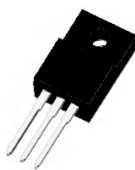
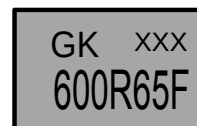


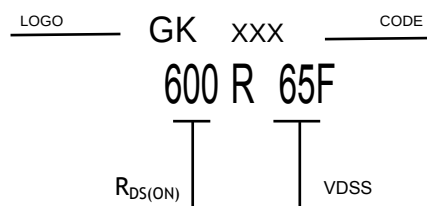
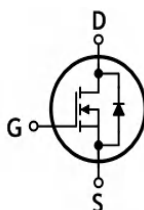
FEATURES

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

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



TO-220F



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute maximum ratings ($T_c=25^\circ C$ 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	$T_c=25^\circ C$	7 A
		$T_c=100^\circ C$	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	$^\circ C$
Storage temperature range	T_{stg}	-55~150	$^\circ C$

* Limited only maximum junction temperature

Thermal Characteristics

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

Electrical Characteristics (T_C=25°C 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

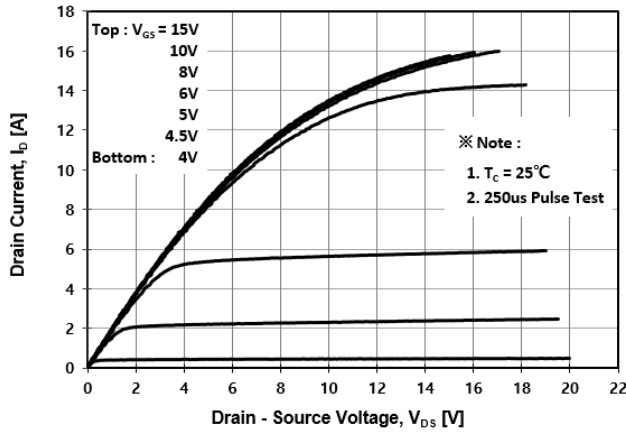


Fig. 2 Typical Transfer Characteristics

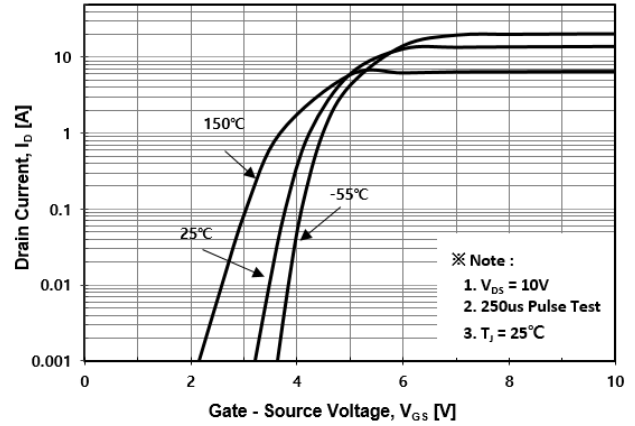


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

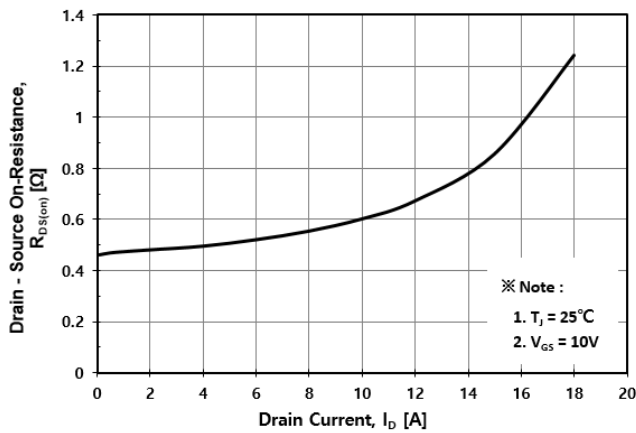


Fig. 4 Body Diode Forward Voltage Variation with Source Current

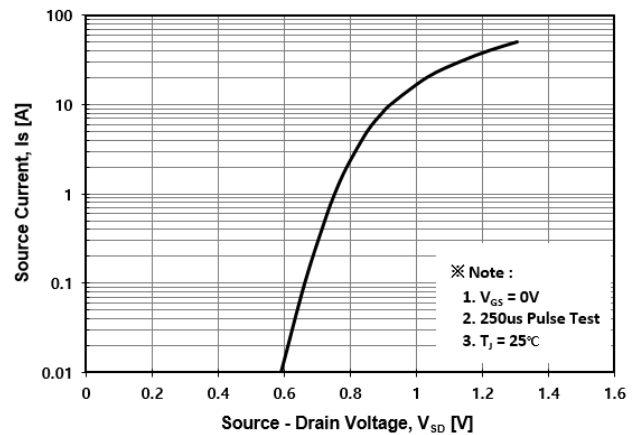


Fig. 5 Typical Capacitance Characteristics

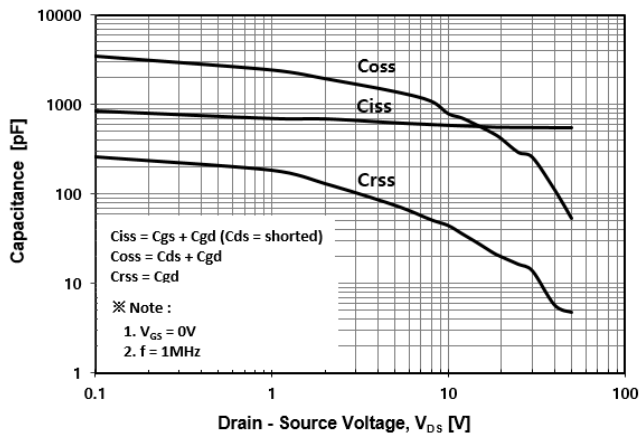
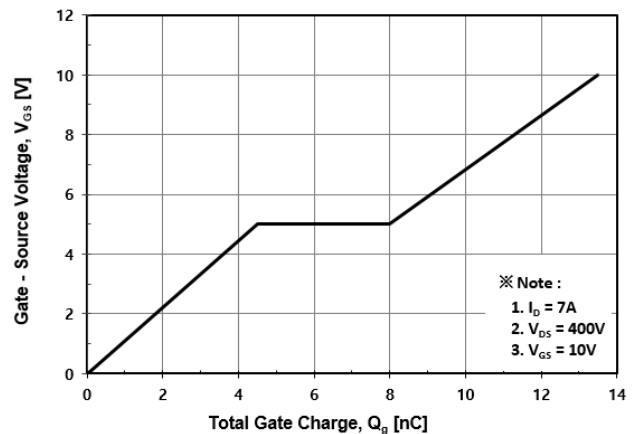


