



FCC PART 15.249

TEST REPORT

For

Shenzhen Merrytek Technology CO., LTD

NO.3 Building,380 Xiangshan Avenue, Luotian,Songgang Town,Bao'an District,
Shenzhen, China

FCC ID: 2AI53-MC054VRC

Report Type: Original Report	Product Name: Lighting Control Switch
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Report Number: RDG170515050A	
Report Date: 2017-06-06	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **Shenzhen Merrytek Technology CO., LTD**'s product, model number: **MC054V RC D (FCC ID: 2A153-MC054VRC)** (the "EUT") in this report was a **Lighting Control Switch**, which was measured approximately: 12 cm (L) x 6.3 cm (W) x 5.9 cm (H), rated input voltage: AC120V/60Hz or AC277V/60Hz.

Note: The series product, model MC054V RC D, MC054V RC A, MC054V RC B and MC054V RC C are electrically identical, we selected MC054V RC D for fully testing, the difference details between them was explained in the declaration letter.

**All measurement and test data in this report was gathered from final production sample, serial number: 170515050 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-05-15, and EUT conformed to test requirement.*

Objective

This type approval report is prepared on behalf of **Shenzhen Merrytek Technology CO., LTD** 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 Rules Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

No related submittal(s)/grant(s).

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".

All of the measurements detailed in this Test Report were performed by Bay Area Compliance Laboratories Corp. (Chengdu).

The Bay Area Compliance Laboratories Corp. Chengdu's measurement Uncertainties (calculated for a k=2 Coverage Factor corresponding to approximately 95% Coverage) were as follows:

- For all of the AC Line Conducted Emissions Tests reported herein: ± 3.17 dB.
- For of all of the Direct Antenna Conducted Emissions Tests reported herein: ± 0.56 dB.

- For of all of the direct Radiated Emissions Tests reported herein are:

- 30 MHz to 200 MHz: ± 4.7 dB;
- 200 MHz to 1 GHz: ± 6.0 dB;
- 1 GHz to 6 GHz: ± 5.13 dB; and,
- 6 GHz to 40 GHz: ± 5.47 dB.

And the uncertainty will not be taken into consideration for all test data recorded in the report.

Test Facility

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in Engineering Mode, which was provided by the manufacturer, the device was operated on 5764MHz.

EUT Exercise Software

No software was used during testing.

Equipment Modifications

No modifications were made to the EUT.

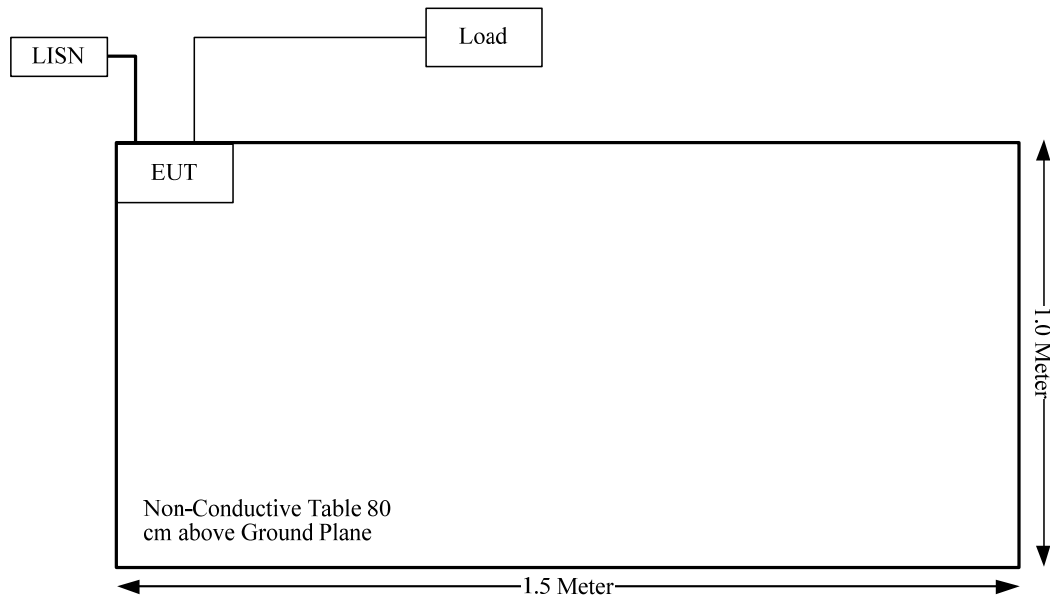
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	Load	/	/

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Power Line	no	no	0.8	Load	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Compliance
15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, 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.

