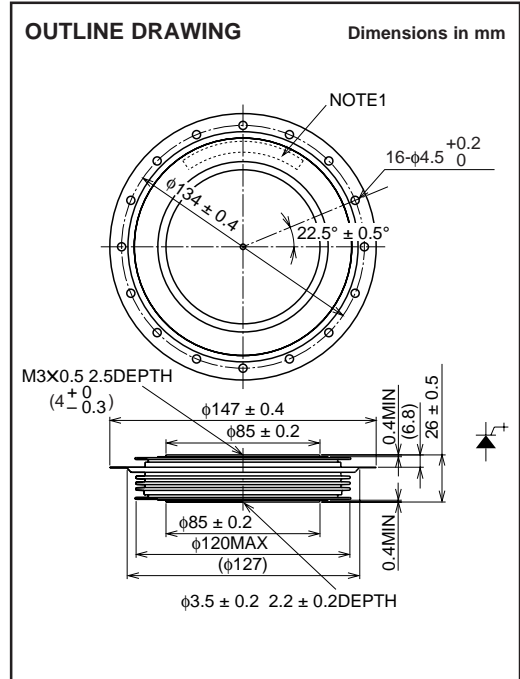


# FG4000HX-90DS

HIGH POWER INVERTER USE  
PRESS PACK TYPE



## APPLICATION

Inverters, DC choppers, Induction heaters, DC to DC converters.

## MAXIMUM RATINGS

| Symbol | Parameter                              | Voltage class |  | Unit |
|--------|--|---------------|--|------|
|        |  | 90DS          |  |      |
| VRRM   | Repetitive peak reverse voltage        | 19            |  | V    |
| VRSM   | Non-repetitive peak reverse voltage    | 19            |  | V    |
| VR(DC) | DC reverse voltage                     | 19            |  | V    |
| VDRM   | Repetitive peak off-state voltage*     | 4500          |  | V    |
| VDSM   | Non-repetitive peak off-state voltage* | 4500          |  | V    |
| VD(DC) | DC off-state voltage*                  | 2500          |  | V    |

\* : VGK = -2V

| Symbol           | Parameter                                 | Conditions  | Ratings               | Unit             |
|------------------|---|---|-----------------------|------------------|
| ITQRM            | Repetitive controllable on-state current  | VDM = 3375V, Cs = 3.0μF, Ls = 0.4μH, Tj = 25/125°C  | 3000                  | A                |
| IT(RMS)          | RMS on-state current                      | Applied for all conduction angles   | 1880                  | A                |
| IT(AV)           | Average on-state current                  | f = 60Hz, sinewave θ = 180°, Tf = 78°C  | 1200                  | A                |
| ITSM             | Surge on-state current                    | One half cycle at 60Hz, Tj = 125°C  | 20                    | kA               |
| i <sup>2</sup> t | Current-squared, time integration         |   | 1.7 × 10 <sup>6</sup> | A <sup>2</sup> s |
| diT/dt           | Critical rate of rise of on-state current | V <sub>D</sub> = 2250V, I <sub>TM</sub> = 3000A, I <sub>GM</sub> = 100A, Tj = 125°C<br>diG/dt = 50A/μs, Cs = 3μF, Rs = 5Ω | 500                   | A/μs             |
| VFGM             | Peak forward gate voltage                 |   | 10                    | V                |
| VRGM             | Peak reverse gate voltage                 |   | 19                    | V                |
| IFGM             | Peak forward gate current                 |   | 1000                  | A                |
| IRGM             | Peak reverse gate current                 |   | 4000                  | A                |
| PFGM             | Peak forward gate power dissipation       | tw = 20μs, f = 60Hz   | 10                    | kW               |
| PRGM             | Peak reverse gate power dissipation       | tw = 30μs, f = 60Hz   | 120                   | kW               |
| PFG(AV)          | Average forward gate power dissipation    |   | 200                   | W                |
| PRG(AV)          | Average reverse gate power dissipation    |   | 6300                  | W                |
| Tj               | Junction temperature                      |   | -40 ~ +125            | °C               |
| Tstg             | Storage temperature                       |   | -40 ~ +150            | °C               |
| —                | Mounting force required                   | (Recommended value 47kN)  | 39 ~ 55               | kN               |
| —                | Weight                                    | Typical value   | 1600                  | g                |

