MJ N-Channel Enhancement Mode Power MOSFET

Description

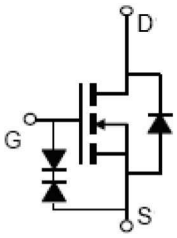
The MJ3011E uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.It is ESD protested.

General Features

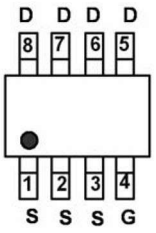
- ◆ V_{DS} =30V,I_D =11A
  $R_{DS(ON)}$ <10mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ <14mΩ @ V_{GS}=4.5V
  ESD Rating: 2000V HBM
- ◆ High power and current handing capability
- ◆ Lead free product is acquired
- ◆ Surface Mount Package

Application

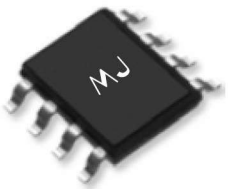
- ◆ PWM application
- ◆ Load switch



Schematic diagram



Marking and pin assignment



SOP-8 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
3011E	MJ3011E	SOP-8	Ø330mm	12mm	2500 units

Absolute Maximum Ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±10	V
Drain Current-Continuous	I_D	11	A
Drain Current-Pulsed (Note 1)	I_{DM}	50	A
Maximum Power Dissipation	P_D	2.5	W
Operating Junction and Storage Temperature Range	T_J ,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	50	℃/W

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	30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS}=±10V,V_{DS}=0V	-	-	±10	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.0	1.5	2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=8A	-	7	10	mΩ
		V_{GS}=4.5V, I_D=6A	-	10	14	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=11A	25	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{lss}	V_{DS}=15V,V_{GS}=0V F=1.0MHz	-	1155	-	PF
Output Capacitance	C_{oss}		-	260	-	PF
Reverse Transfer Capacitance	C_{rss}		-	95	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=15V,R_L=2.2Ω V_{GS}=5V,R_{GEN}=3Ω	-	10	-	nS
Turn-on Rise Time	t_r		-	16	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	40	-	nS
Turn-Off Fall Time	t_f		-	10.8	-	nS
Total Gate Charge	Q_g	V_{DS}=15V,I_D=8A V_{GS}=4.5V	-	17.5	-	nC
Gate-Source Charge	Q_{gs}		-	4.5	-	nC
Gate-Drain Charge	Q_{gd}		-	2.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=1A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	11	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

