

Prüfbericht-Nr.: Test Report No.:	CN238Q6R 001	Auftrags-Nr.: Order No.:	158267138	Seite 1 von 16 Page 1 of 16	
Kunden-Referenz-Nr.: Client Reference No.:	N/A	Auftragsdatum: Order date:	24.02.2023		
Auftraggeber: Client:	Geobra Brandstaetter Stiftung & Co-KG Brandstaetterstr.2-10 -90513 Zirndorf – Germany				
Prüfgegenstand: Test item:	RC Toy with Bluetooth Transceiver				
Bezeichnung / Typ-Nr.: Identification / Type No.:	Bluetooth RC Module Set #71397 (Controller) Brand : PLAYMOBIL				
Auftrags-Inhalt: Order content:	FCC and ISED Certification				
Prüfgrundlage: Test specification:	FCC Part 15 Subpart C; ANSI C63.10-2013 RSS-247 Issue 2; RSS-Gen Issue 5				
Wareneingangsdatum: Date of receipt:	29.03.2023				
Prüfmuster-Nr.: Test sample No.:	A003436743-001				
Prüfzeitraum: Testing period:	31.03.2023 - 03.04.2023				
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:			
					
28.08.2023 Eddy Tsang / Engineer		28.08.2023 Sharon Li / Senior Manager			
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position	Unterschrift Signature
Sonstiges / Other : FCC ID : N2T30659155 IC : 9285A-30659155 HVIN : 71397TX “Decision Rule” document announced in our website (https://www.tuv.com/landingpage/en/gm-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 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable 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

Bluetooth Radio	Transceiver
Operating frequency range	2402 - 2480 MHz
Type of modulation	GFSK
Number of channels	40
Channel separation	2 MHz
Type of antenna	Internal Wire
Antenna gain (dBi)	2.54 dBi
Power level	fix
General	
Type of equipment	Stand-alone Radio Device
Connection to public utility power line	No
Nominal voltage	9.0 VDC
Independent Operation Modes	Transceiver

Product function and intended use

The equipment under test (EUT) is a toy product with Bluetooth low energy radio and 2.4GHz GFSK radio.

FCC ID : N2T30659155

IC : 9285A-30659155 HVIN : 71397TX

Models	Product description
Bluetooth RC Module Set #71397 (Controller)	RC Toy with Bluetooth Transceiver

Submitted documents

Circuit Diagram
Block Diagram
Technical Description
User manual
Label

Independent Operation Modes

The basic operation modes are:

- Transceiver mode.

For further information refer to User Manual

Related Submittal(s) Grants

- This is a single application for certification of the Transceiver Module.

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

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.

- During test, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power is fixed.

Special Accessories and Auxiliary Equipment

- Nil

Countermeasures to achieve EMC Compliance

- Nil

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:

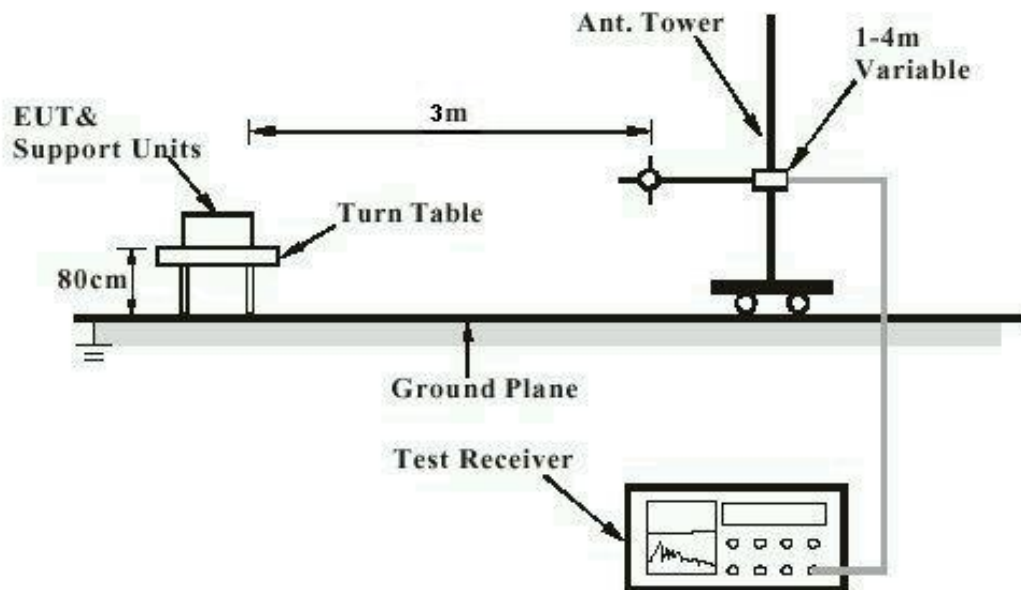
$$FS = R + AF + CF + FA - PA$$

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)

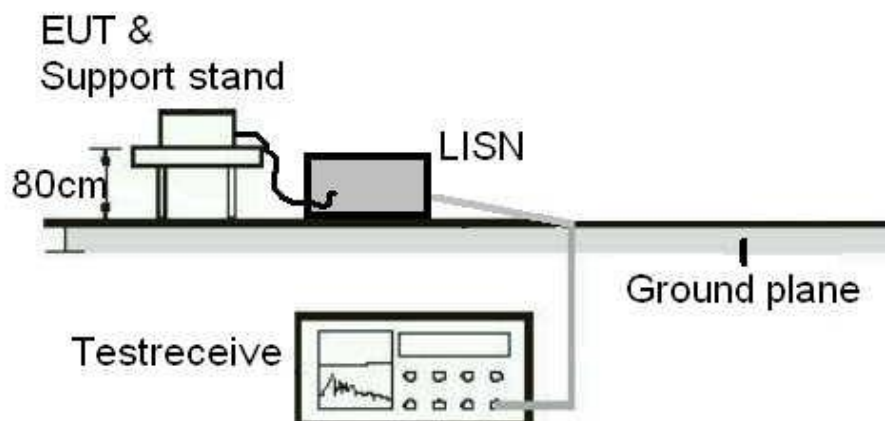
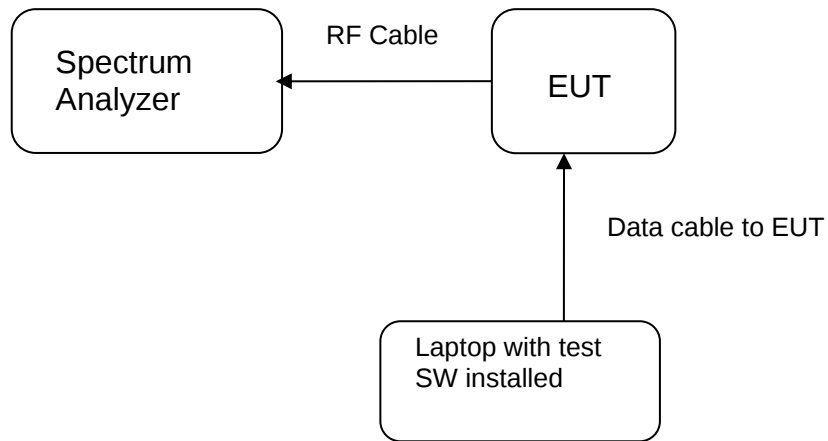


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)

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

Hong Kong Productivity Council

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	3-Mar-23	3-Mar-24
Multi-functional Anechoic Chamber	Albatross	Nil	4-Jan-23	4-Jan-24
Test Receiver	R & S	ESU40	9-Mar-23	9-Mar-24
Active Loop Antenna	EMCO	6502	3-Nov-22	3-Nov-24
Bi-conical Antenna	R & S	HK116	24-Oct-22	24-Oct-24
Log Periodic Antenna	R & S	HL223	25-Oct-22	25-Oct-24
Standard Gain Horn	ETS-Lindgren	3160-07	25-Nov-22	25-Nov-24
Standard Gain Horn	ETS-Lindgren	3160-08	25-Nov-22	25-Nov-24
Standard Gain Horn	ETS-Lindgren	3160-10	30-Nov-22	30-Nov-24
Double-Ridged Waveguide Horn	EMCO	3116	30-Nov-22	30-Nov-24
Double-Ridged Waveguide Horn	EMCO	3117	21-Nov-22	21-Nov-24
Coaxial cable	Harbour	SF118/11n/11n/12000.0	3-Aug-22	3-Aug-24
High Frequency Cable	Pasternack	PE3VNA4001-3M	29-Jan-23	29-Jan-25
Microwave amplifier 0.5-26.5GHz, 25dB gain	COM-POWER Corporation	PAM-118A	4-Mar-23	4-Mar-24
Preamplifier 18GHz to 40GHz with cable (EMC656)	A.H. Systems, Inc.	PAM-1840VH	28-Jan-23	28-Jan-24
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	30-Oct-21	30-Oct-23

TÜV Rheinland Hong Kong Ltd.

