TIMCO ENGINEERING, Inc.

An IIA Company

Test Report - FCC PART 15.247 / DTS
Applicant: etectRX, Inc.

Approved for Release By:

Signature: Bruno Clavier

Name & Title: Bruno Clavier, General Manager

Date of Signature 03/24/2023

Table of Contents

1. Customer Information

Applicant: etectRX, Inc.
Address: 747 SW 2nd Avenue, Suite 365T,
Gainesville, Florida, 32601
United States

1.1 Test Result Summary

The following test procedure and guidance were used for measuring KDB 996369 D04 Module Integration Guide v01, May 1 2019, Section 3 and ANSI C63.10-2013. Full test results are available in this report.

No additions to the test methods were needed. There were no deviations, or exclusions from the test methods. No test results are from external providers or from the customer. The test results relate only to the items tested. Timco does not offer opinions and interpretations, only a pass/fail statement.

FCC Clauses	Description of the requirements	Result (Pass, Fail or N/A)
Applicable Clauses from Part 2 or KDB		
KDB 558074 D01	Duty Cycle	N/A
KDB 558074 D01	99 % Bandwidth	for reporting only
KDB 558074 D01	Band-edge measurements	Pass
Applicable Clauses from Part 15.247		
15.247 (a) (1)	FHSS (i,ii,iii)	N/A
15.247 (a) (2)	6dB Bandwidth	Pass
15.247 (b) (1)	FHSS conducted output power for 2.400-2483.5 MHz	N/A
15.247 (b) (2)	FHSS conducted output power for 902-928 MHz	N/A
15.247 (b) (3)	DTS conducted output power	Pass
15.247 (b) (4)	Conducted output power >6dBi	Pass
15.247 (c) (1)	Ant Gain >6dBi Fixed PtP	---
15.247 (c) (2)	Ant Gain >6dBi MIMO	---
15.247 (d) / 15.215 (b)	Spurious Emissions (Out of Band) Emissions in nonrestricted frequency bands	Pass
15.247 (e)	Power Spectral Density (PSD)	Pass
15.247 (f)	Hybrid System requirements	---
15.247 (g)	FHSS System requirements	N/A
15.247 (h)	FHSS spectrum sensing	N/A
Applicable Clauses from Part 2 and Part 15 Subpart C		
15.203	Antenna requirements	---
15.205	Restricted bands of operation	---
15.207	AC Power Conducted Emissions	N/A
15.209	Radiated Emissions	---
15.211	Tunnel Radio Systems	N/A
15.212 (a)	Single Modular Transmitter	---
15.212 (b)	Limited Modular Transmitter	---
15.213	Cable Locating Equipment	N/A

2. Location of Testing

2.1 Test Laboratory

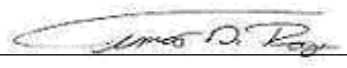
Timco Engineering Inc. is a subsidiary of Industrial Inspection & Analysis, Inc. ("IIA").

Testing was performed at Timco's permanent laboratory located at 849 NW State Road 45, Newberry, Florida 32669

FCC test firm # 578780
FCC Designation # US1070
FCC site registration is under A2LA certificate # 0955.01
ISED Canada test site registration # 2056A
EU Notified Body # 1177
For all designations see A2LA scope # 0955.01

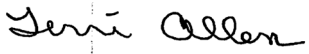
2.2 Testing was performed, reviewed by

Dates of Testing: 01/26/2023

Signature:  Sr. EMC Engineer EMC-003838-NE

Name & Title: Tim Royer, EMC Engineer

Date of Signature 03/24/2023

Signature: 

Name & Title: Terri Allen, Project Specialist

Date of Signature 03/24/2023

3. Test Sample(s) (EUT/DUT)

The test sample was received: 01/26/2023

3.1 Description of the EUT

A description as well as unambiguous identification of the EUT(s) tested. Where more than one sample is required for technical reasons (such as the use of connected units for the purpose of conducted output power testing where the product units will have integral antennas), each specific test shall identify which unit was tested.

Identification	
FCC ID:	2AL2U-020002
Brief Description	Etect Reader version 3 – Body worn device to detect and record ingested sensor
Model(s) #	ET71001
Firmware version	n/a
Software version	n/a
Serial Number	n/a

Technical Characteristics	
Technology	Digital Transmission System
Test Frequency Range	2402 – 2480 MHz
Radio Type	FM / Digital
Highest RF O/P Power (Max.)	-3.26 dBm / 0.0005 W
Antenna Type	Copper wire, base loaded monopole with a matching network
Voltage Rating (AC or Batt.)	Battery Powered, Charging 120V, 60Hz

Antenna Characteristics			
Frequency Range	Mode / BW	Ant Gain 1	Ant Gain 2
2400 – 2480 MHz	1	0 dBi	n/a

3.2 Configuration of EUT

Band (MHz)	Mode	Number of Ant.
2402 - 2480	Transmit	1

Operating conditions during Testing:

No modifications of the device under test (including firmware, specific software settings, and input/output signal levels to the EUT).

Peripherals used during Testing:

No peripherals used.

3.3 Test Setup of EUT

Equipment, antenna, and cable arrangement. The setup of the equipment and cable or wire placement on the test site that produces the highest radiated and the highest ac power line conducted emissions shall be shown clearly and described. Information on the orientation of portable equipment during testing shall be included. Drawings or photographs may be used for this purpose.

Test Setups are included in the test report.

4. Test methods & Applicable Regulatory Limits

4.1 Test methods/Standards/Guidance:

Test procedures and guidance for measuring Digital Transmission System (DTS) are provided in the FCC KDB 558074 D01 DTS Measurement Guidance and in Clause 11 of ANSI C63.10-2013.

1) ANSI C63.10-2013
2) FCC KDB 558074 D01

4.2 Applied Limits and Regulatory Limits:

3) FCC CFR 47 Part 15.247

5. Measurement Uncertainty

Parameter	Uncertainty (dB)
Conducted Emissions	± 3.14 dB
Radiated Emissions (9kHz – 30 MHz)	± 3.08 dB
Radiated Emissions (30 – 200 MHz)	± 2.16 dB
Radiated Emissions (200 – 1000 MHz)	± 2.15 dB
Radiated Emissions (1 GHz – 18 GHz)	± 2.14 dB
Radiated Emissions (18 GHz – 40 GHz)	± 2.31 dB
Note: The uncertainties provided in this table represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of K=2.	

6. Environmental Conditions

6.1 Temperature & Humidity

Measurements performed at the test site did not exceed the following:

Temperature	23 C +/- 5%
Humidity	55% +/- 5%
Barametric pressure	30.05 inHg
Note: Specific environmental conditions that are applicable to a specific test are available in the test result section.	

7. List of Test Equipment and Test Facility

The test equipment used identified by type, manufacturer, serial number, or other identification and the date on which the next calibration or service check is due.

Description of the firmware or software used to operate EUT for testing purposes.

A complete list of all test equipment used shall be included with the test report. The manufacturer's model and serial numbers, and date of last calibration, and calibration interval shall be included. Measurement cable loss, measuring instrument bandwidth and detector function, video bandwidth, if appropriate, and antenna factors shall also be included where applicable.

7.1 List of Test Equipment

Test Equipment						
Type	Device	Manufacturer	Model	SN#	Current Cal	Cal Due
Antenna	Biconical 1057	Eaton	94455-1	1057	10/16/20	10/16/2023
Antenna, NSA	Log-Periodic 1243	Eaton	96005	1243	5/4/21	5/3/2024
Antenna	Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	2/25/20	2/24/2023
CHAMBER	CHAMBER	Panashield	3M	N/A	3/12/19	12/21/2023
Pre-amp	Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	2/27/19	7/26/2025
Receiver	EMI Test Receiver R&S ESW44	Rohde & Schwarz	ESW44	103049	10/13/21	10/12/2024
Receiver	EMI Test Receiver R&S ESU 40	Rohde & Schwarz	ESU 40	100320	5/27/21	5/26/2024

Software			
Software	Author	Version	Validation on
ESU Firmware	Rohde & Schwarz	4.43 SP3; BIOS v5.1-24-3	2018
RSCommander	Rohde & Schwarz	1.6.4	2014
ScopeExplorer	LeCroy	v2.25.0.0	2009
Field Strength	Timco	v4.10.7.0	2016

8. Test Results

The results of the test are usually indicated in the form of tables, spectrum analyzer plots, charts, sample calculations, as appropriate for each test procedure.

