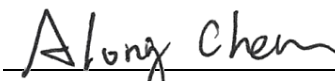


FCC Test Report

FCC ID : P27NA502S
Equipment : Multiple RF Home Gateway
Model No. : NA502S
Brand Name : Sercomm
Multiple Listing : Refer to item 1.1.1 for more details
Applicant : Sercomm Corporation
Address : 8F, No. 3-1, YuanQu St., NanKang, Taipei 115,
Taiwan, R.O.C.
Standard : 47 CFR FCC Part 15.249
Received Date : Nov. 21, 2016
Tested Date : Nov. 29 ~ Dec. 12, 2016

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:


Along Chen / Assistant Manager

Approved by:

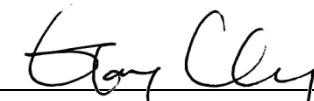

Gary Chang / Manager



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Release Record

Report No.	Version	Description	Issued Date
FR6N2103ZW	Rev. 01	Initial issue	Mar. 03, 2017

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]: 0.400MHz 41.54 (Margin -6.32dB) - AV	Pass
15.249(a)	Field Strength of Fundamental	Meet the requirement of limit	Pass
15.249(a)(d)	Field Strength of Harmonics and Emissions Radiated outside of the Specified Frequency Bands	Meet the requirement of limit	Pass
15.215(c)	20dB bandwidth	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

1 General Description

1.1 Information

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
Sercomm	NA502Sxxxxxxxx	Multiple RF Home Gateway	the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or “-” , for marketing purpose.
MiOS	G550xxxxx	Multiple RF Home Gateway	
Nortek	GC1xxxxxxxx	Multiple RF Home Gateway	
Vera	VeraSecurexxxxx	Multiple RF Home Gateway	
Vera	VeraSecurexxxxx	Advanced Smart Home Security Controller	
✦ All models are electrically identical, different model names are for marketing purpose.			
✦ The above models, model NA502S was selected as a representative one for the final test and only its data was recorded in this report.			

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Mode	Ch. Freq. (MHz)	Modulation Type	Data Rate
902~928	Z-Wave	908.40	FSK	40kbps
		908.42	FSK	9.6kbps
		916.00	GFSK	100kbps

1.1.3 Antenna Details

Ant. No.	Type	Connector	Gain (dBi)	Remarks
1	Monopole	No	-2.6	---

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from adapter
-------------------	--------------------

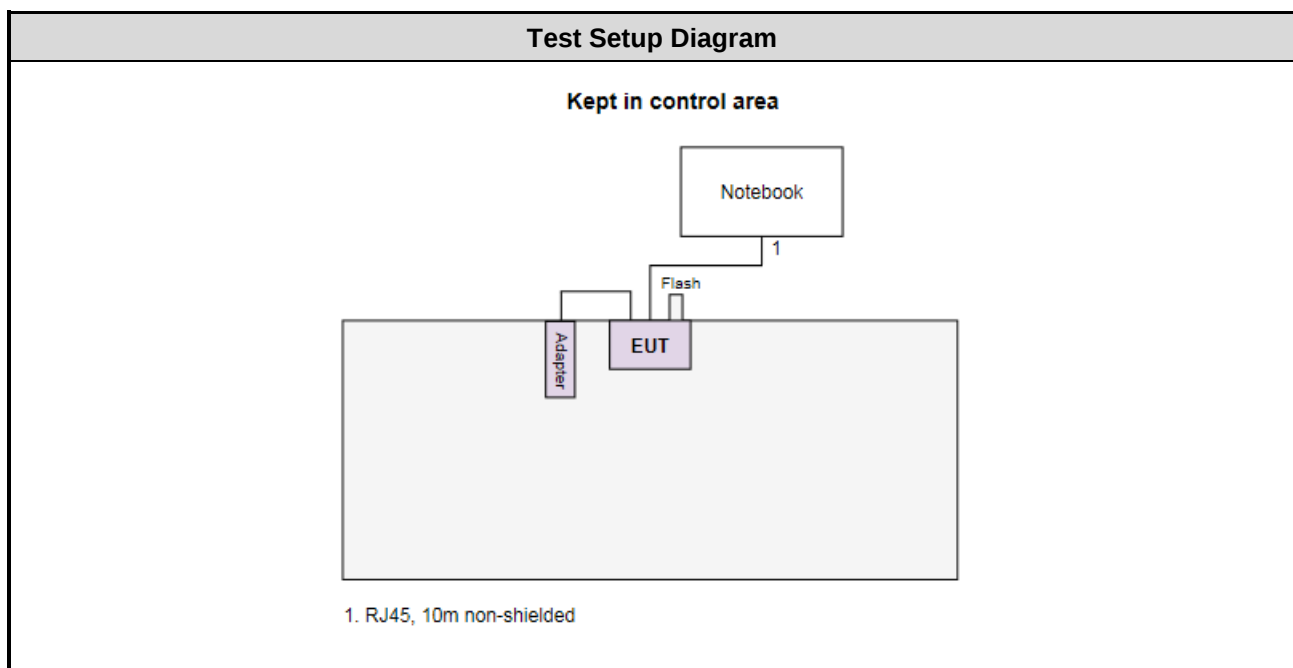
1.1.5 Accessories

Accessories		
No.	Equipment	Description
1	Adapter	Brand: LEI Model: MU24-Y120200-A2 I/P: 100-240Vac, 50/60Hz, 0.7A O/P: 12Vdc, 2A Power line: 1.5m non-shielded without core
2	Adapter	Brand: APD Model: WA-24Q12FU I/P: 100-240Vac, 50-60Hz, 0.7A O/P: 12Vdc, 2A Power line: 1.5m non-shielded without core
3	Lithium-ion Battery	Brand: Simplo Technology Co. LTD. Model: A3EQ2009H Rating: 7.5Vdc, 2400mAh

1.2 Local Support Equipment List

Support Equipment List						
No.	Equipment	Brand	Model	S/N	FCC ID	Signal cable / Length (m)
1	Notebook	DELL	Latitude E6430	9ZFB4X1	DoC	RJ45, 10m non-shielded.
2	USB Flash	SONY	USM16GU	0000020	---	---

1.3 Test Setup Chart



1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Dec. 12, 2016				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Jan. 12, 2016	Jan. 11, 2017
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 08, 2016	Nov. 07, 2017
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 21, 2015	Dec. 20, 2016
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Nov. 29 ~ Dec. 06, 2016				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Nov. 25, 2016	Nov. 24, 2017
Receiver	R&S	ESR3	101658	Nov. 24, 2016	Nov. 23, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 16, 2015	Dec. 15, 2016
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 25, 2016	Oct. 24, 2017
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 10, 2016	Nov. 09, 2017
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 10, 2015	Dec. 09, 2016
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 2017
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2016	Oct. 05, 2017
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 10, 2015	Dec. 09, 2016
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	16052	Dec. 10, 2015	Dec. 09, 2016
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 10, 2015	Dec. 09, 2016
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 10, 2015	Dec. 09, 2016
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Dec. 06, 2016				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2016	Feb. 16, 2017
Power Meter	Anritsu	ML2495A	1241002	Oct. 06, 2016	Oct. 05, 2017
Power Sensor	Anritsu	MA2411B	1207366	Oct. 06, 2016	Oct. 05, 2017
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.249

ANSI C63.10-2013

1.6 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	
Parameters	Uncertainty
Bandwidth	±34.134 Hz
AC conducted emission	±2.90 dB
Radiated emission ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.63 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	22°C / 60%	Howard Huang
Radiated Emissions	03CH01-WS	21-22°C / 61%	Vincent Yeh Kevin Lee
RF Conducted	TH01-WS	22°C / 63%	Alex Huang

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate
AC Power Line Conducted Emissions	FSK FSK GFSK	908.40 908.42 916.00	40kbps 9.6kbps 100kbps
Field Strength of Fundamental			
Radiated Emissions ≤ 1GHz			
Radiated Emissions > 1GHz			
20dB bandwidth			
NOTE: 1. Two adapters (LEI & APD) had been covered during the pretest and found that LEI adapter was the worst case and was selected for final test. 2. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.			

