FCC TEST REPORT

For
Chumby Industries, Inc.

Chumby NeTV
Model No.: CHU-NTLV

Test Report Number : ESTSZ110701216F

EST COMPLIANCE LABORATORY LIMITED
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Chumby Industries, Inc.
Address of applicant:	12264 El Camino Real, Suite 203, San Diego, CA 92130
Manufacturer:	AQS Electronic Manufacturing Solutions
Address of manufacturer:	Room 301 (C, E), 3/F, Block C, Intelig Technology Digital Park, No. 8 Hongmian Road, Futian Free Trade Zones, Shenzhen, China, 518038

General Description of E.U.T

EUT Description:	Chumby NeTV
Trade Name:	Chumby
Model No.:	CHU-NTLV
Rating:	DC 5V via AC/DC adapter
Test Power Supply:	AC 120V, 60Hz
Frequency:	2412~2462 MHz (11 channels, 5MHz step size)

Remark: *The models of EUT are identical except appearance of equipment. Unless otherwise specified, all tests were performed on model CHU-NTLV to represent the other similar models.*

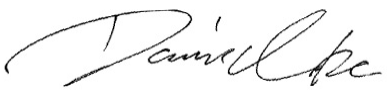
1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with

FCC Rules and Regulations Part 15 Subpart C 15.207, 15.209 and 15.247: 2009

The objective of the manufacturer is to demonstrate compliance with the described above standards. Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of EST COMPLIANCE LABORATORY LIMITED.

Date of Test : Aug. 01~12 , 2011

Prepared by : 

(Engineer: David He)

Reviewer : 

(Project Manager: Ronnie Liu)

Approved & Authorized Signer : 

(Manager: Alex Chen)

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

The maximum emission levels emanating from the device are compared to the FCC Part 15 Subpart C limits for radiation emissions and the measurement results contained in this test report show that EUT is to be technically compliant with FCC requirements.

Global United Technology Service Co., Ltd at 2nd Floor, Block No.2, Laodong Industrial Zone,Xixiang Road, Baoan District, Shenzhen, China

1.4 Test Facility

All measurement required was performed at laboratory of Global United Technology Service Co., Ltd at 2nd Floor, Block No.2, Laodong Industrial Zone,Xixiang Road, Baoan District, Shenzhen, China

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 600491
Global United Technology Service Co., Ltd has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 600491.

The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

1.5 Test Equipment List and Details

Test equipments list of Global United Technology Service Co., Ltd

Equipment	Manufacturer	Model#	Serial #	Data of Cal.	Due Data
3m Semi-Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS201	Mar. 30 2011	Mar. 30 2012
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS202	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Sept. 10 2010	Sept. 10 2011
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Coaxial Cable	GTS	N/A	GTS400	Apr. 01 2011	Apr. 01 2012
Coaxial Cable	GTS	N/A	GTS401	Apr. 01 2011	Apr. 01 2012
Coaxial Cable	GTS	N/A	GTS402	Apr. 01 2011	Apr. 01 2012
Coaxial Cable	GTS	N/A	GTS407	Apr. 01 2011	Apr. 01 2012
Coaxial Cable	GTS	N/A	GTS408	Apr. 01 2011	Apr. 01 2012
BiConiLog Antenna (26-3000MHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS204	Feb. 26 2011	Feb. 26 2012
Pre-amplifier(0.1-3000MHz)	HP	8347A	GTS210	Aug. 03 2011	Aug. 03 2012
Double-ridged horn (1-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS205	Jun. 30 2011	Jun. 30 2012
Pre-amplifier(1-18GHz)	Rohde & Schwarz	8349B	GTS224	Aug. 03 2011	Aug. 03 2012
Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	GTS250	Oct. 28 2010	Oct. 28 2011
Barometer	ChangChun	DYM3	GTS251	Jul. 11 2011	Jul. 11 2012
Shielding Room	ZhongYu Electron	7.0(L)*3.0(W)*3.0(H)	GTS206	Apr. 10 2011	Apr. 10 2012
EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS208	Sept. 14 2010	Sept. 14 2011
10dB Pulse Limiter	Rohde & Schwarz	N/A	GTS209	Sept. 14 2010	Sept. 14 2011
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS207	Apr. 14 2011	Apr. 14 2012
Coaxial Cable	GTS	N/A	GTS406	Apr. 01 2011	Apr. 01 2012

2 - Test Procedure

GENERAL: This report shall NOT be reproduced except in full without the written approval of Anbotek Compliance Lavoratory Limited. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:
Freq (MHz) METER READING + ACF = FS
33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

3 - DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ±2.4 dB.

3.2 Limit of Disturbance Voltage at The Mains Terminals (FCC PART 15.207)

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150～0.500	66~56	56~46
0.500～5.000	56	46
5.000～30.00	60	50

Note: (1)The tighter limit shall apply at the edge between two frequency bands.
(2) Decreases with the logarithm of the frequency.

3.3 EUT Setup

The setup of EUT is according with ANSI C63.4-2003 measurement procedure. The specification used was the FCC Rules and Regulations Part 15.207 limits.

The EUT was placed center and the back edge of the test table.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

3.4 Instrument Setup

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range……150 KHz to 30 MHz
Detector……..Peak & Quasi-Peak & Average
Sweep Speed…….Auto
IF Band Width……..…..9 KHz

3.5 Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dBμV of specification limits). Quasi-peak readings are distinguished with a "**QP**". Average readings are distinguished with a "**AV**".

3.6 Test Situation

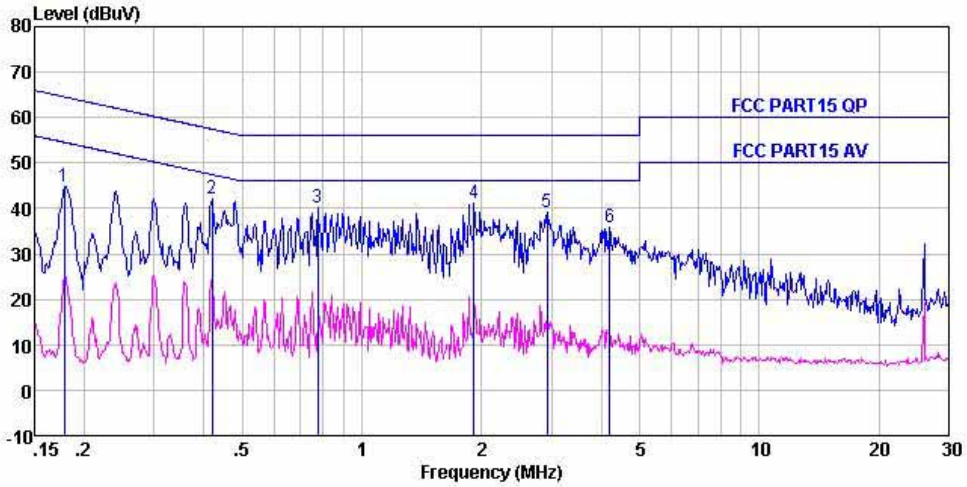
Temperature (°C)	22
Humidity (%RH)	58
Barometric Pressure (mbar)	1001
EUT	Chumby NeTV
M/N	CHU-NTLV
Operating Mode	ON

Remark: (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured
(3) When AV reading is less than relevant limit 20dB, the AV reading will not be recorded.