A description and/or a block diagram of the test setup is usually provided.

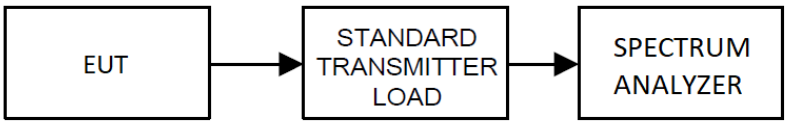
The measurement results, along with the appropriate limits for comparison, may be presented in tabular or graphical form. In addition, any variation in the measurement environment may be reported if applicable (e.g., a significant change of temperature that could affect the cable loss and amplifier response).

Unless noted otherwise in the referenced standard, the measurements of ac power-line conducted emissions and conducted power output will be reported in units of dBµV. Unless noted otherwise in the referenced standard, the measurements of radiated emissions will be reported in units of decibels, referenced to one microvolt per meter (dBµV/m) for electric fields, or to one ampere per meter (dBA/m) for magnetic fields, at the distance specified in the appropriate standards or requirements. The measurements of antenna-conducted power for receivers may be reported in units of dBµV if the impedance of the measuring instrument is also reported. Otherwise, antenna-conducted power will be reported in units of decibels referenced to one milliwatt (dBm). All formulas for data conversions and conversion factors, if used, will be included in this measurement report.

8.1 DTS conducted output power

Limits from FCC Part 15.247 (b) (3) and test procedure from ANSI C63.10-2013 section 11.9

Setup

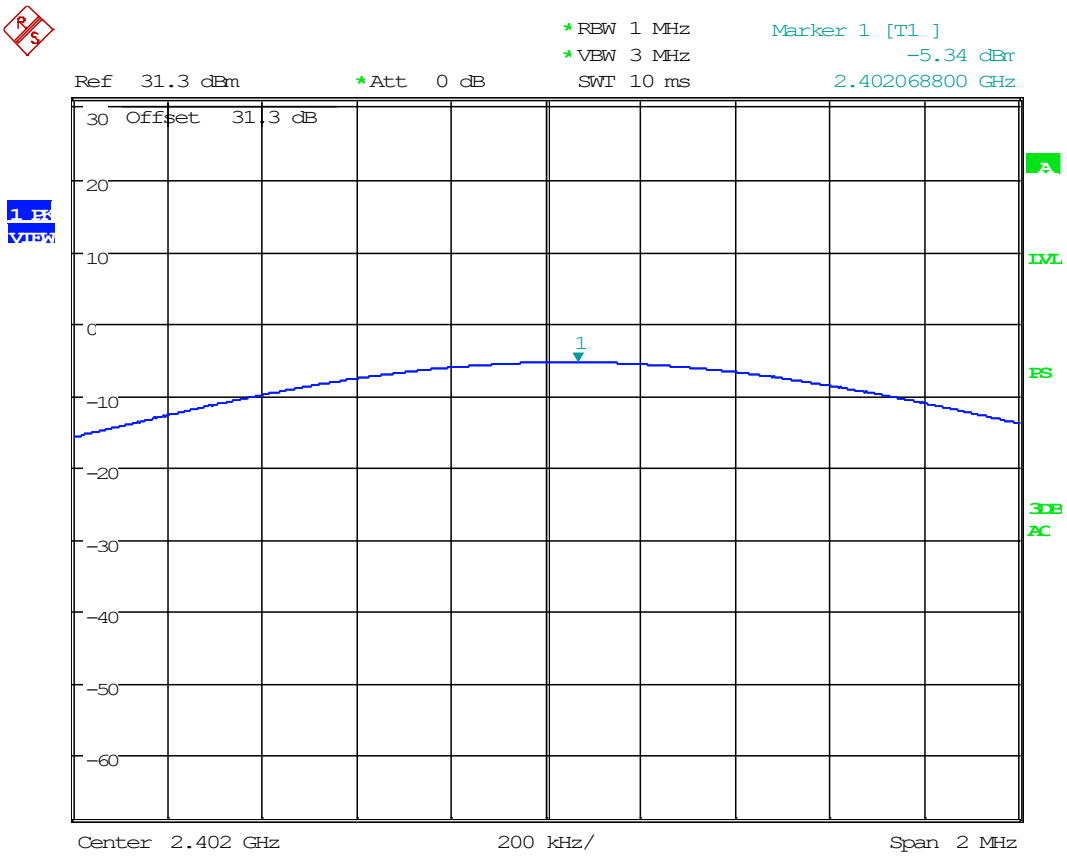


Conducted Output Power Test Results

Tuned Frequency (MHz)	Power Output (dBm)
2402	-5.34
2442	-4.37
2480	-3.26

- MAXIMUM Conducted Output Power = -3.26 dBm

8.1.1 Conducted Output Power Test Data / Spectrum Plots, 2402 MHz



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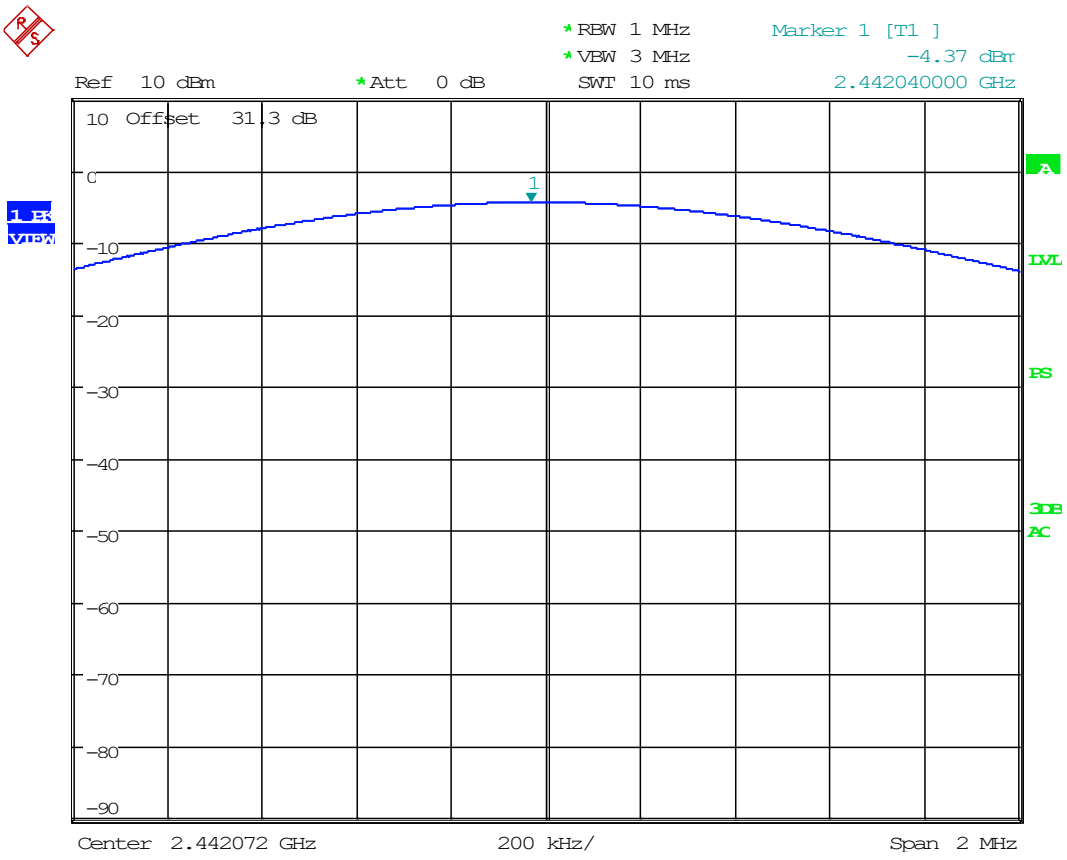
8.1.2 Conducted Output Power Test Data / Spectrum Plots, 2442 MHz



