

MOSFET - Power, Single N-Channel, STD Gate, SO8-FL

40 V, 0.52 mΩ, 414 A

NVMFWS0D5N04XM

Features

- Low R_{DS(on)} to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Small Footprint (5 x 6 mm) with Compact Design
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

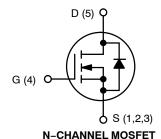
- Motor Drive
- Battery Protection
- Synchronous Rectification

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

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V _{DSS}	40	V
Gate-to-Source Voltage		V _{GS}	±20	V
Continuous Drain Current	T _C = 25°C	I _D	414	Α
	T _C = 100°C		293	
Power Dissipation	T _C = 25°C	P_{D}	163	W
Pulsed Drain Current	T _C = 25°C,	I _{DM}	900	Α
Pulsed Source Current (Body Diode)	t _p = 10 μs	I _{SM}	900	
Operating Junction and Storage Temperature Range		T _J , T _{STG}	-55 to +175	°C
Source Current (Body Diode)		Is	251	Α
Single Pulse Avalanche Energy	I _{PK} = 28.2 A	E _{AS}	1434	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.

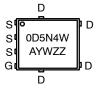
V _{(BR)DSS}	R _{DS(on)} MAX	I _D MAX	
40 V	$0.52~\text{m}\Omega$ @ $10~\text{V}$	414 A	





DFNW5 (SO-8FL WF) CASE 507BD

MARKING DIAGRAM



A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceability

ORDERING INFORMATION

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

THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	0.92	°C/W
Thermal Resistance, Junction-to-Ambient (Notes 1, 2)	$R_{\theta JA}$	38.9	

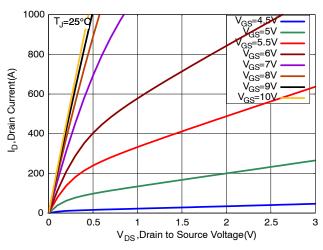
^{1.} Surface-mounted on FR4 board using 650 mm² pad, 2 oz Cu pad.

Parameter	Symbol	Test Condition	Min	Тур	Max	Unit
OFF CHARACTERISTICS	•					•
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	$V_{GS} = 0 \text{ V}, I_D = 1 \text{ mA}, T_J = 25^{\circ}\text{C}$	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			1	μΑ
		V _{DS} = 40 V, T _J = 125°C			60	
Gate-to-Source Leakage Current	I _{GSS}	V _{GS} = 20 V, V _{DS} = 0 V			100	nA
ON CHARACTERISTICS						
Drain-to-Source On Resistance	R _{DS(on)}	$V_{GS} = 10 \text{ V}, I_D = 50 \text{ A}, T_J = 25^{\circ}\text{C}$		0.43	0.52	mΩ
Gate Threshold Voltage	V _{GS(TH)}	$V_{GS} = V_{DS}, I_D = 240 \mu A, T_J = 25^{\circ}C$	2.5	3.0	3.5	V
Gate Threshold Voltage Temperature Coefficient	ΔV _{GS(TH)} /ΔT _J	$V_{GS} = V_{DS}, I_{D} = 240 \mu\text{A}$		-7.21		mV/°C
Forward Trans-conductance	9FS	V _{DS} = 5 V, I _D = 50 A		267		S
CHARGES, CAPACITANCES & GATE RE	SISTANCE					
Input Capacitance	C _{ISS}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz		6232		pF
Output Capacitance	C _{OSS}			3987		
Reverse Transfer Capacitance	C _{RSS}			53.9		
Total Gate Charge	Q _{G(TOT)}	$V_{DD} = 32 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 6 \text{ V}$		60.5		nC
Total Gate Charge	Q _{G(TOT)}	$V_{DD} = 32 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 10 \text{ V}$		97.9		
Threshold Gate Charge	Q _{G(TH)}			18.2		
Gate-to-Source Charge	Q _{GS}			27.4		
Gate-to-Drain Charge	Q_{GD}			18.5		
Gate Resistance	R_{G}	f = 1 MHz		0.47		Ω
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	Resistive Load, V _{GS} = 0/10 V,		8.64		ns
Rise Time	t _r	$V_{DD} = 32 \text{ V}, I_D = 50 \text{ A}, R_G = 0 \Omega$		7.02		
Turn-Off Delay Time	t _{d(OFF)}			13.7		
Fall Time	t _f			6.85		
SOURCE-TO-DRAIN DIODE CHARACTE	RISTICS					
Forward Diode Voltage	V _{SD}	$I_S = 50 \text{ A}, V_{GS} = 0 \text{ V}, T_J = 25^{\circ}\text{C}$		0.8	1.2	V
		I _S = 50 A, V _{GS} = 0 V, T _J = 125°C		0.65		1
Reverse Recovery Time	t _{RR}	$V_{GS} = 0 \text{ V, } I_{S} = 50 \text{ A,}$		101		ns
Charge Time	ta	dI/dt = 100 A/μs, V _{DD} = 32 V		56.9		
Discharge Time	t _b			44.8		1
Reverse Recovery Charge	Q _{RR}	1		286		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.