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSP30	31 Jan 23	31 Jan 24

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is $\pm 2.42\text{dB}$.

The estimated combined standard uncertainty for radiated emissions measurements is $\pm 4.81\text{dB}$ (9kHz to 30MHz) and $\pm 4.62\text{dB}$ (30MHz to 200MHz) and $\pm 5.67\text{dB}$ (200MHz to 1000MHz) and is $\pm 5.07\text{dB}$ (1GHz to 8.2GHz) and $\pm 4.58\text{dB}$ (8.2GHz to 12.4GHz) and $\pm 4.78\text{dB}$ (12.4GHz to 18GHz)

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 / RSS-247 Issue 2

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: Internal Wire b) Manufacturer and model no: N/A c) Peak Gain: 2.54 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	
RSS-Gen 6.3 – External Control		Pass
IC Requirement:	The device shall not have any external controls accessible to the user that enable it to be adjusted, selected or programmed to operate in violation of the limits prescribed in the applicable RSS.	
Results:	The device does not have any transmitter external controls accessible to the user that can be adjusted and operated in violation of the limits of this standard.	
Verdict:	Pass	
RSS-Gen 8.3 – Antenna Requirement		Pass
IC Requirement:	When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer.	
Results:	a) Antenna type: Internal Wire b) Manufacturer: N/A c) model no: N/A d) Gain with reference to an isotropic radiator: 2.54 dBi	
Verdict:	Pass	
FCC 15.207/ RSS-Gen 8.8 – Conducted Emission on AC Mains		N/A
There is no AC power input or output ports on the EUT.		

FCC 15.247 (a)(2) / RSS-247 5.2 – 6dB Bandwidth Measurement			Pass
FCC/ IC 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 : 31.03.2023 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 3.0 VDC Temperature : 23°C Humidity : 65%			
Results: For test protocols please refer to Appendix 1			
Channel Frequency (MHz)	6 dB left (MHz)	6 dB right (MHz)	6dB bandwidth (kHz)
2402	2401.660	2402.330	670.0
2442	2441.670	2442.330	660.0
2480	2479.640	2480.340	700.0

RSS-Gen 6.6 – Occupied Bandwidth		Pass	
FCC/ IC Requirement: N/A			
Test Specification : RSS-Gen Test date : 31.03.2023 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 3.0 VDC Temperature : 23°C Humidity : 65%			
Results:		Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types. For test protocols refer to Appendix 1.	
Channel Frequency (MHz)	Left (MHz)	Right (MHz)	99% bandwidth (MHz)
2402	2401.460	2402.520	1.060
2442	2441.460	2442.520	1.060
2480	2479.460	2480.530	1.070

FCC 15.247(b)(3) / RSS-247 5.4 – Maximum Peak Conducted Output Power			Pass
FCC/ IC 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 : 31.03.2023 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 3.0 VDC Temperature : 23°C Humidity : 65%			
Results: For test protocols please refer to Appendix 1			
Frequency (MHz)	Measured Output Power (dBm) (mW)	Limit (dBm W)	Verdict
2402	-2.22 0.600	30.0 1	Pass
2442	-1.88 0.649	30.0 1	Pass
2480	-1.85 0.653	30.0 1	Pass

FCC 15.247(e) / RSS-247 5.2 – Power Spectral Density			Pass
FCC/ IC 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 : 31.03.2023 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 3.0 VDC Temperature : 23°C Humidity : 65%			
Results: Peak power below 8dBm, PSD deem to pass. PSD level is equal to the measured output power.			

FCC 15.247(d) / RSS-247 5.5 – Spurious Conducted Emissions					Pass	
Test Specification : ANSI C63.10 – 2013 Test date : 31.03.2023 Mode of operation : Tx mode Supply voltage : 9.0 VDC Temperature : 23°C Humidity : 65%						
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 Reference value from 6dB Bandwidth measurement, appendix 1						
Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Limit (dBm)	Margin (dB)	Verdict
2402	No peak found	--	-2.76	-22.76	--	Pass
2442	No peak found	--	-2.41	-22.41	--	Pass
2480	No peak found	--	-2.80	-22.80	--	Pass

FCC 15.205 / RSS-Gen 8.9 – Radiated Emissions in Restricted Frequency Bands			Pass
Test Specification : ANSI C63.10 – 2013 Test date : 03.04.2023 Mode of operation : Tx mode Frequency range : 9kHz – 10GHz Supply voltage : 9.0 VDC Temperature : 25.2°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: 2402 MHz TX		Vertical Polarization	
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2400.000	52.1	74.0 / PK	
2400.000	34.0	54.0 / AV	
4801.016	50.3	74.0 / PK	
4801.016	38.1	54.0 / AV	
9602.032	51.4	74.0 / PK	
9602.032	36.7	54.0 / AV	
Mode: 2402 MHz TX		Horizontal Polarization	
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2400.000	54.0	74.0 / PK	
2400.000	35.4	54.0 / AV	
9602.032	54.4	74.0 / PK	
9602.032	39.0	54.0 / AV	
Mode: 2442 MHz TX		Vertical Polarization	
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m	
4881.016	52.4	74.0 / PK	
4881.016	39.4	54.0 / AV	
9762.032	51.6	74.0 / PK	
9762.032	36.7	54.0 / AV	
Mode: 2442 MHz TX		Horizontal Polarization	
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m	
4881.019	51.3	74.0 / PK	
4881.019	38.0	54.0 / AV	
9762.038	54.9	74.0 / PK	
9762.038	39.3	54.0 / AV	

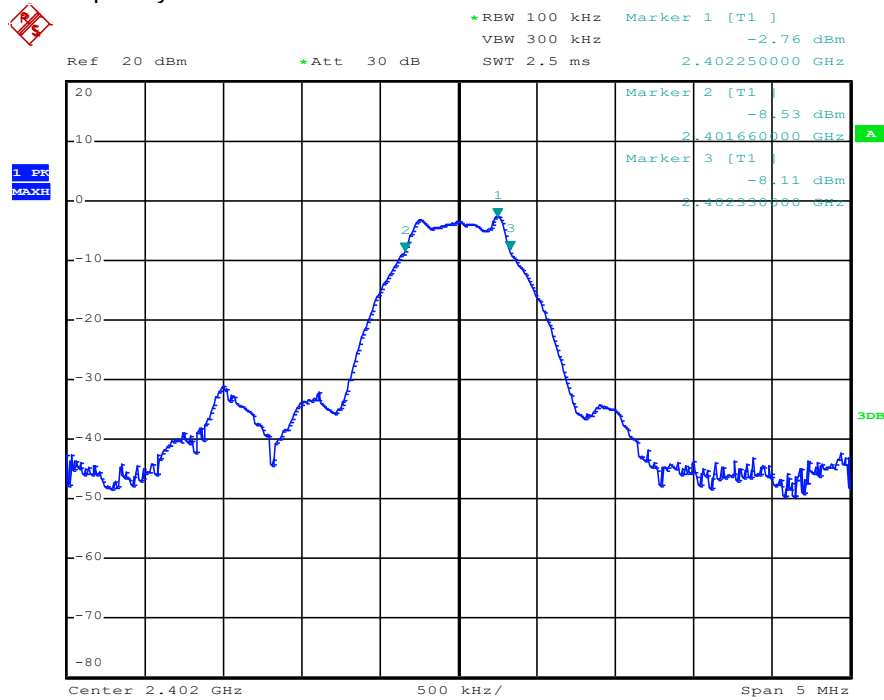
Mode: 2480 MHz TX			Vertical Polarization		
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m	Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	48.2	74.0 / PK	2483.500	26.7	54.0 / AV
4957.019	51.2	74.0 / PK	4957.019	38.2	54.0 / AV
9914.038	54.4	74.0 / PK	9914.038	39.4	54.0 / AV
9914.038	39.4	54.0 / AV			
Mode: 2480 MHz TX			Horizontal Polarization		
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m	Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	42.1	74.0 / PK	2483.500	26.2	54.0 / AV
4957.000	49.0	74.0 / PK	4957.000	36.3	54.0 / AV
9914.035	58.1	74.0 / PK	9914.035	42.2	54.0 / AV
9914.035	42.2	54.0 / AV			

