Type C791A thyristor is suitable for phase control applications such as for HVDC valves, static VAR compensators and synchronous motor drives. The silicon junction design utilizes a second generation pilot gate and a unique orientation of emitter shorts which promote the lateral expansion of conducting plasma resulting in lower spreading losses while achieving high dv/dt withstand. It is supplied in an industry accepted disc-type package, ready to mount using commercially available heat dissipators and mechanical clamping hardware.

MAXIMUM ON-STATE CHARACTERISTIC
Initial $T_j = 125$ degC

![Graph showing maximum on-state characteristic with axes for on-state current ($I_t$) in amperes and on-state voltage ($V_t$) in volts.]

**Thermal Impedance**

- $Z_{thj-case} (\text{degC/watt})$
- $R_{thj-c} = 0.005 \text{ degC/W}$
- Add 0.002 for case to sink

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REPETITIVE PEAK REVERSE AND OFF-STATE BLOCKING VOLTAGE

$T_j = 0$ to 125°C

<table>
<thead>
<tr>
<th>MODEL</th>
<th>$V_{DRM}$ (volts)</th>
<th>$V_{RRM}$ (volts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C791ADE</td>
<td>4500</td>
<td>4500</td>
</tr>
<tr>
<td>C791ADD</td>
<td>4400</td>
<td>4400</td>
</tr>
<tr>
<td>C791ADC</td>
<td>4300</td>
<td>4300</td>
</tr>
<tr>
<td>C791ADB</td>
<td>4200</td>
<td>4200</td>
</tr>
<tr>
<td>C791ADA</td>
<td>4100</td>
<td>4100</td>
</tr>
<tr>
<td>C791ADP</td>
<td>4000</td>
<td>4000</td>
</tr>
</tbody>
</table>

MECHANICAL OUTLINE

- $\Phi = 5.65$ in (143.5 mm)
- $\Phi = 3.92$ in (99.4 mm)
- $D = 1.45$ in (36.8 mm)

ELECTRICAL

- CREEPAGE / STRIKE
  - 1.6 / 1.0 in
  - 40.6 / 25.4 mm

- CLAMPING FORCE (range)
  - 17000 - 19000 lb
  - 75 - 84 kN
**LIMITING CHARACTERISTICS AND RATINGS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repetitive peak off-state &amp; reverse volts</td>
<td>$V_{thn}$, $T_{j}=0$ to 125°C</td>
<td>up to 4500  V</td>
</tr>
<tr>
<td>Repetitive working crest voltage</td>
<td>$V_{thn}$, $T_{j}=0$ to 125°C</td>
<td>0.8$V_{thn}$</td>
</tr>
<tr>
<td>Off-state &amp; reverse leakage current</td>
<td>$I_{thn}$, $T_{j}=0$ to 125°C</td>
<td>450 mA</td>
</tr>
<tr>
<td>Average on-state current</td>
<td>$T_{on}$, $T_{j}=70°C$</td>
<td>3250 A</td>
</tr>
<tr>
<td>Peak half-cycle non-rep surge current</td>
<td>$T_{ms}$, 60 Hz</td>
<td>42 kA</td>
</tr>
<tr>
<td>On-state voltage</td>
<td>$V_{thn}$, $I_{th}=4000A$</td>
<td>2.00 V</td>
</tr>
<tr>
<td>Critical rate of rise of on-state current</td>
<td>$dI/dt$, $T_{j}=125°C$</td>
<td>100 A/us</td>
</tr>
<tr>
<td>Critical rate of rise of off-state voltage</td>
<td>$dV/dt$, $V_{th}=6.7V_{thn}$</td>
<td>1000 V/us</td>
</tr>
<tr>
<td>Recovery current</td>
<td>$I_{th}$, $T_{j}=105°C$</td>
<td>A</td>
</tr>
<tr>
<td>Turn-on delay</td>
<td>$I_{g}$, $V_{th}=0.5V_{thn}$</td>
<td>4 us</td>
</tr>
<tr>
<td>Turn-off time</td>
<td>$T_{off}$, $5A/us = 100V$</td>
<td>500 us</td>
</tr>
<tr>
<td>Thermal resistance</td>
<td>$R_{thJC}$</td>
<td>0.07 c/W</td>
</tr>
<tr>
<td>Externally applied clamping force</td>
<td>$F$</td>
<td>17000 lbs</td>
</tr>
</tbody>
</table>

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**Gate Characteristics and Gate Supply Requirements**

- **THYRISTOR GATE IMPEDANCE**
  Enhanced by fast rising gate voltage, increasing anode bias and junction temperature. It is at a minimum for dc current, zero anode bias and low temperature.

- **GATE SUPPLY**
  Prefer 50V/10 ohm for supporting the di/dt rating and life expectancy. The short circuit current risetime should be nominally 0.5µs and the duration longer than the expected delay time for all magnitudes of anode bias. Practically 10-30us is recommended followed by a back porch of 750mA if needed to sustain conduction.

- **MINIMUM ACCEPTABLE GATE CURRENT**
  The intersection of the load line and gate impedance characteristic indicates the minimum value of actual current needed during the delay time interval to support di/dt. A different load line meeting this criterion may be used.

- **MAXIMUM GATE RATINGS**
  - Peak gate power, $P_{gm}(100us) = 300$ W
  - Average gate power, $P_{gav} = 50$ W
  - Peak gate current, $I_{gm} = 25$ A
  - Peak reverse voltage, $V_{grm} = 25$ V
FULL CYCLE AVERAGE POWER DISSIPATION
120-deg Conduction - includes spread loss
as function of Overlap Angle, U

Average Power, Pavg (watts)

Peak Current, It (amperes)

FULL CYCLE AVERAGE POWER DISSIPATION
Sine Wave - includes spread loss
as function of conduction angle

INRUSH CURRENT (di/dt) RATING
versus
SWITCHING VOLTAGE

Switching Voltage, Vd (volts)

Peak Current, It (amperes)

4500V 100mm

6RT302

4.5kv 100mm

T302

Snubber resistor = 30 ohms
Snubber inductance = 12 uH

SNUBBER RESISTOR = 30 OHMS
SNUBBER INDUCTANCE = 12 uH

C791A / T302A

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