3 Transmitter Test Results

3.1 Conducted Emissions

3.1.1 Limit of Conducted Emissions

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 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

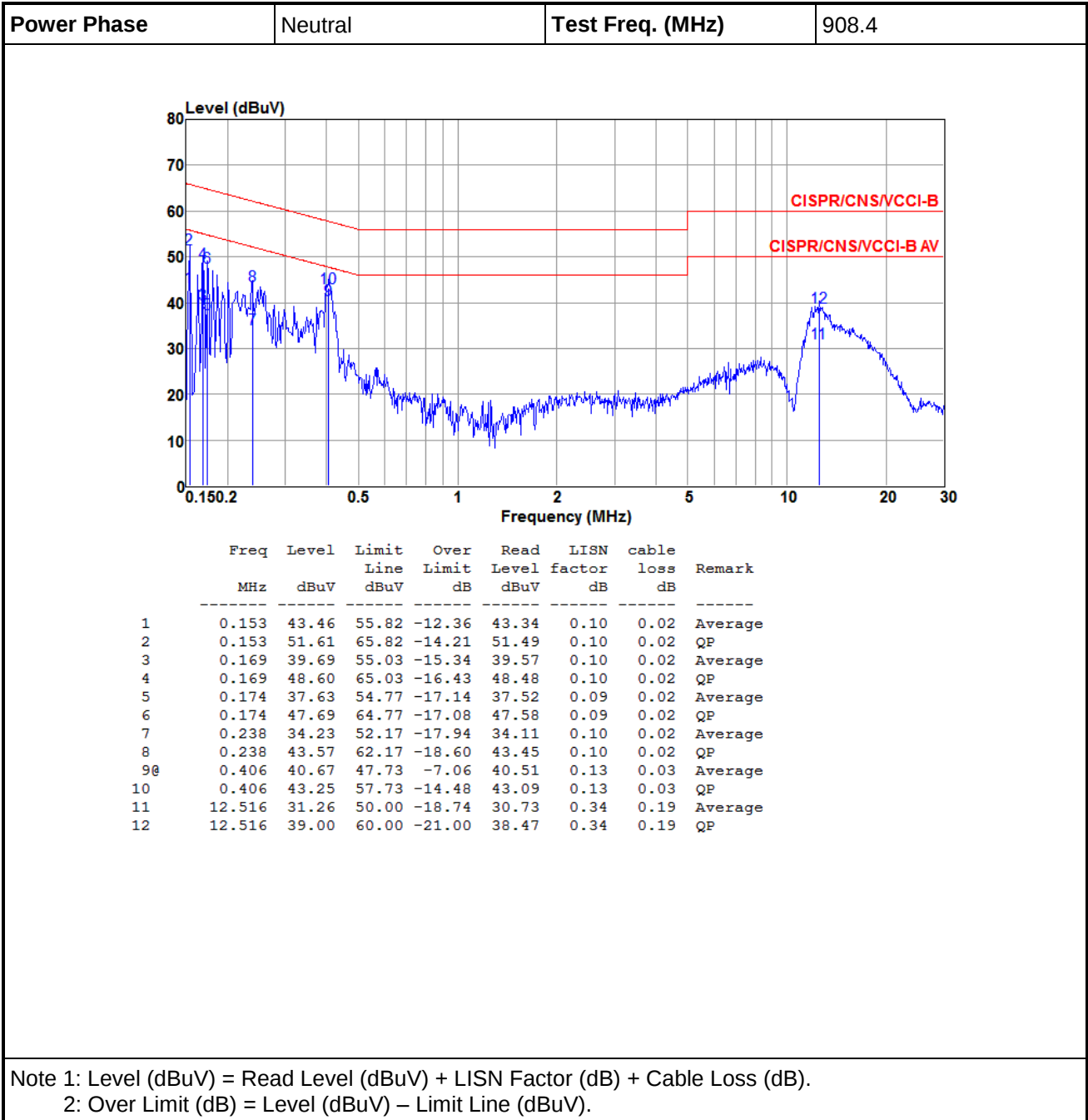
3.1.3 Test Setup

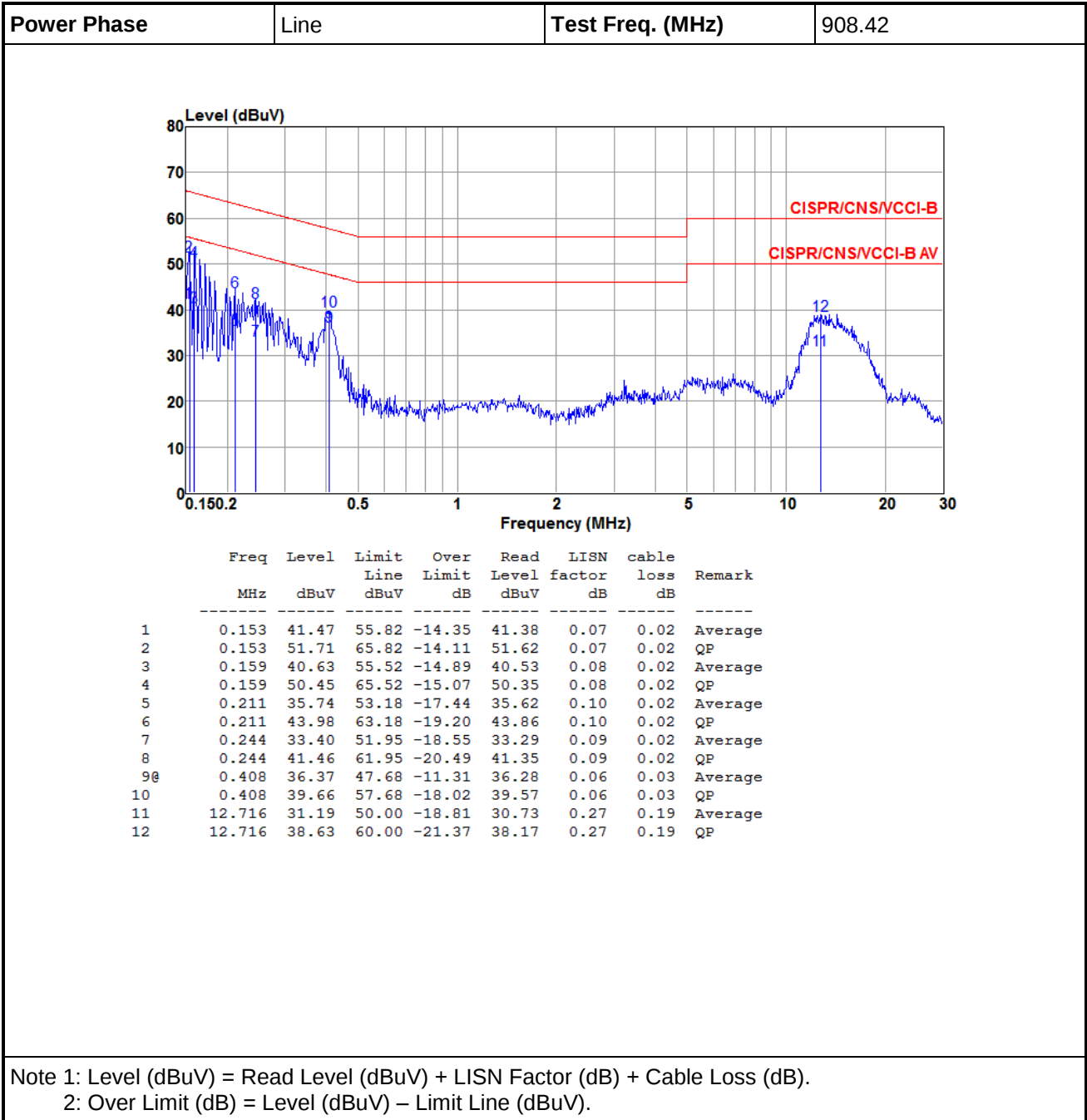


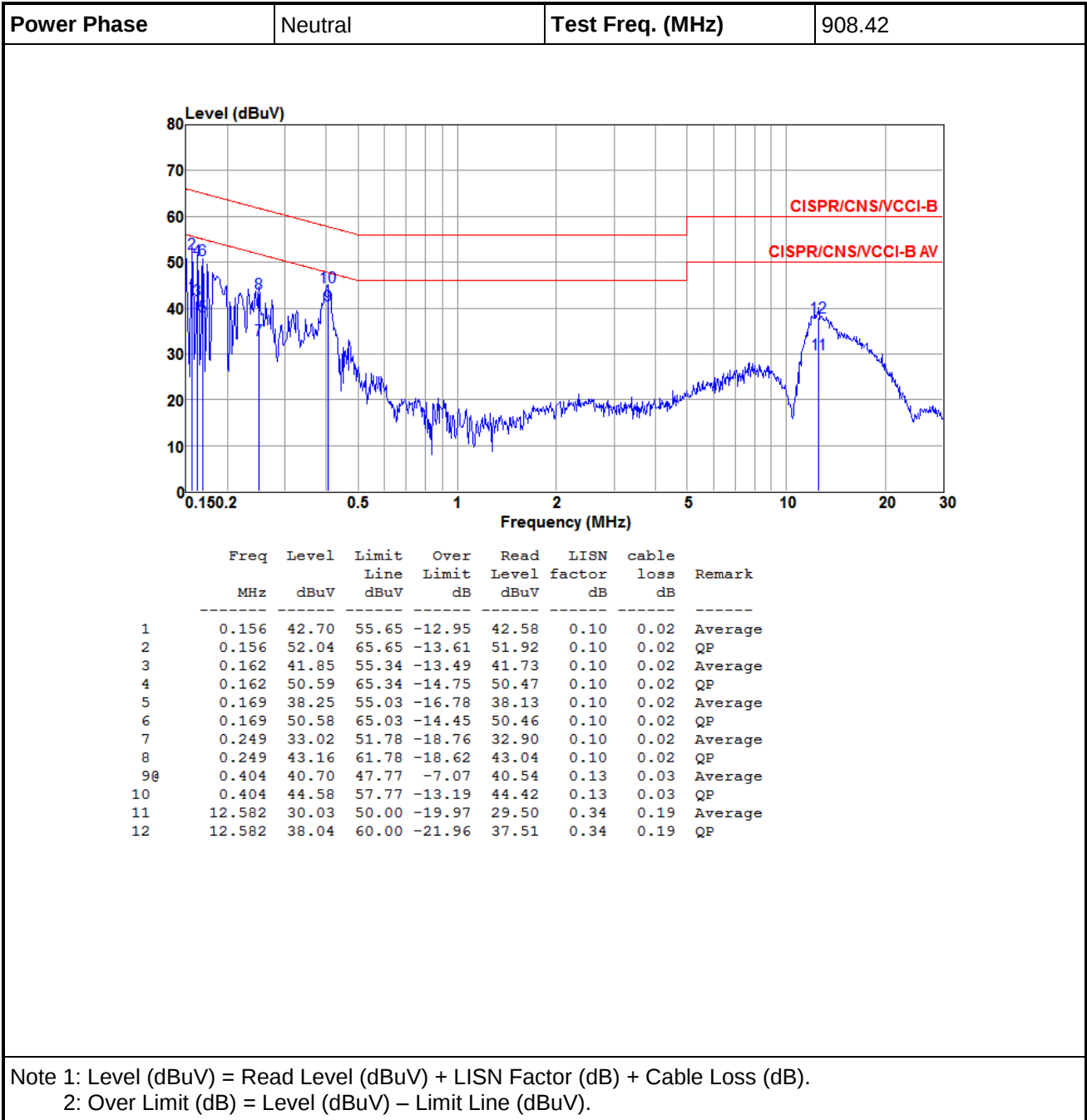
- Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

