

MJ N-Channel Enhancement Mode Power MOSFET

Description

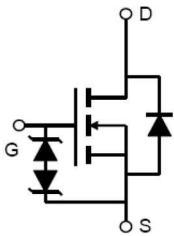
The MJ2014ES uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

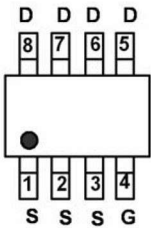
- ◆ $V_{DS} = 20V, I_D = 14A$
 $R_{DS(ON)} < 7m\Omega @ V_{GS} = 4.5V$
 $R_{DS(ON)} < 9m\Omega @ V_{GS} = 2.5V$
- ◆ High power and current handing capability
- ◆ Lead free product is acquired
- ◆ Surface Mount Package

Application

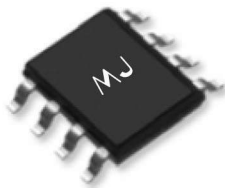
- ◆ PWM application
- ◆ Load switch



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
2014ES	MJ2014ES	SOP-8	Ø330mm	12mm	2500 units

Absolute Maximum Ratings (TA=25℃ 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	14	A
Pulsed Drain Current	I_{DM}	44	A
Maximum Power Dissipation	P_D	3	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	42	℃/W
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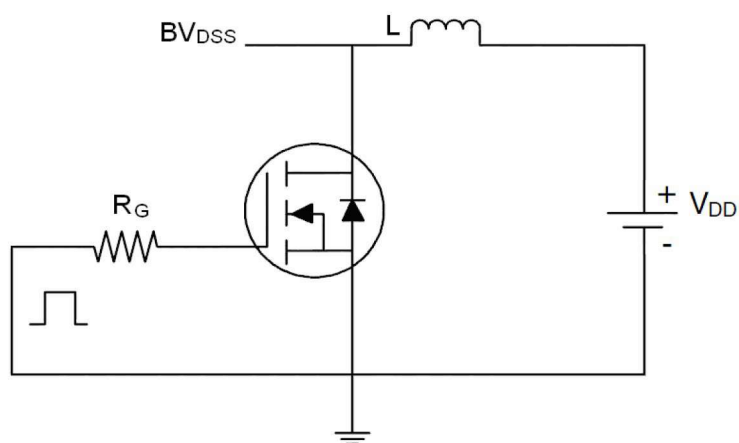
Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	20	22	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =20V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{DS} =±20V, V _{DS} =0V	-	-	±10	μA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.6	0.8	1.2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =10A	-	5	7	mΩ
		V _{GS} =2.5V, I _D =5.5A	-	7	9	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =10A	30	-	-	S
Dynamic Characteristics ^(Note 4)						
Input Capacitance	C _{iss}	V _{DS} =10V, V _{GS} =0V F=1.0MHz	-	1710	-	PF
Output Capacitance	C _{oss}		-	232	-	PF
Reverse Transfer Capacitance	C _{rss}		-	200	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V, R _L =1Ω V _{GS} =10V, R _{GEN} =3Ω	-	2.5	-	nS
Turn-on Rise Time	t _r		-	7.2	-	nS
Turn-Off Delay Time	t _{d(off)}		-	49	-	nS
Turn-Off Fall Time	t _f		-	10.8	-	nS
Total Gate Charge	Q _g	V _{DS} =10V, I _D =10A V _{GS} =4.5V	-	17.5	-	nC
Gate-Source Charge	Q _{gs}		-	1.5	-	nC
Gate-Drain Charge	Q _{gd}		-	4.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V, I _S =10A	-	-	1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	14	A

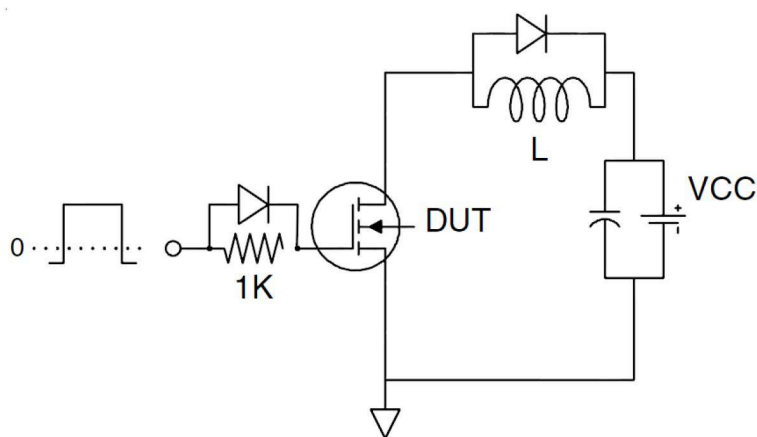
Notes:

