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FCC RADIO TEST REPORT

Applicant's company	LOGITECH FAR EAST LTD.
Applicant Address	#2 Creation Rd. 4, Science-Based Ind. Park Hsinchu Taiwan, R.O.C.
FCC ID	JNZNR0005
Manufacturer's company	LOGITECH FAR EAST LTD.
Manufacturer Address	#2 Creation Rd. 4, Science-Based Ind. Park Hsinchu Taiwan, R.O.C.

Product Name	Remote controller
Brand Name	Logitech
Model Name	N-R0005
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2405~ 2474MHz
Received Date	Jul. 13, 2012
Final Test Date	Jan. 22, 2013
Submission Type	Original Equipment

Statement

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2009**, **47 CFR FCC Part 15 Subpart C** and **KDB 558074 D01 v02**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.



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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR271313	Rev. 01	Initial issue of report	Jan. 30, 2013

1. CERTIFICATE OF COMPLIANCE

Product Name : Remote controller
Brand Name : Logitech
Model Name : N-R0005
Applicant : LOGITECH FAR EAST LTD.
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Jul. 13, 2012 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



Sam Chen

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	Rule Section	Description of Test	Result	Under Limit
-	15.207	AC Power Line Conducted Emissions	Complies	Note1
4.1	15.247(b)(3)	Maximum Conducted Output Power	Complies	29.32dB
4.2	15.247(e)	Power Spectral Density	Complies	22.6dB
4.3	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.4	15.247(d)	Radiated Emissions	Complies	8.48dB
4.5	15.247(d)	Band Edge Emissions	Complies	8.48dB
4.6	15.203	Antenna Requirements	Complies	-

Note1: Due to the EUT is a DC-powered (button cell) equipment; it's not necessary to apply for AC Power Line Conducted Emissions test

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth	±8.5×10 ⁻⁸	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7°C	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (1TX, 1RX)
Power Type	From button cell
Modulation	GFSK
Frequency Range	2405~ 2474MHz
Channel Number	12
Channel Band Width (99%)	1.68 MHz
Maximum Conducted Output Power	0.68 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

3.2. Accessories

N/A

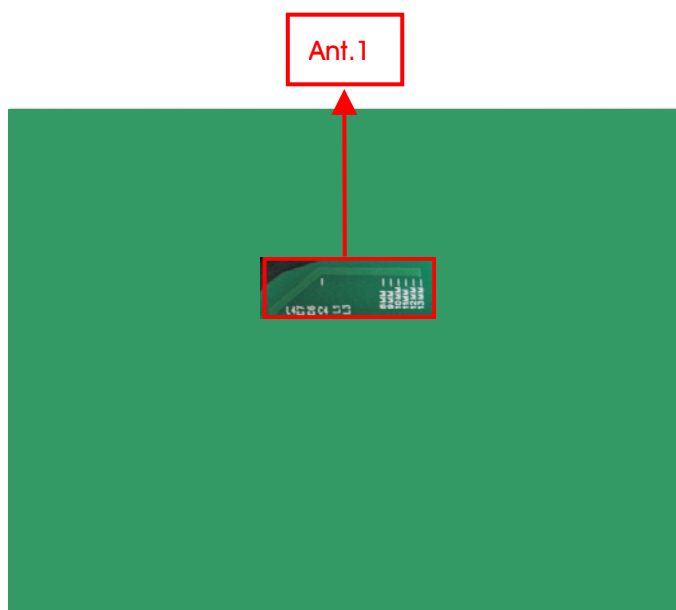
3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	-	-	PCB Printed Antenna	NA	1.95

Note:

For GFSK Modulation (1TX/1RX)

Ant. 1 can be used as transmitting/receiving antenna.



3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2405 ~ 2474MHz	1	2405 MHz	7	2441 MHz
	2	2408 MHz	8	2444 MHz
	3	2414 MHz	9	2462 MHz
	4	2417 MHz	10	2465 MHz
	5	2432 MHz	11	2471 MHz
	6	2435 MHz	12	2474 MHz

3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	-	-	-	-
Maximum Conducted Output Power	TX Mode	GFSK	1/8/12	1
Power Spectral Density 6dB Spectrum Bandwidth	TX Mode	GFSK	1/8/12	1
Radiated Emissions 9kHz~1GHz	TX Mode	GFSK	8	1
Radiated Emissions 1GHz~10 th Harmonic	TX Mode	GFSK	1/8/12	1
Band Edge Emissions	TX Mode	GFSK	1/8/12	1

The following test modes were performed for the test:

Mode 1: Place EUT in X axis

Mode 2: Place EUT in Y axis

Mode 3: Place EUT in Z axis

<for Radiated Emissions Below 1GHz >

Mode 1 generated the worst case, so it was selected to perform test and its test result was written in the report.

