

MJ N-Channel Enhancement Mode Power MOSFET

Description

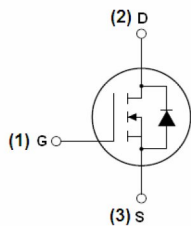
The MJ2006Y uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

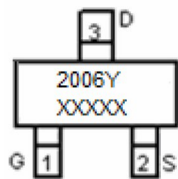
- ◆ $V_{DS} = 20V, I_D = 6A$
 $R_{DS(ON)} < 13m\Omega$ @ $V_{GS} = 4.5V$ (Typ:10.5m Ω)
 $R_{DS(ON)} < 18m\Omega$ @ $V_{GS} = 2.5V$ (Typ:15m Ω)
- ◆ High density cell design for ultra low R_{dson}
- ◆ Fully characterized avalanche voltage and current
- ◆ Good stability and uniformity with high EAS
- ◆ Excellent package for good heat dissipation
- ◆ Special process technology for high ESD capability

Application

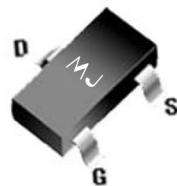
- ◆ Power switching application
- ◆ Load switching
- ◆ Uninterruptible power supply



Schematic diagram



Marking and pin Assignment



SOT-23-3L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2006Y	MJ2006Y	SOT23-3L	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings (Tc =25 °Cunless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	6	A
Drain Current-Continuous(TC=100°C)	$I_D (100^{\circ}C)$	4.2	A
Pulsed Drain Current	I_{DM}	24	A
Maximum Power Dissipation	P_D	1.5	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	83.3	°C/W
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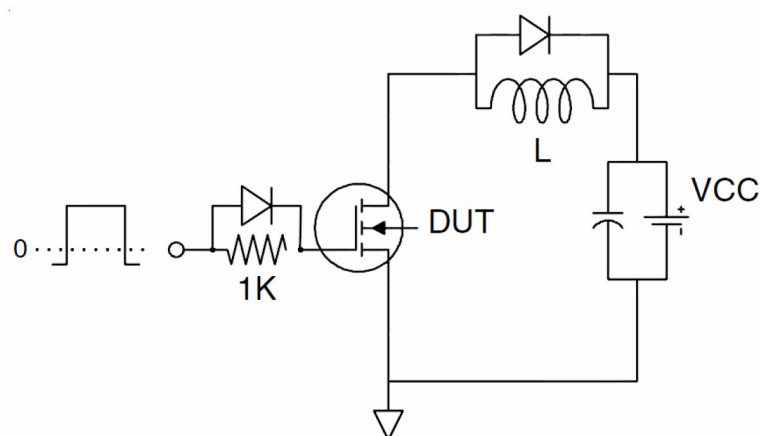
Electrical Characteristics (T_A =25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	20	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =20V,V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{DS} =±12V,V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	0.5	0.7	1.2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =6A	-	10.5	13	mΩ
		V _{GS} =2.5V, I _D =5A		15	18	mΩ
Dynamic Characteristics ^(Note 4)						
Input Capacitance	C _{iss}	V _{DS} =10V,V _{GS} =0V, F=1.0MHz		620		PF
Output Capacitance	C _{oss}			125		PF
Reverse Transfer Capacitance	C _{rss}			64		PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{GS} =10V,V _{DS} =10V R _L =0. 5Ω,R _G =3Ω	-	4.5	-	nS
Turn-on Rise Time	t _r		-	9.2	-	nS
Turn-Off Delay Time	t _{d(off)}		-	18.7	-	nS
Turn-Off Fall Time	t _f		-	3.3	-	nS
Total Gate Charge	Q _g	V _{GS} =10V,V _{DS} =10V, I _D =6A		15		nC
Gate-Source Charge	Q _{gs}			1.8		nC
Gate-Drain Charge	Q _{gd}			2.8		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V,I _S =6A	-	-	1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	6	A

