AS ENERGI

Gate Commutated Turn-Off Thyristors
AFGC 1500-130-A-DS

Key Parameters

I_{TQRM} = 1500 A
$I_{T(AV)}$ = 500 A
V_{DRM} = 6500 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		6500	V
V_{RSM}	Non-repetitive peak reverse voltage		6500	V
V_{DRM}	DC reverse voltage	$V_{GK} = -2V$	6500	V
V_{DSM}	Repetitive peak off-state voltage	$V_{GK} = -2V$	6500	V
V_{LTDS}	Non-repetitive peak off-state voltage	$V_{GK} = -2V$, λ = 100 Fit	3600	V

Symbols and parameters			Value	Unit
I_{TQRM}	Repetitive controllable on-state current	$V_{DM} = 3/4\ V_{DRM}$, $V_D = 3000V$, $L_C = 0.3\mu H$, $V_{RG} = 20V$, $Tj = 25/115°C$	1500	A
$I_{T(RMS)}$	RMS on-state current	Applied for all conduction angles f = 60Hz, sinewave $\theta = 180°$, $T_f = 55°C$	780	A
$I_{T(AV)}$	Average on-state current		500	A
I_{TSM}	Surge (non-repetitive) on-state current	One half cycle at 60Hz, $T_j = 115°C$ Start	8	kA
I^2t	Current-squared, time integration		2.7×10^5	A^2s
di_T/dt	Critical rate of rise of on-state current	$V_D = 3000V$, $I_T = 1500A$, $C_S = 0.2\mu F$, $R_S = 5\Omega$ $T_j = 25/115°C$, f = 60Hz	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		900	A
I_{RGM}	Max. RMS on-state current		1500	A
P_{FGM}	Peak forward gate power dissipation		9	kW
P_{RGM}	Peak reverse gate power dissipation		32	kW
$P_{FG(AV)}$	Max. peak non-repetitive surge current		180	W
$P_{RG(AV)}$	Limiting load integral		230	W

ELECTRICAL CHARACTERISTICS

Symbols and parameters			Value			Unit
			min	typ	max	
V_{TM}	On-state voltage	I_T = 1500A, T_j = 115°C			7.0	V
I_{RRM}	Repetitive peak reverse current	V_{RM} = 6500V, T_j = 115°C			220	mA
I_{DRM}	Repetitive peak off-state current	V_{DM} = 6500V, V_{GK} = –2V, T_j = 115°C			150	mA
I_{GRM}	Reverse gate current	V_{RG} = 21V, T_j = 115°C			100	mA
dv/dt	Critical rate of rise of off-state voltage	V_D = 3000V, V_{GK} = –2V, T_j = 115°C (Expo. wave)	3000			V/µs
t_{gt}	Turn-on time	I_T = 1500A, V_D = 3000V, di/dt = 1000A/µs, T_j = 115°C C_S= 0.2µF, R_S = 5Ω			5	µs
t_d	Delay time				1	µs
E_{on}	Peak gate turn-off current				2.15	J/P
t_s	Gate trigger voltage	I_T = 1500A, V_D = 3000V, V_{DM} = 3/4 V_{DRM}, C_S= 0.2µF, R_S= 5Ω, V_{RG} = 20V, T_j = 115°C			3	µs
E_{off}	Gate trigger current				12	J/P
Q_{RR}	Delay time	V_R = 3000V, I_T = 1500A, di/dt = 1000A/µs, C_S = 0.2µF, R_S = 5Ω, T_j = 115°C			2800	µC
E_{rec}	Peak gate turn-off current				7	A
I_{GT}	Gate trigger voltage	DC METHOD : V_D = 24V, R_L = 0.1Ω, T_j = 25°C			0.75	A
V_{GT}	Gate trigger current				1.5	V

