



TEST REPORT

Date: 2015-02-24

Report No.: 60.870.15.002.01F

Applicant:

Ckicom Technology Limited
Flat F, 4/F, Universal Industrial Centre, 19-21 Shan Mei
Street, Fo Tan, Shatin, N.T., Hong Kong

Description of Samples:

Model name: Infant Monitoring System (Sensor)

Model no.: T-235

FCCID: YQKCEIHT-235

Date Samples Received:

2015-01-09

Date Tested:

2015-01-12 to 2015-02-03

Investigation Requested:

FCC Part 15 Subpart C, Section 15.249

Conclusions:

The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remarks:

Checked by:

A blue ink signature of Ray Cheung.

Approved by:-

A blue ink signature of Jeff Pong.

Ray Cheung
Project Engineer
Wireless & Telecom department

Jeff Pong
Manager
Wireless & Telecom department



CONTENT:

Cover	Page 1 of 19
Content	Page 2 of 19
<u>1.0</u>	<u>General Details</u>
1.1	Test Laboratory
1.2	Applicant Details
1.3	Equipment Under Test [EUT]
1.4	Equipment Modification
1.5	Related Submittal(s) Grants
<u>2.0</u>	<u>Technical Details</u>
2.1	Investigations Requested
2.2	Test Standards and Results Summary
<u>3.0</u>	<u>Test Methodology</u>
3.1	Radiated Emission
3.2	Field Strength Calculation
3.3	Conducted Emission
<u>4.0</u>	<u>Test Results</u>
4.1	Field Strength of Fundamental and Harmonics
4.2	Spurious Radiated Emission
4.3	Out of Band Emissions
4.4	Bandwidth Measurement
4.5	Conducted Emission
<u>5.0</u>	<u>List of Measurement Equipments</u>
<u>Appendix A</u>	
Photos of Test Setup	
<u>Appendix B</u>	
External EUT Photos	
<u>Appendix C</u>	
Internal EUT Photos	



1.0 **General Details**

1.1 **Test Laboratory**

TUV SUD Certification and Testing (China) Co., Ltd
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Shenzhen, 518052 China

Registration Number: 502708

Tested by:

A handwritten signature in blue ink, appearing to read 'John Zhi', written over a horizontal line.

John Zhi

1.2 **Applicant Details** **Applicant**

Ckicom Technology Limited

Flat F, 4/F, Universal Industrial Centre, 19-21 Shan
Mei Street, Fo Tan, Shatin, N.T., Hong Kong

Manufacturer

Suga Electronic Dongguan Company Limited

Suga High Tech Industrial Park, No.8 Fulong Road,
Sanzhong, Qingxi Town, Dongguan, Guangdong, China



1.3 Equipment Under Test [EUT]

Description of EUT

Model Name:	Infant Monitoring System (Sensor)
Model No:	T-235
FCC ID:	YQKCEIHT-235
Rating:	DC 3V (CR2032 Lithium battery)
Antenna Type:	PCB Antenna
Antenna Gain:	0 dBi
Operated Frequency:	2402 MHz to 2424 MHz
Modulation:	FSK
No. of Channel:	23
Channel Separation:	1 MHz
Channel List:	2402; 2403; 2404; 2405; 2406; 2407; 2408; 2409; 2410; 2411; 2412; 2413; 2414; 2415; 2416; 2417; 2418; 2419; 2420; 2421; 2422; 2423; 2424
Accessories and Auxiliary Equipment:	None
EUT Exercising Software:	None

General Operation of EUT

The Equipment Under Test (EUT) is a Sensor of Infant Monitoring System.

1.4 Equipment Modification

No modification was made to the tested unit by TÜV SÜD Hong Kong Ltd.

1.5 Related Submittal(s) Grants

This is a single application of certification for this transmitter.



