FCC TEST REPORT

Test report
On Behalf of
Shenzhen Kalewa IoT Technology Co.,Ltd.
For
Temperature Data Logger
Model No.:TDL2F-1

FCC ID: 2ATECTDL2F-1

Prepared for :	**Shenzhen Kalewa IoT Technology Co.,Ltd.** **Room C605-606, Shenzhen Virtual University Park,Building 2,Yue Xing 3rd Road, Nanshan District, Shenzhen,Guangdong,P.R.China 518057.**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China**
Date of Test:	**May 13, 2019~May 22, 2019**
Date of Report:	**May 22, 2019**
Report Number:	**HK1905131001-2E**

TEST RESULT CERTIFICATION

Applicant's name ..... :	Shenzhen Kalewa IoT Technology Co.,Ltd.
Address ..... :	Room C605-606, Shenzhen Virtual University Park,Building 2,Yue Xing 3rd Road, Nanshan District, Shenzhen,Guangdong,P.R.China 518057.
Manufacture's Name ..... :	Shenzhen Kalewa IoT Technology Co.,Ltd.
Address ..... :	Room C605-606, Shenzhen Virtual University Park,Building 2,Yue Xing 3rd Road, Nanshan District, Shenzhen,Guangdong,P.R.China 518057.

Product description

Product name ..... :	Temperature Data Logger
Trade Mark ..... :	N/A
Model and/or type reference :	TDL2F-1
Standards ..... :	FCC Rules and Regulations Part 15 Subpart C Section 15.249 ANSI C63.10: 2013

This device described above has been tested by Shenzhen HUAK Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of UNI, this document may be altered or revised by Shenzhen HUAK Testing Technology Co., Ltd., personnel only, and shall be noted in the revision of the document.

Date of Test ..... :	
Date (s) of performance of tests ..... :	May 13, 2019~May 22, 2019
Date of Issue ..... :	May 22, 2019
Test Result ..... :	Pass

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

Table of Contents **Page**

1 TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
AC Power Line Conducted Emission	N/A
Field Strength of Fundamental	COMPLIANT
Spurious Emissions	COMPLIANT
Band Edge	COMPLIANT
20dB Occupied Bandwidth	COMPLIANT
Antenna requirement	COMPLIANT

1.2 TEST FACILITY

Test Firm : Shenzhen HUAK Testing Technology Co., Ltd.

Address : 1/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

CNAS-LAB Code: L9589

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of testing Laboratories.

Designation Number: CN1229

Test Firm Registration Number: 616276

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files.

1.3 MEASUREMENT UNCERTAINTY

Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	=	4.06dB, k=2

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Temperature Data Logger
Trade Mark	N/A
Model Name	TDL2F-1
Serial No.	N/A
Model Difference	N/A
FCC ID	2ATECTDL2F-1
Antenna Type	PCB Antenna
Antenna Gain	0dBi
Operation frequency	915MHz
Number of Channels	1CH
Modulation Type	ASK
Battery	N/A
Power Source	DC 3V
Adapter Model	N/A

2.2 Carrier Frequency of Channels

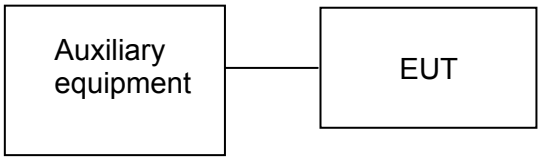
Operation Frequency each of channel	
Channel	Frequency
01	915MHz

2.3 Operation of EUT during testing

Operating Mode
The mode is used: Transmitting mode

2.4 DESCRIPTION OF TEST SETUP

Operation of EUT during testing:



Setup: Transmission mode

Table for auxiliary equipment:

