

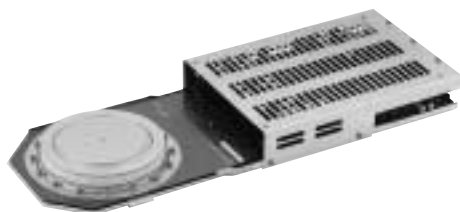
PRELIMINARY
 Notice: This is not a final specification.
 Some parametric limits are subject to change.

MITSUBISHI GCT (Gate Commutated Turn-off) THYRISTOR UNIT

GCU40BC-90

HIGH POWER INVERTER USE
 PRESS PACK TYPE

GCU40BC-90



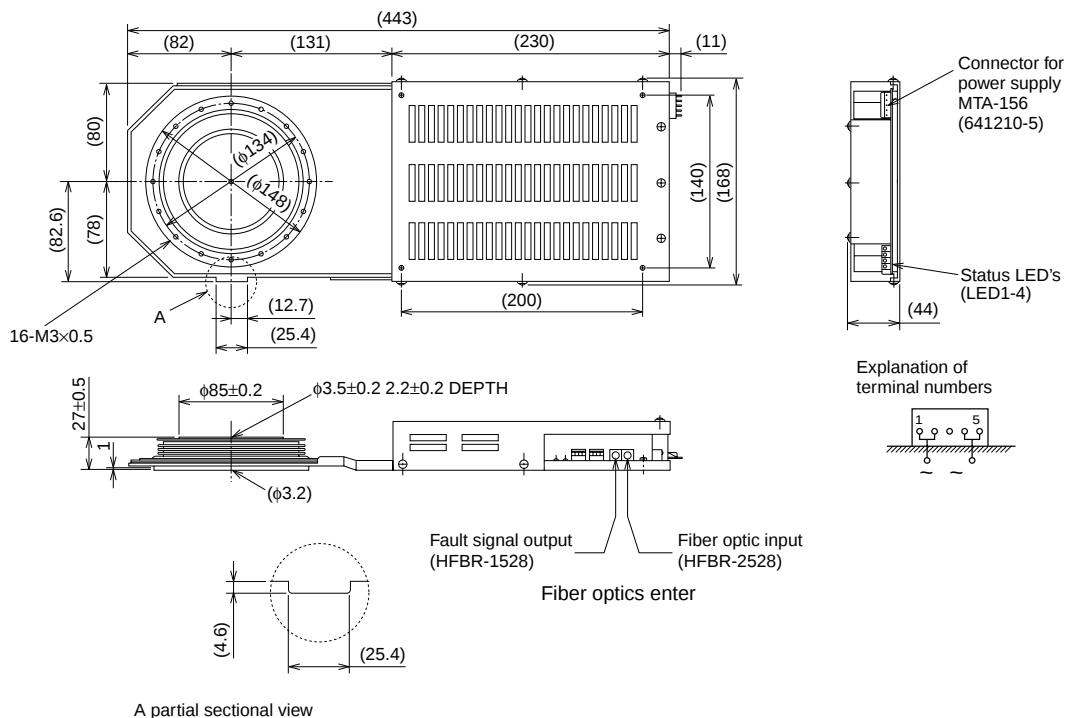
- Asymmetrical GCT unit
- GCT and gate driver are connected
- ITQRM: Repetitive controllable
 on-state current 4000A
- IT(AV): Average on-state current 1200A
- VDRM: Repetitive peak off-state voltage 4500V
- VRRM: Repetitive peak reverse voltage 21V

APPLICATION

Inverters, DC choppers, Induction heaters, DC to DC converter

OUTLINE DRAWING

Dimensions in mm



Mar. 2004

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GCT PART

MAXIMUM RATINGS

Symbol	Parameter	Conditions	Voltage class	Unit
VRRM	Repetitive peak reverse voltage	—	21	V
VRSM	Non-repetitive peak reverse voltage	—	21	V
VDRM	Repetitive peak off-state voltage	Gate driver energized	4500	V
VDSM	Non-repetitive peak off-state voltage	Gate driver energized	4500	V
V(LTDS)	Long term DC stability voltage	Gate driver energized, $\lambda = 100$ Fit	3000	V

