JianYan Testing Group Shenzhen Co., Ltd.

Report No: JYTSZB-R12-2100313

FCC TEST REPORT

Applicant:	Atlinks Asia Limited
Address of Applicant:	Unit 1818, 18/F, Nan Fung Commercial Centre, 19 Lam Lok Street, Kowloon Bay, Kowloon Hong Kong China
Equipment Under Test (EUT)	
Product Name:	1.9GHz DECT 6.0 Wireless Headphone System
Model No.:	TV3500, DH220J
Trade Mark:	ARKON, amplicomms, Swissvoice(See Refer to section 5.2 for details)
FCC ID:	2AYP5TV3500
Applicable standards:	FCC CFR Title 47 Part 15 Subpart D
Date of sample receipt:	01 Feb., 2021
Date of Test:	01 Feb., 2021 to 30 Mar., 2021
Date of report issued:	04 Aug., 2021
Test Result:	PASS*

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

2 Version

Version No.	Date	Description
00	*01 Apr., 2021*	*Original*
01	*04 Aug., 2021*	*Update report footer, Update the standard version on page 7 and 12, Update Radiated emission test setup on page 9, Updated standard terms on pages 11, Update the standard terms and delete the RSS standard terms on page 21 and 26~37*

Tested by: Mike.ou ***Date:*** *04 Aug., 2021*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *04 Aug., 2021*

Project Engineer

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4 Test Summary

Test Item	FCC Section	Result
Antenna requirement	§ 15.317, § 15.203	PASS
AC power line conducted emission	§ 15.315, § 15.207(a)	PASS
Emission bandwidth	§ 15.323(a)	PASS
Peak transmit power	§ 15.319(c)&(e)	PASS
Power spectral density	§ 15.319(d)	PASS
In-band and out-of-band emission	§ 15.323(d)	PASS
Carrier frequency stability	§ 15.323(f)	PASS
Frame repetition stability, period and jitter	§ 15.323(e)	PASS
Automatically discontinue transmission	§ 15.319(f)	PASS
Radiated spurious emission	§ 15.319(g), § 15.209(a)	N/A*
Specific requirements for devices Operating in the 1920–1930MHz sub-band.	§ 15.323(c)	PASS

Remark:

N/A*: Not required if Conducted Out-of-Band Emissions test is passed.

5 General Information

5.1 Client Information

Applicant:	Atlinks Asia Limited
Address of Applicant:	Unit 1818, 18/F, Nan Fung Commercial Centre, 19 Lam Lok Street, Kowloon Bay,Kowloon Hong Kong China
Manufacturer:	UNI-ART PRECISE PRODUCTS LTD.
Address of Manufacturer:	11/F.-12/F., YUE XIU INDUSTRIAL BUILDING, 87 HUNG TO ROAD, KWUN TONG, KOWLOON, HONG KONG
Factory:	ARKON ELECTRONICS (HUIZHOU) CO., LIMITED
Address of Factory:	NO.4 Taihao Road, High-tech Industrial Park,Sandong Town, Huicheng District, Huizhou, Guangdong, China

5.2 General Description of E.U.T.

Product Name:	1.9GHz DECT 6.0 Wireless Headphone System
Model No.:	TV3500, DH220J
Adapter:	Model: AT-538A-050055A Input: AC100-240V, 50/60Hz, 0.2A Output: DC 5.0V, 550mA
Remark:	The model DH220J has the brand name “ARKON”,and the model TV 3500 has the brand name “amplicomms”or "Swissvoice".
Technical Parameter:	
Frequency Range:	1921.536 MHz~1928.448 MHz
Number of channels:	5
Maximum Output Power:	61.52mW(Peak)
Modulation:	GFSK
Antenna Type:	Metal Wire
Antenna Gain:	0 dBi

Channel List

UPCS Channel	Frequency(MHz)
Upper Band Edge	1930
0(Highest)	1928.448
1	1926.720
2(Middle)	1924.992
3	1923.264
4(Lowest)	1921.536
Lower Band Edge	1920

5.3 Related Submittal(s) / Grant (s)

The EUT is a portable device and is designed to be held to ear or worn in a belt clip when used. A test reports with the measured SAR values for both configurations are submitted with the application.

5.4 Test Methodology

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
ANSI 63.17: 2013	American National Standard Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices

5.5 Laboratory Facility

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

- **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

5.6 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.
Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.
Tel: +86-755-23118282, Fax:+86-755-23116366
Email: info-JYTee@lets.com, Website: http://www.ccis-cb.com

5.7 Test Instruments list

Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
3m SAC	ETS	9m*6m*6m	966	01-19-2021	01-18-2024
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-04-2020	03-03-2021
				03-03-2021	03-02-2022
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-04-2020	03-03-2021
				03-03-2021	03-02-2022
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-04-2020	03-03-2021
				03-03-2021	03-02-2022
Pre-amplifier	CD	TRLA-010180G50B	20120401	03-04-2020	03-03-2021
				03-03-2021	03-02-2022
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-04-2020	03-03-2021
				03-03-2021	03-02-2022
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-04-2020	03-03-2021
				03-03-2021	03-02-2022
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-04-2020	03-03-2021
				03-03-2021	03-02-2022
Cable	MICRO-COAX	MFR64639	K10742-5	03-04-2020	03-03-2021
				03-03-2021	03-02-2022
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-04-2020	03-03-2021
				03-03-2021	03-02-2022
Digital Radio communication Tester	Rohde & Schwarz	CMD60	8345791005	03-04-2020	03-03-2021
				03-03-2021	03-02-2022
Spectrum Analyzer	Keysight	N9010B	MY60240202	11-27-2020	11-26-2021
Vector Signal Generator	Keysight	N5182B	MY59101009	11-27-2020	11-26-2021
Analog Signal Generator	Keysight	N5173B	MY59100765	11-27-2020	11-26-2021

