

# MJ N-Channel Enhancement Mode Power MOSFET

## Description

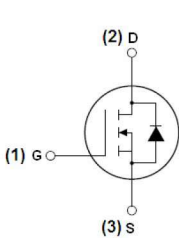
The MJ3080I uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

## General Features

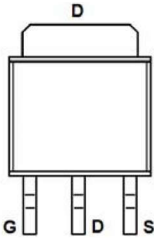
- ◆  $V_{DS} = 30V, I_D = 80A$   
 $R_{DS(ON)} < 6.5m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)} < 10m\Omega @ V_{GS} = 5V$
- ◆ High density cell design for ultra low  $R_{dson}$
- ◆ Fully characterized avalanche voltage and current
- ◆ Good stability and uniformity with high  $E_{AS}$
- ◆ Excellent package for good heat dissipation

## Application

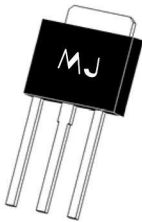
- ◆ Power switching application
- ◆ Hard switched and high frequency circuits
- ◆ Uninterruptible power supply



Schematic diagram



Marking and pin assignment



TO-251 top view

100% UIS TESTED!

## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJ3080I	MJ3080I	TO-251	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	80	A
Drain Current-Continuous( $T_C = 100^{\circ}C$ )	$I_{D(100^{\circ}C)}$	50	A
Pulsed Drain Current	$I_{DM}$	170	A
Maximum Power Dissipation	$P_D$	83	W
Derating factor		0.56	W/ $^{\circ}C$
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	150	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	$^{\circ}C$

## Thermal Characteristic

Thermal Resistance,Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	1.8	$^{\circ}C/W$
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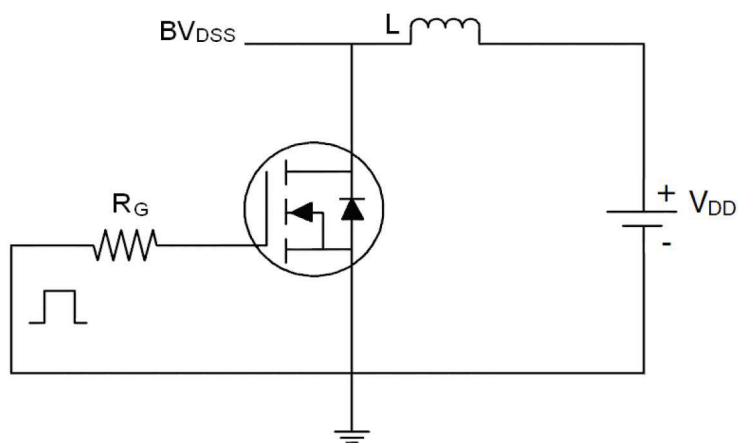
Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

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	30	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V,V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =±20V,V <sub>DS</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	1.5	3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	-	5.5	6.5	mΩ
		V <sub>GS</sub> =5V, I <sub>D</sub> =24A	-	7.5	10	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V,I <sub>D</sub> =24A	20	-	-	S
Dynamic Characteristics <sup>(Note 4)</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V,V <sub>GS</sub> =0V F=1.0MHz	-	2330	-	PF
Output Capacitance	C <sub>oss</sub>		-	460	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	230	-	PF
Switching Characteristics <sup>(Note 4)</sup>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =10V,I <sub>D</sub> =30A V <sub>GS</sub> =10V,R <sub>GEN</sub> =2.7Ω	-	20	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	15	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	60	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	10	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =10V,I <sub>D</sub> =30A V <sub>GS</sub> =10V	-	51	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	14	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	11	-	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> =24A	-	-	1.2	V
Diode Forward Current <sup>(Note 2)</sup>	I <sub>S</sub>		-	-	80	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> =25°C, I <sub>F</sub> =80A di/dt=100A/μs <sup>(Note 3)</sup>	-	32	50	nS
Reverse Recovery Charge	Q <sub>rr</sub>		-	12	20	nC
Forward Turn-On Time	t <sub>on</sub>	Intrinsic turn-on time is negligible(turn-on is dominated by LS+LD)				

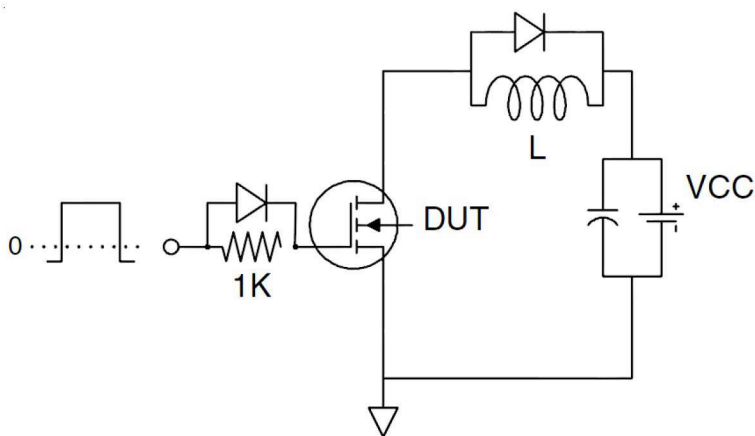
Notes:

- 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
- ⑤ EAS condition: T<sub>J</sub>=25°C,V<sub>DD</sub>=15V,V<sub>G</sub>=10V,L=1mH,R<sub>g</sub>=25Ω

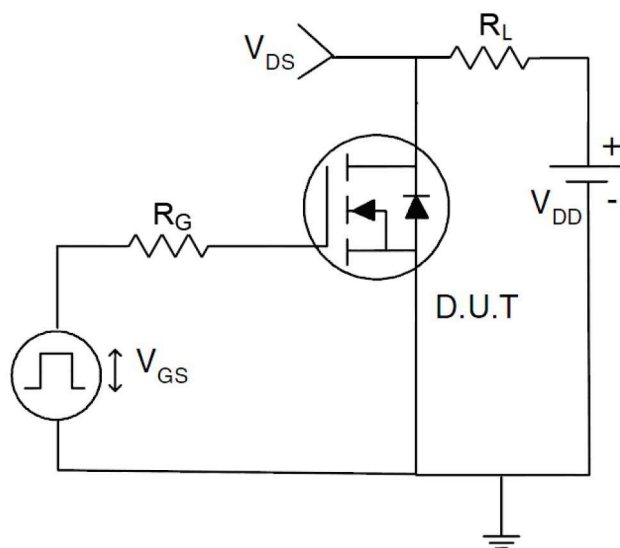
# Test circuit



EAS test Circuit

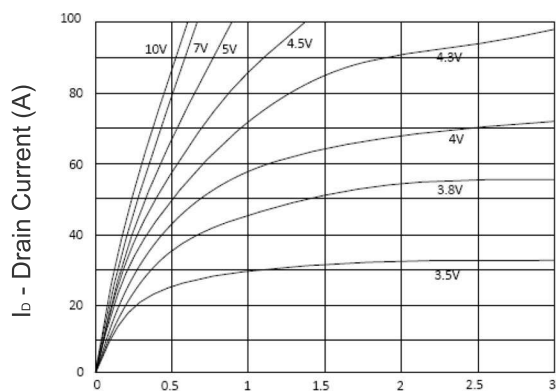


Gate charge test Circuit



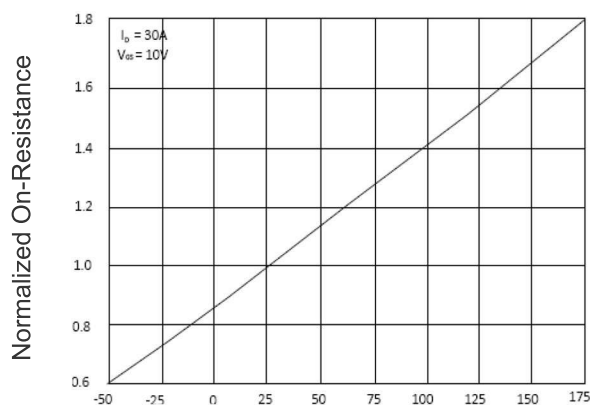
Switch Time Test Circuit

## Typical Electrical and Thermal Characteristics (Curves)



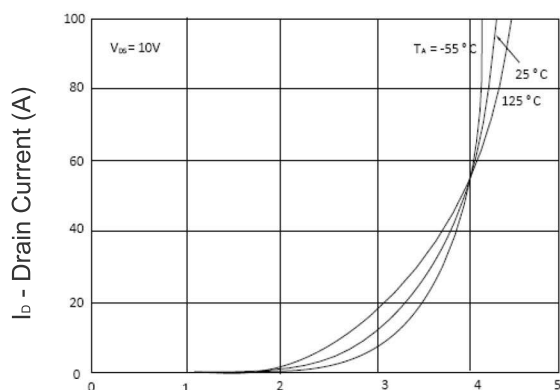
$V_{DS}$  Drain-Source Voltage (V)

