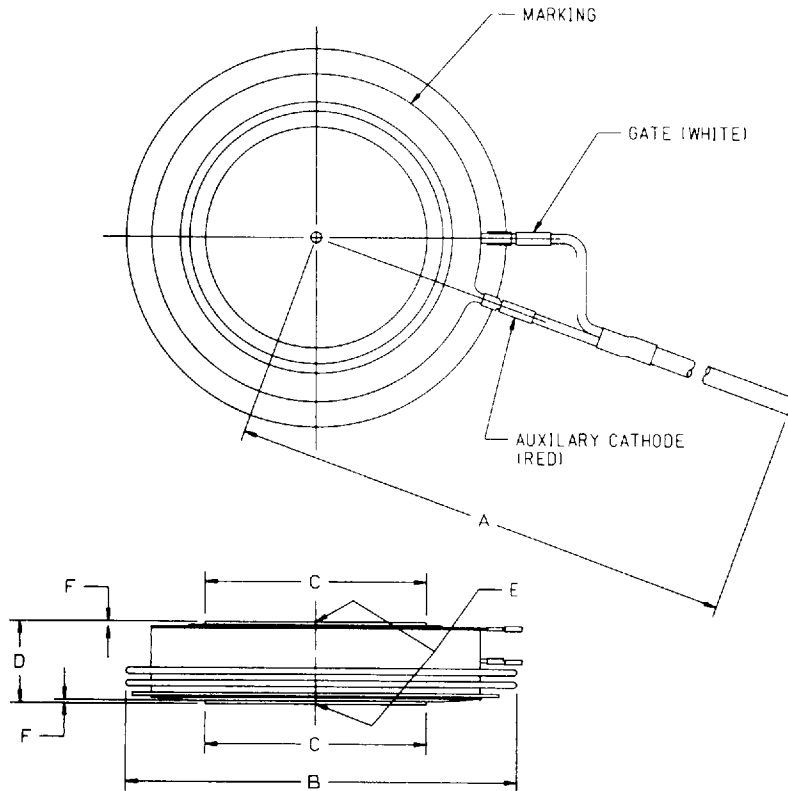


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| DIM | INCHES           | MILLIMETERS      |
|-----|------------------|------------------|
| A   | 16.2 ± .3        | 412 ± 8          |
| B   | 4.72 DIA. MAX    | DIA. 120.0 MAX   |
| C   | 2.76 ± .008 DIA. | DIA. 70.0 ± 0.20 |
| D   | 1.02 ± .02       | 26.0 ± 0.5       |
| E   | .138 ± .008 DIA. | DIA. 3.50 ± 0.20 |
|     | .087 ± .008 DEEP | DEEP 2.20 ± 0.20 |
| F   | .016 MIN         | MIN 0.40         |

## Ordering Information

Example: Select the complete ten digit device part number from the table below.

| DEVICE               | CURRENT RATING       | MANU. NUMBER | TYPE                                 | VOLTAGE RATING        |
|----------------------|----------------------|--------------|--------------------------------------|-----------------------|
| FG                   | 3000                 | B            | V                                    | - 90                  |
| PRESS<br>PACK<br>GTO | $I_{TGRM}$<br>3000 A |              | ASYMMETRIC<br>Super High-<br>Voltage | $V_{DRM}$<br>90=4500V |

## Asymmetric Gate-Turn-Off Thyristors

3000 Amperes/ 4500 Volts

### Description:

Powerex GTOs are designed for use in voltage-source inverter applications requiring fast switching GTOs with low snubber capacitances.

### Features:

- Low Snubber Capacitance (6.0μF for 3000A switch)
- Low On-State Voltage
- Low Switching Losses
- Fast Switching Time ( $t_{qs} = 30\mu S$  maximum)

### Applications:

- Motor Control Inverters
- Traction (Main Motor)
- UPS Inverters
- Choppers
- Power Supply
- Induction Heating
- D.C. to D.C. Converters
- Static VAR Generators