Appendix 1

Test Protocol

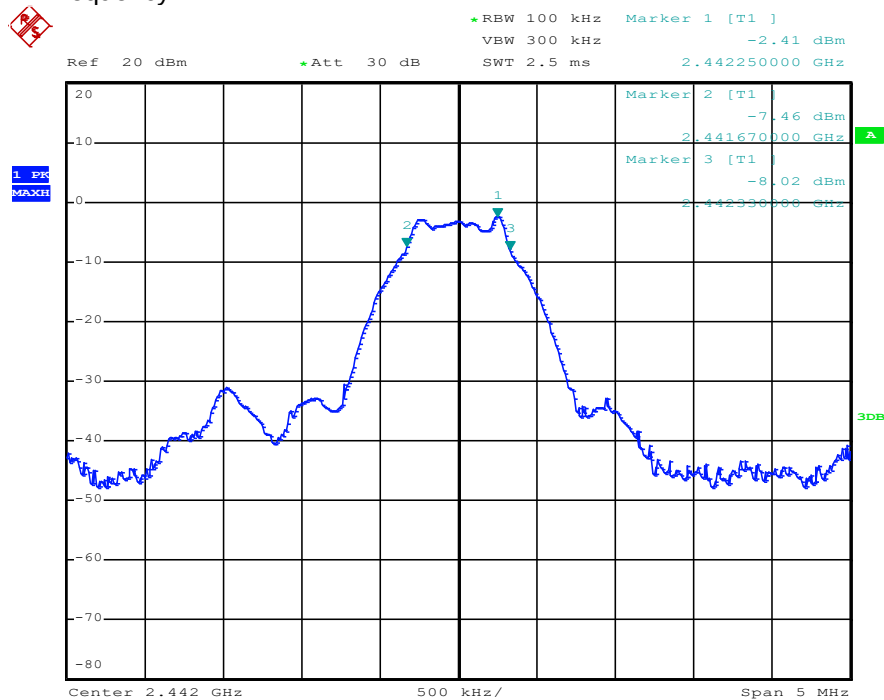
6 dB Bandwidth Measurement

TX Frequency 2402MHz



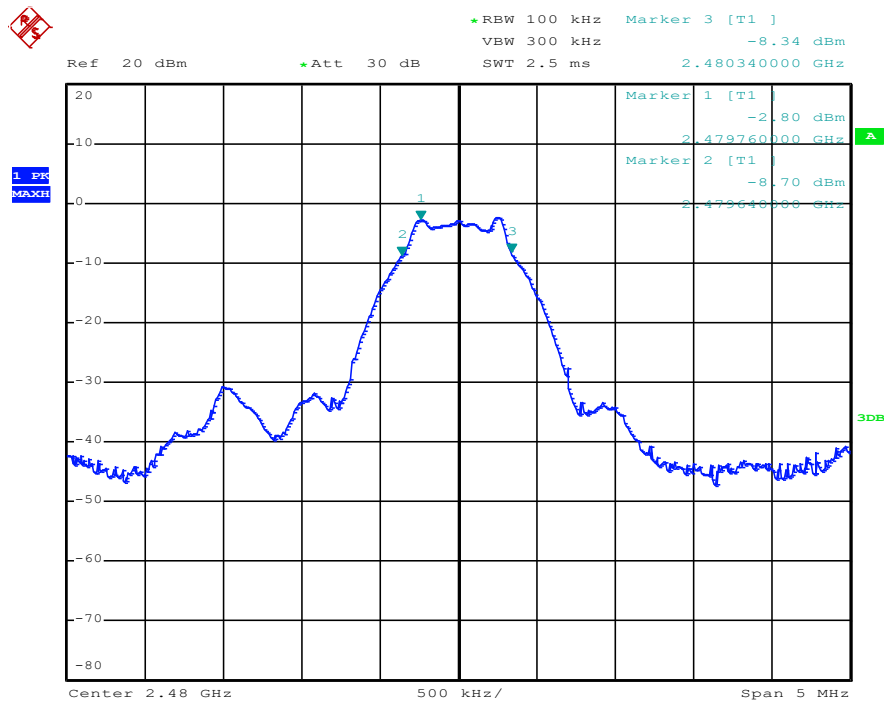
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TX Frequency : 2442MHz



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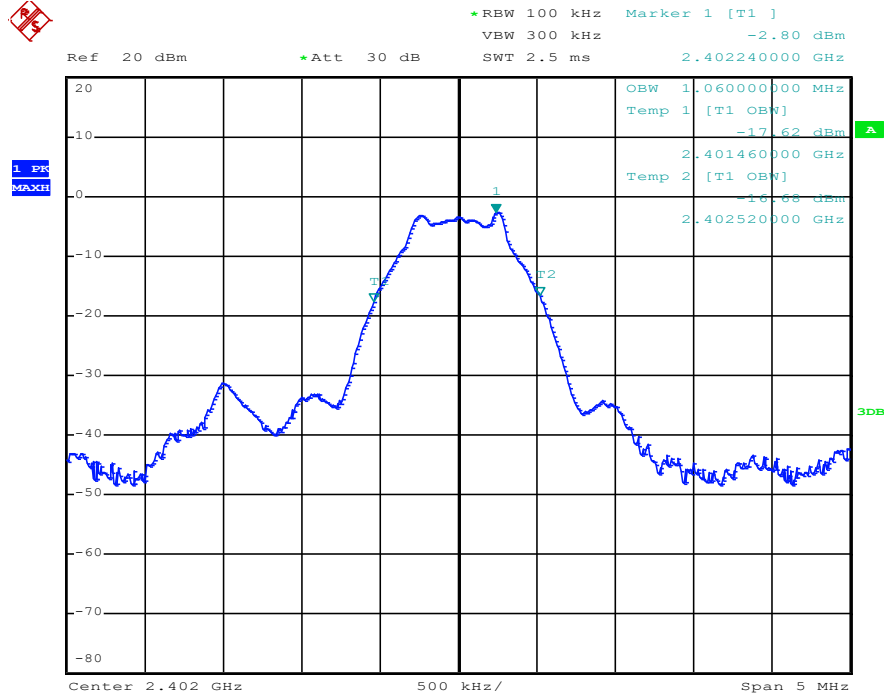
TX Frequency 2480MHz



