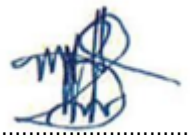
RADIO REPORT

FCC 47 CFR Part 15C

Digital transmission systems operating within the 2400.0 MHz - 2483.5 MHz band

Report Reference No	G0M-2405-2567-TFC247BL-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	STEINER-Optik GmbH
Address	Dr.-Hans-Frisch-Str. 9 95448 Bayreuth GERMANY
Test Specification	47 CFR Part 15C
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Scope with Bluetooth and Display
Model(s)	STEINER eRanger8 3-24x50mm
Additional Model(s)	None
Brand Name(s)	None
Hardware Version(s)	v1.0; CYBLE-416045-02
Software Version(s)	v0.0.16
FCC ID	2BDTF-EP8
Contains FCC ID	WAP6045
Test Result	**PASSED**

Possible test case verdicts:		
Required by standard but not tested	N/T	
Not required by standard	N/R	
Not applicable to EUT	N/A	
Test object does meet the requirement	P(PASS)	
Test object does not meet the requirement	F(FAIL)	
Testing:		
Test Lab Temperature	20 °C - 30 °C	
Test Lab Humidity	25 % - 55 %	
Date of receipt of test item	See test sample identification table on page 7	
Report:		
Compiled by	Godson Offorji	
Tested by (+ signature) (Responsible for Test)	Godson Offorji	
Approved by (+ signature) (Senior Radio Expert)	Radwan Jaafar	
Date of Issue	2025-03-14	
Total number of pages	28	
General Remarks:		
The test results presented in this report relate only to the object tested. **The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.** This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		
None		

ADDITIONAL VARIANTS

Additional Variants (not tested and not evaluated variants)		
Not-tested Variant	**Description**	
1	Product Type Description	Scope with Bluetooth and Display
	Model name	STEINER eRanger8 3-24x56
	Brand name	--
	Hardware Version	v1.0; CYBLE-416045-02
	Software Version	v0.0.16
2	Product Type Description	Scope with Bluetooth and Display
	Model name	STEINER eRanger8 4-32x56
	Brand name	--
	Hardware Version	v1.0; CYBLE-416045-02
	Software Version	v0.0.16
3	Product Type Description	Scope with Bluetooth and Display
	Model name	STEINER eRanger8 2-16x50
	Brand name	--
	Hardware Version	v1.0; CYBLE-416045-02
	Software Version	v0.0.16
4	Product Type Description	Scope with Bluetooth and Display
	Model name	STEINER ePredator8 2-16x42
	Brand name	--
	Hardware Version	v1.0; CYBLE-416045-02
	Software Version	v0.0.16
Comment: Those named additional variants above have not been tested. Those additional variants of the series have been declared by the manufacturer. The test report explicitly states that those variants were neither tested nor assessed nor evaluated.		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2025-03-14	Initial Release	--

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V_{NOM}	Nominal supply voltage

