JMV3809N

Product Preview

25V 20A N-Channel MOSFET

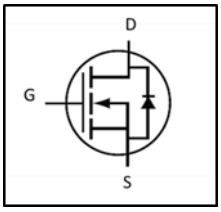
Features

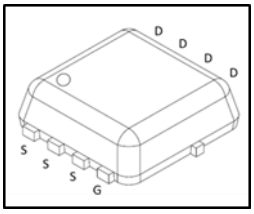
- Advanced shielded-gate technology
- Ultra-low on-resistance and gate-charge
- RoHS compliant
- 100% avalanche tested

Product Summary	
V_{DS}	25V
$R_{DS(ON)}$	9.0mΩ (Typ.)
	11.7mΩ (Max.)
I_D	20A

Applications

- Motor controllers
- DC-to-DC convertors
- Battery-driven electronic products, electrical equipment and machines





Ordering Information

Part Number	Marking	Package	Packaging
JMV3809N	MV3809N	DFN3.3x3.3	Tape & Reel

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Drain-to-Source Voltage	V_{DS}	25	V
Gate-to-Source Voltage	V_{GS}	±10	
Continuous Drain Current, Package limited (T_C = 25°C) (1)	I_D	20	A
Continuous Drain Current, Silicon limited (T_C = 25°C) (1)	I_D	35	
Continuous Drain Current, Silicon limited (T_C = 100°C) (1)	I_D	22	
Continuous Drain Current, Silicon limited (T_A = 25°C) (2), (5)	I_D	11	
Continuous Drain Current, Silicon limited (T_A = 100°C) (2), (5)	I_D	7	
Pulsed Drain Current (3)	I_{DM}	60	
Power Dissipation (T_C = 25°C)	P_D	22	W
Linear Derating Factor	-	0.17	W/°C
Single Pulse Avalanche Energy (4)	E_{AS}	7	mJ
Avalanche Current (4)	I_{AS}	8	A
Junction Temperature	T_J	-55 to 150	°C
Storage Temperature	T_{STG}	-55 to 150	

Thermal Characteristics

Parameter	Symbol	Max	Unit
Junction-to-Ambient Thermal Resistance (5)	$R_{\theta JA}$	62	°C/W
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	5.8	

Static Electrical Characteristics (6)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-to-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = 250μA	25	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS} = V_{GS} , I_D = 250μA	0.4	-	1.2	
Drain-to-Source Leakage Current	I_{DSS}	V_{DS} = 25V, V_{GS} = 0V	-	-	1	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±10V	-	-	±100	nA
Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 10A	-	9	11.7	mΩ
		V_{GS} = 2.5V, I_D = 10A	-	13	17	mΩ

Dynamic Electrical Characteristics (6)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Transconductance	g_{fs}	V_{DS} = 5V, I_D = 15A	-	60	-	S
Total Gate Charge	Q_g	V_{GS} = 4.5V, V_{DS} = 15V, I_D = 20A	-	5.5	-	nC
Gate-to-Source Charge	Q_{gs}		-	1.2	-	
Gate-to-Drain Charge	Q_{gd}		-	1.3	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 15V, I_D = 15A, R_G = 3.0	-	3.5	-	ns
Rise Time	t_r		-	3	-	
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	
Fall Time	t_f		-	3	-	
Input Capacitance	C_{iss}	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz	-	688	-	pF
Output Capacitance	C_{oss}		-	305	-	
Reverse Transfer Capacitance	C_{rss}		-	24	-	

Diode Characteristics (6)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	V_{SD}	V_{GS} = 0V, I_S = 10A	-	0.8	-	V
Reverse Recovery Time	t_{rr}	V_{GS} = 0V, I_S = 30A, dI_S/dt = 100A/μs	-	15	-	ns
Reverse Recovery Charge	Q_{rr}		-	7	-	μC

(1) Rated according to $R_{\theta JC}$.

(2) Rated according to $R_{\theta JA}$.

(3) Limited by maximum T_J.

(4) T_A = 25°C, L = 0.1mH, I_{AS} = 8A.

(5) Surface−mounted on 1 inch² FR4 board, 2 oz Cu.

(6) T_J = 25°C unless otherwise specified.

