TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.247
RSS-GEN, ISSUE 4, NOVEMBER 2014
RSS-247, ISSUE 2, FEBRUARY 2017

TEST REPORT

For

Flyability SA

Flyability SA, Avenue de Sevelin 20, Lausanne, Switzerland, CH-1004

FCC ID: 2AL7M-MAGICREMOTE
IC: 22887-MAGICREMOTE

Report Type:	**Product Name:**
Class II permissive change	Range Extender (REx) Remote Control

Report Number:	RDG180417005-00AA2
Report Date:	2018-05-08
Reviewed By:	Jerry Zhang EMC Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	Range Extender (REx) Remote Control
EUT Model:	No.3
FCC ID:	2AL7M-MAGICREMOTE
IC:	22887-MAGICREMOTE
Rated Input Voltage:	DC 7.4V from lithium rechargeable battery DC 26.3V/26.1V from DC port
External Dimension:	18.2cm (L) x17.14 cm (W) x 10.52 cm(H)
Serial Number:	180417005
EUT Received Date:	2018-04-17

Objective

This report is prepared on behalf of ***Flyability SA*** in accordance with Part 2, Subpart J, Part 15, Subparts A, and C of the Federal Communications Commission's rules and RSS-247, Issue 2, February 2017 of the Innovation, Science and Economic Development Canada, RSS-Gen Issue 4, November 2014 of the Innovation, Science and Economic Development Canada.

The tests were performed in order to determine the compliance of the EUT with FCC Rules Part 15-Subpart C, section 15.203, 15.205, 15.209, 15.247 rules and RSS-247, Issue 2, February 2017, RSS-Gen Issue 4, November 2014 of the Innovation, Science and Economic Development Canada.

This is Class II permissive change Application, the difference with the original is:
1. Changed the 2.4GHz antenna type from PCB to Dipole,
2. Changed the 5.8GHz antenna and it's location
3. The interface board.

The changes are not related with the other RF parameters, only RF exposure and radiation emissions were retested.

Related Submittal(s)/Grant(s)

FCC Part 15C DXX submissions with FCC ID: 2AL7M-MAGICREMOTE .
ISEDC RSS-210 submissions with IC: 22887-MAGICREMOTE

Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices". And RSS-247, Issue 2, February 2017 of the Innovation, Science and Economic Development Canada, RSS-Gen Issue 4, November 2014 of the Innovation, Science and Economic Development Canada.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB,200M~1GHz: 5.92 dB,1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218,the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode, which was provided by manufacuter.

For 2.4G band, 39 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2404	21	2444
2	2406	…	…
…	…	…	…
…	…	…	…
..	…	38	2478
20	2442	39	2480

3channels were tested: 2404MHz, 2442MHz, 2480 MHz

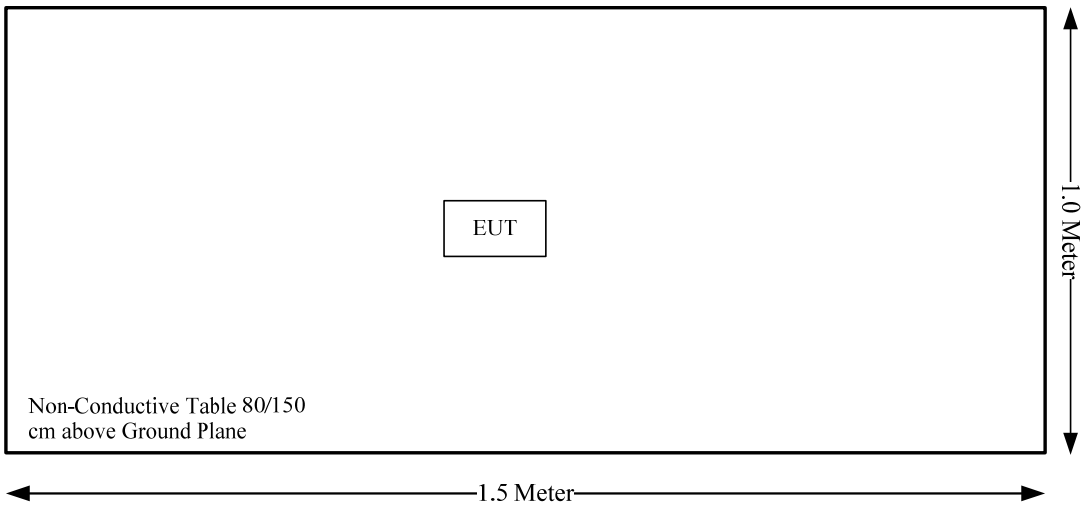
EUT Exercise Software

The software: SScom32 was used in the test. The system configured maximum power as default setting and switched the channel by software commands.