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FG3000BV-90

Asymmetric

**Gate-Turn-Off Thyristors**

3000 Amperes/4500 Volts

Absolute Maximum Ratings,  $T_J=25^\circ\text{C}$  unless otherwise specified

| Characteristic                            | Symbol                                                                                                    | FG3000BV-90                  | Units                   |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------|-------------------------|
| Repetitive Peak Reverse Voltage           | $V_{RRM}$                                                                                                 | 19                           | Volts                   |
| Non-Repetitive Peak Reverse Voltage       | $V_{RSM}$                                                                                                 | 19                           | Volts                   |
| DC Reverse Voltage                        | $V_{R(DC)}$                                                                                               | 19                           | Volts                   |
| Repetitive Peak Off-State Voltage         | $V_{DSM}$                                                                                                 | 4500                         | Volts                   |
| Non-Repetitive Peak Off-State Voltage     | $V_{DSM}$                                                                                                 | 4500                         | Volts                   |
| DC Off-State Voltage                      | $V_{D(DC)}$                                                                                               | 3600                         | Volts                   |
| Controllable On-State Current             | $V_D=1/2 V_{DRM}, T_J=125^\circ\text{C}, C_s=6.0\mu\text{F}$<br>$L_s=0.2\mu\text{H}, I_{GQ}=-600\text{A}$ | $I_{TORM}$ 3000              | A                       |
| RMS On-State Current                      |                                                                                                           | $I_{T(RMS)}$ 1250            | A                       |
| Average On-State Current                  | Sine-wave $\Theta=180^\circ, T_c=77^\circ\text{C}, f=60\text{ Hz}$                                        | $I_{T(AV)}$ 800              | A                       |
| Surge On-State Current                    | NON-REP, One half cycle at 60Hz                                                                           | $I_{TSM}$ 17,000             | A                       |
| $I^2t$ for Fusing                         | One half cycle at 60 Hz                                                                                   | $I^2t$ 1,200,000             | $\text{A}^2\text{-sec}$ |
| Critical Rate of Rise of On-State Current | $V_D=1/2 V_{DRM}, I_{GM}=40\text{A}, T_J=125^\circ\text{C}$                                               | $di/dt$ 500                  | $\text{A}/\mu\text{S}$  |
| Peak Gate Forward Current                 |                                                                                                           | $I_{FGM}$ 100                | A                       |
| Peak Gate Reverse Current                 |                                                                                                           | $I_{RGM}$ 900                | A                       |
| Peak Gate Forward Voltage                 |                                                                                                           | $V_{FGM}$ 10                 | V                       |
| Peak Gate Reverse Voltage                 |                                                                                                           | $V_{RGM}$ 19                 | V                       |
| Peak Gate Forward Power Dissipation       |                                                                                                           | $P_{FGM}$ 400                | W                       |
| Peak Gate Reverse Power Dissipation       |                                                                                                           | $P_{RGM}$ 27000              | W                       |
| Average Gate Forward Power Dissipation    |                                                                                                           | $P_{FG(AV)}$ 100             | W                       |
| Average Gate Reverse Power Dissipation    |                                                                                                           | $P_{RG(AV)}$ 230             | W                       |
| Junction Temperature                      |                                                                                                           | $T_J$ -40 TO +125            | $^\circ\text{C}$        |
| Storage Temperature                       |                                                                                                           | $T_{stg}$ -40 TO +150        | $^\circ\text{C}$        |
| Mounting Force                            | RECOMMENDED VALUE 39.2 kN<br>or 8818 lbs.                                                                 | 35.3 TO 43.1<br>7937 TO 9700 | kN<br>lbs.              |
| Weight (typical)                          |                                                                                                           | 1220                         | grams                   |