Date: 31.MAR.2023 17:35:54

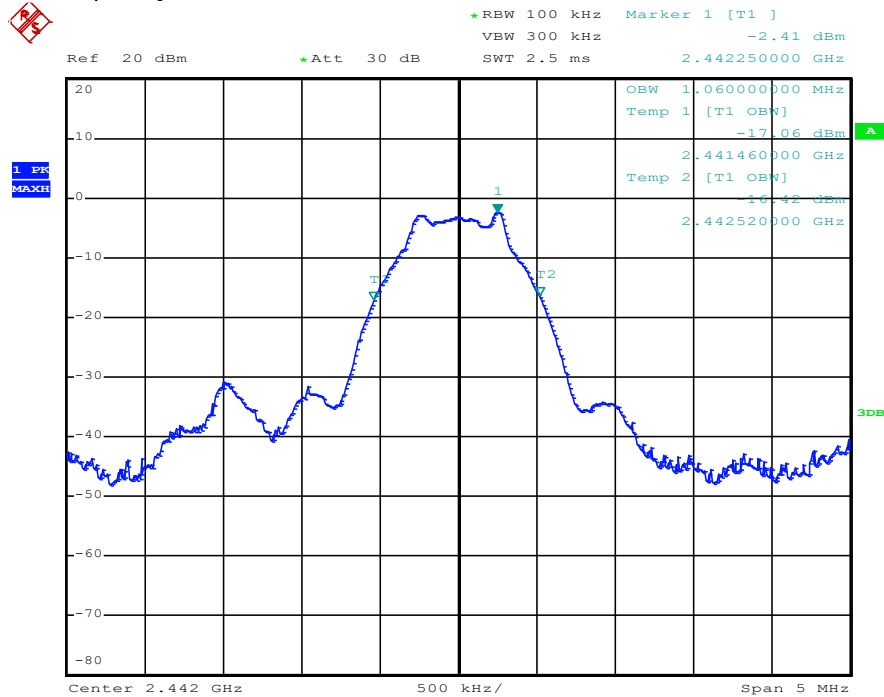
Occupied Bandwidth Measurement

TX Frequency 2402MHz



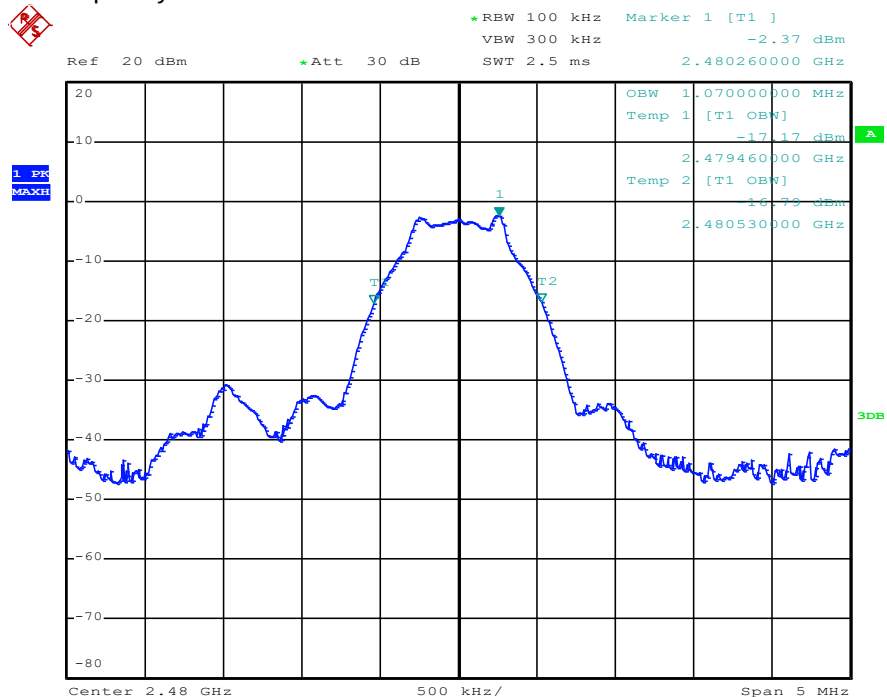
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TX Frequency : 2442MHz



Date: 31.MAR.2023 17:33:11

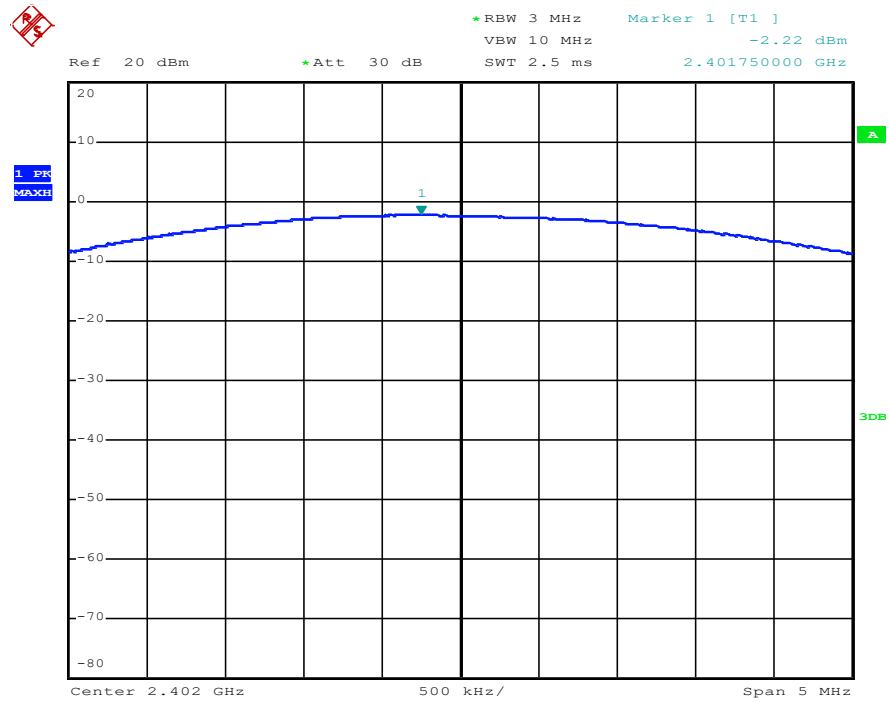
TX Frequency 2480MHz



Date: 31.MAR.2023 17:34:17

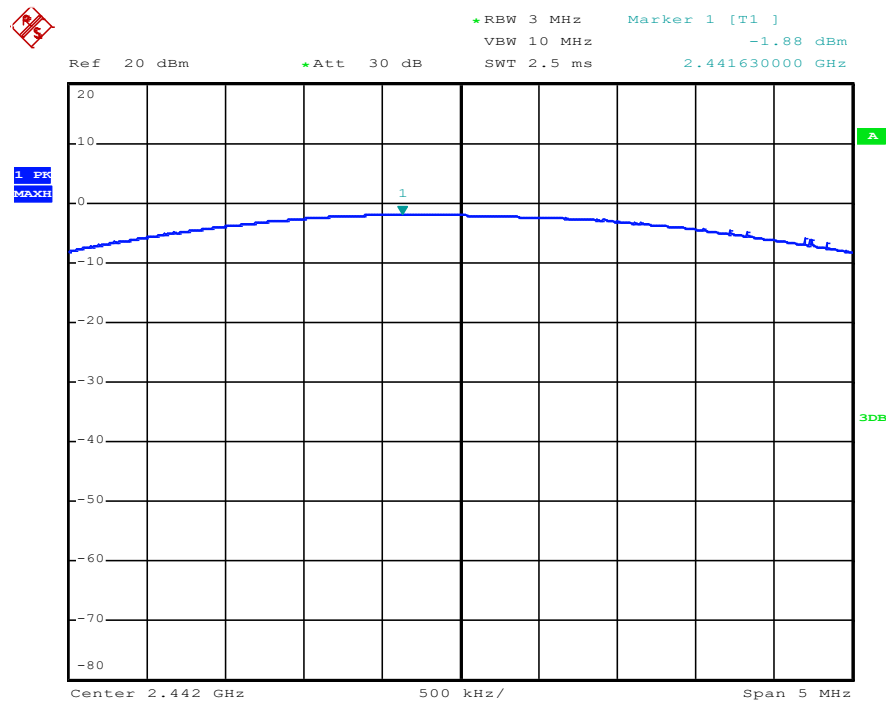
Maximum Peak Conducted Output Power

TX Frequency 2402MHz



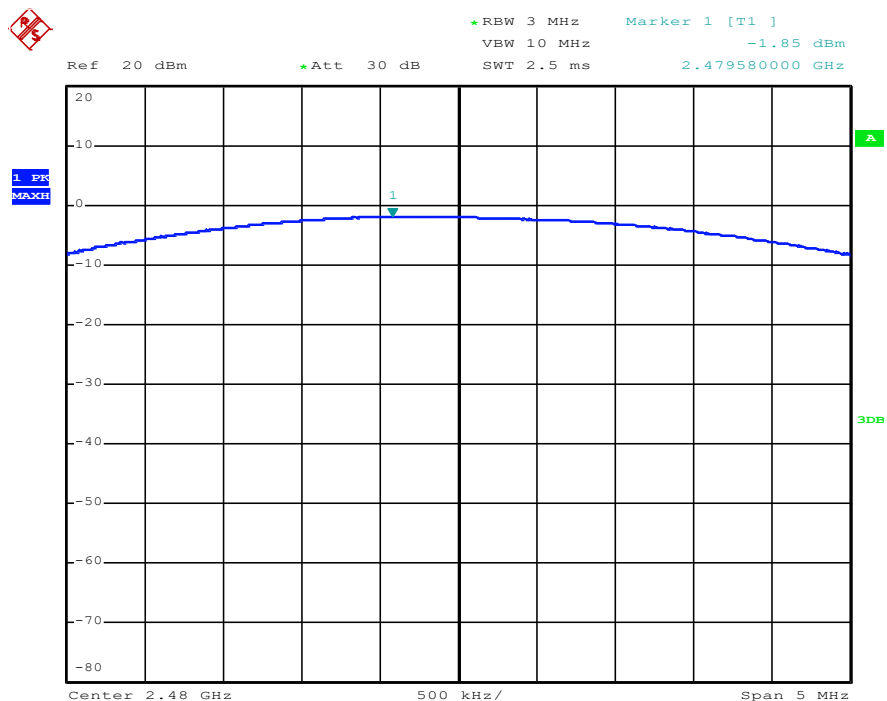
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TX Frequency : 2442MHz



