

FCC RADIO TEST REPORT

For
FCC ID: 2AVYBSFIAQREM1

Report Reference No..... : 20EFAB01009 1871
Date of issue..... : 2020-04-23
Testing Laboratory..... : DongGuan ShuoXin Electronic Technology Co., Ltd.
Address..... : Zone A, 1F, No. 6, XinGang Road YuanGang Street, XinAn District, ChangAn Town, DongGuan City, GuangDong, China

Applicant's name..... : Prom Hong Kong Ltd.
Address..... : FLAT/RM 811A, 08/F, Ocean Centre, Harbour City, 5 Canton Road, TST, Kowloon, Hong Kong
Manufacturer..... : Prom Hong Kong Ltd.

Test specification:

Test item description..... : Aqua Series Remote
Trade Mark : 
Model/Type reference..... : SFI-AQ-REM1
Ratings..... : I/P: DC 3.7V Li-ion Battery

Responsible Engineer :


Smile Wang

Authorized Signatory:

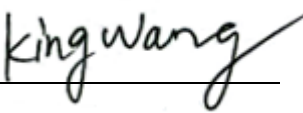

King Wang

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TEST REPORT DECLARE

Applicant	:	Prom Hong Kong Ltd.
Address	:	FLAT/RM 811A, 08/F,Ocean Centre, Harbour City, 5 Canton Road, TST ,Kowloon, Hong Kong
Equipment under Test	:	Aqua Series Remote
Test Model No	:	SFI-AQ-REM1
Manufacturer	:	Prom Hong Kong Ltd.
Address	:	FLAT/RM 811A, 08/F,Ocean Centre, Harbour City, 5 Canton Road, TST ,Kowloon, Hong Kong

Test Standard Used: FCC Rules and Regulations Part 15 Subpart C (15.249)

Test procedure used: ANSI C63.10:2013

We Declare:

The equipment described above is tested by DongGuan ShuoXin Electronic Technology 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 ShuoXin Electronic Technology 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:	20EFAB01009 1871		
Date of Test:	2020-03-10 To 2020-04-23	Date of Report:	2020-04-23

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of DongGuan ShuoXin Electronic Technology Co., Ltd.

1. Summary of test Standards and results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Results
AC Line Conducted Emissions	FCC Part 15.207 (a),	N/A
99% Bandwidth	FCC Part 15.215(c),	PASS
Radiated emission	FCC Part 15.209, 15.249 (a),	PASS
Bandedge	FCC Part 15.205	PASS

NOTE: "N/A" denotes test is not applicable in this Test Report

2. General test information

2.1. Description of EUT

EUT* Name	:	Aqua Series Remote
Model Number	:	SFI-AQ-REM1
EUT function description	:	Please reference user manual of this device
Power supply	:	DC 3.7V Li-ionBattery
Operation frequency	:	915MHz
Modulation	:	FSK
Antenna Type	:	Internal Antenna, maximum PK gain: 0dBi
Date of Receipt	:	2019/12/24
Sample Type	:	Single production
Hardware Version	:	V1.0
Software Version	:	V1.0

Note: EUT is the ab. of equipment under test.

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number or Type	Other
/	/	/	/

2.3. Assistant equipment used for test

Description of Assistant equipment	Manufacturer	Model number or Type	Other
/	/	/	/

2.4. Block diagram of EUT configuration for test



NOTE: Full battery is used during all test

2.5. Test environment conditions

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

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

2.6. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test (9kHz-150kHz)	3.7 dB
Uncertainty for Conduction emission test (150kHz-30MHz)	3.3 dB
Uncertainty for Radiation Emission test (30MHz-200MHz)	4.60 dB (Polarize: V)
	4.60 dB (Polarize: H)
Uncertainty for Radiation Emission test (200MHz-1GHz)	6.10 dB (Polarize: V)
	5.08 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz-6GHz)	5.01 dB (Polarize: V)
	5.01 dB (Polarize: H)
Uncertainty for Radiation Emission test (6GHz-18GHz)	5.26 dB (Polarize: V)
	5.26 dB (Polarize: H)
Uncertainty for Radiation Emission test (18GHz-40GHz)	5.06 dB (Polarize: V)
	5.06 dB (Polarize: H)
Uncertainty for radio frequency	±0.048kHz
Uncertainty for conducted RF Power	±0.32dB

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.8. Table Of Parameters Of Test Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

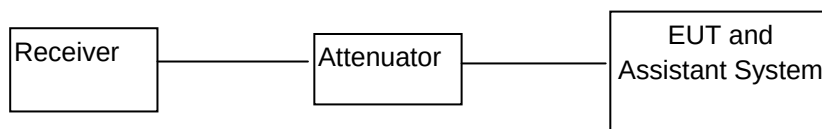
Test Software Version	
Frequency (MHz)	915MHz
Power Parameters (ASK)	default