- 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

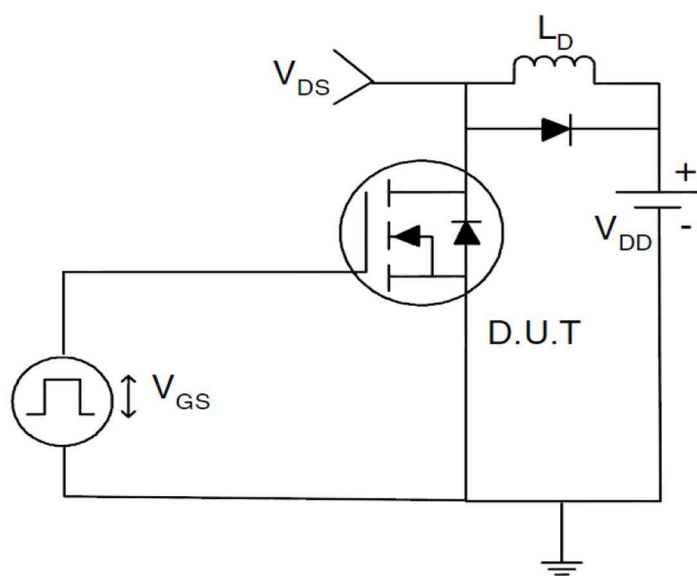
Test circuit



EAS test Circuit



Gate charge test Circuit



Switch Time Test Circuit

Typical Electrical and Thermal Characteristics

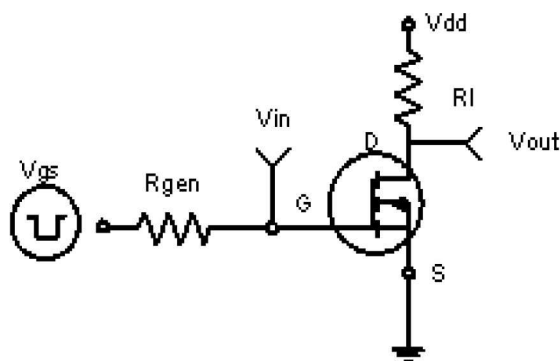


Figure 1 Switching Test Circuit

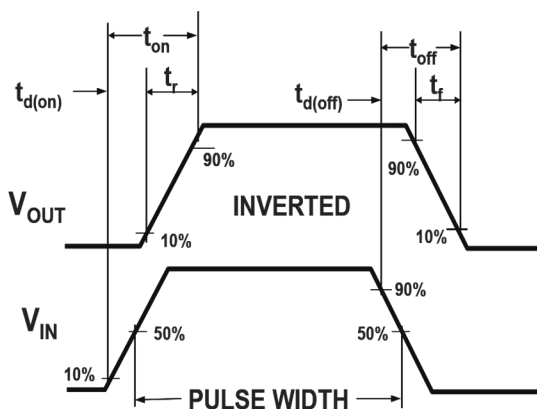
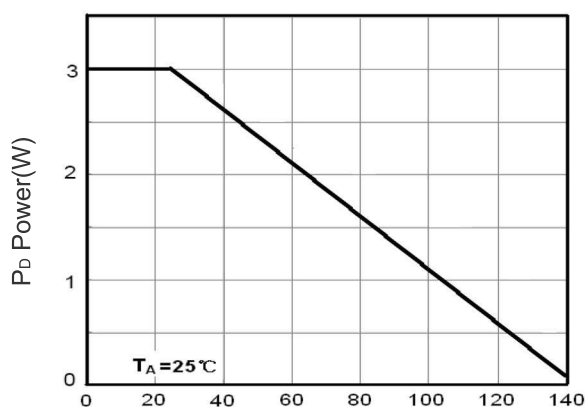
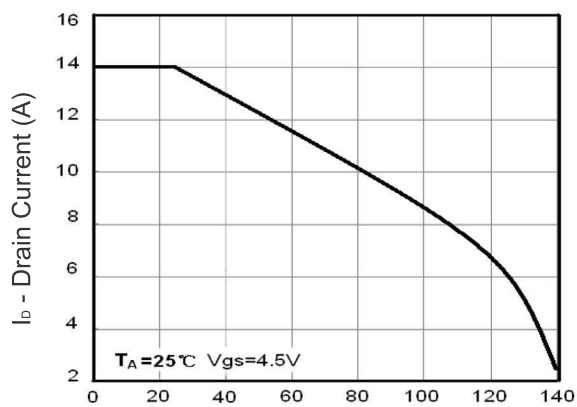