Date: 31.MAR.2023 17:37:24

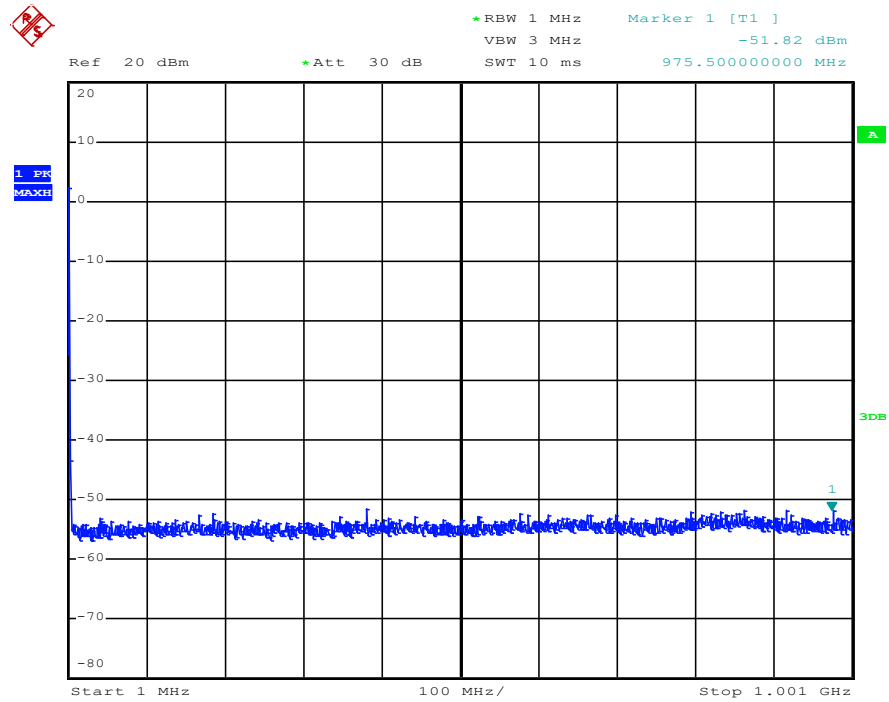
TX Frequency 2480MHz



Date: 31.MAR.2023 17:36:18

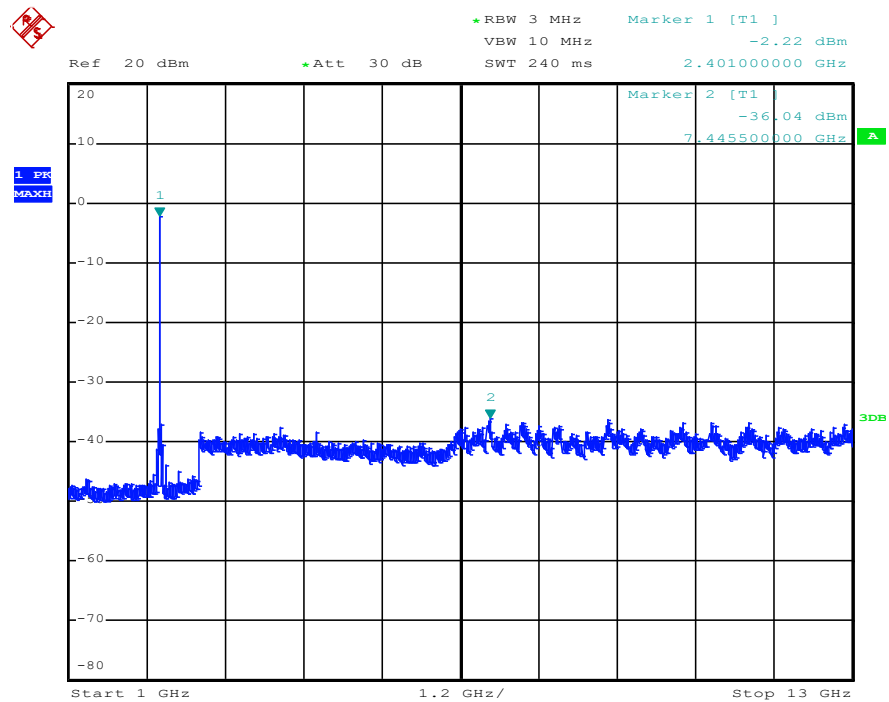
Spurious Conducted Emissions

TX Frequency 2402MHz _ 1M~1GHz Pre-scan



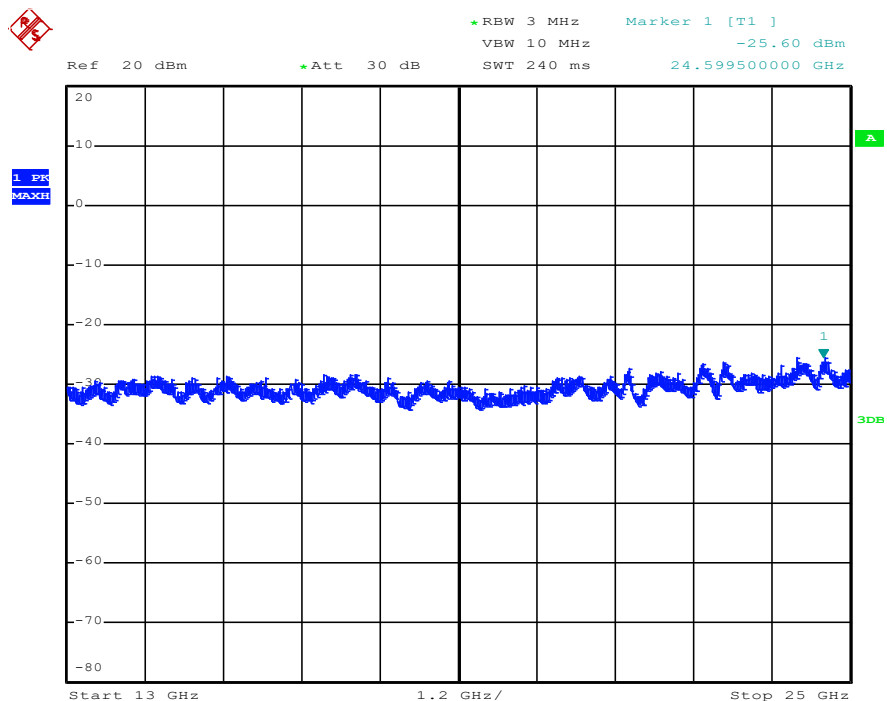
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TX Frequency : 2402MHz _ 1G~13GHz Pre-scan



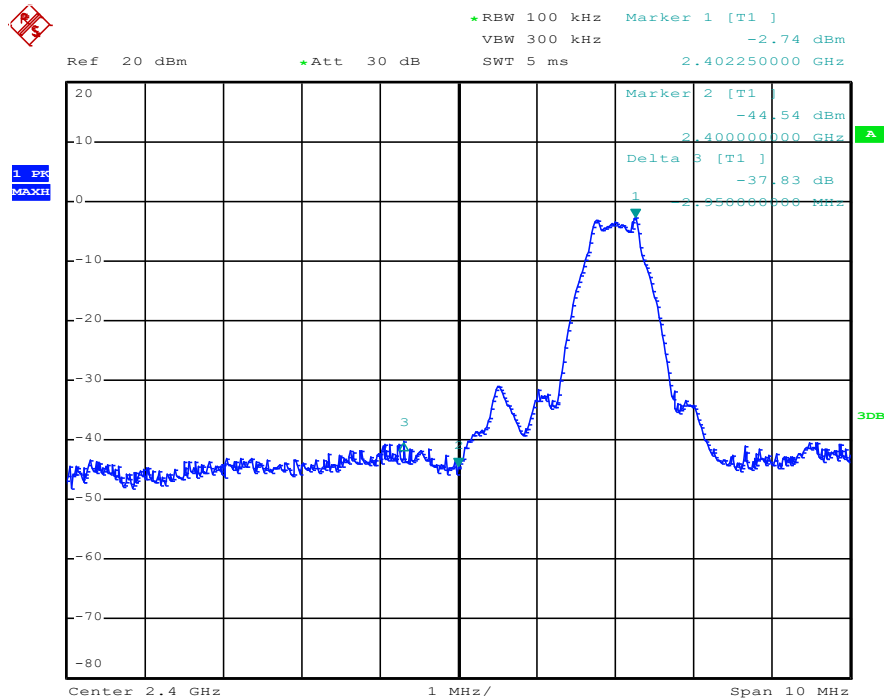
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TX Frequency : 2402MHz _ 13G~25GHz Pre-scan



