



Test report No:
2590822R.701B

FCC TEST REPORT

Product Name	Barcode Scanner
Model and /or type reference	1972
Trademark	Honeywell
FCC ID	HD5-1972
Applicant's name / address	HONEYWELL INTERNATIONAL INC 9680 OLD BAILES RD FORT MILL SC 29707.USA
Test method requested, standard	47 CFR FCC Part 15 (Section 15.247) ANSI C63.10: 2020
Verdict Summary	IN COMPLIANCE
Tested by (name / position & signature)	Jun Xu/ Project Engineer 
Approved by (name / position & signature)	Frank He/Technical Manager 
Date of issue	2025-12-23
Report Version	V1.1
Report template No	Template_FCC Part 15C-RF-V1.0

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COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	Sep. 28, 2025
Date (start test)	Oct. 09, 2025
Date (finish test)	Oct. 26, 2025

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	: Equipment Under Test
QP	: Quasi-Peak
CAV	: CISPR Average
AV	: Average
CDN	: Coupling Decoupling Network
SAC	: Semi-Anechoic Chamber
OATS	: Open Area Test Site
BW	: Bandwidth
AM	: Amplitude Modulation
PM	: Pulse Modulation
HCP	: Horizontal Coupling Plane
VCP	: Vertical Coupling Plane
U_N	: Nominal voltage
T_x	: Transmitter
R_x	: Receiver
N/A	: Not Applicable
N/M	: Not Measured

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
2590822R.701B	V1.0	Initial issue of report.	2025-11-24
2590822R.701B	V1.1	Page11 modified the antenna gain. (Test report 2590822R.701B V1.1 replaces test report 2590822R.701B V1.0, and test report 2590822R.701B V1.0 is invalid)	2025-12-23

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with 47 CFR FCC Part 15 (Section 15.247).
3. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
4. The test results presented in this report relate only to the object tested.
5. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
6. This report will not be used for social proof function in China market.
7. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:
 - Chapter 1.1 General Description of the Item(s);
 - Chapter 1.2 Channel List.

USED EQUIPMENT

Conducted Test/ TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date	Firmware Version	Software version
Wireless Connectivity Tester	R&S	CMW 270	102593	2025.05.10	2026.05.09	V 4.0.60	N/A
Coaxial Cable	N/A	N/A	2477	2025.06.10	2026.06.09	N/A	N/A
Coaxial Cable	N/A	N/A	2478	2025.06.10	2026.06.09	N/A	N/A
High and low temperature and fast temperature change test box	ASTUOD	ASTD-FBT-225K	N/A	2025.03.16	2026.03.15	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	RF07	2025.06.17	2026.06.16	N/A	N/A

Test system

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date	Firmware Version	Software version
Spectrum Analyzer	Agilent	N9010A	MY48030494	2025.09.20	2026.09.19	A.14.03	N/A
RF Control Unit	Tonscend	JS0806-2	22G8060594	2025.01.26	2026.01.25	N/A	N/A
Vector Signal Generator	R&S	SMM 100A	101853	2025.09.20	2026.09.19	5.00.166.23	N/A
EXG-B MW Analog Signal Generator	Keysight	N5173B	MY61252566	2025.05.10	2026.05.09	B.01.95	N/A
Test Software	Tonscend	TS1120	JS1120-3	N/A	N/A	N/A	V3.0.22

Radiated Emission(9KHz-1GHz) / AC2

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date	Firmware Version	Software version
EMI Test Receiver	R&S	ESCI	100573	2025.01.11	2026.01.10	4.42 SP3	N/A
Loop Antenna	R&S	HFH2-Z2E	101149	2025.04.16	2026.04.15	N/A	N/A
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2025.03.24	2026.03.23	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	AC2-TH	2025.06.17	2026.06.16	N/A	N/A
Coaxial Cable	Huber+Suhner	RTS-1909	THM-021	2025.04.30	2026.04.29	N/A	N/A
Anechoic chamber	Quietek	9m*6m*6m	AC2	2024.07.07	2029.07.06	N/A	N/A
Dekra test software	Dekra	N/A	N/A	N/A	N/A	N/A	3

Radiated Emission (1GHz-40GHz) / AC6

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date	Firmware Version	Software version
Signal analyzer	Agilent	N9020A	MY49100159	2025.05.10	2026.05.09	A 08.54	N/A
Power Amplifier	MVE	MPC1018.50	C30002D	2025.05.17	2026.05.16	N/A	N/A
DRG Horn Antenna	RFSPIN	DRH18-E	CE2C07A18EN	2024.12.07	2025.12.06	N/A	N/A
Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9170	750	2024.11.24	2025.11.23	N/A	N/A
Pre-Amplifier	Schwarzbeck	BBV 9721	00114	2025.05.17	2026.05.16	N/A	N/A
TRILOG Broadband Antenna	SCHWARZBECK	VULB 9168	1231	2025.05.28	2026.05.27	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	RF04	2025.06.17	2026.06.16	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2025.06.17	2026.06.16	N/A	N/A
Anechoic chamber	Quietek	9m*5.5m*5.5m	AC6	2024.06.30	2029.06.29	N/A	N/A
Test Software	Tonscend	JS36	JS36-RSE	N/A	N/A	N/A	5.0.0

UNCERTAINTY

Uncertainties have been calculated according to the DEKRA internal document. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%. The Uncertainties is comply with standard required as below.

Test item Test Location	Uncertainty
AC Power Line Conducted Emission	± 2.92 dB
Peak Power Output	± 1.13 dB
Radiated Emission(30MHz~1GHz)	Horizontal: 30MHz~200MHz: 4.60 dB 200MHz~1GHz: 4.10 dB Vertical: 30MHz~200MHz: 4.80 dB 200MHz~1GHz: 4.10 dB
Radiated Emission(1GHz~40GHz)	Horizontal: 1GHz~18GHz: 5.00 dB Vertical: 1GHz~18GHz: 4.80 dB Horizontal: 18GHz~40GHz: 4.70 dB Vertical: 18GHz~40GHz: 4.60 dB
RF antenna conducted test	± 1.13 dB
Radiated Emission Band Edge	± 5.00 dB
DTS Bandwidth	± 279 Hz
Occupied Bandwidth	± 279 Hz
Power Density	± 1.13 dB

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Product Name:	Barcode Scanner					
Model Name:	1972					
Trademark.:	Honeywell					
FCC ID:	HD5-1972					
Power Supply:	3.635Vdc					
Hardware Version:	N/A					
Software Version:	N/A					
Manufacturer:	HONEYWELL INTERNATIONAL INC					
Manufacturer Address:	9680 OLD BAILES RD FORT MILL SC 29707.USA					
Test Matrix/ IMEI:	RF Conducted	#1				
	RSE	#2				
Wireless specification:	Bluetooth (BR/EDR)					
Operating frequency range(s):	2402~2480MHz					
Type of Modulation:	GFSK & DPSK					
PHYs:	☒	GFSK	☒	Pi/4 DQPSK	☒	8DPSK
Data Rate:	☒	1Mbit/s	☒	2Mbit/s	☒	3Mbit/s
Number of channels:	79					
Antenna Type:	Chip Antenna					
Antenna Gain:	1.66dBi					

Remark:

As above information is provided and confirmed by the applicant. DEKRA is not liable to the accuracy, suitability, reliability or/and integrity of the information.

1.2 Channel List

Bluetooth Working Frequency of Each Channel: (For FHSS)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2403 MHz	02	2404 MHz	03	2405 MHz
04	2406 MHz	05	2407 MHz	06	2408 MHz	07	2409 MHz
08	2410 MHz	09	2411 MHz	10	2412 MHz	11	2413 MHz
12	2414 MHz	13	2415 MHz	14	2416 MHz	15	2417 MHz
16	2418 MHz	17	2419 MHz	18	2420 MHz	19	2421 MHz
20	2422 MHz	21	2423 MHz	22	2424 MHz	23	2425 MHz
24	2426 MHz	25	2427 MHz	26	2428 MHz	27	2429 MHz
28	2430 MHz	29	2431 MHz	30	2432 MHz	31	2433 MHz
32	2434 MHz	33	2435 MHz	34	2436 MHz	35	2437 MHz
36	2438 MHz	37	2439 MHz	38	2440 MHz	39	2441 MHz
40	2442 MHz	41	2443 MHz	42	2444 MHz	43	2445 MHz
44	2446 MHz	45	2447 MHz	46	2448 MHz	47	2449 MHz
48	2450 MHz	49	2451 MHz	50	2452 MHz	51	2453 MHz
52	2454 MHz	53	2455 MHz	54	2456 MHz	55	2457 MHz
56	2458 MHz	57	2459 MHz	58	2460 MHz	59	2461 MHz
60	2462 MHz	61	2463 MHz	62	2464 MHz	63	2465 MHz
64	2466 MHz	65	2467 MHz	66	2468 MHz	67	2469 MHz
68	2470 MHz	69	2471 MHz	70	2472 MHz	71	2473 MHz
72	2474 MHz	73	2475 MHz	74	2476 MHz	75	2477 MHz
76	2478 MHz	77	2479 MHz	78	2480 MHz	N/A	N/A

Note: The General Description of the Item, Channel List in clause 1 are provided and confirmed by the client.

2 DESCRIPTION OF TEST SETUP

2.1 Auxiliary equipment /Accessories/Test software for the EUT

Auxiliary equipment	Type / Version	Manufacturer	Supplied by
(1) N/A	N/A	N/A	N/A
(2) N/A	N/A	N/A	N/A
(3) N/A	N/A	N/A	N/A
software	Type / Version		
N/A	N/A		

2.2 Power setting in test

Mode	Channel	Frequency (MHz)	Power Setting
DH5	00	2402	default
	39	2441	default
	78	2480	default
2DH5	00	2402	default
	39	2441	default
	78	2480	default
3DH5	00	2402	default
	39	2441	default
	78	2480	default

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
CFR 47, FCC Part 15 C	2024	Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.
ANSI C63.10	2020	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards: N/A.

(Please define the deviations from the standard(s) if applicable)

3.3 Overview of results

Requirement – Test Item of FCC	Standard(s)	Verdict	Remark
20dB Emission Bandwidth	FCC 15.247(a)(1)	PASS	Test data please refer to Appendix A
Maximum conducted output power	FCC 15.247(b)(1)	PASS	Test data please refer to Appendix B
Carrier Frequency Separation	FCC 15.247(a)(1)	PASS	Test data please refer to Appendix C
Time of Occupancy (Dwell Time)	FCC 15.247(a)(1)(iii)	PASS	Test data please refer to Appendix D
Number of Hopping Frequencies	FCC 15.247(a)(1)(iii)	PASS	Test data please refer to Appendix E
Band edge measurements	FCC 15.247(d)	PASS	Test data please refer to Appendix F
Conducted Spurious Emission	FCC 15.247(d), FCC 15.209	PASS	Test data please refer to Appendix G
Duty Cycle	ANSI C63.10:2020	PASS	Test data please refer to Appendix H
Emissions in Restricted Bands	FCC 15.247(b)(3)	PASS	Test data please refer to Appendix I
AC Power Line Conducted Emission	FCC 15.207	N/A	Not applicable, EUT is battery operated.
Antenna Requirement	FCC 15.203	PASS	---
Note: The radiation measurement is pre tested under X, Y, and Z axis positioning to find the worst placement for final testing.			

3.4 Test Facility

Tset Location	: FCC Designation Number: CN1199
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4 TEST ITEMS OF LIMIT/SETUP/PROCEDURE

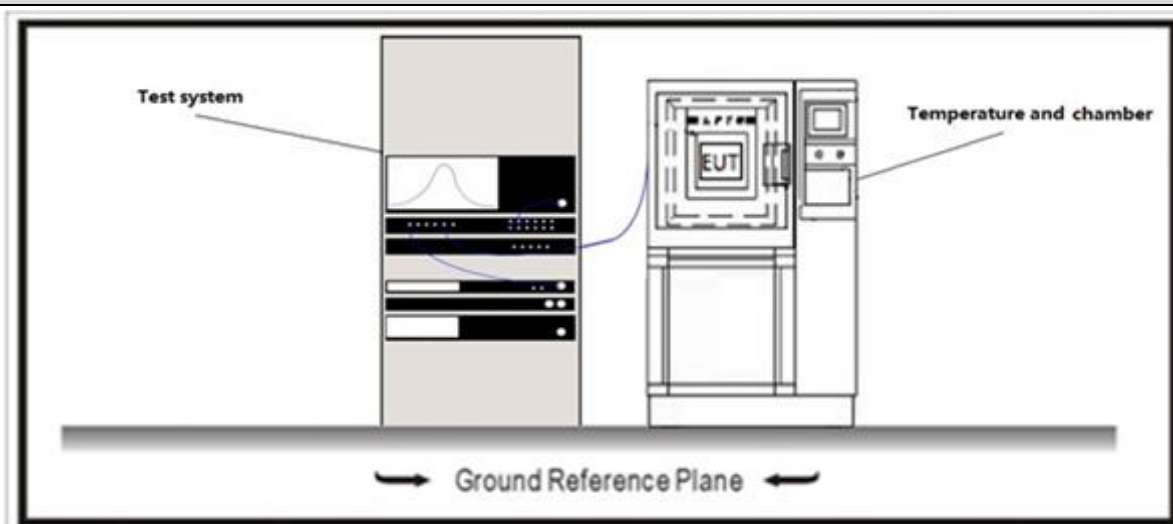
4.1 20dB Emission Bandwidth

VERDICT: PASS

4.1.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247(a)
☒	For frequency hopping systems operating in 2400-2483.5 MHz band, within frequency range.
☐	For frequency hopping systems operating in 902-928 MHz band, the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
☐	For frequency hopping systems operating in 5725-5850 MHz band, the maximum 20 dB bandwidth of the hopping channel is 1 MHz.