Antenna Connector Construction

The EUT has an integrated antenna, the antenna gain is 0dBi, fulfill the requirement of this section. Please refer to the EUT photos.

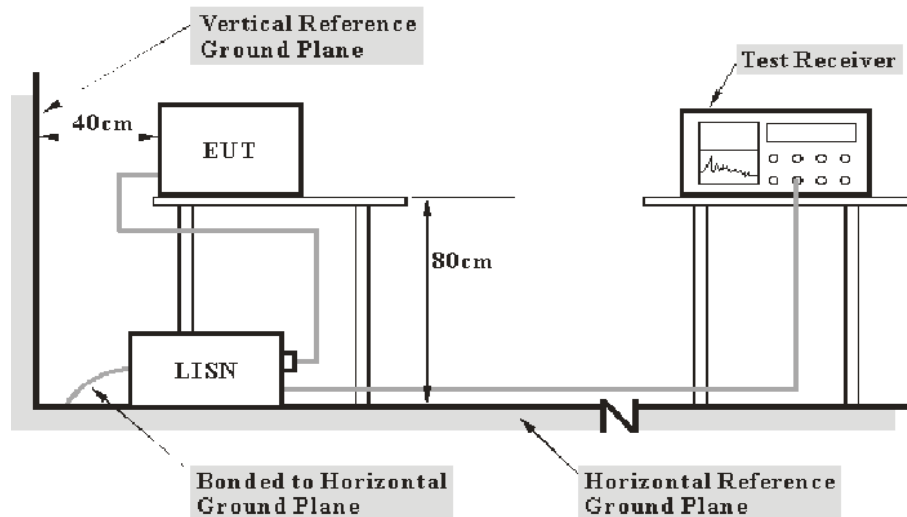
Result: Compliant.

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 setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The EUT was connected to the main lisn with a 120V/60 Hz or 277V/60 Hz 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 EUT was connected to the first 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:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

V_C (cord. Reading): corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF: voltage division factor of AMN

C_f : Correction Factor

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 maximum limit. The equation for margin calculation is as follows:

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2016-12-02	2017-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2016-12-02	2017-12-01
SOLAR ELECTRONICS	L.I.S.N.	9252-50-24-BNC	984413	2016-12-02	2017-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	DE14781	2016-10-31	2017-10-30
Unknown	Conducted Cable	Unknown	NO.5	2016-11-10	2017-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

