FCC Test Report

Applicant	**:**	**BROADCOM CORPORATION**
Equipment	**:**	**802.11abgn WLAN + BLUETOOTH PCI-E MINICARD**
Brand Name	**:**	**Broadcom**
Model No.	**:**	**BCM943228HMB**
FCC ID	**:**	**QDS-BRCM1058**
Standard	**:**	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	**:**	**(DTS) Digital Transmission System**
Filling Type	**:**	**Class II Permissive Change**

The product sample received on Dec. 19, 2013 and completely tested on Jan. 24, 2014. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

Testing Laboratory
1190

Table of Contents

Summary of Test Result

Conformance Test Specifications					
Report Clause	**Ref. Std. Clause**	**Description**	**Measured**	**Limit**	**Result**
1.1.3	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm] LE:-0.50	Power [dBm] LE:30	Complied
3.2	15.247(d)	Transmitter Bandedge Emissions	Restricted Bands [dBuV/m at 3m]:2499.76MHz 59.11 (Margin 14.89dB) - PK 45.31 (Margin 8.69dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied
3.3	15.247(d)	Transmitter Unwanted Emissions	Restricted Bands [dBuV/m at 3m]:30.000MHz 28.57 (Margin 11.43dB) - PK	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied

Revision History

Report No.	Version	Description	Issued Date
FR3D1962-02AL	Rev. 01	Initial issue of report	Mar. 06, 2014

1 General Description

1.1 Information

1.1.1 Feature of Equipment Under Test

Product Feature	
Equipment	802.11abgn WLAN + BLUETOOTH PCI-E MINICARD
Brand Name	Broadcom
Model Name.	BCM943228HMB
FCC ID	QDS-BRCM1058
Installed into host	Equipment: Tablet PC Brand Name: Lenovo Marketing name: Lenovo Miix 2 11
EUT supports Radios application	WLAN 11a/b/g/n HT20 HT40 Bluetooth v2.1 + EDR Bluetooth v4.0
EUT Stage	Production Unit

1.1.2 RF General Information

RF General Information				
Frequency Range (MHz)	**Bluetooth Version**	**Ch. Frequency (MHz)**	**Channel Number**	**RF Output Power (dBm)**
2400-2483.5	v4.0 LE	2402-2480	0-39 [40]	-0.50
Note 1: Bluetooth LE (Low Energy) using GFSK modulation for DTS digital modulation. Note 2: RF output power specifies that Maximum Peak Conducted Output Power.				

1.1.3 Antenna Information

Antenna Category	
☒	Integral antenna (antenna permanently attached)
	☒ Temporary RF connector provided
	☐ No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.

Antenna Information			
Antenna 1	Manufacturer	WNC	
	P/N	Main:025.9000X.001	Aux: 025.9000Y.001
	Antenna Type	Main: PIFA Antenna	Aux: PIFA Antenna
	Peak gain	Main Antenna : WLAN(2.4G):1.87 dBi WLAN(5G):-0.16 dBi	Aux Antenna : Bluetooth:0.69 dBi WLAN(2.4G):0.69 dBi WLAN(5G):2.73 dBi
Antenna 2	Manufacturer	HT	
	P/N	Main:025.9000X.0011	Aux:025.9000Y.0011
	Antenna Type	Main:PIFA Antenna	Aux:PIFA Antenna
	Peak gain	Main Antenna : WLAN(2.4G):-1.63dBi WLAN(5G):1.84 dBi	Aux Antenna : Bluetooth:-0.35 dBi WLAN(2.4G):-0.35 dBi WLAN(5G):1.07dBi

Note: Performed the worst configuration for higher gain was test in final test report.

1.1.4 EUT Operational Condition

Supply Voltage	☒ AC mains	☐ DC	☐ System
Type of DC Source	☐ Internal DC supply	☒ External DC adapter	☒ Battery

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR FCC Part 15
- ANSI C63.10-2009
- FCC KDB 558074

1.3 Testing Location Information

Testing Location					
☒	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.			
		TEL : 886-3-327-3456	FAX : 886-3-327-0973		
Test Condition		**Test Site No.**		**Test Engineer**	**Test Environment**
RF Conducted		TH02-HY		Alex	24~26°C / 45~49%
Radiated Emission		03CH03-HY		Leo	21.4°C / 35%

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty		
Test Item		**Uncertainty**
RF output power, conducted		±0.63 dB
Unwanted emissions, conducted	9 – 150 kHz	±0.38 dB
	0.15 – 30 MHz	±0.42 dB
	30 – 1000 MHz	±0.51 dB
	1 – 18 GHz	±0.67 dB
	18 – 40 GHz	±0.83 dB
	40 – 200 GHz	N/A
All emissions, radiated	9 – 150 kHz	±2.49 dB
	0.15 – 30 MHz	±2.28 dB
	30 – 1000 MHz	±2.56 dB
	1 – 18 GHz	±3.59 dB
	18 – 40 GHz	±3.82 dB
	40 – 200 GHz	N/A
Temperature		±0.8 °C
Humidity		±3 %
DC and low frequency voltages		±3 %
Time		±1.42 %
Duty Cycle		±1.42 %

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing			
Bluetooth Version	**Transmit Chains (N_{TX})**	**Data Rate**	**Modulation Mode**
v4.0 LE	1	1 Mbps	LE-1Mbps
Note 1: Bluetooth LE (Low Energy) using GFSK modulation for DTS digital modulation. Note 2: Modulation modes consist below configuration: DSSS LE-1Mbps: GFSK (1Mbps)			

