MITSUBISHI GATE TURN-OFF THYRISTORS

FG4000BX-90DA

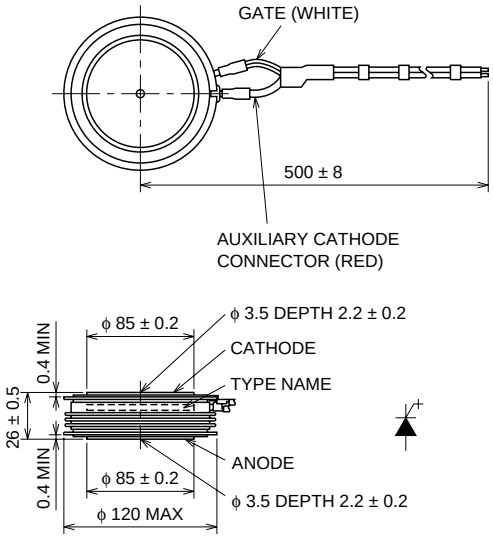
HIGH POWER INVERTER USE
PRESS PACK TYPE

FG4000BX-90DA



- I_{TQRM} Repetitive controllable on-state current 3000A
- $I_{T(AV)}$ Average on-state current 1000A
- V_{DRM} Repetitive peak off state voltage 4500V
- Anode short type

OUTLINE DRAWING Dimensions in mm



APPLICATION

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

MAXIMUM RATINGS

Symbol	Parameter	Voltage class	Unit
		90DA	
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} = 4500V, T_j = 125°C, C_S = 3.0µF, L_S = 0.25µH	3000	A
$I_{T(RMS)}$	RMS on-state current		1600	A
$I_{T(AV)}$	Average on-state current	f = 60Hz, sine wave θ = 180°, T_f = 78°C	1000	A
I_{TSM}	Surge (non-repetitive) on-state current	One half cycle at 60Hz	20	kA
I^2t	Current-squared, time integration	One cycle at 60Hz	1.7×10^6	A^2s
di_T/dt	Critical rate of rise of on-state current	V_D = 3400V, I_{GM} = 25A, T_j = 125°C	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		130	A
I_{RGM}	Peak gate reverse current		1100	A
P_{FGM}	Peak forward gate power dissipation		520	W
P_{RGM}	Peak reverse gate power dissipation		33	kW
$P_{FG(AV)}$	Average forward gate power dissipation		130	W
$P_{RG(AV)}$	Average reverse gate power dissipation		300	W
T_j	Junction temperature		–40 ~ +125	°C
T_{stg}	Storage temperature		–40 ~ +150	°C
—	Mounting force required	Recommended value 38	32 ~ 40	kN
—	Weight	Standard value	1600	g

MITSUBISHI ELECTRIC

FG4000BX-90DA

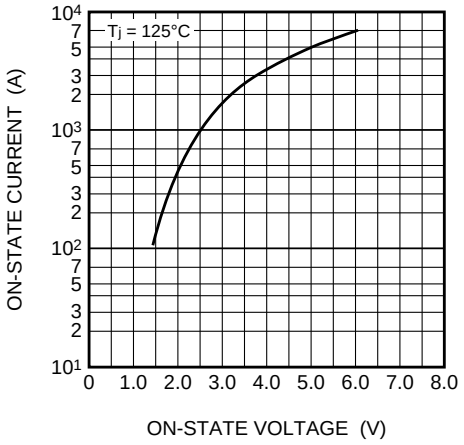
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ELECTRICAL CHARACTERISTICS

