MJ P-Channel Enhancement Mode Power MOSFET

Description

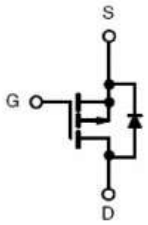
The MJ60P55K uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is well suited for high current load applications.

General Features

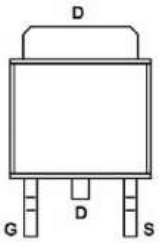
- V_{DS} =-60V,I_D =-55A
  $R_{DS(ON)}$ <28mΩ @ V_{GS}=-10V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

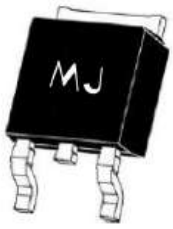
- High side switch for full bridge converter
- DC/DC converter for LCD display



Schematic diagram



Marking and pin assignment



TO-252-2L top view

100% UIS TESTED! 100% ΔVds TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJ60P55K	MJ60P55K	TO-252-2L	-	-	-

Absolute Maximum Ratings (T_C =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	-55	A
Drain Current-Continuous(T_C =100℃)	$I_{D(100℃)}$	-24.8	A
Pulsed Drain Current	I_{DM}	-220	A
Maximum Power Dissipation	P_D	110	W
Derating factor		0.73	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	273	mJ
Operating Junction and Storage Temperature Range	T_J ,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JC}$	1.36	℃/W

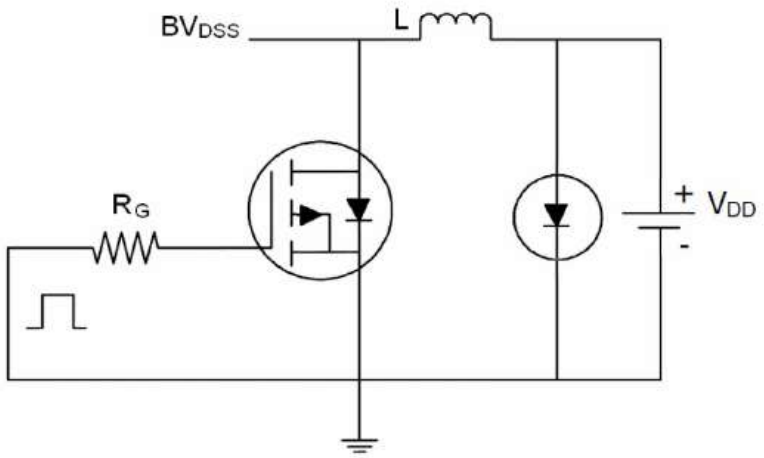
Electrical Characteristics (T_C =25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-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	-2.0	-2.6	-3.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-20A	-	23	28	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-20A	-	25	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{lss}	V_{DS}=-30V,V_{GS}=0V F=1.0MHz	-	3016.8	-	PF
Output Capacitance	C_{oss}		-	180	-	PF
Reverse Transfer Capacitance	C_{rss}		-	126	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-30V, R_L=1.5Ω V_{GS}=-10V,R_G=3Ω	-	12	-	nS
Turn-on Rise Time	t_r		-	15	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	38	-	nS
Turn-Off Fall Time	t_f		-	15	-	nS
Total Gate Charge	Q_g	V_{DS}=-30V,I_D=-20A V_{GS}=-10V	-	49.8	-	nC
Gate-Source Charge	Q_{gs}		-	10.6	-	nC
Gate-Drain Charge	Q_{gd}		-	13.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-20A	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-55	A
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=-20A di/dt=-100A/μs (Note 3)	-	47	-	nS
Reverse Recovery Charge	Q_{rr}		-	53	-	nC

