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Job Number:	SR7180320-T001
UL CCS Project Number:	10U13557
Serial Number:	Prototype
Revised Date:	12 Jan 2011
Model:	M1000026
FCC ID:	YUG-CCM1000026
Industry Canada ID:	9422A-CCM1000026

Electromagnetic Compatibility Test Report

For
Clam Case LLC

Test Report Details

Tests Performed By:	**Underwriters Laboratories Inc. 1285 Walt Whitman Rd. Melville, NY 11747**
Tests Performed For:	**Clam Case LLC 7095 Hollywood Blvd Suite 444, Hollywood CA 90028**
Applicant Contact:	**Anthony Ahee**
Phone: E-mail:	**323-570-1142 anthony@clamcase.com**
RevisedTest Report Date:	**12 Jan 2011**
Product Type:	**iPad Accessory with KB and BT radio**
Product standards	**FCC Part 15 Subpart B and C, Section 15.247, RSS 210**
Model Number:	**M1000026**
Sample Serial Number:	**Prototype**
EUT Category:	**Information technology equipment**
Testing Start Date:	**2010-12-21**
Date Testing Complete:	**2011-01-12**
Overall Results:	**Compliant**

Underwriters Laboratories Inc. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. Underwriters Laboratories Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from Underwriters Laboratories Inc. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or endorsement by NVLAP, NIST, A2LA, or any agency of the US government.

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Report Directory

Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
10 Jan 2011	Change address to: 7095 Hollywood Blvd Suite 444, Hollywood CA 90028, and remove test set up photo's placed in separate document.	Joseph Danisi	Bob DeLisi
12 Jan 2011	Address TCB reviewer questions	Joseph Danisi	Bob DeLisi

1.0 G E N E R A L - Product Description

1.1 Equipment Description

The Clamcase is an all-in-one keyboard, stand, and case for the iPad. It includes a bluetooth keyboard, 360 degree hinge to accommodate various viewing configurations, and a plastic, protective case.

1.2 Equipment Marking Plate

Not provided at time of test

1.3 Device Configuration During Test

The Clamcase connects wirelessly to the iPad via Bluetooth as a human interface device. Once the user pairs the keyboard to an iPad using the pairing button, the device functions as a physical keyboard. The user can power down the device using the soft power button or just leave it idle until it enters sleep mode.

The worst-case channel is determined as the channel with the highest output power.

Radiated emission and power line conducted emission was performed with the EUT set to transmit at the channel with highest output power.

Radiated testing was performed in the normal orientation as a desktop unit.

The test utility software used during testing was Broadcom Bluetool

The antenna is specifically for Bluetooth mouse application. Its operation is in 2.4GHz band.The antenna type is meander stripe PCB antenna similar to those of the F-antenna.

The Clamcase is a Bluetooth 2.0 Device (non-EDR). The only modulation scheme used is GFSK, the data rate was evaluated for DH1 and DH3 and the worst case is reported DH5 is not an option.

1.3.1 Equipment Used During Test:

Use	Product Type	Manufacturer	Model	Comments
EUT	iPad Accessory with KB and BT radio	Clamcase LLC	M1000026	None
AE	Laptop	DELL	Latitude E5500	None
AE	Laptop	HP	HP mini	None
AE	AC Adaptor	DELL	FA90PE1-00	None
AE	AC Adaptor	DELL	N/A	None
Note: **EUT** - Equipment Under Test, **AE** - Auxiliary/Associated Equipment, or **SIM** - Simulator (Not Subjected to Test)				

Note: The model number throughout the report was a typographical error should be M1000026 not M10000026.

1.3.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
0	Enclosure	N/E	—	—	None
1	Mains	AC	NO	NO	AC Adaptor to charge equipment
2	Mains	DC	NO	NO	Internal Battery 3.7Volts
3	USB	I/O	NO	NO	None

Note:
AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

1.3.3 EUT Internal Operating Frequencies:

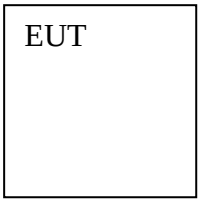
Frequency (MHz)	Description
2402-2480	Fundamental

1.3.4 Power Interface:

Mode # /Rated	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	120Vac	-	-	60Hz	Single Phase	None
2	Battery Operated	-	-	DC	N/A	3.7Volts

1.4 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



1.5 EUT Configurations

Mode #	Description
1	Per manufacturer Clam Case LLC utilized the laptop to set parameters then remove the USB cable and test as intended

1.6 EUT Operation Modes

Mode #	Description
1	Transmit 2402MHz, low band
2	Transmit 2440MHz, mid band
3	Transmit 2480MHz, high band
4	Transmit Hopping
5	Receive

2.0 Summary

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The applicant determined the list of tests performed were applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

2.1 Deviations from standard test methods

None

2.2 Device Modifications Necessary for Compliance

None

2.3 Reference Standards

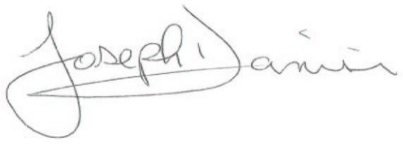
Standard Number	Standard Name	Standard Date
CFR 47	FCC Part 15, Subpart B, Class B	2009
CFR 47	FCC Part 15, Subpart C, 15.207, 15.209, and 15.247	2009
ICES-003, Issue 4	Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard: Digital Apparatus	2004
RSS- 210, Issue 8	Low-power License-exempt Radio communications Devices (All Frequency Bands): Category I Equipment sets out certification requirements for low-power license- exempt radio communication devices that are Category I equipment.	2010
RSS-GEN, Issue 3	General Requirements and Information for the Certification of Radio communication equipment.	2010

2.4 Results Summary

This product is considered Class B,

Requirement – Test	Result (Compliant / Non-Compliant)*
Conducted Emissions - Mains	Compliant
Fundamental Radiated Emissions	Compliant
Occupied Bandwidth 20dB	Compliant
Occupied Bandwidth 99%	Compliant
Radiated Emissions - Unintentional	Compliant
Restricted Band Radiated Emissions	Compliant
Hopping Channels	Compliant
Channel Occupancy	Compliant
Band Edge Measurements	Compliant
Peak Power Output	Compliant
Conducted Spurious Emission antenna port	Compliant
Channel Separation	Compliant

Test Engineer:



Joe Danisi (Ext.23055)
Lead Engineering Associate
International EMC Services
Conformity Assessment Services-

Reviewer:

Bob DeLisi(Ext.22452)
Senior Staff Engineer
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Conformity Assessment Services

Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

3.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or the manufacturers' recommendation, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

4.0 EMISSIONS TEST RESULTS

The emissions tests were performed according to following regulations:

---------- United States ----------

FCC Part 15, Subpart C, 15.207, 15.209, & 15.247.	Code of Federal Regulations, Part 15, and Subpart C, Radio Frequency Devices: 2009.
FCC Part 15, Subpart B, 15.107 & 15.109	Code of Federal Regulations, Part 15, and Subpart B, Radio Frequency Devices: 2009.

---------- Industry Canada ----------

Radio Standards Specification 210, Issue 8	Low-power License-exempt Radio communications Devices (All Frequency Bands): Category I Equipment sets out certification requirements for low-power license- exempt radio communication devices that are Category I equipment. 2010
RSS-GEN, Issue 3	General Requirements and Information for the Certification of Radio communication Equipment.
ICES-003, Issue 4	Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard: Digital Apparatus. 2004

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be verified at the time the test is conducted.

Ambient Temperature, °C	22.5 ± 2.5	Relative Humidity, %	45 ± 15	Barometric Pressure, mBar	950 ± 150

Measurement Uncertainty

Test	Uncertainty
Conducted Emissions	± 3.3, K=2
Radiated Emissions 30-200 MHz, Horizontal	± 3.1, K=2
Radiated Emissions 30-200MHz, Vertical	± 3.2, K=2
Radiated Emissions, 200-1000MHz, Horizontal	± 3.3, K=2
Radiated Emissions, 200-1000MHz, Vertical	± 4.0, K=2

Sample Calculations

Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:

Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)
Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)
Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

4.1 Test Conditions and Results – SPURIOUS EMISSIONS (Antenna Conducted and Radiated)

Test Description	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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section15.205(c)). Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter below 1GHz and at 4-meter above 1GHz. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

Basic Standard	47 CFR Part 15.247, RSS-210, RSS-Gen	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance
Fully configured sample scanned over the following frequency range	1GHz – 26GHz	4 meter distance
Fully configured sample scanned over the following frequency range	30MHz – 26GHz	Conducted at antenna port

Limits (Antenna Conducted)

All emissions must be 20dB below the level of the fundamental frequency.

Limits (Radiated – Restricted Bands Only)

Limits

Frequency (MHz)	Limit (dBµV/m)		
	Quasi-Peak	Average	
	General Emissions	Fundamental	Spurious
30 – 88	40	-	-
88 – 216	43.5	-	-
216 - 960	46	-	
1000 - 10000	-	-	54

Supplementary information: Spurious limits are only applied against products of the transmitter. All other emissions must meet the general limits. The measurement points above 1GHz were extrapolated to 4-meters

Table 1 SPURIOUS EMISSIONS EUT Configuration Settings

Power Interface	EUT Configurations	EUT Operation Mode #
1	1	1-5
Supplementary information: When maximized data for Avg. measurements the resolution Bandwidth was set at 1MHz and Video Bandwidth was set at 10Hz.		

Table 2 SPURIOUS CONDUCTED EMISSIONS Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal date	Cal due date
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2010-01-12	2011-01-12
Spectrum Analyzer	Agilent	E7405A	19695	2010-02-01	2011-02-01
Cable	Megaphase	TM26-S1S1	70188	NA	NA
Attenuator	Pasternak	PE7024-20	70188	NA	NA
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	43734	2010-02-01	2012-02-01
Multimeter	Fluke	83III	ME5B-305	2010-08-03	2011-08-03

Table 3 SPURIOUS RADIATED EMISSIONS Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	22 Feb 10	22 Feb 11
Bicon Antenna	Schaffner	VBA6106A	43441	9 Sep 2010	9 Sep 2011
Log-P Antenna	Schaffner	UPA6109	44067	26 Apr 10	26 Apr 11
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	1 Feb 10	1 Feb 11
Multimeter	Fluke	83III	ME5B-305	3 Aug 10	3 Aug 12

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Above 1GHz (Band Optimized System)					
Spectrum Analyzer	Agilent	E7405A	19695	1 Feb 2010	1 Feb 2011
Horn Antenna (1-2 GHz)	ETS	3161-01	51442	28 Mar 2008	See * below
Horn Antenna (2-4 GHz)	ETS	3161-02	48107	27 Sept 2007	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03	48106	27 Sept 2007	See * below
Horn Antenna (8-12 GHz)	ETS	3160-07	8933	24 Nov 2008	See * below
Horn Antenna (12-18 GHz)	ETS	3160-08	8932	27 Sept 2007	See * below
Horn Antenna (18-26.5 GHz)	ETS	3160-09	8947	26 Sept 2007	See * below
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	12-07-2010	12-07-2012
Multimeter	Fluke	83III	ME5B-305	1 Feb 10	1 Feb 11

* Note: As allowed by the calibration standard ANSI C63.4 Section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration.

* Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than $2D^2/\lambda$. Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances.

Figure 1: Test setup for SPURIOUS EMISSIONS – Antenna conducted

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Figure 2: Test setup for SPURIOUS EMISSIONS – Radiated

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Figure 3: Test setup for SPURIOUS EMISSIONS – Radiated continued

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Figure 4: 30MHz-25GHz Antenna Port Spurious Emissions Plots TX Mode, Low Channel.

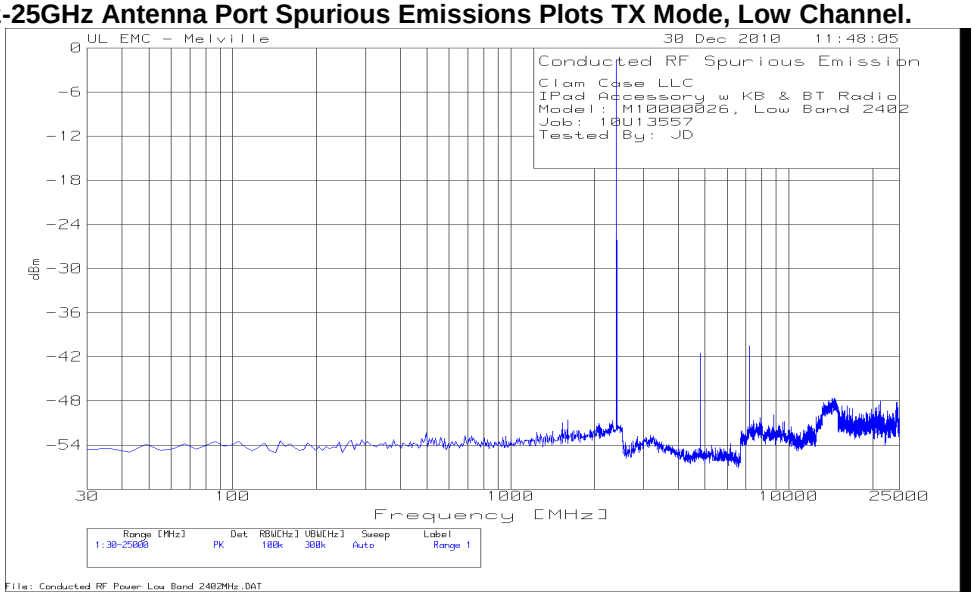

Table 4: Antenna Port Spurious Emissions

Clam Case LLC
IPad Accessory w KB & BT Radio
Model: M10000026, Low Band 2402
Job: 10U13557, Tested By: JD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]		Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm	Limit:1 dBm	2	3
4	5	6							
Range 1 30 - 25000MHz ----------									
1	2396.825	84.91	PK	20.5	-107	-1.59	-	-	-
					Margin [dB]		-	-	-
2	4801.02	44.68	PK	20.8	-107	-41.52	-	-	-
					Margin [dB]		-	-	-
3	7205.216	45.68	PK	20.8	-107	-40.52	-	-	-
					Margin [dB]		-	-	-
4	14293.233	38.53	PK	20.8	-107	-47.67	-	-	-
					Margin [dB]		-	-	-
5	21368.793	38.47	PK	20.6	-107	-47.93	-	-	-
					Margin [dB]		-	-	-
6	24339.78	37.89	PK	20.9	-107	-48.21	-	-	-
					Margin [dB]		-	-	-
7	1599.578	35.89	PK	20.5	-107	-50.61	-	-	-
					Margin [dB]		-	-	-
8	497.1364	34.36	PK	20.3	-107	-52.34	-	-	-
					Margin [dB]		-	-	-

LIMIT 1: -20dBc; PK - Peak detector

All emissions are greater than -20dBc

Figure 5: 30MHz-25GHz Antenna Port Spurious Emissions Plots TX Mode, Middle Channel.

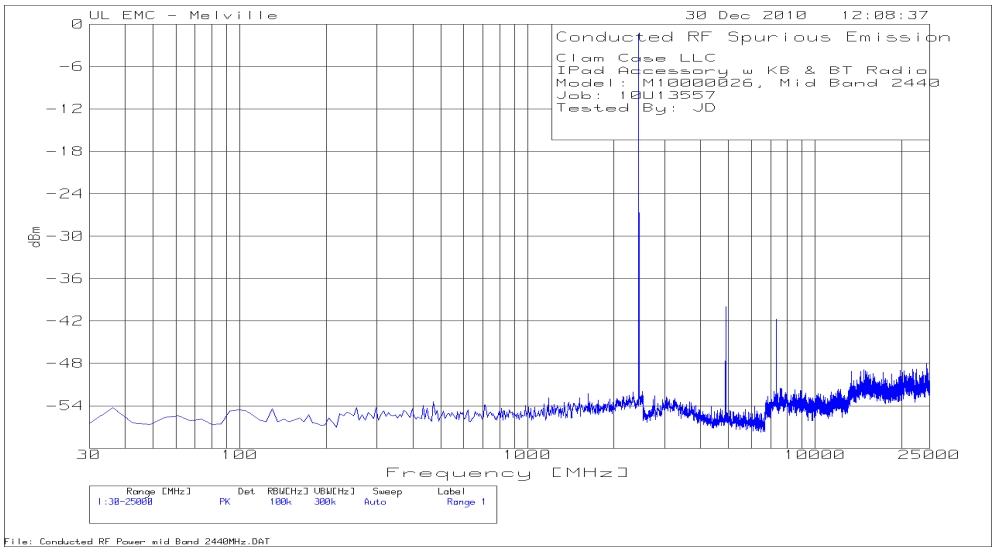

Table 5: Antenna Port Spurious Emissions

Clam Case LLC
IPad Accessory w KB & BT Radio
Model: M10000026, Mid Band 2440
Job: 10U13557, Tested By: JD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm	Limit:1	2	3	4	5	6
Range 1 30 - 25000MHz ----------											
1	2440.424	85.03 PK	20.6	-107	-1.37	-	-	-			
				Margin [dB]		-	-	-			
2	4888.219	46.2 PK	20.8	-107	-40	-	-	-			
				Margin [dB]		-	-	-			
3	7336.014	44.5 PK	20.8	-107	-41.7	-	-	-			
				Margin [dB]		-	-	-			
4	13402.559	37.11 PK	20.8	-107	-49.09	-	-	-			
				Margin [dB]		-	-	-			
5	14990.823	37.18 PK	20.8	-107	-49.02	-	-	-			
				Margin [dB]		-	-	-			
6	24470.579	38.34 PK	20.7	-107	-47.96	-	-	-			
				Margin [dB]		-	-	-			
7	1630.721	34.23 PK	20.5	-107	-52.27	-	-	-			
				Margin [dB]		-	-	-			
8	472.2225	33.31 PK	20.3	-107	-53.39	-	-	-			
				Margin [dB]		-	-	-			

LIMIT 1: -20dBc; PK - Peak detector
All emissions are greater than -20dBc

Figure 6: 30MHz-25GHz Antenna Port Spurious Emissions Plots TX Mode, High Channel.

