TEST REPORT

Applicant:	Sony Corporation
EUT Description:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC and GNSS
Brand:	Sony
FCC ID:	PY7-73716J
Standards:	FCC 47 CFR Part 2 Subpart J FCC 47 CFR Part 15 Subpart C
Date of Receipt:	2023/11/14
Date of Test:	2023/11/14 to 2024/02/18(FCC ID: PY7-64228M (Lead Model)) 2023/11/14 to 2024/02/20 (FCC ID: PY7-73716J (This Model))
Date of Issue:	2024/03/01

TOWE. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

the results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of the model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise. without written approval of TOWE, the test report shall not be reproduced except in full.

ACCREDITED
CERTIFICATE #7088.01

Huang Kun
Approved By:

Chen Chengfu
Reviewed By:

Revision History

Rev.	Issue Date	Description	Revised by
01	2024/03/01	Original	Chen Chengfu

Summary of Test Results

Clause	FCC Part	Test Items	Result
4.1	§15.203/15.247(b)	Antenna Requirement	PASS
4.2	§15.207	AC Power Line Conducted Emission	PASS
4.3	§15.247 (b)(1)	Output Power	PASS*
4.4	§15.247 (a)(1)	Occupied Bandwidth	Reporting purposes only
4.5	§15.247 (a)(1)	Hopping Frequency Separation	PASS
4.6	§15.247 (a)(1)(iii)	Number Hopping Channels	PASS
4.7	§15.247 (a)(1)(iii)	Dwell Time	PASS
4.8	§15.247(d)	Band Edge for Conducted Emissions	PASS
4.9	§15.247(d)	Spurious RF Conducted Emissions	PASS
4.10	§15.205 §15.209	Radiated Spurious emissions and Band Edge	PASS*
Test Method: ANSI C63.10-2013, KDB 558074 D01 15.247 Mesa Guidance v05r02. *Remark:* *Pass: refers to FCC ID PY7-64228M (lead) data.* *PASS*: There is FCC ID PY7-73716J (this model) spot check data.*			

Table of Contents

1 General Description

1.1 Lab Information

1.1.1 Testing Location

These measurements tests were conducted at the Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. facility located at F401 and F101, Building E, Hongwei Industrial Zone, Liuxian 3rd Road, Bao'an District, Shenzhen, China. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014
Tel.: +86-755-27212361
Contact Email: info@towewireless.com

1.1.2 Test Facility / Accreditations

A2LA (Certificate Number: 7088.01)
This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

FCC Designation No.: CN1353
Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized as an accredited testing laboratory. Designation Number: CN1353.

ISED CAB identifier: CN0152
Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.
CAB identifier: CN0152
Company Number: 31000

1.2 Client Information

1.2.1 Applicant

Applicant:	Sony Corporation
Address:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan

1.2.2 Manufacturer:

Manufacturer:	Sony Corporation
Address:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan

1.3 Product Information

EUT Description:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC and GNSS
Brand:	Sony
Hardware Version:	A
Software Version:	1.116(Only Conduction) 1.78(Only Radiation)
SN.:	HQ63B1055E(Only Conduction) HQ63B10532(Only Radiation)
Bluetooth version:	Bluetooth V5.2
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Frequency Range:	2400 ~ 2483.5MHz
Channel Frequency:	2402 ~ 2480MHz
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Remark: The above EUT's information was declared by applicant, please refer to the specifications or user's manual for more detailed description.	

1.4 REUSE OF TEST DATA

1.4.1 INTRODUCTION

According to the manufacturer the major change between FCC ID: PY7-64228M (Lead Model), and FCC ID: PY7-73716J (This Model) is changing band configuration by software, The FCC ID: PY7-64228M (Lead Model conducted test data shall remain representative of FCC ID: PY7-73716J so, FCC ID: PY7-73716J (This Model leverages conducted test data from FCC ID: PY7-64228M (Lead Model).

1.4.2 DEVICE DIFFERENCES

The equipment under test (EUT) in this filing FCC ID: PY7-73716J (This Model) and the reference device certified under FCC ID: PY7-64228M (Lead Model) share a common design. The components used for 2.4GHz and 5GHz Wi-Fi and BT and NFC, including antennas and output power are identical between the EUT and reference device.

1.4.3 Spot Check Verification Data

In this filing, the worst-case data and spot checks were tested on the EUT as noted below, against the reference device. All the necessary test cases were performed to verify the variant EUT is still in compliance with the spot checked results to the reference device and was performed using the guidance of ANSI C63.10-2013.

According to FCC KDB 484596 D01 v02r02, Spot checks of the following tests were performed:

Sport check Items	PY7-73716J Worst case Result		PY7-64228M Worst case Result		|Delta(dB)|	
Output Power	Peak:	12.06	Peak:	11.89	Peak:	0.17
	Average:	11.33	Average:	11.55	Average:	0.22
Radiated Spurious Emission	Peak:	52.42	Peak:	53.19	Peak:	0.77
Radiated Band Edge	Peak:	47.76	Peak:	49.26	Peak:	1.50

2 Test Configuration

2.1 Test Channel

Operation Frequency of each channel for GFSK, π/4DQPSK, 8DPSK							
Channel	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
2	2404MHz	22	2424MHz	42	2444MHz	62	2464MHz
3	2405MHz	23	2425MHz	43	2445MHz	63	2465MHz
4	2406MHz	24	2426MHz	44	2446MHz	64	2466MHz
5	2407MHz	25	2427MHz	45	2447MHz	65	2467MHz
6	2408MHz	26	2428MHz	46	2448MHz	66	2468MHz
7	2409MHz	27	2429MHz	47	2449MHz	67	2469MHz
8	2410MHz	28	2430MHz	48	2450MHz	68	2470MHz
9	2411MHz	29	2431MHz	49	2451MHz	69	2471MHz
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
12	2414MHz	32	2434MHz	52	2454MHz	72	2474MHz
13	2415MHz	33	2435MHz	53	2455MHz	73	2475MHz
14	2416MHz	34	2436MHz	54	2456MHz	74	2476MHz
15	2417MHz	35	2437MHz	55	2457MHz	75	2477MHz
16	2418MHz	36	2438MHz	56	2458MHz	76	2478MHz
17	2419MHz	37	2439MHz	57	2459MHz	77	2479MHz
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		

Remark:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test Channel	Test Frequency
The Lowest channel (CH0)	2402MHz
The Middle channel (CH39)	2441MHz
The Highest channel (CH78)	2480MHz

2.2 Worst-case configuration and Mode

Modulation Type	GFSK			π/4DQPSK			8DPSK		
	DH1	DH3	DH5	2DH1	2DH3	2DH5	3DH1	3DH3	3DH5
Payload	27	183	339	54	367	679	83	552	1021
Hopping mode	Keep the EUT in hopping mode								
No hopping mode	Keep the EUT was programmed to be in continuously transmitting mode								
Normal Link	Keep the EUT operation to normal function.								

2.3 Test Duty Cycle

Test Type	T(ms)	T Period(ms)	Duty Cycle(%)	1/T	VBW Set
DH5	2.88	3.75	76.80	0.35	1KHz
DH5	2.88	3.75	76.80	0.35	1KHz
DH5	2.89	3.75	77.07	0.35	1KHz
2DH5	2.88	3.75	76.80	0.35	1KHz
2DH5	2.89	3.75	77.07	0.35	1KHz
2DH5	2.89	3.75	77.07	0.35	1KHz
3DH5	2.89	3.75	77.07	0.35	1KHz
3DH5	2.89	3.75	77.07	0.35	1KHz
3DH5	2.89	3.76	76.86	0.35	1KHz

Note: If Duty Cycle>98% VBW is set to 10Hz.

2.4 Support Unit used in test

The EUT has been tested as an independent unit.

2.5 Test Environment

Temperature:	Normal: 15℃ ~ 35℃
Humidity:	40-75 % RH Ambient
DC Voltage:	DC 3.89V
AC Voltage:	AC 120V/60Hz
Remark: The testing environment is within the scope of the EUT user manual and meets the requirements of the standard testing environment.	

2.6 Test RF Cable

For all conducted test items: The offset level is set spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.

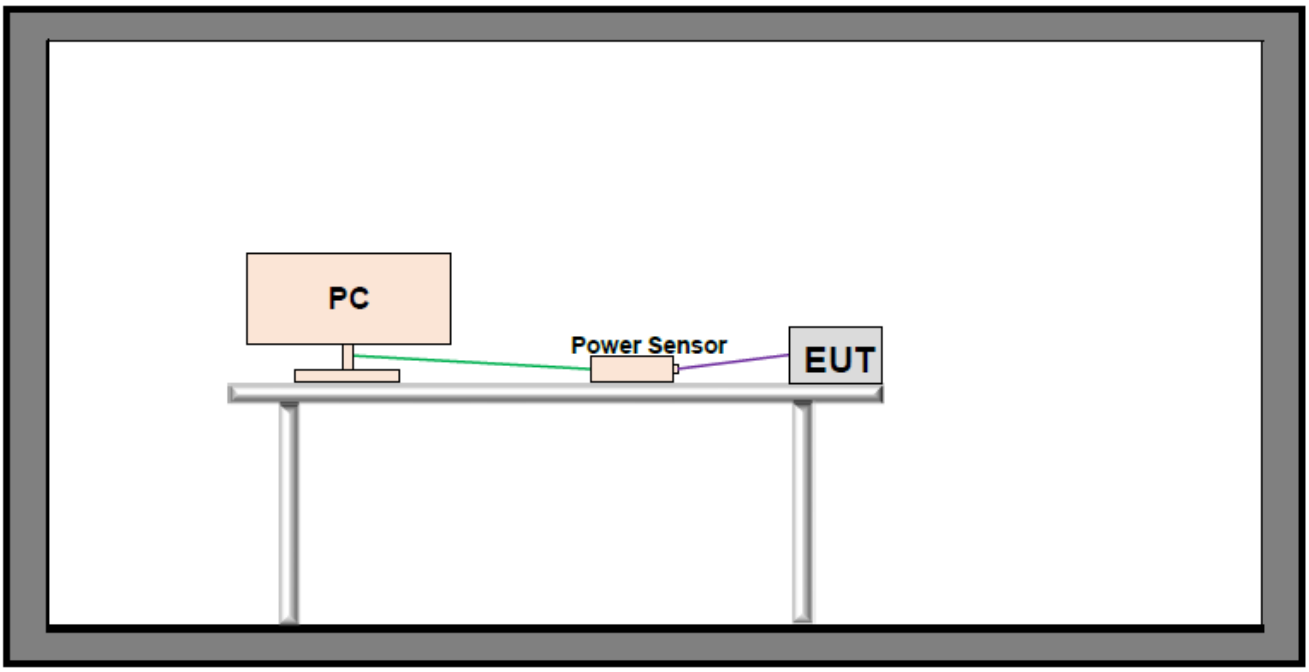
2.7 Modifications

No modifications were made during testing.

