Prüfbericht-Nr.: *Test report No.:*	**50153274 001**	**Auftrags-Nr.:** *Order No.:*	174083228	Seite 1 von 20 *Page 1 of 20*
Kunden-Referenz-Nr.: *Client reference No.:*	N/A	**Auftragsdatum:** *Order date.:*	30.05.2018	
Auftraggeber: *Client:*	**QC Manufacturing Inc.** 43352 Business Park Drive Temecula, CA			
Prüfgegenstand: *Test item:*	RF Hub			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	IT-RFHUB-01			
Auftrags-Inhalt: *Order content:*	FCC approval			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part 15: Subpart C Section 15.231 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 CFR47 FCC Part 2: Section 2.1091			

Wareneingangsdatum: *Date of receipt:*	30.05.2018	Please refer to photo documents
Prüfmuster-Nr.: *Test sample No.:*	A000742501-002	
Prüfzeitraum: *Testing period:*	06.06.2018 - 07.06.2018	
Ort der Prüfung: *Place of testing:*	TÜV Rheinland (Guangdong) Ltd.	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Guangdong) Ltd.	
Prüfergebnis*: *Test result*:*	Pass	

geprüft von / *tested by:*			**kontrolliert von** / *reviewed by:*		
22.06.2018	Storm Shu / Assistant Project Manager		25.06.2018	Amy Wang / Technical Certifier	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges / *Other:*

FCC ID: 2APQIIT-RFHUB-01

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged:*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhalt
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	1 = very good	2 = good	3 = satisfactory	4 = sufficient	5 = poor
	P(ass) = passed a.m. test specifications(s)		F(ail) = failed a.m. test specifications(s)	N/A = not applicable	N/T = not tested

Test Summary

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 FUNDAMENTAL & HARMONICS RADIATED EMISSION
RESULT: Pass

5.1.3 20DB BANDWIDTH
RESULT: Pass

5.1.4 DWELL TIME
RESULT: Pass

5.1.5 CONDUCTED EMISSION ON AC MAINS
RESULT: Pass

6.1.1 ELECTROMAGNETIC FIELDS
RESULT: Pass

Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Guangdong) Ltd.
No.102, 1F of Southwest and No.205, 2F No.767 Tianyuan Road, Tianhe District, Guangzhou 510663, Guangdong Province P.R. China

FCC Accreditation Designation No.: CN1207

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

For the measurement Equipment list, refer to the appendix B.

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Item		Extended Uncertainty
Conducted Emission		± 2.68 dB
Radiated Emission (30-1000MHz)	Field strength (dBμV/m)	± 5.16 dB
Radiated Emission (above 1000MHz)	Field strength (dBμV/m)	± 2.22 dB
Radio Spectrum		± 4.51 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Guangdong) Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Guangdong) Ltd. Test facility located at No.102, 1F of Southwest and No.205, 2F No.767 Tianyuan Road, Tianhe District, Guangzhou 510663, Guangdong Province P.R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is RF Hub operating in 433.92MHz. The EUT is powered by DC 3.0V.

Therefore, full tests were performed on IT-RFHUB-01.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	RF Hub
Type Designation	IT-RFHUB-01
FCC ID	2APQIIT-RFHUB-01
Operating Voltage	AC 120V, 60Hz
Testing Voltage	AC 120V
Type of Modulation	FSK
Channel Number	1 channel
Channel Separation	N/A
Antenna Type	Integral Antenna
Antenna number	1
Antenna Gain	0 dBi Max

3.3 Independent Operation Modes

The basic operation modes are:

A. On, Normal operation with general 433MHz mode
B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Block Diagram
- FCC/IC Label and Location Info
- Operation Description
- Photo Document
- Schematics
- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model IT-RFHUB-01 in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 3: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
N/A	N/A	N/A	N/A	N/A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

