

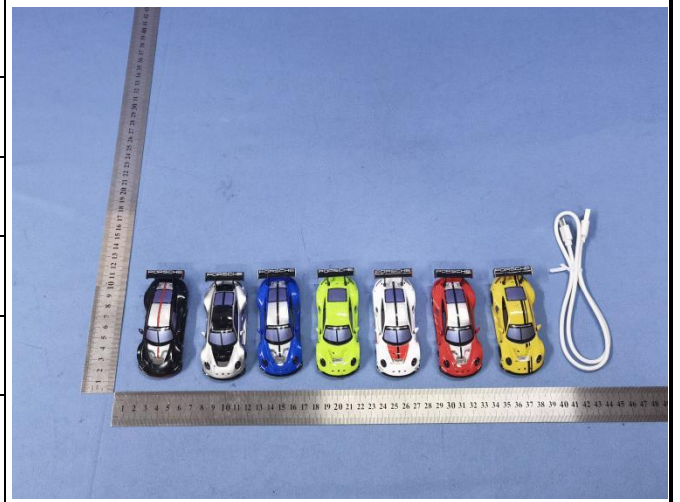


Prüfbericht-Nr.: <i>Test Report No.:</i>	CN240DII 001	Auftrags-Nr.: <i>Order No.:</i>	158294626	Seite 1 von 19 <i>Page 1 of 19</i>	
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	24.07.2024		
Auftraggeber: <i>Client:</i>	Carrera Toys GmbH Rennbahn Allee 1, 5412 Puch, Salzburg, Austria				
Prüfgegenstand: <i>Test item:</i>	RC Toy Car Transceiver with Bluetooth				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	50051001,50051002,50051003,50051004,50051005, 50051006,50051007				
Auftrags-Inhalt: <i>Order content:</i>	FCC and ISED Certification				
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15 Subpart C; ANSI C63.10-2013 RSS-247 Issue 3; RSS-Gen Issue 5+Amendment 1+Amendment 2				
Wareneingangsdatum: <i>Date of receipt:</i>	24.07.2024				
Prüfmuster-Nr.: <i>Test sample No.:</i>	A003775082-001-002				
Prüfzeitraum: <i>Testing period:</i>	23.07.2024 - 13.09.2024				
Ort der Prüfung: <i>Place of testing:</i>	Hong Kong				
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland Hong Kong Ltd.				
Prüfergebnis*: <i>Test result*:</i>	Pass				
geprüft von / tested by:			kontrolliert von / reviewed by:		
					
13.09.2024	Wooga Wu / Assistant Test Engineer		13.09.2024	Billy Yip / Laboratory Manager	
Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>
Sonstiges / Other: FCC ID :YFACARHYB51000 IC ID : 12260A-CARHYB51000 HVIN : CARHYB51000 “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. Track pack accessories Model No.: 50050001,50050002,50050003,50050004,50050005					
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* 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. <i>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.</i>					



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<p>4</p>	<p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p>

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Product information

PMN: CARHYB51000	HVIN : CARHYB51000
FVIN: N/A	HMN: N/A

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	PCB Antenna
Antenna gain (dBi)	0.0 dBi
Power level	fix
General	
Type of equipment	Portable Used Device
Connection to public utility power line	No
Nominal voltage	5.0 VDC
Independent Operation Modes	Transceiver

Product function and intended use

The equipment under test (EUT) is a 2.4GHz RC toy car transceiver with Bluetooth Low Energy (BLE). It is power by battery only. A mobile App will be used for transmitting data to control this EUT.

Models 50050001 to 50050005 are the track pack accessories. Models 50051001 to 50051007 are RC toy car transceiver with Bluetooth low energy.

Test was performed using Porsche 911 GT3 R "Black Devil" (50051003) and Porsche 911 GT3 R "Red Devil" (50051004).

FCC ID : YFACARHYB51000, IC ID : 12260A-CARHYB51000, HVIN : CARHYB51000

Models	Product description
50051001	Porsche 911 GT3 R "Speed Yellow"
50051002	Porsche 911 GT3 R "Acid Green"
50051003	Porsche 911 GT3 R "Black Devil"
50051004	Porsche 911 GT3 R "Red Devil"
50051005	Porsche 911 GT3 R "Blue Thunder"
50051006	Porsche 911 GT3 R "White Lighting"
50051007	Porsche 911 GT3 R "GT-Silver Metallic"

Track pack accessories:

Models	Product description
50050001	Speedway to Hell
50050002	Devil Drivers
50050003	Runway Chase
50050004	Night Speeders
50050005	Max Speed Challenge

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

During the test, channel and 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 was selected according to the instruction given by the manufacturer. The setting of the RF output power expected by the customer shall be fixed on the firmware of the end product. 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:

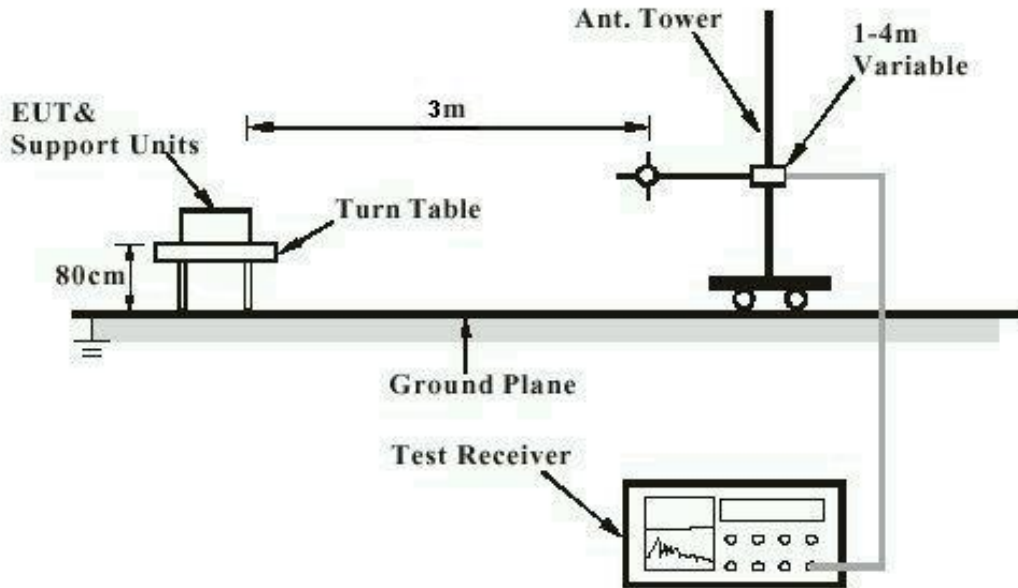
$$FS = R + AF + CF + FA - PA$$

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)

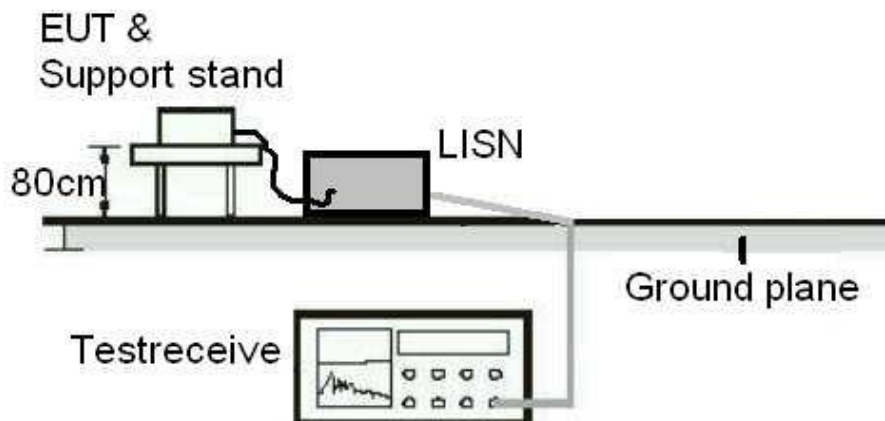
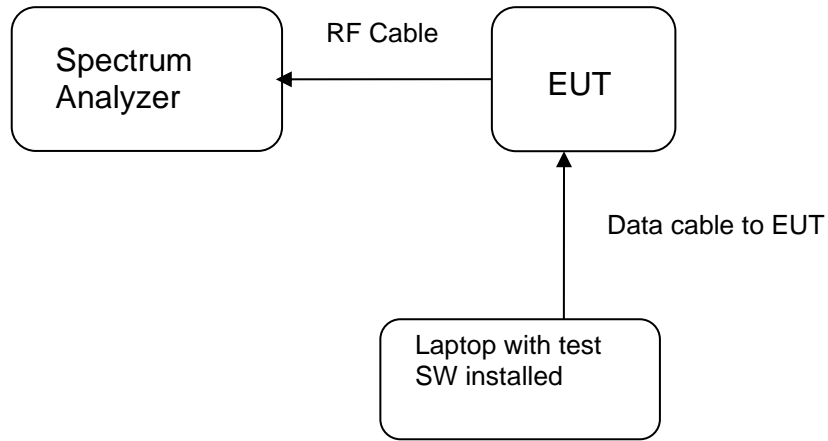


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)



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

Designation Number : HK0013

ISED/IC

Company Number : 26152

Hong Kong Productivity Council

Address: LG 1/F., HKPC Building, 78 Tat Chee Road

Tel.: +852 2788 6396

Fax: +852 2788 5405

Email: emc@hkpc.org

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

FCC

Designation Number : HK0012

ISED/IC

Company Number : 4780A

List of Test and Measurement Instruments

Hong Kong Productivity Council

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Multi-functional Anechoic Chamber (NSA)	Albatross	---	06-Jan-24	06-Jan-25
Multi-functional Anechoic Chamber (VSWR)	Albatross	---	04-Jan-24	04-Jan-25
Test Receiver	Rohde & Schwarz	ESU40	09-Mar-24	09-Mar-25
Double-Ridged Waveguide Horn	EMCO	3117	21-Nov-23	21-Nov-24
Bi-conical Antenna	Rohde & Schwarz	HK116	24-Oct-22	24-Oct-24
Log Periodic Antenna	Rohde & Schwarz	HL223	25-Oct-22	25-Oct-24
Cable	SF118/11N/11 N/1200MM	Huber+Suhner	06-Jan-24	06-Jan-25
Microwave amplifier	COM-POWER Corporation	PAM-118A	03-Mar-24	03-Mar-25
High Pass Filter	Trilithic	23042	29-Oct-23	29-Oct-25

TÜV Rheinland Hong Kong Ltd.

Conducted Emission on AC mains port

Equipment	Manufacturer	Type	Cal. Date	Due Date
EMI Test Receiver	R & S	ESCS30	24-May-24	24-May-25
LISN	R & S	ENV216	18-Oct-23	18-Oct-24
RF Coaxial Cable	R & S	N/A	23-Aug-24	23-Aug-25

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSP40	07-Aug-24	06-Aug-25
Comprehensive Testing Environment (CTE)	TÜV Rheinland LGA Products GmbH	Software version: TMF V52.3 and CTE-RF- Bluetooth V44.0		

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is ± 3.36 dB.

The estimated combined standard uncertainty for radiated emissions measurements is ± 4.81 dB (9kHz to 30MHz) and ± 4.62 dB (30MHz to 200MHz) and ± 5.67 dB (200MHz to 1000MHz) and is ± 5.07 dB (1GHz to 8.2GHz) and ± 4.58 dB (8.2GHz to 12.4GHz) and ± 4.78 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 3

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: b) Manufacturer and model no: c) Peak Gain:	PCB Antenna N/A 0.0 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 PCB 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: b) Manufacturer: c) Model no: d) Gain with reference to an isotropic radiator:	PCB Antenna N/A N/A 0.0 dBi
Verdict:	Pass	

FCC 15.207 / RSS-Gen 8.8 – Conducted Emission on AC Mains					Pass
Test Specification : ANSI C63.10-2013 Test date : 05.09.2024 Mode of operation : TX mode Port of testing : AC Mains input port of power supply Supply voltage : 120VAC 60Hz Temperature : 23°C Humidity : 60%					
Requirement: 15.207(a), RSS-Gen 8.8					
Results: For test protocols please refer to Appendix 1					
Mode: 2440 MHz Live measurement					
Frequency (MHz)	Quasi-peak (dBµV)	Limit QP (dBµV)	Average (dBµV)	Limit AV (dBµV)	Verdict
0.194	19.4	63.7	8.6	53.7	Pass
0.798	12.3	56.0	7.0	46.0	Pass
19.450	19.6	60.0	15.0	50.0	Pass
Mode: 2440 MHz Neutral measurement					
Frequency (MHz)	Quasi-peak (dBµV)	Limit QP (dBµV)	Average (dBµV)	Limit AV (dBµV)	Verdict
0.714	12.2	56.0	5.5	46.0	Pass
5.854	12.1	60.0	7.9	50.0	Pass
18.506	24.5	60.0	16.1	50.0	Pass
Remarks: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits. For test Results plots refer to Appendix 1, page 2.					