<For Radiated Emissions Above 1GHz >

Mode 1 generated the worst case, so it was selected to perform test and its test result was written in the report.

3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D
TH01-CB	OVEN Room	Hsin Chu	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

Please refer section 6 for Test Site Address.

3.7. Table for Supporting Units

N/A

3.8. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

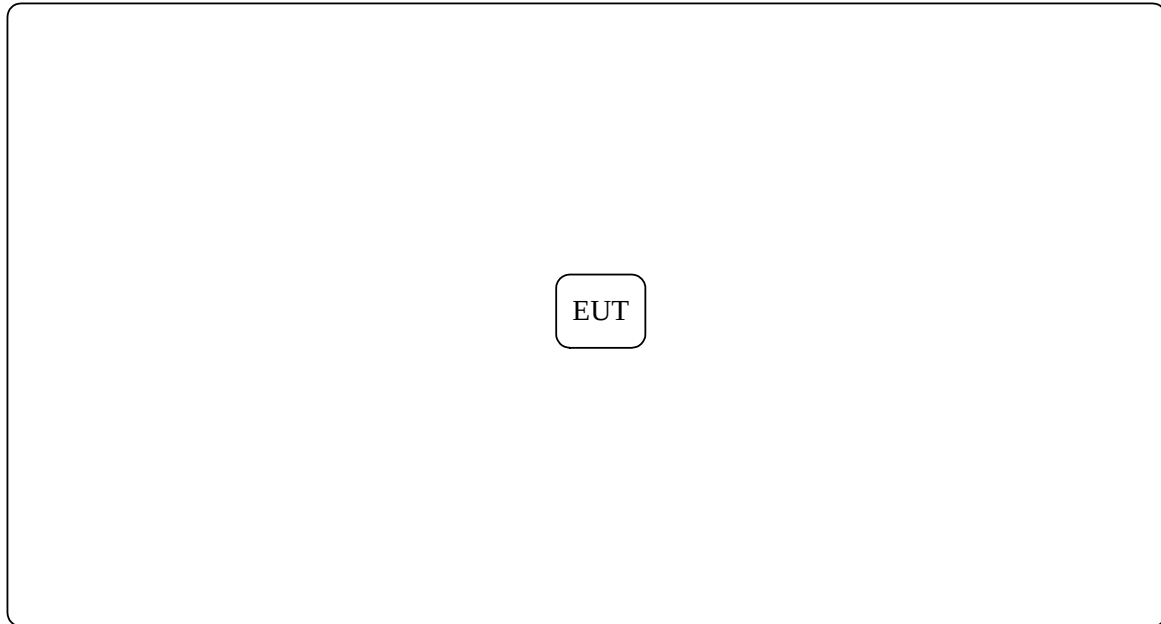
Power Parameters

Test Software Version	Hardware		
Frequency	2405 MHz	2444 MHz	2474 MHz
IEEE 802.11 GFSK	Default	Default	Default

Executed "Hardware" was executed the test program to control the EUT continuously transmit RF signal.

3.9. Test Configurations

3.9.1. Radiation Emissions Test Configuration



4. TEST RESULT

4.1. Maximum Conducted Output Power Measurement

4.1.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. The limit has to be reduced by the amount in dB that the gain of the antenna exceeds 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

4.1.2. Measuring Instruments and Setting

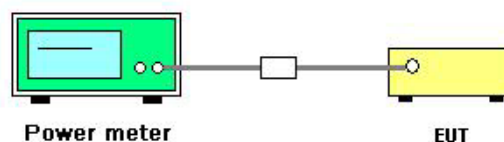
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Bandwidth	50MHz bandwidth is greater than the EUT emission bandwidth
Detector	Average

4.1.3. Test Procedures

1. Test procedures refer KDB558074 v01 r02 section 8.2.3 option 3.
2. This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

4.1.4. Test Setup Layout



4.1.5. Test Deviation

There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.1.7. Test Result of Maximum Conducted Output Power

Temperature	25°C	Humidity	56%
Test Engineer	Robert Chang	Configurations	CTX
Test Date	Jan. 22, 2013		

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2405 MHz	0.68	30.00	Complies
8	2444 MHz	0.04	30.00	Complies
12	2474 MHz	-0.66	30.00	Complies

4.2. Power Spectral Density Measurement

4.2.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.2.2. Measuring Instruments and Setting

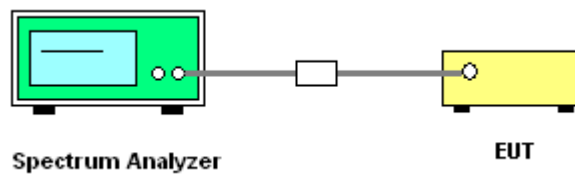
Please refer to section 5 of equipments list in this report. The following table is the setting of Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS channel bandwidth.
RB	100 kHz
VB	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple

