

LMX2531-xxxx Evaluation Board

User's Guide



November 2013

SNAU077A



LMX2531-xxxx

High Performance Frequency Synthesizer System with Integrated VCO
Evaluation Board Operating Instructions

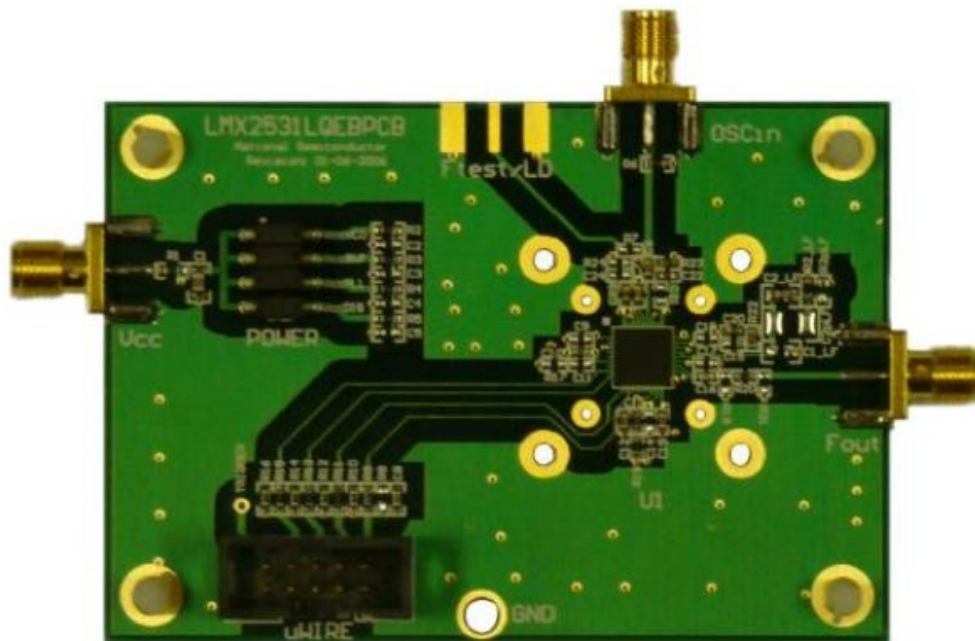


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Equipment

Power Supply

The Power Supply should be a low noise power supply. An Agilent 6623A Triple power supply with LC filters on the output to reduce noise was used in creating these evaluation board instructions.

Signal Generator

The Signal Generator should be capable of frequencies and power level required for the part. A Rohde & Schwarz SML03 was used in creating these evaluation board instructions.

Phase Noise / Spectrum Analyzer

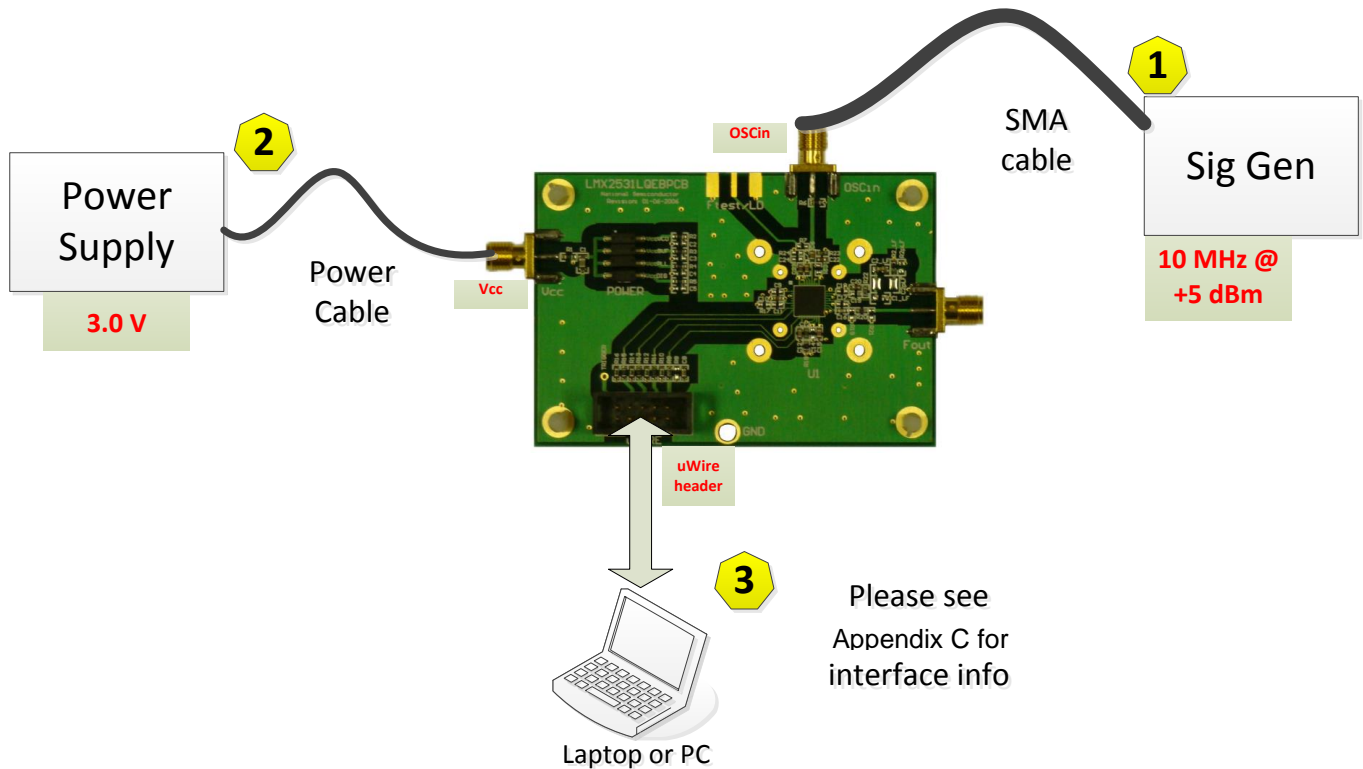
For measuring phase noise an Agilent E5052A is recommended. An Agilent E4445A PSA Spectrum Analyzer with the Phase Noise option is also usable although the architecture of the E5052A is superior for phase noise measurements. At frequencies less than 100 MHz the local oscillator noise of the PSA is too high and measurements will be of the local oscillator, not the device under test.

Oscilloscope

The oscilloscope and probes should be capable of measuring the output frequencies of interest when evaluating this board. The Agilent Infiniium DSO81204A was used in creating these evaluation board instructions.

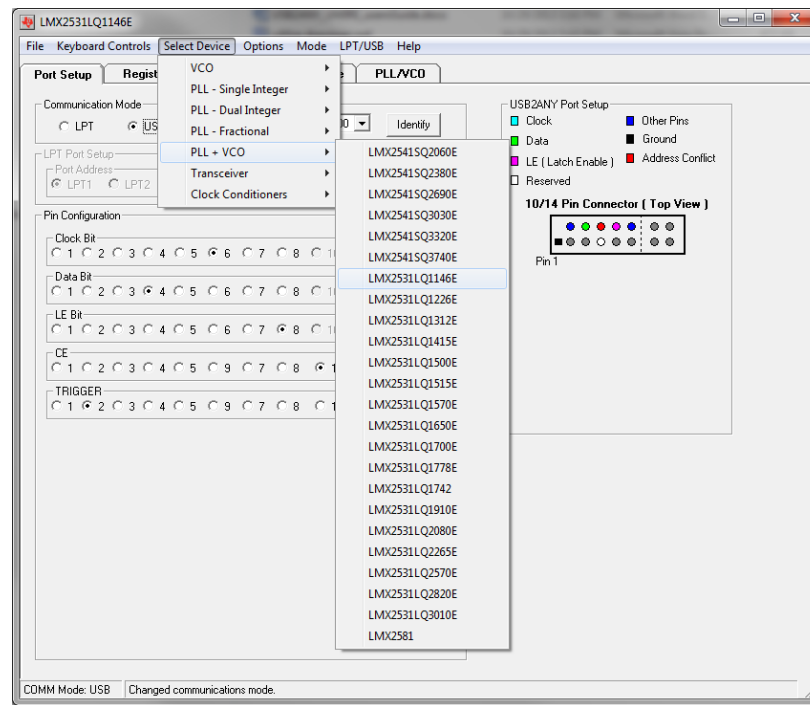
Basic Operation

1. Connect the **signal generator output** to the **OSCin** input of the board. For this example we use a 10 MHz sin signal at +5dBm power level.
2. Connect a low noise **3.3 V** power supply to the **Vcc** connector located at the top left of the board.
3. Please see **Appendix D** for quick start on interfacing the board. Connect PC to the **uWire** header.

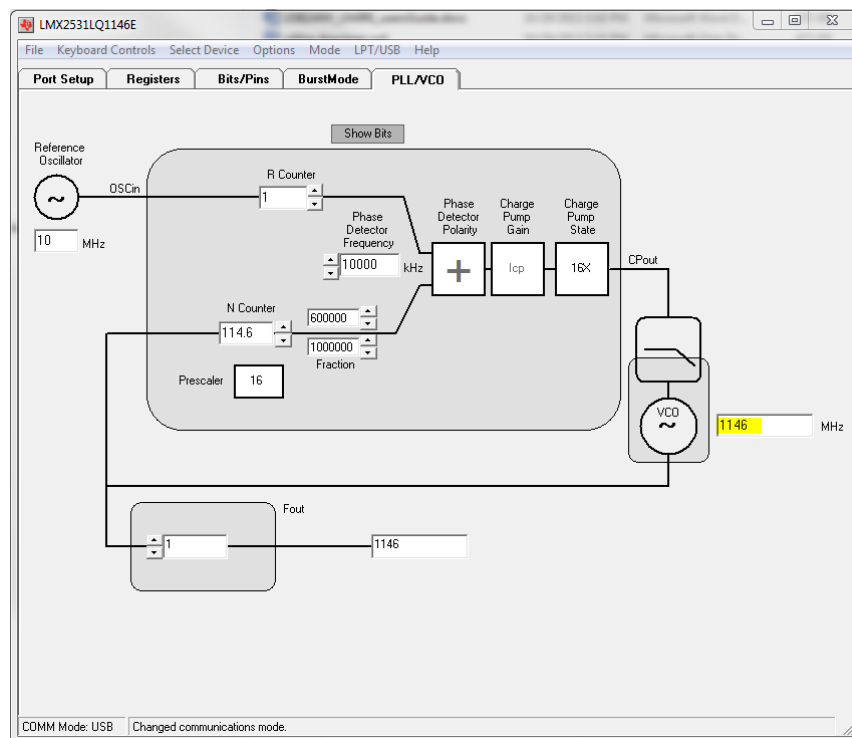


4. Start CodeLoader4.exe.
5. Select USB or LPT Communication Mode on the Port Setup tab as appropriate.

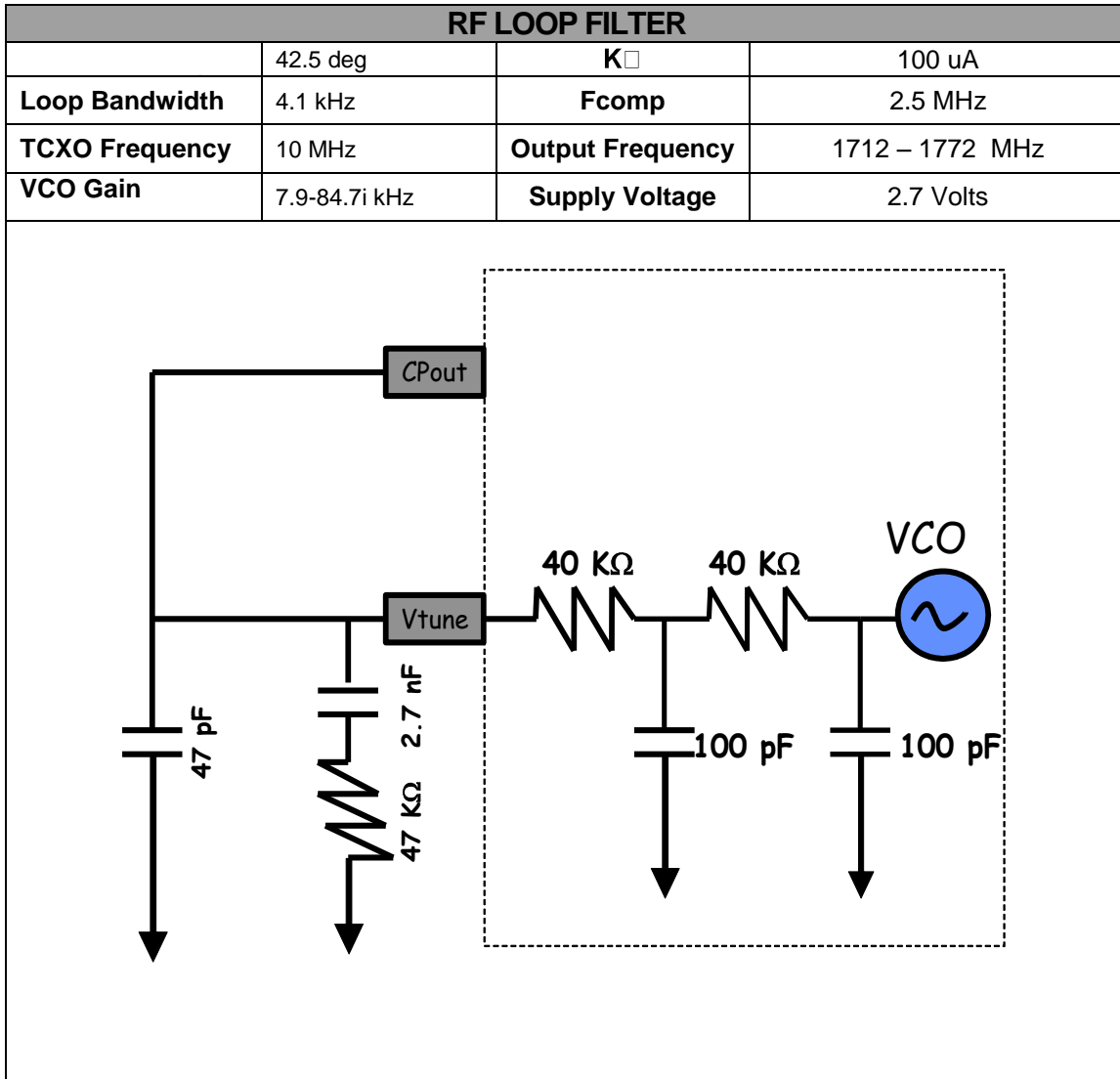
- Click "Select Device" → "PLL-VCO" → LMX2531xxxx depending on which chip is on your board.