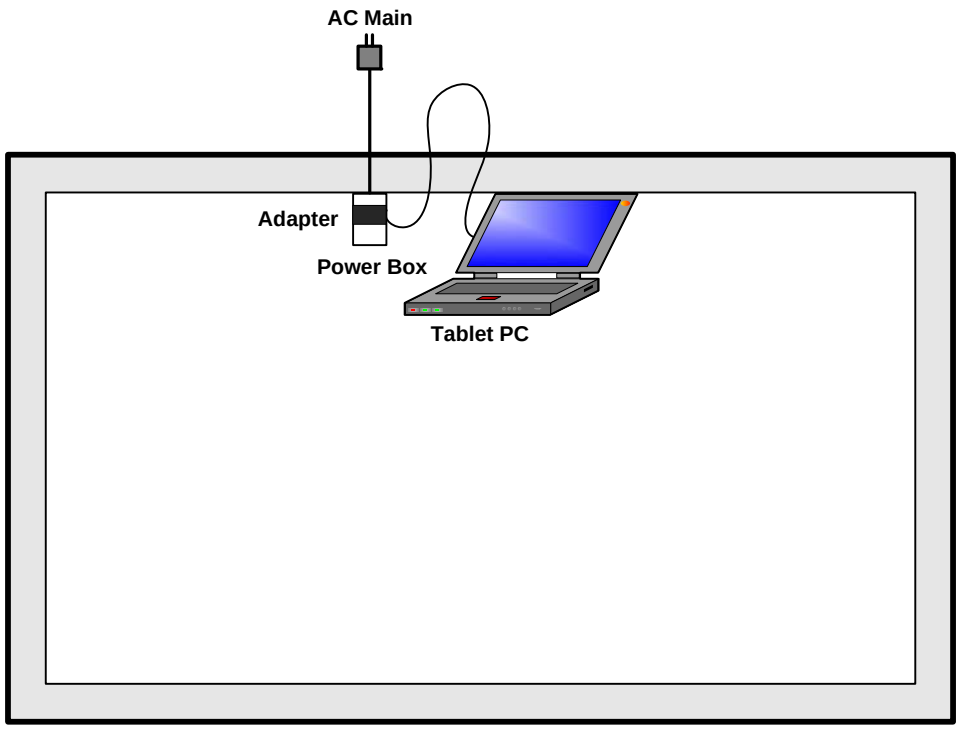
2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	RF Output Power
Test Condition	Conducted measurement at transmit chains
Modulation Mode	LE-1Mbps

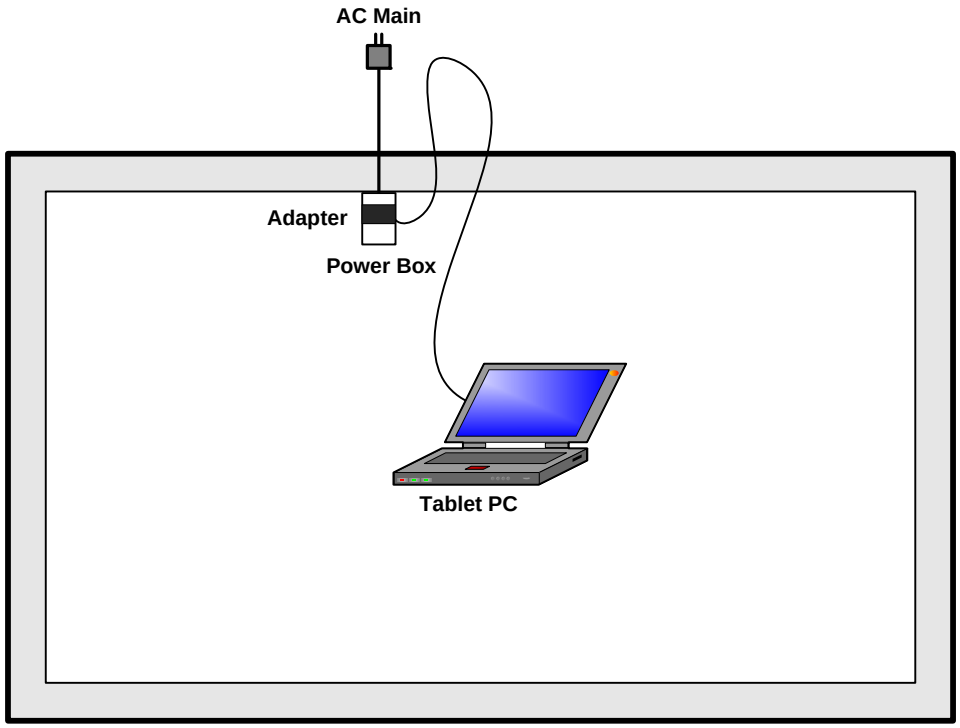
The Worst Case Mode for Following Conformance Tests			
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions		
Test Condition	Radiated measurement		
User Position	☐ EUT will be placed in fixed position.		
	☒ EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes. The worst planes is Y.		
	☐ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed two or three orthogonal planes.		
Operating Mode	☒ 1. AC Power & Radio link (Bluetooth)		
Modulation Mode	LE-1Mbps		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
			

2.3 Test Setup Diagram

Test Setup Diagram - Radiated Test (Below 1GHz)



Test Setup Diagram - Radiated Test (Above 1GHz)



3 Transmitter Test Result

3.1 RF Output Power

3.1.1 RF Output Power Limit

RF Output Power Limit for Digital Modulation Systems	
Maximum Peak Conducted Output Power or Maximum Conducted Output Power Limit	
☒ 2400-2483.5 MHz Band:	
☒ If G_{TX} ≤ 6 dBi, then P_{Out} ≤ 30 dBm (1 W)	
☐ Point-to-multipoint systems (P2M): If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6) dBm	
e.i.r.p. Power Limit:	
☒ 2400-2483.5 MHz Band	
☒ Point-to-multipoint systems (P2M): P_{eirp} ≤ 36 dBm (4 W)	
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, **G_{TX}** = the maximum transmitting antenna directional gain in dBi. **P_{eirp}** = e.i.r.p. Power in dBm.	

