

# FCC TEST REPORT

**REPORT NO.:** RF980622H07

**MODEL NO.:** N-R0001

**RECEIVED:** June 22, 2009

**TESTED:** June 23 to July 03, 2009

**ISSUED:** July 03, 2009

**APPLICANT:** Logitech Inc. - Canada

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**ISSUED BY:** Bureau Veritas Consumer Products Services  
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## 1 CERTIFICATION

**PRODUCT :** Remote control H900  
**BRAND NAME :** Logitech  
**MODEL NO. :** N-R0001  
**TESTED:** June 23 to July 03, 2009  
**APPLICANT :** Logitech Inc. - Canada  
**TEST ITEM:** R&D SAMPLE  
**STANDARDS :** 47 CFR Part 15, Subpart C (Section 15.247)  
ANSI C63.4-2003

The above equipment (Model: N-R0001) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Carol Liao , **DATE:** July 03, 2009  
( Carol Liao, Specialist )

**TECHNICAL ACCEPTANCE :** Hank Chung , **DATE:** July 03, 2009  
Responsible for RF ( Hank Chung, Deputy Manager )

**APPROVED BY :** May Chen , **DATE:** July 03, 2009  
( May Chen, Deputy Manager )

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is -15.99dB at 0.494 MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit
15.247(c)	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -5.08 dB at 110.02 MHz
15.247(d)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit
15.247(c)	Conducted Out-Band Emission Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	3.83 dB
Radiated emissions (1GHz ~18GHz)	2.44 dB
Radiated emissions (18GHz ~20GHz)	2.67 dB

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Remote control H900
<b>MODEL NO.</b>	N-R0001
<b>FCC ID</b>	TOB-NR0001
<b>POWER SUPPLY</b>	DC 5.5V from adapter, DC 5V from host equipment or DC 3.7V from battery
<b>MODULATION TYPE</b>	O-QPSK
<b>CARRIER FREQUENCY OF EACH CHANNEL</b>	2405MHz ~ 2480MHz
<b>NUMBER OF CHANNEL</b>	16
<b>OUTPUT POWER</b>	0.780mW
<b>ANTENNA TYPE</b>	PCB printed quarter wave antenna (Antenna Gain : -6.58dBi)
<b>DATA CABLE</b>	Recharge USB cable (Shielded, 1.65m with one core)
<b>I/O PORTS</b>	USB port x 1
<b>ASSOCIATED DEVICES</b>	Power adapter Recharge USB cable (Shielded, 1.65m with one core)

#### NOTE:

- The EUT must be supplied with a power adapter / battery as following:

Adapter (for Cradle use)		
Brand	Model No.	Spec.
Logitech	KSAA0550080 W1US	AC Input: 100-240V 50/60MHz 0.18A DC Output: 5.5V 0.8A (Unshielded, 1.8m)
Battery (Li-ion Rechargeable battery)		
Brand	Model No.	Spec.
Logitech	R-IG7	930mAh 3.7V

2. The EUT was pre-tested under the following test modes for three different axes placements:

Test Mode	Description
Mode A	X-Y plane
<b>Mode B</b>	<b>X-Z plane</b>
Mode C	Y-Z plane

From the above modes, the worst emission level was found in **Mode B**. Therefore only the test data of the mode was recorded in this report individually.

3. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

## 3.2 DESCRIPTION OF TEST MODES

Sixteen channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2405	4	2425	8	2445	12	2465
1	2410	5	2430	9	2450	13	2470
2	2415	6	2435	10	2455	14	2475
3	2420	7	2440	11	2460	15	2480

**NOTE:**

1. Below 1 GHz, the channel 0, 7, and 15 were pre-tested in chamber. The channel 0, worst case one, was chosen for final test.
2. Above 1 GHz, the channel 0, 7, and 15 were tested individually.



### 3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
-	√	√	√	√	NA

Where PLC: Power Line Conducted Emission  
RE≥1G: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz  
APCM: Antenna Port Conducted Measurement

#### **Power Line Conducted Emission Test:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
0 to 15	0	O-QPSK	0.25

#### **Radiated Emission Test (Below 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
0 to 15	0	O-QPSK	0.25

#### **Radiated Emission Test (Above 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
0 to 15	0, 7, 15	O-QPSK	0.25

#### **Bandedge Measurement:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
0 to 15	0, 15	O-QPSK	0.25

**Antenna Port Conducted Measurement:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
0 to 15	0, 7, 15	O-QPSK	0.25

### 3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Remote control H900. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**47 CFR Part 15, Subpart C. (15.247)**  
**ANSI C63.4 : 2003**

All tests have been performed and recorded as per the above standards.

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of 47 CFR Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

### 3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

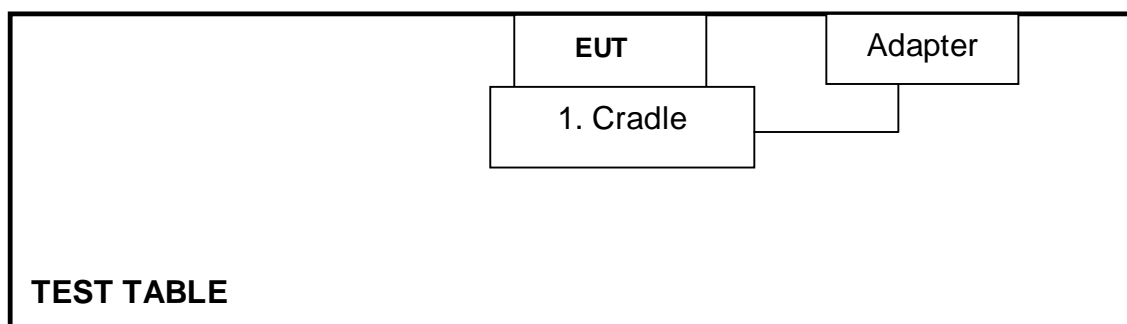
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	Cradle	Logitech	L-LW20	NA	FCC DoC

No.	Signal cable description
1	NA

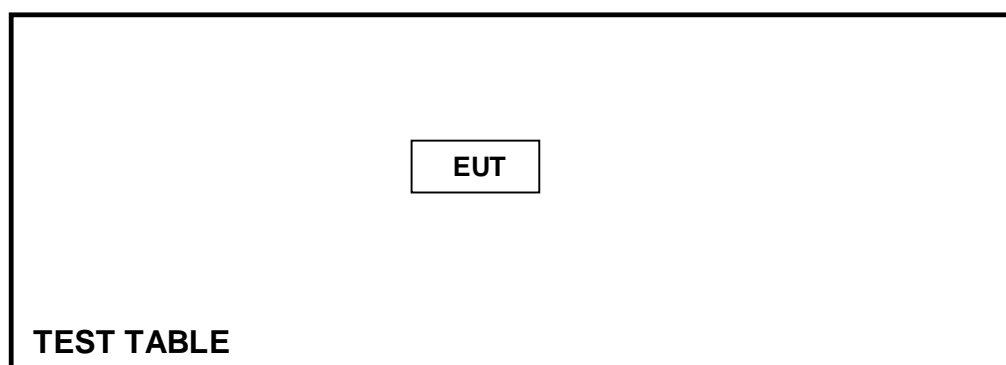
Note: The power cords of the above support units were unshielded (1.8m).

### 3.6 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted Emission Test:



For Radiated Emission Test:



## 4 TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 05, 2009	Mar. 04, 2010
Line-Impedance Stabilization Network (for EUT)	KNW-407	8-1395-12	May 04, 2009	May 03, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 08, 2009	June 07, 2010
RF Cable (JYEBAO)	5DFB	COACAB-001	Dec 15, 2008	Dec 14, 2009
50 ohms Terminator	50	3	Nov. 05, 2008	Nov. 04, 2009
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

