SHENZHEN PAOLUY SILICONE TECHNOLOGY CO., LTD

BLUETOOTH KEYBOARD

Main Model: BL-BKB700

December 28, 2011
Report No.: 11021555-15.247
(This report supersedes NONE**)**

RF Test Report
To: FCC 15.247: 2011
SIEMIC, INC.
Accessing global markets

Modifications made to the product : None

This Test Report is Issued Under the Authority of:	
Peter Cai	Alex Liu
Peter Cai **Compliance Engineer**	**Alex Liu** **Technical Manager**

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Test result presented in this test report is applicable to the representative sample only.

Laboratory Introduction

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Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC , RF/Wireless , Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
Taiwan	BSMI , NCC , NIST	EMC, RF, Telecom , Safety
Hong Kong	OFTA , NIST	RF/Wireless ,Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF , Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom , Safety

Accreditations for Product Certifications

Country/Region	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC, (RCB 208)	RF , Telecom
Hong Kong	OFTA (US002)	RF , Telecom

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CONTENTS

1 EXECUTIVE SUMMARY & EUT INFORMATION

The purpose of this test programme was to demonstrate compliance of the SHENZHEN PAOLUY SILICONE TECHNOLOGY CO., LTD, BLUETOOTH KEYBOARD, and model: BL-BKB700 against the current Stipulated Standards. The BLUETOOTH KEYBOARD has demonstrated compliance with the FCC 15.247: 2011.

EUT Information

EUT Description	:	**BLUETOOTH KEYBOARD**
Main Model	:	**BL-BKB700**
Serial Model	:	**N/A**
Antenna Gain	:	**Bluetooth Antenna Gain: 2dBi**
Input Power	:	**Lithium Battery 3.7V DC 380mAh USB 5V Charge**
Classification Per Stipulated Test Standard	:	**Spread Spectrum System/Device**

2 TECHNICAL DETAILS

Purpose	**Compliance testing of BLUETOOTH KEYBOARD with stipulated standard**
Applicant / Client	**SHENZHEN PAOLUY SILICONE TECHNOLOGY CO., LTD NO.31 FURONG ROAD.GUSHUVILLAGE. XIXIANGTOWN.BAOAN DISTRICT.SHENZHEN**
Manufacturer	**SHENZHEN PAOLUY SILICONE TECHNOLOGY CO., LTD NO.31 FURONG ROAD.GUSHUVILLAGE. XIXIANGTOWN.BAOAN DISTRICT.SHENZHEN**
Laboratory performing the tests	**SIEMIC Nanjing (China) Laboratories NO.2-1,Longcang Dadao, Yuhua Economic Development Zone, Nanjing, China Tel:+86(25)86730128/86730129 Fax:+86(25)86730127 Email:info@siemic.com**
Test report reference number	**11021555-15.247**
Date EUT received	**December 12, 2011**
Standard applied	**FCC 15.247: 2011**
Dates of test (from – to)	**December 27 to December 28, 2011**
No of Units	**#1**
Equipment Category	**DSS**
Trade Name	**PAOLUY**
RF Operating Frequency (ies)	**2402MHz - 2480MHz**
Number of Channels	**79**
Modulation	**GFSK**
FCC ID	**X9PBL-BKB700**
IC ID	**8475A-BTKB08**

3 MODIFICATION

NONE

4 TEST SUMMARY

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

Spread Spectrum System/Device

Test Results Summary

Test Standard 47 CFR Part 15.247:2011	Description	Pass / Fail
15.203	Antenna Requirement	Pass
15.205	Restricted Band of Operation	Pass
15.207(a)	Conducted Emissions Voltage	Pass
15.247(a)(1)	Channel Separation	Pass
15.247(a)(1)	20dB Occupied Bandwidth	Pass
15.247(a)(1)(i)	Number of Hopping Channels	Pass
15.247(a)(1)(i)	Time of Occupancy	Pass
15.247(b)(2)	Peak Output Power	Pass
15.247(c)	Antenna Gain > 6 dBi	N/A
15.247(d)	Conducted Spurious Emissions	Pass
15.209;15.247(d)	Radiated Spurious Emissions	Pass
15.247(e)	Power Spectral Density	N/A
15.247(f)	Hybrid System Requirement	N/A
15.247(g)	Hopping Capability	Pass
15.247(h)	Hopping Coordination Requirement	Pass
15.247(i)	RF Exposure requirement	Pass
15.247(d)	100KHz Bandwidth of Frequency Band Edge	Pass
ANSI C63.4: 2009 PS: All measurement uncertainties are not taken into consideration for all presented test result.		

5 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

5.1 Antenna Requirement

Standard Requirement: 47 CFR §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.

Antenna requirement must meet at least one of the following:

a) Antenna must be permanently attached to the device.

b) Antenna must use a unique type of connector to attach to the device.

c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

The antenna is integral antenna, antenna gain is 2dBi.

5.2 Conducted Emissions Voltage

Standard Requirement:

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

*Decreases with the logarithm of the frequency.

Procedures:

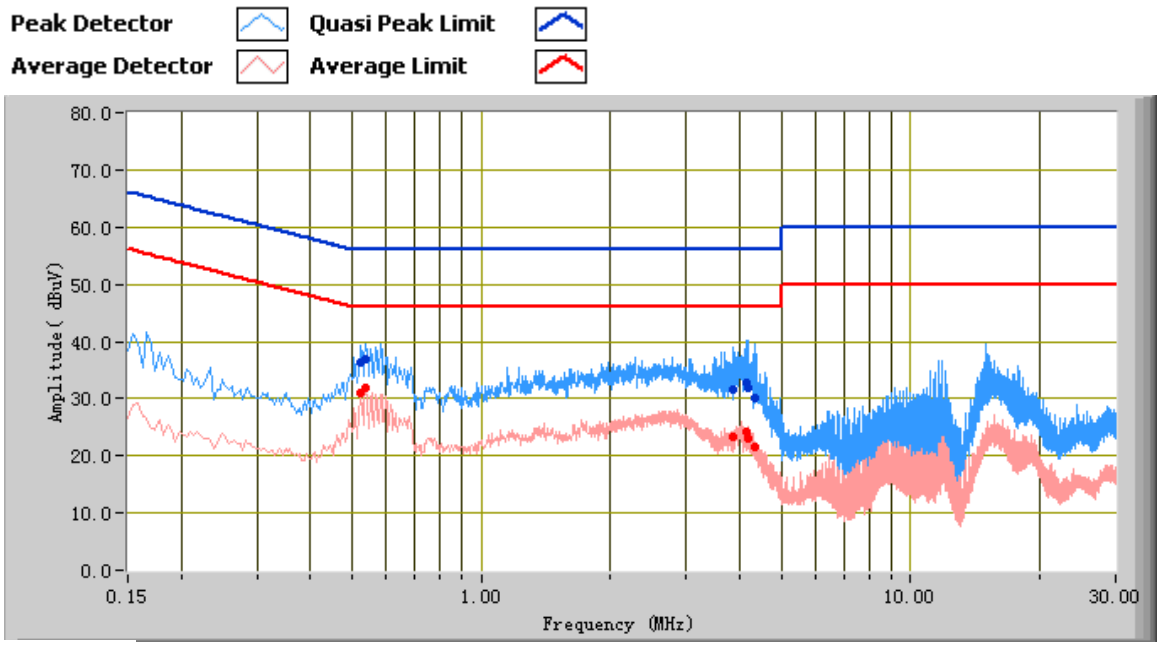
1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±3.5dB.
4. Environmental Conditions

Temperature	16°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

5. Test date : December 27, 2011
   Tested By : Peter Cai

Test Result: Pass

Test Mode:	GFSK Transmitting Power-- Line

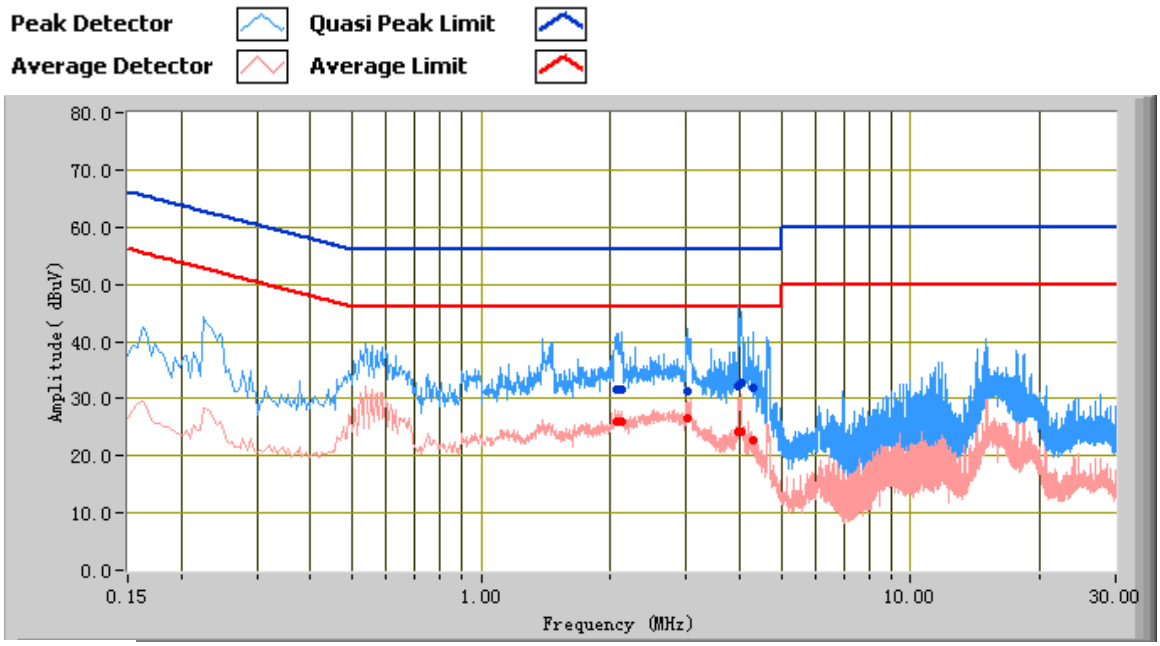


Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
4.13	32.89	56.00	-23.11	24.08	46.00	-21.92	10.49
4.20	31.91	56.00	-24.09	23.12	46.00	-22.88	10.47
0.54	36.89	56.00	-19.11	31.97	46.00	-14.03	10.16
4.34	30.12	56.00	-25.88	21.56	46.00	-24.44	10.45
0.52	36.30	56.00	-19.70	30.89	46.00	-15.11	10.16
3.87	31.50	56.00	-24.50	23.31	46.00	-22.69	10.47

Test Mode:	GFSK Transmitting Power-- Neutral



Test Data

Phase Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
3.95	32.29	56.00	-23.71	24.29	46.00	-21.71	10.49
4.02	32.79	56.00	-23.21	24.19	46.00	-21.81	10.51
3.01	31.36	56.00	-24.64	26.49	46.00	-19.51	10.20
4.28	31.97	56.00	-24.03	22.78	46.00	-23.22	10.46
2.13	31.58	56.00	-24.42	25.95	46.00	-20.05	10.20
2.06	31.48	56.00	-24.52	26.06	46.00	-19.94	10.20

5.3 Channel Separation

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Environmental Conditions

Temperature	16°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : December 28, 2011
   Tested By : Peter Cai

Standard Requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of 20 dB bandwidth of the hopping channel, whichever is greater.

Procedures:

The Channel Separation was measured conducted using a spectrum analyzer at low, middle, and high channels.

