

# FG4000GX-90DA

HIGH POWER INVERTER USE  
PRESS PACK TYPE

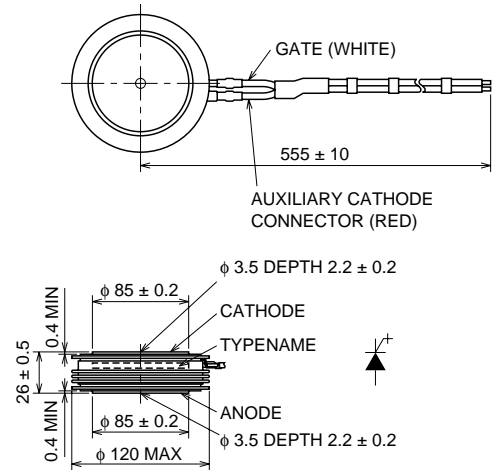
## FG4000GX-90DA



- ITQRM Repetitive controllable on-state current ..... 4000A
- IT(AV) Average on-state current ..... 1200A
- VDRM 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          |  |      |
| VRRM   | Repetitive peak reverse voltage        | 17            |  | V    |
| VRSM   | Non-repetitive peak reverse voltage    | 17            |  | V    |
| VR(DC) | DC reverse voltage                     | 17            |  | V    |
| VDRM   | Repetitive peak off-state voltage*     | 4500          |  | V    |
| VDSM   | Non-repetitive peak off-state voltage* | 4500          |  | V    |
| VD(DC) | DC off-state voltage*                  | 3600          |  | V    |
| VLTD5  | Long term DC stability voltage*        | 3000          |  | V    |

\* : VGK = -2V

| Symbol           | Parameter                                 | Conditions  | Ratings               | Unit             |
|------------------|---|---|-----------------------|------------------|
| ITQRM            | Repetitive controllable on-state current  | V <sub>DM</sub> = 4500V, T <sub>J</sub> = 125°C, C <sub>S</sub> = 4.0μF, L <sub>S</sub> = 0.2μH | 4000                  | A                |
| IT(RMS)          | RMS on-state current                      |   | 1800                  | A                |
| IT(AV)           | Average on-state current                  | f = 60Hz, sine wave θ = 180°, T <sub>r</sub> = 70°C   | 1200                  | A                |
| ITSM             | Surge (non-repetitive) on-state current   | One half cycle at 60Hz  | 25                    | kA               |
| I <sup>2</sup> t | Current-squared, time integration         | One cycle at 60Hz   | 2.6 × 10 <sup>6</sup> | A <sup>2</sup> s |
| diT/dt           | Critical rate of rise of on-state current | V <sub>D</sub> = 3400V, I <sub>GM</sub> = 25A, T <sub>J</sub> = 125°C                           | 500                   | A/μs             |
| VFGM             | Peak forward gate voltage                 |   | 10                    | V                |
| VRGM             | Peak reverse gate voltage                 |   | 17                    | V                |
| IFGM             | Peak forward gate current                 |   | 130                   | A                |
| IRGM             | Peak gate reverse current                 |   | 900                   | A                |
| PFGM             | Peak forward gate power dissipation       |   | 520                   | W                |
| PRGM             | Peak reverse gate power dissipation       |   | 33                    | kW               |
| PFG(AV)          | Average forward gate power dissipation    |   | 130                   | W                |
| PRG(AV)          | Average reverse gate power dissipation    |   | 300                   | W                |
| T <sub>J</sub>   | Junction temperature                      |   | -40 ~ +125            | °C               |
| T <sub>stg</sub> | Storage temperature                       |   | -40 ~ +150            | °C               |
| —                | Mounting force required                   | Recommended value 42  | 35 ~ 48               | kN               |
| —                | Weight                                    | Standard value  | 1220                  | g                |

