GT8G133

Strobe Flash Applications

- Compact and Thin (TSSOP-8) package
- Enhancement-mode
- 4-V gate drive voltage: $V_{GE} = 4.0 \text{ V (min)} \Rightarrow I_C = 150 \text{ A}$
- Peak collector current: $I_C = 150 \text{ A (max)}$

**Absolute Maximum Ratings ($T_a = 25^\circ \text{C}$)**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector-emitter voltage</td>
<td>$V_{CES}$</td>
<td>400</td>
<td>V</td>
</tr>
<tr>
<td>Gate-emitter voltage</td>
<td>$V_{GES}$</td>
<td>±6</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>$V_{GES}$</td>
<td>±8</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td>$I_{CP}$ (Note 1)</td>
<td>150</td>
<td>A</td>
</tr>
<tr>
<td>Collector power dissipation ($t=10 \text{ s}$) (Note 2a)</td>
<td>$P_C$ (1)</td>
<td>1.1</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td>$P_C$ (2)</td>
<td>0.6</td>
<td>W</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>$T_j$</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>$T_{stg}$</td>
<td>55–150</td>
<td>°C</td>
</tr>
</tbody>
</table>

**Thermal Characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal resistance, junction to ambient ($t=10 \text{ s}$) (Note 2a)</td>
<td>$R_{th(j-a)}$ (1)</td>
<td>114</td>
<td>°C/W</td>
</tr>
<tr>
<td>Thermal resistance, junction to ambient ($t=10 \text{ s}$) (Note 2b)</td>
<td>$R_{th(j-a)}$ (2)</td>
<td>208</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

**Marking**

Note: Using continuously under heavy loads (e.g., the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e., operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/Derating Concept and Methods) and individual reliability data (i.e., reliability test report and estimated failure rate, etc.).

Note for (Note 1), (Note 2a), (Note 2b) and (Note 3): Please refer to the next page.
Electrical Characteristics (Ta = 25°C)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Symbol</th>
<th>Test Condition</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gate leakage current</td>
<td>IGES</td>
<td>$V_{GE} = \pm 6$ V, $V_{CE} = 0$</td>
<td>—</td>
<td>—</td>
<td>±10</td>
<td>μA</td>
</tr>
<tr>
<td>Collector cut-off current</td>
<td>ICES</td>
<td>$V_{CE} = 400$ V, $V_{GE} = 0$</td>
<td>—</td>
<td>—</td>
<td>10</td>
<td>μA</td>
</tr>
<tr>
<td>Gate-emitter cut-off voltage</td>
<td>$V_{GE\text{ (OFF)}}$</td>
<td>$I_C = 1$ mA, $V_{CE} = 5$ V</td>
<td>0.7</td>
<td>1.05</td>
<td>1.4</td>
<td>V</td>
</tr>
<tr>
<td>Collector-emitter saturation voltage</td>
<td>$V_{CE\text{ (sat)}}$</td>
<td>$I_C = 150$ A, $V_{GE} = 4$ V</td>
<td>2.9</td>
<td>—</td>
<td>—</td>
<td>V</td>
</tr>
<tr>
<td>Input capacitance</td>
<td>$C_{ies}$</td>
<td>$V_{CE} = 10$ V, $V_{GE} = 0$, $f = 1$ MHz</td>
<td>2500</td>
<td>—</td>
<td>—</td>
<td>pF</td>
</tr>
</tbody>
</table>

Switching time

- Rise time $t_r$
- Turn-on time $t_{on}$
- Fall time $t_f$
- Turn-off time $t_{off}$

Note 1: Please use devices on condition that the junction temperature is below 150°C. Repetitive rating: pulse width limited by maximum junction temperature.

Note 2a: Device mounted on a glass-epoxy board (a)

Note 2b: Device mounted on a glass-epoxy board (b)

Note 3: ○ on lower right of the marking indicates Pin 1.

- Weekly code (Three digits)
  - Week of manufacture
    - (01 for first week of year, continues up to 52 or 53)
  - Year of manufacture
    - (One low-order digits of calendar year)

- Pb-Free Finish (Only a coating lead terminal):
  - It is marking about an underline to a week of manufacture mark.

\[ V_{IN}: t_r < 100 \text{ ns} \]
\[ t_f < 100 \text{ ns} \]
\[ \text{Duty cycle} < 1\% \]
Caution on handling

This device is MOS gate type. Therefore, please care of a protection from ESD in your handling.

Caution in design

You should design $dV/dt$ value is below 400 V/$\mu$s when IGBT turn off.

● definition of $dV/dt$

The slope of $v_{ce}$ from 30V to 90V (attached figure.1)

$$dV/dt = \frac{(90V-30V)}{(\Delta t)} = 60V/\Delta t$$

● waveform

- $I_{C}(begin)$
- $V_{CE}$
- $I_{C}(end)$
- $0V, 0A$
- $dV/dt$ period
Collector current $I_C$ (A)

Collector-emitter voltage $V_{CE}$ (V)

Common emitter

$T_c = -10°C$

$VGE = 5.0 V$

$I_C - V_{CE}$

$T_c = 25°C$

$VGE = 5.0 V$

$I_C - V_{CE}$

$T_c = 70°C$

$VGE = 5.0 V$

$I_C - V_{CE}$

$T_c = 125°C$

$VGE = 5.0 V$

$I_C - V_{GE}$

Common emitter

$V_C = 5 V$

Gate-emitter voltage $V_{GE}$ (V)
Common emitter
VCE = 4 V
Ic = 150 A

Capacitance C (pF)
Collector-emitter voltage VCE (V)

Gate-emitter voltage VGE (V)

Collector-emitter voltage VCE (V)

Gate charge QG (nC)

Switching time (μs)
Gate resistance RG (Ω)

Switching time (μs)
Collector current IC (A)
Main capacitance $C_M$ ($\mu$F)

Peak collector current $I_{CP}$ (A)

Minimum Gate Drive Area

Gate-emitter voltage $V_{GE}$ (V)

Maximum Operating Area

Peak collector current $I_{CP}$ (A)

$V_{CM} = 350$ V

$T_c \leq 70^\circ$C

$V_{GE} = 4.0$ V

$10 \Omega \leq R_G \leq 300 \Omega$

$V_G - 25^\circ$C

$T_c = 70$ V

$80 \leq V_G \leq 200$ V

$0 \leq I_{CP} \leq 800$ A

$0 \leq C_M \leq 200$ $\mu$F

$T_c < 70^\circ$C

$V_G - 4.0$ V

$10 \Omega \leq R_G \leq 300 \Omega$

$V_G - 25^\circ$C

$T_c = 70$ V

$80 \leq V_G \leq 200$ V

$0 \leq I_{CP} \leq 800$ A

$0 \leq C_M \leq 200$ $\mu$F
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