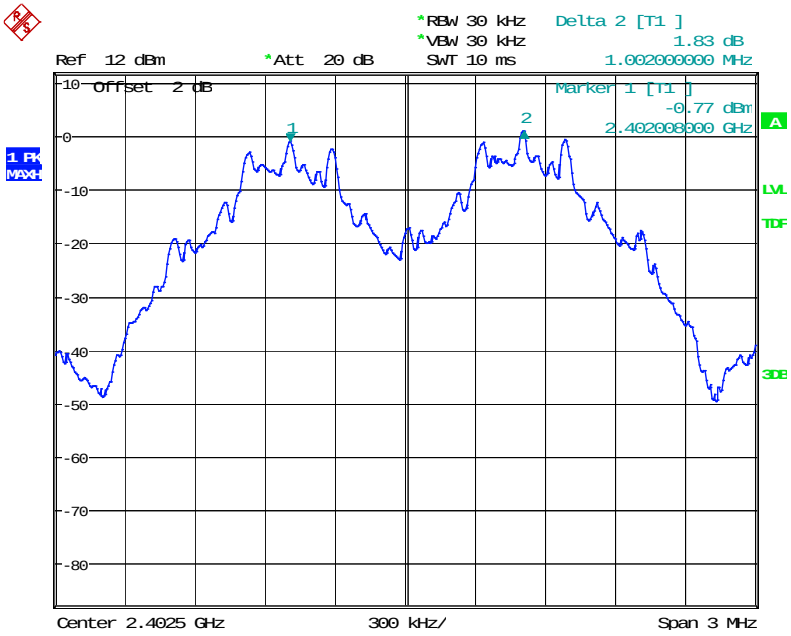
Test Result: Pass

Test Mode:	GFSK Transmitting

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2402	1.002	0.792	Pass
Adjacency Channel	2403			
Mid Channel	2440	0.996	0.792	Pass
Adjacency Channel	2441			
High Channel	2480	1.002	0.792	Pass
Adjacency Channel	2479			

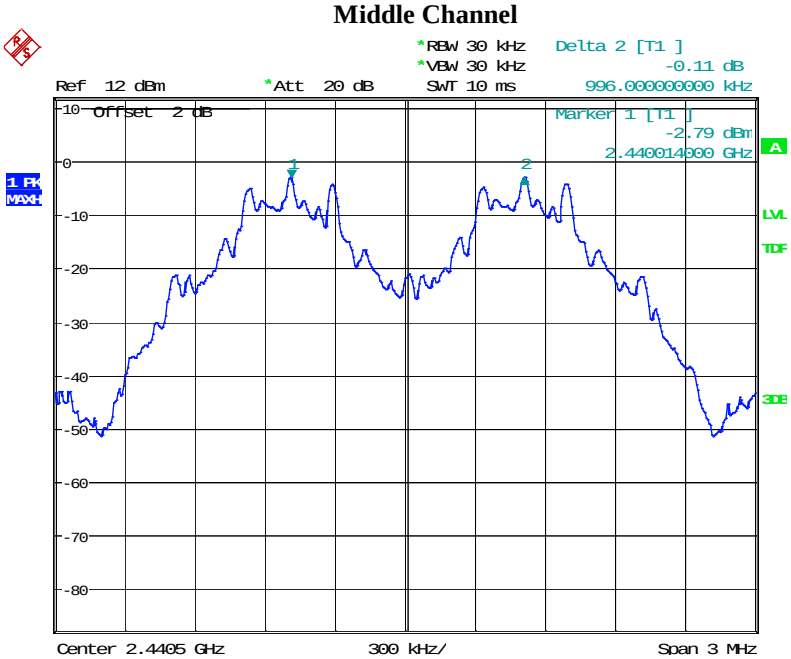
Please refer to the following plots.

Low Channel



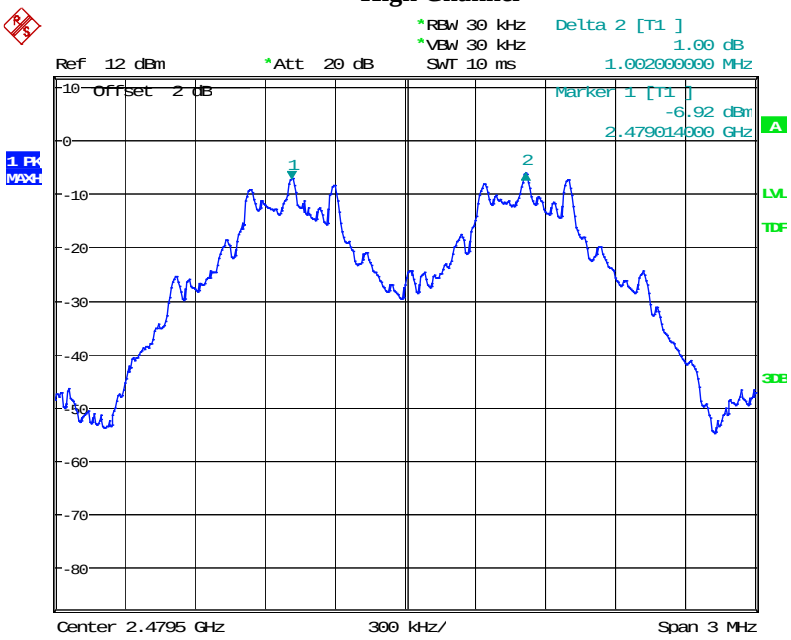
Date: 28.DEC.2011 11:21:57

Middle Channel



Date: 28.DEC.2011 11:31:40

High Channel



Date: 28.DEC.2011 11:33:15

5.4 20dB Occupied Bandwidth

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Environmental Conditions

Temperature	16°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : December 28, 2011
   Tested By : Peter Cai

Standard Requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Procedures:

The 20dB bandwidths were measured conducted using a spectrum analyzer at low, mid, and hi channels.

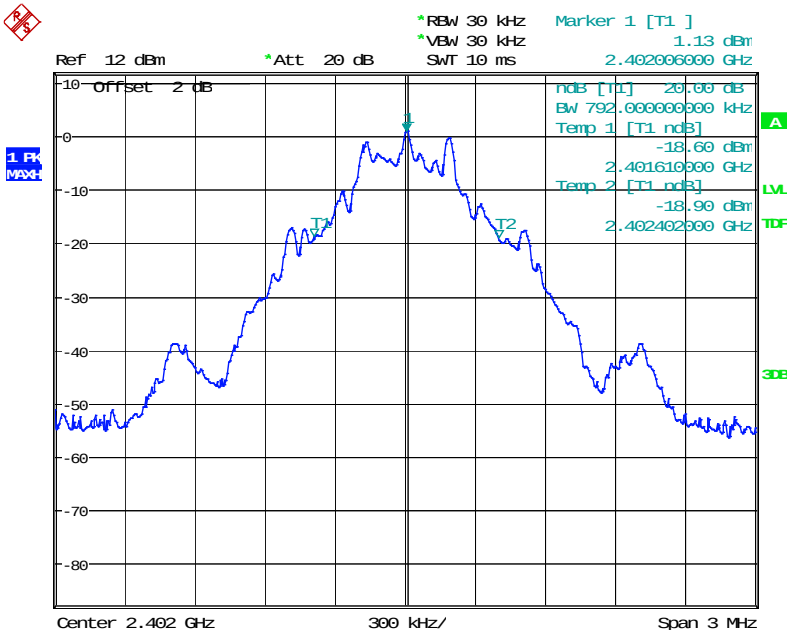
Test Result: Pass

Test Mode:	**GFSK Transmitting**

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2402	0.792
Middle	2441	0.792
High	2480	0.792

Please refer to the following plots.

Low Channel



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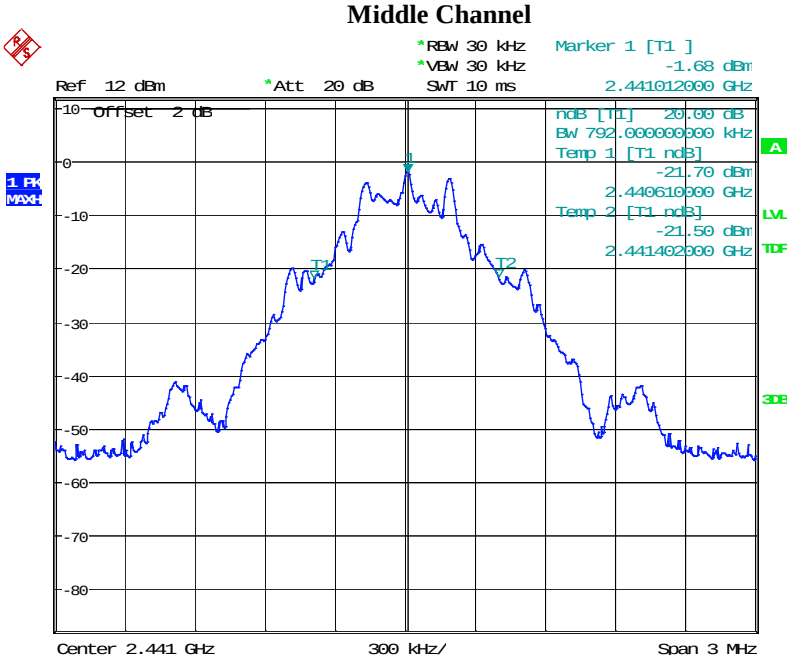
Middle Channel



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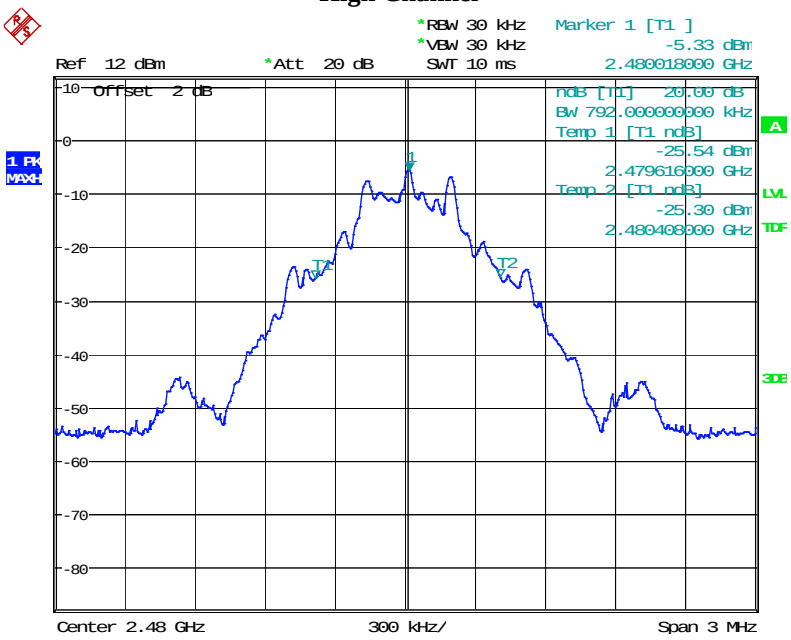
High Channel



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5.5 Number of Hopping Channels

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	16°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : December 28, 2011
   Tested By : Peter Cai

Standard Requirement:

According to §15.247(a)(1)(iii), Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

Procedures:

1. Place the EUT on the table and set it in hopping function transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as Start=2400MHz, Stop = 2483.5MHz, Span = the frequency band of operation, RBW ≥1% of the span, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold.
4. Count the quantity of peaks to get the number of hopping channels.

