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FCC RADIO TEST REPORT

Applicant's company	**Realtek Semiconductor Corp.**
Applicant Address	No. 2,Innovation Road II, Hsinchu Science Park, Hsinchu 300,Taiwan
FCC ID	**TX2-RTL8723DE**
Manufacturer's company	**Realtek Semiconductor Corp.**
Manufacturer Address	No. 2,Innovation Road II, Hsinchu Science Park, Hsinchu 300,Taiwan

Product Name	802.11 b/g/n RTL8723DE Combo module
Brand Name	REALTEK
Model Name	RTL8723DE
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2402 ~ 2480MHz
Received Date	Nov. 30, 2015
Final Test Date	May 05, 2016
Submission Type	Original Equipment

Statement

Test result included is only for the Bluetooth LE of the product.

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 C63.10-2013**, **47 CFR FCC Part 15 Subpart C** and **KDB558074 D01 v03r05**.

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

Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR5D1601AC	Rev. 01	Initial issue of report	May 24, 2016

1. VERIFICATION OF COMPLIANCE

Product Name	:	802.11 b/g/n RTL8723DE Combo module
Brand Name	:	REALTEK
Model No.	:	RTL8723DE
Applicant	:	Realtek Semiconductor Corp.
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 Nov. 30, 2015 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**
4.1	15.207	AC Power Line Conducted Emissions	Complies	13.15 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	24.98 dB
4.3	15.247(e)	Power Spectral Density	Complies	18.41 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	3.04 dB
4.6	15.247(d)	Band Edge Emissions	Complies	6.50 dB
4.7	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Power Type	From host system
Modulation	DSSS
Data Rate (Mbps)	GFSK: 1
Frequency Range	2402 ~ 2480MHz
Channel Number	40 (37 hopping + 3 advertising channel)
Channel Band Width (99%)	1.03 MHz
Maximum Conducted Output Power	5.02 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	P/N	Antenna Type	Connector	Gain (dBi)
1	LYNwave	ALA110-222050-300011	PIFA Antenna	I-PEX MHF4	3.5
2	PSA	RFDPA171320EMLB301	Dipole Antenna	I-PEX MHF4	3.14

Note: The EUT has two antennas.

For EUT 1 and EUT 3:

The EUT supports the antenna with TX/RX diversity function for WLAN and Bluetooth.

For WLAN 802.11b/g/n (1TX, 1RX) mode:

Both of Chain 1 and Chain 2 can be used as transmitting/receiving antennas,

but only one antenna can be used as transmitting/receiving antenna at the one time.

Chain 1 generated the worst case than Chain 2, so it is tested and recorded in the report.

For Bluetooth mode:

Base on WLAN's operation mode to select the other antenna to work.

(Ex. Assume Main port was selected to conduct transmitting function in WLAN,

so AUX port was selected in Bluetooth Mode. Vice versa.)

Chain 2 generated the worst case than Chain 1, so it is tested and recorded in the report.

For EUT 2 and EUT 4:

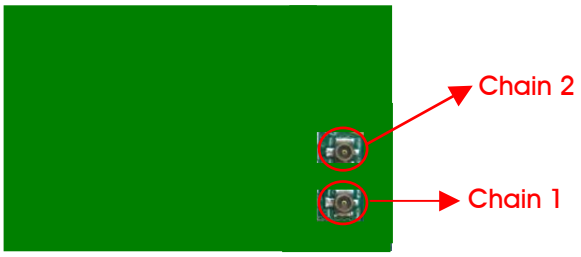
For WLAN 802.11b/g/n (1TX, 1RX) mode:

Chain 1 can be used as transmitting/receiving antenna.

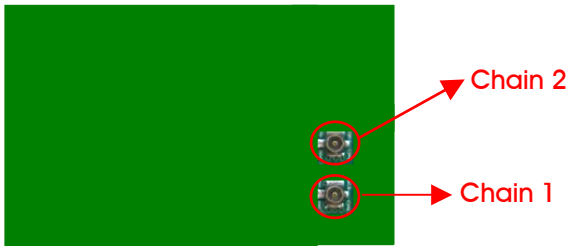
For Bluetooth mode:

Chain 1 can be used as transmitting/receiving antenna.

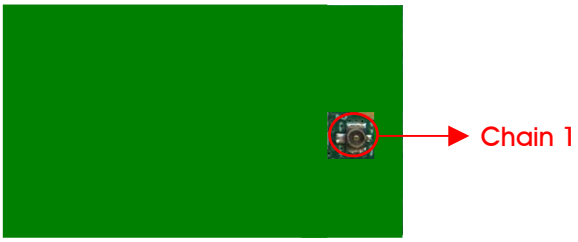
For EUT 1:



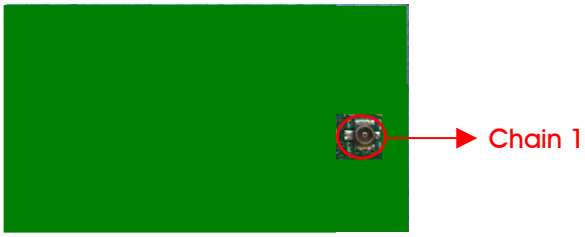
For EUT 3:



For EUT 2:



For EUT 4:



3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	0	2402 MHz	20	2442 MHz
	1	2404 MHz	:	:
	2	2406 MHz	37	2476 MHz
	:	:	38	2478 MHz
	18	2438 MHz	39	2480 MHz
	19	2440 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	Chain
AC Power Line Conducted Emissions	Normal Link	-	-	-
Maximum Conducted Output Power Power Spectral Density	GFSK	1 Mbps	0/20/39	2
6dB Spectrum Bandwidth	GFSK	1 Mbps	0/20/39	2
Radiated Emissions 9kHz~1GHz	Normal Link	-	-	-
Radiated Emissions 1GHz~10th Harmonic	GFSK	1 Mbps	0/20/39	For Mode 1, 2: 2 For Mode 3, 4: 1
Band Edge Emissions	GFSK	1 Mbps	0/20/39	For Mode 1, 2: 2 For Mode 3, 4: 1

Note 1: For Conducted measurement Test: only the higher gain antenna "Ant. 1" was selected to perform the test and recorded in this report.

Note 2: For Radiated measurement Test: all test results were recorded in the report.

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. EUT 1-E key-Diversity + Antenna 1

Mode 2. EUT 2-E key-Fixed + Antenna 1

Mode 3. EUT 3-A+E key-Diversity + Antenna 1

Mode 4. EUT 4-A+E key-Fixed + Antenna 1

Mode 1 has been evaluated to be the worst case between Mode 1~2 thus measurement for Mode 5 will follow this same test mode.

Mode 3 has been evaluated to be the worst case between Mode 3~4 thus measurement for Mode 6 will follow this same test mode.

Mode 5. EUT 1-E key-Diversity + Antenna 2

Mode 6. EUT 3-A+E key-Diversity + Antenna 2

Mode 1 is the worst case, so it was selected to record in this test report.

For Radiated Emission test<Below 1GHz>:

Mode 1. Place EUT 1-E key-Diversity in Y axis + Antenna 1

Mode 2. Place EUT 1-E key-Diversity in Z axis + Antenna 1

Mode 3. Place EUT 2-E key-Fixed in Y axis + Antenna 1

Mode 4. Place EUT 2-E key-Fixed in Z axis + Antenna 1

Mode 5. Place EUT 3-A+E key-Diversity in Y axis + Antenna 1

Mode 6. Place EUT 3-A+E key-Diversity in Z axis + Antenna 1

Mode 7. Place EUT 4-A+E key-Fixed in Y axis + Antenna 1

Mode 8. Place EUT 4-A+E key-Fixed in Z axis + Antenna 1

Mode 2 has been evaluated to be the worst case between Mode 1~4 thus measurement for Mode 9 will follow this same test mode.

Mode 6 has been evaluated to be the worst case between Mode 5~8 thus measurement for Mode 10 will follow this same test mode.

Mode 9. Place EUT 1-E key-Diversity in Z axis + Antenna 2

Mode 10. Place EUT 3-A+E key-Diversity in Z axis + Antenna 2

Mode 2 is the worst case, so it was selected to record in this test report.

For Radiated Emission test<Above 1GHz>:

The EUT can be placed in X axis, Y axis and Z axis. After evaluating, Z axis was the worst case, so it's recorded in this report.

Mode 1. Place EUT 1-E key-Diversity in Z axis + Antenna 1

Mode 2. Place EUT 1-E key-Diversity in Z axis + Antenna 2

Mode 3. Place EUT 2-E key-Fixed in Z axis + Antenna 1

Mode 4. Place EUT 2-E key-Fixed in Z axis + Antenna 2

For Radiated Emission Co-location test:

Mode 1. Place EUT 1-E key-Diversity in X axis + Antenna 1

Mode 2. Place EUT 1-E key-Diversity in Y axis + Antenna 1

Mode 3. Place EUT 1-E key-Diversity in Z axis + Antenna 1

Mode 4. Place EUT 2-E key-Fixed in X axis + Antenna 1

Mode 5. Place EUT 2-E key-Fixed in Y axis + Antenna 1

Mode 6. Place EUT 2-E key-Fixed in Z axis + Antenna 1

Mode 3 has been evaluated to be the worst case between Mode 1~3 thus measurement for Mode 7 will follow this same test mode.

Mode 6 has been evaluated to be the worst case between Mode 4~6 thus measurement for Mode 8 will follow this same test mode.

Mode 7. Place EUT 1-E key-Diversity in Z axis + Antenna 2

Mode 8. Place EUT 2-E key-Fixed in Z axis + Antenna 2

Mode 3 is the worst case, so it was selected to record in this test report.

For Co-location MPE and Radiated Emission Co-location Test:

The EUT could be applied with 2.4GHz WLAN function and Bluetooth function; therefore Co-location Maximum Permissible Exposure (Please refer to FA5D1601) and Radiated Emission Co-location (please refer to Appendix B) tests are added for simultaneously transmit between 2.4GHz WLAN function and Bluetooth function.

3.6. Table for Testing Locations

Test Site Location				
Address:	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			
Test Site No.	**Site Category**	**Location**	**FCC Designation No.**	**IC File No.**
03CH01-CB	SAC	Hsin Chu	TW0006	IC 4086D
CO01-CB	Conduction	Hsin Chu	TW0006	IC 4086D
TH01-CB	OVEN Room	Hsin Chu	-	-

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

3.7. Table for Multiple List

The EUT has four types which are identical to each other in all aspects except for the following table:

Model Name	EUT	Interface		Function	
		E key	A+E key	Diversity	Fixed
RTL8723DE	1	V		V	
	2	V			V
	3		V	V	
	4		V		V

Interface	Description
E key	There are two interface for different platform connector, all the RF circuit and electric identity are the same.
A+E key	

Note:

For Conducted Emission test and Radiated Emission test<Below 1GHz>:

The table above, EUT 1 ~ EUT 4 was selected as representative model for the test and its data was recorded in this report.

For Radiated Emission test<Above 1GHz> and Radiated Emission Co-location test:

The above difference does not affect the test result of RF tests, so only EUT 1 and EUT 2 was tested and recorded in this report.

