TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 15.249

TEST REPORT

For

Keeson Technology Corporation Limited

No. 158, Qiumao Road, Wangjiangjing Xiuzhou district Jiaxing, Zhejiang China

FCC ID: 2AK23MC120

Report Type:	**Product Type:**
CIIPC	Control Box

Test Engineer:	Max Min
Report Number:	RSHA181102005-00A
Report Date:	2019-01-08
Reviewed By:	Oscar Ye RF Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Keeson Technology Corporation Limited
Tested Model	MC120
Series Model	MC120BK, MC120BA, MC120SP, MC120LB, MC120LS, MC120TS, MC120SG
Product Type	Control Box
Dimension	98mm(L)*65mm(W)*26mm(H)
Power Supply	DC 29V from adapter

** Note: The difference between tested model and series model was explained in the declaration letter.*

All measurement and test data in this report was gathered from production sample serial number: 20181102005. (Assigned by BACL, Kunshan). The EUT was received on 2018-11-02.

Objective

This type approval report is prepared on behalf of *Keeson Technology Corporation Limited.* in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

This is a CIIPC report base on the original report RSHA171116003-00A with FCC ID: 2AK23MC120, the differences between the original device and the current one are as follows:

1. Change models to MC120, MC120BK, MC120BA, MC120SP, MC120LB, MC120LS, MC120TS, MC120SG.

2. The board is different:
(1)Removed: K1, K3, R2, C20, P1, D5 .
(2)Added:D7,C5.

The above differences will affect “part of tests”, RADIATED EMISSIONS& OUT OF BAND EMISSION and AC LINE CONDUCTED EMISSIONS were presented in this report, and other data were referred to the original report.

Related Submittal(s)/Grant(s)

FCC Part 15.249 DXX submission with FCC ID: PCU-RF258GA.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Lab Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Justification

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2403	40	2442
2	2404	41	2443
…	…	…	…
38	2440	77	2479
39	2441	78	2480

EUT was tested with channel 1, 40 and 78.

EUT Exercise Software

No software was used during the test.

Support Equipment List and Details

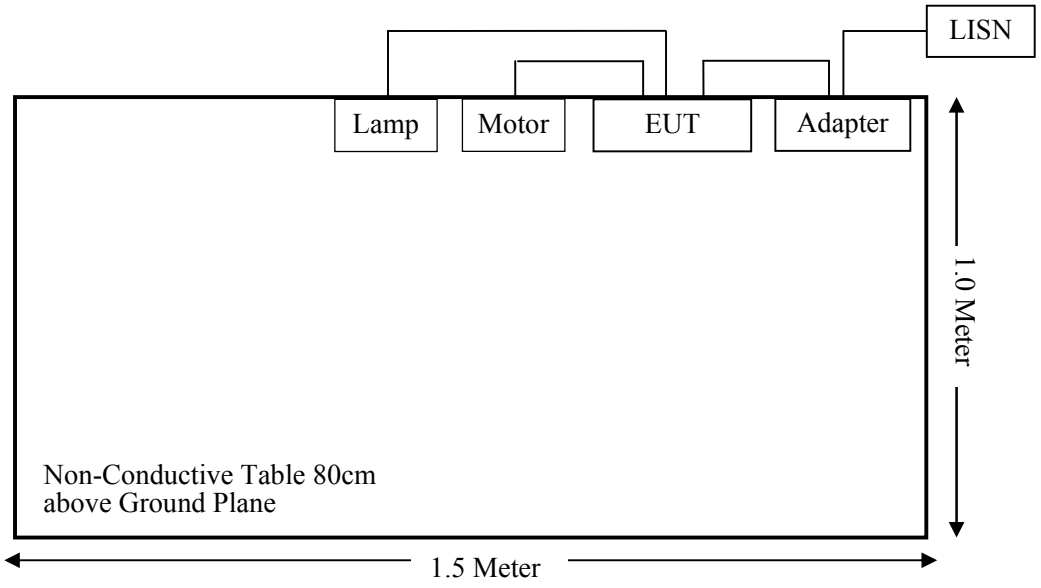
Manufacturer	Description	Model	Serial Number
OKIN Refined	Motor	JLDQ-10	68000011150528680602
OKIN Refined	Lamp	/	/
OKIN Refined	Adapter	02-290018	6800056715R568474511

