



## Description

### JMC Super Junction N-channel MOSFET

#### Features

- $V_{DS}=650V$ ,  $I_D=13A$   
 $R_{DS(ON)} < 0.36\Omega @ V_{GS} = 10V$
- Multi-Epi process SJ-MOSFET
- Smart design in high voltage technology
- Ultra lower on-resistance
- Fast switching
- Ultra low gate charge
- Low reverse recovery charge

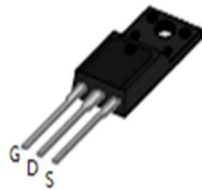
#### Application

- Power factor correction ( PFC)
- Switched mode power supplies ( SMPS)
- Uninterruptible power supply (UPS)



100% UIS TESTED!

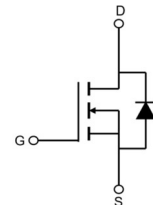
100%  $\Delta V_{ds}$  TESTED!



TO-220F 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)
JMCF65M360A	JMCF65M360A	TUBE	TO-220F	50	1,000	8,000

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

Symbol	Parameter	Max.	Units
V <sub>DSS</sub>	Drain-Source Voltage	650	V
V <sub>GSS</sub>	Gate-Source Voltage	±30	V
I <sub>D</sub>	Continuous Drain Current	T <sub>C</sub> = 25°C	13
		T <sub>C</sub> = 100°C	8.5
I <sub>DM</sub>	Pulsed Drain Current <sup>note1</sup>	52	A
E <sub>AS</sub>	Single Pulsed Avalanche Energy <sup>note2</sup>	146	mJ
P <sub>D</sub>	Power Dissipation	T <sub>C</sub> = 25°C	32.7
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	3.82	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	80	°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	650	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =650V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 25°C	-	-	1	μA
		V <sub>DS</sub> =650V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C	-	-	100	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	2.0	3.0	4.0	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance <small>note3</small>	V <sub>GS</sub> =10V, I <sub>D</sub> =6.5A	-	0.32	0.36	Ω
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =50V, V <sub>GS</sub> = 0V, f = 1.0MHz	-	1030	-	pF
C <sub>oss</sub>	Output Capacitance		-	87	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	4.5	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =480V, I <sub>D</sub> =13A, V <sub>GS</sub> =10V	-	23	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	5.7	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	8	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =380V, I <sub>D</sub> =6.5A, V <sub>GS</sub> =10V, R <sub>G</sub> =6.8Ω	-	9	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	4	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	40	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	4.5	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	13	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	52	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =13A	-	-	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =6.5A, di/dt=100A/μs	-	245	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	2.4	-	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> =5.4A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