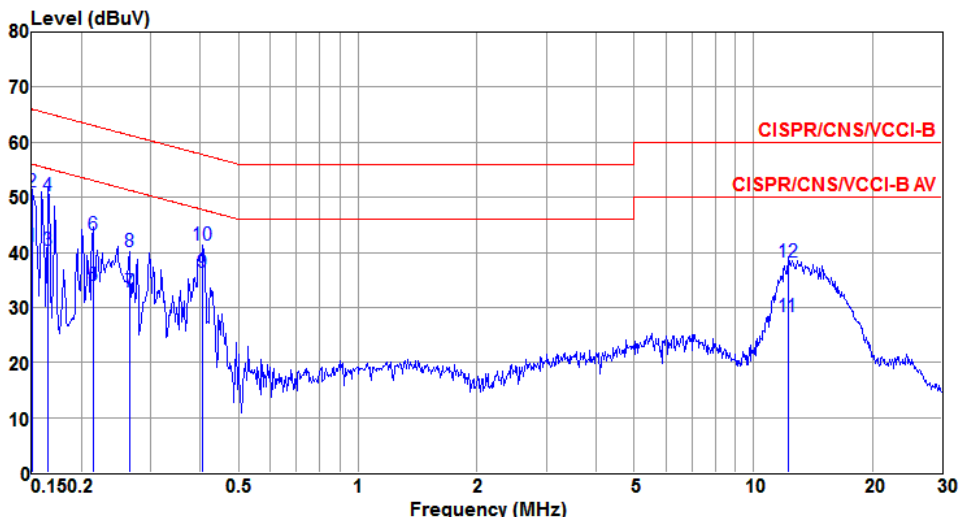
3.1.4 Test Result of Conducted Emissions

Power Phase	Line	Test Freq. (MHz)	908.4
Level (dBuV) </			

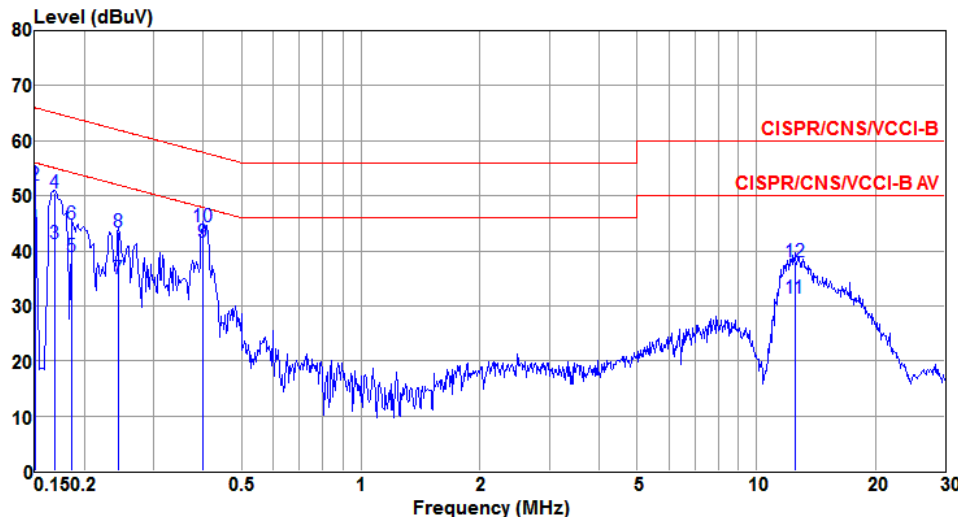






Power Phase	Line	Test Freq. (MHz)	916																																																																																																																																							
Level (dBuV)  Frequency (MHz) <table><tr><th></th><th>Freq</th><th>Level</th><th>Limit</th><th>Over</th><th>Read</th><th>LISN</th><th>cable</th><th></th></tr><tr><th></th><th>MHz</th><th>dBuV</th><th>Line</th><th>Limit</th><th>Level</th><th>factor</th><th>loss</th><th>Remark</th></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>-----</td></tr><tr><td>1</td><td>0.150</td><td>41.08</td><td>56.00</td><td>-14.92</td><td>40.99</td><td>0.07</td><td>0.02</td><td>Average</td></tr><tr><td>2</td><td>0.150</td><td>50.98</td><td>66.00</td><td>-15.02</td><td>50.89</td><td>0.07</td><td>0.02</td><td>QP</td></tr><tr><td>3</td><td>0.165</td><td>40.41</td><td>55.21</td><td>-14.80</td><td>40.31</td><td>0.08</td><td>0.02</td><td>Average</td></tr><tr><td>4</td><td>0.165</td><td>50.35</td><td>65.21</td><td>-14.86</td><td>50.25</td><td>0.08</td><td>0.02</td><td>QP</td></tr><tr><td>5</td><td>0.214</td><td>34.03</td><td>53.05</td><td>-19.02</td><td>33.91</td><td>0.10</td><td>0.02</td><td>Average</td></tr><tr><td>6</td><td>0.214</td><td>43.17</td><td>63.05</td><td>-19.88</td><td>43.05</td><td>0.10</td><td>0.02</td><td>QP</td></tr><tr><td>7</td><td>0.264</td><td>32.81</td><td>51.29</td><td>-18.48</td><td>32.71</td><td>0.08</td><td>0.02</td><td>Average</td></tr><tr><td>8</td><td>0.264</td><td>40.19</td><td>61.29</td><td>-21.10</td><td>40.09</td><td>0.08</td><td>0.02</td><td>QP</td></tr><tr><td>9@</td><td>0.406</td><td>36.24</td><td>47.73</td><td>-11.49</td><td>36.15</td><td>0.06</td><td>0.03</td><td>Average</td></tr><tr><td>10</td><td>0.406</td><td>41.23</td><td>57.73</td><td>-16.50</td><td>41.14</td><td>0.06</td><td>0.03</td><td>QP</td></tr><tr><td>11</td><td>12.253</td><td>28.33</td><td>50.00</td><td>-21.67</td><td>27.88</td><td>0.26</td><td>0.19</td><td>Average</td></tr><tr><td>12</td><td>12.253</td><td>38.16</td><td>60.00</td><td>-21.84</td><td>37.71</td><td>0.26</td><td>0.19</td><td>QP</td></tr></table>					Freq	Level	Limit	Over	Read	LISN	cable			MHz	dBuV	Line	Limit	Level	factor	loss	Remark									-----	1	0.150	41.08	56.00	-14.92	40.99	0.07	0.02	Average	2	0.150	50.98	66.00	-15.02	50.89	0.07	0.02	QP	3	0.165	40.41	55.21	-14.80	40.31	0.08	0.02	Average	4	0.165	50.35	65.21	-14.86	50.25	0.08	0.02	QP	5	0.214	34.03	53.05	-19.02	33.91	0.10	0.02	Average	6	0.214	43.17	63.05	-19.88	43.05	0.10	0.02	QP	7	0.264	32.81	51.29	-18.48	32.71	0.08	0.02	Average	8	0.264	40.19	61.29	-21.10	40.09	0.08	0.02	QP	9@	0.406	36.24	47.73	-11.49	36.15	0.06	0.03	Average	10	0.406	41.23	57.73	-16.50	41.14	0.06	0.03	QP	11	12.253	28.33	50.00	-21.67	27.88	0.26	0.19	Average	12	12.253	38.16	60.00	-21.84	37.71	0.26	0.19	QP
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	Freq	Level	Limit	Over	Read	LISN	cable	Remark																																																																																																																																		
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4	0.169	50.52	65.03	-14.51	50.40	0.10	0.02	QP																																																																																																																																		
5	0.186	39.00	54.20	-15.20	38.89	0.09	0.02	Average																																																																																																																																		
6	0.186	44.94	64.20	-19.26	44.83	0.09	0.02	QP																																																																																																																																		
7	0.244	34.95	51.95	-17.00	34.83	0.10	0.02	Average																																																																																																																																		
8	0.244	43.41	61.95	-18.54	43.29	0.10	0.02	QP																																																																																																																																		
9	0.400	41.54	47.86	-6.32	41.38	0.13	0.03	Average																																																																																																																																		
10	0.400	44.47	57.86	-13.39	44.31	0.13	0.03	QP																																																																																																																																		
11	12.516	31.34	50.00	-18.66	30.81	0.34	0.19	Average																																																																																																																																		
12	12.516	38.06	60.00	-21.94	37.53	0.34	0.19	QP																																																																																																																																		

3.2 Radiated Emission

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

3.2.1 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	500

3.2.2 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 below table, whichever is the lesser attenuation.