# FG4000HX-90DS

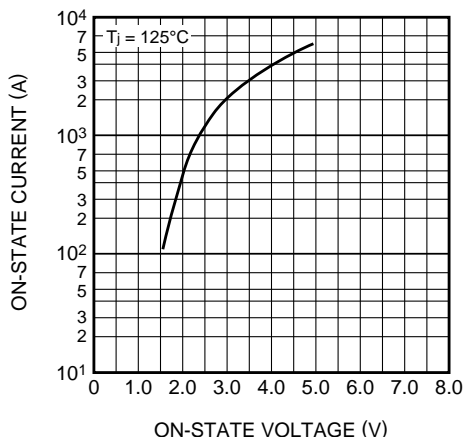
HIGH POWER INVERTER USE  
PRESS PACK TYPE

## ELECTRICAL CHARACTERISTICS

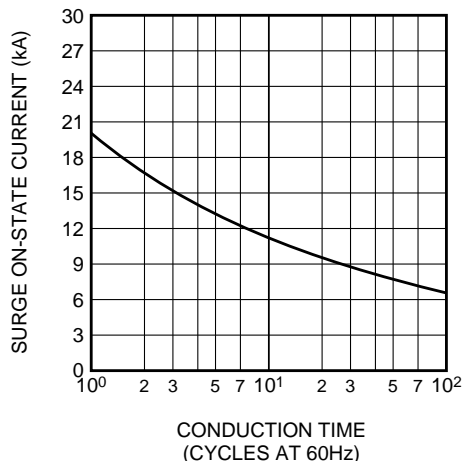
| Symbol               | Parameter                                  | Test conditions  | Limits |     |      | Unit |
|----------------------|--|--|--------|-----|------|------|
|                      |  |  | Min    | Typ | Max  |      |
| V <sub>TM</sub>      | On-state voltage                           | I <sub>T</sub> = 3000A, T <sub>j</sub> = 125°C   | —      | —   | 3.5  | V    |
| I <sub>RRM</sub>     | Repetitive peak reverse current            | V <sub>RM</sub> = 19V, T <sub>j</sub> = 125°C  | —      | —   | 100  | mA   |
| I <sub>DRM</sub>     | Repetitive peak off-state current          | V <sub>DM</sub> = 4500V, V <sub>GK</sub> = -2V, T <sub>j</sub> = 125°C   | —      | —   | 150  | mA   |
| I <sub>GRM</sub>     | Reverse gate current                       | V <sub>RG</sub> = 19V, T <sub>j</sub> = 125°C  | —      | —   | 100  | mA   |
| dv/dt                | Critical rate of rise of off-state voltage | V <sub>D</sub> = 2250V, T <sub>j</sub> = 125°C, V <sub>GK</sub> = -2V (Expo. ware)   | 1000   | —   | —    | V/μs |
| t <sub>d</sub>       | Delay time                                 | I <sub>T</sub> = 3000A, V <sub>D</sub> = 2250V, I <sub>GM</sub> = 100A, T <sub>j</sub> = 125°C<br>di/dt = 500A/μs, dg/dt = 50A/μs<br>Cs = 3μs, Rs = 5Ω | —      | —   | 3    | μs   |
| t <sub>s</sub>       | Storage time                               | I <sub>T</sub> = 3000A, V <sub>DM</sub> = 3375V, V <sub>D</sub> = 2250V<br>diGQ/dt = 6000A/μs, Cs = 3.0μF, Ls = 0.4μH                                  | —      | —   | 3    | μs   |
| I <sub>GQ</sub>      | Peak gate turn-off current                 | T <sub>j</sub> = 125°C   | —      | —   | —    | A    |
| I <sub>GT</sub>      | Gate trigger current                       | DC METHOD : V <sub>D</sub> = 24V, R <sub>L</sub> = 0.1Ω, T <sub>j</sub> = 25°C   | —      | —   | 4.0  | A    |
| V <sub>GT</sub>      | Gate trigger voltage                       |  | —      | —   | 1.5  | V    |
| R <sub>th(j-f)</sub> | Thermal resistance                         | Junction to fin  | —      | —   | 0.01 | °C/W |

