Thyristor/Diode Modules

**VRRM / VDRM** 800 to 1600V

**IFAV / ITAV** 130Amp

**Applications**
- Power Converters
- Lighting Control
- DC Motor Control and Drives
- Heat and temperature control

**Features**
- International standard package
- High Surge Capability
- Glass passivated chip
- Simple Mounting
- Heat transfer through aluminum oxide
  - DBCCeramic isolated metal baseplate
- UL E243882 approved

### Module Type

<table>
<thead>
<tr>
<th>TYPE</th>
<th>VRRM/VDRM</th>
<th>VRSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSFC130-08</td>
<td>800V</td>
<td>900V</td>
</tr>
<tr>
<td>MSFC130-12</td>
<td>1200V</td>
<td>1300V</td>
</tr>
<tr>
<td>MSFC130-16</td>
<td>1600V</td>
<td>1700V</td>
</tr>
</tbody>
</table>

#### Diode

**Maximum Ratings**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Values</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>I0</td>
<td>Output Current(D.C.)</td>
<td>Tc=85°C</td>
<td>130</td>
<td>A</td>
</tr>
<tr>
<td>IFSM</td>
<td>Surge forward current</td>
<td>t=10mS Tvj =45°C</td>
<td>4700</td>
<td>A</td>
</tr>
<tr>
<td>i²t</td>
<td>Circuit Fusing Consideration</td>
<td></td>
<td>110000</td>
<td>A²s</td>
</tr>
<tr>
<td>Visol</td>
<td>Isolation Breakdown Voltage(R.M.S)</td>
<td>a,c.50HZ;r.m.s.;1min</td>
<td>3000</td>
<td>V</td>
</tr>
<tr>
<td>Tvj</td>
<td>Operating Junction Temperature</td>
<td></td>
<td>-40 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>Tstg</td>
<td>Storage Temperature</td>
<td></td>
<td>-40 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>Mt</td>
<td>Mounting Torque</td>
<td>To terminals(M6)</td>
<td>3±15%</td>
<td>Nm</td>
</tr>
<tr>
<td>Ms</td>
<td></td>
<td>To heatsink(M6)</td>
<td>5±15%</td>
<td>Nm</td>
</tr>
<tr>
<td>Weight</td>
<td>Module (Approximately)</td>
<td></td>
<td>165</td>
<td>g</td>
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</table>

**Thermal Characteristics**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Values</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rth(j-c)</td>
<td>Thermal Impedance, max.</td>
<td>Junction to Case</td>
<td>0.09</td>
<td>°C/W</td>
</tr>
<tr>
<td>Rth(c-s)</td>
<td>Thermal Impedance, max.</td>
<td>Case to Heatsink</td>
<td>0.05</td>
<td>°C/W</td>
</tr>
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</table>

**Electrical Characteristics**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Values</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFM</td>
<td>Forward Voltage Drop, max.</td>
<td>T=25°C If =500A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRRM</td>
<td>Repetitive Peak Reverse Current, max.</td>
<td>Tvj =25°C VRD=VRRM</td>
<td>≤0.5</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tvj =125°C VRD=VRRM</td>
<td>≤9</td>
<td>mA</td>
</tr>
</tbody>
</table>
### Thyristor

#### Maximum Ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Values</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{TAV}$</td>
<td>Average On-State Current</td>
<td>Sine 180°; $T_c=85^\circ$C</td>
<td>130</td>
<td>A</td>
</tr>
<tr>
<td>$I_{TSM}$</td>
<td>Surge On-State Current</td>
<td>$T_{VJ}=45^\circ$C, $t=10ms$, sine</td>
<td>4700</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_{VJ}=125^\circ$C, $t=10ms$, sine</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td>$i^2t$</td>
<td>Circuit Fusing Consideration</td>
<td>$T_{VJ}=45^\circ$C, $t=10ms$, sine</td>
<td>110000</td>
<td>A2s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_{VJ}=125^\circ$C, $t=10ms$, sine</td>
<td>80000</td>
<td></td>
</tr>
<tr>
<td>Visol</td>
<td>Isolation Breakdown Voltage(R.M.S)</td>
<td>a.c.50Hz;r.m.s.;1min</td>
<td>3000</td>
<td>V</td>
</tr>
<tr>
<td>$T_{Vj}$</td>
<td>Operating Junction Temperature</td>
<td></td>
<td>-40 to +130</td>
<td>℃</td>
</tr>
<tr>
<td>$T_{Stg}$</td>
<td>Storage Temperature</td>
<td></td>
<td>-40 to +125</td>
<td>℃</td>
</tr>
<tr>
<td>Mt</td>
<td>Mounting Torque</td>
<td>To terminals(M6)</td>
<td>3 ±15%</td>
<td>Nm</td>
</tr>
<tr>
<td>Ms</td>
<td>Mounting Torque</td>
<td>To heatsink(M6)</td>
<td>5 ±15%</td>
<td>Nm</td>
</tr>
<tr>
<td>$di/dt$</td>
<td>Critical Rate of Rise of On-State Current</td>
<td>$T_{VJ}=T_{VJM}$, $2/3V_{DRM}$, $I_G=500mA$ $Tr&lt;0.5us,t_p&gt;6us$</td>
<td>200</td>
<td>A/us</td>
</tr>
<tr>
<td>$dv/dt$</td>
<td>Critical Rate of Rise of Off-State Voltage, min.</td>
<td>$T_J=T_{VJM}$, $2/3V_{DRM}$ linear voltage rise</td>
<td>1000</td>
<td>V/us</td>
</tr>
<tr>
<td>a</td>
<td>Maximum allowable acceleration</td>
<td></td>
<td>50</td>
<td>m/s²</td>
</tr>
</tbody>
</table>