Radiated emission limits			
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.

3.2.3 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 test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
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 field strength of fundamental and harmonics

The average value is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

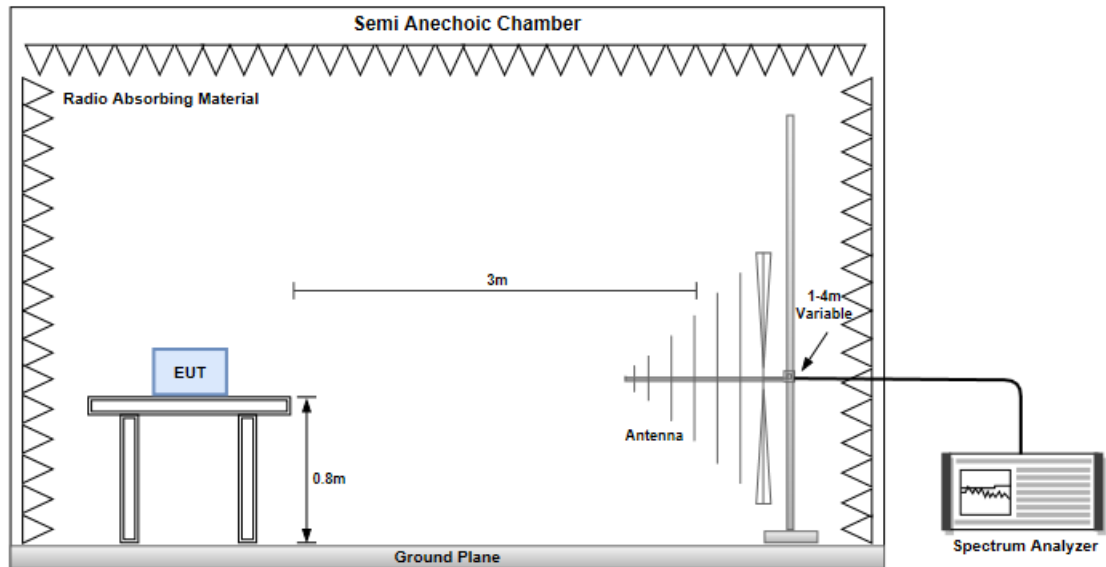
- $$908.40\text{MHz: } 20\log(\text{Duty cycle}) = 20\log \frac{3 \times 7.8986 \text{ ms}}{100 \text{ ms}} = -12.51\text{dB}$$
- $$908.42\text{MHz: } 20\log(\text{Duty cycle}) = 20\log \frac{2 \times 23.9130 \text{ ms}}{100 \text{ ms}} = -6.41\text{dB}$$
- $$916.00\text{MHz: } 20\log(\text{Duty cycle}) = 20\log \frac{4 \times 3.2609 \text{ ms}}{100 \text{ ms}} = -17.69\text{dB}$$

Please see page 33-35 for plotted duty

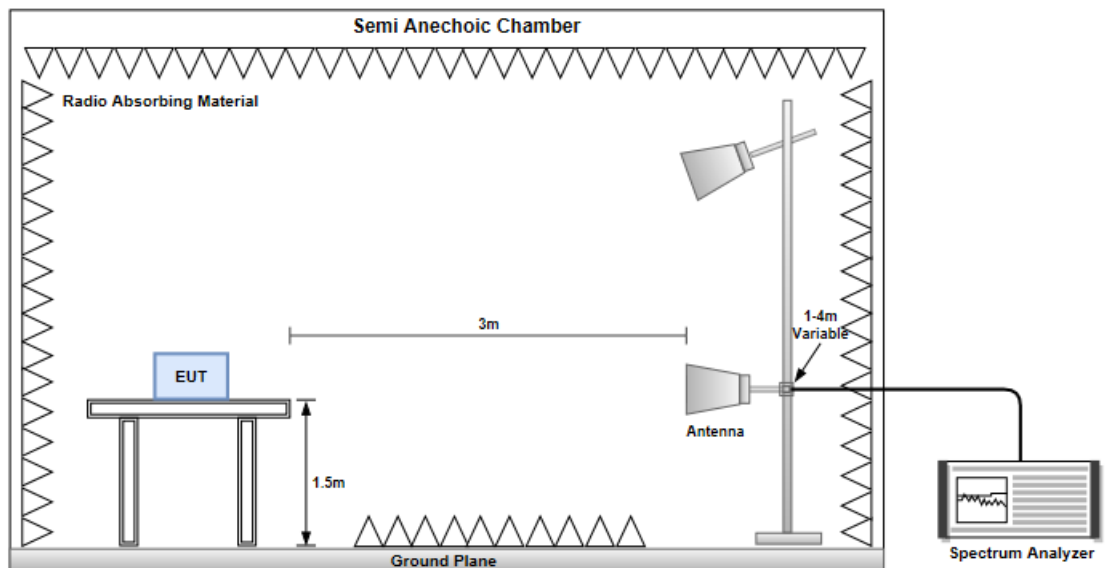
4. Radiated emission above 1GHz / Average value for other emissions
RBW=1MHz, VBW=10Hz and Peak detector
5. Radiated emission Peak value for fundamental
RBW=1MHz, VBW=3MHz and Peak detector

3.2.4 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



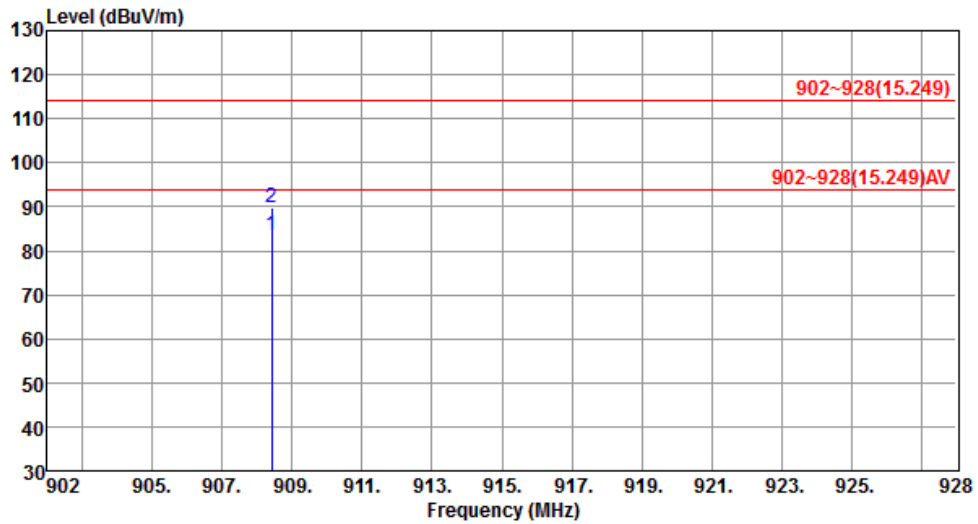
3.2.5 Transmitter Field Strength of Fundamental

Modulation	FSK	Test Freq. (MHz)	908.40
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	FSK	Test Freq. (MHz)	908.40
Polarization	Vertical		
Level (dBuV/m) </			

Modulation	FSK	Test Freq. (MHz)	908.42
Polarization	Horizontal		
Level (dBUV/m) </			

Modulation	FSK	Test Freq. (MHz)	908.42
Polarization	Vertical		



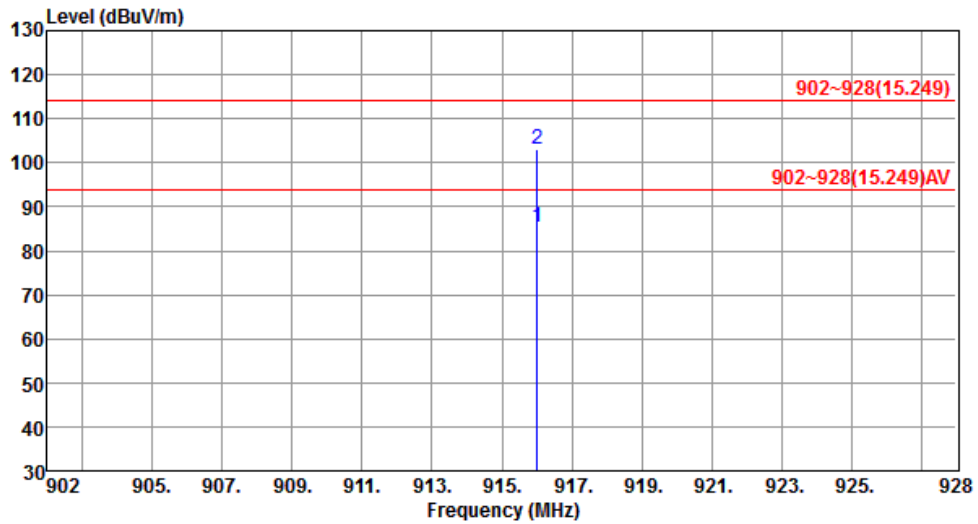
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	908.42	83.50	94.00	-10.50	51.64	31.86	Average	100	262
2	908.42	89.91	114.00	-24.09	58.05	31.86	Peak	100	262