3.8. Table for Supporting Units

For Test Site No: 03CH01-CB<Below 1GHz>

Support Unit	Brand	Model	FCC ID
AP	Netgear	R6300V2	PY313200227
NB*2	DELL	E4300	DoC
Device	REALTEK	RTL8723DE	TX2-RTL8723DE
Test fixture	REALTEK	Ameba adapter	N/A
Earphone	SHYARO CHI	MIC-04	N/A
Mouse	Logitech	M-U0026	DoC

For Test Site No: 03CH01-CB<Above1GHz>

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC
Test fixture	REALTEK	Ameba adapter	N/A

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
AP	Planex	GW-AP54SGX	KA220030603014-1
NB*2	DELL	E6430	DoC
Device	REALTEK	RTL8723DE	TX2-RTL8723DE
Test fixture	REALTEK	Ameba adapter	N/A
Earphone	SHYARO CHI	MIC-04	N/A
Mouse	HP	FM100	DoC

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC
Test fixture	REALTEK	Ameba adapter	N/A

3.9. Table for Parameters of Test Software Setting

During testing, Channel and 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	Bluetooth MP Tool		
Frequency	2402 MHz	2442 MHz	2480 MHz
Power Parameters	default	default	default

3.10. EUT Operation during Test

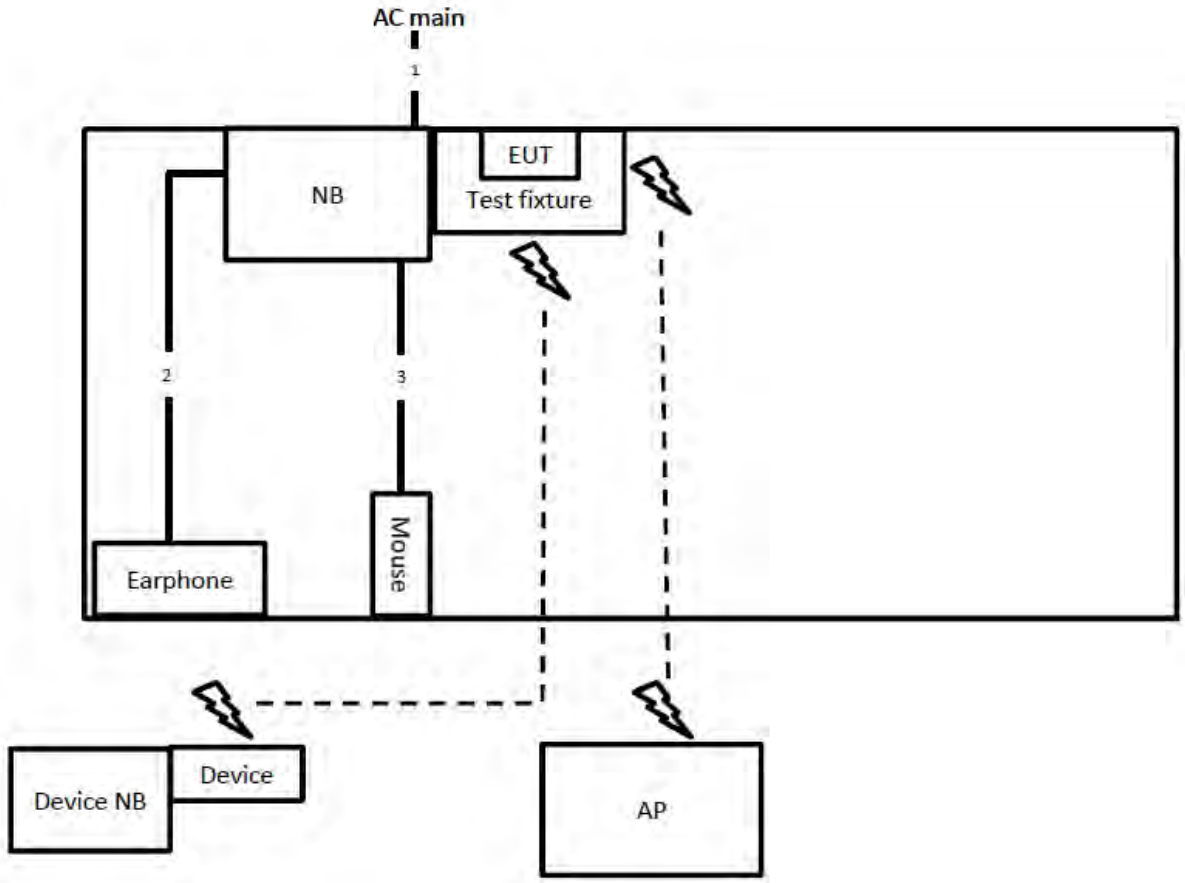
The EUT was programmed to be in continuously transmitting mode.

3.11. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
GFSK	0.096	0.632	15.19%	8.18	10.42

3.12. Test Configurations

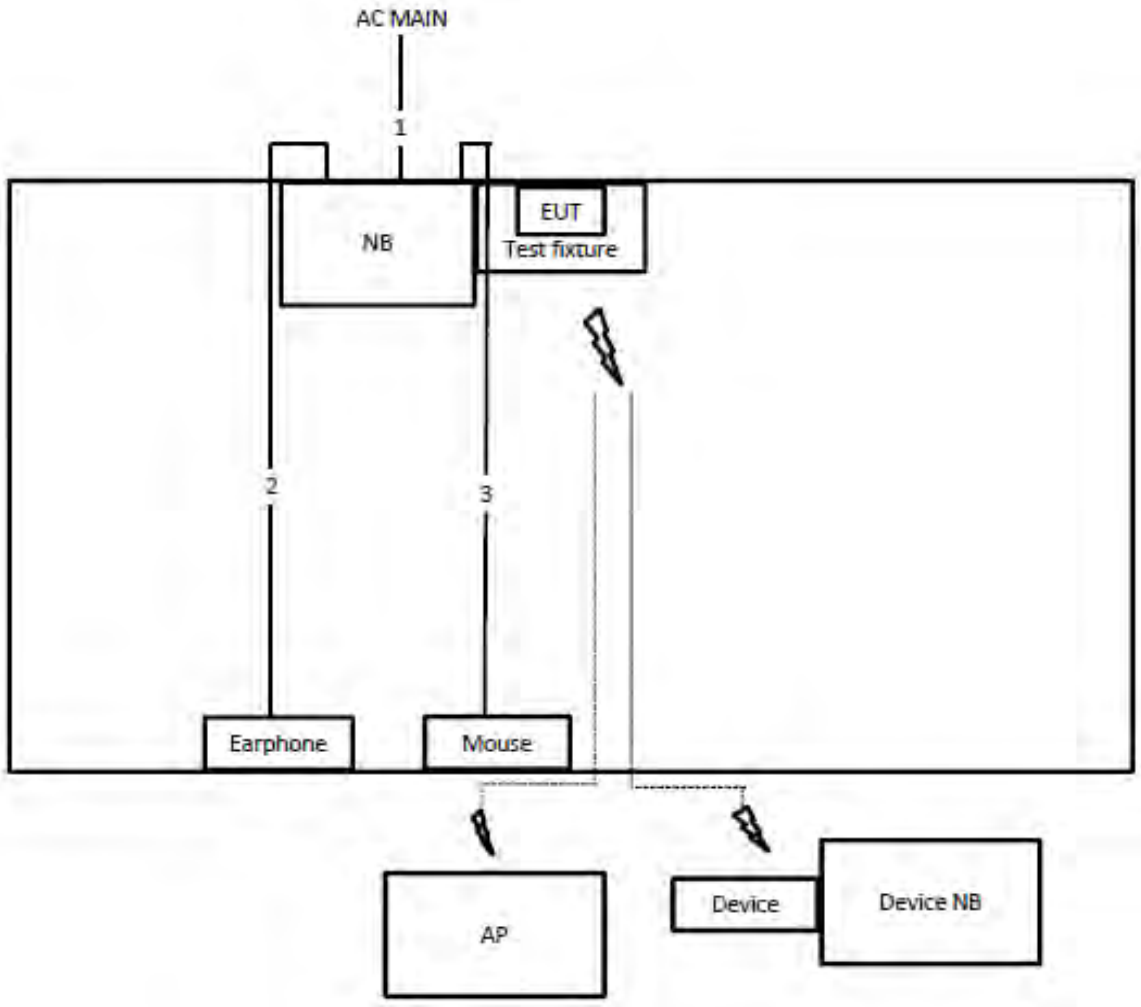
3.12.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	Audio cable	No	1.1m
3	USB cable	Yes	1.8m

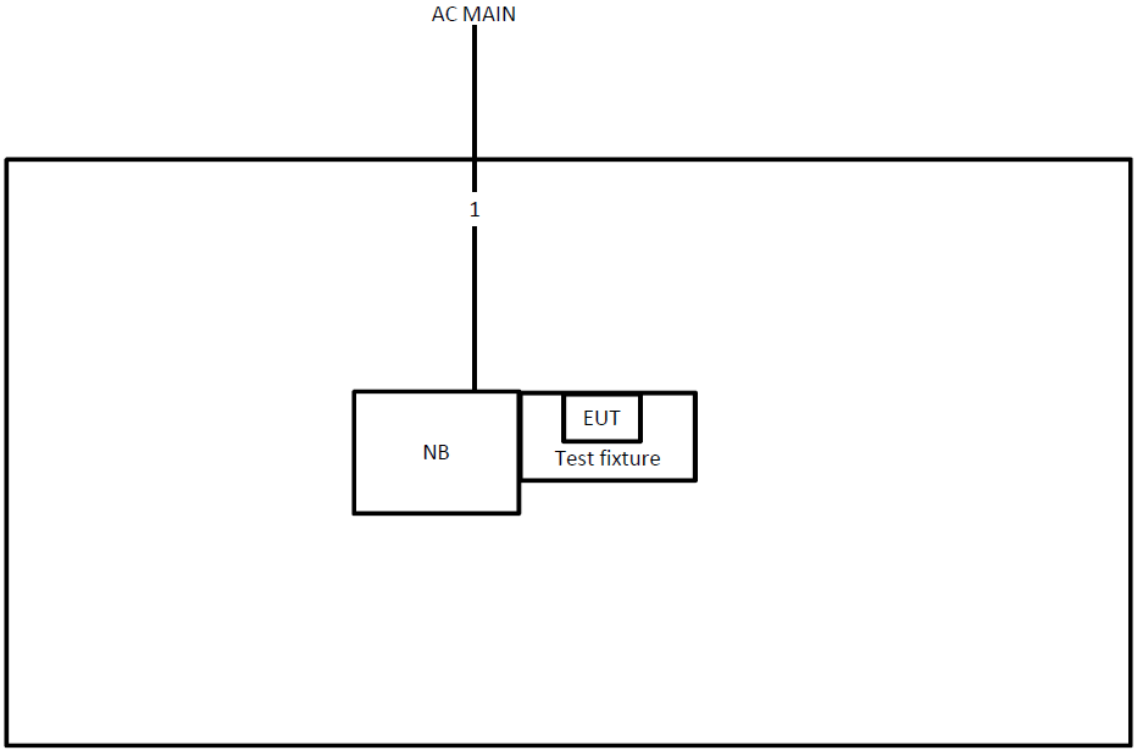
3.12.2. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	Audio cable	No	1.1m
3	USB cable	Yes	1.8m

Test Configuration: above 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	2.6m

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

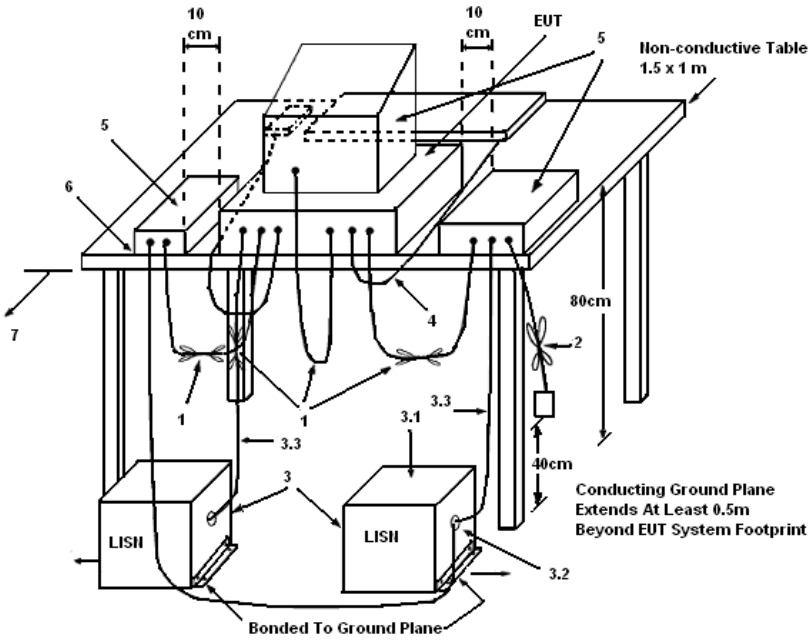
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

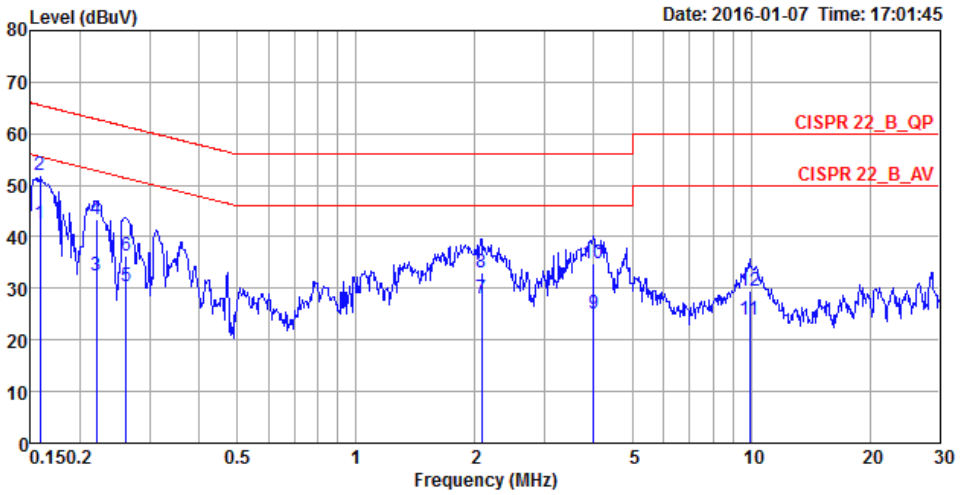
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

