FETek Technology Corp.

N-Ch and P-Ch Fast Switching MOSFETs

Description

★ Advanced Trench MOS technology
★ 100% EAS Guaranteed
★ Green Device Available

Product Summary

BVDSS	RDSON	ID
30V	28mΩ	7A
-30V	32mΩ	-7A

Applications

★ Synchronous Rectification.
★ Motor Control.
★ Fan Application

PRPAK3X3 NEP Pin Configuration

Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	±20	±20	V
$I_D@T_A=25°C$	Continuous Drain Current, V_{GS} @ 10V[1]	7	-7	A
$I_D@T_A=70°C$	Continuous Drain Current, V_{GS} @ 10V[1]	5	-5	A
I_{DM}	Pulsed Drain Current[2]	20	-18	A
EAS	Single Pulse Avalanche Energy[3]	8.1	45	mJ
I_{AS}	Avalanche Current	12.7	-30	A
$P_D@T_A=25°C$	Total Power Dissipation[4]	2.5	2.5	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction-Ambient [1]	---	85	°C/W
$R_{θJA}$	Thermal Resistance Junction-Ambient[1],(t<=10sec)	---	50	°C/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	30	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=6A	---	---	28	mΩ
		V_{GS}=4.5V , I_D=4A	---	---	40	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.0	---	2.5	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=24V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=24V , 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=6A	---	12.8	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	2.3	---	Ω
Q_g	Total Gate Charge (4.5V)		---	5	---	nC
Q_{gs}	Gate-Source Charge	V_{DS}=20V , V_{GS}=4.5V , I_D=6A	---	1.11	---	
Q_{gd}	Gate-Drain Charge		---	2.61	---	
$T_{d(on)}$	Turn-On Delay Time		---	7.7	---	ns
T_r	Rise Time	V_{DD}=12V , V_{GS}=10V , R_G=3.3Ω	---	46	---	
$T_{d(off)}$	Turn-Off Delay Time	I_D=6A	---	11	---	
T_f	Fall Time		---	3.6	---	
C_{iss}	Input Capacitance		---	416	---	pF
C_{oss}	Output Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	62	---	
C_{rss}	Reverse Transfer Capacitance		---	51	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	7	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.
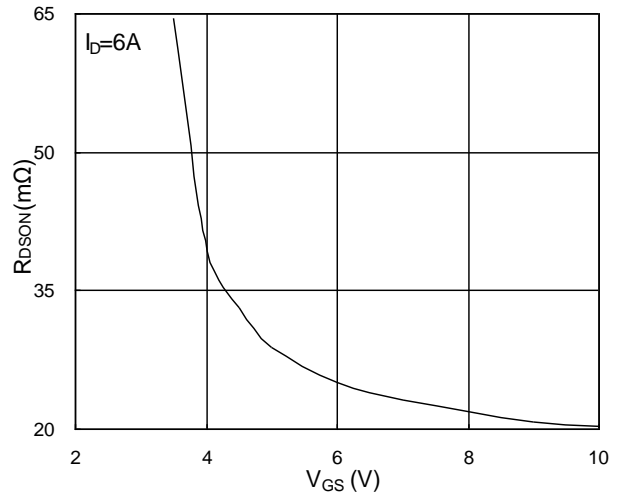2.The data tested by pulsed , pulse width $\leq$ 300us , duty cycle $\leq$ 2%
3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=12.7A
4.The power dissipation is limited by 150℃ junction temperature
5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.
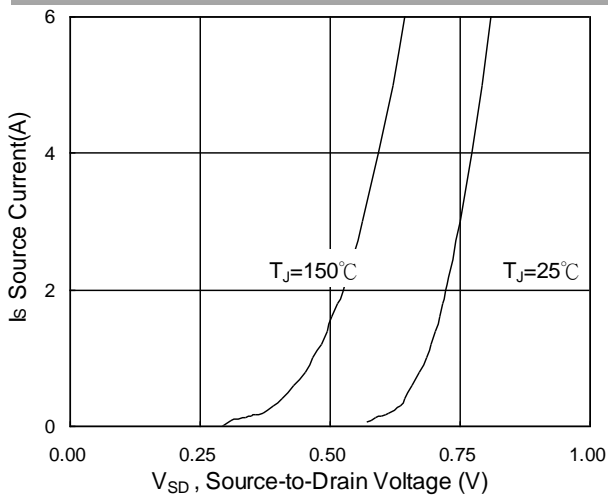
P-Channel Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-30	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-6A	---	---	32	mΩ
		V_{GS}=-4.5V , I_D=-4A	---	---	56	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.0	---	-2.5	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-24V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-24V , 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=-6A	---	12.6	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz		15	---	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-20V , V_{GS}=-4.5V , I_D=-6A	---	9.8	---	nC
Q_{gs}	Gate-Source Charge		---	2.2	---	
Q_{gd}	Gate-Drain Charge		---	3.4	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-24V , V_{GS}=-10V , R_G=3.3Ω, I_D=-1A	---	16.4	---	ns
T_r	Rise Time		---	20.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	55	---	
T_f	Fall Time		---	10	---	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	930	---	pF
C_{oss}	Output Capacitance		---	148	---	
C_{rss}	Reverse Transfer Capacitance		---	115	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	-7	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}=-30A