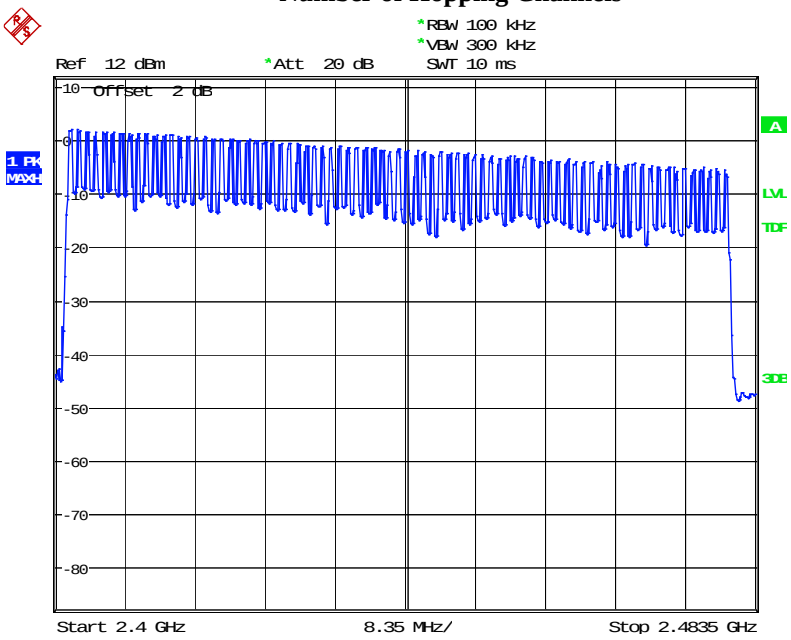
Test Result: Pass

Test Mode:	Hopping Mode With GFSK Modulation

Frequency Range (MHz)	Number of Hopping Channels	Limit
2400-2483.5	79	≥15

Please refer to following tables and plots

Number of Hopping Channels



Date: 28.DEC.2011 12:00:24

5.6 Time of Occupancy

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	16°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : December 28, 2011
   Tested By : Peter Cai

Standard Requirement:

According to §15.247(a)(1)(iii), The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Procedures:

1. Place the EUT on the table and set it in transmitting mode and switch on frequency hopping function.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as Span = zero span, centered on a hopping channel,
   RBW=1MHz, VBW ≥ RBW, Sweep = as necessary to capture the entire dwell time per hopping channel, Detector function = peak, Trace = max hold.
4. Calculate the time of occupancy in a period with time occupancy of a burst and quantity of bursts.

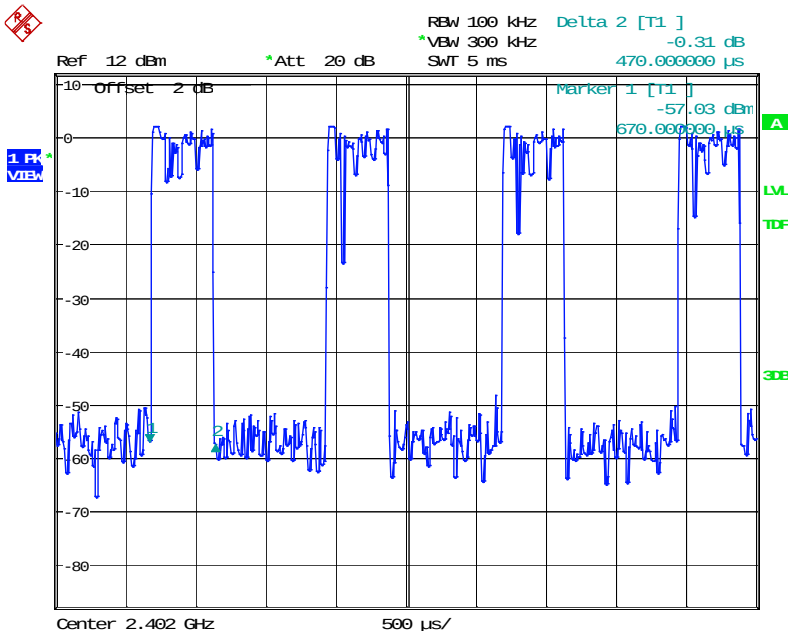
Test Result: Pass

Test Mode:	**Hopping Mode With GFSK Modulation**

Mode	Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
DH 1	Low	0.47	0.150400	0.4	Pass
	Middle	0.48	0.153600	0.4	Pass
	High	0.47	0.150400	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
DH 3	Low	1.73	0.276800	0.4	Pass
	Middle	1.73	0.276800	0.4	Pass
	High	1.74	0.278400	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
DH 5	Low	2.99	0.318933	0.4	Pass
	Middle	2.99	0.318933	0.4	Pass
	High	2.98	0.317867	0.4	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				

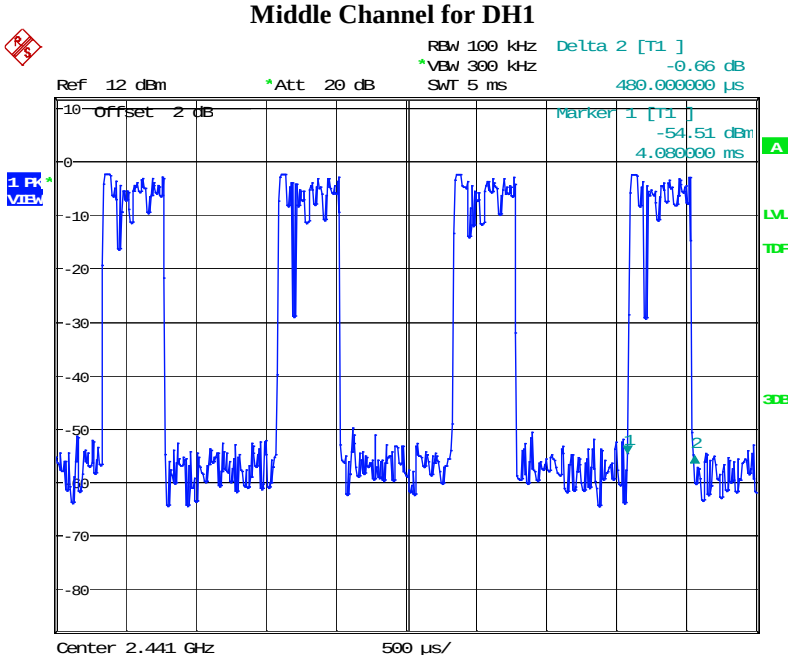
Please refer to the following plots.

Low Channel for DH1



Date: 28.DEC.2011 13:15:04

Middle Channel for DH1



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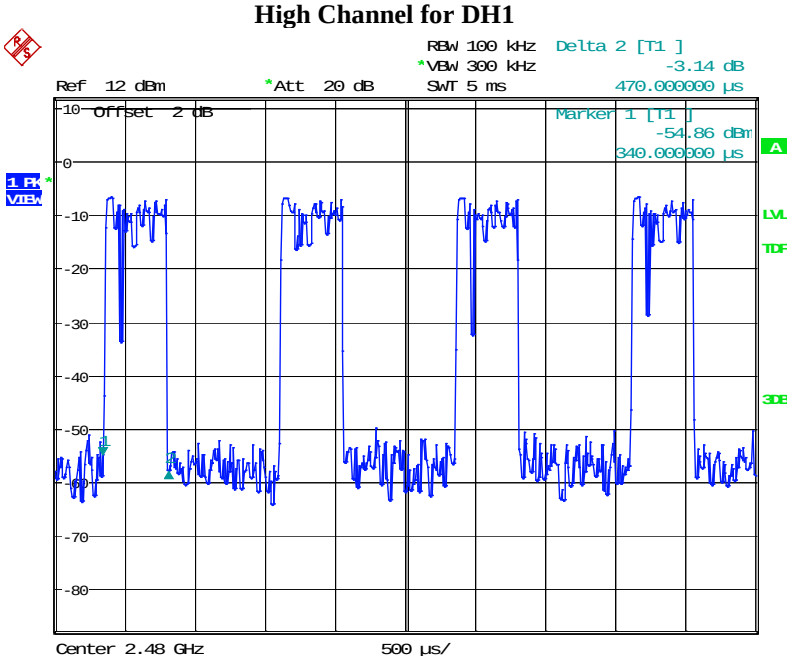
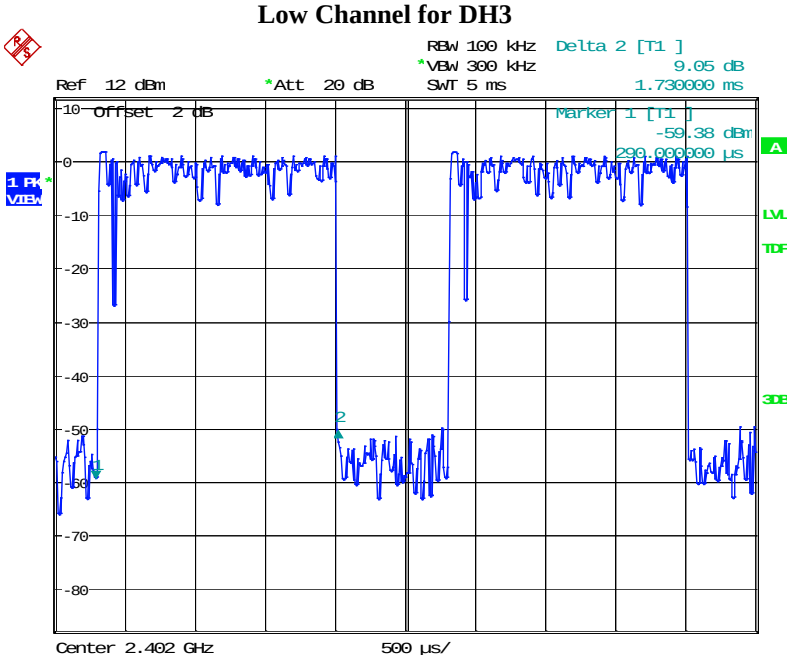
High Channel for DH1



Date: 28.DEC.2011 13:16:47

Low Channel for DH3



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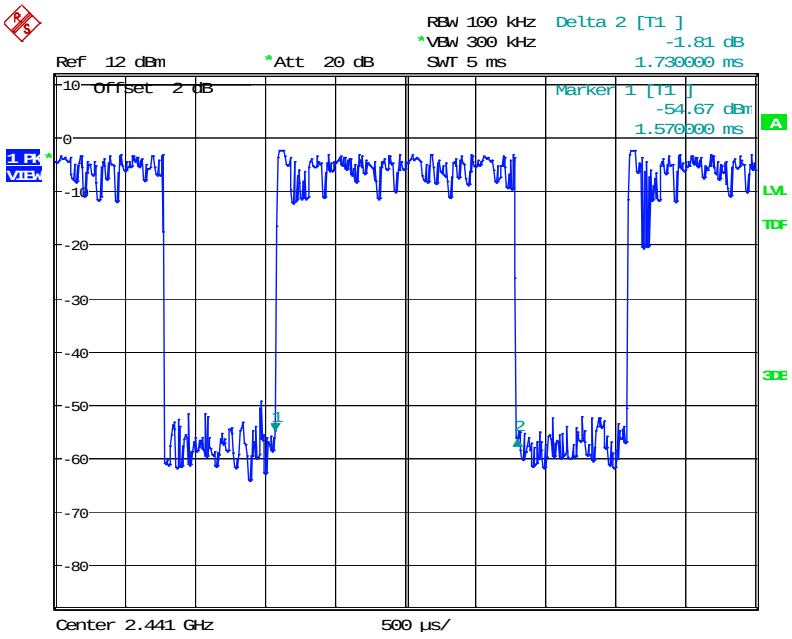
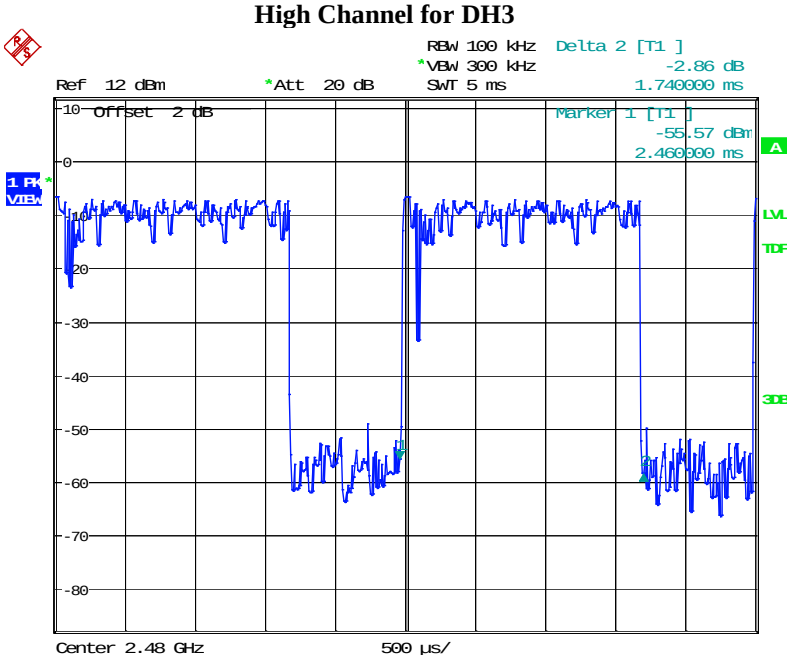
Middle Channel for DH3



