



427 West 12800 South
Draper, UT 84020

Test Report Certification

FCC ID	SWX-UDB
IC ID	6545A-UDB
Equipment Under Test	UDB
Test Report Serial Number	TR9363_02
Date of Test(s)	11, 15 – 18 July; 2, 8, 13 – 14 August; 10 September 2024
Report Issue Date	11 September 2024

Test Specification	Applicant
47 CFR FCC Part 15, Subpart C	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.



NVLAP LAB CODE 600241-0

Certification of Engineering Report

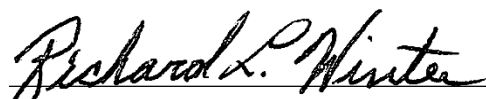
This report has been prepared by Unified Compliance Laboratory (UCL) to document compliance of the device described below with the requirement of Federal Communication Commissions (FCC) Part 15, Subpart C. This report may be reproduced in full. Partial reproduction of this report may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

Applicant	Ubiquiti Inc.
Manufacturer	Ubiquiti Inc.
Brand Name	UBIQUITI
Model Number	UDB
FCC ID	SWX-UDB
IC ID	6545A-UDB

On this 11th day of September 2024, I individually and for Unified Compliance Laboratory certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge and are made in good faith.

Although NVLAP has accredited the Unified Compliance Laboratory testing facilities, this report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. federal government.

Unified Compliance Laboratory


Written By: Joseph W. Jackson
Reviewed By: Richard L. Winter

Revision History		
Revision	Description	Date
01	Original Report Release	11 September 2024
02	Amended Section 5.4	23 September 2024

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1 Client Information

1.1 Applicant

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Alex Macon
Title	Compliance

1.2 Manufacturer

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Alex Macon
Title	Compliance

2 Equipment Under Test (EUT)

2.1 Identification of EUT

Brand Name	UBIQUITI
Model Number	UDB
Serial Number	942A6F40644E
Dimensions (cm)	13.0 x 5.5 x 3.4

2.2 Description of EUT

The UDB is a wireless bridging PoE adapter. The UDB has a 2.4 GHz and 5 GHz transmitter for wireless communications. The 5 GHz is operating in the UNII-1, UNII-2a, UNII-2c, and UNII-3 bands. The UDB can operate with an internal and external antenna. The UDB has one PoE port to power a PoE supported device. The UDB is powered from 120 – 240 Volts AC Mains.

This report covers the circuitry of the device subject to FCC Part 15, Subpart C. The circuitry of the device subject to FCC Part 15 Subpart B was found to be compliant and is covered under a separate Unified Compliance Laboratory test report.

2.3 EUT and Support Equipment

The EUT and support equipment used during the test are listed below.

Brand Name Model Number Serial Number	Description	Name of Interface Ports / Interface Cables
BN: UBIQUITI MN: UDB SN: 942A6F40644E	PoE Bridging Adapter	See Section 2.4
BN: Dell MN: XPS 13 SN: N/A	Laptop Computer	Ethernet / Un-Shielded Cat 5E

Notes: (1) EUT

(2) Interface port connected to EUT (See Section 2.4)

The support equipment listed above was not modified in order to achieve compliance with this standard.

2.4 Interface Ports on EUT

Name of Ports	No. of Ports Fitted to EUT	Cable Description/Length
AC Mains	1	Power Cable/1m
PoE Output	1	Unshielded Cat 5E/7m

2.5 Operating Environment

Power Supply	120 Volts AC Mains
AC Mains Frequency	60 Hz
Temperature	26.7 – 26.3 °C
Humidity	26.6 – 35.8 %
Barometric Pressure	1009 mBar

2.6 Operating Modes

The UDB was connected to a personal computer laptop and tested using test software in order to enable to constant duty cycle greater or equal to 98% of the WiFi transceiver. All emission modes of 802.11 b/g/n were investigated. All measurements are reported with the worst-case mode (802.11n) unless otherwise stated.

2.7 EUT Exercise Software

EUT firmware version 1.0 was used to operate the transmitter using a constant transmit mode.

2.8 Block Diagram of Test Configuration

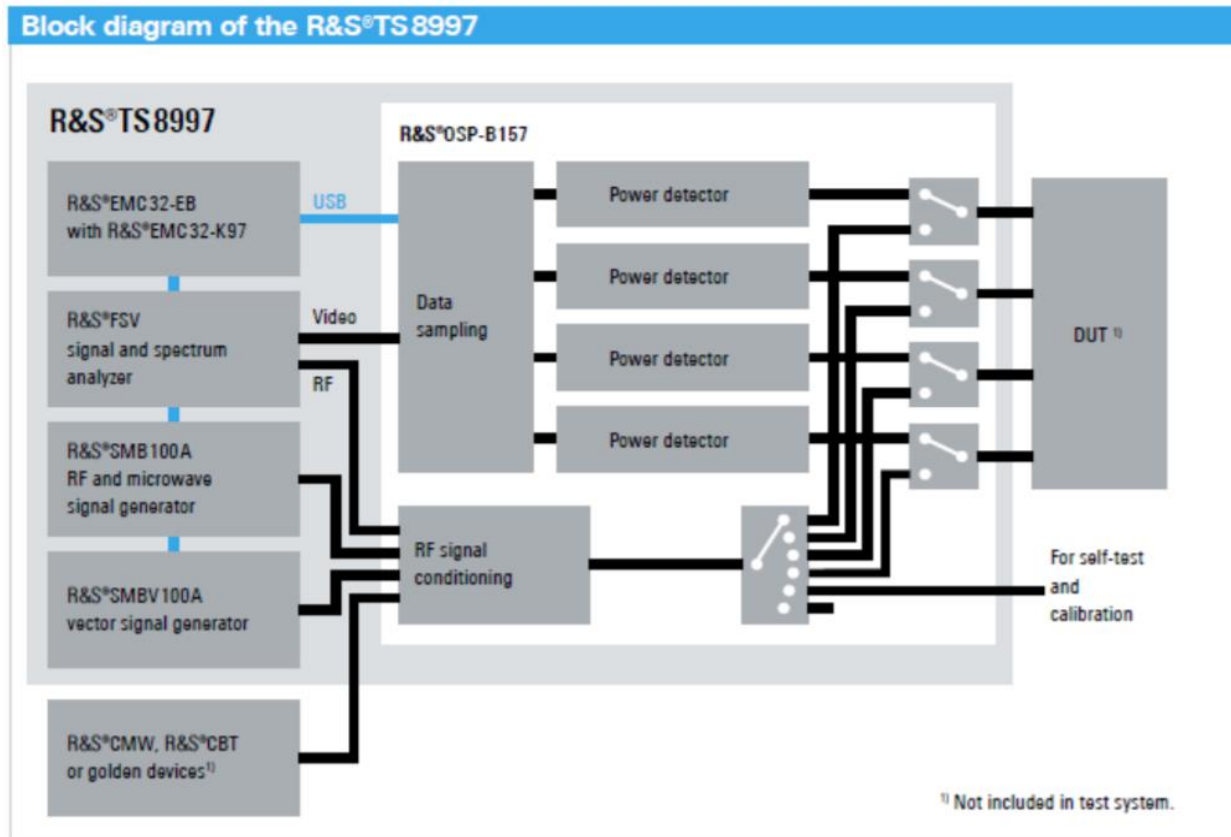


Diagram 1: Test Configuration Block Diagram

2.9 Modification Incorporated/Special Accessories on EUT

There were no modifications made to the EUT during testing to comply with the specification.

2.10 Deviation, Opinions Additional Information or Interpretations from Test Standard

There were no deviations, opinions, additional information or interpretations from the test specification.

3 Test Specification, Method and Procedures

3.1 Test Specification

Title	47 CFR FCC Part 15, Subpart C 15.203, 15.207 and 15.247 Limits and methods of measurement of radio interference characteristics of radio frequency devices.
Purpose of Test	The tests were performed to demonstrate initial compliance

3.2 Methods & Procedures

3.2.1 47 CFR FCC Part 15 Section 15.203

See test standard for details.

3.2.2 47 CFR FCC Part 15 Section 15.207

See test standard for details.

3.2.3 47 CFR FCC Part 15 Section 15.247

See test standard for details.

3.3 FCC Part 15, Subpart C

3.3.1 Summary of Tests

FCC Section	ISED Section	Environmental Phenomena	Frequency Range (MHZ)	Result
15.203	N/A	Antenna requirements	Structural Requirement	Compliant
15.207	RSS-Gen	Conducted Disturbance at Mains Port	0.15 to 30	Compliant
15.247(a)	RSS-247 § 5.2	Bandwidth Requirement	2412 to 2462	Compliant
15.247(b)	RSS-247 § 5.4	Peak Output Power	2412 to 2462	Compliant
15.247(d)	RSS-247 § 5.4	Antenna Conducted Spurious Emissions	0.009 to 40000	N/A
15.247(d)	RSS-247 § 5.4	Radiated Spurious Emissions	0.009 to 40000	Compliant
15.247(e)	RSS-247 § 5.2	Peak Power Spectral Density	2412 to 2462	Compliant
The testing was performed according to the procedures in ANSI C63.10-2013, KDB 558074 and 47 CFR Part 15. Where applicable, KDB 662911 was followed to sum required measurements.				

3.4 Results

In the configuration tested, the EUT complied with the requirements of the specification.

3.5 Test Location

Testing was performed at the Unified Compliance Laboratory 3-Meter and 10-Meter chambers located at 427 West 12800 South, Draper, UT 84020. Unified Compliance Laboratory is accredited by National Voluntary Laboratory Accreditation Program (NVLAP); NVLAP Code 600241-0 which is effective until 30 June 2025. This site has also been registered with Innovations, Science and Economic Development (ISED) department and was accepted under Appendix B, Phase 1 procedures of the APEC Tel MRA for Canadian recognition. ISED No.: 25346, effective until 30 June 2025.

Unified Compliance Laboratory has been assigned Designation Number US5037 by the FCC and Conformity Assessment Number US0223 by ISED.

