FCC TEST DATA

FCC TEST DATA

4.0 Temperature VS Frequency Stability Tests

This test was performed to generate the data to demonstrate the frequency stability of the digital frequency input to the Klystron over the range of -40 to +50 degrees Celsius.

It is noted at this time that the frequency generation circuits are locked to a highly stable 10MHz crystal oscillator, feeding a phase locked loop employed in triple up conversion process. For this test, the Frequency generation circuitry (Digital STALO) and the 10MHz source were placed in an environmental test chamber and subjected to the following conditions.

- Step 1: The equipment was placed in the environmental chamber and thermocouples were installed on the base plate of the Digital Stalo. The signal and power lines were fed through an access hole in the test unit.
- Step 2: The environmental chamber was set for -40C and the control circuits were energized.
- Step 3: The equipment was “cold soaked” until the base plate temperature of the Digital Stalo was stabilized at -40C. This took approximately 22 minutes.
- Step 4: The Units Under Test (UUT) were energized via the signal and power lines.
- Step 5: The following measurements of frequency were taken each minute starting from zero (the time the chamber reached testing temperature and stabilized) and the process was repeated from Step 3 downward with the temperature increased 10 degrees and stabilized IAW the base plate sensor. Calibrated test equipment was used to take these measurements.

DIGITAL STALO FREQUENCY VS TEMPERATURE STABILITY TESTS

Time Minutes	Temperature	Frequency in MHz
0	-40	5610.060
1	-40	5610.070
2	-40	5610.060
3	-40	5610.060
4	-40	5610.070
5	-40	5610.060
0	-30	5610.060
1	-30	5610.060
2	-30	5610.070
3	-30	5610.060
4	-30	5610.070
0	-20	5610.070
DIGITAL STALO FREQUENCY VS TEMPERATURE STABILITY TESTS		
Time Minutes	**Temperature**	**Frequency in MHz**
1	-20	5610.060
2	-20	5610.070
3	-20	5610.070
4	-20	5610.070
5	-20	5610.070
6	-20	5610.070
0	-10	5610.060
1	-10	5610.060

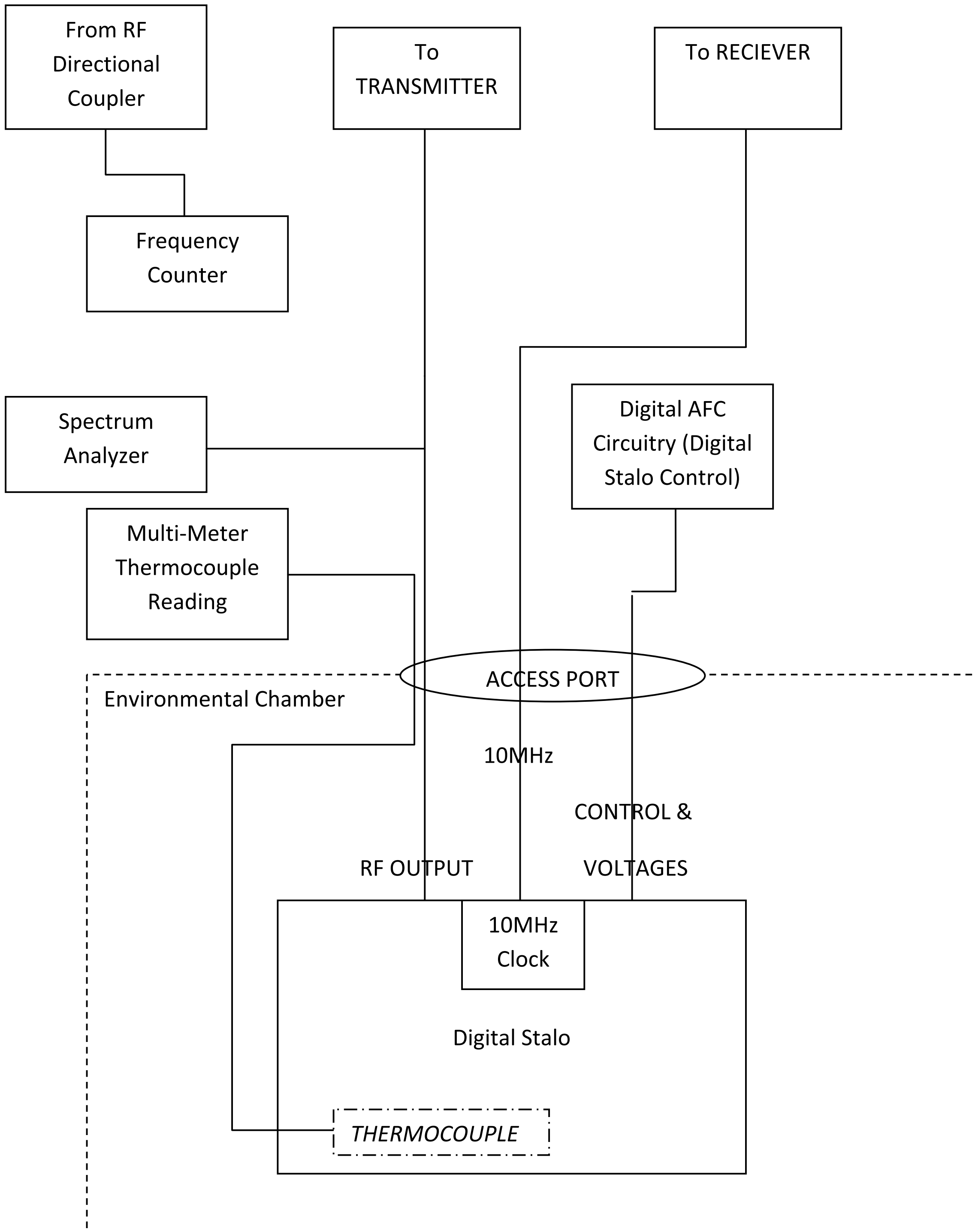
2	-10	5610.080
3	-10	5610.070
4	-10	5610.070
0	0	5610.080
1	0	5610.070
2	0	5610.070
3	0	5610.070
4	0	5610.070
0	10	5610.070
1	10	5610.070
2	10	5610.080
3	10	5610.070
4	10	5610.070
5	10	5610.070
0	20	5610.070
1	20	5610.060
2	20	5610.070
3	20	5610.080
4	20	5610.080
5	20	5610.070
0	30	5610.070
1	30	5610.060
2	30	5610.070
3	30	5610.060
4	30	5610.070
1	40	5610.070
2	40	5610.060
3	40	5610.060
4	40	5610.070
1	50	5610.070
2	50	5610.060
3	50	5610.060
DIGITAL STALO FREQUENCY VS TEMPERATURE STABILITY TESTS		
Time Minutes	**Time Hours**	**Time Hours**
4	50	5610.060

Fig. 4

The “Frequency Stability vs. Temperature Test” was run at the operating frequency for this particular KHDD-1000C transmitter operation. The frequency remained stable over the complete temperature range.

5.0 Transmitter Stability with Line Voltage Fluctuations

The transmitter Line Voltage Fluctuation test was not performed due to the installed Uninterruptable Power Supply and Voltage Regulator installed with the transmitter. This UPS/VR is designed to regulate the voltage to within +-5 volts of the transmitter operating voltage. If the system drifts out of tolerance due to a failure of UPS components or increasing / decreasing line voltage, the UPS power output will shut off, effectively removing power from the KHDD-1000C transmitter.



TEST SET-UP #1

Fig. 5

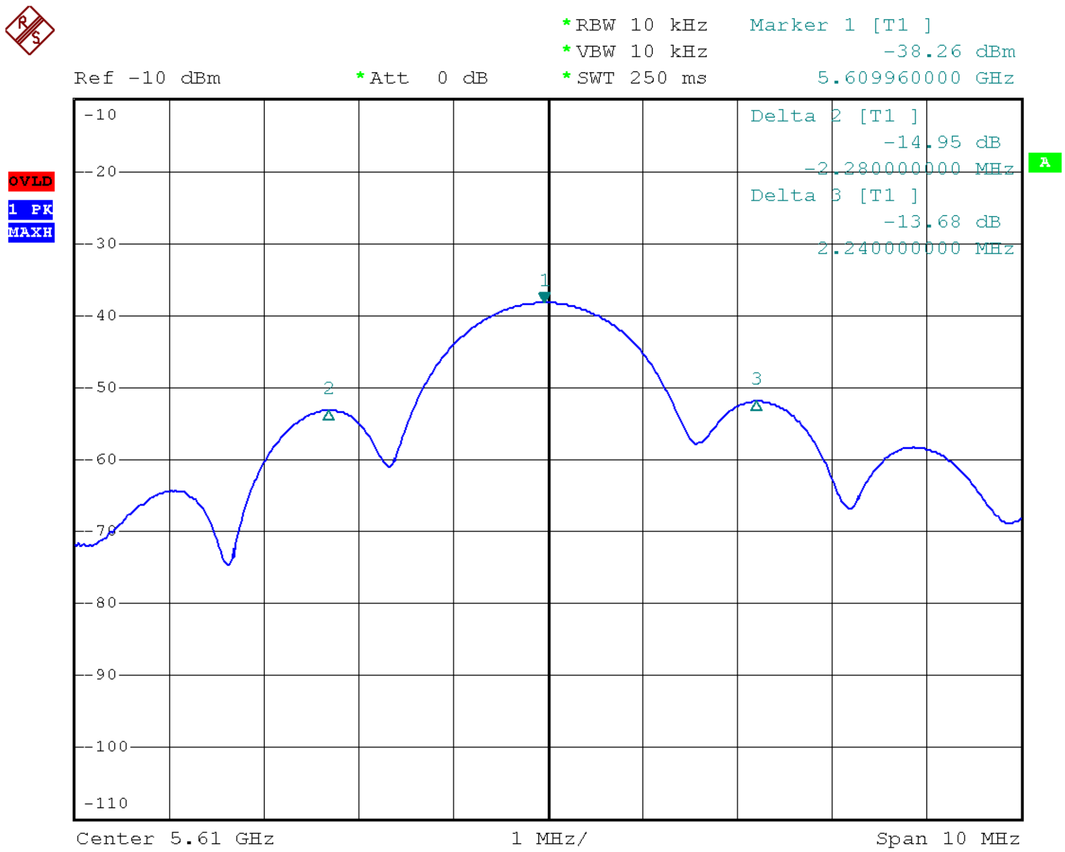
6.0 Spectrum Analysis

The following tests were performed to record the signature of the transmitted spectrum of the KHDD-1000C radar system. The plots of the spectrum analyzer are shown on the following pages and sequentially numbered in the bottom left hand corner of each plot. The plots and results of the measurements are listed as follows:

KHDD-1000C EMISSION MEASUREMENTS		
Plot Number	Test	Comments
1	Emitted Spectrum, Narrow Pulse (.8us) 5610MHz	.8µs Pulse, Spectrum width 4.52MHz, Side lobes -14.95dB and -13.68dB
2	Emitted Spectrum, Narrow Pulse (.8us) 5610MHz **NOTE used for Maximum Spectrum Occupancy**	.8µs pulse, Spectrum width 23.57MHz, 25MHz span
3	Emitted Spectrum, Wide Pulse (4.5us), 5610MHz	4.5µs pulse, Spectrum width 720kHz, Side lobes -12.30dB and -15.00dB
4	Emitted Spectrum, Wide Pulse (4.5us), 5610MHz	4.5µs pulse, spectrum width 4.71MHz, Side lobes, -39.54dB and -37.18dB
5	Emitted Spectrum, Wide Pulse (4.5us), 5610MHz	4.5µs pulse, Emission bandwidth at -50dB = 3.64MHz
6	Emitted Spectrum, Wide Pulse (4.5us), 5610MHz	4.5µs pulse, Emission bandwidth at -61dB = 17.67MHz
7	Emitted Spectrum, Narrow Pulse (.8us), 5610MHz	Non Linear Frequency Modulation chirped at 1.25MHz, 1MHz span
8	Emitted Spectrum, Narrow Pulse (.8us), 5610MHz	Non Linear Frequency Modulation chirped at 1.25MHz, 5MHz span
9	Emitted Spectrum, Narrow Pulse (.8us), 5610MHz	Non Linear Frequency Modulation chirped at 1.25MHz, 10MHz span
10	Spurious Emissions Test	Plot 20MHz to 5GHz, -76.14dBm
11	Spurious Emissions Test	Plot 5GHz to 10GHz, -72dBm
12	Spurious Emissions Test	Plot 10GHz to 15Ghz, -41dBm
13	Spurious Emissions Test	Plot 15GHz to 20Ghz, -57.63dBm
14	Spurious Emissions Test	Plot 20GHz to 25GHz, -66.65dBm
15	Spurious Emissions Test	Plot 25Ghz to 30Ghz, -68.29dBm
16	Spurious Emissions Test	Plot 500kHz to 20MHz, -68.47dBm
17	RF Leakage, 1m from chassis using double ridge horn, Reference plot, Transmitter Radiation OFF	Reference Plot of 2.5Ghz to 5Ghz, TX OFF
18	RF Leakage, 1m from chassis using double ridge horn, Transmitter Radiation ON	Plot 0Hz to 5GHz, -57.38dBm signal
19	RF Leakage, 1m from chassis using double ridge horn, Transmitter Radiation ON	Plot 5GHz to 10Ghz, -36.53dBm signal
20	RF Leakage, 1m from chassis using double ridge horn, Transmitter Radiation ON	Plot 10Ghz to 15Ghz, -63.71dBm signal

