

## FCC PART 15B





## TEST REPORT

For

### Illumicare Group Limited

200Pony Drive, Newmarket, L3Y 7B6 ON Canada

**FCC ID: 2ADP5-MASTER-V1**

<b>Report Type:</b> Original Report	<b>Product Type:</b> MERLIN RECEIVER UNIT
<b>Test Engineer:</b>	Hayley Lao, Felix Wang, Leo Long   
<b>Report Number:</b>	RDG200402802-00
<b>Report Date:</b>	2020-05-25
<b>Reviewed By:</b>	Ivan Cao Assistant Manager 
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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

<b>EUT Name:</b>	MERLIN RECEIVER UNIT
<b>EUT Model:</b>	MERLIN RECEIVER UNIT
<b>Highest Operation Frequency:</b>	2462 MHz
<b>Rated Input Voltage:</b>	DC 12V
<b>Serial Number:</b>	RDG200402802-RF-S1
<b>EUT Received Date:</b>	2020.04.10
<b>EUT Received Status:</b>	Good

### Objective

This report is prepared on behalf of **Illumicare Group Limited** in accordance with FCC Part 15B Part 2, subpart J, and Part 15, Subpart A and B of the Federal Communications Commission's rules.

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15 B Class B.

### Related Submittal(s)/Grant(s)

Part of system with FCC ID: 2ADP5-HUB;  
Part of system with FCC ID: 2ADP5-SLAVE-V1.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

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

### Measurement Uncertainty

Parameter	Measurement Uncertainty
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
Temperature	±1 °C
Humidity	±5%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

*Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.*

**Test Facility**

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

The lab has been recognized as the FCC accredited lab 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 lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

**Declarations**

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “△”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in operation mode.

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

No Software was used in test.

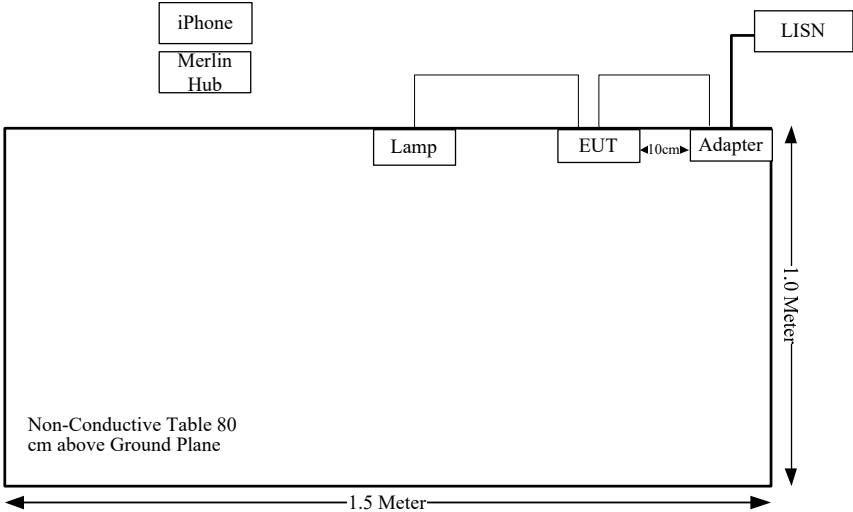
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Illumicare Group Limited	Merlin Hub	Merlin Hub	RDG200402800-RF-S1
TCL	Lamp	45W	Lamp 45W-01
Apple	iPhone	A1863	2017011606002400
Switching Adapter	adapter	PS06C050K1000UU	N/A

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Adapter Cable	Yes	No	1.2	Adapter	EUT

Block Diagram of Test Setup



**Test Equipment List**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Conducted emissions</b>					
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2019-09-05	2020-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2019-12-10	2020-12-10
R&S	EMI Test Receiver	ESPI	100120	2019-05-09	2020-05-09
<b>Radiated emissions Below 1GHz</b>					
R&S	EMI Test Receiver	ESR3	102453	2019-06-26	2020-06-26
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2020-07-21
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2019-09-24	2020-09-24
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
<b>Radiated emissions Above 1GHz</b>					
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-05-09	2020-05-09
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2019-06-27	2020-06-27
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2019-09-05	2020-09-05
E-Microwave	Band-stop Filters	OBSF-2400-2483.5-S	OE01601525	2019-06-16	2020-06-16

\* 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).