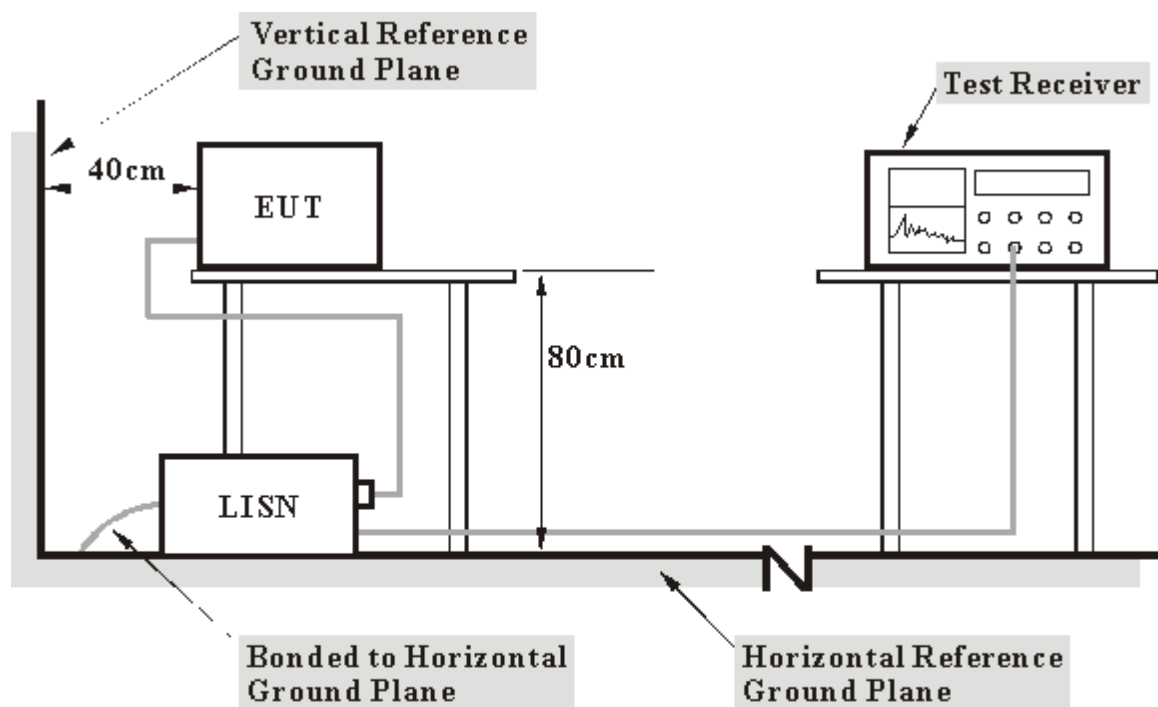
**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.

### 4.1.3 TEST PROCEDURES

- The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT/HOST were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

### 4.1.4 TEST SETUP



- Note:**
- Support units were connected to second LISN.
  - Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### **4.1.5 DEVIATION FROM TEST STANDARD**

No deviation

#### **4.1.6 EUT OPERATING CONDITIONS**

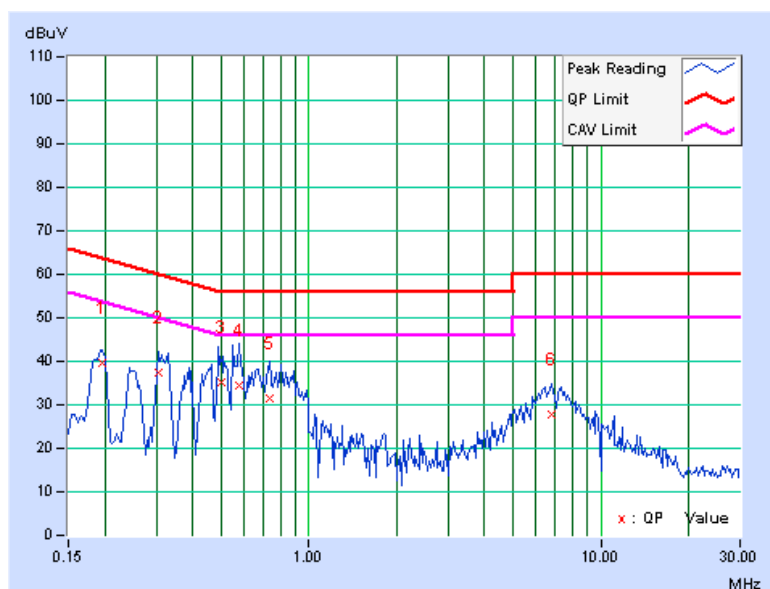
1. Turn on the power of EUT.
2. Set the EUT under charger condition.

#### 4.1.7 TEST RESULTS

TEST MODE	Mode 1	PHASE	Line (L)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 60 % RH, 965 hPa	TESTED BY	Max Tseng

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.197	0.18	39.41	-	39.59	-	63.74	53.74	-24.16	-
2	0.306	0.12	37.32	-	37.44	-	60.07	50.07	-22.63	-
3	0.500	0.08	35.09	-	35.17	-	56.00	46.00	-20.83	-
4	0.580	0.07	34.54	-	34.61	-	56.00	46.00	-21.39	-
5	0.732	0.07	31.23	-	31.30	-	56.00	46.00	-24.70	-
6	6.785	0.18	27.74	-	27.92	-	60.00	50.00	-32.08	-

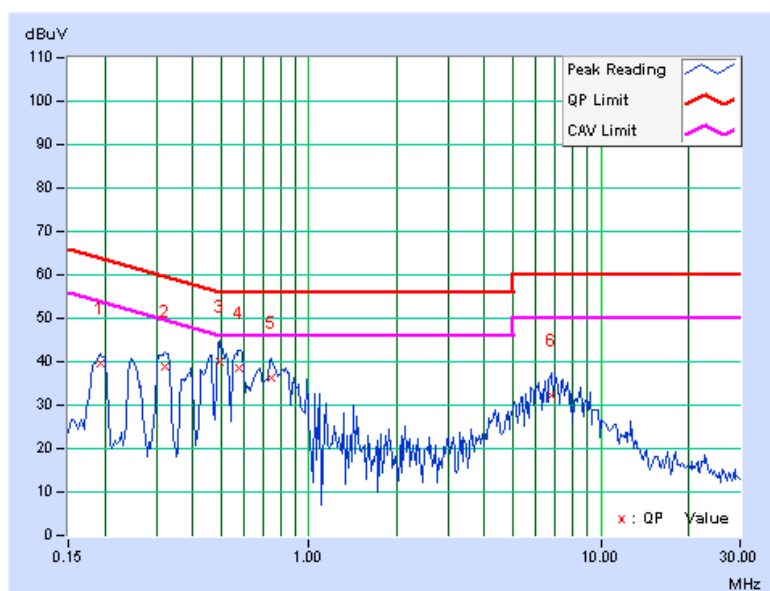
- REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.  
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.  
3. The emission levels of other frequencies were very low against the limit.  
4. Margin value = Emission level - Limit value  
5. Correction factor = Insertion loss + Cable loss  
6. Emission Level = Correction Factor + Reading Value.



TEST MODE	Mode 1	PHASE	Neutral (N)
INPUT POWER (SYSTEM)	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 60 % RH, 965 hPa	TESTED BY	Max Tseng

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.193	0.19	39.50	-	39.69	-	63.91	53.91	-24.21	-
2	0.322	0.13	38.79	-	38.92	-	59.66	49.66	-20.74	-
3	0.494	0.09	40.03	-	40.12	-	56.10	46.10	-15.99	-
4	0.580	0.09	38.40	-	38.49	-	56.00	46.00	-17.51	-
5	0.740	0.08	36.07	-	36.15	-	56.00	46.00	-19.85	-
6	6.773	0.21	32.16	-	32.37	-	60.00	50.00	-27.63	-

- REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.  
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.  
3. The emission levels of other frequencies were very low against the limit.  
4. Margin value = Emission level - Limit value  
5. Correction factor = Insertion loss + Cable loss  
6. Emission Level = Correction Factor + Reading Value.





## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT 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

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

**A D T**

## 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	U3751	17010023	July. 31, 2008	July. 30, 2009
ADVANTEST Spectrum Analyzer	U3772	160100280	July 26, 2008	July 25, 2009
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2008	Sep. 24, 2009
ROHDE & SCHWARZ Test Receiver	ESVS 30	841977/002	Nov. 03, 2008	Nov. 02, 2009
SCHAFFNER(CHASE) Broadband Antenna	CBL6112B	2798	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120-D1	D123	Sep. 30, 2008	Sep. 29, 2009
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 23, 2009	Jan. 22, 2010
RF Switches	MP59B	6100175593	Sep. 02, 2008	Sep. 01, 2009
RF Cable	8DFB	STBCAB-30M-1GHz	Sep. 02, 2008	Sep. 01, 2009
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA
CORCOM AC Filter	MRI2030	024/019	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: U3772) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. B.
4. The VCCI Site Registration No. is R-847.
5. The FCC Site Registration No. is 92753.
6. The CANADA Site Registration No. is IC 7450G-2.