4.1.2 Test Setup

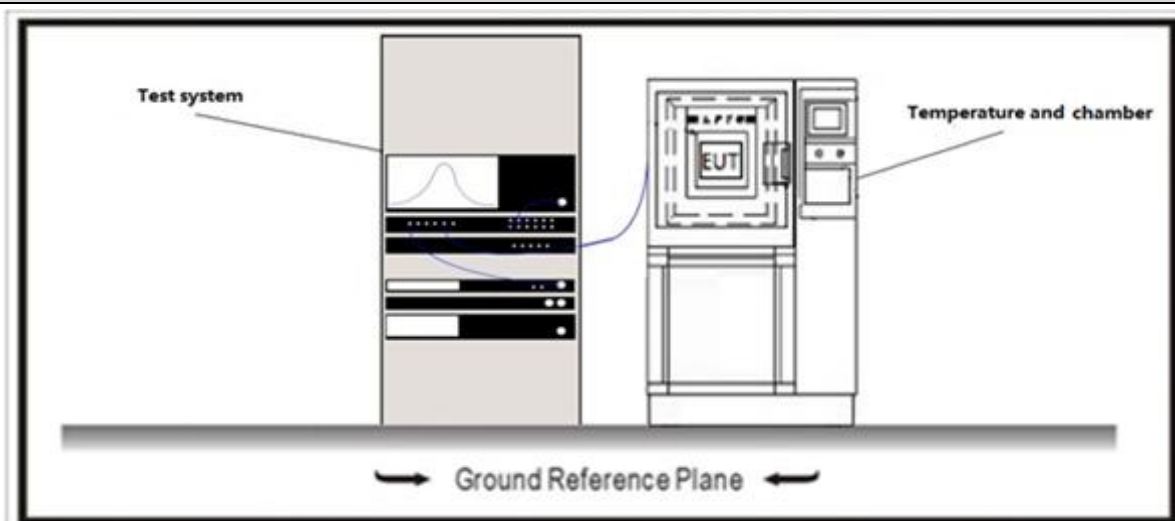


4.1.3 Test Procedure

References Rule	Chapter	Description
☒ ANSI C63.10	6.9	Occupied bandwidth tests
☒ ANSI C63.10	6.9.2	Occupied bandwidth—relative measurement procedure

4.2 Maximum Conducted Output Power**VERDICT: PASS****4.2.1 Limit**

Standard	FCC Part 15 Subpart C Paragraph 15.247(b);
☒	Frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
☒	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.
☐	For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels

4.2.2 Test Setup**4.2.3 Test Procedure**

	References Rule	Chapter	Description
☒	ANSI C63.10	7.8	Evaluation of frequency-hopping device parameters
☒	ANSI C63.10	7.8.5	Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices

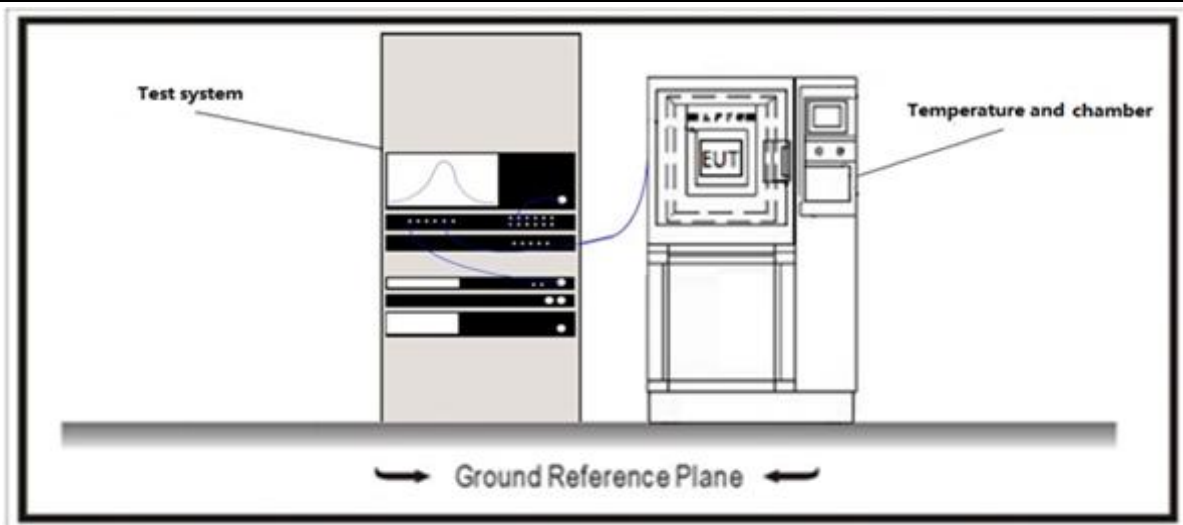
4.3 Carrier Frequency Separation

VERDICT: PASS

4.3.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247(a);
☐	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.
☒	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.
☐	The 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period;
☐	The 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
☐	Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz.

4.3.2 Test Setup



4.3.3 Test Procedure

References Rule	Chapter	Description
☒ ANSI C63.10	7.8	Evaluation of frequency-hopping device parameters
☒ ANSI C63.10	7.8.2	Carrier frequency separation

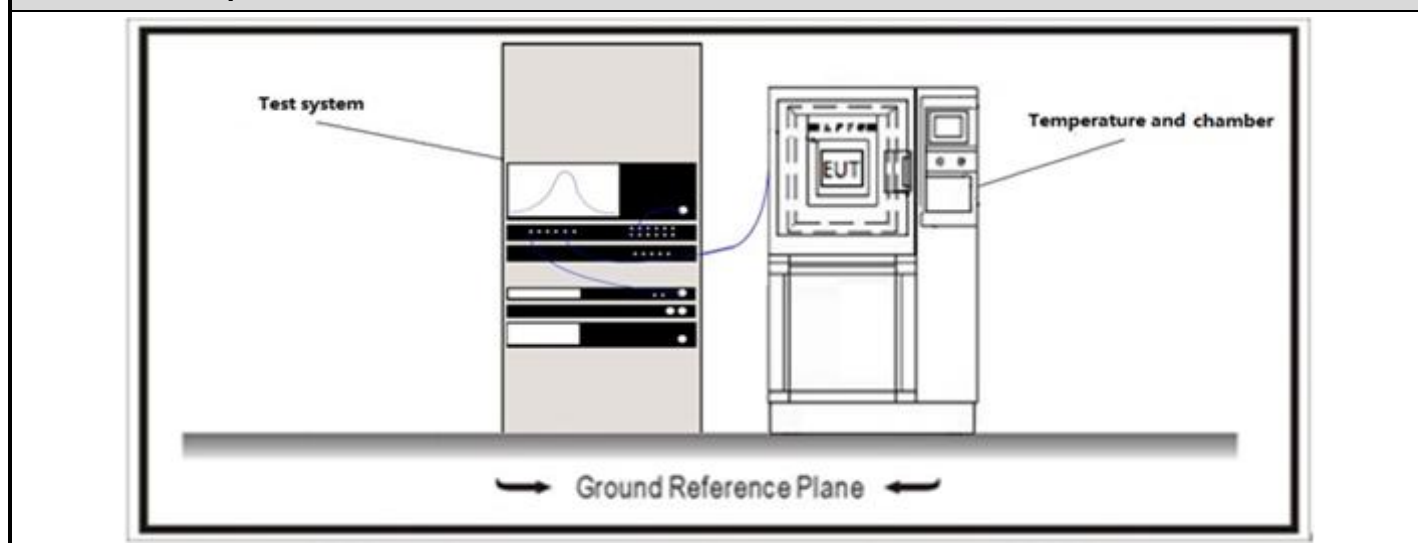
4.4 Time of Occupancy

VERDICT: PASS

4.4.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247(a);
☒	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
☐	For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period
☐	For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.
☐	Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

4.4.2 Test Setup

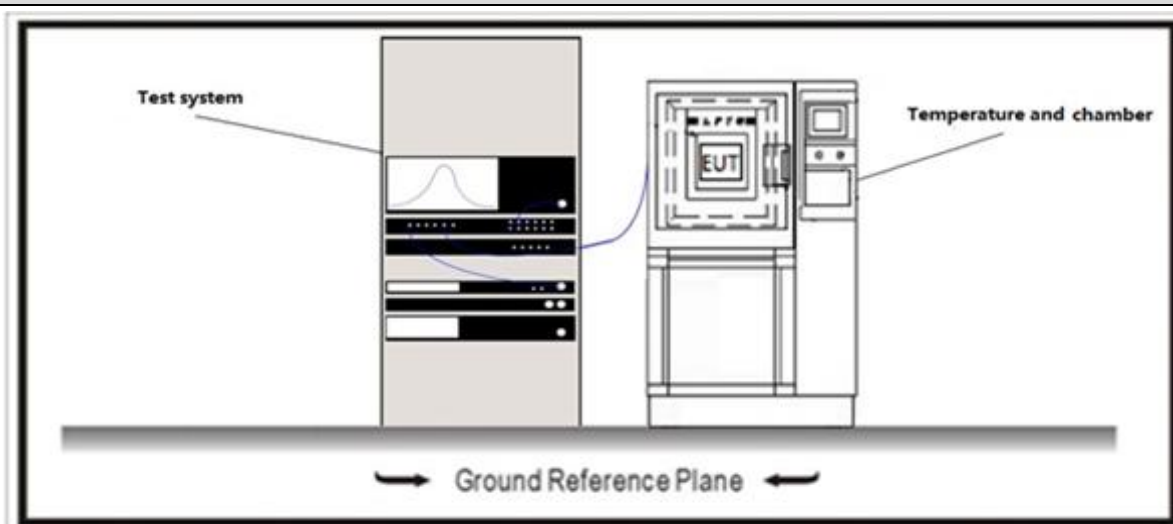


4.4.3 Test Procedure

References Rule	Chapter	Description
☒ ANSI C63.10	7.8	Evaluation of frequency-hopping device parameters
☒ ANSI C63.10	7.8.4	Time of occupancy (dwell time)

4.5 Number of hopping Frequencies**VERDICT: PASS****4.5.1 Limit**

Standard	FCC Part 15 Subpart C Paragraph 15.247(a);
☒	For frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.
☐	For frequency hopping systems operating in 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is less than 250 kHz, shall use at least 50 hopping frequencies.
☐	For frequency hopping systems operating in 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is higher than 250 kHz, shall use at least 25 hopping frequencies.
☐	For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.

4.5.2 Test Setup**4.5.3 Test Procedure**

References Rule	Chapter	Description
☒ ANSI C63.10	7.8.	Evaluation of frequency-hopping device parameters
☒ ANSI C63.10	7.8.3	Number of Hopping Frequencies

4.6 Band edge measurements

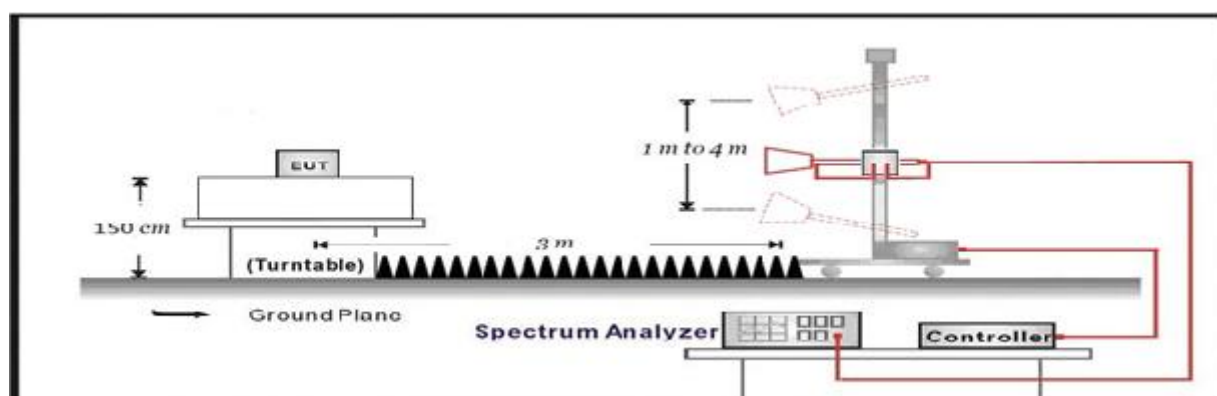
VERDICT: PASS

4.6.1 Limit

Standard		FCC Part 15 Subpart C Paragraph 15.247(d) , 15.209;		
Frequency bands (MHz)	Detector	Limit (dB μ V/m)	RBW (MHz)	Distance (m)
2310-2390	PK	74	1	3
2483.5-2500	AV	54	1	3

Note: The field strength of emissions appearing within these frequency bands shall not exceed the limits.

4.6.2 Test Setup



4.6.3 Test Procedure

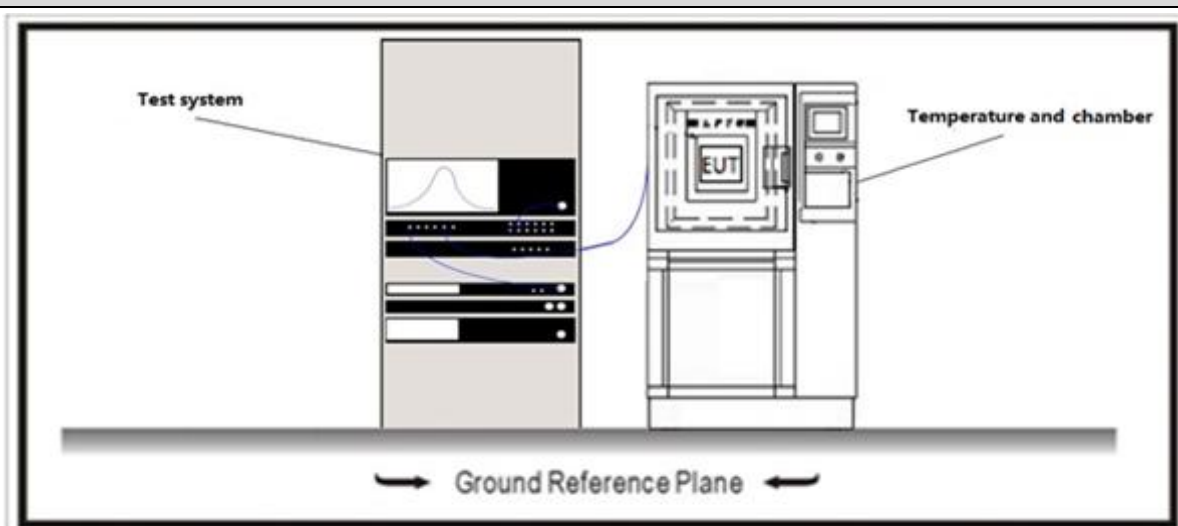
Test Method			
	References Rule	Chapter	Description
☐	DA 00-705	N/A	duty cycle correction factor
☒	ANSI C63.10	6.10	Band-edge testing
☒	ANSI C63.10	6.10.5	Restricted-band band-edge measurements
☐	ANSI C63.10	6.10.6	Marker-delta method
☐	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
☐	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
☐	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

4.7 Conducted Spurious Emission**VERDICT: PASS****4.7.1 Limit**

Standard	FCC Part 15 Subpart C Paragraph 15.247(d);	
RF Output power (Detection methods)	Limit(dB)	
RF Output power(Average detector)	30dBc(Note1)	
RF Output power(PK detector)	20dBc(Note2)	

Note 1: If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

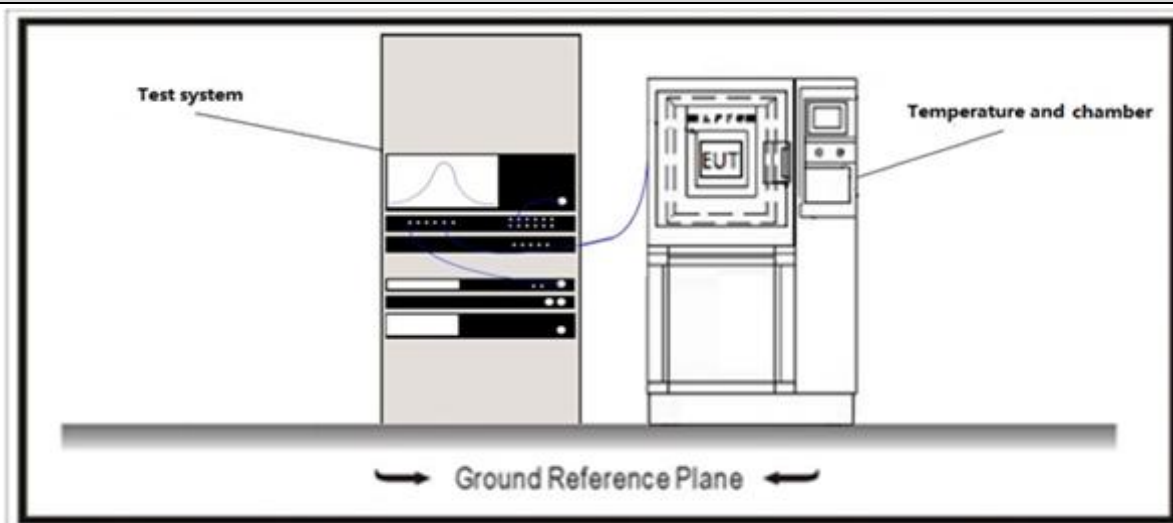
Note 2: If the maximum peak conducted output power procedure was used, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

4.7.2 Test Setup**4.7.3 Test Procedure**

References Rule		Chapter	Description
☒	ANSI C63.10	7.8.7	Conducted spurious emissions test methodology
☒	ANSI C63.10	7.8.7.1	General considerations
☒	ANSI C63.10	7.8.7.2	Band-edges

4.8 Duty cycle**VERDICT: PASS****4.8.1 Limit**

N/A

4.8.2 Test Setup**4.8.3 Test Procedure**

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

- a) A diode detector and an oscilloscope that together have a sufficiently short response time to permit accurate measurements of the ON and OFF times of the transmitted signal.
- b) The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:
 - 1) Set the center frequency of the instrument to the center frequency of the transmission.
 - 2) Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value.
 - 3) Set $VBW \geq RBW$. Set detector = peak or average.
 - 4) The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if $T \leq 16.7 \mu s$.)