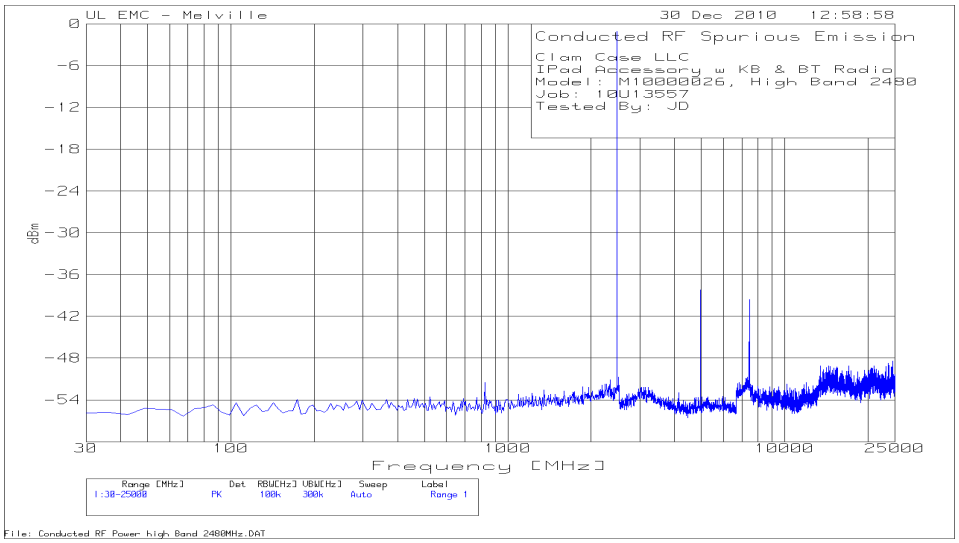

Table 6: Antenna Port Spurious Emissions

Clam Case LLC
IPad Accessory w KB & BT Radio
Model: M10000026, High Band 2480
Job: 10U13557, Tested By: JD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]		Gain/Loss Factor [dB]	Transducer Factor [dBm]	Level	Limit:1	2	3
4	5	6							
Range 1 30 - 25000MHz ----------									
1	2477.795	85.43	PK	20.5	-107	-1.07	-	-	-
					Margin [dB]		-	-	-
2	4962.961	47.97	PK	20.8	-107	-38.23	-	-	-
					Margin [dB]		-	-	-
3	7448.127	46.61	PK	20.8	-107	-39.59	-	-	-
					Margin [dB]		-	-	-
4	14374.203	37.11	PK	20.8	-107	-49.09	-	-	-
					Margin [dB]		-	-	-
5	24501.721	37.91	PK	20.7	-107	-48.39	-	-	-
					Margin [dB]		-	-	-
6	827.2462	35.22	PK	20.3	-107	-51.48	-	-	-
					Margin [dB]		-	-	-
7	17027.538	37.16	PK	20.7	-107	-49.14	-	-	-
					Margin [dB]		-	-	-

LIMIT 1: -20dBc; PK - Peak detector
All emissions are greater than -20dBc

Figure 7: 30MHz-25GHz Antenna Port Spurious Emissions Plots TX Mode, Hopping

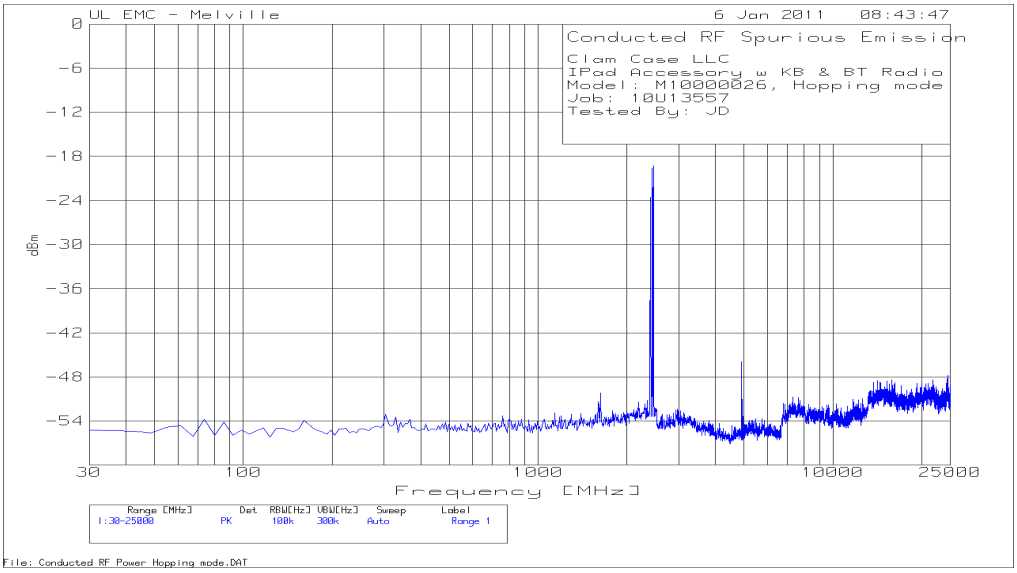

Table 7: Antenna Port Spurious Emissions

Clam Case LLC
IPad Accessory w KB & BT Radio
Model: M10000026, Hopping mode
Job: 10U13557
Tested By: JD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm	Limit:1	2	3
4	5	6						
Range 1 30 - 25000MHz ----------								
1	1624.492	36.3 PK	20.5	-107	-50.2	-	-	-
				Margin [dB]		-	-	-
2	2403.053	62.86 PK	20.6	-107	-23.54	-	-	-
				Margin [dB]		-	-	
3	2440.424	66.8 PK	20.6	-107	-19.6	-	-	-
				Margin [dB]		-	-	-
4	2452.881	64.17 PK	20.6	-107	-22.23	-	-	-
				Margin [dB]		-	-	-
5	2480.008	67.13 PK	20.6	-107	-19.27	-	-	-
				Margin [dB]		-	-	-
6	4906.904	40.29 PK	20.8	-107	-45.91	-	-	-
				Margin [dB]		-	-	-
7	14480.087	37.27 PK	21	-107	-48.73	-	-	-
				Margin [dB]		-	-	-

LIMIT 1: -20dBc; PK - Peak detector
All emissions are greater than -20dBc

Figure 8 Radiated Spurious Emissions below 1GHz, Low Channel

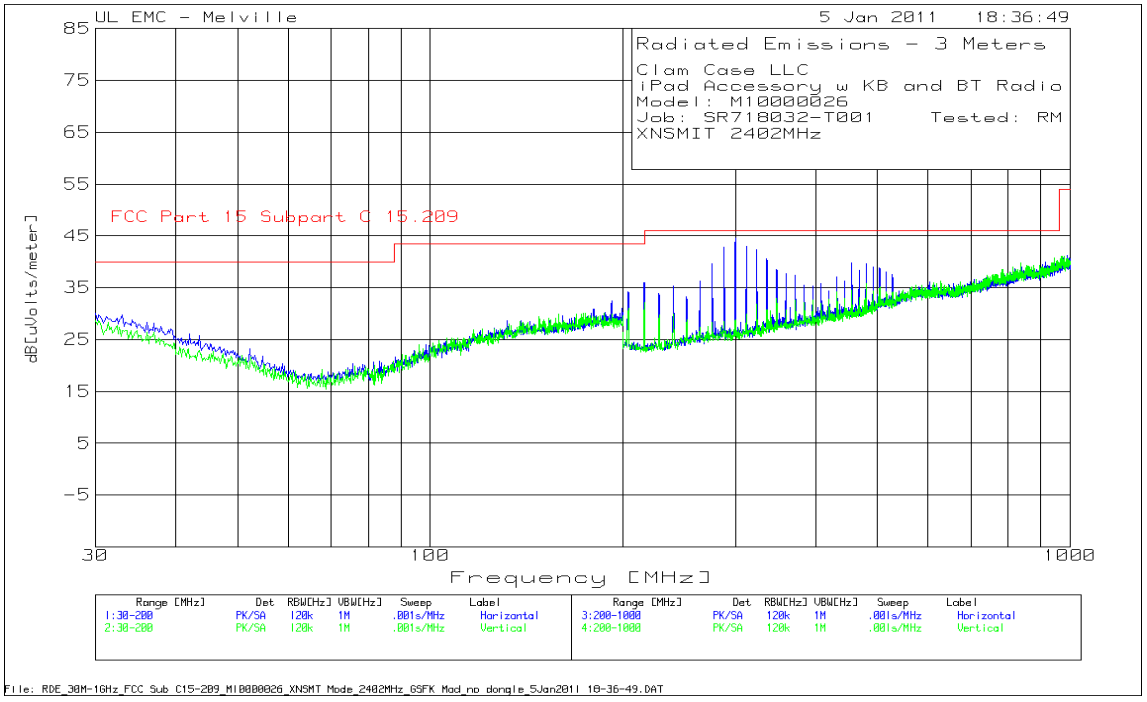

Figure 9 Radiated Spurious Emissions above 1GHz, Low Channel

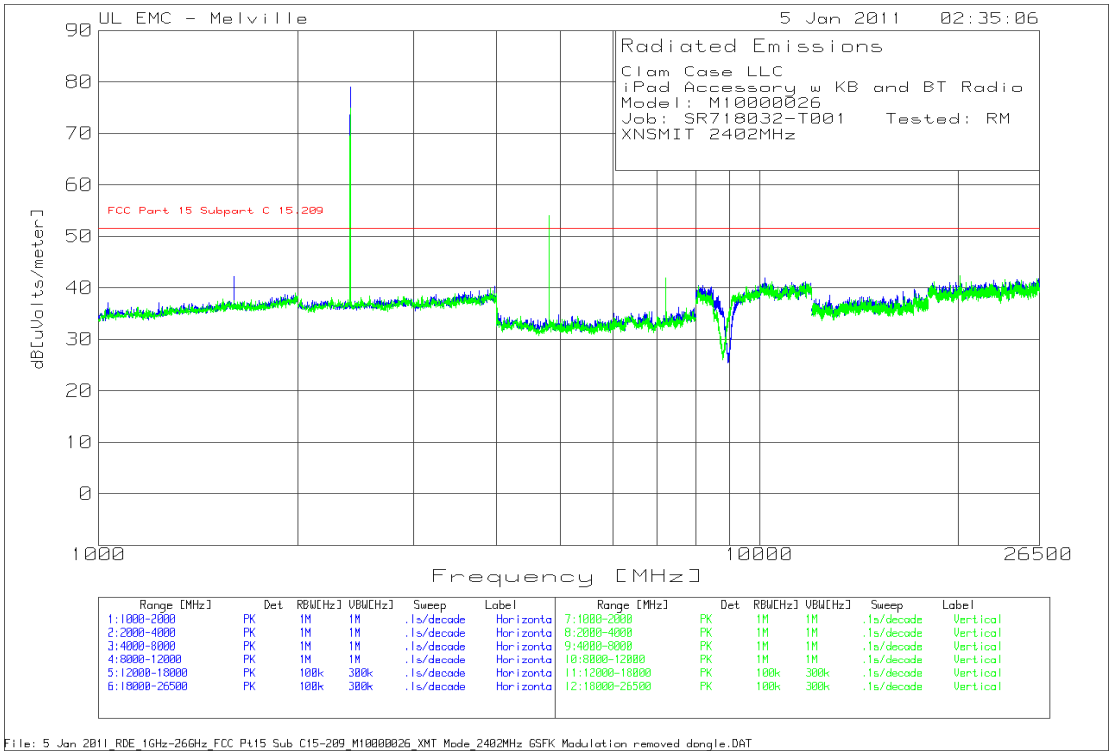

Table 8 Radiated Spurious Emissions below 1GHz, Low Channel

```
Clam Case LLC
iPad Accessory w KB and BT Radio
Model: M10000026
Job: SR718032-T001   Tested: RM
XNSMIT 2402MHz
```

Test Frequency [MHz]	Meter Reading [dB(uV)]		Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Horizontal 200 - 1000MHz									
287.9922	28.69	QP	1	13.6	43.29	46	-	-	
Azimuth: 1	Height:102	Horz			Margin [dB]:	-2.71	-	-	
299.9971	29.03	QP	1	13.8	43.83	46	-	-	
Azimuth: 356	Height:105	Horz			Margin [dB]:	-2.17	-	-	
311.9977	28.48	QP	1	13.9	43.38	46	-	-	
Azimuth: 15	Height:106	Horz			Margin [dB]:	-2.62	-	-	
323.9937	26.59	QP	1	14.4	41.99	46	-	-	
Azimuth: 14	Height:104	Horz			Margin [dB]:	-4.01	-	-	
335.9953	24.41	QP	1	15	40.41	46	-	-	-
Azimuth: 27	Height:110	Horz			Margin [dB]:	-5.59	-	-	

```
LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection
```

Table 9 Radiated Spurious Emissions above 1GHz, Low Channel

```
 Clam Case LLC
 iPad Accessory w KB and BT Radio
 Model: M10000026
 Job: SR718032-T001   Tested: RM
 XNSMIT 2402MHz
```

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Horizontal 2000 - 4000MHz								
Horizontal 4000 - 8000MHz								
4804.09	75.35 PK	-53.54	27.1	49.21	74.0	-	-	
Azimuth: 309	Height:220 Horz		Margin [dB]:	-24.79		-	-	
4804.09	72.12 Av	-53.54	27.1	45.68	54.0	-	-	
Azimuth: 309	Height:220 Horz		Margin [dB]:	-8.32		-	-	
7206.115	63.89 PK	-52.48	27.9	39.31	74.0	-	-	
Azimuth: 305	Height:244 Horz		Margin [dB]:	-34.69		-	-	
7206.115	55.75 Av	-52.48	27.9	31.17	54.0	-	-	
Azimuth: 305	Height:244 Horz		Margin [dB]:	-22.83		-	-	
Vertical 2000 - 4000MHz								
2402.06	93.41 PK	-43.78	21.3	70.93	74.0	-	-	
Azimuth: 36	Height:329 Vert		Margin [dB]:	-3.07		-	-	

```
LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection
```

Clam Case LLC
iPad Accessory w KB and BT Radio
Model: M10000026
Job: SR718032-T001 Tested: RM
XNSMIT 2402MHz

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Vertical 4000 - 8000MHz								
4804.075	85.7 PK	-53.54	27.3	59.46	74.0	-	-	
Azimuth: 346	Height:304 Vert			Margin [dB]:	-14.54	-	-	-
*4804.075	41.3 Av	-53.54	27.3	15.06	54.0	-	-	-
Azimuth: 346	Height:304 Vert			Margin [dB]:		-38.94	-	-
7206.115	69.54 PK	-52.48	27.9	44.96	54.0	-	-	-
Azimuth: 313	Height:282 Vert			Margin [dB]:	-9.04	-	-	-
7206.115	62.9 Av	-52.48	27.9	38.32	54.0	-	-	-
Azimuth: 313	Height:282 Vert			Margin [dB]:	-15.68	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209
***LIMIT 2: Duty cycle correction -41.5dB**

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Figure 10 Radiated Spurious Emissions below 1GHz, Middle Channel

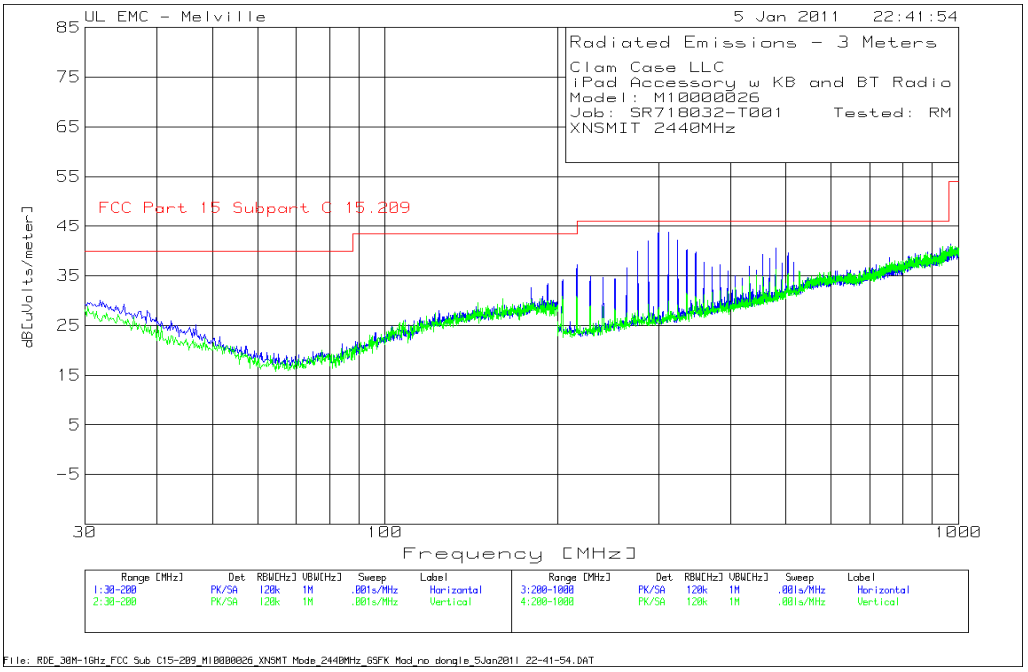

Figure 11 Radiated Spurious Emissions above 1GHz, Middle Channel

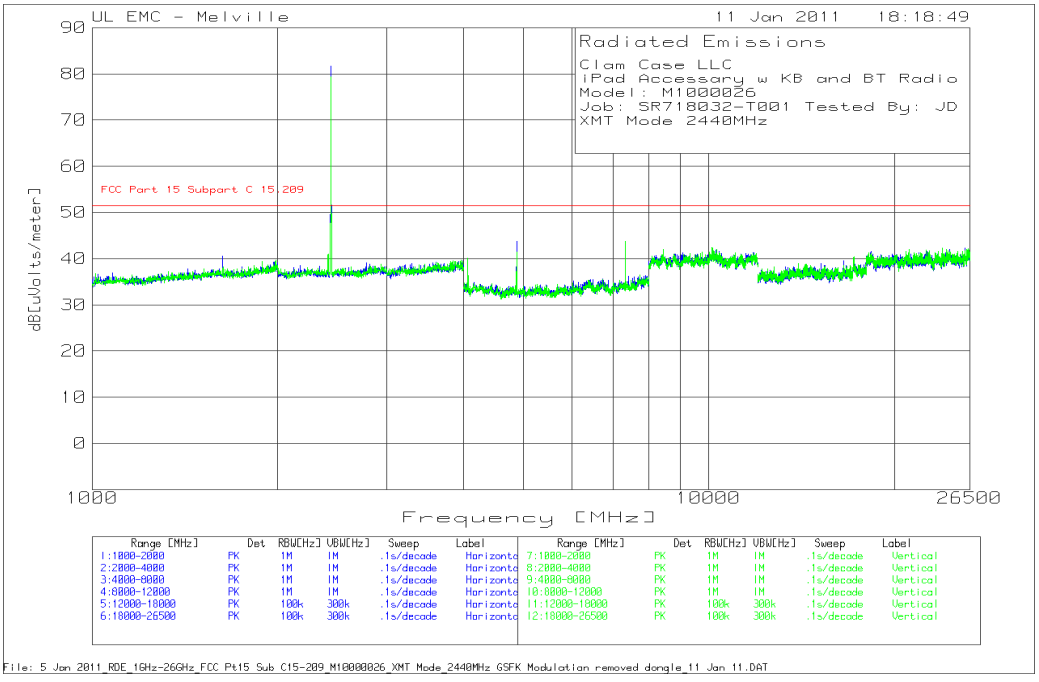

Table 10 Radiated Spurious Emissions below 1GHz, Middle Channel

```
 Clam Case LLC
 iPad Accessory w KB and BT Radio
 Model: M10000026
 Job: SR718032-T001    Tested: RM
 XNSMIT 2440MHz
```

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Horizontal 200 - 1000MHz								
275.9899	24.48 QP	1	13.4	38.88	46	-	-	
Azimuth: 20	Height:116 Horz		Margin [dB]:	-7.12		-	-	
287.9949	28.51 QP	1	13.6	43.11	46	-	-	
Azimuth: 351	Height:106 Horz		Margin [dB]:	-2.89		-	-	
299.9934	27.9 QP	1	13.8	42.7	46	-	-	
Azimuth: 24	Height:116 Horz		Margin [dB]:	-3.3		-	-	
311.9989	27.85 QP	1	13.9	42.75	46	-	-	
Azimuth: 345	Height:110 Horz		Margin [dB]:	-3.25		-	-	
323.9975	26.25 QP	1	14.4	41.65	46	-	-	
Azimuth: 20	Height:104 Horz		Margin [dB]:	-4.35		-	-	
335.9936	24.63 QP	1	15	40.63	46	-	-	
Azimuth: 38	Height:105 Horz		Margin [dB]:	-5.37		-	-	
479.998	16.75 QP	1.2	17.7	35.65	46	-	-	
Azimuth: 204	Height:220 Horz		Margin [dB]:	-10.35		-	-	
Vertical 200 - 1000MHz								
936.3682	8.46 QP	1.7	23.7	33.86	46	-	-	
Azimuth: 308	Height:129 Vert		Margin [dB]:	-12.14		-	-	

```
LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection
```

Table 11 Radiated Spurious Emissions above 1GHz, Middle Channel

```
 Clam Case LLC
 iPad Accessory w KB and BT Radio
 Model: M10000026    XMT Mode
 Job: SR718032-T001
 Tested By: JD       2440MHz

  Test     Meter     Gain/Loss  Transducer  Level  Limit:1      2       3       4
Frequency  Reading    Factor     Factor  dB[uVolts/meter]
 [MHz]     [dB(uV)]     [dB]       [dB]
================================================================================
Horizontal 4000 - 8000MHz
4880.075   72.34 PK      -53.43    27.2      46.11   74.0       -       -       -
Azimuth: 315  Height:398 Horz         Margin [dB]:   -27.89      -       -       -

4880.075   68.63 Av      -53.43    27.2      42.4    54.0       -       -       -
Azimuth: 315  Height:398 Horz         Margin [dB]:   -11.6       -       -       -

7320.375   67.83 PK      -52.31    28        43.52   74.0       -       -       -
Azimuth: 254  Height:361 Horz         Margin [dB]:   -30.48      -       -       -

7320.375   63.25 Av      -52.31    28        36.44   54.0       -       -       -
Azimuth: 254  Height:361 Horz         Margin [dB]:   -17.56     -       -       -


LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection
```