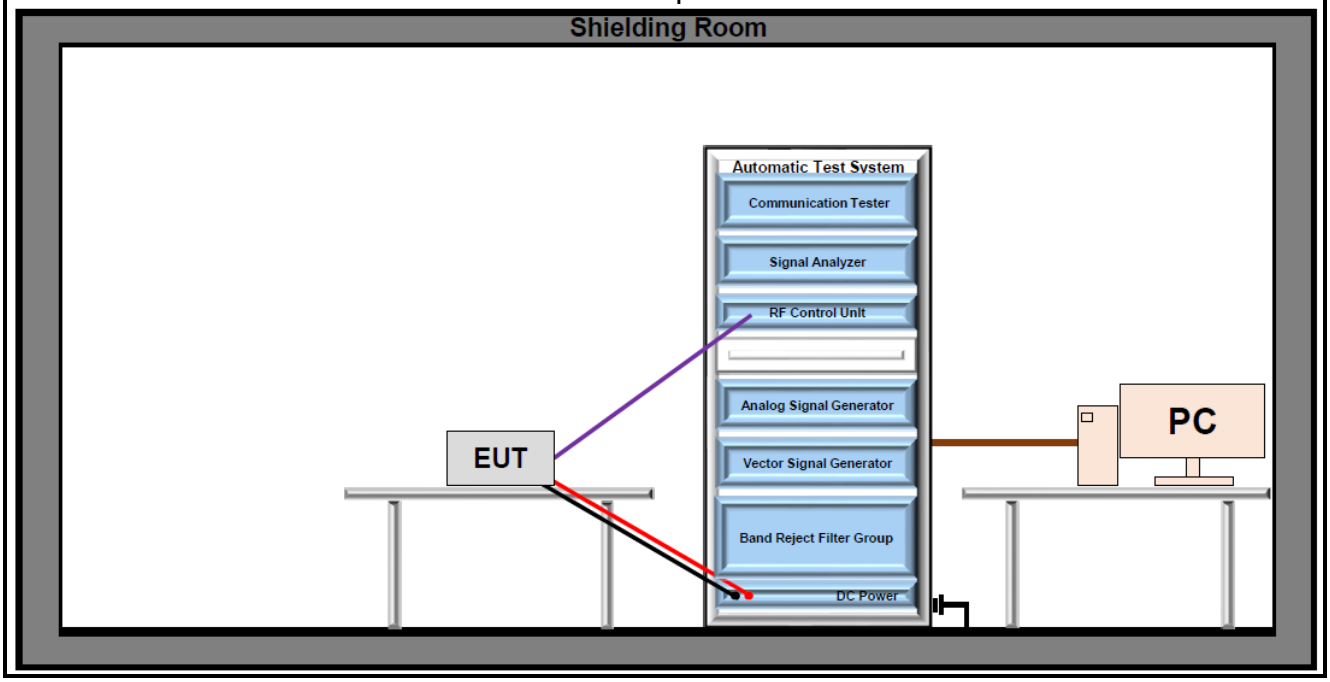
2.8 Test Setup Diagram

2.8.1 Conducted Configuration

Setup 1

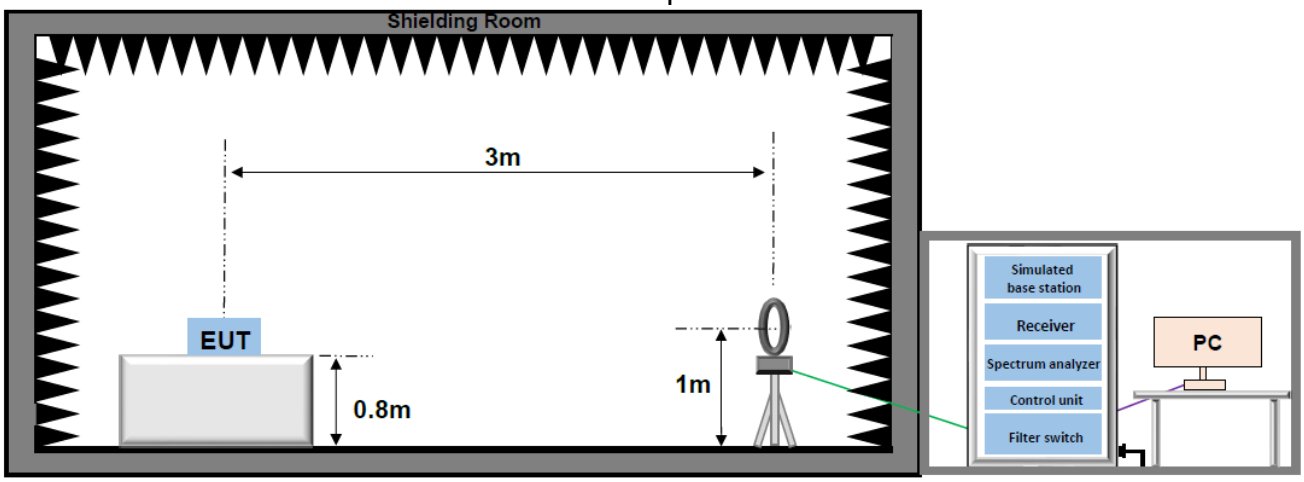


Setup 2

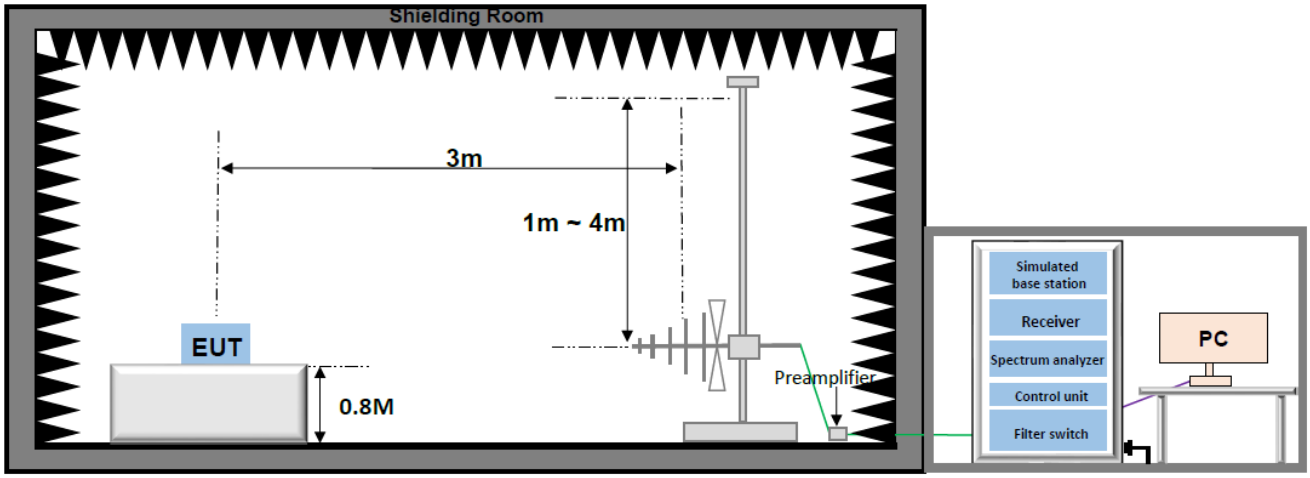


2.8.2 Radiated Configuration

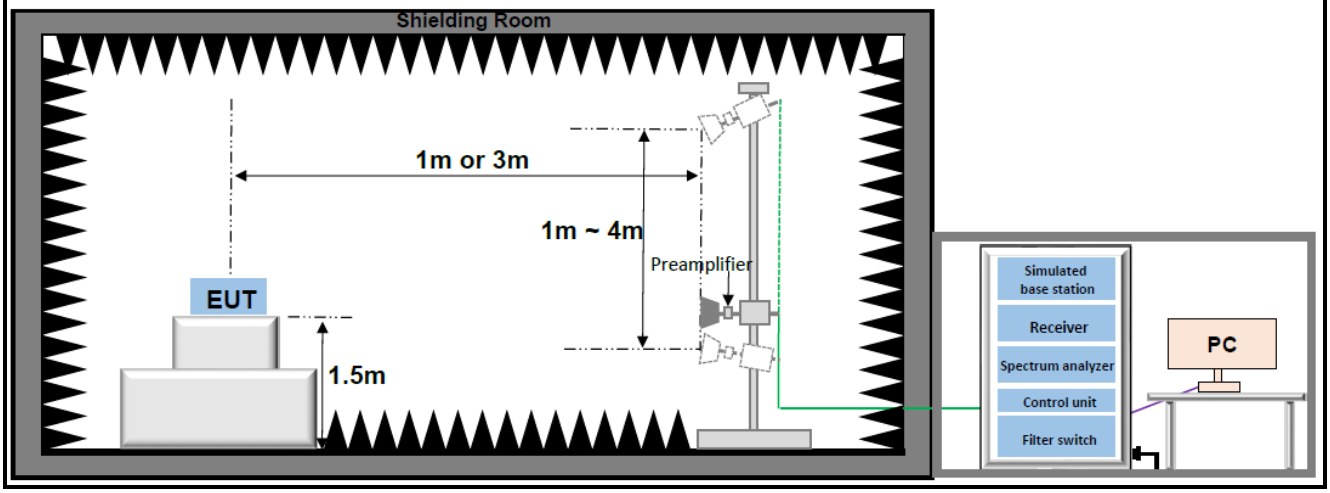
Setup 1



Setup 2



Setup 3



3 Equipment and Measurement Uncertainty

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, whichever is less, and where applicable is traceable to recognized national standards.

3.1 Test Equipment List

RF-03					
Description	**Manufacturer**	**Model**	**SN**	**Last Due**	**Cal Due**
Signal Analyzer	Keysight	N9020A	US46470429	2023/04/08	2024/04/07
Signal Generator	R&S	SMR20	101027	2023/04/08	2024/04/07
Wireless Communication Tester	R&S	CMW270	102840	2023/06/27	2024/06/26
UP/Down-Converter	R&S	CMW-Z800A	100572	2023/06/27	2024/06/26
Hygrometer	BingYu	HTC-1	N/A	2023/06/01	2024/05/31
Vector Signal Generator	R&S	SMM100A	549353	2023/06/27	2024/06/26
RF Control Unit	Tonscend	JS0806-2	23C80620671	2023/06/27	2024/06/26
Power Sensor	Anritsu	MA24408A	12520	2023/07/28	2024/07/27
Shielding Room 13	Taihemaorui	4*3*3	N/A	2023/04/01	2026/03/31
Measurement Software	Tonscend	JS1120-3	10659	N/A	N/A

Radiated Emission					
Description	**Manufacturer**	**Model**	**S.N.**	**Last Due**	**Cal Due**
Loop Antenna	Schwarzbeck	FMZB 1519C	1519C-028	2023/06/29	2025/06/28
Biconic Logarithmic Periodic Antennas	Schwarzbeck	VULB9163	1643	2023/06/25	2025/06/24
Double-Ridged Horn Antennas	Schwarzbeck	BBHA 9120D	2809	2023/06/25	2025/06/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	1290	2023/06/25	2025/06/24
Signal Analyzer	Keysight	N9020A	MY49100252	2023/04/08	2024/04/07
Signal Analyzer	Keysight	N9010B	MY63440541	2023/06/27	2024/06/26
EMI Tester Receiver	Rohde & Schwarz	ESR7	102719	2023/08/17	2024/08/16
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	150645	2023/04/08	2024/04/07
Low Noise Amplifier	Tonscend	TAP9K3G40	AP23A8060273	2023/04/08	2025/04/07
Low Noise Amplifier	Tonscend	TAP01018050	AP22G806258	2023/04/08	2025/04/07
Band Reject Filter Group	Townshend	JS0806-F	23A806F0652	N/A	N/A
Test Software	Tonscend	TS+	Version: 5.0.0	N/A	N/A

Conducted Emission					
Description	**Manufacturer**	**Model**	**S.N.**	**Last Due**	**Cal Due**
EMI Tester Receiver	Rohde & Schwarz	ESR3	103108	2023/07/28	2024/07/27
LISN	Rohde & Schwarz	ENV 216	102836	2023/04/08	2024/04/07
Test software	Rohde & Schwarz	ELEKTRA v4.61	N/A	N/A	N/A

3.2 Measurement Uncertainty

Parameter	U_{lab}
Frequency Error	679.98Hz
Output Power	0.76dB
Conducted Spurious Emissions	2.22dB
Conducted Emissions(150KHz~30MHz)	2.43dB
Radiated Emissions(9kHz~30MHz)	2.40dB
Radiated Emissions(30MHz~1000MHz)	4.66dB
Radiated Emissions(1GHz~18GHHz)	5.42dB
Radiated Emissions(18GHz~40GHHz)	5.46dB

Uncertainty figures are valid to a confidence level of 95%

4 Test results

4.1 Antenna Requirement

Standard Applicable:	47 CFR Part 15C Section 15.203 /247(b)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
The antenna gain and type as provided by the manufacturer are as follows: The antenna Type is PIFA. With maximum gain is -2.8dBi. Antenna Anti-Replacement Construction: An embedded-in antenna design is used.	

4.2 AC Power Line Conducted Emissions

Limits

Frequency range (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

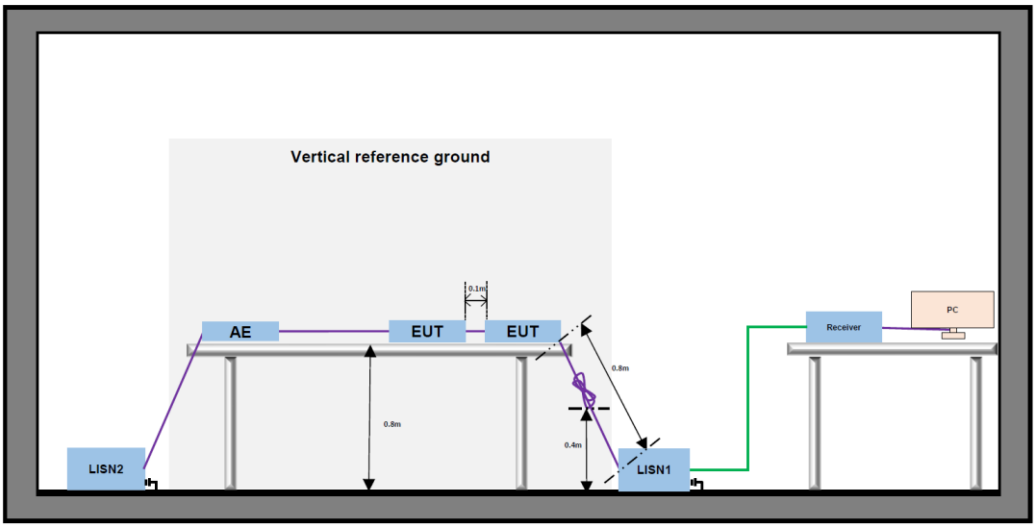
Test Procedure

ANSI C63.10-2013, Section 6.2.

Test Settings

1. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
3. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
4. The receiver is set to a resolution bandwidth of 9kHz. Peak detection s used netless otherwise noted as quasi-peak or average.
5. AC Power Line Conducted Emissions, the channel with the highest output power was tested.
6. Both sides of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Test Setup

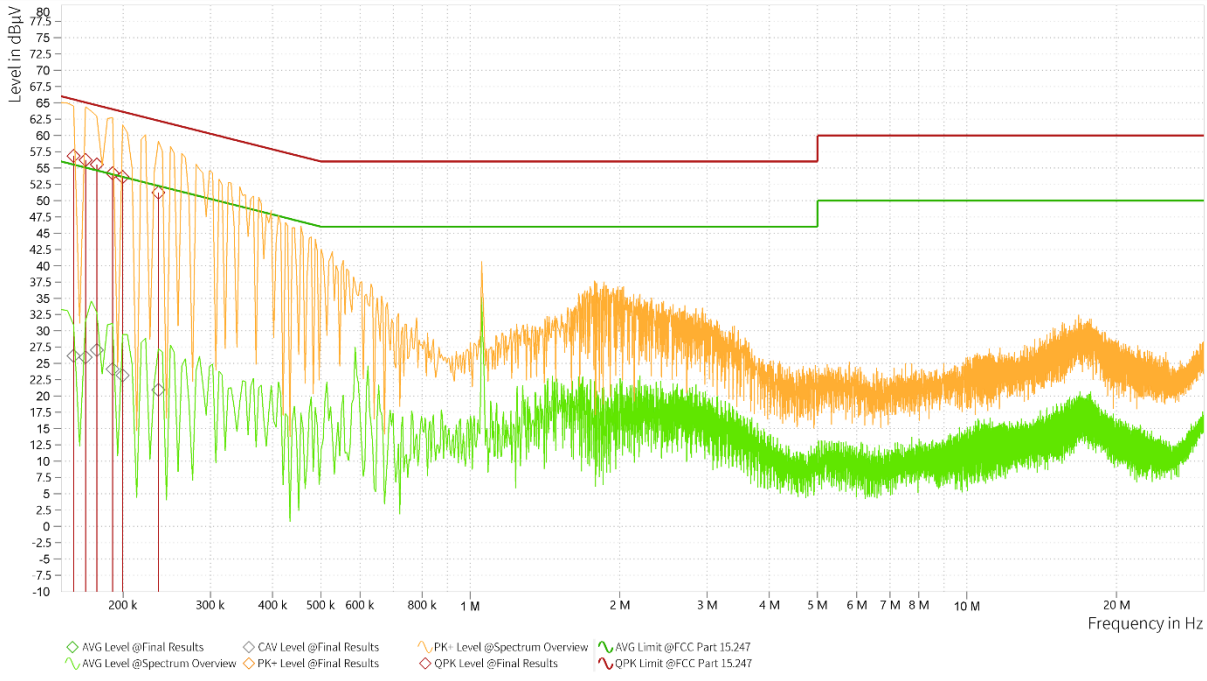


Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result:

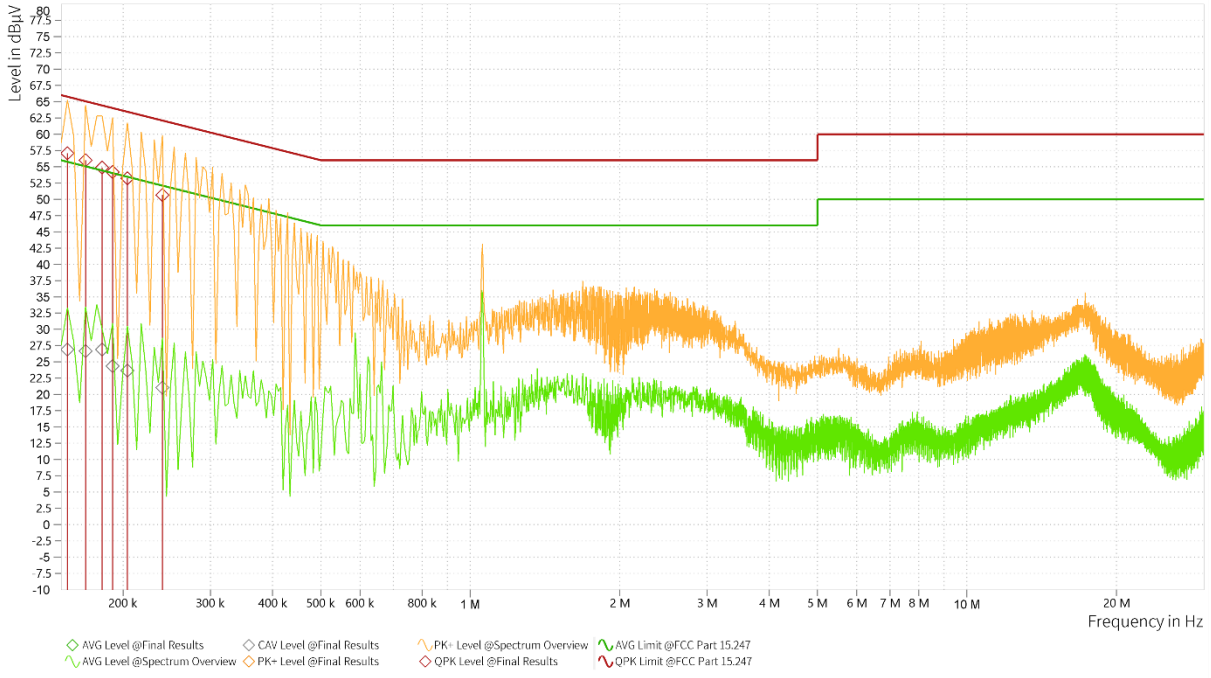
Test mode:	Transmitting		
Test Voltage:	AC 120V / 60Hz	Phase:	Line



Rg	Frequency [MHz]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	CAV Raw Lvl [dBµV]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	QPK Raw Lvl [dBµV]	Correction [dB]	Line
1	0.159	26.15	55.52	29.36	15.67	56.85	65.52	8.67	46.37	10.48	L1
1	0.168	25.94	55.06	29.12	15.45	56.21	65.06	8.85	45.73	10.48	L1
1	0.177	27.07	54.63	27.56	16.57	55.53	64.63	9.10	45.04	10.49	L1
1	0.191	24.13	54.01	29.88	13.64	54.20	64.01	9.82	43.71	10.49	L1
1	0.200	23.17	53.63	30.46	12.68	53.59	63.63	10.04	43.10	10.49	L1
1	0.236	20.95	52.25	31.31	10.44	51.22	62.25	11.03	40.72	10.50	L1

Note:
1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Level = Raw Level[dBµV] + Correction[dB]
3. Margin = Limit[dBµV] - Level[dBµV]

Test mode:	Transmitting		
Test Voltage:	AC 120V / 60Hz	Phase:	Neutral



Rg	Frequency [MHz]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	CAV Raw Lvl [dBµV]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	QPK Raw Lvl [dBµV]	Correction [dB]	Line
1	0.155	26.88	55.75	28.87	16.46	57.06	65.75	8.70	46.63	10.43	N
1	0.168	26.67	55.06	28.39	16.25	56.00	65.06	9.06	45.58	10.42	N
1	0.182	26.90	54.42	27.52	16.49	54.88	64.42	9.54	44.47	10.41	N
1	0.191	24.36	54.01	29.65	13.95	54.19	64.01	9.83	43.78	10.41	N
1	0.204	23.69	53.45	29.76	13.28	53.22	63.45	10.23	42.82	10.40	N
1	0.240	21.07	52.10	31.03	10.66	50.65	62.10	11.44	40.24	10.41	N

Note:
1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Level = Raw Level[dBµV] + Correction[dB]
3. Margin = Limit[dBµV] - Level[dBµV]

4.3 Output Power

Limits

For 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: 1watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Test Procedure

ANSI C63.10:2013 Section 7.8.5

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. The power output was measured on the EUT antenna port using RF Cable with attenuator connected to a power meter via wideband power sensor.
3. Measure and record the results in the test report.

Test Setup

Refer to section 2.8.1- Setup 1 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.4 Occupied Bandwidth

Limits

None, for reporting purposes only.

Test Procedure

ANSI C63.10:2013 Section 6.9.2 and 6.9.3

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. The transmitter output is connected to a spectrum analyzer.
3. RBW = 1% - 5%OBW
4. VBW = 3 times the RBW
5. Span = Approximately 2 to 5times the 20dB bandwidth
6. Sweep = Auto
7. Detector = Peak
8. Trace = Max hold.
9. The trace was allowed to stabilize
10. Measure and record the results in the test report.

Test Notes

The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform the 20dB bandwidth measurement. The "X" dB bandwidth parameter was set to X= 20. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.

Test Setup

Refer to section 2.8.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.5 Hopping Frequency Separation

Limits

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 25kHz 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.

Test Procedure

ANSI C63.10:2013 Section 7.8.2

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously
2. Enable the EUT hopping function
3. The transmitter output is connected to a spectrum analyzer
4. RBW = 30% of channel spacing. Adjust as necessary to best identify center of each individual channel
5. VBW ≥ RBW
6. Span = Wide enough to capture the peaks of two adjacent channels
7. Sweep = Auto
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report

Test Setup

Refer to section 2.8.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.6 Number of Hopping Channels

Limits

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

Test Procedure

ANSI C63.10:2013 Section 7.8.3

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously
2. Enable the EUT hopping function
3. The transmitter output is connected to a spectrum analyzer
4. RBW < 30% of channel spacing or 20dB bandwidth, whichever is smaller.
5. VBW ≥ RBW
6. Span = The frequency band of operation
7. Sweep = Auto
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report.

Test Setup

Refer to section 2.8.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.7 Dwell Time

Limits

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.

Test Procedure

ANSI C63.10:2013 Section 7.8.4

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously
2. Enable the EUT hopping function
3. The transmitter output is connected to a spectrum analyzer
4. RBW ≤ channel spacing and >> 1/T, where T is expected dwell time per channel
5. VBW ≥ RBW
6. Span = Zero span, centered on a hopping channel
7. Sweep = As necessary to capture the entire dwell time per hopping channel
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report

Test Setup

1. For Normal mode, The average time of occupancy in the specified 3.16 second. Period time=(79 channels *0.4s), Total Dwell time = Total Hops* Burst width.
2. For AFH mode, The average time of occupancy in the specified 0.8 second. Period time= (20 channels *0.4s), Total Dwell time = Total Hops* Burst width.

Test Setup

Refer to section 2.8.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.8 Band Edge for Conducted Emissions

Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated. 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 or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph 15.247(b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure

ANSI C63.10:2013 Section 7.8.6

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously
2. Activate frequency hopping function if necessary
3. The transmitter output is connected to a spectrum analyzer
4. RBW = 100kHz
5. VBW = 300kHz
6. Point ≥ 2 x span/RBW
7. Sweep = Auto
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report

Test Setup

Refer to section 2.8.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.9 Spurious RF Conducted Emissions

Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated. 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 or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph 15.247(b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure

ANSI C63.10:2013 Section 7.8.8

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. Activate frequency hopping function if necessary.
3. The transmitter output is connected to a spectrum analyzer
4. The spectrum from 30MHz - 26.5GHz
5. RBW = 100kHz
6. VBW = 300kHz
7. Sweep = Auto
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report

Test Setup

Refer to section 2.8.1- Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.10 Radiated Spurious Emissions and Band Edge

Limits

Spurious emissions are permitted in an of the frequency bands:

MHz	MHz	MHz	MHz	GHz	GHz
0.090 - 0.110	12.29 - 12.293	149.9 - 150.05	1660 - 1710	4.5 - 5.15	14.47 - 14.5
0.495 - 0.505	12.51975 - 1252025	156.52475 - 156.52525	1718.8 - 1722.2	5.35 - 5.46	15.35 - 16.2
2.1735 - 2.1905	12.5767 - 12.57725	156.7 - 156.9	2200 - 2300	7.25 - 7.75	17.7 - 21.4
4.125 - 128	13.36 - 13.41	162.0125 - 167.17	2310 - 2390	8.025 - 8.5	22.01 - 23.12
4.17725 - 4.17775	16.42 - 16.423	167.72 - 173.2	2483.5 - 2500	9.0 - 9.2	23.6 - 24.0
4.20725 - 4.20775	16.69475 - 16.69525	240 - 285	2655 - 2900	9.3 - 9.5	31.2 - 31.8
6.215 - 6.218	1680425 - 1680475	322 - 335.4	3260 - 3267	10.6 - 12.7	36.43 - 36.5
6.26775 - 6.26825	25.5 - 25.67	399.9 - 410	3332 - 3339	13.25 - 13.4	
6.31175 - 6.31225	37.5 - 38.25	608 - 614	3345.8 - 3358		
8.291 - 8.294	73 - 74.6	960 - 1240	3600 - 4400		
8.362 - 8.366	74.8 - 75.2	1300 - 1427			
8.37625 - 8.38675	108 - 121.94	1435 - 1626.5			
8.41425 - 8.41475	123 - 138	1645.5 - 1646.5			

Radiated disturbance of an intentional radiator:

Frequency	Field strength (μV/m)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	74.0	Peak	3
		54.0	Average	

Test Procedure

ANSI C63.10:2013 Section 6.4 & 6.5 & 6.6

Test Settings

1. For radiated emissions measurements performed at frequencies less than or equal to 1GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80cm above the reference ground plane.
2. For radiated emissions measurements performed at frequencies above 1GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80cm above the ground plane.
3. Radiated measurements shall be made with the measurement antenna positioned in both horizontal and vertical polarization. The measurement antenna shall be varied from 1m to 4m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level (i.e, field strength or received power), when orienting the measurement antenna in vertical polarization, the minimum height of the lowest element of the antenna shall clear the site reference ground plane by at least 25cm.
4. For each suspected emission, the EUT was ranged its worst case and then tune the antenna tower(from 1~4m) and turntable(from 0~360°) find the maximum reading. Preamplifier and a high pass filter are used for the test in order get better signal level comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
7. spectrum analyzer setting:
   Measurements Below 1000MHz: RBW = 120 kHz; VBW ≥ 300 kHz; Detector = Peak

Measurements Above 1000MHz: RBW = 1 MHz; VBW ≥ 3 MHz; Detector = Peak

Average Measurements Above 1000MHz:

RBW = 1 MHz, VBW ≥ 1/T, with peak detector for average measurements.

8. The field strength is calculated by adding the Antenna Factor, Cable Factor. The basic equation with a sample calculation is as follows:

   Level = Reading(dBμV) + AF(dB/m) + Factor(dB):

   AF = Antenna Factor(dB/m)

   Factor = Cable Factor(dB) - Preamplifier gain(dB)

   Margin = Limit(dBμV/m) – Level(dBμV/m)

9. Repeat above procedures until all frequencies measured was complete.
10. Measure and record the results in the test report.

Test Notes

1. Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. the disturbance between 9KHz to 30MHz and 18GHzwas very low. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be recorded, so only the harmonics had been displayed.
2. If the peak measurement value does not exceed the average limit, it is determined that further investigation is not necessary.