FCC 15.247 (a)(2) / RSS-247 5.2 – 6dB Bandwidth Measurement	Pass
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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 : 04.09.2024
 Mode of operation : Tx mode
 Port of testing : Antenna port
 Supply voltage : 5 VDC
 Temperature : 23°C
 Humidity : 55%

Results: For test protocols please refer to Appendix 1

Channel Frequency (MHz)	6 dB left (MHz)	6 dB right (MHz)	6dB bandwidth (kHz)
2402	2401.702	2402.406	704.0
2440	2439.711	2440.409	698.0
2480	2479.712	2480.403	690.8

RSS-Gen 6.6 – Occupied Bandwidth	Pass
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FCC/ IC Requirement: N/A

Test Specification : RSS-Gen
 Test date : 04.09.2024
 Mode of operation : Tx mode
 Port of testing : Antenna port
 Supply voltage : 5 VDC
 Temperature : 23°C
 Humidity : 55%

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	2401.544	2402.591	1.047
2440	2439.540	2440.593	1.053
2480	2479.541	2480.593	1.052

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 : 04.09.2024 Mode of operation : Tx mode Port of testing : Antenna port Supply voltage : 5 VDC Temperature : 23°C Humidity : 55%			
Results: For test protocols please refer to Appendix 1			
Frequency (MHz)	Measured Output Power (dBm)	Limit (dBm)	Verdict
2402	-7.87	30.0	Pass
2440	-7.46	30.0	Pass
2480	-7.58	30.0	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 : 12.09.2024 Mode of operation : Tx mode Port of testing : Antenna port Supply voltage : 5 VDC Temperature : 23°C Humidity : 57%			
Results: For test protocols refer to Appendix 1			

FCC 15.247(d) / RSS-247 5.5 – Spurious Conducted Emissions				Pass		
Test Specification : ANSI C63.10-2013 Test date : 12.09.2024 Mode of operation : Tx mode Port of testing : Antenna port Supply voltage : 5 VDC Temperature : 23°C Humidity : 57%						
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	4804.190	-40.17	-14.01	-34.01	-6.16	Pass
	7206.310	-51.04	-14.01	-34.01	-17.03	Pass
2440	4880.601	-41.86	-13.53	-33.53	-8.33	Pass
2480	4960.240	-41.83	-13.55	-33.55	-8.28	Pass

FCC 15.205 / RSS-Gen 8.9 – Radiated Emissions in Restricted Frequency Bands		Pass
Test Specification : ANSI C63.10-2013 Test date : 02.09.2024 Mode of operation : Tx mode Port of testing : Antenna port Frequency range : 30 MHz – 25 GHz Supply voltage : 5 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
2390.000	51.7	74.0 / PK
2390.000	28.6	54.0 / AV
2400.000	54.0	74.0 / PK
2400.000	28.8	54.0 / AV
4804.000	49.7	74.0 / PK
4804.000	41.1	54.0 / AV
7206.000	46.1	74.0 / PK
7206.000	33.2	54.0 / AV
Mode: 2402 MHz TX		Horizontal Polarization
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m
2390.000	40.2	74.0 / PK
2390.000	26.5	54.0 / AV
2400.000	47.2	74.0 / PK
2400.000	27.0	54.0 / AV
4804.000	53.3	74.0 / PK
4804.000	46.5	54.0 / AV
7206.000	45.3	74.0 / PK
7206.000	32.2	54.0 / AV
Mode: 2440 MHz TX		Vertical Polarization
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m
4880.000	48.0	74.0 / PK
4880.000	38.7	54.0 / AV
7320.000	46.0	74.0 / PK
7320.000	32.8	54.0 / AV

Mode: 2440 MHz TX		Horizontal Polarization	
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m	
4880.000	50.8	74.0 / PK	
4880.000	43.0	54.0 / AV	
7320.000	45.1	74.0 / PK	
7320.000	31.8	54.0 / AV	
Mode: 2480 MHz TX		Vertical Polarization	
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2483.500	42.1	74.0 / PK	
2483.500	26.6	54.0 / AV	
4960.000	48.3	74.0 / PK	
4960.000	40.3	54.0 / AV	
7440.000	45.2	74.0 / PK	
7440.000	32.1	54.0 / AV	
Mode: 2480 MHz TX		Horizontal Polarization	
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2483.500	44.3	74.0 / PK	
2483.500	26.4	54.0 / AV	
4960.000	51.4	74.0 / PK	
4960.000	43.4	54.0 / AV	
7440.000	44.1	74.0 / PK	
7440.000	30.8	54.0 / AV	

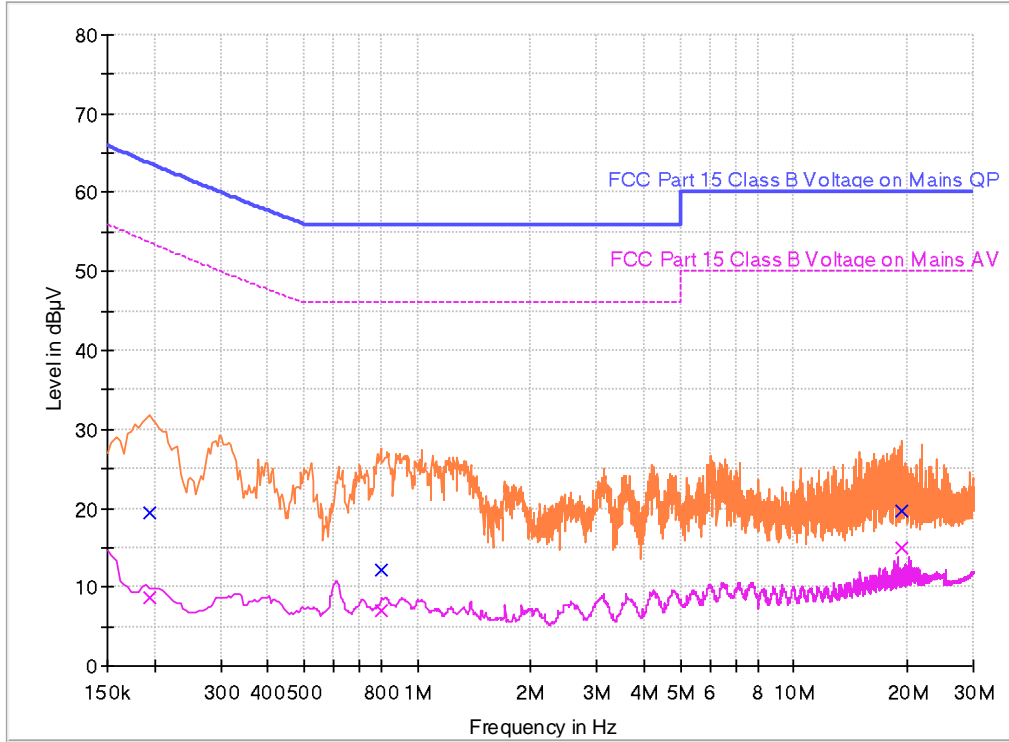
Appendix 1

Test Protocol

Conducted Emission on AC Mains

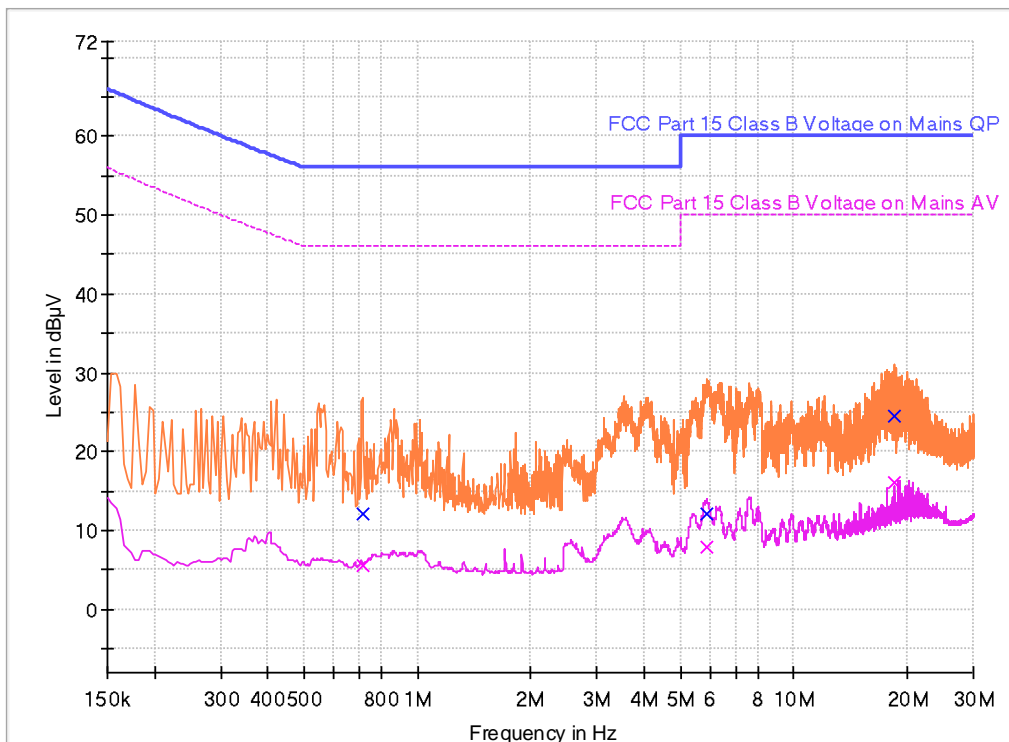
TX Frequency 2440MHz, Line: L1

Conducted Emission (150 kHz - 30 MHz) - scan (PK+AV)



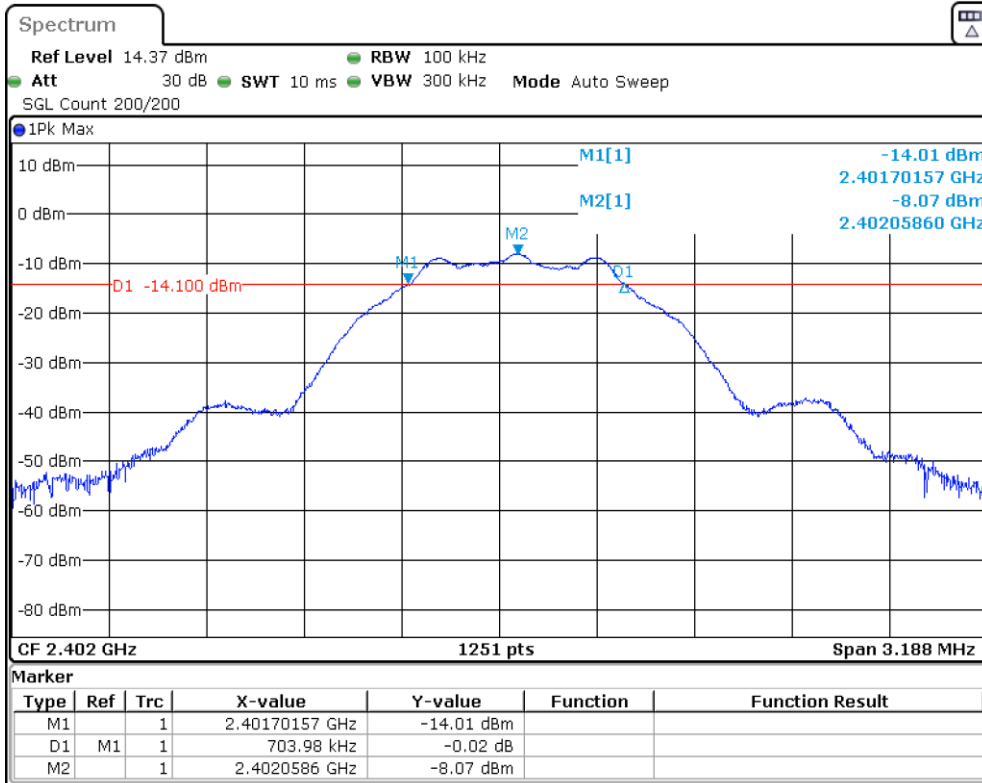
TX Frequency 2440MHz, Line: N

Conducted Emission (150 kHz - 30 MHz) - scan (PK+AV)