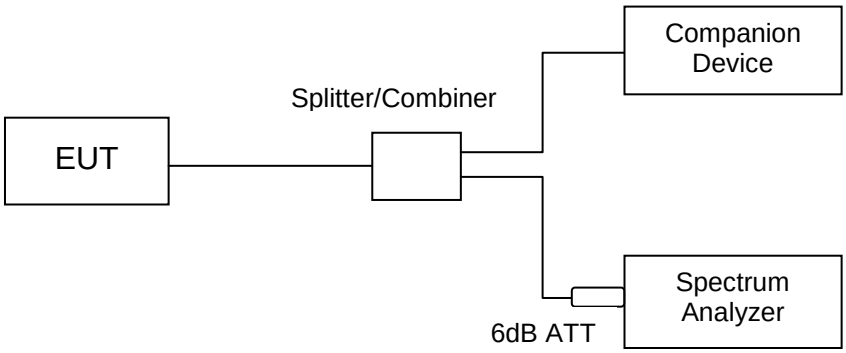
6 TEST CONFIGURATION AND CONDITIONS

6.1 EUT Configuration

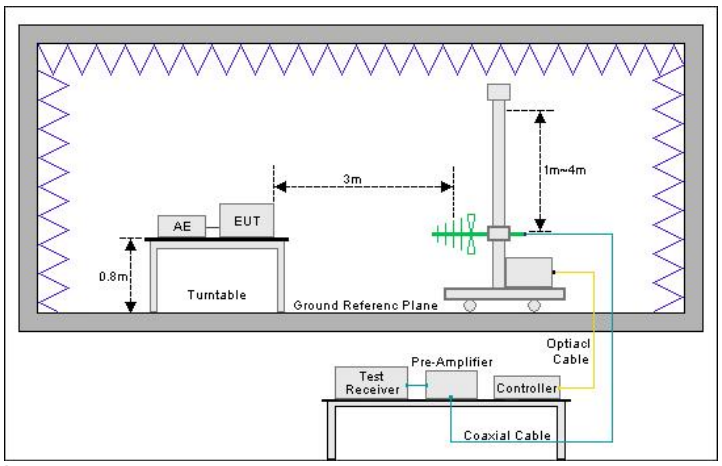
The EUT is DECT fixed part (FP), and is designed to operate together with a DECT portable part (PP). In order to meet the testing requirements, the EUT was set to the test mode (TBR6 mode).

6.2 Configuration of Tested System

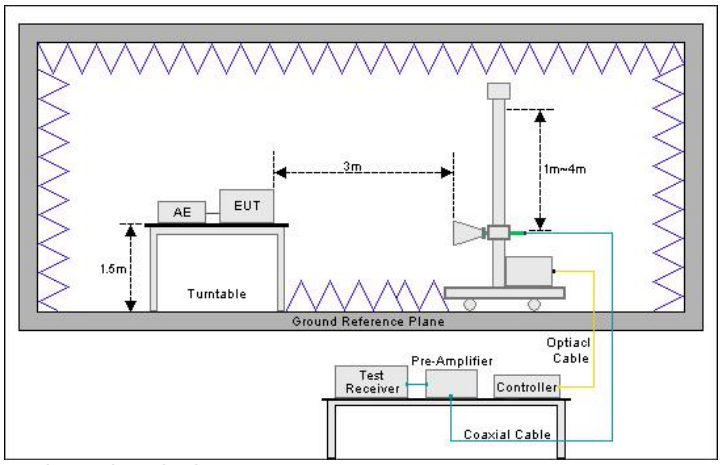
(A) RF Output Power, Power spectral density, Occupied Bandwidth, Conducted spurious emissions etc. conducted method items test setup



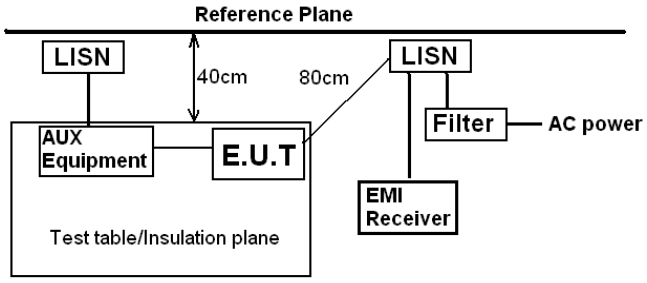
(B) Radiated emission test setup, Frequency below 1000MHz



(C) Radiated Emission test setup Frequency over 1 GHz

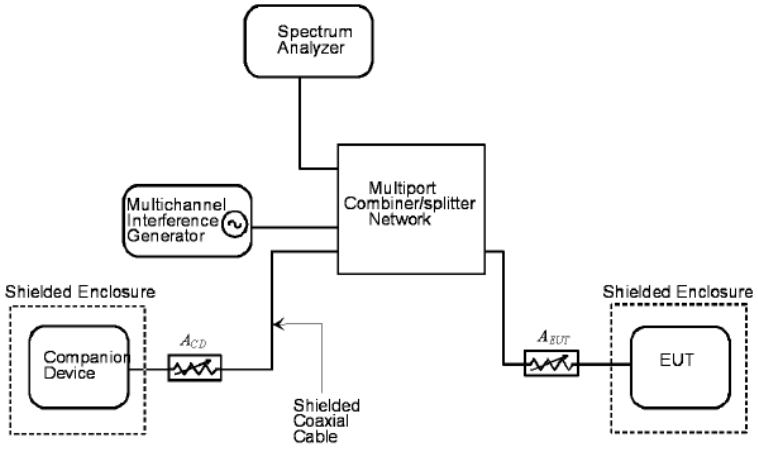


(D) AC Power line conducted emissions test setup



Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

(E) Monitor test setup



6.3 Test Environments

Condition	Minimum value	Maximum value
Barometric pressure	86 kPa	106 kPa
Temperature	15°C	30°C
Relative Humidity	25 %	75 %
Power supply range	±5% of rated voltages	
Normal Test Condition	1. Temperature: +15 °C to +30 °C; 2. Voltage is AC 120V	
Extreme Test Conditions	1. Temperatures: -20°C to +55°C. 2. Voltages: AC 102V to AC138V.	

6.4 Description of test modes

Test mode	Detail description of the test mode
TX mode	Keep the EUT in continuously transmitting mode

6.5 Test uncertainty

Test items	Uncertainty
AC power line conducted emission	±3.28 dB
Conducted method items	±0.96dB
Radiated method items	±4.88 dB

7 Test results and Measurement Data

7.1 Antenna Requirement

7.1.1 Standard Applicable

According to FCC part 15.317, 15.203

7.1.2 Requirement

According to FCC § 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 shall be considered sufficient to comply with the provisions of this Section. 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.

7.1.3 Description of Antenna Construction

The antenna of EUT is an integral antenna which permanently attached, and the best case gain of the antenna is 0 dBi. Details please refer to section 9.

7.1.4 Result

Meet the requirements.

7.2 AC Power Line Conducted Emission

7.2.1 Standard Applicable

According to FCC part 15.315, 15.207(a)

7.2.2 Test Procedure

1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment.

2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).