2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2012 and ANSI C63.4: 2009.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary				
Test Condition	FCC Test Requirement	Test Result		
		Pass	Failed	N/A
Field Strength of Fundamental and Harmonics	Part 15.249 (a),(e)	☒	☐	☐
Spurious Radiated Emission	Part 15.249 (d) Part 15.209 Part 15.205	☒	☐	☐
Out of Band Emissions	Part 15.249 (d)	☒	☐	☐
Bandwidth Measurement	Part 15.215 (c)	☒	☐	☐
Conducted Emission	Part 15.207	☐	☐	☒

Note: N/A - Not Applicable



3.0 Test Methodology

3.1 Radiated Emission

The sample was placed 0.8m above the ground plane on a standard emission test site *. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

3.2 Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$\begin{aligned} FS &= R + \text{System Factor} \\ \text{System Factor} &= AF + CF + FA - PA \end{aligned}$$

Where FS = Net Field Strength in dBuV/m at 3 meters.

R = Reading of Spectrum Analyzer / Test Receiver in dBuV.

AF = Antenna Factor in dB.

CF = Cable Attenuation Factor in dB.

FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

3.3 Conducted Emissions

The EUT was placed on a non-metallic table 0.8m above the horizontal metal reference place and 0.4m from a vertical ground plane which is connected to the horizontal metal ground plane. Meanwhile, the AC main of EUT was connected to the distance of 0.8m line impedance stabilization network (LISN) during measurement.

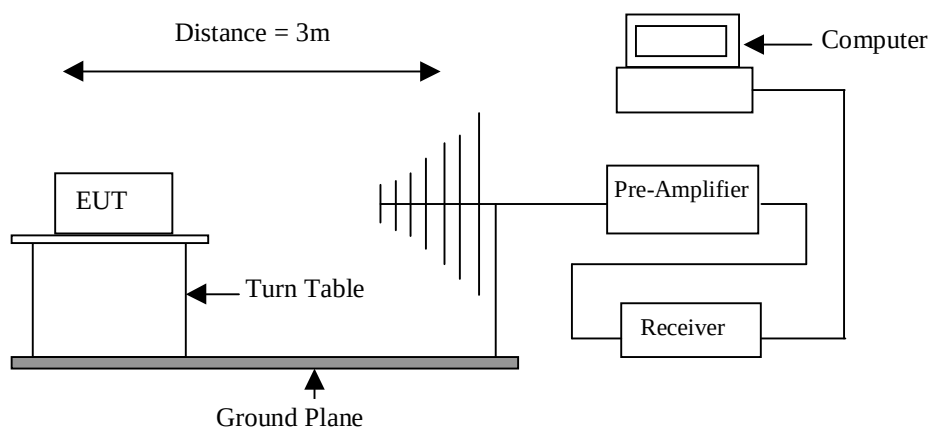
Initial measurements were performed in quasi-peak and average detection modes by the test receiver, any emissions recorded within 30dB of the relevant limit lines were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

4.0 Test Results

4.1 Field Strength of Fundamental and Harmonics

Test Requirement:	FCC part 15 section 15.249(a)(e)
Test Method:	ANSI C63.4:2009
Test Date:	2015-01-26
Mode of Operation:	Transmitting mode.
Detector Function:	Quasi-peak (Below 1000 MHz) Average and Peak (Above 1000 MHz)
Measurement BW:	120 kHz (Below 1000 MHz) 1 MHz (Above 1000 MHz)

Test Setup:



Results: PASS

Field Strength of Fundamental and Harmonics									
Channel	Value	Emissions Frequency MHz	E-Field Polarity	Reading dBμV/m	System Factor dB	Field Strength at 3m dBμV/m	Limit dBμV/m	Delta to Limit dBμV/m	Remarks
Lowest	PK	2402.00	H	78.60	-0.40	78.20	114.00	-35.80	Fund.
	PK	2402.00	V	91.80	-0.40	91.40	114.00	-22.60	Fund.
Middle	PK	2413.00	H	77.80	-0.40	77.40	114.00	-36.60	Fund.
	PK	2413.00	V	82.21	-0.40	81.81	114.00	-32.19	Fund.
Highest	PK	2424.00	H	77.10	-0.30	76.80	114.00	-37.20	Fund.
	PK	2424.00	V	82.80	-0.30	82.50	114.00	-31.50	Fund.
Lowest	PK	3850.00	H	36.90	6.10	43.00	74.00	-31.00	Harmonic
	PK	4805.00	V	35.90	8.60	44.50	74.00	-29.50	Harmonic
Middle	PK	4825.00	H	35.70	8.60	44.30	74.00	-29.70	Harmonic
	PK	4100.00	V	36.30	6.80	43.10	74.00	-30.90	Harmonic
Highest	PK	3962.00	H	36.40	6.60	43.00	74.00	-31.00	Harmonic
	PK	3887.50	V	36.40	6.30	42.70	74.00	-31.30	Harmonic

