FETek Technology Corp.

N-Ch and P-Ch Fast Switching MOSFETs

Green

Features
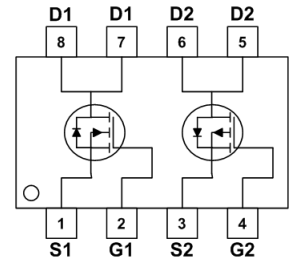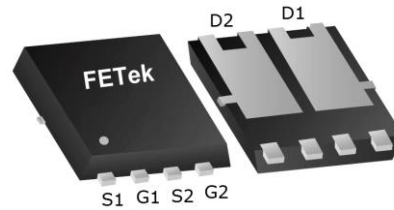
★ Advanced Trench MOS Technology
★ 100% EAS Guaranteed
★ Green Device Available

Product Summary

BVDSS	RDSON(Typ.)	ID
60V	38mΩ	5A
-60V	75mΩ	-3.8A

Applications

★ Synchronous Rectification.
★ Motor Control.
★ High Current, High Speed Switching.
★ Portable equipment application.

PRPAK3X3 Pin Configuration

Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	60	-60	V
V_{GS}	Gate-Source Voltage	±20	±20	V
$I_D@T_A=25℃$	Continuous Drain Current, V_{GS} @ 10V[1]	5	-3.8	A
$I_D@T_A=70℃$	Continuous Drain Current, V_{GS} @ 10V[1]	4	-3.2	A
I_{DM}	Pulsed Drain Current[2]	20	-14	A
EAS	Single Pulse Avalanche Energy[3]	22	28.8	mJ
I_{AS}	Avalanche Current	21	-24	A
$P_D@T_A=25℃$	Total Power Dissipation[4]	2	2	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction-Ambient [1]	---	85	℃/W
	Thermal Resistance Junction-Ambient[1](t≤10sec)	---	62.5	℃/W

N-Channel 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	60	---	---	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V$_{GS}$=10V , I$_D$=5A	---	38	50	mΩ
		V$_{GS}$=4.5V , I$_D$=4A	---	45	70	
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =250uA	1.0	---	2.5	V
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=48V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=48V , V$_{GS}$=0V , T$_J$=55℃	---	---	5	
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA
gfs	Forward Transconductance	V$_{DS}$=5V , I$_D$=4A	---	28	---	S
R$_g$	Gate Resistance	V$_{DS}$=0V , V$_{GS}$=0V , f=1MHz	---	2.8	---	Ω
Q$_g$	Total Gate Charge (4.5V)	V$_{DS}$=48V , V$_{GS}$=4.5V , I$_D$=4A	---	19	---	nC
Q$_{gs}$	Gate-Source Charge		---	2.6	---	
Q$_{gd}$	Gate-Drain Charge		---	4.1	---	
T$_{d(on)}$	Turn-On Delay Time	V$_{DD}$=30V , V$_{GS}$=10V , R$_G$=3.3Ω, I$_D$=4A	---	3	---	ns
T$_r$	Rise Time		---	34	---	
T$_{d(off)}$	Turn-Off Delay Time		---	23	---	
T$_f$	Fall Time		---	6	---	
C$_{iss}$	Input Capacitance	V$_{DS}$=15V , V$_{GS}$=0V , f=1MHz	---	1027	---	pF
C$_{oss}$	Output Capacitance		---	65	---	
C$_{rss}$	Reverse Transfer Capacitance		---	46	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I$_S$	Continuous Source Current[1,5]	V$_G$=V$_D$=0V , Force Current	---	---	2.5	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$_{AS}$=21A
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.