External I/O Cable

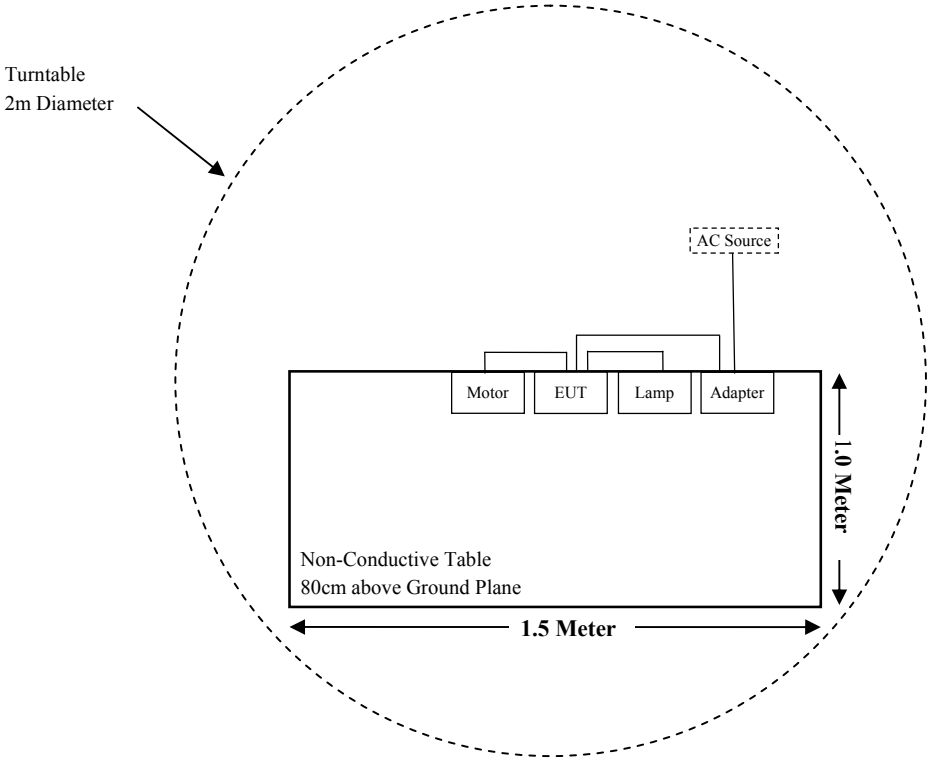
Cable Description	Length (m)	From Port	To
Power Cable	1.2	EUT	Adapter
Motor Cable	0.8	EUT	Motor
Lamp Cable	0.8	EUT	Lamp

Block Diagram of Test Setup

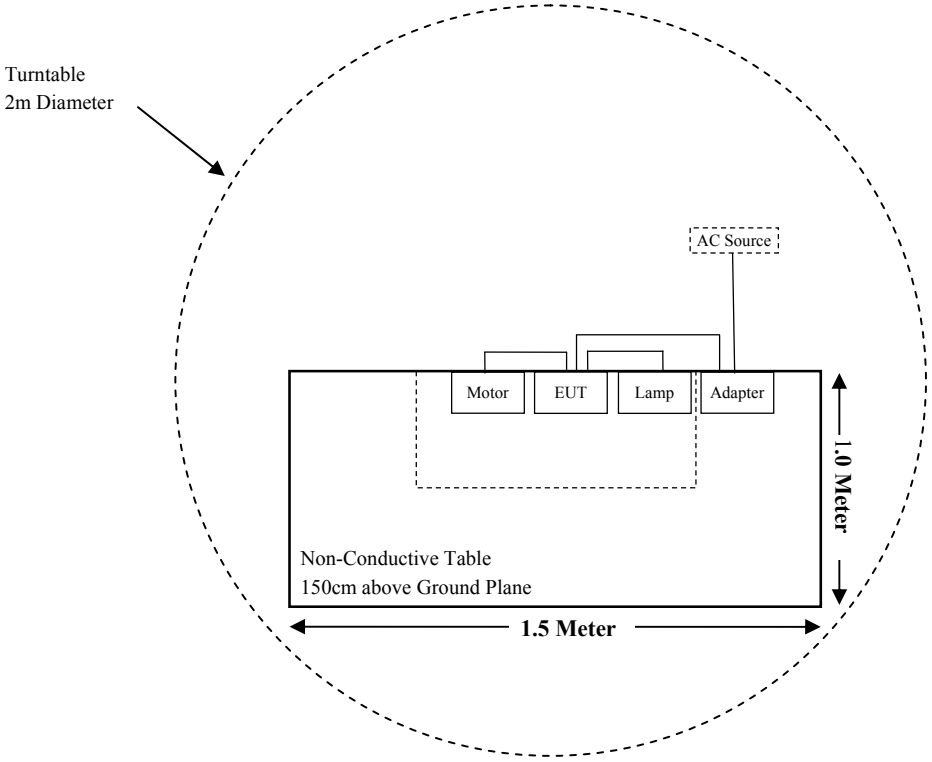
For Conducted Emissions:



For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant (See Note 1)
§15.207(a)	Conduction Emissions	Compliant
15.205, §15.209, §15.249	Radiated Emissions& Out of Band Emission	Compliant
§15.215 (c)	20 dB Bandwidth	Compliant (See Note 1)

Note 1: For these items, all the test data please refer to the original report RSHA171116003-00A.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2018-11-12	2019-11-11
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
Sonoma Instrunent	Pre-amplifier	310N	171205	2018-08-15	2019-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2018-08-15	2019-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2018-08-27	2019-08-26
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2018-08-05	2019-08-04
A.H.Systems, inc	Amplifier	2641-1	466	2018-09-11	2019-09-10
EM Electronics	Amplifier	EM18G40G	060726	2018-03-22	2019-03-21
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2018-08-15	2019-08-14
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2018-11-30	2019-11-29
Rohde & Schwarz	LISN	ENV216	3560655016	2018-11-30	2019-11-29
BACL	Auto test Software	BACL-EMC	CE001	/	/
Narda	Attenuator/6dB	10690812-2	26850-6	2018-01-10	2019-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2018-08-15	2019-08-14

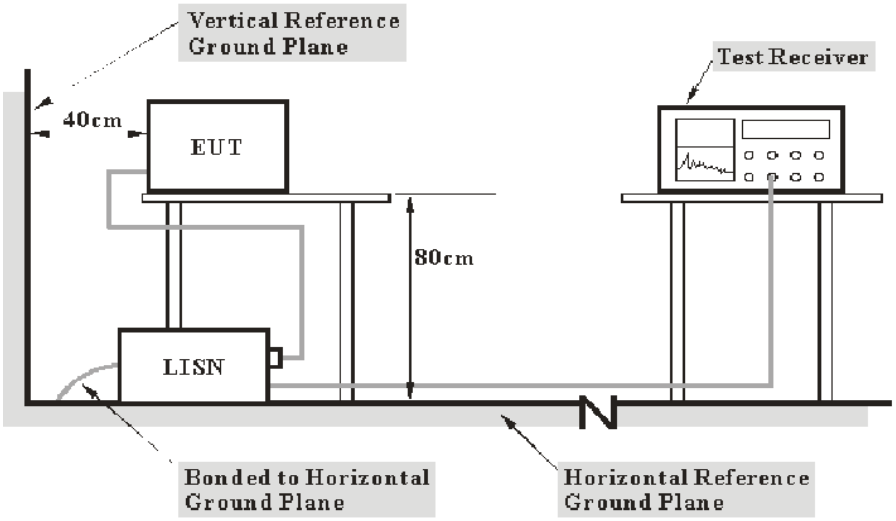
*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

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 ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

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

ANSI C63.10-2013 clause 6.2

During the conducted emission test, the adapter was connected to the outlet of the LISN.

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

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

Corrected Factor & Margin Calculation

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

Corrected Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

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:

Margin (dB) = Limit (dBµV) – Corrected Amplitude (dBµV)

