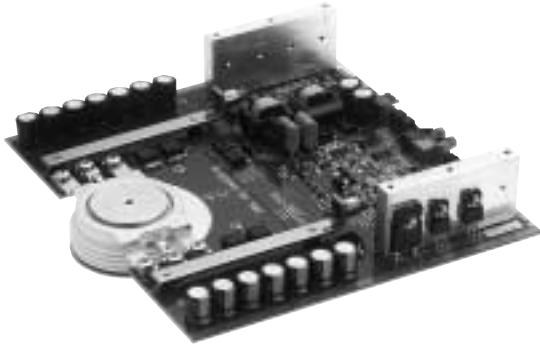


GCU04AA-130

HIGH POWER INVERTER USE
PRESS PACK TYPE

GCU04AA-130



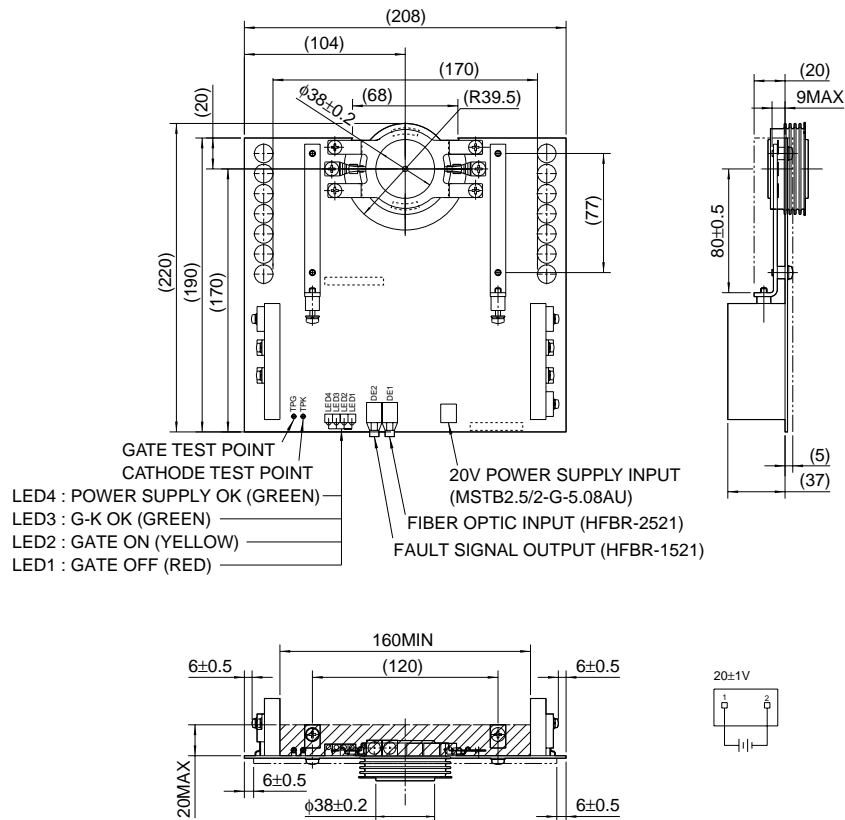
- Symmetrical GCT unit
- GCT and gate driver are connected
- IT(QRM): Repetitive controllable on-state current 400A
- IT(AV): Average on-state current 180A
- VDRM: Repetitive peak off-state voltage 6500V
- VRRM: Repetitive peak reverse voltage 6500V
- T_j: Operation junction temperature 125°C

APPLICATION

Current source inverters, DC choppers, Induction heaters, DC to DC converter

OUTLINE DRAWING

Dimensions in mm



GCT PART

MAXIMUM RATINGS

Symbol	Parameter	Conditions	Voltage class	Unit
VRRM	Repetitive peak reverse voltage	—	6500	V
VRSM	Non-repetitive peak reverse voltage	—	6500	V
VDRM	Repetitive peak off-state voltage	Gate driver energized	6500	V
VDSM	Non-repetitive peak off-state voltage	Gate driver energized	6500	V
V(LTDS)	Long term DC stability voltage	Gate driver energized, $\lambda = 100$ Fit	3600	V

