TEST REPORT

Application No.:	HKEM1911001141AT
Applicant:	VTECH TELECOMMUNICATIONS LTD.
Address of Applicant:	23/F.,BLOCK 1, TAI PING INDUSTRIAL CENTRE,NO. 57 TING KOK ROAD,TAI PO,N.T.,HONG KONG
Equipment Under Test (EUT):	
EUT Name:	Full Color Pan and Tilt Video Monitor
Model No.:	VM5263 BU, VM5263-2 BU, VM5263-ab BU, VM5463 BU, VM5463-2 BU, VM5463-ab BU ♣
♣	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
FCC ID:	EW780-2023-00
IC:	1135B-80202300
HVIN:	35-201303BU
Standard(s):	CFR 47 FCC Part 15, Subpart C, 2019 RSS-247 Issue 2: May 2017 RSS-Gen: Issue 5 Amdt 2019
Date of Receipt:	2019-11-26
Date of Test:	2019-11-26 to 2019-12-12
Date of Issue:	2019-12-12
Test Result:	**PASS ***

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

Keny Xu
EMC Laboratory Manager

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Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2019-12-12		*Original*

Authorized for issue by:				
Tested by:				
		Vincent Chen /Project Engineer		
Checked by:				
		Eric Fu /Reviewer		

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2 Test Summary

Test	Test Requirement	Test method	Result
Antenna Requirement	FCC PART 15 C section 15.247 (c) and Section 15.203	FCC PART 15 C section 15.247 (c) and Section 15.203	PASS
20dB Bandwidth	FCC PART 15 C section 15.247 (a)(1)	ANSI C63.10: Clause 6.9.1	PASS
Carrier Frequencies Separation	FCC PART 15 C section 15.247(a)(1)	ANSI C63.10: Clause 7.8.2	PASS
Hopping Channel Number	FCC PART 15 C section 15.247(a)(1)(iii)	ANSI C63.10: Clause 7.8.3	PASS
Dwell Time	FCC PART 15 C section 15.247(a)(1)(iii)	ANSI C63.10: Clause 7.8.4	PASS
Pseudorandom Frequency Hopping Sequence	FCC PART 15 C section 15.247(a)(1)	ANSI C63.10: Clause 7.7.5	PASS
Maximum Peak Output Power	FCC PART 15 C section 15.247(b)(1)	ANSI C63.10: Clause 7.8.5	PASS
Conducted Emissions at AC Power Line (150kHz-30MHz)	FCC PART 15 C 15.207	ANSI C63.10 (2013) Section 6.2	PASS
Conducted Spurious Emission	FCC PART 15 C section 15.247(d)	ANSI C63.10: Clause 7.8.8	PASS
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	ANSI C63.10 (2013) Section 6.10.5	PASS
Radiated Spurious Emission	FCC PART 15 C section 15.247(d)	ANSI C63.10 (2013) Section 6.4,6.5,6.6	PASS
Band Edges Measurement	FCC PART 15 C section 15.247 (d) &15.205	ANSI C63.10: clause 7.8.6	PASS
Antenna Requirement	RSS-Gen Section 8.3	N/A	PASS
Pseudorandom Frequency Hopping Sequence	RSS-247 Section 5.1(a)	N/A	PASS
99% Bandwidth	RSS-Gen Section 6.7	ANSI C63.10 Section 6.9.3	PASS
Conducted Peak Output Power	RSS-247 Section 5.4(b)	ANSI C63.10 (2013) Section 7.8.5	PASS

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20dB Bandwidth	RSS-247 Section 5.1(a)	ANSI C63.10 Section 6.9.2	PASS
Carrier Frequencies Separation	RSS-247 Section 5.1(b)	ANSI C63.10 (2013) Section 7.8.2	PASS
Hopping Channel Number	RSS-247 Section 5.1(d)	ANSI C63.10 (2013) Section 7.8.3	PASS
Dwell Time	RSS-247 Section 5.1(d)	ANSI C63.10 (2013) Section 7.8.4	PASS
Conducted Band Edges Measurement	RSS-247 Section 5.5	ANSI C63.10 (2013) Section7.8.6	PASS
Conducted Emissions at AC Power Line (150kHz-30MHz)	RSS-Gen Section 8.8	ANSI C63.10 (2013) Section 6.2	PASS
Conducted Spurious Emissions	RSS-247 Section 5.5	ANSI C63.10 (2013) Section 7.8.8	PASS
Radiated Emissions which fall in the restricted bands	RSS-247 Section 3.3 & RSS-Gen Section 8.10	ANSI C63.10 (2013) Section 6.10.5	PASS
Radiated Spurious Emissions	RSS-247 Section 5.5 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.4&6.5&6.6	PASS
Frequency stability	RSS-Gen Section 8.11	RSS-Gen Section 6.11	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.:

VM5263 BU, VM5263-2 BU, VM5263-ab BU, VM5463 BU, VM5463-2 BU, VM5463-ab BU

According to the confirmation from the applicant, the above models are identical in all electrical aspects in relating to electronics/electrical designs, including software & firmware, PCB layout, construction design/physical design/enclosure. The differences are only the color, cosmetic details, trade name, model number. The Baby unit of Model VM5263-ab BU is identical with VM5463-ab BU except for the projector.

Therefore only the model VM5463 BU was tested in this report.

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3 Content

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4 General Information

4.1 Details of E.U.T.

Power supply:	AC 120 V, 60 Hz
Adapter	Adaptor 1 AC 100-240V ~ 50/60Hz 200mA to DC 5.0V 1000 mA Model no: S006AKU0500100 Adaptor 2 AC 100-240V ~ 50/60Hz 150mA to DC 5.0V 1000 mA Model no: VT05EUS05100
Function	Monitoring Device
Test Voltage	AC120 V 60 Hz
Operation Frequency:	2405-2475MHz
Channel Numbers:	16
Channel Separation:	≥ 2MHz
Type of Modulation:	Frequency Hopping Spread Spectrum (FHSS)
Sample Type:	Indoor
Antenna Type:	Dipole
Antenna Gain:	0 dBi
Frequency List	

Channel Number	TX Freq (MHz)	Channel Number	TX Freq (MHz)	Channel Number	TX Freq (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

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9	2422	20	2446	31	2473
10	2424	21	2450	**32**	**2475**
11	2426	22	2452		

Remark: 1. Operation channel is only 16.

2. Testing Channels are highlighted in **bold**.

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
UART Test board	N/A	MX3232	N/A
Test Software	MicroRidge System	Version 3.0.0.108	N/A

Supplied by SGS:

Description	Manufacturer	Model No.	SN/Certificate NO
NoteBook (EMC2)	Dell	P75F	N/A

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4.3 Measurement Uncertainty (95% confidence level, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	± 7.25 x 10^{-8}
2	Duty cycle	± 0.37%
3	Occupied Bandwidth	± 3%
4	Conduction emission	± 3.0dB (150kHz to 30MHz)
5	RF conducted power	± 0.75dB
6	RF power density	± 2.84dB
7	Conducted Spurious emissions	± 0.75dB
8	RF Radiated power	± 4.5dB (Below 1GHz)
		± 4.8dB (Above 1GHz)
9	Radiated Spurious emission test	± 4.5dB (Below 1GHz)
		± 4.8dB (Above 1GHz)
10	Temperature test	± 1℃
11	Humidity test	± 3%
12	Supply voltages	± 1.5%
13	Time	± 3%

Remark:
The Ulab (lab Uncertainty) is less than Ucispr (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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4.4 Test Location

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4.5 Test Facility

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

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

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4.7 Abnormalities from Standard Conditions

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5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2019-06-13	2024-06-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2019-07-11	2020-07-10
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018-09-25	2020-09-23
LISN	ETS-LINDGREN	3816/2	SEM007-02	2019-04-01	2020-03-31
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2019-04-01	2020-03-31

RF Conducted Test					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2024-06-12
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018-09-25	2020-09-23
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2019-04-01	2020-03-31
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2019-07-11	2020-07-10
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-28	2020-09-27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-25	2020-09-24
Electric and Magnetic Field Analyzer	Narda	NBM-550/EHP -50F	EMC2143	2018-02-07	2020-02-06
Electric Field Probe (100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07

Radiated Emissions which fall in the restricted bands					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10

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EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Pre-amplifier (18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

Radiated Spurious Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Pre-amplifier (18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31

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DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

RE in Chamber					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date**	**Cal. Due date**
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2019-09-24	2020-09-23
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2019-04-01	2020-03-31
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2019-07-11	2020-07-10

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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

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6.1.2 Conclusion

Standard Requirment:

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.

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.

15.203 requirement:

For intentional device. According to 15.203. an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

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 uses a unique coupling to the intentional radiator and no consideration of replacement.

The best case gain of the antenna: 0 dBi.

Photo of antenna refer to Appendix – Internal photo.

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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

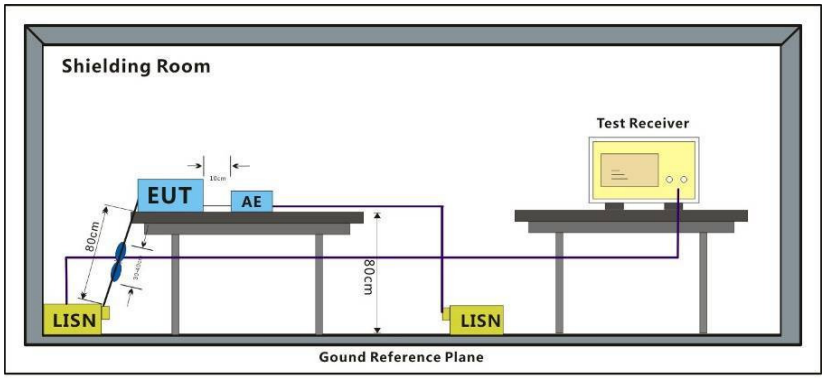
Operating Environment:

Temperature: 23.0 °C Humidity: 52 % RH :

Test mode 1: TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

The worst case for final test: 1: TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

7.1.2 Test Setup Diagram



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7.1.3 Measurement 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.