## PERFORMANCE CURVES

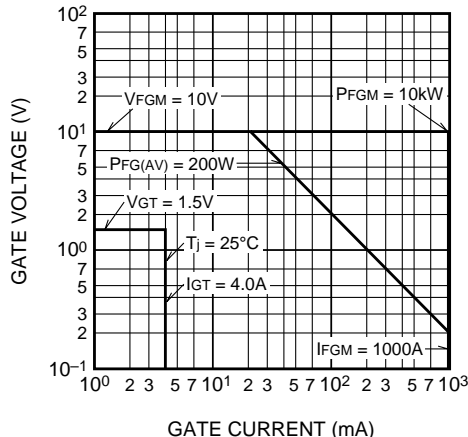
MAXIMUM ON-STATE CHARACTERISTIC



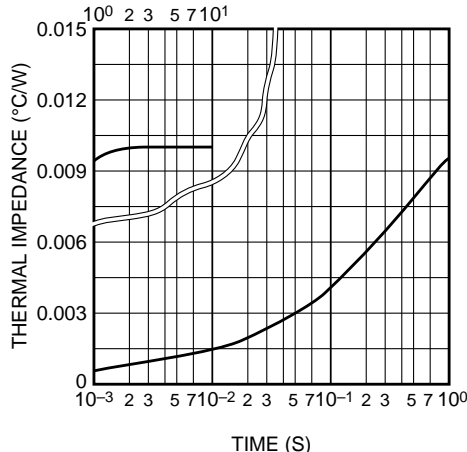
RATED SURGE ON-STATE CURRENT



GATE CHARACTERISTICS

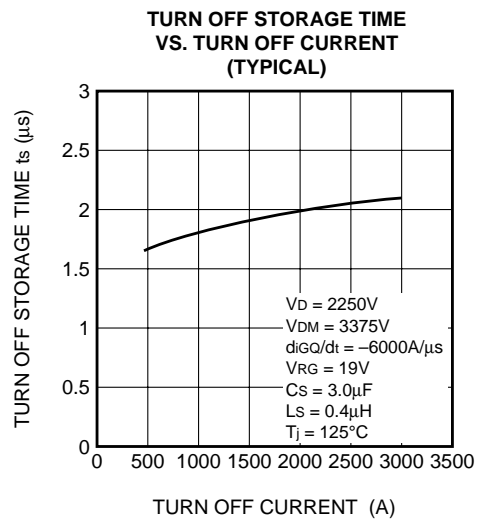
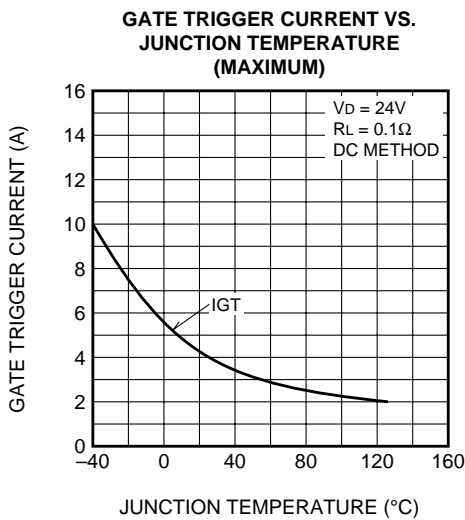
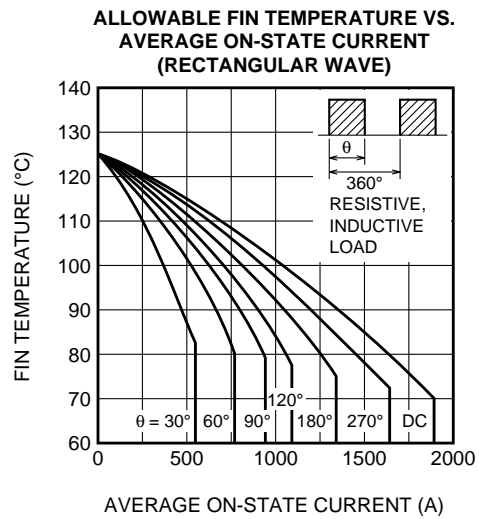
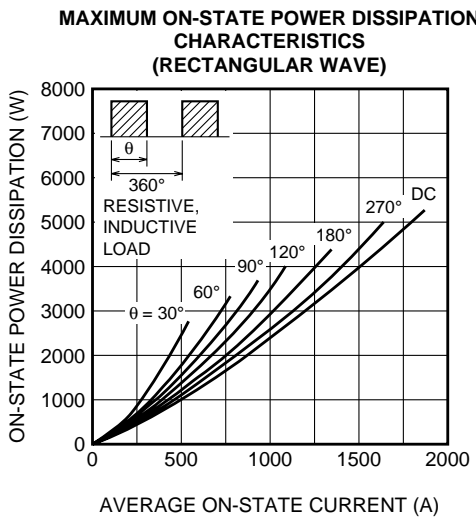
