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FCC TEST REPORT

REPORT NO.: RF971017H04

MODEL NO.: A-R0001

RECEIVED: Oct. 17, 2008

TESTED: Nov. 28 to Dec. 08, 2008

ISSUED: Dec. 11, 2008

APPLICANT: LOGITECH FAR EAST LTD.

ADDRESS: #2 Creation Rd. 4, Science-Based Ind. Park
Hsinchu Taiwan, R.O.C.

ISSUED BY: Bureau Veritas Consumer Products Services
(H.K.) Ltd., Taoyuan Branch

TEST LOCATION: No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung
Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien
307, Taiwan

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1. CERTIFICATION

PRODUCT: Cordless Vantage™ Microphone
BRAND NAME: Logitech
MODEL NO.: A-R0001
TEST SAMPLE: ENGINEERING SAMPLE
TESTED: Nov. 28 to Dec. 08, 2008
APPLICANT: LOGITECH FAR EAST LTD.
STANDARDS: FCC Part 15, Subpart C (Section 15.247),
ANSI C63.4-2003

The above equipment (Model: A-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 : Midoli Peng , **DATE:** Dec. 11, 2008
(Midoli Peng, Specialist)

TECHNICAL ACCEPTANCE : Hank Chung , **DATE:** Dec. 11, 2008
Responsible for RF (Hank Chung, Deputy Manager)

APPROVED BY : May Chen , **DATE:** Dec. 11, 2008
(May Chen, Deputy Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Power supply is DC 3V from batteries
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(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -0.51dB at 4953.00MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Band Edge 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:

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

Measurement	Value
Radiated emissions (30MHz-1GHz)	3.94 dB
Radiated emissions (1GHz -18GHz)	2.49 dB
Radiated emissions (18GHz -40GHz)	2.70 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Cordless Vantage™ Microphone
MODEL NO.	A-R0001
FCC ID	JNZAR0001
POWER SUPPLY	3V (3.5V to 2.6V DC on 2x AA batteries)
MODULATION TYPE	DQPSK $\pi/4$
MODULATION TECHNOLOGY	DSSS
CARRIER FREQUENCY OF EACH CHANNEL	2405MHz ~ 2477MHz
NUMBER OF CHANNEL	37
ANTENNA TYPE	Please see note 1
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

- There are two antennas provided to this EUT, please refer to the following table:

No	Antenna Type	Gain (dBi)	Antenna Connector
1	Wire antenna, quarter wave (External)	0.59	NA
2	Sheet metal inverted-F antenna (Internal)	6.69	NA

- For radiated emissions the EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	X-Y plane With antenna 1(External)
Mode B	Z-X plane With antenna 1(External)
Mode C	Z-Y plane With antenna 1(External)
Mode D	X-Y plane With antenna 2 (Internal)
Mode E	Z-X plane With antenna 2 (Internal)
Mode F	Z-Y plane With antenna 2 (Internal)

From the above modes, the worst radiated emissions level was found in Mode A, and Mode F. Therefore only the test data of the modes were recorded in this report individually.

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

3.2 DESCRIPTION OF TEST MODES

Thirty-seven channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2405	10	2425	20	2445	30	2465
1	2407	11	2427	21	2447	31	2467
2	2409	12	2429	22	2449	32	2469
3	2411	13	2431	23	2451	33	2471
4	2413	14	2433	24	2453	34	2473
5	2415	15	2435	25	2455	35	2475
6	2417	16	2437	26	2457	36	2477
7	2419	17	2439	27	2459		
8	2421	18	2441	28	2461		
9	2423	19	2443	29	2463		

The EUT (Cordless Vantage™ Microphone) have been tested under operating and standby condition. Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed. Channel 0, 18 and 36 are chosen for testing to fulfill the requirement of frequency spectrum usage in each country.

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	
-	-	√	√	√	-

Where **PLC**: Power Line Conducted Emission

RE < 1G: Radiated Emission below 1GHz

RE ≥ 1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

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 TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
0 to 36	0	DSSS	DQPSK $\pi/4$	1

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 TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
0 to 36	0, 18, 36	DSSS	DQPSK $\pi/4$	1

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 TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
0 to 36	0, 36	DSSS	DQPSK $\pi/4$	1

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 TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
0 to 36	0, 18, 36	DSSS	DQPSK $\pi/4$	1

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Cordless Vantage™ Microphone. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.247)

ANSI C63.4-2003

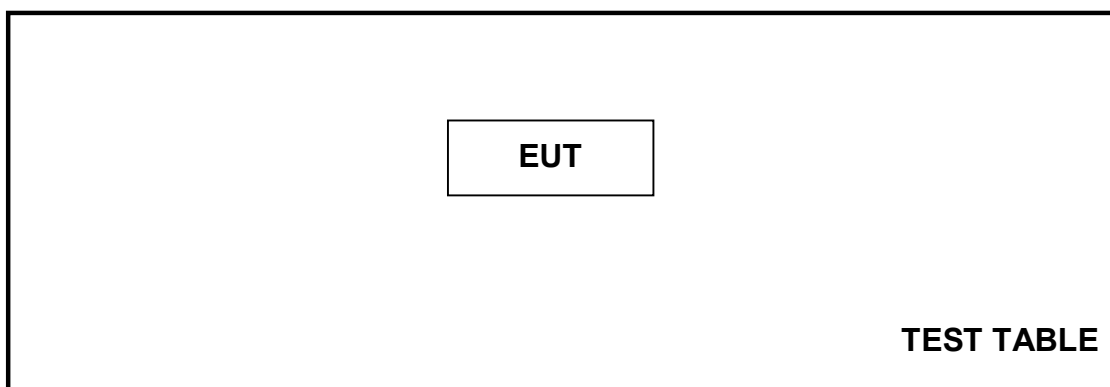
All test items have been performed and recorded as per the above standards.

NOTE: The receiver of 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 FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 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.

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4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	R3271A	85060311	July 16, 2008	July 15, 2009
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2008	Sep. 24, 2009
ROHDE & SCHWARZ Test Receiver	ESCS30	100375	April 01, 2008	Mar. 31, 2009
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	April 30, 2008	April 29, 2009
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 17, 2007	Dec. 16, 2008
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA91701 53	Jan. 28, 2008	Jan. 27, 2009
RF Switches	EMH-011	08009	Oct. 07, 2008	Oct. 06, 2009
RF CABLE (Chaintek)	SF102	22054-2	Dec. 07, 2007	Dec. 06, 2008
RF Cable	8DFB	STCCAB-30 M-1GHz	Oct. 07, 2008	Oct. 06, 2009
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	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 horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 7450G-3.

4.1.3 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 10dB 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 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

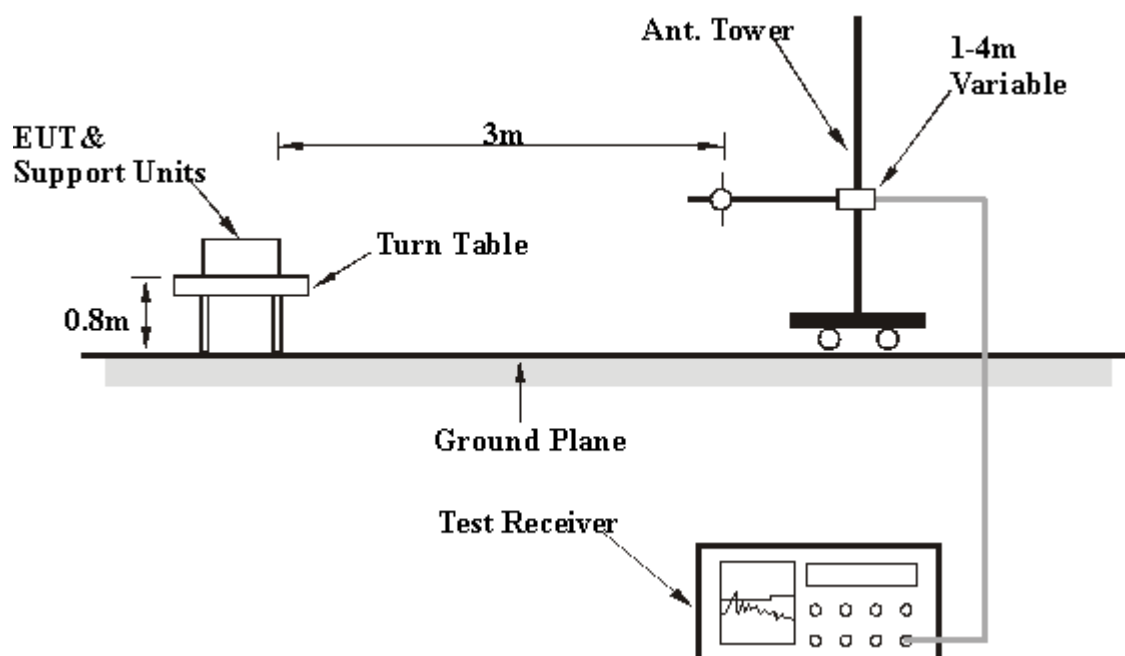
NOTE:

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

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

Below 1GHz Test Data

4.1.7 TEST RESULTS – With Antenna 1(External)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	DC 3V	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	28deg. C, 64%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	120.00	19.61 QP	43.50	-23.89	1.27 H	314	5.78	13.83
2	200.00	19.65 QP	43.50	-23.85	2.08 H	93	6.67	12.98
3	300.00	22.92 QP	46.00	-23.08	1.39 H	261	5.90	17.02
4	400.00	26.49 QP	46.00	-19.51	1.17 H	127	5.35	21.14
5	420.00	27.03 QP	46.00	-18.97	1.31 H	155	5.59	21.44
6	480.00	27.86 QP	46.00	-18.14	1.00 H	297	5.51	22.35
7	500.00	28.30 QP	46.00	-17.70	1.00 H	250	5.64	22.66
8	600.00	29.80 QP	46.00	-16.20	1.67 H	146	5.03	24.77
9	840.00	33.59 QP	46.00	-12.41	1.11 H	287	3.25	30.34
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	120.00	20.85 QP	43.50	-22.65	1.00 V	189	7.02	13.83
2	200.00	24.97 QP	43.50	-18.53	1.00 V	298	11.99	12.98
3	300.00	23.68 QP	46.00	-22.32	1.00 V	209	6.66	17.02
4	400.00	26.92 QP	46.00	-19.08	1.00 V	74	5.78	21.14
5	420.00	28.23 QP	46.00	-17.77	1.56 V	68	6.79	21.44
6	480.00	27.96 QP	46.00	-18.04	1.02 V	331	5.61	22.35
7	500.00	28.70 QP	46.00	-17.30	1.00 V	8	6.04	22.66
8	600.00	33.48 QP	46.00	-12.52	1.00 V	336	8.71	24.77
9	840.00	33.71 QP	46.00	-12.29	1.16 V	247	3.37	30.34

- 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.



