MITSUBISHI GATE COMMUTATED TURN-OFF THYRISTORS

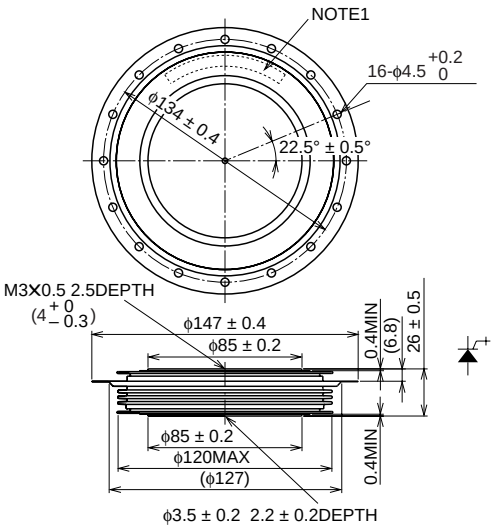
FG4000HX-90DS

HIGH POWER INVERTER USE
PRESS PACK TYPE

FG4000HX-90DS

- I_{TQRM} Repetitive controllable on-state current 3000A
- $I_{T(AV)}$ Average on-state current 1200A
- V_{DRM} Repetitive peak off state voltage 4500V
- 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
		90DS	
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

* : V_{GK} = –2V

Symbol	Parameter	Conditions	Ratings	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	1880	A
$I_{T(AV)}$	Average on-state current	f = 60Hz, sinewave θ = 180°, T_f = 78°C	1200	A
I_{TSM}	Surge 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
I_{FGM}	Peak forward gate current		1000	A
I_{RGM}	Peak reverse gate current		4000	A
P_{FGM}	Peak forward gate power dissipation	t_W = 20μs, f = 60Hz	10	kW
P_{RGM}	Peak reverse gate power dissipation	t_W = 30μs, f = 60Hz	120	kW
$P_{FG(AV)}$	Average forward gate power dissipation		200	W
$P_{RG(AV)}$	Average reverse gate power dissipation		6300	W
T_j	Junction temperature		–40 ~ +125	°C
T_{stg}	Storage temperature		–40 ~ +150	°C
—	Mounting force required	(Recommended value 47kN)	39 ~ 55	kN
—	Weight	Typical value	1600	g

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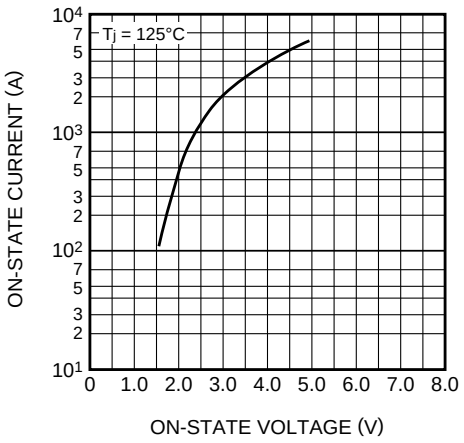
ELECTRICAL CHARACTERISTICS

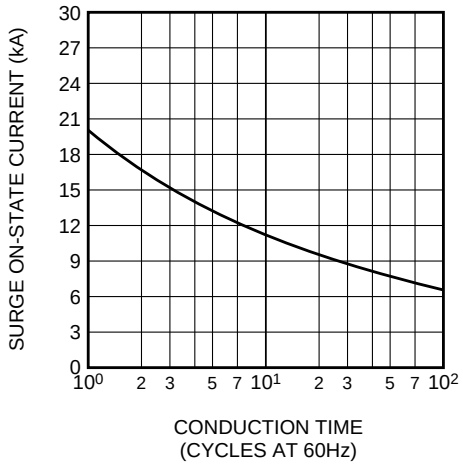
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{TM}	On-state voltage	I_T = 3000A, T_j = 125°C	—	—	3.5	V
I_{RRM}	Repetitive peak reverse current	V_{RM} = 19V, T_j = 125°C	—	—	100	mA
I_{DRM}	Repetitive peak off-state current	V_{DM} = 4500V, V_{GK} = –2V, T_j = 125°C	—	—	150	mA
I_{GRM}	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
I_{GT}	Gate trigger current	DC METHOD : V_D = 24V, R_L = 0.1Ω, T_j = 25°C	—	—	4.0	A
V_{GT}	Gate trigger voltage		—	—	1.5	V
$R_{th(j-f)}$	Thermal resistance	Junction to fin	—	—	0.01	°C/W

PERFORMANCE CURVES

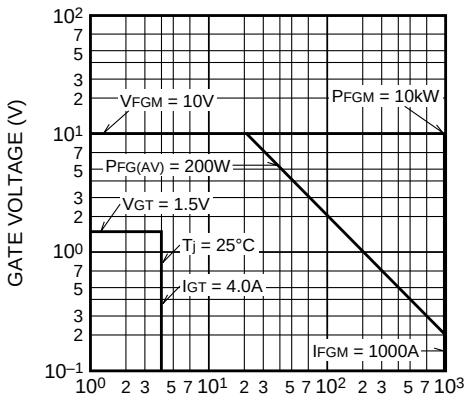
MAXIMUM ON-STATE CHARACTERISTIC



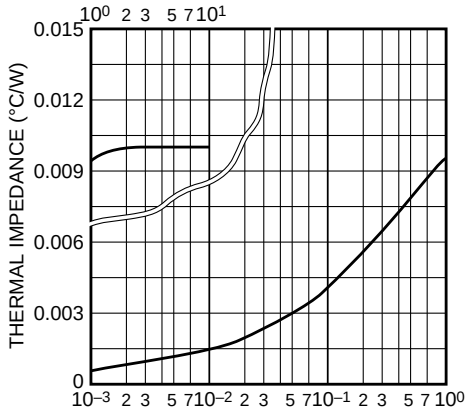
RATED SURGE ON-STATE CURRENT



GATE CHARACTERISTICS



MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)