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.
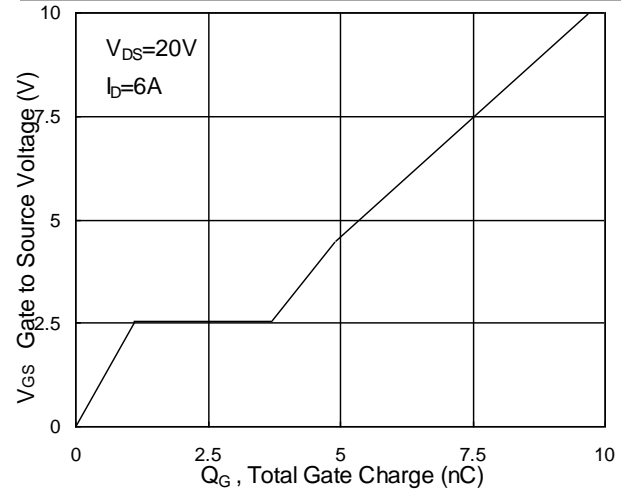
N-Channel Typical Characteristics

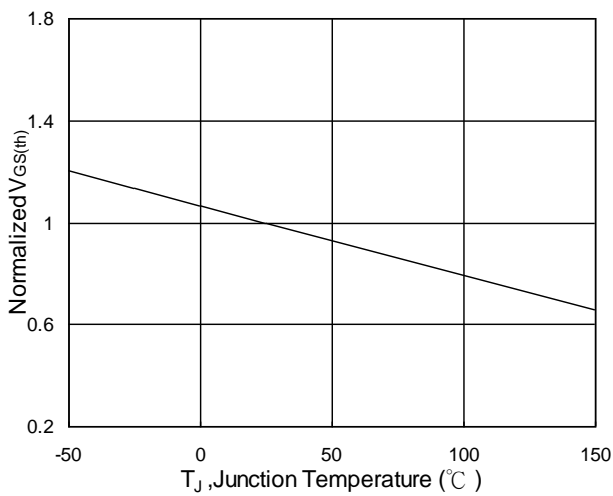**Fig.1 Typical Output Characteristics**