Test Setup

Refer to section 2.8.2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

5 Test Setup Photos

The detailed test data see: **Test Setup Photos**

Appendix

20dB Emission Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	20dB EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant6	2402	0.939	2401.538	2402.477	---	---
DH5	Ant6	2441	0.939	2440.535	2441.474	---	---
DH5	Ant6	2480	0.939	2479.538	2480.477	---	---
2DH5	Ant6	2402	1.335	2401.325	2402.660	---	---
2DH5	Ant6	2441	1.311	2440.331	2441.642	---	---
2DH5	Ant6	2480	1.287	2479.361	2480.648	---	---
3DH5	Ant6	2402	1.308	2401.343	2402.651	---	---
3DH5	Ant6	2441	1.311	2440.340	2441.651	---	---
3DH5	Ant6	2480	1.302	2479.343	2480.645	---	---

Test Graphs

DH5-Ant6-2402

DH5-Ant6-2441

DH5-Ant6-2480

2DH5-Ant6-2402

2DH5-Ant6-2441

2DH5-Ant6-2480

3DH5-Ant6-2402

3DH5-Ant6-2441

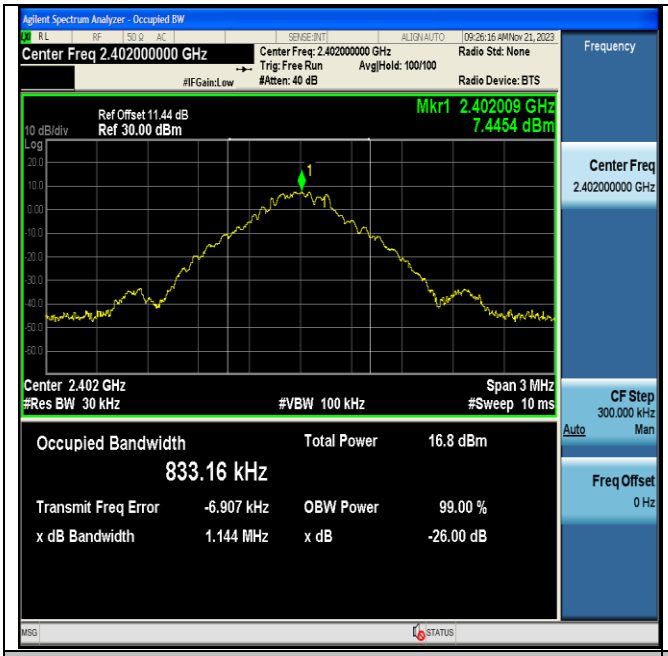
3DH5-Ant6-2480

Occupied Channel Bandwidth

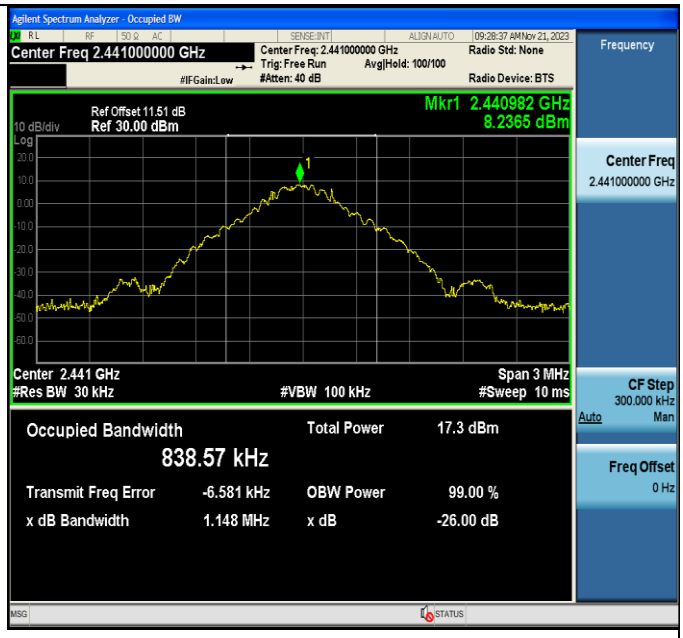
Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant6	2402	0.83316	2401.5765	2402.4097	---	---
DH5	Ant6	2441	0.83857	2440.5741	2441.4127	---	---
DH5	Ant6	2480	0.83847	2479.5722	2480.4106	---	---
2DH5	Ant6	2402	1.1828	2401.4019	2402.5847	---	---
2DH5	Ant6	2441	1.1804	2440.4019	2441.5823	---	---
2DH5	Ant6	2480	1.1827	2479.4009	2480.5836	---	---
3DH5	Ant6	2402	1.1878	2401.4005	2402.5883	---	---
3DH5	Ant6	2441	1.1857	2440.4018	2441.5875	---	---
3DH5	Ant6	2480	1.1890	2479.3991	2480.5881	---	---

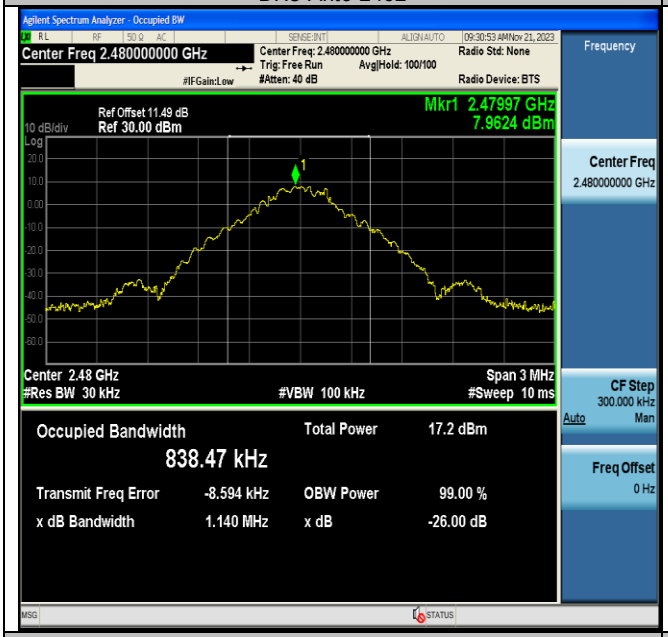
Test Graphs



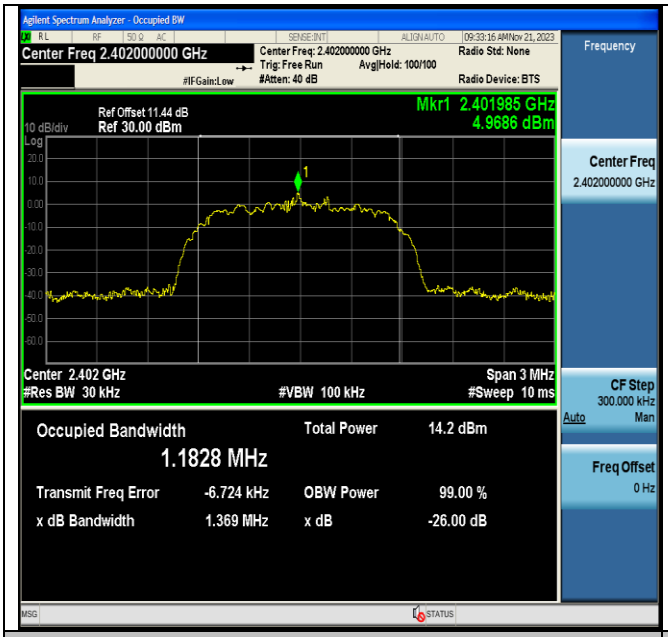
DH5-Ant6-2402



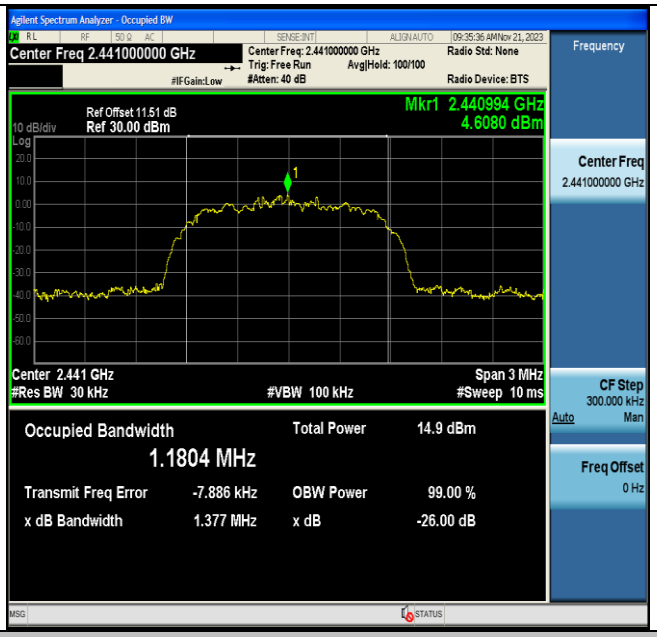
DH5-Ant6-2441



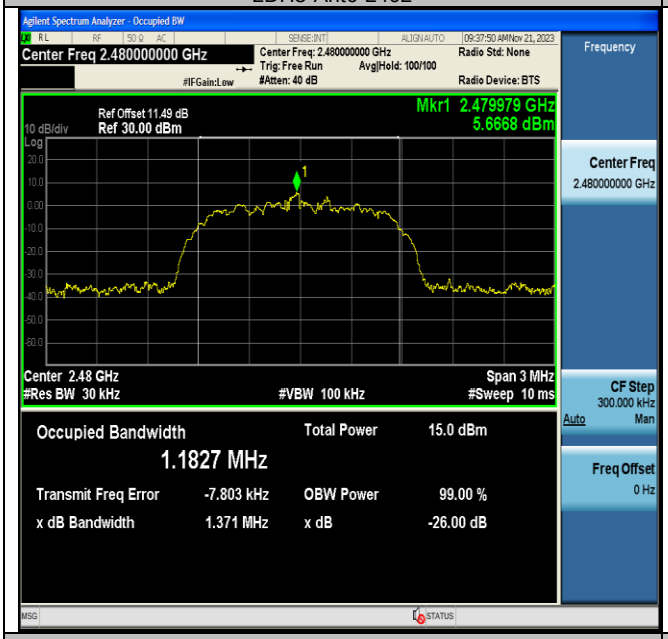
DH5-Ant6-2480



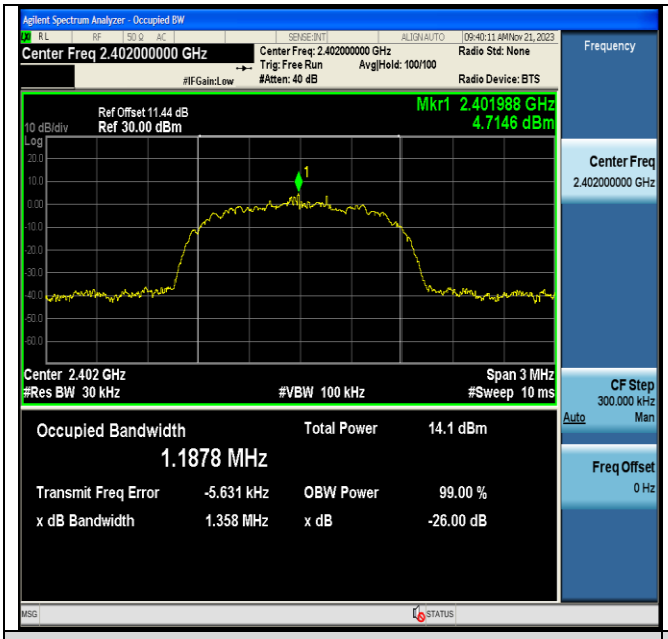
2DH5-Ant6-2402



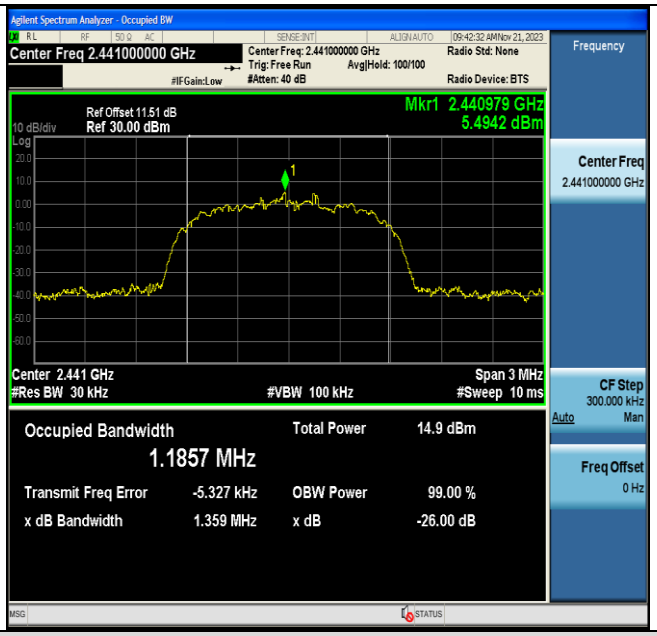
2DH5-Ant6-2441



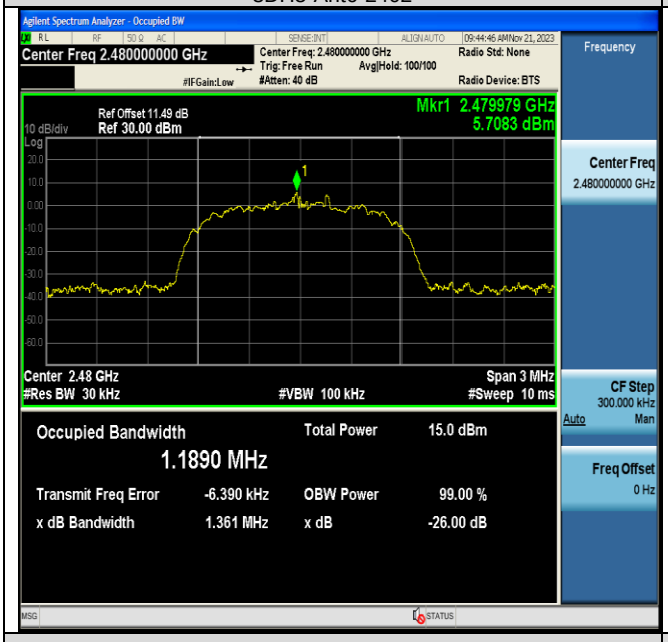
2DH5-Ant6-2480



3DH5-Ant6-2402



3DH5-Ant6-2441



3DH5-Ant6-2480

Maximum conducted output power

FCC ID: PY7-64228M (Lead Model)

Test Result Peak

Test Mode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant6	2402	11.42	≤30	PASS
DH5	Ant6	2441	11.89	≤30	PASS
DH5	Ant6	2480	11.71	≤30	PASS
2DH5	Ant6	2402	9.63	≤20.97	PASS
2DH5	Ant6	2441	10.33	≤20.97	PASS
2DH5	Ant6	2480	10.28	≤20.97	PASS
3DH5	Ant6	2402	10.05	≤20.97	PASS
3DH5	Ant6	2441	10.62	≤20.97	PASS
3DH5	Ant6	2480	10.55	≤20.97	PASS

Test Result Average

Test Mode	Antenna	Frequency[MHz]	Conducted Average Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant6	2402	11.06	≤30	PASS
DH5	Ant6	2441	11.55	≤30	PASS
DH5	Ant6	2480	11.42	≤30	PASS
2DH5	Ant6	2402	8.20	≤20.97	PASS
2DH5	Ant6	2441	8.55	≤20.97	PASS
2DH5	Ant6	2480	8.74	≤20.97	PASS
3DH5	Ant6	2402	8.18	≤20.97	PASS
3DH5	Ant6	2441	8.57	≤20.97	PASS
3DH5	Ant6	2480	8.79	≤20.97	PASS

FCC ID: PY7-73716J (This Model)

Test Result Peak

Test Mode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant6	2441	12.06	≤30	PASS
2DH5	Ant6	2441	10.30	≤20.97	PASS
3DH5	Ant6	2441	10.23	≤20.97	PASS