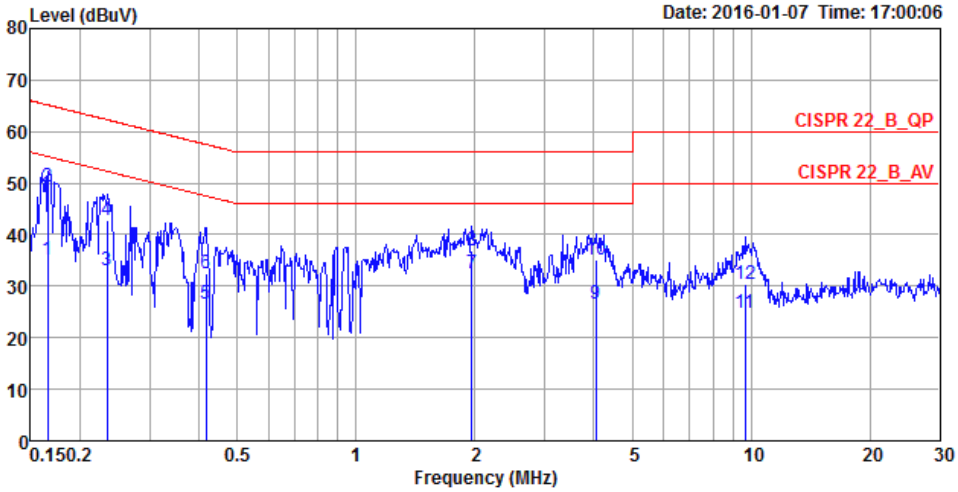
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	22°C	Humidity	58%
Test Engineer	Deven Huang	Phase	Line
Configuration	Normal Link	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1582	42.41	-13.15	55.56	32.46	9.93	0.02	LINE	Average
2	0.1582	51.91	-13.65	65.56	41.96	9.93	0.02	LINE	QP
3	0.2197	32.54	-20.29	52.83	22.59	9.93	0.02	LINE	Average
4	0.2197	43.37	-19.46	62.83	33.42	9.93	0.02	LINE	QP
5	0.2616	30.44	-20.94	51.38	20.48	9.93	0.03	LINE	Average
6	0.2616	36.28	-25.10	61.38	26.32	9.93	0.03	LINE	QP
7	2.0768	28.07	-17.93	46.00	18.02	9.99	0.06	LINE	Average
8	2.0768	33.01	-22.99	56.00	22.96	9.99	0.06	LINE	QP
9	3.9850	25.08	-20.92	46.00	14.99	10.02	0.07	LINE	Average
10	3.9850	34.76	-21.24	56.00	24.67	10.02	0.07	LINE	QP
11	9.9130	23.87	-26.13	50.00	13.44	10.18	0.25	LINE	Average
12	9.9130	29.38	-30.62	60.00	18.95	10.18	0.25	LINE	QP

Temperature	22°C	Humidity	58%
Test Engineer	Deven Huang	Phase	Neutral
Configuration	Normal Link	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1659	35.03	-20.13	55.16	25.23	9.78	0.02	NEUTRAL	Average
2	0.1659	49.40	-15.76	65.16	39.60	9.78	0.02	NEUTRAL	QP
3	0.2341	33.20	-19.10	52.30	23.38	9.79	0.03	NEUTRAL	Average
4	0.2341	42.78	-19.52	62.30	32.96	9.79	0.03	NEUTRAL	QP
5	0.4171	26.69	-20.82	47.51	16.86	9.79	0.04	NEUTRAL	Average
6	0.4171	32.50	-25.01	57.51	22.67	9.79	0.04	NEUTRAL	QP
7	1.9593	32.51	-13.49	46.00	22.61	9.84	0.06	NEUTRAL	Average
8	1.9593	36.86	-19.14	56.00	26.96	9.84	0.06	NEUTRAL	QP
9	4.0489	26.70	-19.30	46.00	16.76	9.87	0.07	NEUTRAL	Average
10	4.0489	35.10	-20.90	56.00	25.16	9.87	0.07	NEUTRAL	QP
11	9.6539	24.85	-25.15	50.00	14.61	10.00	0.24	NEUTRAL	Average
12	9.6539	30.50	-29.50	60.00	20.26	10.00	0.24	NEUTRAL	QP

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

The limit for output power is 30dBm.

4.2.2. Measuring Instruments and Setting

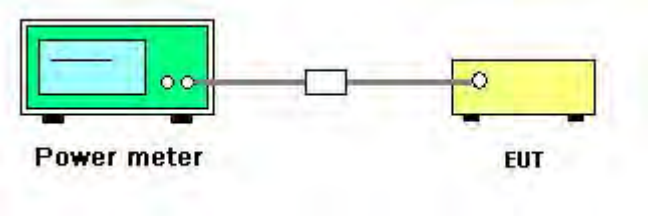
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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

4.2.3. Test Procedures

1. Test procedures refer KDB558074 D01 v03r05 section 9.2.3.2.
2. This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

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 Maximum Conducted Output Power

Temperature	24°C	Humidity	60%
Test Engineer	Andy Tsai	Configurations	GFSK
Test Date	Feb. 17, 2016		

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
0	2402 MHz	5.02	30.00	Complies
20	2442 MHz	5.02	30.00	Complies
39	2480 MHz	5.01	30.00	Complies

4.3. Power Spectral Density Measurement

4.3.1. 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.

4.3.2. Measuring Instruments and Setting

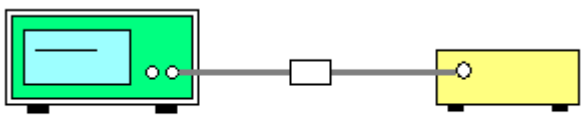
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	5-30 % greater than the DTS channel bandwidth.
RBW	3 kHz ≤ RBW ≤ 100kHz
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple

4.3.3. Test Procedures

1. Test was performed in accordance with KDB558074 D01 v03r05 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 10.2 Method PKPSD (peak PSD).
2. 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.
3. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW (use of a greater number of measurement points than this minimum requirement is recommended).
4. Use the peak marker function to determine the maximum level in any 3 kHz band segment within the fundamental EBW.
5. The resulting PSD level must be ≤ 8 dBm.

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.

4.3.7. Test Result of Power Spectral Density

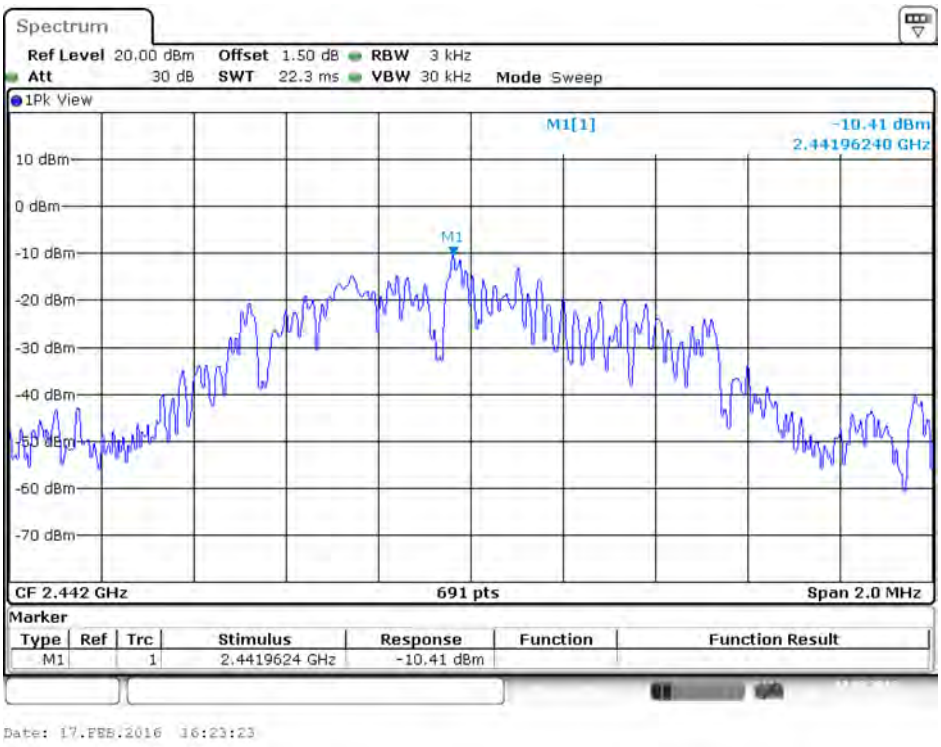
Temperature	24°C	Humidity	60%
Test Engineer	Andy Tsai	Configurations	GFSK

Channel	Frequency	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
		Chain 2		
0	2402 MHz	-10.54	8.00	Complies
20	2442 MHz	-10.41	8.00	Complies
39	2480 MHz	-10.63	8.00	Complies

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

For plots, only the channel with worse result was shown.

Power Density Plot on Configuration Bluetooth / 2442 MHz



4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

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

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 the spectrum analyzer.

6dB Spectrum Bandwidth	
Spectrum Parameters	**Setting**
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RBW	100kHz
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto
99% Occupied Bandwidth	
Spectrum Parameters	**Setting**
Span	1.5 times to 5.0 times the OBW
RBW	1 % to 5 % of the OBW
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold

4.4.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. Test was performed in accordance with KDB558074 D01 v03r05 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 8.0 DTS bandwidth=> 8.1 Option 1.
3. Measured the spectrum width with power higher than 6dB below carrier.

4.4.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

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

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. Test Result of 6dB Spectrum Bandwidth

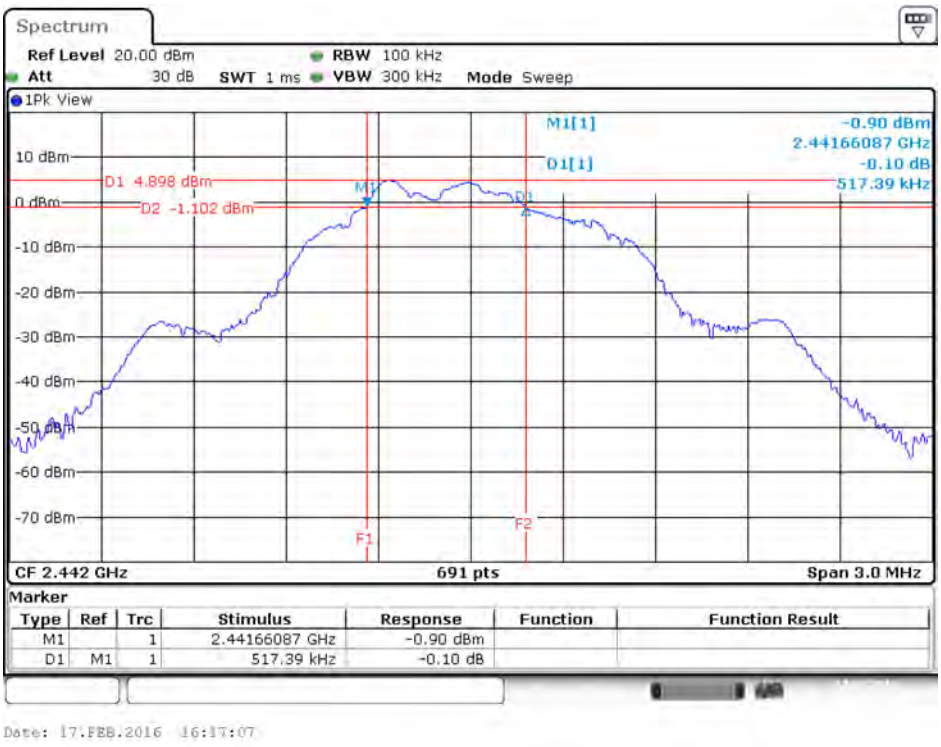
emperature	24°C	Humidity	60%
Test Engineer	Andy Tsai	Configurations	GFSK

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
0	2402 MHz	0.52	1.03	500	Complies
20	2442 MHz	0.52	1.03	500	Complies
39	2480 MHz	0.52	1.03	500	Complies

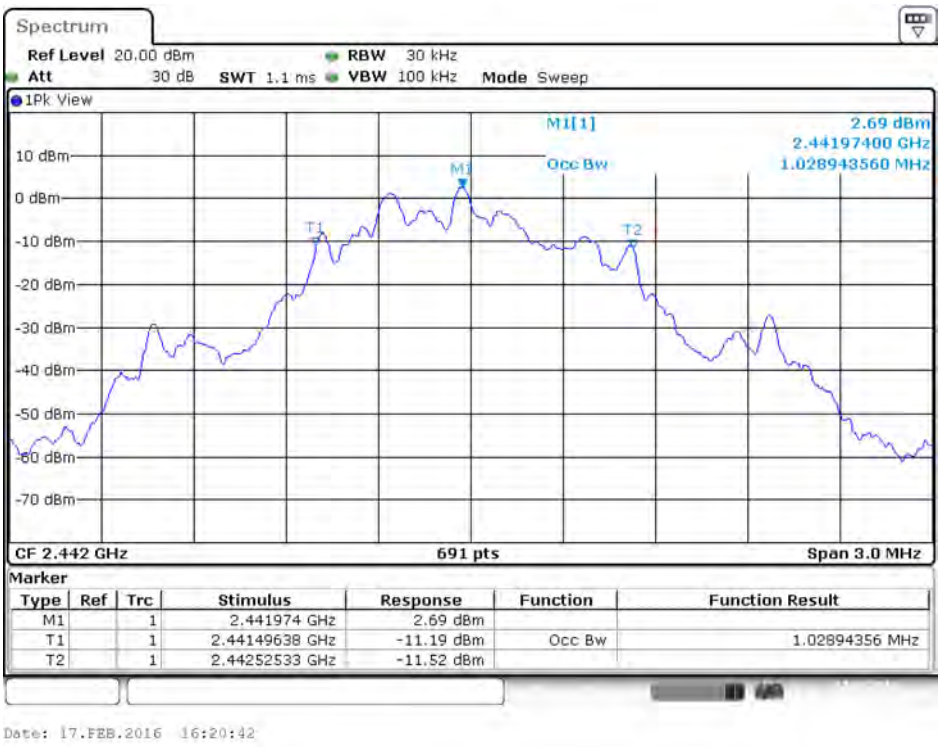
Note: All the test values were listed in the report.