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4.1.8 TEST RESULTS –WITH ANTENNA 2 (INTERNAL)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	DC 3V	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	28deg. C, 64%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	120.00	19.67 QP	43.50	-23.83	1.49 H	149	5.84	13.83
2	200.00	19.35 QP	43.50	-24.15	1.91 H	77	6.37	12.98
3	300.00	22.98 QP	46.00	-23.02	1.33 H	312	5.96	17.02
4	400.00	26.65 QP	46.00	-19.35	1.40 H	186	5.51	21.14
5	420.00	27.26 QP	46.00	-18.74	1.05 H	276	5.82	21.44
6	480.00	27.82 QP	46.00	-18.18	1.33 H	182	5.47	22.35
7	500.00	28.45 QP	46.00	-17.55	1.42 H	212	5.79	22.66
8	600.00	41.57 QP	46.00	-4.43	1.47 H	189	16.80	24.77
9	840.00	34.11 QP	46.00	-11.89	1.00 H	310	3.77	30.34
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	120.00	21.30 QP	43.50	-22.20	1.00 V	321	7.47	13.83
2	200.00	23.95 QP	43.50	-19.55	1.00 V	293	10.97	12.98
3	300.00	23.76 QP	46.00	-22.24	1.00 V	44	6.74	17.02
4	400.00	26.61 QP	46.00	-19.39	1.00 V	287	5.47	21.14
5	420.00	27.38 QP	46.00	-18.62	1.00 V	132	5.94	21.44
6	480.00	27.98 QP	46.00	-18.02	1.00 V	307	5.63	22.35
7	500.00	28.59 QP	46.00	-17.41	1.00 V	55	5.93	22.66
8	600.00	34.29 QP	46.00	-11.71	1.66 V	254	9.52	24.77
9	840.00	33.67 QP	46.00	-12.33	1.19 V	132	3.33	30.34

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.



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Above 1GHz Test Data

4.1.9 TEST RESULTS – With Antenna 1(External)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 3V	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 65%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	2390.00	55.95 PK	74.00	-18.05	1.28 H	114	25.89	30.06
2	2390.00	43.12 AV	54.00	-10.88	1.28 H	114	13.06	30.06
3	*2405.00	97.94 PK			1.44 H	24	67.82	30.12
4	*2405.00	97.22 AV			1.44 H	24	67.10	30.12
5	4810.00	54.13 PK	74.00	-19.87	1.32 H	60	18.69	35.44
6	4810.00	53.41 AV	54.00	-0.59	1.32 H	60	17.96	35.44
7	7215.00	51.24 PK	74.00	-22.76	1.24 H	24	9.44	41.80
8	7215.00	50.52 AV	54.00	-3.48	1.24 H	24	8.71	41.80
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	54.58 PK	74.00	-19.42	1.29 V	2	24.52	30.06
2	2390.00	43.14 AV	54.00	-10.86	1.29 V	2	13.08	30.06
3	*2405.00	93.27 PK			1.22 V	291	63.15	30.12
4	*2405.00	92.55 AV			1.22 V	291	62.43	30.12
5	4810.00	51.63 PK	74.00	-22.37	1.39 V	309	16.19	35.44
6	4810.00	50.91 AV	54.00	-3.09	1.39 V	309	15.46	35.44
7	7215.00	51.24 PK	74.00	-22.76	1.01 V	1	9.44	41.80
8	7215.00	50.52 AV	54.00	-3.48	1.01 V	1	8.71	41.80

- 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. “ * ”: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 18	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 3V	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 65%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	*2441.00	95.84 PK			1.40 H	30	65.58	30.26
2	*2441.00	95.11 AV			1.40 H	30	64.86	30.26
3	4882.00	53.14 PK	74.00	-20.86	1.40 H	30	17.58	35.56
4	4882.00	52.41 AV	54.00	-1.59	1.40 H	30	16.85	35.56
5	7323.00	51.24 PK	74.00	-22.76	1.02 H	21	9.17	42.07
6	7323.00	50.52 AV	54.00	-3.48	1.02 H	21	8.44	42.07
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	*2441.00	91.35 PK			1.50 V	8	61.09	30.26
2	*2441.00	90.62 AV			1.50 V	8	60.37	30.26
3	4882.00	50.11 PK	74.00	-23.89	1.33 V	359	14.55	35.56
4	4882.00	49.38 AV	54.00	-4.62	1.33 V	359	13.82	35.56
5	7323.00	50.24 PK	74.00	-23.76	1.00 V	223	8.17	42.07
6	7323.00	49.52 AV	54.00	-4.48	1.00 V	223	7.44	42.07

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. “ * ”: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 3V	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 65%RH 965hPa	TESTED BY	Frank Liu

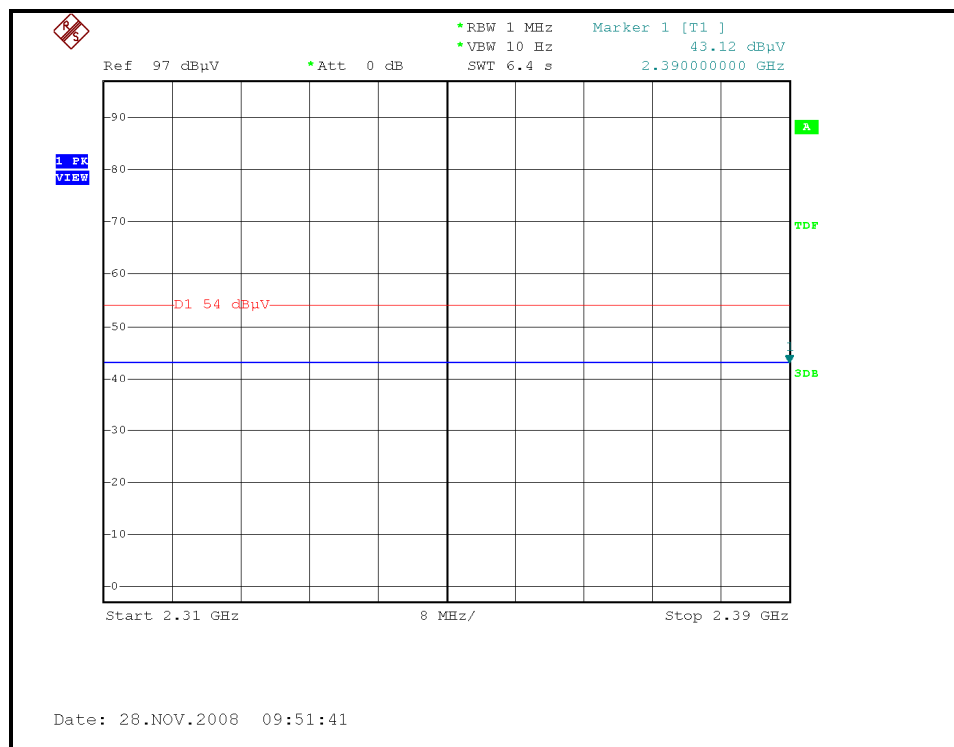
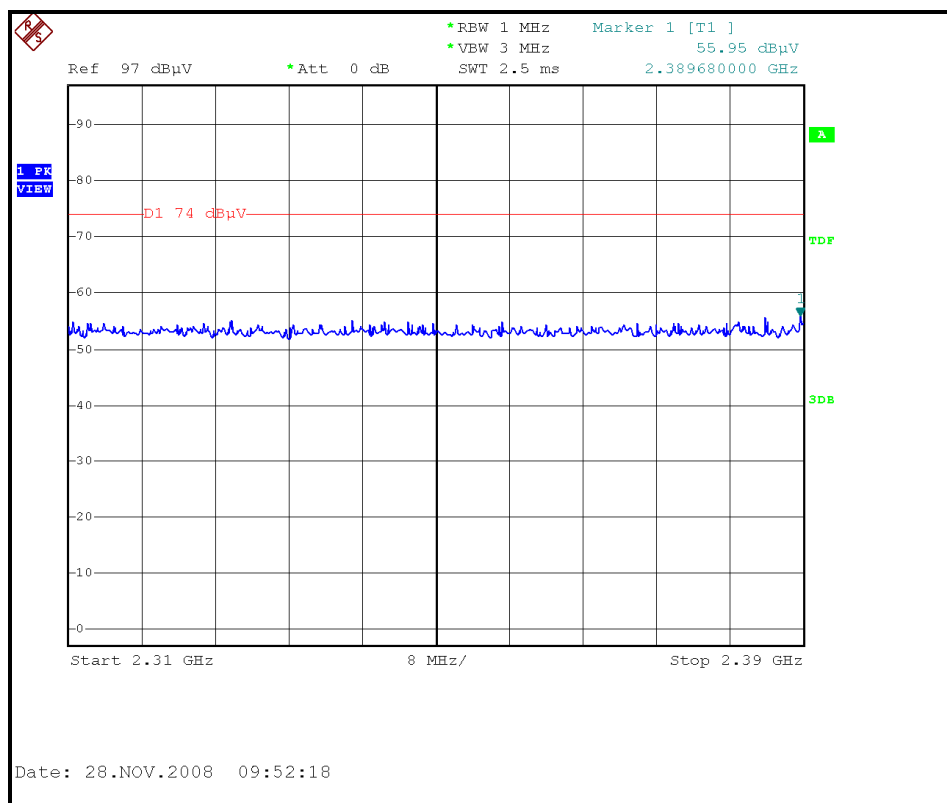
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2477.00	94.24 PK			1.50 H	40	63.84	30.40
2	*2477.00	93.52 AV			1.50 H	40	63.11	30.40
3	2483.50	56.07 PK	74.00	-17.93	1.28 H	163	25.64	30.43
4	2483.50	43.17 AV	54.00	-10.83	1.28 H	163	12.74	30.43
5	4952.00	51.74 PK	74.00	-22.26	1.09 H	21	16.06	35.68
6	4952.00	51.02 AV	54.00	-2.98	1.09 H	21	15.34	35.68
7	7431.00	52.24 PK	74.00	-21.76	1.32 H	62	9.89	42.35
8	7431.00	51.52 AV	54.00	-2.48	1.32 H	62	9.17	42.35
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	*2477.00	90.05 PK			1.50 V	9	59.65	30.40
2	*2477.00	89.33 AV			1.50 V	9	58.92	30.40
3	2483.50	56.06 PK	74.00	-17.94	1.35 V	100	25.63	30.43
4	2483.50	43.32 AV	54.00	-10.68	1.35 V	100	12.89	30.43
5	4952.00	49.89 PK	74.00	-24.11	1.32 V	340	14.21	35.68
6	4952.00	49.16 AV	54.00	-4.84	1.32 V	340	13.49	35.68
7	7431.00	50.24 PK	74.00	-23.76	1.54 V	24	7.89	42.35
8	7431.00	49.52 AV	54.00	-4.48	1.54 V	24	7.17	42.35

- 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. “ * “: Fundamental frequency.



