

MOSFET - Power, Single N-Channel, DFN8 5x6, DUAL COOL[®] GEN2 40 V, 0.40 mΩ, 529 A

NTMFSCH0D4N04XM

Features

- Advanced Dual-Sided Cooled Packaging with Lowest Junction to TOP Thermal Resistance
- Ultra Low $R_{DS(on)}$ to Minimize Conduction Losses
- MSL1 Robust Packaging Design
- These Devices are Pb-Free, Halogen Free, BFR Free and are RoHS Compliant

Applications

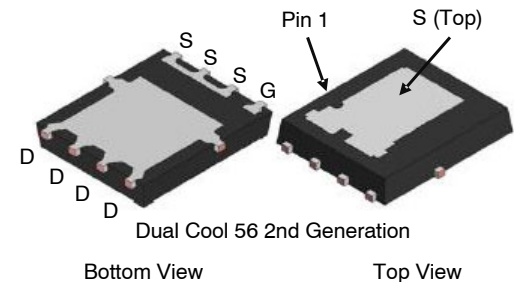
- Motor Drive
- Battery Protection
- ORing

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

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DSS}	40	V
Gate-to-Source Voltage	DC	V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^{\circ}\text{C}$	I_D	529	A
	$T_C = 100^{\circ}\text{C}$		374	
Power Dissipation	$T_C = 25^{\circ}\text{C}$	P_D	208	W
Pulsed Drain Current	$T_C = 25^{\circ}\text{C}$, $t_p = 10\text{ }\mu\text{s}$	I_{DM}	2873	A
Pulsed Source Current (Body Diode)		I_{SM}	2873	A
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	$^{\circ}\text{C}$
Source Current (Body Diode)		I_S	375	A
Single Pulse Avalanche Energy ($I_{PK} = 77.8\text{ A}$)		E_{AS}	907	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^{\circ}\text{C}$

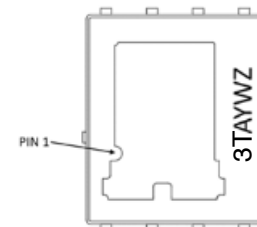
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
40 V	0.40 mΩ @ 10 V	529 A



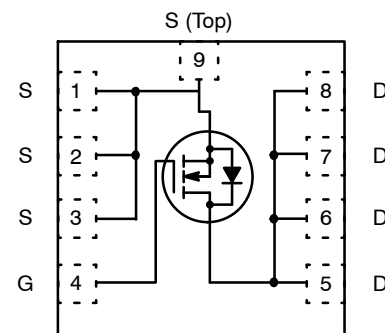
DUAL COOL
DFN8 5x6
CASE 506FF

MARKING DIAGRAM



3T = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
Z = Assembly Lot Code

N-Channel MOSFET



ORDERING INFORMATION

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

NTMF5CH0D4N04XM

THERMAL CHARACTERISTICS

Symbol	Parameter	Max	Unit
$R_{\theta JCT}$	Thermal Resistance, Junction-to-Case (Top)	0.78	°C/W
$R_{\theta JCB}$	Thermal Resistance, Junction-to-Case (Bottom)	0.72	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	39	

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	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$\Delta V_{(BR)DSS} / \Delta T_J$	$I_D = 1\text{ mA}$, ref to 25°C		8.5		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
		$V_{GS} = 0\text{ V}, V_{DS} = 40\text{ V}, T_J = 125^\circ\text{C}$			100	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA

ON CHARACTERISTICS

Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 50\text{ A}$		0.31	0.40	m Ω
		$V_{GS} = 7\text{ V}, I_D = 50\text{ A}$		0.42		
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 350\text{ }\mu\text{A}$	2.5	3.0	3.5	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(TH)} / \Delta T_J$	$V_{GS} = V_{DS}, I_D = 350\text{ }\mu\text{A}$		-7		mV/°C
Forward Transconductance	g_{FS}	$V_{DS} = 5\text{ V}, I_D = 50\text{ A}$		291		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 20\text{ V}$		9143		pF
Output Capacitance	C_{OSS}			6486		
Reverse Transfer Capacitance	C_{RSS}			132		
Output Charge	Q_{OSS}	$V_{GS} = 10\text{ V}, V_{DD} = 20\text{ V}, I_D = 50\text{ A}$		196		nC
Total Gate Charge	$Q_{G(TOT)}$			142		
Threshold Gate Charge	$Q_{G(TH)}$			27		
Gate-to-Source Charge	Q_{GS}			40		
Gate-to-Drain Charge	Q_{GD}			26		
Gate Plateau Voltage	V_{GP}			4.4		
Gate Resistance	R_G	$f = 1\text{ MHz}$		0.56		Ω

