TEST REPORT

Application No.:	HKEM2209000891AT
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:	Baby Monitor
Model No.:	LF1726FHD BU, LF1726-2FHD BU, LF1726HD BU, LF1726-2HD BU
Additional Model:	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Trademark:	Leap frog
FCC ID:	EW780-2950-00
IC:	1135B-80295000
HVIN:	35-400445BU
Standard(s) :	CFR 47 FCC Part 15 Subpart C RSS-247 Issue 2 RSS-Gen: Issue 5
Date of Receipt:	2022-09-13
Date of Test:	2022-09-14 to 2022-09-26
Date of Issue:	2022-09-28
Test Result:	The submitted sample was found to comply with the test requirement

Law Man Kit
EMC Manager

Revision Record			
Revision No.	**Date**	**Report superseded**	**Remark**

Authorized for issue by:				
				
		Panny Leung **/Project Engineer**		Date: 2022-09-28
				
		Law Man Kit **/Reviewer**		Date: 2022-09-28

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Disturbance at AC Power Line(150kHz-30MHz)	47 CFR Part 15, Subpart C 15.207	ANSI C63.10: 2013 Section 6.2	47 CFR FCC Part 15, Subpart C 15.207	Pass
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.2.3	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	RSS-Gen Issue 5, Amdt 2019	N/A	RSS-Gen Section 6.8	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 (2013) Section 6.2	RSS-Gen Section 8.8	Pass
99% Bandwidth	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 Section 6.9.3	RSS-Gen Section 6.7	Pass
Minimum 6dB Bandwidth	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.8.1	RSS-247 Section 5.2(a)	Pass
Conducted Peak Output Power	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.9.1	RSS-247 Section 5.4(d)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Power Spectrum Density	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.10.2	RSS-247 Clause 5.2(b)	Pass
Conducted Band Edges Measurement	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.12	RSS-247 Section 5.5	Pass
Spurious Emissions	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.11	RSS-247 Section 5.5	Pass
Radiated Emissions which fall in the restricted bands	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 (2013) Section 6.4&6.5&6.6	RSS-247 Section Section 3.3 & RSS-Gen Section 8.10	Pass
Frequency stability	RSS-247 Issue 2, February 2017	RSS-Gen Section 6.11	RSS-Gen Section 8.11	Pass

Note: Frequency stability requested in RSS GEN Section 8.1.1 has been complied since the result of band edge can demonstrate.

Declaration of EUT Family Grouping:

Item no.: LF1726FHD BU, LF1726-2FHD BU, LF1726HD BU, LF1726-2HD BU

According to the confirmation from the applicant, the above models are identical in all electrical aspects in relating to the electronics/electrical designs, including software & firmware, PCB layout, construction design/ physical design/Enclosure. The differences are only the model/item No, and color.

Therefore, only the model LF1726FHD BU was tested in this report.

Abbreviation:

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	Model: VT07EUS05150 Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 5V, 1.5A, 7.5W
Test voltage:	AC 120 V
Cable:	Power Cable: 180cm unshielded 2 wires DC cable
Antenna Gain:	Maximum antenna gain at 900MHz: 0.53 dBi
Antenna Type:	FPC Antenna
Channel Spacing:	8MHz
Modulation Type:	802.11ah: OFDM (64QAM, 16QAM, QPSK, BPSK)
Data rate:	802.11ah: 32.5Mbps
Number of Channels:	3
Operation Frequency:	908MHz to 924MHz
Tested Channels:	908MHz, 916MHz, 924MHz
Series number:	A1
Hardware Version:	V1.1
Software Version:	RC01
	Remark: Power level setting was not adjustable and fixed default through SW Version.

4.2 Description of Support Units

The EUT has been tested with corresponding accessories as below:

Supplied by client

Description	Manufacturer	Model No.	SN/Certificate NO
putty	Simon Tatham	Version 0.76	N/A

Supplied by SGS:

Description	Manufacturer	Model No.	SN/Certificate NO
NoteBook (EMC4)	Dell	P75F	N/A

4.3 Measurement Uncertainty

RF

No.	Item	Measurement Uncertainty
1	Conduction emission	2.6dB (9kHz to 150kHz)
		2.6dB (150kHz to 30MHz)
2	Radio Frequency	± 7.25 x 10^{-8}
3	Duty cycle	± 0.37%
4	Occupied Bandwidth	± 3%
5	RF conducted power (30MHz-40GHz)	1.5dB
6	RF power density	1.5dB
7	Conducted Spurious emissions	1.5dB
8	RF Radiated power & Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.7dB (1GHz-6GHz)
		4.7dB (6GHz-18GHz)
		5.7dB (18GHz-40GHz)
9	Temperature test	± 1℃
10	Humidity test	± 3%
11	Supply voltages	± 1.5%
12	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.

According to decision rule based on Clause 4.2 of CISPR 16-4-2, the EUT complied with the standards specified above.

4.4 Test Location

All tests were performed at:

SGS Hong Kong Limited

Unit 2 and 3, G/F, Block A, Po Lung Centre,

11 Wang Chiu Road, Kowloon Bay, Kowloon, Hong Kong

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

No tests were sub-contracted.

4.5 Test Facility

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

- **IAS Accreditation (Lab Code: TL-817)**

SGS HONG KONGLimited has met the requirements of AC89, IAS Accreditation Criteria for Testing Laboratories, and has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories. This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

The report must not be used by the client to claim product certification, approval, or endorsement by IAS, NIST, or any agency of the Federal Government.

- **FCC Recognized Accredited Test Firm(CAB Registration No.: 514599)**

SGS HONG KONG 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: HK0015, Test Firm Registration Number: 514599.

- **Industry Canada (Site Registration No.: 26103; CAB Identifier No.: HK0015)**

SGS HONG KONG 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: HK0015, Site Registration Number: 26103.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

Minimum 6dB Bandwidth, Conducted Peak Output Power, Power Spectrum Density, Conducted Band Edges Measurement, Conducted Spurious Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2022/08/17	2023/08/16
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2022/08/17	2023/08/16
SMB100A SIGNAL GENERATOR	Rohde & Schwarz	SMB100A	E236	2022/08/17	2023/08/16
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	2022/08/20	2023/08/19
OSP	Rohde & Schwarz	OSP-B157W8	E242	2022/04/20	2023/04/19
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2022/09/17	2023/09/16
WMS32 Test Software	R&S	Version 10	N/A	--	--

Conducted Emissions at Mains Terminals (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver 9kHz to 3.6GHz	Rohde & Schwarz	ESR3 / 102326	E231	2022/08/17	2023/08/16
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127 / 8127312	E005	2022/04/13	2023/04/12
Impulse Limiter	Rohde & Schwarz	ESH-3-Z2 / 357881052	E028	2022/07/15	2023/07/14
EMC32 Test Software	R&S	Version 10	N/A	--	--

Radiated Spurious Emissions (30MHz-1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ChamPro	N/A	E229	2022/08/08	2023/08/07
Coaxial Cable	SGS	N/A	E167	2022/07/15	2023/07/14
EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESR7 / 102298	E314	2022/06/29	2023/06/28
TRILOG Super Broadb. Test Antenna, (25) 30-1000 MHz	Schwarzbeck	9168-1110	E264	2021/10/18	2023/10/17
EMC32 Test software	Rohde & Schwarz	Version 10	N/A	N/A	N/A
Boresight Mast Controller	ChamPro	AM-BS-4500-E	E237	N/A	N/A
Turntable with Controller	ChamPro	EM1000	E238	N/A	N/A

