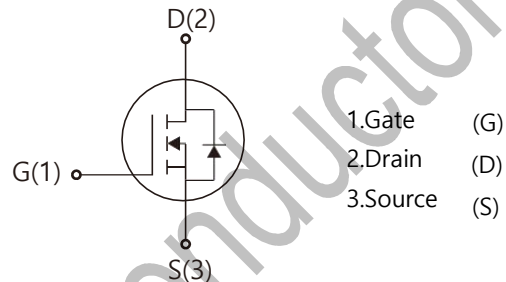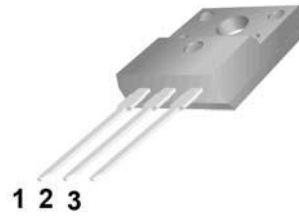**WGF65R850**

TO-220F

RoHS COMPLIANT

Features:
- ☐ Low Intrinsic Capacitances.
- ☐ Excellent Switching Characteristics.
- ☐ Extended Safe Operating Area.
- ☐ Unrivalled Gate Charge :Qg=12 nC(Typ.).
- ☐ V_{DSS}=650 V,I_D=6A
- ☐ R_{DS}(on) : 0.85 Ω (Max) @V_G=10V
- ☐ 100% Avalanche Tested

1 2 3

D(2)

G(1)

S(3)

1.Gate (G)
2.Drain (D)
3.Source (S)

Absolute Maximum Ratings (Ta=25℃ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain-Source Voltage		650	V
I_D	Drain Current	T_j=25℃	6.0	A
V_{GSS}	Gate-Source Voltage		±30	V
E_{AS}	Single Pulse Avalanche Energy (note1)		120	mJ
I_{DM}	Pulsed Drain Current (note2)		18	A
P_D	Power Dissipation (Tj=25℃)		26	W
T_j	Junction Temperature(Max)		150	℃
T_{stg}	Storage Temperature		-55~+150	℃
dv/dt	MOSFET dv/dt ruggeness,VDS=0V...480V		50	V/nS

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance Junction to Case	-	3.13	℃/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	-	70	℃/W

Electrical Characteristics   (Ta=25℃ unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250µA , V_{GS} =0	650	-	-	V
△BVDSS/ △TJ	Breakdown Voltage Temperature Coefficient	I_D=250µA ,Reference to 25℃	-	0.67	-	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS} =0V	-	-	10	µA
		V_{DS}=520V, Tj=125℃			100	
I_{GSSF}	Gate-body leakage Current, Forward	V_{GS} =+30V, V_{DS}=0V	-	-	100	nA
I_{GSSR}	Gate-body leakage Current, Reverse	V_{GS} =-30V, V_{DS}=0V	-	-	-100	
On Characteristics						
$V_{GS(TH)}$	Date Threshold Voltage	I_D=250µA,V_{DS}=V_{GS}	2	-	4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	I_D=3A,V_{GS} =10V	-	0.78	0.85	Ω
Dynamic Characteristics						
Ciss	Input Capacitance	V_{DS}=25V , V_{GS} =0 , f=1.0MHz	-	350	-	pF
Coss	Output Capacitance		-	350	-	
Crss	Reverse Transfer Capacitance			20	-	
Switching Characteristics						
Td(on)	Turn-On Delay Time	V_{DD}=300V , I_D=3A R_G =25Ω (Note 3,4)	-	17		nS
Tr	Turn-on Rise Time		-	22		
Td(off)	Turn-Off Delay Time		-	30		
Tf	Turn-Off Rise Time		-	30		
Qg	Total Gate Charge	V_{DS}=300V,V_{GS} =10V , I_D=6A (Note3,4)	-	12		nC
Qgs	Gate-Source Charge		-	3. 5	-	
Qgd	Gate-Drain Charge		-	5. 6	-	
Drain-Source Diode Characteristics and Maximum Ratings						
Is	Max. Diode Forward Current	-		-	6	A
I_{SM}	Max. Pulsed Forward Current	-		-	18	
V_{SD}	Diode Forward Voltage	I_D=6A	-	-	1.5	V
Trr	Reverse Recovery Time	I_S=6A,V_{GS} =0V diF/dt=100A/µs (Note3)	-	290	-	nS
Qrr	Reverse Recovery Charge		-	2.2	-	µC

Notes : 1, L=0.5mH, IAS= 6A, VDD=50V, RG=25Ω, Starting TJ =25℃
2, Repetitive Rating : Pulse width limited by maximum junction temperature
3, Pulse Test : Pulse Width ≤ 300µs, Duty Cycle ≤ 2%
4, Essentially Independent of Operating Temperature