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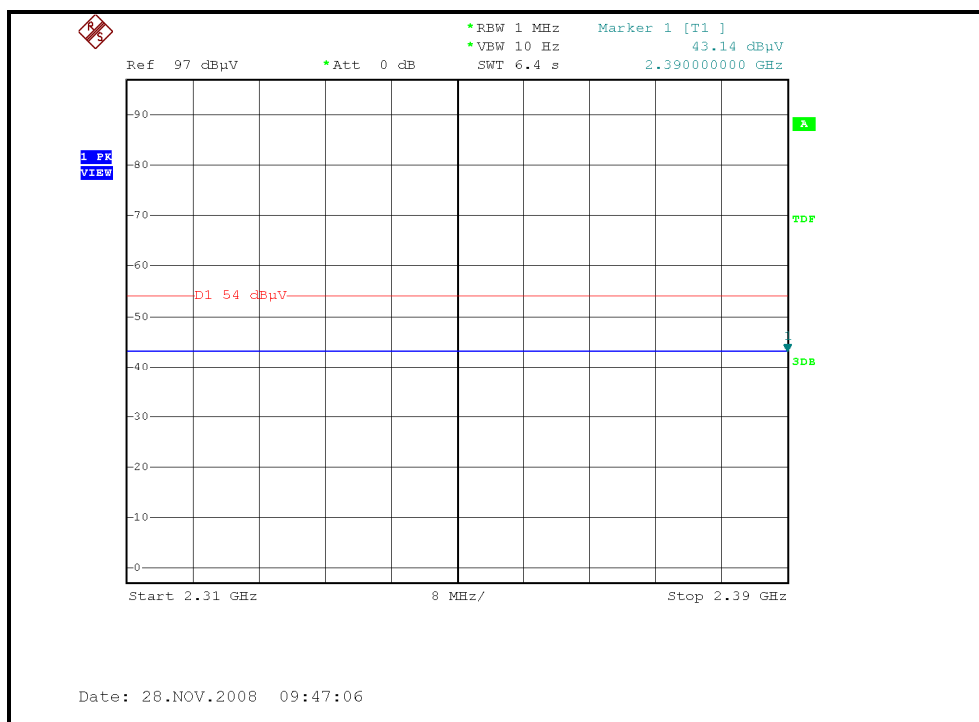
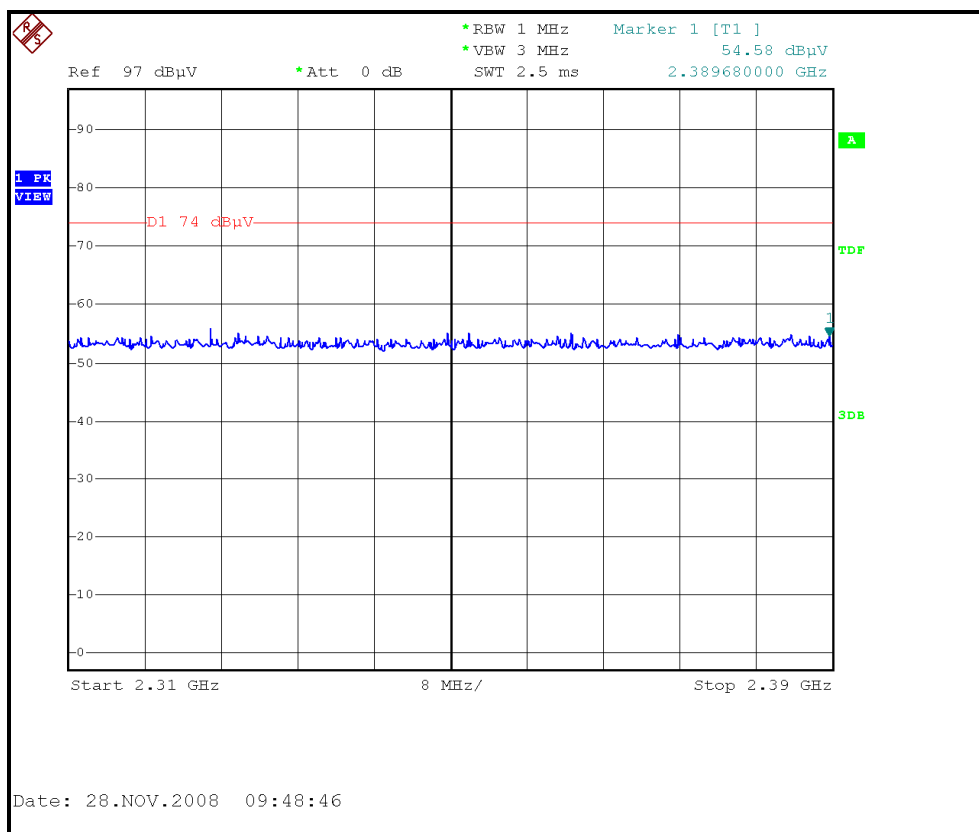
RESTRICTED BANDEDGE (CH0, HORIZONTAL)





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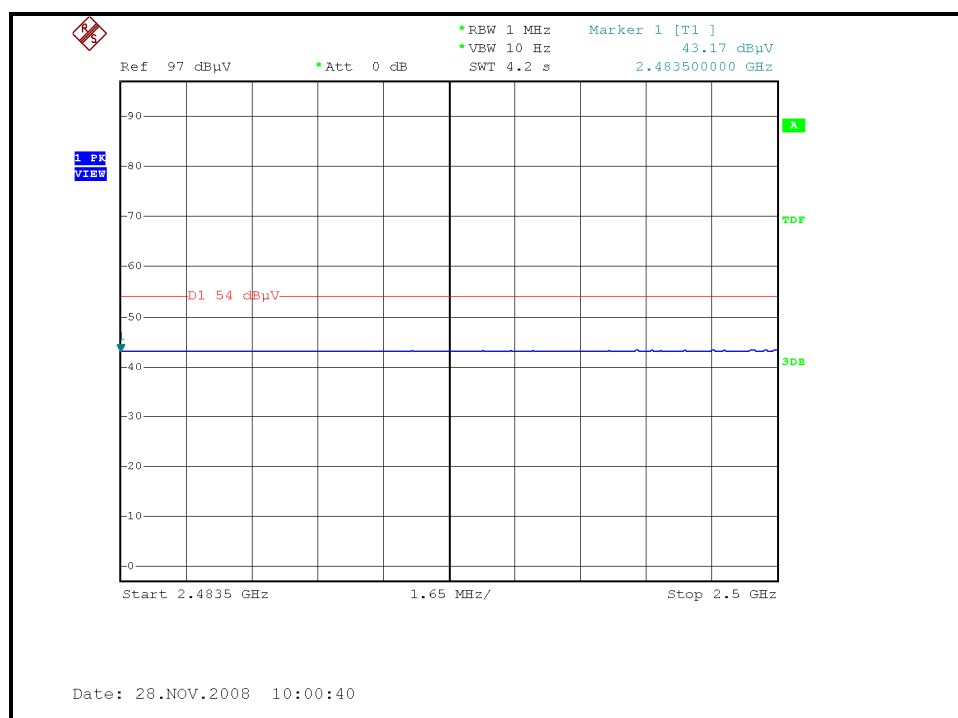
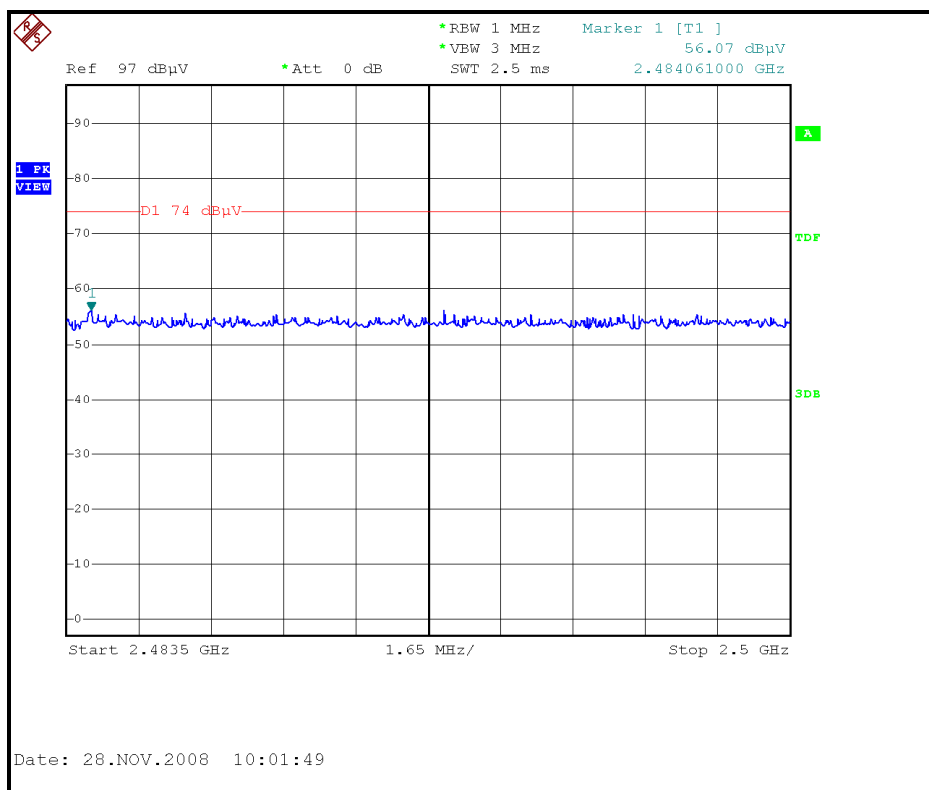
RESTRICTED BANDEDGE (CH0, VERTICAL)





