MITSUBISHI GATE COMMUTATED TURN-OFF THYRISTORS

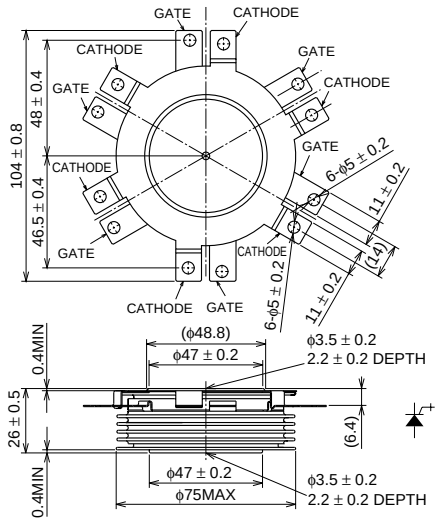
FGC800A-130DS

HIGH POWER INVERTER USE
PRESS PACK TYPE

FGC800A-130DS

- Symmetrical GCT
- I_{TQRM} Repetitive controllable on-state current 800A
- $I_{T(AV)}$ Average on-state current 330A
- V_{DRM} Repetitive peak off-state voltage 6500V
- V_{RRM} Repetitive peak reverse voltage 6500V

OUTLINE DRAWING **Dimensions in mm**



APPLICATION

Current source inverters, DC choppers, Induction heaters, DC to DC converters.

MAXIMUM RATINGS

Symbol	Parameter	Conditions	Voltage class	Unit
V_{RRM}	Repetitive peak reverse voltage	—	6500	V
V_{RSM}	Non-repetitive peak reverse voltage	—	6500	V
V_{DRM}	Repetitive peak off-state voltage	V_{GK} = –2V	6500	V
V_{DSM}	Non-repetitive peak off-state voltage	V_{GK} = –2V	6500	V
V_{LTDS}	Long term DC stability voltage	V_{GK} = –2V, λ = 100 Fit	3600	V

Symbol	Parameter	Conditions	Ratings	Unit
I_{TQRM}	Repetitive controllable on-state current	V_{DM} = 3/4 V_{DRM}, V_D = 3000V, L_C = 0.3μH, V_{RG} = 20V T_j = 25/115°C, di_{GQ}/dt= 1200A/μs (see Fig. 1, 3)	800	A
$I_{T(RMS)}$	RMS on-state current	Applied for all conduction angles	520	A
$I_{T(AV)}$	Average on-state current	f = 60Hz, sinewave θ = 180°, T_f = 55°C	330	A
I_{TSM}	Surge on-state current	One half cycle at 60Hz, T_j = 115°C Start	4.8	kA
I^2t	Current-squared, time integration		9.6×10^4	A^2s
di_T/dt	Critical rate of rise of on-state current	V_D = 3000V, I_T = 800A, C_S= 0.1μF, R_S= 10Ω, T_j = 25/115°C f = 60Hz, I_{GM} = 90A, di_G/dt= 50A/μs (see Fig. 1,2)	1000	A/μs
V_{FGM}	Peak forward gate voltage		10	V
V_{RGM}	Peak reverse gate voltage		21	V
I_{FGM}	Peak forward gate current		500	A
I_{RGM}	Peak reverse gate current		800	A
P_{FGM}	Peak forward gate power dissipation		5	kW
P_{RGM}	Peak reverse gate power dissipation		17	kW
$P_{FG(AV)}$	Average forward gate power dissipation		100	W
$P_{RG(AV)}$	Average reverse gate power dissipation		120	W
T_j	Junction temperature		–20 ~ +115	°C
T_{stg}	Storage temperature		–20 ~ +150	°C
—	Mounting force required	(Recommended value 13kN)	11.1 ~ 15.8	kN
—	Weight	Typical value	530	g