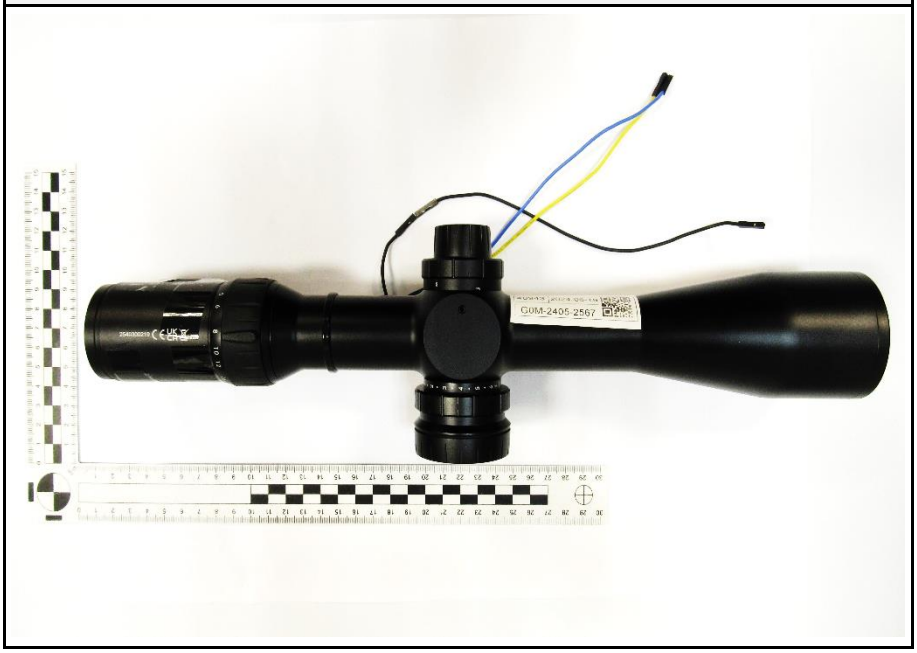
REPORT INDEX

1 Equipment (Test item) Under Test

Description	Scope with Bluetooth and Display			
Model	STEINER eRanger8 3-24x50mm			
Additional Model(s)	None			
Brand Name(s)	None			
Sample Identification	EUT #	Sample-ID	Serial Number	Date of receipt
	EUT 1	48943	2540300219	2024-06-19
Hardware Version(s)	v1.0; CYBLE-416045-02			
Software Version(s)	v0.0.16			
FCC ID	2BDTF-EP8			
Contains FCC ID	WAP6045			
Equipment type	End Product			
Radio type	Transceiver			
Assigned frequency bands	2400.0 MHz - 2483.5 MHz			
Radio technology	Bluetooth LE 5.0			
Bluetooth Specification	LE 1M PHY	No		
	LE 2M PHY	Yes		
	LE Coded PHY S=8 (125 kbit)	No		
	LE Coded PHY S=2 (500 kbit)	No		
	Stable Modulation Index - Transmitter	No		
	Stable Modulation Index - Receiver	No		
Modulation	GFSK			
Number of antenna ports	1			
Radio Module	Type	Bluetooth Low Energy (LE)		
	Model	CYBLE-416045-02		
	Manufacturer	Infineon		
	HW Version	v1.0		
	SW Version	v0.0.16		
	FCC-ID	WAP6045		
Antenna	Type	Integrated Antenna		
	Model	PCB trace		
	Manufacturer	Infineon		
	Peak Gain	-0.5 dBi (From antenna data sheet)		
Supply Voltage	V_{NOM}	3 V DC via internal lithium battery (CR123A)		
Operating Temperature	T_{NOM}	20°C		
AC/DC-Adaptor	None			
Manufacturer	Infineon Technologies AG Am Campeon 1-15 85579 Neubiberg Germany			