3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

7.2.3 Limits

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

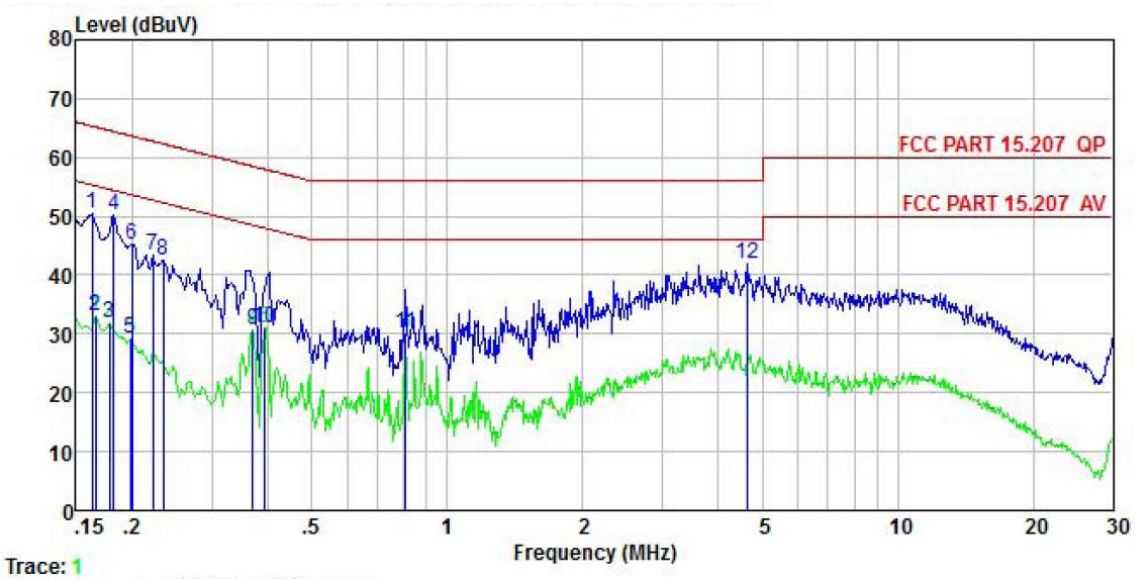
7.2.4 Results

Meet the requirements

7.2.5 Measurement Data

See plots as below

Product name:	1.9GHz DECT 6.0 Wireless Headphone System	Product model:	TV3500
Test by:	Mike	Test mode:	Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 120 V/60 Hz	Environment:	Temp: 22.5℃ Huni: 55%

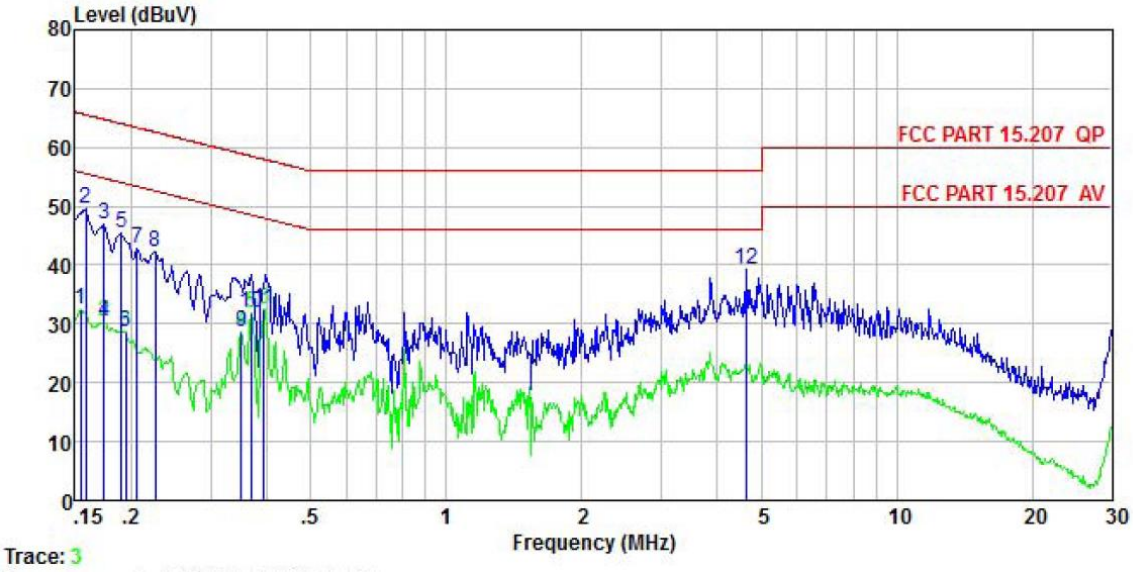


	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.162	40.23	10.20	-0.08	0.01	50.36	65.34	-14.98	QP
2	0.166	22.97	10.20	-0.09	0.01	33.09	55.16	-22.07	Average
3	0.178	21.66	10.20	-0.12	0.01	31.75	54.59	-22.84	Average
4	0.182	40.19	10.20	-0.12	0.01	50.28	64.42	-14.14	QP
5	0.198	19.26	10.20	-0.16	0.04	29.34	53.71	-24.37	Average
6	0.200	35.14	10.20	-0.16	0.04	45.22	63.62	-18.40	QP
7	0.222	33.39	10.20	-0.19	0.03	43.43	62.74	-19.31	QP
8	0.234	32.59	10.20	-0.20	0.02	42.61	62.30	-19.69	QP
9	0.369	20.17	10.20	0.23	0.03	30.63	48.52	-17.89	Average
10	0.393	20.34	10.20	0.38	0.04	30.96	47.99	-17.03	Average
11	0.809	20.00	10.20	-0.05	0.03	30.18	46.00	-15.82	Average
12	4.647	31.45	10.30	0.04	0.09	41.88	56.00	-14.12	QP

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Aux Factor + Cable Loss.*

Product name:	1.9GHz DECT 6.0 Wireless Headphone System	**Product model:**	TV3500
Test by:	Mike	**Test mode:**	Tx mode
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Neutral
Test voltage:	AC 120 V/60 Hz	**Environment:**	Temp: 22.5℃ Huni: 55%



	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.154	22.12	10.20	0.01	0.01	32.34	55.78	-23.44	Average
2	0.158	39.38	10.20	0.01	0.01	49.60	65.56	-15.96	QP
3	0.174	36.62	10.20	0.00	0.01	46.83	64.77	-17.94	QP
4	0.174	20.17	10.20	0.00	0.01	30.38	54.77	-24.39	Average
5	0.190	35.13	10.20	0.00	0.03	45.36	64.02	-18.66	QP
6	0.194	18.52	10.20	0.00	0.03	28.75	53.84	-25.09	Average
7	0.206	32.69	10.20	0.00	0.04	42.93	63.36	-20.43	QP
8	0.226	32.13	10.20	0.00	0.02	42.35	62.61	-20.26	QP
9	0.350	18.36	10.20	-0.03	0.02	28.55	48.96	-20.41	Average
10	0.369	21.63	10.20	-0.04	0.03	31.82	48.52	-16.70	Average
11	0.393	22.42	10.20	-0.06	0.04	32.60	47.99	-15.39	Average
12	4.647	28.28	10.30	0.62	0.09	39.29	56.00	-16.71	QP