* **Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

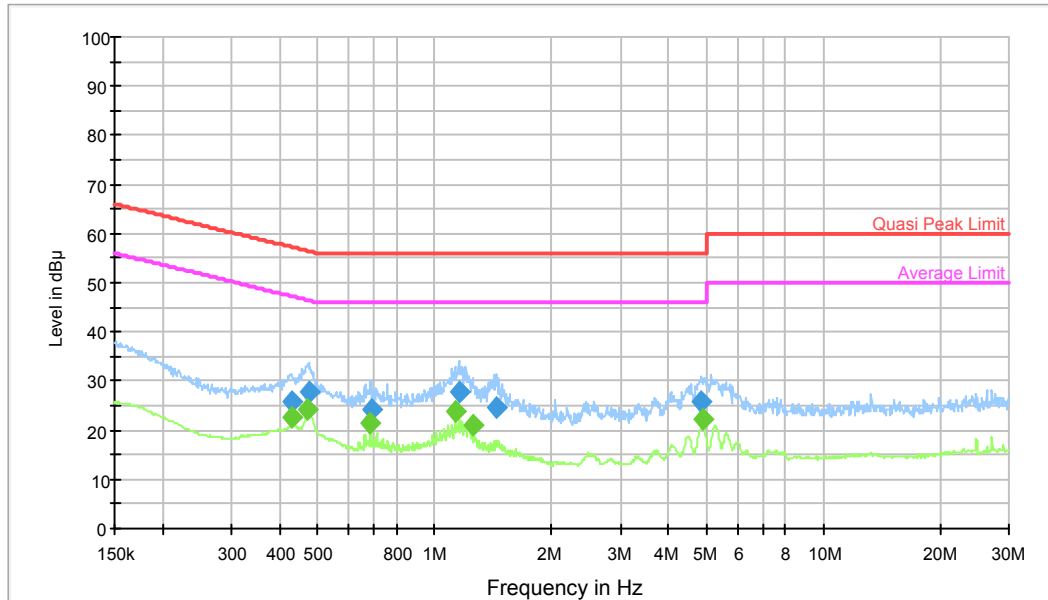
Environmental Conditions

Temperature:	29 °C
Relative Humidity:	34 %
ATM Pressure:	100.1 kPa

The testing was performed by Kevin Hu on 2017-05-27.

Test Mode: Transmitting

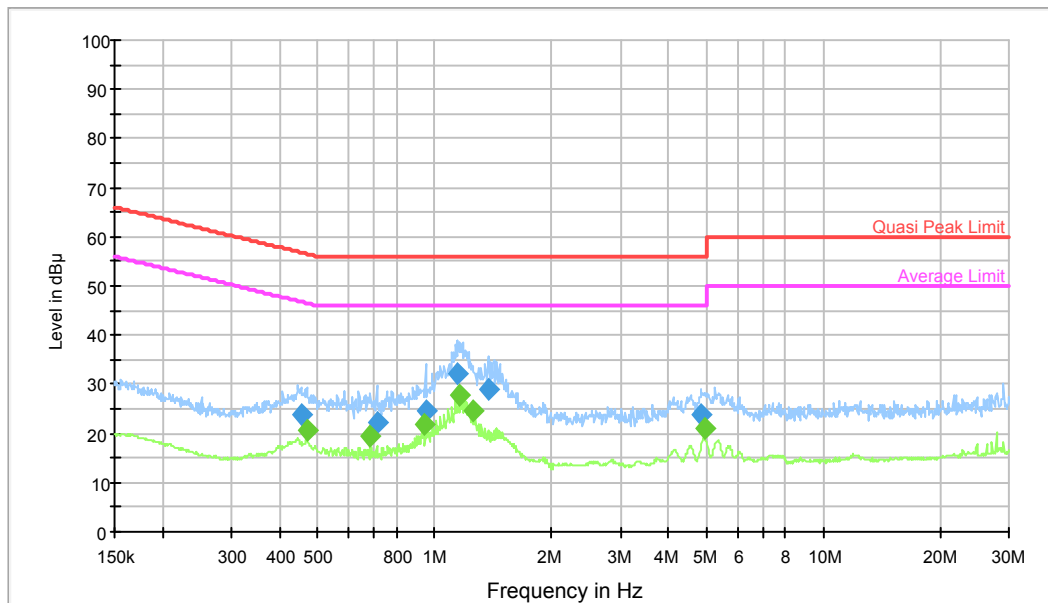
AC120 V, 60 Hz, Line:



Frequency (MHz)	Quasi Peak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.426898	26.0	9.000	L1	19.6	31.3	57.3	Compliance
0.473588	27.9	9.000	L1	19.6	28.6	56.5	Compliance
0.686493	24.3	9.000	L1	19.6	31.7	56.0	Compliance
1.153503	27.7	9.000	L1	19.6	28.3	56.0	Compliance
1.442470	24.5	9.000	L1	19.6	31.5	56.0	Compliance
4.854622	25.7	9.000	L1	19.7	30.3	56.0	Compliance