Symbol	Parameter	Conditions	Ratings	Unit
IT(RMS)	RMS on-state current	Applied for all condition angles	280	A
IT(AV)	Average on-state current	$f = 60\text{Hz}$, sinewave $\theta = 180^\circ$, $T_f = 55^\circ\text{C}$	180	A
ITQRM	Repetitive controllable on-state current	$V_{DM} = 4000\text{V}$, $V_D = 3000\text{V}$, $L_c = 0.3\mu\text{H}$ $T_j = 25/125^\circ\text{C}$ (See Fig. 1, 3)	400	A
ITSM	Surge on-state current	One half cycle at 60Hz, $T_j = 125^\circ\text{C}$ start	2.8	kA
I^2t	Current-squared, time integration		3.3×10^4	A^2s
di_T/dt	Critical rate of rise of on-state current	$V_D = 3000\text{V}$, $I_T = 400\text{A}$, $C_s = 0.06\mu\text{F}$, $R_s = 15\Omega$ $T_j = 25/125^\circ\text{C}$, $f = 60\text{Hz}$ (See Fig. 1, 2)	1000	$\text{A}/\mu\text{s}$
di_R/dt	Critical rate of rise of reverse recovery current	$I_T = 400\text{A}$, $V_R = 3000\text{V}$, $T_j = 25/125^\circ\text{C}$ $C_s = 0.06\mu\text{F}$, $R_s = 15\Omega$ (See Fig. 4, 5)	1000	$\text{A}/\mu\text{s}$
PFGM	Peak forward gate power dissipation		3	kW
PRGM	Peak reverse gate power dissipation		9	kW
PFG(AV)	Average forward gate power dissipation		50	W
PRG(AV)	Average reverse gate power dissipation		60	W
VFGM	Peak forward gate voltage		10	V
VRGM	Peak reverse gate voltage		21	V
IFGM	Peak forward gate current		250	A
IRGM	Peak reverse gate current		400	A

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
V _{TM}	On-state voltage	$I_T = 400\text{A}$, $T_j = 125^\circ\text{C}$	—	—	7.5	V
I _{RRM}	Repetitive peak reverse current	$V_{RM} = 6500\text{V}$, $T_j = 125^\circ\text{C}$	—	—	150	mA
I _{DRM}	Repetitive peak off-state current	$V_{DM} = 6500\text{V}$, $T_j = 125^\circ\text{C}$, Gate driver energized	—	—	100	mA
I _{GRM}	Reverse gate current	$V_{RG} = 21\text{V}$, $T_j = 125^\circ\text{C}$	—	—	50	mA
dv/dt	Critical rate of rise of off-state voltage	$V_D = 3000\text{V}$, $T_j = 125^\circ\text{C}$ Gate driver energized (Expo. wave)	3000	—	—	$\text{V}/\mu\text{s}$
t _{gt}	Turn-on time	$I_T = 400\text{A}$, $V_D = 3000\text{V}$, $di/dt = 1000\text{A}/\mu\text{s}$ $C_s = 0.06\mu\text{F}$, $R_s = 15\Omega$, $T_j = 125^\circ\text{C}$	—	—	5	μs
t _d	Turn-on delay time		—	—	1	μs
E _{on}	Turn-on switching energy	(See Fig. 1, 2)	—	—	0.7	J/P
t _s	Storage time	$I_T = 400\text{A}$, $V_{DM} = 4000\text{V}$, $V_D = 3000\text{V}$	—	—	3	μs
E _{off}	Turn-off switching energy	$C_s = 0.06\mu\text{F}$, $R_s = 15\Omega$, $T_j = 125^\circ\text{C}$ (See Fig. 1, 5)	—	—	2.9	J/P
Q _{RR}	Reverse recovery charge	$V_R = 3000\text{V}$, $I_T = 400\text{A}$, $di/dt = 1000\text{A}/\mu\text{s}$	—	—	1600	μC
E _{rec}	Reverse recovery energy	$C_s = 0.06\mu\text{F}$, $R_s = 15\Omega$, $T_j = 125^\circ\text{C}$ (See Fig. 4, 5)	—	—	4.1	J/P
I _{GT}	Gate trigger current	$V_D = 24\text{V}$, $R_L = 0.1\Omega$, $T_j = 25^\circ\text{C}$	—	—	0.35	A
V _{GT}	Gate trigger voltage	DC method	—	—	1.5	V