### FG3000BV-90

#### Asymmetric

#### Gate-Turn-Off Thyristors

3000 Amperes/4500 Volts

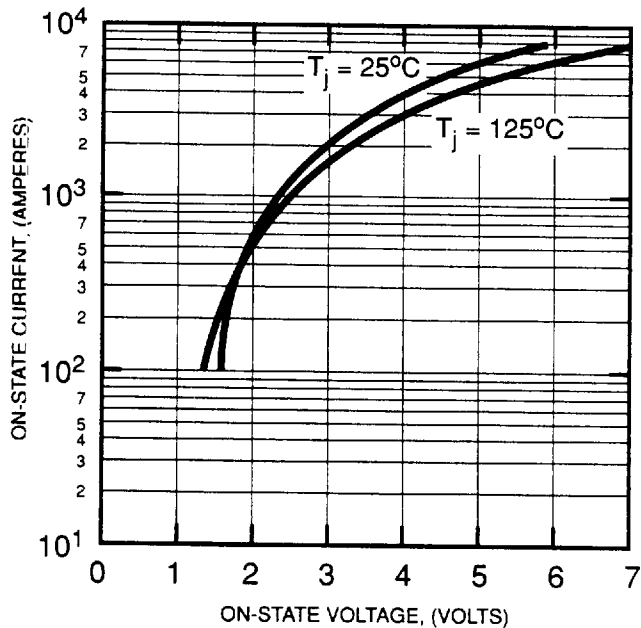
### Electrical Characteristics, $T_J=25^\circ\text{C}$ unless otherwise specified

| Characteristics                            | Symbol    | Test Conditions                                                                                                                                                                 | Min.  | Typ.  | Max.  | Units            |
|--------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|------------------|
| Repetitive Peak Reverse Leakage Current    | $I_{RRM}$ | $T_J=125^\circ\text{C}$ , $V_R=V_{RRM}$                                                                                                                                         | ----- | ----- | 300   | mA               |
| Repetitive Peak Forward Leakage Current    | $I_{DRM}$ | $T_J=125^\circ\text{C}$ , $V_D=V_{DRM}$ , $V_{GK}=-2\text{V}$                                                                                                                   | ----- | ----- | 150   | mA               |
| Gate Reverse Blocking Current              | $I_{RG}$  | $T_J=125^\circ\text{C}$ , $V_{RG}=-17\text{V}$                                                                                                                                  | ----- | ----- | 300   | mA               |
| Peak On-State Voltage                      | $V_{TM}$  | $T_J=125^\circ\text{C}$ , $I_{TM}=3000\text{A}$                                                                                                                                 | ----- | ----- | 4.0   | V                |
| Critical Rate of Rise of Off-State Voltage | $dv/dt$   | $T_J=125^\circ\text{C}$ , $V_D=50\%$ $V_{DRM}$ , $V_{GK}=-2\text{V}$                                                                                                            | 1000  | ----- | ----- | V/ $\mu\text{S}$ |
| Turn-Off Time                              | $t_{qf}$  | $I_{TM}=3000\text{A}$ , $T_J=125^\circ\text{C}$ ,<br>$V_{RG}=17\text{V}$ , $C_s=6.0\mu\text{F}$ , $L_s=0.2\mu\text{H}$<br>$di/dt=40\text{A}/\mu\text{s}$ , $V_D=50\%$ $V_{DRM}$ | ----- | ----- | 30    | $\mu\text{s}$    |
| Turn-On Time                               | $t_{vi}$  | $I_{TM}=3000\text{A}$ , $T_J=125^\circ\text{C}$ ,<br>$I_{GM}=40\text{A}$ , $V_D=1/2$ $V_{DRM}$                                                                                  | ----- | ----- | 10    | $\mu\text{s}$    |
| Gate Trigger Current                       | $I_{GT}$  | $V_D=5\text{V TO } 20\text{V}$ , $I_T=25\text{A TO } 200\text{A}$                                                                                                               | ----- | ----- | 4.0   | A                |
| Gate Trigger Voltage                       | $V_{GT}$  | $V_D=5\text{V TO } 20\text{V}$ , $I_T=25\text{A TO } 200\text{A}$                                                                                                               | ----- | ----- | 1.5   | V                |