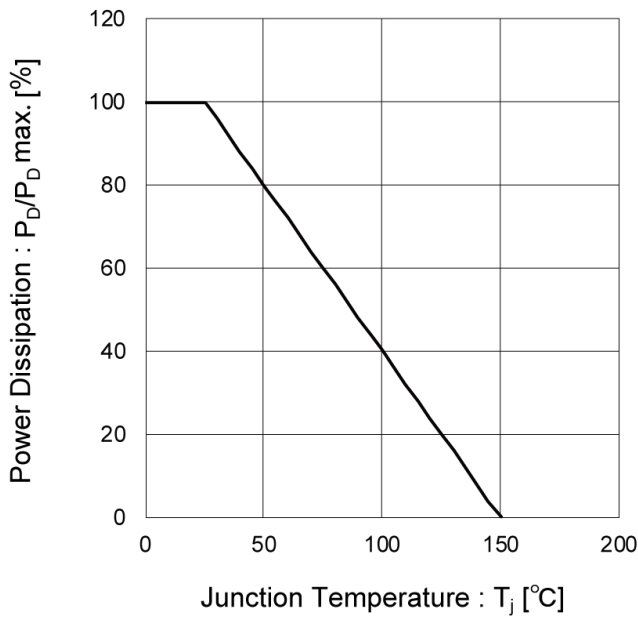## Typical Characteristics
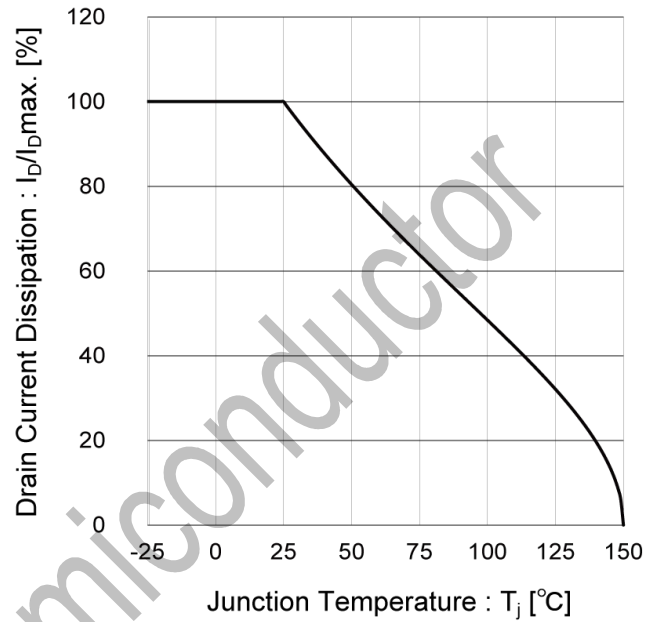
Fig.1 Power Dissipation Derating Curve

Power Dissipation : P_D/P_D max. [%] vs. Junction Temperature : T_j [°C]

Fig.2 Drain Current Derating Curve

Drain Current Dissipation : I_D/I_D max. [%] vs. Junction Temperature : T_j [°C]

Fig.3 Normalized Transien Thermal Resistance vs. Pulse Width

$T_a = 25°C$
Single Pulse
$R_{th(j-a)(t)} = r_{(t)} \times R_{th(j-a)}$
$R_{th(j-a)} = 70°C/W$

top D = 1
D = 0.5
D = 0.1
D = 0.05
D = 0.01
D = Single

Normalized Transient Thermal Resistance : $r_{(t)}$ vs. Pulse Width : PW [s]
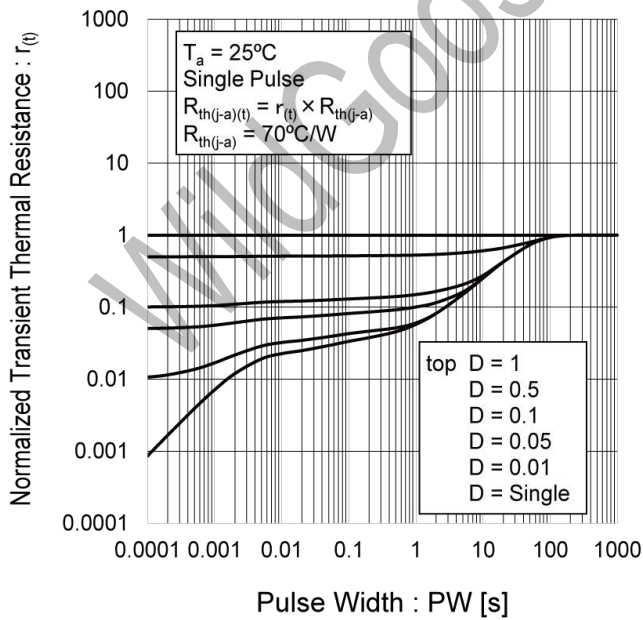
Fig.4 Maximum Safe Operating Area

Operation in this area is limited by $R_{DS(on)}$ (V_{GS} = 10V)