Clam Case LLC
iPad Accessory w KB and BT Radio
Model: M10000026 XMT Mode
Job: SR718032-T001
Tested By: JD 2440MHz

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Vertical 4000 - 8000MHz								
4880.0625	71.38 PK	-53.43	27.5	45.45	74.0	-	-	-
Azimuth: 69	Height:362 Vert			Margin [dB]:	-28.55	-	-	-
4880.0625	67.31 Av	-53.43	27.5	41.38	54.0	-	-	-
Azimuth: 69	Height:362 Vert			Margin [dB]:	-12.62	-	-	-
7320.4	70.57 PK	-52.31	27.9	46.16	74.0	-	-	-
Azimuth: 222	Height:247 Vert			Margin [dB]:	-27.84	-	-	-
7320.4	63.88 Av	-52.31	27.9	39.47	54.0	-	-	-
Azimuth: 222	Height:247 Vert			Margin [dB]:	-14.53	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Figure 12 Radiated Spurious Emissions below 1GHz, High Channel

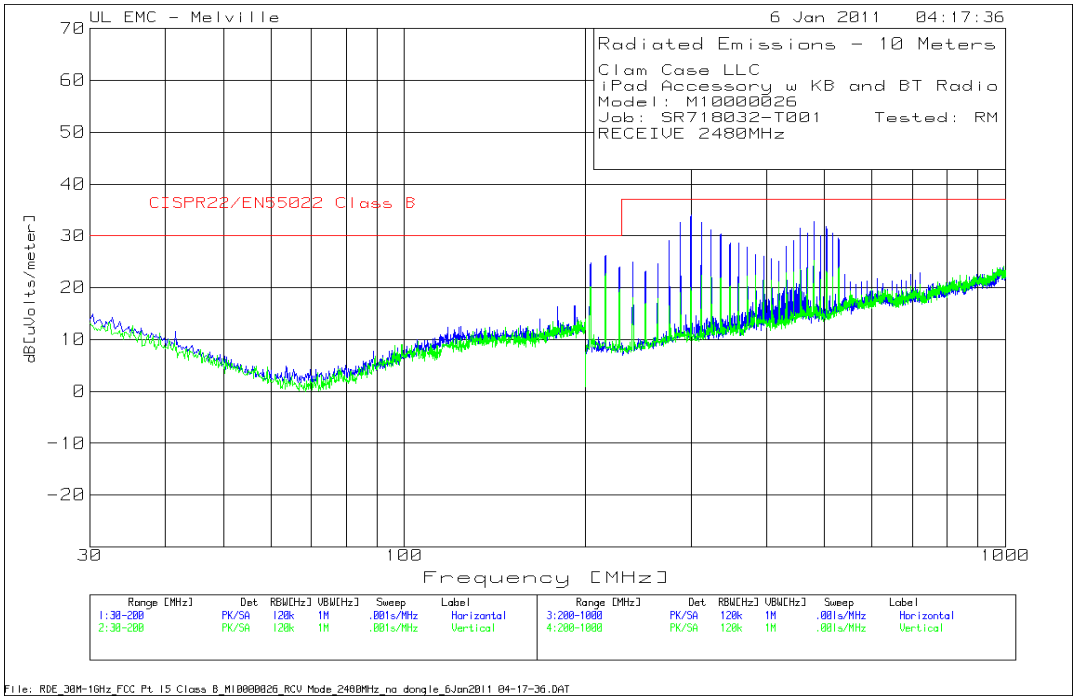

Figure 13 Radiated Spurious Emissions above 1GHz, High Channel

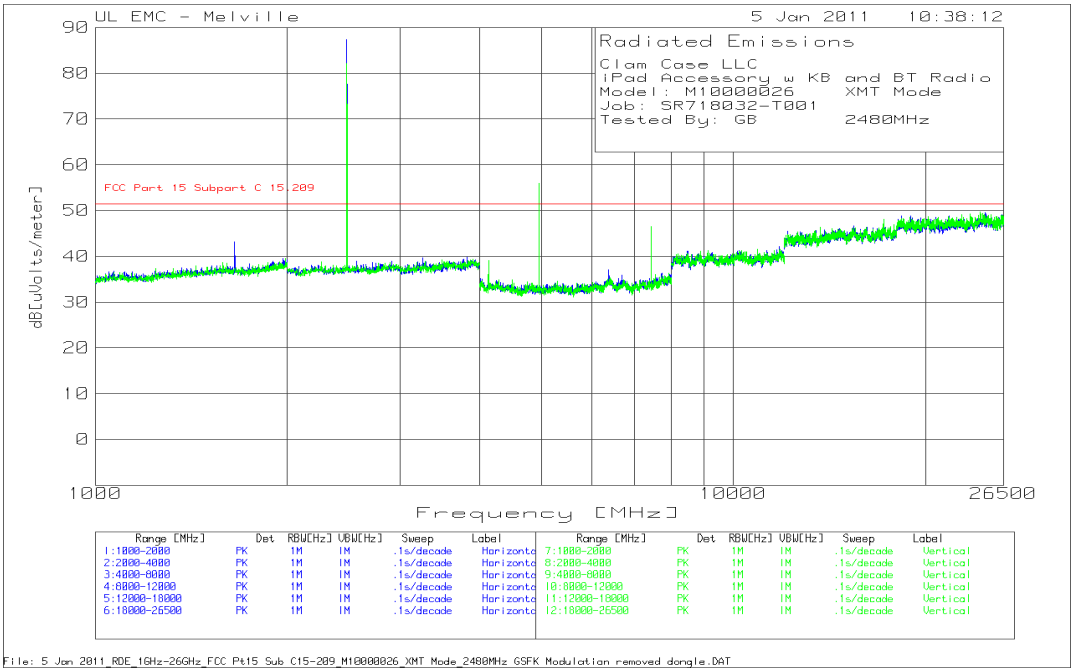

Table 12 Radiated Spurious Emissions below 1GHz, High Channel

```
 Clam Case LLC
 iPod Accessory w KB and BT Radio
 Model:M10000026    XMT Mode
 Job:SR718032-T001
 Tested By:GB   2480MHz

  Test     Meter     Gain/Loss  Transducer  Level  Limit:1      2       3       4
Frequency  Reading    Factor     Factor  dB[uVolts/meter]
 [MHz]     [dB(uV)]     [dB]       [dB]
================================================================================
Horizontal 30 - 200MHz
33.74      17.18 QP      .3        17.2      34.68   40         -       -
Azimuth: 203  Height:400 Horz          Margin [dB]:   -5.32      -       -

Vertical 30 - 200MHz
33.75      23.08 QP      .3        15.8      39.18   40         -       -
Azimuth: 327  Height:180 Vert          Margin [dB]:   -.82       -       -

Horizontal 200 - 1000MHz
287.9892   21.87 QP      1         13.6      36.47   46         -       -
Azimuth: 27   Height:113 Horz          Margin [dB]:   -9.53      -       -

299.9887   22.24 QP      1         13.8      37.04   46         -       -
Azimuth: 344  Height:109 Horz          Margin [dB]:   -8.96      -       -

312.0012   20.17 QP      1         13.9      35.07   46         -       -
Azimuth: 343  Height:104 Horz          Margin [dB]:   -10.93     -       -

480.002    14.03 QP      1.2       17.7      32.93   46         -       -
Azimuth: 177  Height:192 Horz          Margin [dB]:   -13.07     -       -


LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection
```

Table 13 Radiated Spurious Emissions above 1GHz, High Channel

```
Clam Case LLC
iPad Accessory w KB and BT Radio
Model: M10000026    XMT Mode
Job: SR718032-T001
Tested By: GB       2480MHz
```

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
Horizontal 1000 - 2000MHz								
1	1654.182	64.26 PK	-44.45	20.9	40.71	74.0	-	-
		Height:223 Horz		Margin [dB]		-33.29	-	-
Horizontal 4000 - 8000MHz								
3	4958.403	78.45 PK	-53.27	27.3	52.48	54.0	-	-
		Height:223 Horz		Margin [dB]		-1.52	-	-
4	7440.932	61.89 PK	-52	28.1	37.99	54.0	-	-
		Height:223 Horz		Margin [dB]		-16.01	-	-
Vertical 4000 - 8000MHz								
5	4958.403	79.38 PK	-53.27	27.4	53.51	54.0	-	-
		Height:223 Vert		Margin [dB]		-0.49	-	-
7	7440.932	68.09 PK	-52	28	44.09	54.0	-	-
		Height:223 Vert		Margin [dB]		-9.91	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

4.2 Test Conditions and Results – BAND EDGE COMPLIANCE

Test Description	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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section15.205(c)).

Basic Standard	47 CFR Part 15.247(d) RSS-210, A8.5	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	2400MHz – 2483.5MHz	Antenna Conducted

Limits	
Measurement Type	
Conducted	Antenna Conducted – 20dB below the fundamental
Radiated	Radiated only required if emissions are in the restricted band
Supplementary information: None	

Table 14 Band Edge Compliance EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1-4
Supplementary information: None		

Table 15 Band Edge Compliance Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal date	Cal due date
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	12 Jan 2010	12 Jan 2011
Spectrum Analyzer	Agilent	E7405A	19695	1 Feb 2010	1 Feb 2011
Cable	Megaphase	TM26-S1S1	70-188	01/04/2011	01/04/2012
Attenuator	Pasternak	PE7024-20	70-188	01/04/2011	01/04/2012
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	43734	1 Feb 10	1 Feb 11
Multimeter	Fluke	83III	ME5B-305	3 Aug 10	3 Aug 12

Figure 14: Test setup for Band Edge Compliance – Conducted

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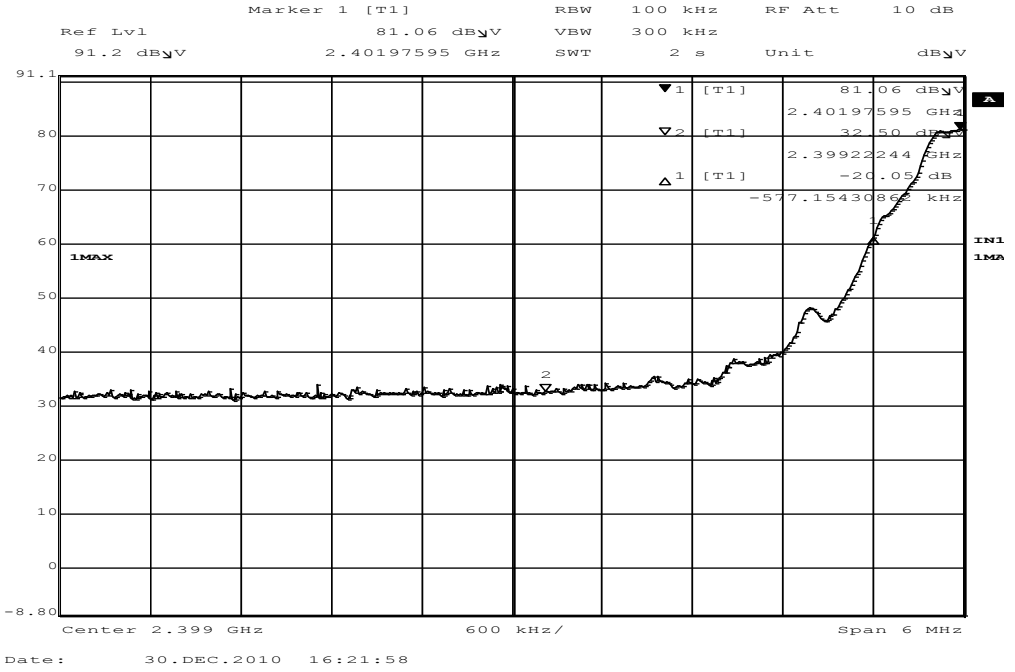
Figure 15: Conducted Band Edge Compliance Graph

Low Channel



High Channel

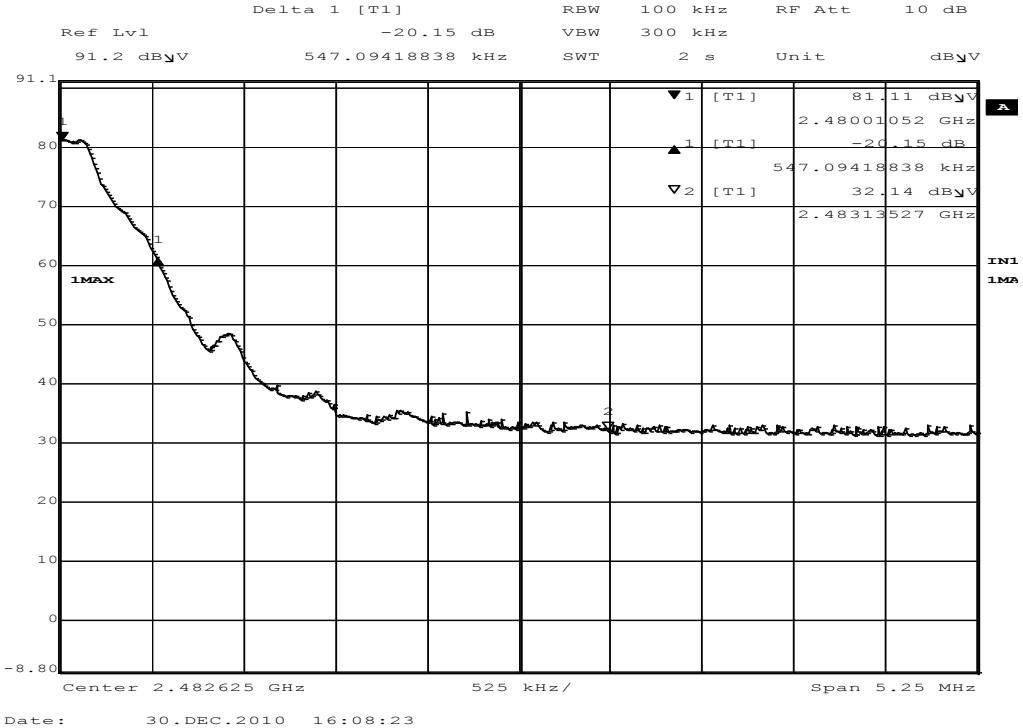
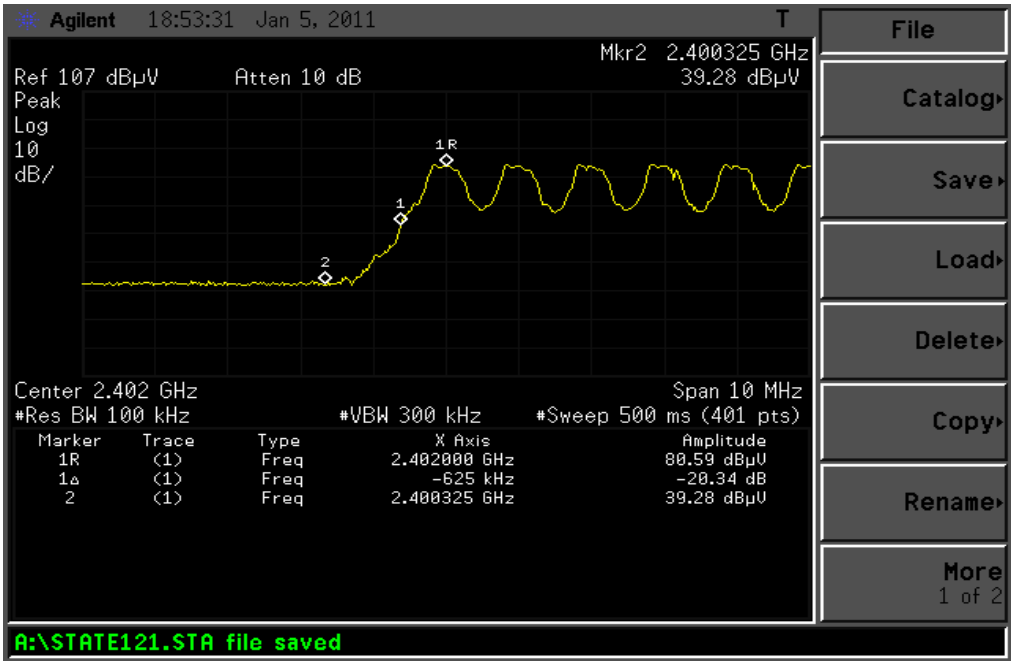


Figure 16: Conducted Band Edge Compliance Graph Hopping

Low Channel



High Channel

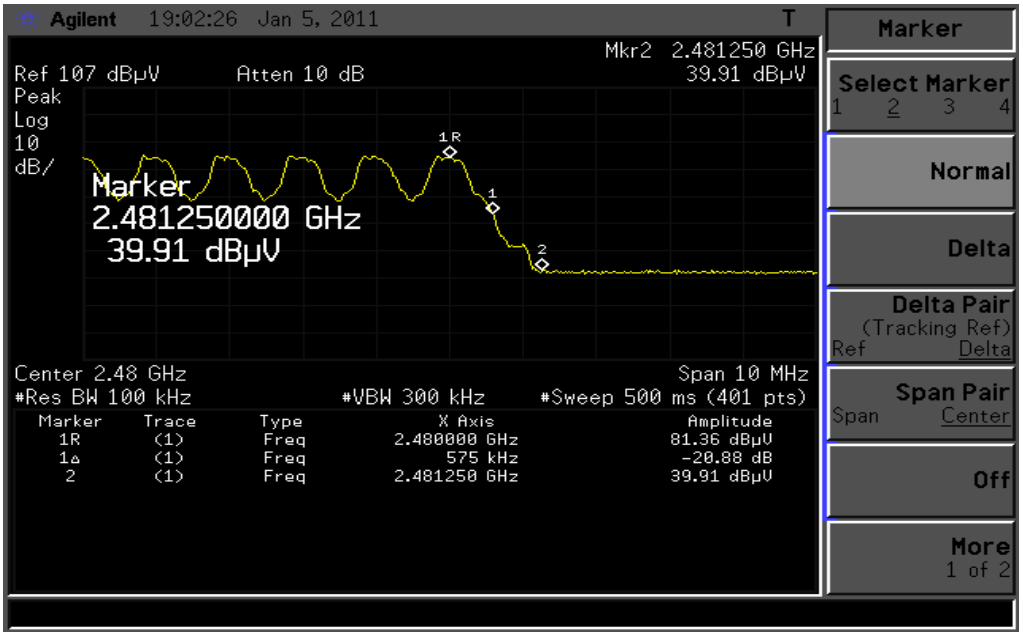
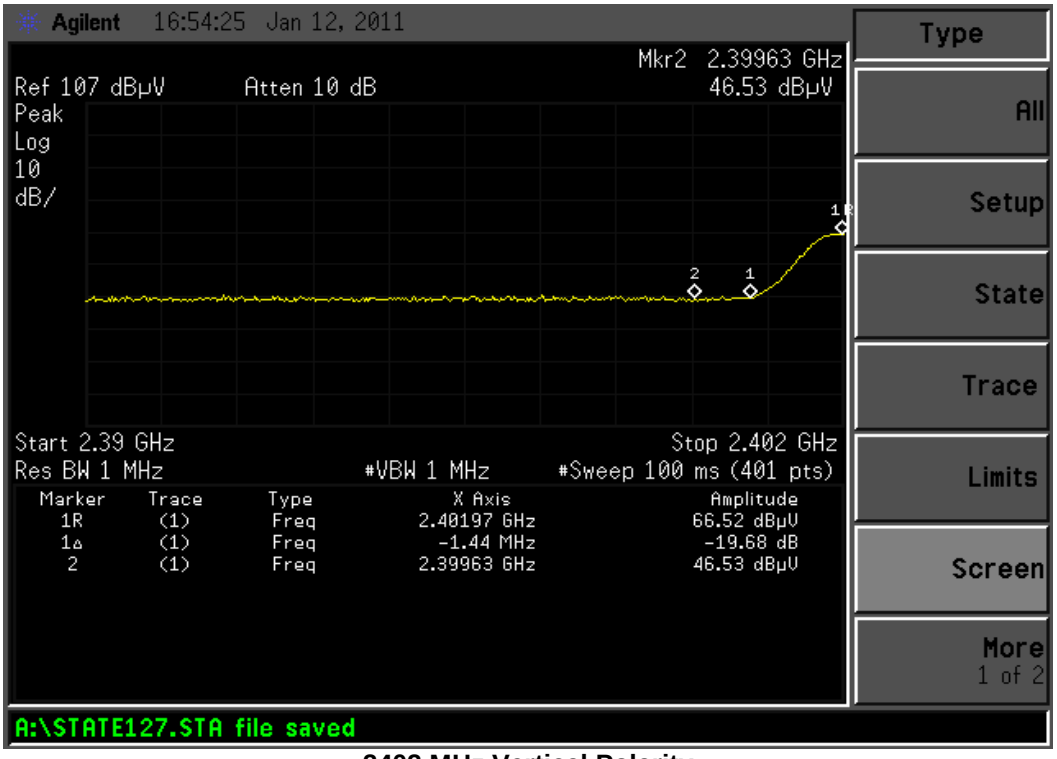
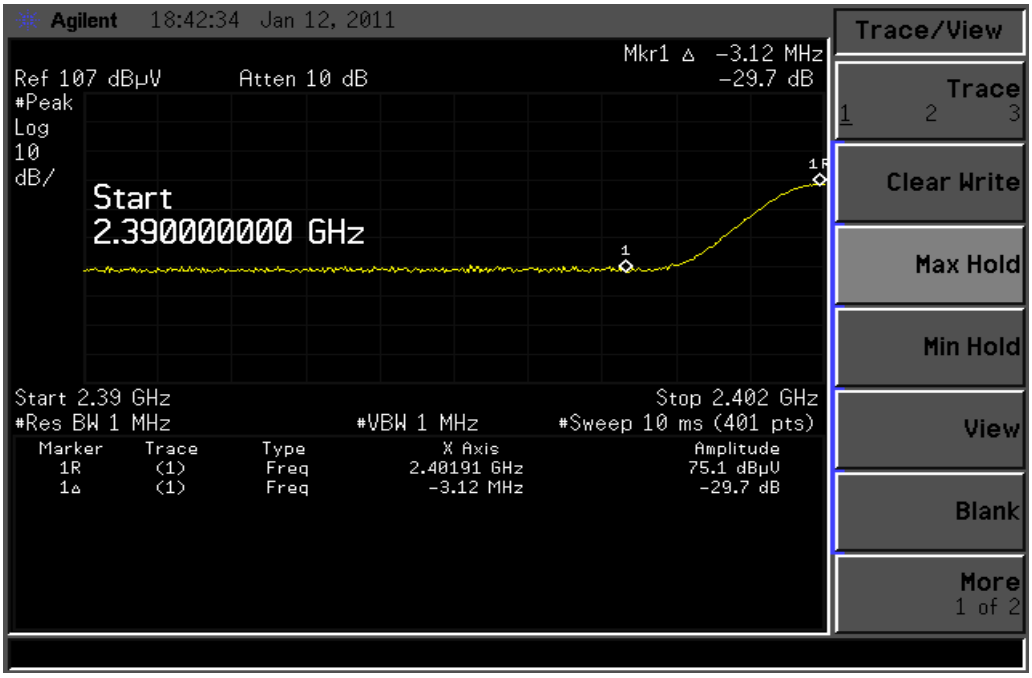