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	GFSK	Test Freq. (MHz)	916.00
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	916.00	85.48	94.00	-8.52	53.55	31.93	Average	100	318
2	916.00	103.17	114.00	-10.83	71.24	31.93	Peak	100	318

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

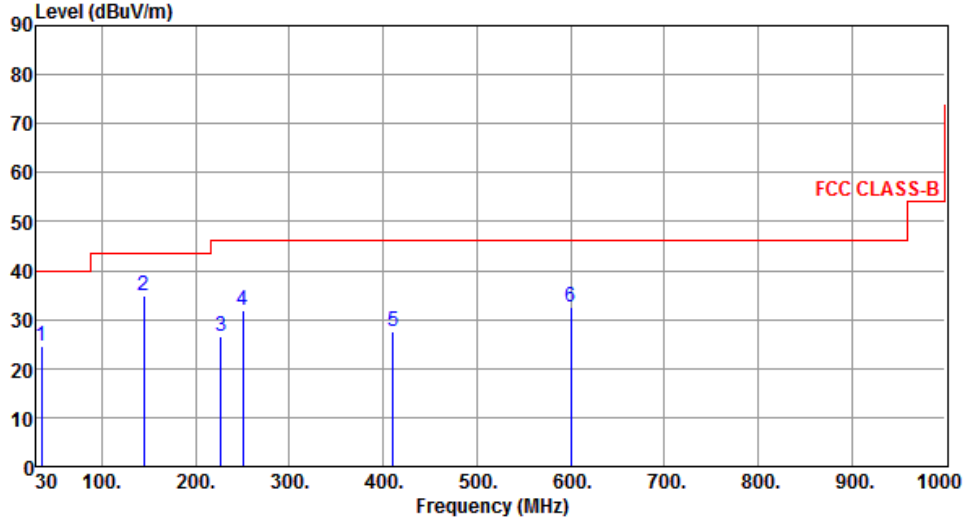
*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	GFSK			Test Freq. (MHz)	916.00				
Polarization	Vertical								
Level (dBuV/m)									

3.2.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	FSK	Test Freq. (MHz)	908.40
Polarization	Horizontal		

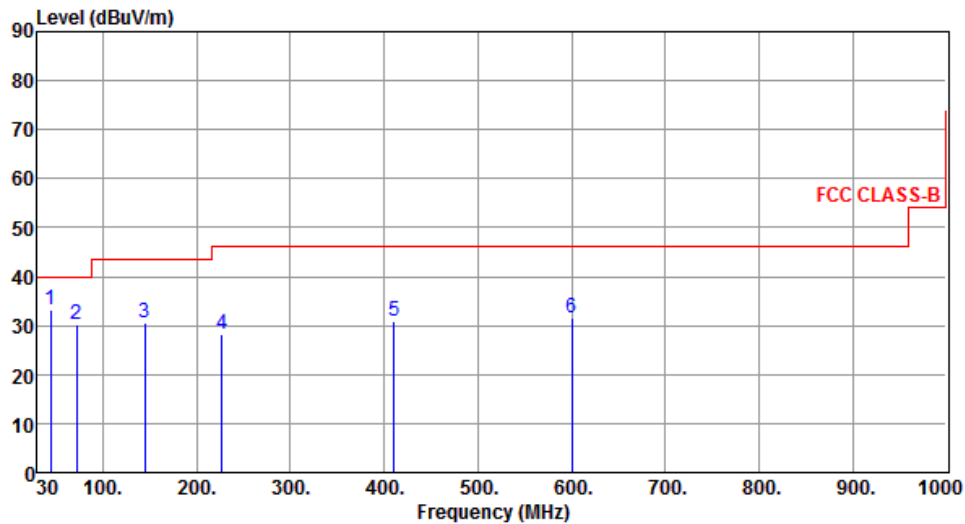


The graph displays the emission level in dBuV/m on the y-axis (0 to 90) against frequency in MHz on the x-axis (30 to 1000). A red line represents the FCC CLASS-B limit, which is 40 dBuV/m from 30 to 100 MHz, 45 dBuV/m from 100 to 300 MHz, and 55 dBuV/m from 300 to 1000 MHz. Six blue vertical lines indicate measured peaks at various frequencies, labeled 1 through 6.

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	35.82	24.48	40.00	-15.52	32.86	-8.38	Peak	---	---
2	144.46	34.98	43.50	-8.52	43.27	-8.29	Peak	---	---
3	226.91	26.62	46.00	-19.38	36.37	-9.75	Peak	---	---
4	250.19	31.76	46.00	-14.24	40.96	-9.20	Peak	---	---
5	410.24	27.72	46.00	-18.28	32.45	-4.73	Peak	---	---
6	600.36	32.53	46.00	-13.47	33.25	-0.72	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)	908.40
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	44.55	33.34	40.00	-6.66	40.89	-7.55	Peak	---	---
2	71.71	30.15	40.00	-9.85	41.10	-10.95	Peak	---	---
3	144.46	30.59	43.50	-12.91	38.88	-8.29	Peak	---	---
4	226.91	28.09	46.00	-17.91	37.84	-9.75	Peak	---	---
5	410.24	30.83	46.00	-15.17	35.56	-4.73	Peak	---	---
6	600.36	31.40	46.00	-14.60	32.12	-0.72	Peak	---	---

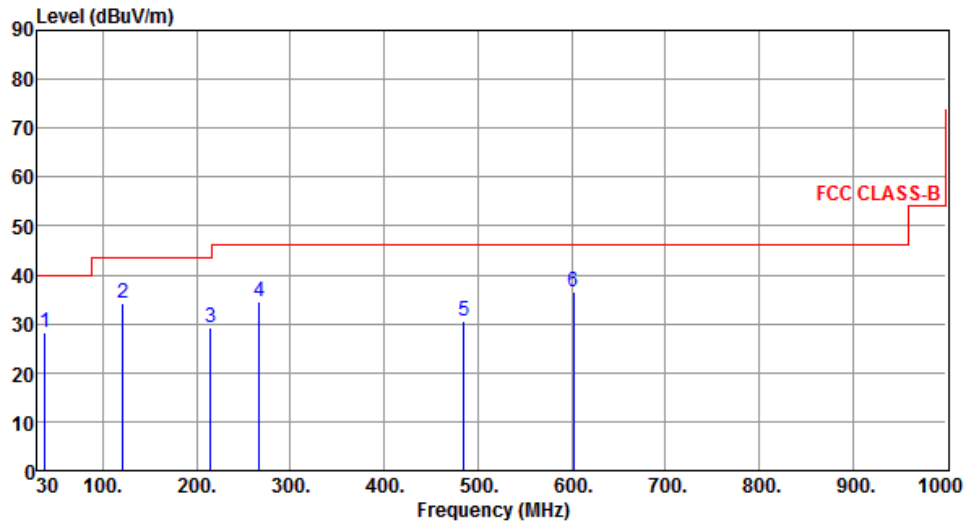
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*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)	908.42
Polarization	Horizontal		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	38.43	28.38	40.00	-11.62	36.37	-7.99	Peak	---	---
2	121.13	34.32	43.50	-9.18	44.38	-10.06	Peak	---	---
3	214.91	29.08	43.50	-14.42	39.74	-10.66	Peak	---	---
4	267.12	34.51	46.00	-11.49	43.05	-8.54	Peak	---	---
5	485.15	30.44	46.00	-15.56	33.58	-3.14	Peak	---	---
6	601.85	36.46	46.00	-9.54	37.16	-0.70	Peak	---	---