3. 99% Occupied Bandwidth

3.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Calibrated Date
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	05/27/2020	05/28/2019
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A	N/A
3	RF Cable	Micable	C10-01-01-1	100309	N/A	N/A

3.2. Block diagram of test setup



3.3. Limits

N/A

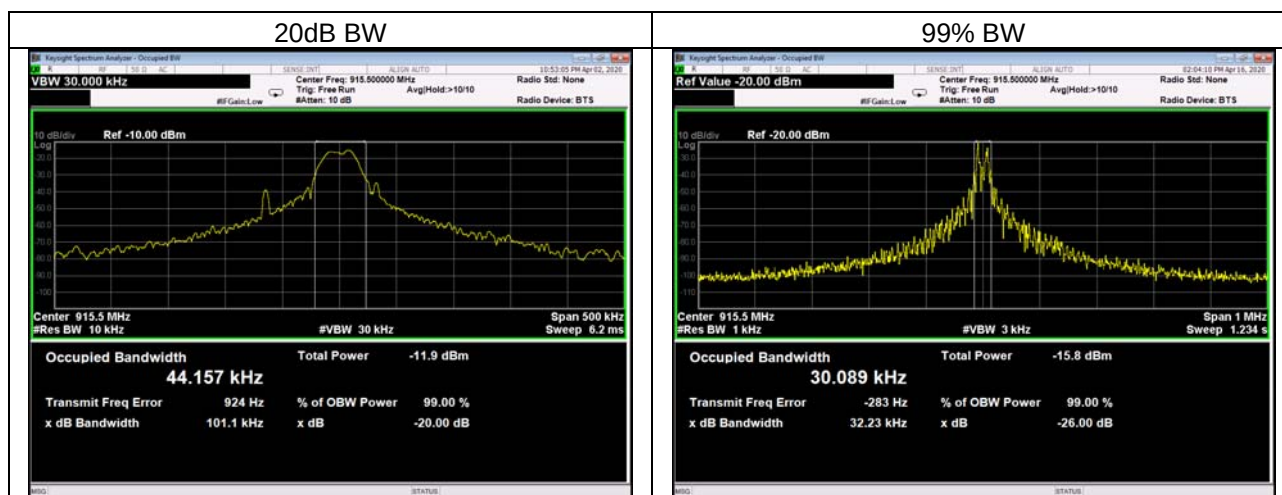
3.4. Test Procedure

- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (3) Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
- (4) Repeat above procedures until all frequencies measured were complete.

3.5. Test Result

Frequency (MHz)	20dB Bandwidth (kHz)	99% dB bandwidth (kHz)
915	101.1	30.089

3.6. Original test data



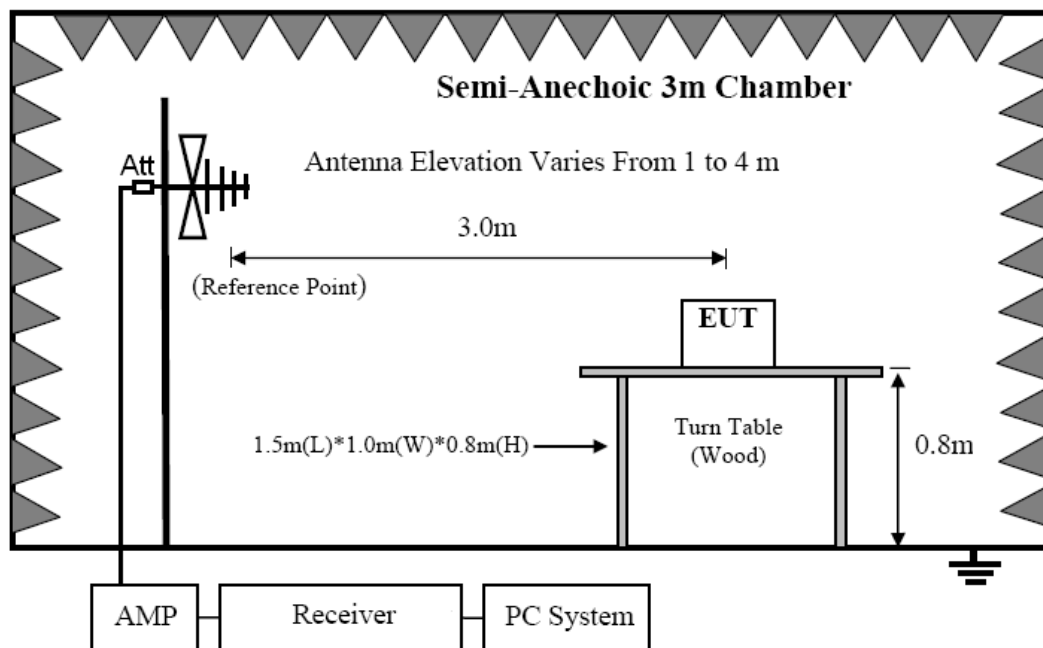
4. Field Strength of Spurious Emissions And Field Strength of Fundamental