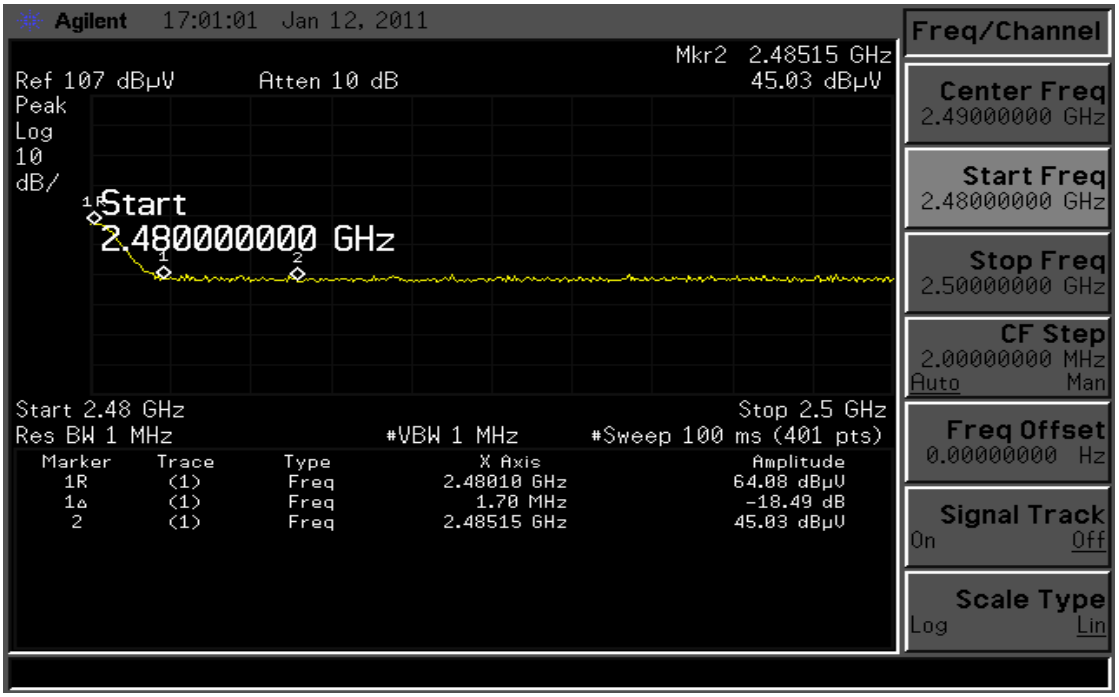
Figure 17: RADIATED BAND EDGE COMPLIANCE



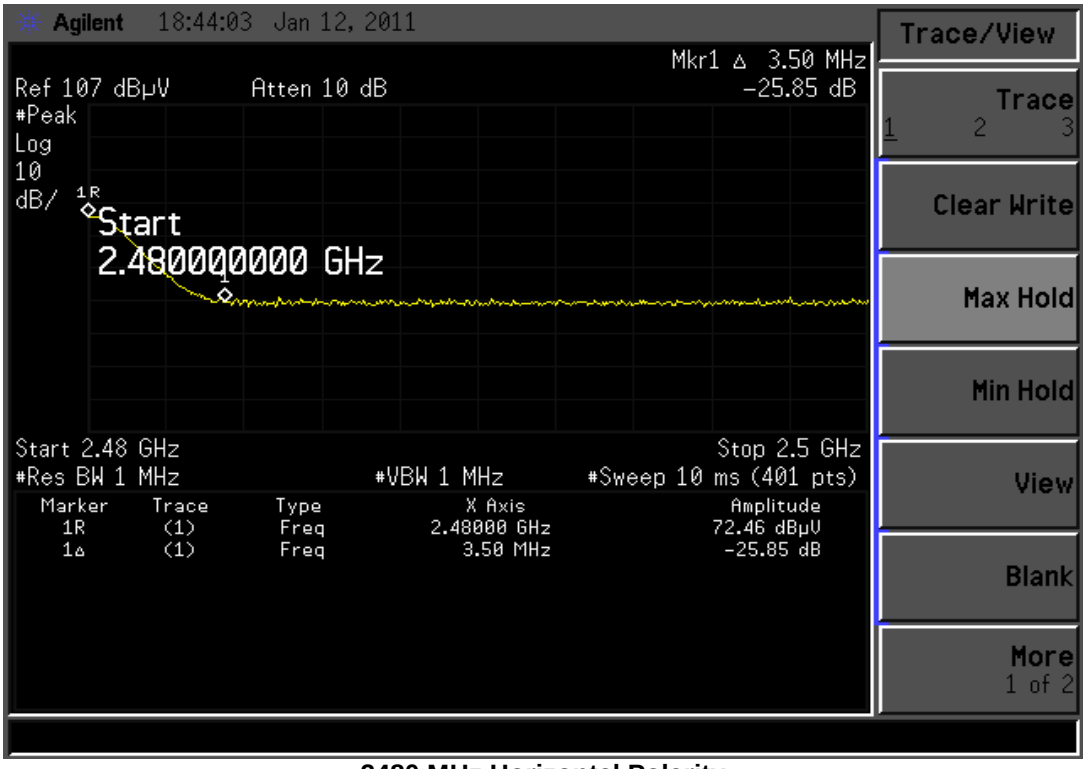
2402 MHz Vertical Polarity



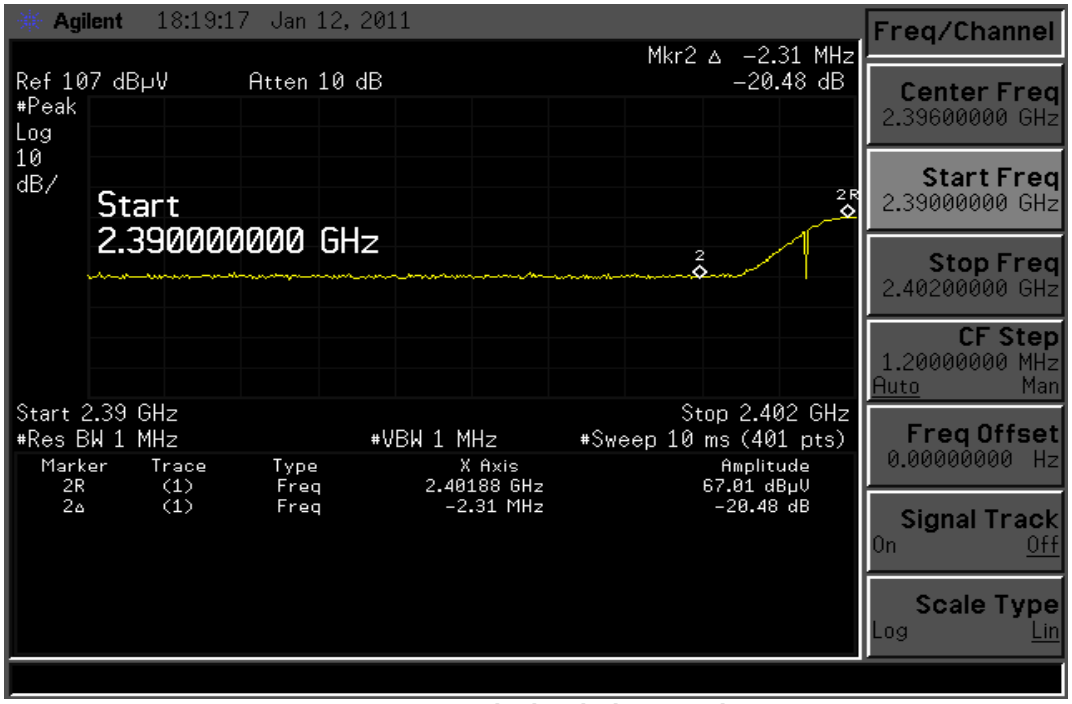
2402 MHz Horizontal Polarity



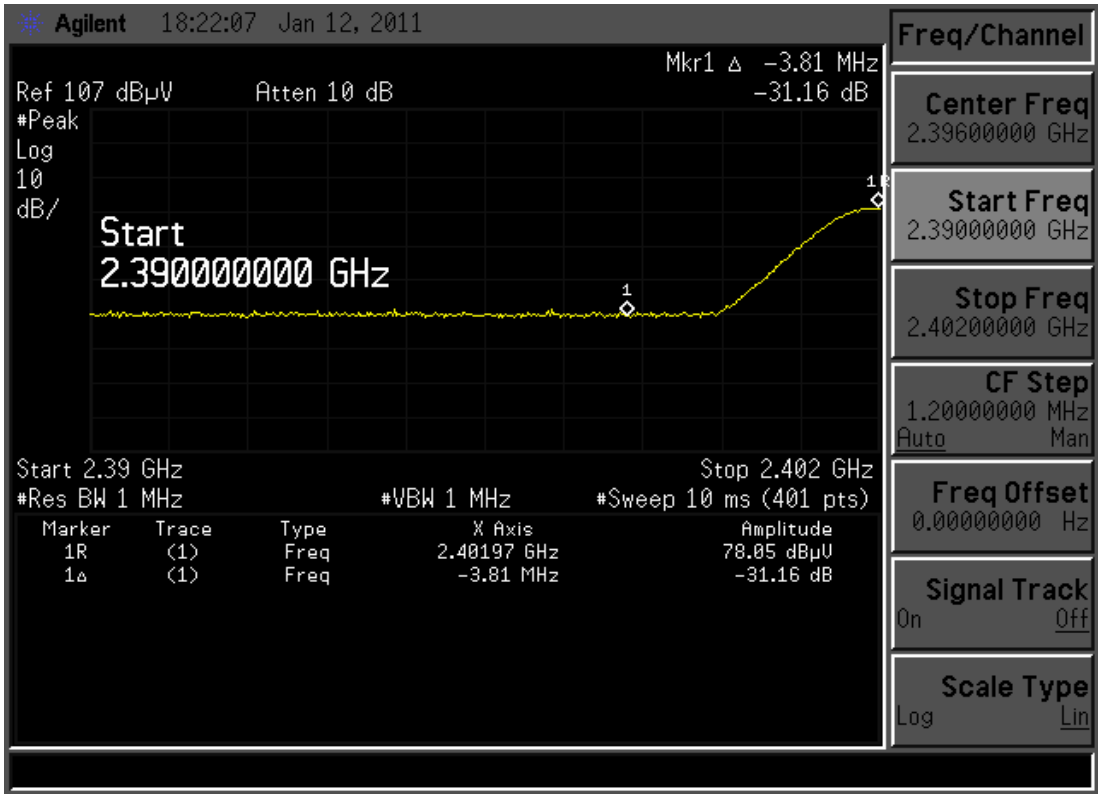
2480MHz Vertical Polarity



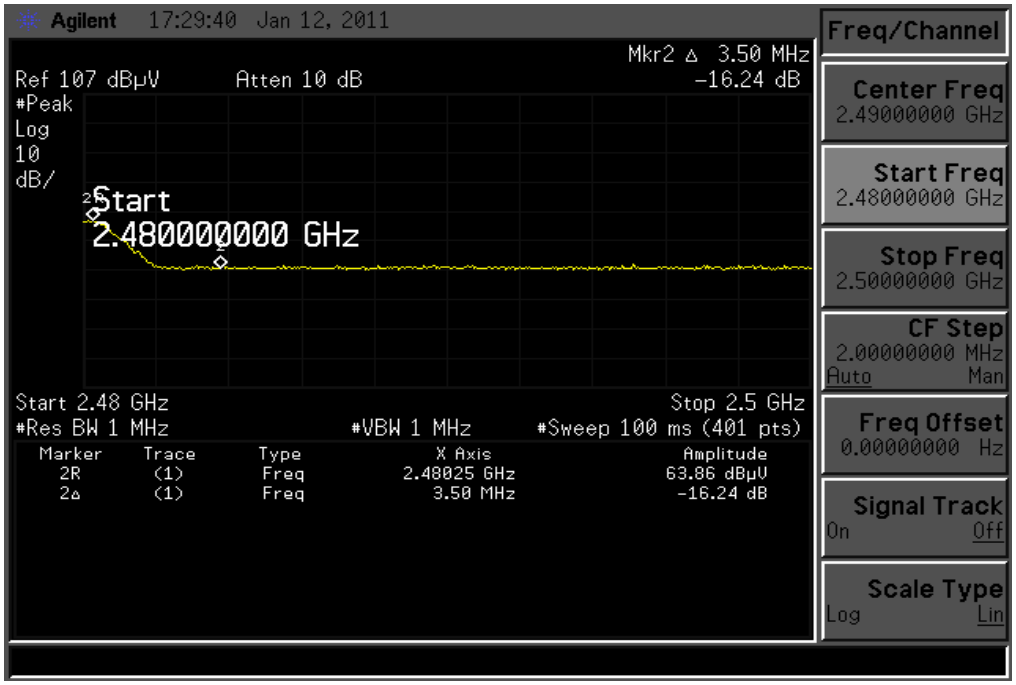
2480 MHz Horizontal Polarity



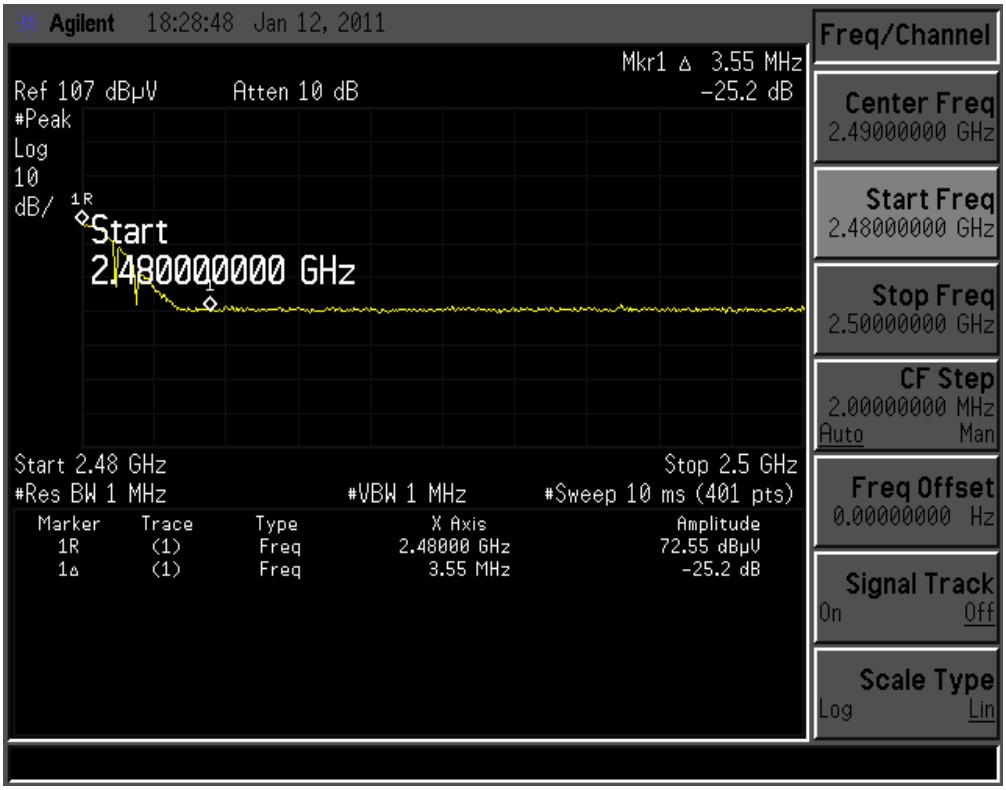
2402 MHz Vertical Polarity Hopping



2402 MHz Horizontal Polarity Hopping



2480 MHz Vertical Polarity Hopping



2480 MHz Horizontal Polarity Hopping

4.3 Test Conditions and Results – MAXIMUM PEAK OUTPUT POWER

Test Description	For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.	
Basic Standard	47 CFR Part 15.247(b)(2) RSS-210, A8.4(2)	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	2400MHz –2483.5MHz	Antenna Conducted
Limits		
Frequency (MHz)	Limit mW	
	Peak	
2400 – 2483.5	125	
Supplementary information: None		

Table 16 Maximum Peak Output Power EUT Configuration Settings

Power Interface	EUT Configurations	EUT Operation
1	1	1-3
Supplementary information: worst case antenna gain		

Table 17 Maximum Peak Output Power Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal date	Cal due date
Spectrum Analyzer	Agilent	E7405A	19695	1 Feb 2010	1 Feb 2011
Cable	Megaphase	TM26-S1S1	70-188	01/04/2011	01/04/2012
Attenuator	Pasternak	PE7024-20	70-188	01/04/2011	01/04/2012
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	43734	1 Feb 10	1 Feb 11
Multimeter	Fluke	83III	ME5B-305	3 Aug 10	3 Aug 12

Table 18 Maximum Peak Output Power Results

Channel	Declared Antenna Gain (dBi)	Power dBm	Limit (dBm)	Limit (W)
Low Channel	6	-1.74	20.97	0.125
Middle Channel	6	-1,46	20.97	0.125
High Channel	6	-1.29	20.97	0.125

