

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

MITSUBISHI GATE COMMUTATED TURN-OFF THYRISTORS

FGC3500AX-120DS

HIGH POWER INVERTER USE
 PRESS PACK TYPE

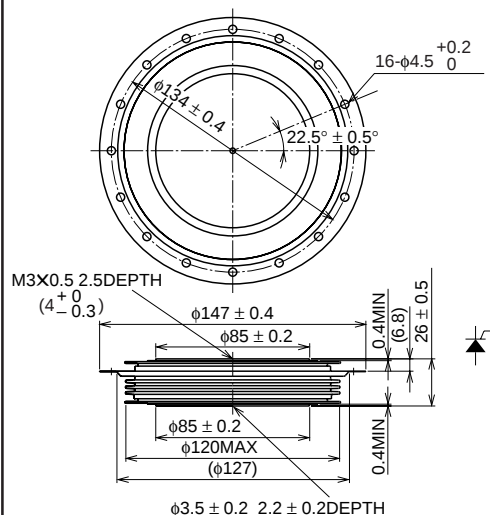
FGC3500AX-120DS



- ITQRM Repetitive controllable on-state current 3500A
- IT(AV) Average on-state current 1200A
- VDRM Repetitive peak off-state voltage 6000V
- Anode short type

OUTLINE DRAWING

Dimensions in mm



APPLICATION

Inverters, DC choppers, Induction heaters, DC to DC converters.

MAXIMUM RATINGS

Symbol	Parameter	Voltage class	Unit
VRRM	Repetitive peak reverse voltage	21	V
VRSM	Non-repetitive peak reverse voltage	21	V
VR(DC)	DC reverse voltage	21	V
VDRM	Repetitive peak off-state voltage*	6000	V
VDSM	Non-repetitive peak off-state voltage*	6000	V
VD(DC)	DC off-state voltage*	4800	V
VLDS	Long term DC stability voltage*	3600	V

* : VGK = -2V

Symbol	Parameter	Conditions	Ratings	Unit
ITQRM	Repetitive controllable on-state current	V _{DM} = 6000V, V _D = 3600V, L _C = 0.3μH, V _{RG} = 20V diGQ/dt = 6000A/μs, T _j = 25/125°C (see Fig. 1, 3)	3500	A
IT(RMS)	RMS on-state current	Applied for all conduction angles	1800	A
IT(AV)	Average on-state current	f = 60Hz, sinewave θ = 180°, T _f = 70°C	1200	A
ITSM	Surge on-state current	One half cycle at 60Hz, T _j = 125°C	25	kA
I ² t	Current-squared, time integration		2.6 × 10 ⁶	A ² s
diT/dt	Critical rate of rise of on-state current	V _D = 3600V, I _T = 3500A, I _{GM} = 200A, T _j = 125°C diG/dt = 100A/μs (see Fig. 1, 2)	1000	A/μs
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		3500	A
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
T _j	Junction temperature		-20 ~ +125	°C
T _{stg}	Storage temperature		-20 ~ +150	°C
—	Mounting force required	(Recommended value 40kN)	32 ~ 48	kN
—	Weight	Typical value	1500	g

Sep. 2000

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ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{TM}	On-state voltage	$I_T = 4000A$, $T_j = 125^\circ C$	—	—	4.0	V
I_{RRM}	Repetitive peak reverse current	$V_{RM} = 21V$, $T_j = 125^\circ C$	—	—	100	mA
I_{DRM}	Repetitive peak off-state current	$V_{DM} = 6000V$, $V_{GK} = -2V$, $T_j = 125^\circ C$	—	—	150	mA
I_{GRM}	Reverse gate current	$V_{RG} = 21V$, $T_j = 125^\circ C$	—	—	100	mA
dv/dt	Critical rate of rise of off-state voltage	$V_D = 3600V$, $V_{GK} = -2V$, $T_j = 125^\circ C$ (Expo. wave) (see Fig. 4)	3000	—	—	V/ μs
t_{gt}	Turn-on time	$V_D = 3600V$, $I_T = 3500A$, $di/dt = 1000A/\mu s$ $I_{GM} = 200A$, $di_G/dt = 100A/\mu s$, $T_j = 125^\circ C$ (see Fig. 1, 2)	—	—	3.0	μs
t_d	Delay time		—	—	1.0	μs
E_{on}	Turn-on switching energy		—	1.2	—	J/P
t_s	Storage time	$V_{DM} = 6000V$, $V_D = 3600V$, $I_T = 3500A$ $di_{GQ}/dt = 6000A/\mu s$, $C_c = 6\mu F$, $L_c = 0.3\mu H$	—	—	3.0	μs
E_{off}	Turn-off switching energy	$V_{RG} = 20V$, $T_j = 125^\circ C$ (see Fig. 1, 3)	—	19	—	J/P
I_{GT}	Gate trigger current	DC METHOD : $V_D = 24V$, $R_L = 0.1\Omega$, $T_j = 25^\circ C$	—	—	2.5	A
V_{GT}	Gate trigger voltage		—	—	1.5	V
$R_{th(j-f)}$	Thermal resistance	Junction to fin	—	—	0.011	$^\circ C/W$

