MOSFET - Power, Single N-Channel, SO-8 FL 60 V, 22 mΩ, 25 A

NVMFS024N06C

Features

- Small Footprint (5x6 mm) for Compact Design
- Low R_{DS(on)} to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- NVMFWS024N06C Wettable Flank Option for Enhanced Optical Inspection
- AEC-Q101 Qualified and PPAP Capable
- 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 ($T_J = 25^{\circ}C$ unless otherwise stated)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V_{DSS}	60	V
Gate-to-Source Volta	Gate-to-Source Voltage			±20	V
Continuous Drain Current R _{B.IC}	Steady	T _C = 25°C	I _D	25	Α
(Notes 1, 3)	State	T _C = 100°C		17	
Power Dissipation	Steady	T _C = 25°C	P_{D}	28	W
R _{θJC} (Note 1)	State	T _C = 100°C		14	
Continuous Drain	Steady	T _A = 25°C	Ι _D	8	Α
Current R _{θJA} (Notes 1, 2, 3)	State	T _A = 100°C		6	
Power Dissipation	Steady	T _A = 25°C	P_{D}	3.4	W
R _{θJA} (Notes 1, 2)	State T _A = 100°C			1.7	
Pulsed Drain Current	$T_A = 25^{\circ}$	°C, t _p = 10 μs	I_{DM}	158	Α
Operating Junction and Storage Temperature Range			T _J , T _{STG}	-55 to +175	°C
Source Current (Body Diode)			I _S	23	Α
Single Pulse Drain-to-Source Avalanche Energy ($I_L = 5.3 A_{pk}$)			E _{AS}	14	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			TL	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 mm², 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

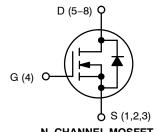
Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State (Note 1)	$R_{ heta JC}$	5.3	°C/W
Junction-to-Ambient - Steady State (Note 1)	$R_{\theta JA}$	43.4	



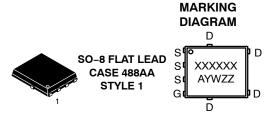
ON Semiconductor®

www.onsemi.com

V _{(BR)DSS}	R _{DS(ON)} MAX	I _D MAX
60 V	22 mΩ @ 10 V	25 A



N-CHANNEL MOSFET



XXXXXX = 24N06C

(NVMFS024N06C) or

24N06W

(NVMFWS024N06C)

= Assembly Location = Year

W = Work Week = Lot Traceability

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

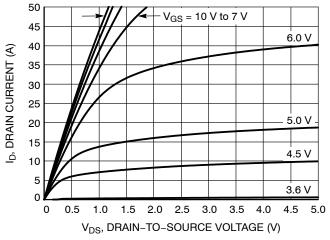
Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS	•			ı			•
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$		60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} / T _J	I _D = 250 μA, ref to 25°C			27		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}					10	
		V _{DS} = 60 V	T _J = 125°C			250	μΑ
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = 20 V				100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	V _{GS(TH)}	$V_{GS} = V_{DS}, I_D = 20 \mu A$		2.0		4.0	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J	I _D = 17 μA, ref to 25°C			-7.8		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 3 A		18.3	22	mΩ
Forward Transconductance	9FS	V _{DS} = 5 V, I _D = 3 A			10		S
Gate Resistance	R_{G}	T _A = 25°C			0.8		Ω
CHARGES AND CAPACITANCES				•			
Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 30 V			333		pF
Output Capacitance	C _{OSS}				225		
Reverse Transfer Capacitance	C _{RSS}				5.05		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 48 V; I _D = 3 A			5.7		nC
Threshold Gate Charge	Q _{G(TH)}				1.3		
Gate-to-Source Charge	Q _{GS}				2.0		
Gate-to-Drain Charge	Q_{GD}				0.68		
SWITCHING CHARACTERISTICS, V _{GS} = 10	V (Note 5)			•			
Turn-On Delay Time	t _{d(ON)}	V_{GS} = 10 V, V_{DS} = 48 V, I_{D} = 3 A, R_{G} = 6.0 Ω			6.6		ns
Rise Time	t _r				1.3		
Turn-Off Delay Time	t _{d(OFF)}				10		
Fall Time	t _f				3.0		
DRAIN-SOURCE DIODE CHARACTERISTIC	s			ı			1
Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 3 A	T _J = 25°C		0.8	1.2	
			T _J = 125°C		0.66		\ \
Reverse Recovery Time	t _{RR}	$V_{GS} = 0 \text{ V, dIS/dt} = 100 \text{ A/}\mu\text{s,}$ $V_{DS} = 30 \text{ V, I}_{S} = 3 \text{ A}$			23		ns
Charge Time	t _a				11		
Discharge Time	t _b				12		
Reverse Recovery Charge	Q _{RR}				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 $\leq 300~\mu s$, duty cycle $\leq 2\%$.

