## **MOSFET**- Power, Single N-Channel, SO-8 FL

## 60 V, 22 mΩ, 25 A

## NTMFS024N06C

#### Features

- Small Footprint (5x6 mm) for Compact Design
- Low R<sub>DS(on)</sub> to Minimize Conduction Losses
- Low Q<sub>G</sub> and Capacitance to Minimize Driver Losses
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

#### Applications

- Power Tools, Battery Operated Vacuums
- UAV/Drones, Material Handling
- BMS/Storage, Home Automation

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

				/	
Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V <sub>DSS</sub>	60	V
Gate-to-Source Voltage			V <sub>GS</sub>	±20	V
Continuous Drain Current R <sub>0-IC</sub>	Steady	T <sub>C</sub> = 25°C	Ι <sub>D</sub>	25	А
(Notes 1, 3)	State	$T_{\rm C} = 100^{\circ}{\rm C}$		17	
Power Dissipation	Steady	$T_{C} = 25^{\circ}C$	PD	28	W
$R_{\theta JC}$ (Note 1)	State	$T_{C} = 100^{\circ}C$		14	
Continuous Drain	Steady	T <sub>A</sub> = 25°C	Ι <sub>D</sub>	8	А
Current R <sub>θJA</sub> (Notes 1, 2, 3)	State	T <sub>A</sub> = 100°C		6	
Power Dissipation	Steady	$T_A = 25^{\circ}C$	PD	3.4	W
R <sub>0JA</sub> (Notes 1, 2)	State	T <sub>A</sub> = 100°C		1.7	
Pulsed Drain Current	$T_{A} = 25^{\circ}$	T <sub>A</sub> = 25°C, t <sub>p</sub> = 10 μs		158	А
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	–55 to +175	°C	
Source Current (Body Diode)		I <sub>S</sub>	23	Α	
Single Pulse Drain-to-Source Avalanche Energy ( $I_L = 5.3 A_{pk}$ )			E <sub>AS</sub>	14	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			ΤL	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. 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 650  $\rm mm^2,$  2 oz. Cu pad.
- 3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

#### THERMAL RESISTANCE MAXIMUM RATINGS

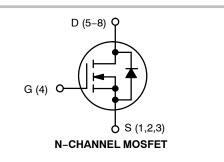
Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State (Note 1)	$R_{ ext{ heta}JC}$	5.3	°C/W
Junction-to-Ambient - Steady State (Note 1)	$R_{\theta JA}$	43.4	

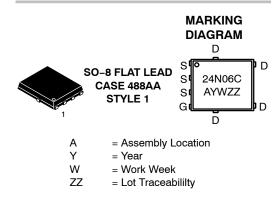


### **ON Semiconductor®**

#### www.onsemi.com

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> MAX	I <sub>D</sub> MAX
60 V	$22 \text{ m}\Omega @ 10 \text{ V}$	25 A





#### **ORDERING INFORMATION**

D	evice	Package	Shipping <sup>†</sup>			
NTMFS0	24N06CT1G	SO-8 FL (Pb-Free)	1500 / Tape & Reel			

