Protection Board

PB-10; PB-20

Top View

General Description

Protection board has two functions. First one is to adopt the chamber anode wire terminals to the anode amplifier board inputs. The second function is to protect the amplifier inputs against large input charge.

PB is designed to install on the chamber plane carrying anode wires on both sides (anode plate) and collected 8 channels from each side.

There are two modifications of the protection boards designed, the first one is for 10 degree chambers PB-10 and the second - for 20 degree chambers PB-20.

Features

Sixteen spread inputs (8+8) are traced into a standard 34 pin connector.

PB provides a proper ground connection of the amplifier input to the chamber signal ground.

Resistor/diode/resistor protection network protects surely each amplifier input against electrical discharge of 1000 pF capacitor charged up to 5 kV.

Protection Circuit Structure

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PB-10
Size: 219.7 mm x 21.6 mm (8.65" x 0.9")

PB-20
Size: 124.5 mm x 21.6 mm (4.9" x 0.9")
Protection Board

PB-10; PB-20

Layout PB10

Top Layer

Input connector #1 (J4)
Input connector #2 (J1)
Input connector #3 (J5)
Input connector #4 (J2)
Ground connector (J7)
Ground connector (J6)
Amplifier channel 1
Amplifier channel 16
Output connector (J3)

Layout PB20

Top Layer

Input connector #1 (J4)
Input connector #2 (J1)
Input connector #3 (J5)
Input connector #4 (J2)
Ground connector (J7)
Ground connector (J6)
Amplifier channel 1
Amplifier channel 16
Output connector (J3)

Bottom Layer

CMU-PNPI

http://www-hep.phys.cmu.edu/cms/
http://dbserv.pnpi.spb.ru/ofve/red/
## Protection Board

### PB-10; PB-20

## Electrical Characteristics

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through resistance</td>
<td>Re</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td>Ohm</td>
</tr>
<tr>
<td>Protection quality</td>
<td></td>
<td>Average number of sparks before amplifier failure. Sparc to ground of 1 nf capacitor charged up to 5 kV.</td>
<td>100,000</td>
<td></td>
<td></td>
<td>spark</td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
<td>Spark to ground of 2nF capacitor charged up to 7 kV</td>
<td>100,000</td>
<td></td>
<td></td>
<td>spark</td>
</tr>
</tbody>
</table>
Protection Board

PB-10; PB-20

Schematic Diagram

R1, R4, R5, R8, R9, R12, R13, R16, R19, R22, R23, R26, R27, R30, R31, R34 – 15 Ohm, 0.25 W Carbon Composition
R2, R3, R6, R7, R10, R11, R14, R15, R20, R21, R24, R25, R28, R29, R32, R33 – 10 Ohm 0.25W SM
D1, D2, D3, D4, D5, D6, D7, D8, D11, D12, D13, D14, D15< D16, D17, D18 – BAV99LT1

CMU-PNPI
http://www-hep.phys.cmu.edu/cms/
http://dbserv.pnpi.spb.ru/ofve/red/
Application note

The protection board connected to the Anode Panel (AP) of CSC collects 8 anode channels from upper side and 8 from lower side of the AP. Arrow and word “STRIP” showes that this side of PB must be connected to the stripped side of AP. This side is a lower side of the AP.

AFEB channels mapping.

<table>
<thead>
<tr>
<th>#</th>
<th>AFEB channel number</th>
<th>PB output connector address</th>
<th>PB input connector address</th>
<th>Anode wire group address; k=1</th>
<th>Anode wire group address; k=2</th>
<th>Anode wire group address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>J3- 34</td>
<td>J4- 2</td>
<td>s1</td>
<td>s9</td>
<td>s1+(k-1)8</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>J3- 32</td>
<td>J4- 3</td>
<td>s2</td>
<td>s10</td>
<td>s2+(k-1)8</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>J3- 30</td>
<td>J4- 4</td>
<td>s3</td>
<td>s11</td>
<td>s3+(k-1)8</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>J3- 28</td>
<td>J4- 5</td>
<td>s4</td>
<td>s12</td>
<td>s4+(k-1)8</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>J3- 26</td>
<td>J1- 2</td>
<td>1</td>
<td>9</td>
<td>1+(k-1)8</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>J3- 24</td>
<td>J1- 3</td>
<td>2</td>
<td>10</td>
<td>2+(k-1)8</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>J3- 22</td>
<td>J1- 4</td>
<td>3</td>
<td>11</td>
<td>3+(k-1)8</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>J3- 20</td>
<td>J1- 5</td>
<td>4</td>
<td>12</td>
<td>4+(k-1)8</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>J3- 18</td>
<td>J5- 2</td>
<td>s5</td>
<td>s13</td>
<td>s5+(k-1)8</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>J3- 16</td>
<td>J5- 3</td>
<td>s6</td>
<td>s14</td>
<td>s6+(k-1)8</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>J3- 14</td>
<td>J5- 4</td>
<td>s7</td>
<td>s15</td>
<td>s7+(k-1)8</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>J3- 12</td>
<td>J5- 5</td>
<td>s8</td>
<td>s16</td>
<td>s8+(k-1)8</td>
</tr>
<tr>
<td>13</td>
<td>13</td>
<td>J3- 10</td>
<td>J2- 2</td>
<td>5</td>
<td>13</td>
<td>5+(k-1)8</td>
</tr>
<tr>
<td>14</td>
<td>14</td>
<td>J3- 8</td>
<td>J2- 3</td>
<td>6</td>
<td>14</td>
<td>6+(k-1)8</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>J3- 6</td>
<td>J2- 4</td>
<td>7</td>
<td>15</td>
<td>7+(k-1)8</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>J3- 4</td>
<td>J2- 5</td>
<td>8</td>
<td>16</td>
<td>8+(k-1)8</td>
</tr>
</tbody>
</table>

Note: k – Protection Board number along the Anode Panel from narrow side of the chamber to wide side.