4.2.3. Test Procedures

1. Test procedures refer KDB558074 v01 r02 section 9.1 option 1
2. Spectrum analyzer must be capable of utilizing a number of measurement points in each sweep that is greater than or equal to twice the span/RBW in order to ensure bin-to-bin spacing of $\leq RBW/2$ so that narrowband signals are not lost between frequency bins.
3. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
4. Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$ (use of a greater number of measurement points than this minimum requirement is recommended).
5. Use the peak marker function to determine the maximum level in any 100 kHz band segment within the fundamental EBW.
6. Scale the observed power level to an equivalent level in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where: $BWCF = 10\log(3 \text{ kHz}/100 \text{ kHz} = -15.2 \text{ dB})$.
7. The resulting PSD level must be $\leq 8 \text{ dBm}$.
8. When measuring power spectral density with multiple antenna systems, add every result of the values by mathematic formula.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Power Spectral Density

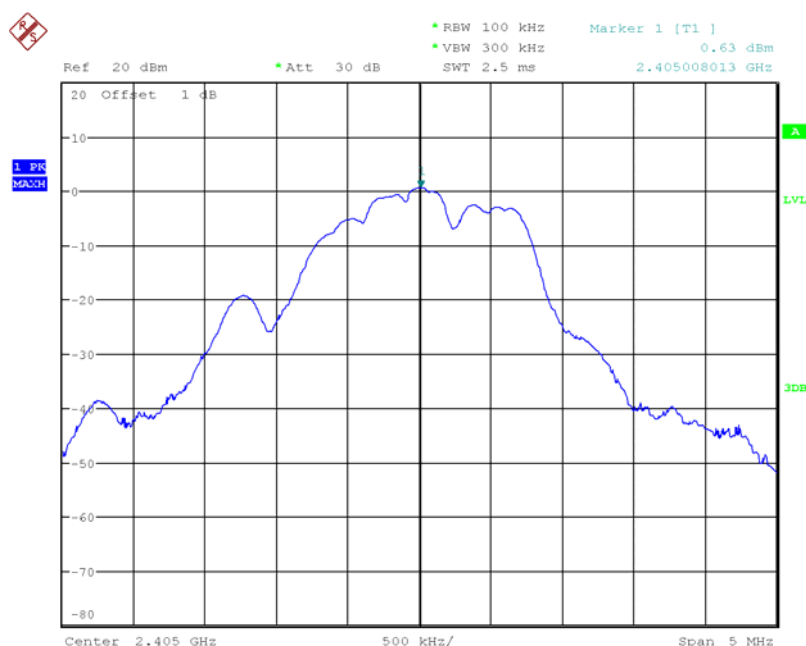
Temperature	25°C	Humidity	56%
Test Engineer	Robert Chang	Configurations	CTX

Frequency	Power Density (dBm/100kHz)	BWCF factor (100KHz to 3KHz)	Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
2405 MHz	0.63	-15.23	-14.60	8.00	Complies
2444 MHz	-0.11	-15.23	-15.34	8.00	Complies
2474 MHz	-0.92	-15.23	-16.15	8.00	Complies

Note: All the test values were listed in the report.

For plots, only the channel with maximum results was shown.

Power Density Plot on Channel 1 / 2405 MHz



Date: 22.JAN.2013 22:05:14

4.3. 6dB Spectrum Bandwidth Measurement

4.3.1. Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.

4.3.2. Measuring Instruments and Setting

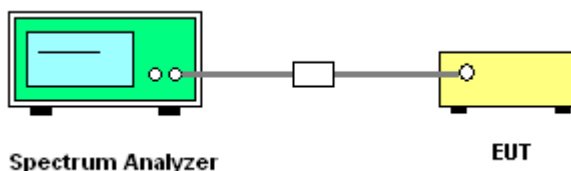
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RB	1-5 % or DTS BW, not exceed 100KHz
VB	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. Test was performed in accordance with KDB 558074 Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 5.1.1 EBW Measurement Procedure
3. Multiple antenna system was performed in accordance with KDB 662911 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. Measured the spectrum width with power higher than 6dB below carrier.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4. Radiated Emissions Measurement

4.4.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

4.4.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 3 MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100kHz / 300kHz for peak