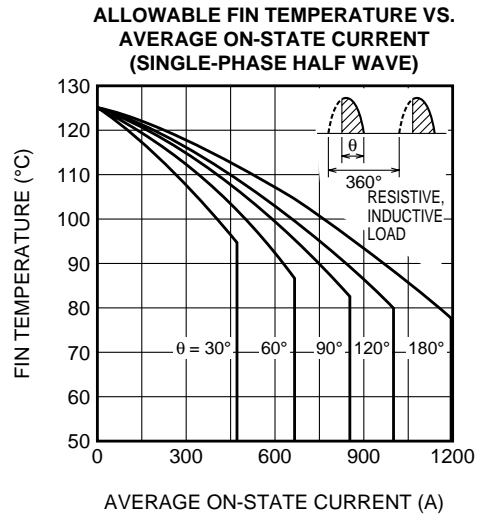
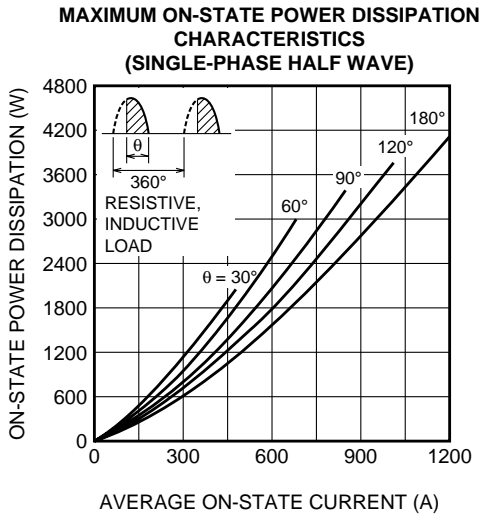


MAXIMUM THERMAL IMPEDANCE CHARACTERISTIC (JUNCTION TO FIN)



**FG4000HX-90DS**

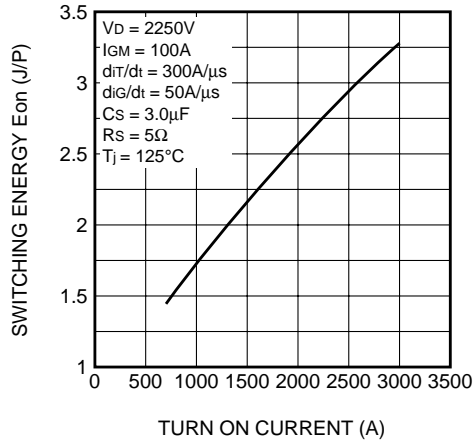
HIGH POWER INVERTER USE  
PRESS PACK TYPE



**FG4000HX-90DS**

HIGH POWER INVERTER USE  
PRESS PACK TYPE

**TURN ON SWITCHING ENERGY (MAXIMUM)**



**TURN OFF SWITCHING ENERGY (MAXIMUM)**

