

MOSFET - Power, Single N-Channel, DUAL COOL[®] 40 V, 0.78 mΩ, 310 A

NTMFSC0D8N04XM

Features

- Dual Sided Cooling Package
- Latest 40 V Power MOSFET Technology for Motor Drive Applications
- Extreme Lower On-Resistance to Minimize Conduction Losses
- Lower Gate Charge to Minimize Gate Driving and Switching Losses
- Soft Body Diode Reverse Recovery
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

Applications

- Motor Drive
- ORing FET
- Battery Protection

MAXIMUM RATINGS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V _{DSS}	40	V
Gate-to-Source Voltage	V _{GS}	±20	V
Continuous Drain Current (Note 2)	T _C = 25°C	I _D	310 A
	T _C = 100°C		219
Power Dissipation (Note 2)	T _C = 25°C	P _D	135 W
Pulsed Drain Current	T _C = 25°C, t _p = 10 μs	I _{DM}	1463 A
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +175	°C
Continuous Source-Drain Current (Body Diode)	I _S	150	A
Single Pulse Avalanche Energy (I _{PK} = 69 A)	E _{AS}	248	mJ
Lead Temperature Soldering Purposes (1/8" from case for 10 s)	T _L	260	°C

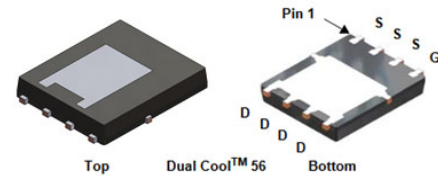
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface-mounted on FR4 board using 1 in² 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.

THERMAL CHARACTERISTICS

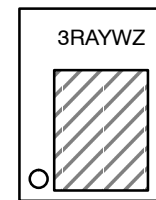
Symbol	Parameter	Max	Unit
R _{θJC}	Junction-to-Case (Bottom) – Steady State (Note 2)	1.1	°C/W
R _{θJC}	Junction-to-Case (Top) – Steady State (Note 2)	1.7	
R _{θJA}	Junction-to-Ambient – Steady State (Notes 1, 2)	39	

V _{(BR)DSS}	R _{DS(ON) MAX}	I _{D MAX}
40 V	0.78 mΩ @ 10 V	310 A



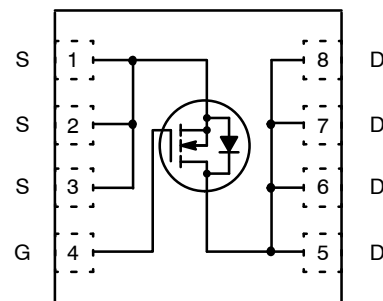
DFN8 5x6
CASE 506EG

MARKING DIAGRAM



- 3R = 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 4 of this data sheet.

NTMFSC0D8N04XM

ELECTRICAL CHARACTERISTICS (T_J = 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 V, I _D = 1 mA	40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	ΔV _{(BR)DSS} /ΔT _J	I _D = 1 mA, Referenced to 25°C		15		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40 V, T _J = 25°C			10	μA
		V _{DS} = 40 V, T _J = 125°C			100	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = 20 V			100	nA

ON CHARACTERISTICS (Note 3)

Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 50 A		0.63	0.78	mΩ
		V _{GS} = 7 V, I _D = 50 A		0.86	1.25	
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 180 μA	2.5	3.0	3.5	V
Gate Threshold Voltage Temperature Coefficient	ΔV _{GS(TH)} /ΔT _J	V _{GS} = V _{DS} , I _D = 180 μA		-7		mV/°C
Forward Trans-conductance	g _{FS}	V _{DS} = 5 V, I _D = 50 A		244		S