Test Result Average

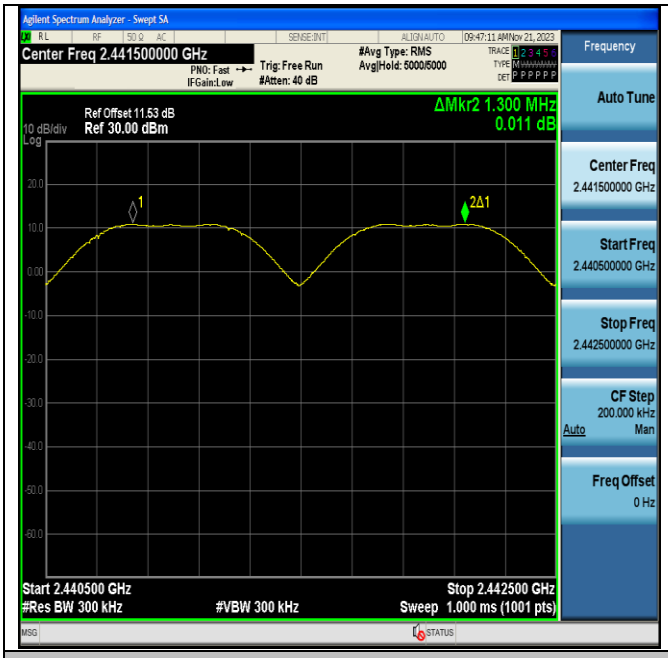
Test Mode	Antenna	Frequency[MHz]	Conducted Average Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant6	2441	11.33	≤30	PASS
2DH5	Ant6	2441	8.71	≤20.97	PASS
3DH5	Ant6	2441	8.54	≤20.97	PASS

Carrier frequency separation

Test Result

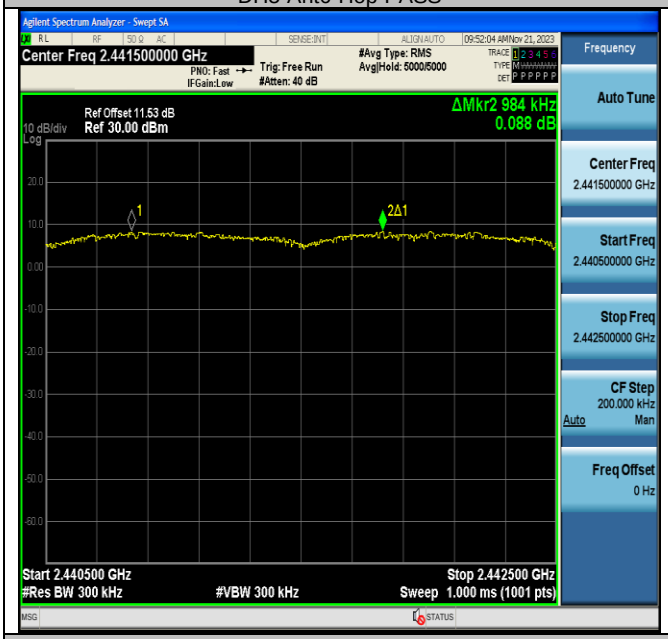
TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant6	Hop	1.3	≥0.939	PASS
2DH5	Ant6	Hop	0.988	≥0.890	PASS
3DH5	Ant6	Hop	0.984	≥0.874	PASS

Test Graphs



DH5-Ant6-Hop-PASS

2DH5-Ant6-Hop-PASS



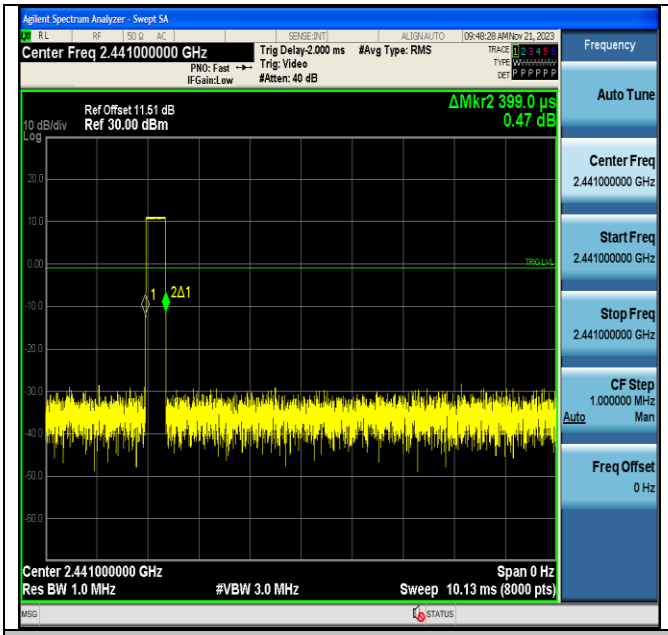
3DH5-Ant6-Hop-PASS

Time of occupancy

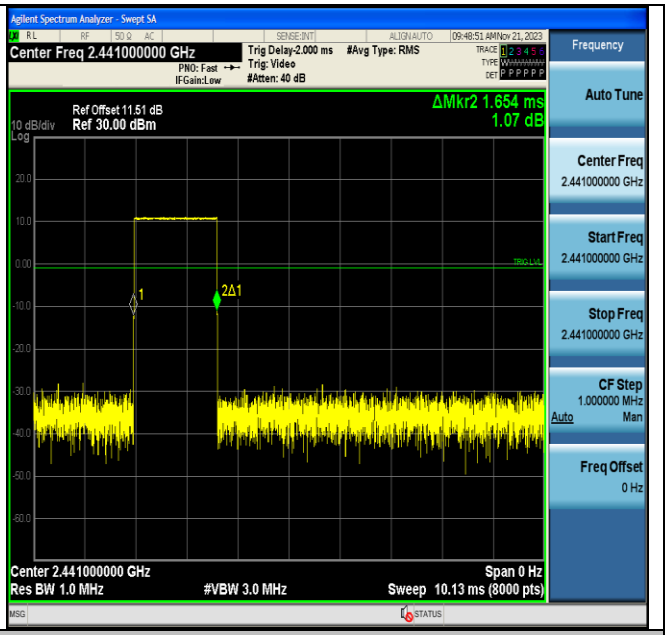
Test Result

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant6	Hop	0.399	320	0.128	≤0.4	PASS
DH3	Ant6	Hop	1.654	160	0.265	≤0.4	PASS
DH5	Ant6	Hop	2.902	106.67	0.31	≤0.4	PASS
2DH1	Ant6	Hop	0.405	320	0.13	≤0.4	PASS
2DH3	Ant6	Hop	1.657	160	0.265	≤0.4	PASS
2DH5	Ant6	Hop	2.904	106.67	0.31	≤0.4	PASS
3DH1	Ant6	Hop	0.405	320	0.13	≤0.4	PASS
3DH3	Ant6	Hop	1.656	160	0.265	≤0.4	PASS
3DH5	Ant6	Hop	2.907	106.67	0.31	≤0.4	PASS

