

TEST REPORT



Dt&C Co., Ltd.

42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042

Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2605-0052(1)

2. Customer

• Name (FCC) : AUMOVIO Korea Ltd. / Name (ISED): AUMOVIO Korea Ltd.

• Address (FCC): 26 Hwangsaoul-ro 312beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea, 13591

Address (ISED) : 26 Hwangsaoul-ro 312beon-gil, Bundang-gu, Seongnam-si Gyeonggi-do 13591 Korea (Republic Of)

3. Use of Report : FCC & ISED Original Certification

4. Product Name / Model Name : UNIT.ASSY-UWB&BLE / SLAVE

FCC ID : SY5SLAVE

IC : 8325A-SLAVE

5. FCC Regulation(s): Part 15 Subpart F

ISED Standard(s): RSS-220 Issue 1, RSS-Gen Issue 5

Test Method used: ANSI C63.10-2020

6. Date of Test : 2026.02.09 ~ 2026.04.15

7. Location of Test : ☒ Permanent Testing Lab

☐ On Site Testing

8. Testing Environment : See appended test report.

9. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

This test report is not related to KOLAS accreditation.

Affirmation	Tested by	Technical Manager
	Name : TaeHoon Kwon 	Name : JaeJin Lee 

2026 . 05 . 20 .

Dt&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2605-0052	May, 06. 2026	Initial issue	TaeHoon Kwon	JaeJin Lee
DRTFCC2605-0052(1)	May, 20. 2026	Update the address of customer	TaeHoon Kwon	JaeJin Lee

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1. General Information

1.1. Description of EUT

Equipment Class	Ultra Wideband Transmitter(UWB)
Product Name	UNIT.ASSY-UWB&BLE
Model Name	SLAVE
Add Model Name	NA
Firmware Version Identification Number	1.0
EUT Serial Number	No Specified
Power Supply	DC 12 V
Frequency Range	6.489 6 GHz ~ 7.987 2 GHz
Max. RF Output Power	-3.96 dBm (Peak) / 50 MHz
Modulation Technique	BPM-BPSK
Antenna Specification	Antenna 0 Type: PCB Pattern Antenna, Gain: 5.49 dBi Antenna 1 Type: PCB Pattern Antenna, Gain: 4.41 dBi

1.2. Declaration by the applicant / manufacturer

N/A

1.3. Testing Laboratory

Dt&C Co., Ltd.		
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042.		
The test site complies with the requirements of Part 2.948.		
- FCC Designation No.: KR0034		
- FCC Test Firm Registration No.: 704742		
- ISED CAB identifier: KR0034		
- ISED#: 5740A		
www.dtnet.net		
Telephone	:	+ 82-31-321-2664
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1.4. Testing Environment

Ambient Condition	
▪ Temperature	+20 °C ~ +22 °C
▪ Relative Humidity	+35 % ~ +42 %

1.5. Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.10-2020. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
Antenna-port conducted emission	1.0 dB (The confidence level is about 95 %, $k = 2$)
Radiated emission (1 GHz Below)	4.9 dB (The confidence level is about 95 %, $k = 2$)
Radiated emission (1 GHz ~ 18 GHz)	4.8 dB (The confidence level is about 95 %, $k = 2$)
Radiated emission (18 GHz Above)	5.7 dB (The confidence level is about 95 %, $k = 2$)

1.6. Test Equipment List

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	25/11/18	26/11/18	MY50410399
Spectrum Analyzer	Agilent Technologies	N9020A	25/05/26	26/05/26	US47360812
Spectrum Analyzer	Agilent Technologies	N9020A	25/11/18	26/11/18	MY50410399
Spectrum Analyzer	Rohde Schwarz	FSW85	25/05/29	26/05/29	101778
Multimeter	FLUKE	17B	25/11/21	26/11/21	26030065WS
DC Power Supply	H.P	66332A	25/05/28	26/05/28	MY43001228
Signal Generator	Rohde Schwarz	SMBV100A	25/11/20	26/11/20	255571
Signal Generator	ANRITSU	MG3695C	25/11/18	26/11/18	173501
Thermohygrometer	BODYCOM	BJ5478	25/11/24	26/11/24	090205-4
Thermohygrometer	BODYCOM	BJ5478	25/11/24	26/11/24	120612-2
Thermohygrometer	BODYCOM	BJ5478	25/05/29	26/05/29	N/A
Loop Antenna	ETS-Lindgren	6502	25/11/06	27/11/06	00060496
Hybrid Antenna	Schwarzbeck	VULB9163	25/05/27	27/05/27	9163-572
Horn Antenna	ETS-Lindgren	3117	25/05/27	26/05/27	00143278
Horn Antenna	A.H.Systems Inc.	SAS-574	25/06/11	26/06/11	155
PreAmplifier	Agilent Technologies	8449B	25/11/17	26/11/17	3008A00161
PreAmplifier	tsj	MLA-1840-J02-45	25/05/29	26/05/29	16966-10728
PreAmplifier	H.P	8447D	25/11/17	26/11/17	2944A07774
High Pass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	25/05/26	26/05/26	8
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300-18000-60SS	25/05/26	26/05/26	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	25/05/26	26/05/26	3
Attenuator	Hefei Shunze	SS5T2.92-10-40	25/05/26	26/05/26	16012202
Attenuator	Aeroflex/Weinschel	56-3	25/05/26	26/05/26	Y2370
Attenuator	SMAJK	SMAJK-2-3	25/05/26	26/05/26	3
Attenuator	SMAJK	SMAJK-2-3	25/05/26	26/05/26	2
Cable	Dt&C	Cable	26/01/02	27/01/02	G-2
Cable	HUBER+SUHNER	SUCOFLEX 100	26/01/02	27/01/02	G-3
Cable	Dt&C	Cable	26/01/02	27/01/02	G-4
Cable	OMT	YSS21S	26/01/02	27/01/02	G-5
Cable	Junkosha	MWX241	26/01/02	27/01/02	mmW-1
Cable	Junkosha	MWX241	26/01/02	27/01/02	mmW-4
Cable	HUBER+SUHNER	SUCOFLEX100	26/01/02	27/01/02	M-01
Cable	HUBER+SUHNER	SUCOFLEX100	26/01/02	27/01/02	M-02
Cable	JUNKOSHA	MWX241/B	26/01/02	27/01/02	M-03
Cable	JUNKOSHA	J12J101757-00	26/01/02	27/01/02	M-07
Cable	HUBER+SUHNER	SUCOFLEX106	26/01/02	27/01/02	M-09
Cable	Dt&C	Cable	26/01/02	27/01/02	RFC-030
Test Software (Radiated)	tsj	EMI Measurement	NA	NA	Version 2.00.0185
3m Semi Anechoic Chamber	SYC	3m-SAC	25/06/13(NSA) 25/06/19(VSWR)	26/06/13(NSA) 26/06/19(VSWR)	3m-SAC-1
3m Semi Anechoic Chamber	SYC	3m-SAC	26/01/09(NSA) 26/01/14(VSWR)	27/01/09(NSA) 27/01/14(VSWR)	3m-SAC-2

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.

Note2: The cable is not a regular calibration item, so it has been calibrated by Dt&C itself.

2. Test Methodology

The measurement procedures described in the ANSI C63.10-2020 was used in measurement of the EUT.

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the test mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the FCC rules.

2.3. General Test Procedures

Conducted Emissions

According to requirements in Section 6.2 of ANSI C63.10-2020, the EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector.

Radiated Emissions

The EUT is placed on a non-conductive table. For emission measurements at or below 960 MHz, the table height is 80 cm. For emission measurements above 960 MHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

2.4. Instrument Calibration

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.5. Description of Test Modes

The EUT has been tested with the operating condition for maximizing the emission characteristics.

EUT Operation test setup

- Test software: pyseq
- Power setting: default

Tested Frequency (MHz)	
Channel 5: 6 489.6	Channel 9: 7 987.2

*This device supports two channels(CH 5, CH 9) and supports SP0 and SP3 mode.

3. Antenna Requirements

Part 15.203

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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.”

RSS-220[5.1](b)

The antenna of the UWB device shall be factory-installed and shall not be made modifiable by users.

**The antenna of this module is permanently printed on the PCB and is not user-modifiable.
Therefore, this EUT complies with the requirements.**

4. Summary of Test Result

FCC part section(s)	RSS section(s)	Test Description	Limit	Test Condition	Status Note 1
15.503 15.519(b)	RSS-220[2], RSS-220[5.1]	- 10 dB Bandwidth	- 10 dB bandwidth $\geq$ 500 MHz or fractional bandwidth $\geq$ 0.2 Within the 3.1 – 10.6 GHz	Radiated	C
15.519(e) 15.521(e) 15.521(g)	RSS-220[5.3.1]	EIRP(Equivalent Isotropically Radiated Power)	Peak eirp < 20 log (RBW/50) dBm		C ^{Note3}
15.519(c) 15.521(c) 15.521(d) 15.521(h) 15.209	RSS-220[5.3.1] RSS-220[3.4]	Radiated Emissions (at or below 960 MHz)	Part 15.209 RSS-220[3.4] (Refer to section 5.3)		C ^{Note3}
15.519(c), (d) 15.521(c) 15.521(d) 15.521(h)	RSS-220[5.3.1]	Radiated Emissions (above 960 MHz)	Part 15.519(c), (d) RSS-220[5.3.1] (Refer to section 5.3)		C ^{Note3}
-	RSS-Gen[6.7]	Occupied Bandwidth (99%)	NA	Conducted	C
15.519(a)(1)	RSS-220[5.3.1]	Cease Transmission Time	Part 15.519(a)(1) RSS-220[5.3.1](b) (Refer to section 5.5)		C
15.521(j) 15.207	RSS-Gen[8.8]	AC Power-Line Conducted Emissions	Part 15.207 RSS-Gen[8.8] (Refer to Section 5.4)	AC Line Conducted	NA ^{Note4}
15.203	RSS-220[5.1]	Antenna Requirements	Part 15.203 RSS-220[5.1] (Refer to Section 3)	-	C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: The device uses two antennas and supports TX diversity. Both antenna configurations under SP0 and SP3 modes were investigated, and the worst-case data are reported.

Note 3: This test item was performed in three orthogonal EUT positions and the worst-case data are reported.

Note 4: This device is installed in a car. Therefore the power source is a battery of car.

5. Test Result

5.1. - 10dB Bandwidth

■ Test Requirements and limit

Part 15.503(d)

Ultra-wideband (UWB) transmitter. An intentional radiator that, at any point in time, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

Part 15.519(b)

The UWB bandwidth of a device operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz.