4.9 Emissions in Restricted Bands**VERDICT: PASS****4.9.1 Limit****Standard** FCC Part 15 Subpart C Paragraph 15.205

Restricted Bands of operation

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.81425 – 8.81475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4	3600 – 4400	
13.36 – 13.41			

Restricted Band Emissions Limit

FCC Part 15 Subpart C Paragraph 15.209

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300 ^(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 ^(Note 1)
1.705 - 30	30	29.5	30 ^(Note 1)
30 - 88	100	40	3 ^(Note 2)
88 - 216	150	43.5	3 ^(Note 2)
216 - 960	200	46	3 ^(Note 2)
Above 960	500	54	3 ^(Note 2)

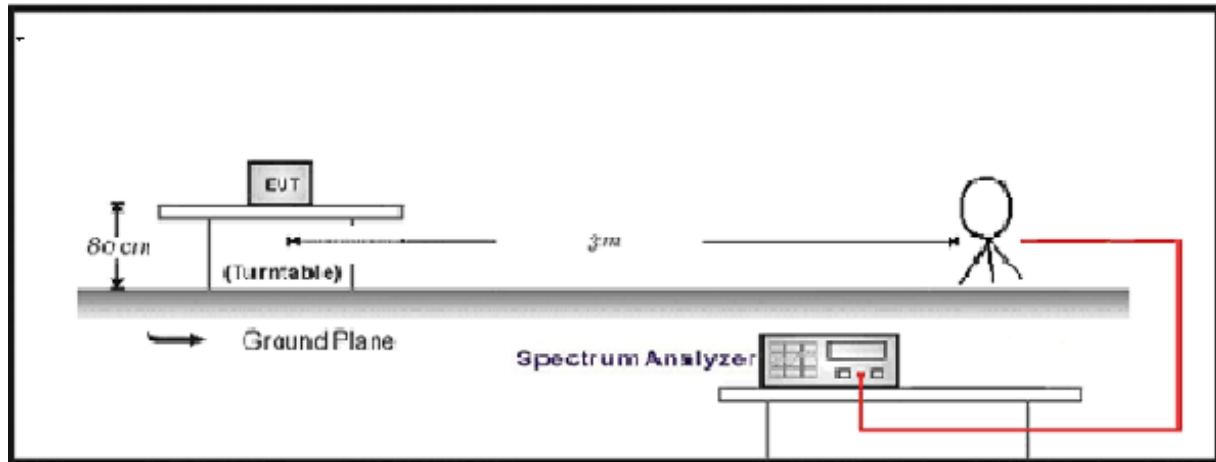
Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results

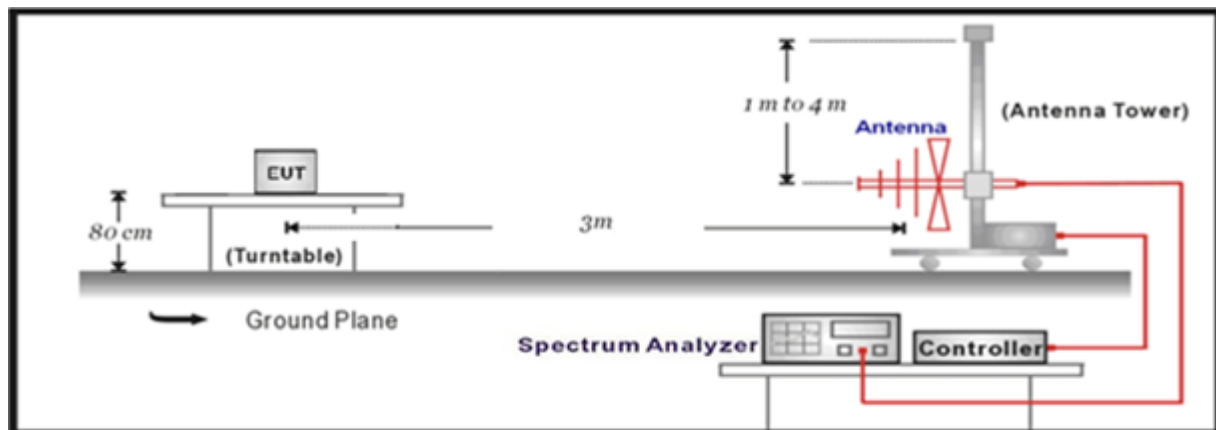
shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

4.9.2 Test Setup

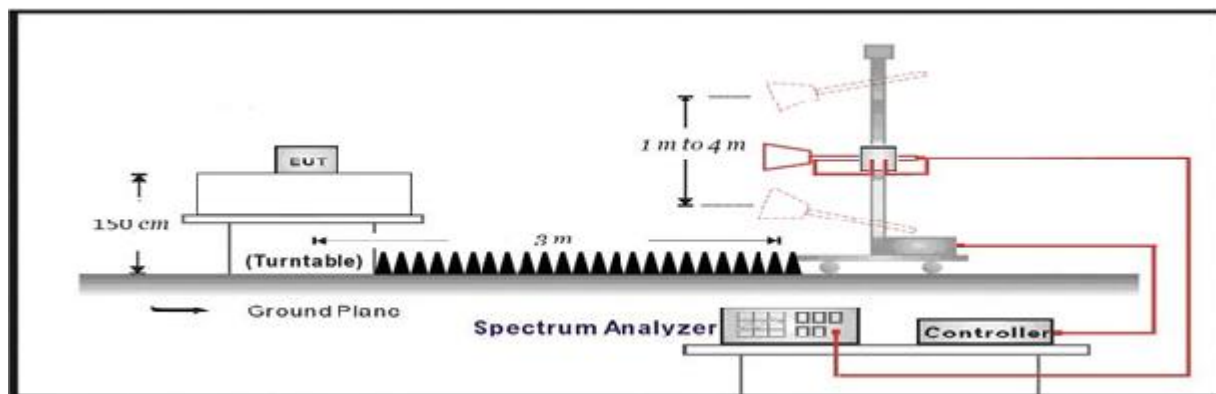
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



4.9.3 Test Procedure

	References Rule		Chapter	Description
☒	ANSI C63.10		11.12	Emissions in restricted frequency bands
	☒	ANSI C63.10	11.12.1	Radiated emission measurements
	☒	ANSI C63.10	11.12.2.7	Radiated spurious emission test
	☒	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
	☒	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
	☒	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

4.10 AC Power Line Conducted Emission**VERDICT: N/A****4.10.1 Limit**

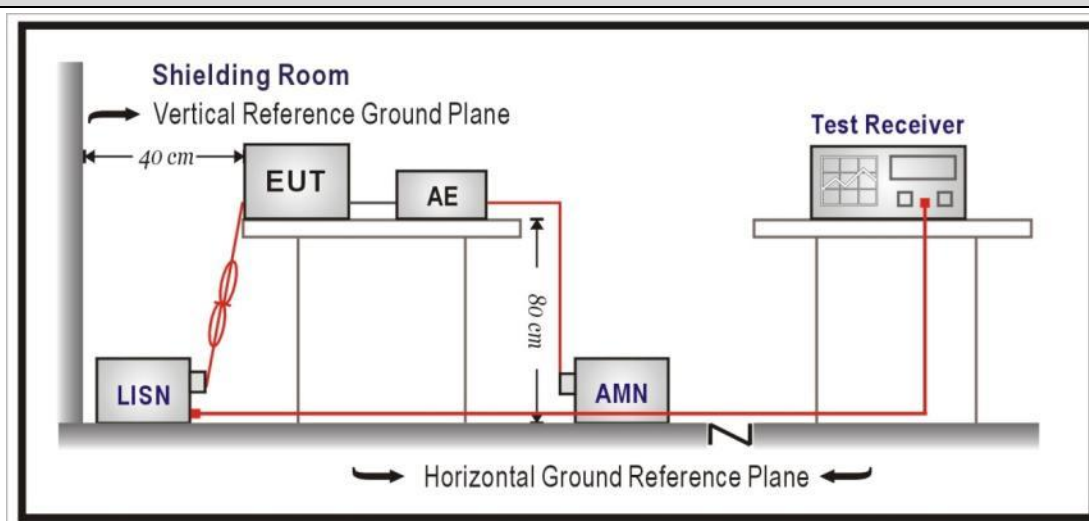
Standard	FCC Part 15 Subpart C Paragraph 15.207 ;	
Frequency range [MHz]	Limit: QP [dB(μV) ¹⁾]	Limit: AV [dB(μV) ¹⁾]
0,15 - 0,50	66 - 56 ²⁾	56 - 46 ²⁾
0,50 - 5,0	56	46
5,0 - 30	60	50

¹⁾ At the transition frequency, the lower limit applies.

²⁾ The limit decreases linearly with the logarithm of the frequency.

NOTE 1: The exclusion band for transmitters shall be considered for transmitters operating at frequencies below 30 MHz.

NOTE 2: Where the AC output port is directly connected (or via a circuit breaker) to the AC power input port of the EUT the AC power output port need not to be tested.

4.10.2 Test Setup**4.10.3 Test Procedure**

	References Rule	Chapter	Item
☐	ANSI C63.10	6.2	Standard test method for ac power-line conducted emissions from unlicensed wireless devices

4.11 Antenna Requirement**VERDICT: PASS****4.11.1 Limit****Standard**

FCC Part 15 Subpart C Paragraph 15.247(d) , 15.209

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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

4.11.2 Antenna Connector Construction:

- | | |
|-------------------------------------|--|
| ☒ | The use of a permanently attached antenna |
| ☐ | The antenna use of a unique coupling to the intentional radiator |
| ☐ | The use of a nonstandard antenna jack or electrical connector |

Please refer to the attached document "Internal Photograph" to show the antenna connector.

5 TEST SETUP PHOTO AND EUT PHOTO

Remark: The test setup photo and EUT Photo please see appendix.

6 TEST RESULT

Appendix A: 20dB Emission Bandwidth

TestMode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.957	2401.538	2402.495	---	---
		2441	0.957	2440.538	2441.495	---	---
		2480	0.957	2479.538	2480.495	---	---
2DH5	Ant1	2402	1.386	2401.313	2402.699	---	---
		2441	1.383	2440.313	2441.696	---	---
		2480	1.377	2479.313	2480.690	---	---
3DH5	Ant1	2402	1.365	2401.319	2402.684	---	---
		2441	1.368	2440.319	2441.687	---	---
		2480	1.353	2479.319	2480.672	---	---

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



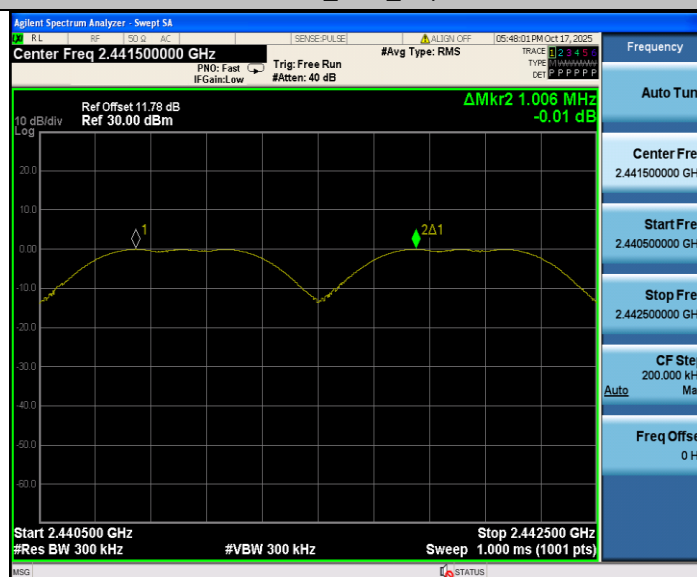
Appendix B: Maximum conducted output power

Test Mode	Antenna	Frequency[MHz]	Conducted Avg Power[dBm]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	1.76	2.60	≤30	PASS
		2441	0.98	1.72	≤30	PASS
		2480	0.18	0.71	≤30	PASS
2DH5	Ant1	2402	2.15	5.03	≤30	PASS
		2441	1.29	4.66	≤30	PASS
		2480	0.44	3.7	≤30	PASS
3DH5	Ant1	2402	0.74	5.58	≤30	PASS
		2441	1.38	5.37	≤30	PASS
		2480	0.54	4.51	≤30	PASS

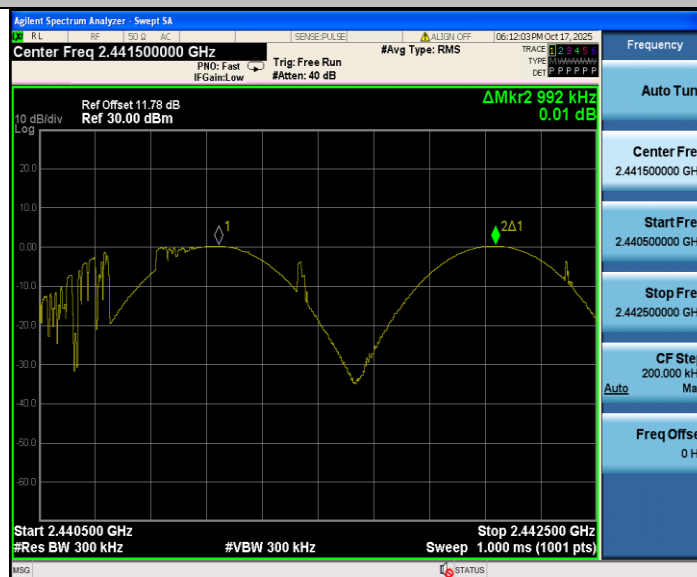
Appendix C: Carrier frequency separation

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.006	≥ 0.957	PASS
2DH5	Ant1	Hop	0.992	≥ 0.924	PASS
3DH5	Ant1	Hop	1.19	≥ 0.912	PASS

