

JMP4708N

Product Preview

30V N-Channel MOSFET

Features

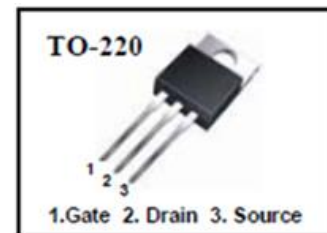
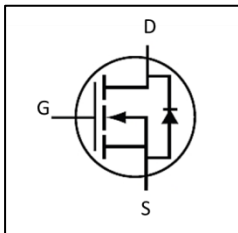
- Advanced shielded-gate technology
- Ultra-low on-resistance and gate-charge
- RoHS compliant
- 100% avalanche tested



Product Summary	
V _{DS}	30V
R _{DS(ON)}	2.9mΩ (Typ.)
	3.7mΩ (Max.)

Applications

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



Ordering Information

Part Number	Marking	Package	Packaging
JMP4708N	MP4708N	TO-220	Tube

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Drain-to-Source Voltage	V_{DS}	30	V
Gate-to-Source Voltage	V_{GS}	± 20	
Continuous Drain Current, Silicon Limited ($T_C = 25^\circ\text{C}$) ⁽¹⁾	I_D	111	A
Continuous Drain Current, Silicon Limited ($T_C = 100^\circ\text{C}$) ⁽¹⁾	I_D	70	
Continuous Drain Current, Silicon Limited t ($T_A = 25^\circ\text{C}$) ^{(2), (5)}	I_D	18	
Continuous Drain Current, Silicon Limited ($T_A = 100^\circ\text{C}$) ^{(2), (5)}	I_D	12	
Pulsed Drain Current ⁽³⁾	I_{DM}	200	
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	73	W
Linear Derating Factor	-	0.59	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ⁽⁴⁾	E_{AS}	125	mJ
Avalanche Current ⁽⁴⁾	I_{AS}	30	A
Junction Temperature	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 to 150	

Thermal Characteristics

Parameter	Symbol	Max	Unit
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	1.7	

Static Electrical Characteristics ⁽⁵⁾

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	30	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.1	-	2.2	
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$	-	-	1	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	± 100	nA
Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$	-	2.9	3.6	m Ω
		$V_{GS} = 4.5\text{V}, I_D = 20\text{A}$	-	3.9	5.0	m Ω
Forward Transconductance	g_{fs}	$V_{DS} = 5\text{V}, I_D = 20\text{A}$	-	75	-	S
Gate Resistance	R_G	$f = 1\text{MHz}$	-	5	-	Ω

Dynamic Electrical Characteristics ⁽⁵⁾

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Total Gate Charge	Q_g	$V_{GS} = 10V,$ $V_{DS} = 15V,$ $I_D = 20A$	-	29.5	-	nC
Gate-to-Source Charge	Q_{gs}		-	6.0	-	
Gate-to-Drain Charge	Q_{gd}		-	5.5	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V,$ $V_{DS} = 15V,$ $I_D = 20A,$ $R_G = 3.0\Omega$	-	15	-	ns
Rise Time	t_r		-	5	-	
Turn-Off Delay Time	$t_{d(off)}$		-	35	-	
Fall Time	t_f		-	9	-	
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $f = 1MHz,$ $V_{DS} = 15V$	-	2225	-	pF
Output Capacitance	C_{oss}		-	986	-	
Reverse Transfer Capacitance	C_{rss}		-	100	-	

Diode Characteristics ⁽⁵⁾

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 20A$	-	0.8	-	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 20A,$ $di_S/dt = 100A/\mu s$	-	24	-	ns
Reverse Recovery Charge	Q_{rr}		-	30	-	nC

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

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

(3) Limited by maximum T_J .

(4) $T_A = 25^\circ C, L = 0.1mH, I_{AS} = 30A$.

(5) $T_J = 25^\circ C$ unless otherwise specified.