RSS-220[2]

A UWB device is an intentional radiator that has either a -10 dB bandwidth of at least 500 MHz or a -10 dB fractional bandwidth greater than 0.2. There are eight distinct subclasses of UWB device.

RSS-220[5.1](a)

The -10 dB bandwidth of the device shall be totally contained in the band 3.1-10.6 GHz.

■ Test Configuration

Refer to the APPENDIX I.

■ Test Procedure

ANSI C63.10-2020 Section 10.1

The frequency at which the maximum power level is measured with the peak detector is designated f_M . The peak power measurements shall be made using a spectrum analyzer or EMI receiver with a 1 MHz resolution bandwidth and a video bandwidth of 1 MHz or greater. The instrument shall be set to peak detection using the maximum-hold trace mode. The outermost 1 MHz segments above and below f_M , where the peak power falls by 10 dB relative to the level at f_M , are designated as f_H and f_L , respectively:

- For the lowest frequency bound f_L , the emission is searched from a frequency lower than f_M that has, by inspection, a peak power much lower than 10 dB less than the power at f_M and increased toward f_M until the peak power indicates 10 dB less than the power at f_M . The frequency of that segment is recorded.
- This process is repeated for the highest frequency bound f_H , beginning at a frequency higher than f_M that has, by inspection, a peak power much lower than 10 dB below the power at f_M . The frequency of that segment is recorded.
- The two recorded frequencies represent the highest (f_H) and lowest (f_L) bounds of the UWB transmission, and the -10 dB bandwidth (B_{-10}) is defined as $(f_H - f_L)$. The center frequency (f_C) is calculated from $(f_H + f_L) / 2$.
- The fractional bandwidth is defined as $2(f_H - f_L) / (f_H + f_L)$.
- Determine whether the -10 dB bandwidth ($f_H - f_L$) is ≥ 500 MHz, or whether the fractional bandwidth $2(f_H - f_L) / (f_H + f_L)$ is ≥ 0.2 .

■ Test Results: **Comply**

- Antenna 0

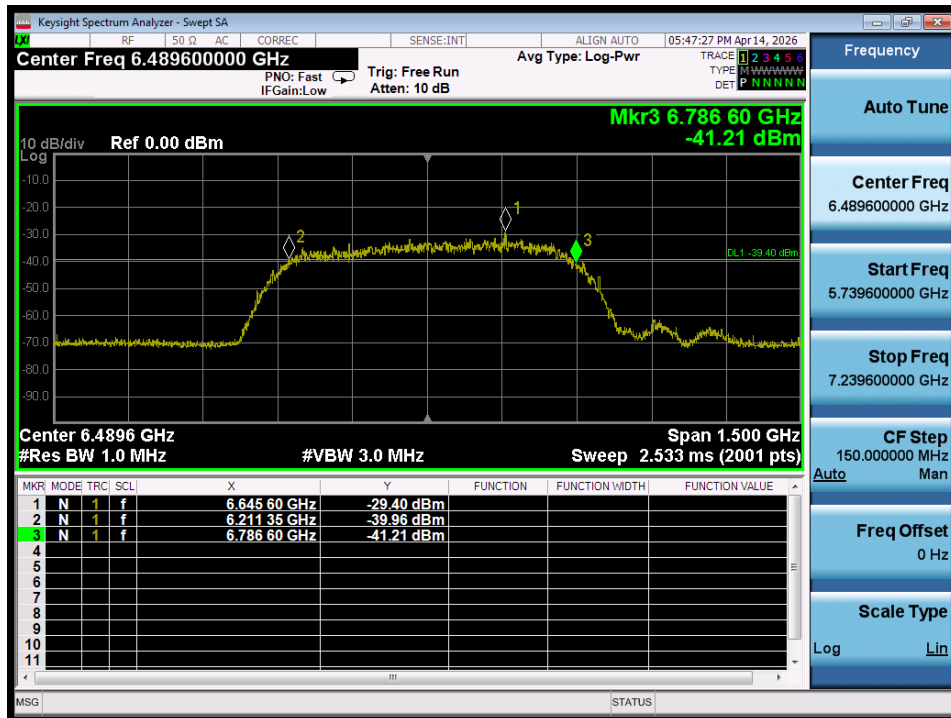
Tested Frequency (MHz)	Configuration	f_M (MHz)	f_L (MHz)	f_H (MHz)	-10dB Bandwidth(MHz)
6 489.6	SP0	6 645.60	6 211.35	6 786.60	575.25
	SP3	6 584.10	6 197.85	6 784.35	586.50
7 987.2	SP0	7 831.95	7 708.95	8 284.20	575.25
	SP3	7 957.20	7 681.95	8 272.20	590.25

- Antenna 1

Tested Frequency (MHz)	Configuration	f_M (MHz)	f_L (MHz)	f_H (MHz)	-10dB Bandwidth(MHz)
6 489.6	SP0	6 645.60	6 218.85	6 773.85	555.00
	SP3	6 521.85	6 197.85	6 782.85	585.00
7 987.2	SP0	7 912.95	7 691.70	8 266.95	575.25
	SP3	8 019.45	7 685.70	8 262.45	576.75