4 Test Equipment

4.1 Conducted Emissions at Mains Ports

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	AFJ	FFT3010	UCL-6754	1/23/2024	2/26/2025
LISN	AFJ	LS16C/10	UCL-2512	7/08/2024	7/08/2025
ISN	Teseq	ISN T800	UCL-2974	7/09/2024	7/09/2025
LISN	AFJ	LS16C\10	UCL-6749	1/29/2024	1/29/2025
AC Power Source	Laplace Instruments	AC1000A	UCL-2857	N/A	N/A
Test Software	UCL	Revision 1	UCL-3107	N/A	N/A

Table 1: List of equipment used for Conducted Emissions Testing at Mains Port

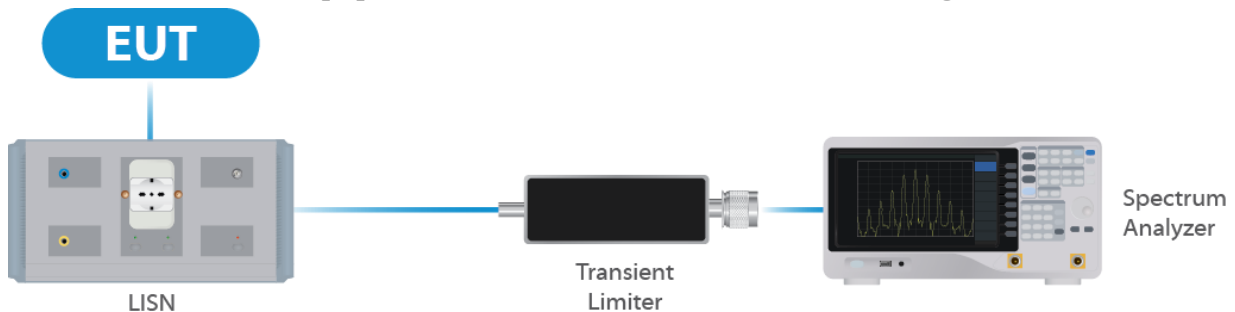


Figure 1: Conducted Emissions Test

4.2 Direct Connect at the Antenna Port Tests

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer	R&S	FSV40	UCL-2861	11/27/2023	11/27/2024
Signal Generator	R&S	SMB100A	UCL-2864	N/A	N/A
Vector Signal Generator	R&S	SMBV100A	UCL-2873	N/A	N/A
Switch Extension	R&S	OSP-B157WX	UCL-2867	4/12/2024	4/19/2025
Switch Extension	R&S	OSP-150W	UCL-2870	4/12/2024	4/19/2025

Table 2: List of equipment used for Direct Connect at the Antenna Port

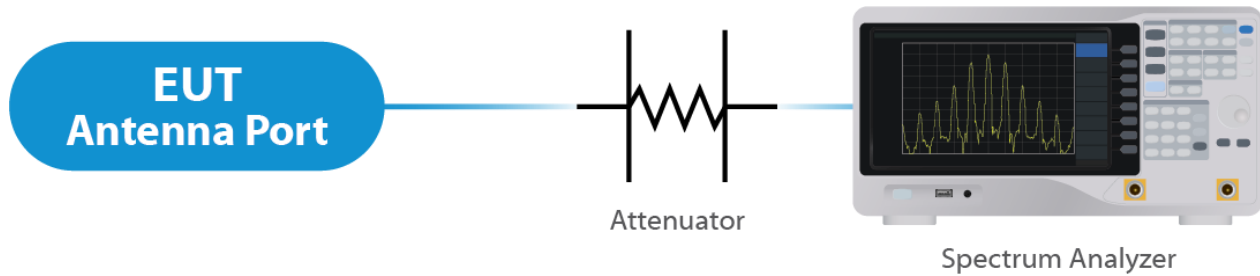


Figure 2: Direct Connect at the Antenna Port Test

4.3 Radiated Emissions

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	Keysight	N9038A	UCL-2778	1/25/2024	1/29/2025
Pre-Amplifier 9 kHz – 1 GHz	Sonoma Instruments	310N	UCL-2889	1/19/2024	1/19/2026
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3062	2/22/2023	2/22/2025
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3071	1/11/2023	1/11/2025
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	3/10/2023	3/10/2025
Log Periodic	Scwarzbeck	STLP 9129	UCL-3068	1/27/2023	1/27/2025
15 - 40 GHz Horn Antenna	Scwarzbeck	BBHA 9170	UCL-2487	3/10/2023	3/10/2025
1 – 18 GHz Amplifier	Com-Power	PAM 118A	UCL-3833	1/19/2024	1/19/2026
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

Table 3: List of equipment used for Radiated Emissions

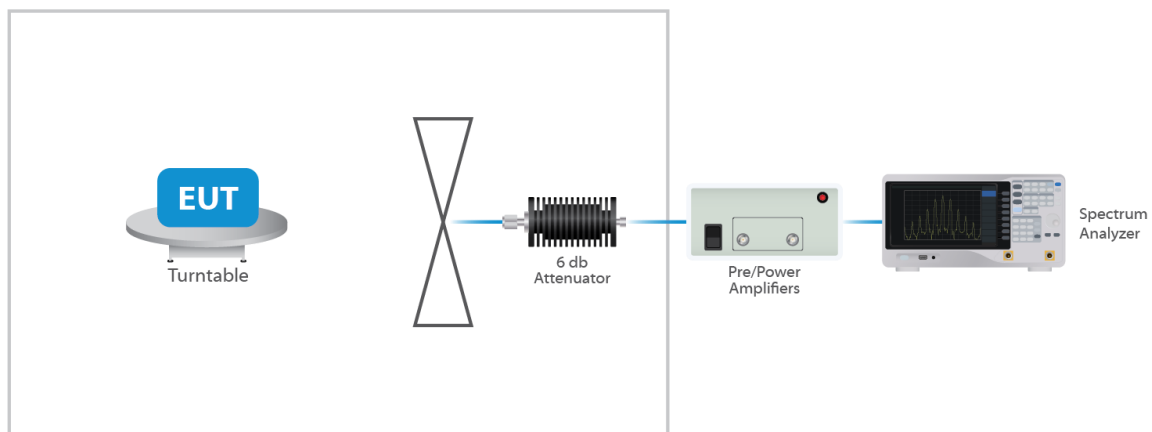


Figure 3: Radiated Emissions Test

4.4 Equipment Calibration

All applicable equipment is calibrated using either an independent calibration laboratory or Unified Compliance Laboratory personnel at intervals defined in ANSI C63.4:2014 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request.

4.5 Measurement Uncertainty

Test	Uncertainty ($\pm$ dB)	Confidence (%)
Conducted Emissions	1.44	95
Radiated Emissions (9 kHz to 30 MHz)	2.50	95
Radiated Emissions (30 MHz to 1 GHz)	4.38	95
Radiated Emissions (1 GHz to 18 GHz)	4.37	95
Radiated Emissions (18 GHz to 40 GHz)	3.93	95
Direct Connect Tests	K Factor	Value
Emissions Bandwidth	2	2.0%
Output Power	2	1.0 dB
Peak Power Spectral Density	2	1.3 dB
Band Edge	2	0.8 dB
Transmitter Spurious Emissions	2	1.8 dB

5 Test Results

5.1 §15.203 Antenna Requirements

The EUT uses an integral internal antenna and a Dipole external antenna. Per the manufacturer, the Maximum gain of the internal antenna per chain is 2 dBi and the external antenna is 4 dBi. This is an 802.11 device and utilizes CDD as described in KDB 662911 D01. The antenna internal antenna is not user replaceable while the external antenna is user replaceable. For CDD transmissions, directional gain is calculated as follows.

Array Gain = $10 \log(\text{NANT}/\text{NSS})$ dB

NANT = number of transmit antennas and

NSS = number of spatial streams. NSS = 1 considered worst case.

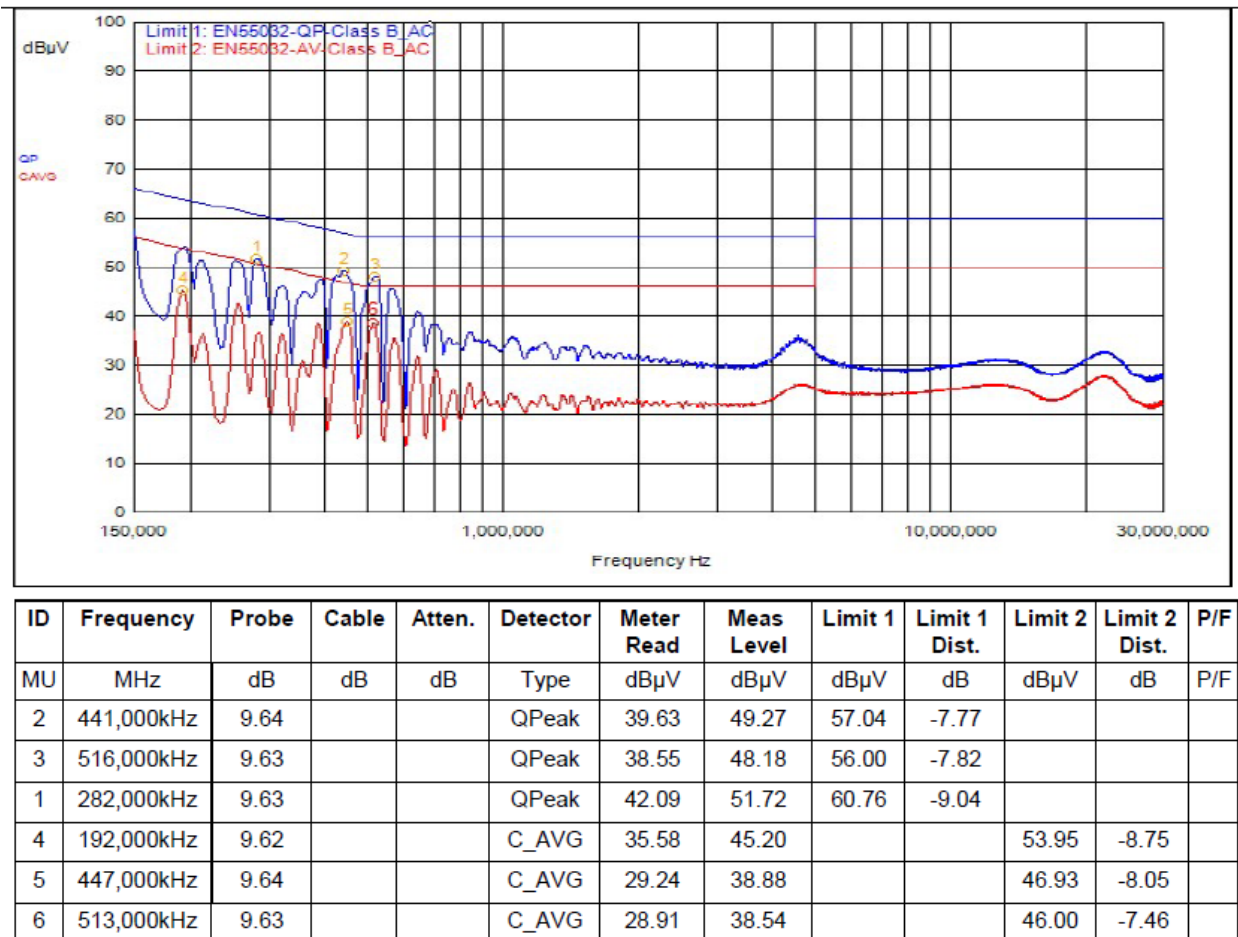
For power measurements on IEEE 802.11 devices, Array Gain = 0 dB for $\text{NANT} \leq 4$;

For PSD measurements when Nss=1: Array Gain = $10 \log(\text{NANT}/\text{NSS})$ dB + Antenna Gain (dBi). Or 3.01 dB + 2 dBi = 5.01 dBi for the internal antenna and 3.01 dB + 4 dBi = 7.01 dBi for the external antenna.

