

FCC Test Report

Equipment : Ultra High Fidelity Mobile Speakers
Brand Name : korus
Model No. : M20
FCC ID : SCGM202014
Standard : 47 CFR FCC Part 15.249
Operating Band : 2400 MHz – 2483.5 MHz
FCC Classification : DXX
Applicant : Core Brands, LLC
1800 South McDowell Blvd-2nd Floor, Petaluma, CA
94954 USA

The product sample received on Jul. 18, 2014 and completely tested on Jul. 31, 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:

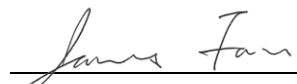

James Fan / Assistant Manager



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Summary of Test Result

Conformance Test Specifications					
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]:16.055 MHz 29.09 (Margin 20.91dB) - AV 45.53 (Margin 14.47dB) - QP	FCC 15.207	Complied
3.2	15.215(c)	Emission Bandwidth	2.287 MHz; fall in band	Information only	Complied
3.3	15.249(a)	Fundamental Emissions	[dBuV/m at 3m]: 57.2 (Margin 36.8dB) average 112.84 (Margin 1.16 dB) Peak	[dBuV/m at 3m]: average: 94 Peak : 114	Complied
3.3	15.249(a)/ (d)	Transmitter Radiated Unwanted Emissions	[dBuV/m at 3m]:162.89MHz 39.31 (Margin 4.19 dB) - PK	Harmonics: 54 dBuV/m@3m Other band: 50 dB or FCC 15.209, whichever is the lesser attenuation.	Complied



SPORTON INTERNATIONAL INC.
TEL : 886-3-3273456
FAX : 886-3-3270973

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information					
Frequency Range (MHz)	Modulation	Ch. Frequency (MHz)	Channel Number	Fundamental Field Strength (dBuV/m)	Co-location
2400-2483.5	FSK	2403.585 - 2477.313	1-49 [49]	57.2	N/A
Note 1: Field strength performed average level at 3m.					

1.1.2 Antenna Information

Antenna Category	
☒	Integral antenna (antenna permanently attached)
☐	External antenna (dedicated antennas) ; Unique antenna connector

Antenna General Information			
No.	Ant. Cat.	Ant. Type	Gain (dBi)
1	Integral	PIFA	2

1.1.3 Type of EUT

Identify EUT	
EUT Serial Number	N/A
Presentation of Equipment	☐ Production ; ☒ Pre-Production ; ☐ Prototype
Type of EUT	
☒	Stand-alone
☐	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: ...
☐	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: ...
☐	Other:

1.1.4 EUT Operational Condition

Supply Voltage	☒ AC mains	☒ DC (3.7 Vdc)	
Type of DC Source	☐ Internal DC supply	☐ External DC adapter	☒ Battery

1.2 Accessories and Support Equipment

Accessories				
No.	Equipment	Brand Name	Model Name	Spec.
1	AC Adapter	Salcomp	S11A02	Rating: I/P: 100-240V~50-60Hz, 450mA O/P: 5V, 2100MA
2	Battery	---	---	Rating: 3.7Vdc
3	USB Cable	---	---	1m, shielded w/o core.

1.3 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

1.4 Testing Location Information

Testing Location				
☒	Sporton Lab	ADD : No. 52, Hwa Ya 1 st 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	
☒	ICC Lab	ADD : No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsein 333, Taiwan (R.O.C.)	TEL : 886-3-271-8666 FAX : 886-3-318-0155	
Test Condition		Test Site No.	Test Engineer	Test Environment
RF Conducted		TH01-HY	Mark Liao	21°C / 62%
AC Conduction*		CO01-WS	Skys Huang	21°C / 68%
Radiated Emission*		03CH02-WS	York Lin	24-26°C / 66%
				Jul. 18, ~ Jul. 21, 2014

Note: * Sporton Lab subcontracts this test item to ICC lab (TAF:2732).

ICC lab is a TAF accreditation test firm and also is an approved supplier of Sporton Lab.

- FCC site registration No.: 657002
- IC site registration No.: 10807A-2

1.5 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	Limit
AC power-line conducted emissions		±2.26 dB	N/A
Emission bandwidth,		±1.42 %	N/A
Unwanted emissions, conducted	30 – 1000 MHz	±0.51 dB	N/A
	1 – 18 GHz	±0.67 dB	N/A
	18 – 40 GHz	±0.83 dB	N/A
	40 – 200 GHz	N/A	N/A
All emissions, radiated	30 – 1000 MHz	±2.56 dB	N/A
	1 – 18 GHz	±3.59 dB	N/A
	18 – 40 GHz	±3.82 dB	N/A
	40 – 200 GHz	N/A	N/A
Temperature		±0.8 °C	N/A
Humidity		±3 %	N/A
DC and low frequency voltages		±3 %	N/A
Time		±1.42 %	N/A
Duty Cycle		±1.42 %	N/A

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Modulation Used for Conformance Testing	
Test Mode	Field Strength (dBuV/m at 3 m)
GFSK-Transmit	57.2

2.2 Test Channel Frequencies Configuration

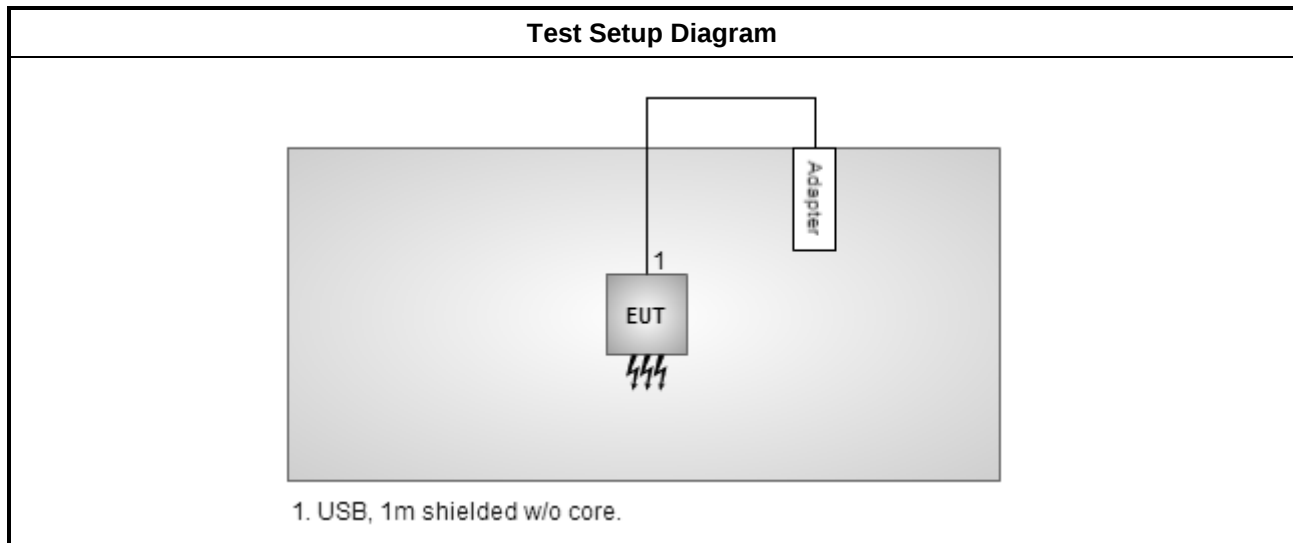
Test Channel Frequencies Configuration	
Test Mode	Test Channel Frequencies (MHz)
GFSK-Transmit	2403.585-(F1), 2438.913-(F2), 2477.313-(F3)