$P_W = 100\mu s$
$P_W = 1ms$
$P_W = 10ms$

$T_a = 25°C$
Single Pulse

Drain Current : I_D [A] vs. Drain - Source Voltage : V_{DS} [V]
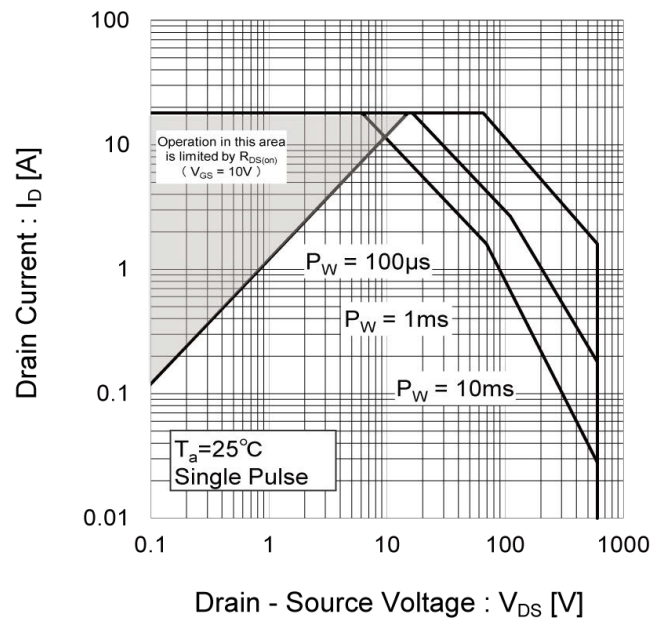
Typical Characteristics (Continued)