Fig. 6 Typical Total Gate Charge Characteristics



RATING AND CHARACTERISTIC CURVES

Fig. 7 Breakdown Voltage Variation vs. Temperature

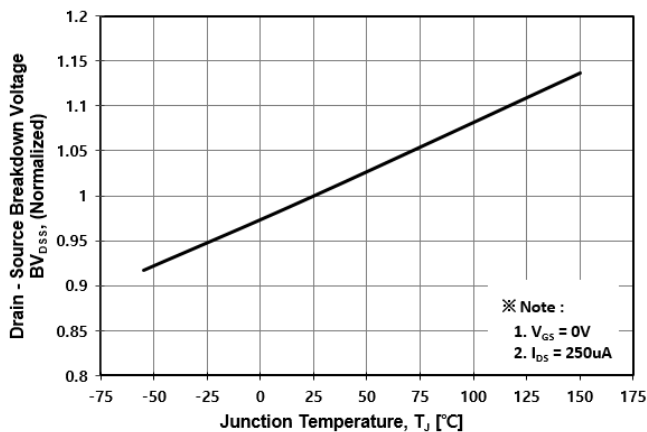


Fig. 8 On-Resistance Variation vs. Temperature

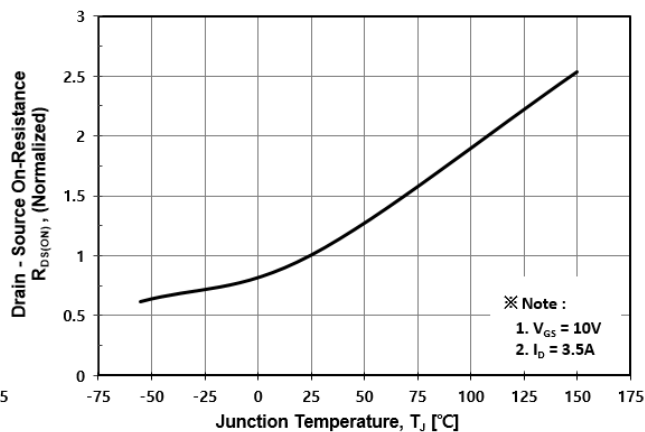


Fig. 9 Maximum Drain Current vs. Case Temperature

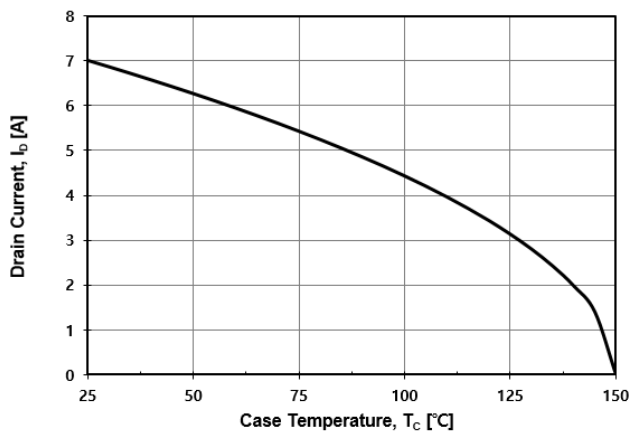


Fig. 10 Maximum Safe Operating Area

