

## Description

### JMT N-channel Enhancement Mode Power MOSFET

#### Features

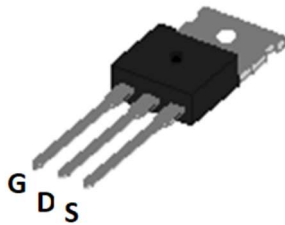
- 40V, 120A  
 $R_{DS(ON)} < 4.5m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)} < 6.5m\Omega @ V_{GS} = 4.5V$
- Advanced Trench Technology
- Provide Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead free product is acquired

#### Application

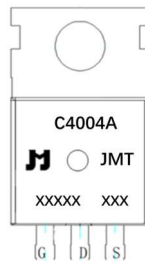
- Load Switch
- PWM Application
- Power management



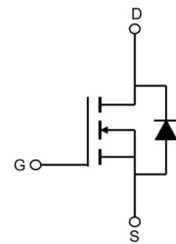
*100% UIS TESTED!*  
*100%  $\Delta V_{ds}$  TESTED!*



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)
JMTC4004A	JMTC4004A	TUBE	TO-220C	50	1,000	8,000

## Absolute Maximum Ratings ( $T_C=25^\circ C$ unless otherwise specified)

Symbol	Parameter	Max.	Units
$V_{DSS}$	Drain-Source Voltage	40	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ C$	120
		$T_C = 100^\circ C$	78
$I_{DM}$	Pulsed Drain Current <sup>note1</sup>	480	A
EAS	Single Pulsed Avalanche Energy <sup>note2</sup>	148	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ C$	123
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.2	$^\circ C/W$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +175	$^\circ C$



## 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	40	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V,	-	-	1.0	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V	-	-	±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	1.1	1.6	2.4	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance <small>note3</small>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	-	3.4	4.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	4.5	6.5	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f=1.0MHz	-	5595	-	pF
C <sub>oss</sub>	Output Capacitance		-	411	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	340	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =20V, I <sub>D</sub> =30A, V <sub>GS</sub> =10V	-	65	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	12.5	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	15	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =20V, I <sub>D</sub> =30A, R <sub>L</sub> =1Ω, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V	-	12	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	16	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	39	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	15	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	60	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	240	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =30A	-	-	1.2	V
t <sub>rr</sub>	Body Diode Reverse Recovery Time	T <sub>J</sub> =25°C, I <sub>F</sub> =20A, dI/dt=100A/μs	-	22	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	11	-	nC

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

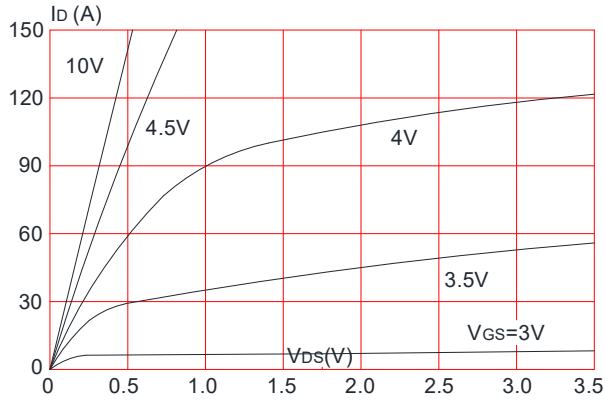
2. EAS condition : T<sub>J</sub>=25°C, V<sub>DD</sub>=20V, V<sub>G</sub>=10V, L=0.5mH, R<sub>g</sub>=25Ω, I<sub>AS</sub>=24.4A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