P-Channel 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	-60	---	---	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V$_{GS}$=-10V , I$_D$=-3A	---	75	100	mΩ
		V$_{GS}$=-4.5V , I$_D$=-3A	---	90	120	
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =-250uA	-1.0	---	-2.5	V
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=-48V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=-48V , V$_{GS}$=0V , T$_J$=55℃	---	---	5	
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA
gfs	Forward Transconductance	V$_{DS}$=-5V , I$_D$=-3A	---	15	---	S
R$_g$	Gate Resistance	V$_{DS}$=0V , V$_{GS}$=0V , f=1MHz	---	13.5	---	Ω
Q$_g$	Total Gate Charge (-4.5V)	V$_{DS}$=-48V , V$_{GS}$=-4.5V , I$_D$=-3A	---	9.86	---	nC
Q$_{gs}$	Gate-Source Charge		---	3.08	---	
Q$_{gd}$	Gate-Drain Charge		---	2.95	---	
T$_{d(on)}$	Turn-On Delay Time	V$_{DD}$=-15V , V$_{GS}$=-10V , R$_G$=3.3Ω, I$_D$=-1A	---	28.8	---	ns
T$_r$	Rise Time		---	19.8	---	
T$_{d(off)}$	Turn-Off Delay Time		---	60.8	---	
T$_f$	Fall Time		---	7.2	---	
C$_{iss}$	Input Capacitance	V$_{DS}$=-15V , V$_{GS}$=0V , f=1MHz	---	1447	---	pF
C$_{oss}$	Output Capacitance		---	97.3	---	
C$_{rss}$	Reverse Transfer Capacitance		---	70	---	

Diode Characteristics

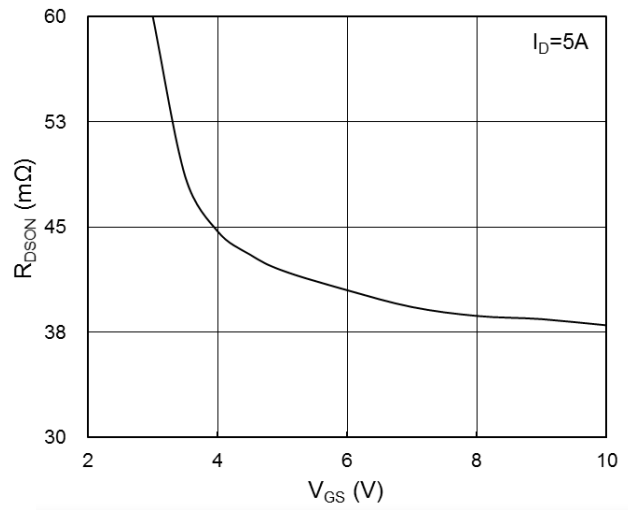| Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I$_S$	Continuous Source Current[1,5]	V$_G$=V$_D$=0V , Force Current	---	---	-2.5	A
V$_{SD}$	Diode Forward Voltage[2]	V$_{GS}$=0V , I$_S$=-1A , T$_J$=25℃	---	---	-1.2	V

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$_{AS}$=-24A

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.

