Gate Turn-Off Thyristors
AFG 4000-90-HX-DS

Key Parameters

I_{TQRM}	=	3000	A
$I_{T(AV)}$	=	1200	A
V_{DRM}	=	4500	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	19	V
V_{RSM}	Non-repetitive peak reverse voltage	19	V
$V_{R(DC)}$	DC reverse voltage	19	V
V_{DRM}	Repetitive peak off-state voltage	4500	V
V_{DSM}	Non-repetitive peak off-state voltage	4500	V
$V_{D(DC)}$	DC off-state voltage	2500	V

Symbols and parameters			Value	Unit
I_{TQRM}	Repetitive controllable on-state current	V_{DM} = 3375V, C_S = 3.0µF, L_S = 0.4µH, T_j = 25/125°C	3000	A
$I_{T(RMS)}$	RMS on-state current	Applied for all conduction angles f = 60Hz, sinewave θ = 180°, T_f = 78°C	1880	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°C	20	kA
I^2t	Current-squared, time integration		1.7×10^6	A^2s
di_T/dt	Critical rate of rise of on-state current	V_D = 2250V, I_{TM} = 3000A, I_{GM}= 100A, T_j= 125°C di_G/dt = 50A/µs, C_S = 3µF, R_S = 5Ω	500	A/µs
V_{FGM}	Peak forward gate voltage		10	V
V_{RGM}	Peak reverse gate voltage		19	V

Symbols and parameters			Value	Unit
I_{FGM}	Peak forward gate current		1000	A
I_{RGM}	Max. RMS on-state current		4000	A
P_{FGM}	Peak forward gate power dissipation	tw = 20µs, f = 60Hz	10	W
P_{RGM}	Peak reverse gate power dissipation	tw = 30µs, f = 60Hz	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 = 3000A, T_j = 125°C			3.5	V
I_{RRM}	Repetitive peak reverse current	V_{RM} = 19V, T_j = 125°C			100	mA
I_{DRM}	Repetitive peak off-state current	V_{DM} = 4500V, V_{GK} = –2V, T_j = 125°C			150	mA
I_{GRM}	Reverse gate current	V_{RG} = 19V, T_j = 125°C			100	mA
dv/dt	Critical rate of rise of off-state voltage	V_D = 2250V, T_j = 125°C, V_{GK} = –2V (Expo. ware)	1000			V/µs
t_d	Delay time	I_T = 3000A, V_D = 2250V, I_{GM} = 100A, T_j = 125°C di/dt = 500A/µs, di_G/dt = 50A/µs C_S = 3µs, R_S = 5Ω			3	µs
t_s	Storage time	I_T = 3000A, V_{DM} = 3375V, V_D = 2250V, di_{GQ}/dt = 6000A/µs, C_S = 3.0µF, L_S = 0.4µH T_j = 125°C			3	µs
I_{GQ}	Peak gate turn-off current			-		A
V_{GT}	Gate trigger voltage	DC METHOD: V_D = 24V, R_L = 0.1Ω, T_j = 25°C			1.5	V
I_{GT}	Gate trigger current				4	A