3.7 Test Result

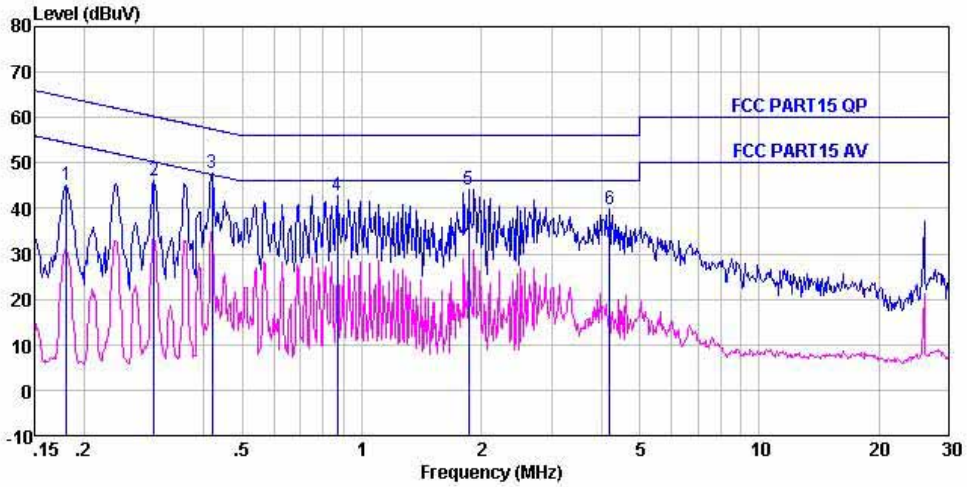
Pass

Details see the following pages.



Condition : FCC PART15 QP LISN(2011) LINE
EUT : Chumby NeTV
Model : CHU-NTLV
Test mode:: On mode
Power: : AC 120V/60Hz
Engineer: : David

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.179	44.10	0.67	0.10	44.87	64.55	-19.68	QP
2	0.419	41.43	0.57	0.10	42.10	57.46	-15.36	QP
3	0.775	39.39	0.51	0.10	40.00	56.00	-16.00	QP
4	1.918	40.56	0.41	0.10	41.07	56.00	-14.93	QP
5	2.931	38.82	0.36	0.10	39.28	56.00	-16.72	QP
6	4.202	35.34	0.32	0.10	35.76	56.00	-20.24	QP



Condition : FCC PART15 QP LISN(2011) NEUTRAL
EUT : Chumby NeTV
Model : CHU-NTLV
Test mode:: On mode
Power: : AC 120V/60Hz
Engineer: : David

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.181	44.28	0.67	0.10	45.05	64.46	-19.41	QP
2	0.300	45.48	0.61	0.10	46.19	60.24	-14.05	QP
3	0.419	47.00	0.57	0.10	47.67	57.46	-9.79	QP
4	0.866	42.20	0.49	0.10	42.79	56.00	-13.21	QP
5	1.858	43.65	0.41	0.10	44.16	56.00	-11.84	QP
6	4.202	39.28	0.32	0.10	39.70	56.00	-16.30	QP

4 RADIATED DISTURBANCES

4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±4.0 dB.

4.2 Limit of Radiated Disturbances (FCC Part 15.209)

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dBμV/m)
30 ~ 88	3	40
88 ~216	3	43.5
216 ~ 960	3	46
960~1000	3	54

Note: (1) The tighter limit shall apply at the edge between two frequency bands.
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

4.3 EUT Setup

The radiated emission tests were performed in the in the 3-meter anechoic chamber, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15 limits.

The EUT was placed on the center of the test table.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

4.4 Test Receiver Setup

According to FCC Part 15 rule, the frequency was investigated from 30 to 1000 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

Detector……..Peak & Quasi-Peak
IF Band Width……..120KHz
Frequency Range……30MHz to 1000MHz
Turntable Rotated……0 to 360 degrees

Antenna Position:

Height……..…1m to 4m
Polarity……....Horizontal and Vertical

4.5 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -10 dBμV of specification limits), and are distinguished with a "**QP**" in the data table.

4.6 Radiated Emissions Test Result

Temperature (°C)	26
Humidity (%RH)	56
Barometric Pressure (mbar)	1001.1
EUT	Chumby NeTV
M/N	CHU-NTLV
Operating Mode	ON

Test data see following pages.

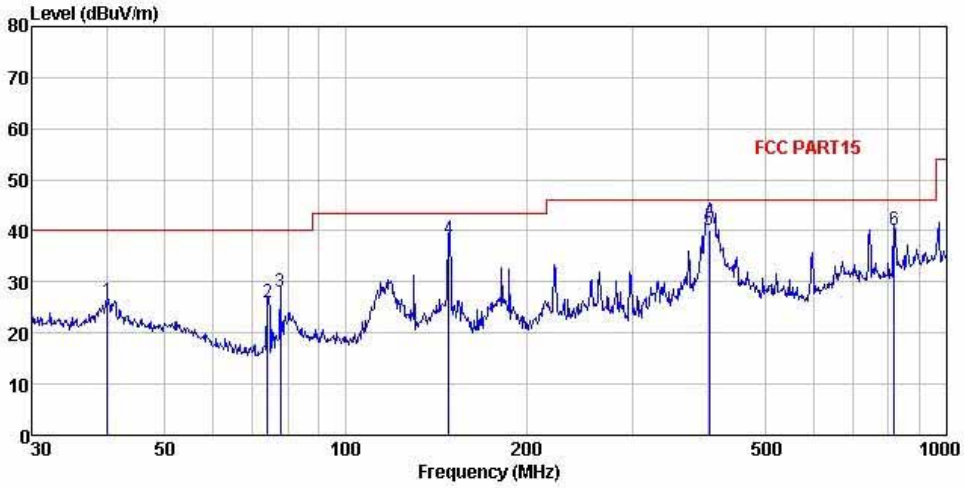
Remark: (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

4.7 Test Result

Pass.

Details see the following pages.

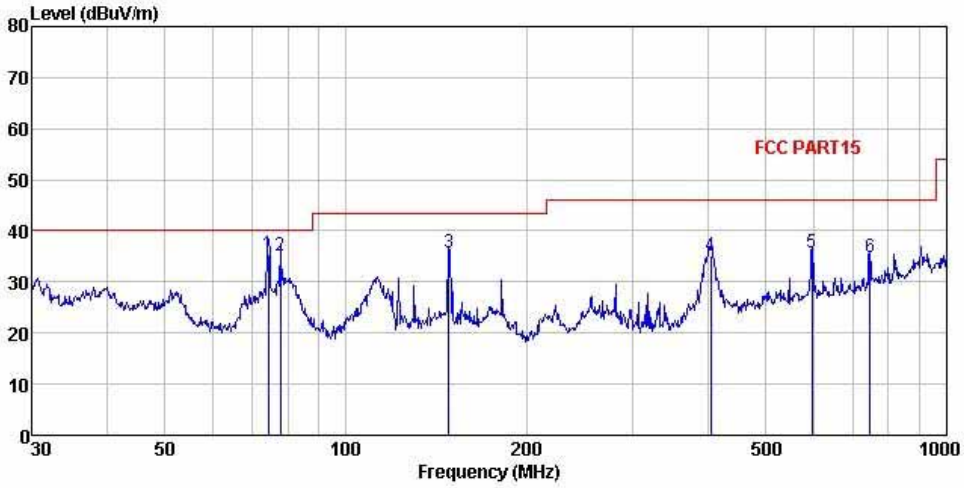
Radiated Emission Test Data



Site : 3m chamber
Condition : FCC PART15 3m VULB9163(NEW) HORIZONTAL
EUT : Chumby Netv
Model : CHU-NTLV
Test Mode : On mode
Power Rating : AC 120V/60Hz
Test Engineer: David

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	40.13	41.58	16.17	0.64	32.16	26.23	40.00	-13.77	QP
2	74.14	47.68	9.13	0.89	31.85	25.85	40.00	-14.15	QP
3	77.87	49.57	9.26	0.93	31.83	27.93	40.00	-12.07	QP
4	148.44	58.30	10.62	1.51	31.96	38.47	43.50	-5.03	QP
5	402.70	54.50	15.79	2.26	32.30	40.25	46.00	-5.75	QP
6	818.83	44.54	23.78	3.18	31.48	40.02	46.00	-5.98	QP