-10dB Bandwidth

Ant 0 & SP0 & 6 489.6 MHz



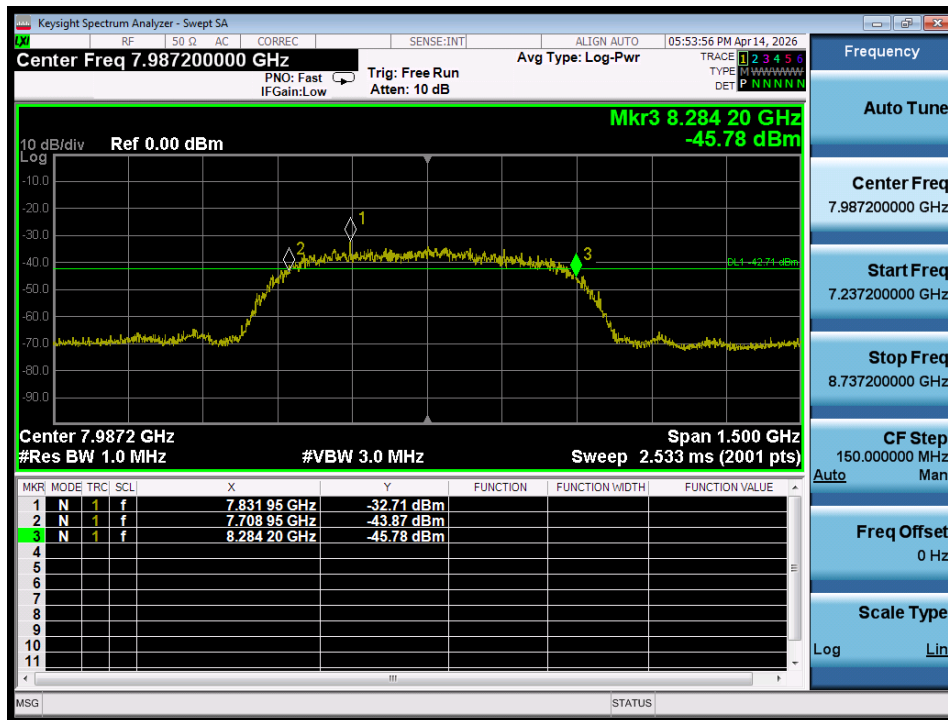
-10dB Bandwidth

Ant 0 & SP3 & 6 489.6 MHz



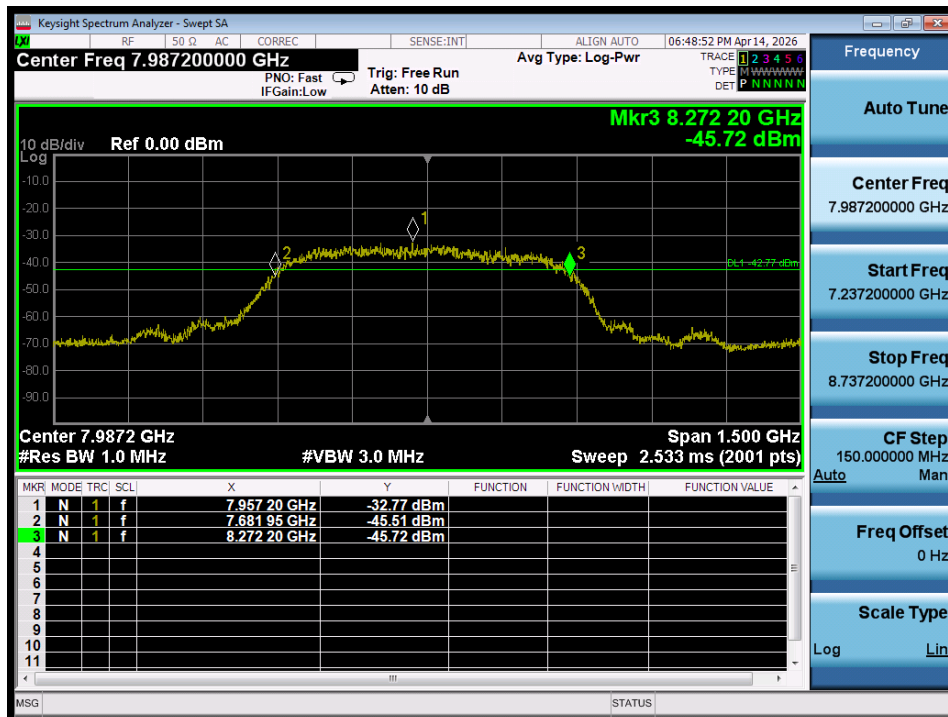
-10dB Bandwidth

Ant 0 & SP0 & 7 987.2 MHz



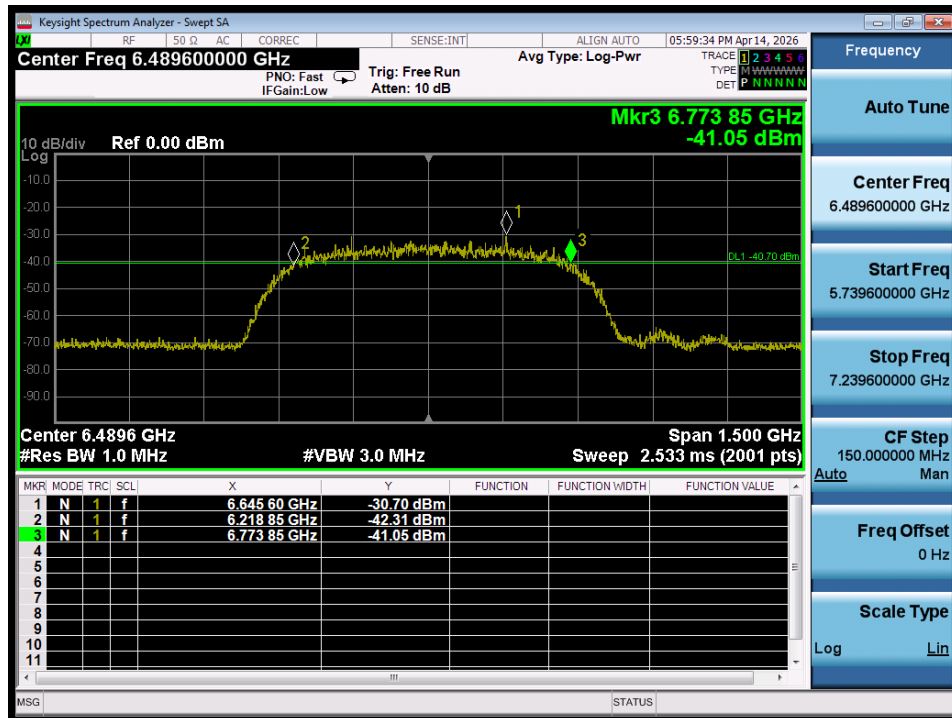
-10dB Bandwidth

Ant 0 & SP3 & 7 987.2 MHz



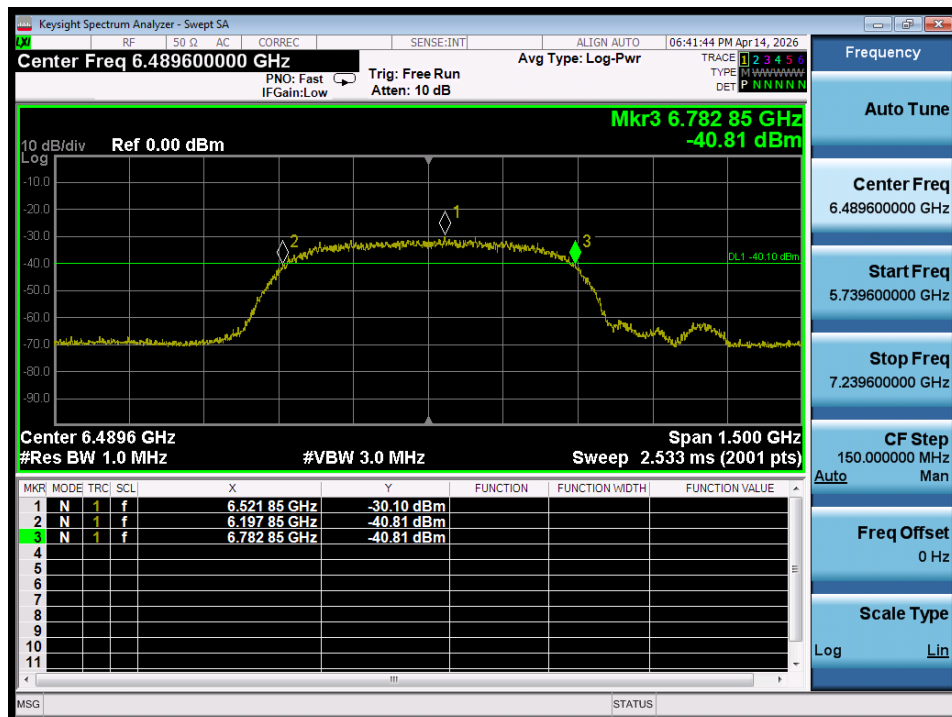
-10dB Bandwidth

Ant 1 & SP0 & 6 489.6 MHz



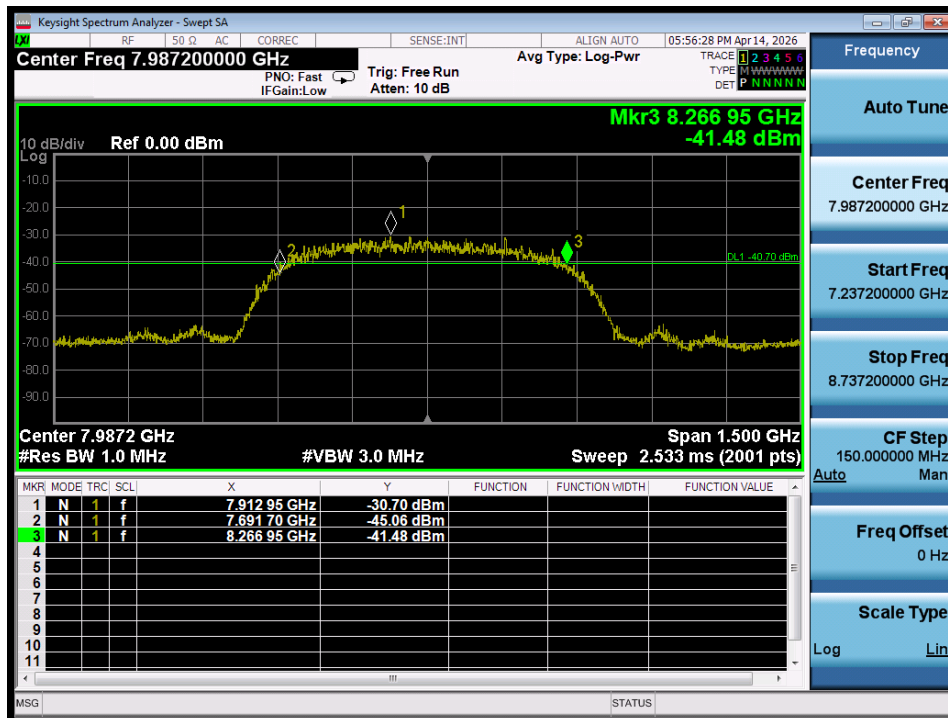
-10dB Bandwidth

Ant 1 & SP3 & 6 489.6 MHz



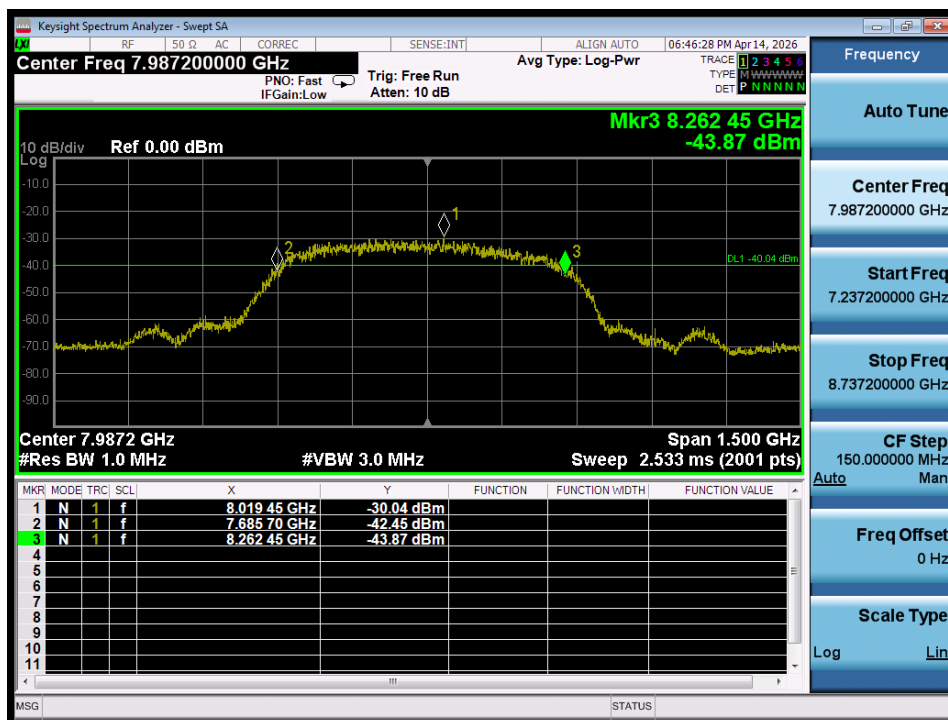
-10dB Bandwidth

Ant 1 & SP0 & 7 987.2 MHz



-10dB Bandwidth

Ant 1 & SP3 & 7 987.2 MHz



5.2. EIRP (Equivalent Isotropically Radiated Power)

■ Test Requirements and limit

Part 15.519(e)

There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f_m . That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in §15.521.

Part 15.521(e)

The frequency at which the highest radiated emission occurs, f_m , must be contained within the UWB bandwidth.

Part 15.521(g)

When a peak measurement is required, it is acceptable to use a resolution bandwidth other than the 50 MHz specified in this subpart. This resolution bandwidth shall not be lower than 1 MHz or greater than 50 MHz, and the measurement shall be centered on the frequency at which the highest radiated emission occurs, f_m . If a resolution bandwidth other than 50 MHz is employed, the peak EIRP limit shall be $20 \log (RBW/50)$ dBm where RBW is the resolution bandwidth in megahertz that is employed. This may be converted to a peak field strength level at 3 meters using $E(\text{dBuV/m}) = P(\text{dBm EIRP}) + 95.2$. If RBW is greater than 3 MHz, the application for certification filed with the Commission must contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing.

RSS-220[5.3.1]

The peak level of the transmissions shall not exceed the peak equivalent of the average limit contained within any 50 MHz bandwidth, as defined in section 4 of the Annex.

■ Test Configuration

Refer to the APPENDIX I.

■ Test Procedure:

ANSI C63.10-2020 Section 10.3 & 6.6

- 1) These measurements were performed at 3 m test site.
- 2) The equipment under test is placed on a non-conductive table 1.5-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.
- 3) For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections.
- 4) The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 5) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

Instrument setting

For peak eirp measurement

1. Set the RBW $\geq 1 \sim 50$ MHz (Actual: 50 MHz)
2. Set VBW $\geq$ RBW
3. Detector = peak
4. Trace mode = max hold
5. Allow trace to fully stabilize

Test Results: Comply

- Test Notes

1. Sample Calculation

$EIRP\ (dBm) = E\ (dB\mu V/m) + 20\log(D) - 104.7$; where D is the measurement distance in m.

