

Gate Commutated Turn-Off Thyristors

AFGC 3500-120-AX-DS



Key Parameters

I_{TQRM}	=	3500 A
$I_{T(AV)}$	=	1200 A
V_{DRM}	=	6000 V

Application

- Inverters
- D.C. choppers
- Induction heaters
- D.C. to D.C. converters

MAXIMUM RATINGS

Symbols and parameters		Voltage class	Unit
V_{RRM}	Repetitive peak reverse voltage	21	V
V_{RSM}	Non-repetitive peak reverse voltage	21	V
$V_{R(DC)}$	DC reverse voltage	21	V
V_{DRM}	Repetitive peak off-state voltage	6000	V
V_{DSM}	Non-repetitive peak off-state voltage	6000	V
$V_{D(DC)}$	DC off-state voltage	4800	V
V_{LTDS}	Long term DC stability voltage	3600	V

Symbols and parameters			Value	Unit
I_{TQRM}	Repetitive controllable on-state current	$V_{DM} = 6000V, V_D = 3600V, L_C = 0.3mH, V_{RG} = 20V, di_{GQ}/dt = 6000A/ms, T_j = 25/125^\circ C$	3500	A
$I_{T(RMS)}$	RMS on-state current	Applied for all conduction angles $f = 60Hz, \text{sinewave}$ $\theta = 180^\circ, T_f = 70^\circ C$	1800	A
$I_{T(AV)}$	Average on-state current		1200	A
I_{TSM}	Surge (non-repetitive) on-state current	One half cycle at 60Hz, $T_j = 125^\circ C$	25	kA
I^2t	Current-squared, time integration		2.6×10^6	A ² s
di_T/dt	Critical rate of rise of on-state current	$V_D = 3600V, I_T = 3500A, I_{GM} = 200A, T_j = 125^\circ C, di_G/dt = 100A/ms$	1000	A/ μs
V_{FGM}	Peak forward gate voltage		10	V
V_{RGM}	Peak reverse gate voltage		21	V

Symbols and parameters			Value	Unit
I_{FGM}	Peak forward gate current		1000	A
I_{RGM}	Max. RMS on-state current		3500	A
P_{FGM}	Peak forward gate power dissipation		10	kW
P_{RGM}	Peak reverse gate power dissipation		120	kW
$P_{FG(AV)}$	Max. peak non-repetitive surge current		200	W
$P_{RG(AV)}$	Limiting load integral		6300	W

ELECTRICAL CHARACTERISTICS

Symbols and parameters			Value			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)	3000			V/ μs
t_{gt}	Turn-on time	$V_D = 3600V, I_T = 3500A, di/dt = 1000A/ms$			3	μs
t_d	Delay time	$I_{GM} = 200A, T_j = 125^\circ C$			1	μs
E_{on}	Peak gate turn-off current	$di_G/dt = 100A/ms$		1.2		J/P
t_s	Gate trigger voltage	$V_{DM} = 6000V, V_D = 3600V, I_T = 3500A,$			3	μs
E_{off}	Gate trigger current	$di_{GQ}/dt = 6000A/ms, C_C = 6mF, L_C = 0.3mH, V_{RG} = 20V, T_j = 125^\circ C$		19		J/P
I_{GT}	Gate trigger voltage	DC METHOD : $V_D = 24V, R_L = 0.1W, T_j = 25^\circ C$			2.5	A
V_{GT}	Gate trigger current				1.5	V

