



## Description

### JMP N-channel Enhancement Mode Power MOSFET

#### Features

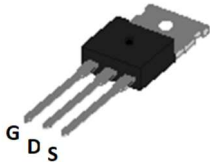
- 600V, 4A  
 $R_{DS(ON)} < 2.3\Omega @ V_{GS} = 10V$
- Fast Switching
- Improved dv/dt Capability

#### Application

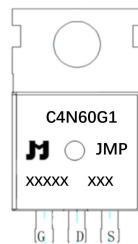
- Load Switch
- PWM Application
- Power management



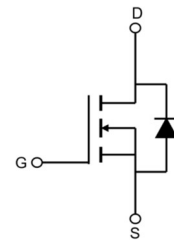
100% UIS TESTED!  
100%  $\Delta V_{ds}$  TESTED!



TO-220C top view



Marking and pin Assignment



Schematic Diagram

## Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	TUBE (PCS)	Inner Box (PCS)	Per Carton (PCS)
JMPC4N60G1	JMPC4N60G1	TUBE	TO-220C	50	1,000	5,000

## Absolute Maximum Ratings (T<sub>C</sub>=25°C unless otherwise specified)

Symbol	Parameter	Max.	Units
V <sub>DSS</sub>	Drain-Source Voltage	600	V
V <sub>GSS</sub>	Gate-Source Voltage	±30	V
I <sub>D</sub>	Continuous Drain Current	T <sub>C</sub> = 25°C	4
		T <sub>C</sub> = 100°C	2.6
I <sub>DM</sub>	Pulsed Drain Current <sup>note1</sup>	16	A
E <sub>AS</sub>	Single Pulsed Avalanche Energy <sup>note2</sup>	80	mJ
P <sub>D</sub>	Power Dissipation	T <sub>C</sub> = 25°C	75
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	1.67	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	60	°C/W
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C



## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	600	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	-	-	1	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±30V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2	3	4	V
R <sub>DS(on)</sub> <small>note3</small>	Static Drain-Source on-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =2A	-	1.95	2.3	Ω
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	-	593	-	pF
C <sub>oss</sub>	Output Capacitance		-	66	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	10	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DD</sub> =480V, I <sub>D</sub> =4A, V <sub>GS</sub> =10V	-	15	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	2.5	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	7.5	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =300V, I <sub>D</sub> =4A, R <sub>G</sub> =25Ω	-	12	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	22	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	50	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	48	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	4	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	16	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>SD</sub> =4A	-	-	1.4	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =4A,	-	250	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	3.5	-	μC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

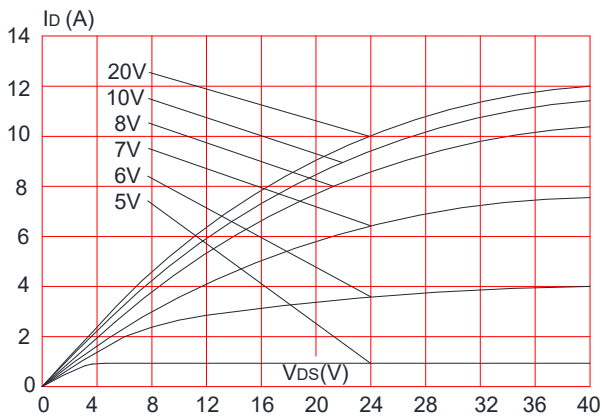
2. EAS condition: T<sub>J</sub> = 25°C, V<sub>DD</sub> = 50V, V<sub>G</sub> = 10V, L = 10mH, I<sub>AS</sub> = 4A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤1%

