

TEST REPORT

Product Name : USB Workstation
Brand Name : **LINKVIL**
Model : DB36
Series Model : DH602D Ultra, DH301D Ultra
FCC ID : 2BCUQ-DB36
Applicant : **Fanvil Link Technology Co.,LTD**
Address : 13th Floor, Building 2, Runzhi R&D Center, Xin'an Street, Bao'an District, Shenzhen, Guangdong, China
Manufacturer : **Fanvil Link Technology Co.,LTD**
Address : 13th Floor, Building 2, Runzhi R&D Center, Xin'an Street, Bao'an District, Shenzhen, Guangdong, China
Standard(s) : FCC CFR Title 47 Part 15 Subpart D
Date of Receipt : May 20, 2026
Date of Test : May 20, 2026~ June 19, 2026
Issued Date : June 19, 2026

Issued By: **Dongguan Yaxu (AiT) Technology Limited**
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Note: This device has been tested and found to comply with the standard(s) listed, this test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory. This report shall not be reproduced except in full, without the written approval of Dongguan Yaxu (AiT) Technology Limited. If there is a need to alter or revise this document, the right belongs to Dongguan Yaxu (AiT) Technology Limited, and it should give a prior written notice of the revision document. This test report must not be used by the client to claim product endorsement.



Report Revise Record

Report Version	Issued Date	Notes
M0	June 19, 2026	Initial Release

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1 TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15D](#): Unlicensed Personal Communications Service Devices

[ANSI C63.17-2013](#): Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices

[ANSI C63.4-2014](#): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

1.2 Test Summary

Requirement	FCC Part	Result
AC Conducted Emissions	§ 15.315, § 15.207	Pass
Emission Bandwidth	§ 15.323 (a)	Pass
Peak Transmit Power	§ 15.319 (c)(e)	Pass
Power Spectral Density	§ 15.319 (d)	Pass
Emission Inside and Outside the sub-band	§ 15.323 (d)	Pass
Radiated Emission	§15.209, § 15.319 (g)	Pass
Frequency Stability	§ 15.323 (f)	Pass
Antenna Requirement	§ 15.317, § 15.203	Pass
Specific Requirements for UPCS	§ 15.323 (c)(e) § 15.319 (b)(f)	Pass

1.3 Test Facility

Test Laboratory: Dongguan Yaxu (AiT) Technology Limited

No.22, Jinqianling 3rd Street, Jitigang, Huangjiang, Dongguan, Guangdong, China

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

CNAS-Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2017 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on April 18, 2022

FCC-Registration No.: 703111 Designation Number: CN1313

Dongguan Yaxu (AiT) Technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC-Registration No.: 6819A CAB identifier: CN0122

The 3m Semi-anechoic chamber of Dongguan Yaxu (AiT) Technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 6819A

A2LA-Lab Cert. No.: 6317.01

Dongguan Yaxu (AiT) Technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

1.4 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 - 4"Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Dongguan Yaxu (AiT) Technology Limited's quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Yaxu (AiT) laboratory is reported:

Test	Measurement Uncertainty	Notes
Power Line Conducted Emission	9KHz~30MHz ± 1.20 dB	(1)
Radiated Emission	9KHz~30MHz ± 3.10 dB	(1)
Radiated Emission	30MHz~1GHz ± 3.75 dB	(1)
Radiated Emission	1GHz~18GHz ± 3.88 dB	(1)
Radiated Emission	18GHz-40GHz ± 3.88 dB	(1)
RF power, conducted	30MHz~6GHz ± 0.16 dB	(1)
RF power density, conducted	± 0.24 dB	(1)
Spurious emissions, conducted	± 0.21 dB	(1)
Temperature	$\pm 1^{\circ}\text{C}$	(1)
Humidity	$\pm 3\%$	(1)
DC and low frequency voltages	$\pm 1.5\%$	(1)
Time	$\pm 2\%$	(1)
Duty cycle	$\pm 2\%$	(1)
Bandwidth	$\pm 1.5 \times 10^{-6}$	(1)

The report uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty Multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

2 GENERAL INFORMATION

2.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2 General Description of EUT

Product Name:	USB Workstation
Model/Type reference:	DB36
Serial Model:	DH602D Ultra, DH301D Ultra
Model difference:	All models are same as the samples except model name, all the models are electrical identical same mechanical structure and design.
Power Supply:	Input:DC 5V/3A
Adapter Information:	Model: DCT18W050300US-A0 Input: 100-240V~50/60Hz 0.7A max. Output: 5.0V=3.0A
Hardware Version:	N/A
Software Version:	N/A
Sample(s) Status:	AiTDG-260727011-1(Normal sample) AiTDG-260727011-2(Engineer sample)
DECT:	
Operation frequency:	1921.536-1928.448MHz
Type of Modulations:	Digital (Gaussian Frequency Shift Keying)
Channel number:	5 RF Channels, 5x12=60 TDMA Duplex Channels
Channel separation:	1.728MHz
Antenna type:	FPC antenna
Antenna gain:	1.63dBi
Remark: The above DUT's information was declared by manufacturer. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.	

2.3 Description of Test Modes and Test Frequency

Operation Frequency List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
04	1921.536	03	1923.264	02	1924.992
01	1926.720	00	1928.448	--	--

Note: The line display in grey were the channel selected for testing.

2.4 Special Accessories

Follow auxiliary equipment(s) test with EUT that provided by the manufacturer or laboratory is listed as follow:

Description	Manufacturer	Model	Serial No.	Provided by	Other
Notebook	Lenovo	T450s	TP00049A	Test lab	/
Adapter	Lenovo	A17-065N2A	SA10J20161	Test lab	/
DECT Wireless Headset	LINKVIL	DH602	/	Manufacturer	/

2.5 Equipment List for the Test

Conducted Emission measurement						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
☒ 1	EMI Test Receiver	R&S	ESCI	100124	2025.09.25	2026.09.24
☒ 2	LISN	R&S	ESH3-Z5	892785/016	2025.09.26	2026.09.25
☒ 3	LISN	KYORITSU	KNW-242	8-837-4	2025.09.26	2026.09.25
☒ 4	Pulse Limiter	R&S	ESH3-Z2	03578810.54	2025.09.25	2026.09.24
☒ 5	CE Software	EZ	EZ-EMC_CE	Ver.AIT-03A	N/A	N/A

Radiation Emission measurement						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
☒ 1	Spectrum Analyzer	R&S	FSV40	101470	2025.09.26	2026.09.25
☒ 2	EMI Measuring Receiver	R&S	ESPI	100773	2025.09.25	2026.09.24
☒ 3	Low Noise Pre Amplifier	HP	HP8447E	1937A01855	2025.09.25	2026.09.24
☒ 4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2025.09.25	2026.09.24
☒ 5	Passive Loop	ETS	6512	00165355	2024.09.04	2026.09.03
☒ 6	TRILOG Super Broadband test Antenna	SCHWARZBEC K	VULB-9160	9160-3206	2024.08.29	2026.08.28
☒ 7	Broadband Horn Antenna	SCHWARZBEC K	BBHA 9120D	452	2024.08.29	2026.08.28
☒ 8	SHF-EHF Horn Antenna 15-40GHz	SCHWARZBEC K	BBHA9170	BBHA9170367	2023.09.12	2026.09.11
☒ 9	6dB Attenuator	JFW	50FPE-006	4360846-949-1	2025.09.23	2026.09.22
☒ 10	Band Reject Filter Group	COM-MW	ZBFS6-700-3000	547	2025.09.23	2026.09.22
☒ 11	Digital Radiocommunication Tester	R&S	CMD60	1050.9008.60	2025.09.23	2026.09.22
☒ 12	RE Software	EZ	EZ-EMC_RE	Ver.AIT-03A	N/A	N/A

RF Conducted measurement						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
☒ 1	Spectrum Analyzer	Agilent	N9020A	MY53421570	2025.09.23	2026.09.22
☐ 2	Power Sensor	Agilent	U2021XA	MY54110007	2025.09.23	2026.09.22
☒ 3	Signal Generator	Agilent	N5182A	MY50143009	2025.09.26	2026.09.25
☒ 4	Analog signal generator	Agilent	E8257	MY51554256	2025.09.23	2026.09.22
☐ 5	Pro.Temp&Humi.chamber	MENTEK	MHP-150-1C	MAA08112501	2025.09.25	2026.09.24
☒ 6	Digital Radiocommunication Tester	R&S	CMD60	1050.9008.60	2025.09.23	2026.09.22
☒ 7	Power divider	xingbo	HXGF-G2A03	210730-1-3	2025.09.23	2026.09.22
☒ 8	Directional Coupler	MCLI/USA	CB11-20	0D2L51502	2025.09.23	2026.09.22
☒ 9	DC power supply	ZHAOXIN	RXN-305D-2	28070002559	N/A	N/A
☐ 10	RF Test box	TST	TSTPASS	21033016	2025.09.23	2026.09.22
☐ 11	RF Software	TST	TSTPASS	Version 2.0	N/A	N/A

Note: ☐ is not applicable in this Test Report. ☒ is applicable in this Test Report.

3 TEST CONDITIONS AND RESULTS

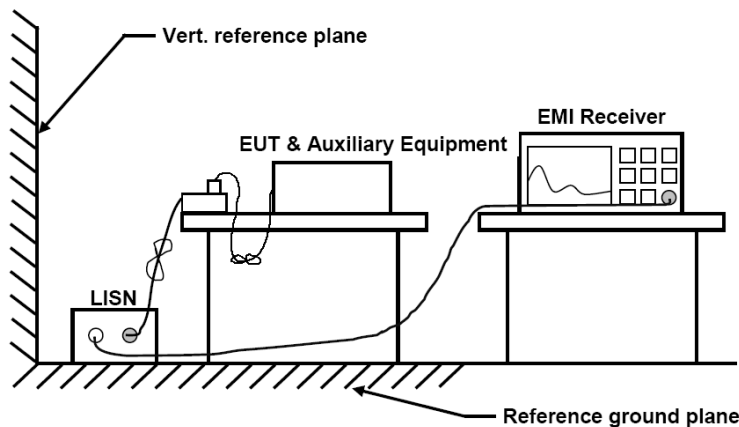
3.1 Conducted Emissions Test

LIMIT

Frequency range (MHz)	Limit (dBuV)	
	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.

