

FCC PART 15B

TEST REPORT

For

Illumicare Group Limited

200Pony Drive, Newmarket, L3Y 7B6 ON Canada

FCC ID: 2ADP5-HUB

Report Type: Original Report	Product Type: MERLIN HUB
Test Engineer:	Hayley Lao, Felix Wang, Leo Long   
Report Number:	RDG200402800-00
Report Date:	2020-05-25
Reviewed By:	Ivan Cao Assistant 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:		MERLIN HUB
EUT Model:		MERLIN HUB
Highest Operation Frequency:		2462 MHz
Adapter Information	Model:	JHD-AP013U-050200BA-B
	Input:	100-240V~50/60Hz 0.35A
	Output:	5V-2000mA
Rated Input Voltage:		DC 5V from adapter
Serial Number:		RDG200402800-RF-S1
EUT Received Date:		2020.04.05
EUT Received Status:		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.

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, Puxinhu 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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This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk “★”.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in Operating mode.

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

No Software was used in test.

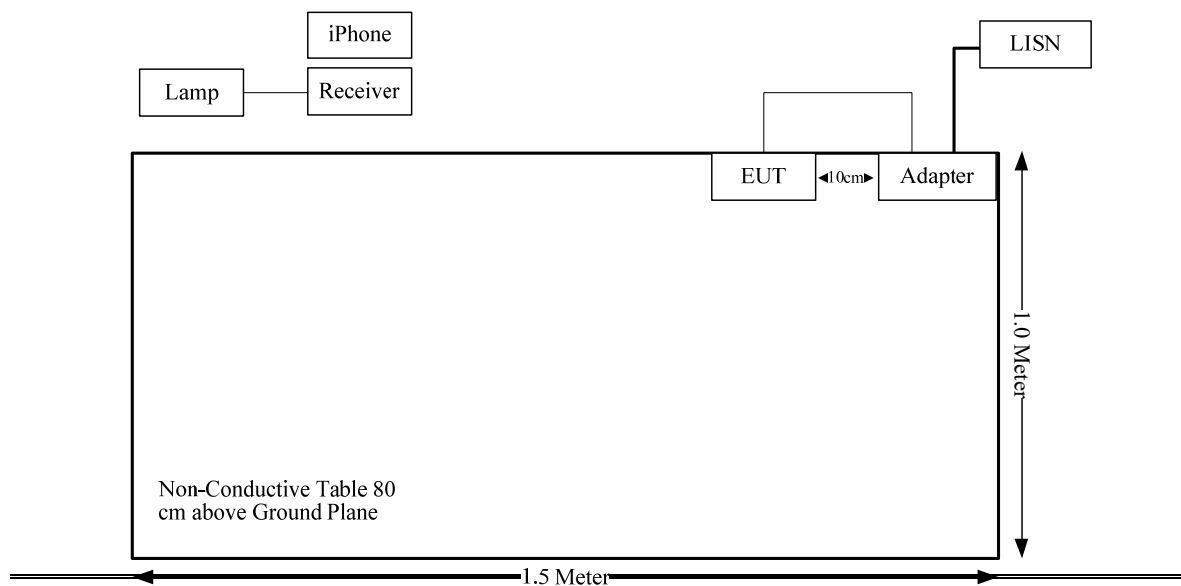
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Illumicare Group Limited	Receiver	Receiver	RDG200402802-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
Conducted emissions					
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
Radiated emissions Below 1GHz					
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
Radiated emissions Above 1GHz					
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