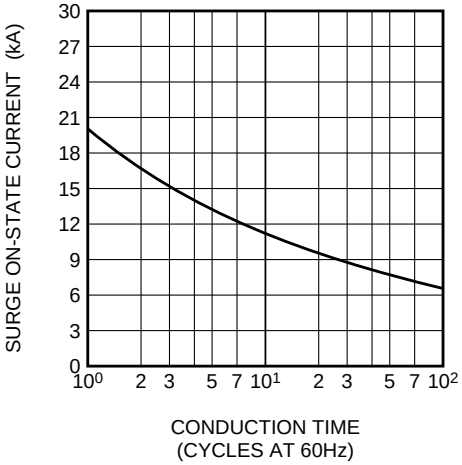
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{TM}	On-state voltage	T_j = 125°C, I_{TM} = 3000A, Instantaneous measurment	—	—	3.8	V
I_{RRM}	Repetitive peak reverse current	T_j = 125°C, V_{RRM} Applied	—	—	100	mA
I_{DRM}	Repetitive peak off-state current	T_j = 125°C, V_{DRM} Applied, V_{GK} = –2V	—	—	150	mA
I_{RG}	Reverse gate current	T_j = 125°C, V_{RG} = 19V	—	—	100	mA
dv/dt	Critical rate of rise of off-state voltage	T_j = 125°C, V_D = 2250V, V_{GK} = –2V	1000	—	—	V/µs
t_{gt}	Turn-on time	T_j = 125°C, I_{TM} = 3000A, I_{GM} = 25A, V_D = 3400V	—	—	6	µs
t_{gq}	Turn-off time	T_j = 125°C, I_{TM} = 3000A, V_{DM} = 4500V, di_{GQ}/dt = –40A/µs V_{RG} = 17V, C_S = 3.0µF, L_S = 0.25µH	—	—	30	µs
I_{GQM}	Peak gate turn-off current		—	750	—	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		—	—	3200	mA
$R_{th(j-f)}$	Thermal resistance	Junction to fin	—	—	0.012	°C/W

PERFORMANCE CURVES

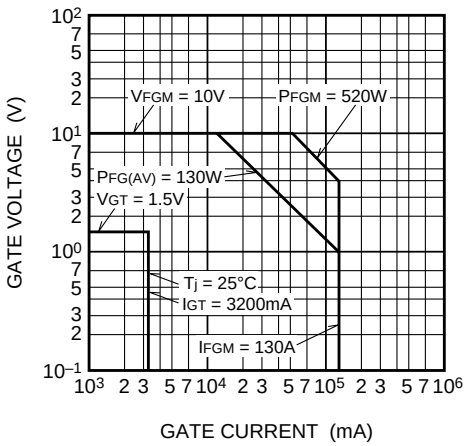
MAXIMUM ON-STATE CHARACTERISTIC



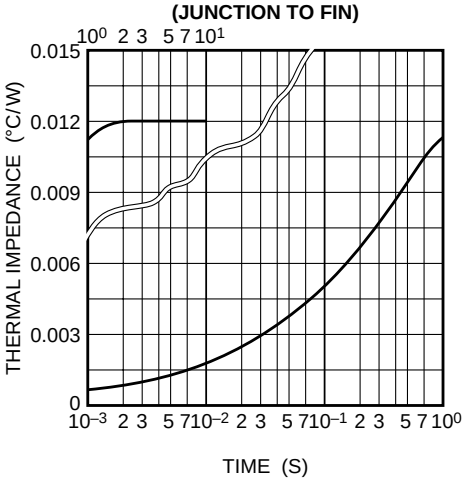
RATED SURGE ON-STATE CURRENT



GATE CHARACTERISTICS



MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)