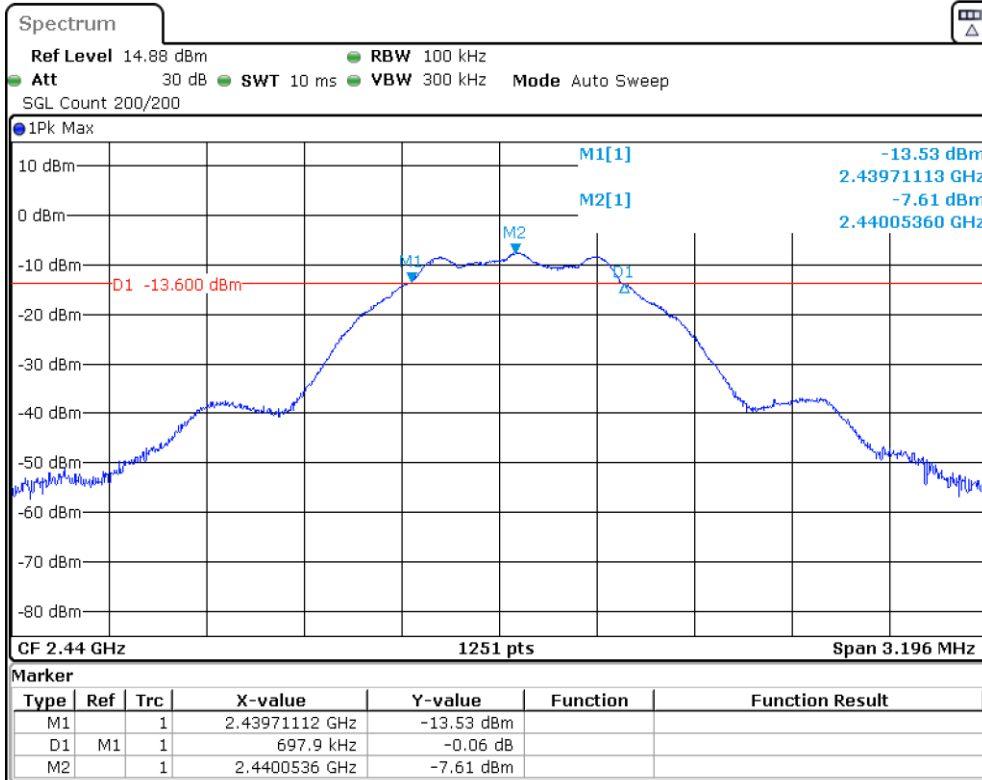
6 dB Bandwidth Measurement

TX Frequency 2402MHz



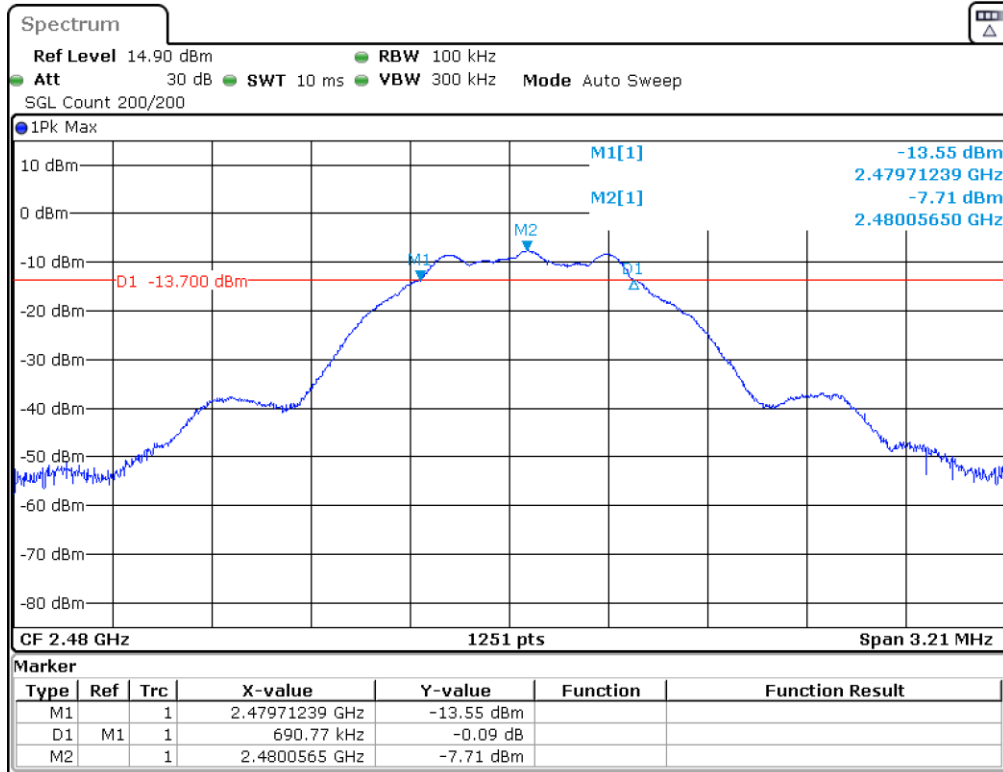
Date: 4.SEP.2024 16:35:12

TX Frequency 2440MHz



Date: 4.SEP.2024 16:35:52

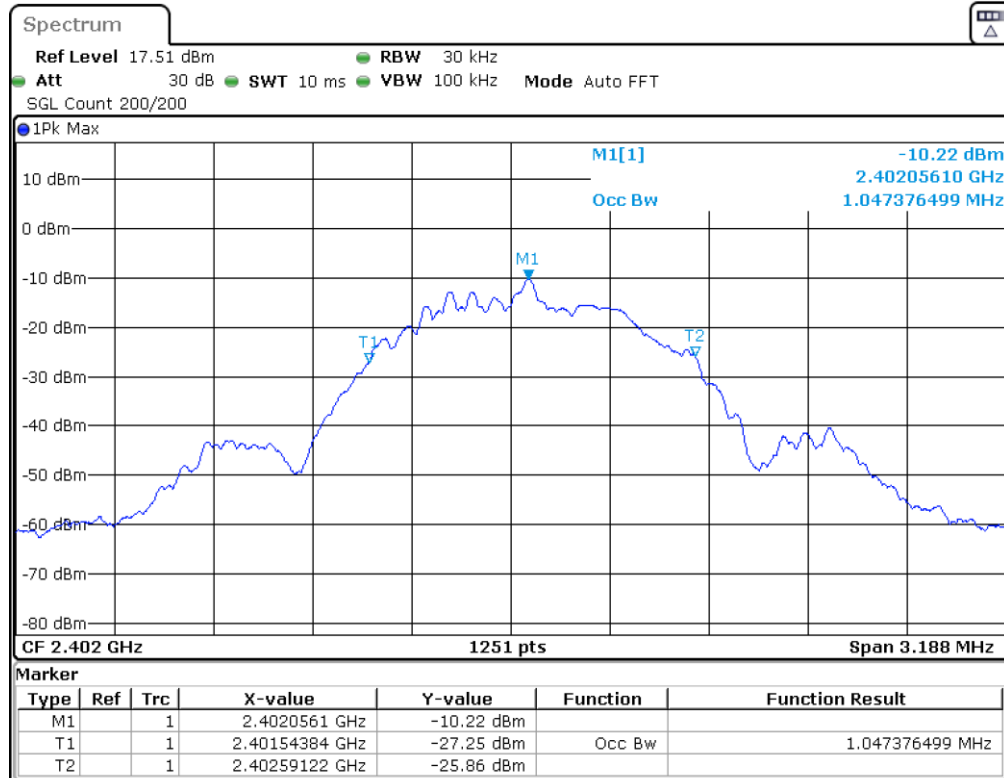
TX Frequency 2480MHz



Date: 4.SEP.2024 16:36:32

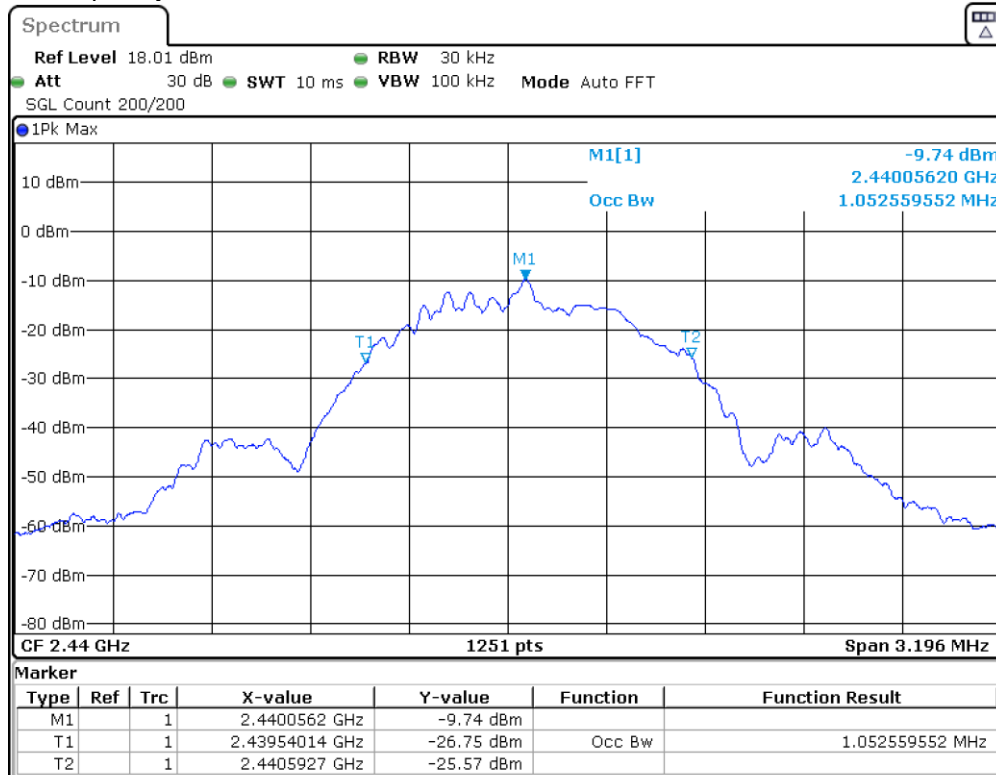
Occupied Bandwidth Measurement

TX Frequency 2402MHz



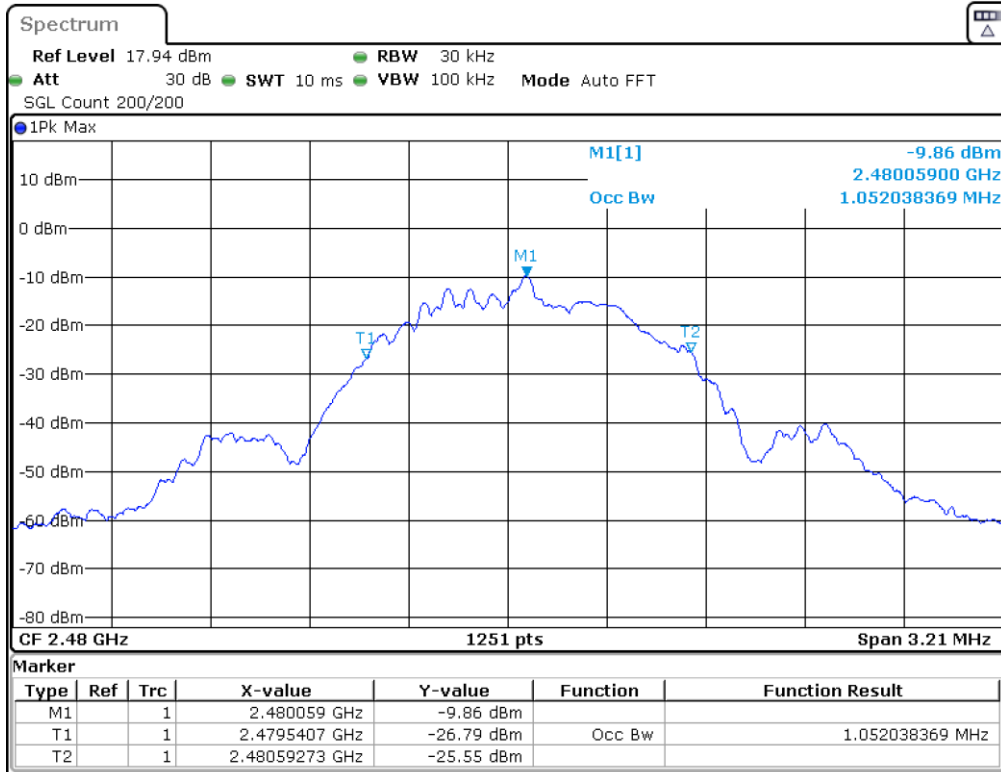
Date: 4.SEP.2024 16:35:22

TX Frequency 2440MHz



Date: 4.SEP.2024 16:36:02

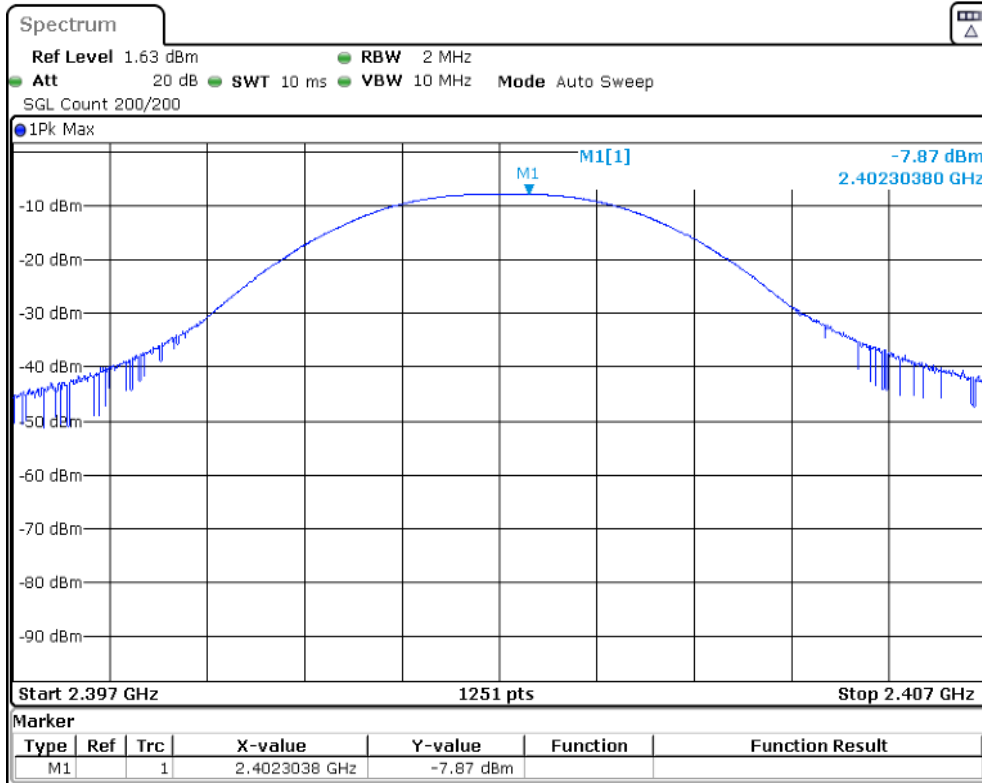
TX Frequency 2480MHz



