MOSFET – Power, Single N-Channel, μ 8FL 30 V, 5.9 m Ω , 55 A

Features

- Low R_{DS(on)} to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- NVTFS4C08NWF Wettable Flanks Product
- NVT Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

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

Param	Symbol	Value	Unit		
Drain-to-Source Voltage	V_{DSS}	30	V		
Gate-to-Source Voltage			V _{GS}	±20	V
Continuous Drain Current R _{0.1A}		T _A = 25°C	I _D	17	Α
(Notes 1, 2, 4)		T _A = 100°C		12	
Power Dissipation R _{θJA}		T _A = 25°C	P_{D}	3.1	W
(Note 1, 2, 4)	Steady	T _A = 100°C		1.6	
Continuous Drain Current R _{0JC} (Note 1,	State	T _A = 25°C	I _D	55	
3, 4)		T _A = 100°C		39	Α
Power Dissipation		T _A = 25°C	P_{D}	31	W
R _{θJC} (Note 1, 3, 4)		T _A = 100°C		15	
Pulsed Drain Current $T_A = 25^{\circ}C$, $t_p = 10 \mu s$			I _{DM}	253	Α
Operating Junction and S	T _J , T _{stg}	–55 to +175	°C		
Source Current (Body Die	I _S	28	Α		
Single Pulse Drain-to-Source Avalanche Energy $(T_J = 25^{\circ}C, I_L = 20 A_{pk}, L = 0.1 \text{ mH})$			E _{AS}	20	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.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State (Drain) (Notes 1 and 4)	$R_{\theta JC}$	4.9	°C/W
Junction-to-Ambient - Steady State (Notes 1 and 2)	$R_{\theta JA}$	48	0/11

- 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.
- Assumes heat-sink sufficiently large to maintain constant case temperature independent of device power.
- Continuous DC current rating. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

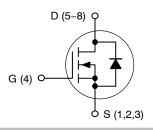


ON Semiconductor®

http://onsemi.com

V _{(BR)DSS}	R _{DS(on)} MAX	I _D MAX	
30 V	5.9 mΩ @ 10 V	55 A	
30 V	9.0 mΩ @ 4.5 V	33 A	

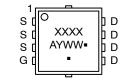
N-Channel MOSFET





CASE 511AB

MARKING DIAGRAM



4C08 = Specific Device Code for

NVMTS4C08N

08WF = Specific Device Code of

NVTFS4C08NWF

A = Assembly Location

/ = Year

WW = Work Week

= Pb-Free Package
 (Note: Microdot may be in either location)

ORDERING INFORMATION

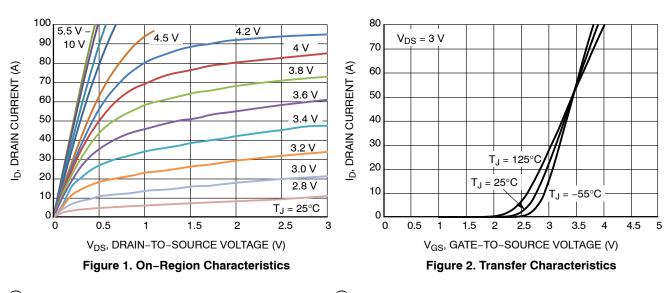
See detailed ordering and shipping information on page 5 of this data sheet.

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}C$ unless otherwise specified)

