

FCC PART 15B, CLASS B TEST REPORT

For

MFOURTEL MEXICO S.A. DE C.V.

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Mexico

FCC ID: CLNM4WILINK1

Report Type: Original Report	Product Type: M4 WiLink1
Report Number: RSZ180614004-00A	
Report Date: 2018-07-11 Bibo Zhang	
Reviewed By: RF Engineer	
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TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
MEASUREMENT UNCERTAINTY	3
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
DESCRIPTION OF TEST CONFIGURATION	5
EUT EXERCISE SOFTWARE	5
SPECIAL ACCESSORIES.....	5
EQUIPMENT MODIFICATIONS	5
SUPPORT EQUIPMENT LIST AND DETAILS	5
EXTERNAL I/O CABLE.....	6
LISN1	6
LISN2.....	6
LISN2.....	6
LISN2.....	6
EUT	6
EUT	6
EUT	6
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
TEST EQUIPMENT LIST	8
FCC §15.107 – AC LINE CONDUCTED EMISSIONS.....	9
APPLICABLE STANDARD	9
EUT SETUP	9
EMI TEST RECEIVER SETUP.....	9
TEST PROCEDURE	9
CORRECTED FACTOR & MARGIN CALCULATION	10
TEST RESULTS SUMMARY	10
TEST DATA	10
FCC §15.109 - RADIATED SPURIOUS EMISSIONS	13
APPLICABLE STANDARD	13
EUT SETUP	13
EMI TEST RECEIVER SETUP.....	14
TEST PROCEDURE	14
CORRECTED AMPLITUDE & MARGIN CALCULATION	14
TEST RESULTS SUMMARY	14
TEST DATA	15

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *MFOURTEL MEXICO S.A. DE C.V.*'s product, model number: *M4 WiLink1* (FCC ID: *CLNM4WILINK1*) or the "EUT" in this report was a *M4 WiLink1*, which was measured approximately: 175mm (L) * 168 mm (W) * 52mm (H), rated with input voltage: DC 12V from adapter. The highest operating frequency is 2690 MHz.

Adapter Information:

Model: ZL-A012W1201000

Input: AC 100-240V, 50/60Hz, 0.5A

Output: DC 12V, 1A

**All measurement and test data in this report was gathered from production sample serial number:180614004. (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-06-14.*

Objective

This test report is prepared on behalf of *MFOURTEL MEXICO S.A. DE C.V.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS, FCC Part 22H&24E&27 PCB submissions with FCC ID: CLNM4WILINK1.

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 emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		uncertainty
Conducted Emissions		±1.95dB
Emissions, radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, 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.: 342867, the FCC Designation No.: CN1221.

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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a manufacturer testing fashion.

EUT operation mode: Working

EUT Exercise Software

“BurnIn test v5.3” exercise software was used.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