Symbol	Parameter	Conditions	Ratings	Unit
IT(RMS)	RMS on-state current	Applied for all condition angles	1800	A
IT(AV)	Average on-state current	f = 60Hz, sinewave $\theta = 180^\circ$, $T_f = 70^\circ\text{C}$	1200	A
ITQRM	Repetitive controllable on-state current	$V_{DM} = 4500\text{V}$, $V_D = 2800\text{V}$, $C_c = 6\mu\text{F}$, $L_c = 0.3\mu\text{H}$ $T_j = 25/125^\circ\text{C}$ (See Fig. 1, 3)	4000	A
ITSM	Surge on-state current	One half cycle at 60Hz, $T_j = 125^\circ\text{C}$ start	25	kA
I^2t	Current-squared, time integration		2.6×10^6	A^2s
di/dt	Critical rate of rise of on-state current	$V_D = 2800\text{V}$, $I_T = 4000\text{A}$, $T_j = 25/125^\circ\text{C}$, f = 60Hz (See Fig. 1, 2)	1000	$\text{A}/\mu\text{s}$
PFGM	Peak forward gate power dissipation		10	kW
PRGM	Peak reverse gate power dissipation		120	kW
PFG(AV)	Average forward gate power dissipation		200	W
PRG(AV)	Average reverse gate power dissipation		6300	W
VFGM	Peak forward gate voltage		10	V
VRGM	Peak reverse gate voltage		21	V
IFGM	Peak forward gate current		1000	A
IRGM	Peak reverse gate current		4000	A

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
V _{TM}	On-state voltage	$I_T = 4000\text{A}$, $T_j = 125^\circ\text{C}$	—	—	4.0	V
I _{RRM}	Repetitive peak reverse current	$V_{RM} = 21\text{V}$, $T_j = 125^\circ\text{C}$	—	—	100	mA
I _{DRM}	Repetitive peak off-state current	$V_{DM} = 4500\text{V}$, $T_j = 125^\circ\text{C}$, Gata driver energized	—	—	150	mA
I _{GRM}	Reverse gate current	$V_{RG} = 21\text{V}$, $T_j = 125^\circ\text{C}$	—	—	100	mA
dv/dt	Critical rate of rise of off-state voltage	$V_D = 2800\text{V}$, $T_j = 125^\circ\text{C}$ Gate driver energized (Expo. wave)	3000	—	—	$\text{V}/\mu\text{s}$
t _{gt}	Turn-on time		—	—	3.0	μs
t _d	Turn-on delay time	$V_D = 2800\text{V}$, $I_T = 4000\text{A}$, $di/dt = 1000\text{A}/\mu\text{s}$, $T_j = 125^\circ\text{C}$ (See Fig. 1, 2)	—	—	1.0	μs
E _{on}	Turn-on switching energy		—	1.5	—	J/P
t _s	Storage time	$V_{DM} = 4500\text{V}$, $V_D = 2800\text{V}$, $I_T = 4000\text{A}$, $T_j = 125^\circ\text{C}$	—	—	3.0	μs
E _{off}	Turn-off switching energy	$C_c = 6\mu\text{F}$, $L_c = 0.3\mu\text{H}$ (See Fig. 1, 5)	—	16	—	J/P
I _{GT}	Gate trigger current	$V_D = 24\text{V}$, $R_L = 0.1\Omega$, $T_j = 25^\circ\text{C}$	—	—	2.5	A
V _{GT}	Gate trigger voltage	DC method	—	—	1.5	V

