

TEST REPORT

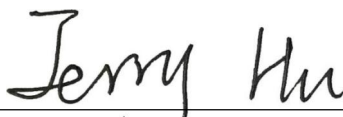
Applicant: Address:	Wuchao (Shenzhen) Technology Development Co., Ltd. Room 1916, Tower A, Rongchuang Zhihui Building, Minzhi Street, Longhua District, Shenzhen City, Guangdong, China	
Manufacturer: Address:	Wuchao (Shenzhen) Technology Development Co., Ltd. Room 1916, Tower A, Rongchuang Zhihui Building, Minzhi Street, Longhua District, Shenzhen City, Guangdong, China	
Factory: Address:	Wuchao (Shenzhen) Technology Development Co., Ltd. Room 1916, Tower A, Rongchuang Zhihui Building, Minzhi Street, Longhua District, Shenzhen City, Guangdong, China	
E.U.T.:	True Wireless Earphones	
Model Number:	SpaceAi Pro	
Trade mark:	HYUNDAI	
FCC ID:	2BMKL-SPACEAIPRO	
Date of Receipt:	2024-12-21	Date of Test: 2024-12-21 to 2024-12-25
Test Specification:	FCC 47 CFR Part 15, Subpart C	
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.	
Prepared by:	Approved & Authorized Signer:	
 Jerry Hu/ Engineer	 Frank Shen/ Manager	
Date: 2024-12-25	Issue Date: 2024-12-31	
This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Dongguan Lepont Service Co., Ltd.		

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Revision History of This Test Report

Report Number	Description	Issued Date
LP24120045C04-01	Initial Issue	2024-12-31

1. GENERAL PRODUCT INFORMATION

1.1. PRODUCT FUNCTION

Refer to Technical Construction Form and User Manual.

1.2. EUT TECHNICAL DESCRIPTION

Product Name:	True Wireless Earphones
Model No.:	SpaceAi Pro
Test Model No:	SpaceAi Pro
Difference:	N/A
Serial No.:	N/A
Test sample(s) ID:	LP24120045C04-S001
Sample(s) Status	Engineer sample
Hardware:	V 1.0
Software:	V 1.0
Operation Frequency:	2402MHz-2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK, $\pi/4$ -DQPSK 8DPSK
Antenna Type:	Chip Antenna
Antenna gain:	1.7dBi
Power supply:	☒ DC 5V form USB ☒ DC 3.7V form battery

1.3. INDEPENDENT OPERATION MODES

The EUT has been tested under its typical operating condition.

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

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (1Mbps for GFSK modulation; 2Mbps for pi/4-DQPSK modulation; 3Mbps for 8DPSK modulation) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	39	2441	...	...
1	2403	40	2442	76	2478
2	2404	41	2443	77	2479
...	...	...	...	78	2480

Note: $f_c = 2402\text{MHz} + (k-1) \times 1\text{MHz}$ $k=1$ to 79

Test Frequency and channel

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	39	2441	78	2480

1.4. TEST SOFTWARE

Software	Description
BT_Tool.exe	Set the COM Port Test Tool to set the corresponding Test conditions

1.5. GENERAL CONDITION

	Temperature	Humidity
Ambient Condition:	21.9℃	42.1%RH

1.6. SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Laptop computer	Lenovo	Xiaoxin Pro IA5HR	PF490VB0

Notes:

- 1.All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2.Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

2. TEST STANDARDS AND SITES

2.1. DESCRIPTION OF STANDARDS AND RESULTS

The EUT have been tested according to the applicable standards as referenced below.

FCC Part Clause	Test Parameter	Verdict	Remark
15.247(a)(1)	20 dB Bandwidth	PASS	
15.247(a)(1)	Carrier Frequency Separation	PASS	
15.247(a)(1)	Number of Hopping Frequencies	PASS	
15.247(a)(1)	Average Time of Occupancy (Dwell Time)	PASS	
15.247(b)(1)	Maximum Peak Conducted Output Power	PASS	
15.247(d)	Conducted Spurious Emissions	PASS	
15.247(d) 15.209	Radiated Spurious Emissions	PASS	
15.207	Conducted Emission	PASS	
15.203	Antenna Application	PASS	
15.247 (a) (1)/g/h	Frequency Hopping System	PASS	

NOTE1: N/A (Not Applicable)

NOTE2: According to FCC KDB 558074 D01 15.247 Meas Guidance v05r02, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.

2.2. LIST OF TEST AND MEASUREMENT INSTRUMENTS

For conducted emission at the mains terminals test(Shielded Room 1)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Lab No.	Remark
EMI Test Receiver	Rohde & Schwarz	ESHS30	8290501003	Jan. 24, 2024	1 Year	LEP-E002	☑
Artificial Mains Network	Baluelec	LSN016	BL041122050121	Nov. 01, 2024	1 Year	LEP-E067	☑
Shielded Room 1	MR	MR-L05	LEP-E053	Nov. 17, 2022	3 Year	LEP-E053	☑
Test software	EZ-EMC	Fala	LEPONT-03A2	N/A	N/A	N/A	☑
For radiated(9K-30M) emission test(966 Chamber 1)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Lab No.	Remark
EMI Test Receiver	Rohde & Schwarz	ESR 3	101849	Jan. 31, 2024	1 Year	LEP-E006	☑
Active Loop Antenna	Schwarzbeck	FMZB 1519C	00008	Jan. 24, 2024	3 Year	LEP-E068	☑
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	☑
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	☑
For radiated(30M-1G) emission test(966 Chamber 1)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Lab No.	Remark
EMI Test Receiver	Rohde & Schwarz	ESR 3	101849	Jan. 31, 2024	1 Year	LEP-E006	☑
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	743	Nov. 20, 2022	3 Year	LEP-E005	☑
Signal Amplifier	HP	8447D	1726A01222	Jan. 24, 2024	1 Year	LEP-E007	☐
6dB Attenuator	RswTech	5W 6dB	LEP-E084	Jan. 24, 2024	1 Year	LEP-E084	☐
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	☑
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	☑
For radiated(1-18G) emission test(966 Chamber 1)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Lab No.	Remark
Spectrum analyzer	Rohde & Schwarz	FSV40	101412	Jan. 24, 2024	1 Year	LEP-E076	☑
Spectrum analyzer	Agilent	N9020A	MY49100060	Jan. 24, 2024	1 Year	LEP-E020	☑
Horn antenna	Schwarzbeck	BBHA 9120D	01875	Nov. 20, 2022	3 Year	LEP-E024	☑
Preamplifier	Schwarzbeck	BBN 9718B	00010	Jan. 24, 2024	1 Year	LEP-E025	☑
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	☑
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	☑
For radiated(18-40G) emission test(966 Chamber 1)							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Lab No.	Remark
Spectrum analyzer	Rohde & Schwarz	FSV40	101412	Jan. 24, 2024	1 Year	LEP-E076	☑
Horn antenna+Preamplifier	COM-POWER	AH840	10100020	Sep. 05, 2022	3 Year	LEP-E075	☑
966 Chamber 1	MR	MR-L02	LEP-E051	Nov. 17, 2022	3 Year	LEP-E051	☑
Test software	EZ-EMC	Fala	EMEC-3A1	N/A	N/A	N/A	☑
For RF test							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval	Lab No.	Remark
Spectrum analyzer	Rohde & Schwarz	FSV40	101412	Jan. 24, 2024	1 Year	LEP-E076	☑
Spectrum analyzer	Agilent	N9020A	MY49100060	Jan. 24, 2024	1 Year	LEP-E020	☑
Vector source	Agilent	N5182A	MY47420382	Jan. 24, 2024	1 Year	LEP-E021	☑
Analog signal source	Agilent	N5171B	MY51350292	Jan. 24, 2024	1 Year	LEP-E022	☑
All instrument	Rohde & Schwarz	CMW 500	1201.002K50	Jan. 24, 2024	1 Year	LEP-E019	☑
High and low temperature chamber	Math-mart	MT-1202-40	LEP-E041	Jan. 24, 2024	1 Year	LEP-E041	☑
control unit	Tonscend	JS0806-2	10165	Jan. 24, 2024	1 Year	LEP-E034	☑
Testing software	Tonscend	JSTS1120-3	Ver 2.6.77.0518	N/A	N/A	N/A	☑