**Environmental Conditions**

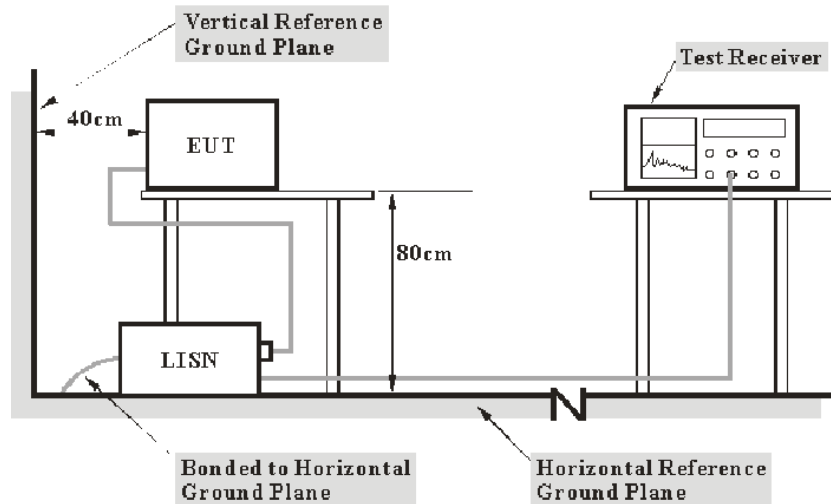
Test Item:	Conducted emissions	Radiated emissions (Below 1GHz)	Radiated emissions (Above 1GHz)
<b>Temperature:</b>	25.1 °C	25.2°C	25.6°C
<b>Relative Humidity:</b>	60 %	53%	56%
<b>ATM Pressure:</b>	101.4 kPa	101.4 kPa	100.1 kPa
<b>Tester:</b>	Hayley Lao	Felix Wang	Leo Long
<b>Test Date:</b>	2020-04-29	2020-04-29	2020-05-04

**SUMMARY OF TEST RESULTS**

Rule and Clause	Description of Test	Test Result
FCC §15.107	Conducted emissions	Compliance
FCC §15.109	Radiated emissions	Compliance

## CONDUCTED EMISSIONS

### EUT Setup



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

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15 B Class B 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 adapter was connected to the Main LISN with 120V/60Hz AC power source.

### EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

### Test Procedure

During the conducted emission test, the Adapter was connected to the outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.



### Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

$V_C$ : corrected voltage amplitude

$V_R$ : reading voltage amplitude

$A_C$ : attenuation caused by cable loss

VDF: voltage division factor of AMN or ISN

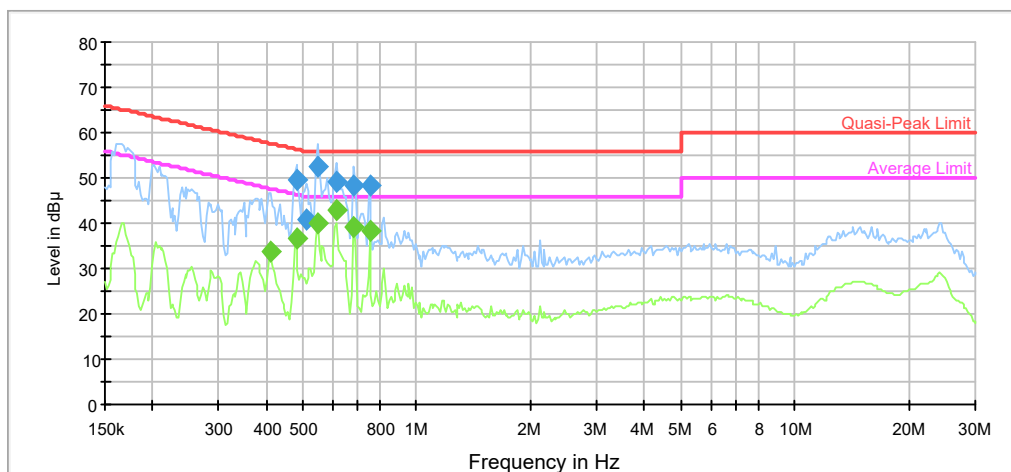
The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Data