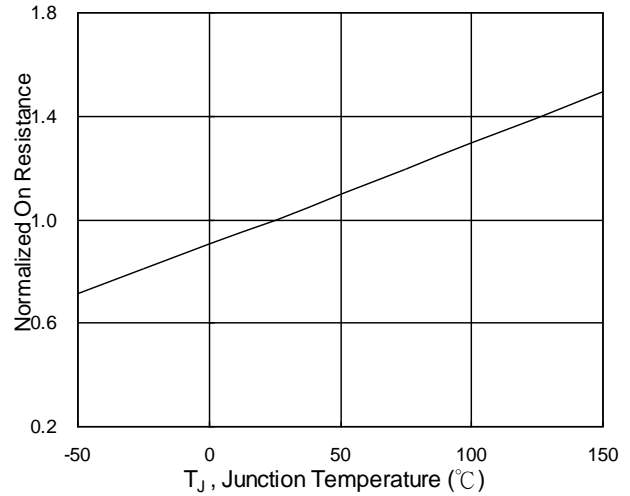**Fig.2 On-Resistance vs G-S Voltage**

Fig.3 Source Drain Forward Characteristics

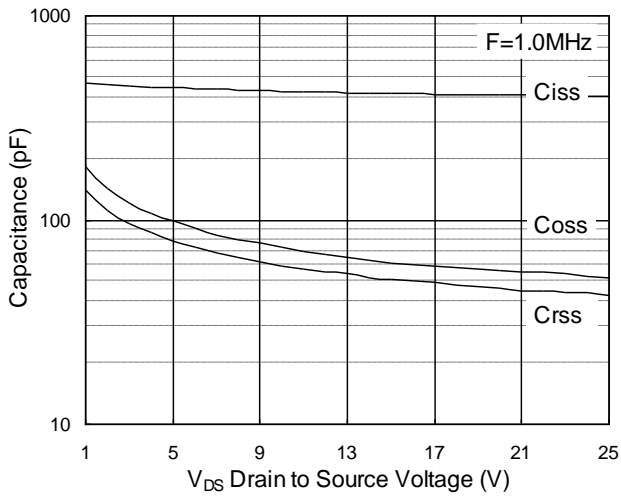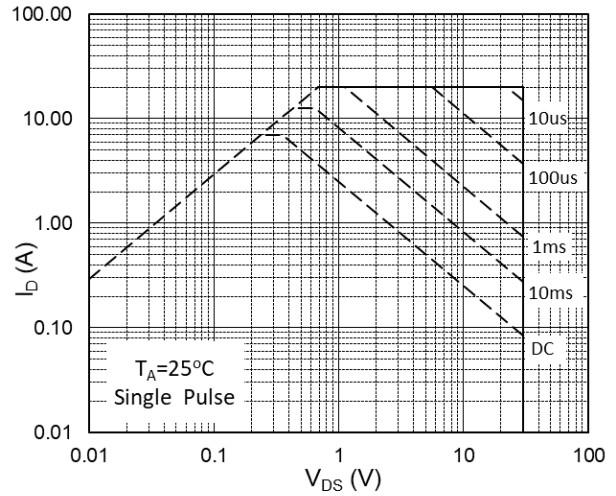
Fig.4 Gate-Charge Characteristics
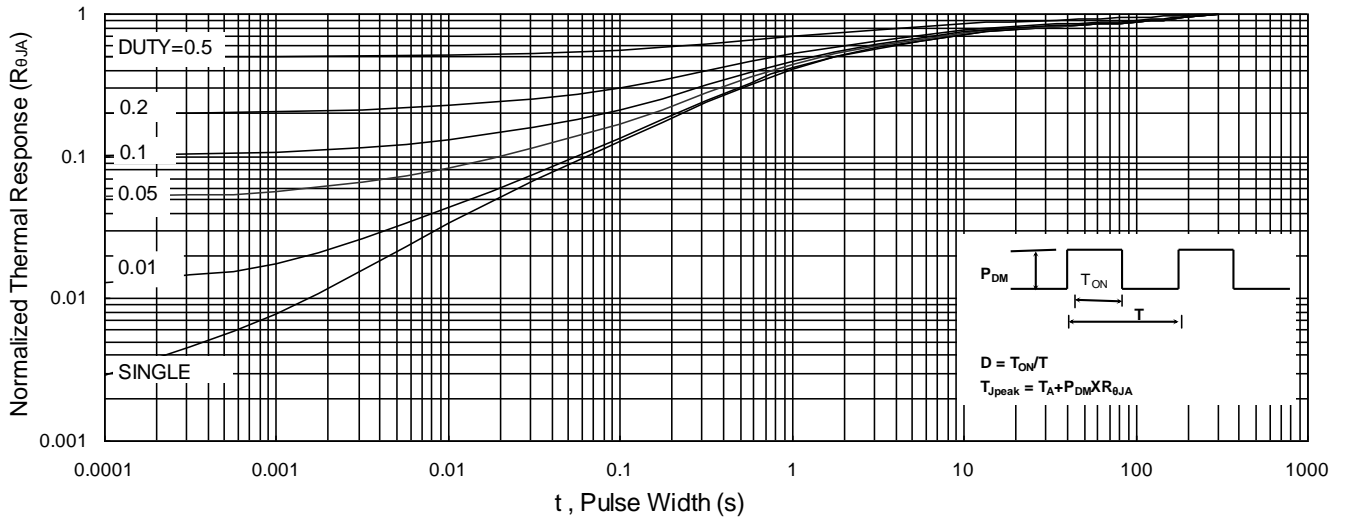