RF Output Power Limit for Frequency Hopping Systems		
Maximum Peak Conducted Output Power Limit		
☒ 2400-2483.5 MHz Band:		
☐ For Hopping Channel: N ≥ 79		
☐ If G_{TX} ≤ 6 dBi, then P_{Out} ≤ 30 dBm (1 W)		
☐ If G_{TX} > 6 dBi, then P_{Out} = 30 – (G_{TX} – 6) dBm		
☒ For Hopping Channel: N ≥ 15		
☒ If G_{TX} ≤ 6 dBi, then P_{Out} ≤ 21 dBm (0.125 W)		
☐ If G_{TX} > 6 dBi, then P_{Out} = 21 – (G_{TX} – 6) dBm		
e.i.r.p. Power Limit:		
☒ 2400-2483.5 MHz Band:		
☐ For Hopping Channel: N ≥ 79 - P_{eirp} ≤ 36 dBm (4 W)		
☒ For Hopping Channel: 79 > N ≥ 15 - P_{eirp} ≤ 27 dBm (0.5 W)		
G_{TX} = the maximum transmitting antenna directional gain in dBi. **P_{eirp}** = e.i.r.p. Power in dBm. **N:** Number of Hopping Frequencies **ChS**: Hopping Channel Separation		

3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method	
☒	Maximum Peak Conducted Output Power
☒	Refer as ANSI C63.10, clause 6.10.2.1 a) for peak power meter.
☐	Refer as ANSI C63.10, clause 6.10.2.1 a) for spectrum analyzer - (RBW ≥ EBW).
☒	For conducted measurement.
☒	The EUT supports single transmit chain and measurements performed on this transmit chain.
☐	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.

3.1.4 Test Setup

RF Output Power

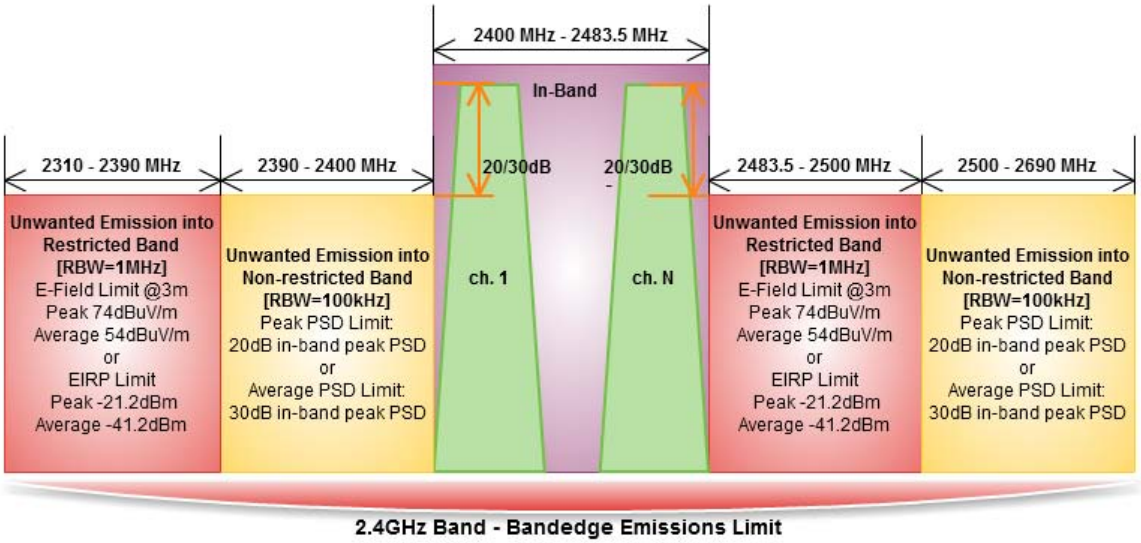
3.1.5 Test Result of Maximum Peak Conducted Output Power

Maximum Peak Conducted Output Power Result						
Condition		RF Output Power (dBm)				
Modulation Mode	Freq. (MHz)	RF Output Power	Power Limit	Antenna Gain (dBi)	EIRP Power	EIRP Limit
LE-1Mbps	2402	-0.56	30	0.69	0.13	36
LE-1Mbps	2440	-0.50	30	0.69	0.19	36
LE-1Mbps	2480	-0.64	30	0.69	0.05	36
Result		Complied				

3.2 Transmitter Bandedge Emissions

3.2.1 Transmitter Radiated Bandedge Emissions Limit

Transmitter Radiated Bandedge Emissions Limit



3.2.2 Measuring Instruments

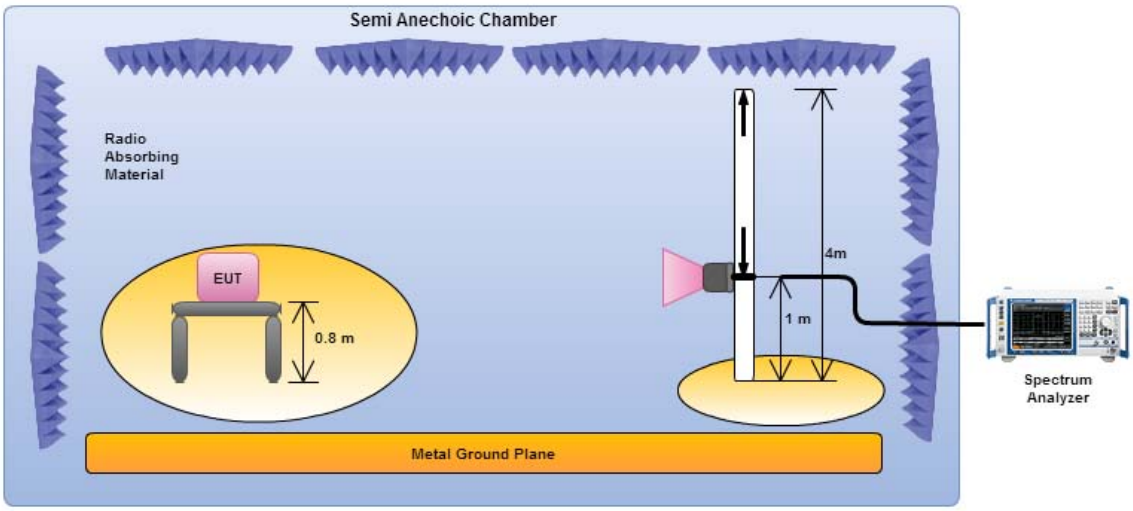
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method		
☒	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
☒	Refer as ANSI C63.10, clause 6.9.2.2 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.	
☒	For the transmitter unwanted emissions shall be measured using following options below:	
	☒	Refer as FCC KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
	☒	Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
		☐ Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle ≥98%)
		☐ Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
		☐ Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW≥1/T).
		☒ Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐ Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
		☒ Refer as FCC KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
☒	For the transmitter bandedge emissions shall be measured using following options below:	
	☐	Refer as FCC KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
	☒	Refer as ANSI C63.10, clause 6.9.2 for band-edge testing.
	☐	Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements.
☒	For radiated measurement, refer as FCC KDB 558074, clause 12.2.7 and ANSI C63.10, clause 6.6. Test distance is 3m.	
☐	For conducted measurement, refer as FCC KDB 558074, clause 12.2.2.	