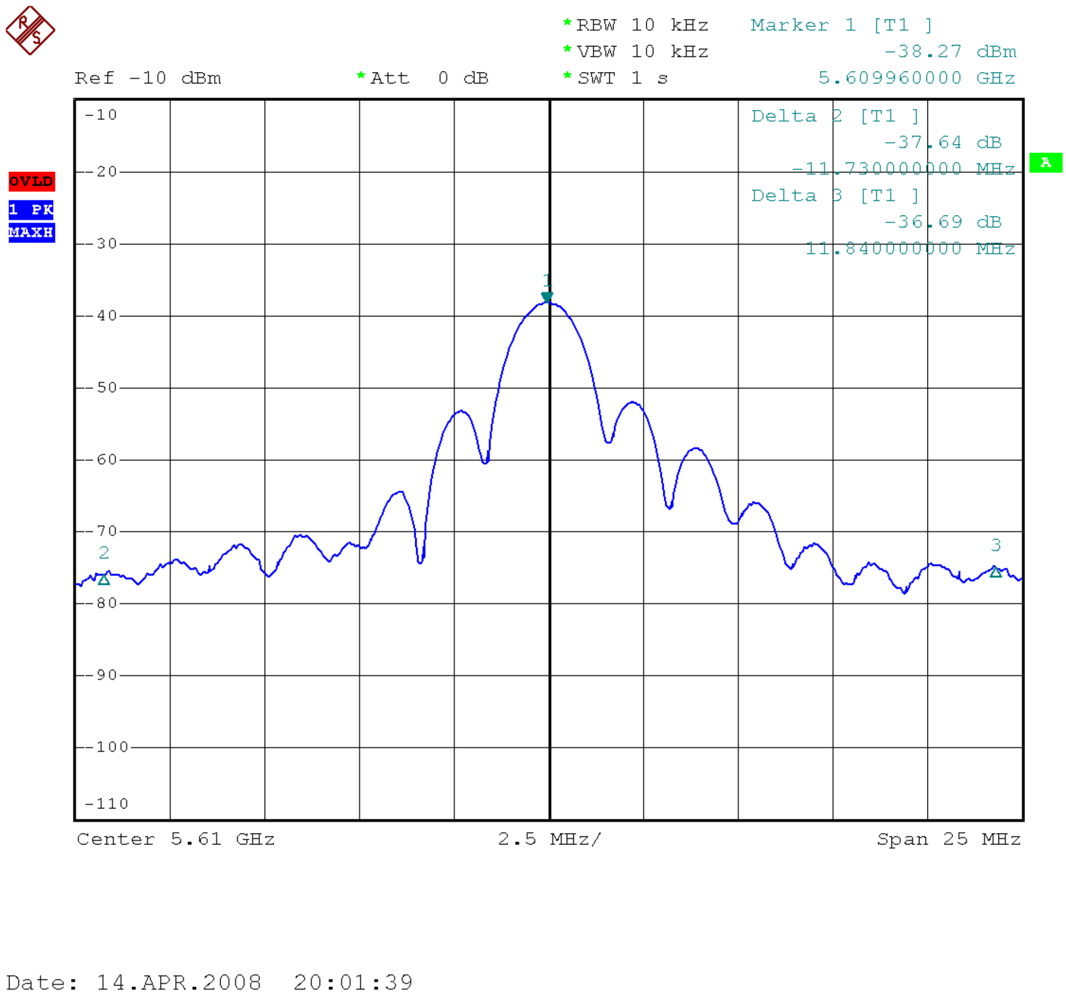
21	RF Leakage, 1m from chassis using double ridge horn, Transmitter Radiation ON	Plot 15Ghz to 20GHz, -64.73dBm signal
22	Detected RF Pulse	4.5μs Detected RF Pulse, 80.5dBm attenuation with **NO** RF PULSE SHAPING
23	Detected RF Pulse	4.5μs Detected RF Pulse, 80.5dBm attenuation with RF Pulse Shaping
24	Detected RF Pulse	.8μs Detected RF Pulse, 80.5dBm attenuation with ***NO*** RF Pulse Shaping
25	Detected RF Pulse	.8μs Detected RF Pulse, 80.5dBm attenuation with RF Pulse Shaping
26	Detected RF Pulse	1.6μs Detected RF Pulse, 80.5dBm attenuation with ***NO*** RF Pulse Shaping
27	Detected RF Pulse	1.6μs Detected RF Pulse, 80.5dBm attenuation with RF Pulse Shaping
28	RF Peak Power Measurement	4.5us RF Pulse with ***NO*** RF Pulse Shaping
29	RF Peak Power Measurement	4.5μsRF Pulse with RF Pulse Shaping
30	RF Peak Power Measurement	.8μs RF Pulse with ***NO*** RF Pulse Shaping
31	RF Peak Power Measurement	.8μs RF Pulse with RF Pulse Shaping
32	RF Peak Power Measurement	1.6μs RF Pulse with ***NO*** RF Pulse Shaping
33	RF Peak Power Measurement	1.6μs RF Pulse with RF Pulse Shaping
34	Antenna Pattern Final Test Data	Table containing side lobe information for multiple frequencies
35	Antenna Pattern (Horizontal)	5400MHz
36	Antenna Pattern (Horizontal)	5550MHz
37	Antenna Pattern (Horizontal)	5700MHz
38	Antenna Pattern (Vertical)	5400MHz
39	Antenna Pattern (Vertical)	5550MHz
40	Antenna Pattern (Vertical)	5700MHz