Please refer to following table and plots:

Port: L  
 Test Mode: Operating  
 Power Source: AC 120V/60Hz  
 Note:



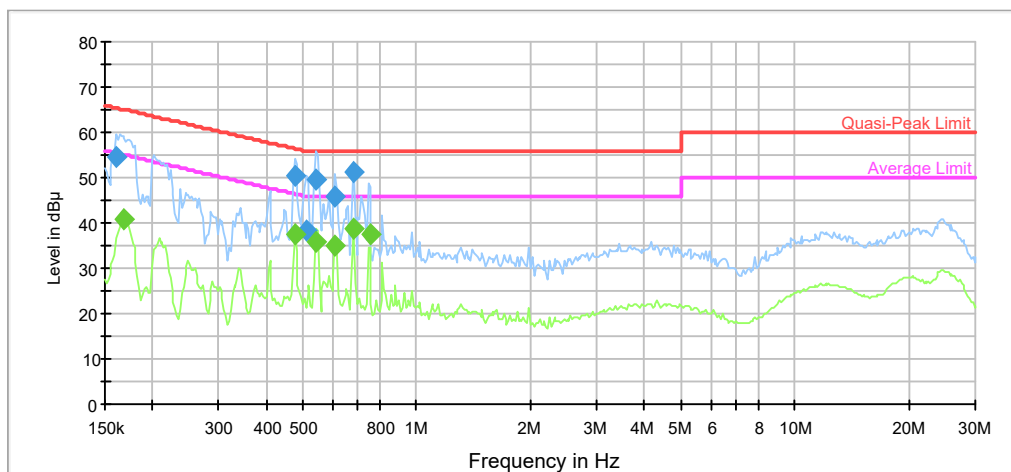
## Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.480499	49.7	9.000	L1	9.7	6.6	56.3
0.510059	41.0	9.000	L1	9.7	15.0	56.0
0.546852	52.7	9.000	L1	9.7	3.3	56.0
0.616207	49.1	9.000	L1	9.7	6.9	56.0
0.680676	48.3	9.000	L1	9.7	7.7	56.0
0.751890	48.5	9.000	L1	9.7	7.5	56.0

## Final Result 2

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.409780	33.7	9.000	L1	9.7	14.0	47.7
0.480499	36.8	9.000	L1	9.7	9.5	46.3
0.546852	39.9	9.000	L1	9.7	6.1	46.0
0.616207	42.9	9.000	L1	9.7	3.1	46.0
0.680676	39.1	9.000	L1	9.7	6.9	46.0
0.751890	38.5	9.000	L1	9.7	7.5	46.0

Port: N  
 Test Mode: Operating  
 Power Source: AC 120V/60Hz  
 Note:



## Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.160820	54.7	9.000	N	9.7	10.7	65.4
0.475741	50.3	9.000	N	9.6	6.1	56.4
0.510059	38.3	9.000	N	9.6	17.7	56.0
0.541438	49.6	9.000	N	9.6	6.4	56.0
0.610106	45.9	9.000	N	9.6	10.1	56.0
0.680676	51.1	9.000	N	9.6	4.9	56.0