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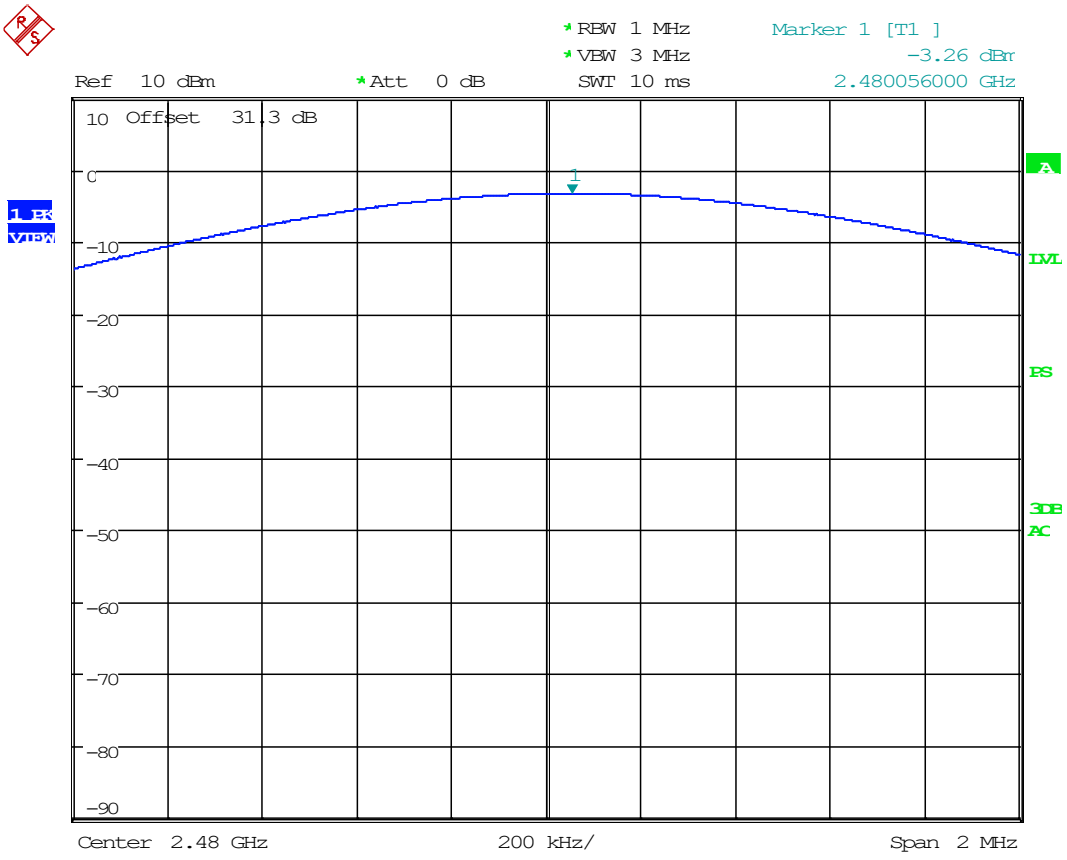
8.1.3 Conducted Output Power Test Data / Spectrum Plots, 2480 MHz



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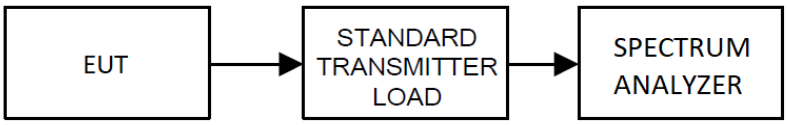
8.2 99% Occupied Bandwidth

Requirement from FCC KDB 558074 D01 and test procedure from ANSI C63.10-2013 section 6.9.3