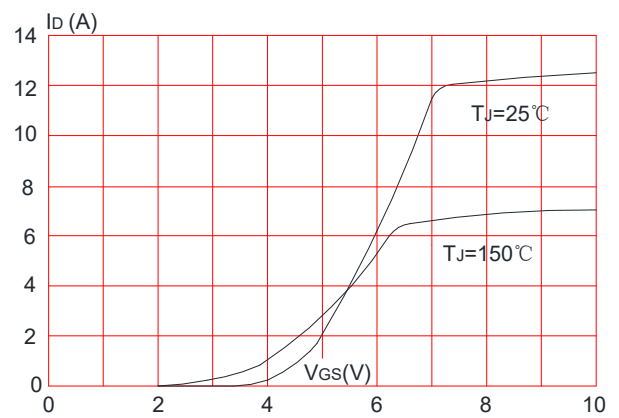


## Typical Performance Characteristics

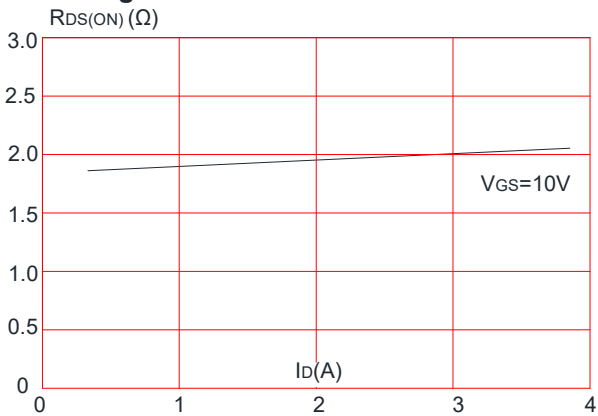
**Figure 1: Output Characteristics**



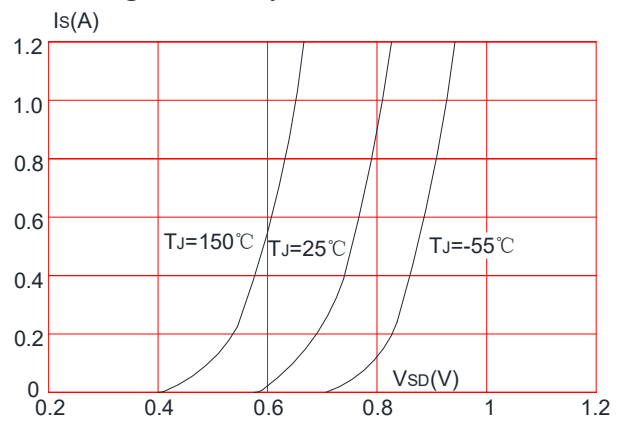
**Figure 2: Typical Transfer Characteristics**



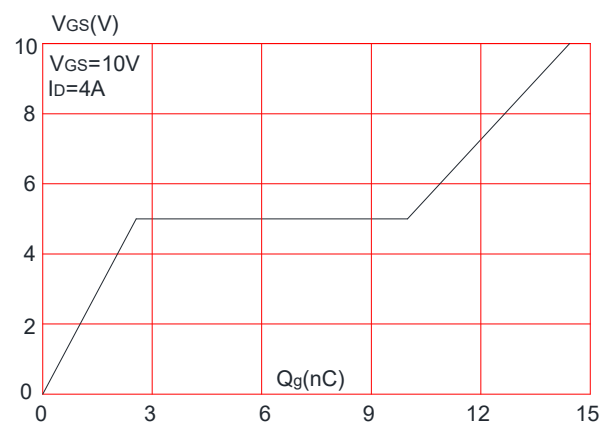
**Figure 3: On-resistance vs. Drain Current**



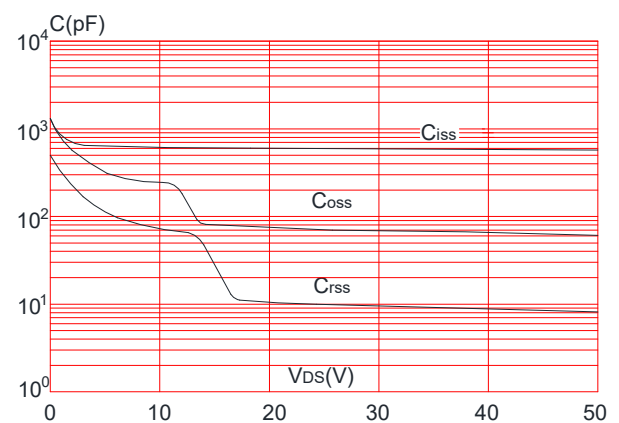
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**