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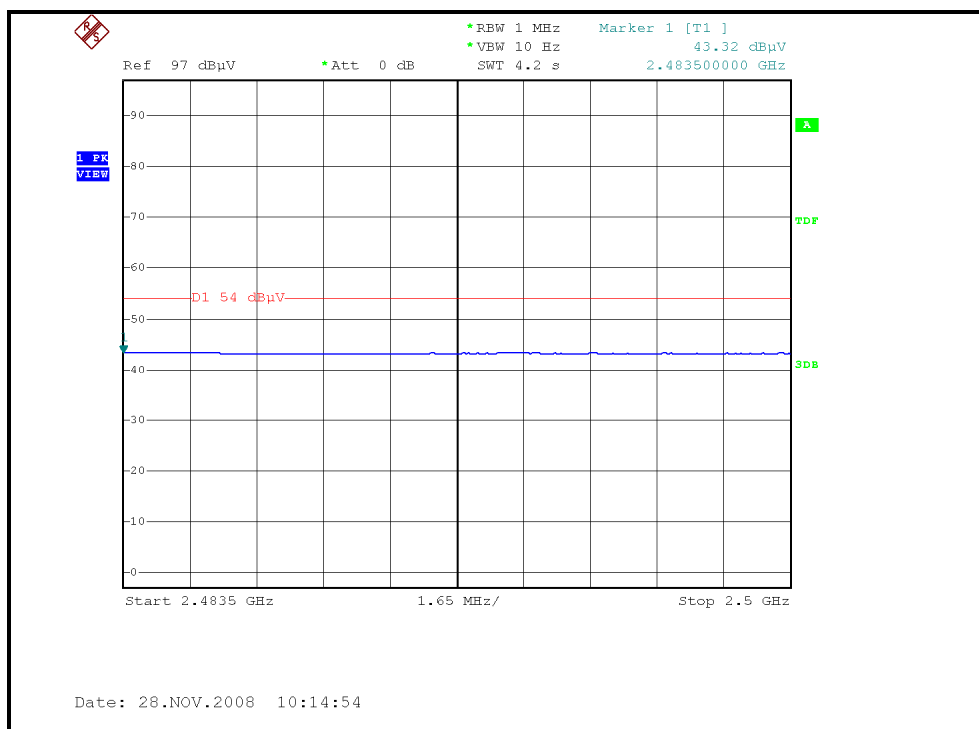
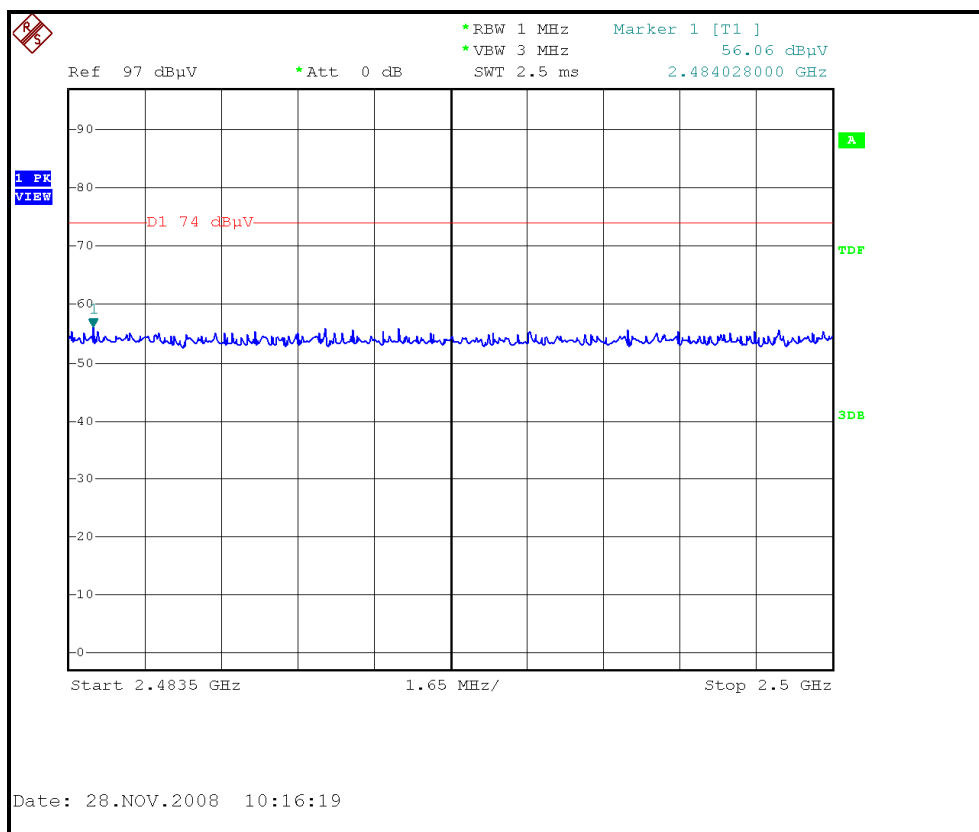
RESTRICTED BANDEDGE (CH36, HORIZONTAL)





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RESTRICTED BANDEDGE (CH36, VERTICAL)





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4.1.10 TEST RESULTS –With Antenna 2(Internal)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 3V	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 66%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	2390.00	53.80 PK	74.00	-20.20	1.60 H	171	23.77	30.03
2	2390.00	43.23 AV	54.00	-10.77	1.60 H	171	13.20	30.03
3	*2405.00	100.30 PK			1.60 H	171	70.21	30.09
4	*2405.00	99.58 AV			1.60 H	171	69.49	30.09
5	4810.00	53.87 PK	74.00	-20.13	1.34 H	262	18.42	35.45
6	4810.00	53.15 AV	54.00	-0.85	1.34 H	262	17.70	35.45
7	7215.00	49.30 PK	74.00	-24.70	1.10 H	12	8.29	41.01
8	7215.00	48.58 AV	54.00	-5.42	1.10 H	12	7.56	41.01
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	54.43 PK	74.00	-19.57	1.00 V	93	24.40	30.03
2	2390.00	43.22 AV	54.00	-10.78	1.00 V	93	13.19	30.03
3	*2405.00	97.00 PK			1.00 V	93	66.91	30.09
4	*2405.00	96.28 AV			1.00 V	93	66.19	30.09
5	4810.00	49.56 PK	74.00	-24.44	1.39 V	165	14.11	35.45
6	4810.00	48.84 AV	54.00	-5.16	1.39 V	165	13.39	35.45
7	7215.00	47.10 PK	74.00	-26.90	1.21 V	24	6.09	41.01
8	7215.00	46.37 AV	54.00	-7.62	1.21 V	24	5.36	41.01

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. “ * “: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 18	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 3V	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 66%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	*2441.00	98.70 PK			1.24 H	171	68.47	30.23
2	*2441.00	97.97 AV			1.24 H	171	67.75	30.23
3	4882.00	53.92 PK	74.00	-20.08	1.31 H	253	18.28	35.64
4	4882.00	53.20 AV	54.00	-0.80	1.31 H	253	17.55	35.64
5	7323.00	49.80 PK	74.00	-24.20	1.14 H	16	8.51	41.29
6	7323.00	49.08 AV	54.00	-4.92	1.14 H	16	7.78	41.29
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	*2441.00	96.20 PK			1.00 V	78	65.97	30.23
2	*2441.00	95.47 AV			1.00 V	78	65.25	30.23
3	4882.00	51.20 PK	74.00	-22.80	1.34 V	158	15.56	35.64
4	4882.00	50.48 AV	54.00	-3.52	1.34 V	158	14.83	35.64
5	7323.00	47.30 PK	74.00	-26.70	1.29 V	26	6.01	41.29
6	7323.00	46.58 AV	54.00	-7.42	1.29 V	26	5.28	41.29

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. “ * ”: Fundamental frequency.



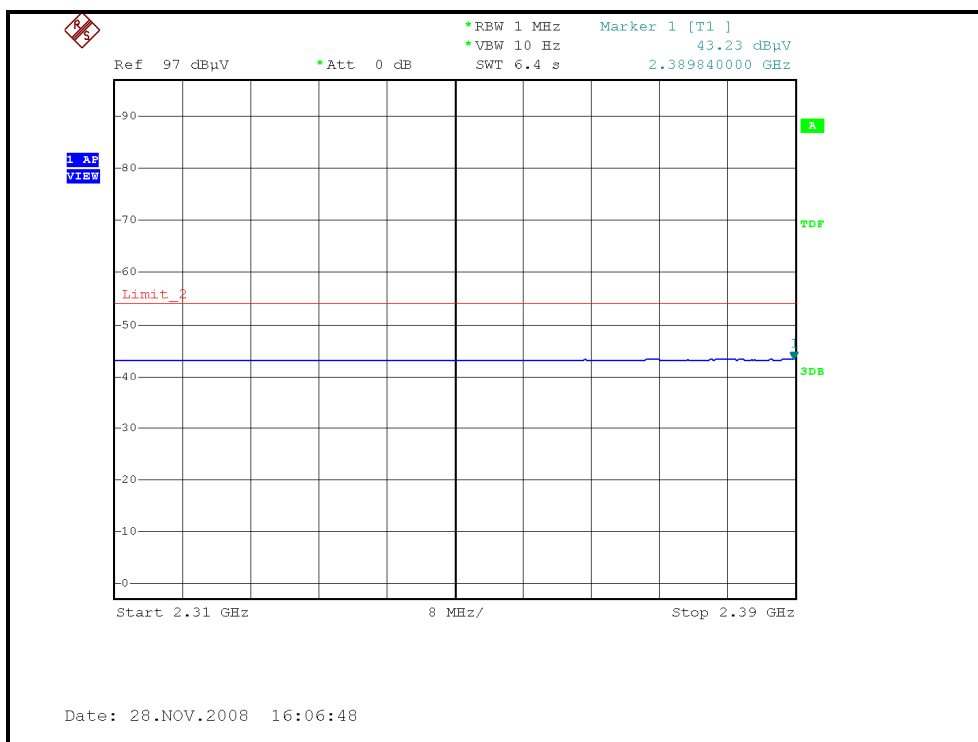
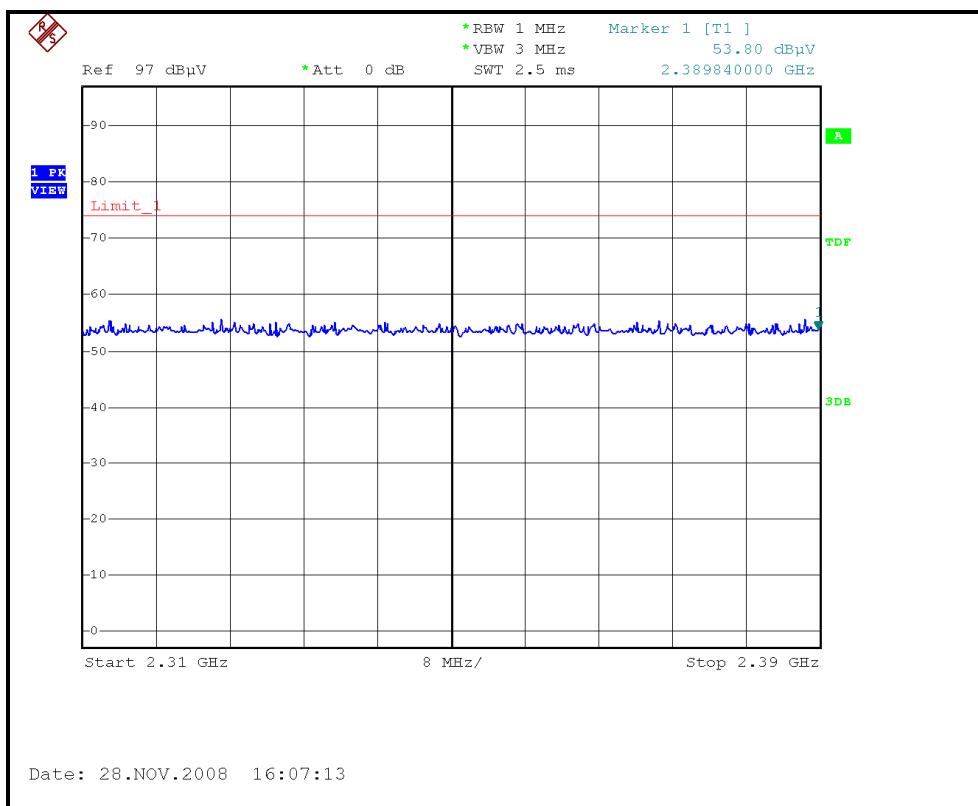
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	DC 3V	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 66%RH 965hPa	TESTED BY	Frank Liu

