Power MOSFET

30 V, 80 A, Single N-Channel, SO-8 FL

Features

- Low R_{DS(on)} 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

- CPU Power Delivery
- DC-DC Converters

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

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V_{DSS}	30	V
Gate-to-Source Voltage		V_{GS}	±20	V	
Continuous Drain Current R _{θJA} (Note 1)		$T_A = 25^{\circ}C$ $T_A = 80^{\circ}C$	I _D	22.5 16.8	Α
Power Dissipation $R_{\theta JA}$ (Note 1)		T _A = 25°C	P _D	2.59	W
Continuous Drain Current $R_{\theta JA} \le 10 \text{ s}$		T _A = 25°C	I _D	36	Α
(Note 1)		T _A = 80°C		27	
Power Dissipation $R_{\theta JA} \le 10 \text{ s (Note 1)}$	Steady	T _A = 25°C	P_{D}	6.65	W
Continuous Drain	State	T _A = 25°C	I _D	12.4	Α
Current R _{θJA} (Note 2)		T _A = 80°C	1	9.3	
Power Dissipation $R_{\theta JA}$ (Note 2)		T _A = 25°C	P_{D}	0.78	W
Continuous Drain		T _C = 25°C	I _D	80	Α
Current R _{θJC} (Note 1)		T _C =80°C		60	
Power Dissipation $R_{\theta JC}$ (Note 1)		T _C = 25°C	P_{D}	33	W
Pulsed Drain Current	$T_A = 25^{\circ}C, t_p = 10 \mu s$		I _{DM}	180	Α
Current Limited by Package T _A = 25°C			I _{Dmax}	80	Α
Operating Junction and Storage Temperature			T _J , T _{STG}	-55 to +150	°C
Source Current (Body Diode)			I _S	30	Α
Drain to Source dV/dt			dV/d _t	7.0	V/ns
Single Pulse Drain–to–Source Avalanche Energy ($T_J = 25$ °C, $V_{GS} = 10$ V, $I_L = 48$ A _{pk} , $L = 0.1$ mH, $R_{GS} = 25$ Ω) (Note 3)			E _{AS}	115	mJ
Lead Temperature for Soldering Purposes			T_L	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.

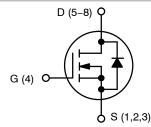
- 1. Surface-mounted on FR4 board using 1 sq-in pad, 1 oz Cu.
- 2. Surface-mounted on FR4 board using the minimum recommended pad size.
- 3. This is the absolute maximum ratings. Parts are 100% tested at T_J = 25°C, $V_{GS} = 10 \text{ V}, I_L = 29 \text{ A}, E_{AS} = 42 \text{ mJ}.$



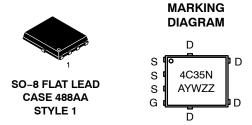
ON Semiconductor®

http://onsemi.com

V _{(BR)DSS}	R _{DS(ON)} MAX	I _D MAX
30 V	3.2 m Ω @ 10 V	80 A
30 V	4.0 mΩ @ 4.5 V	60 A



N-CHANNEL MOSFET



= Assembly Location Α = Year

= Work Week W 77 = Lot Traceabililty

ORDERING INFORMATION

Device	Package	Shipping [†]
NTMFS4C35NT1G	SO-8 FL (Pb-Free)	1500 / Tape & Reel
NTMFS4C35NT3G	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.

(1/8" from case for 10 s)

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{ heta JC}$	3.8	
Junction-to-Ambient - Steady State (Note 4)	$R_{\theta JA}$	48.3	°C/W
Junction-to-Ambient - Steady State (Note 5)	$R_{\theta JA}$	159.3	-C/VV
Junction-to-Ambient - (t ≤ 10 s) (Note 4)	$R_{\theta JA}$	18.8	

