ESD200-B1-CSP0201

Protection device

TVS (transient voltage suppressor)
Bi-directional, 5.5 V, 6.5 pF, 0201, RoHS and halogen free compliant

Feature list

• ESD/transient protection of data lines according to:
  - IEC61000-4-2 (ESD): ±19 kV (air), ±17 kV (contact discharge)
  - IEC61000-4-4 (EFT): ±2 kV/±40 A (5/50 ns)
  - IEC61000-4-5 (Surge): ±3 A (8/20 μs)
• Bi-directional working voltage up to: \( V_{\text{RWM}} = \pm 5.5 \) V
• Line capacitance: \( C_L = 6.5 \) pF (typical) at \( f = 1 \) MHz
• Clamping voltage: \( V_{\text{CL}} = 13 \) V (typical) at \( I_{\text{TLP}} = 16 \) A with \( R_{\text{DYN}} = 0.2 \) Ω (typical)
• Very low reverse current: \( I_R < 1 \) nA (typical)
• Minimized clamping overshoot due to extremely low parasitic inductance
• Small form factor SMD size 0201, low profile (0.58 mm x 0.28 mm x 0.15 mm) \[3\]
• Bi-directional and symmetric I/V characteristic for optimized design and assembly, recommendations for PCB assembly see \[2\]

Potential applications

• ESD protection of highly susceptible IC/ASICs in audio, headset and human digital interfaces

Product validation

Qualified for industrial applications according to the relevant tests of JEDEC47/20/22

Device information

![Pin configuration and schematic diagram](image)

**Figure 1** Pin configuration and schematic diagram

**Table 1** Part information

<table>
<thead>
<tr>
<th>Type</th>
<th>Package</th>
<th>Configuration</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD200-B1-CSP0201</td>
<td>WLL-2-1</td>
<td>1 line, bi-directional</td>
<td>A [1]</td>
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</table>

1 The device has no marking code on the device backside. The marking code is on pad side.

Datasheet Please read the Important Notice and Warnings at the end of this document Revision 1.3 www.infineon.com 2018-02-19
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Maximum ratings

1 Maximum ratings

Note: $T_A = 25 \, ^\circ C$, unless otherwise specified.

Table 2 Maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Values</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse working voltage</td>
<td>$V_{RWM}$</td>
<td>±5.5</td>
<td>V</td>
</tr>
<tr>
<td>ESD discharge 1)</td>
<td>$V_{ESD}$ (contact)</td>
<td>±17</td>
<td>kV</td>
</tr>
<tr>
<td></td>
<td>$V_{ESD}$ (air)</td>
<td>±19</td>
<td></td>
</tr>
<tr>
<td>Peak pulse power 2)</td>
<td>$P_{PK}$</td>
<td>45</td>
<td>W</td>
</tr>
<tr>
<td>Peak pulse current 2)</td>
<td>$I_{PP}$</td>
<td>±3</td>
<td>A</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>$T_{OP}$</td>
<td>-55 to 125</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>$T_{stg}$</td>
<td>-65 to 150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Attention: Stresses above the maximum values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings. Exceeding only one of these values may cause irreversible damage to the component.

1 $V_{ESD}$ according to IEC61000-4-2 ($R = 330 \, \Omega$, $C = 150 \, \text{pF}$ discharge network)

2 Stress pulse: 8/20 μs current waveform according to IEC61000-4-5
Note: $T_A = 25 \, ^\circ C$, unless otherwise specified. Device is electrically symmetrical.