$E(dBuV/m) = \text{Measured level (dBuV)} + TF(dB/m)$

where, E = field strength, TF = Total Factor, $TF = \text{Antenna Factor}(dB/m) + \text{Cable Loss}(dB) - \text{Amplifier Gain}(dB)$

3. Peak eirp limit = $20 \times \log(RBW/50)$

4. The highest radiated emission is within the UWB bandwidth.

Peak eirp: Antenna 0

Tested frequency (MHz)	Configuration	Frequency (MHz)	ANT Pol	Measured Level(dBuV)	TF (dB/m)	E (dBuV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
6 489.6	SP0	6 487.20	H	77.86	12.69	90.55	-4.61	0.00	4.61
	SP3	6 685.62	H	71.55	12.61	84.16	-11.00	0.00	11.00
7 987.2	SP0	7 986.65	H	75.14	13.86	89.00	-6.16	0.00	6.16
	SP3	7 925.83	H	68.75	13.70	82.45	-12.71	0.00	12.71

Peak eirp: Antenna 1

Tested frequency (MHz)	Configuration	Frequency (MHz)	ANT Pol	Measured Level(dBuV)	TF (dB/m)	E (dBuV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
6 489.6	SP0	6 487.03	H	76.59	12.69	89.28	-5.88	0.00	5.88
	SP3	6 368.05	H	70.57	12.34	82.91	-12.25	0.00	12.25
7 987.2	SP0	7 991.93	H	77.33	13.87	91.20	-3.96	0.00	3.96
	SP3	7 923.95	H	71.68	13.69	85.37	-9.79	0.00	9.79

Average eirp: Antenna 0

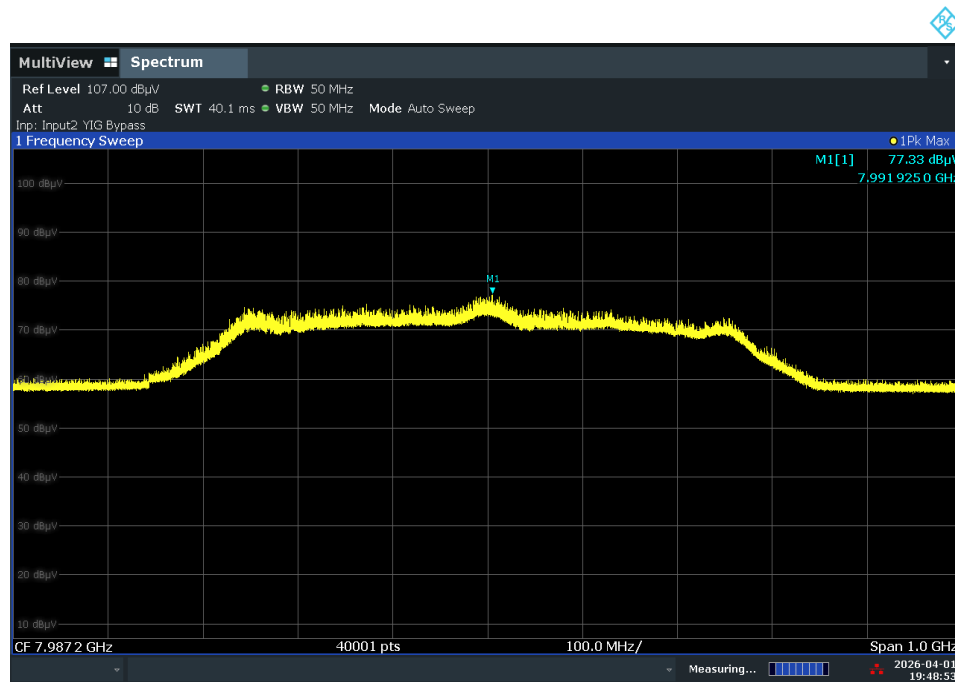
Tested frequency (MHz)	Configuration	Frequency (MHz)	ANT Pol	Measured Level(dBuV)	TF (dB/m)	E (dBuV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
6 489.6	SP0	6 617.60	H	38.67	12.74	51.41	-43.75	-41.30	2.45
	SP3	6 648.10	H	38.91	12.72	51.63	-43.53	-41.30	2.23
7 987.2	SP0	8 069.20	H	34.91	14.40	49.31	-45.85	-41.30	4.55
	SP3	7 902.70	H	37.74	13.60	51.34	-43.82	-41.30	2.52

Average eirp: Antenna 1

Tested frequency (MHz)	Configuration	Frequency (MHz)	ANT Pol	Measured Level(dBuV)	TF (dB/m)	E (dBuV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
6 489.6	SP0	6 402.10	H	36.60	12.43	49.03	-46.13	-41.30	4.83
	SP3	6 549.60	H	37.03	12.74	49.77	-45.39	-41.30	4.09
7 987.2	SP0	7 804.20	H	36.58	13.51	50.09	-45.07	-41.30	3.77
	SP3	7 807.70	H	36.69	13.51	50.20	-44.96	-41.30	3.66

Worst case-Plot(Measured Level)

Peak: Ant1 & SP0 & 7 987.2 MHz & X axis & Hor



07:48:53 PM 04/01/2026

Worst case-Plot(Measured Level)

Average: Ant0 & SP3 & 6 489.6 MHz & X axis & Hor



5.3. Radiated Emissions

5.3.1. Radiated Emissions(Below 960 MHz)

■ Test Requirements and limit

Part 15.519(c)

The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209.

Part 15.521(c)

Emissions from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in § 15.209, rather than the limits specified in this subpart, provided it can be clearly demonstrated that those emissions from the UWB device are due solely to emissions from digital circuitry contained within the transmitter and that the emissions are not intended to be radiated from the transmitter's antenna. Emissions from associated digital devices, as defined in § 15.3(k), e.g., emissions from digital circuitry used to control additional functions or capabilities other than the UWB transmission, are subject to the limits contained in Subpart B of this part.

Part 15.521(d)

Within the tables in §§ 15.509, 15.511, 15.513, 15.515, 15.517, and 15.519, the tighter emission limit applies at the band edges. Radiated emission levels at and below 960 MHz are based on measurements employing a CISPR quasi-peak detector. Radiated emission levels above 960 MHz are based on RMS average measurements over a 1 MHz resolution bandwidth. The RMS average measurement is based on the use of a spectrum analyzer with a resolution bandwidth of 1 MHz, an RMS detector, and a 1 millisecond or less averaging time. Unless otherwise stated, if pulse gating is employed where the transmitter is quiescent for intervals that are long compared to the nominal pulse repetition interval, measurements shall be made with the pulse train gated on. Alternative measurement procedures may be considered by the Commission.

Part 15.521(h)

The highest frequency employed in § 15.33 to determine the frequency range over which radiated measurements are made shall be based on the center frequency, f_c , unless a higher frequency is generated within the UWB device. For measuring emission levels, the spectrum shall be investigated from the lowest frequency generated in the UWB transmitter, without going below 9 kHz, up to the frequency range shown in § 15.33(a) or up to $f_c + 3/(\text{pulse width in seconds})$, whichever is higher. There is no requirement to measure emissions beyond 40 GHz provided f_c is less than 10 GHz; beyond 100 GHz if f_c is at or above 10 GHz and below 30 GHz; or beyond 200 GHz if f_c is at or above 30 GHz.

Part 15.209

Part 15.209(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	FCC Limit (uV/m)	Measurement Distance (m)
0.009 - 0.490	2 400 / F (kHz)	300
0.490 - 1.705	24 000 / F (kHz)	30
1.705 - 30.0	30	30

Frequency (MHz)	FCC Limit (uV/m)	Measurement Distance (m)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

RSS-220[5.3.1](c)

Radiated emissions at or below 960 MHz from a device shall not exceed the limits in section 3.4.

RSS-220[3.4]

Radiated emissions at or below 960 MHz for all subclasses of UWB device shall not exceed the following limits. Measurements of radiated emissions at and below 960 MHz are to be made using a CISPR quasi-peak detector. CISPR measurement bandwidth specifications are to be used.

Frequency (MHz)	Field Strength Limit (uV/m)	Measurement Distance (m)	E.i.r.p. Limit (dBm W)
0.009 - 0.490	2 400 / F (kHz)	300	10 log (17.28 / F ²) (F in kHz)
0.490 - 1.705	24 000 / F (kHz)	30	10 log (17.28 / F ²) (F in kHz)
1.705 - 30.0	30	30	-45.7
30 - 88	100	3	-55.2
88 - 216	150	3	-51.7
216 - 960	200	3	-49.2

Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average emissions detector.

■ Test Configuration

Refer to the APPENDIX I.

■ Test Procedure

ANSI C63.10-2020 Section 10.2 & 6.4 & 6.5

- 1) These measurements were performed at 3 m test site.
- 2) The equipment under test is placed on a non-conductive table 0.8 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.
- 3) The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

Instrument setting:

RBW = As specified in below table, VBW $\geq 3 \times$ RBW, Sweep = Auto, Detector = Peak or quasi-peak

(Note: Measurements were performed using the peak detector. The data measured using the peak detector of a spectrum analyzer or EMI receiver will represent the worst-case results.)

Trace mode = Max Hold until the trace stabilizes.

Frequency	RBW
9 - 150 kHz	200 – 300 Hz
0.15- 30 MHz	9 – 10 kHz
30 – 1 000 MHz	100 – 120 kHz
> 1000 MHz	1 MHz

■ Test Results: Comply

- Test Notes

1. The radiated emissions below 960 MHz were investigated 9 kHz to 960 MHz and the worst case data was reported.

2. Information of Distance Correction Factor (DCF)

For finding emissions, measurements may be performed at a distance closer than that specified in the regulations.

In this case, the distance factor is applied to the result.

