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TEST REPORT

Report Number:	**100061447LEX-003**
Project Number:	**G100061447**
Report Issue Date:	**8/23/2010**
Product Name:	**KeyPad**
FCCID:	**JI5-SMCWK01Z**
ICIC:	**4137A-SMCWK01Z**
Standards:	**Title 47 CFR Part 15 Subpart B and C, RSS-210 Issue 7 and RSS-Gen Issue 2**

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Drive
Lexington, KY 40510

Client:
SMC Networks
20 Mason Street
Irvine, CA 92618

Report prepared by
Bryan Taylor, Team Leader

Report reviewed by
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1 Introduction and Conclusion

The tests indicated in section 2 were performed on the product constructed as described in section 3. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test method, a list of the actual test equipment used, documentation photos, results and raw data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complied with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1 and ANSI C63.4. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The test site is listed with the FCC under registration number 485103. The test site is listed with Industry Canada under site number IC 2042M-1.

2 Test Summary

Page	Test full name	FCC Reference	IC Reference	Result
6	Peak Conducted Power	§ 15.247(b)(3)(4)	RSS210 A8.4 (4)	Pass
7	Occupied Bandwidth	§ 15.247(a)(2)	RSS210 A8.2(A)	Pass
12	Conducted Spurious Emissions	§ 15.247(d)	RSS210 (A8.5)	Pass
16	Power Spectral Density	§ 15.247(e)	RSS210 A8.2(B)	Pass
20	Radiated Spurious Emissions (Transmitter)	§ 15.247(d), § 15.209, and § 15.205	RSS-210 (2.2)	Pass
28	Radiated Spurious Emissions (Receiver)	§ 15.109	RSS-Gen (7.2.3)	Pass
30	AC Powerline Conducted Emissions	§ 15.207	RSS-Gen (7.2.2)	Pass
32	Antenna Requirement per FCC Part 15.203	§ 15.203	RSS-Gen (7.1.4)	Pass
33	RF Exposure Requirements (MPE Calculations)	§ 15.247(b)(5), § 1.1310	RSP100 (4)	Pass

3 Description of Equipment Under Test

Equipment Under Test	
Manufacturer	SMC Networks
Model Number	SMCWK01-Z
Serial Number	Test Sample 1
FCC Identifier	JI5-SMCWK01Z
IC Identifier	4137A-SMCWK01Z
Receive Date	5/24/2010
Testing Start Date	6/11/2010
Testing End Date	7/1/2010
Device Received Condition	Good
Test Sample Type	Production
Frequency Band	2405MHz – 2475MHz
Mode(s) of Operation	Zigbee
Modulation Type	QPSK
Duty Cycle	42.06%
Transmission Control	Test Commands via Ember InSight Adapter
Maximum Output Power	18.29dBm (Conducted Measurement via U.FL Adapter)
Test Channels	11, 19, 25 (Declared by Manufacturer)
Antenna Type (15.203)	Integral to PCB. Non-Detachable. Gain = 2.84dBi
Operating Voltage	3.6VDC

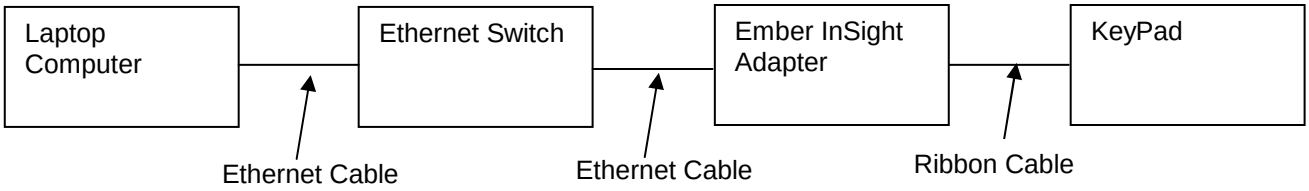
Description of Equipment Under Test
The test sample was a zigbee enabled keypad manufactured by SMC Netowrks.

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Transmitting on channels 11, 19, or 25.
2	Receive / idle mode

3.1 System setup including cable interconnection details, support equipment and simplified block diagram

3.2 EUT Block Diagram:



3.3 Cables:

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
Ethernet Cable	15m	None	None	Ethernet Switch	Ember InSight Adapter
Ethernet Cable	15m	None	None	Ethernet Switch	Laptop Computer
Ribbon Cable	30cm	None	None	Ember InSight Adapter	Test Sample

3.4 Support Equipment:

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Programming Adapter	Ember	InSight ISA3	Not Labeled
Laptop Computer	Dell	Latitude D420	Not Labeled
Ethernet Switch	Netgear	FS108P	16A258340001C

4 Peak Conducted Power

4.1 Test Limits

§ 15.247(b)(3): For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

§ 15.247(b)(4): The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2 Test Procedure

ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

4.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3099	Rohde & Schwarz	FSP7	8/17/2009	8/17/2010

4.4 Results:

Channel Number	Frequency (MHz)	Peak Conducted Power (dBm)	Peak Conducted Power Limit (dBm)	Margin (dB)	Result
11	2405	18.29	30	-11.71	Pass
19	2445	17.77	30	-12.23	Pass
25	2475	16.99	30	-13.01	Pass

5 Occupied Bandwidth

5.1 Test Limits

§ 15.247(a)(2): For digital modulation systems, the minimum 6dB bandwidth shall be at least 500kHz.

5.2 Test Procedure

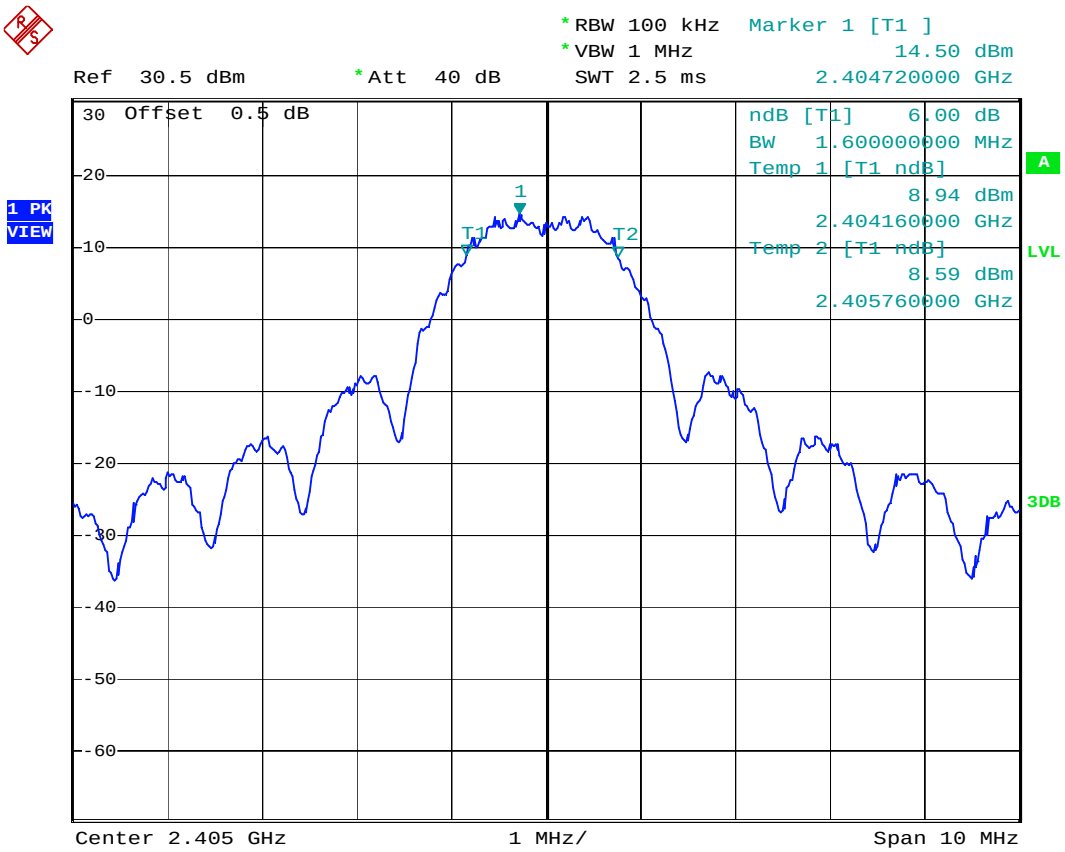
ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

5.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3099	Rohde & Schwarz	FSP7	8/17/2009	8/17/2010

5.4 Results:

Channel Number	Frequency (MHz)	6dB Bandwidth	99% Power Bandwidth	Result
11	2405	1.6MHz	---	Pass
19	2445	1.6MHz	2.52MHz	Pass
25	2475	1.6MHz	---	Pass



