Features

- Advanced Trench MOS Technology
- Low $R_{DS(ON)}$
- 100% EAS Guaranteed
- Green Device Available

Applications

- SMPS Synchronous Rectification
- DC/DC Converters
- Or-ing

Product Summary

BVDSS	RDSON	ID
40V	4.2mΩ	50A

PRPAK5X6 Pin Configuration
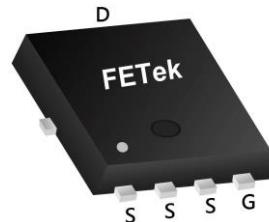
Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V[1,6]	50	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V[1,6]	50	A
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	17.5	A
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 10V[1]	14	A
I_{DM}	Pulsed Drain Current[2]	200	A
EAS	Single Pulse Avalanche Energy[3]	105	mJ
I_{AS}	Avalanche Current	46	A
P_D@T_C=25°C	Total Power Dissipation[4]	46	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	2.7	°C/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	40	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=20A	---	3.6	4.2	mΩ
		V_{GS}=4.5V , I_D=20A	---	5.1	6.0	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.6	2.2	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=32V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=32V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	0.8	---	Ω
Q_g	Total Gate Charge		---	16	---	nC
Q_{gs}	Gate-Source Charge	V_{DS}=20V , V_{GS}=4.5V , I_D=20A	---	4.6	---	
Q_{gd}	Gate-Drain Charge		---	7.9	---	
$T_{d(on)}$	Turn-On Delay Time		---	23.8	---	ns
T_r	Rise Time	V_{DD}=20V , V_{GS}=10V , R_G=3Ω,	---	11.5	---	
$T_{d(off)}$	Turn-Off Delay Time	I_D=20A	---	39	---	
T_f	Fall Time		---	14	---	
C_{iss}	Input Capacitance		---	1523	---	pF
C_{oss}	Output Capacitance	V_{DS}=20V , V_{GS}=0V , f=1MHz	---	475	---	
C_{rss}	Reverse Transfer Capacitance		---	67	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	50	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V

Note :

1.The data tested by surface mounted on a 1 inch[2] FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=46A