3.2.4 Test Setup

Transmitter Radiated Bandedge Emissions



Electric field tests shall be performed in transmitter bandedge emissions using a calibrated horn antenna.

3.2.5 Transmitter Radiated Bandedge Emissions

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Non-restricted Band)								
Modulation	**N_{TX}**	**Test Freq. (MHz)**	**In-band PSD [i] (dBuV/100kHz)**	**Freq. (MHz)**	**Out-band PSD [o] (dBuV/100kHz)**	**[i] – [o] (dB)**	**Limit (dB)**	**Pol.**
LE-1Mbps	1	2402	68.23	2394.66	34.28	33.95	20	H
LE-1Mbps	1	2480	69.01	2528.56	39.30	29.71	20	H
Note 1: Measurement worst emissions of receive antenna polarization								

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band)										
Modulation Mode	**N_{TX}**	**Freq. (MHz)**	**Measure Distance (m)**	**Freq. (MHz) PK**	**Level (dBuV/m) PK**	**Limit (dBuV/m) PK**	**Freq. (MHz) AV**	**Level (dBuV/m) AV**	**Limit (dBuV/m) AV**	**Pol.**
LE-1Mbps	1	2402	3	2362.12	58.61	74	2379.26	45.04	54	H
LE-1Mbps	1	2480	3	2490.80	59.11	74	2499.76	45.31	54	H
Note 1: Measurement worst emissions of receive antenna polarization. Note 2: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is “Pulse On Time”, e.g., LE VBW≥1/625us, VBW=3kHz.										

3.3 Transmitter Unwanted Emissions

3.3.1 Transmitter Radiated Unwanted Emissions Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Un-restricted Band Emissions Limit	
RF output power procedure	**Limit (dB)**
Peak output power procedure	20
Average output power procedure	30

Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

3.3.2 Measuring Instruments

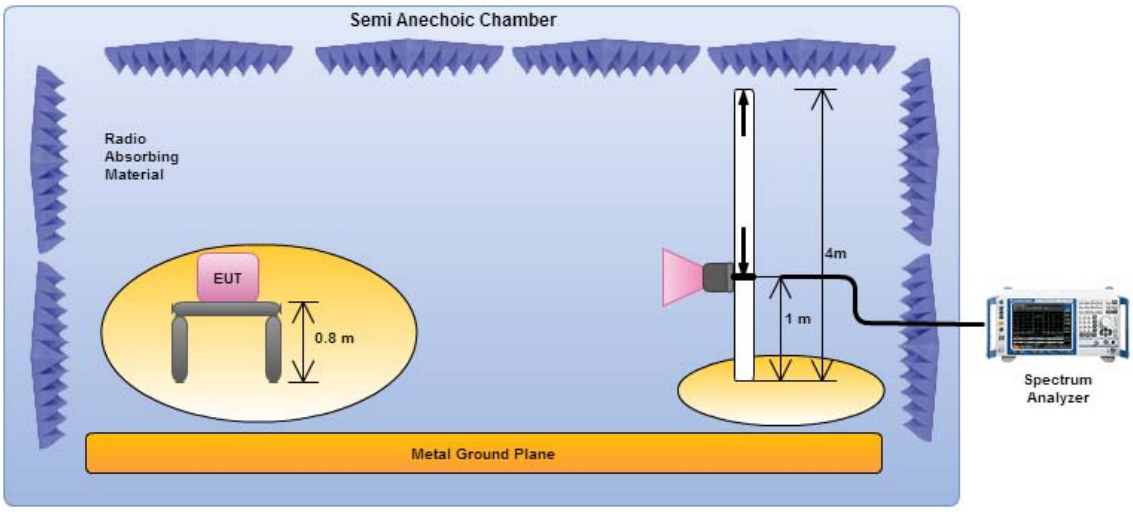
Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method		
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).	
☒	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
☒	For the transmitter unwanted emissions shall be measured using following options below:	
	☒	Refer as FCC KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
	☒	Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
		☐ Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle ≥98%)
		☐ Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
		☐ Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW≥1/T).
		☒ Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐ Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
		☒ Refer as FCC KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
		☒ Refer as FCC KDB 558074, clause 12.2.3 measurement procedure Quasi-Peak limit.
☒	For radiated measurement, refer as FCC KDB 558074, clause 12.2.7.	
	☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
	☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
	☒	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.
☒	The any unwanted emissions level shall not exceed the fundamental emission level.	
☒	All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.	

