Power MOSFET

30 V, 210 A, Single N-Channel, SO-8 FL

Features

- Low R_{DS(on)} to Improve Conduction and Overall Efficiency
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- OR-ing FET, Power Load Switch, Motor Control
- Refer to Application Note AND8195/D for Mounting Information

End Products

• Server, UPS, Fault-Tolerant Power Systems, Hot Swap

MAXIMUM RATINGS ($T_J = 25^{\circ}C$ unless otherwise stated)

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Parameter			Symbol	Value	Unit	
Drain-to-Source Voltage			V_{DSS}	30	V	
Gate-to-Source Voltage			V_{GS}	±20	V	
Continuous Drain		$T_A = 25^{\circ}C$	I _D	34	Α	
Current R _{θJA} (Note 1)		T _A = 100°C		21.5		
Power Dissipation $R_{\theta JA}$ (Note 1)		T _A = 25°C	P _D	2.74	W	
Continuous Drain		T _A = 25°C	I _D	43	Α	
Current $R_{\theta JA} \le 10 \text{ s}$ (Note 1)		T _A = 100°C		27		
Power Dissipation $R_{\theta JA} \le 10 \text{ s (Note 1)}$	Steady	T _A = 25°C	P _D	7.3	W	
Continuous Drain	State	T _A = 25°C	I _D	20	Α	
Current R _{θJA} (Note 2)		T _A = 100°C		12.5		
Power Dissipation R _{0JA} (Note 2)		T _A = 25°C	P _D	1.06	W	
Continuous Drain		T _C = 25°C	I _D	210	Α	
Current R _{θJC} (Note 1)		T _C =100°C		132		
Power Dissipation R _{θJC} (Note 1)		T _C = 25°C	P _D	104	W	
Pulsed Drain Current				400	Α	
Operating Junction and Storage Temperature			T _J , T _{STG}	–55 to +150	°C	
Source Current (Body Diode)			I _S	95	Α	
Drain to Source DV/DT			dV/d _t	4.4	V/ns	
Single Pulse Drain-to-Source Avalanche Energy (T_J = 25°C, V_{DD} = 24 V, V_{GS} = 10 V, I_L = 58 A_{pk} , L = 0.3 mH, R_G = 25 Ω)			E _{AS}	504	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			TL	260	°C	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

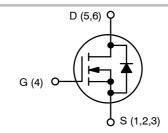
- 1. Surface-mounted on FR4 board using 1 sq-in pad, 1 oz Cu.
- Surface-mounted on FR4 board using the minimum recommended pad size. (Cu area = 50 mm² [1 oz])



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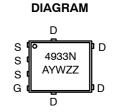
http://onsemi.com

V _{(BR)DSS}	R _{DS(ON)} MAX	I _D MAX
30 V	1.2 mΩ @ 10 V	210 A
30 V	2.0 mΩ @ 4.5 V	2107



N-CHANNEL MOSFET

SO-8 FLAT LEAD CASE 488AA STYLE 1



MARKING

A = Assembly Location Y = Year

W = Work Week ZZ = Lot Traceability

ORDERING INFORMATION

Device	Package	Shipping [†]
NTMFS4933NT1G	SO-8 FL (Pb-Free)	1500 / Tape & Reel
NTMFS4933NT3G	SO-8 FL (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.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{ heta JC}$	1.1	
Junction-to-Ambient - Steady State (Note 3)	$R_{\theta JA}$	45.6	°C/W
Junction-to-Ambient - Steady State (Note 4)	$R_{\theta JA}$	117.5	C/VV
Junction-to-Ambient - (t ≤ 10 s) (Note 3)	$R_{\theta JA}$	17.13	

- Surface-mounted on FR4 board using 1 sq-in pad, 1 oz Cu.
 Surface-mounted on FR4 board using the minimum recommended pad size. (Cu area = 50 mm² [1 oz])