TEST CONFIGURATION

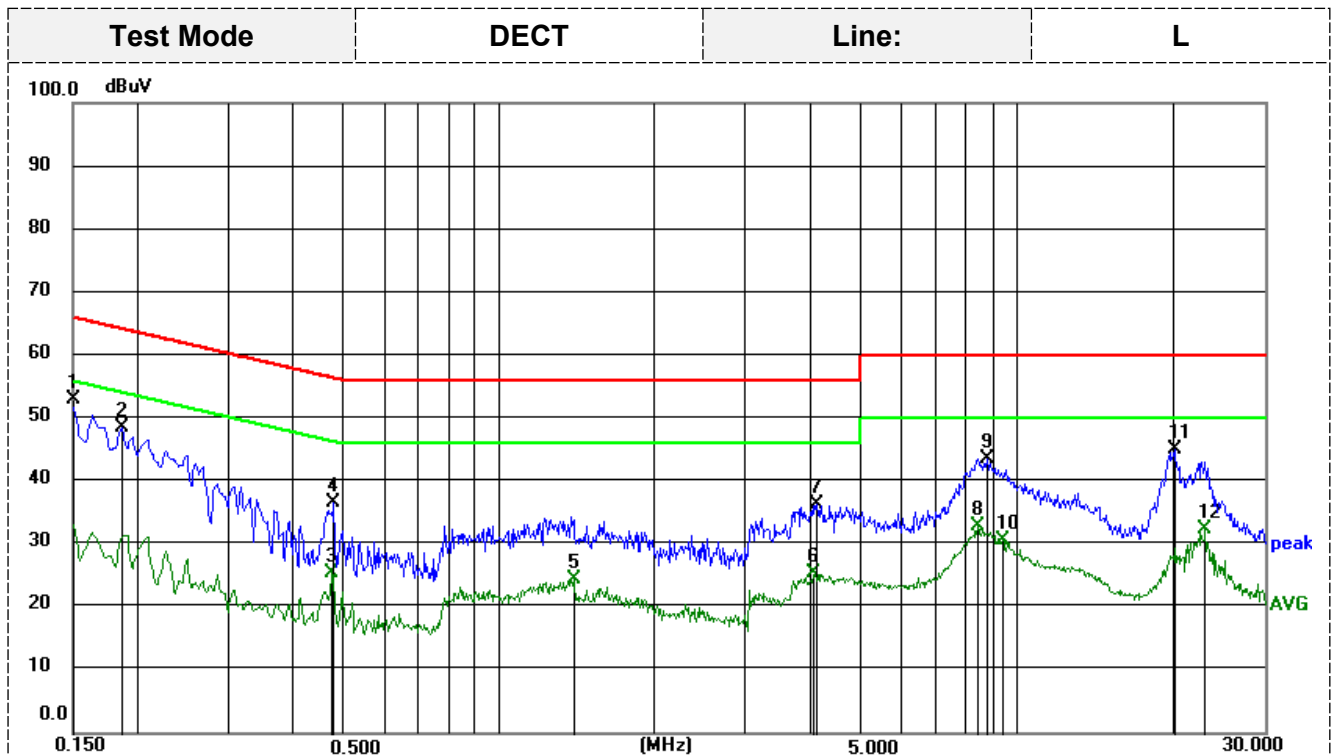


TEST PROCEDURE

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

TEST RESULTS

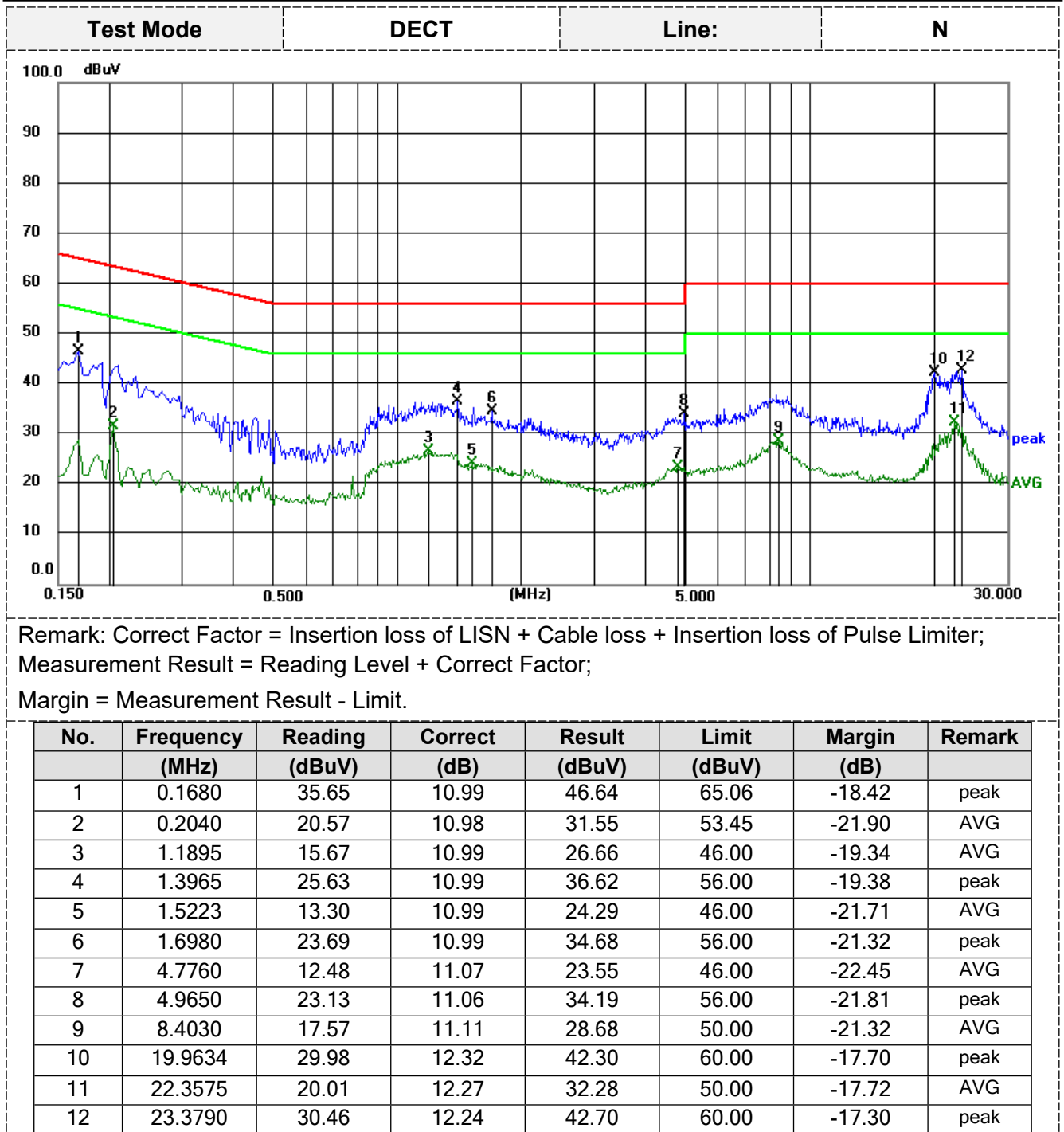
Remark: Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:



Remark: Correct Factor = Insertion loss of LISN + Cable loss + Insertion loss of Pulse Limiter;
Measurement Result = Reading Level + Correct Factor;

Margin = Measurement Result - Limit.

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1500	40.61	12.29	52.90	66.00	-13.10	peak
2	0.1860	37.45	11.07	48.52	64.21	-15.69	peak
3	0.4740	14.49	11.06	25.55	46.44	-20.89	AVG
4	0.4783	25.47	11.06	36.53	56.37	-19.84	peak
5	1.3920	13.42	11.06	24.48	46.00	-21.52	AVG
6	4.0739	14.32	11.16	25.48	46.00	-20.52	AVG
7	4.1055	25.13	11.15	36.28	56.00	-19.72	peak
8	8.3711	21.73	11.19	32.92	50.00	-17.08	AVG
9	8.7583	32.32	11.20	43.52	60.00	-16.48	peak
10	9.3930	19.41	11.12	30.53	50.00	-19.47	AVG
11	20.1120	32.74	12.37	45.11	60.00	-14.89	peak
12	23.0412	20.06	12.35	32.41	50.00	-17.59	AVG



3.2 Radiated Emissions

Limit

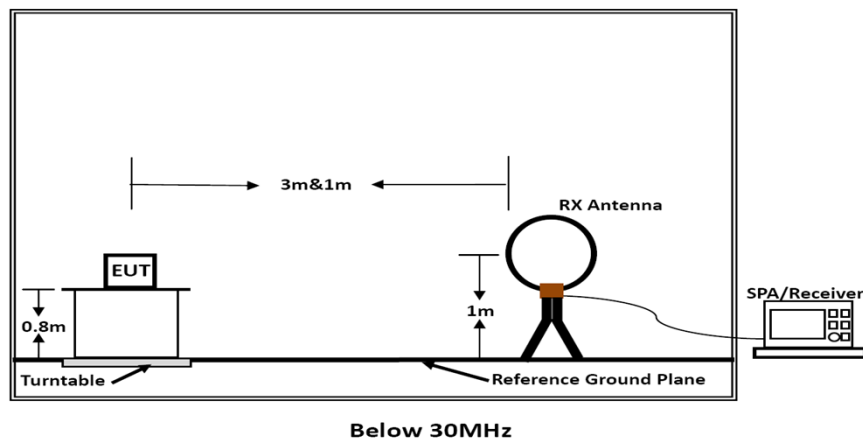
In the region at 2.5 MHz or greater below and above the lower and upper band edges, respectively, the measured emission level shall not exceed the limits of 47CFR15.209. Measurement shall be made as a radiated test.

Radiated emission limits

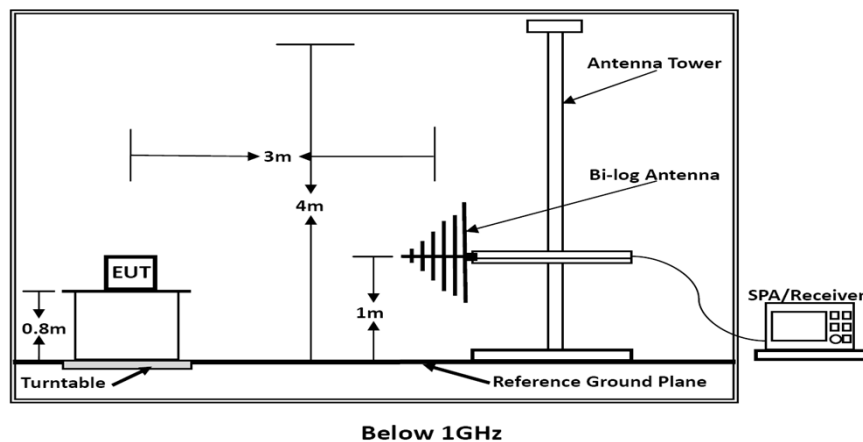
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

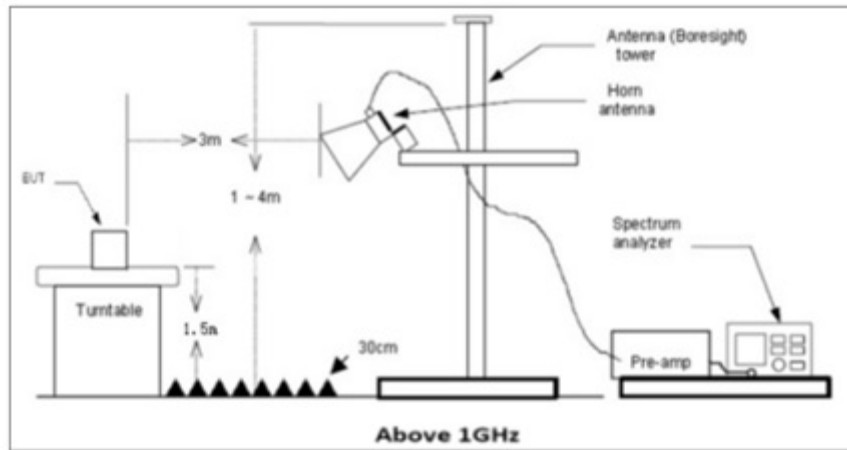
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

- Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
- Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- Repeat above procedures until all frequency measurements have been completed.
- Radiated emission test frequency band from 9KHz to 20GHz.
- The distance between test antenna and EUT as following table states:

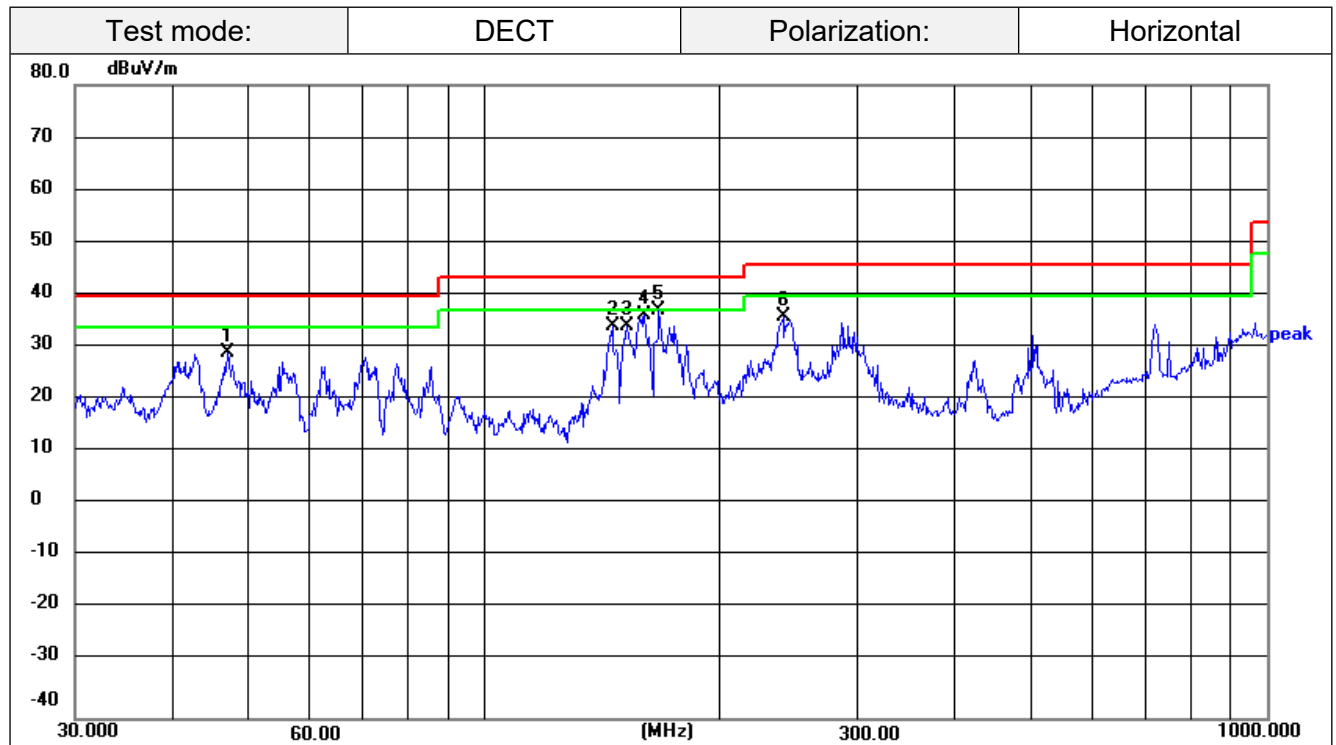
Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Bilog Antenna	3
1GHz-18GHz	Horn Antenna	3
18GHz-25GHz	Horn Antenna	1

- Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

TEST RESULTS

For 30MHz-1GHz



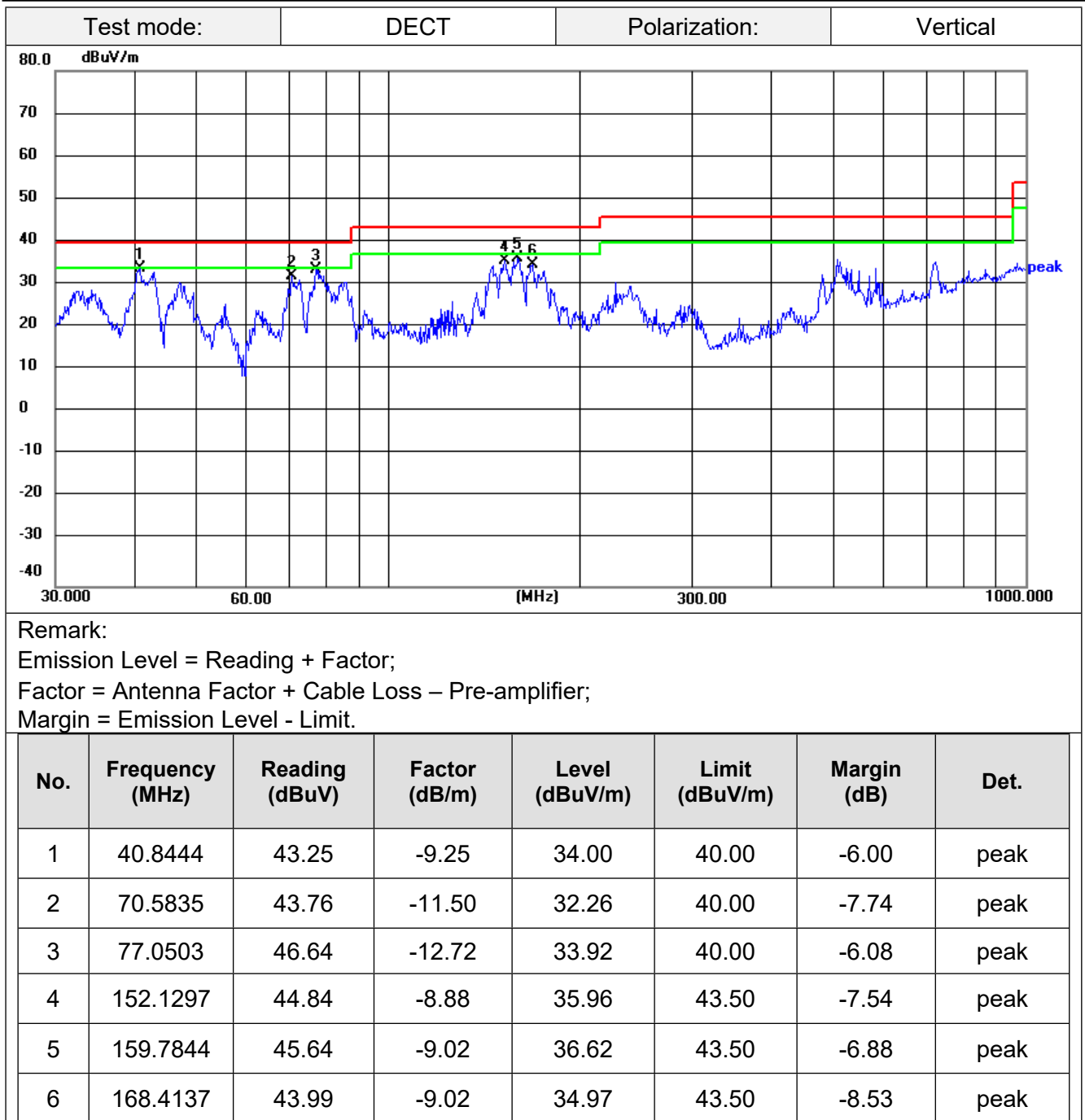
Remark:

Emission Level = Reading + Factor;

Factor = Antenna Factor + Cable Loss – Pre-amplifier;

Margin = Emission Level - Limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	46.9947	38.70	-9.37	29.33	40.00	-10.67	peak
2	145.8610	43.47	-9.13	34.34	43.50	-9.16	peak
3	152.1297	43.29	-8.88	34.41	43.50	-9.09	peak
4	160.3455	45.69	-9.06	36.63	43.50	-6.87	peak
5	167.2366	46.40	-8.98	37.42	43.50	-6.08	peak
6	240.8302	46.10	-9.79	36.31	46.00	-9.69	peak



For 1GHz to 20GHz
GFSK (above 1GHz)

Frequency(MHz):		1921.536		Polarity:	Horizontal	
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	
3843.95	56.00	-8.86	47.14	74	-26.86	PEAK
--	--	--	--	--	--	AVG
5765.00	49.14	-5	44.14	74	-29.86	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		1921.536		Polarity:	VERTICAL	
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	
3843.95	57.04	-8.86	48.18	74	-25.82	PEAK
--	--	--	--	--	--	AVG
5765.00	49.85	-5	44.85	74	-29.15	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		1924.992		Polarity:	Horizontal	
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	
3850.30	55.29	-8.95	46.34	74	-27.66	PEAK
--	--	--	--	--	--	AVG
5774.80	51.11	-4.87	46.24	74	-27.76	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		1924.992		Polarity:	VERTICAL	
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	
3850.30	55.69	-8.95	46.74	74	-27.26	PEAK
--	--	--	--	--	--	AVG
5774.80	51.50	-4.87	46.63	74	-27.37	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		1928.448		Polarity:	Horizontal	
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	
3857.50	57.11	-9.05	48.06	74	-25.94	PEAK
--	--	--	--	--	--	AVG
5786.15	47.51	-4.71	42.80	74	-31.20	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		1928.448		Polarity:	VERTICAL	
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	
3857.50	57.67	-9.05	48.62	74	-25.38	PEAK
--	--	--	--	--	--	AVG
5786.15	48.18	-4.71	43.47	74	-30.53	PEAK
--	--	--	--	--	--	AVG

REMARKS:

1. Emission level (dBuV/m) = Reading (dBuV) + Factor (dB/m).
2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor.
3. Margin value = Emission level - Limit value.
4. -- Mean the PK detector measured value is below average limit.
5. Other emission levels are attenuated 20dB below the limit and not recorded in report.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

3.3 Emission Bandwidth

Limit

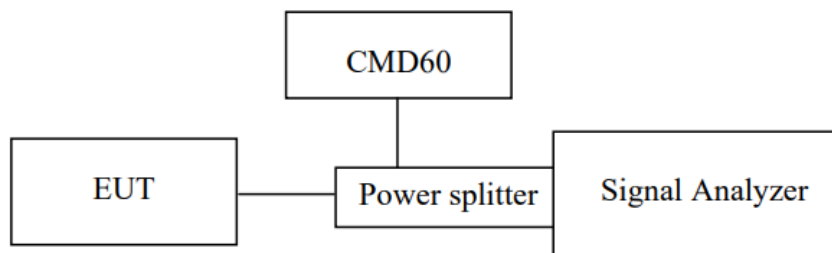
Operation shall be contained within the 1920–1930 MHz band. The emission bandwidth shall be less than 2.5 MHz and greater than 50 kHz.

Test Procedure

Test according to ANSI C63.17-2013 Clause 6.1.3 set the spectrum analyzer as follows:

RBW	Approximately 1% of the emission bandwidth (a rough estimate maybe obtained from peak power level measurement, or use manufacturer's declared value)
Video bandwidth	$\geq 3 \times \text{RBW}$
Span	Zero
Center frequency	Nominal center frequency of channel
Span	$\geq 2 \times$ the expected emission bandwidth
Sweep time	Coupled to frequency span and RBW
Amplitude scale	Log
Detection	Peak detection with maximum hold enabled

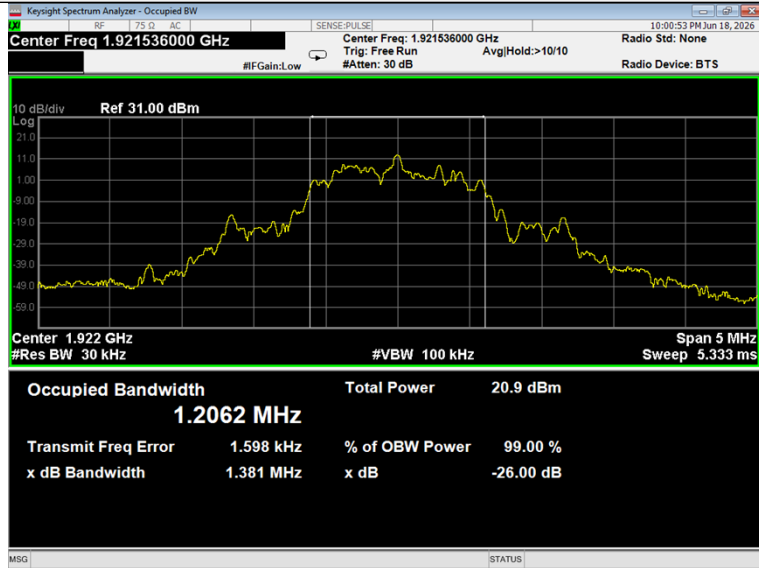
Test Configuration



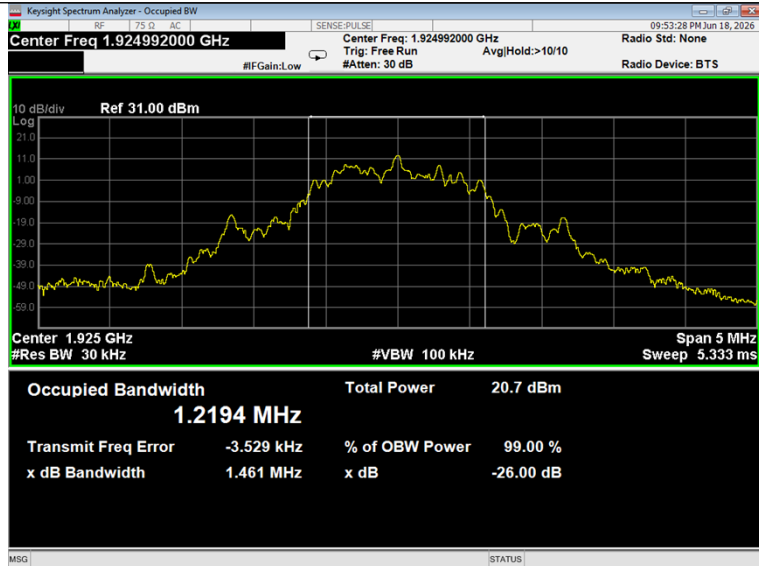
Test Results

Channel	26dB BW(MHz)	99% BW(MHz)	Limit
CH04	1.381	1.206	50 kHz ~ 2.5 MHz
CH02	1.461	1.219	
CH00	1.355	1.198	