Figure 2 Switching Waveforms



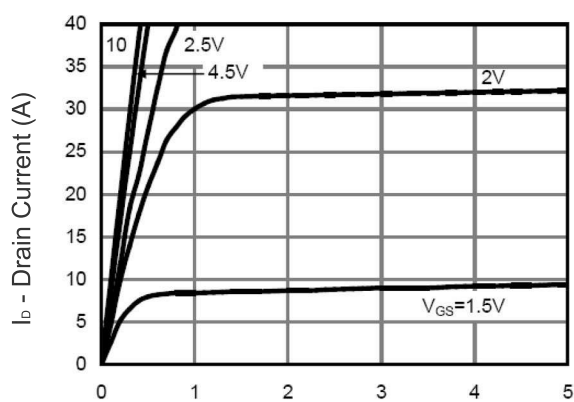
T_J-Junction Temperature(°C)

Figure 3 Power Dissipation



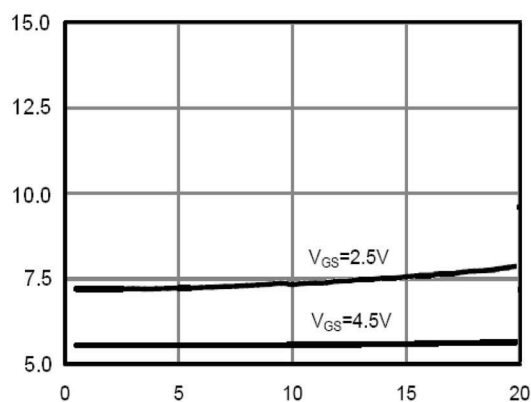
T_J-Junction Temperature(°C)

Figure 4 Drain Current



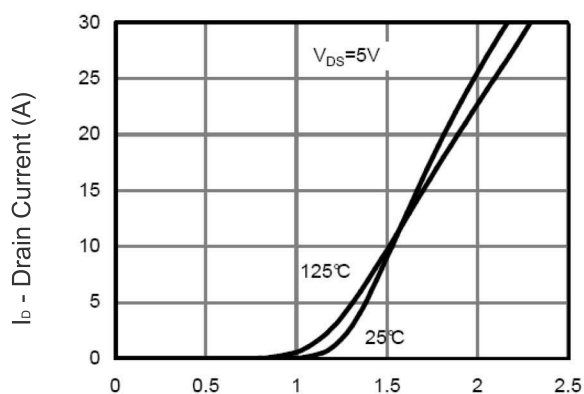
V_{ds} Drain-Source Voltage (V)

Figure 5 Output Characteristics



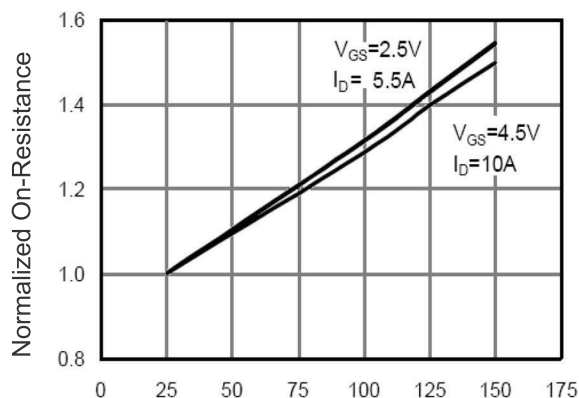
I_D- Drain Current (A)