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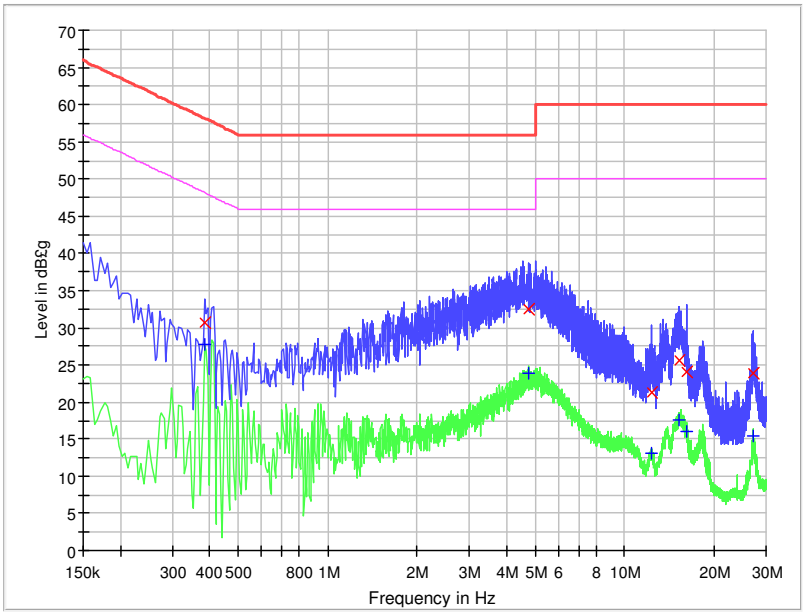

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	QuasiPeak Limit	QuasiPeak Over Limit	Average Limit	Average Over Limit
0.384000	30.7	27.7	58.2	-27.5	48.2	-20.5
4.758000	32.4	23.9	56.0	-23.6	46.0	-22.1
12.390000	21.3	13.1	60.0	-38.7	50.0	-37.0
15.216000	25.7	17.6	60.0	-34.3	50.0	-32.4
16.089000	24.0	16.0	60.0	-36.0	50.0	-34.0
27.127500	23.8	15.4	60.0	-36.2	50.0	-34.6

Level = Read Level + LISN Factor + Cable Loss.

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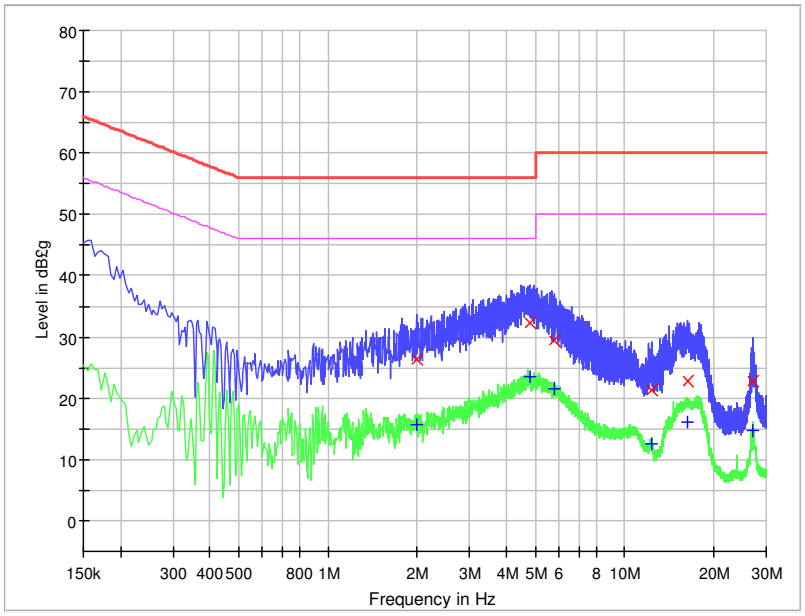

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	QuasiPeak Limit	QuasiPeak Over Limit	Average Limit	Average Over Limit
1.986000	26.3	15.6	56.0	29.7	46.0	30.4
4.798500	32.4	23.6	56.0	23.6	46.0	22.4
5.824500	29.5	21.6	60.0	30.5	50.0	28.4
12.300000	21.3	12.5	60.0	38.7	50.0	37.5
16.251000	22.7	16.2	60.0	37.3	50.0	33.8
26.997000	22.7	14.8	60.0	37.3	50.0	35.2

Level = Read Level + LISN Factor + Cable Loss.

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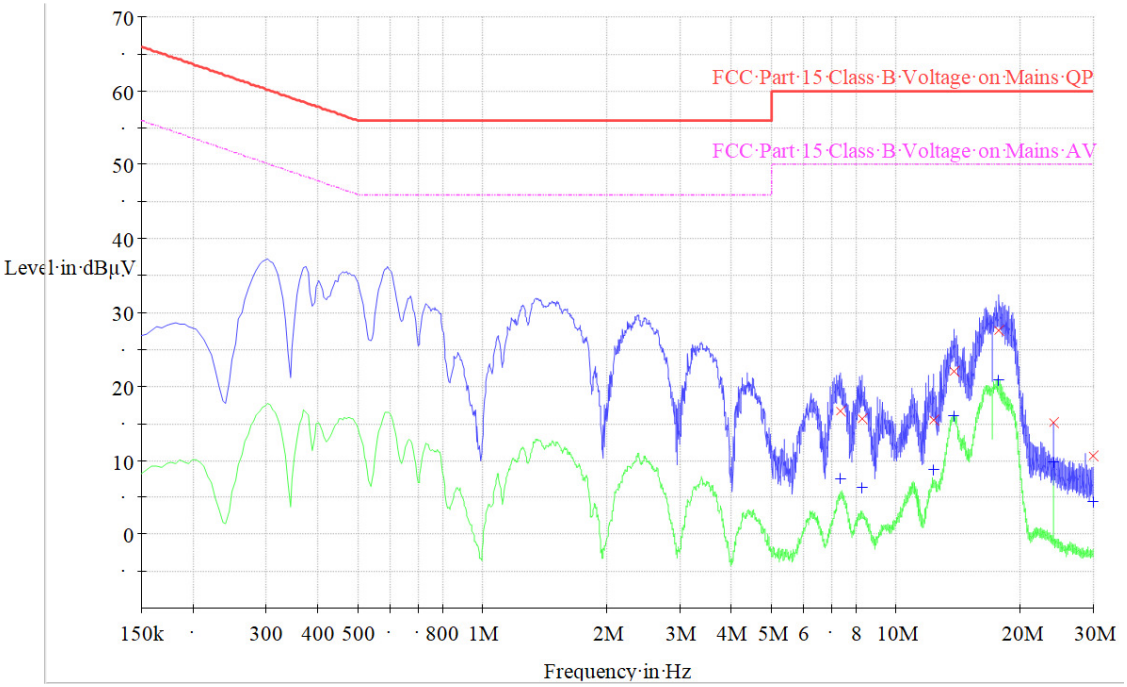

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	QuasiPeak Limit	QuasiPeak Over Limit	Average Limit	Average Over Limit
8.290500	15.6	6.3	60.0	-44.4	50.0	-43.7
12.327000	15.5	8.8	60.0	-44.5	50.0	-41.2
13.861500	22.1	16.0	60.0	-37.9	50.0	-34.0
17.776500	27.5	20.9	60.0	-32.5	50.0	-29.1
24.000000	15.0	9.8	60.0	-45.0	50.0	-40.2
7.336500	16.6	7.5	60.0	-43.4	50.0	-42.5

Level = Read Level + LISN Factor + Cable Loss.

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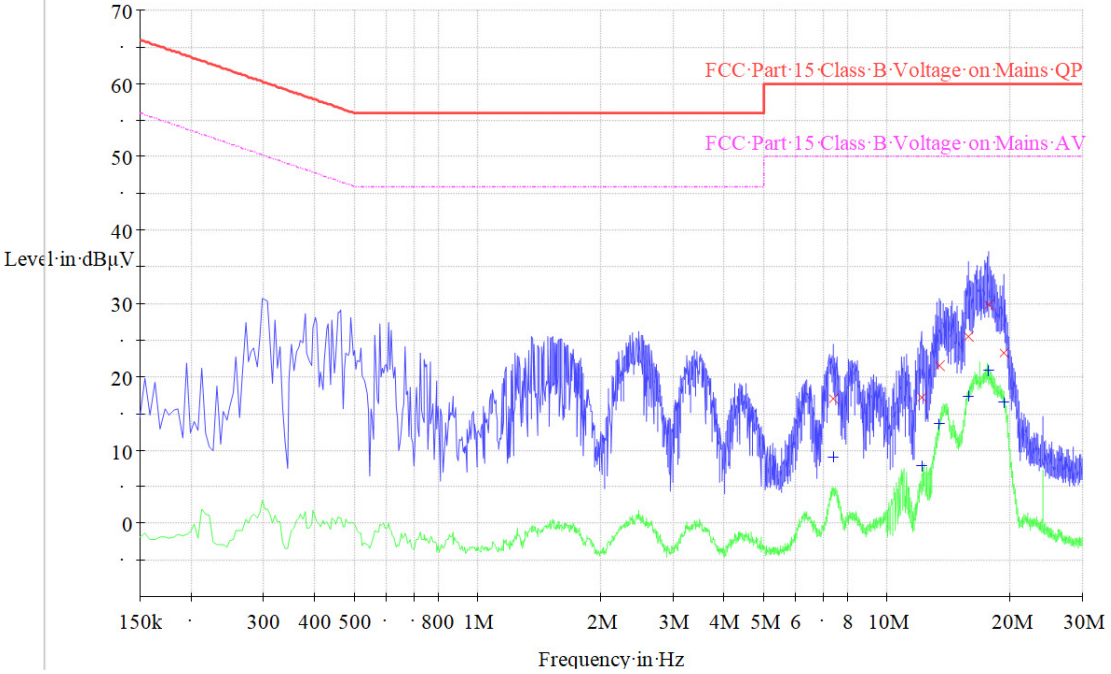

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	QuasiPeak Limit	QuasiPeak Over Limit	Average Limit	Average Over Limit
7.395000	17.0	9.0	60.0	-43.0	50.0	-41.0
12.133500	17.2	7.9	60.0	-42.8	50.0	-42.1
13.416000	21.6	13.5	60.0	-38.4	50.0	-36.5
15.814500	25.5	17.4	60.0	-34.5	50.0	-32.6
17.758500	29.8	20.8	60.0	-30.2	50.0	-29.2
19.347000	23.2	16.5	60.0	-36.8	50.0	-33.5

Level = Read Level + LISN Factor + Cable Loss.