Equipment Description	Manufacturer	Model	Calibration Due Date
N/A	N/A	N/A	N/A

2.5 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
CONDUCTED EMISSIONS TEST					
1	LISN	R&S	ENV216	HKE-002	2019.12.26
2	LISN	R&S	ENV216	HKE-029	2019.12.26
3	EMI Test Receiver	R&S	ESCI-7	HKE-010	2019.12.26
RADIATED EMISSION TEST					
1	Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	2019.12.26
2	Horn antenna	Schwarzbeck	9120D	HKE-013	2019.12.26
3	Receiver	R&S	ESCI 7	HKE-010	2019.12.26
4	Position controller	Taiwan MF	MF7802	HKE-011	2019.12.26
5	Preamplifier	EMCI	EMC051845SE	HKE-015	2019.12.26
6	Preamplifier	Agilent	83051A	HKE-016	2019.12.26
7	High pass filter unit	Tonscend	JS0806-F	HKE-055	2019.12.26
8	Spectrum analyzer	Agilent	N9020A	HKE-048	2019.12.26
9	Spectrum analyzer	Agilent	N9020A	HKE-048	2019.12.26
10	Signal generator	Agilent	83630A	HKE-028	2019.12.26
11	Signal generator	Agilent	N5182A	HKE-029	2019.12.26
12	RF automatic control unit	Tonscend	JS0806-2	HKE-060	2019.12.26
13	Power meter	Agilent	E4419B	HKE-085	2019.12.26

3 CONDUCTED EMISSION TEST

3.1 Test Limit

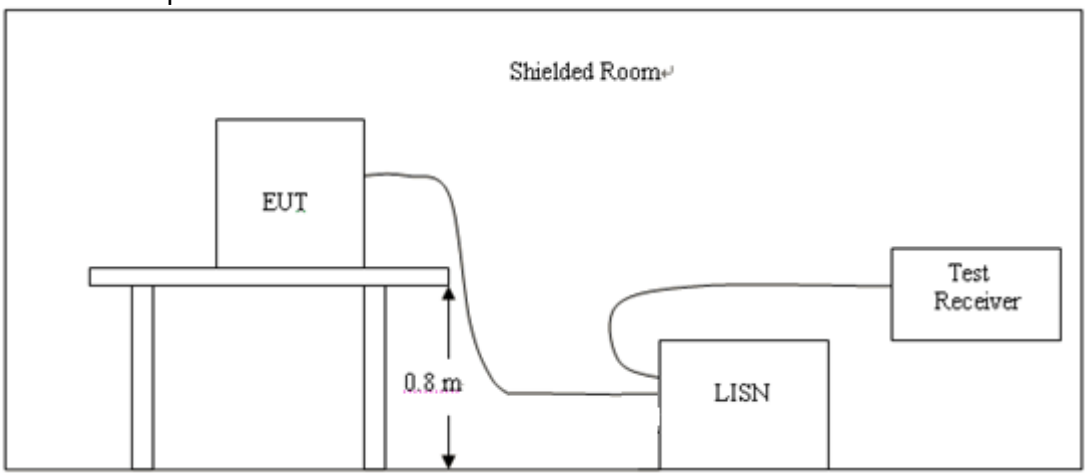
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage(dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15~0.50	79	66	66~56*	56~46*
0.50~5.00	73	60	56	46
5.00~30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 Test Setup



3.3 Test Procedure

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. A wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer/Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

3.4 Test Result

N/A

Test product is test by DC power supply, Not applicable.

4 RADIATED EMISSION TEST

4.1 Test Limit

1. Limit (Field strength of the fundamental signal):

Frequency	Limit(dBuV/m@3m)	Remark
902MHz-928MHz	94.00	Average Value
	114.00	Peak Value

2. Limit (Spurious Emissions):

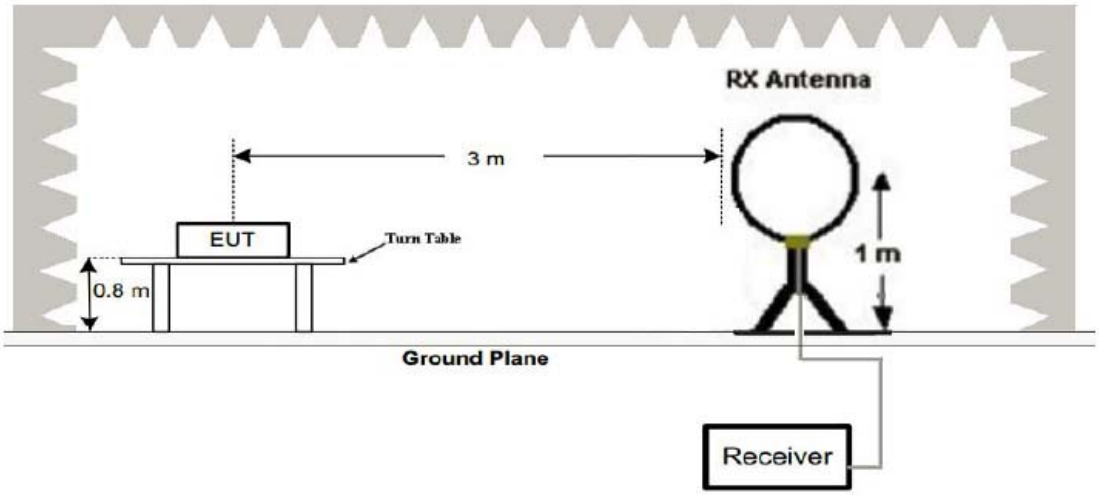
Frequency	Limit(dBuV/m@3m)	Remark
0.009-0.490	2400/F(KHz)	Quasi-peak Value
0.490-1.705	24000/F(KHz)	Quasi-peak Value
1.705-30	30	Quasi-peak Value
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