Typical Electrical Characteristics

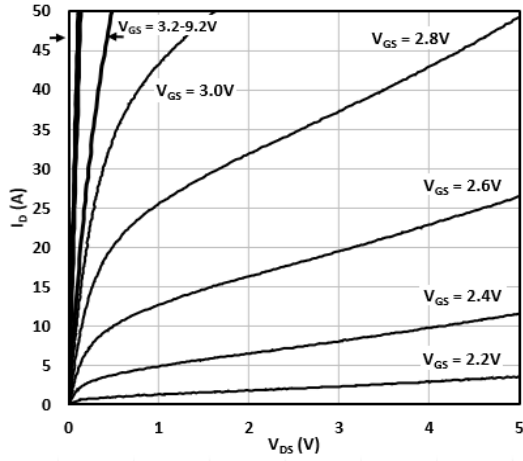


Fig. 1 Output characteristics

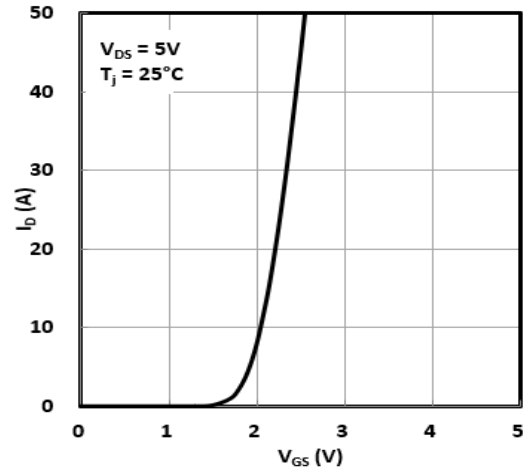


Fig. 2 Transfer characteristics

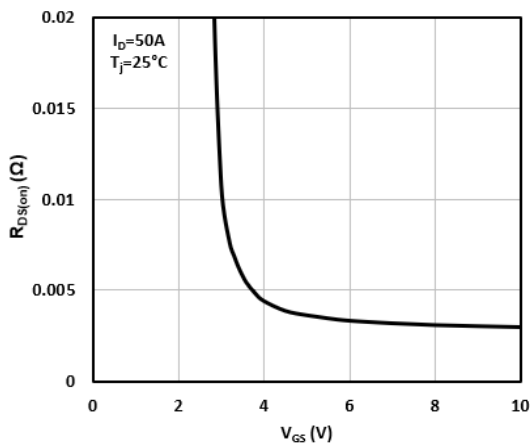


Fig.3 On-resistance vs. gate voltage

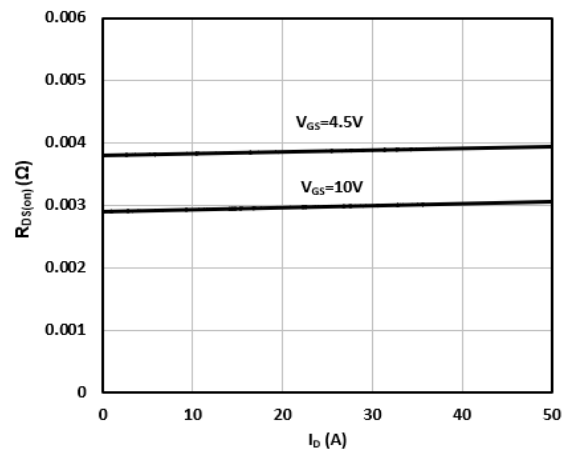


Fig.4 On-resistance vs. drain current

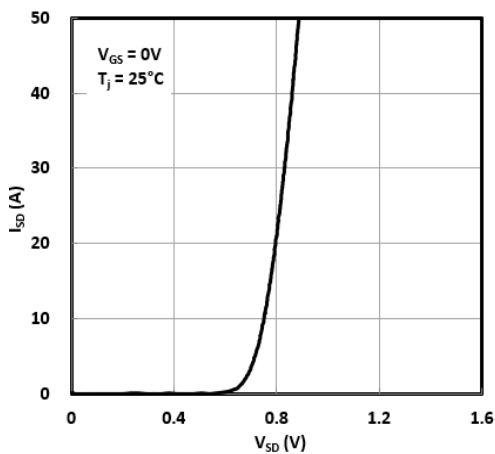


Fig.5 Source-to-drain diode forward characteristics