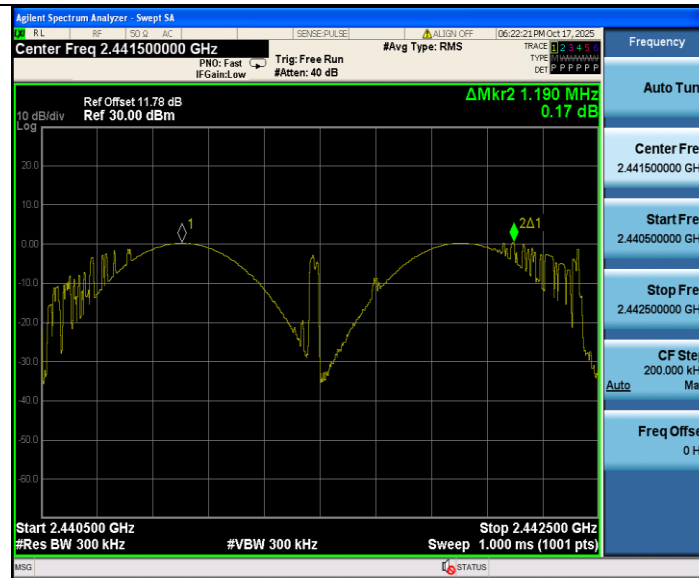
DH5_Ant1_Hop



2DH5_Ant1_Hop



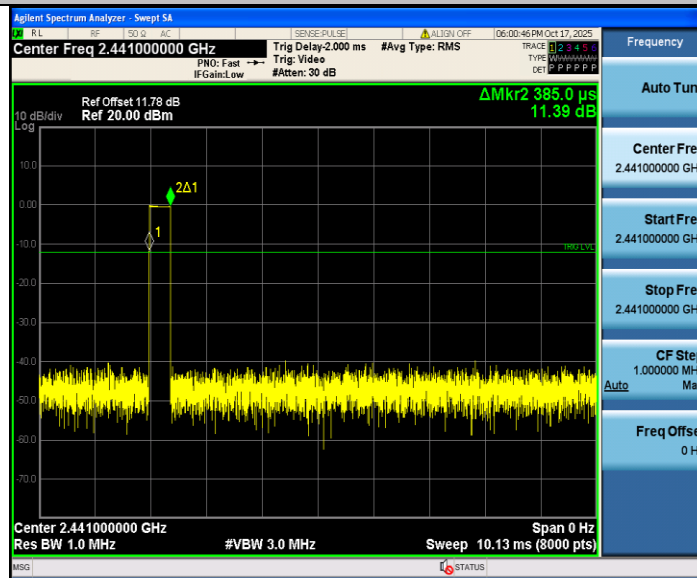
3DH5_Ant1_Hop



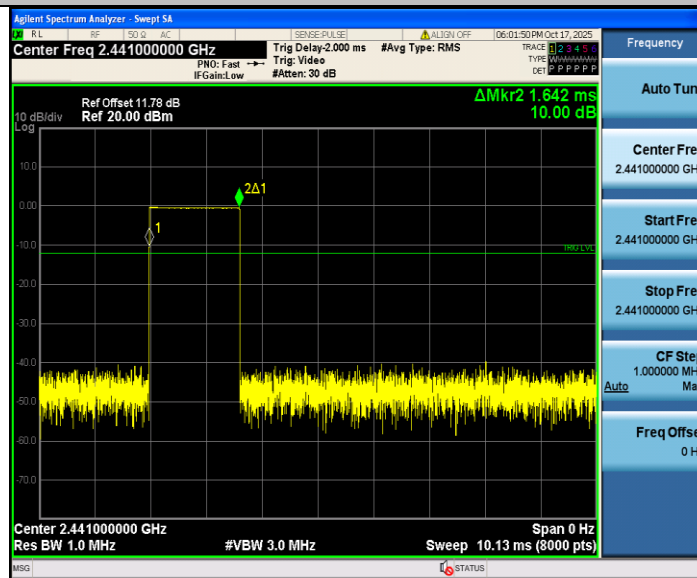
Appendix D: Time of occupancy

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.385	320	0.123	≤0.4	PASS
DH3	Ant1	Hop	1.642	160	0.263	≤0.4	PASS
DH5	Ant1	Hop	2.891	106.67	0.308	≤0.4	PASS
2DH1	Ant1	Hop	0.391	320	0.125	≤0.4	PASS
2DH3	Ant1	Hop	1.644	160	0.263	≤0.4	PASS
2DH5	Ant1	Hop	2.891	106.67	0.308	≤0.4	PASS
3DH1	Ant1	Hop	0.391	320	0.125	≤0.4	PASS
3DH3	Ant1	Hop	1.642	160	0.263	≤0.4	PASS
3DH5	Ant1	Hop	2.894	106.67	0.309	≤0.4	PASS