Typical Electrical Characteristics

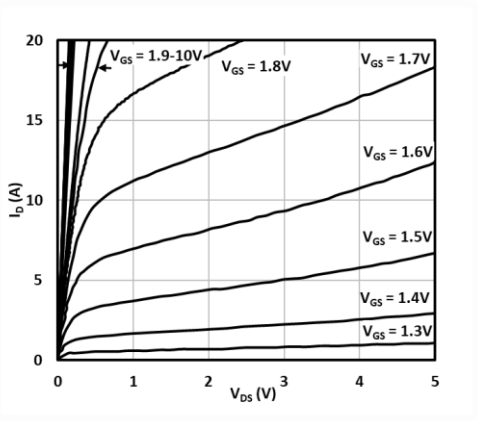


Fig. 1 Output characteristics

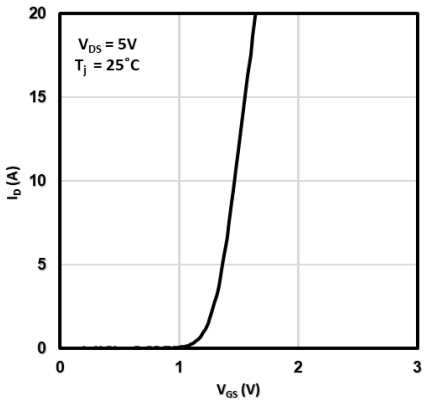


Fig. 2 Transfer characteristics

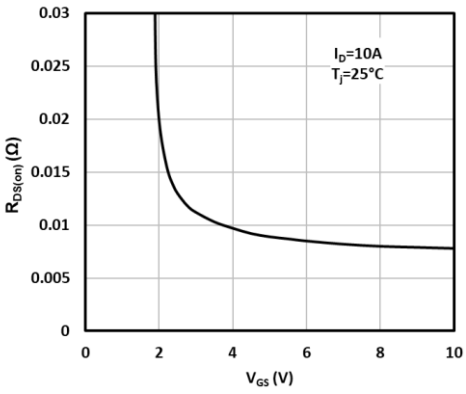


Fig.3 On-resistance vs. gate voltage

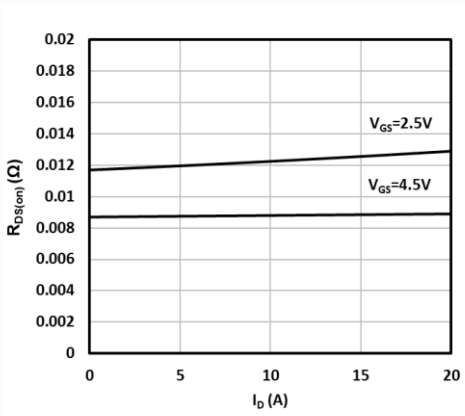


Fig.4 On-resistance vs. drain current

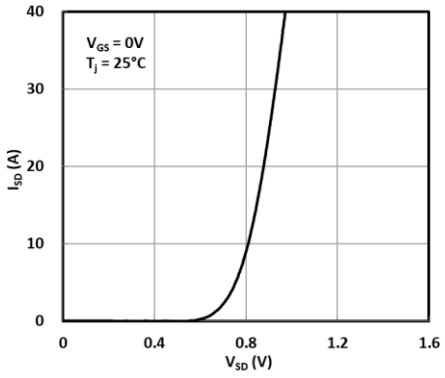


Fig.5 Source-to-drain diode forward characteristics