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS	•			•			•
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$		30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /				15		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 24 V	T _J = 25°C			1.0	μΑ
			T _J = 125°C			10	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _G	_S = ±20 V			±100	nA
ON CHARACTERISTICS (Note 5)							
Gate Threshold Voltage	V _{GS(TH)}	$V_{GS} = V_{DS}, I_{D}$	= 250 μΑ	1.2	1.6	2.2	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J				4.0		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 30 A		0.9	1.2	mΩ
			I _D = 15 A		0.9		
		V _{GS} = 4.5 V	I _D = 30 A		1.5	2.0	
			I _D = 15 A		1.5		
Forward Transconductance	9FS	V _{DS} = 1.5 V, I _D = 15 A			82		S
CHARGES, CAPACITANCES & GATE RESIS	TANCE						
Input Capacitance	C _{ISS}				10930		
Output Capacitance	Coss	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 15 V			3230		pF
Reverse Transfer Capacitance	C _{RSS}				92		
Total Gate Charge	Q _{G(TOT)}				62.1		
Threshold Gate Charge	Q _{G(TH)}	V _{GS} = 4.5 V, V _{DS} = 15 V; I _D = 30 A			15.7		nC
Gate-to-Source Charge	Q_{GS}				27		
Gate-to-Drain Charge	Q_{GD}				10.1		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 15 V; I _D = 30 A			148		nC
SWITCHING CHARACTERISTICS (Note 6)					•		
Turn-On Delay Time	t _{d(ON)}	V_{GS} = 4.5 V, V_{DS} = 15 V, I_{D} = 15 A, R_{G} = 3.0 Ω			31		
Rise Time	t _r				33		1
Turn-Off Delay Time	t _{d(OFF)}				47		ns
Fall Time	t _f				23		1

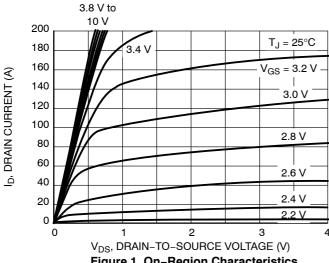
- 5. Pulse Test: pulse width \leq 300 μ s, duty cycle \leq 2%.
 6. Switching characteristics are independent of operating junction temperatures.

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

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
SWITCHING CHARACTERISTICS (N	ote 6)			•	•		
Turn-On Delay Time	t _{d(ON)}	V _{GS} = 10 V, V _{DS} = 15 V,			20		
Rise Time	t _r				26		
Turn-Off Delay Time	t _{d(OFF)}	$I_D = 15 A, R_G$	= 3.0 Ω		88.6		ns
Fall Time	t _f	1			22		1
DRAIN-SOURCE DIODE CHARACT	ERISTICS						
Forward Diode Voltage	V_{SD}	VGS = 0 V,	T _J = 25°C		0.82	1.1	V
			T _J = 125°C		0.68		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dIS/dt = 100 A/μs, I _S = 30 A			73.5		
Charge Time	t _a				35.9		ns
Discharge Time	t _b				37.6		
Reverse Recovery Charge	Q _{RR}				117		nC
PACKAGE PARASITIC VALUES					-		
Source Inductance	L _S	T _A = 25°C			0.50		nΗ
Drain Inductance	L _D				0.005		nΗ
Gate Inductance	L _G				1.84		nΗ
Gate Resistance	R_{G}				1.1	2.2	Ω

^{5.} Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS



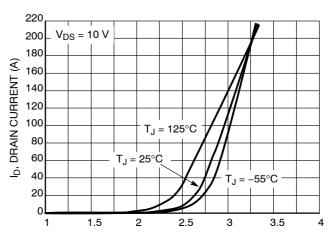
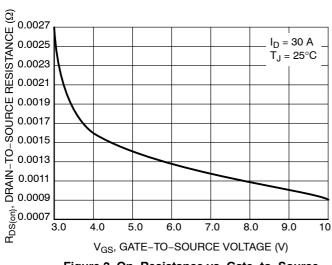


Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics



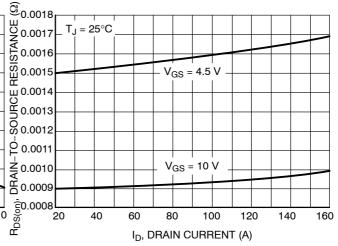
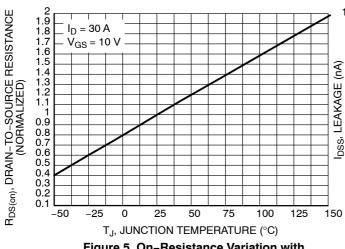
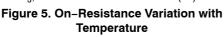


Figure 3. On-Resistance vs. Gate-to-Source Voltage

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





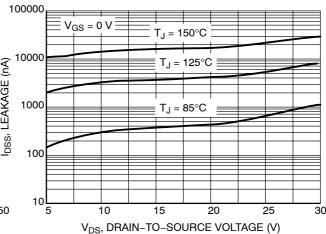
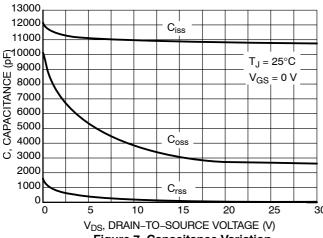