Figure 1 Output Characteristics



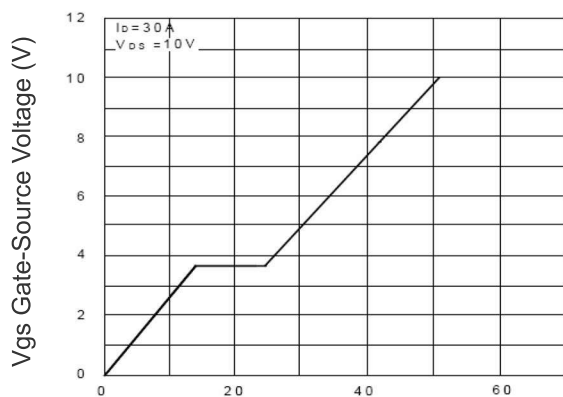
$T_J$  -Junction Temperature( $^{\circ}\text{C}$ )

Figure 4  $R_{DS(on)}$ -Junction Temperature



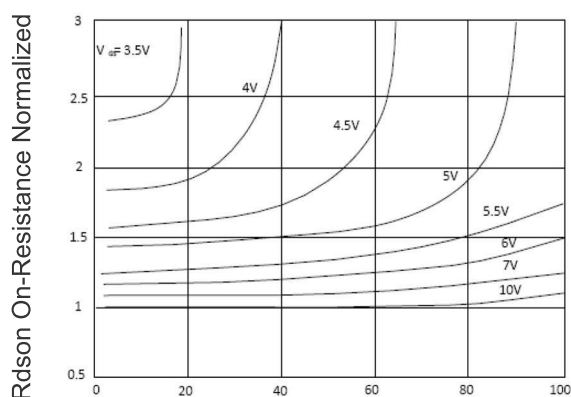
$V_{GS}$  Gate-Source Voltage (V)

Figure 2 Transfer Characteristics



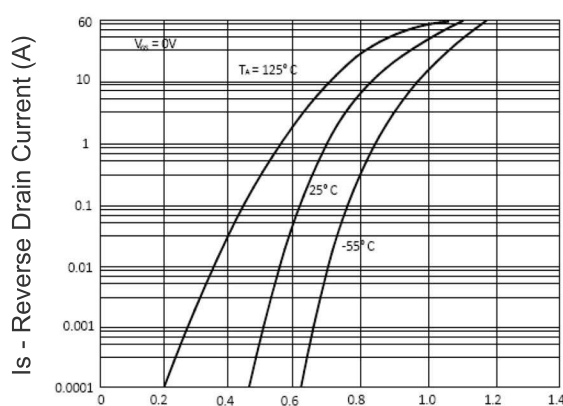
$Q_g$  Gate Charge (nC)

Figure 5 Gate Charge



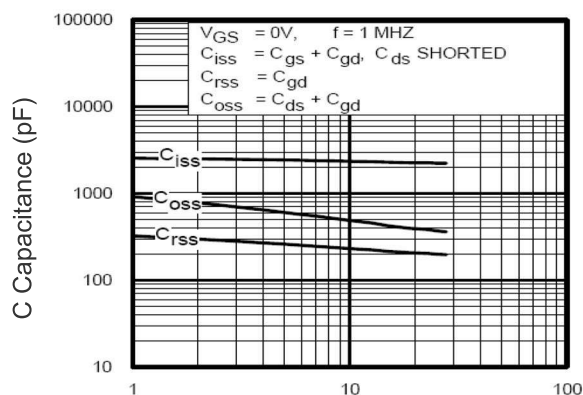
$I_D$  - Drain Current (A)

Figure 3  $R_{DS(on)}$ - Drain Current

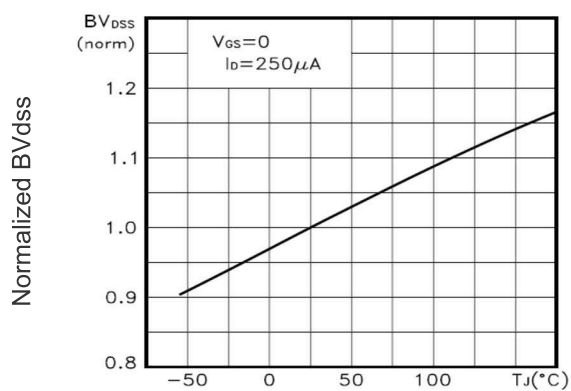


$V_{SD}$  Source-Drain Voltage (V)