Radiated Spurious Emissions (above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ChamPro	N/A	E229	2022/08/08	2023/08/07
Coaxial Cable	SGS	N/A	E167	2022/07/15	2023/07/14
EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESR7 / 102298	E314	2022/06/29	2023/06/28
TRILOG Super Broadb. Test Antenna, (25) 30-1000 MHz	Schwarzbeck	9168-1110	E264	2021/10/18	2023/10/17
Signal and Spectrum Analyzer 2Hz - 26.5GHz	Rohde & Schwarz	FSW26	E296	2022/09/17	2023/09/16
Signal and Spectrum Analyzer 2Hz - 26.5GHz	Rohde & Schwarz	FSW26	E296	2022/09/17	2023/09/16
Preamplifier 33dB, 1 - 18GHz	Schwarzbeck	BBV9718	E214	2022/04/09	2023/04/08
Preamplifier 33dB, 18 - 26.5GHz	Schwarzbeck	BBV9719	E215	2022/09/21	2023/09/20
Broadband Coaxial Preamplifier typ. 30 dB, 18-40GHz	Schwarzbeck	BBV 9721	E266	2021/09/17	2022/09/16
Band Reject Filter 2.4 -2.5GHz	MICRO-TRONICS	BRM50702	E324	2021/09/17	2022/09/16
RF cable SMA to SMA 10000mm	HUBER+SUHNER	SF104-26.5/2*11SMA 45	E207-1	2021/09/17	2022/09/16
Broadband Coaxial Preamplifier typ. 30 dB, 18-40GHz	Schwarzbeck	BBV 9721	E266	2022/09/17	2022/09/16
Band Reject Filter 2.4 -2.5GHz	MICRO-TRONICS	BRM50702	E324	2022/09/17	2023/09/16
RF cable SMA to SMA 10000mm	HUBER+SUHNER	SF104-26.5/2*11SMA 45	E207-1	2022/09/17	2023/09/16
Boresight Mast Controller	ChamPro	AM-BS-4500-E	E237	N/A	N/A
Turntable with Controller	ChamPro	EM1000	E238	N/A	N/A

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Digital temperature & humidity data logger	SATO	SK-L200TH II	E232	2022/08/16	2023/08/15
Electronic Digital Thermometer with Hygrometer	nil	2074/2075	E159	2022/08/16	2023/08/15

Barometer with digital thermometer	SATO	7612-00	E218	2022/03/29	2023/03/28
Conditional Chamber	Zhong Zhi Testing Instruments	CZ-E-608D	E216	2022/08/17	2023/08/16

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

FCC Part 15 Subpart C Section 15.247 & 15.203

RSS-Gen Section 8.3

6.1.2 Conclusion

Standard Requirement:

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The maximum gain of the antenna is 0.53 dBi.

Photo of antenna refer to Appendix – Internal photo.

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.		

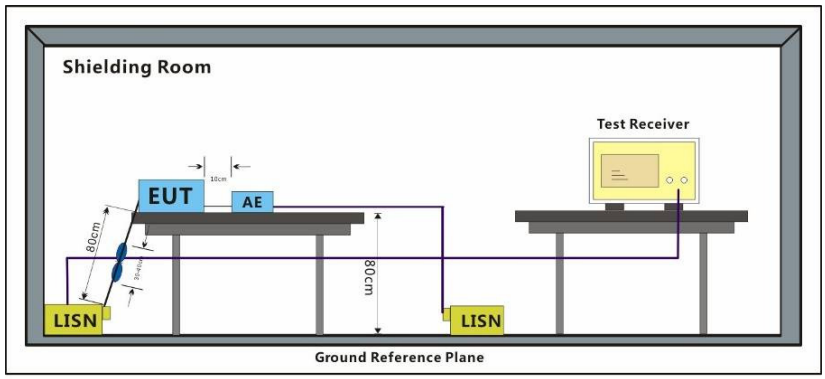
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 21.0 °C Humidity: 57.0 % RH :

Test mode a :TX mode_Keep the EUT in continuously transmitting mode with all modulation types.

7.1.2 Test Setup Diagram



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,

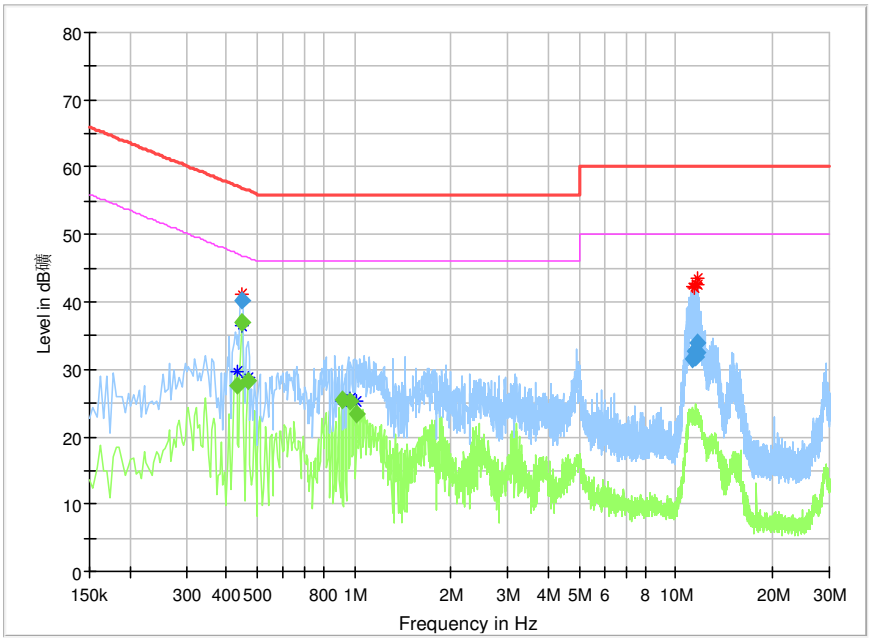
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test 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

Mode:a;
Line: Live Line

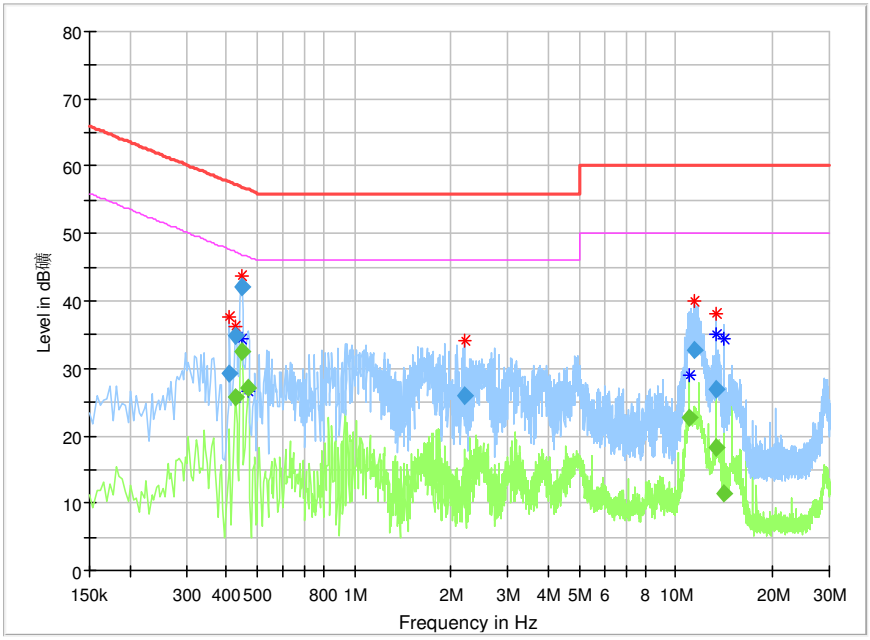
Full Spectrum



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.430000	---	27.52	47.25	19.73	10.9	Pass
0.446000	---	37.07	46.95	9.88	10.9	Pass
0.446000	40.16	---	56.95	16.79	10.9	Pass
0.466000	---	28.23	46.59	18.36	10.9	Pass
0.914000	---	25.59	46.00	20.41	10.6	Pass
0.974000	---	25.35	46.00	20.65	10.6	Pass
1.018000	---	23.39	46.00	22.61	10.6	Pass
11.286000	31.66	---	60.00	28.34	10.5	Pass
11.426000	32.66	---	60.00	27.34	10.5	Pass
11.546000	31.82	---	60.00	28.18	10.5	Pass
11.610000	33.87	---	60.00	26.13	10.5	Pass
11.634000	32.62	---	60.00	27.38	10.5	Pass

