MJ N-Channel Enhancement Mode Power MOSFET

Description

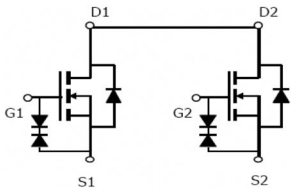
The MJ2010E uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications .It is ESD protested.

General Features

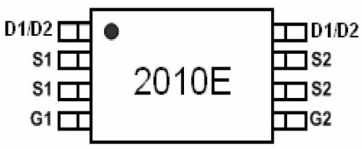
- V_{DS} =20V,I_D =7A
  $R_{DS(ON)}$ <24mΩ @ V_{GS} =2.5V
  $R_{DS(ON)}$ <18mΩ @ V_{GS} =4.5V
  ESD Rating: 2000V HBM
- High power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

- PWM application
- Load switch



Schematic diagram



Marking and pin Assignment

TSSOP-8 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2010E	MJ2010E	TSSOP-8	Ø330mm	12mm	3000 units

Absolute Maximum Ratings (T_C =25 ℃unless 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	7	A
Pulsed Drain Current (Note 1)	I_{DM}	30	A
Maximum Power Dissipation	P_D	1.5	W
Operating Junction and Storage Temperature Range	T_J ,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	83.3	℃/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	20	21.5	23	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =20V,V_{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS} =±10V,V_{DS} =0V	-	-	±10	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} =V_{GS} ,I_D =250μA	0.5	0.7	0.9	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} =4.5V, I_D =6.5A	-	13	18	mΩ
		V_{GS} =2.5V, I_D =5.5A	-	17	24	mΩ
Forward Transconductance	g_{FS}	V_{DS} =5V,I_D =7A	-	20	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{lss}	V_{DS} =10V,V_{GS} =0V, F=1.0MHz	-	1150	-	PF
Output Capacitance	C_{oss}		-	185	-	PF
Reverse Transfer Capacitance	C_{rss}		-	145	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD} =10V,R_L =1.35Ω V_{GS} =5V,R_{GEN} =3Ω	-	6	-	nS
Turn-on Rise Time	t_r		-	13	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	52	-	nS
Turn-Off Fall Time	t_f		-	16	-	nS
Total Gate Charge	Q_g	V_{DS} =10V,I_D =7A, V_{GS} =4.5V	-	15	-	nC
Gate-Source Charge	Q_{gs}		-	0.8	-	nC
Gate-Drain Charge	Q_{gd}		-	3.2	-	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		-	-	7	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