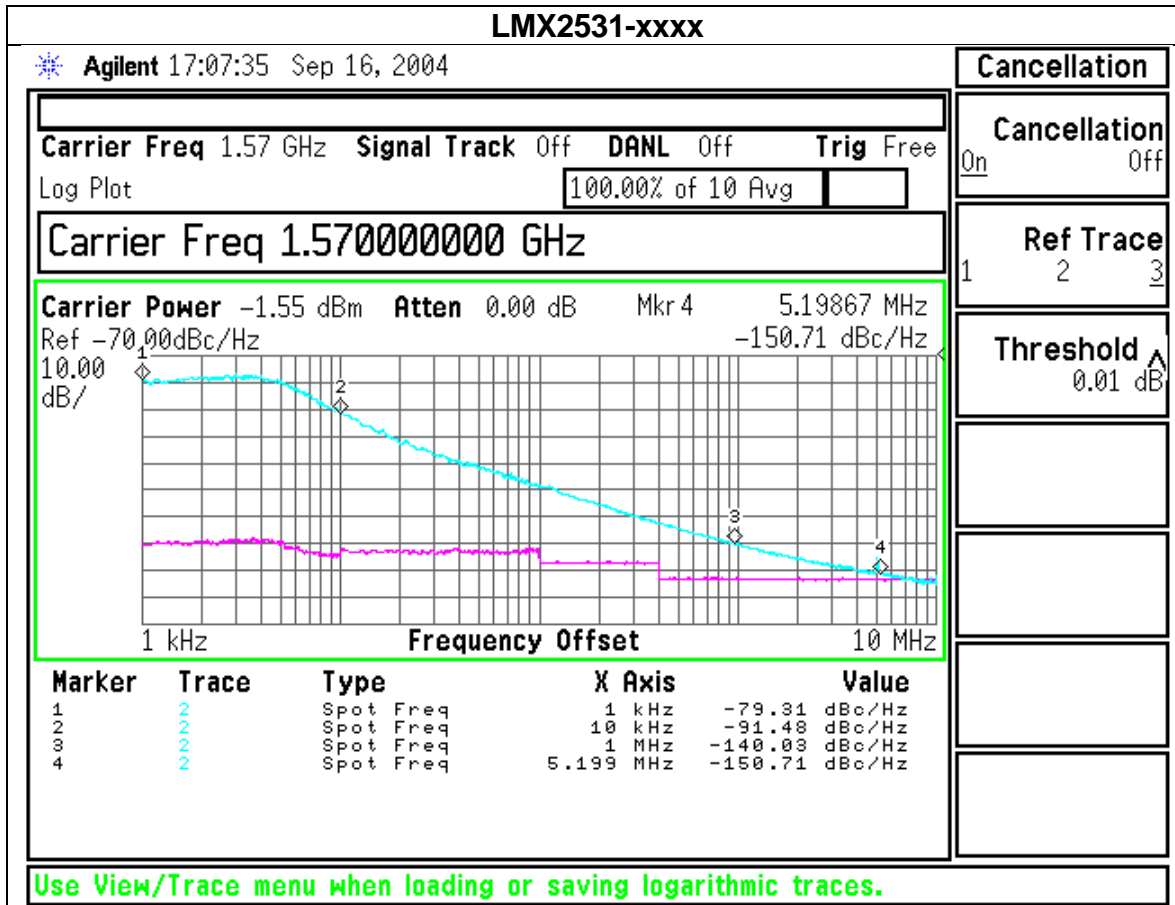


- Check your window with "PLL/VCO" Tab screenshot, 10 MHz input, but with VCO output will be different depending on which LMX2531xxxx you selected



LMX2531-xxxx Board Information





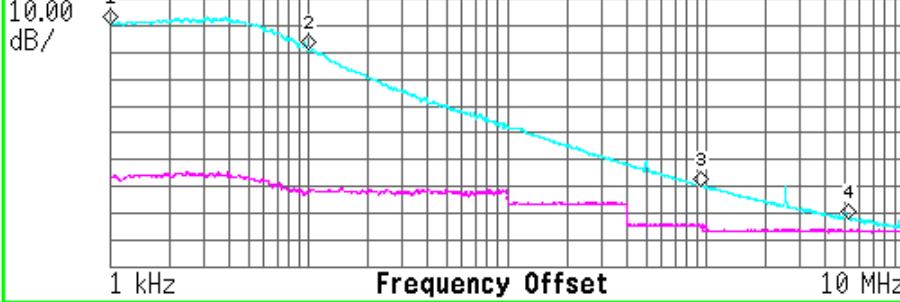
Agilent 17:22:40 Sep 16, 2004

Carrier Freq 1.742 GHz Signal Track Off DANL Off Trig Free

Log Plot 100.00% of 10 Avg

Carrier Freq 1.742000001 GHz

Carrier Power 1.66 dBm Atten 0.00 dB Mkr 4 5.19867 MHz
Ref -70.00 dBc/Hz -151.52 dBc/Hz



| Marker | Trace | Type | X Axis | Value |
|--------|-------|-----------|-----------|----------------|
| 1 | 2 | Spot Freq | 1 kHz | -79.83 dBc/Hz |
| 2 | 2 | Spot Freq | 10 kHz | -89.26 dBc/Hz |
| 3 | 2 | Spot Freq | 1 MHz | -139.65 dBc/Hz |
| 4 | 2 | Spot Freq | 5.199 MHz | -151.52 dBc/Hz |

Cancellation

Cancellation
On Off

Ref Trace
1 2 3

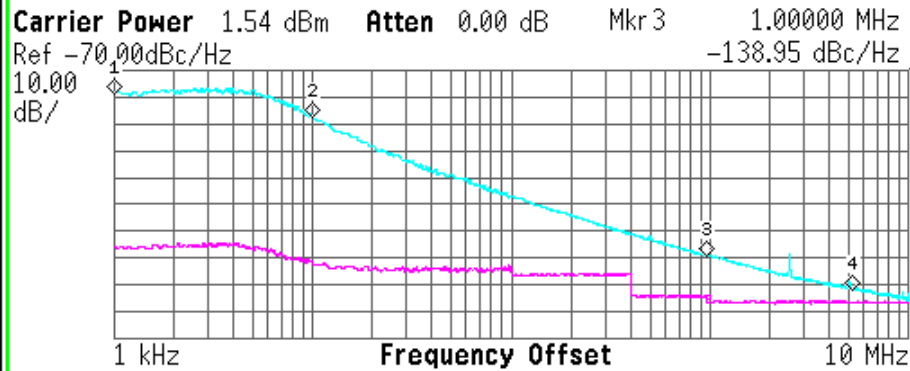
Threshold
0.01 dB

Copyright 2000-2003 Agilent Technologies

Agilent 10:26:22 Sep 17, 2004

Carrier Freq 1.778 GHz Signal Track Off DANL Off Trig Free
 Log Plot 100.00% of 10 Avg

Carrier Freq 1.778000000 GHz



| Marker | Trace | Type | X Axis | Value |
|--------|-------|-----------|-----------|----------------|
| 1 | 2 | Spot Freq | 1 kHz | -79.08 dBc/Hz |
| 2 | 2 | Spot Freq | 10 kHz | -87.87 dBc/Hz |
| 3 | 2 | Spot Freq | 1 MHz | -138.95 dBc/Hz |
| 4 | 2 | Spot Freq | 5.199 MHz | -151.56 dBc/Hz |

Cancellation

Cancellation
On Off

Ref Trace
1 2 3

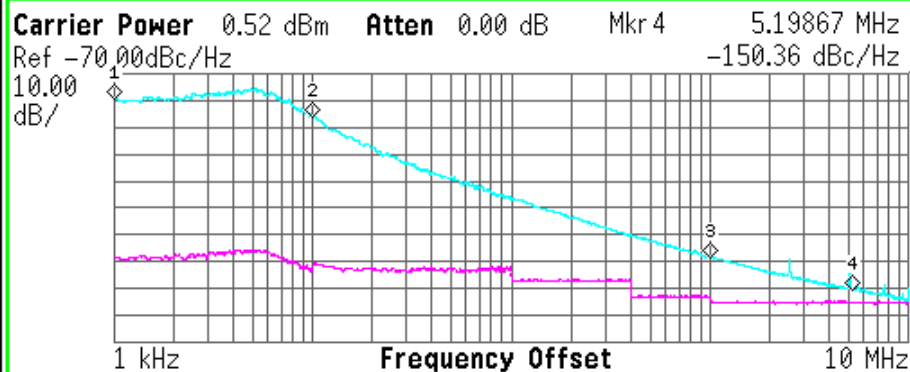
Threshold
0.01 dB

Copyright 2000-2003 Agilent Technologies

Agilent 17:34:00 Sep 16, 2004

Carrier Freq 1.95 GHz Signal Track Off DANL Off Trig Free
 Log Plot 100.00% of 10 Avg

Carrier Freq 1.950000000 GHz



| Marker | Trace | Type | X Axis | Value |
|--------|-------|-----------|-----------|----------------|
| 1 | 2 | Spot Freq | 1 kHz | -79.89 dBc/Hz |
| 2 | 2 | Spot Freq | 10 kHz | -86.18 dBc/Hz |
| 3 | 2 | Spot Freq | 1 MHz | -138.12 dBc/Hz |
| 4 | 2 | Spot Freq | 5.199 MHz | -150.36 dBc/Hz |

Cancellation

Cancellation
On Off

Ref Trace
1 2 3

Threshold
0.01 dB

Cancellation trace has different X-Scale to Smoothed trace.

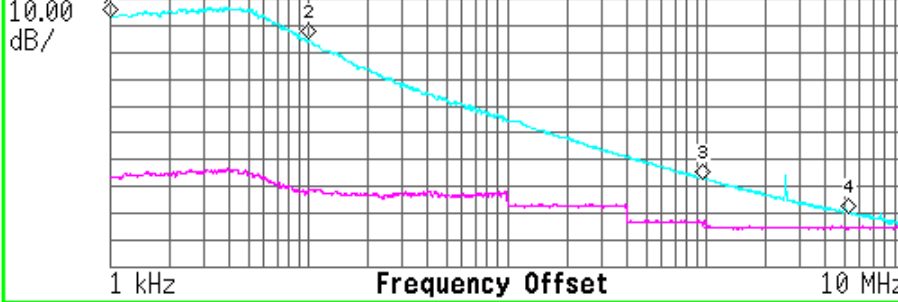
Agilent 17:44:27 Sep 16, 2004

Carrier Freq 2.14 GHz Signal Track Off DANL Off Trig Free

Log Plot 100.00% of 10 Avg

Carrier Freq 2.140000000 GHz

Carrier Power 0.73 dBm Atten 0.00 dB Mkr 4 5.19867 MHz
 Ref -70.00 dBc/Hz -149.76 dBc/Hz



| Marker | Trace | Type | X Axis | Value |
|--------|-------|-----------|-----------|----------------|
| 1 | 2 | Spot Freq | 1 kHz | -76.93 dBc/Hz |
| 2 | 2 | Spot Freq | 10 kHz | -85.22 dBc/Hz |
| 3 | 2 | Spot Freq | 1 MHz | -136.97 dBc/Hz |
| 4 | 2 | Spot Freq | 5.199 MHz | -149.76 dBc/Hz |

Cancellation

Cancellation On Off

Ref Trace 1 2 3

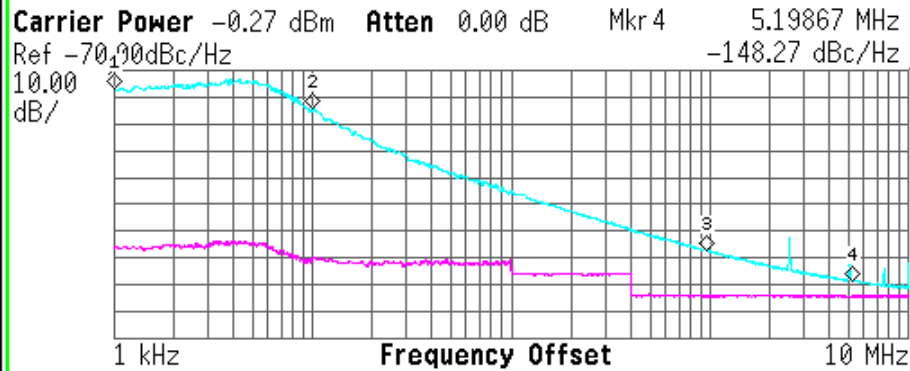
Threshold 0.01 dB

Copyright 2000-2003 Agilent Technologies

Agilent 17:49:52 Sep 16, 2004

Carrier Freq 2.265 GHz Signal Track Off DANL Off Trig Free
 Log Plot 100.00% of 10 Avg