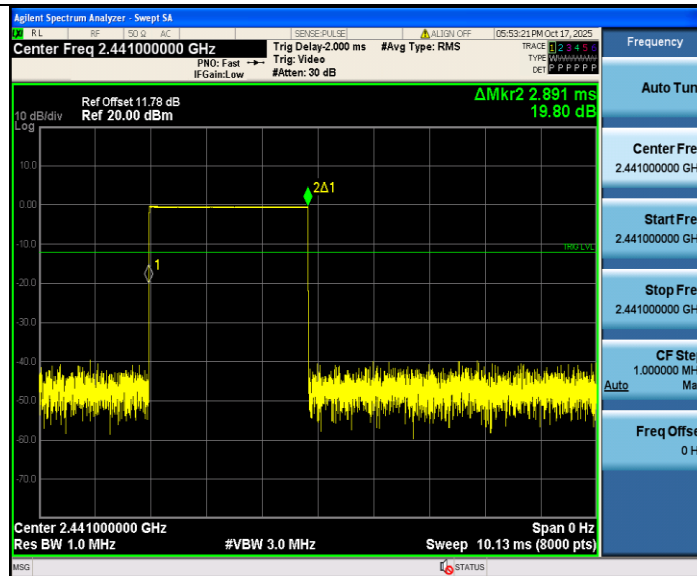
DH1_Ant1_Hop



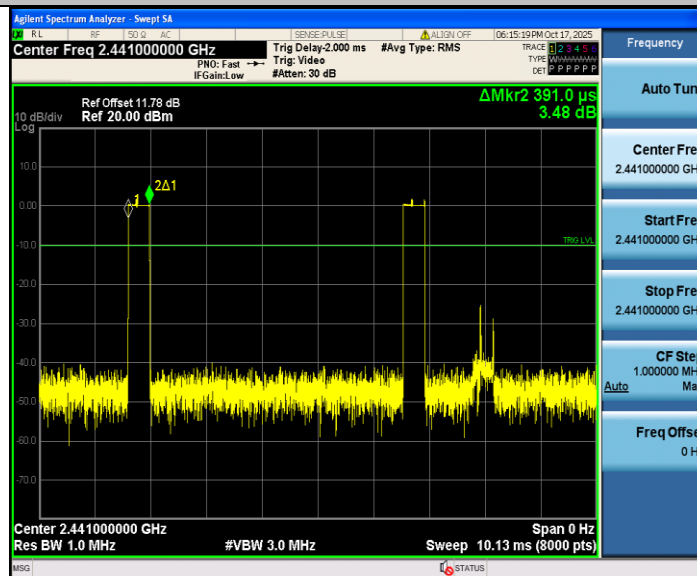
DH3_Ant1_Hop



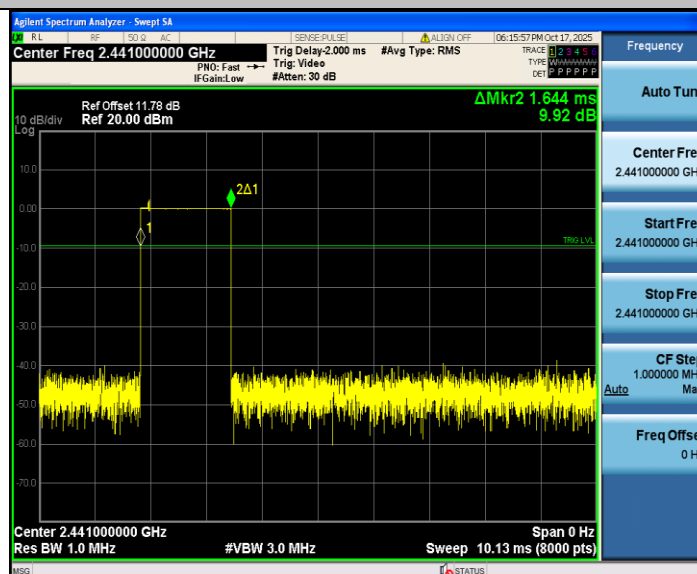
DH5_Ant1_Hop



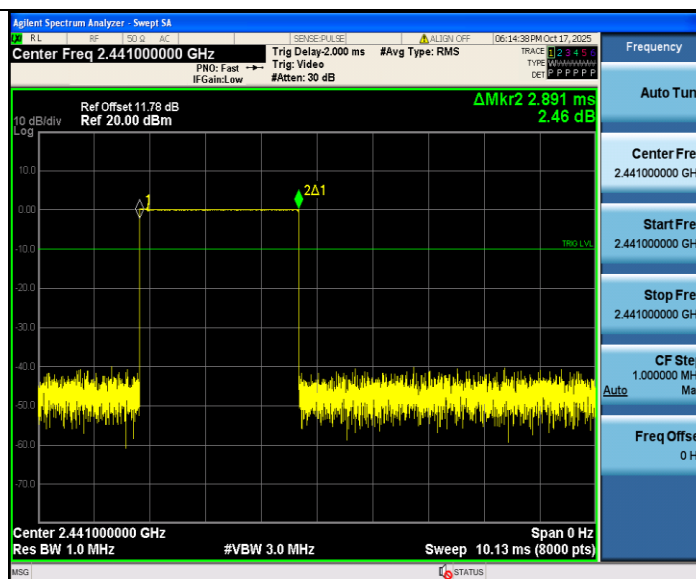
2DH1_Ant1_Hop



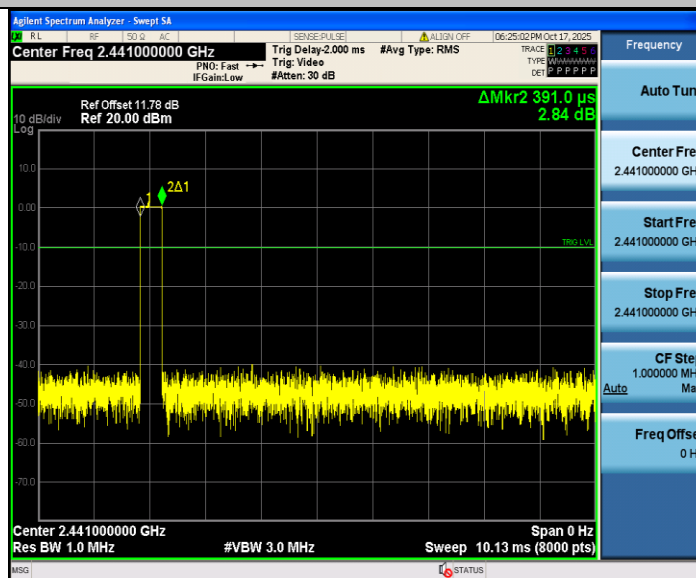
2DH3_Ant1_Hop



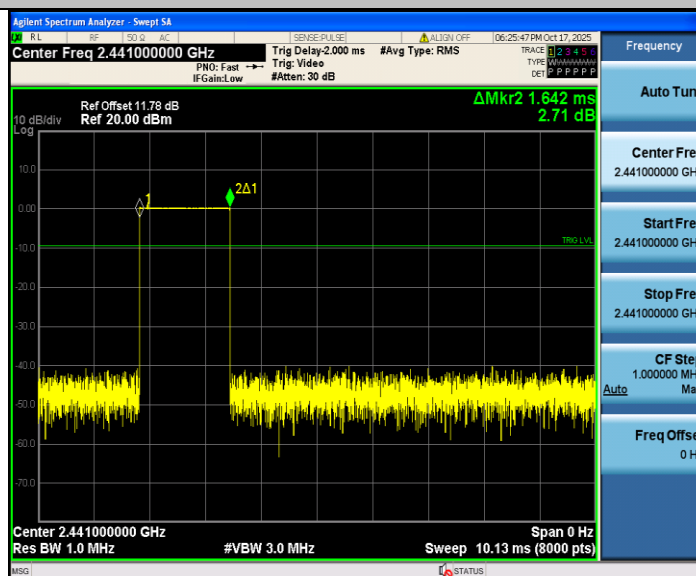
2DH5_Ant1_Hop



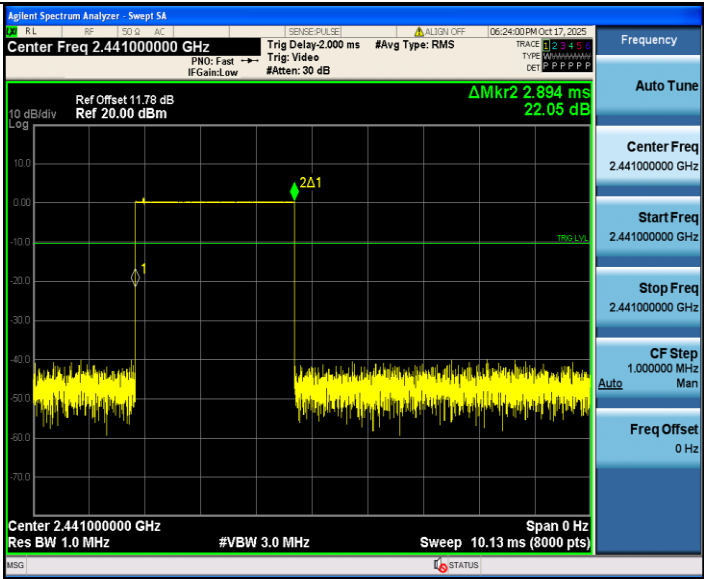
3DH1_Ant1_Hop



3DH3_Ant1_Hop



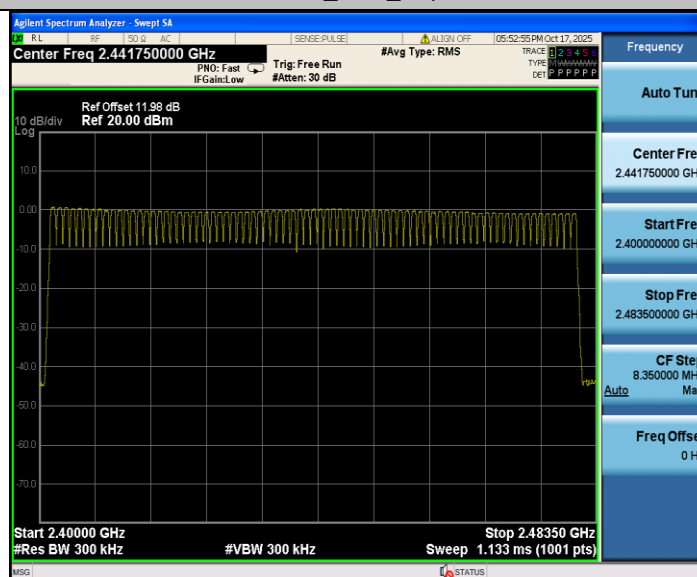
3DH5_Ant1_Hop



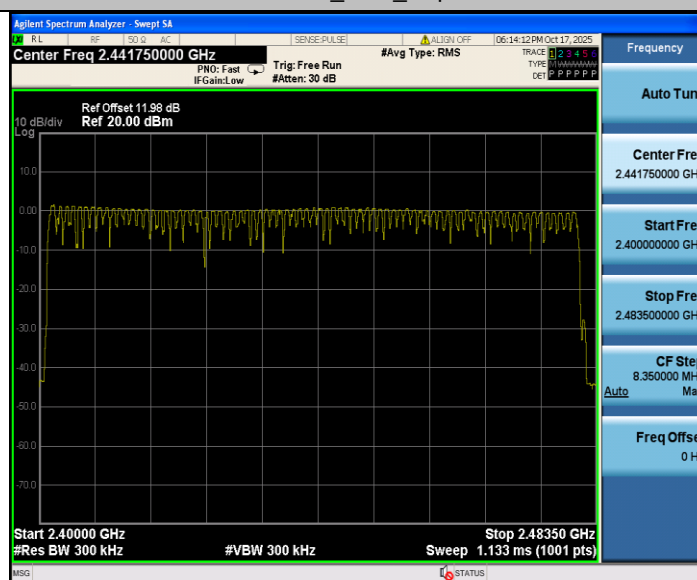
Appendix E: Number of hopping channels

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

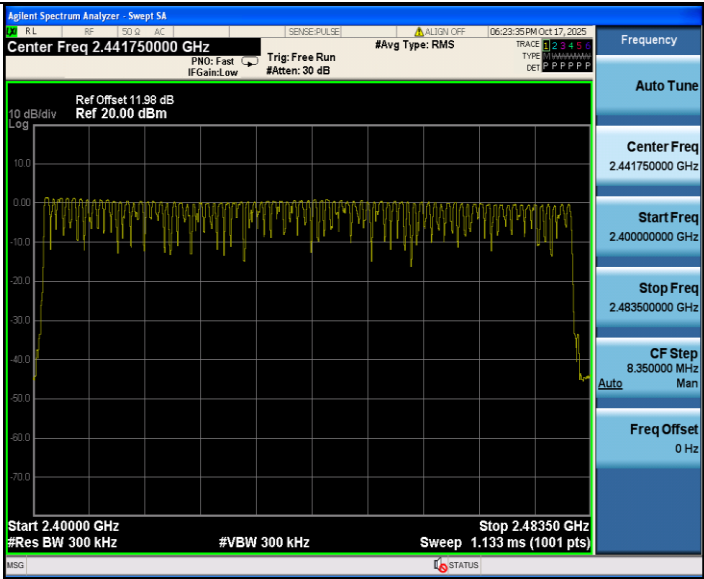
DH5_Ant1_Hop



2DH5_Ant1_Hop

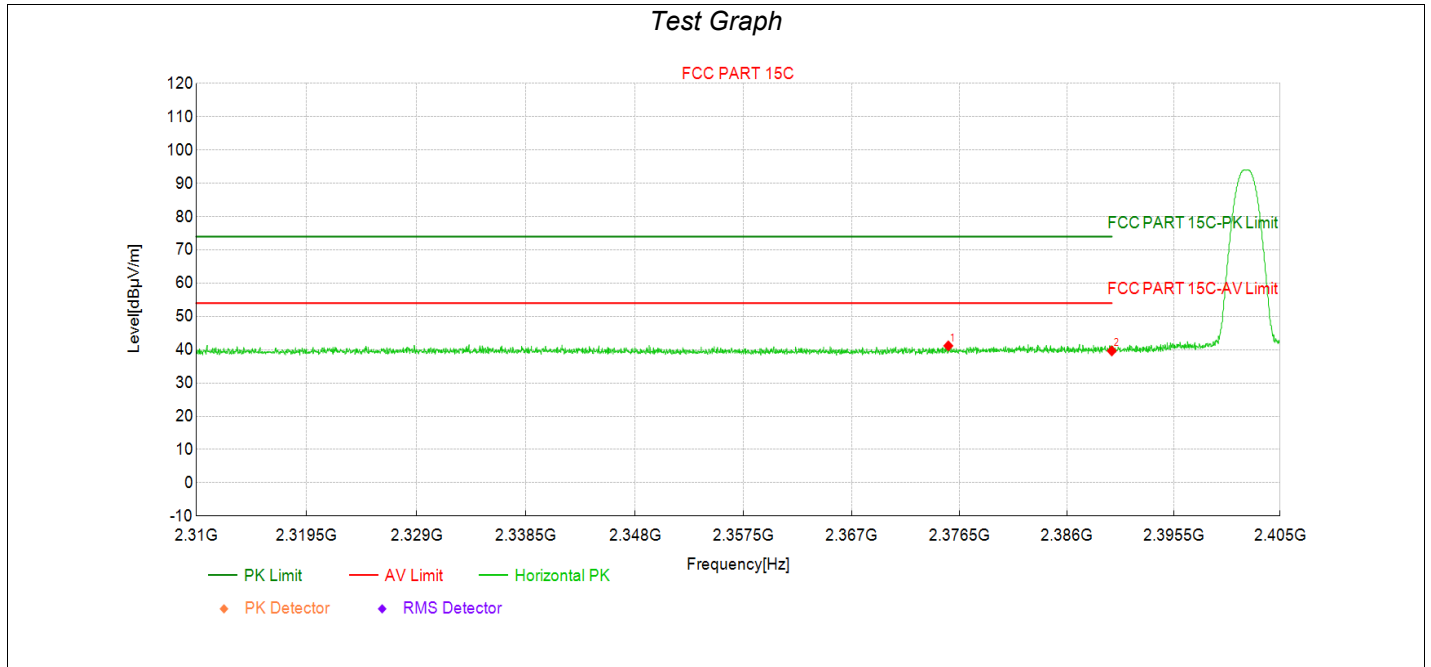


3DH5_Ant1_Hop



Appendix F: Band edge measurements

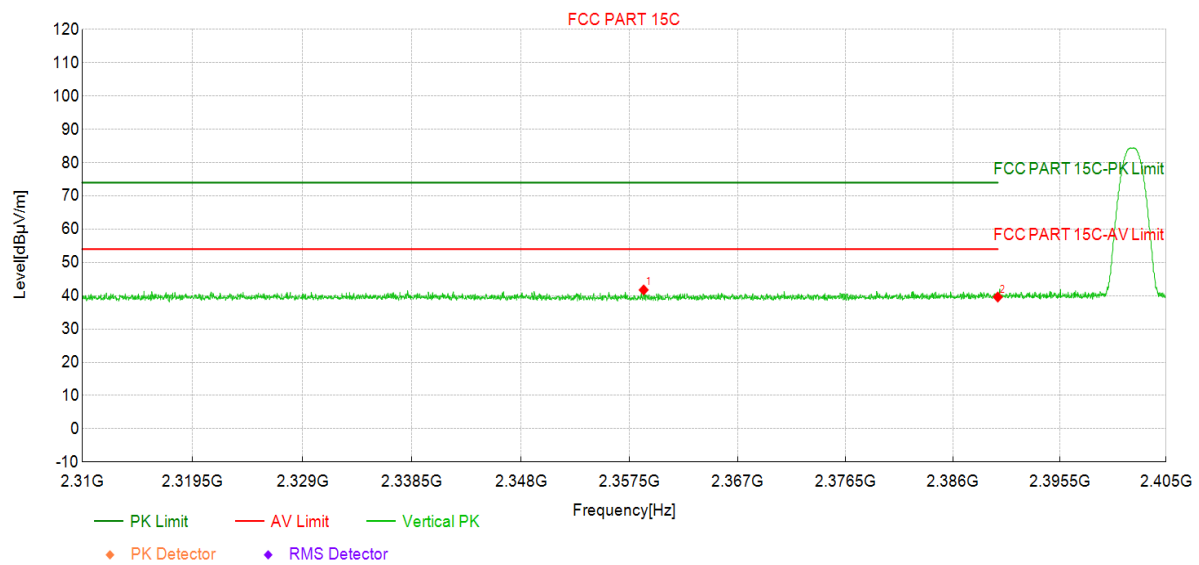
Transmit at 2402MHz by DH5



Data List									
NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2375.52	41.30	41.17	-0.08	74.00	32.83	PK	Horizo	PASS
	2375.52	-	16.38	-	54.00	37.62	AV	Horizo	PASS
2	2390.00	39.70	39.64	-0.05	74.00	34.36	PK	Horizo	PASS
	2390.00	-	14.85	-	54.00	39.15	AV	Horizo	PASS

Transmit at 2402MHz by DH5

Test Graph

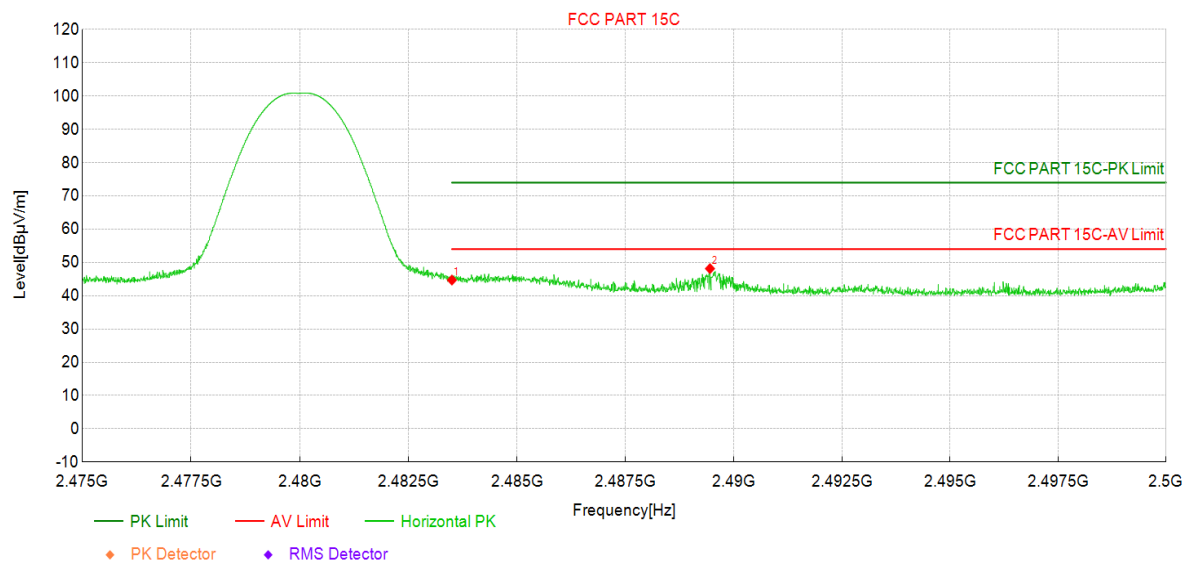


Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2358.74	41.90	41.74	-0.13	74.00	32.26	PK	Vertic	PASS
	2358.74	-	16.95	-	54.00	37.05	AV	Vertic	PASS
2	2390.00	39.70	39.60	-0.05	74.00	34.40	PK	Vertic	PASS
	2390.00	-	14.81	-	54.00	39.19	AV	Vertic	PASS

Transmit at 2480MHz by DH5

Test Graph

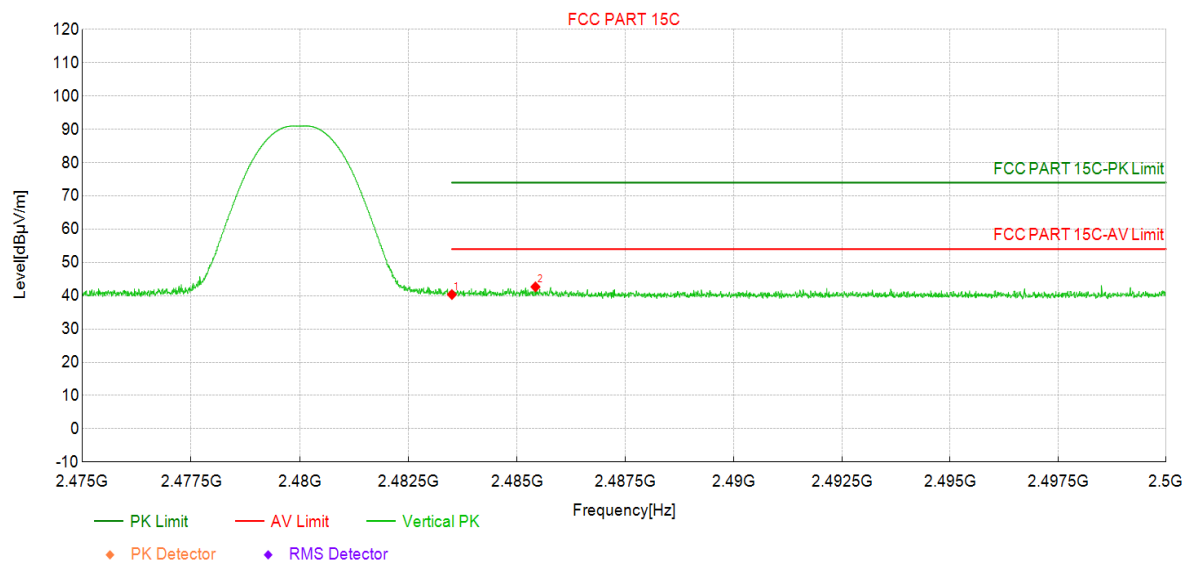


Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2483.50	44.50	44.72	0.27	74.00	29.28	PK	Horizo	PASS
	2483.50	-	19.93	-	54.00	34.07	AV	Horizo	PASS
2	2489.45	47.90	48.15	0.30	74.00	25.85	PK	Horizo	PASS
	2489.45	-	23.36	-	54.00	30.64	AV	Horizo	PASS

Transmit at 2480MHz by DH5

Test Graph

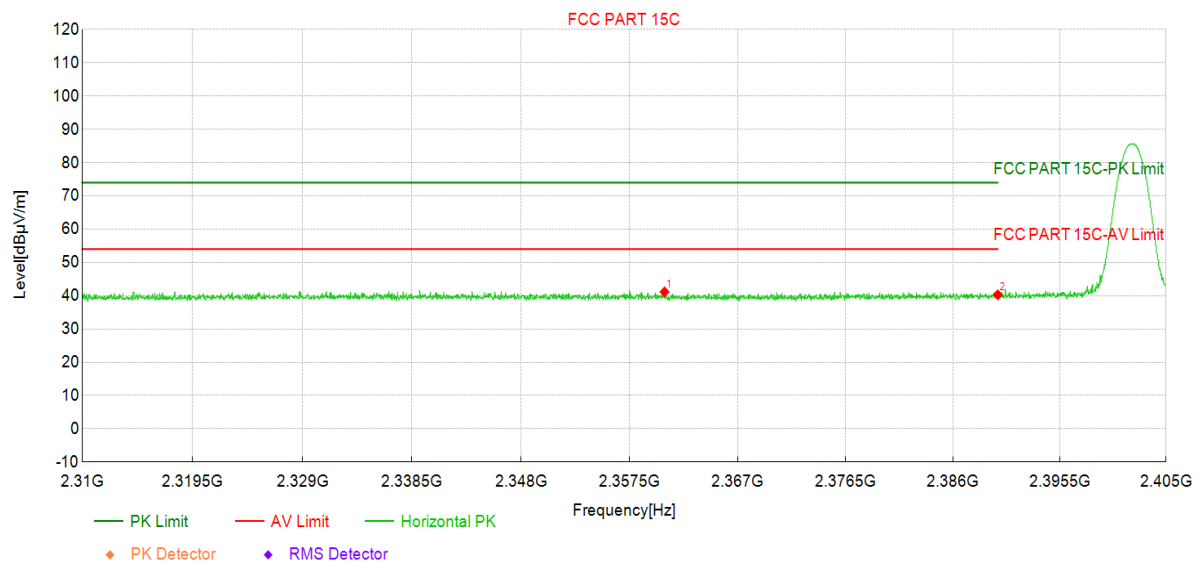


Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2483.50	40.10	40.35	0.27	74.00	33.65	PK	Vertic	PASS
	2483.50	-	15.56	-	54.00	38.44	AV	Vertic	PASS
2	2485.43	42.40	42.66	0.29	74.00	31.34	PK	Vertic	PASS
	2485.43	-	17.87	-	54.00	36.13	AV	Vertic	PASS