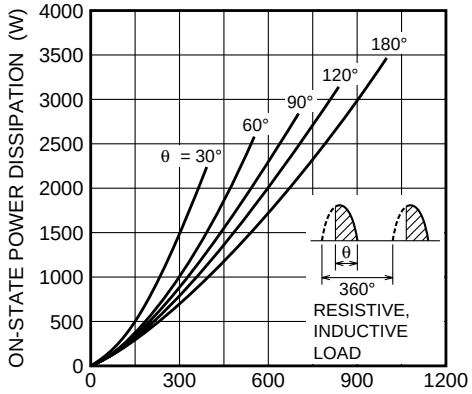


MITSUBISHI ELECTRIC

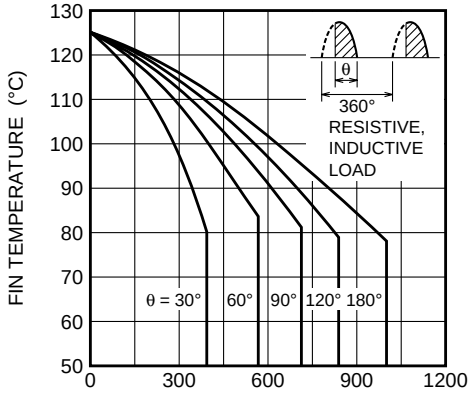
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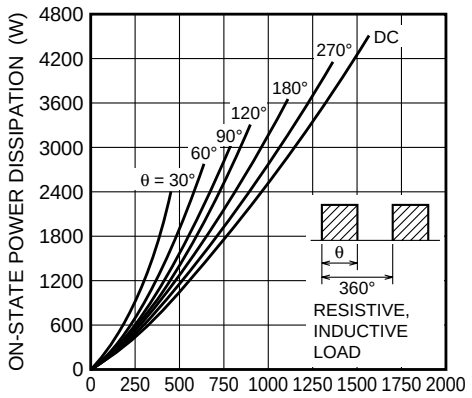
MAXIMUM ON-STATE POWER DISSIPATION CHARACTERISTICS (SINGLE-PHASE HALF WAVE)



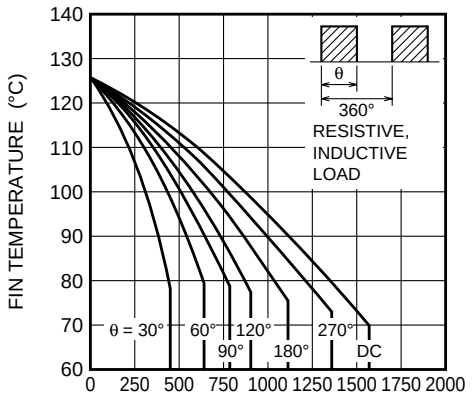
ALLOWABLE FIN TEMPERATURE VS. AVERAGE ON-STATE CURRENT (SINGLE-PHASE HALF WAVE)



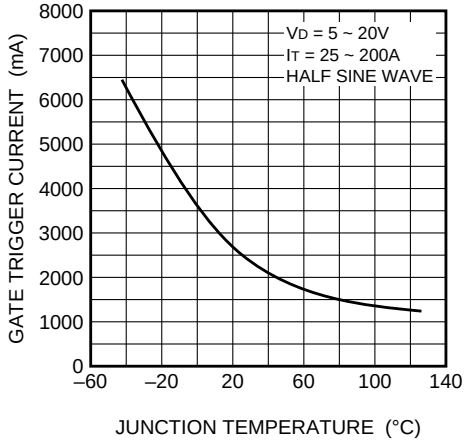
MAXIMUM ON-STATE POWER DISSIPATION CHARACTERISTICS (RECTANGULAR WAVE)



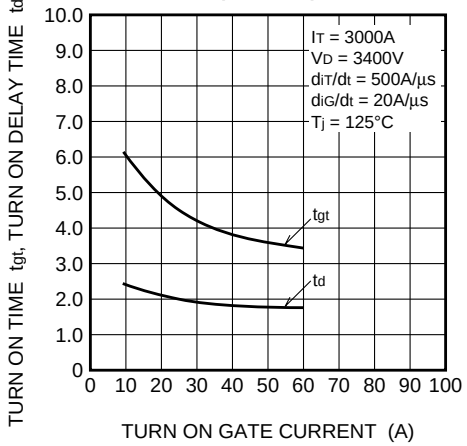
ALLOWABLE FIN TEMPERATURE VS. AVERAGE ON-STATE CURRENT (RECTANGULAR WAVE)



GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE (TYPICAL)

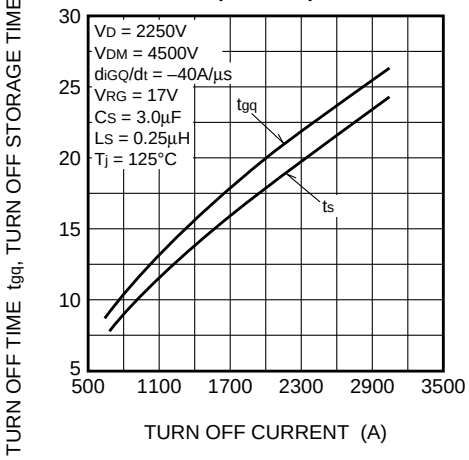


TURN ON TIME, TURN ON DELAY TIME VS. TURN ON GATE CURRENT (TYPICAL)

