V_{DSS}	650	V
I_D	21	A
$R_{DS(ON)}$	0.17	Ω

Features

Ultra low $R_{DS(on)}$
Ultra low gate charge (typ. Q_g=38.4nC)
100% UIS tested
RoHS compliant

GK XXX
65R170

Applications

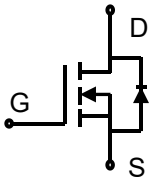
Power factor correction (PFC).
Switched mode power supplies (SMPS).
Uninterruptible power supply (UPS).

LOGO GK XXX CODE
65 R 170
VDSS $R_{DS(on)}$

ITO-220AB



Equivalent Circuit



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (@ T = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	650	V
Continuous drain current [1] (T_C = 25°C)	I_D	21	A
(T_C = 100°C)		13.2	A
Pulsed drain current [2]	I_{DM}	63	A
Gate-Source voltage	V_{GSS}	±30	V
Avalanche energy, single pulse [3]	E_{AS}	600	mJ
Power Dissipation	P_D	34	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	21	A
Diode pulse current	$I_{S,pulse}$	63	A

ELECTRICAL CHARACTERISTICS (T_C =25°C, unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	2.5	3.8	4.5	V
Drain cut-off current	I_{DSS}	V_{DS}=650V, V_{GS}=0 V,T_j =25°C	-	-	1	μA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=30V, V_{DS}=0 V	-	-	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-30V, V_{DS}=0 V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=10A T_j = 25°C T_j = 150°C	- - -	 0.17 0.45	 0.18 -	Ω
Gate resistance	R_G	f=1 MHz, open drain	-	5.19	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} =100V, V_{GS}=0V, f=100kHz	-	1832.55	-	pF
Output capacitance	C_{oss}		-	72.26	-	
Reverse transfer capacitance	C_{rss}		-	0.72	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} =400V, I_D=10A R_G = 10Ω, V_{GS}=10V	-	77.1	-	ns
Rise time	t_r		-	14.7	-	
Turn-off delay time	$t_{d(off)}$		-	64.4	-	
Fall time	t_f		-	6.2	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=520V, I_D=10A, V_{GS}=0 to 10 V	-	10.2	-	nC
Gate to drain charge	Q_{gd}		-	14.9	-	
Gate charge total	Q_g		-	38.4	-	
Gate plateau voltage	$V_{plateau}$		-	5.9	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=10A	-	-	1.1	V
Reverse recovery time	t_{rr}	V_R=400V, I_F=10A, dI_F/dt=100 A/μs	-	302.8	-	ns
Reverse recovery charge	Q_{rr}		-	3616.0	-	nC
Peak reverse recovery current	I_{rrm}		-	25.98	-	A

Notes:

1. Limited by maximum junction temperature and duty cycle, TO-220 equivalent.
2. Limited by maximum junction temperature, maximum duty cycle is 0.75.
3. I_{AS}=5A, L=48mH, V_{DD}=60V, Starting Tj= 25°C.
4. The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.7	°C/W
Thermal Resistance, Junction-to-Ambient, minimal Footprint [4)]	$R_{\theta JA}$	62	°C/W
Soldering temperature, wave soldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	°C