2.3. MEASUREMENT UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\%$
Conducted Emissions Test	$\pm 3.08\text{dB}$
Radiated Emission Test	$\pm 4.60\text{dB}$
Power Density	$\pm 0.9\%$
Occupied Bandwidth Test	$\pm 2.3\%$
Band Edge Test	$\pm 1.2\%$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 3.2\%$
Humidity	$\pm 2.5\%$
Measurement Uncertainty for a level of Confidence of 95%	

2.4. TEST FACILITY

EMC Lab. : The Laboratory has been assessed and proved to be in compliance with CNAS/CL01

The Certificate Registration Number is L10100.

The Laboratory has been assessed and proved to be in compliance with A2LA

The Certificate Registration Number is 6901.01

FCC Designation No.: CN1351

Test Firm Registration No.: 397428

ISED CAB identifier: CN0151

Test Firm Registration No.: 20133

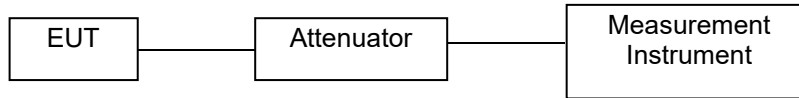
Test Location : Dongguan Lepont Testing Service Co., Ltd.

Address : Room 102, Building 11, No.7, Houjie Science And Technology Avenue, Houjie, Dongguan, Guangdong, China

3. SETUP OF EQUIPMENT UNDER TEST

3.1. RADIO FREQUENCY TEST SETUP 1

The component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



3.2. RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 32.

Below 30MHz:

The EUT is placed on a turntable 0.8meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Above 30MHz:

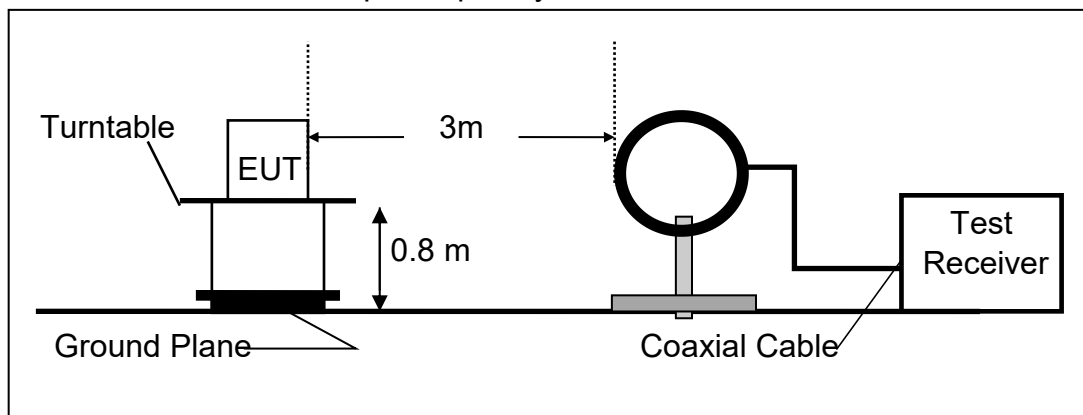
The EUT is placed on a turntable 0.8meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

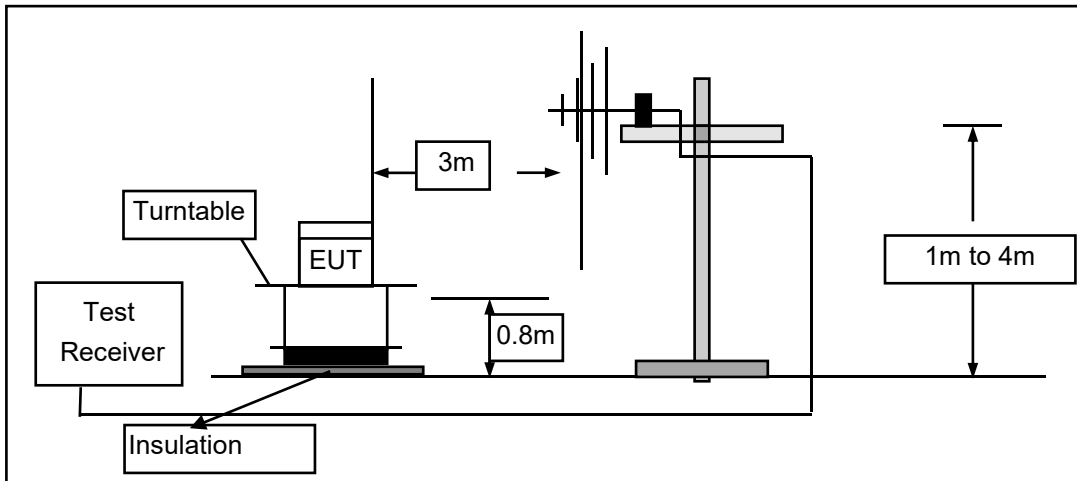
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