Mode: a;
Line: Neutral Line

Full Spectrum



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.410000	29.36	---	57.65	28.29	10.9	Pass
0.426000	---	25.64	47.33	21.69	10.9	Pass
0.426000	34.74	---	57.33	22.59	10.9	Pass
0.446000	---	32.63	46.95	14.32	10.9	Pass
0.446000	42.06	---	56.95	14.89	10.9	Pass
0.466000	---	27.03	46.59	19.56	10.9	Pass
2.202000	25.88	---	56.00	30.12	10.3	Pass
11.014000	---	22.58	50.00	27.42	10.4	Pass
11.426000	32.75	---	60.00	27.25	10.5	Pass
13.374000	---	18.25	50.00	31.75	10.6	Pass
13.374000	26.82	---	60.00	33.18	10.6	Pass
14.162000	---	11.41	50.00	38.59	10.6	Pass

7.2 99% Bandwidth

Test Requirement RSS-Gen Section 6.6

Test Method: ANSI C63.10 Section 6.9.3

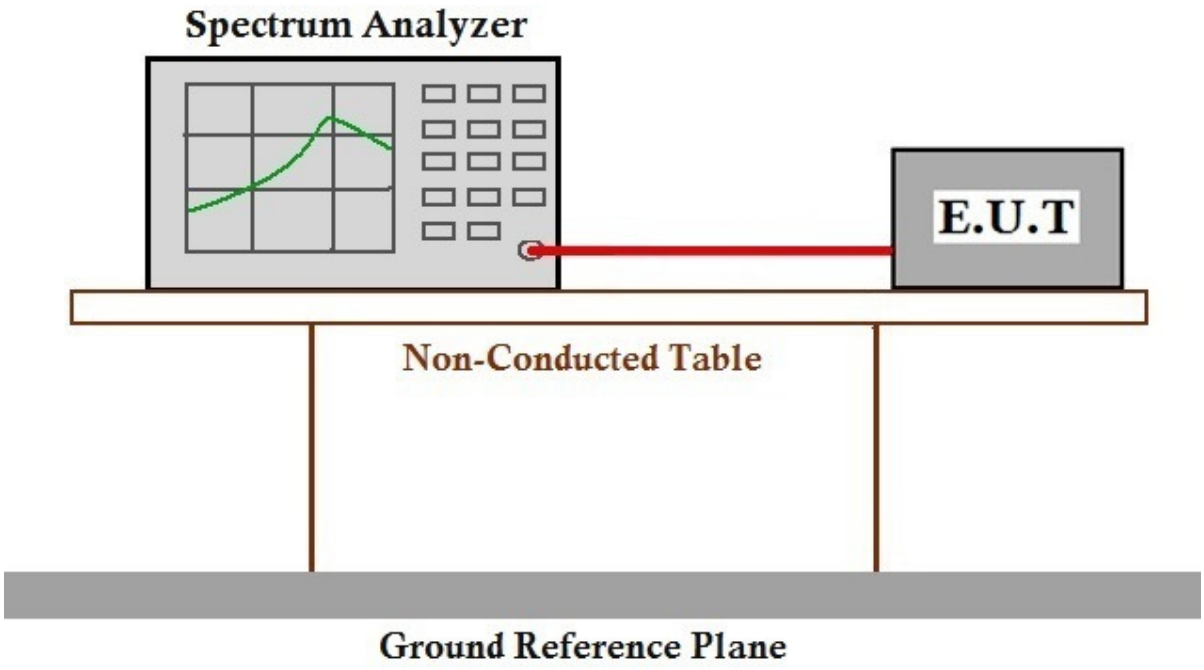
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a :TX mode_Keep the EUT in continuously transmitting mode with all modulation types.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

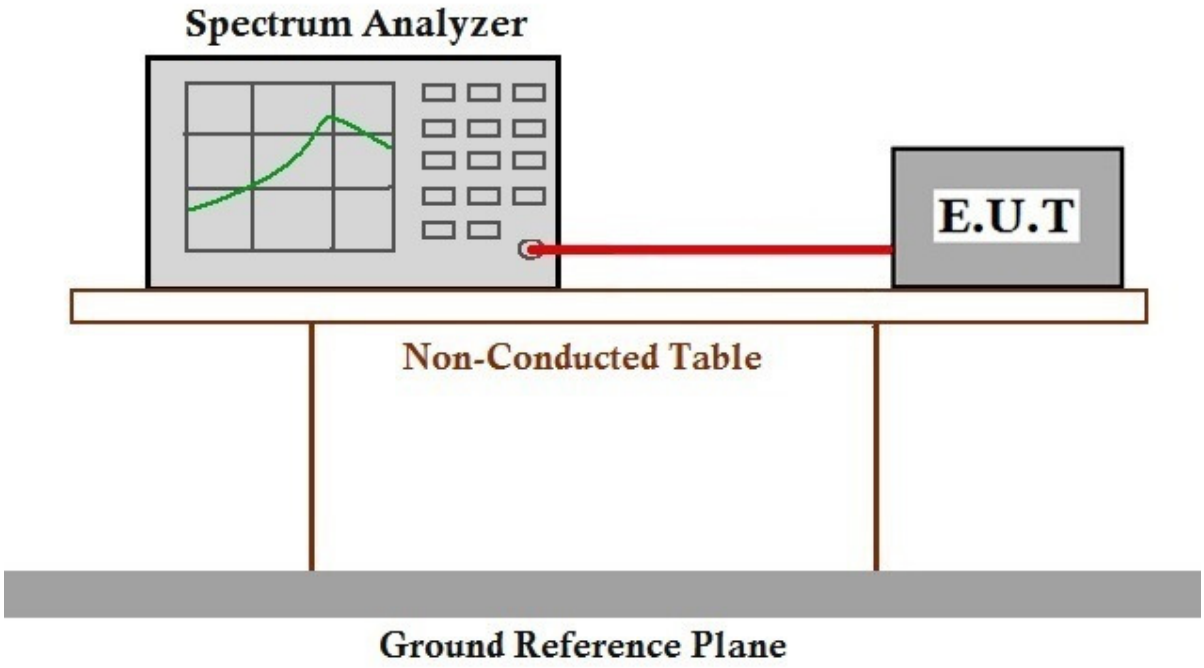
7.3 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)
Test Method: ANSI C63.10 (2013) Section 11.8.1
Limit: ⩾500 kHz

7.3.1 E.U.T. Operation

Operating Environment:
Temperature: 22.5 °C Humidity: 49.1 % RH :
Test mode a :TX mode_Keep the EUT in continuously transmitting mode with all modulation types.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

7.4 Conducted Peak Output Power

Test Requirement 47 CFR Part 15 Subpart C 15.247:2019(b)(1) & 15.247(b)(3), RSS-247 Section 5.4(b)

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

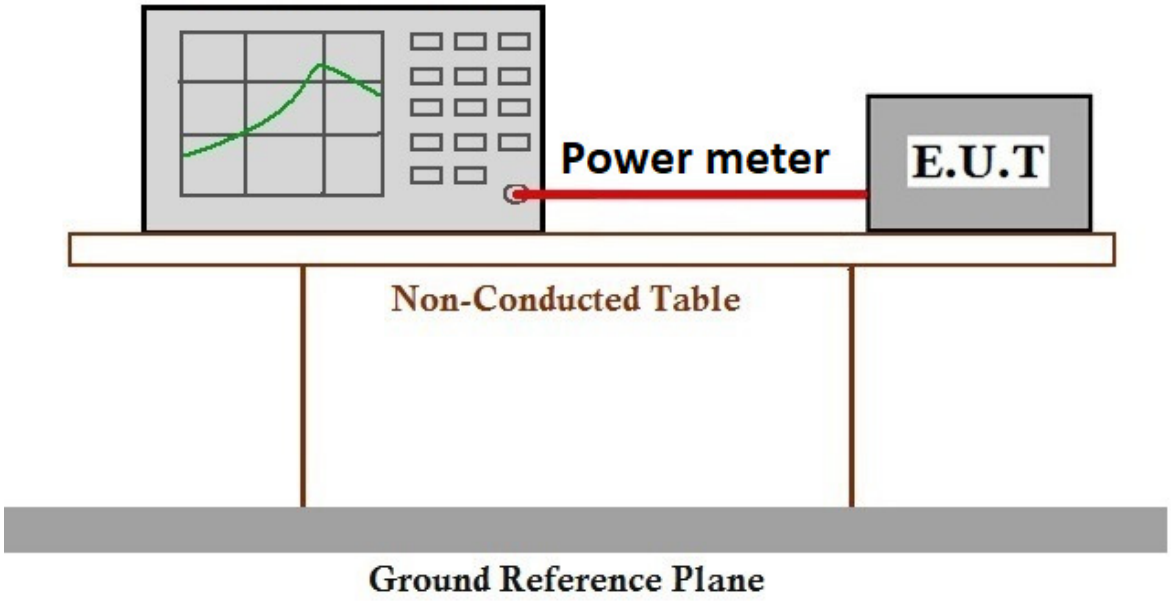
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a :TX mode_Keep the EUT in continuously transmitting mode with all modulation types.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