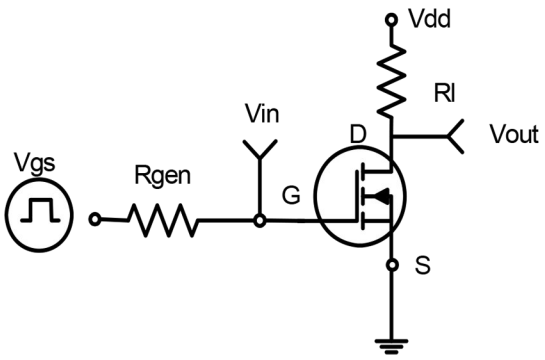


Figure 1 Switching Test Circuit

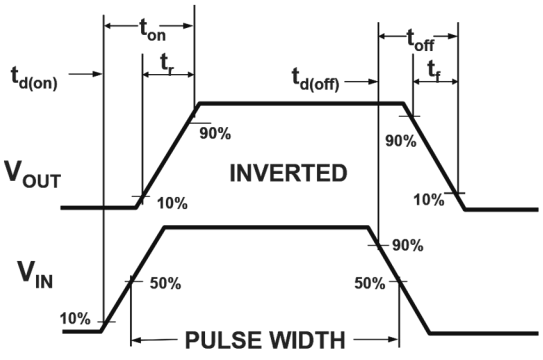


Figure 2 Switching Waveforms

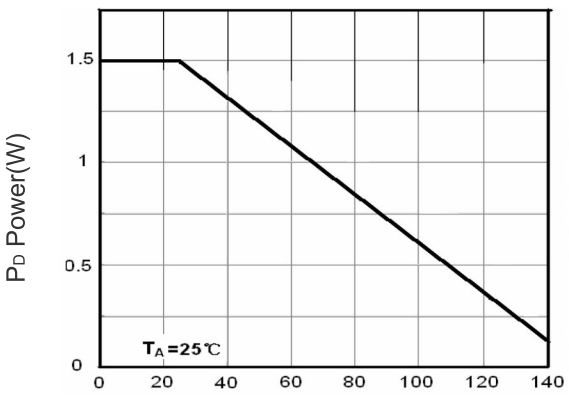


Figure 3 Power Dissipation

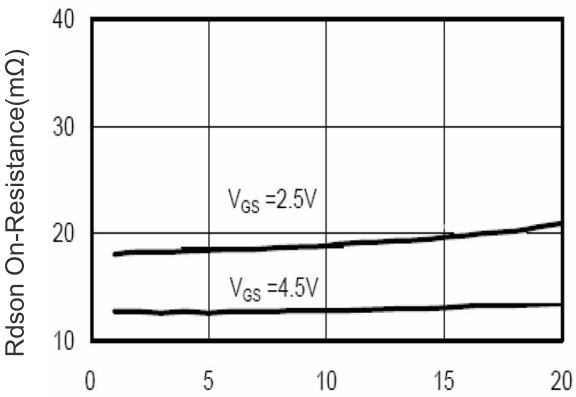


Figure 4 Drain-Source On-Resistance

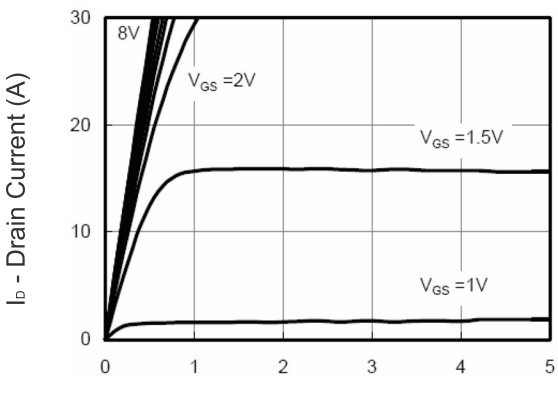


Figure 5 Output Characteristics

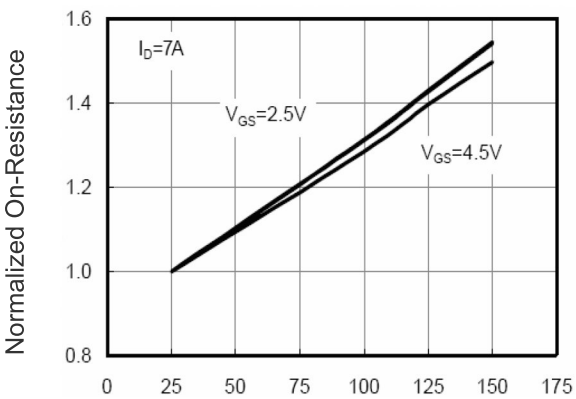


Figure 6 Drain-Source On-Resistance