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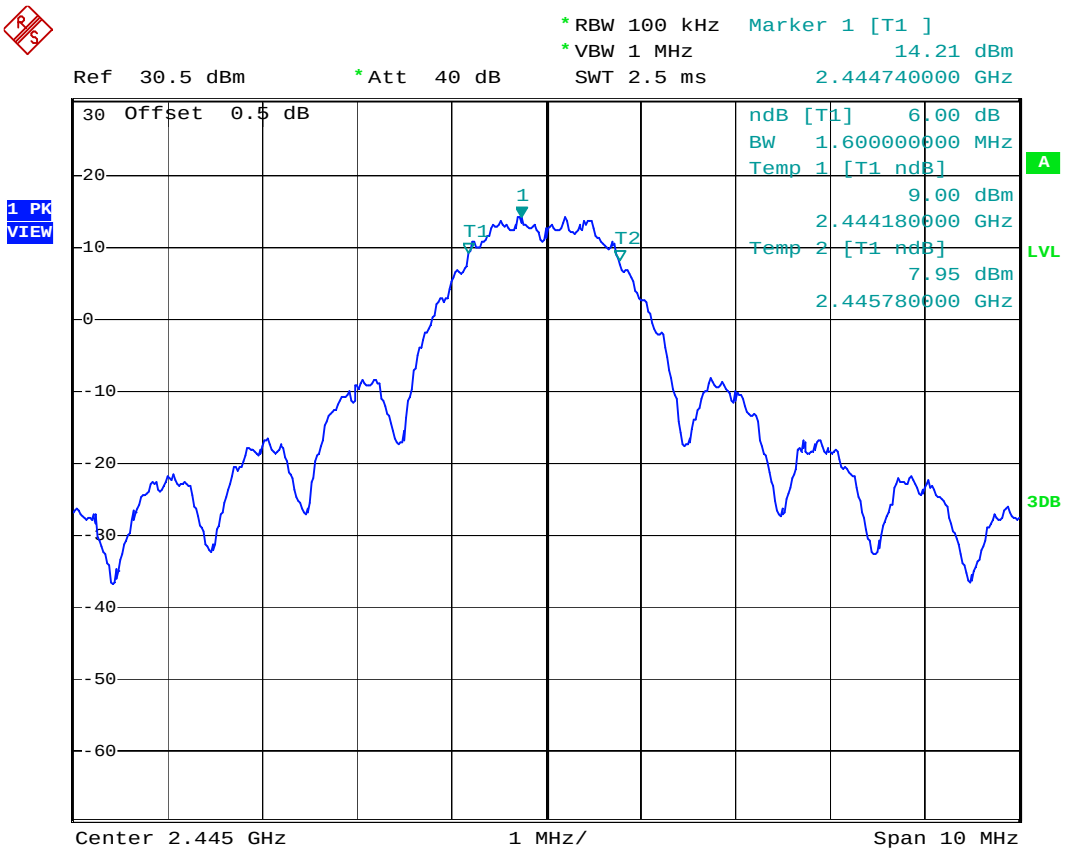
6dB Bandwidth Plot (Channel 11)



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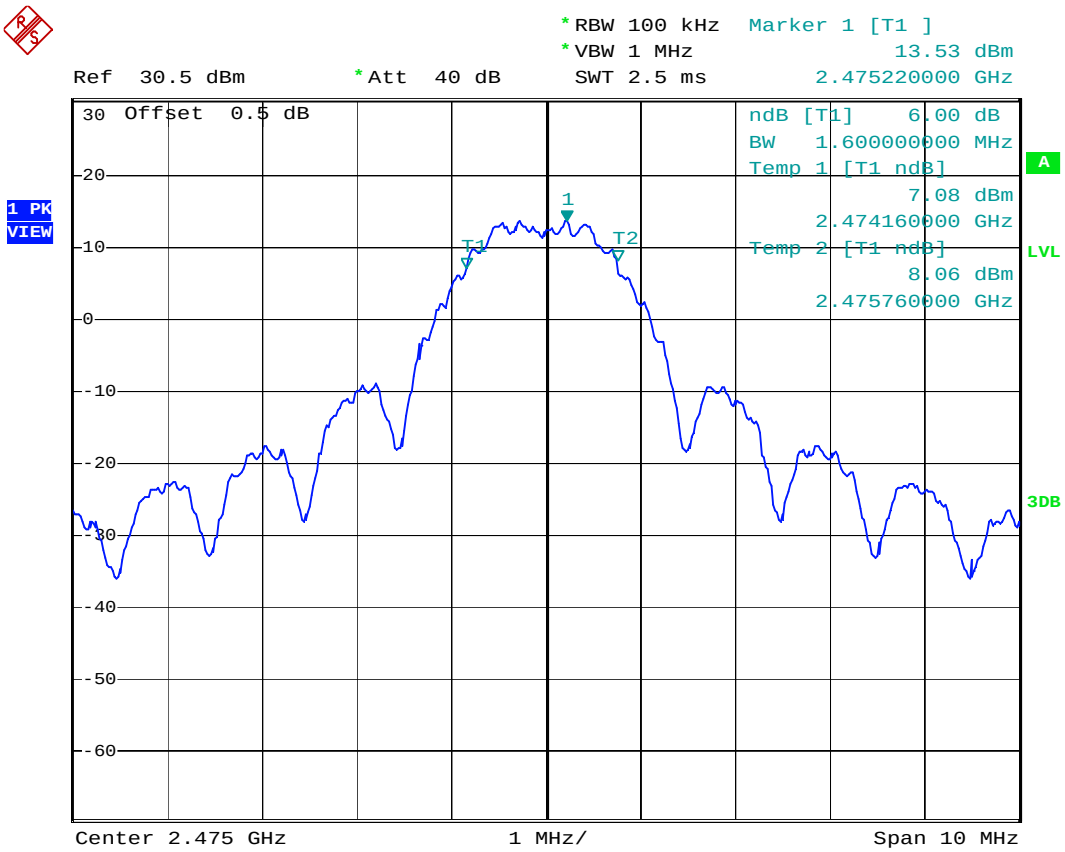
6dB Bandwidth Plot (Channel 19)



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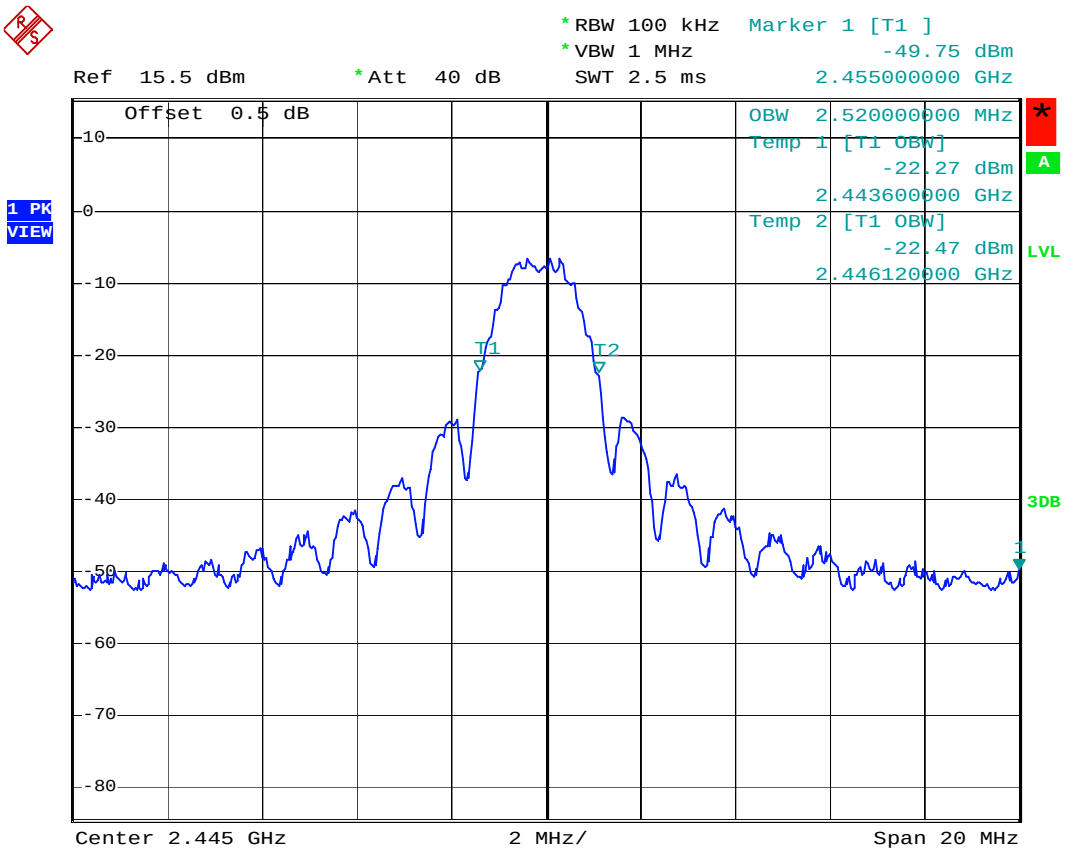
6dB Bandwidth Plot (Channel 25)



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99% Power Bandwidth Plot (Channel 19)