Date: 4.SEP.2024 16:36:42

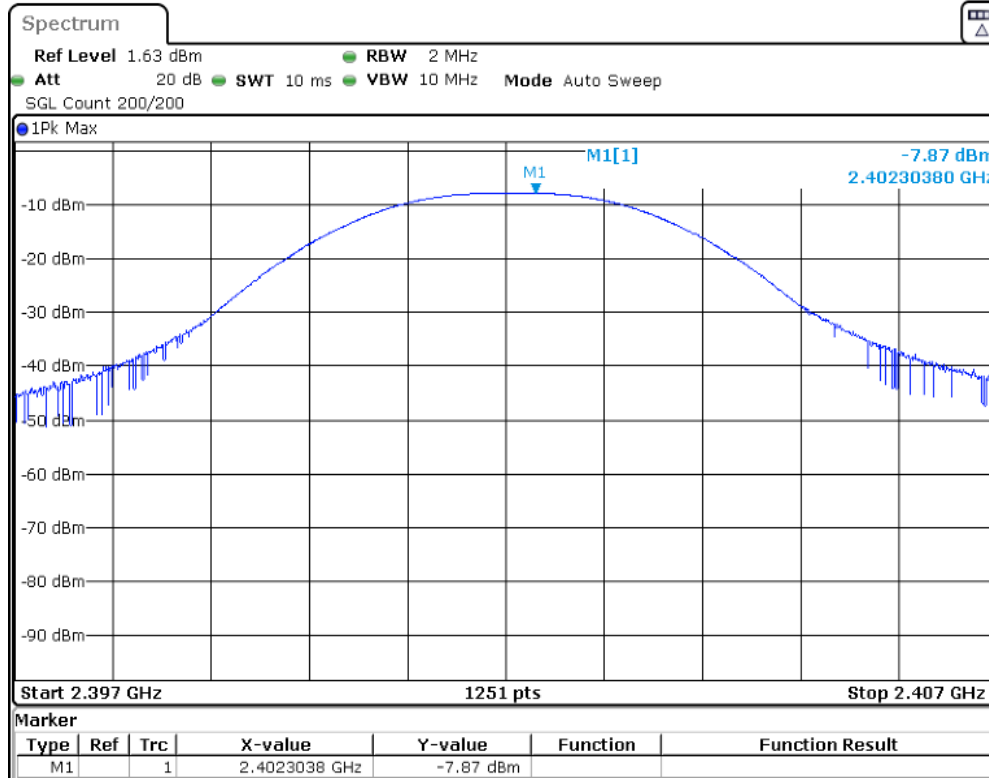
Maximum Peak Conducted Output Power

TX Frequency 2402MHz



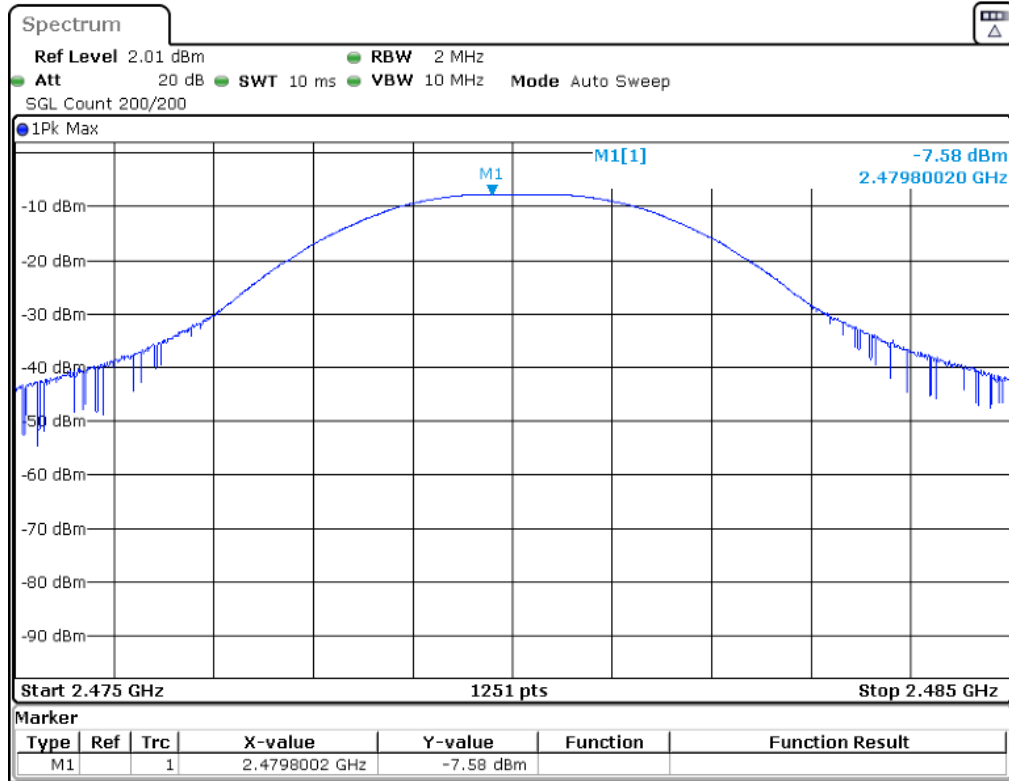
Date: 4.SEP.2024 16:18:21

TX Frequency 2440MHz



Date: 4.SEP.2024 16:18:21

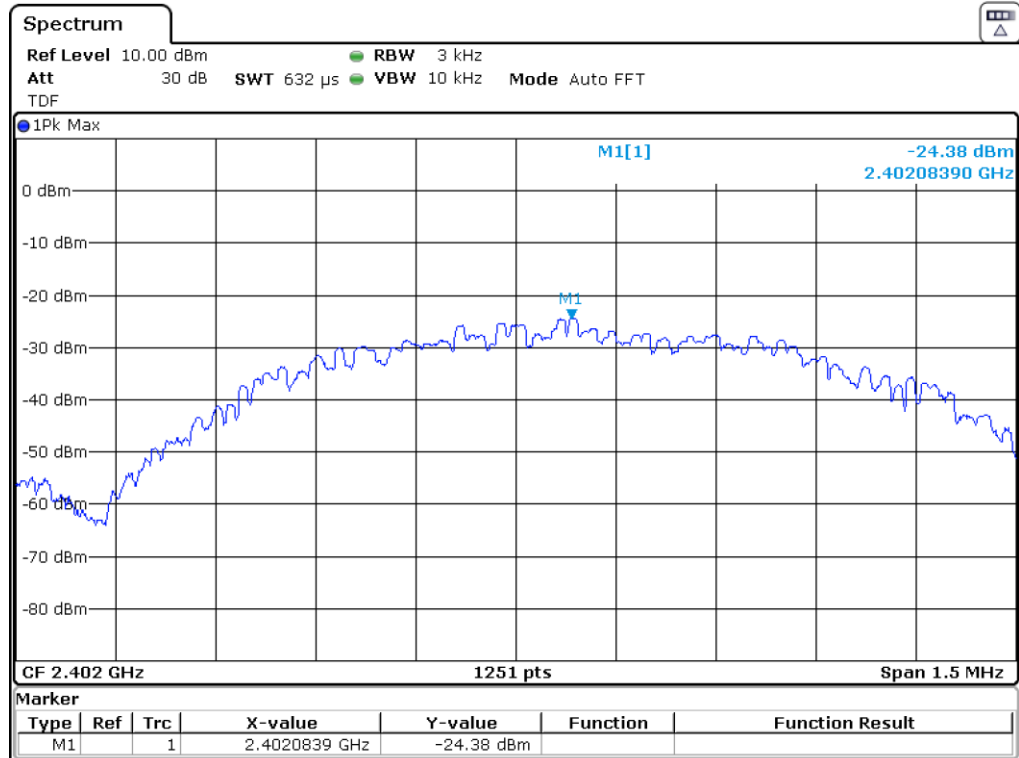
TX Frequency 2480MHz



Date: 4.SEP.2024 16:25:11

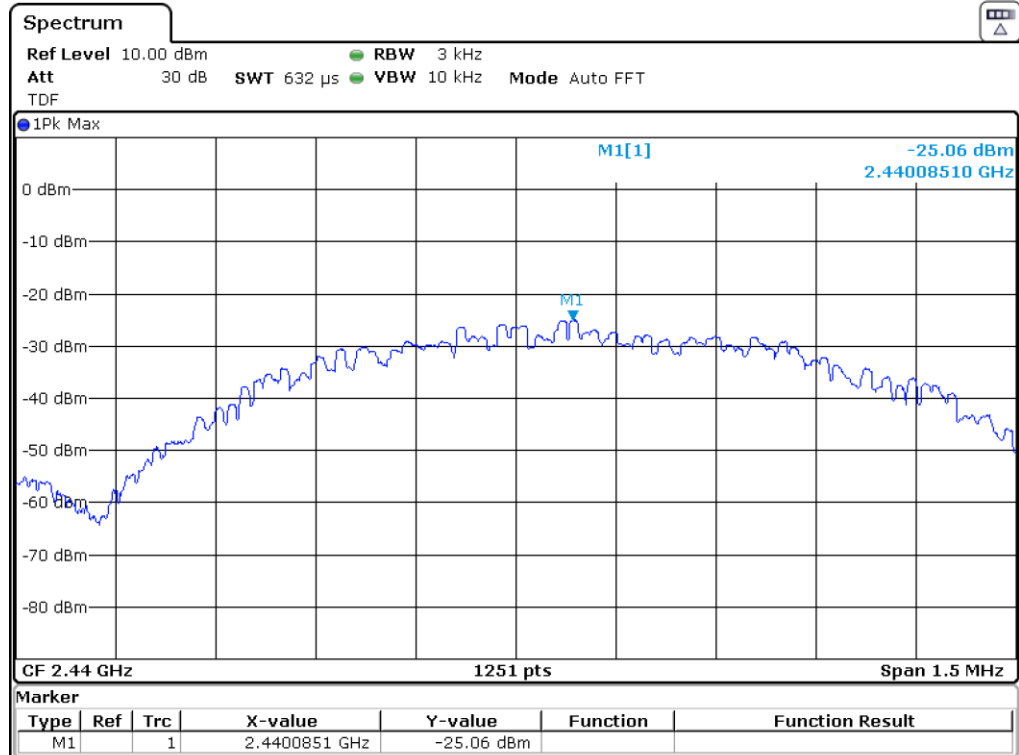
Power Spectral Density

TX Frequency 2402MHz



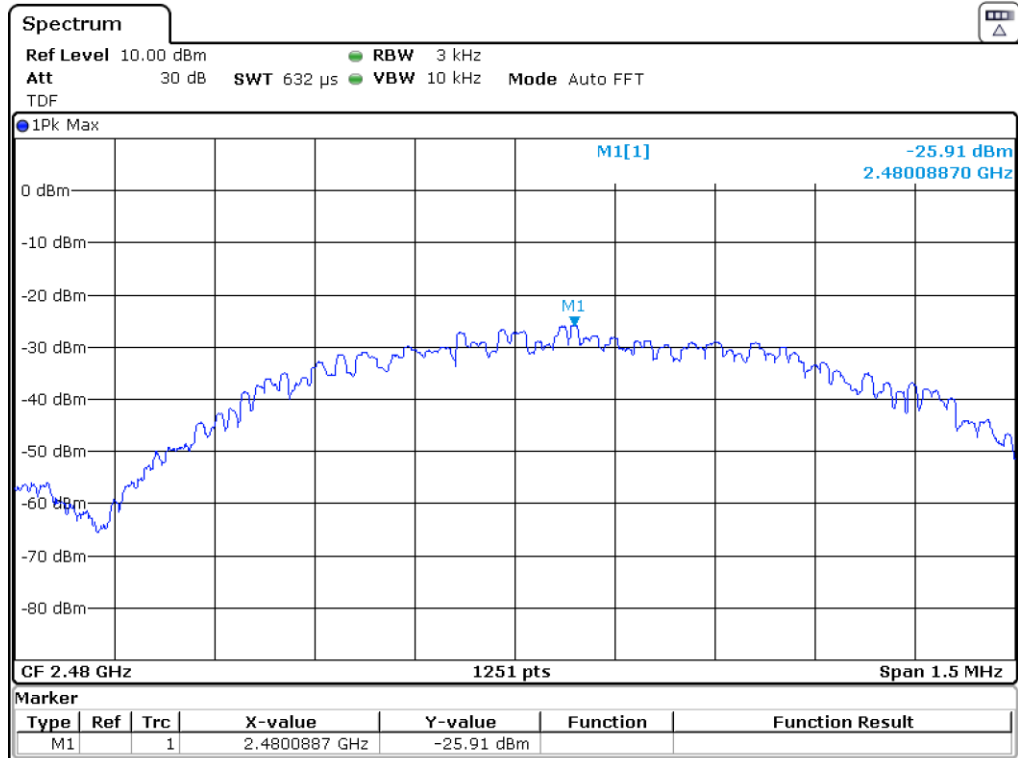
Date: 12.SEP.2024 15:30:57

TX Frequency 2440MHz



Date: 12.SEP.2024 15:29:39

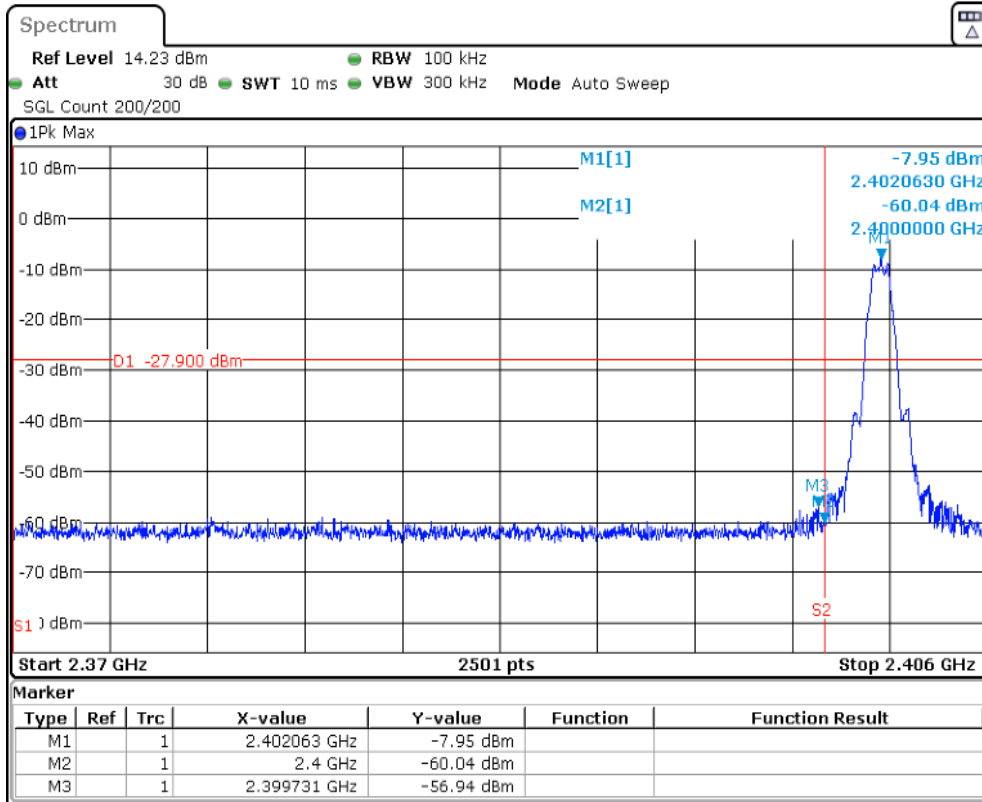
