MOSFET – Power, Single, N-Channel, SO-8 FL 30 V, 52 A

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 ($T_J = 25^{\circ}C$ 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 _{0JA} (Note 1)		$T_A = 25^{\circ}C$ $T_A = 80^{\circ}C$	Ι _D	16.4 12.3	Α
Power Dissipation R _{θJA} (Note 1)		T _A = 25°C	P _D	2.51	W
Continuous Drain Current $R_{\theta JA} \le 10 \text{ s}$		T _A = 25°C	Ι _D	25.3	Α
(Note 1)		T _A = 80°C		19.0	
Power Dissipation $R_{\theta JA} \le 10 \text{ s (Note 1)}$	Steady	T _A = 25°C	P_{D}	6.0	W
Continuous Drain	State	$T_A = 25^{\circ}C$	I _D	9.0	Α
Current R _{0JA} (Note 2)		T _A = 80°C		6.8	
Power Dissipation $R_{\theta JA}$ (Note 2)		T _A = 25°C	P_{D}	0.76	W
Continuous Drain		T _C = 25°C	Ι _D	52	Α
Current R _{θJC} (Note 1)		T _C =80°C		39	
Power Dissipation $R_{\theta JC}$ (Note 1)		T _C = 25°C	P_{D}	25.5	W
Pulsed Drain Current	$T_A = 25^{\circ}$	°C, t _p = 10 μs	I _{DM}	146	Α
Current Limited by Pa	ckage	$T_A = 25^{\circ}C$	I _{Dmax}	80	Α
Operating Junction and Storage Temperature			T _J , T _{STG}	–55 to +150	°C
Source Current (Body Diode)			I _S	23	Α
Drain to Source dV/dt			dV/d _t	7.0	V/ns
Energy (T _J = 25°C, V	Single Pulse Drain-to-Source Avalanche Energy ($T_J = 25^{\circ}C$, $V_{GS} = 10$ V, $I_L = 29$ A _{pk} , $L = 0.1$ mH, $R_{GS} = 25$ Ω) (Note 3)			42	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			TL	260	°C

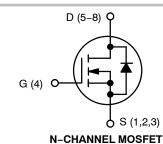
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



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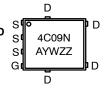
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V _{(BR)DSS}	R _{DS(ON)} MAX	I _D MAX
30 V	5.8 mΩ @ 10 V	52 A
30 V	8.5 mΩ @ 4.5 V	32 A



MARKING DIAGRAMS





A = Assembly Location

Y = Year W = Work Week ZZ = Lot Traceability

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.

- 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 $T_J = 25^{\circ}C$, $V_{GS} = 10$ V, $I_L = 20$ A_{pk}, EAS = 20 mJ.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{ heta JC}$	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/VV
Junction-to-Ambient - (t ≤ 10 s) (Note 4)	$R_{ heta JA}$	21.0	

- 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_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS					•	•	•
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$		30			V
Drain-to-Source Breakdown Voltage (transient)	V _{(BR)DSSt}	$V_{GS} = 0 \text{ V, } I_{D(aval)} = 8.4 \text{ A,}$ $T_{case} = 25^{\circ}\text{C, } t_{transient} = 100 \text{ ns}$		34			٧
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /				14.4		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V,	T _J = 25°C			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		2.1	٧
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	0
		V _{GS} = 4.5 V	I _D = 18 A		6.8	8.5	mΩ
Forward Transconductance	9 _{FS}	V _{DS} = 1.5 V, I _I	_O = 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}				1252		
Output Capacitance	Coss	V _{GS} = 0 V, f = 1 MH	z, V _{DS} = 15 V		610		pF
Reverse Transfer Capacitance	C _{RSS}				126]
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)}	V _{GS} = 4.5 V, V _{DS} = 15 V; I _D = 30 A			10.9		
Threshold Gate Charge	Q _{G(TH)}				1.9		nC
Gate-to-Source Charge	Q_{GS}				3.4		
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)

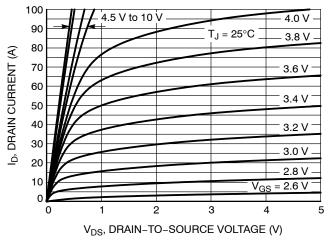
- 6. Pulse Test: pulse width \leq 300 μ s, duty cycle \leq 2%.
- 7. Switching characteristics are independent of operating junction temperatures.

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

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
SWITCHING CHARACTERISTICS (N	lote 7)			•	•	•	
Turn-On Delay Time	t _{d(ON)}	$V_{GS} = 4.5 \text{ V}, V_{DS} = 15 \text{ V},$ $I_{D} = 15 \text{ A}, R_{G} = 3.0 \Omega$			10		- ns
Rise Time	t _r				32		
Turn-Off Delay Time	t _{d(OFF)}				16		
Fall Time	t _f				6.0		
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 CHARACT	ERISTICS						
Forward Diode Voltage	V_{SD}	$V_{GS} = 0 V,$ $T_{J} = 25^{\circ}C$			0.79	1.1	
		I _S = 10 A T _J = 125°C	T _J = 125°C		0.65		V
Reverse Recovery Time	t _{RR}	V_{GS} = 0 V, dIS/dt = 100 A/ μ s, I _S = 30 A			31		
Charge Time	ta				15		ns
Discharge Time	t _b				16		
Reverse Recovery Charge	Q _{BB}			15		nC	