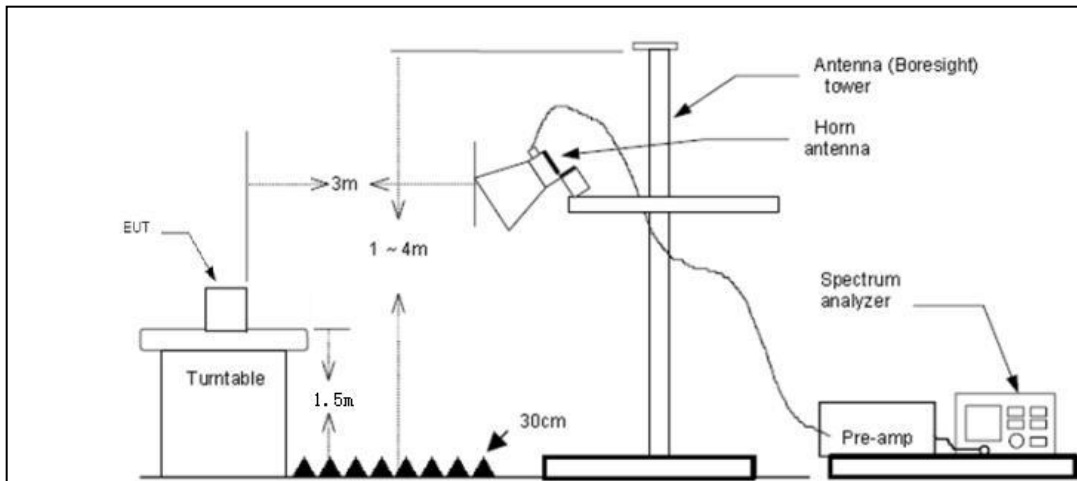
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



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

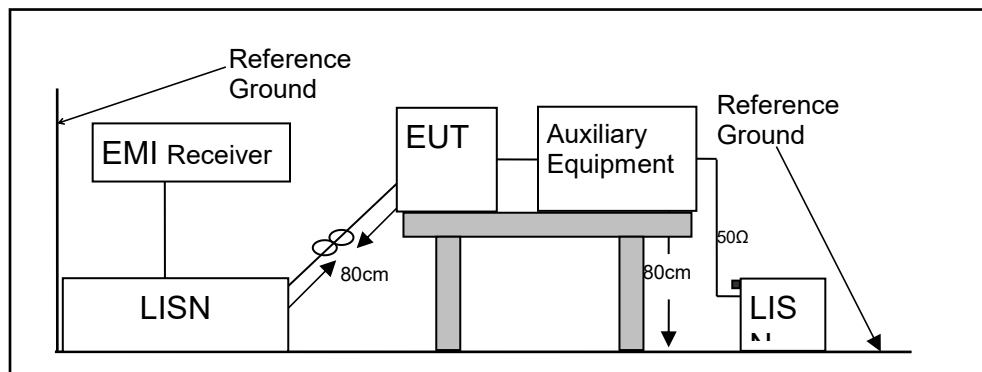


3.3. CONDUCTED EMISSION TEST SETUP

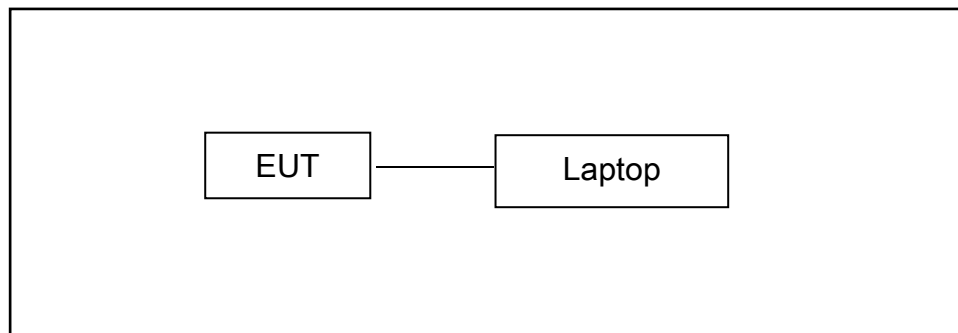
The mains cable of the EUT (Perfect Share Mini) must be connected to LISN. The LISN shall be placed 0.8m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.8m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



3.4. BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



4. TEST RESULTS AND MEASUREMENT DATA

4.1. 20DB BANDWIDTH

4.1.1. Applicable Standard

According to FCC Part 15.247(a)(1) and KDB 558074 D01 15.247 Meas Guidance v05r02

4.1.2. Conformance Limit

No limit requirement.

4.1.3. Test Configuration

Test according to clause 3.1 radio frequency test setup 1

4.1.4. Test Procedure

The EUT was operating in Bluetooth mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 30 kHz.

Set the video bandwidth (VBW) = 100 kHz.

Set Span= approximately 2 to 3 times the 20 dB bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

Measure and record the results in the test report.

Test Results:

TestMode	Antenna	Freq(MHz)	20dB EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]
DH5	Ant1	2402	1.029	2401.472	2402.501	N/A
		2441	1.023	2440.475	2441.498	N/A
		2480	1.005	2479.490	2480.495	N/A
2DH5	Ant1	2402	1.371	2401.304	2402.675	N/A
		2441	1.362	2440.310	2441.672	N/A
		2480	1.299	2479.349	2480.648	N/A
3DH5	Ant1	2402	1.305	2401.346	2402.651	N/A
		2441	1.248	2440.388	2441.636	N/A
		2480	1.263	2479.355	2480.618	N/A

Test Graphs

DH5_Ant1_2402



DH5_Ant1_2441



DH5_Ant1_2480



2DH5 Ant1_2402



2DH5 Ant1_2441



2DH5 Ant1_2480



3DH5 Ant1_2402



3DH5 Ant1_2441



3DH5 Ant1_2480



4.2. CARRIER FREQUENCY SEPARATION

4.2.1. Applicable Standard

According to FCC Part 15.247(a)(1) and KDB 558074 D01 15.247 Meas Guidance v05r02

4.2.2. Conformance Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400 – 2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

4.2.3. Test Configuration

Test according to clause 3.1 radio frequency test setup 1

4.2.4. Test Procedure

■ According to FCC Part 15.247(a)(1)

The EUT must have its hopping function enabled.

Settings:

Set the RBW = 30 kHz.

Set VBW = 100 kHz.

Set the span = wide enough to capture the peaks of two adjacent channels

Set Sweep time = auto couple.

Set Detector = peak. Set Trace mode = max hold.

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the Sub paragraphs of this Section. Submit this plot.

Test Results:

TestMode	Antenna	Freq(MHz)	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.314	≥ 1.029	PASS
2DH5	Ant1	Hop	1.326	≥ 0.914	PASS
3DH5	Ant1	Hop	1.18	≥ 1.011	PASS

Test Graphs





4.3. NUMBER OF HOPPING FREQUENCIES

4.3.1. Applicable Standard

According to FCC Part 15.247(a)(1) and KDB 558074 D01 15.247 Meas Guidance v05r02

4.3.2. Conformance Limit

Frequency hopping systems operating in the 2400-2483.5MHz band shall use at least 15 channels.

