

MJ N-Channel Enhancement Mode Power MOSFET

Description

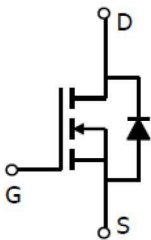
The MJ6012CS uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

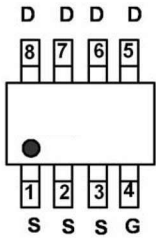
- ◆ $V_{DS} = 60V, I_D = 12A$
 $R_{DS(ON)} < 11m\Omega @ V_{GS} = 10V$ (Typ: 9mΩ)
- ◆ High density cell design for ultra low R_{dson}
- ◆ Fully characterized avalanche voltage and current
- ◆ Low gate to drain charge to reduce switching losses

Application

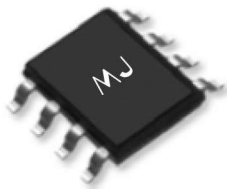
- ◆ Power switching application
- ◆ Load switch



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
MJ6012CS	MJ6012CS	SOP-8	Ø330mm	12mm	4000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	12	A
Drain Current-Continuous($T_c = 100^{\circ}C$)	$I_{D(100^{\circ}C)}$	8.5	A
Pulsed Drain Current	I_{DM}	50	A
Maximum Power Dissipation	P_D	3	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

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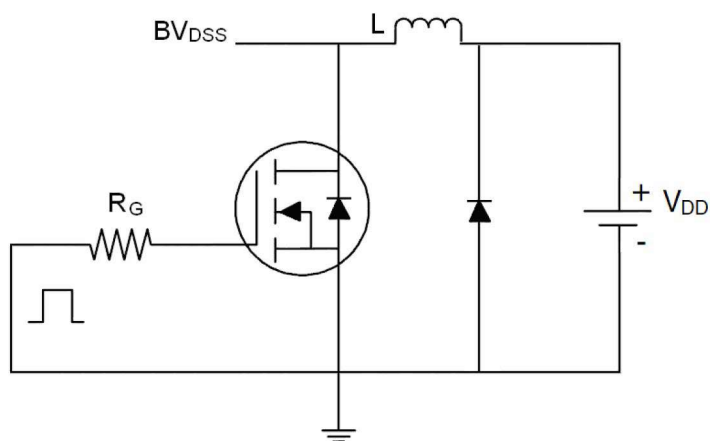
Electrical Characteristics (Tc=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V,I _b =250μA	60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V,V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{DS} =±20V,V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2	3	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V,I _D =12A	-	9	11	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =12A	40	-	-	S
Dynamic Characteristics ^(Note 4)						
Input Capacitance	C _{iss}	V _{DS} =30V,V _{GS} =0V F=1.0MHz	-	3080	-	PF
Output Capacitance	C _{oss}		-	272	-	PF
Reverse Transfer Capacitance	C _{rss}		-	195	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V,R _L =1Ω V _{GS} =10V,R _{GEN} =3Ω	-	8	-	nS
Turn-on Rise Time	t _r		-	6.5	-	nS
Turn-Off Delay Time	t _{d(off)}		-	36	-	nS
Turn-Off Fall Time	t _f		-	13	-	nS
Total Gate Charge	Q _g	V _{DS} =30V,I _D =12A V _{GS} =10V	-	55.5	-	nC
Gate-Source Charge	Q _{gs}		-	14.5	-	nC
Gate-Drain Charge	Q _{gd}		-	16.4	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V,I _S =12A	-	-	1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	12	A
Reverse Recovery Time	t _{rr}	T _J =25°C,I _F =12A di/dt= 100A/μs ^(Note 3)	-	30	-	nS
Reverse Recovery Charge	Q _{rr}		-	42	-	nC