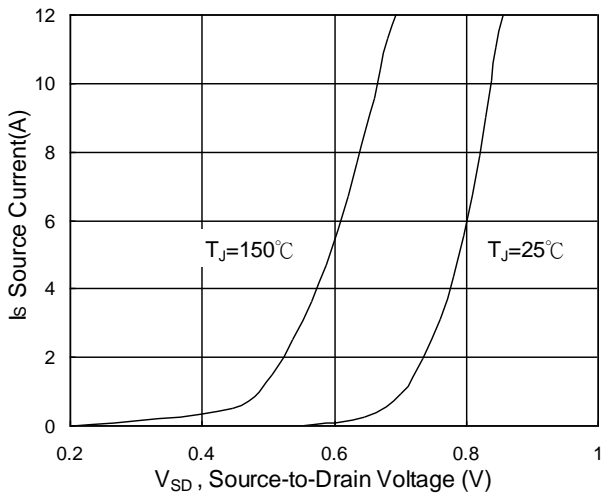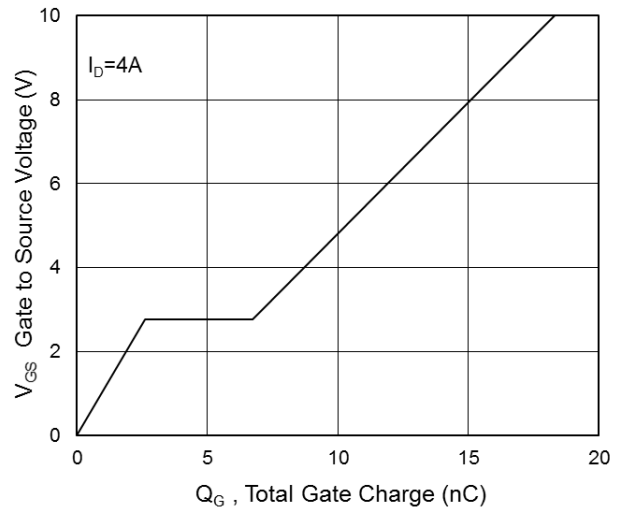## N-Channel Typical Characteristics
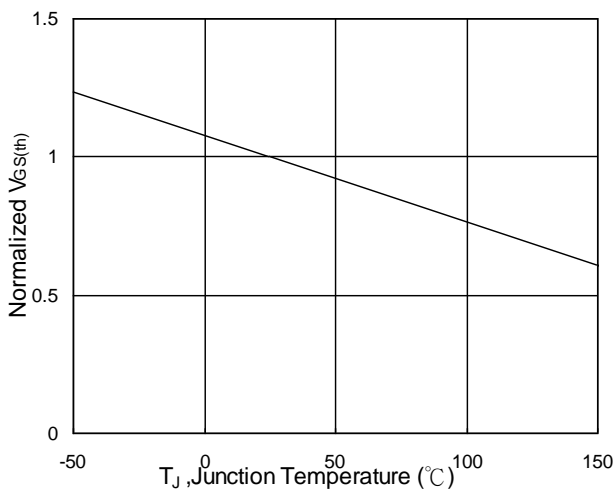

Fig.1 Typical Output Characteristics

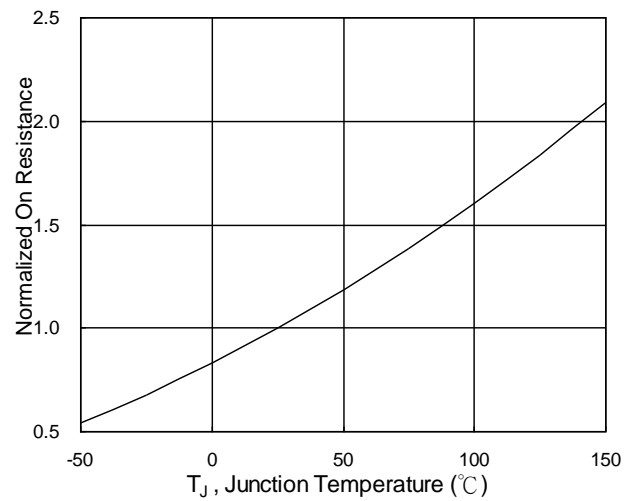**Fig.2 On-Resistance vs G-S Voltage**
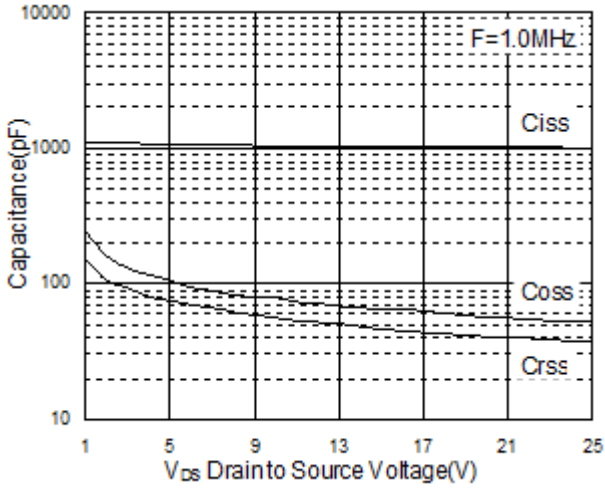