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ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{TM}	On-state voltage	I_T = 800A, T_j = 115°C	—	—	6.8	V
I_{RRM}	Repetitive peak reverse current	V_{RM} = 6500V, T_j = 115°C	—	—	150	mA
I_{DRM}	Repetitive peak off-state current	V_{DM} = 6500V, V_{GK} = –2V, T_j = 115°C	—	—	100	mA
I_{GRM}	Reverse gate current	V_{RG} = 21V, T_j = 115°C	—	—	50	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 = 800A, V_D = 3000V, di/dt = 1000A/µs, T_j = 115°C	—	—	5.0	µs
t_d	Delay time	C_S= 0.1µF, R_S = 10Ω	—	—	1.0	µs
E_{on}	Turn-on switching energy	I_{GM} = 90A, di_G/dt = 50A/µs (see Fig. 1, 2)	—	—	1.6	J/P
t_s	Storage time	I_T = 800A, V_{DM} = 3/4 V_{DRM}, V_D = 3000V	—	—	3.0	µs
E_{off}	Turn-off switching energy	C_S= 0.1µF, R_S= 10Ω, V_{RG} = 20V, T_j = 115°C di_{GQ}/dt = 1200A/µs (see Fig. 1, 5)	—	—	6.0	J/P
Q_{RR}	Reverse recovery charge	V_R = 3000V, I_T = 800A, di/dt = 1000A/µs	—	—	1650	µC
E_{rec}	Reverse recovery energy	C_S= 0.1µF, R_S = 10Ω, T_j = 115°C (see Fig. 4, 5)	—	—	5.0	J/P
I_{GT}	Gate trigger current	DC METHOD : V_D = 24V, R_L = 0.1Ω, T_j = 25°C	—	—	0.5	A
V_{GT}	Gate trigger voltage		—	—	1.5	V
$R_{th(j-f)}$	Thermal resistance	Junction to fin	—	—	0.025	K/W

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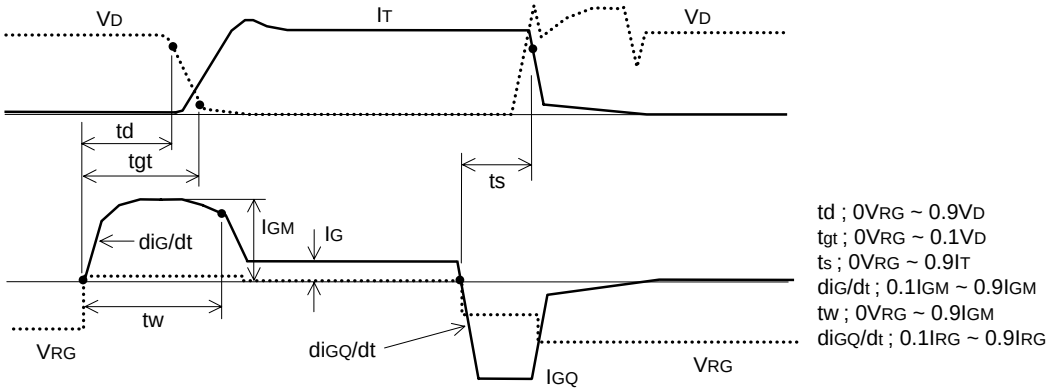

Fig. 1 Turn-on and Turn-off waveform

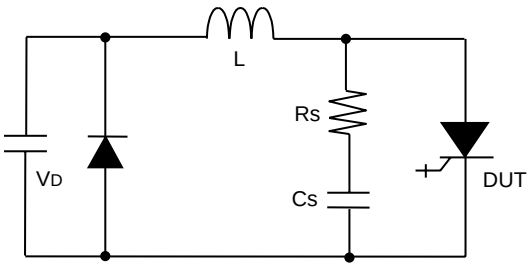

Fig. 2 Turn-on test circuit

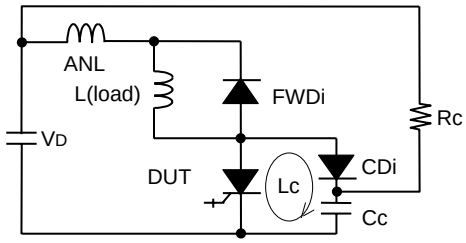

Fig. 3 Turn-off test circuit
(With clamp circuit)

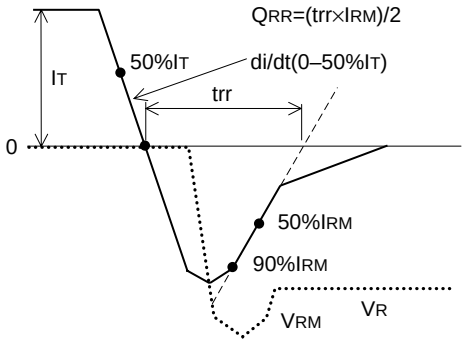

Fig. 4 Reverse recovery waveform

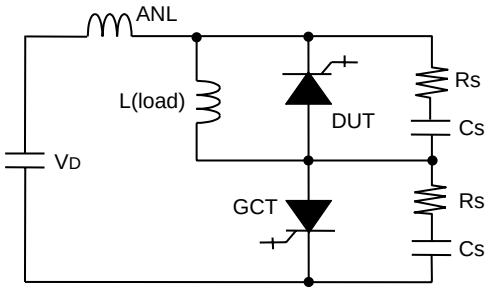

Fig. 5 Turn-off and Reverse recovery test circuit
(With CR snubber circuit)