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

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

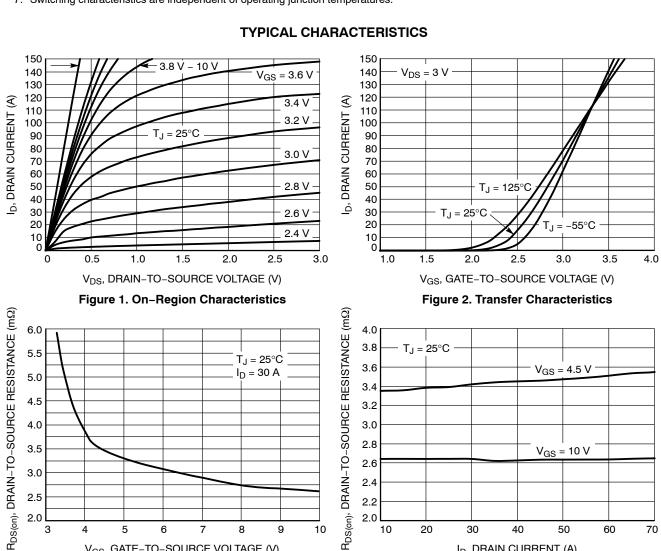
Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS	ı					ı	
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$		30			V
Drain-to-Source Breakdown Voltage (transient)	V _{(BR)DSSt}	$V_{GS} = 0 \text{ V}, I_{D(aval)} = 13.2 \text{ A},$ $T_{case} = 25^{\circ}\text{C}, t_{transient} = 100 \text{ ns}$		34			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /				12		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	SS $V_{GS} = 0 \text{ V}, T_{J} = 25^{\circ}\text{C}$ $V_{DS} = 24 \text{ V}$				1.0	
		V _{DS} = 24 V	T _J = 125°C			10	μΑ
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V				±100	nA
ON CHARACTERISTICS (Note 6)	•					•	•
Gate Threshold Voltage	V _{GS(TH)}	$V_{GS} = V_{DS}, I_D = 250 \mu A$		1.3		2.2	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J				5.0		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 30 A		2.56	3.2	mΩ
		V _{GS} = 4.5 V	I _D = 30 A		3.4	4.0	
Forward Transconductance	9FS	V _{DS} = 1.5 V, I _D = 15 A			50		S
Gate Resistance	R_{G}	T _A = 25°C			1.0		Ω
CHARGES AND CAPACITANCES						•	•
Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 15 V			2300		pF
Output Capacitance	C _{OSS}				1097		
Reverse Transfer Capacitance	C _{RSS}				46		
Capacitance Ratio	C _{RSS} /C _{ISS}	V _{GS} = 0 V, V _{DS} = 15 V, f = 1 MHz			0.02		
Total Gate Charge	Q _{G(TOT)}				15		
Threshold Gate Charge	Q _{G(TH)}	V _{GS} = 4.5 V, V _{DS} = 15 V; I _D = 30 A			3.3		nC
Gate-to-Source Charge	Q_{GS}				6.5		
Gate-to-Drain Charge	Q_{GD}				5.5		
Gate Plateau Voltage	V_{GP}				3.1		V
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 15 V; I _D = 30 A			32.5		nC
SWITCHING CHARACTERISTICS (Note 7)							
Turn-On Delay Time	t _{d(ON)}	$V_{GS} = 4.5 \text{ V}, V_{DS} = 15 \text{ V},$ $I_{D} = 15 \text{ A}, R_{G} = 3.0 \Omega$			12.6		
Rise Time	t _r				33		1
Turn-Off Delay Time	t _{d(OFF)}				21.4		ns
Fall Time	t _f				6.7		1

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

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

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
SWITCHING CHARACTERISTICS (N	ote 7)				•	•	•
Turn-On Delay Time	t _{d(ON)}	V_{GS} = 10 V, V_{DS} = 15 V, I_{D} = 15 A, R_{G} = 3.0 Ω			8.7		- ns
Rise Time	t _r				26		
Turn-Off Delay Time	t _{d(OFF)}				28		
Fall Time	t _f				4.4		
DRAIN-SOURCE DIODE CHARACT	ERISTICS				-		
Forward Diode Voltage	V_{SD}	V _{SD} V _{GS} = 0 V, I _S = 10 A	T _J = 25°C		0.8	1.1	.,
			T _J = 125°C		0.62		\ \
Reverse Recovery Time	t _{RR}	$V_{GS} = 0 \text{ V, } dI_{S}/dt = 100 \text{ A/}\mu\text{s,}$ $I_{S} = 30 \text{ A}$			41		
Charge Time	t _a				21		ns
Discharge Time	t _b				20		
Reverse Recovery Charge	Q_RR				30		nC

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



V_{GS}, GATE-TO-SOURCE VOLTAGE (V) Figure 3. On-Resistance vs. V_{GS}

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

I_D, DRAIN CURRENT (A)