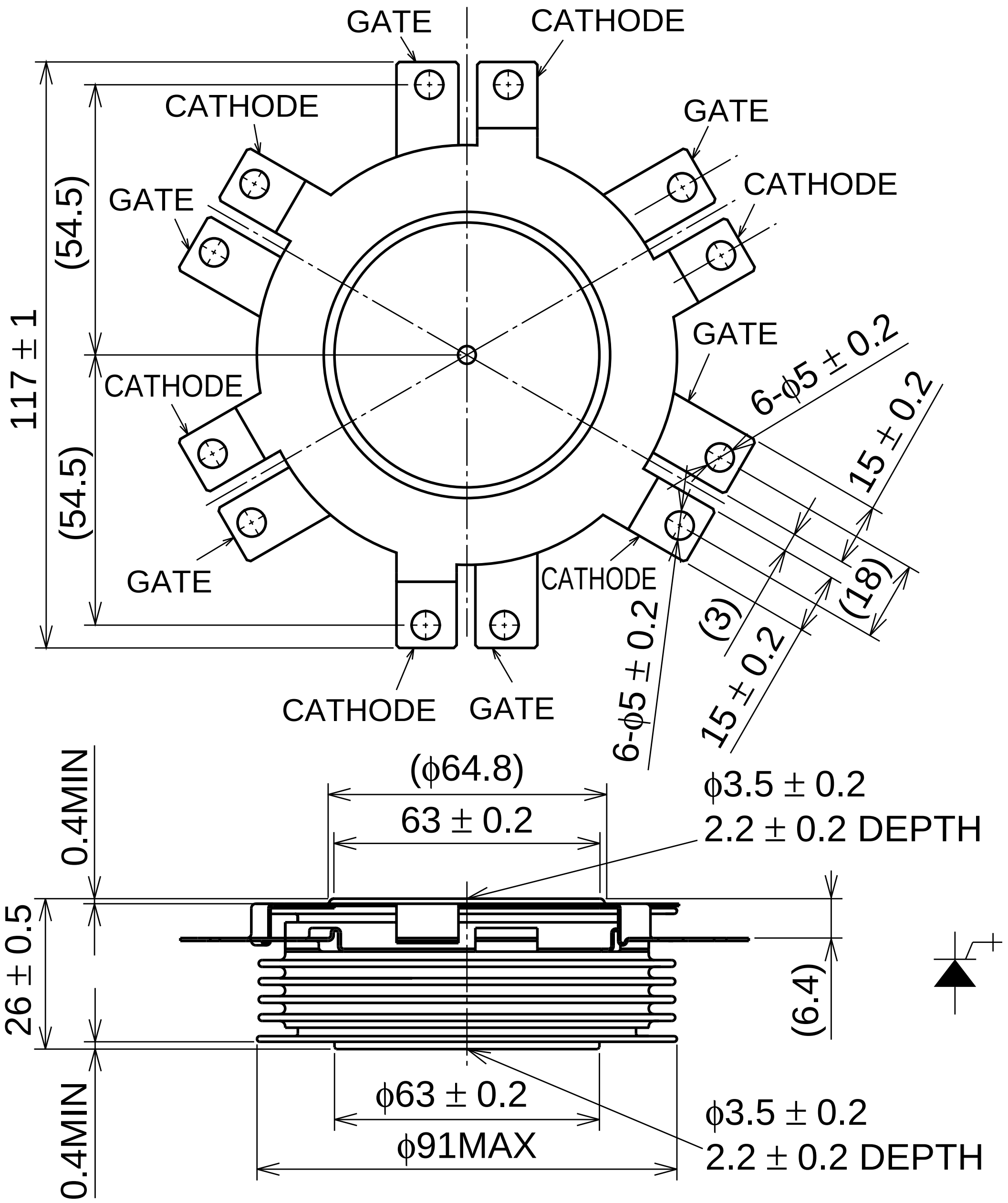
THERMAL

Symbols and parameters			Value	Unit
T_j	Junction operating temperature		-20 ... 115	°C
T_{stg}	Storage temperature range		-20 ... 150	°C
$R_{th(j-f)}$	Thermal resistance, max	Junction to fin	0.016	°C/W

MECHANICAL

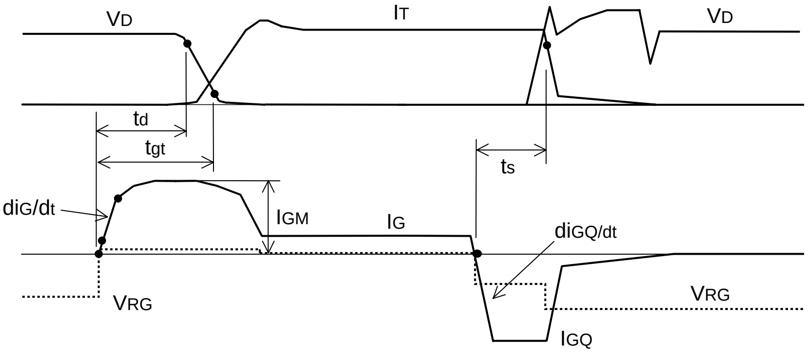
Symbols and parameters			Value	Unit
M	Mounting force required	Recommended value 20	18 ... 24	kN
w	Weight		760	g

DIMENSIONES



All dimensions in millimeters

Fig. 1 Turn-on and Turn-off waveform



t_d ; 0V_G ~ 0.9V_D
t_{gt} ; 0V_G ~ 0.1V_D
di_G/dt ; 0.1I_{GM} ~ 0.9I_{GM}
t_s ; 0V_G ~ 0.9I_T
di_{GQ}/dt ; 0.1I_{GQ} ~ 0.9I_{GQ}

Fig. 2 Turn-on test circuit

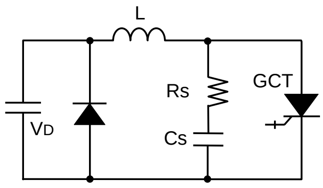


Fig. 3 Turn-off test circuit
(With clamp circuit)