6 Conducted Spurious Emissions

6.1 Test Limits

§ 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

6.2 Test Procedure

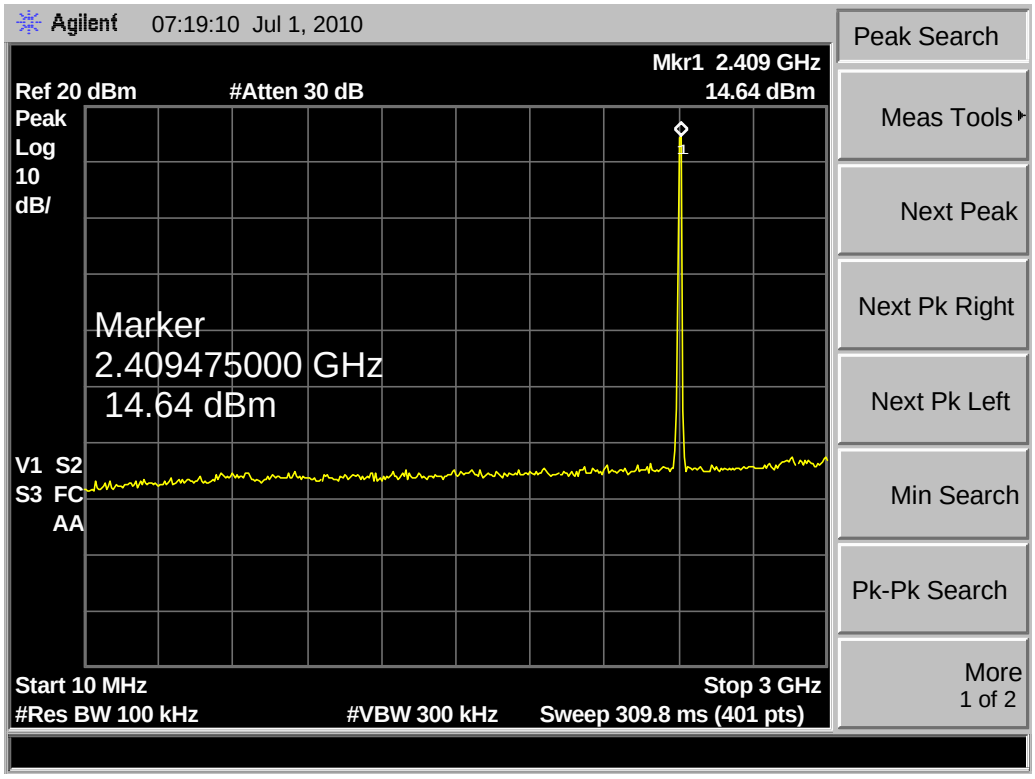
ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

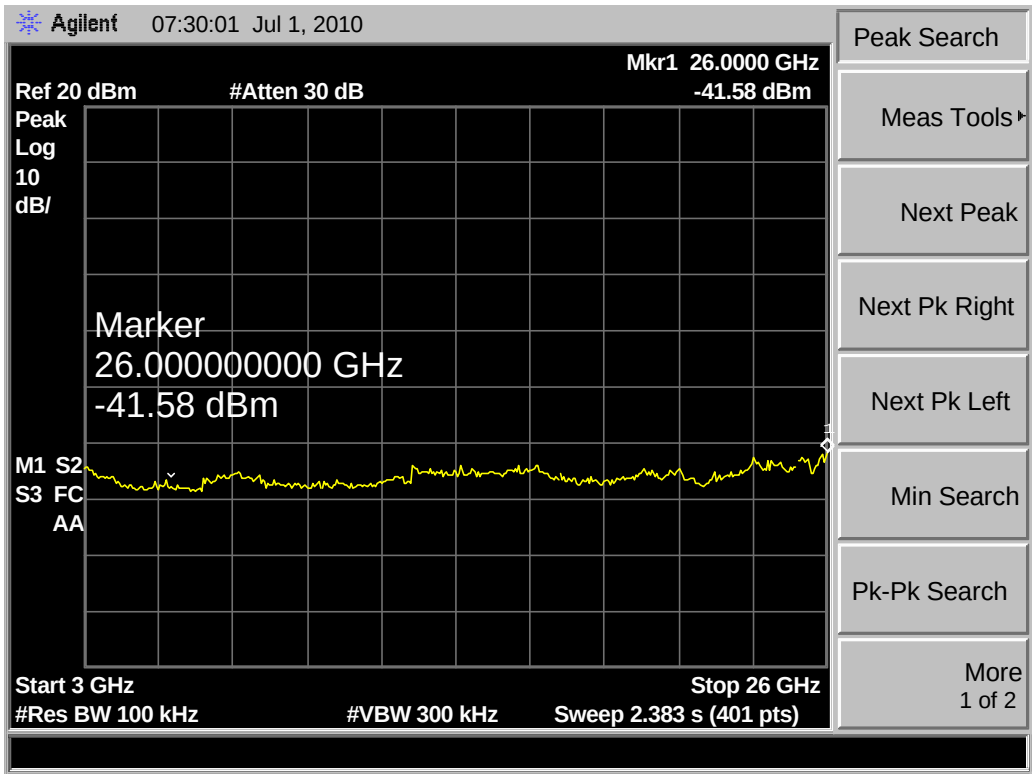
6.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMC Analyzer	2142	HP	E7405	8/21/2009	8/21/2010

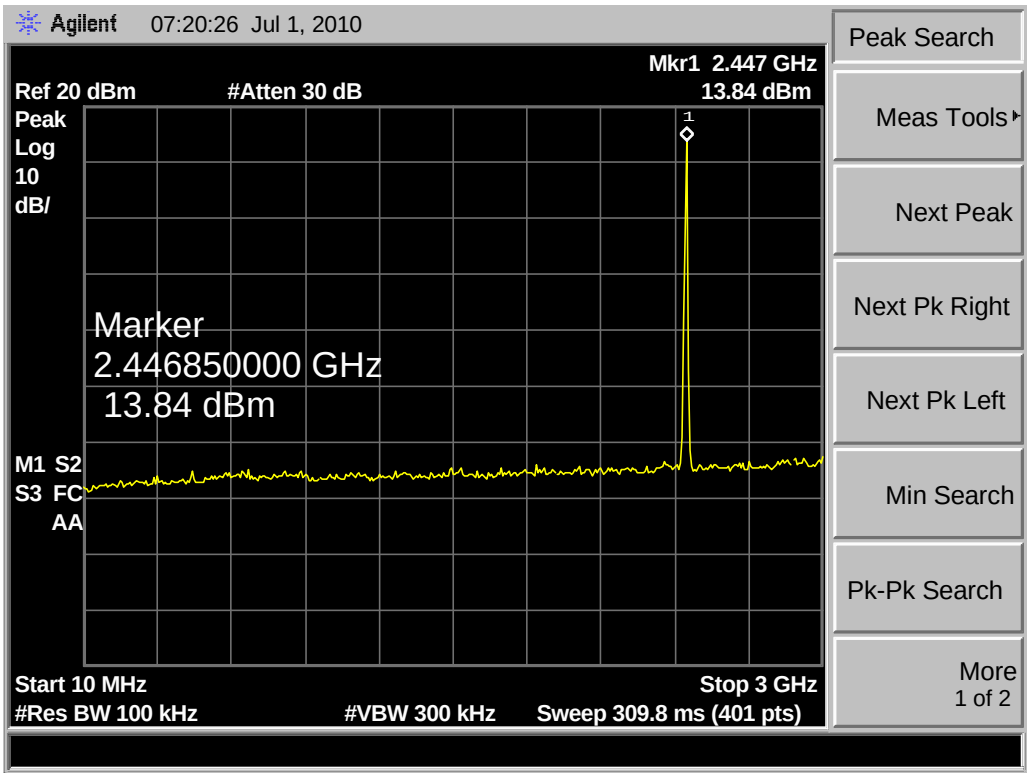
6.4 Results:

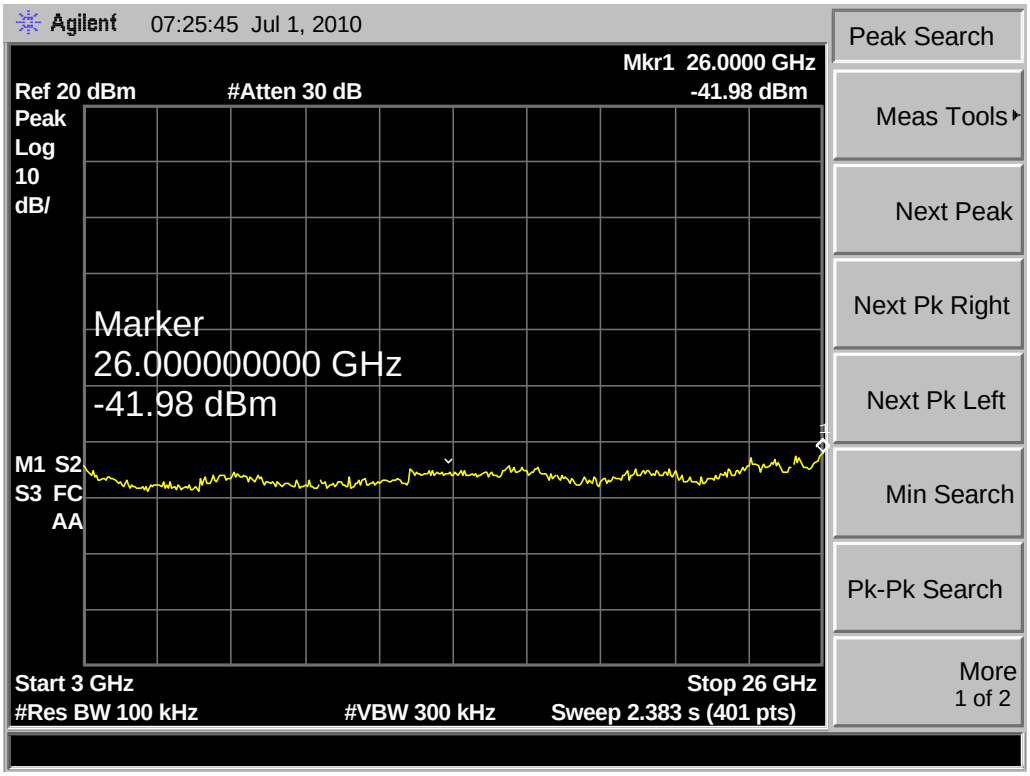
The following plots show that there are no conducted spurious emissions exceeding the 20dB down criteria.



