

MJ P-Channel Enhancement Mode Power MOSFET

Description

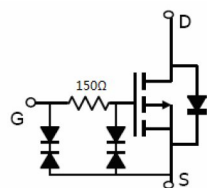
The MJ3415E uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications .It is ESD protested.

General Features

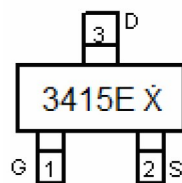
- ◆ $V_{DS}=-20V, I_D=-4A$
 $R_{DS(ON)}<60m\Omega @ V_{GS}=-2.5V$
 $R_{DS(ON)}<45m\Omega @ V_{GS}=-4.5V$
ESD Rating: 4000V HBM
- ◆ High power and current handing capability
- ◆ Lead free product is acquired
- ◆ Surface Mount Package

Application

- ◆ PWM application
- ◆ Load switch



Schematic diagram



Marking and pin Assignment



SOT-23 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
3415E X	MJ3415E	SOT-23	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings (T_c =25 °C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±10	V
Drain Current-Continuous	I_D	-4	A
Pulsed Drain Current ^(Note 1)	I_{DM}	-30	A
Maximum Power Dissipation	P_D	1.4	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	89.3	°C/W
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Electrical Characteristics (T_A =25°Cunless 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} =±10V,V _{GS} =0V	-	-	±15	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =-250μA	-0.45	-0.65	-1.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-4A	-	30	45	mΩ
		V _{GS} =-2.5V, I _D =-4A	-	38	60	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V,I _D =-4A	8	-	-	S
Dynamic Characteristics ^(Note 4)						
Input Capacitance	C _{iss}	V _{DS} =-10V,V _{GS} =0V, F=1.0MHz	-	1173.2	-	PF
Output Capacitance	C _{OSS}		-	121.6	-	PF
Reverse Transfer Capacitance	C _{rss}		-	88.4	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-10V, ,R _L =2.5Ω V _{GS} =-4.5V,R _{GEN} =3Ω	-	14		nS
Turn-on Rise Time	t _r		-	10		nS
Turn-Off Delay Time	t _{d(off)}		-	20		nS
Turn-Off Fall Time	t _f		-	30		nS
Total Gate Charge	Q _g	V _{DS} =-10V,I _D =-4A, V _{GS} =-4.5V	-	11.3	-	nC
Gate-Source Charge	Q _{gs}		-	1.3	-	nC
Gate-Drain Charge	Q _{gd}		-	2.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V,I _S =-4A	-	-	-1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	-4	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