Fig.3 Source Drain Forward Characteristics
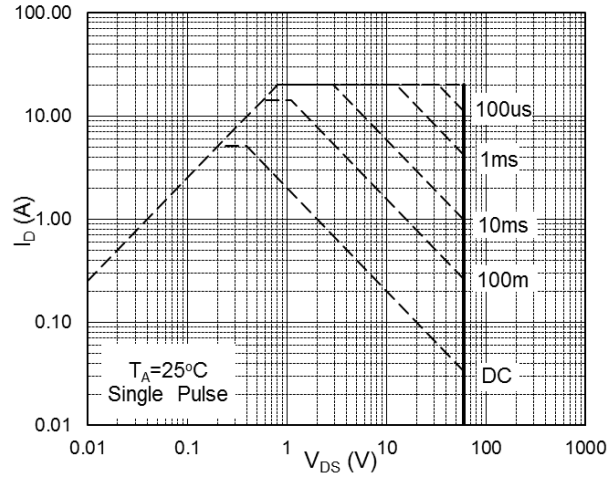

Fig.4 Gate-Charge Characteristics
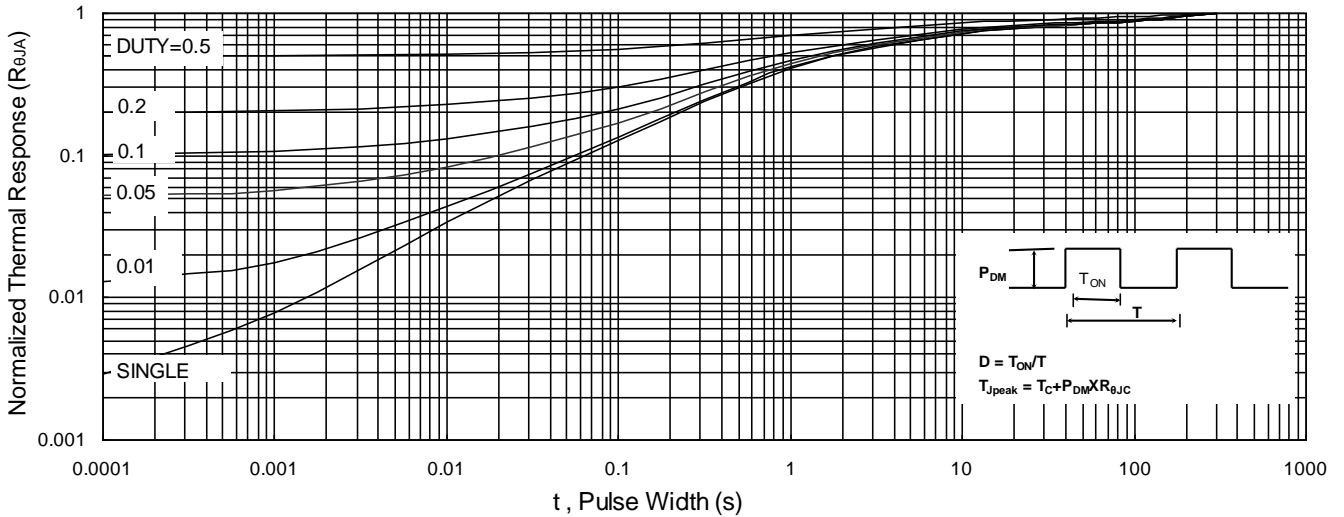

Fig.5 Normalized $V_{GS(th)}$ vs T_J
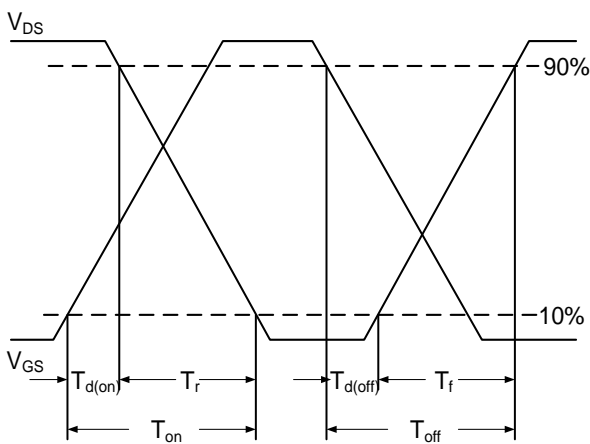

Fig.6 Normalized R_{DSON} vs T_J

Fig.7 Capacitance

Fig.8 Safe Operating Area