OFF CHARACTERISTICS Vigriposs V _{GS} = 0 V, I _D = 250 μA 30 V Drain-10Source Breakdown Voltage Temperature Coefficient Properture Coefficient Pr	Parameter	Symbol	Test Condition		Min	Тур	Max	Unit	
Design Continue	OFF CHARACTERISTICS								
Temperature Coefficient Tourish Tourish	Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA		30			V	
A		V _{(BR)DSS} /				13.8		mV/°C	
A	Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V,	T _J = 25°C			1.0		
ON CHARACTERISTICS (Note 5) VGS(TH)/TJ VGS = VDS, ID = 250 μA 1.3 2.2 V Negative Threshold Temperature Coefficient Drain-to-Source On Resistance RDS(m) VGS = 10 V ID = 30 A 4.7 5.9 mV/°C Drain-to-Source On Resistance RDS(m) VGS = 10 V ID = 18 A 7.2 9.0 MC Forward Transconductance BFS VDS = 1.5 V, ID = 15 A 42 42 N S Gate Resistance RG TA = 25° V 1.0 42 N S C4RAGES AND CAPACITANCES CIBS VGS = 0 V, I = 1 MHz, VDS = 15 V 1113 N PF Reverse Transfer Capacitance CRSS VGS = 0 V, VDS = 15 V, I = 1 MHz, VDS = 15 V 0.035 T Reverse Transfer Capacitance CRSS VGS = 0 V, VDS = 15 V, I = 1 MHz, VDS = 15 V 0.035 T Threshold Gate Charge QG(TtH) VGS = 0 V, VDS = 15 V, ID = 30 A 3.3 T NC Gate Charge QG(TtH) VGS = 0 V, VDS = 15 V, ID = 30 A 1.82 V N N Total Gate Charge<			V _{DS} = 24 V	T _J = 125°C			10	μΑ	
Negative Threshold Voltage Vas(π) Vas = V	Gate-to-Source Leakage Current	I _{GSS}	$V_{DS} = 0 V, V_{GS}$	= ±20 V			±100	nA	
Negative Threshold Temperature Coefficient V _{GS(TH)} /T _J V _{GS} = 10 V D _B = 30 A 4.7 5.9 mΩ C S S S S S S S S S	ON CHARACTERISTICS (Note 5)								
Description	Gate Threshold Voltage	V _{GS(TH)}	$V_{GS} = V_{DS}, I_D =$	= 250 μΑ	1.3		2.2	V	
Forward Transconductance 9Fs V _{GS} = 4.5 V I _D = 18 A 7.2 9.0 Poward Transconductance 9Fs V _{DS} = 1.5 V, I _D = 15 A 42 S S	Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J				5.0		mV/°C	
V _{GS} = 4.5 V I _D = 18 A 7.2 9.0	Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 30 A		4.7	5.9	0	
Cate Resistance Rg TA = 25°C 1.0 Ω Ω			V _{GS} = 4.5 V	I _D = 18 A		7.2	9.0	m Ω	
The property is a content of the prepresentation of the property is a content of the property is a c	Forward Transconductance	9 _{FS}	V _{DS} = 1.5 V, I _D	₎ = 15 A		42		S	
Input Capacitance	Gate Resistance	R_{G}	T _A = 25°0	С		1.0		Ω	
Output Capacitance Coss Caps VGS = 0 V, f = 1 MHz, VDS = 15 V 702 pF Reverse Transfer Capacitance CRSS 39 30	CHARGES AND CAPACITANCES								
Reverse Transfer Capacitance C	Input Capacitance	C _{ISS}				1113			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Output Capacitance	Coss	V _{GS} = 0 V, f = 1 MH;	z, V _{DS} = 15 V		702		pF	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Reverse Transfer Capacitance	C _{RSS}	1			39			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Capacitance Ratio	C _{RSS} /C _{ISS}	V _{GS} = 0 V, V _{DS} = 15 V, f = 1 MHz			0.035			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Total Gate Charge	Q _{G(TOT)}				8.4		nC	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Threshold Gate Charge	Q _{G(TH)}	1			1.8			
Gate Plateau Voltage V _{GP} 3.4 V Total Gate Charge $Q_{G(TOT)}$ $V_{GS} = 10 \text{ V}, V_{DS} = 15 \text{ V}; I_D = 30 \text{ A}$ 18.2 nC SWITCHING CHARACTERISTICS (Note 6) Turn-On Delay Time $t_{d(ON)}$ $V_{GS} = 4.5 \text{ V}, V_{DS} = 15 \text{ V}, I_D = 30 \text{ A}$ 9.0 9.0	Gate-to-Source Charge	Q_{GS}	V _{GS} = 4.5 V, V _{DS} = 1	5 V; I _D = 30 A		3.5			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Gate-to-Drain Charge	Q_{GD}	1			3.3			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Gate Plateau Voltage	V_{GP}	1			3.4		V	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 15 V; I _D = 30 A			18.2		nC	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	SWITCHING CHARACTERISTICS (Note 6)					•		•	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Turn-On Delay Time	t _{d(ON)}				9.0			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Rise Time	t _r	VGS = 4.5 V. VDS	s = 15 V.		33		ns ns	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Turn-Off Delay Time	t _{d(OFF)}	I _D = 15 A, R _G =	= 3.0 Ω		15			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Fall Time	t _f	1			4.0			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Turn-On Delay Time	t _{d(ON)}	V_{GS} = 10 V, V_{DS} = 15 V, I_{D} = 15 A, R_{G} = 3.0 Ω			7.0			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Rise Time					26		- ns	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Turn-Off Delay Time	t _{d(OFF)}				19			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Fall Time					3.0			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	DRAIN-SOURCE DIODE CHARACTERISTICS								
	Forward Diode Voltage	V_{SD}	VGS - 0 V,			0.79	1.1		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						0.66		1 '	
Discharge Time t_b $l_S = 30 \text{ A}$ 13.8	Reverse Recovery Time	t _{RR}				28.3			
Discharge Time t _b Is = 30 A 13.8	Charge Time					14.5		ns	
Reverse Recovery Charge Q _{RR} 15.3 nC	Discharge Time					13.8			
	Reverse Recovery Charge	Q_{RR}				15.3		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. 5. Pulse Test: pulse width $\leq 300~\mu s$, duty cycle $\leq 2\%$. 6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS



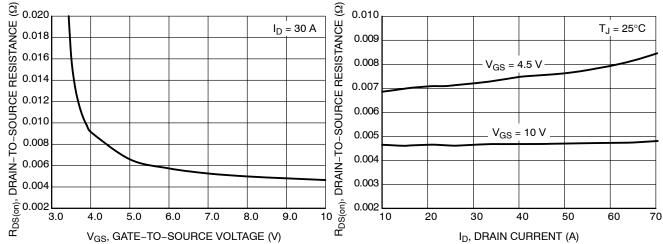


Figure 3. On-Resistance vs. V_{GS}

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

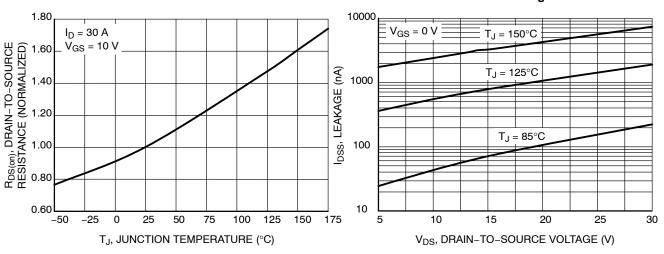


Figure 5. On–Resistance Variation with Temperature

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

TYPICAL CHARACTERISTICS

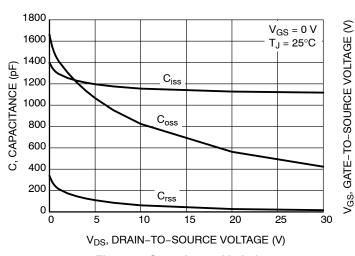


Figure 7. Capacitance Variation

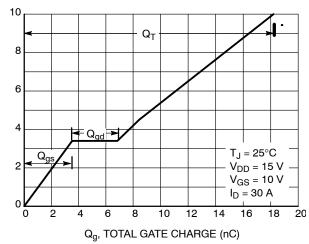


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

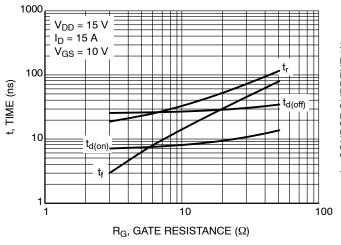


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

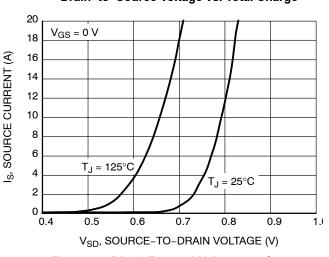


Figure 10. Diode Forward Voltage vs. Current

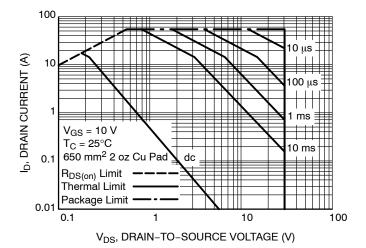


Figure 11. Maximum Rated Forward Biased Safe Operating Area

TYPICAL CHARACTERISTICS

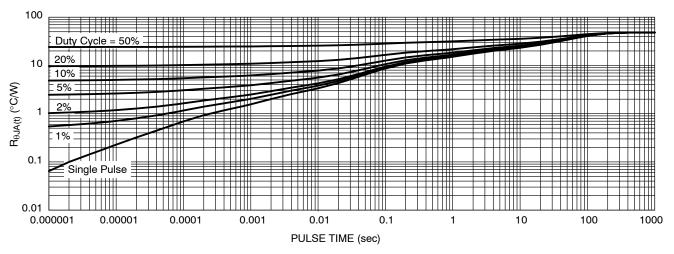


Figure 12. Thermal Response

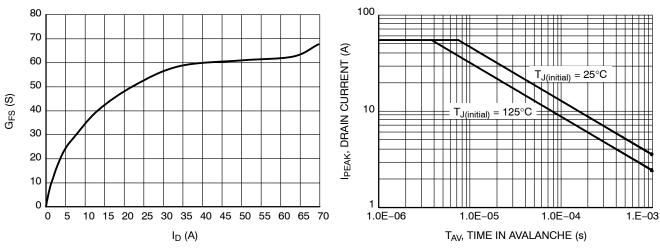


Figure 13. G_{FS} vs. I_D

Figure 14. Avalanche Characteristics

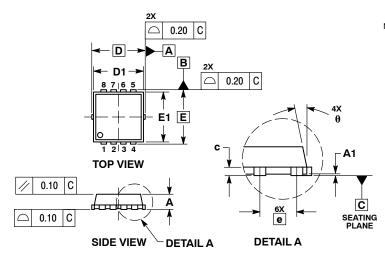
ORDERING INFORMATION

Device	Package	Shipping [†]
NVTFS4C08NTAG	WDFN8 (Pb-Free)	1500 / Tape & Reel