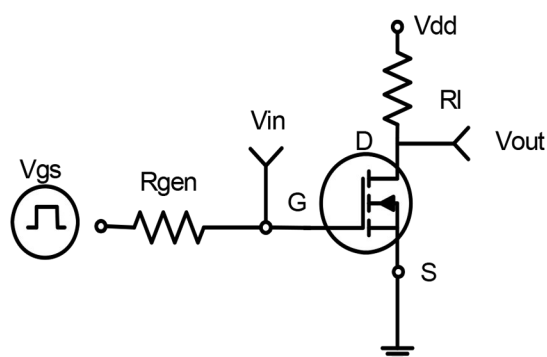


Figure 1 Switching Test Circuit

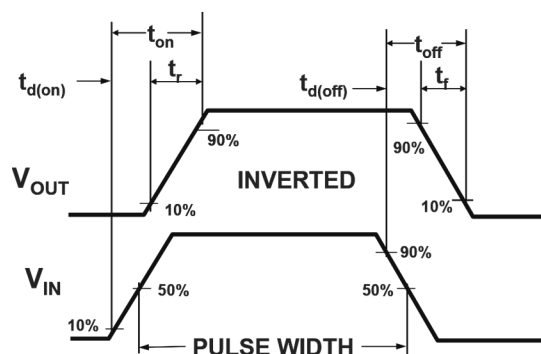


Figure 2 Switching Waveforms

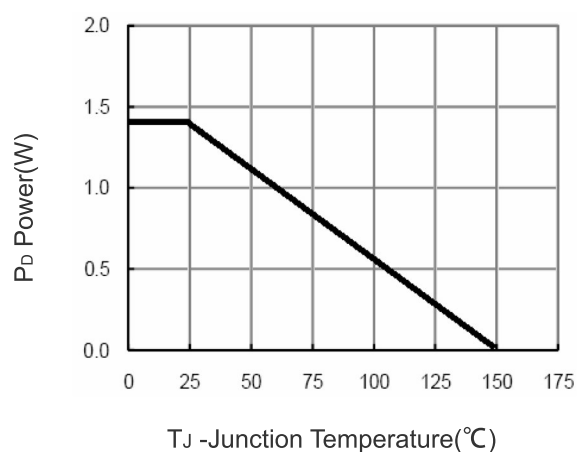


Figure 3 Power Dissipation

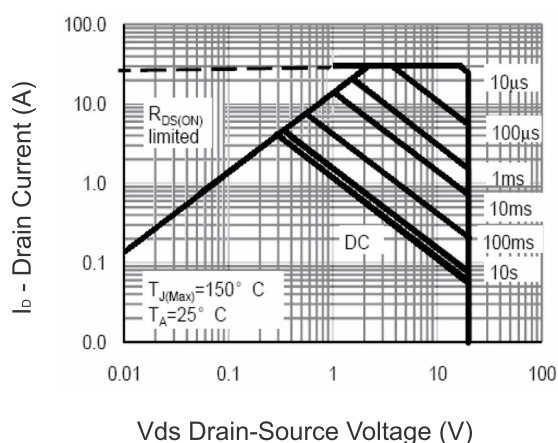


Figure 4 Safe Operation Area

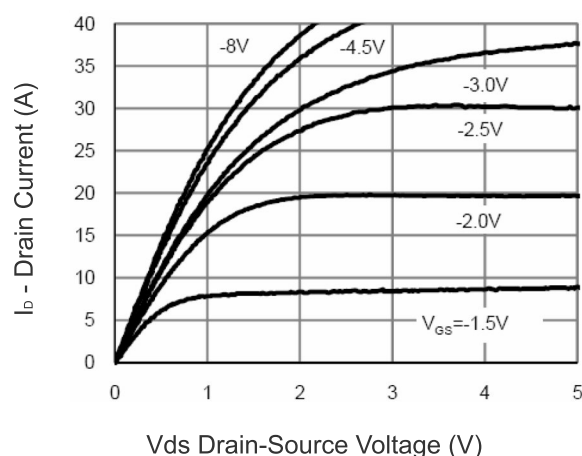


Figure 5 Output Characteristics

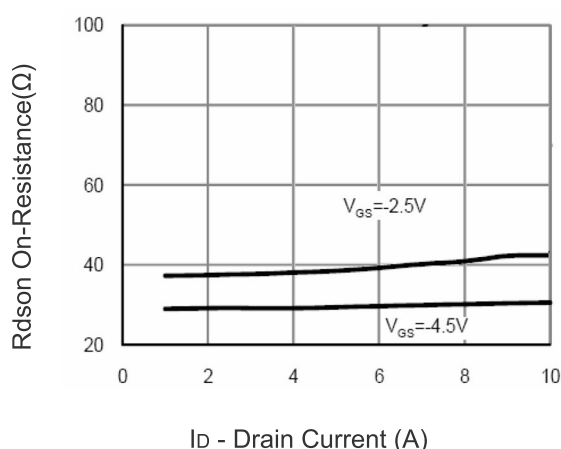