Equipment Modifications

No modification was made to the EUT.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result
FCC§15.247 (i) & §1.1310 & §2.1093 RSS-102 §4	RF Exposure	Compliance
FCC§15.203 RSS-GEN§8.3	Antenna Requirement	Compliance
FCC§15.207 (a) RSS-Gen §8.8	AC Line Conducted Emissions	Not Applicable*
FCC§15.205, §15.209, §15.247(d) RSS-247 §5.5 RSS-Gen §8.10	Spurious Emissions	Compliance
FCC§15.247 (a)(2) RSS-247 §5.2 a)	6 dB Emission Bandwidth And 99% Occupied Bandwidth	Compliance*
FCC§15.247(b)(3) RSS-247 §5.4 d)	Maximum conducted output power	Compliance*
FCC§15.247(d) RSS-247 §5.5	100 kHz Bandwidth of Frequency Band Edge	Compliance*
FCC§15.247 (e) RSS-247 §5.2 b)	Power Spectral Density	Compliance*

Note:
Not applicable*: The device was powered by battery when user operats the device.
Compliance*: The Class II permissive change Application have not effected the result.

FCC §15.247 (i) & §1.1310 & §2.1093, RSS-102 §4- RF EXPOSURE

Applicable Standard

According to§15.247(i),§1.1310 and §2.1093.

According to RSS-102 §4 Table 3, SAR limits for device used by the general public

Body Region	Average SAR (W/Kg)	Averaging Time (minutes)	Mass Average (g)
Whole Body	0.08	6	Whole Body
Localized Head, Neck and Trunk	1.6	6	1
Localized Limbs	4	6	10

Test Result

Compliant, please refer to the SAR report: RDG180417005-20A2.

FCC §15.203 ,RSS-GEN§8.3- ANTENNA REQUIREMENT

Applicable Standard

According to § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

According to RSS-Gen §8.3, The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.
Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.9 When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

Antenna Information And Connector Construction

The EUT has an external dipole antenna with RP-SMA connector for Transmitting, the antenna gain is 3.5 dBi, the other one only for receiving, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

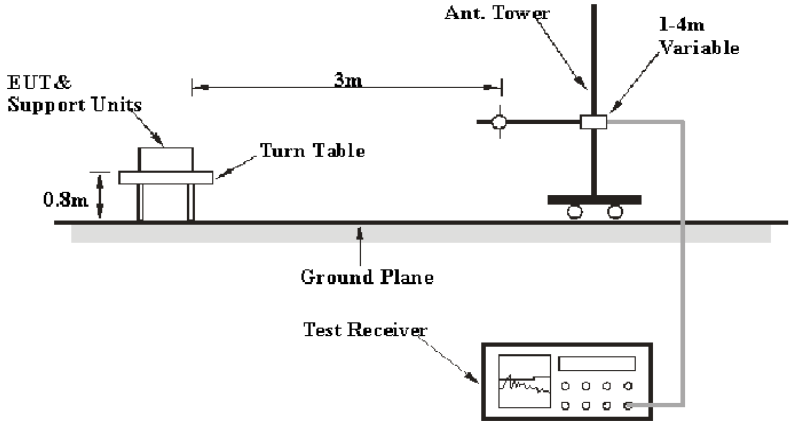
FCC §15.209, §15.205 & §15.247(d) & RSS-247 CLAUSE 5.5, RSS-GEN CLAUSE 8.10- SPURIOUS EMISSIONS