Carrier Freq 2.265000001 GHz



| Marker | Trace | Type | X Axis | Value |
|--------|-------|-----------|-----------|----------------|
| 1 | 2 | Spot Freq | 1 kHz | -77.30 dBc/Hz |
| 2 | 2 | Spot Freq | 10 kHz | -84.40 dBc/Hz |
| 3 | 2 | Spot Freq | 1 MHz | -137.25 dBc/Hz |
| 4 | 2 | Spot Freq | 5.199 MHz | -148.27 dBc/Hz |

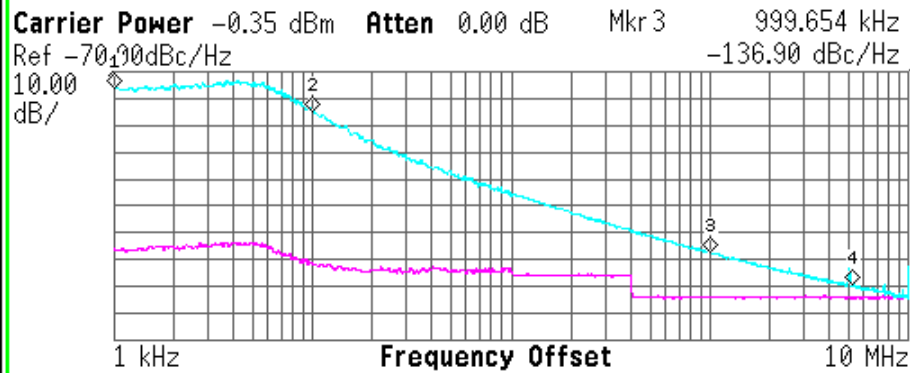
Cancellation
 Cancellation On Off
 Ref Trace 1 2 3
 Threshold 0.01 dB

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Agilent 10:19:31 Sep 17, 2004

Carrier Freq 2.294 GHz Signal Track Off DANL Off Trig Free
 Log Plot 100.00% of 10 Avg

Carrier Freq 2.294000000 GHz

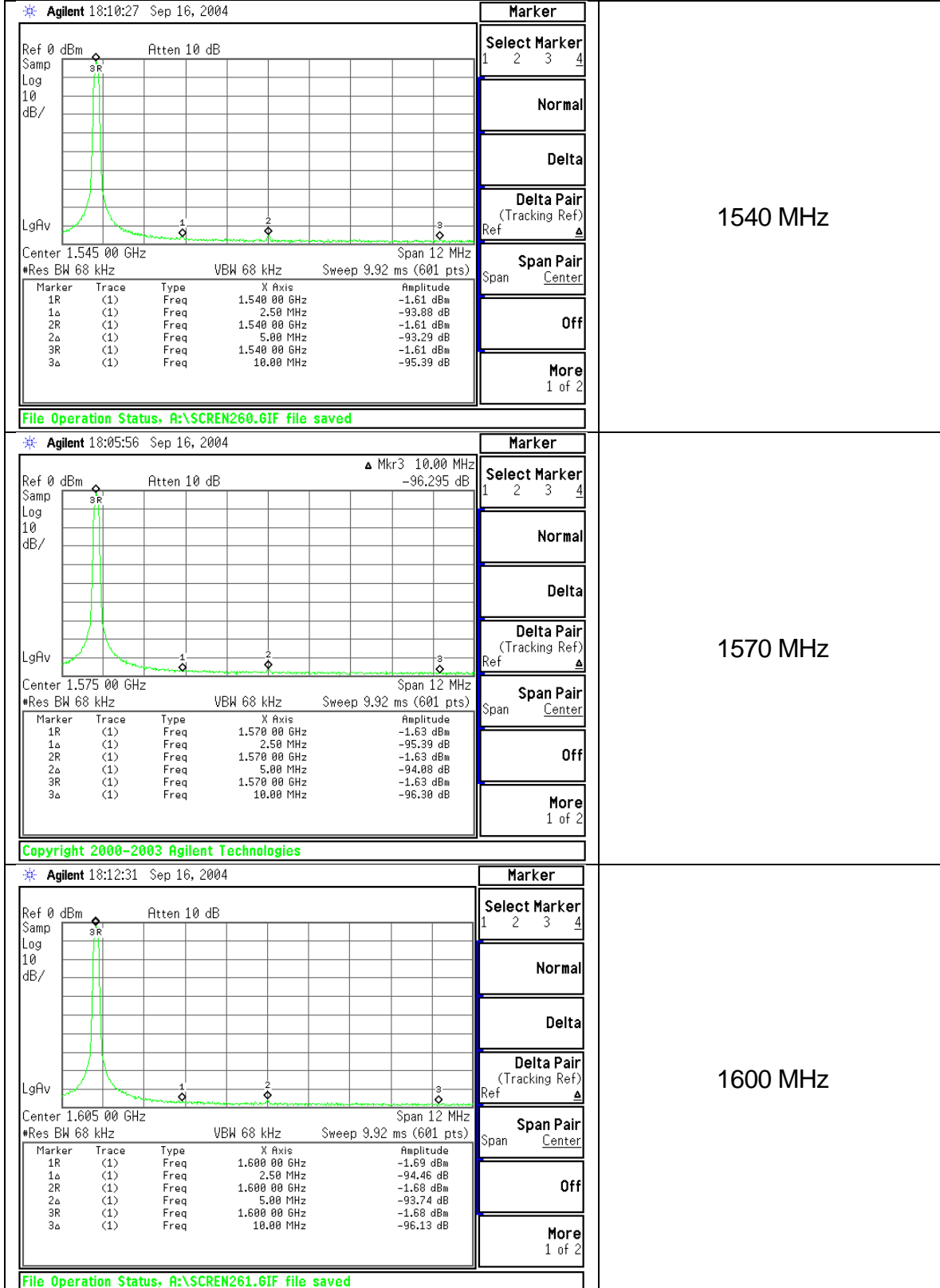


| Marker | Trace | Type | X Axis | Value |
|--------|-------|-----------|-----------|----------------|
| 1 | 2 | Spot Freq | 1 kHz | -76.61 dBc/Hz |
| 2 | 2 | Spot Freq | 10 kHz | -84.98 dBc/Hz |
| 3 | 2 | Spot Freq | 999.7 kHz | -136.91 dBc/Hz |
| 4 | 2 | Spot Freq | 5.199 MHz | -149.32 dBc/Hz |

Peak Search

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LMX2531-1570 Spurs



LMX2531-1742 Spurs

Agilent 18:25:18 Sep 16, 2004

Ref 1.196 dBm Atten 20 dB ▲ Mkr3 10.00 MHz
-96.951 dB

Center 1.717 00 GHz Span 12 MHz
*Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)

| Marker | Trace | Type | X Axis | Amplitude |
|--------|-------|------|--------------|-----------|
| 1R | (1) | Freq | 1.712 00 GHz | 1.63 dBm |
| 1a | (1) | Freq | 2.50 MHz | -89.31 dB |
| 2R | (1) | Freq | 1.712 00 GHz | 1.62 dBm |
| 2a | (1) | Freq | 5.00 MHz | -96.81 dB |
| 3R | (1) | Freq | 1.712 00 GHz | 1.60 dBm |
| 3a | (1) | Freq | 10.00 MHz | -96.95 dB |

Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Span Center

Off

More 1 of 2

Printer not responding

Agilent 18:19:34 Sep 16, 2004

Ref 1.196 dBm Atten 20 dB ▲ Mkr3 10.00 MHz
-89.236 dB

Center 1.747 00 GHz Span 12 MHz
*Res BW 68 kHz VBW 68 kHz Sweep 9.92 ms (601 pts)

| Marker | Trace | Type | X Axis | Amplitude |
|--------|-------|------|--------------|-----------|
| 1R | (1) | Freq | 1.742 00 GHz | 1.55 dBm |
| 1a | (1) | Freq | 2.50 MHz | -88.88 dB |
| 2R | (1) | Freq | 1.742 00 GHz | 1.55 dBm |
| 2a | (1) | Freq | 5.00 MHz | -89.23 dB |
| 3R | (1) | Freq | 1.742 00 GHz | 1.55 dBm |
| 3a | (1) | Freq | 10.00 MHz | -89.24 dB |

Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Span Center

Off

More 1 of 2

File Operation Status, A:\SCREEN262.GIF file saved

Agilent 18:28:15 Sep 16, 2004

Ref 1.196 dBm Atten 20 dB ▲ Mkr3 10.00 MHz
-98.75 dB

Center 1.777 00 GHz Span 12 MHz
*Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)

| Marker | Trace | Type | X Axis | Amplitude |
|--------|-------|------|--------------|-----------|
| 1R | (1) | Freq | 1.772 00 GHz | 1.47 dBm |
| 1a | (1) | Freq | 2.50 MHz | -92.42 dB |
| 2R | (1) | Freq | 1.772 00 GHz | -1.44 dBm |
| 2a | (1) | Freq | 5.00 MHz | -97.03 dB |
| 3R | (1) | Freq | 1.772 00 GHz | -1.43 dBm |
| 3a | (1) | Freq | 10.00 MHz | -98.75 dB |

Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Span Center

Off

More 1 of 2

File Operation Status, A:\SCREEN264.GIF file saved

1712 MHz

1742 MHz

1772 MHz

LMX2531-1778 Spurs

| <p>Agilent 09:54:05 Sep 17, 2004</p> <p>Ref 1.196 dBm Atten 20 dB</p> <p>Center 1.753 00 GHz Span 12 MHz Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr> <td>1R</td> <td>(1)</td> <td>Freq</td> <td>1.748 00 GHz</td> <td>1.55 dBm</td> </tr> <tr> <td>1a</td> <td>(1)</td> <td>Freq</td> <td>2.50 MHz</td> <td>-93.95 dB</td> </tr> <tr> <td>2R</td> <td>(1)</td> <td>Freq</td> <td>1.748 00 GHz</td> <td>1.53 dBm</td> </tr> <tr> <td>2a</td> <td>(1)</td> <td>Freq</td> <td>5.00 MHz</td> <td>-97.40 dB</td> </tr> <tr> <td>3R</td> <td>(1)</td> <td>Freq</td> <td>1.748 00 GHz</td> <td>1.53 dBm</td> </tr> <tr> <td>3a</td> <td>(1)</td> <td>Freq</td> <td>10.00 MHz</td> <td>-97.26 dB</td> </tr> </tbody> </table> <p>File Operation Status: A:\SCREEN277.6IF file saved</p> | Marker | Trace | Type | X Axis | Amplitude | 1R | (1) | Freq | 1.748 00 GHz | 1.55 dBm | 1a | (1) | Freq | 2.50 MHz | -93.95 dB | 2R | (1) | Freq | 1.748 00 GHz | 1.53 dBm | 2a | (1) | Freq | 5.00 MHz | -97.40 dB | 3R | (1) | Freq | 1.748 00 GHz | 1.53 dBm | 3a | (1) | Freq | 10.00 MHz | -97.26 dB | <p>Marker</p> <p>Select Marker 1 2 3 4</p> <p>Normal</p> <p>Delta</p> <p>Delta Pair (Tracking Ref) Ref</p> <p>Span Pair Span Center</p> <p>Off</p> <p>More 1 of 2</p> <p style="text-align: center; font-size: 24pt;">1748 MHz</p> |
|---|--------|-------|--------------|-----------|-----------|----|-----|------|--------------|----------|----|-----|------|----------|-----------|----|-----|------|--------------|----------|----|-----|------|----------|-----------|----|-----|------|--------------|----------|----|-----|------|-----------|-----------|--|
| Marker | Trace | Type | X Axis | Amplitude | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R | (1) | Freq | 1.748 00 GHz | 1.55 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1a | (1) | Freq | 2.50 MHz | -93.95 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R | (1) | Freq | 1.748 00 GHz | 1.53 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2a | (1) | Freq | 5.00 MHz | -97.40 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3R | (1) | Freq | 1.748 00 GHz | 1.53 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3a | (1) | Freq | 10.00 MHz | -97.26 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Agilent 09:52:30 Sep 17, 2004</p> <p>Ref 1.196 dBm Atten 20 dB</p> <p>Center 1.783 00 GHz Span 12 MHz Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr> <td>1R</td> <td>(1)</td> <td>Freq</td> <td>1.778 00 GHz</td> <td>1.47 dBm</td> </tr> <tr> <td>1a</td> <td>(1)</td> <td>Freq</td> <td>2.50 MHz</td> <td>-93.03 dB</td> </tr> <tr> <td>2R</td> <td>(1)</td> <td>Freq</td> <td>1.778 00 GHz</td> <td>1.46 dBm</td> </tr> <tr> <td>2a</td> <td>(1)</td> <td>Freq</td> <td>5.00 MHz</td> <td>-96.52 dB</td> </tr> <tr> <td>3R</td> <td>(1)</td> <td>Freq</td> <td>1.778 00 GHz</td> <td>1.46 dBm</td> </tr> <tr> <td>3a</td> <td>(1)</td> <td>Freq</td> <td>10.00 MHz</td> <td>-97.95 dB</td> </tr> </tbody> </table> <p>File Operation Status: A:\SCREEN276.6IF file saved</p> | Marker | Trace | Type | X Axis | Amplitude | 1R | (1) | Freq | 1.778 00 GHz | 1.47 dBm | 1a | (1) | Freq | 2.50 MHz | -93.03 dB | 2R | (1) | Freq | 1.778 00 GHz | 1.46 dBm | 2a | (1) | Freq | 5.00 MHz | -96.52 dB | 3R | (1) | Freq | 1.778 00 GHz | 1.46 dBm | 3a | (1) | Freq | 10.00 MHz | -97.95 dB | <p>Marker</p> <p>Select Marker 1 2 3 4</p> <p>Normal</p> <p>Delta</p> <p>Delta Pair (Tracking Ref) Ref</p> <p>Span Pair Span Center</p> <p>Off</p> <p>More 1 of 2</p> <p style="text-align: center; font-size: 24pt;">1778 MHz</p> |
| Marker | Trace | Type | X Axis | Amplitude | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R | (1) | Freq | 1.778 00 GHz | 1.47 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1a | (1) | Freq | 2.50 MHz | -93.03 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R | (1) | Freq | 1.778 00 GHz | 1.46 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2a | (1) | Freq | 5.00 MHz | -96.52 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3R | (1) | Freq | 1.778 00 GHz | 1.46 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3a | (1) | Freq | 10.00 MHz | -97.95 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Agilent 10:36:29 Sep 17, 2004</p> <p>Ref 1.196 dBm Atten 20 dB</p> <p>Center 1.813 00 GHz Span 12 MHz Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr> <td>1R</td> <td>(1)</td> <td>Freq</td> <td>1.808 00 GHz</td> <td>1.44 dBm</td> </tr> <tr> <td>1a</td> <td>(1)</td> <td>Freq</td> <td>2.50 MHz</td> <td>-91.11 dB</td> </tr> <tr> <td>2R</td> <td>(1)</td> <td>Freq</td> <td>1.808 00 GHz</td> <td>1.43 dBm</td> </tr> <tr> <td>2a</td> <td>(1)</td> <td>Freq</td> <td>5.00 MHz</td> <td>-96.20 dB</td> </tr> <tr> <td>3R</td> <td>(1)</td> <td>Freq</td> <td>1.808 00 GHz</td> <td>1.40 dBm</td> </tr> <tr> <td>3a</td> <td>(1)</td> <td>Freq</td> <td>10.00 MHz</td> <td>-97.90 dB</td> </tr> </tbody> </table> <p>Unable to save file</p> | Marker | Trace | Type | X Axis | Amplitude | 1R | (1) | Freq | 1.808 00 GHz | 1.44 dBm | 1a | (1) | Freq | 2.50 MHz | -91.11 dB | 2R | (1) | Freq | 1.808 00 GHz | 1.43 dBm | 2a | (1) | Freq | 5.00 MHz | -96.20 dB | 3R | (1) | Freq | 1.808 00 GHz | 1.40 dBm | 3a | (1) | Freq | 10.00 MHz | -97.90 dB | <p>Marker</p> <p>Select Marker 1 2 3 4</p> <p>Normal</p> <p>Delta</p> <p>Delta Pair (Tracking Ref) Ref</p> <p>Span Pair Span Center</p> <p>Off</p> <p>More 1 of 2</p> <p style="text-align: center; font-size: 24pt;">1808 MHz</p> |
| Marker | Trace | Type | X Axis | Amplitude | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R | (1) | Freq | 1.808 00 GHz | 1.44 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1a | (1) | Freq | 2.50 MHz | -91.11 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R | (1) | Freq | 1.808 00 GHz | 1.43 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2a | (1) | Freq | 5.00 MHz | -96.20 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3R | (1) | Freq | 1.808 00 GHz | 1.40 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3a | (1) | Freq | 10.00 MHz | -97.90 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

LMX2531-1950 Spurs

Agilent 08:59:03 Sep 17, 2004

Ref 1.196 dBm Atten 20 dB

Center 1.925 00 GHz Span 12 MHz
Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)

| Marker | Trace | Type | X Axis | Amplitude |
|--------|-------|------|--------------|-----------|
| 1R | (1) | Freq | 1.920 00 GHz | 0.49 dBm |
| 1a | (1) | Freq | 2.50 MHz | -92.90 dB |
| 2R | (1) | Freq | 1.920 00 GHz | 0.48 dBm |
| 2a | (1) | Freq | 5.00 MHz | -94.33 dB |
| 3R | (1) | Freq | 1.920 00 GHz | 0.46 dBm |
| 3a | (1) | Freq | 10.00 MHz | -97.92 dB |

Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref

Span Pair Span Center

Off

More 1 of 2

File Operation Status: A:\SCREEN266.GIF file saved

Agilent 08:57:02 Sep 17, 2004

Ref 1.196 dBm Atten 20 dB

Center 1.955 00 GHz Span 12 MHz
Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)

| Marker | Trace | Type | X Axis | Amplitude |
|--------|-------|------|--------------|-----------|
| 1R | (1) | Freq | 1.950 00 GHz | 0.47 dBm |
| 1a | (1) | Freq | 2.50 MHz | -93.17 dB |
| 2R | (1) | Freq | 1.950 00 GHz | 0.45 dBm |
| 2a | (1) | Freq | 5.00 MHz | -92.15 dB |
| 3R | (1) | Freq | 1.950 00 GHz | 0.44 dBm |
| 3a | (1) | Freq | 11.00 MHz | -96.82 dB |

Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref

Span Pair Span Center

Off

More 1 of 2

File Operation Status: A:\SCREEN265.GIF file saved

Agilent 09:00:37 Sep 17, 2004

Ref 1.196 dBm Atten 20 dB

Center 1.985 00 GHz Span 12 MHz
Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)

| Marker | Trace | Type | X Axis | Amplitude |
|--------|-------|------|--------------|-----------|
| 1R | (1) | Freq | 1.980 00 GHz | 0.40 dBm |
| 1a | (1) | Freq | 2.50 MHz | -95.04 dB |
| 2R | (1) | Freq | 1.980 00 GHz | 0.39 dBm |
| 2a | (1) | Freq | 5.00 MHz | -93.54 dB |
| 3R | (1) | Freq | 1.980 00 GHz | 0.38 dBm |
| 3a | (1) | Freq | 10.00 MHz | -95.35 dB |

Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref

Span Pair Span Center

Off

More 1 of 2

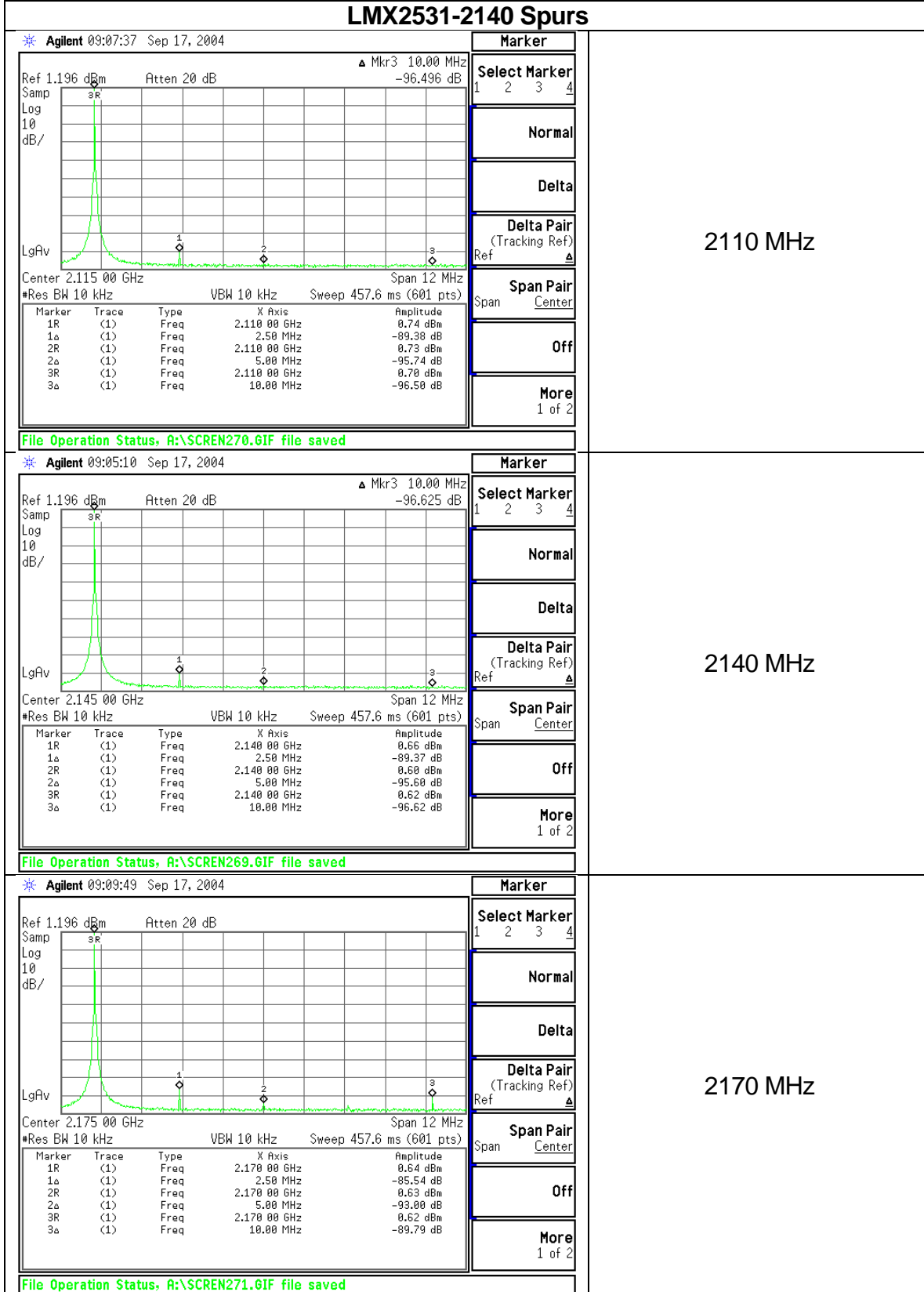
File Operation Status: A:\SCREEN267.GIF file saved

1920 MHz

1950 MHz

1980 MHz

LMX2531-2140 Spurs

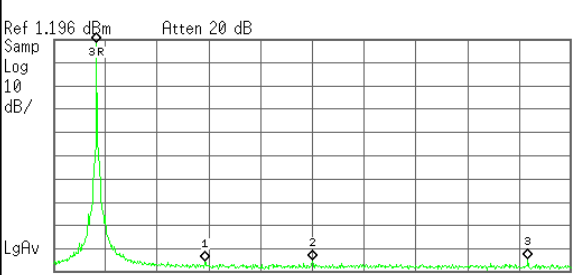
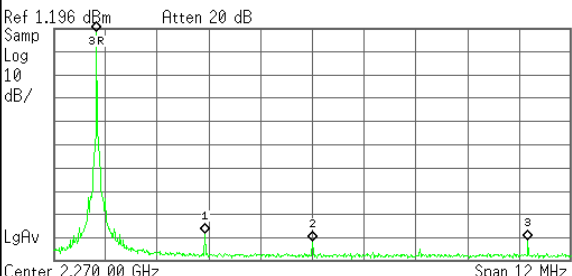
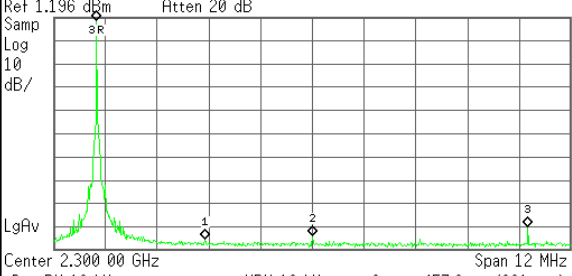