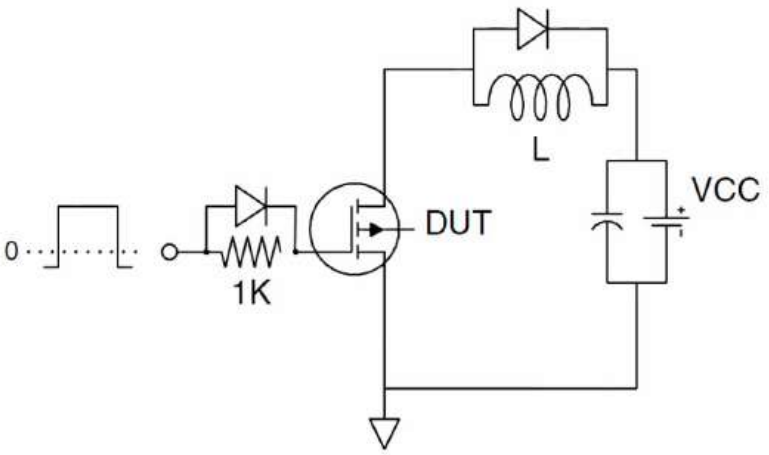
Notes:

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
⑤ EAS condition: Tj=25℃,V_{DD}=-20V,V_G=-10V,L=0.5mH,Rg=25Ω

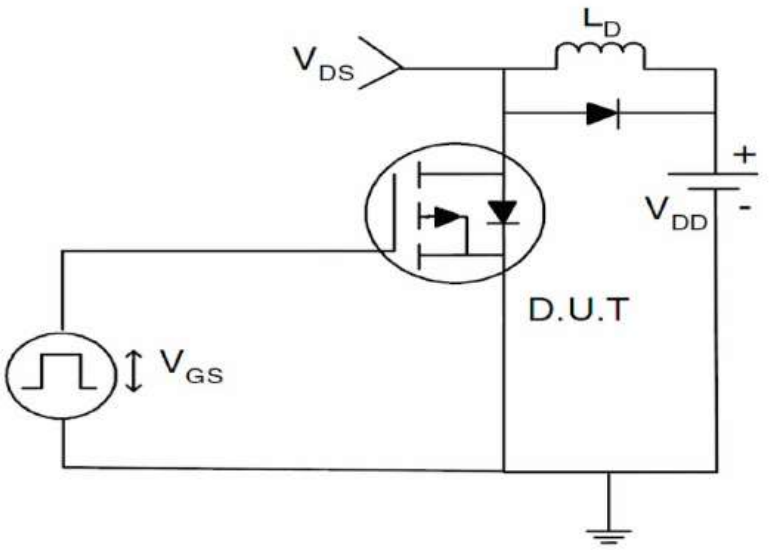
Test circuit



EAS test Circuit

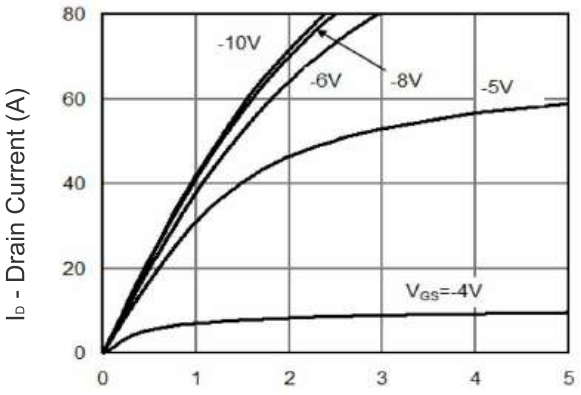


Gate charge test Circuit



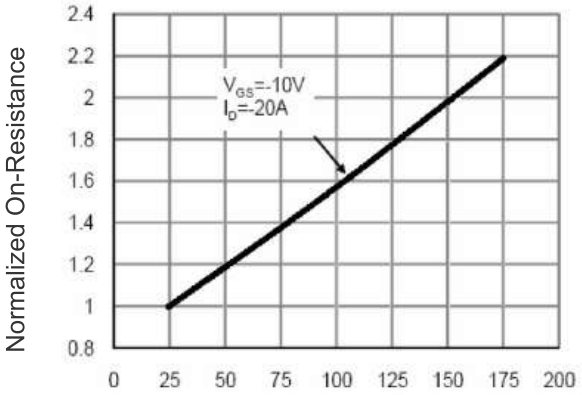
Switch Time Test Circuit

Typical Electrical and Thermal Characteristics (Curves)



