# onsemi

# MOSFET - Power, Single N-Channel

80 V, 10 mΩ, 61 A

## NTMFSC011N08M7

#### Features

- DUAL COOL Top Side Cooling PQFN Package
- Max  $r_{DS(on)} = 10 \text{ m}\Omega$  at  $V_{GS} = 10 \text{ V}$ ,  $I_D = 10 \text{ A}$
- High Performance Technology for Extremely Low rDS(on)
- 100% UIL Tested
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

#### Parameter Symbol Value Unit Drain-to-Source Voltage V<sub>DSS</sub> 80 V Gate-to-Source Voltage V<sub>GS</sub> ±20 v Continuous Drain A Steady $T_C = 25^{\circ}C$ 61 $I_D$ Current R<sub>0JC</sub> State $T_{\rm C} = 100^{\circ}{\rm C}$ 38.6 (Notes 1, 3) Power Dissipation $T_{C} = 25^{\circ}C$ $P_{D}$ 78.1 W R<sub>0JC</sub> (Note 1) $T_{C} = 100^{\circ}C$ 31.2 Continuous Drain А Steady $T_A = 25^{\circ}C$ I<sub>D</sub> 12.5 Current R<sub>0JA</sub> (Notes 1, 2, 3) State $T_A = 100^{\circ}C$ 7.9 Power Dissipation T<sub>A</sub> = 25°C W $P_D$ 3.3 R<sub>0JA</sub> (Notes 1, 2) T<sub>A</sub> = 100°C 1.3 **Pulsed Drain Current** $T_A = 25^{\circ}C, t_p = 10 \ \mu s$ 180 A IDM °C Operating Junction and Storage Temperature T<sub>J</sub>, T<sub>sta</sub> -55 to Range +150 $I_{S}$ Source Current (Body Diode) 61 А Single Pulse Drain-to-Source Avalanche E<sub>AS</sub> 640 mJ Energy $(I_{L(pk)} = 3.9 \text{ A})$ Lead Temperature for Soldering Purposes ΤL 260 °C (1/8" from case for 10 s)

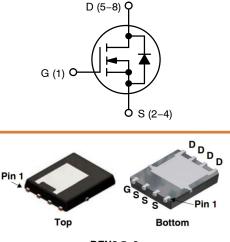
#### **MAXIMUM RATINGS** (T<sub>J</sub> = $25^{\circ}$ C unless otherwise noted)

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. 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 a 1 in<sup>2</sup> pad size, 1 oz Cu pad.
- 3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

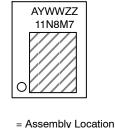
V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> MAX	I <sub>D</sub> MAX
80 V	10 m $\Omega$ @ 10 V	61 A