- Calculation of distance correction factor

At frequencies below 30 MHz = 40 log (tested distance / specified distance)

At frequencies at or above 30 MHz = 20 log (tested distance / specified distance)

When distance factor is "N/A", the measurements were performed at the specified distance and distance factor is not applied.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + TF + DCF / TF = AF + CL – AG

Where, TF = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

- Antenna 0 & SP3

Tested frequency: 6 489.6 MHz

Frequency (MHz)	ANT Pol	Detector Mode	Measured Level(dBuV)	TF (dB/m)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
376.61	H	PK	30.60	-2.66	NA	27.94	46.00	18.06
407.01	H	PK	31.30	-1.73	NA	29.57	46.00	16.43
844.77	H	PK	33.40	5.70	NA	39.10	46.00	6.90
-	-	-	-	-	-	-	-	-

- Antenna 1 & SP3

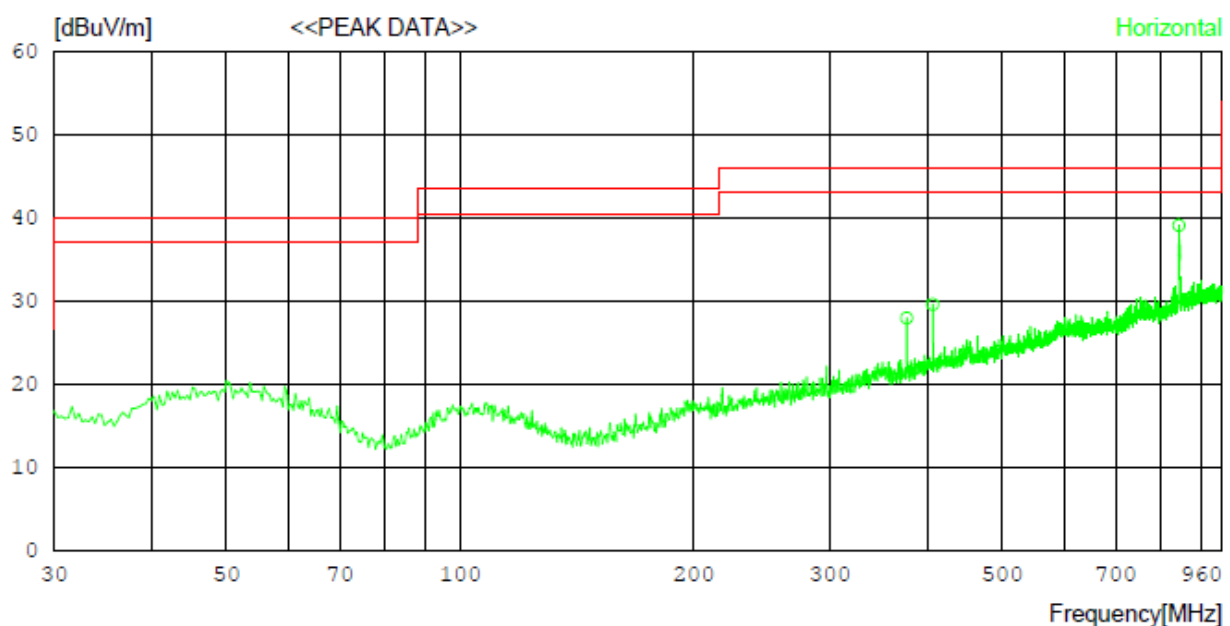
Tested frequency: 7 987.2 MHz

Frequency (MHz)	ANT Pol	Detector Mode	Measured Level(dBuV)	TF (dB/m)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
75.91	V	PK	42.30	-11.92	NA	30.38	40.00	9.62
100.49	V	PK	26.80	-8.23	NA	18.57	43.50	24.93
921.07	V	PK	25.70	7.18	NA	32.88	46.00	13.12
-	-	-	-	-	-	-	-	-

Worst case plot(Measured level)

Detector Mode : PK

6 489.6 MHz & Z & Hor



5.3.2. Radiated Emissions(Above 960 MHz)

■ Test Requirements and limit

Part 15.519(c)

The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
960 – 1 610	-75.3
1 610 – 1 990	-63.3
1 990 – 3 100	-61.3
3 100 – 10 600	-41.3
Above 10 600	-61.3

Part 15.519(d)

In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz	EIRP in dBm
1 164 - 1 240	-85.3
1 559 - 1 610	-85.3

Part 15.521(c)

Emissions from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in § 15.209, rather than the limits specified in this subpart, provided it can be clearly demonstrated that those emissions from the UWB device are due solely to emissions from digital circuitry contained within the transmitter and that the emissions are not intended to be radiated from the transmitter's antenna. Emissions from associated digital devices, as defined in § 15.3(k), e.g., emissions from digital circuitry used to control additional functions or capabilities other than the UWB transmission, are subject to the limits contained in Subpart B of this part.

Part 15.521(d)

Within the tables in §§ 15.509, 15.511, 15.513, 15.515, 15.517, and 15.519, the tighter emission limit applies at the band edges. Radiated emission levels at and below 960 MHz are based on measurements employing a CISPR quasi-peak detector. Radiated emission levels above 960 MHz are based on RMS average measurements over a 1 MHz resolution bandwidth. The RMS average measurement is based on the use of a spectrum analyzer with a resolution bandwidth of 1 MHz, an RMS detector, and a 1 millisecond or less averaging time. Unless otherwise stated, if pulse gating is employed where the transmitter is quiescent for intervals that are long compared to the nominal pulse repetition interval, measurements shall be made with the pulse train gated on. Alternative measurement procedures may be considered by the Commission.

Part 15.521(h)

The highest frequency employed in § 15.33 to determine the frequency range over which radiated measurements are made shall be based on the center frequency, f_c , unless a higher frequency is generated within the UWB device. For measuring emission levels, the spectrum shall be investigated from the lowest frequency generated in the UWB transmitter, without going below 9 kHz, up to the frequency range shown in § 15.33(a) or up to $f_c + 3/(\text{pulse width in seconds})$, whichever is higher. There is no requirement to measure emissions beyond 40 GHz provided f_c is less than 10 GHz; beyond 100 GHz if f_c is at or above 10 GHz and below 30 GHz; or beyond 200 GHz if f_c is at or above 30 GHz.

RSS-220[5.3.1](d)

Radiated emissions above 960 MHz from a device shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz.

Hand-held (Outdoor) Communication, Measurement, Location Sensing, and Tracking Devices	
Frequency in MHz	EIRP in dBm
960 – 1 610	-75.3
1 610 – 4 750	-70.0
4 750 – 10 600	-41.3
Above 10 600	-61.3

RSS-220[5.3.1](e)

In addition to the limits specified in paragraph (d) of this section, radiated emissions shall not exceed the following average limits when measured using a resolution bandwidth greater than or equal to 1 kHz. The measurements shall demonstrate compliance with the stated limits at whatever resolution bandwidth is used.

Frequency in MHz	EIRP in dBm
1 164 - 1 240	-85.3
1 559 - 1 610	-85.3

■ Test Configuration

Refer to the APPENDIX I.

■ Test Procedure**ANSI C63.10-2020 Section 6.6**

- 1) These measurements were performed at 3 m test site.
- 2) The equipment under test is placed on a non-conductive table 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.
- 3) For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections.
- 4) The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 5) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

Instrument setting:

1. Set the RBW = 1 MHz
2. Set VBW $\geq$ 1 MHz (a VBW of 3MHz is desirable)
3. Detector = RMS (power averaging)
4. Sweet time $\leq$ Sweep point x 1 ms
5. Trace mode = max hold
6. Allow trace to fully stabilize

Unwanted emissions in 1 164 - 1 240MHz and 1 559 - 1 610MHz

1. Set the RBW = 1 kHz
2. Set VBW $\geq$ 3 kHz
3. Detector = RMS (power averaging)
4. Sweet time $\leq$ Sweep point x 1 ms
5. Trace mode = max hold
6. Allow trace to fully stabilize

Test Results: Comply

- Test Notes

- The unwanted emissions measurements above 960 MHz investigated up to 40 GHz.
The Worst-case data(Antenna 0 & SP3) are reported. And no other spurious and harmonic emissions were found below listed frequencies.
- Sample Calculation
 $EIRP\ (dBm) = E\ (dB\mu V/m) + 20\log(D) - 104.7$; where D is the measurement distance in m.
 $E(dBuV/m) = \text{Measured level}\ (dBuV) + TF(dB/m)$
 where, E = field strength, TF = Total Factor, $TF = \text{Antenna Factor}(dB/m) + \text{Cable Loss}(dB) - \text{Amplifier Gain}(dB)$

- Antenna 0 & SP3

Tested frequency: 6 489.6 MHz

Measurement Distance(m)	Frequency (MHz)	ANT Pol	Measured Level(dBuV)	TF (dB/m)	E (dBuV/m)	Result (dBm)	FCC Limit(dBm)	FCC Margin(dB)	ISED Limit(dBm)	ISED Margin(dB)
0.5	969.68	H	23.62	7.63	31.25	-79.47	-75.30	4.17	-75.30	4.17
0.5	1 019.20	H	32.82	0.72	33.54	-77.18	-75.30	1.88	-75.30	1.88
0.5	3 202.60	H	29.58	9.32	38.90	-71.82	-41.30	30.52	-70.00	1.82
0.5	7 597.68	H	27.45	13.10	40.55	-70.17	-41.30	28.87	-41.30	28.87
0.5	12 815.50	H	26.27	19.76	46.03	-64.69	-61.30	3.39	-61.30	3.39
0.5	38 990.35	H	39.66	3.57	43.23	-67.49	-61.30	6.19	-61.30	6.19
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Unwanted emissions in 1 164 – 1 240MHz and 1 559 - 1 610MHz (RBW = 1 kHz)

Measurement Distance(m)	Frequency (MHz)	ANT Pol	Measured Level(dBuV)	TF (dB/m)	E (dBuV/m)	Result (dBm)	FCC Limit(dBm)	FCC Margin(dB)	ISED Limit(dBm)	ISED Margin(dB)
0.5	1 199.78	H	11.45	2.41	13.86	-96.86	-85.30	11.56	-85.30	11.56
0.5	1 590.04	H	9.23	2.27	11.50	-99.22	-85.30	13.92	-85.30	13.92