Fig.5 Avalanche Energy Drating Curve vs. Junction Tempreture
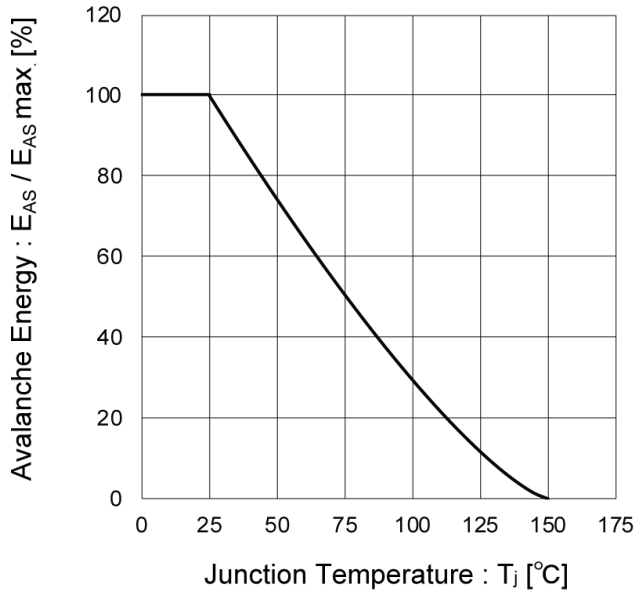
Fig.6 Breakdown Voltage vs. Junction Temperature
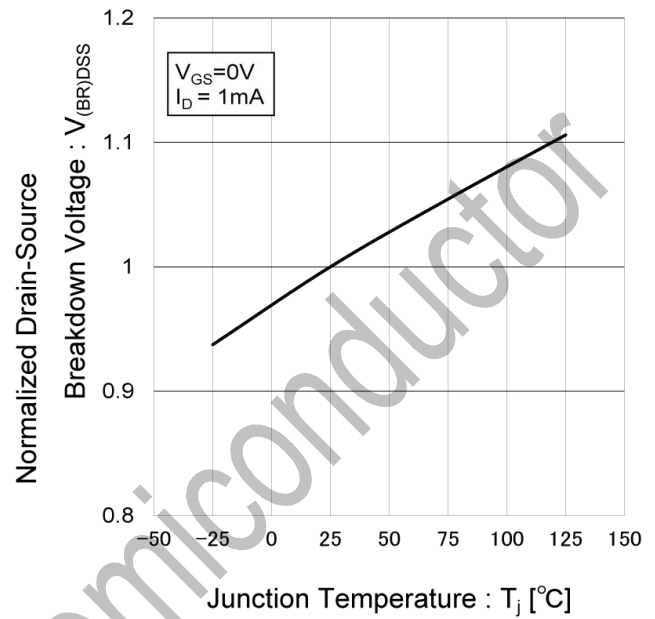
Fig.7 Typical Output Characteristics(I)
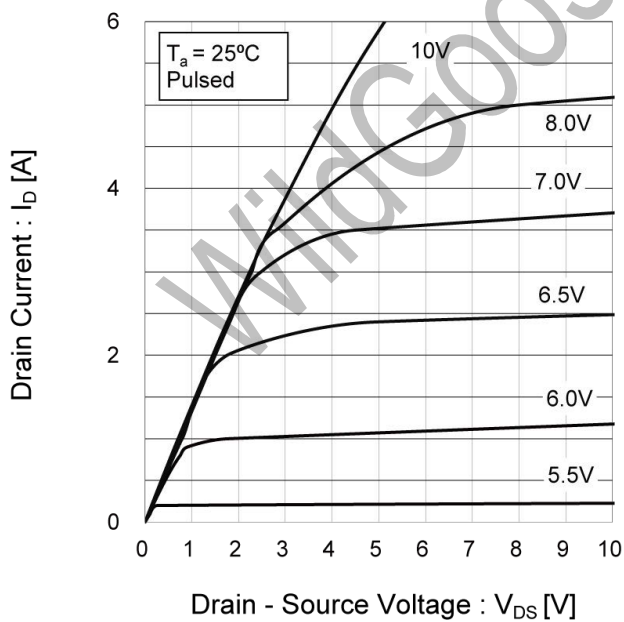
Fig.8 Typical Output Characteristics(II)
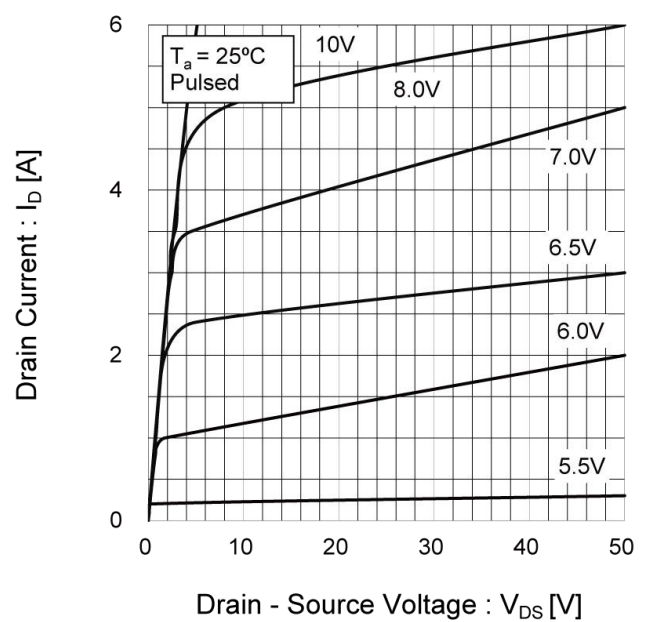