4.3.3. Test Configuration

Test according to clause 3.1 radio frequency test setup 1

4.3.4. Test Procedure

- According to FCC Part 15.247(a)(1)(iii)

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation (2400-2483.5MHz)

RBW $\geq$ 100KHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

Test Results:

TestMode	Antenna	Freq(MHz)	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥ 15	PASS
2DH5	Ant1	Hop	79	≥ 15	PASS
3DH5	Ant1	Hop	79	≥ 15	PASS

Test Graphs

DH5 Ant1 Hop



2DH5 Ant1 Hop



3DH5 Ant1 Hop



4.4. AVERAGE TIME OF OCCUPANCY (DWELL TIME)

4.4.1. Applicable Standard

According to FCC Part 15.247(a)(1) and KDB 558074 D01 15.247 Meas Guidance v05r02

4.4.2. Conformance Limit

For frequency hopping systems operating in the 2400-2483.5MHz band, the average time of occupancy on any channel shall not be greater than 0.4s within a period of 0.4s multiplied by the number of hopping channels employed.

4.4.3. Test Configuration

Test according to clause 3.1 radio frequency test setup 1

4.4.4. Test Procedure

- According to FCC Part 15.247(a)(1)(iii)

The EUT must have its hopping function enabled.

Settings:

Span = zero span, centered on a hopping channel

RBW = 1 MHz

VBW $\geq$ RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

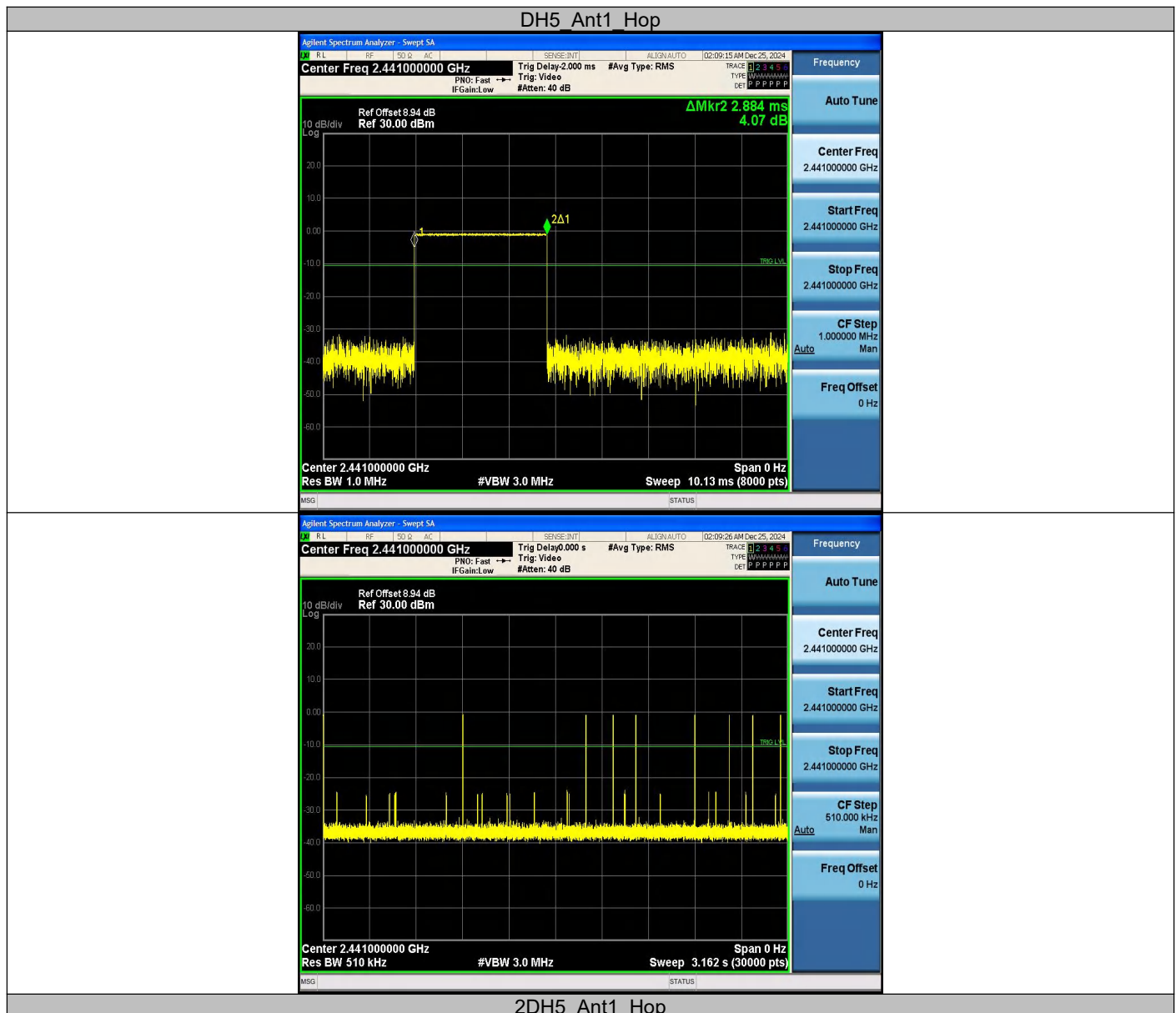
Trace = max hold

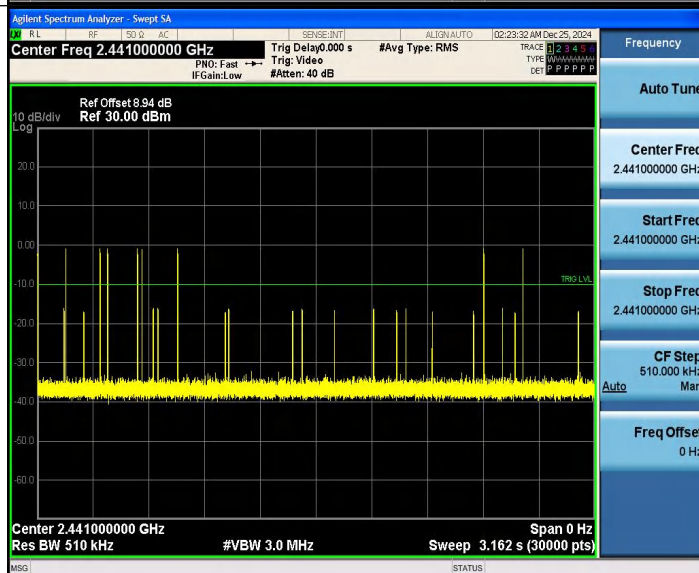
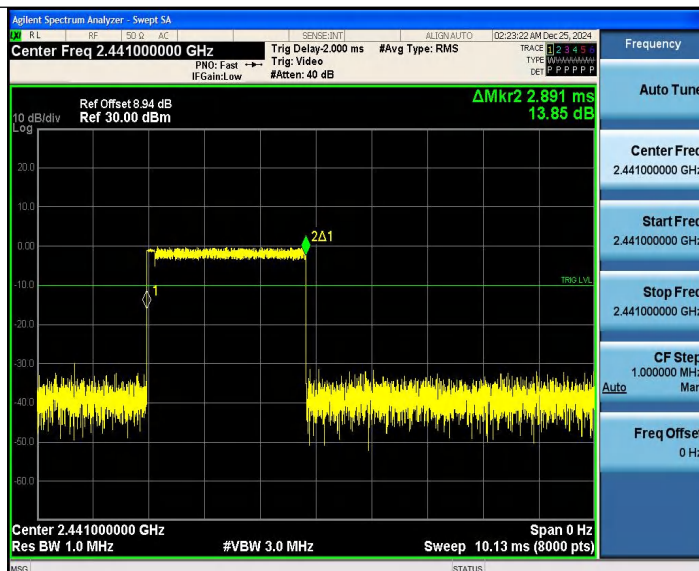
If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section.