Tested frequency: 7 987.2 MHz

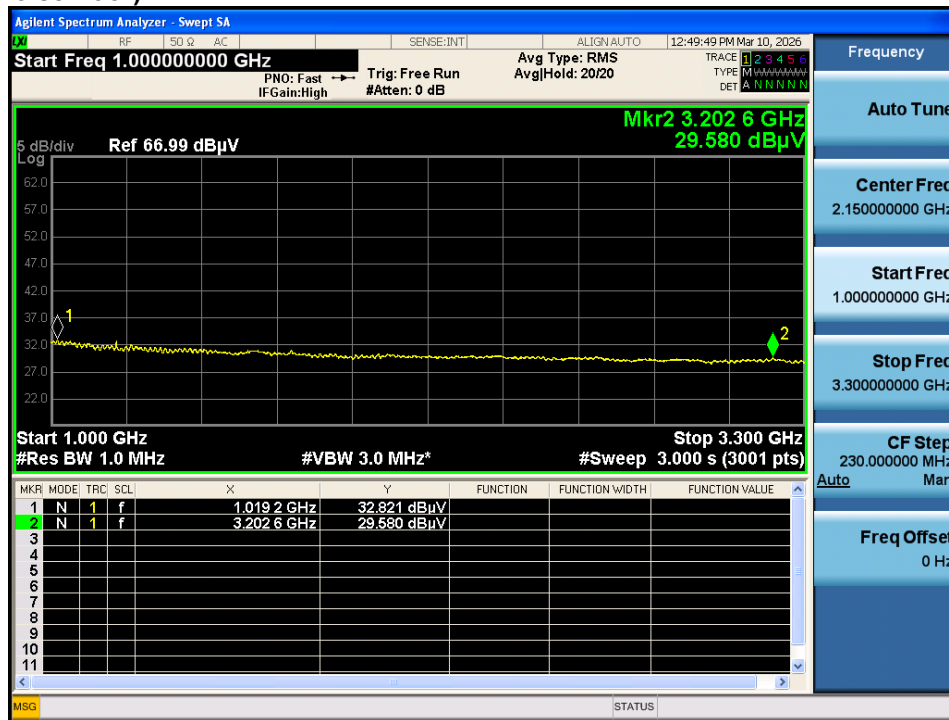
Measurement Distance(m)	Frequency (MHz)	ANT Pol	Measured Level(dBuV)	TF (dB/m)	E (dBuV/m)	Result (dBm)	FCC Limit(dBm)	FCC Margin(dB)	ISED Limit(dBm)	ISED Margin(dB)
0.5	964.88	H	23.60	7.58	31.18	-79.54	-75.30	4.24	-75.30	4.24
0.5	1 020.70	H	32.86	0.72	33.58	-77.14	-75.30	1.84	-75.30	1.84
0.5	3 203.40	H	29.49	9.32	38.81	-71.91	-41.30	30.61	-70.00	1.91
0.5	7 450.10	H	27.49	12.85	40.34	-70.38	-41.30	29.08	-41.30	29.08
0.5	11 866.00	H	26.81	18.54	45.35	-65.37	-61.30	4.07	-61.30	4.07
0.5	38 997.85	H	39.61	3.56	43.17	-67.55	-61.30	6.25	-61.30	6.25
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Unwanted emissions in 1 164 – 1 240MHz and 1 559 - 1 610MHz (RBW = 1 kHz)

Measurement Distance(m)	Frequency (MHz)	ANT Pol	Measured Level(dBuV)	TF (dB/m)	E (dBuV/m)	Result (dBm)	FCC Limit(dBm)	FCC Margin(dB)	ISED Limit(dBm)	ISED Margin(dB)
0.5	1 199.78	H	12.18	2.41	14.59	-96.13	-85.30	10.83	-85.30	10.83
0.5	1 563.11	H	9.07	2.17	11.24	-99.48	-85.30	14.18	-85.30	14.18

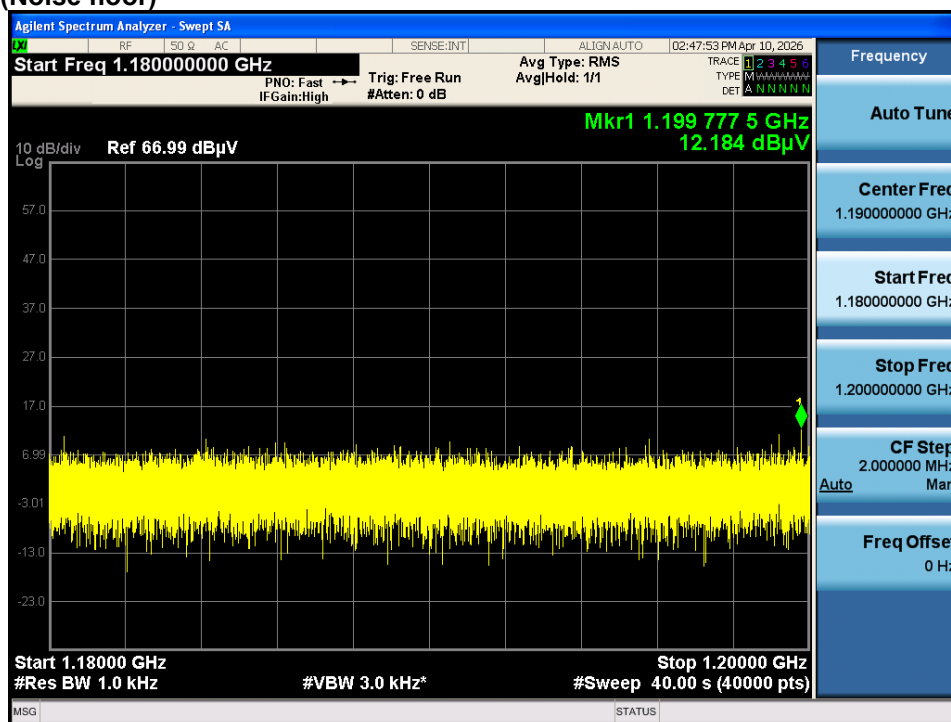
Worst case plot(Unwanted emission)
Measured Level(Noise floor)

6.489 6 MHz & X axis & Hor



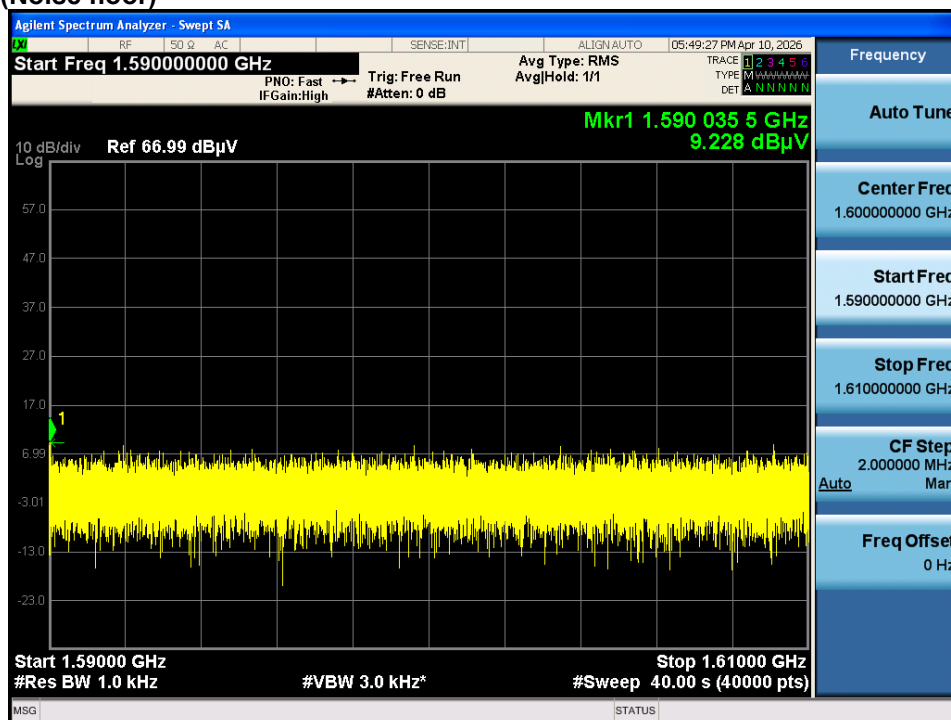
Unwanted emissions in 1 164 – 1 240MHz
Measured Level(Noise floor)

7.987 2 MHz & X axis & Hor



Unwanted emissions in 1 559 – 1 610 MHz
Measured Level(Noise floor)

6.489 6 MHz & X axis & Hor



5.4. AC Power-Line Conducted Emissions

■ Test Requirements and limit

Part 15.207 & RSS-Gen[8.8]

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5.0	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Part 15.521(j)

Responsible parties are reminded of the other standards and requirements cross referenced in § 15.505, such as a limit on emissions conducted onto the AC power lines.

■ Test Configuration

NA

■ Test Procedures

Conducted emissions from the EUT were measured according to the ANSI C63.10-2020.

1. The test procedure is performed in a shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) $\times$ 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

■ Test Results

NA

5.5. Cease Transmission Time

■ Test Requirements and limit

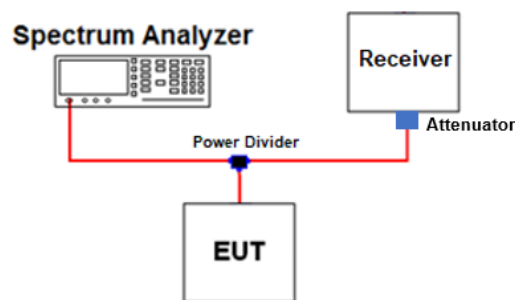
Part 15.519(a)(1)

A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

RSS-Gen[5.3.1](b)

The device is to transmit only when it is sending information to an associated receiver. The device shall cease transmission of information within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB device at least every 10 seconds or the UWB device shall cease transmitting any information other than periodic signals used for the establishment or re-establishment of a communication link with an associated receiver.

■ Test Configuration



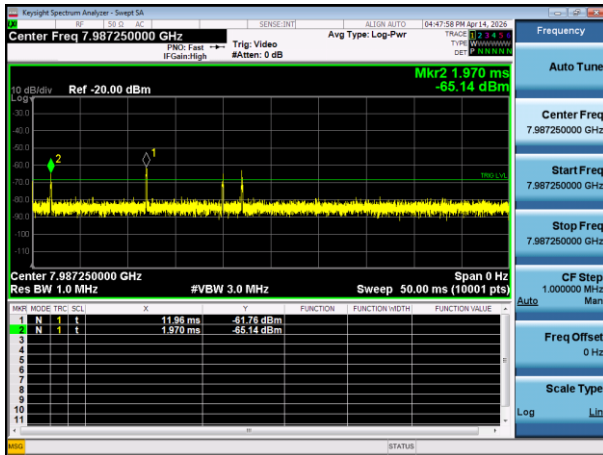
■ Test Procedures

EUT and receiving pairing device keep UWB normal connection.

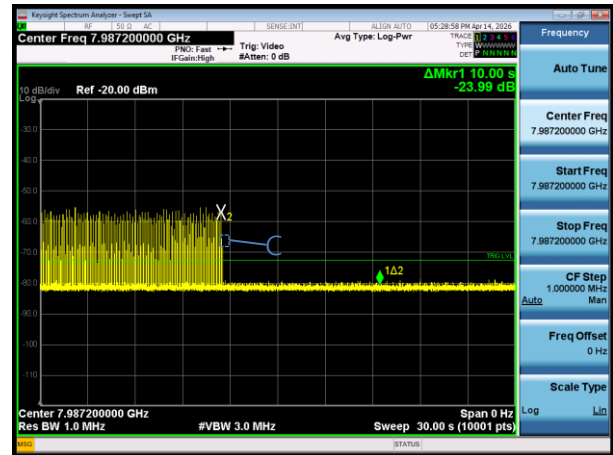
The receiver device ends the UWB link during normal operation and observe that the EUT cease transmission within 10 seconds.