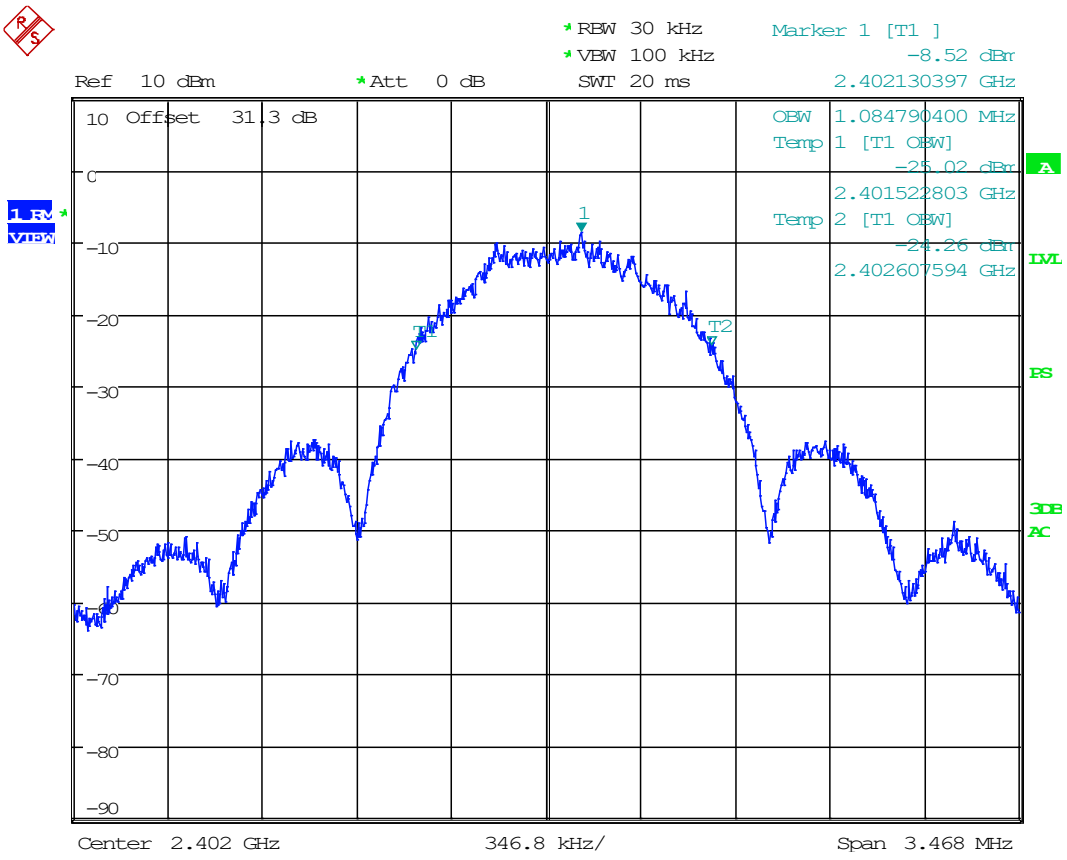
Setup



99% BW Test Results

Tuned Frequency (MHz)	99% BW (MHz)
2402	1.08
2442	1.09
2480	1.09

8.2.1 99% Occupied Bandwidth Test Data / Spectrum Plots, 2402 MHz



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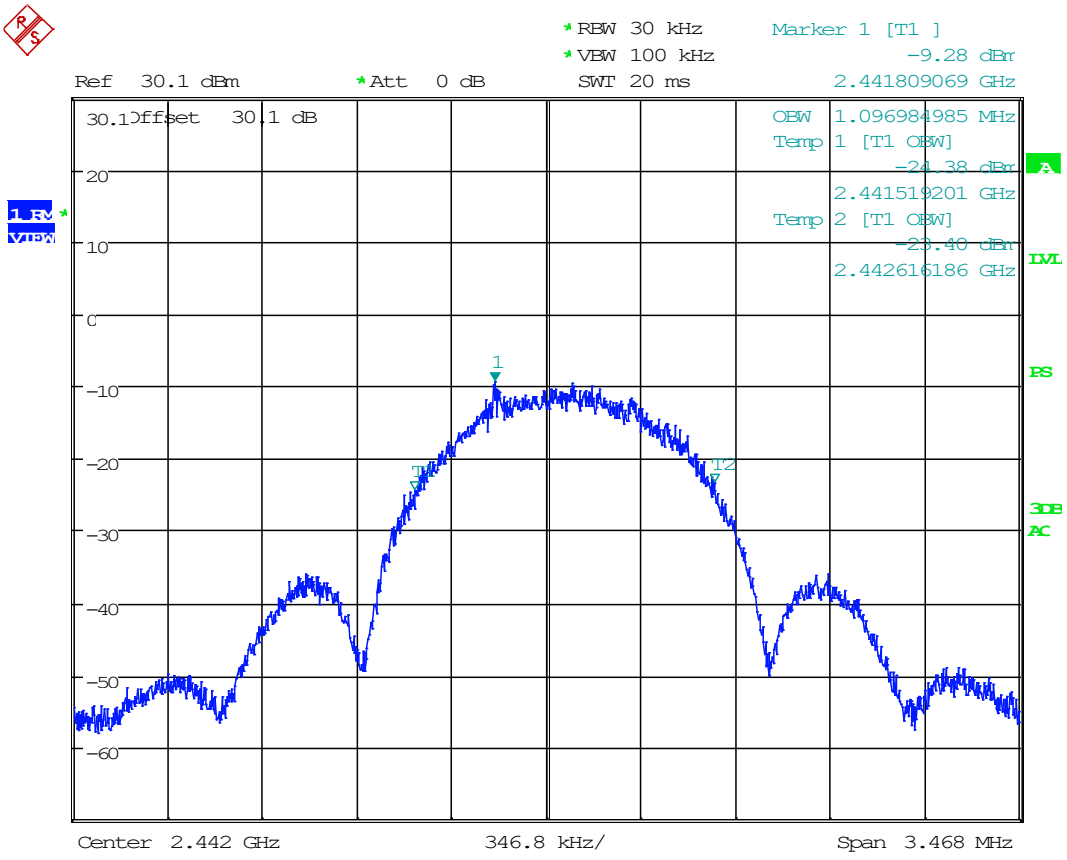
8.2.2 99% Occupied Bandwidth Test Data / Spectrum Plots, 2442 MHz



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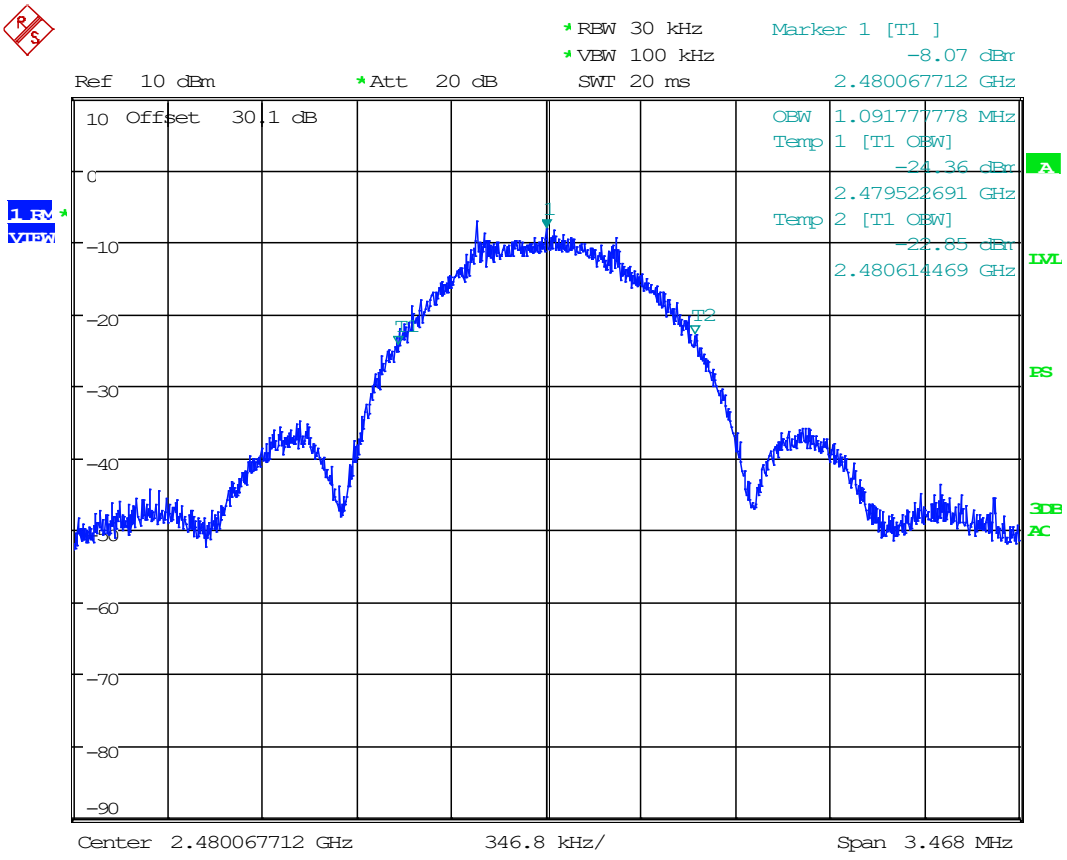
8.2.3 99% Occupied Bandwidth Test Data / Spectrum Plots, 2480 MHz



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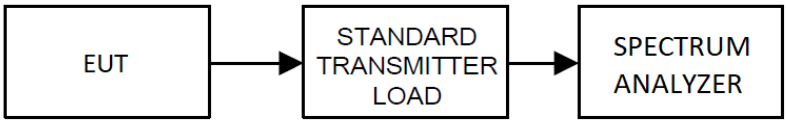
8.3 6dB Bandwidth (DTS BW)

Limits from FCC Part 15.247 (a) (2) and test procedure from ANSI C63.10-2013 section 11.8

