V_{DSS}	650 V
I_D	7 A
$R_{DS(ON)}$	150mΩ

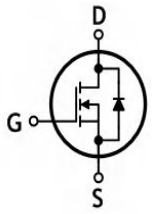
FEATURES

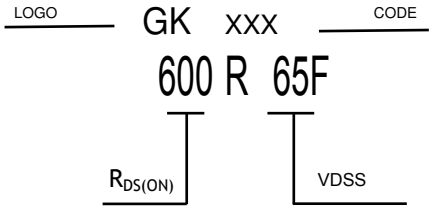
- Drain-Source voltage: V_{DS}=650V (@T_J=150°C)
- Low drain-source On resistance: $R_{DS(on)}$=0.6Ω (Max.)
- Ultra low gate charge: Qg=13.5nC(Typ.)
- RoHS compliant device
- 100% avalanche tested

GK XXX
600R65F



TO-220F





MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute maximum ratings (T_C=25°C unless otherwise noted)

Characteristic	Symbol		Rating	Unit
Drain-source voltage	V_{DSS}		650	V
Gate-source voltage	V_{GSS}		±30	V
Drain current (DC) (Note 1)	I_D	T_C=25°C	7	A
		T_C=100°C	4.4	A
Drain current (Pulsed) (Note 1)	I_{DM}		28	A
Single pulsed avalanche energy (Note 2)	E_{AS}		158	mJ
Repetitive avalanche current (Note 1)	I_{AR}		7	A
Repetitive avalanche energy (Note 1)	E_{AR}		3.2	mJ
Power dissipation	P_D		32	W
Junction temperature	T_J		150	°C
Storage temperature range	T_{stg}		-55~150	°C

* Limited only maximum junction temperature

Thermal Characteristics

Characteristic	Symbol	Rating	Unit
Thermal resistance, junction to case	$R_{th(j-c)}$	Max. 3.9	°C/W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	Max. 62.5	

Electrical Characteristics (T_C=25℃ unless otherwise specified)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	I_D=250uA, V_{GS}=0	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250uA, V_{DS}=V_{GS}	2	3	4	V
Drain-source cut-off current	I_{DSS}	V_{DS}=650V, V_{GS}=0V	-	-	1	uA
		V_{DS}=650V, T_J=125°C	-	-	100	uA
Gate leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±30V	-	-	±100	nA
Drain-source on-resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=3.5A	-	0.5	0.6	Ω
Input capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1MHz	-	557	-	pF
Output capacitance	C_{oss}		-	294	-	
Reverse transfer capacitance	C_{rss}		-	17	-	
Turn-on delay time (Note 3)	$t_{d(on)}$	V_{DS}=350V, I_D=7A, R_G=25Ω	-	16	-	ns
Rise time (Note 3)	t_r		-	13	-	
Turn-off delay time (Note 3)	$t_{d(off)}$		-	35	-	
Fall time (Note 3)	t_f		-	7	-	
Total gate charge (Note 4)	Q_g	V_{DS}=400V, V_{GS}=10V, I_D=7A	-	13.5	-	nC
Gate-source charge (Note 4)	Q_{gs}		-	4.5	-	
Gate-drain charge (Note 4)	Q_{gd}		-	3.5	-	

Source-Drain Diode Ratings and Characteristics (T_C=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Source current (DC)	I_S	Integral reverse diode in the MOSFET	-	-	7	A
Source current (Pulsed)	I_{SM}		-	-	28	A
Forward voltage	V_{SD}	V_{GS}=0V, I_S=7A	-	-	1.2	V
Reverse recovery time (Note 3,4)	t_{rr}	I_S=7A, V_{GS}=0V, dI_S/dt=100A/us	-	278	-	ns
Reverse recovery charge (Note 3,4)	Q_{rr}		-	2	-	uC

Note:
1. Calculated continuous current based on maximum allowable junction temperature
2. L=7mH, I_{AS}=7A, V_{DD}=50V, Starting T_J=25°C
3. Guaranteed by design, not subject to production testing
4. Pulse test: Pulse width≤300us, Duty cycle≤2%

