# MOSFET – Power, Single, N-Channel, μ8FL 30 V, 67 A

#### **Features**

- Low R<sub>DS(on)</sub> to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

#### **Applications**

- DC-DC Converters
- Power Load Switch
- Notebook Battery Management

#### MAXIMUM RATINGS (T<sub>J</sub> = 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		T <sub>A</sub> = 25°C	I <sub>D</sub>	18	Α
Current R <sub>θJA</sub> (Note 1)		T <sub>A</sub> = 85°C		13	
Power Dissipation $R_{\theta JA}$ (Note 1)		T <sub>A</sub> = 25°C	P <sub>D</sub>	2.16	W
Continuous Drain		T <sub>A</sub> = 25°C	I <sub>D</sub>	25.6	Α
Current R <sub>θJA</sub> ≤ 10 s (Note 1)		T <sub>A</sub> = 85°C		18.5	
Power Dissipation $R_{\theta JA} \le 10 \text{ s (Note 1)}$	Steady	T <sub>A</sub> = 25°C	P <sub>D</sub>	4.4	W
Continuous Drain	State	T <sub>A</sub> = 25°C	I <sub>D</sub>	11	Α
Current R <sub>θJA</sub> (Note 2)		T <sub>A</sub> = 85°C	1	8	
Power Dissipation $R_{\theta JA}$ (Note 2)		T <sub>A</sub> = 25°C	P <sub>D</sub>	0.81	W
Continuous Drain		T <sub>C</sub> = 25°C	I <sub>D</sub>	67	Α
Current R <sub>θJC</sub> (Note 1)		T <sub>C</sub> = 85°C		49	
Power Dissipation $R_{\theta JC}$ (Note 1)		T <sub>C</sub> = 25°C	P <sub>D</sub>	31	W
Pulsed Drain Current $T_A = 25^{\circ}C$ , $t_p = 10 \mu s$			$I_{DM}$	166	Α
Operating Junction and Storage Temperature			T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C
Source Current (Body Die	Source Current (Body Diode)			28	Α
Drain to Source dV/dt			dV/dt	7	V/ns
Single Pulse Drain-to-So $(T_J=25^{\circ}C,V_{DD}=50V,V_{DD}=50V,V_{DD}=0.1$ mH, $R_G=25\Omega)$	$I_{GS} = 10 \text{ V},$		E <sub>AS</sub>	68	mJ
Lead Temperature for So (1/8" from case for 10 s)	ldering Pur	poses	T <sub>L</sub>	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. Surface-mounted on FR4 board using 1 sq-in pad, 1 oz Cu.

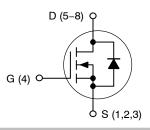


#### ON Semiconductor®

#### http://onsemi.com

V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub> MAX	I <sub>D</sub> MAX
30 V	4.2 mΩ @ 10 V	67 A
30 V	6.1 mΩ @ 4.5 V	07 A

#### **N-Channel MOSFET**





#### WDFN8 (μ8FL) CASE 511AB



4C06 = Specific Device Code A = Assembly Location Y = Year

Y = Year

WW = Work Week

= Pb-Free Package

(Note: Microdot may be in either location)

#### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
NTTFS4C06NTAG	WDFN8 (Pb-Free)	1500 / Tape & Reel
NTTFS4C06NTWG	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 Specification Brochure, BRD8011/D.

- 2. Surface-mounted on FR4 board using the minimum recommended pad size.
- 3. This is the absolute maximum ratings. Parts are 100% tested at  $T_J=25^{\circ}C$ ,  $V_{GS}=10$  V,  $I_L=20$  A,  $E_{AS}=20$  mJ.

#### THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{ heta JC}$	4.1	
Junction-to-Ambient - Steady State (Note 4)	$R_{ heta JA}$	58	°C/W
Junction-to-Ambient - Steady State (Note 5)	$R_{ heta JA}$	154.3	*C/VV
Junction-to-Ambient – (t ≤ 10 s) (Note 4)	$R_{ hetaJA}$	28.3	

- 4. Surface-mounted on FR4 board using 1 sq-in pad, 1 oz Cu.
- 5. Surface-mounted on FR4 board using the minimum recommended pad size.