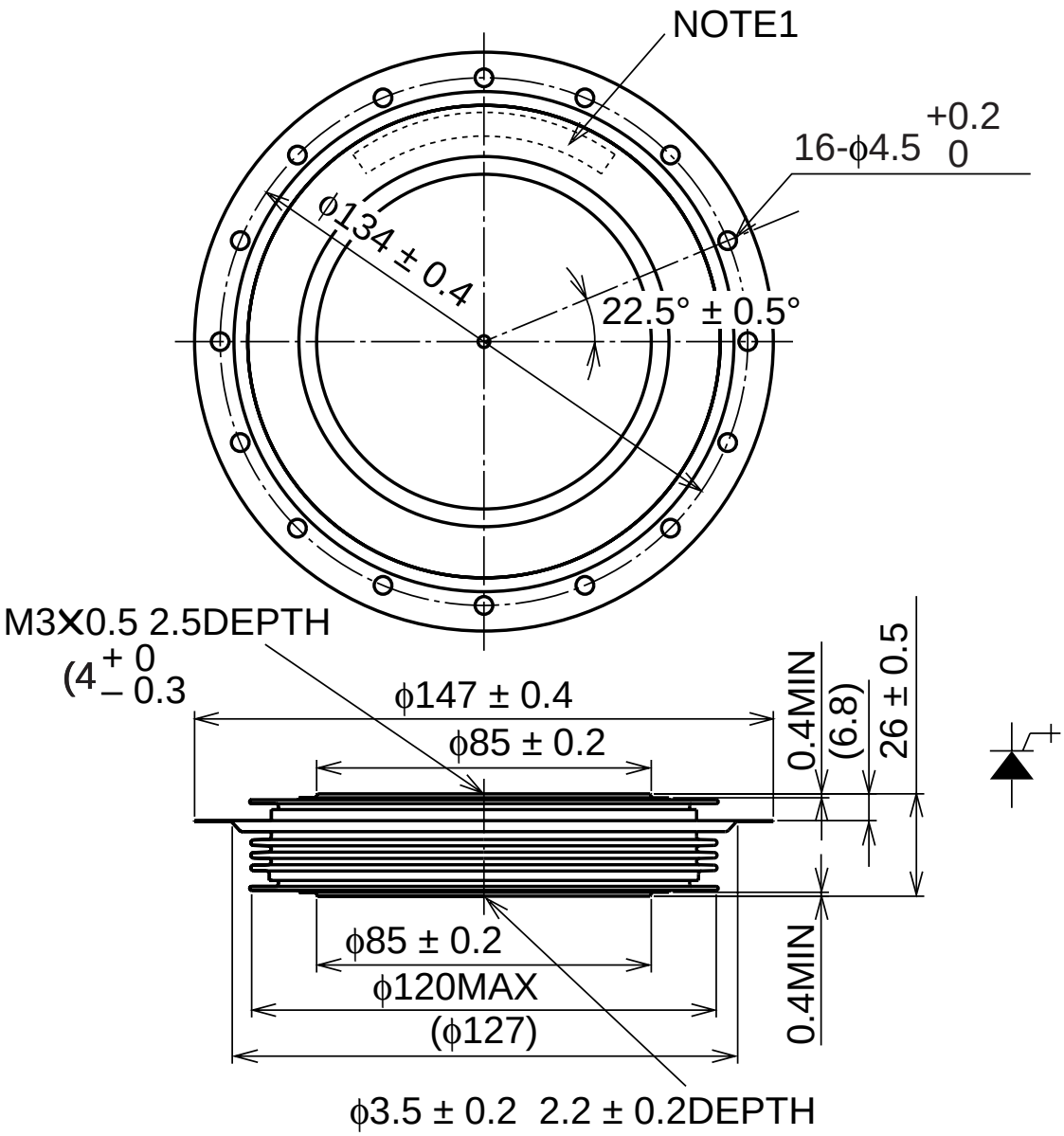
THERMAL

Symbols and parameters			Value	Unit
T_j	Junction operating temperature		-40 ... 125	°C
T_{stg}	Storage temperature range		-40 ... 150	°C
$R_{th(j-f)}$	Thermal resistance, max	Junction to fin	0.01	°C/W

MECHANICAL

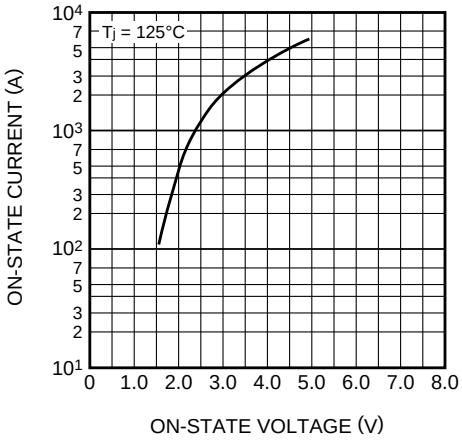
Symbols and parameters			Value	Unit
M	Mounting force required	Recommended value 47	39 ... 55	kN
w	Weight		1600	g

