

FCC/IC - TEST REPORT

Report Number	:	68.960.15.025.01	Date of Issue:	<u>March 31, 2015</u>
Model	:	SDK 1010		
Product Type	:	Cell phone Accessory		
Applicant	:	React Mobile LLC		
Address	:	505 Broadway Ave E., #103, Seattle, WA 98102		
Production Facility	:	Pacific Industries (Zhong Shan) Limited		
Address	:	Xincun Fty Area, Baishawan Ind Park, Eastern District, Zhong Shan, Guangdong, China		
Test Result	:	<input checked="" type="checkbox"/> Positive <input type="checkbox"/> Negative		
Total pages including Appendices	:	<u>24</u>		

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 502708

IC Registration Number: 10320A

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

3 Description of the Equipment Under Test

Product: Cell phone Accessory

Model no.: SDK 1010

FCC ID: 2ADSL015K

Brand Name: React Sidekick

Rating Voltage: DC 3.0V by CR2032 Battery

Rating Current: Max input current 3.5mA

RF Transmission Frequency: 2402-2480MHz

No. of Operated Channel: 40

Modulation: GFSK(BLE)

Antenna Type: PCB

Antenna Gain: 0dBi

Description of the EUT: The Equipment Under Test (EUT) is a Cell phone Accessory operated at 2.4GHz

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 4 November 2014	General Requirements and Information for the Certification of Radio Apparatus
RSS-210 Issue 8 December 2010	RSS-210 — Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

All the test methods were according to KDB558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C, RSS-Gen, RSS-210					
Test Condition			Pages	Test Site	Test Result
§15.207	RSS-Gen A8.8	Conducted emission AC power port	---	---	N/A
§15.247(b)(1)	RSS-210 A8.4	Conducted peak output power	10	Site 1	Pass
§15.247(a)(2)	RSS-210 A8.2(a)	6dB bandwidth	11	Site 1	Pass
§15.247(a)(1)	RSS-210 A8.1(a) & RSS-Gen 6.6	20dB bandwidth and 99% Occupied Bandwidth	---	---	N/A
§15.247(a)(1)	RSS-210 A8.1(b)	Carrier frequency separation	---	---	N/A
§15.247(a)(1)(iii)	RSS-210 A8.1(d)	Number of hopping frequencies	---	---	N/A
§15.247(a)(1)(iii)	RSS-210 A8.1(c)	Dwell Time	---	---	N/A
§15.247(e)	RSS-210 A8.2(b)	Power spectral density*	13	Site 1	Pass
§15.247(d)	RSS-210 A8.5	Spurious RF conducted emissions	14	Site 1	Pass
§15.247(d)	RSS-210 A8.5	Band edge	18	Site 1	Pass
§15.247(d) & §15.209 &	RSS-210 2.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter and receiver	20	Site 1	Pass
§15.203	RSS-Gen 8.3	Antenna requirement	See note 2		Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses a permanently ceramic antenna, which gain is 0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ADSL015K, IC ID: complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules and RSS-210.

SUMMARY:

All tests according to the regulations cited on page 5 were

- - Performed
- - Not Performed

The Equipment Under Test

- - **Fulfills** the general approval requirements.
- - **Does not** fulfill the general approval requirements.

Sample Received Date: March 06, 2015

Testing Start Date: March 06, 2015

Testing End Date: March 30, 2015

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by: _____ Prepared by: _____