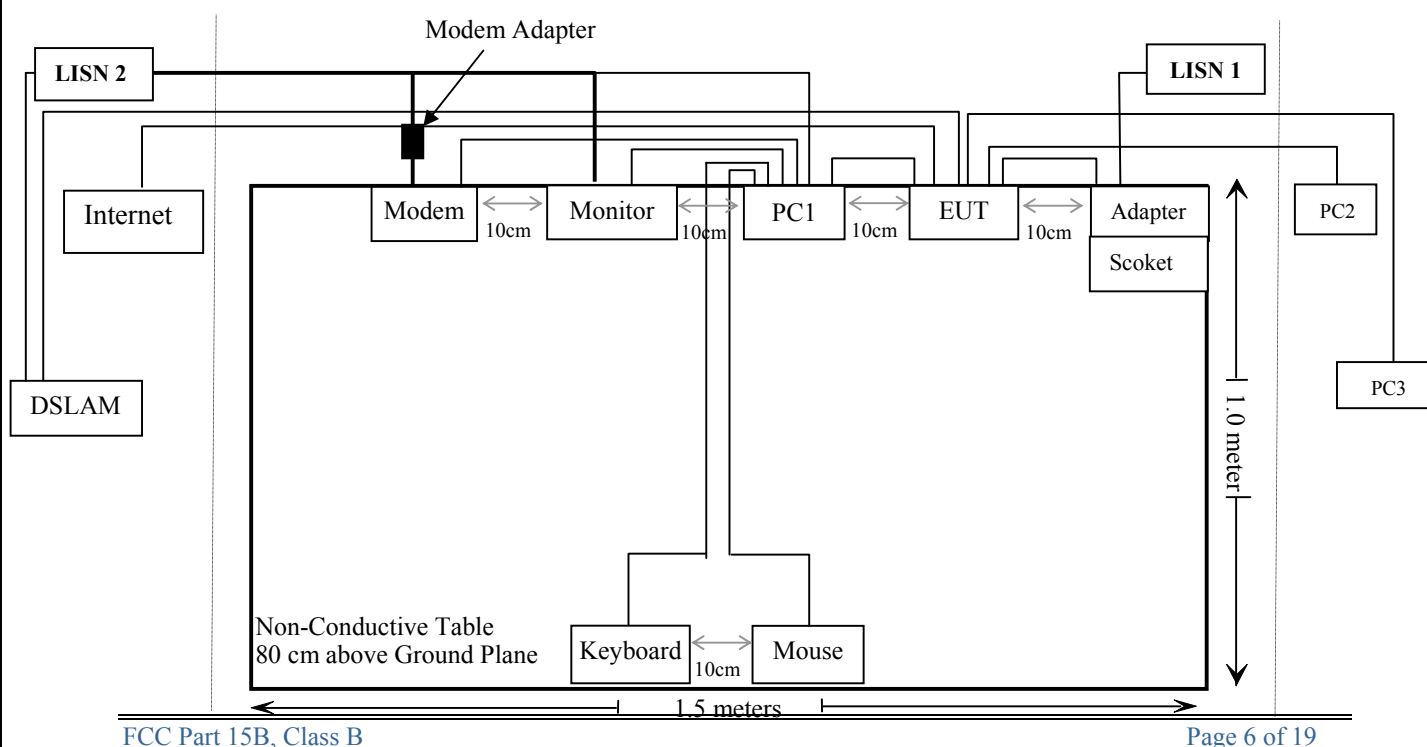
Manufacturer	Description	Model	Serial Number
DELL	Host PC1	DCSCSF	127BP2X
TCL	Monitor	TFT1560PS	ALA560806C160409
Microsoft	Keyboard	1406	0200706128743
DELL	Mouse	MOC5UO	G1900NKD
ARESCOM	DSLAM	CDS6020	N/A
SAST	Modem	AEM-2100	0293
IBM	PC2	D7J	L3AE8DW
IBM	PC3	D9J	L5AE9DW

External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielded undetachable AC cable	1.0	Scoket	LISN1
Un-shielded Detachable AC Power Cable	2.0	PC1/Host	LISN2
Un-shielded Detachable AC Power Cable	2.0	Monitor	LISN2
Un-shielded Detachable AC Power Cable	2.0	DSLAM	LISN2
Un-shielded Detachable Mouse Cable	1.5	Mouse Port / Host	Mouse
Un-shielded Detachable VGA Cable	1.5	VGA Port / Host	Monitor
Un-shielded Detachable RS232Cable	1.8	PC	Modem
Un-shielded Un-detachable DC Cable	1.7	Modem	Adapter
Shielded Un-detachable USB Cable	1.5	Keyboard	PC1
Shielded Un-detachable USB Cable	1.5	Mouse	PC1
Un-shielding undetachable DC Power Cable	1.0	EUT	Adapter
Un-shielded Detachable RJ45 Line	1.0	PC1	EUT
Un-shielded Detachable RJ45 Line	5.0	Internet	EUT
Un-shielded Detachable RJ11 Line	5.0	DSLAM	EUT
Un-shielded Detachable RJ45 Line	5.0	PC2	EUT
Un-shielded Detachable RJ45 Line	5.0	PC3	EUT