GCU04AA-130

HIGH POWER INVERTER USE
PRESS PACK TYPE

GATE DRIVER PART

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
V _{GIN}	Power supply voltage	DC power supply	19	20	21	V
P _{GIN}	Gate power consumption	I _T = 230Arms, f = 780Hz, duty = 0.33	—	—	20	W
t _{fd}	Delay time of on gate current	T _a = 25°C	—	—	3.0	μs
t _{rd}	Delay time of off gate current	T _a = 25°C	—	—	3.0	μs
—	Control signal	Optical fiber data link Transmitter : HFBR-1521 : Agilent Receiver : HFBR-2521 : Agilent	—	—	—	—
—	Power supply connector	Phoenix contact Type name : MSTB25/2-G-508AU	—	—	—	—
—	Status signal	— (Note 1)	—	—	—	—

MECHANICAL DATA

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
F _M	Mounting force	—	7.3	8.6	11	kN
—	Weight	—	—	700	—	g
—	Pole piece diameter (GTC device)	±0.2mm	—	38	—	mm
—	Housing thickness (GTC device)	±0.5mm	—	26	—	mm

THERMAL DATA

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
T _j	Junction operating temperature	—	-10	—	125	°C
T _{stg}	Storage temperature	—	-10	—	60	°C
T _a	Ambient operation temperature	Recommend : ≤ 40°C	-10	—	60	°C
R _{t(j-f)}	Thermal resistance	Junction to Fin	—	—	0.04	K/W

GCU04AA-130

HIGH POWER INVERTER USE
PRESS PACK TYPE

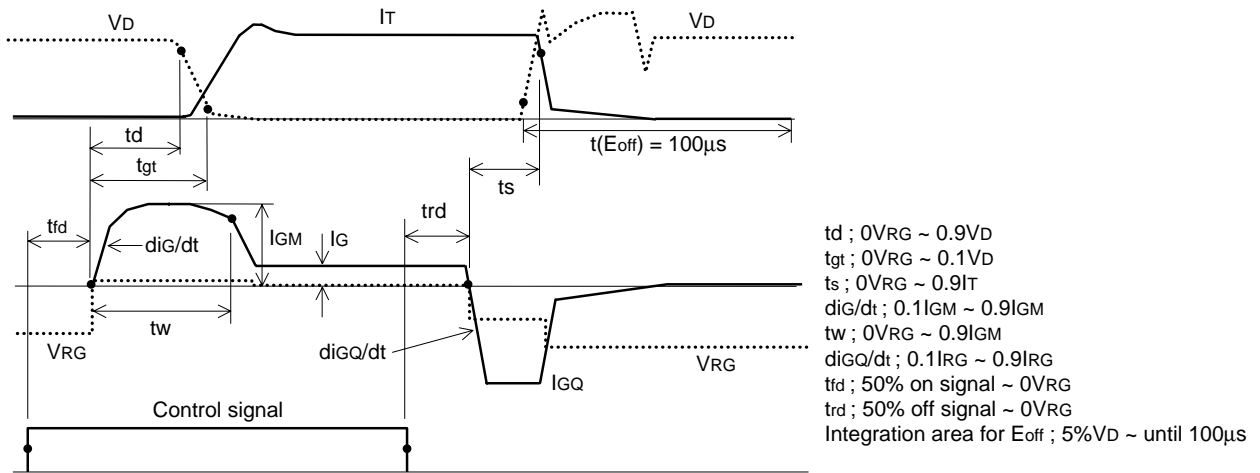


Fig. 1 Turn-on and Turn-off waveform

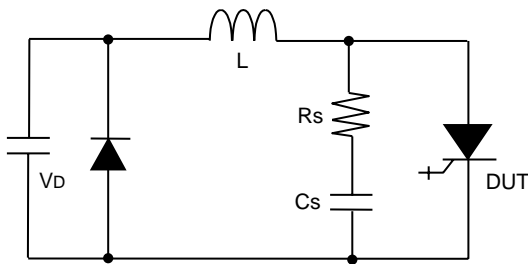


Fig. 2 Turn-on test circuit

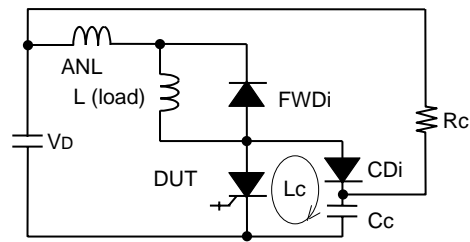


Fig. 3 Turn-off test circuit
(With clamp circuit)