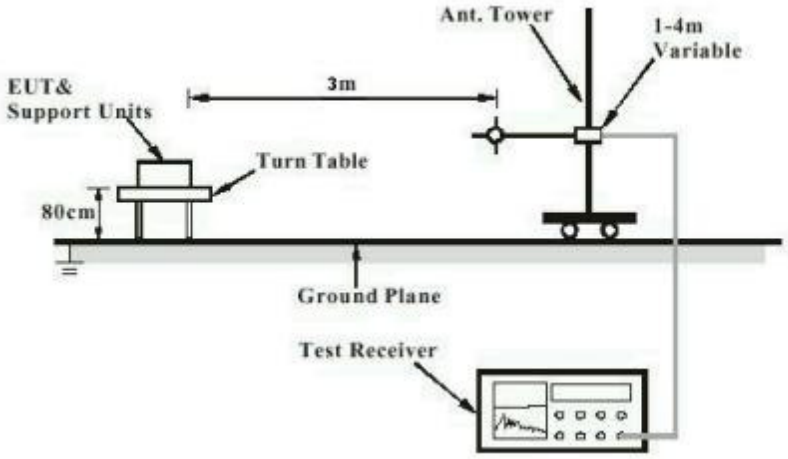


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

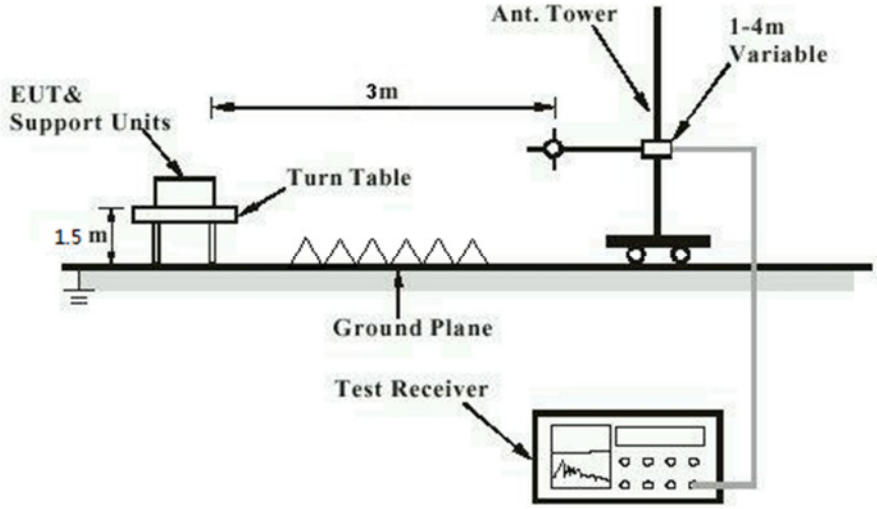


Diagram of Measurement Configuration for Mains Conduction Measurement

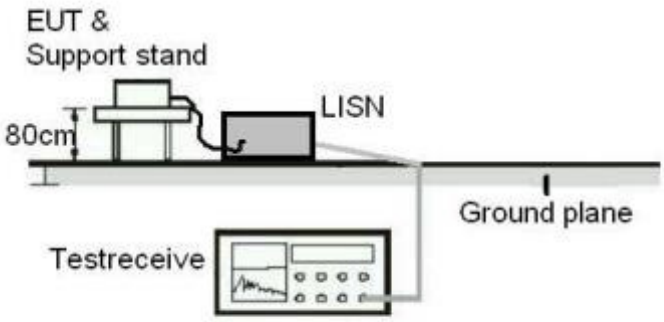
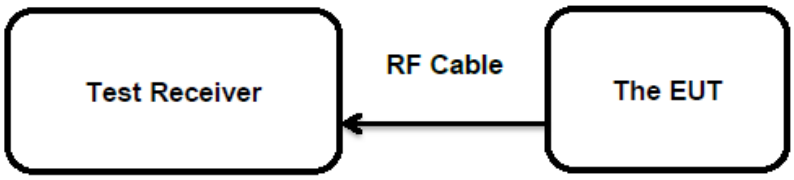


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard : FCC Part 15.247(b)(4) and Part 15.203

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 0 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Fundamental & Harmonics Radiated Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.231(b)
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to FCC Part 15.231(b) *
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	07.06.2018
Input voltage	:	AC 120V
Operation mode	:	A
Test channel	:	433MHz
Ambient temperature	:	22 ℃
Relative humidity	:	56 %
Atmospheric pressure	:	100 kPa

* Remark:

Fundamental Frequency MHz	Field Strength of Fundamental (dBµV/m @ 3 m)	Field Strength of Harmonics and Spurious Emissions (dBµV/m @ 3 m)
40.66 to 40.70	67.04	47.04
70 to 130	61.94	41.94
130 to 174	61.94 to 71.48	41.94 to 51.48
174 to 260	71.48	51.48
260 to 470	71.48 to 81.94	51.48 to 61.94
Above 470	81.94	61.94
Detector:	Peak for pre-scan	
	QP for 30MHz to1000 MHz:120 kHz resolution bandwidth	
	Peak for Above 1 GHz: 1 MHz resolution bandwidth	

linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

The fundamental frequency of the EUT is **433.92 MHz**

The limit for average or QP field strength dBuv/m for the fundamental emission= **80.8 dBµV/m**

No fundamental is allowed in the restricted bands.

The limit for average field strength dBuv/m for the spurious emission= **60.8 dBuV/m**. Spurious in the restricted bands must be less than 60.8 dBuV/m or 15.209, whichever limit permits a higher field strength.

5.1.3 20dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.231(c)
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	07.06.2018
Input voltage	:	AC 120V
Operation mode	:	A
Test channel	:	433MHz
Ambient temperature	:	22 ℃
Relative humidity	:	56 %
Atmospheric pressure	:	100 kPa

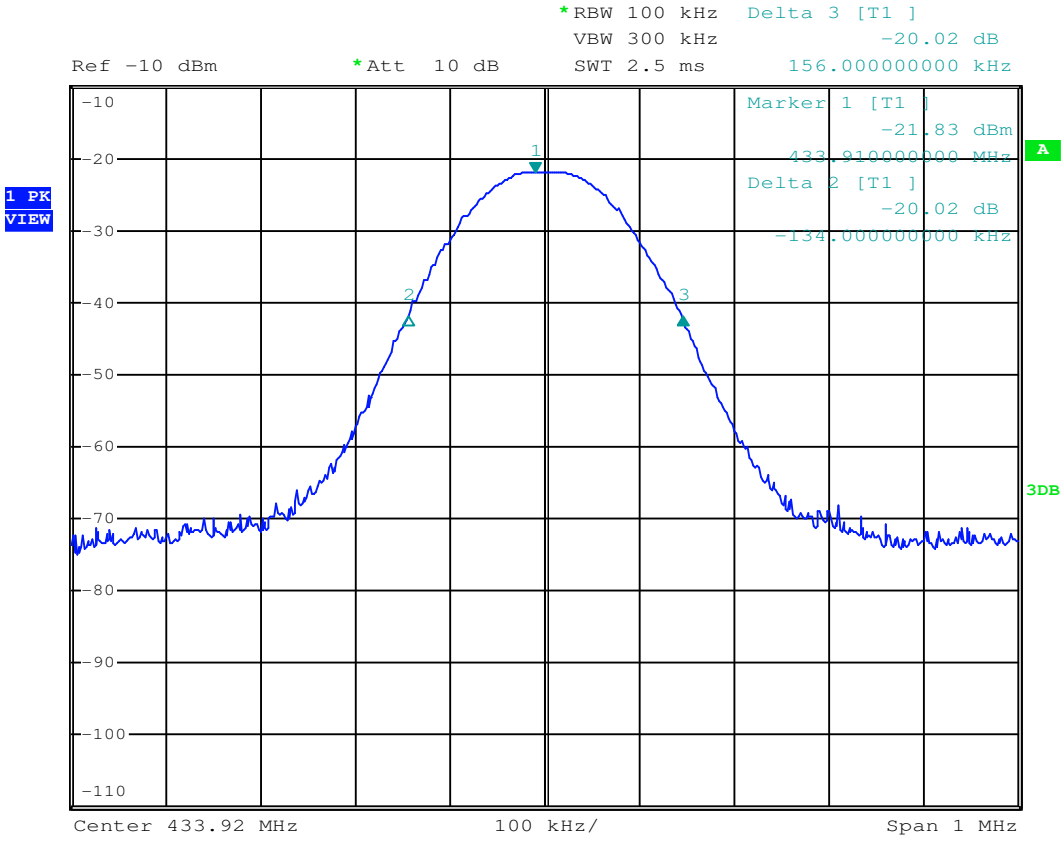
For details refer to following test result.