Radiated Emission Test Data



Site : 3m chamber
Condition : FCC PART15 3m VULB9163(NEW) VERTICAL
EUT : Chumby Netv
Model : CHU-NTLV
Test Mode : On mode
Power Rating : AC 120V/60Hz
Test Engineer: David

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	74.40	53.39	12.93	0.89	31.85	35.36	40.00	-4.64	QP
2	77.87	53.57	12.37	0.93	31.83	35.04	40.00	-4.96	QP
3	148.44	55.91	10.30	1.51	31.96	35.76	43.50	-7.74	QP
4	404.67	50.98	14.26	2.26	32.28	35.22	46.00	-10.78	QP
5	597.22	44.86	19.38	2.69	31.30	35.63	46.00	-10.37	QP
6	744.87	41.85	21.43	3.03	31.61	34.70	46.00	-11.30	QP

5 - FCC Part 15.247 Requirements

Testing was performed in accordance with CFR 47 Part 15.247.
This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

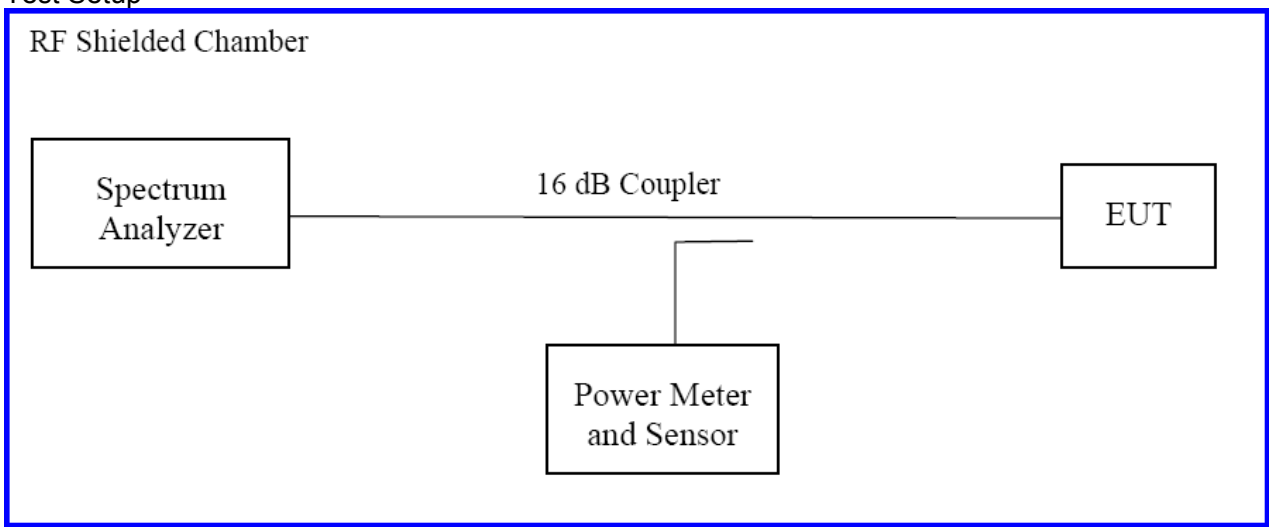
5.1 Output Power Requirements

The maximum output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.
The maximum output power and harmonics shall not exceed CFR47 Part 15.247 (b3).
The maximum transmitted power is + 30 dBm or 1 Watt.

5.1.1 Test Method

The conducted method was used to measure the channel power output according to ANSI C63.4:2003. The measurement was performed with modulation per CFR47 Part 15.247 (b3).
This test was conducted on 3 channels of Sample. The worst mode result indicated below.

Test Setup



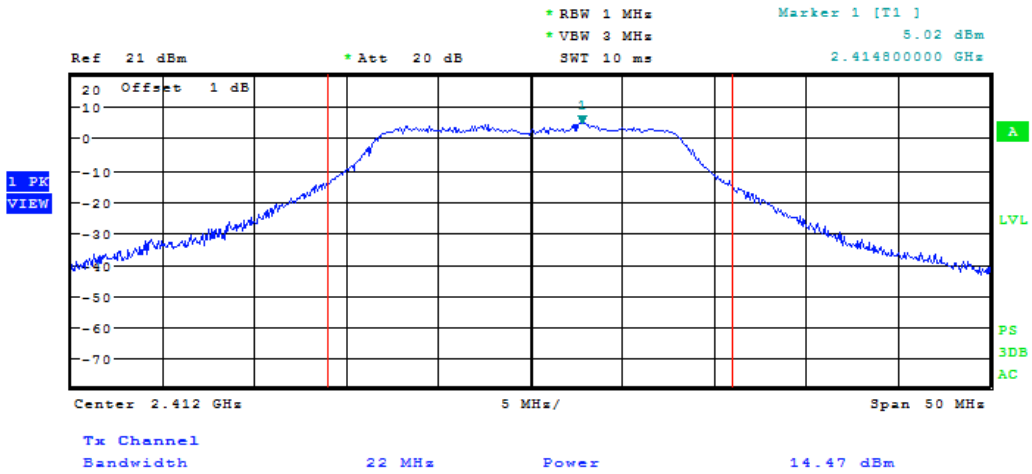
5.1.2 Test Results

Barometric Pressure (mbar)	1000.8
Temperature	23 ° C
Relative Humidity	54 %
EUT	Chumby NeTV
M/N	CHU-NTLV
Operation Condition	TX 11G Mode CH01 / CH06 / CH11
Testing Engineer	David

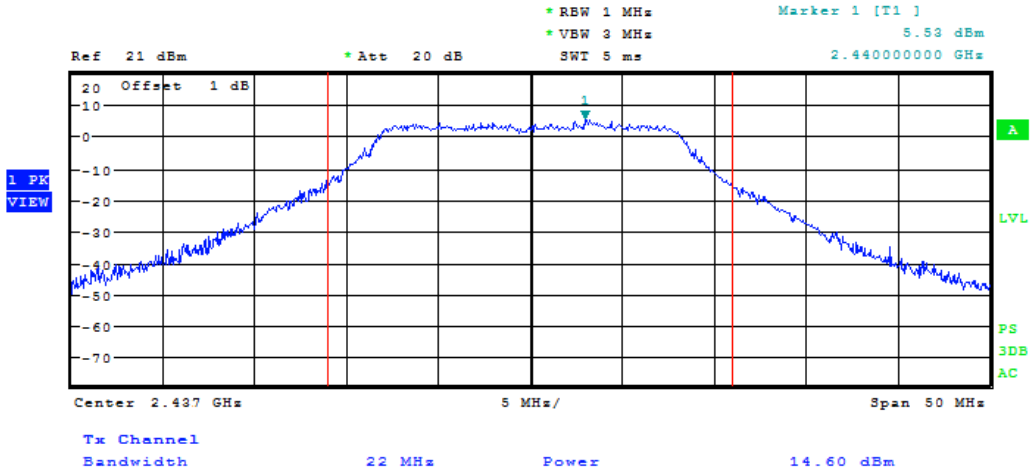
Output Power			
Operating Channel (MHz)	Limit (dBm)	Output Level (dBm)	Margin (dB)
2412	30	14.47	15.53
2437	30	14.60	15.40
2462	30	14.60	15.40

FCC ID: VDCCHUNTLV

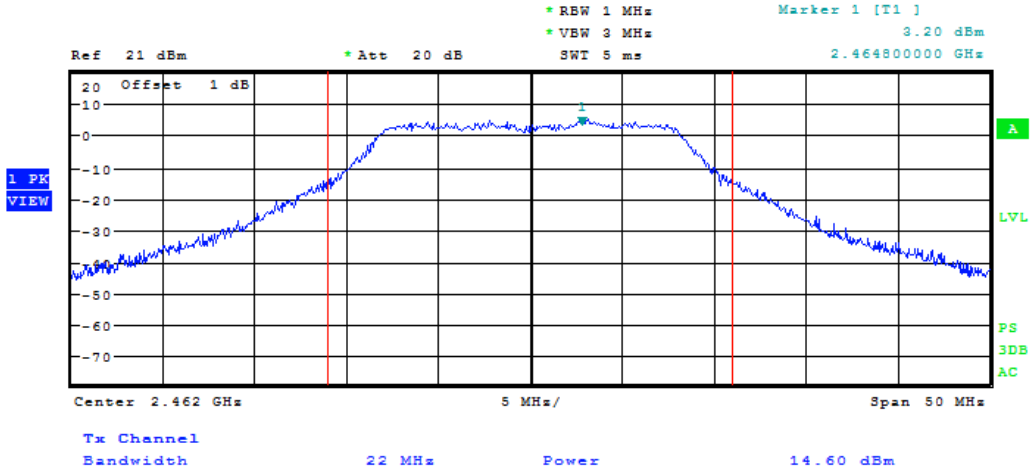
Mode: CH01



Mode: CH06



Mode: CH11



5.2 Occupied Bandwidth Requirements

The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.

