

MOSFET – Power, Single N-Channel, Logic Level, DUAL COOL[®], DFN8 5x6

40 V, 0.5 mΩ, 455 A

Preliminary Document NTMFSCHT0D5N04XL

Features

- Advanced Dual-Side Cool Package with Enhanced Heat-Dissipation Molding Compound
- Low $R_{DS(on)}$ to Minimize Conduction Loss
- Low Q_{RR} with Soft Recovery to Minimize E_{RR} Loss and Voltage Spike
- Low Q_G and Capacitance to Minimize Driving and Switching Loss
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Power Supply Unit (PSU)
- DC/DC Intermediated Bus Converter
- Synchronous Rectification

MAXIMUM RATINGS ($T_C = 25\text{ }^{\circ}\text{C}$ unless otherwise stated)

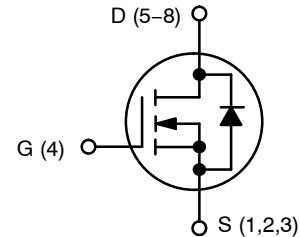
Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DSS}	40	V
Gate-to-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current $R_{\theta JC}$ (Note 2)	$T_C = 25\text{ }^{\circ}\text{C}$	I_D	455	A
	$T_C = 100\text{ }^{\circ}\text{C}$		322	
Power Dissipation $R_{\theta JC}$ (Note 2)	$T_C = 25\text{ }^{\circ}\text{C}$	P_D	194	W
	$T_C = 100\text{ }^{\circ}\text{C}$		97.3	
Pulsed Drain Current	$T_C = 25\text{ }^{\circ}\text{C}$, $t_p = 100\text{ }\mu\text{s}$	I_{DM}	2474	A
Pulsed Sourced Current (Body Diode)		I_{SM}	2474	
Operating Junction and Storage Temperature Range		T_J , T_{STG}	-55 to +175	$^{\circ}\text{C}$
Source Current (Body Diode)	$T_C = 25\text{ }^{\circ}\text{C}$	I_S	306	A
Single Pulse Drain-to-Source Avalanche Energy ($I_{Lpk} = 94\text{ A}$) (Note 3)		E_{AS}	1325	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.

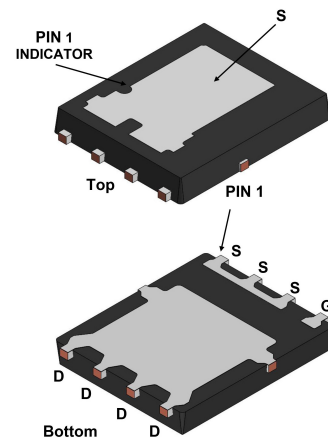
- Surface-mounted on FR4 board using 1 in² pad size, 1 oz Cu pad.
- The entire application environment impacts the thermal resistance values shown. They are not constants and are only valid for the particular conditions noted.
- E_{AS} of 1325 mJ is based on started $T_J = 25\text{ }^{\circ}\text{C}$, $I_{AS} = 94\text{ A}$, $V_{DD} = 32\text{ V}$, $V_{GS} = 10\text{ V}$, 100% avalanche tested.

$V_{(BR)DSS}$	$R_{DS(on)}\text{ MAX}$	$I_D\text{ MAX}$
40 V	0.5 mΩ @ 10 V*	455 A
	0.78 mΩ @ 4.5 V*	

* This is the target value. The current rating and maximum value will be addressed in the final data sheet.

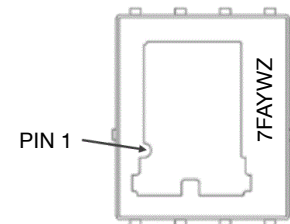


N-CHANNEL MOSFET



**DFN8
CASE 506EA**

MARKING DIAGRAM



7F = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
Z = Assembly Lot Code

ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 6 of this data sheet.

This Preliminary document is for informational purposes only. onsemi may update or withdraw it without notice. Content and referenced products are under development and subject to change.