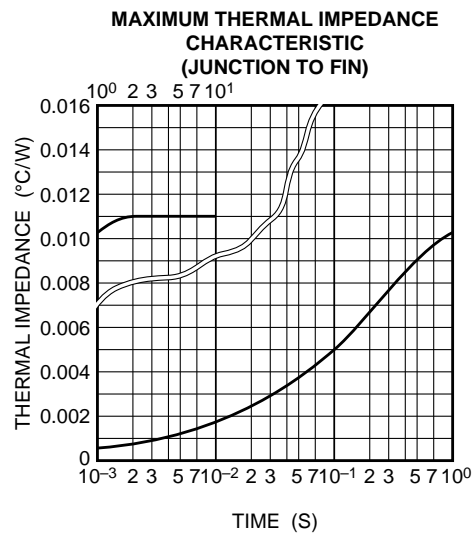
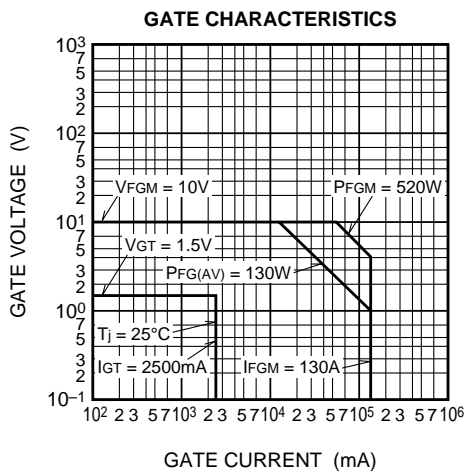
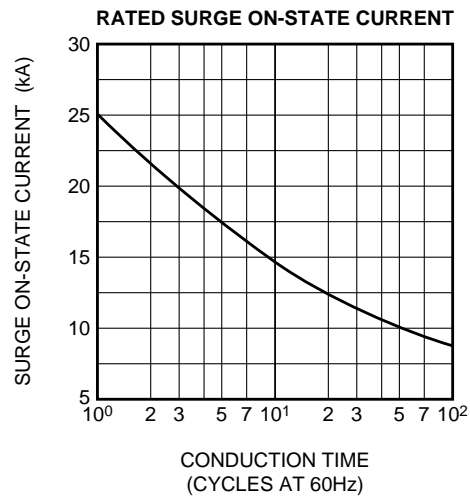
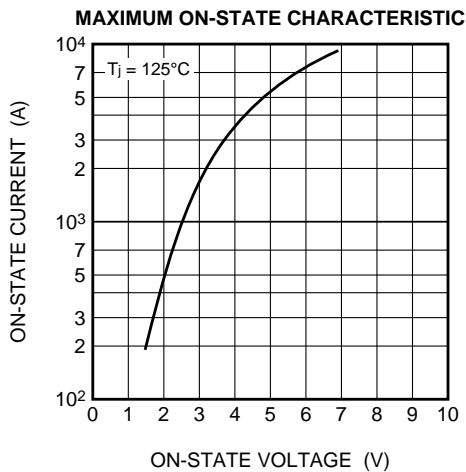
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## ELECTRICAL CHARACTERISTICS

| Symbol               | Parameter                                  | Test conditions  | Limits |     |       | Unit |
|----------------------|--|--|--------|-----|-------|------|
|                      |  |  | Min    | Typ | Max   |      |
| V <sub>TM</sub>      | On-state voltage                           | T <sub>j</sub> = 125°C, I <sub>TM</sub> = 4000A, Instantaneous measurement   | —      | —   | 4.3   | V    |
| I <sub>RRM</sub>     | Repetitive peak reverse current            | T <sub>j</sub> = 125°C, V <sub>RRM</sub> Applied   | —      | —   | 10    | mA   |
| I <sub>DRM</sub>     | Repetitive peak off-state current          | T <sub>j</sub> = 125°C, V <sub>DRM</sub> Applied, V <sub>GK</sub> = -2V  | —      | —   | 150   | mA   |
| I <sub>RG</sub>      | Reverse gate current                       | T <sub>j</sub> = 125°C, V <sub>RG</sub> = 17V  | —      | —   | 10    | mA   |
| dv/dt                | Critical rate of rise of off-state voltage | T <sub>j</sub> = 125°C, V <sub>D</sub> = 2250V, V <sub>GK</sub> = -2V  | 1000   | —   | —     | V/μs |
| t <sub>gt</sub>      | Turn-on time                               | T <sub>j</sub> = 125°C, I <sub>TM</sub> = 4000A, I <sub>GM</sub> = 25A, V <sub>D</sub> = 3400V   | —      | —   | 8     | μs   |
| t <sub>gq</sub>      | Turn-off time                              | T <sub>j</sub> = 125°C, I <sub>TM</sub> = 4000A, V <sub>DM</sub> = 4500V, diGQ/dt = -50A/μs<br>V <sub>RG</sub> = 17V, C <sub>s</sub> = 4.0μF, L <sub>s</sub> = 0.2μH | —      | —   | 35    | μs   |
| I <sub>GQM</sub>     | Peak gate turn-off current                 |  | —      | 900 | —     | A    |
| V <sub>GT</sub>      | Gate trigger voltage                       | DC METHOD : V <sub>D</sub> = 24V, R <sub>L</sub> = 0.1Ω, T <sub>j</sub> = 25°C   | —      | —   | 1.5   | V    |
| I <sub>GT</sub>      | Gate trigger current                       |  | —      | —   | 2500  | mA   |
| R <sub>th(j-f)</sub> | Thermal resistance                         | Junction to fin  | —      | —   | 0.011 | °C/W |