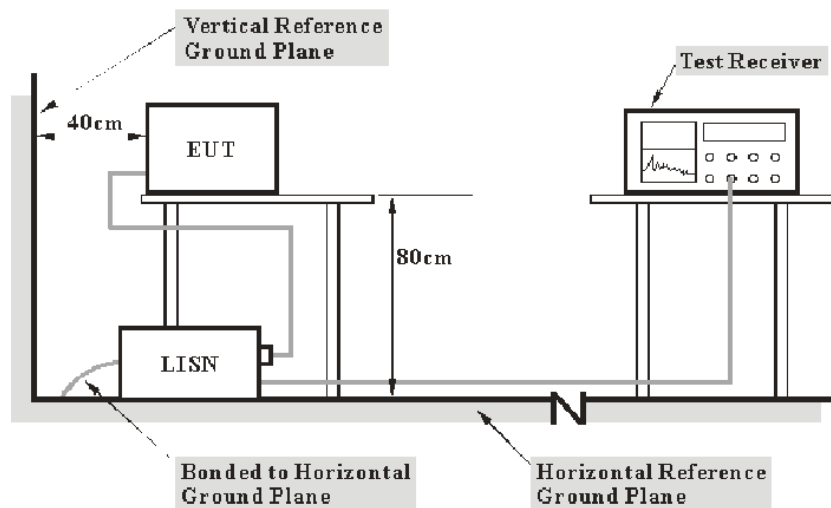
Test Item:	Conducted emissions	Radiated emissions (Below 1GHz)	Radiated emissions (Above 1GHz)
Temperature:	25.1 °C	25.2°C	25.6°C
Relative Humidity:	60 %	53%	56%
ATM Pressure:	101.4 kPa	101.4 kPa	100.1 kPa
Tester:	Hayley Lao	Felix Wang	Leo Long
Test Date:	2020-04-29	2020-04-29	2020-05-04

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

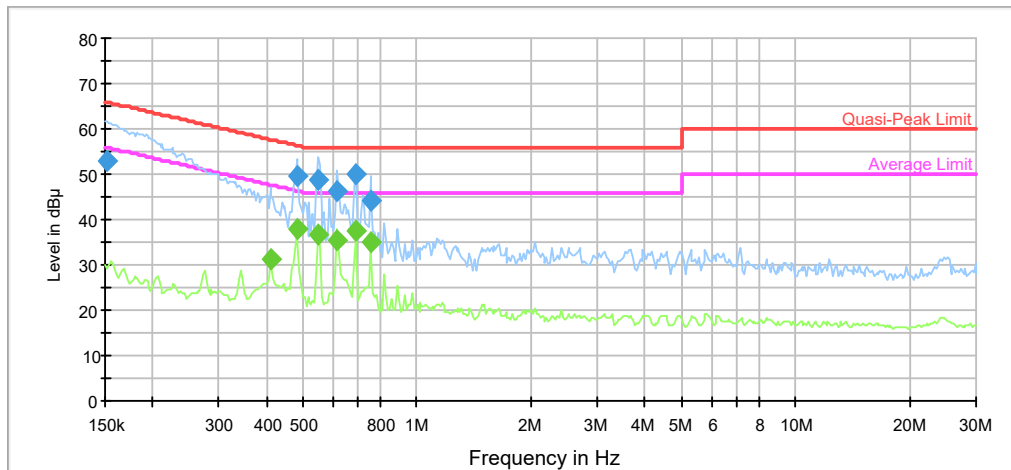
The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

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

Test Data

Please refer to following table and plots:

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



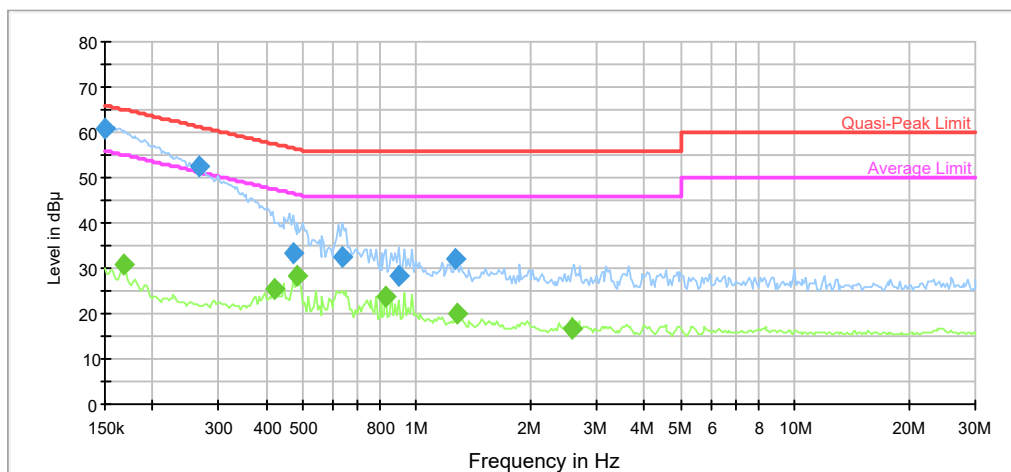
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.151500	53.1	9.000	L1	9.7	12.8	65.9
0.480499	49.4	9.000	L1	9.7	6.9	56.3
0.546852	48.9	9.000	L1	9.7	7.1	56.0
0.616207	46.2	9.000	L1	9.7	9.8	56.0
0.687483	49.8	9.000	L1	9.7	6.2	56.0
0.751890	44.1	9.000	L1	9.7	11.9	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.409780	31.4	9.000	L1	9.7	16.3	47.7
0.480499	37.8	9.000	L1	9.7	8.6	46.3
0.546852	36.7	9.000	L1	9.7	9.3	46.0
0.616207	35.6	9.000	L1	9.7	10.4	46.0
0.687483	37.5	9.000	L1	9.7	8.5	46.0
0.751890	35.0	9.000	L1	9.7	11.0	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)
0.150000	60.9	9.000	N	9.7	5.1	66.0
0.267135	52.6	9.000	N	9.7	8.6	61.2
0.471031	33.2	9.000	N	9.6	23.3	56.5
0.634879	32.7	9.000	N	9.6	23.3	56.0
0.899371	28.2	9.000	N	9.6	27.8	56.0
1.261437	32.0	9.000	N	9.6	24.0	56.0

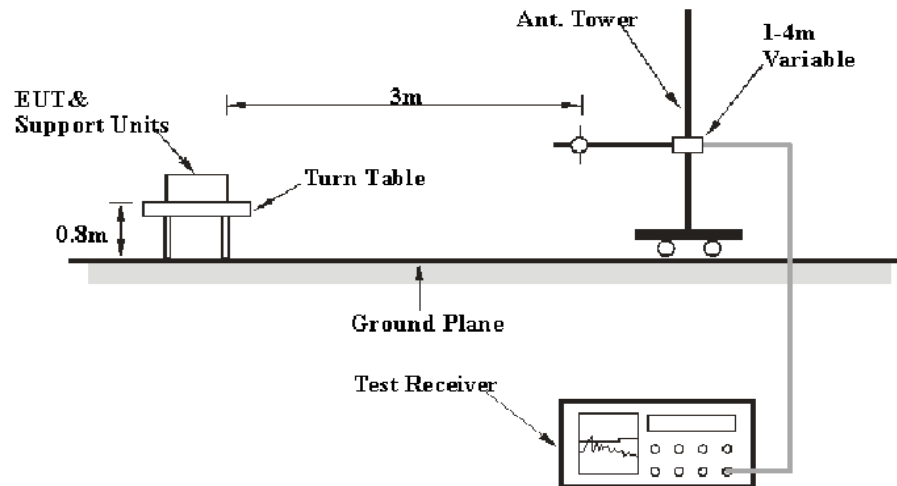
Final Result 2

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.169024	30.8	9.000	N	9.7	24.2	55.0
0.422196	25.5	9.000	N	9.6	21.9	47.4
0.485304	28.3	9.000	N	9.6	17.9	46.2
0.830554	23.9	9.000	N	9.6	22.1	46.0
1.286792	19.9	9.000	N	9.6	26.1	46.0
2.582287	16.5	9.000	N	9.6	29.5	46.0