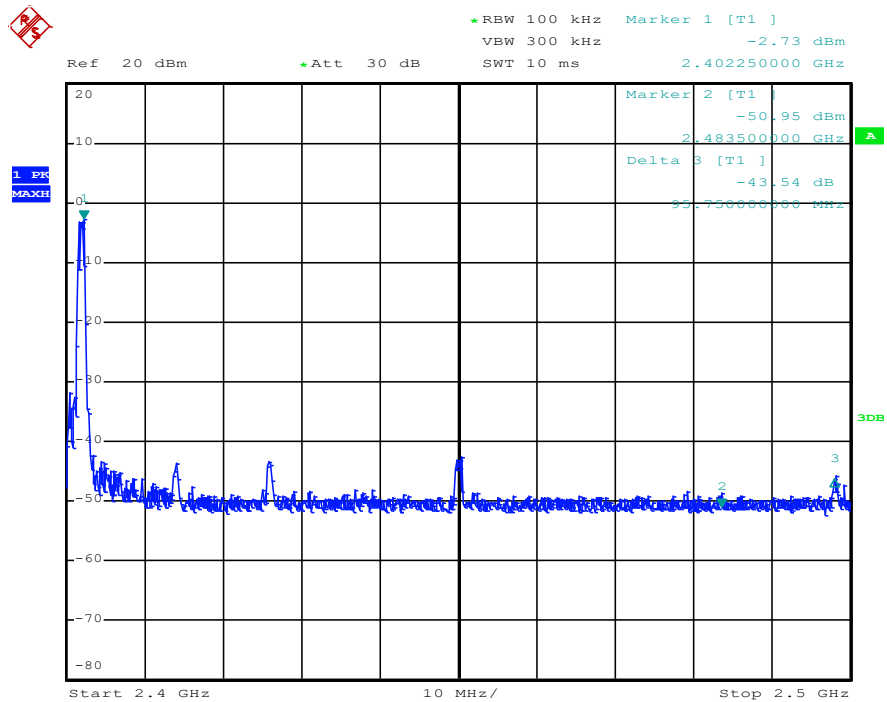
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TX Frequency 2402MHz _ Band Edge 2,400MHz



