February 28, 2008
RE: NextNet Wireless, Inc.
FCC ID: PHX-PCC2510 *(questions are in regard to FCC application for PHX-PCE25100)*

1) This device appears to also require a DoC. Because the FCC desires us to verify that a DoC was **properly performed** (but not actually review the testing and documents associated with this) we have found it best to simply supply an attestation similar to the sample provided. Kindly provide.

Response:

A “DoC Attestation” document has been uploaded.

2) The power measurement appears to use a 0 Hz span, peak detector, but then possibly the final power is the RMS value of the bin values obtained. I do not believe this will meet FCC’s expected Peak value given past discussion on peak vs. RMS. Please provide appropriate detailed explanation. Note if necessary, we can let FCC determine appropriate nature of test during the Permit but Ask. However given past discussions, it appears unlikely they would accept.

Response:

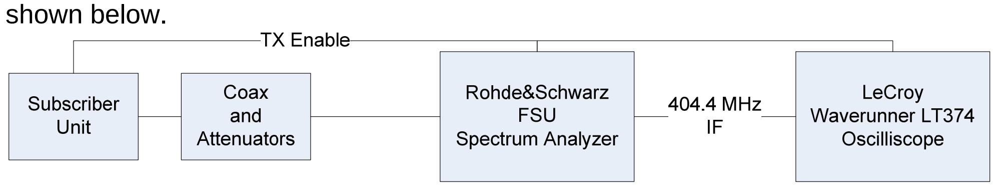
FCC rule 27.50(i): *Peak transmit power shall be measured over any interval of continuous transmission using instrumentation calibrated in terms of rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.*

The measurement of the peak power that has been submitted with this application complies with the requirements set forth in FCC rule 27.50(i). The following information is provided to support this claim.

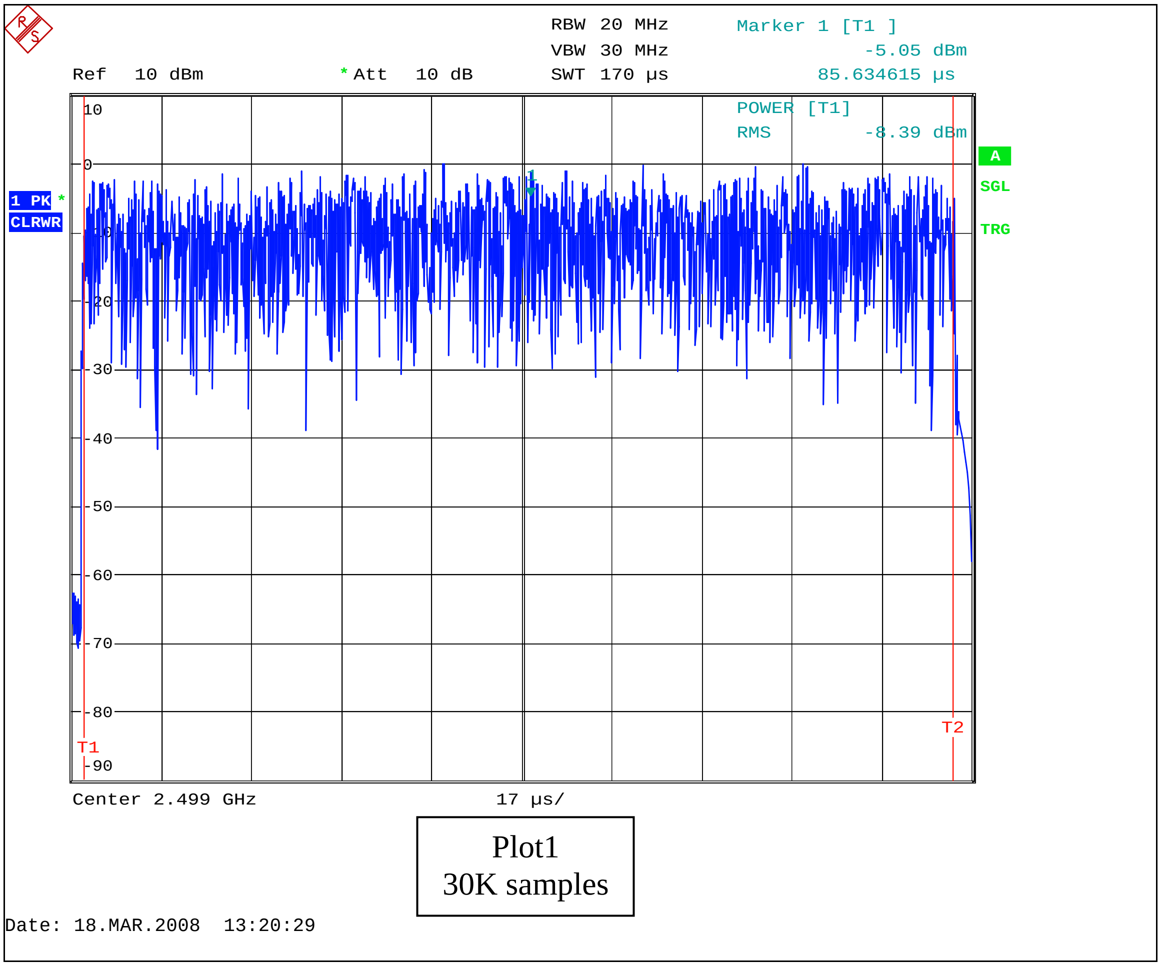
A Rohde&Schwarz FSU spectrum analyzer was selected as the test instrument for the measurement of the RF transmission power. The FSU instrument was selected for two reasons. The test instrument has an adjustable internal trigger level setting which is very beneficial for capturing an RF burst during an EIRP measurement. This instrument also has resolution bandwidth settings that greatly exceed the bandwidth of the emission being measured.

The following measurements of a 6MHz emission show that the Rohde&Schwarz FSU spectrum analyzer reports the peak power of a complex signal using a detector that is calibrated in terms of RMS-equivalent voltage. Measurements of a 5.5 MHz emission would produce similar results. This measurement is performed in two parts, part one documents the peak power of an Expedience subscriber device transmission as “seen” by the spectrum analyzer, with no offsets for coax or attenuator losses, and establishes a reference value for the RMS-equivalent voltage. Part two then substitutes the OFDM transmission with an RF tone. A comparison of the resulting information from these two tests is then provided.

