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Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision 1.0

Revision 1.0 was published in March 2017. It was the first publication of this document.
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2 Product Overview

The 1214GN-50E/EL/EP device provides the following key features:

- 1200 MHz–1400 MHz, 50 W output power at 300 µs and 10% pulsing
- Common source, class AB, 50 V bias voltage
- >60% typical efficiency across the frequency band
- Extremely compact size
- Over 16 dB typical power gain
- Excellent gain flatness
- Ideal for radar, L-Band avionics, communications, and industrial applications
- All-gold metallization and eutectic die attach for highest reliability
- 50 Ω IN/OUT lumped element, very small footprint, plug-and-play pallets available
- Export classification: EAR-99

The following illustrations show the case outlines of the 1214GN-50E/EL/EP device.

Figure 1  55-QQ Case Outline (E)

Figure 2  55-QQP Case Outline (EL)

Figure 3  Pallet Outline (EP)
3 Electrical Specifications

This section details the electrical specifications of the 1214GN-50E/EL/EP device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the 1214GN-50E/EL/EP device.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum power dissipation</td>
<td>Device dissipation at 25 °C</td>
<td>100</td>
<td>W</td>
</tr>
<tr>
<td>Maximum voltage and current</td>
<td>Drain-source voltage (V_{DSS})</td>
<td>150</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>Gate-source voltage (V_{GS})</td>
<td>–8 to 0</td>
<td>V</td>
</tr>
<tr>
<td>Maximum temperatures</td>
<td>Storage temperature (T_{STG})</td>
<td>–55 to 125</td>
<td>°C</td>
</tr>
<tr>
<td></td>
<td>Operating junction temperature</td>
<td>200</td>
<td>°C</td>
</tr>
</tbody>
</table>

3.2 Electrical Characteristics

The following table shows the typical electrical characteristics of the 1214GN-50E/EL/EP device at 25 °C.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Characteristics</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_{OUT}</td>
<td>Output power</td>
<td>P_{IN} = 1.6 W, Freq = 1200 MHz, 1300 MHz, 1400 MHz</td>
<td>50</td>
<td>58</td>
<td></td>
<td>W</td>
</tr>
<tr>
<td>G_{P}</td>
<td>Power gain</td>
<td>P_{IN} = 1.6 W, Freq = 1200 MHz, 1300 MHz, 1400 MHz</td>
<td>15.2</td>
<td>15.9</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>η_{D}</td>
<td>Drain efficiency</td>
<td>P_{IN} = 1.6 W, Freq = 1200 MHz, 1300 MHz, 1400 MHz</td>
<td>55</td>
<td>60</td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Dr</td>
<td>Droop</td>
<td>P_{IN} = 1.6 W, Freq = 1200 MHz, 1300 MHz, 1400 MHz</td>
<td>0.2</td>
<td>0.6</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>VSWR-T</td>
<td>Load mismatch tolerance</td>
<td>P_{OUT} = 50 W, Freq = 1300 MHz, 300 µs, 10%</td>
<td></td>
<td></td>
<td>5:1</td>
<td></td>
</tr>
</tbody>
</table>

Bias Condition: V_{DD} = 50 V, I_{DQ} = 10 mA constant current (V_{GS} = –2.0 V to –4.5 V typical)

3.3 Functional Characteristics

The following table shows the typical functional characteristics of the 1214GN-50E/EL/EP device at 25 °C.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Characteristics</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_{D(Off)}</td>
<td>Drain leakage current</td>
<td>V_{GS} = –8 V, V_{D} = 150 V</td>
<td>4</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>I_{G(Off)}</td>
<td>Gate leakage current</td>
<td>V_{GS} = –8 V, V_{D} = 0 V</td>
<td>0.5</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
</tbody>
</table>
3.4 **Typical Broadband Performance Data**

The following table shows the typical broadband performance data of the 1214GN-50E/EL/EP device at 50 V, 300 μs, and 10% pulsing, and $I_{DQ} = 20$ mA.

<table>
<thead>
<tr>
<th>Freq (MHz)</th>
<th>$P_{IN}$ (dBm)</th>
<th>$P_{IN}$ (W)</th>
<th>$P_{OUT}$ (dBm)</th>
<th>$P_{OUT}$ (W)</th>
<th>$G_P$ (dB)</th>
<th>RL (dB)</th>
<th>$I_D$ (A)</th>
<th>Droop (dB)</th>
<th>$\eta_D$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>960</td>
<td>32</td>
<td>1.6</td>
<td>47.5</td>
<td>56.2</td>
<td>15.5</td>
<td>–8</td>
<td>0.210</td>
<td>0.30</td>
<td>59</td>
</tr>
<tr>
<td>1090</td>
<td>32</td>
<td>1.6</td>
<td>47.9</td>
<td>61.4</td>
<td>15.9</td>
<td>–18</td>
<td>0.216</td>
<td>0.25</td>
<td>63</td>
</tr>
<tr>
<td>1215</td>
<td>32</td>
<td>1.6</td>
<td>47.6</td>
<td>57.7</td>
<td>15.6</td>
<td>–7.6</td>
<td>0.192</td>
<td>0.20</td>
<td>67</td>
</tr>
</tbody>
</table>

The following graphs show the typical broadband performance of the 1214GN-50E/EL/EP device.