7.5 Power Spectrum Density

Test Requirement	47 CFR Part 15, Subpart C 15.247(e), RSS-247 Clause 5.2(b)
Test Method:	ANSI C63.10 (2013) Section 11.10.2
Limit:	≤8dBm in any 3 kHz band during any time interval of continuous transmission

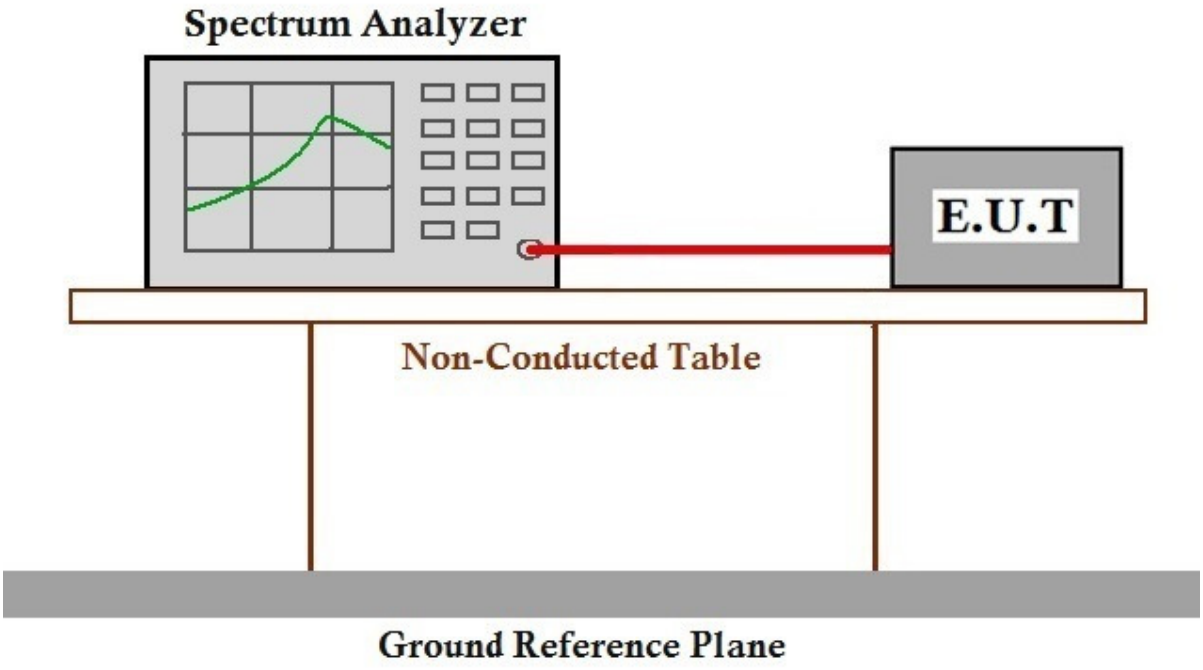
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 49.1 % RH :

Test mode a :TX mode_Keep the EUT in continuously transmitting mode with all modulation types.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

7.6 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247:2019(d), RSS-247 Section 5.5
Test Method:	ANSI C63.10 (2013) Section7.8.6
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required. 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)

FCC Part15 C Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section. only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

RSS-Gen Section 8.10 Restricted bands of operation.

Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:

(a) The transmit frequency, including fundamental components of modulation, of licence-exempt radio

apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, *Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD)*.
(b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.
(c) Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

Table 7 – Restricted frequency bands* MHz	**MHz**	**GHz**
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	* Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138	--	

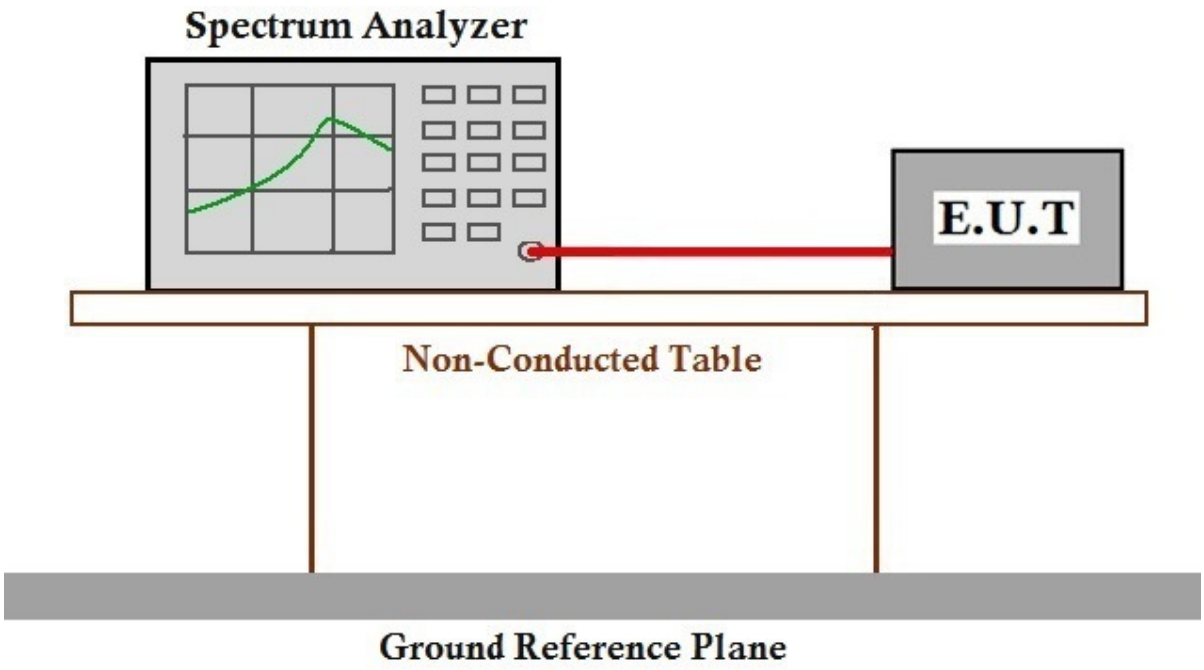
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 51.1 % RH :

Test mode a :TX mode_Keep the EUT in continuously transmitting mode with all modulation types.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

7.7 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247:2019(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 device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