Test Results:

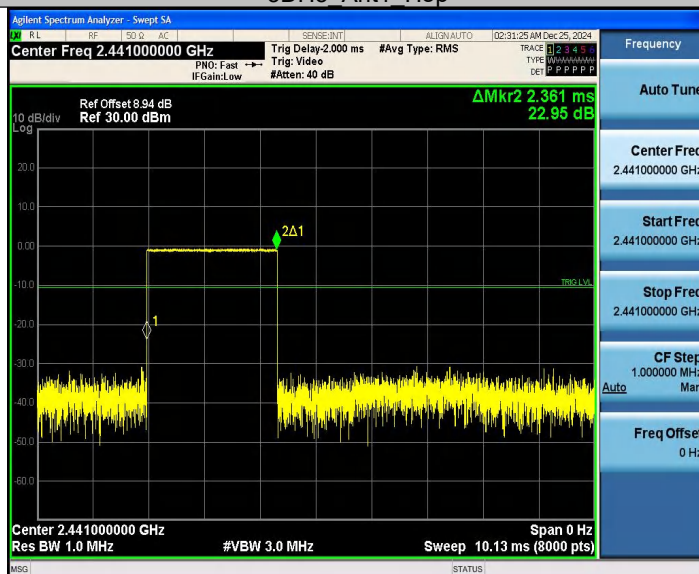
TestMode	Antenna	Freq(MHz)	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.884	90	0.26	≤0.4	PASS
2DH5	Ant1	Hop	2.891	90	0.26	≤0.4	PASS
3DH5	Ant1	Hop	2.361	90	0.212	≤0.4	PASS

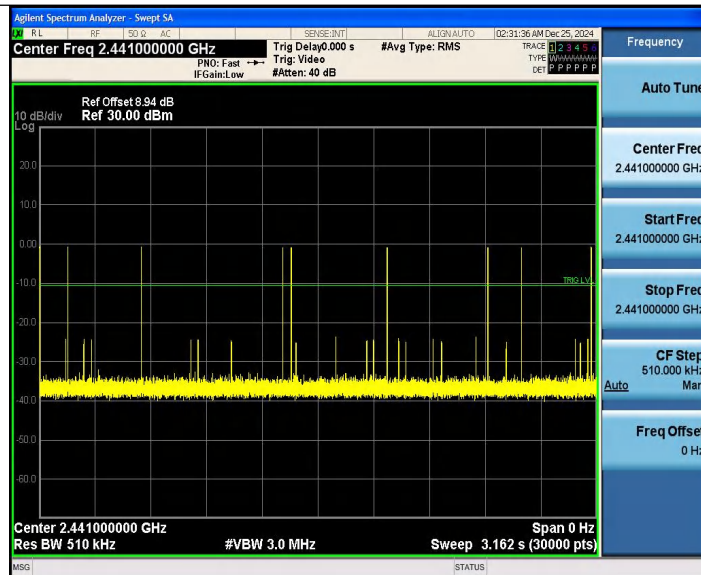
Test Graphs





3DH5 Ant1 Hop





4.5. MAXIMUM PEAK CONDUCTED OUTPUT POWER

4.5.1. Applicable Standard

According to FCC Part 15.247(b)(1) and KDB 558074 D01 15.247 Meas Guidance v05r02

4.5.2. Conformance Limit

The max For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

4.5.3. Test Configuration

Test according to clause 4.5.4 radio frequency test setup 1

4.5.4. Test Procedure

■ According to FCC Part15.247(b)(1)

As an alternative to a peak power measurement, compliance with the limit can be based on a measurement of the maximum conducted output power.

Use the following spectrum analyzer settings:

Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

Set RBW > the 20 dB bandwidth of the emission being measured

Set VBW $\geq$ RBW

Set Sweep = auto

Set Detector function = peak

Set Trace = max hold

Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission to determine the peak amplitude level.

Test Results

Test Mode	Antenna	Freq(MHz)	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	5.83	≤30	PASS
		2441	5.68	≤30	PASS
		2480	5.49	≤30	PASS
2DH5	Ant1	2402	6.95	≤20.97	PASS
		2441	6.53	≤20.97	PASS
		2480	6.30	≤20.97	PASS
3DH5	Ant1	2402	7.53	≤20.97	PASS
		2441	7.10	≤20.97	PASS
		2480	6.91	≤20.97	PASS

Test Graphs

DH5_Ant1_2402



DH5_Ant1_2441



DH5_Ant1_2480



2DH5 Ant1_2402



2DH5 Ant1_2441



2DH5 Ant1_2480



3DH5 Ant1_2402



3DH5 Ant1_2441



3DH5 Ant1_2480



4.6. CONDUCTED SUPRIIOUS EMISSION AND BAND EDGE

4.6.1. Applicable Standard

According to FCC Part 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02

4.6.2. Conformance Limit

According to FCC Part 15.247(d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted, provided the transmitter demonstrates compliance with the peak conducted power limits.

4.6.3. Test Configuration

Test according to clause 3.1 radio frequency test setup 1

4.6.4. Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

■ Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DSS channel center frequency.

Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel.

Set the RBW = 100 kHz. Set the VBW $\geq 3 \times$ RBW.

Set Detector = peak. Set Sweep time = auto couple.

Set Trace mode = max hold. Allow trace to fully stabilize.

Use the peak marker function to determine the maximum Maximum conduceted level.

Note that the channel found to contain the maximum conduceted level can be used to establish the reference level.