Table 4: Test Result of 20dB Bandwidth

Test Channel (MHz)	20dB Bandwidth (kHz)	Limit (MHz)
433.92	290.00	433.92 * 0.5% =2.1696

For the measurement records, refer to following test plot:

Test Plot of 20dB Bandwidth



5.1.4 Dwell Time

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.231(a)
Basic standard	:	ANSI C63.10: 2013
Limits	:	FCC Part 15.231(a)*
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	07.06.2018
Input voltage	:	AC 120V
Operation mode	:	A
Test channel	:	433MHz
Ambient temperature	:	22 ℃
Relative humidity	:	56 %
Atmospheric pressure	:	100 kPa

*Remark:

1. Regulation 15.231 (a) The provisions of this Section are restricted to periodic operation within the band 40.66 40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Radio control of toys is not permitted. Continuous transmissions, such as voice or video, and data transmissions are not permitted. The prohibition against data transmissions does not preclude the use of recognition codes. Those codes are used to identify the sensor that is activated or to identify the particular component as being part of the system.

Result:

The EUT is a remote switch without audio or video transmitted.

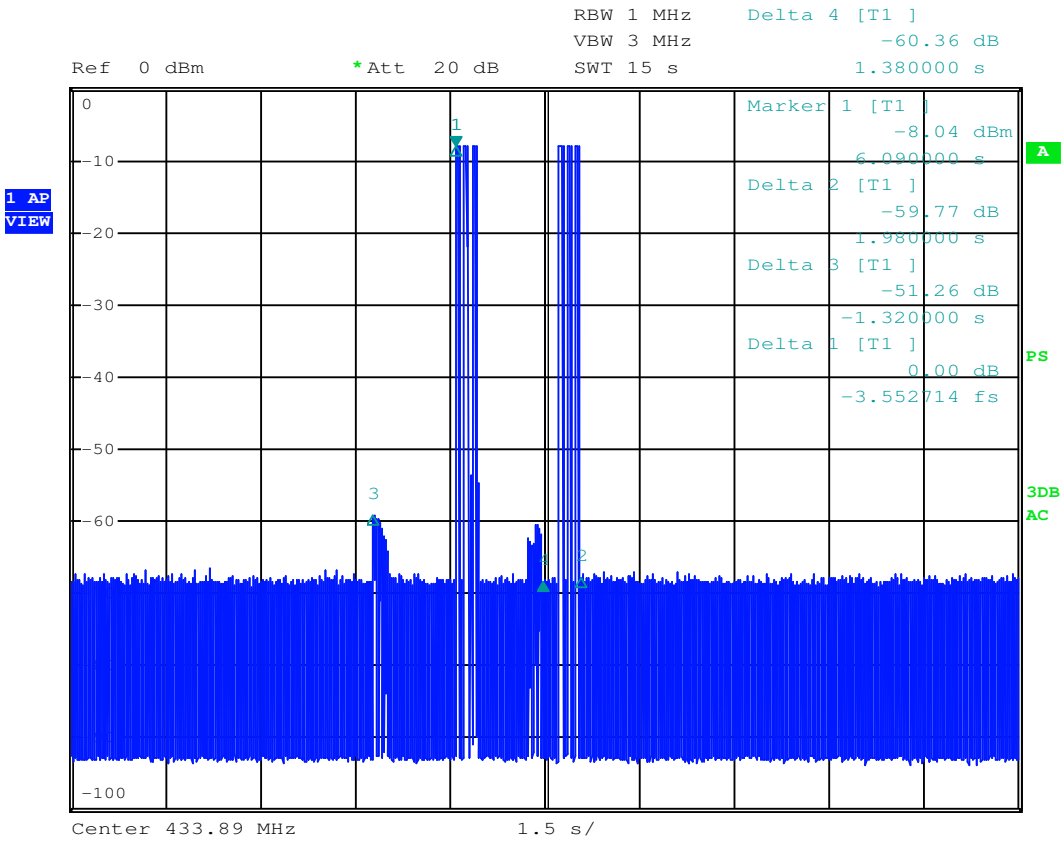
The EUT meets the requirements of this section.

2. Regulation 15.231 (a1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Result:

Carrier Frequency	Shutdown Time	Limit
433.92MHz	1.98s	≤5s

Result polt as follows:

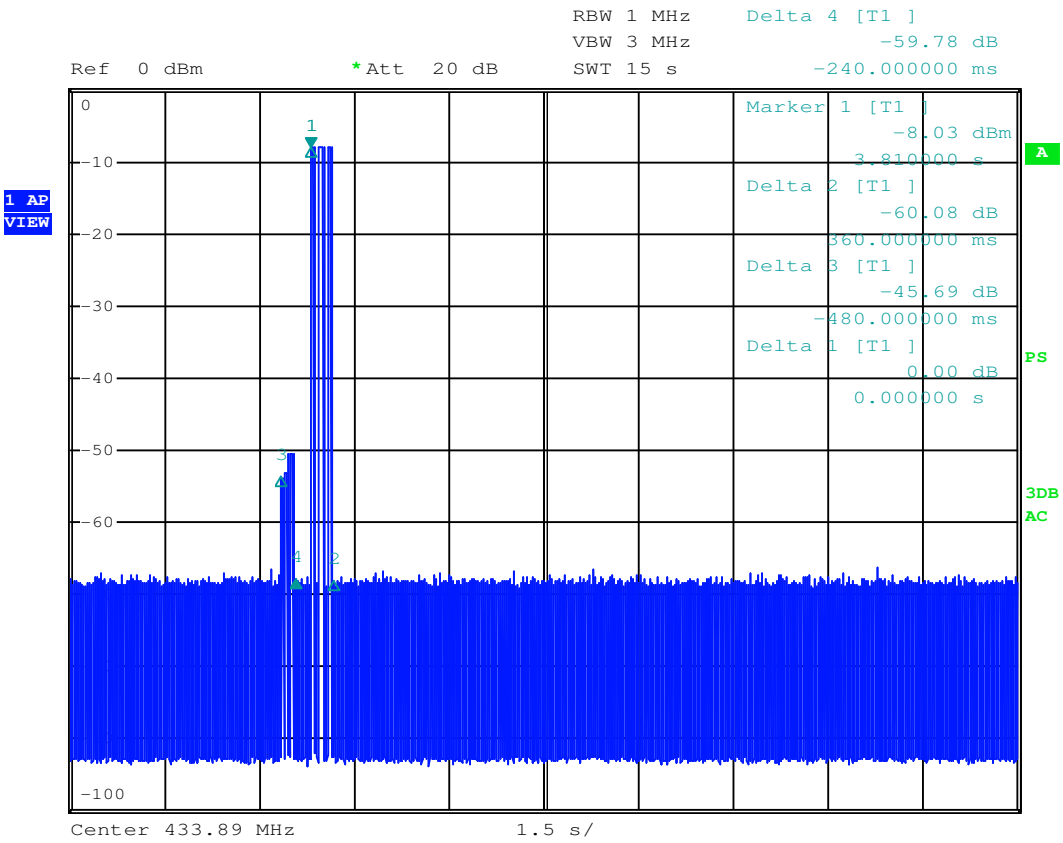


3. Regulation 15.231 (a2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Result:

Carrier Frequency	Shutdown Time	Limit
433.92MHz	360ms	≤5s

Result polt as follows:



4. Regulation15.231 (a3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

Result:

The EUT does not employ periodic transmission.

5. Regulation 15.231 (a4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

Result:

This section is not applicable to the EUT.

5.1.5 Conducted Emission on AC Mains

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.207(a)
Basic standard	:	ANSI C63.10: 2013
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	Refer to test result
Input voltage	:	AC 120V
Operation mode	:	A
Earthing	:	Not connected
Ambient temperature	:	25 ℃
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

6 Safety Human Exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT: **Pass**

Test Specification

Test standard : CFR47 FCC Part 2: Section 2.1093
CFR47 FCC Part 1: Section 1.1310
FCC KDB Publication 447498 D01 v06

➢ **FCC requirements**

FCC requirement: Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20cm normally can be maintained between the user and the device.

Measurement Record for CFR47 FCC Part 2.1093

The minimum distance for the EUT is less than 5mm.

The maximum specified e.i.r.p.: 76.164dBuv/m @3m = -19.06dBm=0.0064mW

Antenna Gain: 0dBi max

According to KDB 447498 D01 v06 4.3.1 a)

Exempted Power: 9.5mW, hence the EUT is compliance with the RF exposure.

The minimum distance for the EUT is less than 5mm.

The maximum specified e.i.r.p.: 76.164dBuv/m @3m = -16.07dBm=0.0064mW

7 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

8 List of Tables

Appendix B: Test Results

Appendix B.1: Measurement Equipment List

TÜVRheinland®
Precisely Right.

Measurement Equipment List

Testing Start Date	06.06.2018
Testing end date	07.06.2018
Project Manager	Storm Shu
Cost Center	144
Test Report Number	50153274 001
Order Item Number	0174083228A00030
Customer	
Product Name	RF Hub
Comment	

Page 1 of 1

Old ID	Equip.	Description	Model	Manufacturer	Inte. (mon)	Due Date
1.887	1813944	EMI Test Receiver	ESCI	Rohde & Schwarz	12	16.03.2019
1.886	1813943	Two-Line V-Network	ENV216	Rohde & Schwarz	12	07.05.2019
1.807	1813832	EMI Test Receiver	ESCI	Rohde & Schwarz	12	18.09.2018
1.805	1813829	FSP30 Spectrum Analyzer	FSP30	Rohde & Schwarz	12	16.03.2019
1.921B	1814142	Trilog Broadband Antenna	VULB9168(6dB)	SCHWARZBECK	24	20.09.2018
1.822	1813850	Loop Antenna	HFH2-Z2	Rohde & Schwarz	24	14.03.2019
1.889C	1814199	Double-Ridged Horn Antenna	HF907(3s	Rohde & Schwarz	24	27.10.2018
1.808	1813833	Horn Antenna	3160-09	EMCO	60	29.07.2019
1.819C	1814068	Pre-Amplifier	A44-00101800-25-10P-	MITEQ	12	16.03.2019
1.819A	1813846	Band Reject Filter	BRM50702	Micro-Tronics	24	07.07.2018
1.808A	1813834	Pre-Amplifier	A33-18002650-30-8P-4	MITEQ	24	20.07.2019
1.666	1813697	SAC	N/A	Albatross Project	36	04.08.2020
1.913	1814012	Shielding Room	9x4x3.4	Changzhou Yuanping	60	06.12.2020

* No entry for devices that are not subject to regular gauging or calibration

Signature: Storm Shu

Note: Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 5GHz were reported.