3. Limit (Band edge):

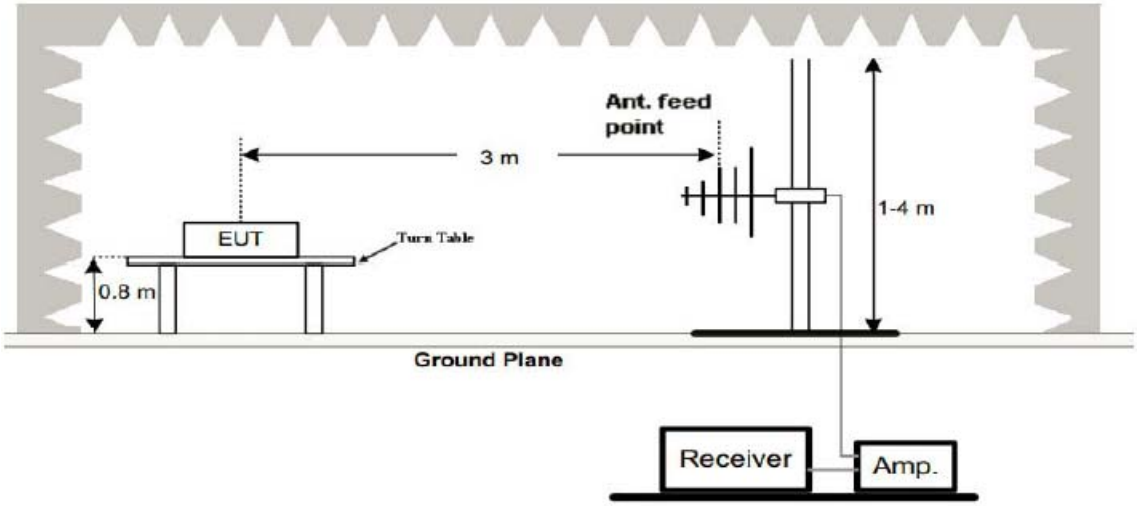
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

4.2 Test Setup

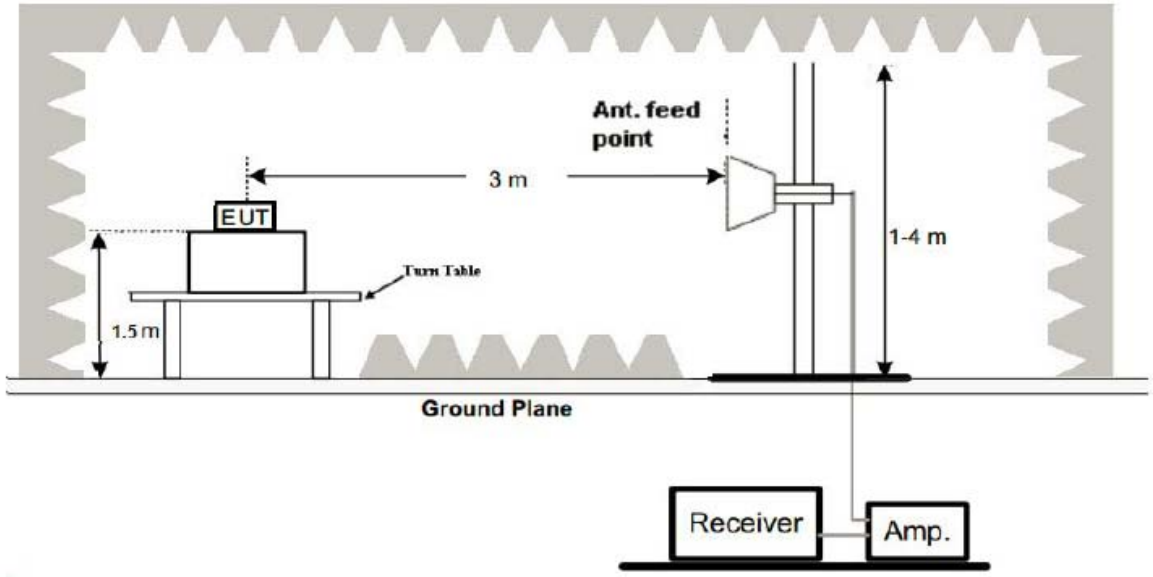
1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency 30MHz~1GHz