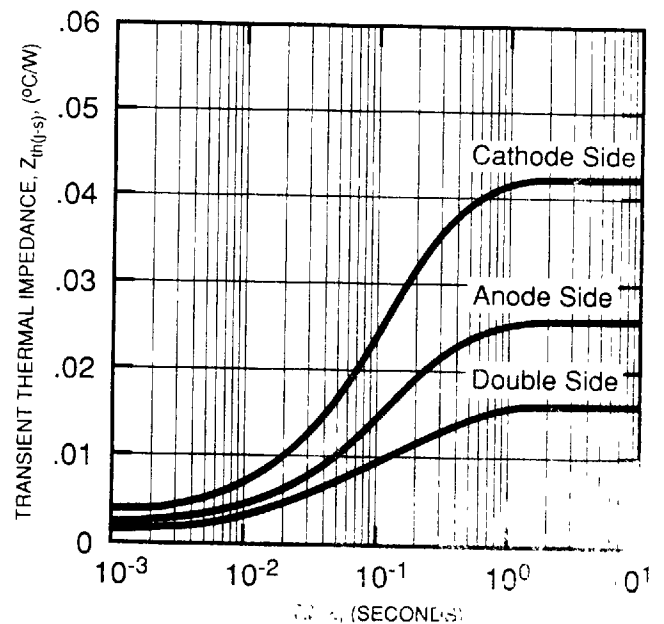
### Thermal Characteristics

| Characteristics                     | Symbol          | Min.  | Typ.  | Max.  | Units              |
|-------------------------------------|-----------------|-------|-------|-------|--------------------|
| Thermal Resistance Junction to Sink | $R_{\theta JS}$ | ----- | ----- | 0.016 | $^\circ\text{C/W}$ |

#### MAXIMUM ON-STATE CHARACTERISTIC



#### TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC, (JUNCTION TO SINK)



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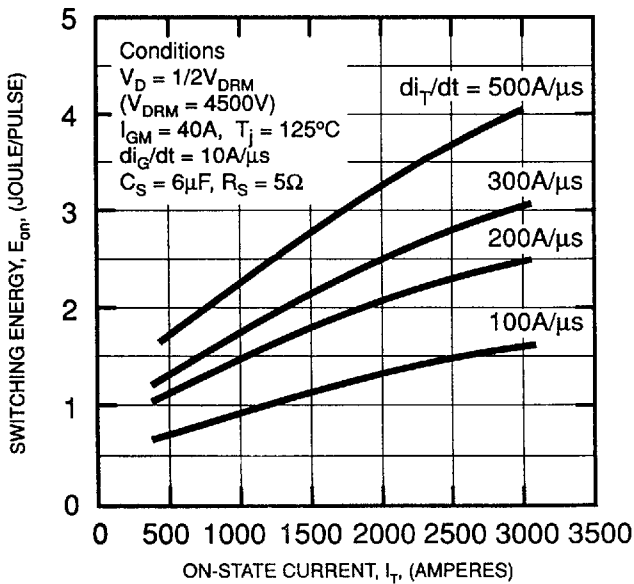
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Asymmetric