John Zhi

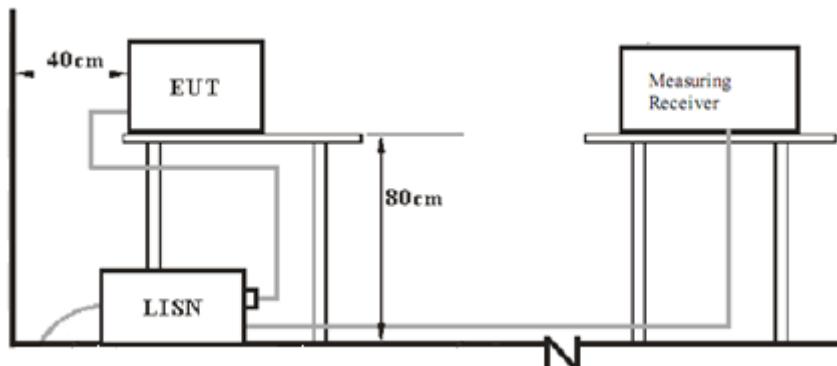
John Zhi
EMC Project Manager

Alam Xiong

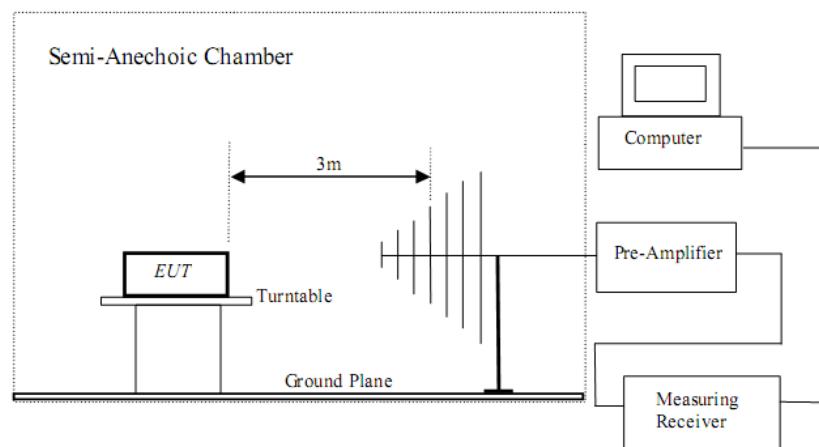
Alan Xiong
EMC Project Engineer

7 Test Setups

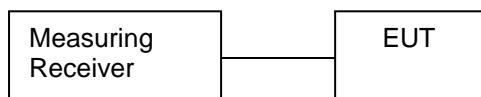
7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
NoteBook	Lenovo	X240	---

The system was configured to non-hopping mode.

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power

9 Technical Requirement

9.1 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW > the 20 dB bandwidth of the emission being measured, $VBW \geq RBW$,
Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

Limits

According to §15.247 (b) (1) and RSS-210 A8.4, conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Bluetooth Mode BLE modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	1.19	Pass
Middle channel 2440MHz	0.69	Pass
High channel 2480MHz	-0.60	Pass

9.2 6dB bandwidth and 99% Occupied Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW \geq 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be \geq 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

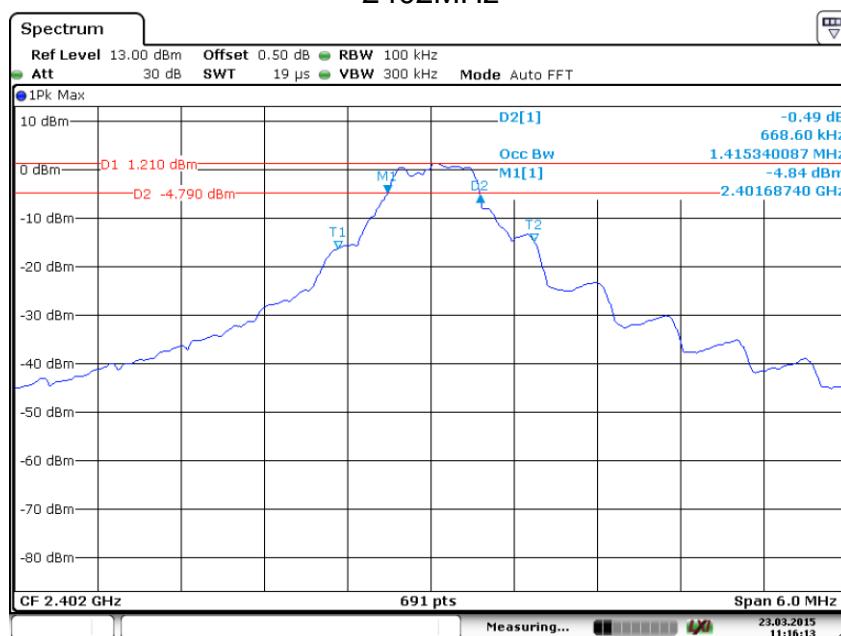
Limit [kHz]

