

# MJ N-Channel Enhancement Mode Power MOSFET

## Description

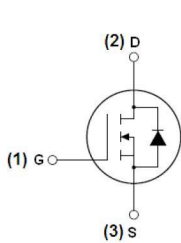
The MJ0205IA uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

## General Features

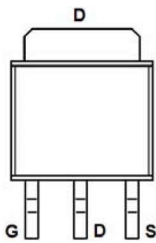
- ◆  $V_{DS} = 200V, I_D = 5A$   
 $R_{DS(ON)} < 580m\Omega @ V_{GS} = 10V$  (Typ: 520m $\Omega$ )
- ◆ High density cell design for ultra low  $R_{dson}$
- ◆ Fully characterized avalanche voltage and current
- ◆ Excellent package for good heat dissipation

## Application

- ◆ Power switching application
- ◆ Hard switched and high frequency circuits
- ◆ Uninterruptible power supply



Schematic diagram



Marking and pin assignment



TO-251 top view

## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJ0205IA	MJ0205IA	TO-251	-	-	-

## Absolute Maximum Ratings ( $T_A = 25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	200	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	5	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	20	A
Maximum Power Dissipation	$P_D$	30	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^{\circ}C$

## Thermal Characteristic

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	4.17	$^{\circ}C/W$
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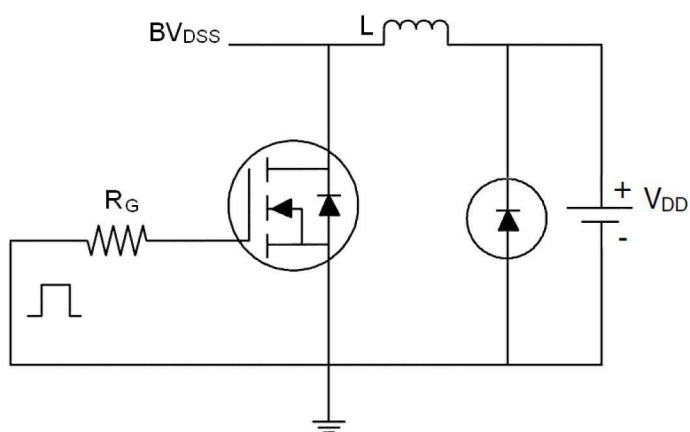
Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	200	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =200V,V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =±20V,V <sub>GS</sub> =0V	-	-	±100	nA
On Characteristics <sup>(Note 3)</sup>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250μA	1.2	1.7	2.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =2A	-	520	580	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =15V,I <sub>D</sub> =2A	-	8	-	S
Dynamic Characteristics <sup>(Note 4)</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V,V <sub>GS</sub> =0V F=1.0MHz	-	580	-	PF
Output Capacitance	C <sub>oss</sub>		-	90	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	3	-	PF
Switching Characteristics <sup>(Note 4)</sup>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =100V, R <sub>L</sub> =15Ω V <sub>GS</sub> =10V,R <sub>G</sub> =2.5Ω	-	10	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	12	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	15	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	15	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =100V,I <sub>D</sub> =2A V <sub>GS</sub> =10V	-	12	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	2.5	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	3.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage <sup>(Note 3)</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V,I <sub>S</sub> =2A	-	-	1.2	V
Diode Forward Current <sup>(Note 2)</sup>	I <sub>S</sub>		-	-	5	A

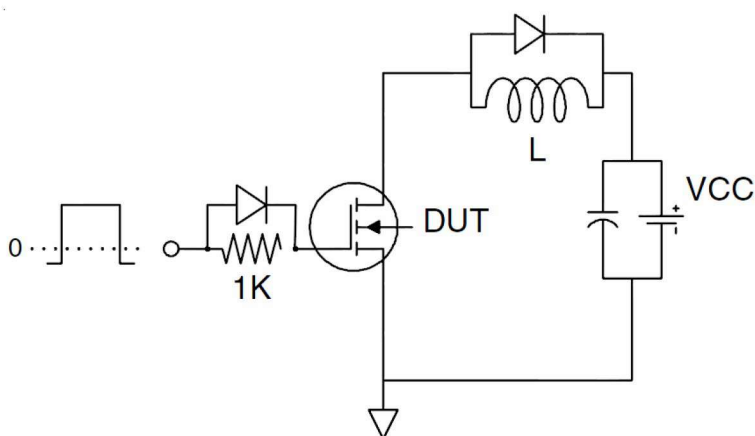
Notes:

- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ② Surface Mounted on FR4 Board, t ≤ 10 sec.
- ③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- ④ Guaranteed by design, not subject to production

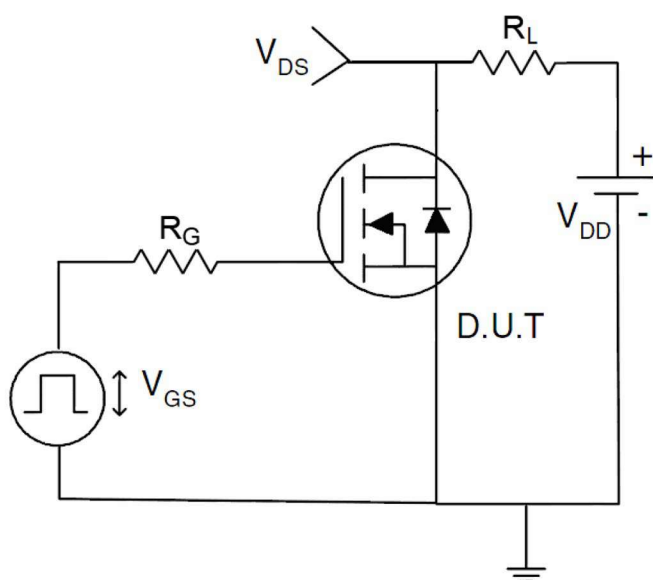
# Test circuit



EAS test Circuit

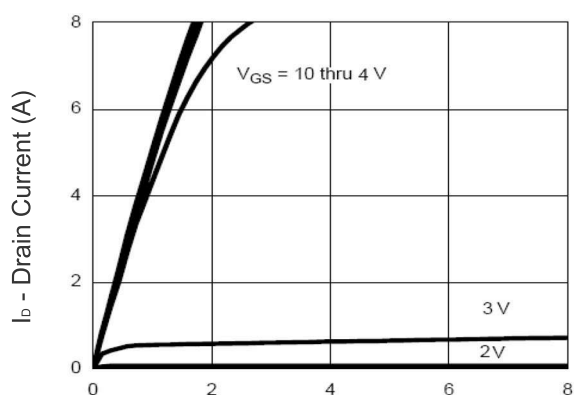


Gate charge test Circuit

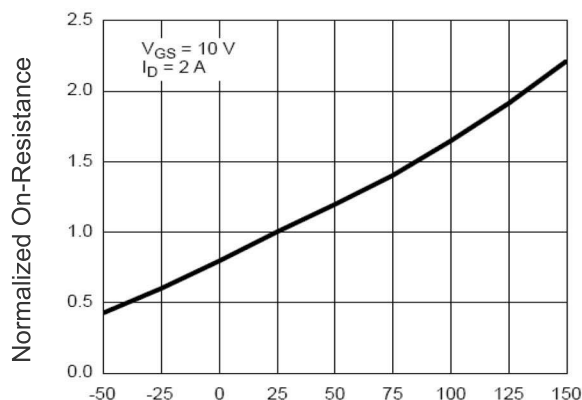


Switch Time Test Circuit

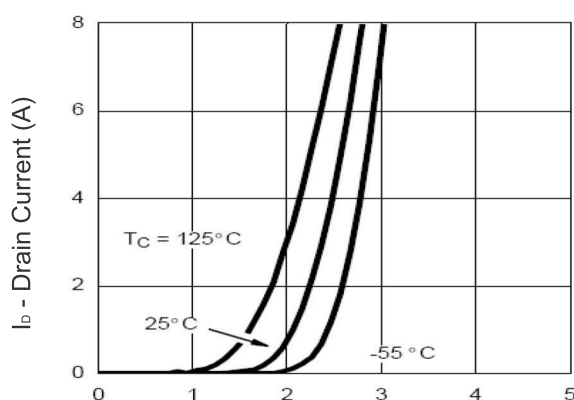
## Typical Electrical and Thermal Characteristics (Curves)



