Jitter measurements were performed on a Wavecrest SIA-3300C signal integrity analyzer. The measurements were recorded by testing the devices on an evaluation board with an AC coupled output. The evaluation board was connected to the SIA-3300C with an SMA bullet and 90k samples were taken. The values in the table represent typical values.

**Period Jitter:** Period jitter compares the length of each cycle to the average period of an ideal clock using the long term averaging frequency.

**Random Jitter:** Unbounded and unpredictable jitter.

**Deterministic Jitter:** Bounded and predictable jitter.

**Total Jitter:** The sum of all of the jitter, measured to a 1x10^{-12} BER or confidence level.

Also included is the integrated jitter for the 12 kHz to 20 MHz offset band, using an Agilent E5052A.

<table>
<thead>
<tr>
<th>Output MHz</th>
<th>Period RMS ps</th>
<th>Period P/P ps</th>
<th>Random P/P ps</th>
<th>Deterministic P/P fs</th>
<th>Total P/P ps</th>
<th>Measured on Agilent E5052A RMS 12kHz - 20MHz² fs</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.000</td>
<td>2.9</td>
<td>25.2</td>
<td>2.9</td>
<td>50</td>
<td>40.5</td>
<td>465</td>
</tr>
<tr>
<td>16.384</td>
<td>3.2</td>
<td>28.1</td>
<td>3.2</td>
<td>40</td>
<td>44.6</td>
<td>432</td>
</tr>
<tr>
<td>20.000</td>
<td>3.2</td>
<td>26.8</td>
<td>3.2</td>
<td>60</td>
<td>43.8</td>
<td>337</td>
</tr>
<tr>
<td>27.000</td>
<td>3.3</td>
<td>28.2</td>
<td>3.3</td>
<td>20</td>
<td>45.6</td>
<td>296</td>
</tr>
<tr>
<td>35.328</td>
<td>2.7</td>
<td>24.3</td>
<td>2.7</td>
<td>60</td>
<td>37.2</td>
<td>223</td>
</tr>
<tr>
<td>50.000</td>
<td>1.8</td>
<td>16.1</td>
<td>1.9</td>
<td>20</td>
<td>26.0</td>
<td>130</td>
</tr>
<tr>
<td>55.000</td>
<td>1.8</td>
<td>15.9</td>
<td>1.9</td>
<td>40</td>
<td>25.7</td>
<td>159</td>
</tr>
<tr>
<td>66.000</td>
<td>1.9</td>
<td>16.9</td>
<td>1.9</td>
<td>20</td>
<td>27.1</td>
<td>113</td>
</tr>
<tr>
<td>100.00</td>
<td>1.9</td>
<td>16.9</td>
<td>1.9</td>
<td>5</td>
<td>26.7</td>
<td>53</td>
</tr>
<tr>
<td>125.00</td>
<td>1.9</td>
<td>16.9</td>
<td>1.9</td>
<td>25</td>
<td>26.0</td>
<td>48</td>
</tr>
</tbody>
</table>

1. Data is based on 12kHz-5MHz for output frequencies < 50.000 MHz

Table of typical jitter values for the VCC4 series of oscillators
Phase Noise Results

Phase noise measurements were performed on an Agilent E5052A signal source analyzer (SSA). The E5052A has a phase noise to jitter integration calculation feature and devices were characterized in the 12kHz-20MHz band (except for the lower frequencies where the equipment limitations prevented measurement to 20 MHz – see graphs for frequency band). Please contact Vectron for other offset integration bands.
Typical Phase Noise for the VCC4 Series

Phase Noise 10.00 dB/Ref -40.00 dBc/Hz [Sno]

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>Phase Noise (dBc/Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
<td>-95.4387</td>
</tr>
<tr>
<td>100 Hz</td>
<td>-131.6501</td>
</tr>
<tr>
<td>1 kHz</td>
<td>-142.7409</td>
</tr>
<tr>
<td>10 kHz</td>
<td>-148.9445</td>
</tr>
<tr>
<td>100 kHz</td>
<td>-154.4677</td>
</tr>
<tr>
<td>1 MHz</td>
<td>-156.2963</td>
</tr>
<tr>
<td>5 MHz</td>
<td>-157.5690</td>
</tr>
</tbody>
</table>