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

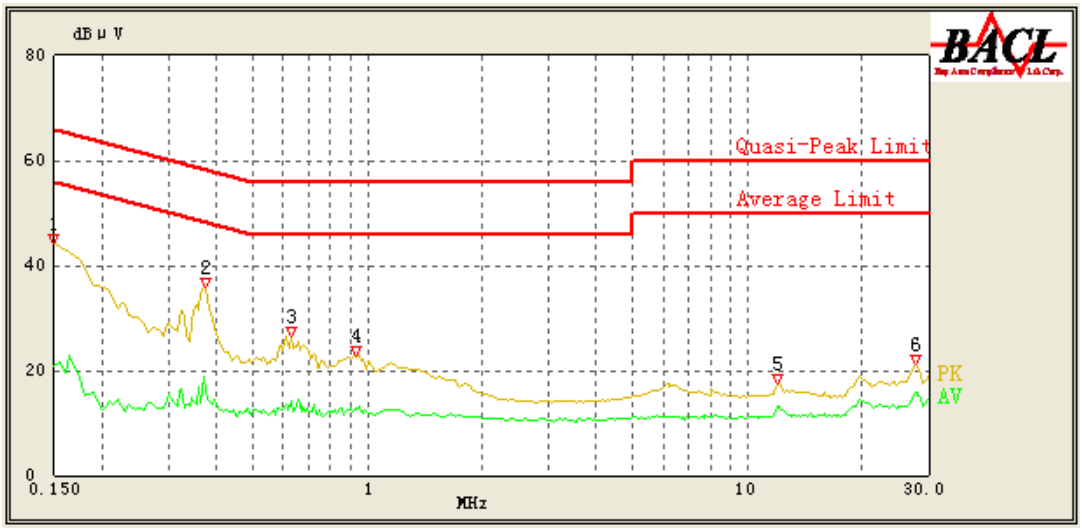
Test Data

Environmental Conditions

Temperature:	23.2 ℃
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

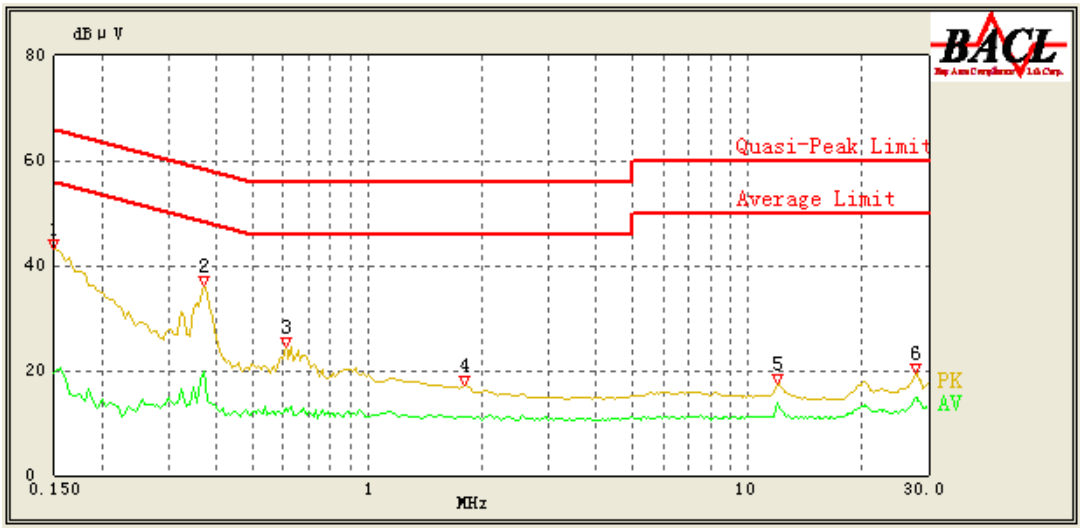
The testing was performed by Max Min on 2019-01-07.

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Comment
0.150	44.10	QP	9.000	L1	16.06	66.00	21.90	Compliant
0.150	20.73	AV	9.000	L1	16.06	56.00	35.27	Compliant
0.375	35.97	QP	9.000	L1	16.05	58.39	22.42	Compliant
0.375	16.03	AV	9.000	L1	16.05	48.39	32.36	Compliant
0.630	26.42	QP	9.000	L1	16.00	56.00	29.58	Compliant
0.630	14.13	AV	9.000	L1	16.00	46.00	31.87	Compliant
0.930	22.87	QP	9.000	L1	15.90	56.00	33.13	Compliant
0.930	12.93	AV	9.000	L1	15.90	46.00	33.07	Compliant
12.000	17.66	QP	9.000	L1	16.12	60.00	42.34	Compliant
12.000	13.33	AV	9.000	L1	16.12	50.00	36.67	Compliant
27.650	21.21	QP	9.000	L1	16.53	60.00	38.79	Compliant
27.650	15.99	AV	9.000	L1	16.53	50.00	34.01	Compliant

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Comment
0.150	43.17	QP	9.000	N	16.06	66.00	22.83	Compliant
0.150	19.51	AV	9.000	N	16.06	56.00	36.49	Compliant
0.370	36.26	QP	9.000	N	16.08	58.50	22.24	Compliant
0.370	19.69	AV	9.000	N	16.08	48.50	28.81	Compliant
0.610	24.52	QP	9.000	N	16.04	56.00	31.48	Compliant
0.610	12.70	AV	9.000	N	16.04	46.00	33.30	Compliant
1.800	17.25	QP	9.000	N	15.92	56.00	38.75	Compliant
1.800	11.23	AV	9.000	N	15.92	46.00	34.77	Compliant
12.000	17.52	QP	9.000	N	16.00	60.00	42.48	Compliant
12.000	13.87	AV	9.000	N	16.00	50.00	36.13	Compliant
27.650	19.66	QP	9.000	N	16.29	60.00	40.34	Compliant
27.650	14.70	AV	9.000	N	16.29	50.00	35.30	Compliant

Note:
1) Corrected Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
2) Margin (dB) = Limit (dBµV) – Corrected Amplitude (dBµV)

FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS& OUT OF BAND EMISSION

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

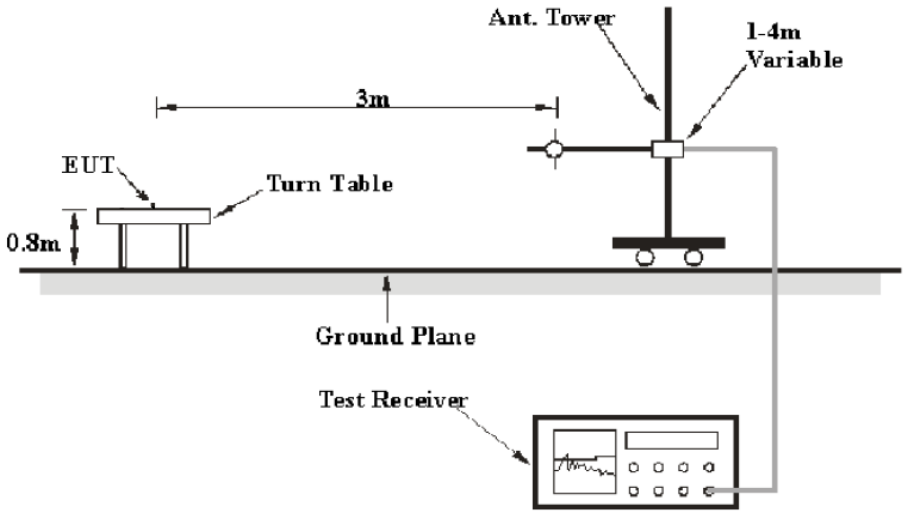
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

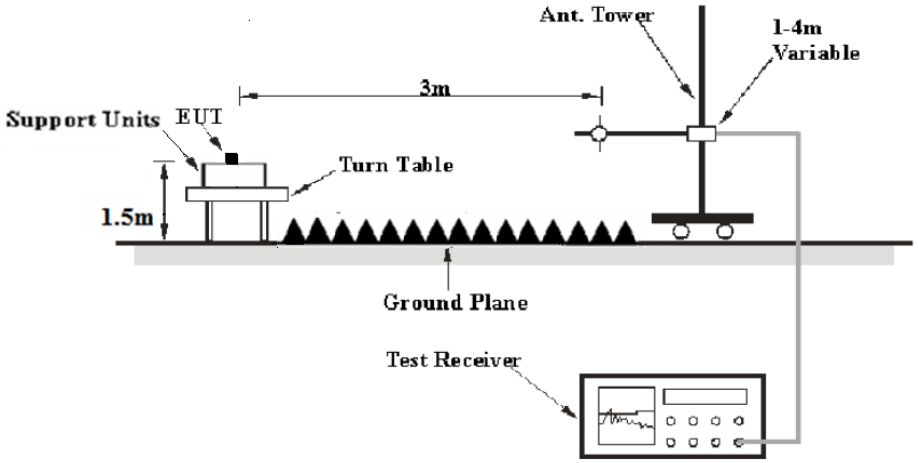
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

Test Equipment Setup

The system was investigated from 30 MHz to 25 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	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	PK
	1MHz	3 MHz	/	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 detection mode from 30MHz to 1GHz, Peak and average detection mode 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:

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 Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 &15.205 & 15.249.

Test Data

Environmental Conditions

Temperature:	24.6°C
Relative Humidity:	52%
ATM Pressure:	101.2 kPa

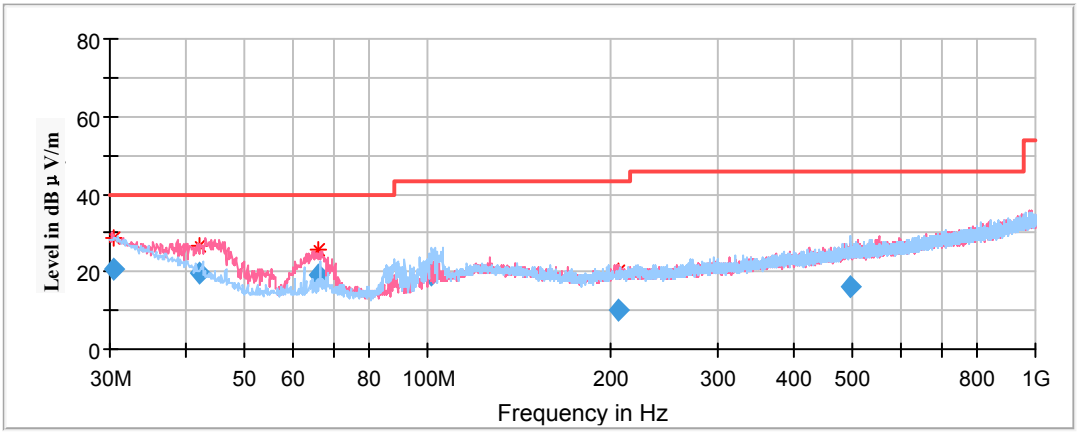
The testing was performed by Max Min on 2018-12-19.

