MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

MITSUBISHI ELECTRIC

GCU08CB-130

GATE COMMUTATED THYRISTOR UNIT

Used with the applicable Mitsubishi GCT Thyristors configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Mitsubishi Electric GCU08CB-130 specification TSH-437-A, March 2018; exact-model voltage, driver, mechanical and thermal tables.

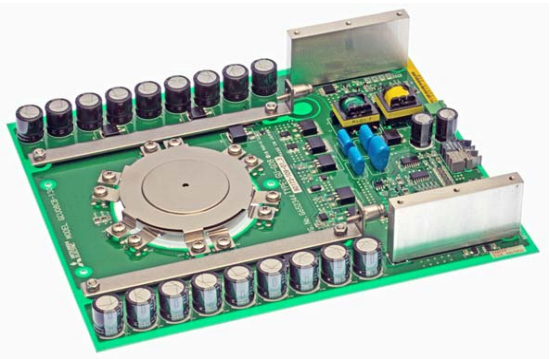
MITSUBISHI ELECTRIC

< GCT(Gate Commutated Turn-off) Thyristor Unit >

GCU08CB-130

HIGH POWER INVERTER USE
PRESS PACK TYPE

GCU08CB-130

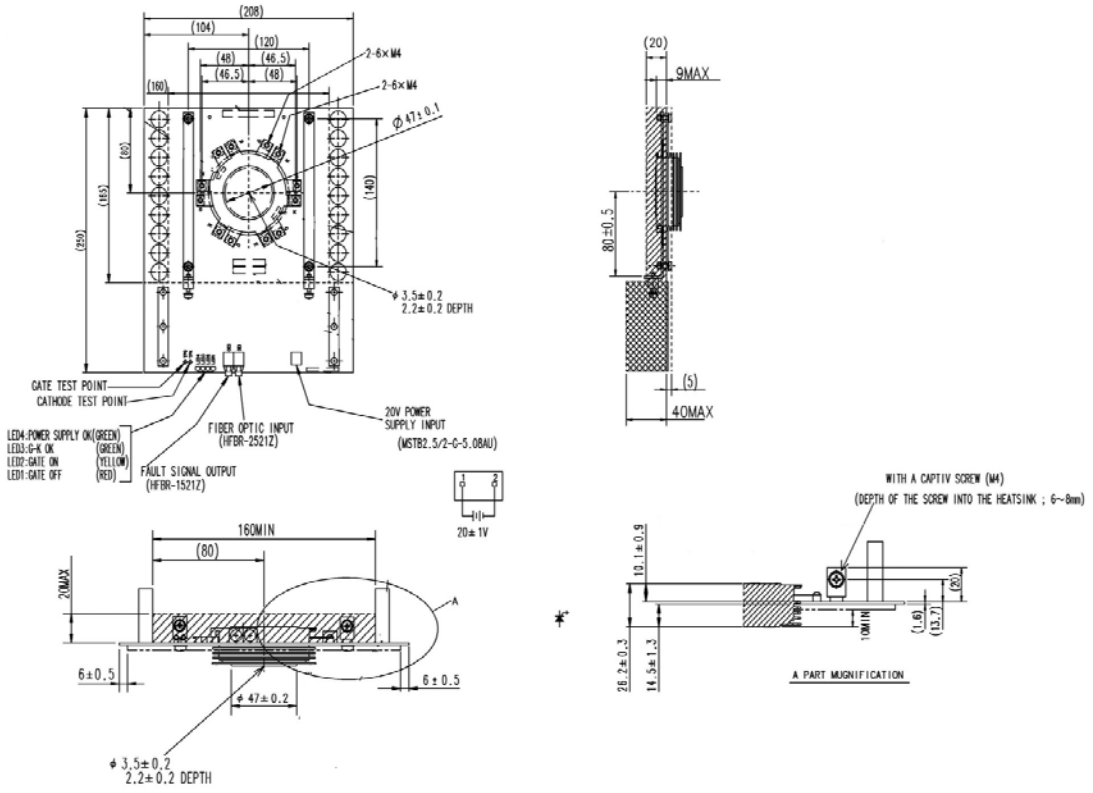


- Symmetrical GCT unit
- GCT and gate driver are connected
- I_{TQRM} · · · · · · · · · · · 800A
- $I_{T(AV)}$ · · · · · · · · · · · 330A
- V_{DRM} · · · · · · · · · · · 6500V
- V_{RRM} · · · · · · · · · · · 6500V
- Tj · · · · · · · · · · · · · 125 ºC

