TEST REPORT

Application No.:	HKEM1901000148AT
Applicant:	VTECH TELECOMMUNICATIONS LTD
Address of Applicant:	23/F, Tai Ping Industrial Centre, Block 1,57 Ting Kok Road, Tai Po, Hong Kong
Equipment Under Test (EUT):	
EUT Name:	Video Monitor
HVIN:	35-201155BU
Model No.:	VM320 BU, VM320-2 BU, VM320-ab BU ♣
♣	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Trade mark:	Vtech
Standard(s) :	47 CFR Part 15, Subpart C 15.247:2018:2018 RSS-247 Issue 2, May 2017 RSS-GEN Issue 5, April 2018
FCC ID :	EW780-1384-00
IC :	1135B-80138400
Date of Receipt:	12-02-2019
Date of Test:	12-02-2019 to 13-03-2019
Date of Issue:	02-04-2019
Test Result:	**Pass**

In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Ivan Toa
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		02-04-2019		*Original*

Authorized for issue by:				
				13-03-2019
		(Leo Xu)/Project Engineer		
				02-04-2019
		Ivan Toa /Reviewer		

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.247:2018	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247:2018	N/A	47 CFR Part 15, Subpart C 15.247:2018(a)(1),(g),(h)	Pass
Antenna Requirement	RSS-247 Issue 2, May 2017	N/A	RSS-Gen Section 8.3	Pass
Pseudorandom Frequency Hopping Sequence	RSS-247 Issue 2, May 2017	N/A	RSS-247 Section 5.1(a)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247:2018	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247:2018	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247:2018a(1)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247:2018	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247:2018a(1)(iii)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247:2018	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247:2018a(1)(iii)	Pass
20dB Bandwidth	RSS-247 Issue 2, May 2017	ANSI C63.10 Section 6.9.2	RSS-247 Section 5.1(a)	Pass
Carrier Frequencies Separation	RSS-247 Issue 2, May 2017	ANSI C63.10 (2013) Section 7.8.2	RSS-247 Section 5.1(b)	Pass
Hopping Channel Number	RSS-247 Issue 2, May 2017	ANSI C63.10 (2013) Section 7.8.3	RSS-247 Section 5.1(d)	Pass
Dwell Time	RSS-247 Issue 2, May 2017	ANSI C63.10 (2013) Section 7.8.4	RSS-247 Section 5.1(d)	Pass

Emission Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247:2018	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247:2018(b)(1)	Pass
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247:2018	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass

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Emission Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247:2018	ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247:2018(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247:2018	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Conducted Peak Output Power	RSS-247 Issue 2, May 2017	ANSI C63.10 (2013) Section 7.8.5	RSS-247 Section 5.4(b)	Pass
Conducted Emissions at AC Power Line (150kHz-30MHz)	RSS-247 Issue 2, May 2017	ANSI C63.10 (2013) Section 6.2	RSS-Gen Section 8.8	Pass
Conducted Spurious Emissions	RSS-247 Issue 2, May 2017	ANSI C63.10 (2013) Section 7.8.8	RSS-247 Section 5.5	Pass
Radiated Emissions which fall in the restricted bands	RSS-247 Issue 2, May 2017	ANSI C63.10 (2013) Section 6.10.5	Section 3.3 & RSS-Gen Section 8.9	Pass
Radiated Spurious Emissions	RSS-247 Issue 2, May 2017	ANSI C63.10 (2013) Section 6.4&6.5&6.6	Section 3.3 & RSS-Gen Section 8.9	Pass

Internal Source	**Upper Frequency**
Crystal	16MHz

Declaration of EUT Family Grouping:

Model:

VM320 BU, VM320-2 BU, VM320-ab BU

Where

Suffix ("a, b,") represents

a=any alphanumeric character or blank is presenting number of baby unit.

b = any alphanumeric character or blank is presenting color of enclosure.

According to the confirmation from the applicant, the above models are identical in all electrical aspects in relating to the circuit design, PCB layout, electrical components used, internal wiring and function. The differences are only the model, color and decorations.

Therefore only the model VM320 BU was tested in this report.

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3 Contents

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4 General Information

4.1 Details of E.U.T.

Power supply:	AC 100-120V 60Hz
Adapter	Adaptor 1* Adapter Model: CS3E060040LU Input: AC100-120V, 60Hz 200mA Output: DC 6.0V, 400mA Adaptor 2 Adapter Model: S003AKU0600040 Input: AC100-120V, 60Hz 150mA Output: DC 6.0V, 400mA *Remark: Both Adapters were tested on Conducted Emissions at AC Power Line, Compare test both Adapter on other RF test items, and find worse case on Adaptor 1 and show in this report.
Test voltage:	AC 120V 60Hz
Cable:	2-wire unshielded cable with the length of 2 meters
Internal source:	16 MHz
Frequency	2405-2475MHz
Channel Numbers:	32
Type of Modulation:	GFSK
Antenna Gain	0dBi
Antenna Type	Integral Antenna

Frequency List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	12	2428	23	2454
2	2407	13	2430	24	2456
3	2409	14	2433	25	2458.5
4	2411	15	2435	26	2460.5
5	2413	16	2437	27	2462.5
6	2415	17	2439	28	2467
7	2418	18	2441	29	2469
8	2420	19	2444	30	2471
9	2422	20	2446	31	2473
10	2424	21	2450	32	2475
11	2426	22	2452		
Remark: Test frequencies are the lowest channel: 1channel(2405MHz), middle channel: 17 channel (2439 MHz) and highest channel: 32 channel (2475 MHz).					

4.2 Description of Support Units

The EUT has been tested as an independent unit.

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4.3 Mode of Operation and Test Method

Detail description of the Test mode
a:TX_Hop mode_Keep the EUT in frequency hopping with modulation mode.
b:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.
c:TX mode_Keep the EUT in continuously transmitting with modulation mode.

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4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conduction Emission at AC Mains	± 2.71dB (9kHz to 150kHz)
		± 2.71dB (150kHz to 30MHz)
2	Radio Frequency	± 7.25 x 10^{-8}
3	Duty cycle	± 0.37%
4	Occupied Bandwidth	± 3%
5	RF conducted power	± 1.43dB
6	RF power density	± 2.84dB
7	Conducted Spurious emissions	± 1.43dB
8	RF Radiated power	± 4.84dB (below 1GHz)
		± 5.05dB (above 1GHz)
9	Radiated Spurious emission test	± 4.84dB (below 1GHz)
		± 5.05dB (above 1GHz)
10	Temperature test	± 1℃
11	Humidity test	± 3%
12	Supply voltages	± 1.5%
13	Time	± 3%

Remark:

The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

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4.5 Test Location

All tests were performed at:

SGS IECC Limited (Member of the SGS Group (SGS SA))

No. 16-B, Yip Wo Street, On Lok Tsuen, Fanling, N.T., Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.6 Test Facility

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

- **HOKLAS (Lab Code: 125)**

SGS IECC Limited has been accepted by HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a HOKLAS Accredited Laboratory, this laboratory meets the requirements of ISO/IEC 17025:2005 an it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

- **FCC Recognized Accredited Test Firm(CAB Registration No.: 446297)**

SGS IECC Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0010, Test Firm Registration Number: 446297.