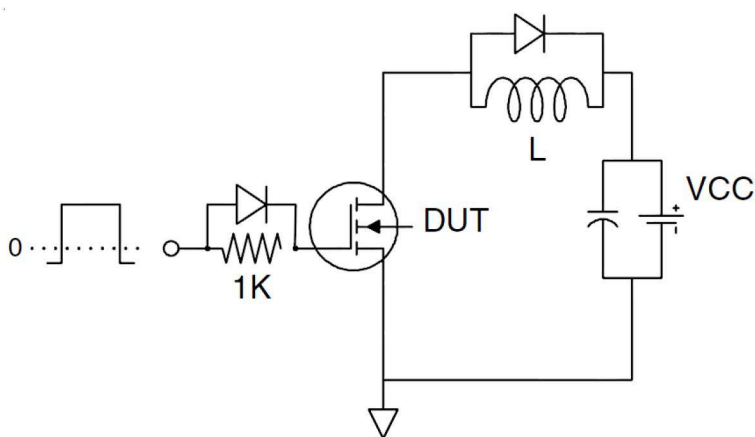
Notes:

- 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

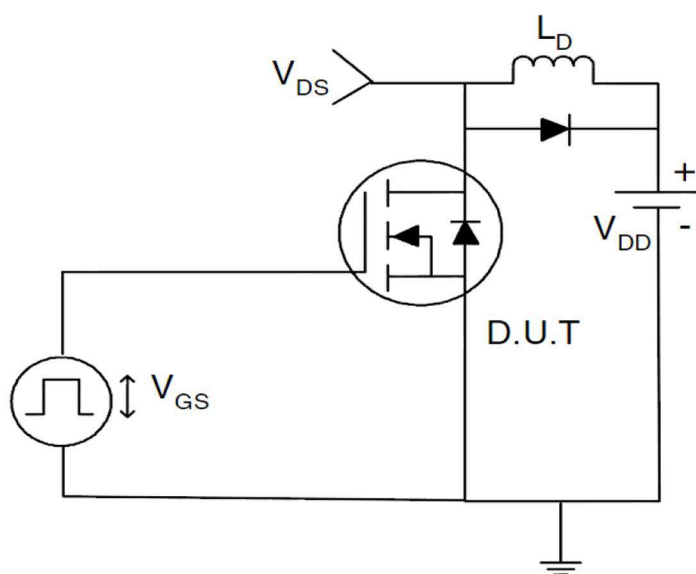
Test circuit



EAS test Circuit

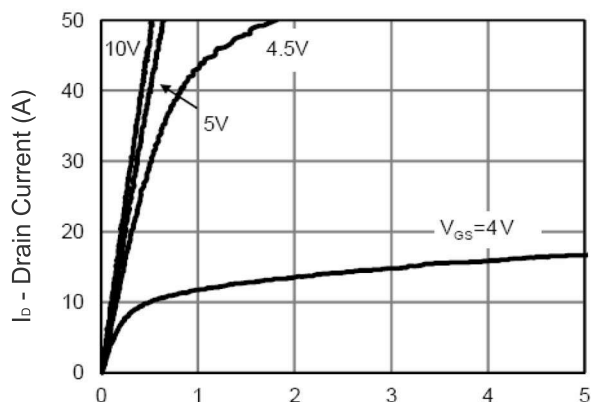


Gate charge test Circuit



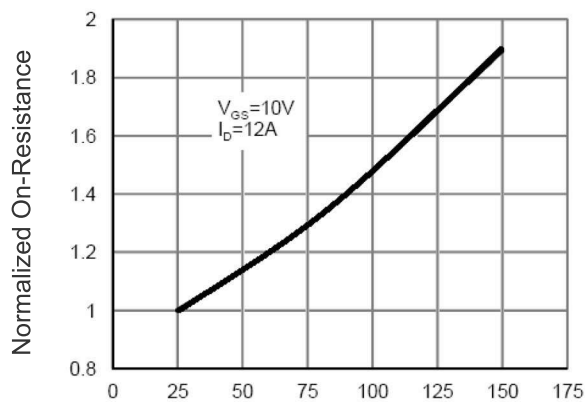
Switch Time Test Circuit

Typical Electrical and Thermal Characteristics (Curves)