The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

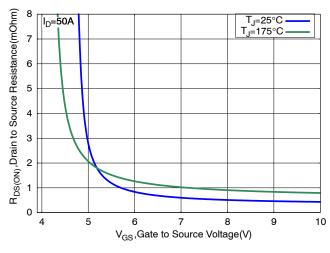
TYPICAL CHARACTERISTICS



1000 $V_{DS} = 5\dot{V}$ 900 800 I_D, Drain Current(A) 700 600 500 400 300 200 T_{J=-55°C}-T_{J=25°C}-100 T_{.I}=175°C 0 3 6 V_{GS},Gate to Source Voltage(V)

Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics



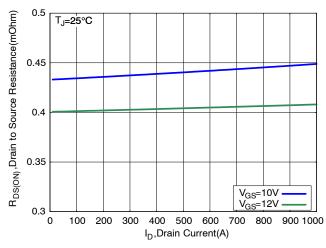
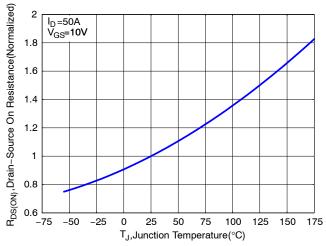


Figure 3. On-Resistance vs. Gate Voltage

Figure 4. On-Resistance vs. Drain Current





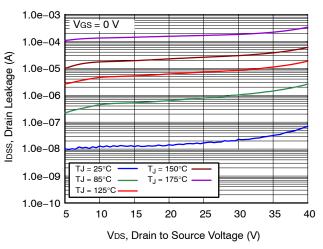


Figure 6. Drain Leakage vs. Drain to Source Voltage

TYPICAL CHARACTERISTICS (continued)

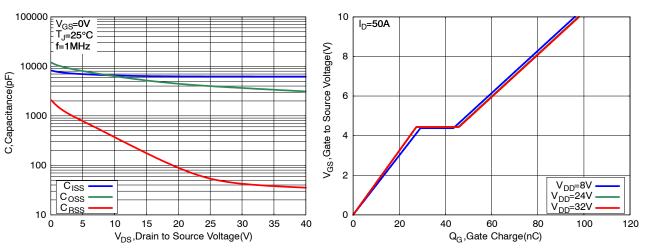


Figure 7. Capacitance Characteristics

Figure 8. Gate Charge Characteristics

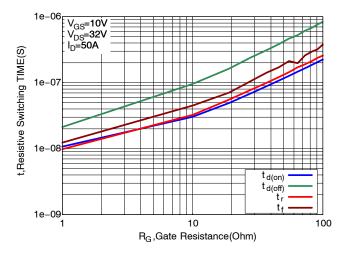


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

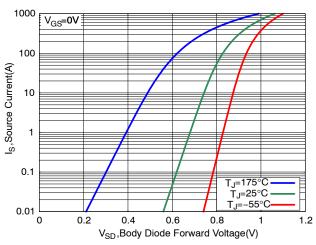


Figure 10. Diode Forward Characteristics

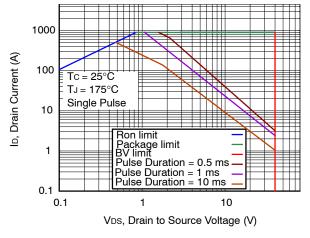


Figure 11. Maximum Rated Forward Biased Safe Operating Area

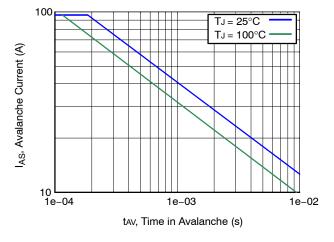


Figure 12. Ipeak vs. Time in Avalanche

TYPICAL CHARACTERISTICS (continued)