Remark : - (*) Radiated emissions which fall in the restricted bands as defined in Section 15.205(a).

- All emission more than 20 below the limit which does not be mentioned in the report
- Calculated measurement uncertainty: $\pm 3.28\text{dB}$

Limits of Field Strength for Fundamental and Harmonics Frequency [Section 15.249 (a)]:

Fundamental Frequency [MHz]	Field Strength of Fundamental		Field Strength of Harmonics	
	[mV/m]	[dB μ V/m]	[μ V/m]	[dB μ V/m]
902 – 928	50	94	500	54
2400 – 2483.5	50	94	500	54

Compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

Limit Requirement under Section 15.249 (e) :

According to section 15.249 (e), for frequencies above 1000MHz, the above field strength limits is based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

Limit for Radiated Emission [Section 15.209]:

Frequency (MHz)	Field Strength	Field Strength
	[μ V/m]	[dB μ V/m]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

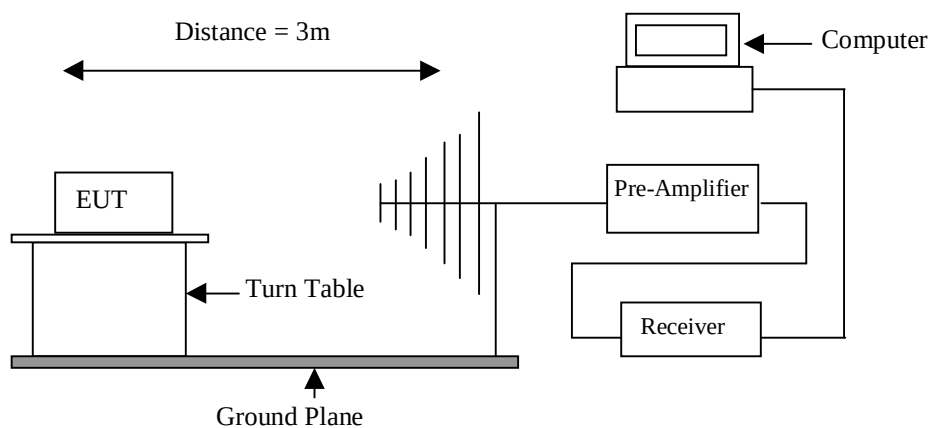
Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

4.2 Spurious Radiated Emission

Test Requirement:	FCC part 15 section 15.249(d), 15.209
Test Method:	ANSI C63.4:2009
Test Date:	2015-01-26
Mode of Operation:	Transmitting Mode
Detector Function:	Quasi-peak (Below 1000 MHz) Average and Peak (Above 1000 MHz)
Measurement BW:	120 kHz (Below 1000 MHz) 1 MHz (Above 1000 MHz)

Test Setup:



Results: PASS

Frequency (MHz)	Detector Type	Antenna	Result (dB μ V/m)	Limit (dB μ V/m)	Margin
36.79	QP	H	25.50	40.00	-14.50
133.79	QP	H	19.90	43.50	-23.60
322.94	QP	H	23.20	46.00	-22.80
555.74	QP	H	27.60	46.00	-18.40
725.49	QP	H	31.10	46.00	-14.90
994.18	QP	H	34.30	54.00	-19.70
37.76	QP	V	26.20	40.00	-13.80
143.98	QP	V	21.40	43.50	-22.10
347.68	QP	V	23.00	46.00	-23.00
482.02	QP	V	26.30	46.00	-19.70
606.18	QP	V	26.80	46.00	-19.20
833.65	QP	V	36.10	46.00	-9.90

- Note:
- No further spurious emissions found between 30MHz and lowest internal used / generated frequency.
 - The result shown the worst case of the operating frequency.
 - All emission more than 20 below the limit which does not be mentioned in the report.
 - Result data graph is shown at the next pages for reference.
 - No significant emissions noise floors were detected above 1 GHz without the operating frequency.