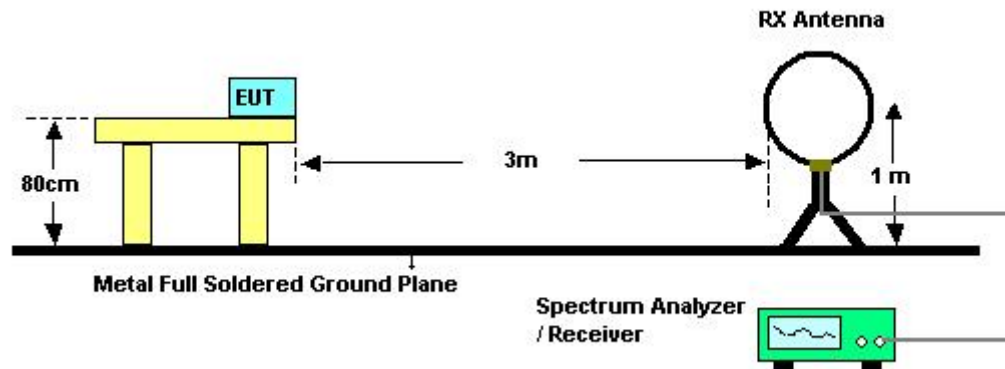
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.4.3. Test Procedures

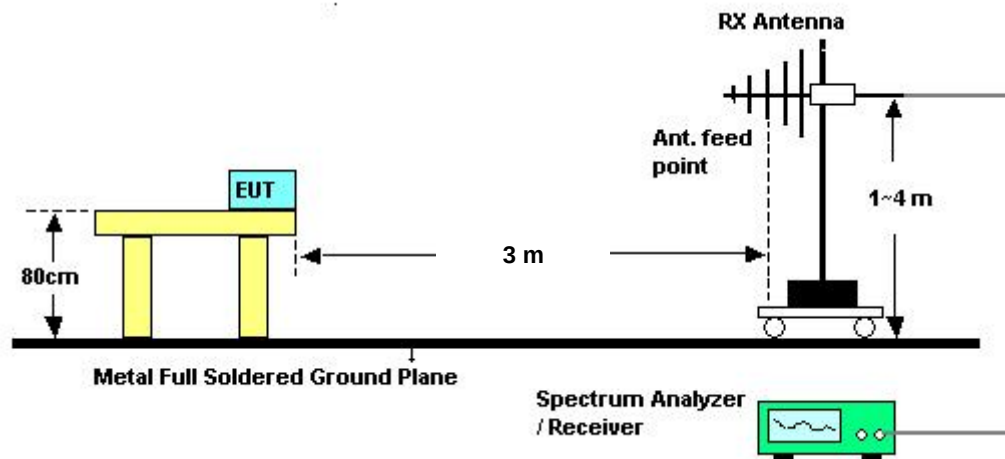
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.4.4. Test Setup Layout

For radiated emissions below 1GHz



For radiated emissions above 1GHz



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	21°C	Humidity	60%
Test Engineer	Robert Chang	Test Date	Jan. 22, 2013

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

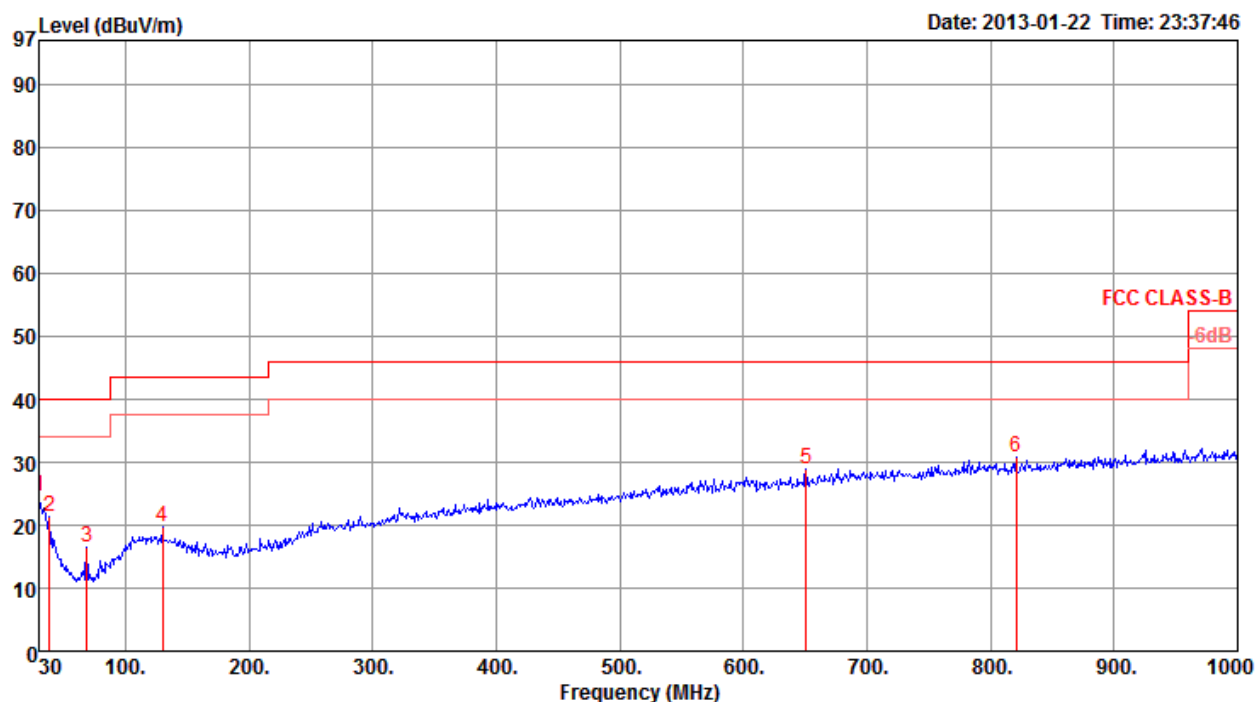
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.4.8. Results of Radiated Emissions (30MHz~1GHz)