4.1. Test equipment

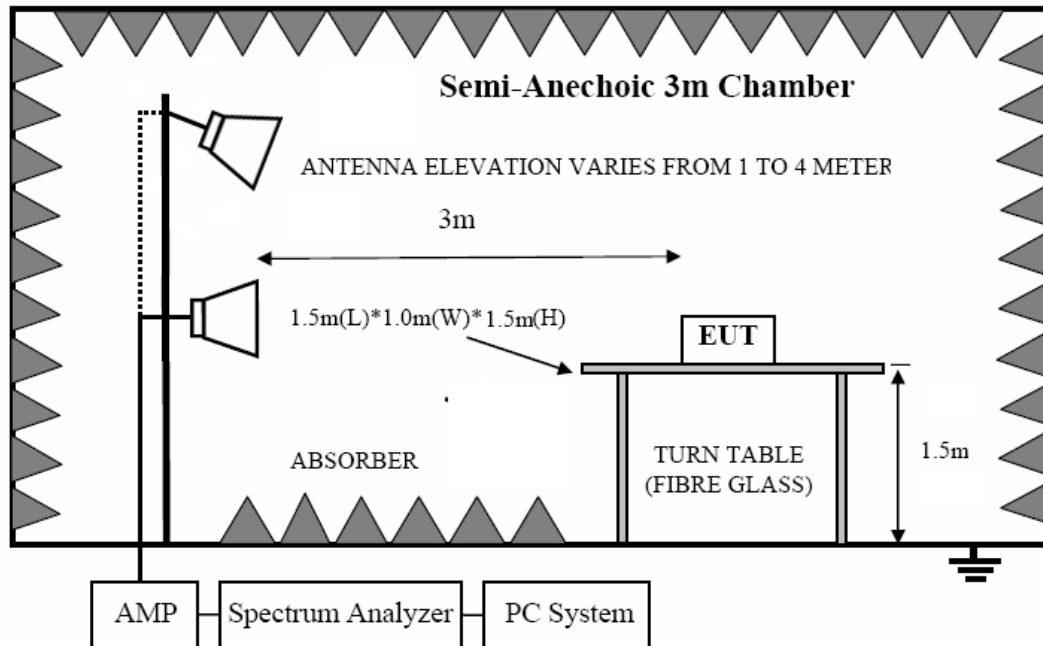
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Calibrated Date
1	EMI Test Receiver	R&S	ESCI	101307	12/12/2020	12/13/2019
2	Spectrum Analyzer	Agilent	E4407B	US40240708	11/17/2020	11/18/2019
3	Loop antenna	SCHWARZBECK K	FMZB1519	1519-062	12/14/2020	12/15/2019
4	Broadband antenna	SCHWARZBECK	VULB9168	VULB9168-192	03/22/2021	03/22/2020
5	HORN ANTENNA	SCHWARZBECK	BBHA9120D	BBHA 9120D 1065	04/16/2020	04/17/2019
6	Preamplifier Amplifier	HP	8447F	3113A05680	12/11/2020	12/12/2019
7	PRE-AMPLIFIER	CY	EMC011830	980136	12/11/2020	12/12/2019
8	RF Cable	R&S	Test Cable 4	4	12/11/2020	12/12/2019
9	RF Cable	R&S	Test Cable 5	5	12/11/2020	12/12/2019
10	RF Cable	R&S	Test Cable 9	9	04/22/2020	04/23/2019
11	RF Cable	R&S	Test Cable 10	10	12/11/2020	12/12/2019
12	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A	N/A

4.2. Block diagram of test setup

In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



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

4.3. Limit

4.3.1 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
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 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)

4.3.2 FCC 15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
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 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