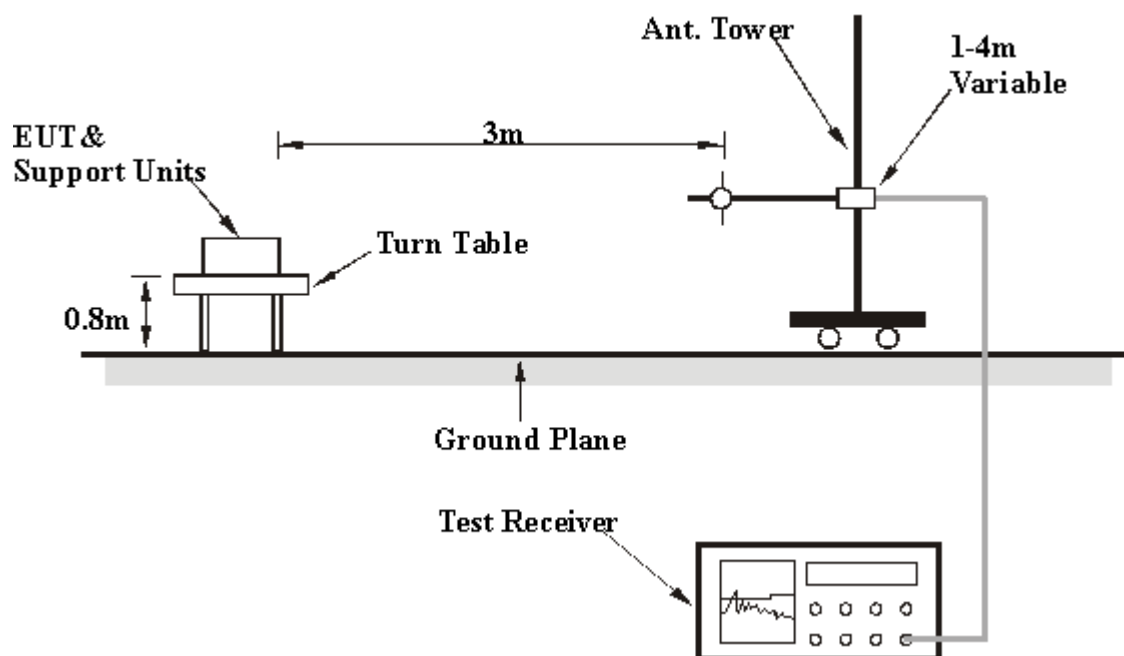
### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

#### 4.2.4 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.2.5 DEVIATION FROM TEST STANDARD

No deviation

#### **4.2.6 EUT OPERATING CONDITIONS**

Set the EUT under transmission / receiver condition continuously at specific channel frequency.

## 4.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	DC 3.7V from battery	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25.0deg. C, 68.0%RH 965hPa	TESTED BY	Frank Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	110.02	38.42 QP	43.50	-5.08	2.77 H	112	28.02	10.40
2	125.00	36.50 QP	43.50	-7.00	2.50 H	24	24.52	11.98
3	161.02	32.60 QP	43.50	-10.90	2.00 H	177	18.74	13.86
4	255.01	37.62 QP	46.00	-8.38	2.11 H	80	24.30	13.32
5	359.59	38.60 QP	46.00	-7.40	1.38 H	70	21.15	17.45
6	960.01	40.70 QP	54.00	-13.30	1.08 H	320	11.10	29.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	127.01	30.22 QP	43.50	-13.28	1.00 V	79	18.08	12.14
2	135.02	36.24 QP	43.50	-7.26	1.00 V	256	23.49	12.75
3	183.99	30.26 QP	43.50	-13.24	1.09 V	248	17.87	12.39
4	268.30	31.47 QP	46.00	-14.53	1.87 V	60	16.70	14.77
5	360.01	36.54 QP	46.00	-9.46	1.38 V	11	19.08	17.46
6	959.88	37.41 QP	46.00	-8.59	1.74 V	30	7.81	29.60

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.

# ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 3.7V from battery	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27.0deg. C, 68.0%RH 965hPa	TESTED BY	Rex Huang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.04 PK	74.00	-19.96	1.00 H	336	23.98	30.06
2	2390.00	40.76 AV	54.00	-13.24	1.00 H	336	10.70	30.06
3	*2405.00	86.28 PK			1.00 H	336	56.16	30.12
4	*2405.00	73.00 AV			1.00 H	336	42.88	30.12
5	4810.00	46.50 PK	74.00	-27.50	1.14 H	143	10.87	35.63
6	4810.00	33.22 AV	54.00	-20.78	1.14 H	143	-2.41	35.63
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.54 PK	74.00	-19.46	1.00 V	90	24.48	30.06
2	2390.00	41.26 AV	54.00	-12.74	1.00 V	90	11.20	30.06
3	*2405.00	87.90 PK			1.00 V	90	57.78	30.12
4	*2405.00	74.62 AV			1.00 V	90	44.50	30.12
5	4810.00	48.40 PK	74.00	-25.60	1.00 V	265	12.77	35.63
6	4810.00	35.12 AV	54.00	-18.88	1.00 V	265	-0.51	35.63

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. The limit value is defined as per 15.247
  6. “ \* ” : Fundamental frequency
  7. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula: 20 log (Duty cycle) = 20 log (0.88 ms / 4.06 ms) = -13.28 dB
  8. Please see page 21 for plotted duty.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 7	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 3.7V from battery	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27.0deg. C, 68.0%RH 965hPa	TESTED BY	Rex Huang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	84.20 PK			1.00 H	336	53.94	30.26
2	*2440.00	70.92 AV			1.00 H	336	40.66	30.26
3	4880.00	46.50 PK	74.00	-27.50	1.12 H	161	10.71	35.79
4	4880.00	33.22 AV	54.00	-20.78	1.12 H	161	-2.57	35.79
5	7320.00	51.80 PK	74.00	-22.20	1.29 H	80	10.07	41.73
6	7320.00	38.52 AV	54.00	-15.48	1.29 H	80	-3.21	41.73
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	90.00 PK			1.00 V	91	59.74	30.26
2	*2440.00	76.72 AV			1.00 V	91	46.46	30.26
3	4880.00	46.90 PK	74.00	-27.10	1.00 V	276	11.11	35.79
4	4880.00	33.62 AV	54.00	-20.38	1.00 V	276	-2.17	35.79
5	7320.00	51.30 PK	74.00	-22.70	1.11 V	74	9.57	41.73
6	7320.00	38.02 AV	54.00	-15.98	1.11 V	74	-3.71	41.73

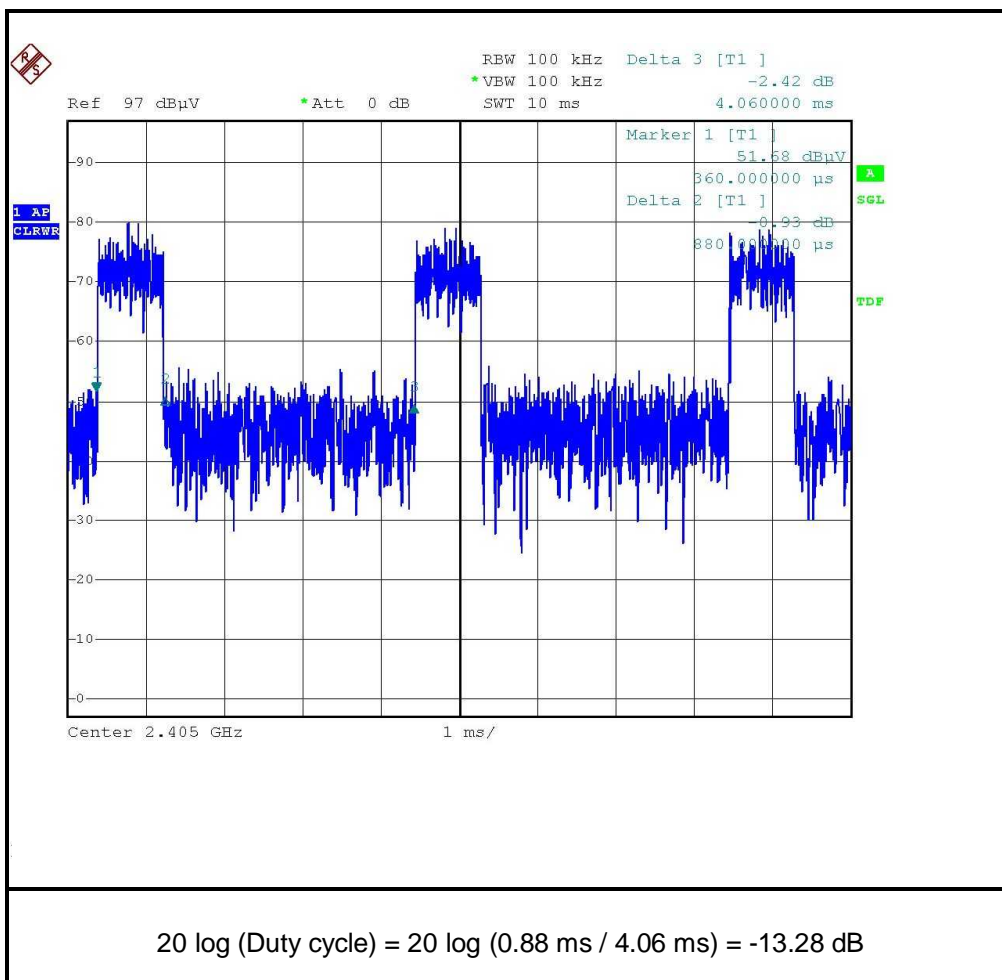
- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. The limit value is defined as per 15.247
  6. “ \* “ : Fundamental frequency
  7. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula: 20 log (Duty cycle) = 20 log (0.88 ms / 4.06 ms) = -13.28 dB
  8. Please see page 21 for plotted duty.