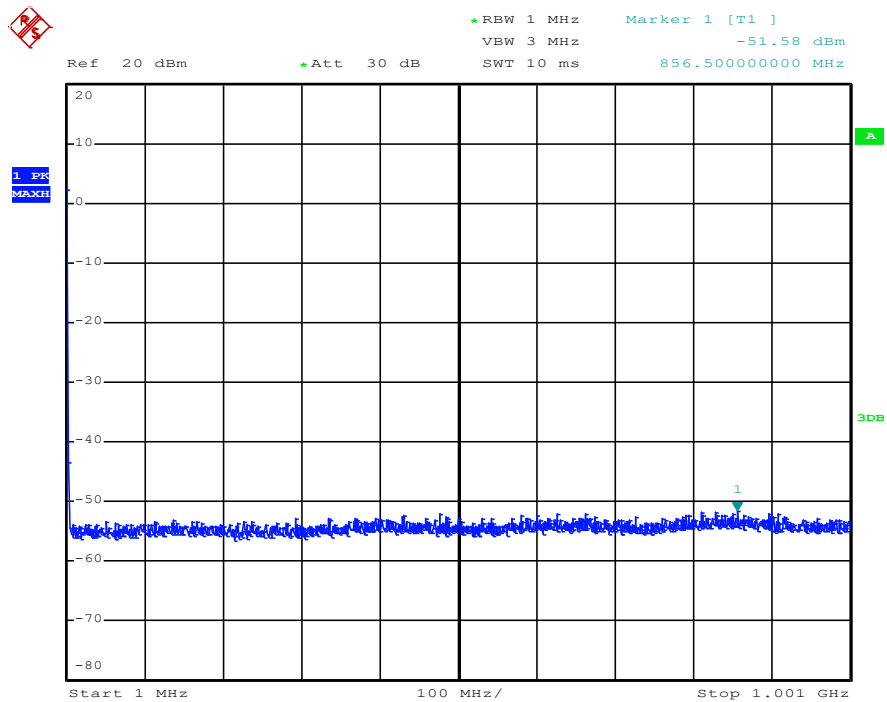
Date: 31.MAR.2023 16:42:16

TX Frequency : 2402MHz _ Band Edge 2,483.5MHz



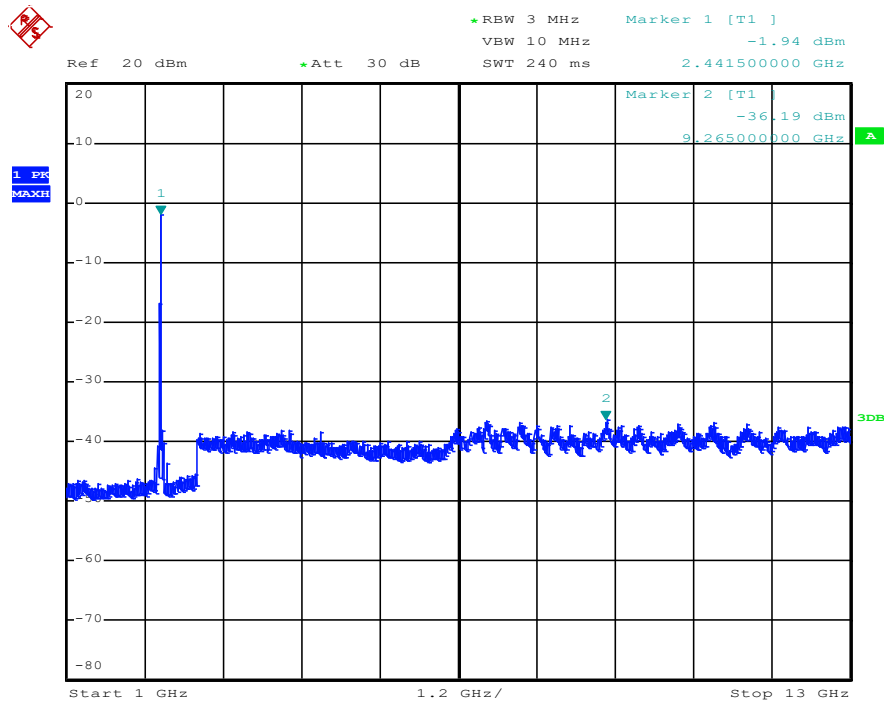
Date: 31.MAR.2023 16:44:20

TX Frequency 2442MHz _ 1M~1GHz Pre-scan



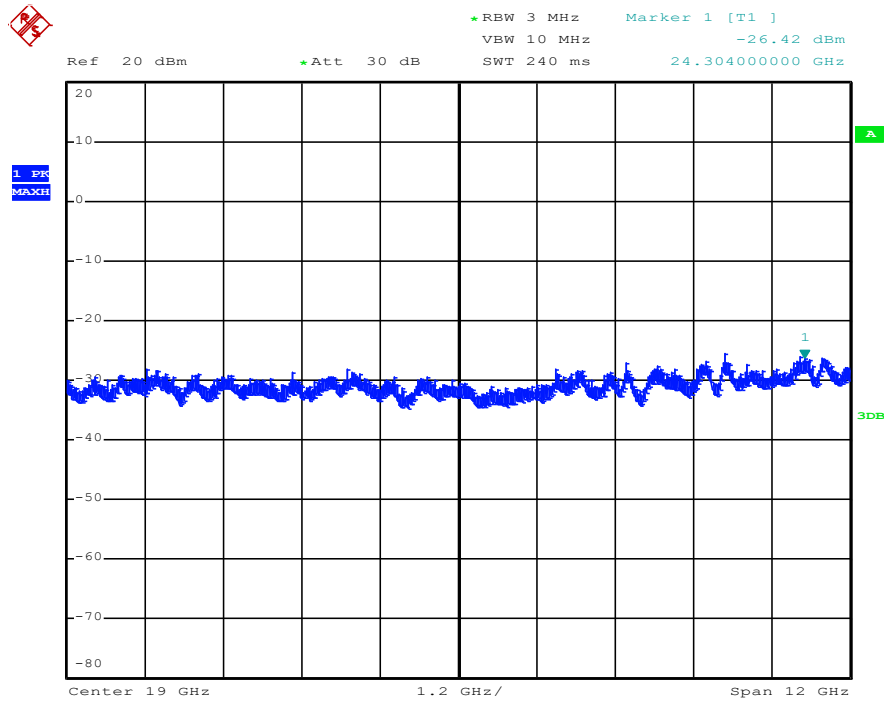
Date: 31.MAR.2023 17:00:55

TX Frequency : 2442MHz _ 1G~13GHz Pre-scan



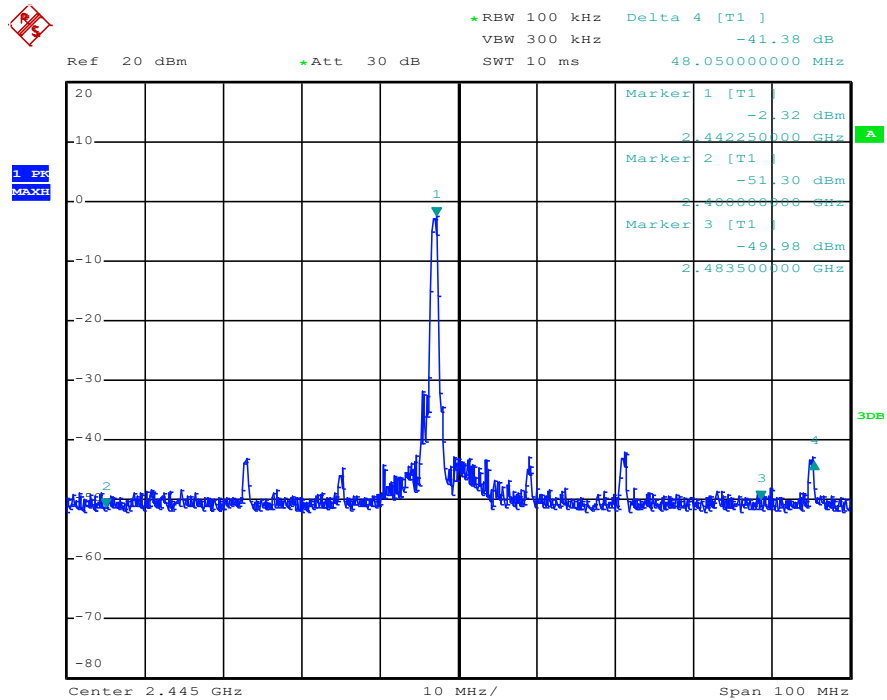
Date: 31.MAR.2023 16:56:52

TX Frequency : 2442MHz _ 13G~25GHz Pre-scan



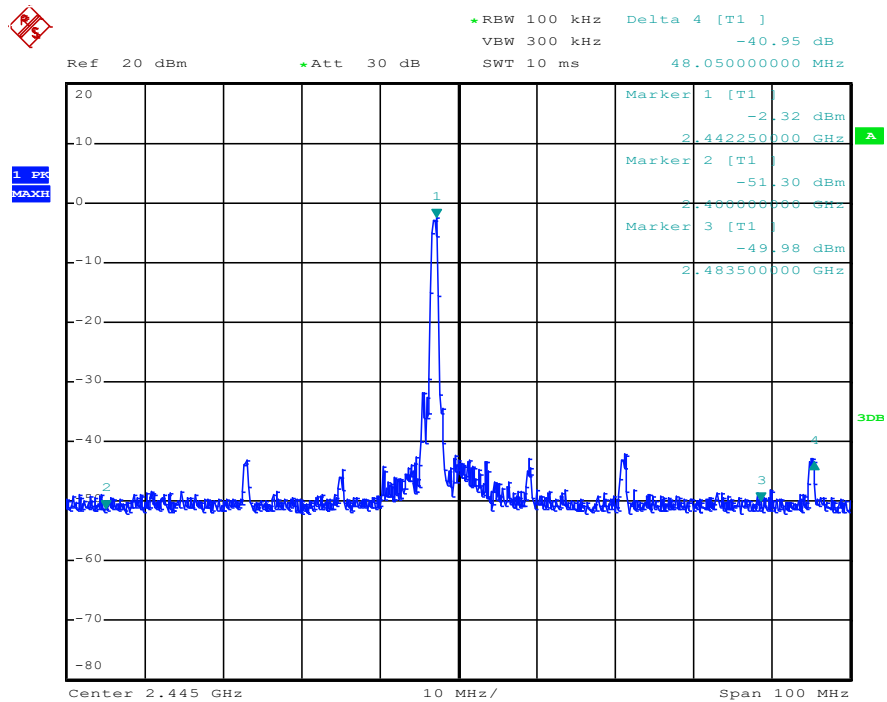
Date: 31.MAR.2023 16:55:49

TX Frequency 2442MHz _ Band Edge 2,400MHz



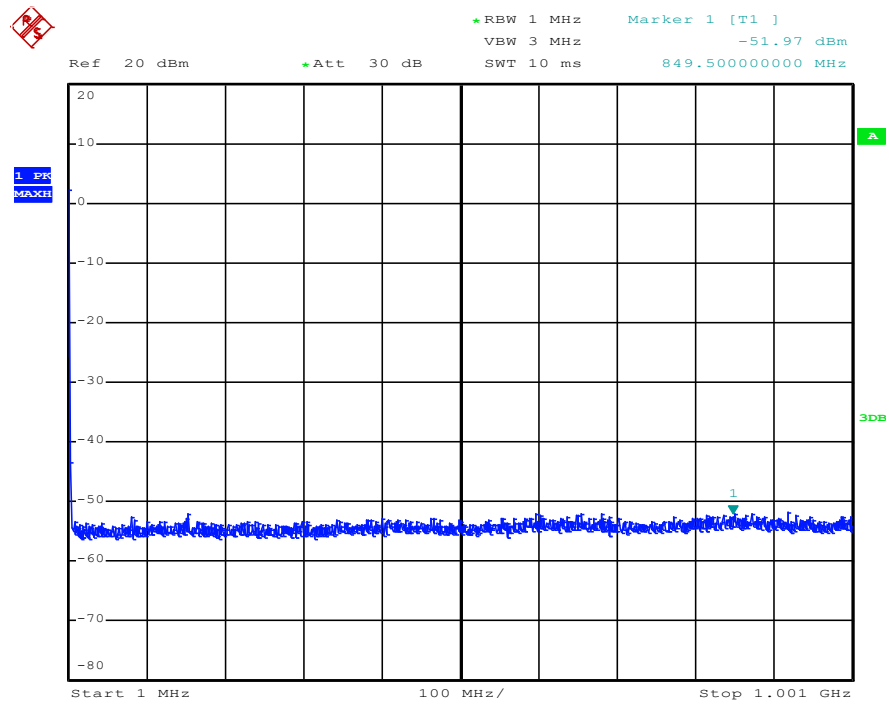
Date: 31.MAR.2023 16:46:04

TX Frequency : 2442MHz _ Band Edge 2,483.5MHz



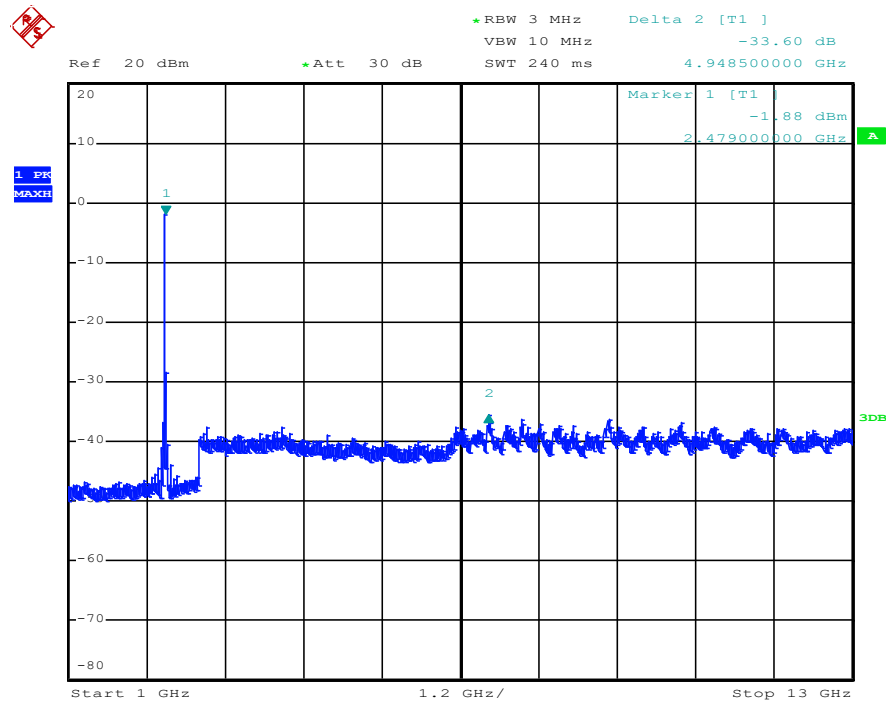
Date: 31.MAR.2023 16:46:09

TX Frequency 2480MHz _ 1M~1GHz Pre-scan



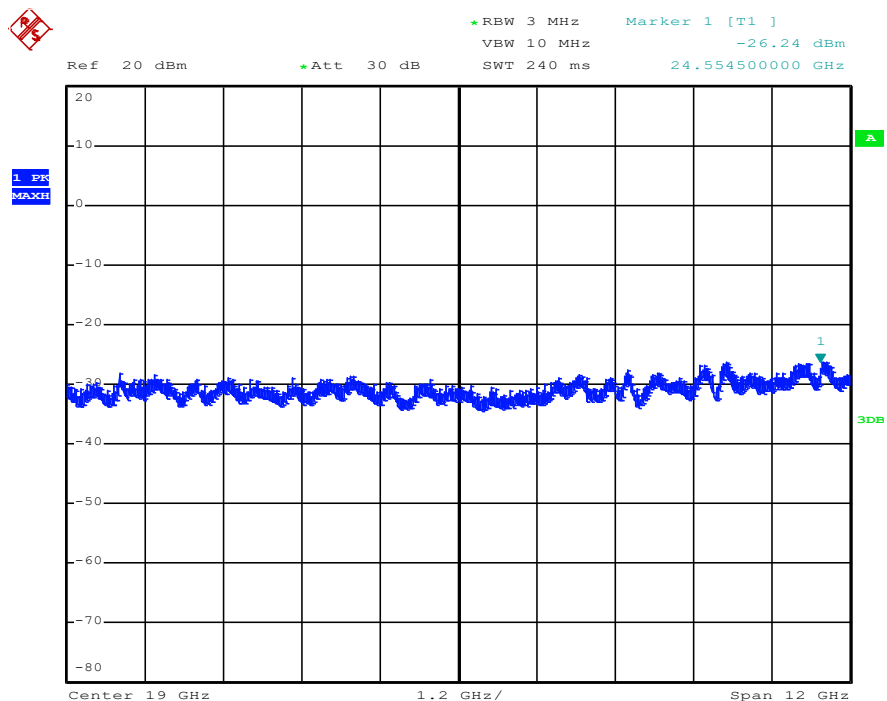
Date: 31.MAR.2023 17:01:41

TX Frequency : 2480MHz _ 1G~13GHz Pre-scan



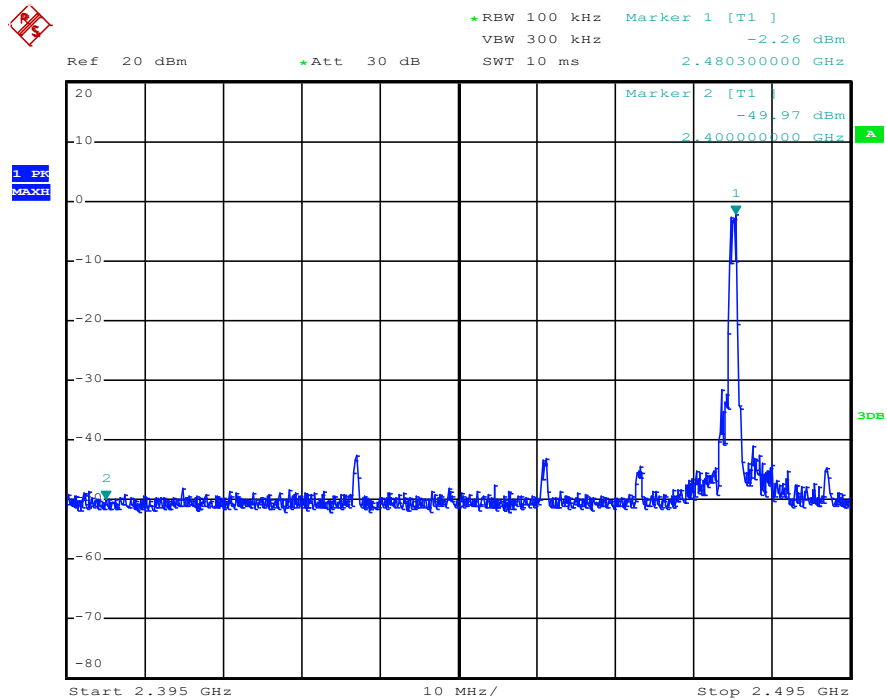
Date: 31.MAR.2023 16:54:11

TX Frequency : 2480MHz _ 13G~25GHz Pre-scan



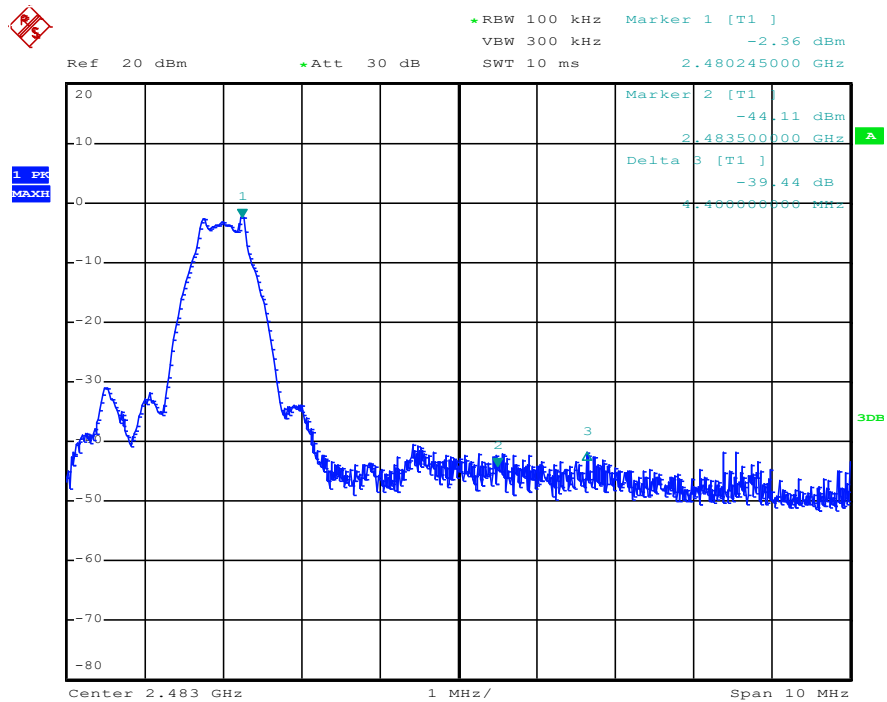
Date: 31.MAR.2023 16:55:06

TX Frequency 2480MHz _ Band Edge 2,400MHz



Date: 31.MAR.2023 16:47:45

TX Frequency : 2480MHz _ Band Edge 2,483.5MHz



