20V P-Channel Trench Power MOSFET

General Description

The SJM20P090 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as -2.5V. This device is suitable for use as a wide variety of applications.

Features

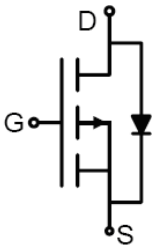
- Low Gate Charge
- High Power and current handing capability
- Lead free product is acquired

Application

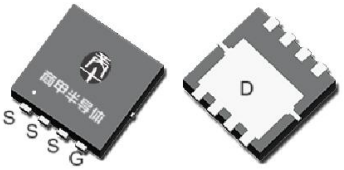
- PWM Applications
- Load Switch
- Power Management

Key Performance Parametes

Parameter	Value	Unit
V_{DS}	-20	V
$R_{DS(ON)\_TYP}$	7.6	mΩ
I_D	-56	A
Q_G	36	nC



Schematic Diagram



PDFN3X3-8L top&bottom view

RoHS

Package Marking and Ordering Information

Device/Ordering Code	Marking	Package	Packing	Reel Size	Tape width	Quantity
SJM20P090	SJM20P090	PDFN3X3-8L	Tape	\	\	5000 Pcs

Table 1. Absolute Maximum Ratings (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V)	-20	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±12	V
I_D	Drain Current-Continuous(T_C=25℃)	-56	A
	Drain Current-Continuous(T_C=100℃)	-34	A
$I_{DM\ (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	-220	A
P_D	Maximum Power Dissipation(T_C=25℃)	42	W
	Maximum Power Dissipation(T_C=100℃)	17	W
E_{AS}	Avalanche energy (Note 2)	90	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	℃

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		3	℃/W

Table 3. Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=-250μA	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-20V, V_{GS}=0V T_J=25℃			-1	μA
		V_{DS}=-20V, V_{GS}=0V T_J=125℃			-100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±12V, V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250μA	-0.5		-1	V
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-6A		23.9		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V, I_D=-6A T_J=25℃		7.6	10	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-2.5V, I_D=-4A T_J=25℃		10.7	14.2	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=-10V,V_{GS}=0V, f=1.0MHz		2711		pF
C_{oss}	Output Capacitance			321		pF
C_{rss}	Reverse Transfer Capacitance			269		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		8.3		Ω
Switching Parameters						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=-4.5V, V_{DS}=-10V, R_L=1.5Ω, R_{GEN}=6Ω		16.6		nS
t_r	Turn-on Rise Time			33.2		nS
$t_{d(off)}$	Turn-Off Delay Time			128.4		nS
t_f	Turn-Off Fall Time			67.2		nS
Q_g	Total Gate Charge	V_{GS}=-4.5V, V_{DS}=-10V, I_D=-6A		36		nC
Q_{gs}	Gate-Source Charge			7		nC
Q_{gd}	Gate-Drain Charge			9		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current (Body Diode)				-56	A
V_{SD}	Forward on Voltage (Note 3)	V_{GS}=0V, I_S=-6A			-1.2	V
t_{rr}	Reverse Recovery Time	I_F=-6A, dI/dt=-100A/μs		16.8		ns
Q_{rr}	Reverse Recovery Charge	I_F=-6A, dI/dt=-100A/μs		5.1		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
Notes 2.E_{AS} condition: T_J=25℃,V_{DD}=-20V,V_G=-10V, Rg=25Ω, L=0.5mH.
Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

Typical Electrical And Thermal Characteristics (Curves)

