

Prüfbericht-Nr.: Test Report No.:	CN22GEVR 001	Auftrags-Nr.: Order No.:	158261738	Seite 1 von 19 Page 1 of 19	
Kunden-Referenz-Nr.: Client Reference No.:	NA	Auftragsdatum: Order date:	15.11.2022		
Auftraggeber: Client:	Latitude Limited 7/F., Southeast Industrial Building, 611-619 Castle Peak Road, Tsuen Wan, N.T., Hong Kong				
Prüfgegenstand: Test item:	Bioenergy Massager				
Bezeichnung / Typ-Nr.: Identification / Type No.:	OH-BM				
Auftrags-Inhalt: Order content:	FCC Certification				
Prüfgrundlage: Test specification:	FCC Part 15 Subpart C, ANSI C63.10-2013				
Wareneingangsdatum: Date of receipt:	15.11.2022				
Prüfmuster-Nr.: Test sample No.:	A003371807-001				
Prüfzeitraum: Testing period:	15.11.2022 – 22.11.2022				
Ort der Prüfung: Place of testing:	Hong Kong				
Prüflaboratorium: Testing laboratory:	TÜV Rheinland Hong Kong Ltd.				
Prüfergebnis*: Test result*:	Pass				
geprüft von / tested by:		kontrolliert von / reviewed by:			
					
06.01.2023	Felicia Chan / Senior Engineer	06.01.2023	Sharon Li / Unit Senior Manager		
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position	Unterschrift Signature
Sonstiges / Other: FCC ID: 2A9TIOHBM Marginal pass result is marked with Pass* "Decision Rule" document announced in our website (https://www.tuv.com/landingpage/en/qm-gcn/) describes the statement of conformity and its rule of enforcement for test results are applicable throughout this test report.					
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:			Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet	5 = mangelhaft N/T = nicht getestet
Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested	5 = poor N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.					

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Product information

Manufacturers declarations

	Transceiver
Operating frequency range	2402 - 2480 MHz
Type of modulation	GFSK
Number of channels	40
Channel separation	2 MHz
Type of antenna	Integral PCB antenna
Antenna gain (dBi)	-1.21 dBi
Power level	fix
Type of equipment	stand alone radio device
Connection to public utility power line	No
Nominal voltage	5 VDC
Independent Operation Modes	Transmitting

Product function and intended use

The equipment under test (EUT) is a Bluetooth low energy device for controlling massager heating system.

FCC ID: 2A9TIOHBM

Models	Product description
OH-BM	Bioenergy Massager

Submitted documents

Circuit Diagram
Block Diagram
Technical Description
User manual
BOM

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production. An AC/DC adapter model SK03T1-0500300Z was provided by the client and was used as a source of power supply during the test.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- A test mode sample is provided by the applicant to control the operating channel. The RF output power is fixed in the test mode sample. The setting of the RF output power used in the testing shall be fixed on the firmware of the final end product.

Special Accessories and Auxiliary Equipment

- None

Countermeasures to achieve EMC Compliance

- None

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360 °, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$FS = R + AF + CF + FA - PA$$

Where FS = Field Strength in dBuV/m at 3 meters.

R = Reading of Spectrum Analyzer in dBuV.

AF = Antenna Factor in dB.

CF = Cable Attenuation Factor in dB.

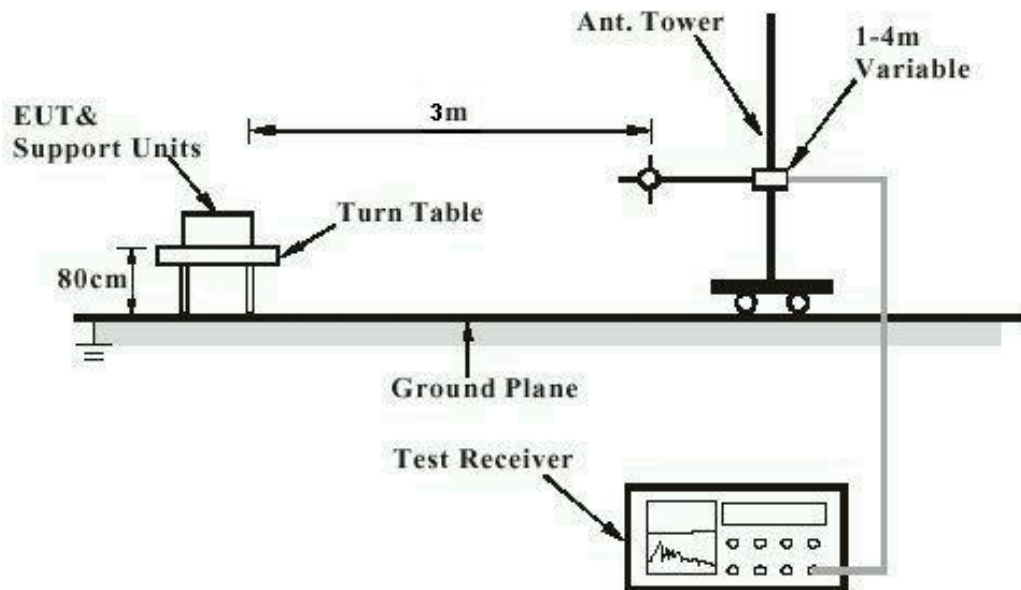
FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

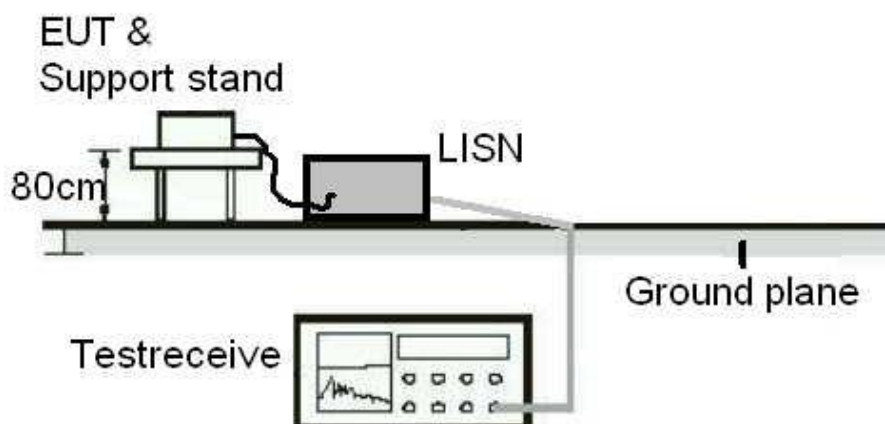
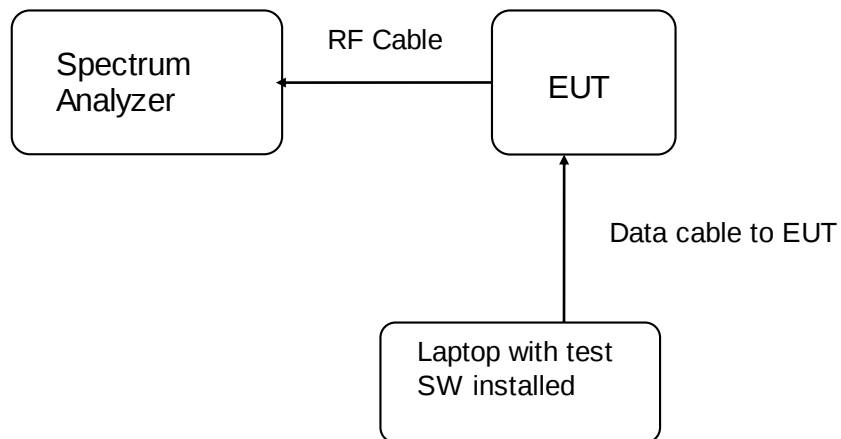


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)

Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.