- **Industry Canada (Site Registration No.: 5193A; CAB Identifier No.: HK0001)**

SGS IECC Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0001, Site Registration Number: 5193A.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

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5 Equipment List

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Digital temperature & humidity data logger	SATO	SK-L200TH II	E232	2018/09/21	2019/09/20
Electronic Digital Thermometer with Hygrometer	nil	2074/2075	E159	2018/10/04	2019/10/03
Barometer with digital thermometer	SATO	7612-00	E218	2018/05/22	2019/05/21
Conditional Chamber -40℃~ +150℃	Zhong Zhi Testing Instruments	CZ-E-608D	E216	2018/09/18	2019/09/17

Radiated Emission			
Equipment	**Manufacturer**	**Model / Serial No.**	**Cal. Due Date**
3m Semi-Anechoic Chamber	ChamPro	N/A	2020/09/14
Test Receiver	Rohde & Schwarz	ESCS 30 / 100388	2019/09/26
EMI Test Receiver	Rohde & Schwarz	ESR3	2019/08/15
Signal Generator	Rohde & Schwarz	SMT03 / 832939/017	2019/06/04
Spectrum Analyzer	Rohde & Schwarz	FSP 30 / 101474	2019/05/30
Loop Antenna	Rohde & Schwarz	HFH2-Z2 / 871336/48	2020/12/03
Antenna 30-1000MHz	Schaffner	CBL6111C / 2791	2019/10/26
Antennas (30MHz-300MHz)	Schwarzbeck	BBA9106, VHA9103	2019/11/14
Log-periodic Antennas (300MHz-1000MHz)	Schwarzbeck	UHALP9107	2019/11/14
Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D / 9120D-1070	2020/01/29
Double Ridge Horn Antenna 2-18 GHz	Schwarzbeck	BBHA 9120 C	2020/03/13
Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170 / 9170-492	2019/11/23
Highpass Filter	Wainwright	WHNX3.5/26.5G-6SS / nil	2019/12/18
Band Reject Filter	Wainwright	WRCJV 2400/2500-2100/2800-40/3SS / nil	2019/12/18
Preamplifier 10MHz – 6GHz	Schwarzbeck	BBV9743 / 9743-052	2019/04/18
Preamplifier 1-18GHz	Schwarzbeck	BBV9718 / 9718-223	2020/01/29
Preamplifier 18-26.5GHz	Schwarzbeck	BBV9719 / 9719-019	2019/11/18
Coaxial Cable	--	E167	2019/10/09
RF Cable	HUBER+SUHNER	E207	2019/11/16
Boresight Mast Controller	ChamPro	AM-BS-4500-E / 060860-ABS	--
Turntable with Controller	ChamPro	EM1000 / 60860	--
RF Conducted			

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Equipment	Manufacturer	Model / Serial No.	Cal. Due Date
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	2019/08/12
OSP	Rohde & Schwarz	OSP-B157W8	2019/09/17
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	2019/08/12
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	2019/08/12
Cable	Rohde & Schwarz	J12J103539-00-2	2019/08/12

Conducted Emission

Equipment	Manufacturer	Model / Serial No.	Calibration Due
Test Receiver	Rohde & Schwarz	ESHS 30 / 839667/002	2019/09/26
Signal Generator	Rohde & Schwarz	SMT03 / 832939/017	2019/06/04
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127 / 8127309	2019/09/26
Impulse Limiter	Rohde & Schwarz	ESH-3-Z2 / 375881052	2019/10/07

Equipment	Manufacturer	Model / Serial No.	Cal. Due Date
Conditional Chamber -40℃~ +150℃	CEPREI	CZ-E-608D/ZH12649	2019/09/17
EMI Test Receiver	Rohde & Schwarz	ESR3	2019/08/15
Spectrum Analyzer	Rohde & Schwarz	FSP 30 / 101474	2019/05/30

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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(c)

6.1.2 Conclusion

Standard Requirement:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.

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6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247:2018(a)(1),(g),(h)

6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

> Number of shift register stages: 9

> Length of pseudo-random sequence: 29 -1 = 511 bits

> Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.

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7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

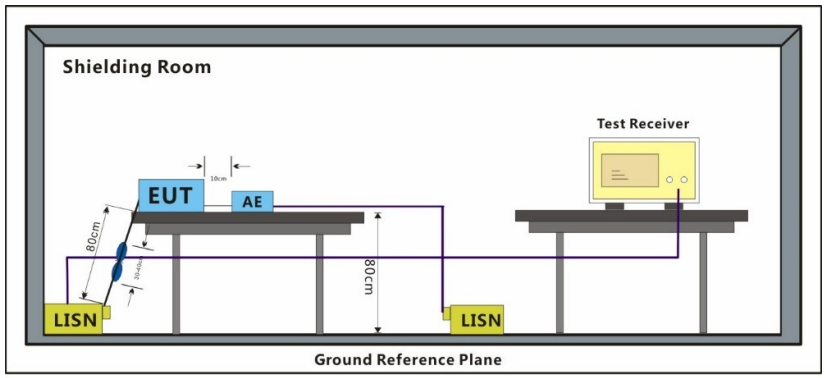
Test Requirement 47 CFR Part 15, Subpart C 15.207, RSS-Gen Section 8.8
Test Method: ANSI C63.10 (2013) Section 6.2
Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		

7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 21 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar
Test mode c:TX mode_Keep the EUT in continuously transmitting with modulation mode.

7.1.2 Test Setup Diagram



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7.1.3 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50µH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor

Test Data:

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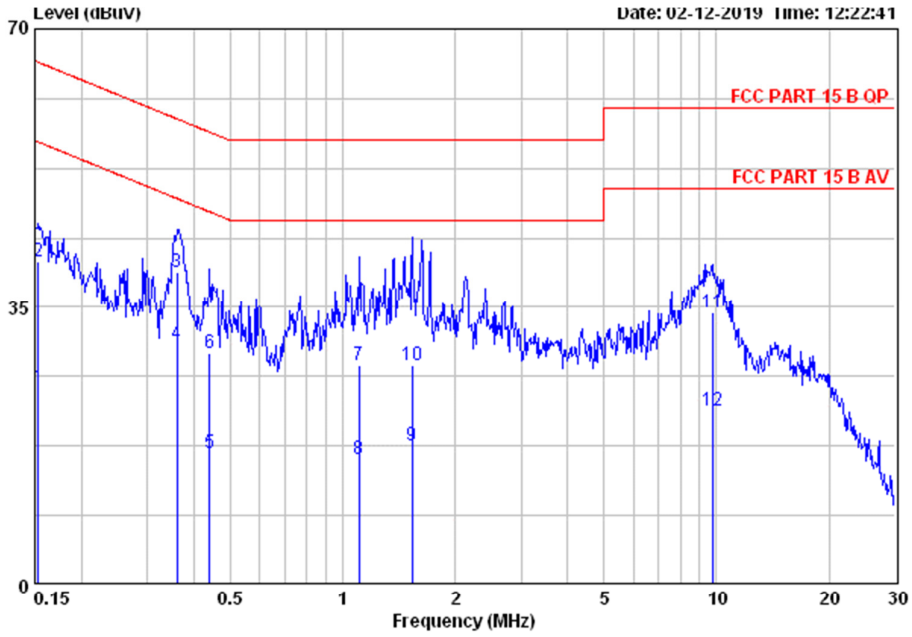
adapter: CS3E060040LU
Live



Site : US6
Condition : FCC PART 15 B QP TE10_L_DUE20190522 LINE
EUT : baby mon (BU)
SAMPLE : A1
MODE : normal
TEMP. : 24
HUMD. : 57
TESTER : leo
DATE :
OTHER : AC120V
RESULTS :

		Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
		MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1		0.15	0.00	9.93	14.85	24.78	55.82	-31.04	AVERAGE
2		0.15	0.00	9.93	30.94	40.87	65.82	-24.95	QP
3		0.36	0.00	9.93	29.59	39.52	58.74	-19.22	QP
4	peak	0.36	0.00	9.93	20.41	30.34	48.74	-18.40	AVERAGE
5		0.44	0.00	9.94	6.69	16.63	47.07	-30.44	AVERAGE
6		0.44	0.00	9.94	19.22	29.16	57.07	-27.91	QP
7		1.11	0.00	9.97	17.68	27.65	56.00	-28.35	QP
8		1.11	0.00	9.97	5.94	15.91	46.00	-30.09	AVERAGE
9		1.54	0.00	9.98	7.61	17.59	46.00	-28.41	AVERAGE
10		1.54	0.00	9.98	17.70	27.68	56.00	-28.32	QP
11		9.76	0.00	10.34	24.01	34.35	60.00	-25.65	QP
12		9.76	0.00	10.34	11.68	22.02	50.00	-27.98	AVERAGE

Neutral

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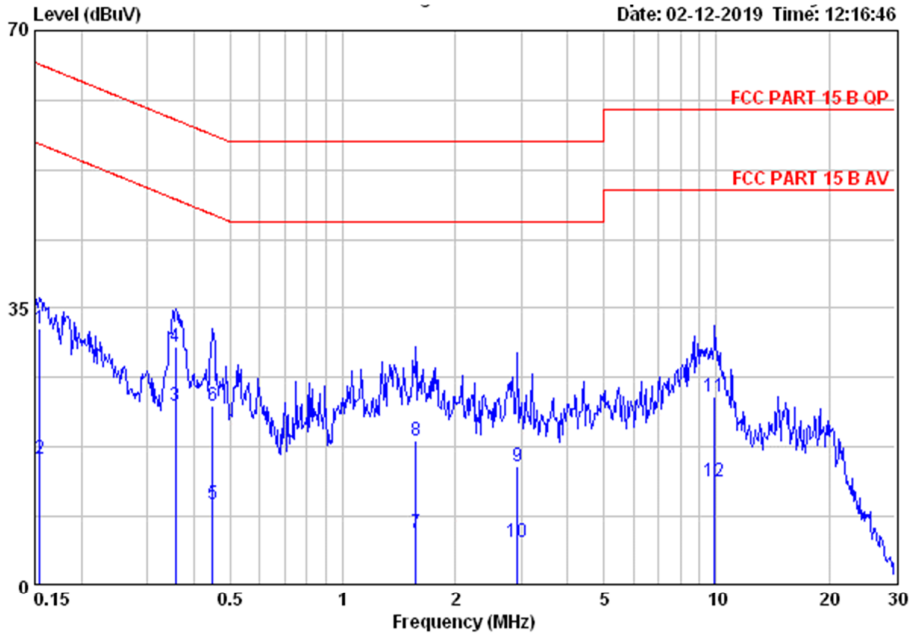

Site : U5/6
Condition : FCC PART 15 B QP TE10_N_DUE2019-05-22 NEUTRAL
EUT : baby mon (BU)
SAMPLE : A1
MODE : normal
TEMP. : 24
HUMD. : 57
TESTER : leo
DATE :
OTHER : AC120V
RESULTS :

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15	0.00	0.00	32.35	32.35	65.74	-33.39	QP
2	0.15	0.00	0.00	16.00	16.00	55.74	-39.74	AVERAGE
3 peak	0.36	0.00	0.00	22.61	22.61	48.78	-26.17	AVERAGE
4	0.36	0.00	0.00	30.17	30.17	58.78	-28.61	QP
5	0.45	0.00	0.00	10.25	10.25	46.89	-36.64	AVERAGE
6	0.45	0.00	0.00	22.63	22.63	56.89	-34.26	QP
7	1.57	0.00	0.00	6.77	6.77	46.00	-39.23	AVERAGE
8	1.57	0.00	0.00	18.30	18.30	56.00	-37.70	QP
9	2.93	0.00	0.00	15.16	15.16	56.00	-40.84	QP
10	2.93	0.00	0.00	5.45	5.45	46.00	-40.55	AVERAGE
11	9.91	0.00	0.00	23.93	23.93	60.00	-36.07	QP
12	9.91	0.00	0.00	13.12	13.12	50.00	-36.88	AVERAGE

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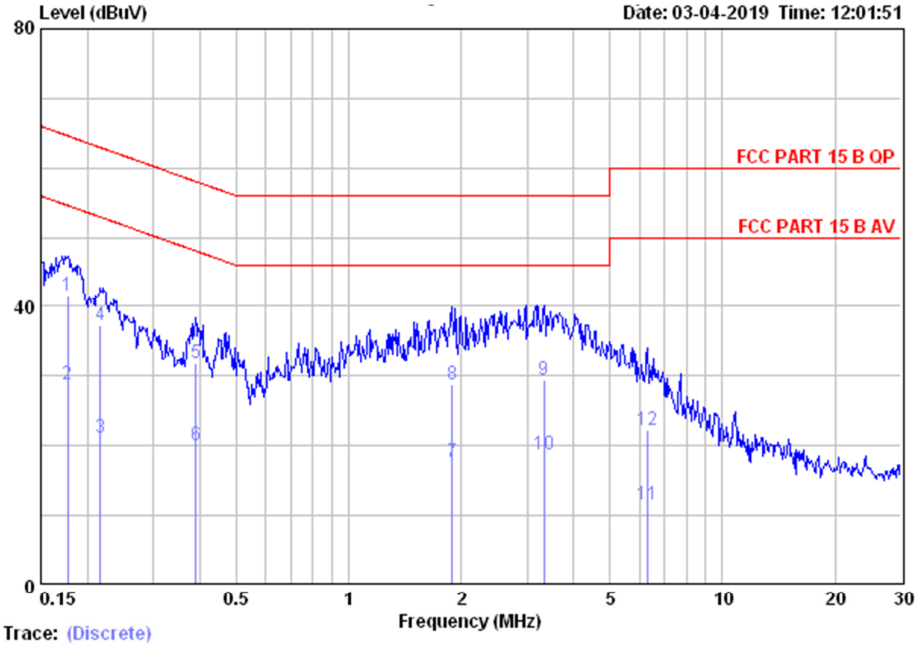
adapter : S003AKU0600040
Live



Trace: (Discrete)

Site : US6
Condition : FCC PART 15 B QP TE10_L_DUE20190522 LINE
EUT : Vtech VM320
SAMPLE : A1
MODE : Normal operating
TEMP. : 21
HUMD. : 57
TESTER : LEO
DATE : 2019-03-01
OTHER : --
RESULTS :
REMARK: : --

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 peak	0.18	0.00	9.93	31.70	41.63	64.64	-23.01	QP
2	0.18	0.00	9.93	18.80	28.73	64.64	-35.91	AVERAGE
3	0.22	0.00	9.93	11.17	21.10	62.96	-41.86	AVERAGE
4	0.22	0.00	9.93	27.41	37.34	62.96	-25.62	QP
5	0.39	0.00	9.93	21.94	31.87	58.08	-26.21	QP
6	0.39	0.00	9.93	10.08	20.01	58.08	-38.07	AVERAGE
7	1.89	0.00	9.99	7.68	17.67	56.00	-38.33	AVERAGE
8	1.89	0.00	9.99	18.86	28.85	56.00	-27.15	QP
9	3.33	0.00	10.04	19.32	29.36	56.00	-26.64	QP
10	3.33	0.00	10.04	8.80	18.84	56.00	-37.16	AVERAGE
11	6.29	0.00	10.15	1.50	11.65	60.00	-48.35	AVERAGE
12	6.29	0.00	10.15	11.98	22.13	60.00	-37.87	QP