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THERMAL CHARACTERISTICS

Parameter	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case, Bottom	$R_{\theta JCB}$	0.77	°C/W
Thermal Resistance, Junction-to-Case, Top	$R_{\theta JCT}$	0.78	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	39	

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	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$\Delta V_{(BR)DSS} / \Delta T_J$	$I_D = 1\text{ mA}$, referenced to 25°C		16.5		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 40\text{ V}$	$T_J = 25^\circ\text{C}$		10	μA
			$T_J = 125^\circ\text{C}$		100	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}$			100	nA

ON CHARACTERISTICS

Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 50\text{ A}, T_J = 25^\circ\text{C}$		0.39	0.49*	mΩ
		$V_{GS} = 4.5\text{ V}, I_D = 50\text{ A}, T_J = 25^\circ\text{C}$		0.54	0.78*	
		$V_{GS} = 6\text{ V}, I_D = 50\text{ A}, T_J = 25^\circ\text{C}$		0.43	0.56*	mΩ
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 330\text{ }\mu\text{A}, T_J = 25^\circ\text{C}$	1.3		2.2	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(TH)} / \Delta T_J$	$V_{GS} = V_{DS}, I_D = 330\text{ }\mu\text{A}$		-5.35		mV/°C
Forward Transconductance	g_{FS}	$V_{DS} = 5\text{ V}, I_D = 50\text{ A}$		277		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance (Note 4)	C_{ISS}	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}, f = 1\text{ MHz}$		9444	14170	pF
Output Capacitance (Note 4)	C_{OSS}			2468	3700	
Reverse Transfer Capacitance	C_{RSS}			38	76	
Output Charge (Note 4)	Q_{OSS}	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}$		95		nC
Total Gate Charge (Note 4)	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 20\text{ V}; I_D = 50\text{ A}$		57	86	
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 6\text{ V}, V_{DS} = 20\text{ V}; I_D = 50\text{ A}$		76	114	
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 10\text{ V}, V_{DS} = 20\text{ V}; I_D = 50\text{ A}$		127	191	
Threshold Gate Charge	$Q_{G(TH)}$			15		
Gate-to-Source Charge	Q_{GS}			27		
Gate-to-Drain Charge (Note 4)	Q_{GD}			9		
Gate Plateau Voltage (Note 4)	V_{GP}			2.8	0.82	
Gate Resistance (Note 4)	R_G	$f = 1\text{ MHz}$		0.48		Ω

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$t_{d(ON)}$	Resistive Load, $V_{GS} = 0/10\text{ V}, V_{DS} = 20\text{ V},$ $I_D = 50\text{ A}, R_G = 2.5\text{ }\Omega$		29		ns
Rise Time	t_r			8		
Turn-Off Delay Time	$t_{d(OFF)}$			78		
Fall Time	t_f			7		

DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V},$ $I_S = 50\text{ A}$	$T_J = 25^\circ\text{C}$		0.78	1.2	V
			$T_J = 125^\circ\text{C}$		0.63		

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
DIODE CHARACTERISTICS						
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V},$ $dI_S/dt = 300\text{ A}/\mu\text{s}, I_S = 50\text{ A}$		41		ns
Charge Time	t_a			22		
Discharge Time	t_b			18		
Reverse Recovery Charge	Q_{RR}			108		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.

* This is the target value. The current rating and maximum value will be addressed in the final data sheet.