Figure 18: Test setup for Maximum Peak Output Power

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Figure 19 Maximum Peak Output Power Graph

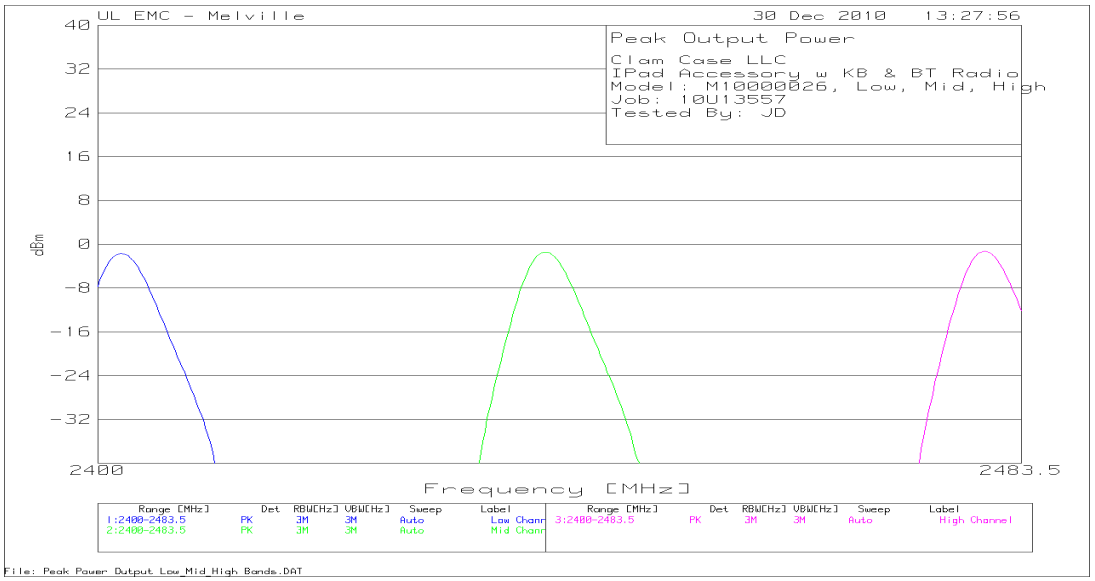

Table 19 Maximum Peak Output Power Emissions Data Points

Clam Case LLC
IPad Accessory w KB & BT Radio
Model: M10000026, Low, Mid, High
Job: 10U13557
Tested By: JD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm	Limit:1	2	3
Low Channel 2400 - 2483.5MHz								
1	2402.296	84.76 PK	20.5	-107	-1.74	-	-	-
				Margin [dB]		-	-	-
Mid Channel 2400 - 2483.5MHz								
2	2440.08	84.94 PK	20.6	-107	-1.46	-	-	-
				Margin [dB]		-	-	-
High Channel 2400 - 2483.5MHz								
3	2480.16	85.21 PK	20.5	-107	-1.29	-	-	-
				Margin [dB]		-	-	-

4.4 Test Conditions and Results – Dwell Time and Duty Cycle Correction

Test Description	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.
Basic Standard	47 CFR Part 15.247(a)(1)(i) RSS-210, A8.1(d)

Table 20 Dwell Time Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: Duty cycle also measured/calculated for use in radiated spurious measurements		

Table 21 Dwell Time Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal date	Cal due date
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	12 Jan 2010	12 Jan 2011
Cable	Megaphase	TM26-S1S1	70-188	01/04/2011	01/04/2012
Attenuator	Pasternak	PE7024-20	70-188	01/04/2011	01/04/2012
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	43734	1 Feb 10	1 Feb 11
Multimeter	Fluke	83III	ME5B-305	3 Aug 10	3 Aug 12

Table 22 Dwell Time Results

Mode	Number of Channels	Maximum Time Allowed in 20s.	Measured Dwell Time in 20s.
TX Hopping	79	0.4	0.264

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 316 * (# of pulses in 100mS) * pulse width.

Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

Type	Pulse Width	Number of pulses	limit	Margin
Hopping	76.1us	11	0.4sec	135mS

Table 23 Duty Cycle Correction Factor

Mode	Number of TX in 100mS	TX Duration in 100mS	Duty Cycle Correction (dB) $20\times\log(\frac{TX(ms)}{100ms})$
TX Hopping	11	76.15us	41.5

Figure 20: Test Setup for Dwell Time

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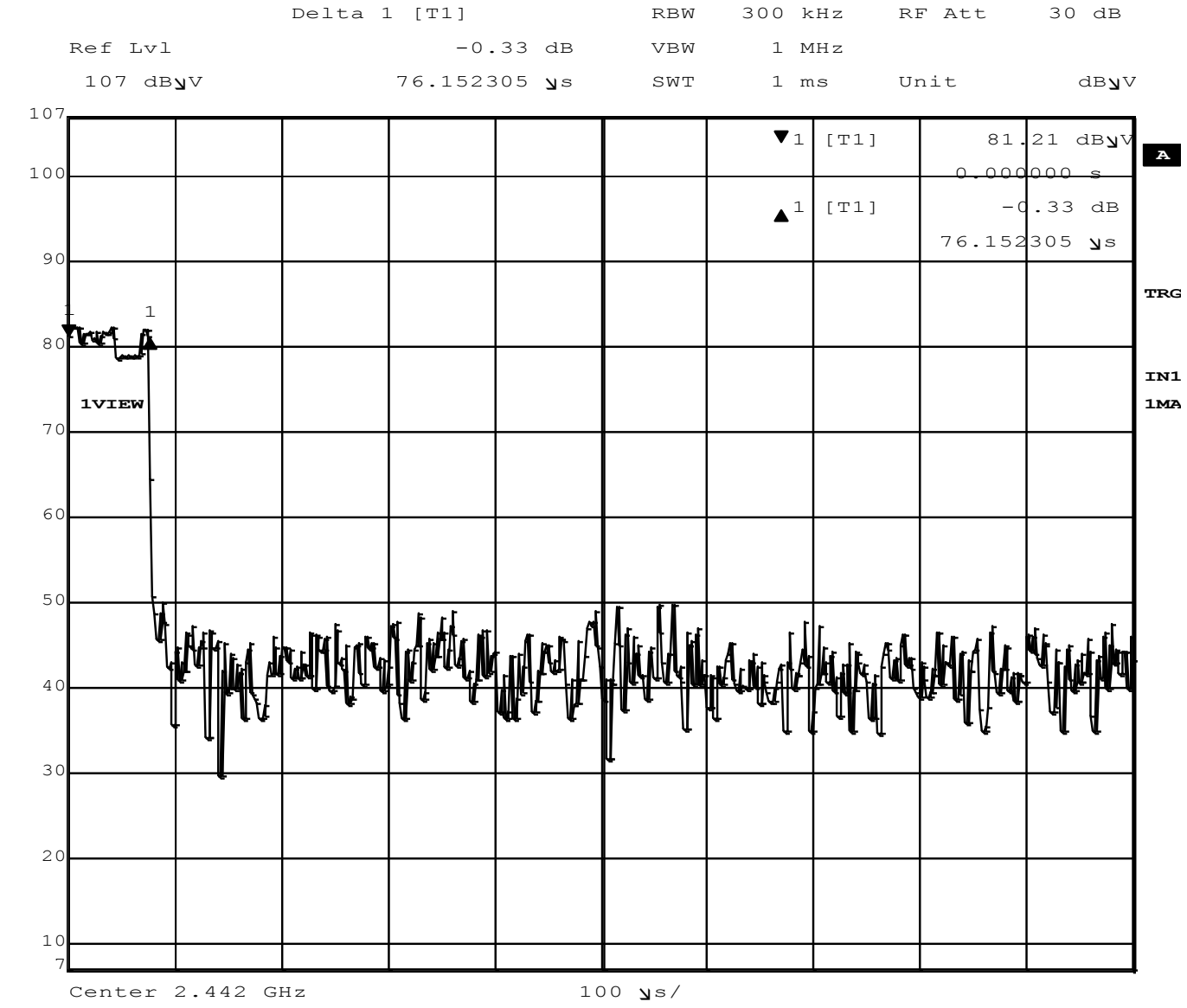
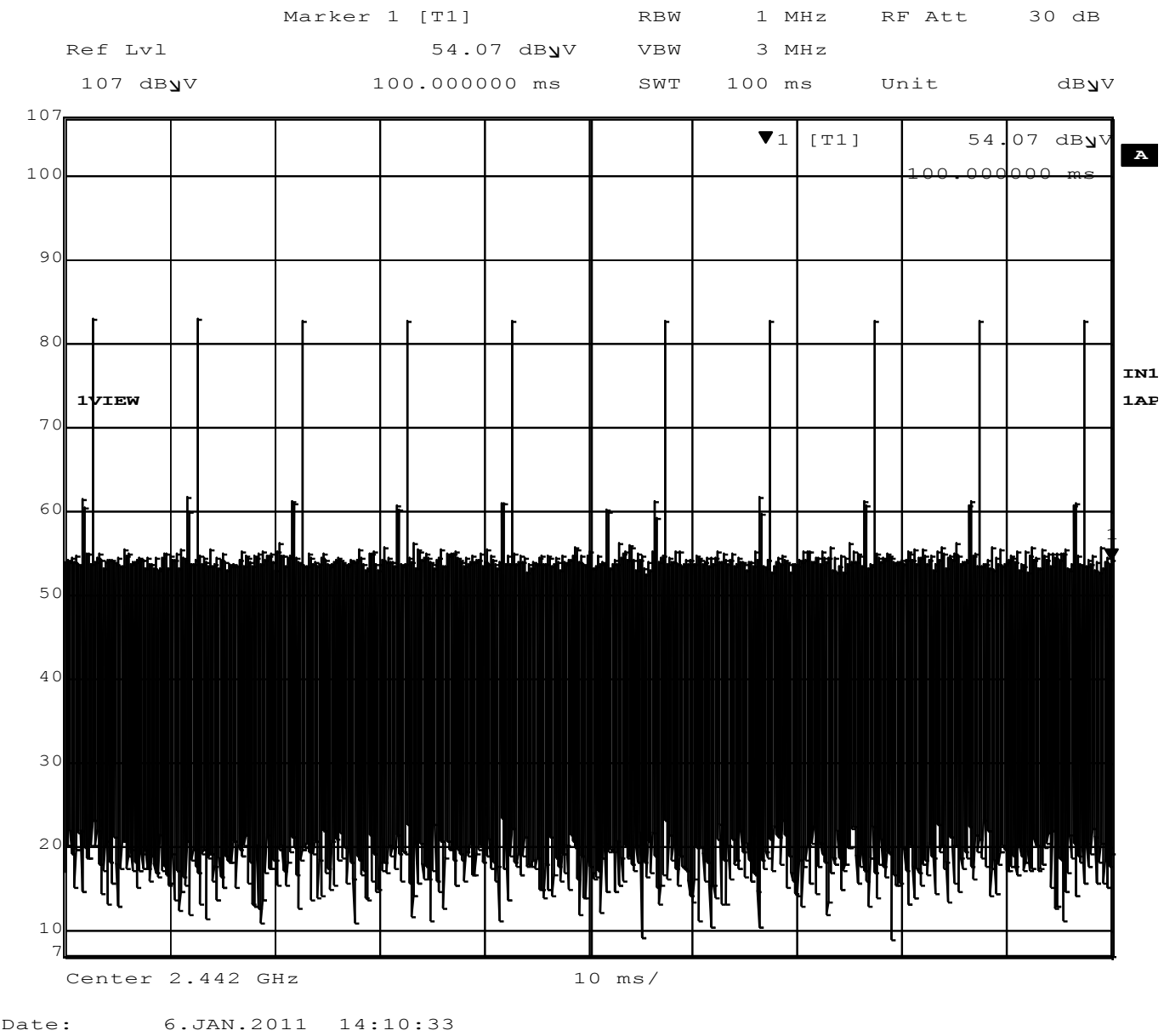
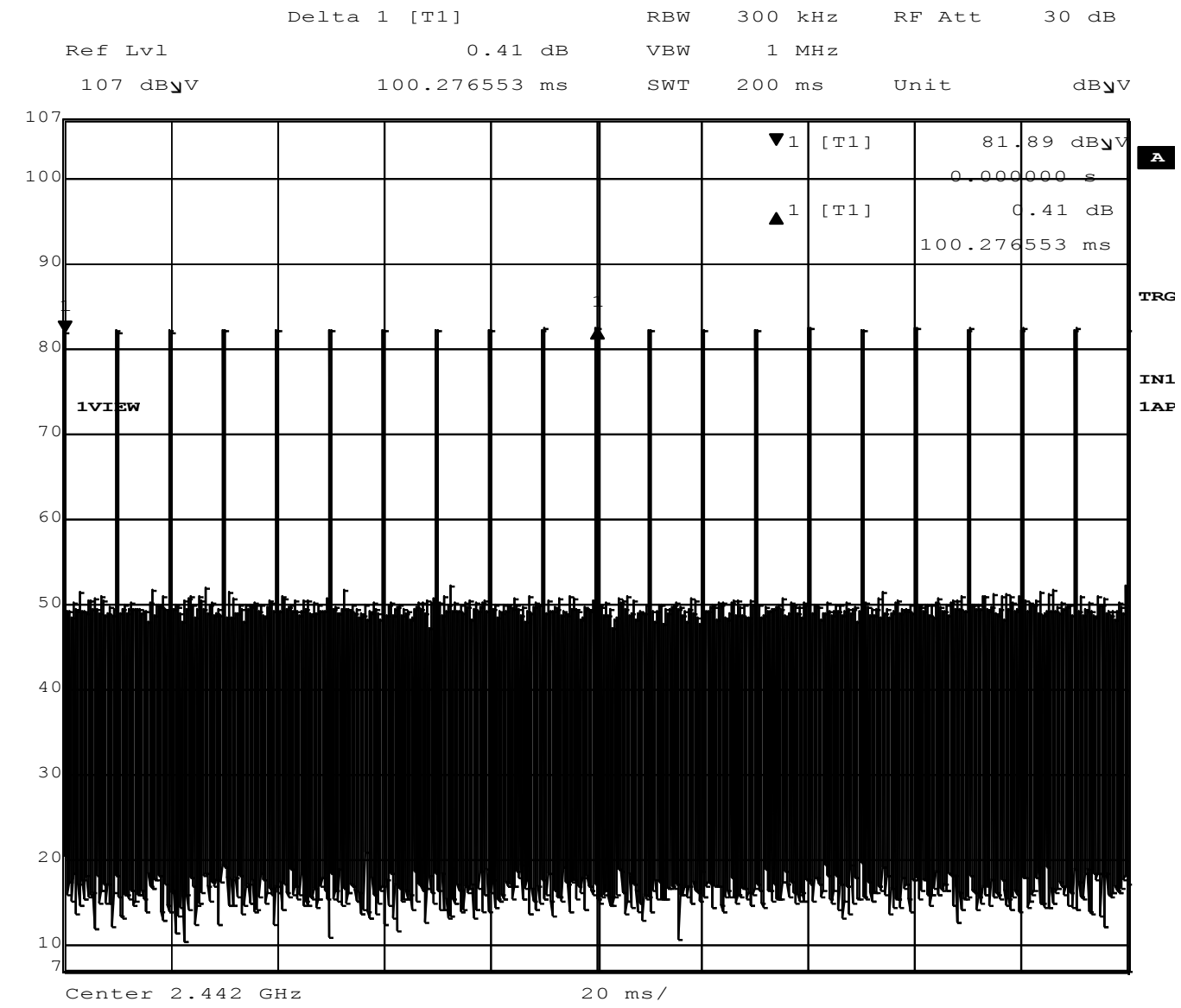
Figure 21 Dwell Time Graphs



Time occupancy Pulse width



Number of pulses in 0.1 seconds observation period



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Number of pulses in 100mS

.

4.5 Test Conditions and Results – NUMBER OF HOPPING FREQUENCIES

Test Description	Frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Basic Standard	47 CFR Part 15.247(a)(1)(i) RSS-210, A8.1(d)

Table 24 Number of Hopping Frequencies Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Table 25 Number of Hopping Frequencies Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal date	Cal due date
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	12 Jan 2010	12 Jan 2011
Cable	Megaphase	TM26-S1S1	70-188	01/04/2011	01/04/2012
Attenuator	Pasternak	PE7024-20	70-188	01/04/2011	01/04/2012
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	43734	1 Feb 10	1 Feb 11
Multimeter	Fluke	83III	ME5B-305	3 Aug 10	3 Aug 12

Table 26 Number of Hopping Frequencies Results

Mode	Number of Channels	Minimum Number Required
TX, Hopping	79	50

Figure 22: Test Setup for Number of Hopping Frequencies

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Figure 23 Number of Hopping Frequencies Graphs First Segment