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	*2477.00	99.50 PK			1.45 H	168	69.13	30.37
2	*2477.00	98.78 AV			1.45 H	168	68.41	30.37
3	2483.50	55.07 PK	74.00	-18.93	1.45 H	168	24.67	30.40
4	2483.50	44.18 AV	54.00	-9.82	1.45 H	168	13.78	30.40
5	4953.00	54.22 PK	74.00	-19.78	1.32 H	273	18.40	35.82
6	4953.00	53.49 AV	54.00	-0.51	1.32 H	273	17.67	35.82
7	7431.00	50.70 PK	74.00	-23.30	1.17 H	32	9.13	41.57
8	7431.00	49.98 AV	54.00	-4.02	1.17 H	32	8.41	41.57
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	*2477.00	97.60 PK			1.00 V	73	67.23	30.37
2	*2477.00	96.87 AV			1.00 V	73	66.50	30.37
3	2483.50	54.69 PK	74.00	-19.31	1.00 V	68	24.29	30.40
4	2483.50	44.13 AV	54.00	-9.87	1.00 V	68	13.73	30.40
5	4953.00	52.40 PK	74.00	-21.60	1.37 V	166	16.58	35.82
6	4953.00	51.67 AV	54.00	-2.33	1.37 V	166	15.86	35.82
7	7431.00	48.40 PK	74.00	-25.60	1.31 V	30	6.83	41.57
8	7431.00	47.67 AV	54.00	-6.33	1.31 V	30	6.11	41.57

- 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. “ * “: Fundamental frequency.

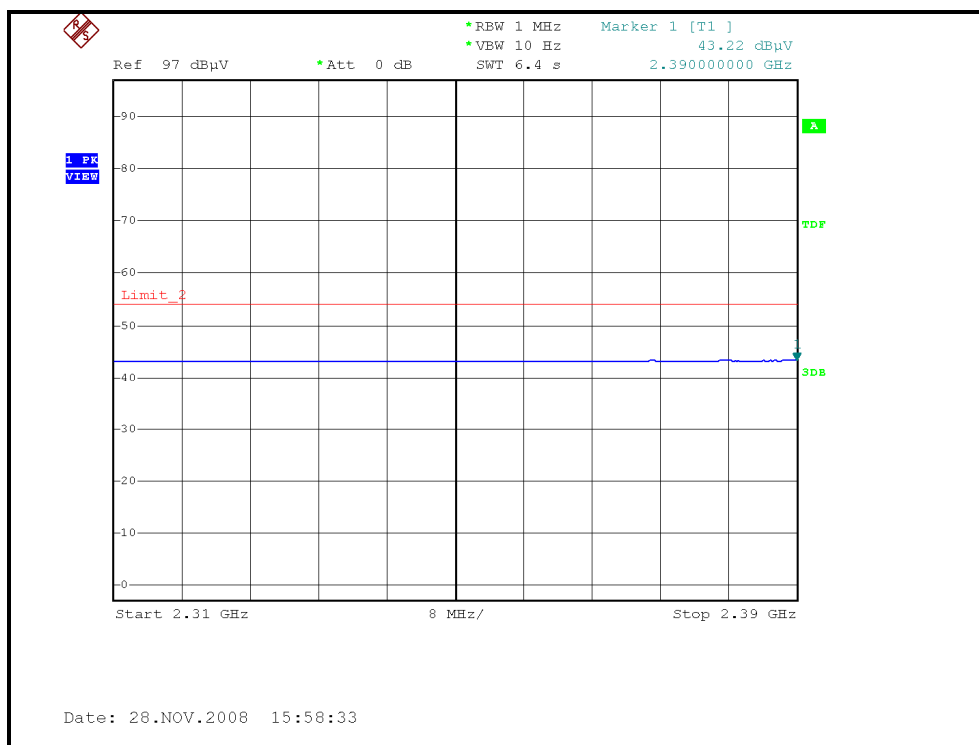
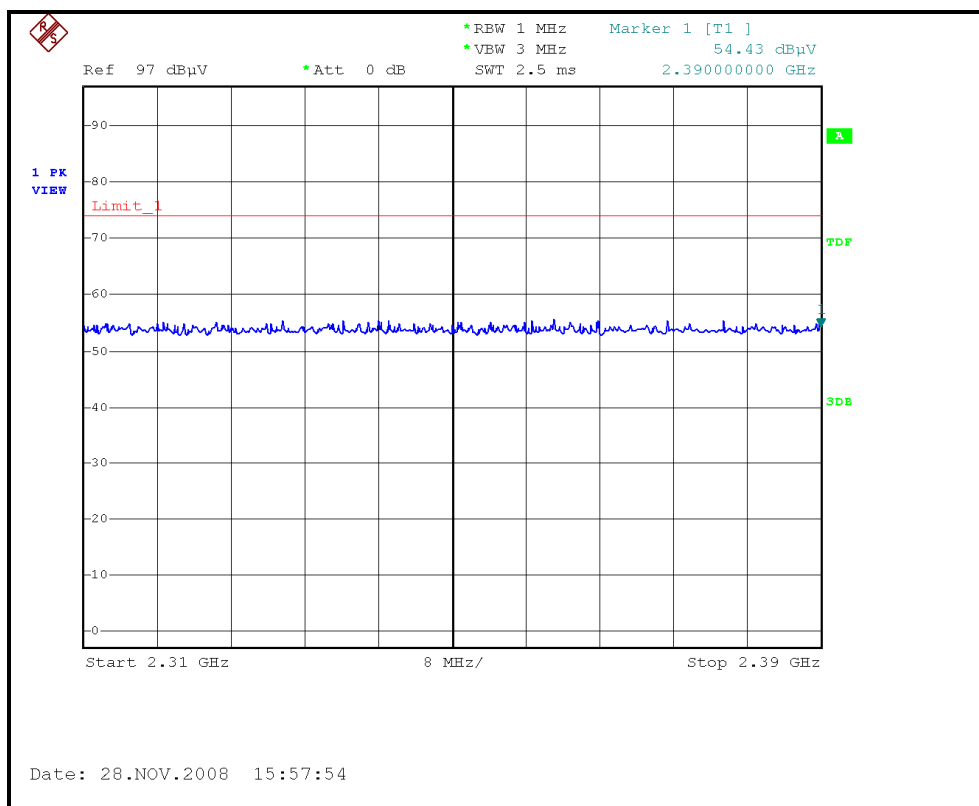
RESTRICTED BANDEDGE (CH0, HORIZONTAL)





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RESTRICTED BANDEDGE (CH0, VERTICAL)





Ref 97 dBuV *Att 0 dB *RBW 1 MHz Marker 1 [T1] 55.07 dBuV
SWT 2.5 ms 2.48350000 GHz