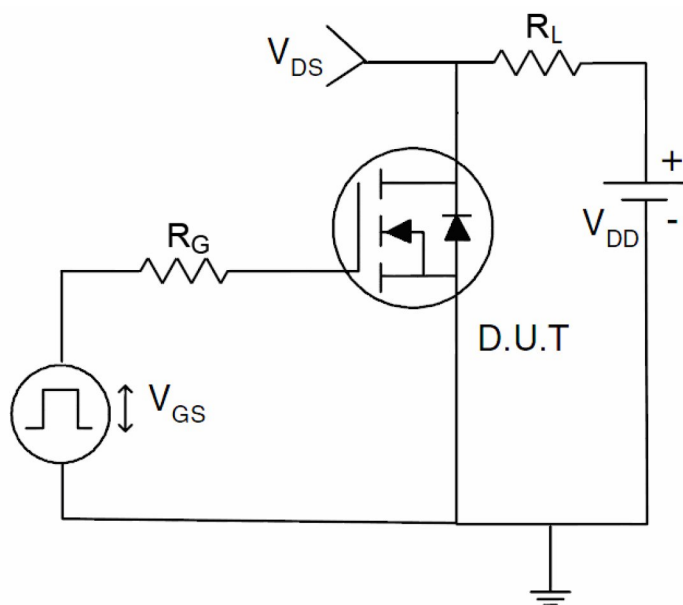
Notes:

- 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



Gate charge test Circuit



Switch Time Test Circuit

Typical Electrical and Thermal Characteristics (Curves)