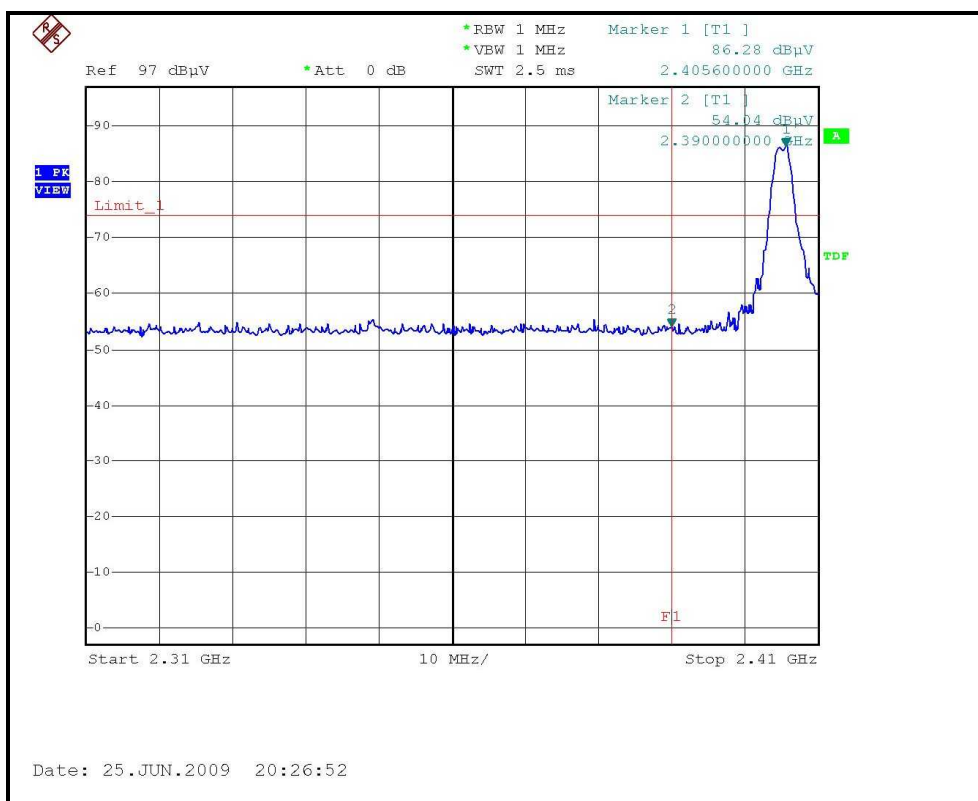
EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 15	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 3.7V from battery	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27.0deg. C, 68.0%RH 965hPa	TESTED BY	Rex Huang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	82.90 PK			1.00 H	338	52.49	30.41
2	*2480.00	69.62 AV			1.00 H	338	39.21	30.41
3	2484.00	47.66 PK	74.00	-26.34	1.00 H	338	17.23	30.43
4	2484.00	34.38 AV	54.00	-19.62	1.00 H	338	3.95	30.43
5	4960.00	46.40 PK	74.00	-27.60	1.14 H	146	10.43	35.97
6	4960.00	33.12 AV	54.00	-20.88	1.14 H	146	-2.85	35.97
7	7440.00	52.10 PK	74.00	-21.90	1.27 H	12	10.04	42.06
8	7440.00	38.82 AV	54.00	-15.18	1.27 H	12	-3.24	42.06
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	90.31 PK			1.00 V	91	59.90	30.41
2	*2480.00	77.03 AV			1.00 V	91	46.62	30.41
3	2484.00	55.07 PK	74.00	-18.93	1.00 V	91	24.64	30.43
4	2484.00	41.79 AV	54.00	-12.21	1.00 V	91	11.36	30.43
5	4960.00	46.80 PK	74.00	-27.20	1.00 V	278	10.83	35.97
6	4960.00	33.52 AV	54.00	-20.48	1.00 V	278	-2.45	35.97
7	7440.00	50.90 PK	74.00	-23.10	1.19 V	243	8.84	42.06
8	7440.00	37.62 AV	54.00	-16.38	1.19 V	243	-4.44	42.06

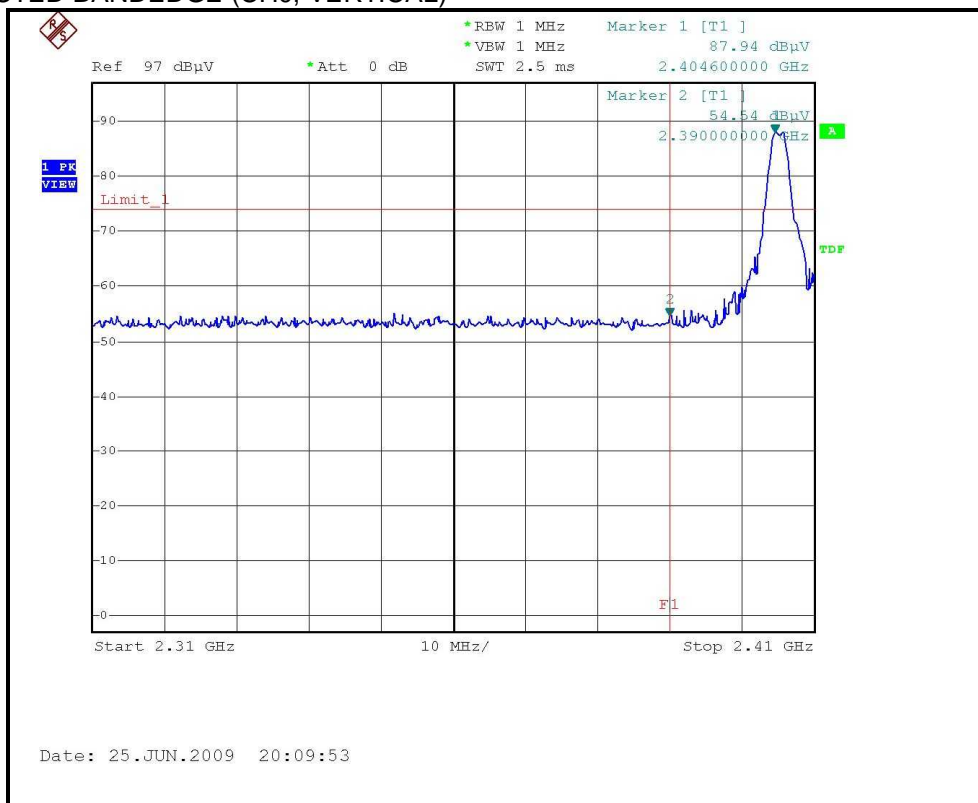
- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. The limit value is defined as per 15.247
  6. “ \* ” : Fundamental frequency
  7. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula: 20 log (Duty cycle) = 20 log (0.88 ms / 4.06 ms) = -13.28 dB
  8. Please see page 21 for plotted duty.