1.1 Photos – Equipment External

EUT Top View

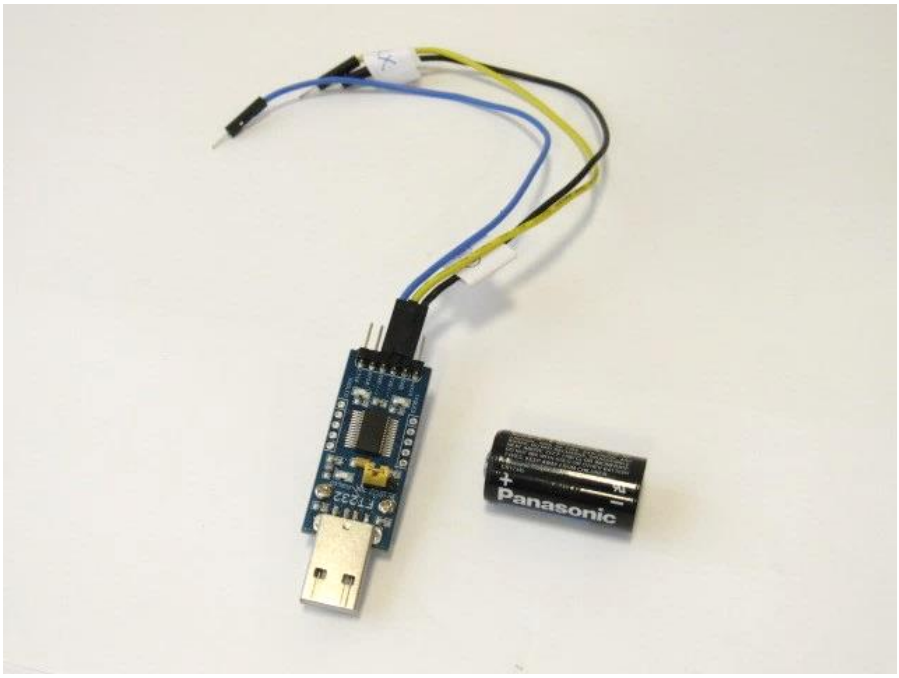

EUT Bottom View


EUT left View


EUT Right View


0 EUT Front View


EUT Rear View


EUT Support Equipment


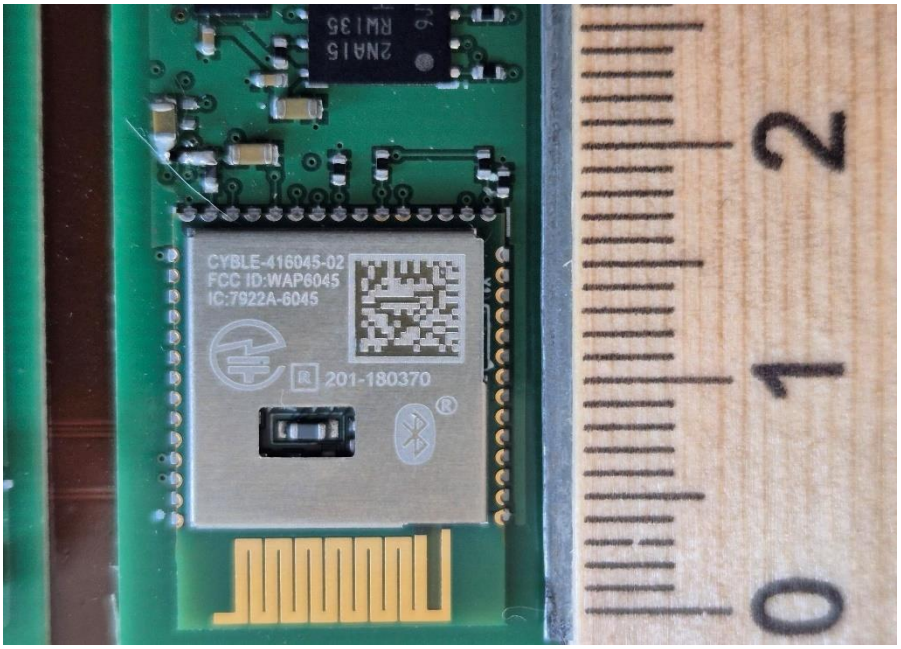
EUT Perspective View 1


EUT Perspective View 2


1.2 Photos – Equipment Internal

EUT Open View 1


EUT Open View 2


Module View


1.3 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Lithium Battery	Panasonic Corporation	CR123A	Used to power the Scope
AE	USB Serial Converter Board	Waveshare	FT232	For DTM BLE software communication interface
SFT	Bluetooth LE DTM over UART	--	--	For Test configuration
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment: None				

1.4 Test Modes

Mode	Description
GFSK	Mode = Transmit Modulation = GFSK Spreading = None Duty cycle = 87% (duty cycle correction factor was taken into account) Payload = PRBS9 Power = Pmax (based on the module test report) Length [Bytes] = 193
Comment: The above settings are found as worst case during evaluation of the original modular test report issued by TA Technology (Shanghai) Co.,Ltd Test report No.R2112A1110-R1 on December 17, 2021.	

1.5 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx	0	2402

1.6 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBµV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on Analyzer (dBµV) + A.F. (dB/m) = Net field strength (dBµV/m)

Net:

This is the net field strength measurement (as shown above).