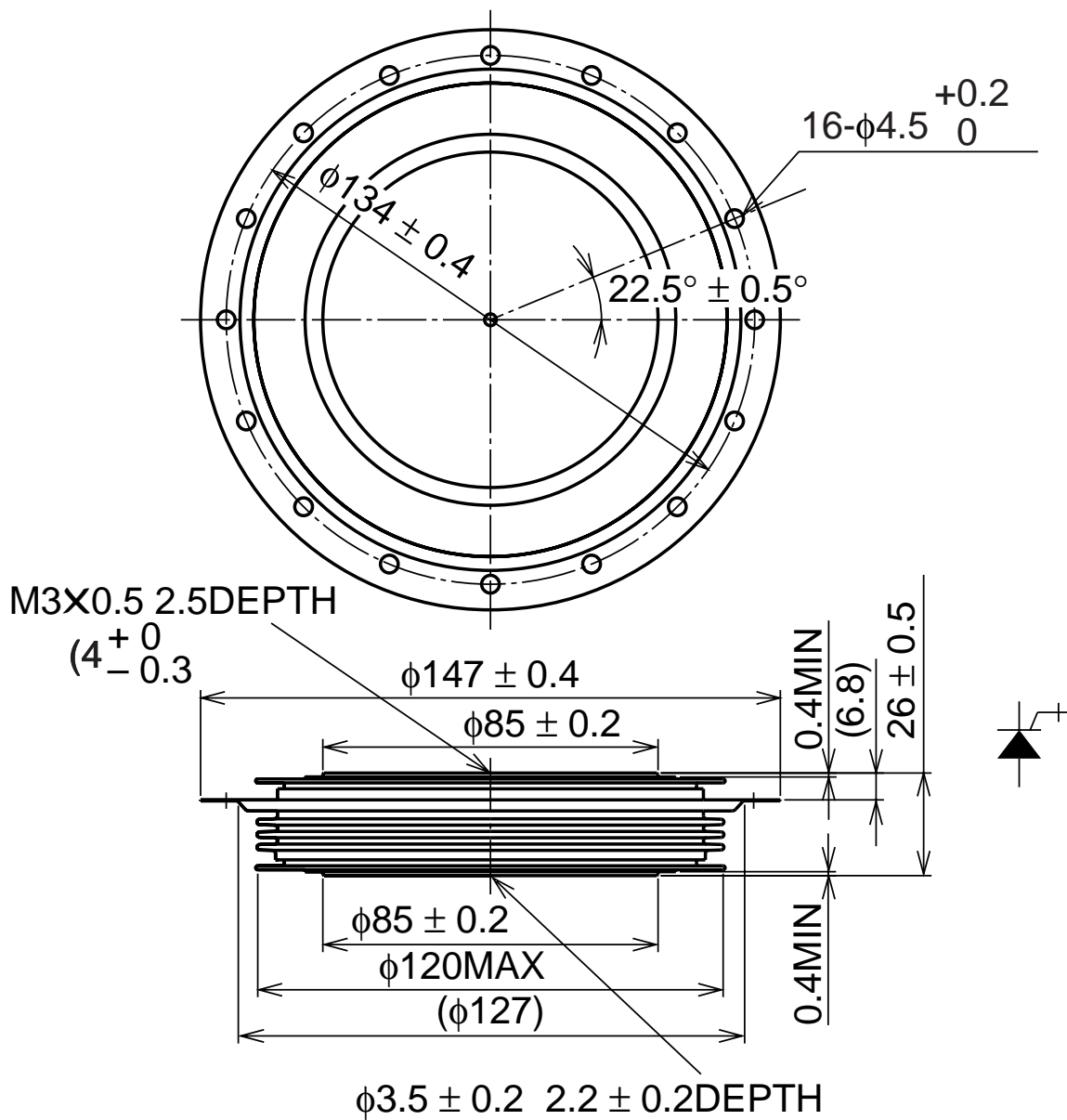
THERMAL

Symbols and parameters			Value	Unit
T_j	Junction operating temperature		-20 ... 125	°C
T_{stg}	Storage temperature range		-20 ... 150	°C
$R_{th(j-f)}$	Thermal resistance, max	Junction to fin	0.011	°C/W

MECHANICAL

Symbols and parameters			Value	Unit
M	Mounting force required	Recommended value 40	32 ... 48	kN
w	Weight		1500	g

DIMENSIONES



All dimensions in millimeters

Fig. 1 Turn-on and Turn-off waveform

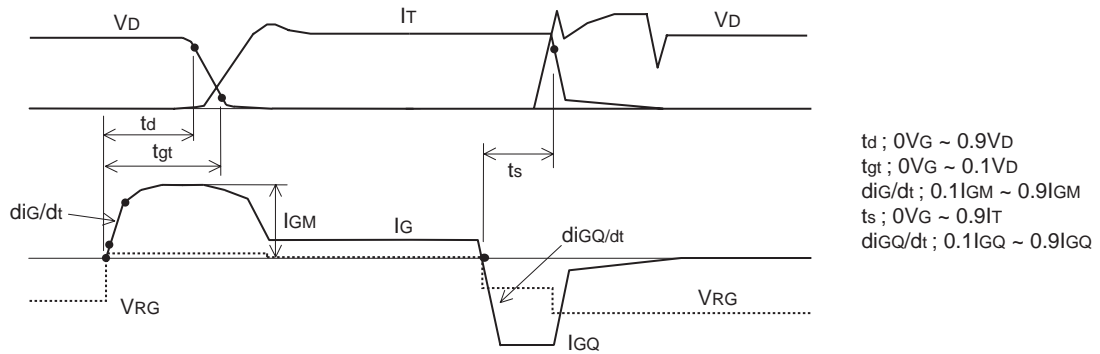
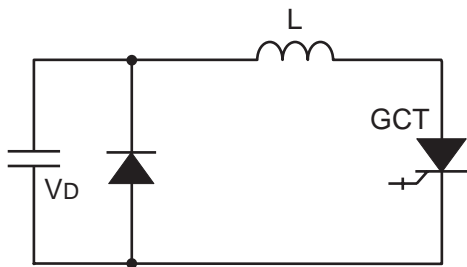