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$t_{d(ON)}$	Resistive Load, $V_{GS} = 0/10\text{ V}, V_{DD} = 20\text{ V},$ $I_D = 50\text{ A}, R_G = 2.5\text{ }\Omega$		40		ns
Rise Time	t_r			15		
Turn-Off Delay Time	$t_{d(OFF)}$			68		
Fall Time	t_f			15		

SOURCE-TO-DRAIN 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
		$V_{GS} = 0\text{ V}, I_S = 50\text{ A}, T_J = 125^\circ\text{C}$		0.63		
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, di/dt = 100\text{ A}/\mu\text{s},$ $I_S = 50\text{ A}, V_{DD} = 20\text{ V}$		98		ns
Charge Time	t_a			55		
Discharge Time	t_b			43		
Reverse Recovery Charge	Q_{RR}			332		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.

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TYPICAL CHARACTERISTICS

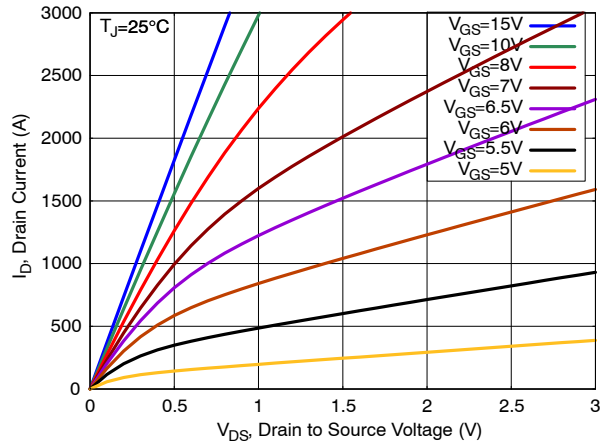


Figure 1. On-Region Characteristics

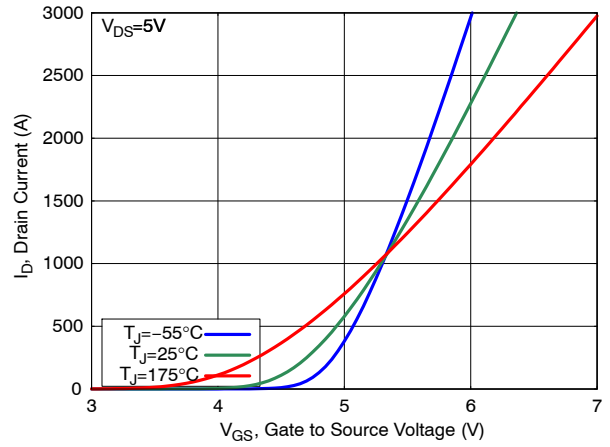


Figure 2. Transfer Characteristics

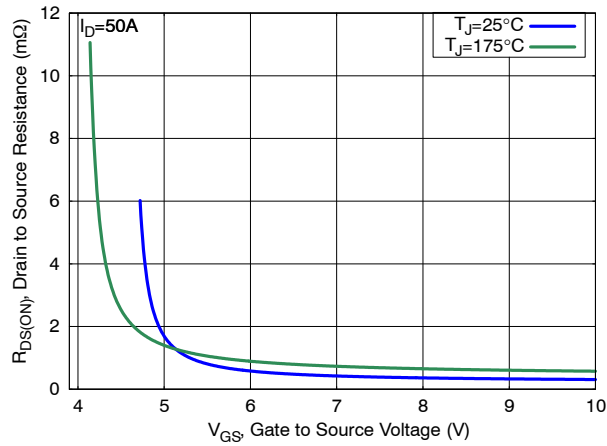


Figure 3. On-Resistance vs. Gate Voltage

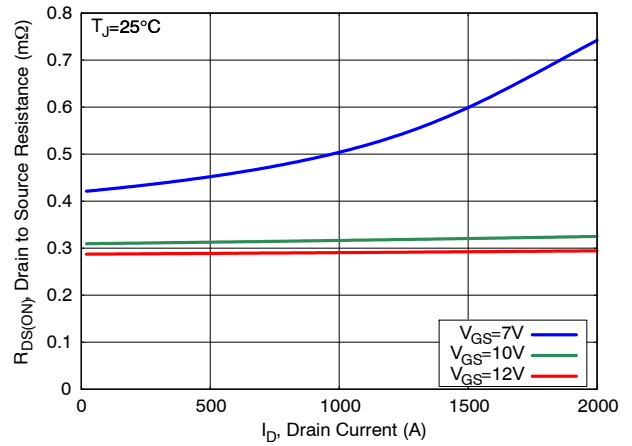


Figure 4. On-Resistance vs. Drain Current

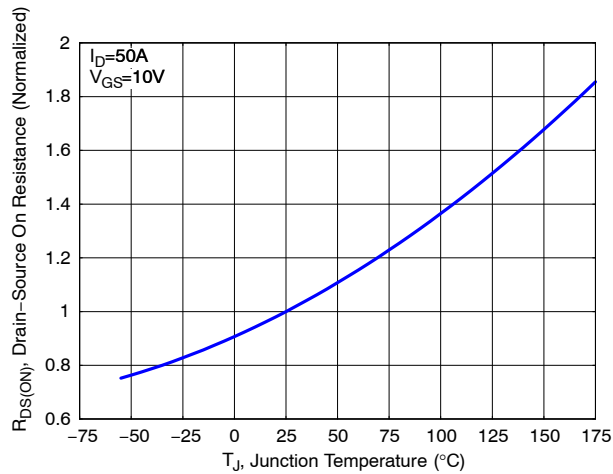


Figure 5. Normalized On-Resistance vs. Junction Temperature

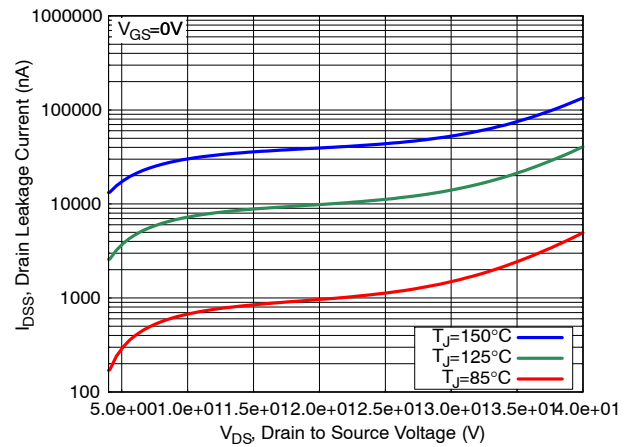