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7.2 Conducted Peak Output Power

Test Requirement: 47 CFR Part 15, Subpart C 15.247:2018(b)(1) & 15.247(b)(3), RSS-247 Section 5.4(b)

Test Method: ANSI C63.10 (2013) Section 7.8.5 & Section 11.9.1

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

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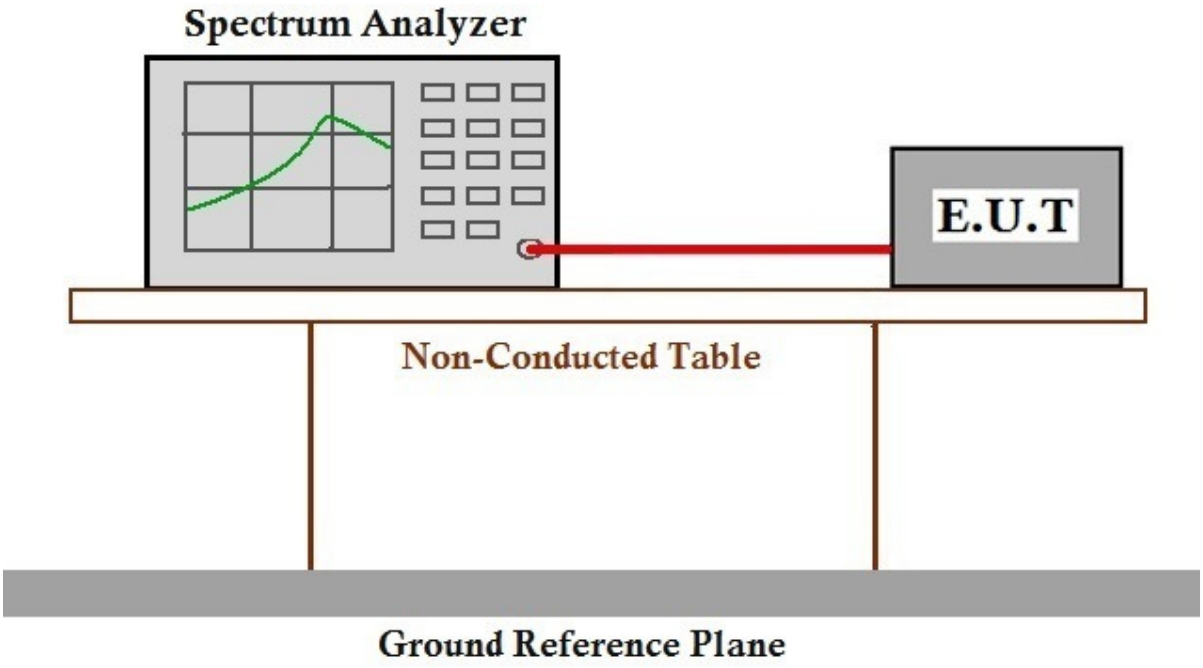
7.2.2 Test Setup Diagram



7.2.3 Measurement Data

The detailed test data see section 9: Appendix

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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

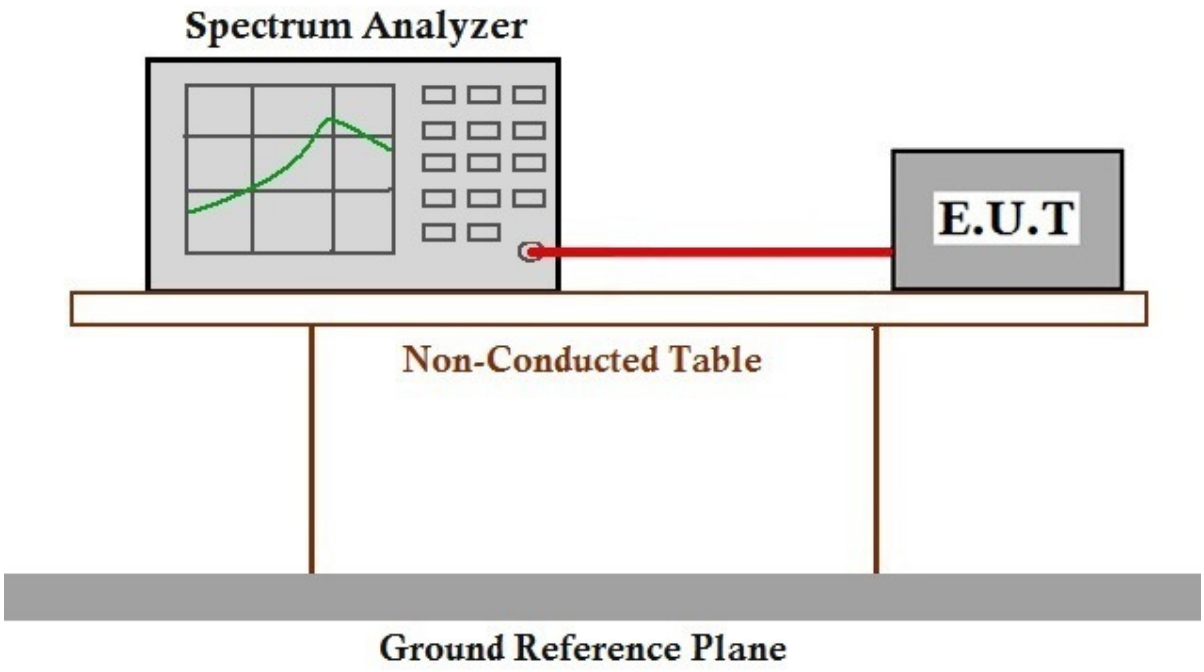
7.3.1 E.U.T. Operation

Operating Environment:

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

Test mode 2:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

7.3.2 Test Setup Diagram



7.3.3 Measurement Data

The detailed test data see section 9: Appendix

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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

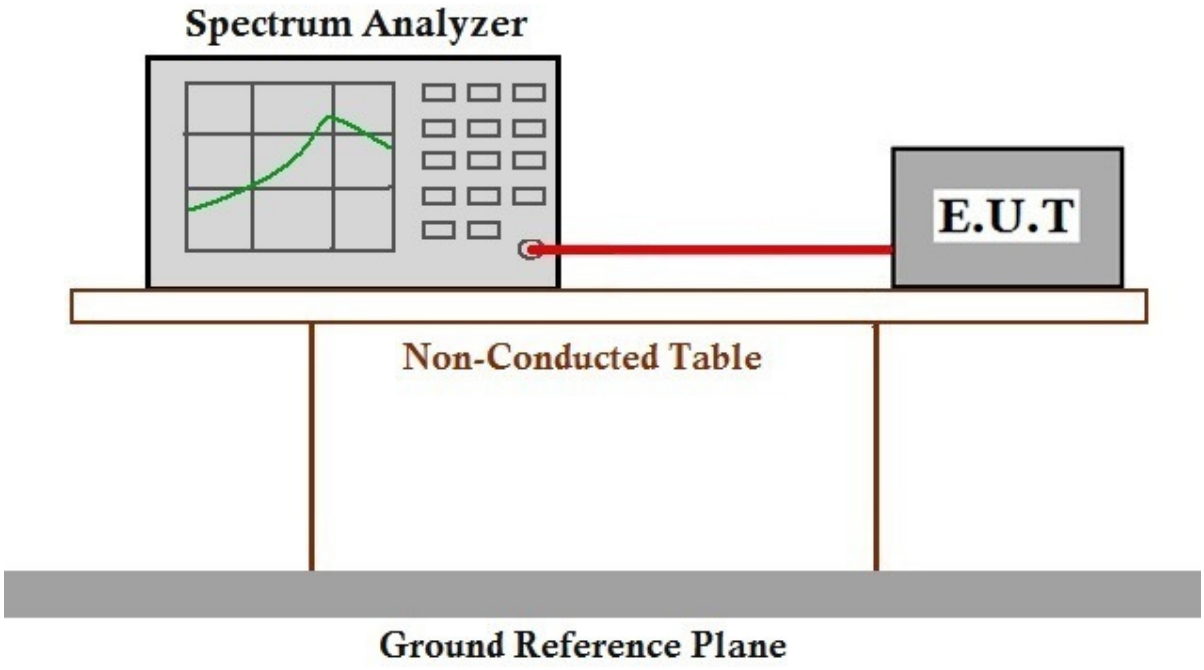
7.4.1 E.U.T. Operation

Operating Environment:

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

Test mode 1:TX_Hop mode_Keep the EUT in frequency hopping with modulation mode.

7.4.2 Test Setup Diagram



7.4.3 Measurement Data

The detailed test data see section 9: Appendix

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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

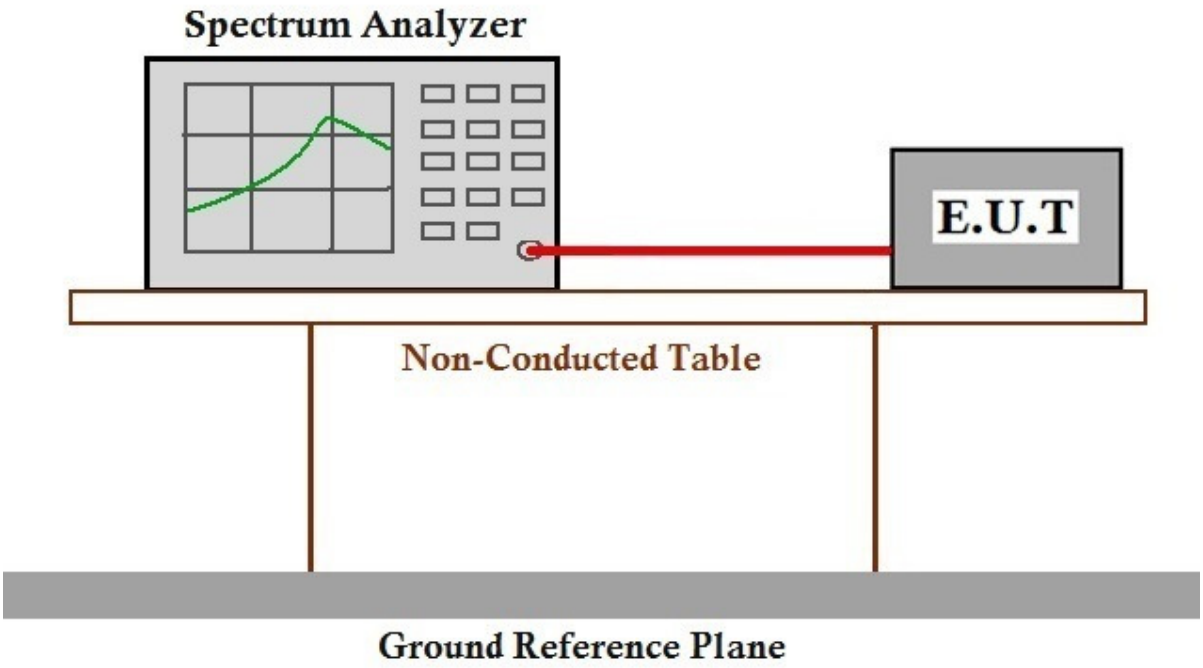
7.5.1 E.U.T. Operation

Operating Environment:

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

Test mode 1:TX_Hop mode_Keep the EUT in frequency hopping with modulation mode.