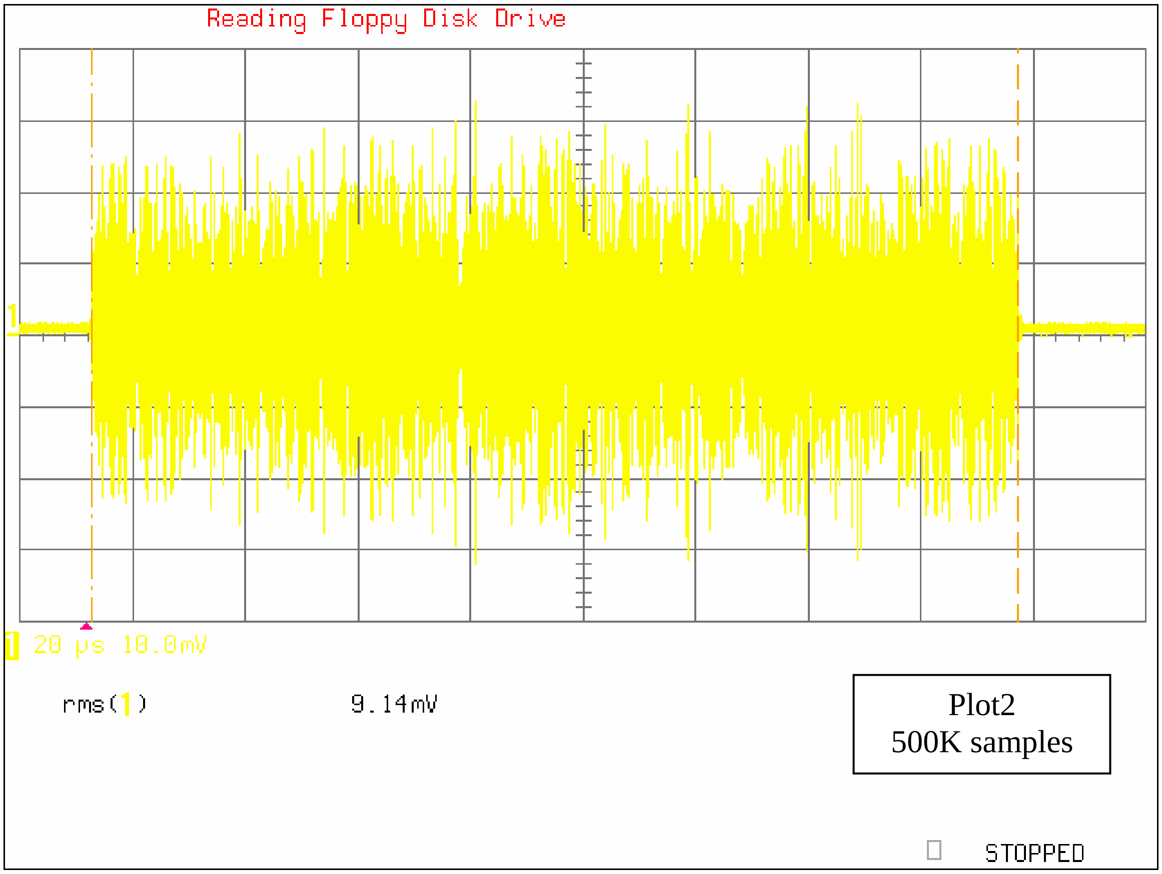
A subscriber device is attached to the FSU spectrum analyzer through the appropriate attenuators and coax to ensure that the FSU is operating within its linear range. The 404.4 MHz IF output of the FSU spectrum analyzer is cabled to the input of a LeCroy LT374 Digital Storage Oscilloscope (500 MHz, 4GS/s). A block diagram of this setup is shown below.



The subscriber device transmitter is enabled and a single transmit burst is recorded by the spectrum analyzer and oscilloscope.

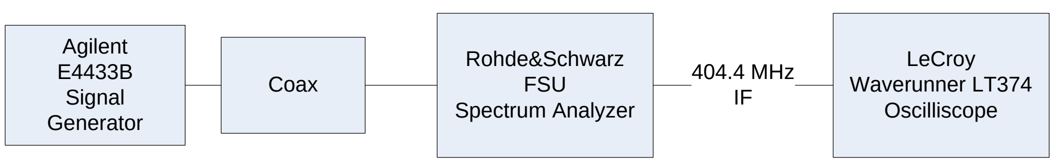


The spectrum analyzer power measurement function reports a value of -8.39 dBm. This specific value is not significant other than it will be used as a reference for comparison.

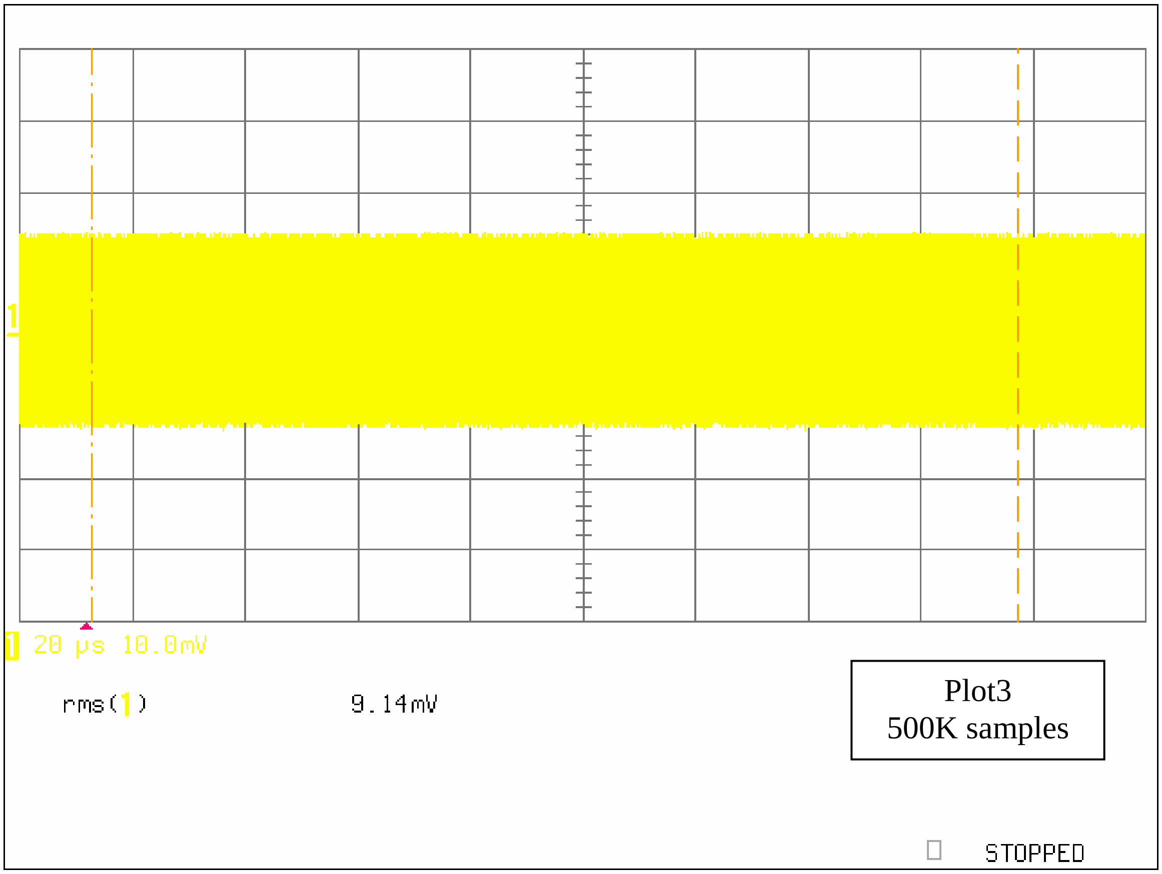


The RMS voltage measured by the oscilloscope for the RF burst from Plot1 is shown to be 9.14mV. The measurement is made between the red markers shown in the plot.