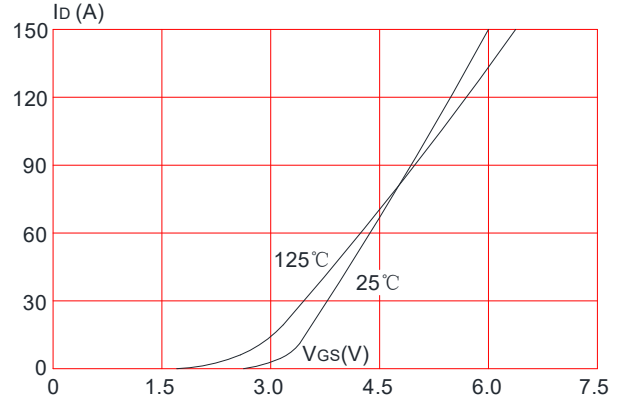


## Typical Performance Characteristics

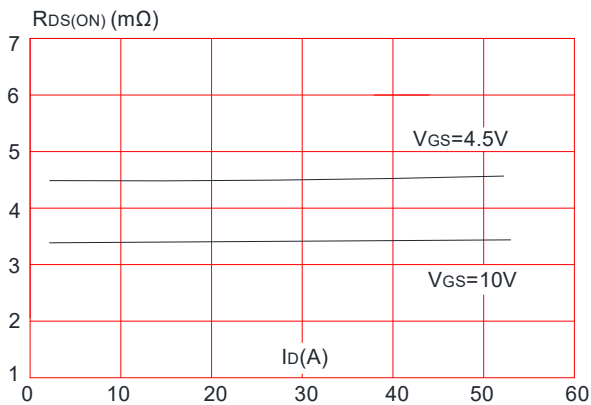
**Figure 1: Output Characteristics**



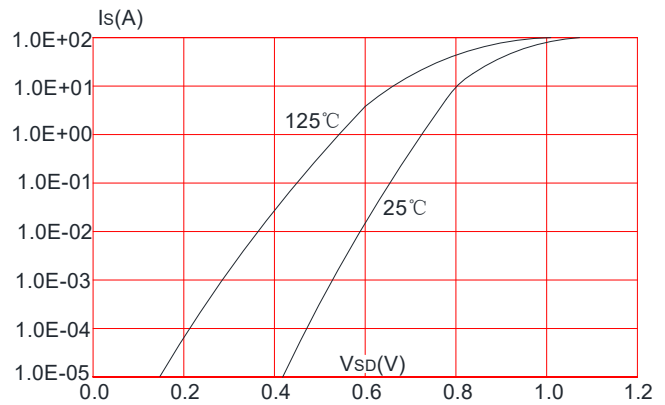
**Figure 2: Typical Transfer Characteristics**



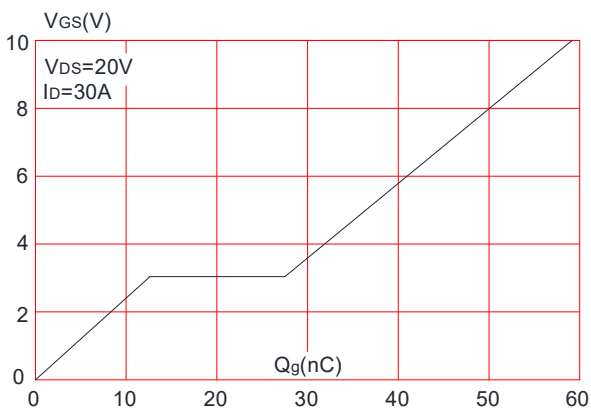
**Figure 3: On-resistance vs. Drain Current**



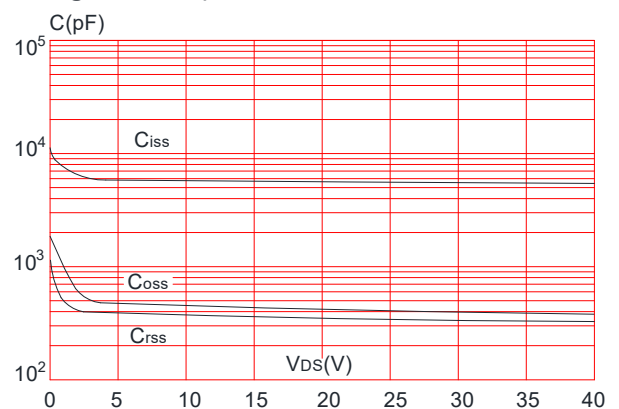
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

