The SPT402 thyristor features a multi-arm involute gate which can be triggered with 5 - 10 A gate pulses by means of an integrated pilot gate or directly fired using 50 - 100A gate pulses. The involute pattern affords full area conduction in minimum time while a corresponding high di/dt rating depends on the choice of gating method. The factory setting for either pilot triggered or gate triggered version, internal to the package, is an option when ordering by keying it to the model number code. The design utilizes a new termination technique, SPCO’s revolutionary Light Silicon Sandwich, LSS technology, which eliminates heavy refractory metal as a substrate while retaining the alloyed anode interface necessary for high surge current duty. This thyristor is supplied in a reliable plastic light weight package allowing the insertion of liquid cooled chillers. Solid copper inserts can be ordered for adjoining air cooled heat dissipators using commercially available clamping hardware.

**ON-STATE CHARACTERISTIC**

Process Maximum

- On-State Current, It (A)
- On-State Voltage, Vt (volts)

**THERMAL IMPEDANCE vs. ON-TIME**

- Zthj-c (deg C/W)
- On-Time (seconds)

**Maximum Off-State & Reverse Blocking Voltage Ratings**

<table>
<thead>
<tr>
<th>Model</th>
<th>V_{DRM} (volts)</th>
<th>V_{RRM} (volts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT402_HT</td>
<td>5000</td>
<td>5000</td>
</tr>
<tr>
<td>SPT402_HS</td>
<td>4900</td>
<td>4900</td>
</tr>
<tr>
<td>SPT402_HR</td>
<td>4800</td>
<td>4800</td>
</tr>
<tr>
<td>SPT402_HP</td>
<td>4700</td>
<td>4700</td>
</tr>
<tr>
<td>SPT402_HM</td>
<td>4600</td>
<td>4600</td>
</tr>
<tr>
<td>SPT402_HK</td>
<td>4500</td>
<td>4500</td>
</tr>
</tbody>
</table>

Internal gate connection:
- Pilot: SPT402A (see page 2 for gate drive)
- Direct: SPT402B

External clamping force
- 25000 lb minimum

Optional external posts drw. # 0215B8315
- Ni plated copper, 0.35" thick each
- Compressed thickness including external posts 0.87" - 0.88"
- Weight: 18oz without posts
- 3 lb 10 oz with posts

**Nominal Dimensions**

<table>
<thead>
<tr>
<th></th>
<th>inch</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A diam.</td>
<td>6 13/32</td>
<td>162.7</td>
</tr>
<tr>
<td>B diam.</td>
<td>4 3/16</td>
<td>106.4</td>
</tr>
<tr>
<td>C</td>
<td>51/64</td>
<td>20.24</td>
</tr>
<tr>
<td>D</td>
<td>0.3061</td>
<td>7.77</td>
</tr>
</tbody>
</table>
**LIMITING CHARACTERISTICS AND RATINGS**

- **Repetitive peak off-state & reverse voltage**
  - \( V_{OH} \) at \( T_J = 0 \) to 115°C up to 5000 V

- **Repetitive working crest voltage**
  - \( V_{OH} \) at \( T_J = 0 \) to 115°C 0.8\( V_{OH} \)

- **Repetitive peak off-state & reverse current**
  - \( I_{RM} \) at \( T_J = 0 \) to 115°C 250 mA

- **Average on-state current**
  - \( I_{T(ON)} \) at 70°C 4600 A

- **Peak half-cycle non-max surge current**
  - \( I_{RM} \) at 8.3 ms 60 kA

- **On-state voltage**
  - \( V_T \) at 6000A

- **Critical rate of rise of on-state current**
  - \( \frac{di}{dt} \) at 105°C 150 mA

- **Non-trigger gate current / voltage**
  - \( I_{G(T)} \) at 12 V 15 mA

- **Maximum peak recovery current**
  - \( I_{RM} \) at 2.4 A

- **Critical rate of rise of off-state voltage**
  - \( \frac{dv}{dt} \) at 676 \( V_{OH} \) 1000 VA/us

- **Turn-on delay**
  - \( t_\alpha \) at 6000A

- **Turn-off time**
  - \( T_\alpha \) at 50A at -100V 400 us

---

**FULL CYCLE AVERAGE POWER LOSS**

- **versus PEAK CURRENT at 50/60 Hz**
  - (plasma spreading and conduction loss)

---

**FULL CYCLE AVERAGE POWER LOSS**

- **50 / 60 Hz \( T_J = 115 \degree C \)**

- \( I_T (\text{peak}) \) at 180° / 360°
  - \( I_T \) (peak) | \( \text{amps} \) | \( \text{watts} \)
  - 1000 | 369 | 424
  - 2000 | 921 | 1035
  - 3000 | 1547 | 1727
  - 4000 | 2233 | 2493
  - 5000 | 2978 | 3331
  - 6000 | 3783 | 4246
  - 7000 | 4650 | 5241
  - 8000 | 5580 | 6319
  - 9000 | 6577 | 7483
  - 10000 | 7641 | 8735
  - 11000 | 8775 | 10078
  - 12000 | 9981 | 11516
  - 13000 | 11259 | 13048
  - 14000 | 12612 | 14679
  - 15000 | 14042 | 16408

---

Gate Pulse: 15us duration / 0.5us rise time

- SPT402A
  - \( I_T \) (peak) at 180° / 360°
  - \( I_T \) (peak) at 50V / 100 V / 100 V
  - \( I_T \) (peak) at 5A / 200 A / 400 A

---

**Peak Recovery Current Relationship with Commutating \( \frac{di}{dt} \)**

**Gate Pulse: 15us duration / 0.5us rise time**

- SPT402A
  - \( I_T \) (peak) at 50V / 100 V / 100 V
  - \( I_T \) (peak) at 5A / 200 A / 400 A

---

**SPT402**