NVTFS4C08NWFTAG	WDFN8 (Pb-Free)	1500 / Tape & Reel
NVTFS4C08NTWG	WDFN8 (Pb-Free)	5000 / Tape & Reel
NVTFS4C08NWFTWG	WDFN8 (Pb-Free)	5000 / 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

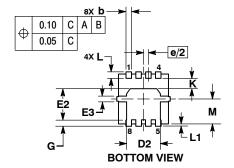
WDFN8 3.3x3.3, 0.65P CASE 511AB ISSUE D



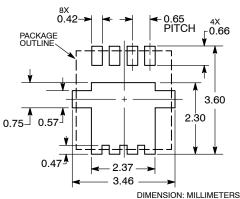
NOTES:

- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994. 2. CONTROLLING DIMENSION: MILLIMETERS.
- DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00		0.05	0.000		0.002
b	0.23	0.30	0.40	0.009	0.012	0.016
С	0.15	0.20	0.25	0.006	0.008	0.010
D		3.30 BSC		0	.130 BSC)
D1	2.95	3.05	3.15	0.116	0.120	0.124
D2	1.98	2.11	2.24	0.078	0.083	0.088
E	3.30 BSC			0	.130 BSC)
E1	2.95	3.05	3.15	0.116	0.120	0.124
E2	1.47	1.60	1.73	0.058	0.063	0.068
E3	0.23	0.30	0.40	0.009	0.012	0.016
е	0.65 BSC			0.026 BSC		
G	0.30	0.41	0.51	0.012 0.016 0.		0.020
K	0.65	0.80	0.95	0.026	0.032	0.037
L	0.30	0.43	0.56	0.012	0.017	0.022
L1	0.06	0.13	0.20	0.002	0.005	0.008
М	1.40	1.50	1.60	0.055	0.059	0.063
θ	0 °		12 °	0 °		12 °



SOLDERING FOOTPRINT*



*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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