7.5.2 Test Setup Diagram



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7.5.3 Measurement Data

The detailed test data see section 9: Appendix

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

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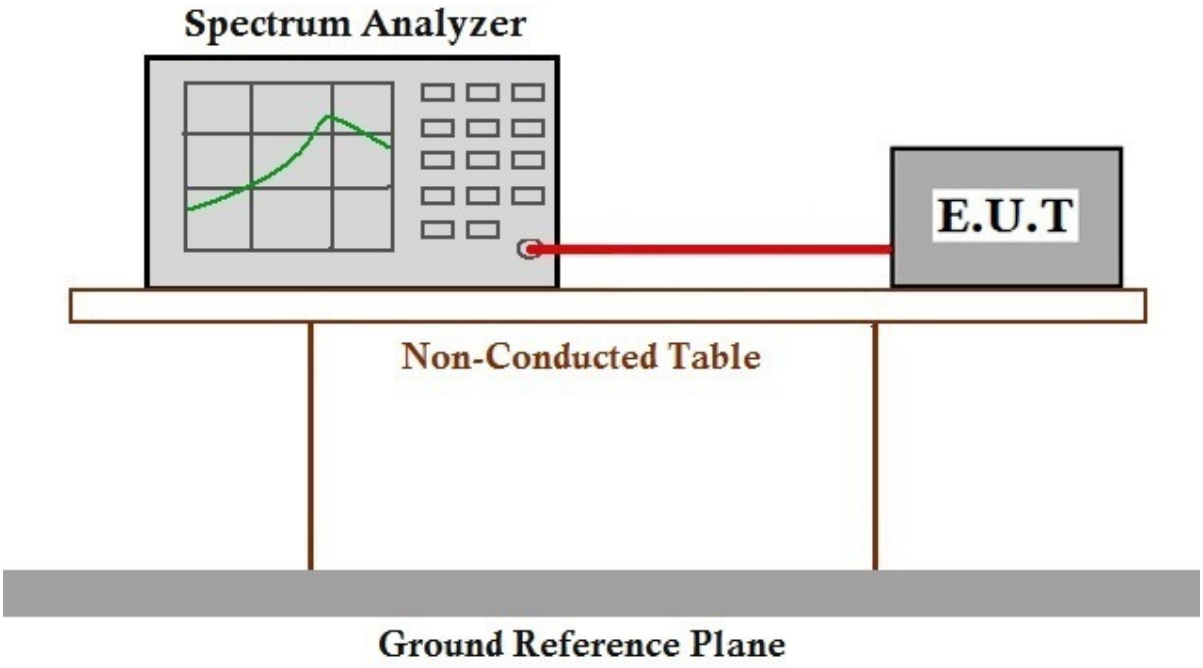
7.6.2 Test Setup Diagram



7.6.3 Measurement Data

The detailed test data see section 9: Appendix

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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)

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:

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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

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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	--	

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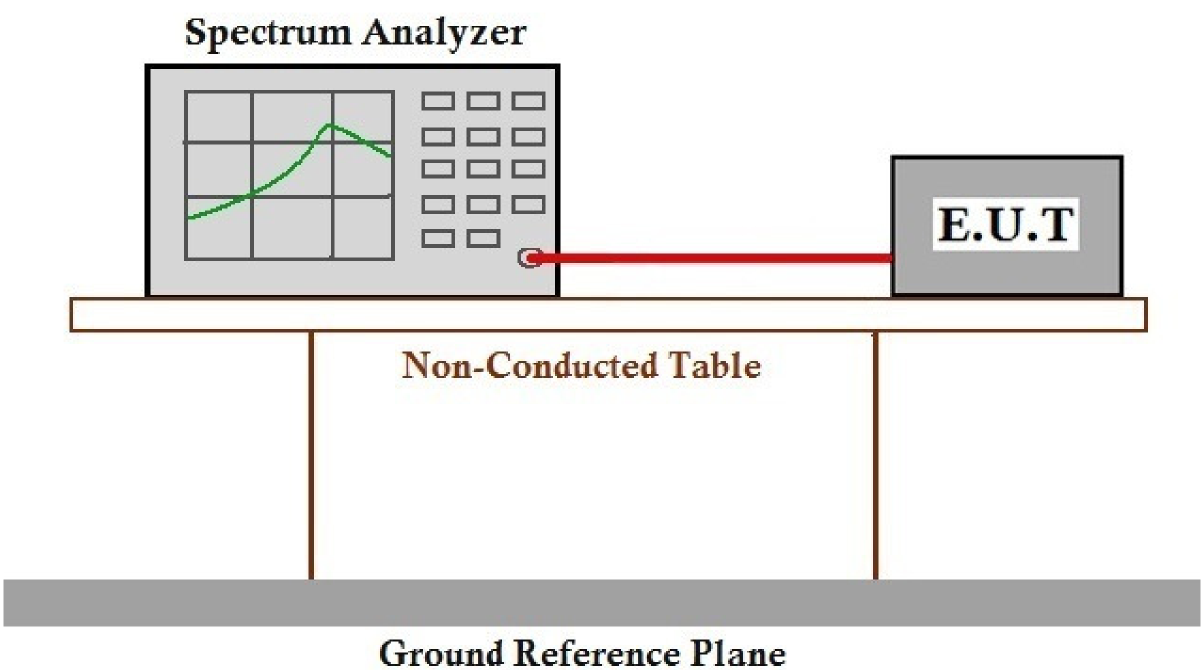
7.7.1 E.U.T. Operation

Operating Environment:

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

Test mode 2:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

7.7.2 Test Setup Diagram



7.7.3 Measurement Data

The detailed test data see section 9: Appendix

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

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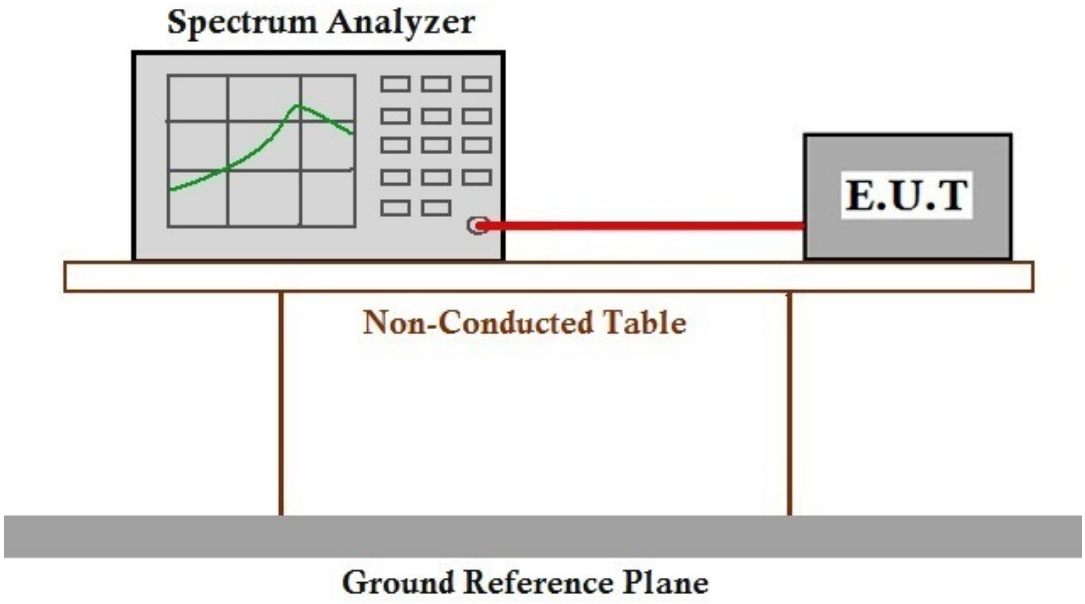
7.8.2 Test Setup Diagram



Remark:
Because the typical emission requirements are specified in terms of radiated field strength levels, measurements performed to determine compliance have traditionally relied on a radiated test configuration. Radiated measurements remain the principal method for determining compliance to the specified requirements; however antenna-port conducted measurements are also now acceptable to determine compliance.

Antenna-port conducted measurements:

Maximum transmit antenna gain: Refer to Section 4
Ground relfeciton faactor:
6 dB for frequencies ≤ 30 MHz; 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive; and 0 dB for frequencies > 1000 MHz
Convert the resultant EIRP to an equivalent electric field strength using the following relationship:

$$E = EIRP - 20\log d + 104.8$$

Where
E is the electric field strength in dBμV/m
EIRP is the equivalent isotropically radiated power in dBm
d is the specified measurement distance in m

Note: Additional radiated test for cabinet/case emissions refer to Section 7.7

7.8.3 Measurement Data

The detailed test data see section 9: Appendix

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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.		

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7.9.1 E.U.T. Operation

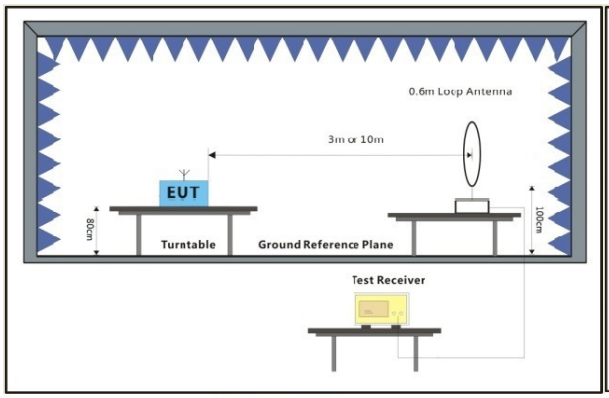
Operating Environment:

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

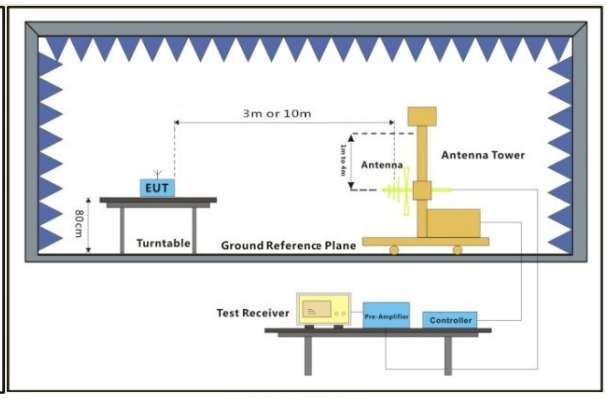
Pretest these modes to find the worst case: 2:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

The worst case for final test: 2:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

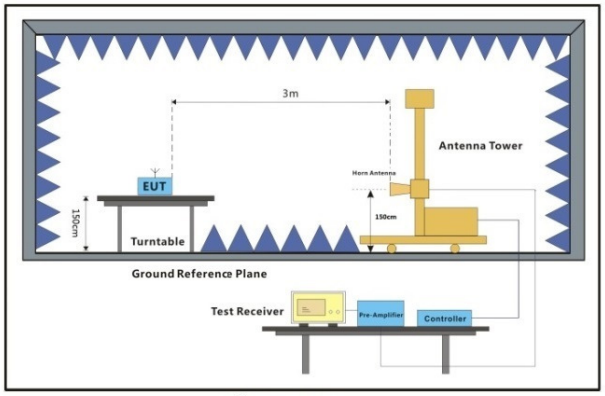
7.9.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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7.9.3 Measurement 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.

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7.9.4 Measurement Procedure and data

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2483.000	H	48.4	/	74.0	54.0	Pass
2490.000	H	47.8	/	74.0	54.0	Pass
2483.500	V	48.4	/	74.0	54.0	Pass
2490.000	V	47.9	/	74.0	54.0	Pass

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7.10 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
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.		