Fig. 6

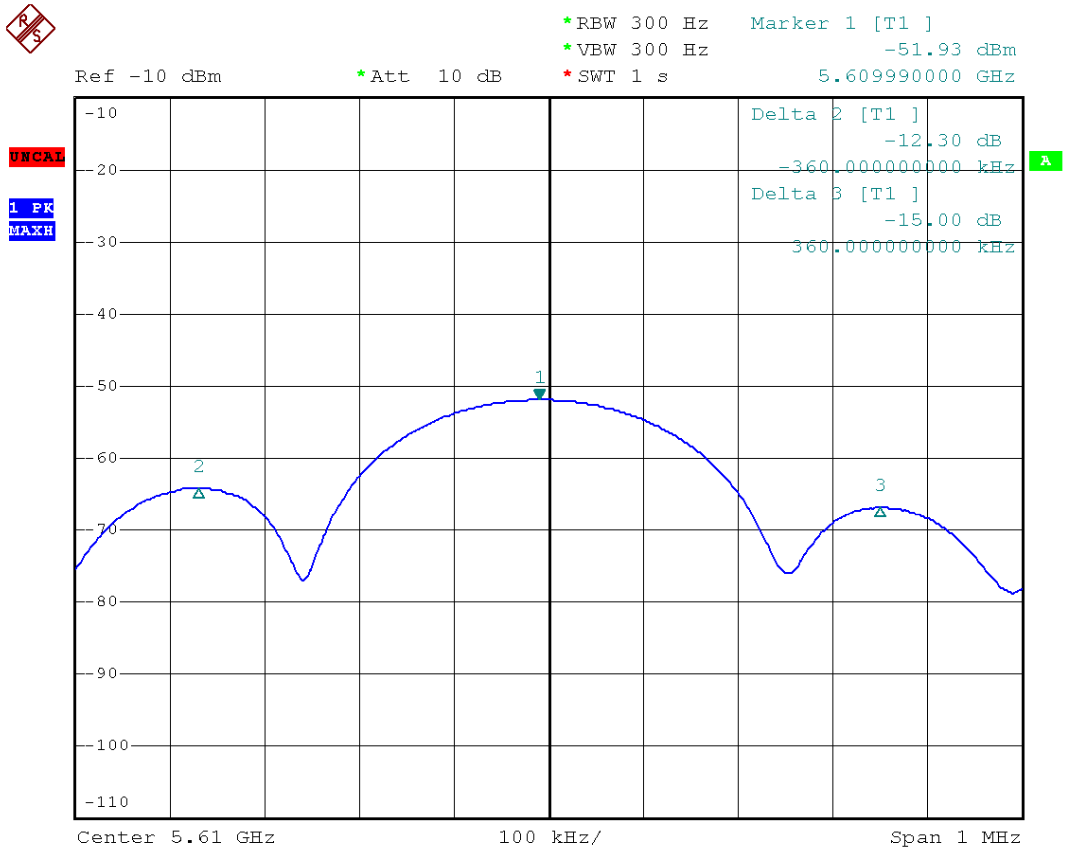


Date: 14.APR.2008 19:59:22

Plot #1: .8μs Pulse, Spectrum width 4.52MHz, Side lobes -14.95dB and -13.68dB

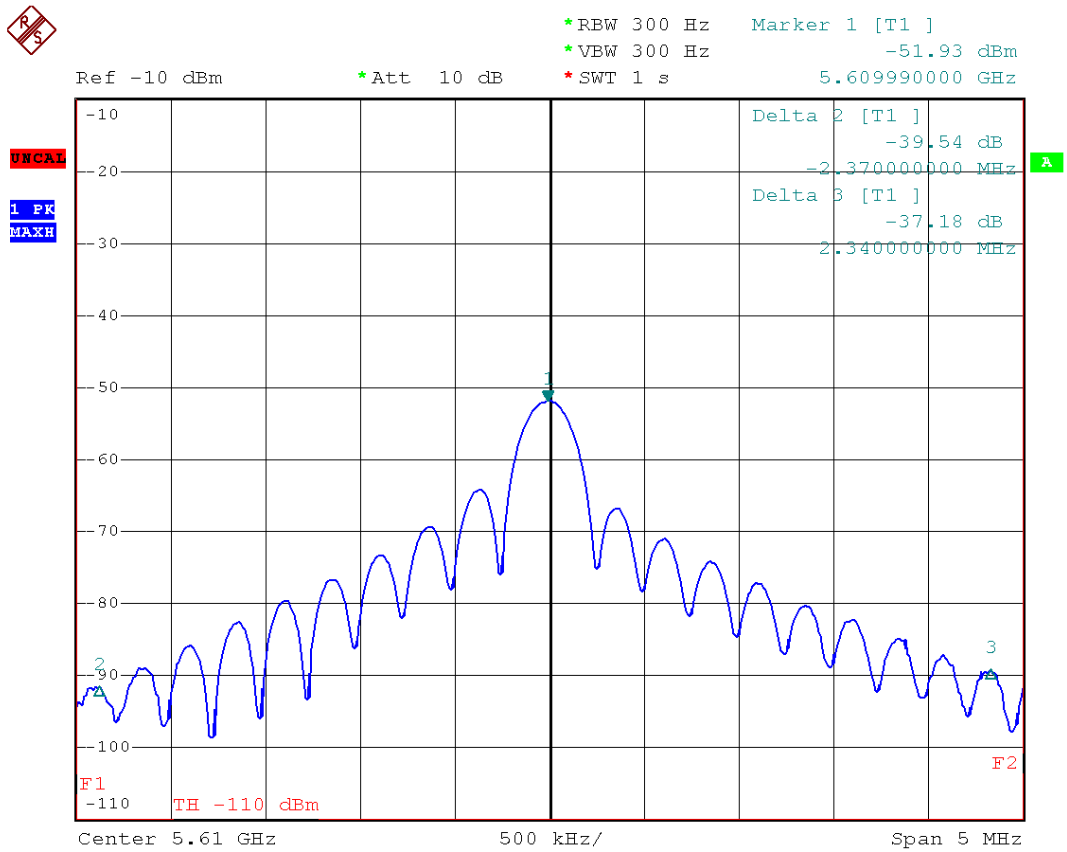


Plot #2: .8μs pulse, Spectrum width 23.57MHz, 25MHz span



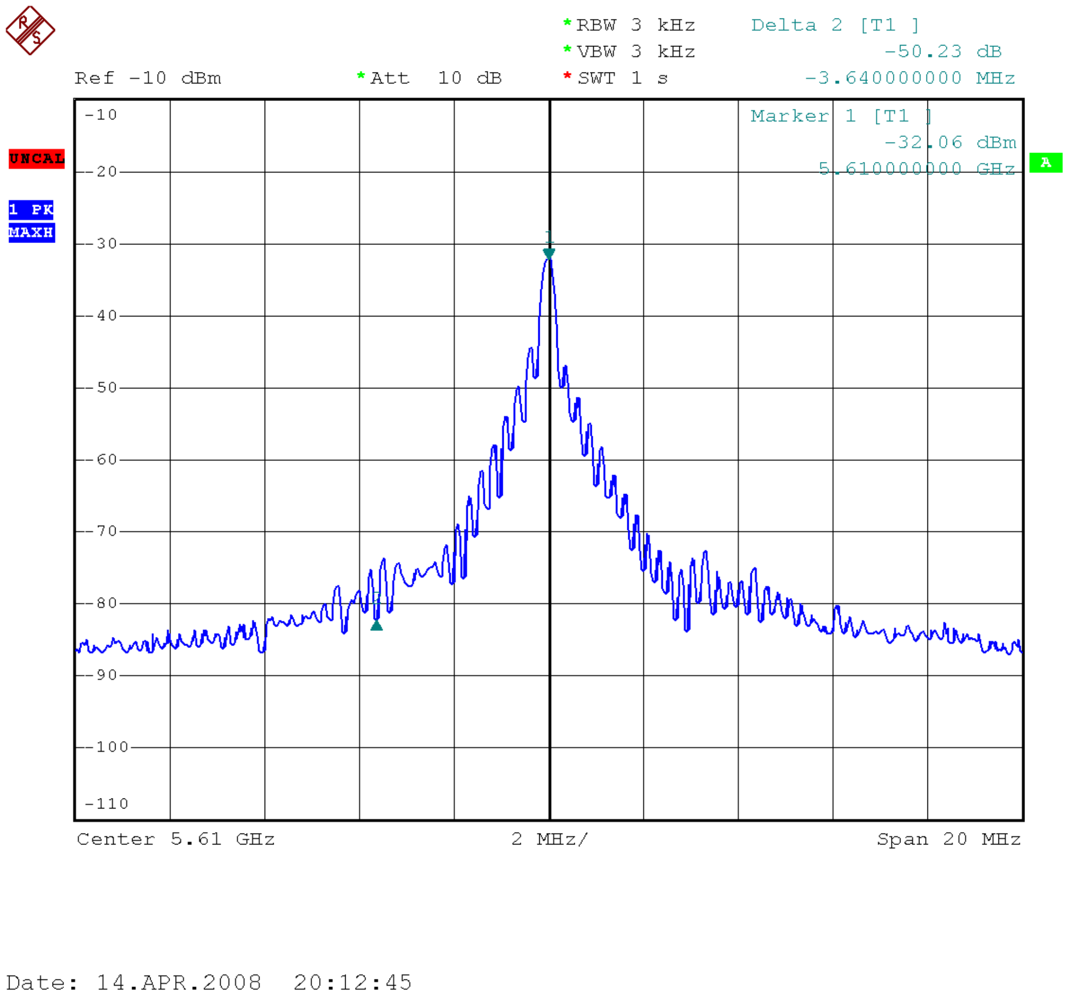
Date: 14.APR.2008 20:04:12

Plot #3: 4.5µs pulse, Spectrum width 720kHz, Side lobes -12.30dB and -15.00dB



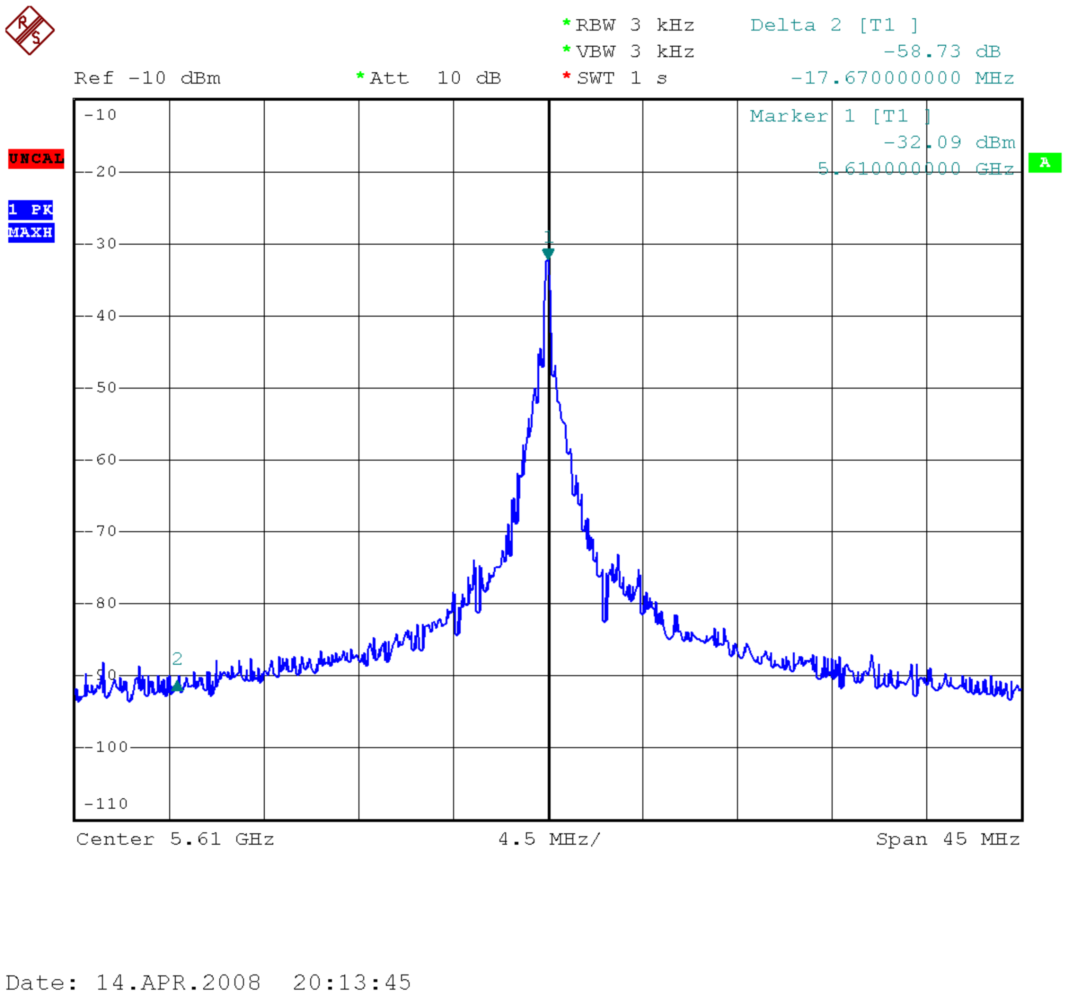
Date: 14.APR.2008 20:05:35

Plot #4 4.5μs pulse, spectrum width 4.71MHz, Side lobes, -39.54dB and -37.18dB

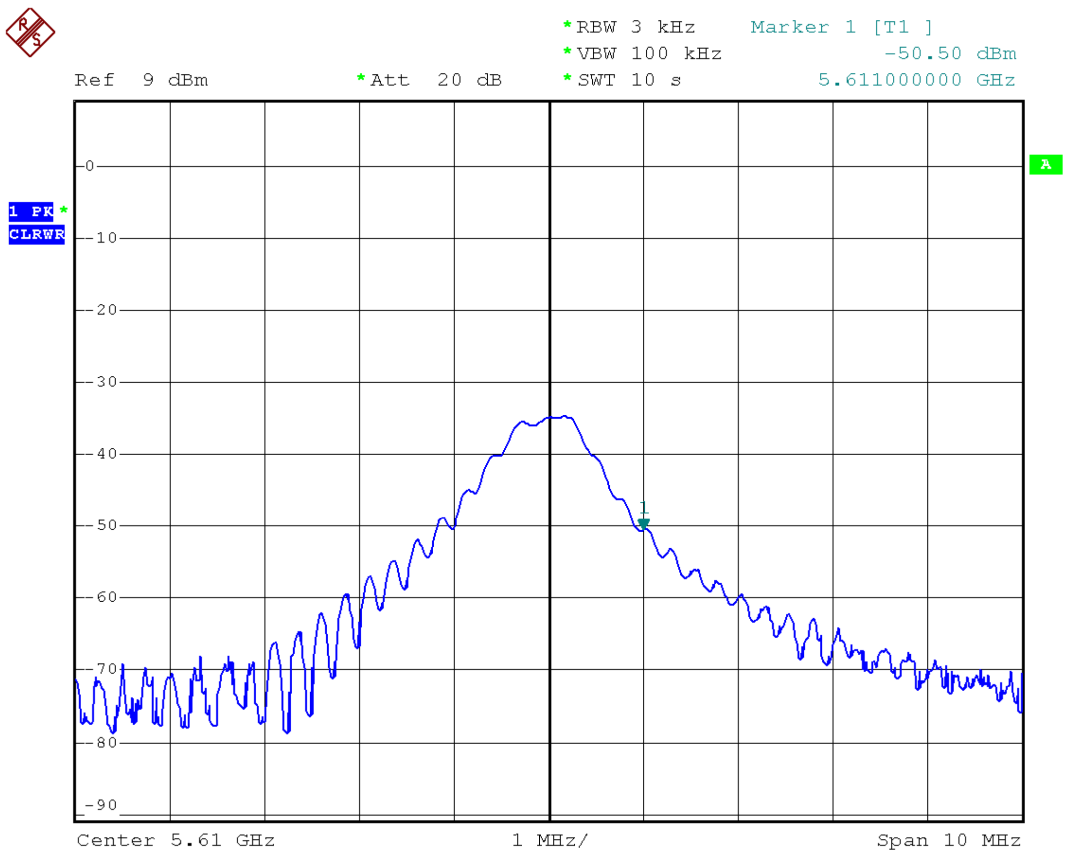


Plot

#5: 4.5μs pulse, Emission bandwidth at -50dB = 3.64MHz

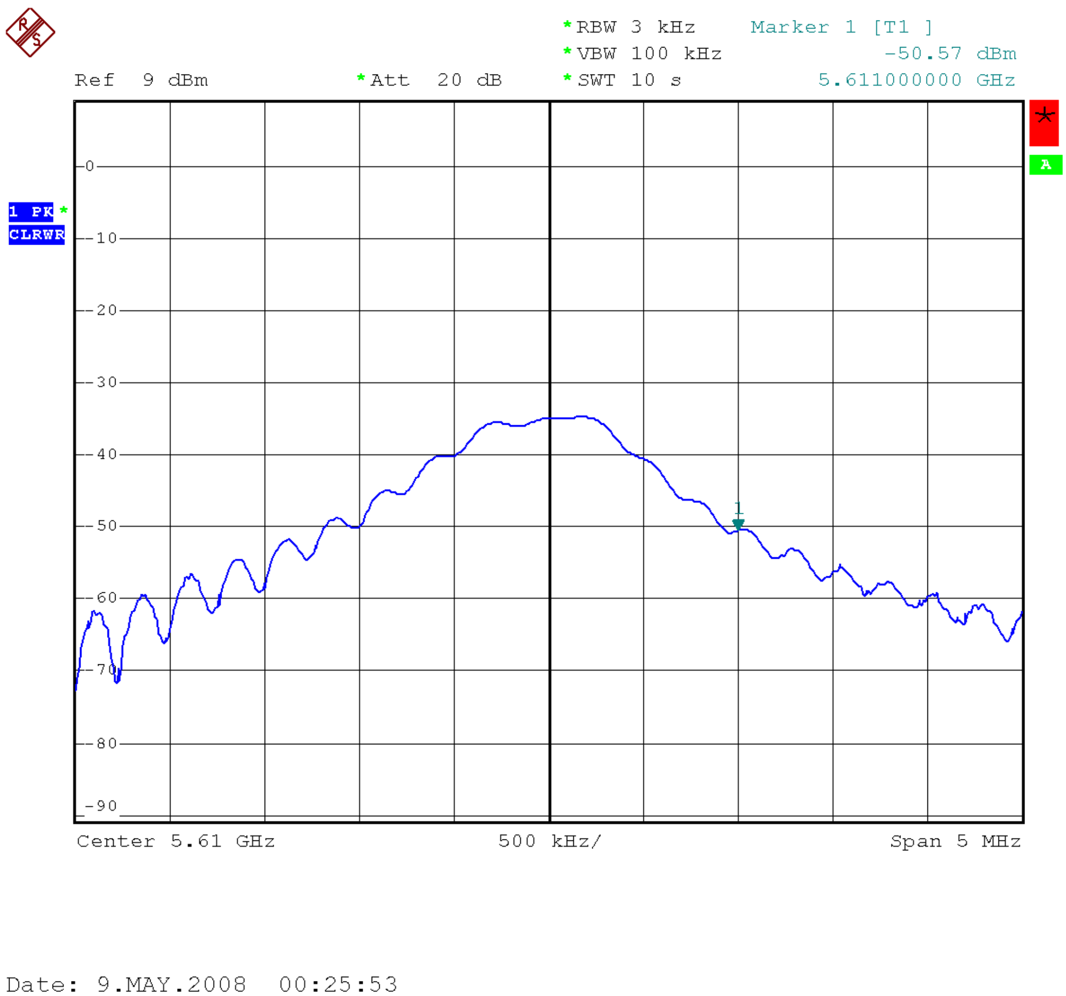


Plot #6: 4.5μs pulse, Emission bandwidth at -61dB = 17.67MHz

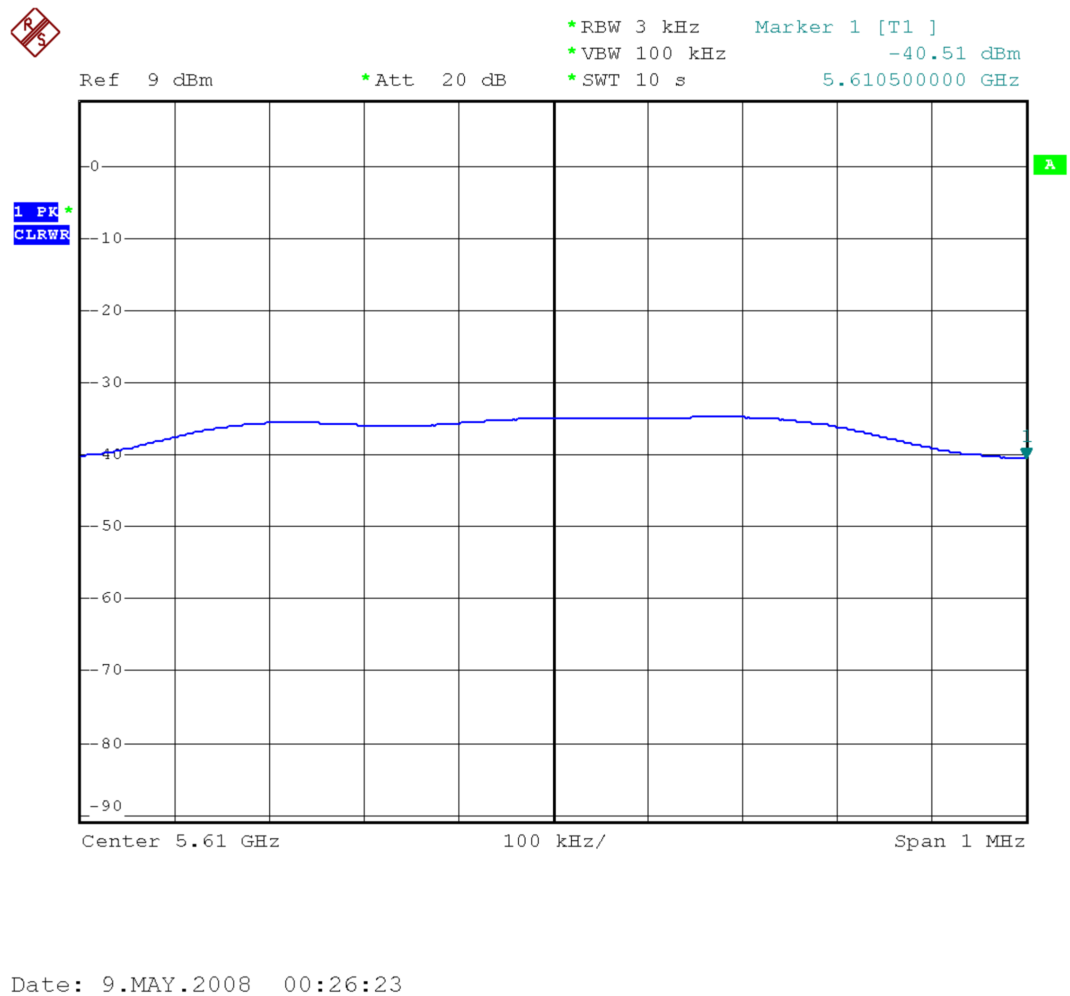


Date: 9.MAY.2008 00:25:26

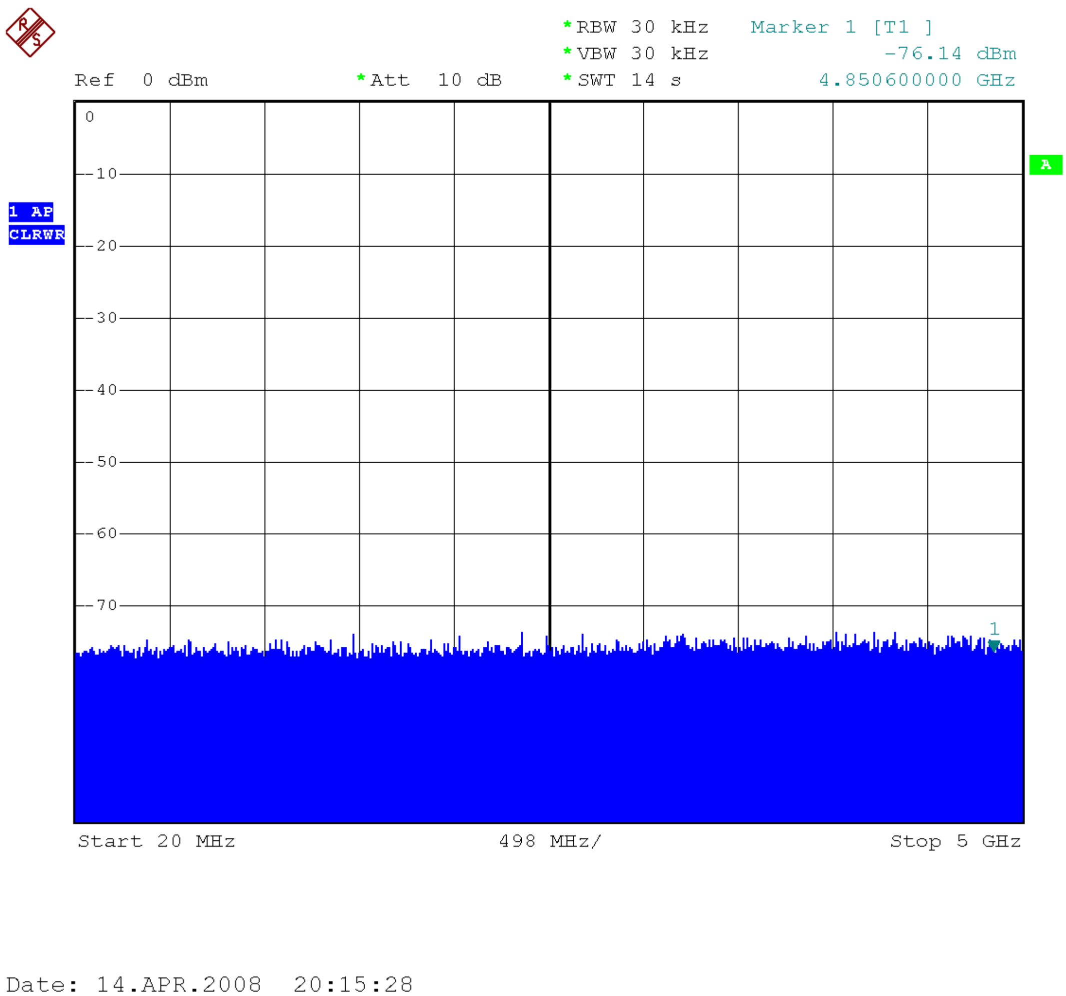
Plot #7: Non Linear Frequency Modulation chirped at 1.25MHz, 1MHz span