**N-Channel MOSFET** 



DFN8 5x6 (Dual Cool 56) CASE 506EG

#### MARKING DIAGRAM



= Year

А

WW = Work Week

ZZ = Lot Traceability

11N8M7 = Specific Device Code

#### **ORDERING INFORMATION**

Device	Package	Shipping		
NTMFSC011N08M7	DFN8 (Pb–Free)	3000 / Tape & Reel		

#### **ELECTRICAL CHARACTERISTICS** (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS		4					
Drain to Source Breakdown Voltage	V <sub>(BR)DSS</sub>	$V_{GS} = 0 \text{ V}, \text{ I}_{D} = 250 \ \mu\text{A}$		80			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>				49		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{GS} = 0 V, V_{DS} = 80 V$	$T_J = 25^{\circ}C$			1	μA
Zero Gate Voltage Drain Current	I <sub>GSS</sub>	$V_{DS}$ = 0 V, $V_{GS}$ = ± 20 V				±100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 1	20 μA	2.5	3.3	4.5	V
Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>				-9		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 10 A		7.6	10	mΩ
Forward Transconductance	gFS	V <sub>DS</sub> = 5 V I <sub>D</sub> = 10 A			21.5	40	S
CHARGES, CAPACITANCES & GATE I	RESISTANCE				-		-
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, f = 1 MHz	$V_{DS} = 0 V$		2373		pF
	C <sub>iss</sub> V <sub>DS</sub> = 40 V		2080	2700			
Output Capacitance	C <sub>oss</sub>				286	430	
Reverse Transfer Capacitance	C <sub>rss</sub>				11	17	
Gate Resistance	Rg	V <sub>GS</sub> = 0.5 V, f = 1MHz			1	2	Ω
Threshold Gate Charge	Q <sub>g(th)</sub>	$V_{GS} = 0 \text{ to } 2 \text{ V}$ $V_{GS} = 10 \text{ V},$			4.3		nC
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 0 to 10 V	- V <sub>DS</sub> = 40 V; I <sub>D</sub> = 10 A		29.3	38	1
Gate to Source Gate Charge	Q <sub>gs</sub>	V <sub>GS</sub> = 0 to 10 V			11.8		
Gate to Drain "Miller" Charge	Q <sub>gd</sub>				4.3		
Plateau Voltage	V <sub>GP</sub>				5.5		V
Output Charge	Q <sub>oss</sub>	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V			26		nC
SWITCHING CHARACTERISTICS (Note	e 5)						
Turn-On Delay Time	t <sub>d(ON)</sub>	$V_{\text{DD}} = 40 \text{ V}, \text{ I}_{\text{D}} = 10 \text{ A}, \\ V_{\text{GS}} = 10 \text{ V}, \text{ R}_{\text{GEN}} = 6 \Omega$			14		ns
Turn-On Rise Time	t <sub>r</sub>				6		ns
Turn-Off Delay Time	t <sub>d(OFF)</sub>				27		ns
Turn-Off Fall Time	t <sub>f</sub>				6		ns
DRAIN – SOURCE DIODE CHARACTE	RISTICS	•			-		-
Source to Drain Diode Voltage	V <sub>SD</sub>	I <sub>SD</sub> = 10 A, V <sub>GS</sub> =	= 0 V		0.82	1.2	V
Reverse Recovery Time	T <sub>RR</sub>	V <sub>GS</sub> = 0 V, dI <sub>SD</sub> /dt = 100 A/μs,			41	50	ns

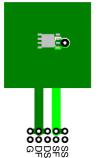
Reverse Recovery Time	T <sub>RR</sub>	V <sub>GS</sub> = 0 V, dI <sub>SD</sub> /dt = 100 A/μs, Is = 10 A	41	50	ns
Charge Time	t <sub>a</sub>	$I_{S} = I_{U} A$	24.6		
Discharge Time	t <sub>b</sub>		16.1		
Reverse Recovery Charge	Q <sub>RR</sub>		45	58	nC

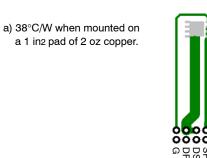
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

#### Symbol Value Unit Parameter Thermal Resistance, Junction to Case $R_{\theta JC}$ (Top Source) 1.6 Thermal Resistance, Junction to Case (Bottom Drain) 3.0 $R_{\theta JC}$ Thermal Resistance, Junction to Ambient (Note 1a) 38 $R_{\theta JA}$ Thermal Resistance, Junction to Ambient (Note 1b) 81 $R_{\theta JA}$ $R_{\theta JA}$ Thermal Resistance, Junction to Ambient (Note 1c) 27 Thermal Resistance, Junction to Ambient (Note 1d) 34 $R_{\theta JA}$ Thermal Resistance, Junction to Ambient (Note 1e) 16 R<sub>0JA</sub> °C/W $R_{\theta JA}$ Thermal Resistance, Junction to Ambient (Note 1f) 19 $R_{\theta JA}$ Thermal Resistance, Junction to Ambient (Note 1g) 26 Thermal Resistance, Junction to Ambient (Note 1h) 61 $R_{\theta JA}$ $R_{\theta JA}$ Thermal Resistance, Junction to Ambient (Note 1i) 16 Thermal Resistance, Junction to Ambient (Note 1j) 23 $R_{\theta JA}$ Thermal Resistance, Junction to Ambient (Note 1k) 11 $R_{\theta JA}$ Thermal Resistance, Junction to Ambient (Note 1I) 13 $R_{\theta JA}$