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level = Receiver Read level + LISN Factor + Aux Factor + Cable Loss.*

7.3 Emission Bandwidth

7.3.1 Standard Applicable

According to FCC part 15.323(a)

7.3.2 Test Procedure

According to ANSI 63.17 clause 6.1.3

7.3.3 Limits

The 26 dB and 99% Bandwidth B shall be larger than 50 kHz and less than 2.5 MHz

7.3.4 Results

Meet the requirements

7.3.5 Measurement Data

Test CH	Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit	Result
Lowest	1.467	1.2072	50 kHz <EB<2.5 MHz	Pass
Middle	1.461	1.2052		
Highest	1.467	1.2124		

Test plot as follows:

Lowest channel

Middle channel

Highest channel

7.4 Peak transmit power

7.4.1 Standard Applicable

According to FCC part 15.319(c) (e)

7.4.2 Test Procedure

According to ANSI 63.17 clause 6.1.2

7.4.3 Limits

Conducted: 100 μW x SQRT (*B*) where *B* is the measured Emission Bandwidth in Hz
FCC 15.319(c)(e): 20.84dBm (121.34 mW)
The antenna gain is below 0 dBi, no reduction in transmit power is necessary

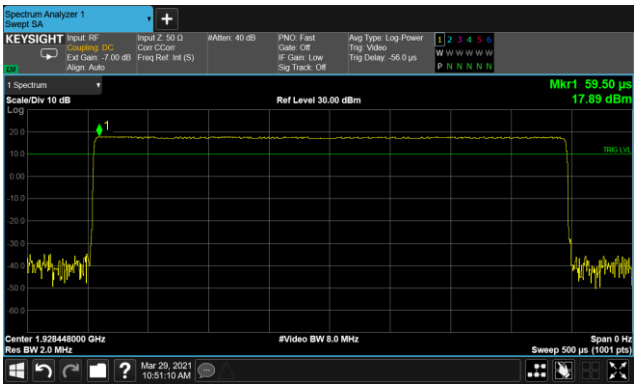
7.4.4 Results

Meet the requirements

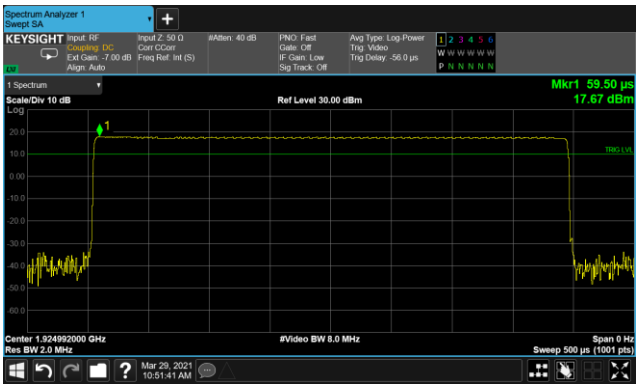
7.4.5 Measurement Data

Test CH	Peak transmit power (dBm)	Limit(dBm)	Result
Lowest	17.89	20.84	Pass
Middle	17.67		
Highest	17.84		

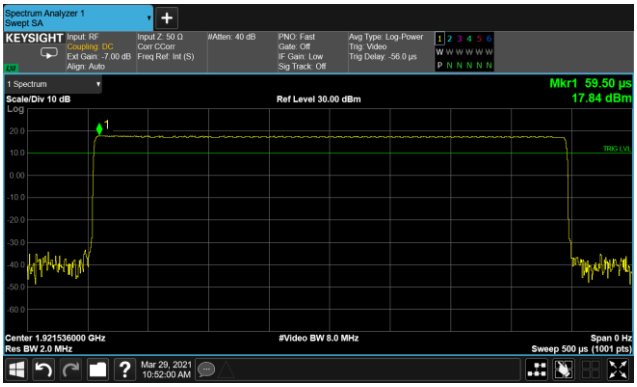
Test plot as follows:



Lowest channel



Middle channel



Highest channel

7.5 Power spectral density

7.5.1 Standard Applicable

According to FCC part 15.319(d)

7.5.2 Test Procedure

According to ANSI 63.17 clause 6.1.5

7.5.3 Limits

The Power Spectral Density shall be less than 3 mW (4.77 dBm) when averaged over at least 100 sweeps.

7.5.4 Results

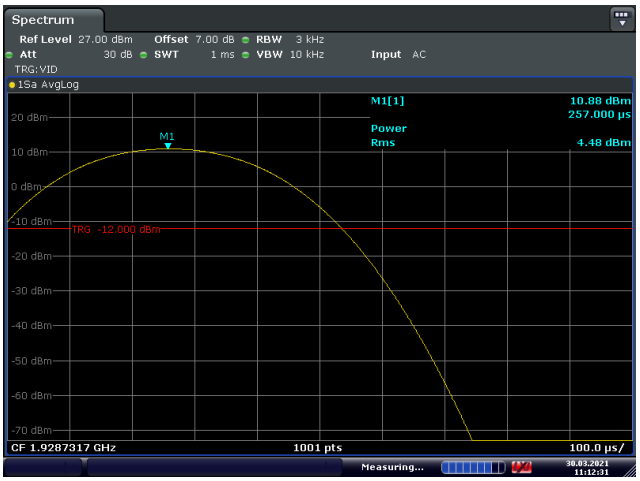
Meet the requirements

7.5.5 Measurement Data

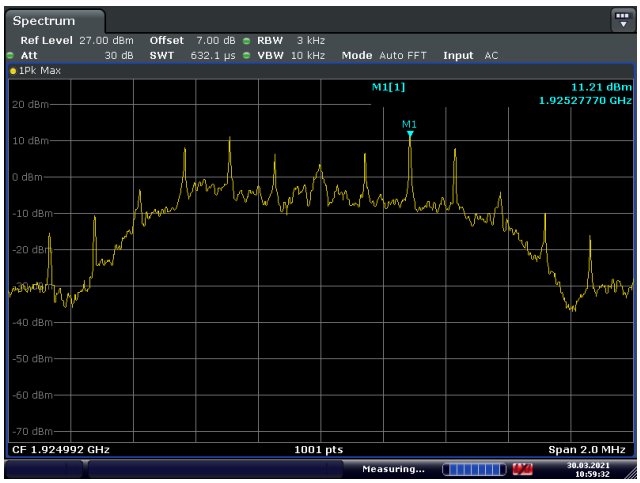
Test CH	Power spectral density (dBm)	Limit(dBm)	Result
Lowest	4.48	4.77	Pass
Middle	4.23		
Highest	4.50		

Test plot as follows:

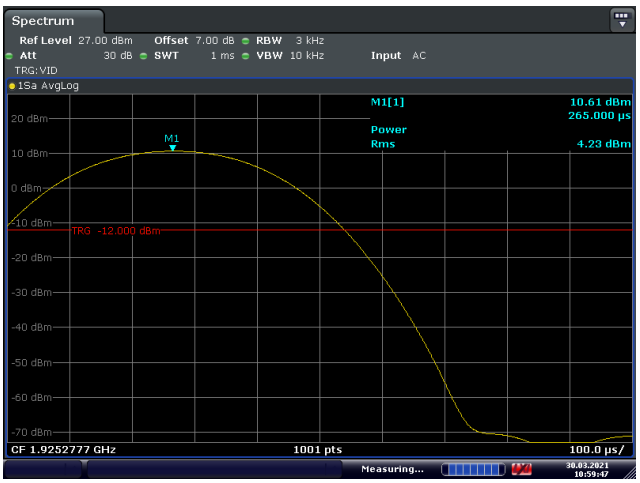
Lowest channel



Lowest channel

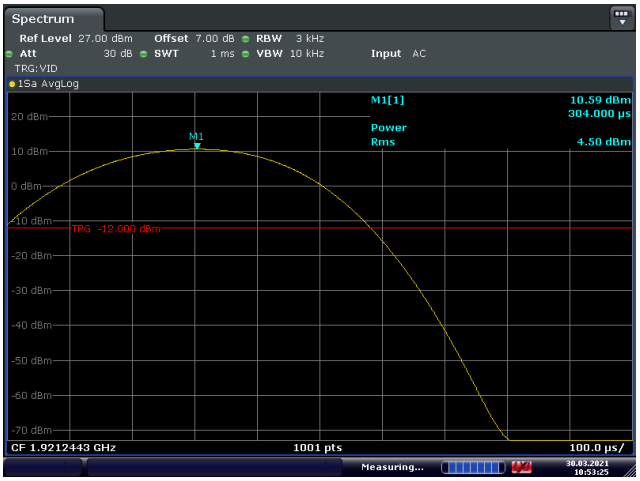


Middle channel



Middle channel

Highest channel



Highest channel

7.6 In-band and Out-of-band emissions

7.6.1 Standard Applicable

According to FCC part 15.323(d)

7.6.2 Test Procedure

According to ANSI 63.17 clause 6.1.6

7.6.3 Limits

In-Band Emissions:
B < *f* ≤ 2*B:* at least 30 dB below max. permitted peak power
2*B* < *f* ≤ 3*B:* at least 50 dB below max. permitted peak power
3*B* < *f* ≤ UPCS Band Edge: at least 60 dB below max. permitted peak power
Out-of-Band Emissions:
f ≤ 1.25MHz outside UPCS band: ≤ -9.5dBm
1.25MHz ≤ *f* ≤ 2.5MHz outside UPCS band: ≤ -29.5 dBm
f ≥ 2.5MHz outside UPCS band: ≤ -39.5 dBm