Transmit at 2402MHz by 2DH5

Test Graph

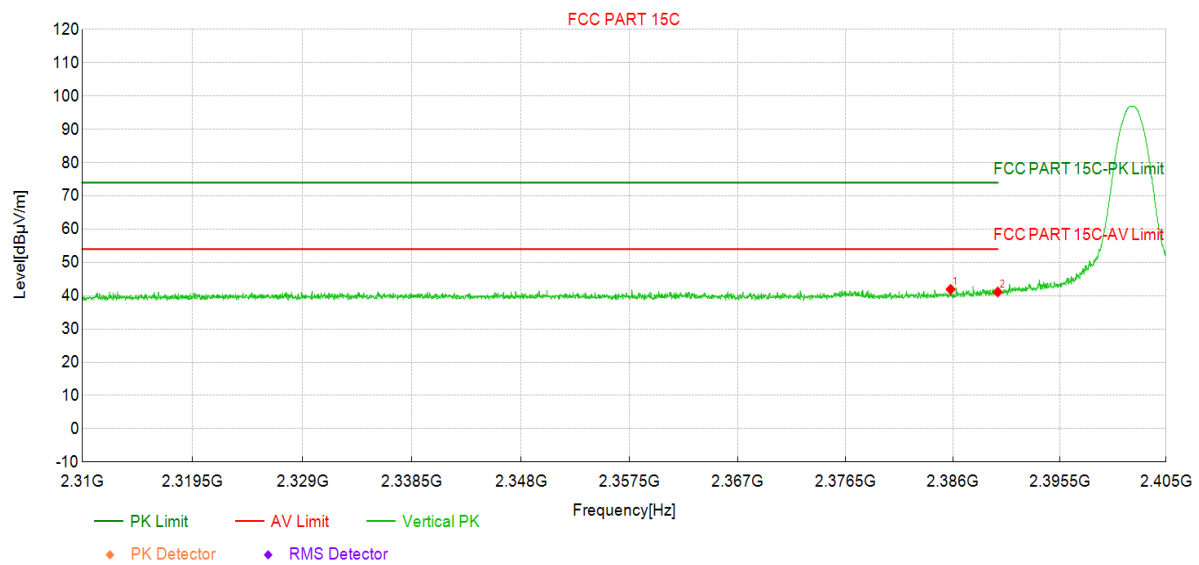


Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2360.57	41.30	41.16	-0.13	74.00	32.84	PK	Horizo	PASS
	2360.57	-	16.37	-	54.00	37.63	AV	Horizo	PASS
2	2390.00	40.30	40.25	-0.05	74.00	33.75	PK	Horizo	PASS
	2390.00	-	15.46	-	54.00	38.54	AV	Horizo	PASS

Transmit at 2402MHz by 2DH5

Test Graph

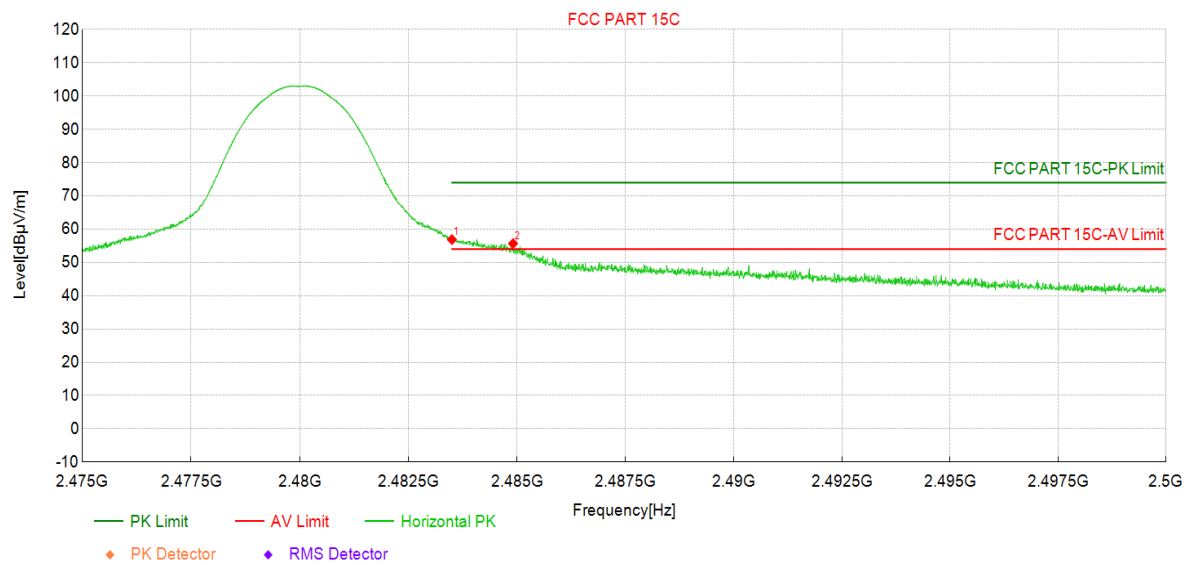


Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2385.81	42.00	41.92	-0.06	74.00	32.08	PK	Vertic	PASS
	2385.81	-	17.13	-	54.00	36.87	AV	Vertic	PASS
2	2390.00	41.20	41.13	-0.05	74.00	32.87	PK	Vertic	PASS
	2390.00	-	16.34	-	54.00	37.66	AV	Vertic	PASS

Transmit at 2480MHz by 2DH5

Test Graph

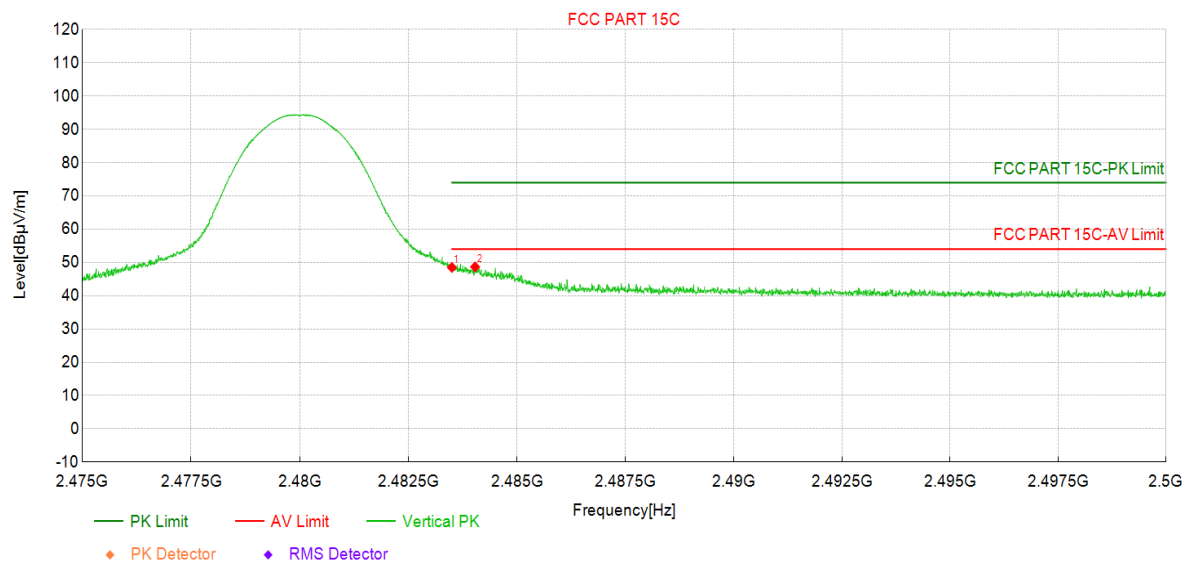


Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2483.50	56.60	56.87	0.27	74.00	17.13	PK	Horizo	PASS
	2483.50	-	32.08	-	54.00	21.92	AV	Horizo	PASS
2	2484.91	55.40	55.67	0.28	74.00	18.33	PK	Horizo	PASS
	2484.91	-	30.88	-	54.00	23.12	AV	Horizo	PASS

Transmit at 2480MHz by 2DH5

Test Graph

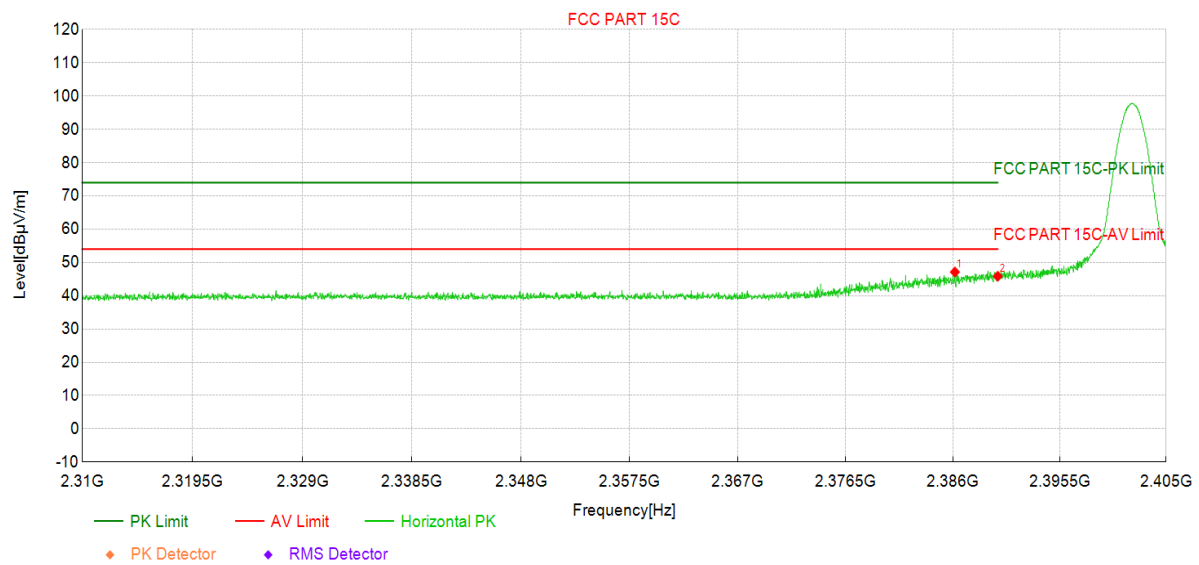


Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2483.50	48.20	48.51	0.27	74.00	25.49	PK	Vertic	PASS
	2483.50	-	23.72	-	54.00	30.28	AV	Vertic	PASS
2	2484.03	48.40	48.67	0.27	74.00	25.33	PK	Vertic	PASS
	2484.03	-	23.88	-	54.00	30.12	AV	Vertic	PASS

Transmit at 2402MHz by 3DH5

Test Graph

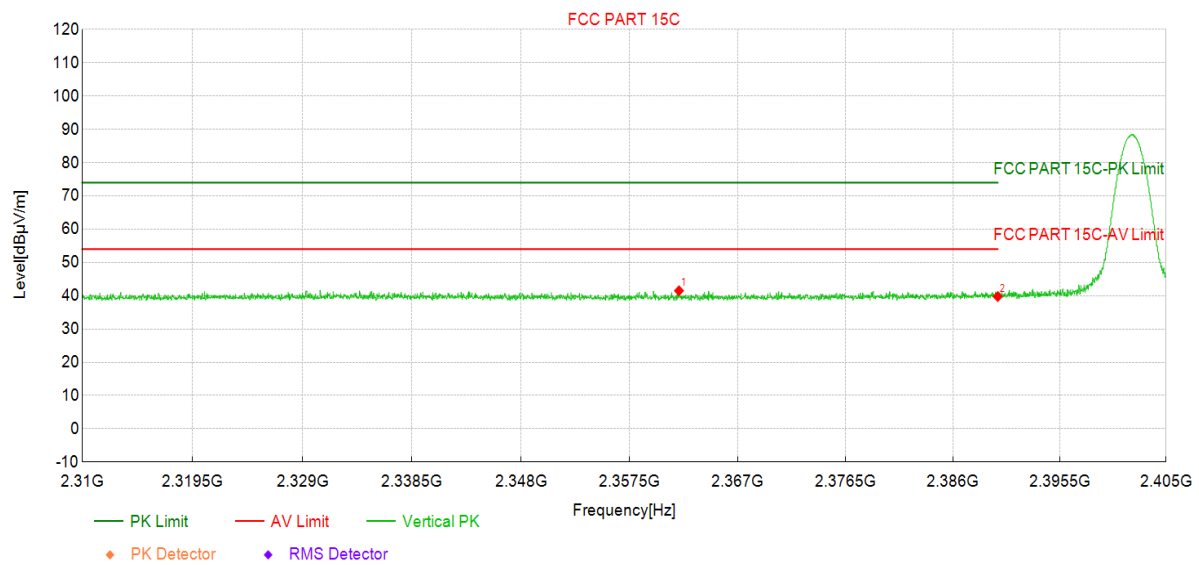


Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2386.19	47.20	47.13	-0.06	74.00	26.87	PK	Horizo	PASS
	2386.19	-	22.34	-	54.00	31.66	AV	Horizo	PASS
2	2390.00	45.90	45.85	-0.05	74.00	28.15	PK	Horizo	PASS
	2390.00	-	21.06	-	54.00	32.94	AV	Horizo	PASS