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral (120Vac / 60Hz)
Operating Mode	Operating Mode Description
1	Radio link, charging by adapter

The Worst Case Mode for Following Conformance Tests			
Tests Item	Emission Bandwidth, Fundamental Emissions, Radiated Unwanted 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 two orthogonal planes. The worst planes is X.		
	☐ 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. The worst planes is X.		
Operating Mode	☒ 1. Radio link, charging by adapter		
Test Mode	GFSK-Transmit		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			

2.4 Test Setup Diagram



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

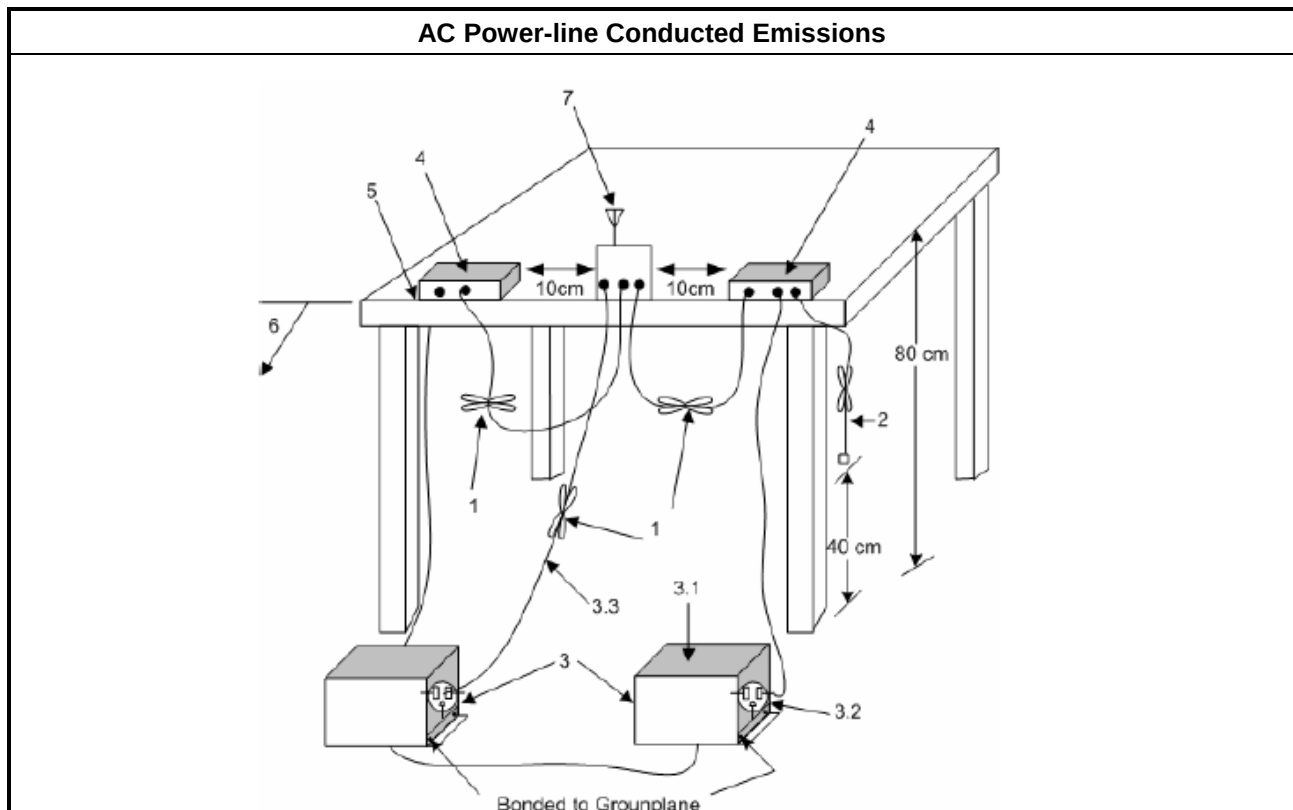
3.1.2 Measuring Instruments

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

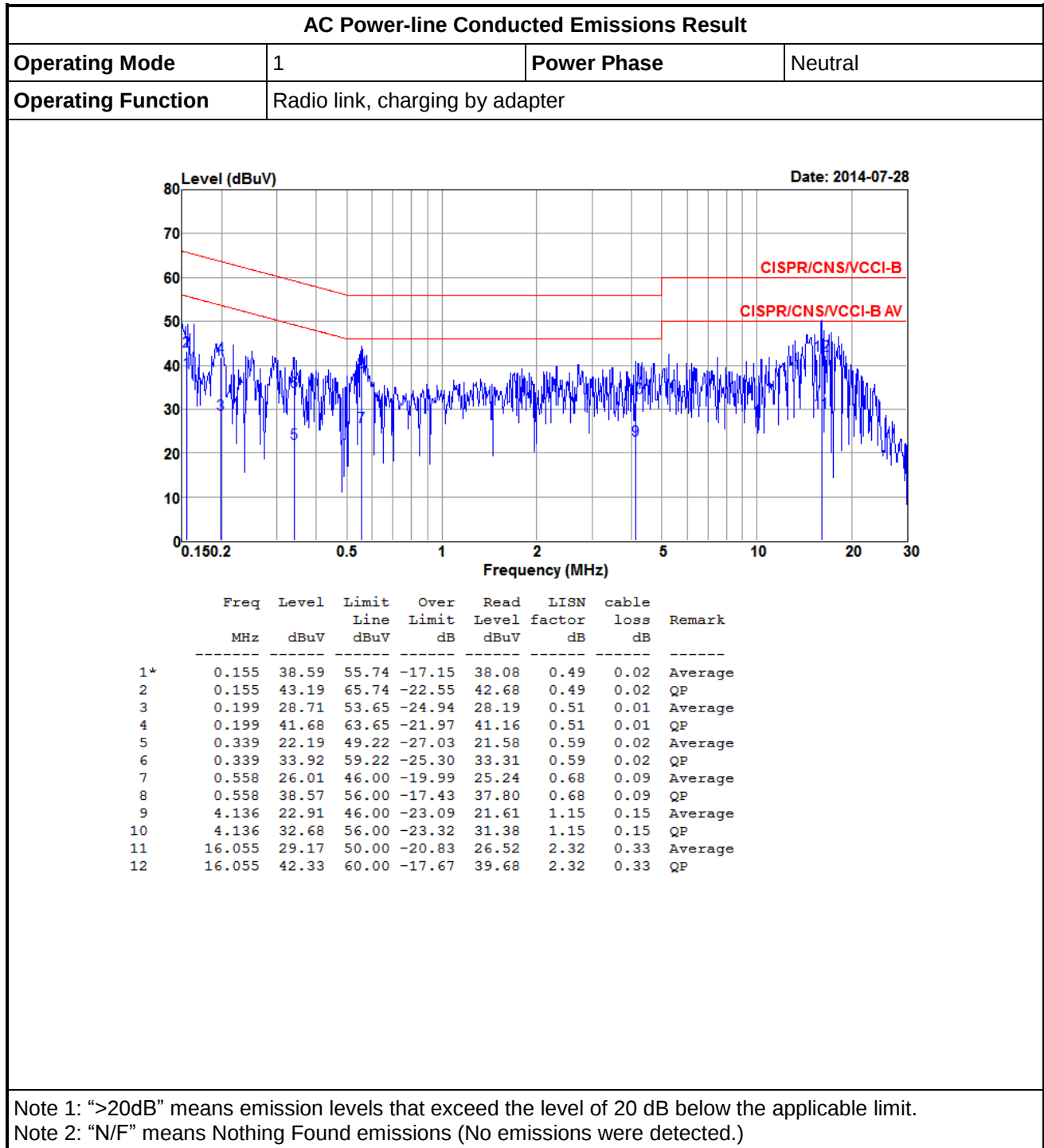
3.1.3 Test Procedures

Test Method
☒ Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions.

3.1.4 Test Setup

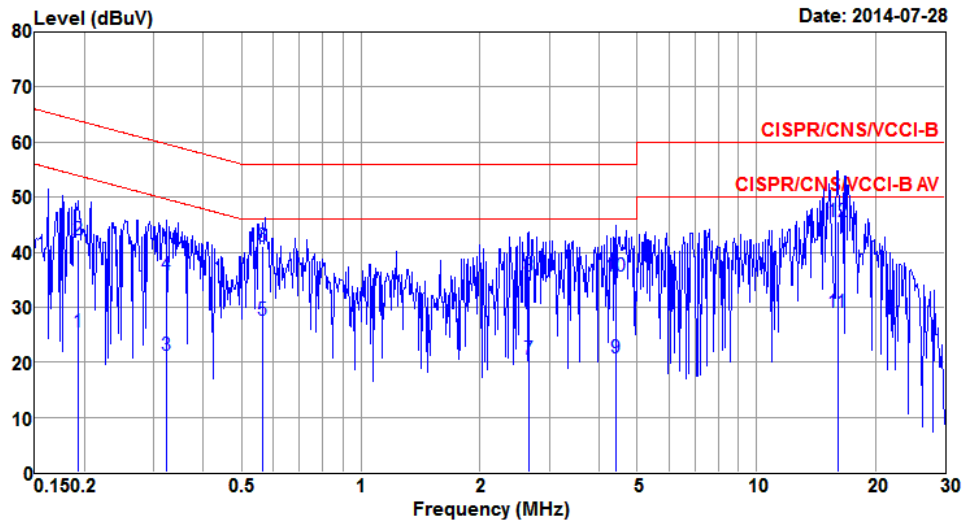


3.1.5 Test Result of AC Power-line Conducted Emissions



AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	Radio link, charging by adapter		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.193	25.40	53.89	-28.49	24.97	0.42	0.01	Average
2	0.193	42.28	63.89	-21.61	41.85	0.42	0.01	QP
3	0.322	21.26	49.66	-28.40	20.74	0.50	0.02	Average
4	0.322	35.87	59.66	-23.79	35.35	0.50	0.02	QP
5	0.563	27.54	46.00	-18.46	26.85	0.60	0.09	Average
6	0.563	41.07	56.00	-14.93	40.38	0.60	0.09	QP
7	2.664	20.53	46.00	-25.47	19.42	1.04	0.07	Average
8	2.664	35.74	56.00	-20.26	34.63	1.04	0.07	QP
9	4.407	20.70	46.00	-25.30	19.40	1.14	0.16	Average
10	4.407	35.63	56.00	-20.37	34.33	1.14	0.16	QP
11	16.055	29.09	50.00	-20.91	26.79	1.97	0.33	Average
12*	16.055	45.53	60.00	-14.47	43.23	1.97	0.33	QP

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

3.2 Emission Bandwidth

3.2.1 Emission Bandwidth Limit

Emission Bandwidth Limit	
☒	Emission bandwidth falls completely within authorized band.

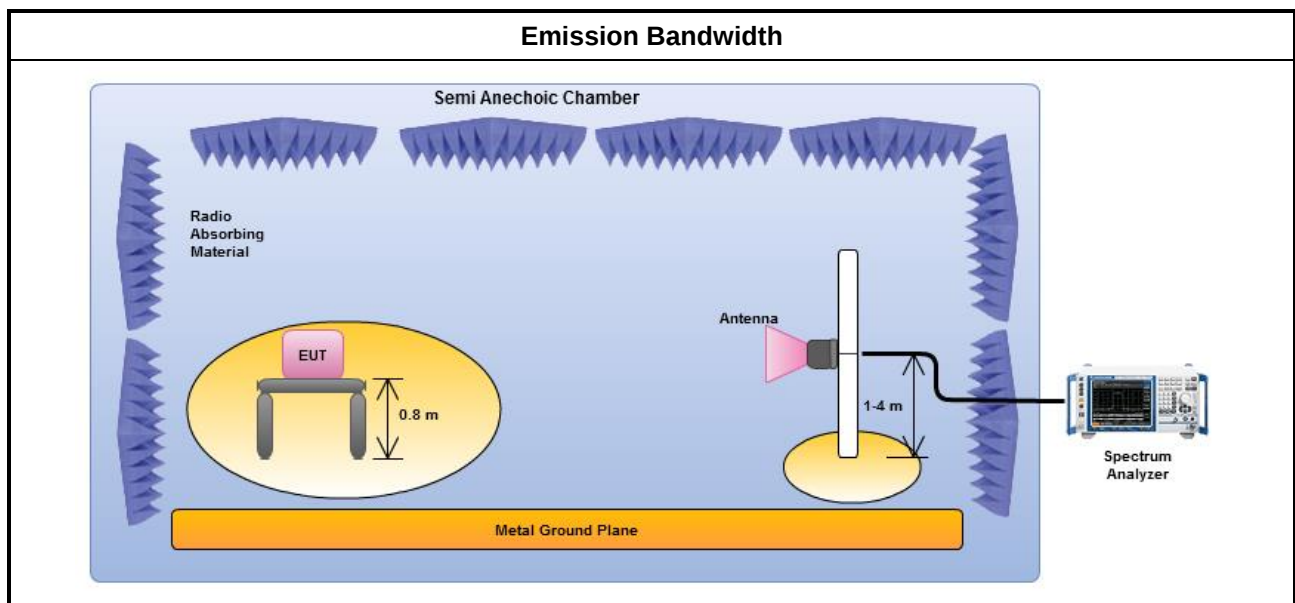
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