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

*Factor includes antenna factor , cable loss and amplifier gain

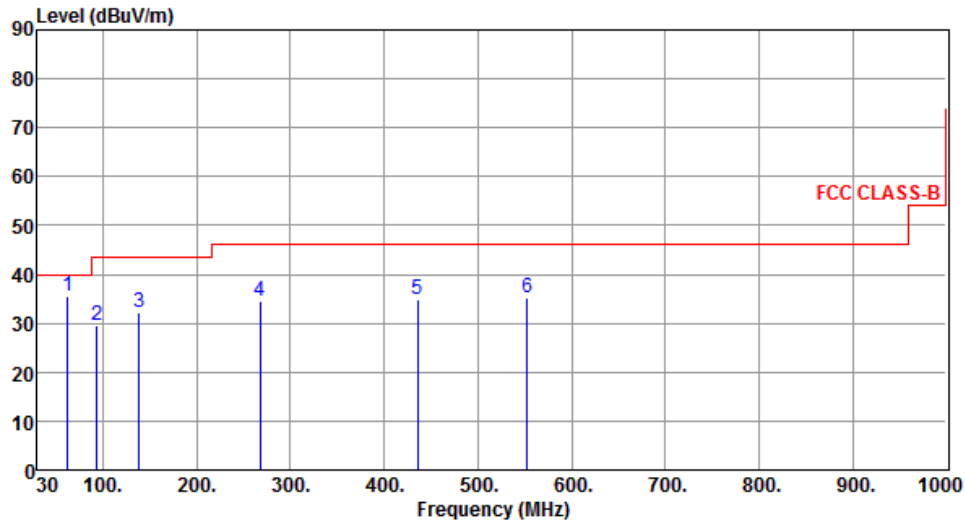
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

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

Modulation	FSK	Test Freq. (MHz)	908.42
Polarization	Vertical		
Level (dBuV/m) </			

Modulation	GFSK	Test Freq. (MHz)	916.00
Polarization	Horizontal		
 			

Modulation	GFSK	Test Freq. (MHz)	916.00
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	62.08	35.51	40.00	-4.49	44.75	-9.24	Peak	---	---
2	93.47	29.41	43.50	-14.09	43.28	-13.87	Peak	---	---
3	138.31	32.29	43.50	-11.21	40.73	-8.44	Peak	---	---
4	267.48	34.57	46.00	-11.43	43.09	-8.52	Peak	---	---
5	435.37	34.80	46.00	-11.20	38.93	-4.13	Peak	---	---
6	552.84	35.05	46.00	-10.95	36.87	-1.82	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.

3.2.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation	FSK	Test Freq. (MHz)	908.40
Polarization	Horizontal		
Level (dBuV/m)			

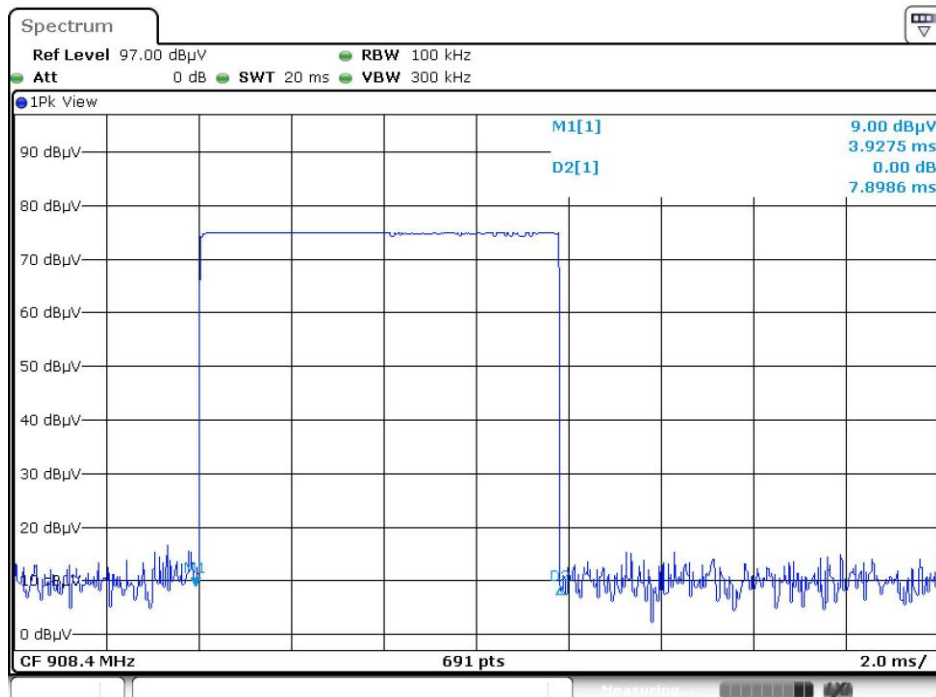
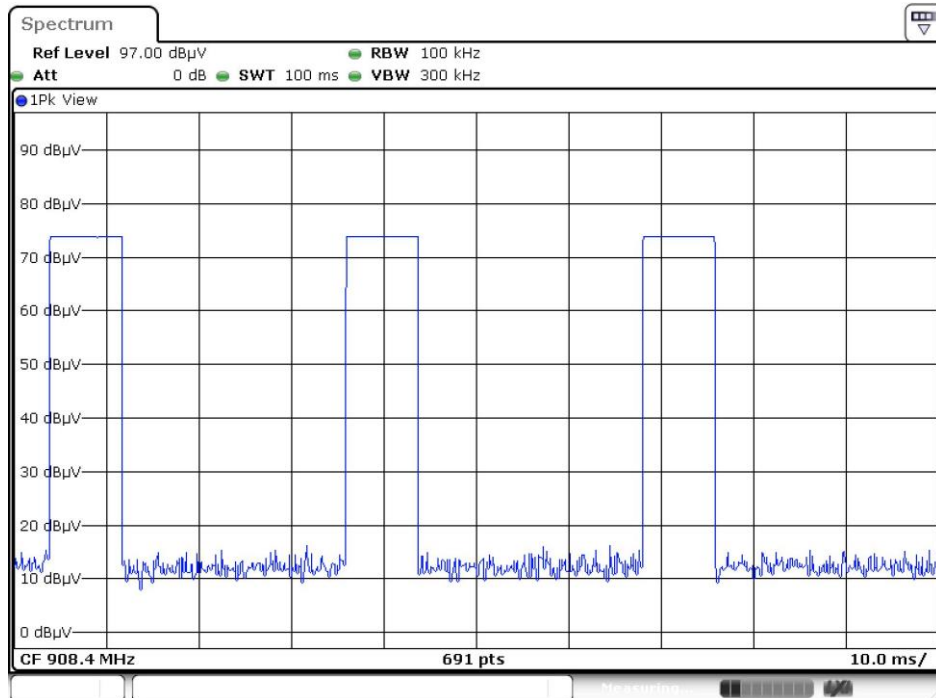
Modulation	FSK	Test Freq. (MHz)	908.40																																																																																										
Polarization	Vertical																																																																																												
Level (dBuV/m) 1 2 3 4 5 6 1000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 25000 Frequency (MHz) 74 FCC CLASS-B 54 FCC CLASS-B (AVG) <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>1816.80</td><td>31.07</td><td>54.00</td><td>-22.93</td><td>36.55</td><td>-5.48</td><td>Average</td><td>114</td><td>233</td></tr><tr><td>2</td><td>1816.80</td><td>43.58</td><td>74.00</td><td>-30.42</td><td>49.06</td><td>-5.48</td><td>Peak</td><td>114</td><td>233</td></tr><tr><td>3</td><td>2725.20</td><td>41.89</td><td>54.00</td><td>-12.11</td><td>43.94</td><td>-2.05</td><td>Average</td><td>100</td><td>201</td></tr><tr><td>4</td><td>2725.20</td><td>54.40</td><td>74.00</td><td>-19.60</td><td>56.45</td><td>-2.05</td><td>Peak</td><td>100</td><td>201</td></tr><tr><td>5</td><td>8175.60</td><td>46.38</td><td>54.00</td><td>-7.62</td><td>36.69</td><td>9.69</td><td>Average</td><td>100</td><td>208</td></tr><tr><td>6</td><td>8175.60</td><td>58.89</td><td>74.00</td><td>-15.11</td><td>49.20</td><td>9.69</td><td>Peak</td><td>100</td><td>208</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	1816.80	31.07	54.00	-22.93	36.55	-5.48	Average	114	233	2	1816.80	43.58	74.00	-30.42	49.06	-5.48	Peak	114	233	3	2725.20	41.89	54.00	-12.11	43.94	-2.05	Average	100	201	4	2725.20	54.40	74.00	-19.60	56.45	-2.05	Peak	100	201	5	8175.60	46.38	54.00	-7.62	36.69	9.69	Average	100	208	6	8175.60	58.89	74.00	-15.11	49.20	9.69	Peak	100	208
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn																																																																																				
	MHz	level			reading			High	Table																																																																																				
		dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg																																																																																				
1	1816.80	31.07	54.00	-22.93	36.55	-5.48	Average	114	233																																																																																				
2	1816.80	43.58	74.00	-30.42	49.06	-5.48	Peak	114	233																																																																																				
3	2725.20	41.89	54.00	-12.11	43.94	-2.05	Average	100	201																																																																																				
4	2725.20	54.40	74.00	-19.60	56.45	-2.05	Peak	100	201																																																																																				
5	8175.60	46.38	54.00	-7.62	36.69	9.69	Average	100	208																																																																																				
6	8175.60	58.89	74.00	-15.11	49.20	9.69	Peak	100	208																																																																																				
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)	908.42
Polarization	Horizontal		
Level (dBuV/m)			