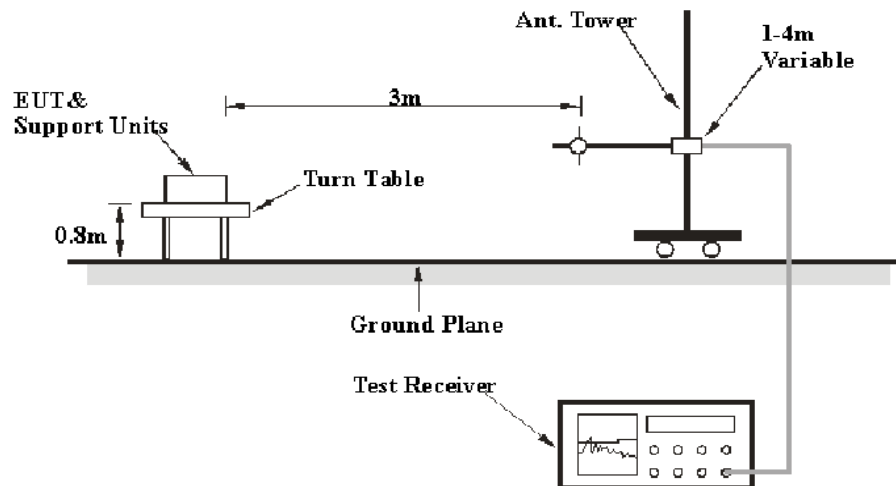
## Final Result 2

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.167350	40.8	9.000	N	9.7	14.3	55.1
0.475741	37.5	9.000	N	9.6	8.9	46.4
0.541438	35.9	9.000	N	9.6	10.1	46.0
0.610106	34.9	9.000	N	9.6	11.1	46.0
0.680676	38.9	9.000	N	9.6	7.1	46.0
0.751890	37.4	9.000	N	9.6	8.6	46.0

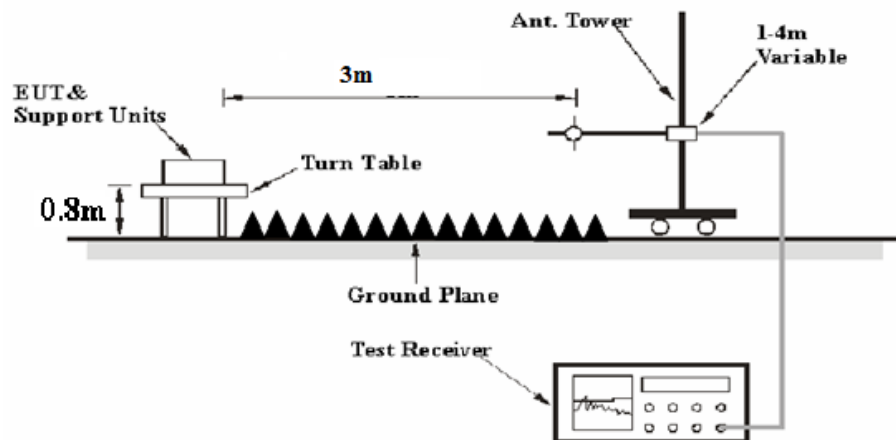
## RADIATED EMISSIONS

### EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission below 1GHz tests were performed in the 3 meters chamber test site A, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.4-2014. The specification used was with the FCC Part 15 B Class B limits.

## EMI Test Receiver Setup

The system was investigated from 30 MHz to 13 GHz.

During the radiated emission test, the EMI test receiver was 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	1 MHz	3 MHz	/	Peak
	1 MHz	Reduced video bandwidth	/	AVG

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

## Test Procedure

During the radiated emissions, the adapter was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

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

The data was recorded in the Quasi-peak detection mode for below 1 GHz, peak and average detection mode above 1 GHz.

## Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Meter Reading+ Corrected

Note:

Corrected = 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 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