4.The power dissipation is limited by 150℃ junction temperature

5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

6. Bonding wire limitation current is 50A.

## Typical Characteristics
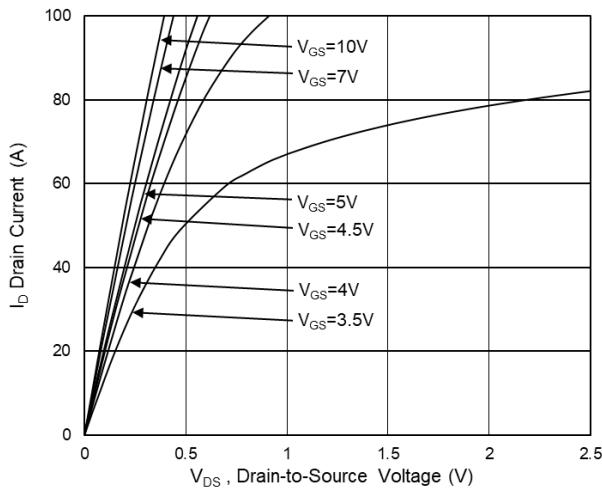
Fig.1 Typical Output Characteristics
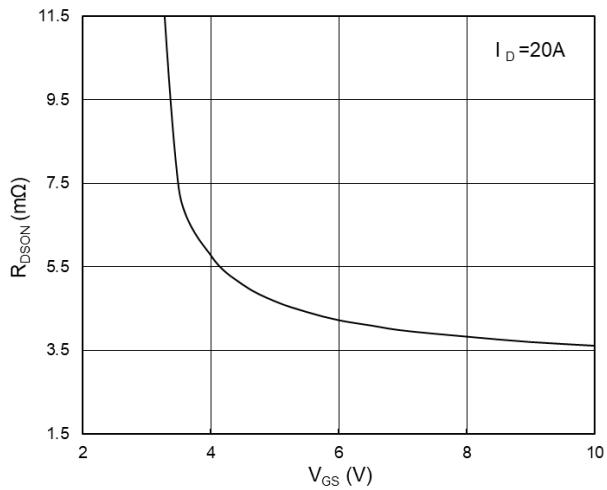
**Fig.2 On-Resistance vs G-S Voltage**
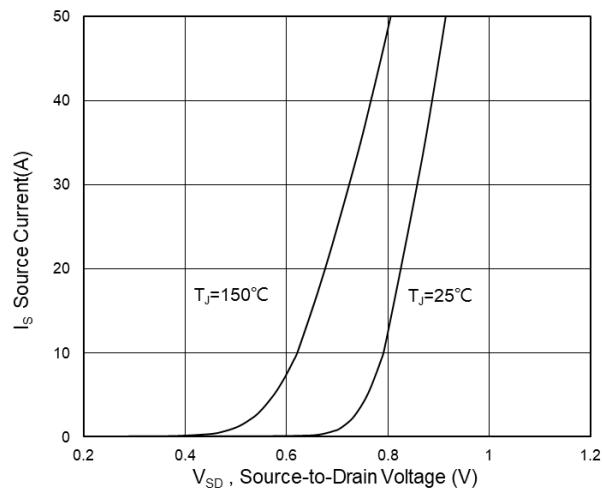
**Fig.3 Source Drain Forward Characteristics**
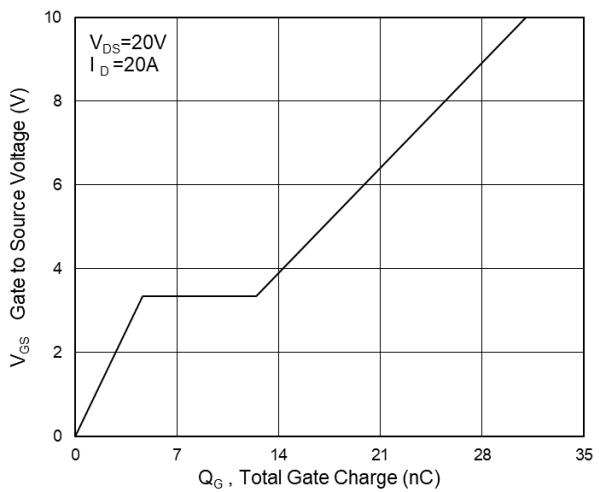
**Fig.4 Gate-Charge Characteristics**
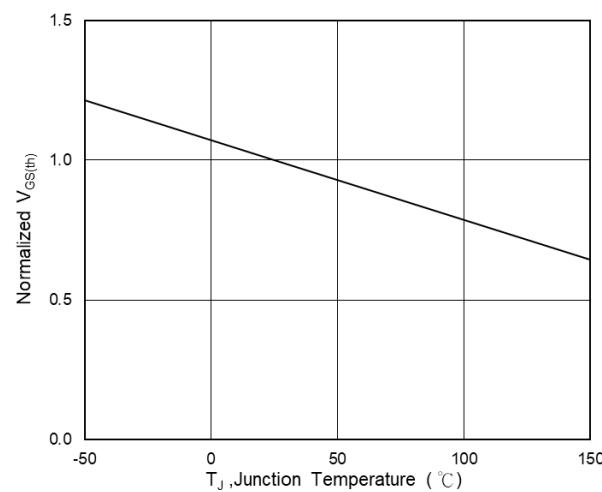
**Fig.5 Normalized $V_{GS(th)}$ vs T_J**
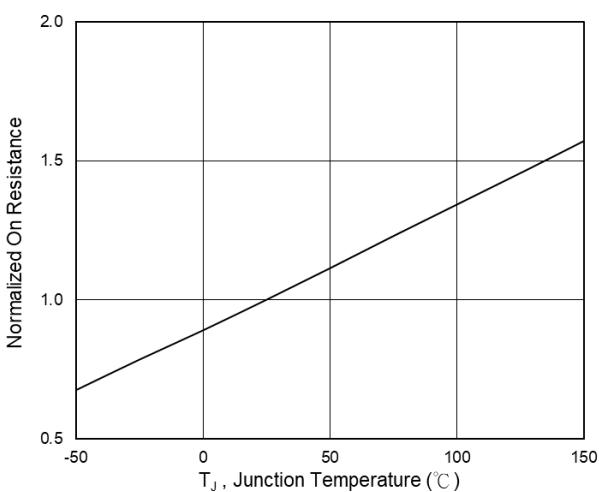
Fig.6 Normalized R_{DSON} vs T_J
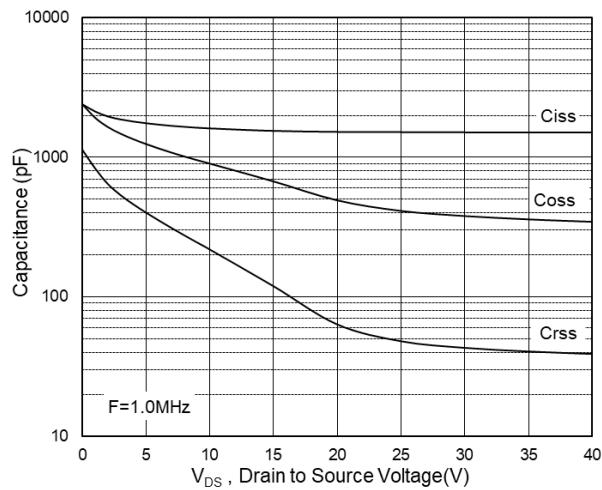
Fig.7 Capacitance
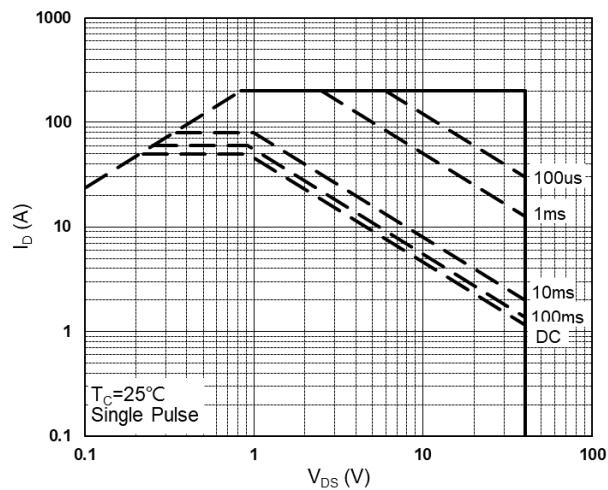
Fig.8 Safe Operating Area