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Field strength limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Field strength limit (dBµV/m) = 20 · log (µV/m)

Example only for radiated field strength:

Reading + AF	= Net Reading	:	Net reading	- Field strength limit	= Margin
+21.5 dBµV	+ 26 dB/m	:	47.5 dBµV/m	- 57.0 dBµV/m	= -9.5

2 Result Summary

FCC 47 CFR Part 15C				
Product Standard Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
FCC § 15.247(a)(2)	6 dB Bandwidth	ANSI C63.10-2013	N/T	See Note 1
FCC § 15.247(b)	Maximum peak conducted power	ANSI C63.10-2013	N/T	See Note 1
FCC § 15.247(e)	Power spectral density	ANSI C63.10-2013	N/T	See Note 1
FCC § 15.207	AC power line conducted emissions	ANSI C63.10-2013	N/R	Only Battery powered
FCC § 15.247(d)	Band edge compliance	ANSI C63.10-2013	N/T	See Note 1
FCC § 15.247(d)	Conducted spurious emissions	ANSI C63.10-2013	N/T	See Note 1
FCC § 15.247(d) FCC § 15.209	Transmitter radiated spurious emissions	ANSI C63.10-2013	PASS	--
Note 1: Integration of Certified Module by TA Technology (Shanghai) Co.,Ltd Test Report No.R2112A1110-R1 Issued Date December 17, 2021.				
Comment: The Decision Rule is applied on the basis of ETSI TR 102 273 and ETSI TR 100 028. These standards provide guidance on how to calculate and apply measurement uncertainty whilst providing maximum uncertainties allowance. In all cases due consideration will be given to ILAC-G8:09/2019. Where a result is considered conditional in respect of its proximity to the limit line, the customer would be made aware of situation so that they can make an informed decision on how to proceed.				

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

3 Test Conditions and Results

3.1 Test Conditions and Results - Transmitter radiated emissions

3.1.1 Information

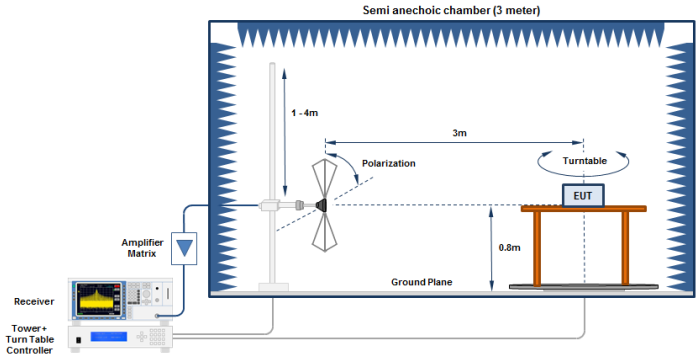
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Godson Offorji
Date	2024-10-04

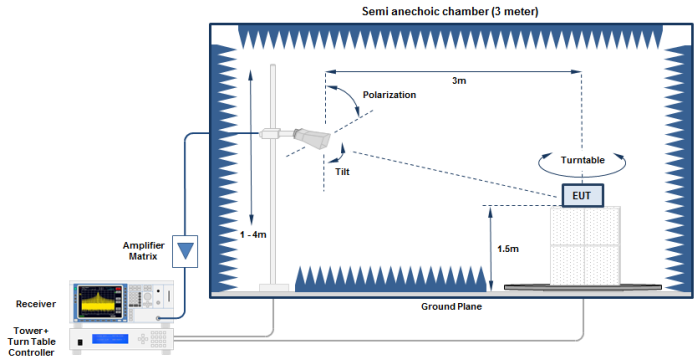
3.1.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.1.3 Setup

Test Setup 30 MHz - 1000 MHz



Test Setup > 1 GHz


3.1.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2023.2.6
EMC Software	DARE Instruments	RadiMation	2024.1.3

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2024-07	2027-07
EMI Test Receiver	R&S	ESW44	EF01856	2024-04	2025-04
Antenna	Schwarzbeck	VULB 9168	EF01824	2022-10	2025-10