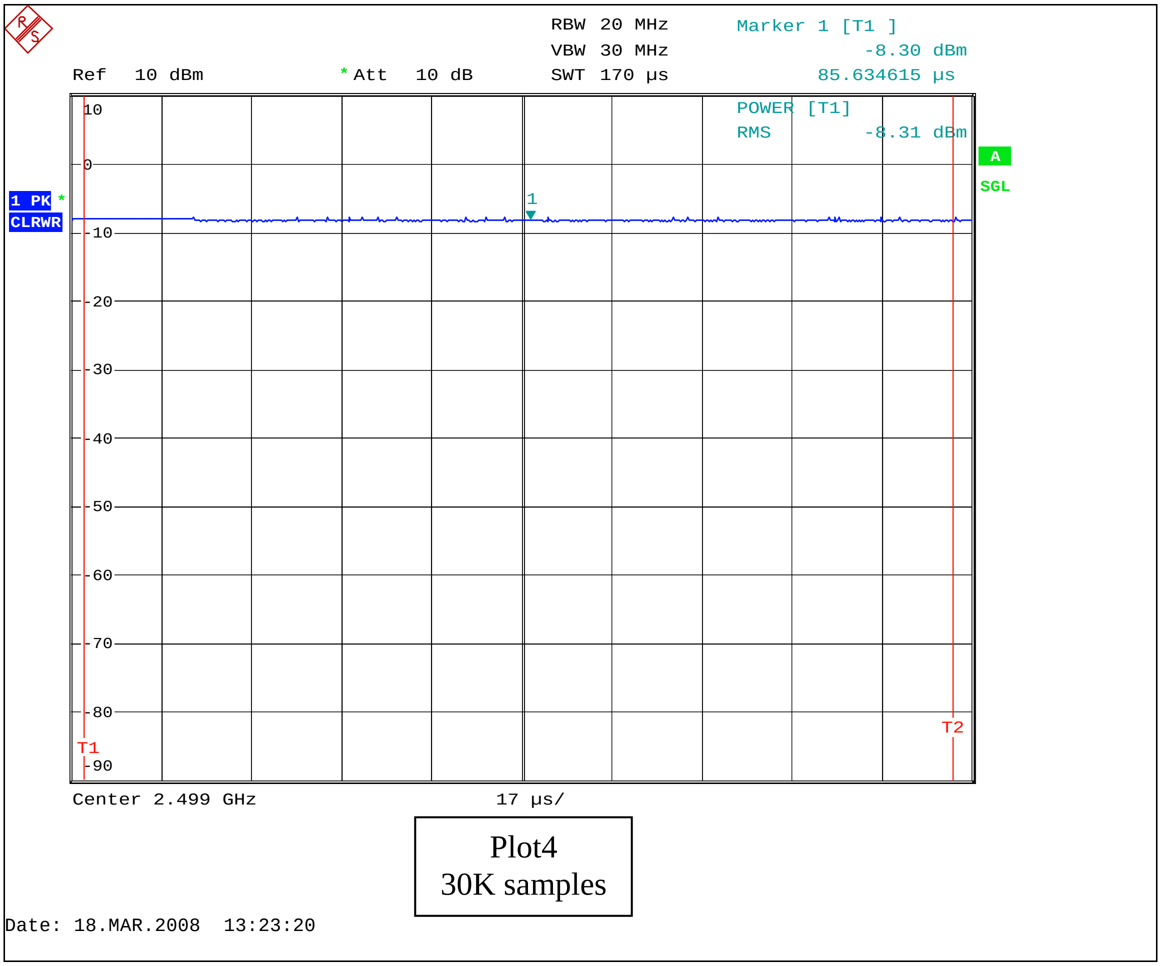
Measurement two is now performed by removing the subscriber device and attenuator / coax and replacing them with a signal generator and a short coax. A block diagram of this setup is shown below.



The signal generator was adjusted for the same center frequency as the test emission (2499 MHz), the modulation was disabled, and the signal generator RF level was adjusted to produce the same RMS voltage on the oscilloscope. This measurement produced the plot shown on the next page, which shows the RMS-equivalent voltage recorded by the oscilloscope of the 404.4 MHz IF signal from the spectrum analyzer.



The power measurement shown on the spectrum analyzer for the RF tone was recorded and is shown in the following plot on the next page.



From the plot above, the RF tone produced a power level of -8.31 dBm using the same measurement method as was used for the complex RF burst.

Measurement	RF power reported (dBm)	Rms voltage reported
Complex signal	-8.39	9.14
RF Tone – no modulation	-8.31	9.14