#### THERMAL CHARACTERISTICS

 R<sub>0JA</sub> is determined with the device mounted on a FR-4 board using a specified pad of 2 oz copper as shown below. R<sub>0JA</sub> is guaranteed by design while R<sub>CA</sub> is determined by the user's board design.





b) 81°C/W when mounted on a minimum pad of 2 oz copper.



d) Still air, 20.9 10.4 12.7 mm Aluminum Heat Sink, minimum pad of 2 oz copper

e) Still air, 45.2.41.4.11.7 mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, 1 in2 pad of 2 oz copper

f) Still air, 45.2·41.4·11.7 mm Aavid Thermalloy Part # 10–L41B–11 Heat Sink, minimum pad of 2 oz copper

g) .200FPM Airflow, No Heat Sink, 1 in2 pad of 2 oz copper

h) .200FPM Airflow, No Heat Sink, minimum pad of 2 oz copper

i) .200FPM Airflow, 20.9 10.4 12.7 mm Aluminum Heat Sink, 1 in2 pad of 2 oz copper

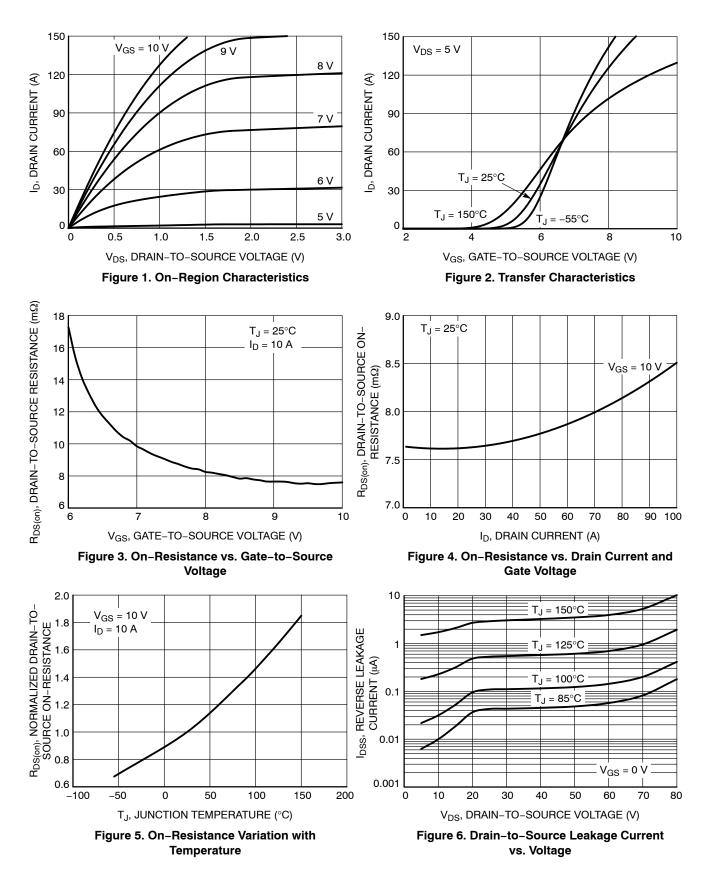
j) .200FPM Airflow, 20.9 10.4 12.7 mm Aluminum Heat Sink, minimum pad of 2 oz copper

k) .200FPM Airflow, 45.2-41.4-11.7 mm Aavid Thermalloy Part # 10 - L41B - 11 Heat Sink, 1 in2 pad of 2 oz copper