CHARGES & CAPACITANCES

Input Capacitance	C _{ISS}	V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz		4651		pF	
Output Capacitance	C _{OSS}			3319			
Reverse Transfer Capacitance	C _{RSS}			69			
Output Charge	Q _{OSS}	V _{GS} = 10 V, V _{DD} = 20 V, I _D = 50 A		100		nC	
Total Gate Charge	Q _{G(TOT)}			72			
Threshold Gate Charge	Q _{G(TH)}			14			
Gate-to-Source Charge	Q _{GS}			21			
Gate-to-Drain Charge	Q _{GD}			13			
Gate Plateau Voltage	V _{GP}			4.5			V
Gate Resistance	R _G		f = 1 MHz		0.65		1.2

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t _{d(ON)}	Resistive Load V _{GS} = 0/10 V, V _{DD} = 20 V, I _D = 50 A, R _G = 2.5 Ω		28		ns
Rise Time	t _r			10		
Turn-Off Delay Time	t _{d(OFF)}			45		
Fall Time	t _f			9.5		

SOURCE-TO-DRAIN DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 50 A, T _J = 25°C		0.81	1.2	V
		V _{GS} = 0 V, I _S = 50 A, T _J = 125°C		0.66	1.0	
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 50 A, V _{DD} = 50 V		69		ns
Charge Time	t _a			36		
Discharge Time	t _b			33		
Reverse Recovery Charge	Q _{RR}			144		

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.

