

# MOSFET – Single N-Channel

**60 V, 3.9 mΩ, 103 A**

## NTTFS3D7N06HL

**Features**

- Max  $R_{DS(on)} = 3.9 \text{ m}\Omega$  at  $V_{GS} = 10 \text{ V}$ ,  $I_D = 23 \text{ A}$
- Max  $R_{DS(on)} = 5.2 \text{ m}\Omega$  at  $V_{GS} = 4.5 \text{ V}$ ,  $I_D = 18 \text{ A}$
- High Performance Technology for Extremely Low  $R_{DS(on)}$
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

**Typical Applications**

- DC-DC Buck Converters
- Point of Load
- High Efficiency Load Switch and Low Side Switching
- O-ring FET

**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		$V_{GS}$	$\pm 20$	V	
Continuous Drain Current $R_{\theta JC}$ (Note 1)	Steady State	$T_C = 25^\circ\text{C}$	$I_D$	103	A
Power Dissipation $R_{\theta JC}$ (Note 1)			$P_D$	83	W
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	16	A
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)			$P_D$	2.2	W
Pulsed Drain Current	$T_A = 25^\circ\text{C}$ , $t_p = 10 \mu\text{s}$	$I_{DM}$	658	A	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$	
Source Current (Body Diode)		$I_S$	69	A	
Single Pulse Drain-to-Source Avalanche Energy ( $I_{AV} = 40 \text{ A}$ , $L = 0.1 \text{ mH}$ ) (Note 3)		$E_{AS}$	80	mJ	
Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260	$^\circ\text{C}$	

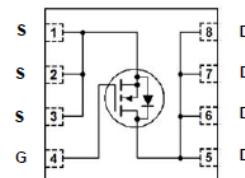
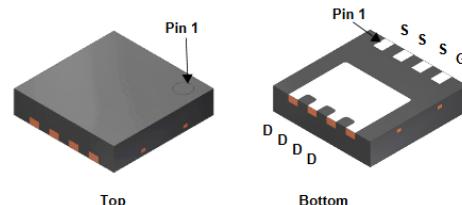
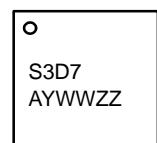
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

**THERMAL RESISTANCE RATINGS**

Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State (Note 1)	$R_{\theta JC}$	1.5	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	54.8	

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. Surface-mounted on FR4 board using 1 in<sup>2</sup> pad size, 1 oz. Cu pad.
3.  $E_{AS}$  of 80 mJ is based on started  $T_J = 25^\circ\text{C}$ ,  $I_{AS} = 40 \text{ A}$ ,  $V_{DD} = 60 \text{ V}$ ,  $V_{GS} = 10 \text{ V}$ . 100% test at  $I_{AS} = 40 \text{ A}$ .

$V_{(BR)DSS}$	$R_{DS(\text{ON}) \text{ MAX}}$	$I_D \text{ MAX}$
60 V	3.9 mΩ @ 10 V	103 A
	5.2 mΩ @ 4.5 V	

**N-CHANNEL MOSFET****WDFN8  
3.3X3.3, 0.65P  
CASE 483AW****MARKING DIAGRAM**

S3D7 = Specific Device Code  
A = Assembly Plant Code  
Y = Numeric Year Code  
WW = Work Week Code  
ZZ = Assembly Lot Code

**ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
NTTFS3D7N06HTWG	WDFN8 (Pb-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 Specification Brochure, [BRD8011/D](#).

# NTTFS3D7N06HL

**ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

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

Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}, I_D = 250 \mu\text{A}$		60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(\text{BR})\text{DSS}}/T_J$	$I_D = 250 \mu\text{A}$ , ref to $25^\circ\text{C}$			38.84		$\text{mV}/^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}, V_{\text{DS}} = 60 \text{ V}$	$T_J = 25^\circ\text{C}$		10		$\mu\text{A}$
			$T_J = 125^\circ\text{C}$			100	
Gate-to-Source Leakage Current	$I_{\text{GSS}}$	$V_{\text{DS}} = 0 \text{ V}, V_{\text{GS}} = 20 \text{ V}$				$\pm 100$	nA

## ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{GS}} = V_{\text{DS}}, I_D = 120 \mu\text{A}$	1.2		2.0		V
Threshold Temperature Coefficient	$V_{\text{GS}(\text{TH})}/T_J$	$I_D = 120 \mu\text{A}$ , ref to $25^\circ\text{C}$		-4.83			$\text{mV}/^\circ\text{C}$
Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10 \text{ V}, I_D = 23 \text{ A}$		3.2	3.9		$\text{m}\Omega$
		$V_{\text{GS}} = 4.5 \text{ V}, I_D = 18 \text{ A}$		4.1	5.2		
Forward Transconductance	$g_{\text{FS}}$	$V_{\text{DS}} = 15 \text{ V}, I_D = 23 \text{ A}$		170			S
Gate-Resistance	$R_G$	$T_A = 25^\circ\text{C}$		1			$\Omega$

## CHARGES & CAPACITANCES

Input Capacitance	$C_{\text{ISS}}$	$V_{\text{GS}} = 0 \text{ V}, f = 1 \text{ MHz}, V_{\text{DS}} = 30 \text{ V}$		2383		pF
Output Capacitance	$C_{\text{OSS}}$			400		
Reverse Transfer Capacitance	$C_{\text{RSS}}$			11.7		
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = 10 \text{ V}, V_{\text{DS}} = 48 \text{ V}, I_D = 11.5 \text{ A}$		32.7		nC
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = 4.5 \text{ V}, V_{\text{DS}} = 48 \text{ V}, I_D = 11.5 \text{ A}$		15.1		nC
Gate-to-Source Charge	$Q_{\text{GS}}$			5.5		
Gate-to-Drain Charge	$Q_{\text{GD}}$			3.3		
Plateau Voltage	$V_{\text{GP}}$			2.5		V

## SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$t_{\text{d}(\text{ON})}$	$V_{\text{GS}} = 4.5 \text{ V}, V_{\text{DS}} = 48 \text{ V}, I_D = 11.5 \text{ A}, R_G = 2.5 \Omega$		15.6		ns
Rise Time	$t_r$			8.4		
Turn-Off Delay Time	$t_{\text{d}(\text{OFF})}$			24.3		
Fall Time	$t_f$			6.2		

## DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{\text{SD}}$	$V_{\text{GS}} = 0 \text{ V}, I_S = 23 \text{ A}$	$T_J = 25^\circ\text{C}$		0.8	1.2	V
			$T_J = 125^\circ\text{C}$		0.7		
Reverse Recovery Time	$t_{\text{RR}}$	$V_{\text{GS}} = 0 \text{ V}, dI_S/dt = 100 \text{ A}/\mu\text{s}, I_S = 11.5 \text{ A}$			39		ns
					28		
Reverse Recovery Charge	$Q_{\text{RR}}$	$V_{\text{GS}} = 0 \text{ V}, dI_S/dt = 100 \text{ A}/\mu\text{s}, I_S = 11.5 \text{ A}$			21		nC
					16		
Charge Time	$t_a$	$V_{\text{GS}} = 0 \text{ V}, dI_S/dt = 100 \text{ A}/\mu\text{s}, I_S = 11.5 \text{ A}$			21		ns
Discharge Time	$t_b$				16		

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.

4. Switching characteristics are independent of operating junction temperatures

5. As an N-ch device, the negative  $V_{\text{GS}}$  rating is for low duty cycle pulse occurrence only. No continuous rating is implied.

