FCC CERTIFICATION TEST REPORT

FOR

Applicant	:	Marvelmind Robotics
Address	:	Lugovaya str., 4 bld 5 room 17, Skolkovo Innovation Center, Moscow, 143026, Russian Federation.
Equipment under Test	:	Modem
Model No.	:	Modem v5.1
Trade Mark	:	/
FCC ID	:	2AL2L-MODEM51
Manufacturer	:	Marvelmind Robotics
Address	:	Lugovaya str., 4 bld 5 room 17, Skolkovo Innovation Center, Moscow, 143026, Russian Federation.

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel.: +86-0769-38826678, **E-mail:** ddt@dgddt.com, http://www.dgddt.com

REPORT

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Test Report Declare

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Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C.

Test Procedure Used:

ANSI C63.10:2013.

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No.:	DDT-R20081303-1E1		
Date of Receipt:	Aug. 24, 2020	**Date of Test:**	Aug. 24, 2020 ~ Oct. 29, 2020

Prepared By: ***Approved By:***

Sam Li

Sam Li/Engineer ***Damon Hu/EMC Manager***

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Oct. 29, 2020	

1. Summary of Test Results

Description of Test Item	Standard	Results
Maximum Peak Output Power	FCC Part 15: 15.247(b)(2) ANSI C63.10:2013	Pass
20 dB Bandwidth	FCC Part 15: 15.247(a)(1)(i) ANSI C63.10:2013	Pass
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1) ANSI C63.10:2013	Pass
Number of Hopping Channel	FCC Part 15: 15.247(a)(1)(i) FCC Part 15: 15.247(b)(2) ANSI C63.10:2013	Pass
Dwell Time	FCC Part 15: 15.247(a)(1)(i) ANSI C63.10:2013	Pass
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10:2013	Pass
Band Edge Compliance	FCC Part 15: 15.247(d) ANSI C63.10:2013	Pass
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.10:2013	N/A
Antenna Requirement	FCC Part 15: 15.203	Pass
Note: N/A is an abbreviation for Not Applicable.		

2. General Test Information

2.1. Description of EUT

EUT* Name	:	Modem
Model Number	:	Modem v5.1
EUT Function Description	:	Please reference user manual of this device
Power Supply	:	DC 5V
Operation frequency	:	For 38 kbps: 902.2-927.6 MHz For 153 kbps & 400 kbps: 902.6-927.2 MHz
Modulation	:	GFSK
Transfer Rate	:	38 kbps, 153 kbps, 400 kbps
Serial Number	:	N/A

Note: EUT is the abbreviation of equipment under test.

For 38 kbps (Channel separation: 0.2 MHz):

Channel Information							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	902.2	33	908.6	65	915	97	921.4
2	902.4	34	908.8	66	915.2	98	921.6
3	902.6	35	909	67	915.4	99	921.8
4	902.8	36	909.2	68	915.6	100	922
5	903	37	909.4	69	915.8	101	922.2
6	903.2	38	909.6	70	916	102	922.4
7	903.4	39	909.8	71	916.2	103	922.6
8	903.6	40	910	72	916.4	104	922.8
9	903.8	41	910.2	73	916.6	105	923
10	904	42	910.4	74	916.8	106	923.2
11	904.2	43	910.6	75	917	107	923.4
12	904.4	44	910.8	76	917.2	108	923.6
13	904.6	45	911	77	917.4	109	923.8
14	904.8	46	911.2	78	917.6	110	924
15	905	47	911.4	79	917.8	111	924.2
16	905.2	48	911.6	80	918	112	924.4
17	905.4	49	911.8	81	918.2	113	924.6
18	905.6	50	912	82	918.4	114	924.8
19	905.8	51	912.2	83	918.6	115	925
20	906	52	912.4	84	918.8	116	925.2
21	906.2	53	912.6	85	919	117	925.4
22	906.4	54	912.8	86	919.2	118	925.6
23	906.6	55	913	87	919.4	119	925.8
24	906.8	56	913.2	88	919.6	120	926
25	907	57	913.4	89	919.8	121	926.2
26	907.2	58	913.6	90	920	122	926.4
27	907.4	59	913.8	91	920.2	123	926.6
28	907.6	60	914	92	920.4	124	926.8
29	907.8	61	914.2	93	920.6	125	927
30	908	62	914.4	94	920.8	126	927.2

31	908.2	63	914.6	95	921	127	927.4
32	908.4	64	914.8	96	921.2	128	927.6

For 153 kbps & 400 kbps (Channel separation: 0.6 MHz):

Channel Information							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	902.6	12	909.2	23	915.8	34	922.4
2	903.2	13	909.8	24	916.4	35	923
3	903.8	14	910.4	25	917	36	923.6
4	904.4	15	911	26	917.6	37	924.2
5	905	16	911.6	27	918.2	38	924.8
6	905.6	17	912.2	28	918.8	39	925.4
7	906.2	18	912.8	29	919.4	40	926
8	906.8	19	913.4	30	920	41	926.6
9	907.4	20	914	31	920.6	42	927.2
10	908	21	914.6	32	921.2		
11	908.6	22	915.2	33	921.8		

2.2. Antenna specifications

Antenna Type	Gain (dBi)
Helical antenna	0
Helical antenna	6

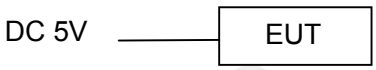
2.3. Accessories of EUT

Assistant equipment	Manufacturer	Model number	Serial No.	Other
N/A	N/A	N/A	N/A	N/A

2.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
Notebook	Lenovo Beijing Co. Ltd.	ThinkPad	FCC/CE	TP00015A

2.5. Block diagram of EUT configuration for test



Test software: DfuSe v.3.0.5
The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.

For 38 kbps:

Tested mode, channel, information			
Mode	Setting Tx Power	Channel	Frequency (MHz)
hopping on Tx mode	13	CH1 to CH128	902.2 to 927.6
hopping off Tx mode	13	CH1	902.2
	13	CH65	915
	13	CH128	927.6

For 153 kbps & 400 kbps:

Tested mode, channel, information			
Mode	Setting Tx Power	Channel	Frequency (MHz)
hopping on Tx mode	13	CH1 to CH42	902.6 to 927.2
hopping off Tx mode	13	CH1	902.6
	13	CH22	915.2
	13	CH42	927.2

2.6. Deviations of test standard

No deviation.

2.7. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25 ℃
Humidity range:	40-75%
Pressure range:	86-106 kPa

2.8. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel.: +86-0769-38826678, http://www.dgddt.com, Email: ddt@dgddt.com

CNAS Registration No. CNAS L6451; A2LA Certificate Number: 3870.01;

FCC Designation Number: CN1182; FCC Test Firm Registration Number: 540522

Industry Canada Site Registration Number: 10288A-1

2.9. Measurement uncertainty

Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum Analyzer)	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Frequencies Stability	6.7×10^{-8} (Antenna couple method)
	5.5×10^{-8} (Conducted method)
Conducted Spurious Emissions	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.40 dB (3.6 GHz ≤ f < 8 GHz)
	1.66 dB (8 GHz ≤ f < 22 GHz)
Uncertainty for Radio Frequency (RBW < 20 kHz)	3×10^{-8}
Temperature	0.4 ℃
Humidity	2 %
Uncertainty for Radiation Emission Test (30 MHz - 1 GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission Test (1 GHz - 40 GHz)	4.10 dB (1 - 6 GHz)
	4.40 dB (6 GHz - 18 GHz)
	3.54 dB (18 GHz - 26 GHz)
	4.30 dB (26 GHz - 40 GHz)
Uncertainty for Power Line Conduction Emission Test	3.32 dB (150 kHz - 30 MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

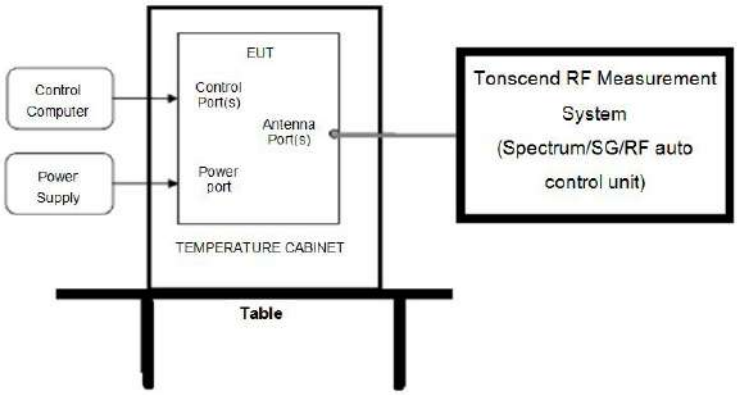
3. Equipment Used During Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
RF Connected Test (Tonscend RF Measurement System 1#)					
Spectrum analyzer	R&S	FSU26	101272	Jul. 01, 2020	1 Year
Spectrum analyzer	Agilent	N9020D	MY49100362	Sep. 28, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 24, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jul. 01, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Jul. 01, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Jul. 01, 2020	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Apr. 25, 2020	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 28, 2020	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jul. 01, 2020	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
RF Connected Test (Tonscend RF Measurement System 2#)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 25, 2020	1 Year
Spectrum analyzer	Agilent	N9020D	MY49100362	Sep. 28, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY19060405	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180912	Jul. 01, 2020	1 Year
RF Control Unit	Tonsend	JS0806-2	DDT-ZC01449	Jul. 01, 2020	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Apr. 25, 2020	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 28, 2020	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jul. 01, 2020	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
Radiation 1#chamber					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jul. 01, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 15, 2019	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 15, 2019	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 15, 2019	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Apr. 11, 2020	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Sep. 28, 2020	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Sep. 24, 2020	1 Year

RF Cable	N/A	5m+6m+1m	06270619	Sep. 30, 2020	1 Year
MI Cable	HUBSER	C10-01-01-1 M	1091629	Sep. 30, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Radiation 2#chamber					
EMI Test Receiver	R&S	ESCI	101364	Sep. 28, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jul. 01, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	9163-994	Nov. 15, 2019	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 15, 2019	1 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120	02108	Jul. 11, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Apr. 11, 2020	1 Year
Pre-amplifier	TERA-MW	TRLA-0040 G35	1013 03	Sep. 28, 2020	1 Year
RF Cable	N/A	14+1.5m	06270619	Sep. 28, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Power Line Conducted Emissions Test 1#					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
LISN 1	R&S	ENV216	101109	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Sep. 24, 2020	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Sep. 24, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Power Line Conducted Emissions Test 2#					
Test Receiver	R&S	ESPI	101761	Sep. 24, 2020	1 Year
LISN 1	R&S	ENV216	101170	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	KH43101	43101180156 8-12#	Jul. 01, 2020	1 Year
CE Cable 2	HUBSER	N/A	W11.02	Sep. 24, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

4. Maximum Peak Output Power

4.1. Block diagram of test setup



4.2. Limits

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

4.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Measure the maximum output power of EUT by spectrum analyzer with PK detector and RBW = 3 MHz (above 20 dB bandwidth of measured signal), VBW = 10 MHz

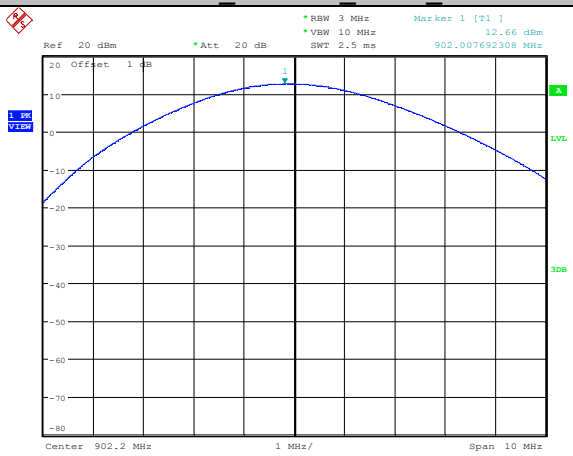
Note: The attenuator loss was inputted into spectrum analyzer as amplitude offset.

4.4. Test result

Mode	Antenna	Freq. (MHz)	Result (dBm)	Limit (dBm)	Verdict
GFSK_38 kbps	ANT1	902.2	12.66	30	Pass
	ANT1	915	12.16	30	Pass
	ANT1	927.6	11.75	30	Pass
GFSK_153 kbps	ANT1	902.6	12.64	24	Pass
	ANT1	915.2	12.16	24	Pass
	ANT1	927.2	11.74	24	Pass
GFSK_400 kbps	ANT1	902.6	12.80	24	Pass
	ANT1	915.2	12.32	24	Pass
	ANT1	927.2	11.92	24	Pass

4.5. Original test data

GFSK_38KBPS_ANT1_902.2



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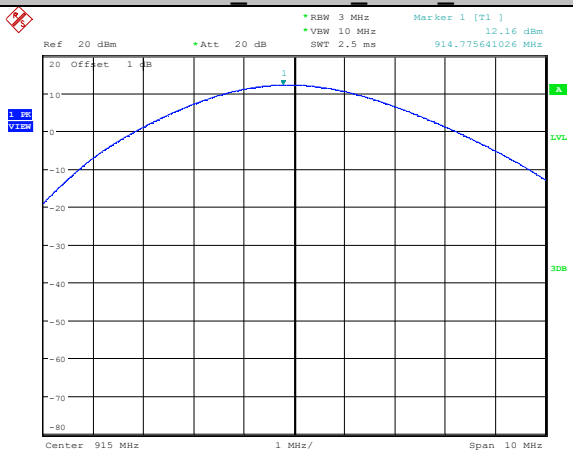

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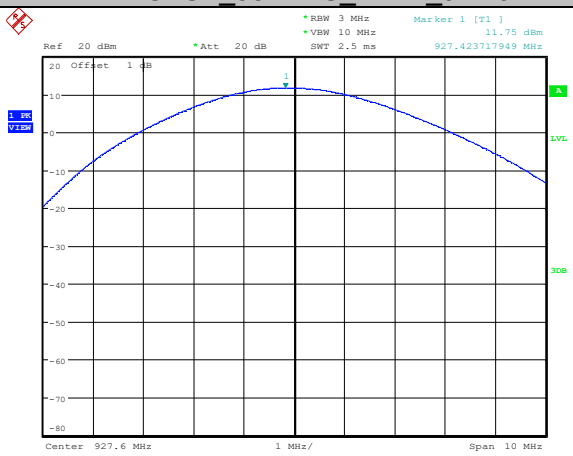

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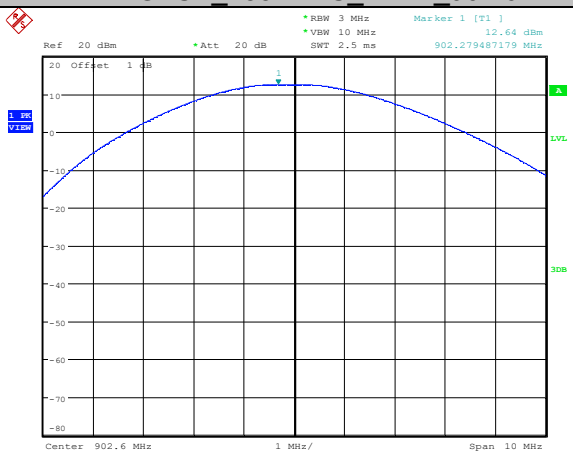

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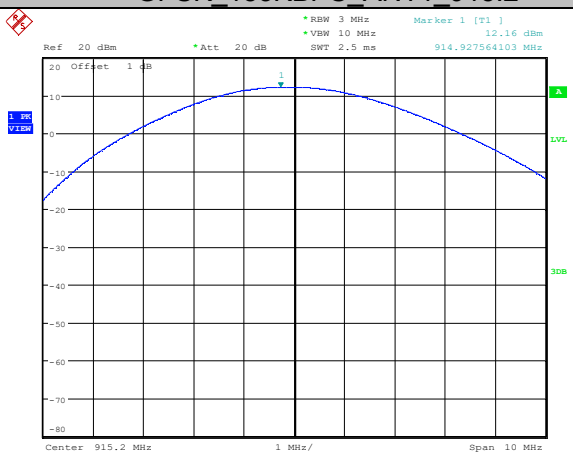

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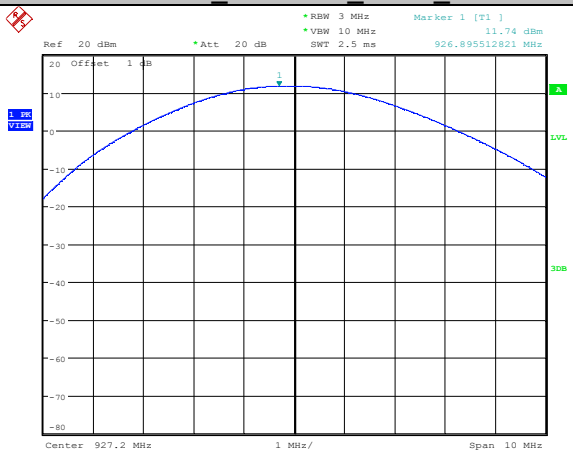

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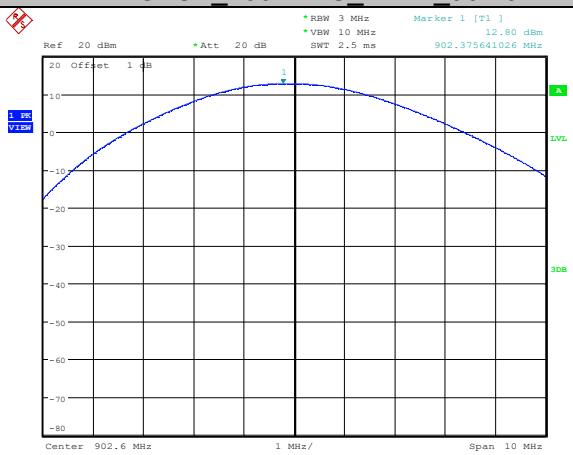

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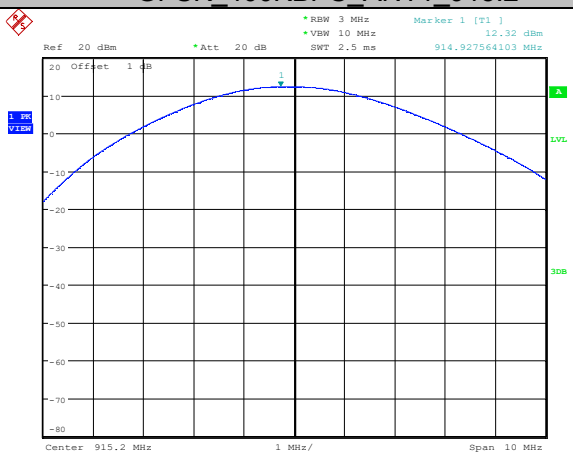

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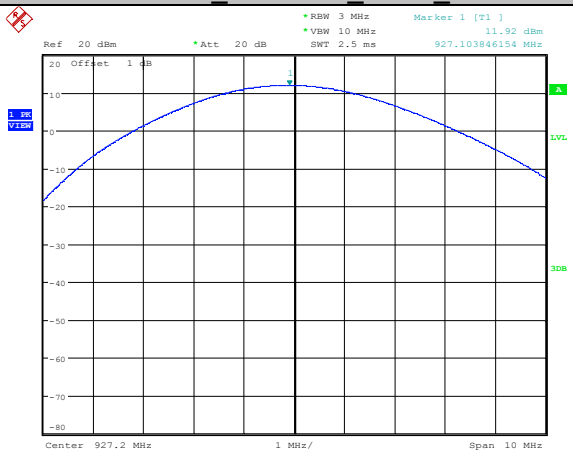

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5. 20 dB Bandwidth

5.1. Block diagram of test setup

Same as section 4.1

5.2. Limits

For frequency hopping systems operating in the 902-928 MHz band: The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

5.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3 kHz/10 kHz RBW and 10 kHz/30 kHz VBW. The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

5.4. Test result

Mode	Antenna	Freq. (MHz)	20 dB bandwidth Result (kHz)	Limit (kHz)	Verdict
GFSK_38 kbps	ANT1	902.2	113	< 500	Pass
	ANT1	915	112	< 500	Pass
	ANT1	927.6	115	< 500	Pass
GFSK_153 kbps	ANT1	902.6	459	< 500	Pass
	ANT1	915.2	459	< 500	Pass
	ANT1	927.2	461	< 500	Pass
GFSK_400 kbps	ANT1	902.6	462	< 500	Pass
	ANT1	915.2	462	< 500	Pass
	ANT1	927.2	462	< 500	Pass

5.5. Original test data

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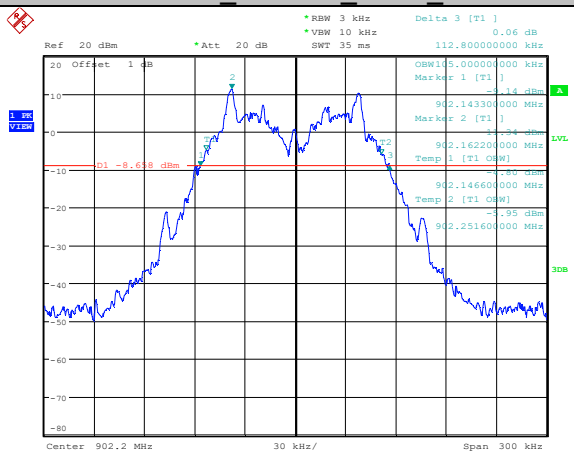

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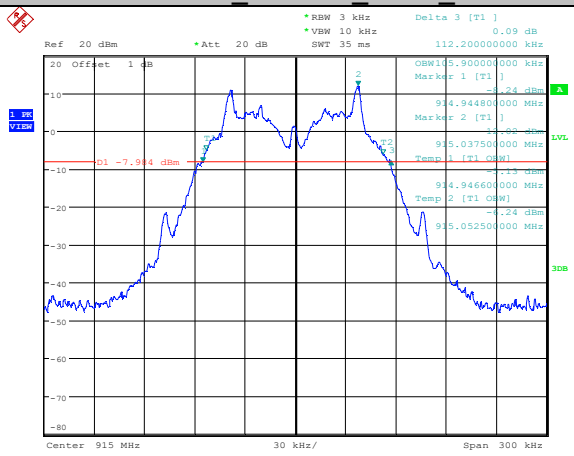

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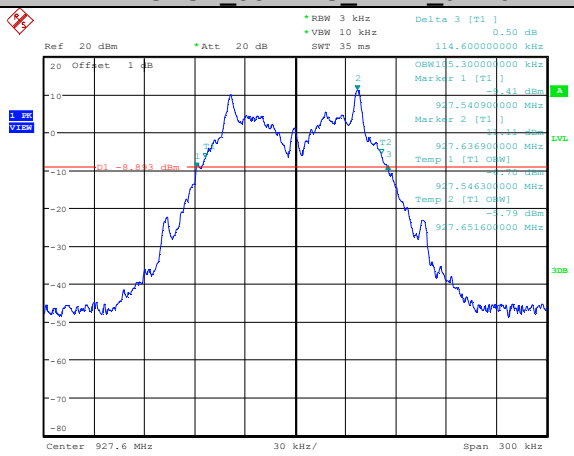

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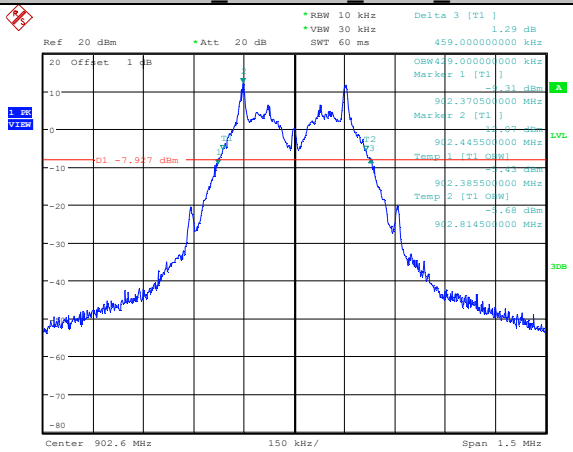

