OVERVIEW

The N7599 series are end-window type of compact X-ray tubes, combining a transmission mode target and an X-ray tube window made of beryllium (Be) for each. They offer ease of use because they can be operated under a condition that heater and Be window are at ground condition, and their targets can be cooled by natural heat radiation. They provide characteristic X-ray spectra of the target materials used. The maximum target current is 0.2 mA.

FEATURES

- High Stability: 0.1 % (RMS)
- High Power: 0.2 mA
- Radiation of Characteristic X-ray Spectrum
- Ease of Use:
  - Compact size
  - Natural cooling target
  - Heater and Be window can be at ground

APPLICATIONS

- Measurement of Thin Film Thickness
- X-ray Fluorescence Spectrometer
- Non-destructive Inspection
- Ash Content Measurement
- Sulfur Analysis
- Measurement of Evaporated Film Thickness and Distribution
### CHARACTERISTICS

#### GENERAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>N7599</th>
<th>N7599-01</th>
<th>N7599-11</th>
<th>N7599-15</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Voltage (AC or DC)</td>
<td>12.0 ± 1.2</td>
<td></td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Heater Current</td>
<td>75 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-Ray Radiating Window</td>
<td>Be (t: 0.1 mm)</td>
<td></td>
<td></td>
<td></td>
<td>—</td>
</tr>
<tr>
<td>Target Material °</td>
<td>W</td>
<td>W</td>
<td>Ti</td>
<td>Fe</td>
<td>mm</td>
</tr>
<tr>
<td>Target Focal Point Area</td>
<td>Approx. φ0.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiation Angle</td>
<td>71 degrees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling Method</td>
<td>Convection cooling</td>
<td></td>
<td></td>
<td></td>
<td>—</td>
</tr>
<tr>
<td>Base</td>
<td>8-pin glass base (JEDEC No. E8-11)</td>
<td></td>
<td></td>
<td></td>
<td>—</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 54</td>
<td></td>
<td></td>
<td></td>
<td>g</td>
</tr>
</tbody>
</table>

#### MAXIMUM RATINGS (Absolute Maximum Value)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>N7599</th>
<th>N7599-01</th>
<th>N7599-11</th>
<th>N7599-15</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Voltage (DC) °</td>
<td>+15.3 kV</td>
<td>+10.0 kV</td>
<td>+10.0 kV</td>
<td>+15.3 kV</td>
<td></td>
</tr>
<tr>
<td>Target Current °</td>
<td>0.2 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target Dissipation</td>
<td>2 W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Be Window Temperature</td>
<td>0 to 60 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### RATINGS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>N7599</th>
<th>N7599-01</th>
<th>N7599-11</th>
<th>N7599-15</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Voltage (DC) °</td>
<td>+15 kV</td>
<td>+9.5 kV</td>
<td>+9.5 kV</td>
<td>+15 kV</td>
<td></td>
</tr>
<tr>
<td>Target Current °</td>
<td>0.2 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target Dissipation</td>
<td>1.9 W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beam Cutoff Voltage (G₁ Voltage)</td>
<td>-150 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid No.2 Voltage (G₂ Voltage)</td>
<td>+250 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cathode Voltage</td>
<td>0 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Be Window Potential</td>
<td>0 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**

- ° Other materials are available upon request.
- °° In the range of output (=Target Voltage × Target Current) less than Target Dissipation.
TYPICAL X-RAY SPECTRUM

TARGET MATERIAL: W
TARGET VOLTAGE: 15 kV

W L_\alpha (8.40 keV)
W L_\beta (9.67 keV)

TARGET MATERIAL: Fe
TARGET VOLTAGE: 15 kV

Fe K_\alpha (6.40 keV)
Fe K_\beta (7.06 keV)

TARGET MATERIAL: Ti
TARGET VOLTAGE: 9.5 kV

Ti K_\alpha (4.51 keV)
Ti K_\beta (4.93 keV)
---

**DIMENSIONAL OUTLINES (Unit: mm)**

1. **Be WINDOW (0.1 t)**
   - Diameter: 28.5 mm
   - Height: 7 mm

2. **TARGET**
   - Diameter: 39.0 ± 0.1 mm
   - Height: 7 mm

3. **HV CABLE**
   - Diameter: 26 mm
   - Length: 70 ± 3 mm

4. **SHORT INDEX PIN**
   - PIN NO.
     - 1. HEATER
     - 2. G1
     - 3. NC (NO CONNECTION)
     - 4. G2
     - 5. IC (INTERNAL CONNECTION)
     - 6. IC (INTERNAL CONNECTION)
     - 7. K (CATHODE)
     - 8. HEATER

---

Subject to local technical requirements and regulations, availability of products included in this promotional material may vary. Please consult with our sales office.

Information furnished by HAMAMATSU is believed to be reliable. However, no responsibility is assumed for possible inaccuracies or omissions. Specifications are subject to change without notice. No patent rights are granted to any of the circuits described herein. ©2012 Hamamatsu Photonics K.K.

---

**HAMAMATSU PHOTONICS K.K.**

**HAMAMATSU PHOTONICS K.K., Electron Tube Division**

314-5, Shimokanzo, Iwata City, Shizuoka Pref., 438-0193, Japan, Telephone: (81)539/62-5248, Fax: (81)539/62-2205

**U.S.A.:** Hamamatsu Corporation: 360 Foothill Road, P. O. Box 6910, Bridgewater, N.J. 08807-0910, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218, E-mail: usa@hamamatsu.com

**Germany:** Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-2658 E-mail: info@hamamatsu.de

**France:** Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: info@hamamatsu.fr

**United Kingdom:** Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Towin Road Wolvyn Garden City Hordfordshe AL7 1BW, United Kingdom, Telephone: 44-(0)1707-294888, Fax: 44(0)1707-325777 E-mail: info@hamamatsu.co.uk

**North Europe:** Hamamatsu Photonics Norden AB: Thorshamnsgatan 35 5E-164 40 Kista, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-011, E-mail: info@hamamatsu.se

**Italy:** Hamamatsu Photonics Italia, S.P.A.: Strada della Moia, I/E, 20020 Arse, (Milano), Italy, Telephone: (39)02-935 81 733, Fax: (39)02-935 81 741 E-mail: info@hamamatsu.it

**China:** Hamamatsu Photonics (China) Co., Ltd.: 1201 Tower B, Jiarong Center, 27 Dongshanhuan Road North, Chaoyang District, Beijing 100020, China, Telephone: (86)10-6586-7608, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn

---

TXPRA0011EA

---

* Subject to local technical requirements and regulations, availability of products included in this promotional material may vary. Please consult with our sales office.