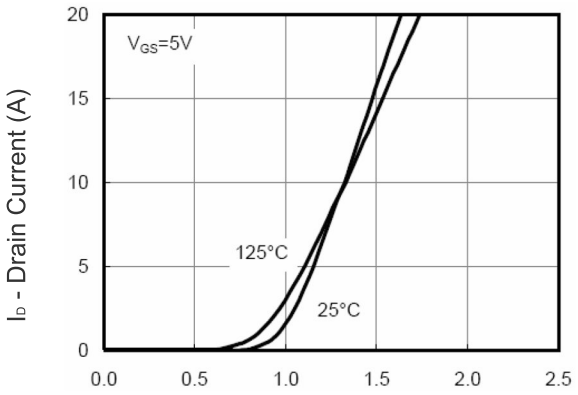


Figure 7 Transfer Characteristics

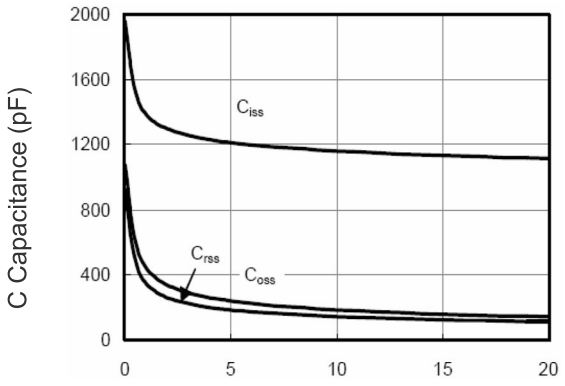


Figure 8 Capacitance vs Vds

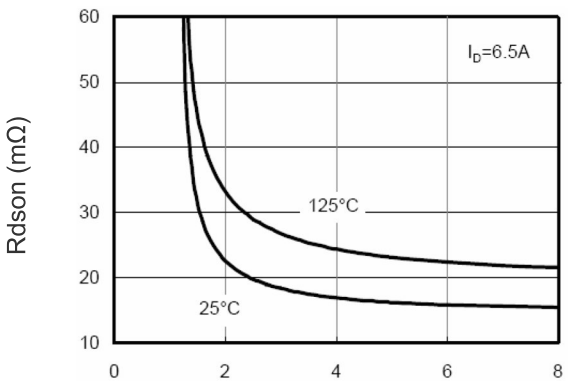


Figure 9 Rdson vs Vgs

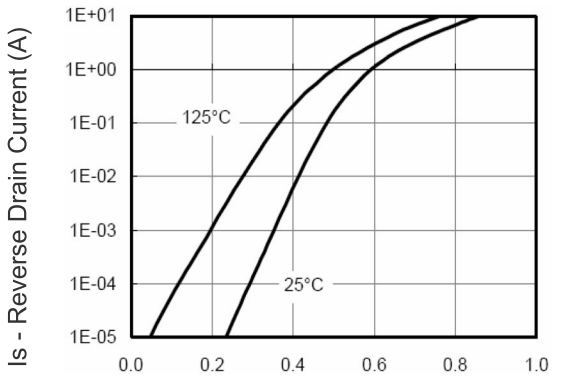


Figure 10 Capacitance vs Vds

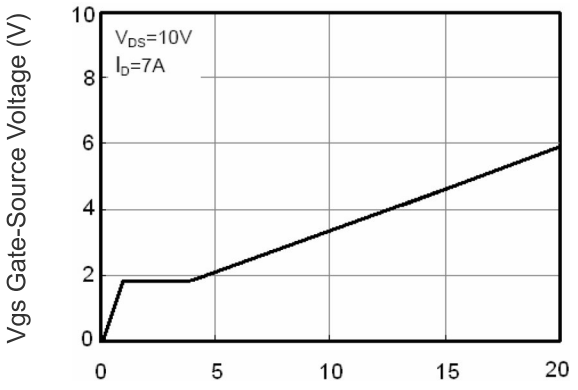


Figure 11 Gate Charge

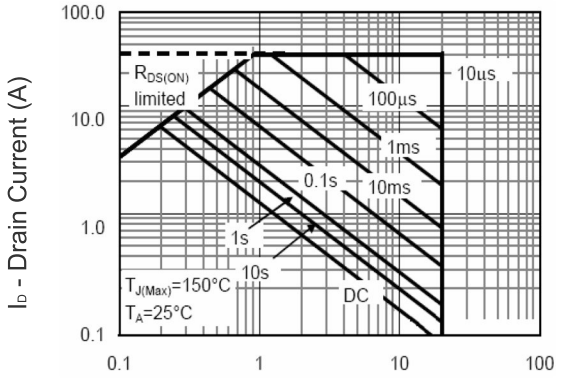


Figure 12 Safe Operation Area