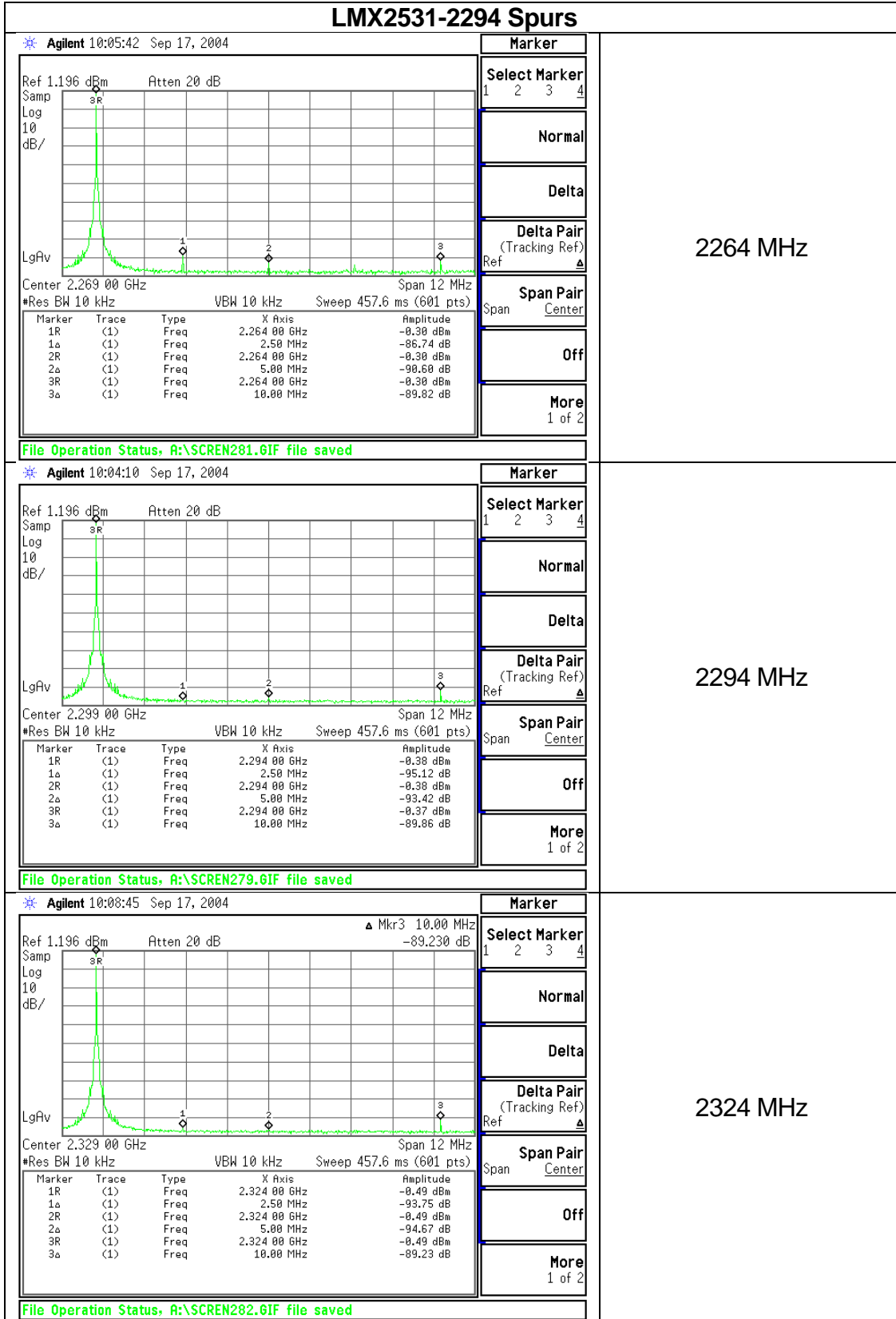
2110 MHz

2140 MHz

2170 MHz

LMX2531-2265 Spurs

| <p>Agilent 09:18:40 Sep 17, 2004</p>  <p>Ref 1.196 dBm Atten 20 dB</p> <p>Center 2.240 00 GHz Span 12 MHz Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)</p> <table border="1" style="width: 100%; font-size: small;"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr><td>1R</td><td>(1)</td><td>Freq</td><td>2.235 00 GHz</td><td>-0.26 dBm</td></tr> <tr><td>1a</td><td>(1)</td><td>Freq</td><td>2.50 MHz</td><td>-93.97 dB</td></tr> <tr><td>2R</td><td>(1)</td><td>Freq</td><td>2.235 00 GHz</td><td>-0.26 dBm</td></tr> <tr><td>2a</td><td>(1)</td><td>Freq</td><td>5.00 MHz</td><td>-93.30 dB</td></tr> <tr><td>3R</td><td>(1)</td><td>Freq</td><td>2.235 00 GHz</td><td>-0.26 dBm</td></tr> <tr><td>3a</td><td>(1)</td><td>Freq</td><td>10.00 MHz</td><td>-92.84 dB</td></tr> </tbody> </table> <p>File Operation Status: A:\SCREEN274.GIF file saved</p> | Marker | Trace | Type | X Axis | Amplitude | 1R | (1) | Freq | 2.235 00 GHz | -0.26 dBm | 1a | (1) | Freq | 2.50 MHz | -93.97 dB | 2R | (1) | Freq | 2.235 00 GHz | -0.26 dBm | 2a | (1) | Freq | 5.00 MHz | -93.30 dB | 3R | (1) | Freq | 2.235 00 GHz | -0.26 dBm | 3a | (1) | Freq | 10.00 MHz | -92.84 dB | <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">Marker</p> <p>Select Marker 1 2 3 4</p> <p style="text-align: center;">Normal</p> <p style="text-align: center;">Delta</p> <p style="text-align: center;">Delta Pair (Tracking Ref)</p> <p style="text-align: center;">Span Pair Span Center</p> <p style="text-align: center;">Off</p> <p style="text-align: center;">More 1 of 2</p> </div> <p style="text-align: center; font-size: large;">2235 MHz</p> |
|---|--------|-------|--------------|-----------|-----------|----|-----|------|--------------|-----------|----|-----|------|----------|-----------|----|-----|------|--------------|-----------|----|-----|------|----------|-----------|----|-----|------|--------------|-----------|----|-----|------|-----------|-----------|---|
| Marker | Trace | Type | X Axis | Amplitude | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R | (1) | Freq | 2.235 00 GHz | -0.26 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1a | (1) | Freq | 2.50 MHz | -93.97 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R | (1) | Freq | 2.235 00 GHz | -0.26 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2a | (1) | Freq | 5.00 MHz | -93.30 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3R | (1) | Freq | 2.235 00 GHz | -0.26 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3a | (1) | Freq | 10.00 MHz | -92.84 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Agilent 09:16:47 Sep 17, 2004</p>  <p>Ref 1.196 dBm Atten 20 dB</p> <p>Center 2.270 00 GHz Span 12 MHz Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)</p> <table border="1" style="width: 100%; font-size: small;"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr><td>1R</td><td>(1)</td><td>Freq</td><td>2.265 00 GHz</td><td>-0.31 dBm</td></tr> <tr><td>1a</td><td>(1)</td><td>Freq</td><td>2.50 MHz</td><td>-86.59 dB</td></tr> <tr><td>2R</td><td>(1)</td><td>Freq</td><td>2.265 00 GHz</td><td>-0.31 dBm</td></tr> <tr><td>2a</td><td>(1)</td><td>Freq</td><td>5.00 MHz</td><td>-89.83 dB</td></tr> <tr><td>3R</td><td>(1)</td><td>Freq</td><td>2.265 00 GHz</td><td>-0.31 dBm</td></tr> <tr><td>3a</td><td>(1)</td><td>Freq</td><td>10.00 MHz</td><td>-89.41 dB</td></tr> </tbody> </table> <p>File Operation Status: A:\SCREEN272.GIF file saved</p> | Marker | Trace | Type | X Axis | Amplitude | 1R | (1) | Freq | 2.265 00 GHz | -0.31 dBm | 1a | (1) | Freq | 2.50 MHz | -86.59 dB | 2R | (1) | Freq | 2.265 00 GHz | -0.31 dBm | 2a | (1) | Freq | 5.00 MHz | -89.83 dB | 3R | (1) | Freq | 2.265 00 GHz | -0.31 dBm | 3a | (1) | Freq | 10.00 MHz | -89.41 dB | <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">Marker</p> <p>Select Marker 1 2 3 4</p> <p style="text-align: center;">Normal</p> <p style="text-align: center;">Delta</p> <p style="text-align: center;">Delta Pair (Tracking Ref)</p> <p style="text-align: center;">Span Pair Span Center</p> <p style="text-align: center;">Off</p> <p style="text-align: center;">More 1 of 2</p> </div> <p style="text-align: center; font-size: large;">2265 MHz</p> |
| Marker | Trace | Type | X Axis | Amplitude | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R | (1) | Freq | 2.265 00 GHz | -0.31 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1a | (1) | Freq | 2.50 MHz | -86.59 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R | (1) | Freq | 2.265 00 GHz | -0.31 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2a | (1) | Freq | 5.00 MHz | -89.83 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3R | (1) | Freq | 2.265 00 GHz | -0.31 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3a | (1) | Freq | 10.00 MHz | -89.41 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Agilent 09:20:28 Sep 17, 2004</p>  <p>Ref 1.196 dBm Atten 20 dB</p> <p>Center 2.300 00 GHz Span 12 MHz Res BW 10 kHz VBW 10 kHz Sweep 457.6 ms (601 pts)</p> <table border="1" style="width: 100%; font-size: small;"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr><td>1R</td><td>(1)</td><td>Freq</td><td>2.295 00 GHz</td><td>-0.35 dBm</td></tr> <tr><td>1a</td><td>(1)</td><td>Freq</td><td>2.50 MHz</td><td>-93.76 dB</td></tr> <tr><td>2R</td><td>(1)</td><td>Freq</td><td>2.295 00 GHz</td><td>-0.35 dBm</td></tr> <tr><td>2a</td><td>(1)</td><td>Freq</td><td>5.00 MHz</td><td>-92.03 dB</td></tr> <tr><td>3R</td><td>(1)</td><td>Freq</td><td>2.295 00 GHz</td><td>-0.35 dBm</td></tr> <tr><td>3a</td><td>(1)</td><td>Freq</td><td>10.00 MHz</td><td>-88.47 dB</td></tr> </tbody> </table> <p>File Operation Status: A:\SCREEN275.GIF file saved</p> | Marker | Trace | Type | X Axis | Amplitude | 1R | (1) | Freq | 2.295 00 GHz | -0.35 dBm | 1a | (1) | Freq | 2.50 MHz | -93.76 dB | 2R | (1) | Freq | 2.295 00 GHz | -0.35 dBm | 2a | (1) | Freq | 5.00 MHz | -92.03 dB | 3R | (1) | Freq | 2.295 00 GHz | -0.35 dBm | 3a | (1) | Freq | 10.00 MHz | -88.47 dB | <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">Marker</p> <p>Select Marker 1 2 3 4</p> <p style="text-align: center;">Normal</p> <p style="text-align: center;">Delta</p> <p style="text-align: center;">Delta Pair (Tracking Ref)</p> <p style="text-align: center;">Span Pair Span Center</p> <p style="text-align: center;">Off</p> <p style="text-align: center;">More 1 of 2</p> </div> <p style="text-align: center; font-size: large;">2295 MHz</p> |
| Marker | Trace | Type | X Axis | Amplitude | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R | (1) | Freq | 2.295 00 GHz | -0.35 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1a | (1) | Freq | 2.50 MHz | -93.76 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R | (1) | Freq | 2.295 00 GHz | -0.35 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2a | (1) | Freq | 5.00 MHz | -92.03 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3R | (1) | Freq | 2.295 00 GHz | -0.35 dBm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3a | (1) | Freq | 10.00 MHz | -88.47 dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

