

Features

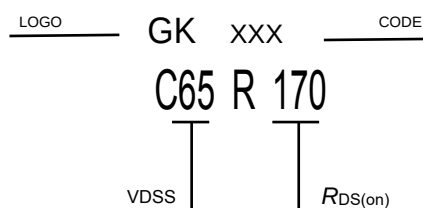
Ultra low $R_{DS(on)}$
Ultra low gate charge (typ. $Q_g=38.4nC$)
100% UIS tested
RoHS compliant

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

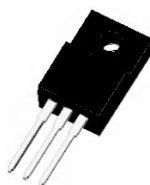


Applications

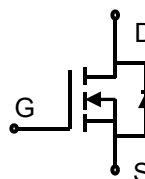
Power factor correction (PFC).
Switched mode power supplies (SMPS).
Uninterruptible power supply (UPS).



ITO-220AB



Equivalent Circuit



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (@ $T = 25^\circ C$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	650	V
Continuous drain current ¹⁾ ($T_C = 25^\circ C$) ($T_C = 100^\circ C$)	I_D	21 13.2	A 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	$^\circ C$
Continuous diode forward current	I_S	21	A
Diode pulse current	$I_{S,pulse}$	63	A

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, 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	-	0.17	0.18	Ω
		T _j = 150°C	-	0.45	-	
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:

- Limited by maximum junction temperature and duty cycle, TO-220 equivalent.
- Limited by maximum junction temperature, maximum duty cycle is 0.75.
- $I_{AS}=5A, L=48mH, V_{DD}=60V$, Starting $T_J=25^\circ\text{C}$.
- 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	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient, minimal Footprint ⁴⁾	$R_{\theta JA}$	62	$^\circ\text{C/W}$
Soldering temperature, wave soldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	$^\circ\text{C}$