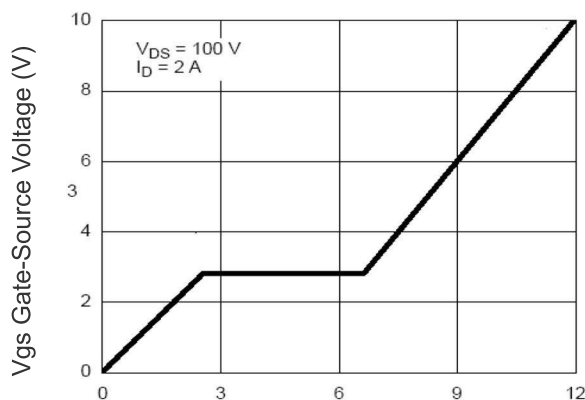
V<sub>DS</sub> Drain-Source Voltage (V)  
Figure 1 Output Characteristics



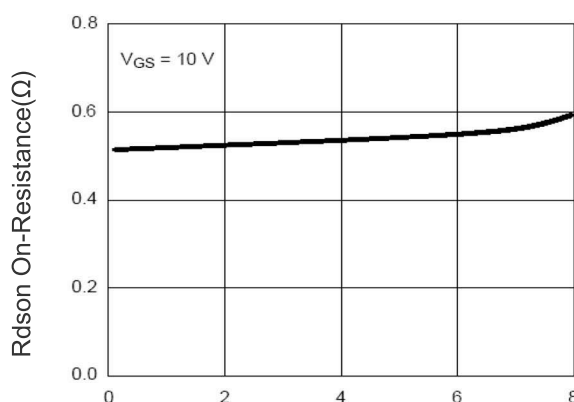
T<sub>J</sub> -Junction Temperature(°C)  
Figure 4 Rdson-Junction Temperature



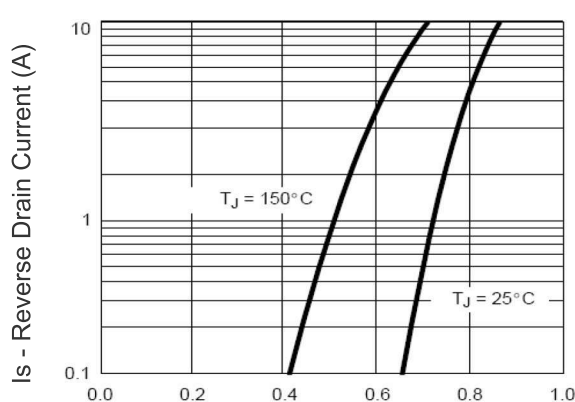
V<sub>GS</sub> Gate-Source Voltage (V)  
Figure 2 Transfer Characteristics



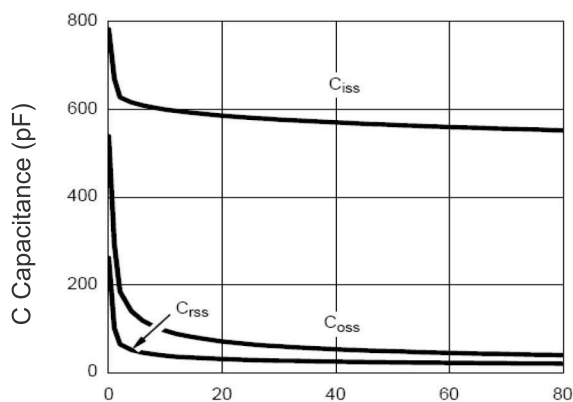
Q<sub>g</sub> Gate Charge (nC)  
Figure 5 Gate Charge



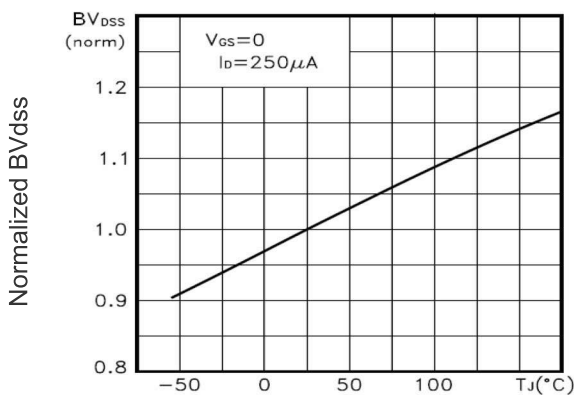
ID - Drain Current (A)  
Figure 3 Rdson- Drain Current