Block Diagram of Test Setup

For conducted emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Spurious Emissions	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2017-08-04	2018-08-04
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2017-12-21	2018-12-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2018-05-21	2018-11-19
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
N/A	Conducted Emission Cable	N/A	UF A210B-1-0720-504504	2018-05-12	2018-11-12
Radiated Emission Test					
A.H.System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Signal Analyzer	FSEM	845987/005	2018-04-24	2019-04-24
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2018-05-21	2019-05-21
HP	Amplifier	HP8447E	1937A01046	2018-05-21	2018-11-19
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	104PEA	218124002	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	RG-214	1	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	RG-214	2	2018-05-22	2018-11-22
Ducommun Technologies	Pre-amplifier	ALN-22093530-01	991373-01	2017-08-03	2018-08-03
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Agilent	Spectrum Analyzer	8564E	3943A01781	2018-01-04	2019-01-04
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-06	2020-12-05

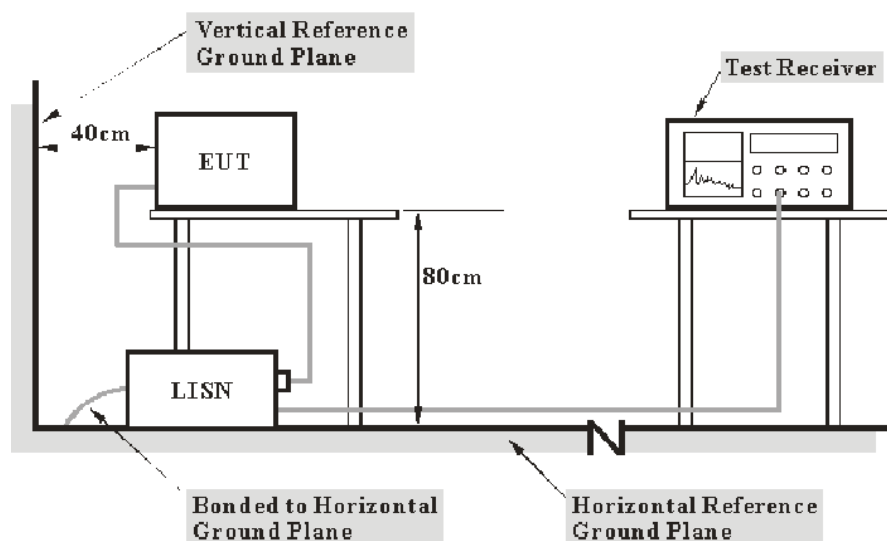
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.107

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 measurement procedure of EUT setup is according with per ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B.

The spacing between the peripherals was 10 cm.

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 host PC was connected to the first LISN and the other relevant equipments were connected to 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 Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

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:

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

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL., $U_{(Lm)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

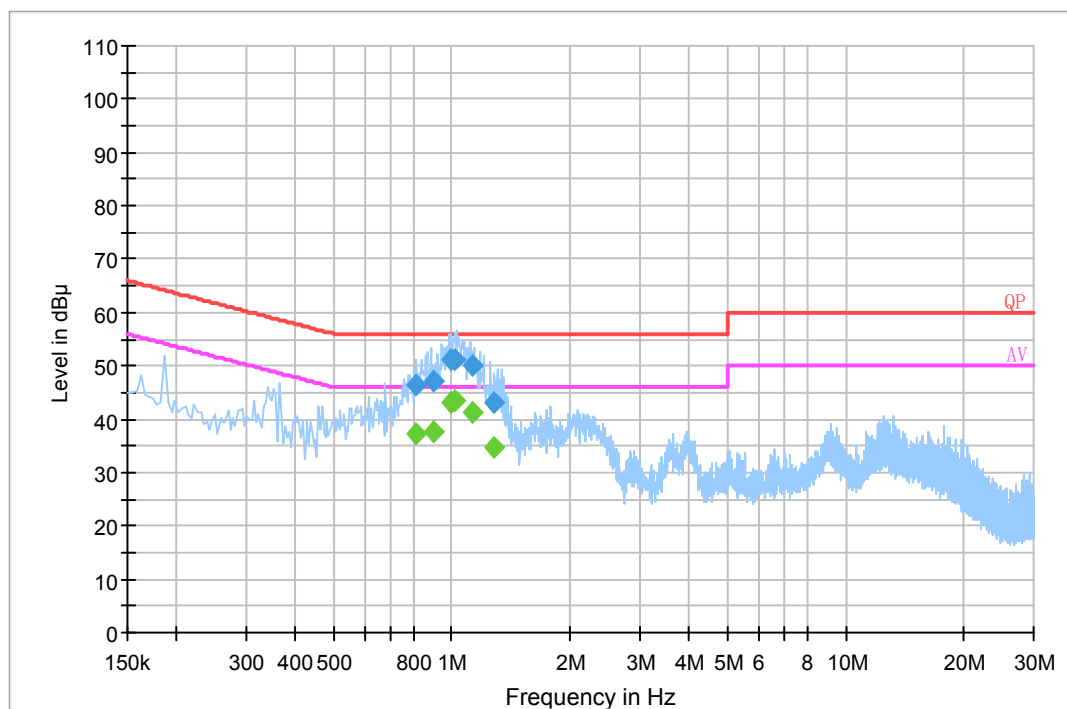
Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	101.0 kPa