≥ 500

Test result

Frequency MHz	6dB bandwidth kHz	99% Bandwidth kHz	Result
Top channel 2402MHz	668.6	1415.3	Pass
Middle channel 2440MHz	738.1	1866.9	Pass
Bottom channel 2480MHz	684.5	1953.7	Pass

2402MHz



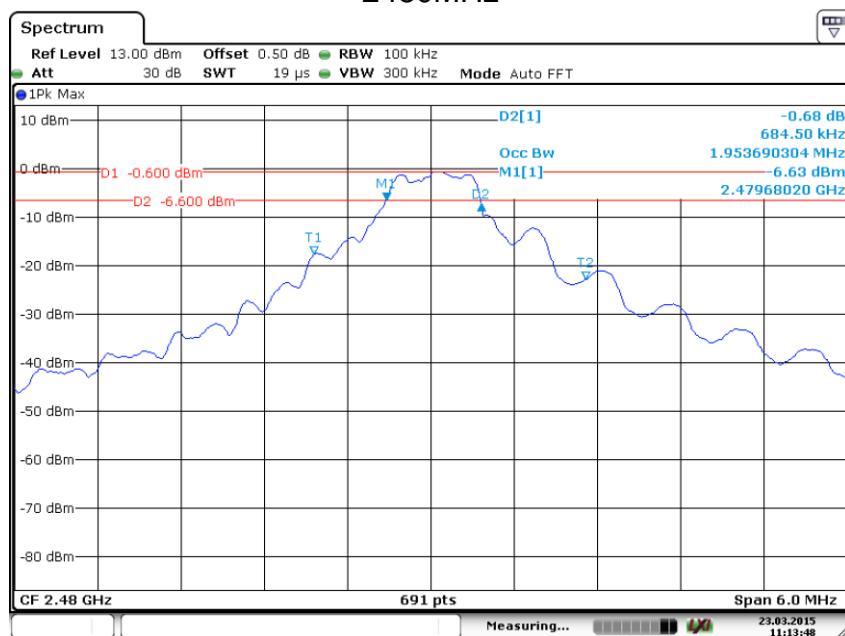
Date: 23.MAR.2015 11:16:12

2440MHz



Date: 23 MAR 2015 11:15:13

2480MHz



Date: 23 MAR 2015 11:13:48

9.3 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency.
RBW=3kHz, VBW \geq 3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace=max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm]

≤ 8

Test result

Frequency MHz	Power spectral density dBm	Result
Low channel 2402MHz	-14.70	Pass
Middle channel 2440MHz	-13.92	Pass
High channel 2480MHz	-15.04	Pass