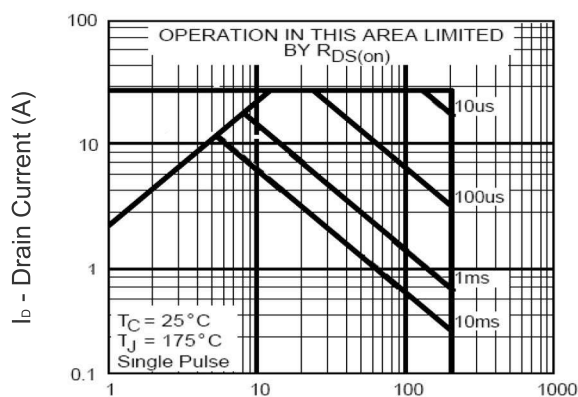
V<sub>SD</sub> Source-Drain Voltage (V)  
Figure 6 Source- Drain Diode Forward



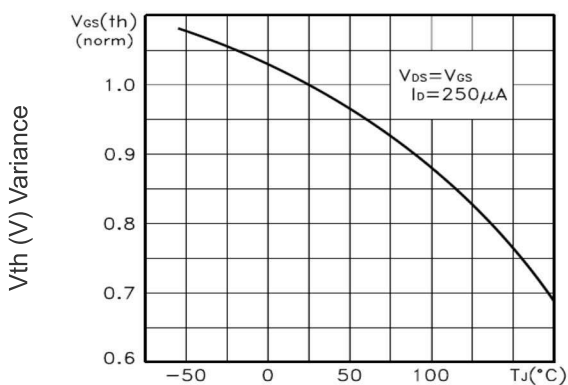
Vds Drain-Source Voltage (V)  
Figure 7 Capacitance vs Vds



TJ -Junction Temperature(°C)  
Figure 9 BV<sub>DSS</sub> vs Junction Temperature



Vds Drain-Source Voltage (V)  
Figure 8 Safe Operation Area



TJ -Junction Temperature(°C)  
Figure 10 V<sub>GS(th)</sub> vs Junction Temperature