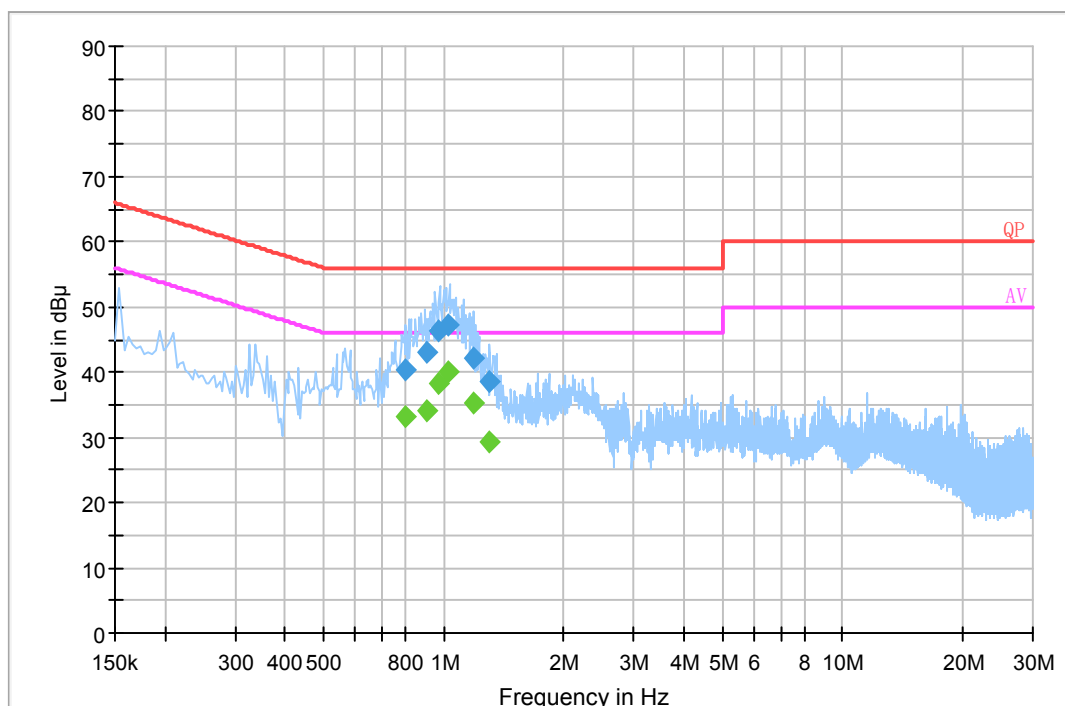
The testing was performed by Bibo Zhang on 2018-07-09.