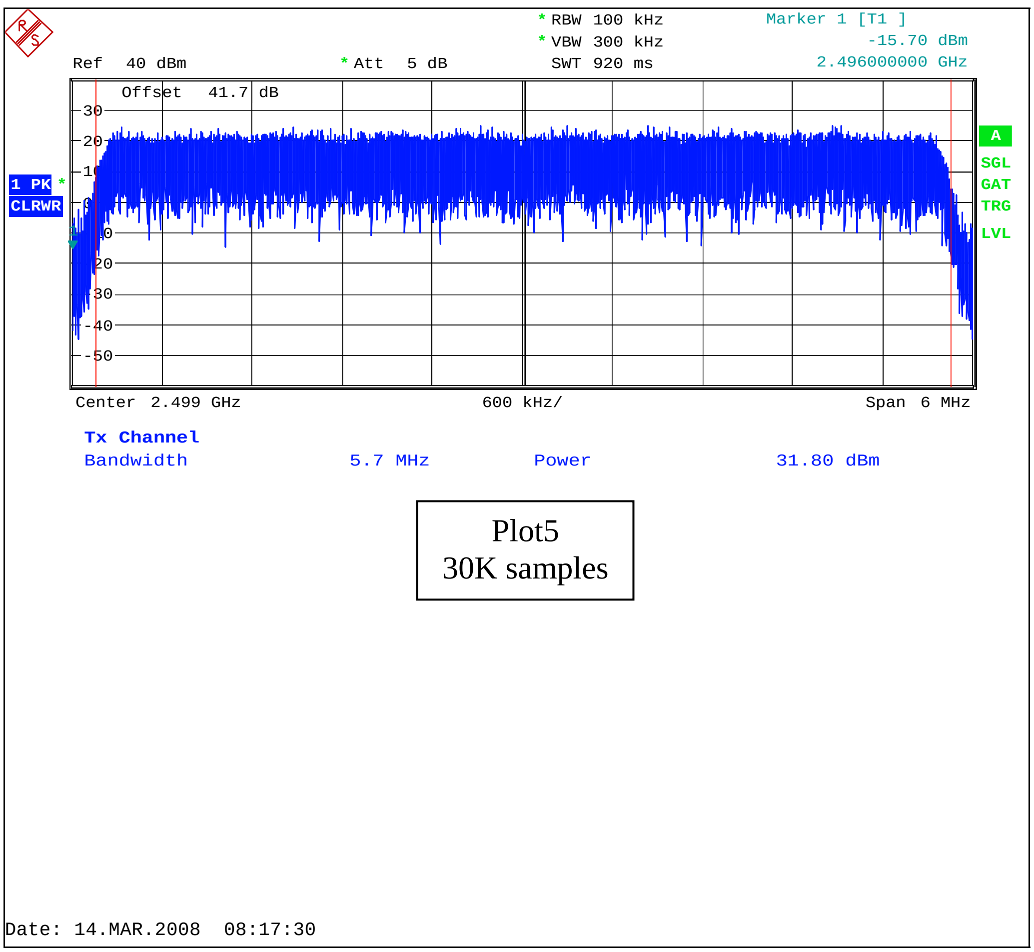
A discrepancy of 0.08 dB was observed in the reported power measurement from the spectrum analyzer.

From this data, we conclude that the Rohde&Schwarz FSU spectrum analyzer power measurement function (as configured for this test and test report measurements) reports the peak power of the Expedience OFDM emission to a reasonable degree of accuracy and complies with the FCC measurement requirements set forth in 27.50(i).

Additional power measurement information:

To measure the peak power as described by FCC 27.50(i), the spectrum analyzer is configured to capture a single continuous RF transmission. Given the short duration of the RF burst and the sweep time required for a complete frequency domain sweep, the spectrum analyzer is set for a zero RF span. The emissions of the PCEx25100 are intended to utilize the FCC 5.5 and 6.0 MHz channel bandwidths.

> Note: Measurement of the RF power for a single burst is not possible for the spectrum analyzers that were used for data collection for this application filing when configured for the frequency domain mode. In the frequency domain mode, the spectrum analyzer is time gated to only sweep when the transmitter is enabled. When in frequency domain mode, a full sweep of the spectrum analyzer trace requires multiple transmission bursts as a complete sweep of the RF bandwidth for the spectrum analyzer display is greater than the burst transmission time. While use of this method produces power values that can be very similar to the zero span method, the reported power value is the result of multiple RF transmission cycles being required to complete a full sweep of the spectrum analyzer display. Plot5 shows the power output measurement in the frequency domain. For this measurement, the transmitter needed to be enabled at least 5575 times (920 msec sweep time / 165 usec TX burst time). While the power number is close in value to the data that follows, it does not represent the peak power of a single transmission.



Plot5
30K samples

The resolution and video bandwidths are adjusted to a setting that ensures that the signal being measured is not influenced by the spectrum analyzer bandwidths. A resolution bandwidth of 20 MHz was used and the video bandwidth was set to 30 MHz. The 3 dB BW of the FSU spectrum analyzer is also the resolution bandwidth. The 10 MHz and 50 MHz resolution bandwidth settings were verified for their power measurement suitability for the emissions being measured and it was determined that the 10 MHz resolution bandwidth was distorting the measurement. Power readings using the 50 MHz resolution bandwidth produced the same results as the 20 MHz resolution bandwidth. The detector was set to peak. The sweep time is adjusted to capture the complete transmission. The two channel bandwidths included in this submission have slightly different transmission times. An estimate of the minimum number of data points that will be required to accurately represent the 20 MHz of bandwidth being measured is shown below:

sweep time =	1.75E-04	Seconds
Measurement BW =	2.00E+07	Hz
Min over sample rate =	2	
Over sample freq =	4.00E+07	Hz (Measurement BW * over sample rate)
Over sample time =	2.50E-08	Seconds (1 / over sample frequency)
Min number of points =	7001	(1 + (sweep time / over sample time))

To ensure that the noise like orthogonal frequency division multiplexed (OFDM) signal is adequately sampled for the data in the test report, the number of bins or data points within the sweep was set to the instrument maximum of 30001. The Rohde&Schwarz FSU spectrum analyzer cannot be set to 7001 data points, the next valid number is 10001. Measured data is shown below for 10001 and 30001 sample points.

When a marker is placed on an un-modulated tone or sinusoidal signal, the spectrum analyzer will report the power value that is derived from the RMS equivalent voltage that is measured in the analyzer IF. This is true regardless of selected detector. This does not hold true for signals that are complex and exhibit no sinusoidal characteristics. The RF signal being measured for this filing is a composite of complex digital signals comprised of hundreds of modulated carriers that make up the OFDM transmission. As a result, this signal is not sinusoidal and the power cannot be determined by placing a marker on the waveform and reading the value.

To obtain the RMS equivalent voltage [as described in 27.50(i)] for the signal represented by the transmission shown in the spectrum analyzer display, an RMS summation of the voltage values for each bin contained within the continuous portion of the waveform is performed by the FSU spectrum analyzer. The FSU spectrum analyzer can perform this task by placing markers at the start and end of the trace information that is to be measured. This is shown on the plots as T1 and T2. This information can then be displayed as a voltage or the corresponding power value in dBm. Verification of this information has also been performed by extracting the 30001 data points and performing the RMS summation, and power calculations in an Excel spreadsheet.

Additional plots and data are shown below and the following pages that compare the power measurement values when the spectrum analyzer is configured for a log scale with dBm or voltage information reported or the display is configured for a linear scale and reporting is in dBm or voltage units.