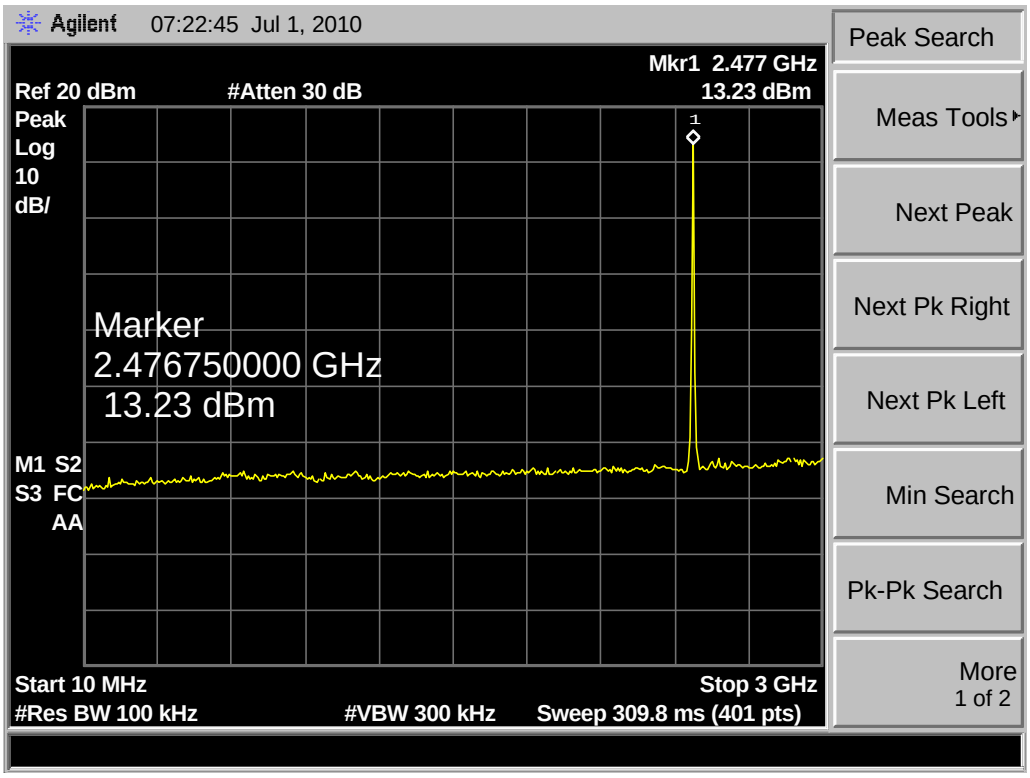


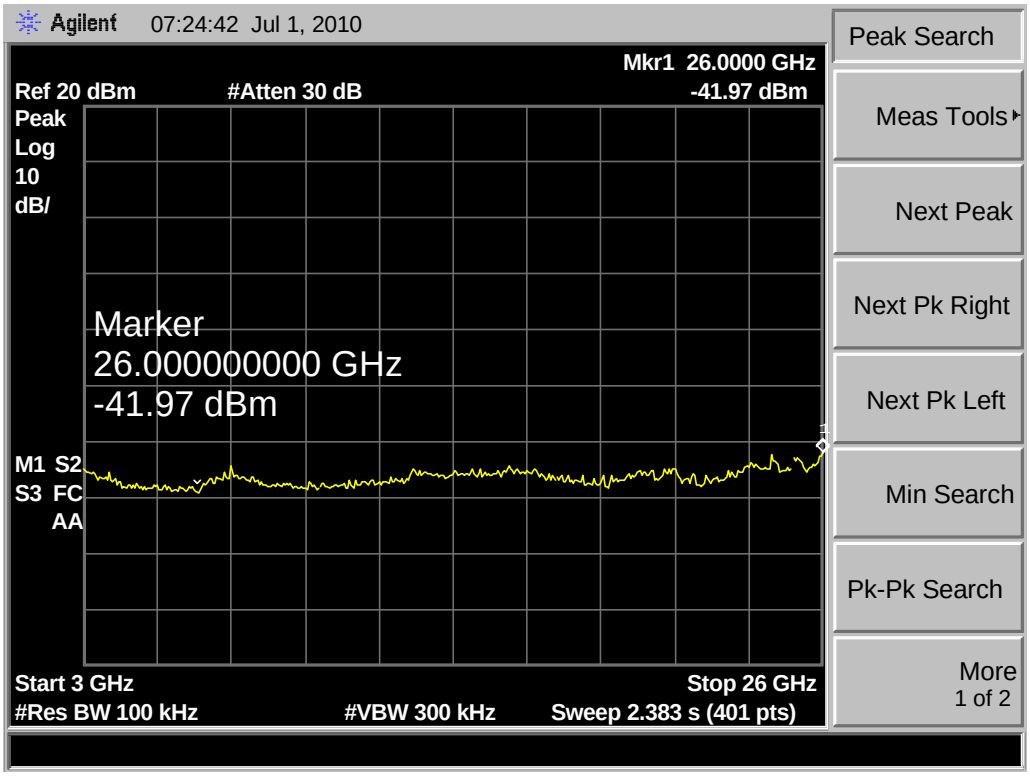
Conducted Spurious Emissions (Channel 11)





Conducted Spurious Emissions (Channel 19)





Conducted Spurious Emissions (Channel 25)

7 Power Spectral Density

7.1 Test Limits

§ 15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

7.2 Test Procedure

ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

*PSD Option 1 Method

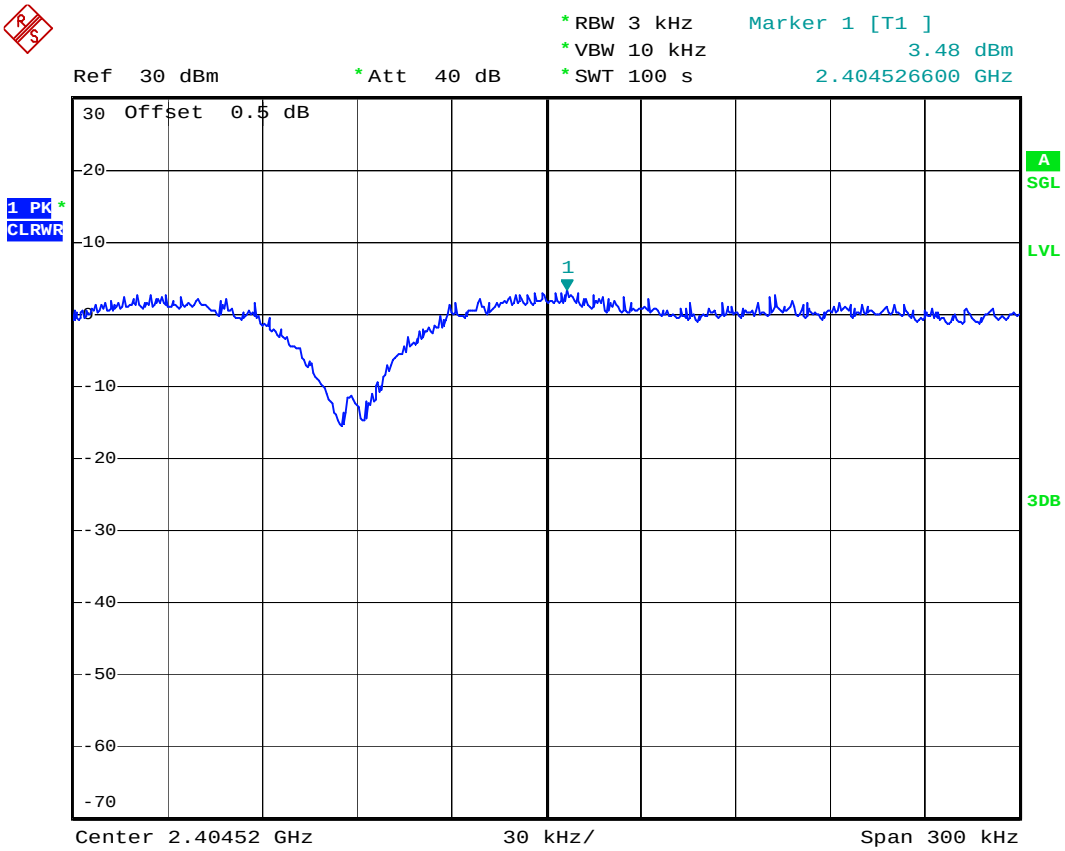
7.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3099	Rohde & Schwarz	FSP7	8/17/2009	8/17/2010

7.4 Results:

*PSD Option 1 Method

Channel Number	Frequency (MHz)	PSD in 3kHz BW (dBm)	Limit (dBm)	Margin (dBm)	Result
11	2405	3.48	8	4.52	Pass
19	2445	3.07	8	4.93	Pass
25	2475	2.11	8	5.89	Pass