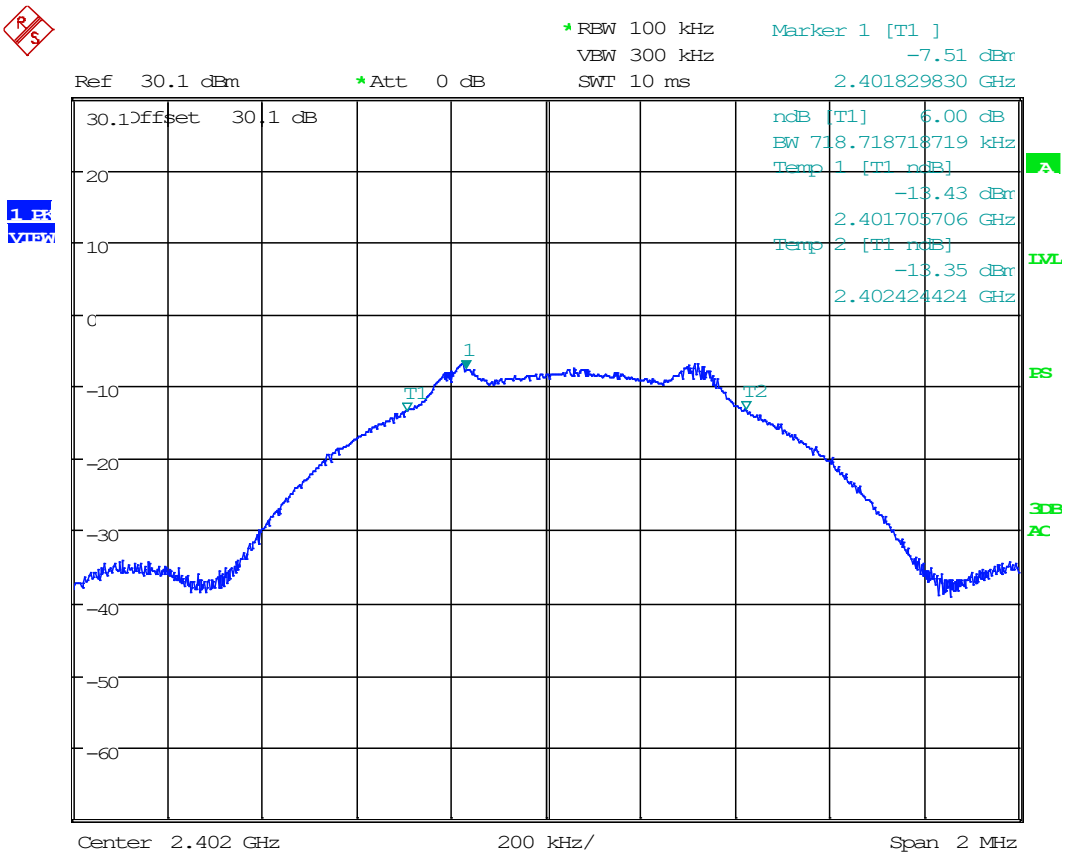
Setup



6dB BW Results

Tuned Frequency (MHz)	6dB BW (kHz)
2402	718.72
2442	693.69
2480	694.69

8.3.1 6dB BW Test Data / Spectrum Plots, 2402 MHz



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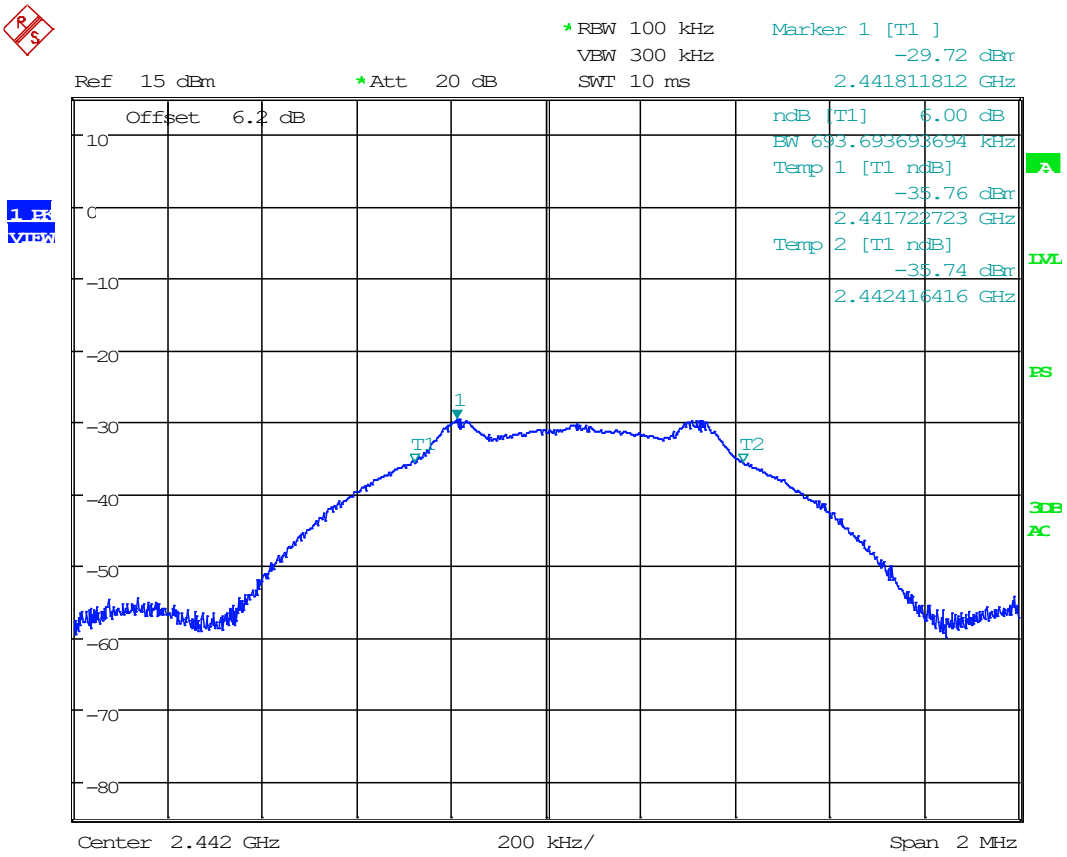
8.3.2 6dB BW Test Data / Spectrum Plots, 2442 MHz



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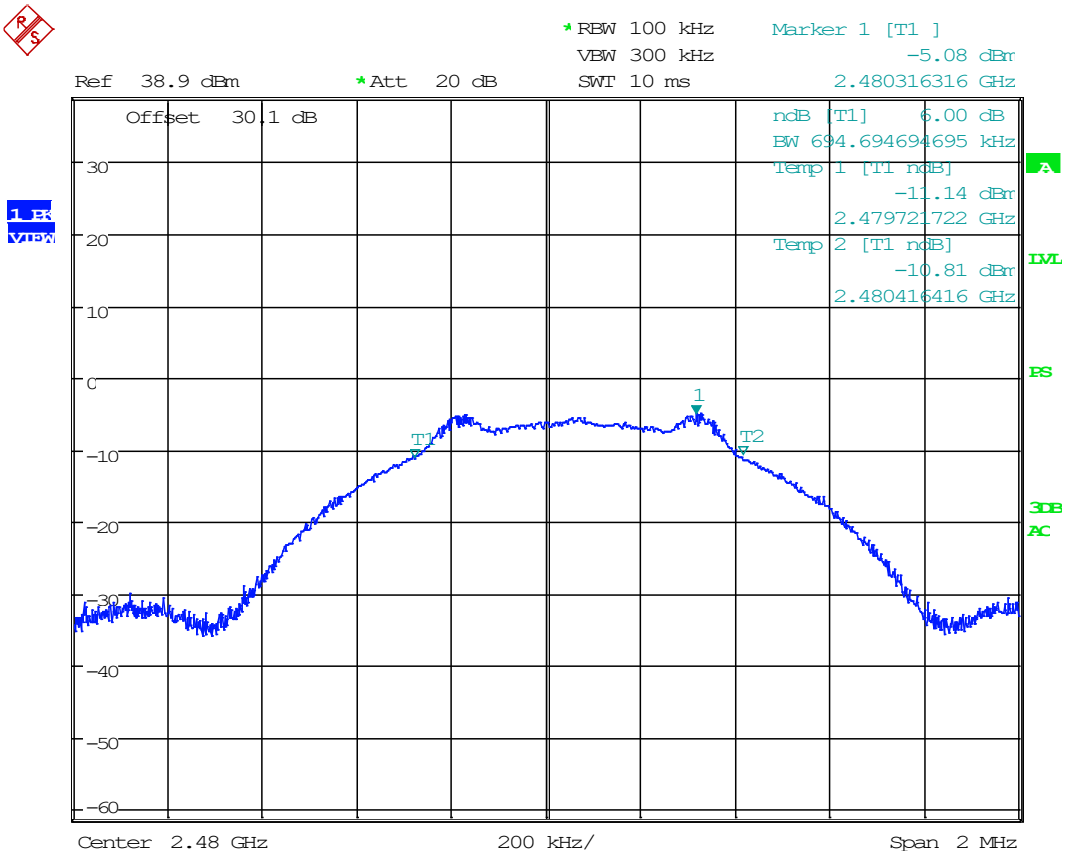
8.3.3 6dB BW Test Data / Spectrum Plots, 2480 MHz



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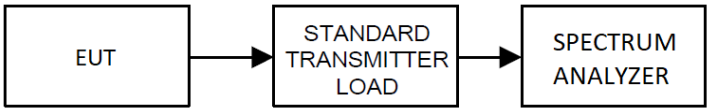
8.4 Power Spectral Density (PSD)

Limits from FCC Part 15.247 (e) and test procedure from ANSI C63.10-2013 section 11.10