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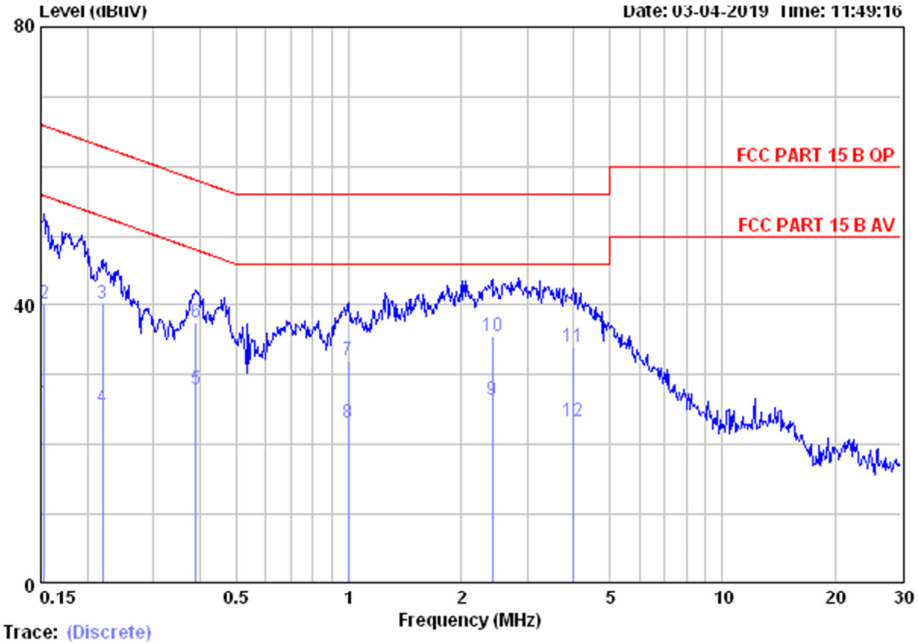
Neutral



Site : US6
Condition : FCC PART 15 B QP TE10_N_DUE20190522 NEUTRAL
EUT : Vtech VM320
SAMPLE : A1
MODE : Normal operating
TEMP. : 21
HUMD. : 57
TESTER : LEO
DATE : 2019-03-01
OTHER : --
RESULTS :
REMARK: : --

		Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
		MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1		0.15	0.00	9.95	16.00	25.95	65.82	-39.87	AVERAGE
2		0.15	0.00	9.95	30.45	40.40	65.82	-25.42	QP
3		0.22	0.00	9.95	30.43	40.38	62.83	-22.45	QP
4		0.22	0.00	9.95	15.24	25.19	62.83	-37.64	AVERAGE
5		0.39	0.00	9.95	18.04	27.99	58.08	-30.09	AVERAGE
6	peak	0.39	0.00	9.95	27.60	37.55	58.08	-20.53	QP
7		1.00	0.00	9.99	22.11	32.10	56.00	-23.90	QP
8		1.00	0.00	9.99	13.19	23.18	56.00	-32.82	AVERAGE
9		2.42	0.00	10.02	16.28	26.30	56.00	-29.70	AVERAGE
10		2.42	0.00	10.02	25.43	35.45	56.00	-20.55	QP
11		3.99	0.00	10.07	23.85	33.92	56.00	-22.08	QP
12		3.99	0.00	10.07	13.27	23.34	56.00	-32.66	AVERAGE

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7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247:2018(b)(1), RSS-247 Section 5.4(b)

Test Method: ANSI C63.10 (2013) Section 7.8.5

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ hopping channels <50
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

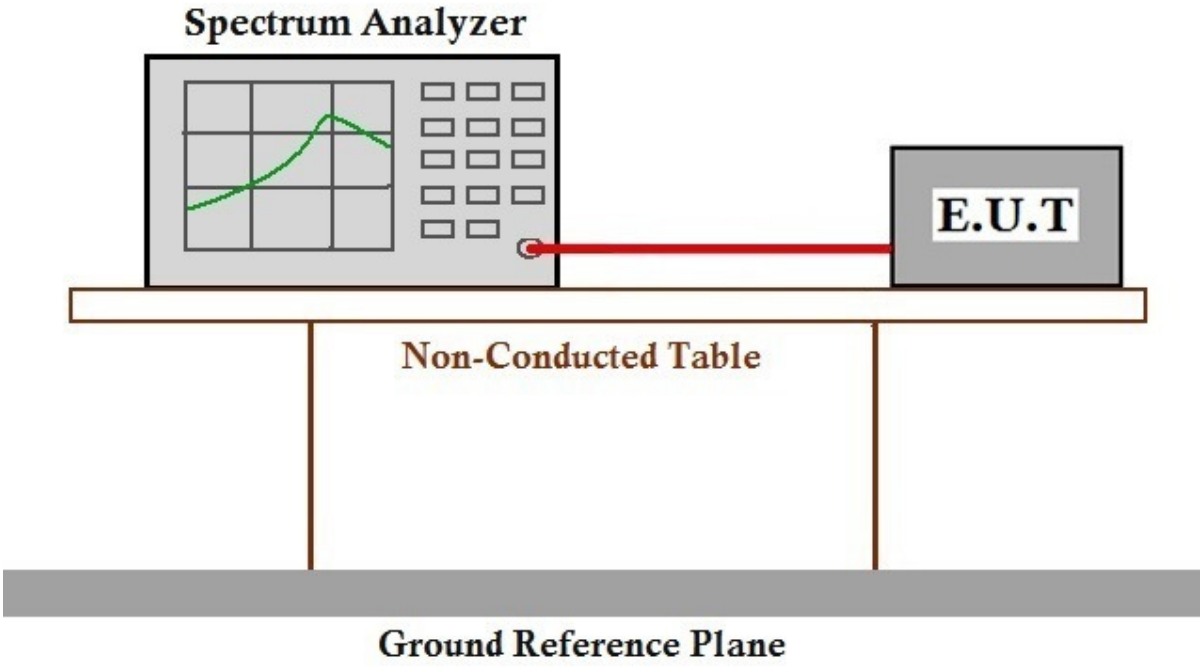
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

Test mode b:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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7.3 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215, RSS-247 Section 5.1(a)

Test Method: ANSI C63.10 (2013) Section 6.9

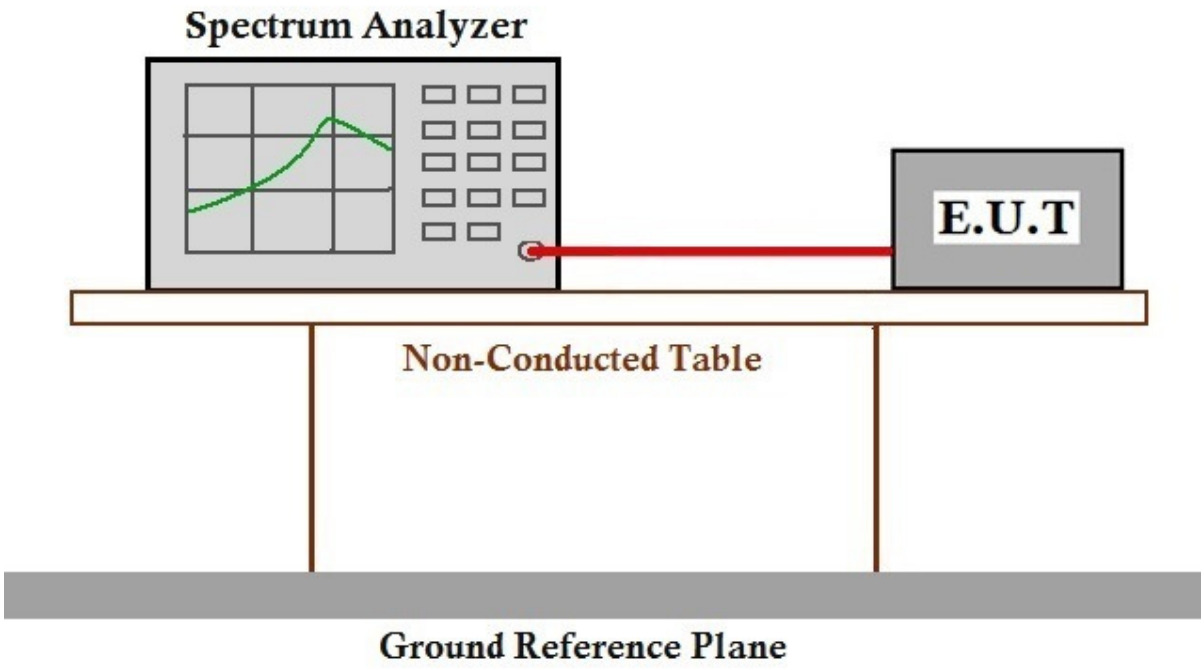
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