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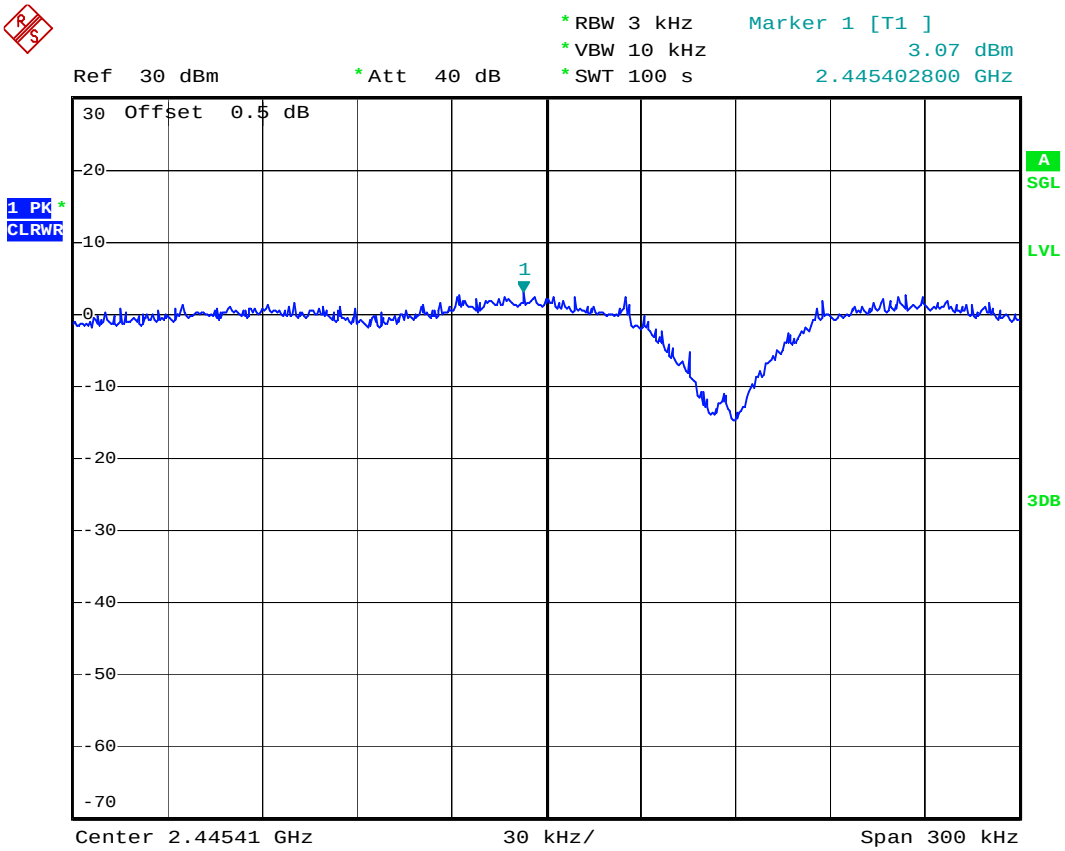
Power Spectral Density (Channel 11)



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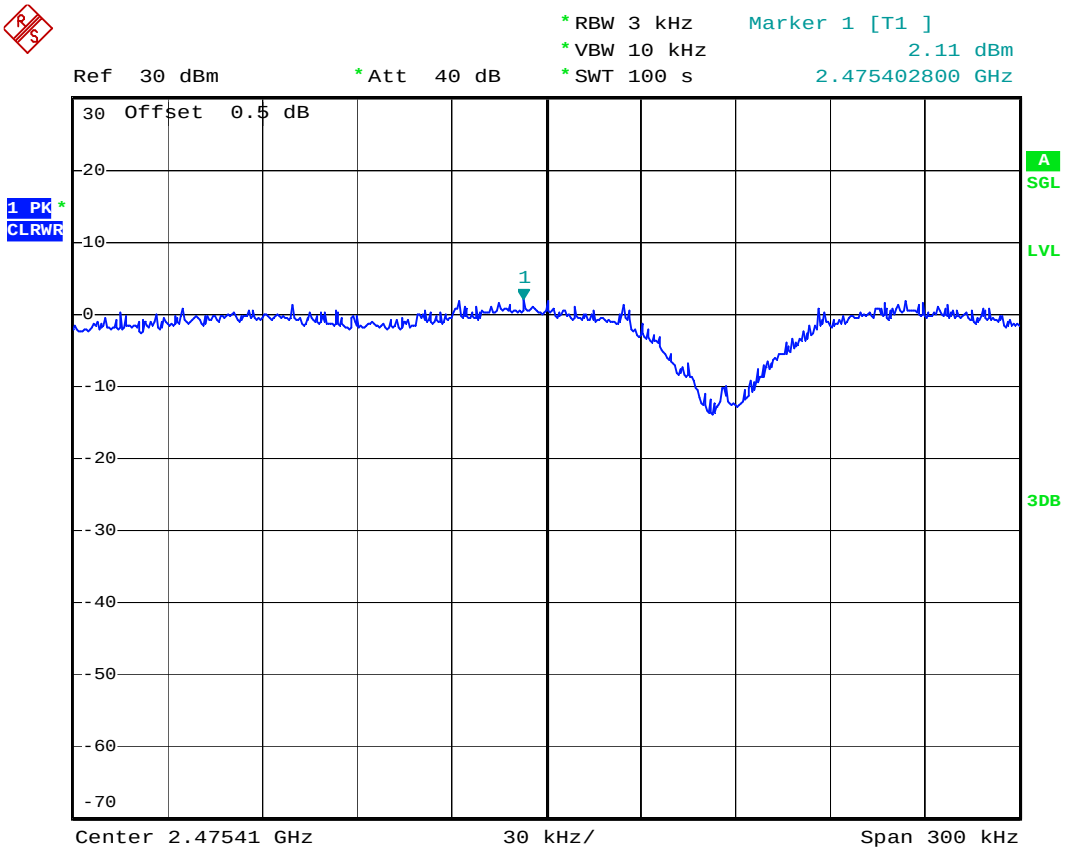
Power Spectral Density (Channel 19)



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Power Spectral Density (Channel 25)

8 Radiated Spurious Emissions (Transmitter)

8.1 Test Limits

§ 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Part 15.205(a): Restricted Bands of Operations

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
[1] 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	[2]
13.36–13.41.			

[1] Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.
[2] Above 38.6

Part 15.209(a): Field Strength Limits for Restricted Bands of Operation

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2,400 / F (kHz)	300
0.490 - 1.705	24,000 / F (kHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

8.2 Test Procedure

ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

8.3 Example of Field Strength Calculation Method:

The measured field strength was calculated by summing the readings taken from the spectrum analyzer with the appropriate correction factors associated with the antenna losses and cable losses. The calculation formula and sample calculations are listed below:

Formula:
FS = RA + AF + CF

FS = Field Strength in dBμV/m
RA = Receiver Amplitude in dBμV
AF = Antenna Factor in dB
CF = Cable Attenuation Factor in dB (Including preamplifier and filter attenuation)

Example Calculation:

RA = 19.48 dBμV
AF = 18.52 dB
CF = 0.78 dB

FS = 19.48 + 18.52 + 0.78 = 38.78 dBμV/m
Level in μV/m = Common Antilogarithm [(38.78 dBμV/m)/20] = 86.89 μV/m

8.4 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3099	Rohde & Schwarz	FSP7	8/17/2009	8/17/2010
Preamplifier	987410	Miteq	AFS44-00102000-30-10P-44	6/17/2010	6/17/2011
Preamplifier	SF456200904	Mini-Circuits	ZX60-3018G-S+	2/12/2010	2/12/2011
Biconnilog Antenna	00051864	ETS	3142C	12/21/2009	12/21/2010
Horn Antenna	6556	ETS	3115	8/4/2009	8/4/2010
System Controller	121701-1	Sunol Sciences	SC99V	Time of Use	Time of Use
High Pass Filter	3986-01 DC0408	Microwave Circuits, Inc.	H3G020G2	2/10/2010	2/10/2011

8.5 Results:

All spurious emissions were attenuated by at least 20dB below the level of the fundamental as required by Part 15.247(d). Additionally, all emissions falling within restricted bands of operation and at the band edges were found to be below the limit specified in Part 15.209(a). The spurious emissions listed in the following tables are the worst case emissions.

Worst Case Spurious Measurements (3 Orthogonal Positions)

Channel	Frequency (GHz)	Polarity	Corr. Peak Reading. (dBuV/m)	Corr. Avg Reading. (dBuV/m)	Peak Limit (dBuV/m)	Avg. Limit (dBuV/m)	Results	Comments
Low	4.809	H	65.31	51.59	74	54	**Pass**	Restricted Band
		V	67.43	53.74	74	54	**Pass**	Restricted Band
Mid	4.889	H	64.32	50.4	74	54	**Pass**	Restricted Band
		V	67.03	53.3	74	54	**Pass**	Restricted Band
High	4.949	H	66.4	52.7	74	54	**Pass**	Restricted Band
		V	67.11	53.65	74	54	**Pass**	Restricted Band
Low	7.213	H	66.81	51.98	74	54	**Pass**	Restricted Band
		V	66.1	51.16	74	54	**Pass**	Restricted Band
Mid	7.333	H	57.88	41.81	74	54	**Pass**	Restricted Band
		V	68.1	53.79	74	54	**Pass**	Restricted Band
High	7.423	H	60.3	44.54	74	54	**Pass**	Restricted Band
		V	65.19	50.18	74	54	**Pass**	Restricted Band
Low	12.022	H	57.17	39.68	74	54	**Pass**	Restricted Band
		V	66.2	50.7	74	54	**Pass**	Restricted Band
Mid	12.222	H	58.37	41.69	74	54	**Pass**	Restricted Band
		V	64.66	49.25	74	54	**Pass**	Restricted Band
High	12.37	H	52.52	34.09	74	54	**Pass**	Restricted Band
		V	62.28	46.31	74	54	**Pass**	Restricted Band
Low	14.426	H	58.05	40.07	74	54	**Pass**	Restricted Band
		V	64.53	48.78	74	54	**Pass**	Restricted Band
Mid	14.667	H	52.9	33.33	74	54	**Pass**	Restricted Band
		V	53.2	33.7	74	54	**Pass**	Restricted Band
High	14.85	H	54.58	35.13	74	54	**Pass**	Restricted Band
		V	55.19	37.2	74	54	**Pass**	Restricted Band

* A 42.06% duty cycle correction factor (-7.5dB) was applied to the average detector measurements.