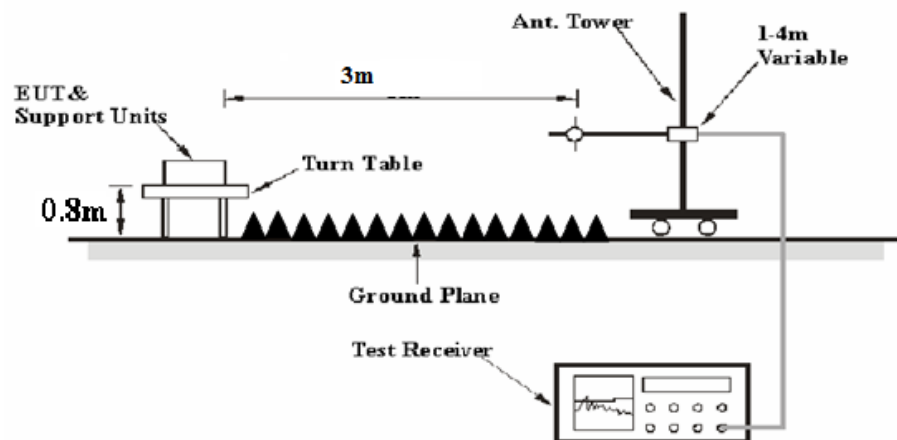
RADIATED EMISSIONS

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:

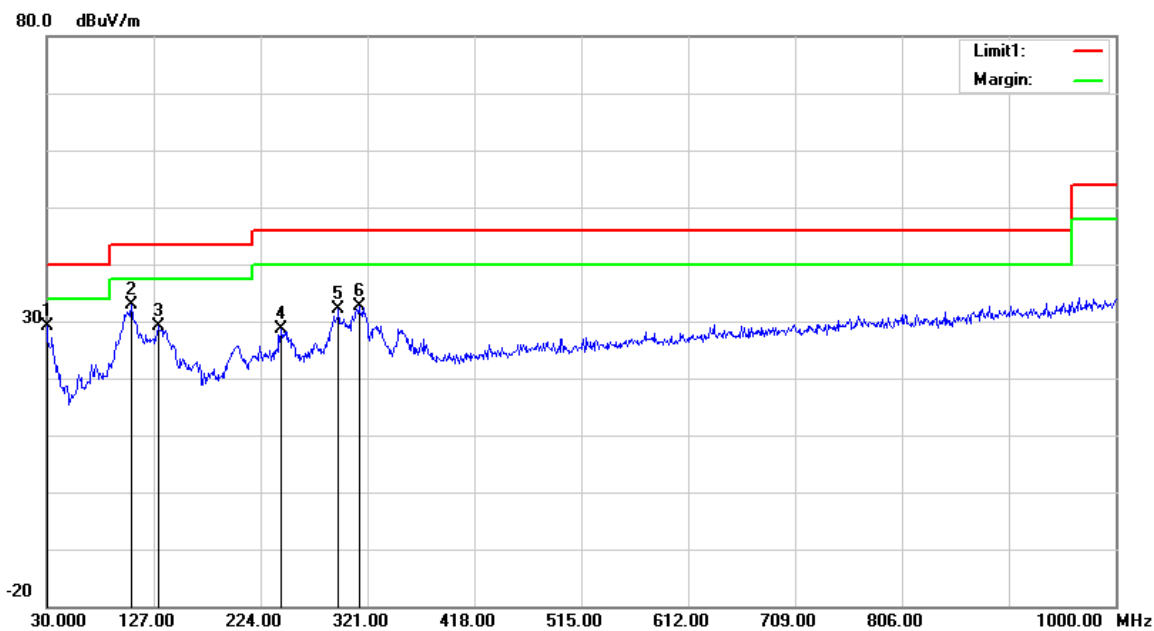
$$\text{Margin} = \text{Limit} - \text{Result}$$

Test Data

Please refer to following table and plots:

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

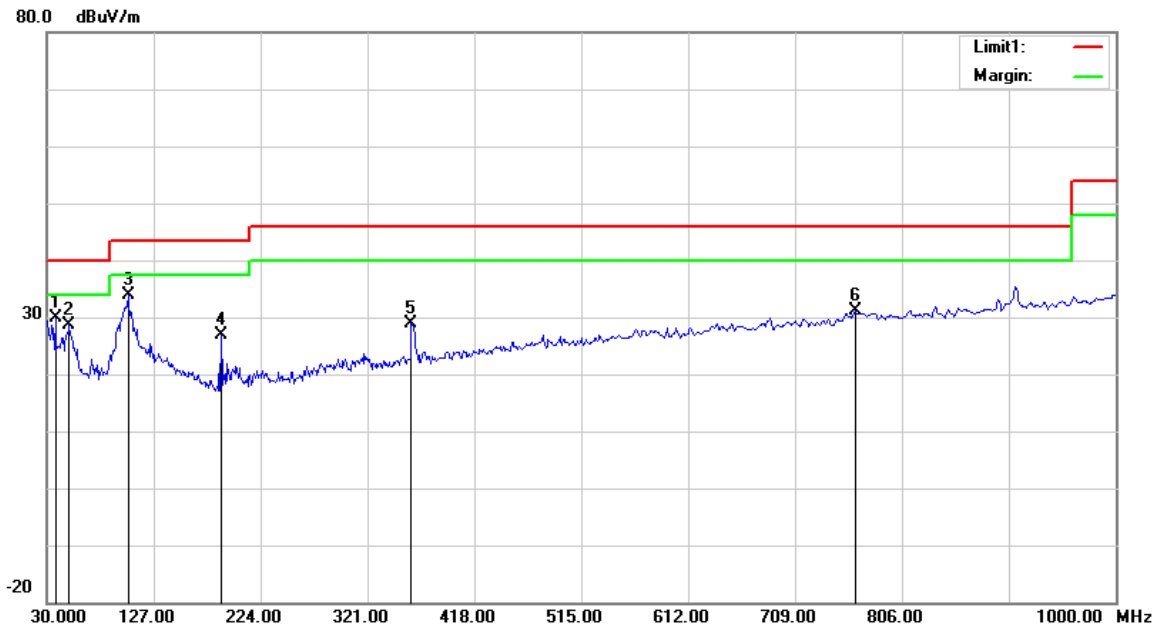
Polarization: Horizontal
Distance: 3m



No.	Frequency (MHz)	Reading (dBμV)	Detector	Corrected (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1	30.0000	27.34	peak	1.72	29.06	40.00	10.94
2	106.6300	39.91	peak	-7.10	32.81	43.50	10.69
3	130.8800	34.06	peak	-4.85	29.21	43.50	14.29
4	242.4300	34.49	peak	-5.97	28.52	46.00	17.48
5	294.8100	36.04	peak	-3.88	32.16	46.00	13.84
6	313.2400	36.13	peak	-3.50	32.63	46.00	13.37