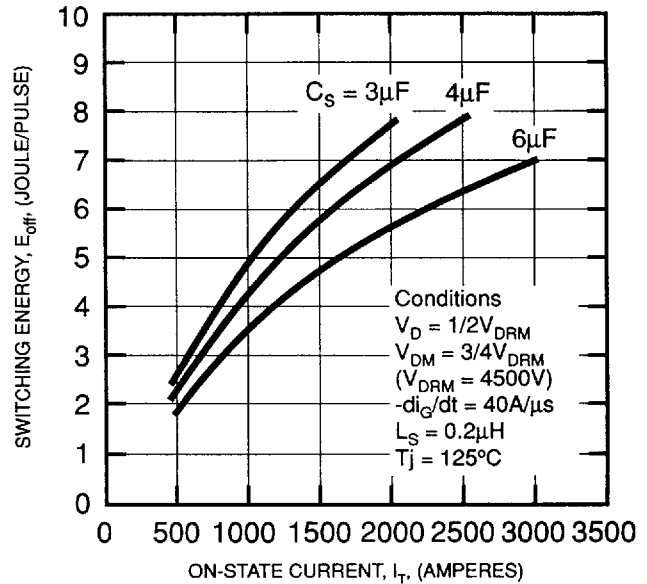
Gate-Turn-Off Thyristors

3000 Amperes/4500 Volts

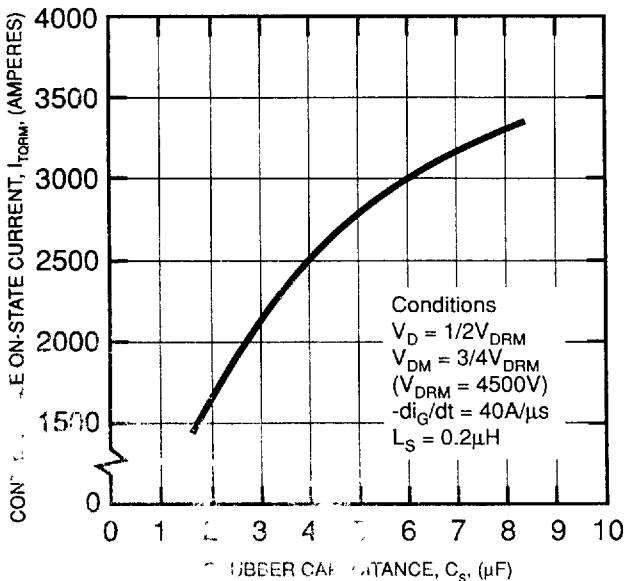
MAXIMUM TURN-ON SWITCHING ENERGY DISSIPATION PER PULSE



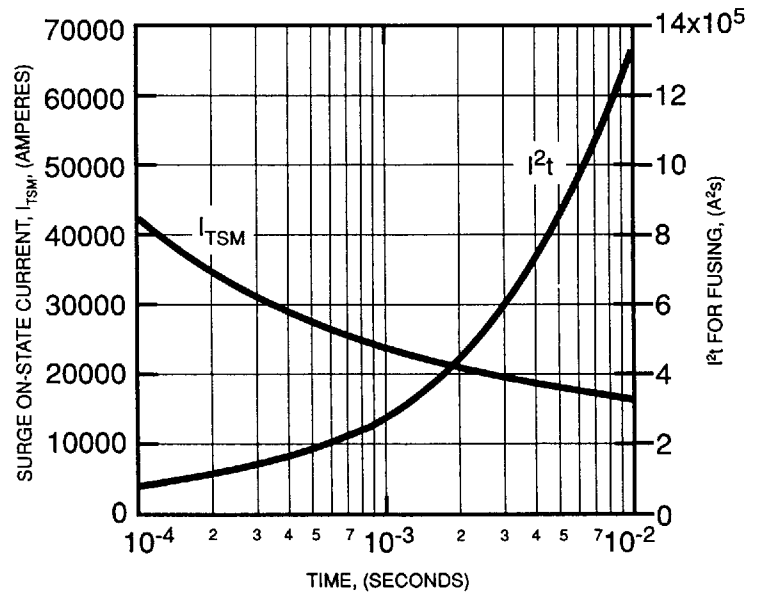
MAXIMUM TURN-OFF SWITCHING ENERGY DISSIPATION PER PULSE



MAXIMUM CONTROLLABLE ON-STATE CURRENT VS. SNUBBER CAPACITANCE



PEAK ONE-CYCLE ON-STATE SURGE CURRENT AND  $i^2t$



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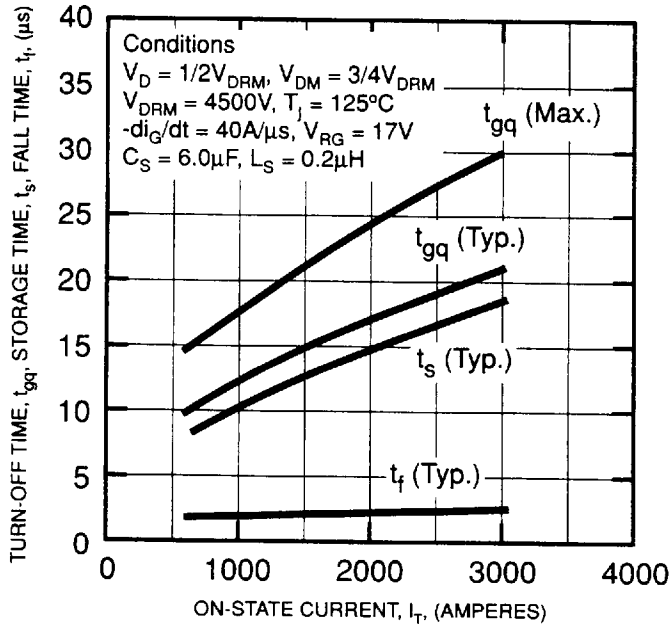
FG3000BV-90