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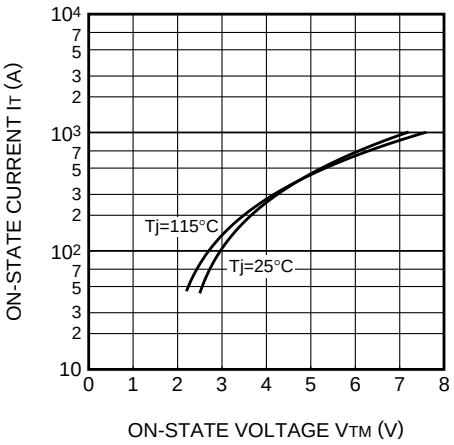
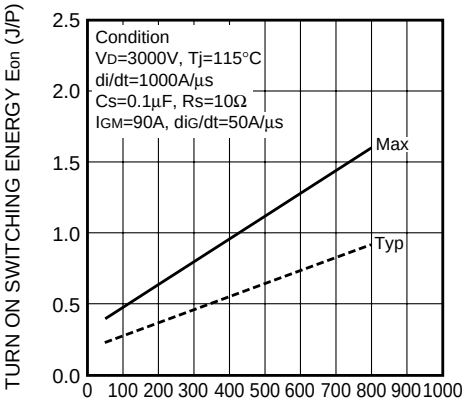
PERFORMANCE CURVES

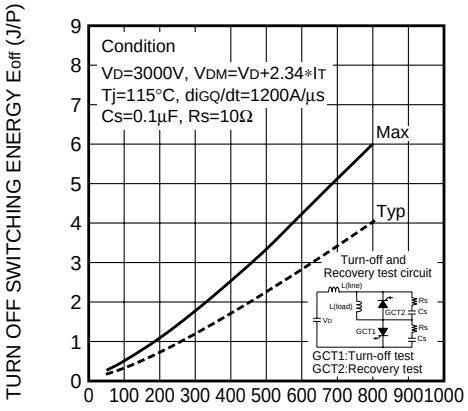
MAXIMUM ON-STATE CHARACTERISTIC



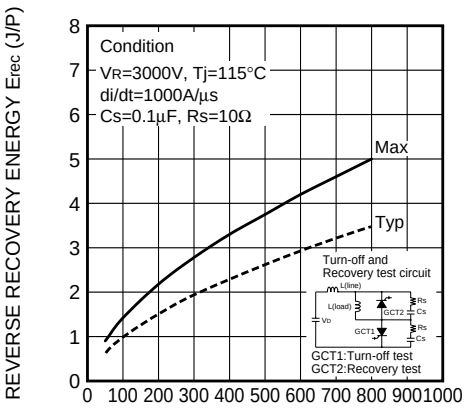
Eon VS IT



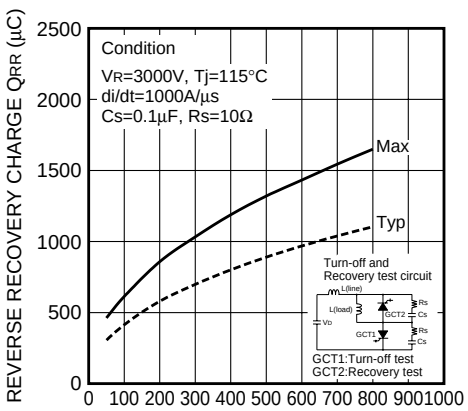
Eoff VS IT



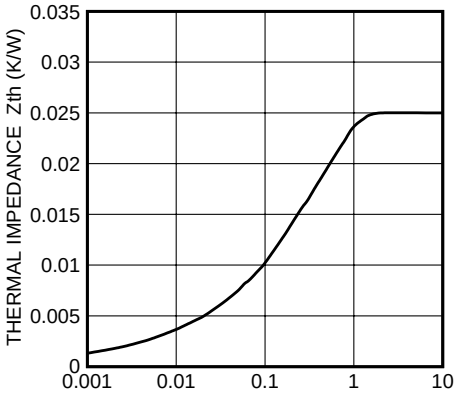
Erec VS IT



QRR VS IT



MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)



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