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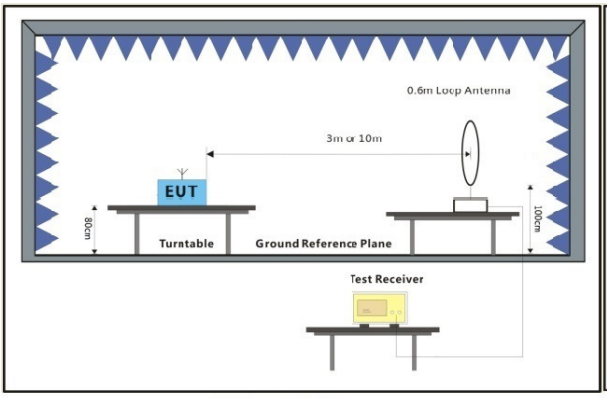
7.10.1 E.U.T. Operation

Operating Environment:

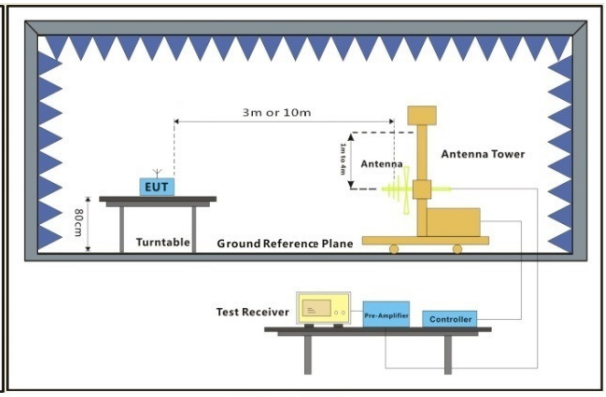
Temperature:	21.1 °C	Humidity:	56.4	% RH	Atmospheric Pressure:	1005	mbar

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

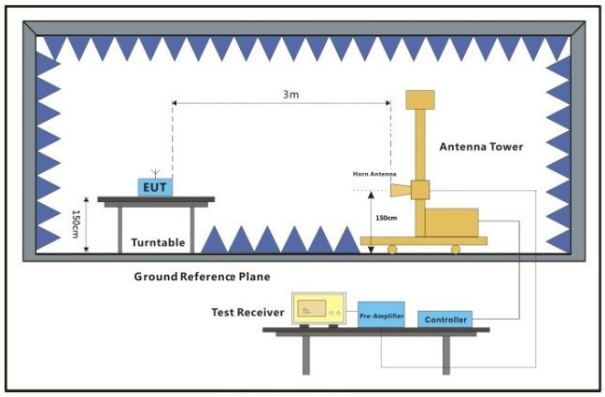
7.10.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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7.10.3 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 25GHz, 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.

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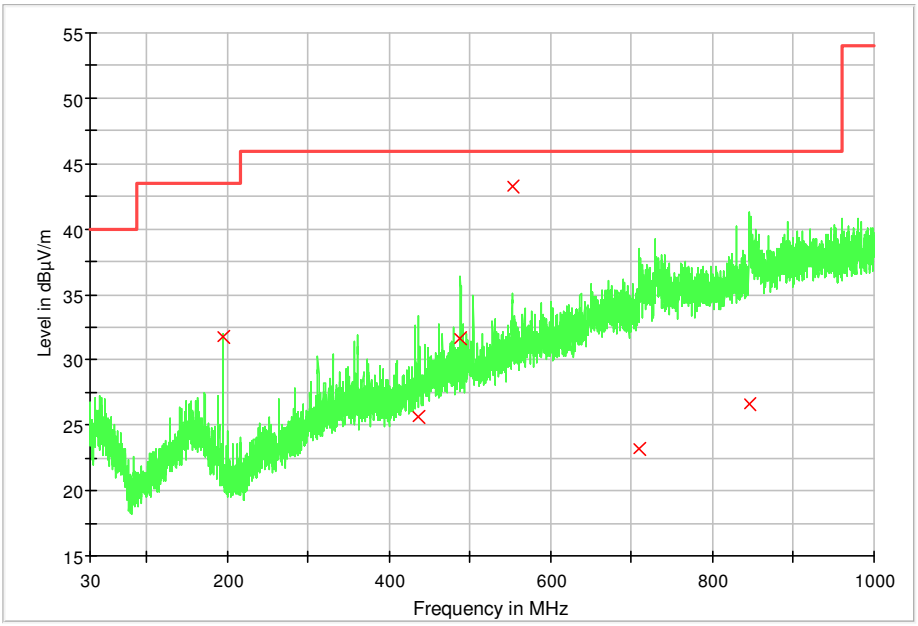
Radiated emission below 1GHz

Horizontal:



Frequency (MHz)	Pol.	QuasiPeak (dBuV/m)	Limit	Over Limit
194.124000	H	31.7	43.5	11.8
435.557000	H	25.6	46.0	20.4
488.228000	H	31.6	46.0	14.4
551.957000	H	43.2	46.0	2.8
709.097000	H	23.2	46.0	22.8
845.091000	H	26.6	46.0	19.4

1. All readings are Quasi-Peak values.

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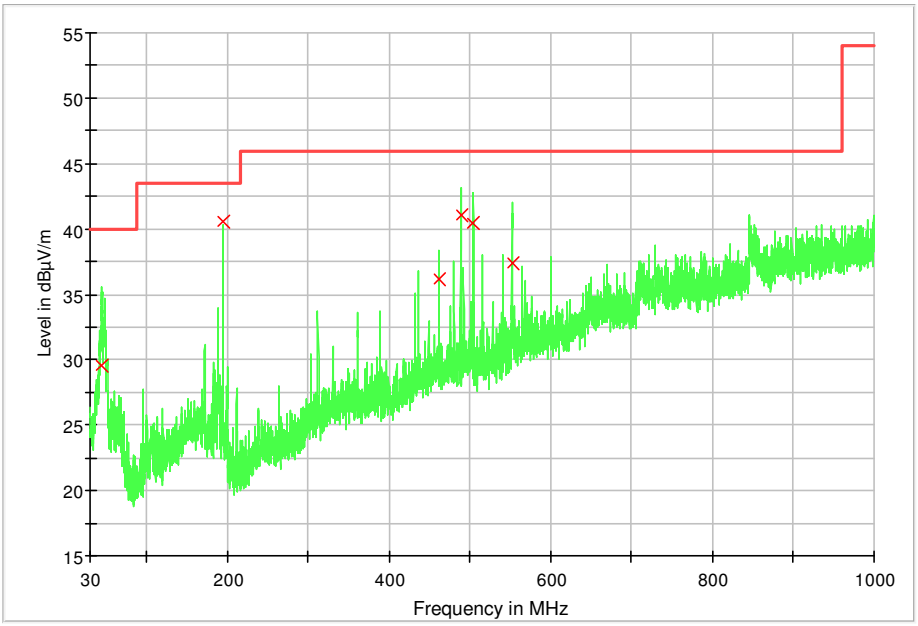
Vertical:



Frequency (MHz)	Pol.	QuasiPeak (dBuV/m)	Limit	Over Limit
44.259000	V	29.5	40.0	10.5
194.124000	V	40.6	43.5	2.9
462.038000	V	36.2	46.0	9.8
488.519000	V	41.0	46.0	5.0
503.845000	V	40.5	46.0	5.5
552.054000	V	37.3	46.0	8.7

1. All readings are Quasi-Peak values.

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Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2400.000	H	46.9	/	74.0	54.0	Pass
2483.500	H	48.4	/	74.0	54.0	Pass
2390.000	H	42.9	/	74.0	54.0	Pass
2491.500	H	47.7	/	74.0	54.0	Pass
2450.000	H	51.6	/	74.0	54.0	Pass
2400.000	V	52.3	/	74.0	54.0	Pass
2483.500	V	46.9	/	74.0	54.0	Pass
2310.000	V	48.4	/	74.0	54.0	Pass
2500.000	V	42.9	/	74.0	54.0	Pass
3000.000	V	46.9	/	74.0	54.0	Pass

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Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
3000.000	H	27.4	/	74.0	54.0	Pass
3836.578	H	34.1	/	74.0	54.0	Pass
4857.653	H	37.1	/	74.0	54.0	Pass
5654.323	H	39.8	/	74.0	54.0	Pass
3000.000	V	27.4	/	74.0	54.0	Pass
4234.237	V	35.6	/	74.0	54.0	Pass
5925.650	V	39.2	/	74.0	54.0	Pass
6268.508	V	41.4	/	74.0	54.0	Pass

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Channel: High

Frequency (MHz)	**Antenna Polarization**	**Emission Level (dBµV/m)**		**Limit (dBµV/m)**		**Remark**
		Peak	**Average**	**Peak**	**Average**	
3000.000	H	27.4	/	74.0	54.0	Pass
4642.558	H	36.9	/	74.0	54.0	Pass
5123.447	H	39.7	/	74.0	54.0	Pass
3874.424	H	34.8	/	74.0	54.0	Pass
3000.000	V	27.4	/	74.0	54.0	Pass
3579.532	V	34.4	/	74.0	54.0	Pass
4247.843	V	35.7	/	74.0	54.0	Pass
5998.277	V	39.5	/	74.0	54.0	Pass

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7.11 99% Bandwidth

Test Requirement RSS-Gen Section 6.6

Test Method: ANSI C63.10 Section 6.9.3

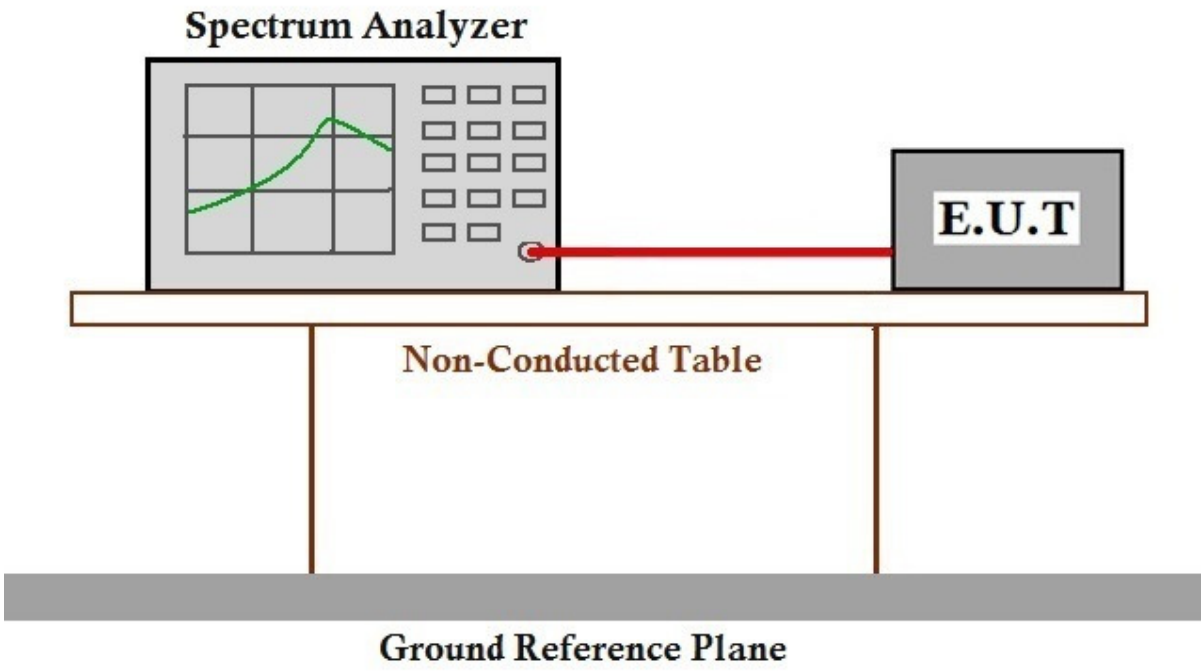
7.11.1 E.U.T. Operation

Operating Environment:

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

Test mode 1:TX_non-Hop mode_Keep the EUT in continuously transmitting with modulation mode.