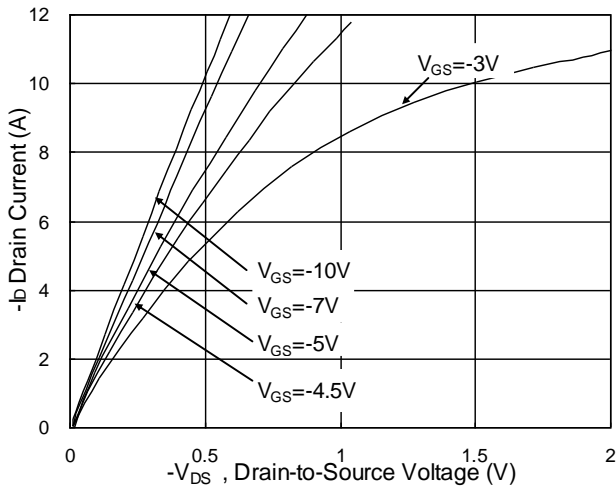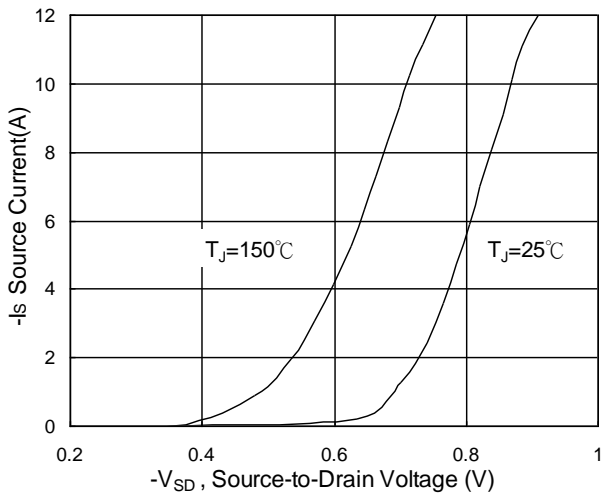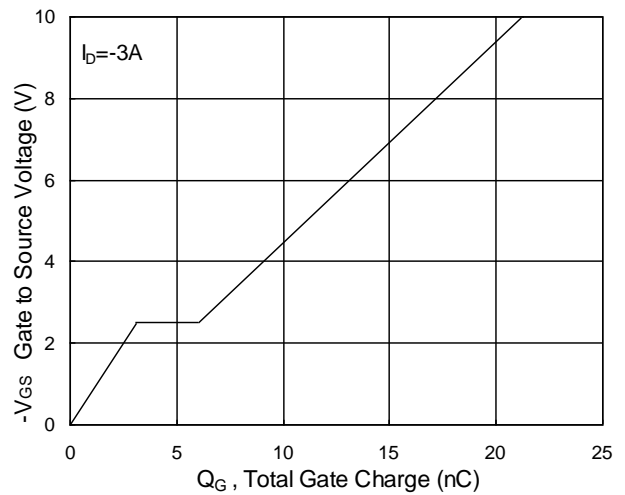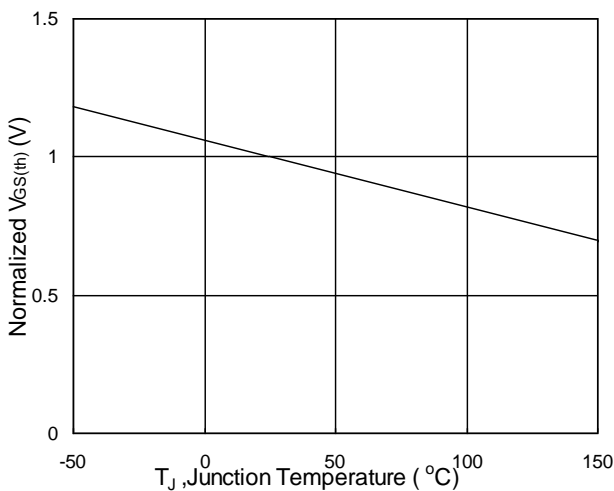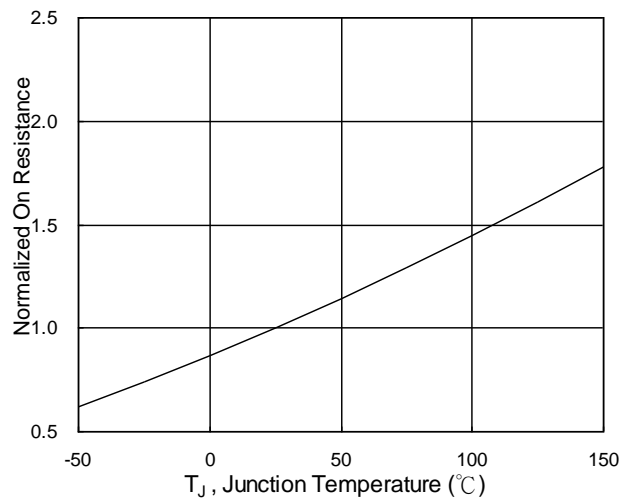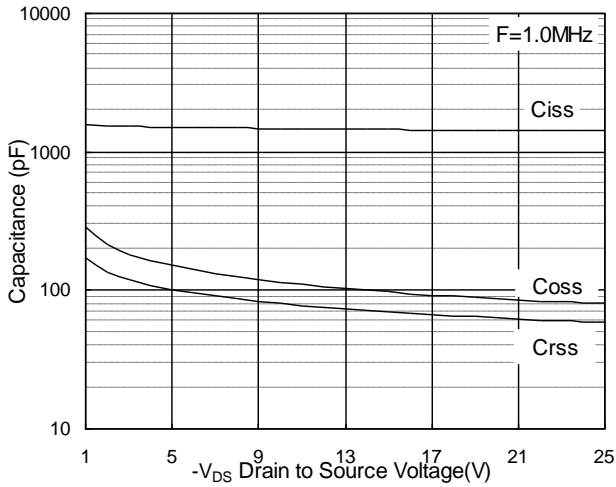**Fig.9 Normalized Maximum Transient Thermal Impedance**