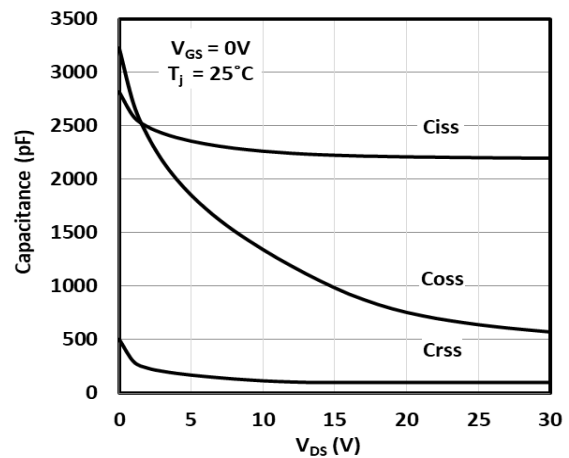


Fig.6 Capacitance vs. drain-to-source voltage

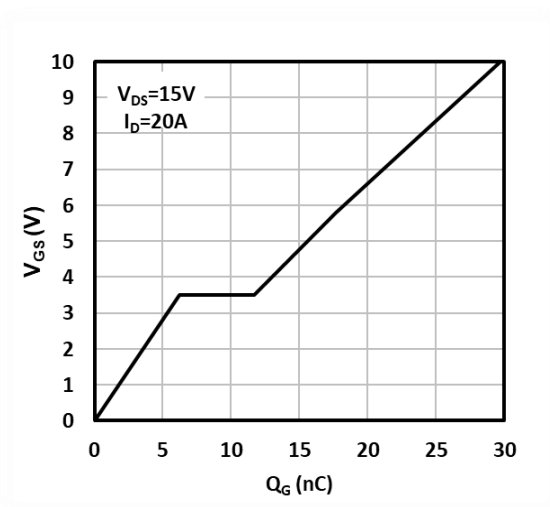


Fig.7 Gate-to-source voltage vs. gate charge

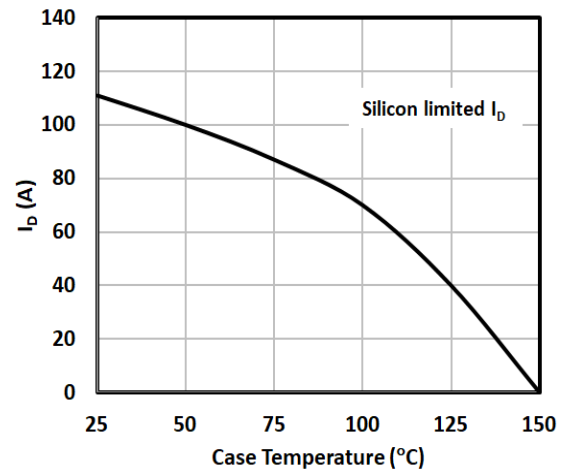


Fig.8 Maximum drain current vs. case temperature

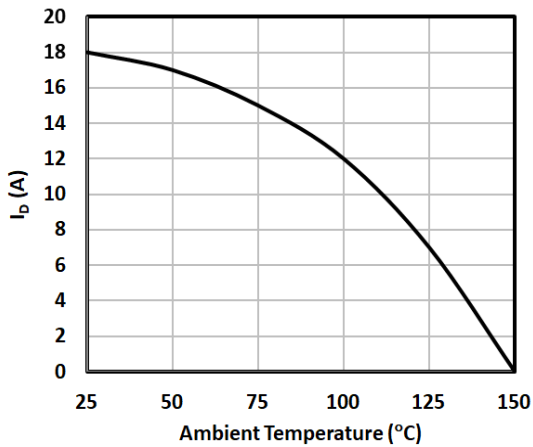
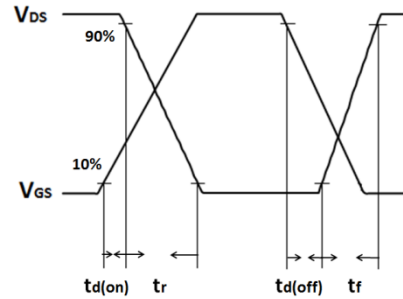
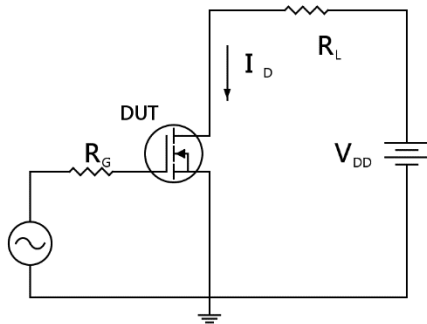
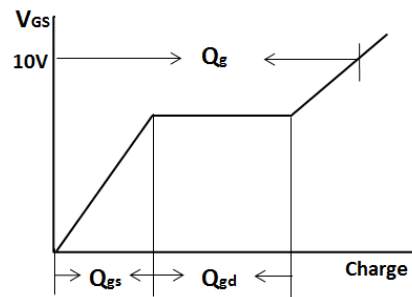
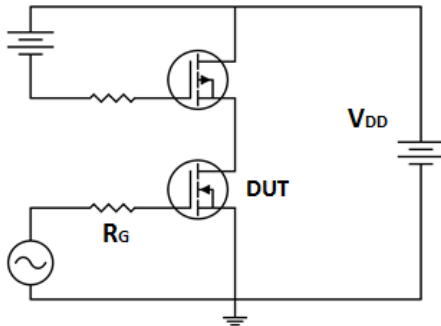