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC2	EF01616	2024-07	2025-07
Spectrum analyzer	R&S	FSW43	EF00896	2024-07	2025-07
Antenna	Schwarzbeck	BBHA 9120B	EF01678	2024-05	2027-05
Antenna	Schwarzbeck	HWRD 650	EF01679	2024-05	2027-05
Antenna	Amplifier Research	AT4560	EF00302	2023-09	2025-09

3.1.5 Procedure

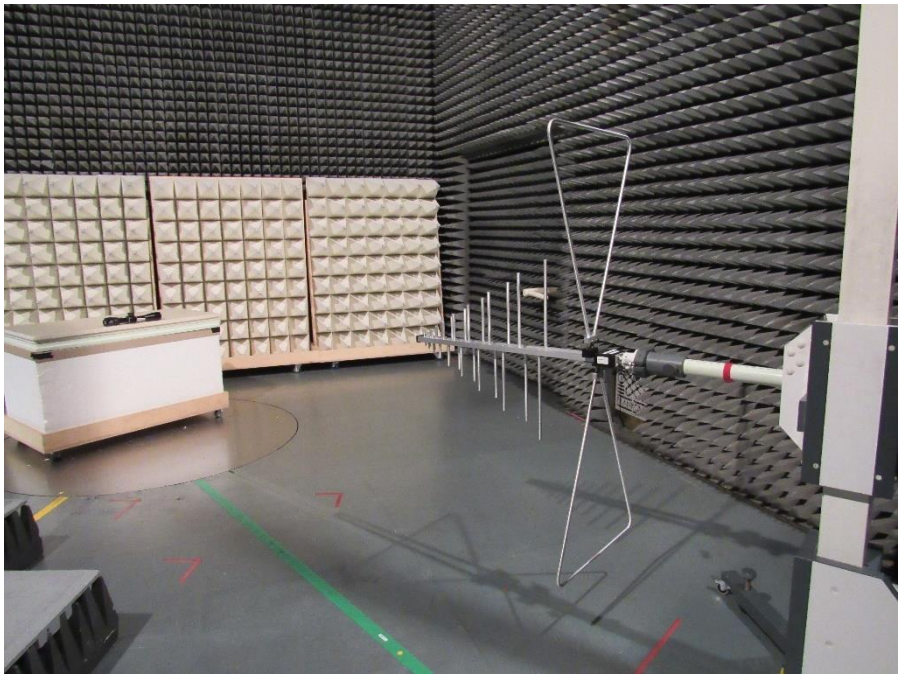
Test Procedure 30 MHz - 1000 MHz
1. EUT is placed on a non-conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz
1. EUT is placed on a non-conducting support at the centre of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

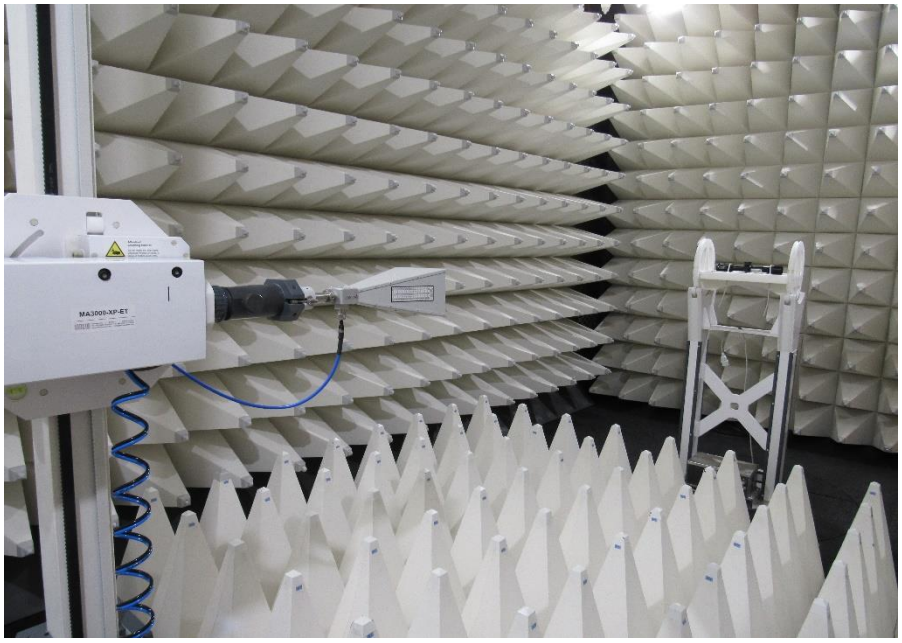
Test Results						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2402	1464.4467	46.92	pk	ver	74	-27.08
2402	1464.4467	28.28	avg	ver	54	-25.72
2402	4803.2	47.67	pk	ver	74	-26.33
2402	4803.2	41.1	avg	ver	54	-12.9