The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

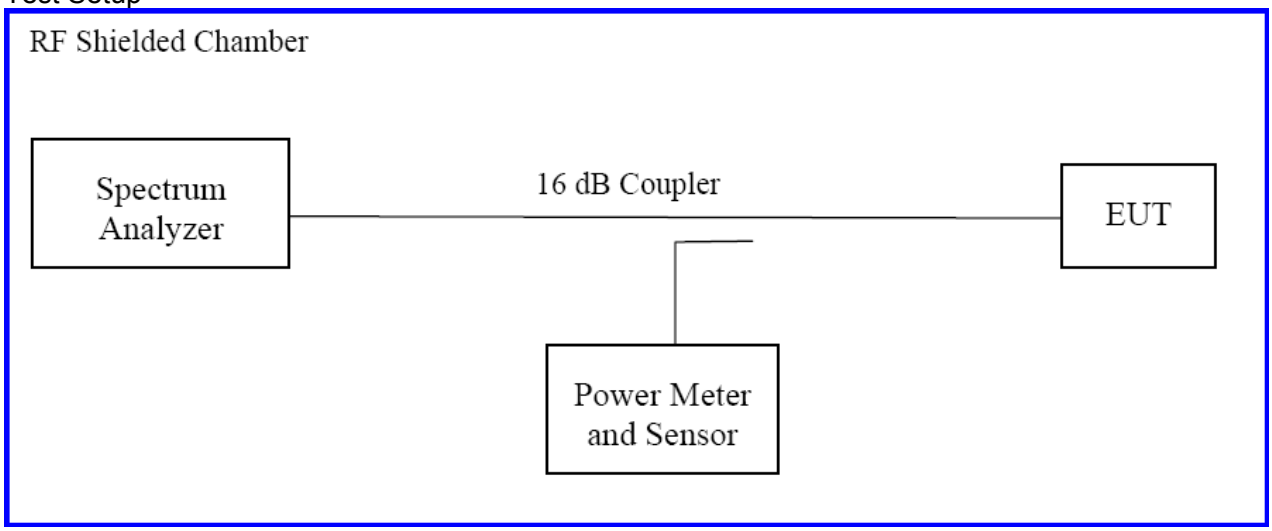
The 6 dB bandwidth is defined the bandwidth of 6 dBr from highest transmitted level of the fundamental frequency.

The bandwidth shall be at least 500 kHz via Section CFR47 15.247(a2).

5.2.1 Test Method

The conducted method was used to measure the channel power output according to ANSI C63.4:2003. The measurement was performed with modulation per CFR47 Part 15.247 (a2). This test was conducted on 3 channels of Sample. The worst mode result indicated below.

Test Setup



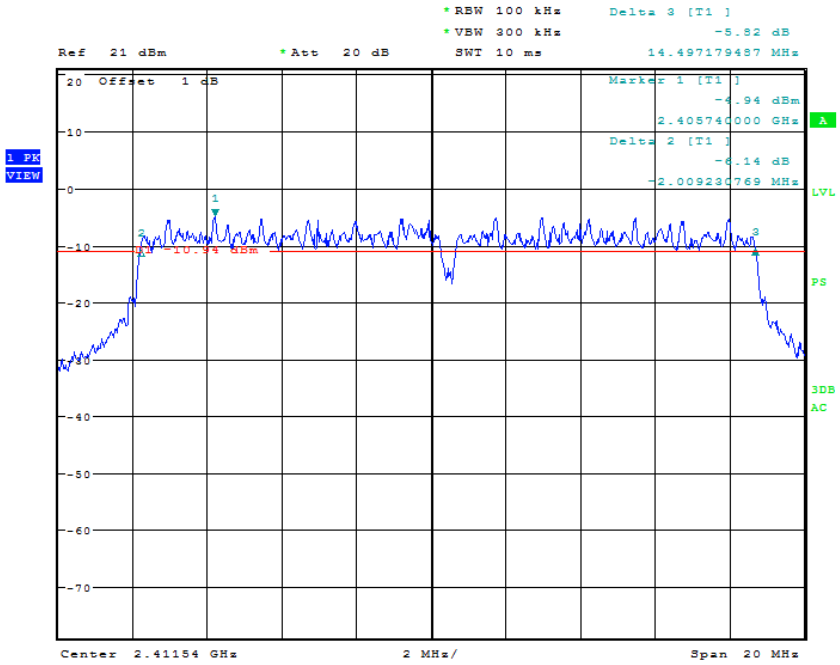
5.2.2 Test Results

Barometric Pressure (mbar)	1000.8
Temperature	23 ° C
Relative Humidity	54 %
EUT	Chumby NeTV
M/N	CHU-NTLV
Operation Condition	TX 11G Mode CH01 / CH06 / CH11
Testing Engineer	David

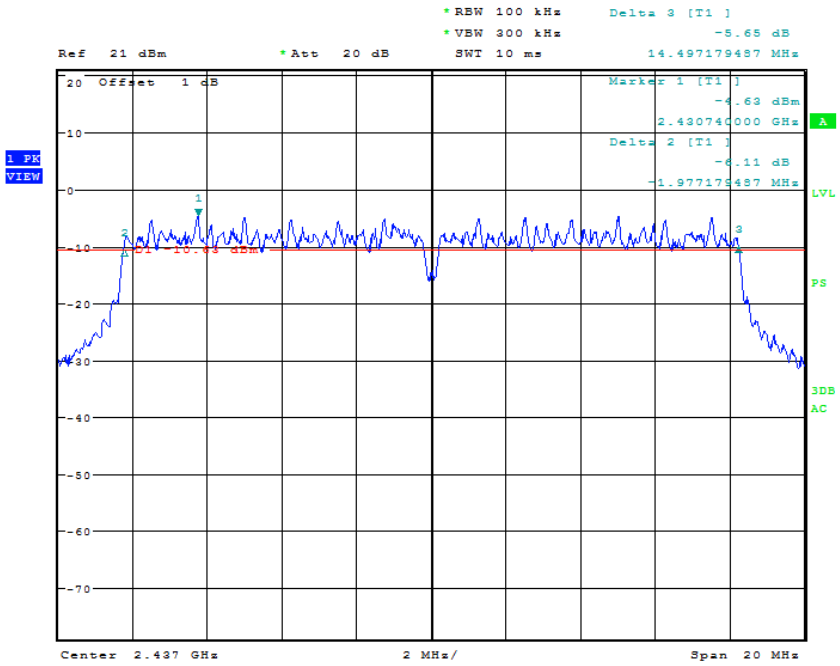
6dB Bandwidth(MHz)			
Operating Channel (MHz)	Limit	Bandwidth (MHz)	Result
2412	> 500kHz	16.506	**PASS**
2437	> 500kHz	16.474	**PASS**
2462	> 500kHz	16.410	**PASS**