Transmit at 2402MHz by 3DH5

Test Graph

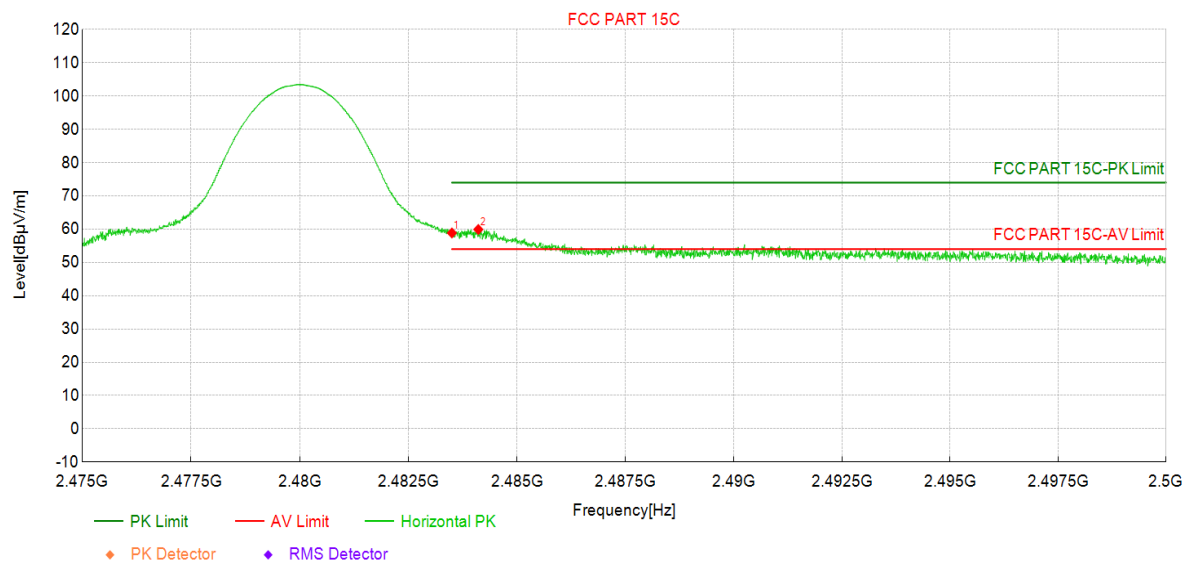


Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2361.84	41.60	41.50	-0.12	74.00	32.50	PK	Vertic	PASS
	2361.84	-	16.71	-	54.00	37.29	AV	Vertic	PASS
2	2390.00	39.80	39.75	-0.05	74.00	34.25	PK	Vertic	PASS
	2390.00	-	14.96	-	54.00	39.04	AV	Vertic	PASS

Transmit at 2480MHz by 3DH5

Test Graph

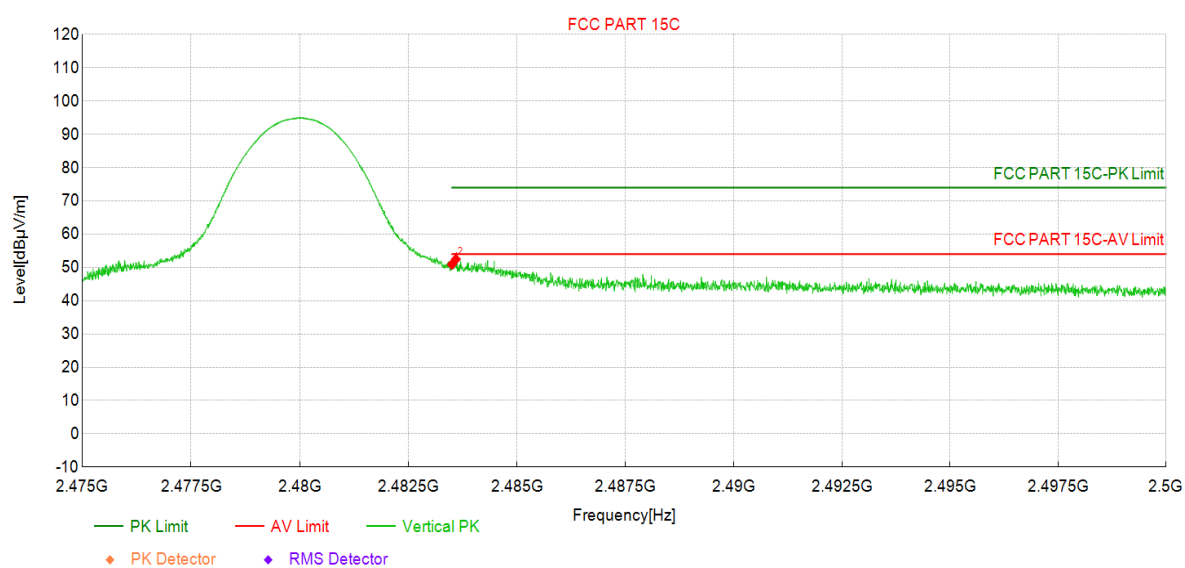


Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2483.50	58.60	58.86	0.27	74.00	15.14	PK	Horizo	PASS
	2483.50	-	34.07	-	54.00	19.93	AV	Horizo	PASS
2	2484.11	59.60	59.91	0.27	74.00	14.09	PK	Horizo	PASS
	2484.11	-	35.12	-	54.00	18.88	AV	Horizo	PASS

Transmit at 2480MHz by 3DH5

Test Graph



Data List

NO	Frequency [MHz]	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Det	Pol	Verdict
1	2483.50	50.60	50.91	0.27	74.00	23.09	PK	Vertic	PASS
	2483.50	-	26.12	-	54.00	27.88	AV	Vertic	PASS
2	2483.59	52.20	52.47	0.27	74.00	21.53	PK	Vertic	PASS
	2483.59	-	27.68	-	54.00	26.32	AV	Vertic	PASS

Note:

1. Level = Reading + Factor.

2. Margin = Limit - Level.

3. Margin = Limit - Level, AV Level = PK Level + Duty Cycle Factor.

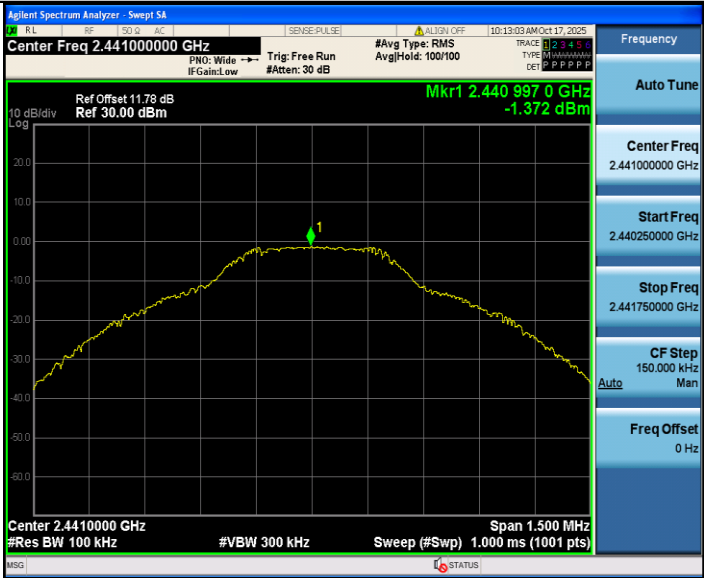
Appendix G: Conducted Spurious Emission

Test Result for Reference level :

DH5_Ant1_2402



DH5_Ant1_2441



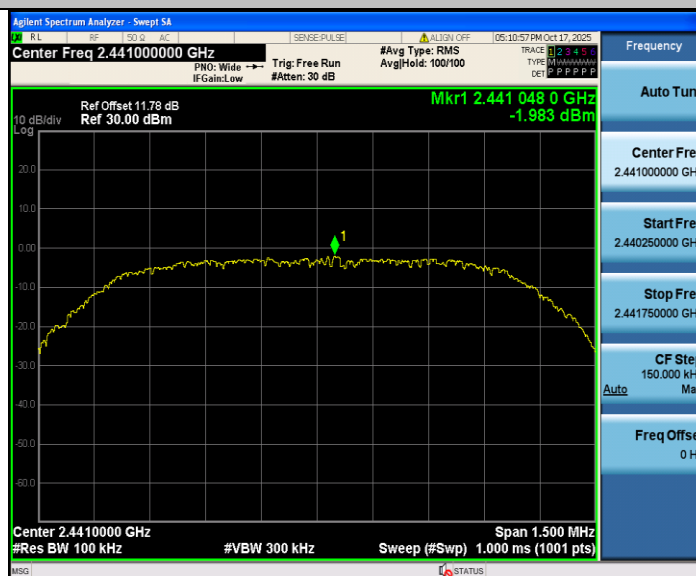
DH5_Ant1_2480



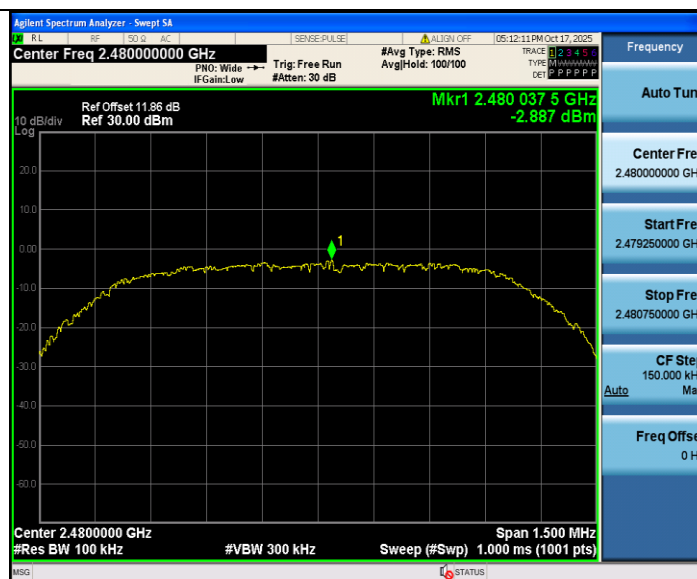
2DH5_Ant1_2402



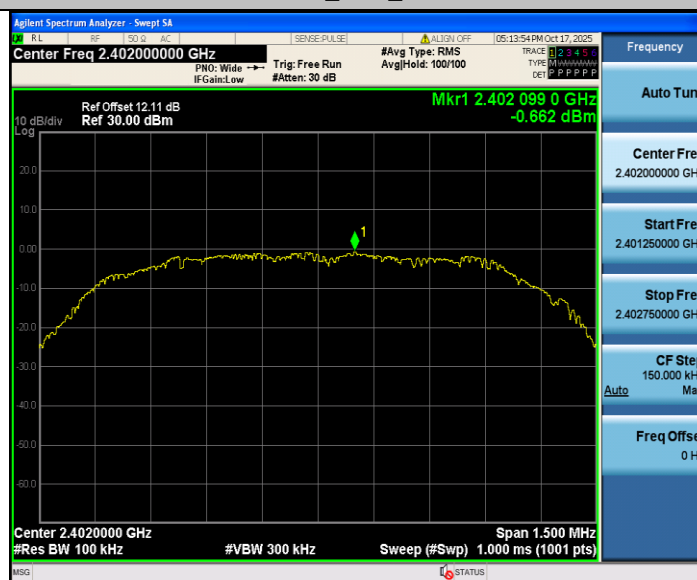
2DH5_Ant1_2441



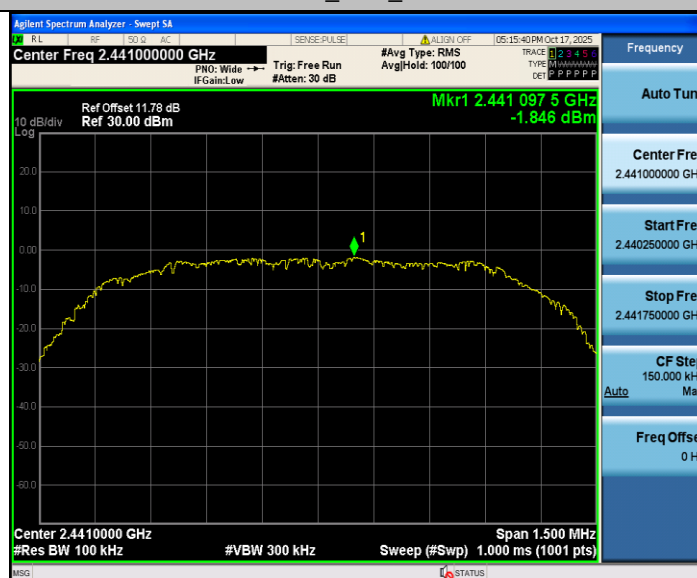
2DH5_Ant1_2480



3DH5_Ant1_2402



3DH5_Ant1_2441

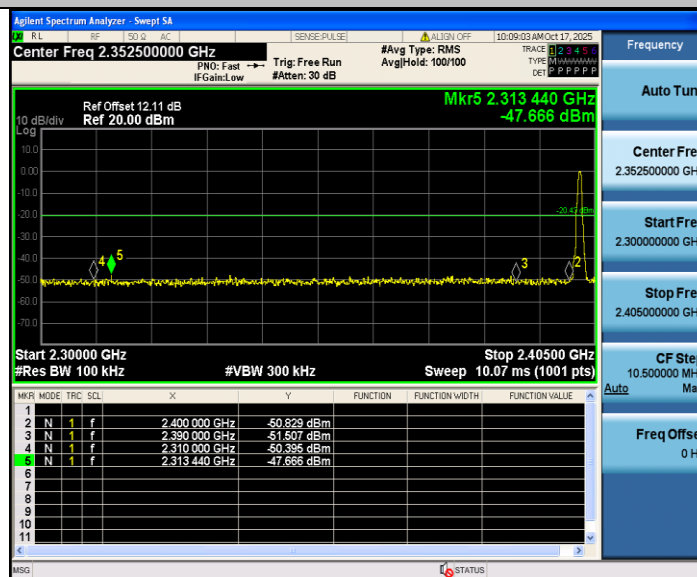


3DH5_Ant1_2480

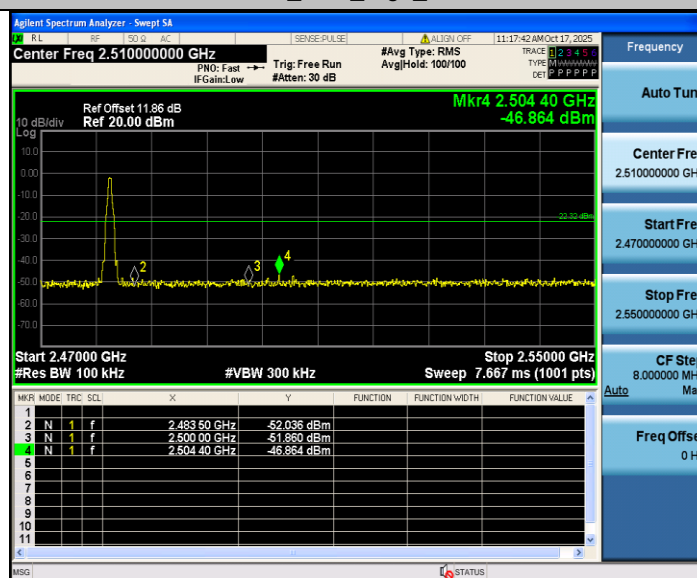


Test Result for Band edge:

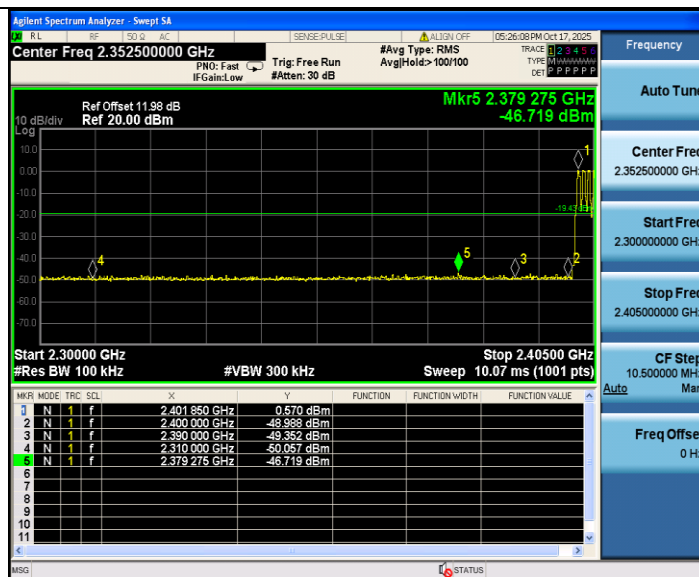
DH5_Ant1_Low_2402



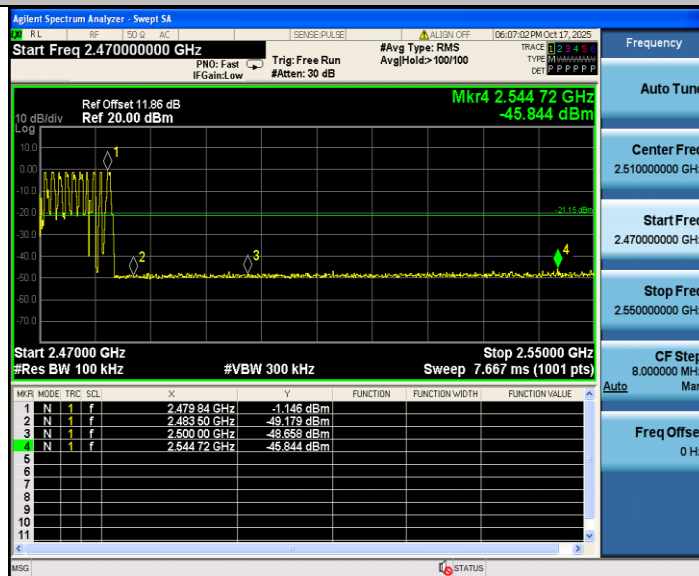
DH5_Ant1_High_2480



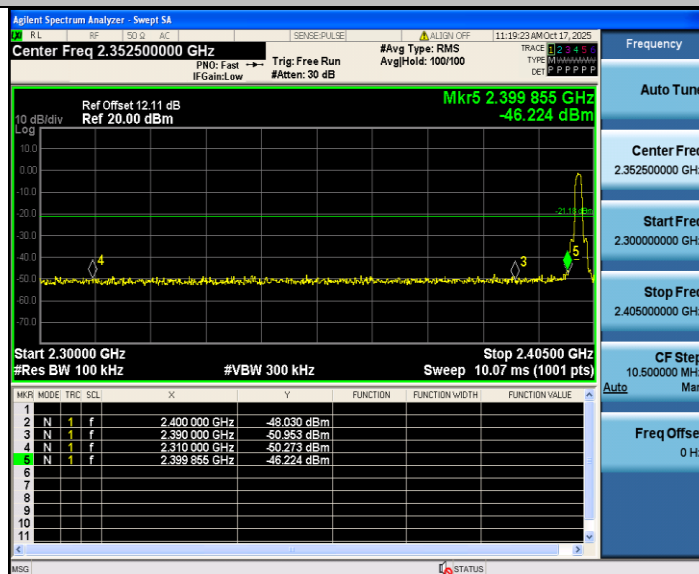
DH5_Ant1_Low_Hop_2402



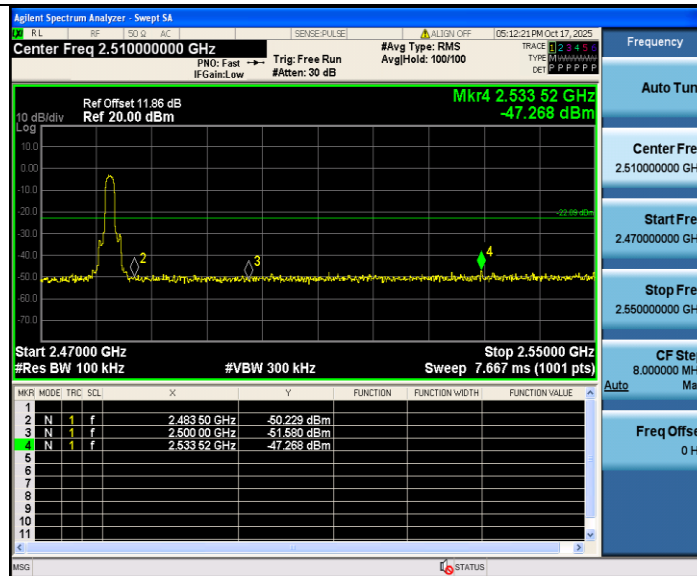
DH5_Ant1_High_Hop_2480



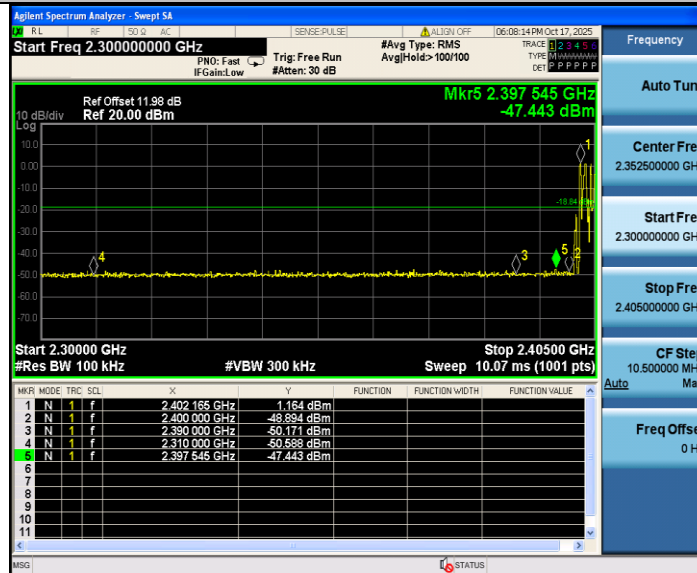
2DH5_Ant1_Low_2402



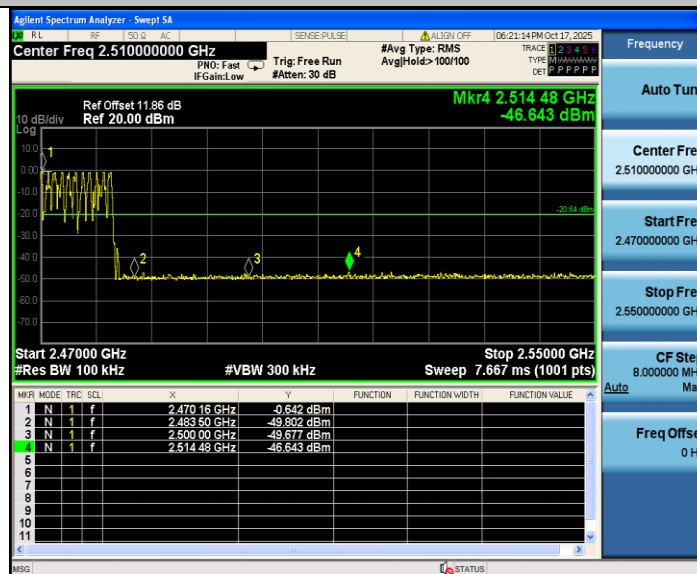
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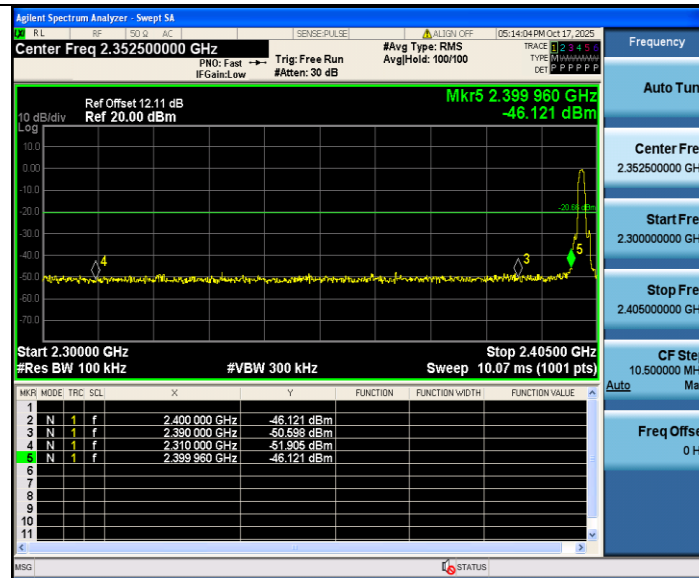
2DH5_Ant1_Low_Hop_2402



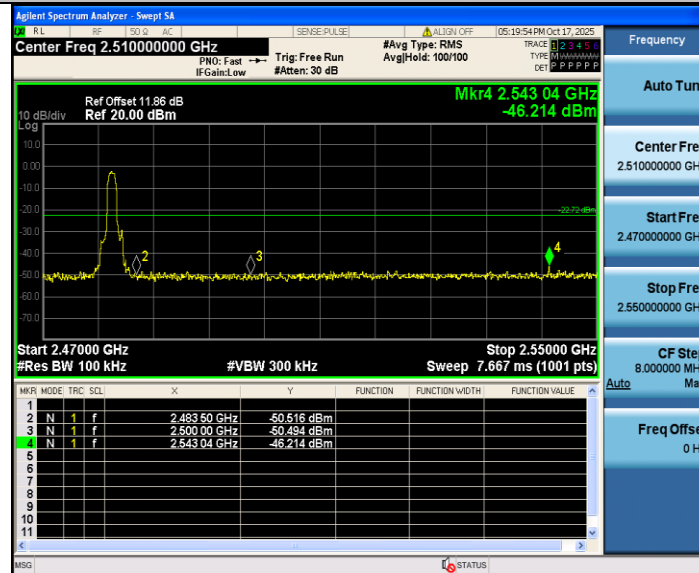
2DH5_Ant1_High_Hop_2480



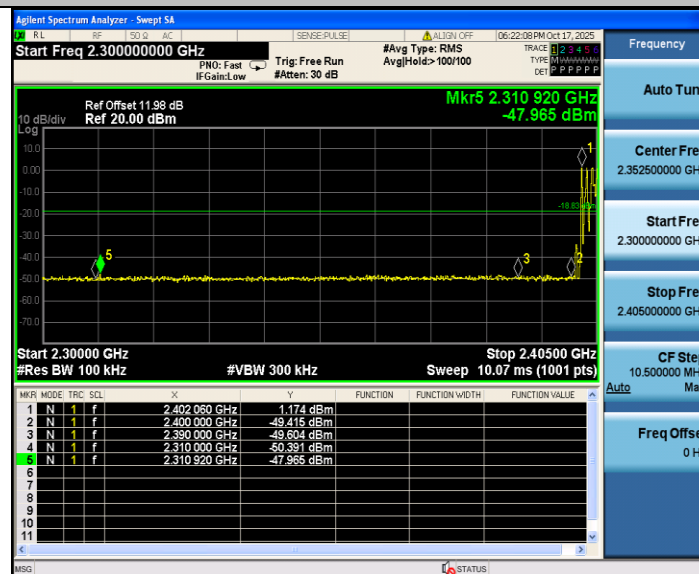
3DH5_Ant1_Low_2402



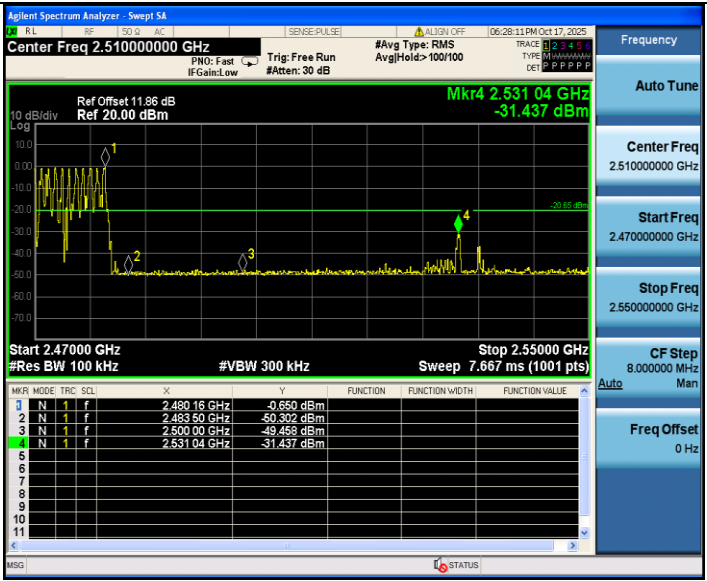
3DH5_Ant1_High_2480



3DH5_Ant1_Low_Hop_2402

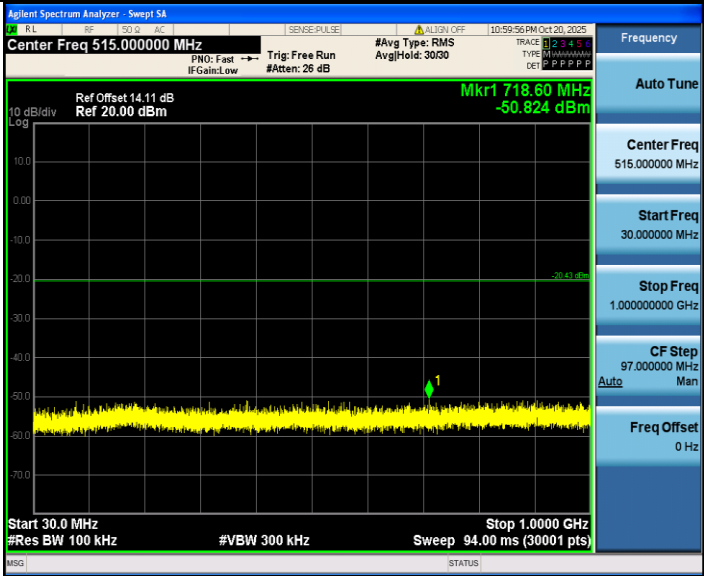


3DH5_Ant1_High_Hop_2480

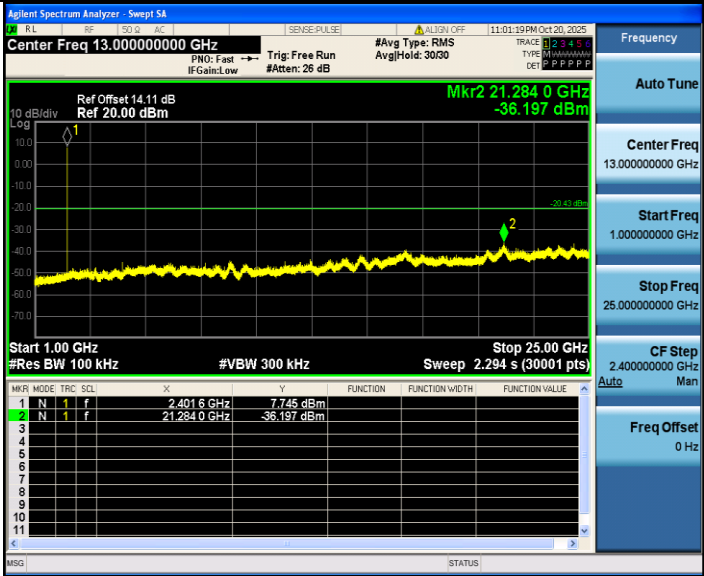


Test Result for Spurious Emission:

DH5_Ant1_2402_30~1000



DH5_Ant1_2402_1000~25000



DH5_Ant1_2441_30~1000