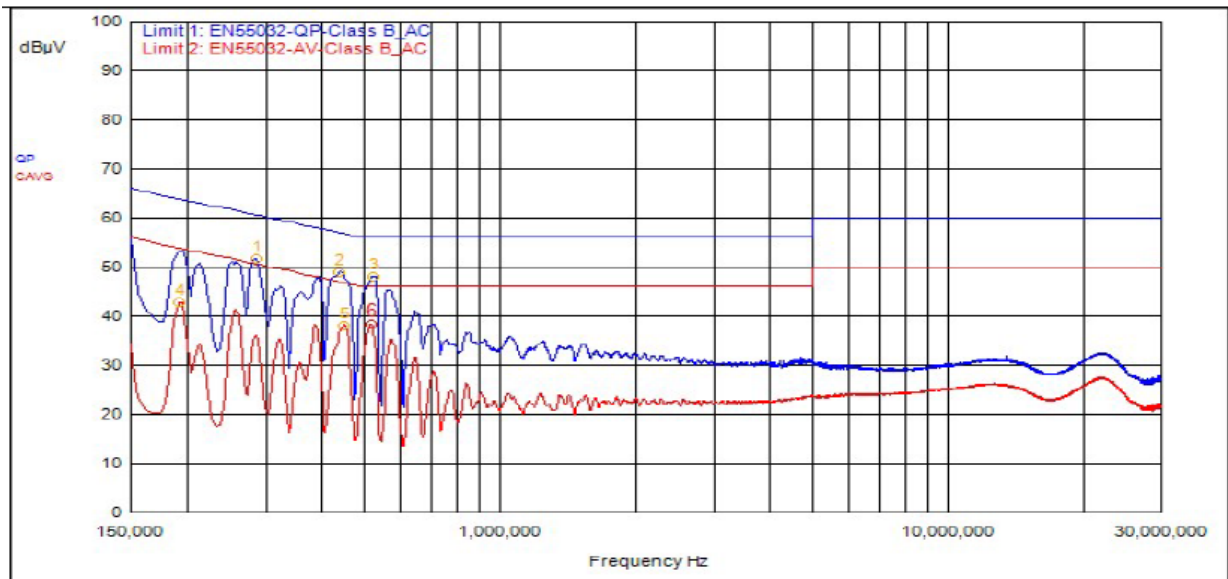
Results

The EUT complied with the specification

5.2 Conducted Emissions at Mains Ports Data



Graph 1: Conducted Emissions Plot - Neutral



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit 1	Limit 1 Dist.	Limit 2	Limit 2 Dist.	P/F
MU	MHz	dB	dB	dB	Type	dBμV	dBμV	dBμV	dB	dBμV	dB	P/F
3	519,000kHz	9.49			QPeak	38.70	48.19	56.00	-7.81			
2	438,000kHz	9.49			QPeak	39.35	48.84	57.10	-8.26			
1	285,000kHz	9.48			QPeak	42.22	51.70	60.67	-8.97			
4	192,000kHz	9.49			C_AVG	33.34	42.83			53.95	-11.12	
5	447,000kHz	9.49			C_AVG	28.70	38.19			46.93	-8.74	
6	516,000kHz	9.49			C_AVG	28.96	38.45			46.00	-7.55	

Graph 2: Conducted Emissions Plot – Line 1

Result

The EUT complied with the specification limit.

5.3 §15.247(a)(2) Emissions Bandwidth

All chains were measured under the guidance of KDB 558074 Section 8.2. and KDB 66291 D01. Please see associated annex for details on instrument settings.

5.3.1 Internal Antenna

Mode	Frequency (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth (MHz)
b	2412	14.0	9.2
	2437	14.0	9.2
	2462	13.8	9.2
g	2412	17.8	16.6
	2437	19.5	16.5
	2462	17.3	16.6
n 20	2412	18.5	17.8
	2437	20.5	17.9
	2462	18.5	17.7
n 40	2422	36.5	36.5
	2437	36.5	36.5
	2452	37.5	36.5

5.3.2 External Antenna

Mode	Frequency (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth (MHz)
b	2412	13.9	8.2
	2437	14.4	8.2
	2462	14.0	8.2
g	2412	17.5	16.6
	2437	31.8	16.6
	2462	17.3	16.4
n 20	2412	18.3	17.8
	2437	23.3	15.2
	2462	18.3	17.0
n 40	2422	37.0	36.4
	2437	37.0	36.4
	2452	37.0	36.5

Result

All chains were tested and the highest bandwidth per chain is reported above.

In the configuration tested, the 6 dB bandwidth was greater than 500 kHz; therefore, the EUT complied with the requirements of the specification (see spectrum analyzer plot within the Annex).

5.4 §15.247(b)(3) Maximum Average Output Power

All chains/outputs were measured and summed under the guidance of KDB 558074 Section 8.3.2.3. and KDB 66291 D01. Please see associated annex for details on instrument settings.

The maximum average RF conducted output power measured for this device was 25.26 dBm or 335.74 mW. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The internal antenna has a gain of 2 dBi. The external antenna has a gain of 3.6 dBi.

5.4.1 Internal Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP
b 20	2412	Mcs0_Nss2	44	22.6	24.66
	2417	Mcs0_Nss2	44	22.79	24.79
	2422	Mcs0_Nss2	44	22.89	24.89
	2427	Mcs0_Nss2	44	22.94	24.94
	2432	Mcs0_Nss2	44	22.89	24.89
	2437	Mcs0_Nss2	44	22.91	24.91
	2442	Mcs0_Nss2	42	22.32	24.32
	2447	Mcs0_Nss2	42	22.31	24.31
	2452	Mcs0_Nss2	42	22.40	24.40
	2457	Mcs0_Nss2	42	22.48	24.48
	2462	Mcs0_Nss2	42	22.46	24.46
g 20	2412	Mcs0_Nss2	36	19.51	21.51
	2417	Mcs0_Nss2	40	21.59	23.59
	2422	Mcs0_Nss2	40	21.67	23.67
	2427	Mcs0_Nss2	42	22.39	24.39
	2432	Mcs0_Nss2	42	22.37	24.37
	2437	Mcs0_Nss2	42	22.33	24.33
	2442	Mcs0_Nss2	42	22.31	24.31
	2447	Mcs0_Nss2	41	22.02	24.02
	2452	Mcs0_Nss2	41	22.05	24.05
	2457	Mcs0_Nss2	41	22.16	24.16
	2462	Mcs0_Nss2	25	19.65	21.65
n 20	2412	Mcs0_Nss2	30	16.77	18.77
	2417	Mcs0_Nss2	40	21.56	53.56
	2422	Mcs0_Nss2	42	22.30	24.30
	2427	Mcs0_Nss2	42	22.38	24.38
	2432	Mcs0_Nss2	42	22.35	24.35

	2437	Mcs0_Nss2	42	22.30	24.30
	2442	Mcs0_Nss2	42	22.27	24.27
	2447	Mcs0_Nss2	41	21.99	23.99
	2452	Mcs0_Nss2	41	22.03	24.03
	2457	Mcs0_Nss2	41	22.12	24.12
	2462	Mcs0_Nss2	31	17.66	19.66
n 40	2422	Mcs0_Nss2	30	16.64	18.65
	2437	Mcs0_Nss2	35	19.12	21.12
	2452	Mcs0_Nss2	30	16.91	18.91

5.4.2 External/Internal Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP
b 20	2412	Mcs0_Nss2	43	22.36	25.96
	2417	Mcs0_Nss2	44	22.85	26.45
	2422	Mcs0_Nss2	45	25.03	28.63
	2427	Mcs0_Nss2	45	24.92	28.52
	2432	Mcs0_Nss2	45	24.85	28.45
	2437	Mcs0_Nss2	45	24.82	28.42
	2442	Mcs0_Nss2	45	23.16	26.76
	2447	Mcs0_Nss2	45	24.36	27.96
	2452	Mcs0_Nss2	44	22.92	26.52
	2457	Mcs0_Nss2	44	23.10	26.70
	2462	Mcs0_Nss2	43	22.63	26.23
g 20	2412	Mcs0_Nss2	33	18.24	21.84
	2417	Mcs0_Nss2	40	21.61	25.21
	2422	Mcs0_Nss2	41	22.02	25.62
	2427	Mcs0_Nss2	43	24.36	27.96
	2432	Mcs0_Nss2	43	24.24	27.84
	2437	Mcs0_Nss2	44	25.26	28.86
	2442	Mcs0_Nss2	44	25.23	28.83
	2447	Mcs0_Nss2	42	22.24	25.84
	2452	Mcs0_Nss2	42	22.38	25.98
	2457	Mcs0_Nss2	41	22.20	25.90
	2462	Mcs0_Nss2	34	18.93	22.53
n 20	2412	Mcs0_Nss2	30	16.60	20.20
	2417	Mcs0_Nss2	38	20.51	24.11
	2422	Mcs0_Nss2	42	22.36	25.96
	2427	Mcs0_Nss2	42	22.33	28.93

	2432	Mcs0_Nss2	42	22.30	25.90
	2437	Mcs0_Nss2	43	24.21	27.81
	2442	Mcs0_Nss2	43	22.45	26.05
	2447	Mcs0_Nss2	42	22.26	25.86
	2452	Mcs0_Nss2	42	22.37	25.97
	2457	Mcs0_Nss2	40	21.76	25.36
	2462	Mcs0_Nss2	33	18.52	22.12
n 40	2422	Mcs0_Nss2	32	17.45	21.05
	2437	Mcs0_Nss2	36	19.37	22.97
	2452	Mcs0_Nss2	31	17.08	20.68

Result

In the configuration tested, the maximum average RF output power was less than 1 watt; therefore, the EUT complied with the requirements of the specification (see spectrum analyzer plot within the Annex).

* Gated EIRP shown in the Annex is the conducted measurement

5.5 §15.247(d) Spurious Emissions

5.5.1 Conducted Spurious Emissions

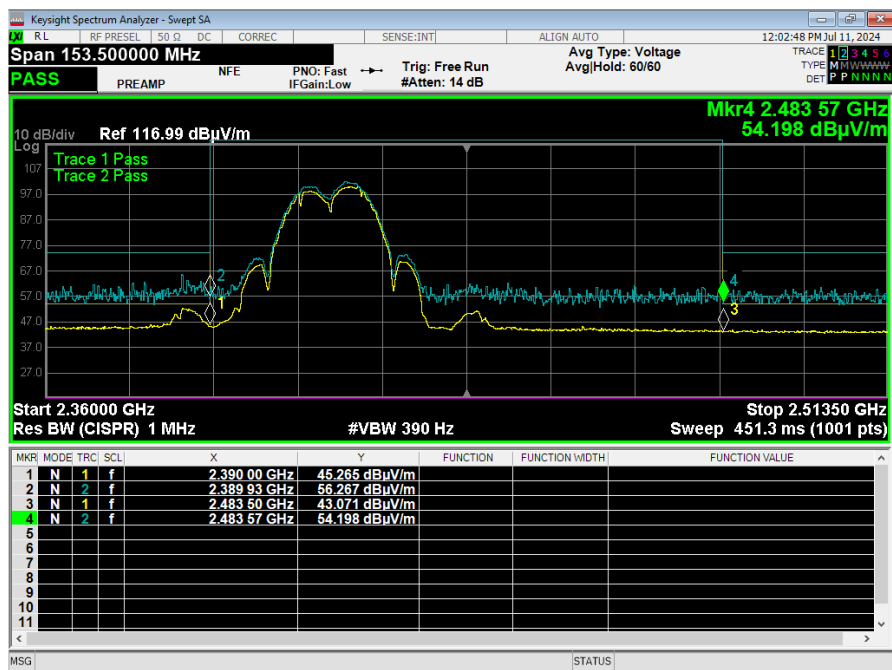
The frequency range from the lowest frequency generated or used in the device to the tenth harmonic of the highest fundamental frequency was investigated to measure any antenna-conducted emissions. The table show the measurement data from spurious emissions noted across the frequency range when transmitting at the lowest frequency, middle frequency and upper frequency. Shown below are plot(s) with the EUT tuned to the upper and lower channels. These demonstrate compliance with the provisions of this section at the band edges.

The emissions must be attenuated 30 dB or more below the highest power spectral density level measured within the authorized band as measured with a 100 kHz RBW.