Plot6 indicates that the power contained between T1 and T2 is equivalent to 32.02 dBm. Plot7 is the same data trace but the units have been changed to volts. From this plot we see that the RMS value is 8.922 volts. Conversion of this value to power results in the following:

$$P(watts) = V^2/R = (8.922\ volts)^2/50\ ohms = 79.6021\ volts^2/50\ ohms = 1.592\ watts$$

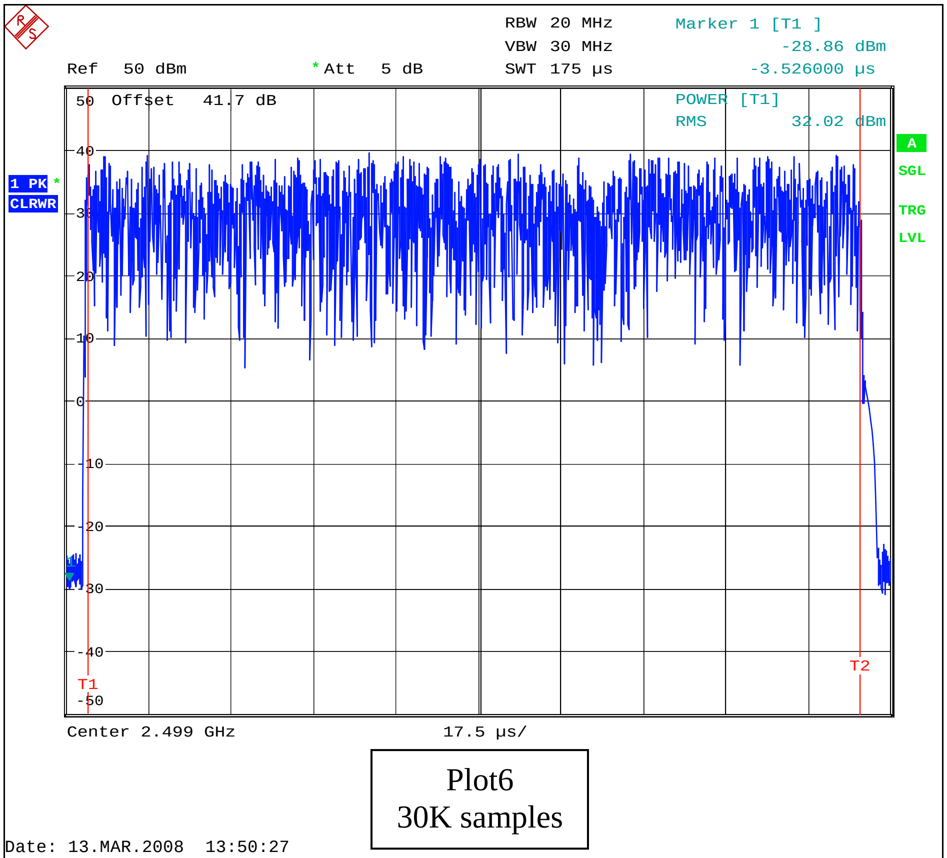
$$P(dBm) = 10log[P(watts)/0.001] = 10*log[1.592/0.001] = 10*3.202 = 32.02\ dBm$$

Another sweep was performed with the spectrum analyzer changed to “linear” mode. From this we find the power in plot8 to be 32.09 dBm and the voltage in plot9 to be 8.993 volts which equates to 32.0884 dBm.

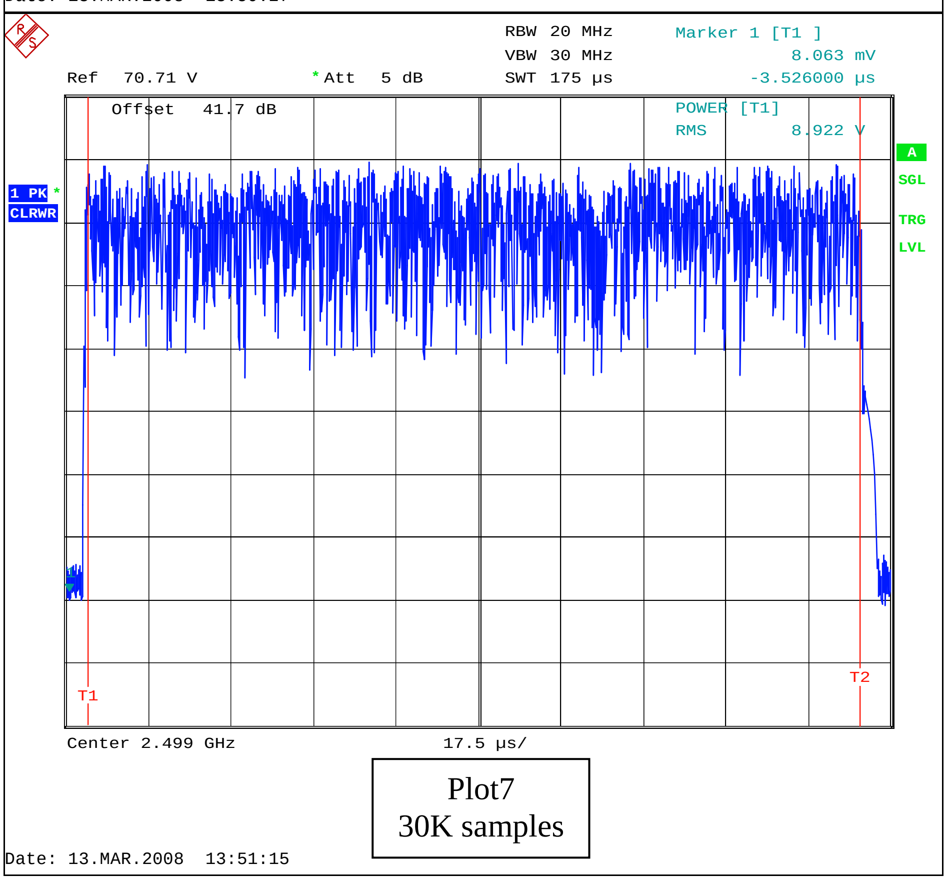
Plot	Plot Setup	Plot Value
6	Log (dBm)	32.02 dBm
7	Log (Volts)	8.922 Volts (32.02 dBm)
8	Linear (dBm)	32.09 dBm
9	Linear (Volts)	8.993 Volts (32.0884 dBm)

To ensure that 30001 data points was not producing an error, a measurement with 10001 data points was performed. These are shown as plot10 thru plot13.