Fig.9 Typical Transfer Characteristics
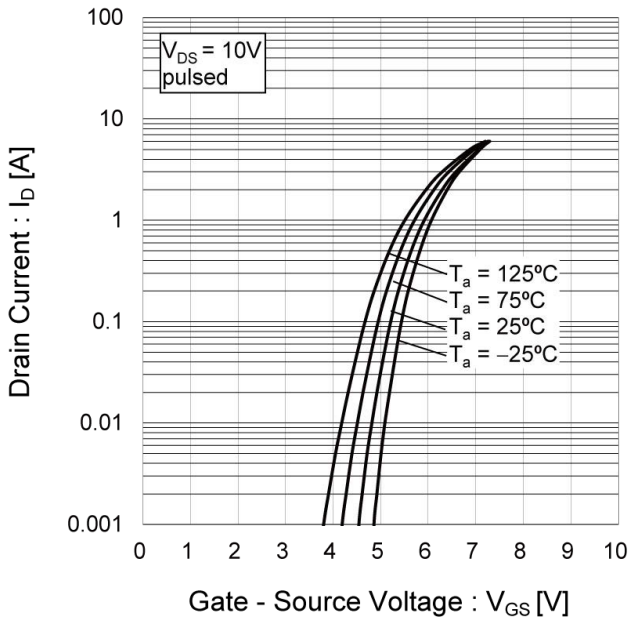
Fig.10 Gate Threshold Voltage vs. Junction Temperature
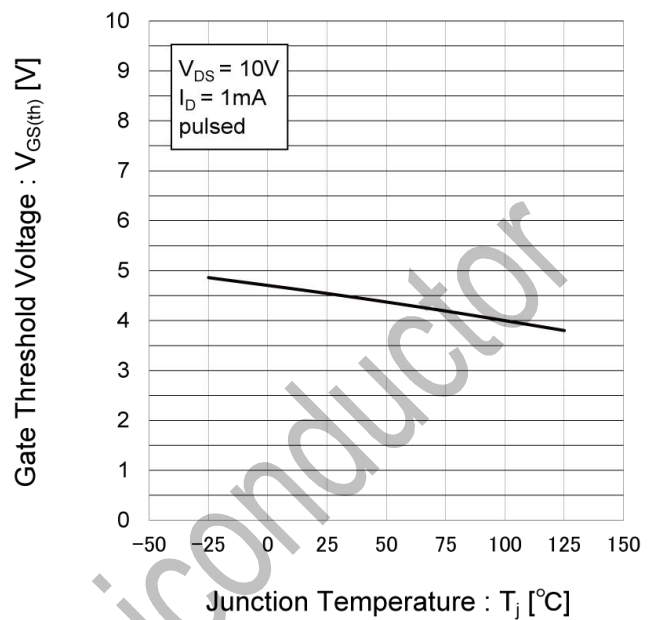
Fig.11 Static Drain - Source On - State Resistance vs. Drain Current
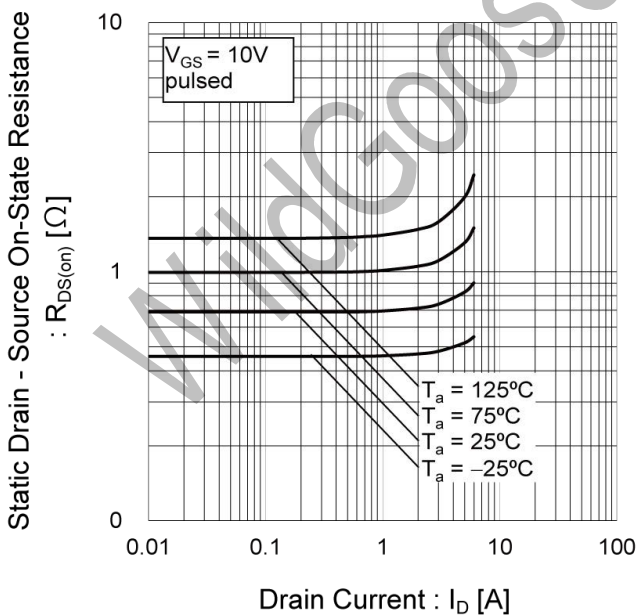
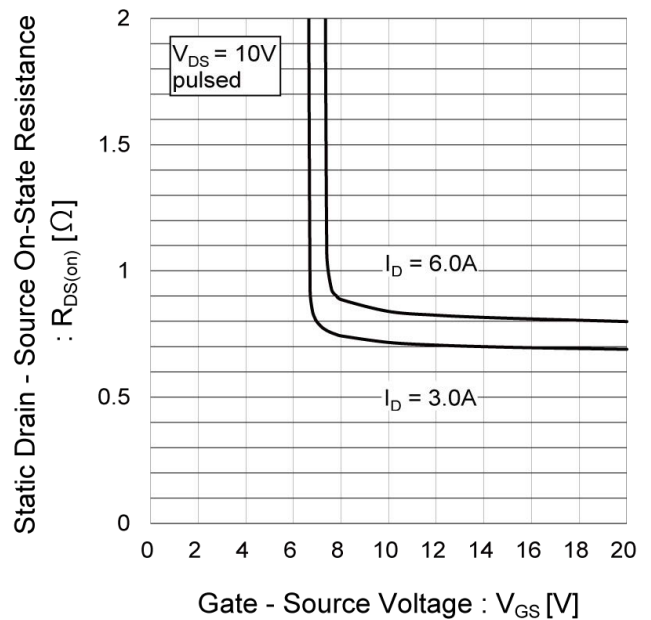Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