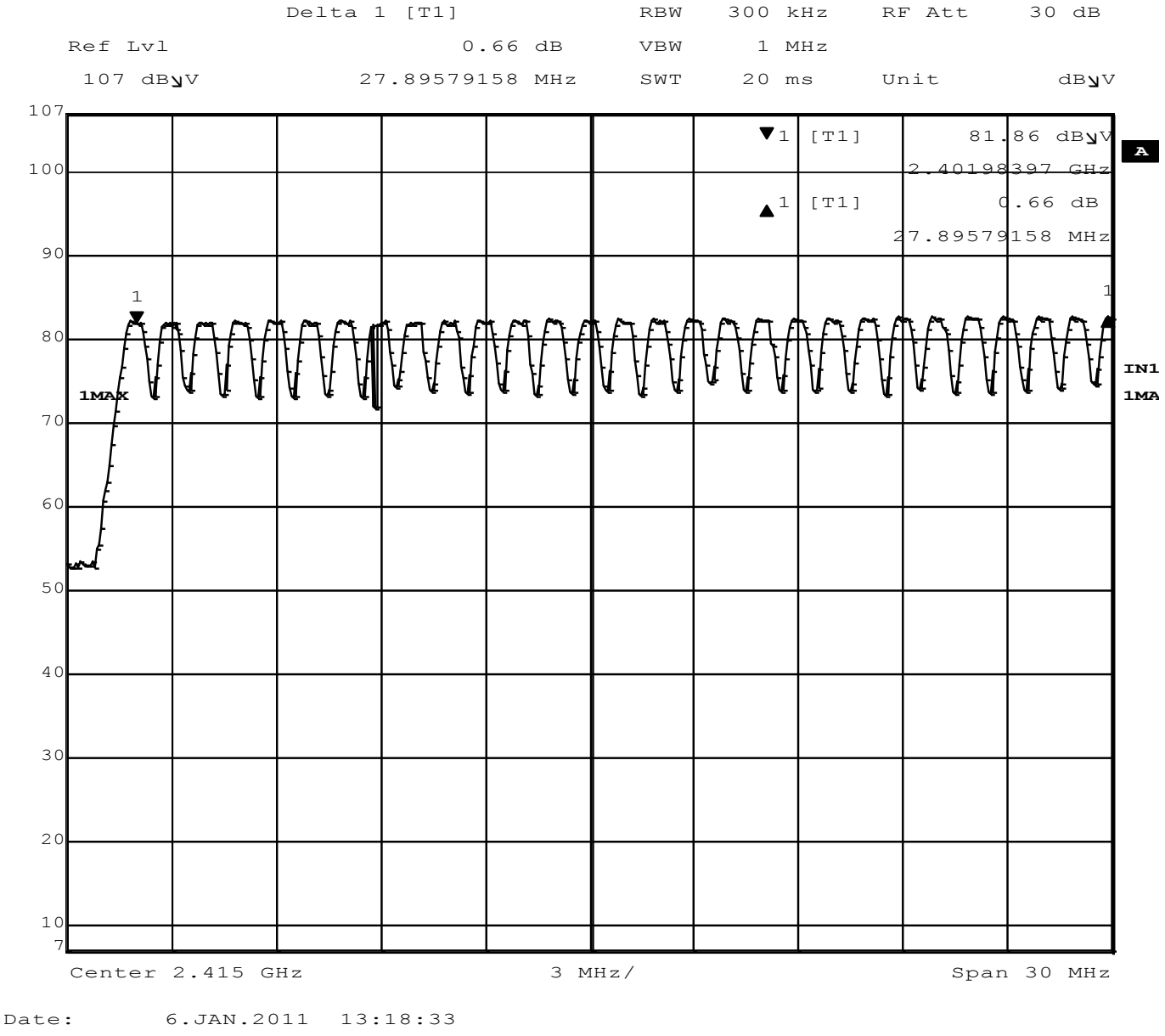


Figure 24: Number of Hopping Frequencies Graphs Second Segment

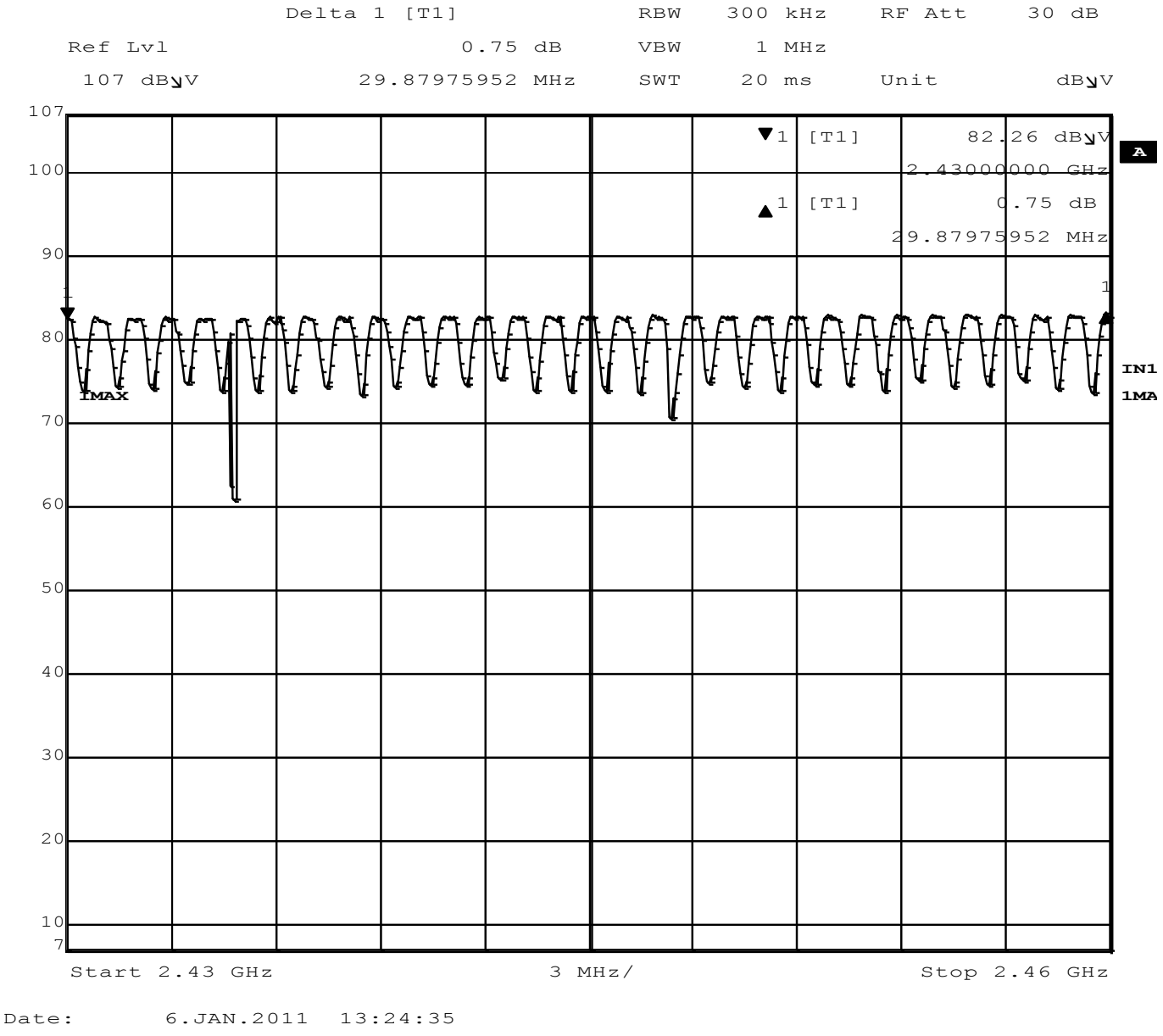
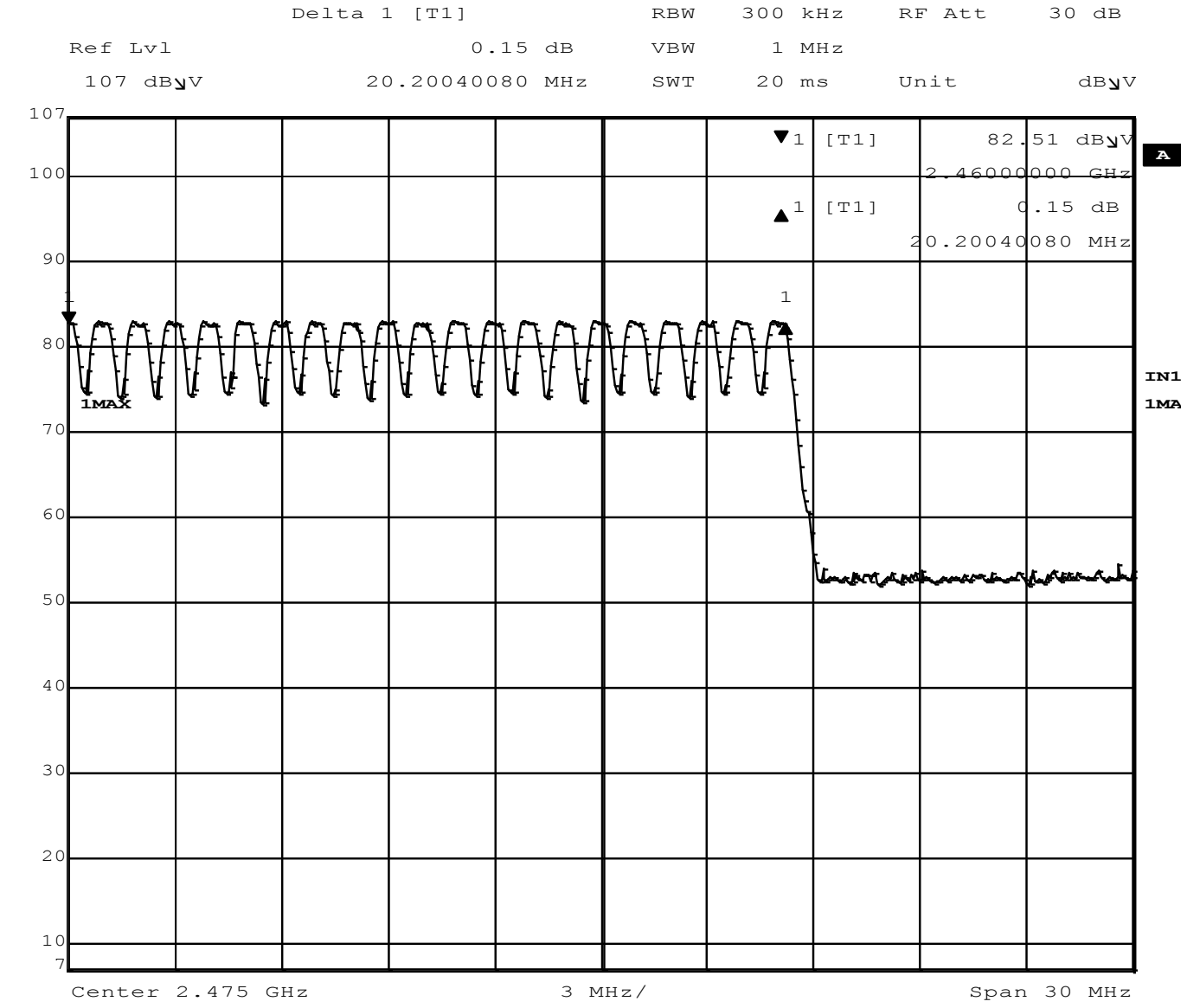


Figure 25: Number of Hopping Frequencies Graphs Third Segment



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4.6 Test Conditions and Results – 20DB BANDWIDTH

Test Description	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.
Basic Standard	47 CFR Part 15.247(a)(1)(i) RSS-210, A8.1(b)

Table 27 20dB Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1-3
Supplementary information: None		

Table 28 20dB Bandwidth Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal date	Cal due date
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	12 Jan 2010	12 Jan 2011
Cable	Megaphase	TM26-S1S1	70-188	01/04/2011	01/04/2012
Attenuator	Pasternak	PE7024-20	70-188	01/04/2011	01/04/2012
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	43734	1 Feb 10	1 Feb 11
Multimeter	Fluke	83III	ME5B-305	3 Aug 10	3 Aug 12

Table 29 20dB Bandwidth Results

Mode	Channel	20dB Bandwidth	99% Bandwidth
TX	Low	1.032MHz	913.8KHz
	Middle	1.044MHz	925.8KHz
	High	1.052MHz	919.8KHz

Figure 26: Test Setup for 20dB Bandwidth

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Figure 27: 20dB Bandwidth Graphs 20dB

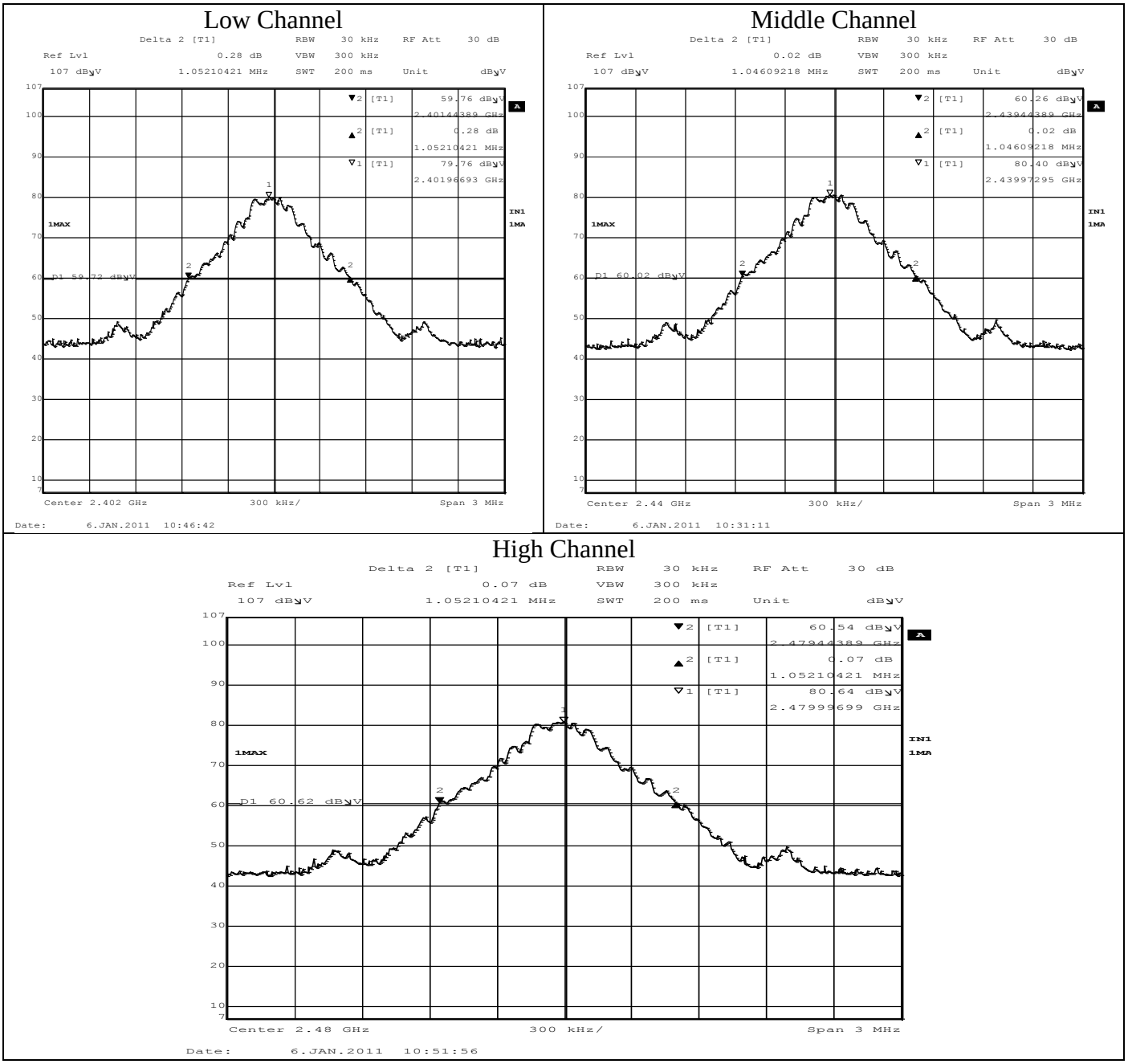
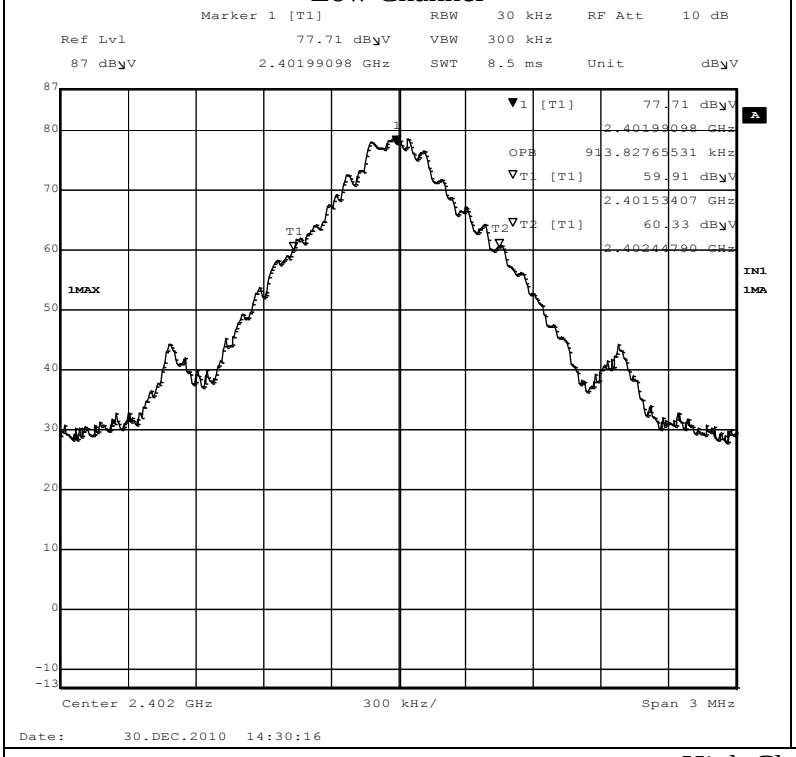
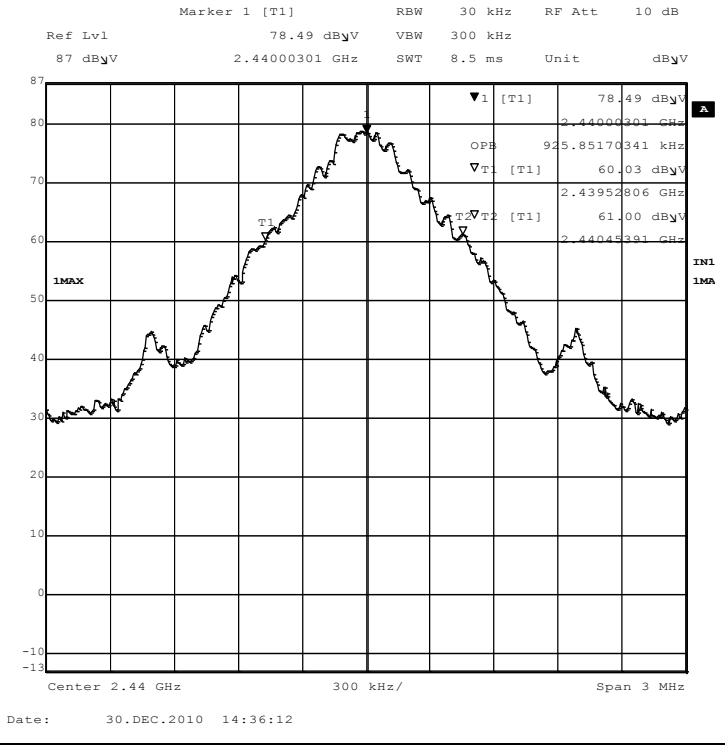


Figure 28: Bandwidth Graphs 99%

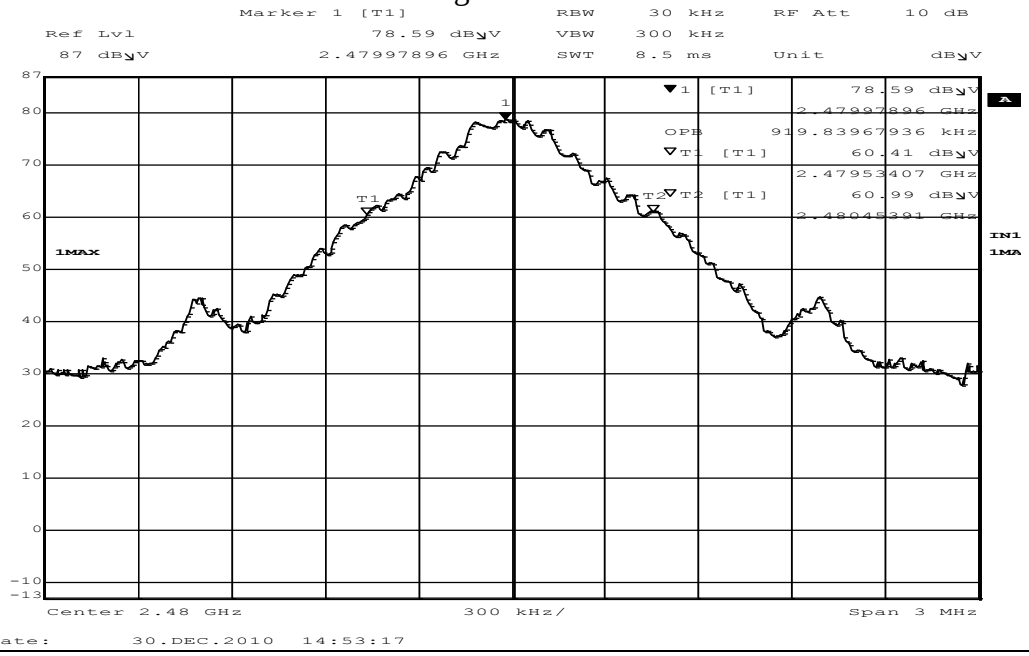
Low Channel



Middle Channel



High Channel



4.7 Test Conditions and Results – Carrier Frequency Separation

Test Description	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
Basic Standard	47 CFR Part 15.247(a)(1) RSS-210, A8.1(b)

Table 30 Carrier Frequency Separation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: Separation frequencies were measured for each channel and then averaged.		