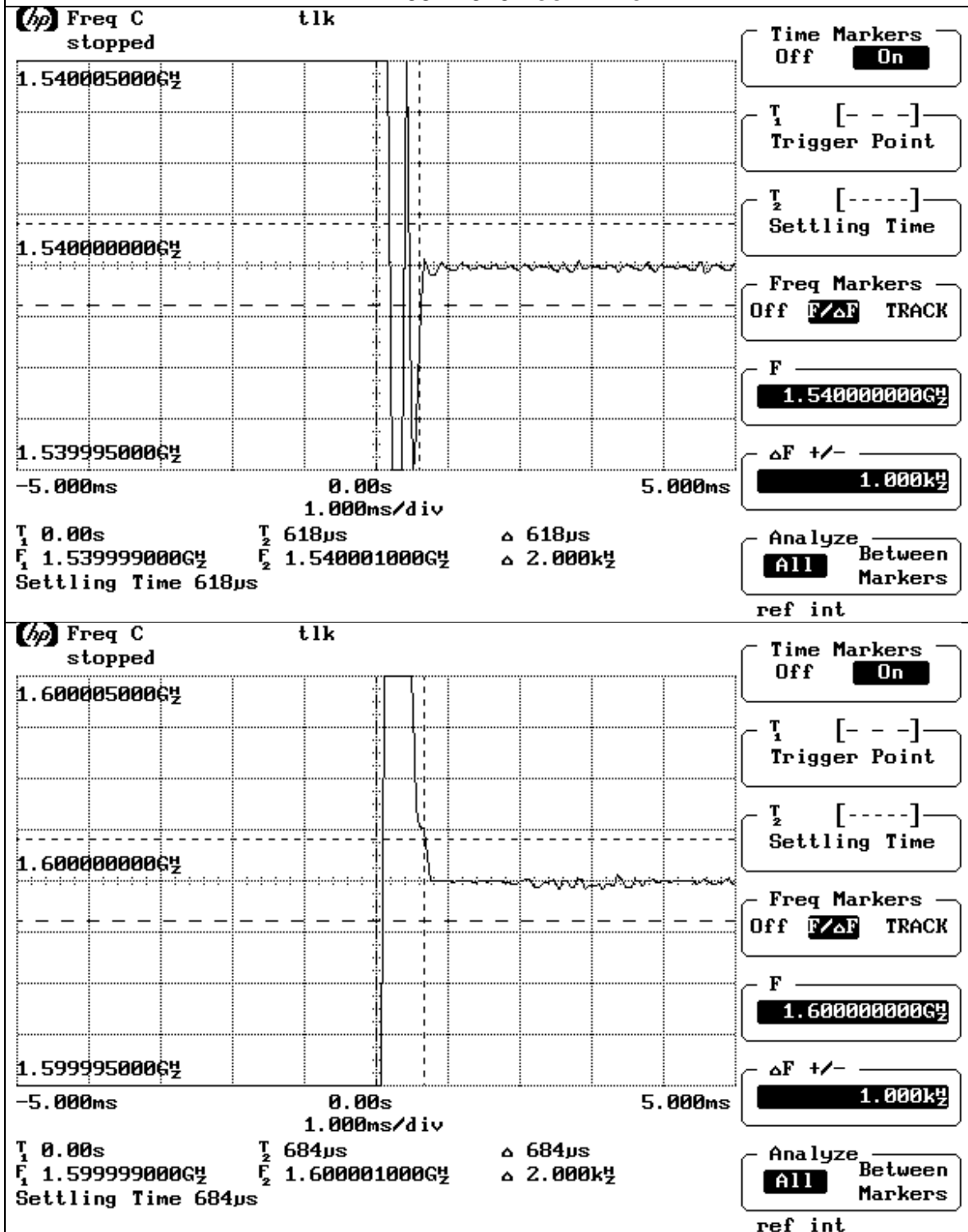


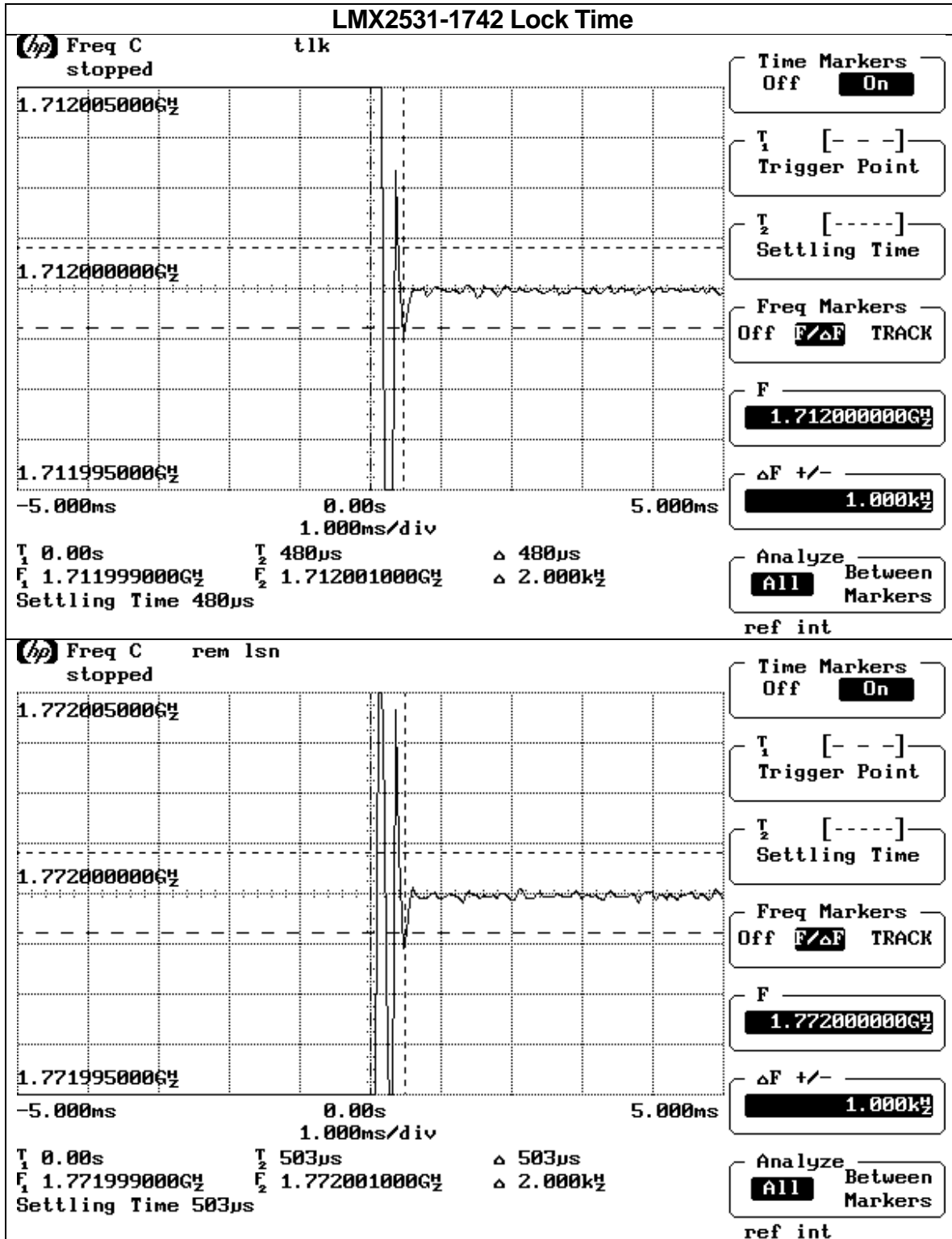
2264 MHz

2294 MHz

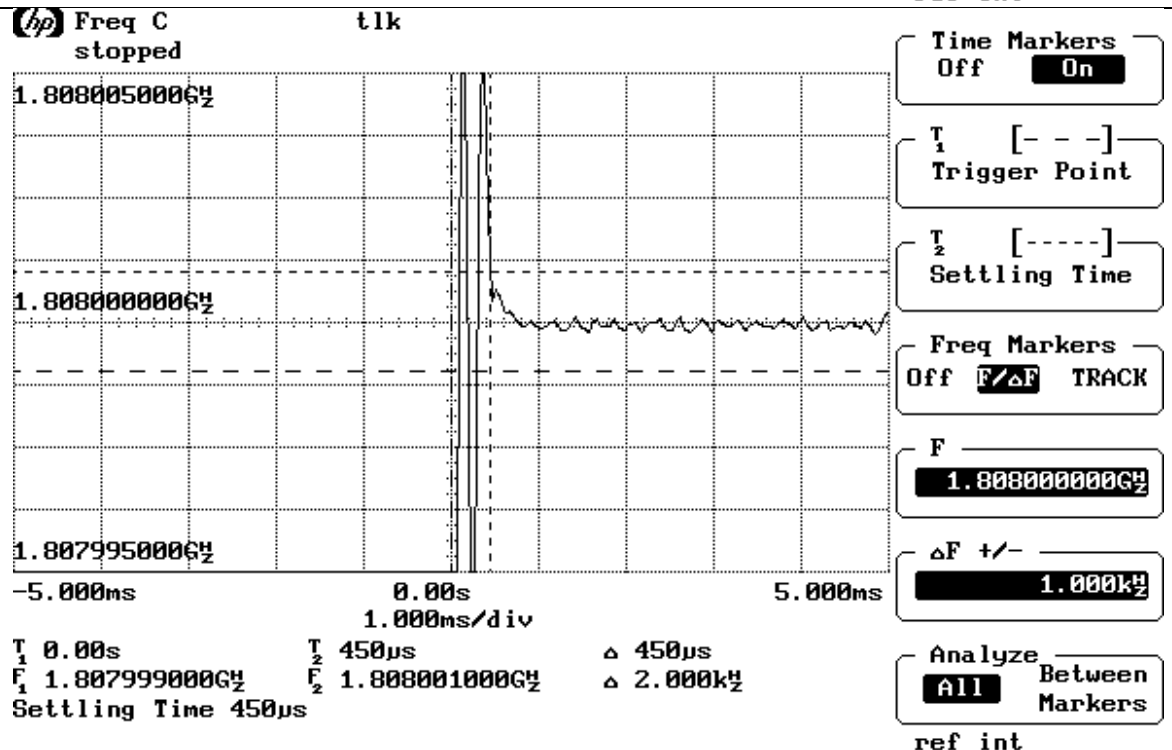
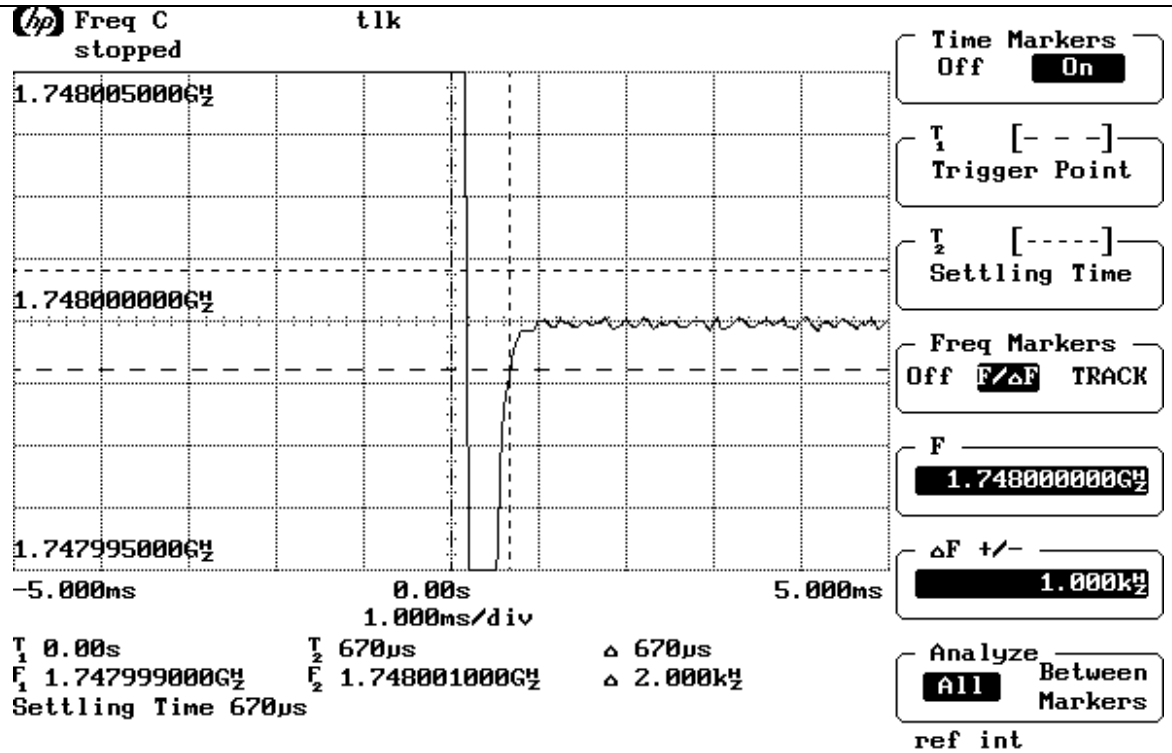
2324 MHz

