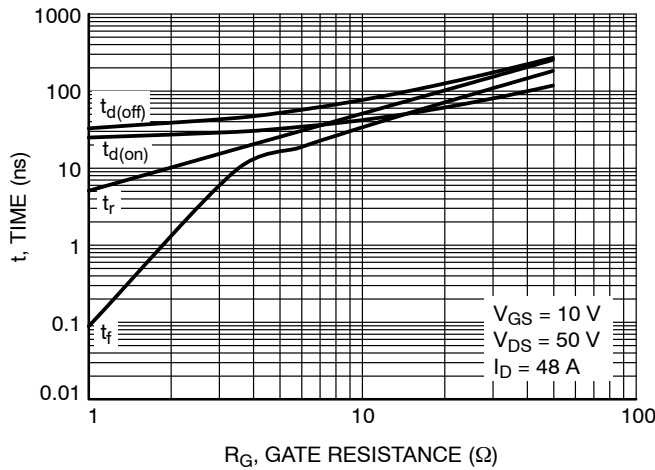


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

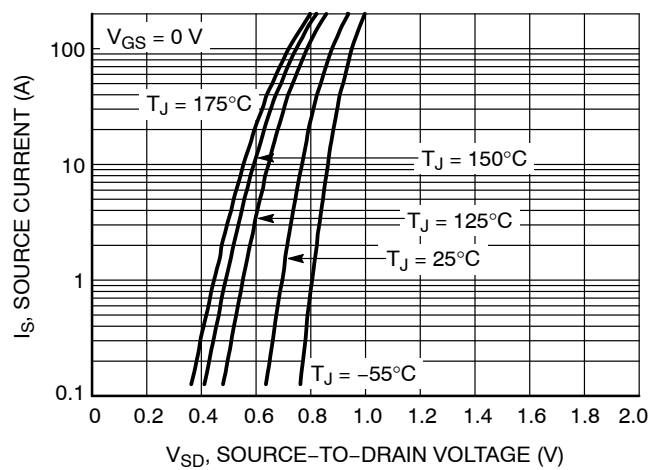


Figure 10. Diode Forward Voltage vs. Current

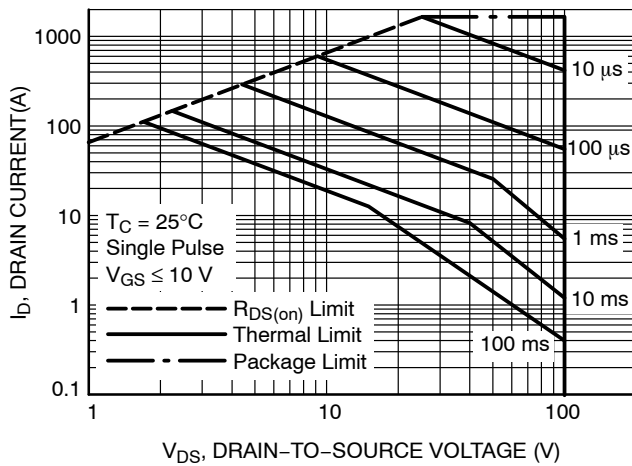


Figure 11. Maximum Rated Forward Biased Safe Operating Area

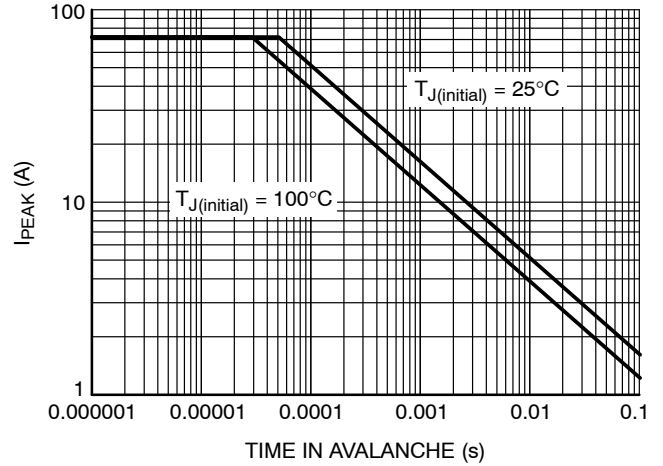
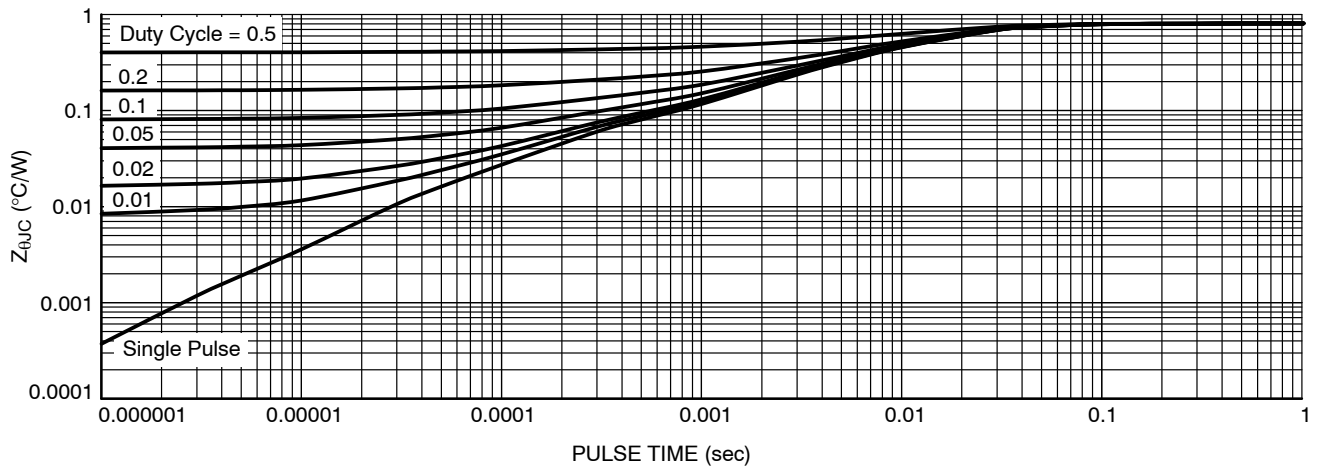


