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Kind regards,

Team Nexperia
BZA408B
Quadruple bidirectional ESD transient voltage suppressor
FEATURES

- ESD rating >15 kV, according to IEC1000-4-2
- SOT457 surface mount package
- Non-clamping range: −5 V to +5 V
- Channel separation: >70 dB
- Low reverse current: <100 nA
- Low diode capacitance: <75 pF.

APPLICATIONS

- Protection of equipment, connected to data and transmission lines, against voltage surges caused by electrostatic discharge e.g:
  - Computers and peripherals
  - Audio and video equipment
  - Communication systems
  - Medical equipment
  - Portable electronics.

DESCRIPTION

4-bit wide monolithic bidirectional ESD transient voltage suppressor in a six lead SOT457 (SC-74) package.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per diode</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_{ZSM}</td>
<td>non-repetitive peak reverse current</td>
<td>t_{p} = 1 ms; square pulse; see Fig.2</td>
<td>−</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>P_{ZSM}</td>
<td>non-repetitive peak power</td>
<td>t_{p} = 1 ms; square pulse</td>
<td>−</td>
<td>20</td>
<td>W</td>
</tr>
<tr>
<td>T_{stg}</td>
<td>storage temperature</td>
<td></td>
<td>−65</td>
<td>+150</td>
<td>°C</td>
</tr>
<tr>
<td>T_{j}</td>
<td>junction temperature</td>
<td></td>
<td>−65</td>
<td>+150</td>
<td>°C</td>
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</table>

PINNING

<table>
<thead>
<tr>
<th>PIN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>cathode 1</td>
</tr>
<tr>
<td>2, 5</td>
<td>ground</td>
</tr>
<tr>
<td>3</td>
<td>cathode 2</td>
</tr>
<tr>
<td>4</td>
<td>cathode 3</td>
</tr>
<tr>
<td>6</td>
<td>cathode 4</td>
</tr>
</tbody>
</table>

Marking code: Z8.

Fig.1  Simplified outline (SOT457) and symbol.
THERMAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{th,j-s}$</td>
<td>thermal resistance from junction to soldering point</td>
<td>one or more diodes loaded</td>
<td>340</td>
<td>K/W</td>
</tr>
</tbody>
</table>

ELECTRICAL CHARACTERISTICS

$T_j = 25 \, ^\circ C$ unless otherwise specified.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{RWM}$</td>
<td>working reverse voltage</td>
<td></td>
<td>–</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>$V_R$</td>
<td>reverse voltage</td>
<td>$I_{test} = 5 , mA$</td>
<td>5.5</td>
<td>–</td>
<td>V</td>
</tr>
<tr>
<td>$V_{ZSM}$</td>
<td>non-repetitive peak reverse voltage</td>
<td>$t_p = 1 , ms; I_{ZSM} = 2 , A$</td>
<td>–</td>
<td>10</td>
<td>V</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = V_{RWM}$</td>
<td>–</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>see Fig.3</td>
<td>–</td>
<td>75</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 0; f = 1 , MHz$</td>
<td>–</td>
<td>55</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 5 , V; f = 1 , MHz$</td>
<td>–</td>
<td>–</td>
<td>dB</td>
</tr>
<tr>
<td>$\alpha_{ch,(p,to,p)}$</td>
<td>pin to pin channel separation</td>
<td>note 1; see Fig.4</td>
<td>70</td>
<td>–</td>
<td>dB</td>
</tr>
</tbody>
</table>

Note

1. $\alpha_{ch\,(p\,to\,p)}$ is measured as follows: a $-7 \, dB$s sinewave of 400 Hz is connected to e.g. pin 6 and a $-7 \, dB$s sinewave of 1 kHz to pin 1. The 1 kHz signal of pin 1 is measured on pin 6 by means of a spectrum analyser with an input impedance of 1 M\(\Omega\). So $\alpha_{ch\,(p\,to\,p)}$ equals the 1 kHz level on pin 1 minus the 1 kHz level on pin 6. For the 400 Hz signal the same measurement is done in the opposite way.
Graphical Data

Fig. 2 Maximum non-repetitive peak reverse current as a function of pulse time.

Fig. 3 Diode capacitance as a function of reverse voltage; typical values.

Fig. 4 Channel separation measurement setup.
Fig. 5 ESD clamping test set-up and waveforms.

Note 1: attenuator is only used for open socket high voltage measurements.
APPLICATION INFORMATION

Typical bidirectional application

A quadruple bidirectional transient suppressor in a SOT457 package makes it possible to protect four separate lines using only one package. One simplified example is shown in Fig.6.

Fig.6  Scart connector protection.

Device placement and printed-circuit board layout

Circuit board layout is of extreme importance in the suppression of transients. The clamping voltage of the BZA408B is determined by the peak transient current and the rate of rise of that current (di/dt). Since parasitic inductances can further add to the clamping voltage (V = L di/dt) the series conductor lengths on the printed-circuit board should be kept to a minimum. This includes the lead length of the suppression element.

In addition to minimizing conductor length the following printed-circuit board layout guidelines are recommended:

1. Place the suppression element close to the input terminals or connectors.
2. Keep parallel signal paths to a minimum.
3. Avoid running protection conductors in parallel with unprotected conductors.
4. Minimize all printed-circuit board loop areas including power and ground loops.
5. Minimize the length of the transient return path to ground.
6. Avoid using shared transient return paths to a common ground point.
 Quadruple bidirectional ESD transient voltage suppressor

BZA408B

PACKAGE OUTLINE
Plastic surface mounted package; 6 leads

SOT457

DIMENSIONS (mm are the original dimensions)

<table>
<thead>
<tr>
<th>UNIT</th>
<th>A</th>
<th>A₁</th>
<th>bₚ</th>
<th>c</th>
<th>D</th>
<th>E</th>
<th>e</th>
<th>Hₑ</th>
<th>Lₚ</th>
<th>Q</th>
<th>v</th>
<th>w</th>
<th>y</th>
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<tbody>
<tr>
<td>mm</td>
<td>1.1</td>
<td>0.1</td>
<td>0.26</td>
<td>3.1</td>
<td>1.7</td>
<td>0.95</td>
<td>3.0</td>
<td>0.6</td>
<td>0.33</td>
<td>0.2</td>
<td>0.2</td>
<td>0.1</td>
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REFERENCES

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EUROPEAN PROJECTION

ISSUE DATE

1998 Oct 15

97-02-28-01-05-04
Quadruple bidirectional ESD transient voltage suppressor

DATA SHEET STATUS

<table>
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<th>DOCUMENT STATUS(1)</th>
<th>PRODUCT STATUS(2)</th>
<th>DEFINITION</th>
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<td>Objective data sheet</td>
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<td>This document contains data from the objective specification for product development.</td>
</tr>
<tr>
<td>Preliminary data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
</tr>
<tr>
<td>Product data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
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This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content, except for package outline drawings which were updated to the latest version.

Contact information

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