RATING AND CHARACTERISTIC CURVES

Fig 1: Output Characteristics

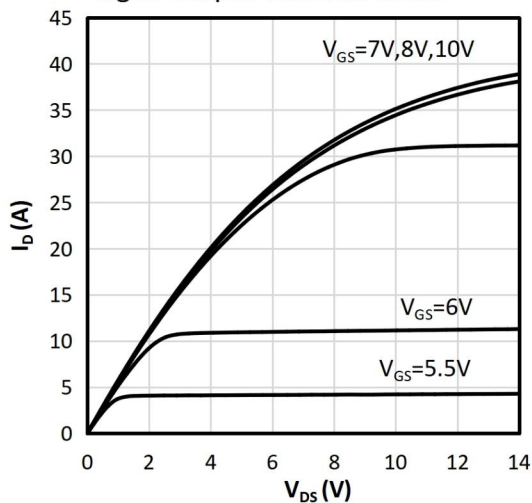


Fig 2: Transfer Characteristics

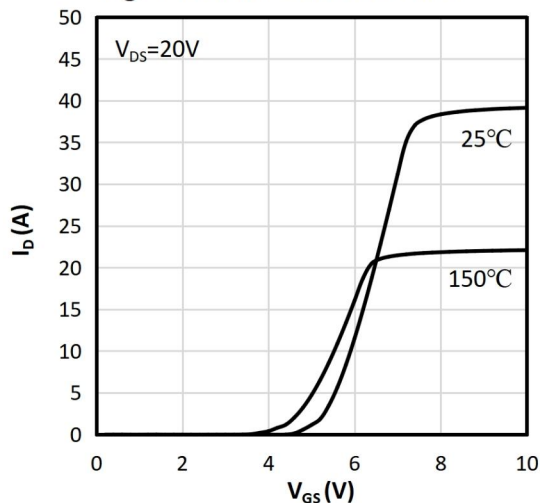


Fig 3: $R_{DS(on)}$ vs Drain Current

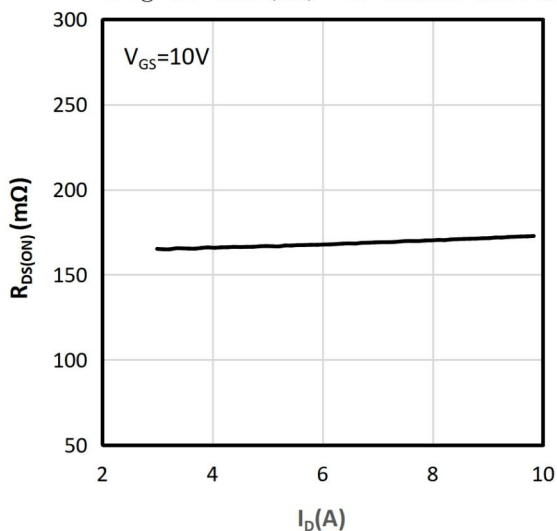


Fig 4: $R_{DS(on)}$ vs. Temperature

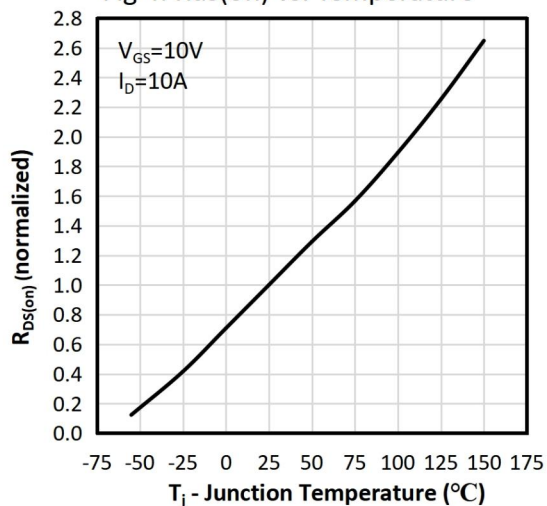


Fig 5: Breakdown Voltage vs. Temperature

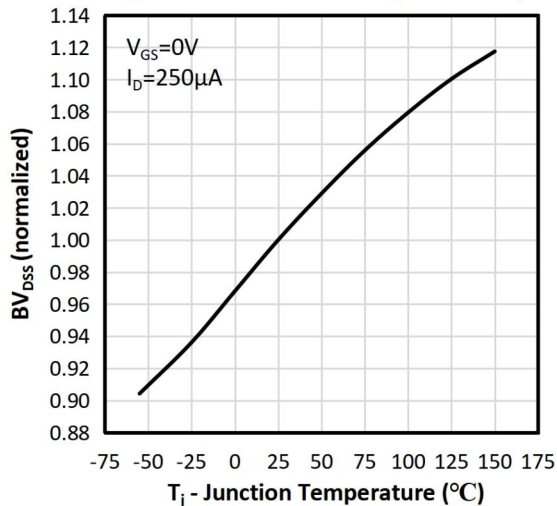
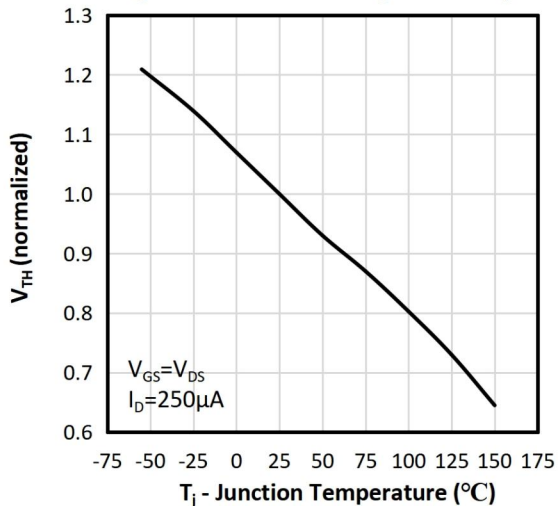