RATING AND CHARACTERISTIC CURVES

Fig. 1 Typical Output Characteristics

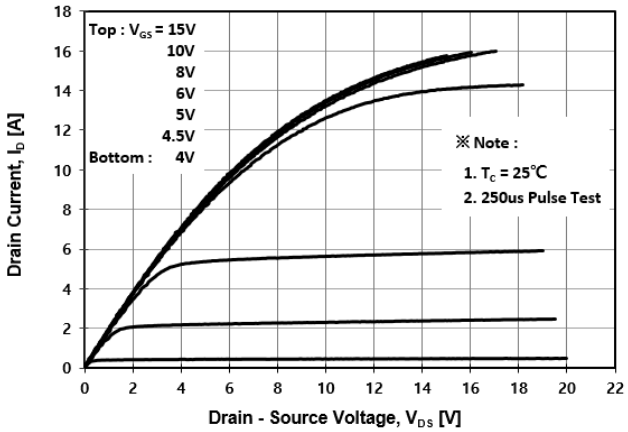


Fig. 2 Typical Transfer Characteristics

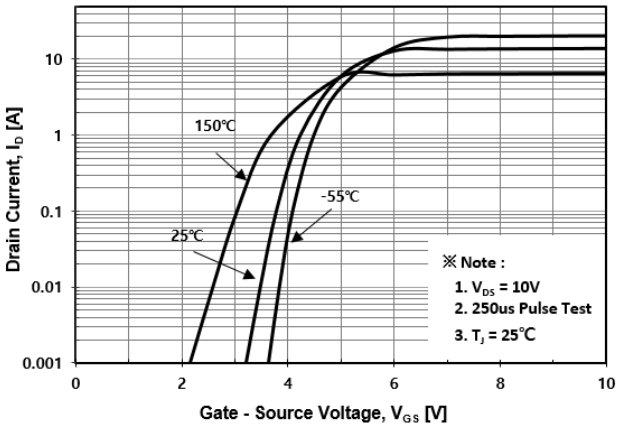


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

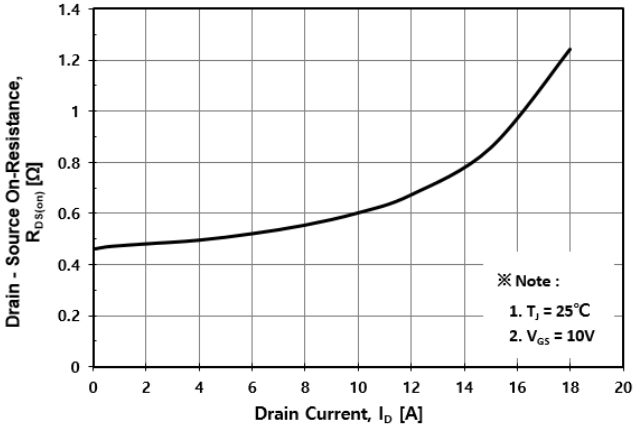


Fig. 4 Body Diode Forward Voltage Variation with Source Current

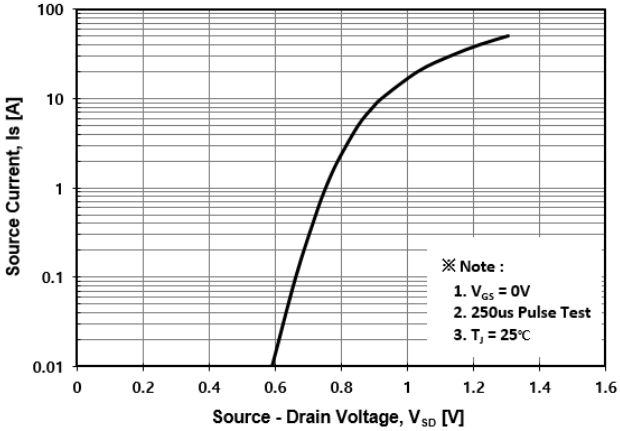


Fig. 5 Typical Capacitance Characteristics

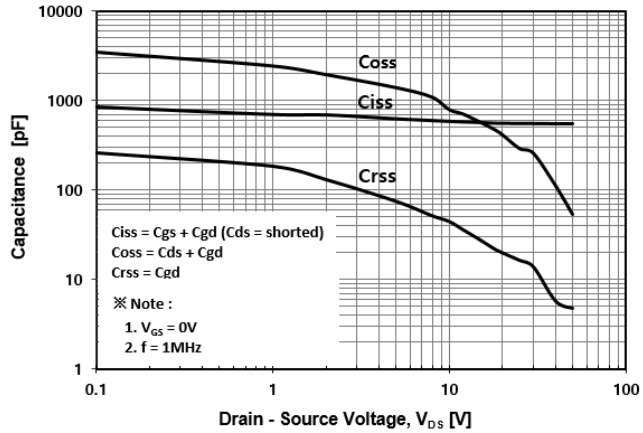
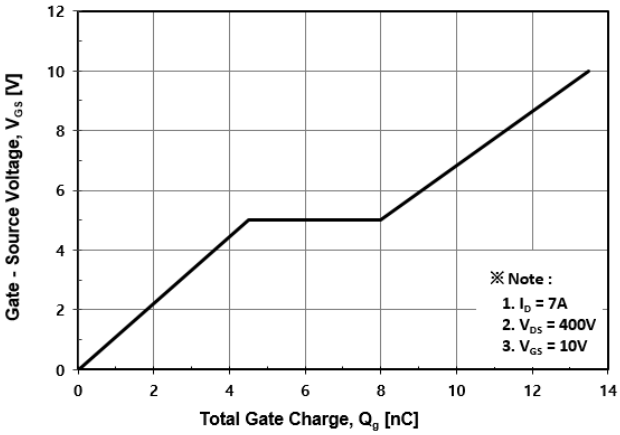