FCC ID: VDCCHUNTLV

Mode: CH01

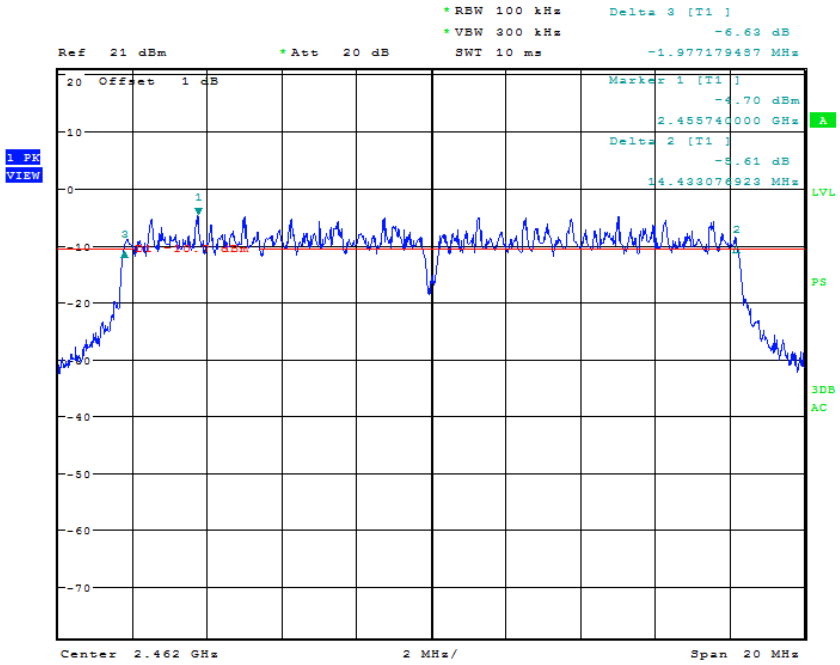


Mode: CH06



FCC ID: VDCCHUNTLV

Mode: CH11

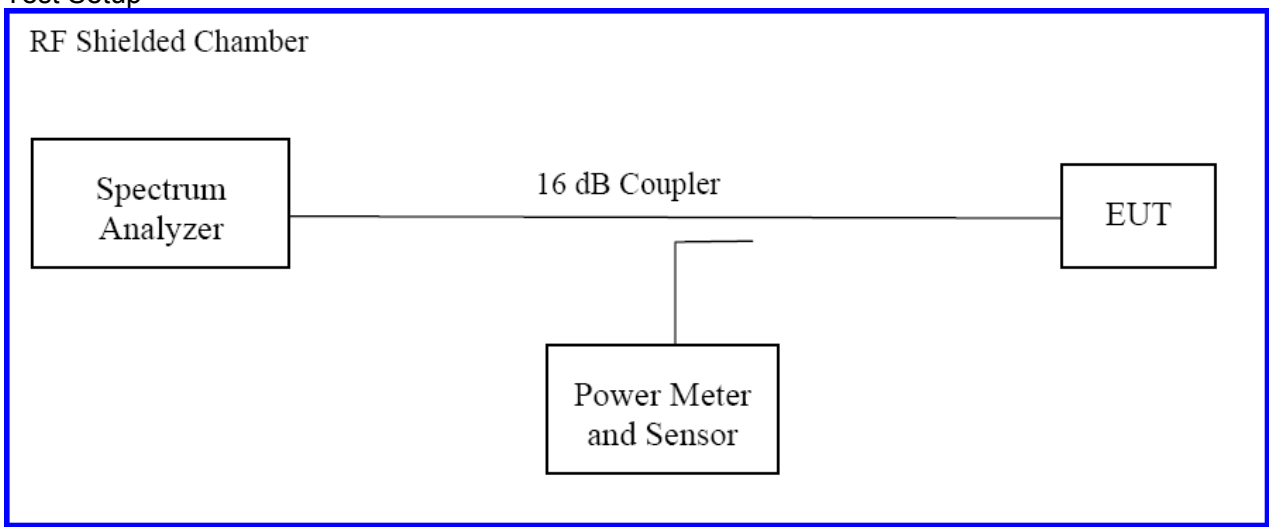


5.3 Band Edge Requirements

The setup was identical to RF output power measurement. Intentional radiators operating under the alternative provisions to the general emission limits, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If the frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.
Any frequency outside the band of 2400 MHz to 2483.5 MHz, the power output level must be below 20 dB from the in-band transmitting signal: CFR 47 Part 15.215, 15.247(d).

5.3.1 Test Method

The conducted method was used to measure the channel power output according to ANSI C63.4:2003. The measurement was performed with modulation per CFR47 Part 15.215, 15.247 (d). This test was conducted on 2 channels of Sample. The worst mode result indicated below.
Test Setup



5.3.2 Test Results

Barometric Pressure (mbar)	1000.8
Temperature	23 ° C
Relative Humidity	54 %
EUT	Chumby NeTV
M/N	CHU-NTLV
Operation Condition	TX 11G Mode CH01 / CH11
Testing Engineer	David

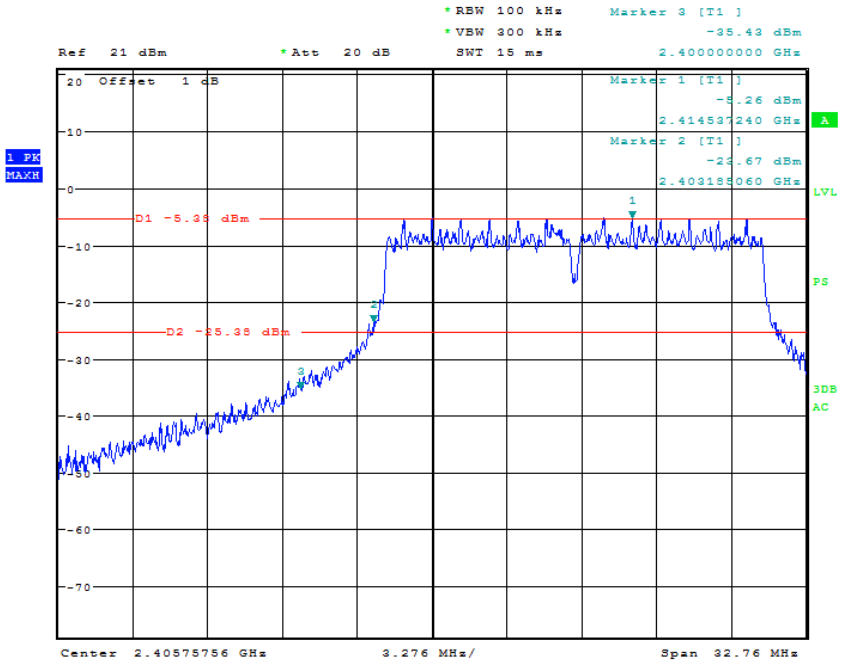
Band Edge Results			
Operating Channel (MHz)	Band Edge Level (dBm)	20dB Level (dBm)	Margin (dB)
2412	-35.43	-25.38	10.05
2462	-51.14	-24.87	26.27

Barometric Pressure (mbar)	1000.8
Temperature	23 ° C
Relative Humidity	54 %
EUT	Chumby NeTV
M/N	CHU-NTLV
Operation Condition	TX 11G Mode CH01 / CH11
Testing Engineer	David

