Type GC11
GC14, GC16
Thermometrics Glass Encapsulated NTC Chip Thermistor

Description
Small glass encapsulated chip thermistors on fine diameter platinum alloy lead wires.

Features
- Glass encapsulated bead thermistors.
- Suitable for temperature measurement, control or compensation applications.
- Fast thermal response times.
- Suitable for self-heated applications such as liquid level sensing or gas flow measurement.
- Operating temperatures range from -40°C to +250°C.
- Unaffected by severe environmental exposures, including nuclear radiation.
- Intermittent operation up to 450°C is permissible; however, stability will be degraded.
- Improved beta tolerance with respect to glass encapsulated beads.
- RoHS compliant to 2002/95/CE.

Options
- Non-standard resistance tolerances and values
- Reference temperature(s) other than 25°C - specify.
- Custom packaging available.
- Welded or soldered extension leads - specify lead material, diameter, length and insulation, if any.
- Calibration - specify temperature(s).
- Interchangeable pairs or sets, curve matching — specify temperature ranges and tolerances.
- Special aging and conditioning for high reliability applications.

Amphenol
Advanced Sensors
Specifications

Thermal and Electrical Properties

Note: These thermal and electrical properties are for all small glass encapsulated thermistors. All definitions and test methods are per MIL-PRF-23648.

<table>
<thead>
<tr>
<th>Thermistor Series</th>
<th>GC11</th>
<th>GC14</th>
<th>GC16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Body Dimensions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Diameter</td>
<td>0.012“</td>
<td>0.016“</td>
<td>0.017“</td>
</tr>
<tr>
<td>Maximum Length</td>
<td>0.024“</td>
<td>0.032“</td>
<td>0.034“</td>
</tr>
<tr>
<td><strong>Lead Wires</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal Diameter</td>
<td>0.0012“</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Lead Length</td>
<td>0.156“ for adjacent cut</td>
<td>0.312“</td>
<td></td>
</tr>
<tr>
<td>Lead Material</td>
<td>Platinum alloy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available Cuts</td>
<td>“K” adjacent</td>
<td>“P” opposite</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material System</th>
<th>Code Letter</th>
<th>R-vs.-T Curve</th>
<th>25/125 Ratio</th>
<th>Nominal Resistance Range @ 25°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>GC1</td>
<td>11.9</td>
<td>-</td>
<td>1000-2500 Ω</td>
</tr>
<tr>
<td>A</td>
<td>GC2</td>
<td>14.7</td>
<td>-</td>
<td>2500-7000 Ω</td>
</tr>
<tr>
<td>A</td>
<td>GC3</td>
<td>21.1</td>
<td>-</td>
<td>7500-30000 Ω</td>
</tr>
<tr>
<td>F</td>
<td>GC4</td>
<td>27.8</td>
<td>14004 Ω only for adjacent cut, 9000 opposite cut with 19.1 25/125 ratio</td>
<td>30-100 k Ω</td>
</tr>
<tr>
<td>B</td>
<td>GC9</td>
<td>30.9</td>
<td>-</td>
<td>100-200 k Ω</td>
</tr>
<tr>
<td>G</td>
<td>GC6</td>
<td>36.4</td>
<td>-</td>
<td>200-500 k Ω</td>
</tr>
<tr>
<td>D</td>
<td>GC10</td>
<td>41.1</td>
<td>-</td>
<td>500-1000 k Ω</td>
</tr>
<tr>
<td>D</td>
<td>GC11</td>
<td>46.1</td>
<td>-</td>
<td>1000-2000 k Ω</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thermal Time Constant</th>
<th>Still Air @ 25°C</th>
<th>0.65</th>
<th>1.2 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plunge into Water</td>
<td>12 milliseconds</td>
<td>16 milliseconds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dissipation Constant</th>
<th>Still Air @ 25°C</th>
<th>0.07 mW/°C</th>
<th>0.12 mW/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Still Water @ 25°C</td>
<td>-</td>
<td>0.60 mW/°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Rating (in air)</th>
<th>Maximum Power Rating</th>
<th>0.015 Watt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100% Maximum Power to:</td>
<td>75 °C</td>
</tr>
<tr>
<td></td>
<td>Derated to 0% at</td>
<td>250 °C</td>
</tr>
</tbody>
</table>

Resistance-Vs.-Temperature Characteristics
The nominal resistance range for the zero-power resistance at 25°C is shown for each available Material System. Each Material System is denoted by an ordering Code Letter, a referenced curve number and the nominal 25°C/125°C resistance ratio. The R-vs.-T curves are on the facing page.