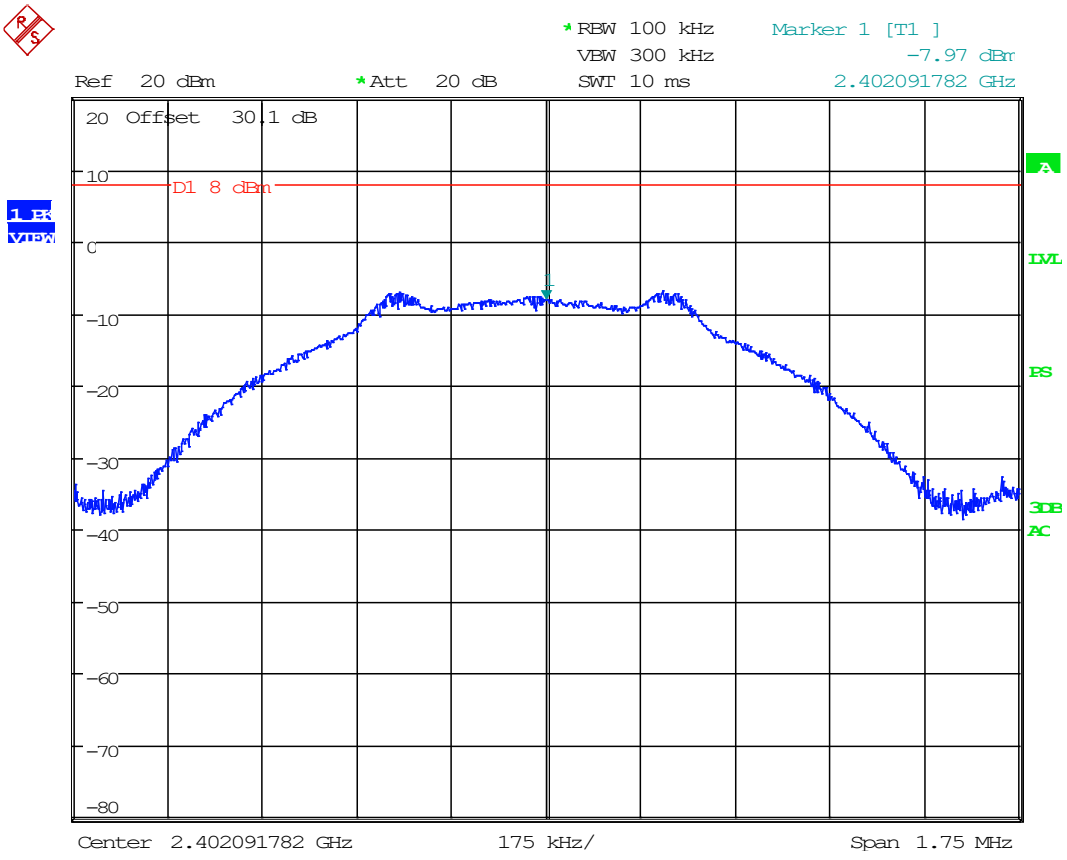
Setup



PSD Test Results

Tuned Frequency (MHz)	PSD Level (dBm)
2402	-7.97
2442	-7.29
2480	-5.26

8.4.1 Power Spectral Density (PSD) Test Data / Spectrum Plots, 2402 MHz



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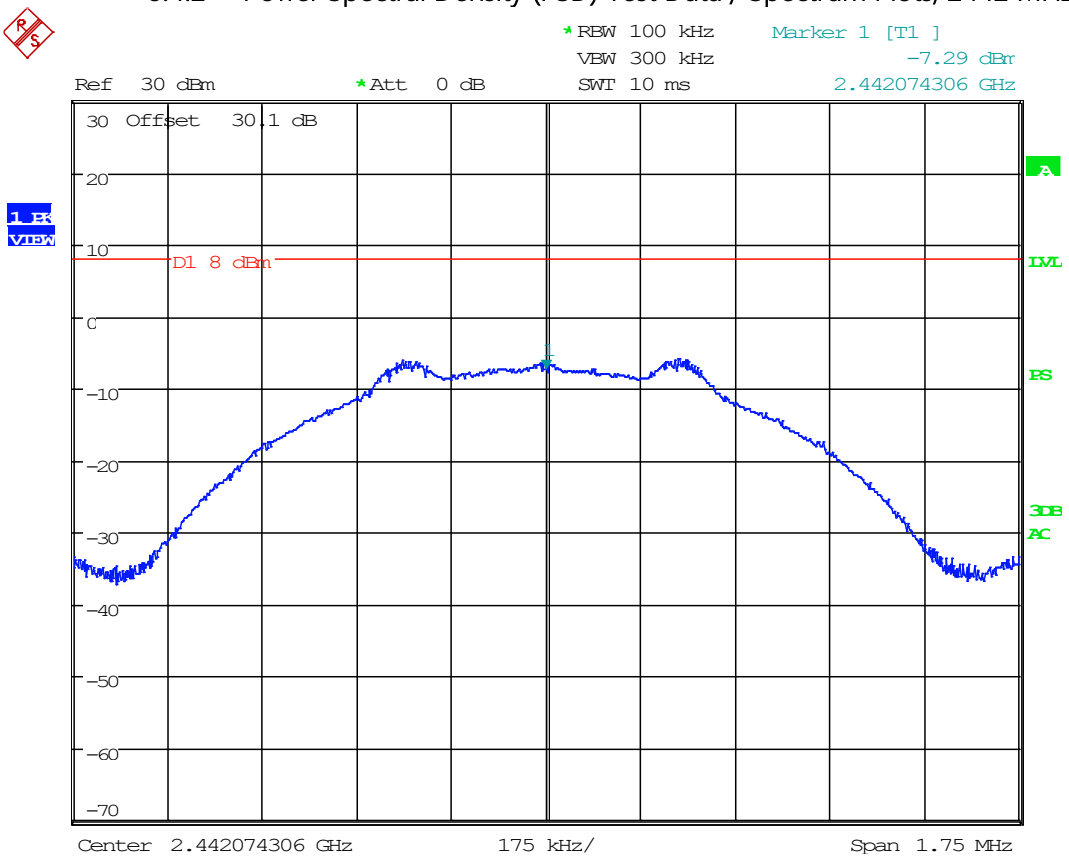
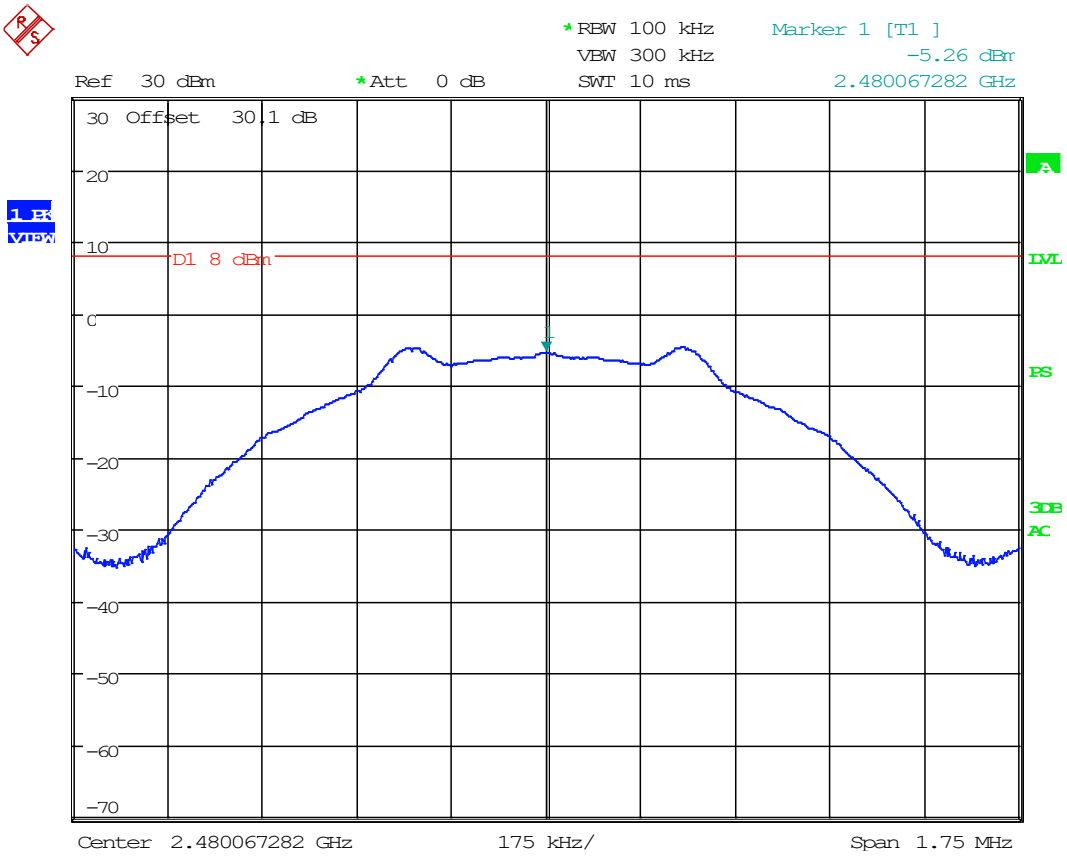
8.4.2 Power Spectral Density (PSD) Test Data / Spectrum Plots, 2442 MHz