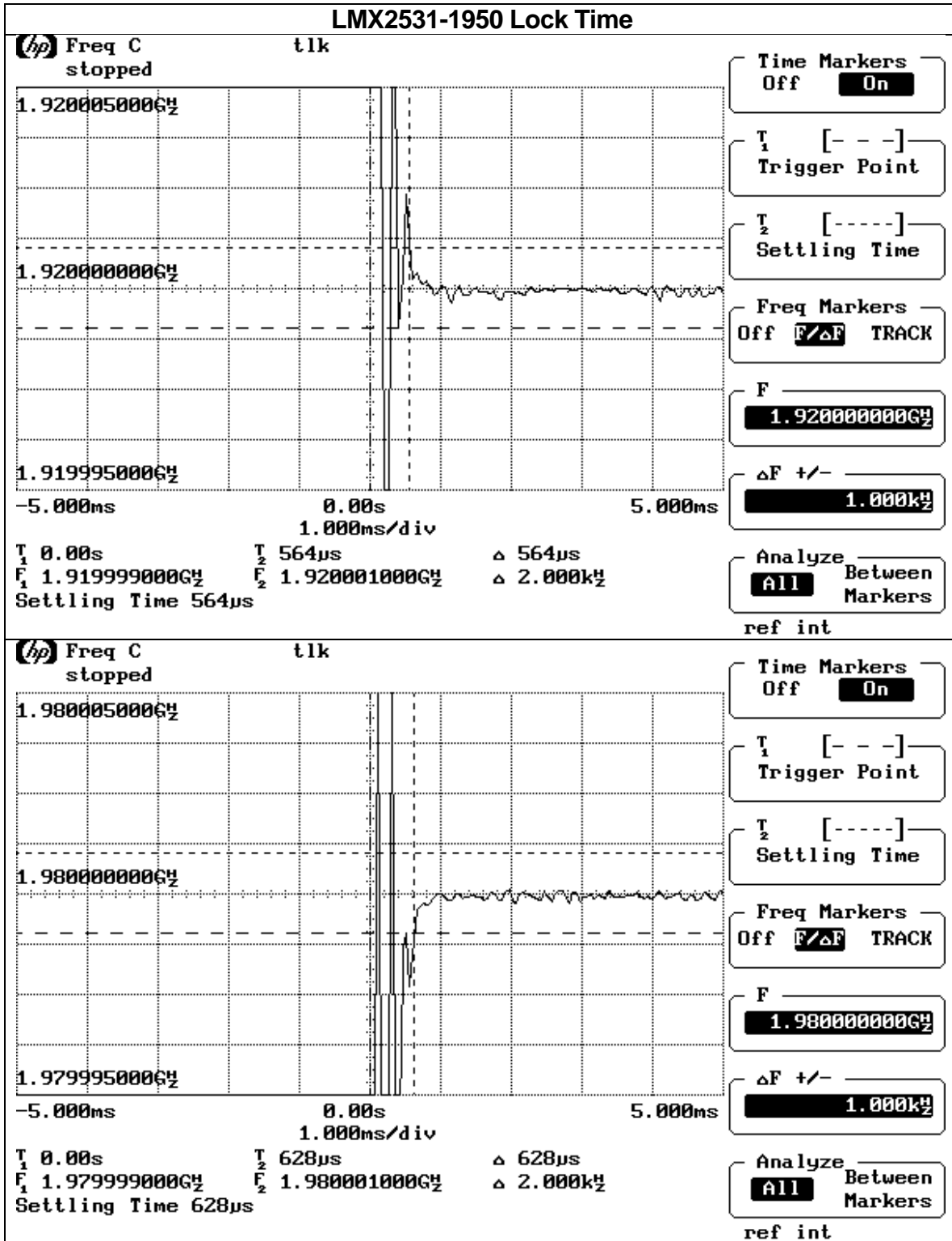
LMX2531-1570 Lock Time



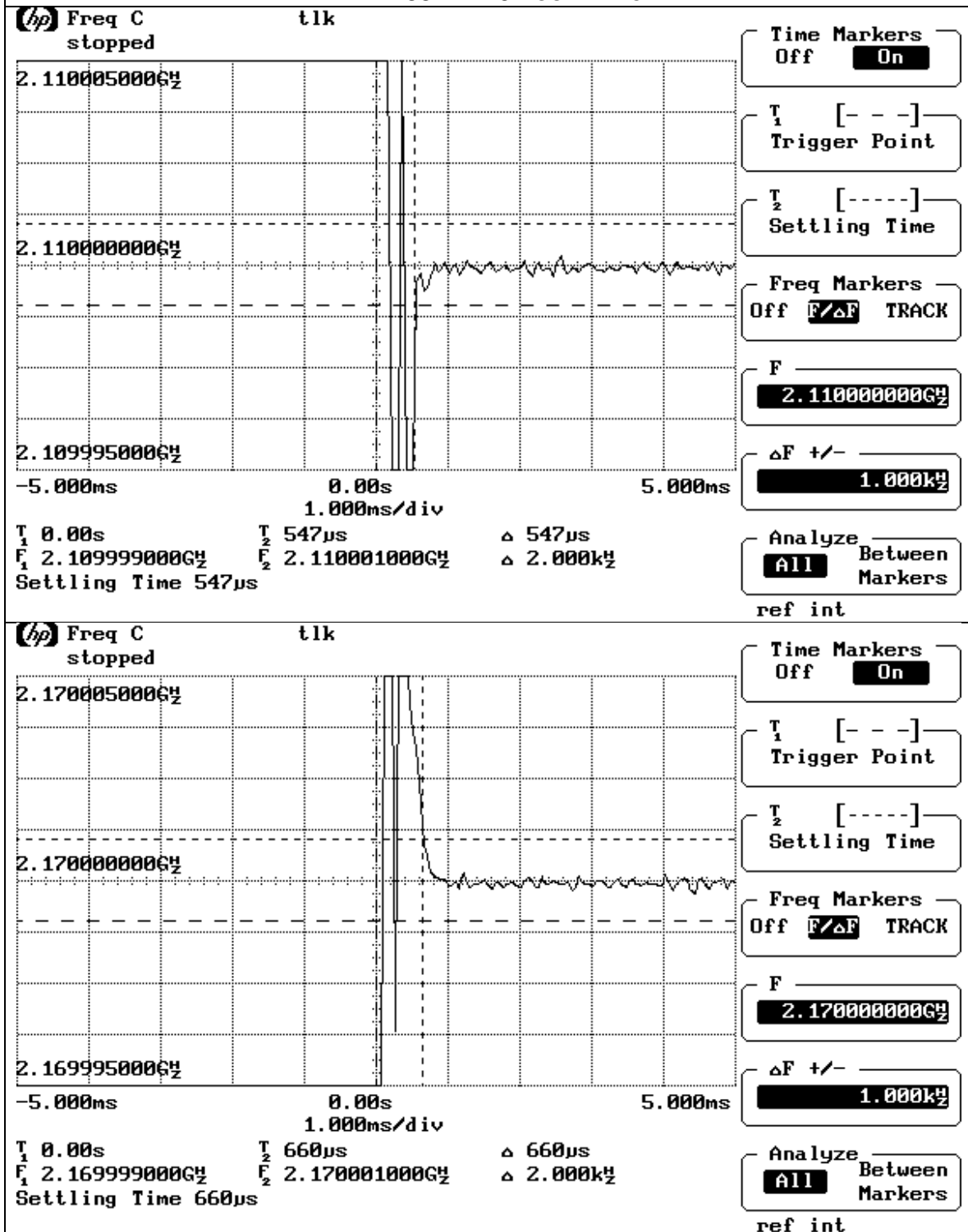


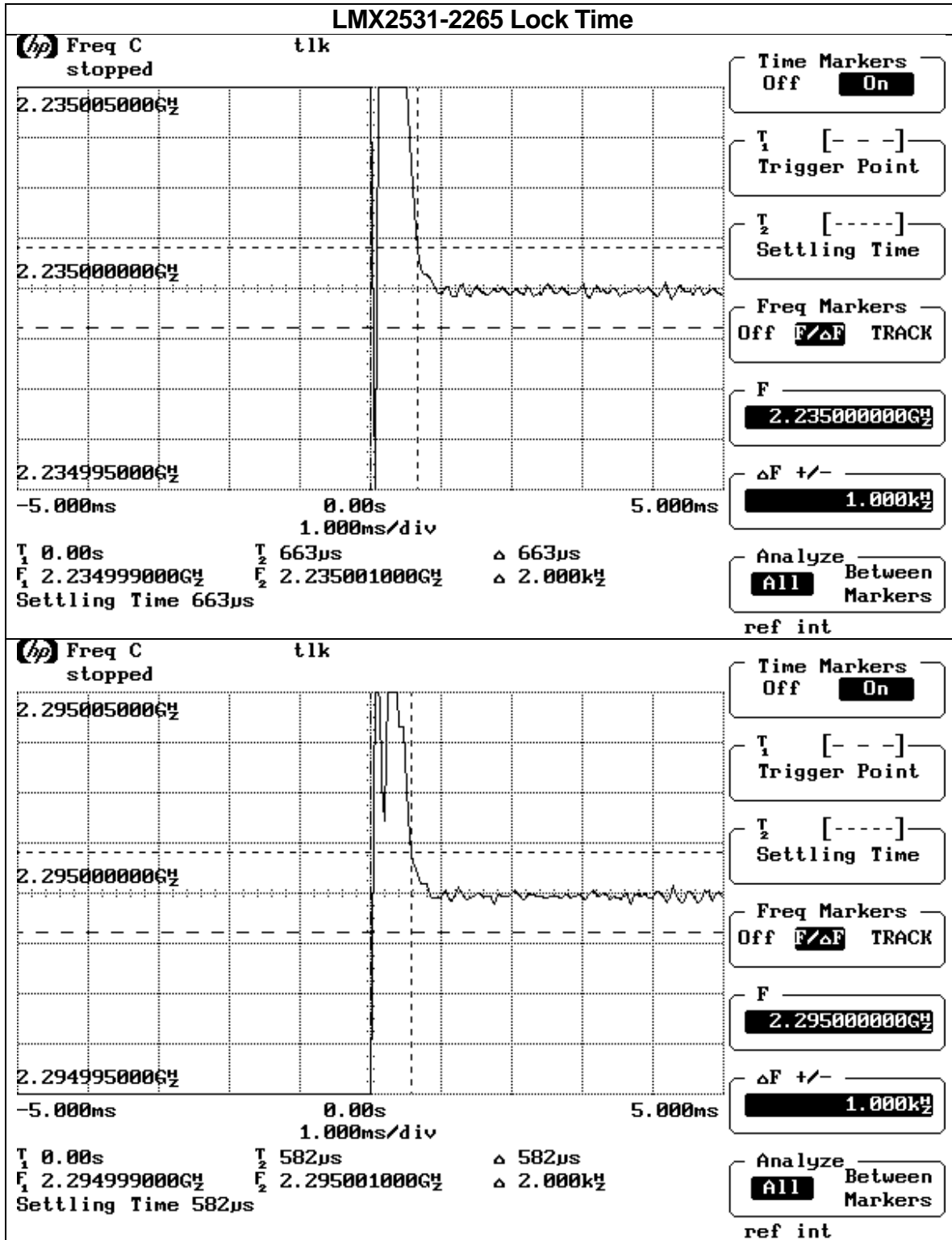
LMX2531-1778 Lock Time



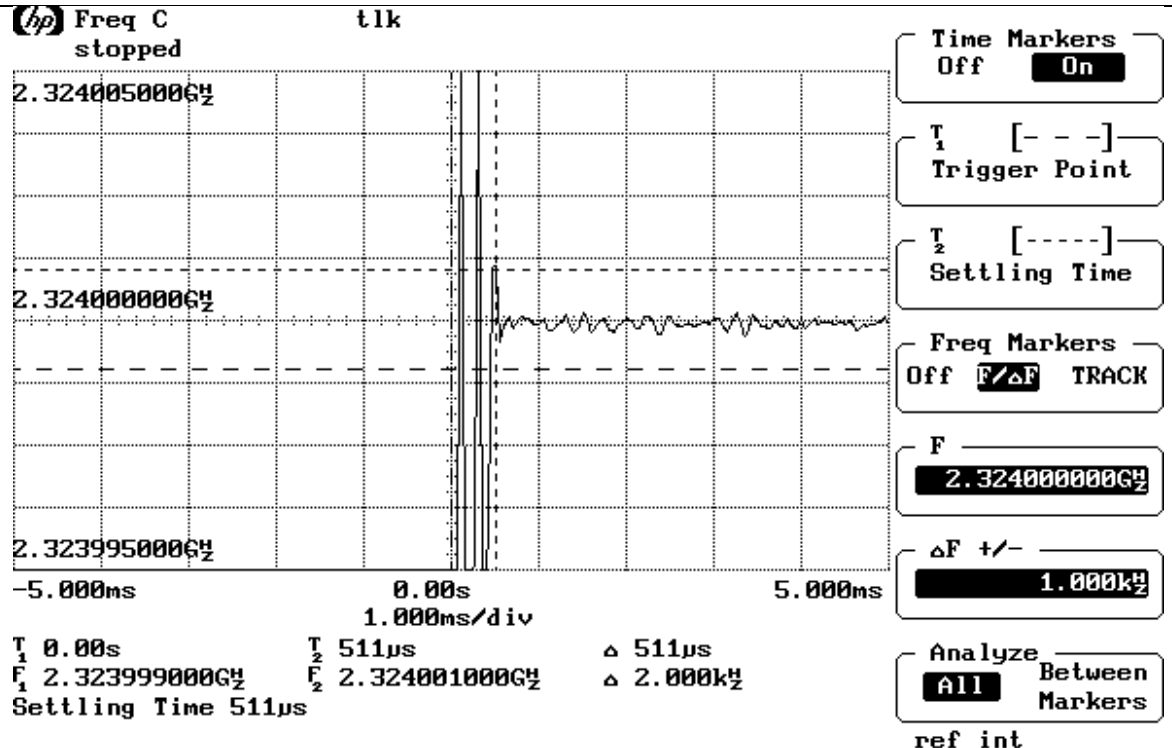
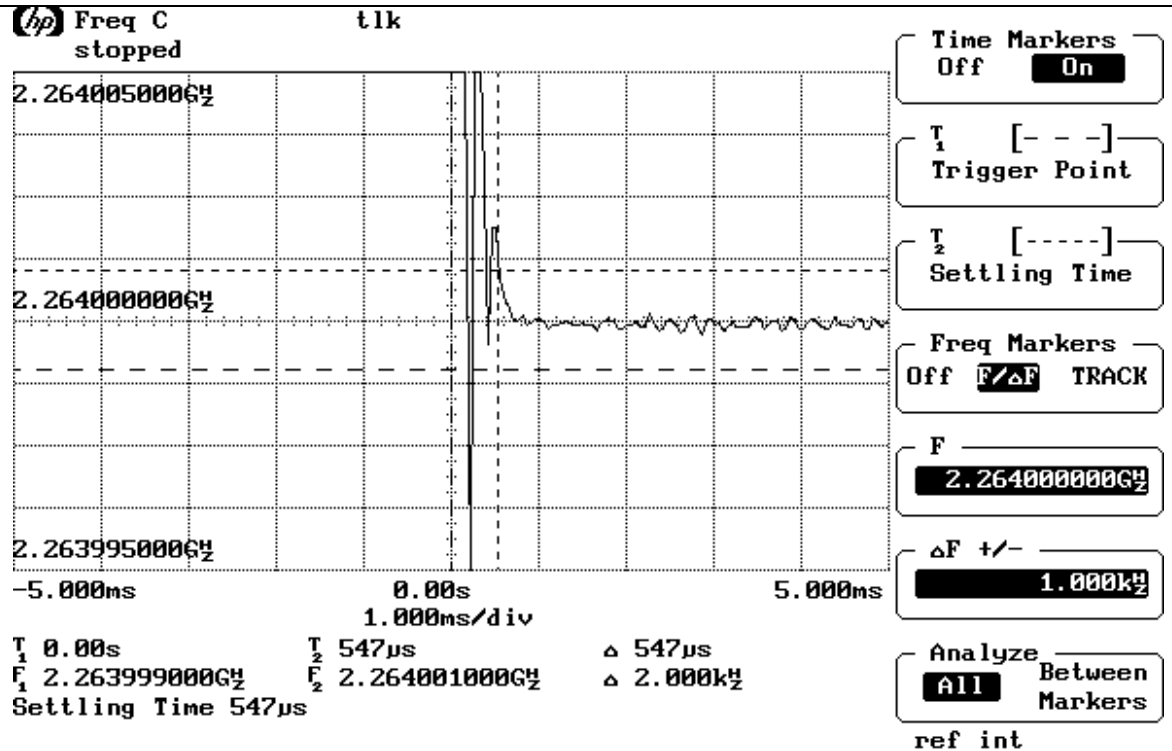