Address: 3-4/F, Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong

Tel.: +852 2192 1000

Fax: +852 2192 1001

Email service-gc@tuv.com

The test facility is recognized or accredited by the following organizations:

FCC

Test Firm Registration Number : 371735

ISED/IC

Test Site Registration Number : 26152

List of Test and Measurement Instruments

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	5-Mar-22	5-Mar-23
Multi-functional Anechoic Chamber	Albatross	Nil	04-Jan-22	04-Jan-23
Test Receiver	R & S	ESU40	13-Jan-22	13-Jan-23
Active Loop Antenna	EMCO	6502	3-Dec-20	3-Dec-22
Bi-conical Antenna	R & S	HK116	24-Oct-22	24-Oct-24
Log Periodic Antenna	R & S	HL223	31-Oct-22	31-Oct-24
Standard Gain Horn	ETS-Lindgren	3160-07	24-Nov-20	24-Nov-22
Standard Gain Horn	ETS-Lindgren	3160-08	24-Nov-20	24-Nov-22
Standard Gain Horn	ETS-Lindgren	3160-10	30-Nov-20	30-Nov-22
Double-Ridged Waveguide Horn	EMCO	3116	30-Nov-20	30-Nov-22
Double-Ridged Waveguide Horn	EMCO	3117	30-Nov-20	30-Nov-22
Coaxial cable	Harbour	SF118/11n/11n/12000.0	3-Aug-22	3-Aug-24
High Frequency Cable	Pasternack	PE3VNA4001-3M	29-Jan-21	29-Jan-23
Microwave amplifier 0.5-26.5GHz, 25dB gain	COM-POWER Corporation	PAM-118A	5-Mar-22	5-Mar-23
Preamplifier 18GHz to 40GHz with cable (EMC656)	A.H. Systems, Inc.	PAM-1840VH	29-Jan-22	29-Jan-23

Conducted Emission on AC main

Equipment	Manufacturer	Type	Cal. Date	Due Date
Test Receiver	Rohde & Schwarz	ESU40	13-Jan-2022	13-Jan-2023
LISN	Rohde & Schwarz	ENV216	30-Aug-2022	30-Aug-2023
Double Shield Cable	Huber+ Suhner	RG223/U-01	20-May-2021	20-May-2023

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Signal and Spectrum Analyzer	R & S	FSV40	29-Nov-21	29-Nov-22

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is 2.28dB.

The estimated combined standard uncertainty for radiated emissions measurements is 3.23dB (9kHz to 30MHz) and 5.18dB (30MHz to 200MHz) and 6.09dB (200MHz to 1000MHz) and is 4.91dB (1GHz to 8.2GHz) and 4.78dB (8.2GHz to 12.4GHz) and 4.91dB (12.4GHz to 18GHz)

The estimated combined standard uncertainty for antenna conducted emission is 2.68dB

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for the level of confidence is approximately 95%.

Results FCC Part 15 – Subpart C

FCC 15.203 – Antenna Requirement 1		Pass
FCC Requirement: No antenna other than that furnished by the responsible party shall be used with the device		
Results:	a) Antenna type:	Integral PCB antenna
	b) Manufacturer and model no:	N/A
	c) Peak Gain:	-1.21 dBi
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2		N/A
FCC Requirement: An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.		
Results:	Only one integral antenna can be used.	
Verdict:	N/A	

FCC 15.207– Conducted Emission on AC Mains					Pass	
FCC Requirement: Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.						
Test Specification : ANSI C63.10 – 2013 Test date : 18.11.2022 Mode of operation : BT mode Port of testing : Temporary antenna port Supply voltage : AC 120V/60Hz Temperature : 23°C Humidity : 50%						
Results: For test protocols please refer to Appendix 1. Marginal pass result is marked with Pass*						
Worst case Operation Mode: Charging + BT linked						
Line						
Frequency range (MHz)	Frequency (MHz)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark	Verdict
0.15 - 30	0.172	40.90	54.39	-13.49	Average	Pass
	0.172	57.10	64.86	-7.76	QP	Pass
	0.237	31.60	52.20	-20.60	Average	Pass
	0.237	45.30	62.20	-16.90	QP	Pass
	2.756	23.60	46.00	-22.40	Average	Pass
	2.756	24.20	56.00	-31.80	QP	Pass
Neutral						
Frequency range (MHz)	Spurious Frequency (MHz)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark	Verdict
0.15 - 30	0.550	44.90	46.00	-1.10	Average	Pass*
	0.550	51.70	56.00	-4.30	QP	Pass*
	0.274	28.80	51.00	-22.20	Average	Pass
	0.274	41.70	61.00	-19.30	QP	Pass
	0.394	32.50	47.98	-15.48	Average	Pass
	0.394	40.20	57.98	-17.78	QP	Pass

FCC 15.247 (a)(2) – 6dB Bandwidth Measurement			Pass
FCC Requirement: Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500kHz.			
Test Specification : ANSI C63.10 – 2013 Test date : 22.11.2022 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 5VDC Temperature : 23°C Humidity : 50%			
Results: For test protocols please refer to Appendix 1			
Channel frequency (MHz)	6 dB left (MHz)	6 dB right (MHz)	6dB bandwidth (kHz)
2402	2401.745	2402.553	808.0
2440	2439.769	2440.572	803.0
2480	2479.728	2480.542	814.0

FCC 15.247(b)(3) – Maximum Peak Conducted Output Power			Pass
FCC Requirement: For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt (30dBm)			
Test Specification : ANSI C63.10 – 2013 Test date : 22.11.2022 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 5VDC Temperature : 23°C Humidity : 50%			
Results: For test protocols please refer to Appendix 1			
Frequency (MHz)	Measured Output Power (dBm)	Limit (W/dBm)	Verdict
2402	-7.09	1/30	Pass
2440	-5.69	1/30	Pass
2480	-6.29	1/30	Pass

FCC 15.247(e) – Power Spectral Density			Pass
FCC Requirement: For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.			
Test Specification : ANSI C63.10 – 2013 Test date : 22.11.2022 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 5VDC Temperature : 23°C Humidity : 50%			
Results: For test protocols please refer to Appendix 1.			
Operating frequency (MHz)	Power density (dBm)	Limit (dBm)	Verdict
2402	-11.04	8	Pass
2440	-8.17	8	Pass
2480	-9.29	8	Pass

FCC 15.247(d) – Spurious Conducted Emissions					Pass
Test Specification : ANSI C63.10 – 2013 Test date : 22.11.2022 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 5VDC Temperature : 23°C Humidity : 50%					
FCC Requirement: 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.					
Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Only the worst cases is shown below. For test protocols refer to Appendix 1					
Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	5965	-53.6	-11.04	-42.56	Pass
2440	6833	-53.8	-8.17	-45.63	Pass
2480	6905	-54.4	-9.29	-45.11	Pass

FCC 15.205 – Radiated Emissions in Restricted Frequency Bands		Pass
Test Specification : ANSI C63.10 – 2013 Test Date : 17.11.2022 Mode of operation : Tx mode Port of testing : Enclosure Frequency range : 9kHz – 25GHz Supply voltage : 5VDC Temperature : 23°C Humidity : 50%		
FCC Requirement: In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission general limits.		
Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.		
Mode: 2402MHz TX Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2400.000	53.6	74.0 / PK
2400.000	43.2	54.0 / AV
4804.262	49.2	74.0 / PK
4804.262	41.5	54.0 / AV
7206.394	59.2	74.0 / PK
7206.394	49.8	54.0 / AV
Mode: 2402 MHz TX Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2400.000	60.5	74.0 / PK
2400.000	49.9	54.0 / AV
4804.253	55.9	74.0 / PK
4804.253	49.8	54.0 / AV
7207.381	54.3	74.0 / PK
7207.381	45.3	54.0 / AV
Mode: 2440 MHz TX Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4884.246	48.8	74.0 / PK
4884.246	41.6	54.0 / AV
7321.371	60.0	74.0 / PK
7321.371	50.6	54.0 / AV

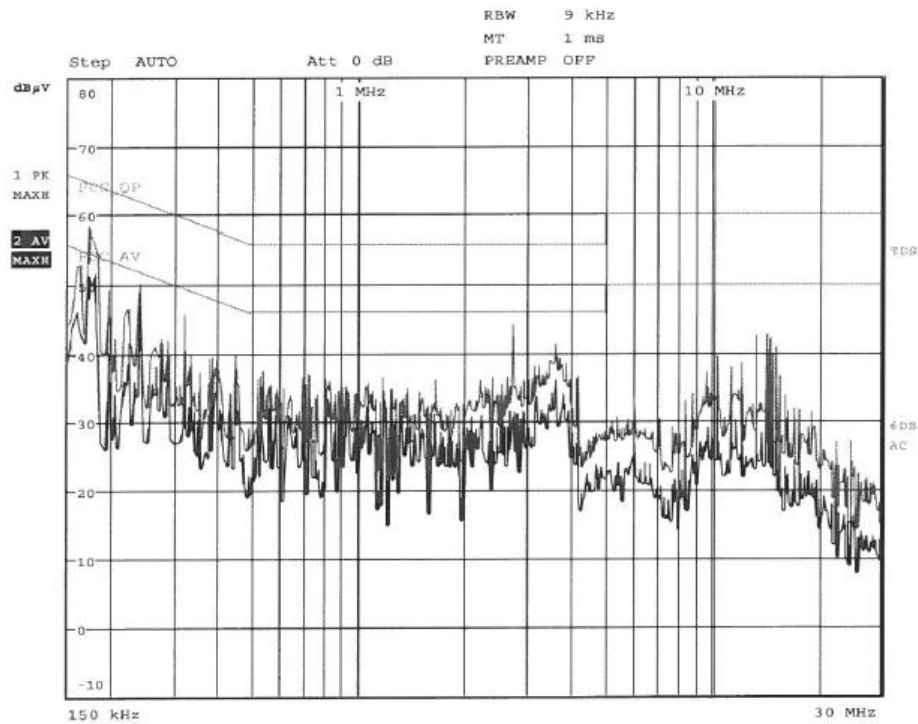
Mode: 2440 MHz TX			Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4880.253	55.8	74.0 / PK	4880.253	49.5	54.0 / AV
7321.381	56.6	74.0 / PK	7321.381	47.3	54.0 / AV
Mode: 2480 MHz TX			Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
113.610	23.2	43.5 /QP	2483.500	40.9	74.0 / PK
2483.500	24.6	54.0 / AV	4960.256	48.1	74.0 / PK
4960.256	40.3	54.0 / AV	7441.378	58.3	74.0 / PK
7441.378	49.7	54.0 / AV	7441.378	49.7	54.0 / AV
Mode: 2480 MHz TX			Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	51.6	74.0 / PK	2483.500	34.0	54.0 / AV
4960.269	53.6	74.0 / PK	4960.269	47.3	54.0 / AV
7441.381	56.0	74.0 / PK	7441.381	47.3	54.0 / AV