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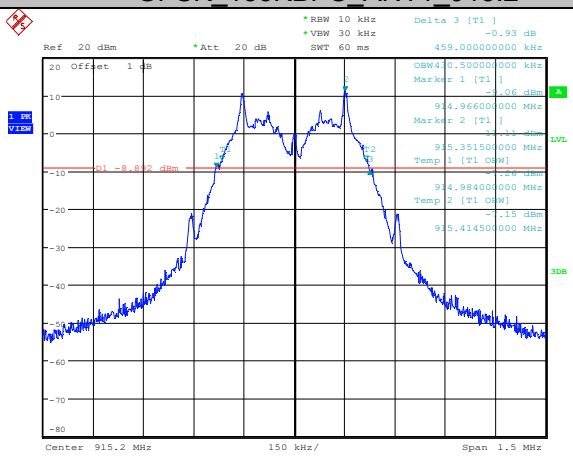
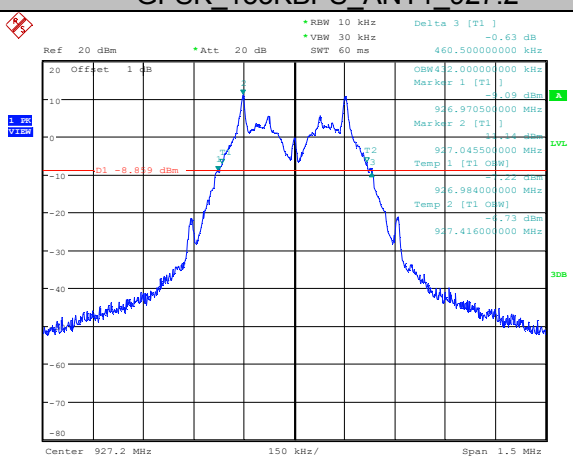


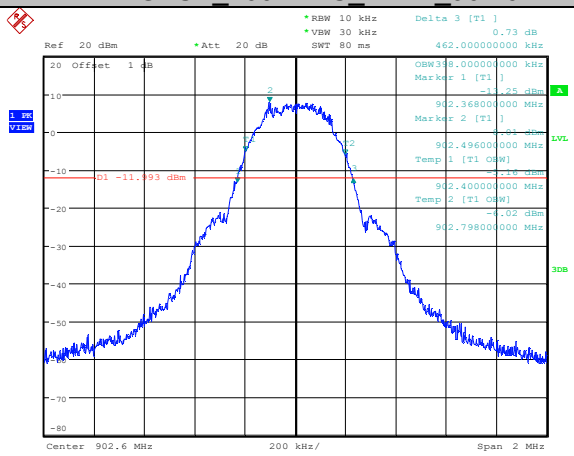
Date: 15.OCT.2020 21:37:36

GFSK_153KBPS_ANT1_927.2



Date: 15.OCT.2020 21:38:51

GFSK_400KBPS_ANT1_902.6



Date: 15.OCT.2020 21:39:50

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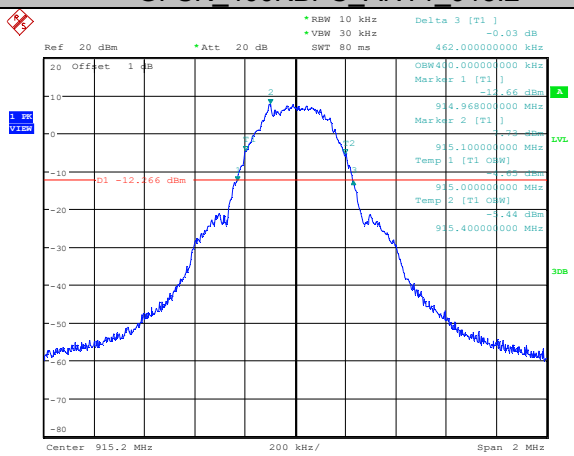
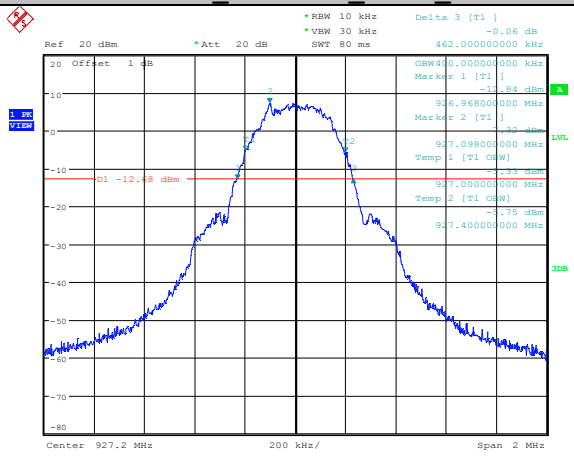


Date: 15.OCT.2020 21:42:36

GFSK_400KBPS_ANT1_927.2



Date: 15.OCT.2020 21:45:02

6. Carrier Frequency Separation

6.1. Block diagram of test setup

Same as section 4.1

6.2. Limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

6.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

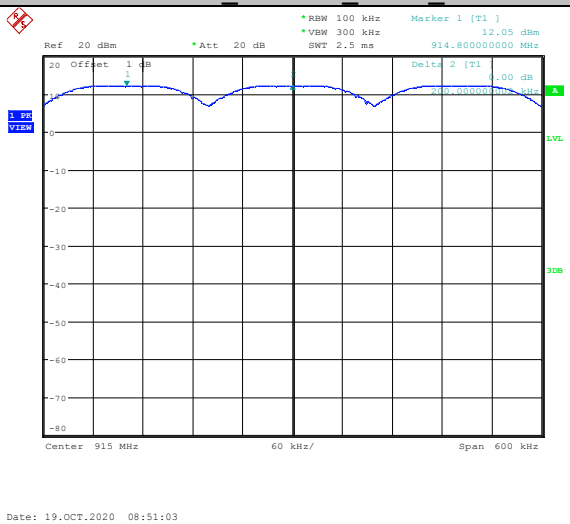
(2) The carrier frequency was measured by spectrum analyzer with 100 kHz RBW and 300 kHz VBW.

6.4. Test result

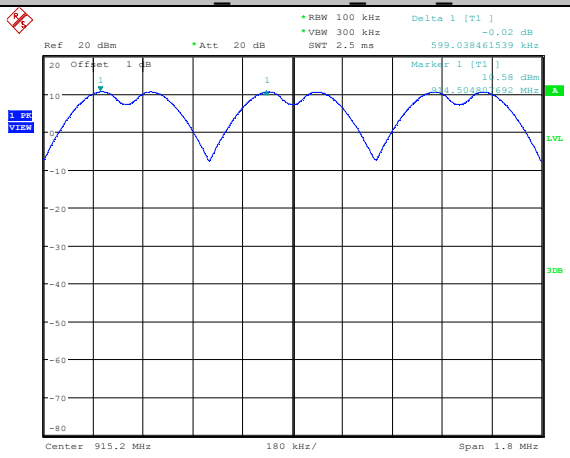
Mode	Antenna	Channel separation (kHz)	Limit (kHz) 20 dB bandwidth	Verdict
GFSK_38 kbps	ANT1	200	> 115	Pass
GFSK_153 kbps	ANT1	599	> 461	Pass
GFSK_400 kbps	ANT1	599	> 462	Pass

6.5. Original test data

GFSK_38KBPS_ANT1_HOP



GFSK_153KBPS_ANT1_HOP



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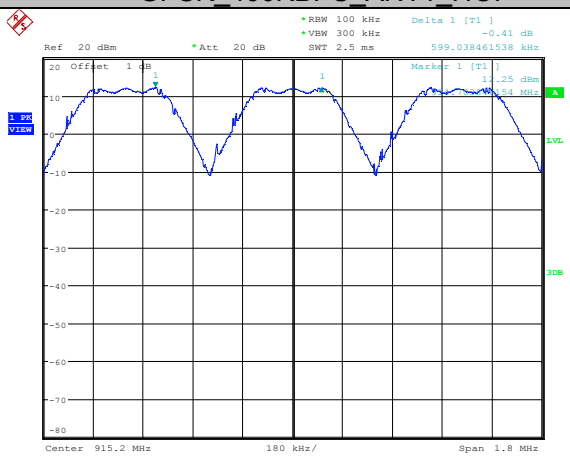


7. Number of Hopping Channel

7.1. Block diagram of test setup

Same as section 4.1

7.2. Limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

7.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

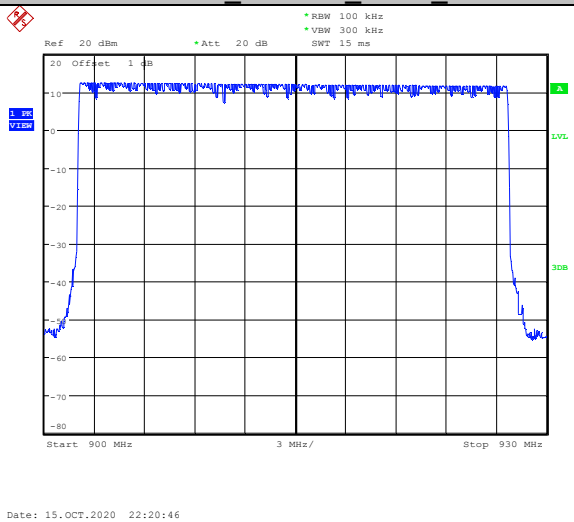
(2) The number of hopping channels was measured by spectrum analyzer with 100 kHz RBW and 300 kHz VBW.

7.4. Test result

Mode	Antenna	20 dB bandwidth (kHz)	Number of hopping channels	Limit	Verdict
GFSK_38 kbps	ANT1	115	128	> 50	Pass
GFSK_153 kbps	ANT1	461	42	> 25	Pass
GFSK_400 kbps	ANT1	462	42	> 25	Pass

7.5. Original test data

GFSK_38KBPS_ANT1_HOP



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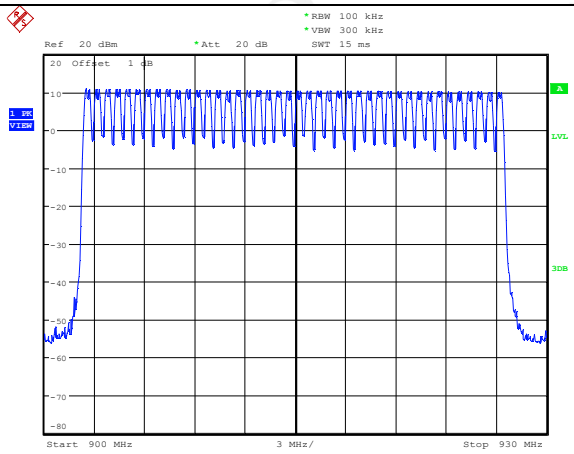

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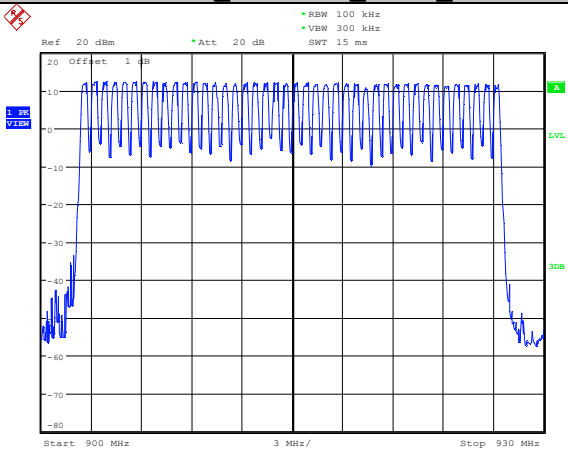
GFSK_400KBPS_ANT1_HOP



Date: 15.OCT.2020 22:09:06

8. Dwell Time

8.1. Block diagram of test setup

Same as section 4.1

8.2. Limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

8.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) The test period: T = 0.4 Second/Channel x 79 Channel = 31.6 s

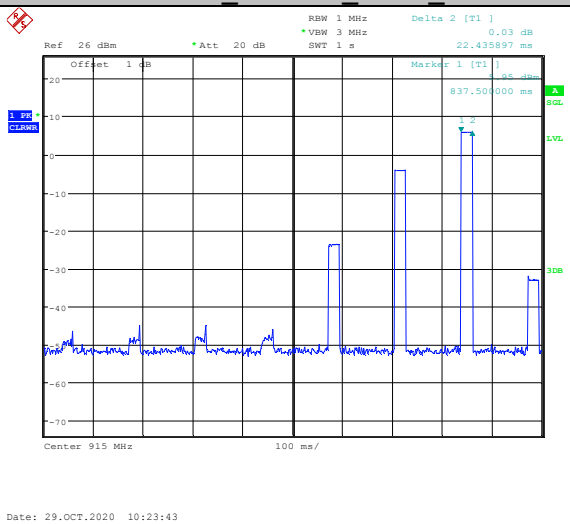
(3) Measure the hopping number and on time of each pulse with spectrum analyzer in zero span set, and calculate dwell time with formula Dwell time = total hops *pulse's on time.

8.4. Test result

Mode	Antenna	20 dB bandwidth (kHz)	Dwell time (ms)	Pulse's on time (ms)	Total hops	Limit	Verdict
GFSK_38 kbps	ANT1	115	359.04	22.44	16	< 400 ms	Pass
GFSK_153 kbps	ANT1	461	348.64	21.79	16	< 400 ms	Pass
GFSK_400 kbps	ANT1	462	307.68	19.23	16	< 400 ms	Pass
Note: Dwell time = total hops * pulse's on time.							

8.5. Original test data

GFSK_38KBPS_ANT1_HOP



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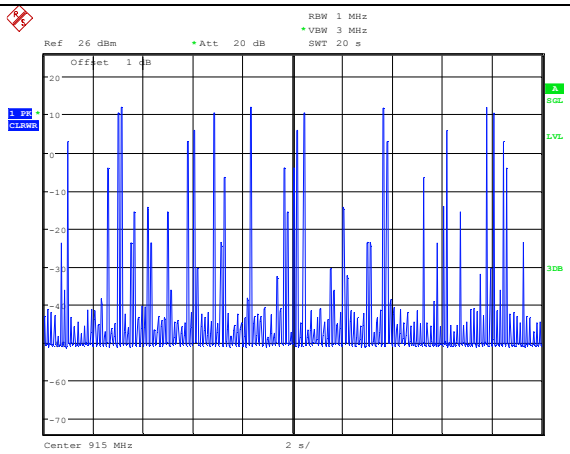

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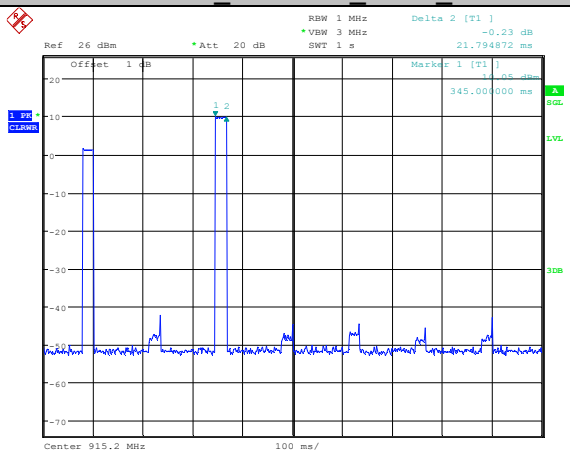
GFSK_153KBPS_ANT1_HOP



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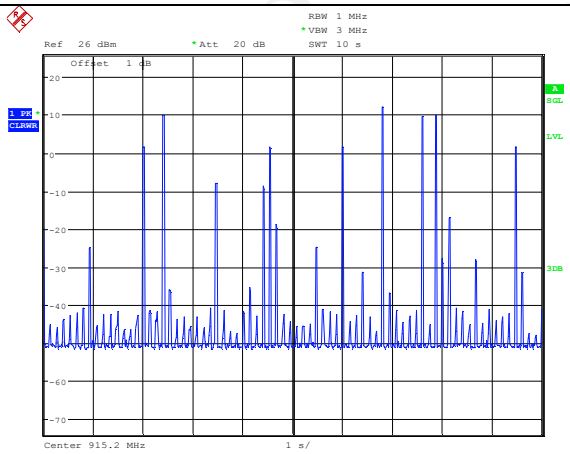

Date: 29.OCT.2020 10:22:01

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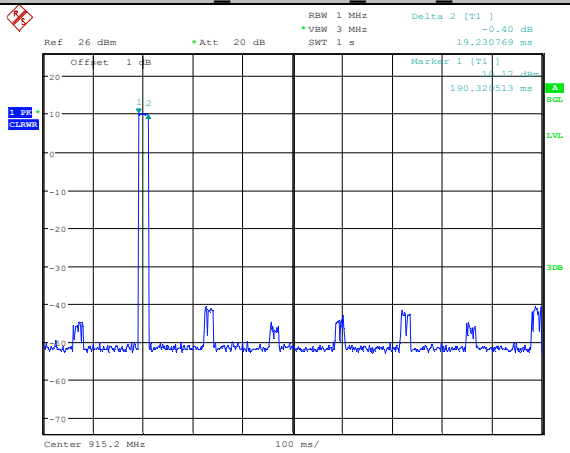

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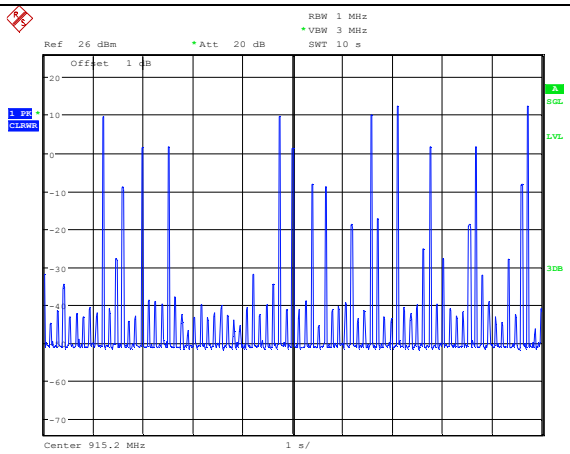


Date: 29.OCT.2020 10:21:04

9. Band Edge Compliance (Conducted Method)

9.1. Block diagram of test setup

Same as section 4.1

9.2. Limit

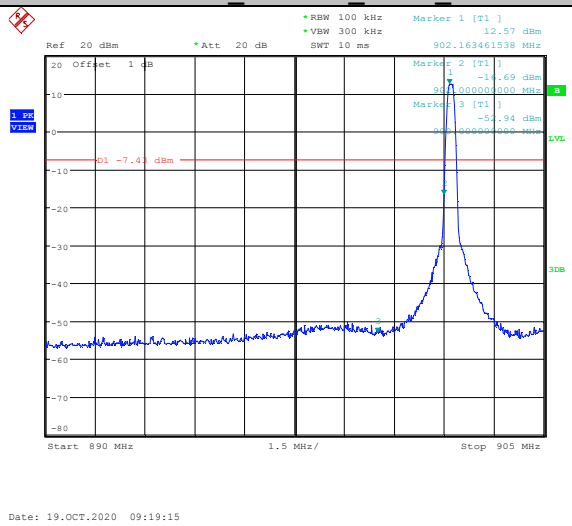
All restriction band should comply with 15.209, other emission should be at least 20 dB below the fundamental.

9.3. Test result

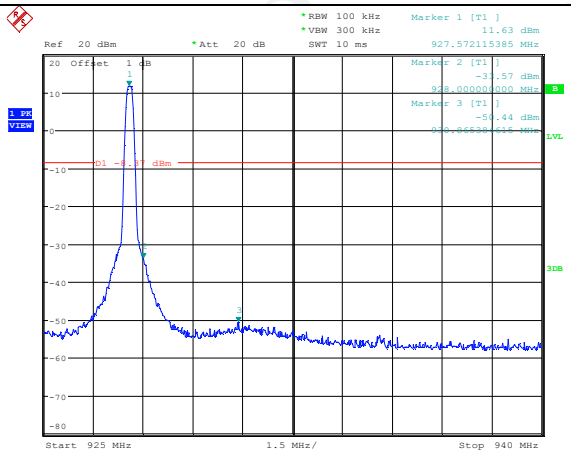
Mode	Antenna	Freq. (MHz)	Verdict
GFSK_38 kbps	ANT1	Hopping off 902.2	Pass
	ANT1	Hopping off 927.6	Pass
	ANT1	Hopping on	Pass
GFSK_153 kbps	ANT1	Hopping off 902.6	Pass
	ANT1	Hopping off 927.2	Pass
	ANT1	Hopping on	Pass
GFSK_400 kbps	ANT1	Hopping off 902.6	Pass
	ANT1	Hopping off 927.2	Pass
	ANT1	Hopping on	Pass

9.4. Original test data

GFSK_38KBPS_ANT1_Low



GFSK_38KBPS_ANT1_High



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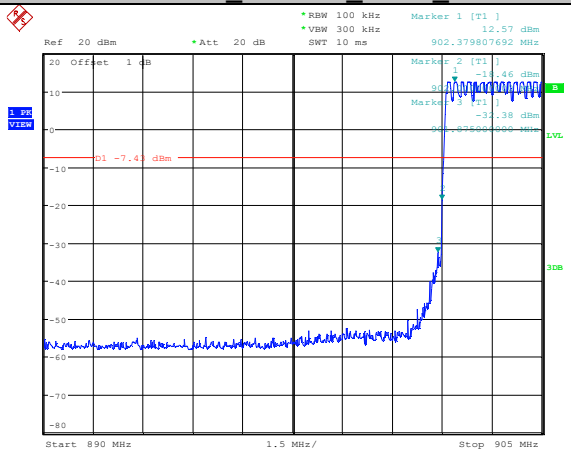

Date: 19.OCT.2020 09:28:18

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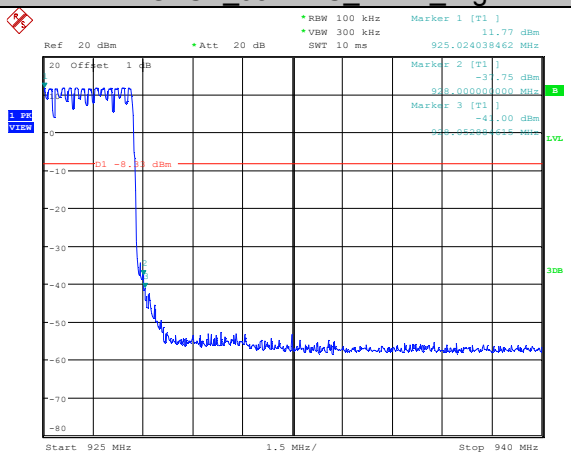

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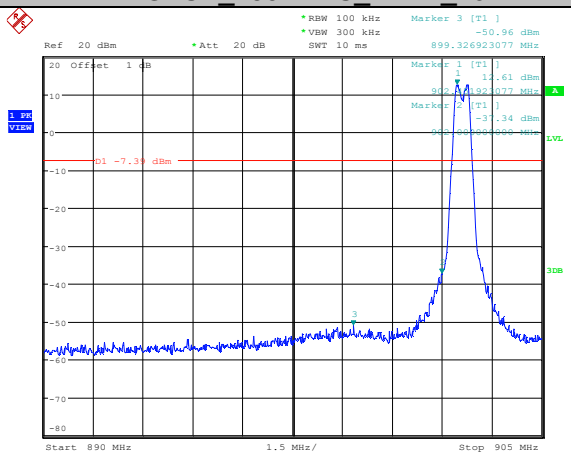

Date: 21.OCT.2020 10:45:01

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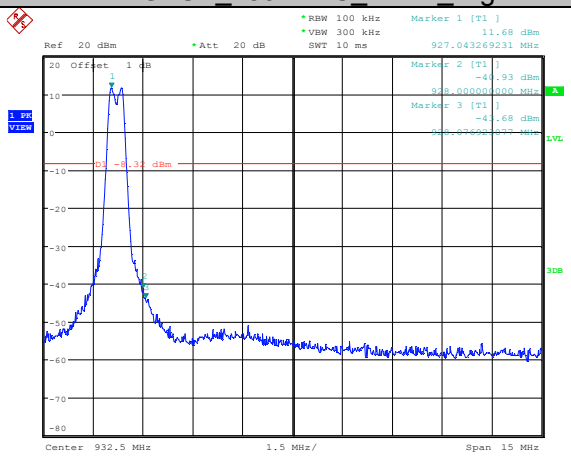