7.11.2 Test Setup Diagram



7.11.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

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7.12 Pseudorandom Frequency Hopping Sequence

7.12.1 Standard requirement

15.247(a)(1) requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly 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.

RSS-247 Section 5.1(a)

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system's radio frequency (RF) bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. 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.

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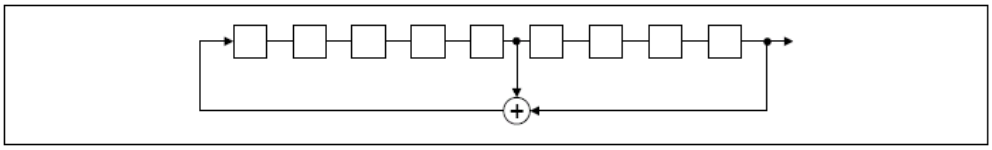
7.12.2 EUT Pseudorandom Frequency Hopping Sequence

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

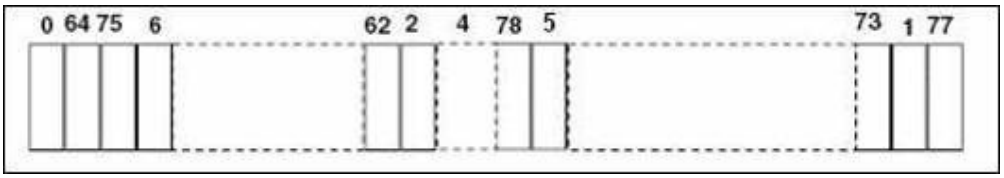
• Length of pseudo-random sequence: 2^9 -1 = 511 bits

• 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.

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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7.13 Occupied Bandwidth

Test Requirement: RSS-Gen Section 6.7

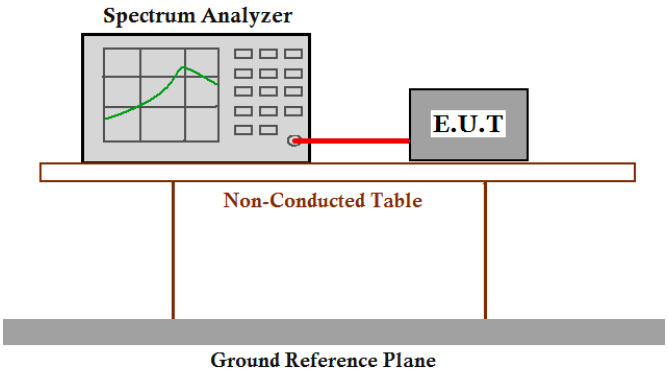
The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

Test Method: ANSI C63.10 Section 6.9.3

Test Status: Pre-test the EUT in continuous transmitting mode at the lowest (902.250MHz), middle (915.250 MHz) and highest (927.750MHz) channel. to find antenna 1 and air speed 224kBaud is the worst-case mode.

Only worst-case data is shown on this report

Test Configuration:



Test Procedure:

The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.

Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

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Step 1) through step 3) might require iteration to adjust within the specified range.

Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

Test result:

The detailed test data see section 9: Appendix

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8 Photographs

8.1 Radiated Spurious Emission Test Setup

Remark: Photos refer to Appendix: Setup Photo

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8.2 EUT Constructional Details

Remark: Photos refer to Appendix: External Photo

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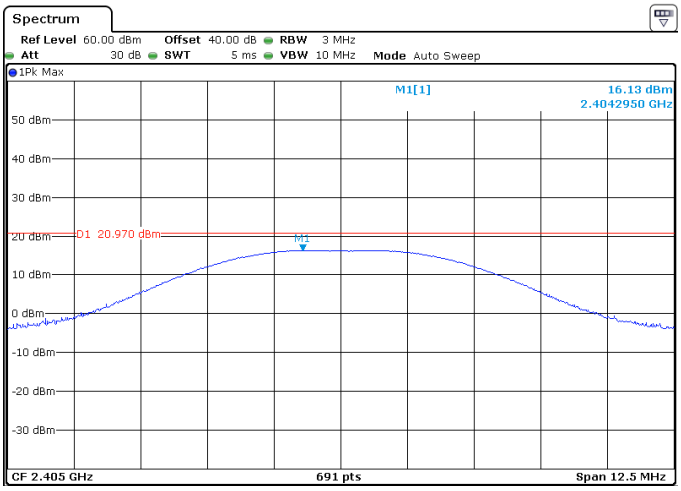
9 Appendix

Test Data

Peak output power (Sweep)

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2405.000000	16.1	21.0	PASS
2439.000000	15.6	21.0	PASS
2475.000000	15.0	21.0	PASS



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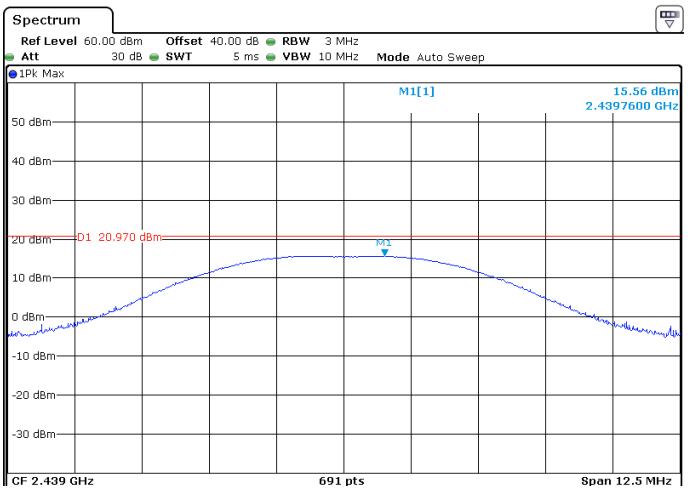

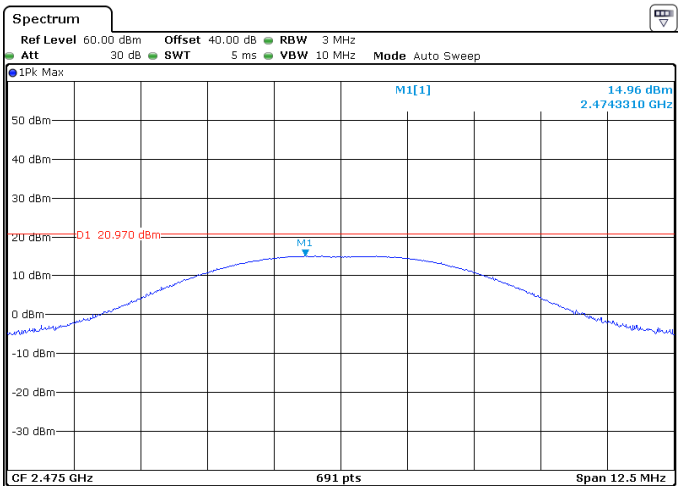

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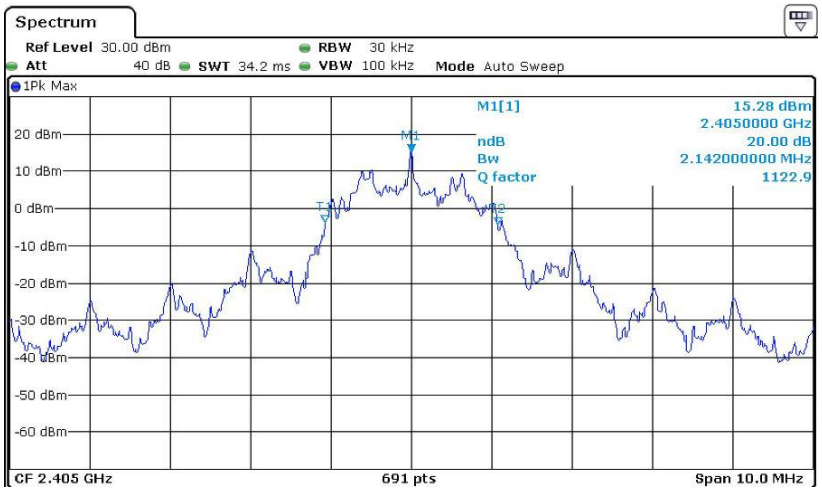
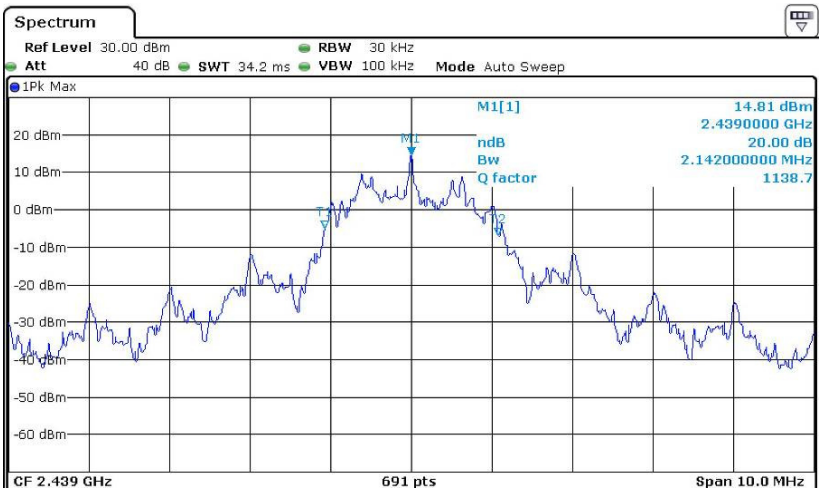
Emission Bandwidth 20 dB