1 PK VIEW

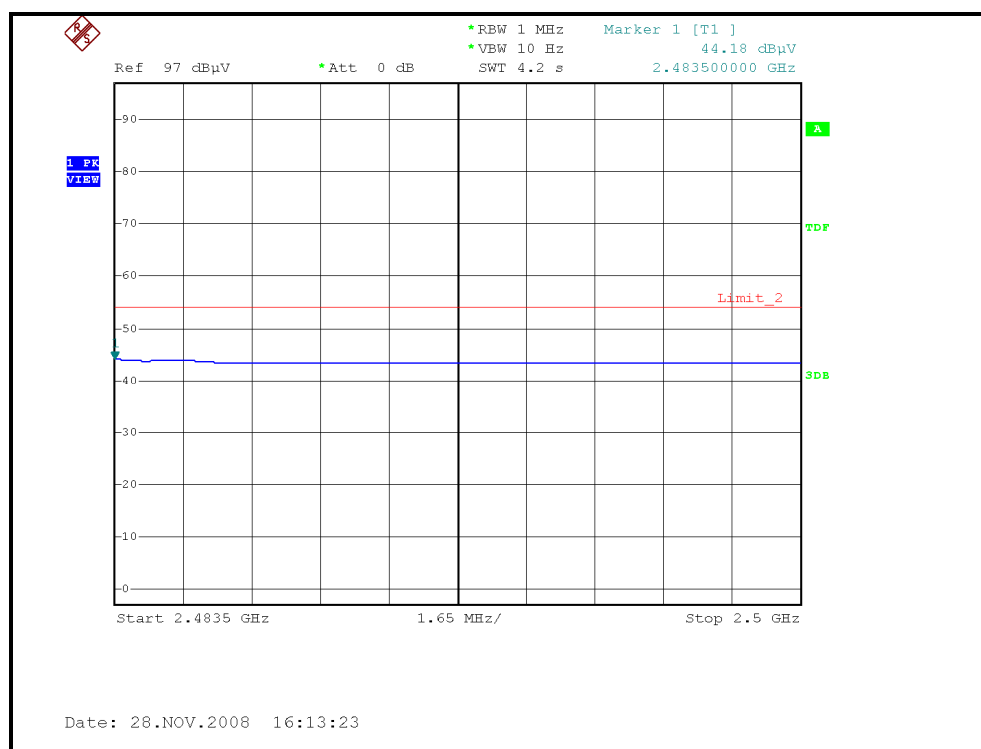
Limit_1

TDF

3dB

Start 2.4835 GHz 1.65 MHz/ Stop 2.5 GHz

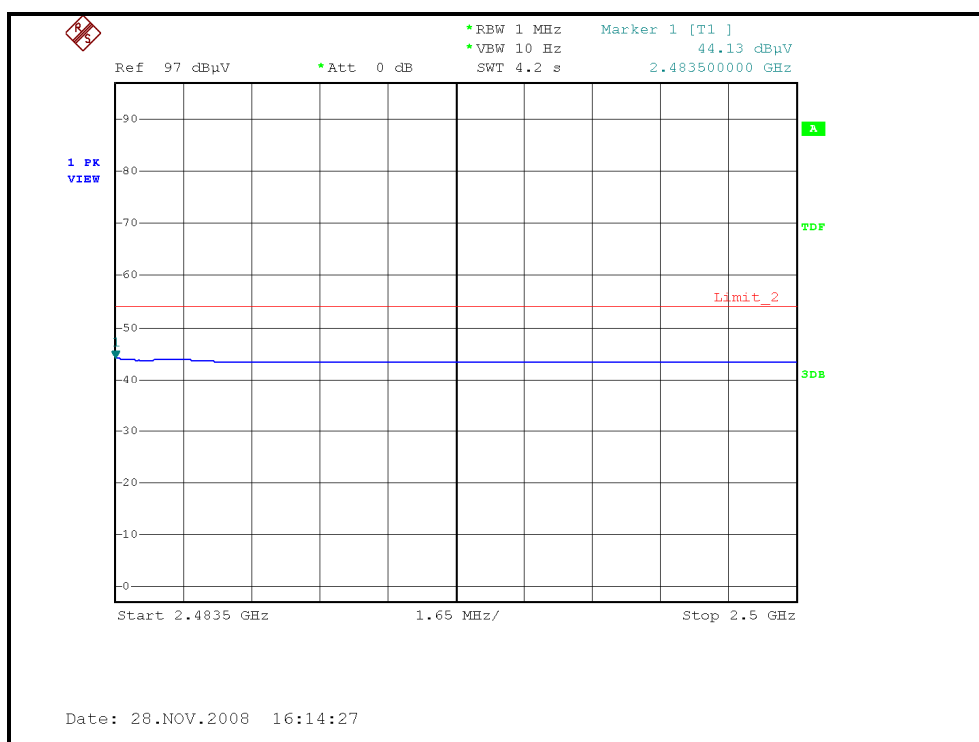
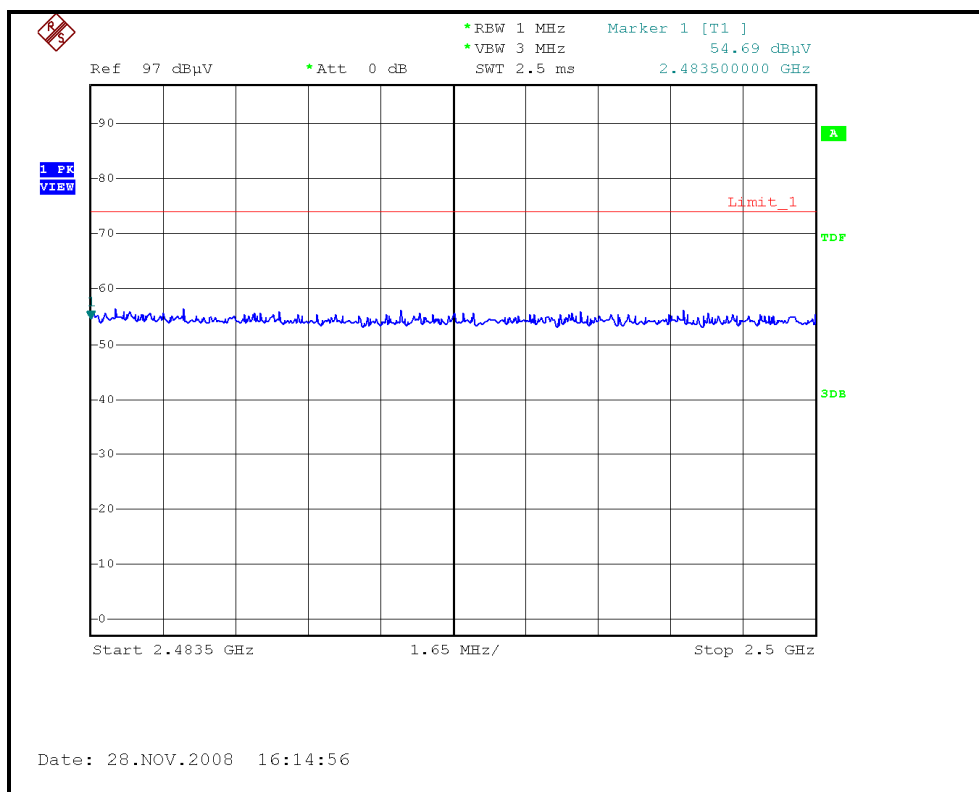
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RESTRICTED BANDEDGE (802.11g MODE,CH11, VERTICAL)



4.2 6dB BANDWIDTH MEASUREMENT

4.2.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.2.2 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 measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3 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 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



4.2.6 EUT OPERATING CONDITIONS

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



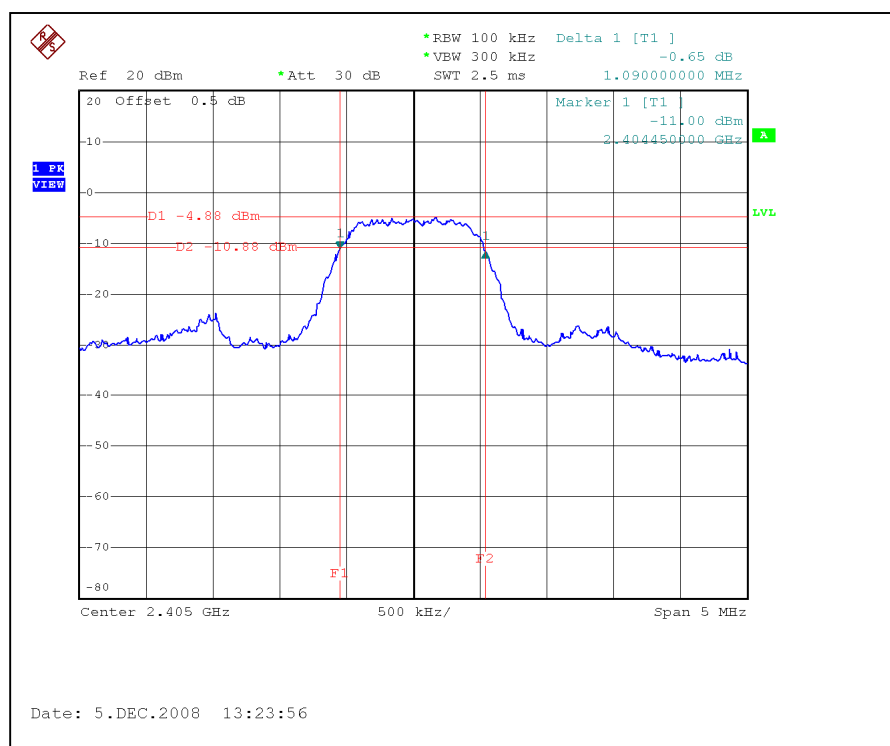
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4.2.7 TEST RESULTS

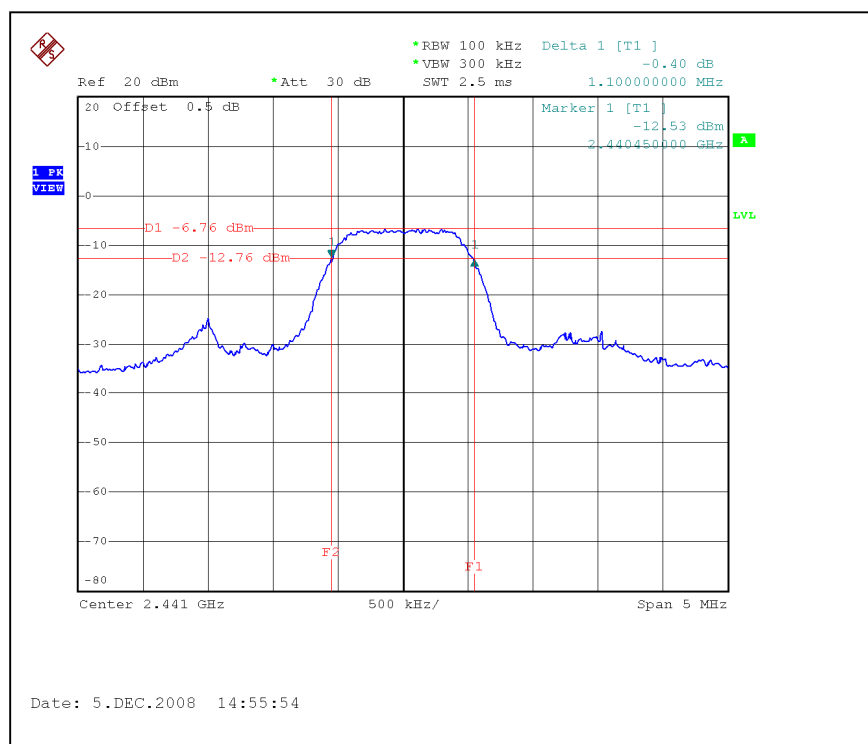
MODULATION TYPE	DQPSK $\pi/4$	TRANSFER RATE	1Mbps
INPUT POWER	DC 3V	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Frank Liu		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2405	1.09	0.5	PASS
18	2441	1.10	0.5	PASS
36	2477	1.09	0.5	PASS