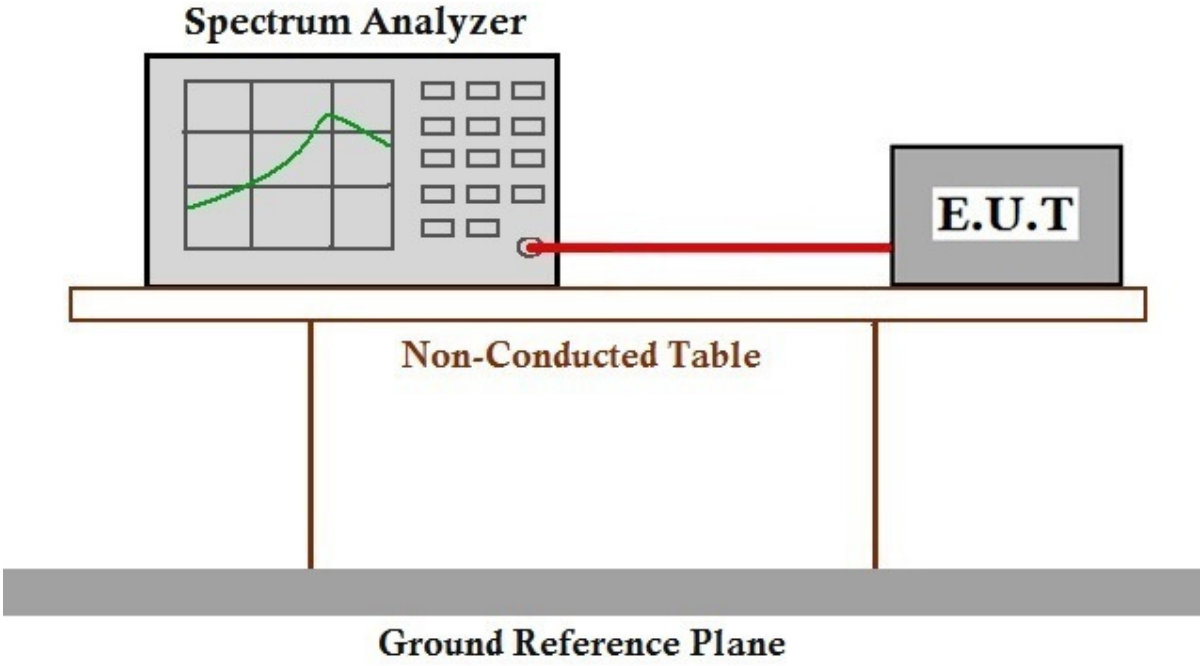
7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a :TX mode_Keep the EUT in continuously transmitting mode with all modulation types.

7.7.2 Test Setup Diagram



7.7.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

7.8 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

Limit:

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (μ V/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (μ A/m)	Measurement distance (m)
9 - 490 kHz 1	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

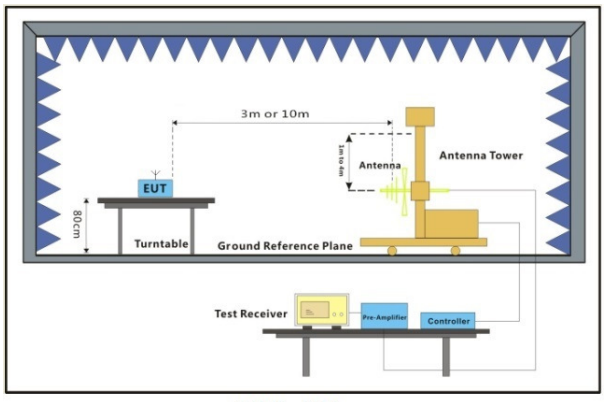
7.8.1 E.U.T. Operation

Operating Environment:

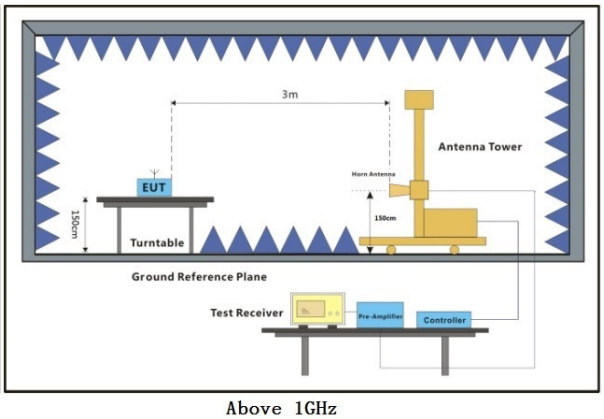
Temperature: 23.1 °C Humidity: 51.4 % RH :

Test mode a :TX mode_Keep the EUT in continuously transmitting mode with all modulation types.

7.8.2 Test Setup Diagram



30MHz-1GHz



Above 1GHz

7.8.3 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.

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Result
		Peak	Average	Peak	Average	
902.000	H	50.1	37.8	74.0	54.0	Pass
928.000	H	52.3	39.6	74.0	54.0	Pass
902.000	V	51.2	38.7	74.0	54.0	Pass
928.000	V	53.1	39.7	74.0	54.0	Pass

7.9 Radiated Spurious Emissions

Test Requirement Section 3.3 & RSS-Gen Section 8.9
Test Method: ANSI C63.10 (2013) Section 6.4, 6.5 & 6.6
Limit:

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (μ V/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (μ A/m)	Measurement distance (m)
9 - 490 kHz	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

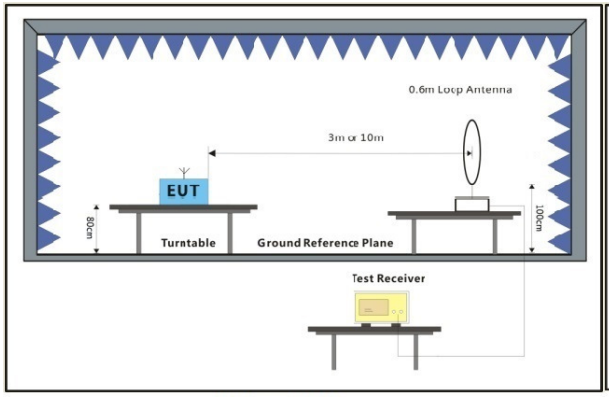
7.9.1 E.U.T. Operation

Operating Environment:

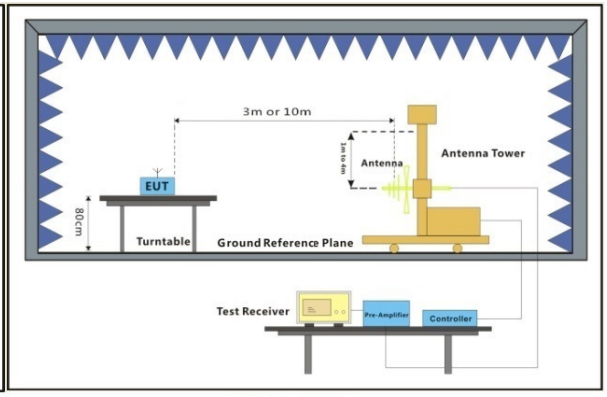
Temperature: 22.3 °C Humidity: 52.3 % RH :

Test mode a:TX mode_Keep the EUT in continuously transmitting mode with all modulation types.

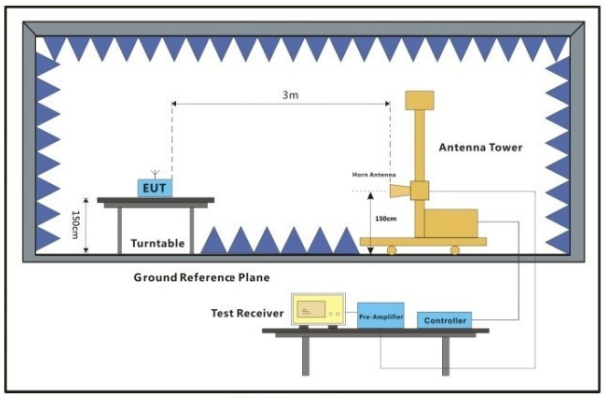
7.9.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

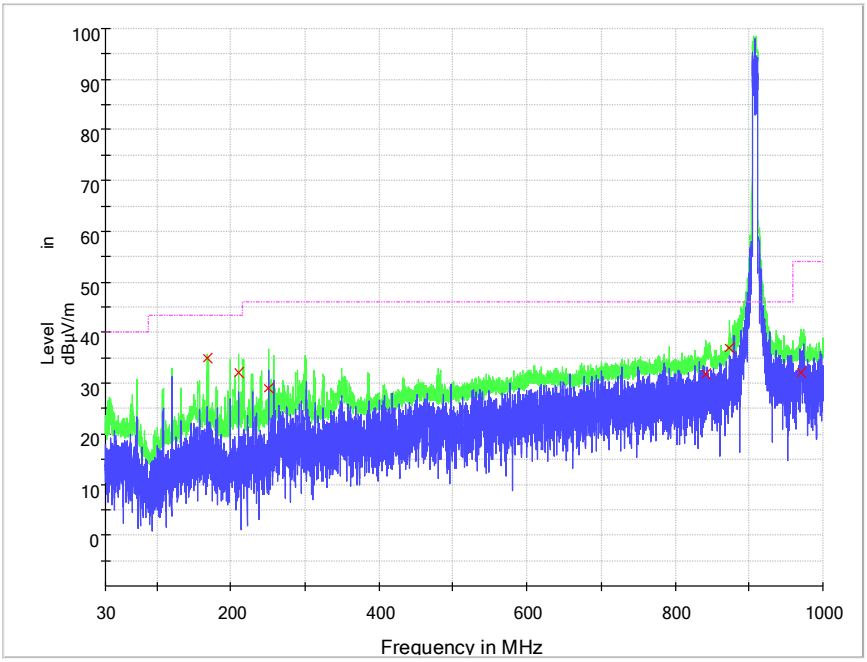
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 40GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) 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.