- Remark :
- (*) Radiated emissions which fall in the restricted bands as defined in Section 15.205(a).
 - Calculated measurement uncertainty: ± 3.28 dB.

Limit of Outside of the Specified Bands [Section 15.249 (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 section 15.209, whichever is the lesser attenuation

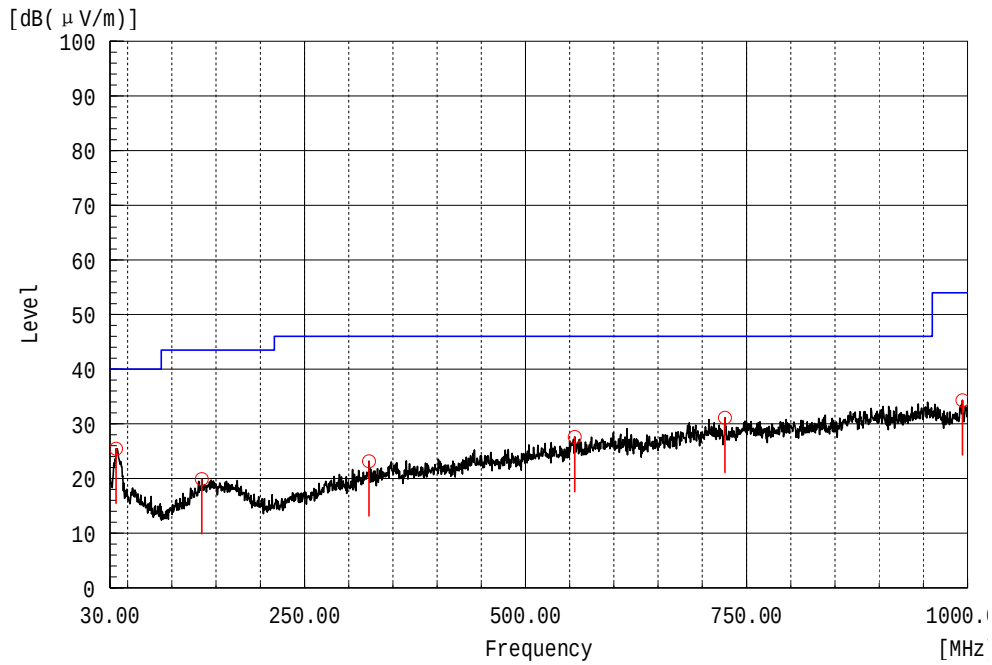
Limit for Radiated Emission [Section 15.209]:

Frequency (MHz)	Field Strength [μ V/m]	Field Strength [dB μ V/m]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