APPLICATION

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

OUTLINE DRAWING **Dimensions in mm**



GCT PART
MAXIMUM RATINGS

Symbol	Parameter	Condition	Voltage	Unit
V_{RRM}	Repetitive peak reverse voltage	-	6500	V
V_{RSM}	Non-repetitive peak reverse voltage	-	6500	V
V_{DRM}	Repetitive peak off-state voltage	Gate driver energized	6500	V
V_{DSM}	Non-repetitive peak off-state voltage	Gate driver energized	6500	V
$V_{(LTDS)}$	Long term DC stability voltage	Gate driver energized λ=100Fit	3600	V

Symbol	Parameter	Condition	Ratings	Unit
$I_{T(RMS)}$	RMS on-state current	Applied for all condition angles f=60Hz,sinewave θ=180°, Tf=62 ºC	800	A
$I_{T(AV)}$	Average on-state current		520	A
I_{TQRM}	Repetitive controllable on state current	V_{DM}=3/4V_{DRM}, V_D=3000V, Tj=25/125 ºC Lc=0.3μH (See Fig.1,3)	330	A
I_{TSM}	Surge on-state current	One half cycle at 60Hz, Tj=125 ºC start	4.8	kA
I^2t	Current-squared, time integration		9.6×10^4	A^2s
di_T/dt	Critical rate of rise of on state current	I_T=800A, V_D=3000V, Tj=25/125 ºC Cs=0.1μF, Rs=10Ω, f=60Hz (See Fig.1,2)	1000	A/μs
di_R/dt	Critical rate of rise of reverse recovery current	I_T=800A, V_R=3000V, Tj=25/125 ºC Cs=0.1μF, Rs=10Ω (See Fig.3,4)	1000	A/μs
P_{FGM}	Peak forward gate power dissipation		5	kW
P_{RGM}	Peak reverse gate power dissipation		17	kW
$P_{FG(AV)}$	Average forward gate power dissipation		100	W
$P_{RG(AV)}$	Average reverse gate power dissipation		120	W
V_{FGM}	Peak forward gate voltage		10	V
V_{RGM}	peak reverse gate voltage		21	V
I_{FGM}	Peak forward gate current		500	A
I_{RGM}	Peak reverse gate current		800	A

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	Limits			Unit
			Min	Typ	Max	
V_{TM}	On-state voltage	I_T=400A, Tj=125 ºC	—	—	5.5	V
I_{RRM}	Repetitive peak reverse current	V_{RM}=6500V, Tj=125 ºC	—	—	250	mA
I_{DRM}	Repetitive peak off state current	V_{DM}=6500V, Tj=125 ºC Gate driver energized	—	—	100	mA
I_{GRM}	Reverse gate current	V_{RG}=21V, Tj=125 ºC	—	—	40	mA
dv/dt	Critical rate of rise of off state voltage	V_D=3000V, Tj=125 ºC Gate driver energized	3000	—	—	V/μs
tgt	Turn-on time	I_T=800A, V_D=3000V, di/dt=1000A/μs Cs=0.1μF, Rs=10Ω, Tj=125 ºC (See Fig.1,2)	—	—	5	μs
td	Turn-on delay time		—	—	1	μs
Eon	Turn-on switching energy	I_T=400A, V_D=3000V, di/dt=1000A/μs Cs=0.1μF, Rs=10Ω, Tj=125 ºC (See Fig.1,2)	—	—	0.6	J/P
ts	Storage time	I_T=800A , V_{DM}=3/4V_{DRM}, V_D=3000V Cs=0.1μF, Rs=10Ω, Tj=125 ºC (See Fig.1,3)	—	—	3	μs
Eoff	Turn-off switching energy	I_T=400A , V_{DM}=4000V, V_D=3000V Cs=0.1μF, Rs=10Ω, Tj=125 ºC (See Fig.1,3)	—	—	2.3	J/P
Q_{RR}	Reverse recovery charge	I_T=400A, V_R=3000V, di/dt=1000A/μs Cs=0.1μF, Rs=10Ω, Tj=125 ºC (See Fig.3,4)	—	—	1800	μC
Erec	Reverse recovery energy		—	—	4.4	J/P
I_{GT}	Gate trigger current	V_D=24V, R_L=0.1Ω, Tj=25 ºC DC method	—	—	0.5	A
V_{GT}	Gate trigger voltage		—	—	1.5	V