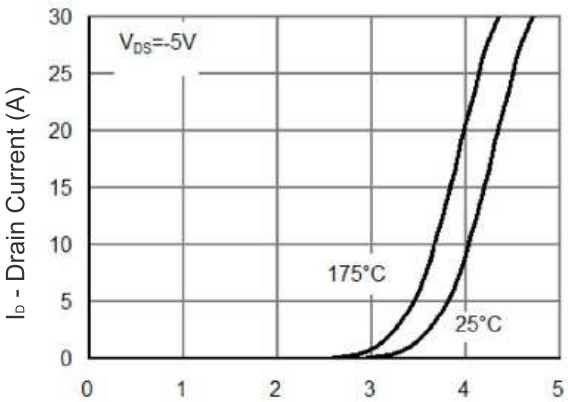
Vds Drain-Source Voltage (V)

Figure 1 Output Characteristics



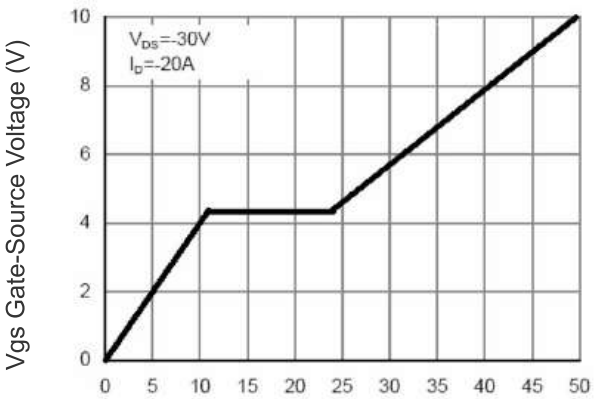
TJ -Junction Temperature(℃)

Figure 4 Rdson-Junction Temperature



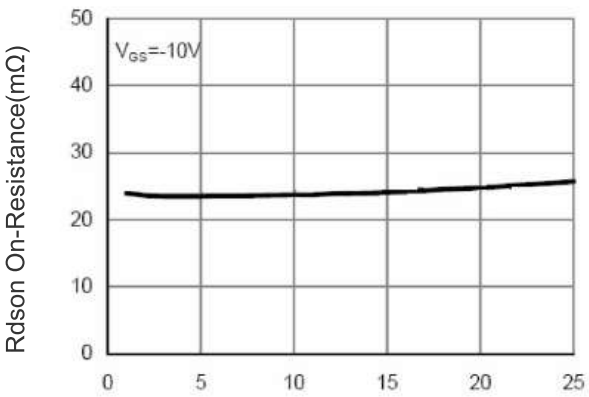
Vgs Gate-Source Voltage (V)

Figure 2 Transfer Characteristics



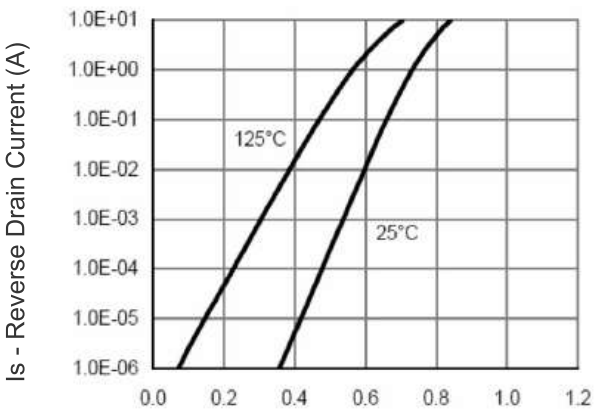
Qg Gate Charge (nC)