TYPICAL CHARACTERISTICS

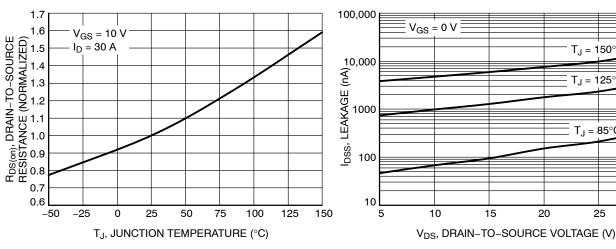


Figure 5. On-Resistance Variation with **Temperature**



 $T_J = 150^{\circ}C$

 $T_J=125^{\circ}C$

 $T_J = 85^{\circ}C$

30

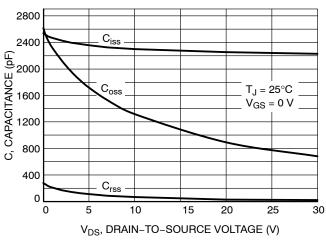


Figure 7. Capacitance Variation

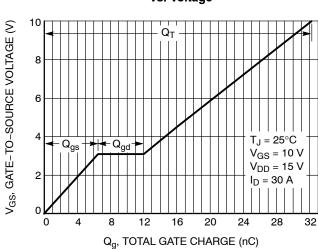


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

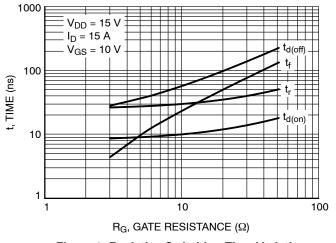


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

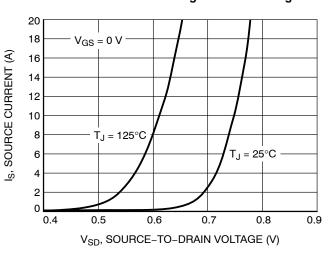
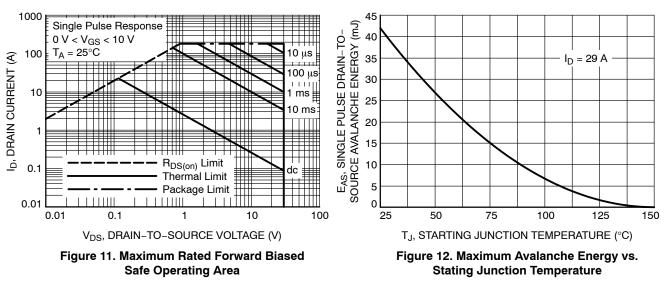


Figure 10. Diode Forward Voltage vs. Current

TYPICAL CHARACTERISTICS



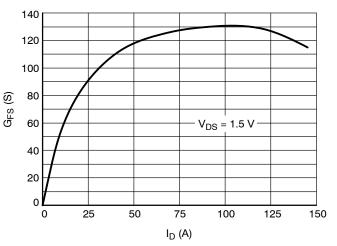
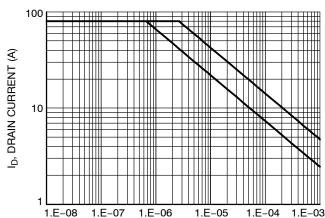


Figure 13. G_{FS} vs. I_D



PULSE WIDTH (sec)

Figure 14. Avalanche Characteristics

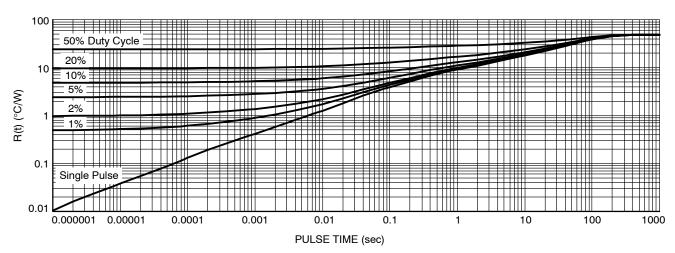
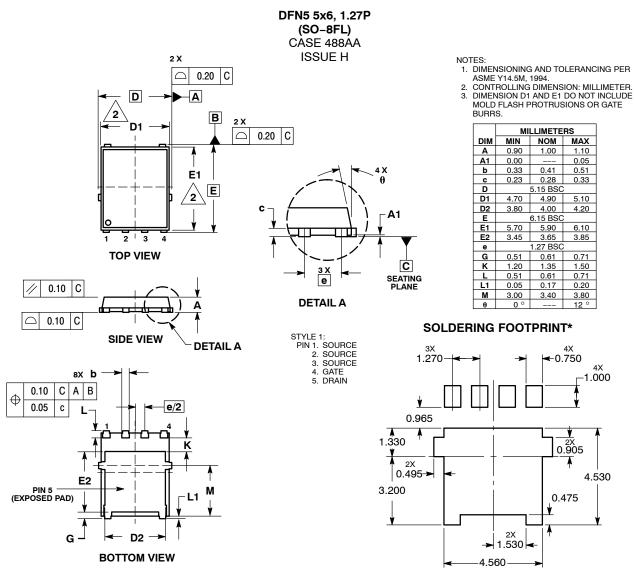


Figure 15. Thermal Response

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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