For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration Bluetooth / 2442 MHz



99% Occupied Bandwidth Plot on Configuration Bluetooth / 2442 MHz



4.5. Radiated Emissions Measurement

4.5.1. Limit

30dBc 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 spectrum analyzer and receiver.

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

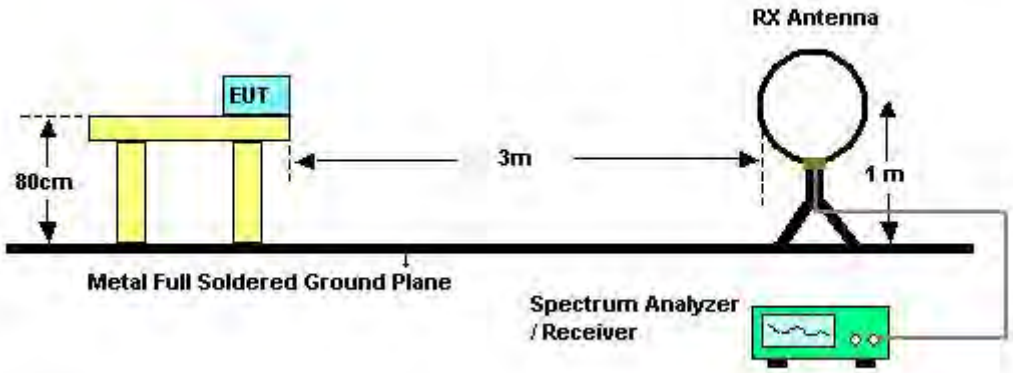
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.5.3. Test Procedures

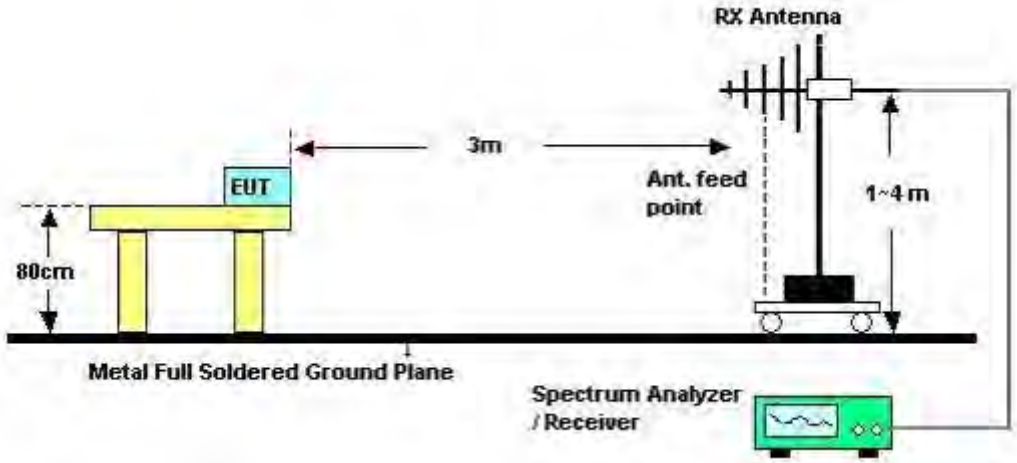
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting 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 1/T VBW for average reading in spectrum analyzer.
7. 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.
8. 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.
9. 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.

4.5.4. Test Setup Layout

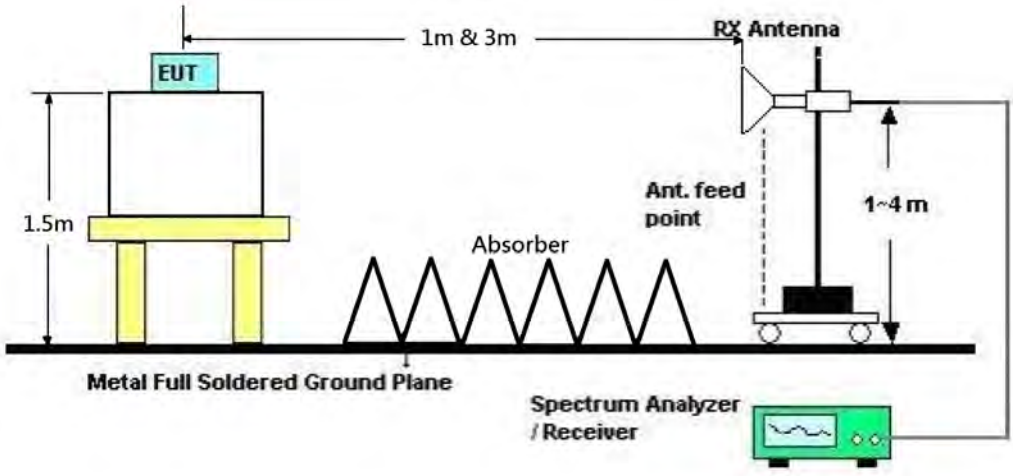
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



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

Temperature	22°C	Humidity	57%
Test Engineer	Eason Chen	Configurations	Normal Link
Test Date	Jan. 13, 2016	Test Mode	Mode 2

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.

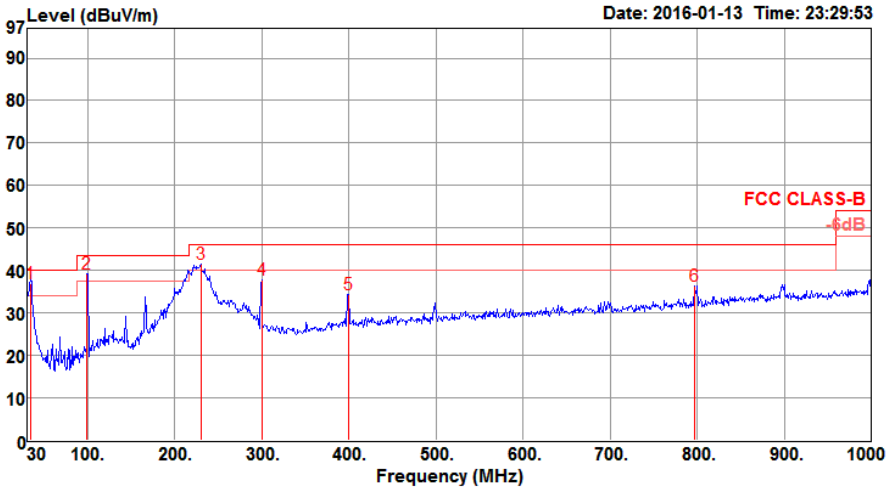
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

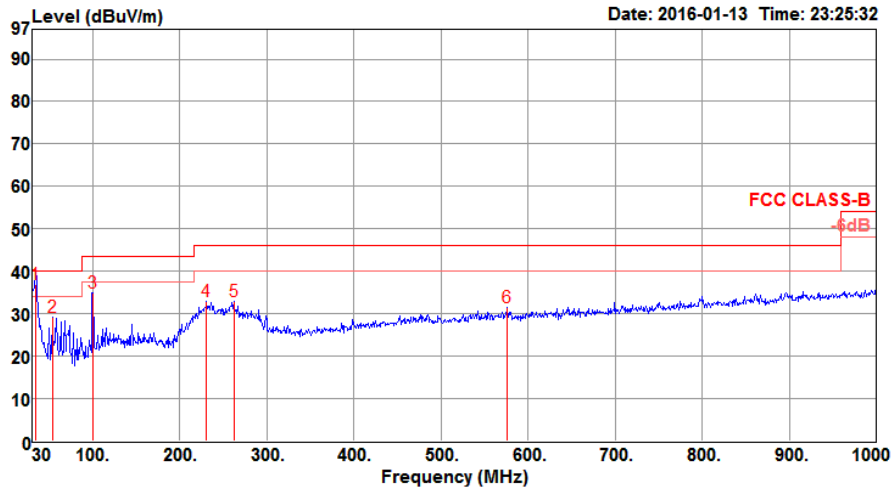
Temperature	22°C	Humidity	57%
Test Engineer	Eason Chen	Configurations	Normal Link
Test Mode	Mode 2		

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	33.88	36.96	40.00	-3.04	41.02	1.24	23.19	28.49	QP	100	0	HORIZONTAL
2	98.87	39.32	43.50	-4.18	49.52	1.58	16.51	28.29	Peak	100	0	HORIZONTAL
3	229.82	41.42	46.00	-4.58	50.23	1.93	16.90	27.64	Peak	100	0	HORIZONTAL
4	299.66	37.87	46.00	-8.13	43.64	2.13	19.58	27.48	Peak	100	0	HORIZONTAL
5	399.57	34.35	46.00	-11.65	38.04	2.36	22.17	28.22	Peak	100	0	HORIZONTAL
6	797.27	36.32	46.00	-9.68	34.71	3.28	26.67	28.34	Peak	100	0	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	33.88	36.83	40.00	-3.17	40.89	1.24	23.19	28.49	QP	200	0	VERTICAL
2	53.28	29.27	40.00	-10.73	42.53	1.35	13.84	28.45	Peak	200	0	VERTICAL
3	99.84	34.85	43.50	-8.65	44.86	1.58	16.70	28.29	Peak	200	0	VERTICAL
4	230.79	32.90	46.00	-13.10	41.62	1.93	16.98	27.63	Peak	200	0	VERTICAL
5	261.83	32.97	46.00	-13.03	38.81	2.01	19.71	27.56	Peak	200	0	VERTICAL
6	576.11	31.48	46.00	-14.52	32.71	2.77	24.71	28.71	Peak	200	0	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB 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.