3.3.4 Test Setup

Transmitter Radiated Unwanted Emissions



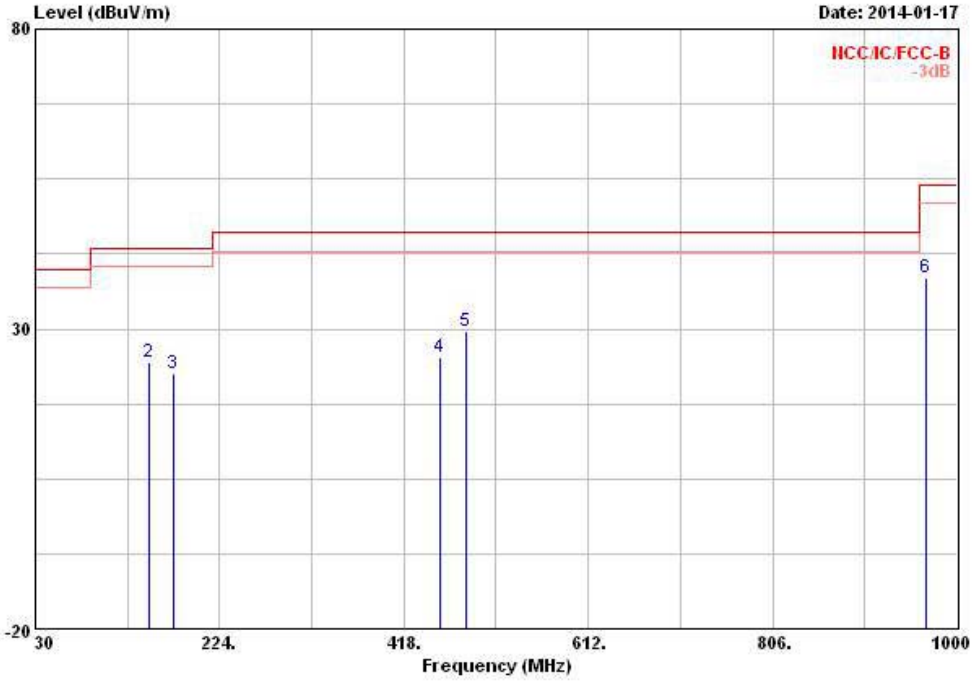
Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna. Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna and the frequency range of 1 GHz to 40 GHz using a calibrated horn antenna.

3.3.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

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

3.3.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

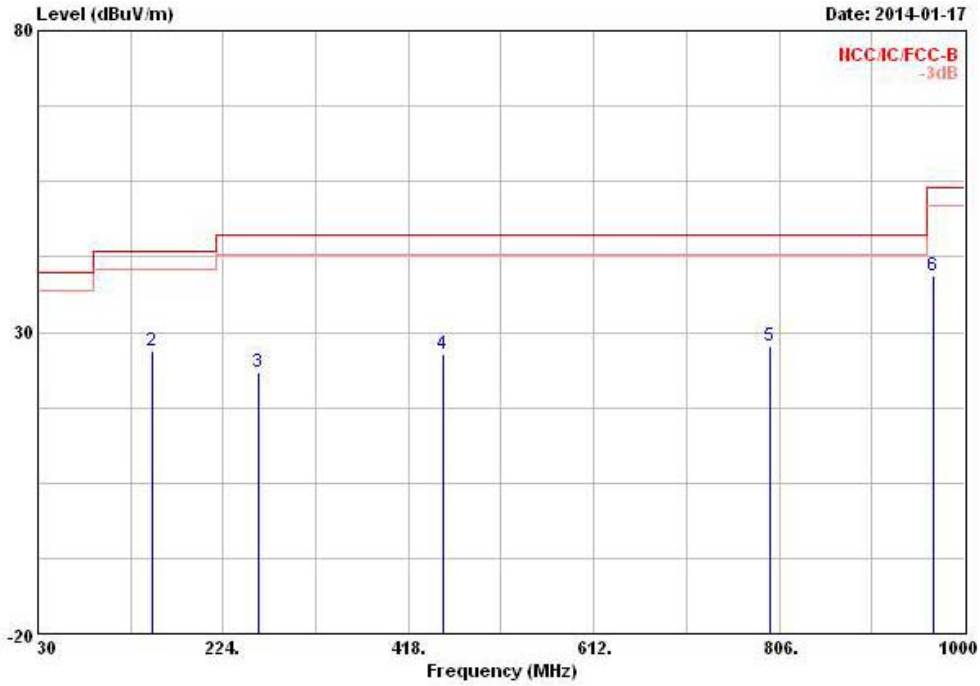
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	1	**Polarization**	V
Operating Function	AC Power & Radio link (Bluetooth)		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	30.000	28.57	-11.43	40.00	36.51	18.85	0.82	27.61	Peak	---	---
2 @	149.310	24.43	-19.07	43.50	38.92	10.68	2.02	27.19	Peak	---	---
3 @	175.500	22.56	-20.94	43.50	37.90	9.58	2.17	27.09	Peak	---	---
4 @	455.830	25.34	-20.66	46.00	32.82	16.63	3.53	27.64	Peak	---	---
5 @	482.990	29.61	-16.39	46.00	36.61	17.10	3.68	27.78	Peak	---	---
6 @	967.990	38.43	-15.57	54.00	39.22	21.18	5.39	27.36	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	1	**Polarization**	H
Operating Function	AC Power & Radio link (Bluetooth)		

