MJ P-Channel Enhancement Mode Power MOSFET

Description

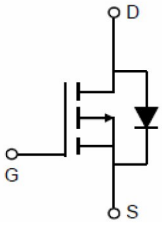
The MJ20P45Q uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

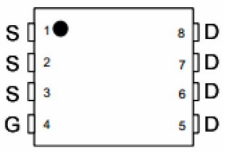
- V_{DS}=-20V,I_D=-45A
  $R_{DS(ON)}$<7mΩ @ V_{GS}=-4.5V
  $R_{DS(ON)}$<9mΩ @ V_{GS}=-2.5V
  $R_{DS(ON)}$<12mΩ @ V_{GS}=-1.8V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

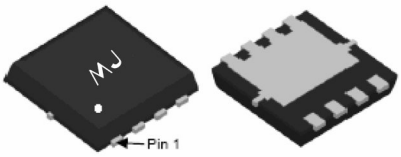
- Load switch
- Battery protection



Schematic diagram



Pin Assignment



DFN 3.3x3.3 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJ20P45Q	MJ20P45Q	DFN 3.3x3.3-8L	-	-	-

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}	±10	V
Drain Current-Continuous	I_D	-45	A
Drain Current-Continuous(T_C =100℃)	$I_{D(100℃)}$	-35	A
Pulsed Drain Current	I_{DM}	-200	A
Maximum Power Dissipation	P_D	80	W
Single pulse avalanche energy (Note 5)	E_{AS}	180	mJ
Derating factor		0.64	W/℃
Operating Junction and Storage Temperature Range	T_J ,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JA}$	1.6	℃/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	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-16V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS}=±10V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} ,I_D=-250μA	-0.4	-0.6	-1.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-20A	-	5.8	7	mΩ
		V_{GS}=-2.5V, I_D=-20A	-	7.2	9	mΩ
		V_{GS}=-1.8V, I_D=-20A	-	9	12	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-20A	80	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{lss}	V_{DS}=-10V,V_{GS}=0V, F=1.0MHz	-	3500	-	PF
Output Capacitance	C_{oss}		-	577	-	PF
Reverse Transfer Capacitance	C_{rss}		-	445	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-10V, R_{GEN}=3Ω V_{GS}=-4.5V,R_L=0.5Ω	-	18	-	nS
Turn-on Rise Time	t_r		-	42	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	85	-	nS
Turn-Off Fall Time	t_f		-	23	-	nS
Total Gate Charge	Q_g	V_{DS}=-10V,I_D=-20A, V_{GS}=-4.5V	-	55	-	nC
Gate-Source Charge	Q_{gs}		-	10	-	nC
Gate-Drain Charge	Q_{gd}		-	15	-	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		-	-	-45	A
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=-10A di/dt=100A/μs (Note 2)	-	47	-	nS
Reverse Recovery Charge	Q_{rr}		-	53	-	nC
Forward Turn-On Time	ton	Intrinsic turn-on time is negligible(turn-on is dominated by LS+LD)				