4.3.3 FCC 15.249(a) limit

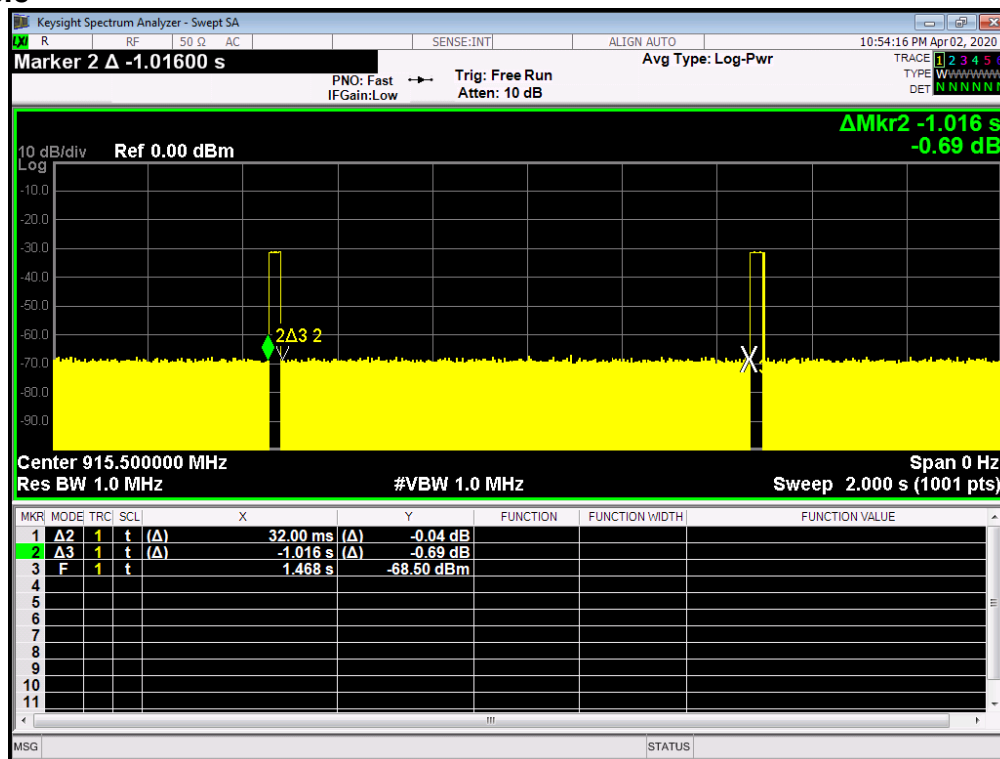
Fundamental Frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24.0-24.25	250	2500

4.4. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.4 and 8.2
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Change power supply range from 85% to 115% of the rated supply voltage
 - (d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9MHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m 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 equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.
- (6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 KHz.
- (7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure, Detector is at PK; RBW is set at 1MHz, VBW is set at 3MHz for Average measure, Detector is at RMS..
- (8) For Field Strength of Fundamental were measured with Spectrum Analyzer, and the RBW is set at above 99% Occupied Bandwidth , VBW is set at equal to RBW for Peak measure, Detector is at PK
- (9) The test result is calculated as the following:
Result = Reading + Correct Factor
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
Margin = Result - Limit
 $AVG = Peak + 20 \log(Duty Cycle) = PEAK - 9.9$

4.5. Test result

Duty Cycle



DUTY CYCLE=ON TIME/TOTAL TIME=32ms/100ms≈0.32
AVG=PEAK+20LOG(DUTY CYCLE)=PEAK-9.9

Below 30M

EUT:	Aqua Series Remote	Model No.:	SFI-AQ-REM1
Temperature:	24C°	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3.7V Li-ionBattery
Polarization:	--	Test Result:	Pass
Test Mode:	Keeping TX mode	Test By:	Smile

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

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

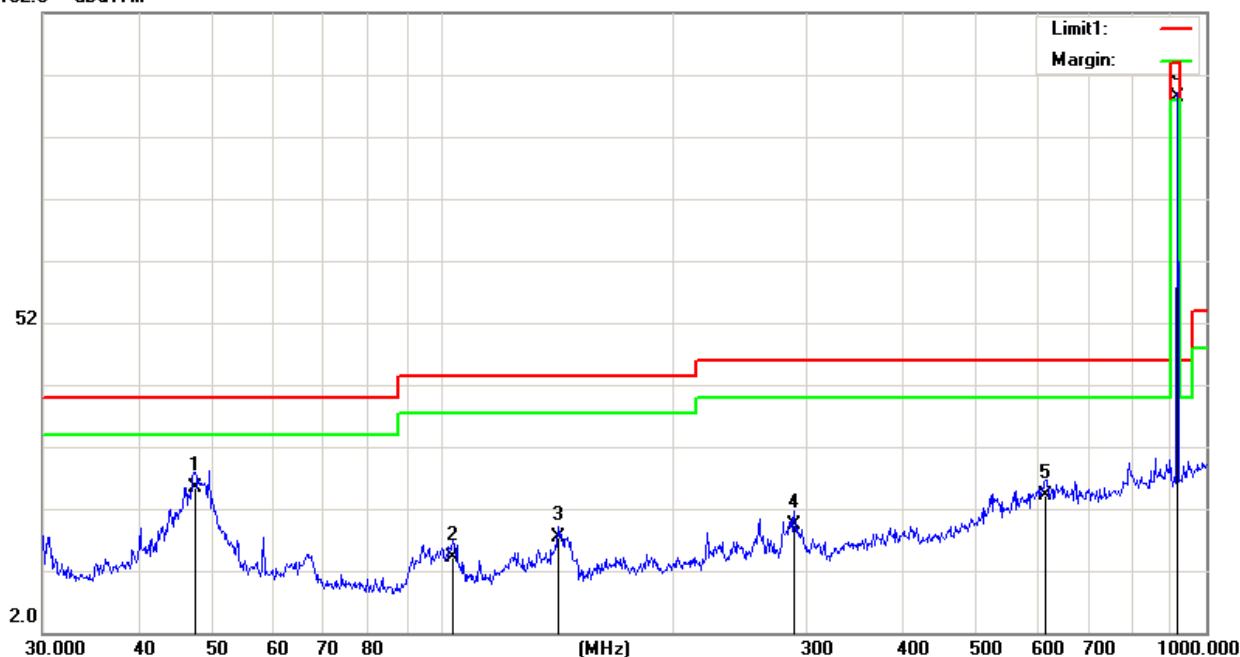
Distance extrapolation factor = $20 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor

Between 30M – 1000 MHz

EUT:	Aqua Series Remote	Model No.:	SFI-AQ-REM1
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	DC 3.7V
Polarization:	Vertical	Test Result:	Pass
Test Time:	2020-4-23	Test By:	
Standard:	(RE)FCC PART 15.249 30M-1G		
Test Mode:	TX		
Note:			

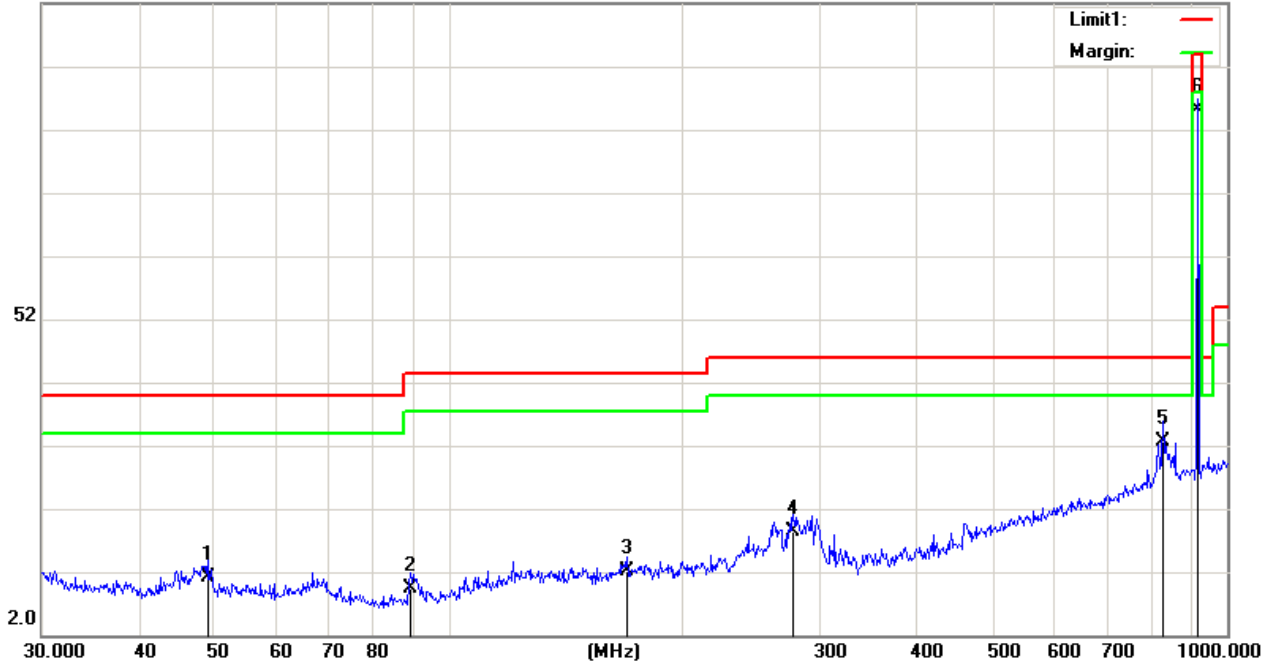
102.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	47.4917	38.99	-13.55	25.44	40.00	-14.56	QP
2	103.0798	28.87	-14.68	14.19	43.50	-29.31	QP
3	141.8262	30.12	-12.76	17.36	43.50	-26.14	QP
4	289.0020	27.22	-7.94	19.28	46.00	-26.72	QP
5	616.3718	27.43	-3.35	24.08	46.00	-21.92	QP
6	916.0687	84.76	3.58	88.34	94.00	-5.66	QP

EUT:	Aqua Series Remote	Model No.:	SFI-AQ-REM1
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	DC 3.7V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2020-4-23	Test By:	
Standard:	(RE)FCC PART 15.249 30M-1G		
Test Mode:	TX		
Note:			