Frequency (MHz)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.430320	22.6	9.000	L1	19.6	24.6	47.2	Compliance
0.471701	24.1	9.000	L1	19.6	22.4	46.5	Compliance
0.683758	21.4	9.000	L1	19.6	24.6	46.0	Compliance
1.130707	23.8	9.000	L1	19.6	22.2	46.0	Compliance
1.249376	21.2	9.000	L1	19.6	24.8	46.0	Compliance
4.874040	22.3	9.000	L1	19.7	23.7	46.0	Compliance

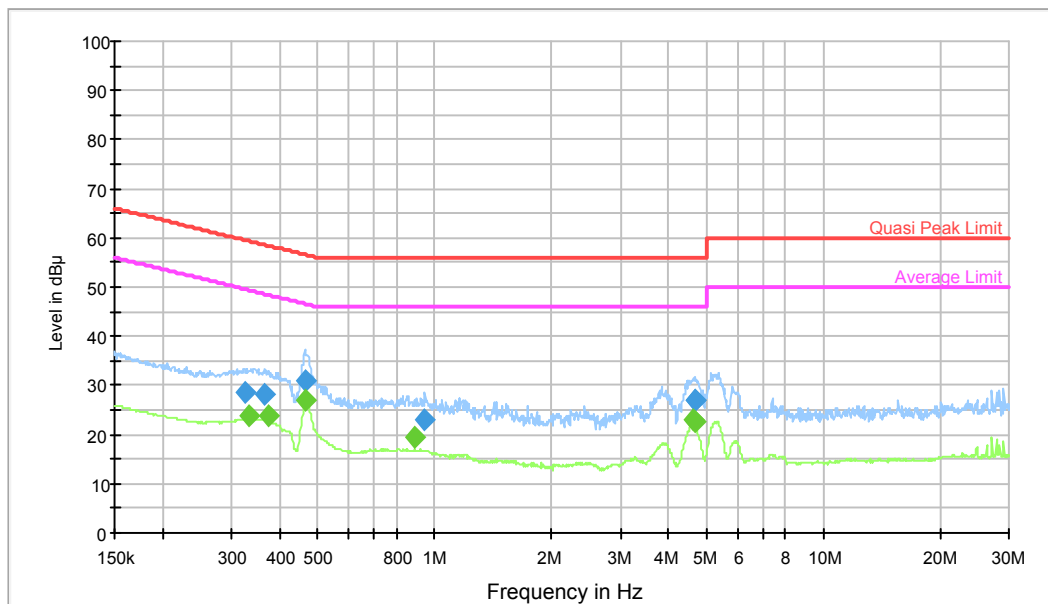
AC120V, 60 Hz, Neutral:



Frequency (MHz)	Quasi Peak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.453242	23.8	9.000	N	19.7	33.0	56.8	Compliance
0.708771	22.3	9.000	N	19.7	33.7	56.0	Compliance
0.948564	24.7	9.000	N	19.7	31.3	56.0	Compliance
1.144330	32.3	9.000	N	19.7	23.7	56.0	Compliance
1.369520	28.8	9.000	N	19.7	27.2	56.0	Compliance
4.835281	23.7	9.000	N	19.7	32.3	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.467950	20.7	9.000	N	19.7	25.9	46.6	Compliance
0.683758	19.3	9.000	N	19.7	26.7	46.0	Compliance
0.937272	21.8	9.000	N	19.7	24.2	46.0	Compliance
1.153503	27.7	9.000	N	19.7	18.3	46.0	Compliance
1.249376	24.5	9.000	N	19.7	21.5	46.0	Compliance
4.952494	21.0	9.000	N	19.7	25.0	46.0	Compliance