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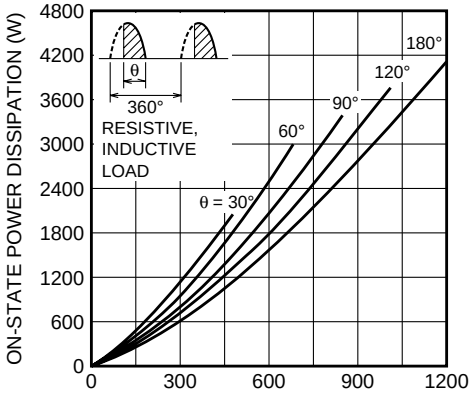
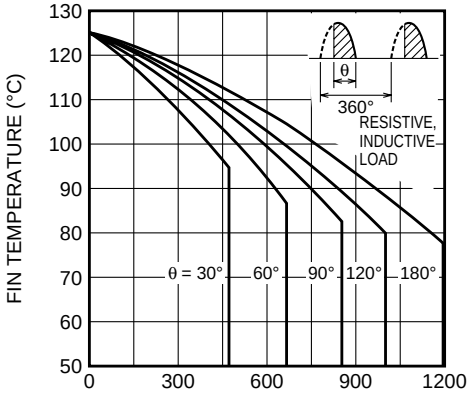
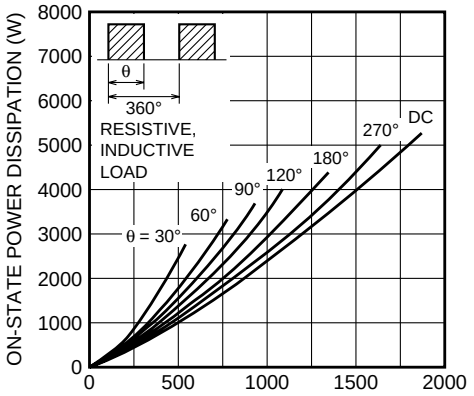
MAXIMUM ON-STATE POWER DISSIPATION CHARACTERISTICS (SINGLE-PHASE HALF WAVE)



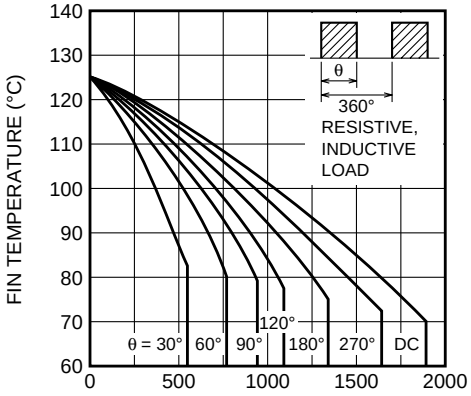
ALLOWABLE FIN TEMPERATURE VS. AVERAGE ON-STATE CURRENT (SINGLE-PHASE HALF WAVE)



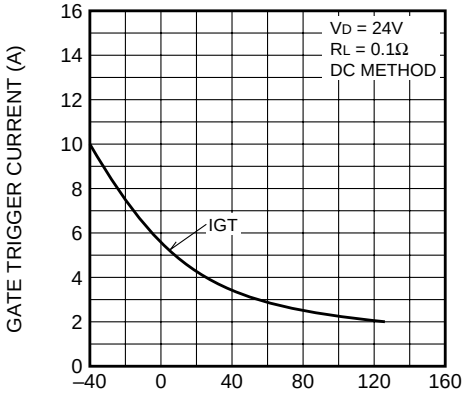
MAXIMUM ON-STATE POWER DISSIPATION CHARACTERISTICS (RECTANGULAR WAVE)



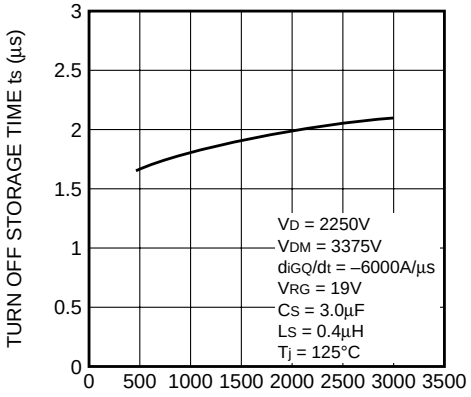
ALLOWABLE FIN TEMPERATURE VS. AVERAGE ON-STATE CURRENT (RECTANGULAR WAVE)



GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE (MAXIMUM)



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



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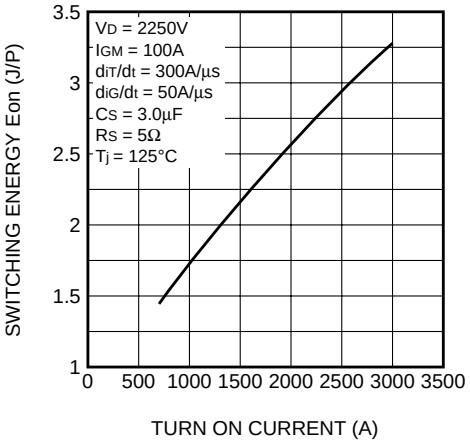
TURN ON SWITCHING ENERGY (MAXIMUM)



TURN OFF SWITCHING ENERGY (MAXIMUM)