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

Typical Electrical and Thermal Characteristics

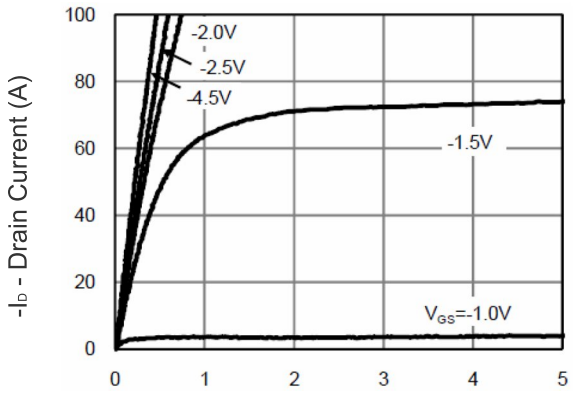


Figure 1 Output Characteristics

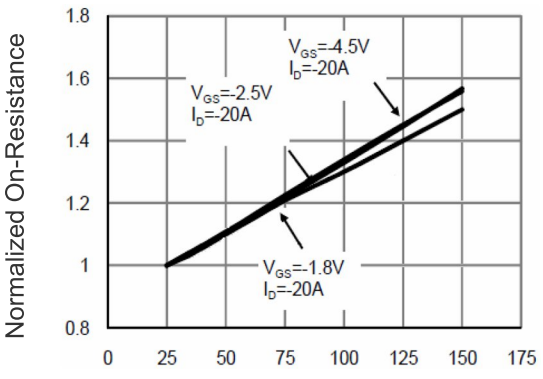


Figure 4 Rdson-Junction Temperature

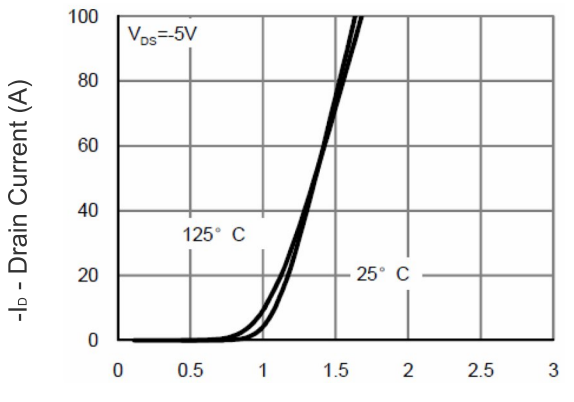


Figure 2 Transfer Characteristics

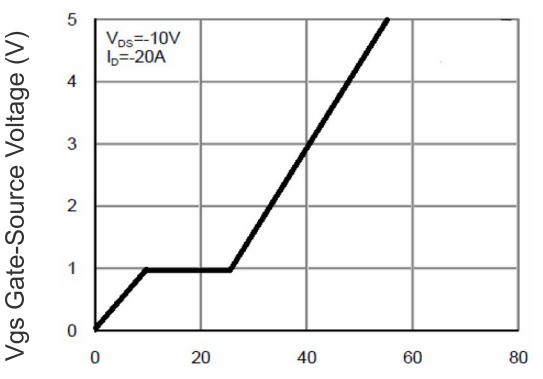


Figure 5 Gate Charge