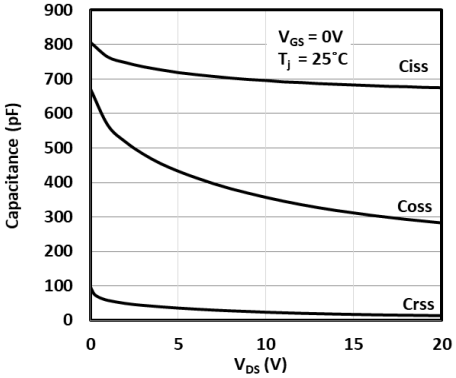


Fig.6 Capacitance vs. drain-to-source voltage

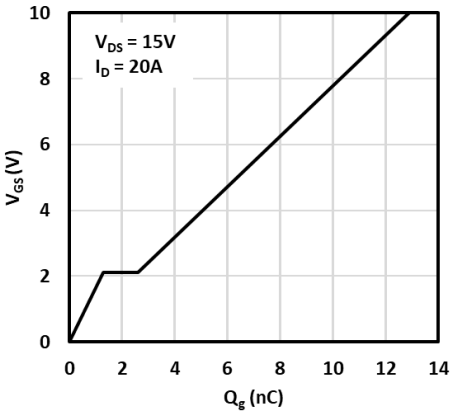


Fig.7 Gate-to-source voltage vs. gate charge

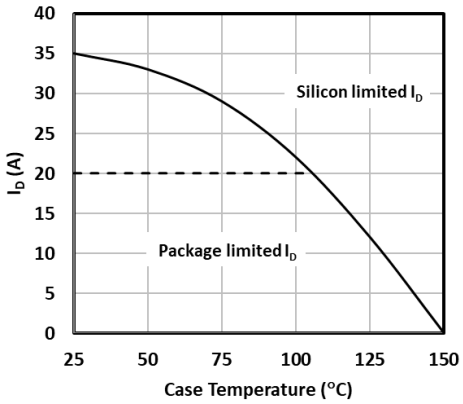


Fig.8 Maximum drain current vs. case temperature

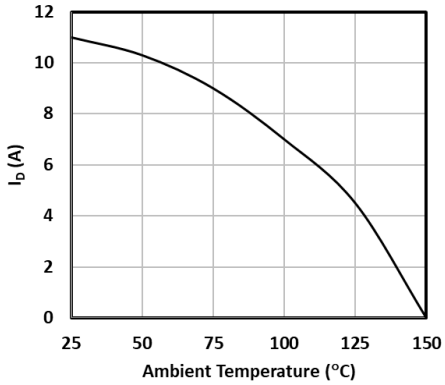
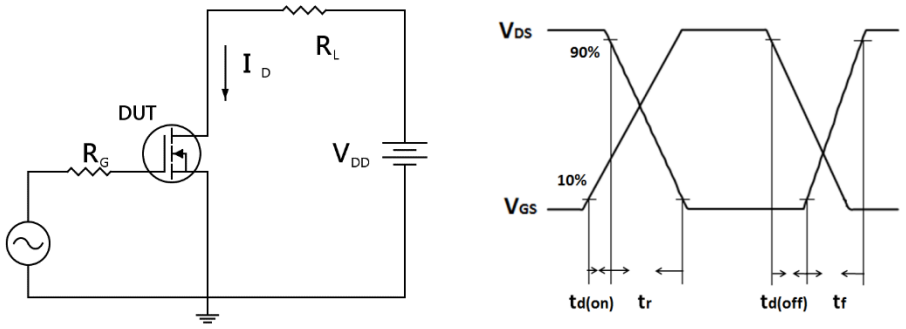
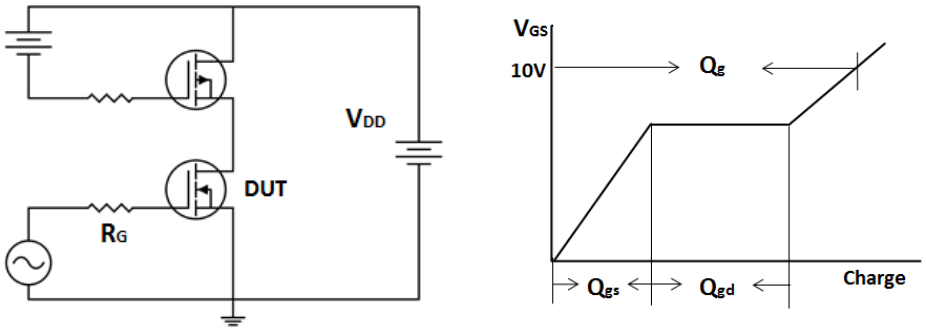