Fig 6: Threshold voltage vs. Temperature



RATING AND CHARACTERISTIC CURVES

Fig 7: Body-Diode Characteristics

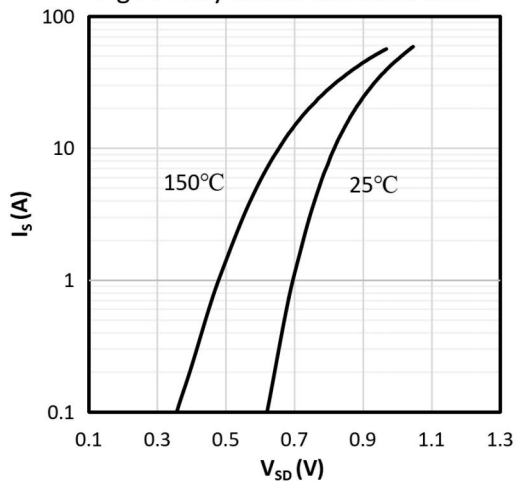


Fig 8: Capacitance Characteristics

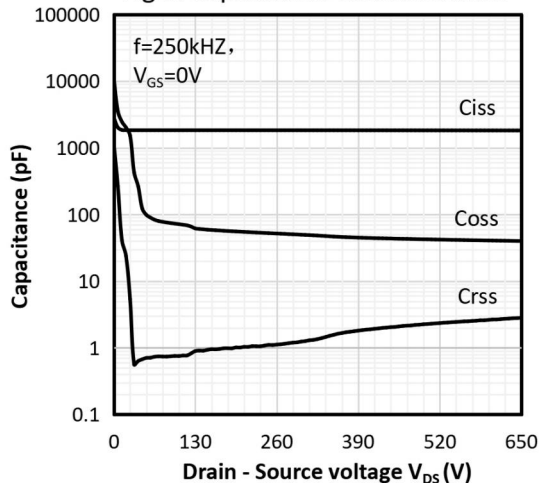


Fig 9: Gate charger Characteristics