Figure 12.  $I_{PEAK}$  vs. Time in Avalanche

# NTMFS7D8N10G

## TYPICAL CHARACTERISTICS

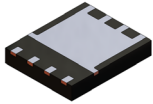


**Figure 13. Thermal Characteristics**

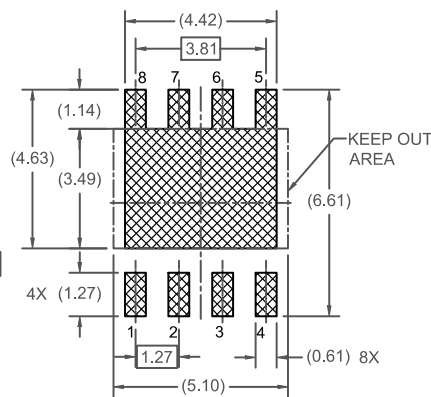
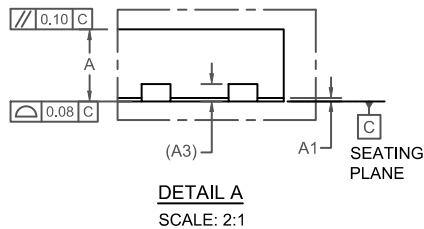
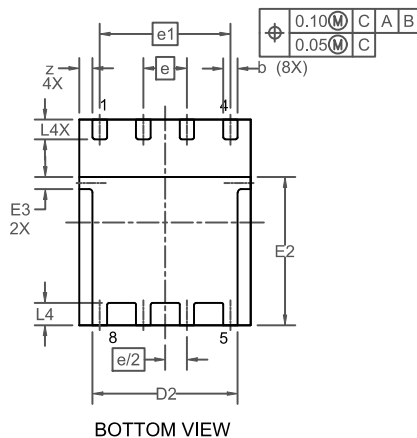
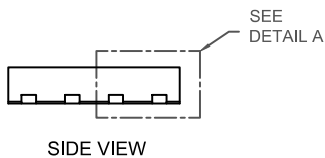
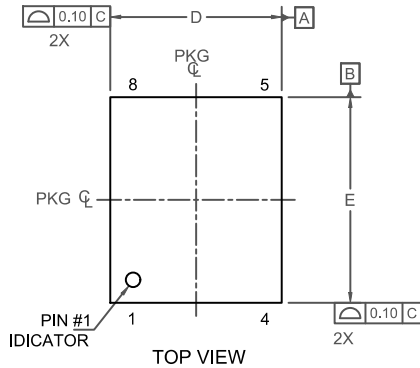
## ORDERING INFORMATION

Device	Device Marking	Package	Shipping <sup>†</sup>
NTMFS7D8N10GTWG	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.


**PQFN8 5X6, 1.27P**  
**CASE 483AF**  
**ISSUE A**

DATE 06 JUL 2021


**LAND PATTERN**  
**RECOMMENDATION**

\*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERM/D.

NOTES: UNLESS OTHERWISE SPECIFIED

- A) PACKAGE STANDARD REFERENCE:  
JEDEC MO-240, ISSUE A, VAR. AA,  
B) ALL DIMENSIONS ARE IN MILLIMETERS.  
C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.  
D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.  
E) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	-	0.05
A3	0.20 REF.		
b	0.37	0.42	0.47
D	4.90	5.00	5.10
D2	4.13	4.23	4.33
E	5.90	6.00	6.10
E2	4.23	4.33	4.43
E3	0.35 REF.		
e	1.27 BSC		
e/2	0.635 BSC		
e1	3.81 BSC		
L	0.52	0.57	0.62
L4	0.55	0.65	0.75
z	0.38 REF		

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