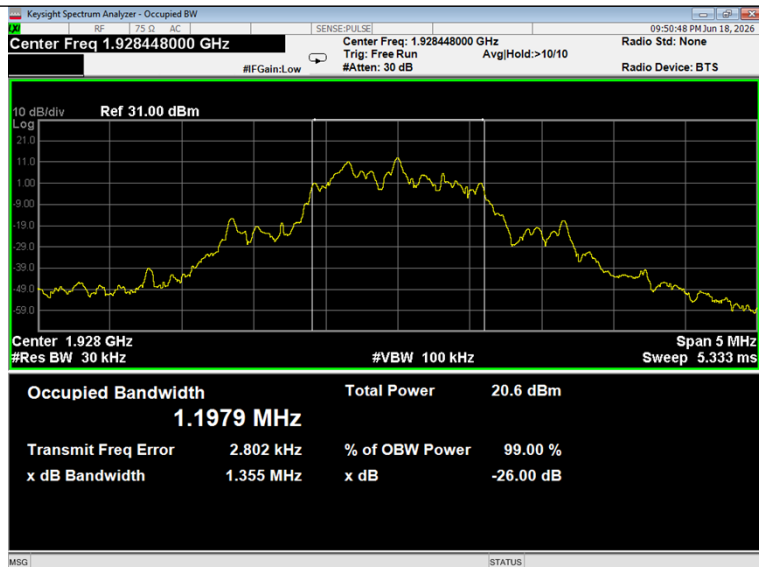
CH04:1921.536MHz



CH02:1924.992MHz



CH00:1928.448MHz



3.4 Peak Transmit Power

Limit

Per FCC Part15.319 (c) Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in hertz. Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

Per FCC Part15.319 (e), the peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Calculation of Peak Transmit Power Limit:

$$\text{Peak Transmit Power Limit} = 100\mu\text{W} \times (\text{EBW})^{1/2}$$

EBW is the transmit emission bandwidth in Hz determined in the other test item:

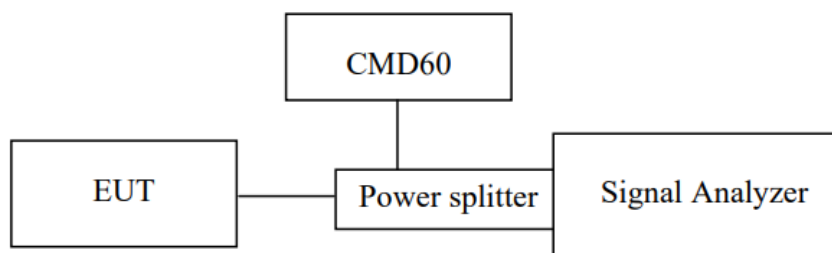
Peak transmit power shall not exceed 100 μW multiplied by the square root of the occupied bandwidth in hertz. The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Test Procedure

Test according to ANSI C63.17-2013 Clause 6.1.2 set the spectrum analyzer as follows:

RBW	$\geq$ Emission bandwidth
Video bandwidth	$\geq$ RBW
Span	Zero
Center frequency	Nominal center frequency of transmit carrier
Amplitude scale	Log (linear may be used if analyzer has sufficient linear dynamic range and accuracy)
Detection	Peak detection
Trigger	Video
Sweep rate	Sufficiently rapid to permit the transmit pulse to be resolved accurately

Test Configuration

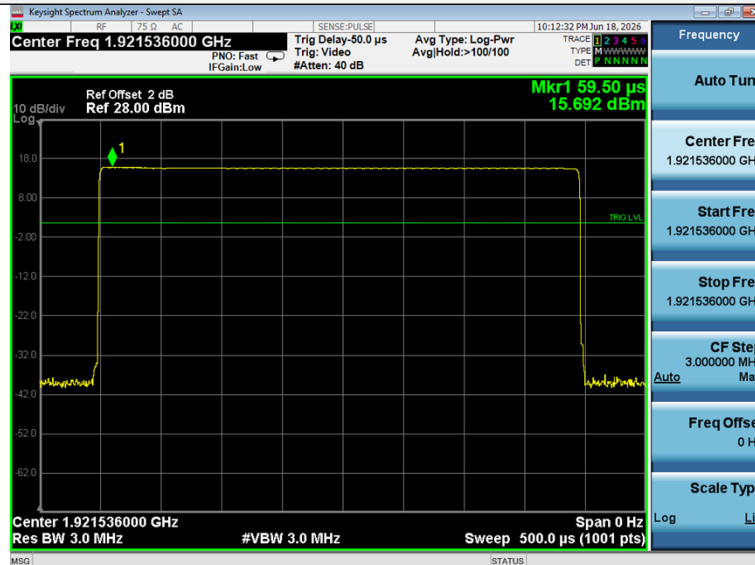


Test Results

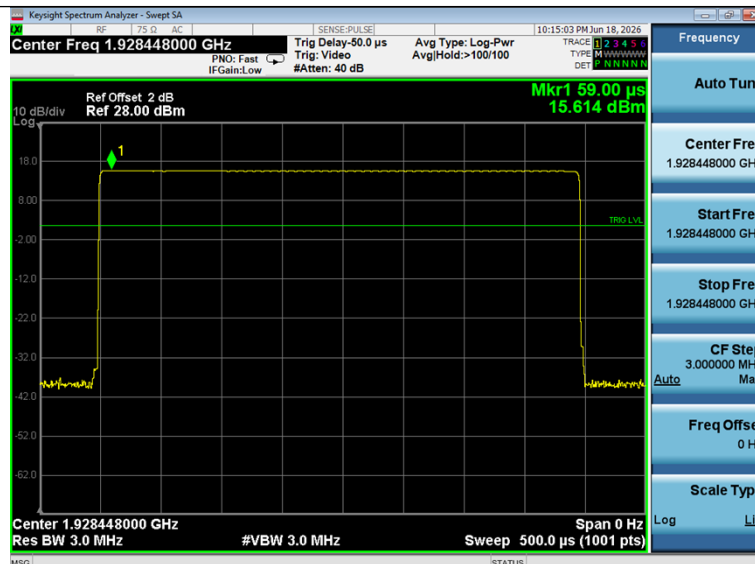
Channel	Frequency (MHz)	Measured Peak Output Power (dBm)	Limit(uw)	Limit(dBm)
CH04	1921.536	15.69	117516.0	20.70
CH02	1924.992	15.61	120871.8	20.82
CH00	1928.448	15.61	116404.5	20.66

Note: Peak Transmitter Power Limit= $100 \cdot (EBW)^{1/2} \mu W$

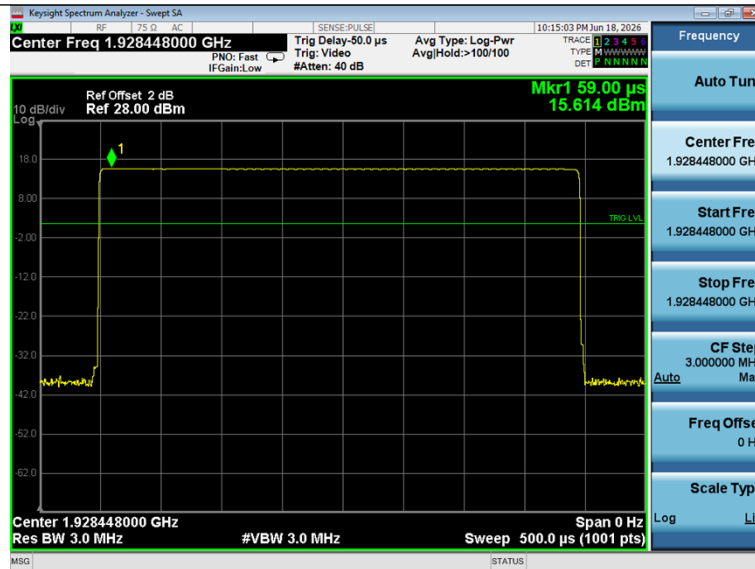
CH04:1921.536MHz



CH02:1924.992MHz



CH00:1928.448MHz



3.5 Power Spectral Density

Limit

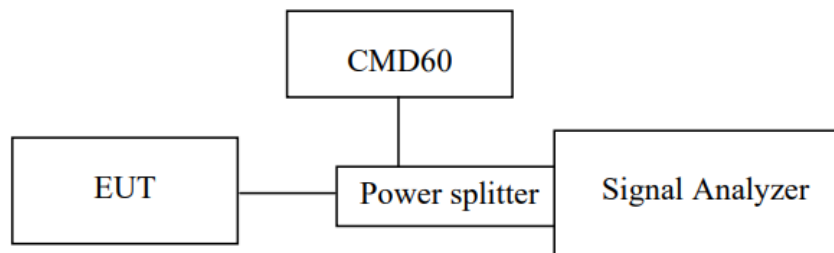
§15.319(d): Power spectral density shall not exceed 3 milliwatts in any 3 kHz bandwidth as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

Test Procedure

Test according to ANSI C63.17-2013 Clause 6.1.5 set the spectrum analyzer as follows:

RBW	3 kHz
Video bandwidth	$\geq 3 \times \text{RBW}$
Span	Zero span at frequency with the maximum level (frequency determined in 6.1.3 if the same type of signal (continuous versus burst) was used in 6.1.3)
Center frequency	Spectral peak as determined in 6.1.3
Sweep time	For burst signals, sufficient to include essentially all of the maximum length burst at the output of a 3 kHz filter (e.g., maximum input burst duration plus 600 μs). For continuous signals, 20 ms.
Amplitude scale	Log power
Detection	Sample detection and averaged for a minimum of 100 sweeps
Trigger	Internal

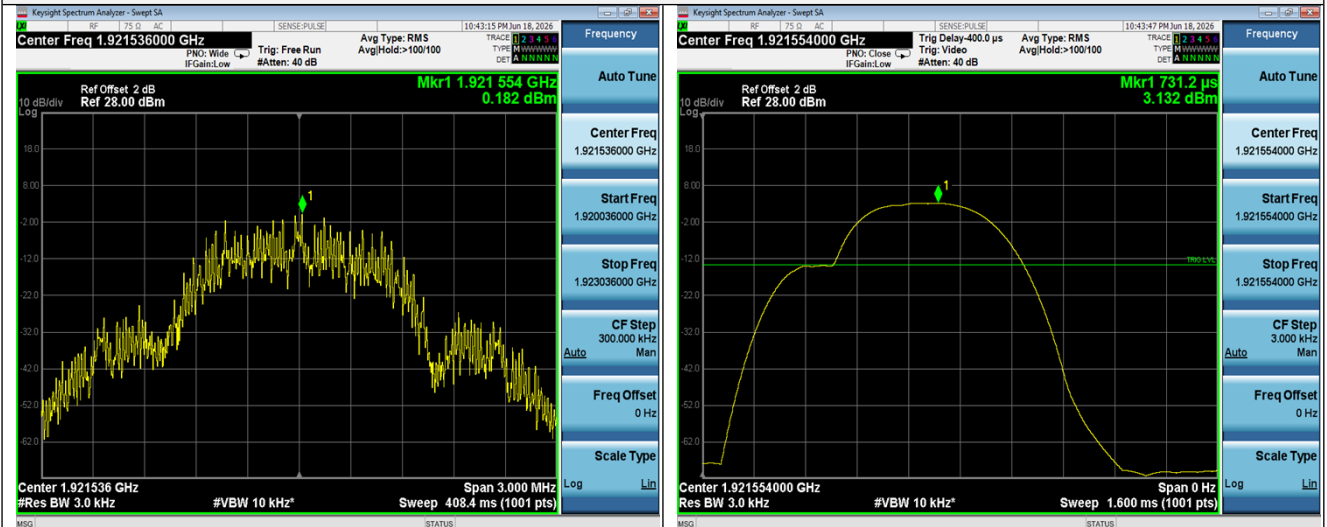
Test Configuration



Test Results

Carrier Channel	Frequency (MHz)	Measured Peak Power Spectral Density (dBm)	Limit(mw)	Limit(dBm)
CH04	1921.536	3.132	3	4.77
CH02	1924.992	3.026		
CH00	1928.448	3.364		