5. Switching characteristics are independent of operating junction temperatures.

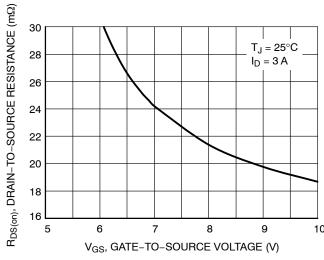
TYPICAL CHARACTERISTICS



25 20 ID, DRAIN CURRENT (A) 15 10 $T_{.1} = 25^{\circ}C$ 5 $T_J = 125^{\circ}C$ -55°C 0 0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 V_{GS}, GATE-TO-SOURCE VOLTAGE (V)

Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics



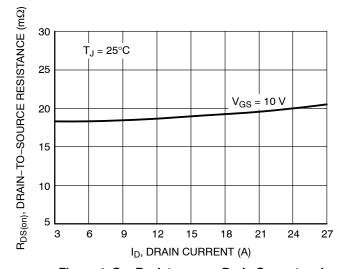
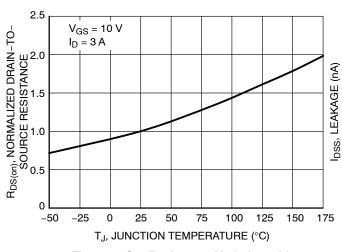


Figure 3. On-Resistance vs. Gate-to-Source Voltage

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



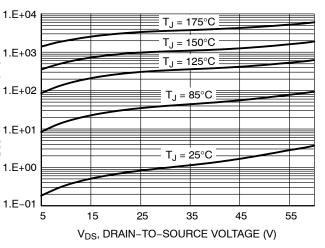
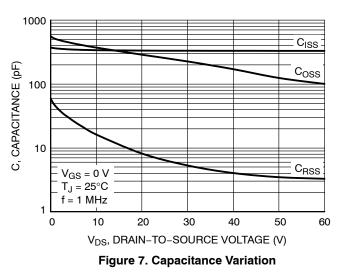


Figure 5. On–Resistance Variation with Temperature

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

TYPICAL CHARACTERISTICS



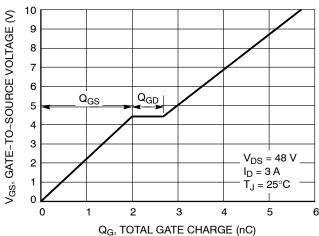


Figure 8. Gate-to-Source Voltage vs. Total Charge

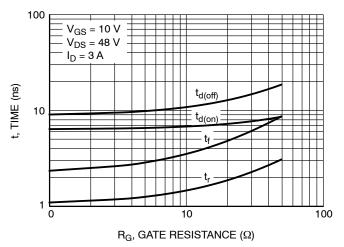


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

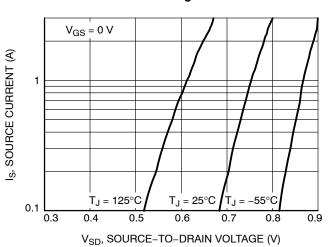


Figure 10. Diode Forward Voltage vs. Current

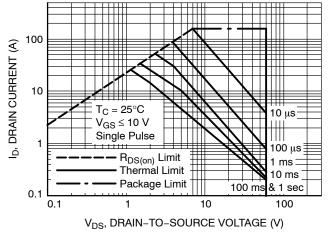


Figure 11. Maximum Rated Forward Biased Safe Operating Area

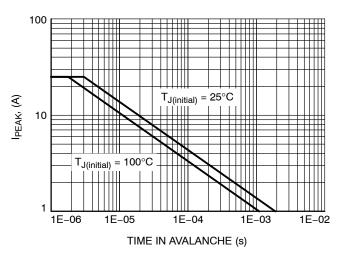


Figure 12. Maximum Drain Current vs. Time in Avalanche

TYPICAL CHARACTERISTICS

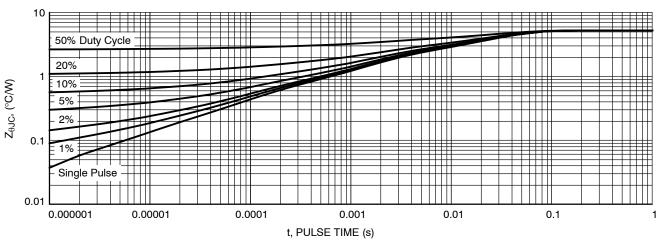


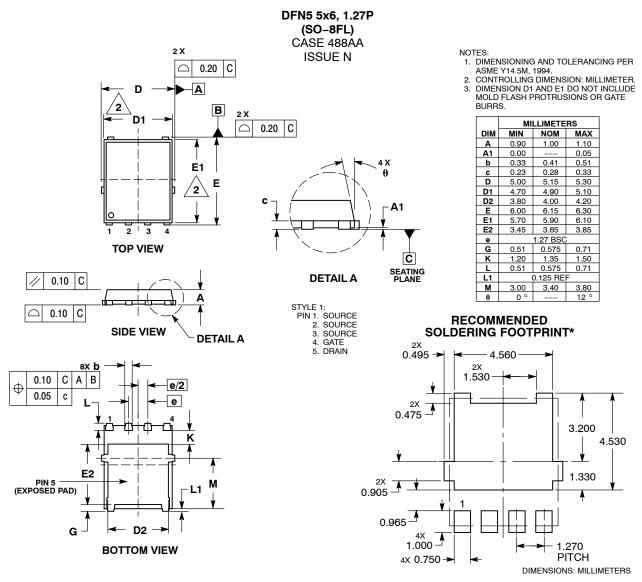
Figure 13. Thermal Response

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NVMFS024N06CT1G	24N06C	DFN5 (Pb-Free)	1500 / Tape & Reel
NVMFWS024N06CT1G	24N06W	DFN5 (Pb-Free, Wettable Flanks)	1500 / 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.

PACKAGE DIMENSIONS



*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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