Date: 31.MAR.2023 16:51:02

Appendix 5

RF Exposure Information

FCC ID : N2T30659155
IC : 9285A-30659155

Maximum transmitter power

Bluetooth Transmitter

Frequency (MHz)	Maximum peak output power (dBm)	Output power (mW)
2402	-2.22	0.600
2442	-1.88	0.649
2480	-1.85	0.653

Note: The maximum peak field strength was taken from table of "Subclause 15.247(b)(3) / RSS-247 5.4 – Maximum Peak Conducted Output Power".

For FCC

According to KDB 447498 D01:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 5 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$
 ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

Result:

Bluetooth Transmitter

$$(0.600/5) \cdot \sqrt{2.402} = 0.186 < 3.0$$

$$(0.649/5) \cdot \sqrt{2.442} = 0.203 < 3.0$$

$$(0.653/5) \cdot \sqrt{2.480} = 0.206 < 3.0$$

Conclusion:

No SAR is required.

For ISED

According to table 1 in RSS-102 Issue 5, below exemption limit is applied

Frequency: 2480 MHz

At separation distance of ≤ 5 mm

Exemption limits: 4mW

Results:

max. power of channels = 0.653 mW < 4mW

Conclusion:

The maximum peak output power of the transmitter is less than the SAR evaluation exemption threshold and hence it complies with the RSS-102 RF exposure requirement.