Appendix 1

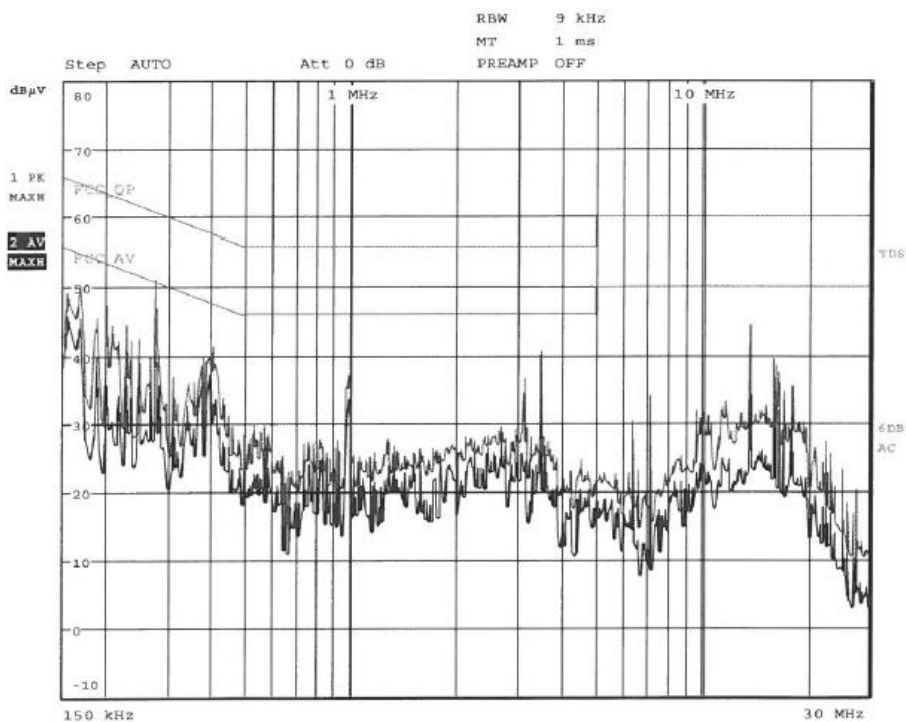
Test Results

Conducted Emission on AC Mains

Live

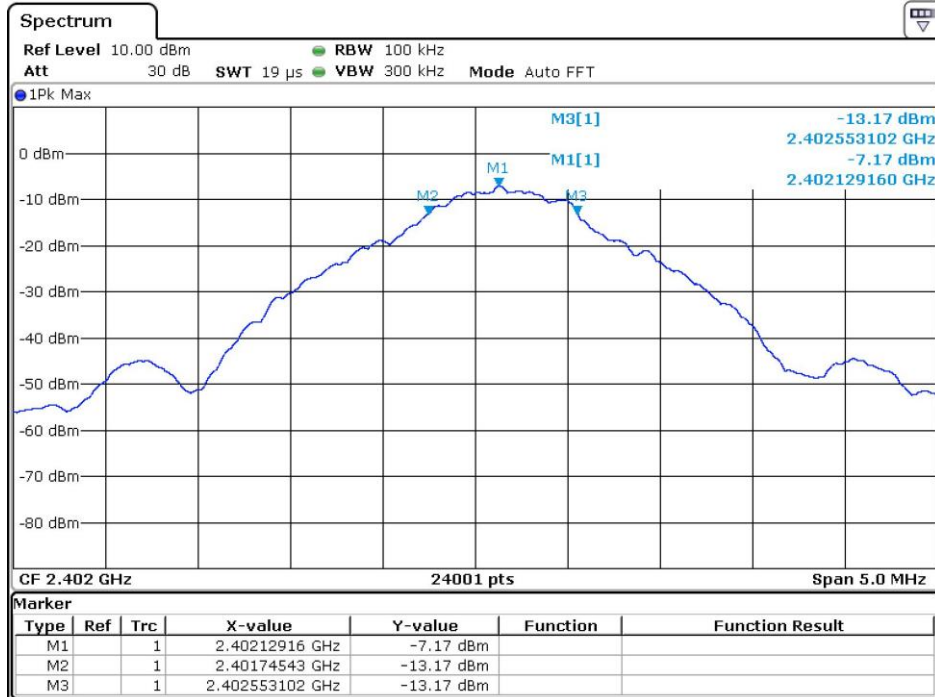


Neutral



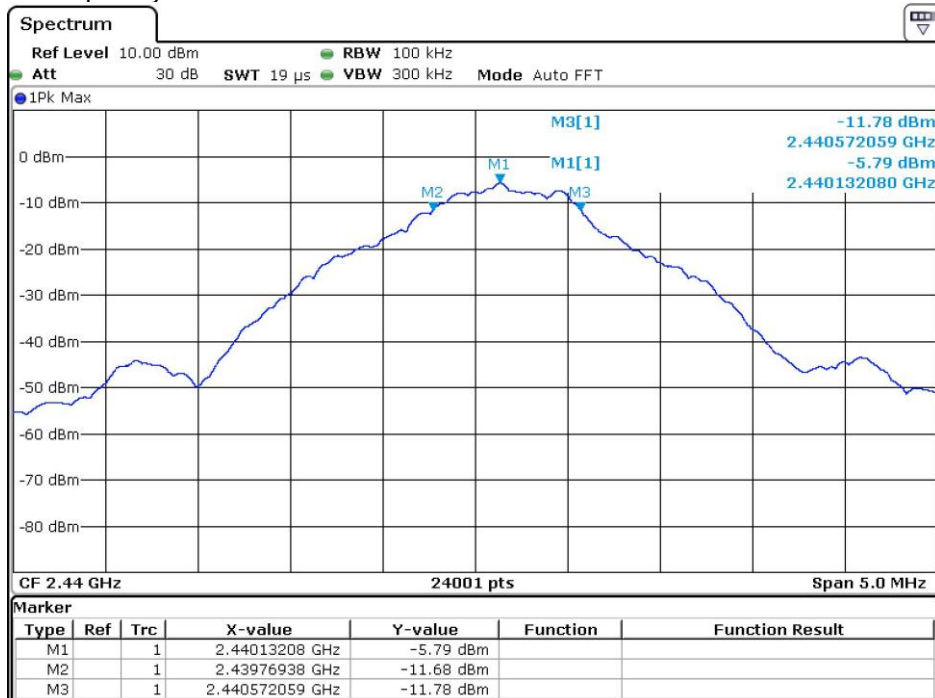
6 dB Bandwidth Measurement

TX frequency: 2402MHz



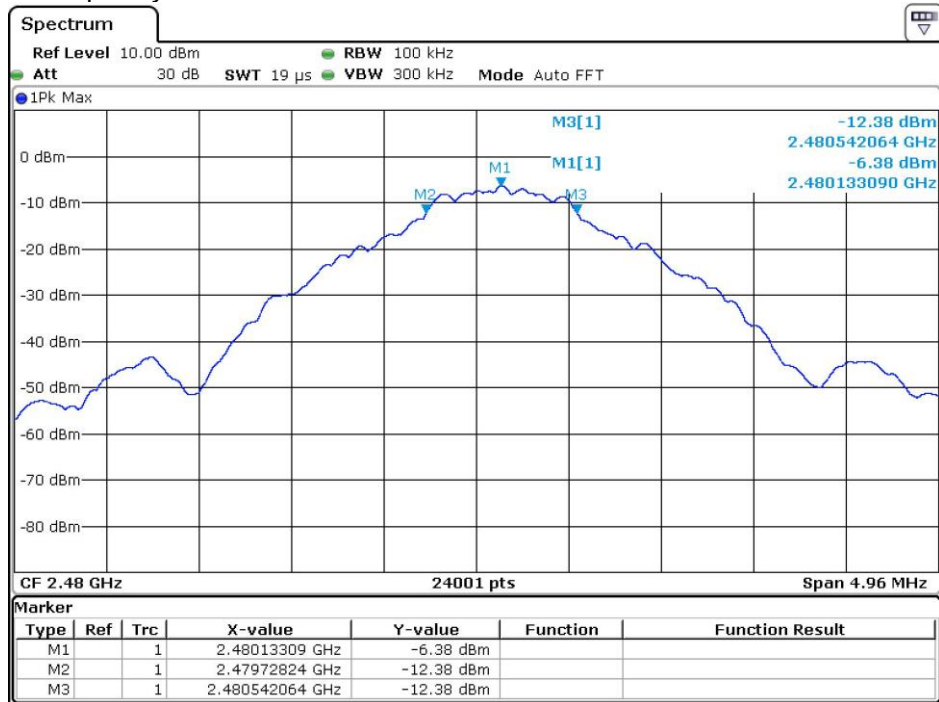
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TX frequency: 2440MHz