4. Defined by design, not subject to production test.

TYPICAL CHARACTERISTICS

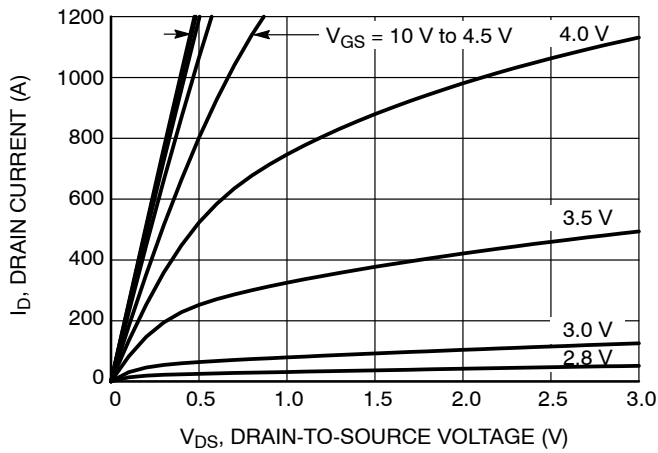


Figure 1. On-Region Characteristics

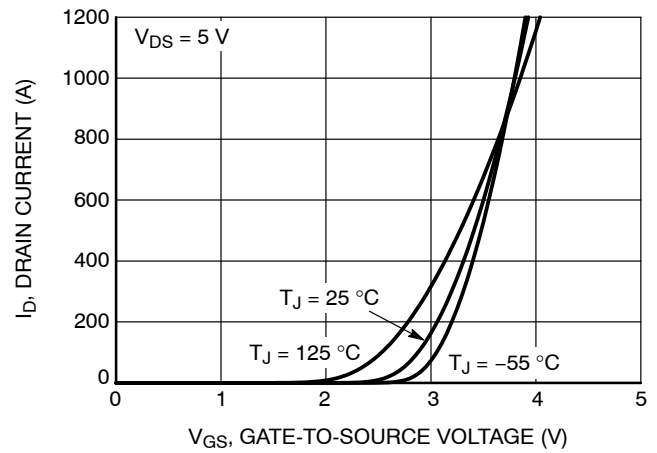


Figure 2. Transfer Characteristics

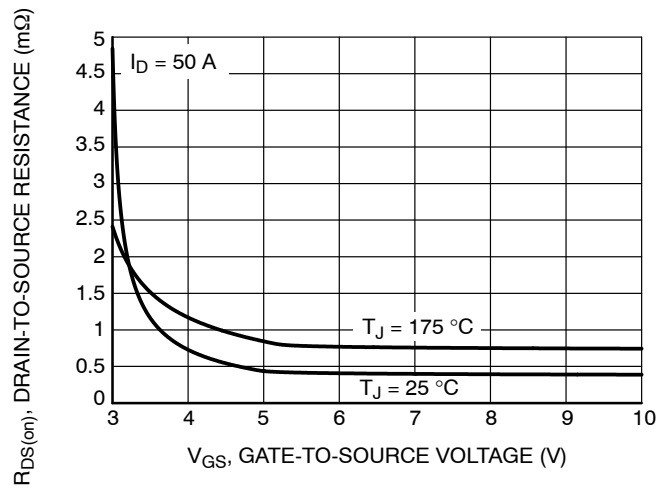


Figure 3. On-Resistance vs. Gate-to-Source Voltage