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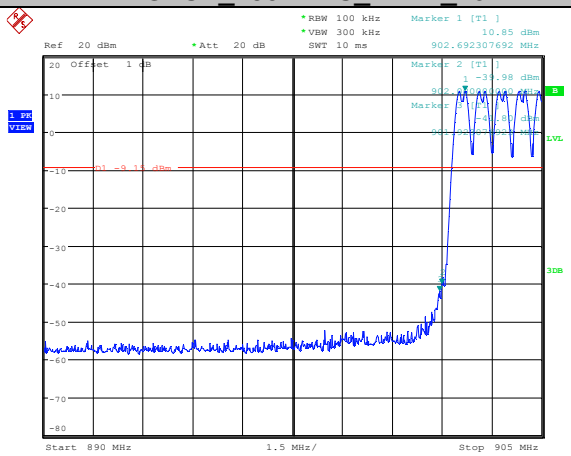

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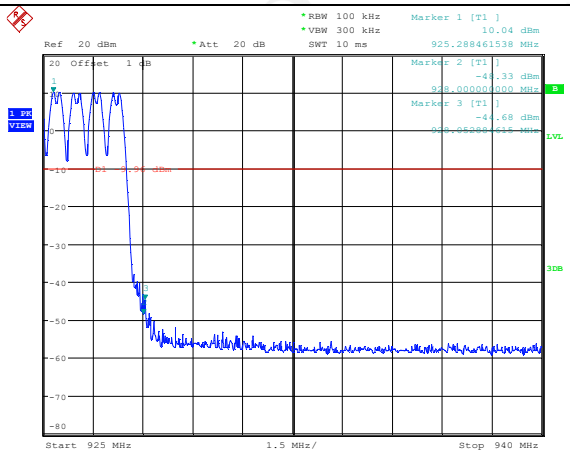

Date: 19.OCT.2020 09:34:28

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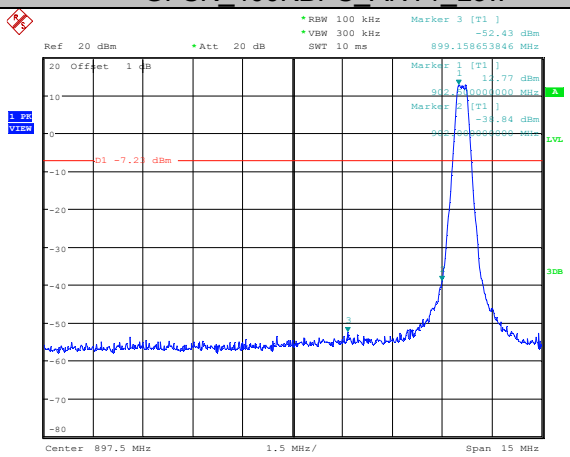

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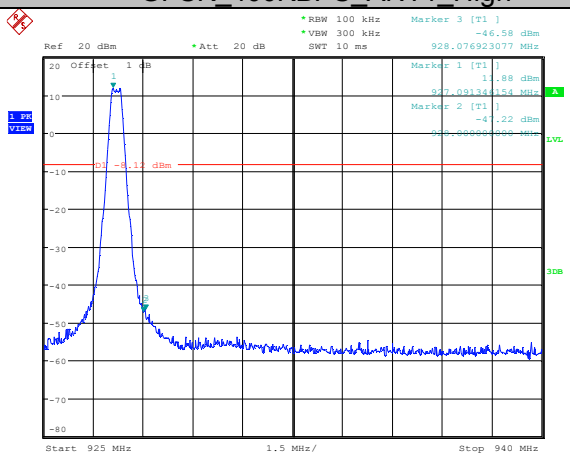

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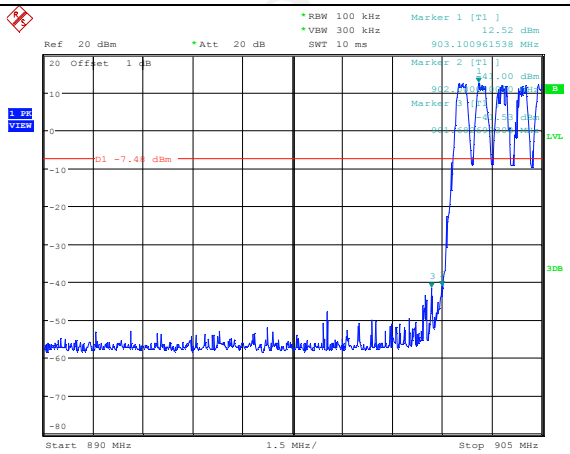

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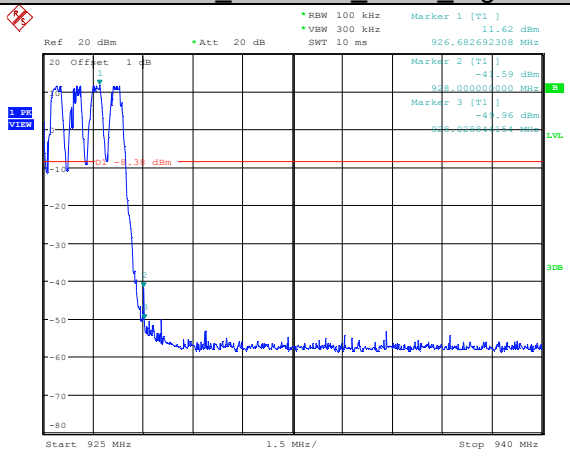
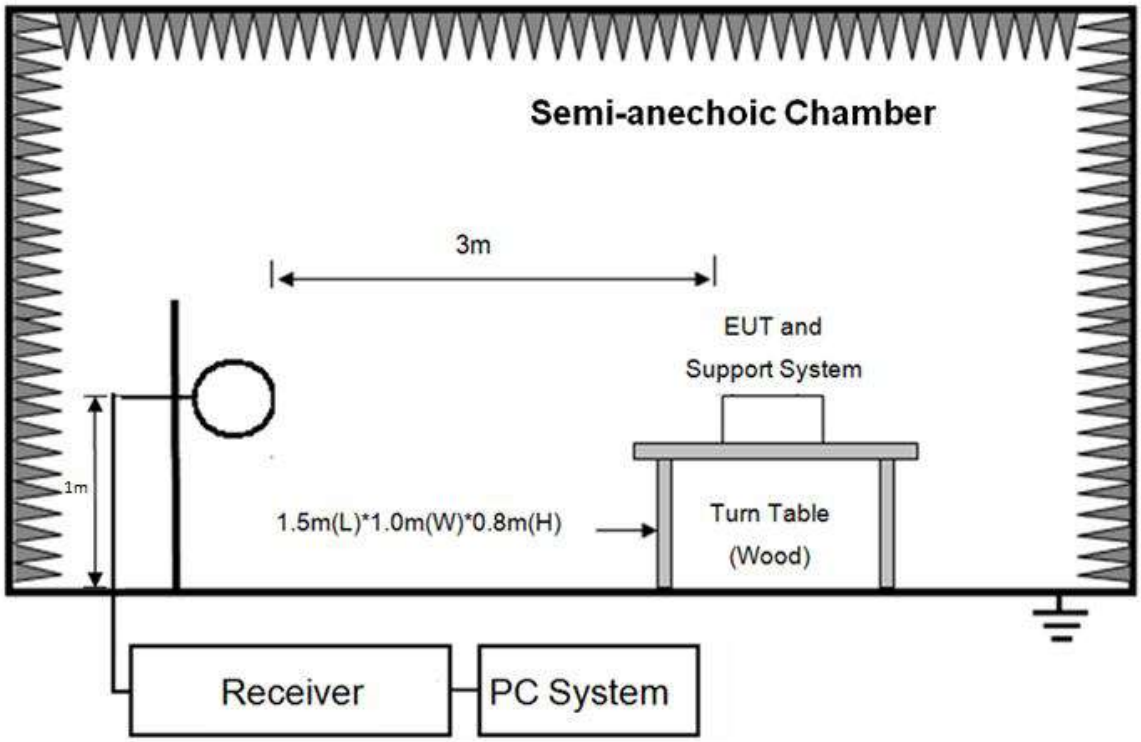


Date: 19.OCT.2020 09:37:35

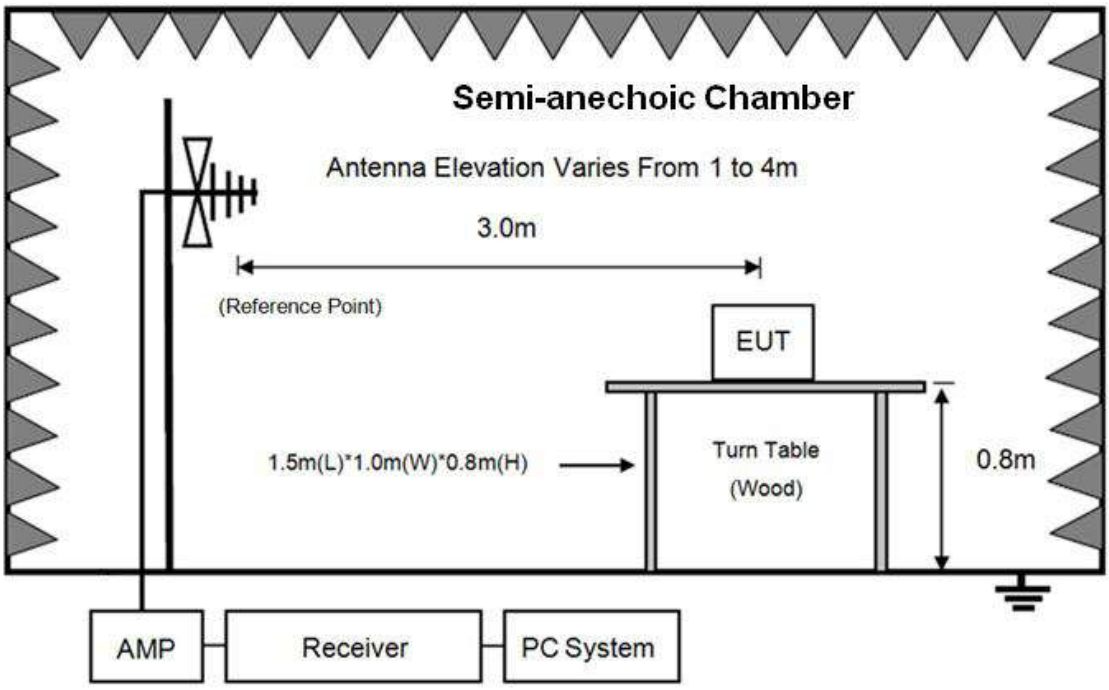
10. Radiated Emission

10.1. Block diagram of test setup

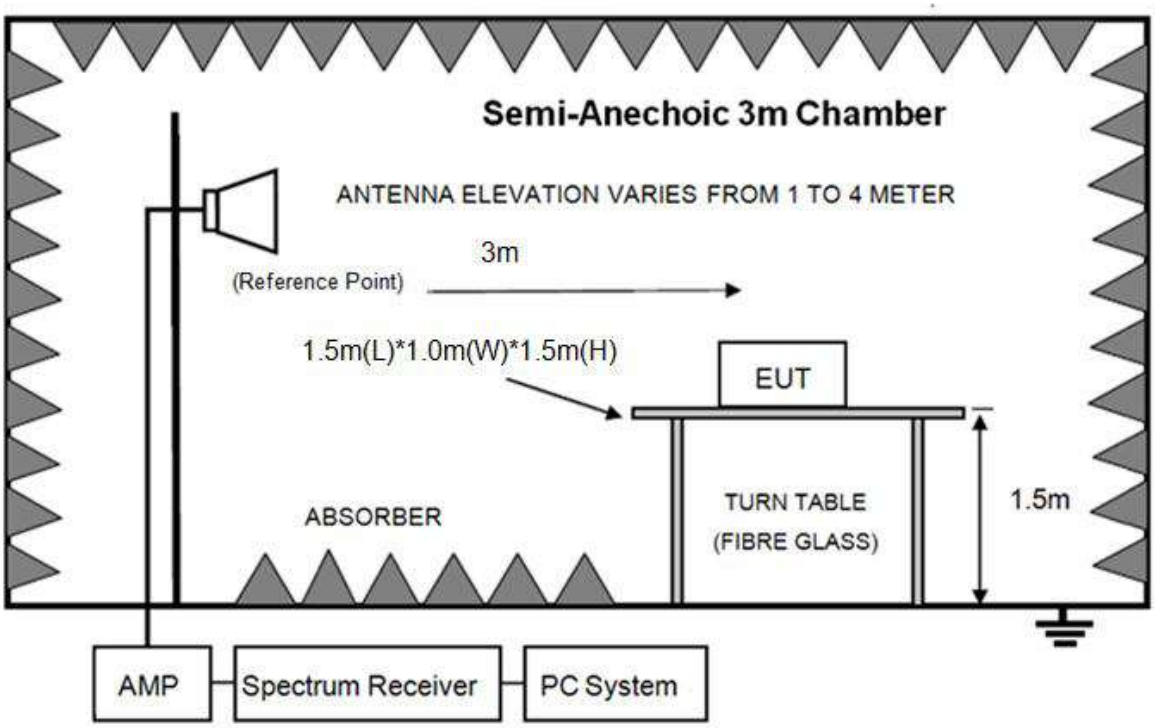
In 3 m Anechoic Chamber, test setup diagram for 9 kHz - 30 MHz



In 3 m Anechoic Chamber, test setup diagram for below 1 GHz



In 3 m Anechoic Chamber, test setup diagram for frequency above 1 GHz



Note: For harmonic emissions test an appropriate high pass filter was inserted in the input port of AMP.

10.2. Limit

(1) FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.1772&4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.2072&4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2]Above 38.6

(2) FCC 15.209 Limit.

Frequency (MHz)	Measurement distance (meters)	Field strength limit	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(kHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Note: (1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9 - 90 kHz, 110 - 490 kHz and above 1000 MHz, radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30 MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$Limit_{3m}(dBuV/m) = Limit_{30m}(dBuV/m) + 40Log(30m/3m)$$

(3) Limit for this EUT
All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20 dB below the fundamental emissions or comply with 15.209 limits.

10.3. Test procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1 GHz and 150 cm above the ground plane inside a fully-anechoic chamber for above 1 GHz.

(2) Test antenna was located 3 m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used	Test antenna distance
9 kHz - 30 MHz	Active Loop antenna	3 m
30 MHz - 1 GHz	Trilog Broadband Antenna	3 m
1 GHz - 18 GHz	Double Ridged Horn Antenna (1 GHz - 18 GHz)	3 m
18 GHz - 40 GHz	Horn Antenna (18 GHz - 40 GHz)	1 m

According ANSI C63.10:2013 clause 6.4.4.2 and 6,5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical

axis for maximum response at each azimuth position around the EUT. And the loop antenna also is positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. For measurement above 30 MHz, the trilog Broadband Antenna or Horn Antenna was located 3 m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9 kHz to 10 GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1 m to 4 m (Except loop antenna, it's fixed 1 m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9 kHz to 10 GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9 kHz to 30 MHz, so below final test was performed with frequency range from 30 MHz to 10 GHz.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to ANSI C63.10:2013 on Radiated Emission test.

(5) The emissions from 9 kHz to 1 GHz were measured based on CISPR QP detector except for the frequency bands 9 - 90 kHz, 110 - 490 kHz, for emissions from 9 kHz - 90 kHz, 110 kHz - 490 kHz and above 1 GHz were measured based on average detector, for emissions above 1 GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9 kHz to 1 GHz, QP or average values were measured with EMI receiver with below RBW.

Frequency band	RBW
9 kHz - 150 kHz	200 Hz
150 kHz - 30 MHz	9 kHz
30 MHz - 1 GHz	120 kHz

(7) For emissions above 1 GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1 MHz, VBW is set at 3 MHz for Peak measure; according ANSI C63.10:2013 clause 4.1.4.2.2 procedure for average measure.

10.4. Test result

Pass. (See below detailed test result)

All the emissions except fundamental emission from 9 kHz to 10 GHz were comply with 15.209 limits.

Note1: According exploratory test, the emission levels are 20 dB below the limit detected from 9 kHz to 30 MHz, so the final test was performed with frequency range from 30 MHz to 10 GHz and recorded in below.

Note2: For emissions below 1 GHz. If peak results comply with QP limit, QP Result is deemed to comply with QP limit.

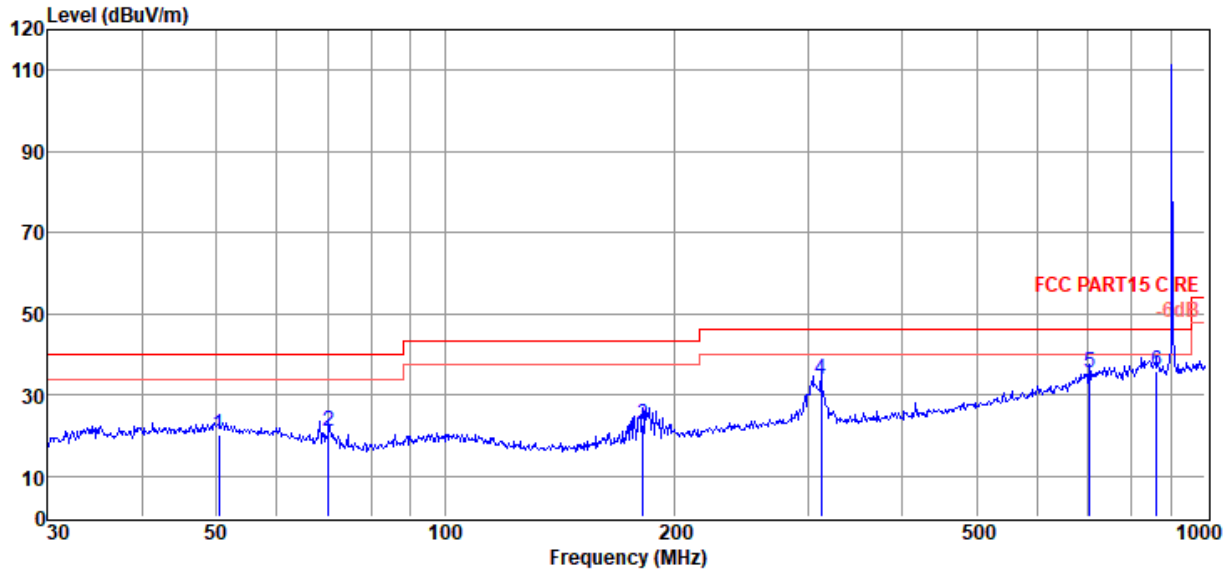
Note3: For emissions above 1 GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

Radiated Emission test (below 1 GHz)

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 902.2 MHz 38 kbps POWER 13		

Data: 17



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	50.41	2.04	14.15	3.99	20.18	40.00	-19.82	QP	HORIZONTAL
2	70.34	7.07	9.58	4.18	20.83	40.00	-19.17	QP	HORIZONTAL
3	181.92	7.79	10.06	4.93	22.78	43.50	-20.72	QP	HORIZONTAL
4	312.18	13.89	14.27	5.58	33.74	46.00	-12.26	QP	HORIZONTAL
5	704.23	8.41	19.94	7.09	35.44	46.00	-10.56	QP	HORIZONTAL
6	863.06	7.07	21.41	7.57	36.05	46.00	-9.95	QP	HORIZONTAL

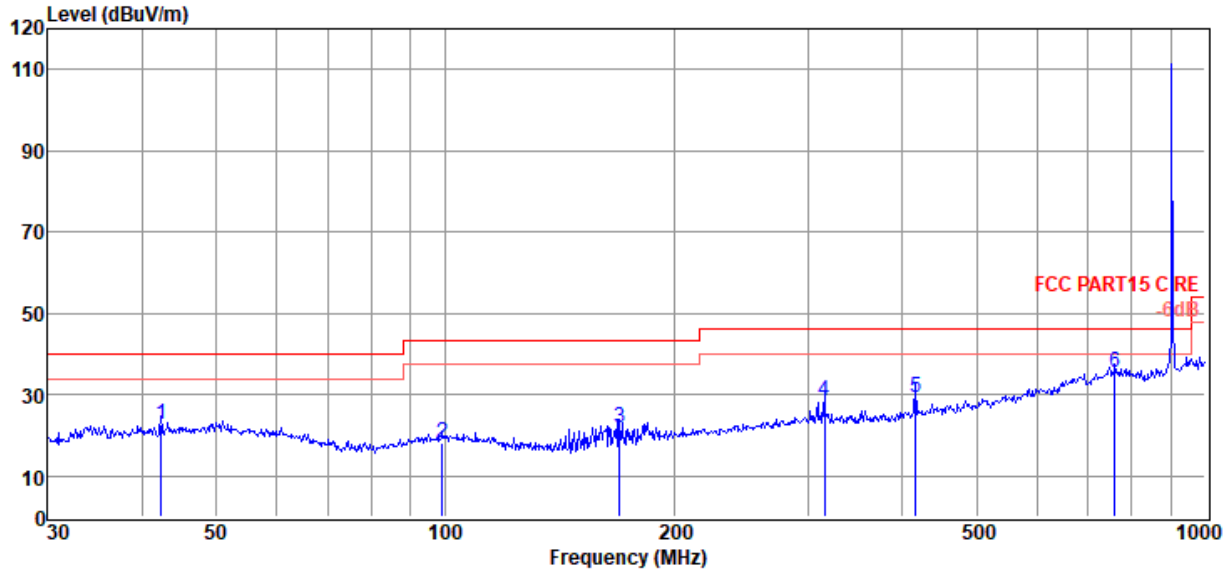
Note:

1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 902.2 MHz 38 kbps POWER 13		

Data: 18



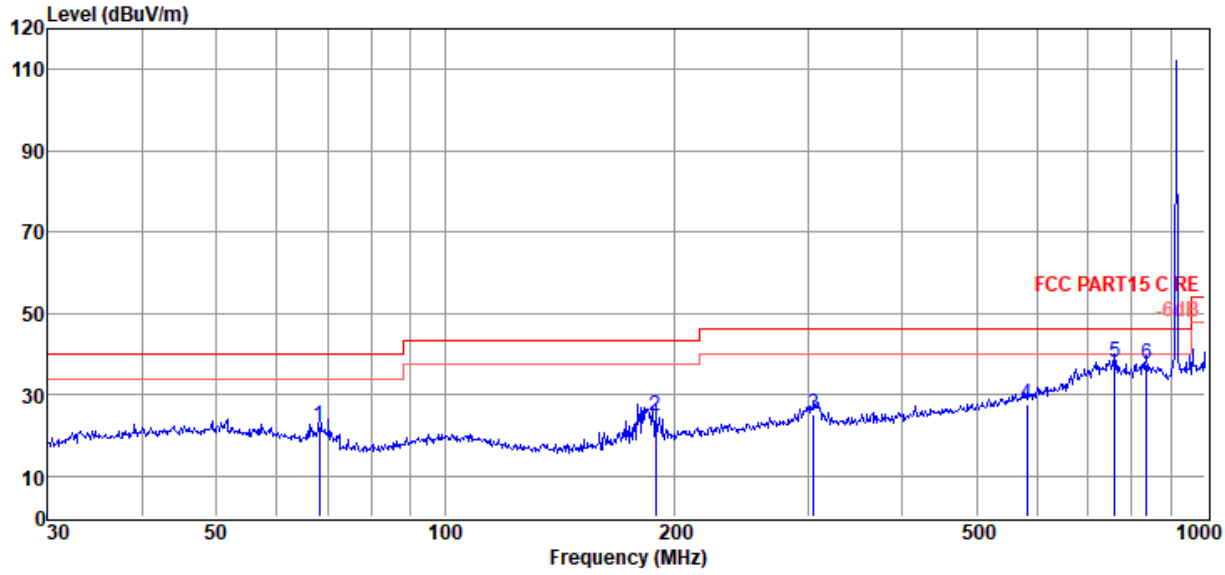
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	42.30	4.83	13.83	3.93	22.59	40.00	-17.41	QP	VERTICAL
2	99.18	1.77	11.82	4.40	17.99	43.50	-25.51	QP	VERTICAL
3	169.60	7.91	9.18	4.86	21.95	43.50	-21.55	QP	VERTICAL
4	315.48	8.70	14.31	5.60	28.61	46.00	-17.39	QP	VERTICAL
5	416.18	7.79	15.64	6.03	29.46	46.00	-16.54	QP	VERTICAL
6	760.70	7.78	20.40	7.26	35.44	46.00	-10.56	QP	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 915 MHz 38 kbps POWER 13		