3. Radiated Emission Test-Up Frequency Above 1GHz



4. Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

4.3 Test Procedure

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber in below 1GHz, 1.5m above the ground in above 1GHz. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

4.4 Test Result

Field Strength of Fundamental:

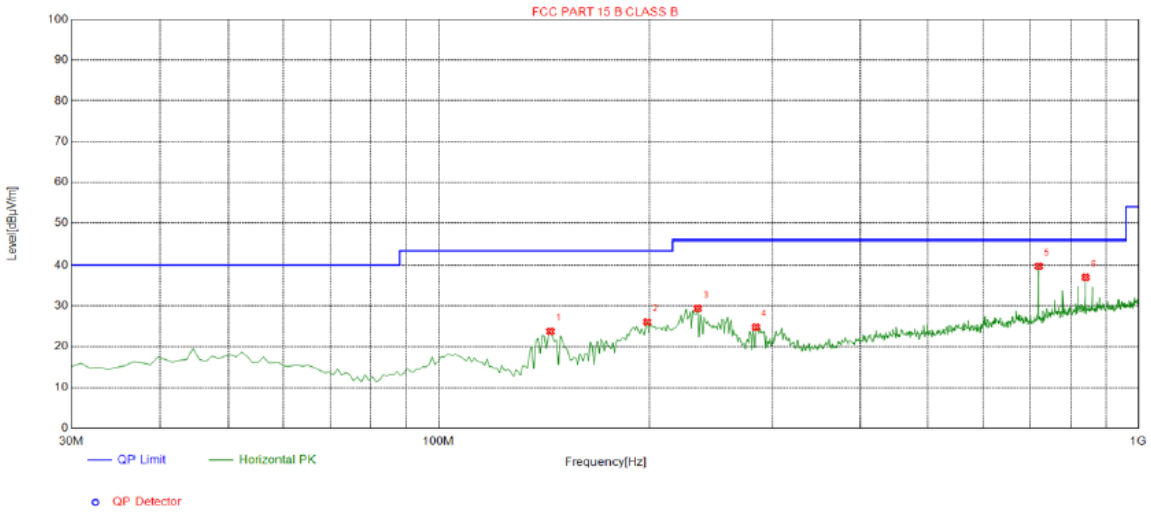
Frequency (MHz)	Emission PK/AV (dBuV/m)	Ant. Pol.	Limits PK/AV (dBuV/m)	Margin (dB)	Detector
915	94.39	H	114	-19.61	PK
915	81.73	H	94	-12.27	AV
915	94.57	V	114	-19.44	PK
915	81.95	V	94	-12.05	AV

Harmonics and Spurious Emissions
Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
--	--	--
--	--	--
--	--	--
--	--	--