9.4 Spurious RF conducted emissions

Test Method

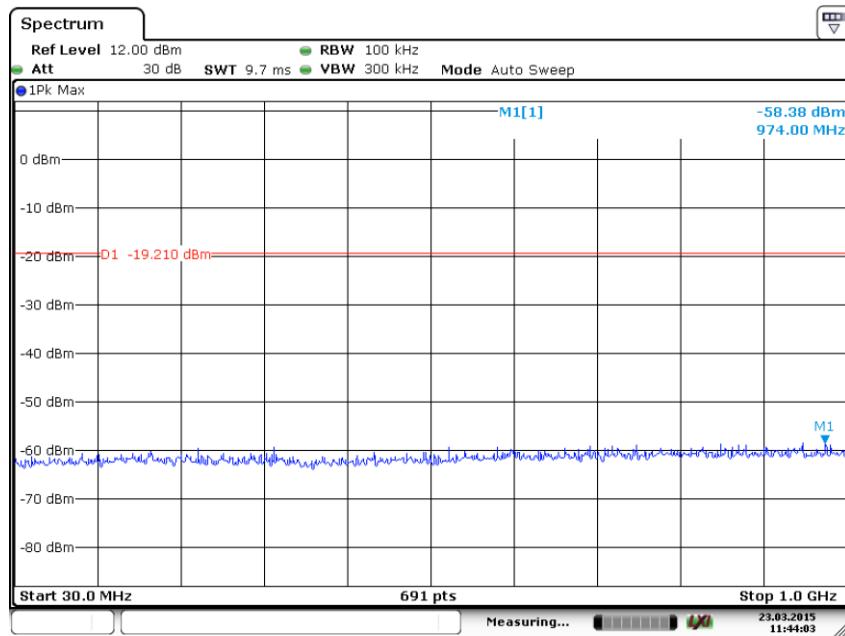
1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

Limit

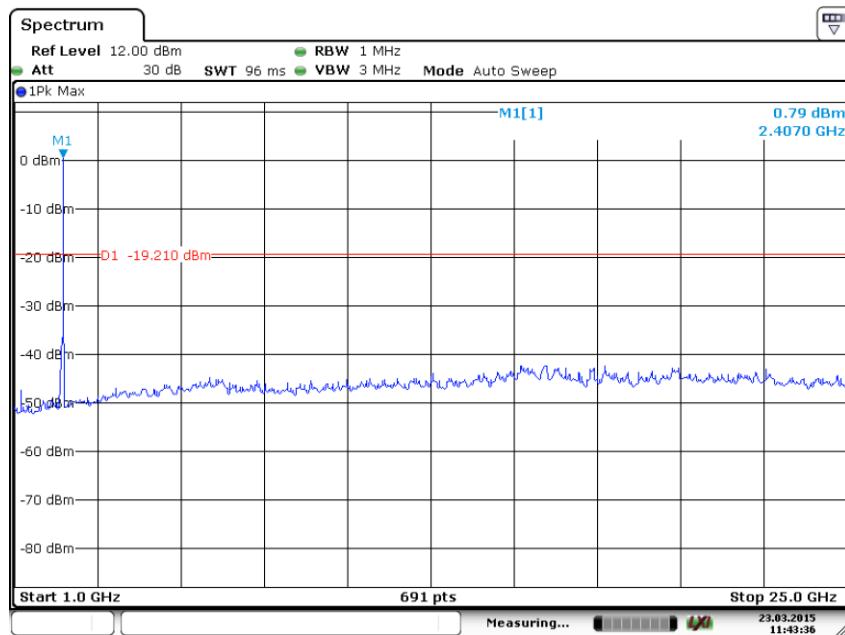
Frequency Range MHz	Limit (dBc)
30-25000	-20

