$V_{RM} = 400\, V$, $I_{F(AV)} = 20\, A$, $t_{rr} = 50\, \text{ns}$

**Fast Recovery Diode**

FMLB-4204S

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**Description**

The FMLB-4204S is a fast recovery diode of 400 V / 20 A. The maximum $t_{rr}$ of 50 ns is realized by optimizing a life-time control.

**Features**

- $V_{RM} = 400\, V$
- $I_{F(AV)} = 20\, A$
- $V_F = 1.3\, V$
- $t_{rr} = 50\, \text{ns}$
- Bare lead frame: Pb-free (RoHS compliant)
- Suitable for High Reliability and Automotive Requirement

**Applications**

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

**Package**

TO3PF-3L

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(1) Anode
(2) Cathode
(3) Anode

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http://www.sanken-ele.co.jp/en
**Absolute Maximum Ratings**

Unless otherwise specified, $T_A = 25 \, ^\circ C$

<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$^{(1)}$</td>
<td>$V_{RSM}$</td>
<td>400</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Repetitive Reverse Voltage$^{(1)}$</td>
<td>$V_{RM}$</td>
<td>400</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>See Figure 1 and Figure 2</td>
</tr>
<tr>
<td>Surge Forward Current$^{(1)}$</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>$t^\prime$ Limiting Value$^{(1)}$</td>
<td>$t^\prime$</td>
<td>50</td>
<td>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>°C</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>$T_{STG}$</td>
<td>-40 to 150</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>

**Electrical Characteristics**

Unless otherwise specified, $T_A = 25 \, ^\circ C$

<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$^{(1)}$</td>
<td>$V_F$</td>
<td>$T_J = 25 , ^\circ C, I_F = 10 , A$</td>
<td>—</td>
<td>—</td>
<td>1.3</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J = 100 , ^\circ C, I_F = 10 , A$</td>
<td>—</td>
<td>0.94</td>
<td>—</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current$^{(1)}$</td>
<td>$I_R$</td>
<td>$V_R = V_{RM}$</td>
<td>—</td>
<td>—</td>
<td>200</td>
<td>µA</td>
</tr>
<tr>
<td>Reverse Leakage Current Under High Temperature$^{(1)}$</td>
<td>$H \cdot I_R$</td>
<td>$V_R = V_{RM}, T_J = 150 , ^\circ C$</td>
<td>—</td>
<td>—</td>
<td>400</td>
<td>µA</td>
</tr>
<tr>
<td>Reverse Recovery Time$^{(1)}$</td>
<td>$t_{rr1}$</td>
<td>$I_F = I_{RP} = 500 , mA$</td>
<td>—</td>
<td>—</td>
<td>50</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90% recovery point, $T_J = 25 , ^\circ C$</td>
<td>—</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$t_{rr2}$</td>
<td>$I_F = 500 , mA, I_{RP} = 1 , A$</td>
<td>—</td>
<td>—</td>
<td>35</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75% recovery point, $T_J = 25 , ^\circ C$</td>
<td>—</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Resistance$^{(2)}$</td>
<td>$R_{th(J-C)}$</td>
<td>—</td>
<td>—</td>
<td>2.0</td>
<td>°C/W</td>
<td></td>
</tr>
</tbody>
</table>

$^{(1)}$ Specifies a value per chip; the FMLB-4204S consists of two chips.

$^{(2)}$ $R_{th(J-C)}$ is thermal resistance between junction and the case. The case temperature is measured at the back side near the screw hole.
Rating and Characteristic Curves

Figure 1. $I_{F(AV)}$ vs. $T_C$ Typical Characteristics
($V_R = 0$ V)

Figure 2. $I_{F(AV)}$ vs. $T_C$ Typical Characteristics
($V_R = 400$ V)

Figure 3. $V_F$ vs. $I_F$ Typical Characteristics

Figure 4. $V_R$ vs. $I_R$ Typical Characteristics
NOTES:
- Dimensions in millimeters
- 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 TO3PF: 0.686 N·m to 0.882 N·m (7 kgf·cm to 9 kgf·cm)
Marking Diagram

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)

Specific Device Code (See Table 1)

Table 1. Specific Device Code

<table>
<thead>
<tr>
<th>Specific Device Code</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB4204S</td>
<td>FMLB-4204S</td>
</tr>
</tbody>
</table>
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