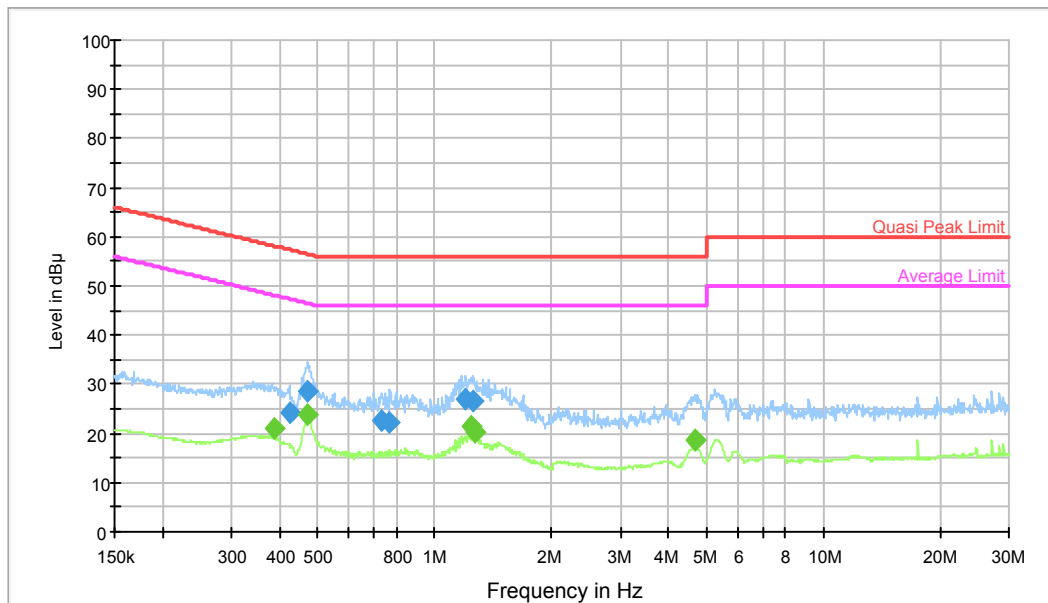
AC277 V, 60 Hz, Line:



Frequency (MHz)	Quasi Peak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.325411	28.4	9.000	N	19.7	31.2	59.6	Compliance
0.366812	28.3	9.000	N	19.7	30.3	58.6	Compliance
0.462379	31.1	9.000	N	19.7	25.5	56.6	Compliance
0.944785	22.9	9.000	N	19.7	33.1	56.0	Compliance
4.664642	27.1	9.000	N	19.7	28.9	56.0	Compliance
4.702033	26.8	9.000	N	19.7	29.2	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.331971	24.0	9.000	N	19.7	25.4	49.4	Compliance
0.372716	24.0	9.000	N	19.7	24.4	48.4	Compliance
0.466086	27.1	9.000	N	19.7	19.5	46.6	Compliance
0.886327	19.4	9.000	N	19.7	26.6	46.0	Compliance
4.609111	23.1	9.000	N	19.7	22.9	46.0	Compliance
4.702033	22.8	9.000	N	19.7	23.2	46.0	Compliance

AC277V, 60 Hz, Neutral:



Frequency (MHz)	Quasi Peak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.421816	24.1	9.000	N	19.7	33.3	57.4	Compliance
0.471701	28.4	9.000	N	19.7	28.1	56.5	Compliance
0.731772	22.4	9.000	N	19.7	33.6	56.0	Compliance
0.767680	22.2	9.000	N	19.7	33.8	56.0	Compliance
1.200483	27.1	9.000	N	19.7	28.9	56.0	Compliance
1.259391	26.7	9.000	N	19.7	29.3	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.384811	21.0	9.000	N	19.7	27.2	48.2	Compliance
0.471701	24.0	9.000	N	19.7	22.5	46.5	Compliance
1.239440	21.6	9.000	N	19.7	24.4	46.0	Compliance
1.264428	20.4	9.000	N	19.7	25.6	46.0	Compliance
4.683300	18.8	9.000	N	19.7	27.2	46.0	Compliance
4.702033	18.8	9.000	N	19.7	27.2	46.0	Compliance

FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS

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:

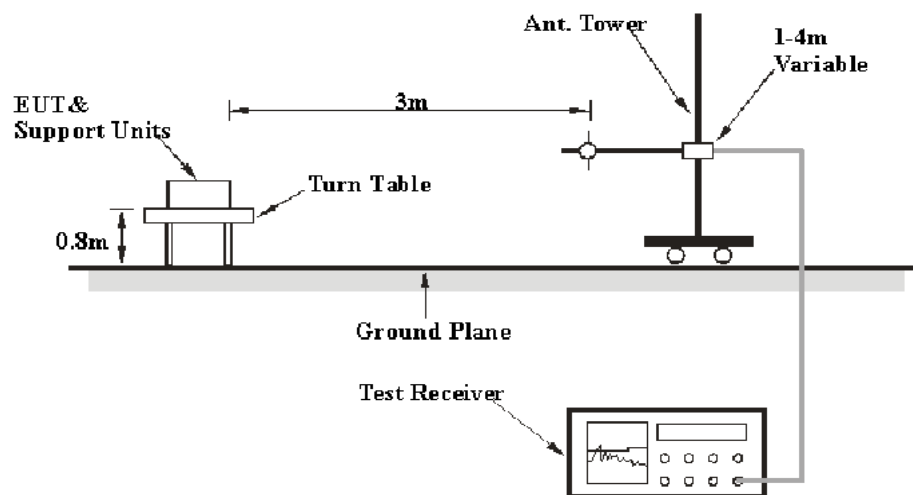
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

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

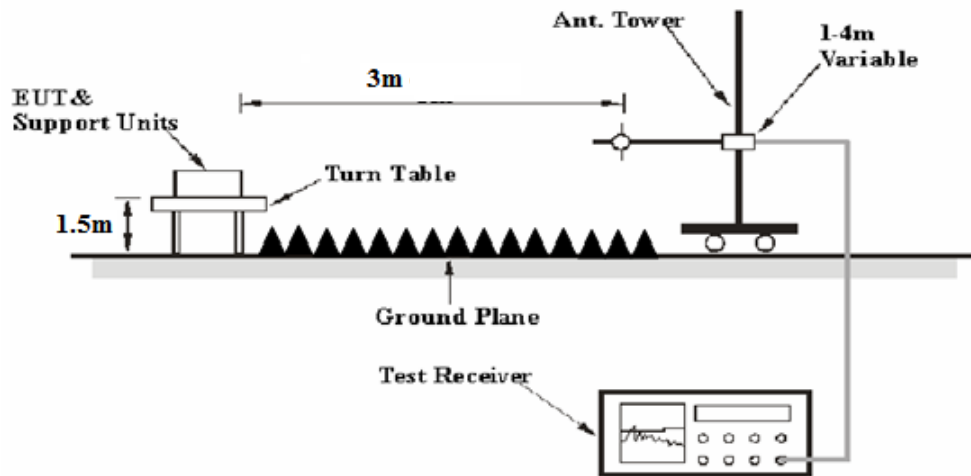
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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.

Test Equipment Setup

The system was investigated from 30 MHz to 40 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	Detector
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.

All data was recorded in the Quasi-peak detection mode from 30 MHz 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:

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

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2017-05-20	2018-05-19
EMCT	Semi-Anechoic Chamber	966	966-1	2015-04-24	2018-04-23
Unknown	RF Cable (below 1GHz)	Unknown	NO.1	2016-11-10	2017-11-09
Unknown	RF Cable (below 1GHz)	Unknown	NO.4	2016-11-10	2017-11-09
Unknown	RF Cable (above 1GHz)	Unknown	NO.2	2016-11-10	2017-11-09
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-011312	2016-08-18	2017-08-18
Quinstar	Amplifier	QLW-18405536-JO	15964001032	2016-08-18	2017-08-18
Agilent	Spectrum Analyzer	8564E	5943A01752	2016-08-18	2017-08-18

* **Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	58%
ATM Pressure:	98.6 kPa

The testing was performed by Lorin Bian on 2017-05-31.