GATE DRIVER PART

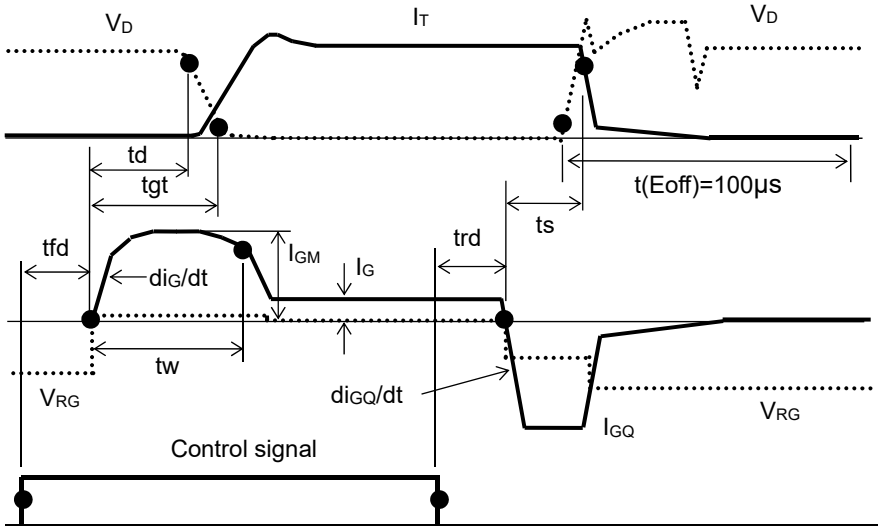
Symbol	Parameter	Condition	Limits			UNIT
			Min	Typ	Max	
V_{GIN}	Power supply voltage	DC power supply	19	20	21	V
P_{GIN}	Gate power consumption	I_T=420Arms, f=780Hz duty=0.33	—	—	35	W
tfd	Delay time of on gate current	Ta=25 ºC	—	—	3	μs
trd	Delay time of off gate current	Ta=25 ºC	—	—	3	μs
—	Control signal	Optical fiber data link Transmitter: HFBR-1521Z (BROADCOM) Receiver:HFBR-2521Z (BROADCOM)	—	—	—	—
—	Power supply connector	Phoenix contact Type name :MSTB25/2-G-508AU	—	—	—	—
—	Status signal	— (Note 1)	—	—	—	—

MECHANICAL DATA

Symbol	Parameter	Condition	Limits			UNIT
			Min	Typ	Max	
F_M	Mounting force	—	11.1	13	15.8	kN
—	Weight	—	—	1060	—	g
—	Pole piece diameter(GCT device)	±0.2mm	—	47	—	mm
—	Housing thickness(GCT device)	±0.5mm	—	26	—	mm

THERMAL DATA

Symbol	Parameter	Condition	Limits			UNIT
			Min	Typ	Max	
Tj	Junction operating temperature	—	-20	—	125	ºC
Tstg	Storage temperature	—	-40	—	60	ºC
Ta	Ambient operation temperature	Recommend:≤40 ºC	-10	—	60	ºC
Rt(j-f)	Thermal resistance	Junction to Fin	—	—	0.025	K /W



td; $0V_{RG}$～$0.9V_D$
tgt; $0V_{RG}$～$0.1V_D$
ts; $0V_{RG}$～$0.9I_T$
di_G/dt; $0.1I_{GM}$～$0.9I_{GM}$
tw; $0V_{RG}$～$0.9I_{GM}$
di_{GQ}/dt; $0.1I_{RG}$～$0.9I_{RG}$
tfd; 50%on signal～$0V_{RG}$
trd; 50%off signal～$0V_{RG}$