Standard Tolerances

<table>
<thead>
<tr>
<th>Tolerance Code Letter</th>
<th>G</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>±% Tolerance at 25 °C</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>Non-standard – consult factory</td>
</tr>
</tbody>
</table>
Resistance vs. Temperature Curves for GC14/16/11 Devices

BETA 0/50  
RATIO 0/50  2859  5.05  3103  5.80  3494  7.24  3844  8.83  3953  9.38  4111  10.27  4191  10.76  4316  11.53

BETA 25/85  
RATIO 25/85  2916  5.15  3174  5.95  3588  7.51  3918  9.04  4036  9.66  4220  10.71  4344  11.49  4478  12.38

BETA 0/70  
RATIO 0/70  2876  5.85  3124  10.31  3522  13.87  3866  17.95  3977  19.50  4143  22.07  4236  23.69  26.03

BETA 25/100  
RATIO 25/100  2924  7.18  3182  8.54  3601  11.33  3930  14.15  4050  15.34  4239  17.42  4371  19.04  4611

BETA 25/125  
RATIO 25/125  2935  11.85  3192  14.71  3620  21.10  3948  27.82  4072  30.88  4268  36.43  4410  41.05

BETA 37.8/104.4  
RATIO 37.8/104.4  2938  5.30  3197  6.14  3624  7.83  3949  9.42  4074  10.11  4269  11.29  4413  12.25

R-vs-T Curve  
Material System:  
BETA 25/100  
RATIO 25/100  
BETA 25/125  
RATIO 25/125  
BETA 37.8/104.4  
RATIO 37.8/104.4

R-vs-T Curve  
Material System:  
BETA 0/50  
RATIO 0/50  
BETA 25/85  
RATIO 25/85  
BETA 0/70  
RATIO 0/70  
BETA 25/100  
RATIO 25/100  
BETA 25/125  
RATIO 25/125  
BETA 37.8/104.4  
RATIO 37.8/104.4

R-vs-T Curve  
Material System:  
BETA 0/50  
RATIO 0/50  
BETA 25/85  
RATIO 25/85  
BETA 0/70  
RATIO 0/70  
BETA 25/100  
RATIO 25/100  
BETA 25/125  
RATIO 25/125  
BETA 37.8/104.4  
RATIO 37.8/104.4

R-vs-T Curve  
Material System:  
BETA 0/50  
RATIO 0/50  
BETA 25/85  
RATIO 25/85  
BETA 0/70  
RATIO 0/70  
BETA 25/100  
RATIO 25/100  
BETA 25/125  
RATIO 25/125  
BETA 37.8/104.4  
RATIO 37.8/104.4

R-vs-T Curve  
Material System:  
BETA 0/50  
RATIO 0/50  
BETA 25/85  
RATIO 25/85  
BETA 0/70  
RATIO 0/70  
BETA 25/100  
RATIO 25/100  
BETA 25/125  
RATIO 25/125  
BETA 37.8/104.4  
RATIO 37.8/104.4

R-vs-T Curve  
Material System:  
BETA 0/50  
RATIO 0/50  
BETA 25/85  
RATIO 25/85  
BETA 0/70  
RATIO 0/70  
BETA 25/100  
RATIO 25/100  
BETA 25/125  
RATIO 25/125  
BETA 37.8/104.4  
RATIO 37.8/104.4

R-vs-T Curve  
Material System:  
BETA 0/50  
RATIO 0/50  
BETA 25/85  
RATIO 25/85  
BETA 0/70  
RATIO 0/70  
BETA 25/100  
RATIO 25/100  
BETA 25/125  
RATIO 25/125  
BETA 37.8/104.4  
RATIO 37.8/104.4

R-vs-T Curve  
Material System:  
BETA 0/50  
RATIO 0/50  
BETA 25/85  
RATIO 25/85  
BETA 0/70  
RATIO 0/70  
BETA 25/100  
RATIO 25/100  
BETA 25/125  
RATIO 25/125  
BETA 37.8/104.4  
RATIO 37.8/104.4