Appendix B.2: Fundamental & Harmonics Radiated Emission

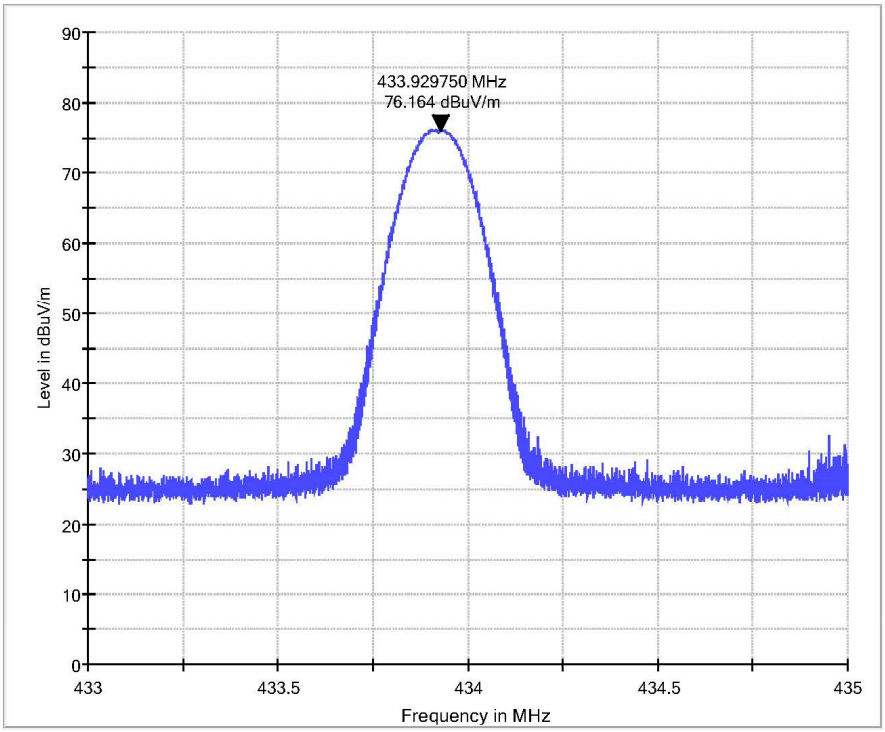
30MHz - 1GHz

TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

EMC Test Record (Emission)

Common Information

Manufacturer:	Innovation
Test Item:	IT-RFHUB-01
Identification:	RF Hub
Test Standard:	FCC Part 15
Test Detail:	Radiated Emission
Operation Mode:	Transmitter (433MHz)
Climate Condition:	21 ℃, 52 %, 101
Test Voltage/ Freq:	AC 120V,60Hz
Receipt No:	174083228
Report No:	/
Result:	Pass
Comment:	Test distance is 3m; Horizontal
Subrange 1	
Frequency range:	30-1000MHz
Receiver:	ESCI 3
Transducer:	VULB9168



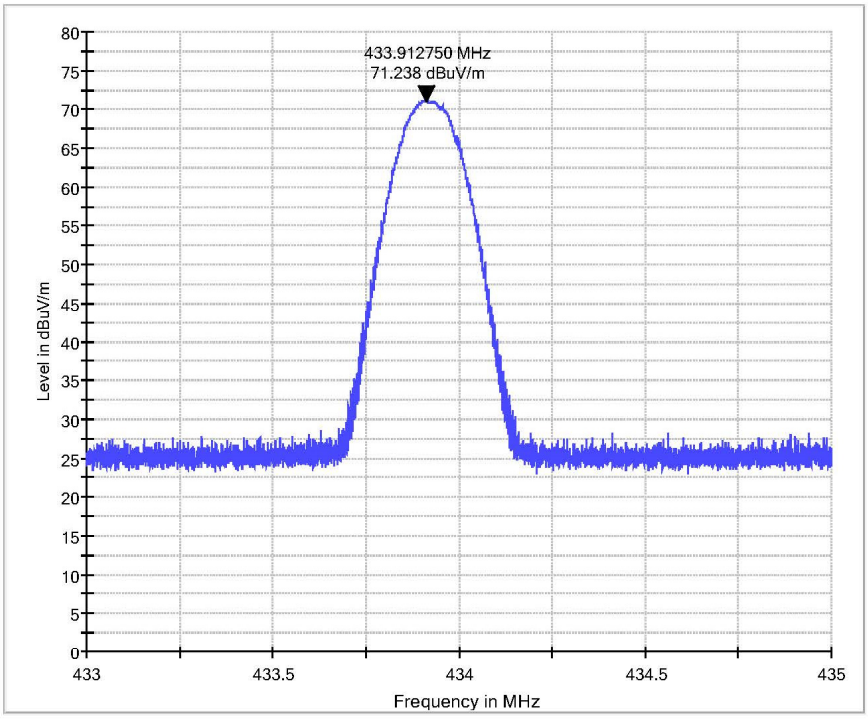
Tested by: Chris Liang 20180607 Reviewed by: Jacky chen 20180608

TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

EMC Test Record (Emission)

Common Information

Manufacturer:	Innovation
Test Item:	IT-RFHUB-01
Identification:	RF Hub
Test Standard:	FCC Part 15
Test Detail:	Radiated Emission
Operation Mode:	Transmitter (433MHz)
Climate Condition:	21 ℃, 52 %, 101
Test Voltage/ Freq:	AC 120V,60Hz
Receipt No:	174083228
Report No:	/
Result:	Pass
Comment:	Test distance is 3m;Vertical
Subrange 1	
Frequency range:	30-1000MHz
Receiver:	ESCI 3
Transducer:	VULB9168



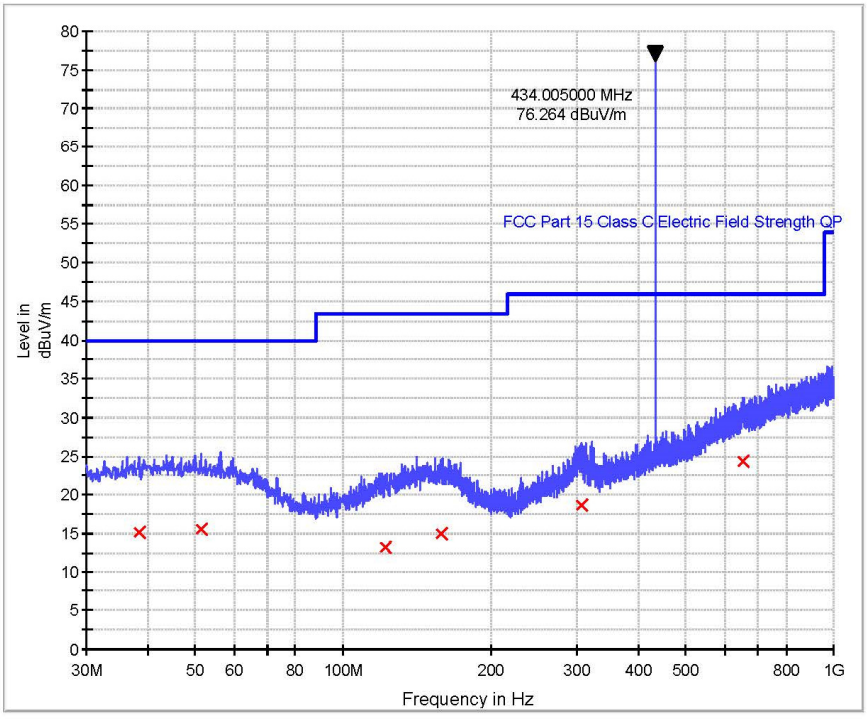
Tested by: Chris Liang 20180607 Reviewed by: Jacky chen 20180608

TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

EMC Test Record (Emission)

Common Information

Manufacturer:	Innovation
Test Item:	IT-RFHUB-01
Identification:	RF Hub
Test Standard:	FCC Part 15
Test Detail:	Radiated Emission
Operation Mode:	Transmitter (433MHz)
Climate Condition:	21 ℃, 52 %, 101 kPa
Test Voltage/ Freq:	AC 120V,60Hz
Receipt No:	174083228
Report No:	/
Result:	Pass
Comment:	Test distance is 3m; Horizontal
Subrange 1	
Frequency range:	30M-1000MHz
Receiver:	ESCI 3
Transducer:	VULB9168



Tested by: Chris Liang 20180607 Reviewed by: Jacky Chen 20180608

TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)	Comment
38.360000	15.2	1000.0	120.000	H	19.4	24.8	40.0	
51.320000	15.5	1000.0	120.000	H	19.4	24.5	40.0	
121.800000	13.3	1000.0	120.000	H	17.5	30.2	43.5	
159.000000	15.1	1000.0	120.000	H	19.3	28.4	43.5	
306.560000	18.6	1000.0	120.000	H	19.0	27.4	46.0	
656.000000	24.4	1000.0	120.000	H	27.2	21.6	46.0	

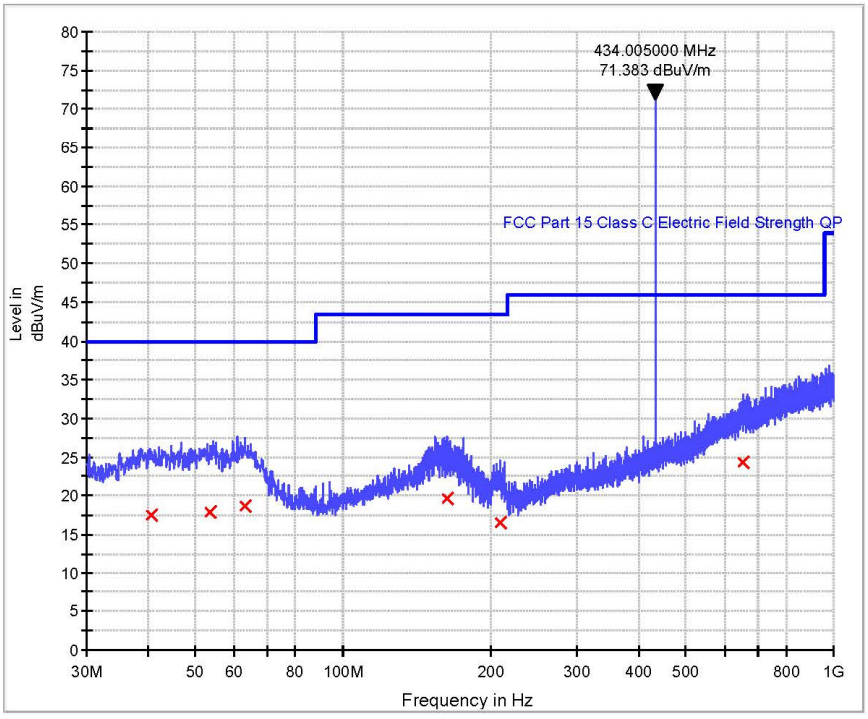
Tested by: Chris Liang 20180607 Reviewed by: Jacky Chen 20180608

TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

EMC Test Record (Emission)

Common Information

Manufacturer:	Innovation
Test Item:	IT-RFHUB-01
Identification:	RF Hub
Test Standard:	FCC Part 15
Test Detail:	Radiated Emission
Operation Mode:	Transmitter (433MHz)
Climate Condition:	21 ℃, 52 %, 101
Test Voltage/ Freq:	AC 120V,60Hz
Receipt No:	174083228
Report No:	/
Result:	Pass
Comment:	Test distance is 3m; Vertical
Subrange 1	
Frequency range:	30M-1000MHz
Receiver:	ESCI 3
Transducer:	VULB9168



Tested by: Chris Liang 20180607 Reviewed by: Jacky Chen 20180608

TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)	Comment
40.680000	17.6	1000.0	120.000	V	19.7	22.4	40.0	
53.760000	17.9	1000.0	120.000	V	19.2	22.1	40.0	
63.120000	18.8	1000.0	120.000	V	18.3	21.2	40.0	
163.360000	19.7	1000.0	120.000	V	19.2	23.8	43.5	
209.440000	16.6	1000.0	120.000	V	15.5	27.0	43.5	
654.560000	24.4	1000.0	120.000	V	27.3	21.6	46.0	