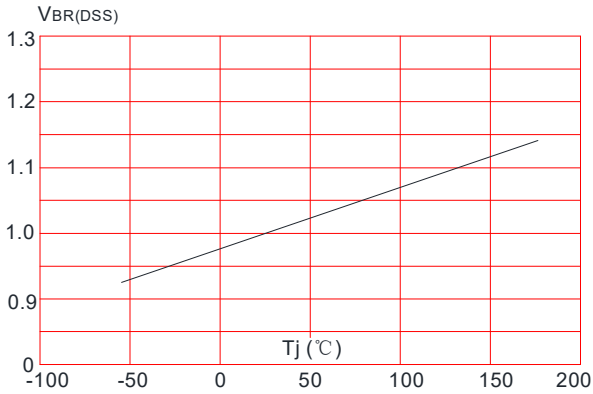


**Figure 6: Capacitance Characteristics**

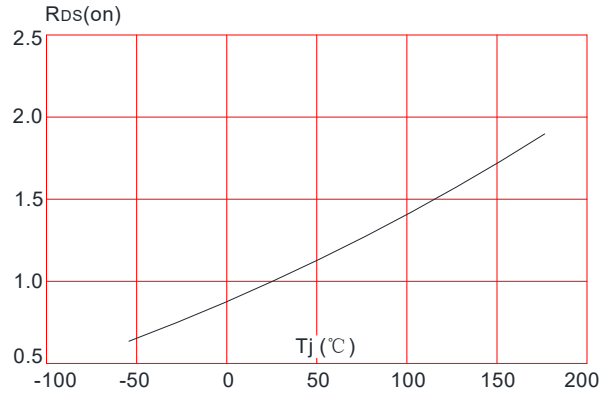




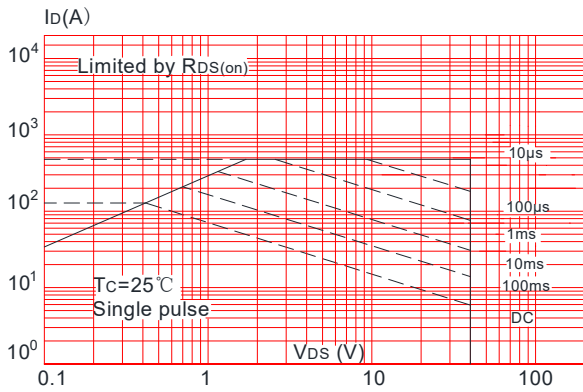
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**



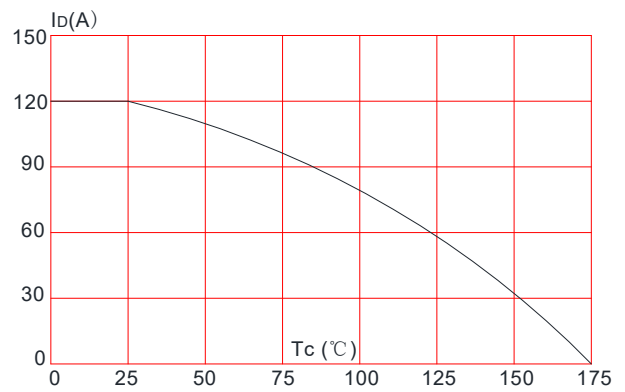
**Figure 8: Normalized on Resistance vs. Junction Temperature**



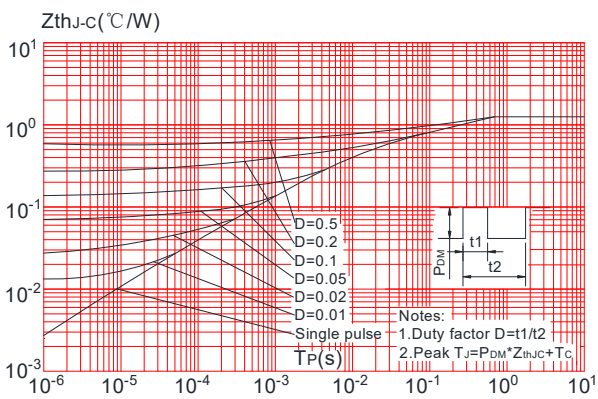
**Figure 9: Maximum Safe Operating Area**