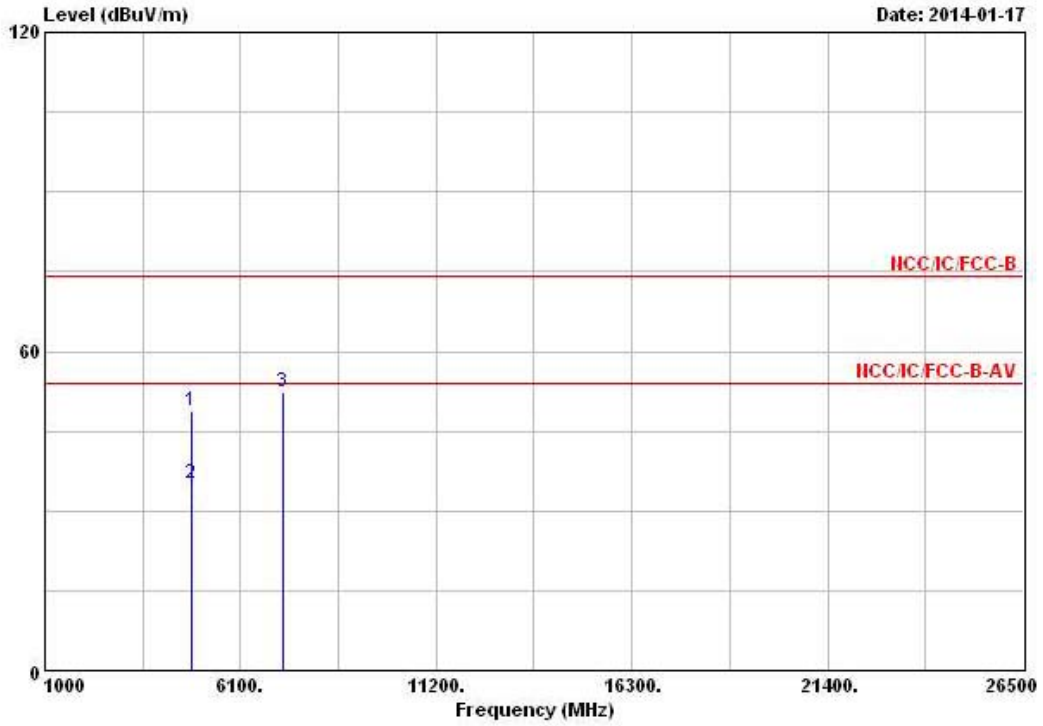


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	30.000	18.31	-21.69	40.00	26.25	18.85	0.82	27.61	Peak	---	---
2 @	149.310	26.87	-16.63	43.50	41.36	10.68	2.02	27.19	Peak	---	---
3 @	260.860	23.45	-22.55	46.00	33.82	13.75	2.67	26.79	Peak	---	---
4 @	454.860	26.44	-19.56	46.00	33.94	16.60	3.53	27.63	Peak	---	---
5 @	796.300	27.77	-18.23	46.00	31.01	19.66	4.90	27.80	Peak	---	---
6 @	967.990	39.24	-14.76	54.00	40.03	21.18	5.39	27.36	Peak	---	---

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

3.3.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)

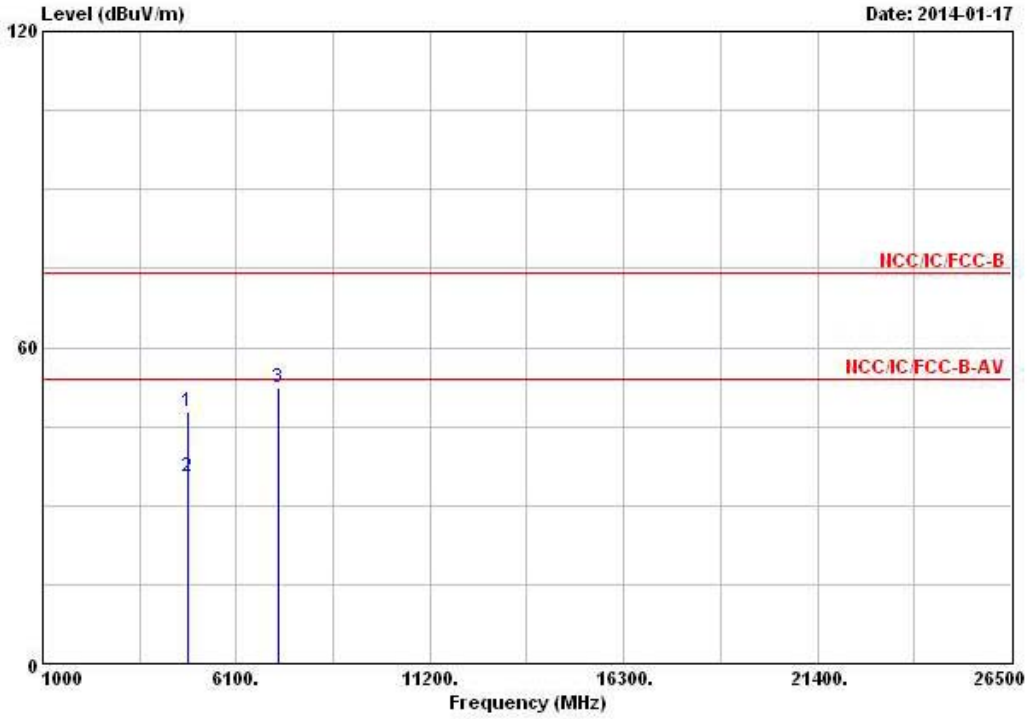
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	LE-1Mbps	**Test Freq. (MHz)**	2402
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4804.000	48.70	-25.30	74.00	42.37	33.06	5.71	32.44	Peak	---	---
2	4804.000	34.97	-19.03	54.00	28.64	33.06	5.71	32.44	Average	---	---
3	7206.000	52.29	-21.71	74.00	41.93	35.80	7.20	32.64	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (74.12 dBuV/m).
Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