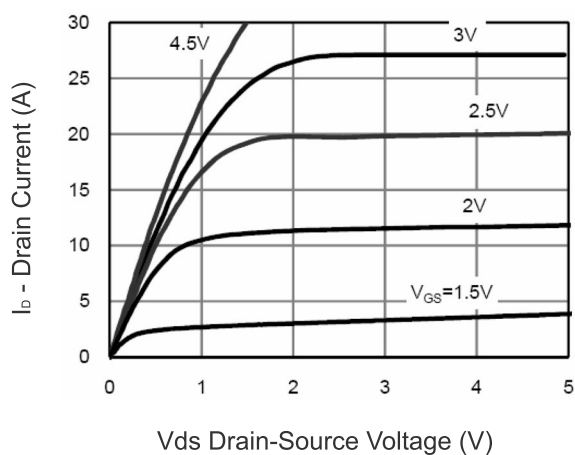


Figure 1 Output Characteristics

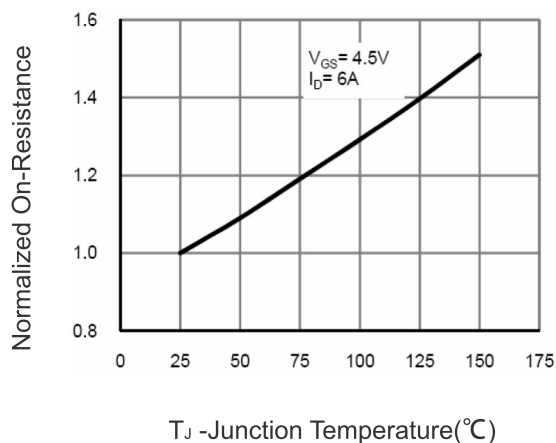


Figure 4 Rdson-Junction Temperature

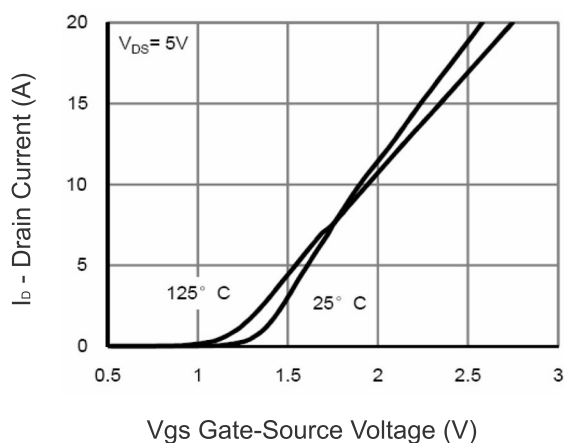


Figure 2 Transfer Characteristics

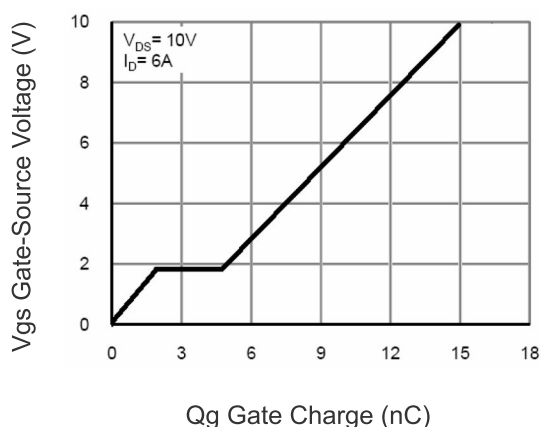


Figure 5 Gate Charge

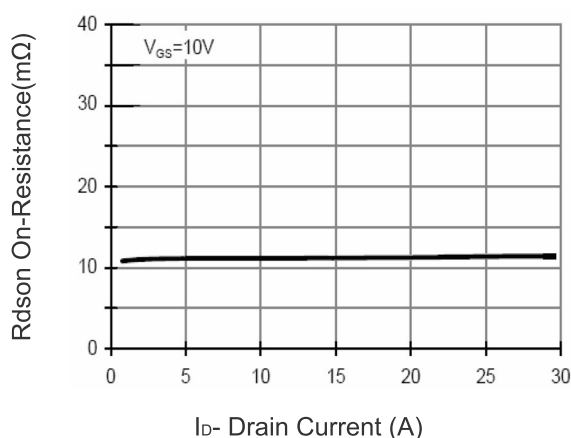


Figure 3 Rdson- Drain Current

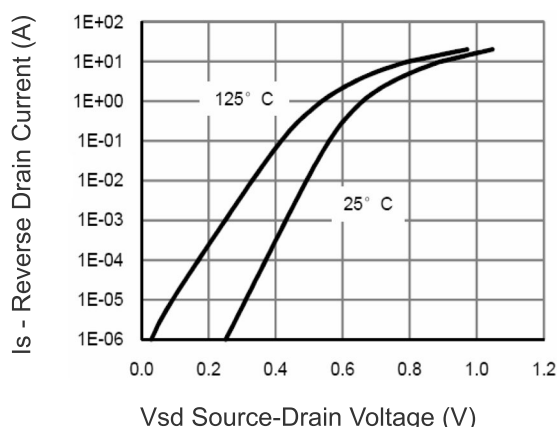
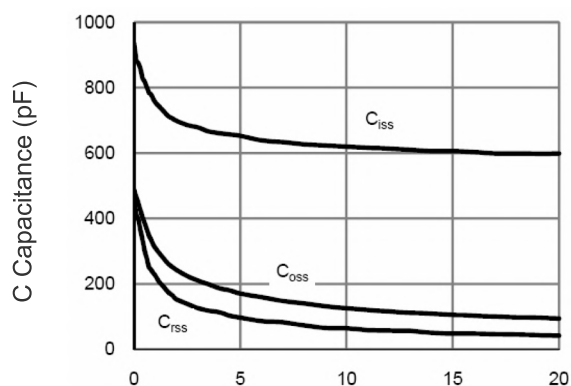
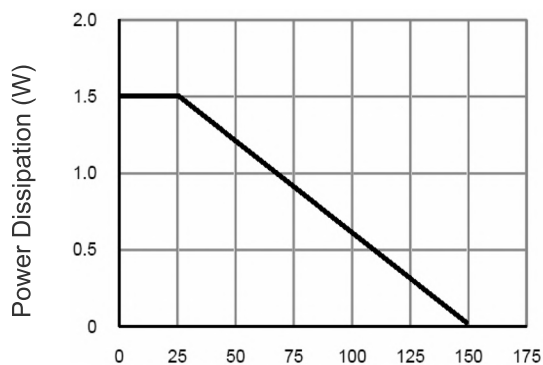


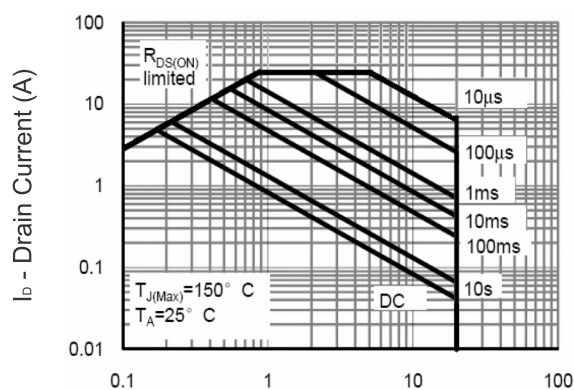
Figure 6 Source- Drain Diode Forward



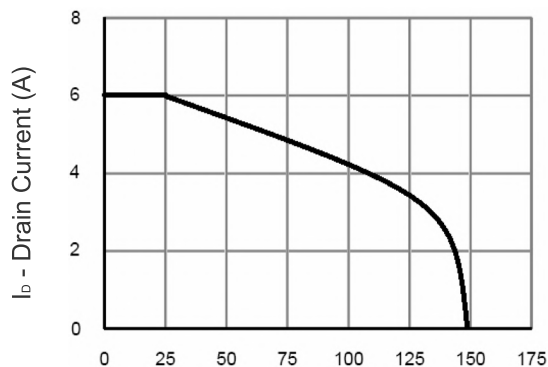
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