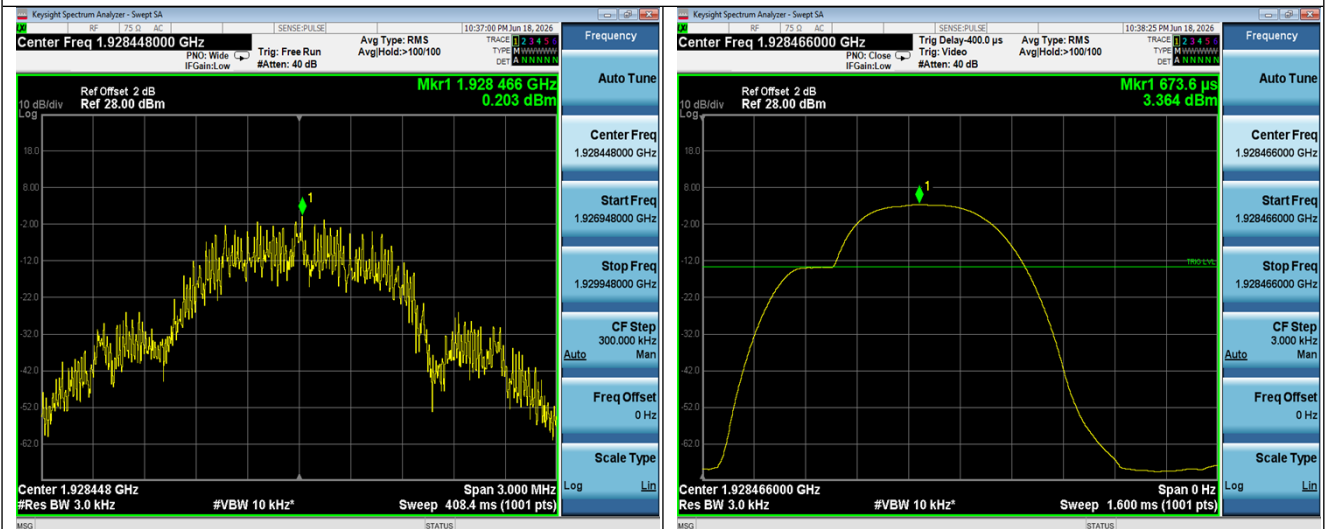
CH04:1921.536MHz



CH02:1924.992MHz



CH00:1928.448MHz



3.6 Emission Inside and Outside the Subband

Limit

Emissions inside the sub-band must comply with the following emission mask:

1. In the bands between 1B and 2B measured from the center of the emission bandwidth the total power emitted by the device shall be at least 30 dB below the transmit power permitted for that device;
2. in the bands between 2B and 3B measured from the center of the emission bandwidth the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator;
3. in the bands between 3B and the sub-band edge the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator. Where B = emission bandwidth

Emission Outside the sub-band shall be attenuated below a reference power of 112 mw (20.5 dBm) as follows:

1. 30 dB between the sub-band and 1.25 MHz above or below the sub-band;
2. 50 dB between 1.25 and 2.5 MHz above or below the sub-band;
3. 60 dB at 2.5 MHz or greater above or below the sub-band.

Emissions outside the 1920-1930 MHz Band

Emissions outside the 1920-1930 MHz band shall be attenuated below a reference power of 112 milliwatts (-9.5 dBW) by at least:

- 30 dB between the band edges and 1.25 MHz above and below the band edges;
- 50 dB between 1.25 MHz and 2.5 MHz above or below the band edges; and
- 60 dB at 2.5 MHz or greater above or below the band edges.

Emissions inside the 1920-1930 MHz Band

Emissions inside the 1920-1930 MHz band shall be attenuated below the transmit power permitted for that device, as follows:

- 30 dB between the frequencies 1B and 2B measured from the centre of the occupied bandwidth;
- 50 dB between the frequencies 2B and 3B measured from the centre of the occupied bandwidth; and
- 60 dB between the frequencies 3B and band edge, where B is the occupied bandwidth in hertz.

Test Procedure

In-band emission:

Test according to ANSI C63.17-2013 Clause 6.1.6 set the spectrum analyzer as follows:

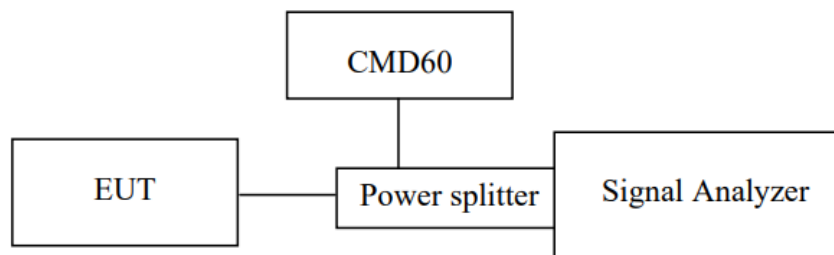
RBW	Approximately 1% of the emission bandwidth (B)
Video bandwidth	$3 \times \text{RBW}$
Sweep time	The sweep time shall be sufficiently slow that the swept frequency rate shall not exceed one RBW per three transmit bursts.
Number of sweeps	Sufficient to stabilize the trace
Amplitude scale	Log
Detection	Peak detection and max hold enabled
Span	Approximately equal to 3.5 B

Out-band emission:

Out-of-band tests shall be performed with the RF carrier set to the lowest and highest carriers defined by the EUT. The spectrum analyzer settings for in-band unwanted emissions in 6.1.6.1 also apply to out of band emissions. The EUT shall pass the tests of item a), item b), and either item c) or item d), as follows:

- In the region between the band edges and 1.25 MHz below and above the lower and the upper band edges, respectively, the measured emission level shall not exceed -9.5dBm .
- In the region between 1.25 and 2.5 MHz below and above the lower and the upper band edges, respectively, the measured emission level shall not exceed -29.5dBm .
- In the region at 2.5 MHz or greater below and above the lower and upper band edges, respectively, the measured emission level shall not exceed -39.5dBm .
- In the region at 2.5 MHz or greater below and above the lower and upper band edges, respectively, the measured emission level shall not exceed the limits of 47CFR15.209. Measurement shall be made as a radiated test.

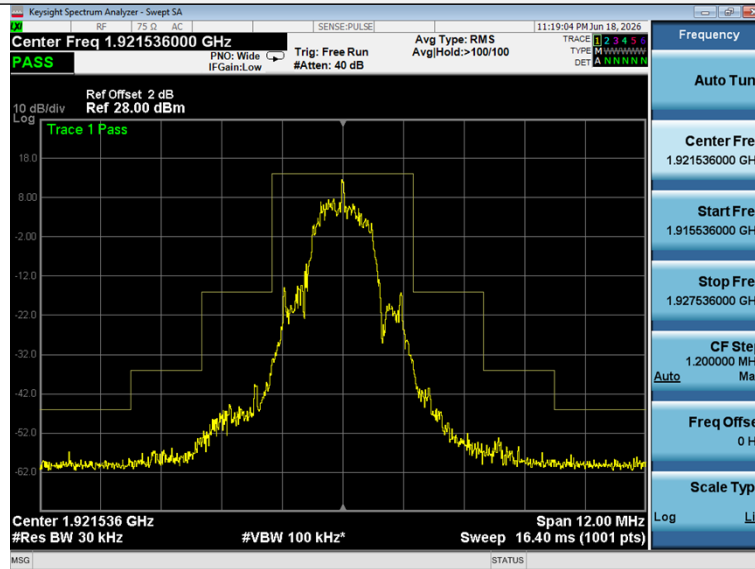
Test Configuration



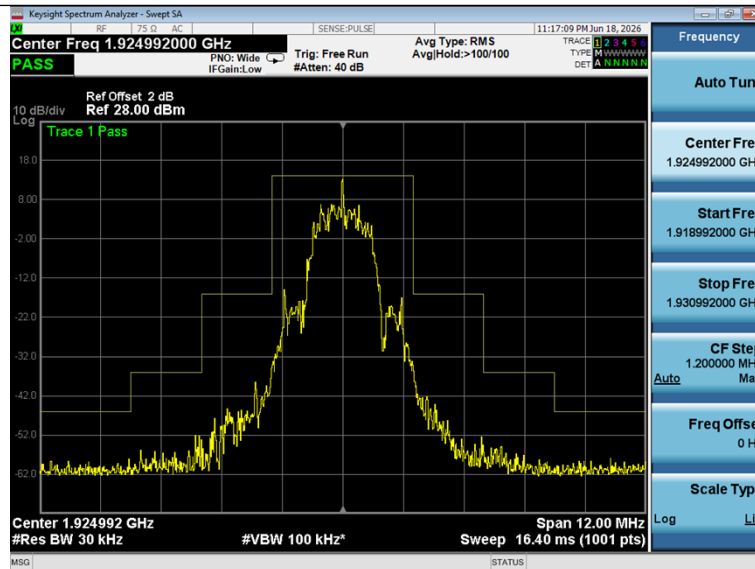
Test Results

In-band emission:

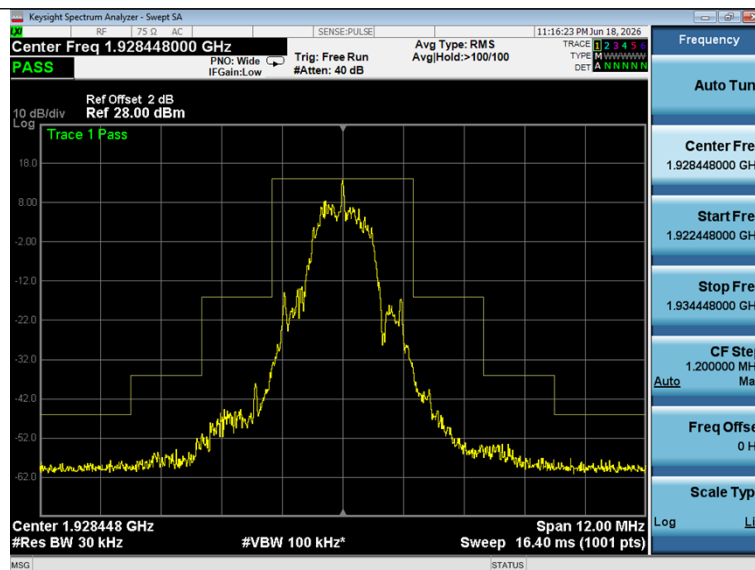
CH04:1921.536MHz



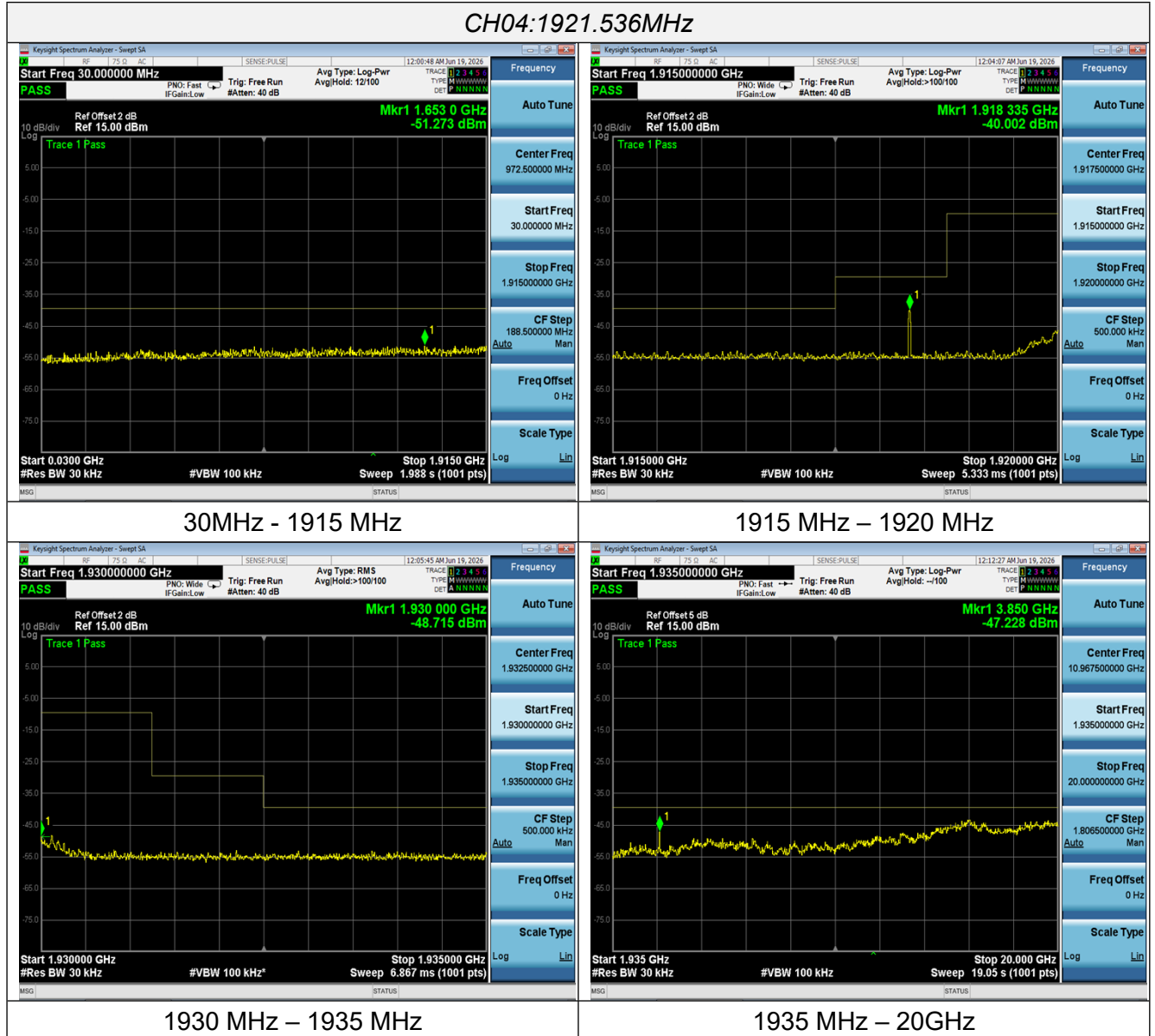
CH02:1924.992MHz



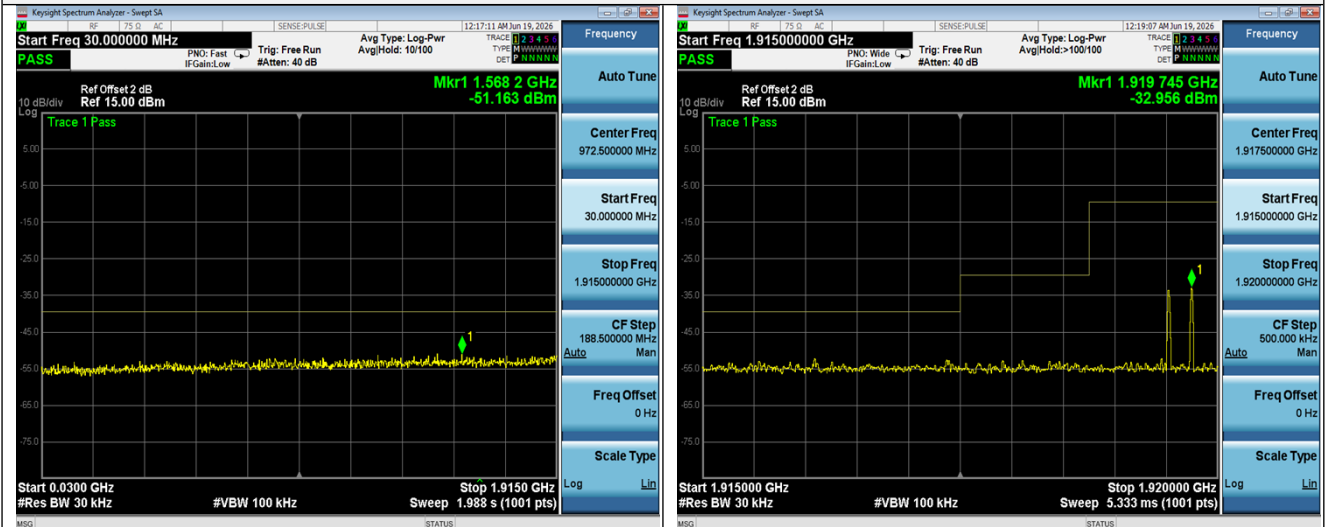
CH00:1928.448MHz



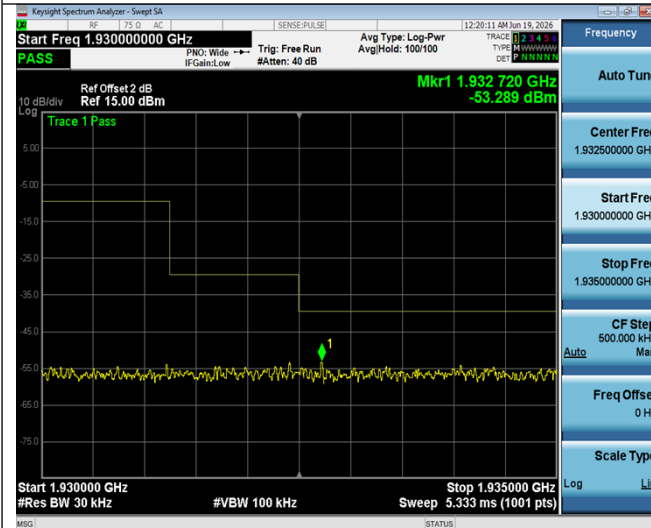
Out-band emission:



CH02:1924.992MHz



30MHz - 1915 MHz



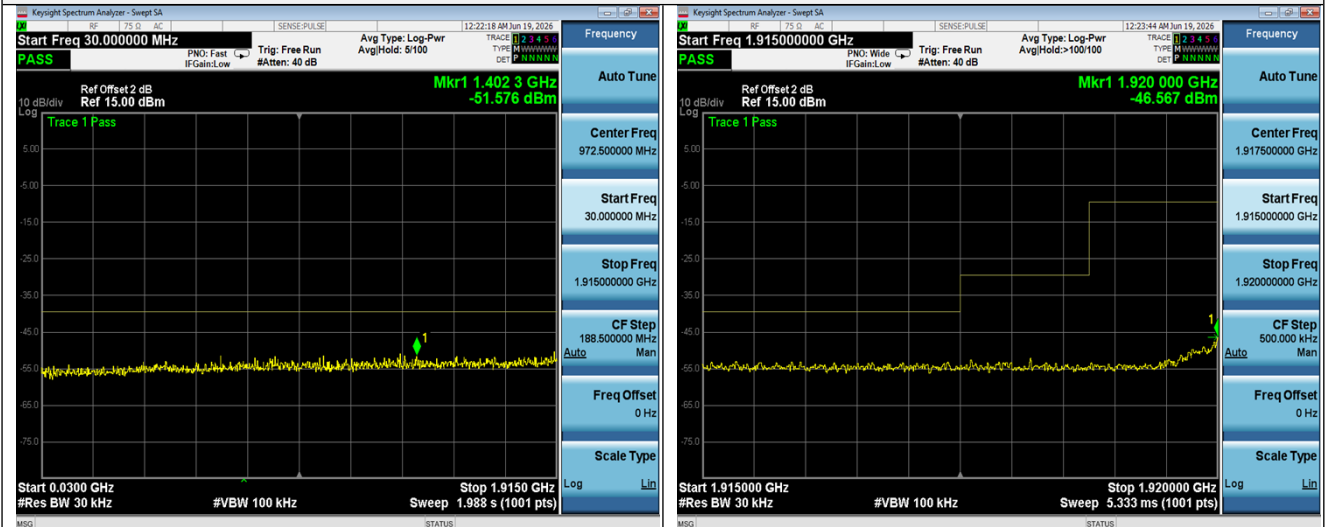
1915 MHz – 1920 MHz



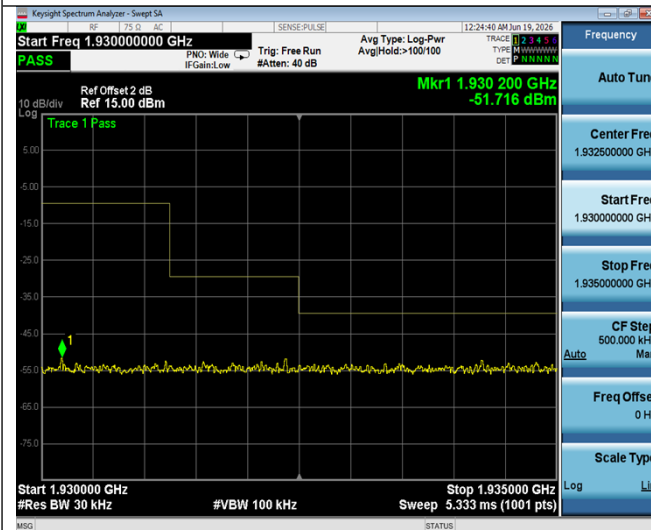
1930 MHz – 1935 MHz

1935 MHz – 20GHz

CH00:1928.448MHz



30MHz - 1915 MHz



1915 MHz – 1920 MHz



1930 MHz – 1935 MHz

1935 MHz – 20GHz

3.7 Frequency Stability

Limit

§15.323 (f) The frequency stability of the carrier frequency of the intentional radiator shall be maintained within $\pm 10\text{ppm}$ over 1 hour or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of -20° to $+50^{\circ}$ C at normal supply voltage and over a variation in the primary supply voltage of 85% to 115% of the rated supply voltage at a temperature of 20° C. For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

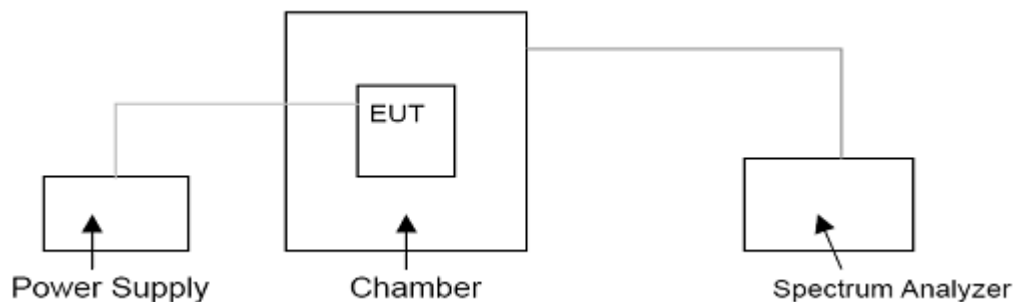
Test Procedure

The EUT was placed in the Environmental Chamber and support equipment are outside the chamber on a table. A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations.

The frequency drift was investigated for every 10° C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -20° to $+50^{\circ}$ C.

Voltage supplied to EUT is DC12V from AC adapter, the reference temperature was done at 20° C. The voltage was varied by $\pm 15\%$ of nominal

Test Configuration



Test Results

Reference Frequency: 1921.536MHz					
Voltage (V)	Temperature ($^{\circ}\text{C}$)	Frequency error (Hz)	Frequency Tolerance (ppm)	Limit (ppm)	Result
120	-20	-343	-0.18	± 10	Pass
	-10	-155	-0.08		
	0	-775	-0.40		
	10	227	0.12		
	20	-45	-0.02		
	30	11	0.01		
	40	215	0.11		
	50	472	0.25		
138	20	-411	-0.21	± 10	Pass
102	20	-261	-0.14		

Reference Frequency: 1924.992MHz					
Voltage (V)	Temperature (°C)	Frequency error (Hz)	Frequency Tolerance (ppm)	Limit (ppm)	Result
120	-20	-298	-0.16	± 10	Pass
	-10	-752	-0.39		
	0	-88	-0.05		
	10	-534	-0.28		
	20	282	0.15		
	30	696	0.36		
	40	-51	-0.03		
	50	-13	-0.01		
138	20	-293	-0.15	± 10	Pass
102	20	-459	-0.24		

Reference Frequency: 1928.448MHz					
Voltage (V)	Temperature (°C)	Frequency error (Hz)	Frequency Tolerance (ppm)	Limit (ppm)	Result
120	-20	-208	-0.11	± 10	Pass
	-10	-412	-0.21		
	0	-351	-0.18		
	10	778	0.40		
	20	368	0.19		
	30	-255	-0.13		
	40	569	0.30		
	50	93	0.05		
138	20	122	0.06	± 10	Pass
102	20	3	0.00		

3.8 Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

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

Test Result

The maximum gain of antenna was 1.63dBi with impedance 50Ω. The EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and or conclusions.