Applicable Standard

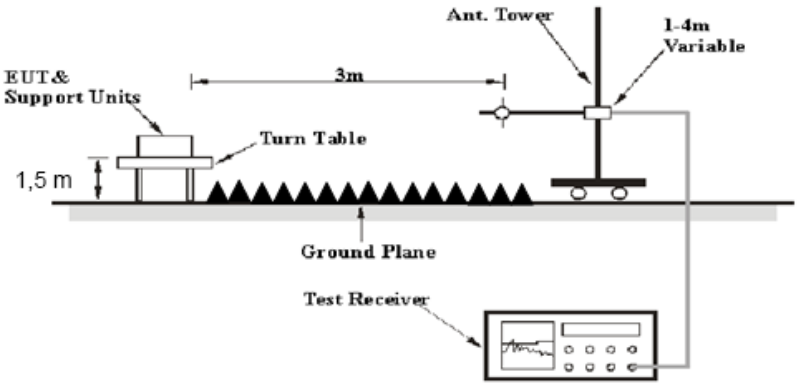
FCC §15.247 (d); §15.209; §15.205; RSS-247 Clause 5.5, RSS-GEN Clause 8.10

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters distance, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, 15.247 and RSS-247 Clause 5.5, RSS-GEN Clause 8.10 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz - 1 GHz, peak and average detection modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-09-01	2018-09-01
Sunol Sciences	Antenna	JB3	A060611-2	2017-08-25	2020-08-25
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
Unknown	Coaxial Cable	4m	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	0.75m	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	10m	C-1000-01	2017-09-05	2018-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2017-06-27	2018-06-27
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Unknown	Coaxial Cable	8m	C-0800-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2017-06-27	2018-06-27
E-Microwave	Band-stop Filters	OBSF-2400-2483.5-S	OE01601525	2017-06-16	2018-06-16
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2017-06-16	2018-06-16
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Data

Environmental Conditions

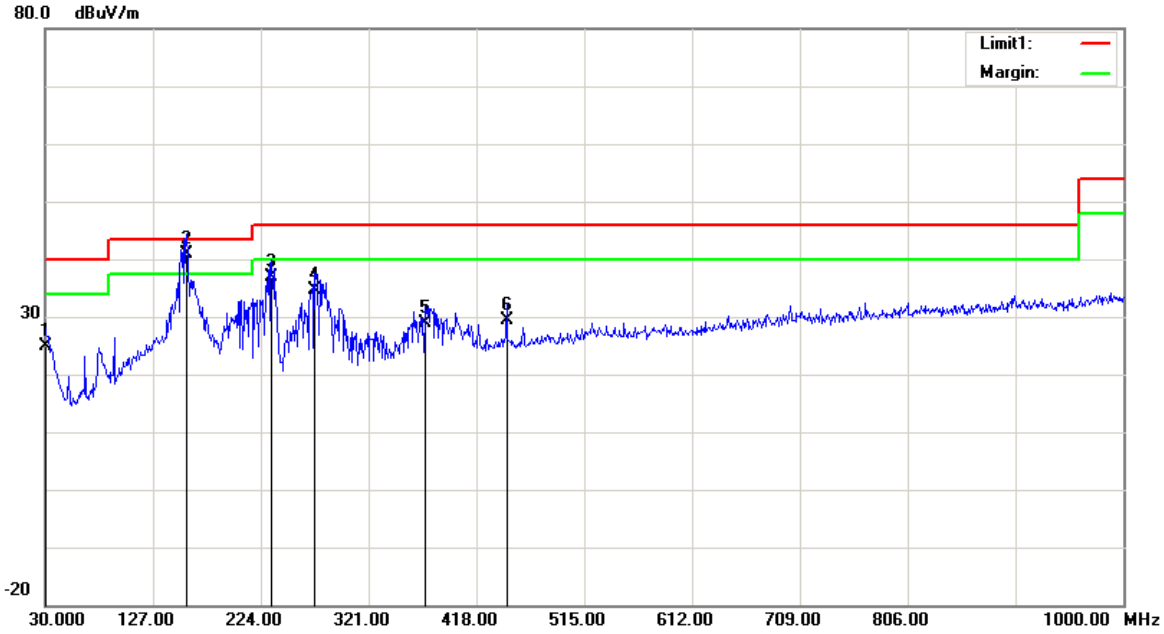
Temperature:	24.2 °C
Relative Humidity:	52 %
ATM Pressure:	100.6 kPa