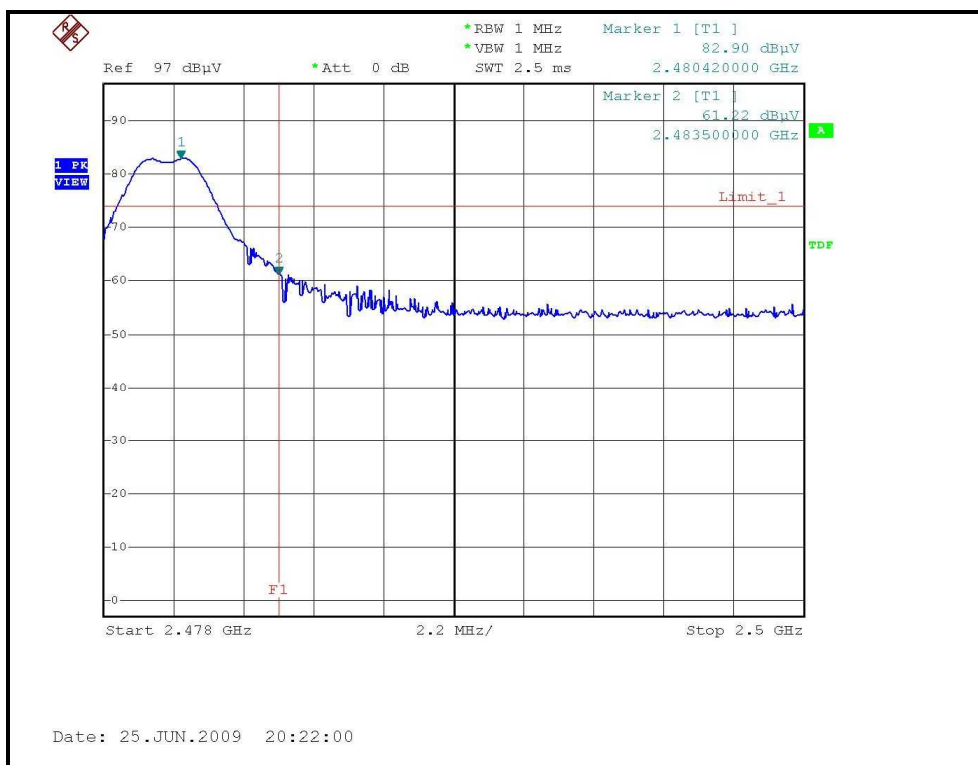
## RESTRICTED BANDEDGE (CH0, HORIZONTAL)



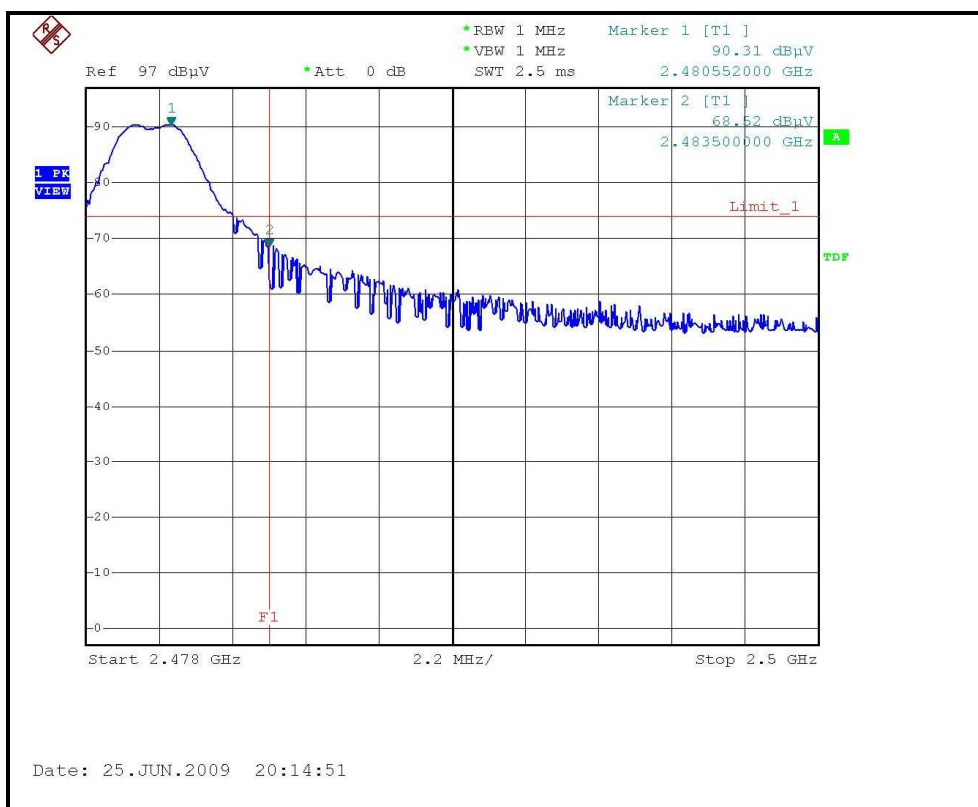
## RESTRICTED BANDEDGE (CH0, VERTICAL)



# RESTRICTED BANDEDGE (CH15, HORIZONTAL)



# RESTRICTED BANDEDGE (CH15, VERTICAL)



### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 09, 2008	Dec. 08, 2009

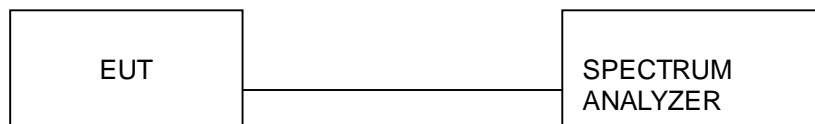
**NOTE:**

- 1.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 100 kHz VBW. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

#### 4.3.4 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

#### 4.3.5 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



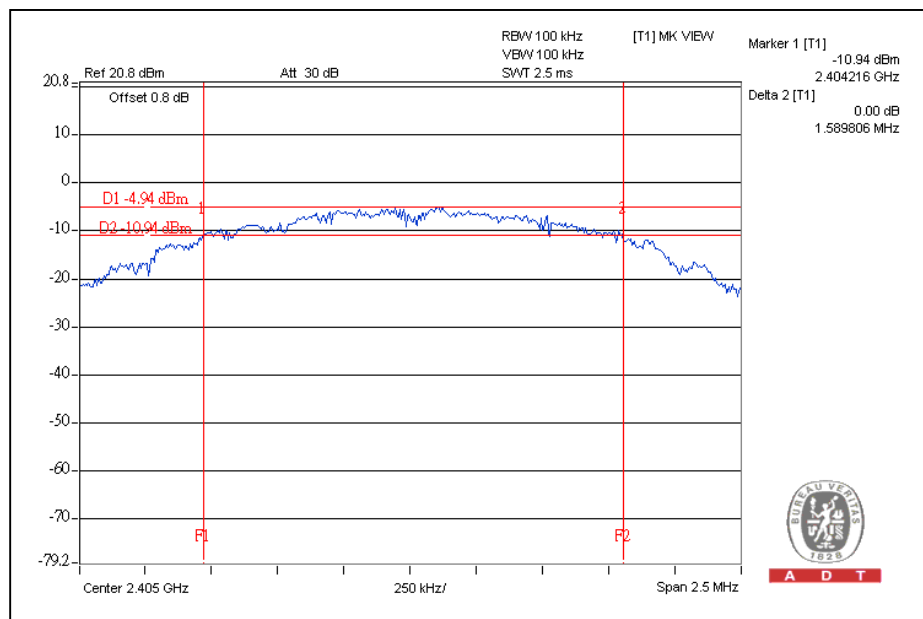
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#### 4.3.6 TEST RESULTS

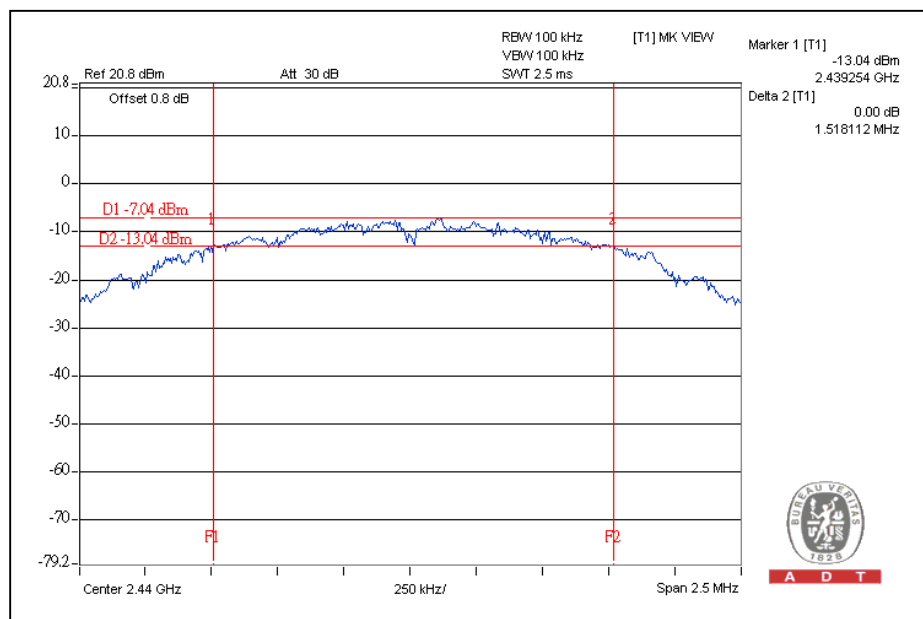
<b>MODULATION TYPE</b>	O-QPSK	<b>TRANSFER RATE</b>	0.25Mbps
<b>INPUT POWER</b>	DC 3.7V from battery	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 965hPa
<b>TESTED BY</b>	Rex Huang		

