$V_{RM} = 600 \, \text{V}, \; I_{F(AV)} = 20 \, \text{A}, \; t_{rr} = 60 \, \text{ns}$

Fast Recovery Diode

**FMXR-1206S-CG**

**Description**

The FMXR-1206S-CG is a fast recovery diode of 600 V / 20 A. The low $Q_{rr}$ characteristic allows the product to have almost no ringing at turn-off, leading to the realization of low-noise systems. The maximum $t_{rr}$ of 60 ns is realized by optimizing a life-time control.

**Features**

- $V_{RM}$: 600 V
- $I_{F(AV)}$: 20 A
- $V_F$: 2.5 V
- $t_{rr}$: 60 ns
- $Q_{rr}$: 145 nC
- Bare lead frame: Pb-free (RoHS compliant)

**Applications**

- For CCM PFC Circuit
- Secondary Side Rectifier Diode (Flyback Converter, LLC Converter, etc.)
- Freewheel Diode (Offline Buck and Buck-boost Converter)

**Package**

TO220F-2L

![Package Diagram](https://www.sanken-ele.co.jp/en/data/1206S-CG/package.png)

Not to scale
Absolute Maximum Ratings
Unless otherwise specified, $T_A = 25 \, ^\circ \text{C}$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Repetitive Reverse Voltage</td>
<td>$V_{RSM}$</td>
<td>600</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Repetitive Reverse Voltage</td>
<td>$V_{RM}$</td>
<td>600</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Average Forward Current</td>
<td>$I_{F(AV)}$</td>
<td>20</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Surge Forward Current</td>
<td>$I_{FSM}$</td>
<td>100</td>
<td>A</td>
<td>Half cycle sine wave, positive side, 10 ms, 1 shot</td>
</tr>
<tr>
<td>$t^2$ Limiting Value</td>
<td>$t^2$</td>
<td>50</td>
<td>$\text{A}^2$ s</td>
<td>1 ms $\leq t \leq 10$ ms</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>$T_J$</td>
<td>$-40$ to $150$</td>
<td>$^\circ \text{C}$</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>$T_{STG}$</td>
<td>$-40$ to $150$</td>
<td>$^\circ \text{C}$</td>
<td></td>
</tr>
</tbody>
</table>

Electrical Characteristics
Unless otherwise specified, $T_A = 25 \, ^\circ \text{C}$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward Voltage Drop</td>
<td>$V_F$</td>
<td>$T_J = 25 , ^\circ \text{C}, I_F = 20 , \text{A}$</td>
<td>—</td>
<td>—</td>
<td>2.5</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J = 100 , ^\circ \text{C}, I_F = 20 , \text{A}$</td>
<td>—</td>
<td>2.2</td>
<td>—</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>$I_R$</td>
<td>$V_R = V_{RM}$</td>
<td>—</td>
<td>—</td>
<td>10</td>
<td>$\mu \text{A}$</td>
</tr>
<tr>
<td>Reverse Leakage Current Under High Temperature</td>
<td>$H\cdot I_R$</td>
<td>$V_R = V_{RM}, T_J = 150 , ^\circ \text{C}$</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>mA</td>
</tr>
<tr>
<td>Reverse Recovery Time</td>
<td>$t_{rr}$</td>
<td>$I_F = 20 , \text{A}, V_R = 400 , \text{V}$, $\frac{\text{d}I}{\text{d}t} = -200 , \text{A/}\mu\text{s}$, 100% recovery point</td>
<td>—</td>
<td>—</td>
<td>60</td>
<td>ns</td>
</tr>
<tr>
<td>Reverse Recovery Charge</td>
<td>$Q_{rr}$</td>
<td>$I_F = 20 , \text{A}, V_R = 400 , \text{V}$, $\frac{\text{d}I}{\text{d}t} = -200 , \text{A/}\mu\text{s}$, 100% recovery point</td>
<td>—</td>
<td>—</td>
<td>145</td>
<td>nC</td>
</tr>
<tr>
<td>Thermal Resistance</td>
<td>$R_{th(J-F)}$ (1)</td>
<td>—</td>
<td>—</td>
<td>2.8</td>
<td>$^\circ \text{C/}\text{W}$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$R_{th(J-L)}$ (2)</td>
<td>—</td>
<td>—</td>
<td>3.2</td>
<td>$^\circ \text{C/}\text{W}$</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. $T_F$ Measurement Point
Figure 2. $T_L$ Measurement Point

(1) $R_{th(J-F)}$ is thermal resistance between junction and the flame. $T_F$ is the flame temperature ($^\circ \text{C}$), measured at the point defined in Figure 1.

(2) $R_{th(J-L)}$ is thermal resistance between junction and the lead. $T_L$ is the cathode lead temperature ($^\circ \text{C}$), measured at the point defined in Figure 2.
Rating and Characteristic Curves

$T_F$ is the flame temperature ($^\circ$C), measured at the point defined in Figure 1.
$T_L$ is the cathode lead temperature ($^\circ$C), measured at the point defined in Figure 2.

Figure 3. $I_{F(AV)}$ vs. $T_F$ Typical Characteristics
($V_R = 0 \text{ V}$)

Figure 4. $I_{F(AV)}$ vs. $T_F$ Typical Characteristics
($V_R = 600 \text{ V}$)

Figure 5. $I_{F(AV)}$ vs. $T_L$ Typical Characteristics
($V_R = 0 \text{ V}$)

Figure 6. $I_{F(AV)}$ vs. $T_L$ Typical Characteristics
($V_R = 600 \text{ V}$)
Figure 7. $V_F$ vs. $I_F$ Typical Characteristics

Figure 8. $V_R$ vs. $I_R$ Typical Characteristics

Figure 9. Typical Transient Thermal Resistance
Physical Dimensions

- TO220F-2L

NOTES:
- Dimensions in millimeters
- Maximum gate burr height is 0.3 mm.
- Bare lead frame: Pb-free (RoHS compliant)
- When soldering the products, it is required to minimize the working time, within the following limits:
  - Flow: 260 ± 5 °C / 10 ± 1 s, 2 times
  - Soldering Iron: 380 ± 10 °C / 3.5 ± 0.5 s, 1 time
  - Soldering should be at a distance of at least 1.5 mm from the body of the product.
- Recommended screw torque for TO220F: 0.490 N·m to 0.686 N·m (5 kgf·cm to 7 kgf·cm)
Marking Diagram

Specific Device Code (See Table 1)

Lot Number:
- Y is the last digit of the year of manufacture (0 to 9)
- M is the month of the year (1 to 9, O, N, or D)
- DD is the day of the month (01 to 31)
- XX is the control number

XR1206
YMDDXX

Table 1. Specific Device Code

<table>
<thead>
<tr>
<th>Specific Device Code</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>XR1206</td>
<td>FMXR-1206S-CG</td>
</tr>
</tbody>
</table>
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