EUT Operation Mode: Working

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.809790	46.4	19.9	56.0	9.6	QP
0.892710	47.1	20.0	56.0	8.9	QP
0.995090	51.2	20.0	56.0	4.8	QP
1.022490	51.2	20.0	56.0	4.8	QP
1.124870	50.0	20.0	56.0	6.0	QP
1.272810	43.2	20.0	56.0	12.8	QP
0.809790	37.4	19.9	46.0	8.6	Ave.
0.892710	37.8	20.0	46.0	8.2	Ave.
0.995090	43.2	20.0	46.0	2.8	Ave.
1.022490	43.4	20.0	46.0	2.6	Ave.
1.124870	41.4	20.0	46.0	4.6	Ave.
1.272810	34.7	20.0	46.0	11.3	Ave.

AC 120V/60 Hz, Neutral

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.801910	40.3	19.9	56.0	15.7	QP
0.904470	43.0	20.0	56.0	13.0	QP
0.971330	46.4	20.0	56.0	9.6	QP
1.022490	47.3	20.0	56.0	8.7	QP
1.184090	42.1	20.0	56.0	13.9	QP
1.302410	38.6	20.0	56.0	17.4	QP
0.801910	33.1	19.9	46.0	12.9	Ave.
0.904470	34.1	20.0	46.0	11.9	Ave.
0.971330	38.4	20.0	46.0	7.6	Ave.
1.022490	40.1	20.0	46.0	5.9	Ave.
1.184090	35.2	20.0	46.0	10.8	Ave.
1.302410	29.4	20.0	46.0	16.6	Ave.

Note:

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

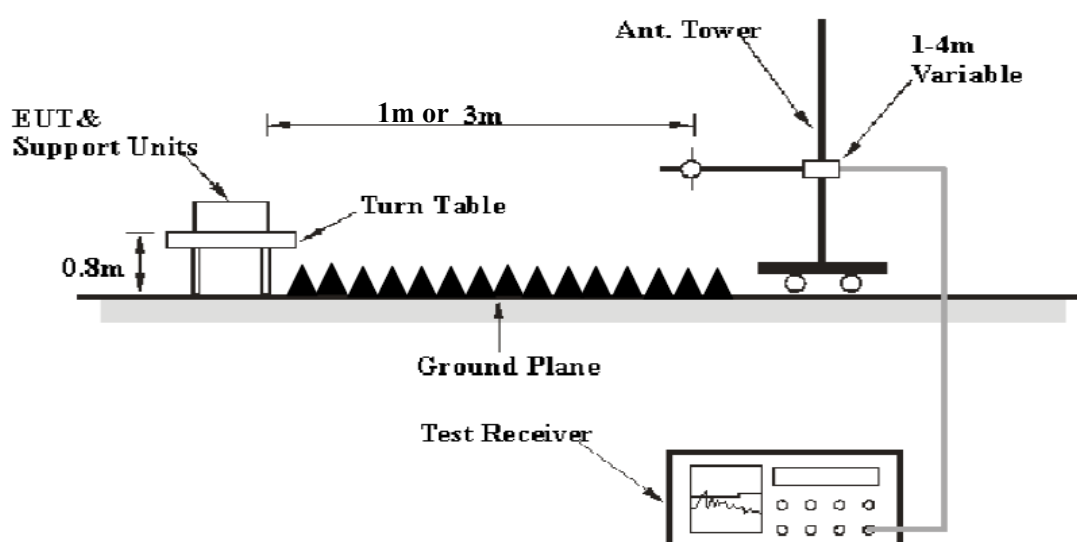
FCC §15.109

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 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 spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 13.5 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	Measurment
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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:

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

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109 Class B,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