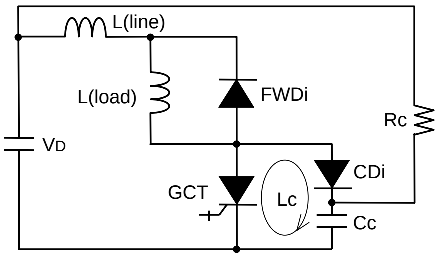


Fig. 4 dv/dt test waveform

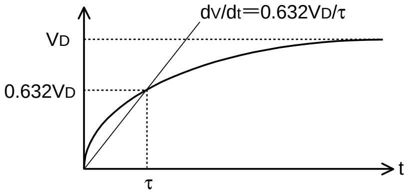
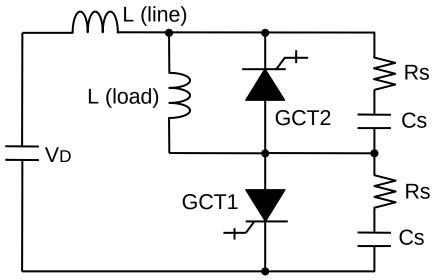
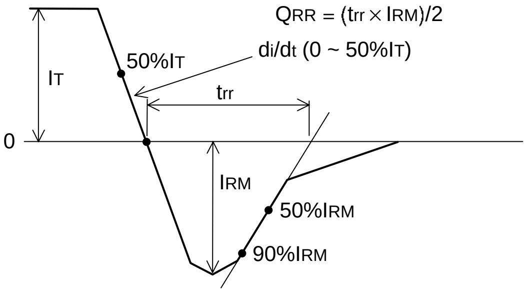


Fig. 5 Turn-off and Recovery test circuit

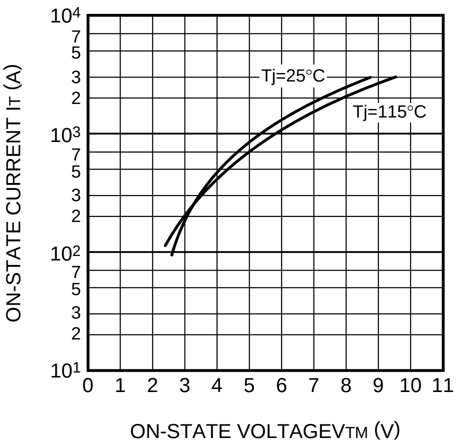


GCT1 : For turn-off test
GCT2 : For Recovery test

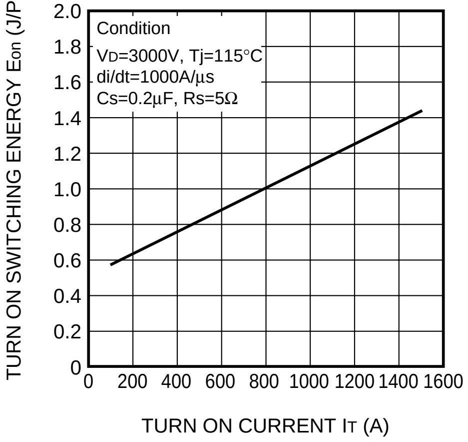
Fig. 6 Reverse recovery waveform



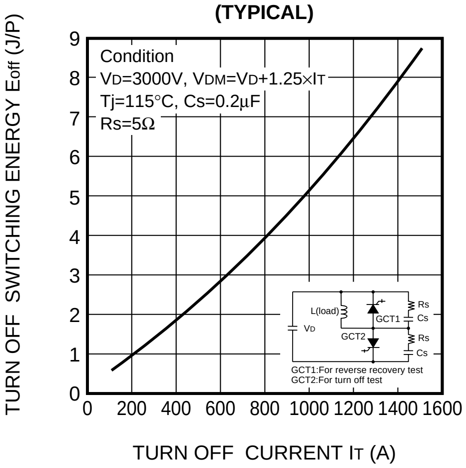
MAXIMUM ON-STATE CHARACTERISTIC



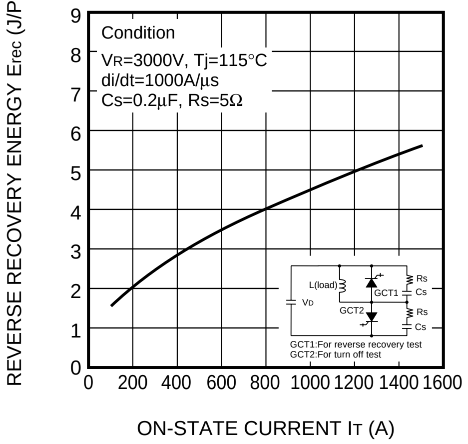
Eon VS IT (TYPICAL)



Eoff VS IT (TYPICAL)



Erec VS IT (TYPICAL)



MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)