Typical Electrical and Thermal Characteristics

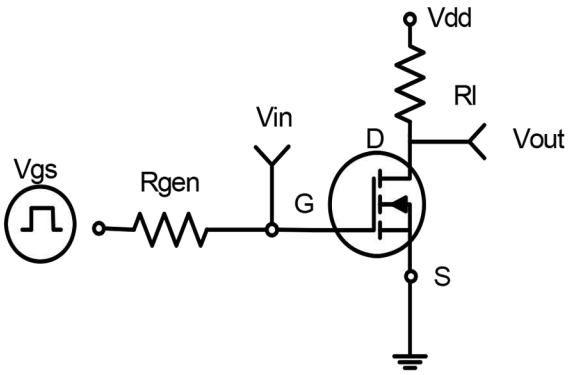


Figure 1 Switching Test Circuit

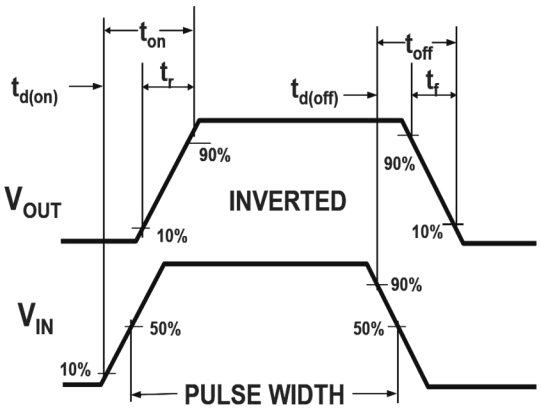
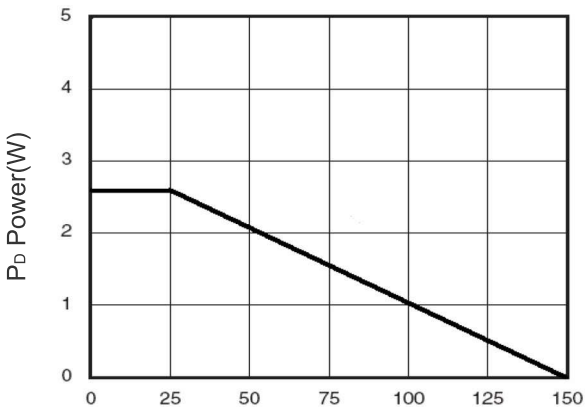
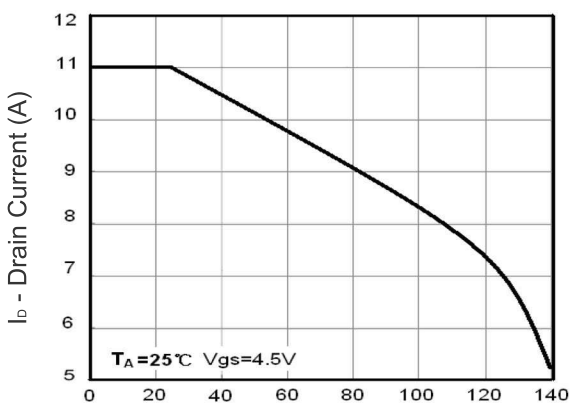


Figure 2 Switching Waveforms



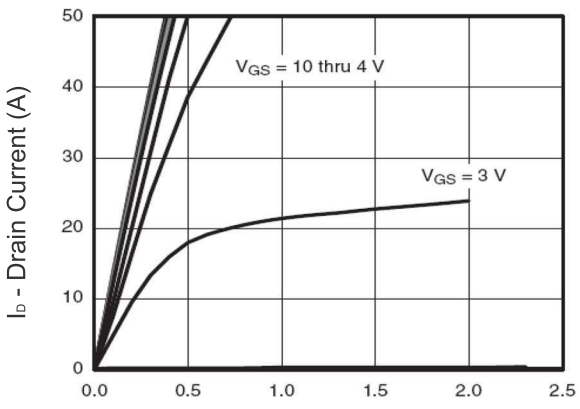
TJ-Junction Temperature(℃)

Figure 3 Power Dissipation



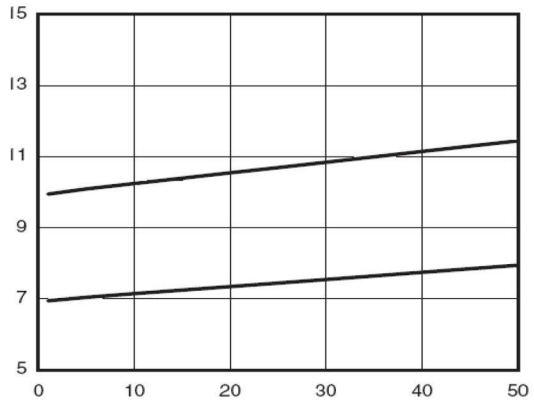
TJ-Junction Temperature(℃)

Figure 4 Drain Current



Vds Drain-Source Voltage (V)

Figure 5 Output Characteristics



ID- Drain Current (A)