** The testing was performed by Sunny Cen on 2018-04-27.*

Test Mode: Transmitting

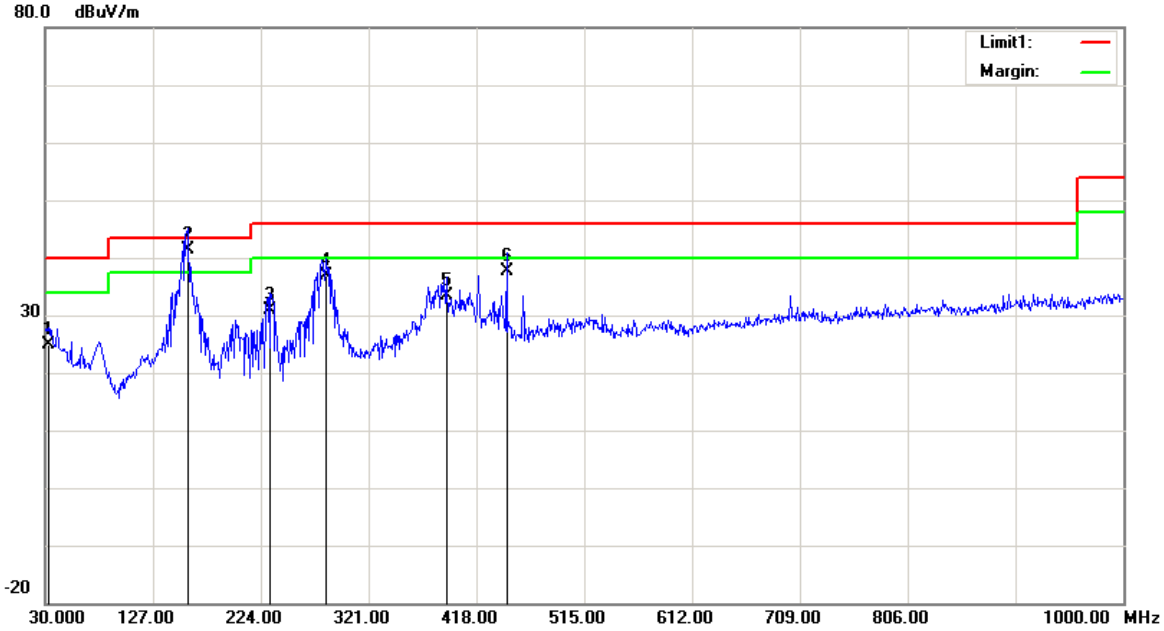
1) 30MHz-1GHz(Low Channel was the worst):

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	23.46	QP	1.54	25.00	40.00	15.00
157.0700	46.71	QP	-5.91	40.80	43.50	2.70
233.7000	43.39	QP	-6.49	36.90	46.00	9.10
272.5000	38.76	QP	-4.16	34.60	46.00	11.40
372.4100	31.63	QP	-2.73	28.90	46.00	17.10
445.1600	30.67	QP	-1.27	29.40	46.00	16.60

Vertical:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.9100	25.56	QP	-0.66	24.90	40.00	15.10
158.0400	47.29	QP	-5.89	41.40	43.50	2.10
232.7300	37.27	QP	-6.47	30.80	46.00	15.20
283.1700	40.99	QP	-4.09	36.90	46.00	9.10
390.8400	35.85	QP	-2.35	33.50	46.00	12.50
445.1600	38.97	QP	-1.27	37.70	46.00	8.30