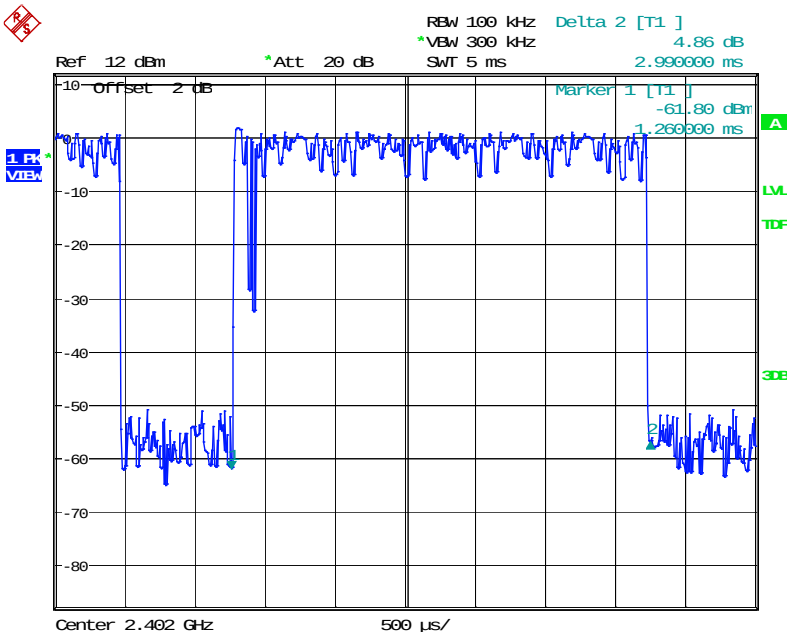
Date: 28.DEC.2011 13:10:09

High Channel for DH3



Date: 28.DEC.2011 13:12:09

Low Channel for DH5



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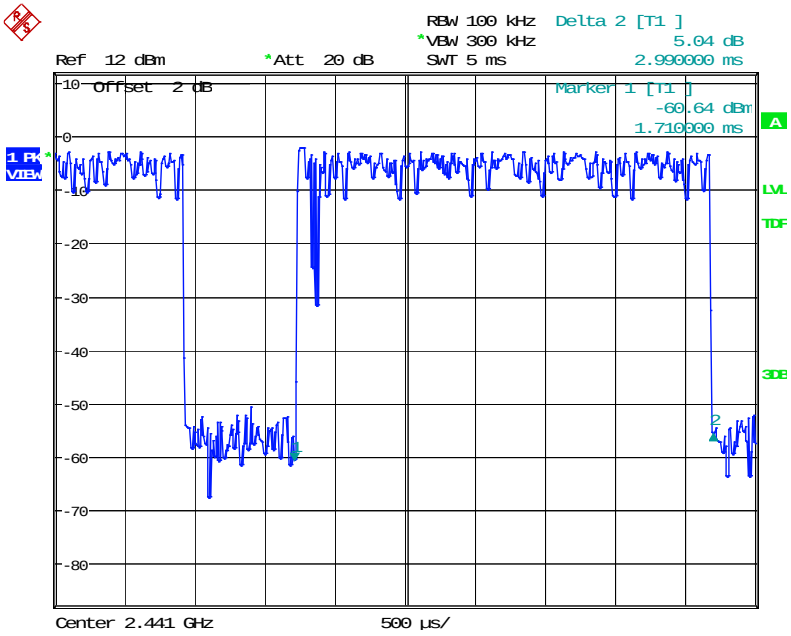
Middle Channel for DH5



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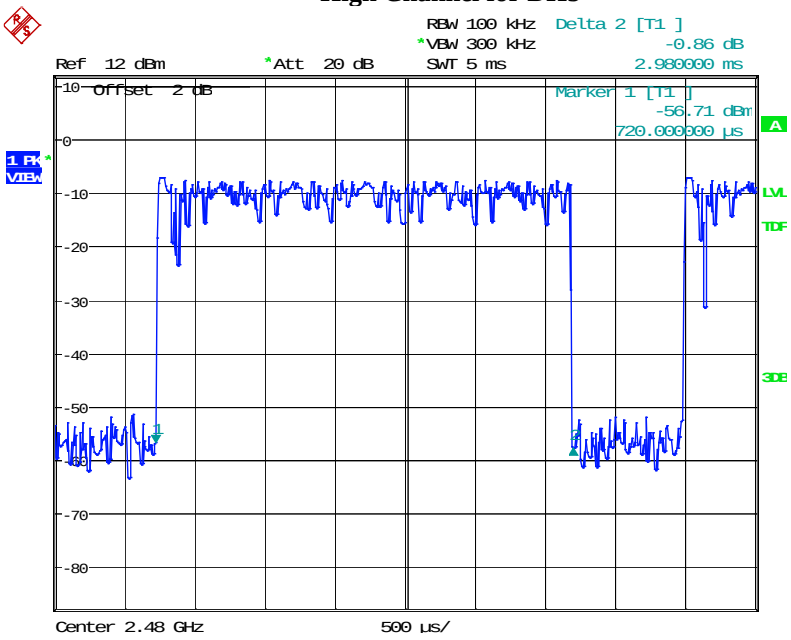
High Channel for DH5



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5.7 Peak Output Power

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	16°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : December 28, 2011
   Tested By : Peter Cai

Standard Requirement:

According to §15.247(b)(2), For frequency hopping systems in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5MHz band: 0.125watts.

Procedures:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel, RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW, Sweep=auto, Detector function=peak, Trace = max hold.
4. Then set the EUT to transmit at low, middle and high channel and measure the conducted output power separately.

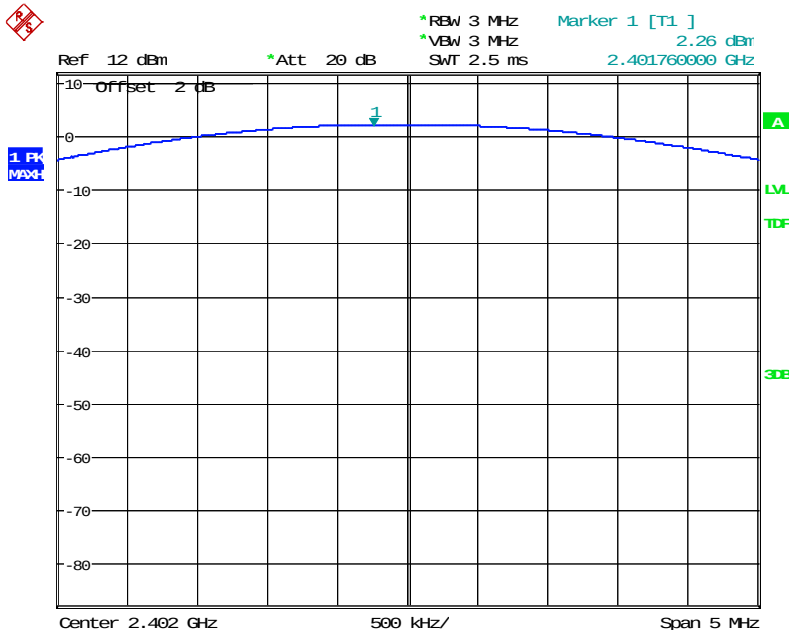
Test Result: Pass

Test Mode:	GFSK Transmitting

Channel	Channel frequency (MHz)	Peak output power (dBm)	Power output (mW)	Limit (mW)
Low channel	2402	2.26	1.68	1000
Middle channel	2441	-1.05	0.79	1000
High channel	2480	-5.04	0.31	1000

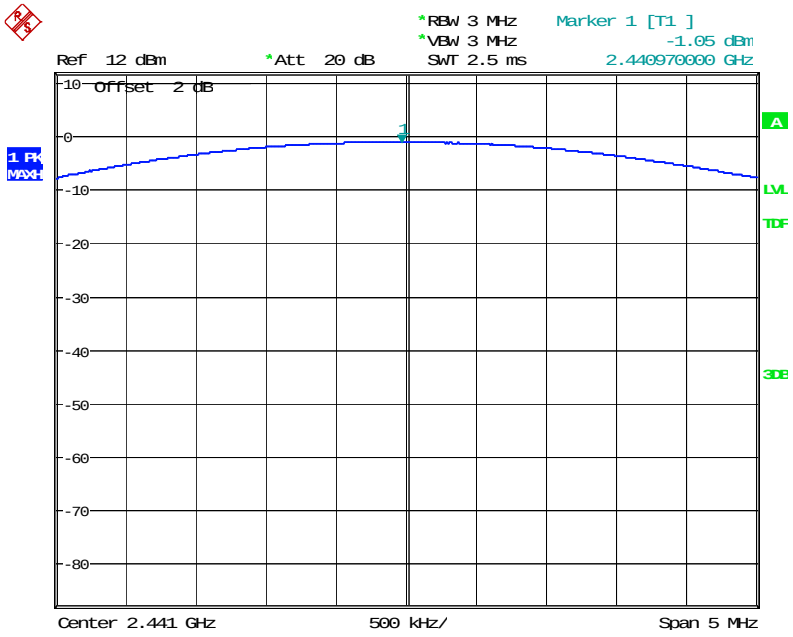
Please refer to the following plots.
Note: The data above was tested in conducted mode.

Low Channel



Date: 28.DEC.2011 12:07:55

Middle Channel



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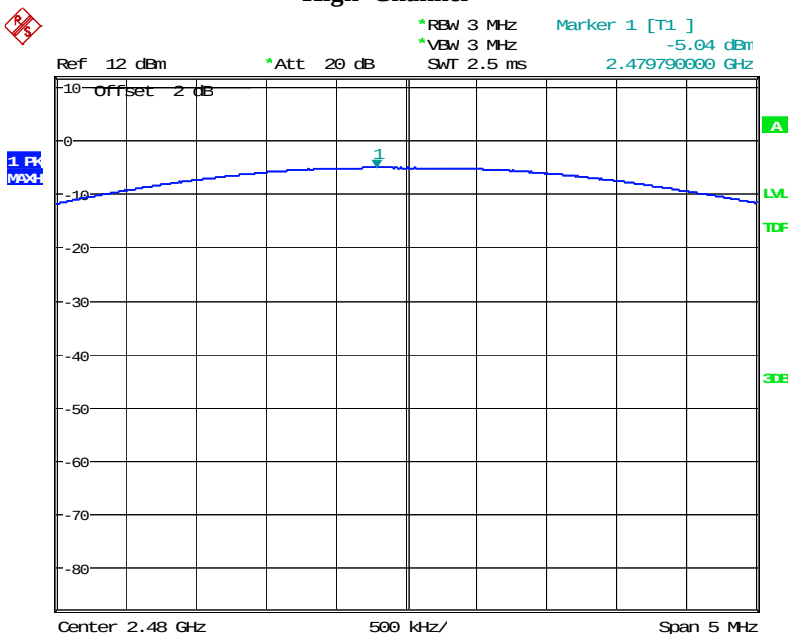
High Channel



Date: 28.DEC.2011 12:09:05

5.8 Antenna Port Emission

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	17°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : December 28, 2011
   Tested By : Peter Cai

Standard Requirement:

Radiated emission limits: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

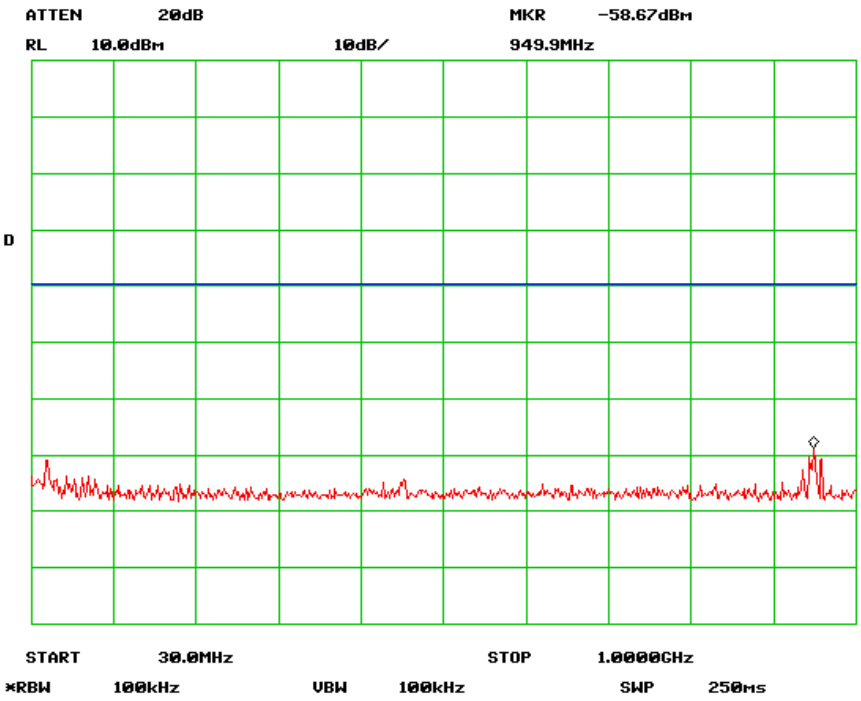
Procedures:

The conducted spurious emissions were measured conducted using a spectrum analyzer at low, mid, and hi channels. The limit was determined by attenuating 20 dB of the RF peak power output

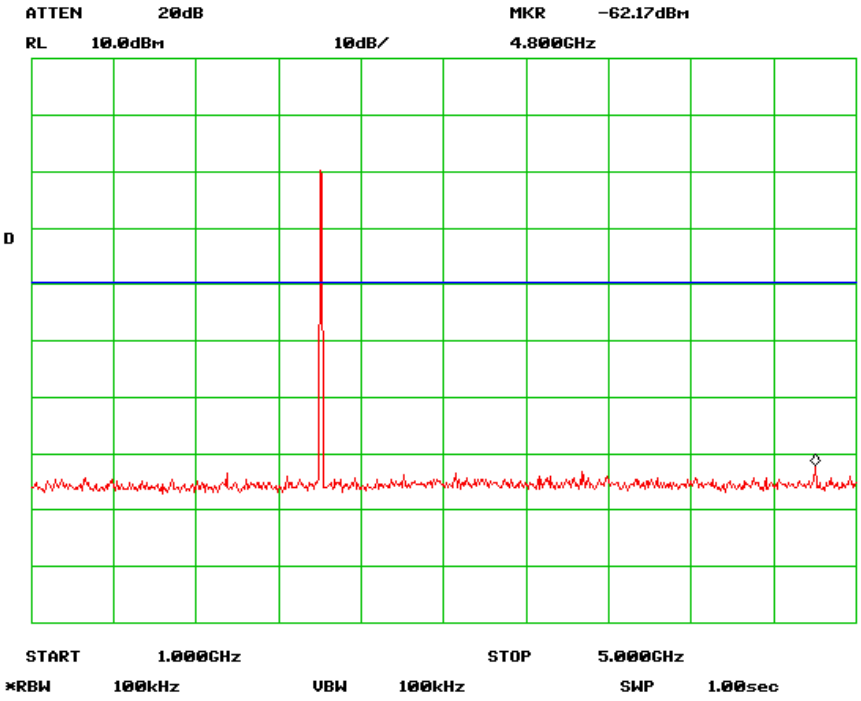
Test Result: Pass

Refer to the attached plots.