LMX2531-2140 Lock Time





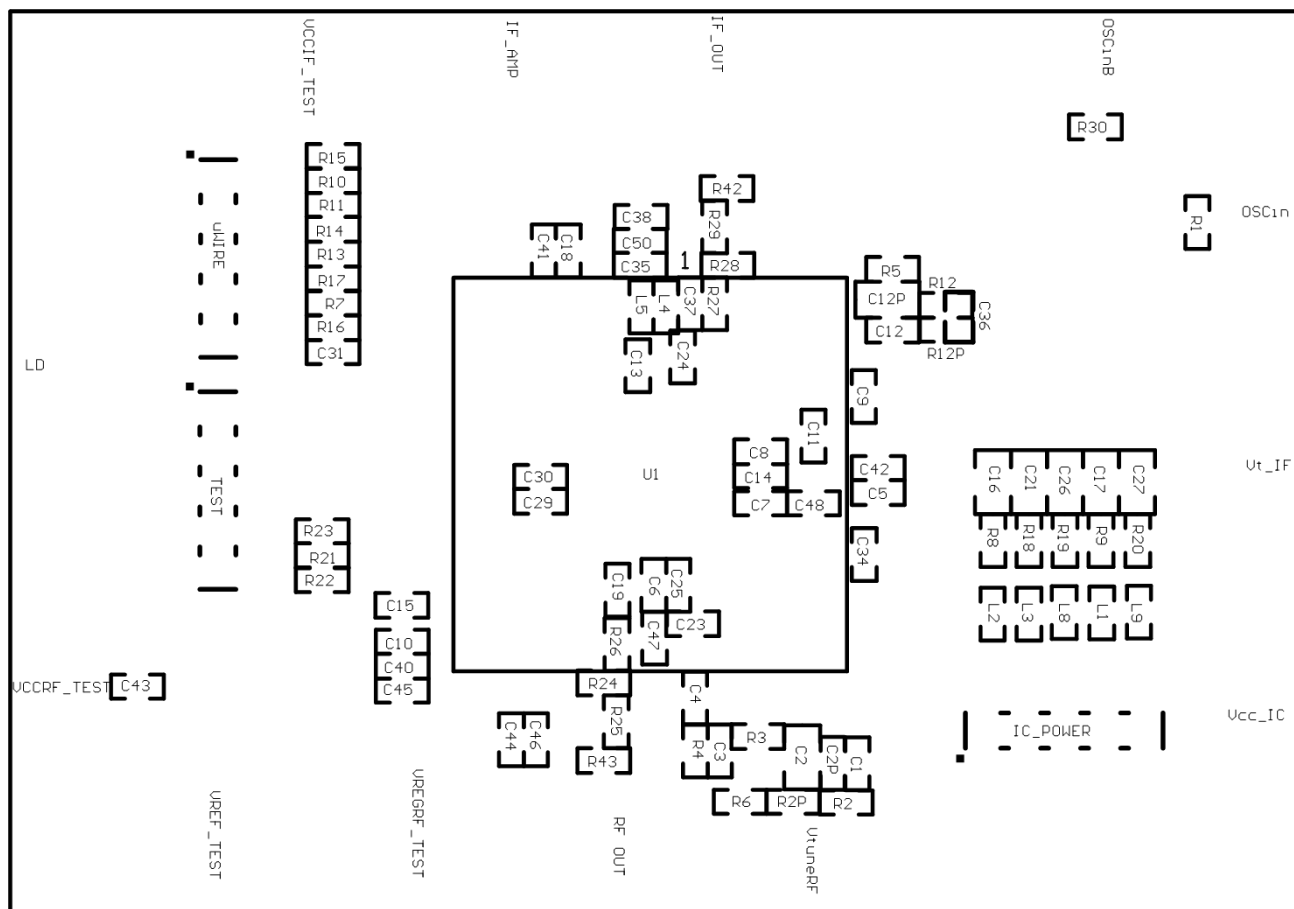
LMX2531-2294 Lock Time



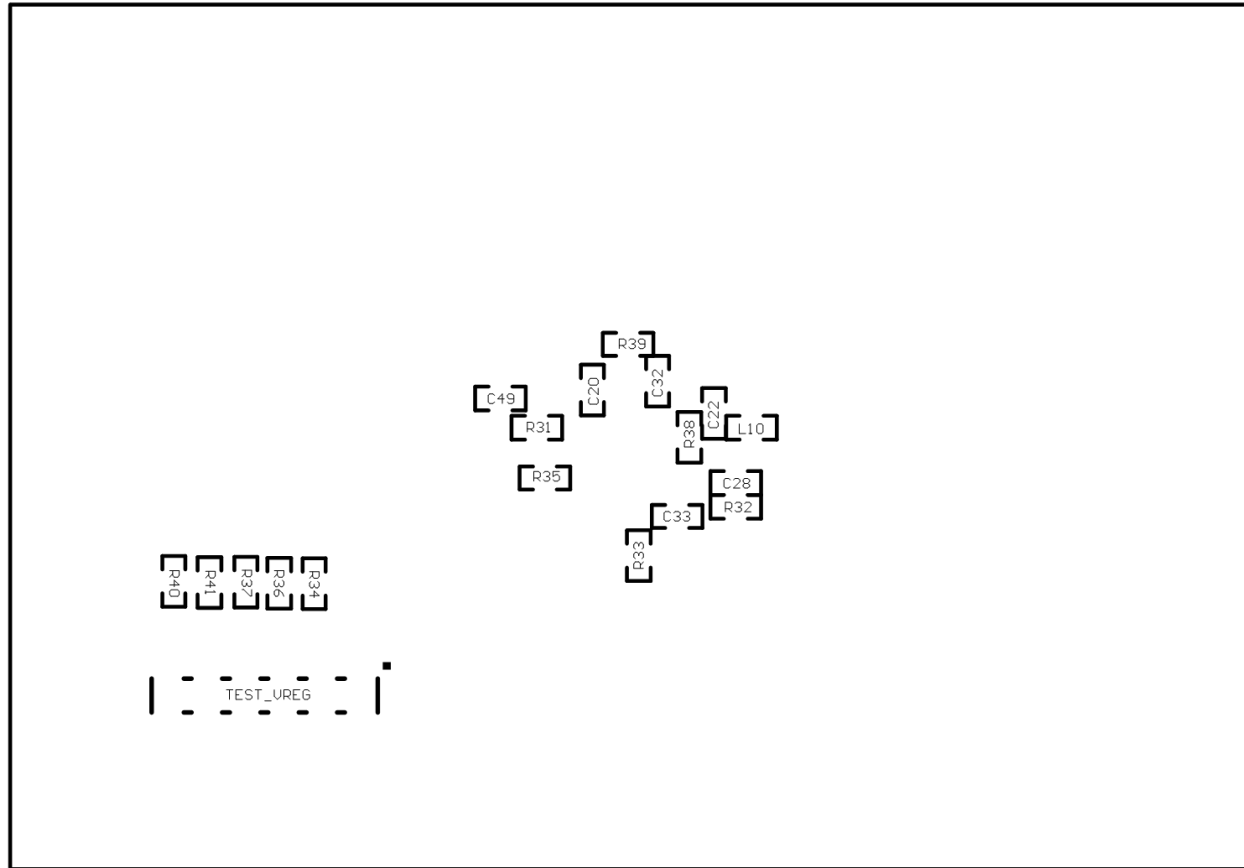
rsf

Appendix B: Build Diagram

Top Overlay



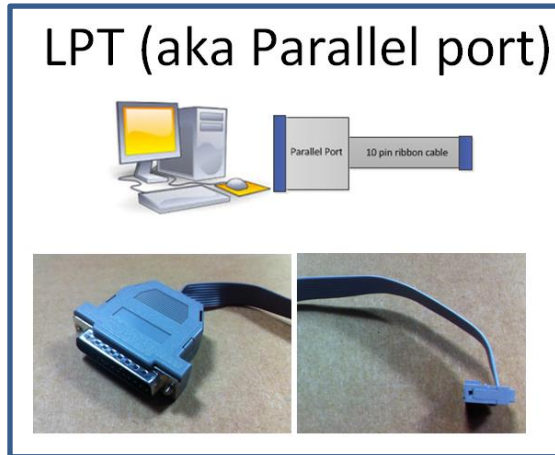
Bottom Overlay



Appendix C: Quick Start on EVM Communication

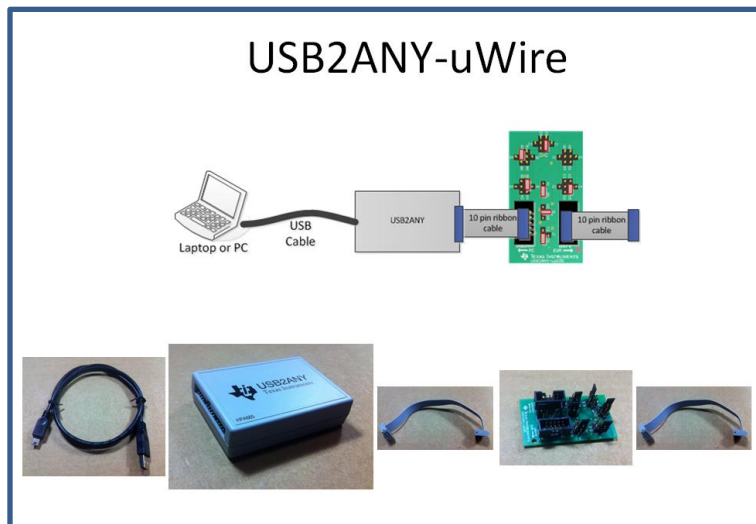
Codeloader is the software used to communicate with the EVM (Please download the latest version from TI.com - <http://www.ti.com/tool/codeloader>). This EVM can be controlled through the uWire interface on board. There are two options in communicating with the uWire interface from the computer.

OPTION 1



Open Codeloader.exe → Click “Select Device” → Click “Port Setup” tab → Click “LPT” (in Communication Mode)

OPTION 2

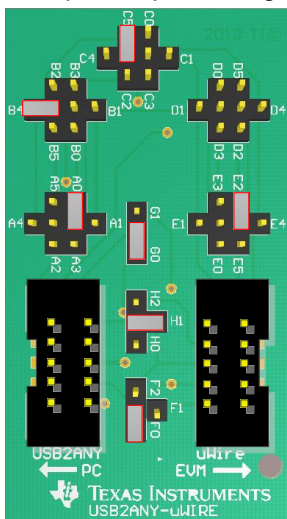


The Adapter Board

This table describes the pins configuration on the adapter board for each EVM board (See examples below table)

| EVM | Jumper Bank | | | | | | | | Code Loader Configuration |
|---------------------|-------------|----|----|----|----|----|----|----|------------------------------------|
| | A | B | C | D | E | F | G | H | |
| LMX2581 | A4 | B1 | C2 | | E5 | F1 | G1 | H1 | BUFEN (pin 1), Trigger (pin 7) |
| LMX2541 | A4 | | C3 | | E4 | F1 | G1 | H1 | CE (pin 1), Trigger (pin 10) |
| LMK0400x | A0 | | C3 | | E5 | F1 | G1 | H1 | GOE (pin 7) |
| LMK01000 | A0 | | C1 | | E5 | F1 | G1 | H1 | GOE (pin 7) |
| LMK030xx | A0 | | C1 | | E5 | F1 | G1 | H1 | SYNC (pin 7) |
| LMK02000 | A0 | | C1 | | E5 | F1 | G1 | H1 | SYNC (pin 7) |
| LMK0480x | A0 | B2 | C3 | | E5 | F0 | G0 | H1 | Status_CLKin1 (pin 3) |
| LMK04816/4906 | A0 | B2 | C3 | | E5 | F0 | G0 | H1 | Status_CLKin1 (pin 3) |
| LMK01801 | A0 | B4 | C5 | | E2 | F0 | G0 | H1 | Test (pin 3), SYNC0 (pin 10) |
| LMK0482x (prelease) | A0 | B5 | C3 | D2 | E4 | F0 | G0 | H1 | CLKin1_SEL (pin 6), Reset (pin 10) |
| LMX2531 | A0 | | | | E5 | F2 | G1 | H2 | Trigger (pin 1) |
| LMX2485/7 | A0 | | C1 | | E5 | F2 | G1 | H0 | ENOSC (pin 7), CE (pin 10) |
| LMK03200 | A0 | | | | E5 | F0 | G0 | H1 | SYNC (pin 7) |
| LMK03806 | A0 | | C1 | | E5 | F0 | G0 | H1 | |
| LMK04100 | A0 | | C1 | | E5 | F1 | G1 | H1 | |

Example adapter configuration (LMK01801)



Open Codeloader.exe → Click “Select Device” → Click “Port Setup” Tab → Click “USB” (in Communication Mode)

**Remember to also make modifications in “Pin Configuration” Section according to Table above.*

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