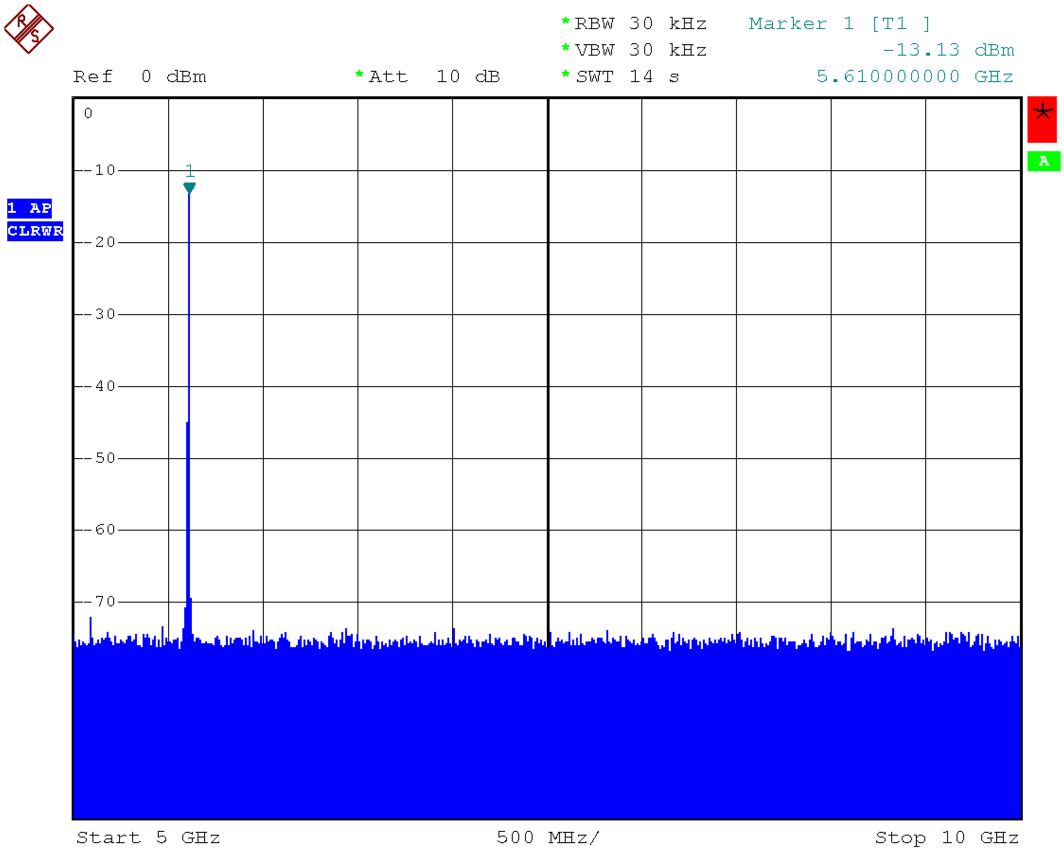
Plot #8: Non Linear Frequency Modulation chirped at 1.25MHz, 5MHz span



