

Gate Commutated Turn-Off Thyristors AFGC 800-130-A-DS



Key Parameters

| | | |
|-------------|---|--------|
| I_{TQRM} | = | 800 A |
| $I_{T(AV)}$ | = | 330 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 | $V_{GK} = -2V, \lambda = 100 \text{ Fit}$ | 3600 | V |

| Symbols and parameters | | | Value | Unit |
|------------------------|---|--|-------------------|-----------|
| I_{TQRM} | Repetitive controllable on-state current | $V_{DM} = 3/4 V_{DRM},$ $V_D = 3000V, L_C = 0.3\mu H,$ $V_{RG} = 20V, T_j = 25/115^\circ C,$ | 800 | A |
| $I_{T(RMS)}$ | RMS on-state current | Applied for all conduction angles $f = 60\text{Hz},$ sinewave $\theta = 180^\circ, T_f = 55^\circ C$ | 520 | A |
| $I_{T(AV)}$ | Average on-state current | | 330 | A |
| I_{TSM} | Surge (non-repetitive) on-state current | One half cycle at 60Hz, $T_j = 115^\circ C$ 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 | $V_D = 3000V, I_T = 800A,$ $C_S = 0.1\mu F, R_S = 10\Omega$ $T_j = 25/115^\circ C, f = 60\text{Hz}$ | 1000 | $A/\mu s$ |
| 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 | | 500 | A |
| I_{RGM} | Max. RMS on-state current | | 800 | A |
| P_{FGM} | Peak forward gate power dissipation | | 5 | kW |
| P_{RGM} | Peak reverse gate power dissipation | | 17 | kW |
| $P_{FG(AV)}$ | Max. peak non-repetitive surge current | | 100 | W |
| $P_{RG(AV)}$ | Limiting load integral | | 120 | W |

ELECTRICAL CHARACTERISTICS

| Symbols and parameters | | | Value | | | Unit |
|------------------------|--|--|-------|-----|------|------------|
| | | | min | typ | max | |
| V_{TM} | On-state voltage | $I_T = 800A, T_j = 115^\circ C$ | | | 6.8 | V |
| I_{RRM} | Repetitive peak reverse current | $V_{RM} = 6500V, T_j = 115^\circ C$ | | | 150 | mA |
| I_{DRM} | Repetitive peak off-state current | $V_{DM} = 6500V, V_{GK} = -2V, T_j = 115^\circ C$ | | | 100 | mA |
| I_{GRM} | Reverse gate current | $V_{RG} = 21V, T_j = 115^\circ C$ | | | 50 | mA |
| dv/dt | Critical rate of rise of off-state voltage | $V_D = 3000V, V_{GK} = -2V, T_j = 115^\circ C$ (Expo. wave) | 3000 | | | V/ μs |
| t_{gt} | Turn-on time | $I_T = 800A, V_D = 3000V, di/dt = 1000A/\mu s, T_j = 115^\circ C, C_S = 0.1\mu F, R_S = 10\Omega$ | | | 5 | μs |
| t_d | Delay time | | | | 1 | μs |
| E_{on} | Peak gate turn-off current | | | | 1.6 | J/P |
| t_s | Gate trigger voltage | $I_T = 800A, V_{DM} = 3/4 V_{DRM}, V_D = 3000V, C_S = 0.1\mu F, R_S = 10\Omega, V_{RG} = 20V, T_j = 115^\circ C$ | | | 3 | μs |
| E_{off} | Gate trigger current | | | | 6 | J/P |
| Q_{RR} | Delay time | $V_R = 3000V, I_T = 800A, di/dt = 1000A/\mu s, C_S = 0.1\mu F, R_S = 10\Omega, T_j = 115^\circ C$ | | | 1650 | μC |
| E_{rec} | Peak gate turn-off current | | | | 5 | A |
| I_{GT} | Gate trigger voltage | DC METHOD : $V_D = 24V, R_L = 0.1\Omega, T_j = 25^\circ C$ | | | 0.5 | 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 | 0.025 | °C/W |