NTMFSC0D8N04XM

TYPICAL CHARACTERISTICS

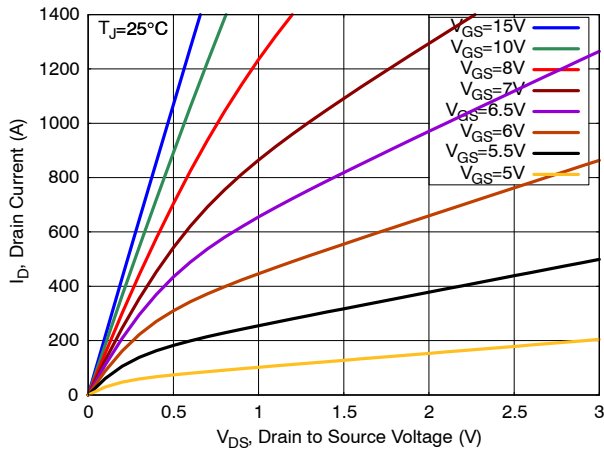


Figure 1. On-Region Characteristics

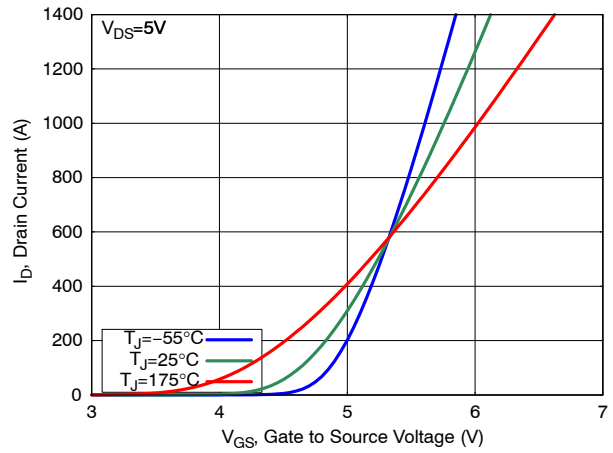


Figure 2. Transfer Characteristics

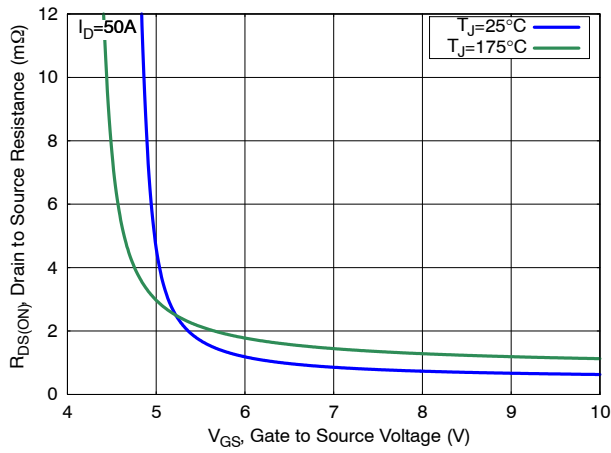


Figure 3. On-Resistance vs. Gate Voltage

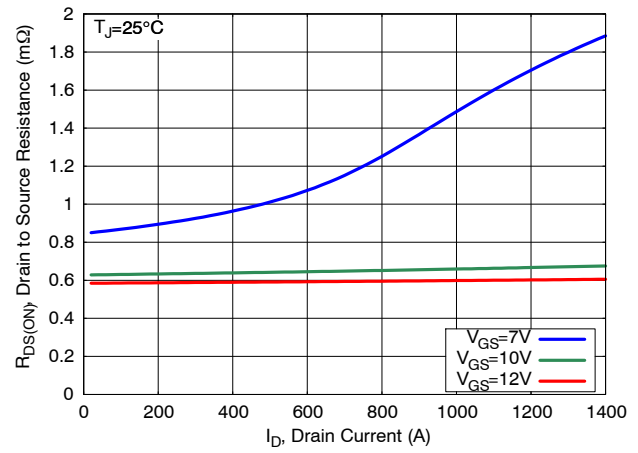


Figure 4. On-Resistance vs. Drain Current

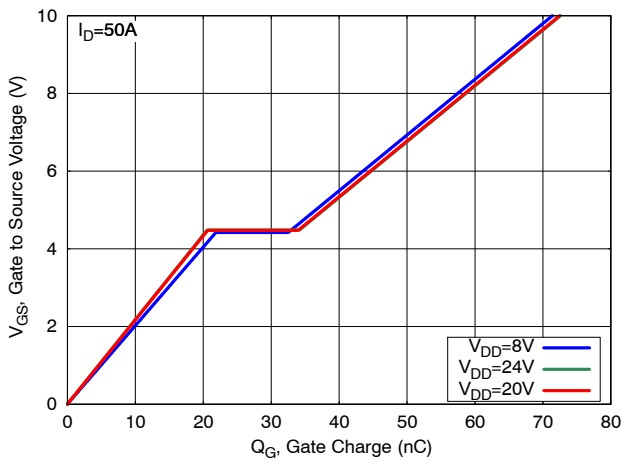


Figure 5. Gate Charge Characteristics

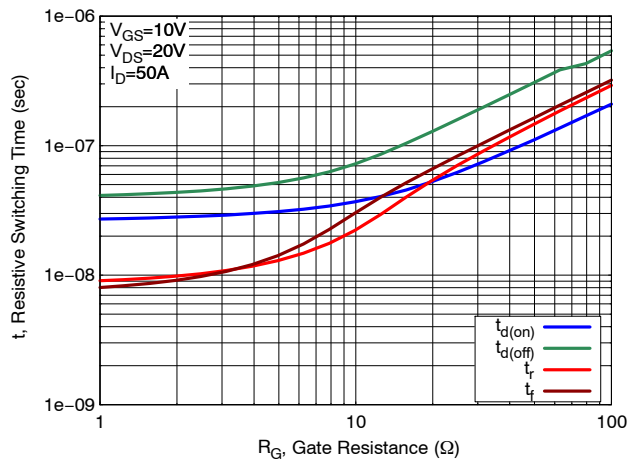


Figure 6. Resistive Switching Time Variation vs. Gate Resistance

NTMFSC0D8N04XM

TYPICAL CHARACTERISTICS

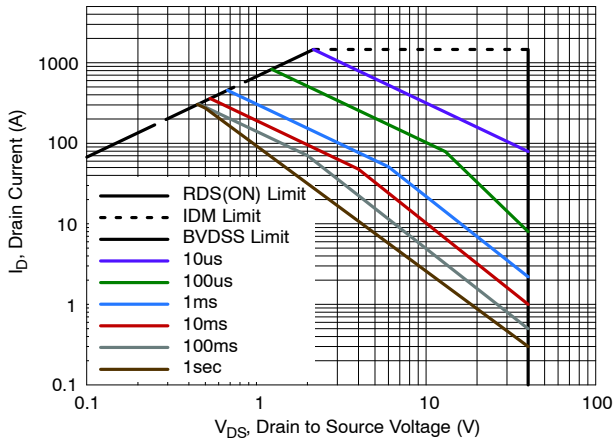


Figure 7. Safe Operating Area (SOA)