Plot #9: Non Linear Frequency Modulation chirped at 1.25MHz, 10MHz span

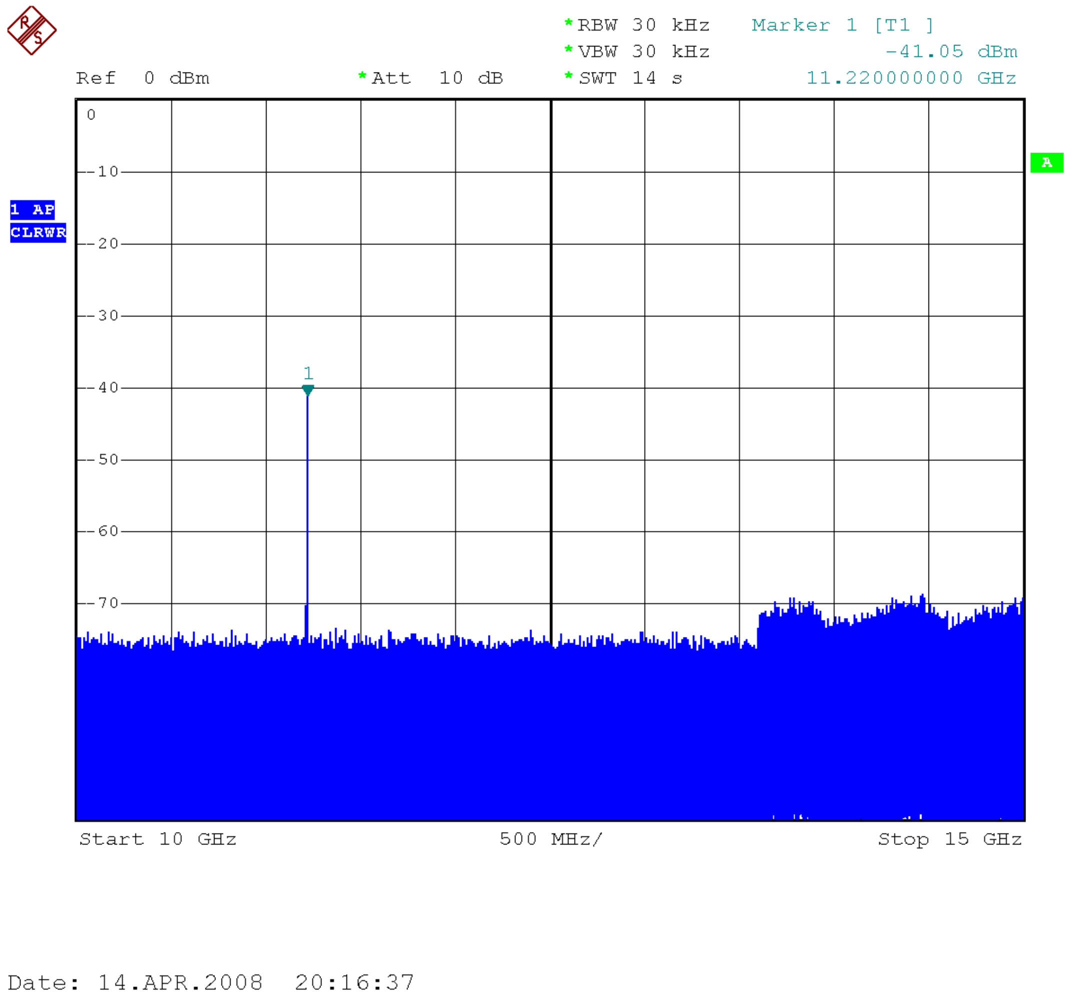


Plot #10: Plot 20MHz to 5GHz, -76.14dBm

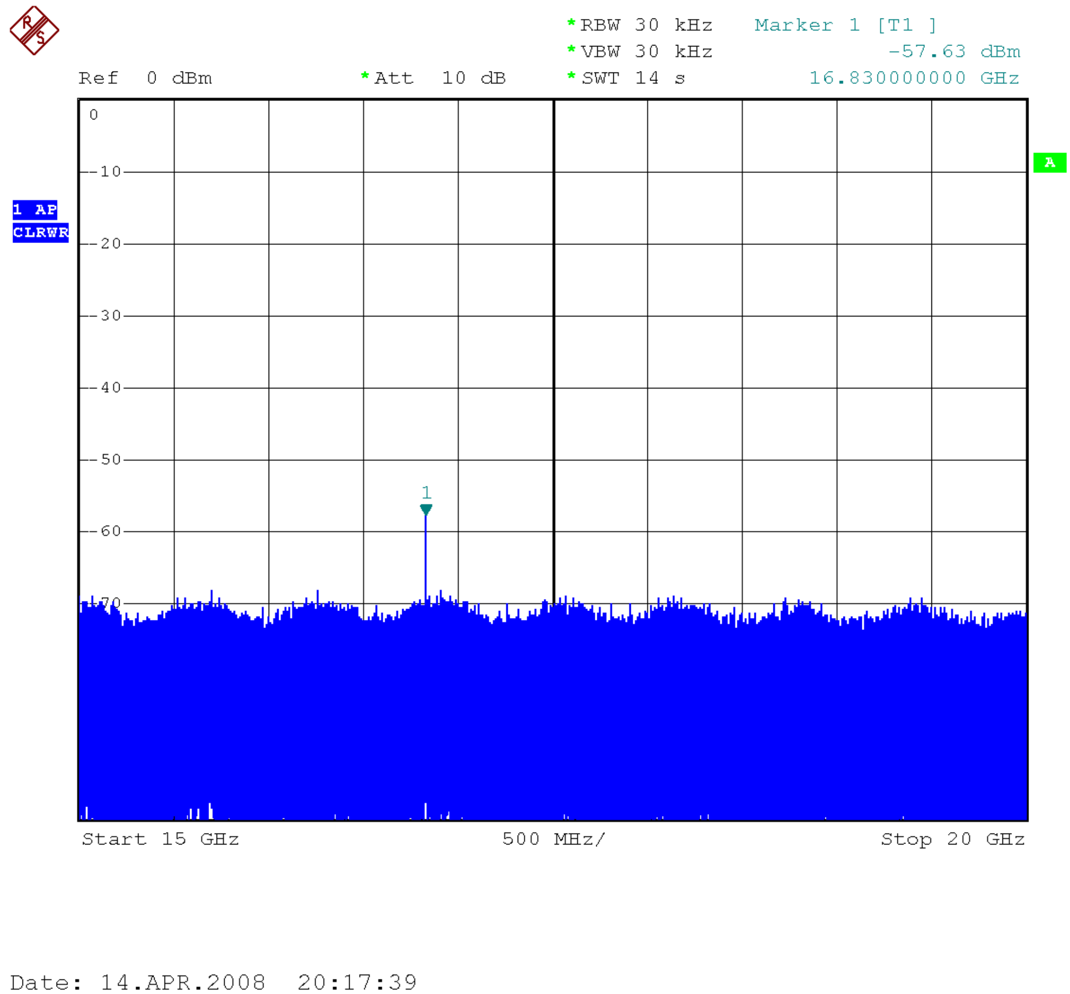


Date: 14.APR.2008 20:15:53

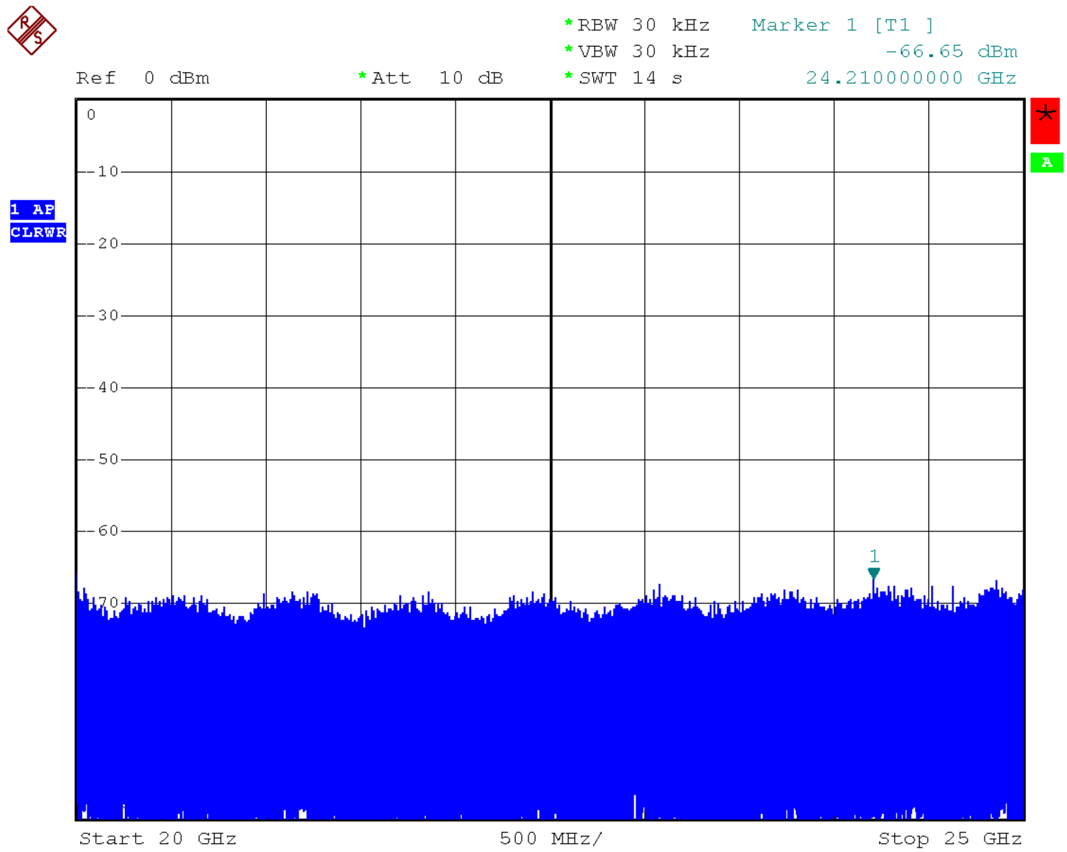
Plot #11: Plot 5GHz to 10GHz, -72dBm



Plot #12: Plot 10GHz to 15Ghz, -41dBm

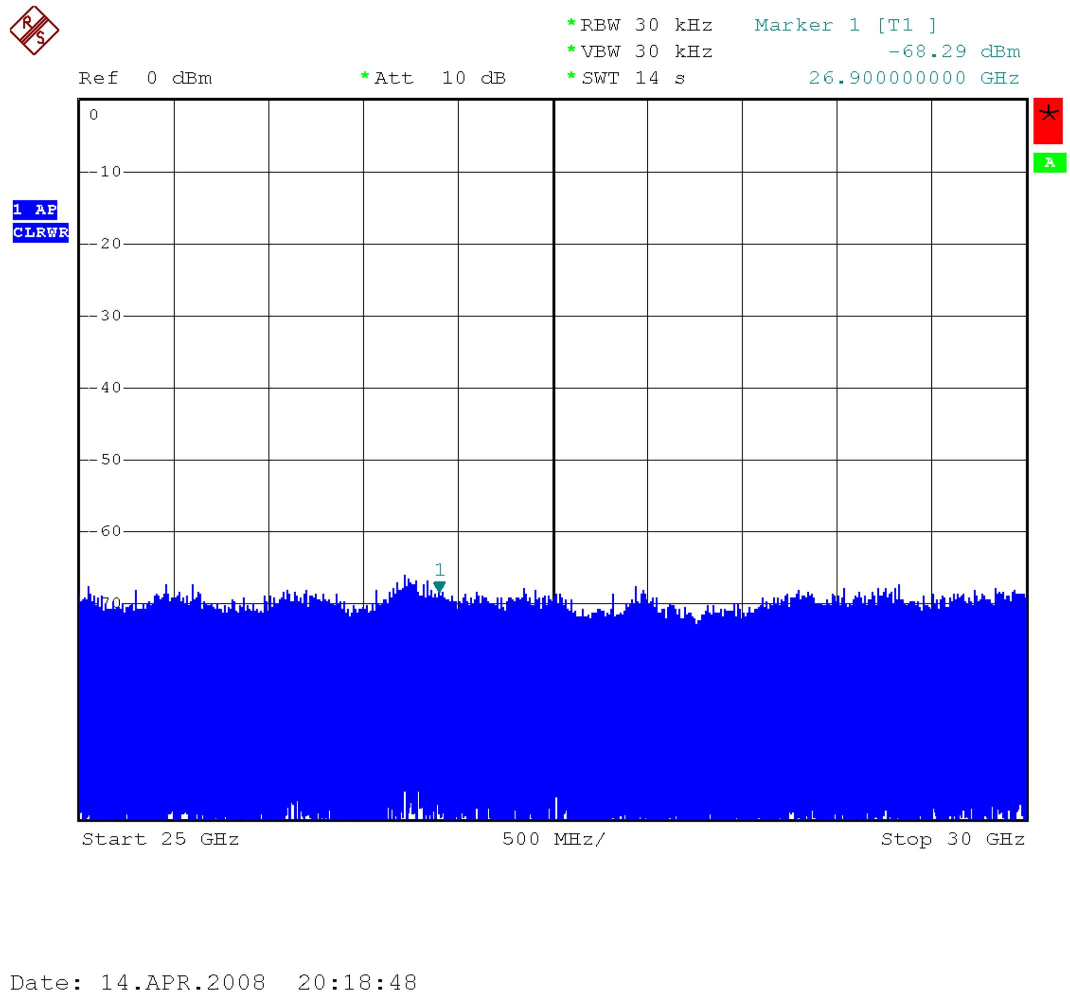


Plot #13: Plot 15GHz to 20Ghz, -57.63dBm

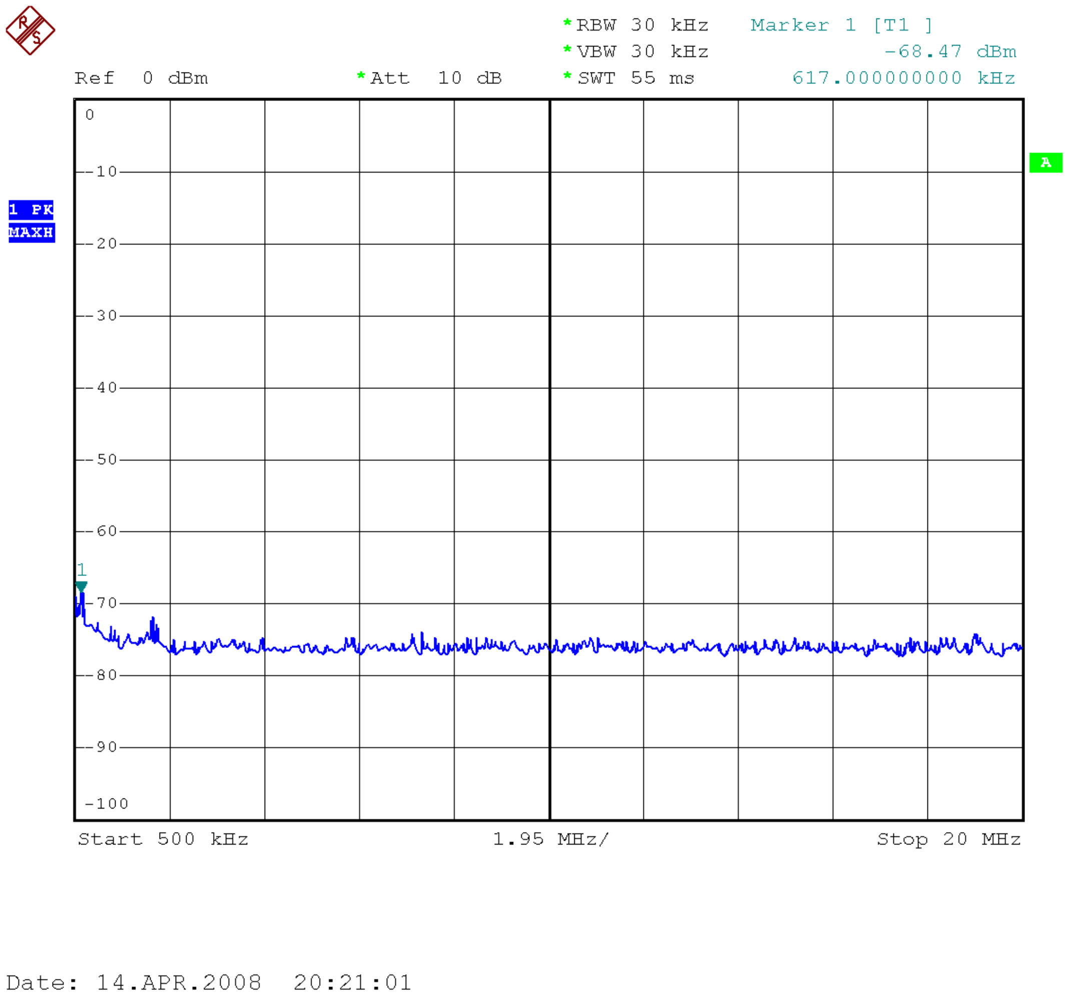


Date: 14.APR.2008 20:18:15

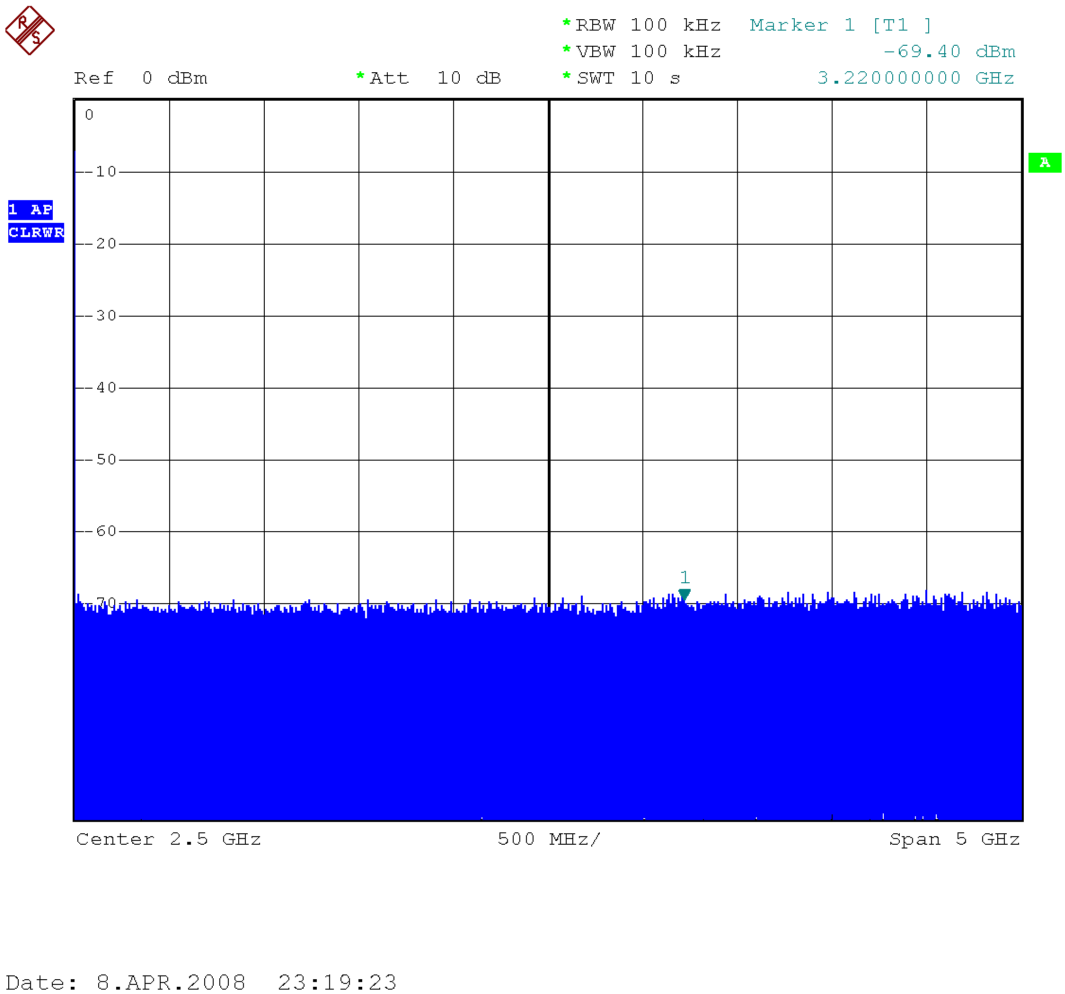
Plot #14: Plot 20GHz to 25GHz, -66.65dBm



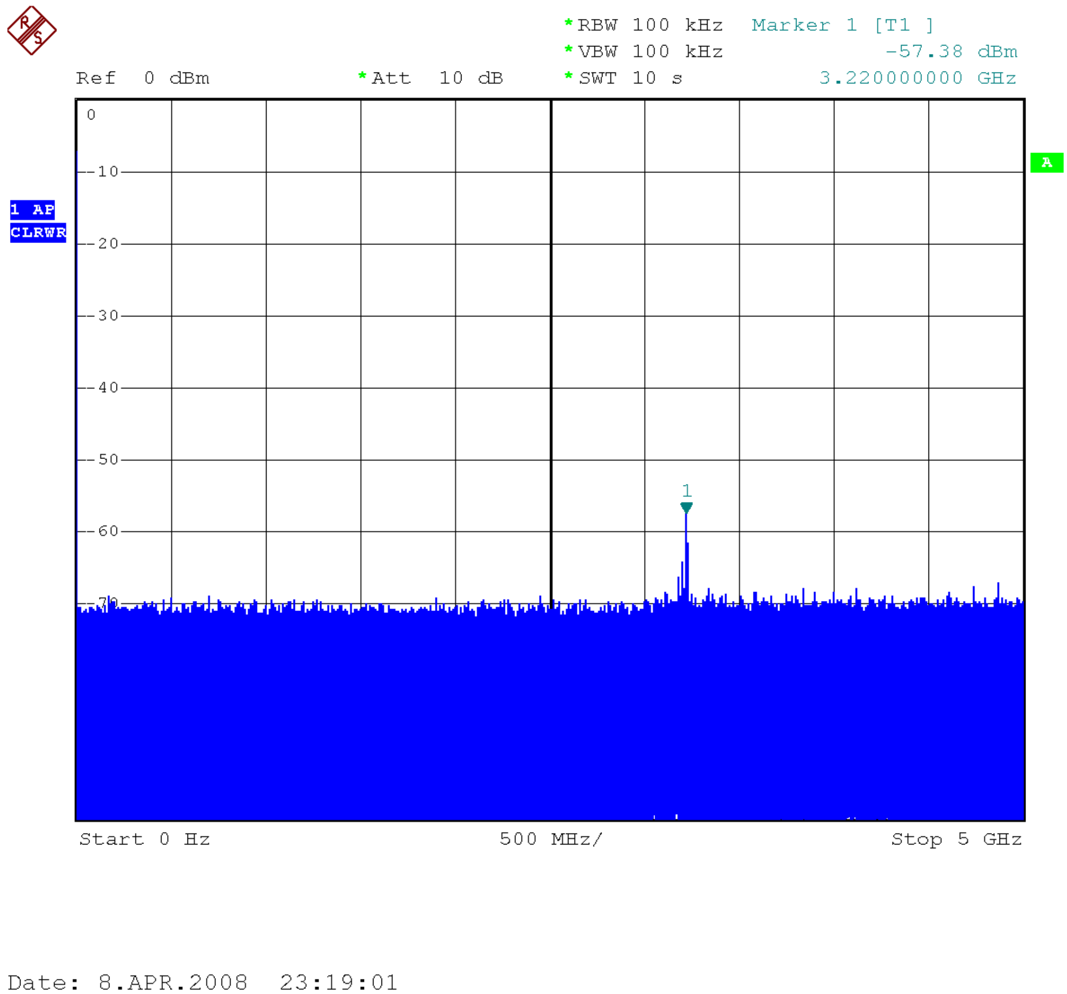
Plot #15: Plot 25Ghz to 30Ghz, -68.29dBm



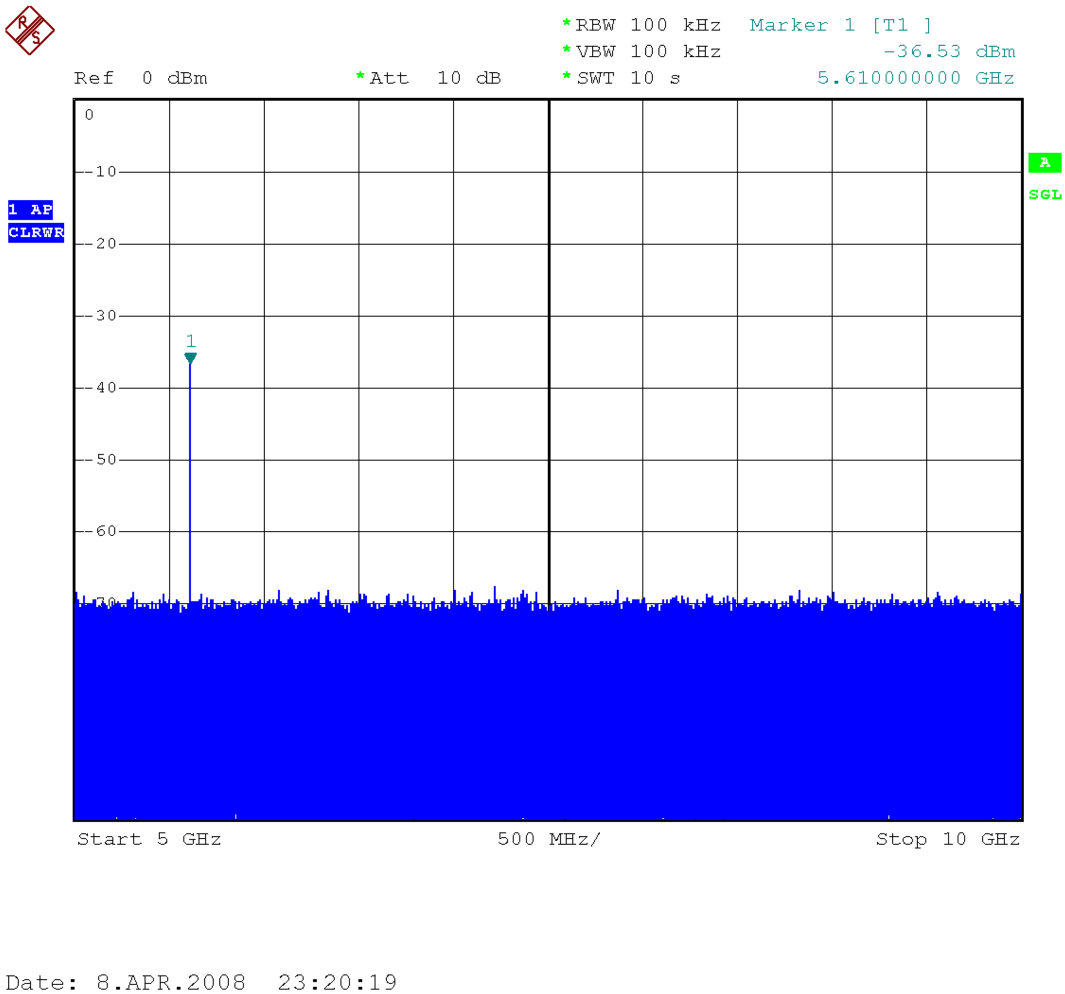
Plot #16: Plot 500kHz to 20MHz, -68.47dBm