Test mode b:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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7.4 Carrier Frequencies Separation

Test Requirement	47 CFR Part 15, Subpart C 15.247:2018a(1), RSS-247 Section 5.1(b)
Test Method:	ANSI C63.10 (2013) Section 7.8.2
Limit:	2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W

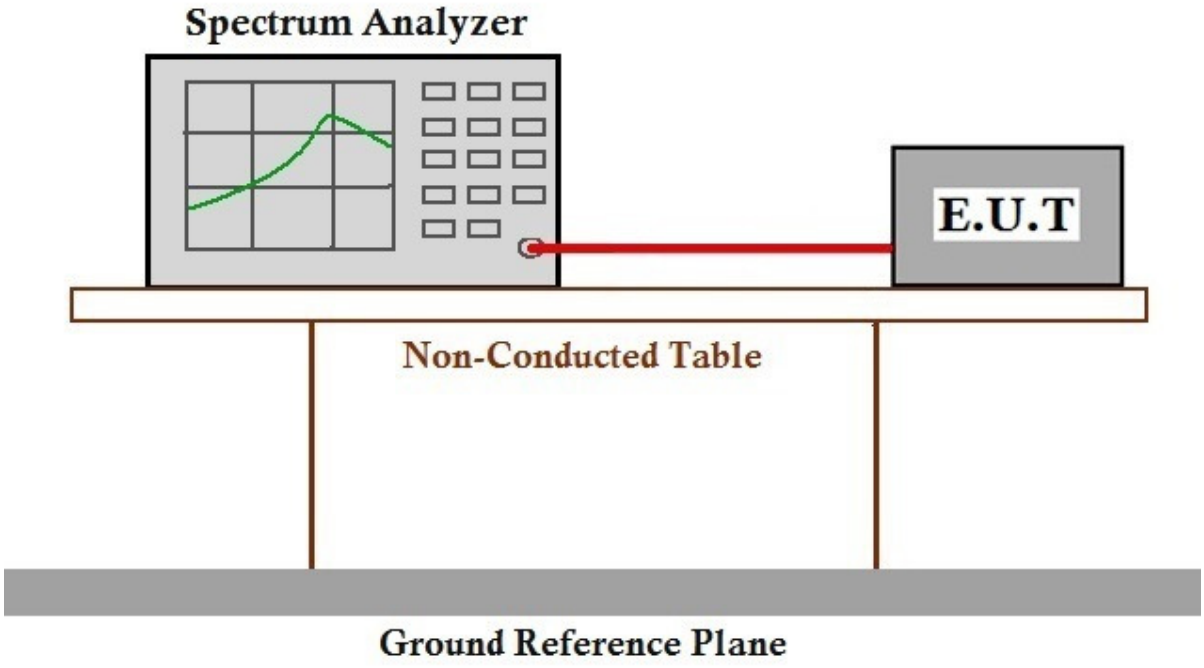
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

Test mode a:TX_Hop mode_Keep the EUT in frequency hopping with modulation mode.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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7.5 Hopping Channel Number

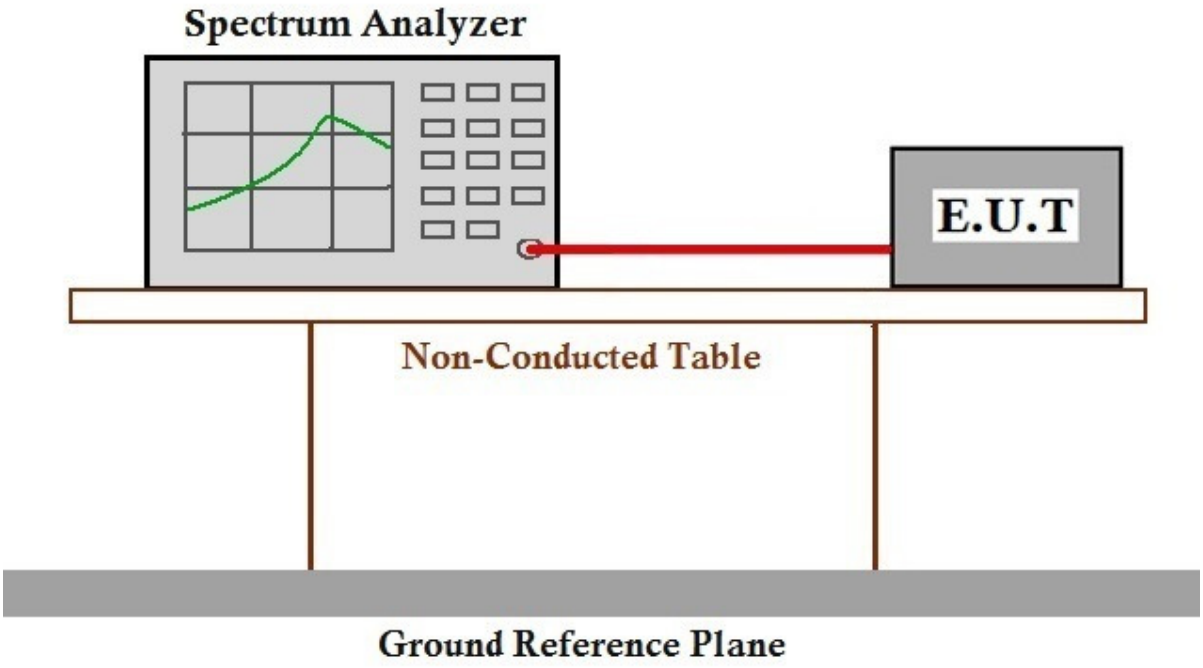
Test Requirement 47 CFR Part 15, Subpart C 15.247:2018a(1)(iii), RSS-247 Section 5.1(d)
Test Method: ANSI C63.10 (2013) Section 7.8.3
Limit:

Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

7.5.1 E.U.T. Operation

Operating Environment:
Temperature: 21 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar
Test mode a:TX_Hop mode_Keep the EUT in frequency hopping with modulation mode.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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7.6 Dwell Time