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

Fig.10 Switching Time Waveform

Fig.11 Unclamped Inductive Waveform

P-Channel Typical Characteristics

Fig.1 Typical Output Characteristics

Fig.2 On-Resistance vs G-S Voltage

Fig.3 Source Drain Forward Characteristics
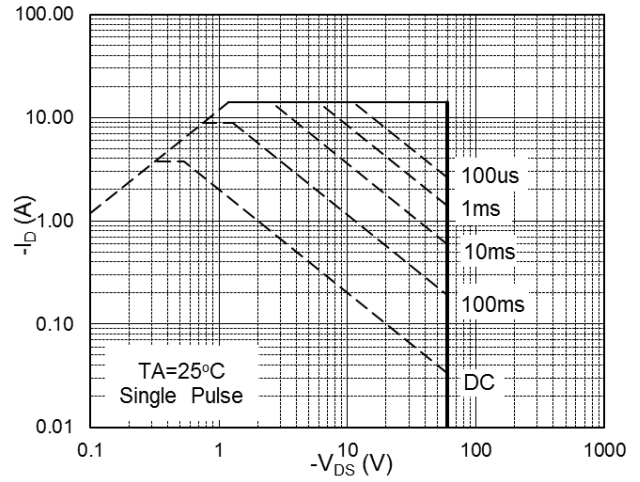