Date: 22.NOV.2022 16:23:46

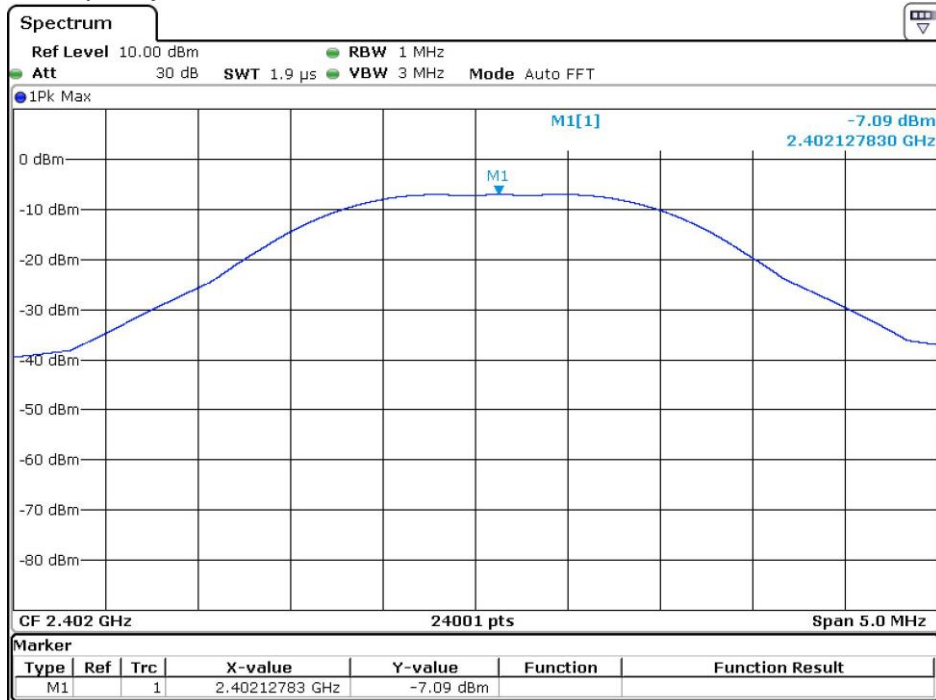
TX frequency: 2480MHz



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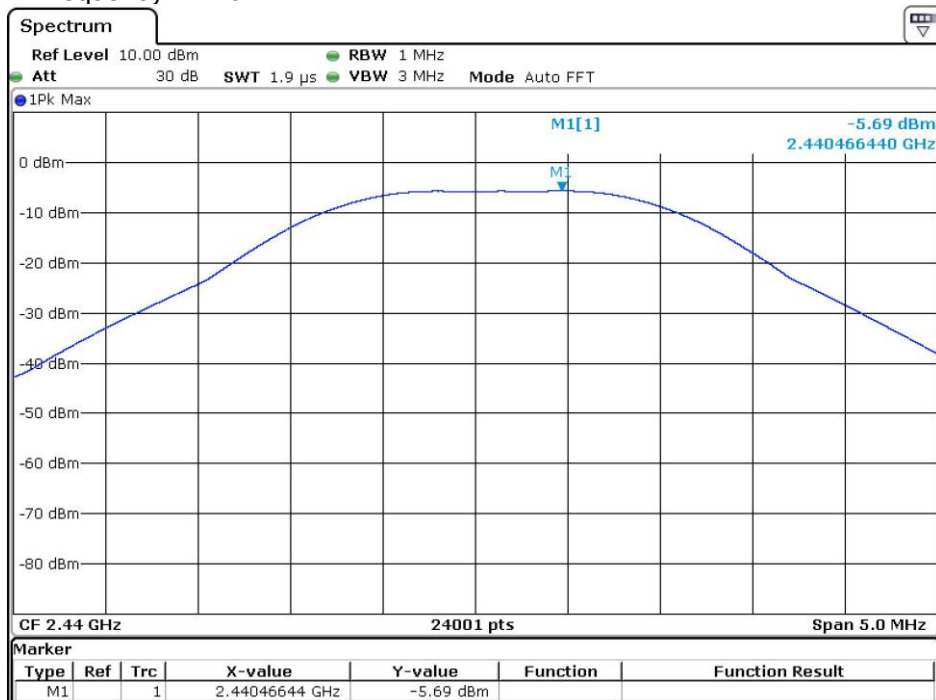
Maximum Peak Conducted Output power

TX frequency: 2402MHz



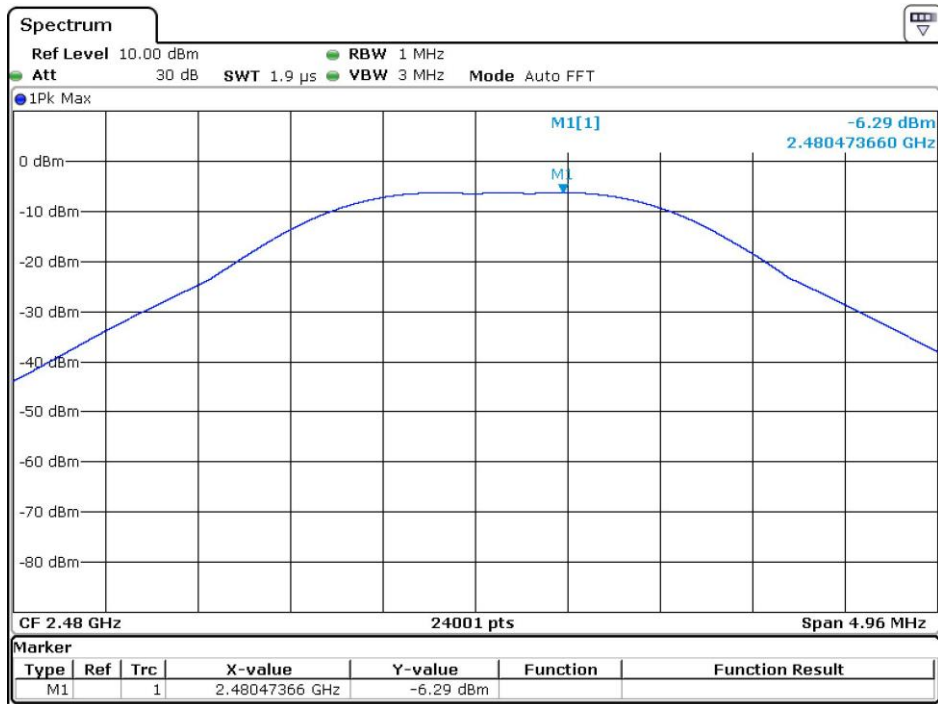
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TX frequency: 2440MHz



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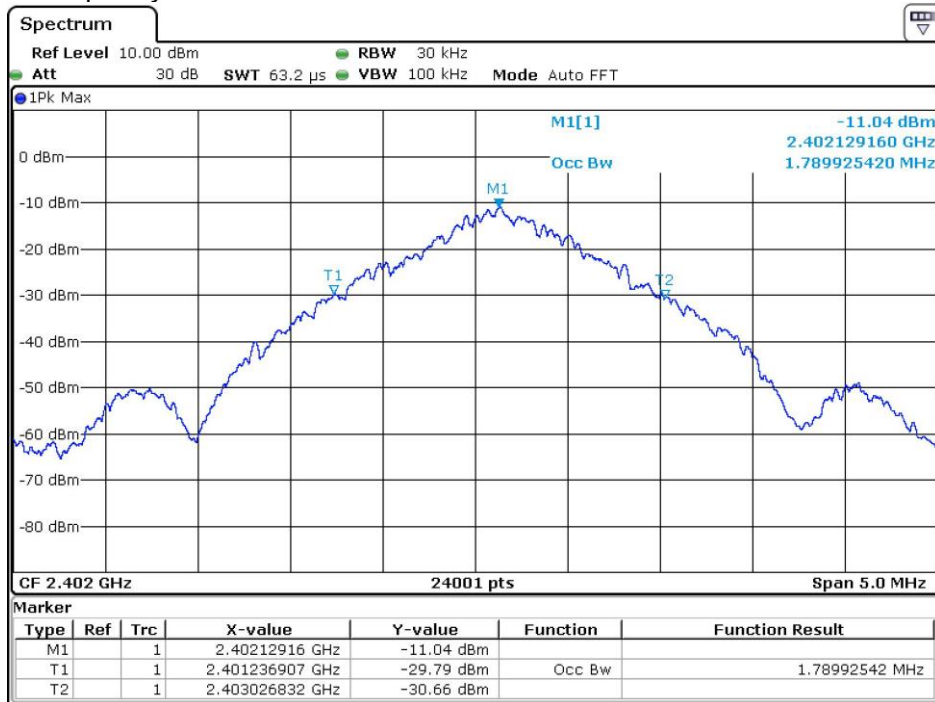
TX frequency: 2480MHz