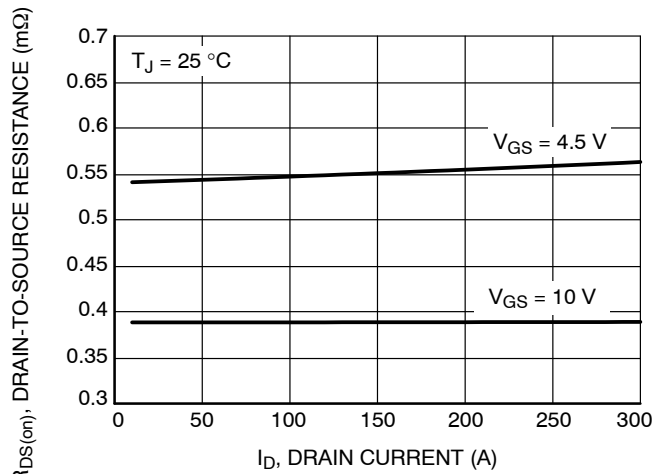


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

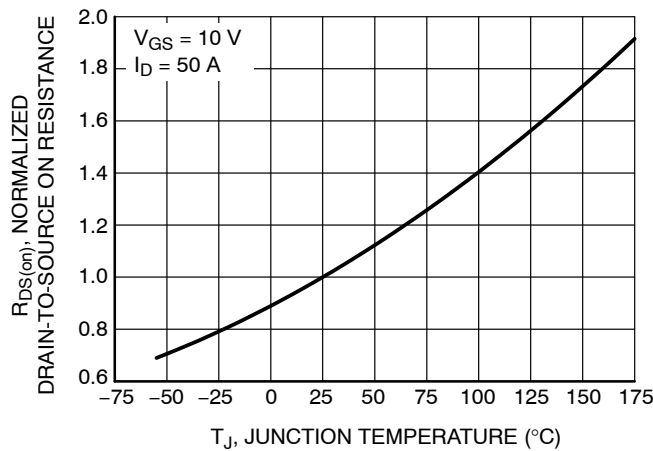


Figure 5. On-Resistance Variation with Temperature

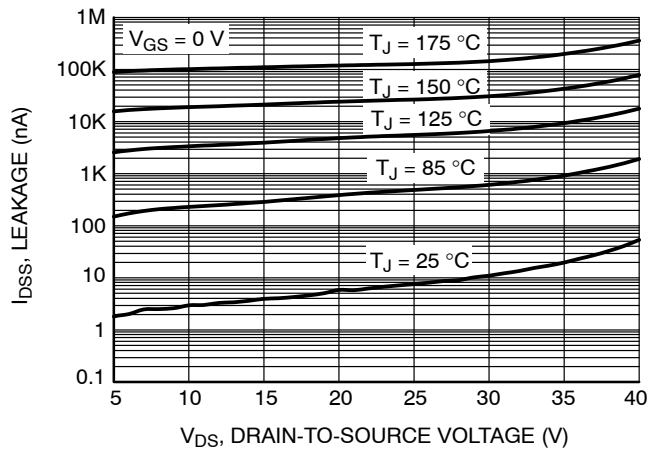


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS (continued)