Test Graphs

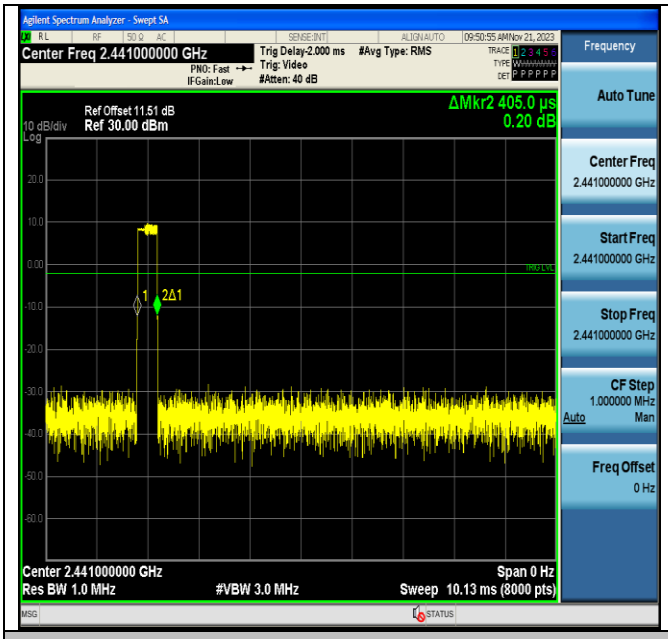


DH1-Ant6-Hop-PASS

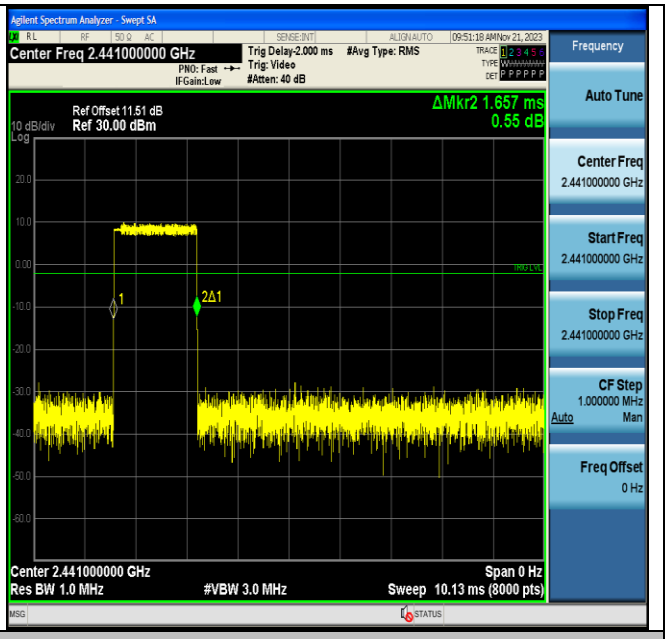


DH3-Ant6-Hop-PASS

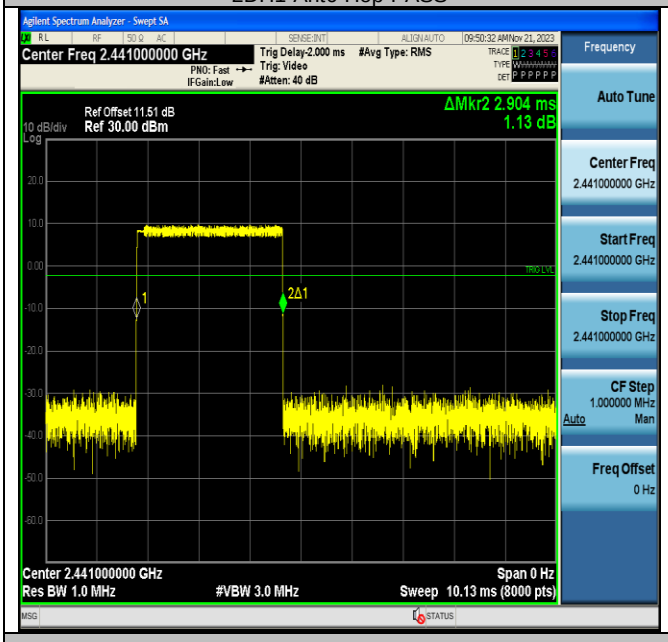
DH5-Ant6-Hop-PASS



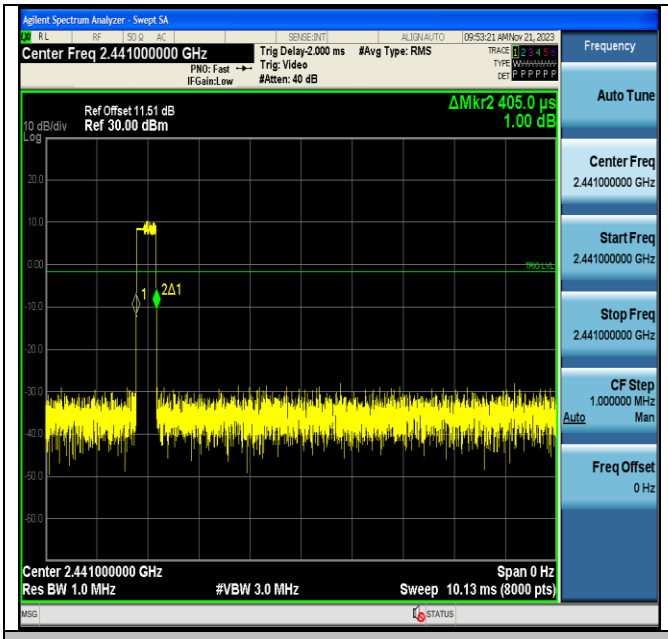
2DH1-Ant6-Hop-PASS



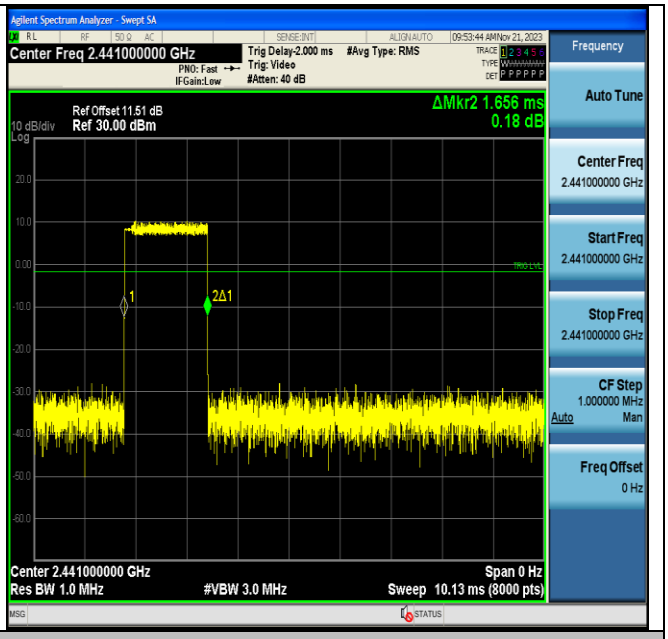
2DH3-Ant6-Hop-PASS



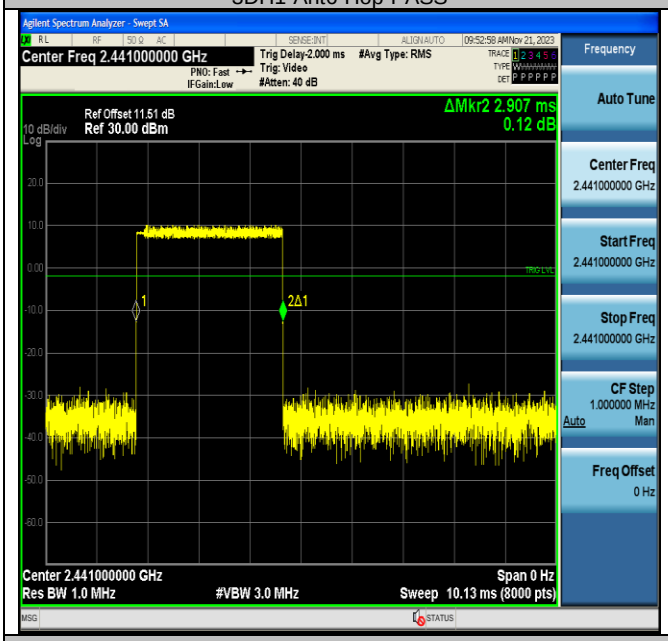
2DH5-Ant6-Hop-PASS



3DH1-Ant6-Hop-PASS



3DH3-Ant6-Hop-PASS



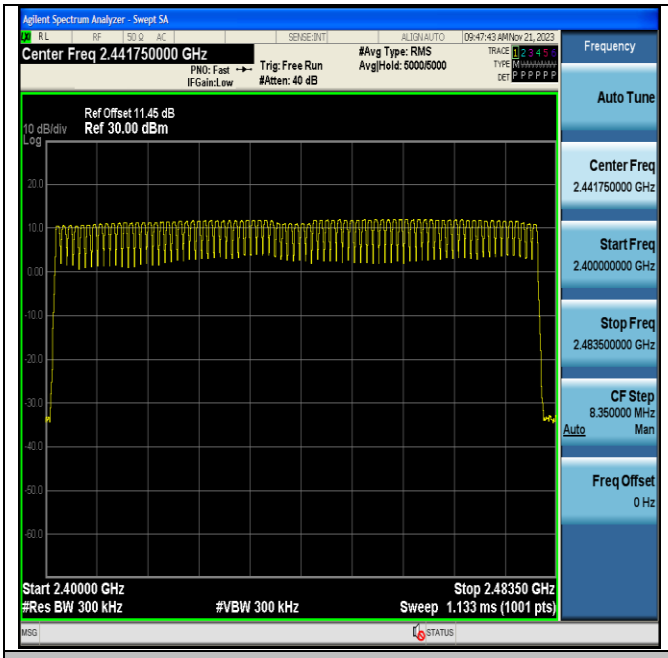
3DH5-Ant6-Hop-PASS

Number of hopping channels

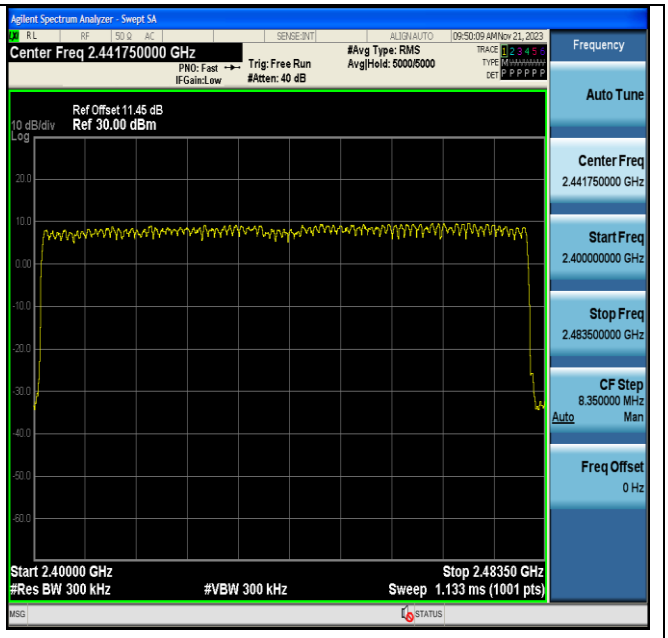
Test Result

TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant6	Hop	79	≥15	PASS
2DH5	Ant6	Hop	79	≥15	PASS
3DH5	Ant6	Hop	79	≥15	PASS

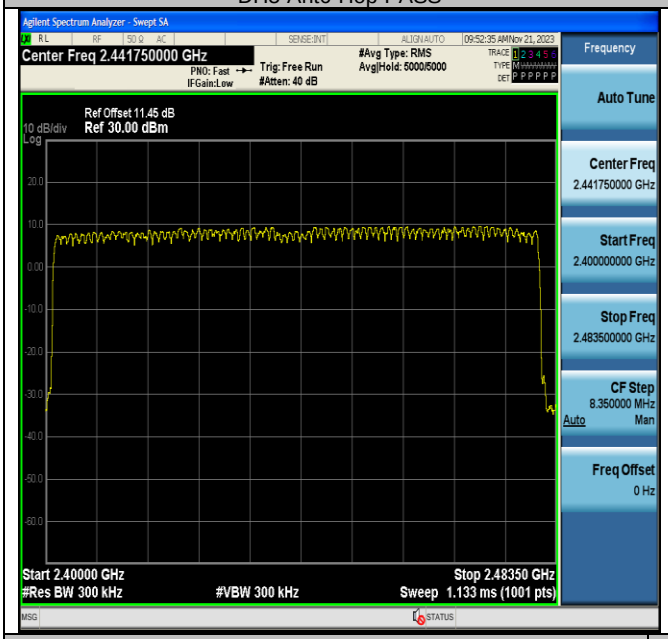
Test Graphs



DH5-Ant6-Hop-PASS



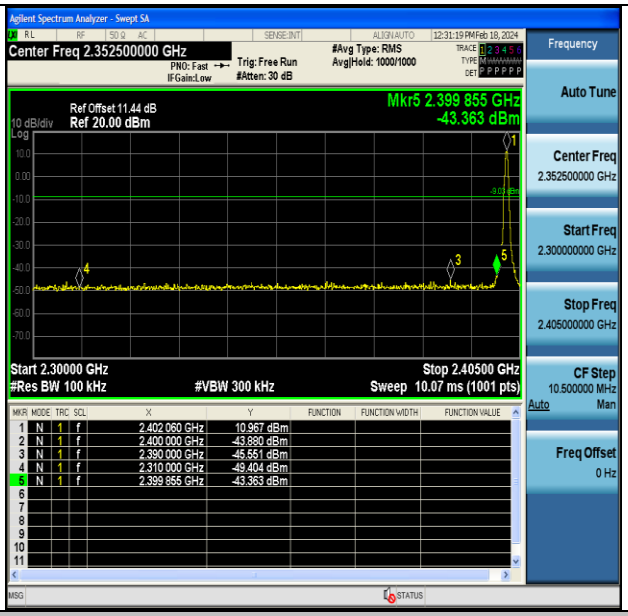
2DH5-Ant6-Hop-PASS



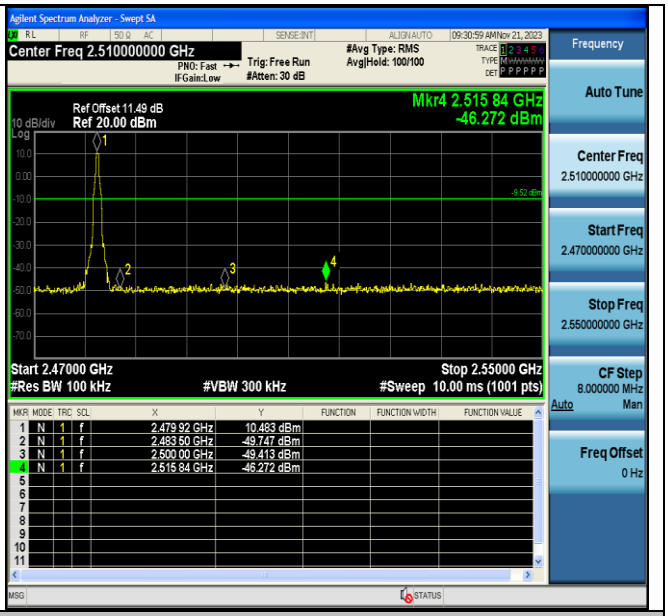
3DH5-Ant6-Hop-PASS

Band edge measurements

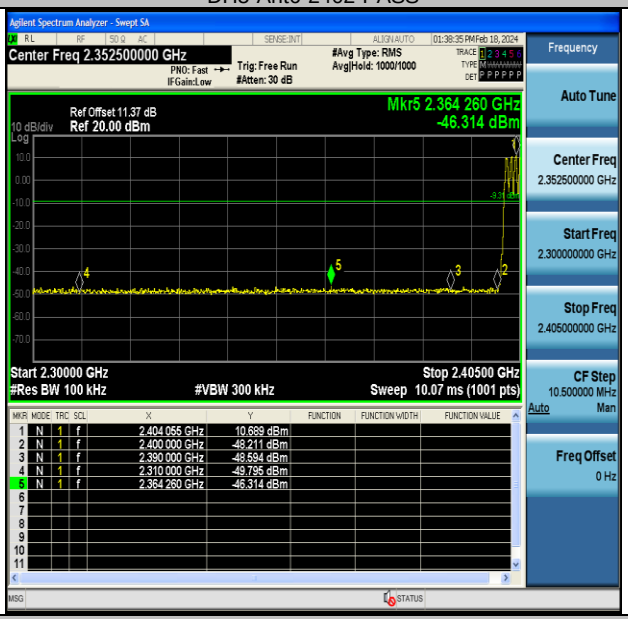
Test Graphs



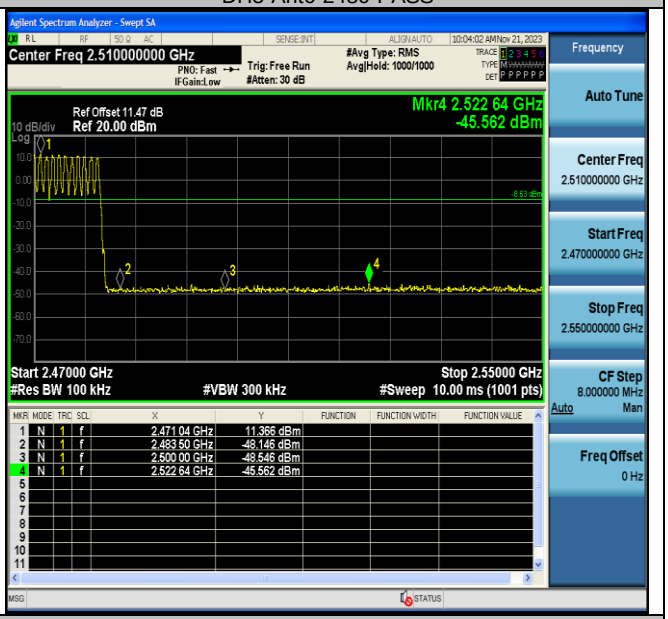
DH5-Ant6-2402-PASS



DH5-Ant6-2480-PASS



DH5-Ant6-Hop_2402-PASS



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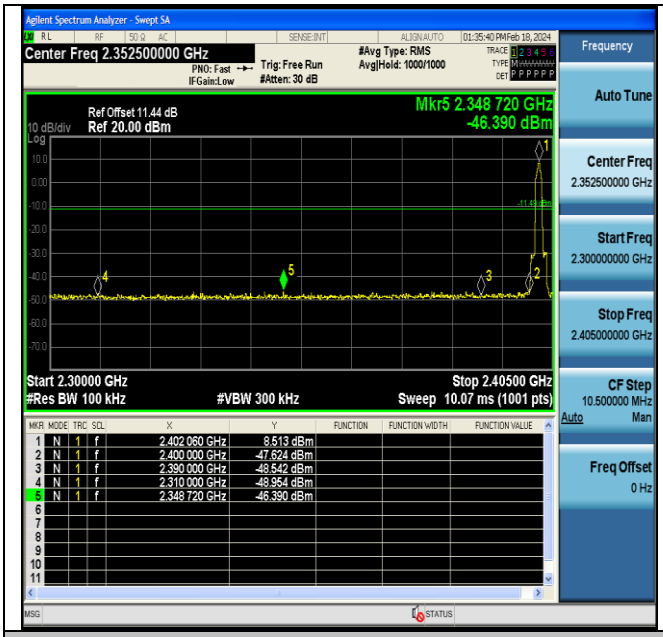
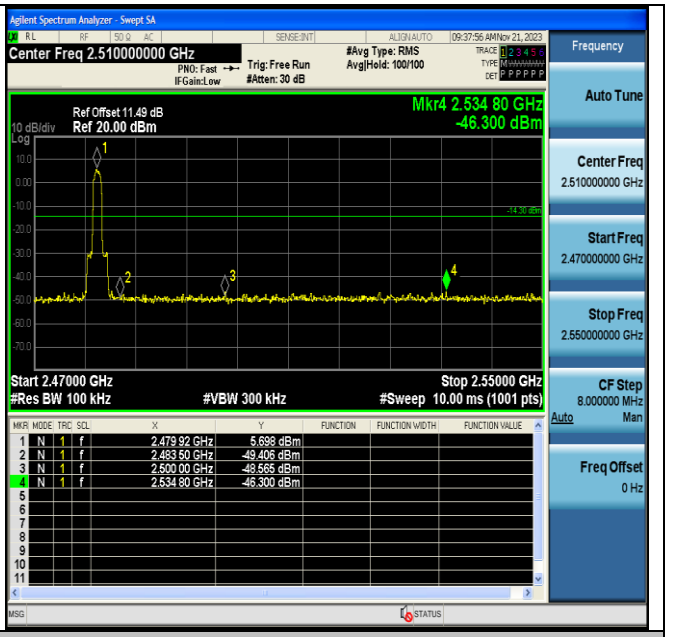


2DH5-Ant6-2402-PASS



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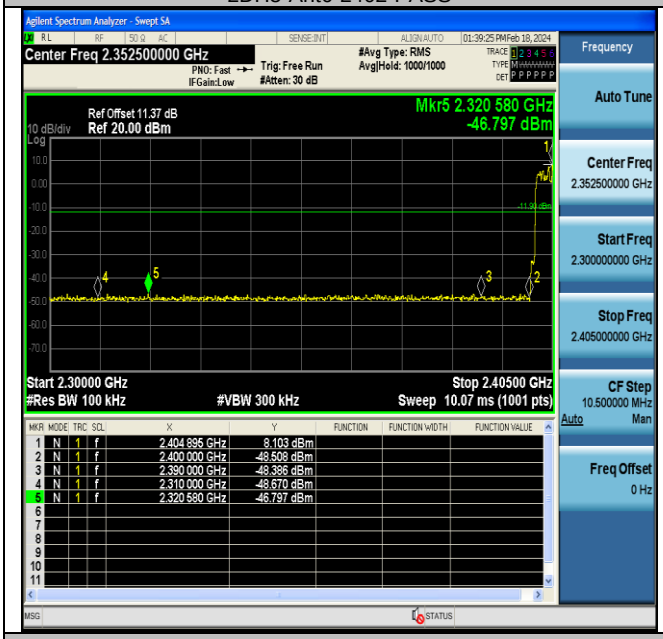