Fig. 6 Typical Total Gate Charge Characteristics



RATING AND CHARACTERISTIC CURVES

Fig. 7 Breakdown Voltage Variation vs. Temperature

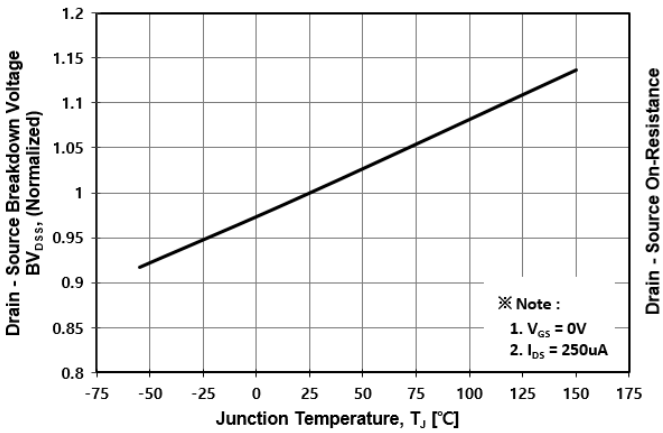


Fig. 8 On-Resistance Variation vs. Temperature

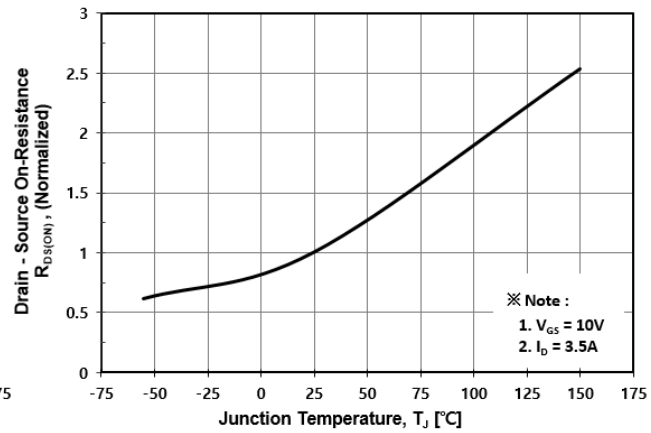


Fig. 9 Maximum Drain Current vs. Case Temperature

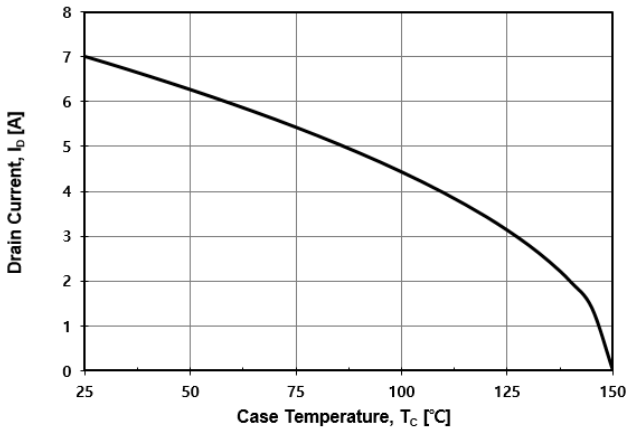


Fig. 10 Maximum Safe Operating Area

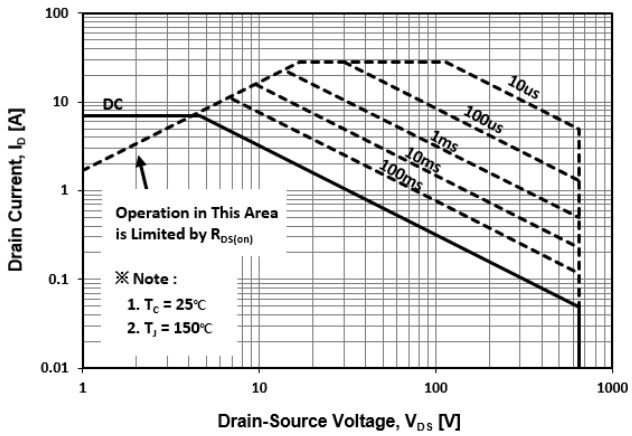
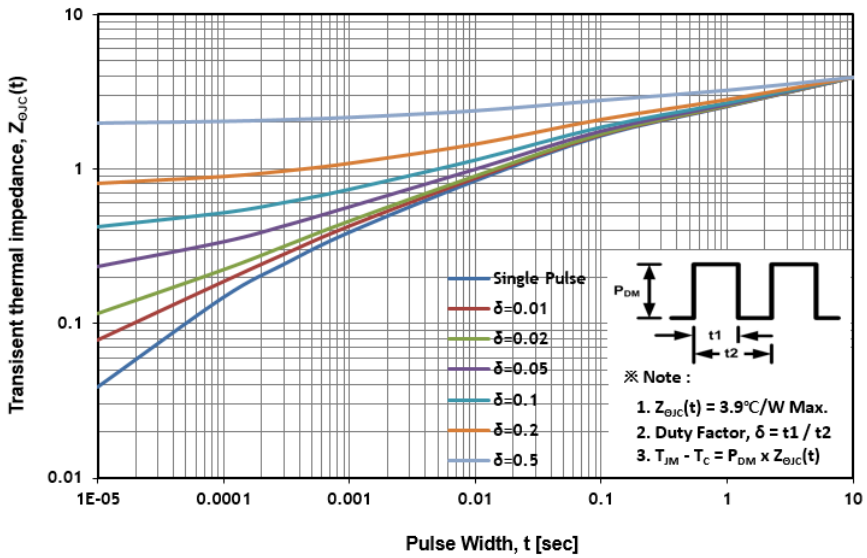


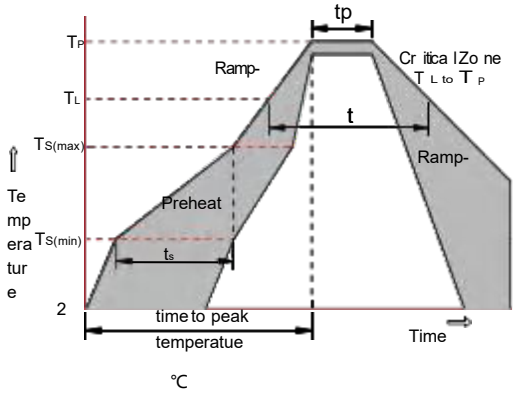