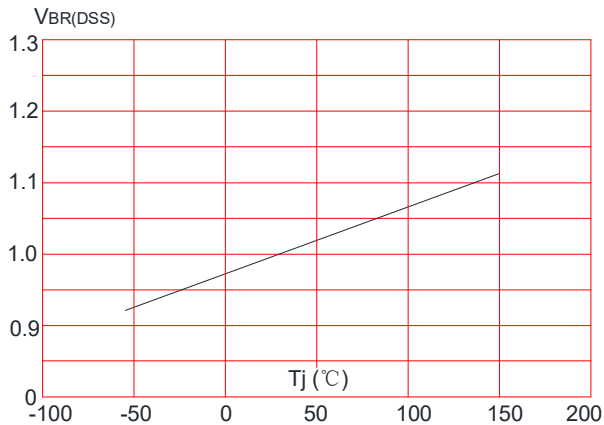
**Figure 6: Capacitance Characteristics**



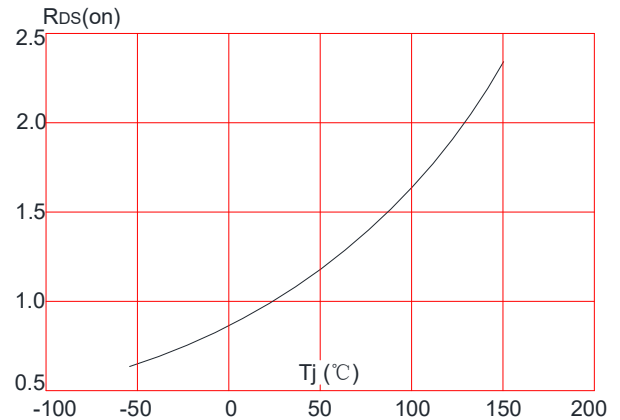


# JMPC4N60G1

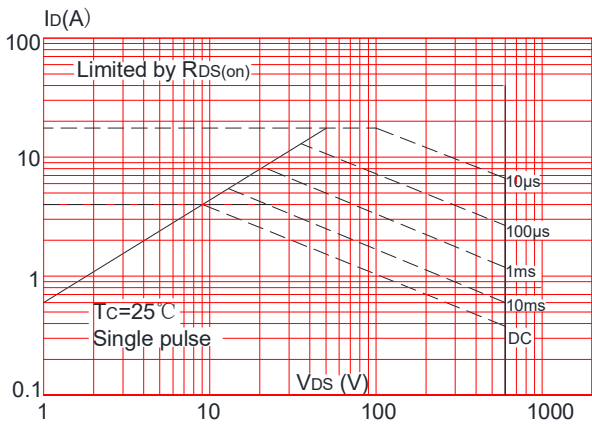
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



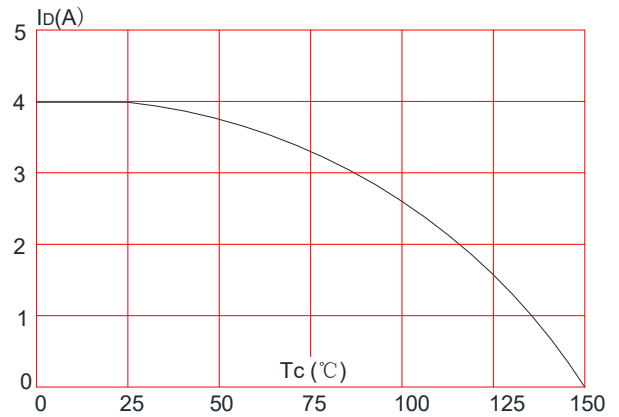
**Figure 8:** Normalized on Resistance vs. Junction Temperature