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

Temperature	22°C	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 0 / Chain 2
Test Date	Jan. 26, 2016	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4803.29	48.12	74.00	-25.88	42.58	7.48	31.10	33.04	122	344	Peak	HORIZONTAL
2	4803.88	35.19	54.00	-18.81	29.65	7.48	31.10	33.04	122	344	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4803.72	34.91	54.00	-19.09	29.37	7.48	31.10	33.04	125	203	Average	VERTICAL
2	4804.54	47.78	74.00	-26.22	42.24	7.48	31.10	33.04	125	203	Peak	VERTICAL

Temperature	22℃	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 20 / Chain 2
Test Date	Jan. 26, 2016	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4884.52	34.72	54.00	-19.28	28.88	7.61	31.23	33.00	128	229	Average	HORIZONTAL
2	4884.87	47.03	74.00	-26.97	41.19	7.61	31.23	33.00	128	229	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4883.27	34.92	54.00	-19.08	29.08	7.61	31.23	33.00	123	338	Average	VERTICAL
2	4884.31	47.22	74.00	-26.78	41.38	7.61	31.23	33.00	123	338	Peak	VERTICAL

Temperature	22℃	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 39 / Chain 2
Test Date	Jan. 26, 2016	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4960.19	47.72	74.00	-26.28	41.62	7.72	31.34	32.96	137	68	Peak	HORIZONTAL
2	4960.53	34.76	54.00	-19.24	28.66	7.72	31.34	32.96	137	69	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4960.10	34.81	54.00	-19.19	28.71	7.72	31.34	32.96	132	203	Average	VERTICAL
2	4960.94	47.61	74.00	-26.39	41.51	7.72	31.34	32.96	132	203	Peak	VERTICAL

Temperature	22℃	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 0 / Chain 2
Test Date	Jan. 26, 2016	Test Mode	Mode 2

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4883.48	39.55	54.00	-14.45	36.27	7.10	32.71	36.53	245	101	HORIZONTAL	Average
2	4883.84	46.98	74.00	-27.02	43.70	7.10	32.71	36.53	245	101	HORIZONTAL	Peak
3	7323.16	52.59	74.00	-21.41	42.62	8.71	37.27	36.01	167	308	HORIZONTAL	Peak
4	7325.78	40.82	54.00	-13.18	30.85	8.71	37.27	36.01	167	308	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4883.58	45.37	74.00	-28.63	42.09	7.10	32.71	36.53	116	29	VERTICAL	Peak
2	4883.84	34.95	54.00	-19.05	31.67	7.10	32.71	36.53	116	29	VERTICAL	Average
3	7322.88	52.30	74.00	-21.70	42.33	8.71	37.27	36.01	104	272	VERTICAL	Peak
4	7330.76	41.94	54.00	-12.06	31.97	8.71	37.27	36.01	104	272	VERTICAL	Average

Temperature	22°C	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 20 / Chain 2
Test Date	Jan. 26, 2016	Test Mode	Mode 2

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4803.47	41.10	54.00	-12.90	37.89	7.19	32.56	36.54	101	44	HORIZONTAL	Average
2	4804.20	48.20	74.00	-25.80	44.99	7.19	32.56	36.54	101	44	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4803.87	37.42	54.00	-16.58	34.21	7.19	32.56	36.54	101	15	VERTICAL	Average
2	4804.00	46.43	74.00	-27.57	43.22	7.19	32.56	36.54	101	15	VERTICAL	Peak

Temperature	22°C	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 39 / Chain 2
Test Date	Jan. 26, 2016	Test Mode	Mode 2

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4960.12	45.42	74.00	-28.58	42.08	7.03	32.83	36.52	152	288	HORIZONTAL	Peak
2	4962.65	33.47	54.00	-20.53	30.13	7.03	32.83	36.52	152	288	HORIZONTAL	Average
3	7439.54	51.44	74.00	-22.56	41.27	8.76	37.41	36.00	160	310	HORIZONTAL	Peak
4	7441.11	40.70	54.00	-13.30	30.53	8.76	37.41	36.00	160	310	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4957.31	35.70	54.00	-18.30	32.37	7.03	32.83	36.53	190	29	VERTICAL	Average
2	4959.78	44.96	74.00	-29.04	41.62	7.03	32.83	36.52	190	29	VERTICAL	Peak
3	7440.36	52.41	74.00	-21.59	42.24	8.76	37.41	36.00	145	335	VERTICAL	Peak
4	7442.85	40.72	54.00	-13.28	30.55	8.76	37.41	36.00	145	335	VERTICAL	Average

Temperature	22℃	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 0 / Chain 1
Test Date	Jan. 27, 2016	Test Mode	Mode 3

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4803.47	46.73	74.00	-27.27	41.19	7.48	31.10	33.04	101	86	Peak	HORIZONTAL
2	4803.70	34.42	54.00	-19.58	28.88	7.48	31.10	33.04	101	86	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4803.81	47.18	74.00	-26.82	41.64	7.48	31.10	33.04	130	0	Peak	VERTICAL
2	4803.92	34.20	54.00	-19.80	28.66	7.48	31.10	33.04	130	0	Average	VERTICAL

Temperature	22℃	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 20 / Chain 1
Test Date	Jan. 27, 2016	Test Mode	Mode 3

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4883.02	34.58	54.00	-19.42	28.74	7.61	31.23	33.00	120	100	Average	HORIZONTAL
2	4883.90	47.26	74.00	-26.74	41.42	7.61	31.23	33.00	120	100	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4883.05	34.72	54.00	-19.28	28.88	7.61	31.23	33.00	122	171	Average	VERTICAL
2	4883.65	47.02	74.00	-26.98	41.18	7.61	31.23	33.00	122	171	Peak	VERTICAL

Temperature	22℃	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 39 / Chain 1
Test Date	Jan. 27, 2016	Test Mode	Mode 3

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4959.60	34.72	54.00	-19.28	28.62	7.72	31.34	32.96	179	110	Average	HORIZONTAL
2	4959.81	47.80	74.00	-26.20	41.70	7.72	31.34	32.96	179	110	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4959.40	48.56	74.00	-25.44	42.46	7.72	31.34	32.96	148	46	Peak	VERTICAL
2	4960.34	34.81	54.00	-19.19	28.71	7.72	31.34	32.96	148	46	Average	VERTICAL

Temperature	22℃	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 0 / Chain 1
Test Date	Jan. 27, 2016	Test Mode	Mode 4

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4803.45	48.35	74.00	-25.65	42.81	7.48	31.10	33.04	100	155	Peak	HORIZONTAL
2	4803.86	35.16	54.00	-18.84	29.62	7.48	31.10	33.04	100	155	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4803.84	49.56	74.00	-24.44	44.02	7.48	31.10	33.04	100	108	Peak	VERTICAL
2	4804.00	35.35	54.00	-18.65	29.81	7.48	31.10	33.04	100	108	Average	VERTICAL

Temperature	22℃	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 20 / Chain 1
Test Date	Jan. 27, 2016	Test Mode	Mode 4

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4883.28	34.76	54.00	-19.24	28.92	7.61	31.23	33.00	100	189	Average	HORIZONTAL
2	4885.95	48.27	74.00	-25.73	42.43	7.61	31.23	33.00	100	189	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4883.74	48.23	74.00	-25.77	42.39	7.61	31.23	33.00	100	179	Peak	VERTICAL
2	4885.69	34.80	54.00	-19.20	28.96	7.61	31.23	33.00	100	179	Average	VERTICAL

Temperature	22℃	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 39 / Chain 1
Test Date	Jan. 27, 2016	Test Mode	Mode 4

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4958.05	48.01	74.00	-25.99	41.91	7.72	31.34	32.96	100	182	Peak	HORIZONTAL
2	4960.99	35.08	54.00	-18.92	28.98	7.72	31.34	32.96	100	182	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4959.64	35.00	54.00	-19.00	28.90	7.72	31.34	32.96	100	155	Average	VERTICAL
2	4961.11	48.70	74.00	-25.30	42.60	7.72	31.34	32.96	100	155	Peak	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.

4.6. Emissions Measurement

4.6.1. Limit

30dBc 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

4.6.2. 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
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (30dBc in any 100 kHz bandwidth emission)	100 kHz / 300 kHz for Peak

4.6.3. Test Procedures

For Radiated band edges Measurement:

1. The test procedure is the same as section 4.5.3.

For Radiated Out of Band Emission Measurement:

1. Test was performed in accordance with KDB558074 D01 v03r05 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 11.0 Unwanted Emissions into Non-Restricted Frequency Bands Measurement Procedure.

4.6.4. Test Setup Layout

For Radiated band edges Measurement:

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

For Radiated Out of Band Emission Measurement:

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

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.6.7. Test Result of Band Edge and Fundamental Emissions

Temperature	22°C	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 0, 20, 39 / Chain 2
Test Date	Jan. 26, 2016	Test Mode	Mode 1

Channel 0

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2374.87	56.06	74.00	-17.94	23.82	5.22	27.02	0.00	218	104	Peak	VERTICAL
2	2390.00	46.55	54.00	-7.45	14.27	5.23	27.05	0.00	218	104	Average	VERTICAL
3	2402.00	99.33			67.00	5.25	27.08	0.00	218	104	Average	VERTICAL
4	2402.17	100.56			68.23	5.25	27.08	0.00	218	104	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 2402 MHz.

Channel 20

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2378.67	55.88	74.00	-18.12	23.61	5.23	27.04	0.00	271	360	Peak	HORIZONTAL
2	2390.00	45.99	54.00	-8.01	13.71	5.23	27.05	0.00	271	360	Average	HORIZONTAL
3	2442.00	99.39			66.92	5.29	27.18	0.00	271	360	Average	HORIZONTAL
4	2442.33	100.69			68.22	5.29	27.18	0.00	271	360	Peak	HORIZONTAL
5	2483.50	46.36	54.00	-7.64	13.76	5.33	27.27	0.00	271	360	Average	HORIZONTAL
6	2485.50	56.94	74.00	-17.06	24.34	5.33	27.27	0.00	271	360	Peak	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2442 MHz.

Channel 39

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2479.83	99.90			67.33	5.32	27.25	0.00	290	4	Peak	HORIZONTAL
2	2480.00	98.55			65.98	5.32	27.25	0.00	290	4	Average	HORIZONTAL
3	2483.50	47.50	54.00	-6.50	14.90	5.33	27.27	0.00	290	4	Average	HORIZONTAL
4	2488.83	57.58	74.00	-16.42	24.98	5.33	27.27	0.00	290	4	Peak	HORIZONTAL

Item 1, 2 are the fundamental frequency at 2480 MHz.

Note:

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

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

Temperature	22°C	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 0, 20, 39 / Chain 2
Test Date	Jan. 26, 2016	Test Mode	Mode 2

Channel 0

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2383.20	57.07	74.00	-16.93	24.65	4.51	27.91	0.00	119	28	VERTICAL	Peak
2	2388.48	46.71	54.00	-7.29	14.29	4.52	27.90	0.00	119	28	VERTICAL	Average
3	2402.00	98.46			66.03	4.54	27.89	0.00	119	28	VERTICAL	Average
4	2402.00	99.23			66.80	4.54	27.89	0.00	119	28	VERTICAL	Peak

Item 3, 4 are the fundamental frequency at 2402 MHz.

Channel 20

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2343.60	48.21	74.00	-25.79	15.80	4.47	27.94	0.00	118	322	VERTICAL	Peak
2	2390.00	46.69	54.00	-7.31	14.27	4.52	27.90	0.00	118	322	VERTICAL	Average
3	2442.00	100.06			67.64	4.57	27.85	0.00	118	322	VERTICAL	Average
4	2442.00	100.62			68.20	4.57	27.85	0.00	118	322	VERTICAL	Peak
5	2485.90	48.90	74.00	-25.10	16.48	4.61	27.81	0.00	118	322	VERTICAL	Peak
6	2496.80	46.60	54.00	-7.40	14.18	4.62	27.80	0.00	118	322	VERTICAL	Average

Item 3, 4 are the fundamental frequency at 2442 MHz.

Channel 39

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2479.96	99.35			66.93	4.60	27.82	0.00	104	39	VERTICAL	Average
2	2480.16	100.71			68.29	4.60	27.82	0.00	104	39	VERTICAL	Peak
3	2483.50	46.55	54.00	-7.45	14.13	4.61	27.81	0.00	104	39	VERTICAL	Average
4	2487.16	56.66	74.00	-17.34	24.24	4.61	27.81	0.00	104	39	VERTICAL	Peak

Item 1, 2 are the fundamental frequency at 2480 MHz.

Note:

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

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

Temperature	22℃	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 0, 20, 39 / Chain 1
Test Date	Jan. 26, 2016	Test Mode	Mode 3

Channel 0

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2367.50	55.48	74.00	-18.52	23.27	5.21	27.00	0.00	351	63	Peak	VERTICAL
2	2390.00	46.25	54.00	-7.75	13.97	5.23	27.05	0.00	351	63	Average	VERTICAL
3	2402.00	95.82			63.49	5.25	27.08	0.00	351	63	Average	VERTICAL
4	2402.17	97.13			64.80	5.25	27.08	0.00	351	63	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 2402 MHz.

Channel 20

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2362.33	55.65	74.00	-18.35	23.46	5.20	26.99	0.00	333	213	Peak	HORIZONTAL
2	2390.00	46.12	54.00	-7.88	13.84	5.23	27.05	0.00	333	213	Average	HORIZONTAL
3	2442.00	99.46			66.99	5.29	27.18	0.00	333	213	Average	HORIZONTAL
4	2442.33	101.05			68.58	5.29	27.18	0.00	333	213	Peak	HORIZONTAL
5	2483.50	46.73	54.00	-7.27	14.13	5.33	27.27	0.00	333	213	Average	HORIZONTAL
6	2485.10	56.71	74.00	-17.29	24.11	5.33	27.27	0.00	333	213	Peak	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2442 MHz.

Channel 39

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2480.00	98.29			65.72	5.32	27.25	0.00	271	222	Average	HORIZONTAL
2	2480.17	99.59			67.02	5.32	27.25	0.00	271	222	Peak	HORIZONTAL
3	2483.50	47.06	54.00	-6.94	14.46	5.33	27.27	0.00	271	222	Average	HORIZONTAL
4	2492.83	57.58	74.00	-16.42	24.96	5.34	27.28	0.00	271	222	Peak	HORIZONTAL

Item 1, 2 are the fundamental frequency at 2480 MHz.