102.0 dBuV/m

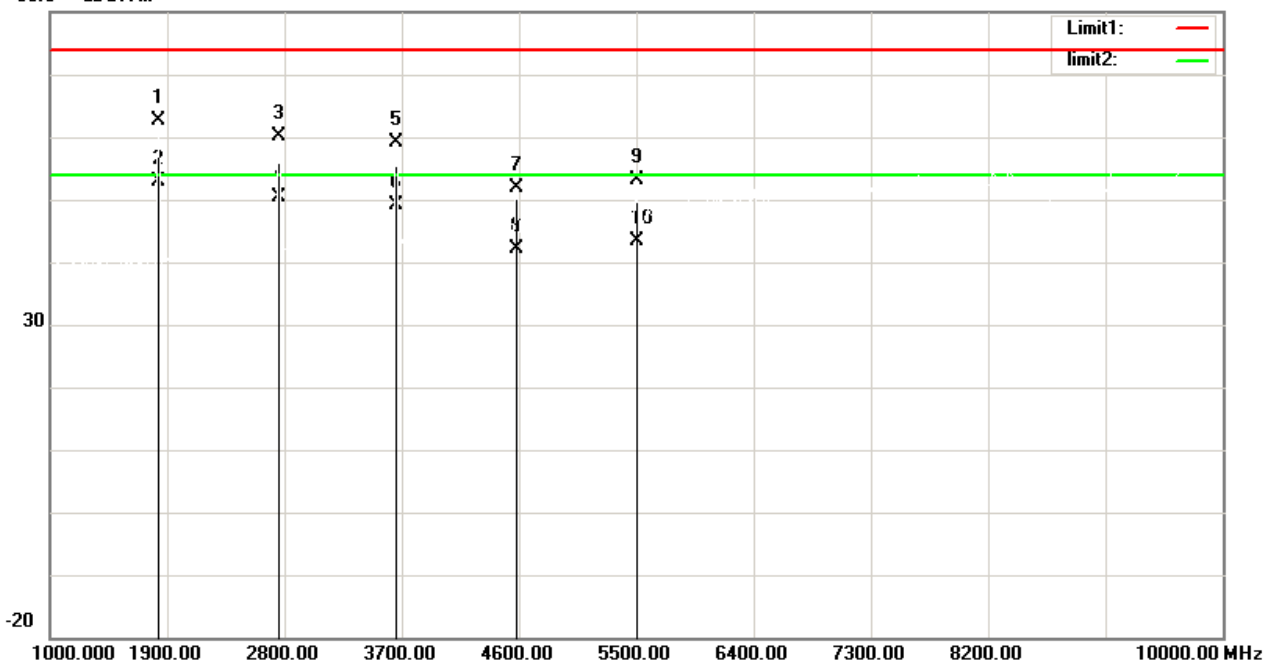


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	49.0144	25.93	-14.90	11.03	40.00	-28.97	QP
2	89.2762	26.53	-17.17	9.36	43.50	-34.14	QP
3	169.5988	22.38	-10.30	12.08	43.50	-31.42	QP
4	277.0935	23.59	-5.18	18.41	46.00	-27.59	QP
5	827.4932	31.16	1.53	32.69	46.00	-13.31	QP
6	916.0687	81.49	3.58	85.07	94.00	-8.93	QP

Between 1000M – 10000 MHz

EUT:	Aqua Series Remote	Model No.:	SFI-AQ-REM1
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	DC 3.7V
Polarization:	Vertical	Test Result:	Pass
Test Time:	2020-4-23	Test By:	
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:			