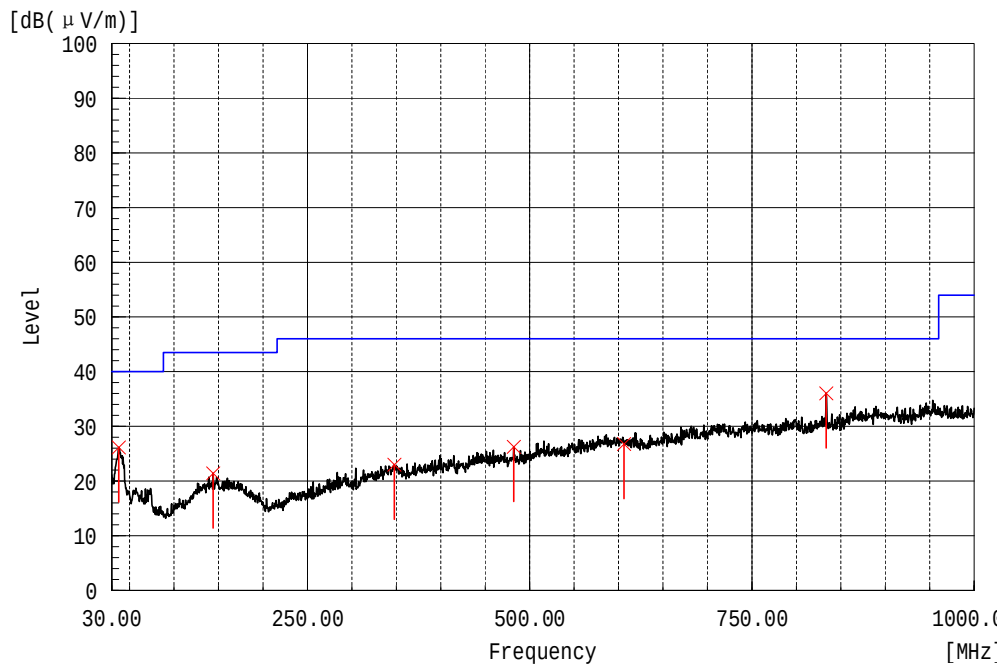
Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Horizontal



Vertical





4.3 Out of Band Emissions

Test Requirement:	FCC part 15 section 15.249 (d)
Test Method:	ANSI C63.4:2009
Test Date:	2015-01-26
Mode of Operation:	Transmitting mode.
Detector Function:	Peak

Results: PASS

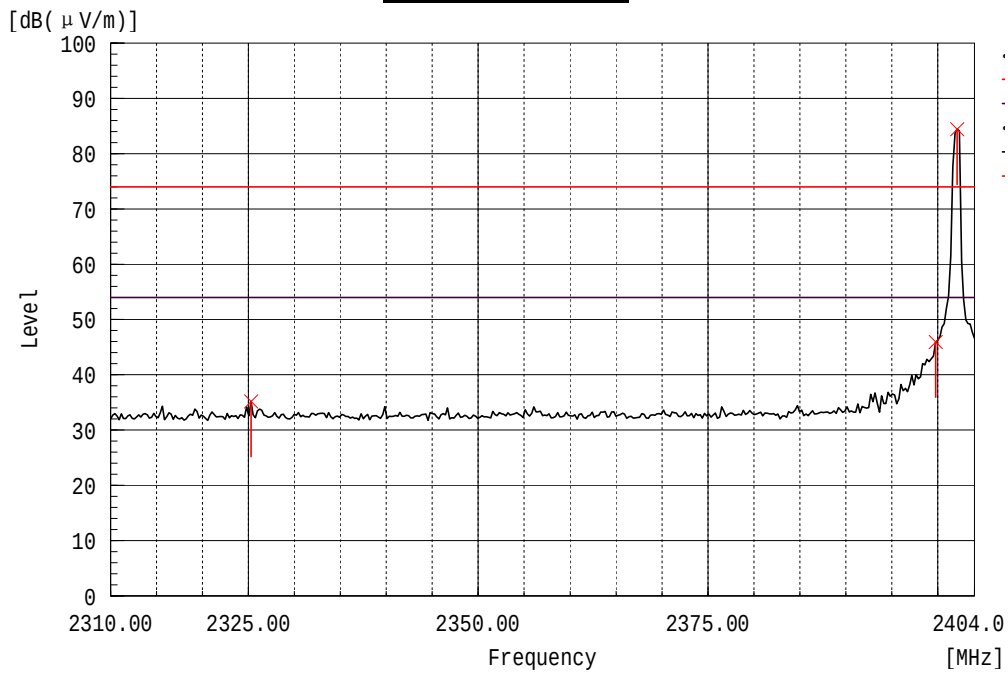
Refer to the data graph, the lower and higher edge of the specified frequency bands fulfill the general radiated emission limits in section 15.209. Therefore, the EUT meets the requirement of section 15.249 (d).