TX Frequency 2480MHz



Date: 12.SEP.2024 15:31:38

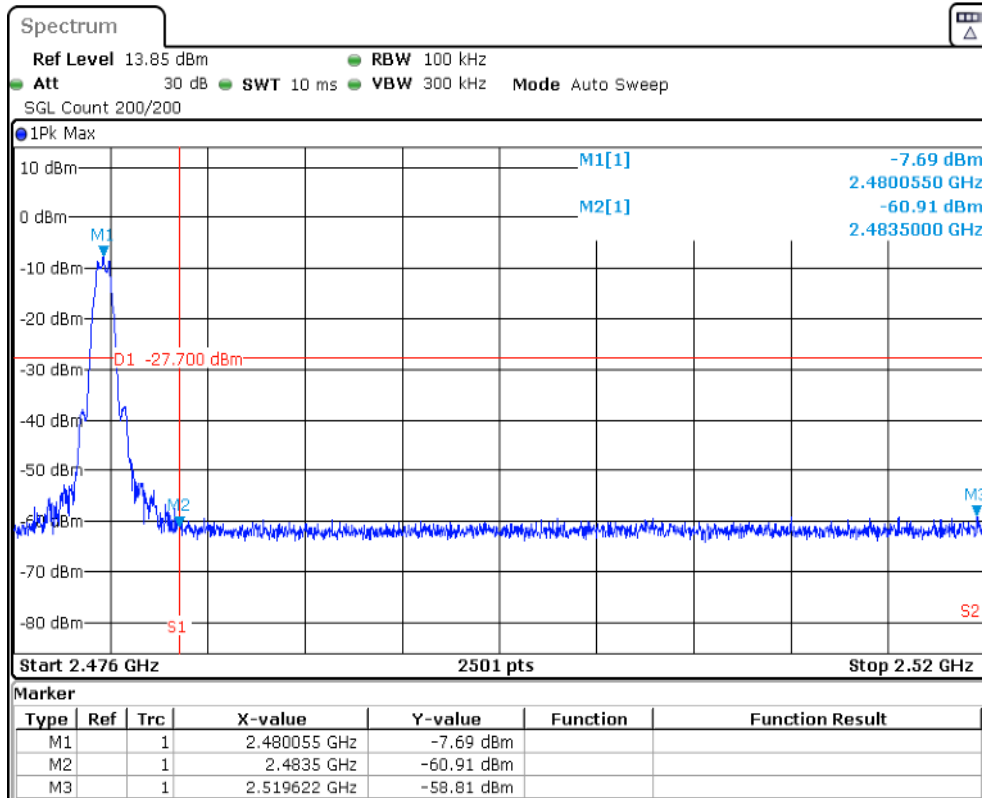
Spurious Conducted Emissions

TX Frequency 2402MHz _ Band Edge



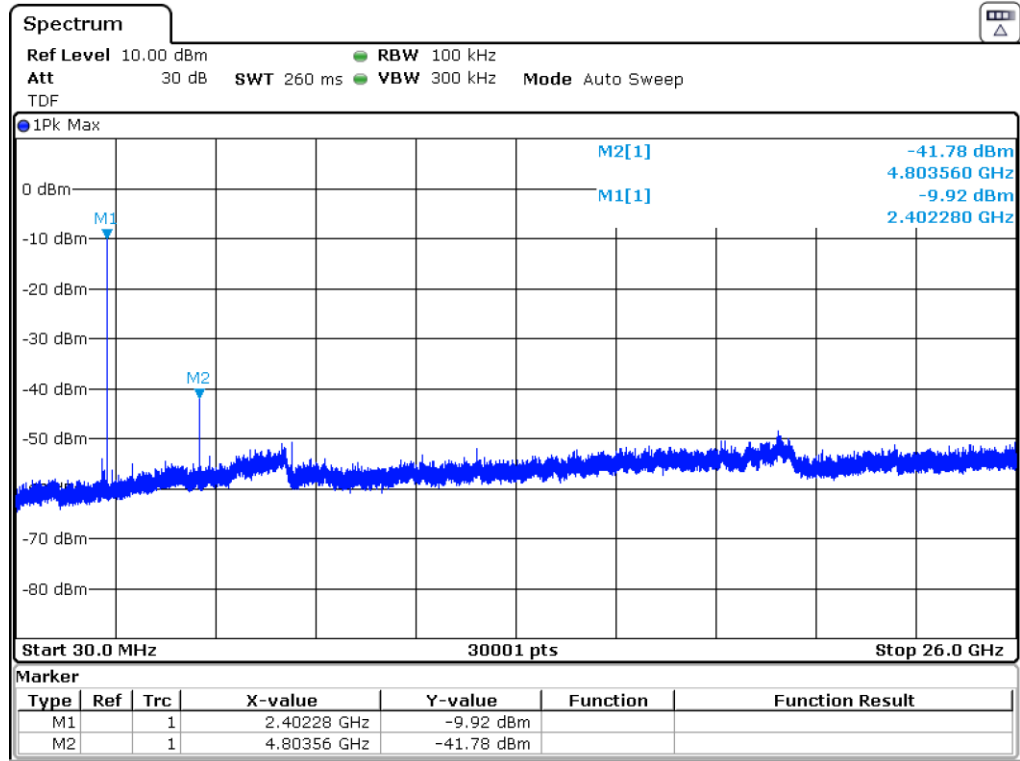
Date: 4.SEP.2024 16:19:14

TX Frequency 2480MHz _ Band Edge



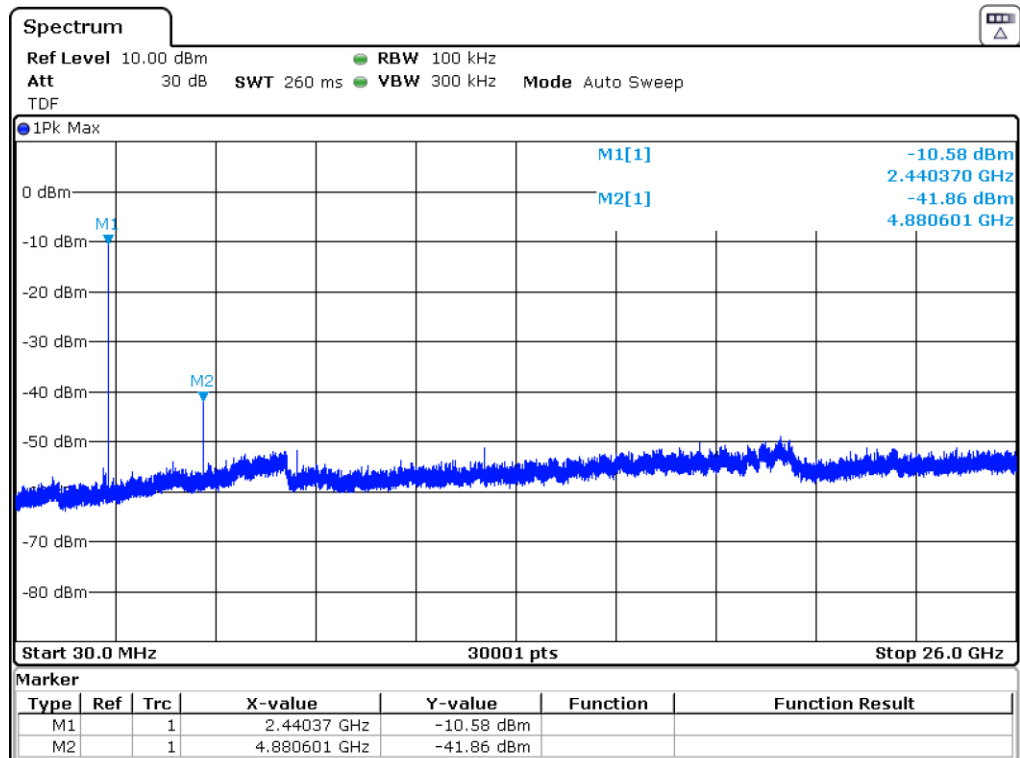
Date: 4.SEP.2024 16:26:01

TX Frequency 2402MHz _ 30M~26GHz Pre-scan



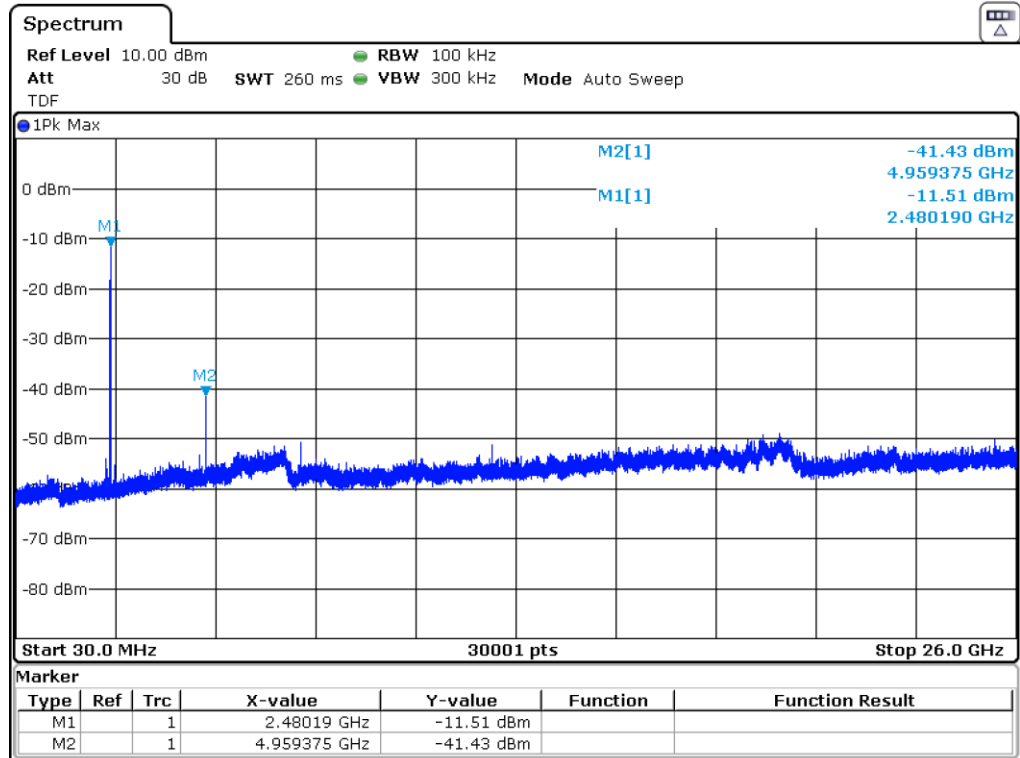
Date: 13.SEP.2024 11:38:00

TX Frequency 2440MHz _ 30M~26GHz Pre-scan



Date: 13.SEP.2024 11:45:27

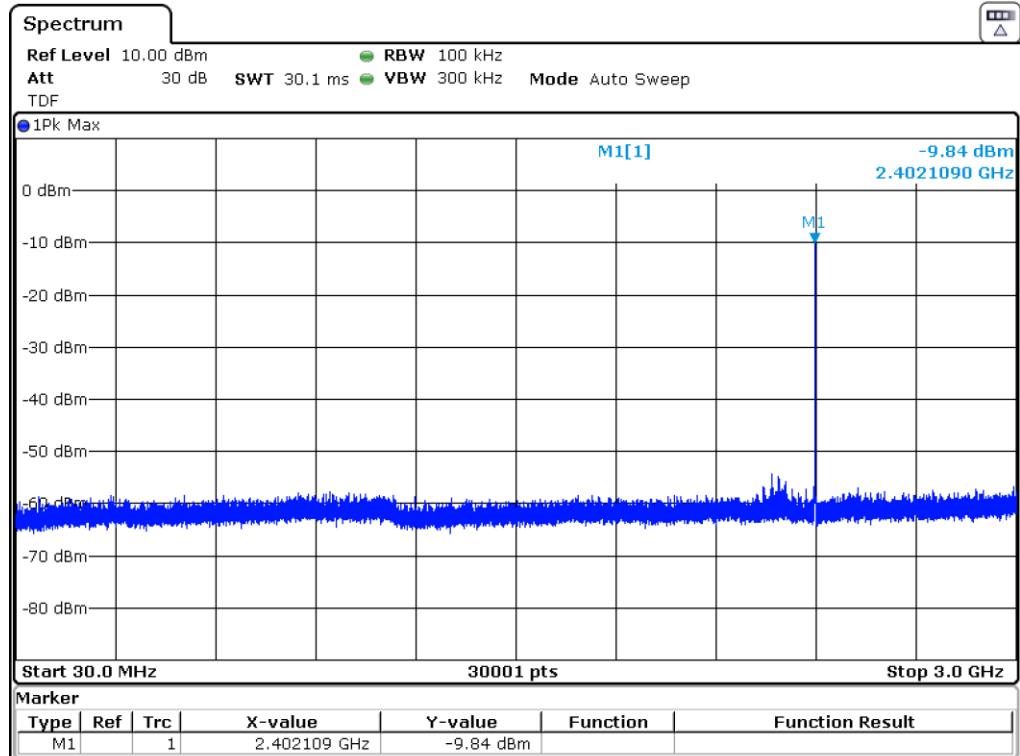
TX Frequency 2480MHz _ 30M~26GHz Pre-scan