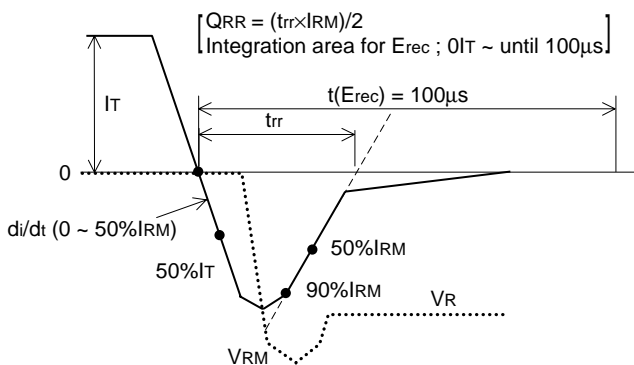


Fig. 4 Reverse recovery waveform

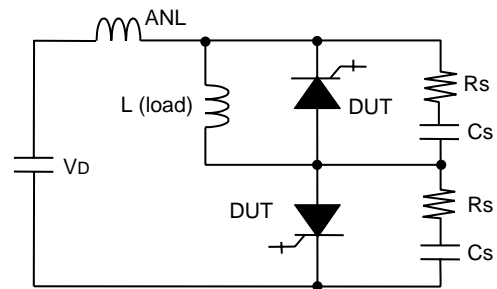


Fig. 5 Turn-off and Reverse recovery test circuit

GCU04AA-130

HIGH POWER INVERTER USE
PRESS PACK TYPE

Note 1. Status signal

1. Status signal from LED

(1) Status signal

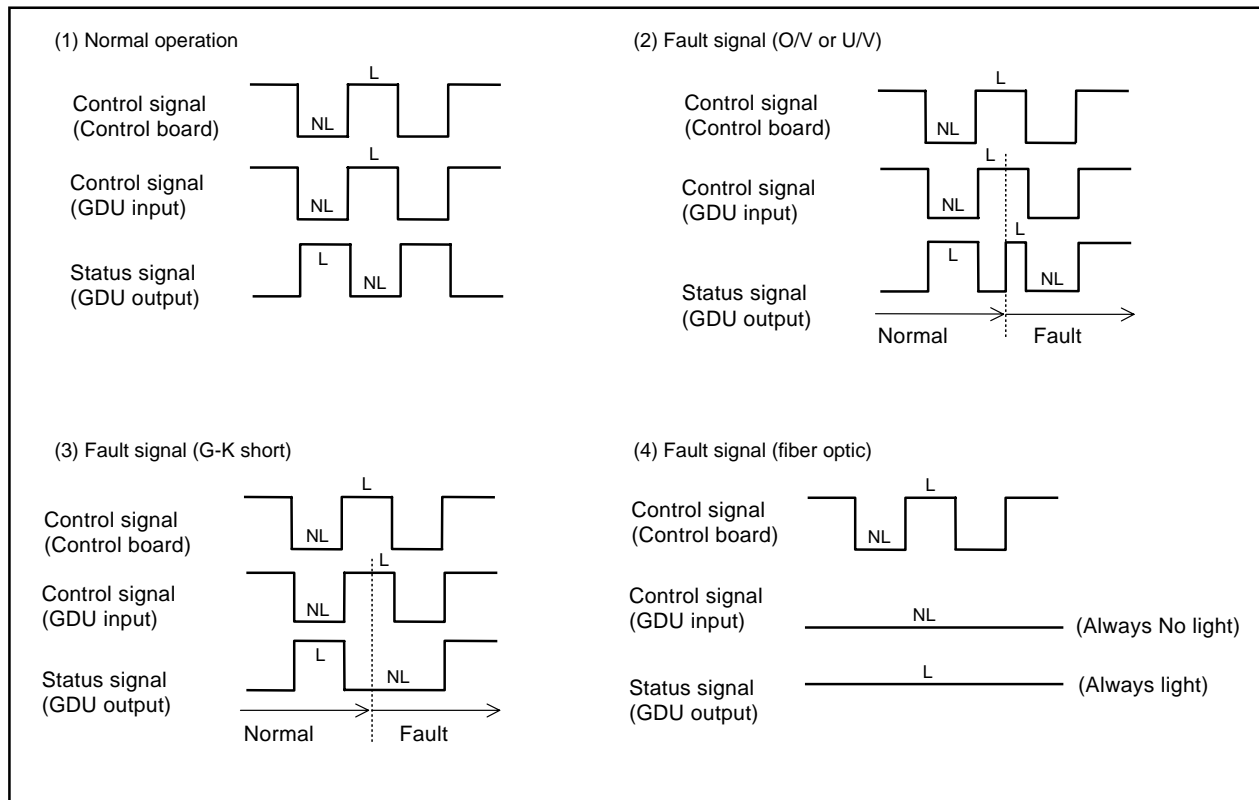
Status of GCT	LED 1 (Red)	LED 2 (Yellow)
On state	OFF	ON
Off state	ON	OFF