## Typical Performance Characteristics

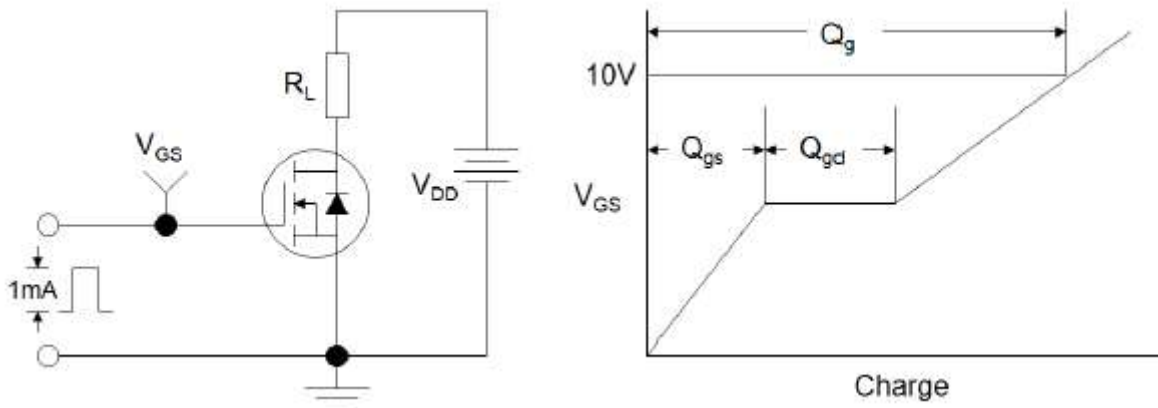


Figure1:Gate Charge Test Circuit & Waveform

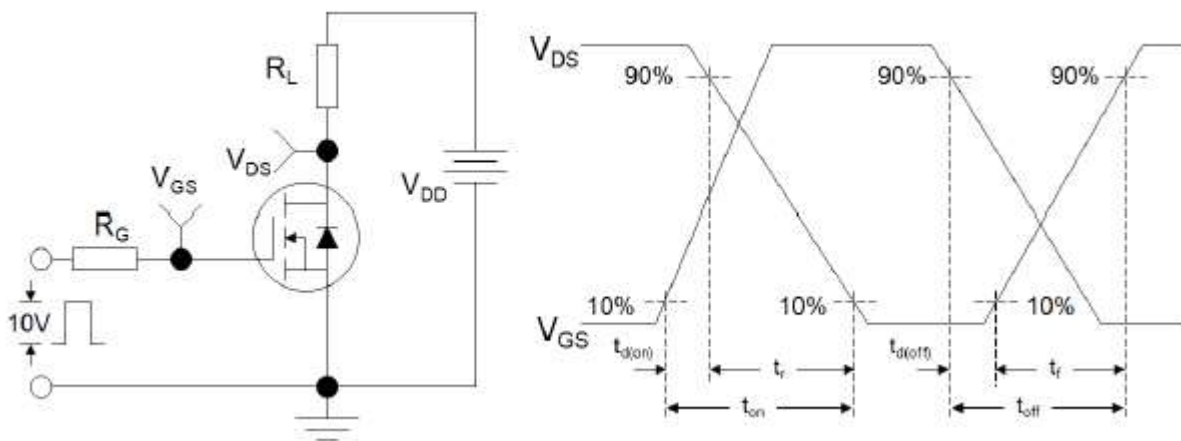


Figure 2: Resistive Switching Test Circuit & Waveforms

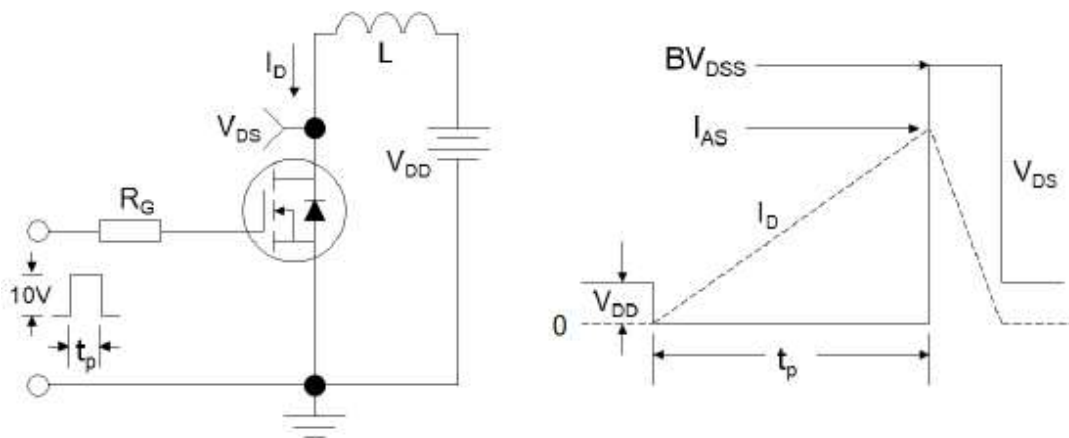
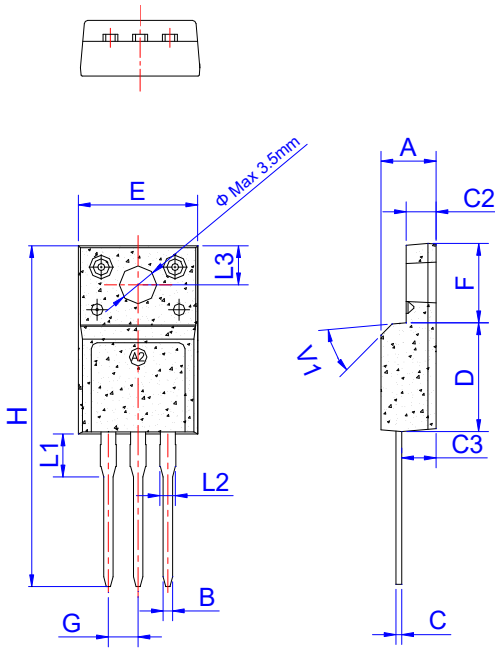


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



## Package Mechanical Data



TO-220F

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.50		4.90	0.177		0.193
B	0.74	0.80	0.83	0.029	0.031	0.033
C	0.47		0.65	0.019		0.026
C2	2.45		2.75	0.096		0.108
C3	2.60		3.00	0.102		0.118
D	8.80		9.30	0.346		0.366
E	9.80		10.4	0.386		0.410
F	6.40		6.80	0.252		0.268
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.63			0.143	
L2	1.14		1.70	0.045		0.067
L3		3.30			0.130	
V1		45°			45°	

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