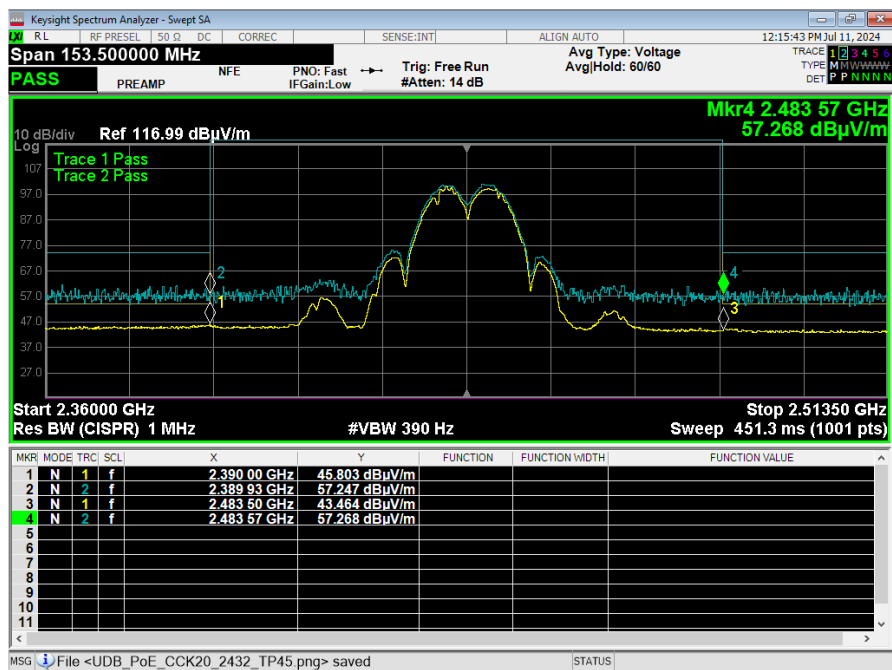
Result

Conducted spurious emissions were attenuated 30 dB or more below the fundamental; therefore, the EUT complies with the specification.