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GATE DRIVER PART

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
V _{GIN}	Power supply voltage	AC square wave (f = 15kHz ~ 100kHz) or DC power supply	24	—	40	V
P _{GIN}	Gate power consumption	I _T = 1000Arms, f = 1000Hz, duty = 0.5	—	—	100	W
t _{rd}	Delay time of on gate current	T _a = 25°C	—	—	2.0	μs
t _{rd}	Delay time of off gate current	T _a = 25°C	—	—	2.0	μs
t _{on} (min)	Turn-on minimum	T _a = 25°C (Note 1)	—	15	—	μs
t _{off} (min)	Turn-off minimum	T _a = 25°C (Note 2)	—	15	—	μs
—	Control signal	Optical fiber data link Transmitter : HFBR-1528 : Agilent Receiver : HFBR-2528 : Agilent	—	—	—	—
—	Power supply connector	AMP: MTA-156 Part number : 641210-5	—	—	—	—
—	Status signal	— (Note 3)	—	—	—	—

Note 1. If input turn-on signal is shorter than t_{on}(min), protection operates.

Note 2. If turn-on signal is input during t_{off}(min), protection operates.

MECHANICAL DATA

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
F _M	Mounting force	—	32	40	48	kN
—	Weight	—	—	3500	—	g
—	Pole piece diameter (GTC device)	±0.2mm	—	85	—	mm
—	Housing thickness (GTC device)	±0.5mm	—	26	—	mm

THERMAL DATA

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
T _j	Junction operating temperature	—	0	—	125	°C
T _{stg}	Storage temperature	—	-10	—	60	°C
T _a	Ambient operation temperature	Recommend : ≤ 40°C	0	—	60	°C
R _{t(j-f)}	Thermal resistance	Junction to Fin	—	—	0.0115	K/W

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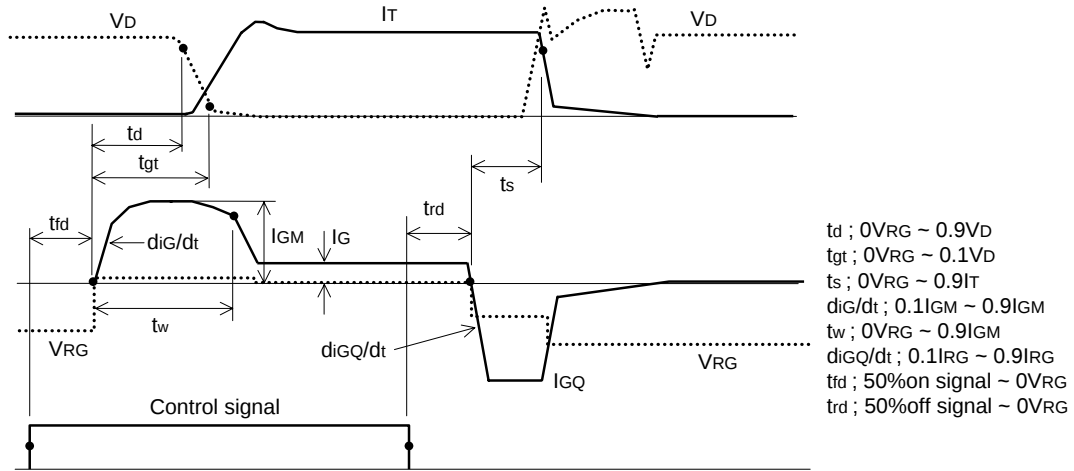


Fig. 1 Turn-on and Turn-off waveform

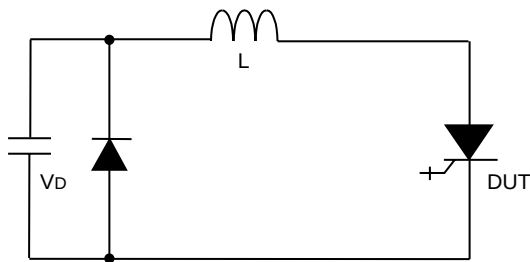


Fig. 2 Turn-on test circuit

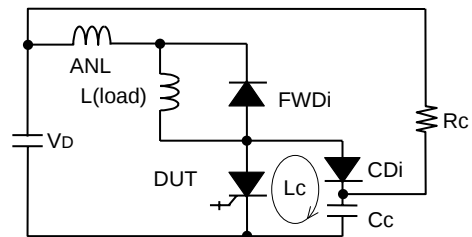


Fig. 3 Turn-off test circuit
 (With clamp circuit)