Figure 6 Drain-Source On-Resistance



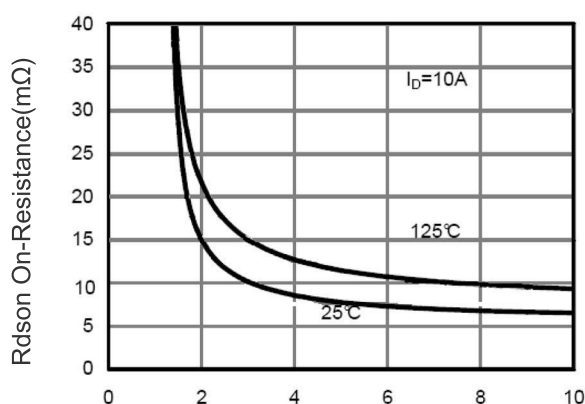
V_{GS} Gate-Source Voltage (V)

Figure 7 Transfer Characteristics



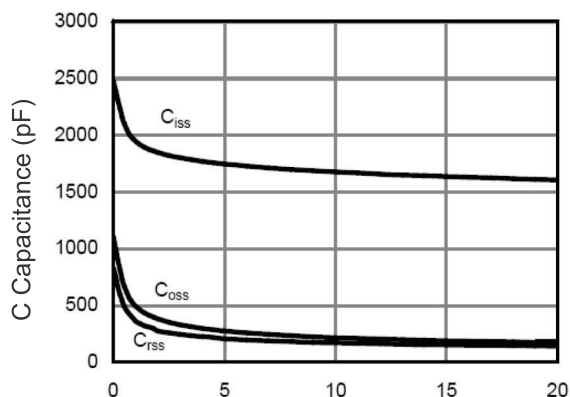
T_J-Junction Temperature(°C)

Figure 8 Drain-Source On-Resistance



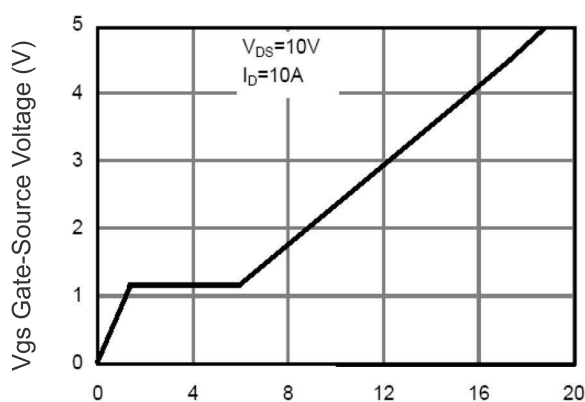
V_{GS} Gate-Source Voltage (V)

Figure 9 Rdson vs Vgs



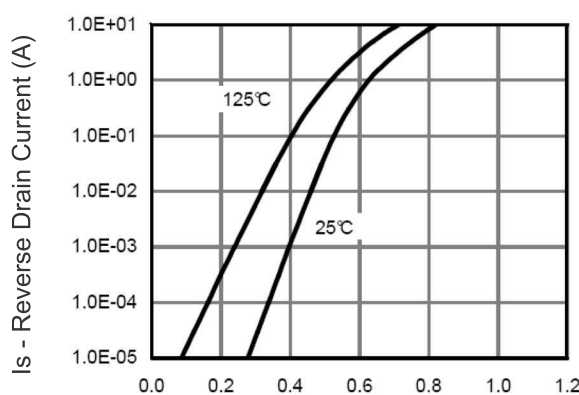
V_{DS} Drain-Source Voltage (V)