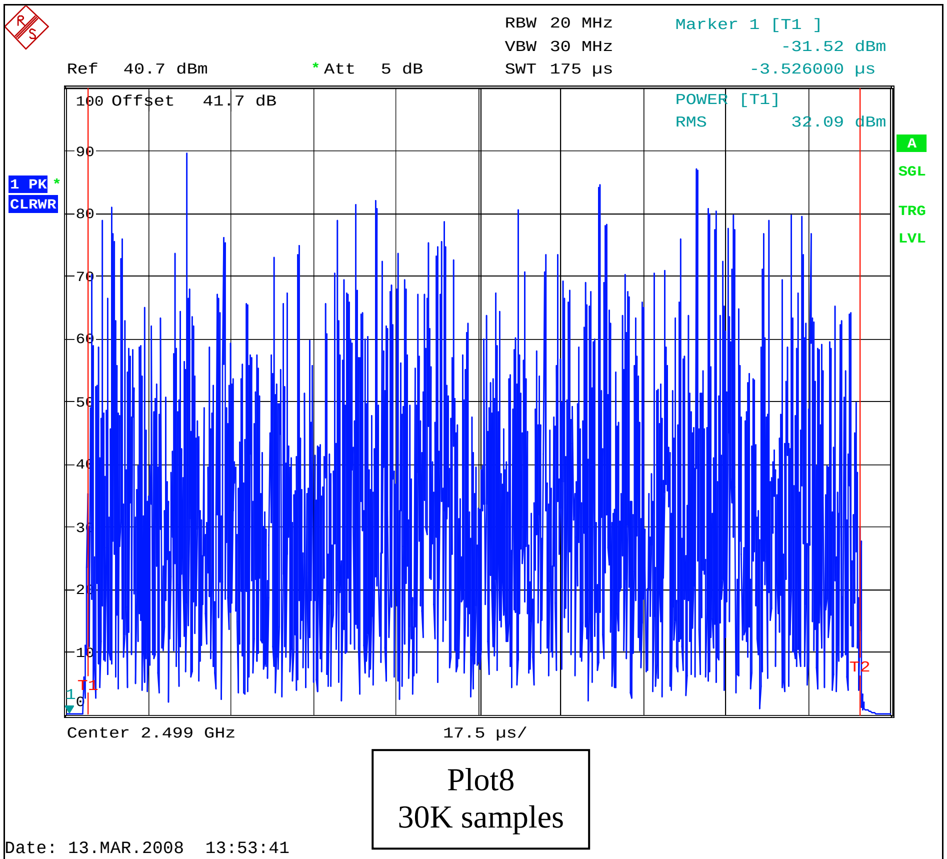
Plot	Plot Setup	Plot Value
10	Log (dBm)	32.02 dBm
11	Log (Volts)	8.923 Volts (32.0205 dBm)
12	Linear (dBm)	32.09 dBm
13	Linear (Volts)	8.993 Volts (32.0884 dBm)