<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>6 dB BANDWIDTH (MHz)</b>	<b>MINIMUM LIMIT (MHz)</b>	<b>PASS/FAIL</b>
0	2405	1.59	0.5	PASS
7	2440	1.52	0.5	PASS
15	2480	1.59	0.5	PASS

CH0



CH7

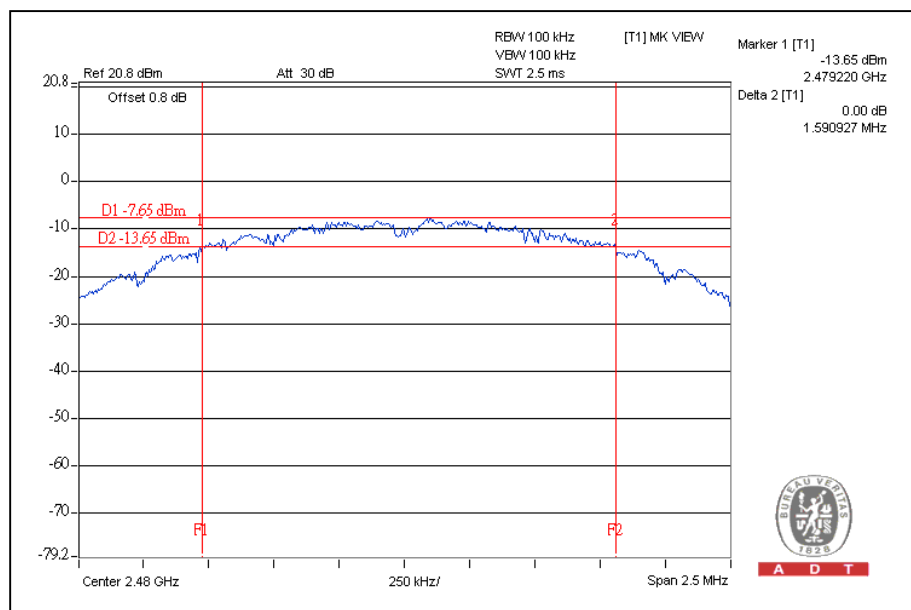






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CH15





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#### 4.4 MAXIMUM PEAK OUTPUT POWER

##### 4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

##### 4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 09, 2008	Aug. 08, 2009

**NOTE:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

##### 4.4.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW.
4. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
5. Repeat above procedures until all frequencies measured were complete.

#### **4.4.4 TEST SETUP**



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

#### **4.4.5 DEVIATION FROM TEST STANDARD**

No deviation

#### **4.4.6 EUT OPERATING CONDITIONS**

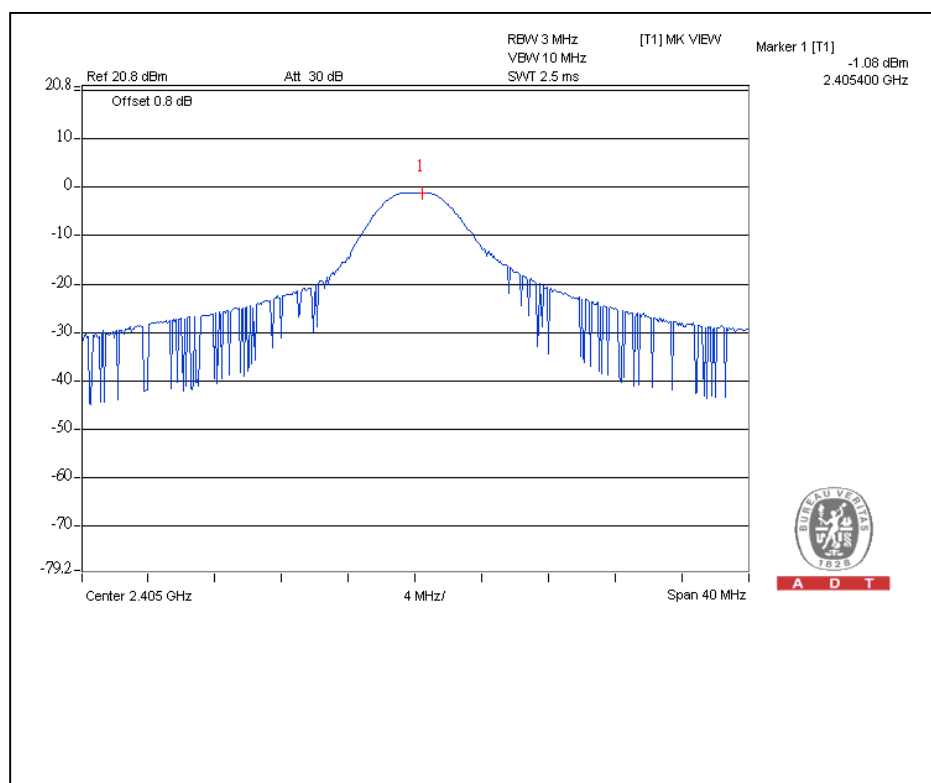
Same as Item 4.2.5

#### 4.4.7 TEST RESULTS

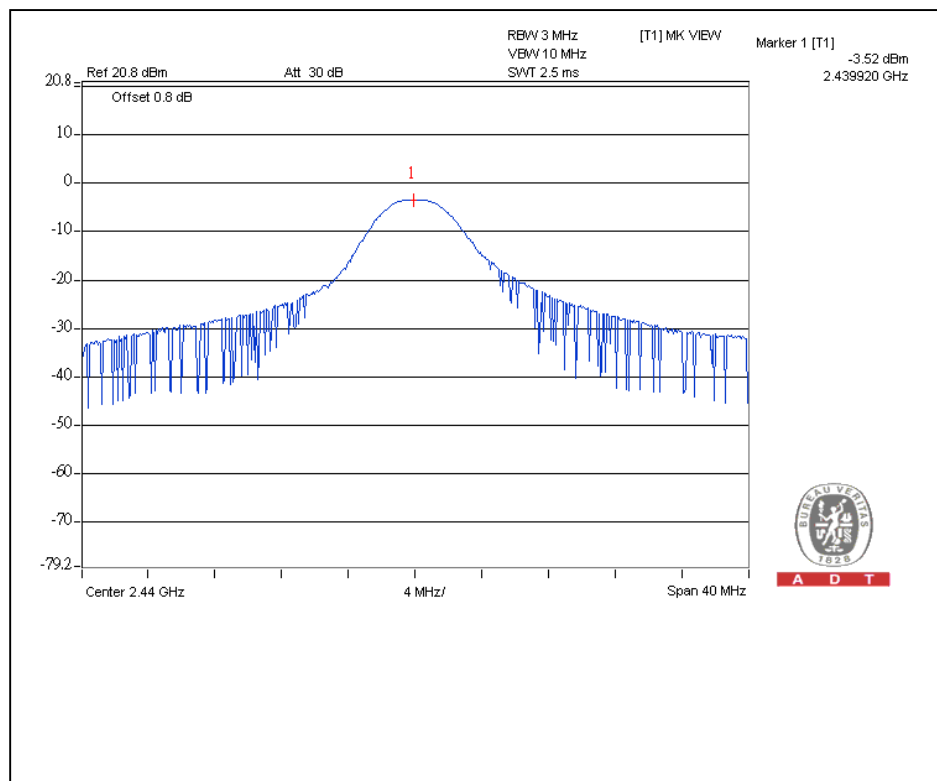
<b>MODULATION TYPE</b>	O-QPSK	<b>TRANSFER RATE</b>	0.25Mbps
<b>INPUT POWER</b>	DC 3.7V from battery	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 966hPa
<b>TESTED BY</b>	Rex Huang		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2405	0.780	-1.08	30	PASS
7	2440	0.445	-3.52	30	PASS
15	2480	0.414	-3.83	30	PASS