Fig. 9 Maximum drain current vs. ambient temperature

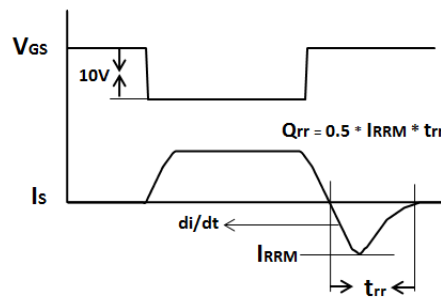
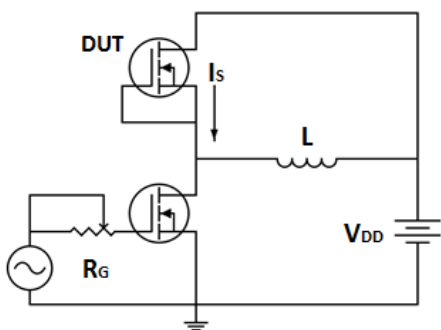
Test Circuits and Waveforms



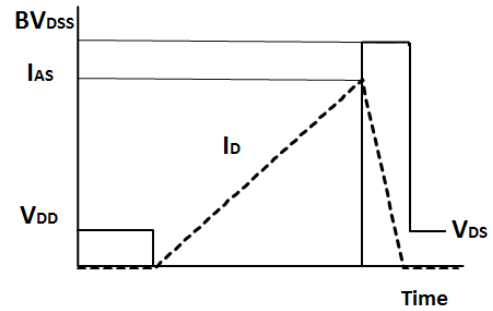
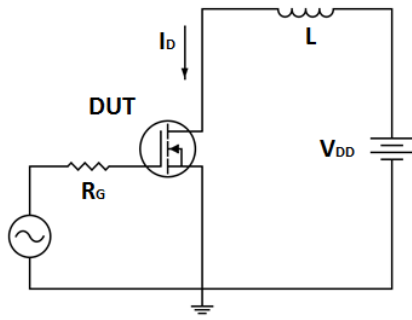
Resistive switching time test circuit & waveforms



Gate charge test circuit & waveform

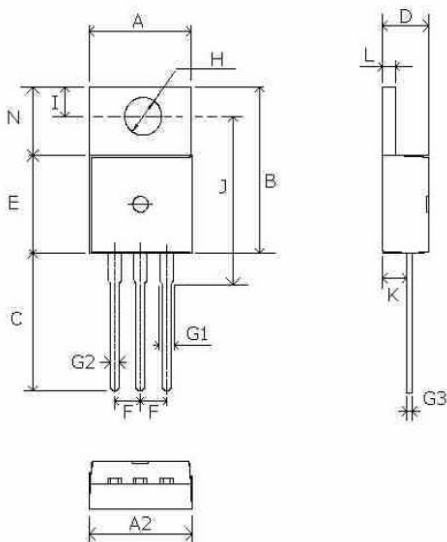


Peak diode recovery dv/dt test circuit & waveforms



Unclamped inductive switching test circuit & waveforms

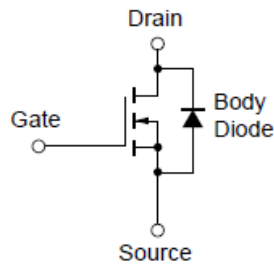
Package Drawing



Symbol	Min. (mm)	Nom. (mm)	Max. (mm)
A	9.6	10.0	10.4
A2	9.8	10.0	10.4
B	15.1	15.7	16.1
C	12.6	13.0	14.3
D	4.3	4.5	4.7
E	8.9	9.2	9.7
F	2.34	2.54	2.74
G1	1.08	1.25	1.72
G2	0.70	0.80	0.95
G3	0.34	0.50	0.60
H(∅)	3.5	3.6	4.0
I	2.6	2.8	3.0
J	15.7	15.9	16.4
K	1.8	2.4	2.8
L	1.15	1.30	1.40
N	6.0	6.5	7.0

TO-220

Equivalent Circuit



Revision history of JMP4708N specification

Version	Change Items	Effective Date
1.00	Initial Release	09-June-21

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