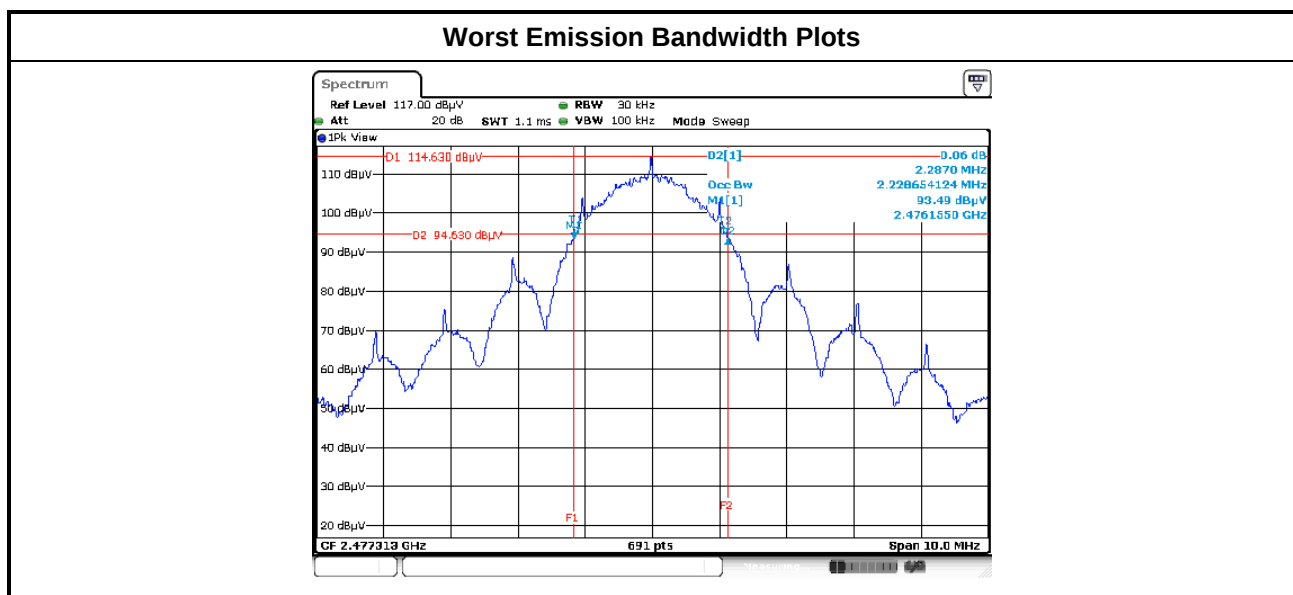
Test Method	
☒	Refer as ANSI C63.10, clause 6.9.1 for 20 dB emission bandwidth and 99% occupied bandwidth measurement.

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Emission Bandwidth Result					
Modulation Mode	Frequency (MHz)	99% Bandwidth (MHz)	20dB BW (MHz)	F _L at 20dB BW (MHz)	F _H at 20dB BW (MHz)
GFSK-Transmit	2403.585	2.171	2.243	2402.4560	-
GFSK-Transmit	2438.913	2.214	2.272	-	-
GFSK-Transmit	2477.313	2.229	2.287	-	2478.4420
Limit		N/A	N/A	2400	2483.5
Result		Complied			



3.3 Radiated Emission

This section includes field strength of fundamental, field strength of harmonics and emissions radiated outside of the operating frequency bands.

3.3.1 Limit of field strength of fundamental and field strength of harmonics

Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	50
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

3.3.2 Limit of Unwanted Emissions

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Radiated emission limits in §15.209			
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:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.3.3 Test Procedures

1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

1. Radiated emission below 1GHz
120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission
2. Radiated emission above 1GHz / Peak value except fundamental
RBW=1MHz, VBW=3MHz and Peak detector
Radiated emission above 1GHz / Average value for filed strength of fundamental and harmonics
The average value is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

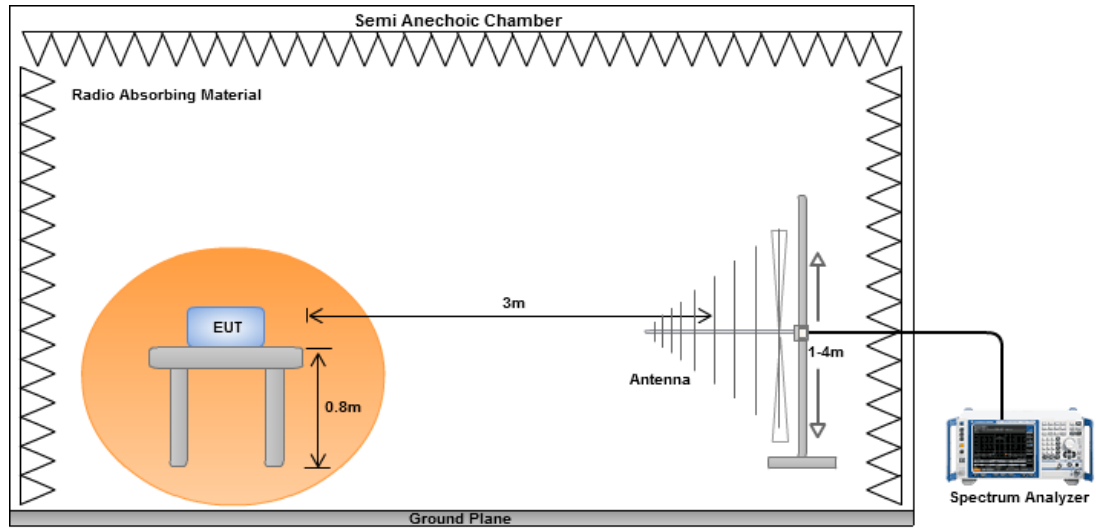
3.
$$20\log (\text{Duty cycle}) = 20\log \frac{0.16522 \text{ ms}}{100 \text{ ms}} = -55.64\text{dB}$$