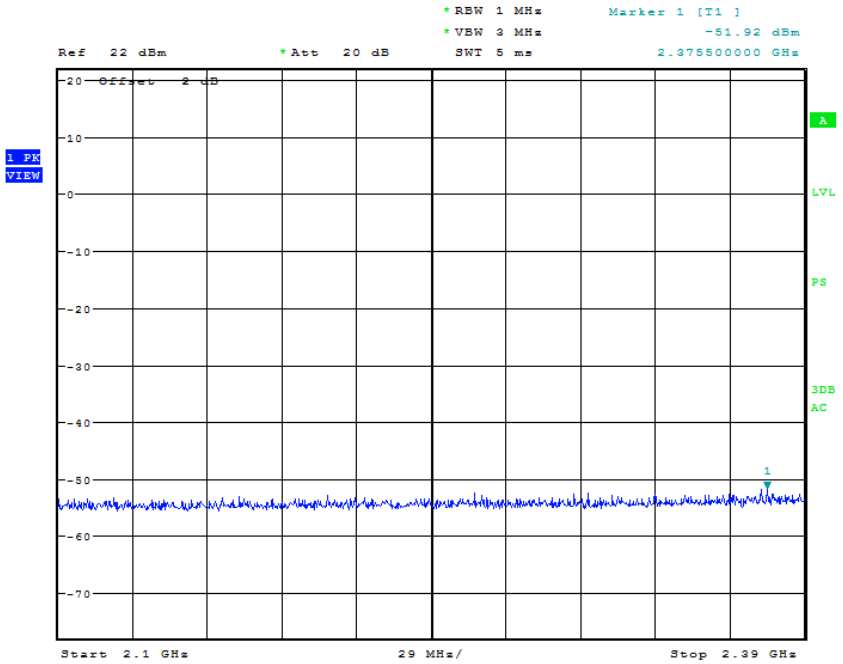
Out of Band Edge Results			
Operating Channel (MHz)	Band Edge Level (dBm)	20dB Level (dBm)	Margin (dB)
2412	-51.92	-26.69	25.23
2462	-51.20	-25.25	25.95

FCC ID: VDCCHUNTLV

Mode: CH01

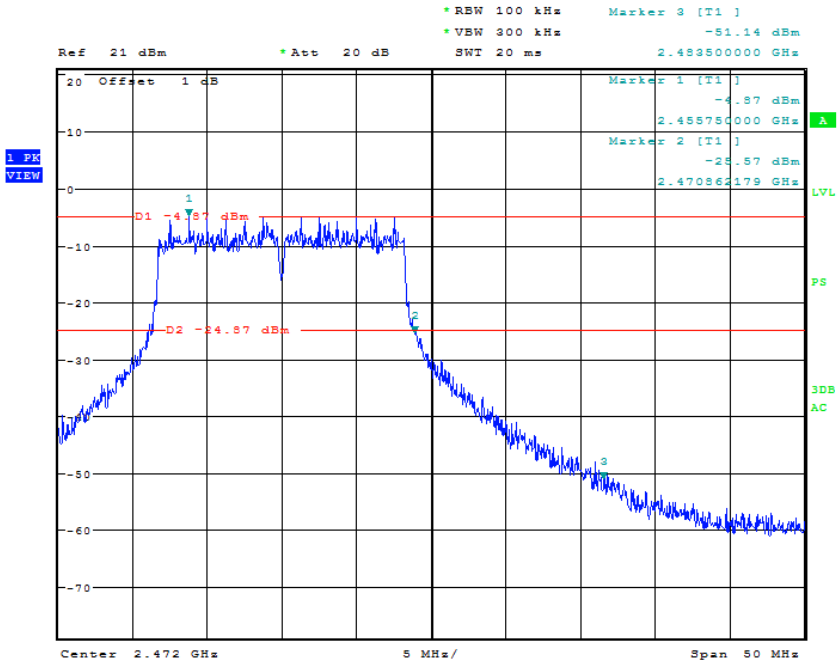


Mode: CH01 (2100MHz-2390MHz)



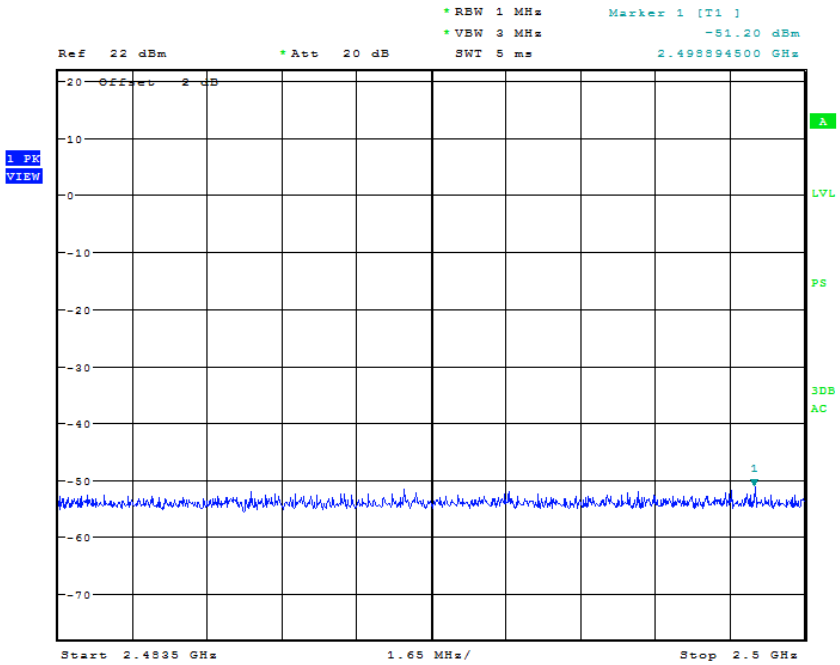
FCC ID: VDCCHUNTLV

Mode: CH11



Date: 15.AUG.2011 21:50:28

Mode: CH11 (2483.5MHz-2500MHz)



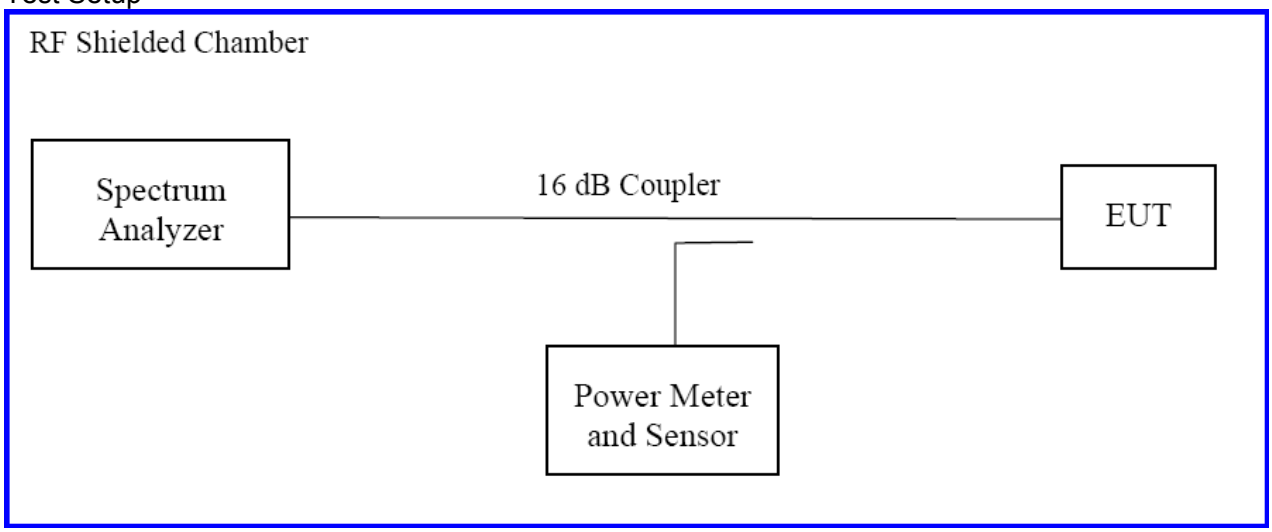
5.4 Peak Power Spectral Density Requirements

According to the CFR47 Part 15.247 (e), the spectral power density output of the antenna port shall be less than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.4.1 Test Method

The conducted method was used to measure the channel power output according to ANSI C63.4:2003. The measurement was performed with modulation per CFR47 Part 15.247 (e). This test was conducted on 3 channels of Sample. The worst mode result indicated below.

