Power MOSFET

30 V, 52 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 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 $R_{\theta JA}$		$T_{A} = 25^{\circ}C$ $T_{A} = 80^{\circ}C$	Ι _D	16.4 12.3	А	
(Note 1) Power Dissipation R _{0JA} (Note 1)		$T_A = 25^{\circ}C$	P _D	2.51	w	
Continuous Drain Current $R_{\theta JA} \le 10 \text{ s}$ (Note 1)		T _A = 25°C T _A = 80°C	ID	25.3 19.0	A	
Power Dissipation $R_{\theta JA} \le 10 \text{ s} \text{ (Note 1)}$	Steady	T _A = 25°C	P _D	6.0	W	
Continuous Drain Current R _{θJA} (Note 2)	State	$T_A = 25^{\circ}C$ $T_A = 80^{\circ}C$	Ι _D	9.0 6.8	A	
Power Dissipation R _{0JA} (Note 2)		T _A = 25°C	P _D	0.76	W	
Continuous Drain Current R _{θJC} (Note 1)		T _C = 25°C T _C =80°C	Ι _D	52 39	A	
Power Dissipation $R_{\theta JC}$ (Note 1)		T _C = 25°C	PD	25.5	W	
Pulsed Drain Current	T _A = 25°C, t _p = 10 μs		I _{DM}	146	A	
Current Limited by Pa	ckage	T _A = 25°C	I _{Dmax}	80	А	
Operating Junction and Storage Temperature			T _J , T _{STG}	–55 to +150	°C	
Source Current (Body Diode)			ا _S	23	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 = 29 A _{pk} , L = 0.1 mH, R _{GS} = 25 Ω) (Note 3)			E _{AS}	42	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		ΤL	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.

2. Surface-mounted on FR4 board using the minimum recommended pad size.

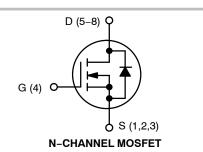
3. Parts are 100% tested at T_J = 25°C, \tilde{V}_{GS} = 10 V, I_L = 20 A_{pk}, EAS = 20 mJ.

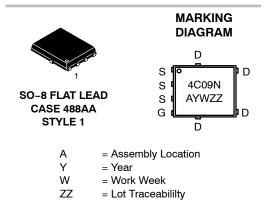


ON Semiconductor®

http://onsemi.com

V _{(BR)DSS}	R _{DS(ON)} MAX	I _D MAX
30 V	5.8 mΩ @ 10 V	52 A
30 V	8.5 mΩ @ 4.5 V	52 A





ORDERING INFORMATION

Device	Package	Shipping [†]
NTMFS4C09NT1G	SO-8 FL (Pb-Free)	1500 / Tape & Reel
NTMFS4C09NT3G	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)	$R_{ extsf{ heta}JC}$	4.9	
Junction-to-Ambient - Steady State (Note 4)	$R_{\theta JA}$	49.8	°C/W
Junction-to-Ambient - Steady State (Note 5)	$R_{\theta JA}$	164.6	-C/W
Junction-to-Ambient – (t \leq 10 s) (Note 4)	R_{\thetaJA}	21.0	

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		•					
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V_{GS} = 0 V, I_D = 250 μ A		30			V
Drain-to-Source Breakdown Voltage (transient)	V _{(BR)DSSt}	V_{GS} = 0 V, $I_{D(aval)}$ = 8.4 A, T_{case} = 25°C, $t_{transient}$ = 100 ns		34			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} / T _J				14.4		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	S V _{GS} = 0 V, V _{DS} = 24 V	$T_J = 25^{\circ}C$			1.0	
			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		2.1	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J				4.8		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 30 A		4.6	5.8	mΩ
		V _{GS} = 4.5 V	I _D = 18 A		6.8	8.5	
Forward Transconductance	9 _{FS}	V _{DS} = 1.5 V, I _D = 15 A			50		S
Gate Resistance	R _G	T _A = 25°C		0.3	1.0	2.0	Ω
CHARGES AND CAPACITANCES							
Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 15 V			1252		pF
Output Capacitance	C _{OSS}				610		
Reverse Transfer Capacitance	C _{RSS}				126		1
Capacitance Ratio	C _{RSS} /C _{ISS}	V _{GS} = 0 V, V _{DS} = 15 V, f = 1 MHz			0.101		
Total Gate Charge	Q _{G(TOT)}				10.9		
Threshold Gate Charge	Q _{G(TH)}				1.9		
Gate-to-Source Charge	Q _{GS}	V_{GS} = 4.5 V, V_{DS} = 15 V; I_{D} = 30 A			3.4		nC
Gate-to-Drain Charge	Q _{GD}				5.4		
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			22.2		nC
SWITCHING CHARACTERISTICS (Note 7)	-	-		-	-	-	-