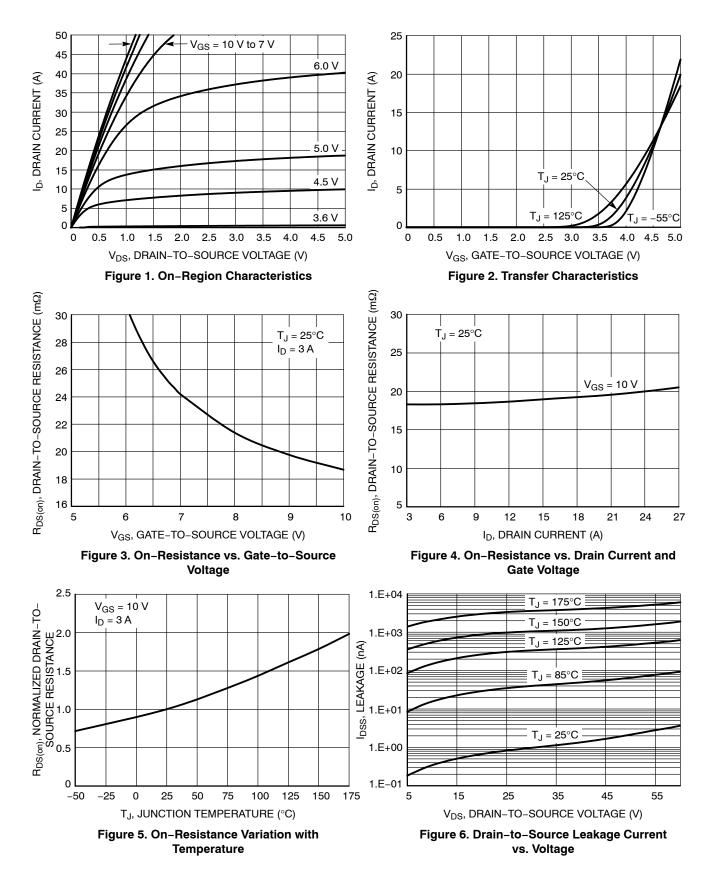
<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

#### **ELECTRICAL CHARACTERISTICS** (T<sub>J</sub> = $25^{\circ}$ C unless otherwise specified)

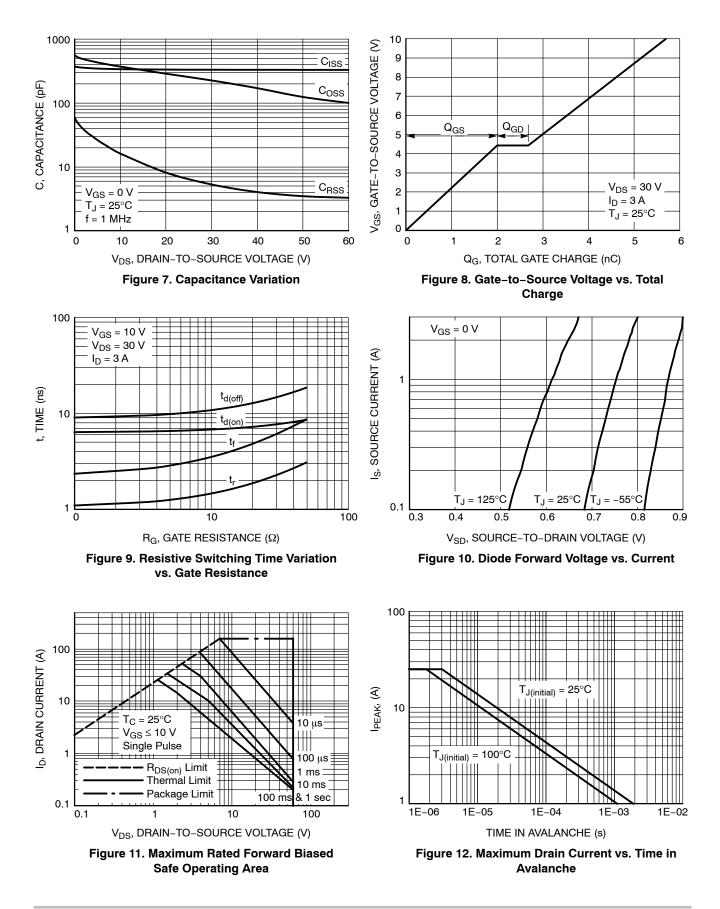
Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	$V_{GS}$ = 0 V, $I_D$ = 250 $\mu$ A		60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> / T <sub>J</sub>	$I_D = 250 \ \mu A$ , ref to $25^{\circ}C$			27		mV/°C
Zero Gate Voltage Drain Current	$I_{DSS}$ $V_{GS} = 0 V$ , $T_J = 25^{\circ}C$				10		
		V <sub>DS</sub> = 60 V	T <sub>J</sub> = 125°C			250	μΑ
Gate-to-Source Leakage Current	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS}$	<sub>S</sub> = 20 V			100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	$V_{GS} = V_{DS}, I_D$	= 20 μA	2.0		4.0	V
Negative Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>	l <sub>D</sub> = 17 μA, ret	to 25°C		-7.8		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V I <sub>D</sub> = 3 A			18.3	22	mΩ
Forward Transconductance	<b>9</b> FS	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 3 A			10		S
Gate Resistance	R <sub>G</sub>	T <sub>A</sub> = 25°C			0.8		Ω
CHARGES AND CAPACITANCES				-	-	-	
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1 MHz, V <sub>DS</sub> = 30 V			333		pF
Output Capacitance	C <sub>OSS</sub>				225		
Reverse Transfer Capacitance	C <sub>RSS</sub>				5.05		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 30 V; I <sub>D</sub> = 3 A			5.7		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>				1.3		
Gate-to-Source Charge	Q <sub>GS</sub>				2.0		
Gate-to-Drain Charge	Q <sub>GD</sub>				0.68		
SWITCHING CHARACTERISTICS, $V_{GS} = 10$	V (Note 5)						
Turn-On Delay Time	t <sub>d(ON)</sub>				6.6		
Rise Time	t <sub>r</sub>	$V_{GS}$ = 10 V, $V_{DS}$ = 30 V, $I_{D}$ = 3 A, $R_{G}$ = 6.0 $\Omega$			1.3		- ns
Turn-Off Delay Time	t <sub>d(OFF)</sub>				10		
Fall Time	t <sub>f</sub>				3.0		
DRAIN-SOURCE DIODE CHARACTERISTIC	s						
Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 3 A	$T_J = 25^{\circ}C$		0.8	1.2	V
			T <sub>J</sub> = 125°C		0.66		v
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, dIS/dt = 100 A/µs, V <sub>DS</sub> = 30 V, I <sub>S</sub> = 3 A			23		ns
Charge Time	t <sub>a</sub>				11		
Discharge Time	t <sub>b</sub>				12		
Reverse Recovery Charge	Q <sub>RR</sub>				11		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.
4. Pulse Test: pulse width ≤ 300 µs, duty cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.