Date: 13.SEP.2024 11:47:24

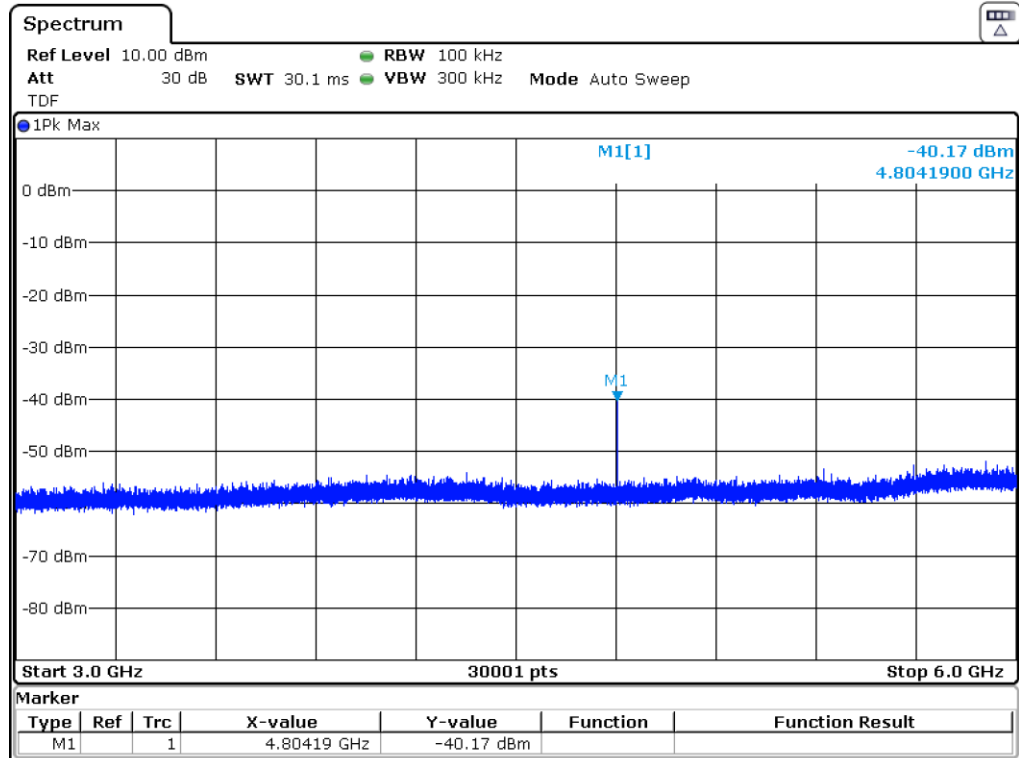
Worse Case

TX Frequency 2402MHz _ 30M~3GHz



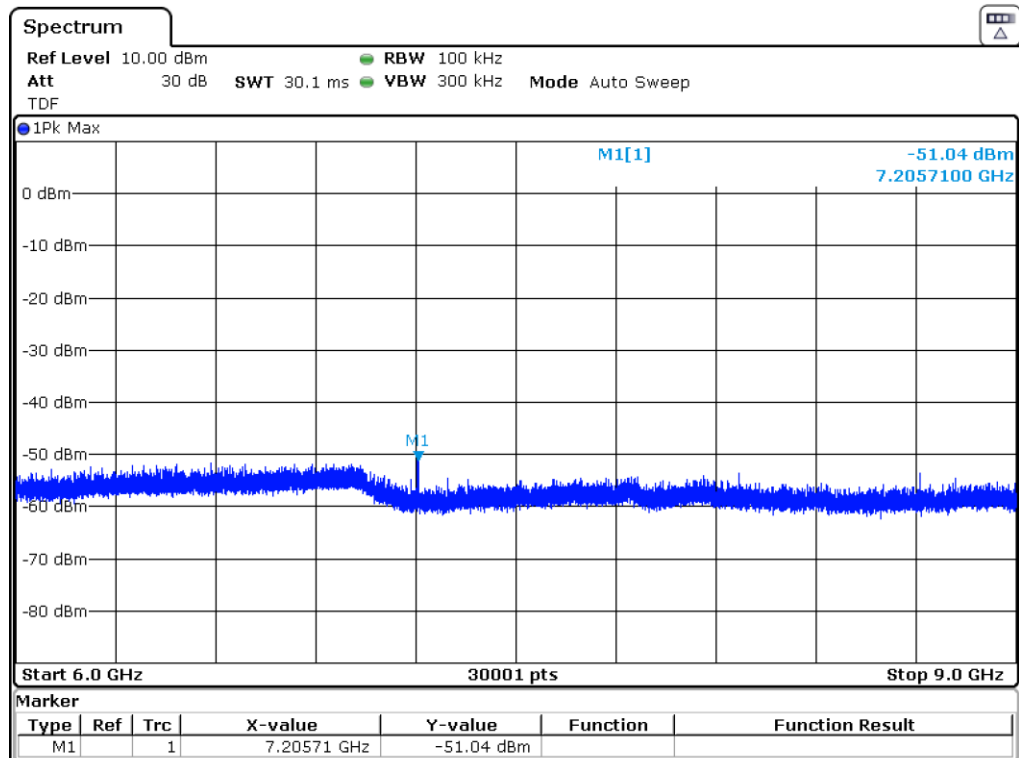
Date: 13.SEP.2024 11:39:08

TX Frequency 2402MHz _ 3G~6GHz



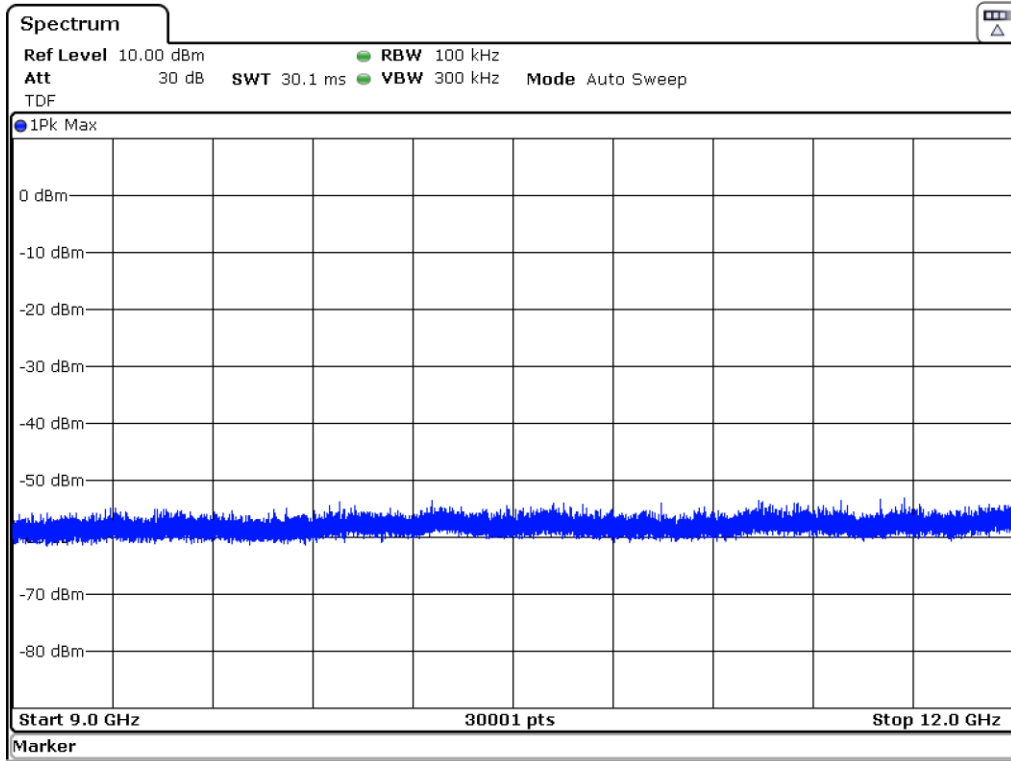
Date: 13.SEP.2024 11:39:46

TX Frequency 2402MHz _ 6G~9GHz



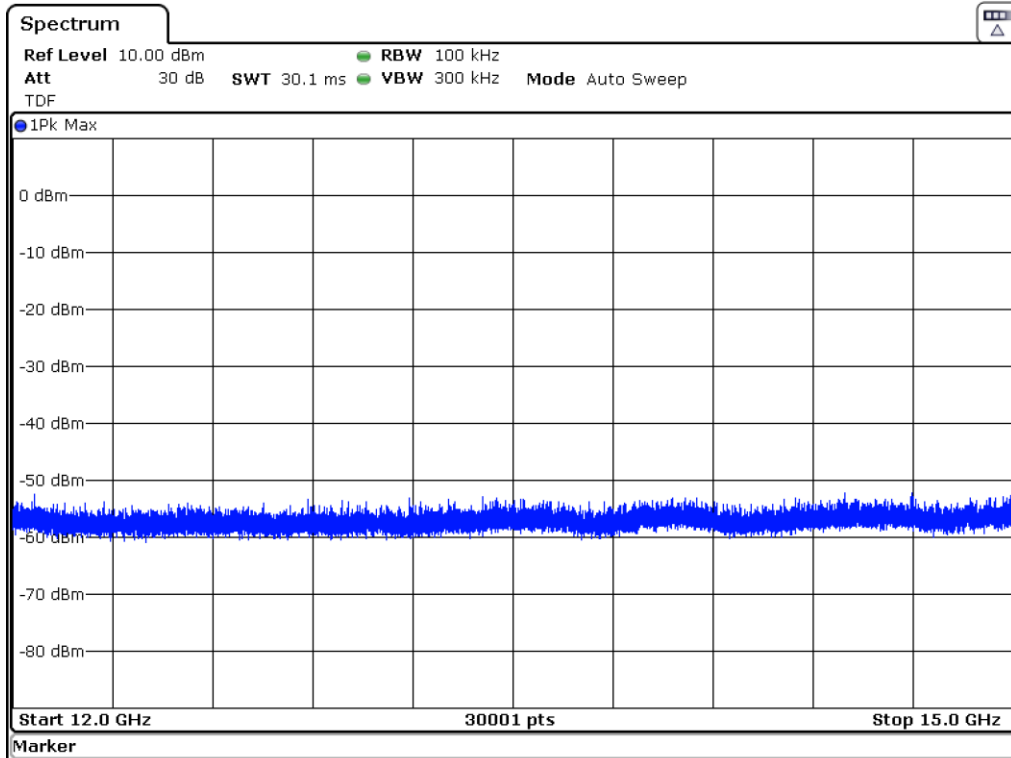
Date: 13.SEP.2024 11:40:20

TX Frequency 2402MHz _ 9G~12GHz



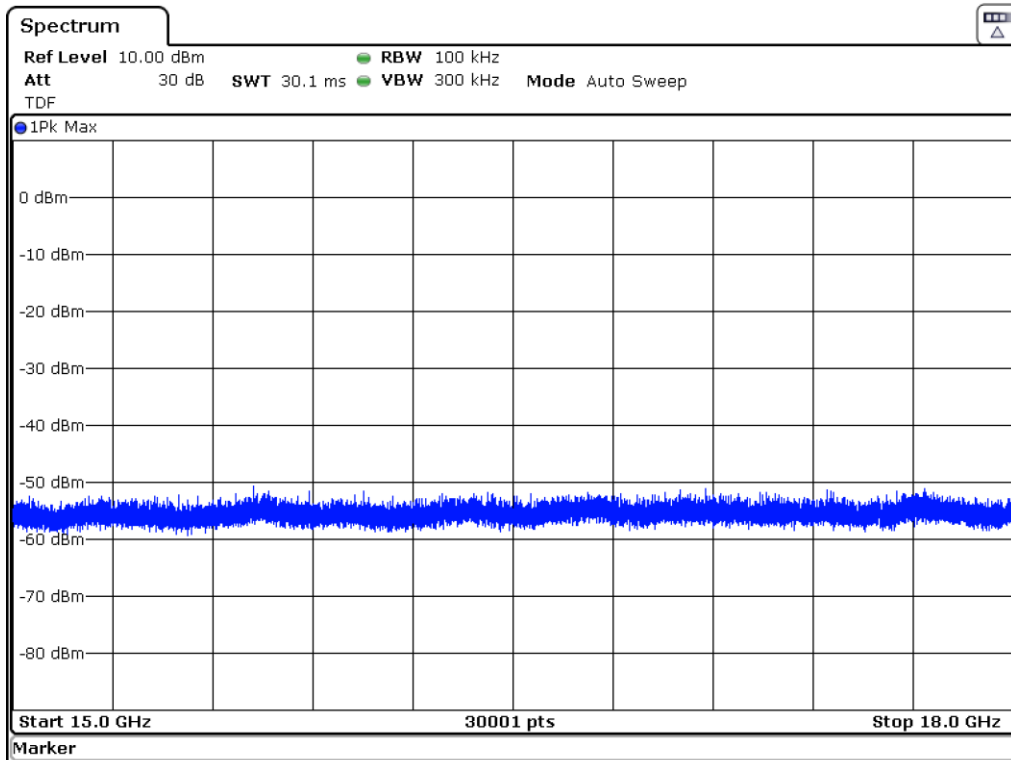
Date: 13.SEP.2024 11:40:55

TX Frequency 2402MHz _ 12G~15GHz



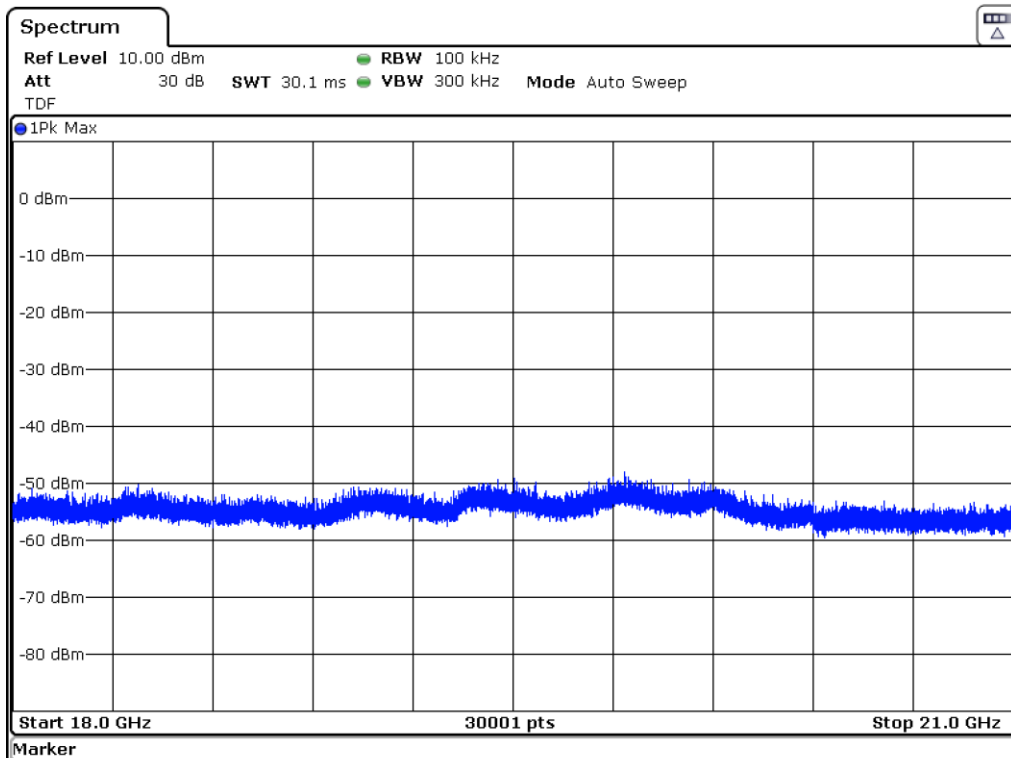