Turn-On Delay Time t_{d(ON)} 10 **Rise Time** t_r 32 $\begin{array}{l} \mathsf{V}_{GS} = 4.5 \; \mathsf{V}, \, \mathsf{V}_{DS} = 15 \; \mathsf{V}, \\ \mathsf{I}_{D} = 15 \; \mathsf{A}, \, \mathsf{R}_{G} = 3.0 \; \Omega \end{array}$ ns Turn-Off Delay Time $t_{d(OFF)}$ 16 Fall Time 6.0 t_f

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

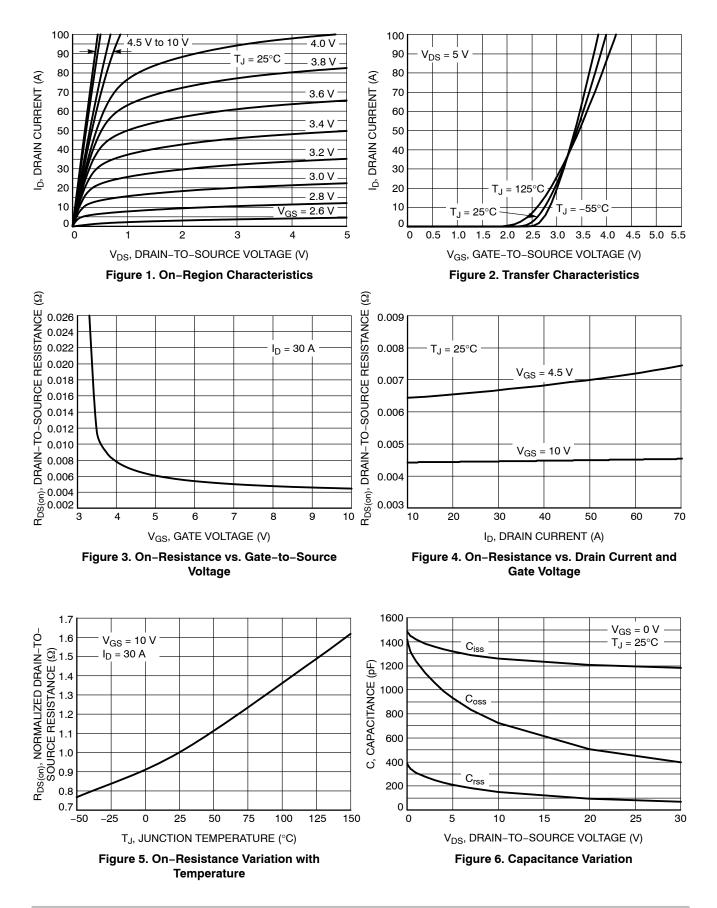
7. Switching characteristics are independent of operating junction temperatures.