Spurious RF conducted emissions

2402MHz



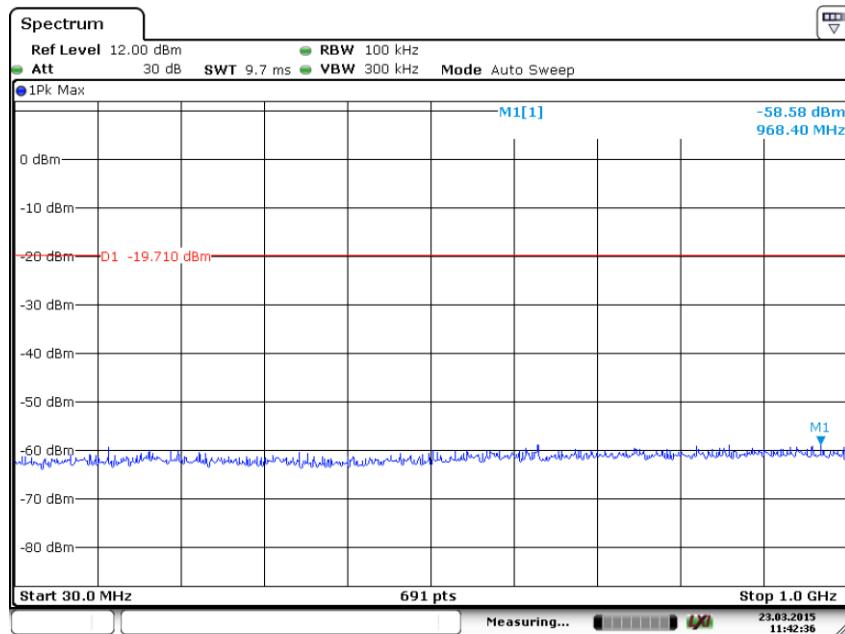
Date: 23.MAR.2015 11:44:03



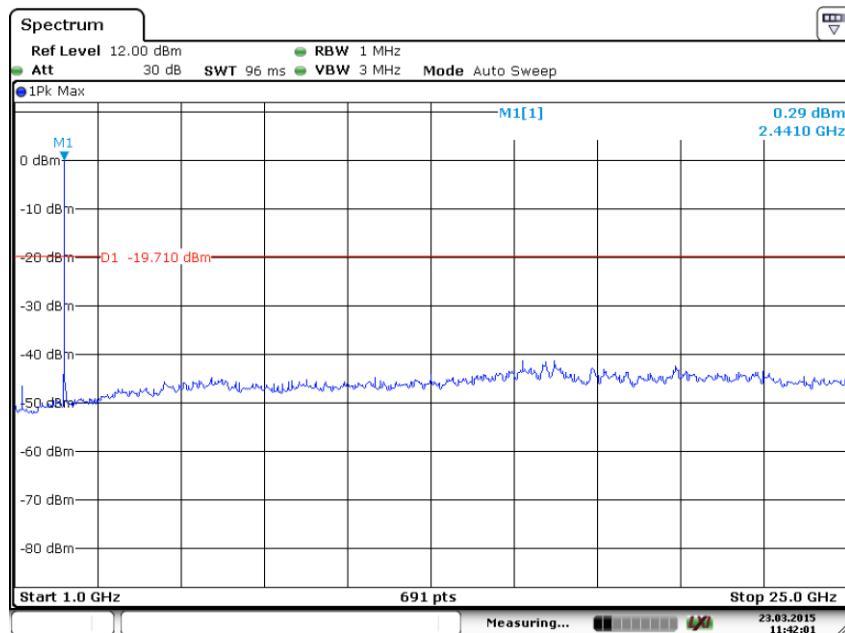