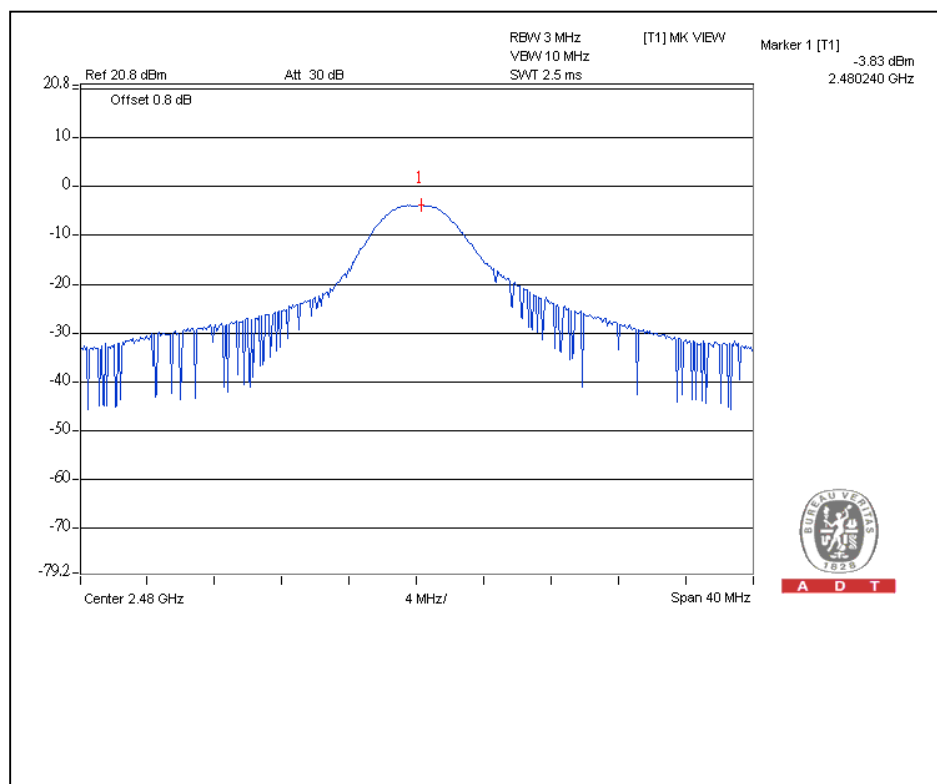
#### Channel 0



## Channel 7



## Channel 15



## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 09, 2008	Dec. 08, 2009

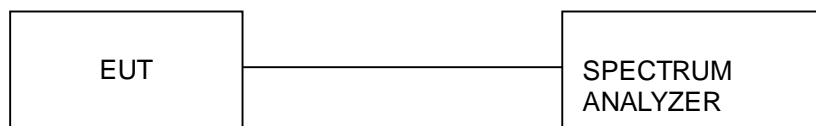
**NOTE:**

- 1.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time=span/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

#### 4.5.4 TEST SETUP



#### 4.5.5 EUT OPERATING CONDITIONS

Same as 4.3.5



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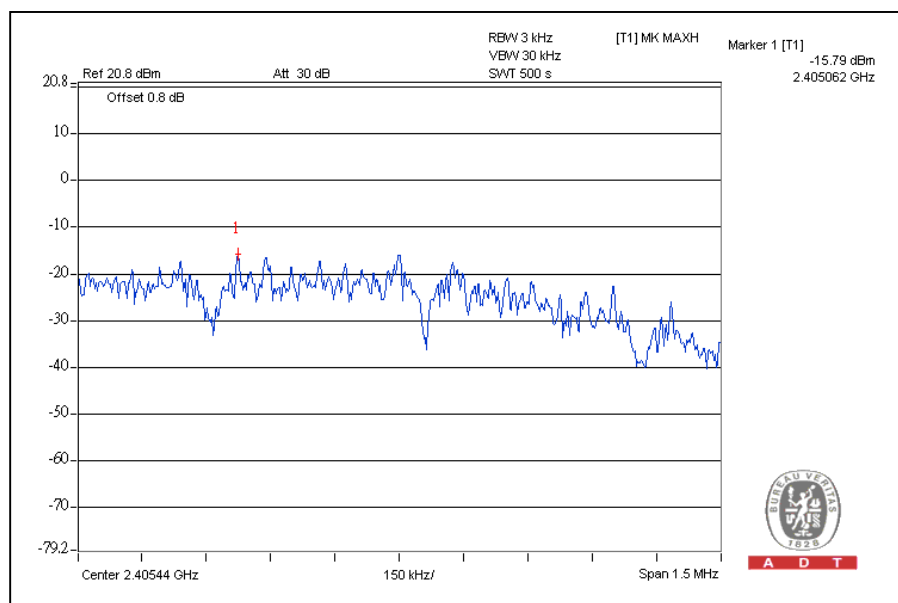
#### 4.5.6 TEST RESULTS

<b>MODULATION TYPE</b>	O-QPSK	<b>TRANSFER RATE</b>	0.25Mbps
<b>INPUT POWER</b>	DC 3.7V from battery	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 965hPa
<b>TESTED BY</b>	Rex Huang		

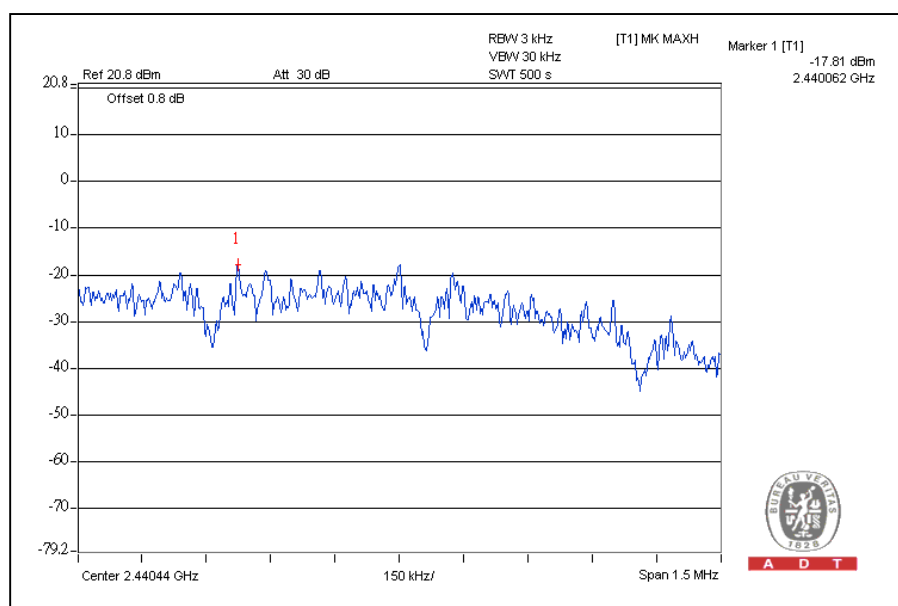
<b>CHANNEL NUMBER</b>	<b>CHANNEL FREQUENCY (MHz )</b>	<b>RF POWER LEVEL IN 3 KHz BW (dBm)</b>	<b>MAXIMUM LIMIT (dBm)</b>	<b>PASS/FAIL</b>
0	2405	-15.79	8	PASS
7	2440	-17.81	8	PASS
15	2480	-17.92	8	PASS



CH1



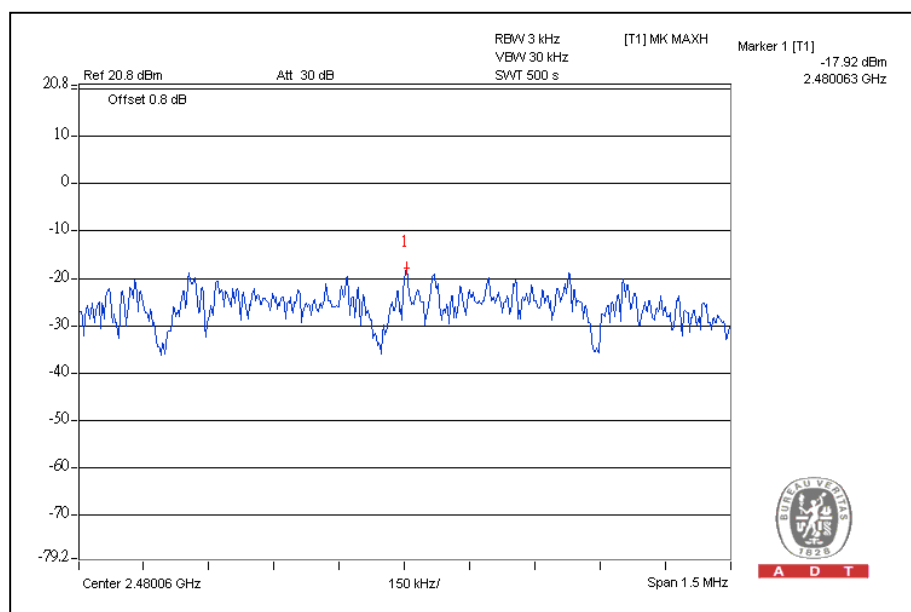
CH6





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CH11



## 4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

### 4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100KHz Resolution Bandwidth).

### 4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 09, 2008	Dec. 08, 2009

**NOTE:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges were measured and recorded.

The spectrum plots (RBW = VBW = 100kHz) are attached on the following pages.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