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

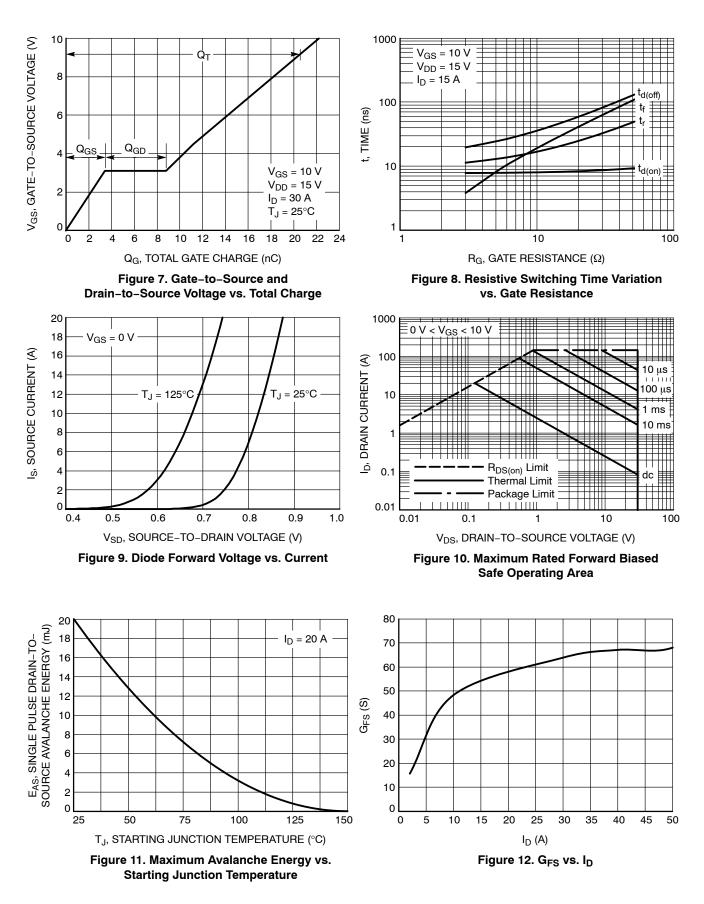
						1	
Parameter	Symbol	Test Condition		Min	Тур	Мах	Unit
SWITCHING CHARACTERISTICS (No	ote 7)						
Turn-On Delay Time	t _{d(ON)}	V_{GS} = 10 V, V_{DS} = 15 V, I _D = 15 A, R _G = 3.0 Ω			7.0		ns
Rise Time	t _r				28		
Turn-Off Delay Time	t _{d(OFF)}				20		
Fall Time	t _f				4.0		
DRAIN-SOURCE DIODE CHARACTE	RISTICS						
Forward Diode Voltage	V _{SD}	$V_{SD} \qquad V_{GS} = 0 V, \\ I_{S} = 10 A \qquad T_{J} = 25^{\circ}C \\ T_{J} = 125^{\circ}C$		0.79	1.1	V	
			T _J = 125°C		0.65		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dIS/dt = 100 A/µs, I _S = 30 A			31		
Charge Time	t _a				15		ns
Discharge Time	t _b				16		
Reverse Recovery Charge	Q _{RR}				15		nC

 $\begin{array}{ll} \mbox{6. Pulse Test: pulse width } \le 300 \ \mu \mbox{s, duty cycle } \le 2\%. \\ \mbox{7. Switching characteristics are independent of operating junction temperatures.} \end{array}$

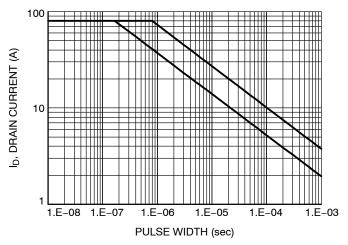
TYPICAL CHARACTERISTICS



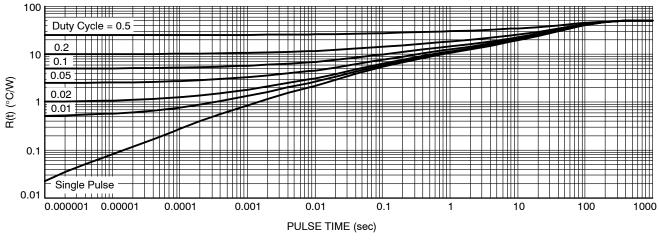
TYPICAL CHARACTERISTICS

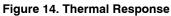


TYPICAL CHARACTERISTICS

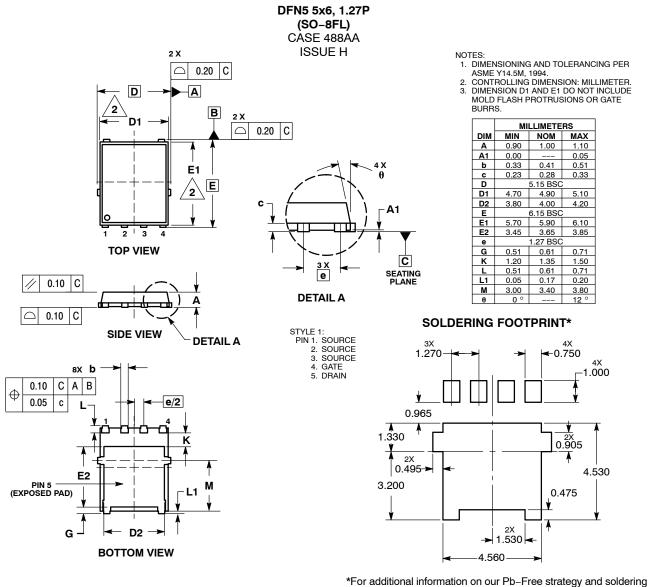








PACKAGE DIMENSIONS



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

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