Fig.5 Normalized $V_{GS(th)}$ vs T_J

Fig.6 Normalized R_{DSON} vs T_J

Fig.7 Capacitance
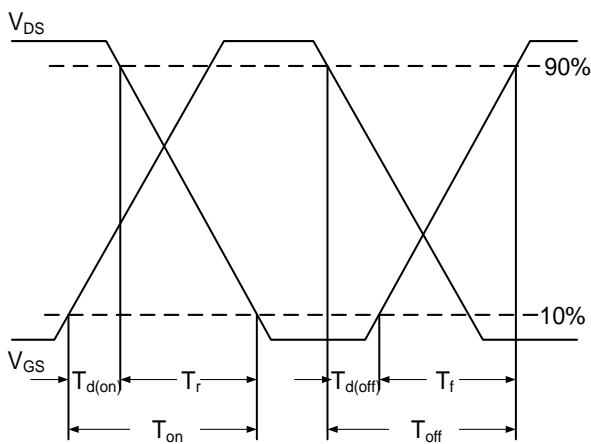
Fig.8 Safe Operating Area
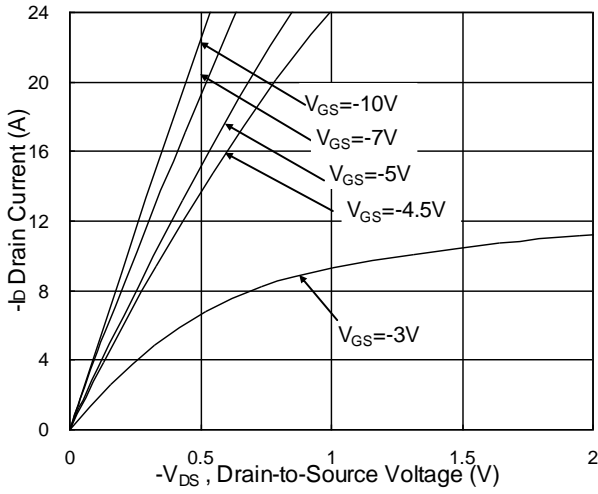