Figure 6. Drain-to-Source Leakage Current vs. Voltage

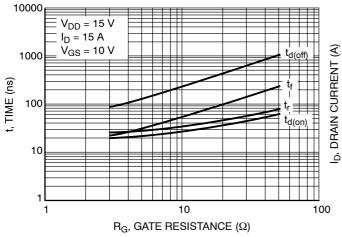
TYPICAL CHARACTERISTICS



10 V_{GS}, GATE-TO-SOURCE VOLTAGE (V) $T_J = 25^{\circ}C$ Q_{T} 6 5 4 QGS 3 Q_{GD} V_{DD} = 15 V 2 V_{GS} = 10 V $I_D = 30 A$ 20 60 80 100 QG, TOTAL GATE CHARGE (nC)

Figure 7. Capacitance Variation

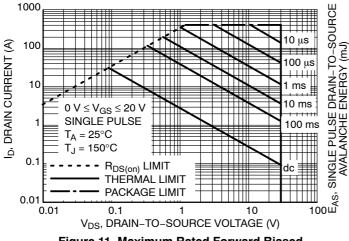
Figure 8. Gate-To-Source and Drain-To-Source Voltage vs. Total Charge



30 25 20 T_J = 125°C 15 10 5 0.4 0.5 0.6 0.7 0.8 0.9 1.0 V_{SD}, SOURCE-TO-DRAIN VOLTAGE (V)

Figure 9. Resistive Switching Time Variation vs. Gate Resistance

Figure 10. Diode Forward Voltage vs. Current



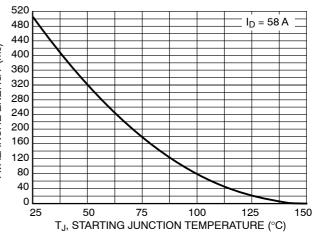


Figure 11. Maximum Rated Forward Biased Safe Operating Area

Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

TYPICAL CHARACTERISTICS

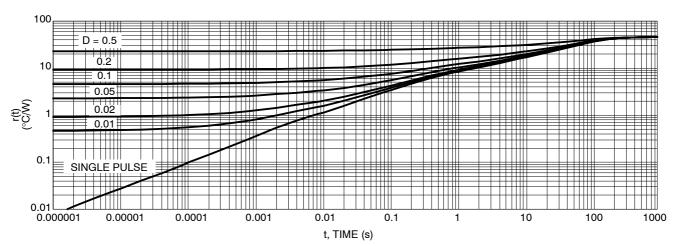


Figure 13. Thermal Response

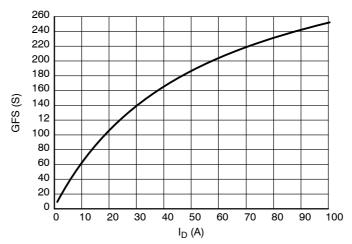
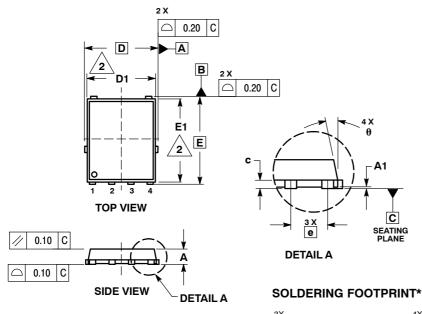


Figure 14. GFS vs. I_D

PACKAGE DIMENSIONS





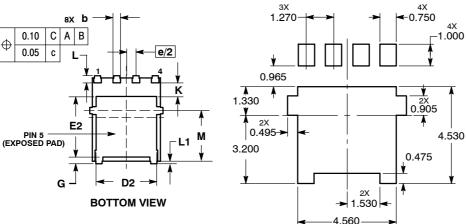
NOTES:

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

	MILLIMETERS				
DIM	MIN	NOM	MAX		
Α	0.90	1.00	1.10		
A1	0.00		0.05		
b	0.33	0.41	0.51		
С	0.23	0.28	0.33		
D		5.15 BSC	;		
D1	4.50	4.90	5.10		
D2	3.50		4.22		
E	6.15 BSC				
E1	5.50	5.80	6.10		
E2	3.45		4.30		
е	1.27 BSC				
G	0.51	0.61	0.71		
K	1.20	1.35	1.50		
L	0.51	0.61	0.71		
L1	0.05	0.17	0.20		
M	3.00	3.40	3.80		
θ	0 °		12 °		

- STYLE 1: PIN 1. SOURCE 2. SOURCE

 - 3. SOURCE GATE



*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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