Data: 19



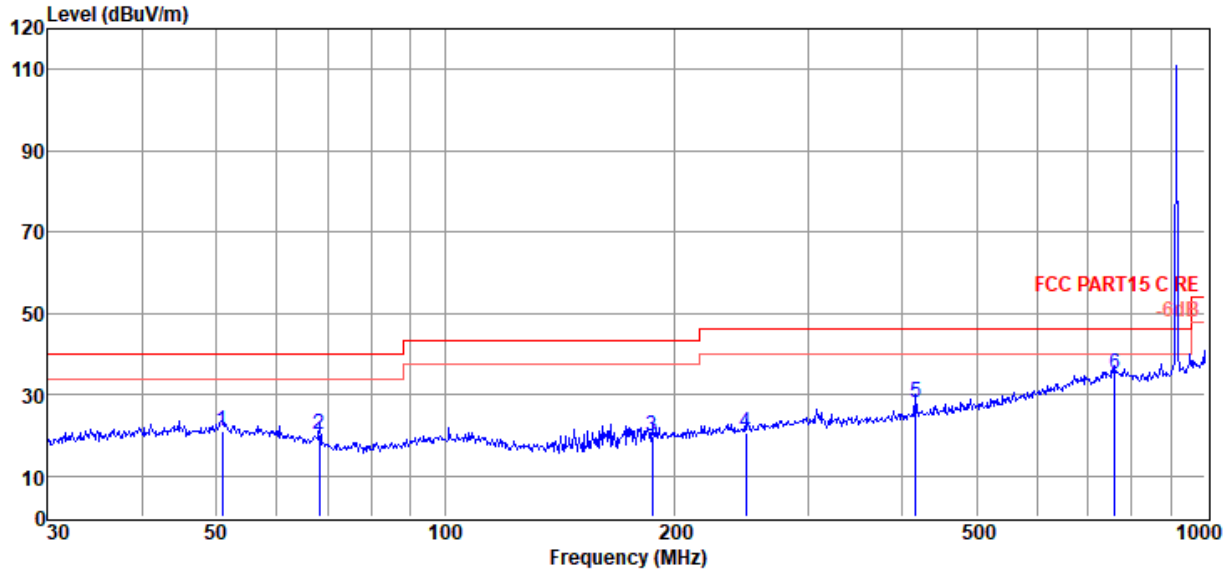
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	68.39	8.15	10.11	4.16	22.42	40.00	-17.58	QP	HORIZONTAL
2	189.07	8.78	10.98	4.97	24.73	43.50	-18.77	QP	HORIZONTAL
3	305.68	5.26	14.18	5.55	24.99	46.00	-21.01	QP	HORIZONTAL
4	582.74	1.99	18.88	6.68	27.55	46.00	-18.45	QP	HORIZONTAL
5	760.70	10.19	20.40	7.26	37.85	46.00	-8.15	QP	HORIZONTAL
6	836.24	9.11	21.11	7.49	37.71	46.00	-8.29	QP	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 915 MHz 38 kbps POWER 13		

Data: 20



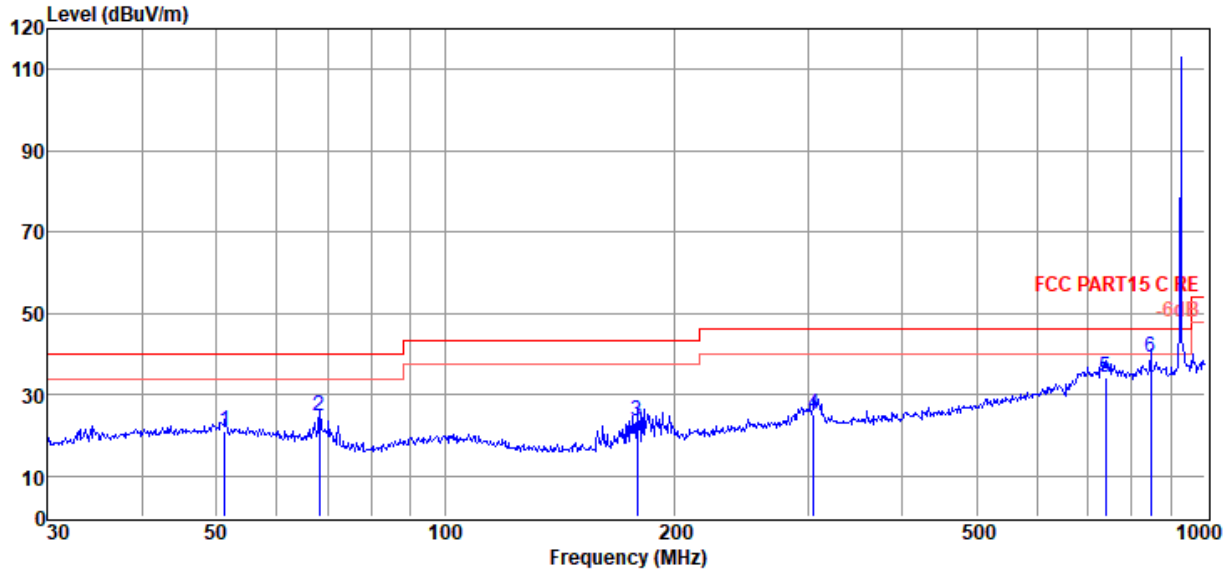
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	50.94	2.83	14.08	4.00	20.91	40.00	-19.09	QP	VERTICAL
2	68.39	5.98	10.11	4.16	20.25	40.00	-19.75	QP	VERTICAL
3	187.10	4.20	10.73	4.96	19.89	43.50	-23.61	QP	VERTICAL
4	248.55	2.67	12.85	5.29	20.81	46.00	-25.19	QP	VERTICAL
5	416.18	6.42	15.64	6.03	28.09	46.00	-17.91	QP	VERTICAL
6	760.70	7.31	20.40	7.26	34.97	46.00	-11.03	QP	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 927.6 MHz 38 kbps POWER 13		

Data: 21



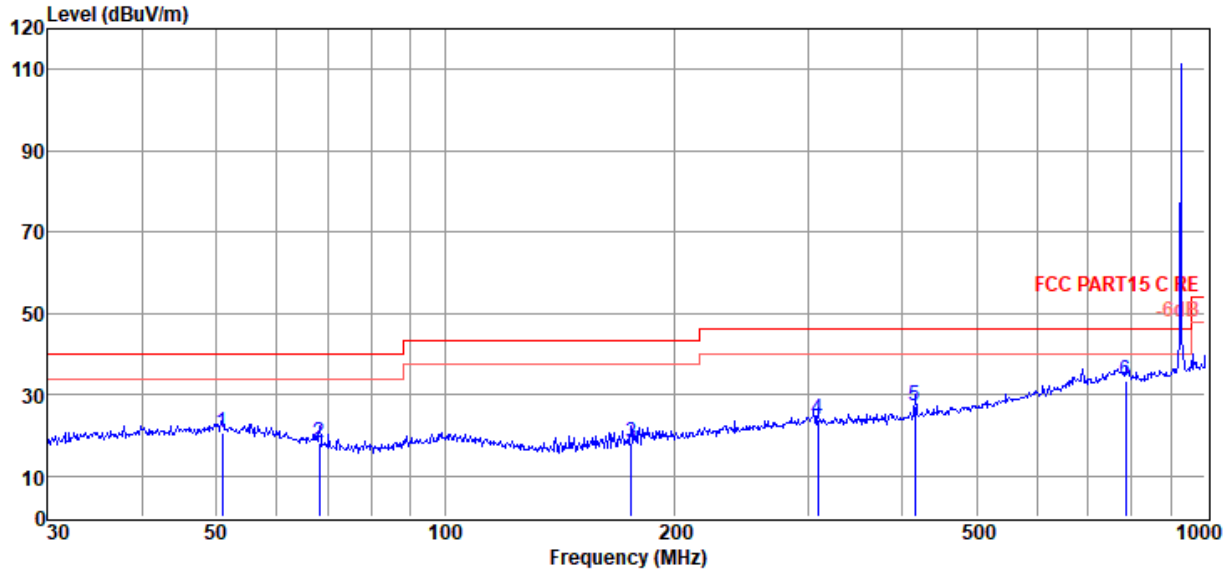
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	51.30	3.02	14.03	4.00	21.05	40.00	-18.95	QP	HORIZONTAL
2	68.39	10.27	10.11	4.16	24.54	40.00	-15.46	QP	HORIZONTAL
3	178.76	9.06	9.73	4.92	23.71	43.50	-19.79	QP	HORIZONTAL
4	305.68	5.61	14.18	5.55	25.34	46.00	-20.66	QP	HORIZONTAL
5	739.66	6.93	20.23	7.20	34.36	46.00	-11.64	QP	HORIZONTAL
6	848.06	10.27	21.24	7.53	39.04	46.00	-6.96	QP	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 927.6 MHz 38 kbps POWER 13		

Data: 22



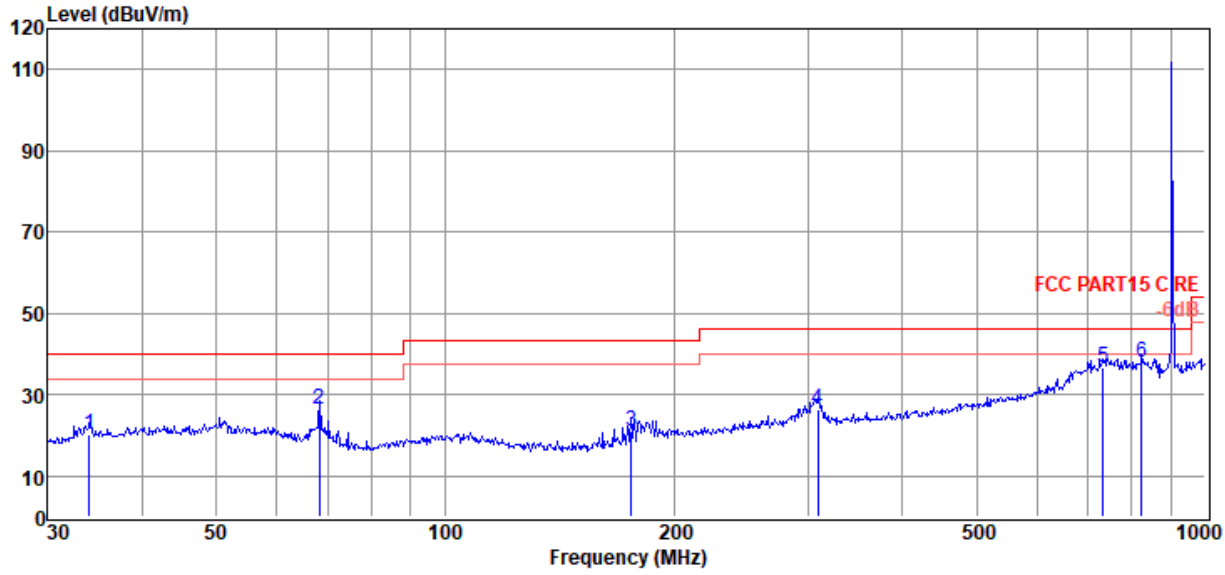
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	50.94	2.72	14.08	4.00	20.80	40.00	-19.20	QP	VERTICAL
2	68.39	3.95	10.11	4.16	18.22	40.00	-21.78	QP	VERTICAL
3	175.65	3.72	9.54	4.90	18.16	43.50	-25.34	QP	VERTICAL
4	308.91	4.18	14.22	5.56	23.96	46.00	-22.04	QP	VERTICAL
5	414.72	5.41	15.61	6.02	27.04	46.00	-18.96	QP	VERTICAL
6	785.09	5.59	20.59	7.33	33.51	46.00	-12.49	QP	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 902.6 MHz 153 kbps POWER 13		

Data: 23



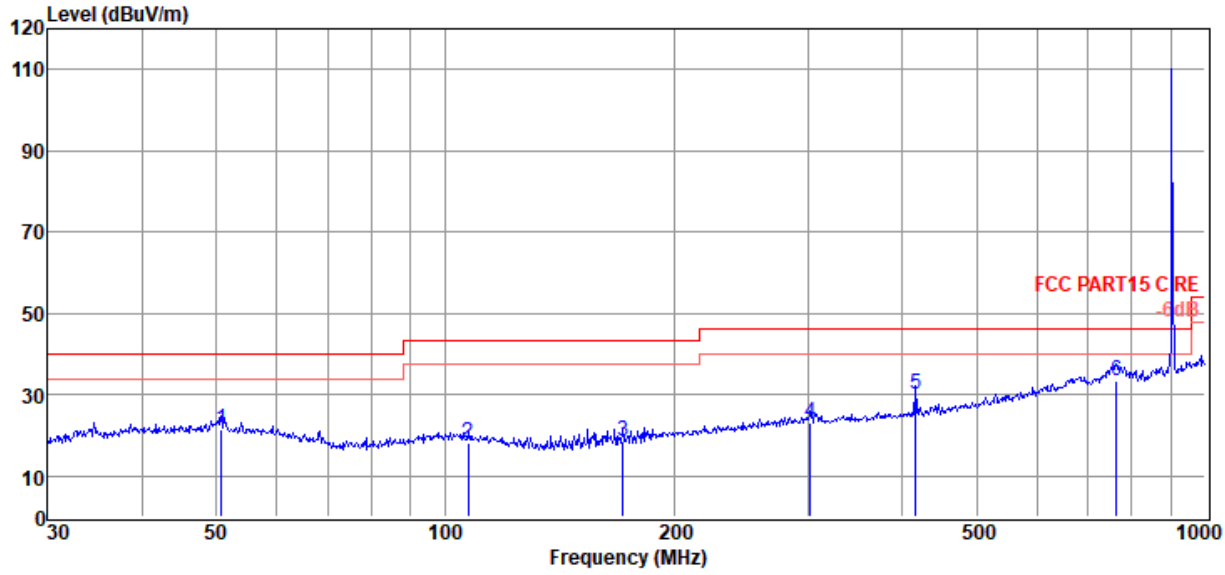
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	34.04	3.98	12.30	3.84	20.12	40.00	-19.88	QP	HORIZONTAL
2	68.39	12.14	10.11	4.16	26.41	40.00	-13.59	QP	HORIZONTAL
3	175.65	6.74	9.54	4.90	21.18	43.50	-22.32	QP	HORIZONTAL
4	308.91	6.67	14.22	5.56	26.45	46.00	-19.55	QP	HORIZONTAL
5	734.49	9.44	20.19	7.18	36.81	46.00	-9.19	QP	HORIZONTAL
6	824.60	9.57	20.98	7.45	38.00	46.00	-8.00	QP	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 902.6 MHz 153 kbps POWER 13		

Data: 24



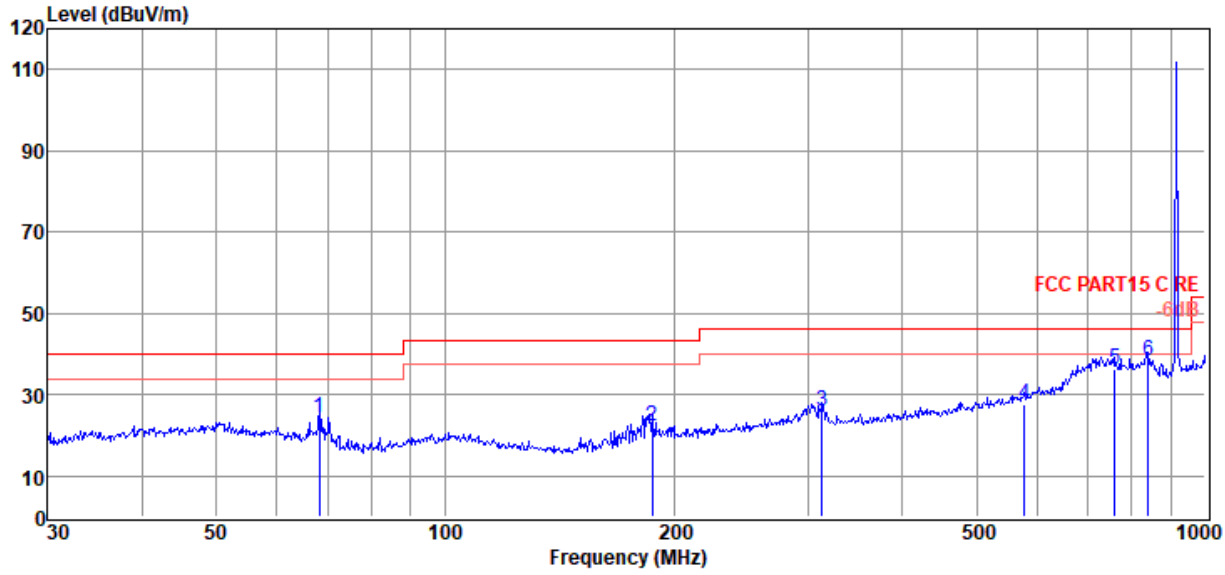
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	50.76	3.48	14.10	4.00	21.58	40.00	-18.42	QP	VERTICAL
2	107.13	2.04	11.47	4.46	17.97	43.50	-25.53	QP	VERTICAL
3	171.39	4.39	9.29	4.87	18.55	43.50	-24.95	QP	VERTICAL
4	302.48	3.49	14.13	5.53	23.15	46.00	-22.85	QP	VERTICAL
5	416.18	8.48	15.64	6.03	30.15	46.00	-15.85	QP	VERTICAL
6	763.38	5.67	20.42	7.27	33.36	46.00	-12.64	QP	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 915.2 MHz 153 kbps POWER 13		

Data: 25



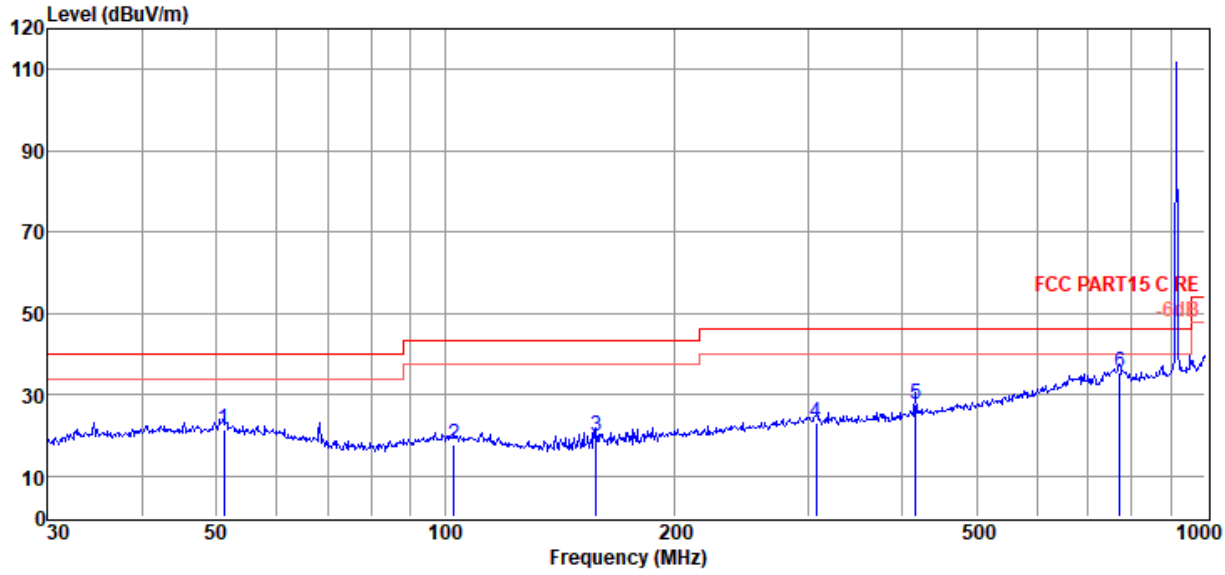
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	68.39	10.19	10.11	4.16	24.46	40.00	-15.54	QP	HORIZONTAL
2	187.10	6.59	10.73	4.96	22.28	43.50	-21.22	QP	HORIZONTAL
3	313.28	6.13	14.28	5.59	26.00	46.00	-20.00	QP	HORIZONTAL
4	578.67	2.07	18.80	6.66	27.53	46.00	-18.47	QP	HORIZONTAL
5	760.70	8.53	20.40	7.26	36.19	46.00	-9.81	QP	HORIZONTAL
6	842.13	9.76	21.18	7.51	38.45	46.00	-7.55	QP	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 915.2 MHz 153 kbps POWER 13		

Data: 26



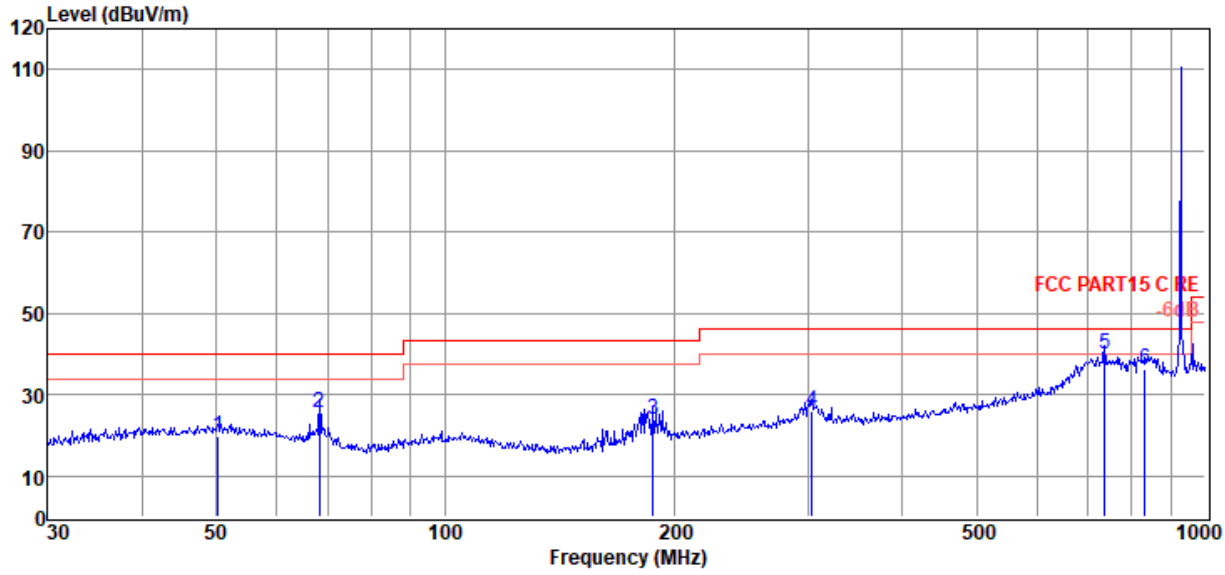
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	51.12	3.22	14.05	4.00	21.27	40.00	-18.73	QP	VERTICAL
2	102.72	1.44	11.73	4.43	17.60	43.50	-25.90	QP	VERTICAL
3	158.11	6.48	8.63	4.79	19.90	43.50	-23.60	QP	VERTICAL
4	307.83	3.31	14.21	5.56	23.08	46.00	-22.92	QP	VERTICAL
5	416.18	6.02	15.64	6.03	27.69	46.00	-18.31	QP	VERTICAL
6	771.45	7.71	20.48	7.29	35.48	46.00	-10.52	QP	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 927.2 MHz 153 kbps POWER 13		