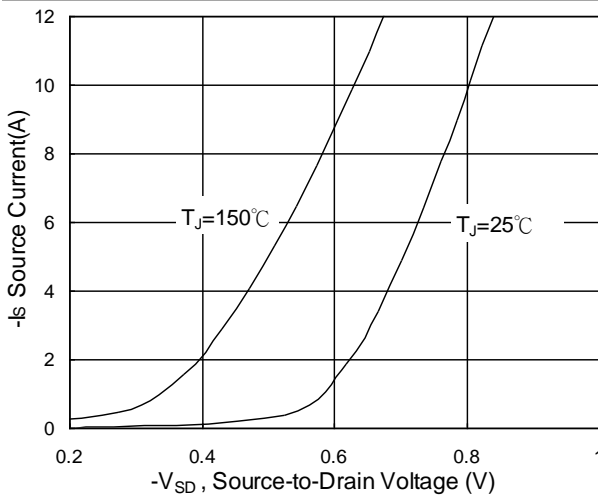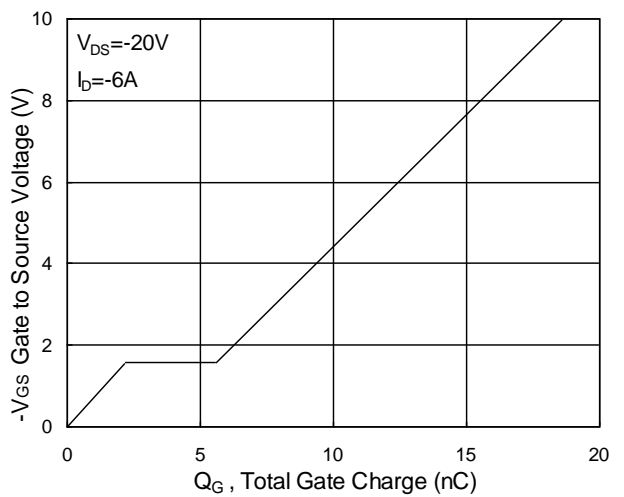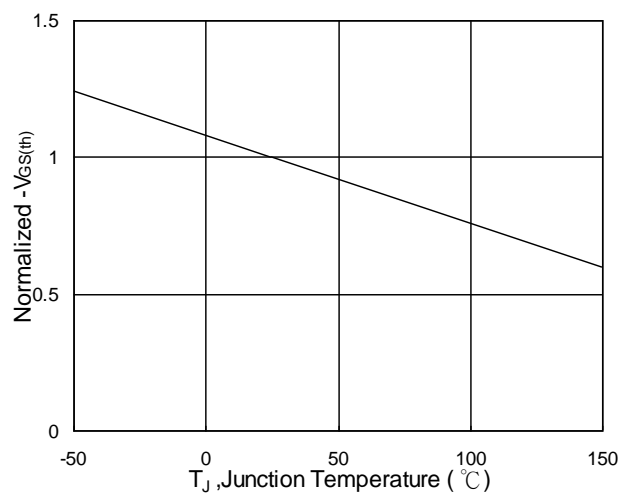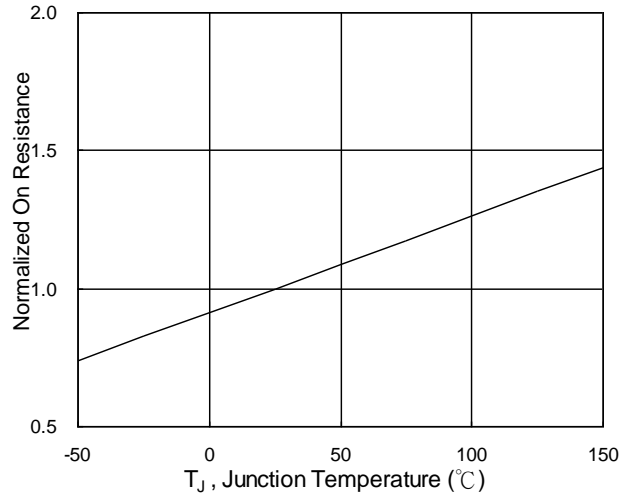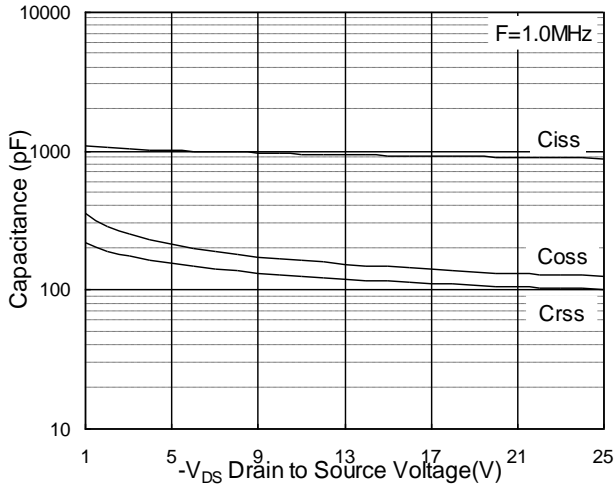**Fig.9 Normalized Maximum Transient Thermal Impedance**