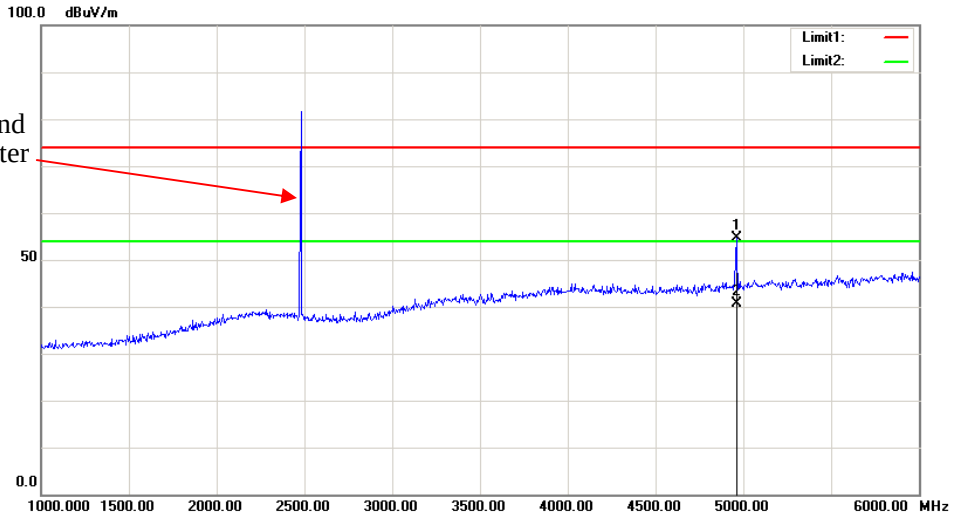
2) 1-25GHz:

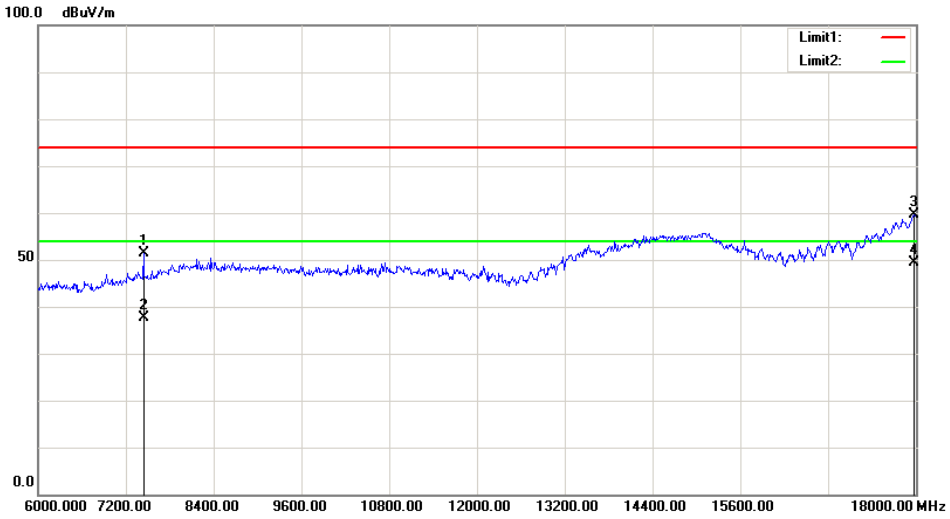
Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
(MHz)	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2404 MHz									
2404.00	89.05	PK	H	28.11	1.80	0.00	118.96	N/A	N/A
2404.00	68.49	AV	H	28.11	1.80	0.00	98.40	N/A	N/A
2404.00	94.35	PK	V	28.11	1.80	0.00	124.26	N/A	N/A
2404.00	73.87	AV	V	28.11	1.80	0.00	103.78	N/A	N/A
2390.00	25.45	PK	V	28.08	1.80	0.00	55.33	74.00	18.67
2390.00	13.44	AV	V	28.08	1.80	0.00	43.32	54.00	10.68
4808.00	62.98	PK	V	32.92	3.17	37.20	61.87	74.00	12.13
4808.00	48.94	AV	V	32.92	3.17	37.20	47.83	54.00	6.17
7212.00	56.50	PK	V	35.75	4.81	37.24	59.82	74.00	14.18
7212.00	42.74	AV	V	35.75	4.81	37.24	46.06	54.00	7.94
Middle Channel: 2442 MHz									
2442.00	88.09	PK	H	28.18	1.82	0.00	118.09	N/A	N/A
2442.00	67.89	AV	H	28.18	1.82	0.00	97.89	N/A	N/A
2442.00	92.07	PK	V	28.18	1.82	0.00	122.07	N/A	N/A
2442.00	72.43	AV	V	28.18	1.82	0.00	102.43	N/A	N/A
4884.00	60.54	PK	V	33.07	3.28	37.21	59.68	74.00	14.32
4884.00	46.06	AV	V	33.07	3.28	37.21	45.20	54.00	8.80
7326.00	57.69	PK	V	36.05	4.61	37.38	60.97	74.00	13.03
7326.00	43.03	AV	V	36.05	4.61	37.38	46.31	54.00	7.69
High Channel: 2480 MHz									
2480.00	88.67	PK	H	28.26	1.84	0.00	118.77	N/A	N/A
2480.00	68.24	AV	H	28.26	1.84	0.00	98.34	N/A	N/A
2480.00	93.17	PK	V	28.26	1.84	0.00	123.27	N/A	N/A
2480.00	73.71	AV	V	28.26	1.84	0.00	103.81	N/A	N/A
2483.50	35.52	PK	V	28.27	1.84	0.00	65.63	74.00	8.37
2483.50	17.89	AV	V	28.27	1.84	0.00	48.00	54.00	6.00
4960.00	58.28	PK	V	33.22	3.23	37.25	57.48	74.00	16.52
4960.00	44.88	AV	V	33.22	3.23	37.25	44.08	54.00	9.92
7440.00	61.14	PK	V	36.34	4.41	37.52	64.37	74.00	9.63
7440.00	45.25	AV	V	36.34	4.41	37.52	48.48	54.00	5.52