Figure 5 Gate Charge



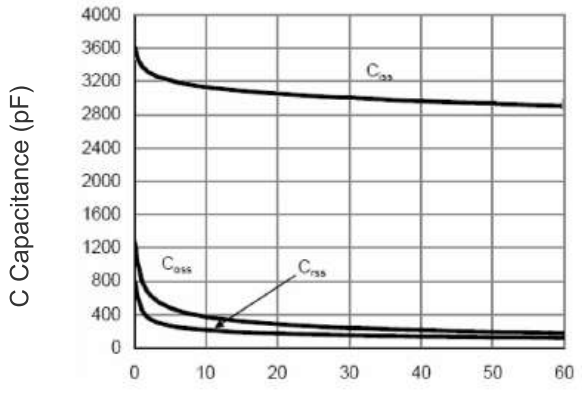
ID - Drain Current (A)

Figure 3 Rdson- Drain Current



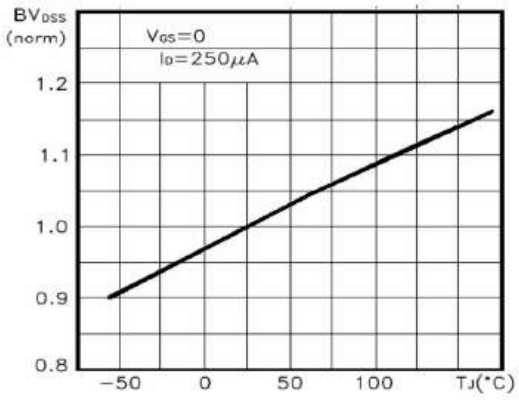
Vsd Source-Drain Voltage (V)

Figure 6 Source- Drain Diode Forward



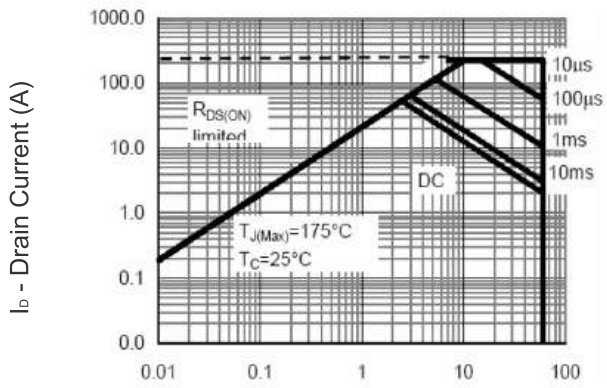
Vds Drain-Source Voltage (V)

Figure 7 Capacitance vs Vds



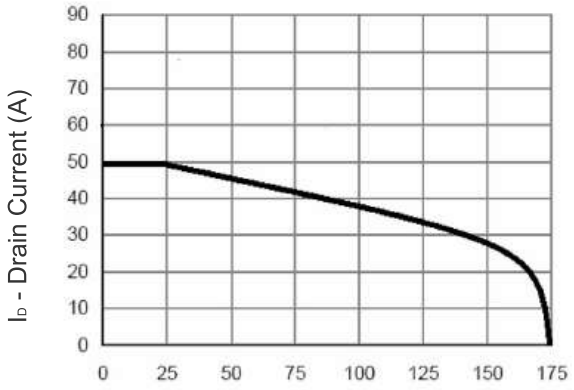
TJ -Junction Temperature(℃)