Please see page 26 for plotted duty

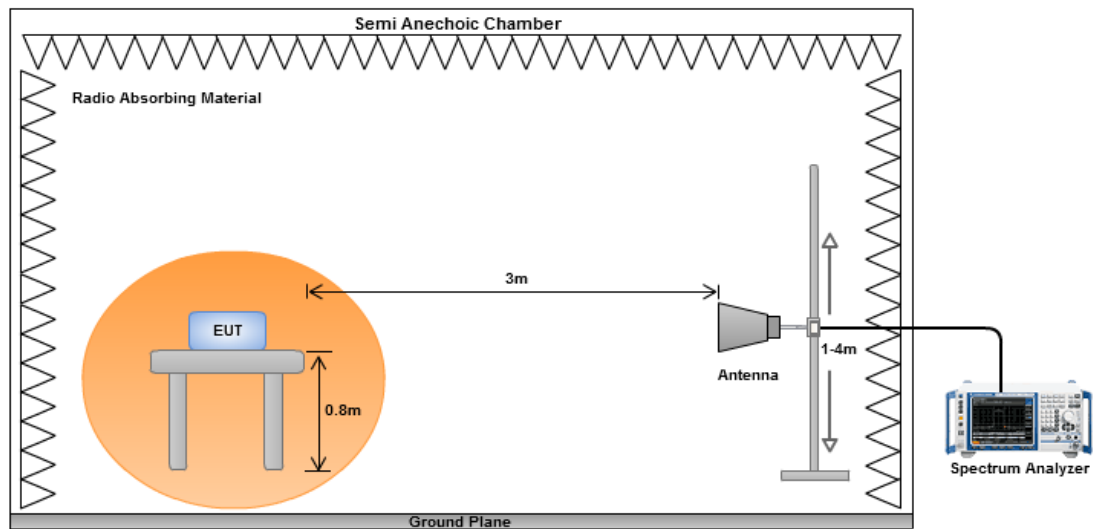
4. Radiated emission above 1GHz / Average value for other emissions
RBW=1MHz, VBW=10Hz and Peak detector
5. Radiated emission Peak value for fundamental
RBW=3MHz, VBW=10MHz and Peak detector

3.3.4 Test Setup

Radiated Emissions below 1 GHz

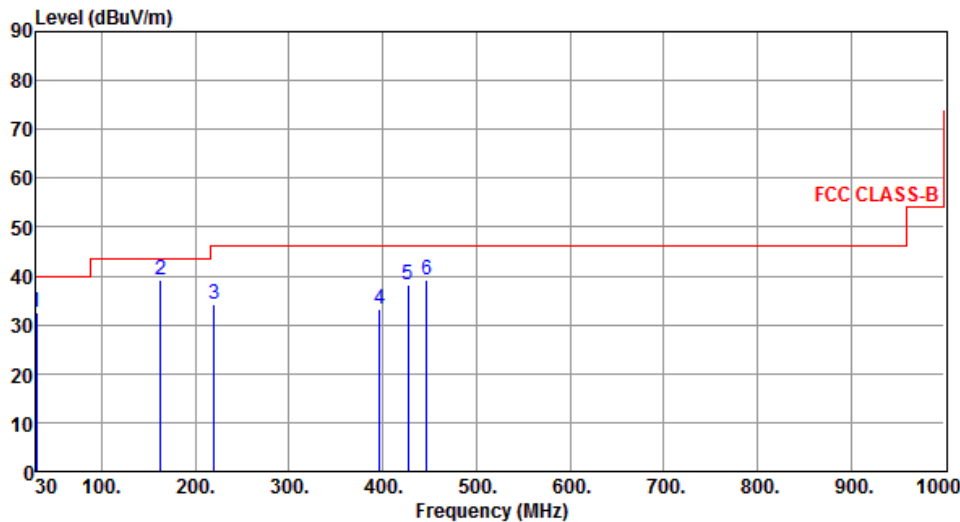


Radiated Emissions above 1 GHz



3.3.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	FSK	Test Freq. (MHz)	2477.313
Polarization	Horizontal		

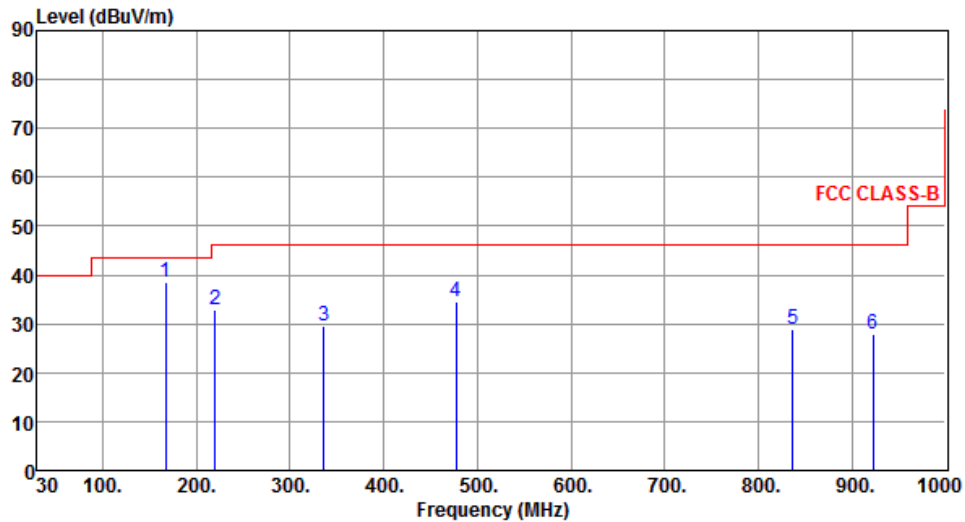


The graph displays the emission level in dBuV/m on the y-axis (0 to 90) against frequency in MHz on the x-axis (30 to 1000). A red line represents the FCC CLASS-B limit, which is 40 dBuV/m from 30 to 100 MHz, 45 dBuV/m from 100 to 1000 MHz, and 55 dBuV/m above 1000 MHz. Six blue vertical lines indicate measured peaks at 162.89, 220.12, 396.66, 426.73, 447.10, and 467.10 MHz. The peak at 162.89 MHz is the highest, exceeding the 45 dBuV/m limit.