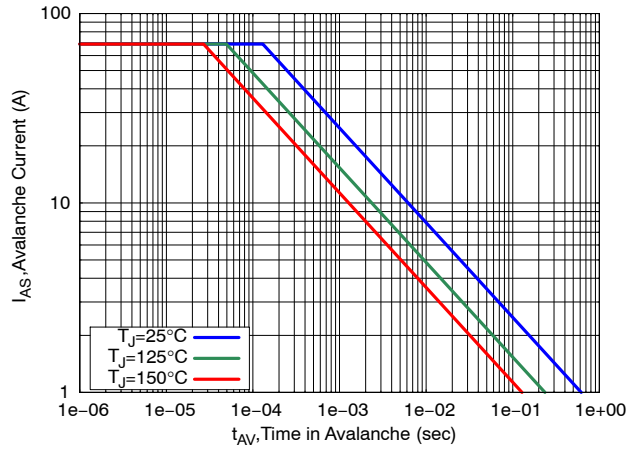


Figure 8. Avalanche Current vs Pulse Time (UIS)

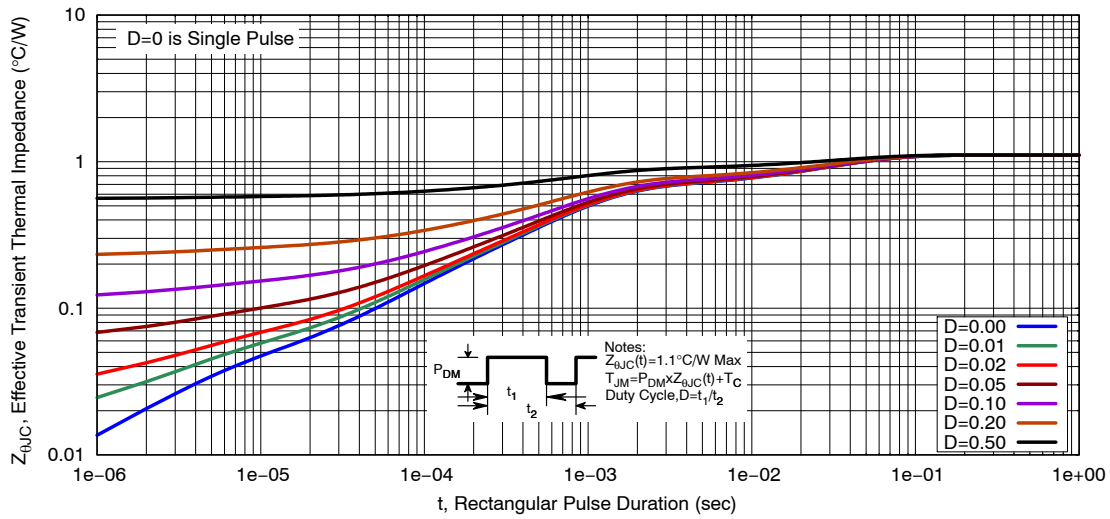


Figure 9. Transient Thermal Response

ORDERING INFORMATION

Device	Device Marking	Package	Shipping†
NTMFSC0D8N04XMTWG	3R	DFN8 5x6 (Pb-Free/Halogen Free)	3000 / Tape & Reel