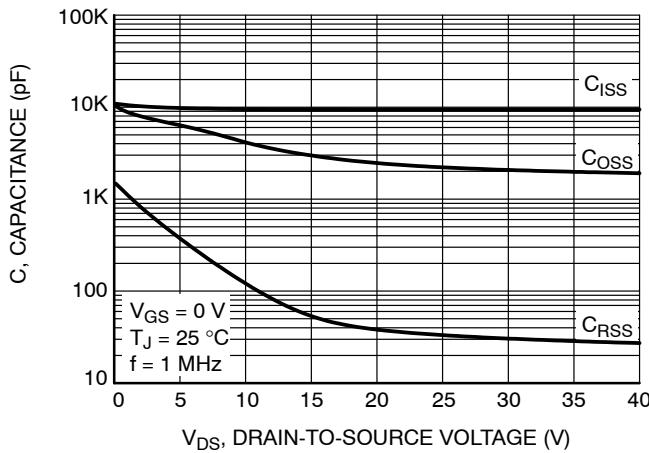


Figure 7. Capacitance Variation

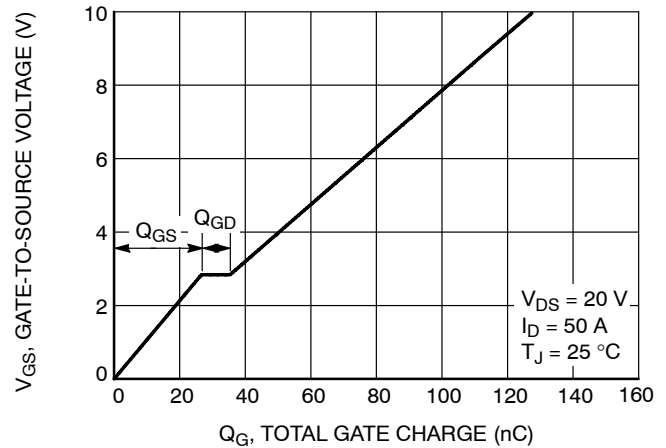


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

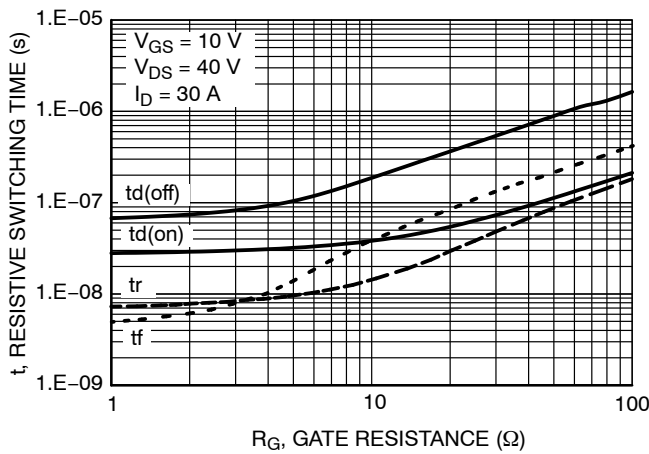


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

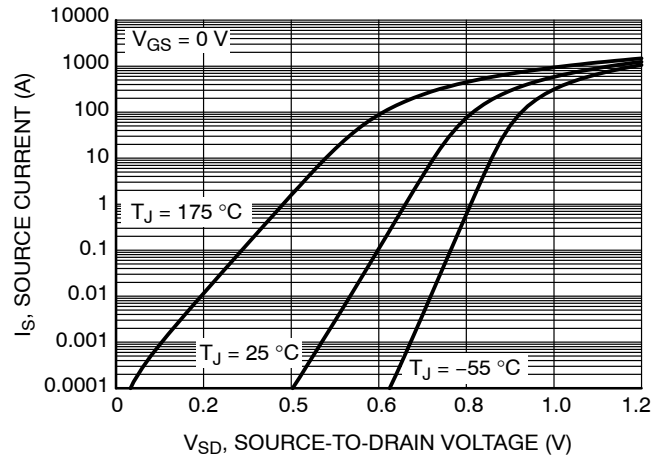


Figure 10. Diode Forward Voltage vs. Current

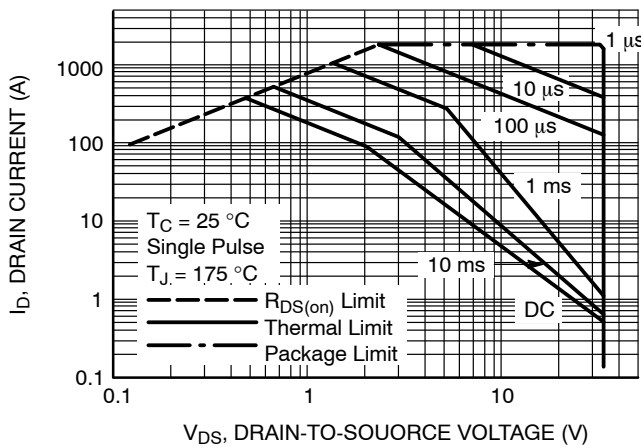


Figure 11. Safe Operating Area (SOA)

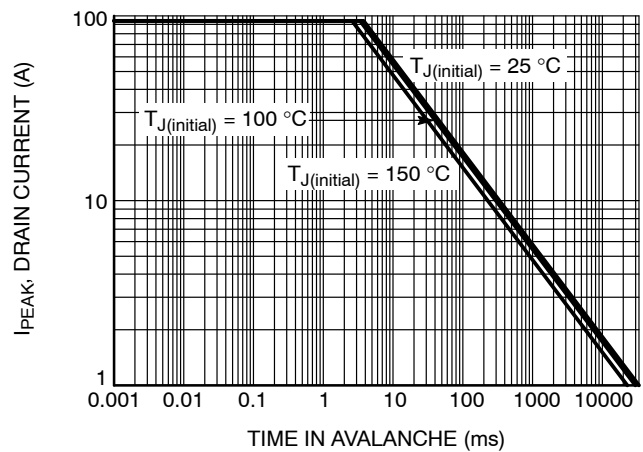


Figure 12. Avalanche Current vs. Pulse Time (UIS)

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TYPICAL CHARACTERISTICS (continued)