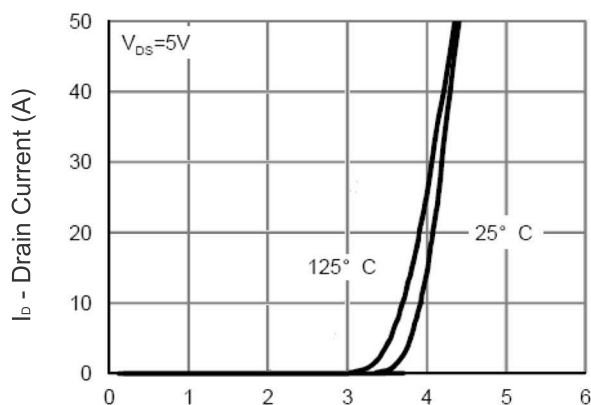
V_{DS} Drain-Source Voltage (V)

Figure 1 Output Characteristics



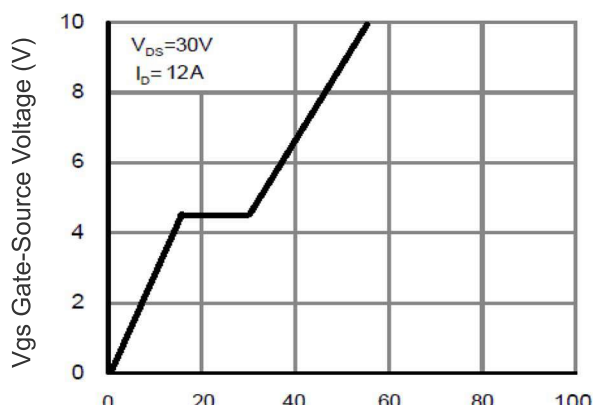
T_J -Junction Temperature($^{\circ}C$)

Figure 4 $R_{DS(on)}$ -Junction Temperature



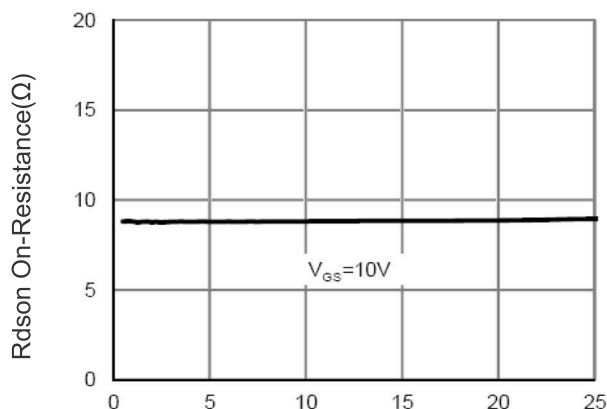
V_{GS} Gate-Source Voltage (V)

Figure 2 Transfer Characteristics



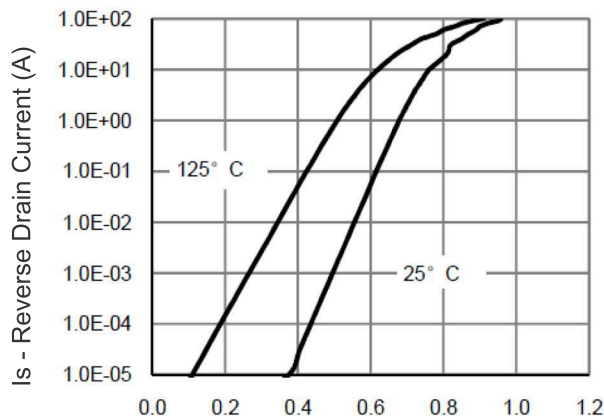
Q_g Gate Charge (nC)