Fig. 11 Transient Thermal Impedance



Soldering parameters

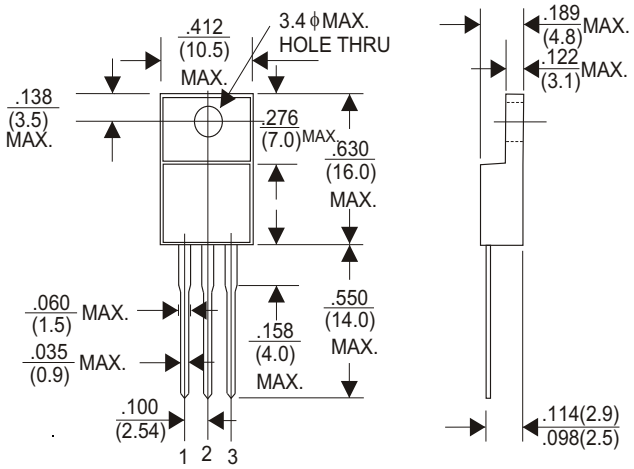
Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217℃
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)℃
Time within 5℃ of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6℃/sec. Max
Time 25℃ to Peak Temp (T_P)		8 min. Max
Do not exceed		+260℃

FIG5: Reflow condition



Package Dimensions & Suggested Pad Layout

TO-220F (FULLYINSULATED)



Dimensions in inches and (millimeters)

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