Figure 6. Drain Leakage Current vs. Drain Voltage

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TYPICAL CHARACTERISTICS

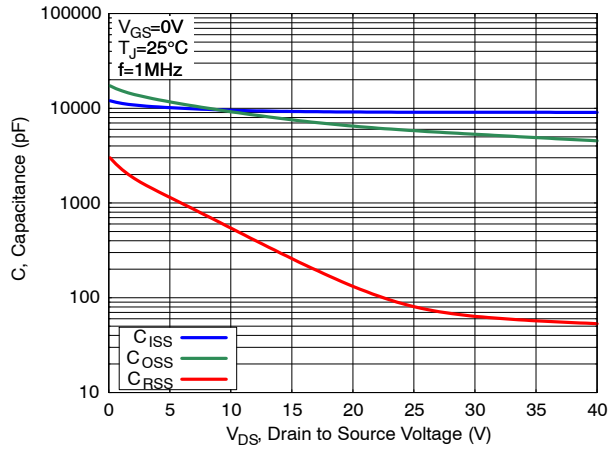


Figure 7. Capacitance Characteristics

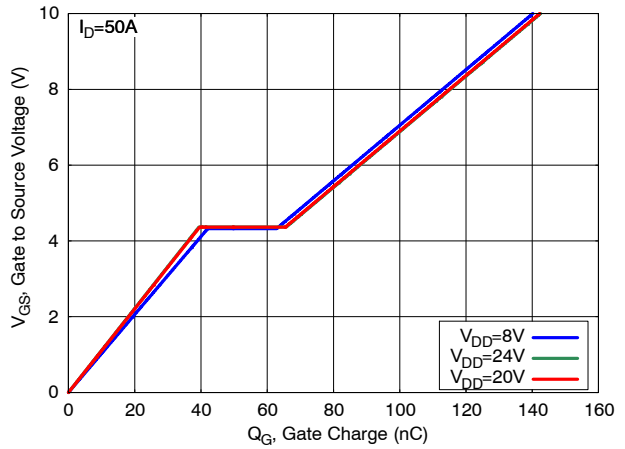


Figure 8. Gate Charge Characteristics

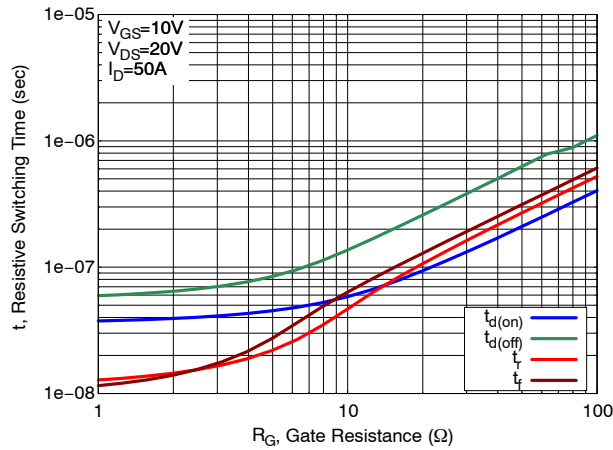


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

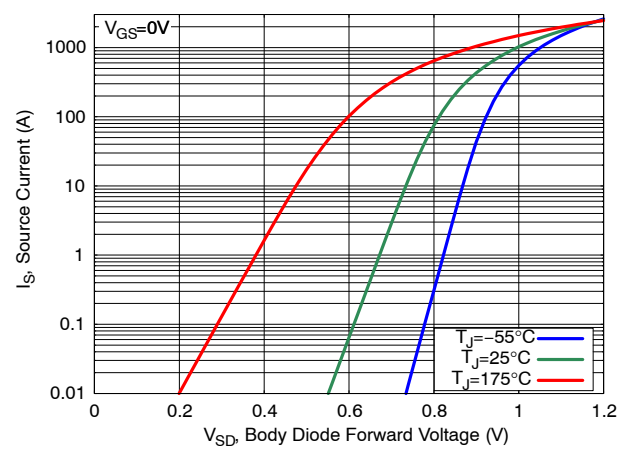


Figure 10. Diode Forward Characteristics

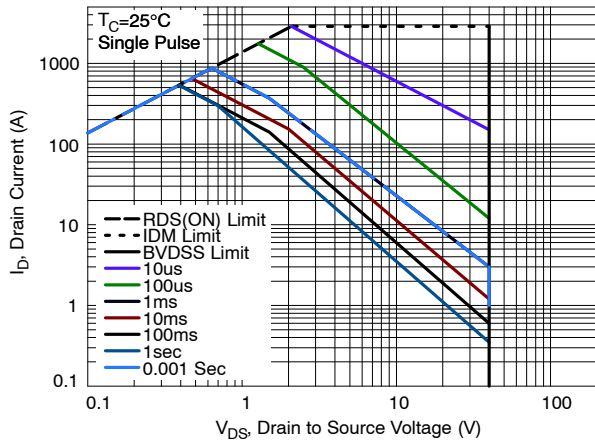


Figure 11. Safe Operating Area

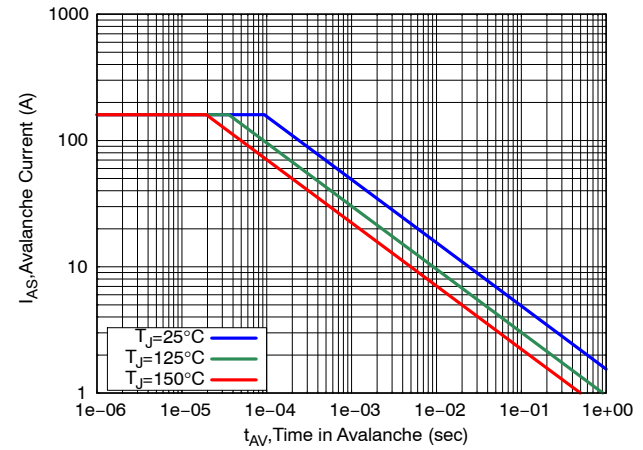


Figure 12. Avalanche Current vs. Pulse Time (UIS)