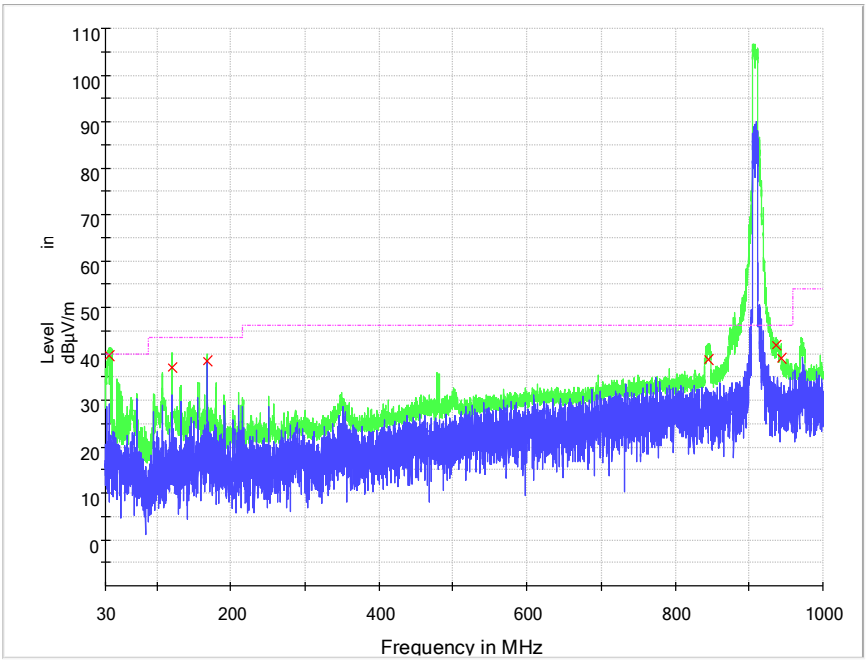
Radiated emission below 1GHz

Horizontal (worse plot was shown as below)



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
167.935000	35.0	H	14.3	8.5	43.5	Pass
210.542500	32.2	H	11.0	11.3	43.5	Pass
249.932500	29.0	H	13.0	17.0	46.0	Pass
840.977500	31.9	H	25.3	14.1	46.0	Pass
873.250000	37.0	H	25.5	9.0	46.0	Pass
970.067500	32.1	H	26.6	22.0	54.0	Pass

Vertical (worse plots was shown as below)



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
36.017500	39.5	V	13.3	0.5	40.0	Pass
119.575000	37.1	V	12.2	6.4	43.5	Pass
168.130000	38.5	V	14.3	5.0	43.5	Pass
845.267500	38.8	V	25.3	7.2	46.0	Pass
936.625000	42.0	V	26.2	4.0	46.0	Pass
943.352500	39.1	V	26.3	6.9	46.0	Pass

Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1813.571	V	67.1	51.2	74.0	54.0	Pass
2724.285	H	53.6	/	74.0	54.0	Pass
3628.928	H	61.7	46.5	74.0	54.0	Pass
4542.071	H	50.5	/	74.0	54.0	Pass
5451.571	H	48.7	/	74.0	54.0	Pass
6354.392	H	51.7	/	74.0	54.0	Pass

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1829.964	V	68.5	52.9	74.0	54.0	Pass
2744.321	H	52.5	/	74.0	54.0	Pass
3667.178	H	61.4	46.5	74.0	54.0	Pass
4585.785	H	49.5	/	74.0	54.0	Pass
5502.571	H	48.2	/	74.0	54.0	Pass
6406.607	H	50.7	/	74.0	54.0	Pass

Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1850.000	V	66.9	51.0	74.0	54.0	Pass
2768.000	H	48.3	/	74.0	54.0	Pass
3695.107	H	63.0	47.7	74.0	54.0	Pass
4623.428	H	49.9	/	74.0	54.0	Pass
5543.250	H	49.8	/	74.0	54.0	Pass
6497.678	H	51.2	/	74.0	54.0	Pass

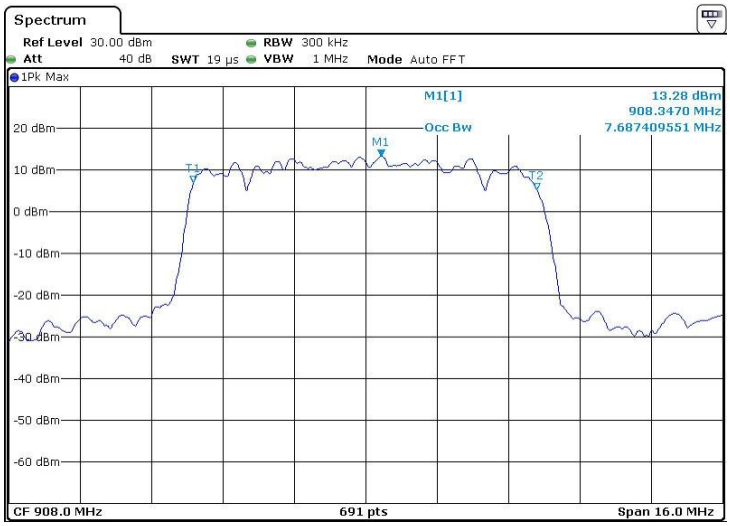
8 Photographs

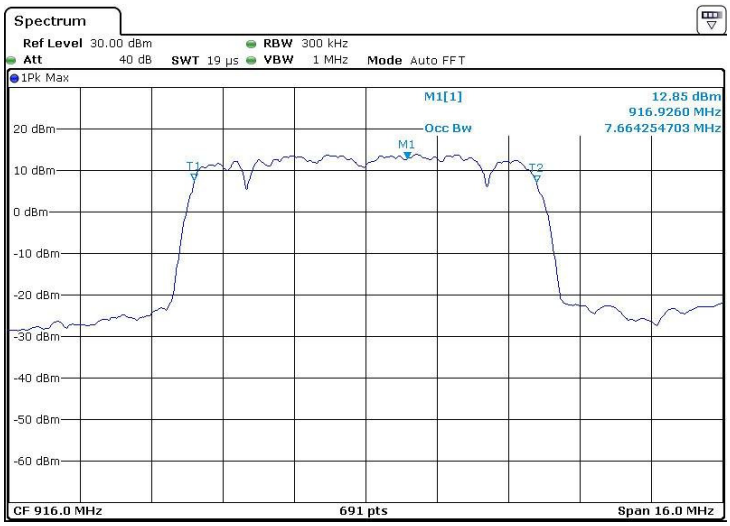
Remark: Photos refer to Appendix: External Photo, Internal Photo, and Setup Photo

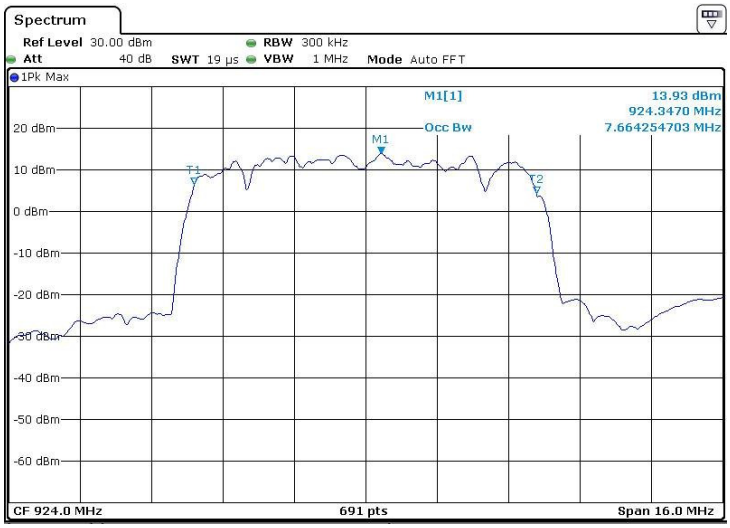
Appendix

8.1 99% Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)
908.000000	7.687409551
916.000000	7.664254703
924.000000	7.664254703