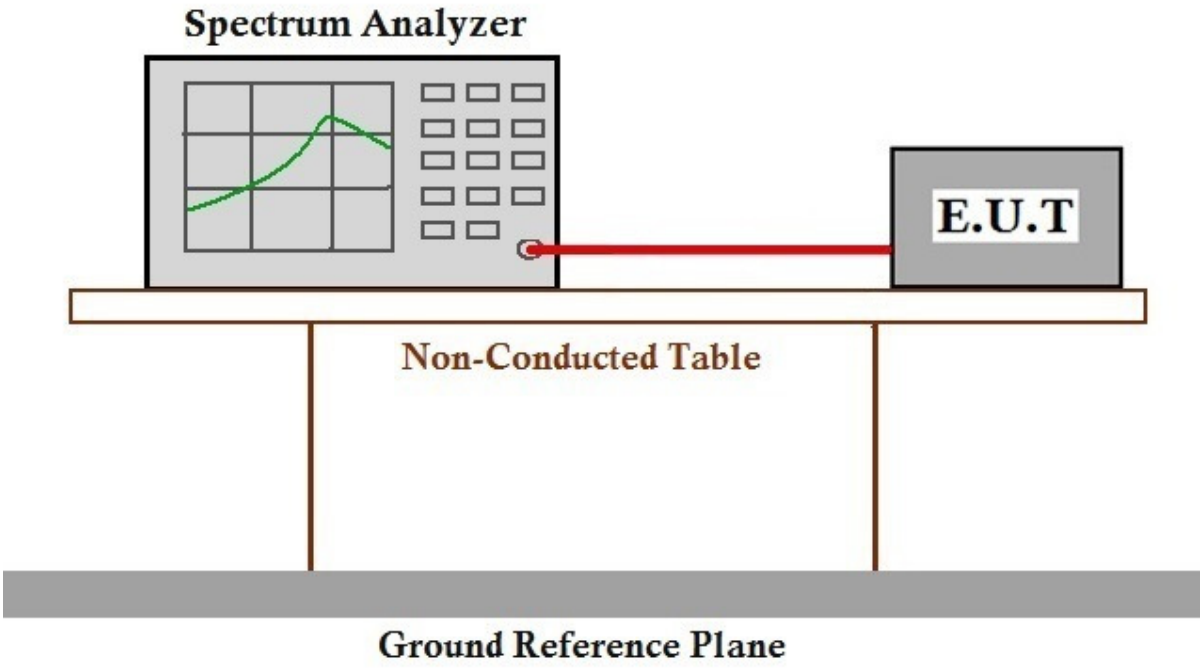
Test Requirement 47 CFR Part 15, Subpart C 15.247:2018a(1)(iii), RSS-247 Section 5.1(d)
Test Method: ANSI C63.10 (2013) Section 7.8.4
Limit:

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S multiplied by the number of hopping channels
5725-5850	0.4S within a 30S period

7.6.1 E.U.T. Operation

Operating Environment:
Temperature: 21 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar
Test mode a:TX_Hop mode_Keep the EUT in frequency hopping with modulation mode.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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7.7 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247:2018(d), RSS-247 Section 5.5
Test Method:	ANSI C63.10 (2013) Section 7.8.6
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)

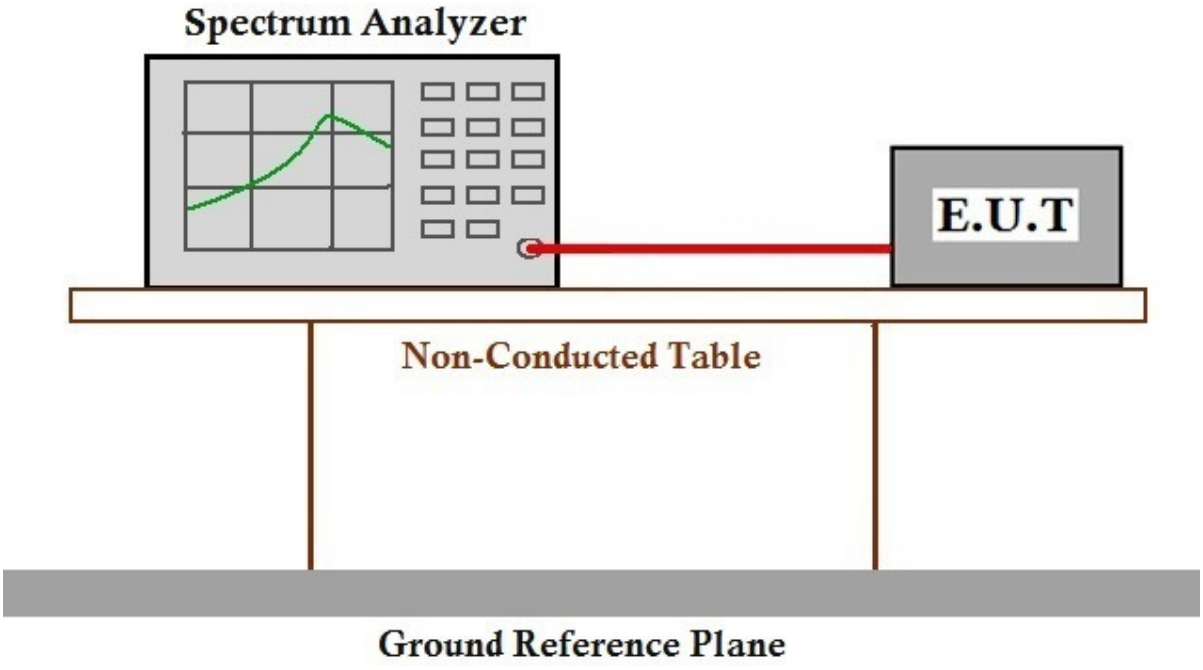
7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

Test mode b:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

7.7.2 Test Setup Diagram



7.7.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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7.8 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247:2018(d), RSS-247 Section 5.5
Test Method:	ANSI C63.10 (2013) Section 7.8.8
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)

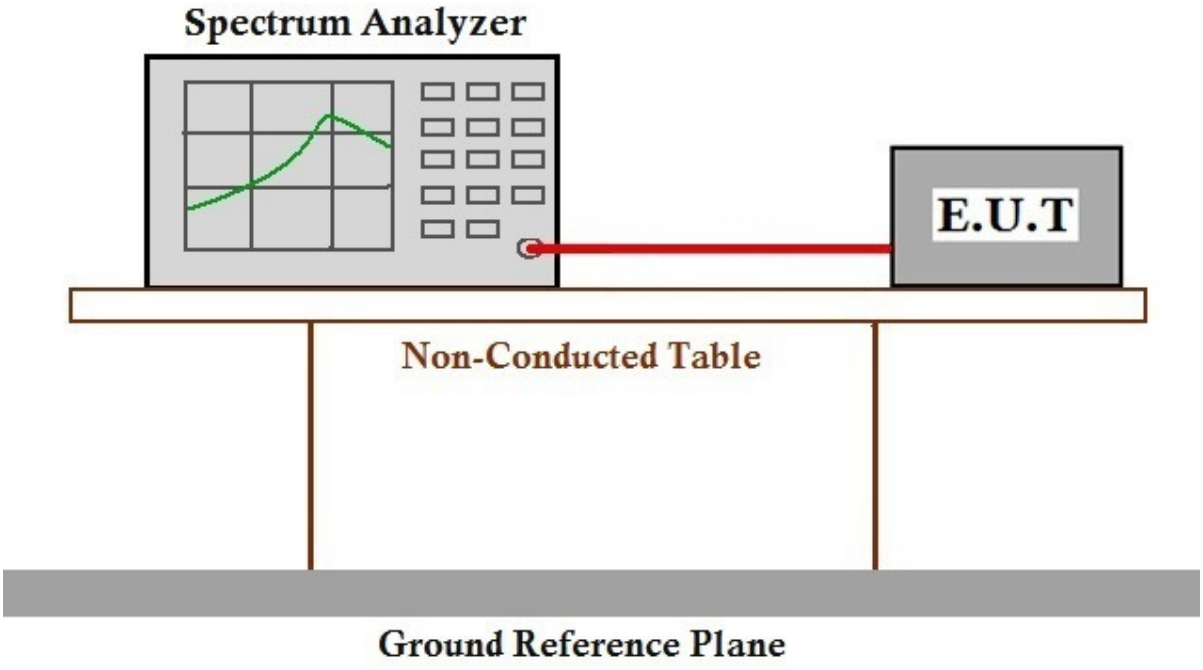
7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