80.0 dBuV/m

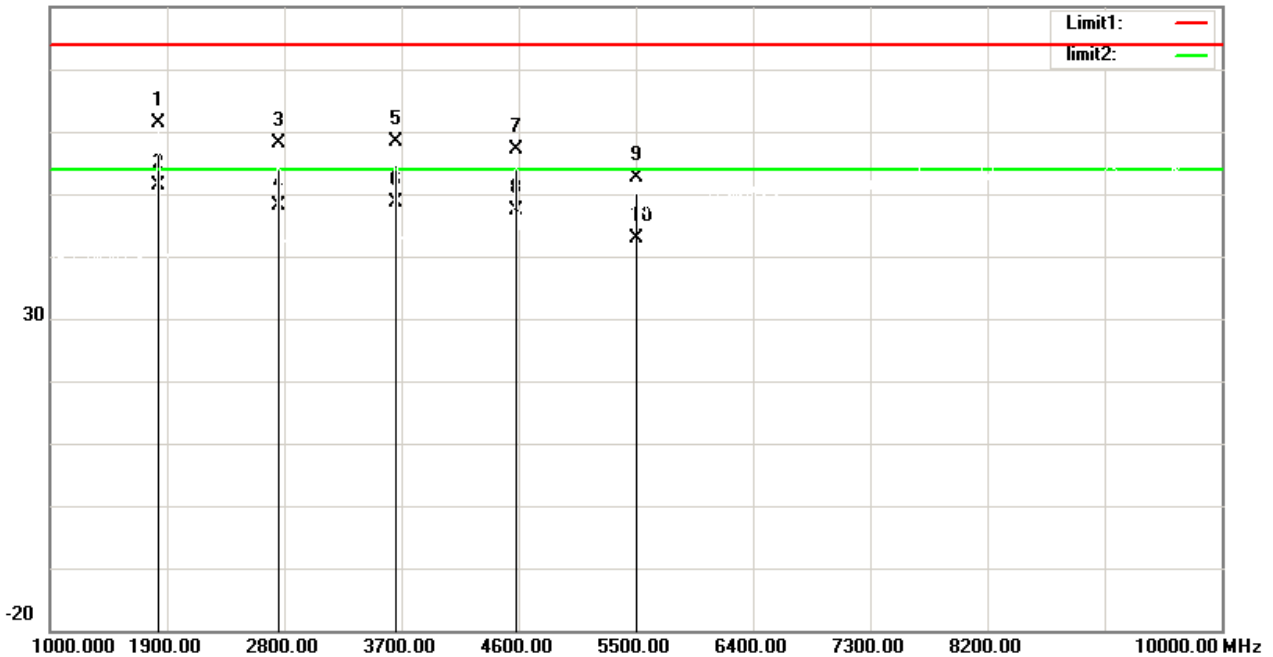


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1832.500	75.04	-12.34	62.70	74.00	-11.30	peak
3	2755.000	69.12	-8.93	60.19	74.00	-13.81	peak
5	3655.000	65.90	-6.87	59.03	74.00	-14.97	peak
7	4577.500	56.13	-4.17	51.96	74.00	-22.04	peak
9	5500.000	53.49	-0.28	53.21	74.00	-20.79	peak

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2	1832.500	52.81	54.00	-1.19	AVG
4	2755.000	50.29	54.00	-3.71	AVG
6	3655.000	49.13	54.00	-4.87	AVG
8	4577.500	42.06	54.00	-11.94	AVG
10	5500.000	43.31	54.00	-10.69	AVG

EUT:	Aqua Series Remote	Model No.:	SFI-AQ-REM1
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	DC 3.7V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2020-4-23	Test By:	
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:			

80.0 dBuV/m



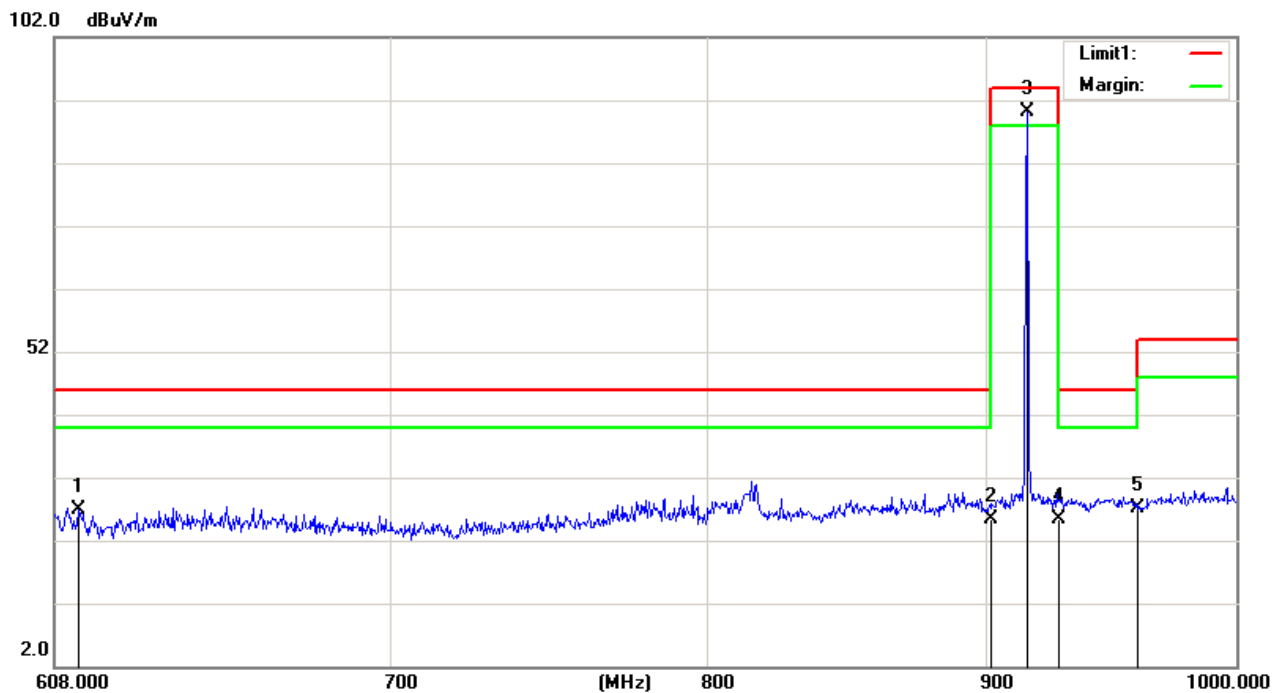
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1832.500	73.73	-12.34	61.39	74.00	-12.61	peak
3	2755.000	66.99	-8.93	58.06	74.00	-15.94	peak
5	3655.000	65.28	-6.87	58.41	74.00	-15.59	peak
7	4577.500	61.37	-4.17	57.20	74.00	-16.80	peak
9	5500.000	52.98	-0.28	52.70	74.00	-21.30	peak