Fig. 2 Turn-on test circuit



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

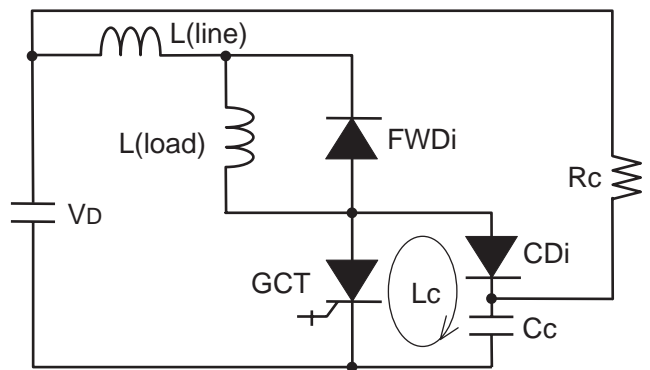
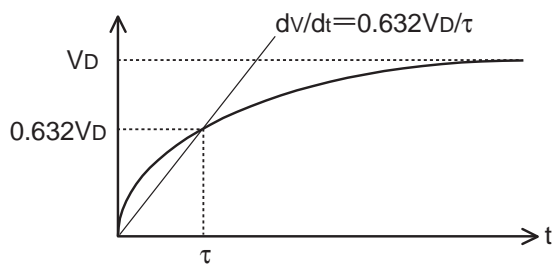
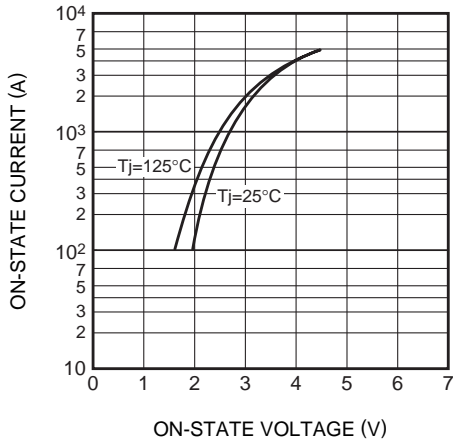


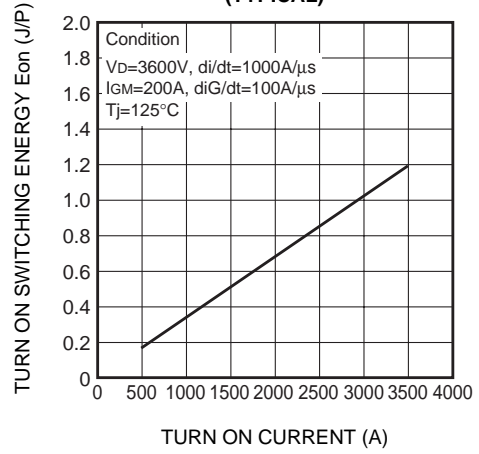
Fig. 4 dv/dt test waveform



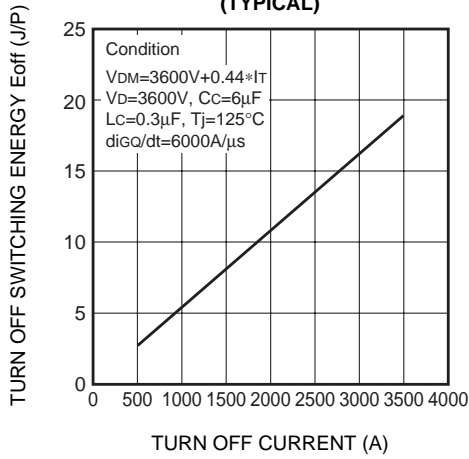
MAXIMUM ON-STATE CHARACTERISTIC



TURN ON SWITCHING ENERGY (TYPICAL)



TURN OFF SWITCHING ENERGY (TYPICAL)



MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)