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Note 3. Status signal

1. Status signal from LED

(1) Status signal

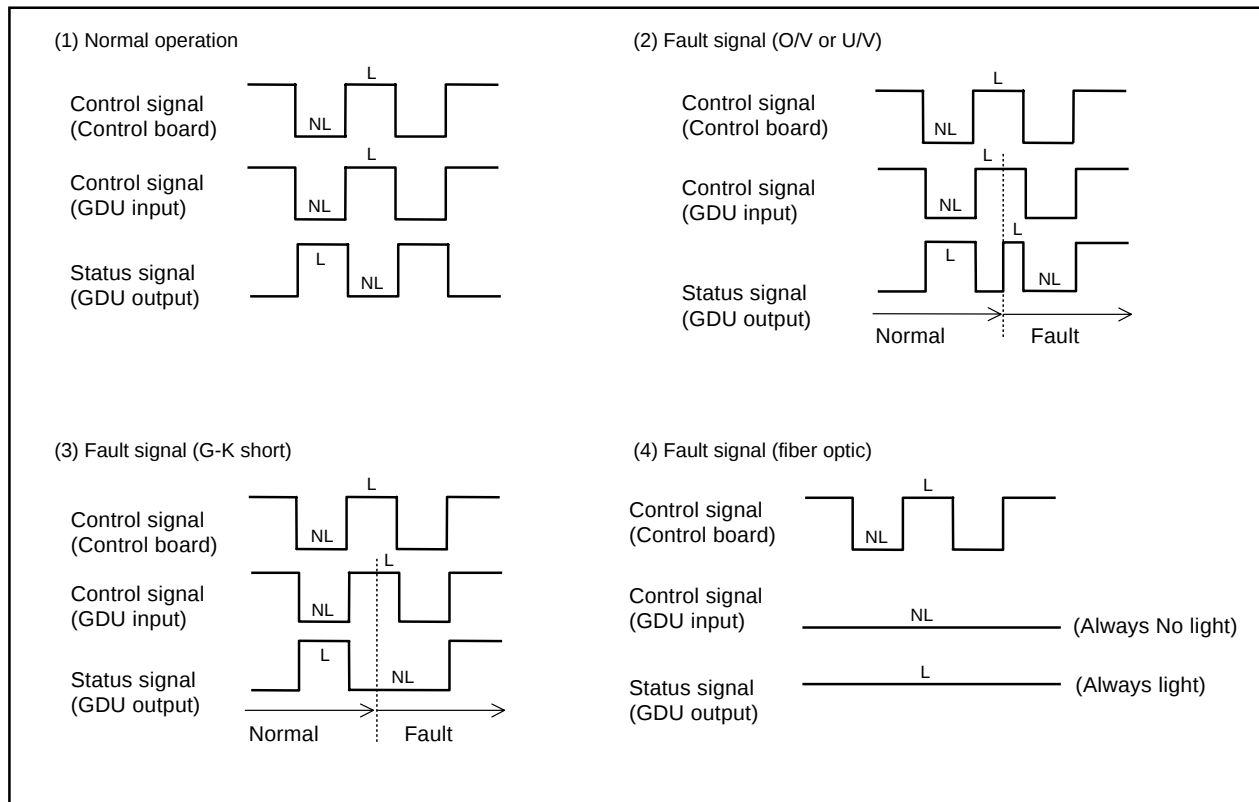
Status of GCT	LED 1 (Red)	LED 2 (Yellow)
On state	OFF	ON
Off state	ON	OFF

(2) Fault signal

Status	G-K	Power Supply	G-K LED (LED 3) (Green)	PS LED (LED 4) (Green)
Normal	Normal	32±8V	On	On
Fault	Normal	Voltage down	Off	Off
Fault	G-K short	32±8V	Off	On
Fault	G-K short	Voltage down	Off	Off

2. Status signal from Transmitter

(L : Light NL : No light)



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PERFORMANCE CURVES