$$D = T_{ON}/T$$
$$T_{Jpeak} = T_A + P_{DM} X R_{\theta JA}$$

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 Switching Waveform

P-Channel Typical Characteristics

Fig.1 Typical Output Characteristics

Fig.2 On-Resistance vs G-S Voltage

Fig.3 Source Drain Forward Characteristics
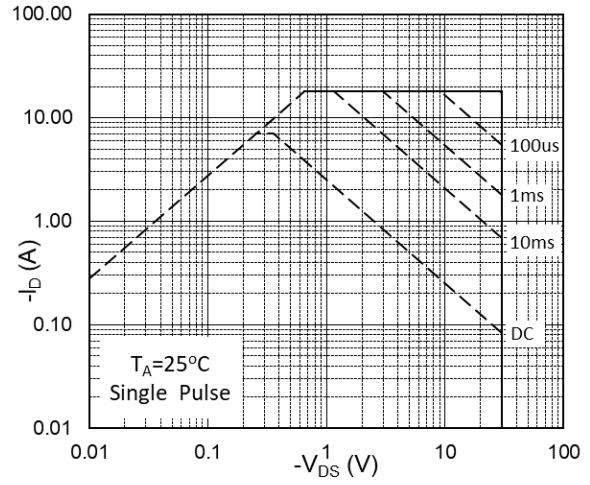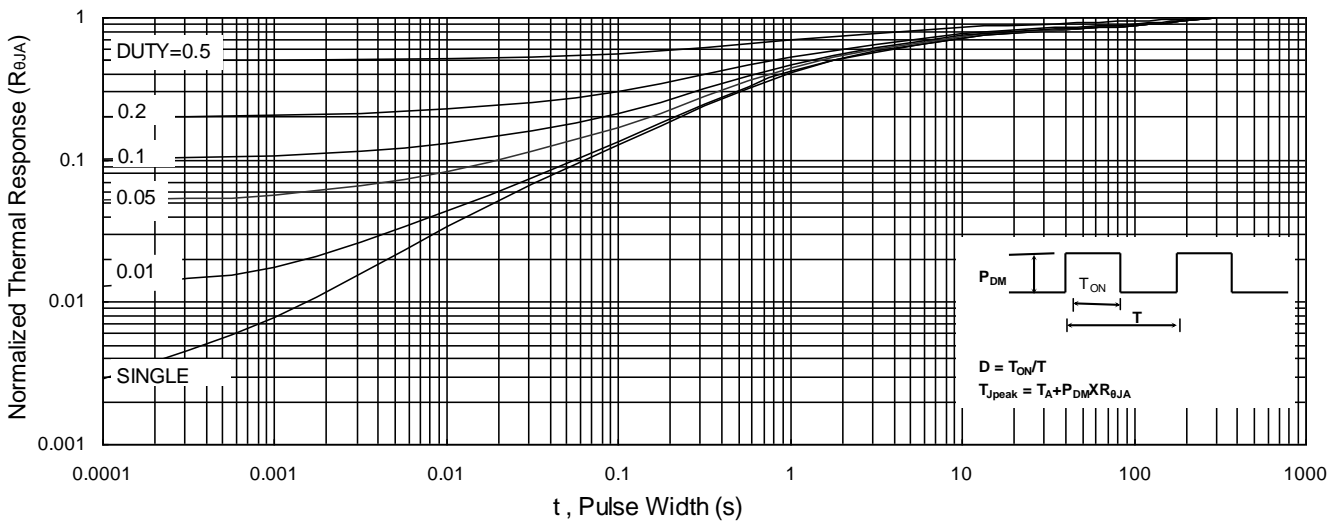
Fig.4 Gate-Charge Characteristics

Fig.5 Normalized $V_{GS(th)}$ vs T_J
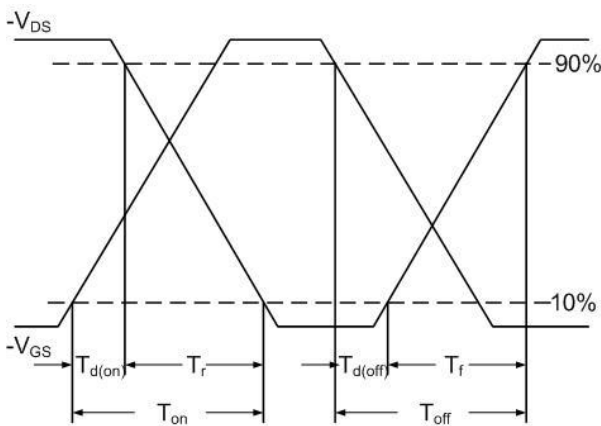
Fig.6 Normalized R_{DSON} vs T_J

Fig.7 Capacitance

Fig.8 Safe Operating Area

$$D = T_{ON}/T$$
$$T_{Jpeak} = T_A + P_{DM}XR_{\theta JA}$$

Fig.9 Normalized Maximum Transient Thermal Impedance

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 Switching Waveform