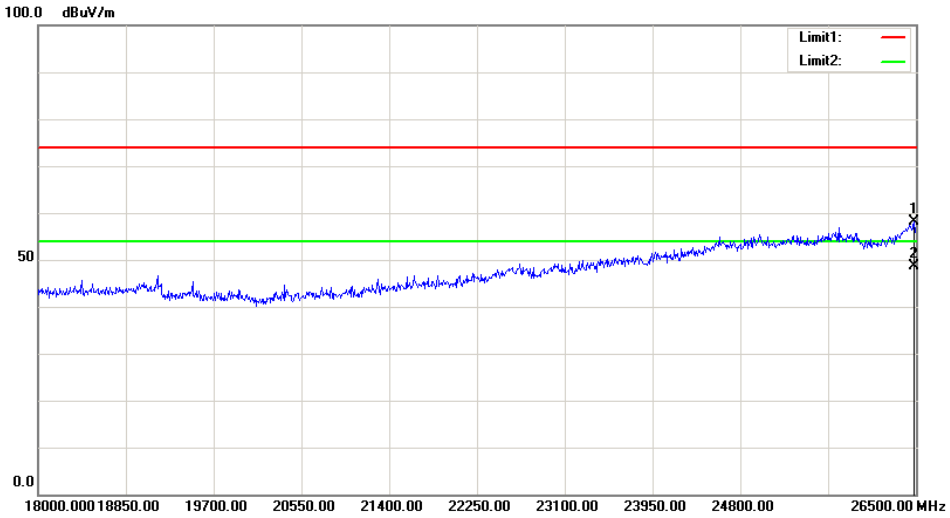
Worst mode Plots(High channel)

Horizontal:

Fundamental Test with Band Rejection Filter

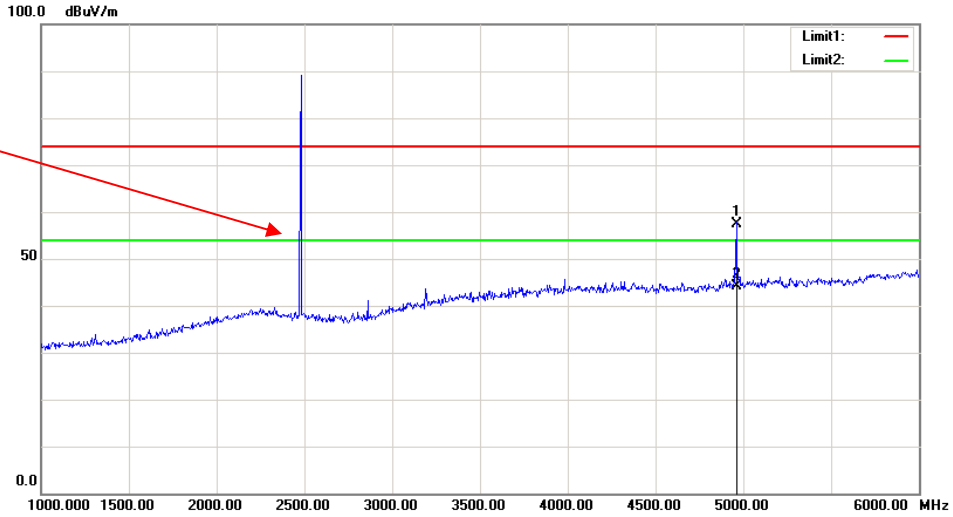


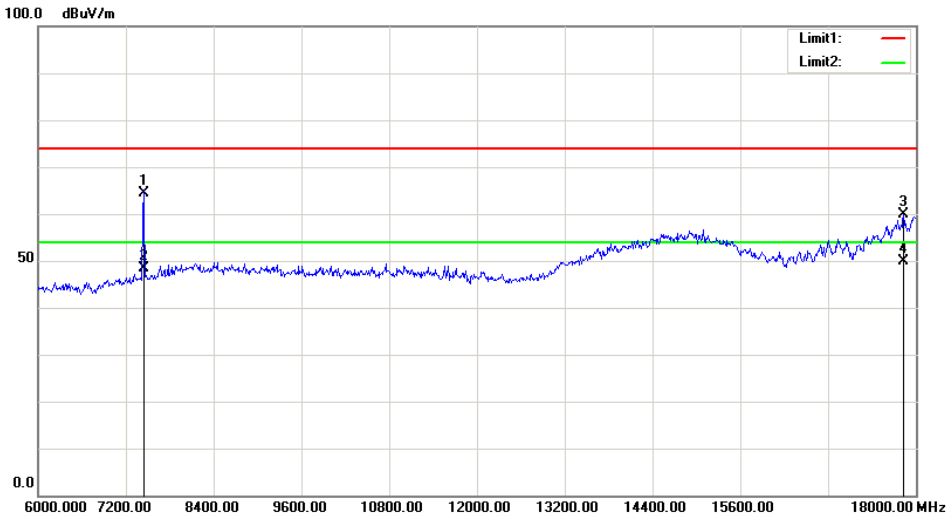


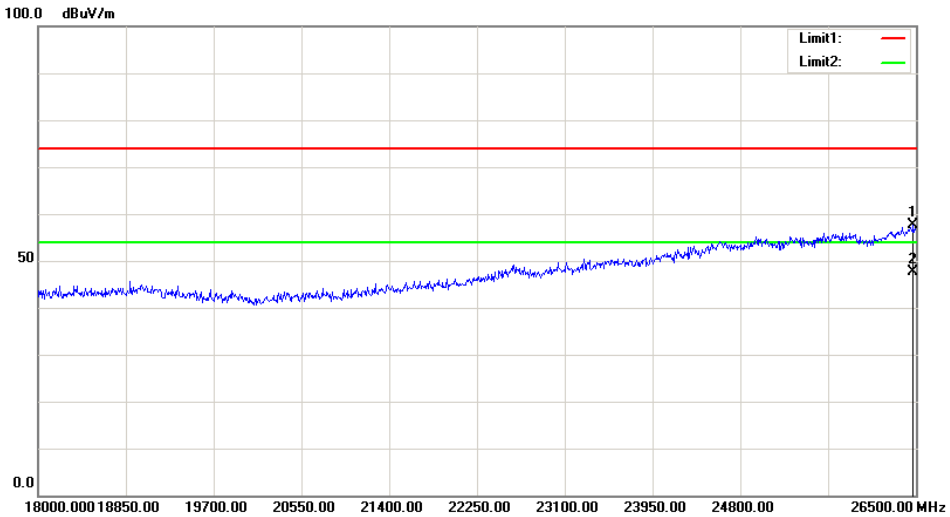


Vertical:

Fundamental Test with Band Rejection Filter







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