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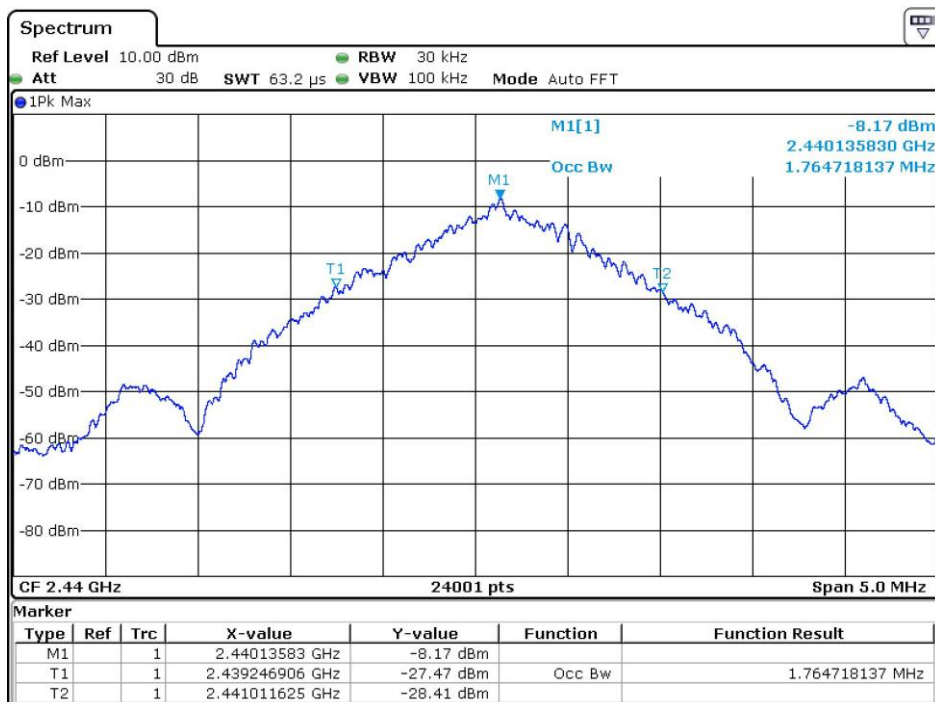
Power Spectral Density

TX frequency: 2402MHz



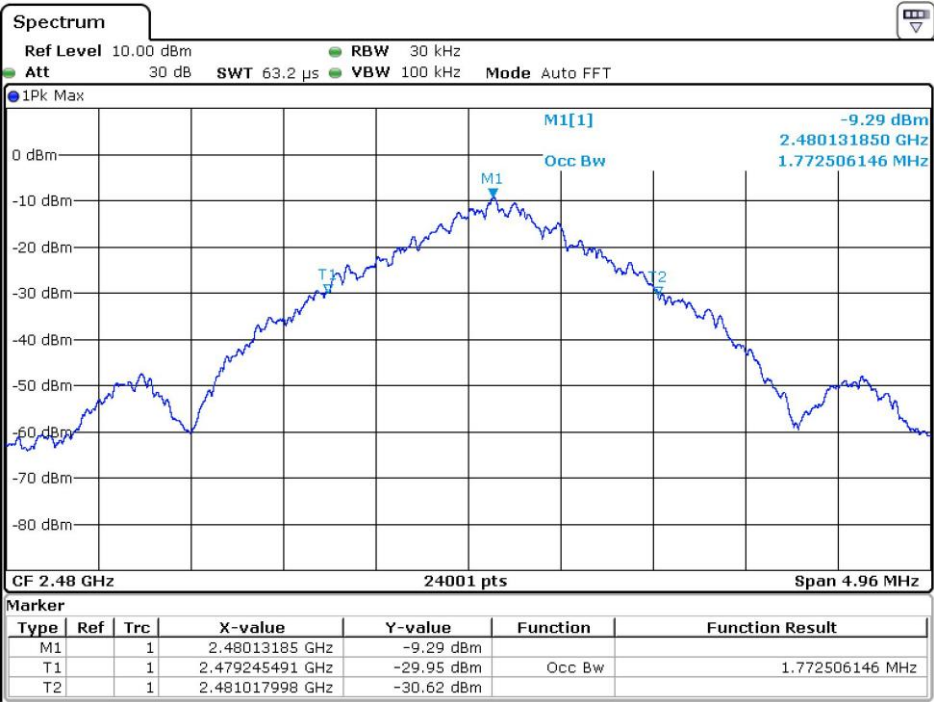
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TX frequency: 2440MHz



Date: 22.NOV.2022 16:26:54

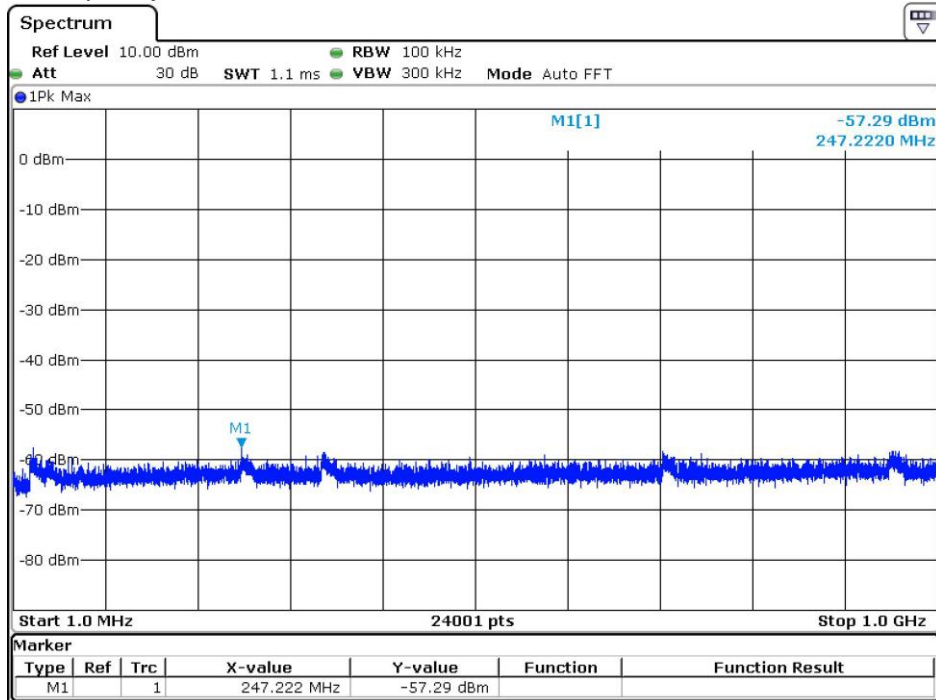
TX frequency: 2480MHz



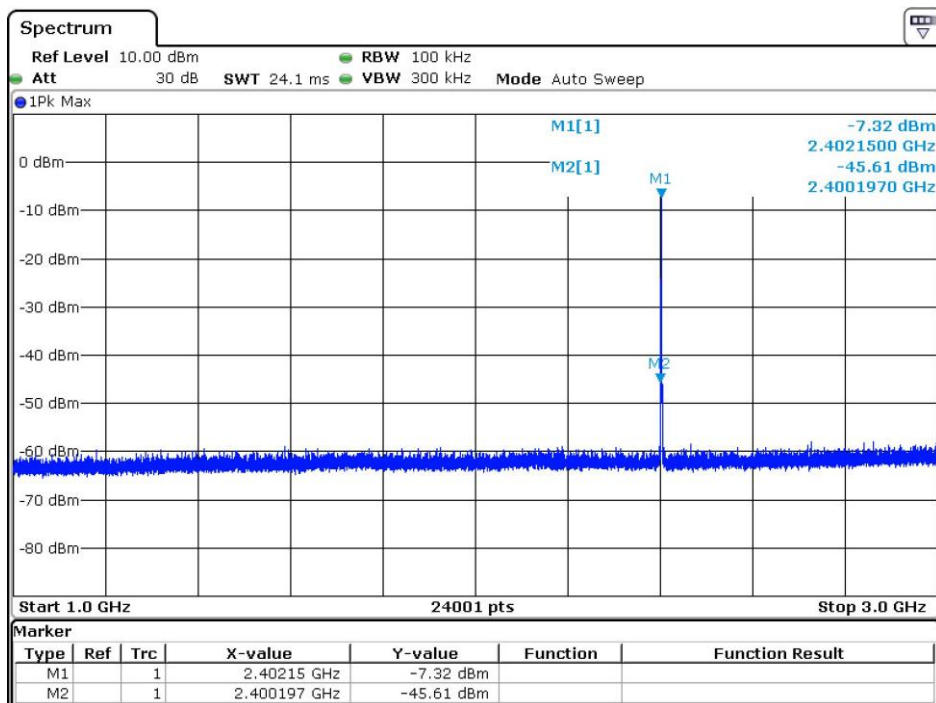
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Spurious Conducted Emissions