**Figure 4  Typical Broadband Performance Data Graphs**
4 Package Information

This section details the package information of the 1214GN-50E/EL/EP device.

4.1 Transistor Test Fixture Overall Dimension

The following illustration shows the overall transistor test fixture dimensions of the 1214GN-50E/EL/EP device. The dimensions are in inches. Contact your Microsemi sales representative for test fixtures.

![Transistor Test Fixture Dimensions](image)

4.2 55-QQ Package

The following illustration shows the 55-QQ package outline of the 1214GN-50E/EL/EP device. PIN 1 is the drain, PIN 2 is the source, and PIN 3 is the gate.

![55-QQ Package Outline](image)
The following table shows the 55-QQ dimensions of the 1214GN-50E/EL/EP device, and it corresponds to Figure 5 above.

Table 5  55-QQ Package Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Millimeters</th>
<th>Tol (mm)</th>
<th>Inches</th>
<th>Tol (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>13.970</td>
<td>0.250</td>
<td>0.550</td>
<td>0.010</td>
</tr>
<tr>
<td>B</td>
<td>4.570</td>
<td>0.250</td>
<td>0.160</td>
<td>0.010</td>
</tr>
<tr>
<td>C</td>
<td>3.860</td>
<td>0.330</td>
<td>0.152</td>
<td>0.013</td>
</tr>
<tr>
<td>D</td>
<td>1.270</td>
<td>0.130</td>
<td>0.050</td>
<td>0.005</td>
</tr>
<tr>
<td>E</td>
<td>1.020</td>
<td>0.130</td>
<td>0.040</td>
<td>0.005</td>
</tr>
<tr>
<td>F</td>
<td>1.700</td>
<td>0.130</td>
<td>0.067</td>
<td>0.005</td>
</tr>
<tr>
<td>G</td>
<td>0.130</td>
<td>0.025</td>
<td>0.005</td>
<td>0.001</td>
</tr>
<tr>
<td>H</td>
<td>8.130</td>
<td>0.250</td>
<td>0.320</td>
<td>0.010</td>
</tr>
<tr>
<td>I</td>
<td>45°</td>
<td>5°</td>
<td>45°</td>
<td>5°</td>
</tr>
<tr>
<td>J</td>
<td>5.080</td>
<td>0.250</td>
<td>0.200</td>
<td>0.010</td>
</tr>
<tr>
<td>K</td>
<td>2.54 DIA</td>
<td>0.130</td>
<td>0.100 DIA</td>
<td>0.005</td>
</tr>
<tr>
<td>L</td>
<td>1.270</td>
<td>0.130</td>
<td>0.050</td>
<td>0.005</td>
</tr>
<tr>
<td>M</td>
<td>9.530</td>
<td>0.130</td>
<td>0.375</td>
<td>0.005</td>
</tr>
</tbody>
</table>

4.3  55-QQP Package

The following illustration shows the 55-QQP package outline of the 1214GN-50E/EL/EP device. PIN 1 is the drain, PIN 2 is the source, and PIN 3 is the gate.

Figure 7  55-QQP Package Outline
The following table shows the 55-QQP dimensions of the 1214GN-50E/EL/EP device, and it corresponds to Figure 6 above.

**Table 6  55-QQP Package Dimensions**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Millimeters</th>
<th>Tol (mm)</th>
<th>Inches</th>
<th>Tol (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5.840</td>
<td>0.250</td>
<td>0.230</td>
<td>0.010</td>
</tr>
<tr>
<td>B</td>
<td>4.060</td>
<td>0.250</td>
<td>0.160</td>
<td>0.010</td>
</tr>
<tr>
<td>C</td>
<td>3.170</td>
<td>0.050</td>
<td>0.125</td>
<td>0.002</td>
</tr>
<tr>
<td>D</td>
<td>1.270</td>
<td>0.130</td>
<td>0.050</td>
<td>0.005</td>
</tr>
<tr>
<td>E</td>
<td>1.020</td>
<td>0.130</td>
<td>0.040</td>
<td>0.005</td>
</tr>
<tr>
<td>F</td>
<td>1.570</td>
<td>0.130</td>
<td>0.062</td>
<td>0.005</td>
</tr>
<tr>
<td>G</td>
<td>0.130</td>
<td>0.020</td>
<td>0.005</td>
<td>0.001</td>
</tr>
<tr>
<td>H</td>
<td>8.120</td>
<td>0.250</td>
<td>0.320</td>
<td>0.010</td>
</tr>
<tr>
<td>I</td>
<td>45°</td>
<td>5°</td>
<td>45°</td>
<td>5°</td>
</tr>
<tr>
<td>J</td>
<td>5.080</td>
<td>0.250</td>
<td>0.200</td>
<td>0.010</td>
</tr>
<tr>
<td>K</td>
<td>1.400</td>
<td>0.130</td>
<td>0.055</td>
<td>0.005</td>
</tr>
</tbody>
</table>

### 4.4 Pallet Package

The following illustration shows the pallet outline and the overall pallet dimensions of the 1214GN-50E/EL/EP device. It is 1.200 inches long, 0.600 inches wide, and 0.150 inches high.

**Figure 8  Pallet Package Outline**