Test Mode: Transmitting

Spurious Emission Test:

30MHz-1GHz

*(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low channel of operation in X-axis of orientation** was recorded)*



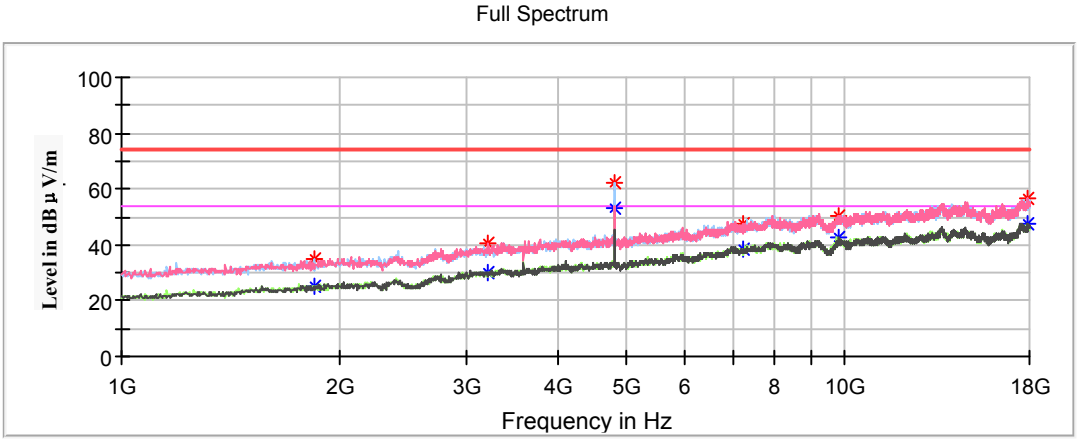
Frequency (MHz)	Corrected Amplitude	Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	Quasi-peak (dBµV/m)	Height (cm)	Polar (H/V)				
30.538052	20.53	101.0	V	327.0	-4.3	40.00	19.47
42.192050	19.69	101.0	V	60.0	-12.2	40.00	20.31
66.051050	19.15	101.0	V	86.0	-17.5	40.00	20.85
101.455100	18.89	199.0	H	100.0	-14.6	43.50	24.61
205.352800	10.22	198.0	V	198.0	-12.3	43.50	33.28
496.514300	15.97	101.0	H	176.0	-6.2	46.00	30.03

1GHz-18GHz

*(Pre-scan in the X, Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)*

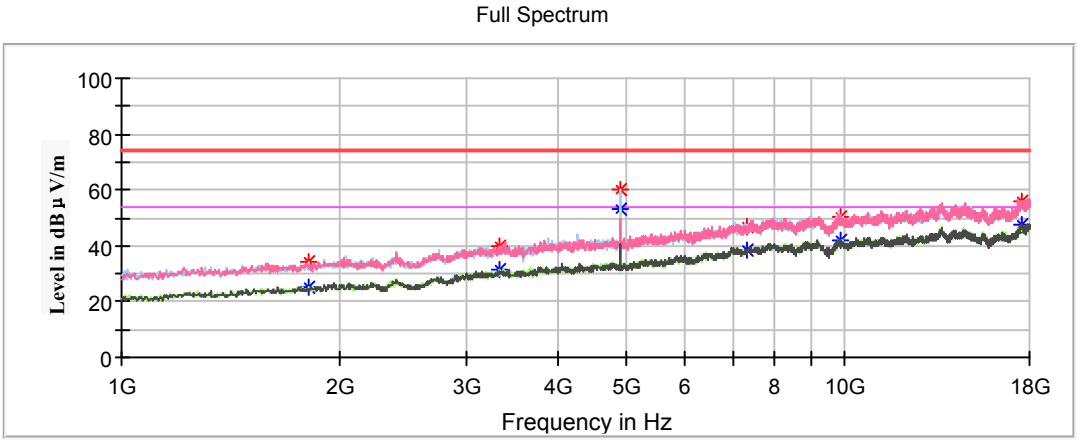
Note:
1. This test was performed with the 2.4-2.5GHz band reject filter.
2. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
   Corrected Amplitude = Corrected Factor + Reading
   Margin = Limit – Corrected. Amplitude

