RJP30E3DPP-M0
Silicon N Channel IGBT
High Speed Power Switching

Features
- Trench gate technology (G5H series)
- Low collector to emitter saturation voltage \( V_{CE(sat)} = 1.6 \text{ V typ} \)
- High speed switching \( t_f = 150 \text{ ns typ} \)
- Low leak current \( I_{CES} = 1 \mu\text{A max} \)
- Isolated package TO-220FL

Outline

RENESAS Package code: PRSS0003AF-A)
(Package name: TO-220FL)

Absolute Maximum Ratings

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Item} & \text{Symbol} & \text{Ratings} & \text{Unit} \\
\hline
\text{Collector to Emitter voltage} & V_{CES} & 360 & \text{V} \\
\text{Gate to Emitter voltage} & V_{GES} & \pm30 & \text{V} \\
\text{Collector current} & I_C & 40 & \text{A} \\
\text{Collector peak current} & I_{C(peak)}^{\text{Note1}} & 250 & \text{A} \\
\text{Collector dissipation} & P_C^{\text{Note2}} & 30 & \text{W} \\
\text{Junction to case thermal impedance} & \theta_{JC} & 4.17 & \text{°C/W} \\
\text{Junction temperature} & T_J & 150 & \text{°C} \\
\text{Storage temperature} & T_{stg} & -55 \text{ to } +150 & \text{°C} \\
\hline
\end{array}
\]

Notes:
1. \( PW \leq 10 \mu\text{s, duty cycle } \leq 1\% \)
2. \( T_c = 25\text{°C} \)
### Electrical Characteristics

*(Ta = 25°C)*

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero gate voltage collector current</td>
<td>I_CES</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>μA</td>
<td>V_CE = 360 V, V_GE = 0</td>
</tr>
<tr>
<td>Gate to emitter leak current</td>
<td>I_GES</td>
<td>—</td>
<td>—</td>
<td>±100</td>
<td>nA</td>
<td>V_GE = ± 30 V, V_CE = 0</td>
</tr>
<tr>
<td>Gate to emitter cutoff voltage</td>
<td>V_GE(off)</td>
<td>2.5</td>
<td>—</td>
<td>5</td>
<td>V</td>
<td>V_CE = 10 V, I_C = 1 mA</td>
</tr>
<tr>
<td>Collector to emitter saturation voltage</td>
<td>V_CE(sat)</td>
<td>—</td>
<td>1.6</td>
<td>2.1</td>
<td>V</td>
<td>I_C = 40 A, V_GE = 15 V</td>
</tr>
<tr>
<td>Gate to emitter current</td>
<td>—</td>
<td>1700</td>
<td>—</td>
<td>—</td>
<td>pF</td>
<td>V_CE = 25 V</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>—</td>
<td>85</td>
<td>—</td>
<td>—</td>
<td>pF</td>
<td>V_CE = 0</td>
</tr>
<tr>
<td>Reverse transfer capacitance</td>
<td>—</td>
<td>40</td>
<td>—</td>
<td>—</td>
<td>pF</td>
<td>f = 1 MHz</td>
</tr>
<tr>
<td>Total gate charge</td>
<td>Q_g</td>
<td>—</td>
<td>52</td>
<td>—</td>
<td>nC</td>
<td>V_CE = 15 V</td>
</tr>
<tr>
<td>Gate to emitter charge</td>
<td>Q_ge</td>
<td>—</td>
<td>9</td>
<td>—</td>
<td>nC</td>
<td>V_CE = 150 V</td>
</tr>
<tr>
<td>Gate to collector charge</td>
<td>Q_gC</td>
<td>—</td>
<td>15</td>
<td>—</td>
<td>nC</td>
<td>I_C = 40 A</td>
</tr>
<tr>
<td>Switching time</td>
<td>t_d(on)</td>
<td>—</td>
<td>0.04</td>
<td>—</td>
<td>μs</td>
<td>I_C = 40 A</td>
</tr>
<tr>
<td></td>
<td>t_r</td>
<td>—</td>
<td>0.12</td>
<td>—</td>
<td>μs</td>
<td>R_L = 4 Ω</td>
</tr>
<tr>
<td></td>
<td>t_d(off)</td>
<td>—</td>
<td>0.09</td>
<td>—</td>
<td>μs</td>
<td>V_GE = 15 V</td>
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<tr>
<td></td>
<td>t_f</td>
<td>—</td>
<td>0.15</td>
<td>—</td>
<td>μs</td>
<td>R_G = 5 Ω</td>
</tr>
</tbody>
</table>

Notes: 3. Pulse test.
Main Characteristics

Maximum Safe Operation Area

Typical Output Characteristics

Typical Transfer Characteristics

Collector to Emitter Saturation Voltage vs. Gate to Emitter Voltage ( Typical)

Collector to Emitter Saturation Voltage vs. Collector Current ( Typical)
Normalized Transient Thermal Impedance vs. Pulse Width

\[ \theta_j - c(t) = \gamma_s(t) \cdot \theta_j - c \]

\[ \theta_j - c = 4.17 \, ^\circ\text{C}/\text{W}, T_c = 25 \, ^\circ\text{C} \]

Switching Time Test Circuit

Waveform

Vin Monitor

Ic Monitor
Package Dimension

<table>
<thead>
<tr>
<th>Package Name</th>
<th>JEITA Package Code</th>
<th>RENESAS Code</th>
<th>Previous Code</th>
<th>MASS(Typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO-220FL</td>
<td>—</td>
<td>PRSS0003AF-A</td>
<td>TO-220FL</td>
<td>1.5g</td>
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</tbody>
</table>

Unit: mm

Ordering Information

<table>
<thead>
<tr>
<th>Orderable Part Number</th>
<th>Quantity</th>
<th>Shipping Container</th>
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<tbody>
<tr>
<td>RJP30E3DPP-M0-T2</td>
<td>600 pcs</td>
<td>Box (Tube)</td>
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</table>
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