Note:

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

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

Temperature	22°C	Humidity	57%
Test Engineer	Eason Chen	Configurations	Channel 0, 20, 39 / Chain 1
Test Date	Jan. 27, 2016	Test Mode	Mode 4

Channel 0

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2352.80	46.66	54.00	-7.34	14.49	5.20	26.97	0.00	101	196	Average	VERTICAL
2	2370.60	56.09	74.00	-17.91	23.85	5.22	27.02	0.00	101	196	Peak	VERTICAL
3	2402.00	96.66			64.33	5.25	27.08	0.00	101	196	Average	VERTICAL
4	2402.20	97.98			65.65	5.25	27.08	0.00	101	196	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 2402 MHz.

Channel 20

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2390.00	46.74	54.00	-7.26	14.46	5.23	27.05	0.00	100	258	Average	VERTICAL
2	2390.00	56.34	74.00	-17.66	24.06	5.23	27.05	0.00	100	258	Peak	VERTICAL
3	2441.60	98.21			65.74	5.29	27.18	0.00	100	258	Peak	VERTICAL
4	2442.00	97.03			64.56	5.29	27.18	0.00	100	258	Average	VERTICAL
5	2483.50	46.98	54.00	-7.02	14.38	5.33	27.27	0.00	100	258	Average	VERTICAL
6	2484.70	56.44	74.00	-17.56	23.84	5.33	27.27	0.00	100	258	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 2442 MHz.

Channel 39

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2480.00	97.59			65.02	5.32	27.25	0.00	100	241	Average	VERTICAL
2	2480.20	98.88			66.31	5.32	27.25	0.00	100	241	Peak	VERTICAL
3	2484.40	47.45	54.00	-6.55	14.85	5.33	27.27	0.00	100	241	Average	VERTICAL
4	2498.40	57.02	74.00	-16.98	24.37	5.35	27.30	0.00	100	241	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 2480 MHz.

Note:

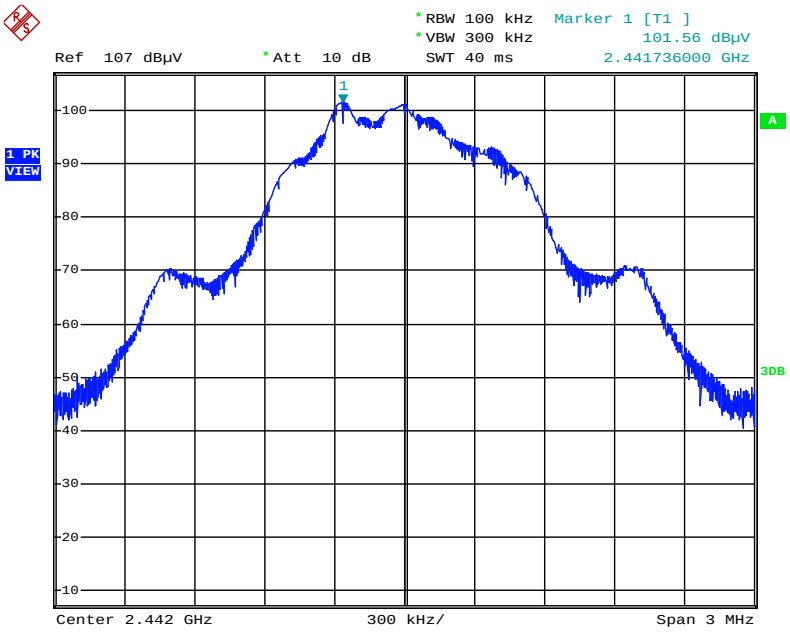
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

For Emission not in Restricted Band

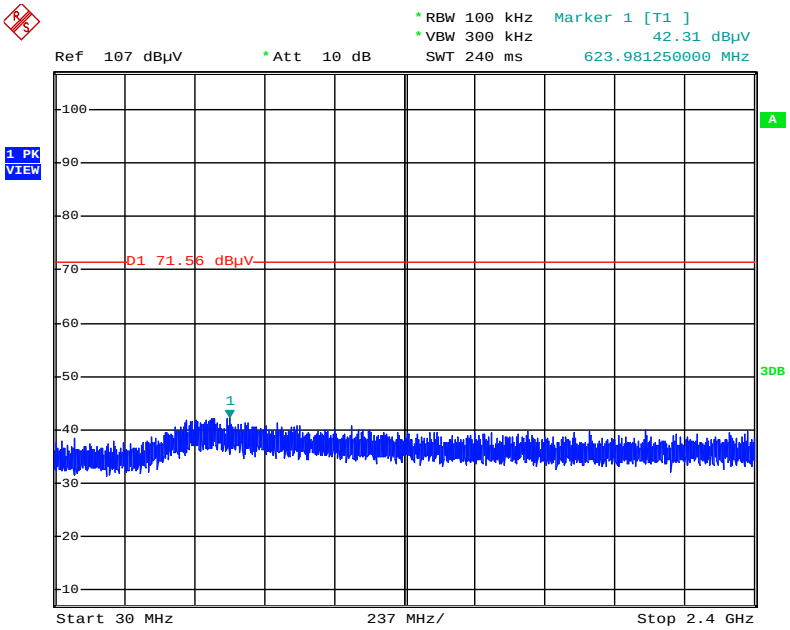
Test Mode : Mode 1

Plot on Configuration / Reference Level



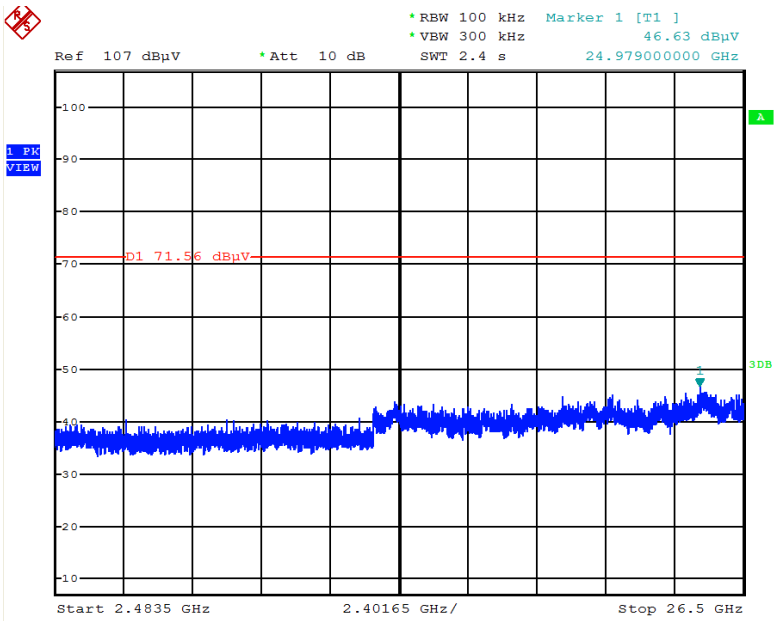
Date: 26.JAN.2016 22:30:56

Plot on Configuration For Bluetooth 4.0 / Channel 0 / 30MHz~2400MHz (down 30dBc)



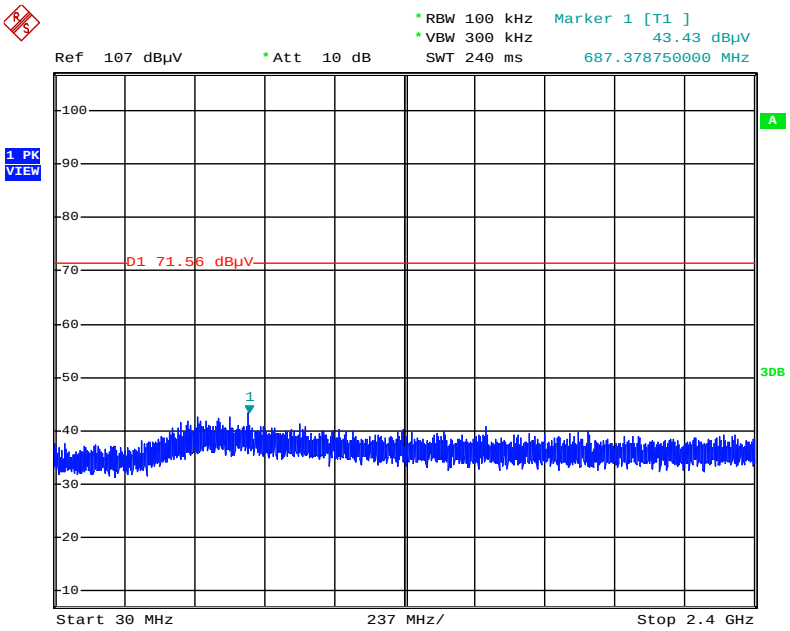
Date: 26.JAN.2016 22:31:51

Plot on Configuration For Bluetooth 4.0 / Channel 0 / 2483.5MHz~26500MHz (down 30dBc)



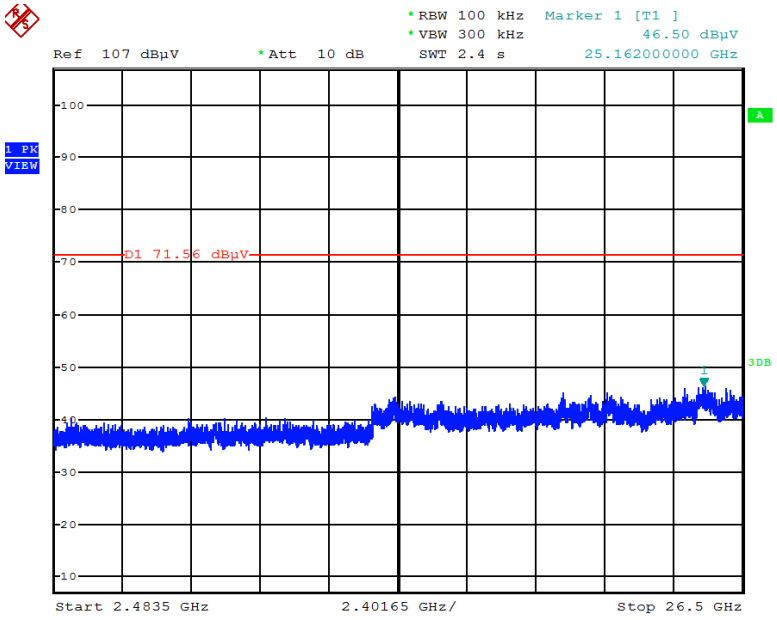
Date: 26.JAN.2016 22:32:15

Plot on Configuration For Bluetooth 4.0 / Channel 39 / 30MHz~2400MHz (down 30dBc)



Date: 26.JAN.2016 22:32:35

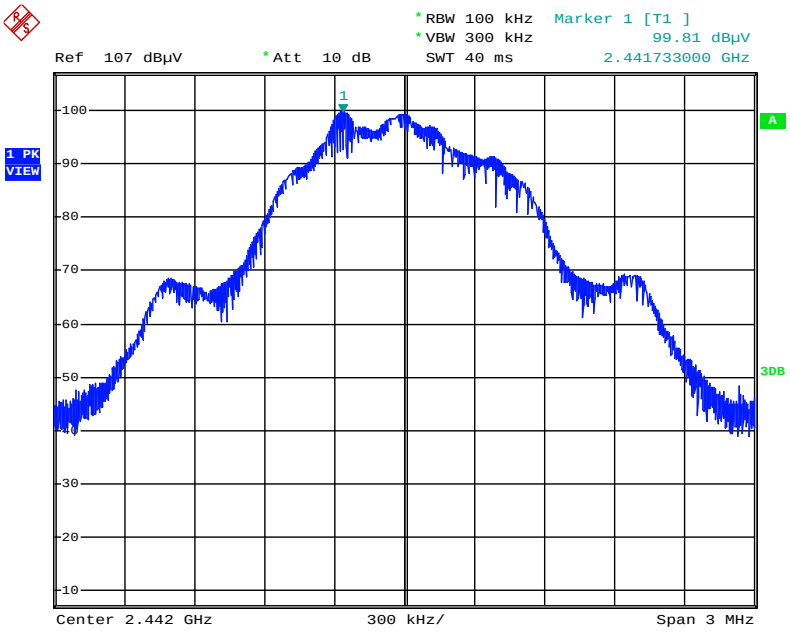
Plot on Configuration For Bluetooth 4.0 / Channel 39 / 2483.5MHz~26500MHz (down 30dBc)