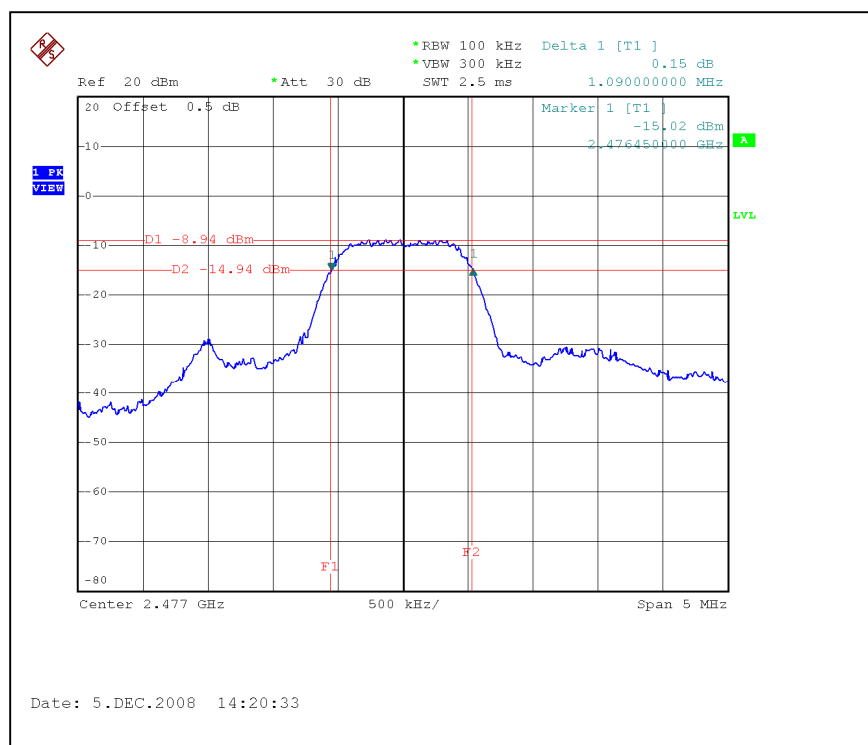
CH0



CH18



CH36





4.3 MAXIMUM PEAK OUTPUT POWER

4.3.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.3.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 13, 2008	Aug. 12, 2009
Agilent SIGNAL GENERATOR	E8257C	MY43320668	Dec. 26, 2007	Dec. 25, 2008
Anritsu Power Meter	ML2495A	0824006	NA	NA
Pulse Power Sensor	MA2411B	0738172	NA	NA

NOTE:

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

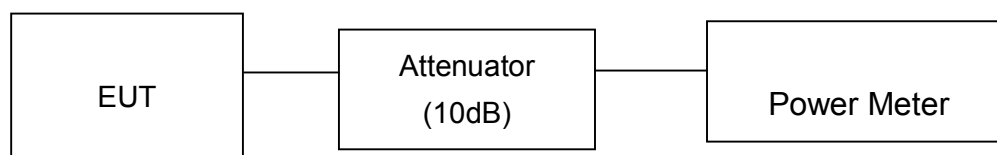
4.3.3 TEST PROCEDURES

1. The transmitter output was connected to the power meter through an attenuator; the bandwidth of the fundamental frequency was measured with the power meter.
2. Record the power level.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

Same as Item 4.2.6

4.3.7 TEST RESULTS

WITH ANTENNA 1(EXTERNAL):

MODULATION TYPE	DQPSK $\pi/4$	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	DC 3V	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Frank Liu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS / FAIL
0	2405	-3.25	0.473	30	PASS
18	2441	-4.95	0.320	30	PASS
36	2477	-7.15	0.193	30	PASS

WITH ANTENNA 2 (INTERNAL)

MODULATION TYPE	DQPSK $\pi/4$	TRANSFER RATE	1Mbps
INPUT POWER	DC 3V	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Frank Liu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	PASS / FAIL
0	2405	-3.25	0.473	29.83	PASS
18	2441	-4.95	0.320	29.83	PASS
36	2477	-7.15	0.193	29.83	PASS



4.4 POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

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 measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.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 PROCEDURE

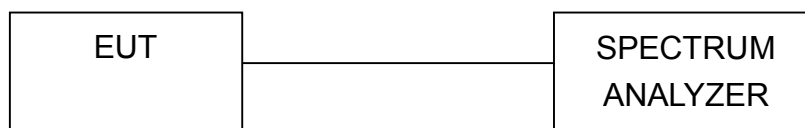
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITION

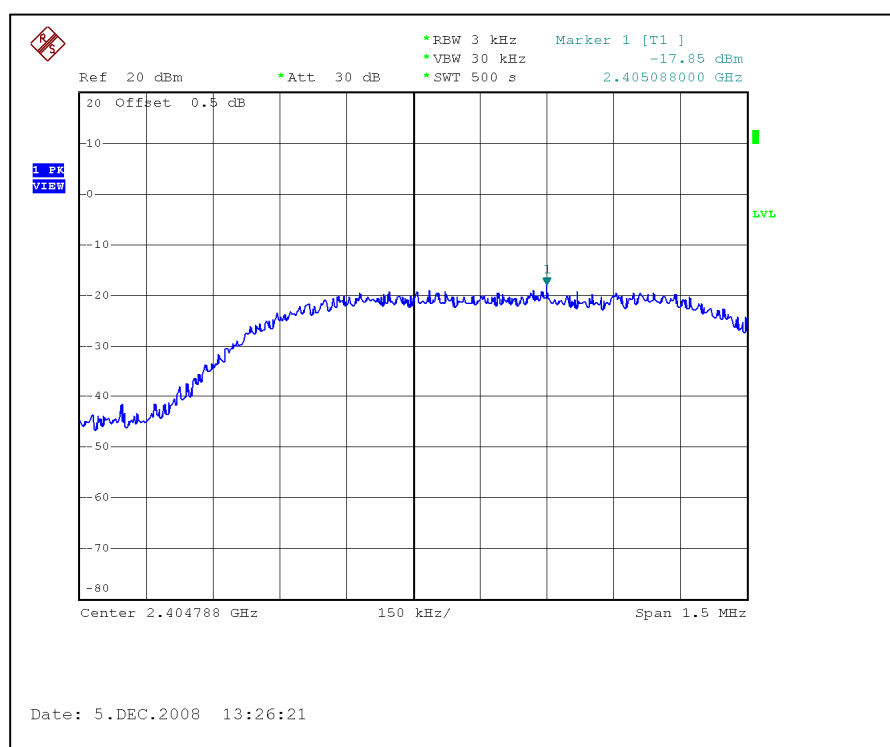
Same as Item 4.3.6

4.4.7 TEST RESULTS

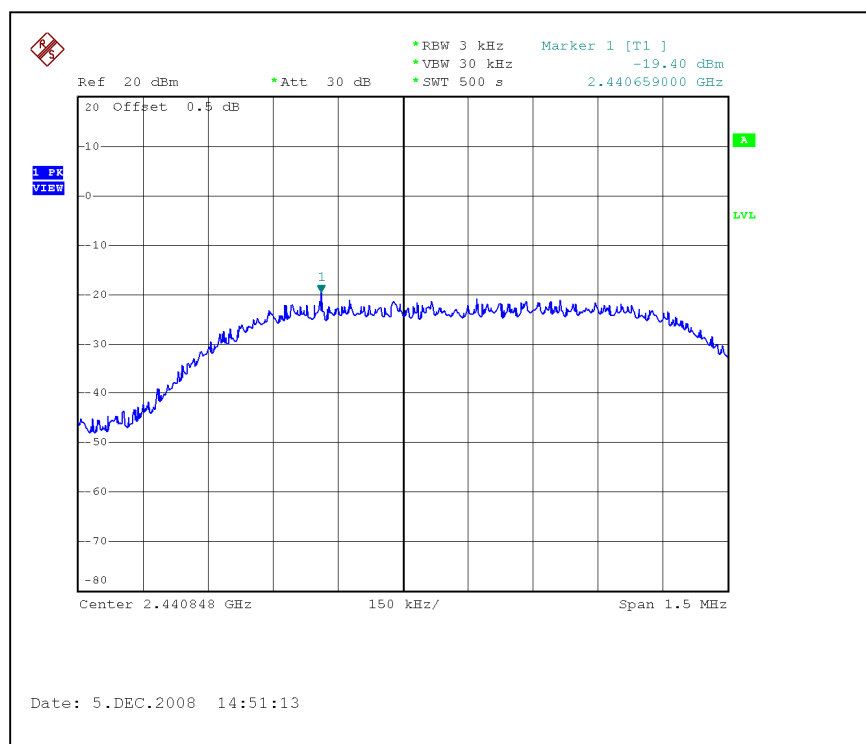
MODULATION TYPE	DQPSK $\pi/4$	TRANSFER RATE	1Mbps
INPUT POWER	DC 3V	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Frank Liu		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
0	2405	-17.85	8	PASS
18	2441	-19.40	8	PASS
36	2477	-22.84	8	PASS

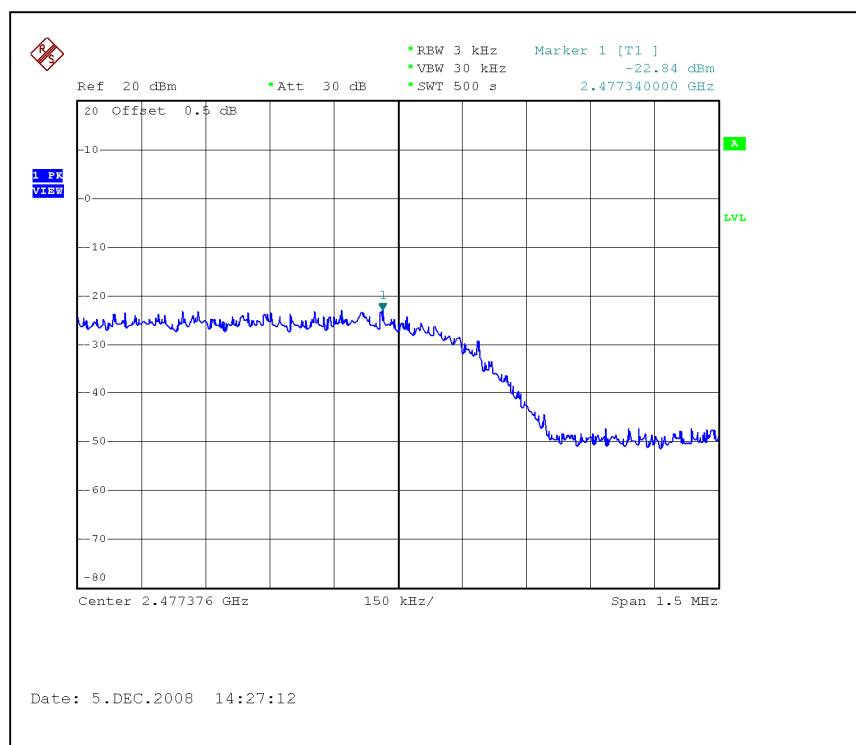
CH0



CH18



CH36



4.5 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.5.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.5.2 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 measurement uncertainty is less than $\pm 2.6\text{dB}$, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.
- 2.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 via a low loss cable. Set RBW of spectrum analyzer to 100kHz and VBW of spectrum analyzer to 300kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges were measured and recorded.