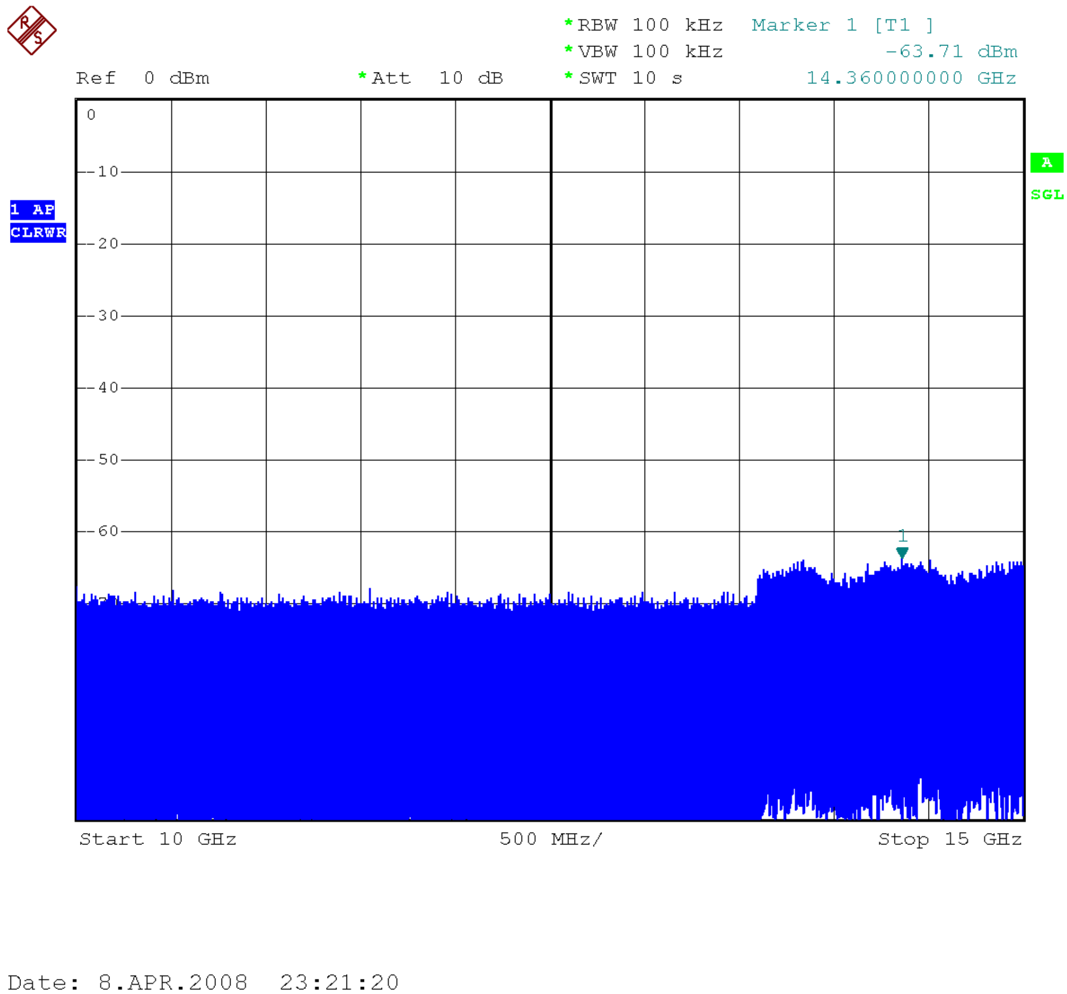
Plot #17: Reference Plot of 2.5Ghz to 5Ghz, TX OFF



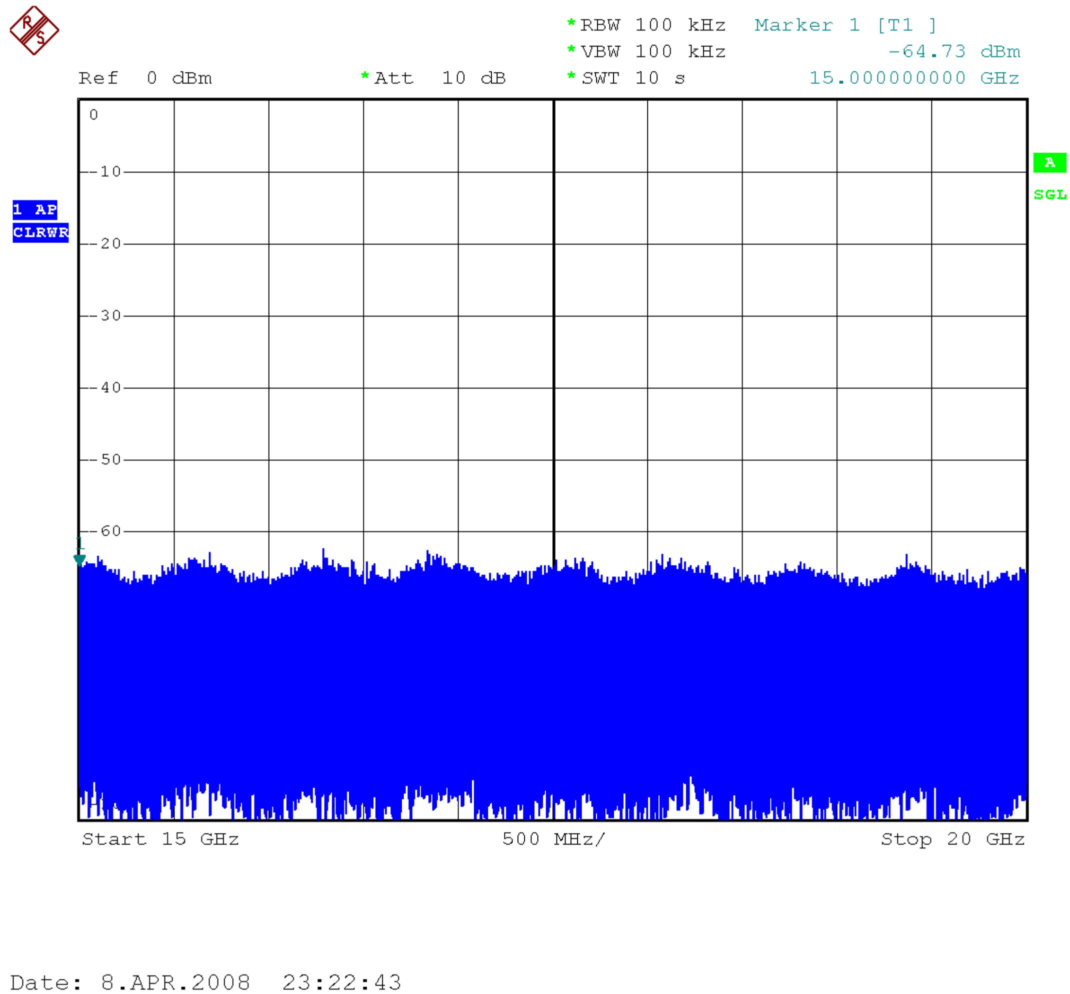
Plot #18: Plot 0Hz to 5GHz, -57.38dBm signal



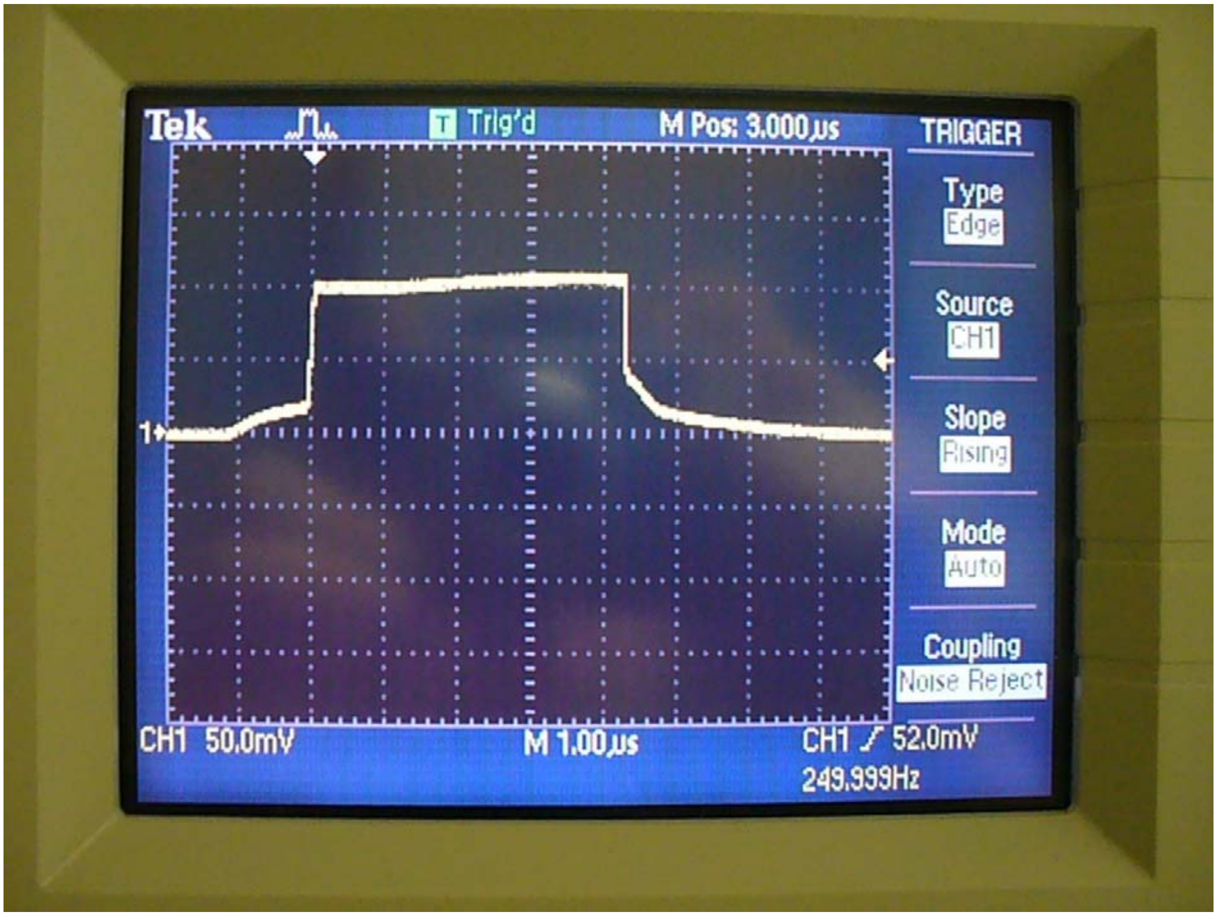
Plot #19: Plot 5GHz to 10Ghz, -36.53dBm signal



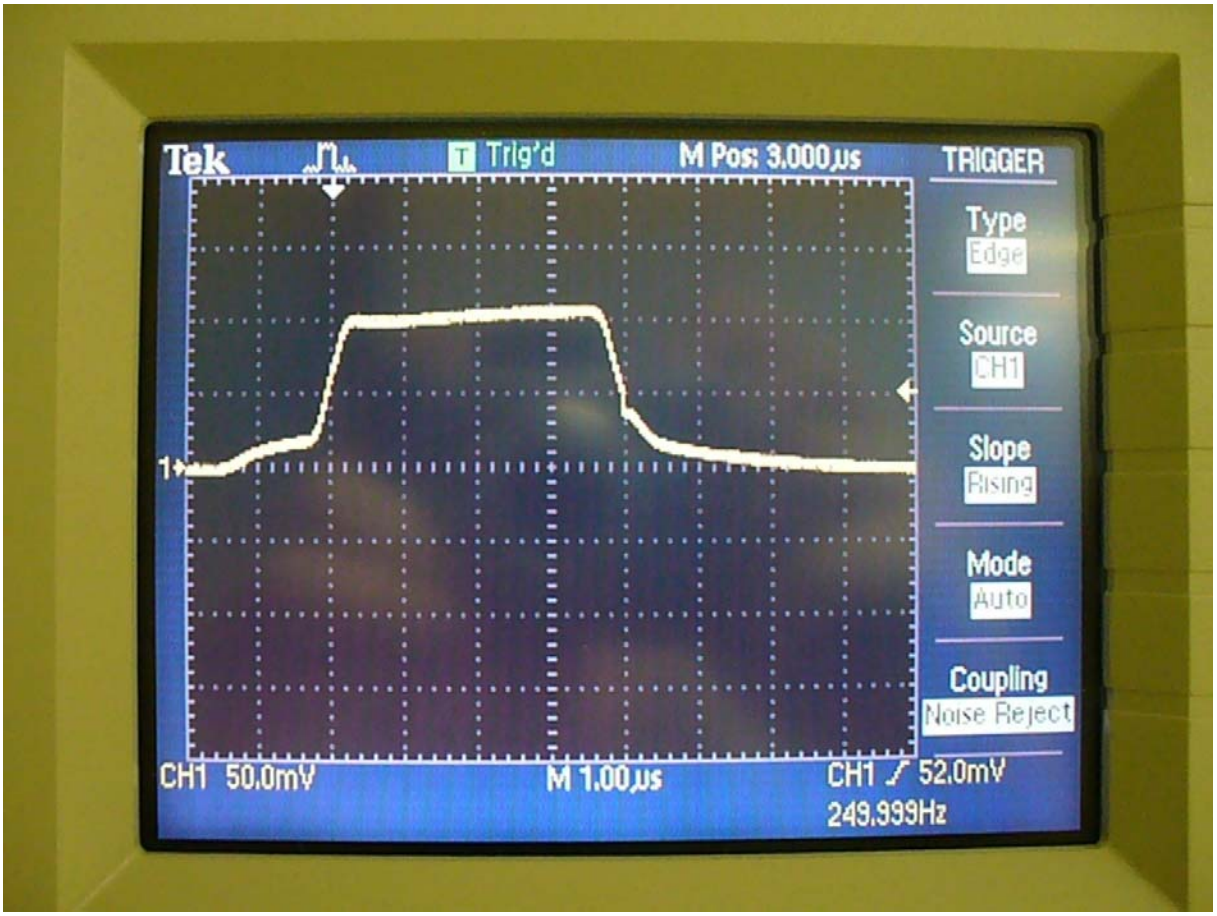
Plot #20: Plot 10Ghz to 15Ghz, -63.71dBm signal



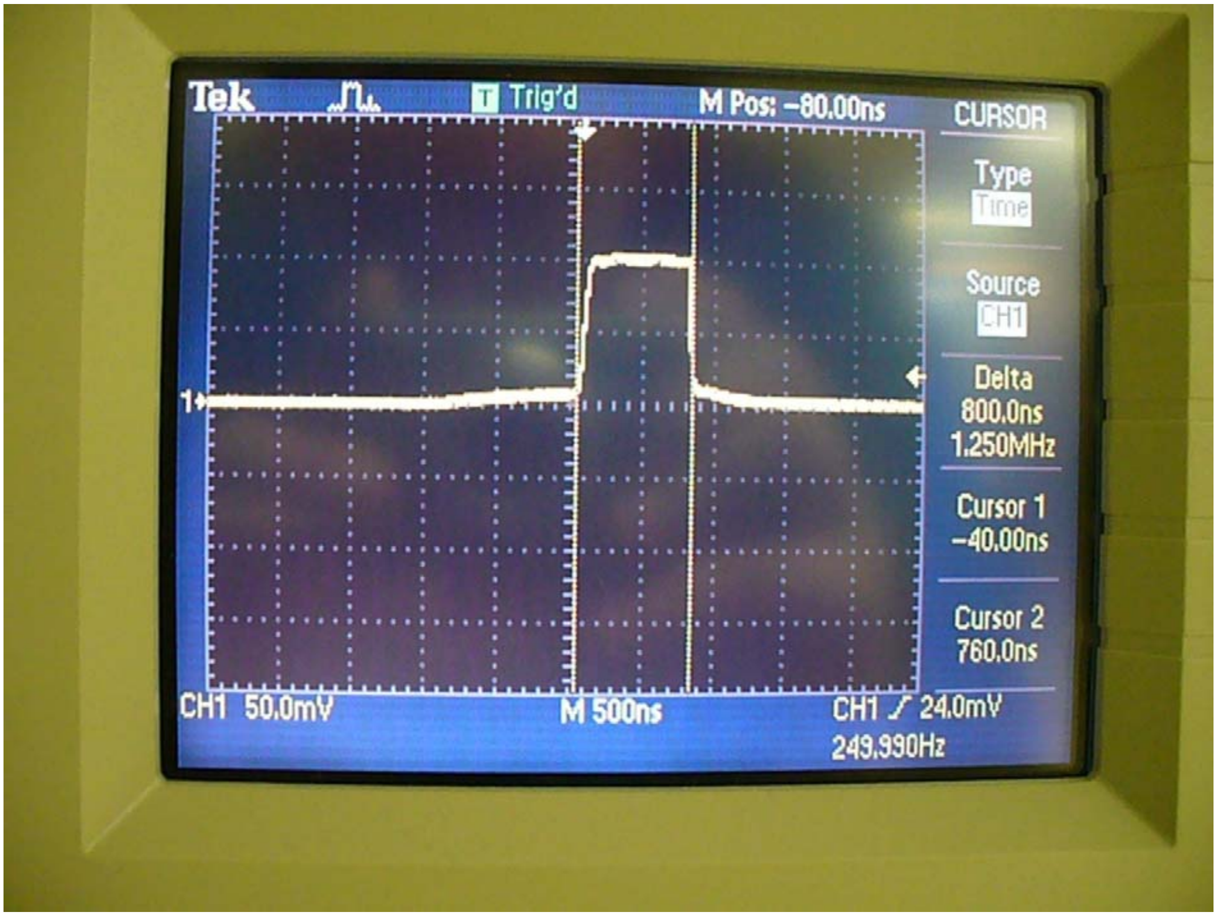
Plot #21: Plot 15Ghz to 20GHz, -64.73dBm signal