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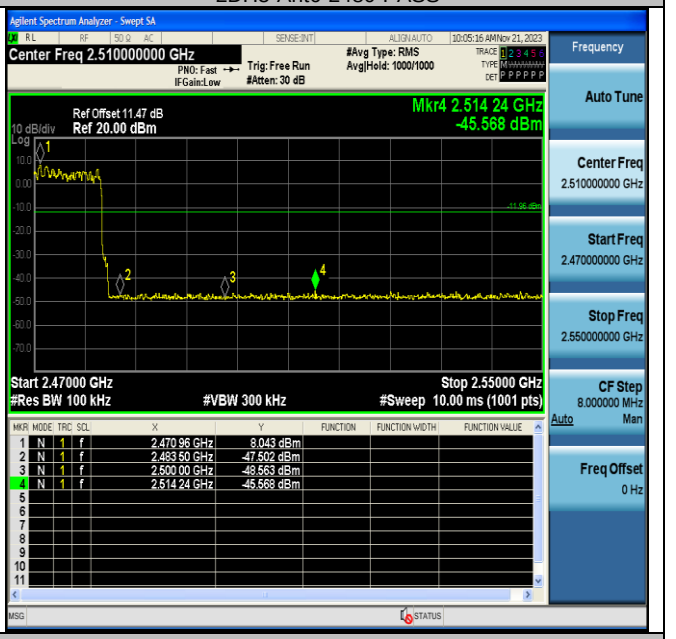

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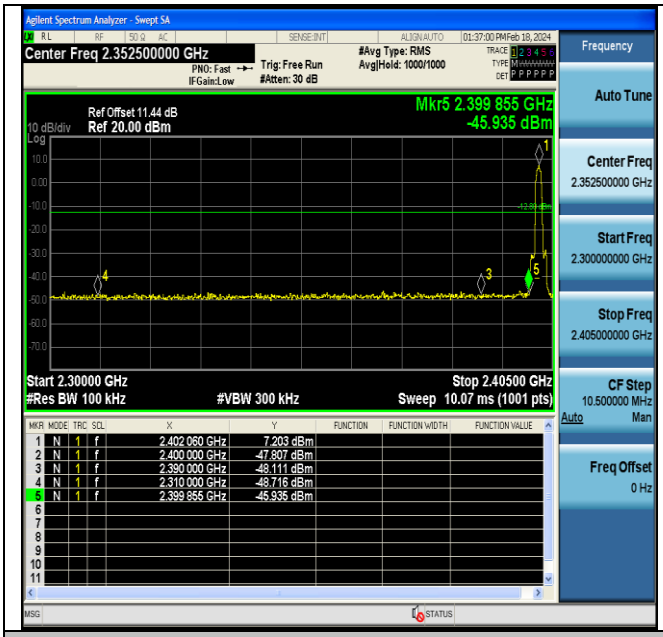

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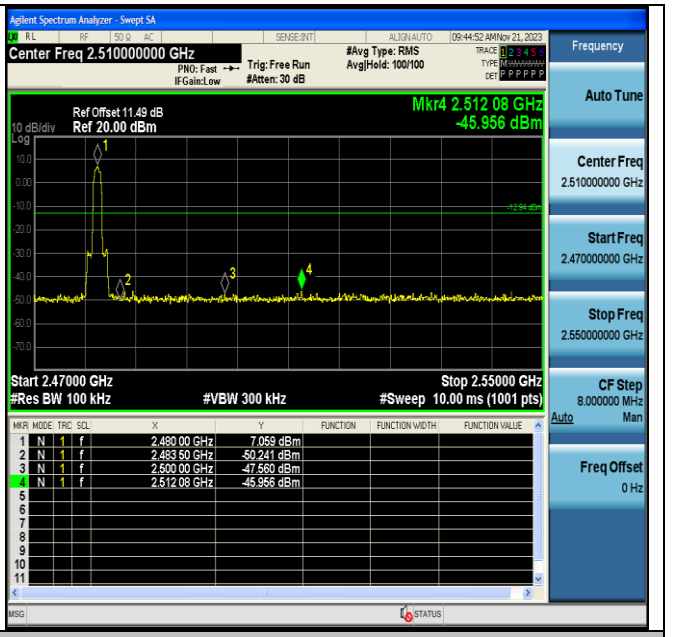

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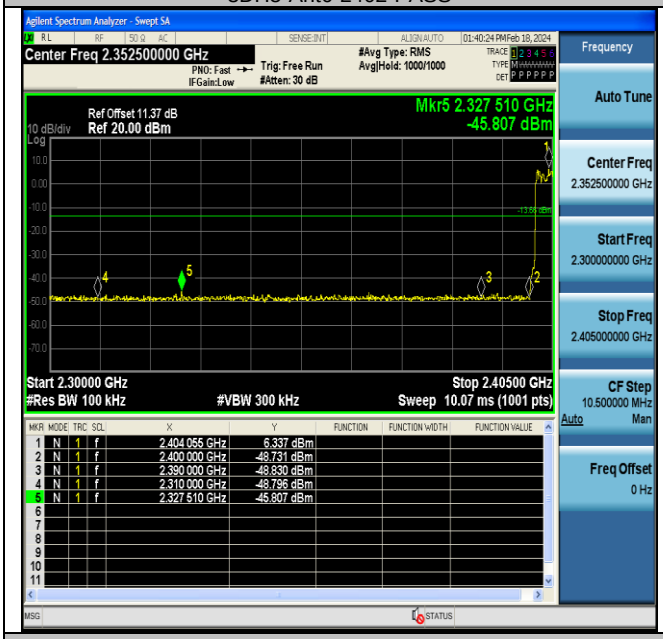

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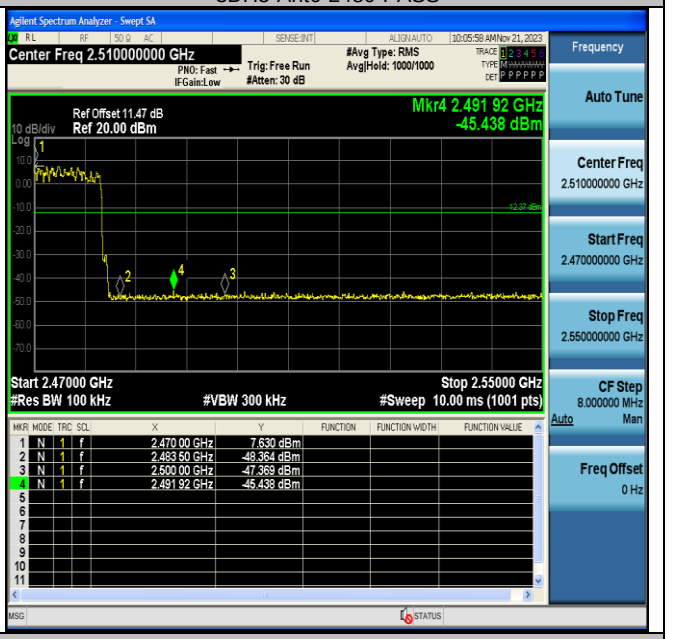
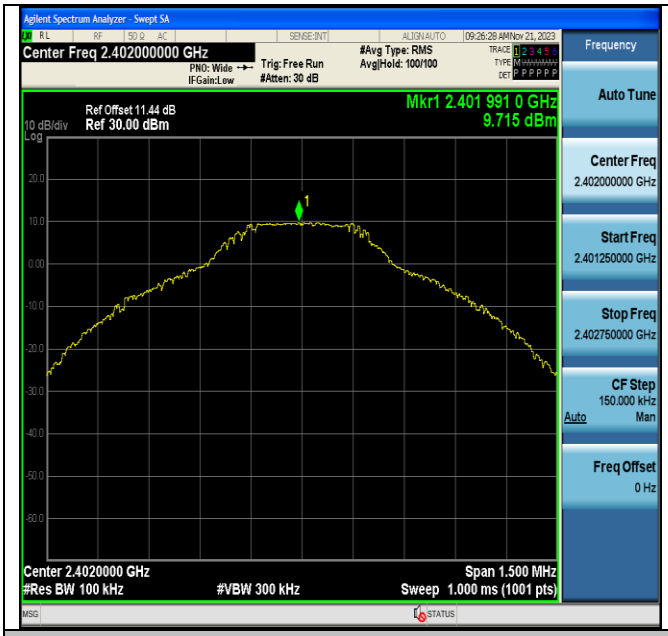