Data: 27



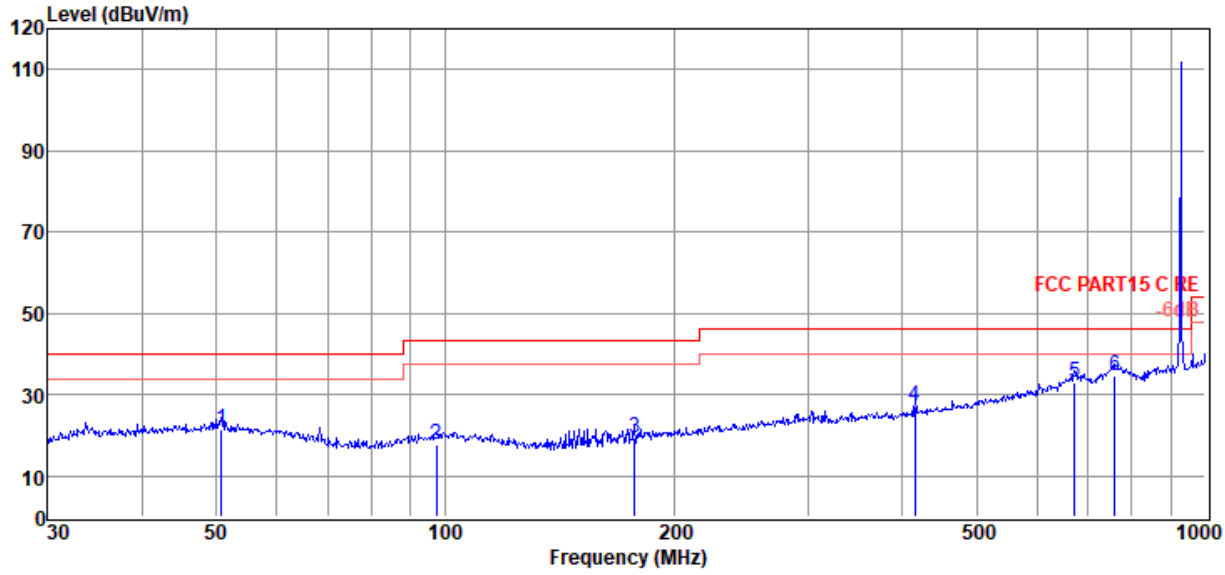
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	50.23	1.47	14.17	3.99	19.63	40.00	-20.37	QP	HORIZONTAL
2	68.39	11.46	10.11	4.16	25.73	40.00	-14.27	QP	HORIZONTAL
3	187.75	8.04	10.81	4.97	23.82	43.50	-19.68	QP	HORIZONTAL
4	303.54	6.16	14.15	5.54	25.85	46.00	-20.15	QP	HORIZONTAL
5	737.07	12.74	20.21	7.19	40.14	46.00	-5.86	QP	HORIZONTAL
6	833.32	7.69	21.08	7.48	36.25	46.00	-9.75	QP	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 927.2 MHz 153 kbps POWER 13		

Data: 28



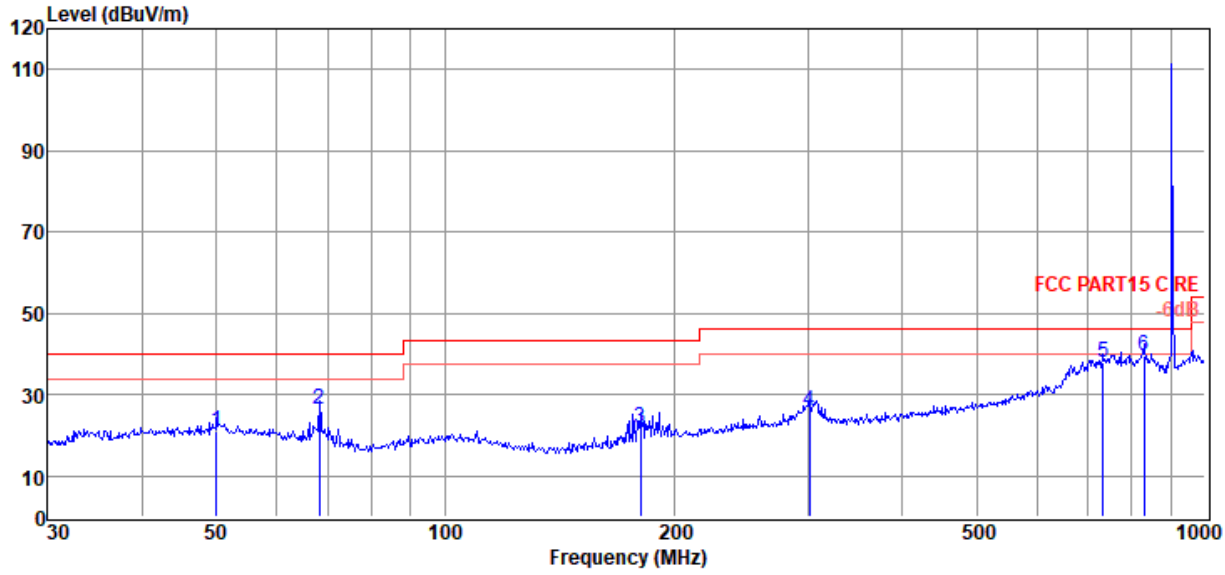
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	50.76	3.26	14.10	4.00	21.36	40.00	-18.64	QP	VERTICAL
2	97.46	1.76	11.66	4.39	17.81	43.50	-25.69	QP	VERTICAL
3	177.51	4.68	9.65	4.91	19.24	43.50	-24.26	QP	VERTICAL
4	414.72	5.68	15.61	6.02	27.31	46.00	-18.69	QP	VERTICAL
5	672.84	6.24	19.72	6.99	32.95	46.00	-13.05	QP	VERTICAL
6	760.70	7.07	20.40	7.26	34.73	46.00	-11.27	QP	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 902.6 MHz 400 kbps POWER 13		

Data: 29



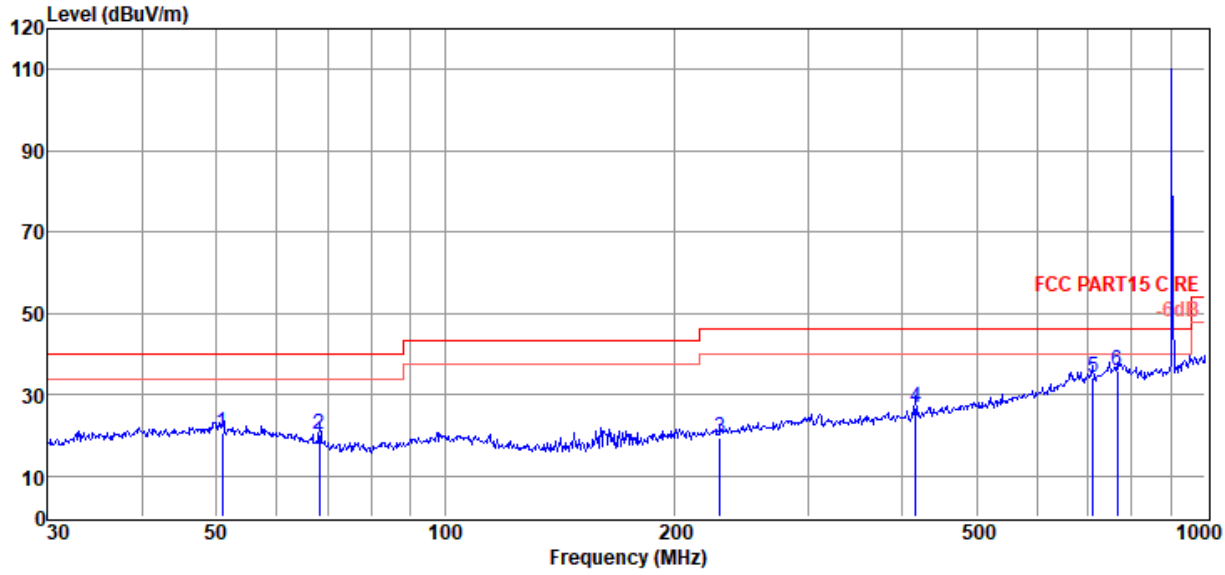
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	50.06	2.95	14.19	3.99	21.13	40.00	-18.87	QP	HORIZONTAL
2	68.39	12.07	10.11	4.16	26.34	40.00	-13.66	QP	HORIZONTAL
3	180.65	6.85	9.89	4.93	21.67	43.50	-21.83	QP	HORIZONTAL
4	301.42	6.28	14.12	5.53	25.93	46.00	-20.07	QP	HORIZONTAL
5	734.49	10.64	20.19	7.18	38.01	46.00	-7.99	QP	HORIZONTAL
6	830.40	10.92	21.05	7.47	39.44	46.00	-6.56	QP	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 902.6 MHz 400 kbps POWER 13		

Data: 30



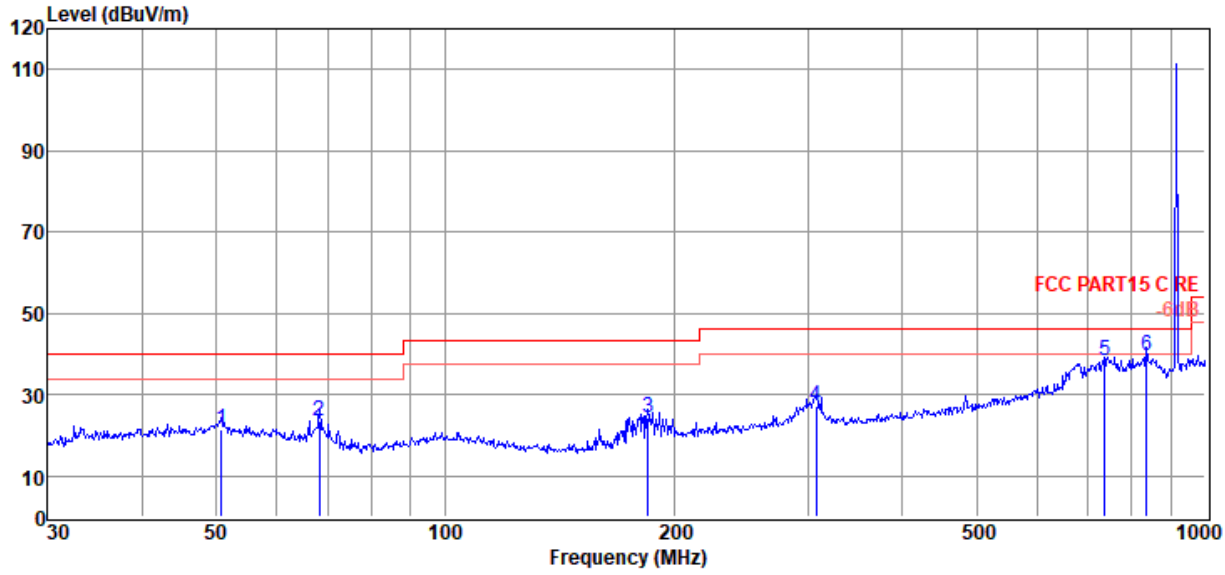
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	50.94	2.56	14.08	4.00	20.64	40.00	-19.36	Peak	VERTICAL
2	68.39	5.78	10.11	4.16	20.05	40.00	-19.95	Peak	VERTICAL
3	230.10	1.90	12.33	5.19	19.42	46.00	-26.58	Peak	VERTICAL
4	416.18	5.17	15.64	6.03	26.84	46.00	-19.16	Peak	VERTICAL
5	711.67	7.05	20.00	7.11	34.16	46.00	-11.84	Peak	VERTICAL
6	766.06	8.17	20.44	7.27	35.88	46.00	-10.12	Peak	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 915.2 MHz 400 kbps POWER 13		

Data: 31



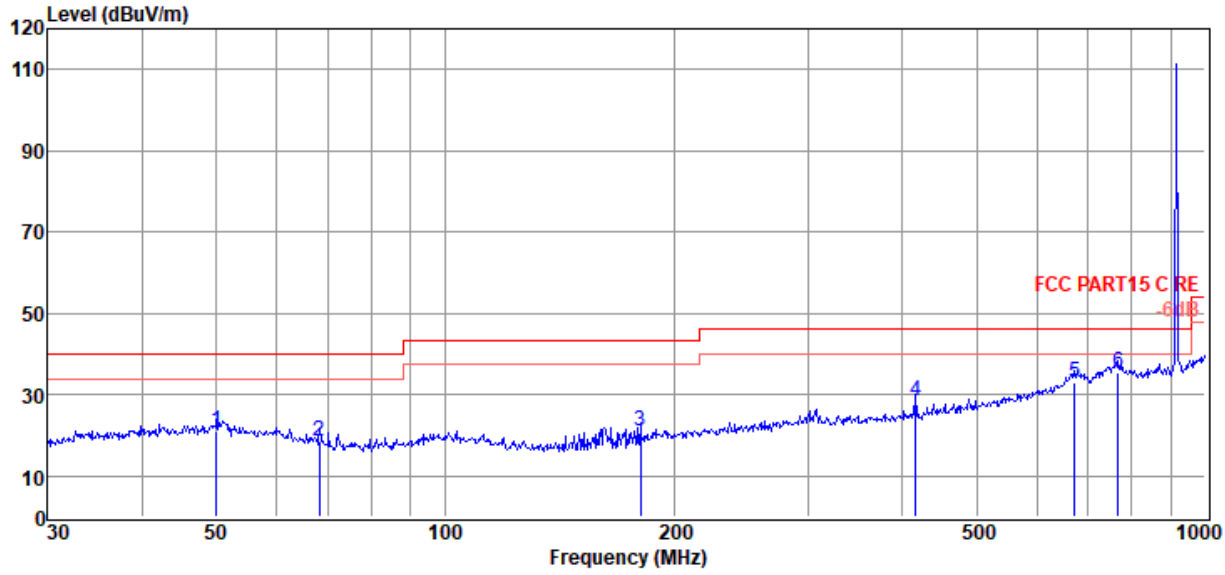
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	50.76	3.21	14.10	4.00	21.31	40.00	-18.69	QP	HORIZONTAL
2	68.39	9.29	10.11	4.16	23.56	40.00	-16.44	QP	HORIZONTAL
3	185.14	8.77	10.48	4.95	24.20	43.50	-19.30	QP	HORIZONTAL
4	307.83	7.46	14.21	5.56	27.23	46.00	-18.77	QP	HORIZONTAL
5	737.07	10.94	20.21	7.19	38.34	46.00	-7.66	QP	HORIZONTAL
6	836.24	11.09	21.11	7.49	39.69	46.00	-6.31	QP	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 915.2 MHz 400 kbps POWER 13		

Data: 32



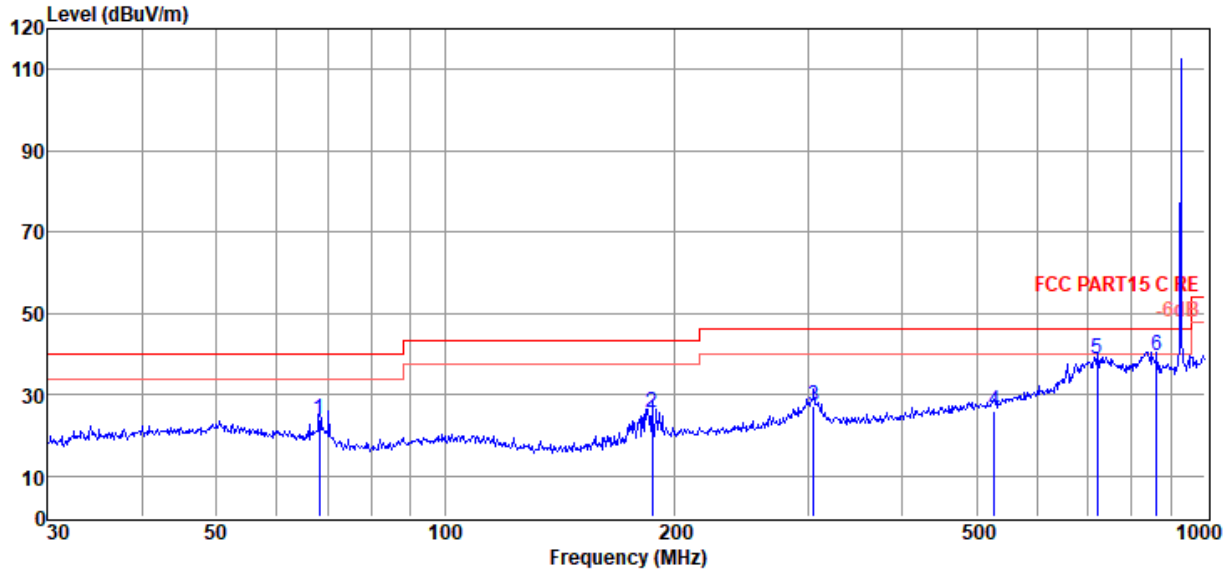
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	50.06	2.75	14.19	3.99	20.93	40.00	-19.07	QP	VERTICAL
2	68.39	4.43	10.11	4.16	18.70	40.00	-21.30	QP	VERTICAL
3	180.65	6.14	9.89	4.93	20.96	43.50	-22.54	QP	VERTICAL
4	416.18	6.60	15.64	6.03	28.27	46.00	-17.73	QP	VERTICAL
5	672.84	6.30	19.72	6.99	33.01	46.00	-12.99	QP	VERTICAL
6	768.75	7.71	20.46	7.28	35.45	46.00	-10.55	QP	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 927.2 MHz 400 kbps POWER 13		

Data: 33



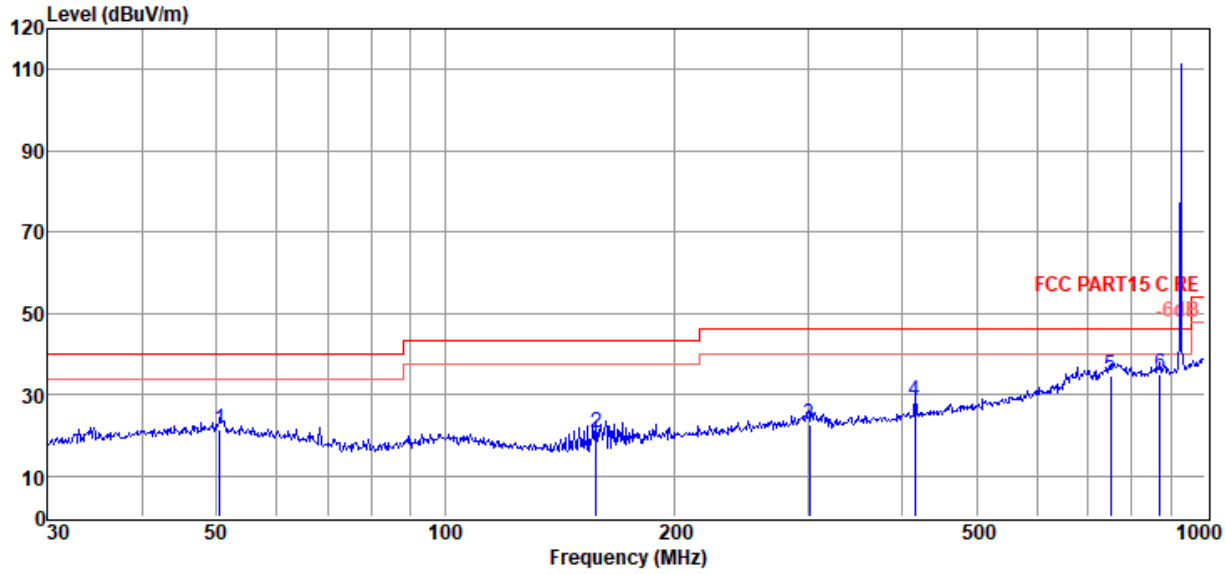
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	68.39	9.76	10.11	4.16	24.03	40.00	-15.97	QP	HORIZONTAL
2	187.10	9.70	10.73	4.96	25.39	43.50	-18.11	QP	HORIZONTAL
3	305.68	7.61	14.18	5.55	27.34	46.00	-18.66	QP	HORIZONTAL
4	528.25	1.63	17.80	6.46	25.89	46.00	-20.11	QP	HORIZONTAL
5	721.73	11.72	20.08	7.14	38.94	46.00	-7.06	QP	HORIZONTAL
6	863.06	10.53	21.41	7.57	39.51	46.00	-6.49	QP	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 927.2 MHz 400 kbps POWER 13		

Data: 34



Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	50.59	3.22	14.12	4.00	21.34	40.00	-18.66	QP	VERTICAL
2	158.11	7.29	8.63	4.79	20.71	43.50	-22.79	QP	VERTICAL
3	301.42	3.19	14.12	5.53	22.84	46.00	-23.16	QP	VERTICAL
4	414.72	6.97	15.61	6.02	28.60	46.00	-17.40	QP	VERTICAL
5	750.11	7.09	20.31	7.23	34.63	46.00	-11.37	QP	VERTICAL
6	872.18	5.74	21.51	7.60	34.85	46.00	-11.15	QP	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Radiated Emission test (above 1 GHz)

Freq. (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor(dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/ m)	Margin (dB)	Detector type	Polarization
GFSK 38 kbps Tx mode 902.2 MHz									
1804.40	59.52	26.23	42.69	3.41	46.47	74.00	-27.53	Peak	HORIZONTAL
2706.60	61.35	28.28	43.35	4.34	50.62	74.00	-23.38	Peak	HORIZONTAL
3608.80	62.55	29.58	43.68	5.27	53.72	74.00	-20.28	Peak	HORIZONTAL
4510.00	52.99	31.81	43.59	5.99	47.20	74.00	-26.80	Peak	HORIZONTAL
6247.00	50.47	34.24	43.06	7.12	48.77	74.00	-25.23	Peak	HORIZONTAL
7480.00	50.96	37.29	42.87	8.10	53.48	74.00	-20.52	Peak	HORIZONTAL
1804.40	61.46	26.23	42.69	3.41	48.41	74.00	-25.59	Peak	VERTICAL
2706.60	60.48	28.28	43.35	4.34	49.75	74.00	-24.25	Peak	VERTICAL
3608.80	61.48	29.58	43.68	5.27	52.65	74.00	-21.35	Peak	VERTICAL
5473.00	51.84	32.69	43.26	6.60	47.87	74.00	-26.13	Peak	VERTICAL
6418.00	51.03	34.96	43.03	7.22	50.18	74.00	-23.82	Peak	VERTICAL
7282.00	51.00	37.17	42.90	7.88	53.15	74.00	-20.85	Peak	VERTICAL
GFSK 38 kbps Tx mode 915 MHz									
1828.00	57.12	26.29	42.73	3.44	44.12	74.00	-29.88	Peak	HORIZONTAL
2737.00	62.29	28.36	43.36	4.37	51.66	74.00	-22.34	Peak	HORIZONTAL
3660.00	64.70	29.72	43.70	5.33	56.05	74.00	-17.95	Peak	HORIZONTAL
3660.00	61.33	29.72	43.70	5.33	52.68	54.00	-1.32	Average	HORIZONTAL
5365.00	51.44	32.65	43.29	6.53	47.33	74.00	-26.67	Peak	HORIZONTAL
6130.00	50.71	33.75	43.08	7.05	48.43	74.00	-25.57	Peak	HORIZONTAL
7282.00	50.84	37.17	42.90	7.88	52.99	74.00	-21.01	Peak	HORIZONTAL
1828.00	61.70	26.29	42.73	3.44	48.70	74.00	-25.30	Peak	VERTICAL
2737.00	63.49	28.36	43.36	4.37	52.86	74.00	-21.14	Peak	VERTICAL
3655.00	60.81	29.70	43.70	5.32	52.13	74.00	-21.87	Peak	VERTICAL
4573.00	54.93	31.90	43.57	6.02	49.28	74.00	-24.72	Peak	VERTICAL
6004.00	52.65	33.22	43.10	6.97	49.74	74.00	-24.26	Peak	VERTICAL
8560.00	49.02	37.82	42.68	8.64	52.80	74.00	-21.20	Peak	VERTICAL
GFSK 38 kbps Tx mode 927.6 MHz									
2782.00	60.86	28.49	43.38	4.41	50.38	74.00	-23.62	Peak	HORIZONTAL
3718.00	62.20	29.87	43.72	5.39	53.74	74.00	-20.26	Peak	HORIZONTAL
4987.00	52.04	32.48	43.42	6.26	47.36	74.00	-26.64	Peak	HORIZONTAL
5707.00	51.47	32.91	43.19	6.76	47.95	74.00	-26.05	Peak	HORIZONTAL
6922.00	50.08	36.73	42.95	7.51	51.37	74.00	-22.63	Peak	HORIZONTAL
7498.00	50.74	37.30	42.87	8.12	53.29	74.00	-20.71	Peak	HORIZONTAL
2782.00	59.70	28.49	43.38	4.41	49.22	74.00	-24.78	Peak	VERTICAL
3718.00	61.99	29.87	43.72	5.39	53.53	74.00	-20.47	Peak	VERTICAL
4870.00	53.16	32.32	43.46	6.19	48.21	74.00	-25.79	Peak	VERTICAL
5428.00	51.89	32.67	43.27	6.57	47.86	74.00	-26.14	Peak	VERTICAL
6580.00	50.35	35.57	43.00	7.31	50.23	74.00	-23.77	Peak	VERTICAL
7813.00	50.03	37.74	42.82	8.48	53.43	74.00	-20.57	Peak	VERTICAL
Result: Pass									