Test Results: **Comply**

Tested Frequency(MHz): 7 987.2



Marker 1: EUT transmission signal
Marker 2: Receiver signal



C: The receiver device ends the UWB link.
Marker 2: The EUT immediately stops transmission.

5.6. Occupied Bandwidth

■ Test Requirements and limit

RSS-Gen[6.7]

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

■ Test Configuration

Refer to the APPENDIX I.

■ Test Procedures

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
- The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

■ Test Results: **Comply**

- Antenna 0

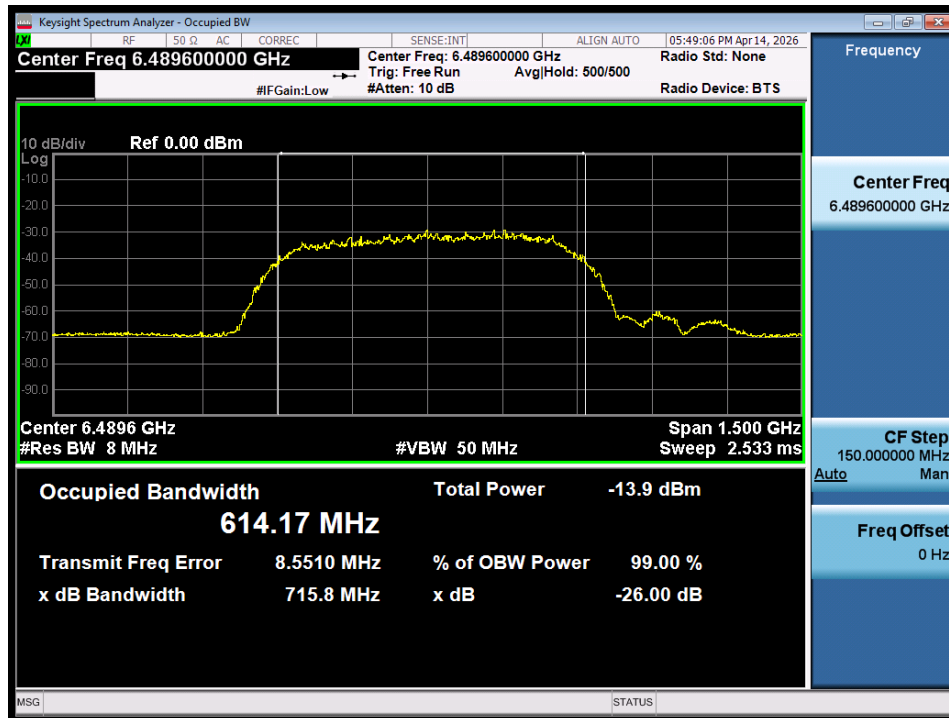
Tested Frequency (MHz)	Configuration	Occupied Bandwidth(MHz)
6 489.6	SP0	614.17
	SP3	601.75
7 987.2	SP0	614.71
	SP3	605.79

- Antenna 1

Tested Frequency (MHz)	Configuration	Occupied Bandwidth(MHz)
6 489.6	SP0	606.95
	SP3	593.00
7 987.2	SP0	608.25
	SP3	597.02