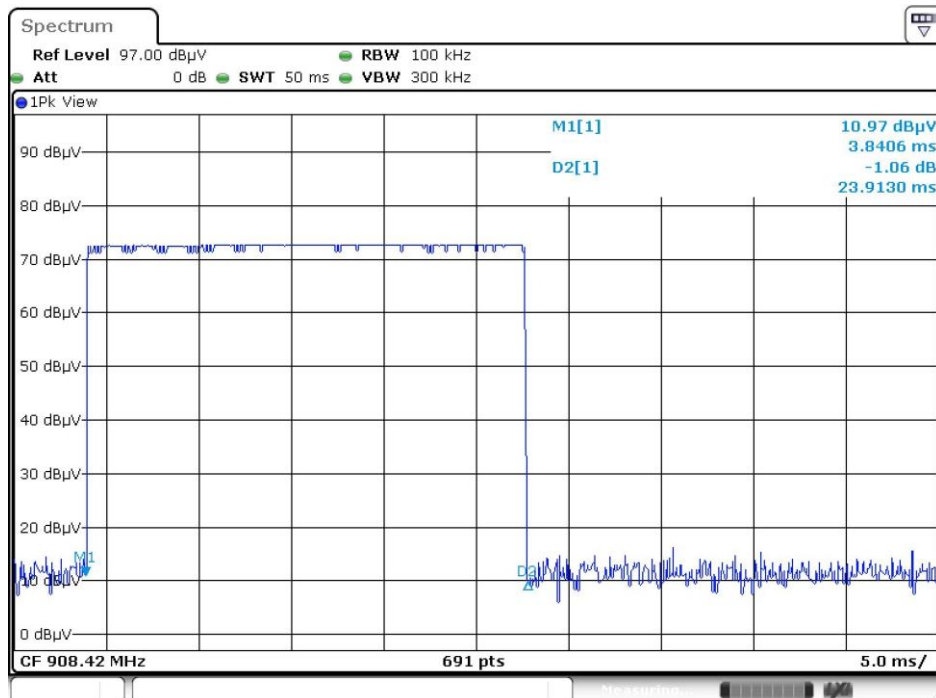
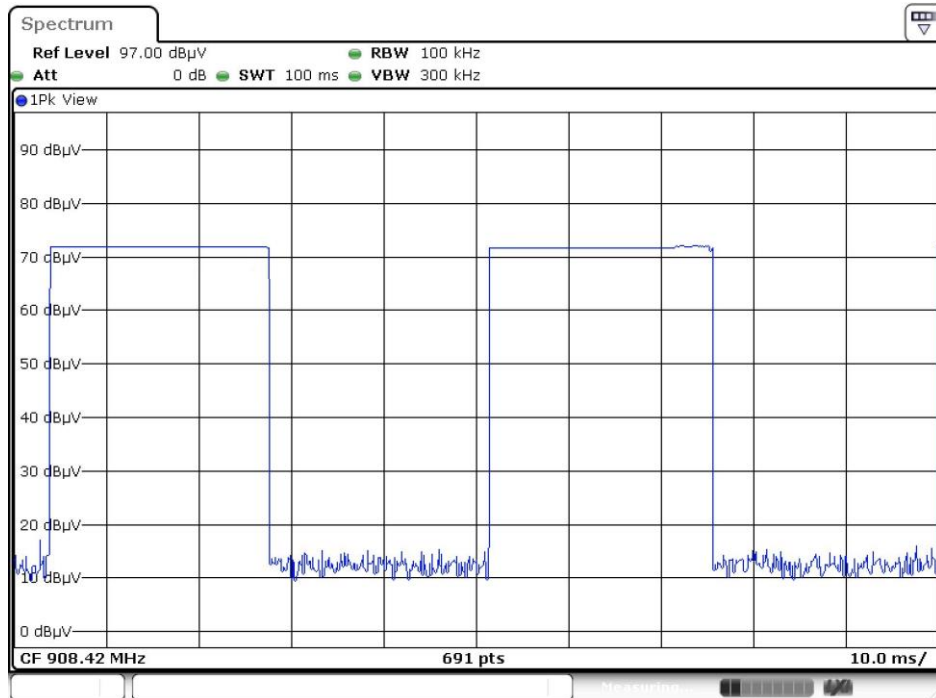
Modulation	FSK	Test Freq. (MHz)	908.42
Polarization	Vertical		
Level (dBuV/m)			

Modulation	GFSK	Test Freq. (MHz)	916.00
Polarization	Horizontal		
Level (dBuV/m) 90 80 70 60 50 40 30 20 10 0 1000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 25000 Frequency (MHz) 2 4 3 6 5			

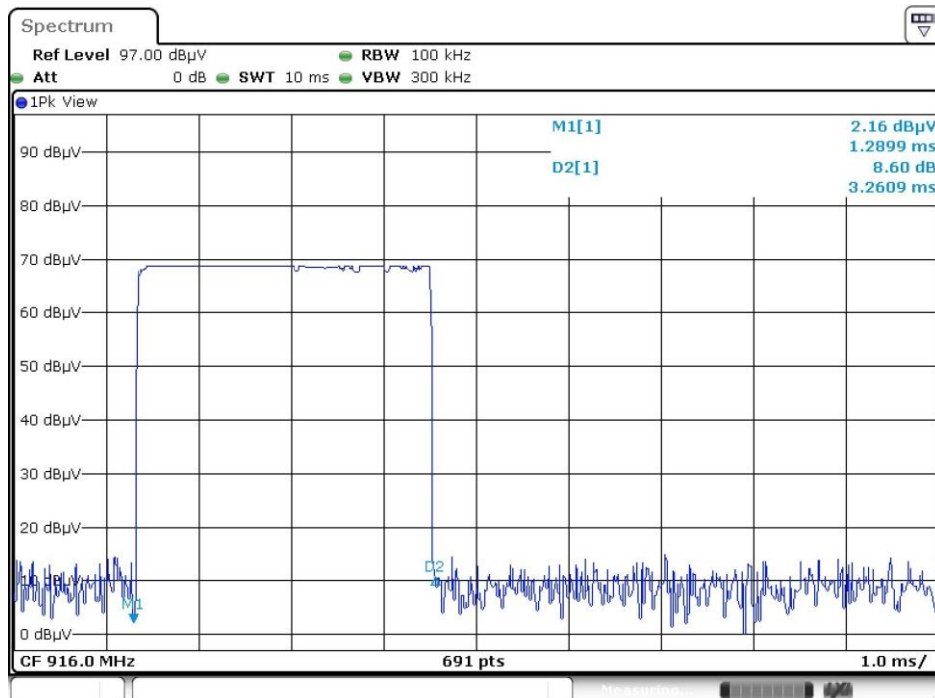
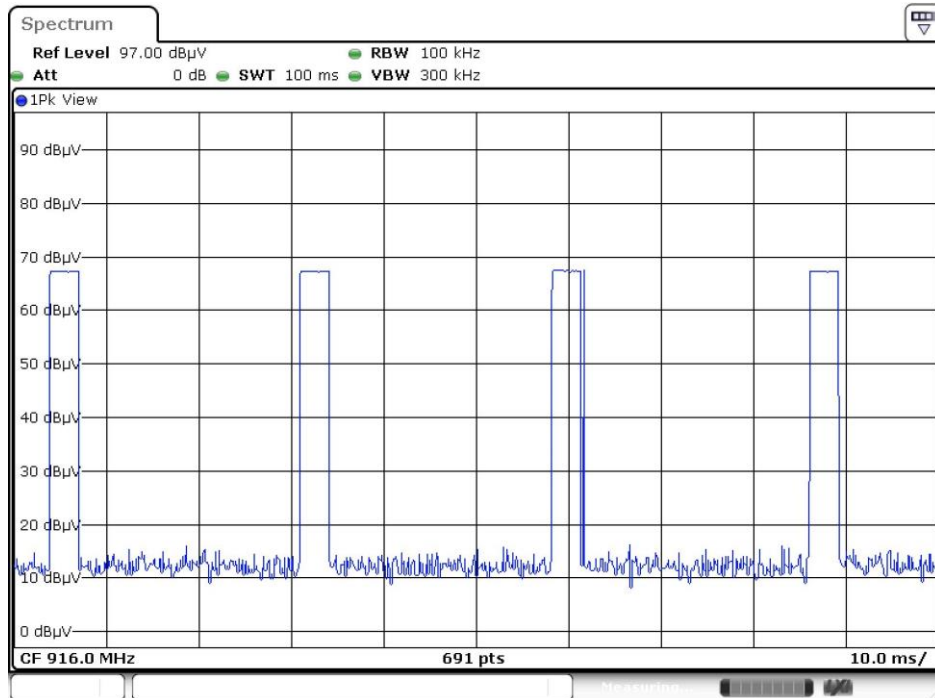
Modulation	GFSK	Test Freq. (MHz)	916.00						
Polarization	Vertical								
Level (dBuV/m) 1 2 3 4 5 6 1000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 25000 Frequency (MHz) FCC CLASS-B FCC CLASS-B (AVG)									
	Freq.	Emission level	Limit	Margin	SA	Factor	Remark	ANT	Turn
	MHz	dBuV/m	dBuV/m	dB	reading	dB		High	Table
								cm	deg
1	1832.00	24.44	54.00	-29.56	29.87	-5.43	Average	100	233
2	1832.00	42.13	74.00	-31.87	47.56	-5.43	Peak	100	233
3	2748.00	35.71	54.00	-18.29	37.68	-1.97	Average	100	312
4	2748.00	53.40	74.00	-20.60	55.37	-1.97	Peak	100	312
5	8244.00	41.49	54.00	-12.51	31.76	9.73	Average	100	209
6	8244.00	59.18	74.00	-14.82	49.45	9.73	Peak	100	209
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).									