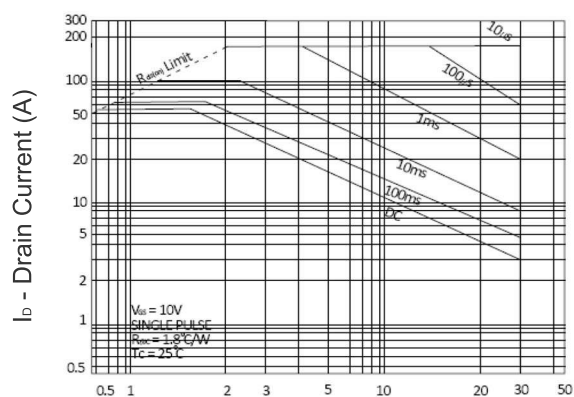
Figure 6 Source- Drain Diode Forward



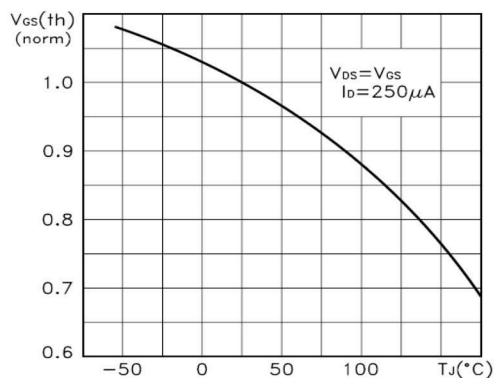
Vds Drain-Source Voltage (V)  
Figure 7 Capacitance vs Vds



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

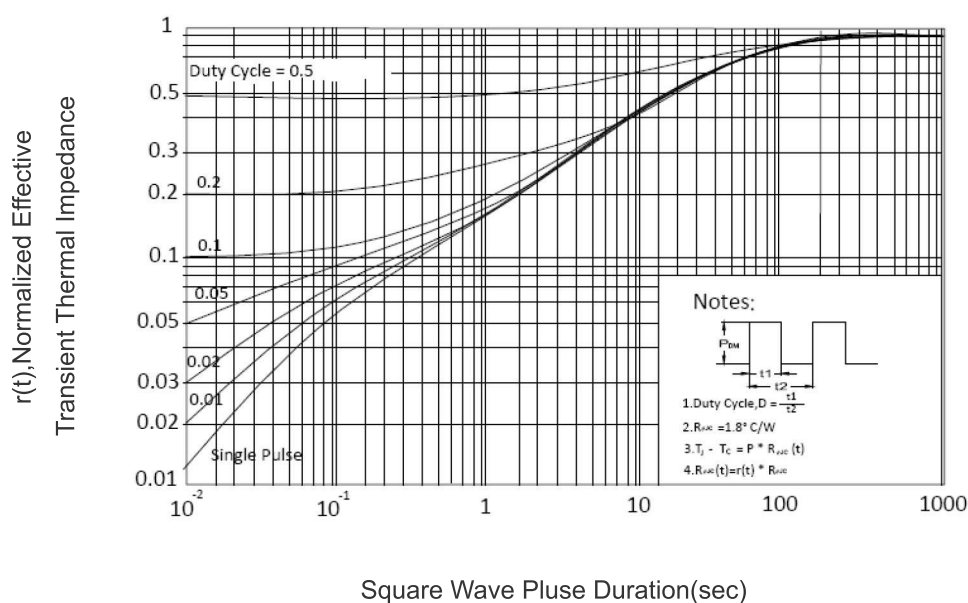
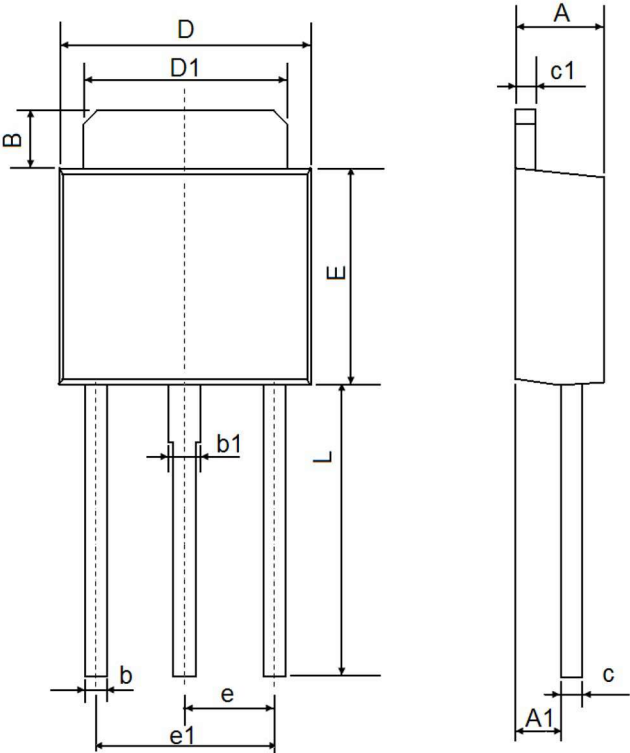


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-251 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	1.050	1.350	0.042	0.054
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP		0.091 TYP	
e1	4.500	4.700	0.177	0.185
L	7.500	7.900	0.295	0.311

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