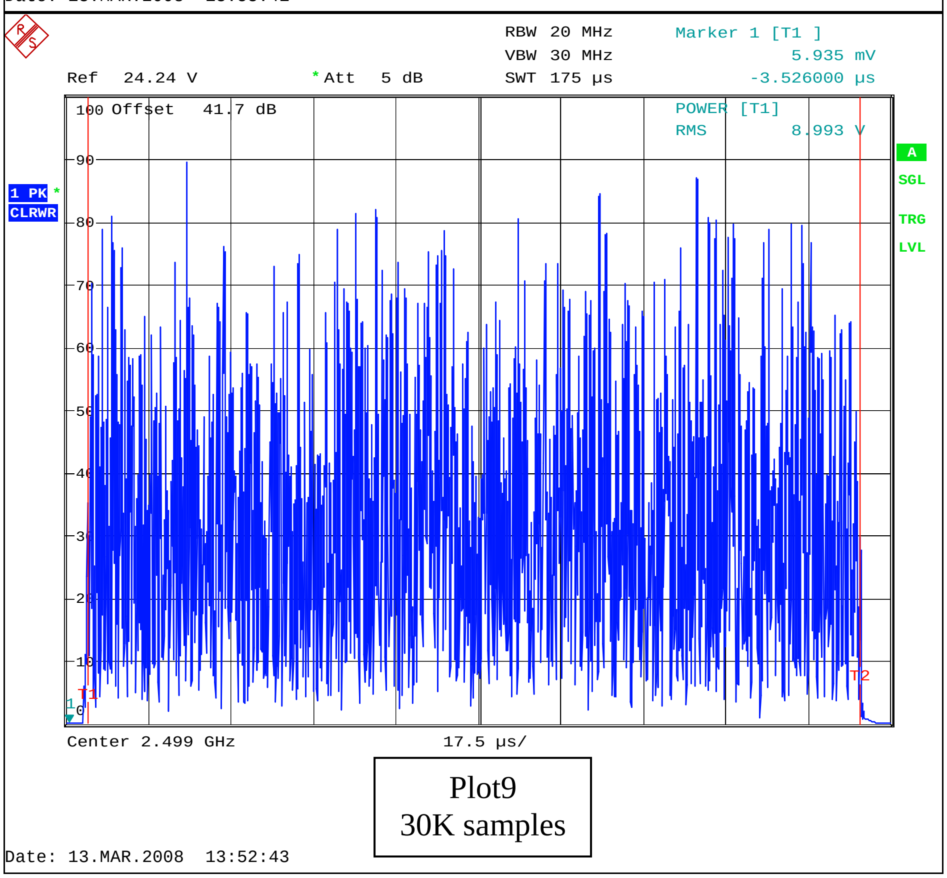
Plot6
30K samples



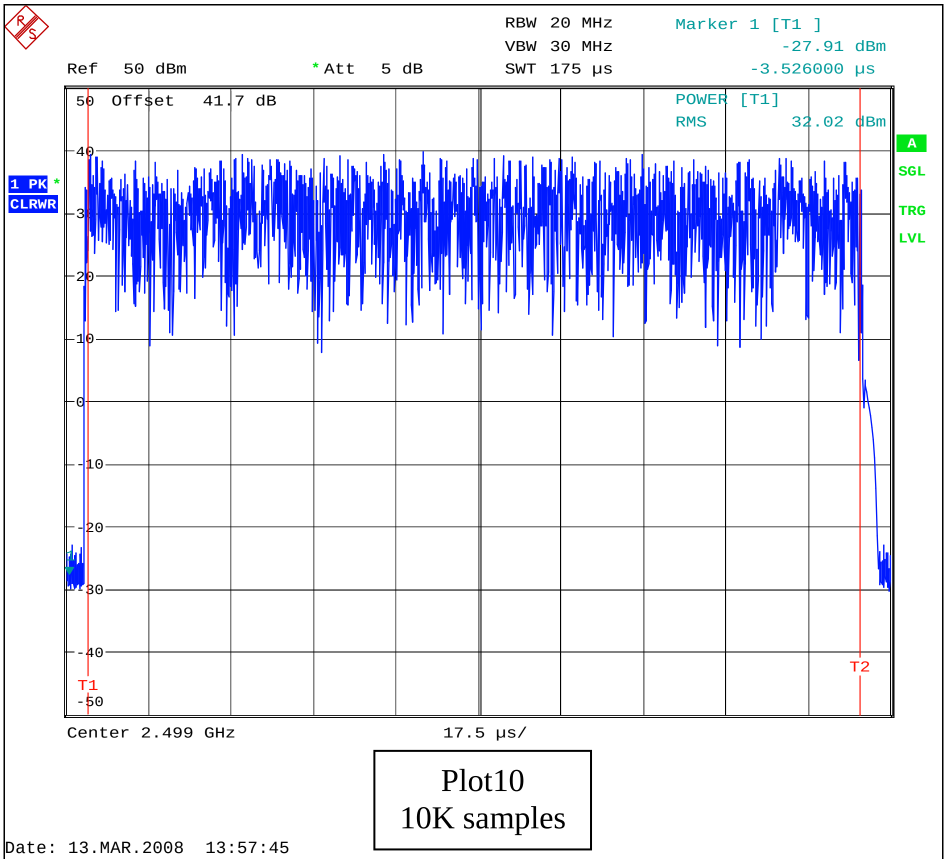
Plot7
30K samples



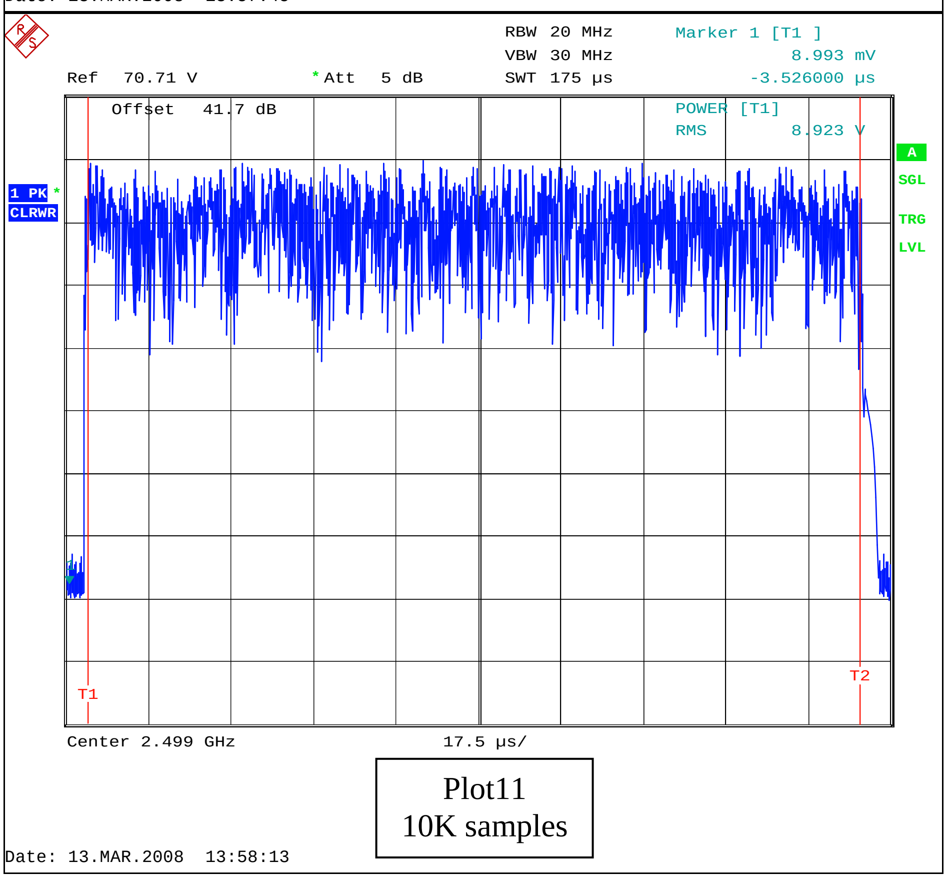
Plot8
30K samples



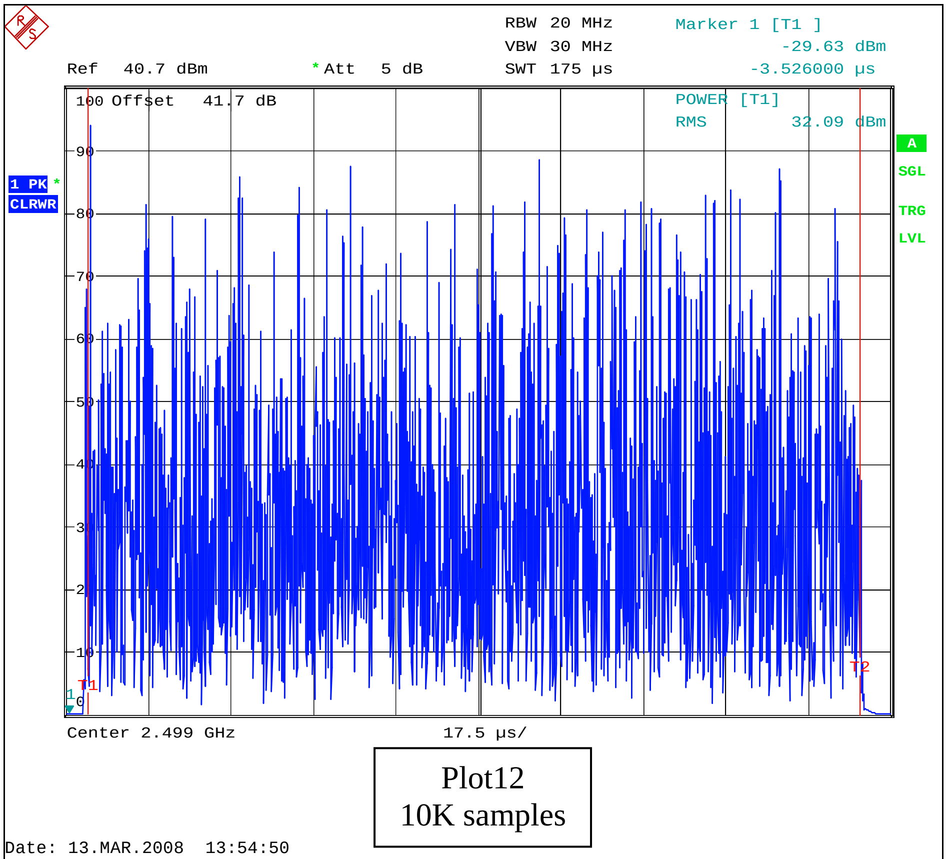
Plot9
30K samples



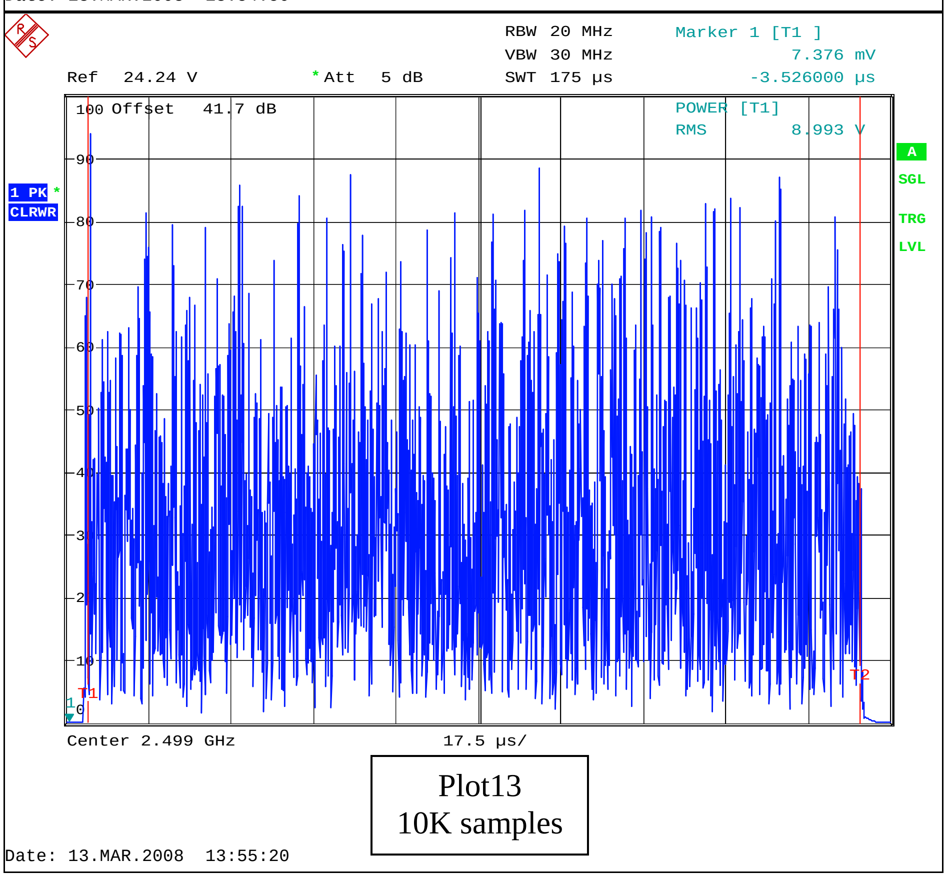
Plot10
10K samples



Plot11
10K samples



Plot12
10K samples



Plot13
10K samples

3) The operational description references power as 27.53. Shouldn't this be 27.50(h)(2)?

Response:

Yes, an updated document has been uploaded.

4) MPE and SAR makes reference to temporary confidentiality where a photo may be placed, but this appears this type of confidentiality has not be requested. Please review.

Response:

Temporary confidentiality is not requested for this filing.

5) MPE makes mention of 7.0 dBi gain antenna. However antenna information and plots suggest 7.5 dBi in the plots for the antenna. Please review.

Response:

An addendum to the MPE document has been uploaded.

6) FYI…Page 62 of the report mentions 43 + 10 log where it should likely be 55 + 10 log. Data is noted as compliant.

Response:

An updated document has been uploaded.

7) FYI…Also page 62 - Reference to ANSI C63.4 should be 2003.

Response:

An updated document has been uploaded.

8) EMC report shows an AGC adjustment that was necessary. Was this change in place for SAR testing?

Response:

Yes, SAR testing was performed with the maximum transmitter power applied to the integrated antenna.

9) FYI….While explanations have been cited in the report, note that according to FCC Documents released January 2007 ("SAR Probe Calibration and System Verification Considerations for measurements 150 MHz – 3 GHz"), the target SAR values should be within 10% of the **manufacturers calibrated dipole SAR value**. This does not appear to be shown directly, but does appear to be done indirectly. Since the evaluation seem reasonable and this filing falls under a permit but ask filing, we will see if the FCC desires further information on this fact.

Response:

FYI – Response not required

10) Some data suggests lowest channel is higher SAR value, and Laptop 1 is higher SAR for a specified channel. However it does not appear that Laptop 1 measured SAR for low and high channels. Please review.

Response:

Laptop 1 was measured for SAR on the low and high channels, please refer to table 1 (continued) on page 11. The low channel's results are lower than the mid channel results for the same (opened 180 degrees) antenna configuration.

11) Typically FCC desires all test plots to be provided, unless you can justify similar patterns for each. However it would seem reasonable to expect the patters of the 0, 90, and 180 to vary, and that these should be provided – please explain.