**Figure 2**  Definitions of electrical characteristics
### Table 3  DC characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Values</th>
<th>Unit</th>
<th>Note or test condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakdown voltage</td>
<td>$V_{BR}$</td>
<td>6 – 10</td>
<td>V</td>
<td>$I_T = 1$ mA</td>
</tr>
<tr>
<td>Reverse current</td>
<td>$I_R$</td>
<td>– 0.1</td>
<td>nA</td>
<td>$V_R = 5.5$ V</td>
</tr>
</tbody>
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### Table 4  AC characteristics

<table>
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<th>Values</th>
<th>Unit</th>
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<tr>
<td>Line capacitance</td>
<td>$C_L$</td>
<td>– 6.5</td>
<td>pF</td>
<td>$V_R = 0$, $f = 1$ MHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– 6.5</td>
<td></td>
<td>$V_R = 0$, $f = 1$ GHz</td>
</tr>
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### Table 5  ESD and Surge characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Values</th>
<th>Unit</th>
<th>Note or test condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping voltage 1)</td>
<td>$V_{CL}$</td>
<td>– 12</td>
<td>V</td>
<td>$V_{ESD} = 8$ kV, contact discharge</td>
</tr>
<tr>
<td>Clamping voltage 2)</td>
<td></td>
<td>– 10</td>
<td></td>
<td>$I_{TLP} = 1$ A, $t_p = 100$ ns</td>
</tr>
<tr>
<td>Clamping voltage 3)</td>
<td></td>
<td>– 13</td>
<td></td>
<td>$I_{TLP} = 16$ A, $t_p = 100$ ns</td>
</tr>
<tr>
<td>Dynamic resistance 2)</td>
<td>$R_{DYN}$</td>
<td>– 0.2</td>
<td>Ω</td>
<td>$t_p = 100$ ns</td>
</tr>
</tbody>
</table>

1  $V_{ESD}$ according to IEC61000-4-2 ($R = 330$ Ω, $C = 150$ pF discharge network)
2  Please refer to application note AN210 [1], TLP parameters: $Z_0 = 50$ Ω, $t_p = 100$ ns, $t_r = 0.6$ ns
3  Stress pulse: 8/20 μs current waveform according to IEC61000-4-5
# Typical characteristic diagrams

### 3 Typical characteristic diagrams

**Note:** \( T_A = 25 \, ^\circ \text{C}, \) unless otherwise specified.

**Figure 3**  
Reverse leakage current: \( I_R = f(V_R) \)

**Figure 4**  
Reverse current \( I_R = f(T_A), V_R = 5.5 \, \text{V} \)
Figure 5  Reverse voltage $V_{BR} = f(T_A)$, $I_{BR} = 1$ mA

Figure 6  Line capacitance: $C_L = f(V_R)$, $f = 1$ MHz, 1 GHz
Typical characteristic diagrams

**Figure 7** Clamping voltage (ESD): $V_{CL} = f(t)$, 8 kV positive pulse according to IEC61000-4-2

**Figure 8** Clamping voltage (ESD): $V_{CL} = f(t)$, 8 kV negative pulse according to IEC61000-4-2
**Figure 9** Clamping voltage (ESD): $V_{CL} = f(t)$, 15 kV positive pulse according to IEC61000-4-2

**Figure 10** Clamping voltage (ESD): $V_{CL} = f(t)$, 15 kV negative pulse according to IEC61000-4-2
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Protection device

Typical characteristic diagrams

Figure 11  Clamping voltage (TLP): $I_{TLP} = f(V_{TLP})$ [1]
Figure 12  Clamping voltage (Surge): $I_{PP} = f(V_{CL})$ according to IEC61000-4-5 [1]
Figure 13  Insertion loss versus frequency in a 50 Ω system
4 Package information

4.1 WLL-2-1 package

Note: Dimensions in mm

Figure 14 WLL-2-1 package outline

Figure 15 WLL-2-1 footprint

Figure 16 WLL-2-1 packing

Figure 17 WLL-2-1 marking example (marking code see Device information)
5 References

[1] Infineon AG - Application note AN210: Effective ESD protection design at system level using VF-TLP characterization methodology

[2] Infineon AG - Recommendations for Printed Circuit Board Assembly of Infineon WLL Packages
   [http://www.infineon.com/Packageinformation_WLL](http://www.infineon.com/Packageinformation_WLL)


Revision history

Revision history: Rev. 1.2. 2016-05-13

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Datasheet 14 Revision 1.3
2018-02-19
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