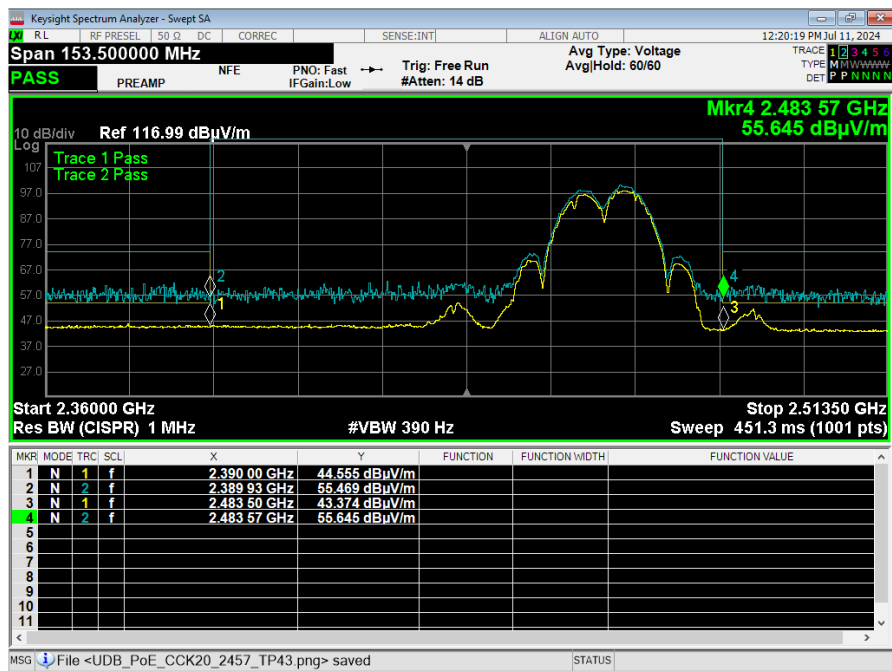
Internal Antenna



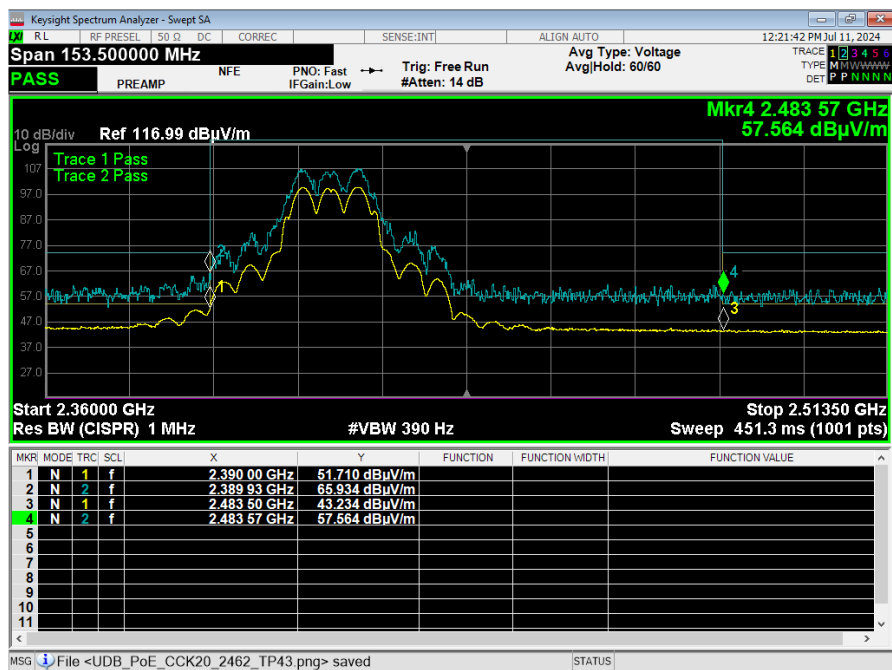
Graph 3: Band Edge Low b Mode 20 MHz



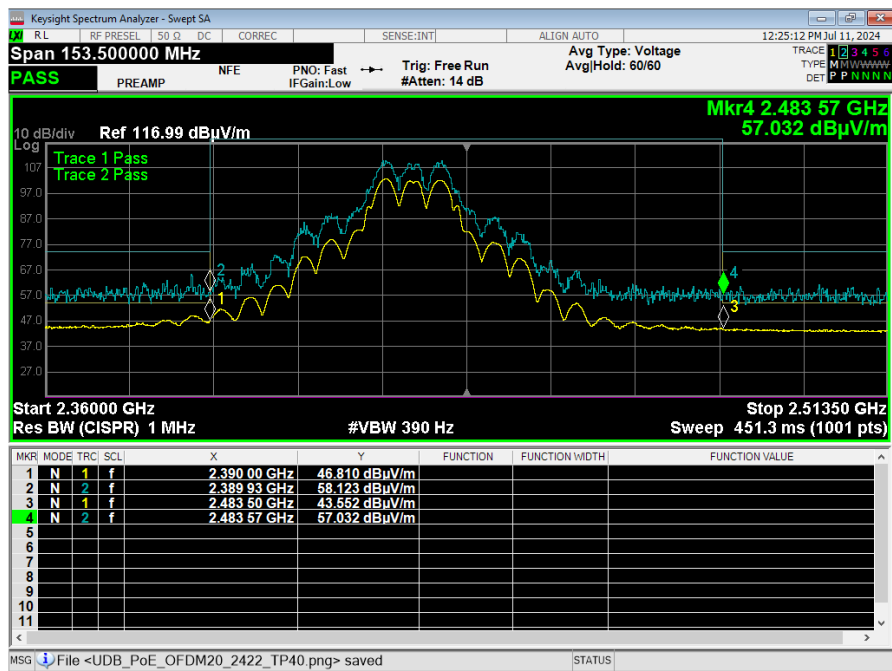
Graph 4: Band Edge Middle b Mode 20 MHz



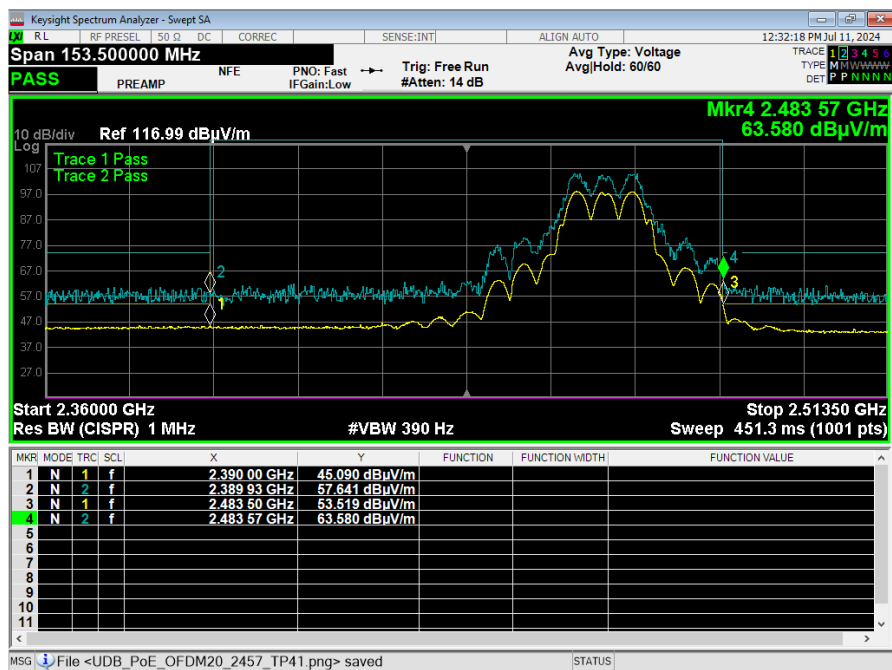
Graph 5: Band Edge High b Mode 20 MHz



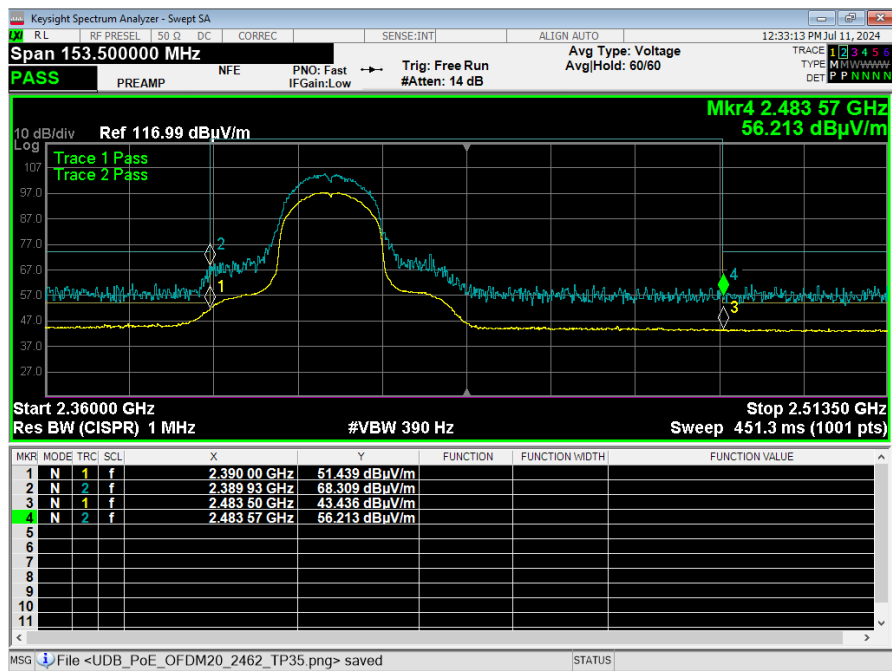
Graph 6: Band Edge Low g Mode 20 MHz



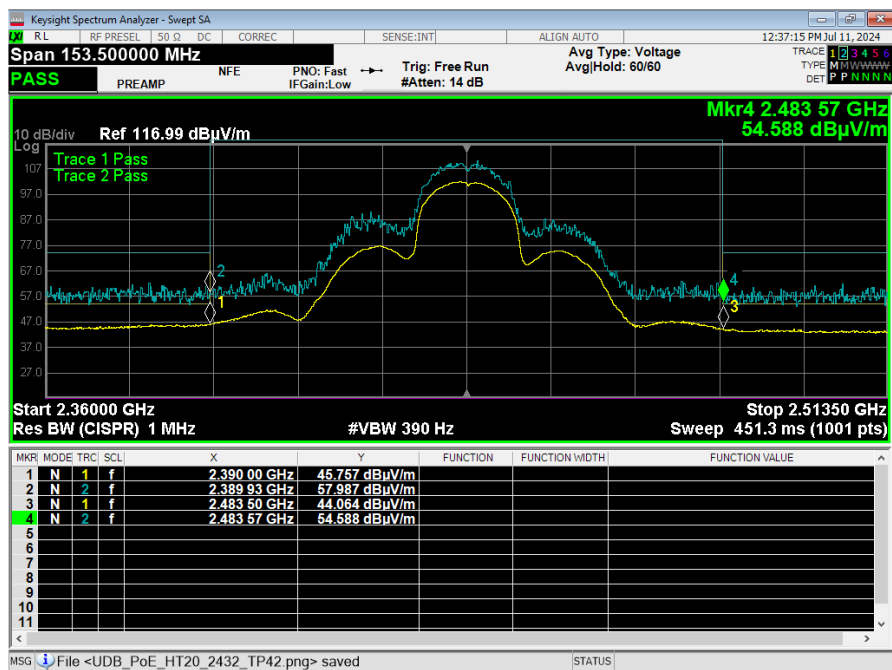
Graph 7: Band Edge Middle g Mode 20 MHz



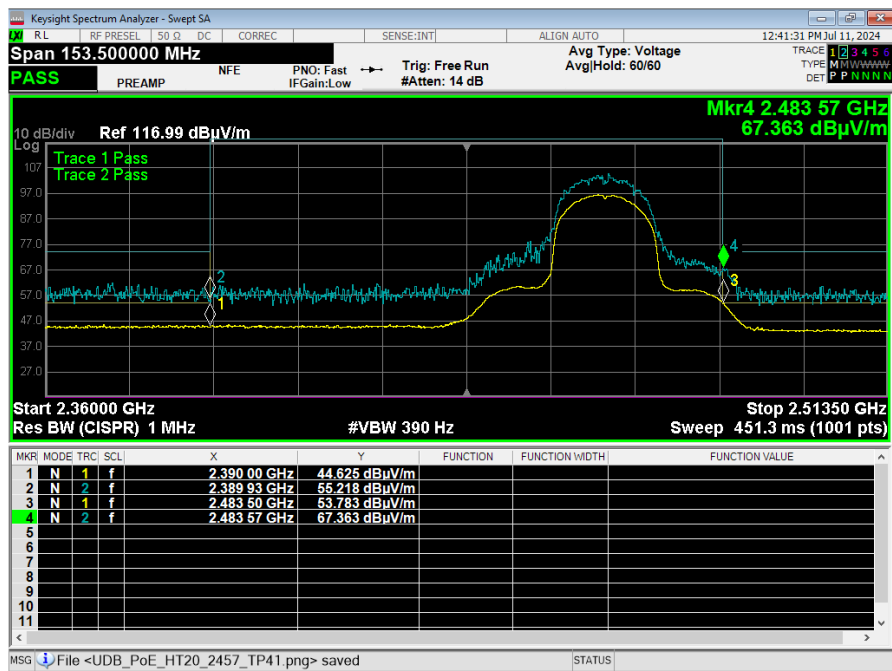
Graph 8: Band Edge High g Mode 20 MHz



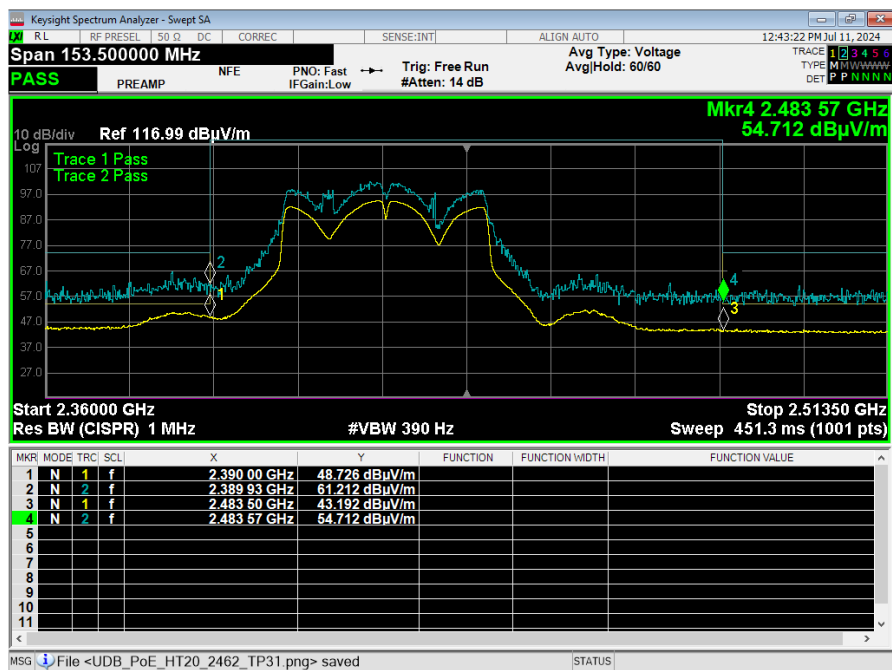
Graph 9: Band Edge Low n Mode 20 MHz



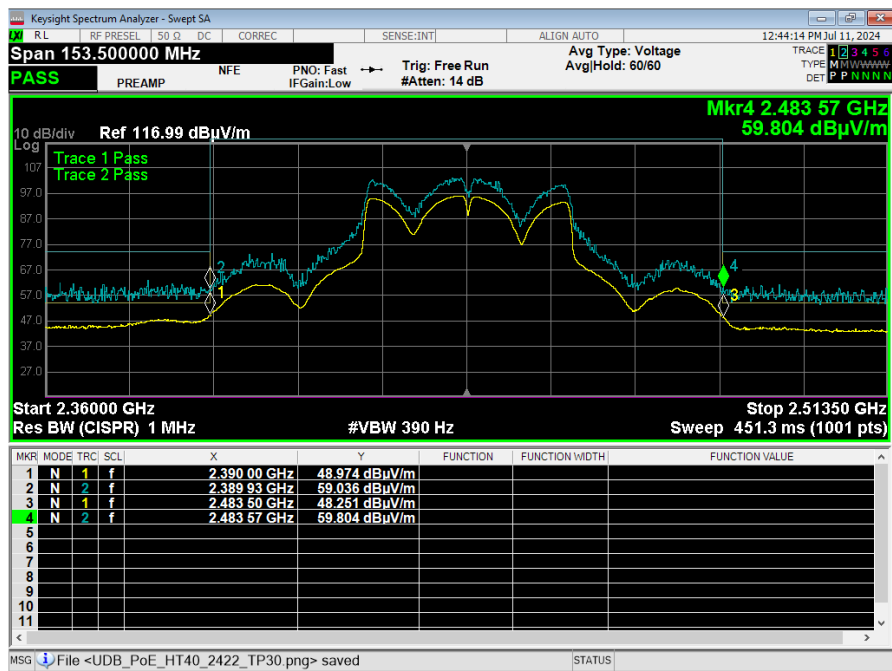
Graph 10: Band Edge Middle n Mode 20 MHz