Test Mode: Transmitting

30MHz-40GHz(120V/60Hz power supply is the worst):

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB(1/m))					
5764 MHz									
5764	52.89	PK	H	34.75	5.75	0.00	93.39	113.98	N/A
5764	27.28	AV	H	34.75	5.75	0.00	67.78	93.98	N/A
5764	58.99	PK	V	34.75	5.75	0.00	99.49	113.98	N/A
5764	32.65	AV	V	34.75	5.75	0.00	73.15	93.98	N/A
5725	28.34	PK	V	34.75	5.72	0.00	68.81	74.00	5.19
5725	12.06	AV	V	34.75	5.72	0.00	52.53	54.00	1.47
5875	28.67	PK	V	34.78	5.85	0.00	69.30	74.00	4.70
5875	11.97	AV	V	34.78	5.85	0.00	52.60	54.00	1.40
11528	41.25	PK	V	38.91	8.22	26.01	62.37	74.00	11.63
11528	21.26	AV	V	38.91	8.22	26.01	42.38	54.00	11.62
17292	39.83	PK	V	42.78	10.92	26.07	67.46	74.00	6.54
17292	19.73	AV	V	42.78	10.92	26.07	47.36	54.00	6.64
4346	35.69	PK	V	32.91	5.16	26.76	47.00	74.00	27.00
4346	23.17	AV	V	32.91	5.16	26.76	34.48	54.00	19.52
97.29	54.7	PK	H	9.99	0.47	28.32	36.84	43.50	6.66
103.94	52.6	AV	H	11.88	0.61	28.26	36.83	43.50	6.67

FCC §15.215(c) – 20 dB BANDWIDTH TESTING

Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2017-05-20	2018-05-19
EMCT	Semi-Anechoic Chamber	966	966-1	2015-04-24	2018-04-23
Unknown	RF Cable (above 1GHz)	Unknown	NO.2	2016-11-10	2017-11-09

* **Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Data

Environmental Conditions

Temperature:	25.4 °C
Relative Humidity:	35 %
ATM Pressure:	101.7 kPa

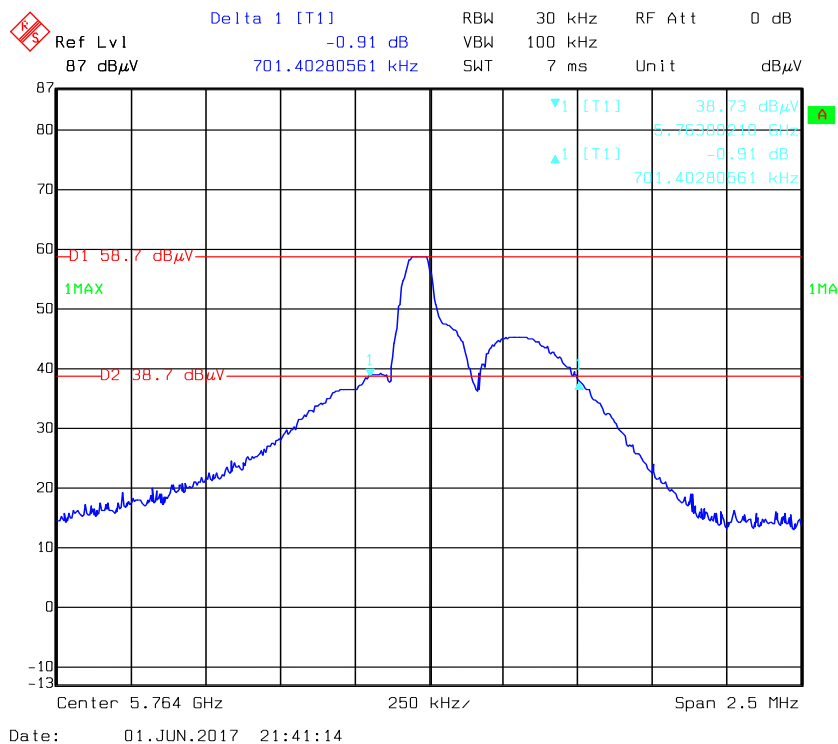
The testing was performed by Lorin Bian on 2017-06-01.

Test Result: Compliant.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency (MHz)	20 dB Bandwidth (MHz)
5764	0.701



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