RATING AND CHARACTERISTIC CURVES

Fig 1: Output Characteristics

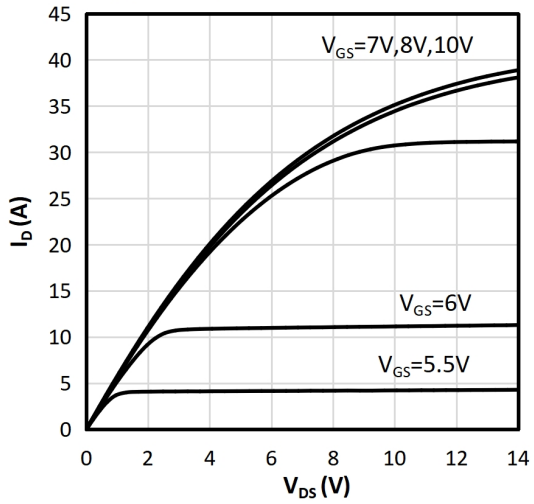


Fig 2: Transfer Characteristics

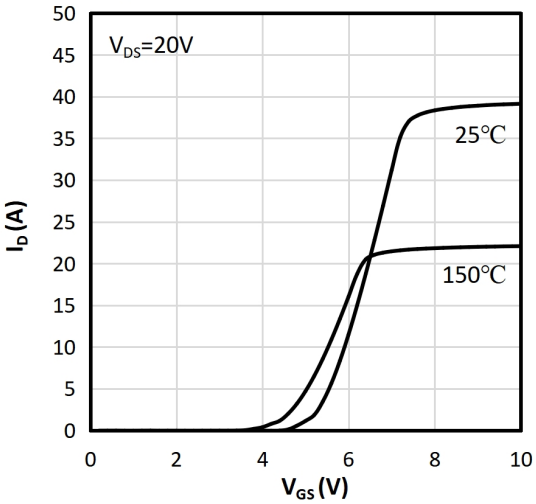


Fig 3: Rds(on) vs Drain Current

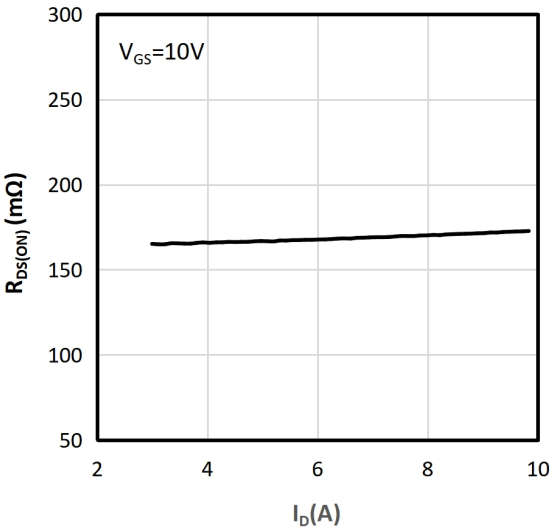


Fig 4: Rds(on) vs. Temperature

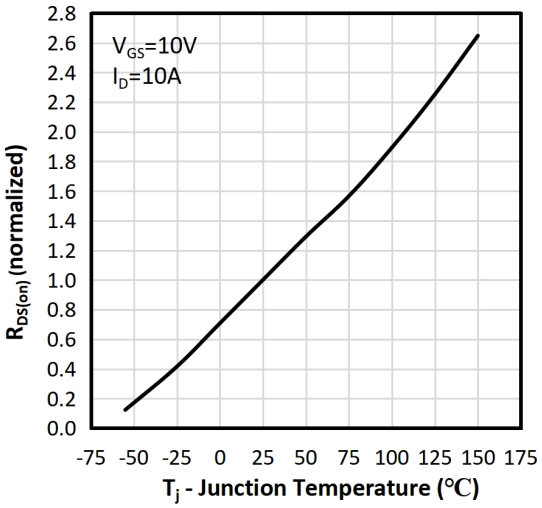


Fig 5: Breakdown Voltage vs. Temperature

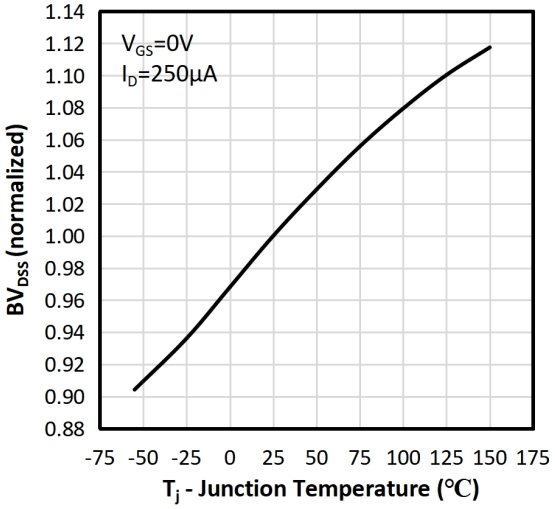
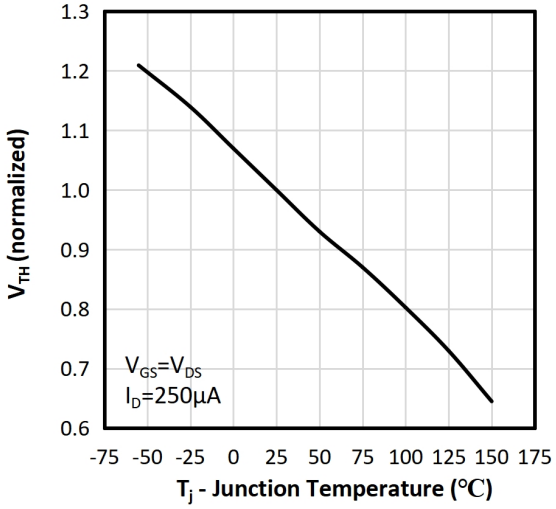