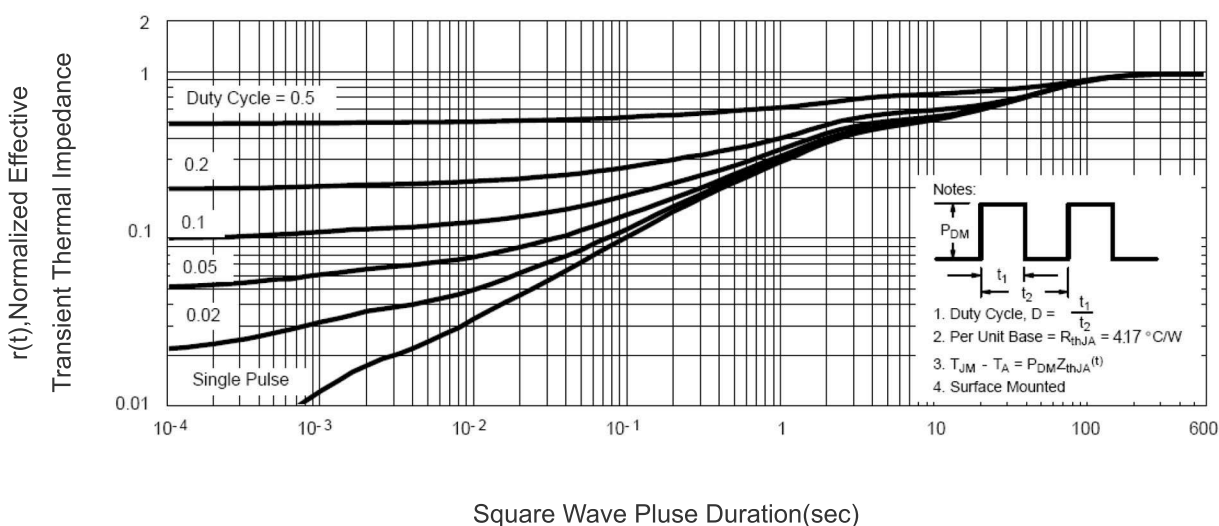
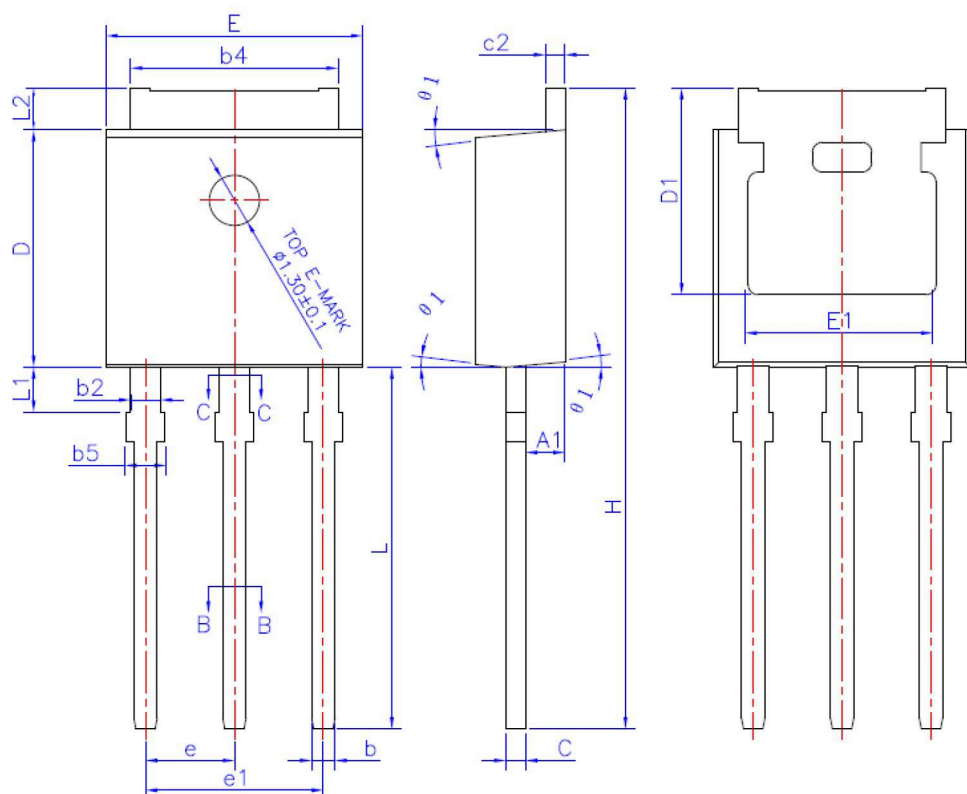


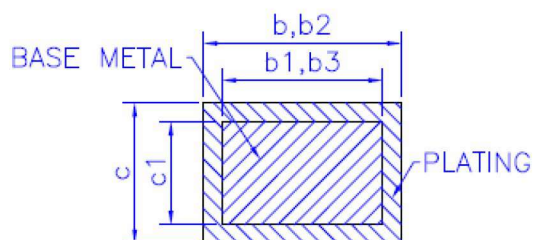
Figure 11 Normalized Maximum Transient Thermal Impedance

# TO-251 Package Information



COMMON DIMENSIONS  
(UNITS OF MEASURE =MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.35
A1	0.90	1.01	1.10
b	0.56	---	0.69
b1	0.55	0.60	0.65
b2	0.77	---	0.90
b3	0.76	0.81	0.86
b4	5.23	5.33	5.43
b5	---	---	1.05
c	0.46	---	0.59
c1	0.45	0.51	0.55
c2	0.46	---	0.59
D	6.00	6.10	6.20
D1	5.20	---	---
E	6.50	6.60	6.70
E1	4.60	4.83	5.00
e	2.24	2.29	2.34
e1	4.47	4.57	4.67
H	16.18	16.48	16.78
L	9.00	9.30	9.60
L1	0.95	1.16	1.35
L2	0.90	1.08	1.25
$\theta 1$	3°	5°	7°
$\theta 2$	1°	3°	5°



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