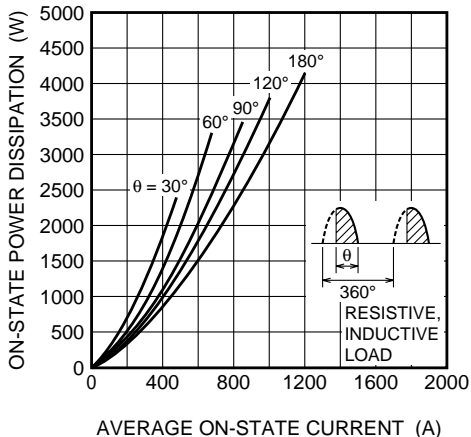
## PERFORMANCE CURVES



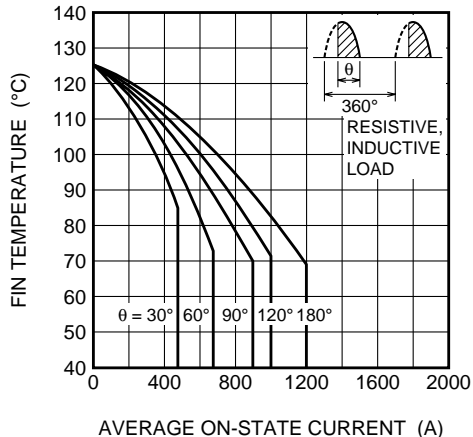
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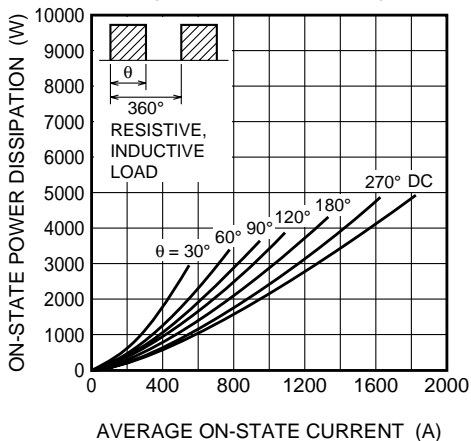
**MAXIMUM ON-STATE POWER DISSIPATION CHARACTERISTICS (SINGLE-PHASE HALF WAVE)**



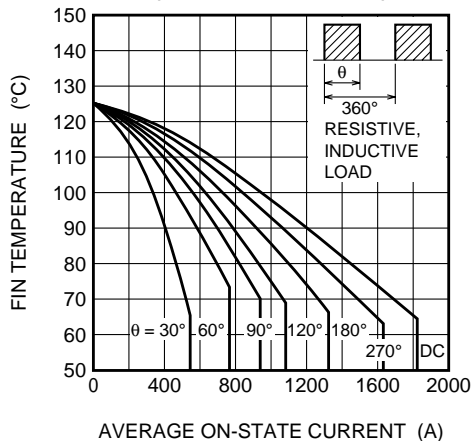
**ALLOWABLE FIN TEMPERATURE VS. AVERAGE ON-STATE CURRENT (SINGLE-PHASE HALF WAVE)**



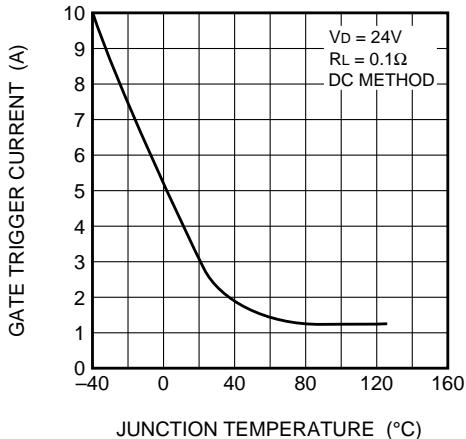
**MAXIMUM ON-STATE POWER DISSIPATION CHARACTERISTICS (RECTANGULAR WAVE)**



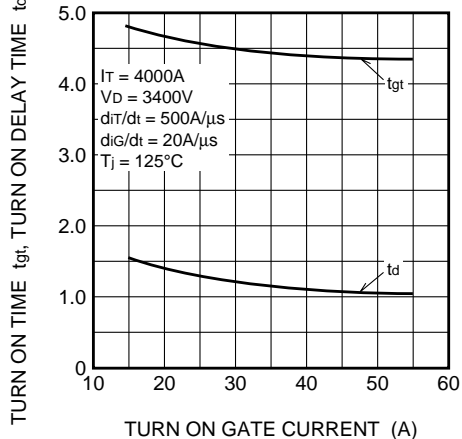
**ALLOWABLE FIN TEMPERATURE VS. AVERAGE ON-STATE CURRENT (RECTANGULAR WAVE)**



**GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE (MAXIMUM)**



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



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