MECHANICAL

| Symbols and parameters | | | Value | Unit |
|------------------------|-------------------------|----------------------|---------------|------|
| M | Mounting force required | Recommended value 13 | 11.1 ... 15.8 | kN |
| w | Weight | | 530 | g |

Fig. 1 Turn-on and Turn-off waveform

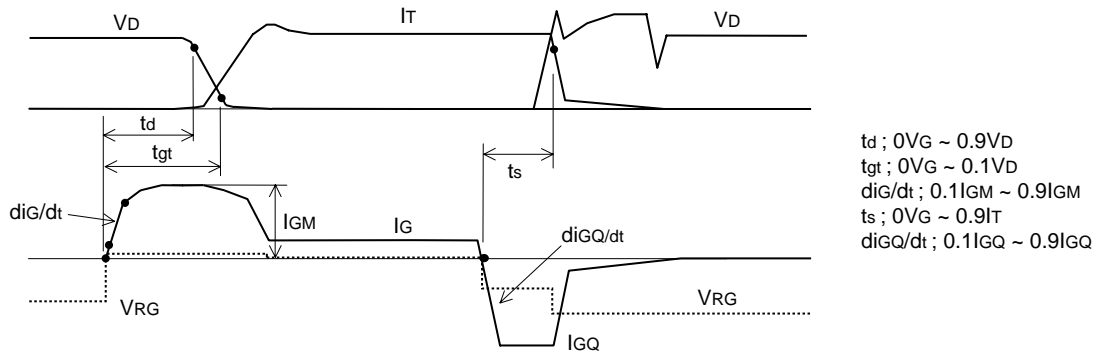


Fig. 2 Turn-on test circuit

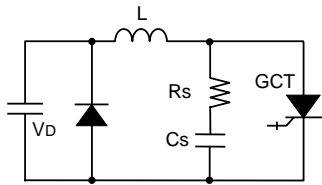


Fig. 3 Turn-off test circuit (With clamp circuit)

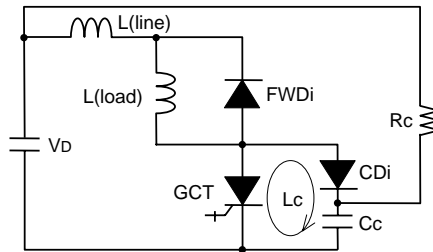


Fig. 4 dv/dt test waveform

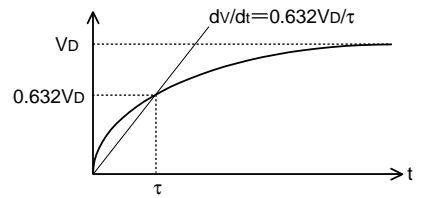
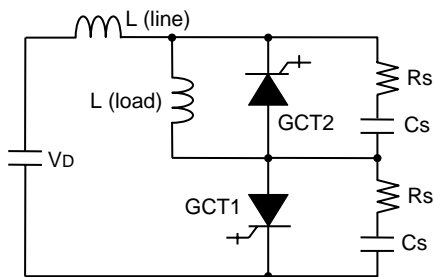
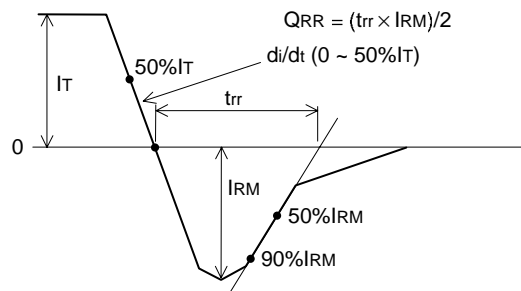