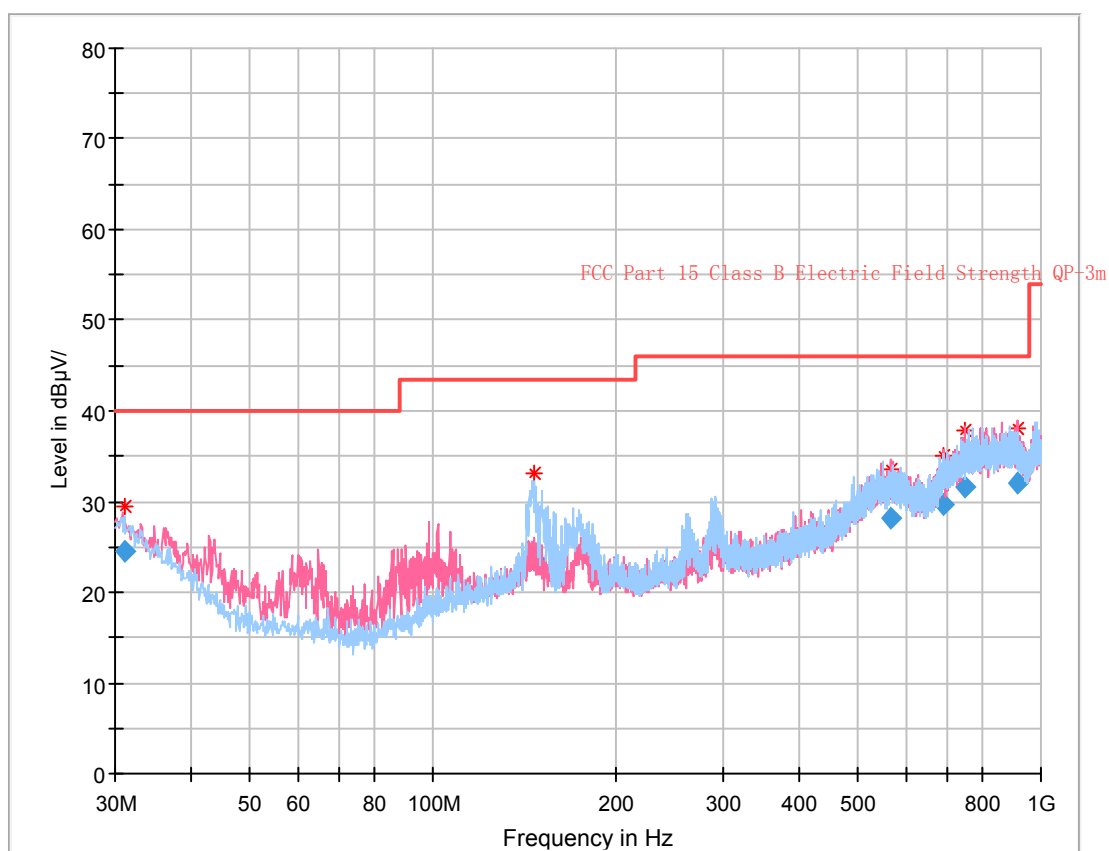
In BACL, $U_{(Lm)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Bibo Zhang on 2018-07-07.

EUT Operation Mode: Working

30 MHz~1 GHz:

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
31.202500	24.51	137.0	V	36.0	-0.1	40.00	15.49
147.189625	23.70	210.0	H	64.0	-4.7	43.50	19.80
565.546875	28.23	251.0	V	153.0	5.1	46.00	17.77
690.495125	29.63	244.0	V	186.0	6.4	46.00	16.37
751.768250	31.65	329.0	V	32.0	8.7	46.00	14.35
913.510125	32.13	329.0	V	0.0	9.7	46.00	13.87