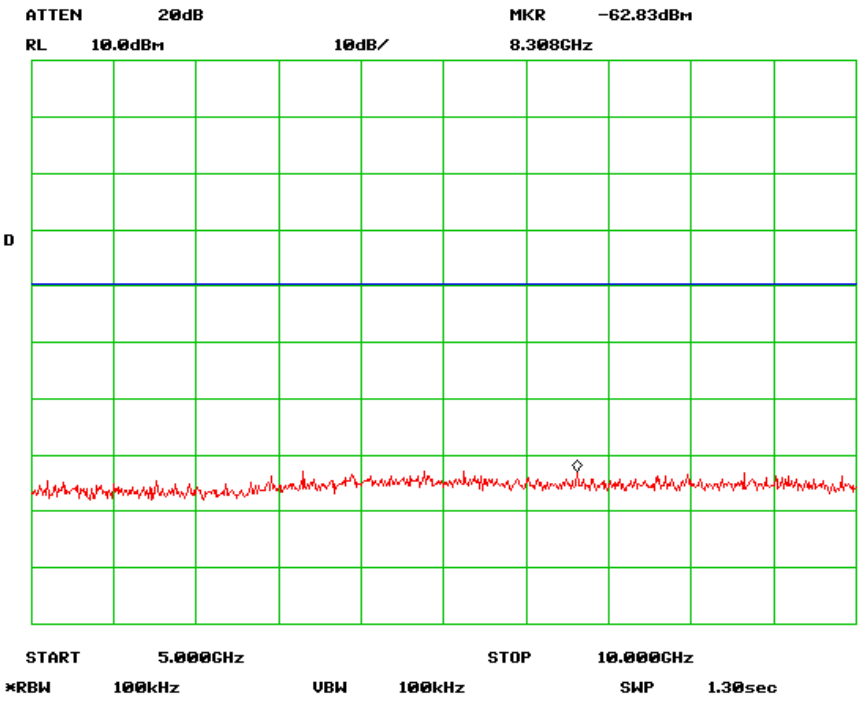
Antenna Port Emission Low-1



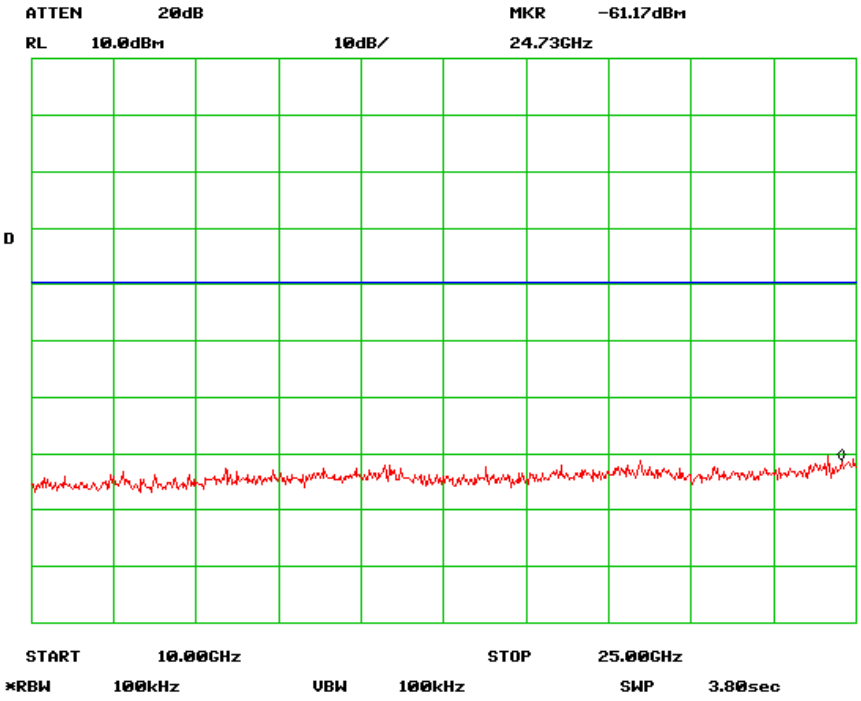
Antenna Port Emission Low-2



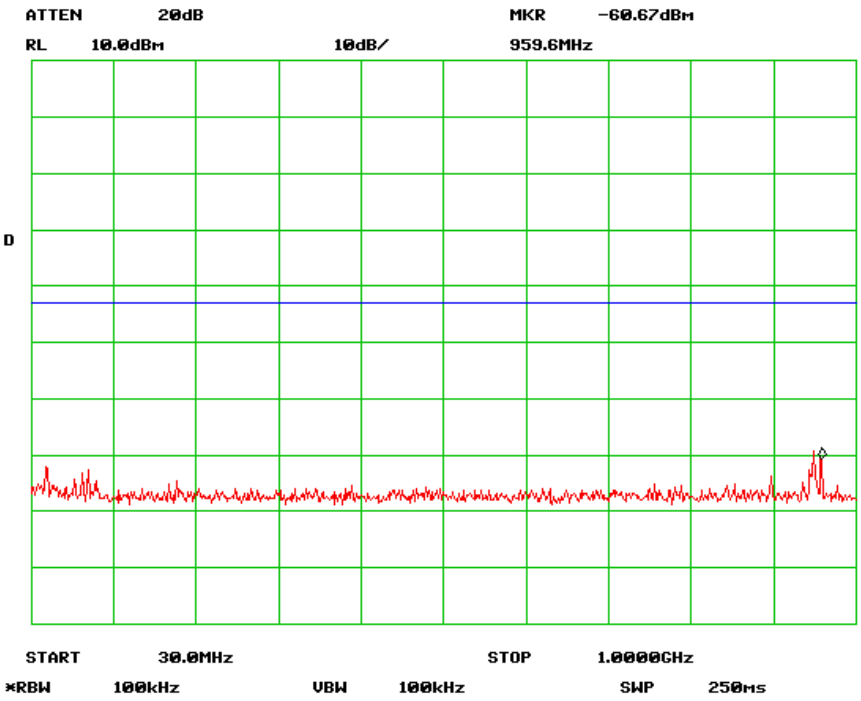
Antenna Port Emission Low-3



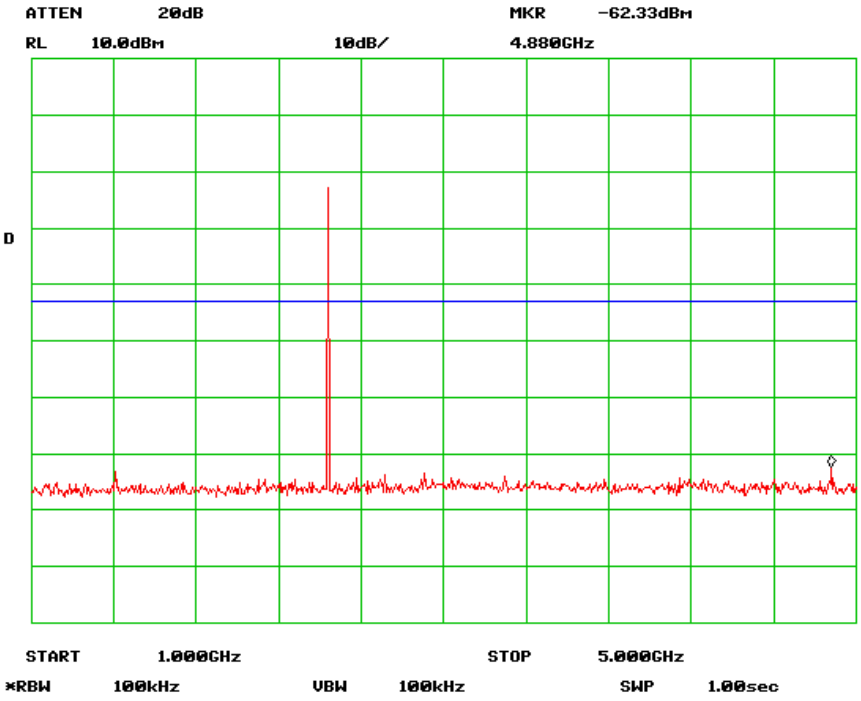
Antenna Port Emission Low-4



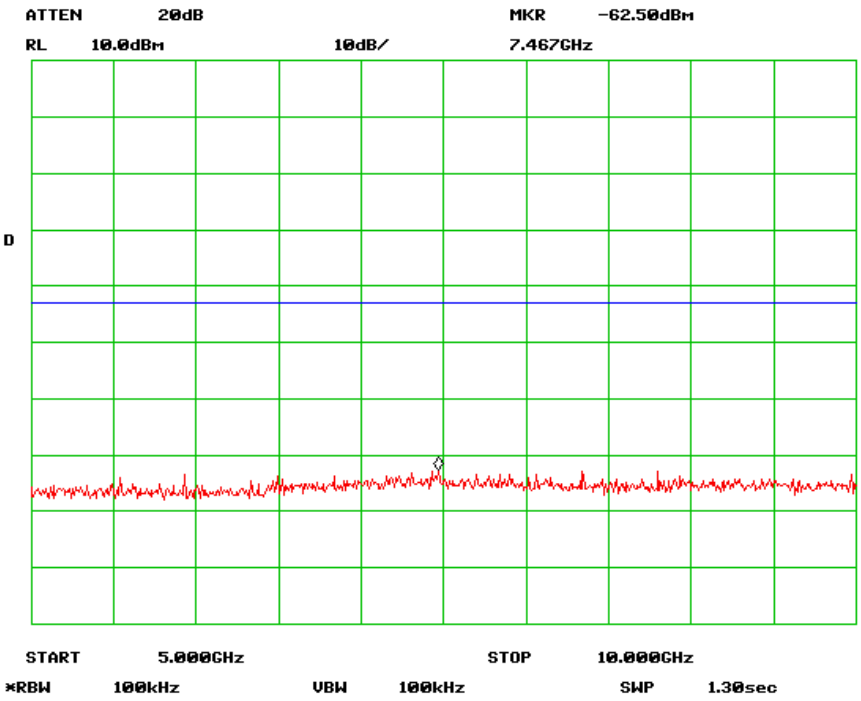
Antenna Port Emission Middle-1



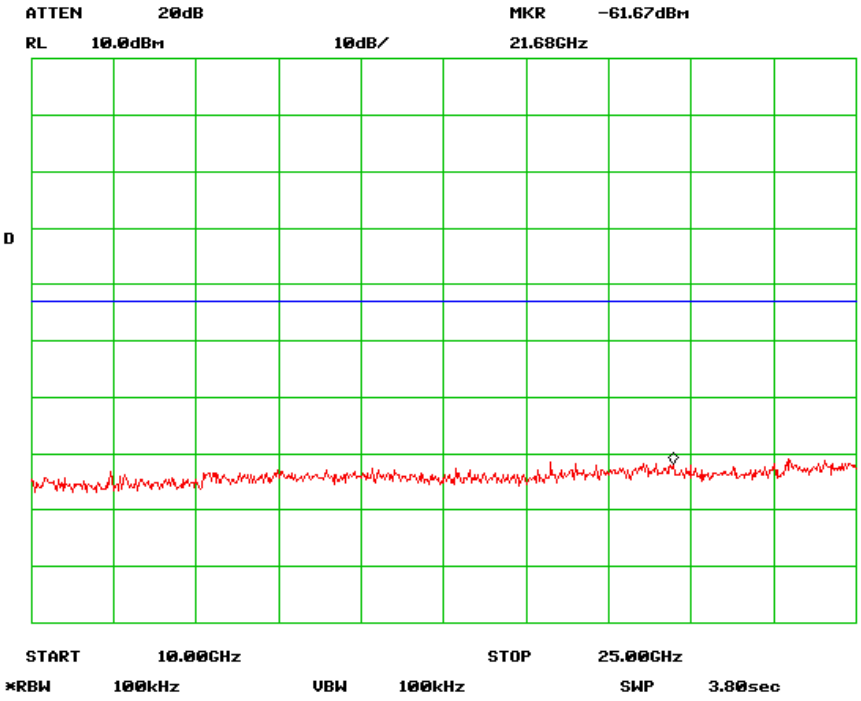
Antenna Port Emission Middle-2



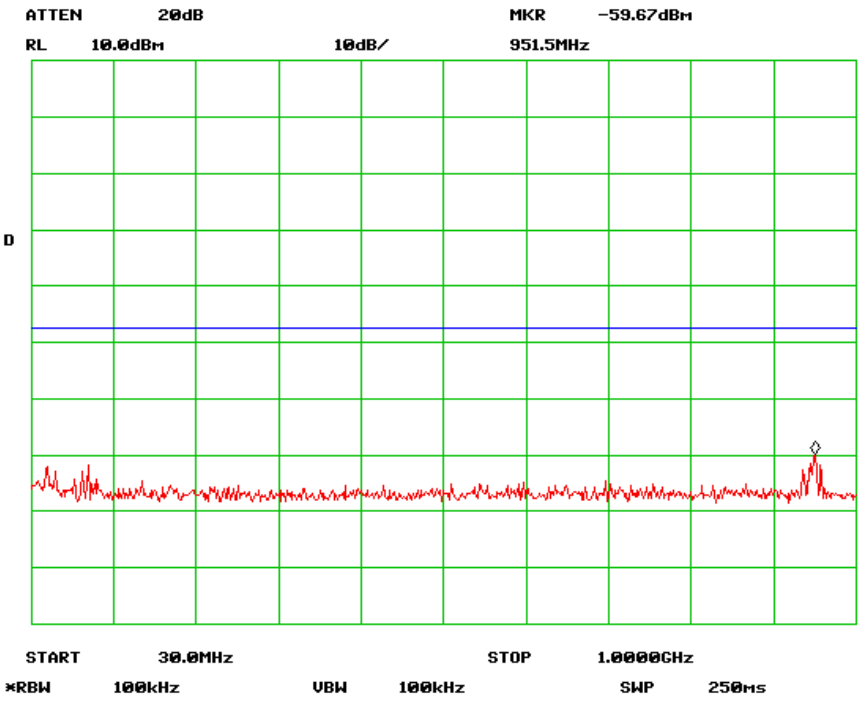
Antenna Port Emission Middle-3



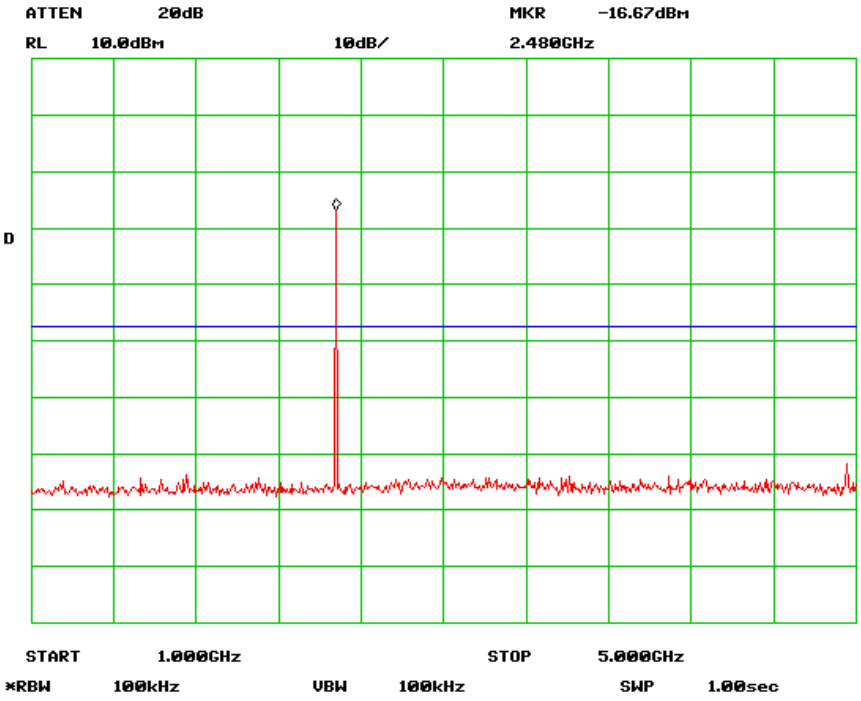
Antenna Port Emission Middle-4



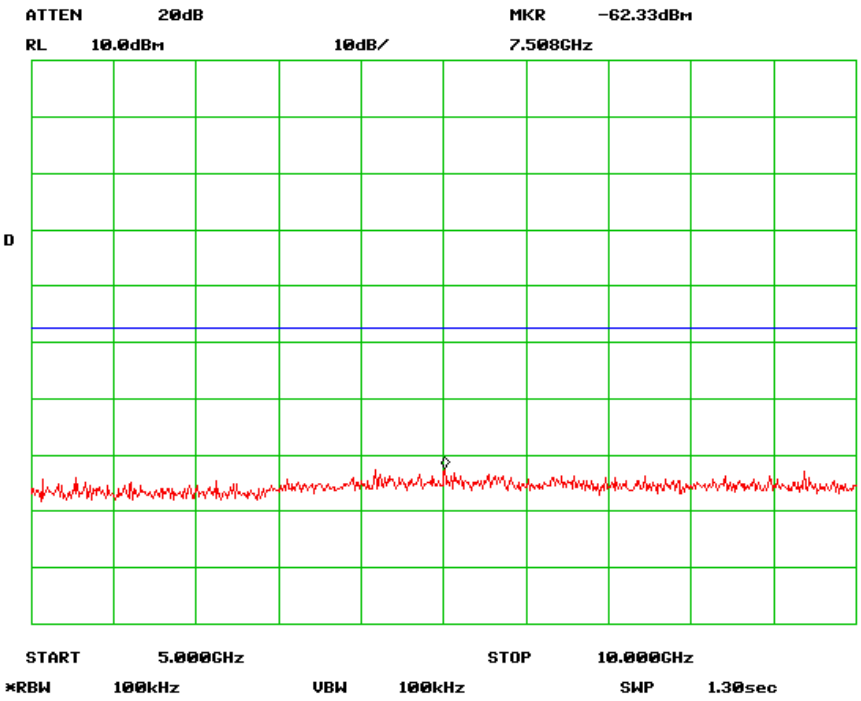
Antenna Port Emission High-1



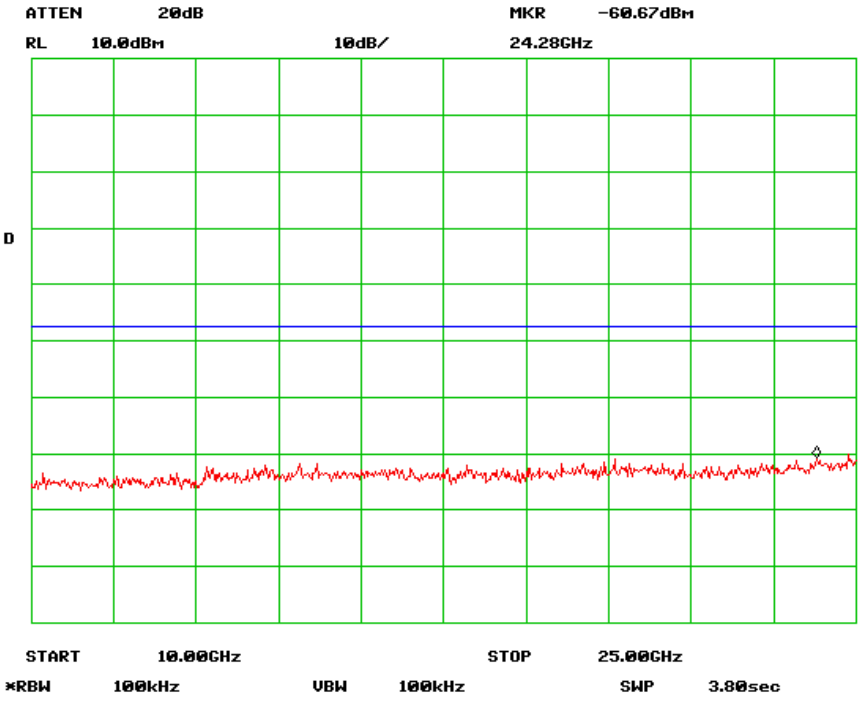
Antenna Port Emission High-2



Antenna Port Emission High-3



Antenna Port Emission High-4



5.9 Radiated Spurious Emission < 1GHz

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz & 1GHz above (3m & 10m) is +5.6/-4.5dB.
4. Environmental Conditions