## TYPICAL CHARACTERISTICS

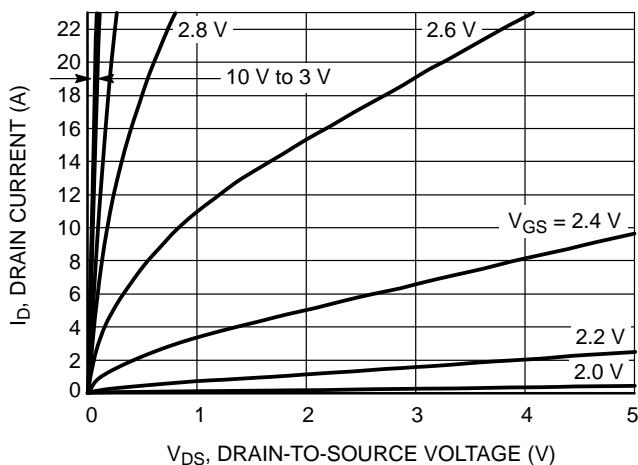


Figure 1. On-Region Characteristics

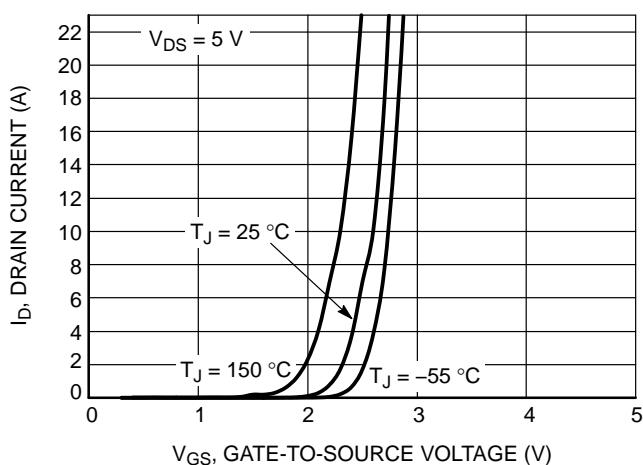


Figure 2. Transfer Characteristics

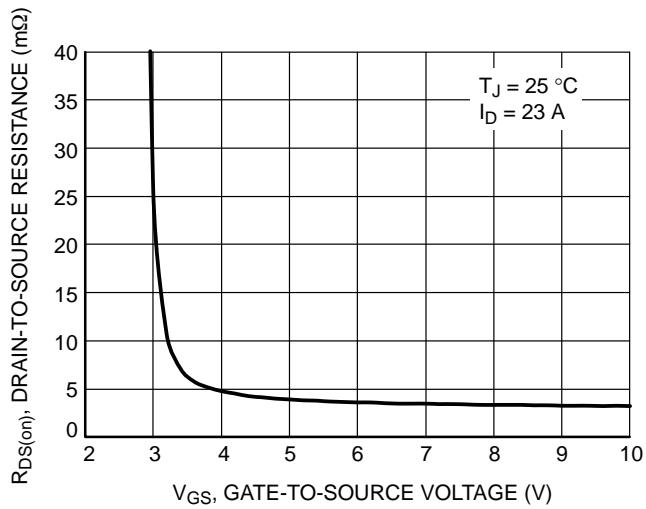


Figure 3. On-Resistance vs. Gate-to-Source Voltage