■ Band-edge Compliance of RF Conducted Emissions

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation

Set RBW $\geq 1\%$ of the span=100kHz Set VBW $\geq$ RBW

Set Sweep = auto Set Detector function = peak Set Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section.

Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize.

Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

■ Conduceted Spurious RF Conducted Emission

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.(30MHz to 26.5GHz). Set RBW = 100 kHz Set VBW $\geq$ RBW

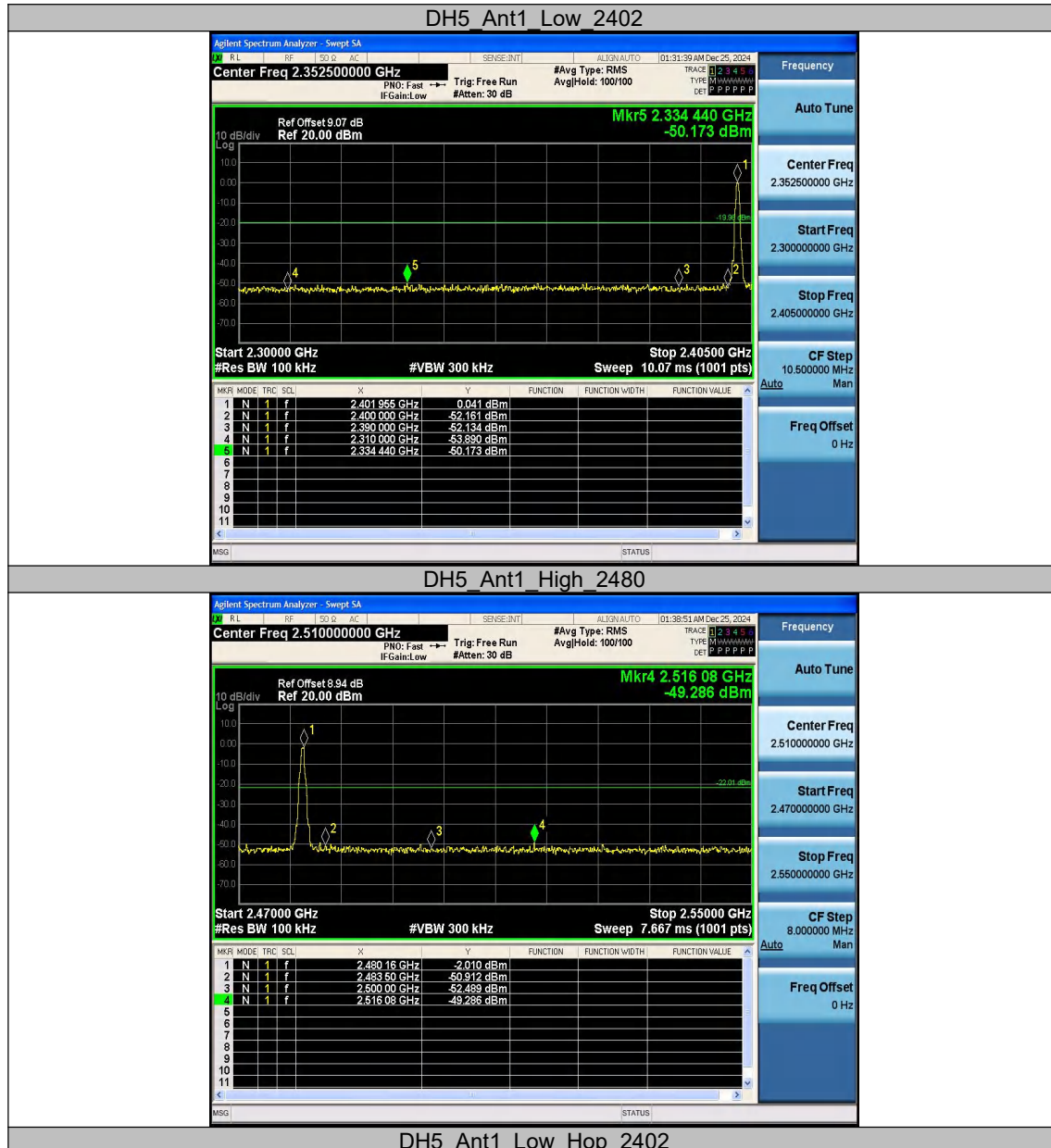
Set Sweep = auto Set Detector function = peak Set Trace = max hold

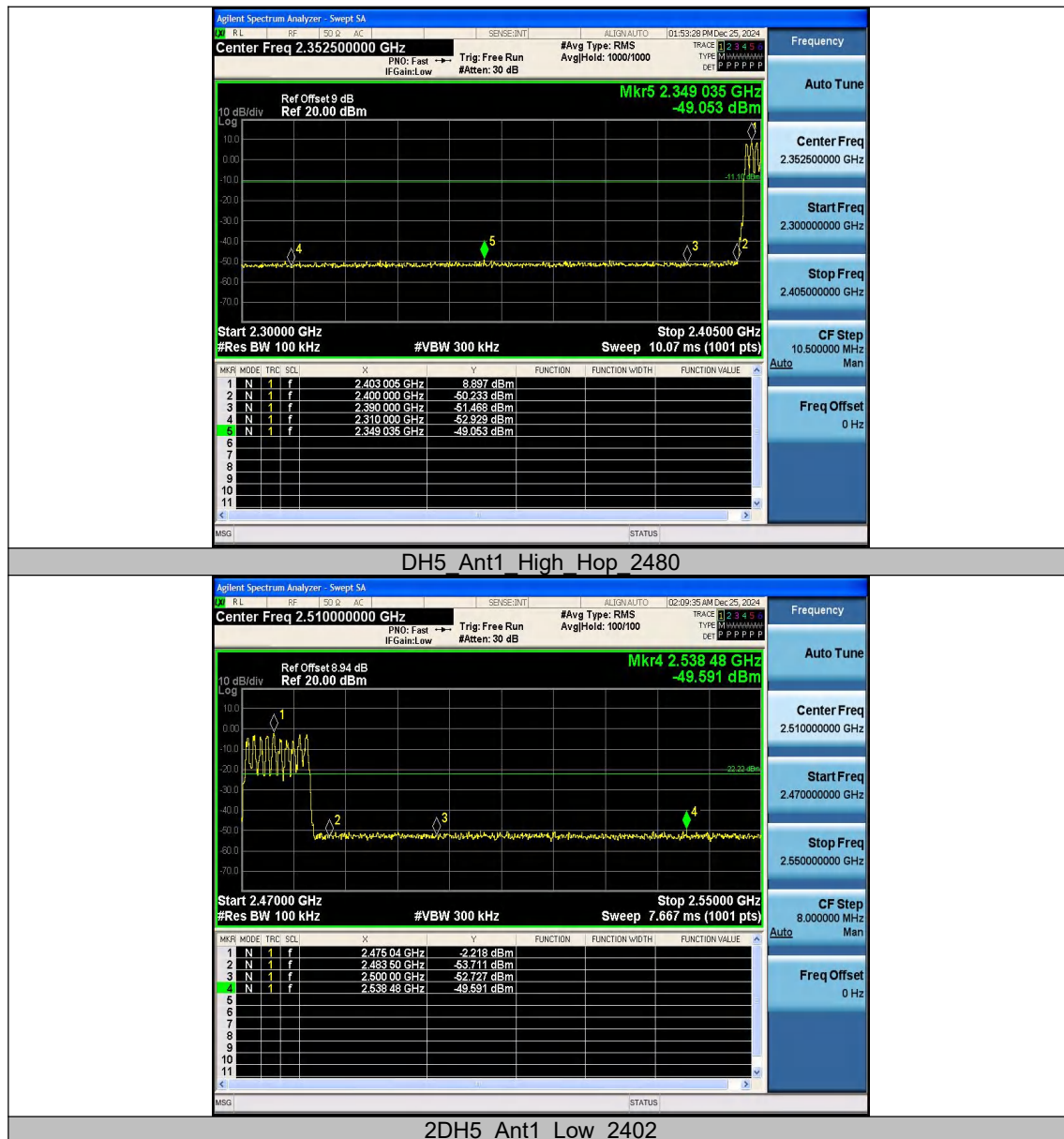
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.