Date: 13.SEP.2024 11:41:26

TX Frequency 2402MHz _ 15G~18GHz



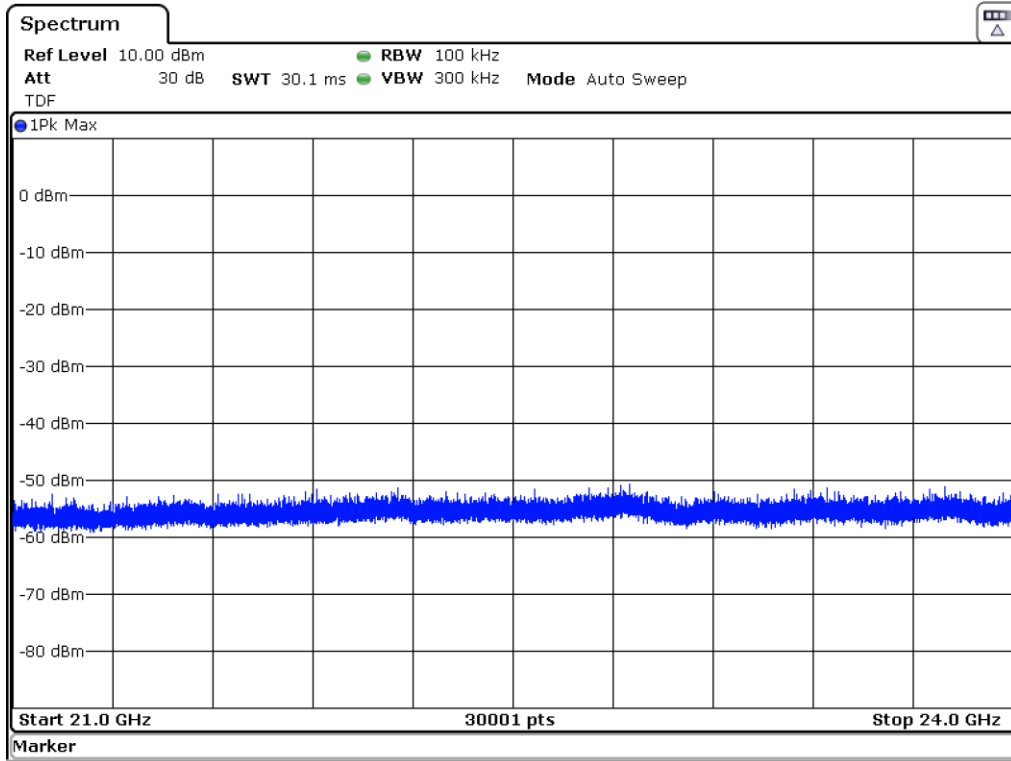
Date: 13.SEP.2024 11:41:54

TX Frequency 2402MHz _ 18G~21GHz



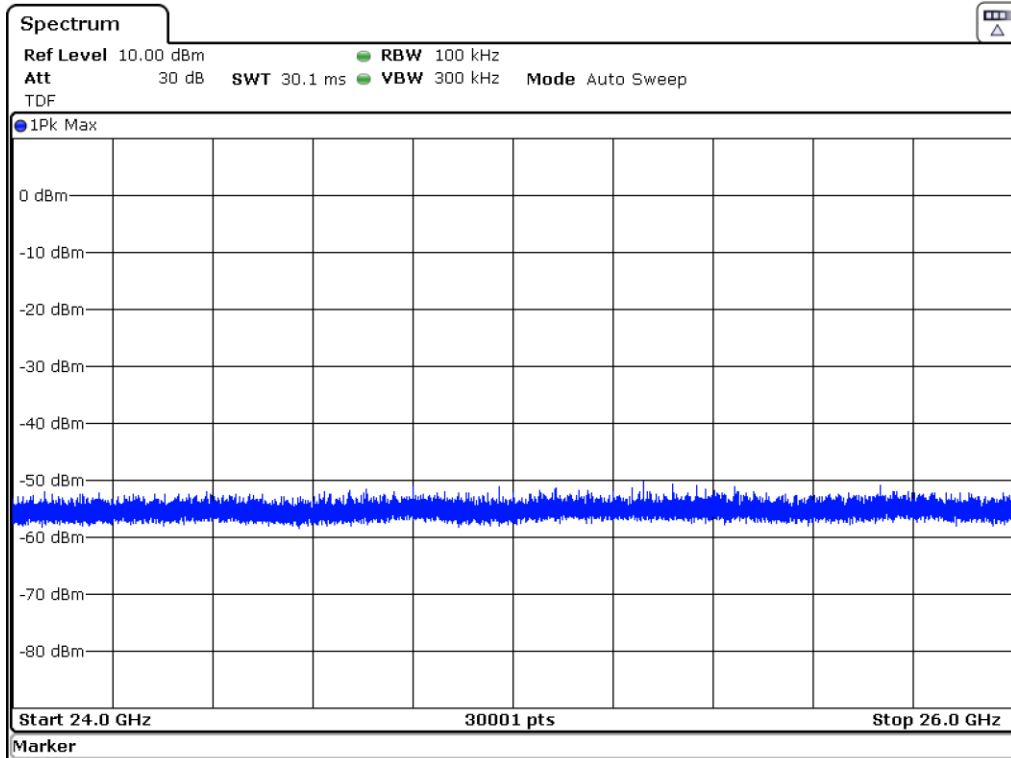
Date: 13.SEP.2024 11:42:25

TX Frequency 2402MHz _ 21G~24GHz



Date: 13.SEP.2024 11:42:55

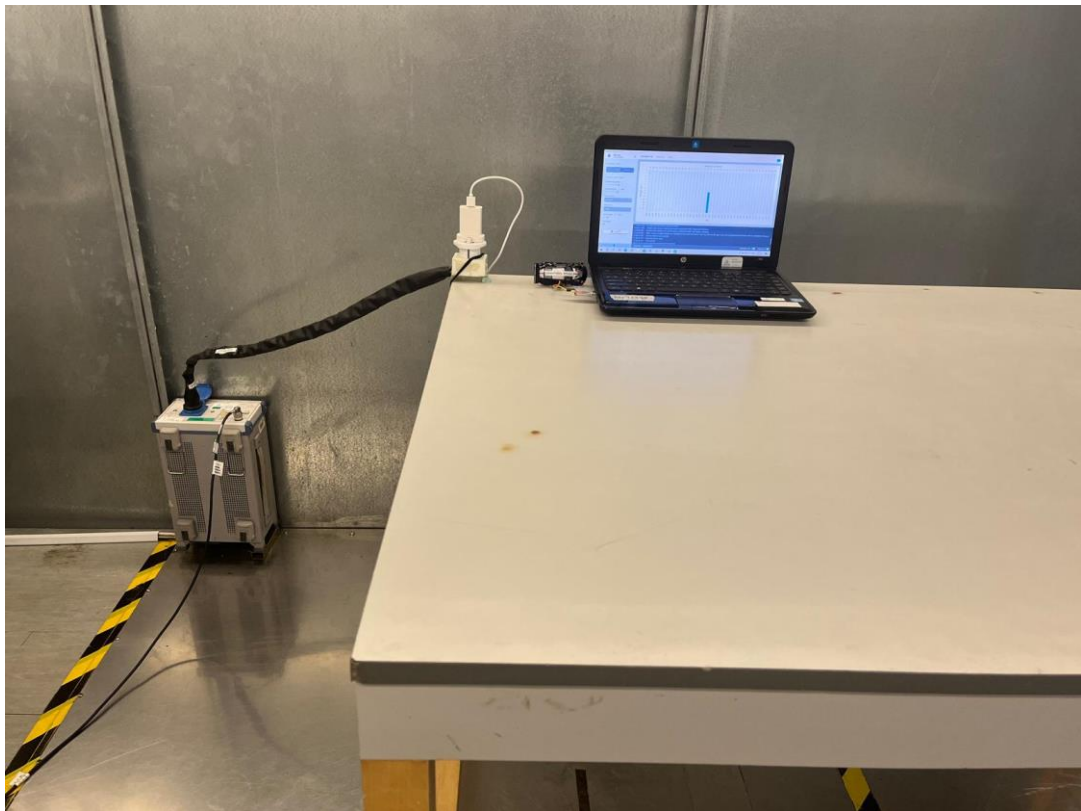
TX Frequency 2402MHz _ 24G~26GHz



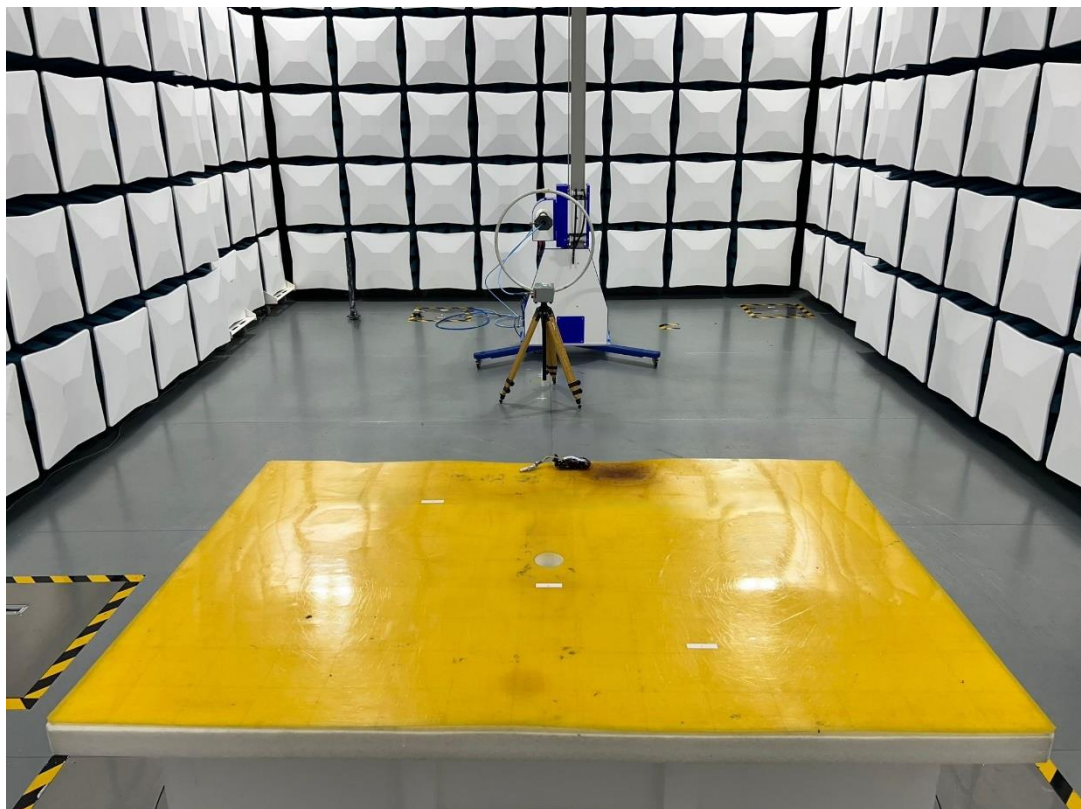
Date: 13.SEP.2024 11:43:24

Appendix 2

Test Setup Photos



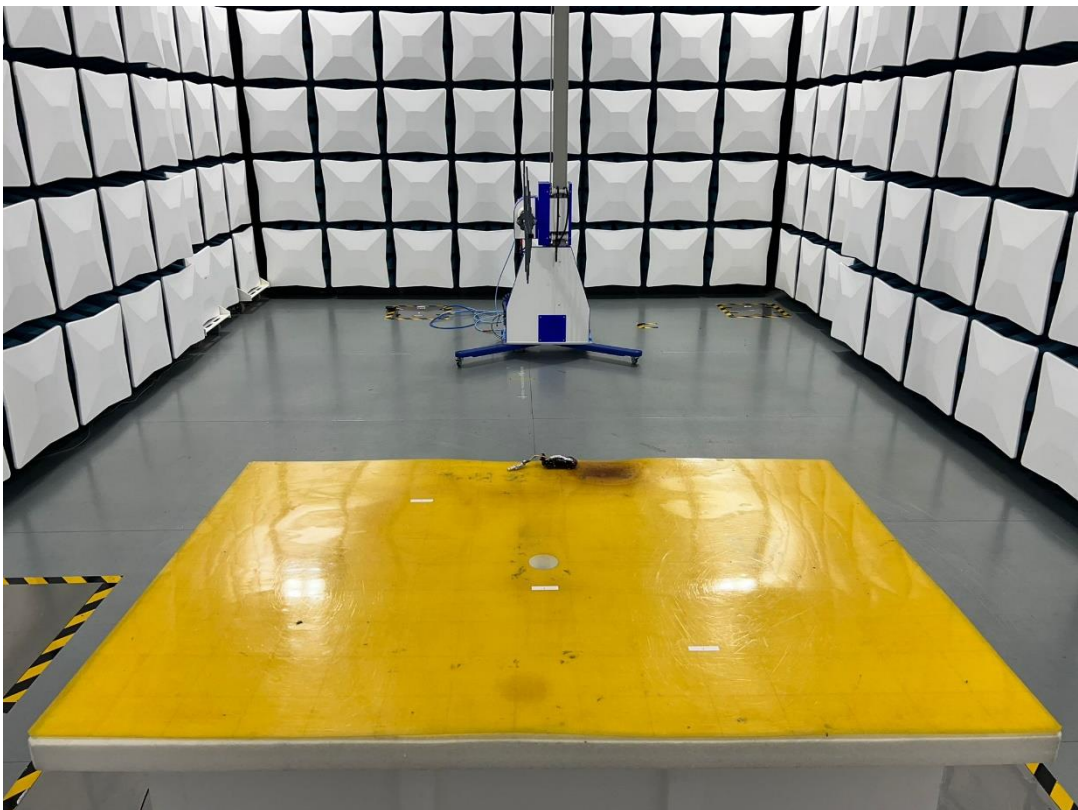
Set-up for Conducted Emission on AC Mains