Figure 6 Drain-Source On-Resistance

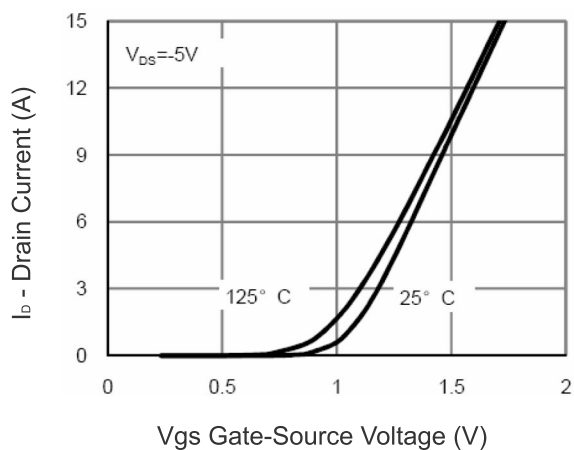


Figure 7 Transfer Characteristics

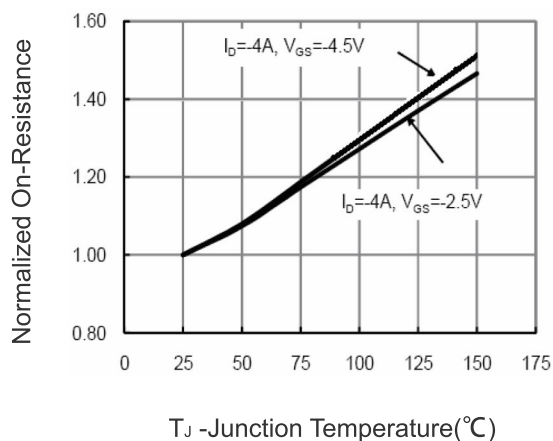


Figure 8 Drain-Source On-Resistance

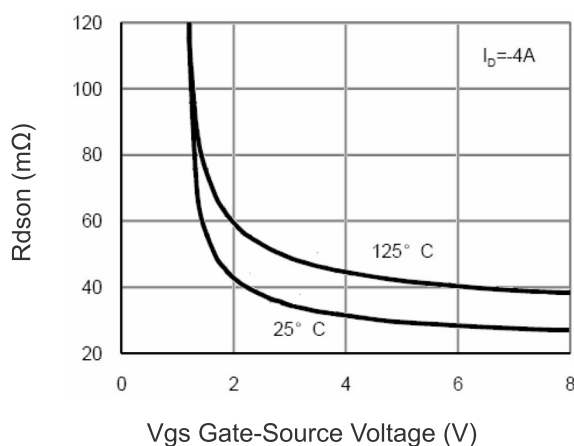


Figure 9 Rdson vs Vgs

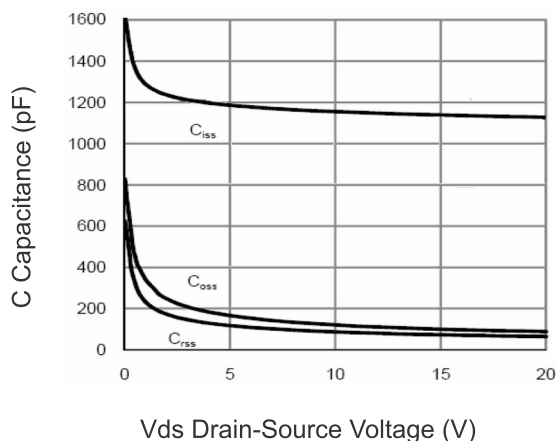


Figure 10 Capacitance vs Vds

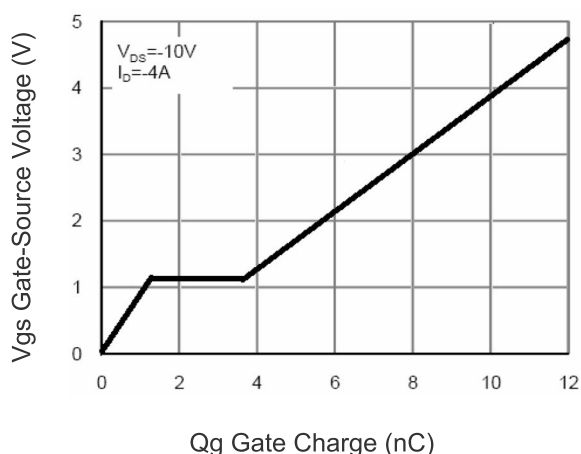


Figure 11 Gate Charge