Figure 9 BVDSS vs Junction Temperature



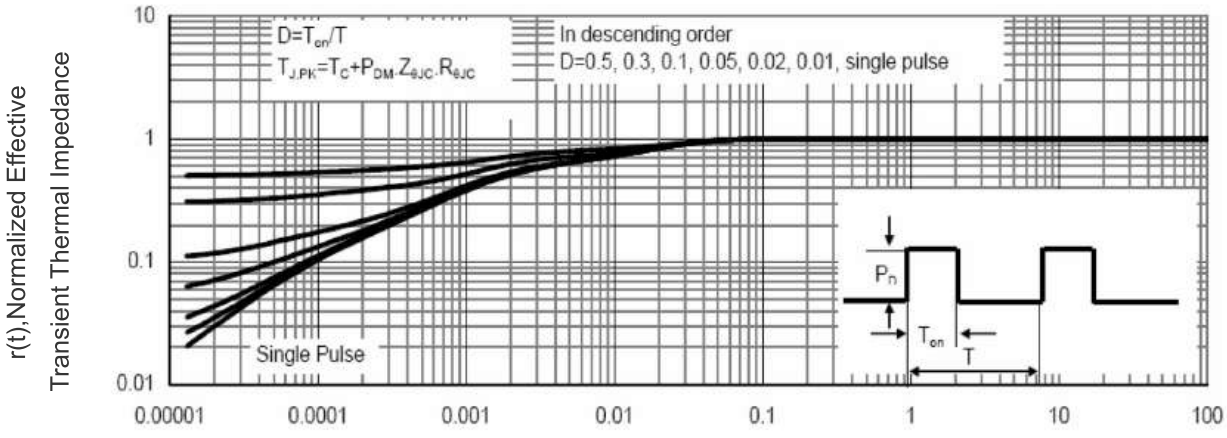
Vds Drain-Source Voltage (V)

Figure 8 Safe Operation Area



TJ -Junction Temperature(℃)

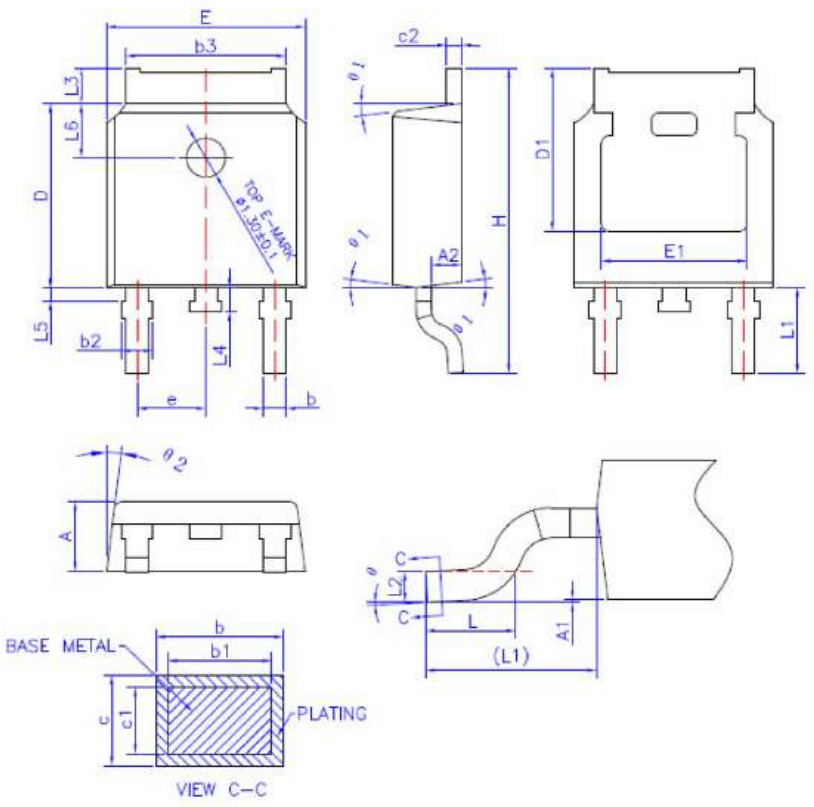
Figure 10 ID Current De-rating



Square Wave Pluse Duration(sec)

Figure 11 Normalized Maximum Transient Thermal Impedance

TO-252 Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE =MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	—	0.10
A2	0.90	1.01	1.10
b	0.72	—	0.85
b1	0.71	0.76	0.81
b2	0.72	—	0.90
b3	5.13	5.33	5.46
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	0.47	—	0.60
D	6.00	6.10	6.20
D1	5.25	—	—
E	6.50	6.60	6.70
E1	4.70	—	—
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90 REF		
L2	0.508 BSC		
L3	0.90	—	1.25
L4	0.60	0.80	1.00
L5	0.15	—	0.75
L6	1.80 REF		
θ	0°	—	8°
θ1	5°	7°	9°
θ2	5°	7°	9°

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