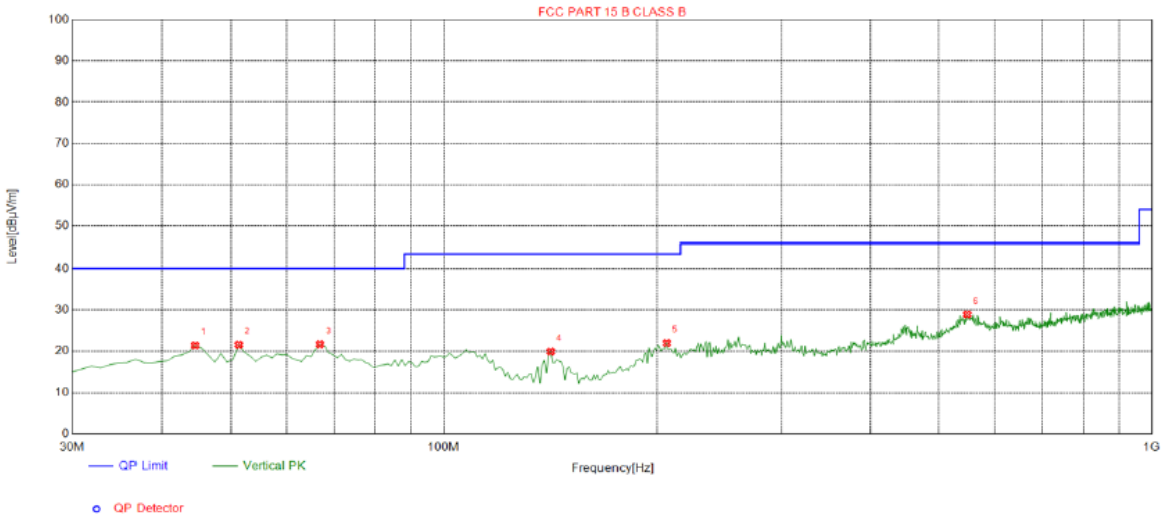
Note: *1. Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor*
2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

For 30MHz-1GHz Test Results:



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	144.460	23.75	-19.07	43.50	19.75	100	12	Horizontal
2	198.780	26.09	-15.18	43.50	17.41	100	15	Horizontal
3	234.670	29.33	-14.10	46.00	16.67	100	169	Horizontal
4	284.140	24.81	-13.08	46.00	21.19	100	166	Horizontal
5	720.640	39.77	-4.70	46.00	6.23	100	207	Horizontal
6	840.920	37.02	-2.57	46.00	8.98	100	21	Horizontal

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	44.5500	21.41	-13.73	40.00	18.59	100	319	Vertical
2	51.3400	21.57	-13.85	40.00	18.43	100	268	Vertical
3	66.8600	21.67	-16.88	40.00	18.33	100	221	Vertical
4	141.550	19.93	-19.14	43.50	23.57	100	256	Vertical
5	206.540	21.95	-14.89	43.50	21.55	100	133	Vertical
6	548.950	28.88	-6.99	46.00	17.12	100	55	Vertical

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

For Above 1GHz Test Results:

Frequency (MHz)	Ant. Pol.	PK Reading (dBμV)	AV Reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin Peak(dB)
					Peak (dBμV/m)	AV (dBμV/m)			
1830	H	50.94	---	-4.12	46.82	---	74	54	-27.18
2745	H	50.57	---	-0.58	49.99	---	74	54	-24.01
1830	V	55.48	---	-4.17	51.31	---	74	54	-22.69
2745	V	51.08	---	-0.58	50.50	---	74	54	-23.50

Note:
1. Emission Level = Peak Reading + Correction Factor; Correction Factor = Antenna Factor + Cable loss – Pre-amplifier
2. Margin = Emission - Limit
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
5. Data of measurement shown "---" in the above table mean that the reading of emissions is attenuated more than 20dB below the limits or the field strength is too small to be measured.

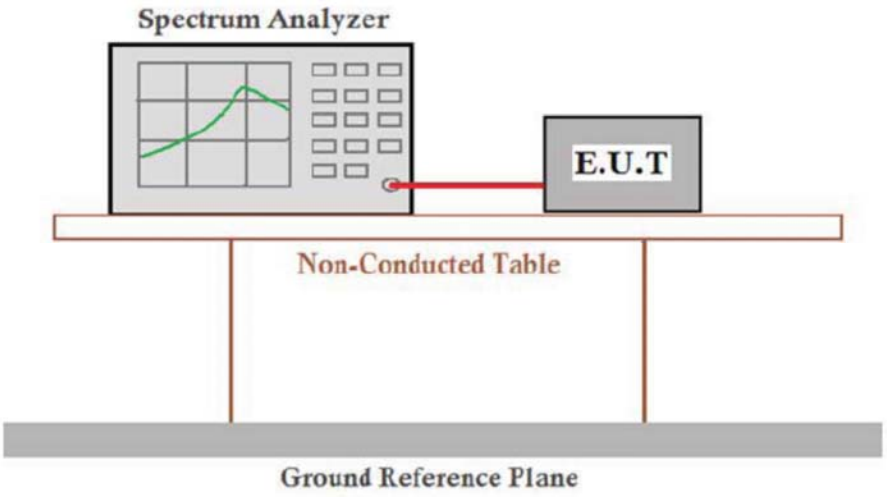
Band Edge Requirement:

Frequency (MHz)	Ant. Pol.	PK Reading (dBμV)	AV Reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin Peak(dB)
					Peak (dBμV/m)	AV (dBμV/m)			
902	H	55.35	---	-3.8	51.55	---	74	---	-22.45
928	H	55.39	---	-3.7	51.69	---	74	---	-22.31
902	V	54.62	---	-3.8	50.82	---	74	---	-23.18
928	V	53.92	---	-4.3	49.62	---	74	---	-24.38

Note:
1. Emission Level = Peak Reading + Correction Factor; Correction Factor = Antenna Factor + Cable loss – Pre-amplifier
2. Margin = Emission - Limit
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
5. Data of measurement shown "---" in the above table mean that the reading of emissions is attenuated more than 20dB below the limits or the field strength is too small to be measured.

5 OCCUPIED BANDWIDTH TEST

5.1 Test Setup



5.2 Rules and specifications

CFR 47 Part 15.215(c)

ANSI C63.10: 2013

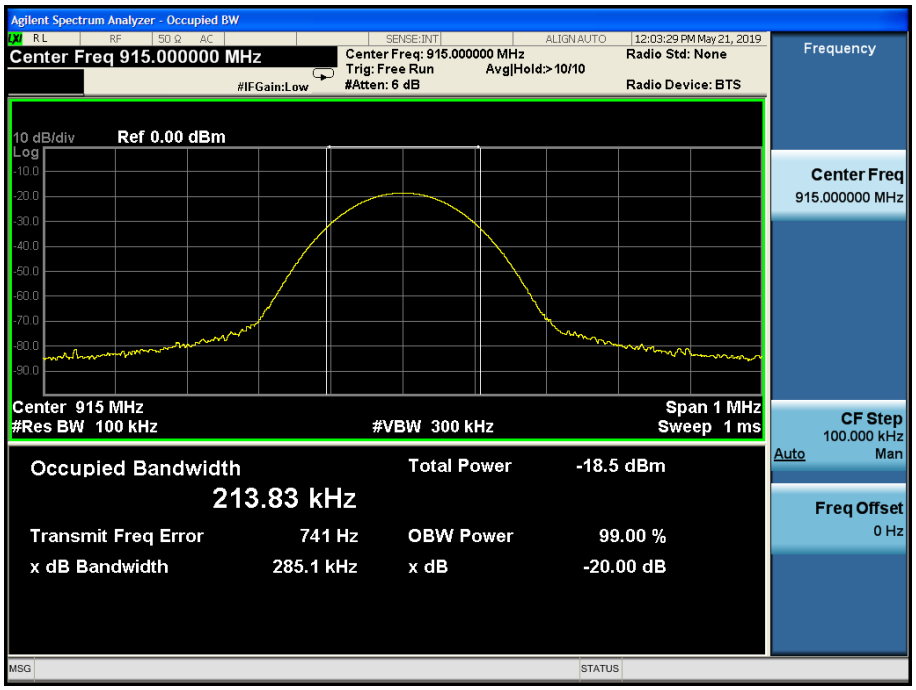
5.3 Test Procedure

1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW≥1% of the 20dB bandwidth; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold.
4. Measure and record the results in the test report.