Table 31 Carrier Frequency Separation Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal date	Cal due date
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	12 Jan 2010	12 Jan 2011
Cable	Megaphase	TM26-S1S1	70-188	01/04/2011	01/04/2012
Attenuator	Pasternak	PE7024-20	70-188	01/04/2011	01/04/2012
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	43734	1 Feb 10	1 Feb 11
Multimeter	Fluke	83III	ME5B-305	3 Aug 10	3 Aug 12

Table 32 Carrier Frequency Separation Results

Mode	Channel	Carrier Frequency Separation Limit	Channel Separation (MHz)
TX Hopping	Overall Average	TWO-THIRDS OF THE 20 DB	1.0

Figure 29: Test Setup for Carrier Frequency Separation

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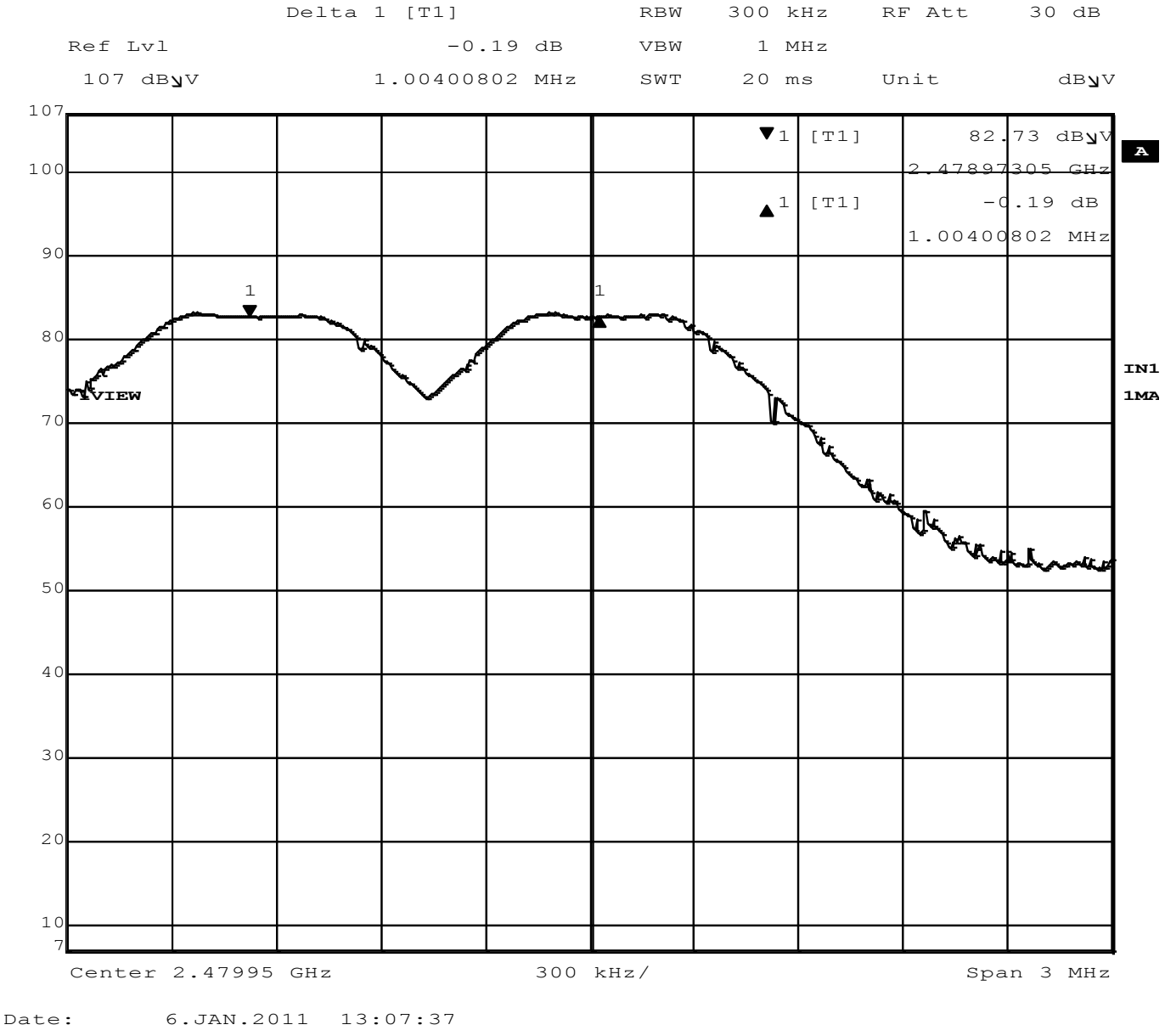
Figure 30 Carrier Frequency Separation Graphs



4.8 Test Conditions and Results – MAINS TERMINAL – CONDUCTED EMISSIONS

Test Description	Measurements were made on a ground plane. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.		
Basic Standard		FCC Part 15, Subpart C, 15.207and RSS-210	
UL LPG		80-EM-S0026	
		Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range		150kHz to 30MHz	Mains

Limits - Class B

Frequency (MHz)	Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Supplementary information: Limits are the same as 15.107, ICES-003, Result reported for worst case configuration.

Table 33 Conducted Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: Tested in worst case configuration		

Table 34 Conducted Emissions Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal date	Cal due date
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	12 Jan 2010	12 Jan 2011
LISN	Solar	9252-50-R-24-BNC	ME5A-636	3/26/2010	3/31/2011
LISN	EMCO	3825/2R	ME5-629	N/A	N/A
Switch Driver	HP	11713A	44397	N/A	N/A
RF Switch Box	UL	4	44404	N/A	N/A
Measurement Software	UL	Version 9.3	44736	N/A	N/A
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	43734	1 Feb 10	1 Feb 11
Multimeter	Fluke	83III	ME5B-305	3 Aug 10	3 Aug 12

Figure 31: Test Setup for Conducted Emissions

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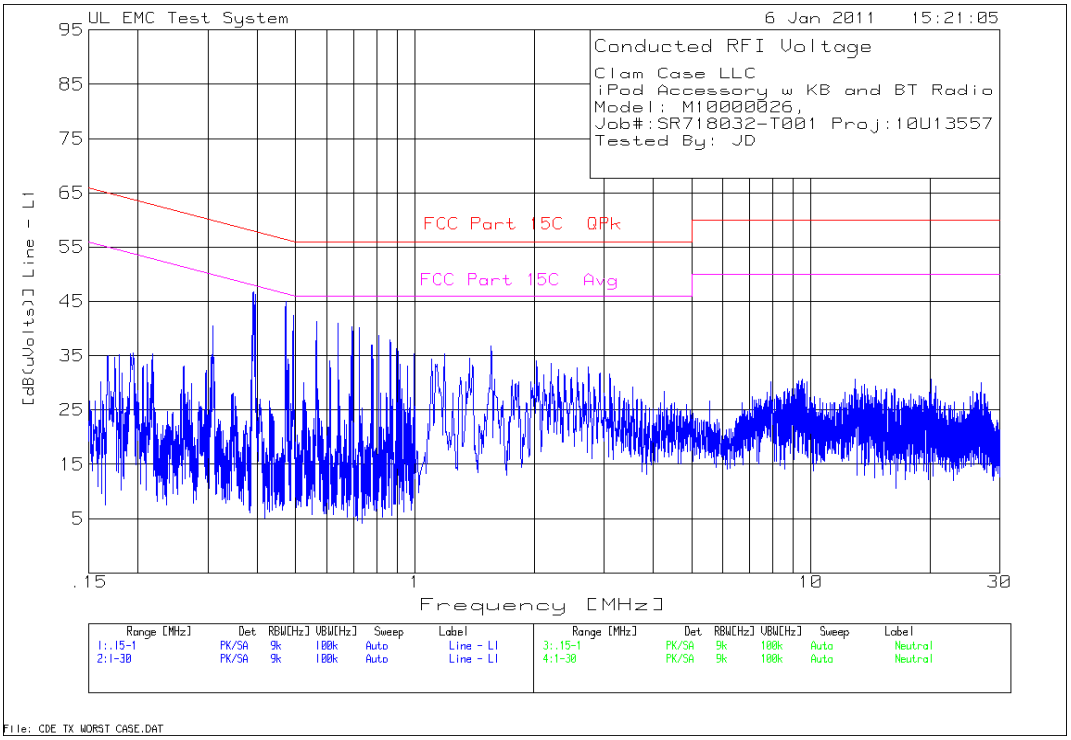
Figure 32 Conducted Emissions Graph



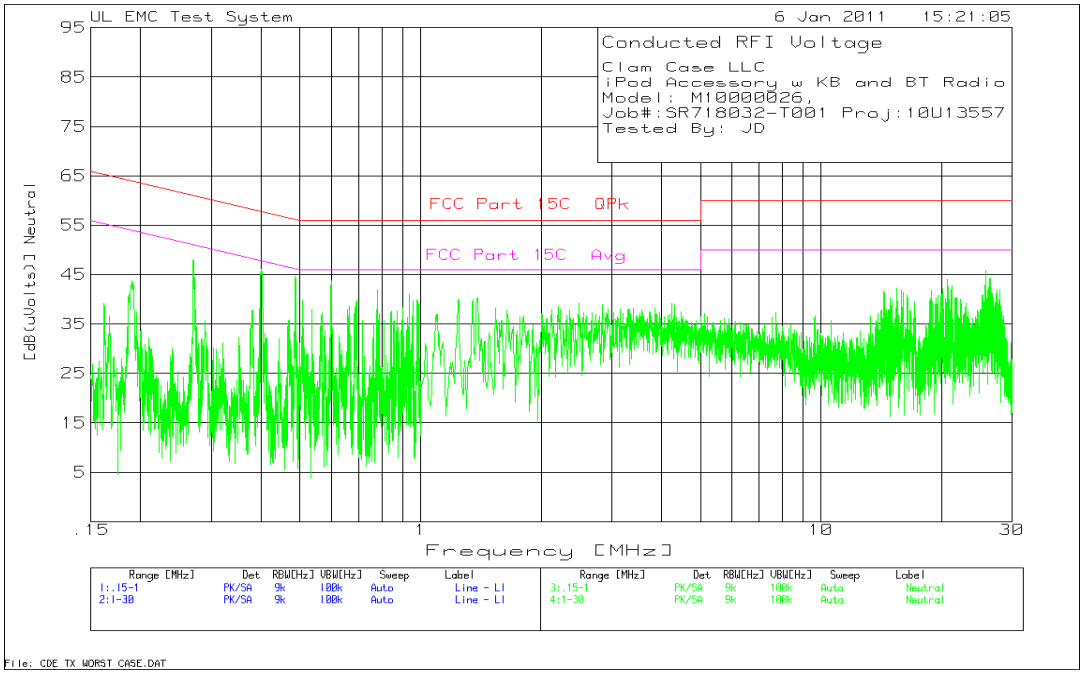


Table 35 Conducted Emissions Data Points

Clam Case LLC
iPod Accessory w KB and BT Radio
Model: M10000026,
Job#:SR718032-T001 Proj:10U13557
Tested By: JD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3
Line - L1 .15 - 1MHz								
23	.38975	36.46 PK	10	0	46.46	58.1	48.1	-
				Margin [dB]		-11.64	-1.64	-
24	.39519	35.61 PK	10	0	45.61	58	48	-
				Margin [dB]		-12.39	-2.39	-
25	.4717	35.01 PK	10	0	45.01	56.5	46.5	-
				Margin [dB]		-11.49	-1.49	-
26	.49245	32.4 PK	10	0	42.4	56.1	46.1	-
				Margin [dB]		-13.7	-3.7	-
27	.56369	30.89 PK	10	0	40.89	56	46	-
				Margin [dB]		-15.11	-5.11	-
28	.6397	30.96 PK	10	0	40.96	56	46	-
				Margin [dB]		-15.04	-5.04	-
29	.69547	29.54 PK	10	0	39.54	56	46	-
				Margin [dB]		-16.46	-6.46	-
30	.80973	28.8 PK	10	0	38.8	56	46	-
				Margin [dB]		-17.2	-7.2	-
31	.72438	30.18 PK	10	0	40.18	56	46	-
				Margin [dB]		-15.82	-5.82	-
32	.86516	27.99 PK	10	0	37.99	56	46	-
				Margin [dB]		-18.01	-8.01	-

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - average log detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

LIMIT 1: FCC Part 15C QPk
LIMIT 2: FCC Part 15C Avg

Clam Case LLC
iPod Accessory w KB and BT Radio
Model: M10000026,
Job#:SR718032-T001 Proj:10U13557
Tested By: JD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3
Line - L1 1 - 30MHz								
33	1.18564	25.3 PK	10.1	0	35.4	56	46	-
				Margin [dB]		-20.6	-10.6	-
34	1.55691	26.67 PK	10.1	0	36.77	56	46	-
				Margin [dB]		-19.23	-9.23	-
Neutral .15 - 1MHz								
1	.2714	37.89 PK	10.1	0	47.99	61.1	51.1	-
				Margin [dB]		-13.11	-3.11	-
2	.39978	36.08 PK	10.1	0	46.18	57.9	47.9	-
				Margin [dB]		-11.72	-1.72	-
3	.48633	34.66 PK	10.1	0	44.76	56.2	46.2	-
				Margin [dB]		-11.44	-1.44	-
4	.50707	29.71 PK	10.1	0	39.81	56	46	-
				Margin [dB]		-16.19	-6.19	-
5	.53479	27.8 PK	10.1	0	37.9	56	46	-
				Margin [dB]		-18.1	-8.1	-
6	.56633	27.22 PK	10.1	0	37.32	56	46	-
				Margin [dB]		-18.68	-8.68	-
7	.59787	33.68 PK	10.1	0	43.78	56	46	-
				Margin [dB]		-12.22	-2.22	-
8	.69173	29.74 PK	10.1	0	39.84	56	46	-
				Margin [dB]		-16.16	-6.16	-
9	.77896	31.89 PK	10.1	0	41.99	56	46	-
				Margin [dB]		-14.01	-4.01	-

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - average log detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

LIMIT 1: FCC Part 15C QPk
LIMIT 2: FCC Part 15C Avg

Clam Case LLC
iPod Accessory w KB and BT Radio
Model: M10000026,
Job#:SR718032-T001 Proj:10U13557
Tested By: JD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3
10	.78015	30.44 PK	10.1	0	40.54	56	46	-
				Margin [dB]		-15.46	-5.46	-
11	.78763	26.66 PK	10.1	0	36.76	56	46	-
				Margin [dB]		-19.24	-9.24	-
12	.90172	28.16 PK	10.1	0	38.26	56	46	-
				Margin [dB]		-17.74	-7.74	-
13	.93556	31.03 PK	10.1	0	41.13	56	46	-
				Margin [dB]		-14.87	-4.87	-
14	.95596	29.53 PK	10.1	0	39.63	56	46	-
				Margin [dB]		-16.37	-6.37	-
15	.97756	29.72 PK	10.1	0	39.82	56	46	-
				Margin [dB]		-16.18	-6.18	-
16	.9864	28.97 PK	10.1	0	39.07	56	46	-
				Margin [dB]		-16.93	-6.93	-
Neutral 1 - 30MHz ----------								
17	1.09282	26.85 PK	10.1	0	36.95	56	46	-
				Margin [dB]		-19.05	-9.05	
18	1.24365	29.38 PK	10.1	0	39.48	56	46	-
				Margin [dB]		-16.52	-6.52	-
19	1.35387	29.84 PK	10.1	0	39.94	56	46	-
				Margin [dB]		-16.06	-6.06	-
20	1.38868	30.29 PK	10.1	0	40.39	56	46	-
				Margin [dB]		-15.61	-5.61	-
21	1.53951	28.21 PK	10.1	0	38.31	56	46	-
				Margin [dB]		-17.69	-7.69	-
22	25.81736	34.04 PK	11.7	0	45.74	60	50	-
				Margin [dB]		-14.26	-4.26	-

LIMIT 1: FCC Part 15C QPk
LIMIT 2: FCC Part 15C Avg

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

Clam Case LLC
iPod Accessory w KB and BT Radio
Model: M10000026,
Job#:SR718032-T001 Proj:10U13557
Tested By: JD

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
Line - L1 .15 - 1MHz								
.39017	14.41 Av	10	0	24.41	58.1	48.1	-	-
			Margin [dB]:		-33.69	-23.69	-	-
.3958	16.28 Av	10	0	26.28	57.9	47.9	-	
			Margin [dB]:		-31.62	-21.62	-	
.47161	12.04 Av	10	0	22.04	56.5	46.5	-	
			Margin [dB]:		-34.46	-24.46	-	
.49313	12.77 Av	10	0	22.77	56.1	46.1	-	
			Margin [dB]:		-33.33	-23.33	-	-
.56343	11.63 Av	10	0	21.63	56	46	-	-
			Margin [dB]:		-34.37	-24.37	-	-
.63934	5.45 Av	10	0	15.45	56	46	-	-
			Margin [dB]:		-40.55	-30.55	-	-
.69568	11.04 Av	10	0	21.04	56	46	-	-
			Margin [dB]:		-34.96	-24.96	-	-
.8096	9.71 Av	10	0	19.71	56	46	-	-
			Margin [dB]:		-36.29	-26.29	-	-
.72458	4.63 Av	10	0	14.63	56	46	-	-
			Margin [dB]:		-41.37	-31.37	-	-
.86505	9.25 Av	10	0	19.25	56	46	-	-
			Margin [dB]:		-36.75	-26.75	-	-
Line - L1 1 - 30MHz								
1.18601	8.72 Av	10.1	0	18.82	56	46	-	-
			Margin [dB]:		-37.18	-27.18	-	-
1.55667	8.85 Av	10.1	0	18.95	56	46	-	-
			Margin [dB]:		-37.05	-27.05	-	-

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - average log detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

LIMIT 1: FCC Part 15C QPk
LIMIT 2: FCC Part 15C Avg

Clam Case LLC
iPod Accessory w KB and BT Radio
Model: M10000026,
Job#:SR718032-T001 Proj:10U13557
Tested By: JD

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
Neutral .15 - 1MHz								
.27181	13.57 Av	10.1	0	23.67	61.1	51.1	-	-
			Margin [dB]:		-37.43	-27.43	-	-
.39986	20.38 Av	10.1	0	30.48	57.9	47.9	-	-
			Margin [dB]:		-27.42	-17.42	-	-
.48621	19.48 Av	10.1	0	29.58	56.2	46.2	-	-
			Margin [dB]:		-26.62	-16.62	-	-
.5063	16.67 Av	10.1	0	26.77	56	46	-	-
			Margin [dB]:		-29.23	-19.23	-	-
.53445	8.61 Av	10.1	0	18.71	56	46	-	-
			Margin [dB]:		-37.29	-27.29	-	-
.56612	16.33 Av	10.1	0	26.43	56	46	-	-
			Margin [dB]:		-29.57	-19.57	-	-
.59798	18.4 Av	10.1	0	28.5	56	46	-	-
			Margin [dB]:		-27.5	-17.5	-	-
.69158	18.37 Av	10.1	0	28.47	56	46	-	-
			Margin [dB]:		-27.53	-17.53	-	-
.77896	14.91 Av	10.1	0	25.01	56	46	-	-
			Margin [dB]:		-30.99	-20.99	-	-
.78062	15.25 Av	10.1	0	25.35	56	46	-	-
			Margin [dB]:		-30.65	-20.65	-	-
.7877	16.05 Av	10.1	0	26.15	56	46	-	-
			Margin [dB]:		-29.85	-19.85	-	-
.90188	14.85 Av	10.1	0	24.95	56	46	-	-
			Margin [dB]:		-31.05	-21.05	-	-

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - average log detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

LIMIT 1: FCC Part 15C QPk
LIMIT 2: FCC Part 15C Avg

Clam Case LLC
iPod Accessory w KB and BT Radio
Model: M10000026,
Job#:SR718032-T001 Proj:10U13557
Tested By: JD

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
.93517	17.15 Av	10.1	0	27.25	56	46	-	-
			Margin [dB]:		-28.75	-18.75	-	-
.95597	17.77 Av	10.1	0	27.87	56	46	-	-
			Margin [dB]:		-28.13	-18.13	-	-
.97787	18.73 Av	10.1	0	28.83	56	46	-	-
			Margin [dB]:		-27.17	-17.17	-	-
.98637	18.75 Av	10.1	0	28.85	56	46	-	-
			Margin [dB]:		-27.15	-17.15	-	-
Neutral 1 - 30MHz								
1.09257	17.62 Av	10.1	0	27.72	56	46	-	-
			Margin [dB]:		-28.28	-18.28	-	-
1.24405	16.01 Av	10.1	0	26.11	56	46	-	-
			Margin [dB]:		-29.89	-19.89	-	-
1.35403	16.78 Av	10.1	0	26.88	56	46	-	-
			Margin [dB]:		-29.12	-19.12	-	-
1.38855	17.76 Av	10.1	0	27.86	56	46	-	-
			Margin [dB]:		-28.14	-18.14	-	-
1.53953	14.62 Av	10.1	0	24.72	56	46	-	-
			Margin [dB]:		-31.28	-21.28	-	-
25.8171	20.95 Av	11.7	0	32.65	60	50	-	-
			Margin [dB]:		-27.35	-17.35	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - average log detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

LIMIT 1: FCC Part 15C QPk
LIMIT 2: FCC Part 15C Avg

4.9 Test Conditions and Results – RADIATED EMISSIONS

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 4-meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	
Basic Standard	FCC Part 15 Subpart B/CISPRR 22	
UL LPG	80-EM-S0029	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 1000MHz	(10 meter measurement distance)
	1GHz -14GHz	(4 meter measurement distance)

Limits - Class B

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Average
30-230	30	NA
230-1000	37	NA
Above 1GHz.	NA	54

Supplementary information: CISPR 22 limits applied below 1GHz.