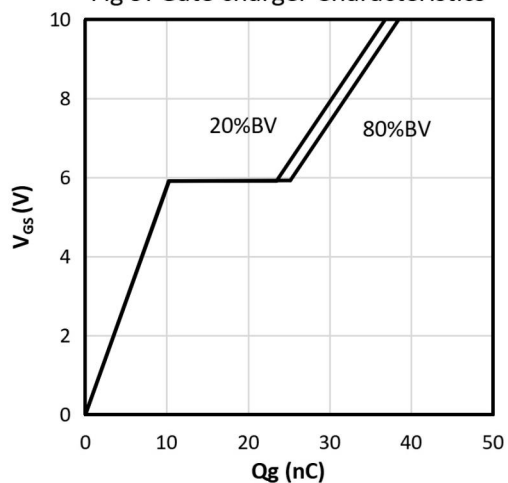


Fig 10: Drain Current Derating

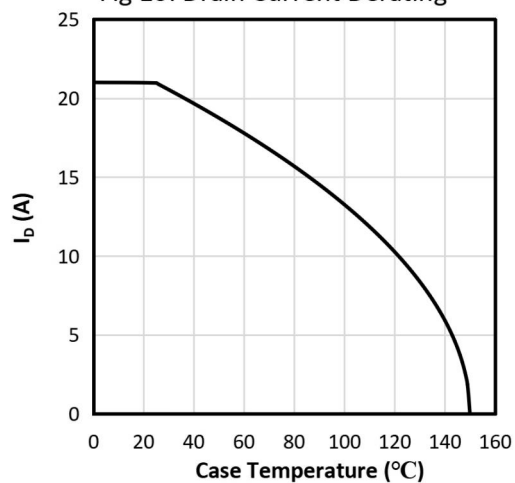


Fig 11: Power Dissipation vs. Temperature

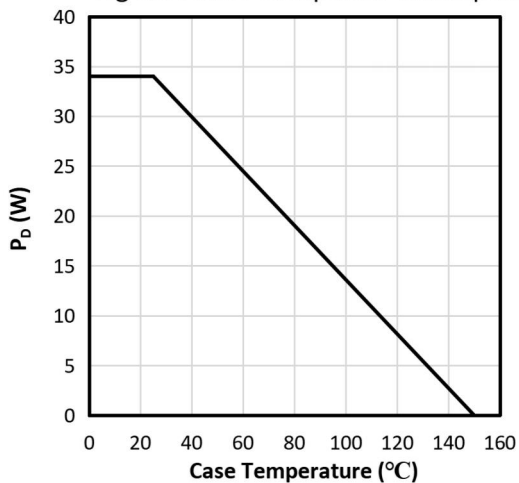
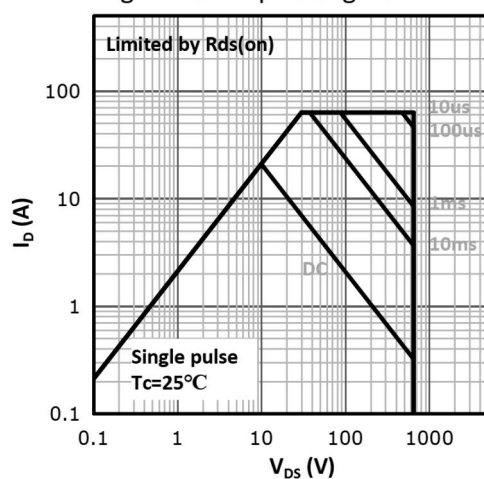
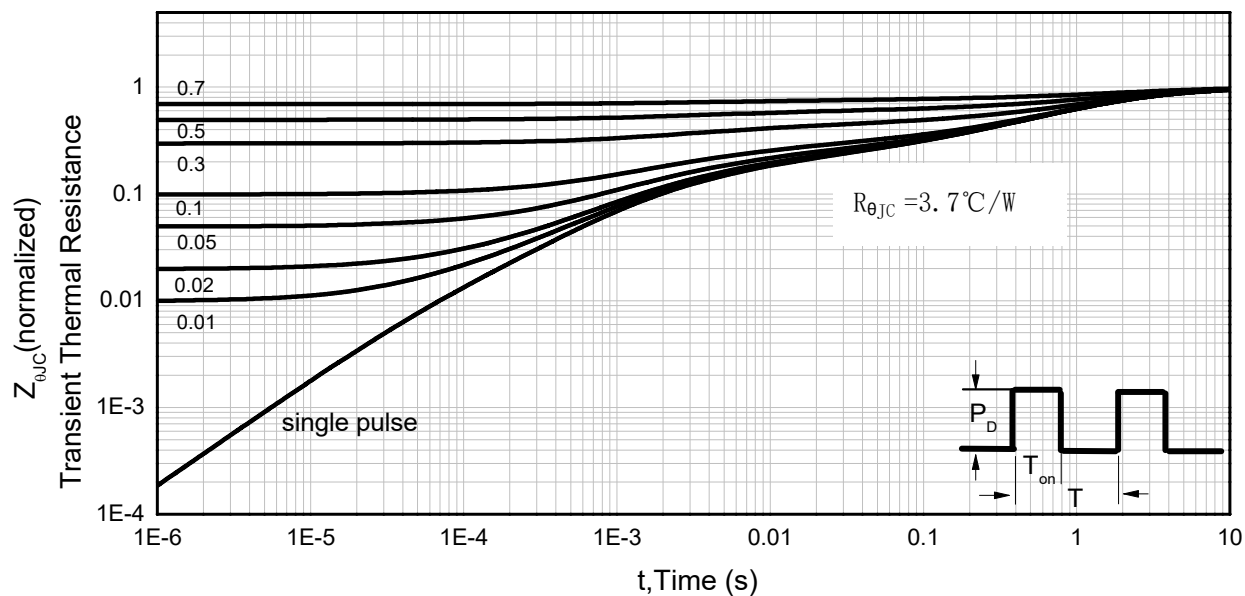