Fig.13 Static Drain - Source
On - State Resistance
vs. Junction Temperature
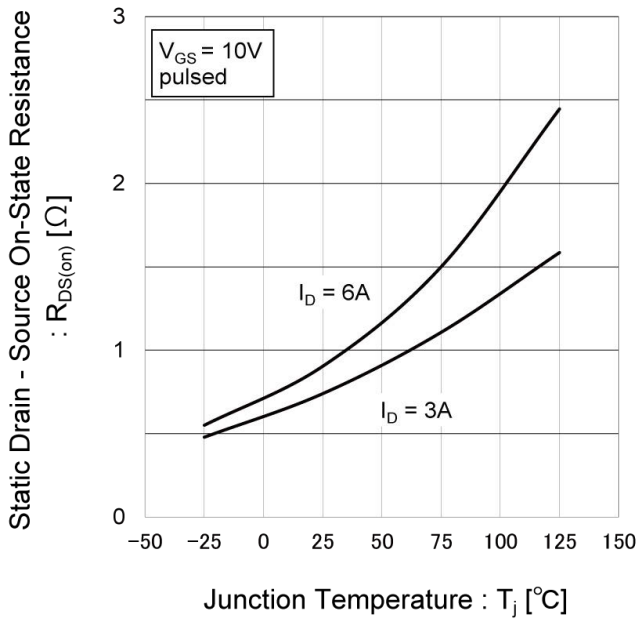
Fig.14 Typical Capacitance vs.
Drain - Source Voltage
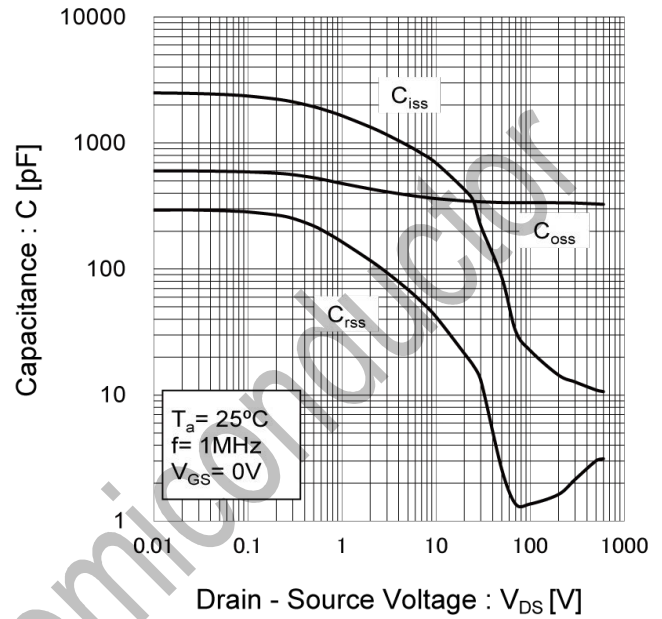
Fig.15 Switching Characteristics
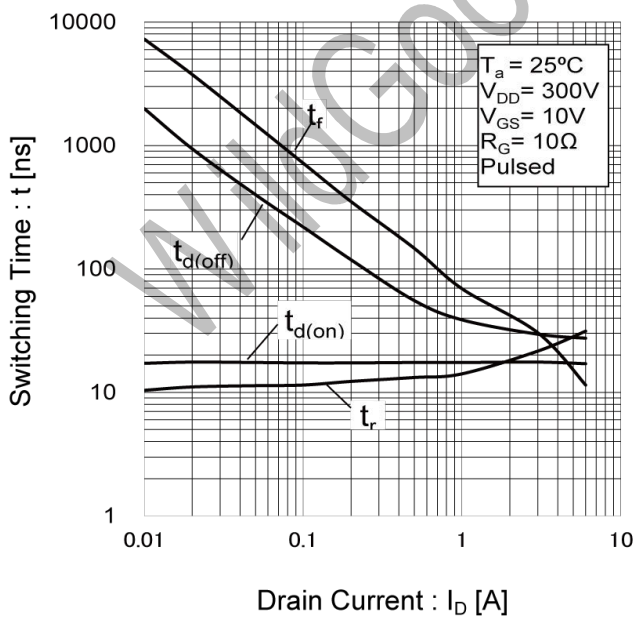
Fig.16 Typical Gate Charge
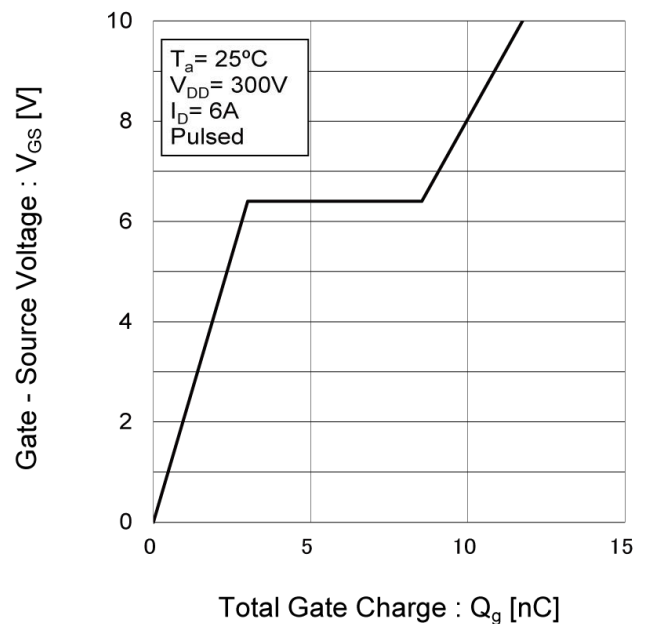
Fig.17 Source Current
vs. Source - Drain Voltage
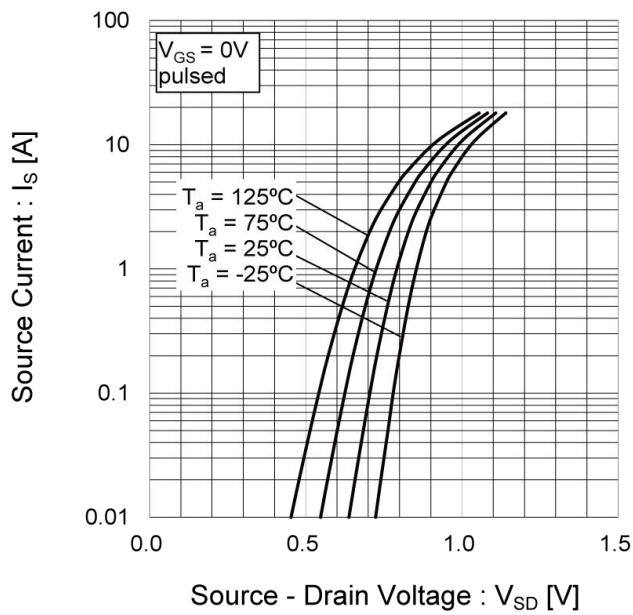
Fig.18 Reverse Recovery Time vs.
Source Current
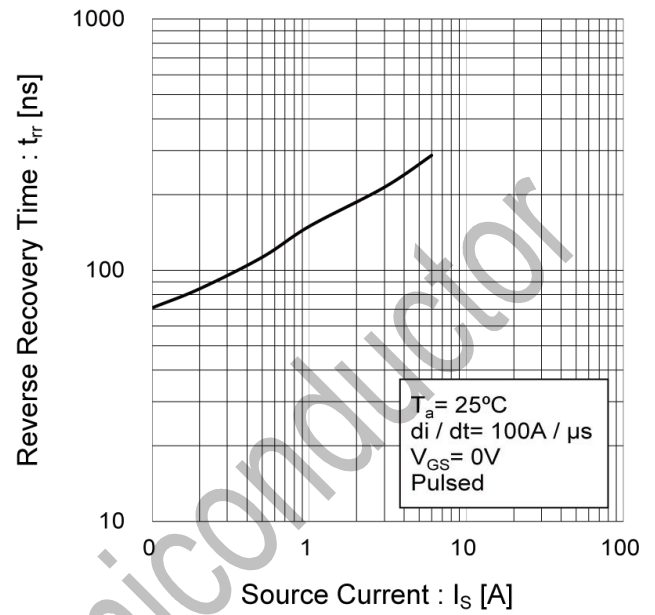
Measurement circuits
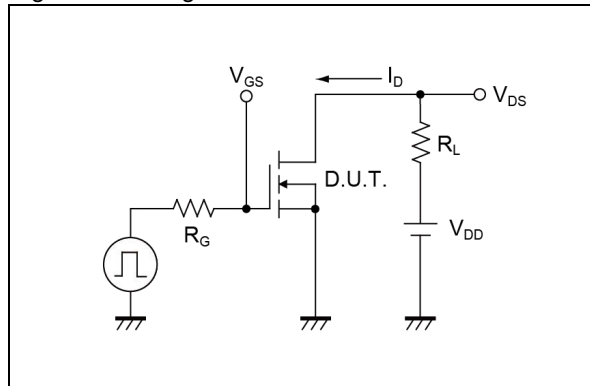
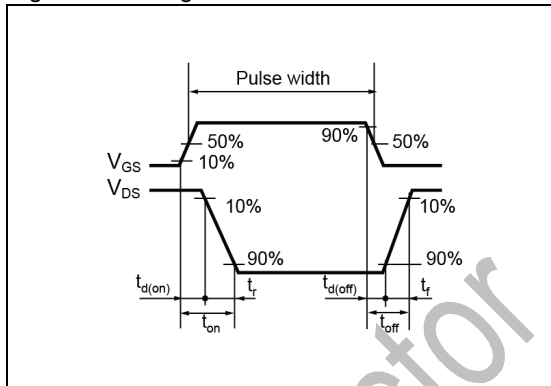Fig.1-1 Switching Time Measurement Circuit

