Model: UV460

A Practical Guide for UV sensor Application

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NIDA®
Electronics
Contents

1. Field Test Data for Sunlight UV meter

2. Standard Circuit

3. Cover glass for potable UV meter

4. Testing Equipment

5. Genicom's Demo-kit

6. UV Safety Precautions
1. Field Test Data for Sunlight UV meter

- UV Source: Sunlight
- Weather: the clear blue sky
- Location: Jinchun, Korea (37 degrees[37°] north latitude)
- Measuring Equipment: Parameter Analyzer (measurement of photo-current)
- Model No.: GUVA-S10GD (Iph variation: < ± 10%)

The relationship between UV Index and the photocurrent (Iph) is a linear one under the sunlight. Since the solar irradiance in Korea and another country is dissimilar situations, you have to obtain the field test data by regional groups for sunlight UV meter.

* Iph value with UV Index for GUVA-S10GD: \( I_{ph}(nA) = 27U_{VI} + 45 \)

<table>
<thead>
<tr>
<th>UVI</th>
<th>1.2</th>
<th>2.1</th>
<th>3.1</th>
<th>3.8</th>
<th>4.6</th>
<th>5.2</th>
<th>6.0</th>
<th>6.4</th>
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</thead>
<tbody>
<tr>
<td>Iph(nA)</td>
<td>70</td>
<td>98</td>
<td>128</td>
<td>155</td>
<td>179</td>
<td>190</td>
<td>198</td>
<td>205</td>
</tr>
</tbody>
</table>
2. Circuit

- **Standard Circuit**
  - Photovoltaic mode
  - Rf is responsible for the gain of the circuit
  - Cf compensates the reverse junction capacitance of the photodiode and input capacitance of the OPV. (Typical 0.1μF)
  - Option circuit helps for stabilization of output voltage.

- **Basic Circuit for Genicom’s Demo-kit**
  - Gain ~ 5.6x10^6 V/A
  - OP Amp 1: R1[V/A]
  - OP Amp 2: 1+R3/R2
  - Total Gain: R1*(1+R3/R2) [V/A]
  - Ip = (R2*V)/(R1*(R2+R3)) [A]

- **Basic Circuit for common OP Amp. (LMV712, LPV358)**

*Note: We recommend that you should use the low-noise circuit including suitable capacitors because the basic circuits are used high gains to amplify very low photocurrent.*
3. Cover glass for potable UV meter

- Material: crystal quartz
- Thickness: typ. < 0.5mm (±0.02)
- Diameter and Opening size: depend on your design of the potable UV meter
  - The observation angle is reduced by cosine law according to the opening size and the distance from opening widow to device.

**< Best conditions >**
- Opening size: > 2.25mm
- The distance from opening widow to device (UV detector PKG): 0.0 mm (The closer the better)

![Graph showing transmittance of crystal quartz](image_url)

**< Transmittance of Crystal Quartz >**

![Diagram illustrating sunlight and opening window](image_url)
4. Testing Equipment (1)

- UV Source: UV(A+B) lamp
  - 6W black light lamp (Model: FL6 BL, Sankyo Denki, Japan)
  - Wavelength: 300~400nm (352nm peak)
  - Stand of a controllable height

< Spectrum of the UV(A+B) lamp >

< UV Index vs. Distance from UV lamp >

< Application Example for the UV lamp >
4. Testing Equipment (2)

- UV Index Meter
  Manufacturer: Solarmeter (Homepage: www.solarmeter.com)
  Model No.: SM6.5 UVI Meter

Sensor
Silicon Carbide (SiC) Photodiode packaged on gold plated header via gold wire bonding under UV glass window cap, hermetically sealed.

Radiometer
Peak sunlight response bandwidth: 297-310nm
Total solar response: 290-400nm, Diffey
Display: 3 ½ digit LCD
Resolution: 0.1 UVI
Power Source: 9V DC battery
Accuracy: +/-10% ref NIST (NBS) standards
5. Genicom’s Demo-kit

- Circuit: Basic Circuit for Genicom’s Demo-kit
- UV Source: UV(A+B) 6W black light lamp
- Model No.: GUVA-S10GD

![Graph showing photocurrent and demo-kit voltage increase linearly with UV Index (UV irradiance).]

The photocurrent and the demo-kit voltage increase linearly with UV Index (UV irradiance).

* Iph value and output voltage with UV Index for GUVA-S10GD (@UVA Lamp)

<table>
<thead>
<tr>
<th>UV Index</th>
<th>0.9</th>
<th>1.3</th>
<th>1.5</th>
<th>1.9</th>
<th>2.6</th>
<th>3.6</th>
<th>4.3</th>
<th>5.2</th>
<th>6.3</th>
<th>7.5</th>
<th>8.3</th>
<th>10.5</th>
<th>15.7</th>
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</thead>
<tbody>
<tr>
<td>Iph (nA)</td>
<td>51</td>
<td>80</td>
<td>97</td>
<td>113</td>
<td>162</td>
<td>190</td>
<td>241</td>
<td>276</td>
<td>330</td>
<td>394</td>
<td>416</td>
<td>662</td>
<td>904</td>
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<tr>
<td>Vout (mV)</td>
<td>13</td>
<td>20</td>
<td>22</td>
<td>30</td>
<td>36</td>
<td>53</td>
<td>66</td>
<td>91</td>
<td>102</td>
<td>133</td>
<td>170</td>
<td>197</td>
<td>280</td>
</tr>
</tbody>
</table>
6. UV Safety Precautions

- Limit access to areas where UV sources are used.
- Post warning signs at the entrance to labs or other work areas using UV sources.
- Wear protective eyewear and gloves.
  - Wear sunglasses that absorb 99-100% of the full UV spectrum.
  - Wear clothing that covers the body and shades the face.
- Cover arms and neck and limit exposure time
- Never look directly at the beam.
- Use a manual or electronic shutter to close the beam when the source is not in use.
- Use enclosed beam paths where possible.