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	30.00	32.69	40.00	-7.31	50.50	-17.81	Peak	---	---
2	162.89	39.31	43.50	-4.19	56.24	-16.93	Peak	---	---
3	220.12	34.05	46.00	-11.95	53.64	-19.59	Peak	---	---
4	396.66	33.13	46.00	-12.87	46.95	-13.82	Peak	---	---
5	426.73	38.28	46.00	-7.72	51.35	-13.07	Peak	---	---
6	447.10	39.19	46.00	-6.81	51.77	-12.58	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	FSK	Test Freq. (MHz)	2477.313
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	166.77	38.47	43.50	-5.03	55.70	-17.23	Peak	---	---
2	220.12	32.76	46.00	-13.24	52.35	-19.59	Peak	---	---
3	336.52	29.45	46.00	-16.55	44.86	-15.41	Peak	---	---
4	477.17	34.58	46.00	-11.42	46.65	-12.07	Peak	---	---
5	837.04	28.86	46.00	-17.14	35.25	-6.39	Peak	---	---
6	922.40	28.02	46.00	-17.98	33.35	-5.33	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.3.1 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation	FSK			Test Freq. (MHz)		2403.585																																																																																																																																					
Polarization	Horizontal																																																																																																																																										
Level (dBuV/m) 127 120 100 80 60 40 20 0 6 5 4 3 2 1 8 7 10 9 FCC 15C 249(2.4G) FCC 15C 249(2.4G-AV) Frequency (MHz) 1000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 25000 <table><tr><th></th><th>Freq.</th><th>Emission</th><th>Limit</th><th>Margin</th><th>SA</th><th>Factor</th><th>Remark</th><th>ANT</th><th>Turn</th></tr><tr><th></th><th>MHz</th><th>level</th><th></th><th></th><th>reading</th><th></th><th></th><th>High</th><th>Table</th></tr><tr><th></th><th></th><th>dBuV/m</th><th>dBuV/m</th><th>dB</th><th>dBuV</th><th>dB</th><th></th><th>cm</th><th>deg</th></tr><tr><td>1</td><td>2398.00</td><td>40.66</td><td>54.00</td><td>-13.34</td><td>43.44</td><td>-2.78</td><td>Average</td><td>---</td><td>---</td></tr><tr><td>2</td><td>2398.00</td><td>50.38</td><td>74.00</td><td>-23.62</td><td>53.16</td><td>-2.78</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>3</td><td>2400.00</td><td>14.06</td><td>54.00</td><td>-39.94</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>4</td><td>2400.00</td><td>69.70</td><td>74.00</td><td>-4.30</td><td>72.47</td><td>-2.77</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>5</td><td>2403.59</td><td>56.06</td><td>94.00</td><td>-37.94</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>6</td><td>2403.59</td><td>111.70</td><td>114.00</td><td>-2.30</td><td>114.45</td><td>-2.75</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>7</td><td>4807.17</td><td>3.55</td><td>54.00</td><td>-50.45</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>8</td><td>4807.17</td><td>59.19</td><td>74.00</td><td>-14.81</td><td>54.14</td><td>5.05</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>9</td><td>7210.76</td><td>7.47</td><td>54.00</td><td>-46.53</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>10</td><td>7210.76</td><td>63.11</td><td>74.00</td><td>-10.89</td><td>52.51</td><td>10.60</td><td>Peak</td><td>---</td><td>---</td></tr></table>											Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn		MHz	level			reading			High	Table			dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg	1	2398.00	40.66	54.00	-13.34	43.44	-2.78	Average	---	---	2	2398.00	50.38	74.00	-23.62	53.16	-2.78	Peak	---	---	3	2400.00	14.06	54.00	-39.94			Average	---	---	4	2400.00	69.70	74.00	-4.30	72.47	-2.77	Peak	---	---	5	2403.59	56.06	94.00	-37.94			Average	---	---	6	2403.59	111.70	114.00	-2.30	114.45	-2.75	Peak	---	---	7	4807.17	3.55	54.00	-50.45			Average	---	---	8	4807.17	59.19	74.00	-14.81	54.14	5.05	Peak	---	---	9	7210.76	7.47	54.00	-46.53			Average	---	---	10	7210.76	63.11	74.00	-10.89	52.51	10.60	Peak	---	---
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn																																																																																																																																		
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4	2400.00	69.70	74.00	-4.30	72.47	-2.77	Peak	---	---																																																																																																																																		
5	2403.59	56.06	94.00	-37.94			Average	---	---																																																																																																																																		
6	2403.59	111.70	114.00	-2.30	114.45	-2.75	Peak	---	---																																																																																																																																		
7	4807.17	3.55	54.00	-50.45			Average	---	---																																																																																																																																		
8	4807.17	59.19	74.00	-14.81	54.14	5.05	Peak	---	---																																																																																																																																		
9	7210.76	7.47	54.00	-46.53			Average	---	---																																																																																																																																		
10	7210.76	63.11	74.00	-10.89	52.51	10.60	Peak	---	---																																																																																																																																		
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).																																																																																																																																											