Figure 6 Drain-Source On-Resistance

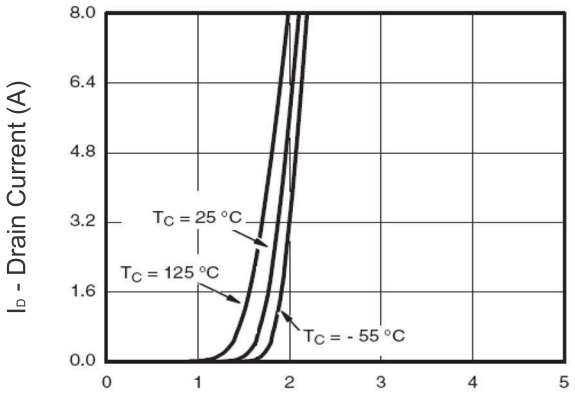


Figure 7 Transfer Characteristics

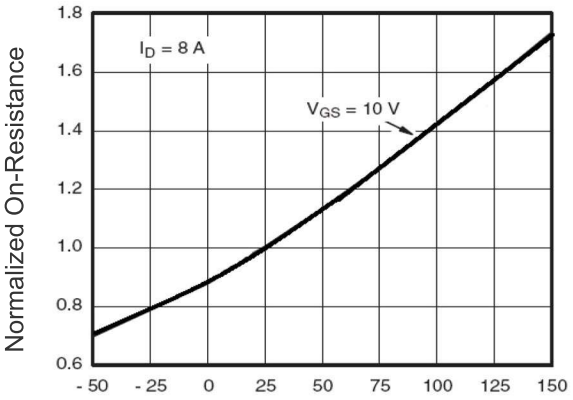


Figure 8 Drain-Source On-Resistance

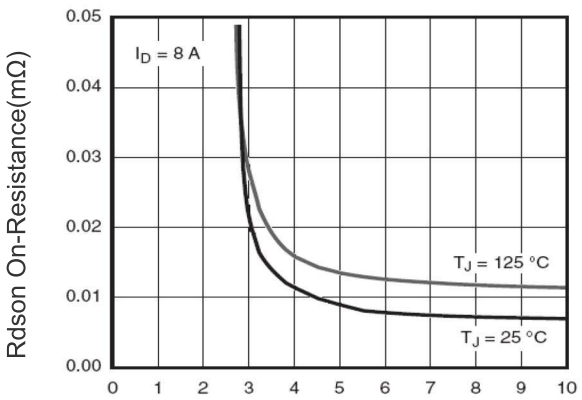


Figure 9 Rdson vs Vgs

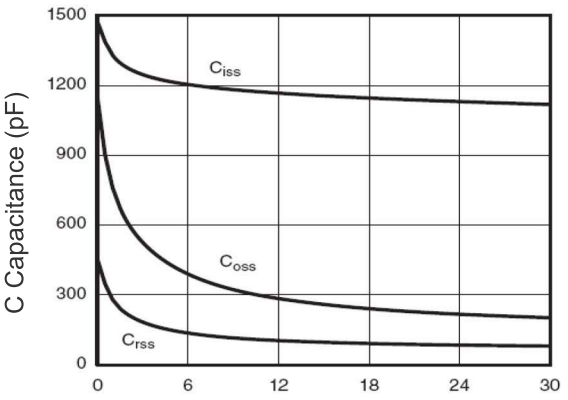


Figure 10 Capacitance vs Vds

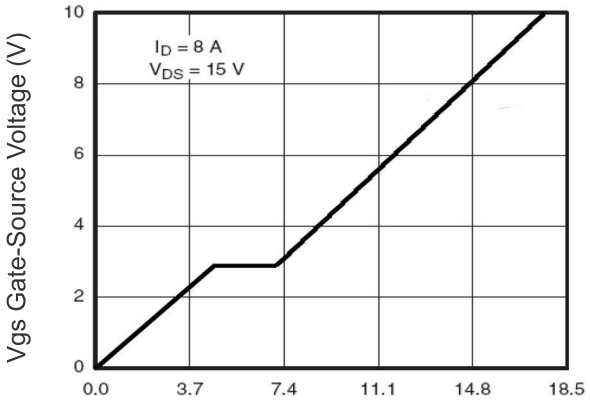