X: Start 12 kHz
Stop 5 MHz
Center 2.506 MHz
Span 4,988 MHz

Analysis Range X: Band Marker
Analysis Range Y: Band Marker
Int. Noise: -90.0532 dBc/Hz 4,988 MHz
RMS Noise: 49.944 μrad
RMS Jitter: 413.775 nsec
Residual FM: 112.099 Hz

Phase Noise 10.00 dB/Ref -40.00 dBc/Hz [Sno]

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>Phase Noise (dBc/Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
<td>-90.4038</td>
</tr>
<tr>
<td>100 Hz</td>
<td>-123.2968</td>
</tr>
<tr>
<td>1 kHz</td>
<td>-140.0350</td>
</tr>
<tr>
<td>10 kHz</td>
<td>-148.5721</td>
</tr>
<tr>
<td>100 kHz</td>
<td>-155.1273</td>
</tr>
<tr>
<td>1 MHz</td>
<td>-157.2009</td>
</tr>
<tr>
<td>5 MHz</td>
<td>-157.9769</td>
</tr>
</tbody>
</table>

X: Start 12 kHz
Stop 5 MHz
Center 2.506 MHz
Span 4,988 MHz

Analysis Range X: Band Marker
Analysis Range Y: Band Marker
Int. Noise: -90.4665 dBc/Hz 4,988 MHz
RMS Noise: 41.2831 μrad
RMS Jitter: 337.276 nsec
Residual FM: 110.698 Hz
Typical Phase Noise for the VCC4 Series

VCC4-B3F-50M000

VCC4-B3C-55M000

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Typical Phase Noise for the VCC4 Series

Phase Noise 10.00dB/Ref 40.00dBc/Hz [Sno]

Carrier 65,999,952 MHz  13.093 kHz
1: 10 Hz -72.4807 dBc/Hz
2: 100 Hz -107.6984 dBc/Hz
3: 1 kHz -143.4496 dBc/Hz
4: 10 kHz -153.5267 dBc/Hz
5: 100 kHz -150.4484 dBc/Hz
6: 1 MHz -161.8833 dBc/Hz
>7: 10 MHz -163.1554 dBc/Hz
8: 20 MHz -162.8996 dBc/Hz

X: Start 12 kHz
Stop 20 MHz
Center 10,006 MHz
Span 19.988 MHz

Analysis Range: Xi: Band Marker
Analysis Range: Yi: Band Marker
Integ Noise: -59.5397 dBc / 12.500 MHz
RMS Noise: 46.863 μrad
RMS Jitter: 2.48505 μs
Residual FM: 532.137 Hz

VCC4-B3D-66M000

Phase Noise 10.00dB/Ref 40.00dBc/Hz [Sno]

Carrier 99,999,912 MHz  13.265 kHz
1: 10 Hz -71.3554 dBc/Hz
2: 100 Hz -105.3021 dBc/Hz
3: 1 kHz -139.4154 dBc/Hz
4: 10 kHz -154.8595 dBc/Hz
5: 100 kHz -165.2631 dBc/Hz
6: 1 MHz -165.3953 dBc/Hz
7: 10 MHz -165.7204 dBc/Hz
>8: 20 MHz -165.7303 dBc/Hz

X: Start 12 kHz
Stop 20 MHz
Center 10,006 MHz
Span 19.988 MHz

Analysis Range: Xi: Band Marker
Analysis Range: Yi: Band Marker
Integ Noise: -92.4825 dBc / 12.500 MHz
RMS Noise: 31.604 μrad
RMS Jitter: 1.91537 μs
Residual FM: 384.024 Hz

VCC4-B3D-100M000
Typical Phase Noise for the VCC4 Series

Contact Application Engineering for any phase noise/jitter data on frequencies not listed.

For Additional Information Please Contact:

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October 2007.