Limit for Out of Band Emissions [Section 15.249 (d)]

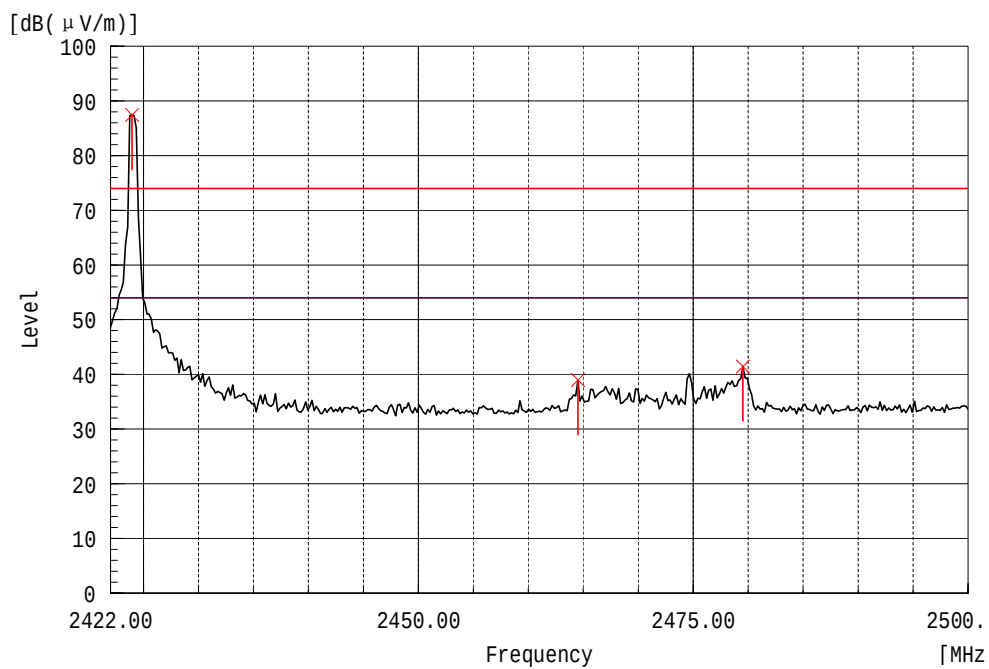
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in section 15.209, whichever is the lesser attenuation.

Test Result: Result data graph is shown at the next pages for reference.

Lowest Channel



Highest Channel





4.4 Bandwidth Measurement

Test Requirement:	FCC part 15 section 15.215 (c)
Test Method:	ANSI C63.4:2009
Test Date:	2015-01-26
Mode of Operation:	Transmitting mode.
Detector Function:	Peak