Tested by: Chris Liang 20180607 Reviewed by: Jacky chen 20180608

1GHz - 5GHz

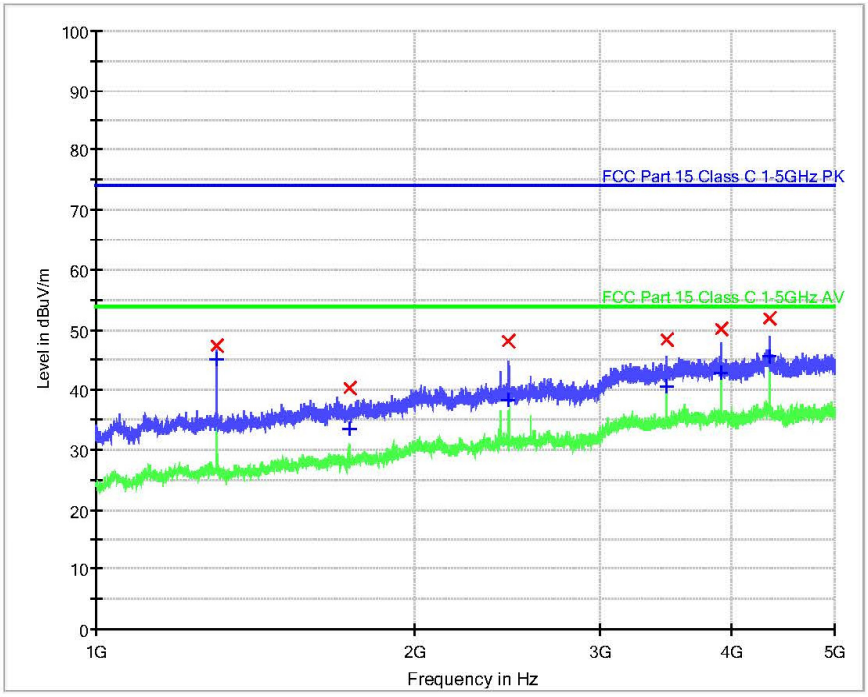
TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

EMC Test Record (Emission)

Common Information

Manufacturer:	Innovation
Test Item:	IT-RFHUB-01
Identification:	RF Hub
Test Standard:	FCC Part 15
Test Detail:	Radiated Emission
Operation Mode:	Transmitter (433MHz)
Climate Condition:	21 ℃, 52 %, 101
Test Voltage/ Freq:	AC 120V,60Hz
Receipt No:	174083228
Report No:	/
Result:	Pass
Comment:	Horizontal
Subrange 1	
Frequency Range:	1GHz-5GHz
Receiver:	TUV FSP30
Transducer:	TUV SAC HF907/ TUV

EMCTT_EREF011-A02-06_1GHz-18GHz_With PreAMP EXT& Hight-pass filter



Tested by: Chris Liang 20180607 Reviewed by: Jacky Chen 20180608

TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

Limit and Margin PK

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Comment
1301.500000	47.2	1000.0	1000.000	H	-16.0	26.8	74.0	
1735.500000	40.4	1000.0	1000.000	H	-13.7	33.6	74.0	
2460.000000	48.0	1000.0	1000.000	H	-10.2	26.0	74.0	
3471.500000	48.4	1000.0	1000.000	H	-7.0	25.6	74.0	
3905.500000	50.2	1000.0	1000.000	H	-5.9	23.8	74.0	
4339.500000	51.9	1000.0	1000.000	H	-4.0	22.1	74.0	

Limit and Margin AV

Frequency (MHz)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBuV/m)	Comment
1301.500000	45.2	1000.0	1000.000	H	-16.0	8.8	54.0	
1735.500000	33.4	1000.0	1000.000	H	-13.7	20.6	54.0	
2460.000000	38.3	1000.0	1000.000	H	-10.2	15.7	54.0	
3471.500000	40.5	1000.0	1000.000	H	-7.0	13.5	54.0	
3905.500000	42.9	1000.0	1000.000	H	-5.9	11.1	54.0	
4339.500000	45.7	1000.0	1000.000	H	-4.0	8.3	54.0	

Tested by: Chris Liang 20180607 Reviewed by: Jacky Chen 20180608

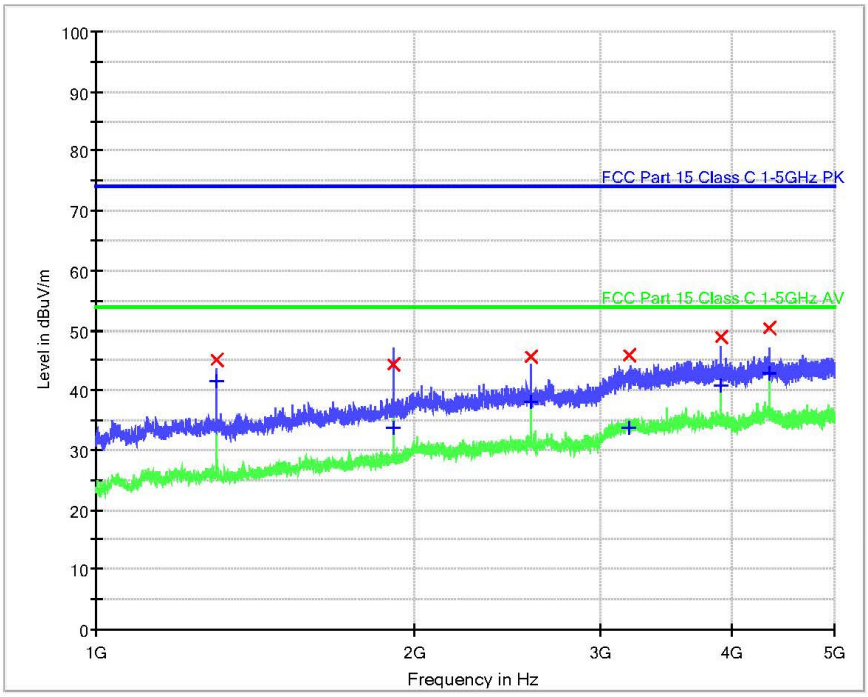
TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

EMC Test Record (Emission)

Common Information

Manufacturer:	Innovation
Test Item:	IT-RFHUB-01
Identification:	RF Hub
Test Standard:	FCC Part 15
Test Detail:	Radiated Emission
Operation Mode:	Transmitter (433MHz)
Climate Condition:	21 ℃, 52 %, 101
Test Voltage/ Freq:	AC 120V,60Hz
Receipt No:	174083228
Report No:	/
Result:	Pass
Comment:	Vertical
Subrange 1	
Frequency Range:	1GHz-5GHz
Receiver:	TUV FSP30
Transducer:	TUV SAC HF907/ TUV

EMCTT_EREF011-A02-06_1GHz-18GHz_With PreAMP EXT& Hight-pass filter



Tested by: Chris Liang 20180607 Reviewed by: Jacky Chen 20180608

TUV Rheinland (Guangdong) Ltd.

