MULTIANODE PHOTOMULTIPLIER TUBE ASSEMBLY

H12428 SERIES

8 × 8 Multianode, High Speed Response, High Collection Efficiency
30 mm Square, Super Bialkali and Ultra Bialkali Photocathode
12-stage, Head-on Type

FEATURES

- High Quantum Efficiency
- Compact
- 8 × 8 Multianode
- Effective Area: 23 mm × 23 mm
- High Speed Response
- High Cathode Sensitivity
  - Luminous 105 µA/Im Typ. (-100/-103 Type)
  - Luminous 135 µA/Im Typ. (-200/-203 Type)
- Weight: Approx. 62 g

APPLICATIONS

- High Energy Physics
- Radiation Imaging

Figure 1: Typical Spectral Response
# MULTIANODE PHOTOMULTIPLIER TUBE ASSEMBLIES H12428 SERIES

## Table: Spectral Response, Maximum Ratings, and Cathode Characteristics

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Spectral Response</th>
<th>Photocathode Material</th>
<th>Window Material</th>
<th>Dynode Structure / Stages</th>
<th>Supply Voltage Between Anode and Cathode (V)</th>
<th>Average Anode Output Current in Total (mA)</th>
<th>Luminous Min. (µA/Im)</th>
<th>Luminous Typ. (µA/Im)</th>
<th>Blue Sensitivity Index (CS 5-58) Typ. (mA/W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H12428-100</td>
<td>300 to 650</td>
<td>SBA</td>
<td>K</td>
<td>MC/12</td>
<td>-1100</td>
<td>0.018</td>
<td>90</td>
<td>105</td>
<td>13.5</td>
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<tr>
<td>H12428-103</td>
<td>185 to 650</td>
<td>SBA</td>
<td>U</td>
<td>MC/12</td>
<td>-1100</td>
<td>0.018</td>
<td>90</td>
<td>105</td>
<td>13.5</td>
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<tr>
<td>H12428-200</td>
<td>300 to 650</td>
<td>UBA</td>
<td>K</td>
<td>MC/12</td>
<td>-1100</td>
<td>0.018</td>
<td>110</td>
<td>135</td>
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<tr>
<td>H12428-203</td>
<td>185 to 650</td>
<td>UBA</td>
<td>U</td>
<td>MC/12</td>
<td>-1100</td>
<td>0.018</td>
<td>110</td>
<td>135</td>
<td>15.5</td>
</tr>
</tbody>
</table>

**NOTE:**
- A: SBA: Super Bialkali, UBA: Ultra Bialkali
- B: K: Borosilicate glass, U: UV glass
- C: MC: Metal channel

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## Figure 2: Typical Gain

![Gain Graph](TPMHB0892EXA)

**SUPPLY VOLTAGE (V)**

## Figure 3: Time Response (Example)

![Time Response Graph](TPMHB0897EXA)

**SUPPLY VOLTAGE: -1000 V**

**LOAD RESISTANCE: 50 Ω**

**LIGHT SOURCE: 406 nm PLP**

**PULSE WIDTH: 72 ps**

**RISE TIME: 0.6 ns**

**TIME (1 ns/div.)**

**OUTPUT VOLTAGE (5 mV/div.)**

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## Figure 4: Single Photoelectron PHD per Channel (Example)

![PHD Graph](TPMHB0898EXA)

**SUPPLY VOLTAGE: -1000 V**

**PHOTON + DARK: 3525 s⁻¹**

**PHOTON + DARK: 3525 s⁻¹**

**DARK COUNT: 21 s⁻¹**

**PULSE HEIGHT (ch)**

**COUNTS (s⁻¹)**
### Anode Characteristics

<table>
<thead>
<tr>
<th>Anode to Cathode Supply Voltage (V)</th>
<th>Luminous (A/Im)</th>
<th>Gain</th>
<th>Dark Current per Channel (After 30 min) (nA)</th>
<th>Time Response</th>
<th>Pulse Linearity per Channel</th>
<th>Uniformity Between Each Anode</th>
<th>Type No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1000</td>
<td>25</td>
<td>105</td>
<td>1.0 x 10^6</td>
<td></td>
<td></td>
<td>1:3</td>
<td>H12428-100</td>
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<tr>
<td>-1000</td>
<td>25</td>
<td>105</td>
<td>1.0 x 10^6</td>
<td>0.4</td>
<td>4</td>
<td>1:3</td>
<td>H12428-103</td>
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<tr>
<td>-1000</td>
<td>25</td>
<td>135</td>
<td>1.0 x 10^6</td>
<td>0.6</td>
<td>5.1</td>
<td>1:3</td>
<td>H12428-200</td>
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<tr>
<td>-1000</td>
<td>25</td>
<td>135</td>
<td>1.0 x 10^6</td>
<td>0.6</td>
<td>5.1</td>
<td>1:3</td>
<td>H12428-203</td>
</tr>
</tbody>
</table>

**VOLTAGE DISTRIBUTION RATIO AND SUPPLY VOLTAGE**

<table>
<thead>
<tr>
<th>Electrodes</th>
<th>Ratio</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Typ.</th>
<th>2% Deviation (mA)</th>
<th>5% Deviation (mA)</th>
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<tbody>
<tr>
<td>K</td>
<td>2.3</td>
<td>1.0</td>
<td>1.4</td>
<td>3.7</td>
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<td>0.6</td>
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<td>10</td>
<td>100</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
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<tr>
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<td>1.0</td>
<td>100</td>
<td>1.2</td>
<td>10</td>
<td>0.6</td>
<td>0.2</td>
<td>0.2</td>
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<tr>
<td>Dy3</td>
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</tr>
</tbody>
</table>

**Supply Voltage:** -1000 V,  **Type No.:** H12428

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**Figure 5: Pulse Linearity with All Anodes Shorted (Example)**

**Figure 6: Anode Cross-talk (Example)**
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Figure 7: Dimensional Outline and Basing Diagram (Unit: mm)

Figure 8: Internal Circuit

Figure 9: Suitable Sockets (Unit:mm) Supplied

SD-108-T-22 × 4 pcs (for Anode Output Pins)

SS-101-T-22 × 2 pcs (for for GND, DY12 Pin)

ASP-24307-02 (for GND, -HV Pin)

* HAMAMATSU also provides C10940 series compact high voltage power supply module.

WARNING ~ High Voltage ~

The product is operated at high voltage potential. Further, the metal housing of the product is connected to the photocathode (potential) so that it becomes a high voltage potential when the product is operated at a negative high voltage (anode grounded). Accordingly, extreme safety care must be taken for the electrical shock hazard to the operator or the damage to the other instruments.

* PATENT: USA: 5410211 and other(9), GBR: 551767 and other(9), DEU: 69209809 and other(9), FRA: 551767 and other(9), JPN: 3078905 and other(9)

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