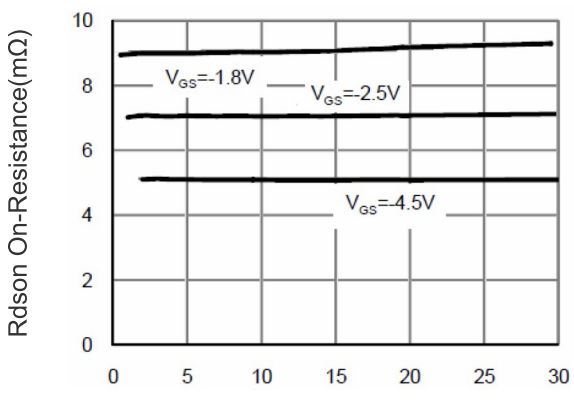


Figure 3 Rdson- Drain Current

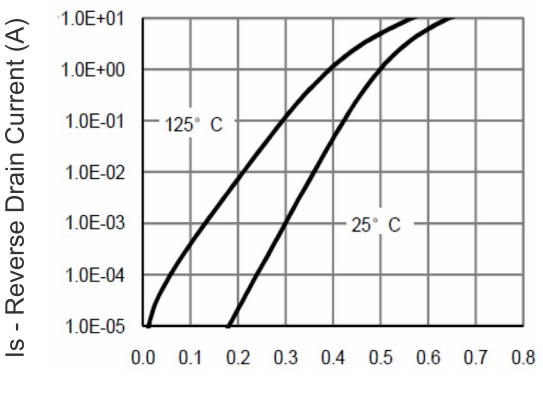


Figure 6 Drain-Source On-Resistance

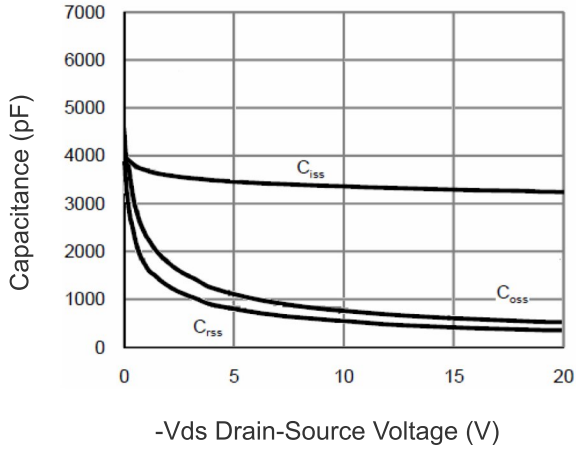


Figure 7 Capacitance vs Vds

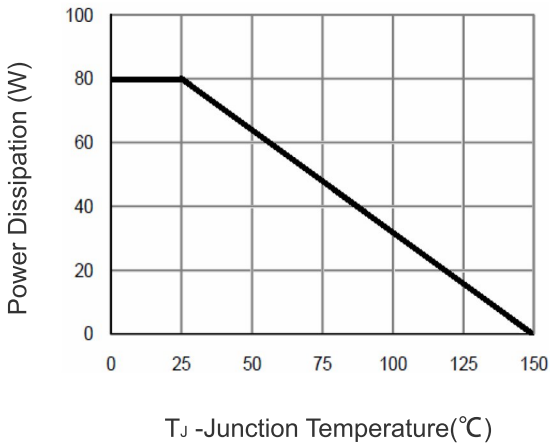


Figure 9 Power De-rating

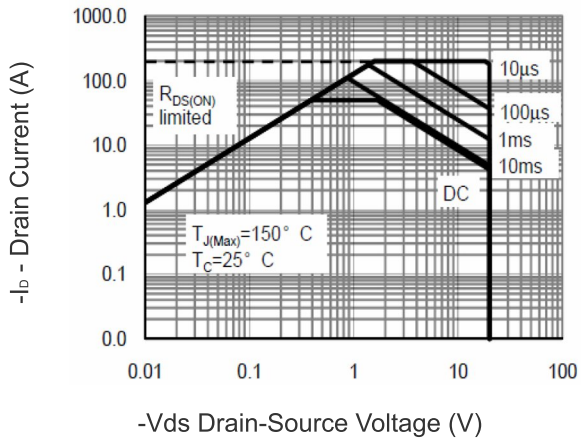


Figure 8 Safe Operation Area

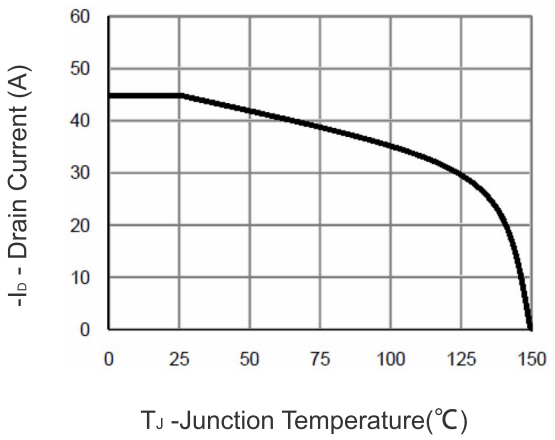


Figure 10 -Current De-rating