Figure 5 Gate Charge



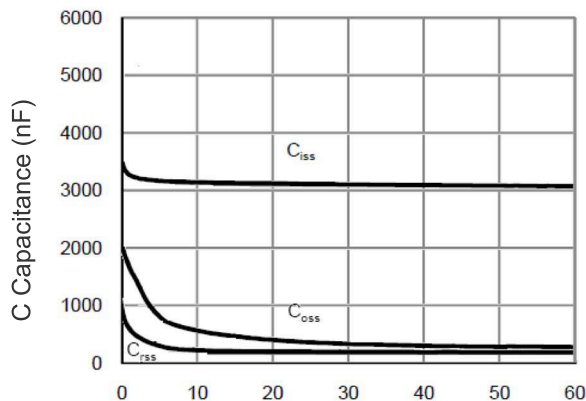
I_D - Drain Current (A)

Figure 3 $R_{DS(on)}$ - Drain Current

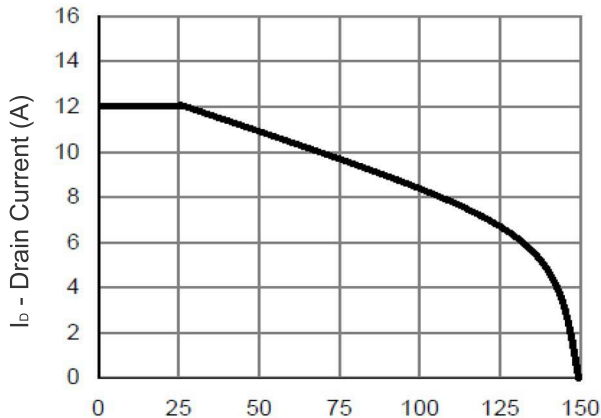


V_{SD} Source-Drain Voltage (V)

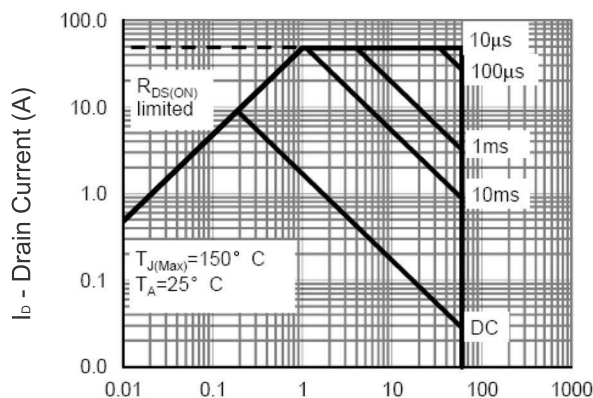
Figure 6 Source- Drain Diode Forward



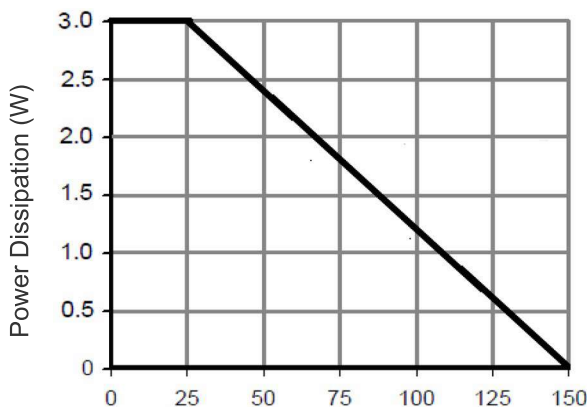
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