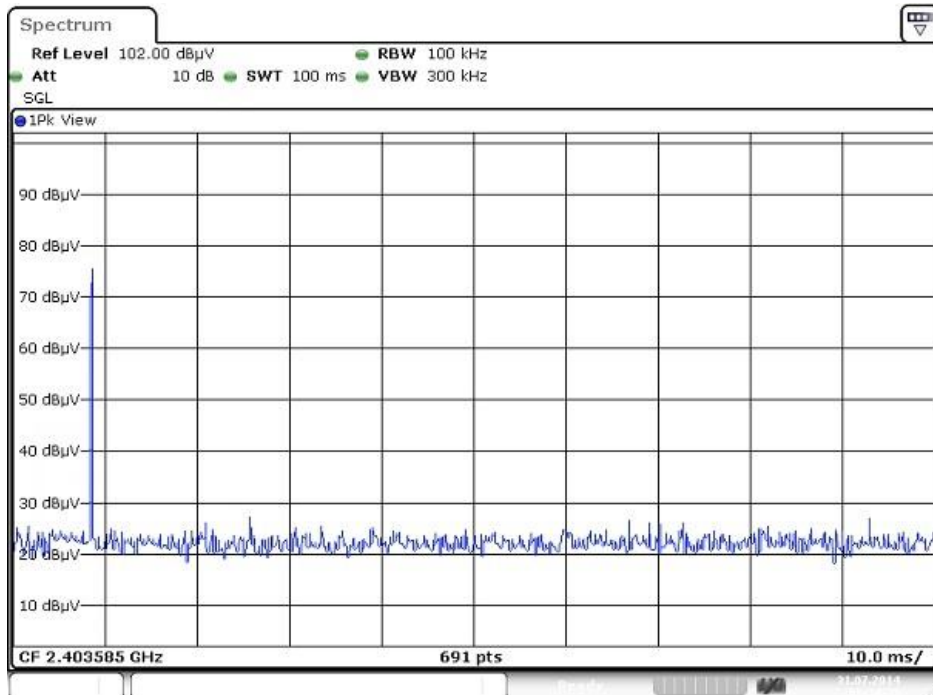
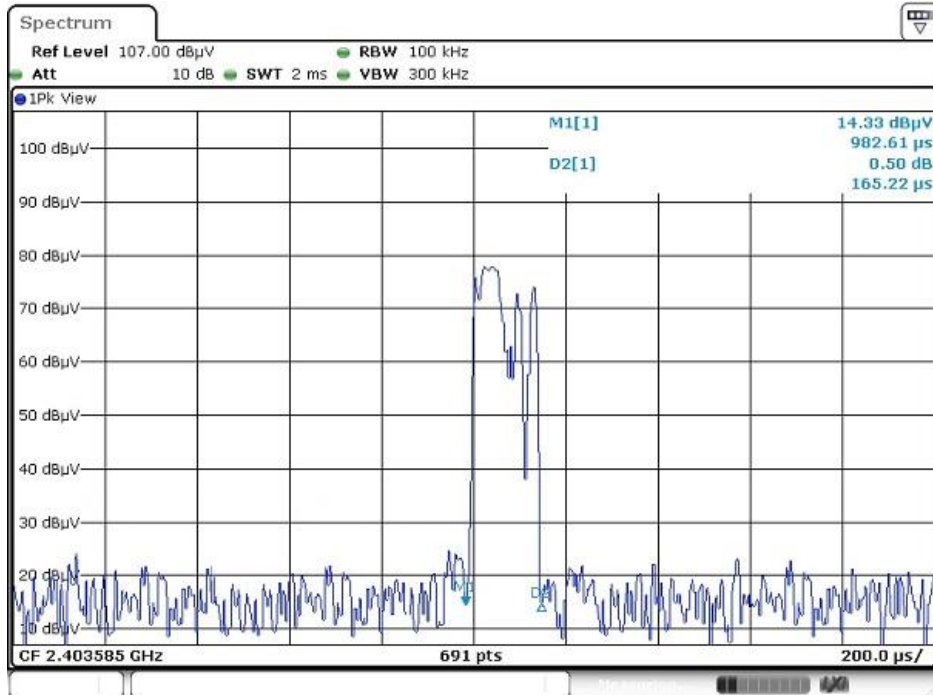
Modulation	FSK	Test Freq. (MHz)	2403.585																																																																																																														
Polarization	Vertical																																																																																																																
Level (dBuV/m) 127 120 100 80 60 40 20 0 6 4 5 3 8 10 9 1000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 25000 Frequency (MHz) FCC 15C 249(2.4G) FCC 15C 249(2.4G-AV) <table><tr><th></th><th>Freq. MHz</th><th>Emission level dBuV/m</th><th>Limit dBuV/m</th><th>Margin dB</th><th>SA reading dBuV</th><th>Factor dB</th><th>Remark</th><th>ANT High cm</th><th>Turn Table deg</th></tr><tr><td>1</td><td>2398.00</td><td>38.48</td><td>54.00</td><td>-15.52</td><td>41.26</td><td>-2.78</td><td>Average</td><td>---</td><td>---</td></tr><tr><td>2</td><td>2398.00</td><td>48.30</td><td>74.00</td><td>-25.70</td><td>51.08</td><td>-2.78</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>3</td><td>2400.00</td><td>3.10</td><td>54.00</td><td>-50.90</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>4</td><td>2400.00</td><td>58.74</td><td>74.00</td><td>-15.26</td><td>61.51</td><td>-2.77</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>5</td><td>2403.59</td><td>45.10</td><td>94.00</td><td>-48.90</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>6</td><td>2403.59</td><td>100.74</td><td>114.00</td><td>-13.26</td><td>103.49</td><td>-2.75</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>7</td><td>4807.17</td><td>3.02</td><td>54.00</td><td>-50.98</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>8</td><td>4807.17</td><td>58.66</td><td>74.00</td><td>-15.34</td><td>53.61</td><td>5.05</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>9</td><td>7210.76</td><td>6.54</td><td>54.00</td><td>-47.46</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>10</td><td>7210.76</td><td>62.18</td><td>74.00</td><td>-11.82</td><td>51.58</td><td>10.60</td><td>Peak</td><td>---</td><td>---</td></tr></table>					Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg	1	2398.00	38.48	54.00	-15.52	41.26	-2.78	Average	---	---	2	2398.00	48.30	74.00	-25.70	51.08	-2.78	Peak	---	---	3	2400.00	3.10	54.00	-50.90			Average	---	---	4	2400.00	58.74	74.00	-15.26	61.51	-2.77	Peak	---	---	5	2403.59	45.10	94.00	-48.90			Average	---	---	6	2403.59	100.74	114.00	-13.26	103.49	-2.75	Peak	---	---	7	4807.17	3.02	54.00	-50.98			Average	---	---	8	4807.17	58.66	74.00	-15.34	53.61	5.05	Peak	---	---	9	7210.76	6.54	54.00	-47.46			Average	---	---	10	7210.76	62.18	74.00	-11.82	51.58	10.60	Peak	---	---
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg																																																																																																								
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Modulation	FSK	Test Freq. (MHz)	2438.913						
Polarization	Horizontal								
Level (dBuV/m) 127 120 100 80 60 40 20 0 2 4 6 5 3 8 7 10 9 FCC 15C 249(2.4G) FCC 15C 249(2.4G-AV) Frequency (MHz) 1000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 25000									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	2438.91	56.07	94.00	-37.93			Average	---	---
2	2438.91	111.71	114.00	-2.29	114.31	-2.60	Peak	---	---
3	2483.50	11.07	54.00	-42.93			Average	---	---
4	2483.50	66.71	74.00	-7.29	69.10	-2.39	Peak	---	---
5	2485.50	28.86	54.00	-25.14	31.25	-2.39	Average	---	---
6	2485.50	41.83	74.00	-32.17	44.22	-2.39	Peak	---	---
7	4877.83	4.15	54.00	-49.85			Average	---	---
8	4877.83	59.79	74.00	-14.21	54.61	5.18	Peak	---	---
9	7316.74	8.82	54.00	-45.18			Average	---	---
10	7316.74	64.46	74.00	-9.54	53.71	10.75	Peak	---	---
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).									