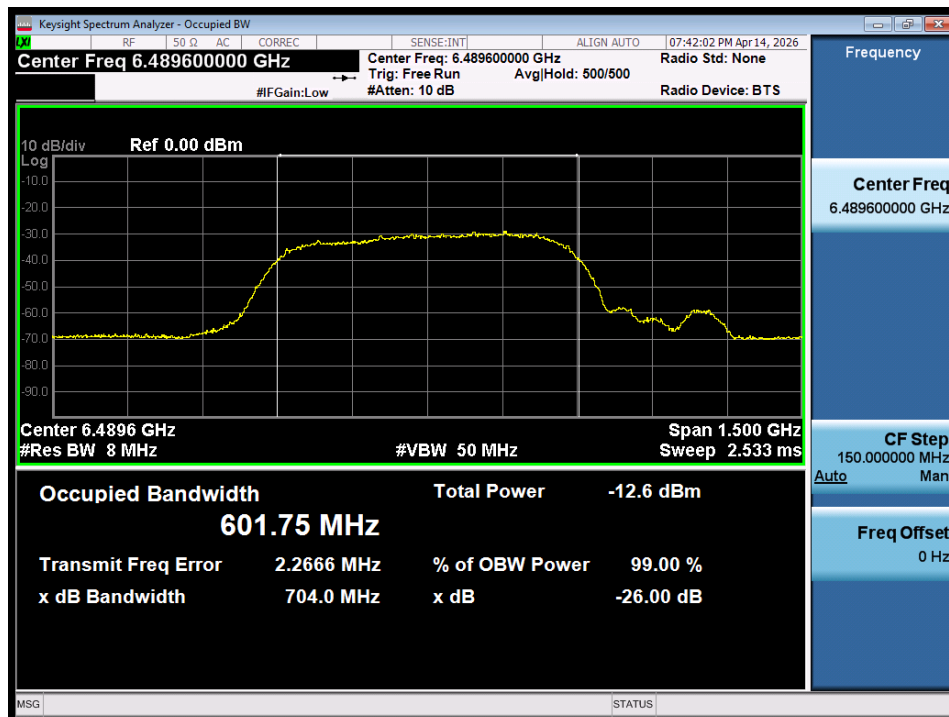
Occupied Bandwidth

Ant 0 & SP0 & 6 489.6 MHz



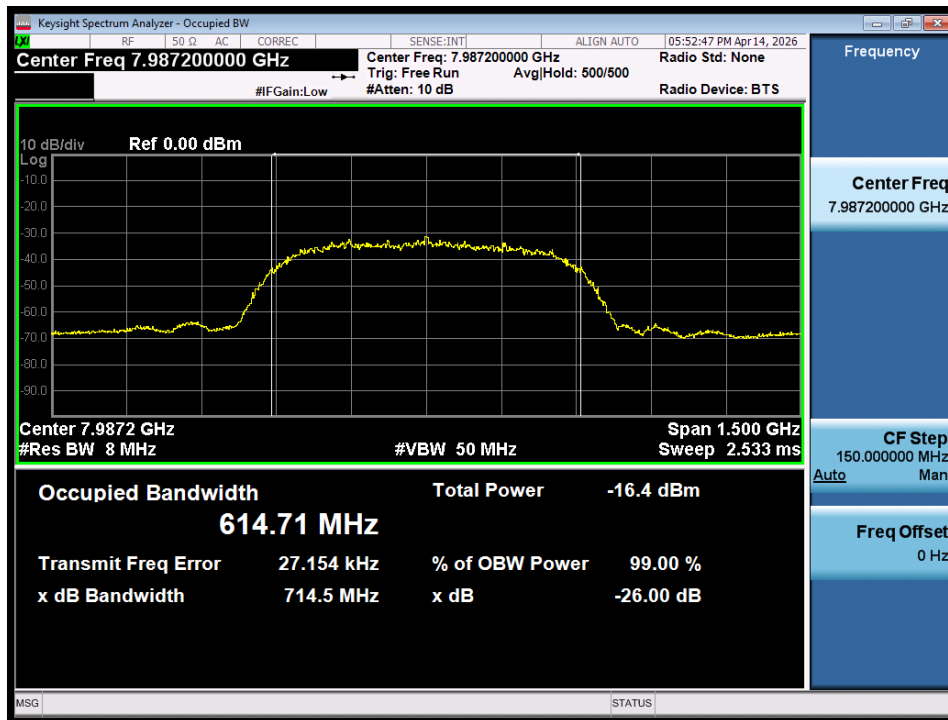
Occupied Bandwidth

Ant 0 & SP3 & 6 489.6 MHz



Occupied Bandwidth

Ant 0 & SP0 & 7 987.2 MHz



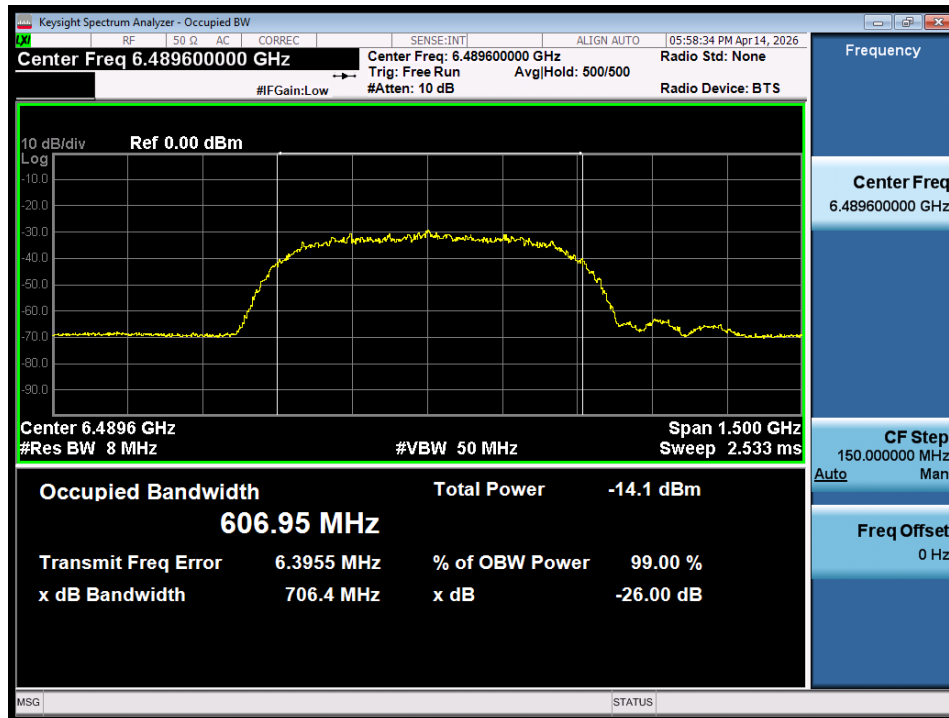
Occupied Bandwidth

Ant 0 & SP3 & 7 987.2 MHz



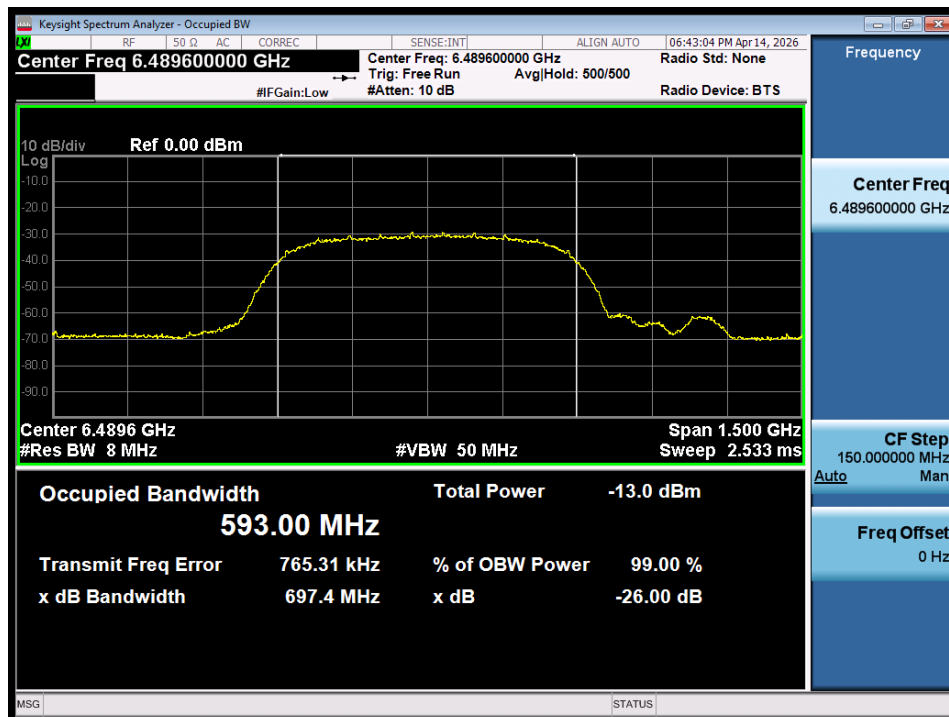
Occupied Bandwidth

Ant 1 & SP0 & 6 489.6 MHz



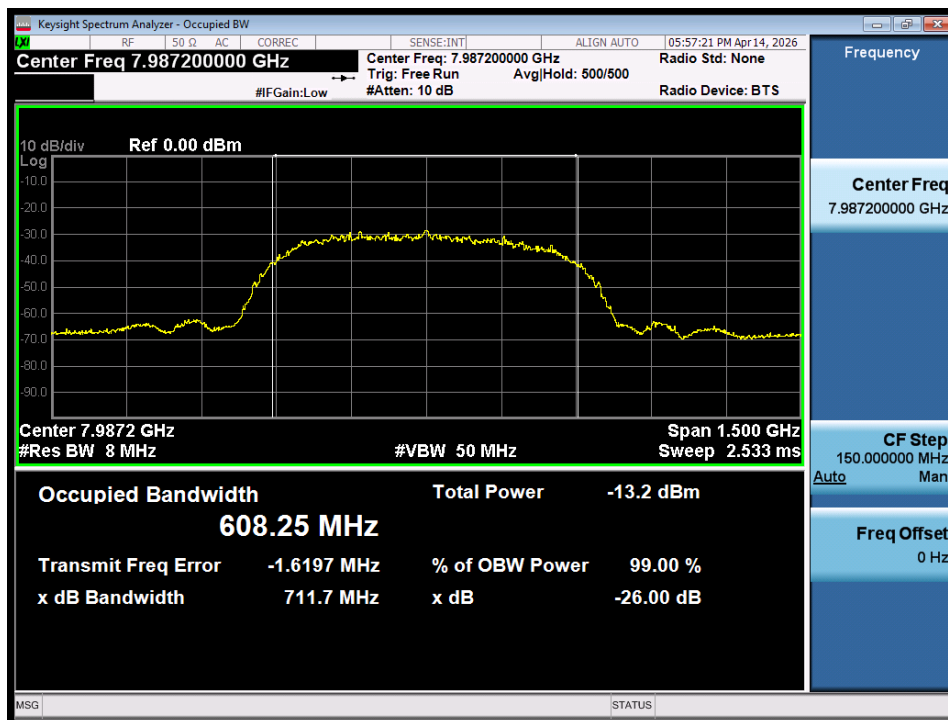
Occupied Bandwidth

Ant 1 & SP3 & 6 489.6 MHz



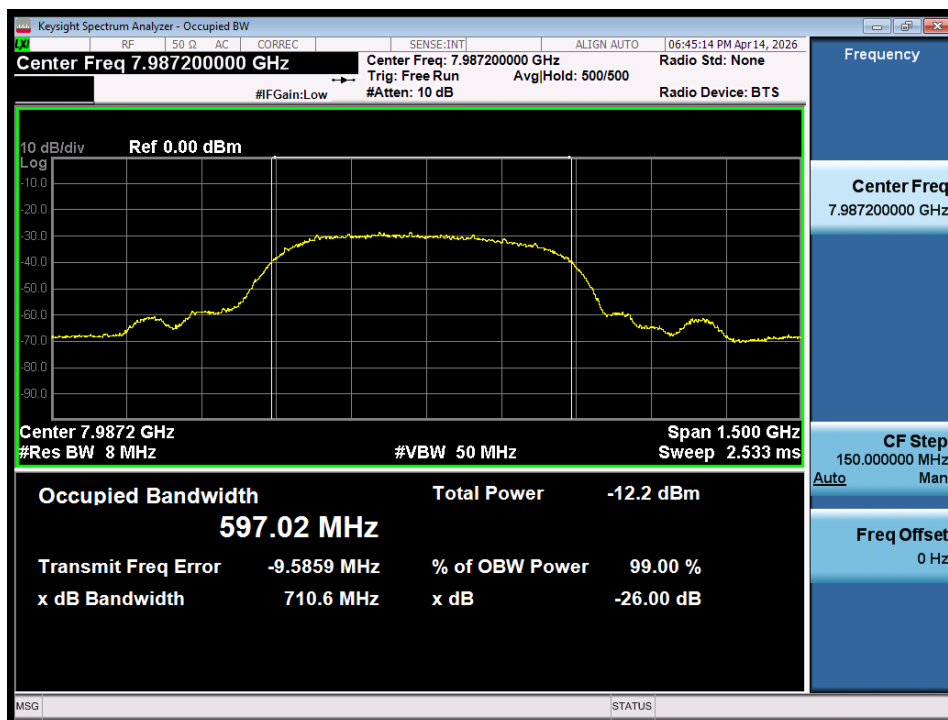
Occupied Bandwidth

Ant 1 & SP0 & 7 987.2 MHz



Occupied Bandwidth

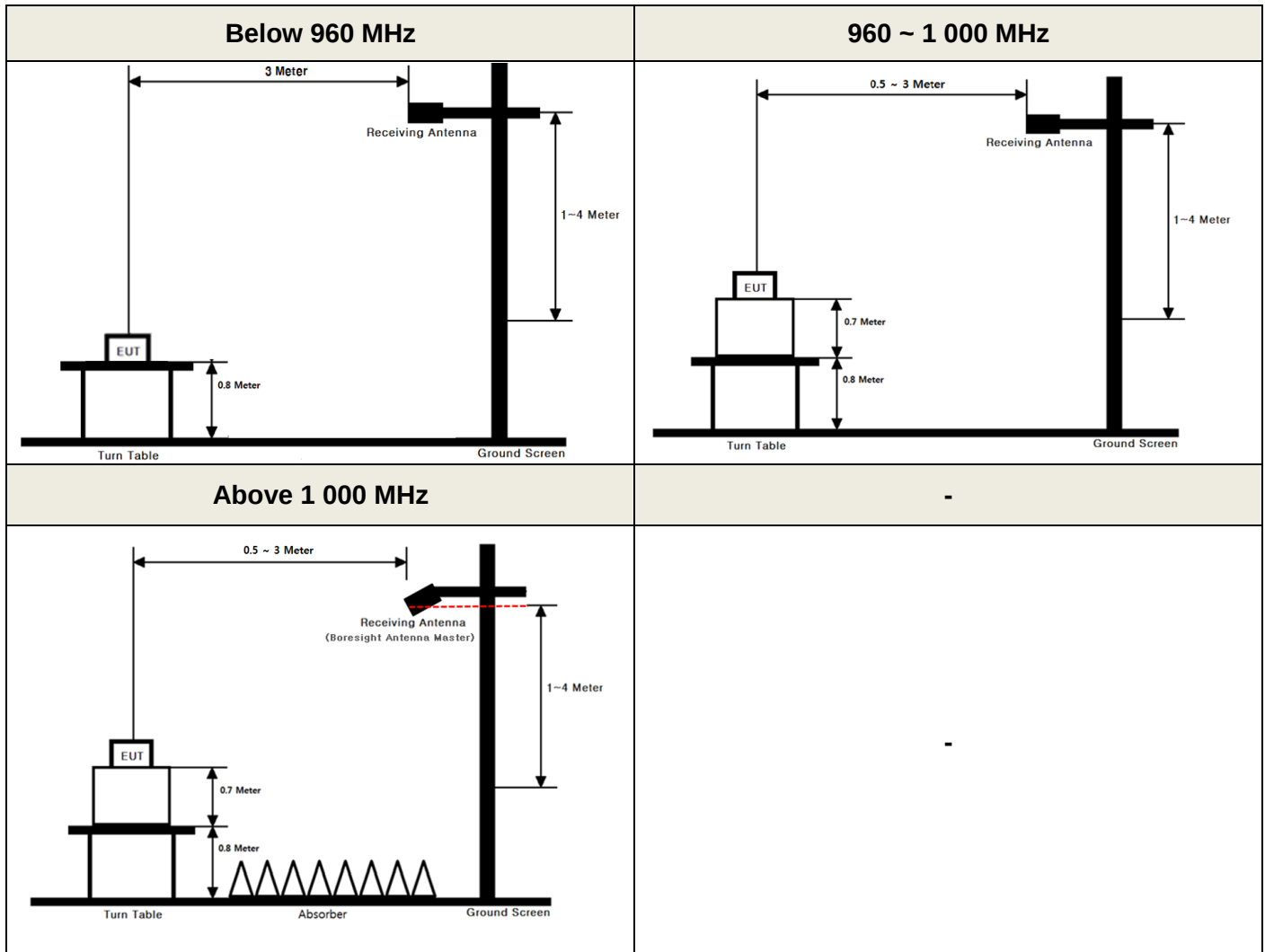
Ant 1 & SP3 & 7 987.2 MHz



APPENDIX I

Test set up diagrams

▪ Radiated Measurement



▪ Conducted Measurement