$$908.40\text{MHz: } 20\log (\text{Duty cycle}) = 20\log \frac{3 \times 7.8986 \text{ ms}}{100 \text{ ms}} = -12.51\text{dB}$$



$$908.42\text{MHz: } 20\log (\text{Duty cycle}) = 20\log \frac{2 \times 23.9130 \text{ ms}}{100 \text{ ms}} = -6.41\text{dB}$$



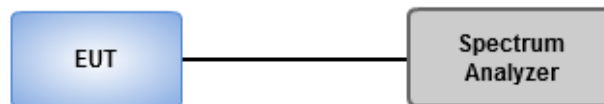
$$916.00\text{MHz: } 20\log (\text{Duty cycle}) = 20\log \frac{4 \times 3.2609 \text{ ms}}{100 \text{ ms}} = -17.69\text{dB}$$

3.3 20dB and Occupied Bandwidth

3.3.1 Test Procedures

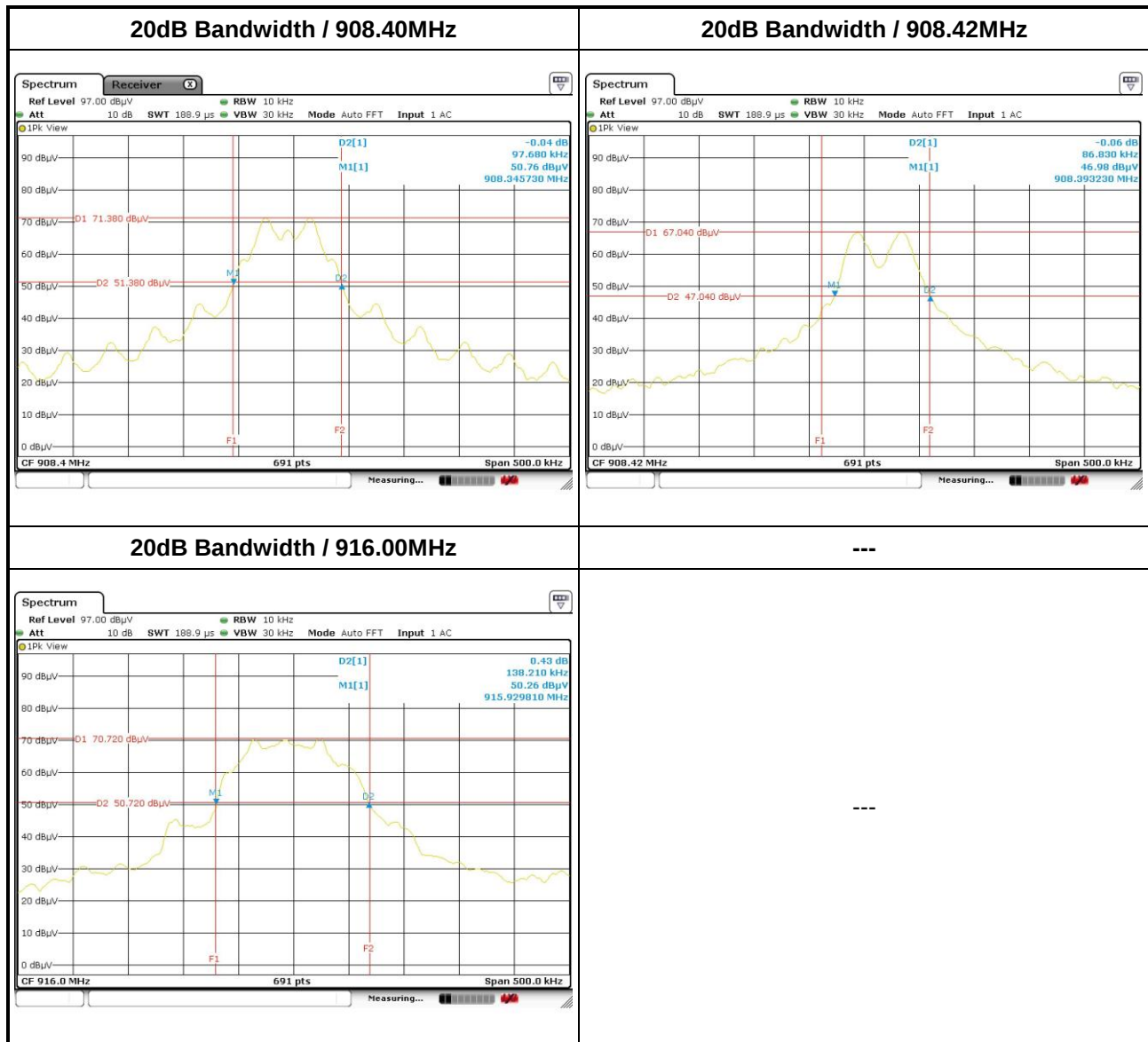
1. Set resolution bandwidth (RBW) = 10 kHz, Video bandwidth = 30 kHz.
2. Detector = Peak(20 dB bandwidth) / Sample(Occupied bandwidth), Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20dB relative to the maximum level measured in the fundamental emission.
5. Use the occupied measurement function of spectrum analyzer to measure 99% occupied bandwidth

3.3.2 Test Setup

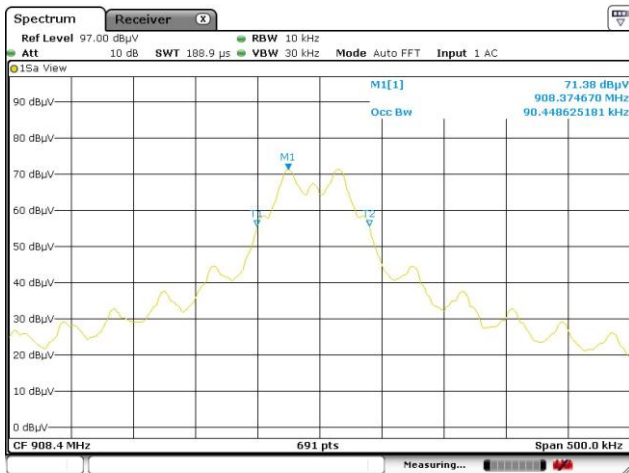


3.3.3 20dB and Occupied Bandwidth

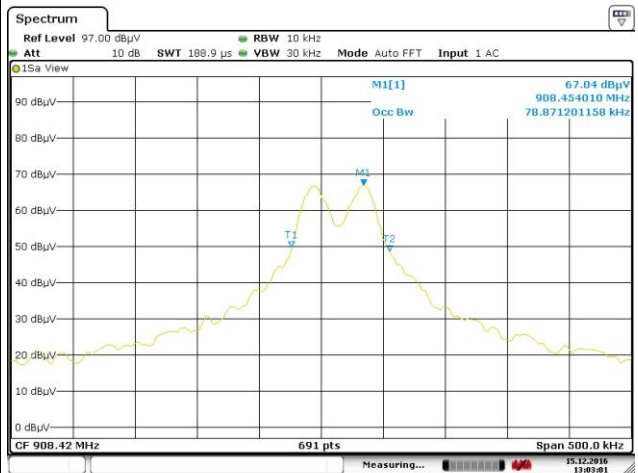
Freq. (MHz)	20dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
908.40	97.68	90.45
908.42	86.83	78.87
916.00	138.21	121.56



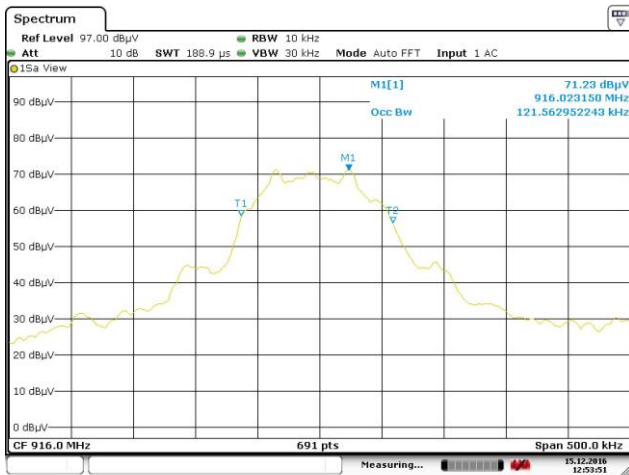
Occupied Bandwidth / 908.40MHz



Occupied Bandwidth / 908.42MHz



Occupied Bandwidth / 916.00MHz



4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

Linkou

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin
Kou District, New Taipei City,
Taiwan, R.O.C.

Kwei Shan

Tel: 886-3-271-8666

No. 3-1, Lane 6, Wen San 3rd St.,
Kwei Shan District, Tao Yuan City
333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd
St., Kwei Shan District, Tao Yuan
City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666

Fax: 886-3-318-0155

Email: ICC_Service@icertifi.com.tw

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