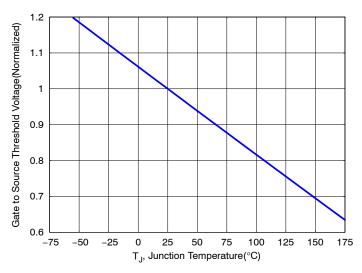


Figure 13. Gate Threshold Voltage vs. Junction Temperature

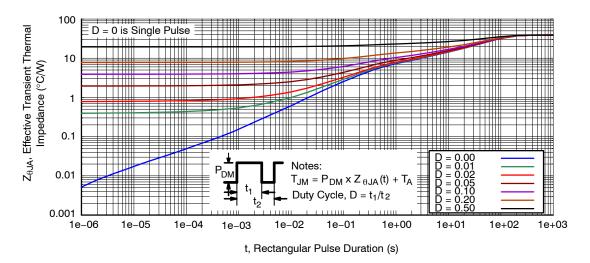


Figure 14. Thermal Characteristics

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NVMFWS0D5N04XMT1G	0D5N4W	DFNW5 (Pb-Free)	1500 / Tape & Reel

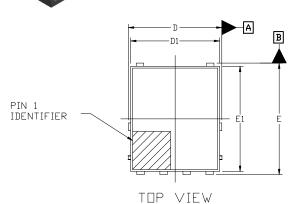
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

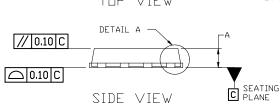


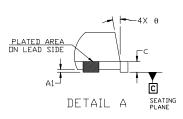
DFNW5 5x6, FULL-CUT SO8FL WF

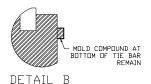
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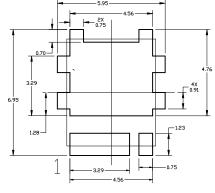




NOTES

- TES:
 DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
 CONTROLLING DIMENSION: MILLIMETERS
 DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH,
 PROTRUSIONS, OR GATE BURRS.
 THIS PACKAGE CONTAINS WETTABLE FLANK DESIGN
 FEATURES TO AID IN FILLET FORMATION ON THE LEADS
 DURING MOUNTING.

	MILLIMETERS		
DIM	MIN.	N□M.	MAX.
А	0.90	1.00	1.10
A1	0.00		0.05
b	0.33	0.41	0.51
C	0.23	0.28	0.33
D	5.00	5.15	5.30
D1	4.80	5.00	5.20
D2	3.90	4.10	4.30
E	6.00	6.15	6.30
E1	5.70	5.90	6.10
E2	3.55	3.75	3,95
е		1.27 BSC	;
G	0.50	0.55	0.70
G1	0.26	0.36	0.46
k	1.10	1.25	1.40
L	0.50	0.60	0.70
L1	0.150 REF		
М	3.00	3.40	3.80
θ	0°		12°



RECOMMENDED MOUNTING FOOTPRINT

For additional information on our Pb-Free strategy and soldering details, please download the DN Semiconductor Soldering and Mounting Techniques Reference Manual, SBLDERRM/D.

8X b- 	e e
G1	1 DETAIL
PIN 5 E2 (EXPOSED PAD)	D2 L1
	BOTTOM VIEW

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code

Α = Assembly Location

Υ = Year

W = Work Week

ΖZ = Assembly Lot *This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may

not follow the Generic Marking.

В

DOCI	INTENT	NUMBER:
DUC		NUMBER:

98AON31027H

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DESCRIPTION:

DFNW5 5x6, FULL-CUT SO8FL WF

PAGE 1 OF 1

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