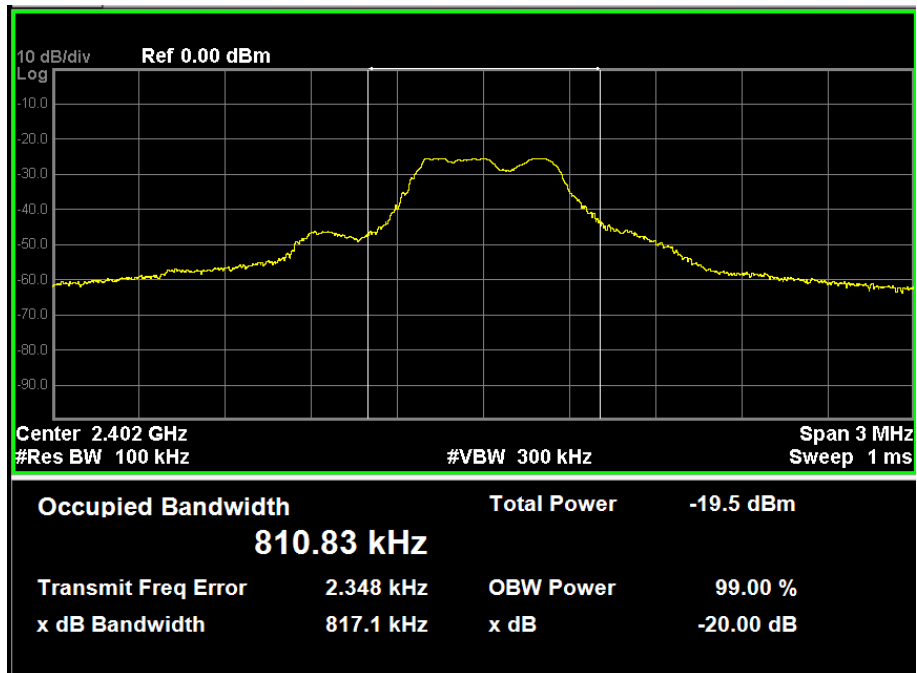
Results: PASS

Refer to the data graph, the 20dB points of Low Channel, Mid Channel and High Channel. All channels within the operation bandwidth when equipment is operated. Therefore, the EUT meets the requirement of section 15.215(c).

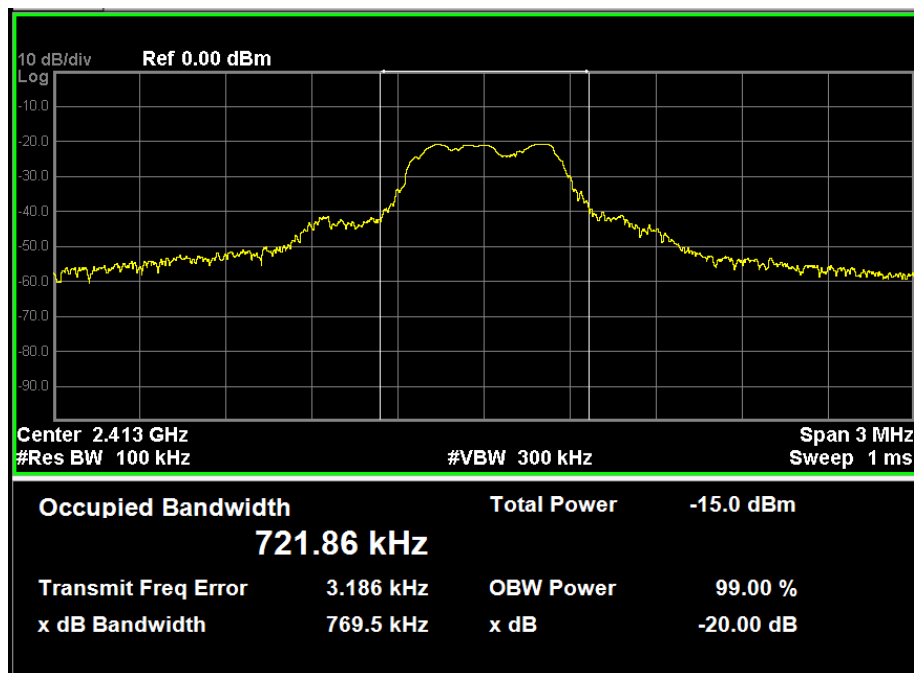
Limit for Bandwidth [Section 15.215 (c)]

The 20dB bandwidth of the emission shall be within the frequency band designated in the rule section under which the equipment is operated.