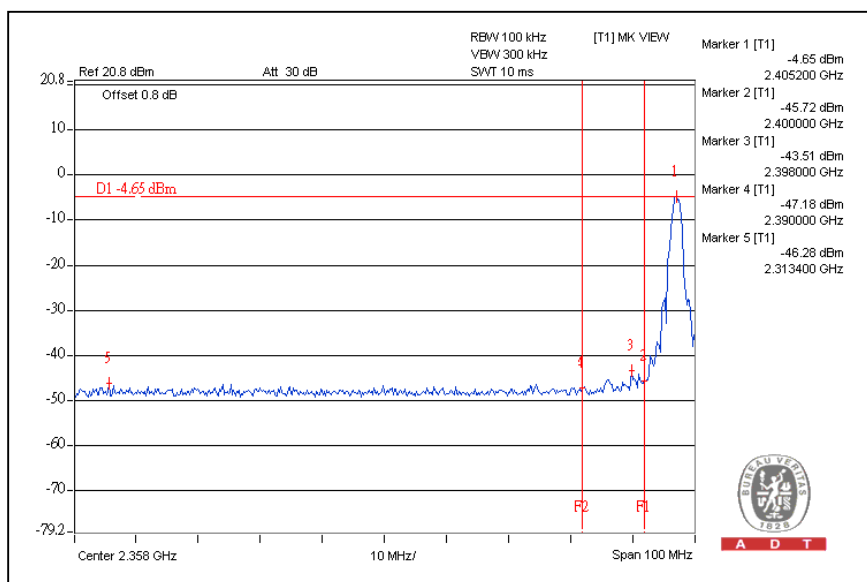
### 4.6.5 EUT OPERATING CONDITION

Same as Item 4.2.5

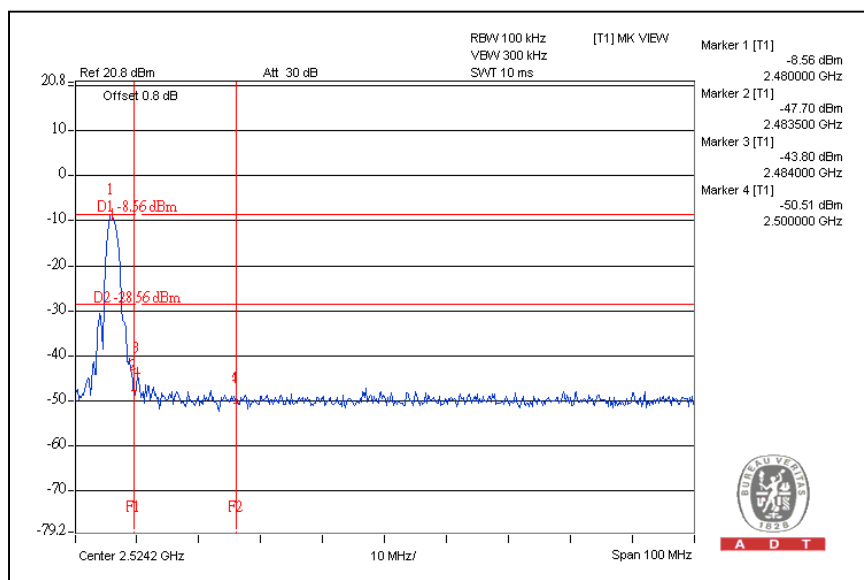
#### 4.6.6 TEST RESULTS

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

# CH0



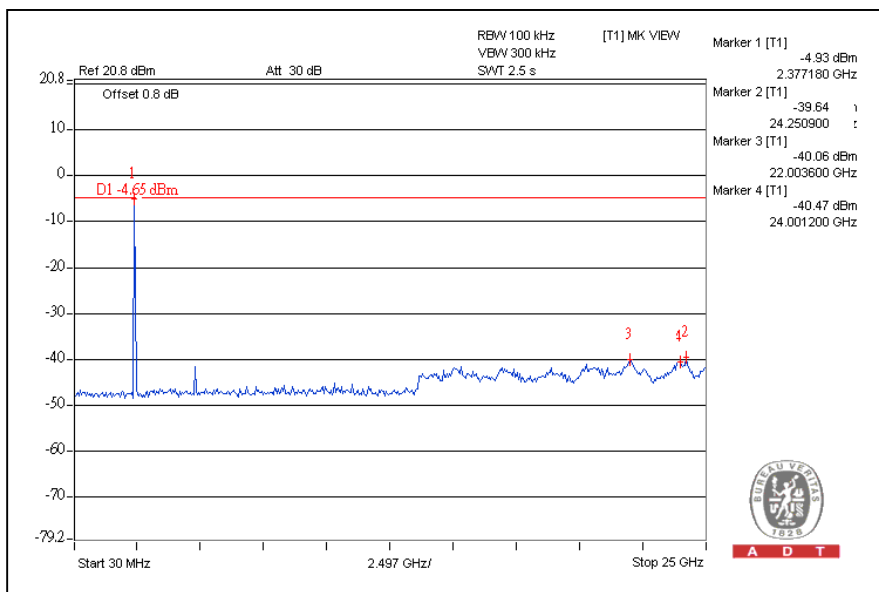
# CH15



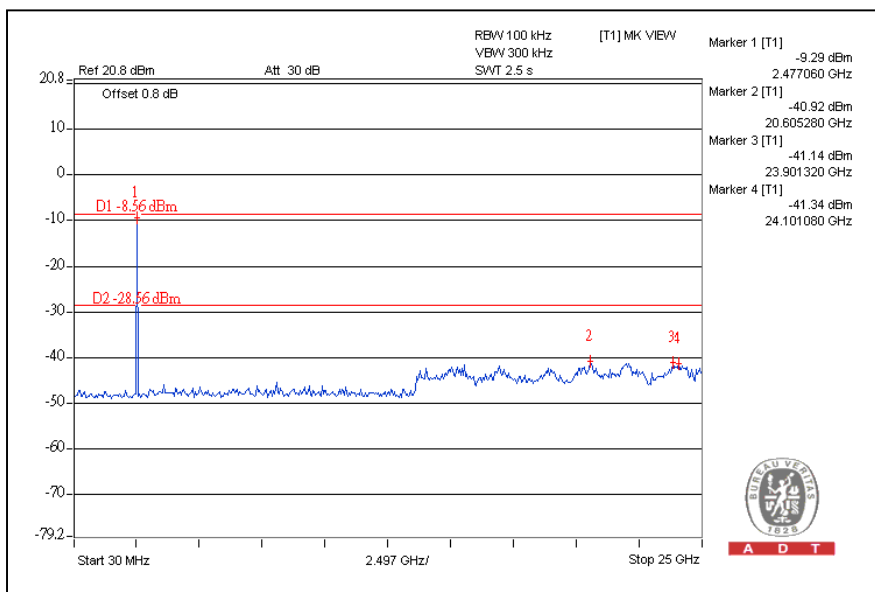


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CH0



CH15



## **4.7 ANTENNA REQUIREMENT**

### **4.7.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **4.7.2 ANTENNA CONNECTED CONSTRUCTION**

The antenna used in this product is PCB printed quarter wave antenna without connector. The maximum Gain of the antenna is -6.58dBi

## 5 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

<b>USA</b>	FCC, NVLAP
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>Norway</b>	NEMKO
<b>Canada</b>	INDUSTRY CANADA, CSA
<b>R.O.C.</b>	TAF, BSMI, NCC
<b>Netherlands</b>	Telefication
<b>Singapore</b>	GOST-ASIA(MOU)
<b>Russia</b>	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml).  
If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26052943

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety Telecom Lab:**

Tel: 886-3-3183232

Fax: 886-3-3185050

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.





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## **6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**--- END ---**