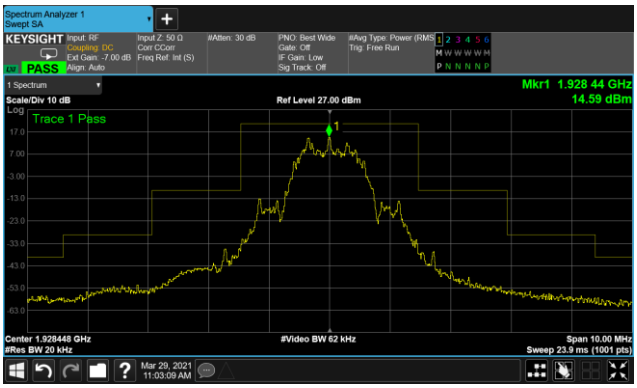
7.6.4 Test Result

Meet the requirements

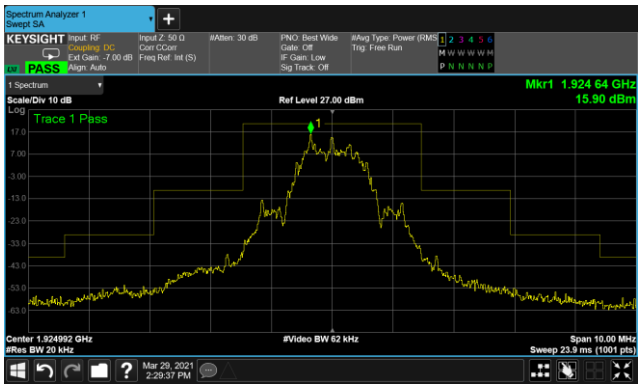
7.6.5 Measurement Data

See plots as below

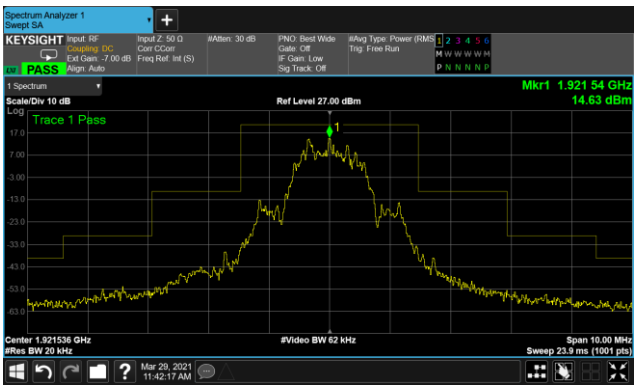
In-band emissions



Lowest channel



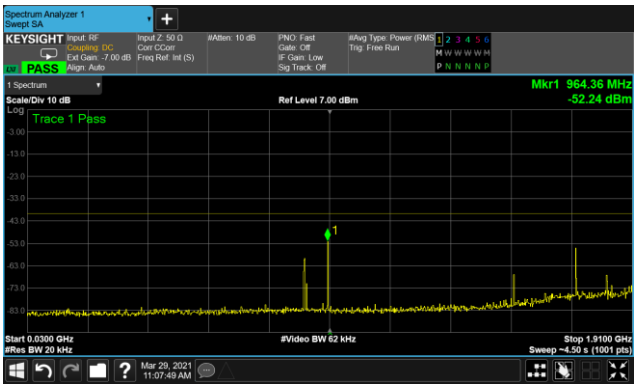
Middle channel



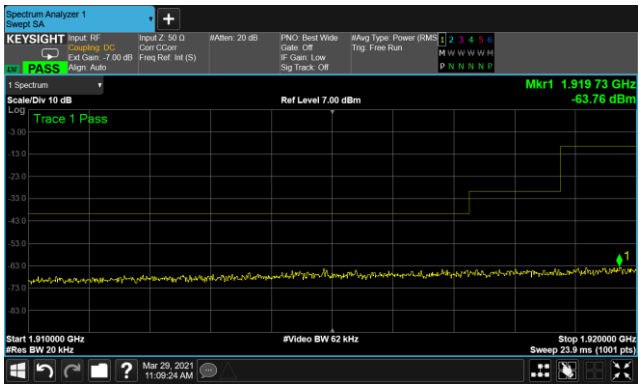
Highest channel

Out-of-band emissions

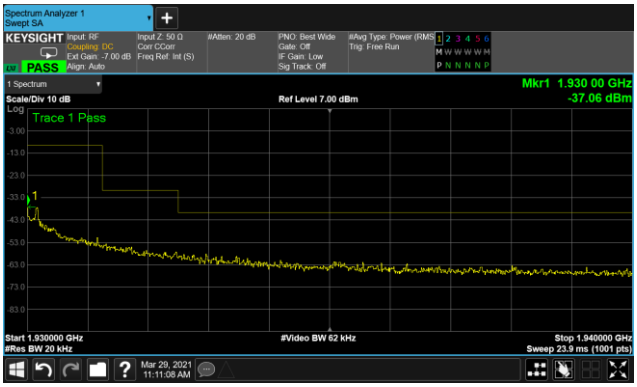
Lowest Channel



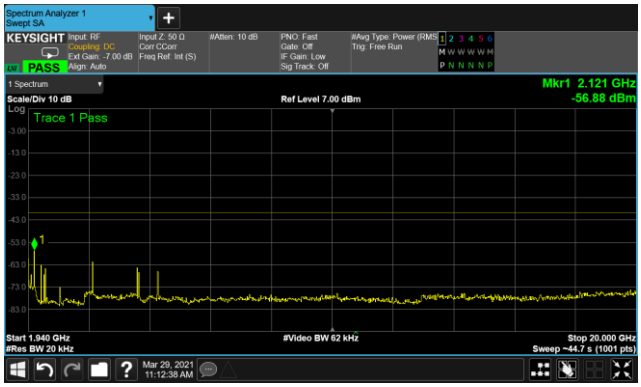
30MHz-1910MHz



1910MHz-1920MHz



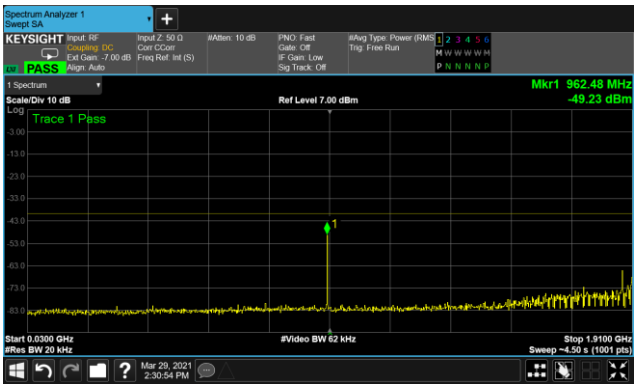
1930MHz-1940MHz



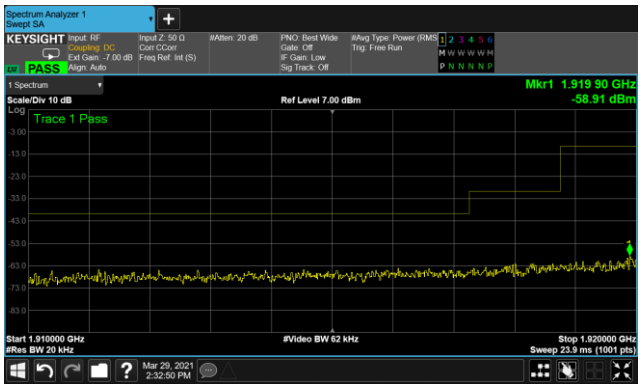
1940MHz-20GHz

Out-of-band emissions

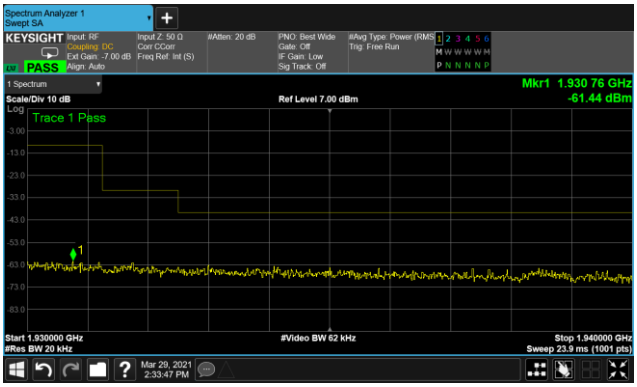
Middle Channel



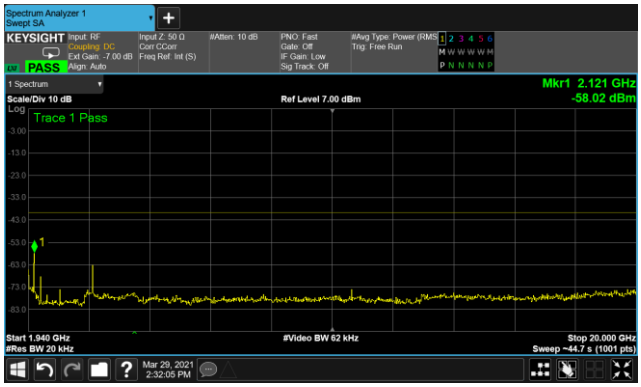
30MHz-1910MHz



1910MHz-1920MHz



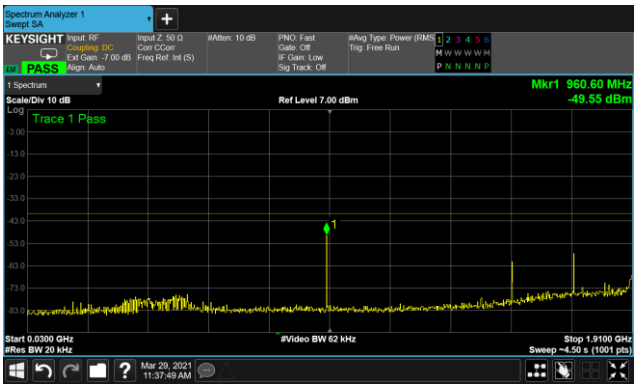
1930MHz-1940MHz



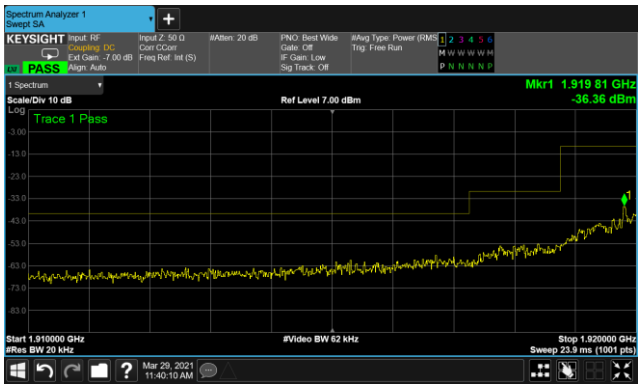
1940MHz-20GHz

Out-of-band emissions

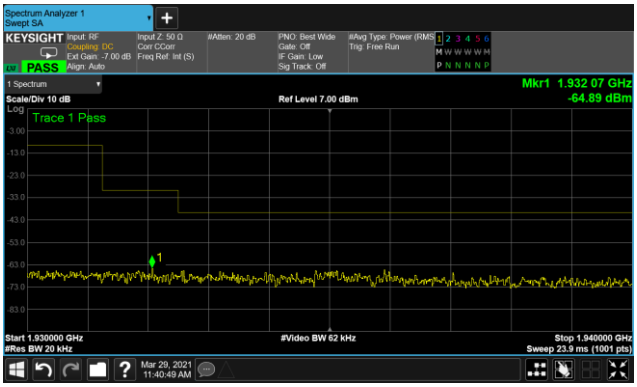
Highest Channel



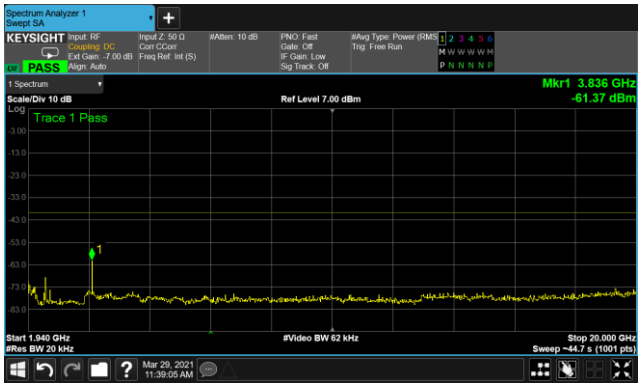
30MHz-1910MHz



1910MHz-1920MHz



1930MHz-1940MHz



1940MHz-20GHz

7.7 Carrier Frequency Stability

7.7.1 Standard Applicable

According to FCC part 15.323(f)

7.7.2 Test Procedure

According to ANSI 63.17 clause 6.2.1

7.7.3 Limits

±10 ppm

7.7.4 Test Result

Meet the requirements

7.7.5 Measurement Data

Frequency Stability over Power Supply Voltage at Nominal Temperature

Voltage	Channel Frequency	Difference	Deviation	Limits
V_{nom}	1924.992	-0.86 KHz	0.45	±10 ppm
85% of V_{nom}	1924.992	-1.00KHz	0.51	
115% of V_{nom}	1924.992	-0.92KHz	0.47	

Note:
Deviation ppm = ((Mean – Measured Frequency) / Mean) x 10^6

Frequency Stability over Temperature

Temp.	Channel Frequency	Difference	Deviation	Limits
+20°C	1924.992	2 kHz	1.0	±10 ppm
-20°C	1924.992	-3 kHz	-1.6	
+55°C	1924.992	5 kHz	2.6	

7.8 Frame repetition Stability, period and jitter

7.8.1 Standard Applicable

According to FCC part 15.323(e)

7.8.2 Test Procedure

According to ANSI 63.17 clause 6.2.2

7.8.3 Limits

±10 ppm for Frame Repetition Stability, 20 or 10 ms for frame period, 25 μs for max jitter.

7.8.4 Test Result

Meet the requirements

7.8.5 Measurement Data

Carrier Frequency (MHz)	Frame repetition (ppm)	Frame period (ms)	Max. jitter (μs)
1924.448	1.98	10	0.05

7.9 Automatically discontinue transmission

7.9.1 Standard Applicable

According to FCC part 15.319(f)

7.9.2 Requirements

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. The provisions in this section 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.

7.9.3 Results

Meet the requirements

7.9.4 Measurement Data

The EUT is a initiating device, and cannot transmits contrl and signaling information.