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1832.500	51.49	54.00	-2.51	AVG
2	2755.000	48.16	54.00	-5.84	AVG
3	3655.000	48.51	54.00	-5.49	AVG
4	4577.500	47.30	54.00	-6.70	AVG
5	5500.000	42.80	54.00	-11.20	AVG

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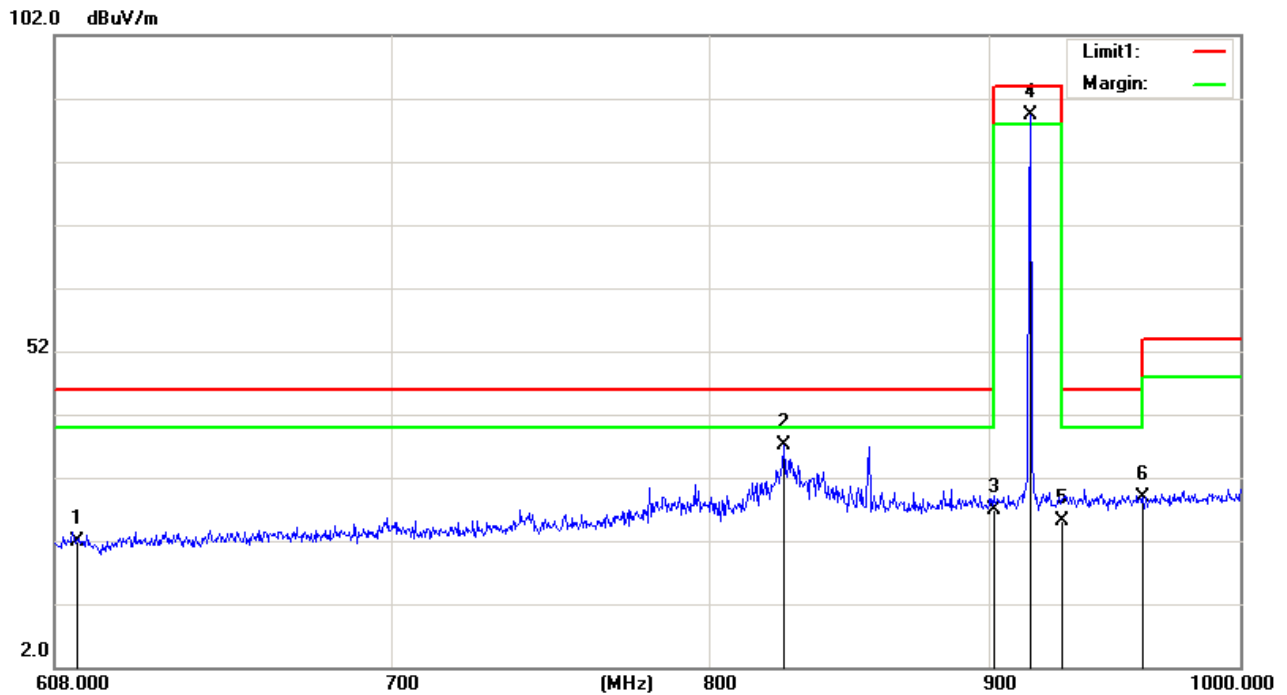
Radiated band edge and Field Strength of Fundamental

EUT:	Aqua Series Remote	Model No.:	SFI-AQ-REM1
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	DC 3.7V
Polarization:	Vertical	Test Result:	Pass
Test Time:	2020-4-23	Test By:	
Standard:	(RE)FCC PART 15.249 30M-1G		
Test Mode:	TX		
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	614.0000	29.90	-3.13	26.77	46.00	-19.23	peak
2	902.0000	22.55	2.81	25.36	46.00	-20.64	QP
3	915.6951	86.64	3.57	90.21	94.00	-3.79	peak
4	928.0000	21.72	3.72	25.44	46.00	-20.56	QP
5	960.0000	24.10	3.09	27.19	46.00	-18.81	peak

EUT:	Aqua Series Remote	Model No.:	SFI-AQ-REM1
Temperature:	23	Relative Humidity:	54%
Distance:	3m	Test Power:	DC 3.7V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2020-4-23	Test By:	
Standard:	(RE)FCC PART 15.249 30M-1G		
Test Mode:	TX		
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	614.0000	25.00	-3.13	21.87	46.00	-24.13	peak
2	825.6630	35.69	1.48	37.17	46.00	-8.83	peak
3	902.0000	23.46	3.41	26.87	46.00	-19.13	QP
4	915.6951	85.83	3.57	89.40	94.00	-4.60	peak
5	928.0000	21.47	3.72	25.19	46.00	-20.81	QP
6	960.0000	24.91	4.09	29.00	46.00	-17.00	peak

END OF REPORT