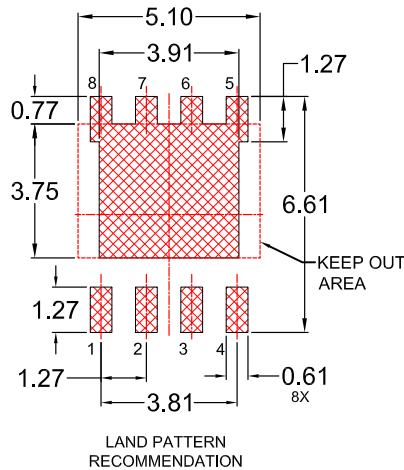
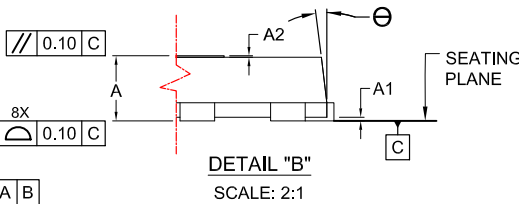
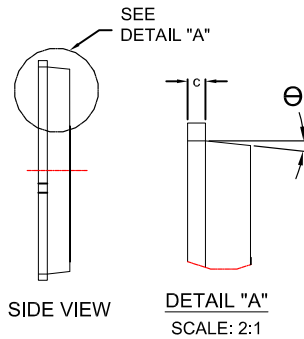
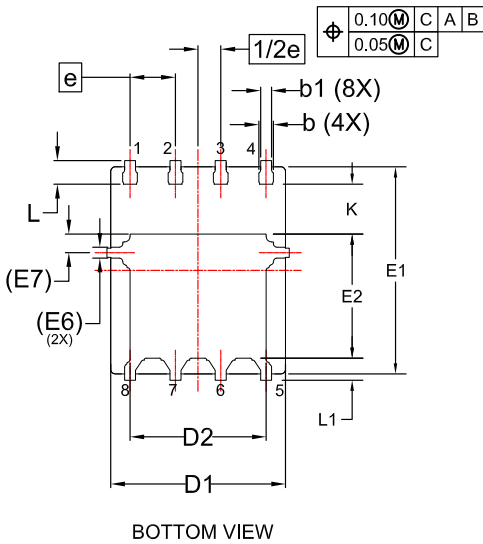
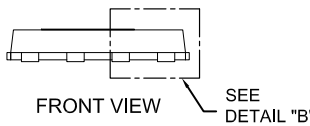
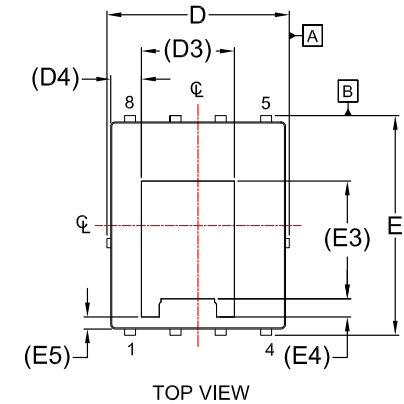
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

DUAL COOL is a registered trademark of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries.

NTMFSC0D8N04XM

PACKAGE DIMENSIONS

DFN8 5.1x6.15, 1.27P, DUAL COOL CASE 506EG ISSUE D



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

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.85	0.90	0.95
A1	-	-	0.05
A2	-	-	0.05
b	0.31	0.41	0.51
b1	0.21	0.31	0.41
c	0.20	0.25	0.30
D	4.90	5.00	5.10
D1	4.80	4.90	5.00
D2	3.67	3.82	3.97
D3	2.60 REF		
D4	0.86 REF		
E	6.05	6.15	6.25
E1	5.70	5.80	5.90
E2	3.38	3.48	3.58
E3	3.30 REF		
E4	0.50 REF		
E5	0.34 REF		
E6	0.30 REF		
E7	0.52 REF		
e	1.27 BSC		
1/2e	0.635 BSC		
K	1.30	1.40	1.50
L	0.56	0.66	0.76
L1	0.52	0.62	0.72
θ	0°	---	12°

onsemi, 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's product/patent coverage may be accessed at 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.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[onsemi:](#)

[NTMFSC0D8N04XMTWG](#)