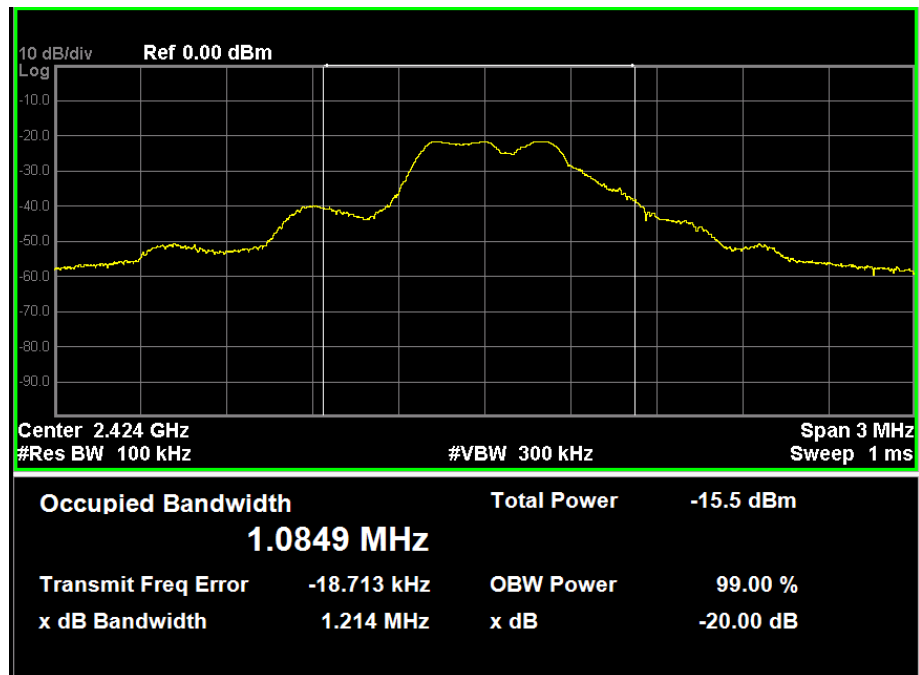
Test Result: Result data graph is shown at the next pages for reference.



Low Channel – Bandwidth 817 kHz



Mid Channel – Bandwidth 770 kHz

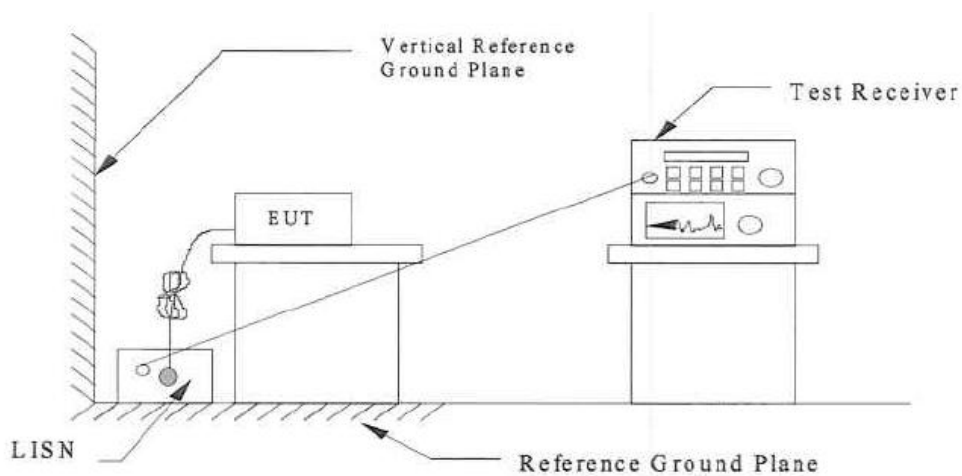


High Channel – Bandwidth 1.214 MHz

4.5 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC part 15 Section 15.207 Class B
Test Method:	ANSI C63.4:2009
Test Date:	---
Mode of Operation:	---
Detector Function:	Quasi-peak, average
Measurement BW:	9 kHz

Test Setup:



Result: N/A.

Remark: This test not applicable for battery operated device.

Limits for Conducted Emission [Section 15.207]:

Frequency Range [MHz]	Quasi-Peak Limit [dB μ V]	Average Limit [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Remarks:

Calculated measurement uncertainty: ± 2.8 dB



5.0 List of Measurement Equipment

Radiated Emission and Bandwidth Emissions

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2015-8-17
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2017-8-17
Horn Antenna	Rohde & Schwarz	HF907	102294	2017-8-17
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2015-8-17
Spectrum Analyzer	Agilent	E7405A	MY45111421	2015-8-19
3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

Conducted Emissions

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2015-8-17
LISN	Rohde & Schwarz	ENV4200	100249	2015-8-17
LISN	Rohde & Schwarz	ENV216	100326	2015-8-17

N/A Not Applicable or Not Available