R-vs-T Curve  
Material System:  
BETA 0/50  
RATIO 0/50  
BETA 25/85  
RATIO 25/85  
BETA 0/70  
RATIO 0/70  
BETA 25/100  
RATIO 25/100  
BETA 25/125  
RATIO 25/125  
BETA 37.8/104.4  
RATIO 37.8/104.4
<table>
<thead>
<tr>
<th>Temperature °C</th>
<th>GC1</th>
<th>GC2</th>
<th>GC3</th>
<th>GC4</th>
<th>GC9</th>
<th>GC6</th>
<th>GC10</th>
<th>GC11</th>
</tr>
</thead>
<tbody>
<tr>
<td>185</td>
<td>0.02351</td>
<td>0.01391</td>
<td>0.00944</td>
<td>0.00808</td>
<td>0.00633</td>
<td>0.00524</td>
<td>0.00443</td>
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<tr>
<td>190</td>
<td>0.02180</td>
<td>0.01273</td>
<td>0.00857</td>
<td>0.00731</td>
<td>0.00569</td>
<td>0.00468</td>
<td>0.00395</td>
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<tr>
<td>195</td>
<td>0.02024</td>
<td>0.01168</td>
<td>0.00780</td>
<td>0.00663</td>
<td>0.00512</td>
<td>0.00420</td>
<td>0.00353</td>
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</tr>
<tr>
<td>200</td>
<td>0.01882</td>
<td>0.01073</td>
<td>0.00711</td>
<td>0.00602</td>
<td>0.00463</td>
<td>0.00377</td>
<td>0.00316</td>
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<tr>
<td>205</td>
<td>0.00988</td>
<td>0.00649</td>
<td>0.00548</td>
<td>0.00418</td>
<td>0.00339</td>
<td>0.00283</td>
<td>Please enquire for details.</td>
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<tr>
<td>210</td>
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<td>0.00499</td>
<td>0.00379</td>
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<td>0.00254</td>
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<tr>
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<td>0.00841</td>
<td>0.00544</td>
<td>0.00456</td>
<td>0.00344</td>
<td>0.00276</td>
<td>0.00229</td>
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<td></td>
</tr>
<tr>
<td>220</td>
<td>0.00778</td>
<td>0.00500</td>
<td>0.00417</td>
<td>0.00313</td>
<td>0.00250</td>
<td>0.00207</td>
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</tr>
<tr>
<td>225</td>
<td>0.00721</td>
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<td>0.00382</td>
<td>0.00285</td>
<td>0.00227</td>
<td>0.00187</td>
<td></td>
<td></td>
</tr>
<tr>
<td>230</td>
<td>0.00669</td>
<td>0.00423</td>
<td>0.00351</td>
<td>0.00261</td>
<td>0.00206</td>
<td>0.00169</td>
<td></td>
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</tr>
<tr>
<td>235</td>
<td>0.00622</td>
<td>0.00390</td>
<td>0.00322</td>
<td>0.00238</td>
<td>0.00187</td>
<td>0.00153</td>
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<tr>
<td>240</td>
<td>0.00579</td>
<td>0.00361</td>
<td>0.00297</td>
<td>0.00218</td>
<td>0.00171</td>
<td>0.00139</td>
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<tr>
<td>245</td>
<td>0.00539</td>
<td>0.00334</td>
<td>0.00274</td>
<td>0.00200</td>
<td>0.00156</td>
<td>0.00127</td>
<td></td>
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</tr>
<tr>
<td>250</td>
<td>0.00503</td>
<td>0.00309</td>
<td>0.00253</td>
<td>0.00184</td>
<td>0.00143</td>
<td>0.00116</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Coding**

**NOTE 1:** Special tolerances are available on request. Consult factory for special resistance tolerances, non-standard resistances and/or non-standard temperatures.

**NOTE 2:** The zero-power resistance at 25°C, expressed in ohms, is identified by a three-digit code number. The first two digits represent significant figures, and the last digit specifies the number of zeros to follow. Example: 51 kOhms = “513”. The standard resistance values are from the 24-value series decade as specified in Military Standard MS90178.

```
1.0 / 1.1 / 1.2 / 1.3 / 1.5 / 1.6 / 1.8 / 2.0 / 2.2 / 2.4 / 2.7 / 3.0
3.3 / 3.6 / 3.9 / 4.3 / 4.7 / 5.1 / 5.6 / 6.2 / 6.8 / 7.5 / 8.2 / 9.1
```