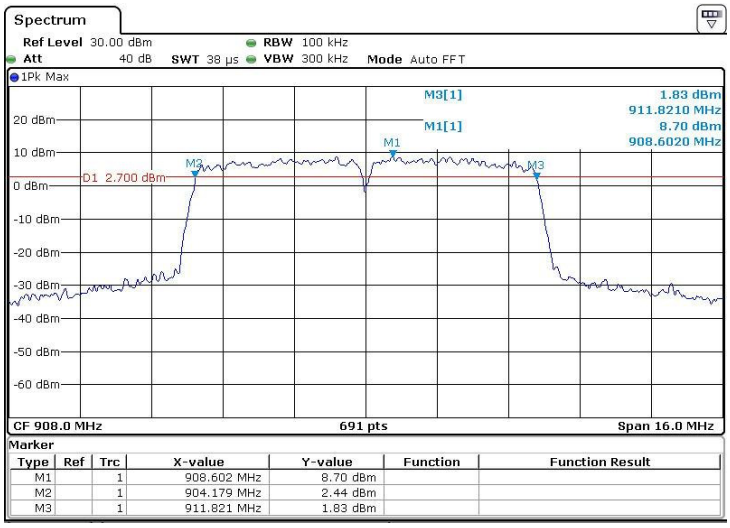


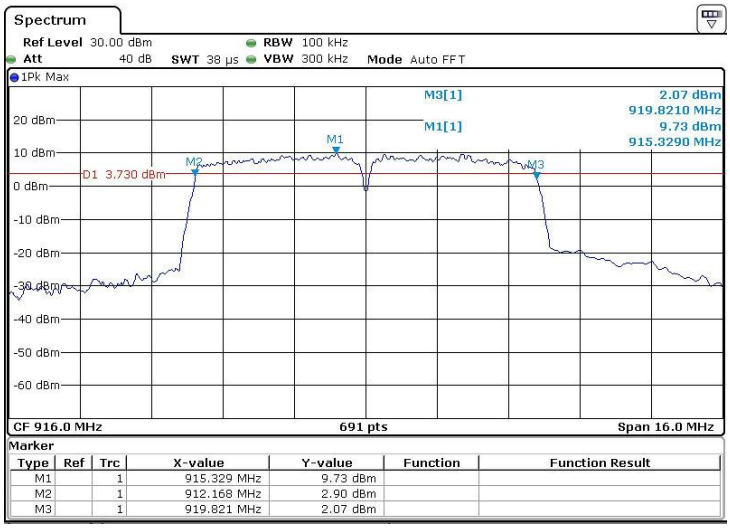


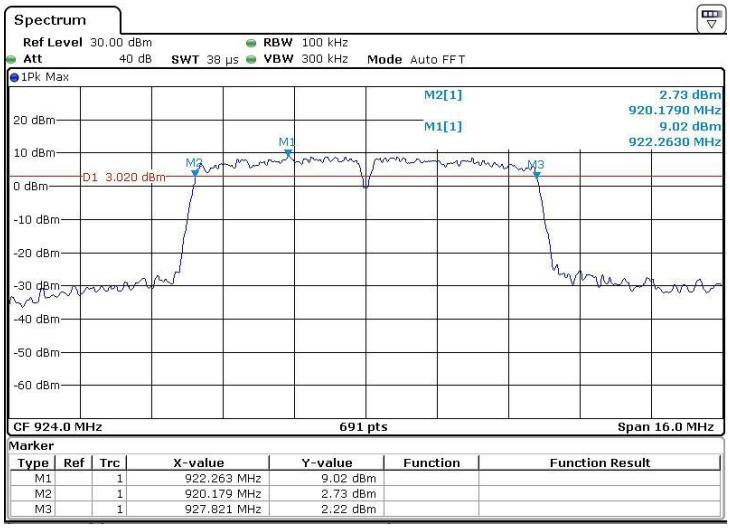
Remark: Cable loss 0.8dB was considered and set in system configuration.

8.2 Minimum Emission Bandwidth 6 dB

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
908.000000	7.642000	0.500000	---	904.179000	911.821000	Pass
916.000000	7.653000	0.500000	---	912.168000	919.821000	Pass
924.000000	7.642000	0.500000	---	920.179000	927.821000	Pass







Remark: Cable loss 0.8dB was considered and set in system configuration.

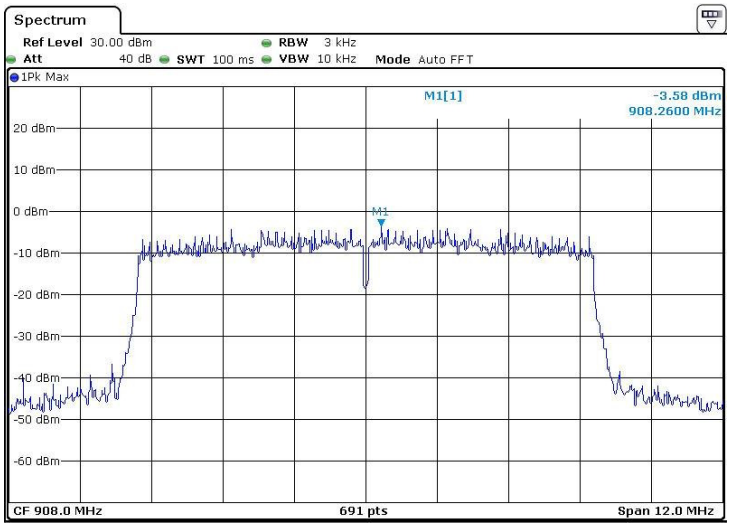
8.3 RF output power

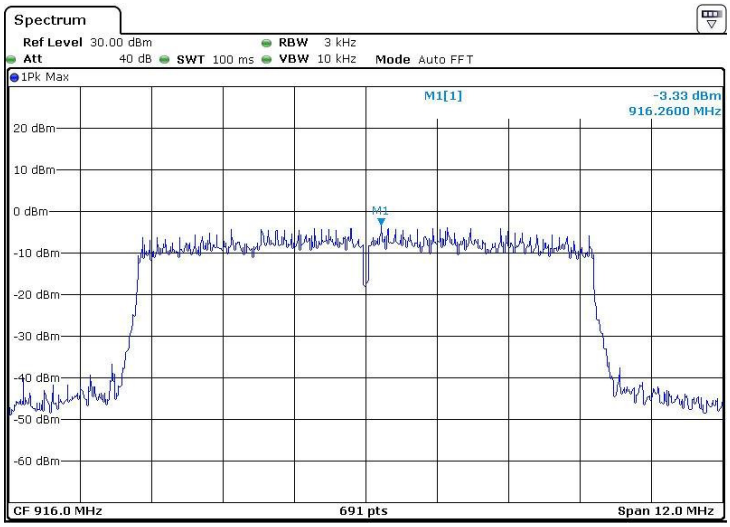
DUT Frequency (MHz)	Limit Max (dBm)	Gated Level (dBm)	Result
908.000000	30.0	28.1	Pass
916.000000	30.0	28.1	Pass
924.000000	30.0	28.0	Pass

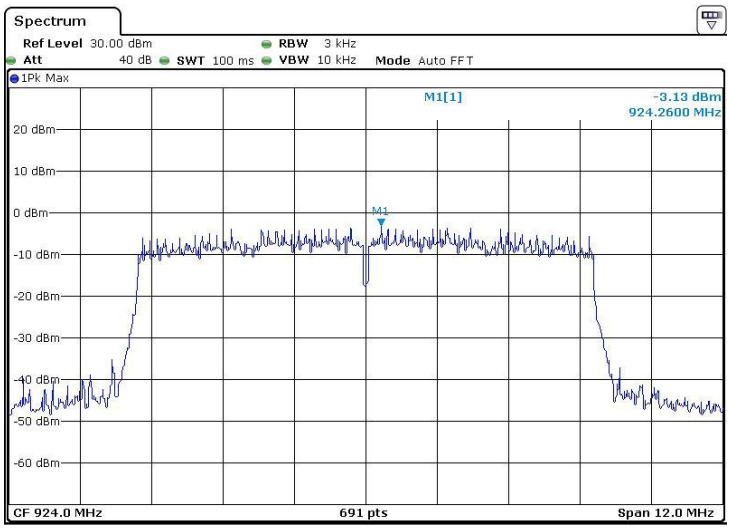
Remark:
Antenna gain: 0.53 dBi
Cable loss 0.8dB was considered and set in system configuration.