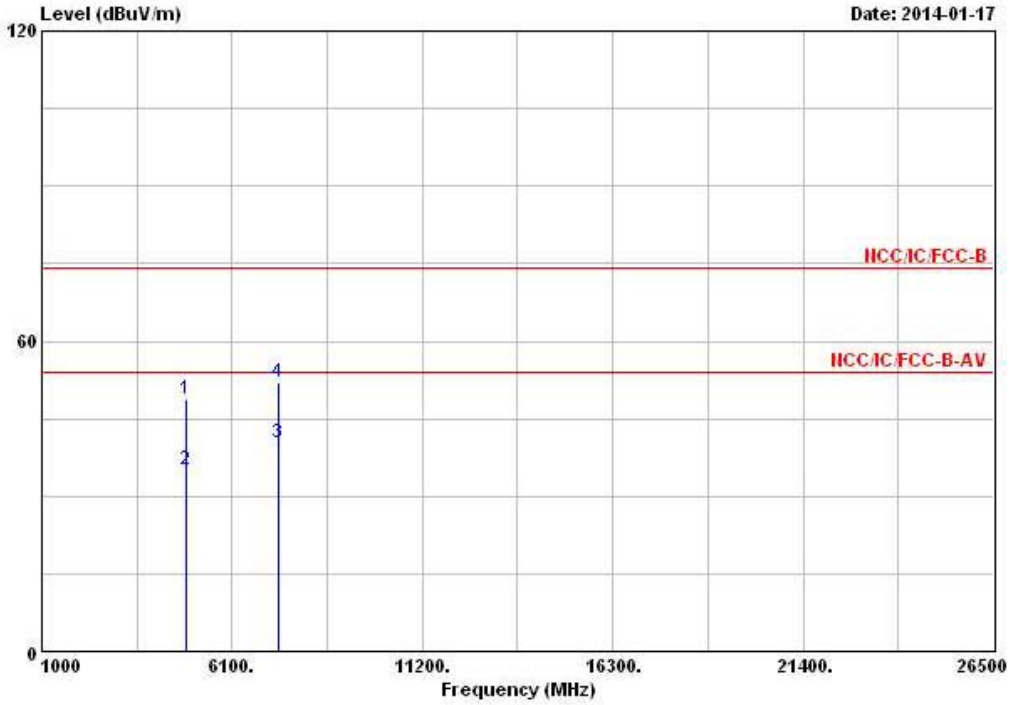
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	LE-1Mbps	**Test Freq. (MHz)**	2402
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4804.000	47.83	-26.17	74.00	41.50	33.06	5.71	32.44	Peak	---	---
2 @	4804.000	35.46	-18.54	54.00	29.13	33.06	5.71	32.44	Average	---	---
3	7206.000	52.27	-21.73	74.00	41.91	35.80	7.20	32.64	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (74.12 dBuV/m).
Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

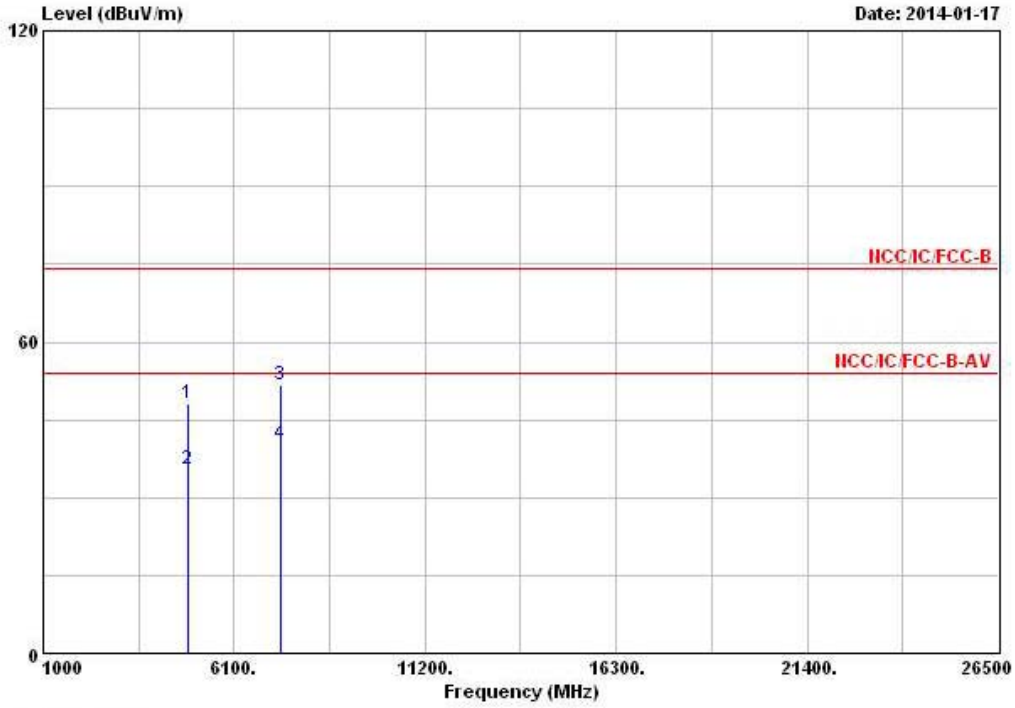
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	LE-1Mbps	**Test Freq. (MHz)**	2440
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4880.000	48.67	-25.33	74.00	42.19	33.18	5.72	32.42	Peak	---	---
2	4880.000	35.26	-18.74	54.00	28.78	33.18	5.72	32.42	Average	---	---
3 @	7320.000	40.28	-13.72	54.00	29.58	36.09	7.28	32.67	Average	---	---
4	7320.000	51.92	-22.08	74.00	41.22	36.09	7.28	32.67	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (74.37 dBuV/m).
Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