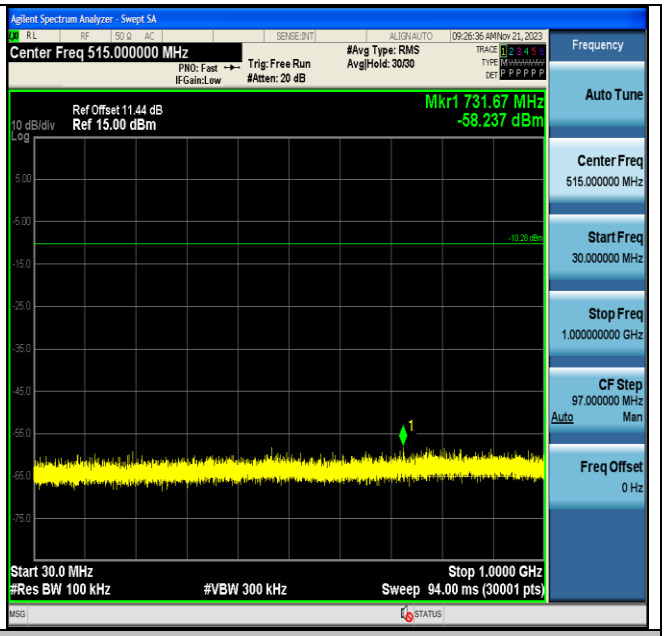
3DH5-Ant6-Hop_2480-PASS

Conducted Spurious Emission

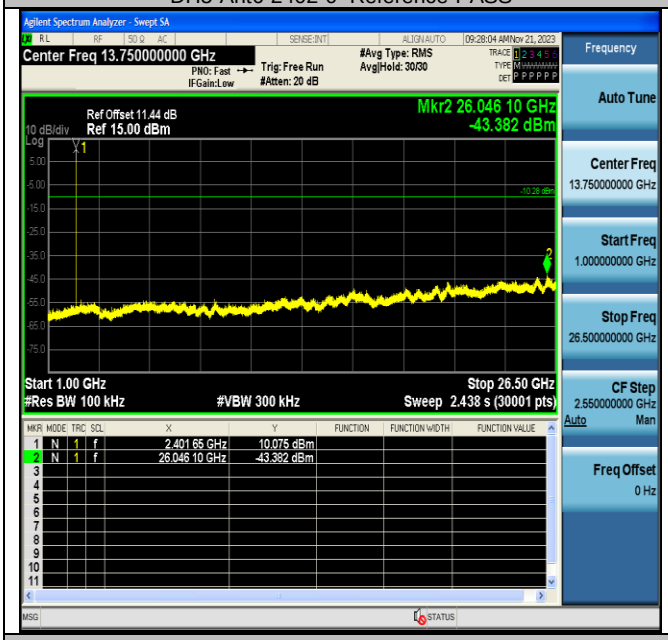
Test Graphs



DH5-Ant6-2402-0~Reference-PASS

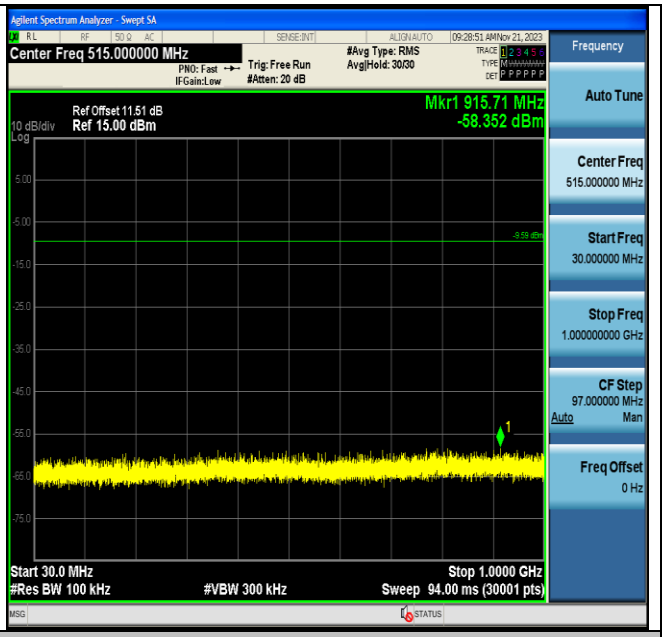


DH5-Ant6-2402-30~1000-PASS

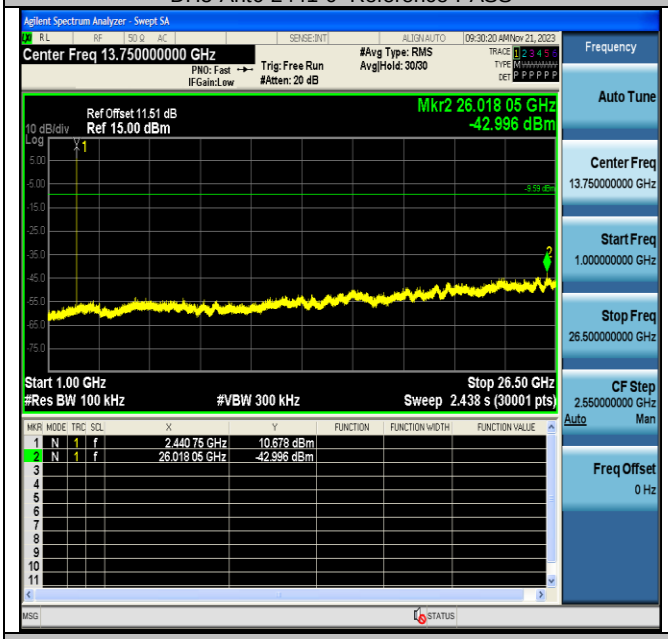


DH5-Ant6-2402-1000~26500-PASS

DH5-Ant6-2441-0~Reference-PASS

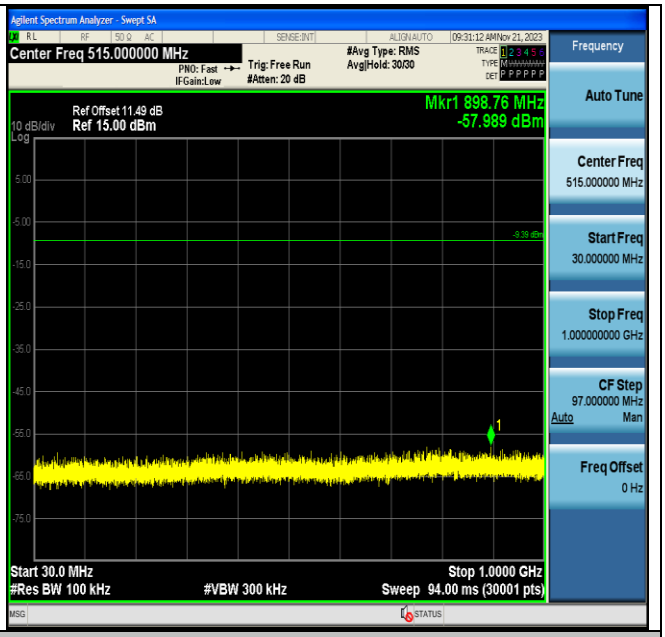


DH5-Ant6-2441-30~1000-PASS

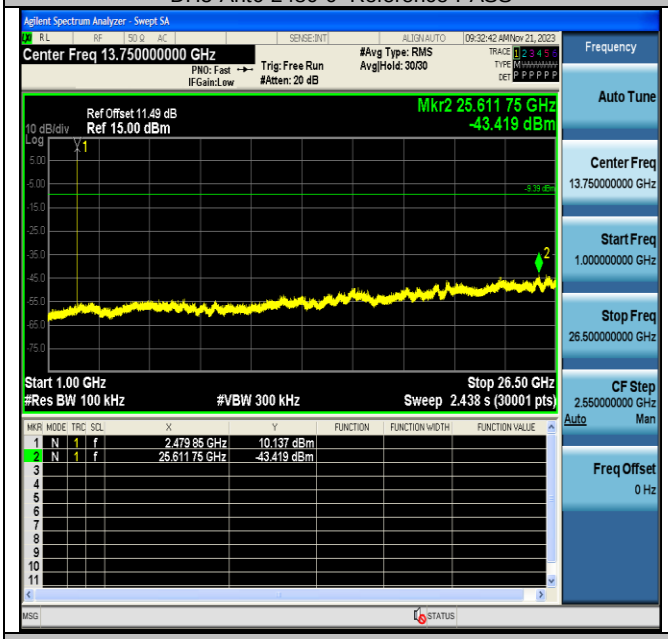


DH5-Ant6-2441-1000~26500-PASS

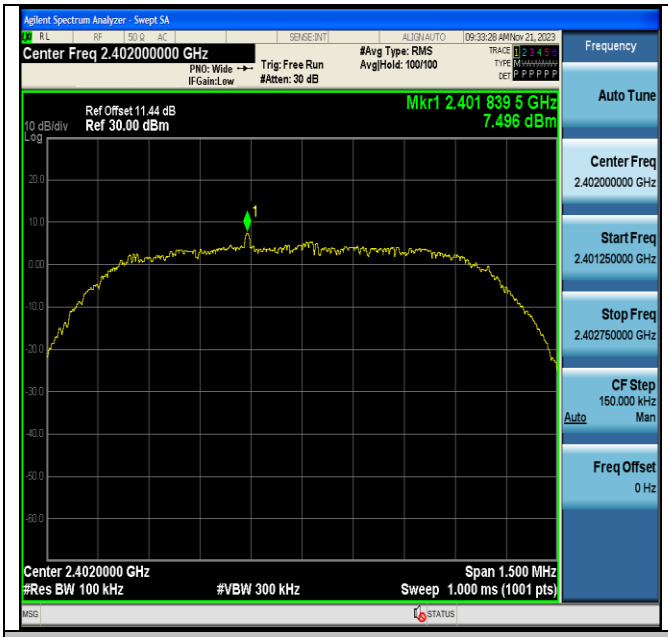
DH5-Ant6-2480-0~Reference-PASS



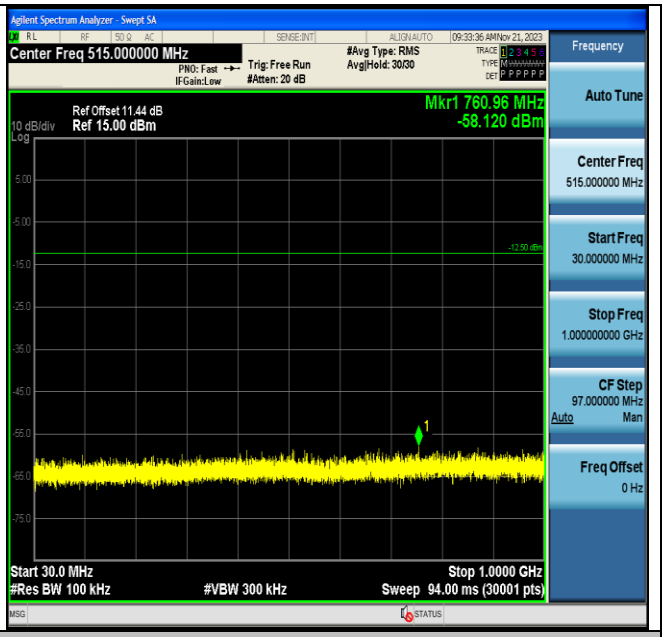
DH5-Ant6-2480-30~1000-PASS



DH5-Ant6-2480-1000~26500-PASS



2DH5-Ant6-2402-0~Reference-PASS



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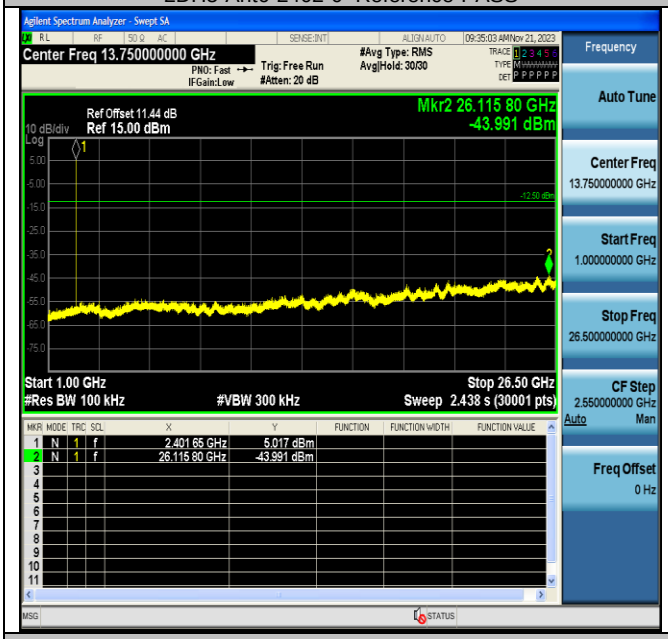
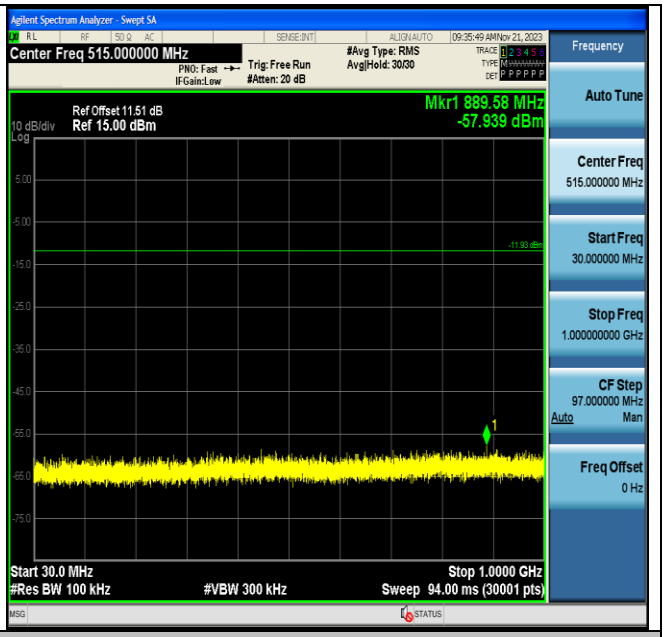


2DH5-Ant6-2402-1000~26500-PASS

2DH5-Ant6-2441-0~Reference-PASS



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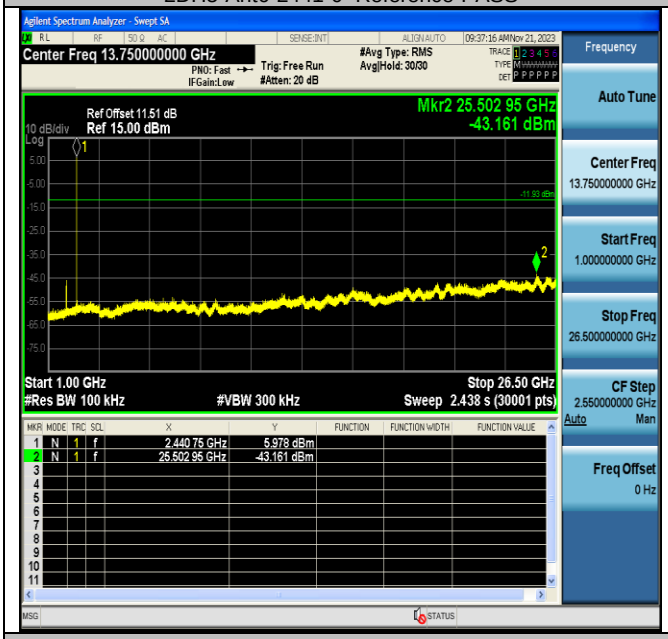

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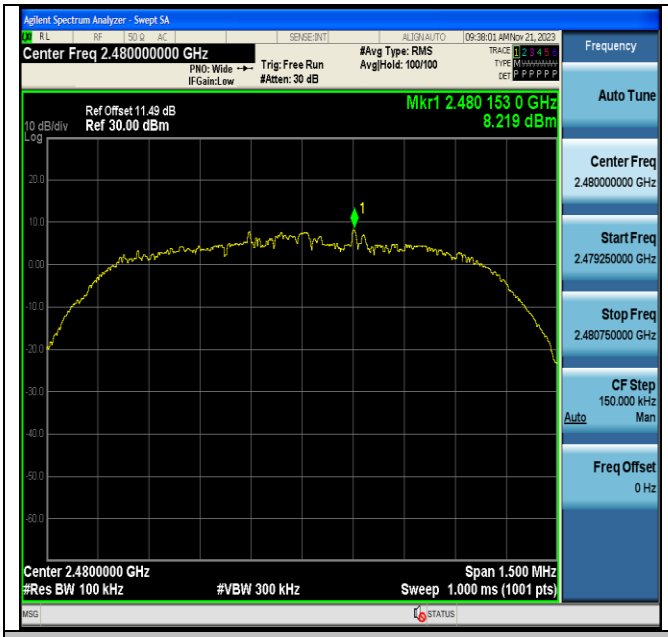

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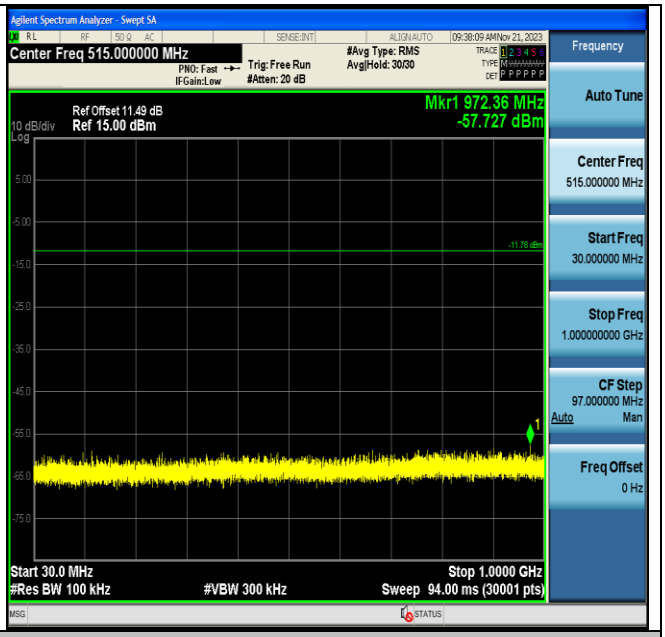

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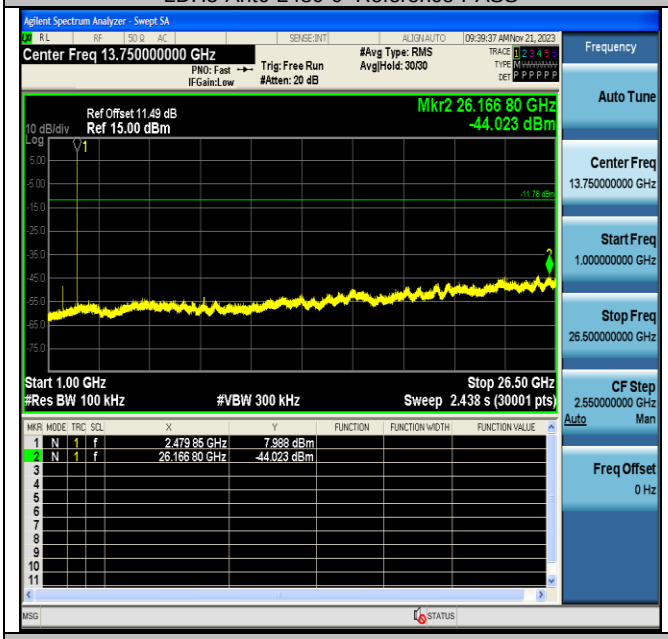

2DH5-Ant6-2480-1000~26500-PASS