Figure 1. Output Characteristics

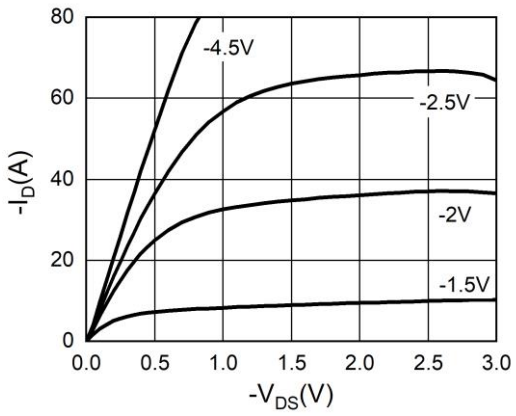


Figure 2. Transfer Characteristics

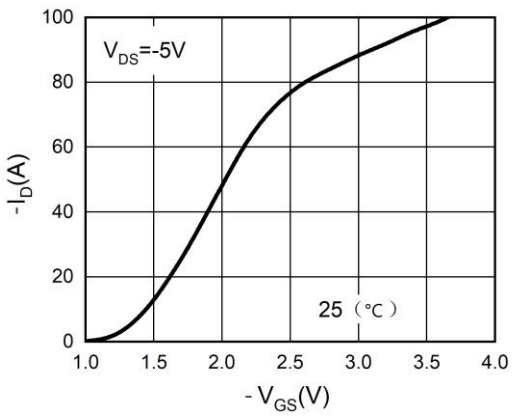


Figure 3. Power Dissipation

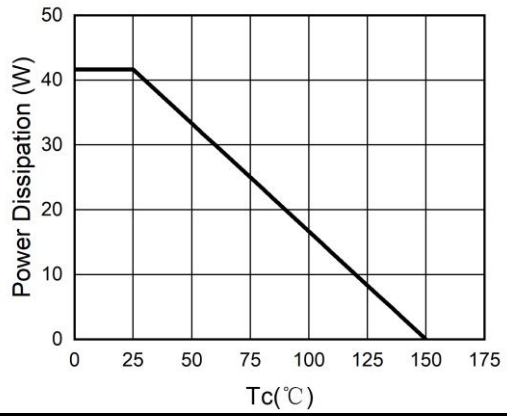


Figure 4. Drain Current

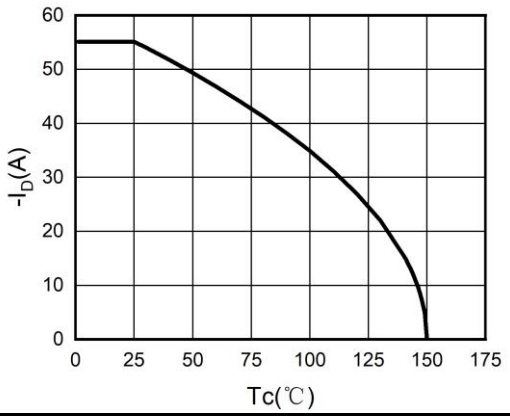


Figure 5. BV_{DSS} vs Junction Temperature

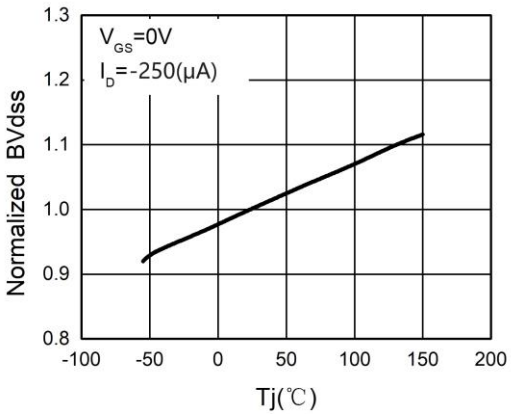
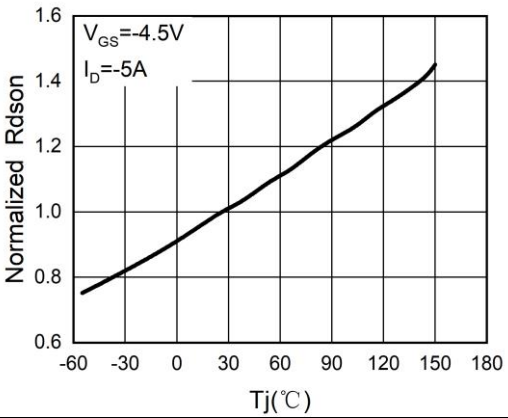


Figure 6. $R_{DS(ON)}$ vs Junction Temperature



Typical Electrical And Thermal Characteristics (Curves)