Worst Case Spurious Measurements >18GHz (3 Orthogonal Positions)

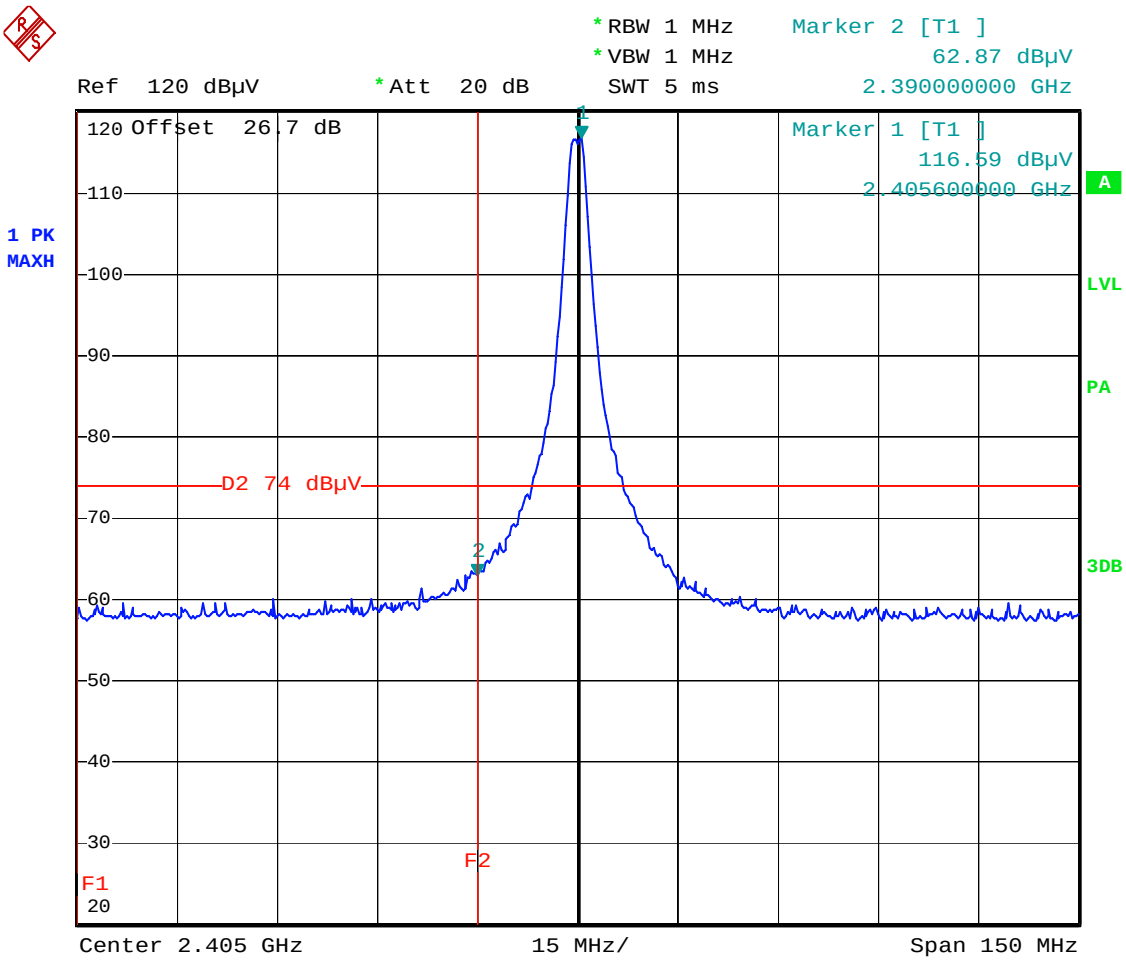
Channel	Frequency (GHz)	Polarity	Corr. Peak Reading. (dBuV/m)	Corr. Avg Reading. (dBuV/m)	Peak Limit (dBuV/m)	Avg. Limit (dBuV/m)	Results	Measurement Distance
Low	19.24	H	61.4	42.3	83.5	63.5	**Pass**	1m
		V	61.7	43	83.5	63.5	**Pass**	1m
Mid	19.56	H	63.8	44.6	83.5	63.5	**Pass**	1m
		V	64.1	45.9	83.5	63.5	**Pass**	1m
High	19.84	H	64.3	46.1	83.5	63.5	**Pass**	1m
		V	65.2	47	83.5	63.5	**Pass**	1m

* A 42.06% duty cycle correction factor (-7.5dB) was applied to the average detector measurements.

Band Edge Emissions (3 Orthogonal Positions)

Channel	Frequency (GHz)	Polarity	Corr. Peak Reading. (dBuV/m)	Corr. Avg Reading. (dBuV/m)*	Peak Limit (dBuV/m)	Avg. Limit (dBuV/m)	Results	Comments
Low	2.39	H	62.87	43.82	74	54	**Pass**	Low Band Edge
High	2.4835	H	68.13	48.13	74	54	**Pass**	High Band Edge

* A 42.06% duty cycle correction factor (-7.5dB) was applied to the average detector measurements.



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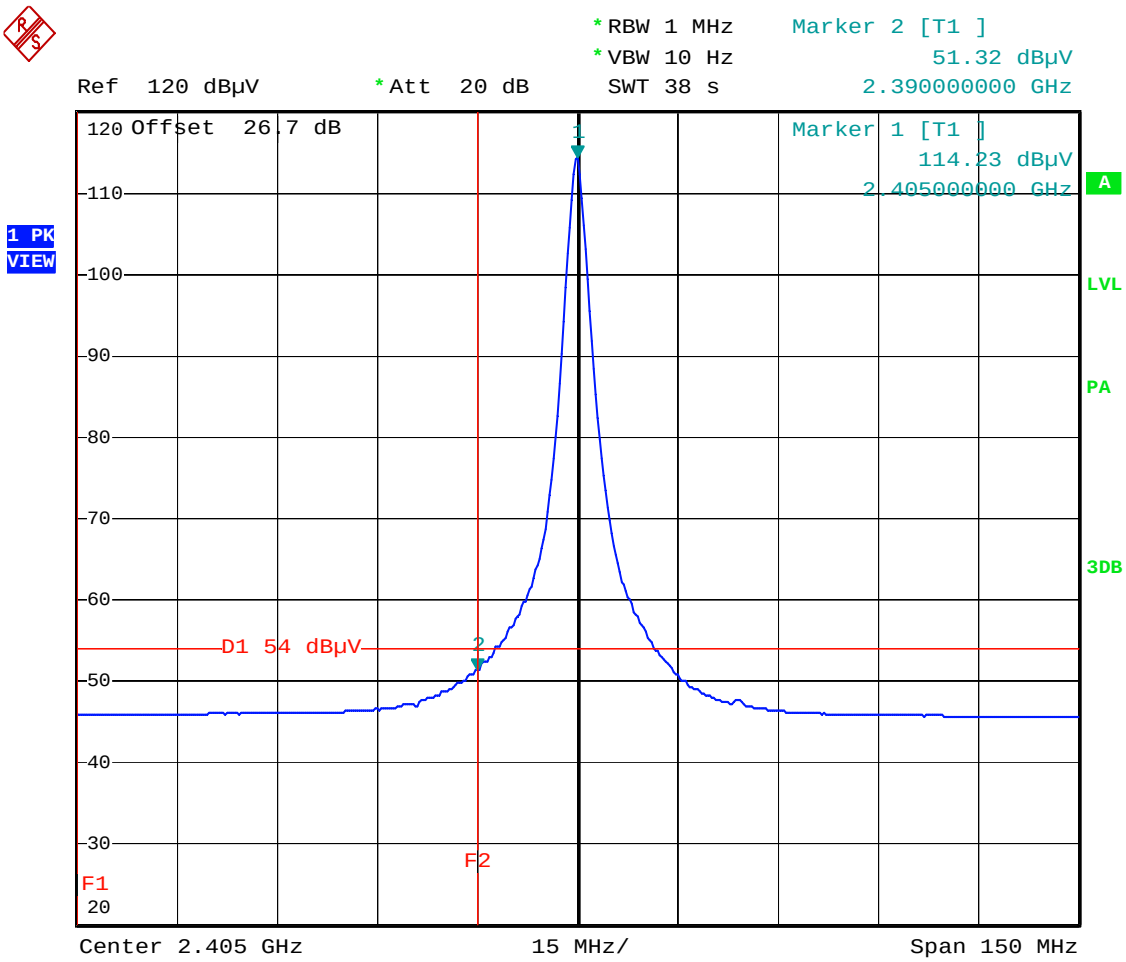
Low Channel Band Edge Emissions (Peak Detection)