Fig 6: Threshold voltage vs. Temperature



RATING AND CHARACTERISTIC CURVES

Fig 7: Body-Diode Characteristics

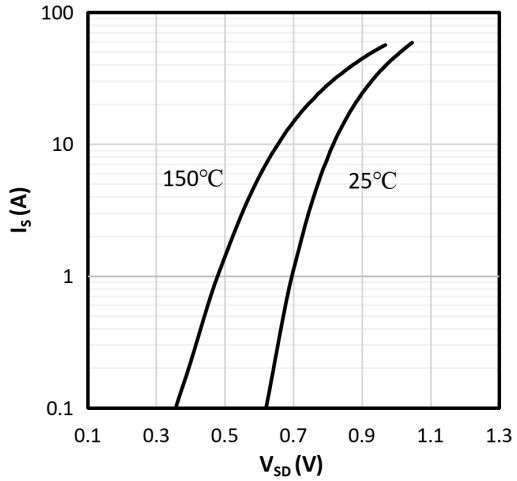


Fig 8: Capatitance Characteristics

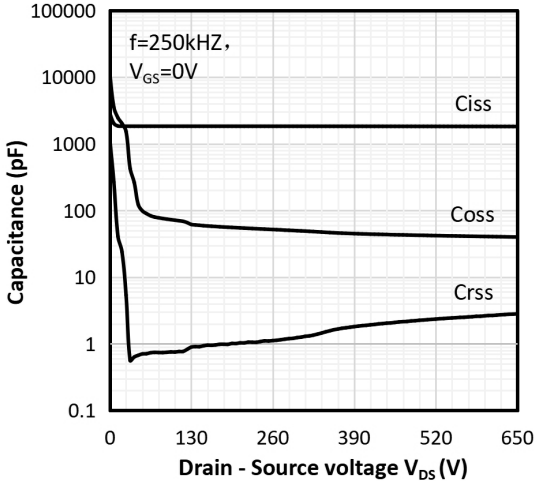


Fig 9: Gate charger Characteristics

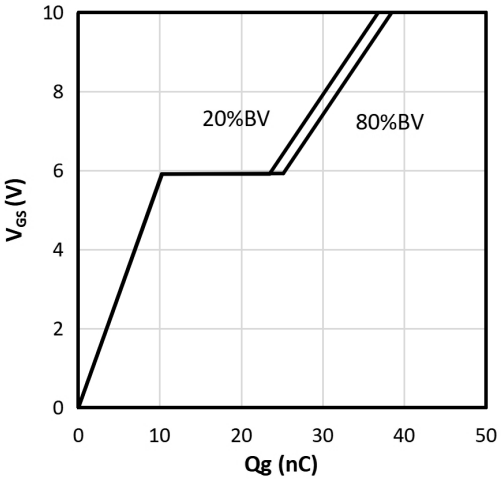


Fig 10: Drain Current Derating

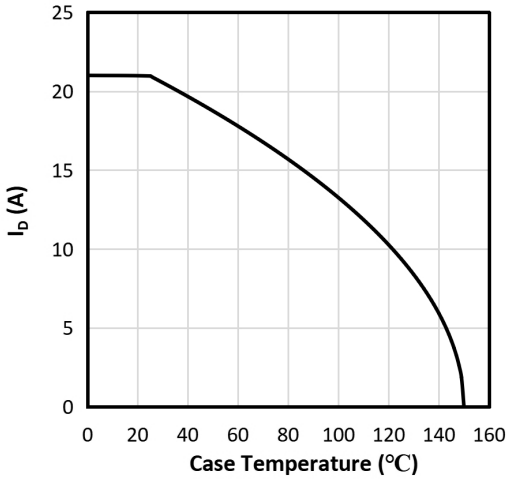