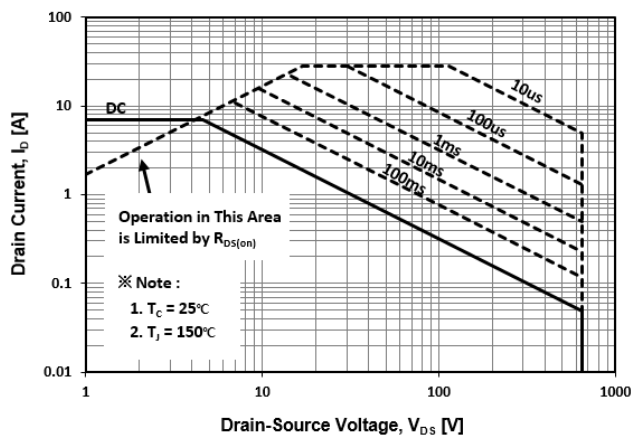
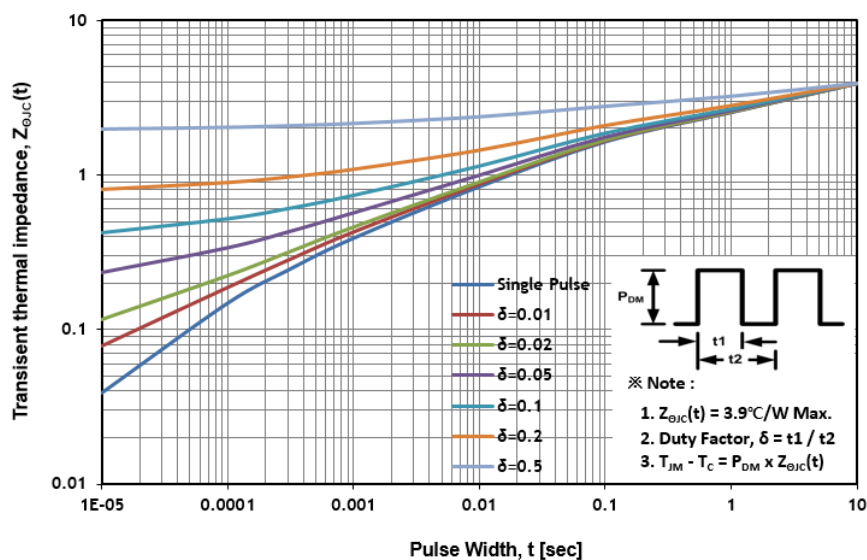
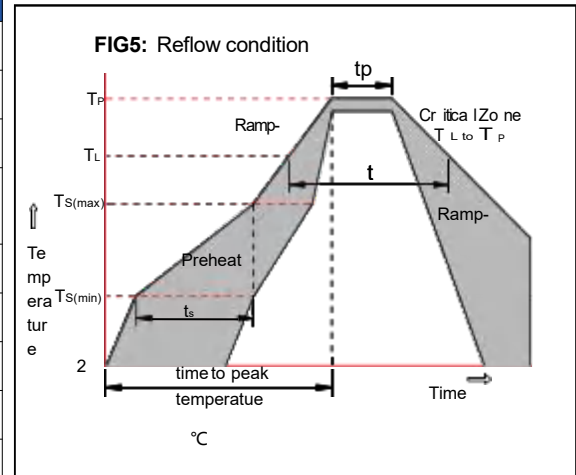


Fig. 11 Transient Thermal Impedance



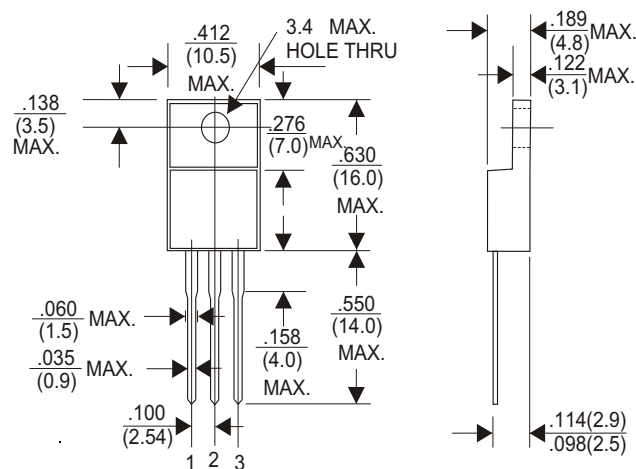
Soldering parameters

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



Package Dimensions & Suggested Pad Layout

TO-220F (FULLY INSULATED)



Dimensions in inches and (millimeters)