8.4.3 Power Spectral Density (PSD) Test Data / Spectrum Plots, 2480 MHz



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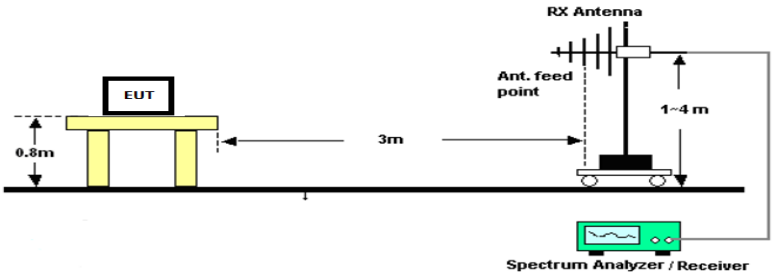
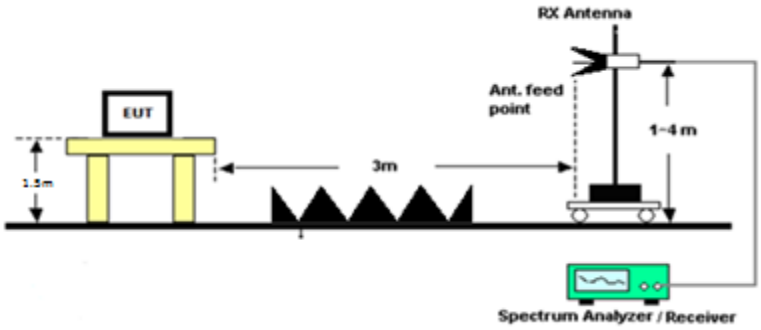
8.1 Radiated Emissions

Limits from FCC Part 15.247 (d) and 15.215 (b) and test procedure from ANSI C63.10-2013 section 11.11

Radiated Test Setup, 30 – 1000 MHz



Radiated Test Setup, Above 1000 MHz



Radiated Emissions in Restricted Bands, Tabular Data

8.1.1 Radiated Emissions Test Data, 2402 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	15.205 Restricted Band	15.205, 15.35, 15.247(d) Detector	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2402.00	4804.00	X	PK	-9.30	H	7.10	0.00	33.93	3.00	31.73	73.98	42.25
2402.00	4804.00	X	PK	-10.40	V	7.10	0.00	33.93	3.00	30.63	73.98	43.35
2402.00	4804.00	X	AVG	-22.90	H	7.10	0.00	33.93	3.00	18.13	53.98	35.85
2402.00	4804.00	X	AVG	-22.80	V	7.10	0.00	33.93	3.00	18.23	53.98	35.75
2402.00	7206.00		PK	-12.40	H	9.54	0.00	36.39	3.00	33.53	53.98	20.45
2402.00	7206.00		PK	-11.80	V	9.54	0.00	36.39	3.00	34.13	53.98	19.85
2402.00	9608.00		PK	-12.70	H	10.70	0.00	36.62	3.00	34.62	53.98	19.36
2402.00	9608.00		PK	-11.00	V	10.70	0.00	36.62	3.00	36.32	53.98	17.66
2402.00	12010.00	X	PK	-15.00	H	12.40	0.00	39.08	3.00	36.48	73.98	37.50
2402.00	12010.00	X	PK	-15.10	V	12.40	0.00	39.08	3.00	36.38	73.98	37.60
2402.00	12010.00	X	AVG	-27.10	H	12.40	0.00	39.08	3.00	24.38	53.98	29.60
2402.00	12010.00	X	AVG	-27.20	V	12.40	0.00	39.08	3.00	24.28	53.98	29.70
2402.00	14412.00		PK	-16.90	H	13.35	0.00	39.75	3.00	36.20	53.98	17.78
2402.00	14412.00		PK	-17.40	V	13.35	0.00	39.75	3.00	35.70	53.98	18.28
2402.00	16814.00		PK	-17.80	H	14.60	0.00	42.34	3.00	39.14	53.98	14.84
2402.00	16814.00		PK	-17.40	V	14.60	0.00	42.34	3.00	39.54	53.98	14.44

8.1.2 Radiated Emissions Test Data, 2442 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	15.205 Restricted Band	15.205, 15.35, 15.247(d) Detector	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2442.00	4884.00	X	PK	-10.10	H	7.36	0.00	33.92	3.00	31.19	73.98	42.79
2442.00	4884.00	X	PK	-10.80	V	7.36	0.00	33.92	3.00	30.49	73.98	43.49
2442.00	4884.00	X	AVG	-22.90	H	7.36	0.00	33.92	3.00	18.39	53.98	35.59
2442.00	4884.00	X	AVG	-23.10	V	7.36	0.00	33.92	3.00	18.19	53.98	35.79
2442.00	7326.00	X	PK	-12.10	H	9.59	0.00	36.23	3.00	33.71	73.98	40.27
2442.00	7326.00	X	PK	-11.60	V	9.59	0.00	36.23	3.00	34.21	73.98	39.77
2442.00	7326.00	X	AVG	-24.10	H	9.59	0.00	36.23	3.00	21.71	53.98	32.27
2442.00	7326.00	X	AVG	-24.20	V	9.59	0.00	36.23	3.00	21.61	53.98	32.37
2442.00	9768.00		PK	-13.10	H	11.01	0.00	36.84	3.00	34.75	53.98	19.23
2442.00	9768.00		PK	-13.20	V	11.01	0.00	36.84	3.00	34.65	53.98	19.33
2442.00	12210.00	X	PK	-14.80	H	12.50	0.00	39.24	3.00	36.93	73.98	37.05
2442.00	12210.00	X	PK	-15.30	V	12.50	0.00	39.24	3.00	36.43	73.98	37.55
2442.00	12210.00	X	AVG	-27.30	H	12.50	0.00	39.24	3.00	24.43	53.98	29.55
2442.00	12210.00	X	AVG	-27.40	V	12.50	0.00	39.24	3.00	24.33	53.98	29.65
2442.00	14652.00		PK	-16.30	H	13.61	0.00	40.27	3.00	37.57	53.98	16.41
2442.00	14652.00		PK	-16.40	V	13.61	0.00	40.27	3.00	37.47	53.98	16.51
2442.00	17094.00		PK	-17.30	H	14.66	0.00	42.42	3.00	39.78	53.98	14.20
2442.00	17094.00		PK	-16.20	V	14.66	0.00	42.42	3.00	40.88	53.98	13.10