Fig.1 Turn on and turn off waveform

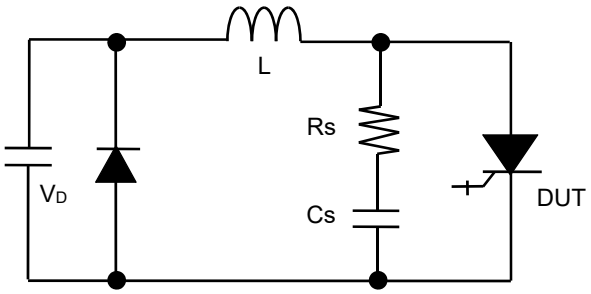


Fig.2 Turn-on test circuit

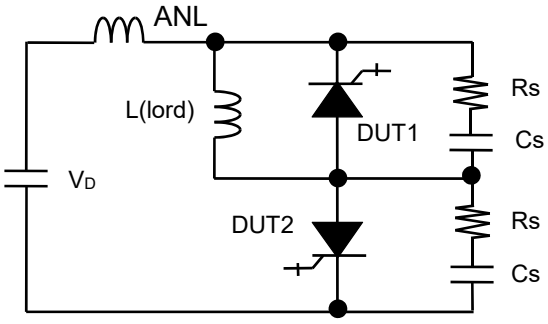


Fig.3 Turn off and Reverse recovery test circuit

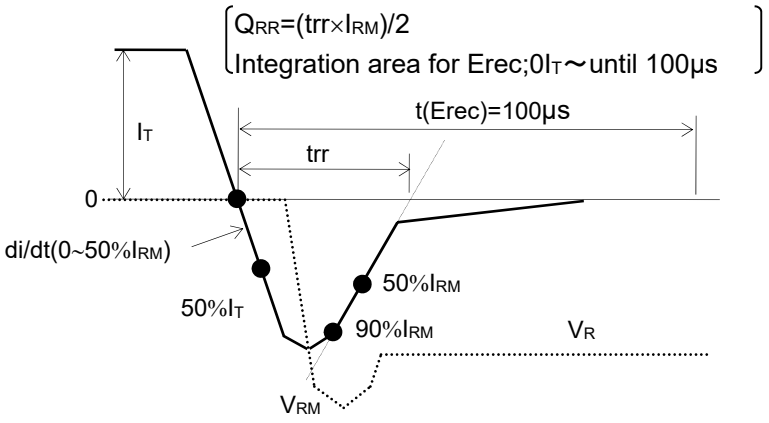


Fig.4 Reverse recovery waveform

(Note 1): Status signal

1.Status signal from LED

(1)Status signal

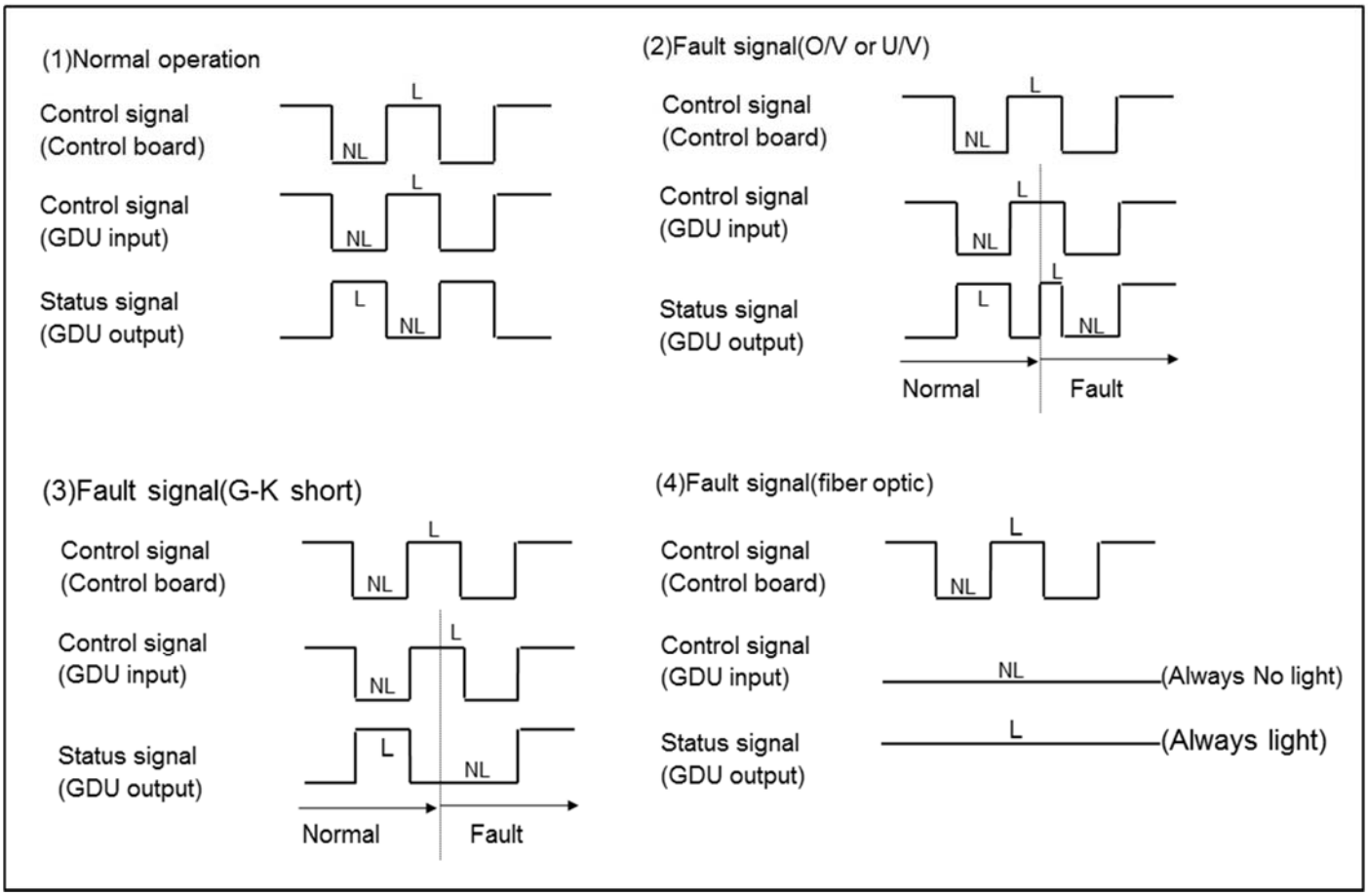
Status of GCT	LED 1 (Red)	LED 2 (Yellow)
On state	OFF	ON
Off state	ON	OFF

(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)



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