

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

MITSUBISHI GATE COMMUTATED TURN-OFF THYRISTORS

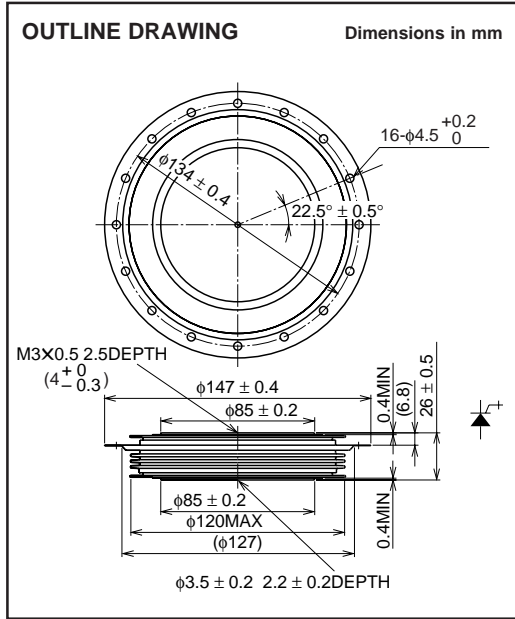
**FGC3500AX-120DS**

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



**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
VLTD5	Long term DC stability voltage*	3600	V

\* : V<sub>GK</sub> = -2V

Symbol	Parameter	Conditions	Ratings	Unit
ITQRM	Repetitive controllable on-state current	V <sub>DM</sub> = 6000V, V <sub>D</sub> = 3600V, L <sub>C</sub> = 0.3μH, V <sub>RG</sub> = 20V diG/dt = 6000A/μs, T <sub>j</sub> = 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 <sub>f</sub> = 70°C	1200	A
ITSM	Surge on-state current	One half cycle at 60Hz, T <sub>j</sub> = 125°C	25	kA
I <sup>2</sup> t	Current-squared, time integration		2.6 × 10 <sup>6</sup>	A <sup>2</sup> s
diT/dt	Critical rate of rise of on-state current	V <sub>D</sub> = 3600V, I <sub>T</sub> = 3500A, I <sub>GM</sub> = 200A, T <sub>j</sub> = 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 <sub>j</sub>	Junction temperature		-20 ~ +125	°C
T <sub>stg</sub>	Storage temperature		-20 ~ +150	°C
—	Mounting force required	(Recommended value 40kN)	32 ~ 48	kN
—	Weight	Typical value	1500	g

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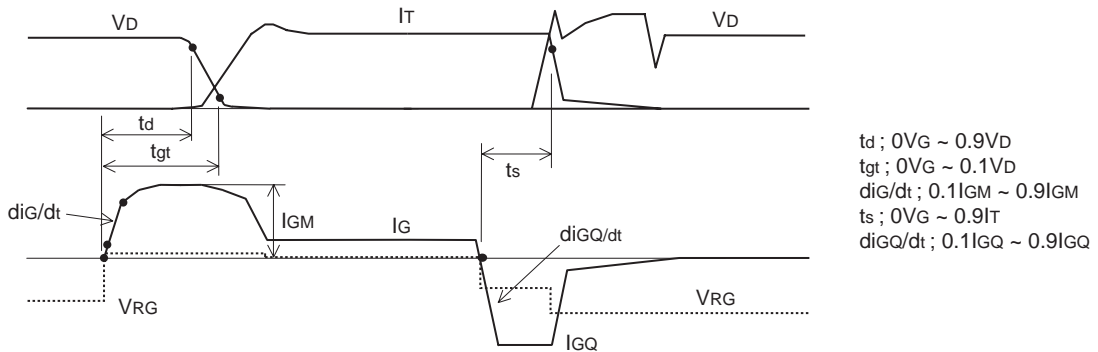
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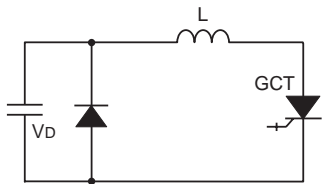
**ELECTRICAL CHARACTERISTICS**