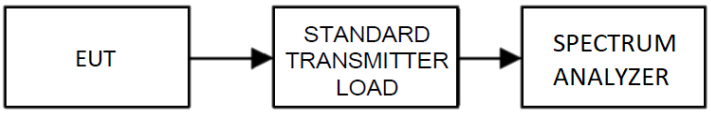
8.1.3 Radiated Emissions Test Data, 2480 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	15.205 Restricted Band	15.205, 15.35, 15.247(d) Detector	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2480.00	4960.00	X	PK	-8.20	H	7.72	0.00	33.96	3.00	33.48	73.98	40.50
2480.00	4960.00	X	PK	-9.00	V	7.72	0.00	33.96	3.00	32.68	73.98	41.30
2480.00	4960.00	X	AVG	-22.20	H	7.72	0.00	33.96	3.00	19.48	53.98	34.50
2480.00	4960.00	X	AVG	-22.20	V	7.72	0.00	33.96	3.00	19.48	53.98	34.50
2480.00	7440.00	X	PK	-11.80	H	9.56	0.00	36.01	3.00	33.78	73.98	40.20
2480.00	7440.00	X	PK	-12.70	V	9.56	0.00	36.01	3.00	32.88	73.98	41.10
2480.00	7440.00	X	AVG	-24.50	H	9.56	0.00	36.01	3.00	21.08	53.98	32.90
2480.00	7440.00	X	AVG	-24.20	V	9.56	0.00	36.01	3.00	21.38	53.98	32.60
2480.00	9920.00		PK	-13.40	H	11.15	0.00	37.08	3.00	34.83	53.98	19.15
2480.00	9920.00		PK	-12.80	V	11.15	0.00	37.08	3.00	35.43	53.98	18.55
2480.00	12400.00	X	PK	-14.00	H	12.54	0.00	39.23	3.00	37.77	73.98	36.21
2480.00	12400.00	X	PK	-13.10	V	12.54	0.00	39.23	3.00	38.67	73.98	35.31
2480.00	12400.00	X	AVG	-26.40	H	12.54	0.00	39.23	3.00	25.37	53.98	28.61
2480.00	12400.00	X	AVG	-26.40	V	12.54	0.00	39.23	3.00	25.37	53.98	28.61
2480.00	14880.00		PK	-17.20	H	13.44	0.00	40.29	3.00	36.54	53.98	17.44
2480.00	14880.00		PK	-17.40	V	13.44	0.00	40.29	3.00	36.34	53.98	17.64
2480.00	17360.00		PK	-17.30	H	15.01	0.00	42.52	3.00	40.23	53.98	13.75
2480.00	17360.00		PK	-17.50	V	15.01	0.00	42.52	3.00	40.03	53.98	13.95

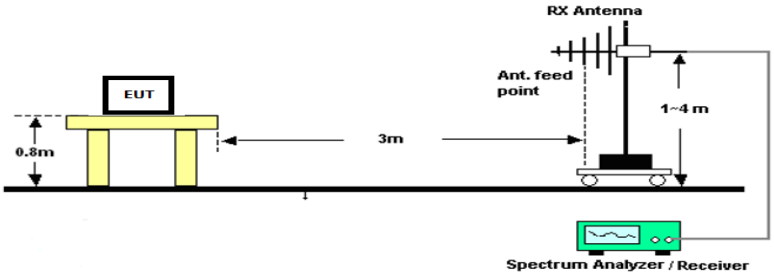
8.2 Band-edge measurements

Requirement from FCC KDB 558074 D01 and test procedure from ANSI C63.10-2013 section 11.13

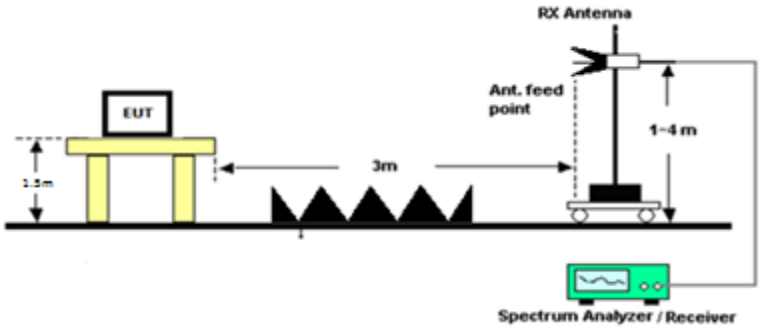
Conducted Test Setup



Radiated Test Setup, 30 – 1000 MHz

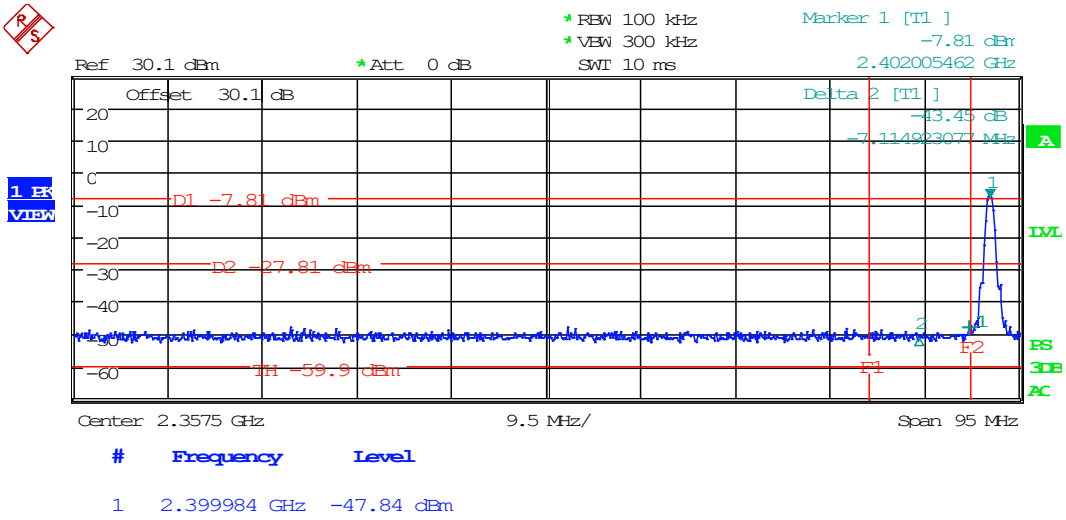


Radiated Test Setup, Above 1000 MHz



Band-edge Spectrum Plots

8.2.1 Lower Band Edge Plot, 2402 MHz



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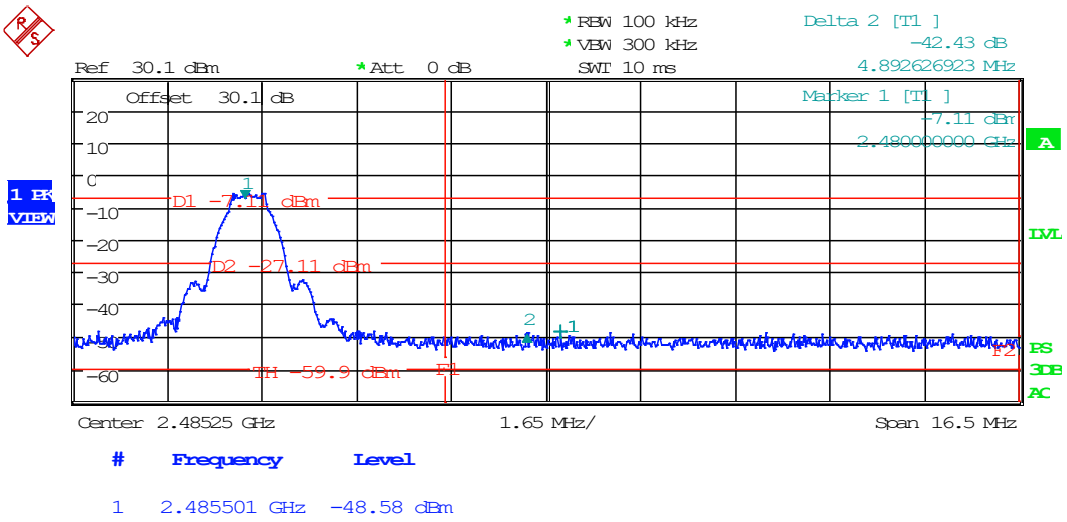
8.2.2 Upper Band Edge Plot, 2480 MHz



Date: 26.JAN.2023 14:23:53

9. ANNEX-A - Photographs of the EUT

Photographs of the EUT and any manufacturer supplied accessories to be used with the EUT are in separate supplementary documents labelled EXTERNAL PHOTOS and INTERNAL PHOTOS.

10. ANNEX-B – Test Setup Photographs

Test setup photographs are located in a separate supplementary ANNEX-B document.

11. History of Test Report Changes

Test Report #	Revision #	Description	Date of Issue
TR_6249-23_FCC_15.247 DTS_	1	Initial release	02/14/2023
	2	Updated description, Page 7	03/24/2023

END OF TEST REPORT