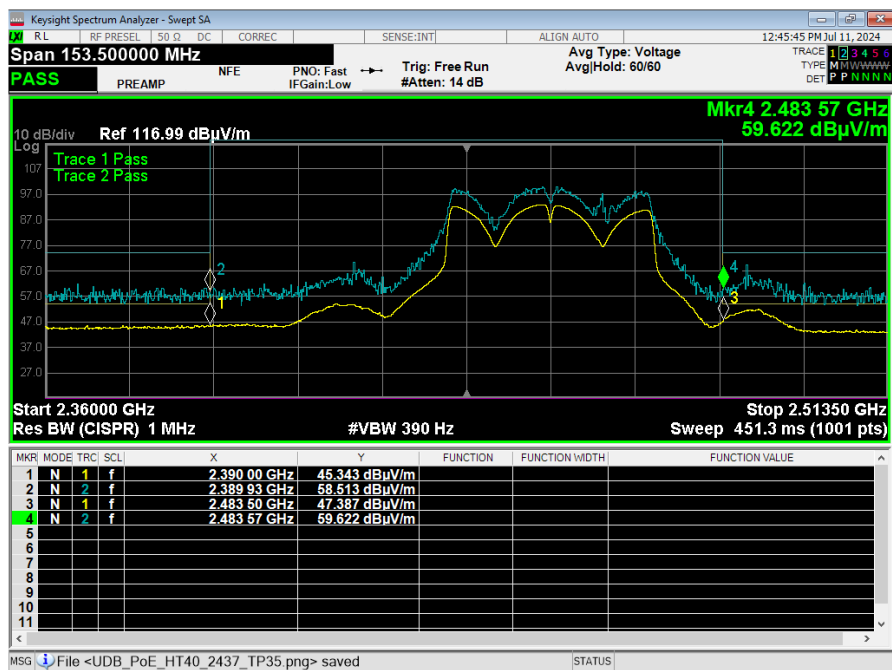
Graph 11: Band Edge High n Mode 20 MHz



Graph 12: Band Edge Low n Mode 40 MHz

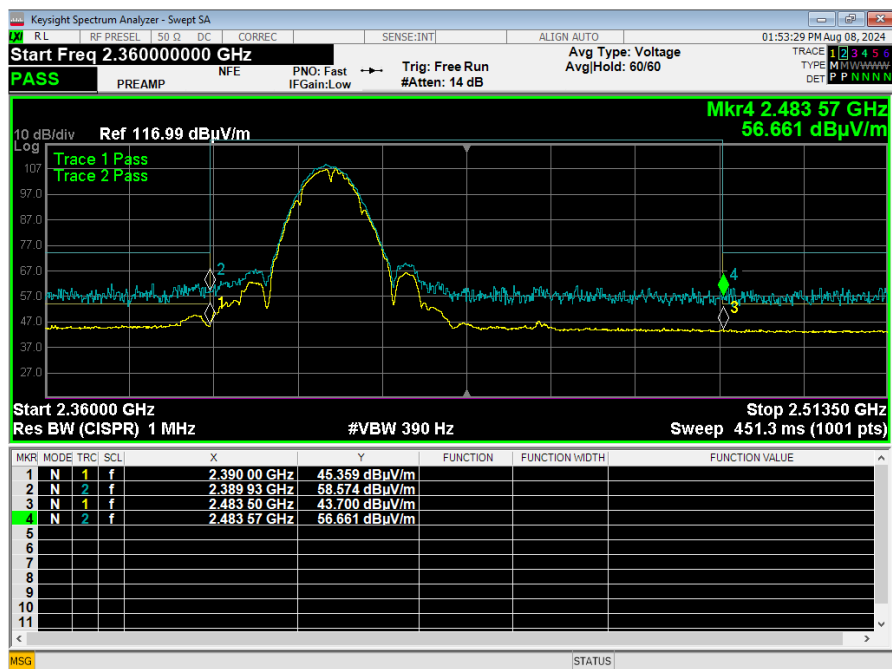


Graph 13: Band Edge Middle n Mode 40 MHz

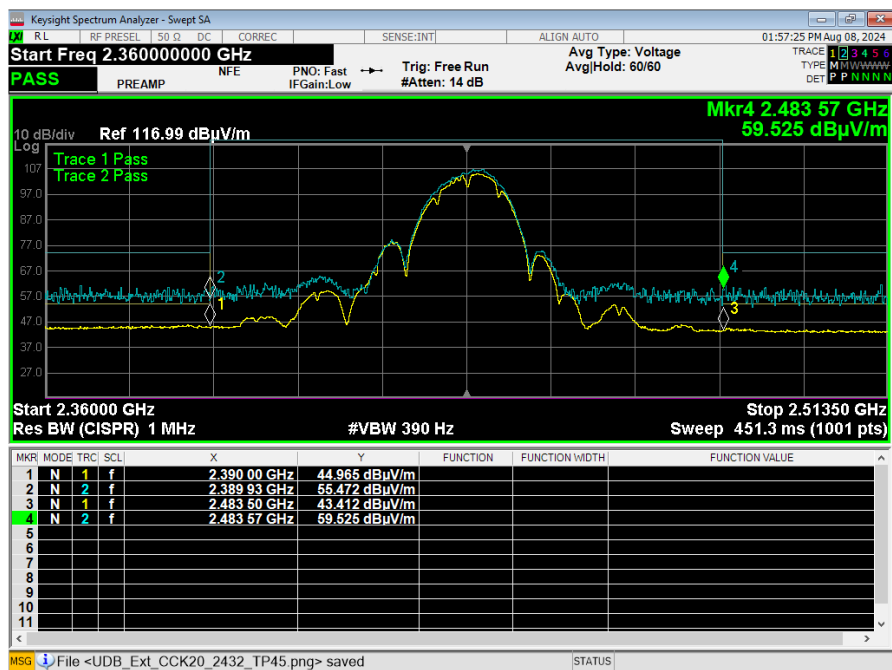


Graph 14: Band Edge High n Mode 40 MHz

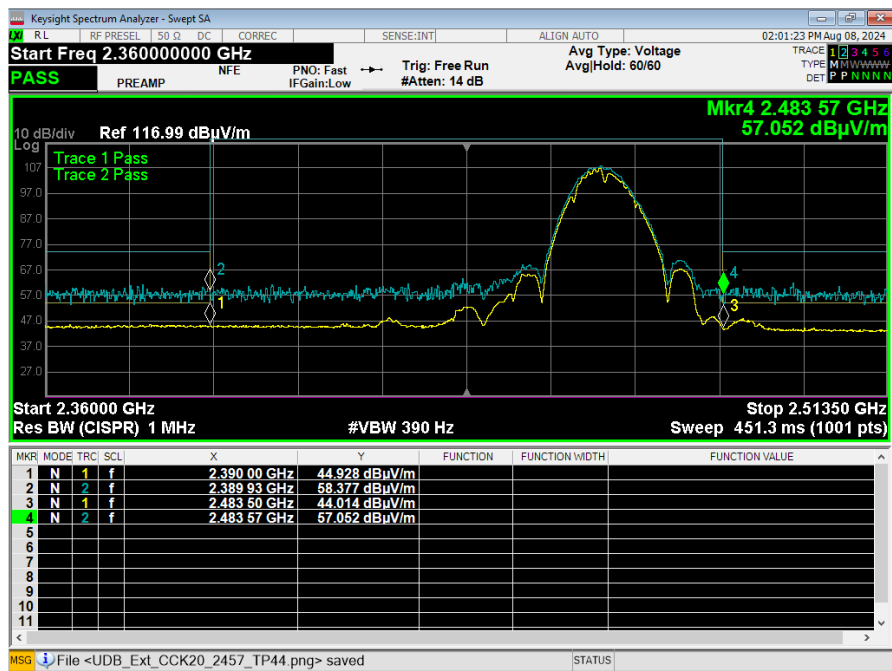
External/Internal Antenna



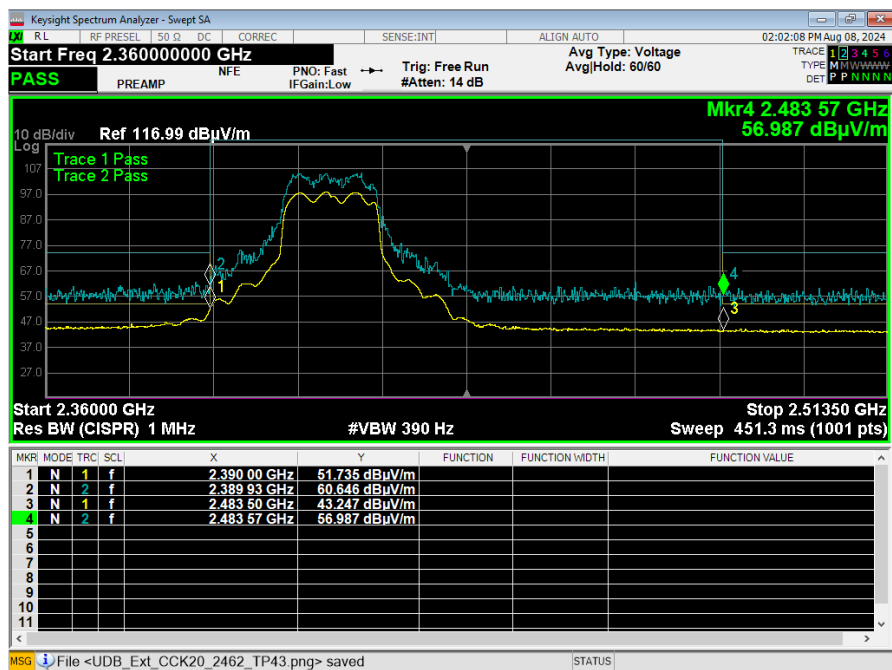
Graph 15: Band Edge Low b Mode 20 MHz



Graph 16: Band Edge Middle b Mode 20 MHz



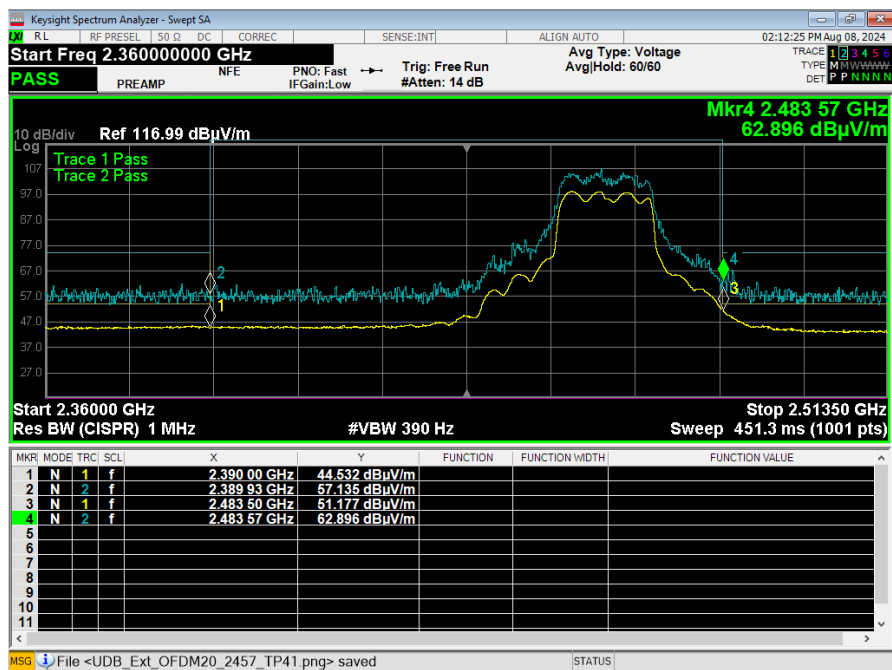
Graph 17: Band Edge High b Mode 20 MHz



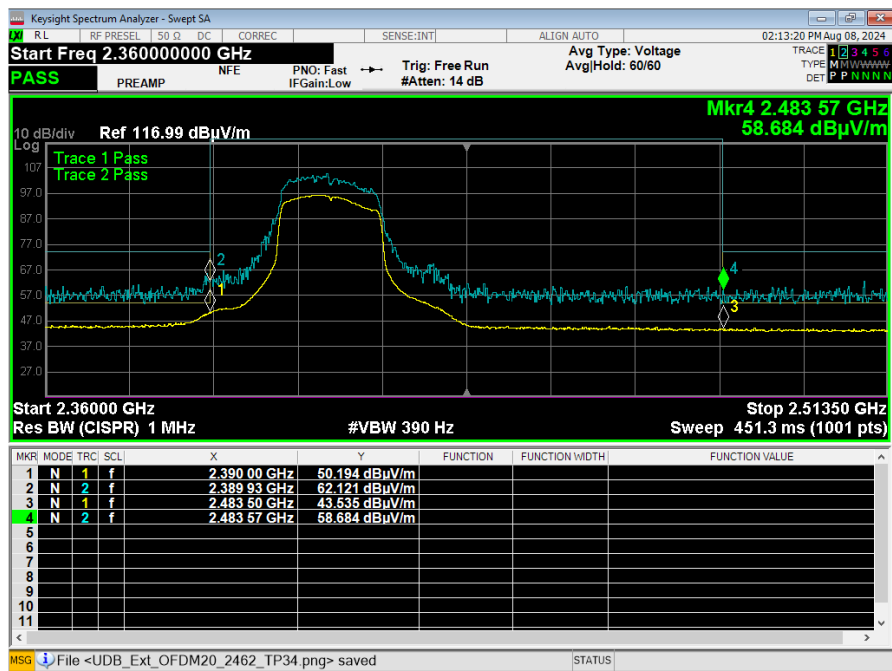
Graph 18: Band Edge Low g Mode 20 MHz



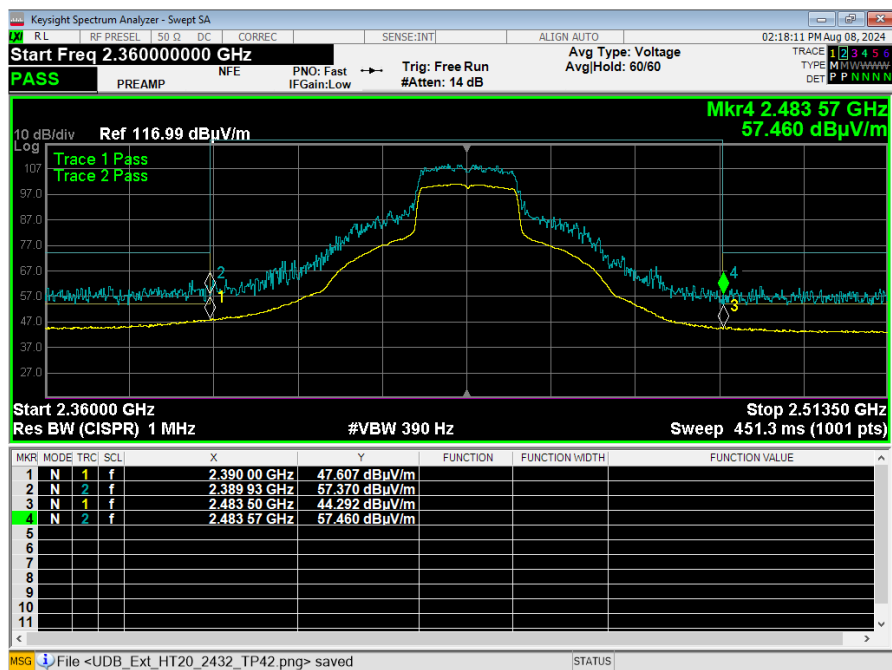
Graph 19: Band Edge Middle g Mode 20 MHz