Fig.1-2 Switching Waveforms

Fig.2-1 Gate Charge Measurement Circuit
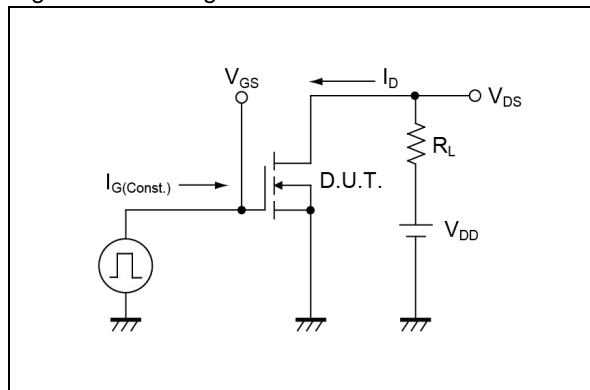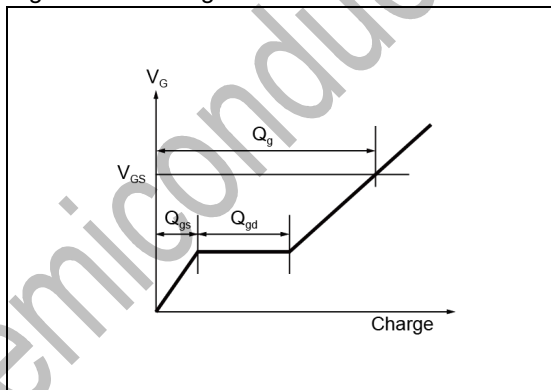

Fig.2-2 Gate Charge Waveform

Fig.3-1 Avalanche Measurement Circuit
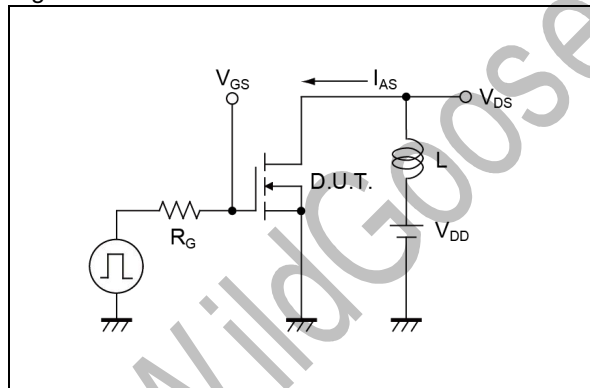
Fig.3-2 Avalanche Waveform

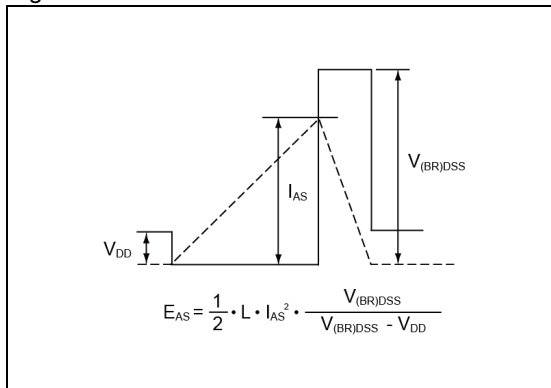$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AS}^2 \cdot \frac{V_{(BR)DSS}}{V_{(BR)DSS} - V_{DD}}$$