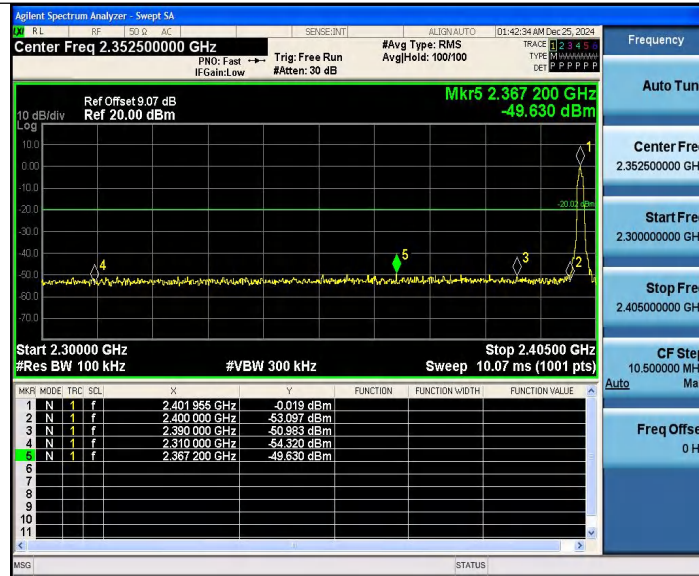
Test Results:

TestMode	Antenna	ChName	Freq(MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	0.04	-50.17	≤ -19.96	PASS
		High	2480	-2.01	-49.29	≤ -22.01	PASS
		Low	Hop_2402	8.90	-49.05	≤ -11.1	PASS
		High	Hop_2480	-2.22	-49.59	≤ -22.22	PASS
2DH5	Ant1	Low	2402	-0.02	-49.63	≤ -20.02	PASS
		High	2480	-1.73	-49.85	≤ -21.73	PASS
		Low	Hop_2402	7.11	-41.49	≤ -12.89	PASS
		High	Hop_2480	8.34	-49.56	≤ -11.66	PASS
3DH5	Ant1	Low	2402	0.41	-49.06	≤ -19.6	PASS
		High	2480	-1.83	-49.62	≤ -21.83	PASS
		Low	Hop_2402	9.00	-40.51	≤ -11	PASS
		High	Hop_2480	8.36	-48.92	≤ -11.64	PASS