DIMENSIONES

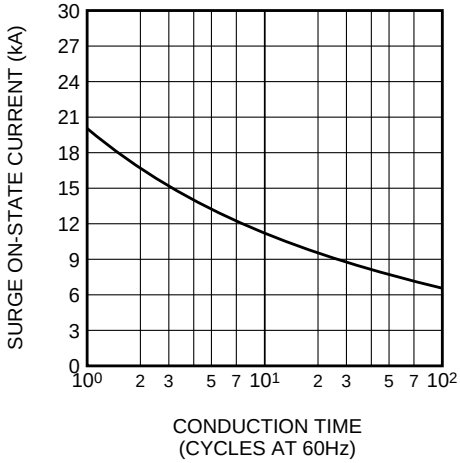


All dimensions in millimeters

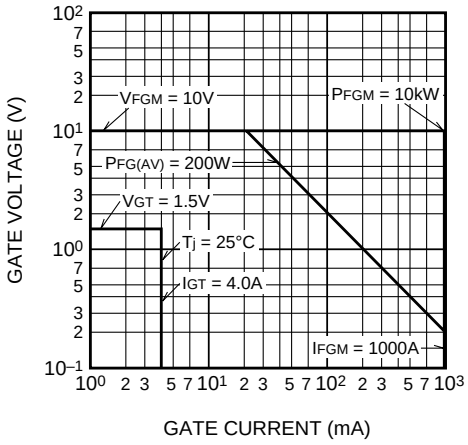
MAXIMUM ON-STATE CHARACTERISTIC



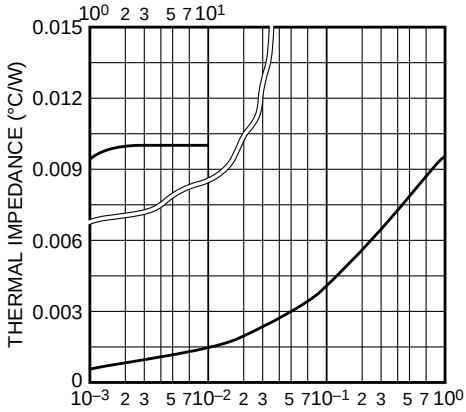
RATED SURGE ON-STATE CURRENT



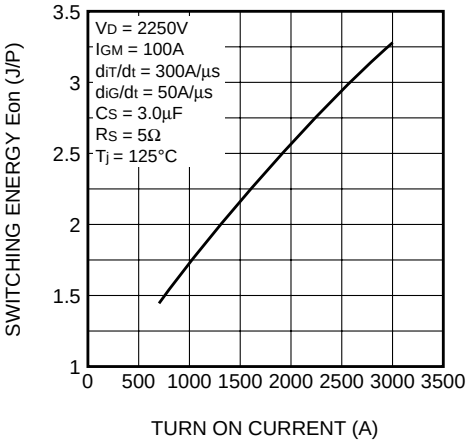
GATE CHARACTERISTICS



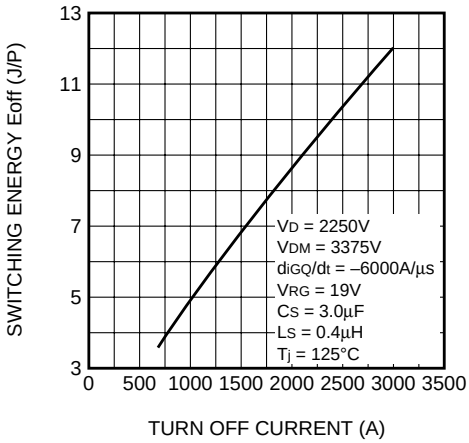
MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)