Fig. 9 Maximum drain current vs. ambient temperature

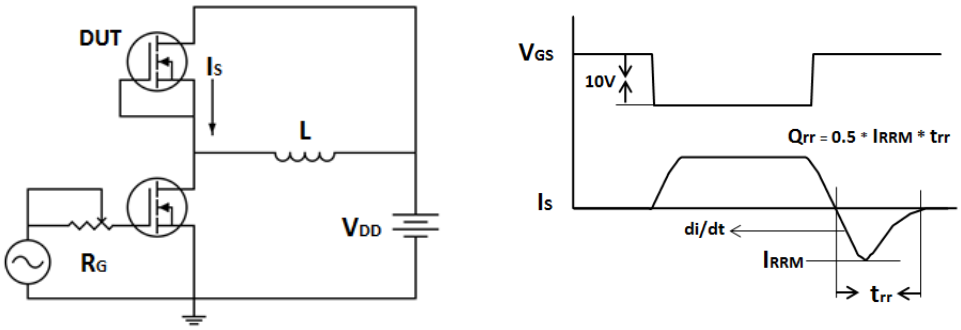
Test Circuits and Waveforms



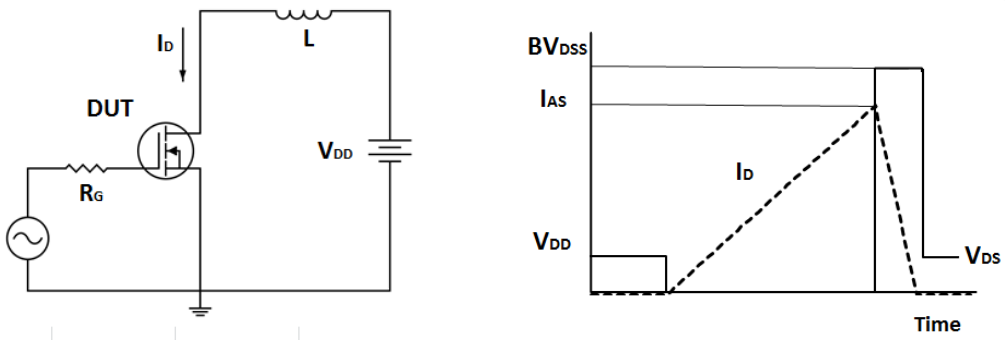
Resistive switching time test circuit & waveforms



Gate charge test circuit & waveform

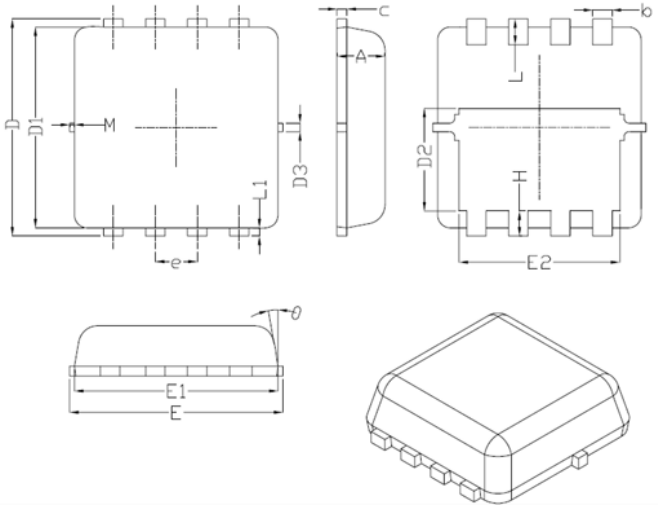


Peak diode recovery dv/dt test circuit & waveforms



Unclamped inductive switching test circuit & waveforms

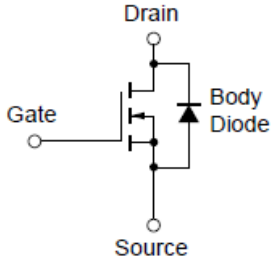
Package Drawing



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.70	0.80	0.90
b	0.25	0.32	0.39
c	0.10	0.15	0.25
D	3.00	3.30	3.60
D1	3.00	3.10	3.50
D2	1.48	2.00	2.20
D3	--	0.20	--
E	3.00	3.30	3.60
E1	3.00	3.10	3.25
E2	2.29	2.49	2.69
e	0.65 BSC		
H	0.15	0.25	0.50
L	0.15	0.40	0.60
L1	0.05	0.15	0.25
α	8°	10°	12°
M	--	0.10	--

DFN 3.3x3.3

Equivalent Circuit



Revision history of JMV3809N Specification

Version	Change Items	Effective Date
1.00	Initial Release	09-Mar-20

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