The spectrum plots (RBW = 100kHz, VBW = 300kHz) are attached on the following pages.



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4.5.4 DEVIATION FROM TEST STANDARD

No deviation

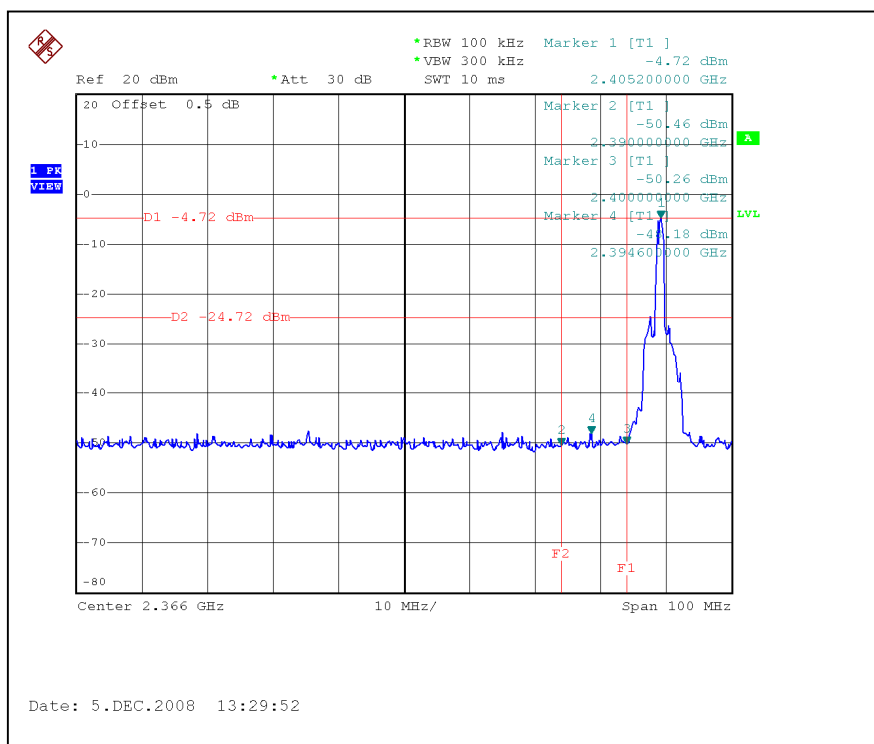
4.5.5 EUT OPERATING CONDITION

Same as Item 4.3.6

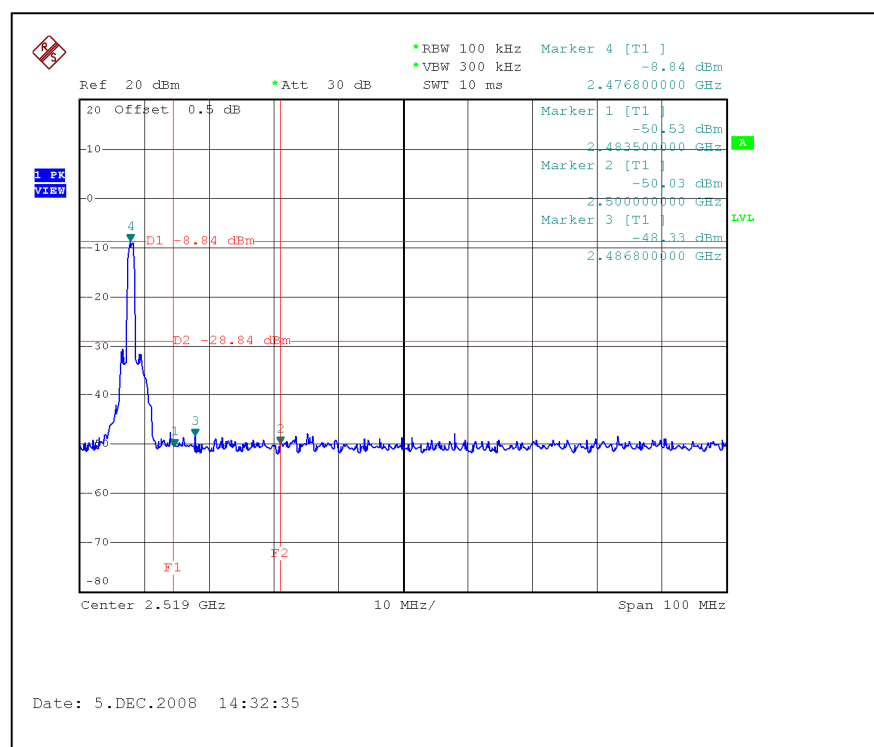
4.5.6 TEST RESULTS

The spectrum plots are attached on the following images. 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).

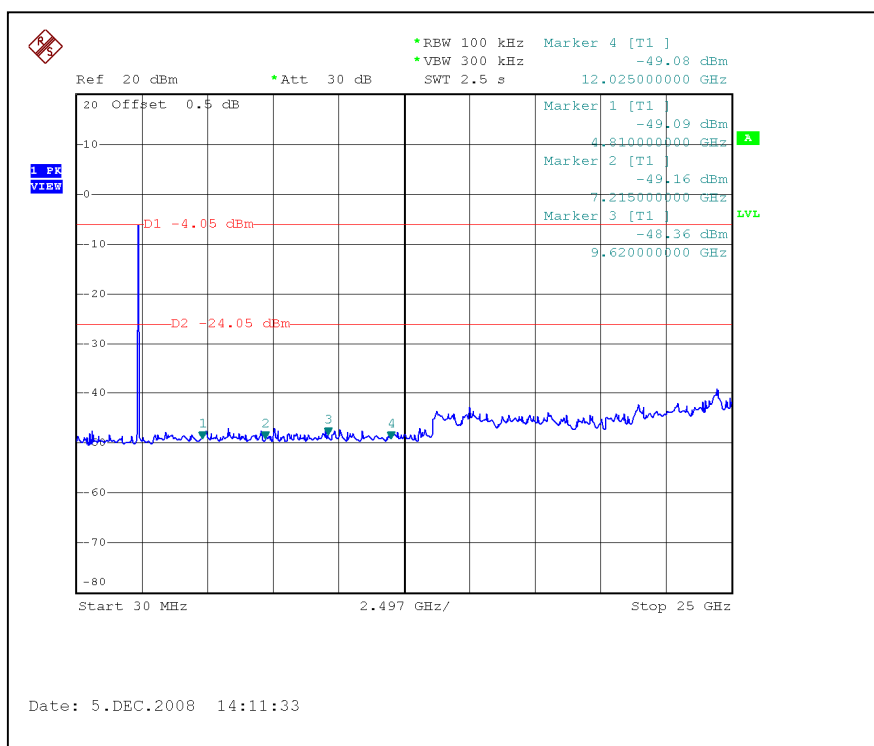
CH0



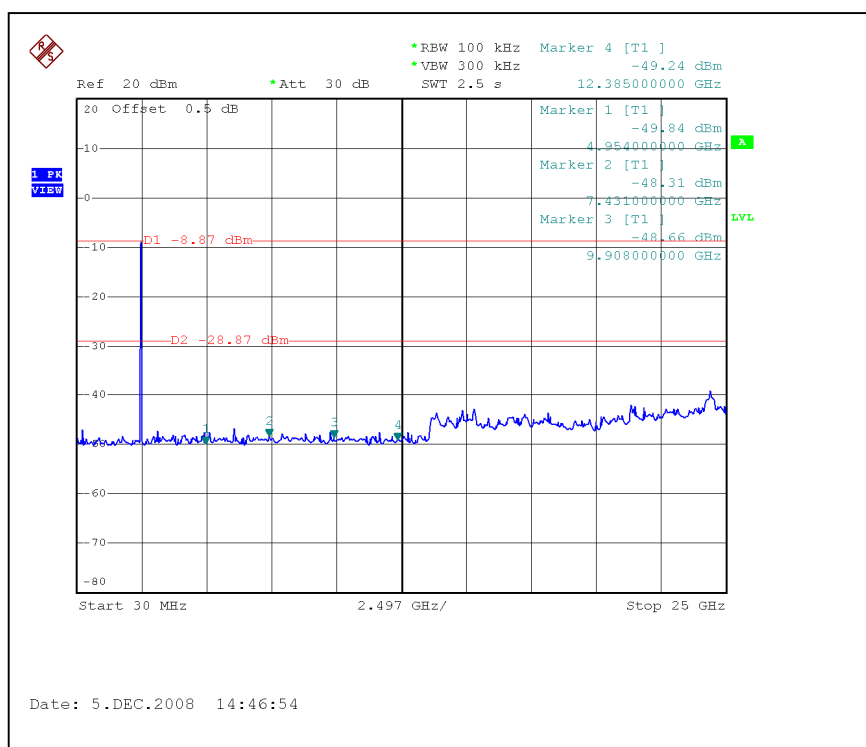
CH36



CH0



CH36



4.6 ANTENNA REQUIREMENT

4.6.1 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.

4.6.2 ANTENNA CONNECTED CONSTRUCTION

There are two antennas provided to this EUT, please refer to the following table:

No	Antenna Type	Gain (dBi)	Antenna Connector
1	Wire antenna, quarter wave (External)	0.59	NA
2	Sheet metal inverted-F antenna (Internal)	6.69	NA



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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.

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

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.

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