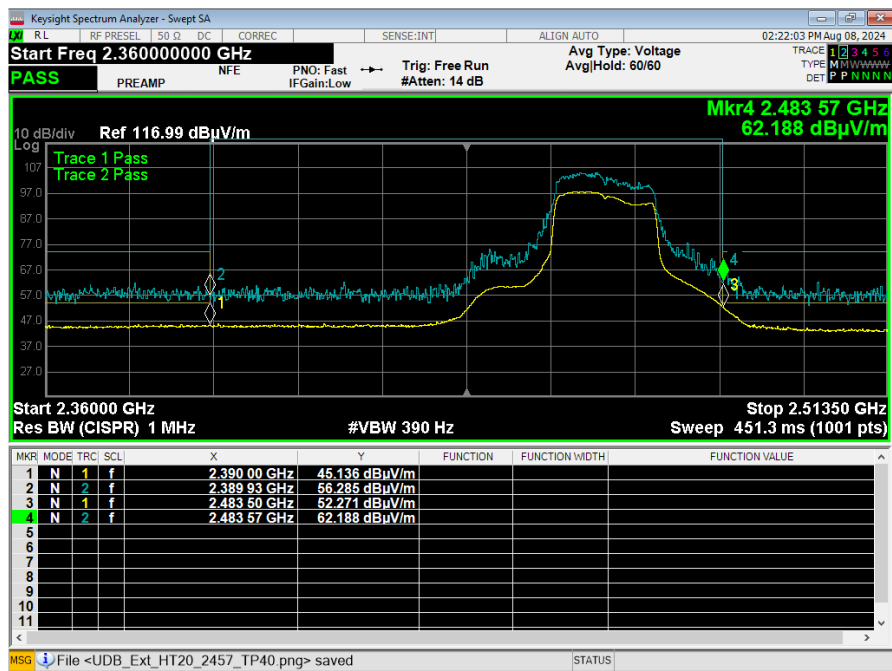
Graph 20: Band Edge High g Mode 20 MHz



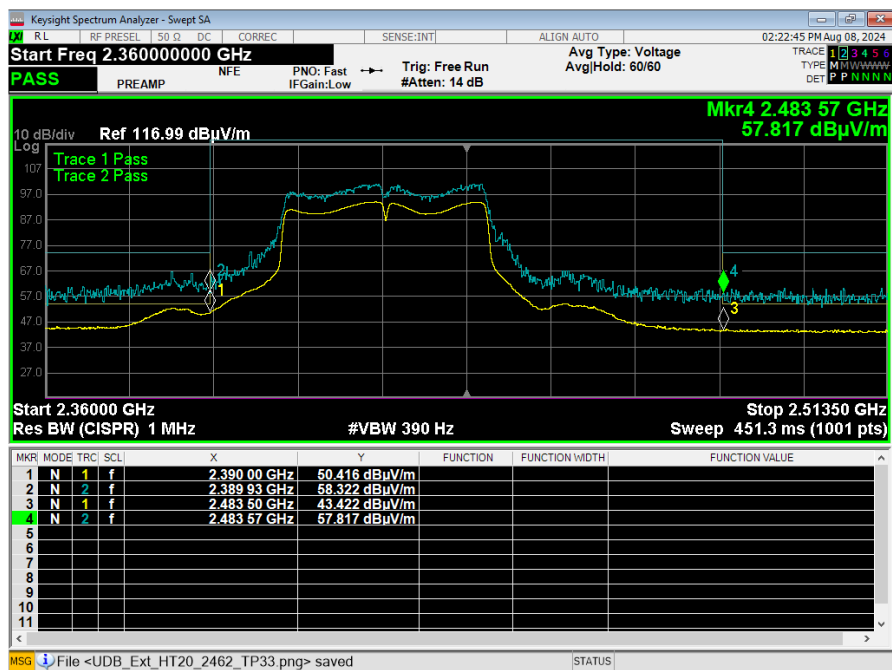
Graph 21: Band Edge Low n Mode 20 MHz



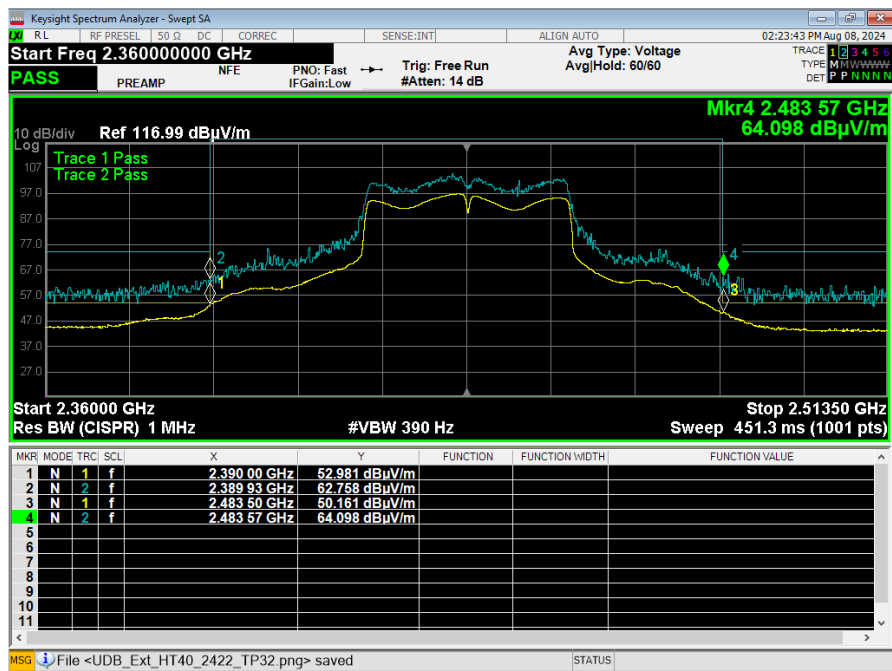
Graph 22: Band Edge Middle n Mode 20 MHz



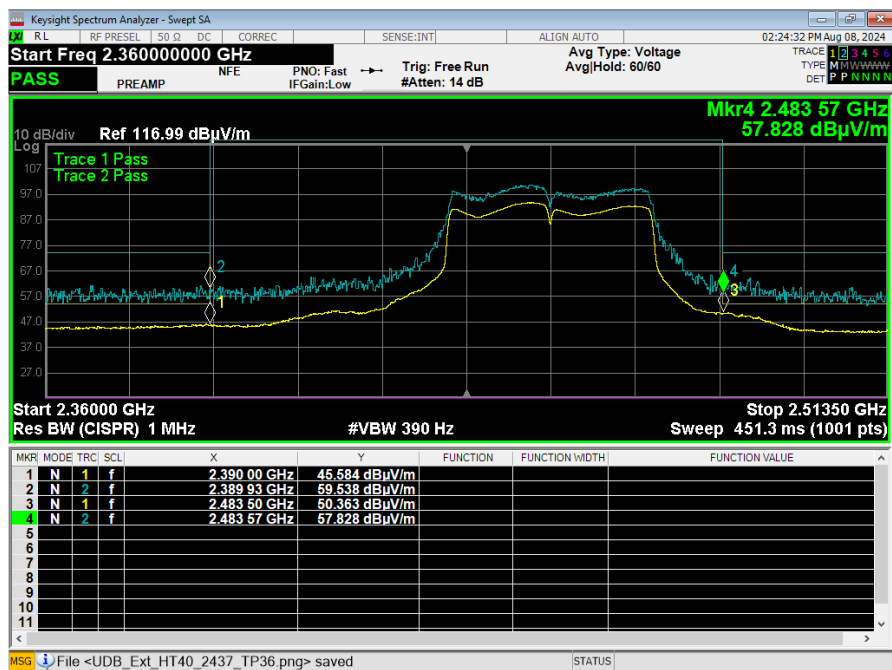
Graph 23: Band Edge High n Mode 20 MHz



Graph 24: Band Edge Low n Mode 40 MHz



Graph 25: Band Edge Middle n Mode 40 MHz



Graph 26: Band Edge High n Mode 40 MHz

5.5.2 Radiated Spurious Emissions in the Restricted Bands of §15.205

The frequency range from the lowest frequency generated or used in the device to the tenth harmonic of the highest fundamental emissions was investigated to measure any radiated emissions in the restricted bands. The following tables show measurements of any emissions that fell into the restricted bands of §15.205. The tables show the worst-case emissions measured from the EUT. For frequencies above 18.0 GHz, a measurement distance of 1 meter was used. The noise floor was a minimum of 6 dB below the limits. The emissions in the restricted bands must meet the limits specified in §15.209. Tabular data for each of the spurious emissions is shown below for each of the units. Plots of the band edges are also shown.

Correction Factor = Antenna Factor + Cable Loss - Pre-Amplifier Gain, and is added to the Receiver reading.

Result

All emissions in the restricted bands of §15.205 met the limits specified in §15.209; therefore, the EUT complies with the specification.

Internal Antenna

QuasiPeak

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin	Azimuth (°)	Height	Pol.	Correction (dB)
55.914 MHz	36.099	40	-3.901	2	1	Vertical	-8.31
59.593 MHz	31.468	40	-8.532	52	1.131	Vertical	-8.836
156.38 MHz	27.183	40	-12.817	246	1.131	Vertical	-12.477
778.37 MHz	32.04	47	-14.96	128	2.567	Vertical	1.411
235.1 MHz	28.778	47	-18.222	131	1	Horizontal	-8.241

Table 4: Radiated Emissions 30 – 1000 MHz

Peak

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
9.6483 GHz	55.882	74	-18.118	175	3.798	Vertical	6.152
12.5 GHz	58.726	74	-15.274	201	1.5	Vertical	9.879
14.472 GHz	61.02	74	-12.98	85	2.645	Vertical	13.5
16.885 GHz	57.557	74	-16.443	105	2.142	Vertical	13.861
9.648 GHz	54.829	74	-19.171	122	3.802	Horizontal	6.152
12.5 GHz	58.913	74	-15.087	269	3.802	Horizontal	9.879
13.849 GHz	58.237	74	-15.763	355	1.834	Horizontal	13.353

Avg

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
9.6483 GHz	48.974	54	-5.026	175	3.798	Vertical	6.152
12.5 GHz	51.665	54	-2.335	201	1.5	Vertical	9.879
14.472 GHz	52.409	54	-1.591	85	2.645	Vertical	13.5
16.885 GHz	45.618	54	-8.382	105	2.142	Vertical	13.861
9.648 GHz	46.097	54	-7.903	122	3.802	Horizontal	6.152
12.5 GHz	51.773	54	-2.227	269	3.802	Horizontal	9.879
13.849 GHz	45.192	54	-8.808	355	1.834	Horizontal	13.353