3.9 Specific Requirements for UPCS Device

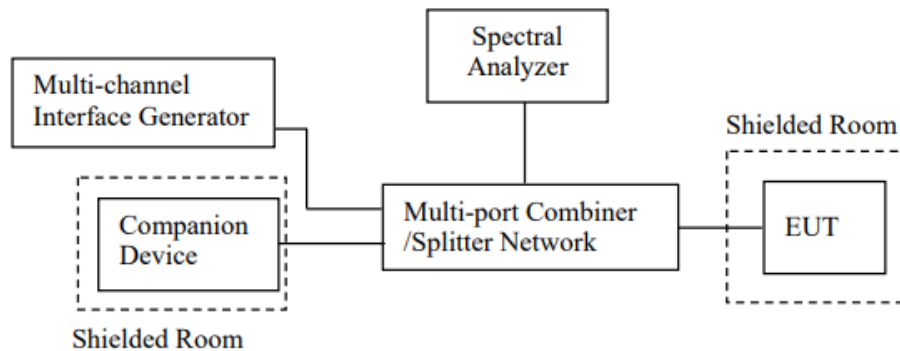
Applicable Standard

FCC§15.323(c)(e) & §15.319(f) Specific Requirements for UPCS device

Test Procedure

Measurement method according to ANSI C63.17- 2013

Test Configuration



Test Item

1) Automatic Discontinuation of Transmission

Requirement

§15.319(f): The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Test Result

No.	Test	Reaction of EUT	Result
1	Remove Power from Companion Device	A	Pass
2	Switch off the companion device	A	Pass
3	Terminate call at the companion device	A	Pass
4	Switch off the EUT	NA2	N/A
5	Terminate call at the EUT	A	Pas

A - Connection was terminated and transmission ceased.

B - Connection was terminated but the EUT transmits control or signaling information.

C - Connection was terminated but the companion device transmits control or signaling information.

Note:

1. NA1: The companion device does not have a switch to terminate call.

2. NA2: The EUT does not have an On/Off switch.

3. NA3: The EUT does not have a switch to terminate call.

2) Monitoring time

Requirement

§15.323(c)(1): Immediately prior to initiating transmission, devices must monitor the combined time and spectrum window in which they intend to transmit. For a period of at least 10 milliseconds for systems designed to use a 10 milliseconds or shorter frame period or at least 20 milliseconds for systems designed to use a 20 milliseconds frame period.

Test procedure

Measurement method is in according to ANSI C63.17 -2013 clause 7.3.3. RF signal generators apply uniform CW interference on all system carriers except two carriers (designated f_1 and f_2), each at level $T_L + U_M$. EUT can only transmit on these two carriers.

Test Result

This requirement is covered by the results of Least Interfered Channel (LIC).

Interference (Refer to ANSI C63.17 clause 7.3.3)	Reaction of EUT	Results
a) Apply the interference on f_1 at level $T_L + U_M + 20\text{dB}$ and no interference on f_2 . Initiate transmission and verify the transmission only on f_2 . Then terminate it.	EUT transmits on f_2	Pass
b) Apply the interference on f_2 at level $T_L + U_M + 20\text{dB}$ and immediately remove all interference from f_1 . The EUT should immediately attempt transmission on f_1 (but at least 20 ms after the interference on f_2 is applied), verify the transmission only on f_1 .	EUT transmission f_1	Pass

3) Monitoring threshold

Requirement

§15.323(c)(2): The monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth used by the device

Test procedure

Measurement method according to ANSI C63.17 -2013 clause 7.3.1

Test result

Not applicable because the EUT has more 40 defined duplex system access channels and meet the provision of the Least Interfered Channel (LIC).

4) Maximum transmit period

Requirement

§15.323(c)(3): If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

Test procedure

Measurement method according to ANSI C63.17 -2013 clause 8.2.2

- Activate the EUT and initiate a communication channel with the companion device, and start a timer or frame counter.
- The centre frequency of spectrum analyzer was set to the carrier frequency and SPAN was set to

ZERO. The spectrum analyzer was used to monitor the time and spectrum window of the communication channel.

- c) Stop the timer at the end of the EUT transmission on the current time and frequency window (measure the time until the EUT changes to a different slot).

Test result

Repetition of Access Criteria	Measured Maximum Transmission Time (Second)	Limit (Second)	Results
First	21537	28,800	Pass
Second	21537	28,800	Pass

5) System Acknowledgement

Requirement

§15.323(c)(4): Once access to specific combined time and spectrum windows is obtained an acknowledgment from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgments must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgment, at which time the access criteria must be repeated.

Test procedure

Measurement method according to ANSI C63.17 2013 clause 8.1, 8.2, 8.2.1

During testing initial transmission without acknowledgement, the signal from the EUT to the companion device is blocked by the circulator.

The test of the transmission time after loss of acknowledgements is performed by cutting off the signal from the companion device by a RF switch and measuring the time until the EUT stops transmitting.

Test result

Test	Time taken (second)	Limit (Second)	Results
Initial Connection acknowledgement	0.47	1	Pass
Change of access criteria for control information	N/A	30	N/A
Transmission cease time after loss of acknowledgement	11.5	30	Pass

Note: N/A=Not Applicable

6) Least Interfered Channel (LIC)

Requirement

§15.323(c)(5): If access to spectrum is not available as determined by the above, and a minimum of 20 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level may be accessed. A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 milliseconds frame period) immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value. The power measurement resolution for this comparison must be accurate to within 6 dB. No device or group of co-operating devices located within 1 meter of each other shall during any frame period occupy more than 6 MHz of aggregate bandwidth, or alternatively, more than one third of the time and spectrum windows defined by the system.

Calculation of monitoring threshold limits for isochroous devices:

Lower threshold: $TL = -174 + 10\log_{10}B + M_L + P_{MAX} - P_{EUT}$ (dBm)

Where: B=Emission bandwidth (Hz)

M_L = dB the threshold may exceed thermal noise (30 for T_L)

$P_{MAX} = 5\log_{10}B - 10$ (dBm)

P_{EUT} = Transmitted power (dBm)

Calculated thresholds

Monitor Threshold	B(MHz)	ML(dB)	P_{MAX} (dBm)	P_{EUT} (dBm)	Threshold (dBm)
Lower threshold	1.461	30	20.83	15.61	-77.13

Note: 1. The upper threshold is not applicable as the EUT utilizes more than 20 duplex system channels

Test procedure

Measurement method according to ANSI C63.17 clause 7.3.2, 7.3.3

C63.17 clause 7.3.2, LIC procedure test:

- Allow EUT transmission on only two carrier frequencies, which will be designated f_1 and f_2 .
- Apply interference to the EUT on f_1 at a level of $T_L + U_M + 7$ dB and on f_2 at a level of $T_L + U_M$. Initiate transmission. The EUT should transmit on f_2 . Terminate the connection. Repeat five times. If the EUT transmits once on f_1 , the test failed.
- Apply interference to the EUT on f_1 at a level of $T_L + U_M$ and on f_2 at a level of $T_L + U_M + 7$ dB. Initiate transmission. The EUT should transmit on f_1 . Terminate the connection. Repeat five times. If the EUT transmits once on f_2 , the test failed.
- Apply interference to the EUT on f_1 at a level of $T_L + U_M + 1$ dB and on f_2 at a level of $T_L + U_M - 6$ dB. Initiate transmission. If the EUT transmits on f_2 , terminate the connection. Repeat five times. If the EUT transmits once on f_1 , the test failed.
- Apply interference to the EUT on f_1 at a level of $T_L + U_M - 6$ dB and on f_2 at a level of $T_L + U_M + 1$ dB. Initiate transmission. If the EUT transmits on f_1 , terminate the connection. Repeat five times. If the EUT transmits once on f_2 , the test failed.

C63.17 clause 7.3.3, Selected channel confirmation:

- Allow EUT transmission on only two carrier frequencies, which will be designated f_1 and f_2 . This limitation to carriers f_1 and f_2 is performed preferably by administration commands for the EUT, or alternatively by applying by a multicarrier interference generator uniform interference on all system carriers except f_1 and f_2 , at a level of $T_L + U_M + 20$ dB in-band per carrier. Set the interference level to the EUT on f_1 to a level of $T_L + U_M + 20$ dB, and let there be no interference applied on f_2 .
- Initiate transmission and verify that the EUT transmits on f_2 . If a connection was made, terminate it.
- Apply interference on f_2 at a level of $T_L + U_M + 20$ dB in-band, and immediately remove all interference from f_1 and immediately (but not sooner than 20 ms after the interference on f_2 is applied) cause the EUT to attempt transmission. The EUT should now transmit on f_1 , if it transmits.
- If the EUT transmits on f_2 , it fails.

Test result

1) LIC procedure test:

Interference (Refer to ANSI C63.17 clause 7.3.3)	Reaction of EUT	Results
a) Apply the interference on f_1 at level $T_L + U_M + 7$ dB and the interference on f_2 at level $T_L + U_M$. Initiate	EUT transmits on f_2	Pass
b) Apply the interference on f_1 at level $T_L + U_M$ and the interference on f_2 at level $T_L + U_M + 7$ dB. Initiate transmission and verify the transmission only on f_1 . Repeat 5 times.	EUT transmits on f_1	Pass
c) Apply the interference on f_1 at level $T_L + U_M + 1$ dB the interference on f_2 at level $T_L + U_M - 6$ dB. Initiate transmission and verify the transmission only on f_2 . Repeat 5 times.	EUT transmits on f_2	Pass
d) Apply the interference on f_1 at level $T_L + U_M - 6$ dB and the interference on f_2 at level $T_L + U_M + 1$ dB. Initiate transmission and verify the transmission only on f_1 . Repeat 5 times.	EUT transmits on f_1	Pass

2) Selected channel confirmation:

Interference (Refer to ANSI C63.17 clause 7.3.4)	Reaction of EUT	Results
a) Apply the interference on f_1 at level $T_U + U_M$ and no interference on f_2 . Initiate transmission and verify the transmission only on f_2 . Then terminate it	EUT transmits on f_2	Pass
b) Apply the interference on f_2 at level $T_L + U_M$ and immediately remove all interference from f_1 . The EUT should immediately attempt transmission on f_1 (but at least 20 ms after the interference on f_2 is applied), verify the transmission only on f_1 .	EUT transmits on f_1	Pass

7) Random waiting

Requirement

§15.323(c)(6): If the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same windows after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.

Test procedure

This test is for EUTs that transmit control and signaling channels and that use the provisions of FCC §15.323(c)(6), thus to verify that the EUT (if in deferral) waits for a channel to go clear, then implements a 10 ms to 150 ms hold off prior to using the channel. FCC §15.323(c)(6) is not restrictive for EUTs that use the LIC and offer 20 or more duplex communications channels, as a combined time

and spectrum window cannot become unavailable as there is no threshold limit. Test method according to ANSI C63.17 2013 clause 8.1.3

- Restrict operation of the EUT to a single carrier designated f_1 . For TDMA system, further restrict EUT transmission to a single timeslot of the usable timeslots available in the TDMA frame structure and synchronize the interference so as to occur centered within the timeslot.
- Activate the EUT with no interference present. The EUT must transmit on f_1 . Then apply CW interference on f_1 . The interference level shall be at $T_L + U_M$ as appropriate for EUTs that do or do not meet the requirements for using the upper threshold. The EUT must stop transmitting within 30 s.
- Cancel the interference. Measure the time interval between the end of the interference transmission and the beginning of transmission by the EUT.
- Repeat step b) and step c) 100 times. If the measured time intervals vary uniformly between 10 ms and 150 ms, the EUT passes the test

Test result

Note: Not Applicable as the EUT does not support the Random Waiting Interval option.

8) Monitoring requirements

Requirement

§15.323(c)(7): The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission and have a maximum reaction time less than $50 \times \text{SQRT}(1.25/\text{emission bandwidth in MHz})$ microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds. If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be $35 \times \text{SQRT}(1.25/\text{emission bandwidth in MHz})$ microseconds but shall not be required to be less than 35 microseconds.