Temperature	17°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

5. Test date : December 27, 2011
   Tested By : Peter Cai

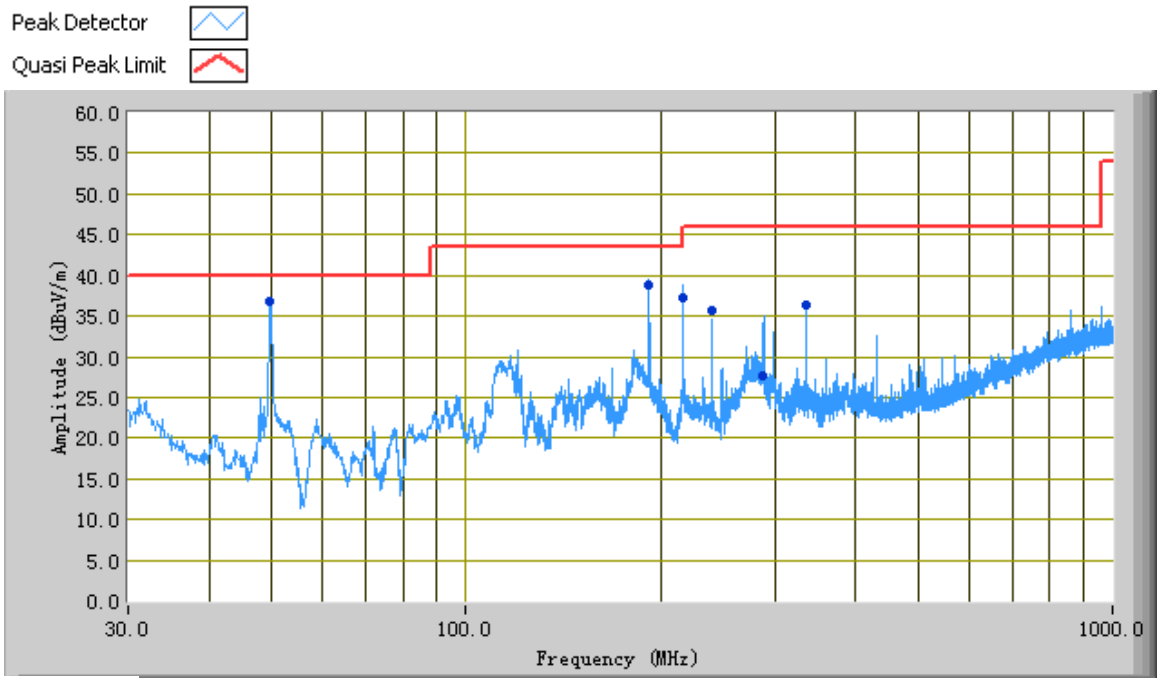
Standard Requirement:

The emissions from the Low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges.

Test Result: Pass

Test Mode:	GFSK Transmitting

Below 1GHz



Test Data

@ 3m

Frequency (MHz)	QP (dBµV/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dBµV/m)	Margin (dB)
49.75	36.72	236.00	V	101.00	-36.73	40.00	-3.28
192.00	38.84	195.00	H	170.00	-30.69	43.50	-4.66
216.41	37.34	260.00	H	179.00	-32.14	46.00	-8.66
335.99	36.46	262.00	H	100.00	-29.33	46.00	-9.54
240.01	35.79	268.00	H	122.00	-31.42	46.00	-10.21
288.56	27.68	351.00	H	138.00	-30.22	46.00	-18.32

5.10 Radiated Spurious Emissions > 1GHz & Band Edge

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz & 1GHz above (3m & 10m) is +5.6/-4.5dB.
4. Environmental Conditions

Temperature	17°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

5. Test date : December 27, 2011
   Tested By : Peter Cai

Standard Requirement:

The emissions from the Low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges.

Test Result: Pass

Test Mode:	GFSK Transmitting

Note: Other Bluetooth modes were verified, only the result of worst case DH5 mode was presented.

@ 2402MHz @ 3 Meter

Frequency (MHz)	Direction Degree	Height (cm)	Polar (H / V)	Cable loss (dB)	Amplifier (dB)	Corrected Reading (dBµV/m)	15.247/15.209 Limit (dBµV/m)	15.247/15.209 Margin(dB)	Comments
4804	2	102	V	5.15	55.00	58.0	74.00	-16.0	Peak
4804	10	110	H	5.15	55.00	52.0	74.00	-22.0	Peak
4804	16	102	V	5.15	55.00	48.0	54.00	-6.0	Ave
4804	21	110	H	5.15	55.00	43.0	54.00	-11.0	Ave

Emission was scanned up to 25GHz.

@ 2441MHz @ 3Meter

Frequency (MHz)	Direction Degree	Height (cm)	Polar (H / V)	Cable loss (dB)	Amplifier (dB)	Corrected Reading (dBµV/m)	15.247/15.209 Limit (dBµV/m)	15.247/15.209 Margin(dB)	Comments
4882	5	1.10	V	5.16	55.00	60.0	74.00	-14.0	Peak
4882	30	1.24	H	5.16	55.00	59.0	74.00	-15.0	Peak
4882	5	1.10	V	5.16	55.00	50.0	54.00	-4.0	Ave
4882	30	1.24	H	5.16	55.00	47.0	54.00	-7.0	Ave

Emission was scanned up to 25GHz.

@ 2480MHz @ 3Meter

Frequency (MHz)	Direction Degree	Height (cm)	Polar (H / V)	Cable loss (dB)	Amplifier (dB)	Corrected Reading (dBµV/m)	15.247/15.209 Limit (dBµV/m)	15.247/15.209 Margin(dB)	Comments
4960	26	111	V	5.17	55.00	56.0	74.00	-18.0	Peak
4960	7	142	H	5.17	55.00	52.0	74.00	-22.0	Peak
4960	26	111	V	5.17	55.00	47.0	54.00	-7.0	Ave
4960	7	42	H	5.17	55.00	44.0	54.00	-10.0	Ave

Emission was scanned up to 25GHz.

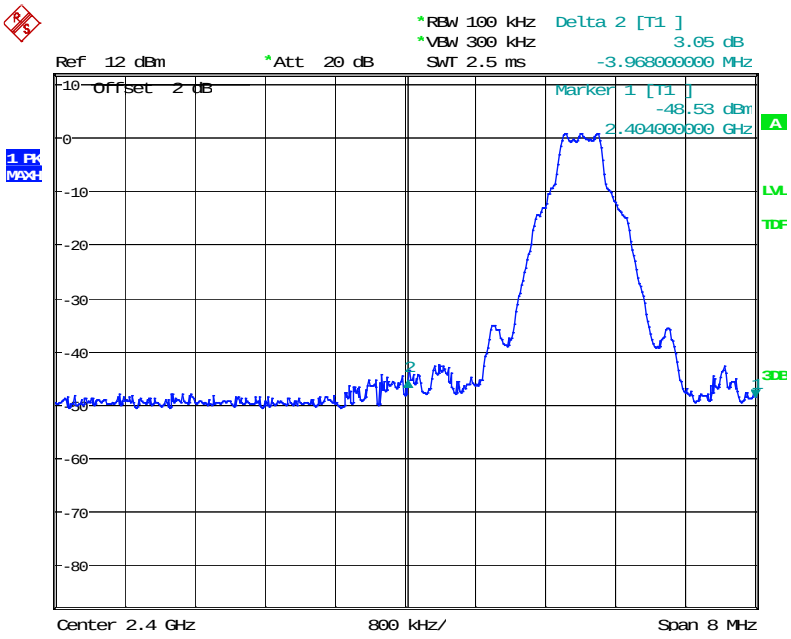
Band Edge Radiated Method

Channel	Polarity (H/V)	Detector	Frequency (MHz)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Low Channel	V	Peak	2400	36.77	74	-37.23
Low Channel	H	Peak	2400	32.12	74	-41.88
Low Channel	V	Avg	2400	26.44	54	-27.56
Low Channel	H	Avg	2400	24.59	54	-29.41

Channel	Polarity (H/V)	Detector	Frequency (MHz)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
High Channel	V	Peak	2483.5	33.23	74	-40.77
High Channel	H	Peak	2483.5	35.67	74	-38.33
High Channel	V	Avg	2483.5	24.33	54	-29.67
High Channel	H	Avg	2483.5	26.75	54	-27.25

Band Edge Conducted Method

Low Channel



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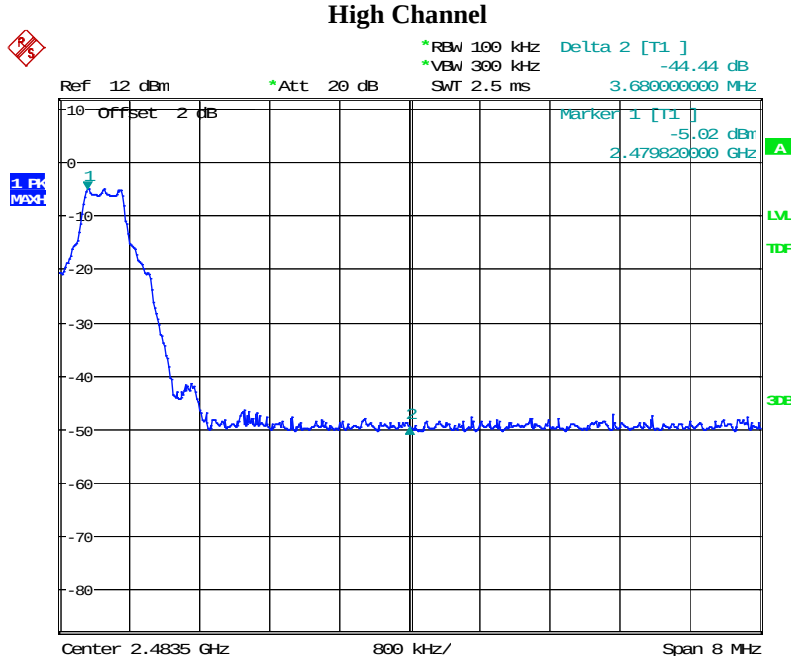
High Channel



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Annex A. TEST INSTRUMENT & METHOD

Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Model	Calibration Date	Calibration Due Date
AC Line Conducted Emissions			
R&S EMI Test Receiver	ESPI3	05/25/2011	05/25/2012
Com-Power LISN	LI-115	05/25/2011	05/25/2012
Com-Power Limiter	LIT-153	05/25/2011	05/25/2012
Radiated Emissions			
Hp Spectrum Analyzer	8563E	01/10/2011	01/10/2012
R&S EMI Receiver	ESPI3	05/18/2011	05/18/2012
Sunol Sciences, Inc. antenna (30MHz~3GHz)	JB3	05/25/2011	05/25/2012
ETS-Lindgren Antenna(1 ~18GHz)	3115	06/02/2011	06/02/2012
A-INFOMW Antenna(1 ~18GHz)	JXTXLB-10180	06/02/2011	06/02/2012
Horn Antenna (18~40GHz)	AH-840	07/23/2011	07/23/2013
Microwave Pre-Amp (18~40GHz)	PA-840	Every 2000 Hours	
Hp Agilent Pre-Amplifier	8447F	05/25/2011	05/25/2012
MITEQ Pre-Amplifier(1 ~ 18GHz)	AMF-7D-00101800-30-10P	05/25/2011	05/25/2012

Annex A.ii. CONDUCTED EMISSIONS TEST DESCRIPTION

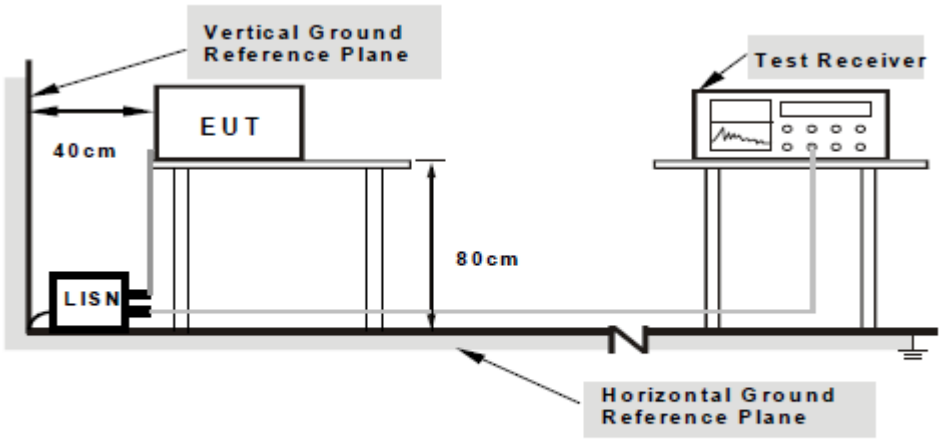
Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.