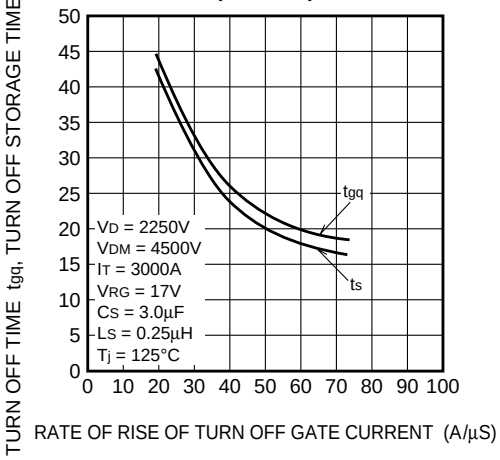


MITSUBISHI ELECTRIC

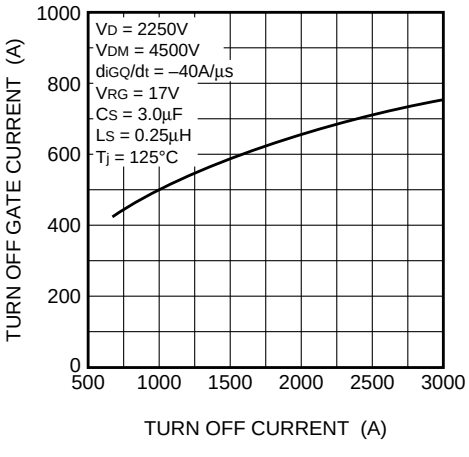
TURN OFF TIME, TURN OFF STORAGE TIME VS. TURN OFF CURRENT (TYPICAL)



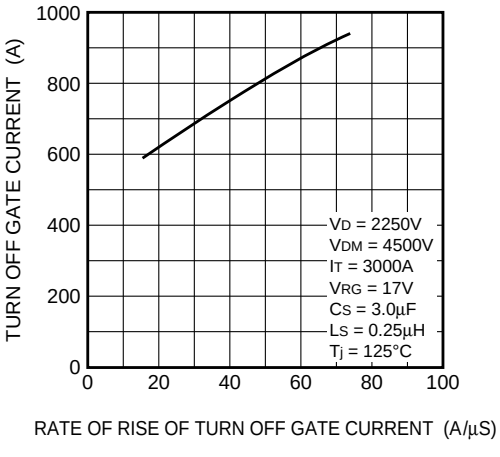
TURN OFF TIME, TURN OFF STORAGE TIME VS. RATE OF RISE OF TURN OFF GATE CURRENT (TYPICAL)



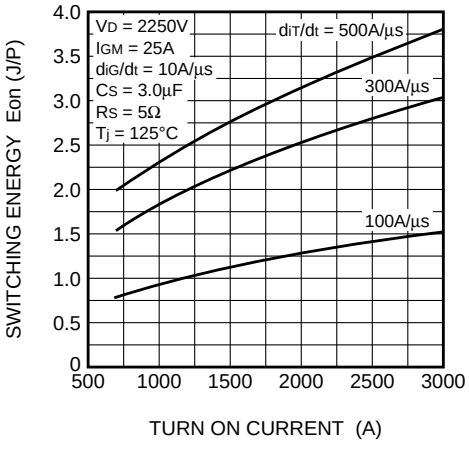
TURN OFF GATE CURRENT VS. TURN OFF CURRENT (TYPICAL)



TURN OFF GATE CURRENT VS. RATE OF RISE OF GATE CURRENT (TYPICAL)



TURN ON SWITCHING ENERGY (MAXIMUM)



TURN OFF SWITCHING ENERGY (MAXIMUM)