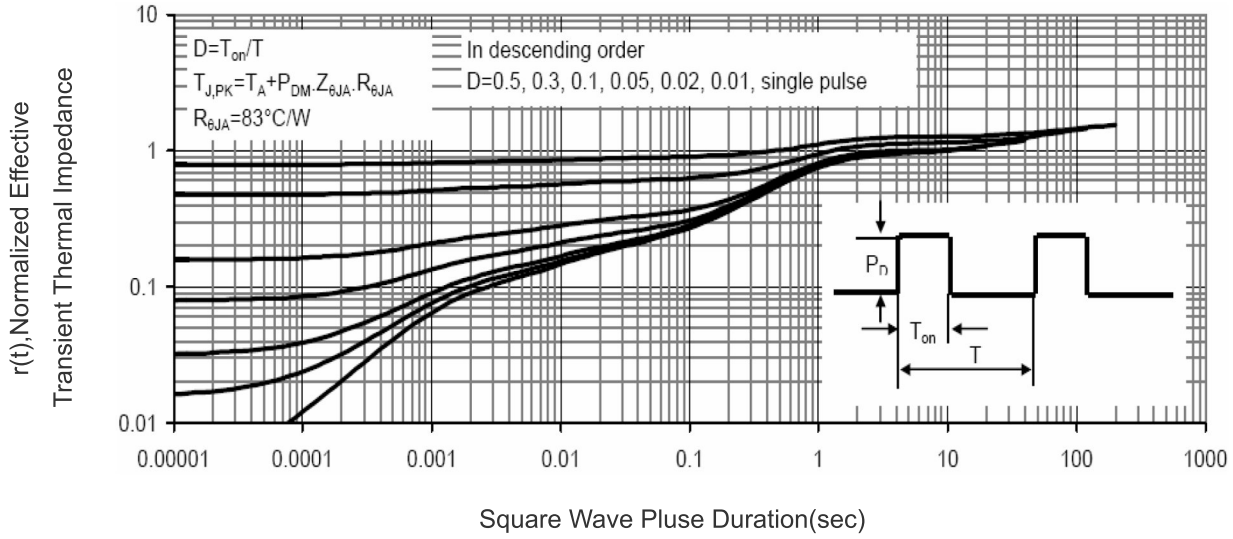
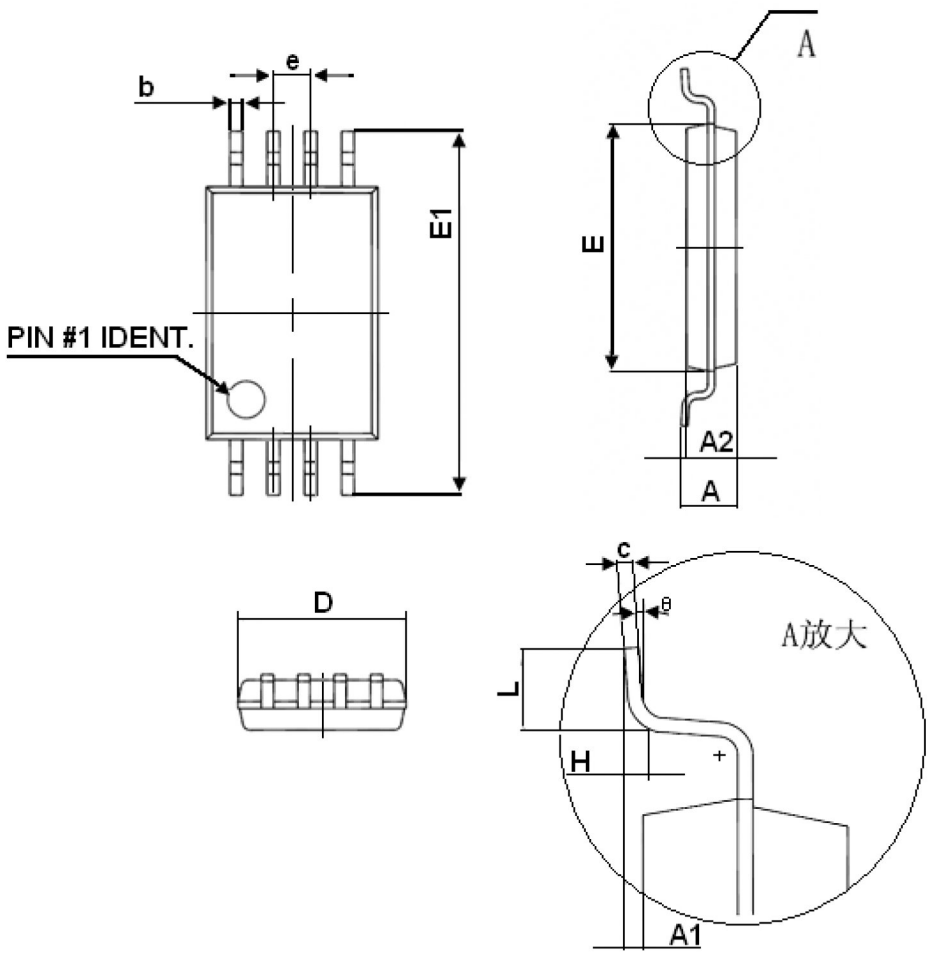


Figure 13 Normalized Maximum Transient Thermal Impedance

Tssop-8 Package Information



Symbol	Dimensions In Millimeters	
	Min	Max
D	2.900	3.100
E	4.300	4.500
b	0.190	0.300
c	0.090	0.200
E1	6.250	6.550
A		1.100
A2	0.800	1.000
A1	0.020	0.150
e	0.65(BSC)	
L	0.500	0.700
H	0.25(TYP)	
Θ	1°	7°

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