2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

4. All other supporting equipments were powered separately from another main supply.



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration1.

Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.

3. High peaks, relative to the limit line, were then selected.

4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 KHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made.

5. Steps 2 to 4 were then repeated for the LIVE line (for AC mains) or DC line (for DC power).

Description of Conducted Emission Program

This EMC Measurement software run LabView automation software and offers a common user interface for electromagnetic interference (EMI) measurements. This software is a modern and powerful tool for controlling and monitoring EMI test receivers and EMC test systems. It guarantees reliable collection, evaluation, and documentation of measurement results. Basically, this program will run a pre-scan measurement before it proceeds with the final measurement. The pre-scan routine will run the common scan range from 150 kHz to 30 MHz; the program will first start a peak and average scan on selectable measurement time and step size. After the program complete the pre-scan, this program will perform the Quasi Peak and Average measurement, based on the pre-scan peak data reduction result.

Sample Calculation Example

At 20 MHz limit = 250 μV = 47.96 dBμV

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.20 dB

Q-P reading obtained directly from EMI Receiver = 40.00 dBμV
(Calibrated for system losses)

Therefore, Q-P margin = 40.00 – 47.96 = -7.96 i.e. **7.96 dB below limit**

Annex A. iii. RADIATED EMISSIONS TEST DESCRIPTION

Limit

1. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

2. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 10th Harmonic , was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

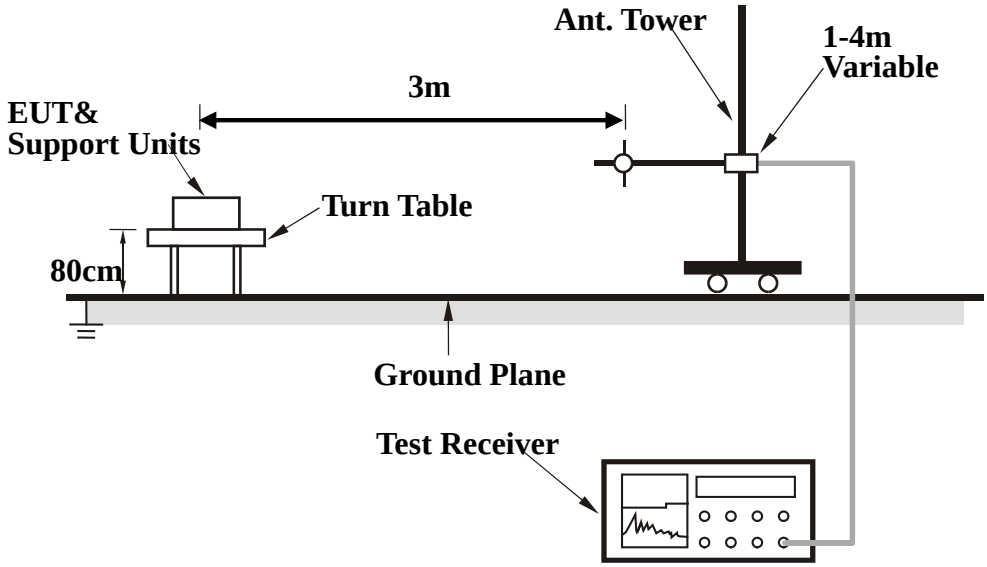
The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred, clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS) or 3m EMC chamber.

Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.

2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.



Test Method

The following procedure was performed to determine the maximum emission axis of EUT:
1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

Final Radiated Emission Measurement
1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.

2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.

3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ◦ to 360 ◦ with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.

5. Repeat step 4 until all frequencies need to be measured were complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100 kHz	100 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Description of Radiated Emission Program

This EMC Measurement software run LabView automation software and offers a common user interface for electromagnetic interference (EMI) measurements. This software is a modern and powerful tool for controlling and monitoring EMI test receivers and EMC test systems. It guarantees reliable collection, evaluation, and documentation of measurement results. Basically, this program will run a pre-scan measurement before it proceeds with the final measurement. The pre-scan routine will run the scan on four different antenna heights, 2 antenna polarity, and 360 degrees table rotation. For example, the program was set to run 30 MHz to 1 GHz scan; the program will first start from a meter antenna height and divide the 30 MHz to 1 GHz into 10 separate parts of maximum hold sweeps. Each parts of maximum hold sweep, the program will collect the data from 0 degree to 360 degrees table rotation. After the program complete the 1m scan, the antenna continues to rise to 2m and continue the scan. The step will repeated for all specified antenna height and polarity. This program will perform the Quasi Peak measurement after the signal maximization process and pre-scan routine. The final measurement will be base on the pre-scan data reduction result.

Sample Calculation Example

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

where

Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

And the average value is

Average = Peak Value + Duty Factor or

Set RBW = 1MHz, VBW = 10Hz.

Note:

If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function.

Annex B. EUT AND TEST SETUP PHOTOGRAPHS

Please see attachment

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

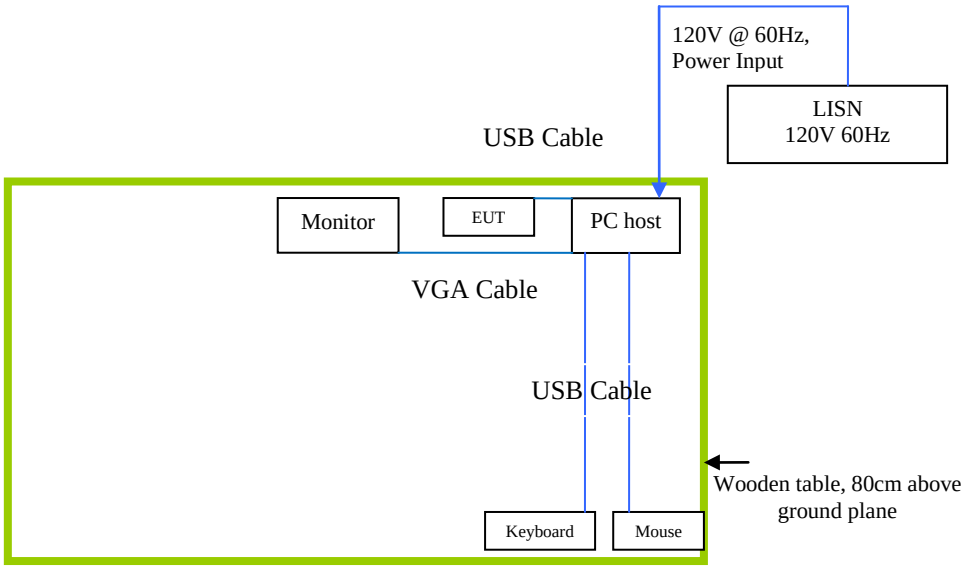
EUT TEST CONDITIONS

Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION

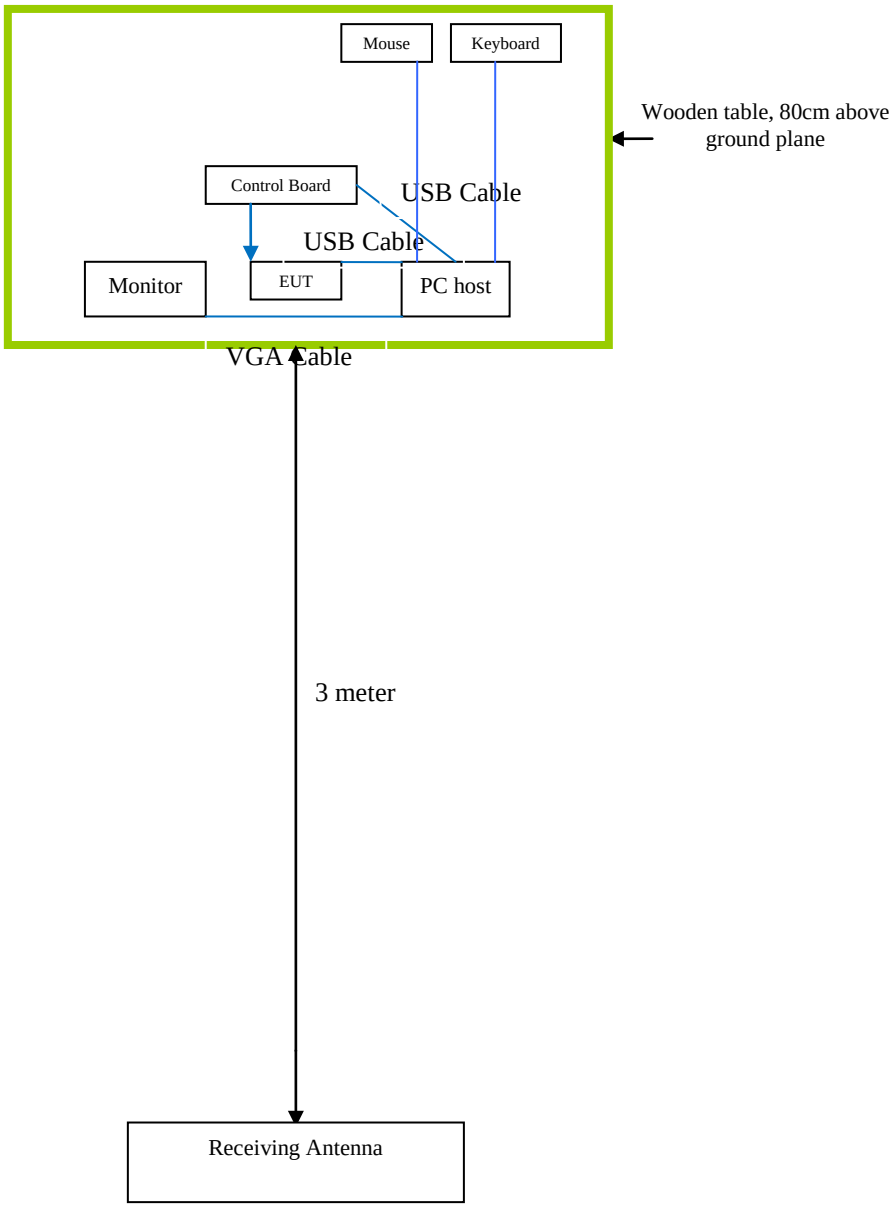
The following is a description of supporting equipment and details of cables used with the EUT.

Equipment Description (Including Brand Name)	Model & Serial Number	Cable Description (List Length, Type & Purpose)
PC Host	Caida	N/A
Monitor	IN1910Nb	N/A
Keyboard	SK-8115	N/A
Mouse	MOC5UO	N/A

Block Configuration Diagram for Conducted Emissions



Block Configuration Diagram for Radiated Emissions



Annex C.ii. EUT OPERATING CONDITIONS

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
Emissions Testing	The EUT was continuously transmitting to stimulate the worst case.

Annex D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PART LIST

Please see attachment