Figure 10 Capacitance vs Vds



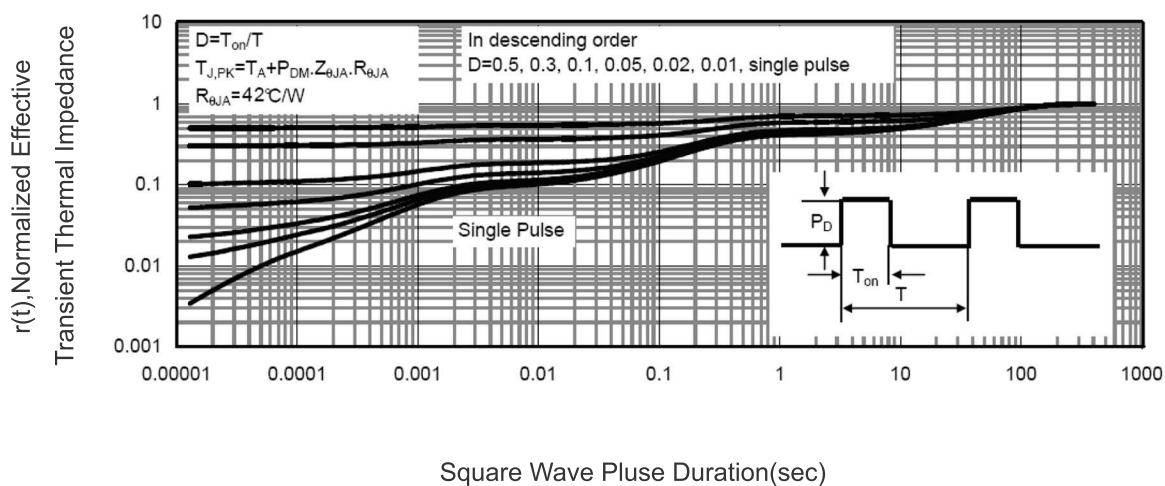
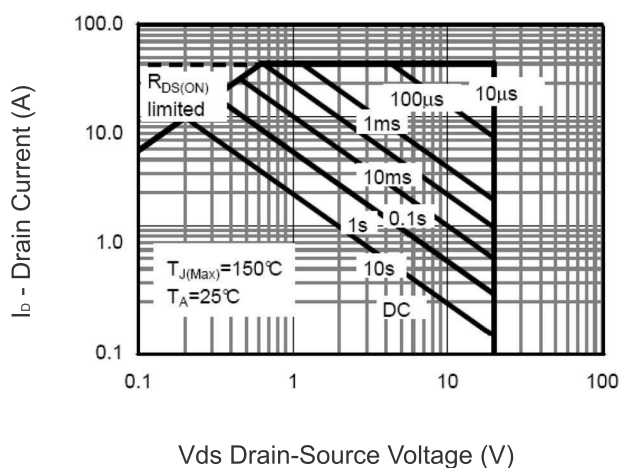
Q_g Gate Charge (nC)

Figure 11 Gate Charge

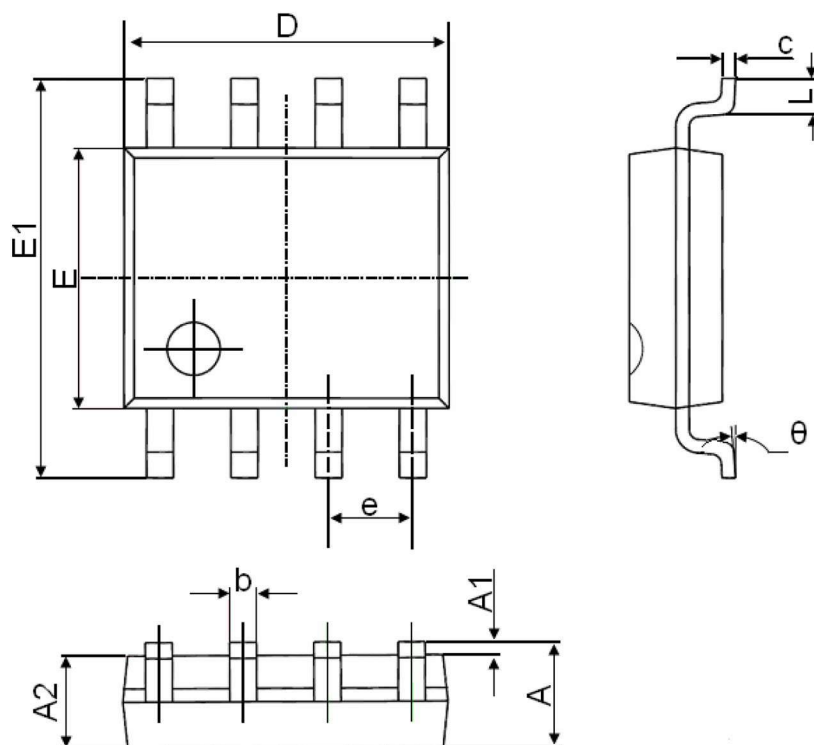


V_{SD} Source-Drain Voltage (V)

Figure 12 Source- Drain Diode Forward



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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