Date: 26.JAN.2016 22:32:57

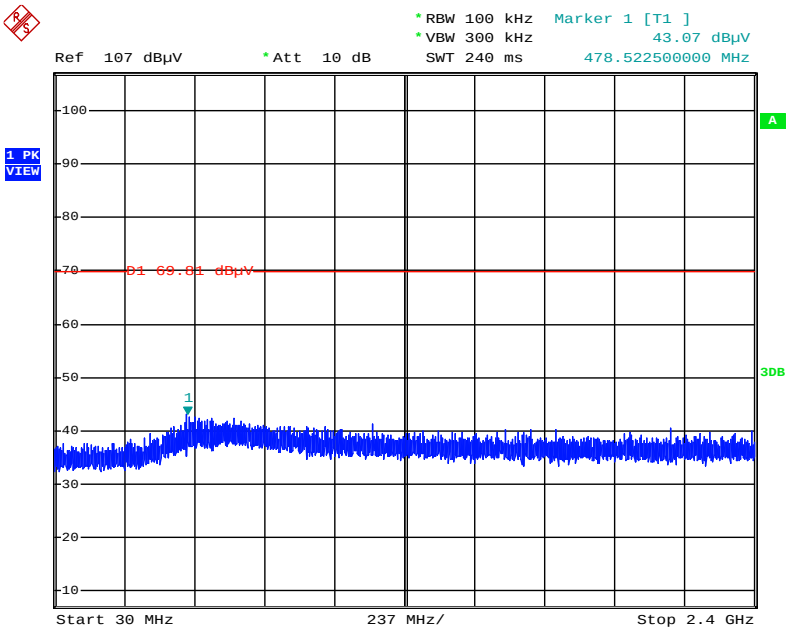
Test Mode : Mode 2

Plot on Configuration / Reference Level



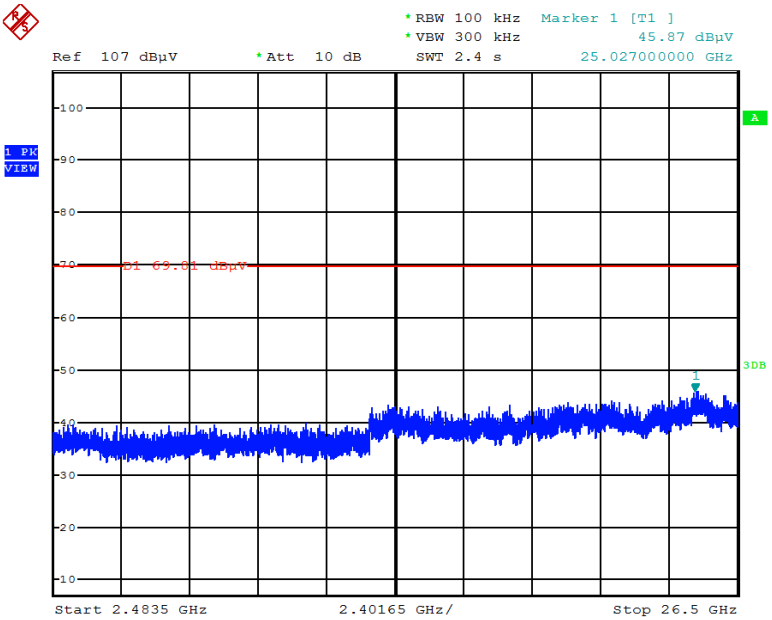
Date: 26.JAN.2016 21:27:50

Plot on Configuration For Bluetooth 4.0 / Channel 0 / 30MHz~2400MHz (down 30dBc)



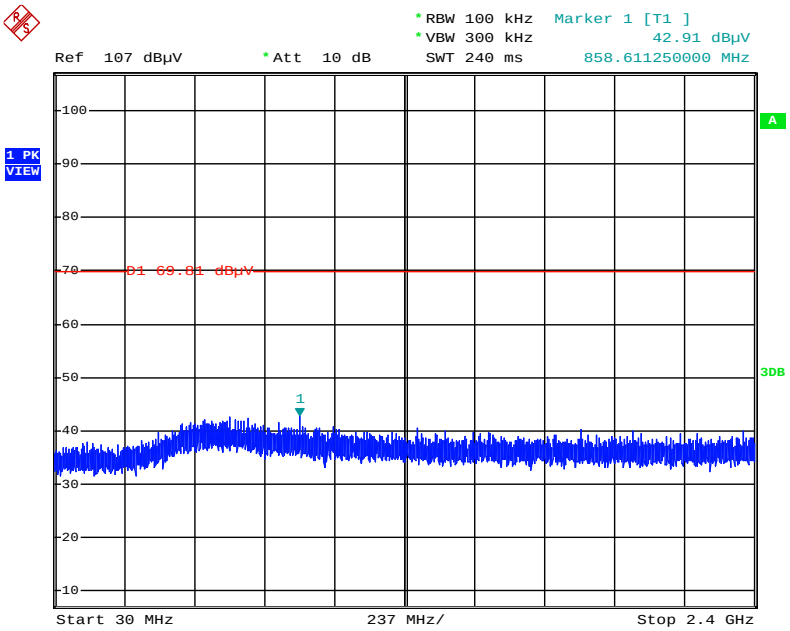
Date: 26.JAN.2016 21:29:49

Plot on Configuration For Bluetooth 4.0 / Channel 0 / 2483.5MHz~26500MHz (down 30dBc)



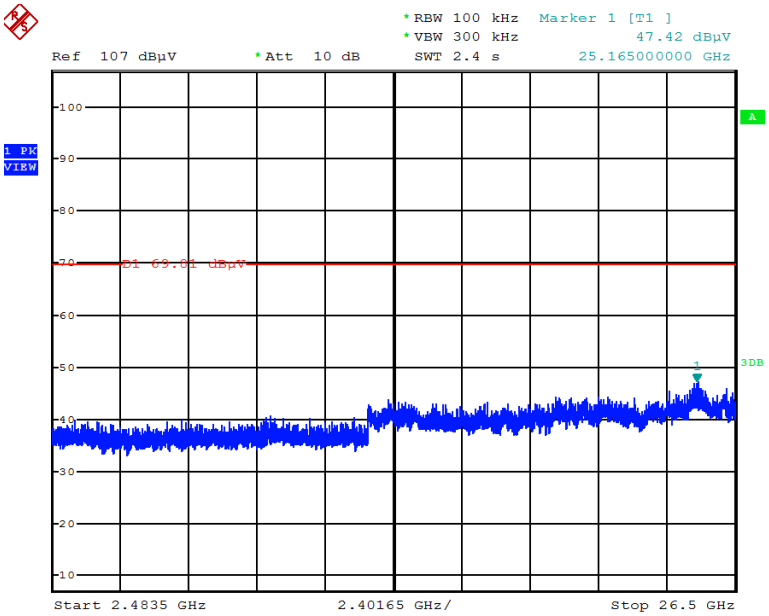
Date: 26.JAN.2016 21:30:20

Plot on Configuration For Bluetooth 4.0 / Channel 39 / 30MHz~2400MHz (down 30dBc)



Date: 26.JAN.2016 21:30:47

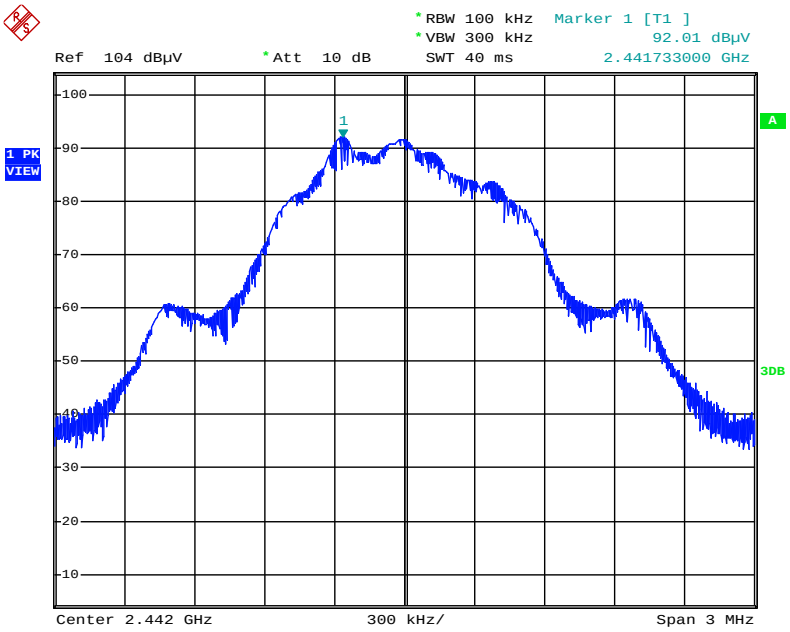
Plot on Configuration For Bluetooth 4.0 / Channel 39 / 2483.5MHz~26500MHz (down 30dBc)



Date: 26.JAN.2016 21:31:18

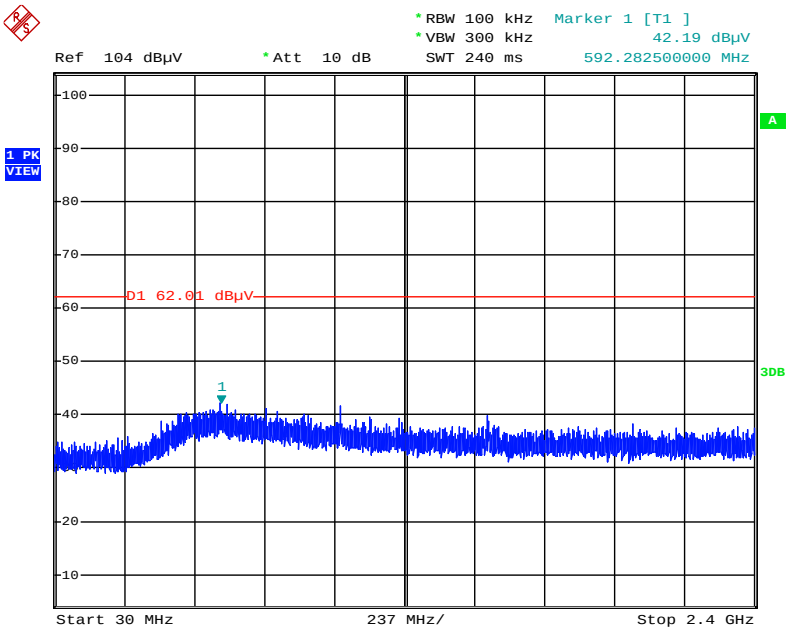
Test Mode : Mode 3

Plot on Configuration / Reference Level



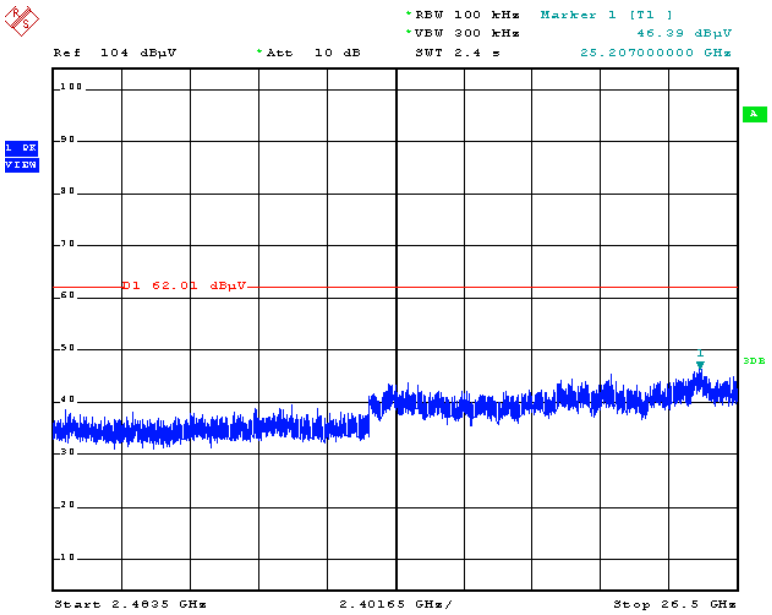
Date: 26.JAN.2016 23:15:39

Plot on Configuration For Bluetooth 4.0 / Channel 0 / 30MHz~2400MHz (down 30dBc)