#### Thermal Characteristics

<table>
<thead>
<tr>
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<th>Values</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{th(j-c)}$</td>
<td>Thermal Impedance, max.</td>
<td>Junction to Case</td>
<td>0.18</td>
<td>℃/W</td>
</tr>
<tr>
<td>$R_{th(c-s)}$</td>
<td>Thermal Impedance, max.</td>
<td>Case to Heatsink</td>
<td>0.10</td>
<td>℃/W</td>
</tr>
</tbody>
</table>

#### Electrical Characteristics

<table>
<thead>
<tr>
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<th>Conditions</th>
<th>Values</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{TM}$</td>
<td>Peak On-State Voltage, max.</td>
<td>$T=25^\circ$C, $I_T=500A$</td>
<td>1.8</td>
<td>V</td>
</tr>
<tr>
<td>$I_{RRM}/I_{DRM}$</td>
<td>Repetitive Peak Reverse Current, max. / Repetitive Peak Off-State Current, max.</td>
<td>$T_{VJ}=T_{VJM}$, $V_R=V_{RRM}$, $V_D=V_{DRM}$</td>
<td>40</td>
<td>mA</td>
</tr>
<tr>
<td>$V_{TO}$</td>
<td>On state threshold voltage</td>
<td>For power-loss calculations only ($T_{VJ}=125^\circ$C)</td>
<td>1</td>
<td>V</td>
</tr>
<tr>
<td>$r_T$</td>
<td>Value of on-state slope resistance, max</td>
<td>$T_{VJ}=T_{VJM}$</td>
<td>1.6</td>
<td>mΩ</td>
</tr>
<tr>
<td>$V_{GT}$</td>
<td>Gate Trigger Voltage, max.</td>
<td>$T_{VJ}=25^\circ$C, $V_D=6V$</td>
<td>3</td>
<td>V</td>
</tr>
<tr>
<td>$I_{GT}$</td>
<td>Gate Trigger Current, max.</td>
<td>$T_{VJ}=25^\circ$C, $V_D=6V$</td>
<td>150</td>
<td>mA</td>
</tr>
<tr>
<td>$V_{GD}$</td>
<td>Non-triggering gate voltage, max.</td>
<td>$T_{VJ}=125^\circ$C, $V_D=2/3V_{DRM}$</td>
<td>0.25</td>
<td>V</td>
</tr>
<tr>
<td>$I_{GD}$</td>
<td>Non-triggering gate current, max.</td>
<td>$T_{VJ}=125^\circ$C, $V_D=2/3V_{DRM}$</td>
<td>10</td>
<td>mA</td>
</tr>
<tr>
<td>$I_L$</td>
<td>Latching current, max.</td>
<td>$T_{VJ}=25^\circ$C, $R_G=33\Omega$</td>
<td>300</td>
<td>mA</td>
</tr>
<tr>
<td>$I_H$</td>
<td>Holding current, max.</td>
<td>$T_{VJ}=25^\circ$C, $V_D=6V$</td>
<td>150</td>
<td>mA</td>
</tr>
<tr>
<td>$t_{gd}$</td>
<td>Gate controlled delay time</td>
<td>$TVJ=25^\circ$C, $IG=1A$, $diG/dt=1A/us$</td>
<td>1</td>
<td>us</td>
</tr>
<tr>
<td>$t_{q}$</td>
<td>Circuit commutated turn-off time</td>
<td>$T_{VJ}=T_{VJM}$</td>
<td>100</td>
<td>us</td>
</tr>
</tbody>
</table>
Performance Curves

Fig1. Power dissipation

Fig2. Forward Current Derating Curve

Fig3. Transient thermal impedance

Fig4. Max Non-Repetitive Forward Surge Current

Fig5. Forward Characteristics
Package Outline Information

**CASE: F2**

Dimensions in mm

**Fig6. Gate trigger Characteristics**