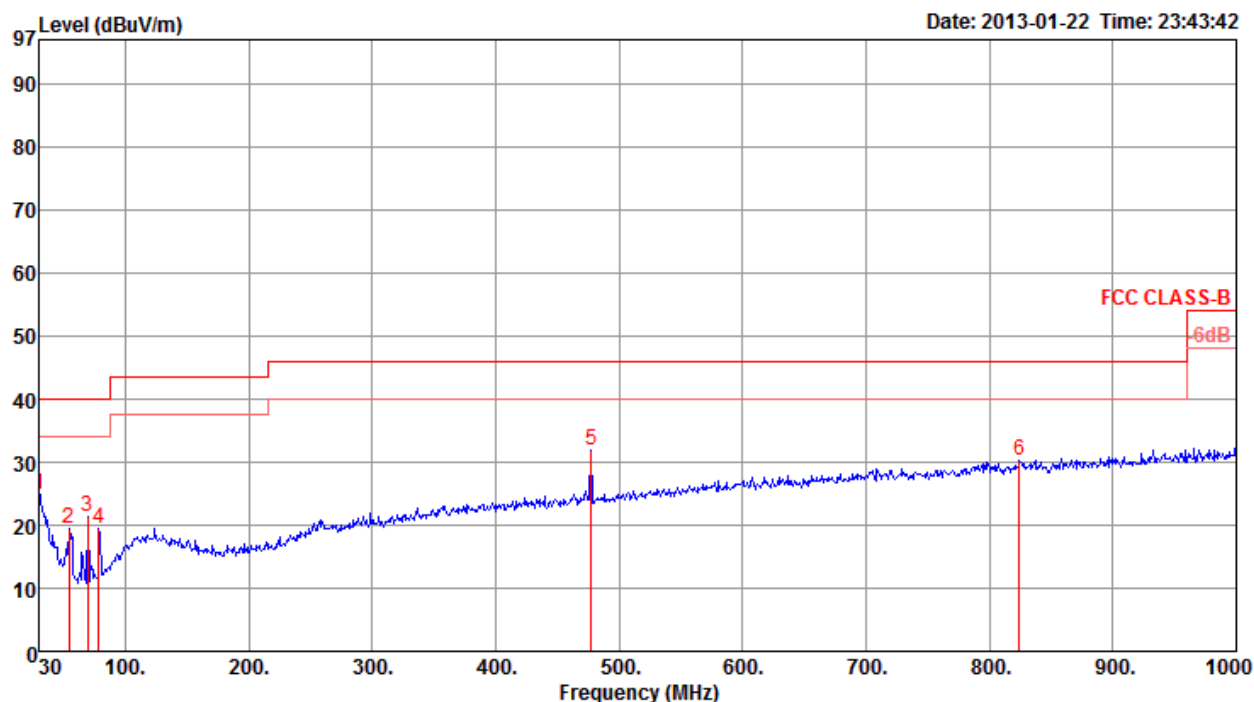
Temperature	21°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	Mode 1 / CH 8 / 2444 MHz / Ant.1

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	Remark	deg	cm	
1	30.00	24.60	40.00	-15.40	31.84	0.83	27.97	19.90	Peak	0	400	HORIZONTAL
2	38.73	21.22	40.00	-18.78	33.89	0.98	27.99	14.34	Peak	0	400	HORIZONTAL
3	68.80	16.47	40.00	-23.53	36.34	1.26	27.94	6.81	Peak	0	400	HORIZONTAL
4	129.91	19.71	43.50	-23.79	32.87	1.67	27.63	12.80	Peak	0	400	HORIZONTAL
5	650.80	28.82	46.00	-17.18	32.85	3.91	27.55	19.61	Peak	0	400	HORIZONTAL
6 p	820.55	30.72	46.00	-15.28	32.26	4.39	26.89	20.96	Peak	0	400	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	30.00	24.95	40.00	-15.05	32.19	0.83	27.97	19.90	Peak	0	100	VERTICAL
2	54.25	19.32	40.00	-20.68	38.12	1.12	27.90	7.98	Peak	0	100	VERTICAL
3	69.77	21.22	40.00	-18.78	41.08	1.28	27.94	6.80	Peak	0	100	VERTICAL
4	78.50	19.34	40.00	-20.66	38.55	1.33	27.91	7.37	Peak	0	100	VERTICAL
5	477.17	31.87	46.00	-14.13	39.01	3.32	27.89	17.43	Peak	0	100	VERTICAL
6	824.43	30.27	46.00	-15.73	31.77	4.39	26.89	21.00	Peak	0	100	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.4.9. Results for Radiated Emissions (1GHz~10th Harmonic)