8.4 Power Spectral Density

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
908.000000	908.260000	-3.58	8.0	Pass
916.000000	916.260000	-3.33	8.0	Pass
924.000000	924.260000	-3.13	8.0	Pass

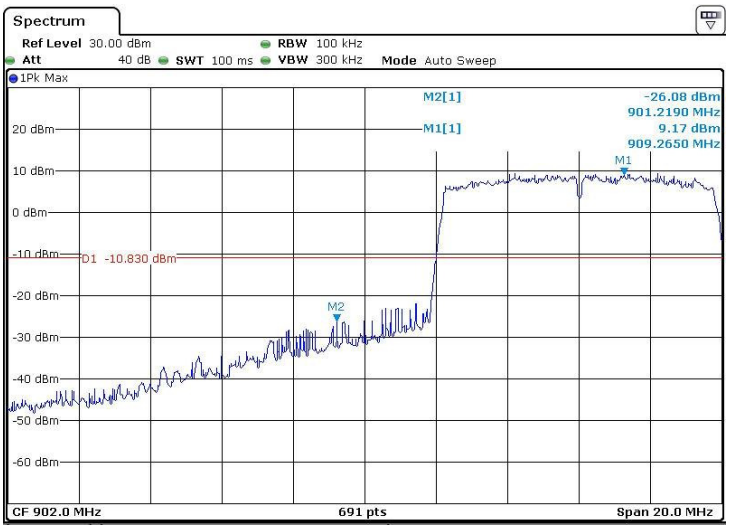






Remark: Cable loss 0.8dB was considered and set in system configuration.

8.5 Band Edge



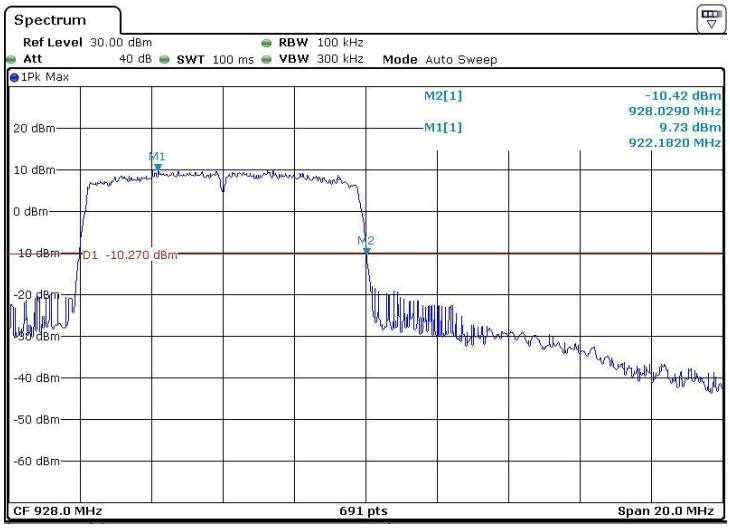
Inband Peak

Frequency (MHz)	Level (dBm)
909.265000	9.17

Remark: Limit = Inband peak - 20dB

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
901.219000	-26.08	-15.25	-10.83	Pass



Inband Peak

Frequency (MHz)	Level (dBm)
922.182000	9.73

Remark: Limit = Inband peak - 20dB

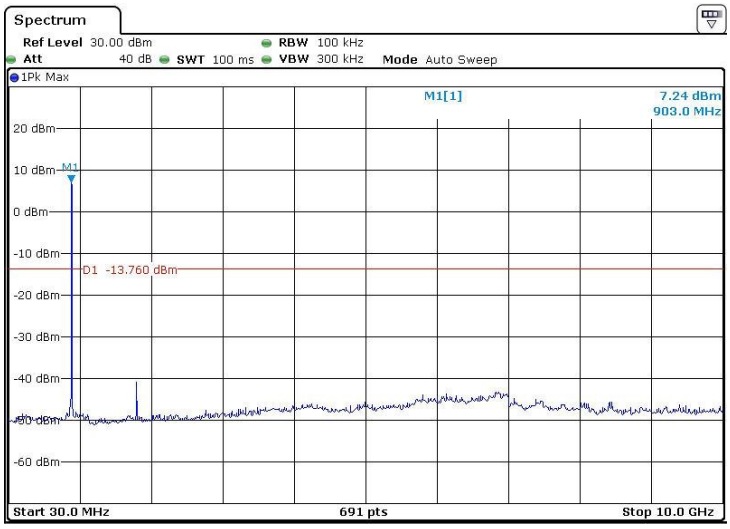
Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
928.029000	-10.42	-0.15	-10.27	Pass

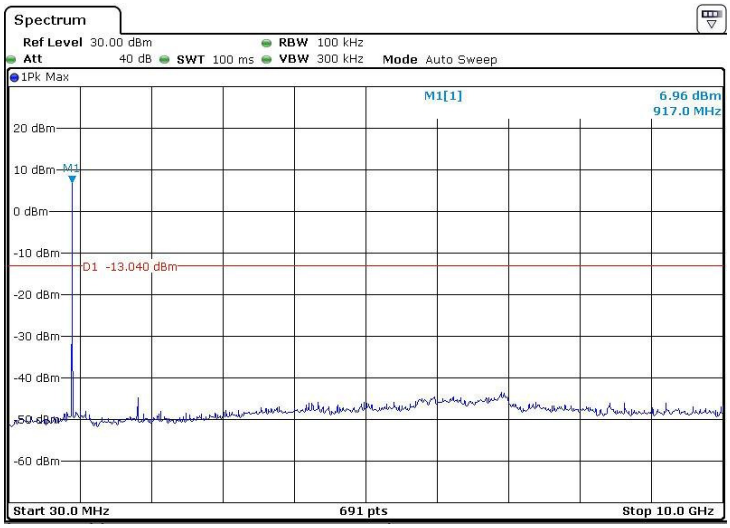
Remark: Cable loss 0.8dB was considered and set in system configuration.

8.6 Conducted spurious emission

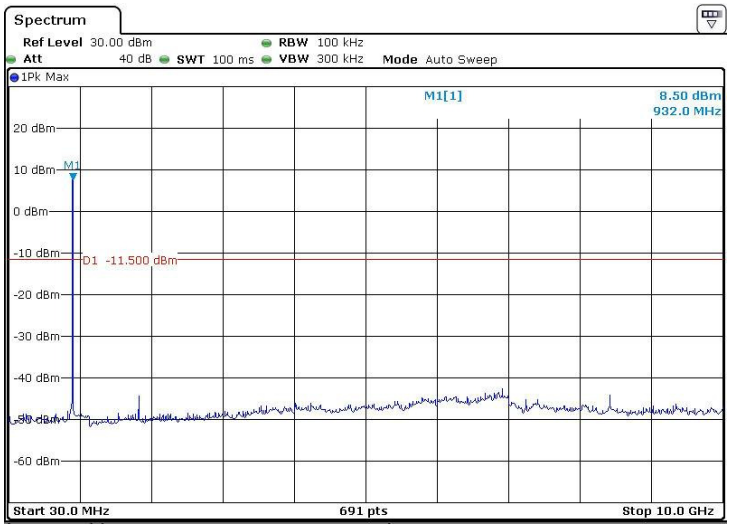
Lowest channel



Middle channel



Highest channel



Remark:
Limit: Inband peak - 20dB

- End of the Report -