1 GHz –13.5 GHz:

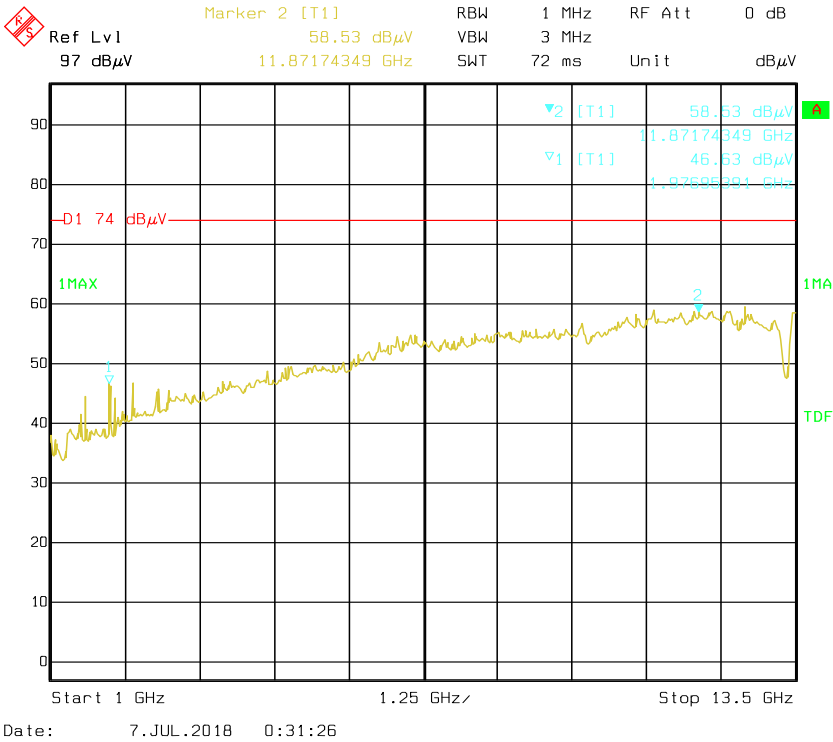
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1157.84	43.67	PK	106	2.4	H	-8.48	35.19	74	38.81
1157.84	29.28	Ave.	106	2.4	H	-8.48	20.80	54	33.20
1568.40	44.96	PK	102	1.7	V	-5.35	39.61	74	34.39
1568.40	29.71	Ave.	102	1.7	V	-5.35	24.36	54	29.64
1976.95	47.62	PK	7	2.2	H	-0.99	46.63	74	27.37
1976.95	26.32	Ave.	7	2.2	H	-0.99	25.33	54	28.67

Note:

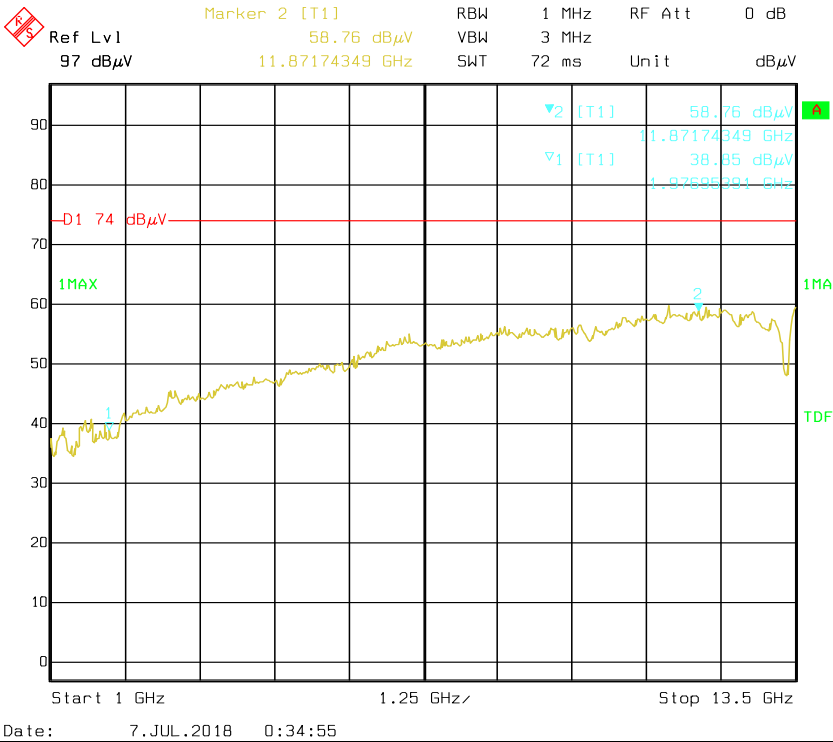
- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Correction Factor + Reading
- 3) Margin = Limit - Corrected Amplitude