Temperature	21°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	Mode 1 / CH 1 / 2405 MHz / Ant.1
Test Date	Jan. 22, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	1202.50	46.40	74.00	-27.60	56.20	1.53	24.71	36.04	Peak	100	101	HORIZONTAL
2	1202.51	44.06	54.00	-9.94	53.86	1.53	24.71	36.04	Average	100	101	HORIZONTAL
3	4810.00	46.42	74.00	-27.58	45.15	3.29	33.02	35.04	Peak	136	178	HORIZONTAL
4	4810.00	36.56	54.00	-17.44	35.29	3.29	33.02	35.04	Average	136	178	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	1202.51	35.02	54.00	-18.98	44.82	1.53	24.71	36.04	Average	205	142	VERTICAL
2	1202.69	39.92	74.00	-34.08	49.72	1.53	24.71	36.04	Peak	205	142	VERTICAL
3	4810.00	45.40	54.00	-8.60	44.13	3.29	33.02	35.04	Average	100	160	VERTICAL
4	4810.09	51.19	74.00	-22.81	49.92	3.29	33.02	35.04	Peak	100	160	VERTICAL

Temperature	21°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	Mode 1 / CH 8 / 2444 MHz / Ant.1
Test Date	Jan. 22, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	1222.00	44.56	54.00	-9.44	54.30	1.55	24.75	36.04	Average	100	92	HORIZONTAL
2	1222.03	46.62	74.00	-27.38	56.36	1.55	24.75	36.04	Peak	100	92	HORIZONTAL
3	4887.97	45.80	74.00	-28.20	44.31	3.33	33.19	35.03	Peak	102	172	HORIZONTAL
4	4888.01	34.34	54.00	-19.66	32.85	3.33	33.19	35.03	Average	102	172	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	1222.00	38.58	54.00	-15.42	48.32	1.55	24.75	36.04	Average	184	163	VERTICAL
2	1222.20	42.32	74.00	-31.68	52.06	1.55	24.75	36.04	Peak	184	163	VERTICAL
3	4887.75	48.66	74.00	-25.34	47.17	3.33	33.19	35.03	Peak	100	261	VERTICAL
4	4888.00	41.48	54.00	-12.52	39.99	3.33	33.19	35.03	Average	100	261	VERTICAL

Temperature	21°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	Mode 1 / CH 12 / 2474 MHz / Ant.1
Test Date	Jan. 22, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	1237.00	45.52	54.00	-8.48	55.19	1.55	24.78	36.00	Average	139	30	HORIZONTAL
2	1237.01	47.52	74.00	-26.48	57.19	1.55	24.78	36.00	Peak	139	30	HORIZONTAL
3	4947.78	46.80	74.00	-27.20	45.14	3.37	33.30	35.01	Peak	100	233	HORIZONTAL
4	4948.02	37.95	54.00	-16.05	36.29	3.37	33.30	35.01	Average	100	233	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	1237.01	39.95	54.00	-14.05	49.62	1.55	24.78	36.00	Average	120	123	VERTICAL
2	1237.02	43.46	74.00	-30.54	53.13	1.55	24.78	36.00	Peak	120	123	VERTICAL
3	4948.00	45.40	54.00	-8.60	43.74	3.37	33.30	35.01	Average	113	205	VERTICAL
4	4948.02	50.93	74.00	-23.07	49.27	3.37	33.30	35.01	Peak	113	205	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.5. Band Edge Emissions Measurement

4.5.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

4.5.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (Emission in restricted band)	1MHz / 3 MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100 KHz /100 KHz for Peak

4.5.3. Test Procedures

- The test procedure is the same as section 4.5.3, only the frequency range investigated is limited to 100MHz around bandedges.

4.5.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.5.4.

4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Test Result of Band Edge and Fundamental Emissions

Temperature	21°C	Humidity	60%
Test Engineer	Robert Chang	Configurations	Mode 1 / CH 1, 8, 12 / Ant.1
Test Date	Jan. 22, 2013		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2390.00	45.11	54.00	-8.89	14.72	2.22	28.17	0.00	Average	100	157	HORIZONTAL
2	2390.00	55.60	74.00	-18.40	25.21	2.22	28.17	0.00	Peak	100	157	HORIZONTAL
3	2404.84	101.67	74.00			2.22	28.21	0.00	Peak	100	157	HORIZONTAL
4	2405.00	100.50	54.00			2.22	28.21	0.00	Average	100	157	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2405 MHz.