Tj -Junction Temperature(°C)
Figure 9 Current De-rating



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



Tj -Junction Temperature(°C)
Figure 10 Power De-rating

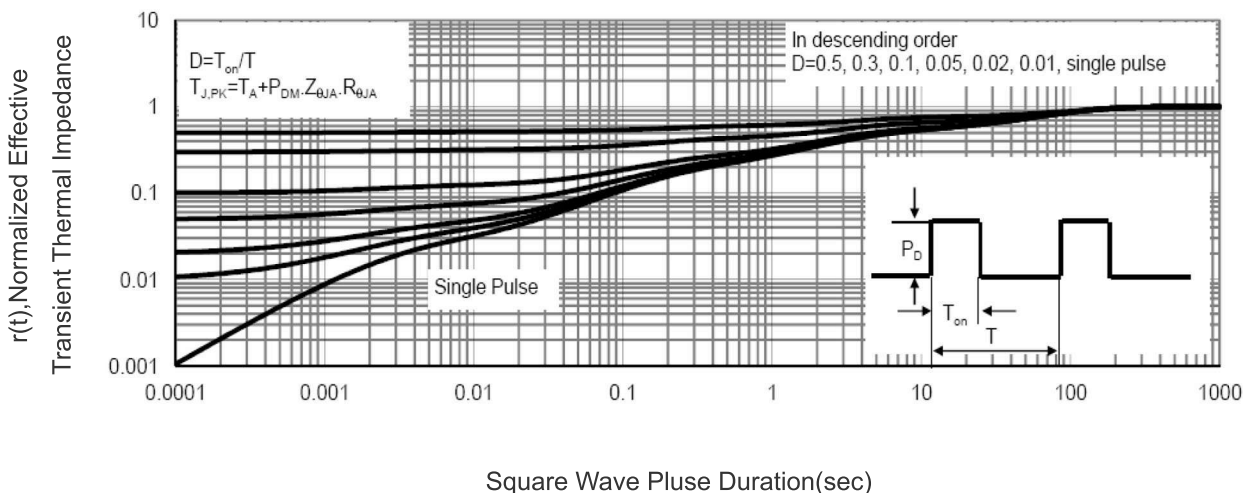
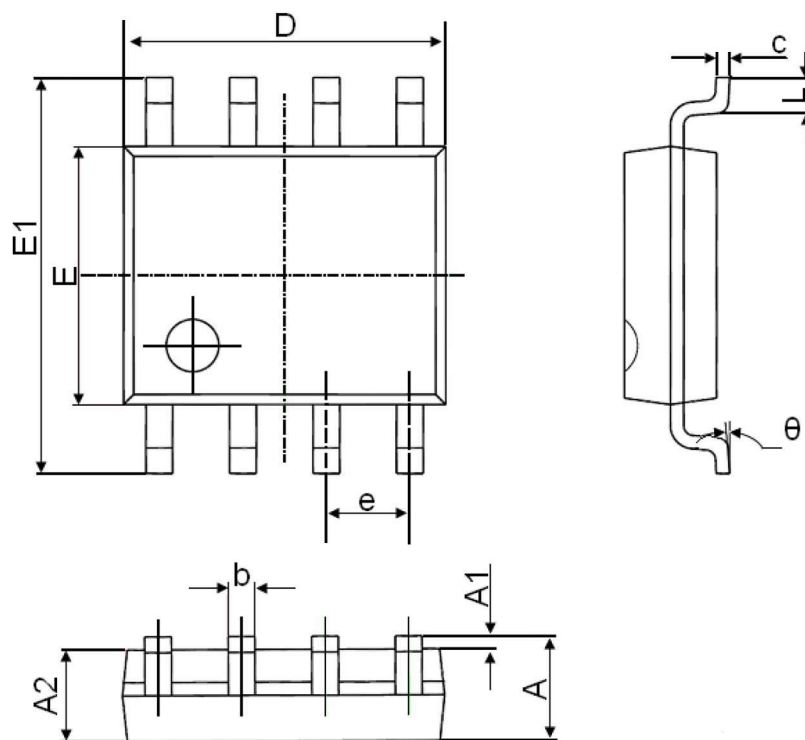


Figure 11 Normalized Maximum Transient Thermal Impedance

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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