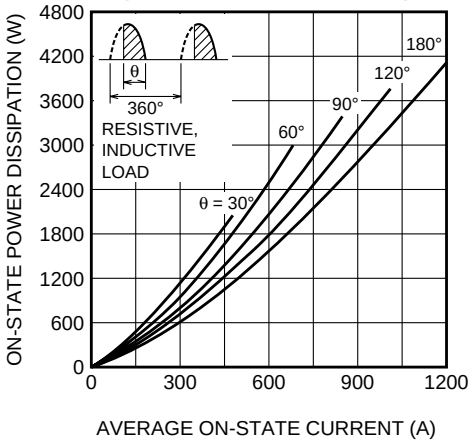
TURN ON SWITCHING ENERGY (MAXIMUM)



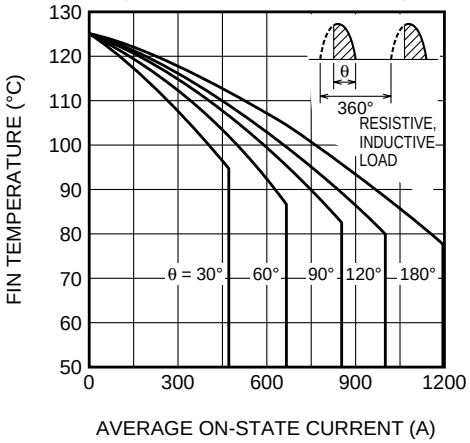
TURN OFF SWITCHING ENERGY (MAXIMUM)



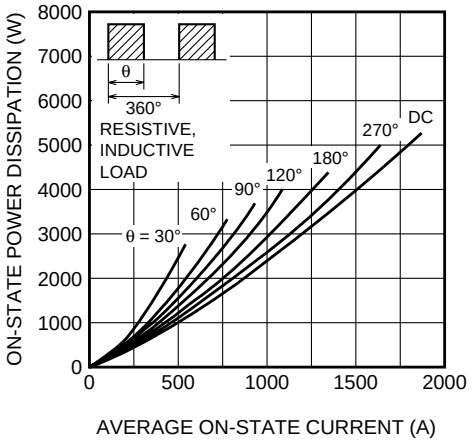
MAXIMUM ON-STATE POWER DISSIPATION CHARACTERISTICS (SINGLE-PHASE HALF WAVE)



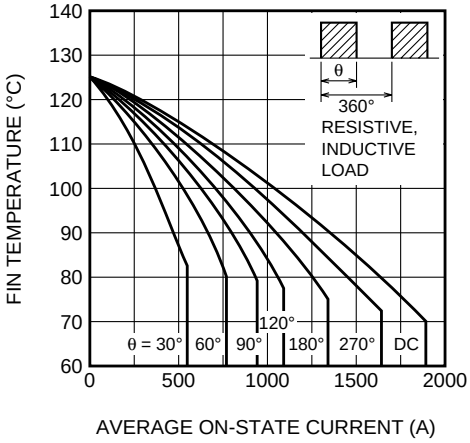
ALLOWABLE FIN TEMPERATURE VS. AVERAGE ON-STATE CURRENT (SINGLE-PHASE HALF WAVE)



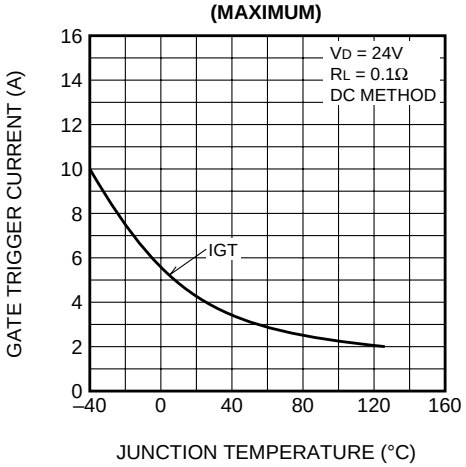
MAXIMUM ON-STATE POWER DISSIPATION CHARACTERISTICS (RECTANGULAR WAVE)



ALLOWABLE FIN TEMPERATURE VS. AVERAGE ON-STATE CURRENT (RECTANGULAR WAVE)



GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE (MAXIMUM)



TURN OFF STORAGE TIME VS. TURN OFF CURRENT (TYPICAL)