Modulation	FSK	Test Freq. (MHz)	2438.913						
Polarization	Vertical								
Level (dBuV/m) 127 120 100 80 60 40 20 0 1 2 3 4 5 6 7 8 9 10 1000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 25000 Frequency (MHz) FCC 15C 249(2.4G) FCC 15C 249(2.4G-AV)									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	2438.91	47.13	94.00	-46.87			Average	---	---
2	2438.91	102.77	114.00	-11.23	105.37	-2.60	Peak	---	---
3	2483.50	2.13	54.00	-51.87			Average	---	---
4	2483.50	57.77	74.00	-16.23	60.16	-2.39	Peak	---	---
5	2485.50	29.05	54.00	-24.95	31.44	-2.39	Average	---	---
6	2485.50	42.19	74.00	-31.81	44.58	-2.39	Peak	---	---
7	4877.83	4.48	54.00	-49.52			Average	---	---
8	4877.83	60.12	74.00	-13.88	54.94	5.18	Peak	---	---
9	7316.74	4.93	54.00	-49.07			Average	---	---
10	7316.74	60.57	74.00	-13.43	49.82	10.75	Peak	---	---
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).									

Modulation	FSK	Test Freq. (MHz)	2477.313																																																																																																																								
Polarization	Horizontal																																																																																																																										
Level (dBuV/m) 127 120 100 80 60 40 20 0 2 4 3 6 5 3 8 7 10 9 FCC 15C 249(2.4G) FCC 15C 249(2.4G-AV) Frequency (MHz) <table><tr><th></th><th>Freq.</th><th>Emission level</th><th>Limit</th><th>Margin</th><th>SA reading</th><th>Factor</th><th>Remark</th><th>ANT High</th><th>Turn Table</th></tr><tr><th></th><th>MHz</th><th>dBuV/m</th><th>dBuV/m</th><th>dB</th><th>dBuV</th><th>dB</th><th></th><th>cm</th><th>deg</th></tr><tr><td>1</td><td>2477.31</td><td>57.20</td><td>94.00</td><td>-36.80</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>2</td><td>2477.31</td><td>112.84</td><td>114.00</td><td>-1.16</td><td>115.26</td><td>-2.42</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>3</td><td>2483.50</td><td>12.20</td><td>54.00</td><td>-41.80</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>4</td><td>2483.50</td><td>67.84</td><td>74.00</td><td>-6.16</td><td>70.23</td><td>-2.39</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>5</td><td>2485.50</td><td>29.23</td><td>54.00</td><td>-24.77</td><td>31.62</td><td>-2.39</td><td>Average</td><td>---</td><td>---</td></tr><tr><td>6</td><td>2485.50</td><td>42.35</td><td>74.00</td><td>-31.65</td><td>44.74</td><td>-2.39</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>7</td><td>4954.63</td><td>2.83</td><td>54.00</td><td>-51.17</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>8</td><td>4954.63</td><td>58.47</td><td>74.00</td><td>-15.53</td><td>53.14</td><td>5.33</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>9</td><td>7431.94</td><td>9.66</td><td>54.00</td><td>-44.34</td><td></td><td></td><td>Average</td><td>---</td><td>---</td></tr><tr><td>10</td><td>7431.94</td><td>65.30</td><td>74.00</td><td>-8.70</td><td>54.39</td><td>10.91</td><td>Peak</td><td>---</td><td>---</td></tr></table> Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).					Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table		MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg	1	2477.31	57.20	94.00	-36.80			Average	---	---	2	2477.31	112.84	114.00	-1.16	115.26	-2.42	Peak	---	---	3	2483.50	12.20	54.00	-41.80			Average	---	---	4	2483.50	67.84	74.00	-6.16	70.23	-2.39	Peak	---	---	5	2485.50	29.23	54.00	-24.77	31.62	-2.39	Average	---	---	6	2485.50	42.35	74.00	-31.65	44.74	-2.39	Peak	---	---	7	4954.63	2.83	54.00	-51.17			Average	---	---	8	4954.63	58.47	74.00	-15.53	53.14	5.33	Peak	---	---	9	7431.94	9.66	54.00	-44.34			Average	---	---	10	7431.94	65.30	74.00	-8.70	54.39	10.91	Peak	---	---
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table																																																																																																																		
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7	4954.63	2.83	54.00	-51.17			Average	---	---																																																																																																																		
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Modulation	FSK	Test Freq. (MHz)	2477.313
Polarization	Vertical		
Level (dBuV/m) 127 120 100 80 60 40 20 0 1 2 3 4 5 6 7 8 9 10			



$$20\log (\text{Duty cycle}) = 20\log \frac{0.16522 \text{ ms}}{100 \text{ ms}} = -55.64\text{dB}$$

4 Test Equipment and Calibration Data

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
EMC Receiver	R&S	ESCS 30	100169	Oct. 15, 2013	Oct. 14, 2014
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 23, 2013	Nov. 22, 2014
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127-666	Dec. 04, 2013	Dec. 03, 2014
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Apr. 23, 2014	Apr. 22, 2015
50 ohm terminal (Support Unit)	NA	50	04	Apr. 18, 2014	Apr. 17, 2015
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber 2 / (03CH02-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101499	Feb. 08, 2014	Feb. 07, 2015
Receiver	R&S	ESR3	101657	Jan. 18, 2014	Jan. 17, 2015
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-524	Jan. 08, 2014	Jan. 07, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Jan. 07, 2014	Jan. 06, 2015
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Dec. 27, 2013	Dec. 26, 2014
Preamplifier	Burgeon	BPA-530	100218	Dec. 09, 2013	Dec. 08, 2014
Preamplifier	Agilent	83017A	MY39501309	Dec. 09, 2013	Dec. 08, 2014
Preamplifier	WM	TF-130N-R1	923365	Oct. 23, 2013	Oct. 22, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	Dec. 17, 2013	Dec. 16, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Dec. 17, 2013	Dec. 16, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16015/4	Dec. 17, 2013	Dec. 16, 2014
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Dec. 17, 2013	Dec. 16, 2014
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-004	Dec. 17, 2013	Dec. 16, 2014
Note: Calibration Interval of instruments listed above is one year.					

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014
Note: Calibration Interval of instruments listed above is two year.					

Test Item	RF Conducted				
Test Site	TH01-HY				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV 40	101063	Feb. 17, 2014	Feb. 16, 2015
Spectrum Analyzer	Agilent	N9010A	MY53400091	Oct. 07, 2013	Oct. 06, 2014
Note: Calibration Interval of instruments listed above is one year.					