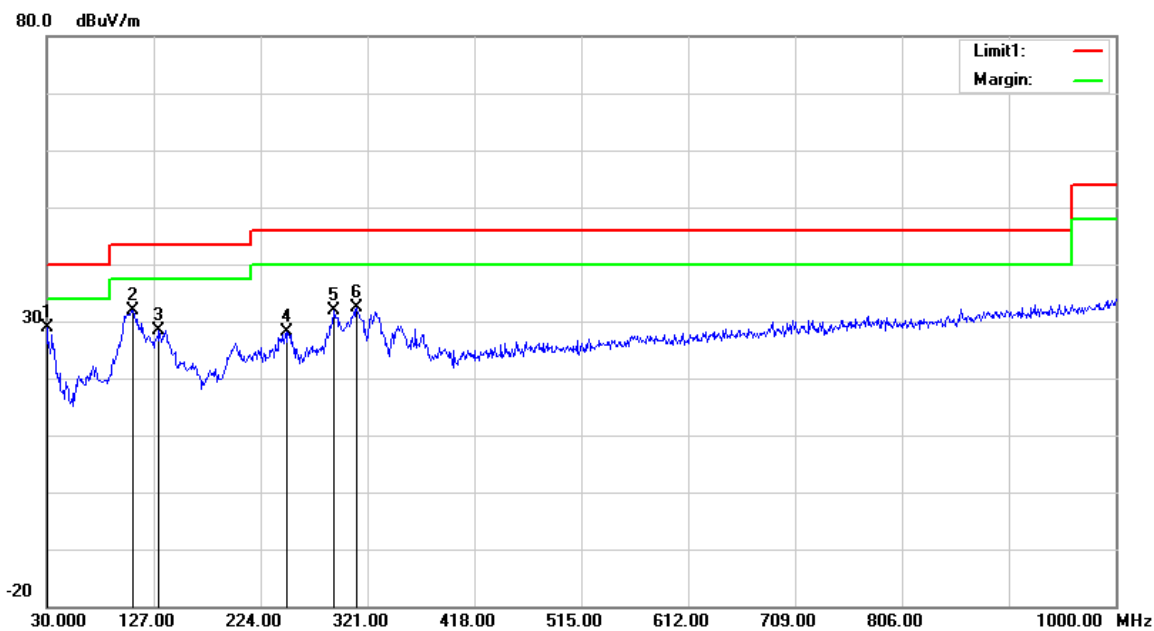
$$\text{Margin} = \text{Limit} - \text{Result}$$

## Test Data

Please refer to following table and plots:

**Condition:** FCC Part 15B Class B  
**Test Mode:** Operating

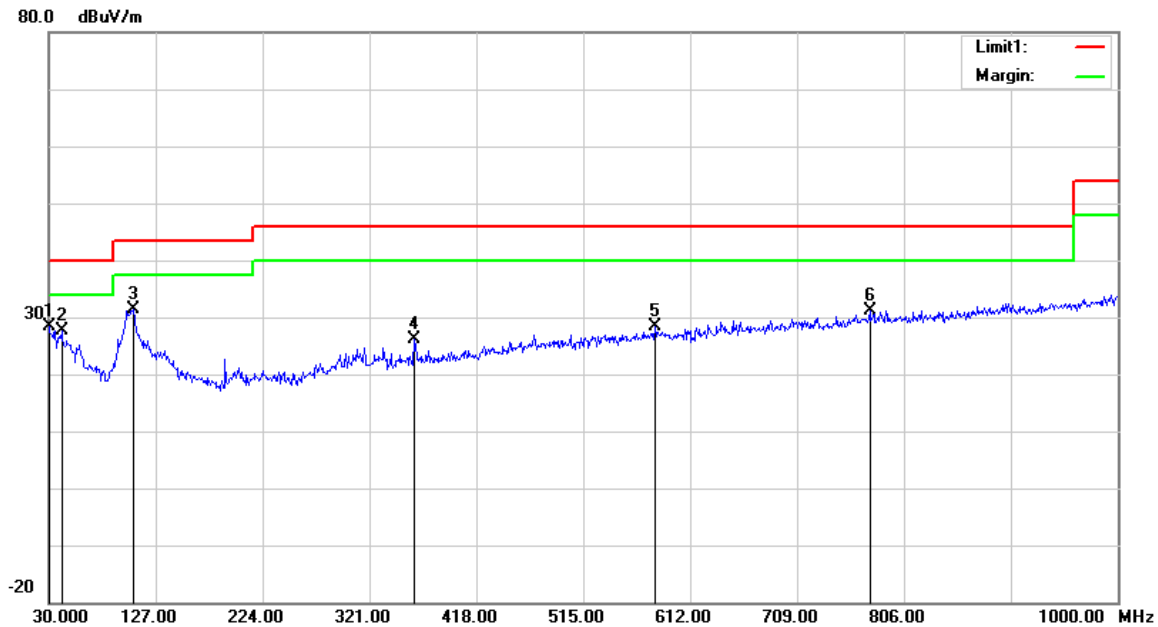
**Polarization:** Horizontal  
**Distance:** 3m