Date: 23.MAR.2015 11:43:37

Spurious RF conducted emissions

2440MHz



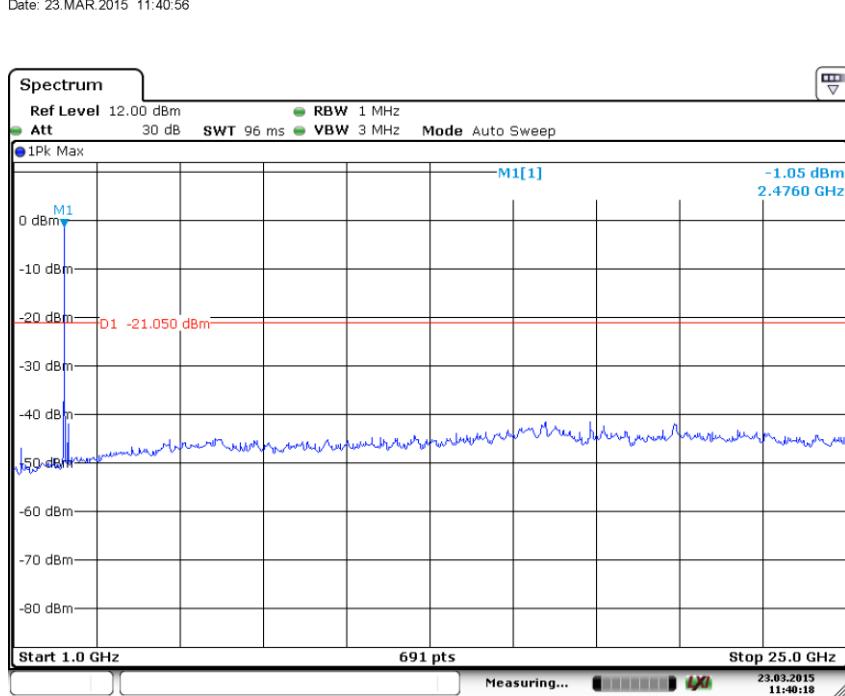
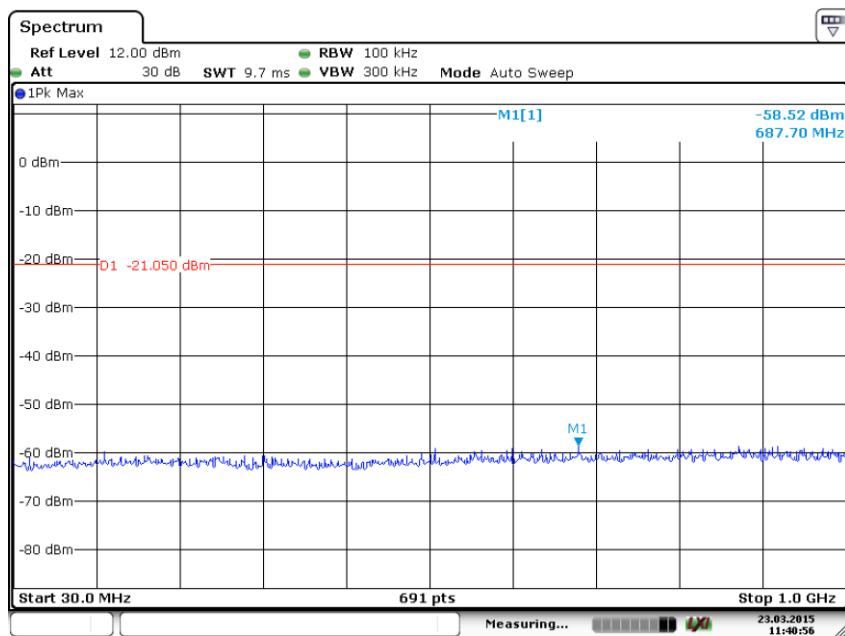
Date: 23.MAR.2015 11:42:36