#### **TYPICAL CHARACTERISTICS**



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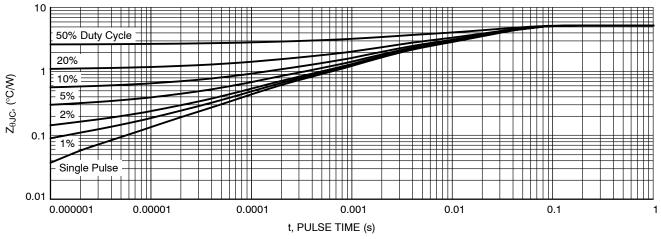
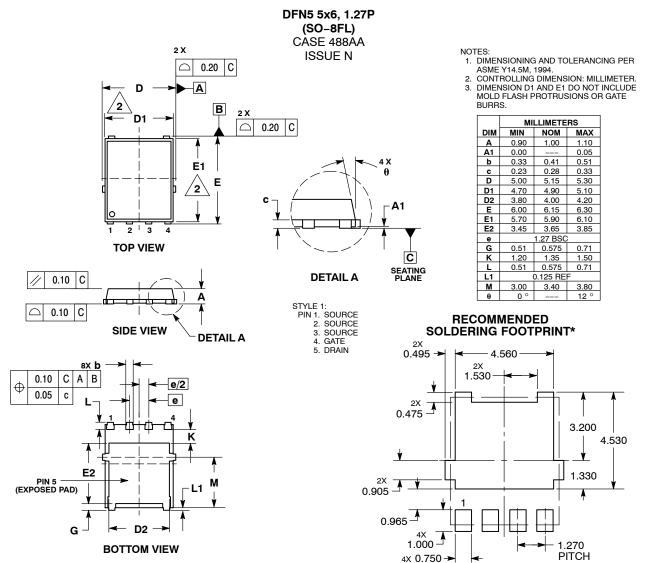


Figure 13. Thermal Response

#### PACKAGE DIMENSIONS



DIMENSIONS: MILLIMETERS

\*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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