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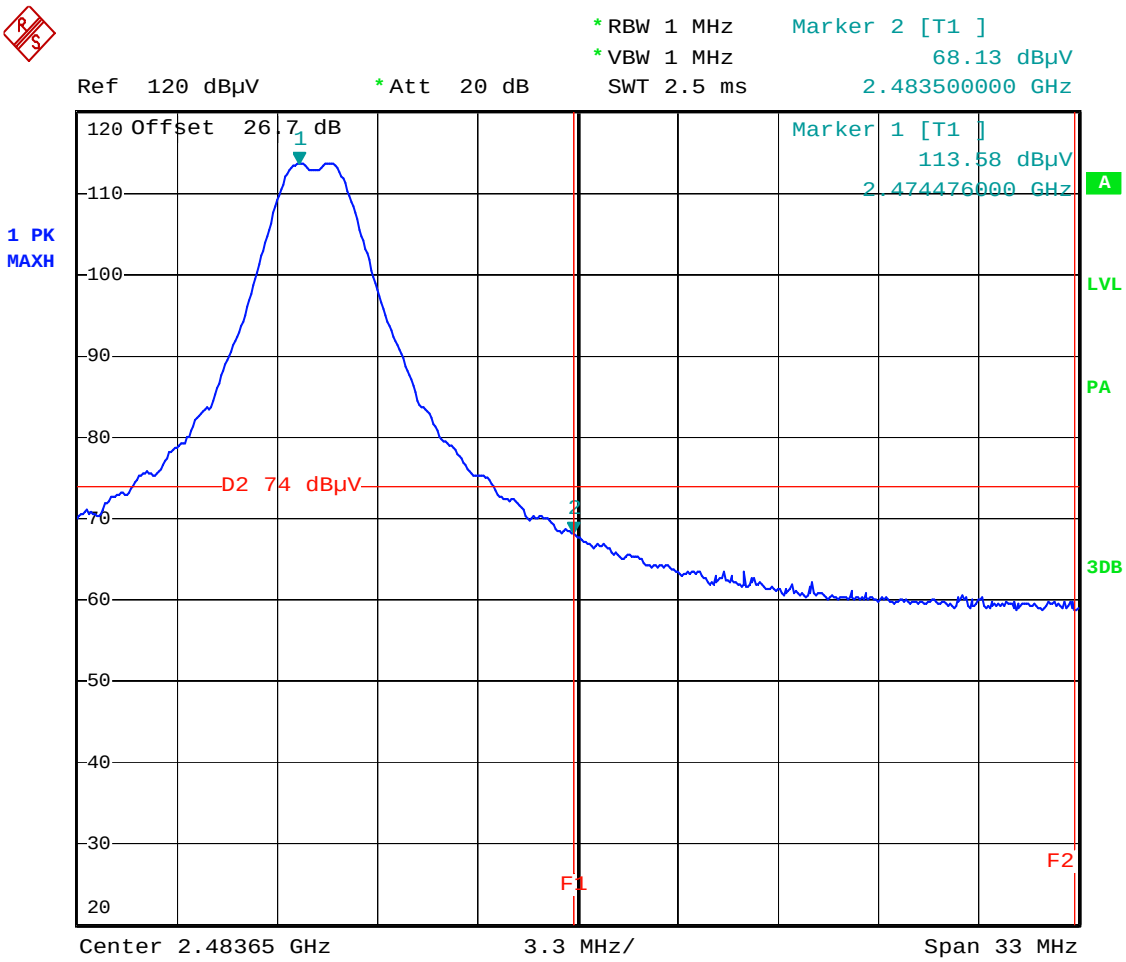
Average: 51.32dBuV/m - 7.5dB = 43.82dBuV/m (Limit = 54dBuV/m)
(Computation for duty cycle correction factor)

Low Channel Band Edge Emissions (Average Detection, Duty Cycle Correction Applied)



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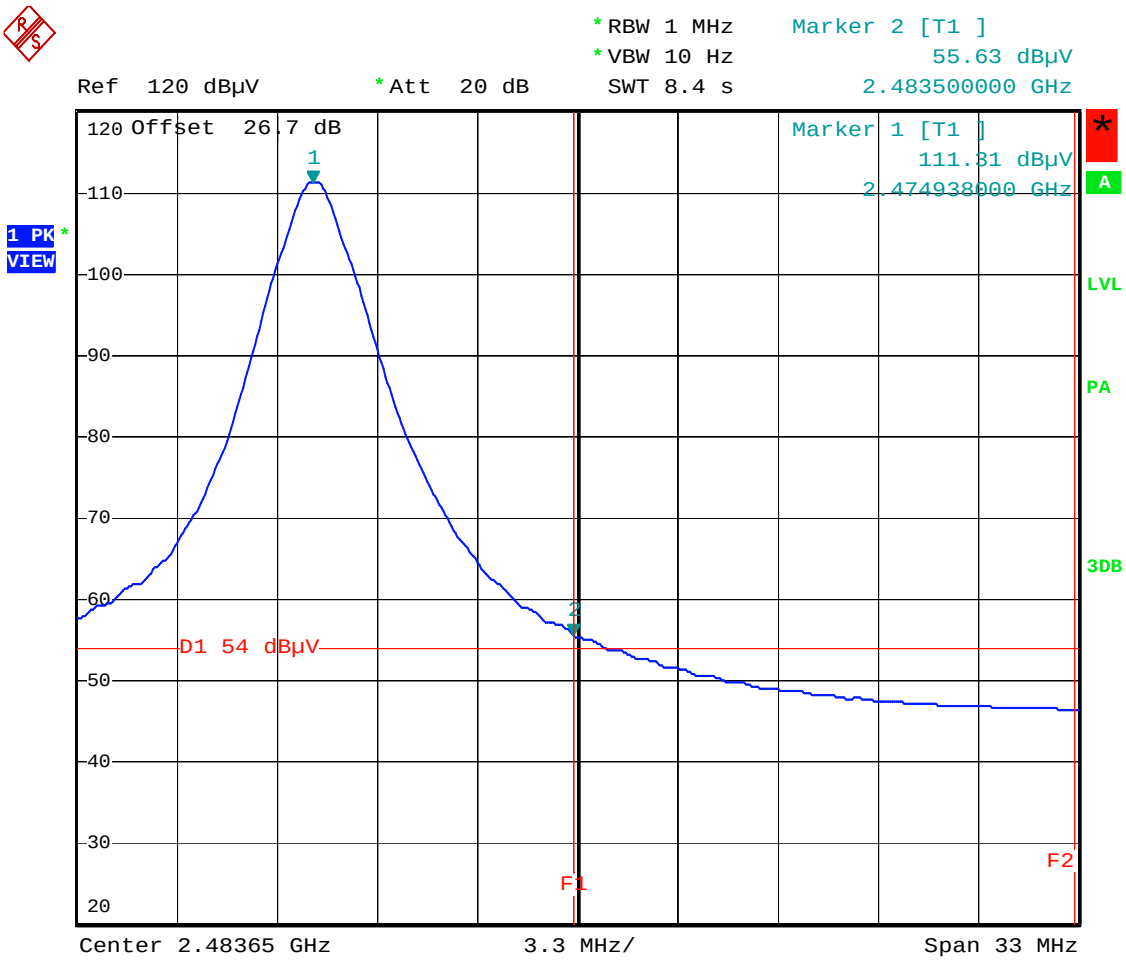
High Channel Band Edge Emissions (Peak Detection)



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Average: 55.63dBuV/m - 7.5dB = 48.13dBuV/m (Limit = 54dBuV/m)
(Computation for duty cycle correction factor)

High Channel Band Edge Emissions (Average Detection, Duty Cycle Correction Applied)

9 Radiated Spurious Emissions (Receiver)

9.1 Test Limits

§ 15.109: Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength (microvolts/meter)	Field strength (dBuV/m)
30–88	100	40
88–216	150	43.5
216–960	200	46
Above 960	500	54

9.2 Test Procedure

ANSI C63.4: 2003

9.3 Example of Field Strength Calculation Method:

The measured field strength was calculated by summing the readings taken from the spectrum analyzer with the appropriate correction factors associated with the antenna losses and cable losses. The calculation formula and sample calculations are listed below:

Formula:
FS = RA + AF + CF

FS = Field Strength in dBµV/m
RA = Receiver Amplitude in dBµV
AF = Antenna Factor in dB
CF = Cable Attenuation Factor in dB (Including preamplifier and filter attenuation)

Example Calculation:

RA = 19.48 dBµV
AF = 18.52 dB
CF = 0.78 dB

FS = 19.48 + 18.52 + 0.78 = 38.78 dBµV/m
Level in µV/m = Common Antilogarithm [(38.78 dBµV/m)/20] = 86.89 µV/m