Channel 8

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2390.00	45.05	54.00	-8.95	14.66	2.22	28.17	0.00	Average	100	181	HORIZONTAL
2	2390.00	55.22	74.00	-18.78	24.83	2.22	28.17	0.00	Peak	100	181	HORIZONTAL
3	2444.00	97.91	54.00			2.24	28.29	0.00	Average	100	181	HORIZONTAL
4	2444.64	99.09	74.00			2.24	28.29	0.00	Peak	100	181	HORIZONTAL
5	2483.50	45.52	54.00	-8.48	14.88	2.26	28.38	0.00	Average	100	181	HORIZONTAL
6	2483.50	54.75	74.00	-19.25	24.11	2.26	28.38	0.00	Peak	100	181	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2444 MHz.

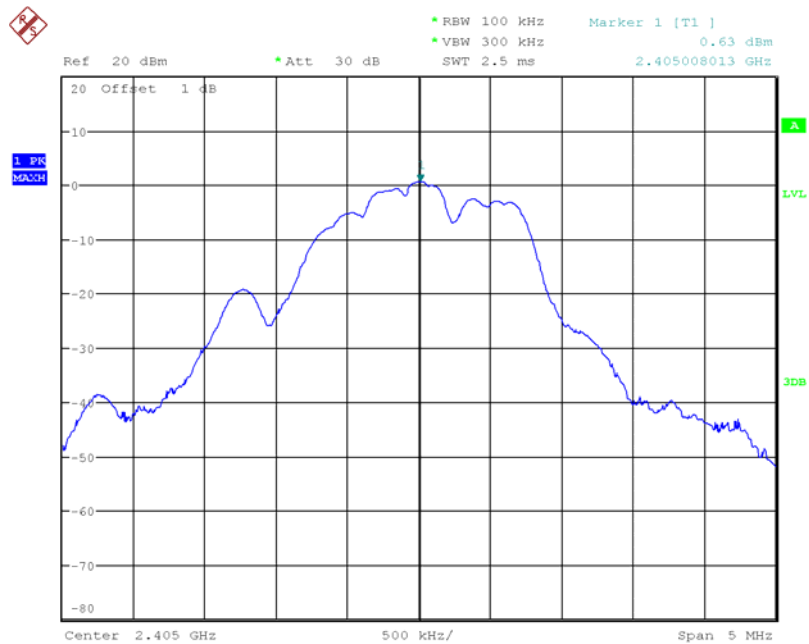
Channel 12

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2473.52	99.03	74.00			2.26	28.38	0.00	Peak	100	173	HORIZONTAL
2	2474.00	97.81	54.00			2.26	28.38	0.00	Average	100	173	HORIZONTAL
3	2483.50	45.49	54.00	-8.51	14.85	2.26	28.38	0.00	Average	100	173	HORIZONTAL
4	2483.50	56.35	74.00	-17.65	25.71	2.26	28.38	0.00	Peak	100	173	HORIZONTAL

Item 1, 2 are the fundamental frequency at 2474 MHz.