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

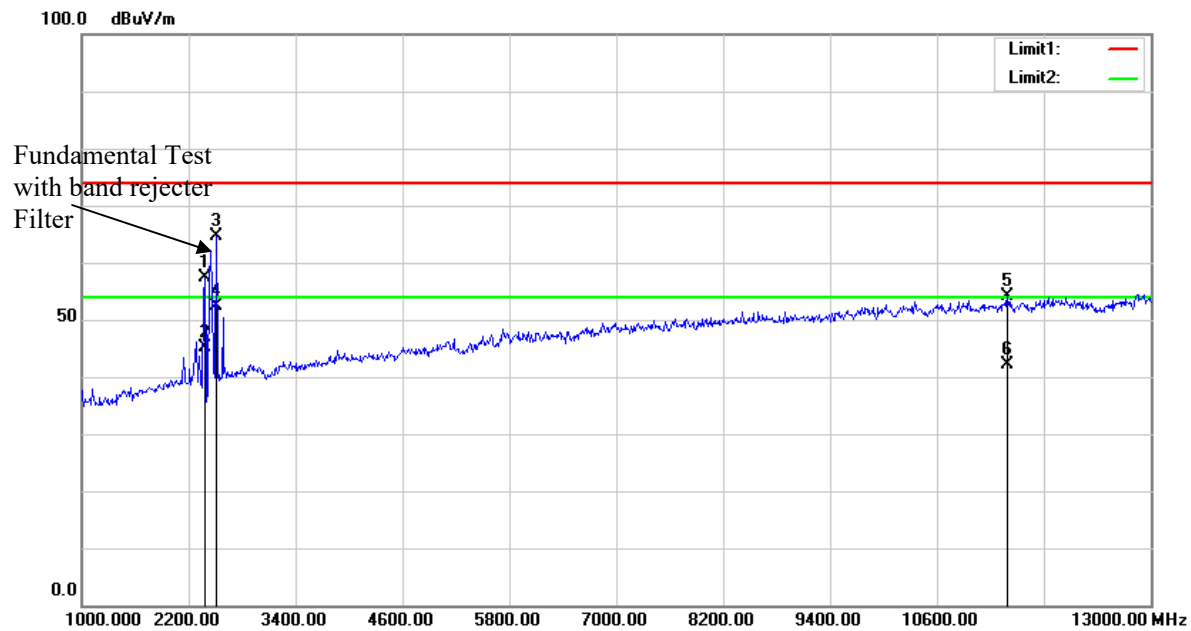
Polarization: Vertical
Distance: 3m



No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	38.6160	34.80	peak	-4.86	29.94	40.00	10.06
2	51.3004	40.33	peak	-11.58	28.75	40.00	11.25
3	104.1701	41.58	peak	-7.75	33.83	43.50	9.67
4	189.0742	34.08	peak	-7.17	26.91	43.50	16.59
5	361.7140	31.67	peak	-2.80	28.87	46.00	17.13
6	763.3757	26.92	peak	4.11	31.03	46.00	14.97

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

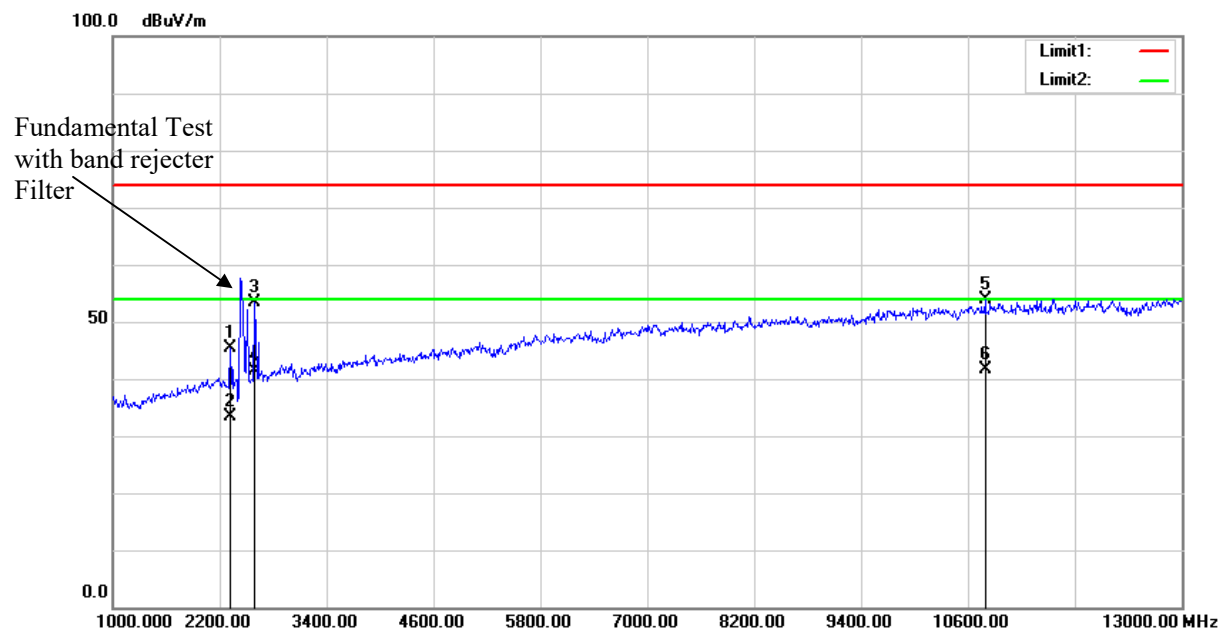
Polarization: Horizontal
Distance: 3m



No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ 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 μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ 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*****