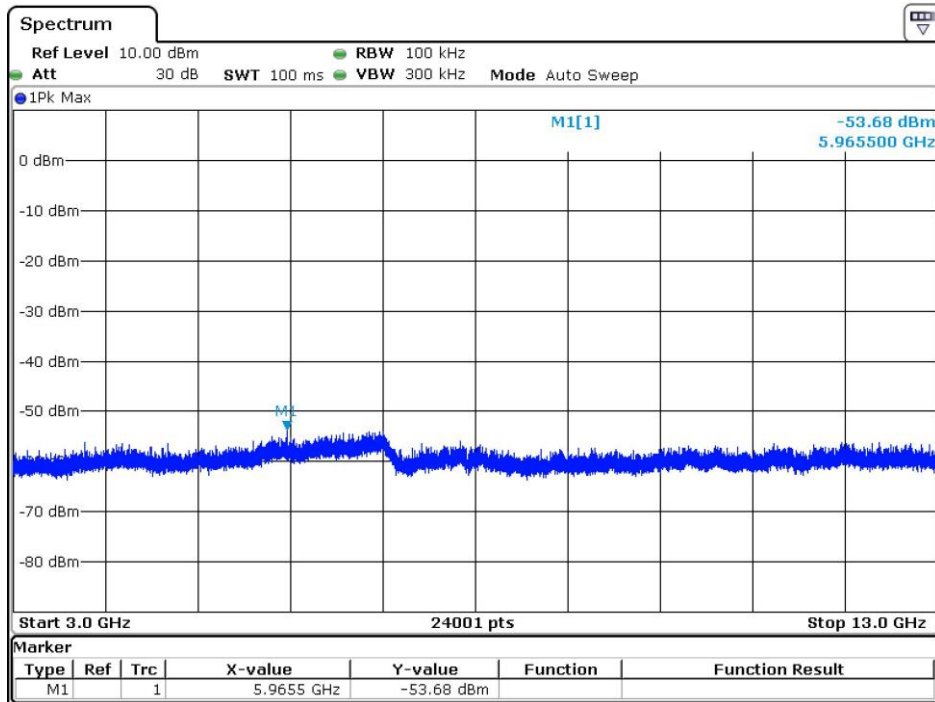
TX frequency: 2402MHz



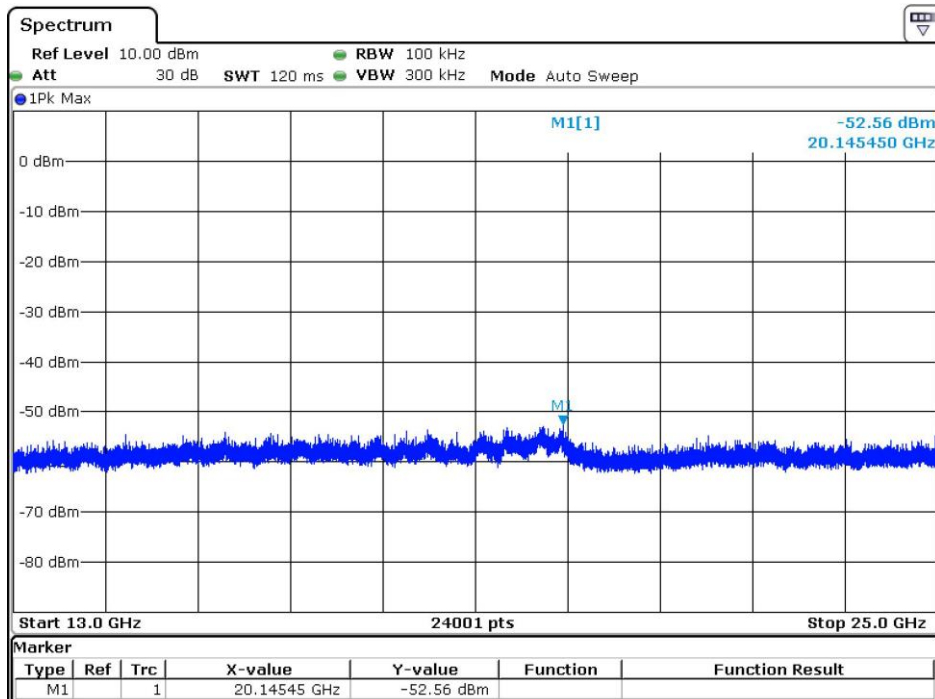
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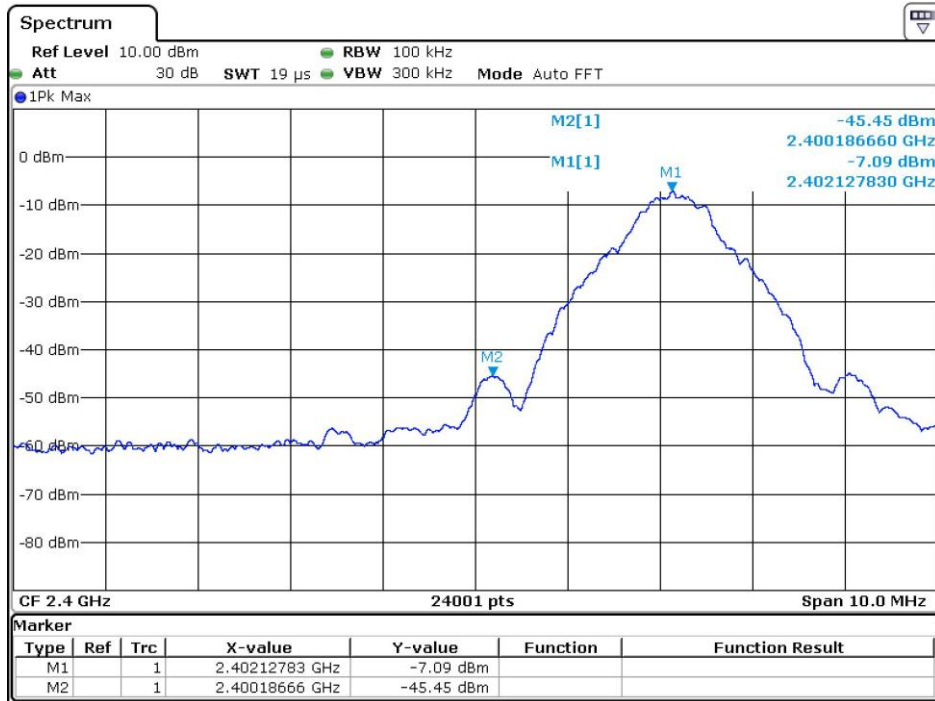
Date: 22.NOV.2022 16:18:09