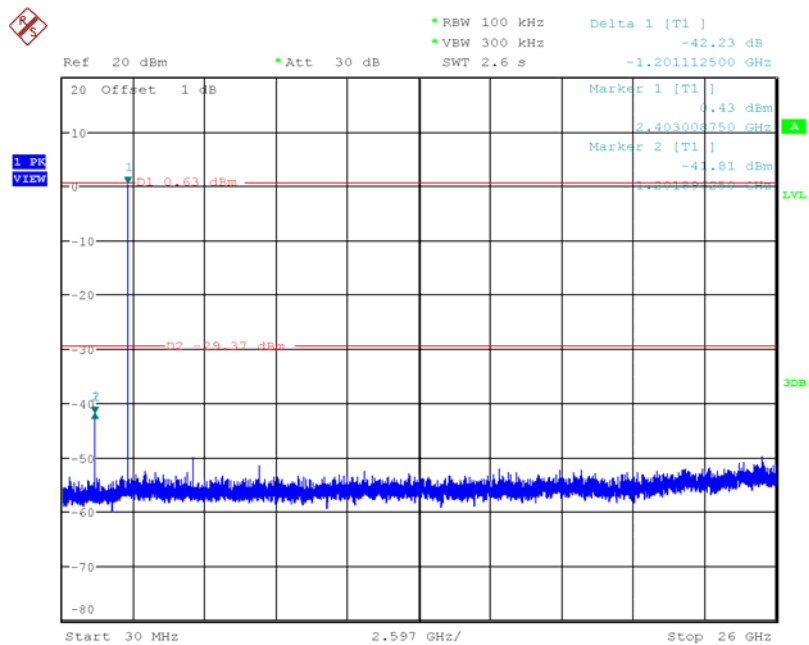
For Emission not in Restricted Band

Plot on CH 1 / Reference Level



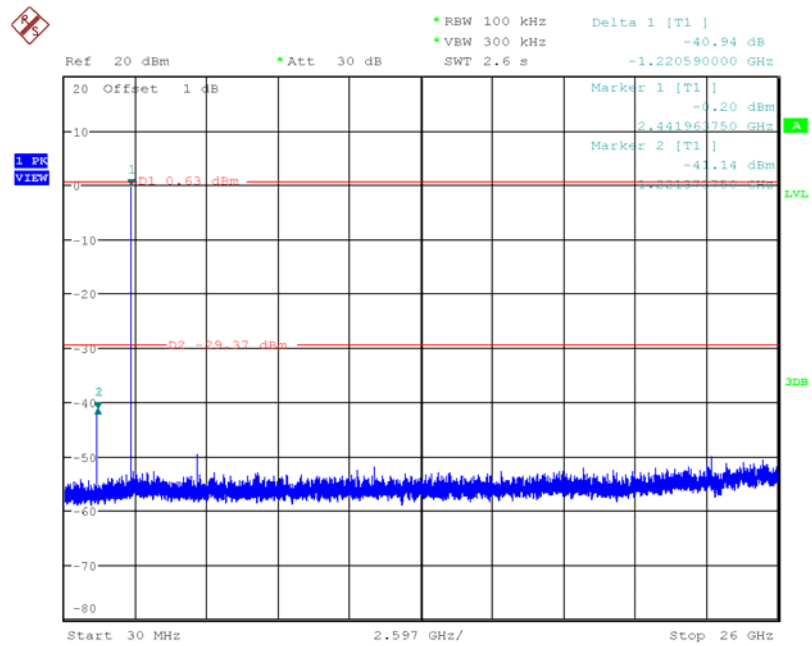
Date: 22.JAN.2013 22:05:14

Plot on CH 1 / 2405 MHz



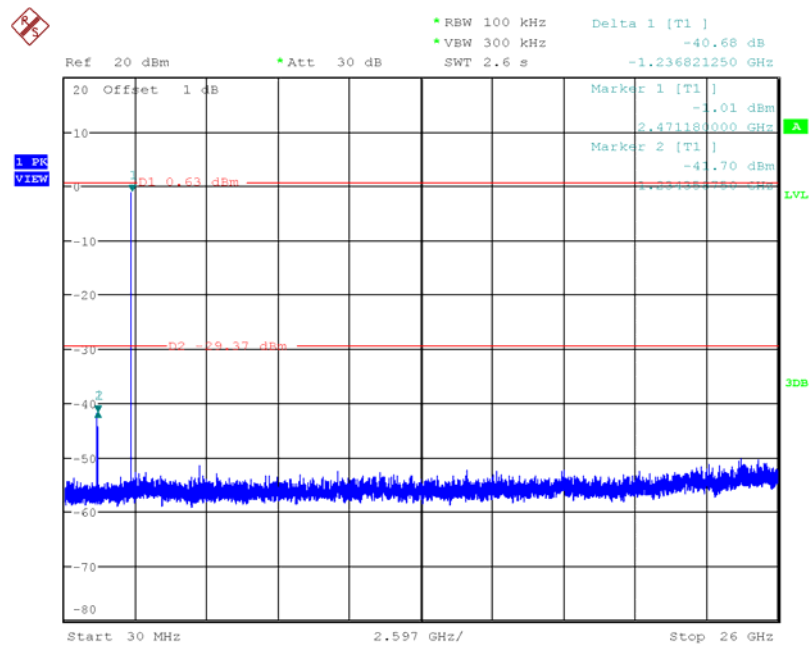
Date: 22.JAN.2013 22:10:16

Plot on CH 8 / 2444 MHz



Date: 22.JAN.2013 22:11:05

Plot on CH 12 / 2474 MHz



Date: 22.JAN.2013 22:11:45

4.6. Antenna Requirements

4.6.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.6.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Jan. 11, 2013	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9KHz~40GHz	Nov. 16, 2012	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 20, 2012	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz ~ 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz ~ 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9KHz~40GHz	Oct. 08, 2012	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 05, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	0120A02056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	3 Way	MDC2366	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	4 Way	0120A04056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz ~ 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz ~ 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz ~ 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz ~ 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz ~ 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Nov. 28, 2012	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Nov. 27, 2012	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

*Calibration Interval of instruments listed above is two years.

N.C.R. means Non-Calibration required.

6. TEST LOCATION

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085