RS-485 Port Protection Evaluation Board 1

Introduction

This Evaluation Board serves as an aid in evaluating circuit protection on RS-485 serial device ports, using two Bourns® TBU® High-Speed Protectors (HSP), two fast-acting GDTs and two TVS diodes to meet the required industry standards on RS-485 port interfaces. The recommended Bourns® TBU® device solution, with a low capacitance GDT1, offers enhanced high-speed performance features over competing technologies, which can help the design engineer increase the surge and transient protection level on RS-485 ports and place the entire circuit protection solution into a smaller reduced PCB area. Bourns has developed an RS-485 Evaluation Board (measuring 45 mm x 21 mm x 1.2 mm) manufactured using FR4 PCB with nickel gold plating on the top and bottom sides.

How to Connect the Evaluation Board for Test Set-up

- Connect IN1 and IN2 to the exposed lines.
- Connect OUT1 and OUT2 to the RS-485 IC device.

<table>
<thead>
<tr>
<th>No.</th>
<th>Part Number</th>
<th>Qty.</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TBU-C065-200-WH</td>
<td>2</td>
<td>TBU® Single Bidirectional Line 650 V 200 mA</td>
<td>TBU® HSP 1, TBU® HSP 2</td>
</tr>
<tr>
<td>2</td>
<td>2031-23T-SM-RPLF</td>
<td>2</td>
<td>Single Line Fast-acting GDT 650 V</td>
<td>GDT1, GDT2</td>
</tr>
<tr>
<td>3</td>
<td>SMBJ12CA</td>
<td>2</td>
<td>Single Bidirectional Line TVS 12 V SMB</td>
<td>TVS1, TVS2</td>
</tr>
</tbody>
</table>

*The default configuration of this board uses 2 GDTs (GDT1, GDT2) and discrete SMB TVS diodes (TVS1, TVS2). The board allows different configurations:
- 2 single 2031 GDTs (GDT1 and GDT2) may be replaced by a dual 2030 GDT (GDT3)
- 2 SMB TVS diodes (TVS1 and TVS2) may be replaced with a) 2 SOT23 TVS diodes (TVS3, TVS4) or b) a single TVS diode array (TVS5)
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**Performance Graphs**

**Figure 3**  |  **Power Cross 120 Vrms**

- **Ch 1:** Surge generator
- **Ch 2:** Consumed current (TBU® HSP trigger current)

The ohm unit following the current units shown for Channel 4 (i.e. AOhm) indicates that a 50 ohm termination was used internal to the oscilloscope.

**Figure 4**  |  **Slew Rate 1 KV/µs**

- **Ch 1:** Surge generator
- **Ch 2:** Consumed current (TBU® HSP trigger current)

The ohm unit following the current units shown for Channel 4 (i.e. AOhm) indicates that a 50 ohm termination was used internal to the oscilloscope.

**Figure 5**  |  **Slew Rate 5 KV/µs**

- **Ch 1:** Surge generator
- **Ch 2:** Consumed current (TBU® HSP trigger current)

The ohm unit following the current units shown for Channel 4 (i.e. AOhm) indicates that a 50 ohm termination was used internal to the oscilloscope.

**Reference**

For more information on implementing advanced circuit protection technologies for RS-485 ports, please review the Bourns® RS-485 application note:


**Note**

Please note that RS-485 Port Protection Evaluation Board 1 was replaced by RS-485 Port Protection Evaluation Board 3 in order to extend the flat GDT configuration option.

For further technical support and for complete circuit protection solutions, please visit

www.bourns.com