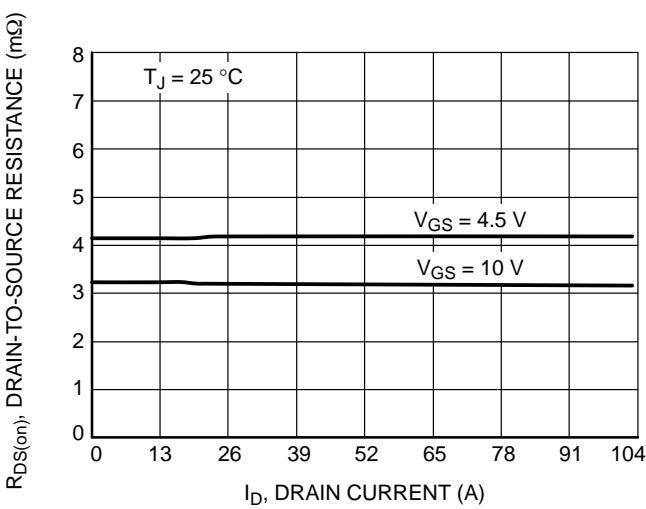


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

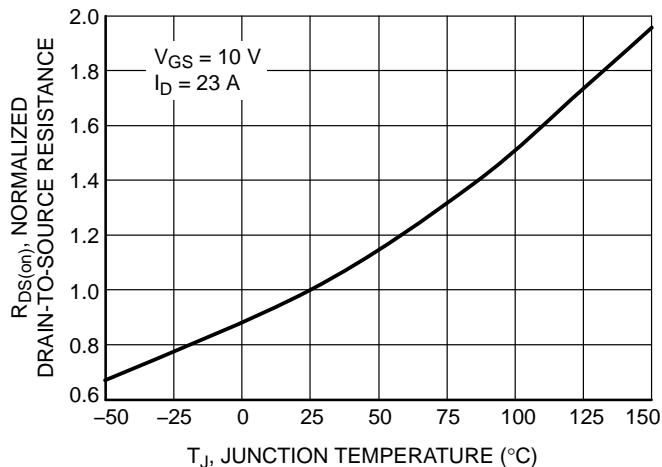


Figure 5. On-Resistance Variation with Temperature

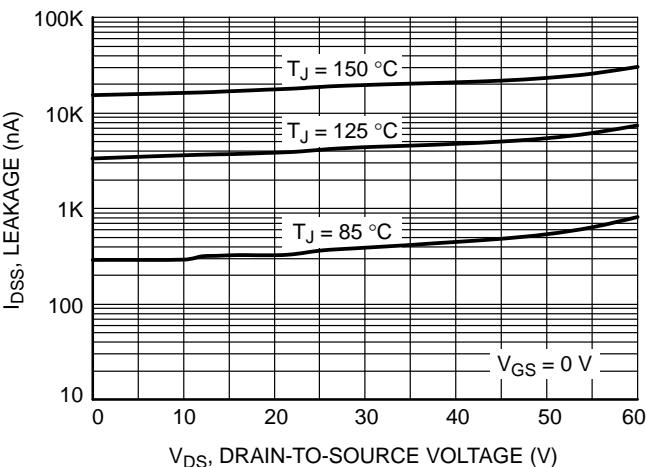
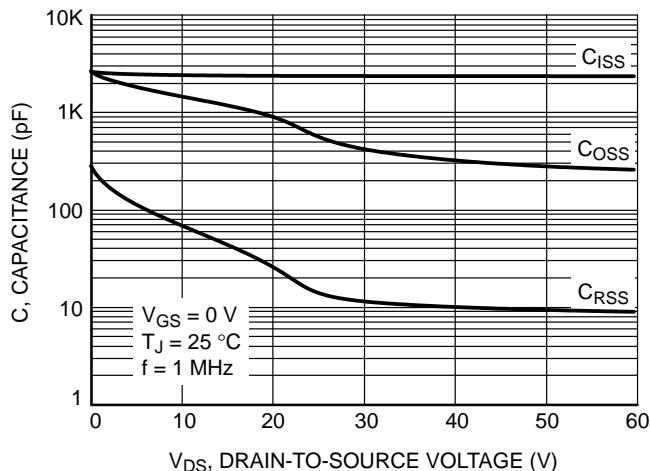
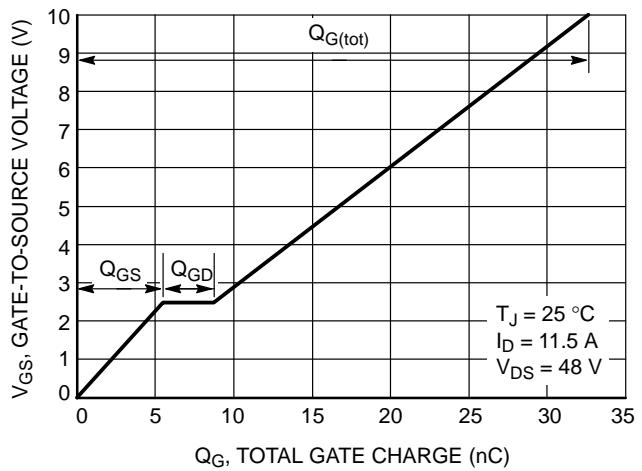