Fig 11: Power Dissipation vs.Temperature

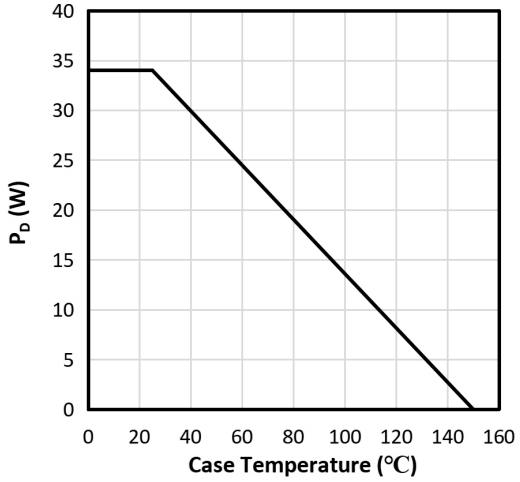
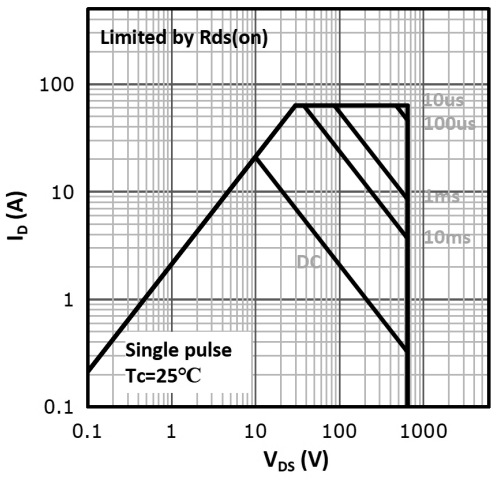
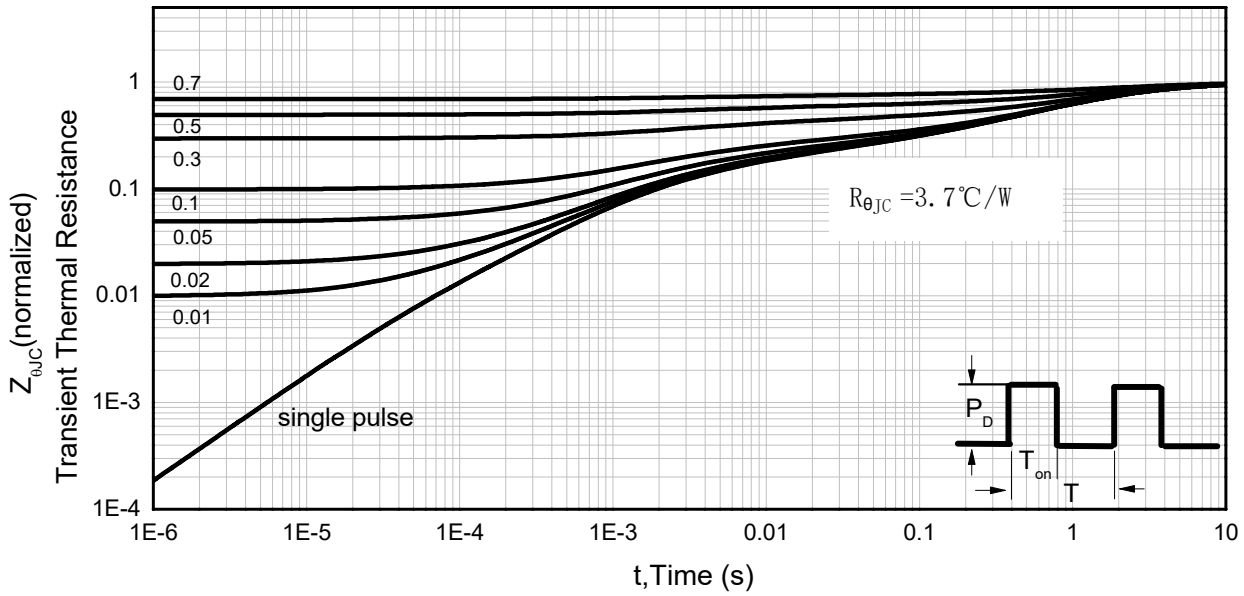


Fig 12: Safe Operating Area



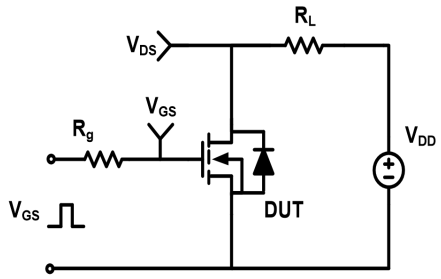
RATING AND CHARACTERISTIC CURVES

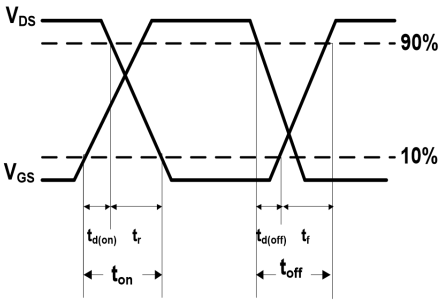
Fig 13. Normalized Maximum Transient Thermal Impedance (R_{thJC})