Set up for Radiated Emission Below 30MHz



Set up for Radiated Emission 30M~200MHz



Set up for Radiated Emission Below 200M~1GHz



Set up for Radiated Emission Above 1GHz

Appendix 3

EUT External Photos

FCC ID : YFACARHYB51000
IC ID : 12260A-CARHYB51000
HVIN : CARHYB51000



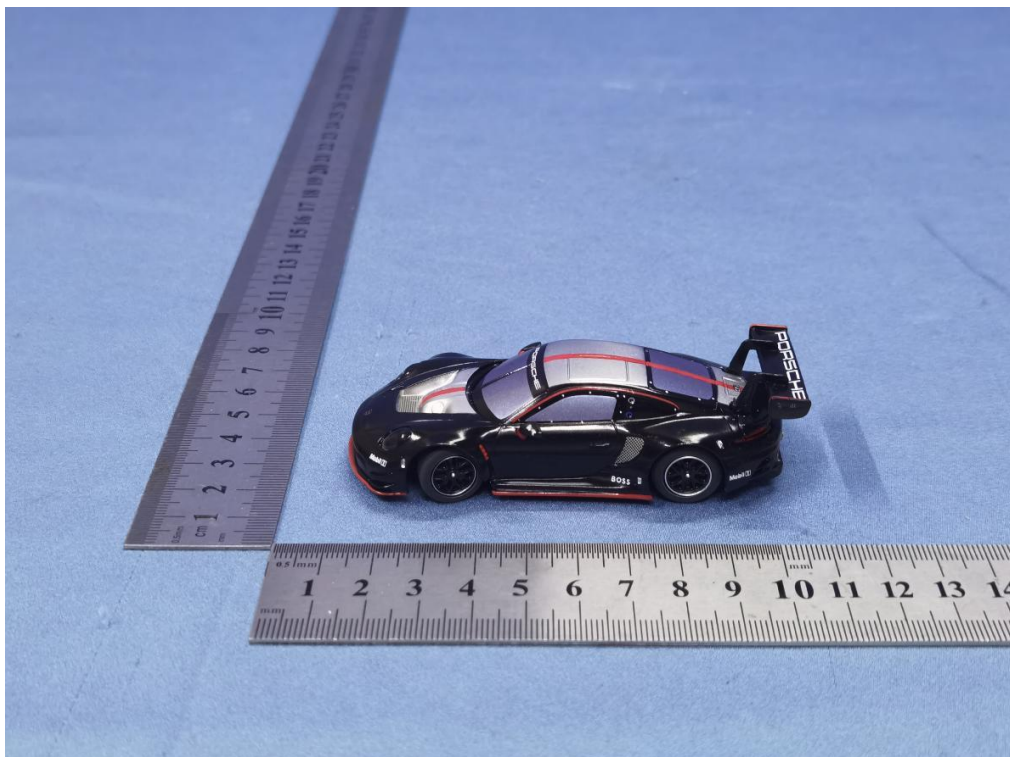
External View



External View



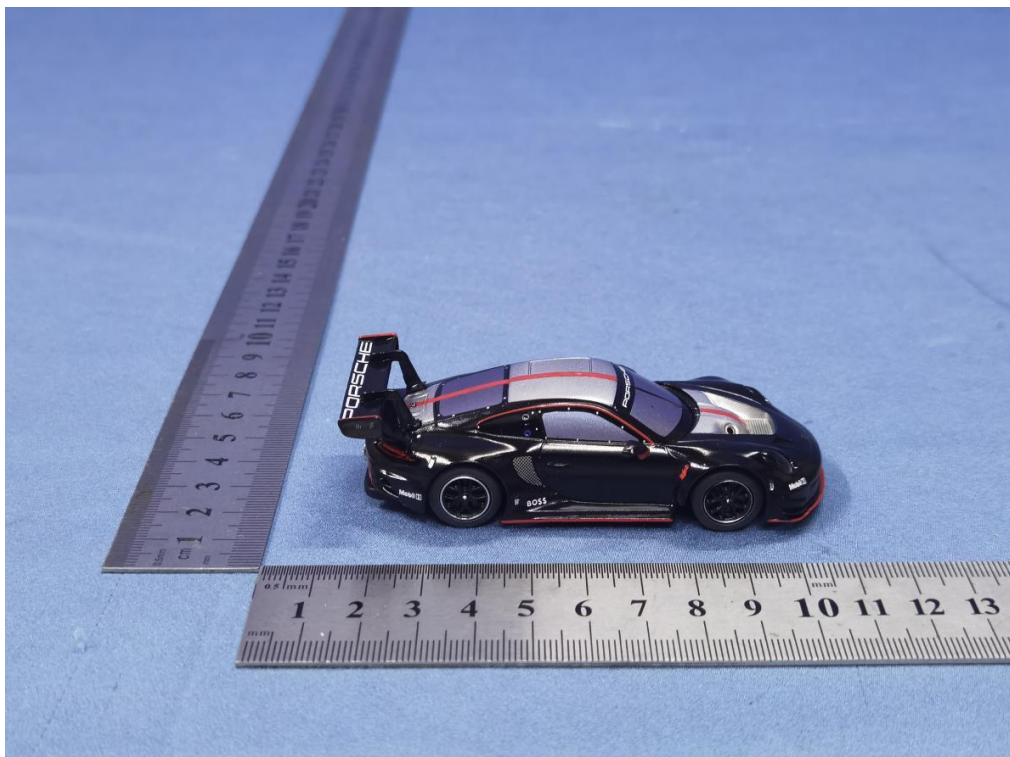
External View



External View



External View

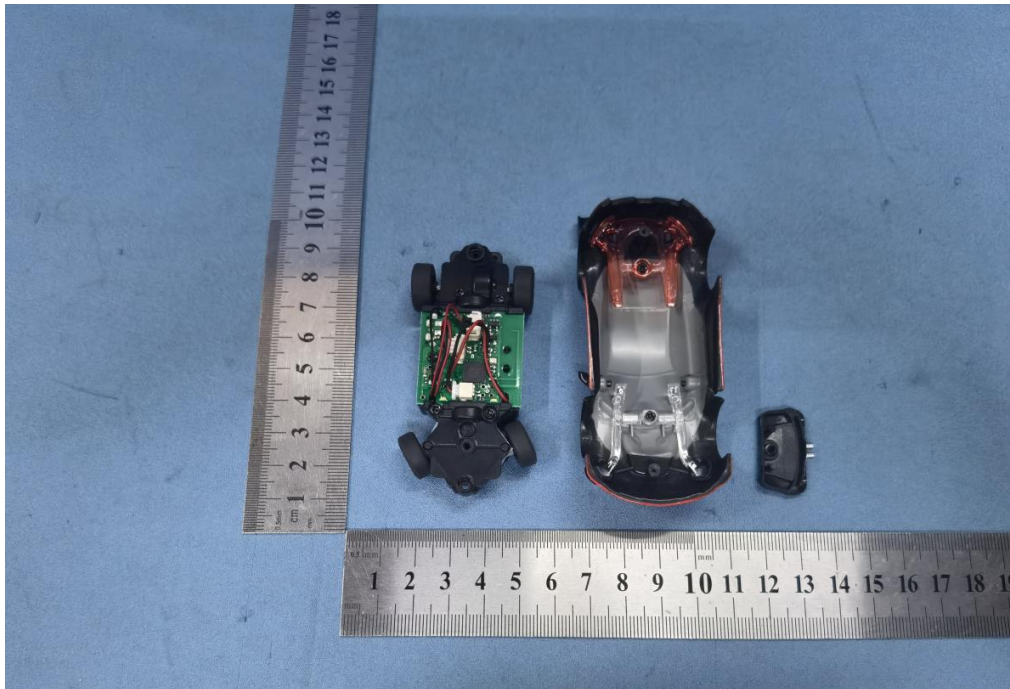


External View

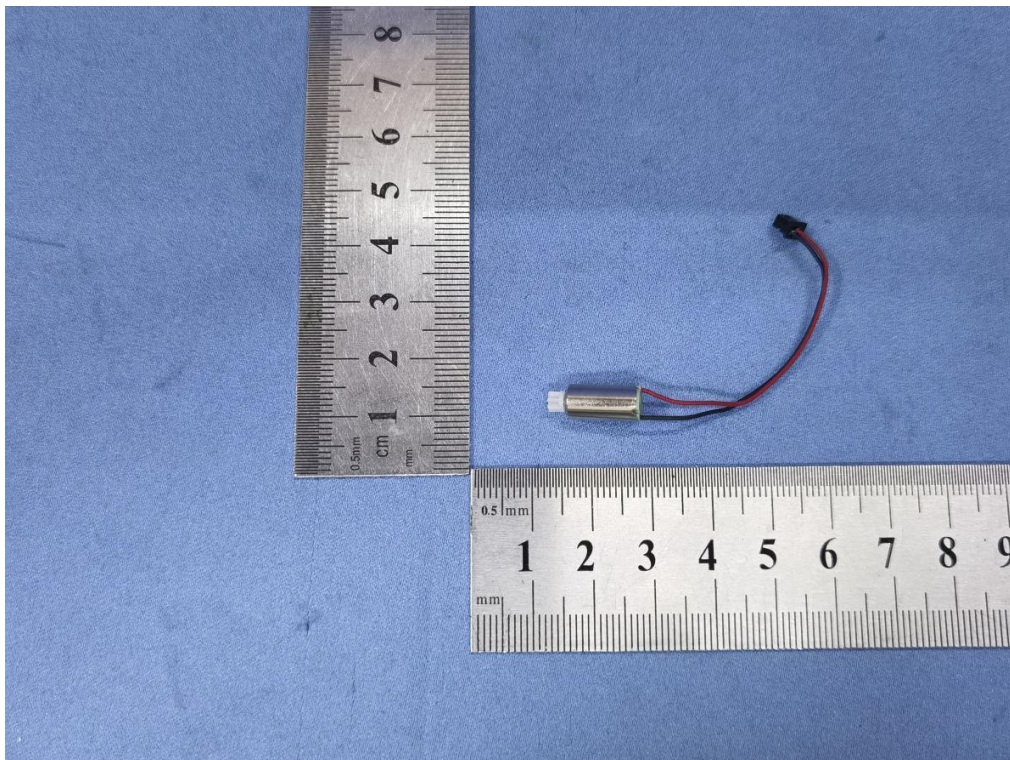
Appendix 4

EUT Internal Photos

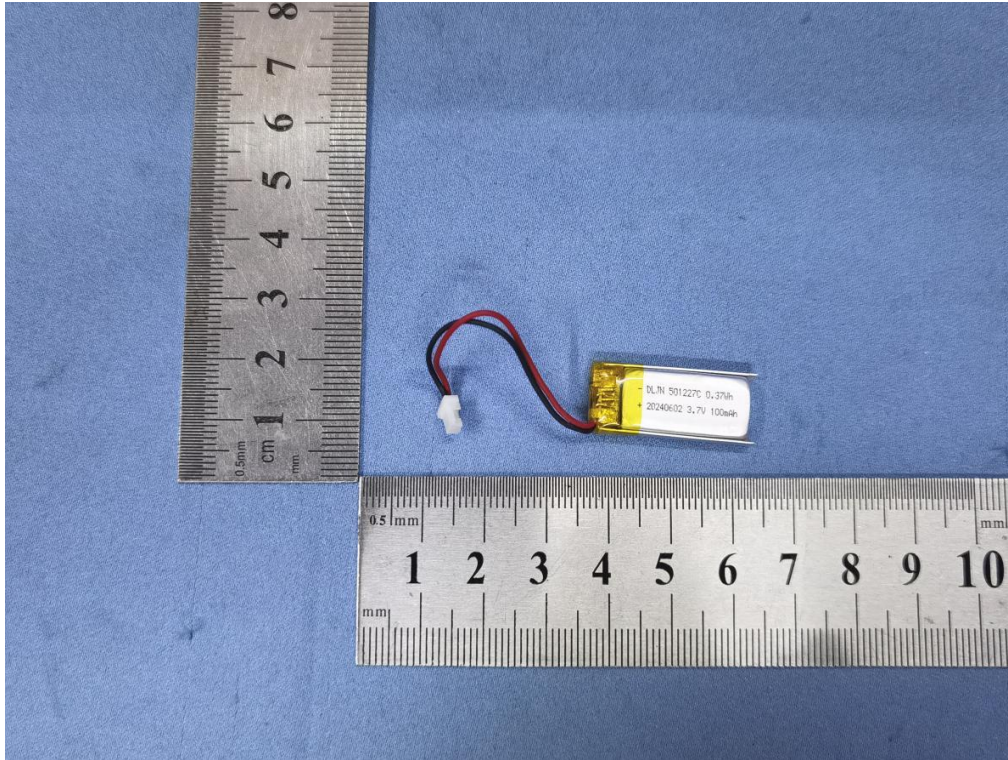
FCC ID : YFACARHYB51000
IC ID : 12260A-CARHYB51000
HVIN : CARHYB51000



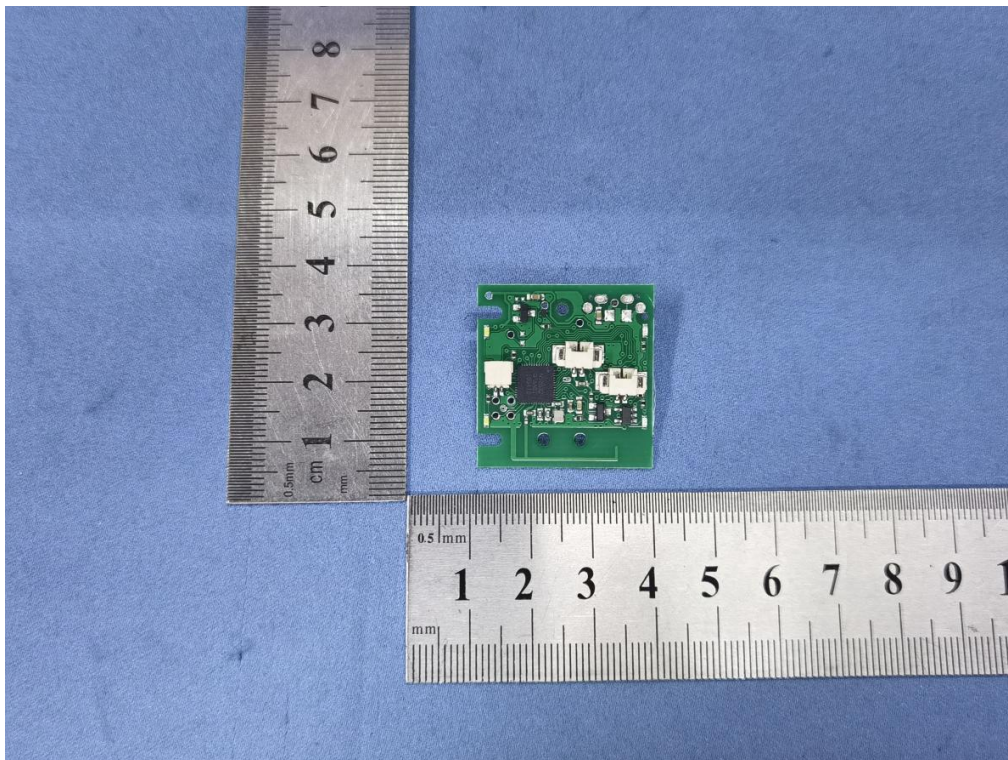
Internal View



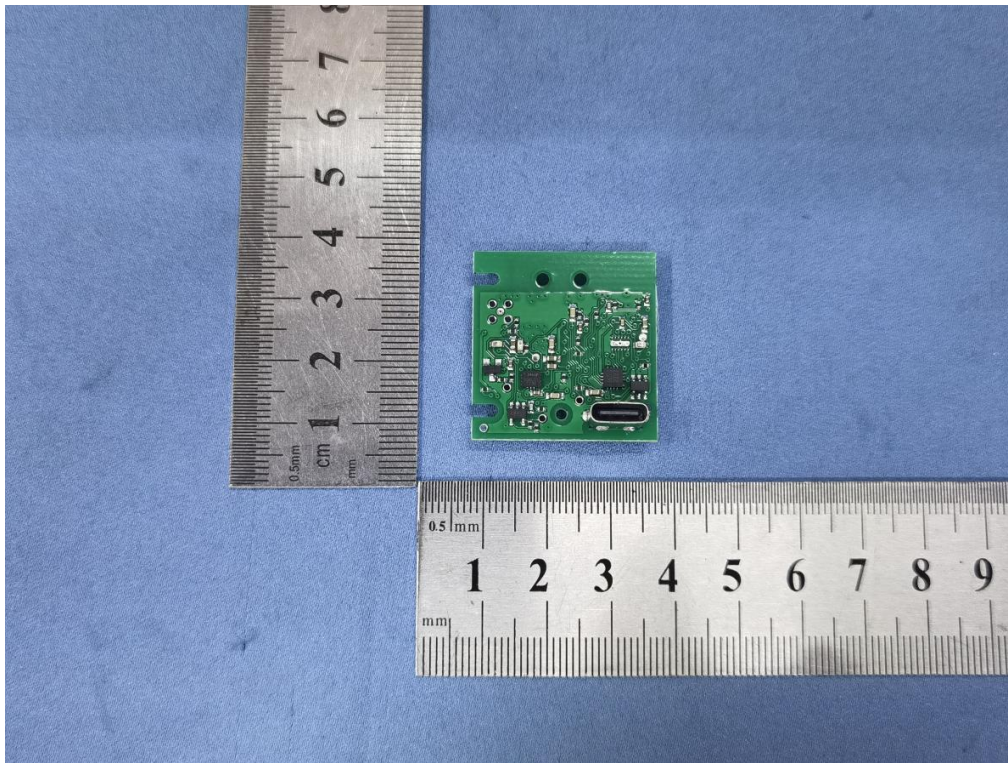
Internal View



Internal View



Internal View



Internal View

Appendix 5

RF Exposure Information

FCC ID : YFACARHYB51000
IC ID : 12260A-CARHYB51000
HVIN : CARHYB51000

Maximum transmitter power

Bluetooth Transmitter

Frequency (MHz)	Maximum peak output power (dBm)	Output power (mW)
2402	-7.87	0.163
2440	-7.46	0.179
2480	-7.58	0.175

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(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

$$(0.163/5) \cdot \sqrt{2.402} = 0.051 < 3.0$$

$$(0.179/5) \cdot \sqrt{2.440} = 0.056 < 3.0$$

$$(0.175/5) \cdot \sqrt{2.480} = 0.055 < 3.0$$

Conclusion:

No SAR is required.

For ISED

According to table 11 in RSS-102 Issue 6, below exemption limit is applied:

Frequency: 2440 MHz

At separation distance ≤ 5 mm

Exemption limits: 3mW

Results:

max. power of channels = 0.179 mW < 3mW

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.