Low Channel: 2403MHz



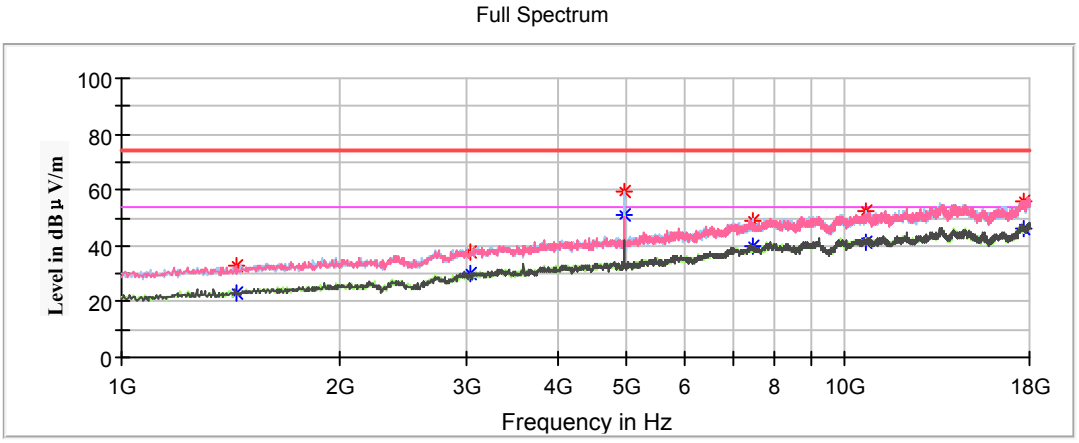
Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1843.200000	---	25.42	100.0	H	338.0	-6.3	54.00	28.58
1843.200000	35.00	---	100.0	H	338.0	-6.3	74.00	39.00
3216.800000	---	30.11	100.0	V	12.0	-1.3	54.00	23.89
3216.800000	40.90	---	100.0	V	12.0	-1.3	74.00	33.10
4806.000000	62.56	---	100.0	H	358.0	1.8	74.00	11.44
4806.000000	---	52.85	100.0	H	358.0	1.8	54.00	1.15
7209.000000	---	38.47	100.0	H	302.0	8.9	54.00	15.53
7209.000000	47.22	---	100.0	H	302.0	8.9	74.00	26.78
9799.200000	50.12	---	100.0	V	80.0	12.1	74.00	23.88
9799.200000	---	42.75	100.0	V	63.0	12.1	54.00	11.25
17908.200000	56.51	---	100.0	H	209.0	17.6	74.00	17.49
17908.200000	---	47.66	100.0	H	12.0	17.7	54.00	6.34

Middle Channel: 2442MHz



Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1816.000000	34.18	---	100.0	H	70.0	-6.4	74.00	39.82
1816.000000	---	24.88	100.0	H	70.0	-6.4	54.00	29.12
3325.600000	40.11	---	200.0	V	354.0	-1.1	74.00	33.89
3325.600000	---	31.45	200.0	V	354.0	-1.1	54.00	22.55
4884.000000	---	53.45	100.0	H	54.0	1.9	54.00	0.55
4884.000000	60.05	---	100.0	H	54.0	1.9	74.00	13.95
7326.000000	47.15	---	100.0	H	70.0	9.3	74.00	26.85
7326.000000	---	38.37	100.0	H	70.0	9.3	54.00	15.63
9836.600000	50.04	---	150.0	V	288.0	12.2	74.00	23.96
9836.600000	---	42.14	150.0	V	288.0	12.2	54.00	11.86
17554.600000	---	47.90	100.0	V	271.0	17.2	54.00	6.10
17554.600000	56.18	---	100.0	V	271.0	17.3	74.00	17.82