The following tests simulate the reaction of the EUT in case of either absence of information to transmit or operational failure after a connection with the conpanion device is established.

Number	Test	EUT Reaction	Verdict
1	Power removed from EUT	C	Pass
2	Switch off EUT	C	Pass
3	Hook-on by EUT	C	Pass
4	Power removed from companion device	A	Pass
5	Swithch off companion device	N/A	Pass
6	Hook-on by companion device	N/A	Pass

A - Connection breakdown, cease of all transmissions
B - Connection breakdown, EUT transmits control and signaling information
C - Connection breakdown, comanion device transmits control and signaling information
N/A - Not Applicable (Companion device does not have On/ Off swithc and cannot perform Hook-on)

7.10 Specific requirements for devices operating in the 1920-1930MHz sub-band

7.10.1 Monitoring time

Standard Applicable
According to FCC part 15.323(c)(1)

Requirement
Immediately prior to initiating transmission, devices must monitor the combined time and spectrum windows 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
According to ANSI 63.17 clause 7.3.3.

Result
Meet the requirements

Measurement Data
EUT monitors the combined time and spectrum window prior to initiation of transmission. The observation results as below

Channel Selection	Observation result	Verdict
Apply the interference on f_1 at level T_U +$U_{M,}$ and no interference on f_2. Initiate transmission and verify the transmission on f_2.	EUT transmission on f_2	Pass
Apply interference on f_2 at a level of *TU* + *UM*, 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.	EUT transmission on f_1	Pass

7.10.2 Monitoring Threshold, Lease Interfered Channel

Standard Applicable
According to FCC part 15.323(c)(2)(5).

Requirement
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.

If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed.

Test procedure
Measurement method according to ANSI C63.17 clause 7.3.1, 7.3.2, 7.3.3

Test result
Meet the requirements

Measurement Data
Lower threshold: TL = -174 + $10\log_{10}B$ + M_U + P_{MAX}-P_{EUT} (dBm)
Upper threshold: TU = -174 + $10\log_{10}B$ + Mu + P_{MAX}-P_{EUT} (dBm)
Where: B=Emission bandwidth (Hz)
M_U=dB the threshold may exceed thermal noise (30 for TL & 50 for TU)

Calculated values

Threshold	FCC part 15D
Lower threshold	N/A
Upper threshold	N/A

The Lower Threshold is applicable for systems which have defined less than 20 duplex system access channels.
The Upper Threshold is applicable for systems with more than 20 duplex system access channels and that implements the Least Interfered Channel Procedure (LIC).

Limit

Threshold	FCC part 15D
Lower threshold + 6 dB	N/A
Upper threshold + 6 dB	N/A

The Upper or Lower Threshold is found by the procedure defined in ANSI C63.17 clause 7.3.1 or 7.3.2.