DUT Frequency (MHz)	Bandwidth (MHz)	Limit (MHz)	Result
2405.000000	2.14	---	PASS
2439.000000	2.14	---	PASS
2475.000000	2.14	---	PASS





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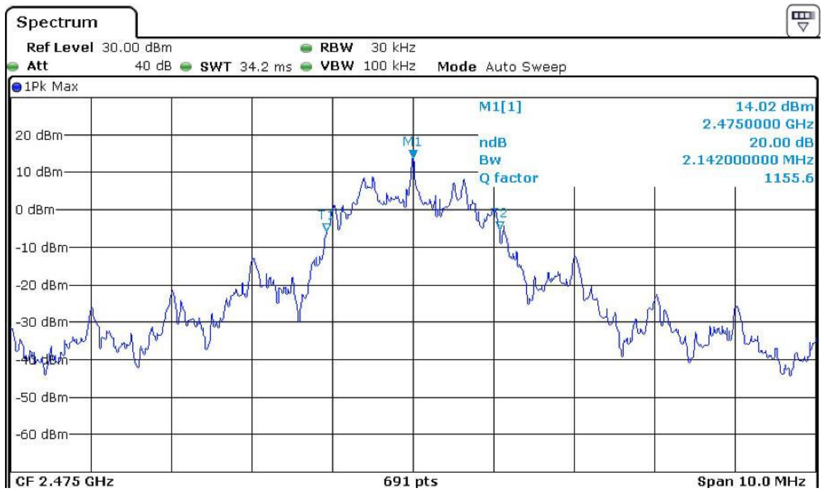

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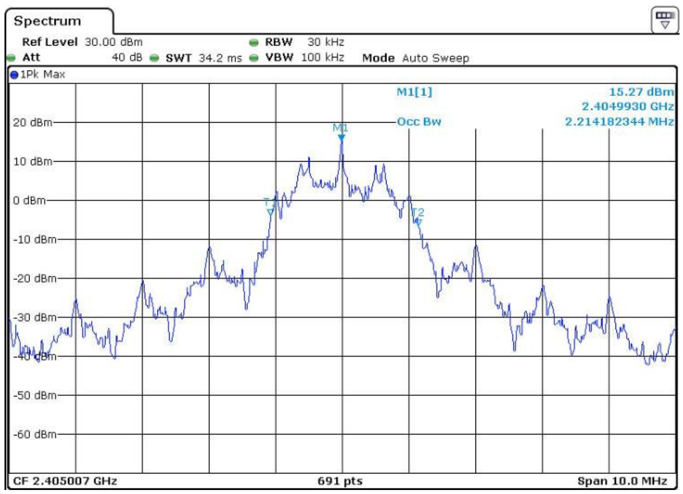
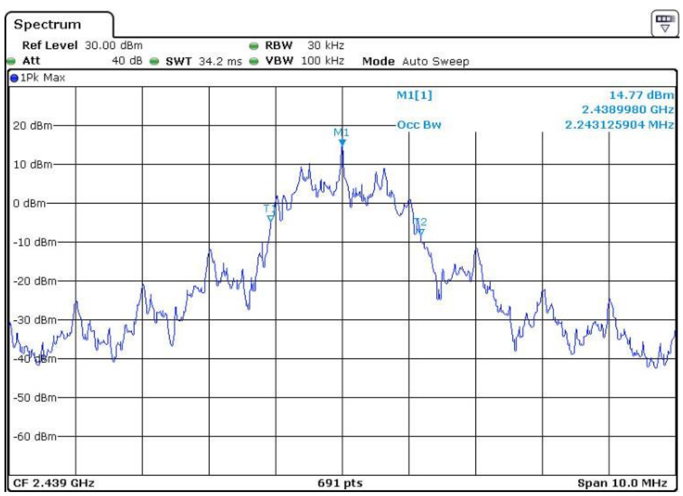
Occupied Channel Bandwidth 99%

DUT Frequency (MHz)	Bandwidth (MHz)	Limit (MHz)	Result
2405.000000	2.21	---	PASS
2439.000000	2.24	---	PASS
2475.000000	2.21	---	PASS





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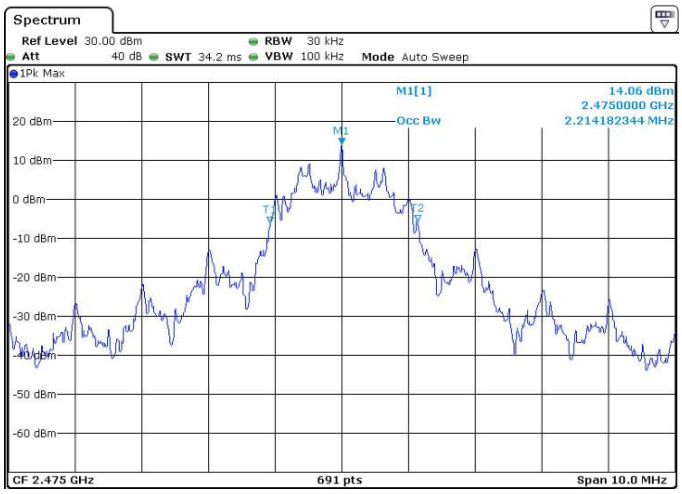

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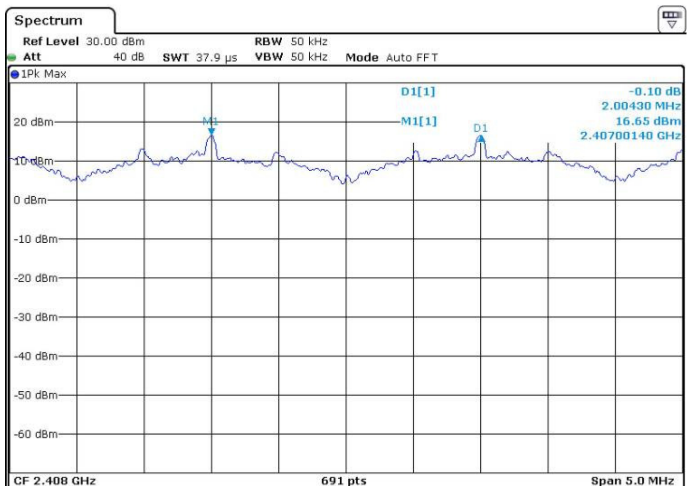
Carrier Frequency Separation

DUT Frequency (MHz)	Frequency Separation (MHz)	Limit (MHz)	Result
2407.000000	2.004	1.428	PASS



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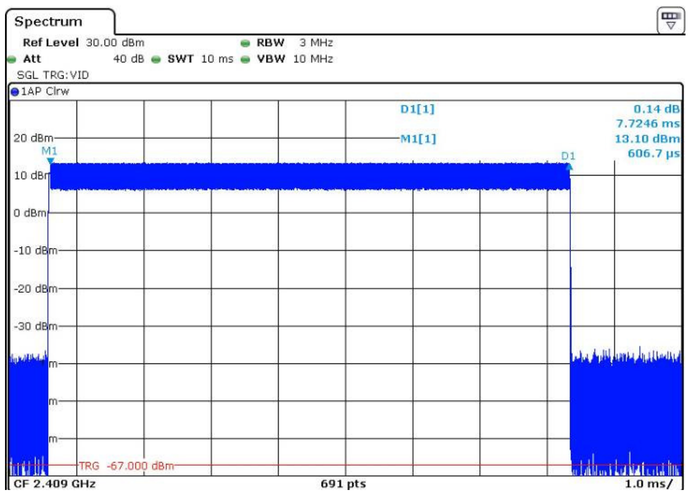
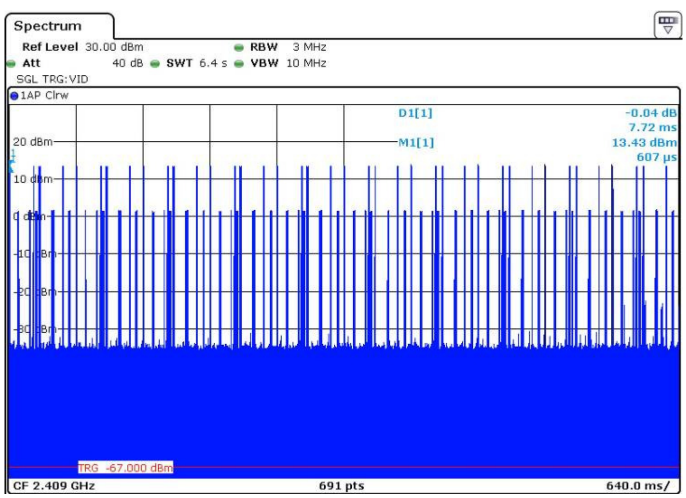
Dwell Time

Channel (MHz)	Width of Burst (ms)	Number of Burst(s)	Active Channels	Measurement Time (s)	Dwell Time (ms)	Limit (ms)	Result
2409	7.72	42	16	6.4	324.2	≤400	Pass

*Remark: the channel shown is the worst case.





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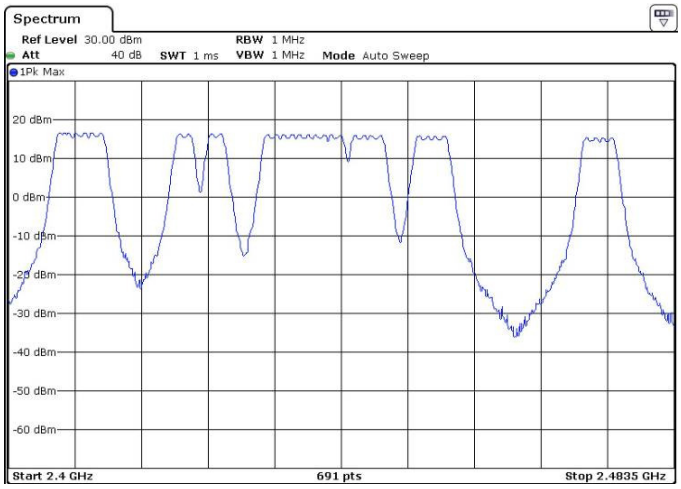
Hopping Frequencies