Date: 22.NOV.2022 16:19:14

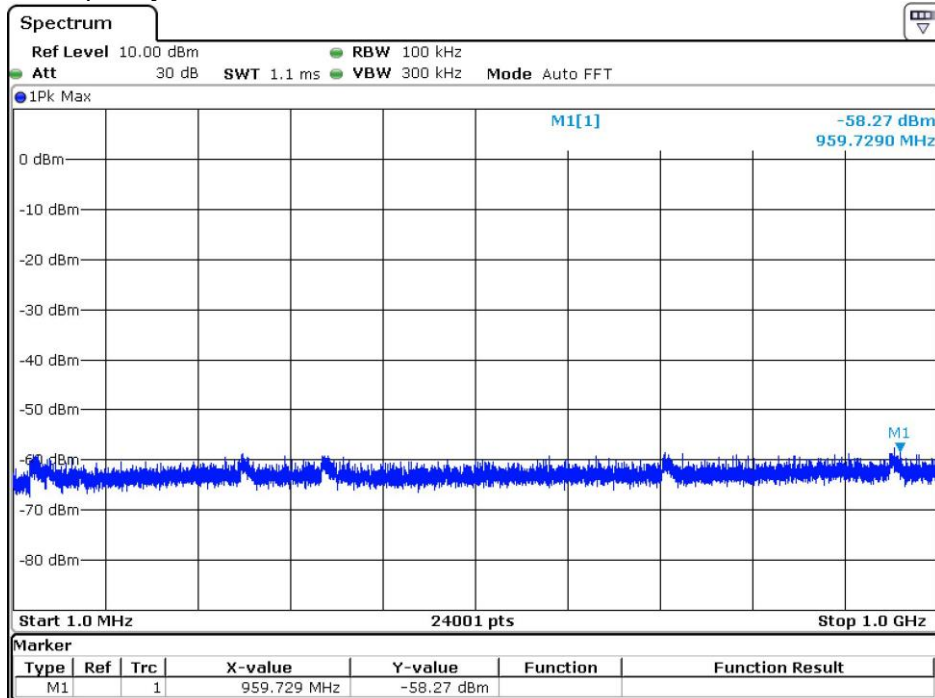


Date: 22.NOV.2022 16:19:42

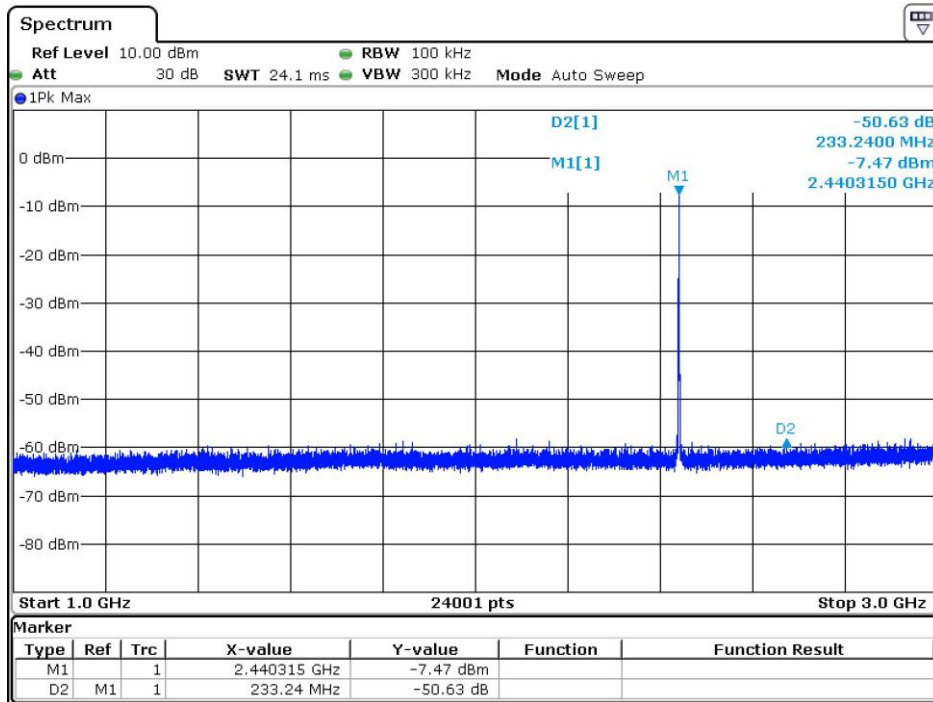


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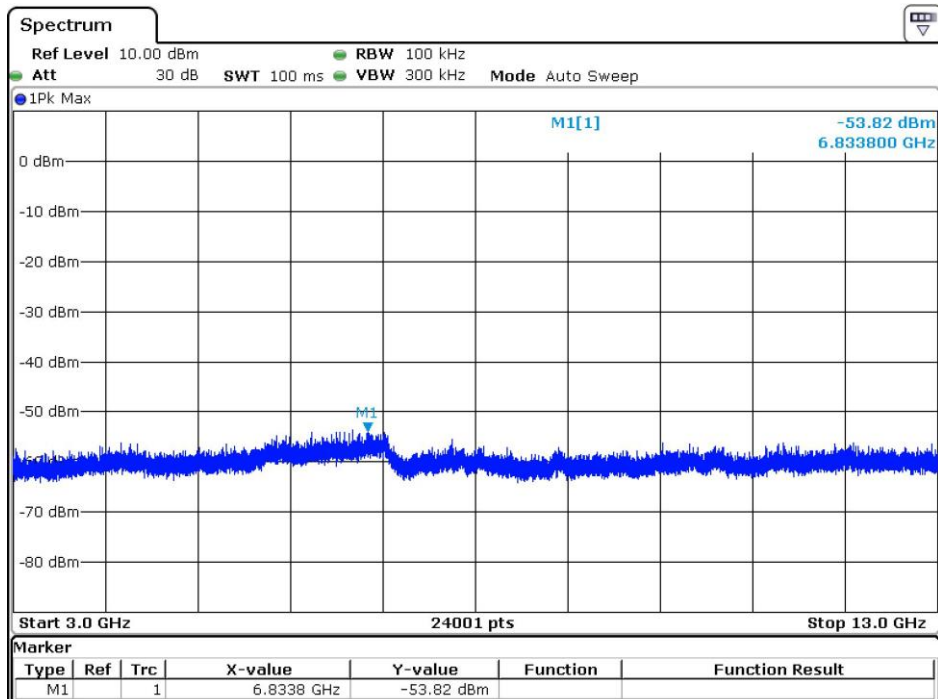
TX frequency: 2440MHz