Asymmetric

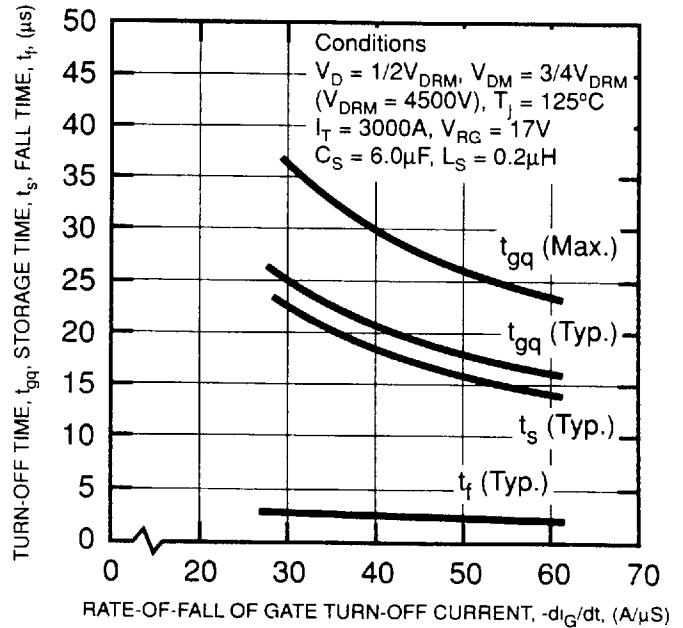
Gate-Turn-Off Thyristors

3000 Amperes/4500 Volts

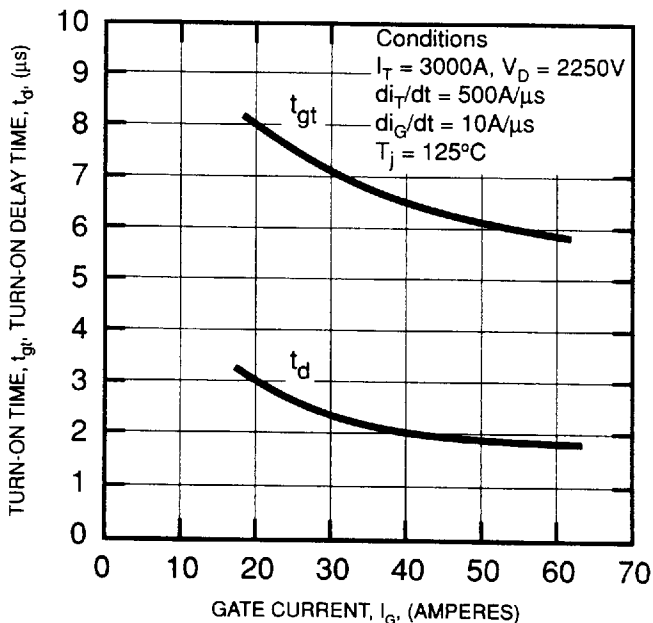
TURN-OFF TIME, STORAGE TIME, FALL TIME  
VS. ON-STATE CURRENT



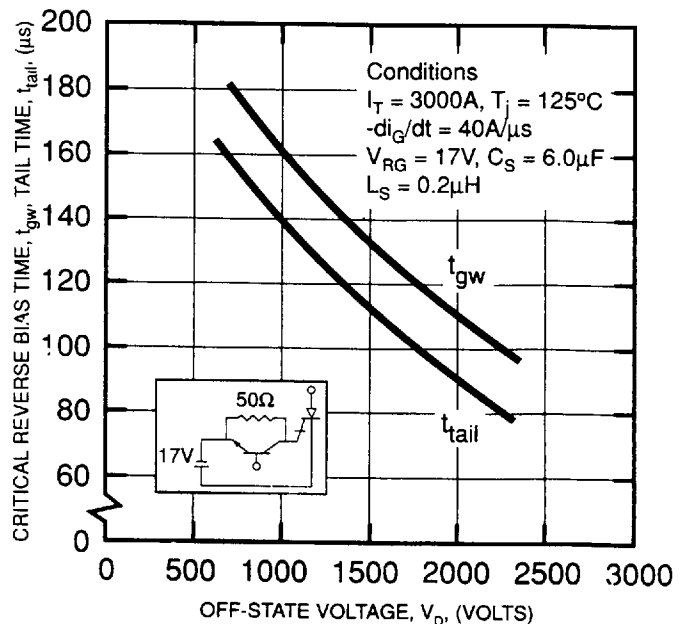
TURN-OFF TIME, STORAGE TIME, FALL TIME VS.  
RATE-OF-FALL OF GATE TURN-OFF CURRENT