9.4 Test Equipment Used:

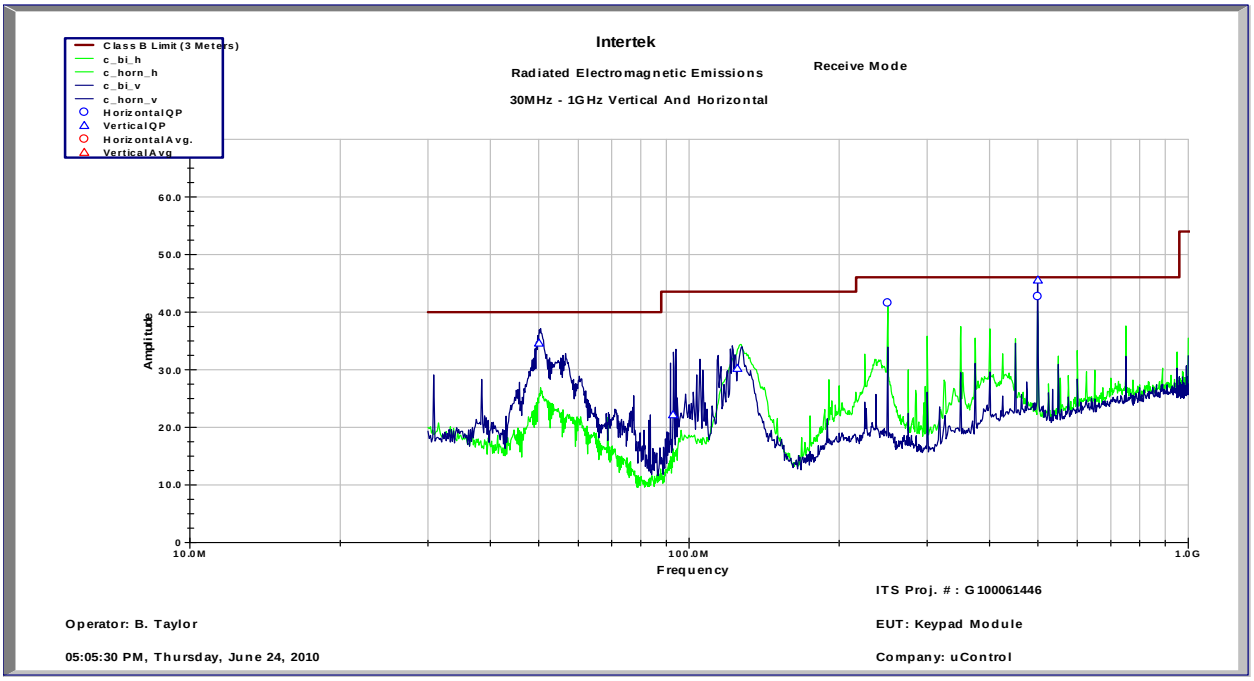
Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	9/14/2009	9/14/2010
Preamplifier	SF456200904	Mini-Circuits	ZX60-3018G-S+	2/12/2010	2/12/2011
Biconnilog Antenna	00051864	ETS	3142C	12/21/2009	12/21/2010
System Controller	121701-1	Sunol Sciences	SC99V	Time of Use	Time of Use

9.5 Results:

All spurious emissions with the test sample in receive mode were below the limits specified in Part 15.109 for a class B digital device.

Radiated Emissions										
Test Engineer:	Bryan Taylor	**Start Date:**	6/24/2010		**End Date:**	6/24/2010				
Temperature:	22.8C	**Humidity:**	45.30%		**Pressure:**	994.2mBar				
Specification:	FCC Part 15	**Test Limit:**	Class B							
Notes:	Rx Mode									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / Detector**	**Test Distance**	**Results**
250.01 MHz	H	43.74	-14.57	12.4	41.57	46.02	-4.45	120kHz / QP	3m	**Compliant**
500.0 MHz	H	37.94	-13.44	18.2	42.7	46.02	-3.32	120kHz / QP	3m	**Compliant**
50.056 MHz	V	42.8	-15.8	7.6	34.6	40	-5.4	120kHz / QP	3m	**Compliant**
92.947 MHz	V	29.36	-15.38	8.18	22.16	43.52	-21.36	120kHz / QP	3m	**Compliant**
125.02 MHz	V	37.9	-15.09	7.4	30.21	43.52	-13.31	120kHz / QP	3m	**Compliant**
500.0 MHz	V	41.28	-13.44	17.7	45.54	46.02	-0.48	120kHz / QP	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Maximized Quasi Peak Emissions



Peak Scan (Receive Mode)

10 AC Powerline Conducted Emissions

10.1 Test Limits

§ 15.107(e): Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

10.2 Test Procedure

ANSI C63.4: 2003

10.3 Test Equipment Used:

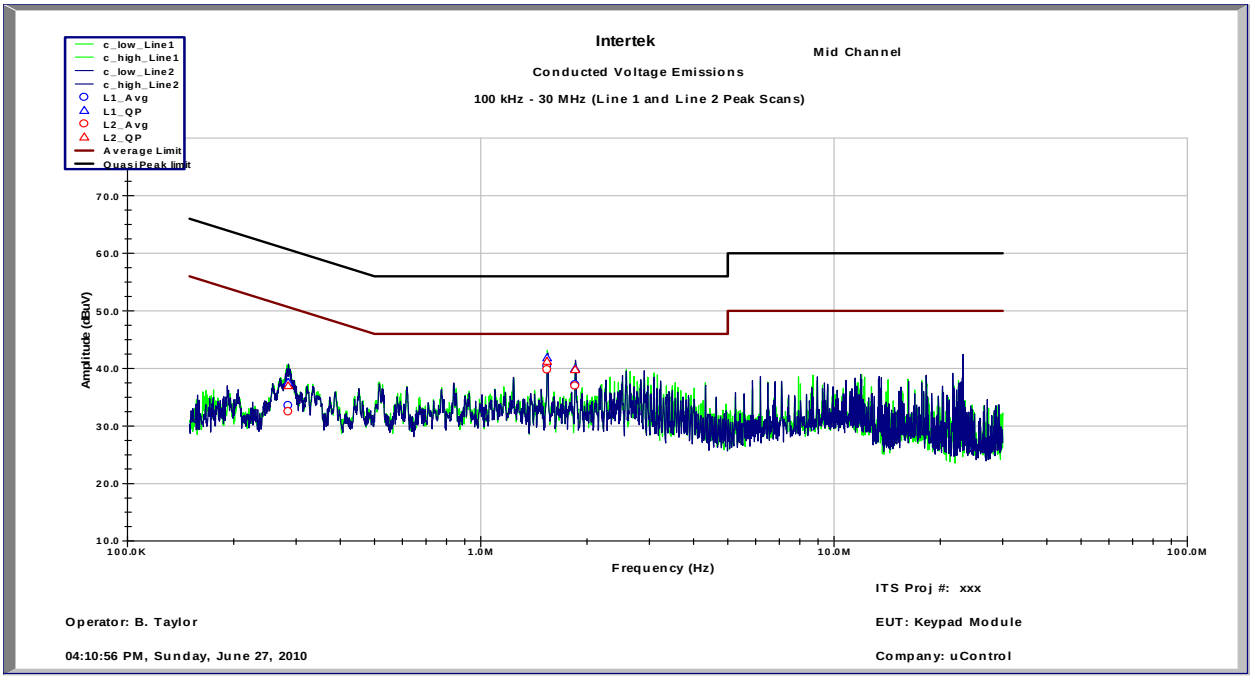
Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	9/14/2009	9/14/2010
LISN	3333	Teseq	NNB52	2/23/2010	2/23/2011

10.4 Results:

Conducted Voltage Emissions on Power Lines								
Test Engineer:	Bryan Taylor	**Start Date:**	6/27/2010	**End Date:**	6/27/2010			
Temperature:	23.1C	**Humidity:**	48.30%	**Pressure:**	987.7mBar			
Specification:	FCC Part 15	**Test Limit:**	Class B	**RBW:**	9kHz			
Notes:								

Line	Frequency (MHz)	Quasi-Peak (dBuV)	Quasi-Peak Limit (dBuV)	Quasi-Peak Delta (dB)	Average (dBuV)	Average Limit (dBuV)	Average Delta (dB)	Results
L1	285.0 KHz	37.53	60.67	-23.14	33.53	50.67	-17.14	**Compliant**
L1	1.54 MHz	41.8	56	-14.2	40.39	46	-5.61	**Compliant**
L1	1.85 MHz	39.9	56	-16.1	37.18	46	-8.82	**Compliant**
L2	285.0 KHz	37.53	60.67	-23.14	33.53	50.67	-17.14	**Compliant**
L2	1.54 MHz	41.8	56	-14.2	40.39	46	-5.61	**Compliant**
L2	1.85 MHz	39.9	56	-16.1	37.18	46	-8.82	**Compliant**

Quasi-Peak and Average Measurements



Peak Scan (Line 1 and 2)

11 Antenna Requirement per FCC Part 15.203

11.1 Test Limits

§ 15.203: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

11.2 Results:

The sample tested met the antenna requirement. The antenna used was permanently attached and integral to the PCB.

12 RF Exposure Requirements (MPE Calculations)

12.1 Test Limits

§ 1.1310: The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

Part 1.1310 Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

12.2 Test Procedure

The radiated RF power (calculated from the conducted output power and antenna gain) was used to calculate the maximum RF exposure at a 20 cm distance using the formula:

$$\text{Maximum RF Exposure at 20cm} = (\text{EIRP in mW})/(4\text{Pi}(20\text{cm})^2)$$

Once the Maximum RF Exposure calculations were complete the results were compared to the MPE limits above.

12.3 Results:

The following calculations show the Maximum RF Exposure from the test sample at 20cm for the worst case EIRP. The MPE level is well below the limits for the general population described in the table above.

The maximum conducted output power measured was 18.29dBm. Using the declared antenna gain of 2.84dBi the maxmun EIRP is 18.29dBm + 2.84dBi = 21.13 dBm (or 129.7mW)

$\text{MPE} = 129.7\text{mW} / (4\text{Pi}(20\text{cm})^2) = 129.7\text{mW} / 5025.6\text{cm}^2 = 0.025\text{mW/cm}^2$

13 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of k = 2, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

Parameter	Uncertainty	Notes
Radiated emissions, 30 to 1000 MHz	±3.9dB	
Radiated emissions, 1 to 18 GHz	±4.2dB	
Radiated emissions, 18 to 40 GHz	±4.3dB	
Power Port Conducted emissions, 150kHz to 30 MHz	±2.8dB	

14 Revision History

Revision Level	Date	Report Number	Notes
0	8/23/2010	100061447LEX-003	Original Issue