Date: 23.MAR.2015 11:42:01

Spurious RF conducted emissions

2480MHz



9.5 Band edge testing

Test Method

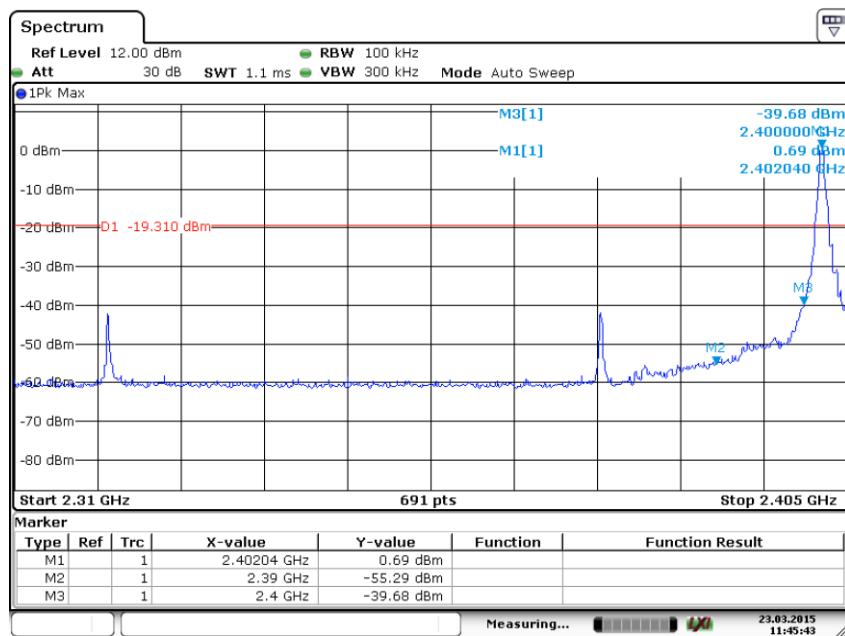
- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section. .
- 4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

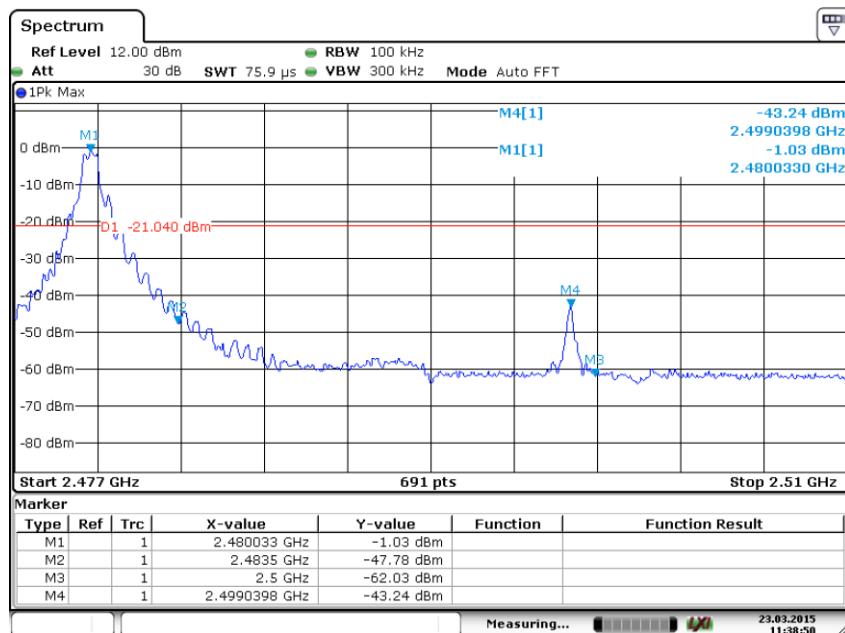
According to §15.247(d) and RSS-210 A8.5, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) and RSS-Gen7.2.2, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

Band edge testing

BLE Modulation Test Result:



Date: 23.MAR.2015 11:45:43



Date: 23.MAR.2015 11:38:51

9.6 Spurious radiated emissions for transmitter and receiver

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for $f \geq 1\text{GHz}$, 100 kHz for $f < 1\text{ GHz}$, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{duty cycle}/100\text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

According to part 15.247(d), the radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB μ V/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Spurious radiated emissions for transmitter and receiver

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

AV Factor=20log(dutycycle)=20Log(0.23)=-12.77

Bluetooth Mode GFSK (BLE) Modulation 2402MHz Test Result

Frequency	Emission Level	Limit	Polarization	Margin	Detector	Result
MHz	dB _u V/m	dB _u V/m		dB _u V/m		
239.82	38.52	46.00	Horizontal	7.48	QP	Pass
288.38	38.75	46.00	Horizontal	7.25	QP	Pass
191.87	27.07	43.50	Vertical	16.43	QP	Pass
240.31	30.59	46.00	Vertical	15.41	QP	Pass
*4804	45.13	74	Horizontal	28.87	PK	Pass
*4804	47.48	74	Vertical	26.52	PK	Pass
*4804	32.36	54	Horizontal	21.64	Ave	Pass
*4804	34.71	54	Vertical	19.29	Ave	Pass
7206	64.20	74	Horizontal	9.8	PK	Pass
7206	58.93	74	Vertical	15.07	PK	Pass
7206	51.43	54	Horizontal	2.57	Ave	Pass
7206	46.16	54	Vertical	7.84	Ave	Pass