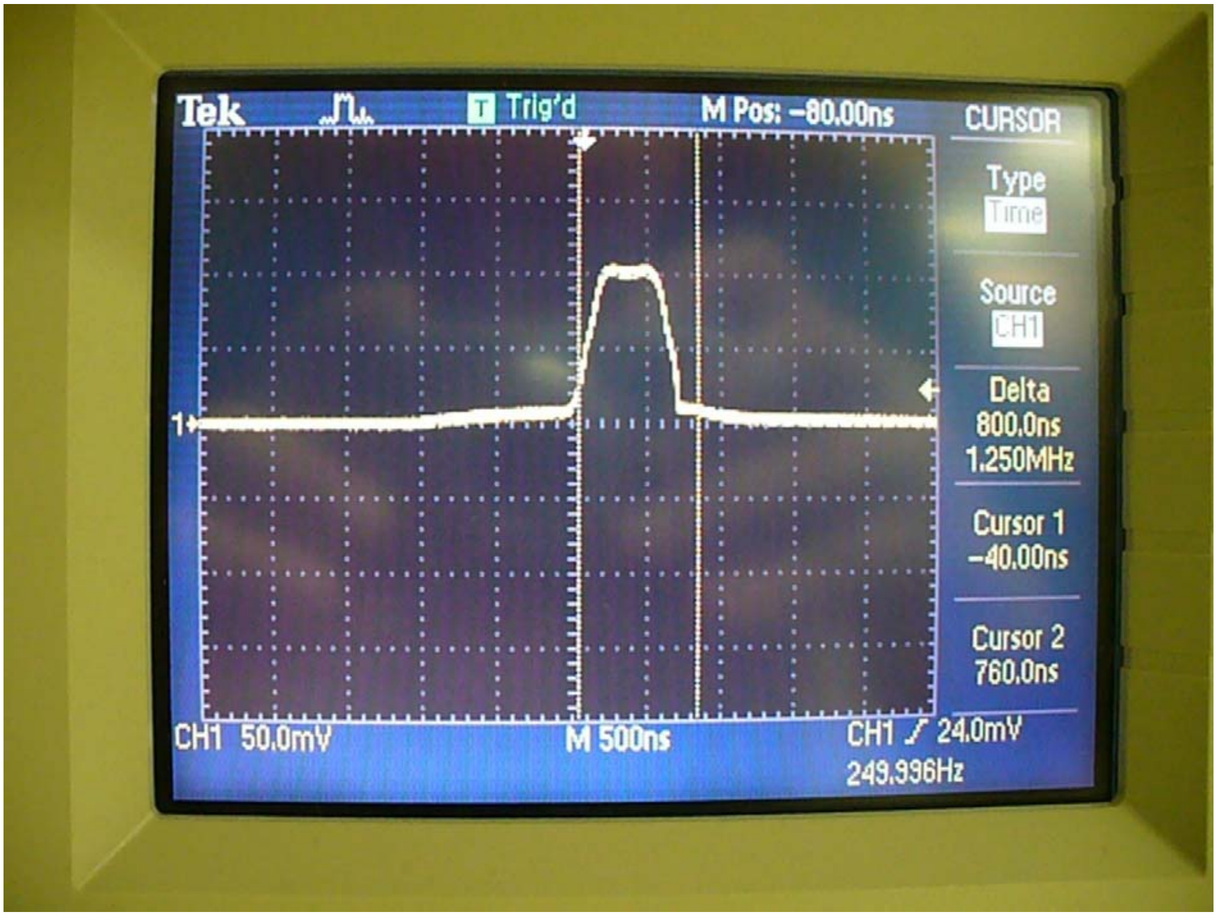
Plot #22: 4.5µs Detected RF Pulse, 80.5dBm attenuation with **NO** RF PULSE SHAPING



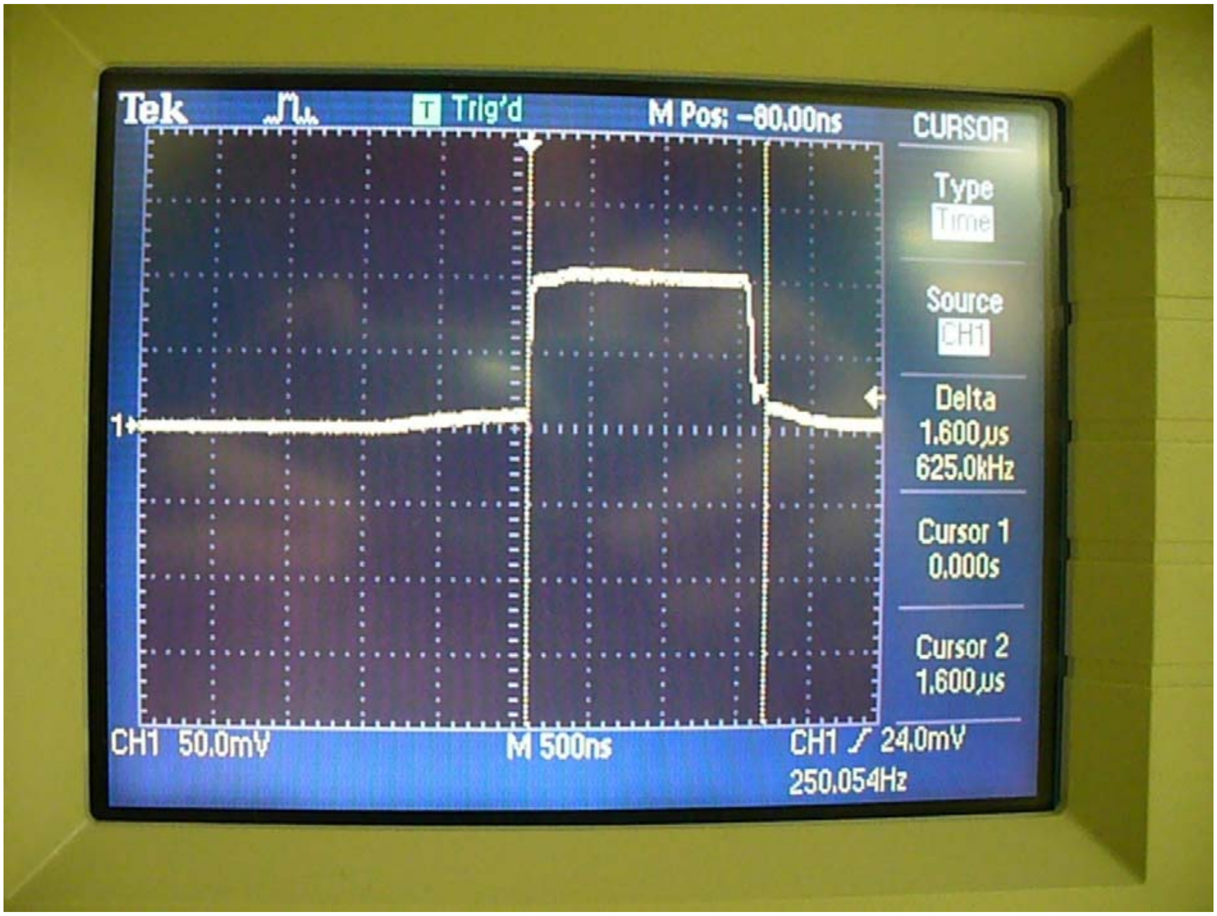
Plot #23: 4.5µs Detected RF Pulse, 80.5dBm attenuation with RF Pulse Shaping



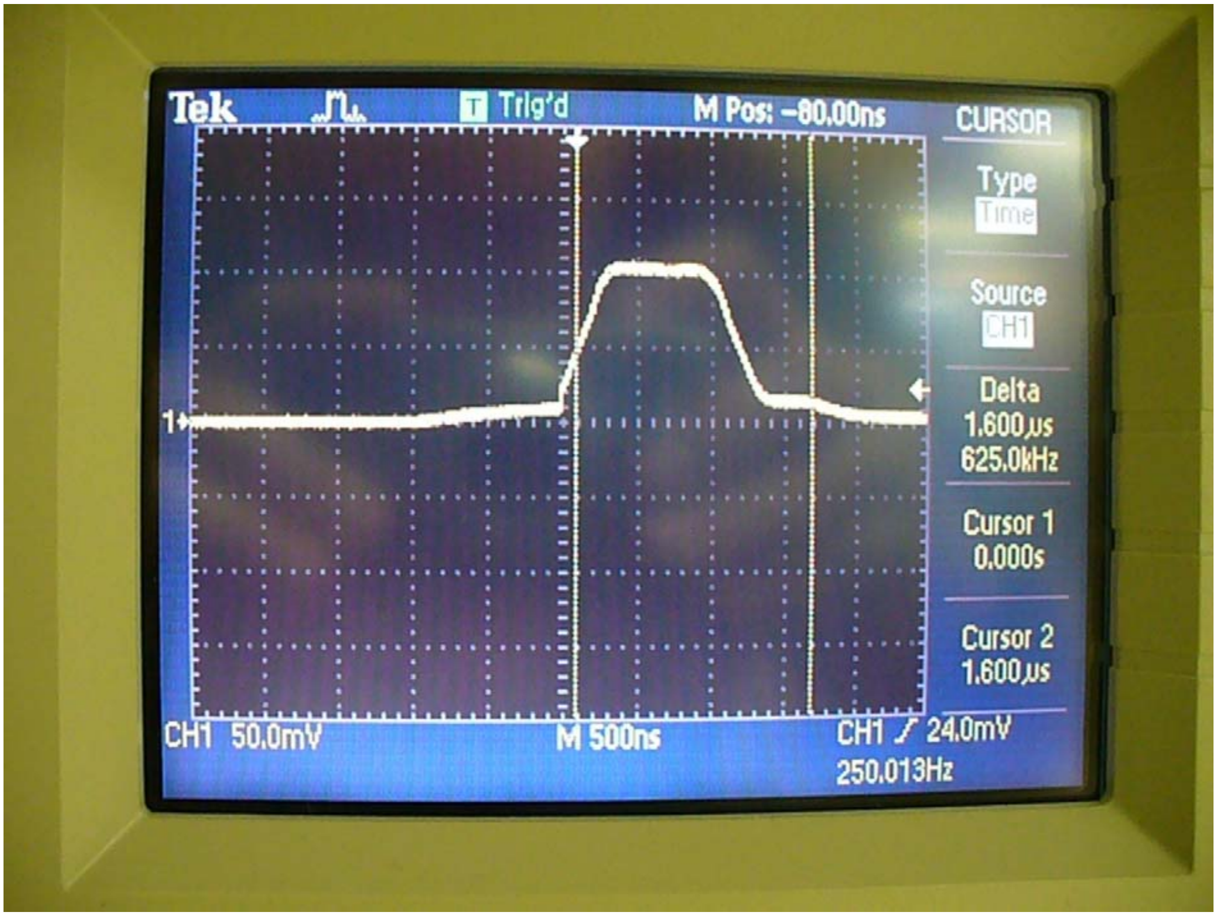
Plot #24: .8µs Detected RF Pulse, 80.5dBm attenuation with ***NO*** RF Pulse Shaping



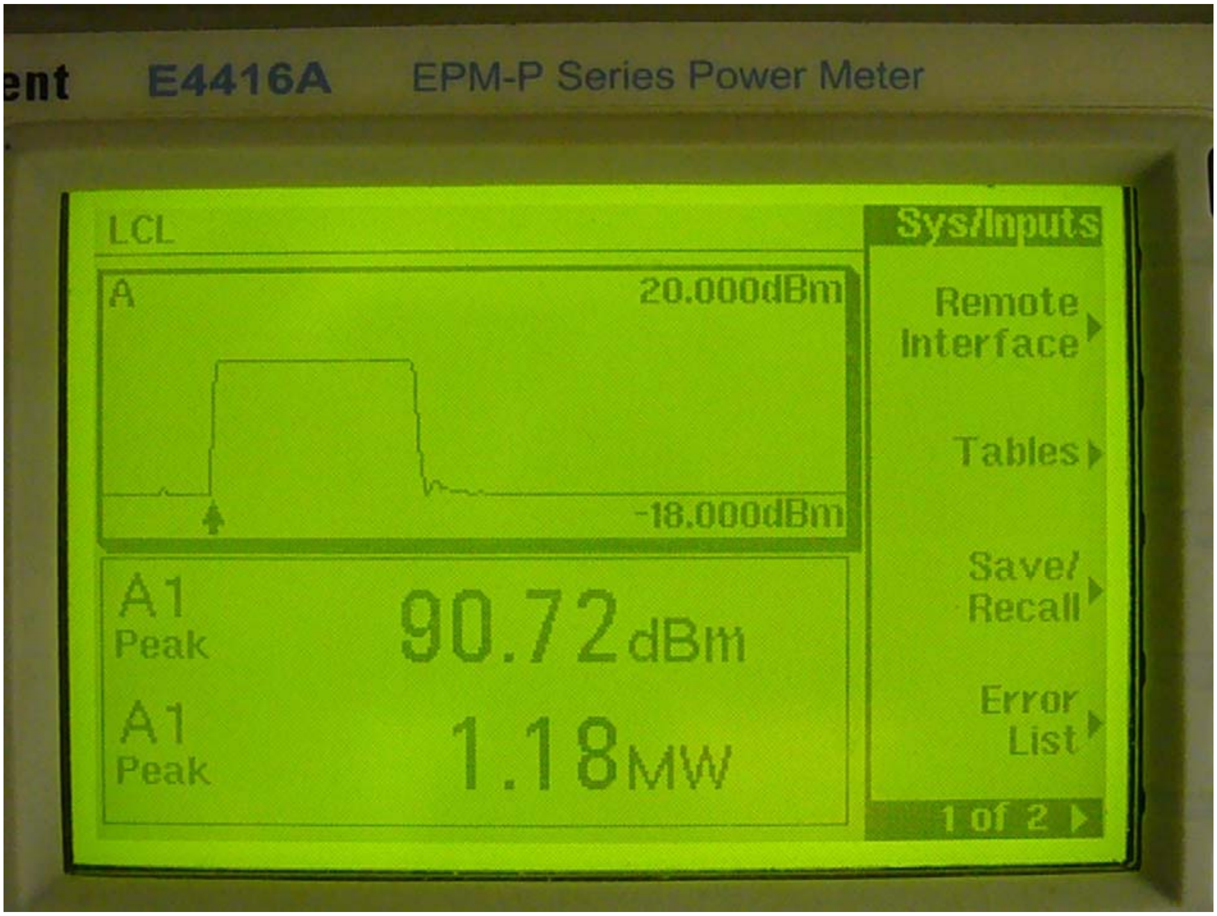
Plot #25: .8μs Detected RF Pulse, 80.5dBm attenuation with RF Pulse Shaping