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

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS						•	•
Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$		30			V
Drain-to-Source Breakdown Voltage (transient)	V <sub>(BR)DSSt</sub>	$V_{GS} = 0 \text{ V}, I_{D(aval)} = 12.6 \text{ A},$ $T_{case} = 25^{\circ}\text{C}, t_{transient} = 100 \text{ ns}$		34			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> / T <sub>J</sub>				14.4		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{GS} = 0 \text{ V}, \qquad T_{J} = 25^{\circ}\text{C}$				1.0	
		V <sub>DS</sub> = 24 V	$V_{DS} = 24 \text{ V}$ $T_{J} = 125^{\circ}\text{C}$			10	μΑ
Gate-to-Source Leakage Current	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$				±100	nA
ON CHARACTERISTICS (Note 6)						•	•
Gate Threshold Voltage	V <sub>GS(TH)</sub>	$V_{GS} = V_{DS}, I_D = 250 \mu A$		1.3		2.2	V
Negative Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>				3.8		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 30 A		3.4	4.2	mΩ
		V <sub>GS</sub> = 4.5 V	I <sub>D</sub> = 30 A		4.9	6.1	
Forward Transconductance	9FS	V <sub>DS</sub> = 1.5 V, I <sub>D</sub> = 15 A			58		S
Gate Resistance	$R_{G}$	T <sub>A</sub> = 25°C			1.0		Ω
CHARGES AND CAPACITANCES						•	•
Input Capacitance	C <sub>ISS</sub>				1683	3366	
Output Capacitance	C <sub>OSS</sub>	V <sub>GS</sub> = 0 V, f = 1 MHz, V <sub>DS</sub> = 15 V			841	1682	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>				40		
Capacitance Ratio	C <sub>RSS</sub> /C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 15	V, f = 1 MHz		0.023		
Total Gate Charge	Q <sub>G(TOT)</sub>				11.6	16.2	
Threshold Gate Charge	Q <sub>G(TH)</sub>				2.6	3.6	
Gate-to-Source Charge	$Q_{GS}$	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 1	5 V; I <sub>D</sub> = 30 A		4.7	6.6	nC
Gate-to-Drain Charge	$Q_{GD}$				4.0	5.6	
Gate Plateau Voltage	V <sub>GP</sub>				3.1		V
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 15 V; I <sub>D</sub> = 30 A			26	36	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.

- 6. Pulse Test: pulse width  $\leq$  300  $\mu$ s, duty cycle  $\leq$  2%.
- 7. Switching characteristics are independent of operating junction temperatures.

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

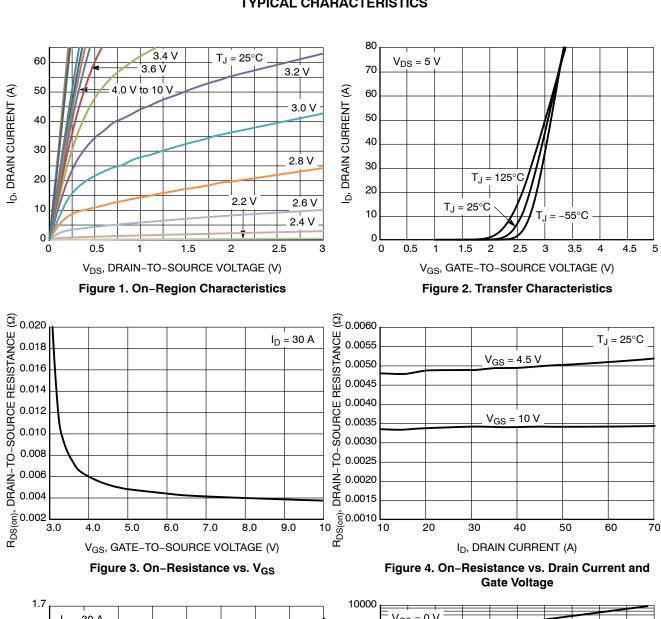
Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
SWITCHING CHARACTERISTICS (N	lote 7)					•	
Turn-On Delay Time	t <sub>d(ON)</sub>				10		
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub>	s = 15 V,		32		
Turn-Off Delay Time	t <sub>d(OFF)</sub>	$V_{GS} = 4.5 \text{ V}, V_{DS} = 15 \text{ V},$ $I_{D} = 15 \text{ A}, R_{G} = 3.0 \Omega$			18		ns
Fall Time	t <sub>f</sub>				5.0		
Turn-On Delay Time	t <sub>d(ON)</sub>	$V_{GS}$ = 10 V, $V_{DS}$ = 15 V, $I_{D}$ = 15 A, $R_{G}$ = 3.0 $\Omega$			8.0		
Rise Time	t <sub>r</sub>				28		
Turn-Off Delay Time	t <sub>d(OFF)</sub>	I <sub>D</sub> = 15 A, R <sub>G</sub> =	= 3.0 Ω		24		ns
Fall Time	t <sub>f</sub>	1			3.0		
DRAIN-SOURCE DIODE CHARACT	ERISTICS					•	
Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0 \text{ V},$ $T_{J} = 25^{\circ}\text{C}$			0.8	1.1	.,
		1 40 4	T <sub>J</sub> = 125°C		0.63		V
Reverse Recovery Time	t <sub>RR</sub>				34		
Charge Time	t <sub>a</sub>	$V_{GS}$ = 0 V, dIS/dt = 100 A/ $\mu$ s, I <sub>S</sub> = 30 A			17		ns
Discharge Time	t <sub>b</sub>				17		
Reverse Recovery Charge	Qpp			22		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.