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

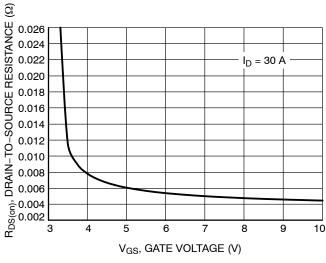
TYPICAL CHARACTERISTICS



100 90 $V_{DS} = 5 V$ 80 ID, DRAIN CURRENT (A) 70 60 50 40 30 20 $T_J = 125^{\circ}C$ 10 T_J = -55°C $T_J = 25^{\circ}C$ 0.5 2.5 3.0 3.5 4.0 1.0 1.5 2.0 V_{GS}, GATE-TO-SOURCE VOLTAGE (V)

Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics



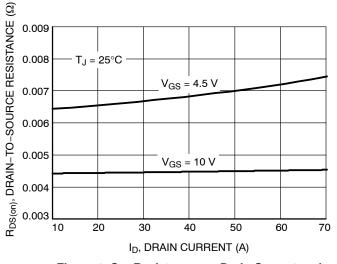
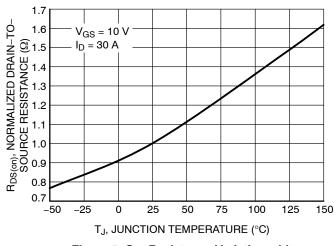


Figure 3. On-Resistance vs. Gate-to-Source Voltage

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



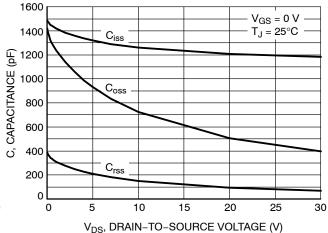


Figure 5. On–Resistance Variation with Temperature

Figure 6. Capacitance Variation

TYPICAL CHARACTERISTICS

1000

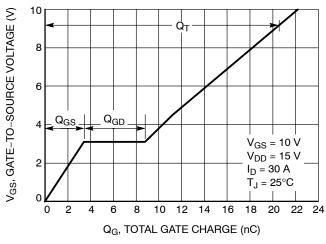


Figure 7. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

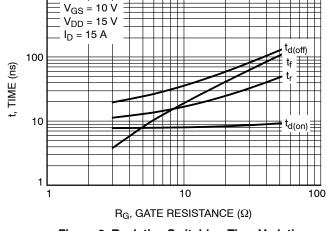


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

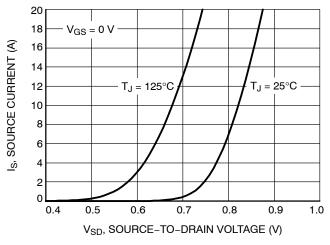


Figure 9. Diode Forward Voltage vs. Current

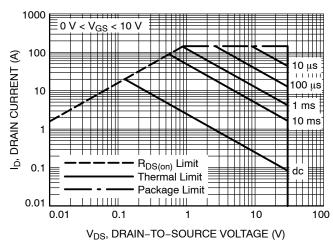


Figure 10. Maximum Rated Forward Biased Safe Operating Area

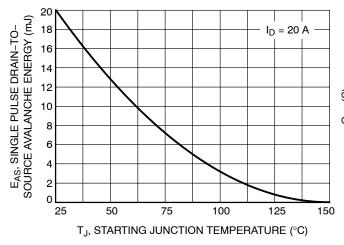


Figure 11. Maximum Avalanche Energy vs. Starting Junction Temperature

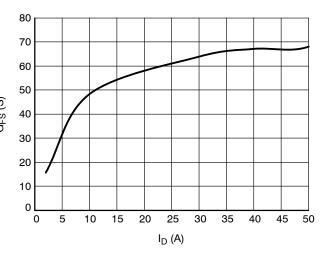


Figure 12. G_{FS} vs. I_D

TYPICAL CHARACTERISTICS

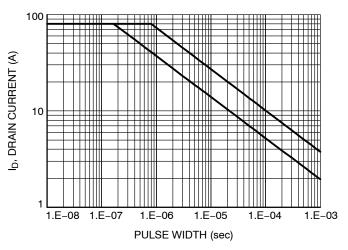


Figure 13. Avalanche Characteristics

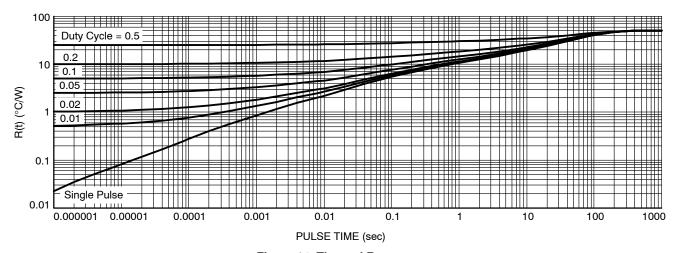


Figure 14. Thermal Response



0.10

0.10

SIDE VIEW

DFN5 5x6, 1.27P (SO-8FL) CASE 488AA ISSUE N

DATE 25 JUN 2018

NOTES:

BURRS

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

	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	5.00	5.15	5.30		
D1	4.70	4.90	5.10		
D2	3.80	4.00	4.20		
E	6.00	6.15	6.30		
E1	5.70	5.90	6.10		
E2	3.45	3.65	3.85		
е	1.27 BSC				
G	0.51	0.575	0.71		
K	1.20	1.35	1.50		
L	0.51	0.575	0.71		
L1	0.125 REF				
М	3.00	3.40	3.80		
A	0 0		12 °		

GENERIC MARKING DIAGRAM*



XXXXXX = Specific Device Code

= Assembly Location Α

Υ = Year W = Work Week ZZ = Lot Traceability

*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. Some products may not follow the Generic Marking.





DETAIL A

*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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