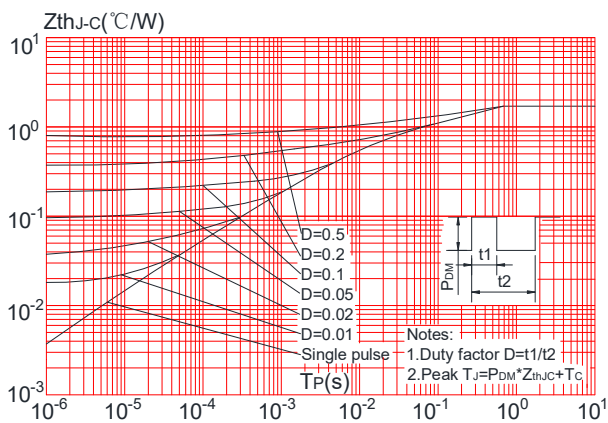
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



## Test Circuit

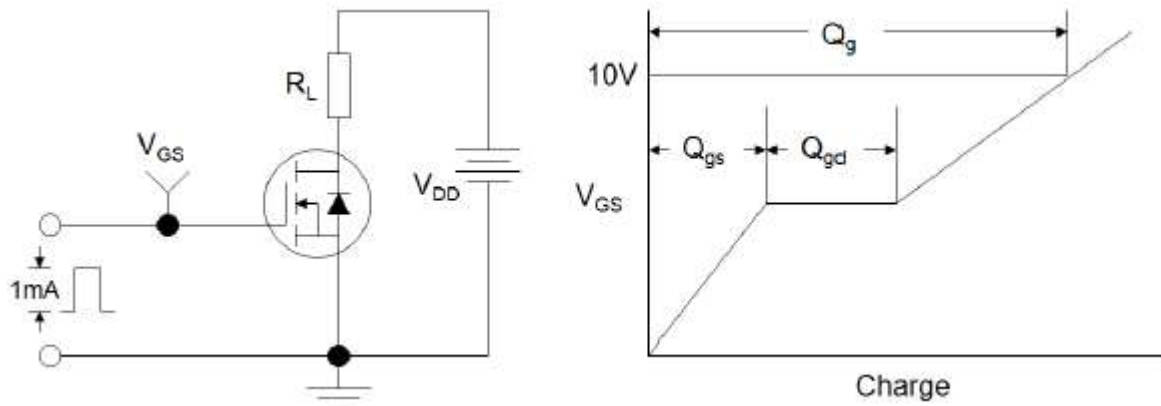


Figure 1: Gate Charge Test Circuit & Waveform

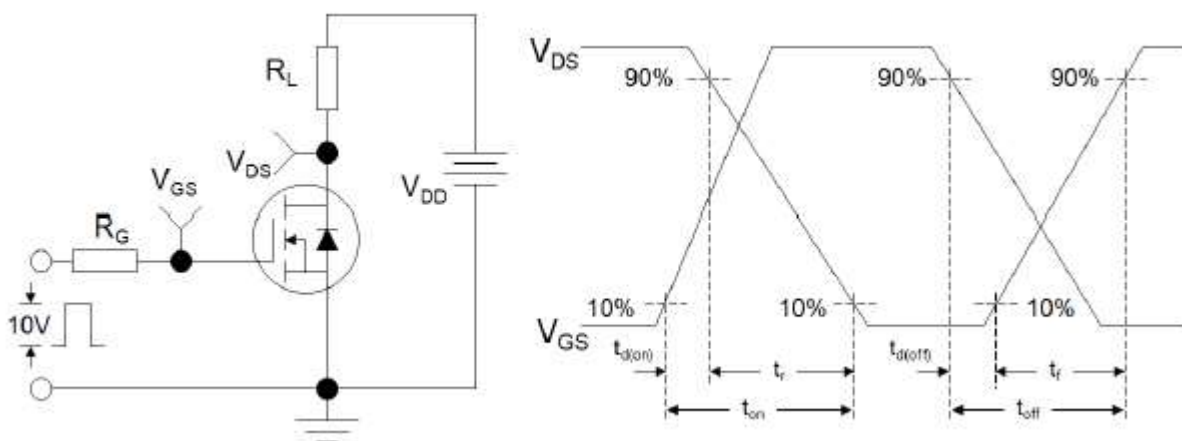


Figure 2: Resistive Switching Test Circuit & Waveforms

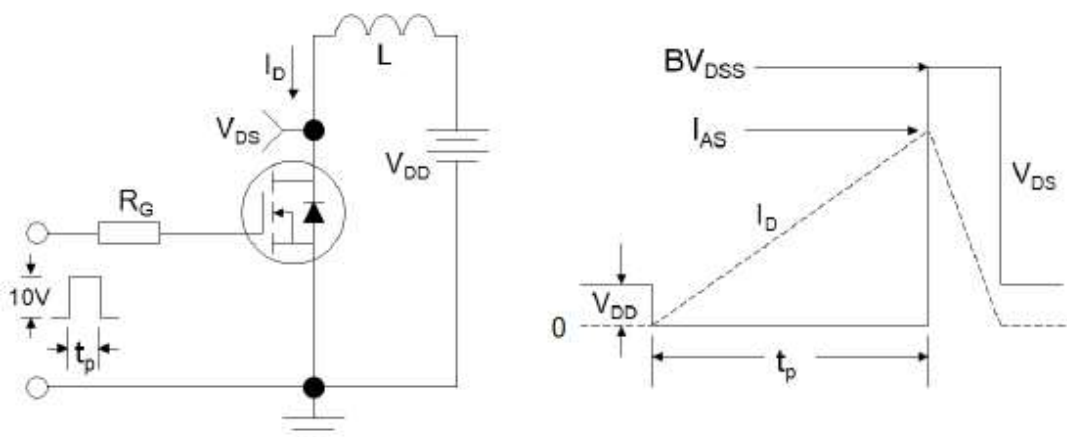
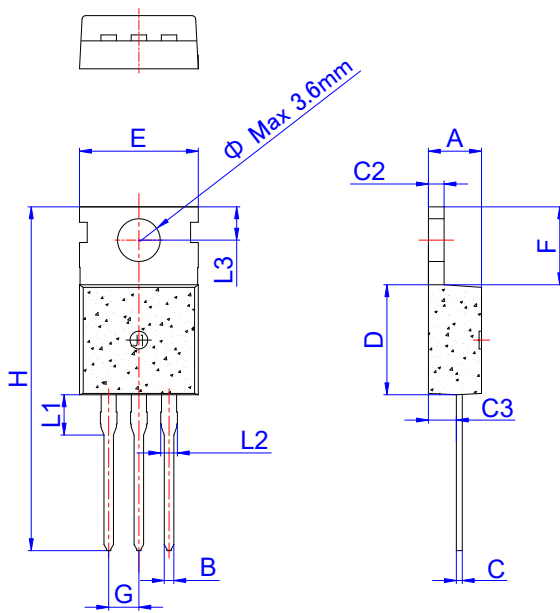


Figure 3: Unclamped Inductive Switching Test Circuit & Waveforms



## Package Mechanical Data-TO-220C



TO-220C

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	0.70		0.90	0.028		0.035
C	0.45		0.60	0.018		0.024
C2	1.23		1.32	0.048		0.052
C3	2.20		2.60	0.087		0.102
D	8.90		9.90	0.350		0.390
E	9.90		10.3	0.390		0.406
F	6.30		6.90	0.248		0.272
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.39			0.133	
L2	1.14		1.70	0.045		0.067
L3	2.65		2.95	0.104		0.116
Φ		3.6			0.142	

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