$$D = T_{ON}/T$$

$$T_Jpeak = T_C + P_{DM} \times R_{\theta JC}$$
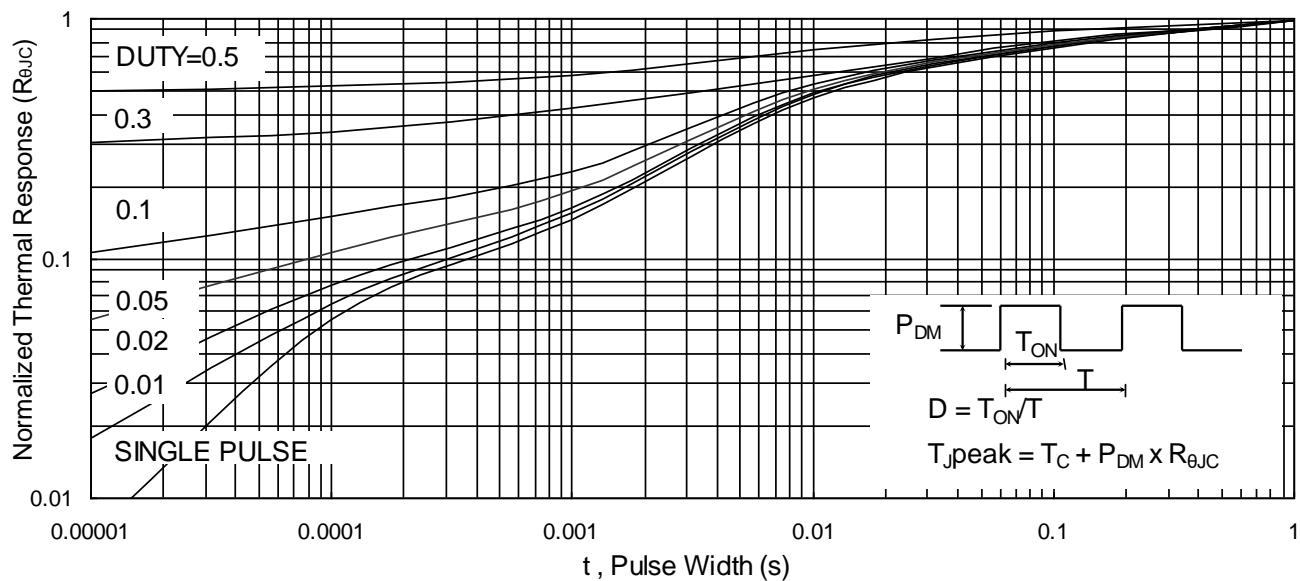
Fig.9 Normalized Maximum Transient Thermal Impedance

$$EAS= \frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$
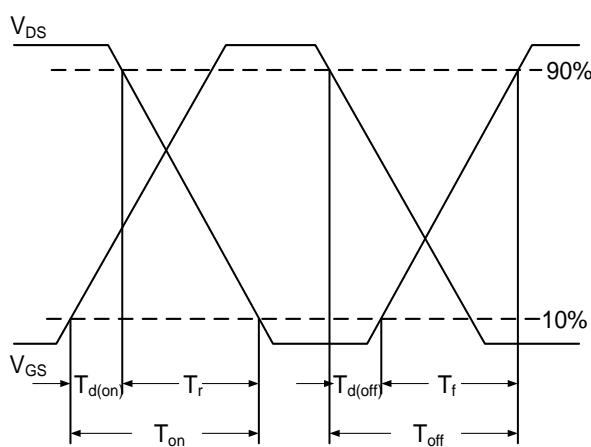
Fig.10 Switching Time Waveform
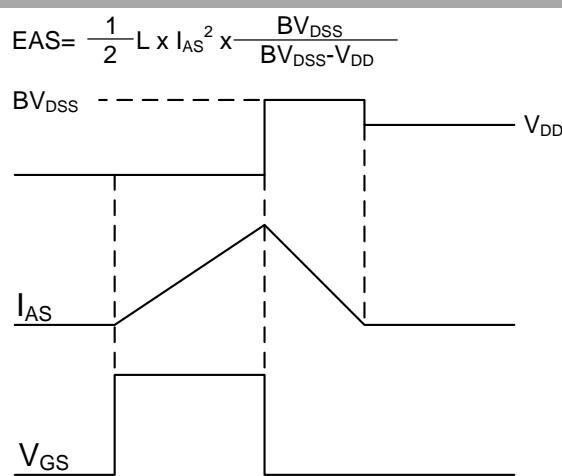
Fig.11 Unclamped Inductive Waveform