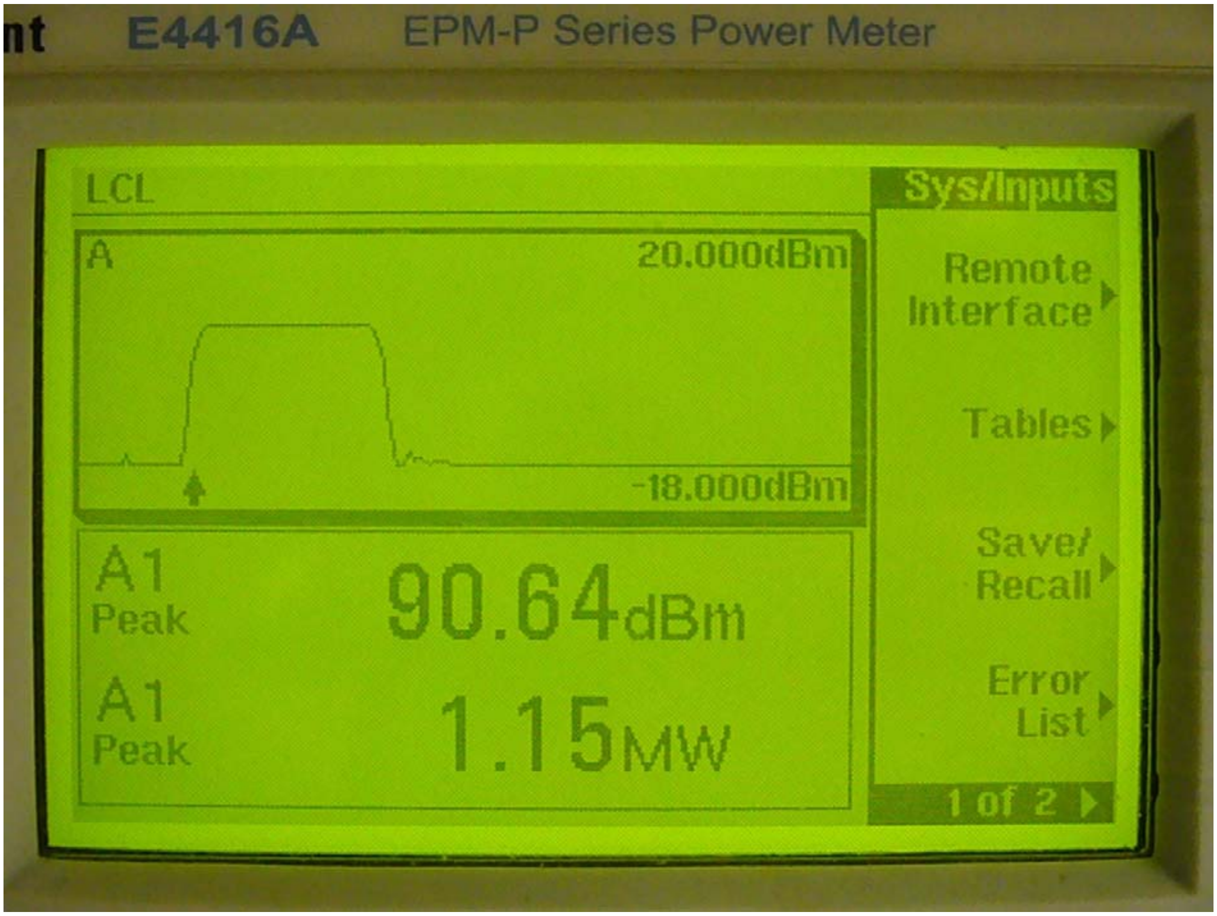
Plot #26: 1.6µs Detected RF Pulse, 80.5dBm attenuation with ***NO*** RF Pulse Shaping



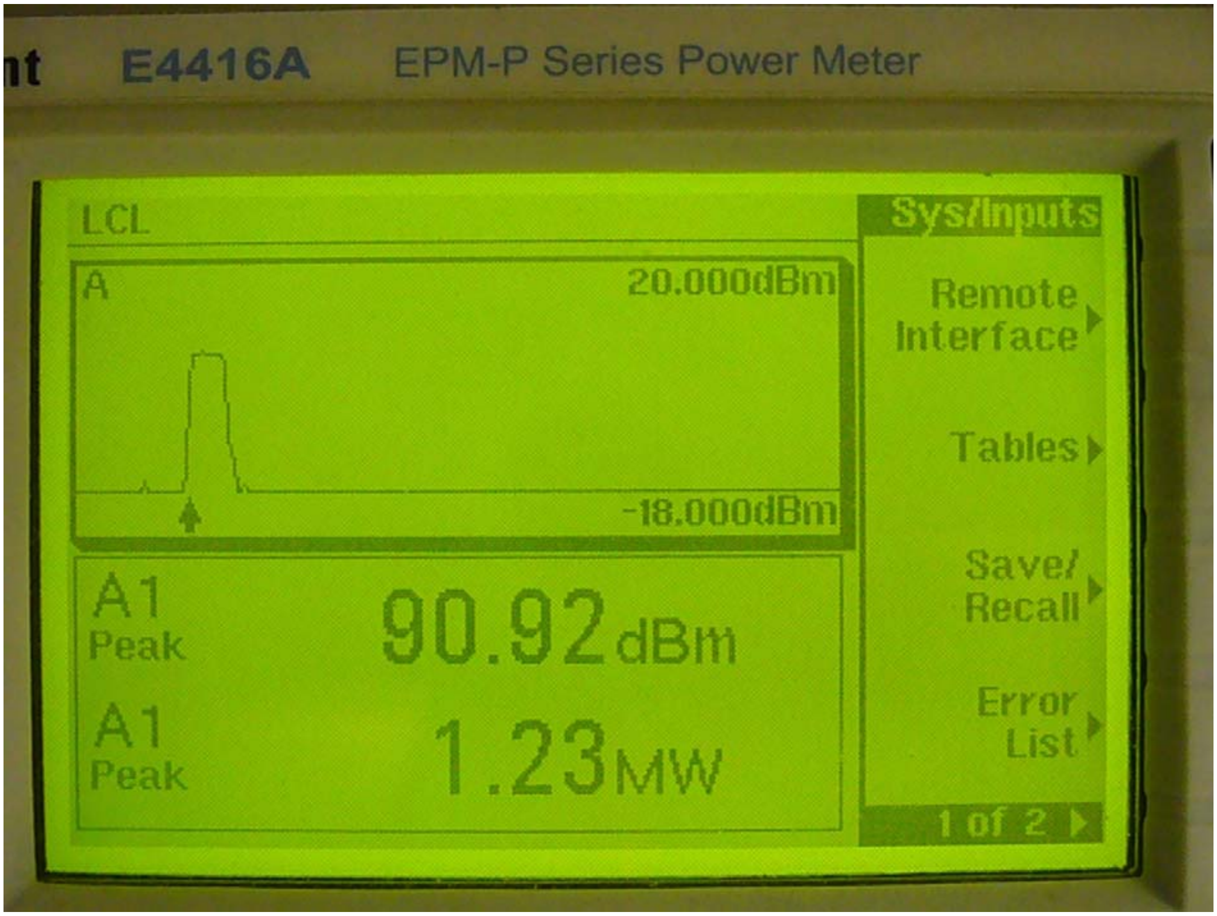
Plot #27: 1.6µs Detected RF Pulse, 80.5dBm attenuation with RF Pulse Shaping



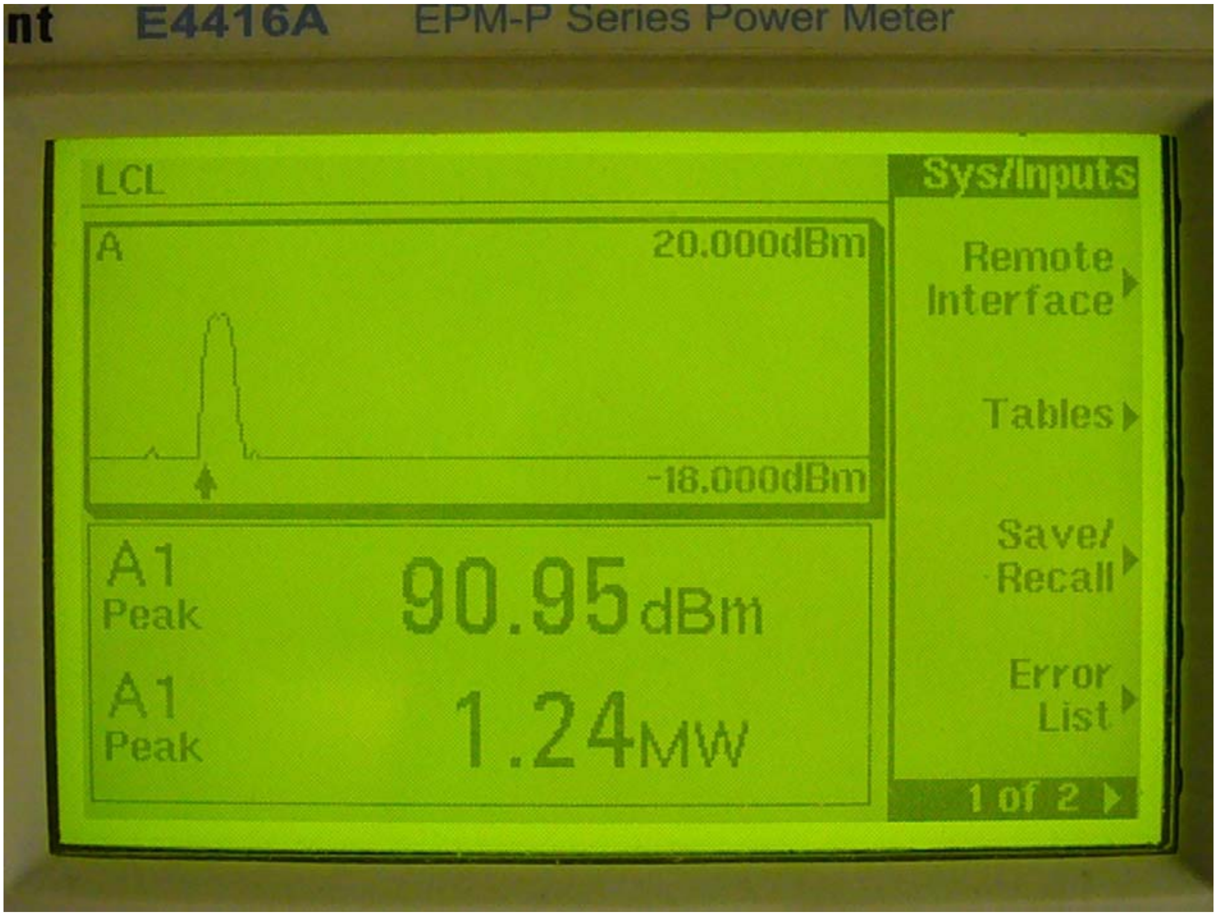
Plot #28: 4.5us RF Pulse with ***NO*** RF Pulse Shaping



Plot #29: 4.5µsRF Pulse with RF Pulse Shaping

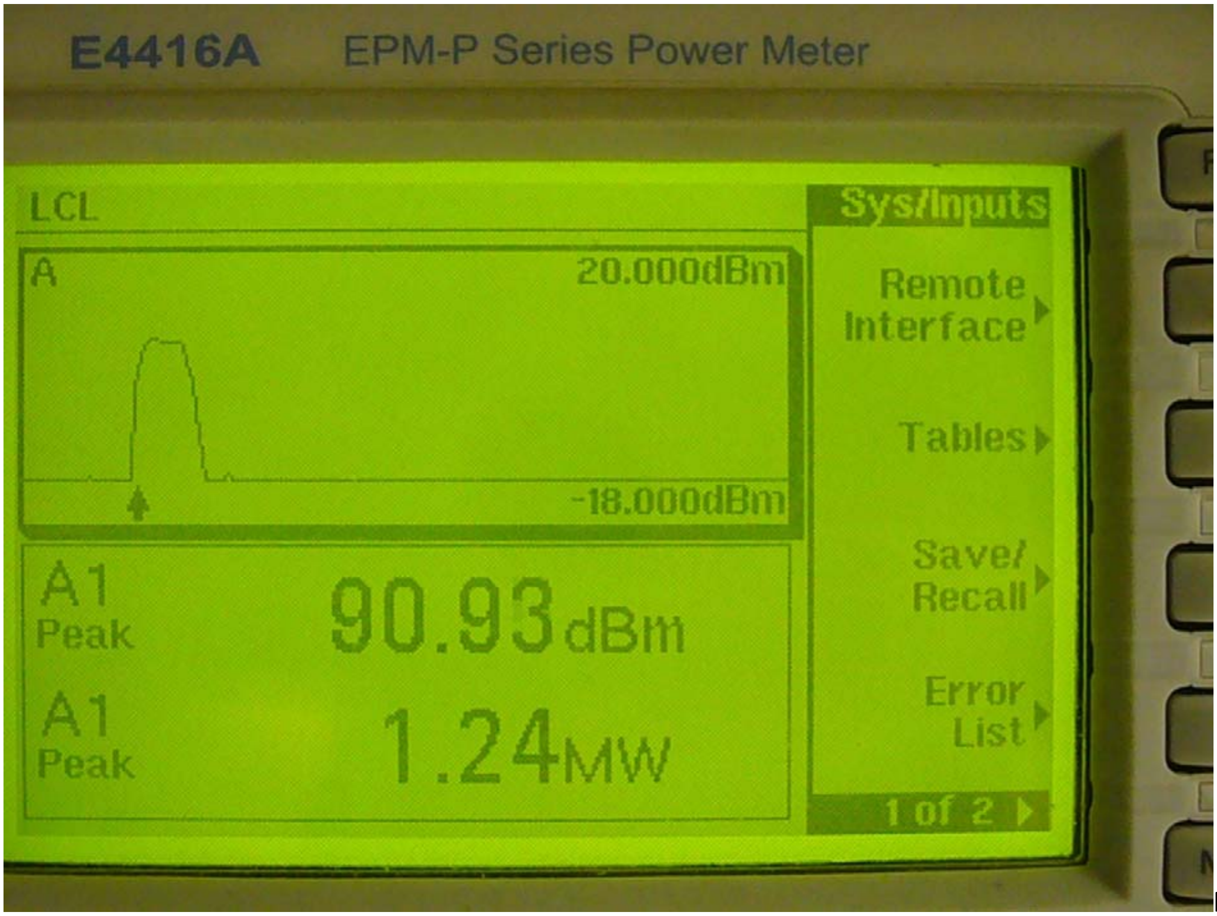


Plot #30: .8μs RF Pulse with ***NO*** RF Pulse Shaping



Plot #31: .8μs RF Pulse with RF Pulse Shaping

Plot #32: 1.6μs RF Pulse with ***NO*** RF Pulse Shaping



Plot #33: 1.6µs RF Pulse with RF Pulse Shaping