Fig. 1 Turn-on and Turn-off waveform

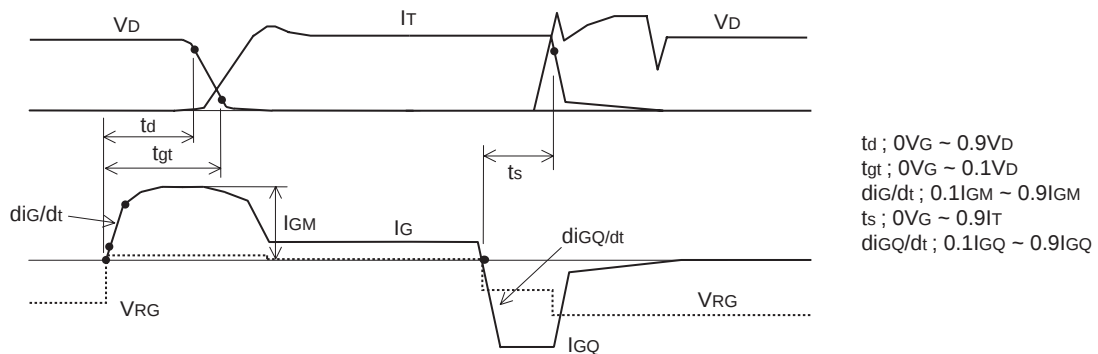


Fig. 2 Turn-on test circuit

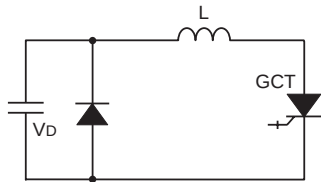


Fig. 3 Turn-off test circuit
 (With clamp circuit)

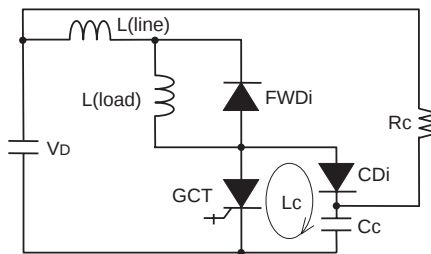
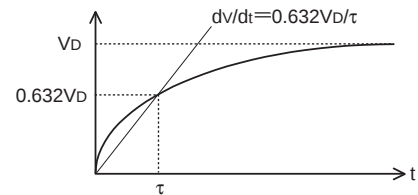


Fig. 4 dv/dt test waveform



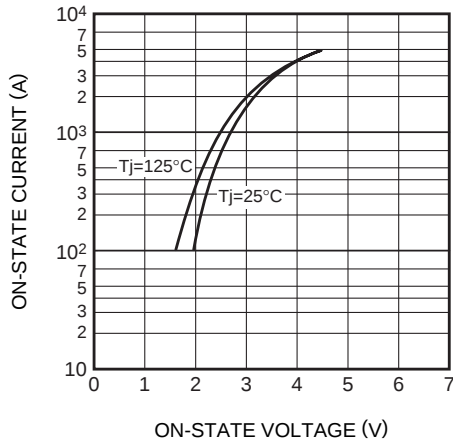
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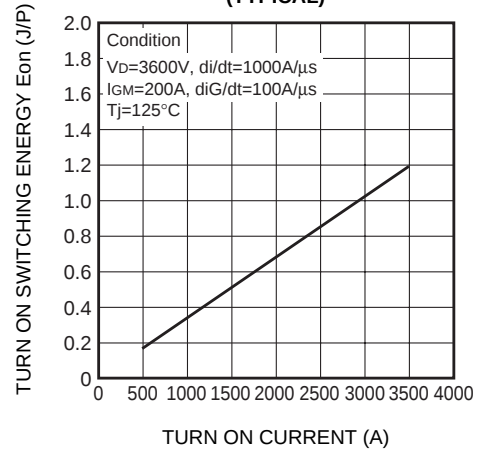
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PERFORMANCE CURVES

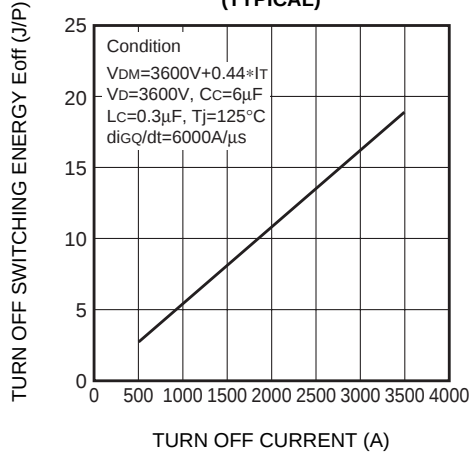
MAXIMUM ON-STATE CHARACTERISTIC



TURN ON SWITCHING ENERGY (TYPICAL)



TURN OFF SWITCHING ENERGY (TYPICAL)



MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)