Figure 7. Gate Charge Waveforms

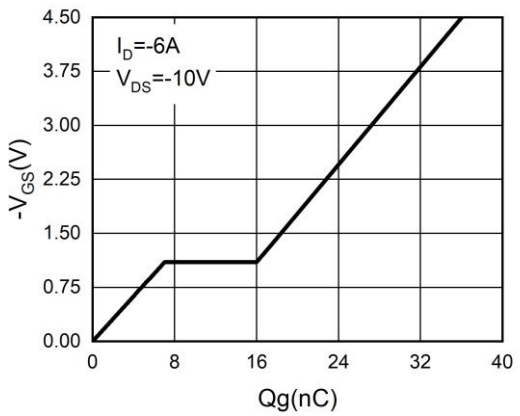


Figure 8. Capacitance

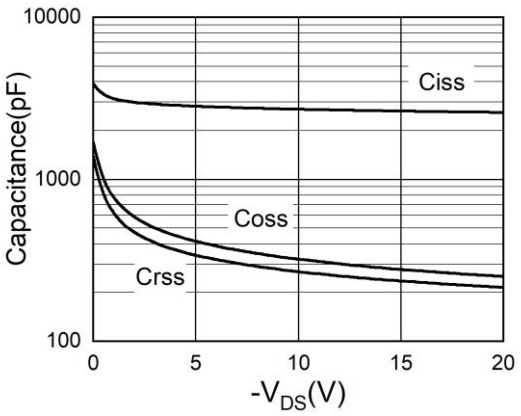


Figure 9. Body-Diode Characteristics

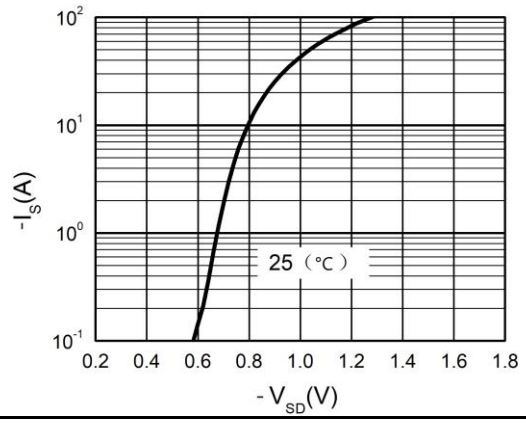
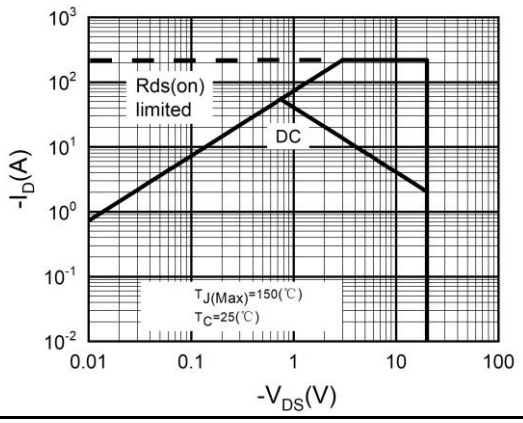
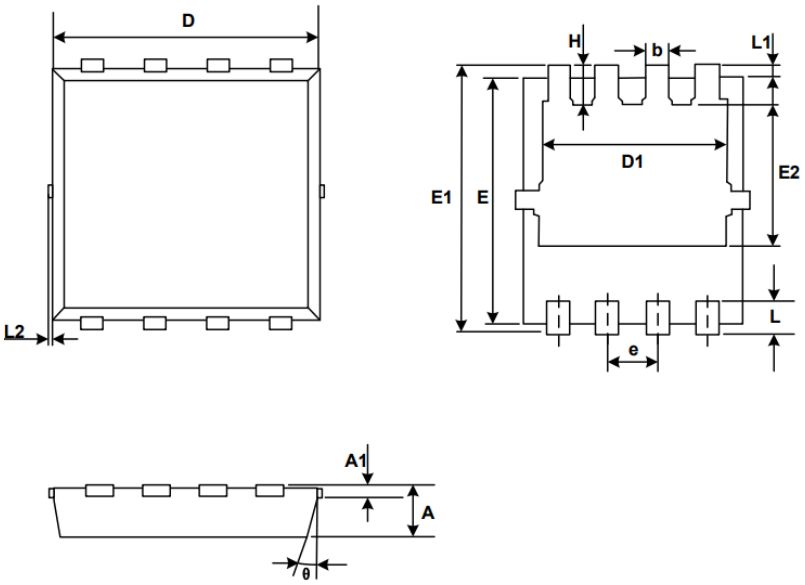


Figure 10. Maximum Safe Operating Area



PDFN3X3-8L Package Information



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	0.65	0.90
A1	0.10	0.25
D	2.90	3.25
D1	2.25	2.69
E	2.90	3.20
E1	3.00	3.60
E2	1.35	2.20
b	0.20	0.40
e	0.65BSC	
L	0.15	0.50
L1	0.13BSC	
L2	0.00	0.20
H	0.15	0.65
θ	0°	14°

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