Fig. 5 Turn-off and Recovery test circuit

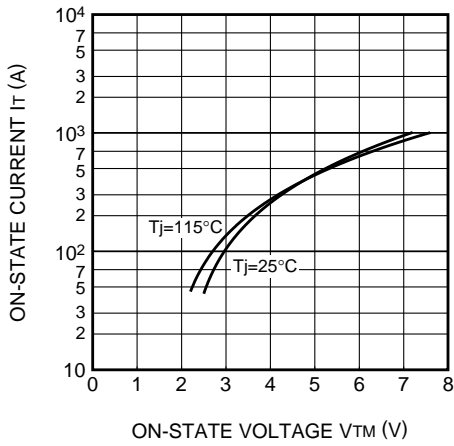


GCT1 : For turn-off test
 GCT2 : For Recovery test

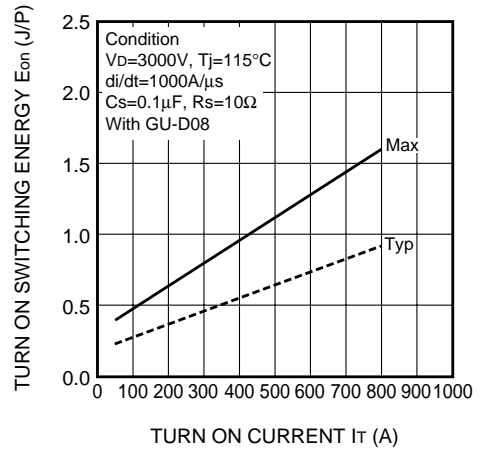
Fig. 6 Reverse recovery waveform



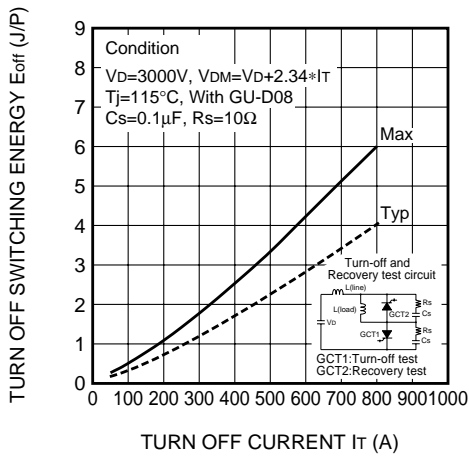
MAXIMUM ON-STATE CHARACTERISTIC



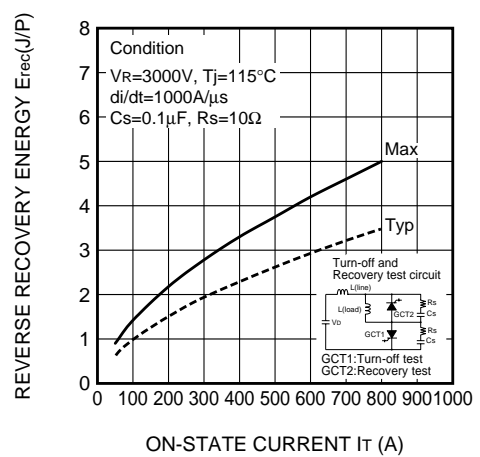
E_{on} VS I_T



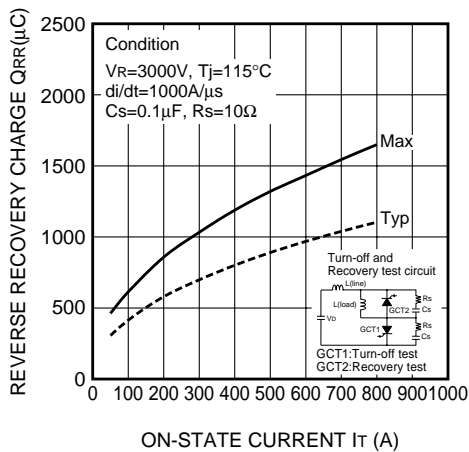
E_{off} VS I_T



E_{rec} VS I_T



Q_{RR} VS I_T



MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)