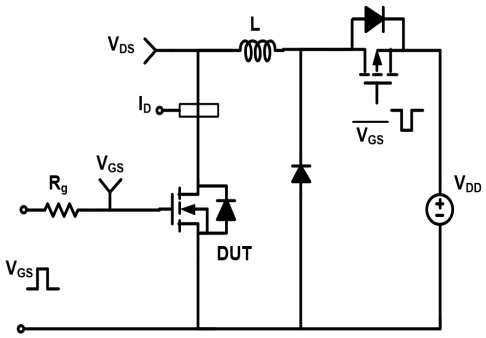
Test Circuit

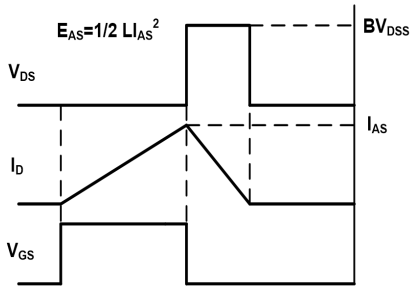
Resistive Switching Test Circuit & Waveform



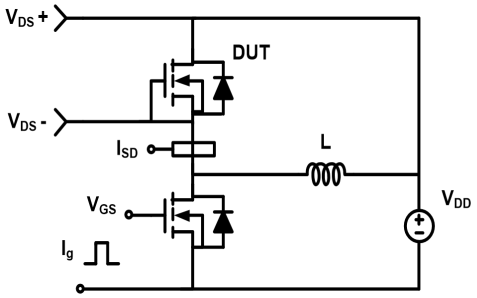


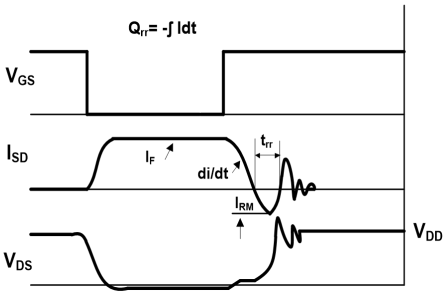
Unclamped Inductive Switching (UIS) Test Circuit & Waveform





Diode Recovery Test Circuit & Waveform

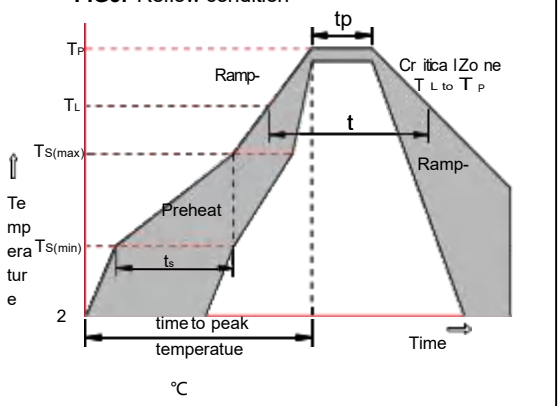




Soldering parameters

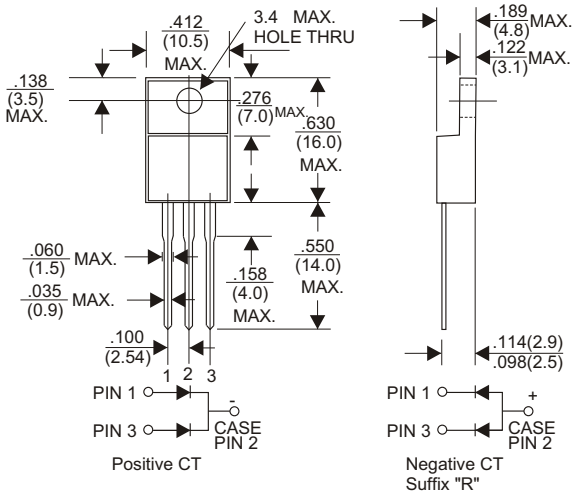
Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid 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

ITO-220AB(FULLYINSULATED)



Dimensions in inches and (millimeters)