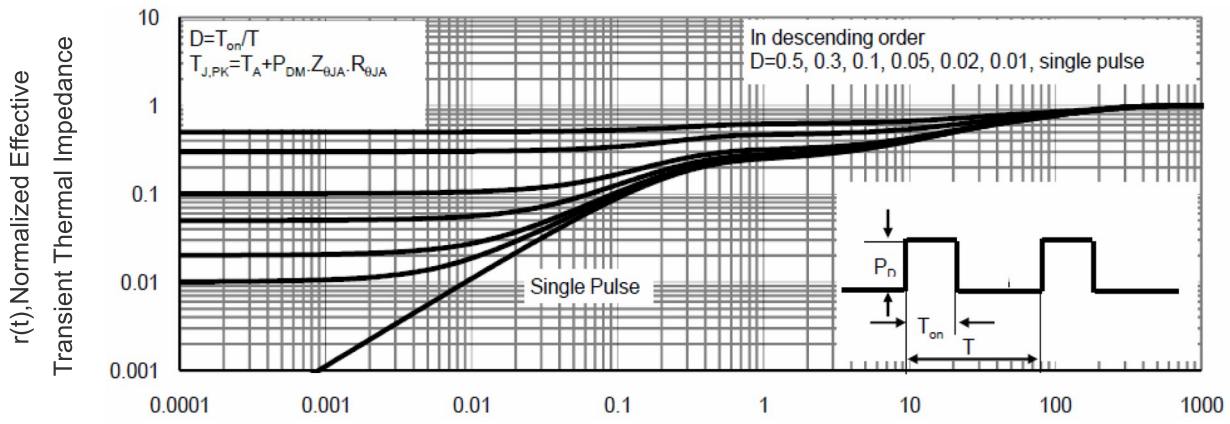
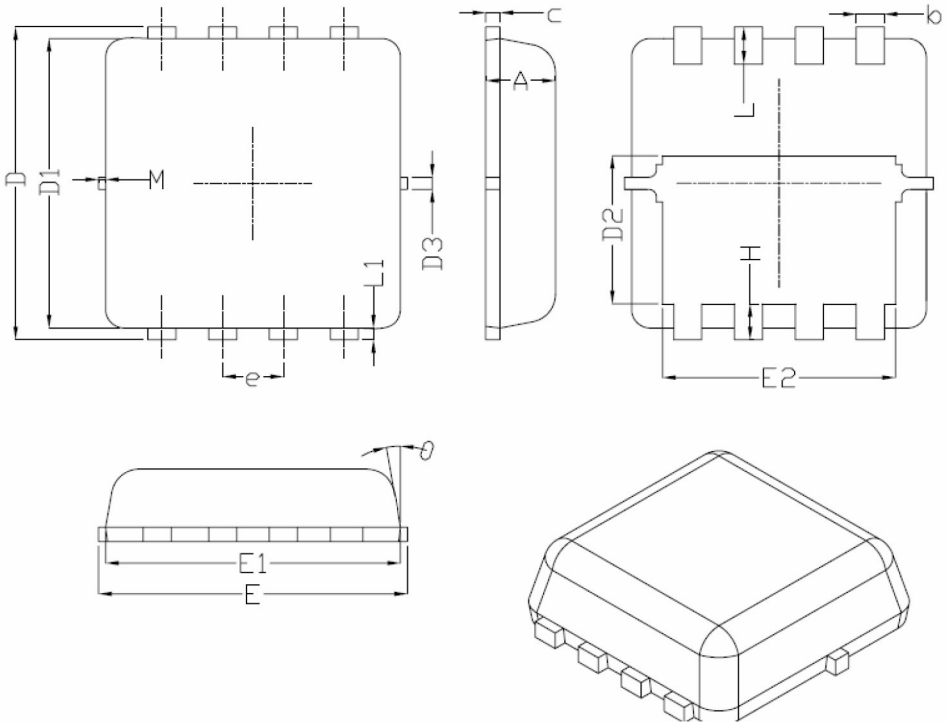


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN3.3X3.3 EP Package Information



SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.48	1.58	1.68
D3	---	0.13	---
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	---	0.13	---
θ	---	10°	12°
M	*	*	0.15
* Not specified			

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