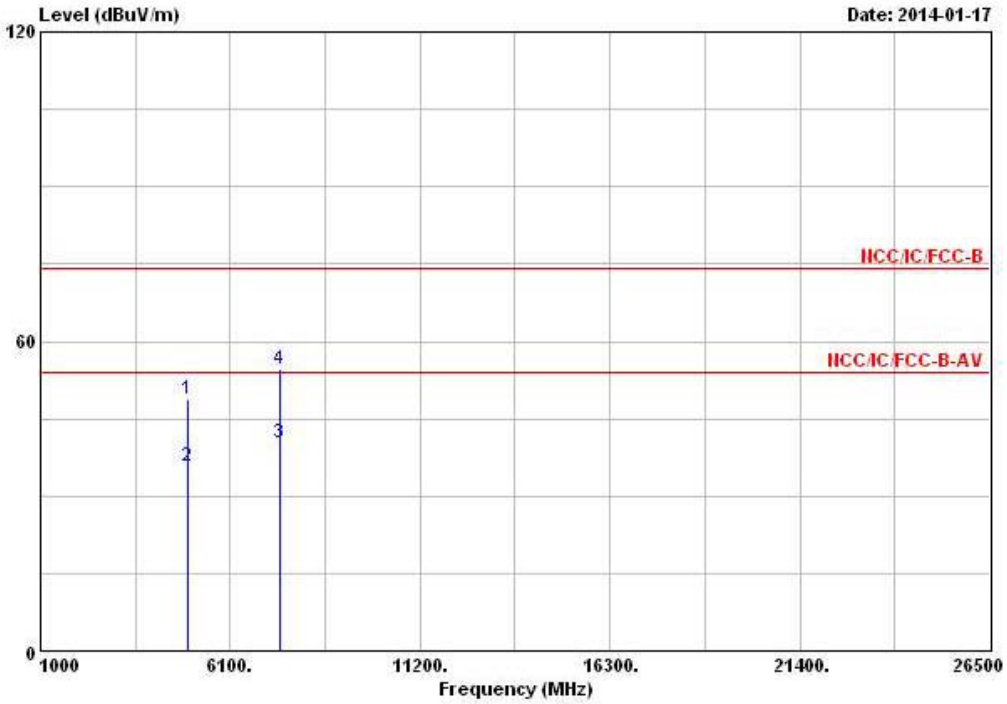
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	LE-1Mbps	**Test Freq. (MHz)**	2440
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4880.000	48.29	-25.71	74.00	41.81	33.18	5.72	32.42	Peak	---	---
2 @	4880.000	35.46	-18.54	54.00	28.98	33.18	5.72	32.42	Average	---	---
3	7320.000	51.68	-22.32	74.00	40.98	36.09	7.28	32.67	Peak	---	---
4 @	7320.000	40.23	-13.77	54.00	29.53	36.09	7.28	32.67	Average	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (74.37 dBuV/m).
Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

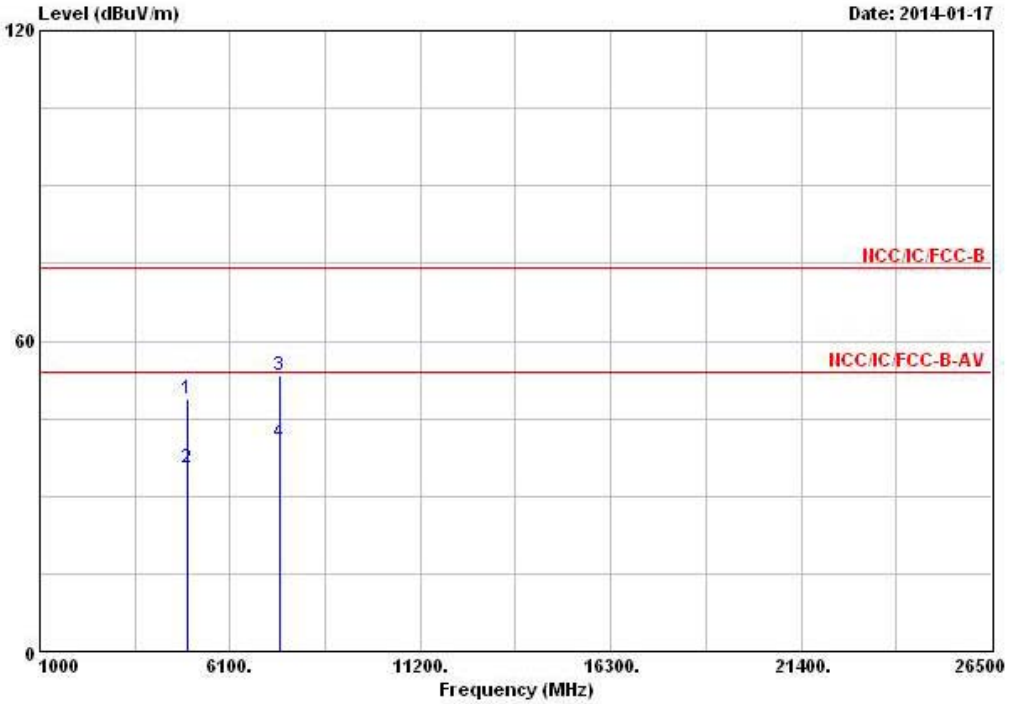
Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	LE-1Mbps	**Test Freq. (MHz)**	2480
Operating Function	Transmit	**Polarization**	V



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4960.000	48.67	-25.33	74.00	41.99	33.34	5.75	32.41	Peak	---	---
2 @	4960.000	35.80	-18.20	54.00	29.12	33.34	5.75	32.41	Average	---	---
3 @	7440.000	40.34	-13.66	54.00	29.30	36.38	7.37	32.71	Average	---	---
4	7440.000	54.72	-19.28	74.00	43.68	36.38	7.37	32.71	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (71.96 dBuV/m).
Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	LE-1Mbps	**Test Freq. (MHz)**	2480
Operating Function	Transmit	**Polarization**	H



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4960.000	48.91	-25.09	74.00	42.23	33.34	5.75	32.41	Peak	---	---
2 @	4960.000	35.60	-18.40	54.00	28.92	33.34	5.75	32.41	Average	---	---
3	7440.000	53.33	-20.67	74.00	42.29	36.38	7.37	32.71	Peak	---	---
4 @	7440.000	40.38	-13.62	54.00	29.34	36.38	7.37	32.71	Average	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (71.96 dBuV/m).
Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9KHz ~ 40GHz	Jun. 07, 2013	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz ~ 40GHz	Aug. 17, 2013	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz ~ 40GHz	Aug. 17, 2013	Conducted (TH02-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Nov. 30, 2013	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May 03, 2013	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Aug. 20, 2013	Radiation (03CH03-HY)
Spectrum	R&S	FSP40	100004	9kHz ~ 40GHz	Mar. 11, 2013	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 21, 2013	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	May 31, 2013	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz ~ 40GHz	Jan. 10, 2014	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 16, 2013	Radiation (03CH03-HY)
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec. 11, 2013	Radiation (03CH03-HY)
Turn Table	EM Electronics	EM Electronics	060615	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiation (03CH03-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	TESEQ	HLA 6120	31244	9kHz ~ 30MHz	Dec. 02, 2012	Radiation (03CH03-HY)

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