Pre-scan for peak

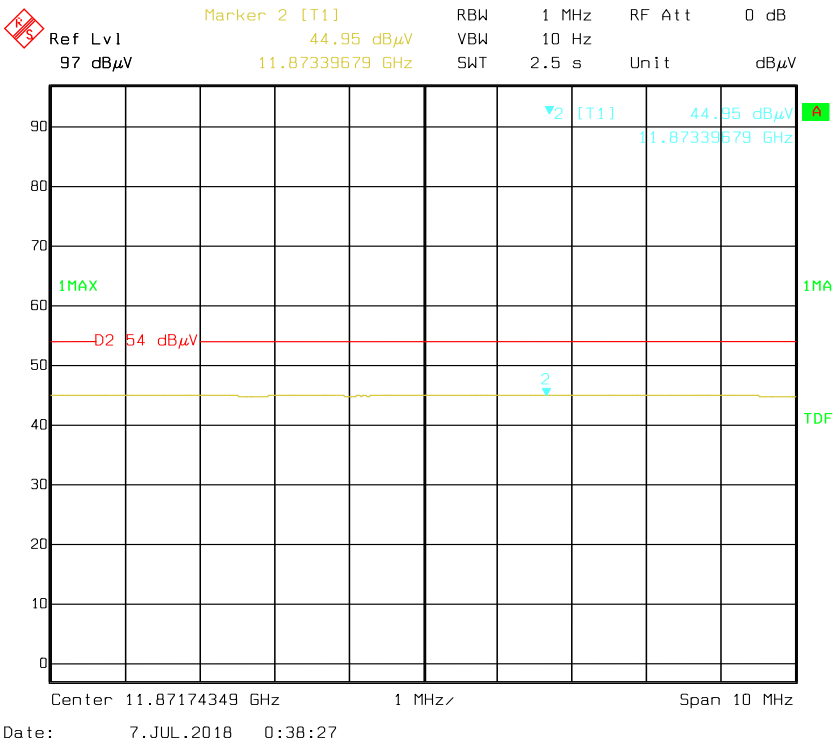
Horizontal – Peak (1-13.5 GHz)



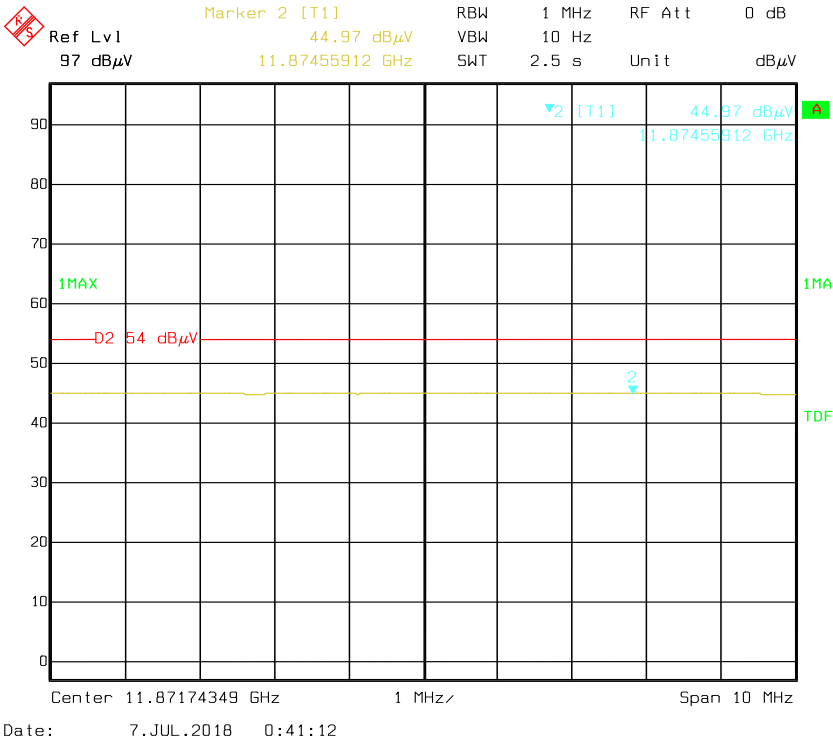
Vertical - Peak (1-13.5 GHz)



Horizontal – Average



Vertical - Average



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