Fig.4 Gate-Charge Characteristics

Fig.5 Normalized $V_{GS(th)}$ vs T_J

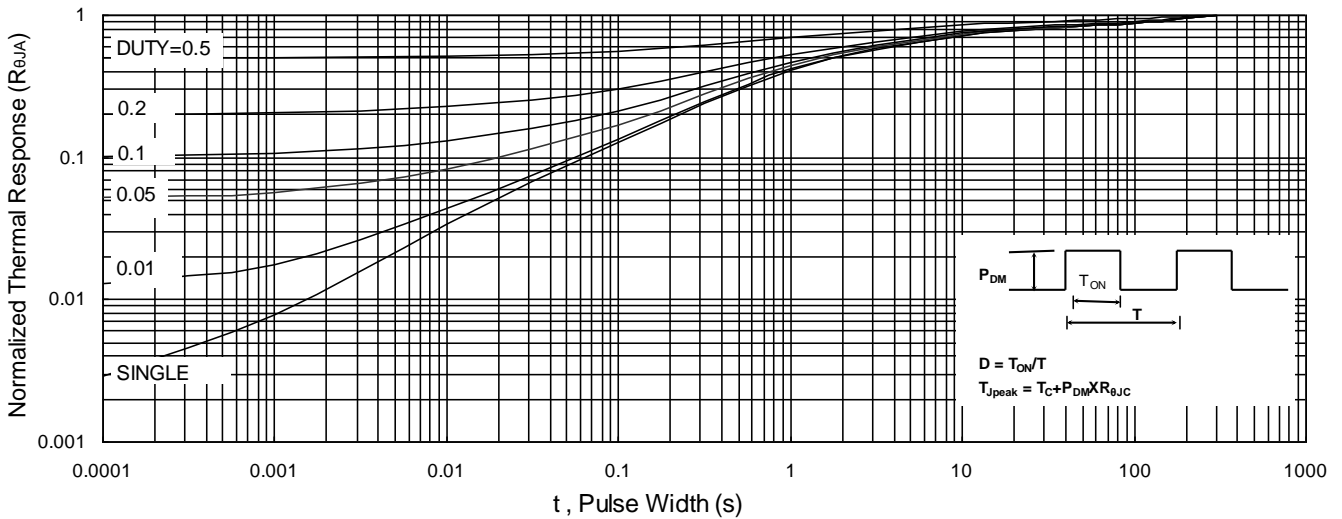

Fig.6 Normalized R_{DSON} vs T_J

Fig.7 Capacitance
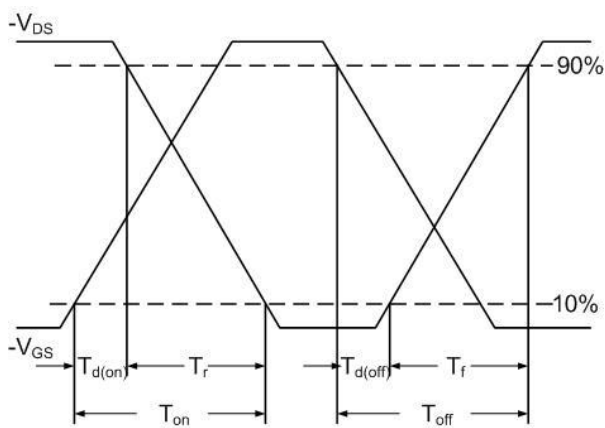
Fig.8 Safe Operating Area

Fig.9 Normalized Maximum Transient Thermal Impedance

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

$$T_{Jpeak} = T_C + P_{DM} X R_{\theta JC}$$

Fig.10 Switching Time Waveform

$$EAS = \frac{1}{2} L \times (-I_{AS}^2) \times \frac{-BV_{DSS}}{-BV_{DSS} - (-V_{DD})}$$

Fig.11 Unclamped Inductive Waveform