Response:

The 0, 90 and 180 patterns do differ slightly and therefore are included within this response to satisfy this concern. Please refer to the attached PDF file, named *EME antenna positions.pdf.*

12) Low channel appears outside the +/- 100 MHz for using the same probe factors as other channels. However validity of this factor could not be verified given the plots were not provided. Additionally, investigation of low channel in laptop 1 may have been overlooked. See 10) above.

Response:

Correct, the low channel (2499MHz) is outside the ± 100 MHz range for the mid channel (2593MHz). The probe calibration sheets located in Appendix B page 23 lists probe calibrations for 2450MHz (range of 2350-2550MHz) which was used for the low channel (2499MHz) assessment. The plot of the low channel has been included as proof to satisfy this concern. Please refer to attached PDF file named *EME low channel.pdf.*

13) It appears that the SAR report is missing:

a) Descriptions of interpolation procedures used to locate peak SARs at a finer spatial resolution

b) Descriptions of extrapolation procedures used to estimate SAR values adjacent to phantom surface (unreachable due to probe case and boundary effects)

c) Descriptions of within-cube interpolation procedures to get 1 mm or 2 mm SAR grid

d) Description of averaging (integration) procedures to get 1-g SAR from final interpolated grid

Response:

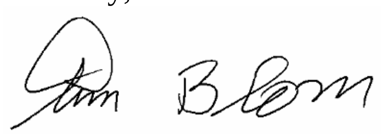
Section 4.1 of the submitted report describes the Dosimetric Assessment System (DASY 4) SAR measurement system and the process to locate the interpolated maximum in order to conduct a cube scan which is then used to determine the final measured SAR. The DASY scans submitted with this response along with the scans in Appendix E of the submitted report identify the step sizes for both coarse and cube scans. Additional details are available in the DASY 4 user manual Chapter 18 Spatial Peak SAR Evaluation. A copy of the manual is available on the manufacturer's website.

http://www.speag.com/measurement/support/dasy4/index.php

The SAR report is a declaration of compliance and states "said product complies with the national and international reference standards and guidelines listed in section 2.0 of this report." The DASY 4 interpolation and extrapolation algorithms are accepted by the national and international standards referenced in section 2.0.

If you have any questions, please contact me at (507) 837-3672.

Sincerely,



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