Figure 11 Gate Charge

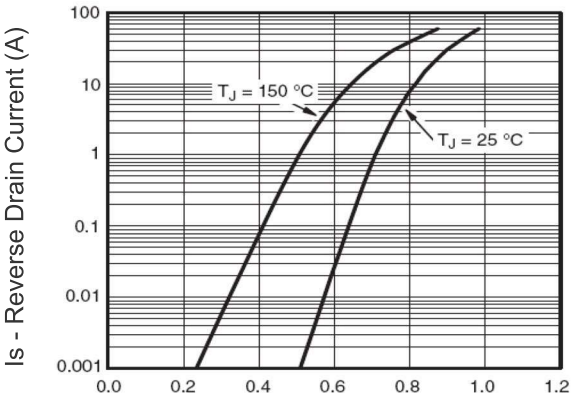


Figure 12 Source- Drain Diode Forward

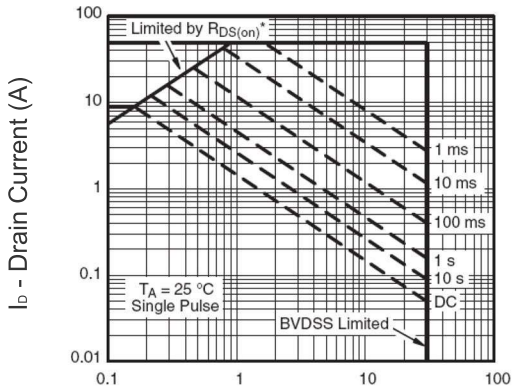


Figure 13 Safe Operation Area

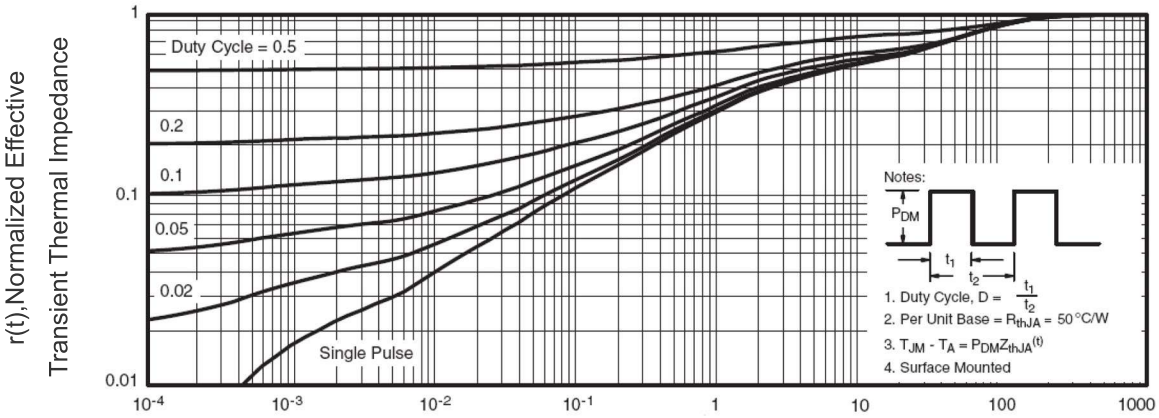
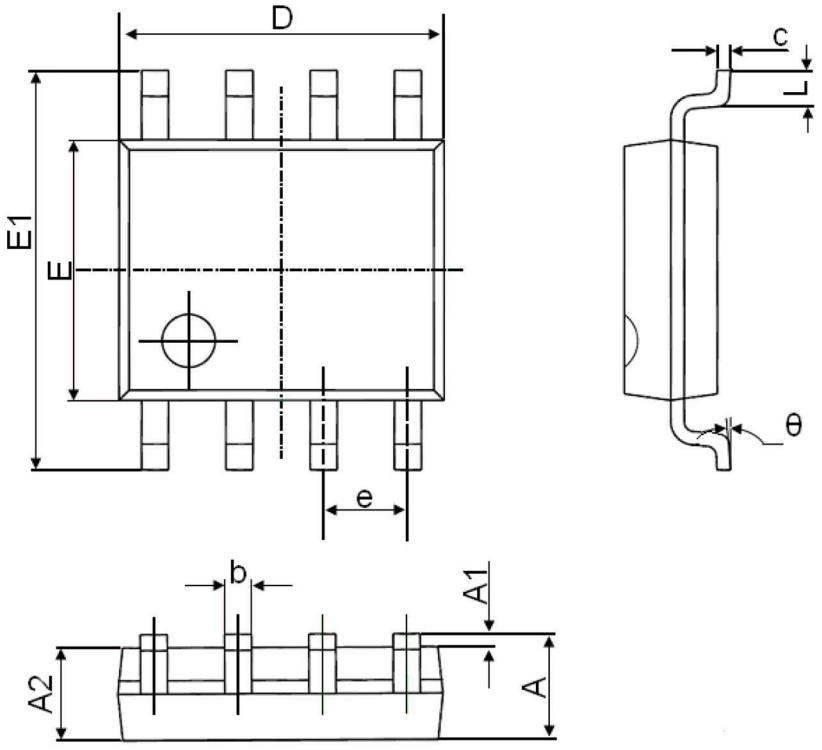


Figure 14 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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