Freq. (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor(dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/ m)	Margin (dB)	Detector type	Polarization
GFSK 153 kbps Tx mode 902.6 MHz									
1810.00	58.80	26.24	42.70	3.42	45.76	74.00	-28.24	Peak	HORIZONTAL
2710.00	58.39	28.29	43.35	4.34	47.67	74.00	-26.33	Peak	HORIZONTAL
3610.00	63.69	29.59	43.68	5.27	54.87	74.00	-19.13	Peak	HORIZONTAL
3610.00	60.34	29.59	43.68	5.27	51.52	54.00	-2.48	Average	HORIZONTAL
5032.00	52.13	32.51	43.40	6.29	47.53	74.00	-26.47	Peak	HORIZONTAL
5995.00	52.62	33.19	43.10	6.97	49.68	74.00	-24.32	Peak	HORIZONTAL
7210.00	50.48	37.13	42.91	7.80	52.50	74.00	-21.50	Peak	HORIZONTAL
1810.00	62.07	26.24	42.70	3.42	49.03	74.00	-24.97	Peak	VERTICAL
2710.00	61.86	28.29	43.35	4.34	51.14	74.00	-22.86	Peak	VERTICAL
3610.00	62.26	29.59	43.68	5.27	53.44	74.00	-20.56	Peak	VERTICAL
5005.00	52.12	32.50	43.41	6.27	47.48	74.00	-26.52	Peak	VERTICAL
6175.00	51.20	33.94	43.07	7.07	49.14	74.00	-24.86	Peak	VERTICAL
7597.00	50.29	37.44	42.85	8.23	53.11	74.00	-20.89	Peak	VERTICAL
GFSK 153 kbps Tx mode 915.2 MHz									
1830.40	57.51	26.29	42.73	3.44	44.51	74.00	-29.49	Peak	HORIZONTAL
2745.60	60.68	28.39	43.37	4.38	50.08	74.00	-23.92	Peak	HORIZONTAL
3660.80	63.06	29.72	43.70	5.33	54.41	74.00	-19.59	Peak	HORIZONTAL
3660.80	60.24	29.72	43.70	5.33	51.59	54.00	-2.41	Average	HORIZONTAL
5437.00	51.94	32.67	43.27	6.58	47.92	74.00	-26.08	Peak	HORIZONTAL
7228.00	50.41	37.14	42.91	7.82	52.46	74.00	-21.54	Peak	HORIZONTAL
9343.00	48.23	38.97	42.52	8.87	53.55	74.00	-20.45	Peak	HORIZONTAL
1830.40	60.81	26.29	42.73	3.44	47.81	74.00	-26.19	Peak	VERTICAL
2745.60	61.11	28.39	43.37	4.38	50.51	74.00	-23.49	Peak	VERTICAL
3660.80	62.07	29.72	43.70	5.33	53.42	74.00	-20.58	Peak	VERTICAL
5707.00	53.12	32.91	43.19	6.76	49.60	74.00	-24.40	Peak	VERTICAL
7390.00	50.89	37.23	42.88	8.00	53.24	74.00	-20.76	Peak	VERTICAL
9037.00	48.76	38.73	42.58	8.63	53.54	74.00	-20.46	Peak	VERTICAL
GFSK 153 kbps Tx mode 927.2 MHz									
2781.60	61.51	28.49	43.38	4.41	51.03	74.00	-22.97	Peak	HORIZONTAL
3708.80	61.92	29.84	43.71	5.38	53.43	74.00	-20.57	Peak	HORIZONTAL
4627.00	53.13	31.98	43.55	6.05	47.61	74.00	-26.39	Peak	HORIZONTAL
5995.00	52.48	33.19	43.10	6.97	49.54	74.00	-24.46	Peak	HORIZONTAL
6697.00	51.75	35.97	42.99	7.38	52.11	74.00	-21.89	Peak	HORIZONTAL
7687.00	50.23	37.56	42.84	8.34	53.29	74.00	-20.71	Peak	HORIZONTAL
2781.60	62.52	28.49	43.38	4.41	52.04	74.00	-21.96	Peak	VERTICAL
3718.00	61.11	29.87	43.72	5.39	52.65	74.00	-21.35	Peak	VERTICAL
5203.00	52.76	32.58	43.35	6.41	48.40	74.00	-25.60	Peak	VERTICAL
5995.00	52.81	33.19	43.10	6.97	49.87	74.00	-24.13	Peak	VERTICAL
7597.00	50.82	37.44	42.85	8.23	53.64	74.00	-20.36	Peak	VERTICAL
8713.00	49.00	38.13	42.65	8.63	53.11	74.00	-20.89	Peak	VERTICAL
Result: Pass									

Freq. (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor(dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector type	Polarization
GFSK 400 kbps Tx mode 902.6 MHz									
2710.00	61.78	28.29	43.35	4.34	51.06	74.00	-22.94	Peak	HORIZONTAL
3610.00	62.40	29.59	43.68	5.27	53.58	74.00	-20.42	Peak	HORIZONTAL
3610.00	59.00	29.59	43.68	5.27	50.18	54.00	-3.82	Average	HORIZONTAL
4510.00	53.15	31.81	43.59	5.99	47.36	74.00	-26.64	Peak	HORIZONTAL
5833.00	51.71	33.03	43.15	6.85	48.44	74.00	-25.56	Peak	HORIZONTAL
6922.00	51.02	36.73	42.95	7.51	52.31	74.00	-21.69	Peak	HORIZONTAL
2710.00	62.32	28.29	43.35	4.34	51.60	74.00	-22.40	Peak	VERTICAL
3610.00	62.30	29.59	43.68	5.27	53.48	74.00	-20.52	Peak	VERTICAL
5023.00	51.37	32.51	43.41	6.29	46.76	74.00	-27.24	Peak	VERTICAL
5473.00	51.87	32.69	43.26	6.60	47.90	74.00	-26.10	Peak	VERTICAL
6787.00	49.48	36.28	42.97	7.43	50.22	74.00	-23.78	Peak	VERTICAL
7615.00	50.42	37.46	42.85	8.25	53.28	74.00	-20.72	Peak	VERTICAL
GFSK 400 kbps Tx mode 915.2 MHz									
1828.00	60.81	26.29	42.73	3.44	47.81	74.00	-26.19	Peak	HORIZONTAL
2737.00	61.90	28.36	43.36	4.37	51.27	74.00	-22.73	Peak	HORIZONTAL
3660.80	64.66	29.72	43.70	5.33	56.01	74.00	-17.99	Peak	HORIZONTAL
3660.80	61.10	29.72	43.70	5.33	52.45	54.00	-1.55	Average	HORIZONTAL
4573.00	56.04	31.90	43.57	6.02	50.39	74.00	-23.61	Peak	HORIZONTAL
6508.00	50.77	35.33	43.02	7.27	50.35	74.00	-23.65	Peak	HORIZONTAL
1828.00	58.63	26.29	42.73	3.44	45.63	74.00	-28.37	Peak	VERTICAL
2737.00	62.66	28.36	43.36	4.37	52.03	74.00	-21.97	Peak	VERTICAL
3655.00	62.04	29.70	43.70	5.32	53.36	74.00	-20.64	Peak	VERTICAL
5113.00	51.85	32.55	43.38	6.35	47.37	74.00	-26.63	Peak	VERTICAL
6535.00	50.22	35.42	43.01	7.29	49.92	74.00	-24.08	Peak	VERTICAL
7903.00	49.87	37.86	42.81	8.58	53.50	74.00	-20.50	Peak	VERTICAL
GFSK 400 kbps Tx mode 927.2 MHz									
2781.60	63.64	28.49	43.38	4.41	53.16	74.00	-20.84	Peak	HORIZONTAL
3708.80	63.48	29.84	43.71	5.38	54.99	74.00	-19.01	Peak	HORIZONTAL
3708.80	60.20	29.84	43.71	5.38	51.71	54.00	-2.29	Average	HORIZONTAL
4627.00	52.33	31.98	43.55	6.05	46.81	74.00	-27.19	Peak	HORIZONTAL
5977.00	53.49	33.18	43.11	6.95	50.51	74.00	-23.49	Peak	HORIZONTAL
6958.00	50.66	36.86	42.95	7.54	52.11	74.00	-21.89	Peak	HORIZONTAL
2782.00	62.84	28.49	43.38	4.41	52.36	74.00	-21.64	Peak	VERTICAL
3718.00	63.55	29.87	43.72	5.39	55.09	74.00	-18.91	Peak	VERTICAL
3718.00	60.44	29.87	43.72	5.39	51.98	54.00	-2.02	Average	VERTICAL
5023.00	51.84	32.51	43.41	6.29	47.23	74.00	-26.77	Peak	VERTICAL
5995.00	52.78	33.19	43.10	6.97	49.84	74.00	-24.16	Peak	VERTICAL
7282.00	50.74	37.17	42.90	7.88	52.89	74.00	-21.11	Peak	VERTICAL
Result: Pass									

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2. For emissions above 1 GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

11. RF Conducted Spurious Emissions

11.1. Block diagram of test setup

Same as section 4.1

11.2. Limits

In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

11.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Establish a reference level by using the following procedure:

Center frequency	Test frequency
RBW:	100 kHz
VBW:	300 kHz
Span	Wide enough to capture the peak level of the in-band emission
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(4) Set the spectrum analyzer as follows:

RBW:	100 kHz
VBW:	300 kHz
Span	Encompass frequency range to be measured
Number of measurement points	≥span/RBW
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

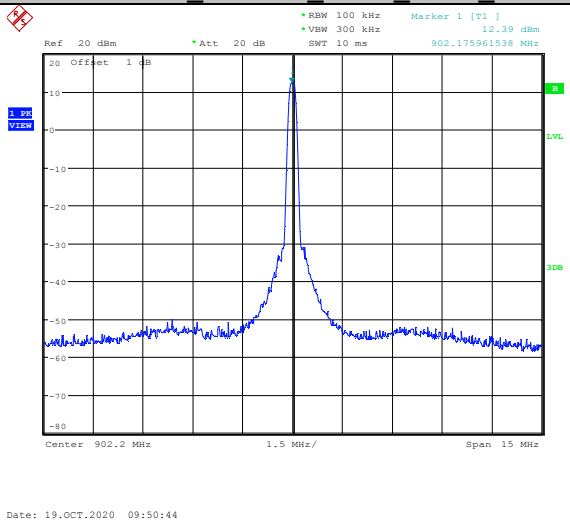
(5) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

11.4. Test result

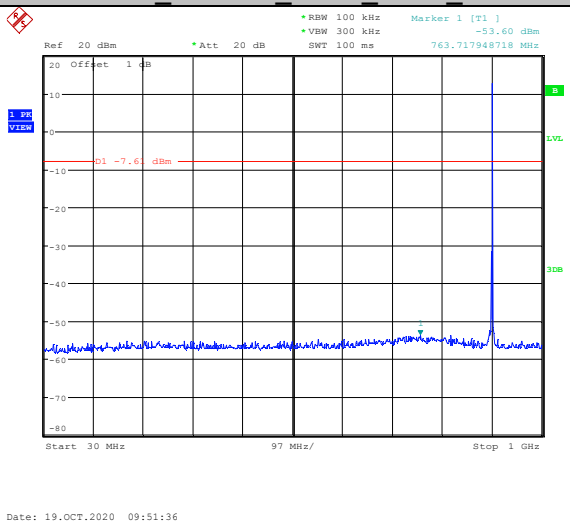
Mode	Antenna	Freq. (MHz)	Verdict
GFSK_38 kbps	ANT1	Hopping off 902.2	Pass
	ANT1	Hopping off 915	Pass
	ANT1	Hopping off 927.6	Pass
GFSK_153 kbps	ANT1	Hopping off 902.6	Pass
	ANT1	Hopping off 915.2	Pass
	ANT1	Hopping off 927.2	Pass
GFSK_400 kbps	ANT1	Hopping off 902.6	Pass
	ANT1	Hopping off 915.2	Pass
	ANT1	Hopping off 927.2	Pass

11.5. Original test data

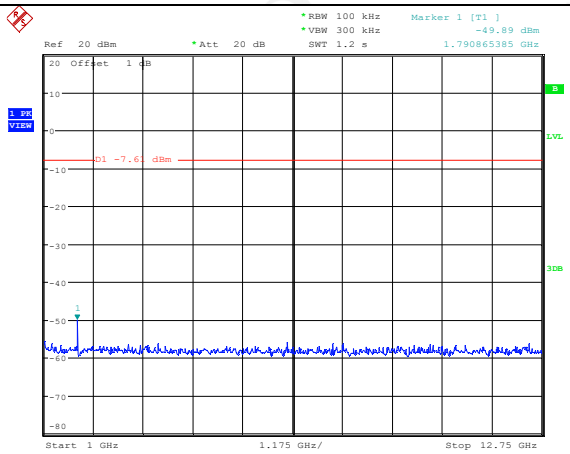
GFSK_38KBPS_ANT1_902.2_Ref



GFSK_38KBPS_ANT1_902.2_30~1000



GFSK_38KBPS_ANT1_902.2_1000~12750



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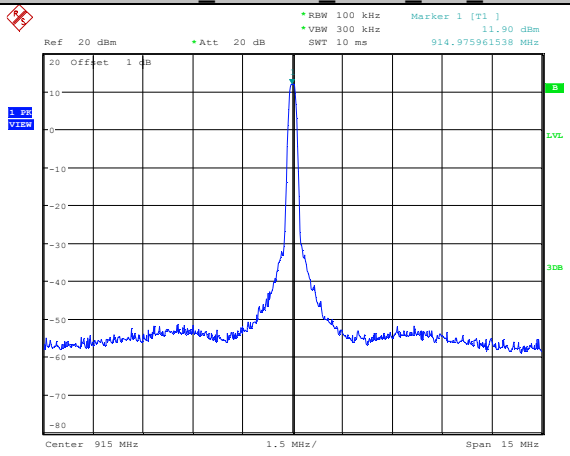
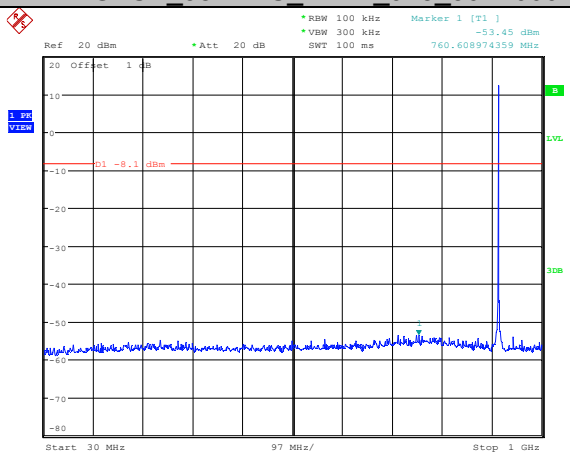
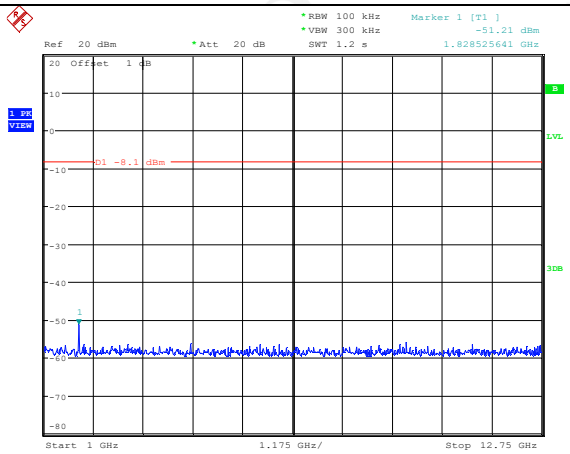


GFSK_38KBPS_ANT1_915_30~1000



GFSK_38KBPS_ANT1_915_1000~12750



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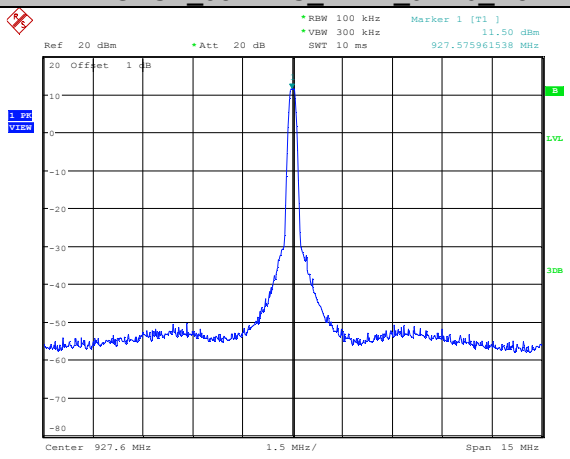

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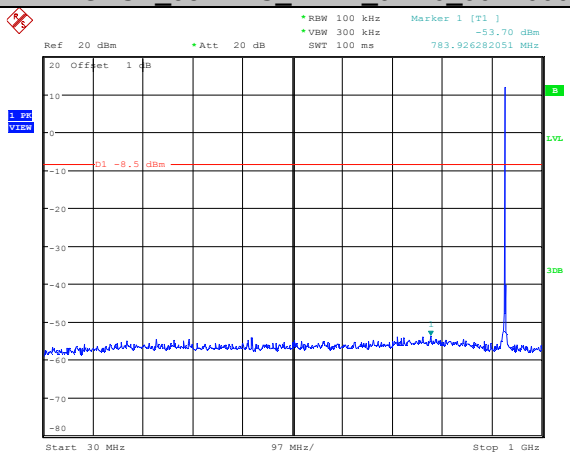

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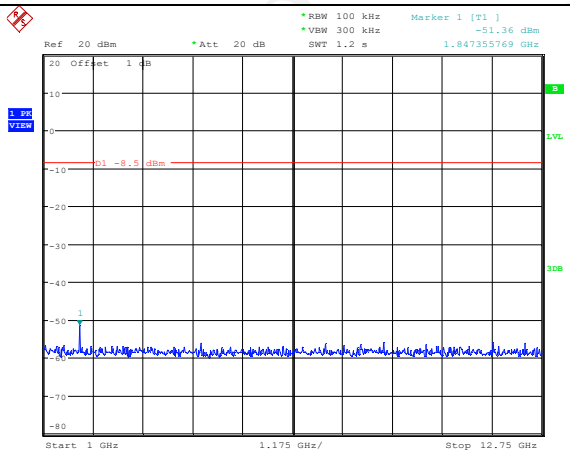

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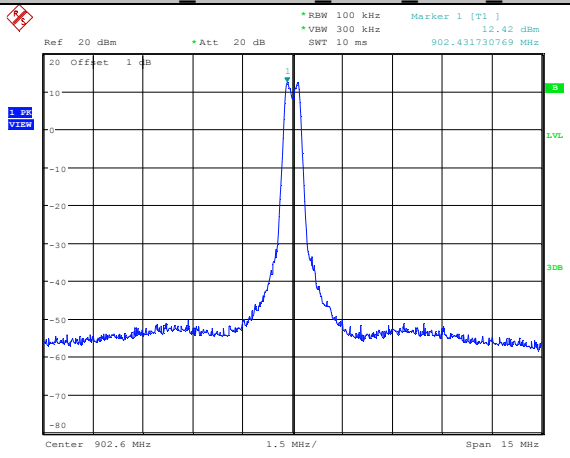
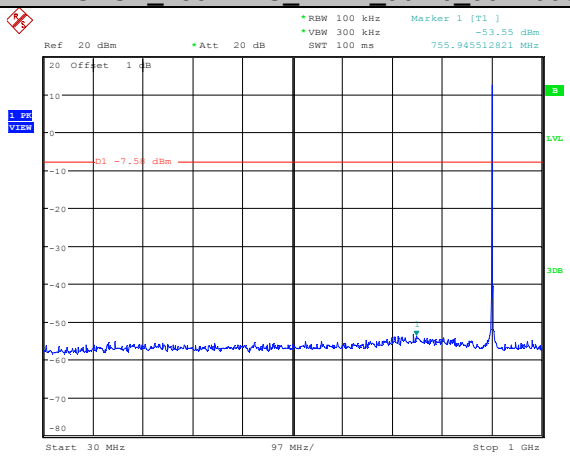
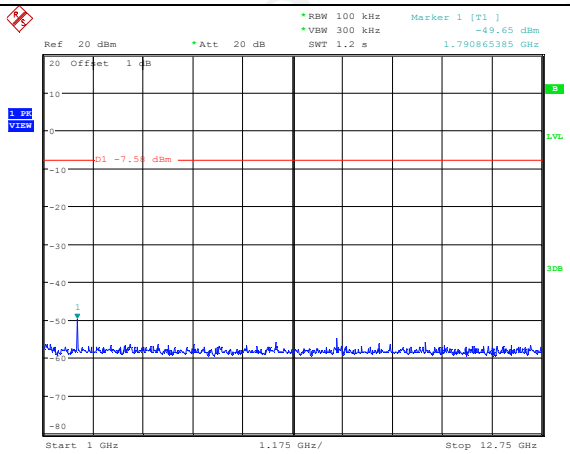


GFSK_153KBPS_ANT1_902.6_30~1000



GFSK_153KBPS_ANT1_902.6_1000~12750



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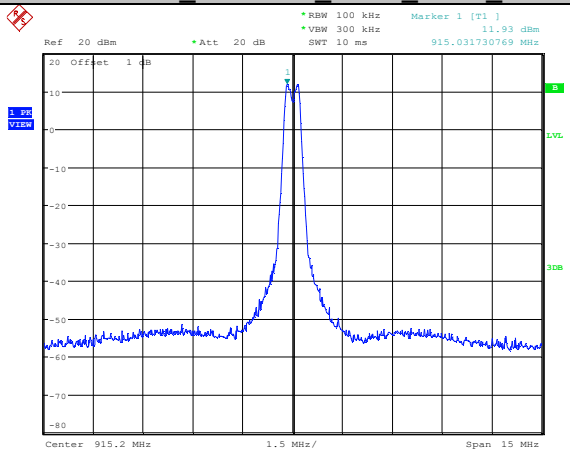
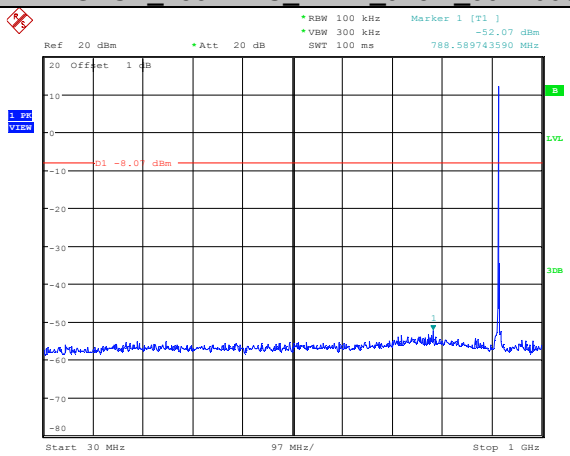
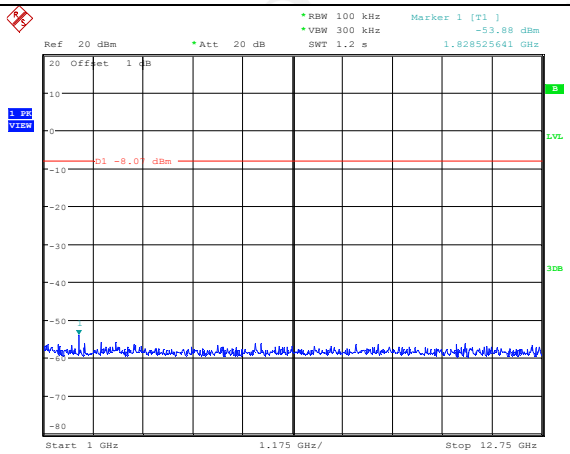