No.	Frequency (MHz)	Reading (dBμV)	Detector	Corrected (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1	30.0000	27.23	peak	1.72	28.95	40.00	11.05
2	107.6000	38.74	peak	-6.89	31.85	43.50	11.65
3	131.8500	33.23	peak	-4.89	28.34	43.50	15.16
4	248.2500	33.95	peak	-5.91	28.04	46.00	17.96
5	290.9300	35.81	peak	-3.98	31.83	46.00	14.17
6	311.3000	36.02	peak	-3.56	32.46	46.00	13.54

**Condition:** FCC Part 15B Class B  
**Test Mode:** Operating

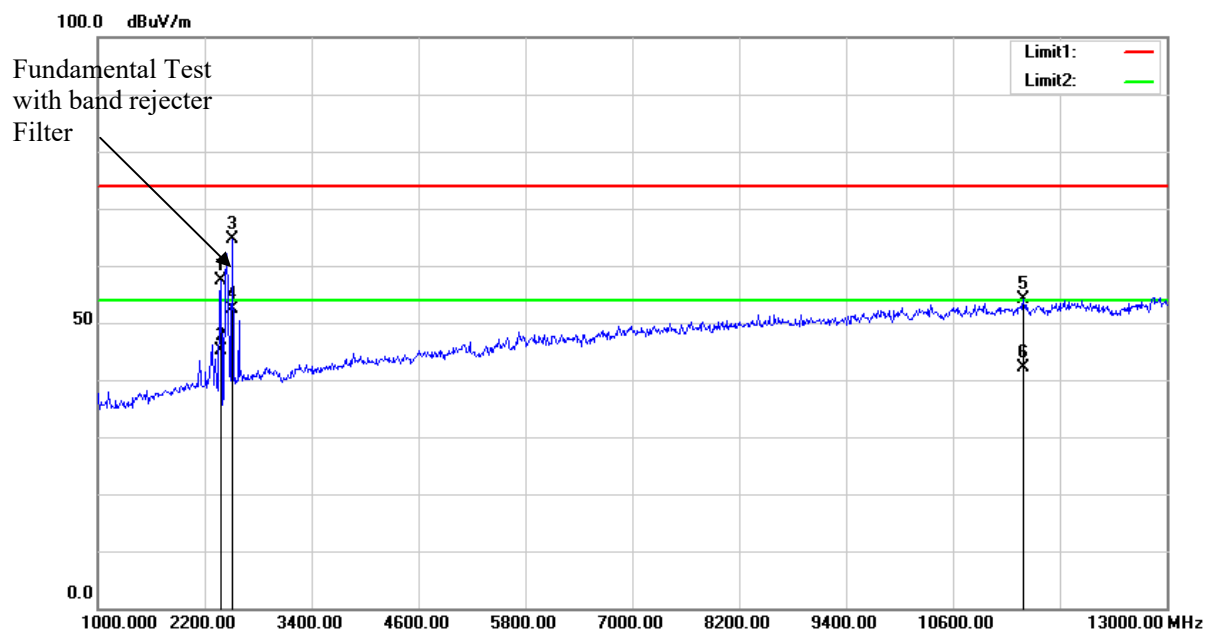
**Polarization:** Vertical  
**Distance:** 3m



No.	Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
1	30.0000	26.75	peak	1.72	28.47	40.00	11.53
2	41.6400	34.47	peak	-6.96	27.51	40.00	12.49
3	106.6300	38.37	peak	-7.10	31.27	43.50	12.23
4	361.7400	28.97	peak	-2.80	26.17	46.00	19.83
5	579.9900	27.22	peak	1.10	28.32	46.00	17.68
6	774.9600	26.81	peak	4.37	31.18	46.00	14.82