Figure 6. Drain-to-Source Leakage Current vs. Voltage

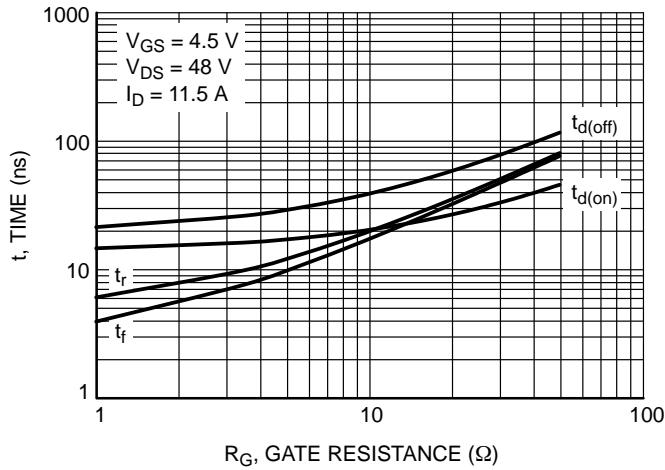
## TYPICAL CHARACTERISTICS



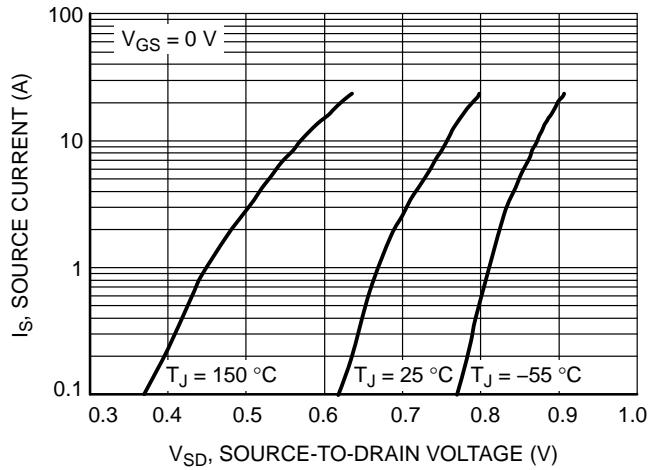
**Figure 7. Capacitance Variation**



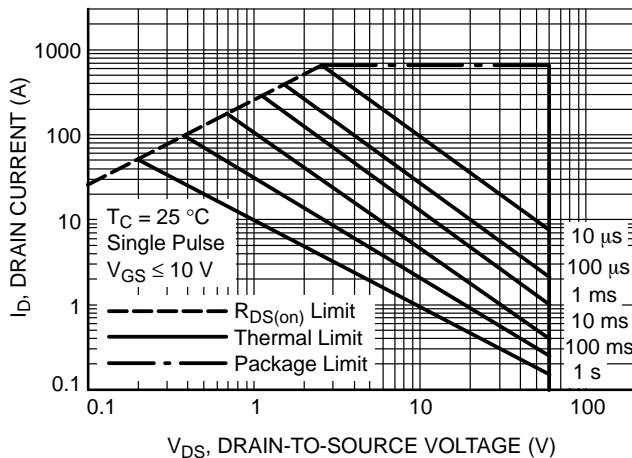
**Figure 8. Gate-to-Source Voltage vs. Total Charge**



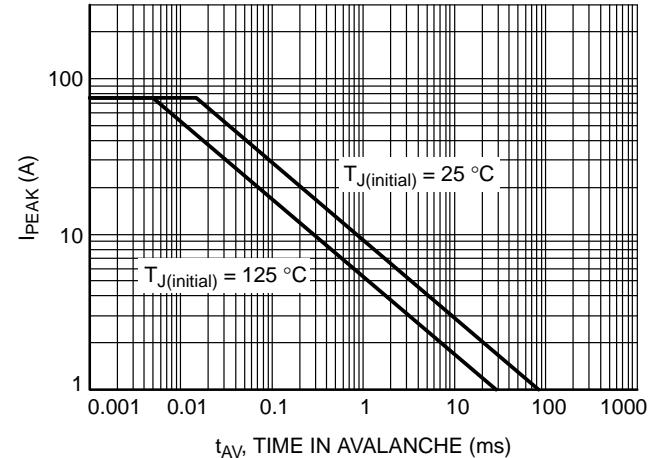
**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**