GFSK_153KBPS_ANT1_915.2_30~1000



GFSK_153KBPS_ANT1_915.2_1000~12750



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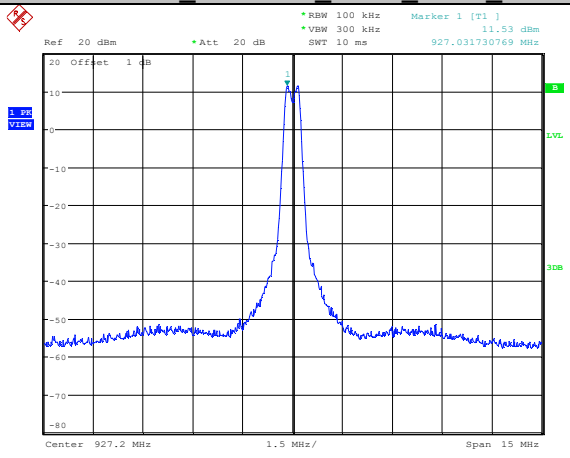
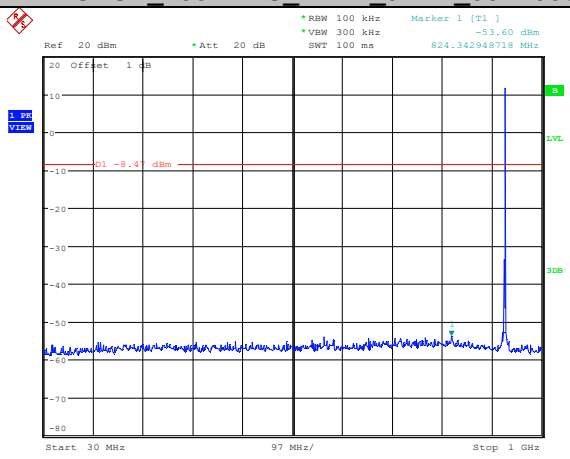
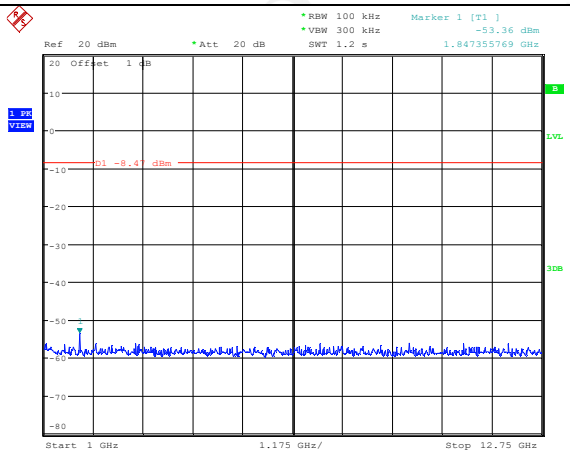


GFSK_153KBPS_ANT1_927.2_30~1000



GFSK_153KBPS_ANT1_927.2_1000~12750



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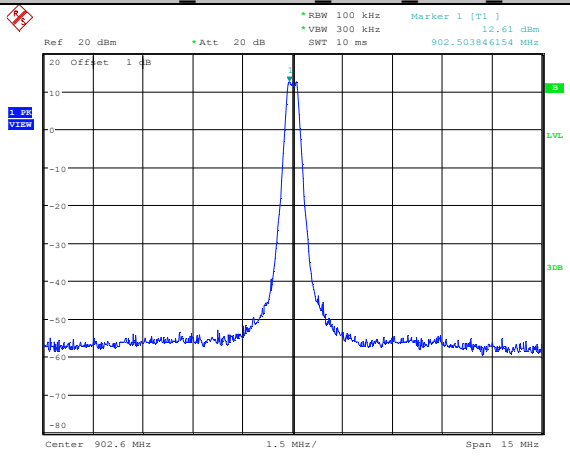

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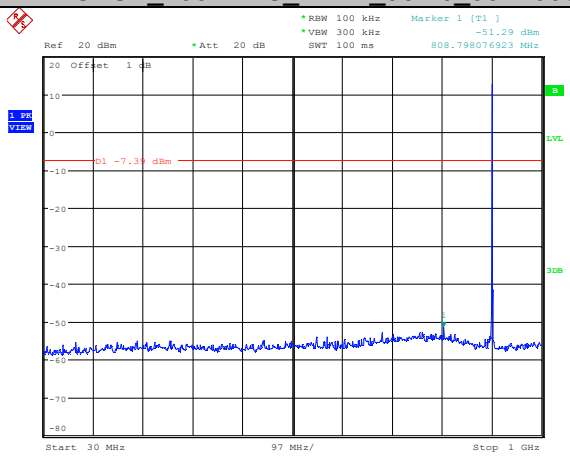

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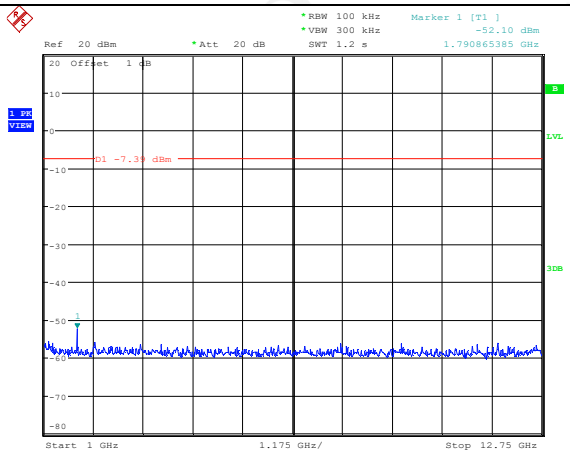

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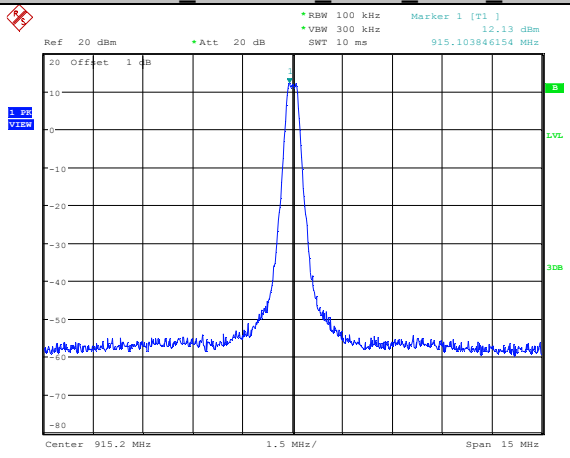

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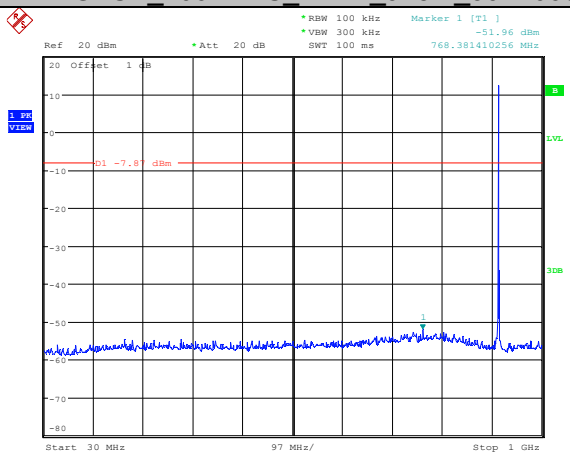
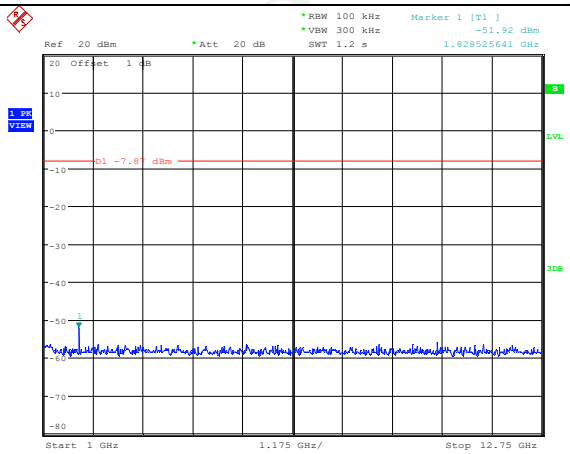


GFSK_400KBPS_ANT1_915.2_1000~12750



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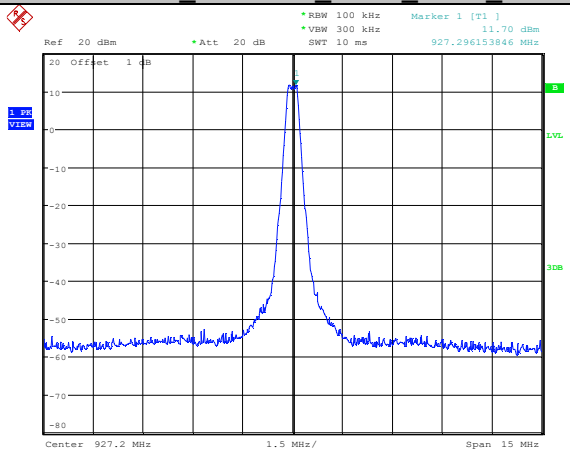

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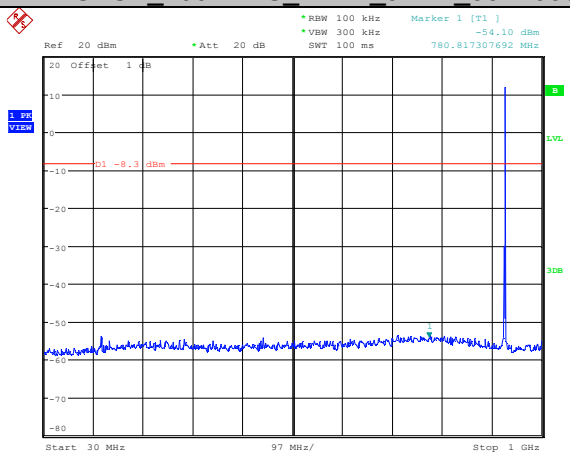

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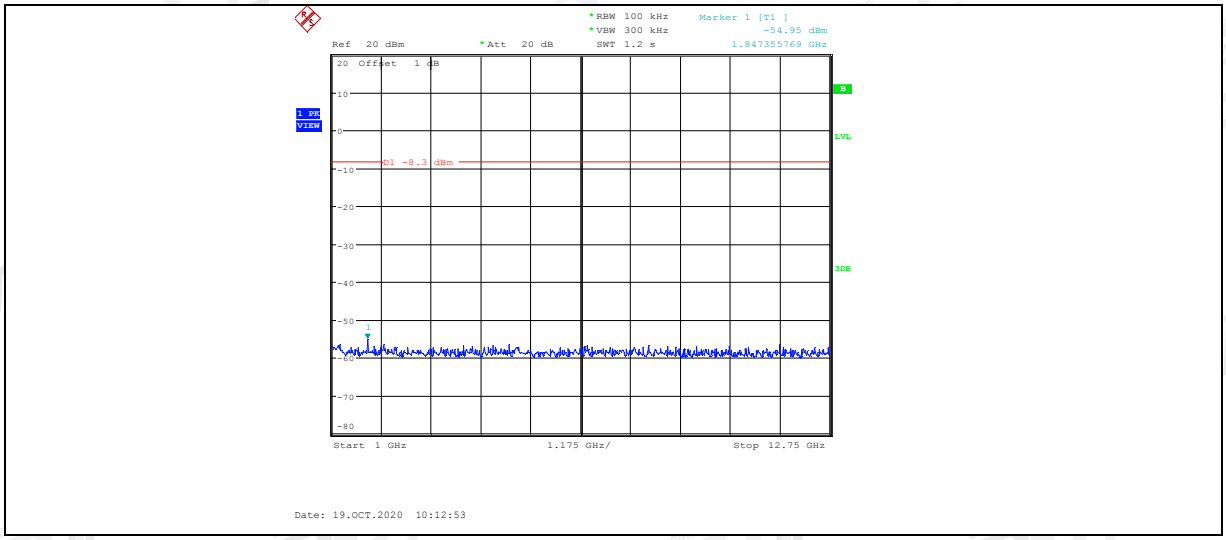
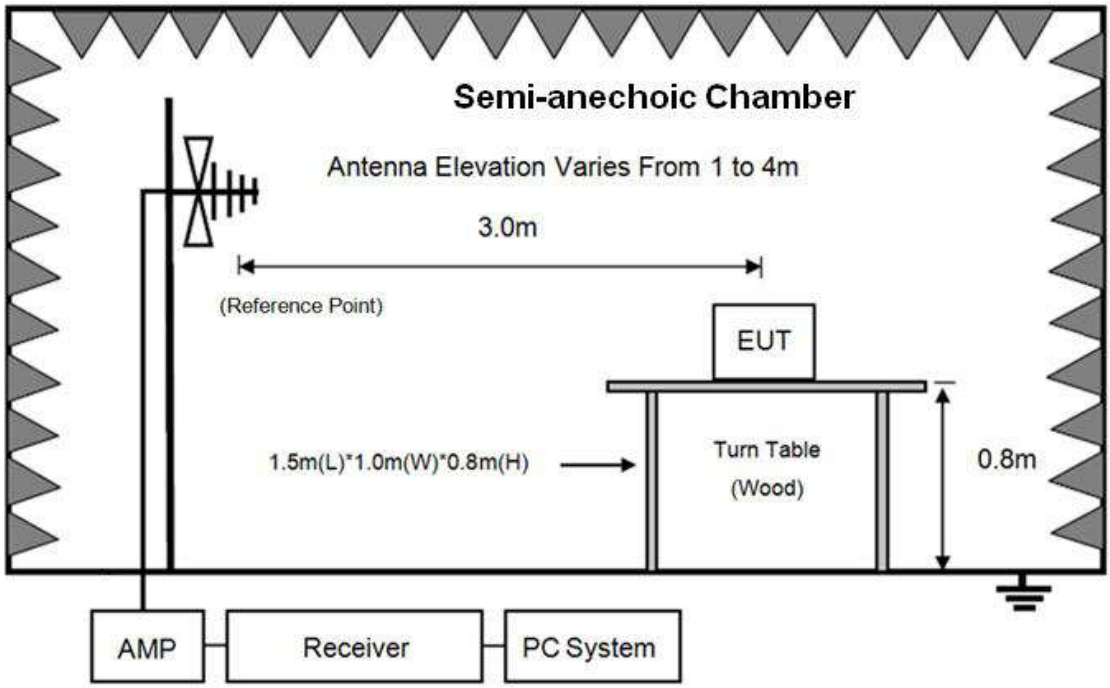

RBW 100 kHz
VBW 300 kHz
SWT 1.2 s
Marker 1 [T1]
-54.95 dBm
1.847355769 GHz
Ref 20 dBm
Att 20 dB
Offset 1 dB
1 PK VIEW
D1 -8.3 dBm
B
LVL
3DB
Start 1 GHz
1.175 GHz/
Stop 12.75 GHz
Date: 19.OCT.2020 10:12:53

12. Band Edge Compliance (Radiated Method)

12.1. Block diagram of test setup



12.2. Limit

All restriction band should comply with 15.209, other emission should be at least 20 dB below the fundamental.

12.3. Test procedure

Same with clause 10.3 except change investigated frequency range from 890 MHz to 910 MHz and 910 MHz to 1000 MHz.

Remark: All restriction band have been tested, and only the worst case is shown in report.

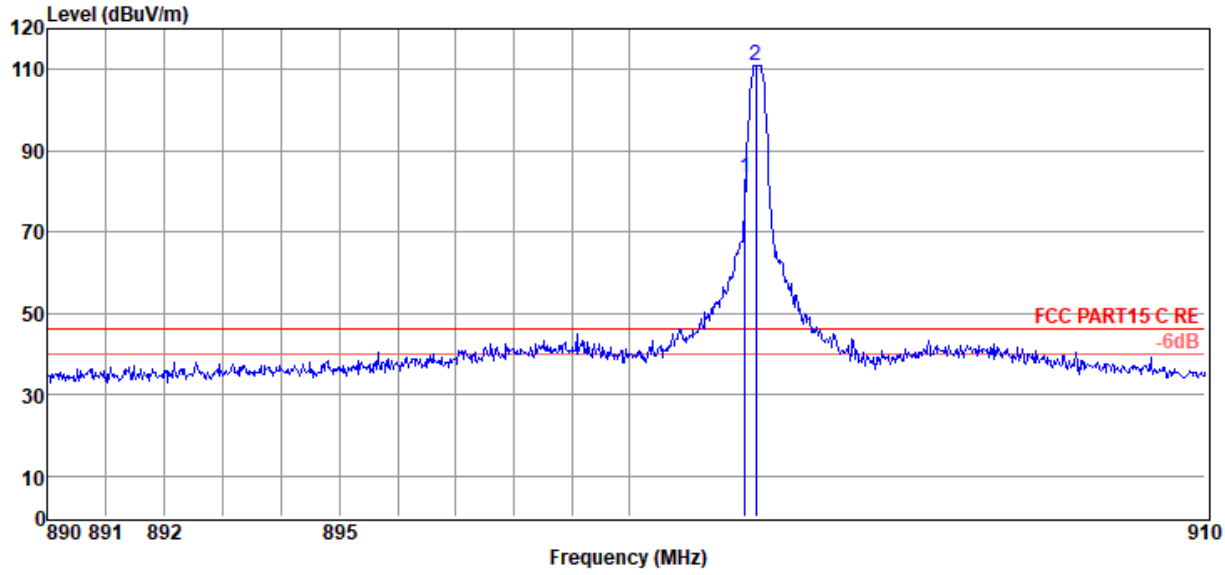
12.4. Test result

Pass. (See below detailed test result)

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 902.2 MHz 38 kbps POWER 13		

Data: 35



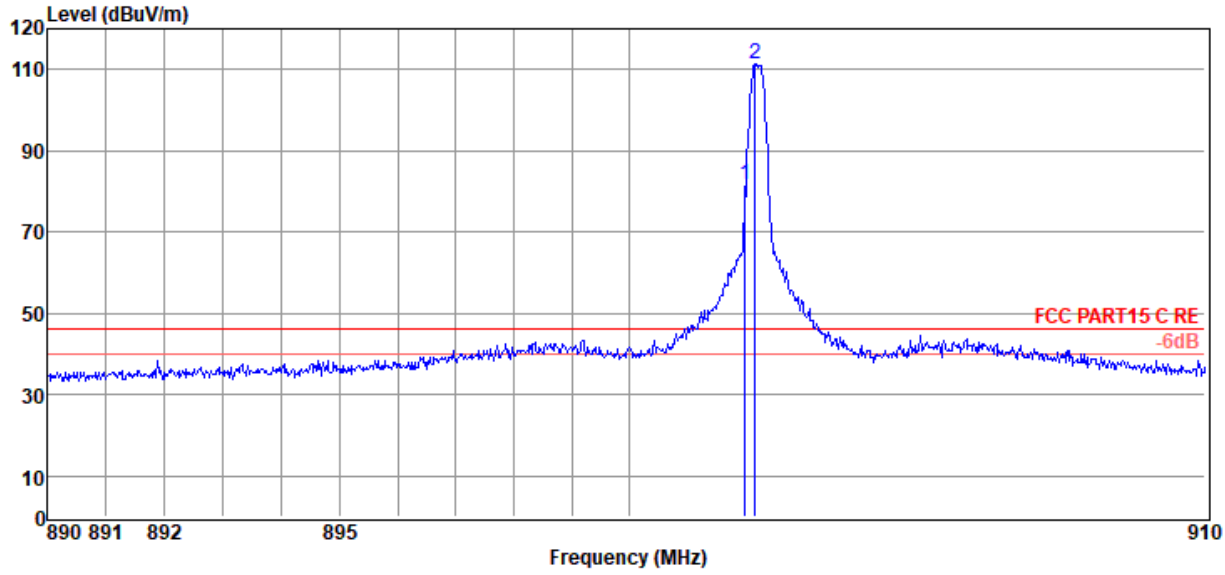
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	902.00	53.92	21.82	7.69	83.43	46.00	37.43	Peak	HORIZONTAL
2	902.19	81.58	21.82	7.69	111.09	46.00	65.09	Peak	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 902.2 MHz 38 kbps POWER 13		

Data: 36



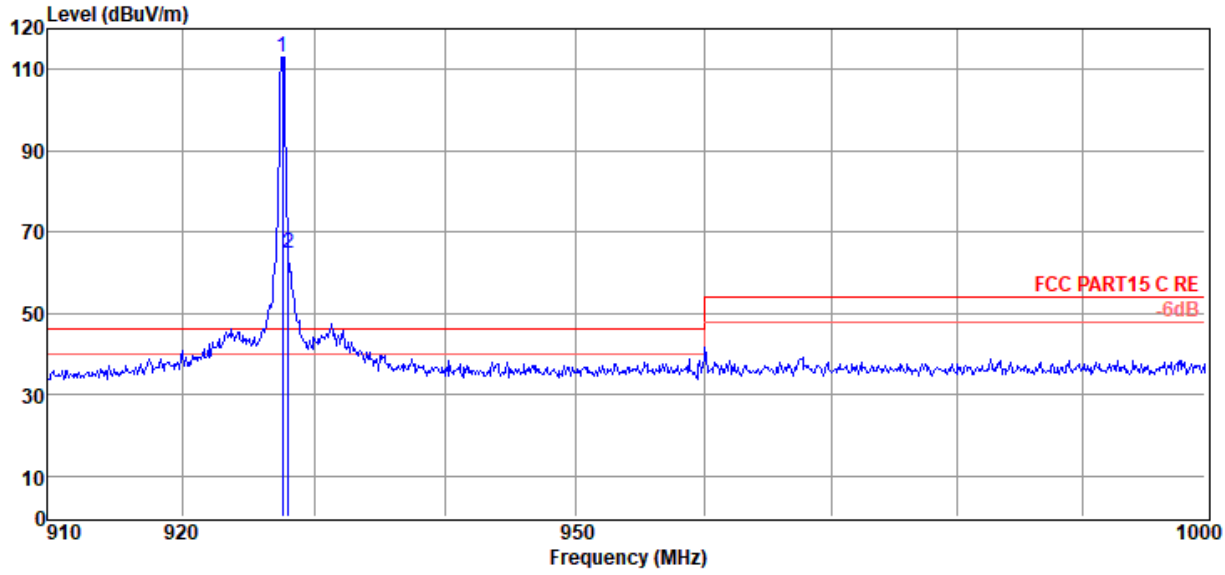
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	902.00	52.04	21.82	7.69	81.55	46.00	35.55	Peak	VERTICAL
2	902.17	81.66	21.82	7.69	111.17	46.00	65.17	Peak	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 927.6 MHz 38 kbps POWER 13		

Data: 37



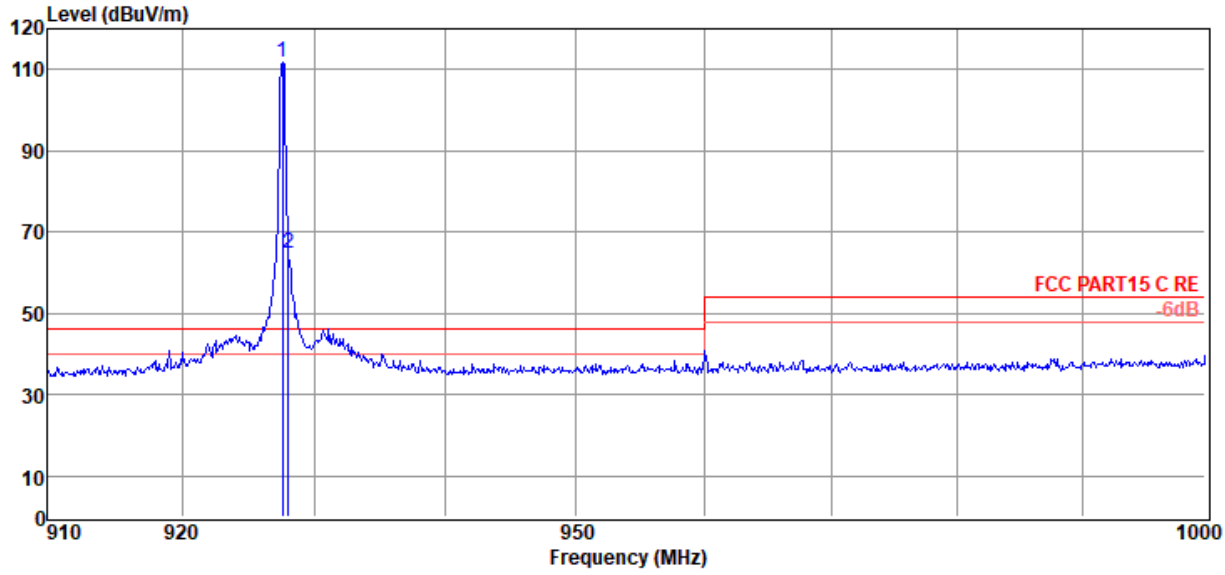
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	927.59	83.30	22.09	7.77	113.16	46.00	67.16	Peak	HORIZONTAL
2	928.00	34.84	22.09	7.77	64.70	46.00	18.70	Peak	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 927.6 MHz 38 kbps POWER 13		