Note: Testing of the monitoring system bandwidth is not required if the designed bandwidth from the manufacturer is available and given in the test report. The maximum reaction time of the monitor shall be less than $50 \sqrt{1.25/\text{occupied bandwidth in MHz}}$ μs for signals at the applicable threshold level but shall not be required to be less than 50 μs . If a signal of 6 dB or more above the threshold level is detected, the maximum reaction time shall be $35 \sqrt{1.25/\text{occupied bandwidth in MHz}}$ μs but shall not be required to be less than 35 μs .

Test procedure

Measurement method according to ANSI C63.17 2013 clause 7.4 & 7.5

- Restrict the EUT to a single transmit carrier frequency f_1 , and verify that the EUT can establish a connection with no interference applied on f_1 .
- Apply time-synchronized, pulsed interference on f_1 at the pulsed level $T_L + U_M$, verify that the EUT does not establish a connection when the width of the interference pulse exceeds the largest of 50 μs and $50 \sqrt{1.25/B}$ μs , where B is the emission bandwidth of the EUT in megahertz.
- With the channel interference level 6 dB above $T_L + U_M$, verify that the EUT does not establish a connection when the width of the interference pulse exceeds the largest of 35 μs and $35 \sqrt{1.25/B}$ μs , where B is the emission bandwidth of the EUT in megahertz.

Test Pulse width Equation (μs)	B(bandwidth) (MHz)	Pulse width (μs)	Limit (largest) (μs)
$50 (1.25/B)^{1/2}$	1.461	46.25	50
$35 (1.25/B)^{1/2}$	1.461	32.37	35

Test result

1) Monitoring Bandwidth:

The antenna of the EUT used for monitoring is the same interior antenna that used for transmission, so the monitoring system bandwidth is equal to the emission bandwidth of the intended transmission

2) Reaction Time Test:

No.	Interference Pulse width (μs)	Reaction of EUT	Observing time (μs)	Result
1	50μs with level $T_L + U_M$	No transmission	23.5	Pass
2	35μs with level $T_L + U_M + 6\text{dB}$	No transmission	25.2	Pass

9) Monitoring Antenna

Requirement

§15.323(c)(8): The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

Test procedure

Measurement method according to ANSI C63.17 -2013 paragraph 4

Test result

The antenna of the EUT used for transmission is the same interior antenna that used for monitoring.

10) Monitoring threshold relaxation

Requirement

§15.323(c)(9): Devices that have a power output lower than the maximum permitted under the rules can increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

Test procedure

Measurement method according to ANSI C63.17 -2013 clause 7.4 & paragraph 4

Test result

This requirement is covered by the results of Least Interfered Channel (LIC).

11) Duplex system LBT

Requirement

§15.323(c)(10): An initiating device may attempt to establish a duplex connection by monitors both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

Test procedure

This test validates proper operation of an EUT that operates according to the provisions of FCC §15.323(c)(10) using a check of both transmit and receive channels on one end of the link to qualify both ends of the link for transmissions. Test method according to ANSI C63.17 clause 8.3 Validation of dual access criteria check for EUTs that implement the upper threshold

- a) Adjust the path loss between the EUT and its companion device such that the received signal to the EUT from the companion device is at least 40 dB above $TL + UM$.
- b) Restrict the EUT and its companion device to operation at a single carrier f_1 for TDMA systems and on f_1 and f_2 and corresponding duplex carriers for FDMA systems. Verify that the EUT and its companion device can establish a connection on a time/spectrum window on the enabled carrier(s). Terminate the connection.
- c) Apply interference to the EUT on the EUT's transmit time/spectrum windows at $TL + UM$ per carrier on all time/spectrum windows except for one, which has interference at least 10 dB below TL . Adjust the interference to the EUT on its receive time/spectrum windows such that a single time/spectrum window has interference at least 10 dB below TL , and the interference on the other time/spectrum windows is at $TL + UM + 7$ dB. The interference to the companion device should be at least 10 dB below TL on all active time/spectrum windows. The interference-free receive time/spectrum window must not be the duplex mate of the interference-free transmit time/spectrum window.
- d) Cause the EUT to attempt to establish a connection. The connection should be made on the interference free receive time/spectrum window and its duplex mate. Otherwise, the EUT fails the test.
- e) If a connection exists, terminate it. Reduce the interference on the EUT's receive time/spectrum windows to a level of $TL + UM$ per carrier on all time/spectrum windows except for one, which has interference at least 10 dB below TL . Raise the interference on the EUT's transmit time/spectrum windows to a level of $TL + UM + 7$ dB, maintaining one time/spectrum window with interference at least 10 dB below TL . The interference to the companion device should be at least 10 dB below TL on all active time/spectrum windows. Again, the interference-free transmit and receive time/spectrum windows should not constitute a duplex pair if the system designates a specific duplex pairing for time/spectrum windows.
- f) Cause the EUT to attempt to establish a connection. The connection should be made on the interference-free transmit time/spectrum window and its duplex mate. Otherwise, the system fails the test.
- g) Terminate the connection and raise the interference to the EUT on all of the EUT's transmit and

receive time/spectrum windows to $TU + UM$ per carrier on all time/spectrum windows except for a single transmit time/spectrum window and a single receive time/spectrum window, which shall have interference at least 10 dB below TL . The low-interference transmits and receives time/spectrum windows shall not constitute a duplex pair. Adjust the path loss between the EUT and its companion device such that the received signal to the EUT from the companion device is at least 30 dB above TU . Cause the EUT to attempt to establish a connection. If a connection is established, the test fails.

Test result

Interference (Refer to ANSI C63.17 § 8.3& § 8.3.2)	Reaction of EUT	Result
a) Only a single carrier f_1 for EUT TDMA systems and on f_1 and f_2 and corresponding duplex carriers for FDMA systems.	EUT can transmit	Pass
b) All Tx windows with level $TL+UM$ except one & Rx windows with level $TL+UM+7$ dB except one, which are not the duplex mate.	Connected on the target Rx window and its duplex mate.	Pass
c) All Tx windows with level $TL+UM+7$ dB except one & Rx windows with level $TL+UM$ except one, which are not duplex mate.	Connected on the target Tx window and its duplex mate.	Pass
d) All Tx & Rx windows with level $TU+UM$, except one for Tx window & one for Rx window, which are not duplex mate.	No connection possible	Pass

12) Co-located device LBT

Requirement

§15.323(c)(11): An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within 1.25 MHz of the center frequency of channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

Test procedure

This test validates the ability of the EUT to distinguish between same-system and other-system interference for purposes of satisfying the requirement of 47CFR15.323(c) (11). Test method according to ANSI C63.17 2013 clause 8.4

- a) Adjust the path loss between the EUT and its companion device such that the received signal to the EUT from the companion device is at least 30 dB above TL .
- b) Restrict the EUT and its companion device to operation at a single carrier f_1 for TDMA systems and on f_1 and f_2 and corresponding duplex carriers for FDMA systems. Verify that the EUT and its companion device can establish a connection.
- c) Apply interference at $TL + UM$ per carrier to the EUT on all transmit time/spectrum windows on the enabled carrier(s). The interference must use the same physical layer parameters (modulation, frame format, etc.) as the EUT transmissions, but with a system identifier different from that used by the EUT and the companion device. Ensure that the interference level at the companion device is at least 10 dB below TL . Apply no interference to the receive time/spectrum windows on the enabled carriers.
- d) Cause the EUT to attempt to establish a connection. If a connection is established, the test fails.

Test result

Interference (Refer to ANSI C63.17 § 8.4)	Reaction of EUT	Result
a) Only a single carrier f_1 for EUT TDMA systems and on f_1 and f_2 and corresponding duplex carriers for FDMA systems.	EUT can transmit	Pass
b) Apply interference with same parameters as EUT transmissions on all Tx windows with level $TL+UM$ on the enabled carrier(s) and no interference on the Rx windows on the enabled carriers.	No connection is established	Pass

13) Fair Access

Requirement

§15.323(c)(12):The provisions of FCC §15.323 (c) & paragraphs 5.2 (10) or (11) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

Test result

The manufacturer declares that this device does not use any mechanisms as provided by FCC §15.323(c)(10) or (11) to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other device.

14) Frame-repetition stability & Frame period and jitter

Requirement

§15.323(e): The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in these sub-bands shall be 20 milliseconds or 10 milliseconds/X where X is a positive whole number. Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 50 parts per million (ppm). Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 10 ppm. The jitter (time related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 microseconds for any two consecutive transmissions. Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

Test procedure

Measurement method according to ANSI C63.17 2013 clause 6.2.2, 6.2.3

Test result

Channel	Mean frame-repetition rate(Hz)	Three times Standard Deviation(ppm)	The limit of Frame Repetition Stability(ppm)	Verdict
Middle	100.00	7.86	± 10	Pass

Note: $\text{ppm} = \frac{3\sigma}{\text{Mean}} \times 10^6$

Channel	Mean Frame Period (ms)	Max. pos. Jitter (μs)	3xStandard Deviation of Jitter (μs)	Limit(μs)		Verdict
				Max Jitter	3 times St.Dev.of Jitter	
Middle	10.00	5.43	0.079	25	12.5	Pass

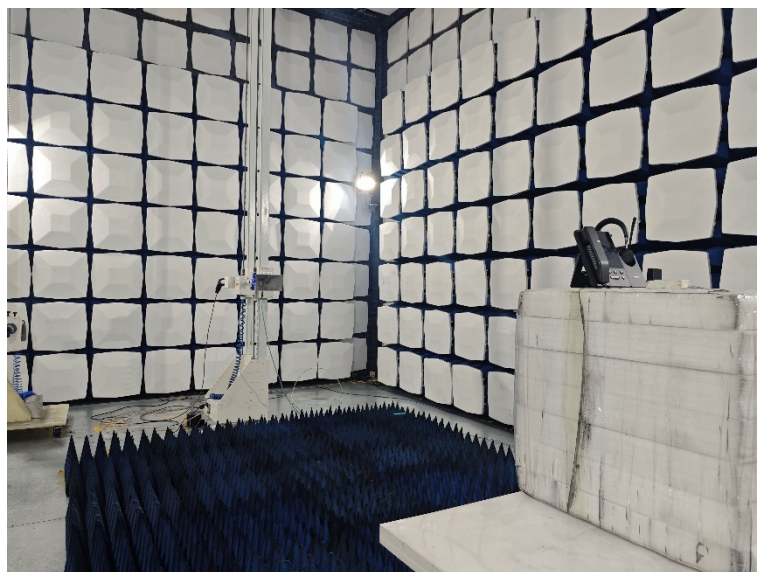
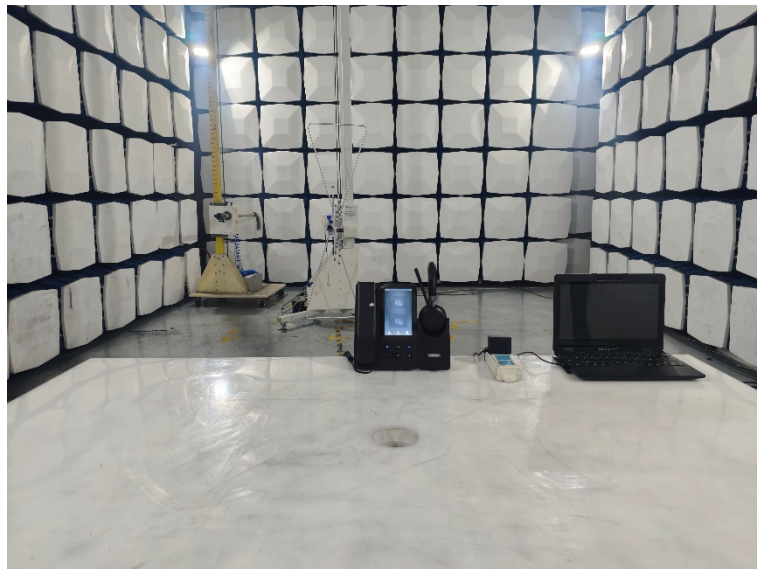
Note:

$$\text{Max Jitter (Consecutive)} = \max(|T_n - T_{n-1}|)$$

$$3 \times \text{St.Dev. Jitter} = 3 \times \sqrt{\frac{1}{N-1} \sum_{i=1}^N (T_i - T_{\text{mean}})^2}$$

(Where T is the frame period time interval in μs)

4 Test Setup Photographs of EUT



5 Photos of EUT

External Photos