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



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



## Test Circuit

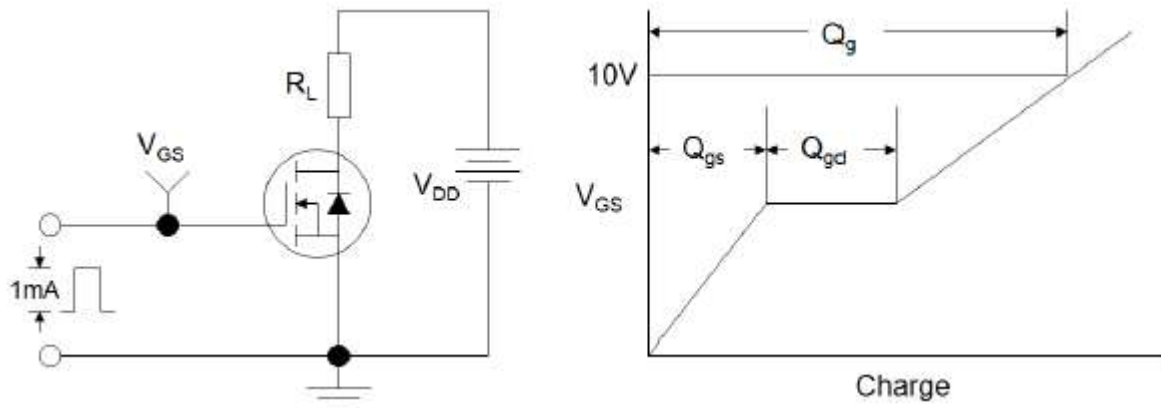


Figure1:Gate Charge Test Circuit & Waveform

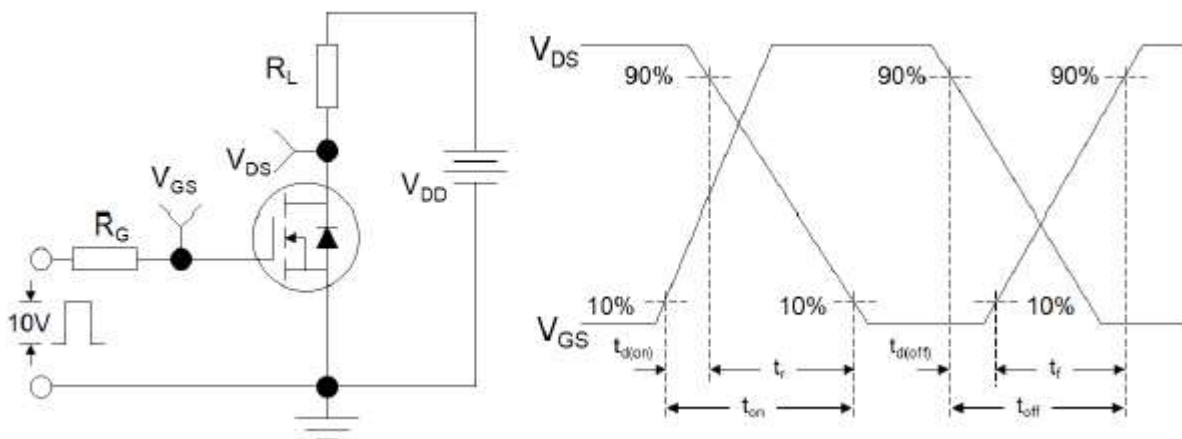


Figure 2: Resistive Switching Test Circuit & Waveforms

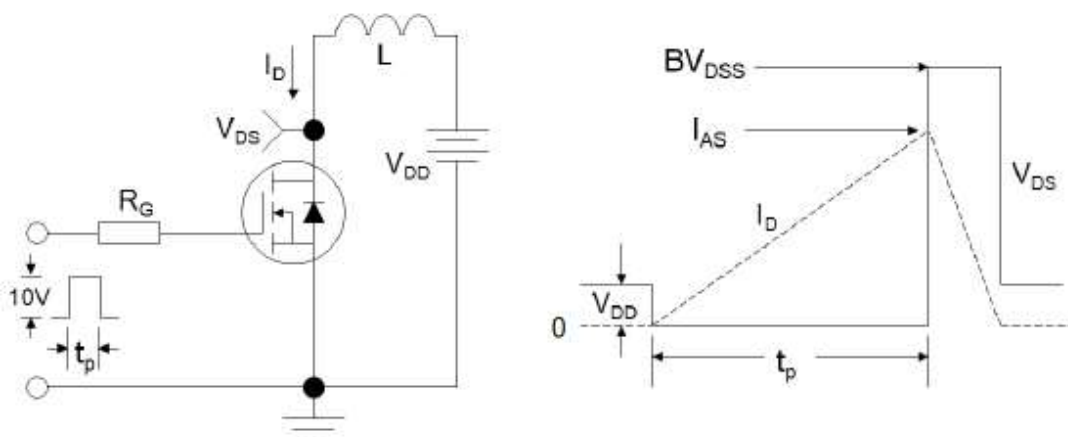
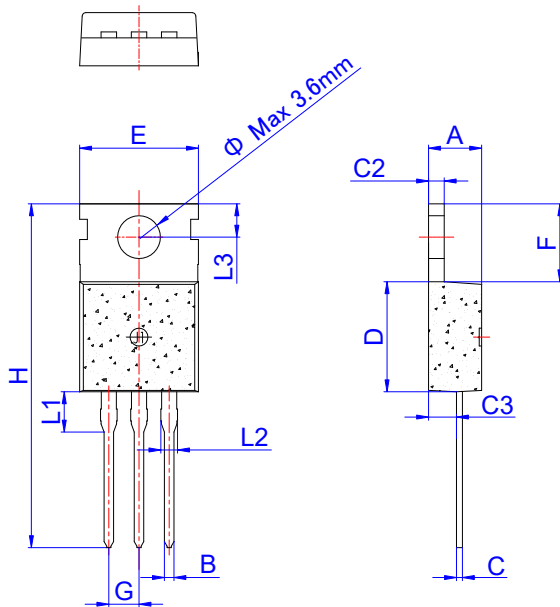


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

## Package Mechanical Data-TO-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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