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TYPICAL CHARACTERISTICS

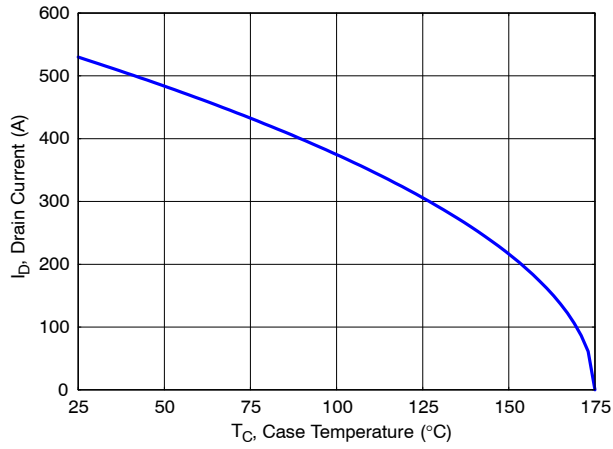


Figure 13. Maximum Current vs. Case Temperature

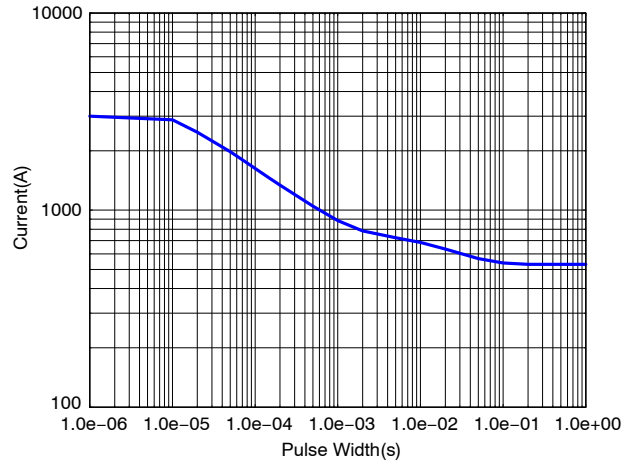


Figure 14. IDM vs. Pulse Width

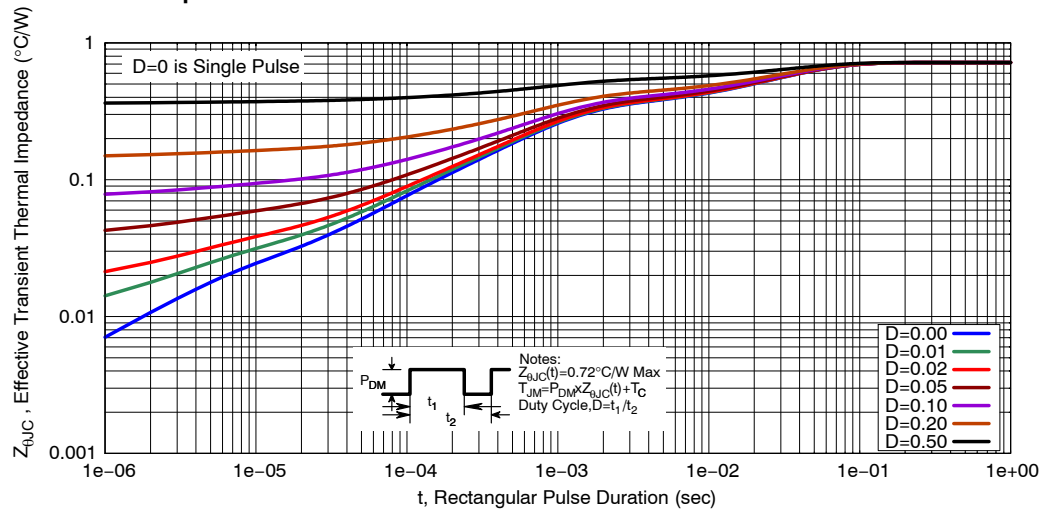


Figure 15. Transient Thermal Response

ORDERING INFORMATION

Device	Device Marking	Package	Shipping [†]
NTMFSCH0D4N04XMTWG	3T	DFN8 5x6 (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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