TYPICAL TURN-ON TIME, TURN-ON DELAY  
TIME VS. GATE CURRENT



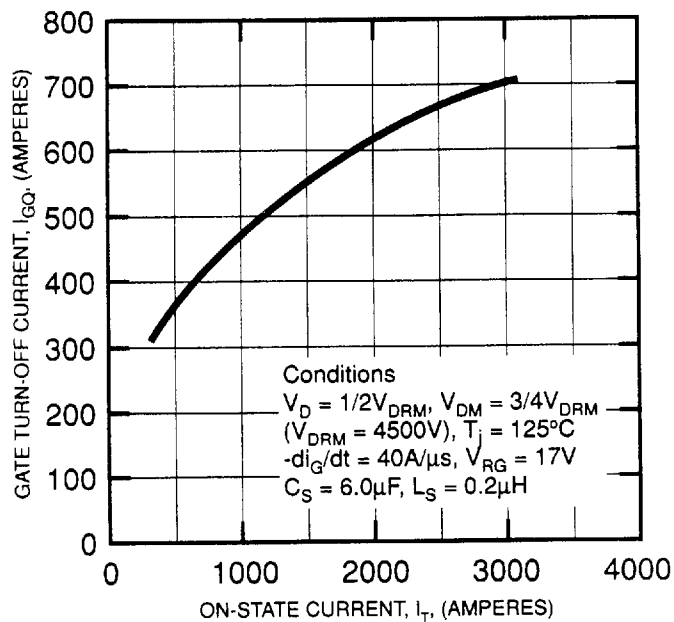
MAXIMUM CRITICAL REVERSE BIAS TIME,  
TAIL TIME VS. OFF-STATE VOLTAGE



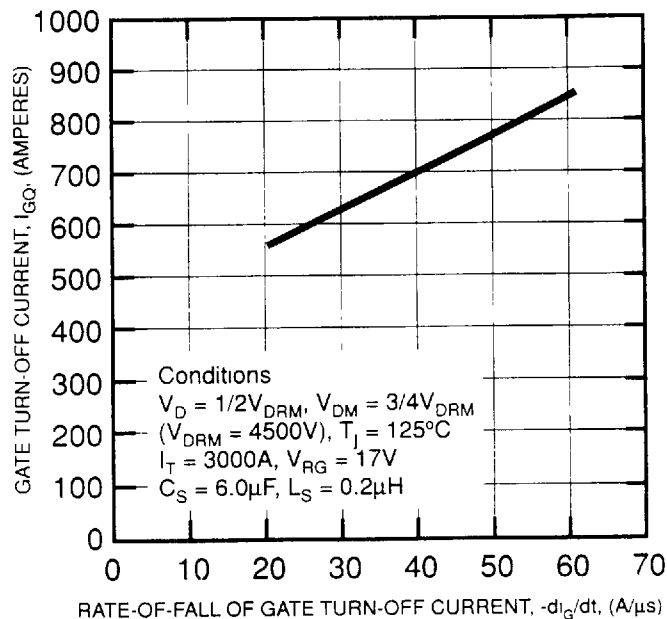
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**Gate-Turn-Off Thyristors**  
 3000 Amperes/4500 Volts

**MAXIMUM GATE TURN-OFF CURRENT VS.  
ON-STATE CURRENT**



**MAXIMUM GATE TURN-OFF CURRENT VS.  
RATE-OF-FALL OF GATE TURN-OFF CURRENT**



**MAXIMUM GATE TRIGGER VOLTAGE,  
GATE TRIGGER CURRENT  
VS. JUNCTION TEMPERATURE**