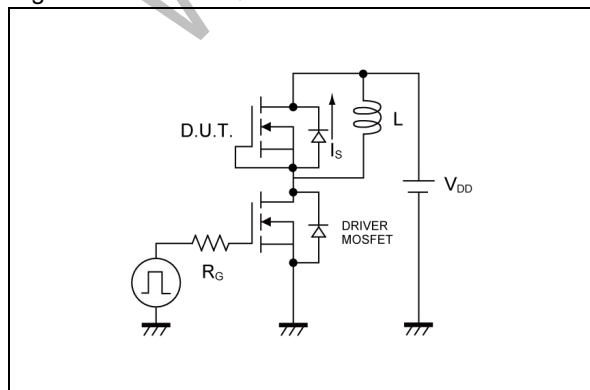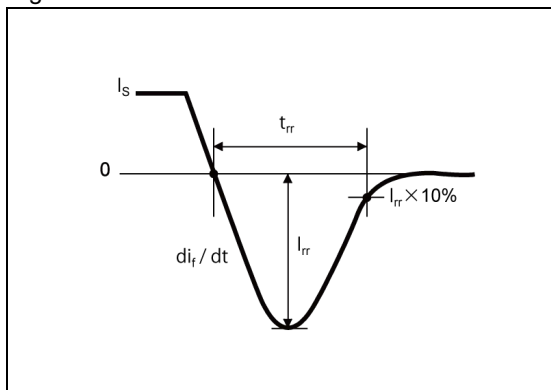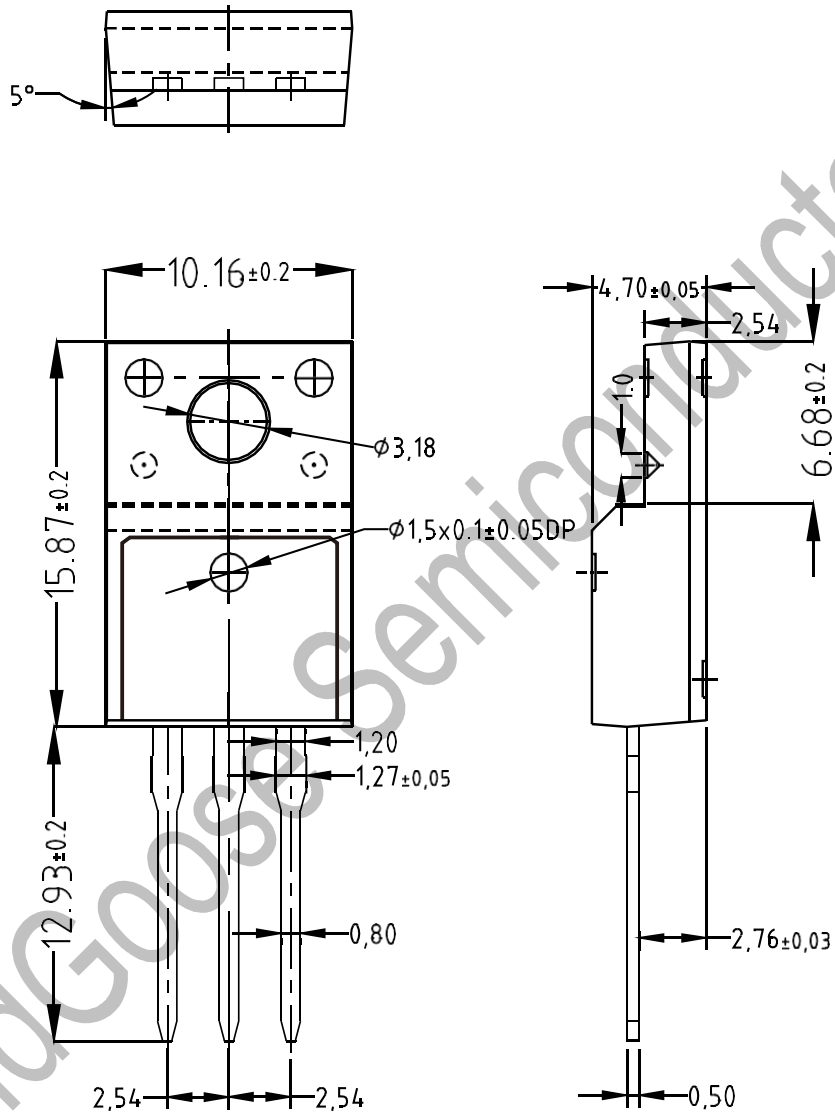Fig.4-1 trr Measurement Circuit

Fig.4-2 trr Waveform

Package Dimension

TO-220F

Unit: mm

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