High Channel: 2480MHz

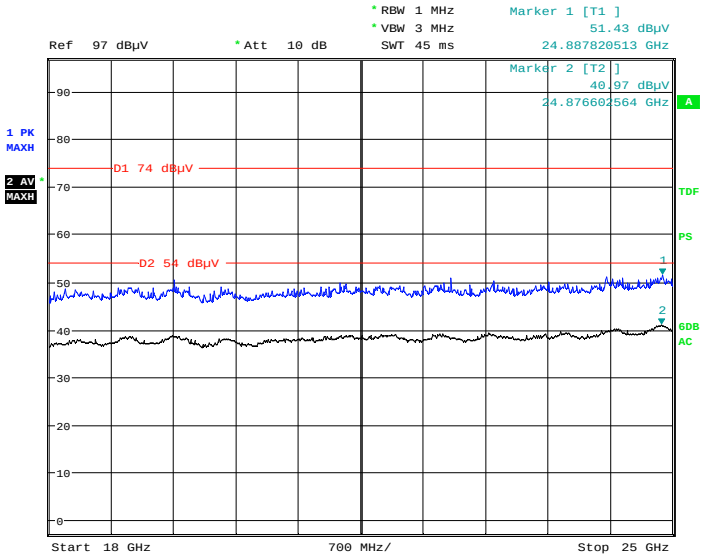


Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
1438.600000	33.08	---	150.0	V	132.0	-7.9	74.00	40.92
1438.600000	---	22.98	150.0	V	132.0	-7.9	54.00	31.02
3029.800000	37.90	---	100.0	H	231.0	-1.6	74.00	36.10
3029.800000	---	30.25	100.0	H	231.0	-1.6	54.00	23.75
4960.000000	59.55	---	200.0	H	350.0	2.0	74.00	14.45
4960.000000	---	51.25	200.0	H	350.0	2.0	54.00	2.75
7440.000000	---	39.77	100.0	H	167.0	9.6	54.00	14.23
7440.000000	48.77	---	100.0	H	167.0	9.6	74.00	25.23
10666.200000	---	41.37	100.0	H	125.0	13.0	54.00	12.63
10666.200000	52.33	---	100.0	H	125.0	13.0	74.00	21.67
17646.400000	---	46.47	100.0	V	174.0	17.3	54.00	7.53
17646.400000	56.04	---	100.0	V	174.0	17.3	74.00	17.96

18GHz-25GHz

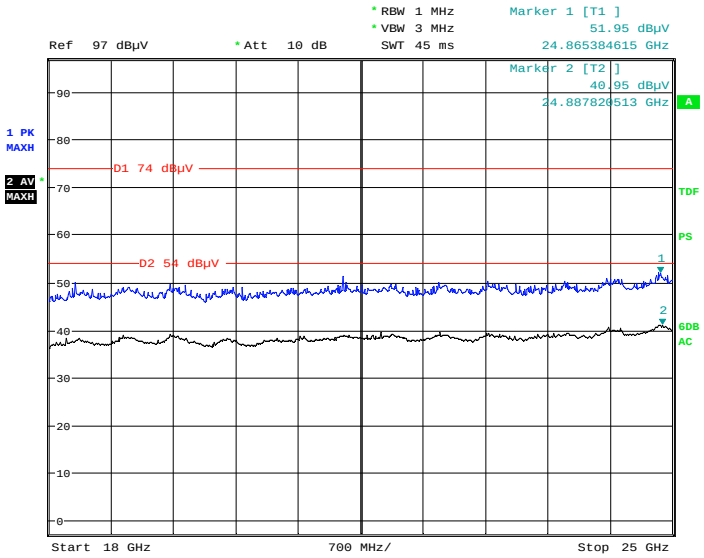
*(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **high channel of operation in X-axis of orientation** was recorded)*

Horizontal



Date: 19.DEC.2018 17:03:20

Vertical



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Fundamental Test & Restricted Bands Emissions Test:

*(Pre-scan in the X, Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)*

Note:
1. Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
2. Corrected Amplitude = Corrected Factor + Reading
3. Margin = Limit - Corrected. Amplitude

Frequency (MHz)	Corrected Amplitude		Rx Antenna		Turntable Degree	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
	MaxPeak (dBµV /m)	Average (dBµV /m)	Height (cm)	Polar (H/V)				
Low Channel: 2403MHz								
2403.000000	86.21	---	200.0	H	192.0	6.0	114	27.79
2403.000000	---	83.59	200.0	H	192.0	6.0	94	10.41
2403.000000	84.06	---	200.0	V	298.0	6.0	114	29.94
2403.000000	---	81.30	200.0	V	298.0	6.0	94	12.70
2400.000000	36.69	---	200.0	H	187.0	6.0	74	37.31
2400.000000	---	26.46	200.0	H	187.0	6.0	54	27.54
Middle Channel: 2442MHz								
2442.000000	86.25	---	150.0	H	319.0	6.2	114	27.75
2442.000000	---	82.62	150.0	H	319.0	6.2	94	11.38
2442.000000	83.97	---	250.0	V	321.0	6.2	114	30.03
2442.000000	---	80.18	250.0	V	321.0	6.2	94	13.82
High Channel: 2480MHz								
2480.000000	85.42	---	200.0	H	15.0	6.3	114	28.58
2480.000000	---	81.92	200.0	H	15.0	6.3	94	12.09
2480.000000	82.98	---	150.0	V	275.0	6.3	114	31.02
2480.000000	---	79.59	150.0	V	275.0	6.3	94	14.41
2483.500000	38.26	---	250.0	H	329.0	6.3	74	35.74
2483.500000	---	28.53	250.0	H	329.0	6.3	54	25.47

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