Test Setup



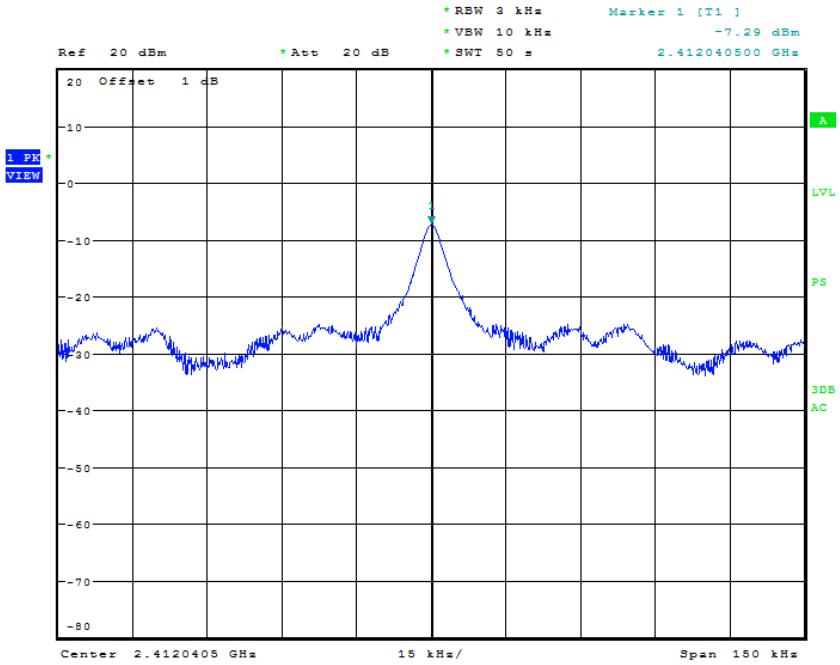
5.4.2 Test Results

Barometric Pressure (mbar)	1000.8
Temperature	23 ° C
Relative Humidity	54 %
EUT	Chumby NeTV
M/N	CHU-NTLV
Operation Condition	TX 11G Mode CH01 / CH06 / CH11
Testing Engineer	David

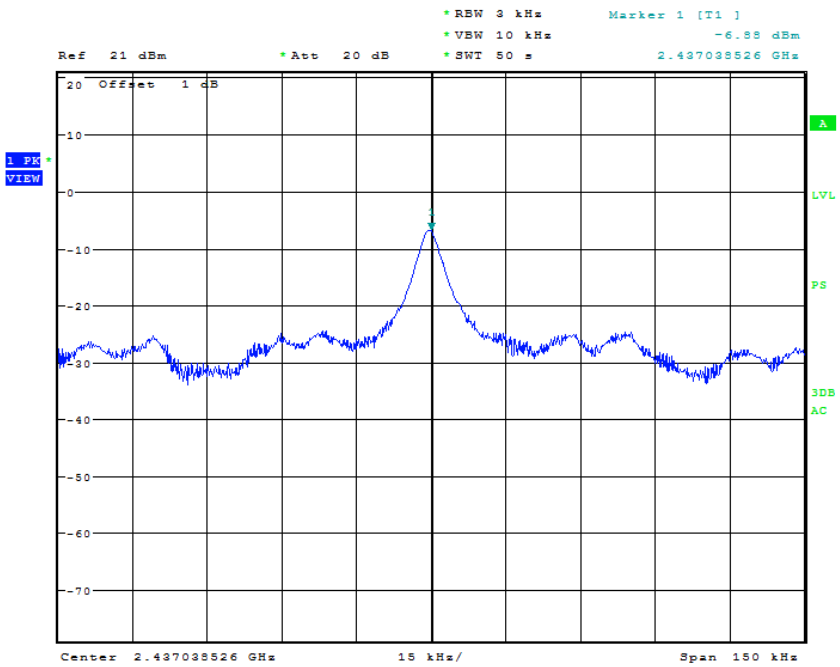
Peak Power Spectral Density			
Operating Channel (MHz)	Limit (dBm)	PPSD (dBm)	Margin (dB)
2412	8	-7.29	15.29
2437	8	-6.88	14.88
2462	8	-6.60	14.60

FCC ID: VDCCHUNTLV

Mode: CH01

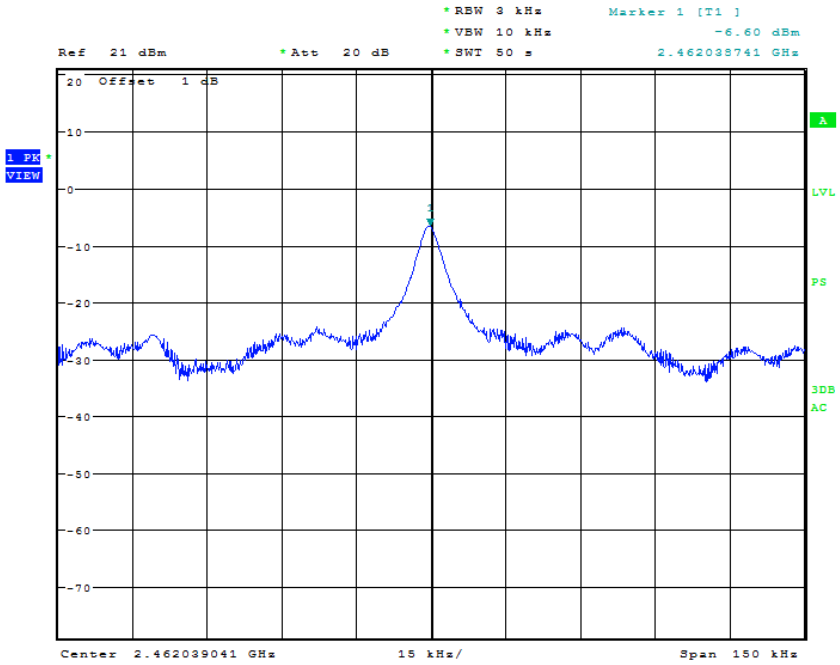


Mode: CH06



FCC ID: VDCCHUNTLV

Mode: CH11



5.5 Maximum Permissible Exposure Requirements

5.5.1 Test Methodology

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this product is measured in a Semi-Anechoic Chamber, and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

5.5.2 RF Exposure Limit

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
300-1500	-	-	F/300	6
1500-100,000	-	-	5	6
300-1500	-	-	F/1500	6
1500-100,000	-	-	1.0	30

F = Frequency in MHz

5.5.3 EUT Operation Condition

The software provided by Manufacturer enabled the EUT to transmit data at lowest, middle and highest channel individually.

5.5.4 Classification

The antenna of the product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in users manual. So, this device is classified as a Mobile Device.

5.5.5 Test Results

5.5.5.1 Antenna Gain

The transmitting antenna was externally connected. The dipole antenna had the highest gain of +1.5 dBi or 1.41 (numeric).

5.5.5.2 Sample Calculation

The Friis transmission formula: Pd = (Pout*G) / (4*π*R2)

Where;

Pd = power density in mW/cm2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
π ≈ 3.1416
R = distance between observation point and center of the radiator in cm

5.5.5.3 Output Power into Antenna & RF Exposure value at distance 20cm:

Calculations for this report are based on highest power measurement.
Limit for MPE (from FCC part 1.1310 table1) is 1.0 mW/cm2
The highest measured channel output power is +14.60 dBm or 28.85 mW
Using the Friss transmission formula, the EIRP is Pout*G, and R is 20cm.
Pd = (28.85*1.41) / (1600π) = 0.0081 mW/cm2, which is 0.9919 mW/cm2 below to the limit.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

5.6 Transmitter Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.247(d).

5.6.1 Test Methodology

5.6.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's. Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

5.6.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.
Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m nonconductive table 80cm above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.
The final scans performed on the worst axis for three operating channels; 2412 MHz, 2437 MHz, and 2462 MHz at 1 MBit/s for 802.11g mode.
The worst axis for each antennas type was scanned.