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V <sub>TM</sub>	On-state voltage	I <sub>T</sub> = 4000A, T <sub>j</sub> = 125°C	—	—	4.0	V
I <sub>RRM</sub>	Repetitive peak reverse current	V <sub>RM</sub> = 21V, T <sub>j</sub> = 125°C	—	—	100	mA
I <sub>DRM</sub>	Repetitive peak off-state current	V <sub>DM</sub> = 6000V, V <sub>GK</sub> = -2V, T <sub>j</sub> = 125°C	—	—	150	mA
I <sub>GRM</sub>	Reverse gate current	V <sub>RG</sub> = 21V, T <sub>j</sub> = 125°C	—	—	100	mA
dv/dt	Critical rate of rise of off-state voltage	V <sub>D</sub> = 3600V, V <sub>GK</sub> = -2V, T <sub>j</sub> = 125°C (see Fig. 4)	3000	—	—	V/μs
t <sub>gt</sub>	Turn-on time	V <sub>D</sub> = 3600V, I <sub>T</sub> = 3500A, di/dt = 1000A/μs I <sub>GM</sub> = 200A, di <sub>G</sub> /dt = 100A/μs, T <sub>j</sub> = 125°C (see Fig. 1, 2)	—	—	3.0	μs
t <sub>d</sub>	Delay time		—	—	1.0	μs
E <sub>on</sub>	Turn-on switching energy		—	1.2	—	J/P
t <sub>s</sub>	Storage time	V <sub>DM</sub> = 6000V, V <sub>D</sub> = 3600V, I <sub>T</sub> = 3500A di <sub>GQ</sub> /dt = 6000A/μs, C <sub>c</sub> = 6μF, L <sub>c</sub> = 0.3μH	—	—	3.0	μs
E <sub>off</sub>	Turn-off switching energy	V <sub>RG</sub> = 20V, T <sub>j</sub> = 125°C (see Fig. 1, 3)	—	19	—	J/P
I <sub>GT</sub>	Gate trigger current	DC METHOD : V <sub>D</sub> = 24V, R <sub>L</sub> = 0.1Ω, T <sub>j</sub> = 25°C	—	—	2.5	A
V <sub>GT</sub>	Gate trigger voltage		—	—	1.5	V
R <sub>th(j-f)</sub>	Thermal resistance	Junction to fin	—	—	0.011	°C/W

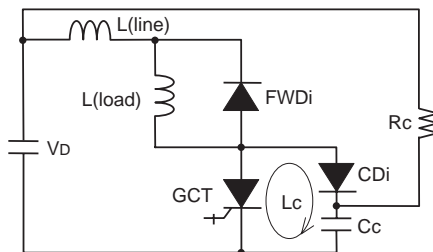
**Fig. 1 Turn-on and Turn-off waveform**



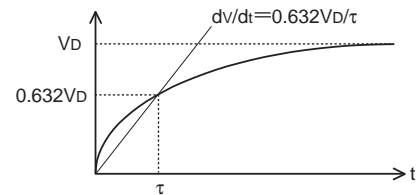
**Fig. 2 Turn-on test circuit**



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



**Fig. 4 dv/dt test waveform**



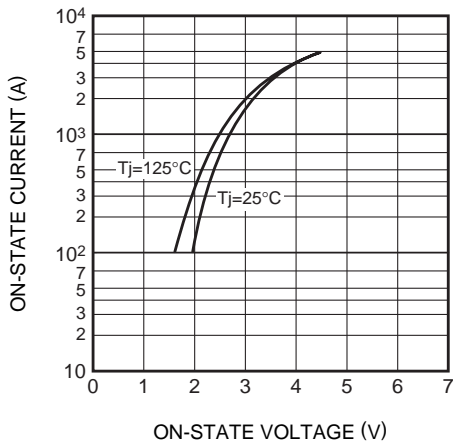
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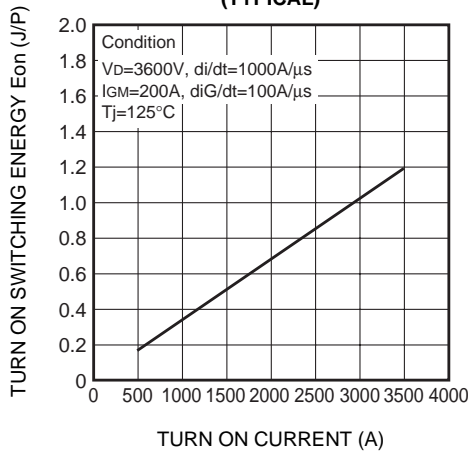
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**PERFORMANCE CURVES**

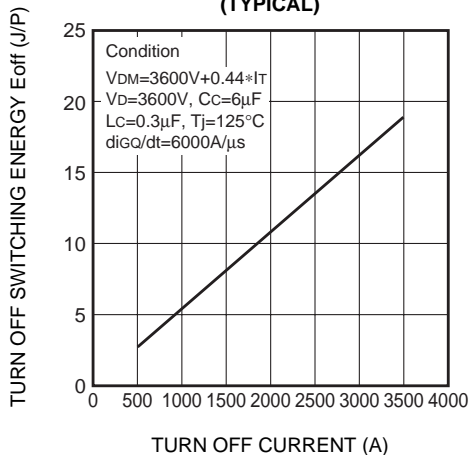
**MAXIMUM ON-STATE CHARACTERISTIC**



**TURN ON SWITCHING ENERGY (TYPICAL)**



**TURN OFF SWITCHING ENERGY (TYPICAL)**



**MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)**