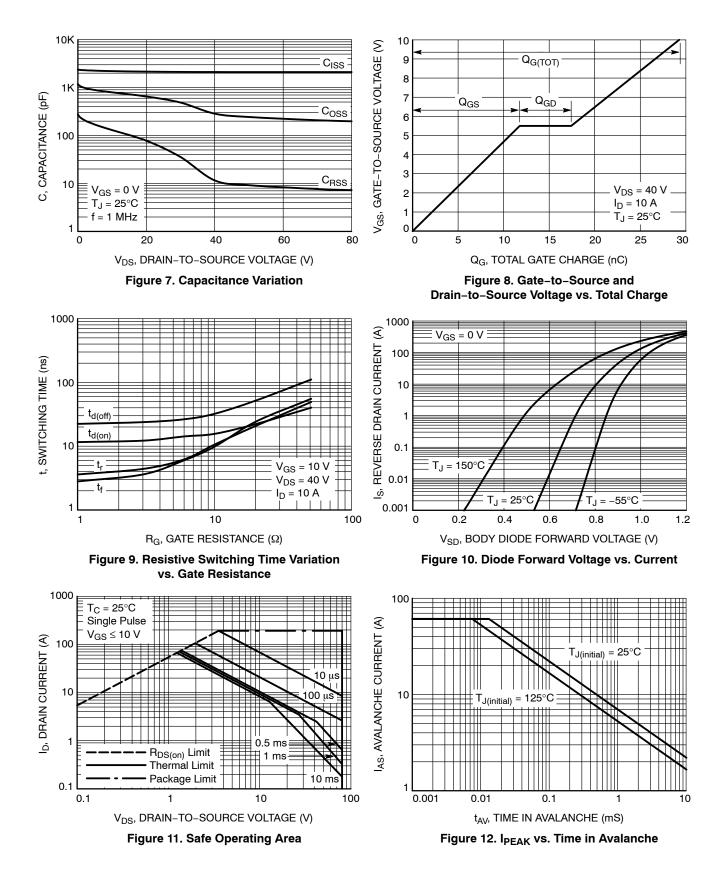
I) .200FPM Airflow, 45.2-41.4-11.7 mm Aavid Thermalloy Part # 10 - L41B - 11 Heat Sink, minimum pad of 2 oz copper

7. Pulse Test: Pulse Width < 300 \_s, Duty cycle < 2.0%.

#### **TYPICAL CHARACTERISTICS**



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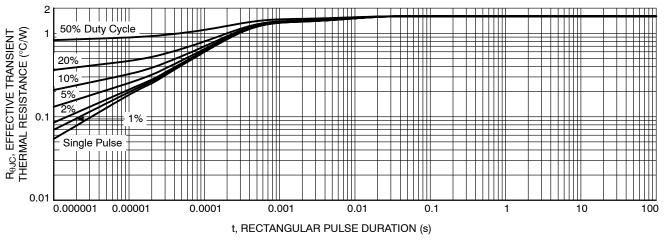
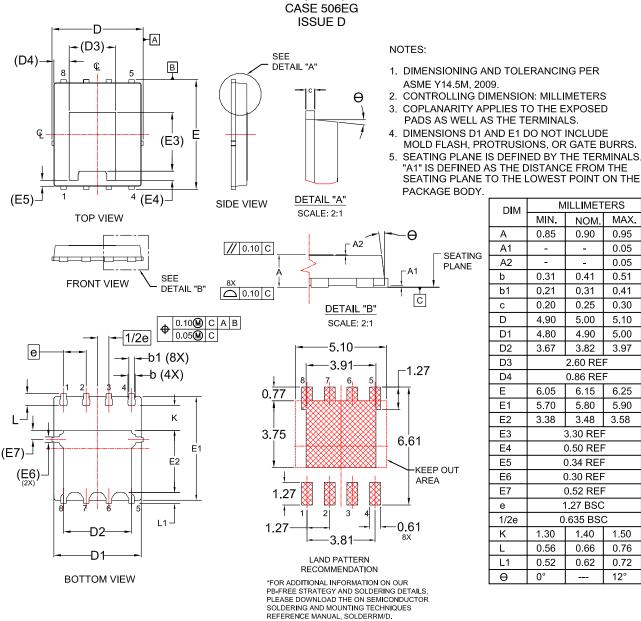


Figure 13. Thermal Response

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#### PACKAGE DIMENSIONS



DFN8 5.1x6.15, 1.27P, DUAL COOL

DIM	MILLIMETERS				
Dim	MIN.	NOM.	MAX.		
А	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		
С	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 3.9				
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				
е	1.27 BSC				
1/2e	0.635 BSC				
К	1.30	1.40	1.50		
L	0.56	0.66	0.76		
L1	0.52	0.62	0.72		
θ	0°		12°		

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