5.6.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209:

Measurement Frequency (MHz)	Field strength (microvolts/meter)	distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/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

All harmonics and spurious emission which are outside of the restricted band shall be 20 dB below the in-band emission.

5.6.3 Test Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and 1.5.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Data (From 30MHz ~ 1GHz):

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
40.13	41.58	16.17	0.64	32.16	26.23	40.00	-13.77	QP	H
74.14	47.68	9.13	0.89	31.85	25.85	40.00	-14.15	QP	H
77.87	49.57	9.26	0.93	31.83	27.93	40.00	-12.07	QP	H
148.44	58.30	10.62	1.51	31.96	38.47	43.50	-5.03	QP	H
402.70	54.50	15.79	2.26	32.30	40.25	46.00	-5.75	QP	H
818.83	44.54	23.78	3.18	31.48	40.02	46.00	-5.98	QP	H
74.40	53.39	12.93	0.89	31.85	35.36	40.00	-4.64	QP	V
77.87	53.57	12.37	0.93	31.83	35.04	40.00	-4.96	QP	V
148.44	55.91	10.30	1.51	31.96	35.76	43.50	-7.74	QP	V
404.67	50.98	14.26	2.26	32.28	35.22	46.00	-10.78	QP	V
597.22	44.86	19.38	2.69	31.30	35.63	46.00	-10.37	QP	V
744.87	41.85	21.43	3.03	31.61	34.70	46.00	-11.30	QP	V

Emissions attenuated more than 20 dB below the permissible value are not reported.

Data (Above 1GHz to the tenth Harmonic, Average):

CH Low(2412MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
2100	30.24	27.43	3.27	31.90	29.04	54	-24.96	Average	H
2390	31.59	27.76	3.33	30.10	32.58	54	-21.42	Average	H
2400	35.21	27.76	3.37	30.10	36.24	54	-17.76	Average	H
2412	88.06	27.57	3.37	30.06	88.94	94	-5.06	Average	H
4824	29.56	31.79	5.34	24.09	42.60	54	-11.40	Average	H
7236	29.46	36.19	6.88	26.41	46.12	54	-7.88	Average	H
9648	25.11	38.07	8.96	25.37	46.77	54	-7.23	Average	H
2100	30.62	27.43	3.27	31.90	29.42	54	-24.58	Average	V
2390	31.88	27.76	3.33	30.10	32.87	54	-21.13	Average	V
2400	35.40	27.76	3.37	30.10	36.43	54	-17.57	Average	V
2412	90.09	27.57	3.37	30.06	90.97	94	-3.03	Average	V
4824	33.21	31.79	5.34	24.09	46.25	54	-7.75	Average	V
7236	30.58	36.19	6.88	26.41	47.24	54	-6.76	Average	V
9648	25.56	38.07	8.96	25.37	47.22	54	-6.78	Average	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

CH Middle(2437MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
2437	86.64	27.48	3.43	29.99	87.56	94	-6.44	Average	H
4874	30.99	31.85	5.4	24.01	44.23	54	-9.77	Average	H
7311	29.55	36.37	6.91	26.62	46.21	54	-7.79	Average	H
9748	24.11	38.35	9.01	25.3	46.17	54	-7.83	Average	H
2437	88.21	27.48	3.43	29.99	89.13	94	-4.87	Average	V
4874	32.16	31.85	5.4	24.01	45.40	54	-8.60	Average	V
7311	30.59	36.37	6.91	26.62	47.25	54	-6.75	Average	V
9748	25.15	38.35	9.01	25.3	47.21	54	-6.79	Average	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

CH High(2462MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
2462	85.94	27.49	3.46	29.96	86.93	94	-7.07	Average	H
2483.5	34.06	27.87	3.49	29.93	35.49	54	-18.51	Average	H
2500	31.20	27.92	3.52	30.68	31.96	54	-22.04	Average	H
4924	30.11	31.91	5.46	23.94	43.54	54	-10.46	Average	H
7386	28.19	36.49	6.93	26.79	44.82	54	-9.18	Average	H
9848	24.64	38.72	9.06	25.24	47.18	54	-6.82	Average	H
2462	86.46	27.49	3.46	29.96	87.45	94	-6.55	Average	V
2483.5	34.94	27.87	3.49	29.93	36.37	54	-17.63	Average	V
2500	31.25	27.92	3.52	30.68	32.01	54	-21.99	Average	V
4924	31.12	31.91	5.46	23.94	44.55	54	-9.45	Average	V
7386	30.22	36.49	6.93	26.79	46.85	54	-7.15	Average	V
9848	25.16	38.72	9.06	25.24	47.70	54	-6.30	Average	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

Emissions attenuated more than 20 dB below the permissible value are not reported.

Data (Above 1GHz to the tenth Harmonic, Peak):

CH Low(2412MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
2100	42.97	27.43	3.27	31.90	41.77	74	-32.23	Peak	H
2390	44.85	27.76	3.33	30.10	45.84	74	-28.16	Peak	H
2400	48.03	27.76	3.37	30.10	49.06	74	-24.94	Peak	H
2412	98.06	27.57	3.37	30.06	98.94	114	-15.06	Peak	H
4824	40.21	31.79	5.34	24.09	53.25	74	-20.75	Peak	H
7236	40.22	36.19	6.88	26.41	56.88	74	-17.12	Peak	H
9648	37.35	38.07	8.96	25.37	59.01	74	-14.99	Peak	H
2100	43.62	27.43	3.27	31.90	42.42	74	-31.58	Peak	V
2390	45.44	27.76	3.33	30.10	46.43	74	-27.57	Peak	V
2400	49.96	27.76	3.37	30.10	50.99	74	-23.01	Peak	V
2412	99.21	27.57	3.37	30.06	100.09	114	-13.91	Peak	V
4824	42.15	31.79	5.34	24.09	55.19	74	-18.81	Peak	V
7236	42.52	36.19	6.88	26.41	59.18	74	-14.82	Peak	V
9648	39.16	38.07	8.96	25.37	60.82	74	-13.18	Peak	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

CH Middle(2437MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
2437	96.94	27.48	3.43	29.99	97.86	114	-16.14	Peak	H
4874	39.74	31.85	5.4	24.01	52.98	74	-21.02	Peak	H
7311	40.41	36.37	6.91	26.62	57.07	74	-16.93	Peak	H
9748	37.82	38.35	9.01	25.3	59.88	74	-14.12	Peak	H
2437	97.09	27.48	3.43	29.99	98.01	114	-15.99	Peak	V
4874	42.04	31.85	5.4	24.01	55.28	74	-18.72	Peak	V
7311	42.62	36.37	6.91	26.62	59.28	74	-14.72	Peak	V
9748	39.9	38.35	9.01	25.3	61.96	74	-12.04	Peak	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

CH High(2462MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
2462	94.04	27.49	3.46	29.96	95.03	114	-18.97	Peak	H
2483.5	47.35	27.87	3.49	29.93	48.78	74	-25.22	Peak	H
2500	44.21	27.92	3.52	30.68	44.97	74	-29.03	Peak	H
4924	39.23	31.91	5.46	23.94	52.66	74	-21.34	Peak	H
7386	39.43	36.49	6.93	26.79	56.06	74	-17.94	Peak	H
9848	36.04	38.72	9.06	25.24	58.58	74	-15.42	Peak	H
2462	95.39	27.49	3.46	29.96	96.38	114	-17.62	Peak	V
2483.5	48.16	27.87	3.49	29.93	49.59	74	-24.41	Peak	V
2500	44.90	27.92	3.52	30.68	45.66	74	-28.34	Peak	V
4924	41.78	31.91	5.46	23.94	55.21	74	-18.79	Peak	V
7386	41.73	36.49	6.93	26.79	58.36	74	-15.64	Peak	V
9848	38.83	38.72	9.06	25.24	61.37	74	-12.63	Peak	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

Emissions attenuated more than 20 dB below the permissible value are not reported.