Data: 38



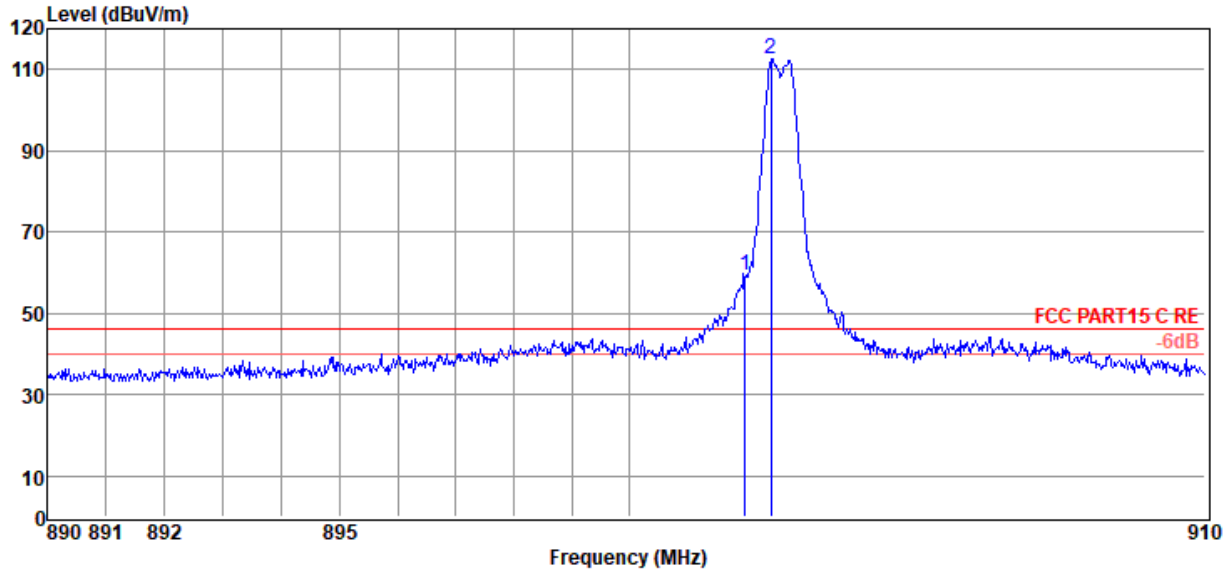
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	927.59	81.78	22.09	7.77	111.64	46.00	65.64	Peak	VERTICAL
2	928.00	35.02	22.09	7.77	64.88	46.00	18.88	Peak	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 902.6 MHz 153 kbps POWER 13		

Data: 39



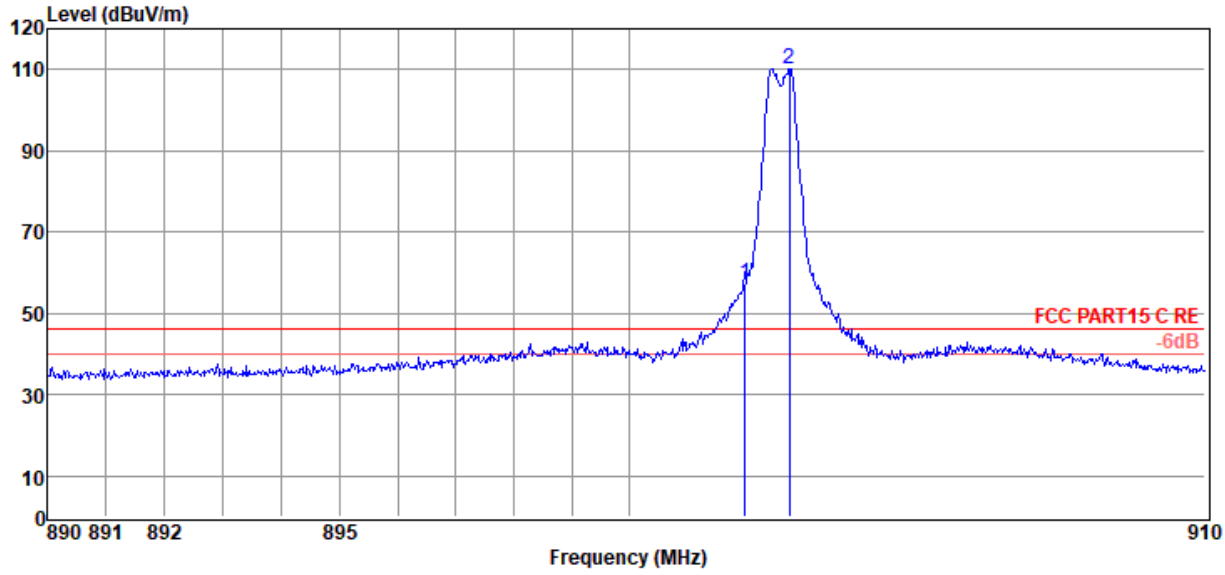
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	902.00	29.95	21.82	7.69	59.46	46.00	13.46	Peak	HORIZONTAL
2	902.45	82.96	21.83	7.69	112.48	46.00	66.48	Peak	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 902.6 MHz 153 kbps POWER 13		

Data: 40



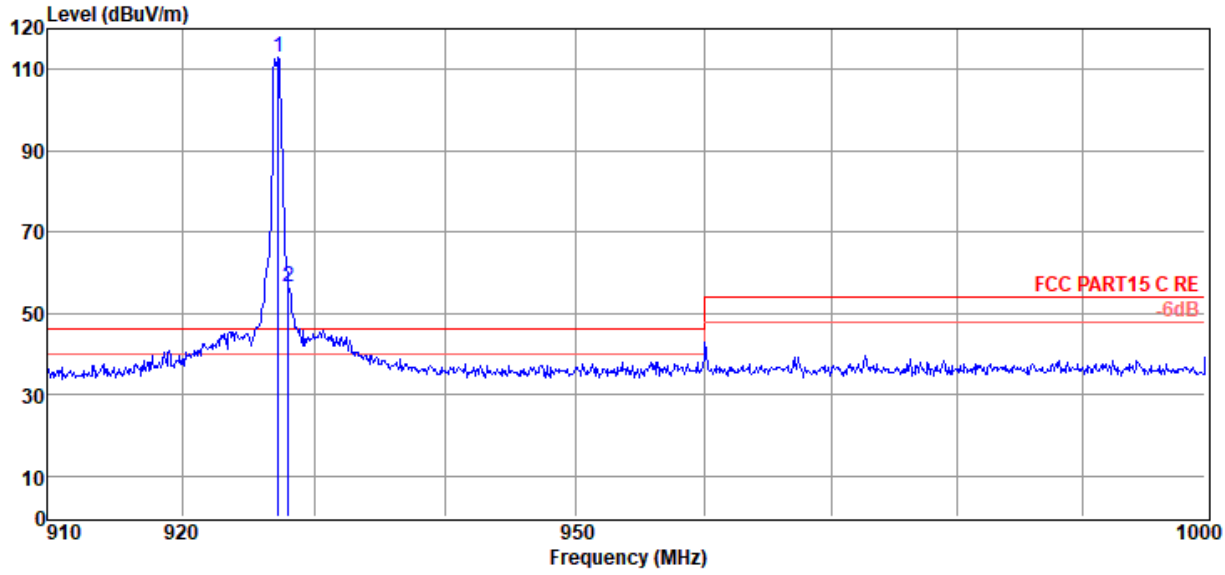
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	902.00	27.88	21.82	7.69	57.39	46.00	11.39	Peak	VERTICAL
2	902.77	80.65	21.83	7.69	110.17	46.00	64.17	Peak	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 927.2 MHz 153 kbps POWER 13		

Data: 41



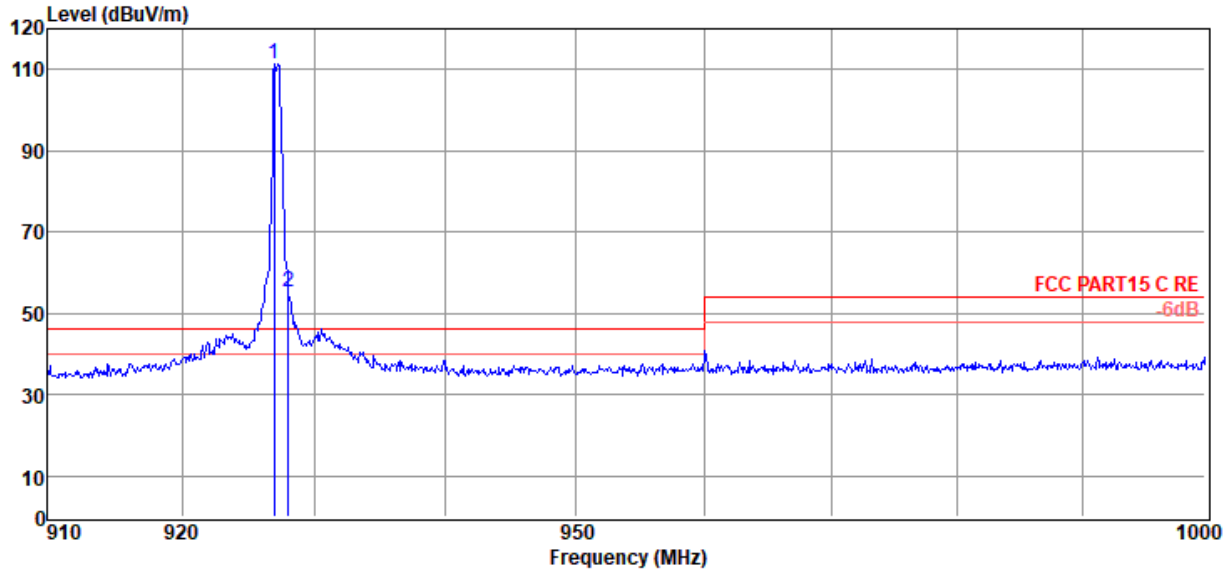
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	927.24	83.12	22.08	7.77	112.97	46.00	66.97	Peak	HORIZONTAL
2	928.00	26.78	22.09	7.77	56.64	46.00	10.64	Peak	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 927.2 MHz 153 kbps POWER 13		

Data: 42



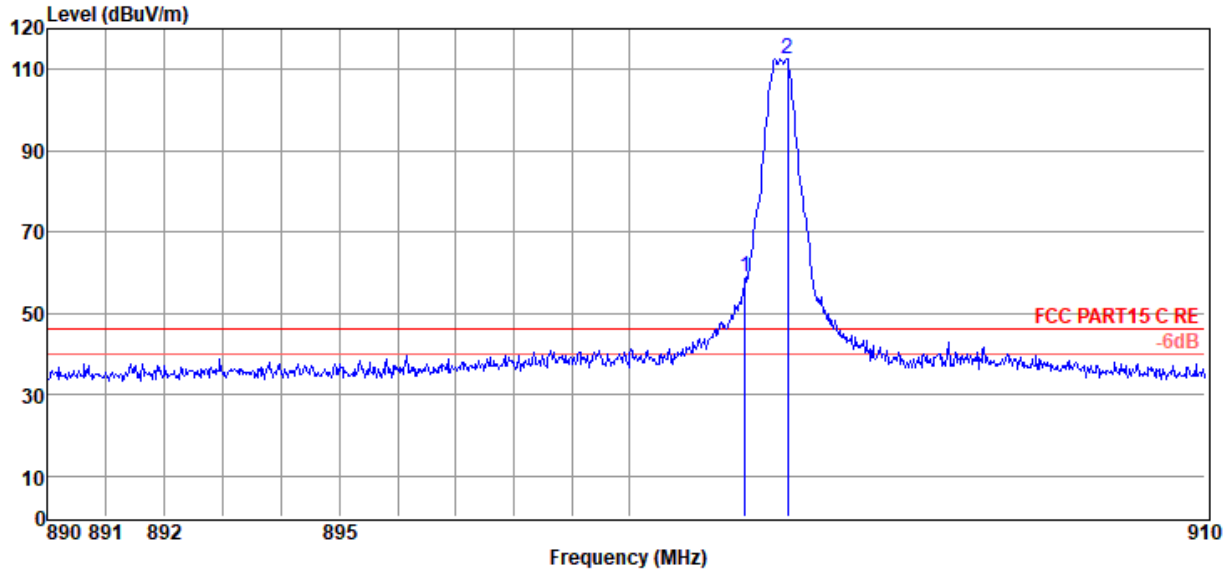
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	926.98	81.67	22.08	7.77	111.52	46.00	65.52	Peak	VERTICAL
2	928.00	25.48	22.09	7.77	55.34	46.00	9.34	Peak	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 902.6 MHz 400 kbps POWER 13		

Data: 43



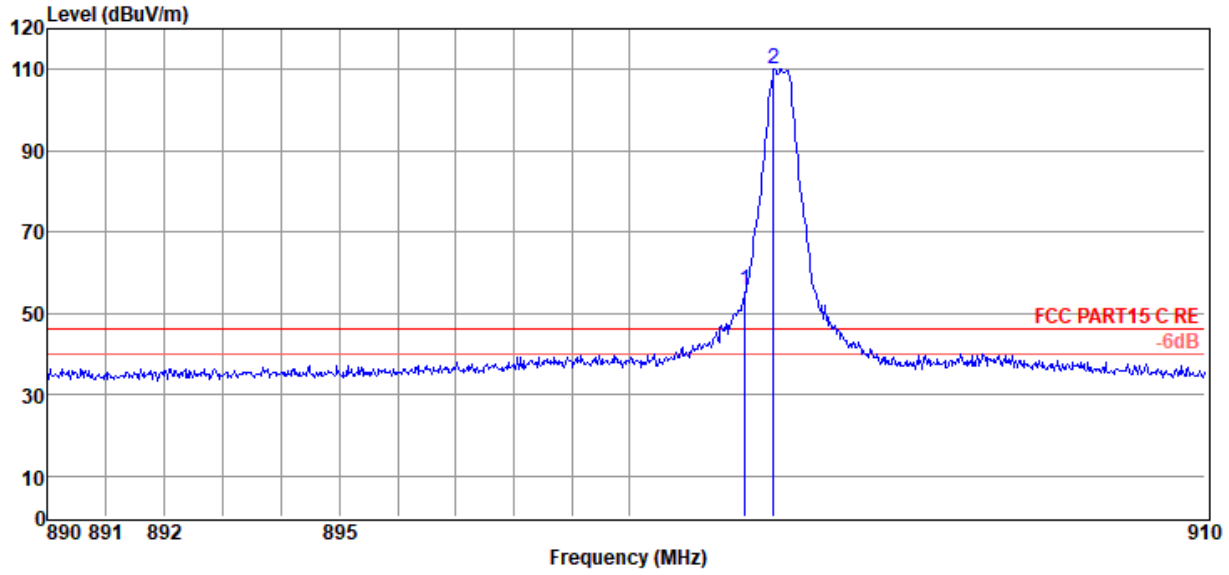
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	902.00	29.34	21.82	7.69	58.85	46.00	12.85	Peak	HORIZONTAL
2	902.73	83.01	21.83	7.69	112.53	46.00	66.53	Peak	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 902.6 MHz 400 kbps POWER 13		

Data: 44



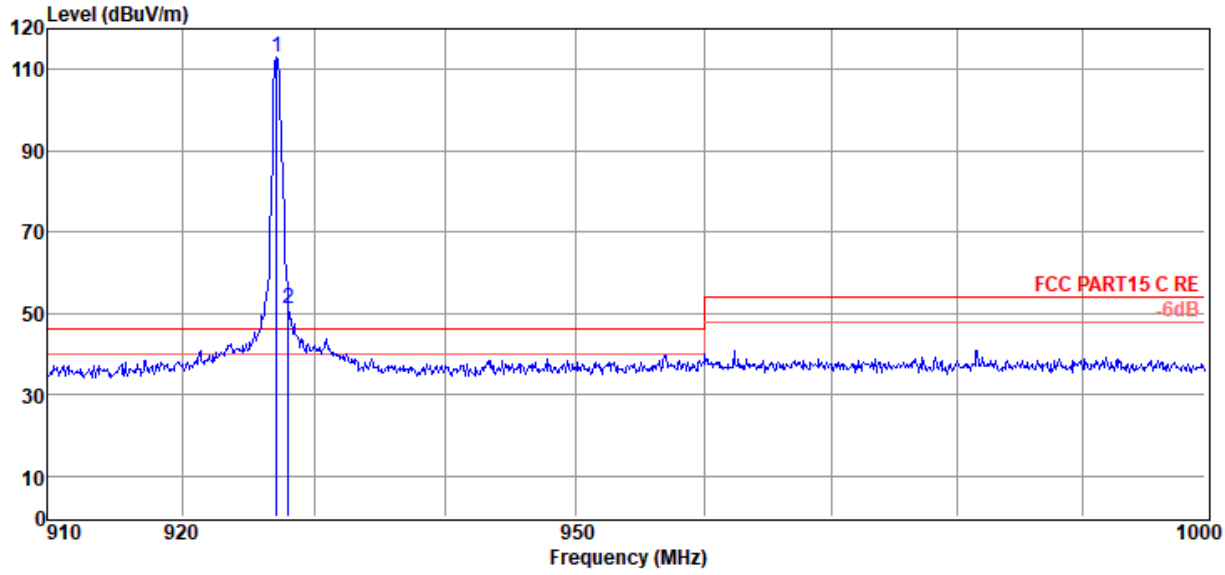
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	902.00	25.96	21.82	7.69	55.47	46.00	9.47	Peak	VERTICAL
2	902.49	80.65	21.83	7.69	110.17	46.00	64.17	Peak	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 927.6 MHz 400 kbps POWER 13		

Data: 45



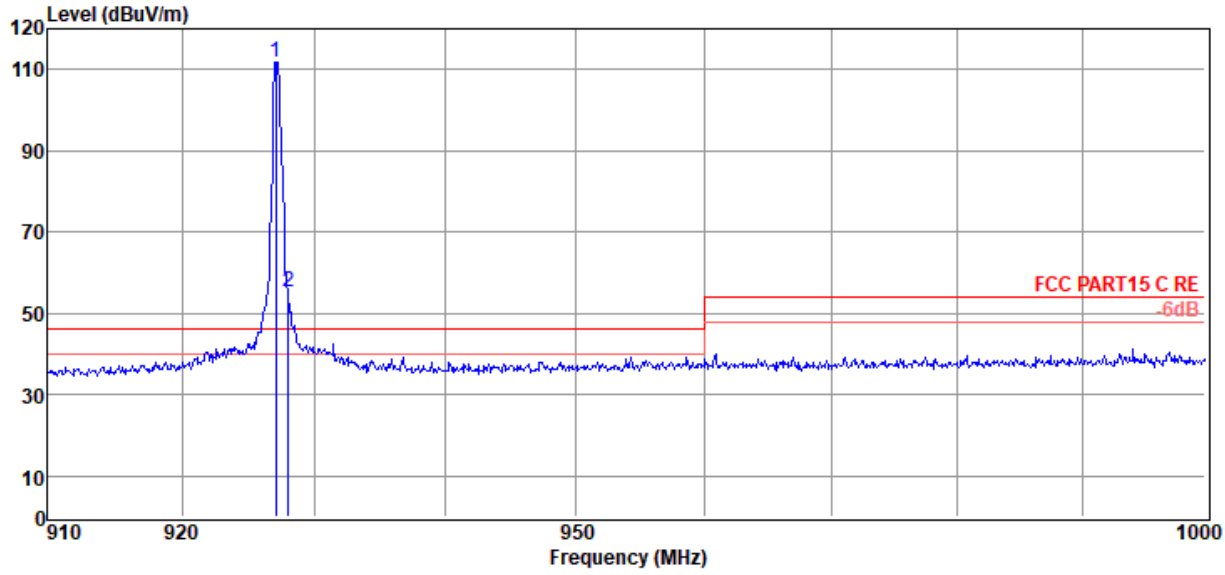
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	927.15	82.95	22.08	7.77	112.80	46.00	66.80	Peak	HORIZONTAL
2	928.00	21.26	22.09	7.77	51.12	46.00	5.12	Peak	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2020 RE 1# Report data\Q20081303-1E Modem v5.1\FCC BELOW 1G.EM6	
Test Date	: 2020-10-18	**Tested By**	: Jacky
EUT	: Modem	**Model Number**	: Modem v5.1
Power Supply	: DC 5V	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:45%,Press:101.3kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 927.6 MHz 400 kbps POWER 13		

Data: 46

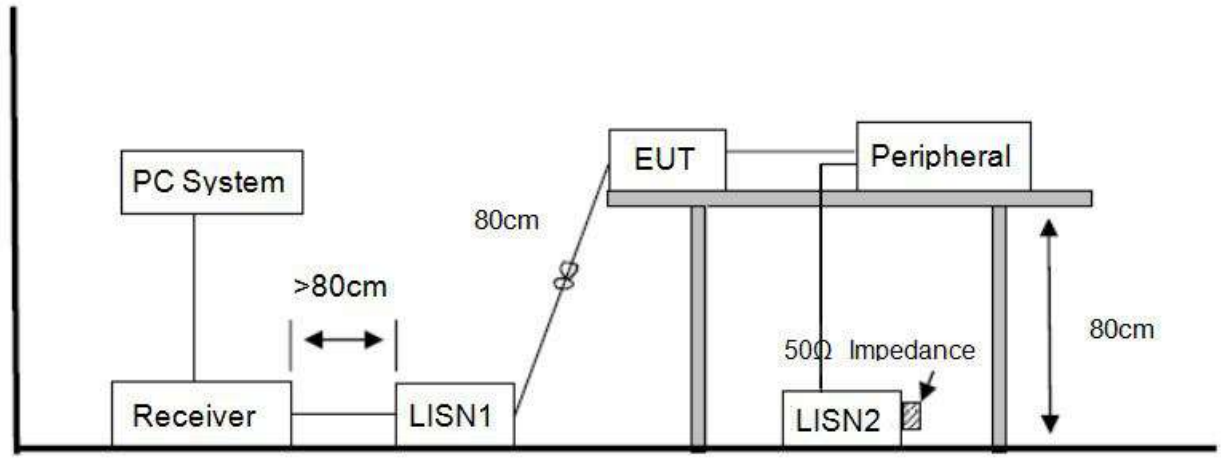


Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	927.07	81.85	22.08	7.77	111.70	46.00	65.70	Peak	VERTICAL
2	928.00	25.23	22.09	7.77	55.09	46.00	9.09	Peak	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

13. Power Line Conducted Emission

13.1. Block diagram of test setup



13.2. Power line conducted emission limits

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150 kHz ~ 500 kHz	66 ~ 56*	56 ~ 46*
500 kHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

13.3. Test procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 3 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were

recorded for reference of the final test.
EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.
Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
The test data of the worst-case condition(s) was recorded.
The bandwidth of test receiver is set at 9 kHz.

13.4. Test result

Not Applicable, since the EUT is not AC-operated device.

14. Antenna Requirements

14.1. Limit

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

14.2. Result

The antennas used for this product are Helical antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain is 6 dBi.

END OF REPORT