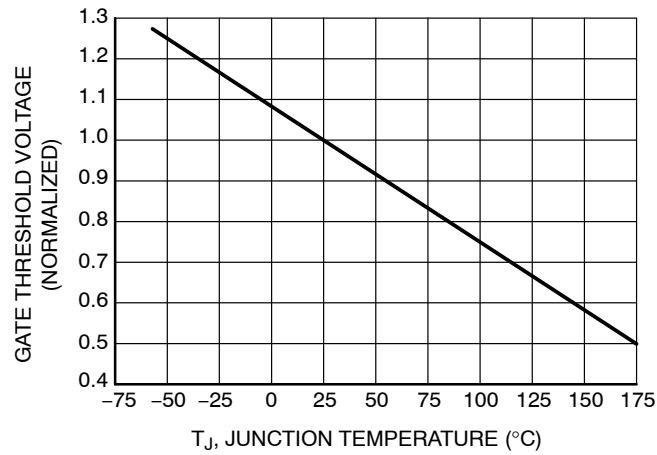


Figure 13. Gate Threshold Voltage vs. Junction Temperature

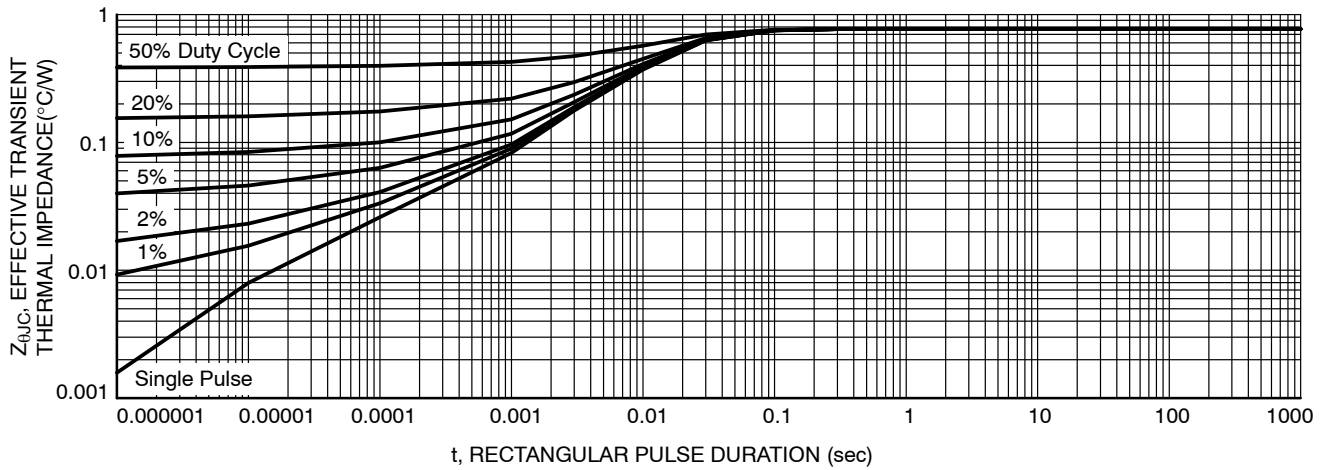


Figure 14. Thermal Characteristics

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NTMFSCHT0D5N04XLTWG	7F	DFN8 4.9x5.8x0.80 (Pb-Free/Halogen Free)	3000 / Tape & Reel

[†] 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](#).

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REVISION HISTORY

Revision	Description of Changes	Date
P0	Initial Product Preview Data Sheet release.	07/02/2025
P1	Revision to correct 3D drawing only.	07/22/2025
P2	Product Preview Data Sheet Release.	08/06/2025
P3	Revision to correct typo for $R_{DS(on)}$, 4.5 V_{GS} max value.	12/18/2025
P4	Revised Electrical Characteristics table: updated $R_{DS(on)}$, capacitance (C_{ISS} , C_{OSS} , C_{RSS}), and gate charge parameters; added $V_{GS} = 6$ V conditions; refined parameter values; and added Note 4. Replaced Figure 9. Updated OPN to NTMFSCHT0D5N04XLTWG.	7/3/2026