6. Pulse Test: pulse width  $\leq 300~\mu s$ , duty cycle  $\leq 2\%$ .

7. Switching characteristics are independent of operating junction temperatures.

#### TYPICAL CHARACTERISTICS



I<sub>D</sub> = 30 A  $V_{GS} = 0 V$ 1.6  $V_{GS} = 10 V$ \_ Т<sub>Ј</sub> = 150°С RESISTANCE (NORMALIZED)

O C I I C F F C DSS, LEAKAGE (nA) 1000  $T_J = 125^{\circ}C$ 100 T<sub>J</sub> = 85°C 0.7 10 -25 0 25 50 75 100 5 10 15 20 25 -50 125 30 150 T<sub>J</sub>, JUNCTION TEMPERATURE (°C) V<sub>DS</sub>, DRAIN-TO-SOURCE VOLTAGE (V)

Figure 5. On-Resistance Variation with **Temperature** 

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

#### **TYPICAL CHARACTERISTICS**

V<sub>GS</sub>, GATE-TO-SOURCE VOLTAGE (V)

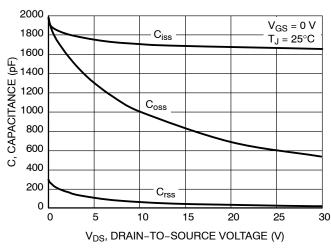


Figure 7. Capacitance Variation

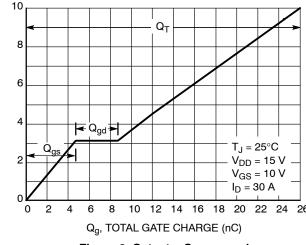


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

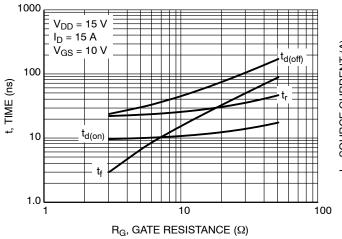


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

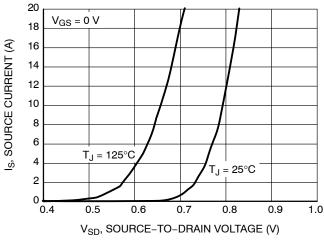


Figure 10. Diode Forward Voltage vs. Current

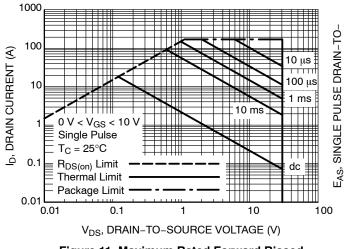


Figure 11. Maximum Rated Forward Biased Safe Operating Area

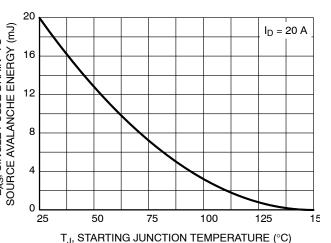


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

#### **TYPICAL CHARACTERISTICS**

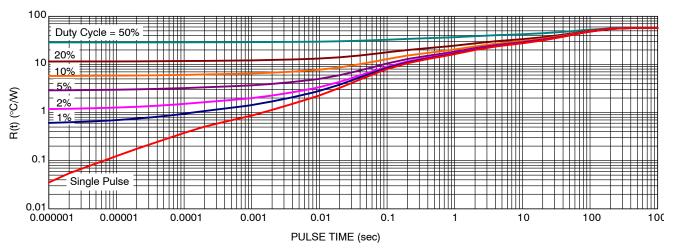


Figure 13. Thermal Response

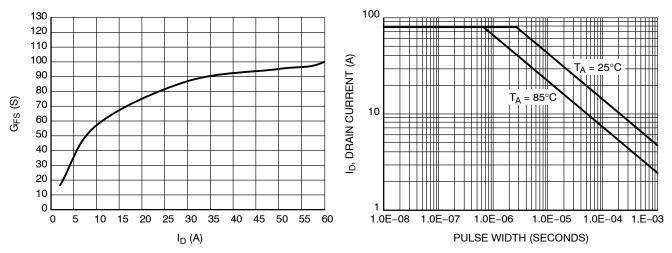
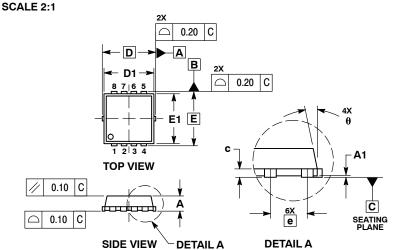


Figure 14. G<sub>FS</sub> vs. I<sub>D</sub> Figure 15. Avalanche Characteristics



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

**DATE 23 APR 2012** 



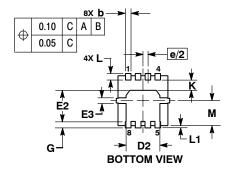
#### NOTES:

0.75 0.57

0.47

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

	MI	LLIMETE	RS		<b>INCHES</b>		
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 BS0	2	
G	0.30	0.41	0.51	0.012	0.016	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 °	



#### **GENERIC MARKING DIAGRAM\***



XXXXX = Specific Device Code = Assembly Location

= Year WW = Work Week = Pb-Free Package

\*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.

## <sub>[</sub>0.66 PACKAGE OUTLINE 3.60

**SOLDERING FOOTPRINT\*** 

DIMENSION: MILLIMETERS

2.30

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

3.46

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