Channels	Limit Min	Result
16	15	PASS



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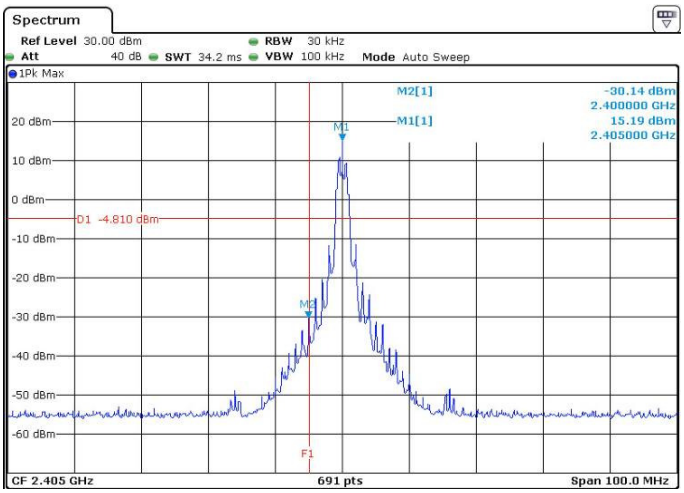
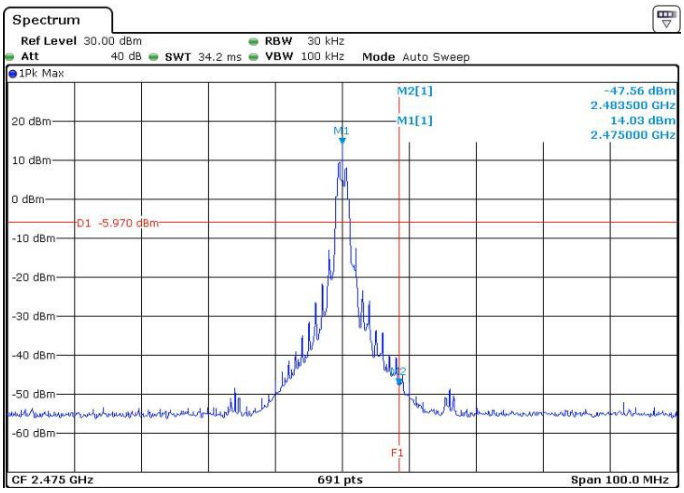
Conducted Band Edge Measurement

Non-hopping mode

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
2400.000000	-30.14	-4.81	-25.33	PASS
2483.500000	-47.56	-5.97	-41.59	PASS





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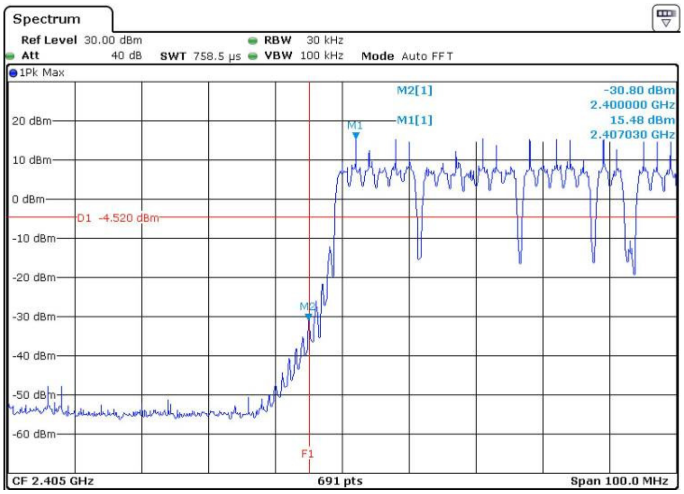
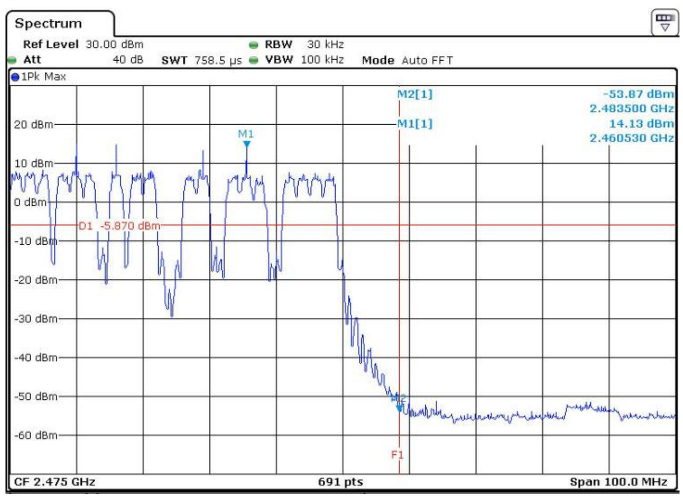
Hopping mode

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
2400.000000	-30.80	-4.52	-26.28	PASS
2483.500000	-53.87	-5.87	-48.00	PASS





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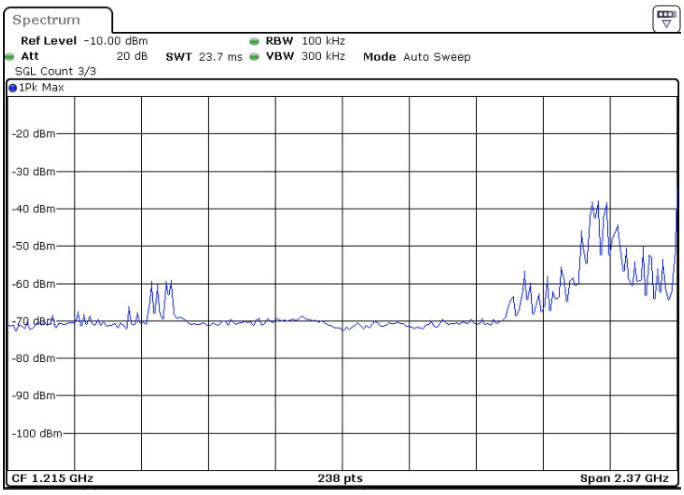
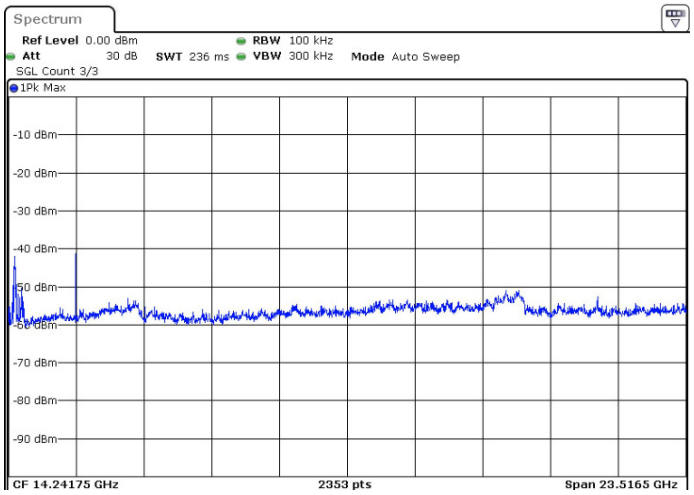
Conducted spurious emission

Lowest Channel





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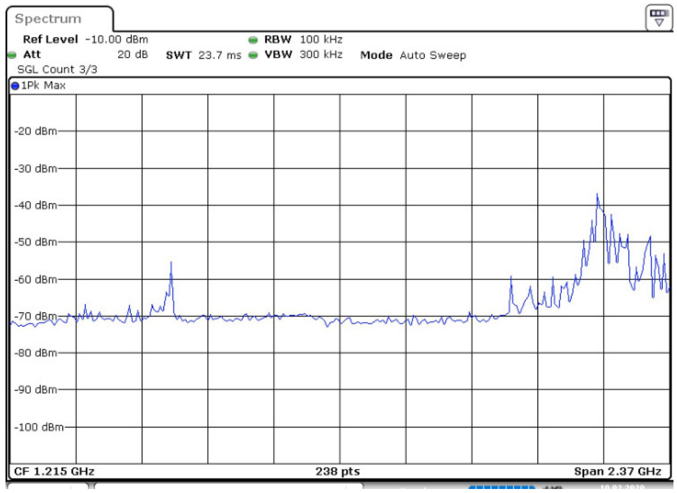
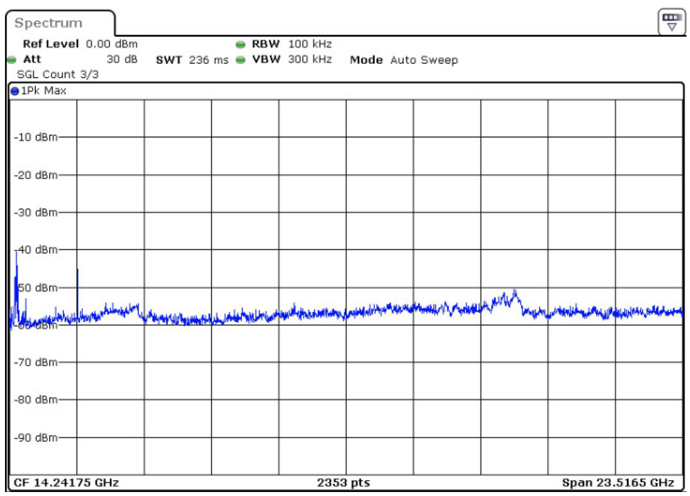
Middle Channel





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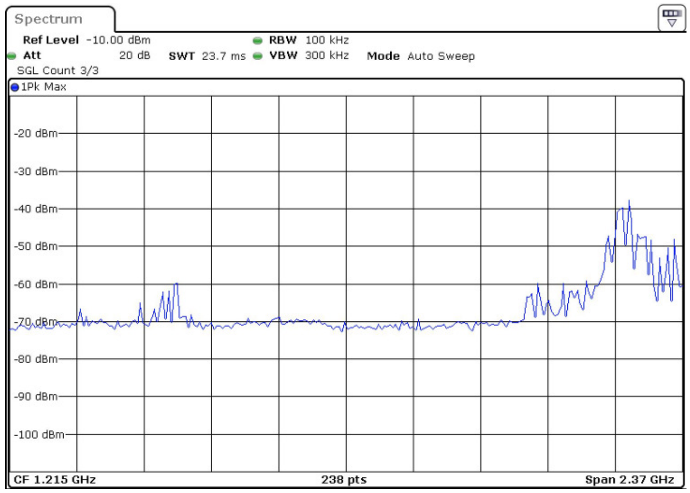

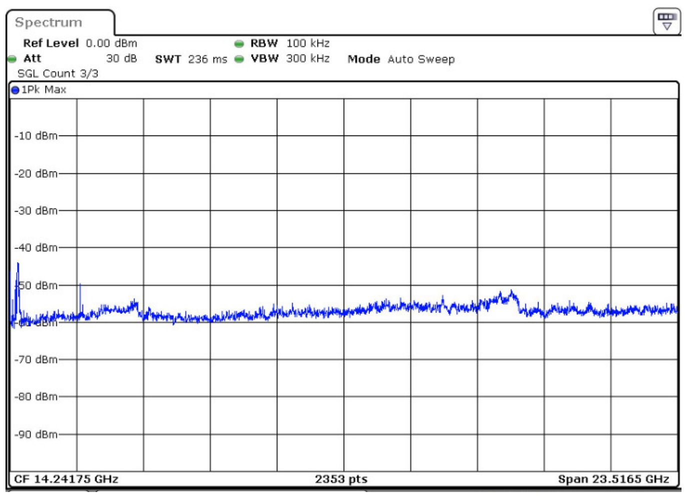

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