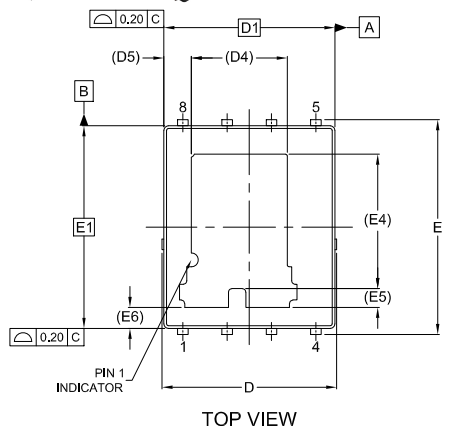
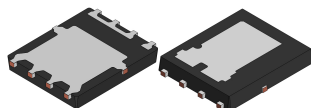
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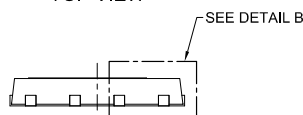
PACKAGE DIMENSIONS

DFN8 4.90x5.80x0.80, 1.27P
CASE 506EA
ISSUE O

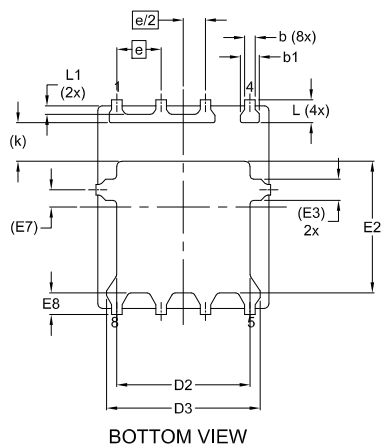
DATE 16 MAY 2025



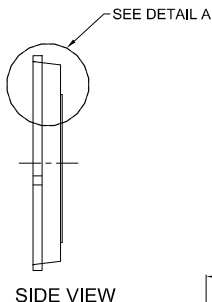
TOP VIEW



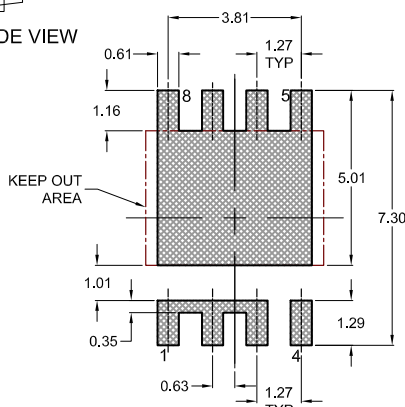
FRONT VIEW



BOTTOM VIEW

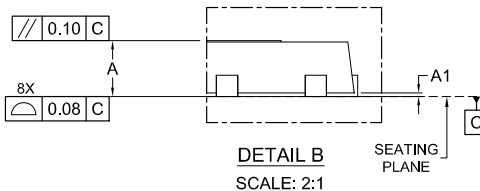


SIDE VIEW



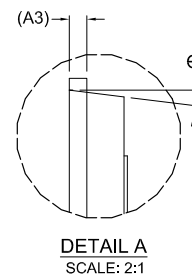
LAND PATTERN
RECOMMENDATION

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



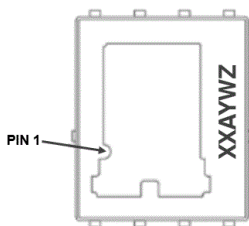
DETAIL B
SCALE: 2:1

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.75	0.80	0.85
A1	-	-	0.05
A3	0.25 REF		
b	0.21	0.31	0.41
b1	0.44	0.54	0.64
D	4.90	5.00	5.10
D1	4.90 BSC		
D2	3.72	3.82	3.92
D3	4.30	4.40	4.50
D4	2.75 REF		
D5	0.79 REF		
E	6.05	6.15	6.25
E1	5.80 BSC		
E2	3.67	3.77	3.87
E3	0.60 REF		
E4	3.85 REF		
E5	0.54 REF		
E6	0.60 REF		
E7	0.50 REF		
E8	0.52	0.62	0.72
e	1.27 BSC		
e/2	0.635 BSC		
k	1.10 REF		
L	0.56	0.66	0.76
L1	0.15	0.25	0.35
Θ	0°	---	7°



DETAIL A
SCALE: 2:1

GENERIC MARKING DIAGRAM*



XX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
Z = Assembly Lot Code

*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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