Test mode b:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

7.8.2 Test Setup Diagram



7.8.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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7.9 Radiated Emissions which fall in the restricted bands

Test Requirement: 47 CFR Part 15, Subpart C 15.209 & 15.247(d), Section 3.3 & RSS-Gen Section 8.9

Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

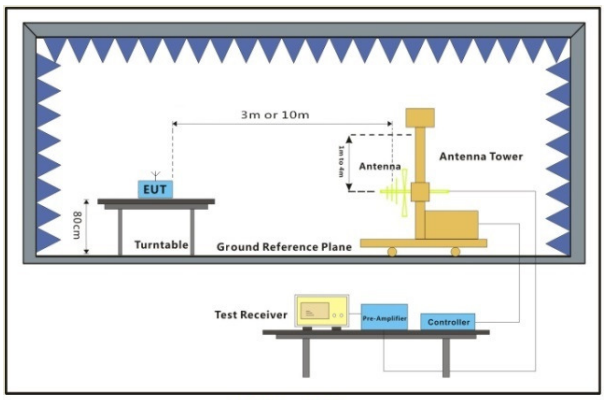
Pretest these modes to find the worst case: b:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

c:TX mode_Keep the EUT in continuously transmitting with modulation mode.

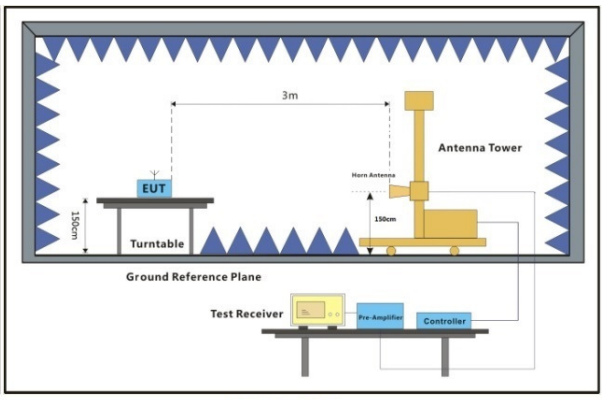
The worst case for final test: c:TX mode_Keep the EUT in continuously transmitting with modulation mode.

(only worst case data is showed on this test report)

7.9.2 Test Setup Diagram



30MHz-1GHz



Above 1GHz

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7.9.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. 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.

e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. 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.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are 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 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Mode:c; Polarization: Horizontal; Modulation:GFSK; ; Channel:Low

Frequency (MHz)	Polarity	Peak Level (dBµV/m)	Average Level (dBµV/m)	Peak Limit (dBµV/m)	Average Limit (dBµV/m)	Peak Margin (dB)	Average Margin (dB)	Remark
2693.6	V	57.9	31.6	74.0	54.0	-16.1	-22.4	PASS

Mode:c; Polarization:Vertical; Modulation:GFSK; ; Channel:High

Frequency (MHz)	Polarity	Peak Level (dBµV/m)	Average Level (dBµV/m)	Peak Limit (dBµV/m)	Average Limit (dBµV/m)	Peak Margin (dB)	Average Margin (dB)	Remark
2171	V	54.98	28.7	74.0	54.0	-19.0	-25.3	PASS
2603	V	57.1	30.8	74.0	54.0	-16.9	-23.2	PASS

Remark:

No emission was observed for the frequency range of 9 kHz-30MHz and 30MHz-1GHz.

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7.10 99% Bandwidth

Test Requirement RSS-Gen Section 6.6

Test Method: ANSI C63.10 Section 6.9.3

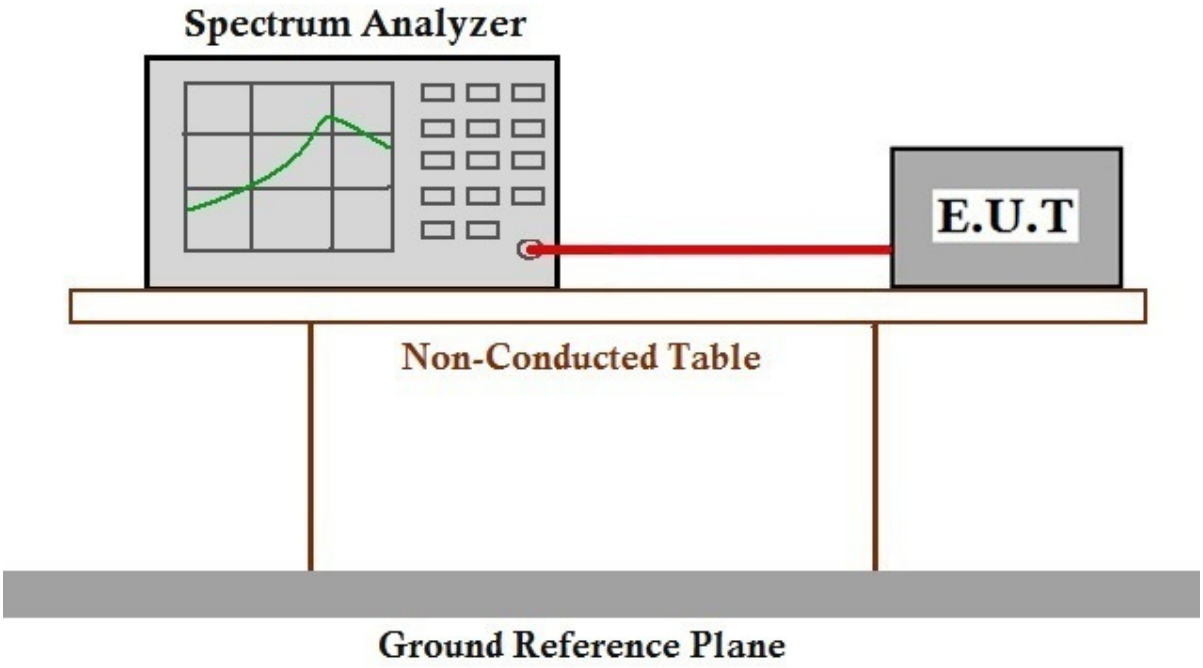
7.10.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

Test mode b:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

7.10.2 Test Setup Diagram



7.10.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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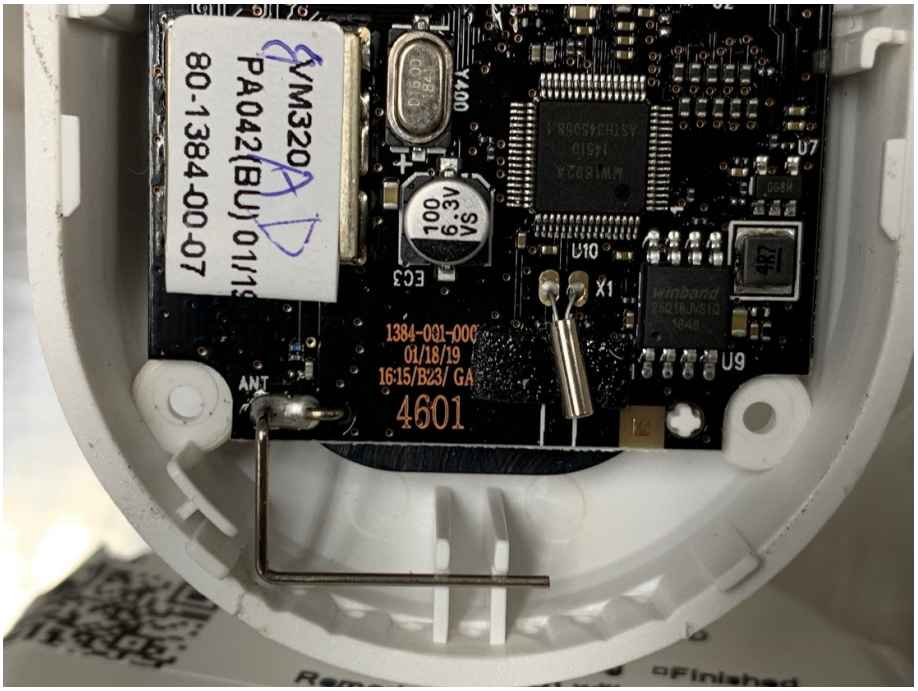
8 Photographs