Table 36 Radiated Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1

Supplementary information: Radiated Emissions above 1GHz was tested in worst case configuration

Table 37 Radiated Emissions Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	22 Feb 10	22 Feb 11
Bicon Antenna	Schaffner	VBA6106A	43441	9 Sep 2010	9 Sep 2011
Log-P Antenna	Schaffner	UPA6109	44067	26 Apr 10	26 Apr 11
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	1 Feb 10	1 Feb 11
Multimeter	Fluke	83III	ME5B-305	3 Aug 10	3 Aug 12
Above 1GHz (Band Optimized System)					
Spectrum Analyzer	Agilent	E7405A	19695	1 Feb 2010	1 Feb 2011
Horn Antenna (1-2 GHz)	ETS	3161-01	51442	28 Mar 2008	See * below
Horn Antenna (2-4 GHz)	ETS	3161-02	48107	27 Sept 2007	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03	48106	27 Sept 2007	See * below
Horn Antenna (8-12 GHz)	ETS	3160-07	8933	24 Nov 2008	See * below
Horn Antenna (12-18 GHz)	ETS	3160-08	8932	27 Sept 2007	See * below
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	12-07-2010	12-07-2012
Multimeter	Fluke	83III	ME5B-305	1 Feb 10	1 Feb 11

* Note: As allowed by the calibration standard ANSI C63.4 Section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration.

* Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than $2D^2/\lambda$. Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances.

Figure 33: Test setup for Radiated Emissions Unintentional

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Figure 34: Test setup for EMISSIONS – Radiated Unintentional

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Figure 35: Radiated Emissions Graph

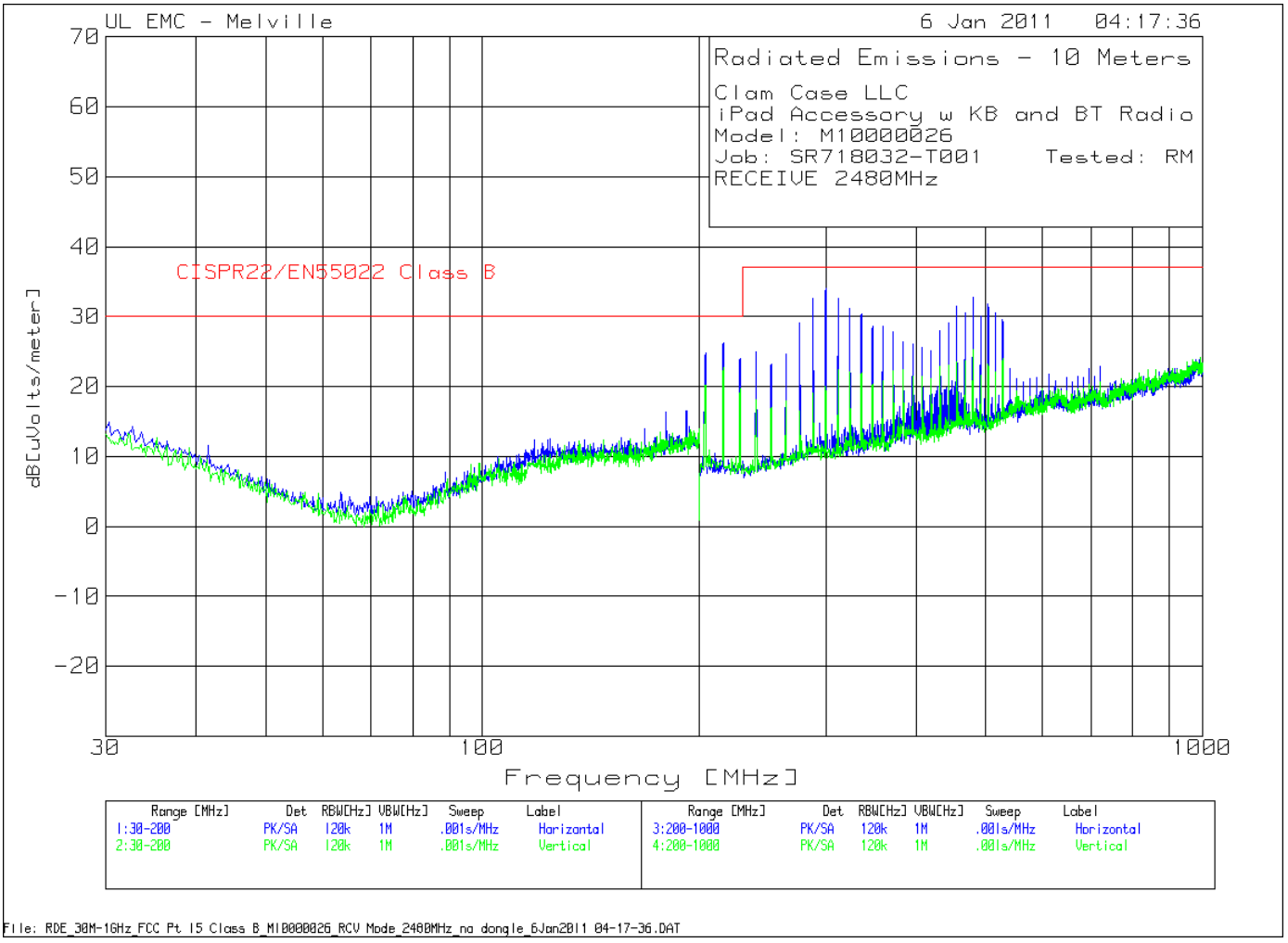

Table 38: Radiated Emissions Data Points

Clam Case LLC
iPad Accessory w KB and BT Radio
Model: M10000026
Job: SR718032-T001 Tested: RM
RECEIVE 2480MHz worst case

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Horizontal 200 - 1000MHz								
203.9975	48.91 QP	-34.7	11.3	25.51	30	-	-	-
Azimuth: 283	Height:400 Horz		Margin [dB]:	-4.49		-	-	-
215.9958	50.38 QP	-34.6	11	26.78	30	-	-	-
Azimuth: 97	Height:334 Horz		Margin [dB]:	-3.22		-	-	-
227.9982	48.04 QP	-34.5	10.9	24.44	30	-	-	-
Azimuth: 101	Height:397 Horz		Margin [dB]:	-5.56		-	-	-
287.9958	53.9 QP	-34.1	13.1	32.9	37	-	-	-
Azimuth: 11	Height:303 Horz		Margin [dB]:	-4.1		-	-	-
299.997	54.47 QP	-33.9	13.1	33.67	37	-	-	-
Azimuth: 16	Height:318 Horz		Margin [dB]:	-3.33		-	-	-
311.9949	54.3 QP	-33.7	13.2	33.8	37	-	-	-
Azimuth: 25	Height:252 Horz		Margin [dB]:	-3.2		-	-	-
323.9969	51.97 QP	-33.8	13.7	31.87	37	-	-	-
Azimuth: 26	Height:270 Horz		Margin [dB]:	-5.13		-	-	-
455.9971	47.53 QP	-32.8	16.8	31.53	37	-	-	-
Azimuth: 30	Height:190 Horz		Margin [dB]:	-5.47		-	-	-
479.9963	49.18 QP	-32.7	16.9	33.38	37	-	-	-
Azimuth: 25	Height:184 Horz		Margin [dB]:	-3.62		-	-	-
503.9965	47.42 QP	-32.5	17.5	32.42	37	-	-	-
Azimuth: 23	Height:169 Horz		Margin [dB]:	-4.58		-	-	-

LIMIT 1: CISPR22/EN55022 Class B
PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection

Figure 36: Radiated Emissions Graph

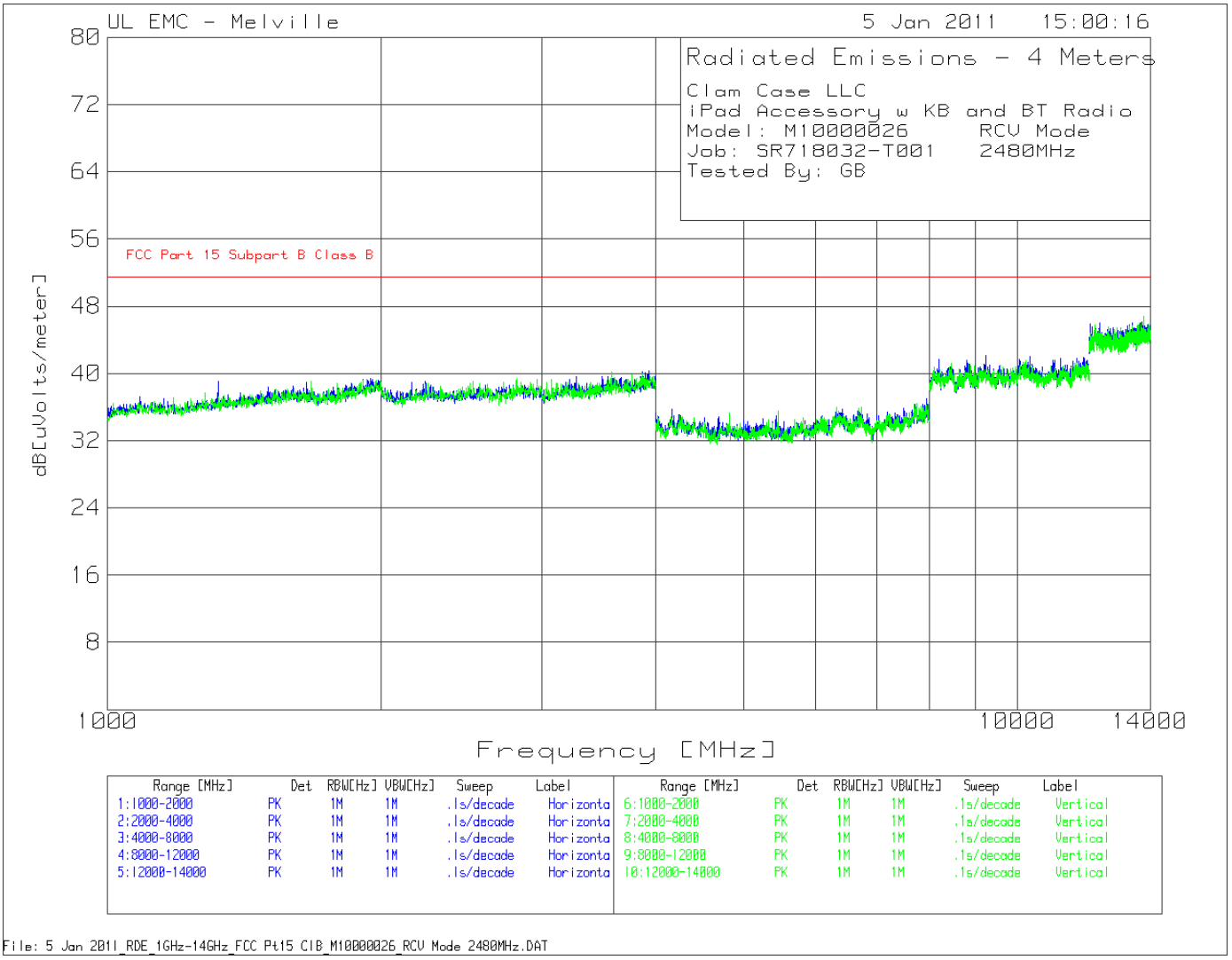

Table 39 Radiated Emissions Data Points

```
Clam Case LLC
iPad Accessory w KB and BT Radio
Model: M10000026     RCV Mode
Job: SR718032-T001   2480MHz worst case
Tested By: GB
```

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
Horizontal 1000 - 2000MHz								
1	1322.097	63.61 PK	-45.1	20.5	36.51	54	-	-
		Height:100 Horz		Margin [dB]		-17.49	-	-
2	1933.833	58.67 PK	-43.9	21.8	36.57	54	-	-
		Height:100 Horz		Margin [dB]		-17.43	-	
Horizontal 2000 - 4000MHz								
3	2232.21	61.55 PK	-43.94	21.4	36.51	54	-	-
				Margin [dB]		-17.49	-	-
4	3935.081	57.93 PK	-42.82	22.7	37.81	54	-	-
				Margin [dB]		-16.19	-	-
Horizontal 8000 - 12000MHz								
5	9234.609	57.28 PK	-51.03	33.4	39.65	54	-	-
				Margin [dB]		-14.35	-	-
6	10309.484	55.07 PK	-50.05	33.4	38.42	54	-	-
				Margin [dB]		-15.58	-	-

LIMIT 1: FCC Part 15 Subpart B Class B

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

4.10 MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (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.

TABLE 1—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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
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.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

Spread spectrum transmitters operating under Section 15.247 are categorically excluded from routine environmental evaluation for demonstrating RF exposure compliance with respect to MPE and/or SAR limits. These devices are not exempted from compliance. As indicated in Section 15.247(b)(4), these transmitters are required to operate in a manner that ensures that exposure to the public (users and nearby persons) does not exceed the Commission's RF exposure guidelines (see Sections 1.1307, 2.1091 and 2.1093). Unless a device operates at substantially low output power levels, with a low gain antenna(s), supporting information is generally needed to establish the various potential operating configurations and exposure conditions of a transmitter and its antenna(s), in order to determine compliance with the RF exposure guidelines.

In order to demonstrate compliance with MPE requirements (see Section 2.1091), the following information is typically needed: (1) calculations that estimate the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits (defined for free-space), (2) antenna installation and device operating instructions for installers (professional and/or unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirements, (3) any caution statements and/or warning labels that are necessary in order for a device to comply with the exposure limits, and (4) any other RF exposure related issues that may affect MPE compliance.

For portable transmitters (see Section 2.1093), or devices deigned to operate next to a person's body, compliance is determined with respect to the SAR limit (defined in body tissues) for near-field exposure conditions. If the maximum average output power, operating configurations, and exposure conditions are comparable to those of existing cellular and PCS phones, an SAR evaluation may be required in order to determine if such a device complies with the SAR limit. When SAR data is not available, and the additional supporting information cannot assure compliance, the Commission may request that an SAR evaluation be performed, as provided for in Section 1.1307(d).

Installation/Operation Manual Requirements

Submit a copy of the information/instructions that will be included in the installation/operation manual pertaining to: (a) correct peak output power settings required for compliant operation for every antenna proposed for use with the EUT, (b) point-to-point operational requirements and responsibilities, (c) any RF exposure compliance requirements.

MPE Estimate

RF Exposure Calculations:

The following information provides the minimum separation distance for the highest gain antenna provided. This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1.0 mW/cm^2 uncontrolled exposure limit. The formula shown in OET Bulletin 65 is used in the calculation.

Equation from page 19 of OET Bulletin 65, Edition 97-01 is:

$$S = PG / 4\pi R^2$$

where: S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)
hence

$$R = (PG / 4\pi S)^{1/2}$$

For our device
P = 0.743mW
G = 6.0
R = 20 cm
$S = (0.743 * 6.0) / (4*\pi*20^2)$ = **0.008873** $mW/cm^2 < 1.0\ mW/cm^2$

For complying the FCC limits for general population/uncontrolled exposure, the power density limit is 1.0 mW/cm^2. The calculation result of the power density at a distance of 20 cm of our device is less than the limit.

This means that according to OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), the equipment fulfills the requirements on power density for general population/uncontrolled exposure and therefore fulfills the requirements of 47 CFR Part 15.247 (b)(5).

4.11 Operational Description : 15.247(a)(1), 15.247(g) and 15.247(h)

Hopping characteristics:

The basic piconet physical channel is characterized by a pseudo-random hopping through all 79 RF channels. The frequency hopping in the piconet physical channel is determined by the Bluetooth clock and BD_ADDR of the master. When the piconet is established, the master clock is communicated to the slaves. Each slave shall add an offset to its native clock to synchronize with the master clock. Since the clocks are independent, the offsets must be updated regularly. All devices participating in the piconet are time-synchronized and hop-synchronized to the channel.

ADAPTED PICONET PHYSICAL CHANNEL

Hopping characteristics:

The adapted piconet physical channel shall use at least Nmin RF channels (where Nmin is 20). The adapted piconet physical channel uses the adapted channel hopping sequence described in Section 2.6 on page 82. Adapted piconet physical channels can be used for connected devices that have adaptive frequency hopping (AFH) enabled. There are two distinctions between basic and adapted piconet physical channels. The first is that the same channel mechanism that makes the slave frequency the same as the preceding master transmission. The second
aspect is that the adapted piconet physical channel may be based on less than the full 79 frequencies of the basic piconet physical channel.

HOP SELECTION:

Bluetooth devices shall use the hopping kernel as defined in the following sec- tions. In total, six types of hopping sequence are defined − five for the basic hop sys- tem and one for an adapted set of hop locations used by
adaptive frequency hopping (AFH). These sequences are: A page hopping sequence with 32 wake-up frequencies distributed equally over the 79 MHz, with a period length of 32; A page response hopping sequence covering 32 response frequencies that are in a one-to-one correspondence to the current page hopping sequence. The master and slave use different rules to obtain the same sequence; An inquiry hopping sequence with 32 wake-up frequencies distributed equally over the 79 MHz, with a period length of 32; An inquiry response hopping sequence covering 32 response frequen- cies that are in a one-to-one correspondence to the current inquiry hopping sequence. A basic channel hopping sequence which has a very long period length, which does not show repetitive patterns over a short time interval, and which distributes the hop frequencies equally over the 79 MHz during a short time interval. An adapted channel hopping sequence derived from the basic channel hopping sequence which uses the same channel mechanism and may use fewer than 79 frequencies. The adapted channel hopping sequence is
only used in place of the basic channel hopping sequence. All other hopping sequences are not affected by hop sequence adaptation.

Adapted hop selection kernel:

The adapted hop selection kernel is based on the basic hop selection kernel defined in the preceding sections.
The inputs to the adapted hop selection kernel are the same as for the basic hop system kernel except that the input AFH_channel_map (defined in Link Manager Protocol [Part C] Section 5.2 on page 303) is used. The AFH_channel_map indicates which RF channels shall be used and which shall be unused. When hop sequence adaptation is enabled, the number of used RF channels may be reduced from 79 to some smaller
value N. All devices shall be capable of operating on an adapted hop sequence (AHS) with Nmin ≤ N ≤ 79, with any combination of used RF channels within the AFH_channel_map that meets this constraint. Nmin is defined in Section . Adaptation of the hopping sequence is achieved through two additions to the basic channel hopping sequence. Unused RF channels are re-mapped uniformly onto used RF channels. That is, if the hop selection kernel of the basic system generates an unused RF channel, an alternative RF channel out of the set of used RF channels is selected pseudo-randomly. The used RF channel generated for the master-to-slave packet is also used for the immediately following slave-to-master packet.

Appendix A

Accreditations and Authorizations

NVLAP Lab code: 100255-0

NVLAP: The National Institute of Standards and Technology (NIST) administers the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP is comprised of laboratory accreditation programs (LAPs) which are established on the basis of requests and demonstrated need. Each LAP includes specific calibration and/or test standards and related methods and protocols assembled to satisfy the unique needs for accreditation in a field of testing or calibration. NVLAP accredits public and private laboratories based on evaluation of their technical qualifications and competence to carry out specific calibrations or tests. Accreditation criteria are established in accordance with the U.S. Code of Federal Regulations (CFR, Title 15, Part 285), NVLAP Procedures and General Requirements, and encompass the requirements of ISO/IEC 17025. For a full scope listing see http://ts.nist.gov/ts/htdocs/210/214/scopes/1002550.htm

FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland (Ref. No. 91040).

Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2181

VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: (Radiated Emissions) R-797, (Conducted Emissions) C-832, C-83400, and C-81879 and (Conducted Emissions - Telecommunications Ports) T-1582 and T-1583.

ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).

NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 2004/108/EC, Annex III (2-3). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.
NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).
NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6

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