Table 5: Radiated Emissions 1 – 17 GHz at the Lowest Frequency

Peak

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
9.7479 GHz	55.148	74	-18.852	161	3.798	Vertical	6.123
12.5 GHz	57.824	74	-16.176	208	1.5	Vertical	9.879
14.622 GHz	62.682	74	-11.318	98	2.65	Vertical	14.164
9.748 GHz	54.057	74	-19.943	117	3.311	Horizontal	6.123
11.459 GHz	55.742	74	-18.258	168	3.802	Horizontal	10.411
14.623 GHz	59.924	74	-14.076	105	3.802	Horizontal	14.167

Avg

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
9.7479 GHz	47.685	54	-6.315	161	3.798	Vertical	6.123
12.5 GHz	50.557	54	-3.443	208	1.5	Vertical	9.879
14.622 GHz	53.755	54	-0.245	98	2.65	Vertical	14.164
9.748 GHz	44.843	54	-9.157	117	3.311	Horizontal	6.123
11.459 GHz	42.207	54	-11.793	168	3.802	Horizontal	10.411
14.623 GHz	47.326	54	-6.674	105	3.802	Horizontal	14.167

Table 6: Radiated Emissions 1 – 17 GHz at the Middle Frequency

Peak

Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
9.8482 GHz	53.489	74	-20.511	161	2.65	Vertical	5.712
12.5 GHz	56.742	74	-17.258	188	2.645	Vertical	9.879
14.772 GHz	61.948	74	-12.052	102	2.645	Vertical	13.97
10.925 GHz	55.316	74	-18.684	38	2.65	Horizontal	11.606
12.5 GHz	56.976	74	-17.024	271	1.643	Horizontal	9.879
14.772 GHz	59.678	74	-14.322	203	2.645	Horizontal	13.97
16.984 GHz	57.029	74	-16.971	76	2.645	Horizontal	14.528

Avg

Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
9.8482 GHz	45.658	54	-8.342	161	2.65	Vertical	5.712
12.5 GHz	48.534	54	-5.466	188	2.645	Vertical	9.879
14.772 GHz	51.425	54	-2.575	102	2.645	Vertical	13.97
10.925 GHz	42.254	54	-11.746	38	2.65	Horizontal	11.606
12.5 GHz	48.907	54	-5.093	271	1.643	Horizontal	9.879
14.772 GHz	48.946	54	-5.054	203	2.645	Horizontal	13.97
16.984 GHz	44.238	54	-9.762	76	2.645	Horizontal	14.528

Table 7: Radiated Emissions 1 – 17 GHz at the Highest Frequency

Peak

Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.061 GHz	53.742	74	-20.258	249	Vertical	0.59
17.956 GHz	50.41	74	-23.59	157	Vertical	-0.231
24.371 GHz	53.666	74	-20.334	66	Vertical	1.516
25.6 GHz	54.141	74	-19.859	125	Vertical	4.01
17.06 GHz	57.266	74	-16.734	92	Horizontal	0.593
24.37 GHz	54.561	74	-19.439	39	Horizontal	1.518
25.09 GHz	52.687	74	-21.313	48	Horizontal	2.657

Avg

Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.061 GHz	45.532	54	-8.468	249	Vertical	0.59
17.956 GHz	37.411	54	-16.589	157	Vertical	-0.231
24.371 GHz	42.678	54	-11.322	66	Vertical	1.516
25.6 GHz	41.164	54	-12.836	125	Vertical	4.01
17.06 GHz	51.273	54	-2.727	92	Horizontal	0.593
24.37 GHz	44.757	54	-9.243	39	Horizontal	1.518
25.09 GHz	39.853	54	-14.147	48	Horizontal	2.657

Table 8: Radiated Emissions 17 – 26 GHz at the Middle Frequency (worse case)

External/Internal Antenna

QuasiPeak

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin	Azimuth (°)	Height	Pol.	Correction (dB)
55.914 MHz	36.099	40	-3.901	2	1	Vertical	-8.31
59.593 MHz	31.468	40	-8.532	52	1.131	Vertical	-8.836
156.38 MHz	27.183	40	-12.817	246	1.131	Vertical	-12.477
778.37 MHz	32.04	47	-14.96	128	2.567	Vertical	1.411
235.1 MHz	28.778	47	-18.222	131	1	Horizontal	-8.241

Table 9: Radiated Emissions 30 – 1000 MHz

Peak

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
4.83 GHz	50.61	74	-23.39	154	1.714	Vertical	-12.43
9.64 GHz	56.25	74	-17.75	228	2.292	Vertical	6.45
12.50 GHz	56.78	74	-17.22	196	1.714	Vertical	9.88
14.47 GHz	60.18	74	-13.82	176	1.714	Vertical	13.52
4.83 GHz	51.97	74	-22.03	199	1.714	Horizontal	-12.43
9.65 GHz	55.25	74	-18.74	172	2.867	Horizontal	6.15
12.50 GHz	57.34	74	-16.66	127	3.164	Horizontal	9.88
14.25 GHz	56.83	74	17.17	171	3.168	Horizontal	13.58
15.40 GHz	56.02	74	-17.98	356	1.5	Horizontal	12.13

Avg

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
4.83 GHz	37.82	54	-16.18	154	1.714	Vertical	-12.43
9.64 GHz	42.86	54	-11.14	228	2.292	Vertical	6.45
12.50 GHz	49.37	54	-4.63	196	1.714	Vertical	9.88
14.47 GHz	46.55	54	-7.45	176	1.714	Vertical	13.52
4.83 GHz	38.44	54	-15.56	199	1.714	Horizontal	-12.43
9.65 GHz	42.51	54	-11.49	172	2.867	Horizontal	6.15
12.50 GHz	49.11	54	-4.89	127	3.164	Horizontal	9.88
14.25 GHz	43.99	54	-10.01	171	3.168	Horizontal	13.58
15.40 GHz	42.79	54	-11.21	356	1.5	Horizontal	12.13

Table 10: Radiated Emissions 1 – 17 GHz at the Lowest Frequency

Peak

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
2440.7	52.45	74.0	-21.55	181	1.66	Vertical	-16.96
4879.7	54.11	74.0	-19.89	104	1.66	Vertical	-12.38
9747.6	54.12	74.0	-19.88	188	1.66	Vertical	6.12
12500.0	58.75	74.0	-15.25	70	1.66	Vertical	9.88
14617.0	62.92	74.0	-11.08	279	1.66	Vertical	14.15
487737	54.55	74.0	-19.45	39	3.58	Horizontal	-12.49
9748.0	54.79	74.0	-19.21	334	3.78	Horizontal	4.79
12500.0	57.16	74.0	-16.84	43	1.54	Horizontal	8.32
14635.0	59.62	74.0	-14.38	329	1.66	Horizontal	12.81

Avg

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
2440.7	41.94	54.0	-12.06	181	1.66	Vertical	-16.96
4879.7	41.12	54.0	-12.88	104	1.66	Vertical	-12.38
9747.6	40.76	54.0	-13.24	188	1.66	Vertical	6.12
12500.0	52.41	54.0	-1.59	70	1.66	Vertical	9.88
14617.0	48.03	54.0	-5.97	279	1.66	Vertical	14.15
487737	41.01	54.0	-12.99	39	3.58	Horizontal	-12.49
9748.0	43.03	54.0	-10.97	334	3.78	Horizontal	4.79
12500.0	51.32	54.0	-2.68	43	1.54	Horizontal	8.32
14635.0	45.79	54.0	-8.21	329	1.66	Horizontal	12.81

Table 11: Radiated Emissions 1 – 17 GHz at the Middle Frequency

Peak

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
4923.2	58.12	74.0	-15.85	53	3.78	Vertical	-12.29
9838.2	53.56	74.0	-20.44	260	3.78	Vertical	5.76
12500.0	55.06	74.0	-18.94	30	1.7	Vertical	9.88
14797.0	61.78	74.0	-12.22	281	2.19	Vertical	13.92
4922.2	57.56	74.0	-16.44	55	3.78	Horizontal	-12.39
12500.0	56.64	74.0	-17.36	51	1.53	Horizontal	8.32
14762.0	61.24	74.0	-12.76	310	1.66	Horizontal	12.7

Avg

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
4923.2	44.48	54.0	-9.52	53	3.78	Vertical	-12.29
9838.2	40.18	54.0	-13.82	260	3.78	Vertical	5.76
12500.0	44.16	54.0	-9.84	30	1.7	Vertical	9.88
14797.0	47.14	54.0	-6.86	281	2.19	Vertical	13.92
4922.2	43.27	54.0	-10.73	55	3.78	Horizontal	-12.39
12500.0	50.72	54.0	-3.28	51	1.53	Horizontal	8.32
14762.0	46.50	54.0	-7.50	310	1.66	Horizontal	12.7

Table 12: Radiated Emissions 1 – 17 GHz at the Highest Frequency

Peak

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.05 GHz	57.30	74	-16.70	302	Vertical	0.64
19.47 GHz	50.21	74	-23.79	251	Vertical	-0.52
24.34 GHz	57.10	74	-16.90	165	Vertical	1.58
17.04 GHz	54.71	74	-19.29	188	Horizontal	0.65
23.28 GHz	50.99	74	-23.02	263	Horizontal	1.65
25.60 GHz	54.47	74	-19.53	4	Horizontal	3.96

Avg

Frequency	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.05 GHz	43.21	54	-10.79	302	Vertical	0.64
19.47 GHz	35.96	54	-18.04	251	Vertical	-0.52
24.34 GHz	42.08	54	-11.92	165	Vertical	1.58
17.04 GHz	40.72	54	-13.28	188	Horizontal	0.65
23.28 GHz	37.89	54	-16.11	263	Horizontal	1.65
25.60 GHz	40.85	54	-13.15	4	Horizontal	3.96

Table 13: Radiated Emissions 17 – 26 GHz at the Middle Frequency (worse case)

5.6 §15.247(e) Maximum Average Power Spectral Density

All chains were measured and summed under the guidance of KDB 558074 Section 8.4. and KDB 66291 D01. Please see associated annex for details on instrument settings.

The maximum average power spectral density conducted from the intentional radiator of the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. The internal antenna gain is 2 dBi + Array gain of 3.01 dB which is a total of 5.01 dBi, and the external antenna gain is 4 dBi + Array gain of 3.01 dB which is a total of 7.01 dBi.

5.6.1 Internal Antenna

Mode	Frequency (MHz)	Measurement (dBm)	Criteria (dBm)
b	2412	-5.35	8.0
	2437	-6.85	8.0
	2462	-6.78	8.0
g	2412	-14.26	8.0
	2437	-11.63	8.0
	2462	-14.54	8.0
n 20	2412	-17.23	8.0
	2437	-11.88	8.0
	2462	-16.54	8.0
n 40	2422	-19.89	8.0
	2437	-17.19	8.0
	2452	-19.35	8.0

5.6.2 External/Internal Antenna

Mode	Frequency (MHz)	Measurement (dBm)	Criteria (dBm)
b	2412	-7.03	8.0
	2437	-3.90	8.0
	2462	-6.83	8.0
g	2412	-15.65	8.0

	2437	-8.11	8.0
	2462	-15.09	8.0
n 20	2412	-17.66	8.0
	2437	-9.71	8.0
	2462	-15.70	8.0
n 40	2422	-18.94	8.0
	2437	-16.80	8.0
	2452	-19.25	8.0

Result

The maximum average power spectral density was less than the limit of 8 dBm; therefore, the EUT complies with the specification.

-- End of Test Report --