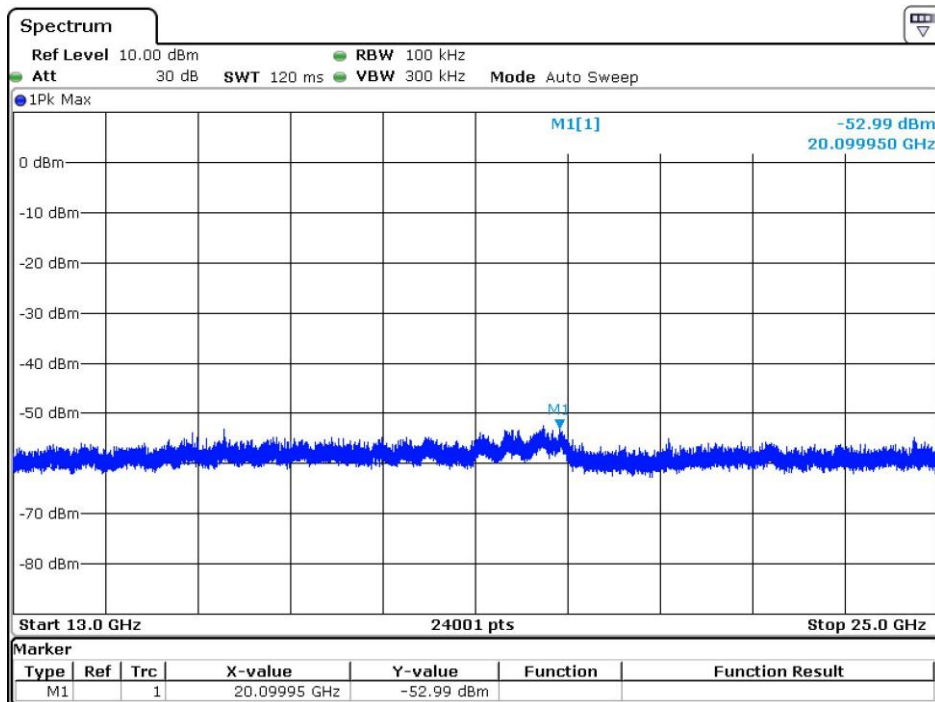
Date: 22.NOV.2022 16:24:26



Date: 22.NOV.2022 16:25:02

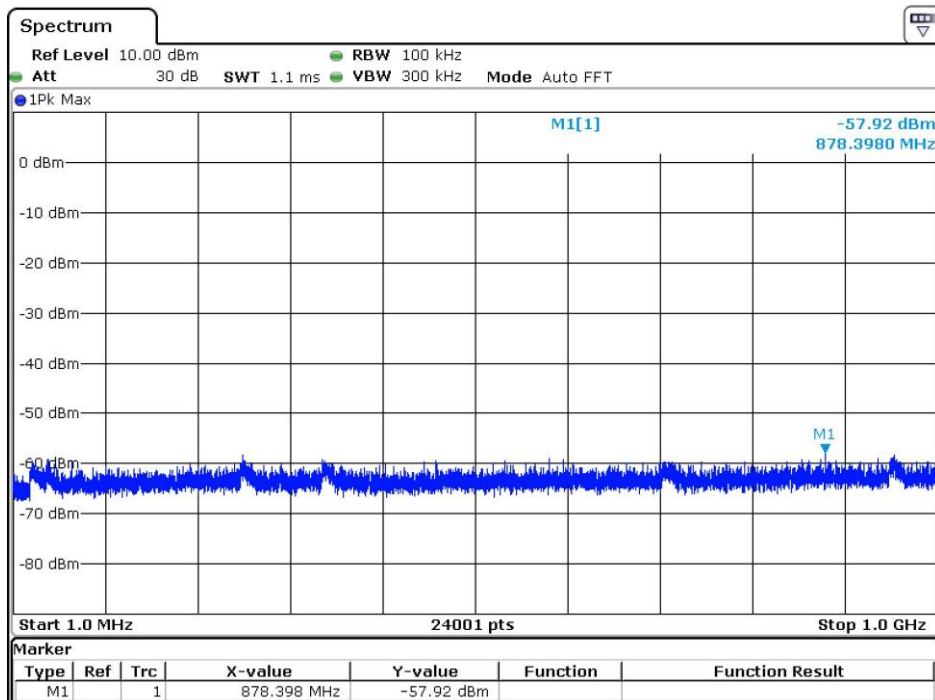


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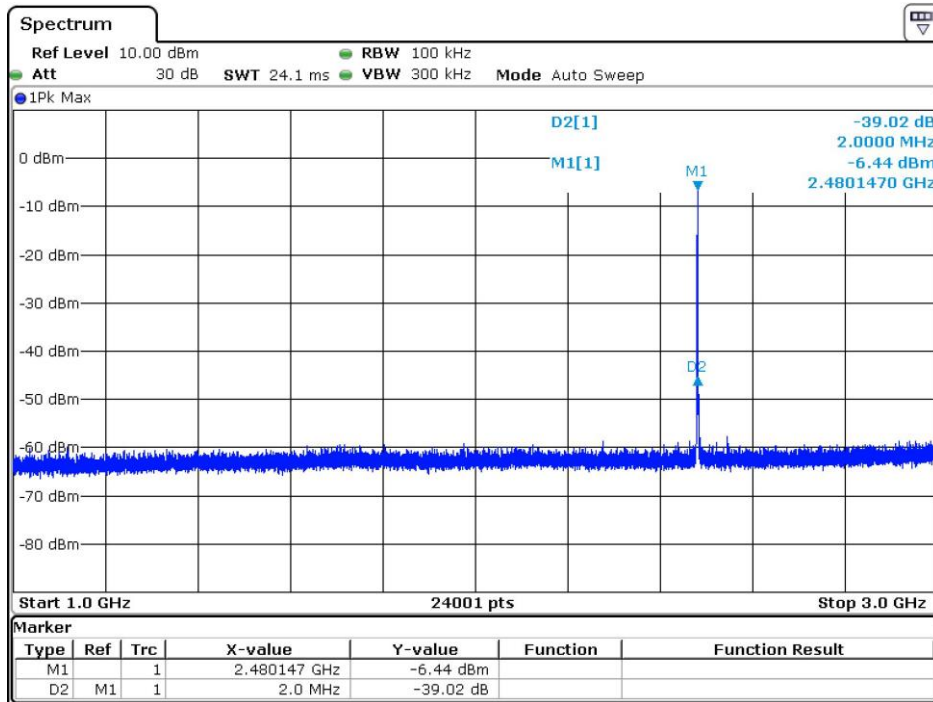


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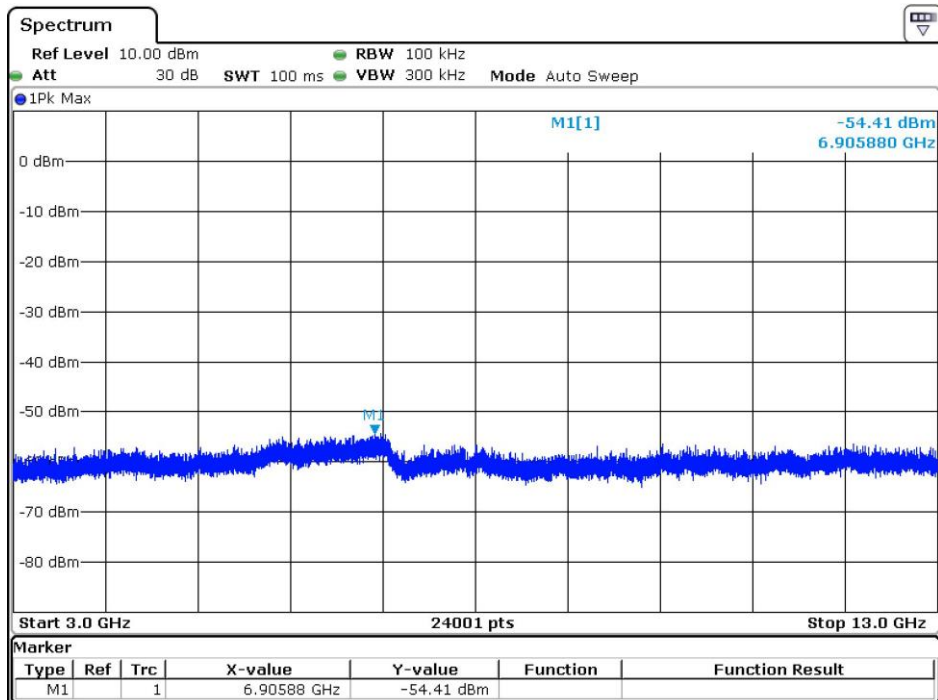
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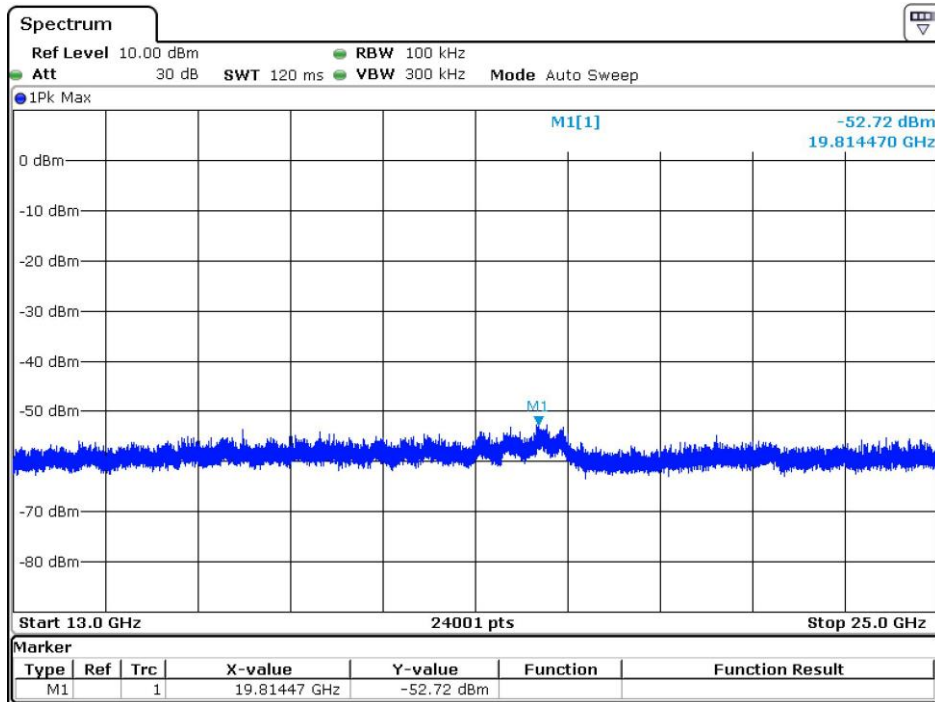
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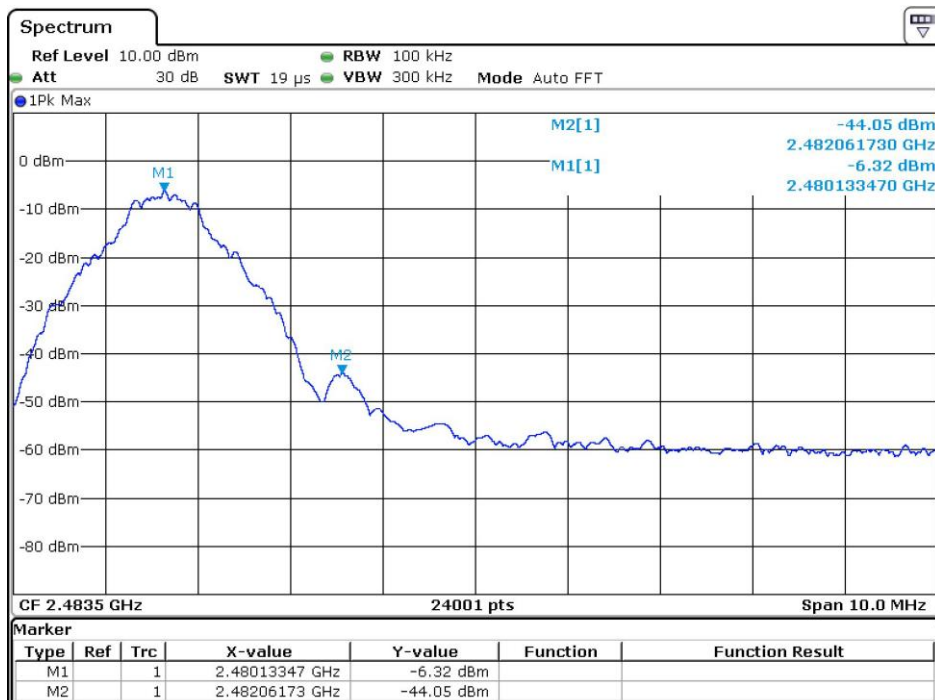
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Date: 22.NOV.2022 16:30:42



Date: 22.NOV.2022 16:31:03



Date: 22.NOV.2022 16:31:54