8.1 Antenna Requirement Test Setup



8.2 Conducted Emissions at AC Power Line (150kHz-30MHz) Test Setup

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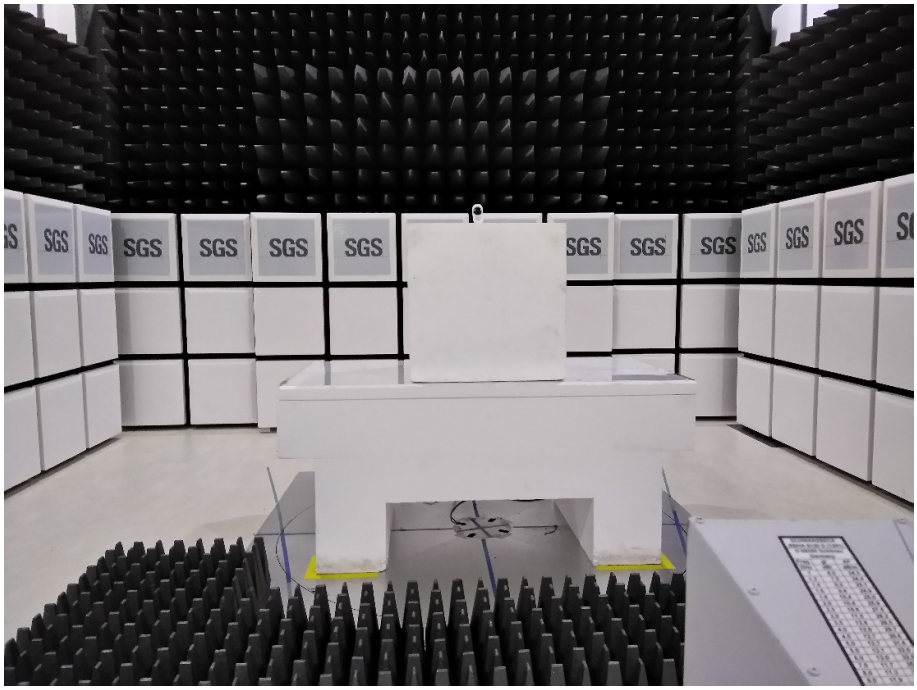
8.3 Radiated Spurious Emissions Test Setup



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8.4 EUT Constructional Details (EUT Photos)

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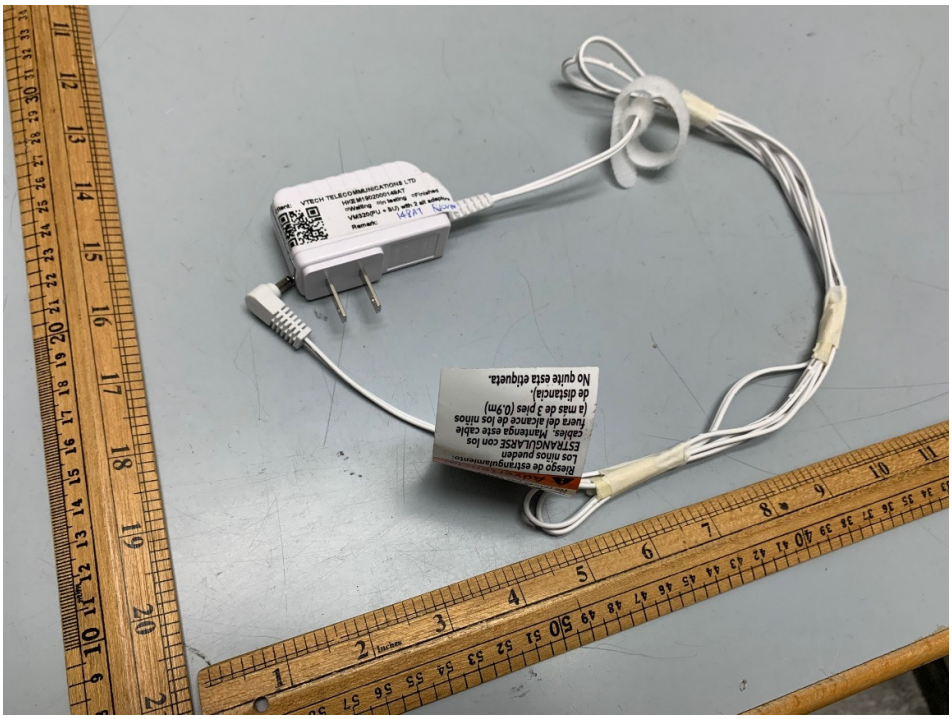

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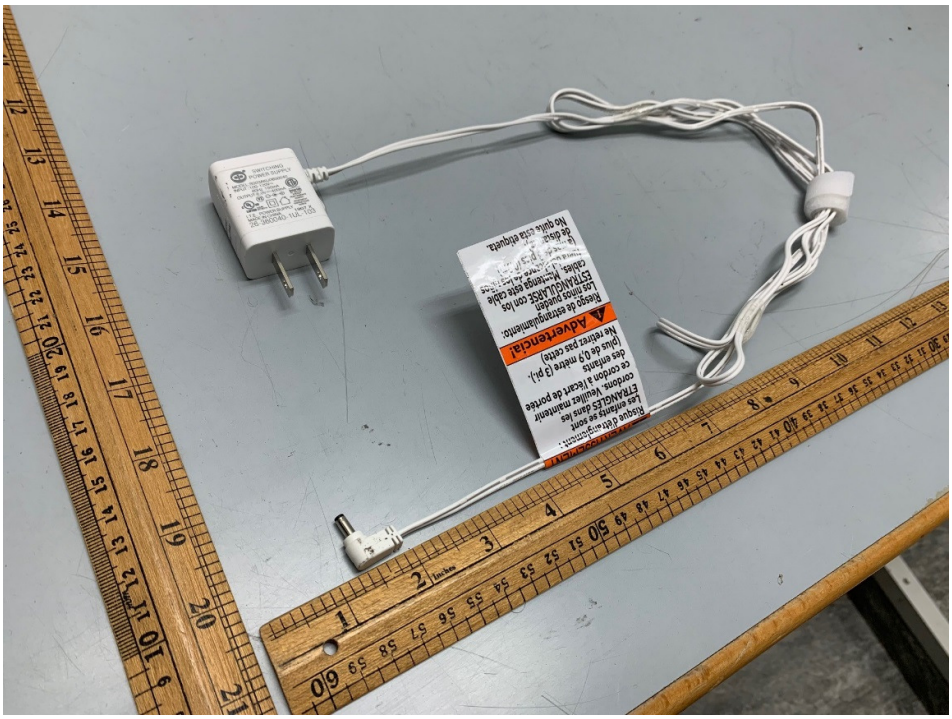

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