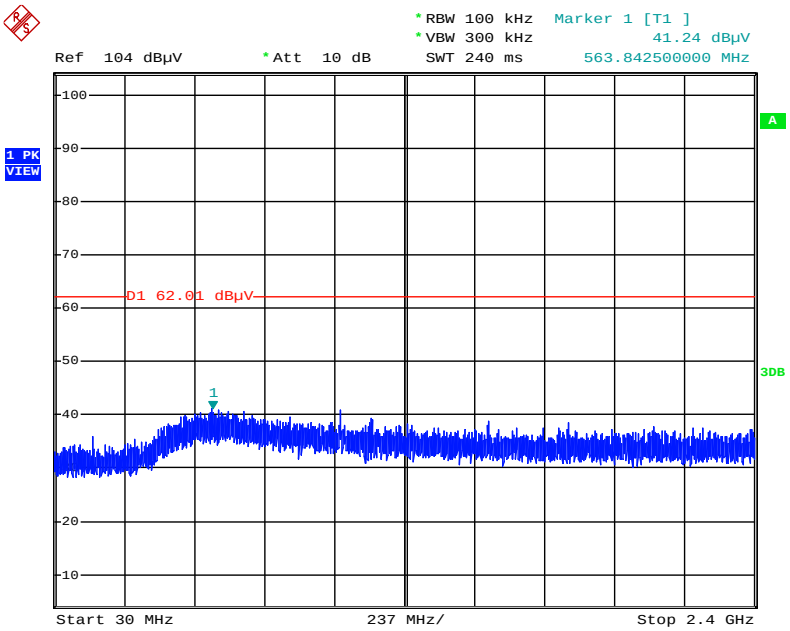
Date: 26.JAN.2016 23:16:36

Plot on Configuration For Bluetooth 4.0 / Channel 0 / 2483.5MHz~26500MHz (down 30dBc)



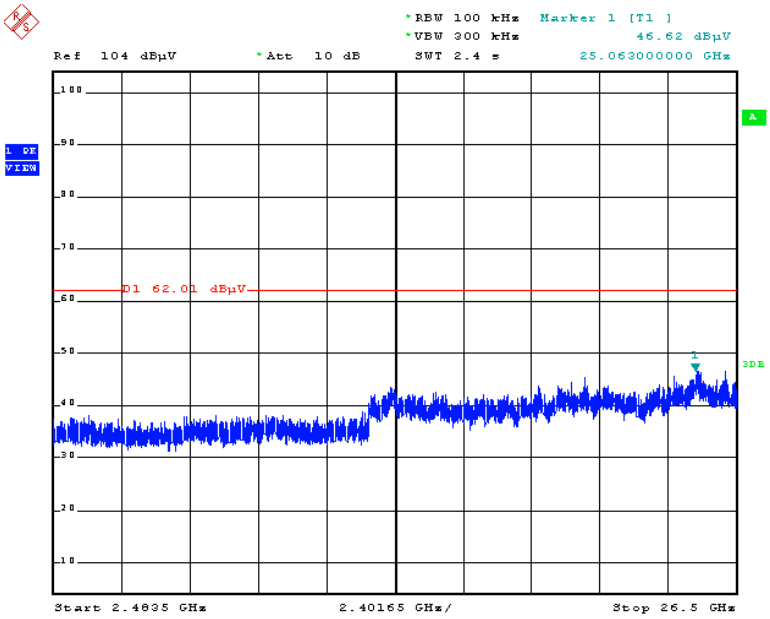
Date: 26.JAN.2016 23:16:55

Plot on Configuration For Bluetooth 4.0 / Channel 39 / 30MHz~2400MHz (down 30dBc)



Date: 26.JAN.2016 23:17:11

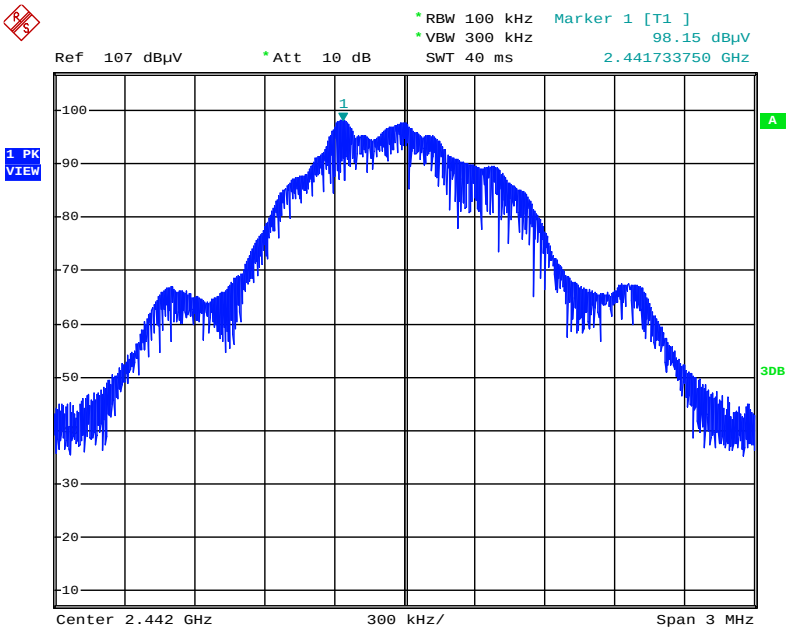
Plot on Configuration For Bluetooth 4.0 / Channel 39 / 2483.5MHz~26500MHz (down 30dBc)



Date: 26.JAN.2016 23:17:30

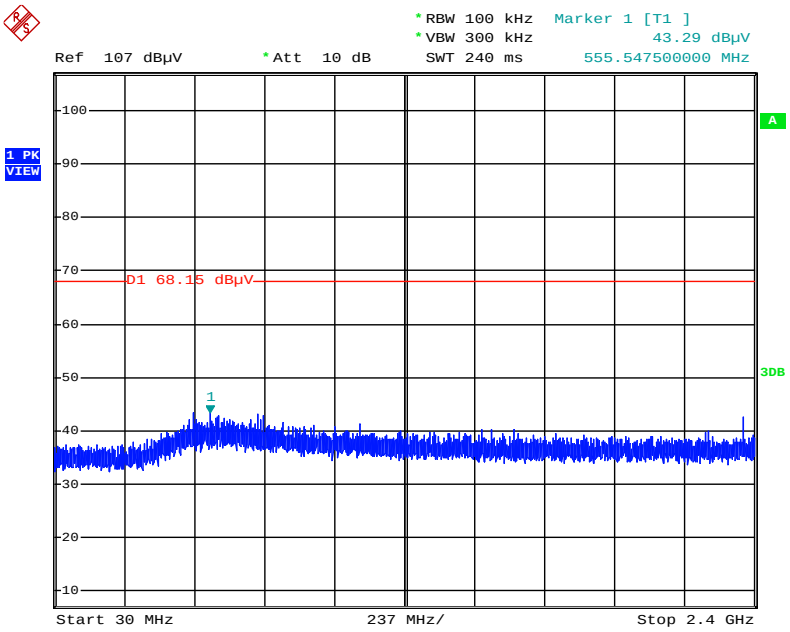
Test Mode : Mode 4

Plot on Configuration / Reference Level



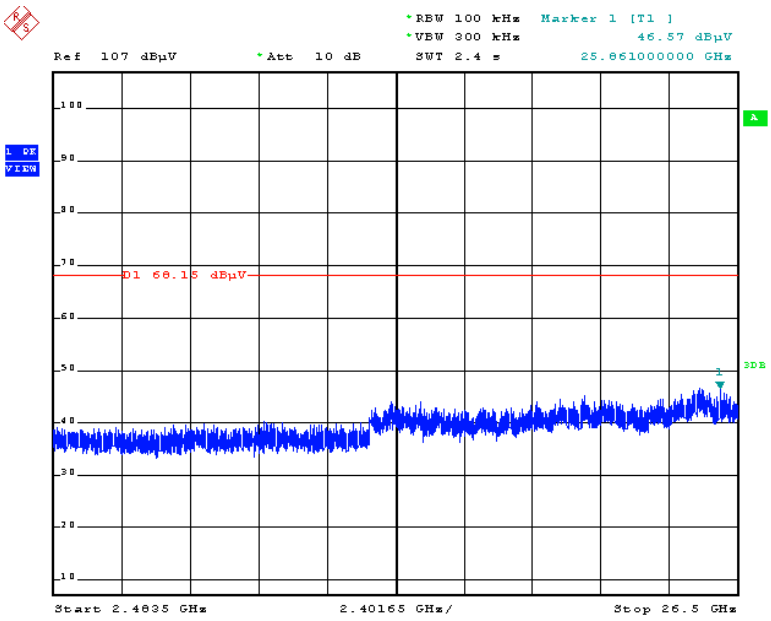
Date: 27.JAN.2016 00:43:04

Plot on Configuration For Bluetooth 4.0 / Channel 0 / 30MHz~2400MHz (down 30dBc)



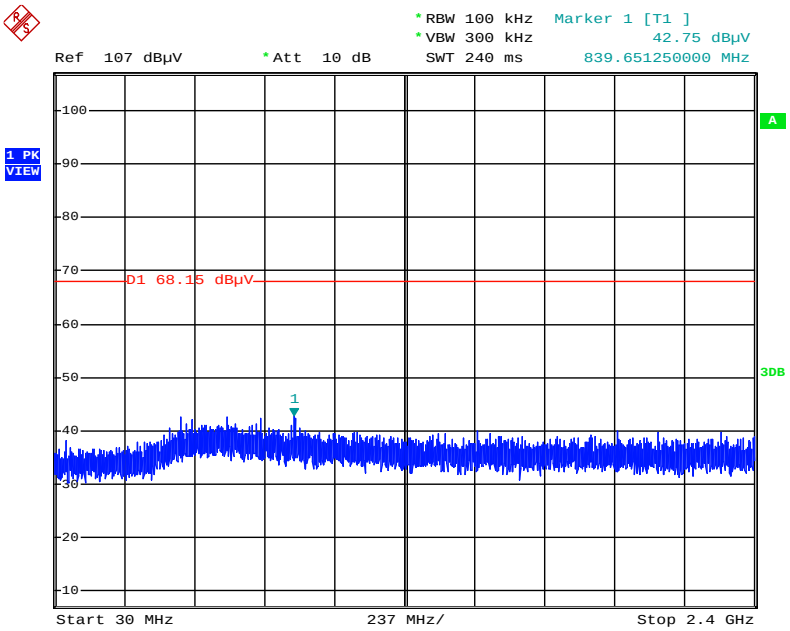
Date: 27.JAN.2016 00:44:20

Plot on Configuration For Bluetooth 4.0 / Channel 0 / 2483.5MHz~26500MHz (down 30dBc)



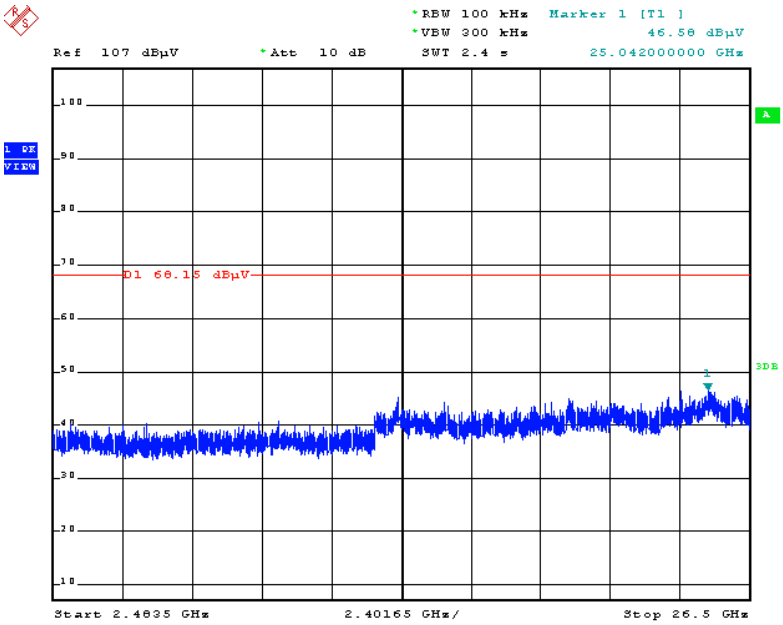
Date: 27.JAN.2016 00:44:58

Plot on Configuration For Bluetooth 4.0 / Channel 39 / 30MHz~2400MHz (down 30dBc)



Date: 27.JAN.2016 00:45:27

Plot on Configuration For Bluetooth 4.0 / Channel 39 / 2483.5MHz~26500MHz (down 30dBc)



Date: 27.JAN.2016 00:45:47

4.7. Antenna Requirements

4.7.1. 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.

4.7.2. 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
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 22, 2015	Conduction (CO01-CB)
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 27, 0216	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 08, 2015	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 23, 2015	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	May 25, 2015	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	37880	20MHz ~ 2GHz	Sep. 03, 2015	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Mar. 15, 2016	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02099	1GHz ~ 26.5GHz	Dec. 07, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 21, 2015	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100355	9kHz ~ 2.75GHz	Apr. 22, 2016	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
Test Software	Audix	E3	6.2009-I0-7	N/A	N/A	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 09, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 02, 2015	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. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%