Monitor Threshold	Measured level	FCC part 15D
Lower threshold	N/A	-75.8
Upper threshold	-61.3	N/A

For the EUT which support LIC there is no need to measure lower threshold because it is automatically met by LIC procedure

Least Interfered Channel (LIC) Procedure Test, FCC 15.323(c)(2) and (c)(5)

ANSI C63.17 clause 7.3.3 ref.	Observation	Verdict
b) f_1 T_L + 13 dB, f_2 at T_L + 6 dB	Transmission always on f_2	Pass
c) f_1 T_L + 6 dB, f_2 at T_L + 13 dB	Transmission always on f_1	Pass
d) f_1 T_L + 7 dB, f_2 at T_L	Transmission always on f_1	Pass
e) f_1 T_L, f_2 at T_L + 7 dB	Transmission always on f_1	Pass

7.10.3 Monitoring Threshold Bandwidth

Standard Applicable
According to FCC part 15.323(c)(7).

Requirement
The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission.

Test procedure
Measurement method according to ANSI C63.17 clause 7.4

Test result
Meet the requirements

Measurement Data

This test is only required if a dedicated monitoring receiver is used. However, if the test is not carried out the manufacturer shall declare and provide proper evidence that the monitoring is made through the radio receiver used for communication.

Test performed	Observation	Verdict
Simple Compliance test, at ±30% of *B*	No transmissions	Pass
More Detailed Test, at -6 dB points	N/A	N/A
More Detailed Test, at -12 dB points	N/A	N/A

Notes:
1. The more detailed test must be pass at both the -6 and -12 dB points if the Simple Compliance test fails.
2. The Simple Compliance Test was performed with the level at $T_U + U_M + 10$ dB to check that the EUT did not transmit at all.
3. The tested EUT uses the same receiver for monitoring and communication, this test is therefore not required. However the test has been performed nonetheless and the test is passed.

7.10.4 Reaction Time and Monitoring Interval

Standard Applicable
According to FCC part 15.323(c)(1)(5)(7)

Requirement
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 50xSQRT (1.25/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 35xSQRT (1.25/emission bandwidth in MHz) microseconds but shall not be required to be less than 35 microseconds.

Test procedure
Measurement method according to ANSI C63.17 clause 7.5

Test result
Meet the requirements

Measurement Data
By administrative commands and out-of-operating region interference, the EUT is restricted to operate on a single carrier frequency.
Time-synchronized pulsed interference was then applied on the carrier at pulsed levels $T_U + U_M$ to check that the EUT does not transmit at all. The level was raised 6 dB for part d) with 35 µs pulses.

The pulses are synchronized with the EUT timeslots and applied centered within all timeslots.

Pulse Width, ref. to ANSI C63.17 clause 7.5	Observation	Verdict
c) > largest of 50 µs and 50*SQRT(1.25/*B*)	No transmissions	Pass
d) > largest of 35 µs and 35*SQRT(1.25/*B*), and with interference level raised 6 dB	No transmissions	Pass

Notes:
Since *B* is larger than 1.25 MHz the test was performed with pulse lengths of 50 µs and 35 µs.

7.10.5 Time and Spectrum Window Access Procedure

Standard Applicable
According to FCC part 15.323(c)(4)(6)

Requirement
FCC 15.323(c)(4):
Once access to specific combined time and spectrum windows is obtained an acknowledgement from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgements 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 acknowledgement, at which time the access criteria must be repeated.

FCC 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
Measurement method according to ANSI C63.17 clause 8.1

Test result
Meet the requirements

Measurement Data
This requirement is only for EUTs which transmit unacknowledged control and signaling information.

Access Criteria, ref. to ANSI C63.17 clause 8.1.1	Observation	Verdict
a) Check that the EUT transmits on the interference free time-slot	N/A	N/A
b) The EUT must terminate or pause in its repetitive transmission of the control and signaling channel on the open channel to repeat the access criteria not less frequently than every 30 s	N/A	N/A

If FCC 15.323(c)(6) option, **If Random Waiting Interval is NOT implemented**

Access Criteria, ref. to ANSI C63.17 clause 8.1.2	Observation	Verdict
b) Check that the EUT changes to an interference-free slot when interference is introduced on the time slot in use	N/A	N/A

If FCC 15.323(c)(6) option, **Only if Random Waiting Interval is implemented**

Access Criteria, ref. to ANSI C63.17 clause 8.1.3	Observation	Verdict
b-d) Check that the EUT uses random waiting interval before continuing transmission on an interfered time slot	N/A	N/A

Notes:
The tested EUT does not transmit unacknowledged control and signaling information.

7.10.6 Acknowledgements and Transmission Duration

Standard Applicable
According to FCC part 15.323(c)(3)(4)

Requirement
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. Once access to specific combined time and spectrum windows is obtained an acknowledgement from a system participant must be received by the initiating transmitter within one second or transmission must cease.

Periodic acknowledgements 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 acknowledgement, at which time the access criteria must be repeated.

Test procedure
Measurement method according to ANSI C63.17 clause 8.2

Test result
Meet the requirements

Measurement Data
During the test **Initial transmission without acknowledgements** the signal from the EUT to the companion device is blocked by circulators in addition to the tunable attenuator.

The test **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.

The **Transmission Duration** test is performed by monitoring the slot in use and measuring the time until the EUT changes to a different slot.

Acknowledgements

Test ref. to ANSI C63.17 clause 8.2.1	Observation	Verdict
a) Initial transmission without acknowledgements	0.68s	Pass
c) Transmission time after loss of acknowledgements	10s	Pass

Transmission Duration

Test ref. to ANSI C63.17 clause 8.2.2	Observation	Verdict
b) Transmission duration on same time and frequency window	1.5 hour	Pass

7.10.7 Dual Access Criteria Check

Standard Applicable
According to FCC part 15.323(c)(10)

Requirement
An initiating device may attempt to establish a duplex connection by monitoring both its intended transmits 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
Measurement method according to ANSI C63.17 clause 8.3

Test result
Not tested. The manufacturer declares that this provision is not utilized by the EUT.

7.10.8 Alternative Monitoring Interval

Standard Applicable
According to FCC part 15.323(c)(11)

Requirement
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
Measurement method according to ANSI C63.17 clause 8.4

Test result
Not tested. The manufacturer declares that this provision is not utilized by the EUT.

7.10.9 Fair Access

Standard Applicable
According to FCC part 15.323(c)(12)

Requirement
The provisions of (c)(10) or (c)(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 Part15.323 (c) (10) or (c) (11) to extend the range of spectrum occupied over space or time for the purpose of denying fail access to spectrum to other device.