TJ -Junction Temperature(°C)
Figure 9 Power De-rating



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



TJ -Junction Temperature(°C)
Figure 10 Current De-rating

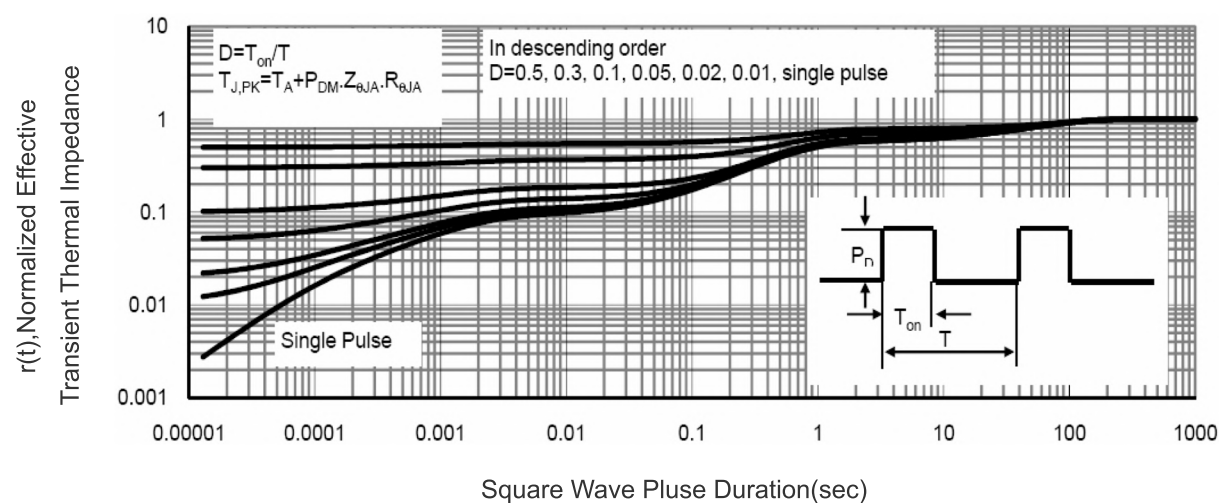
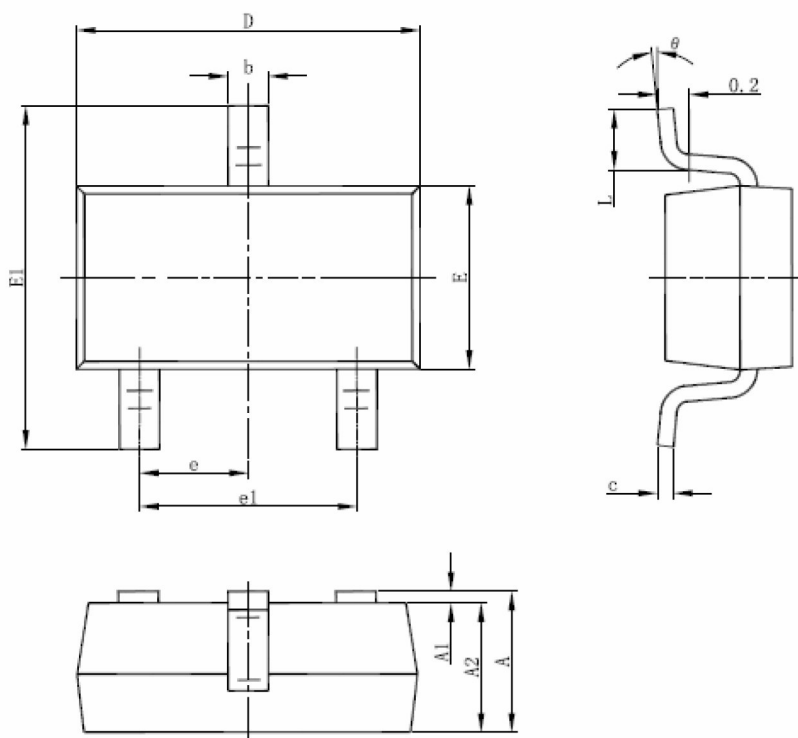


Figure 11 Normalized Maximum Transient Thermal Impedance

SOT-23-3L Package Information



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Notes:

- ① All dimensions are in millimeters.
- ② Tolerance $\pm 0.10\text{mm}$ (4 mil) unless otherwise specified
- ③ Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
- ④ Dimension L is measured in gauge plane.
- ⑤ Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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