EMC Test Service Hotline: +86-20-28391188

Limit and Margin QP

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Comment
1301.500000	45.0	1000.0	1000.000	V	-16.0	29.0	74.0	
1914.500000	44.4	1000.0	1000.000	V	-12.5	29.7	74.0	
2582.000000	45.5	1000.0	1000.000	V	-9.5	28.5	74.0	
3198.500000	45.8	1000.0	1000.000	V	-7.0	28.2	74.0	
3905.500000	48.9	1000.0	1000.000	V	-5.9	25.1	74.0	
4339.500000	50.3	1000.0	1000.000	V	-4.0	23.7	74.0	

Limit and Margin AV

Frequency (MHz)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBuV/m)	Comment
1301.500000	41.7	1000.0	1000.000	V	-16.0	12.3	54.0	
1914.500000	33.8	1000.0	1000.000	V	-12.5	20.2	54.0	
2582.000000	38.0	1000.0	1000.000	V	-9.5	16.0	54.0	
3198.500000	33.6	1000.0	1000.000	V	-7.0	20.4	54.0	
3905.500000	40.9	1000.0	1000.000	V	-5.9	13.1	54.0	
4339.500000	42.9	1000.0	1000.000	V	-4.0	11.1	54.0	

Tested by: Chris Liang 20180607 Reviewed by: Jacky Chen 20180608

Appendix B.3: Conducted Emission on AC Mains

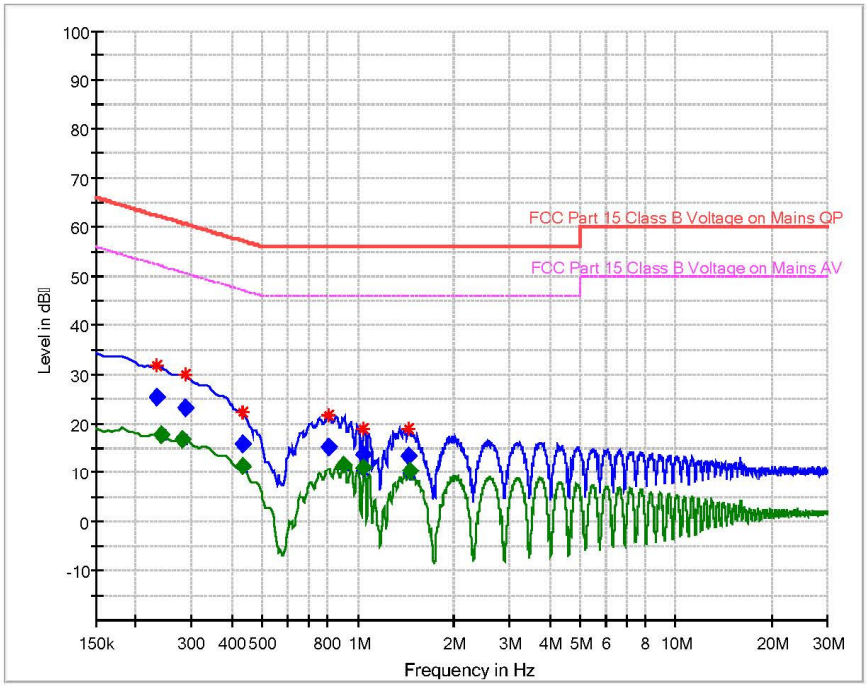
TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

EMC Test Record (EMISSION)

Common Information

Manufacturer:	Innovation
Test Item:	IT-RFHUB-01
Identification:	RF Hub
Test Standard:	FCC Part 15
Test Detail:	Conducted Emission
Operation Mode:	A
Climate Condition:	20 ℃, 50 %, 100 k Pa
Test Voltage/ Freq.:	AC 120V/60Hz
Port / Line:	AC mains
Receipt No.:	174083228
Report No.:	/
Result:	Pass
Comment:	/
Hardware Setup:	1phase LISN ENV216 to ESCI 3
Level Unit:	dBµV

Subrange	Detectors	IF Bandwidth	Step Size	Meas. Time	Receiver
150kHz - 30MHz	Peak; Average	9kHz	4.5kHz	10ms	ESCI 3



Tested by: Chris Liang 20180607 Reviewed by: Jacky chen 20180607

TUV Rheinland (Guangdong) Ltd. EMC Test Service Hotline: +86-20-28391188

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.231000	25.28	---	62.41	37.14	1000.	9.000	N	OFF	9.6
0.240000	---	17.81	52.10	34.28	1000.	9.000	L1	OFF	9.6
0.280500	---	16.89	50.80	33.91	1000.	9.000	L1	OFF	9.6
0.285000	23.42	---	60.67	37.25	1000.	9.000	N	OFF	9.6
0.433500	---	11.26	47.19	35.93	1000.	9.000	L1	OFF	9.6
0.433500	15.76	---	57.19	41.43	1000.	9.000	N	OFF	9.6
0.807000	15.25	---	56.00	40.75	1000.	9.000	N	OFF	9.6
0.901500	---	11.55	46.00	34.45	1000.	9.000	L1	OFF	9.6
1.041000	13.90	---	56.00	42.10	1000.	9.000	N	OFF	9.6
1.041000	---	10.89	46.00	35.11	1000.	9.000	L1	OFF	9.6
1.446000	13.53	---	56.00	42.47	1000.	9.000	N	OFF	9.6
1.450500	---	10.26	46.00	35.74	1000.	9.000	L1	OFF	9.6

Tested by: Chris Liang 20180607 Reviewed by: Jacky chen 20180607