**Figure 10. Diode Forward Voltage vs. Current**



**Figure 11. Maximum Rated Forward Biased Safe Operating Area**



**Figure 12. Maximum Drain Current vs. Time in Avalanche**

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## TYPICAL CHARACTERISTICS

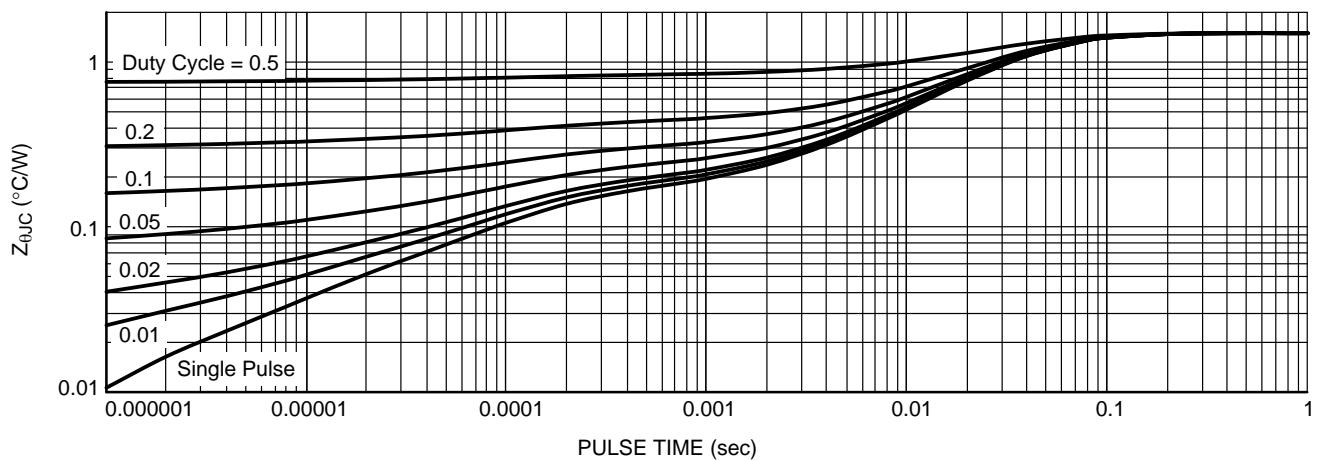


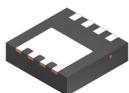
Figure 13. Transient Thermal Impedance

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## REVISION HISTORY

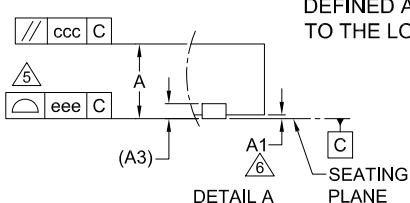
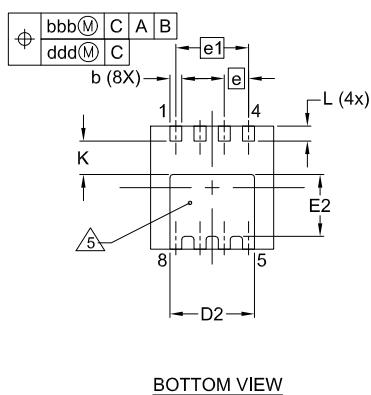
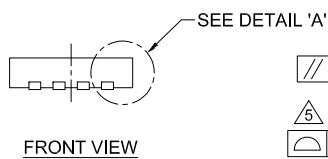
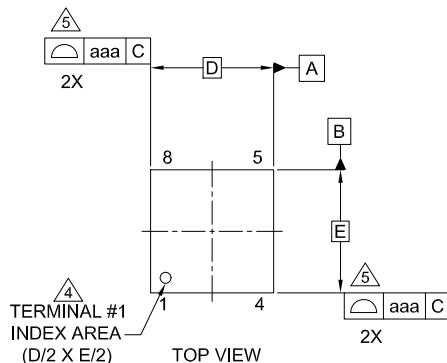
Revision	Description of Changes	Date
3	Rebranded the Data Sheet to <b>onsemi</b> format.	10/17/2025

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

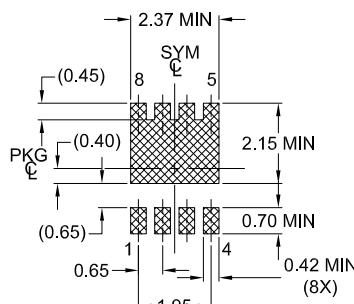


**WDFN8 3.30x3.30x0.75, 0.65P**  
CASE 483AW  
ISSUE B

DATE 22 MAR 2024



#### 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, SOLDERRM/D.

#### GENERIC MARKING DIAGRAM\*



XXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week

\*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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DESCRIPTION:	WDFN8 3.30x3.30x0.75, 0.65P	PAGE 1 OF 1

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