(2) Fault signal

Status	G-K	Power Supply	G-K LED (LED 3) (Green)	PS LED (LED 4) (Green)
Normal	Normal	20±1V	On	On
Fault	Normal	Voltage down	Off	Off
Fault	G-K short	20±1V	Off	On
Fault	G-K short	Voltage down	Off	Off

2. Status signal from Transmitter

(L : Light NL : No light)

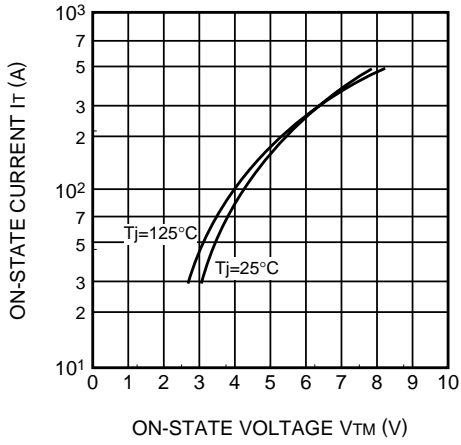


GCU04AA-130

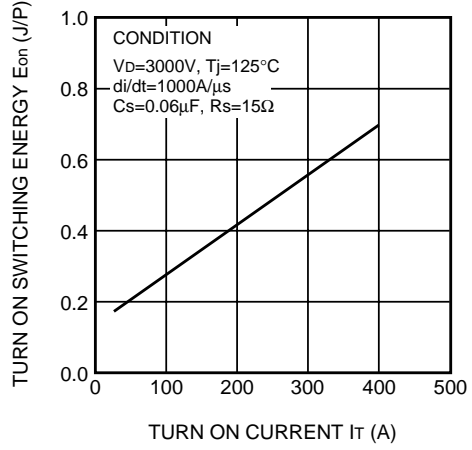
HIGH POWER INVERTER USE
PRESS PACK TYPE

PERFORMANCE CURVES

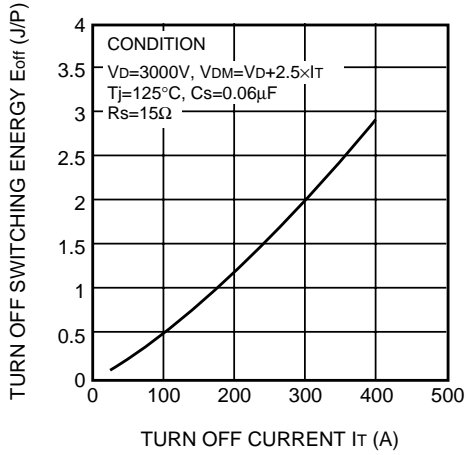
MAXIMUM ON-STATE CHARACTERISTIC



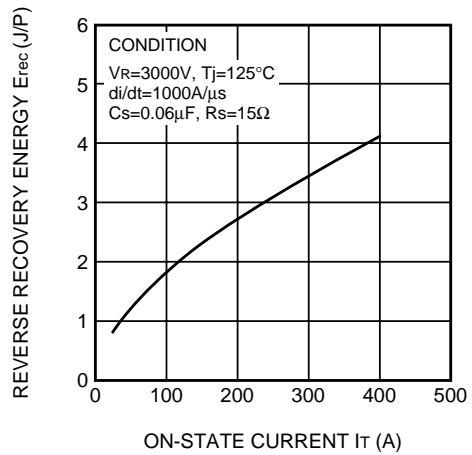
E_{on} VS I_T (Max)



E_{off} VS I_T (Max)



E_{rec} VS I_T (Max)



MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)