**Condition:** FCC Part 15B Class B  
**Test Mode:** Operating

**Polarization:** Horizontal  
**Distance:** 3m

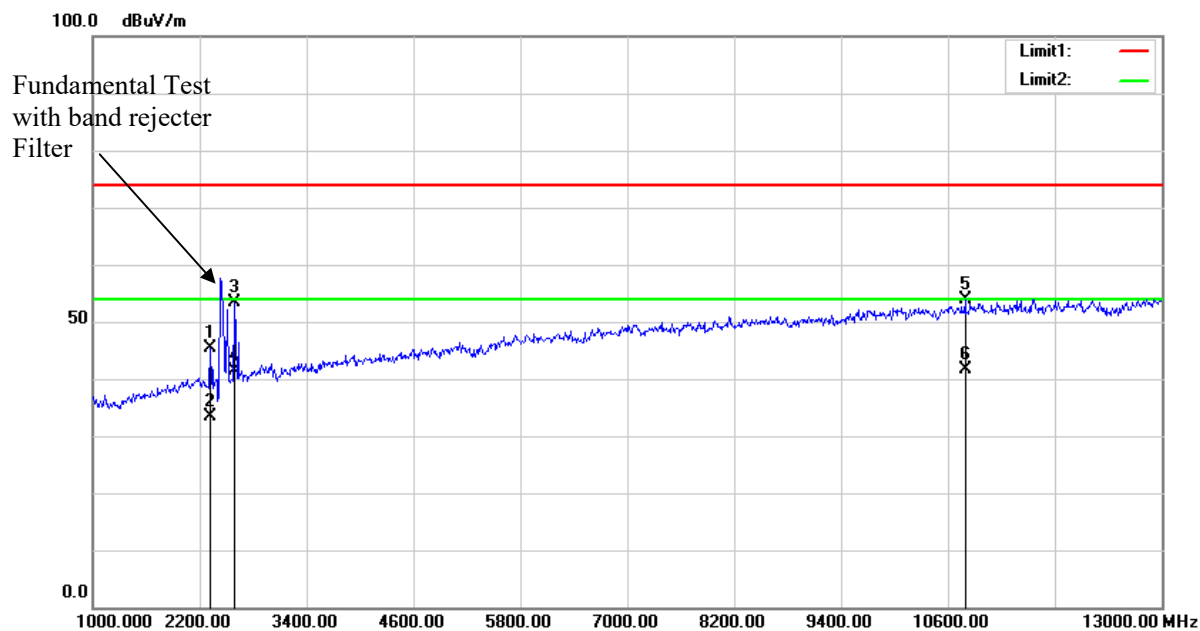


No.	Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
1	2386.000	53.85	peak	3.57	57.42	74.00	16.58
2	2386.000	41.62	AVG	3.57	45.19	54.00	8.81
3	2512.000	60.80	peak	3.93	64.73	74.00	9.27
4	2512.000	48.53	AVG	3.93	52.46	54.00	1.54
5	11398.000	34.20	peak	19.99	54.19	74.00	19.81
6	11398.000	22.15	AVG	19.99	42.14	54.00	11.86



**Condition:** FCC Part 15B Class B  
**Test Mode:** Operating

**Polarization:** Vertical  
**Distance:** 3m



No.	Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
1	2326.000	42.07	peak	3.36	45.43	74.00	28.57
2	2326.000	30.04	AVG	3.36	33.40	54.00	20.60
3	2596.000	49.02	peak	4.34	53.36	74.00	20.64
4	2596.000	37.02	AVG	4.34	41.36	54.00	12.64
5	10792.000	34.37	peak	19.41	53.78	74.00	20.22
6	10792.000	22.29	AVG	19.41	41.70	54.00	12.30

\*\*\*\*\*END OF REPORT\*\*\*\*\*