Fig 12: Safe Operating Area



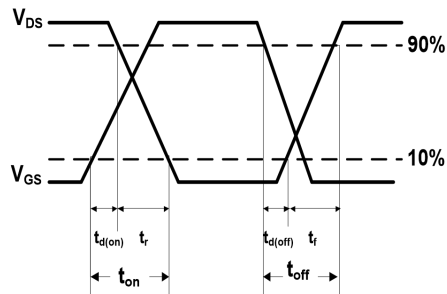
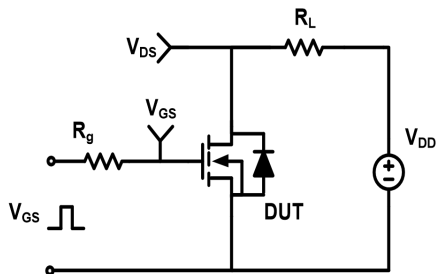
RATING AND CHARACTERISTIC CURVES

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

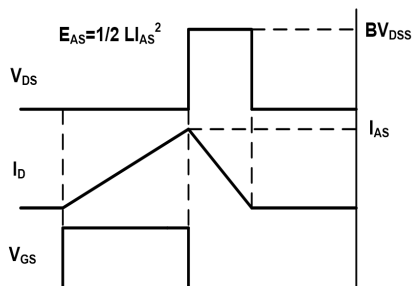
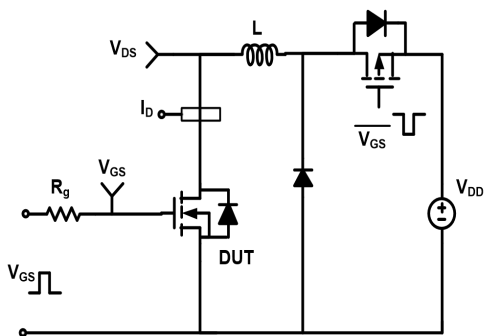


Test Circuit

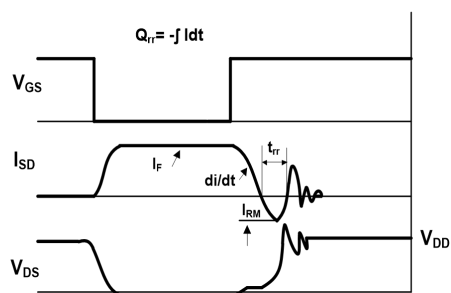
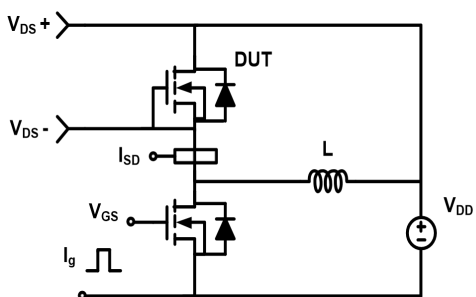
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform

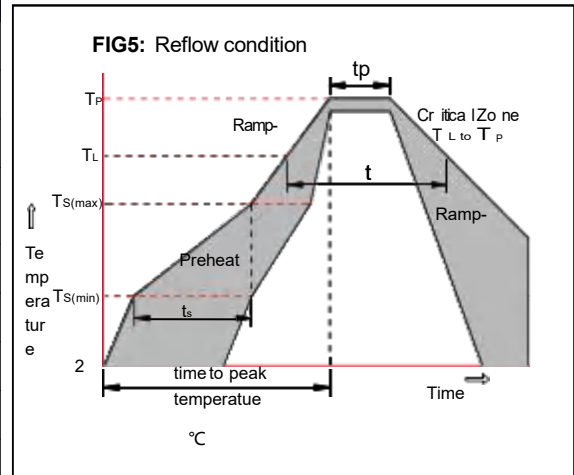


Diode Recovery Test Circuit & Waveform



Soldering parameters

Reflow Condition		Pb-Free assembly (see as 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