5.4 Test Result

PASS

Mode	Frequency(MHz)	20dB Bandwidth (KHz)	Limit (kHz)	Conclusion
TX	915	285.1	/	PASS

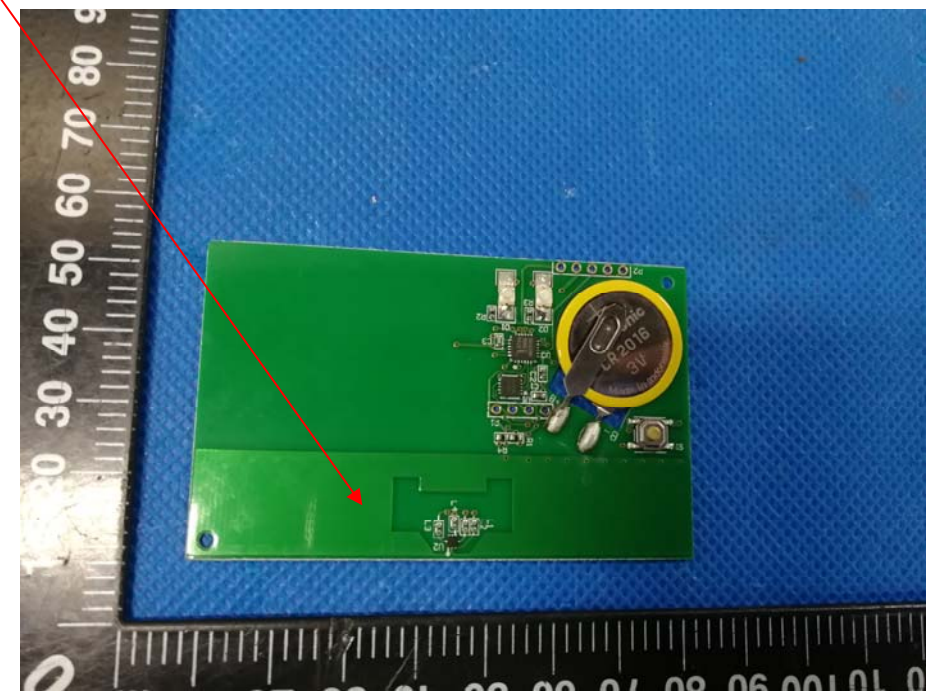


6 ANTENNA REQUIREMENT

Standard Applicable:
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

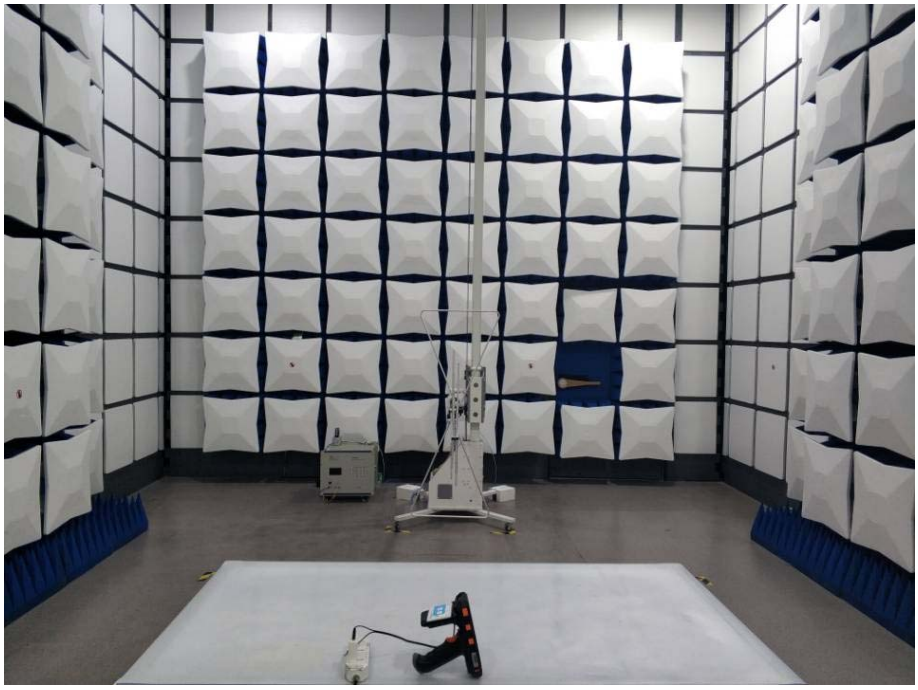
Antenna Connected Construction
The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is 0dBi.

ANTENNA



7 PHOTOGRAPH OF TEST

7.1 Radiated Emission



End of Report