Bluetooth Mode GFSK (BLE) Modulation 2440MHz Test Result

Frequency	Emission Level	Limit	Polarization	Margin	Detector	Result
MHz	dB _u V/m	dB _u V/m		dB _u V/m		
*4880	49.40	74	Horizontal	24.6	PK	Pass
*4880	44.89	74	Vertical	29.11	PK	Pass
*4880	36.63	54	Horizontal	17.37	Ave	Pass
*4880	32.12	54	Vertical	21.88	Ave	Pass
*7320	49.40	74	Horizontal	24.6	PK	Pass
*7320	57.60	74	Vertical	16.4	PK	Pass
*7320	36.63	54	Horizontal	17.37	Ave	Pass
*7320	44.83	54	Vertical	9.17	Ave	Pass

Bluetooth Mode GFSK (BLE) Modulation 2480MHz Test Result

Frequency	Emission Level	Limit	Polarization	Margin	Detector	Result
MHz	dBuV/m	dBuV/m		dB μ V/m		
*4960	50.45	74	Horizontal	23.55	PK	Pass
*4960	44.32	74	Vertical	29.68	PK	Pass
*4960	37.68	54	Horizontal	16.32	Ave	Pass
*4960	31.55	54	Vertical	22.45	Ave	Pass
*7440	56.67	74	Horizontal	17.33	PK	Pass
*7440	54.58	74	Vertical	19.42	PK	Pass
*7440	43.9	54	Horizontal	10.1	Ave	Pass
*7440	41.81	54	Vertical	12.19	Ave	Pass

Remark:

- (1) QP Emission Level= Antenna Factor +Cable Loss + Reading
 PK Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
 AV Emission Level= PK Emission Level+20log(dutycycle)
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (3) “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

Receiving emission test result as below:

Frequency	Emission Level	Limit	Polarization	Margin	Detector	Result
MHz	dBuV/m	dBuV/m		dB μ V/m		
331.99	34.55	46	Horizontal	11.45	QP	Pass
428.02	35.13	46	Horizontal	10.87	QP	Pass
428.12	31.24	46	Vertical	14.76	QP	Pass
444.03	32.57	46	Vertical	13.43	QP	Pass
1000-25000	--	--	Horizontal	--	PK	Pass
1000-25000	--	--	Vertical	--	PK	Pass

Remark:

- (1) QP Emission Level= Antenna Factor +Cable Loss + Reading
 PK Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
 AV Emission Level= PK Emission Level+20log (dutycycle)
- (2) Data of measurement within this frequency range shown “--” in the table above means the reading of emissions are the noise floor or attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (3) “*” means the emission(s) appear within the restrict bands shall follow the requirement of section RSS-Gen.

10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	101031	2015-8-17
RE	Signal Analyzer	Rohde & Schwarz	FSV40	101031	2015-8-17
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	708	2017-8-17
	Horn Antenna	Rohde & Schwarz	HF907	102295	2017-8-17
	Wideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	12827	2017-8-17
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2015-8-17
	Pre-amplifier	Rohde & Schwarz	SCU 40A	100432	2015-8-17
	Fully Anechoic Chamber	TDK	8X4X4	--	2019-8-29

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth and 99% bandwidth
- Power spectral density
- Spurious RF conducted emissions
- Band edge

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.83dB; Vertical: 4.91dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	Horizontal: 4.89dB; Vertical: 4.88dB;