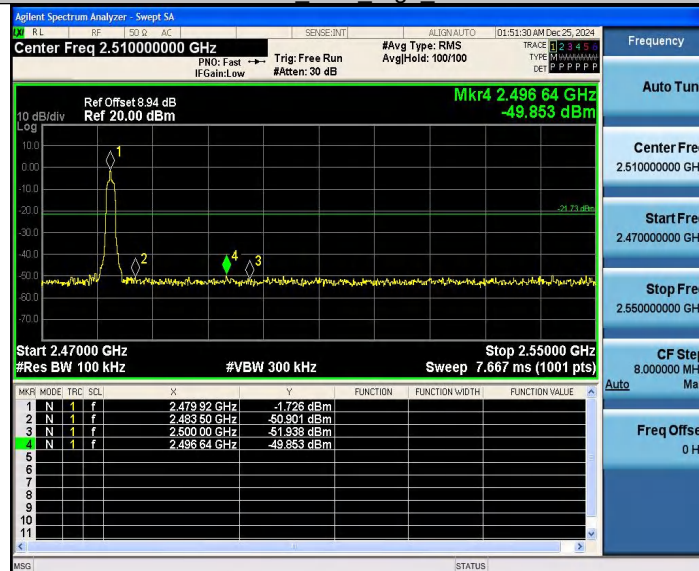
Test Graphs



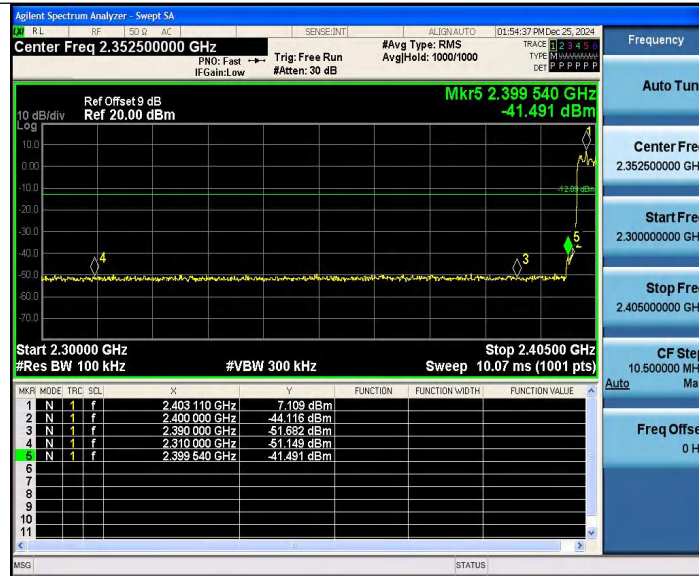




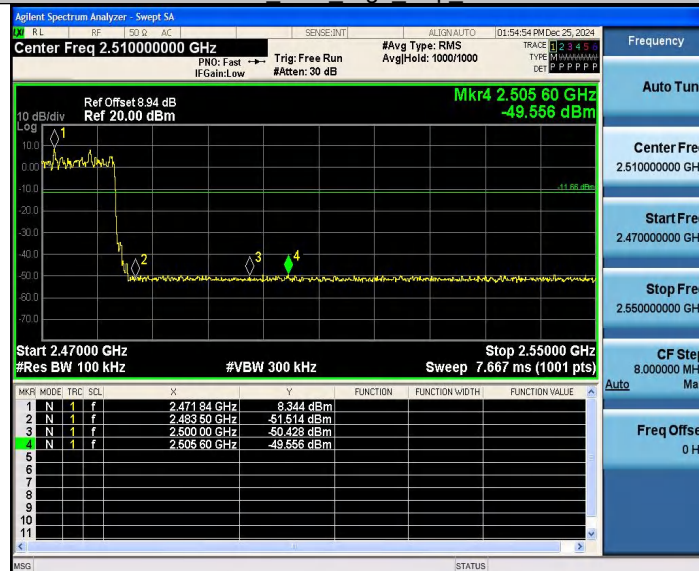
2DH5_Ant1_High_2480



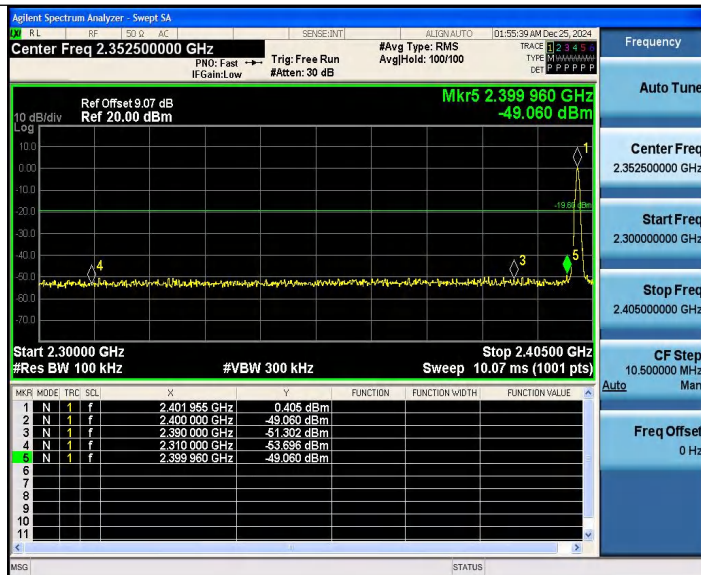
2DH5_Ant1_Low_Hop_2402



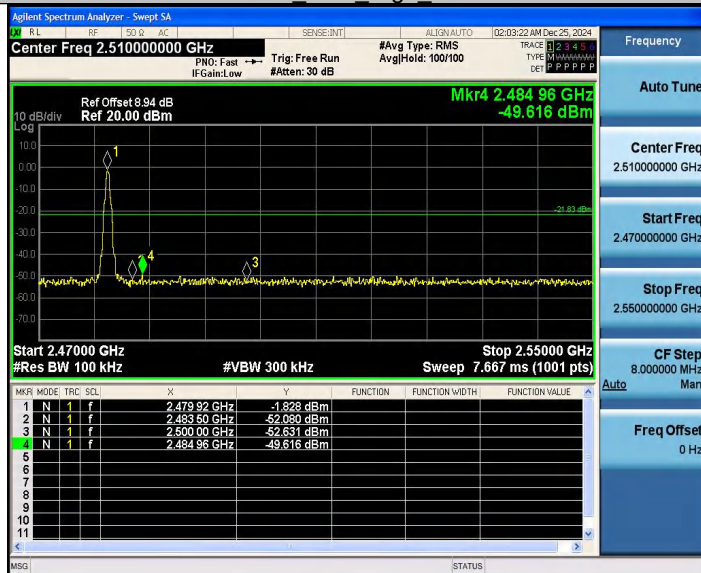
2DH5 Ant1 High Hop 2480



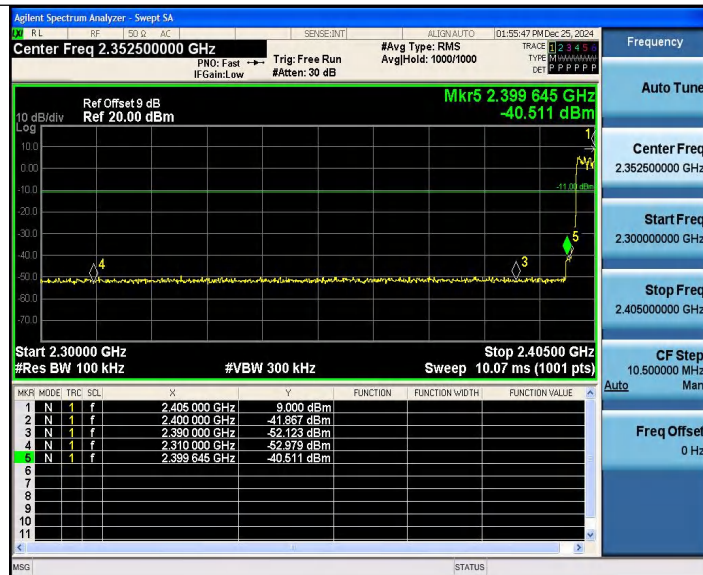
3DH5 Ant1 Low 2402



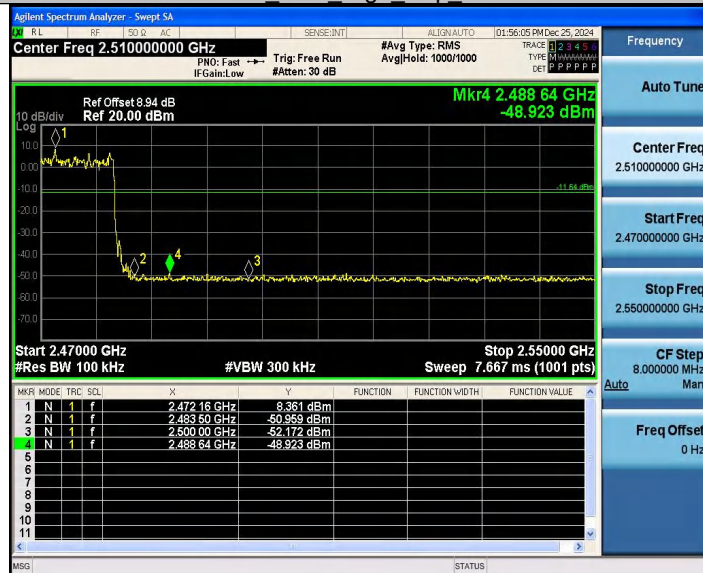
3DH5 Ant1_High_2480



3DH5_Ant1_Low_Hop_2402



3DH5 Ant1 High Hop 2480



DH5_Ant1_2402_0~Reference