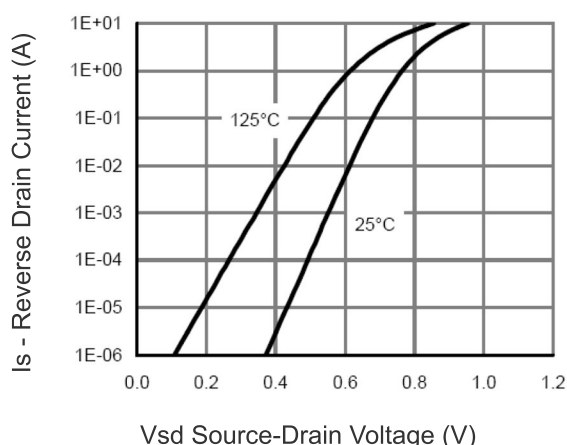


Figure 12 Source- Drain Diode Forward

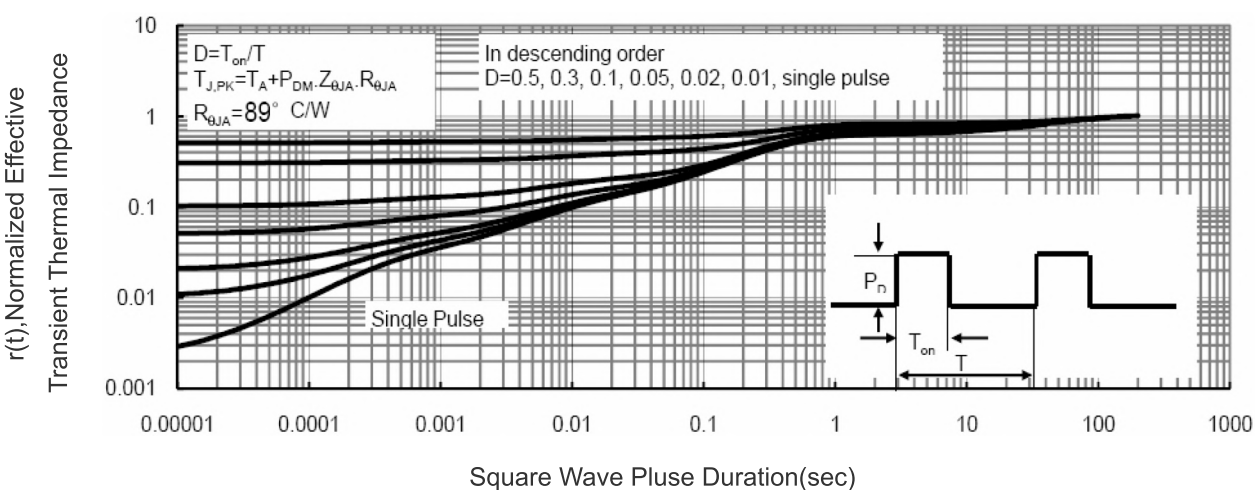
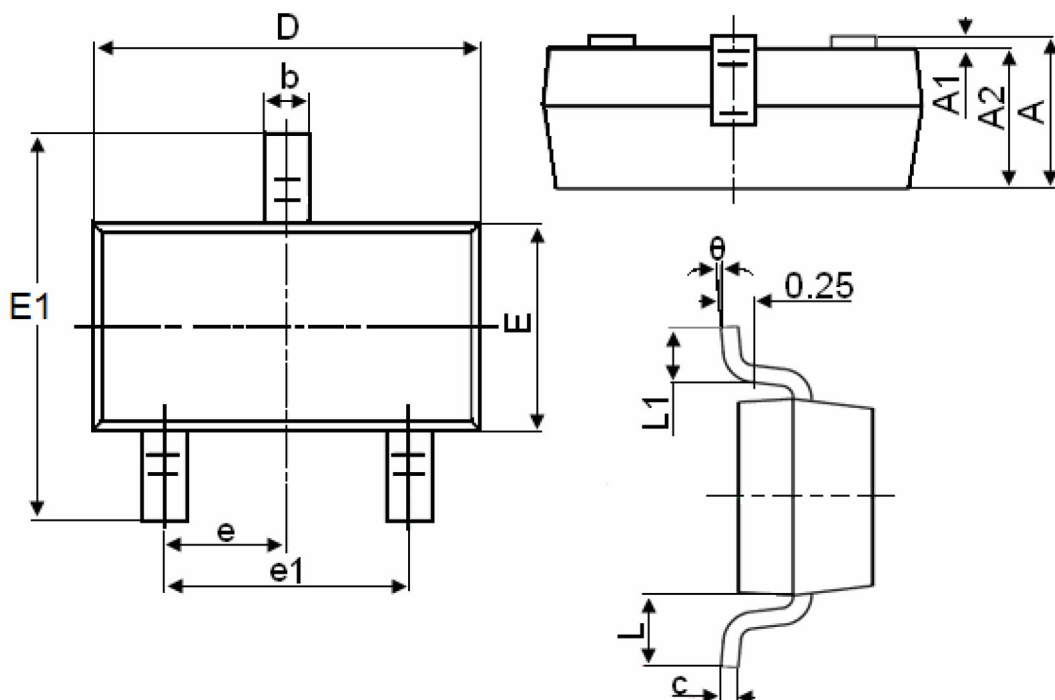


Figure 13 Normalized Maximum Transient Thermal Impedance

SOT-23 Package Information



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	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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