3.1.6 Setup Photos

Setup Below 1 GHz



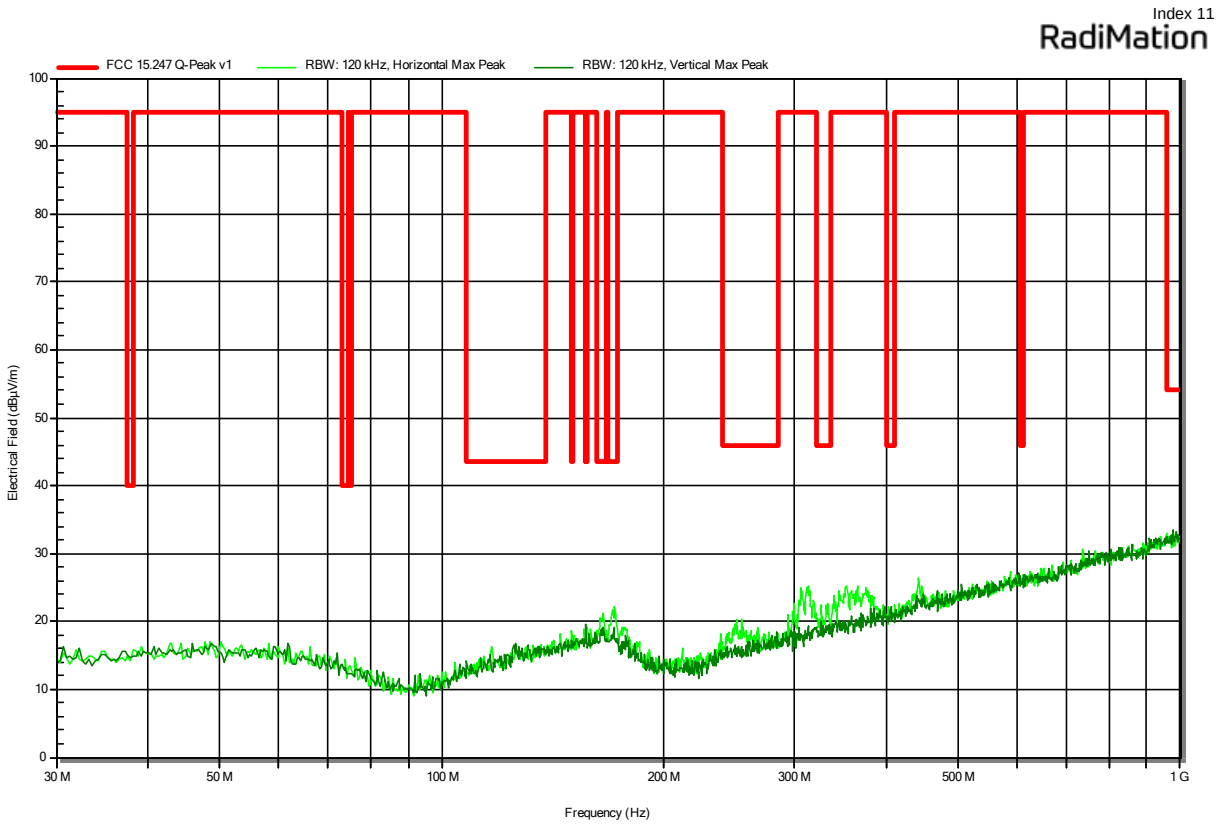
Setup Above 1 GHz



ANNEX A Transmitter spurious emissions

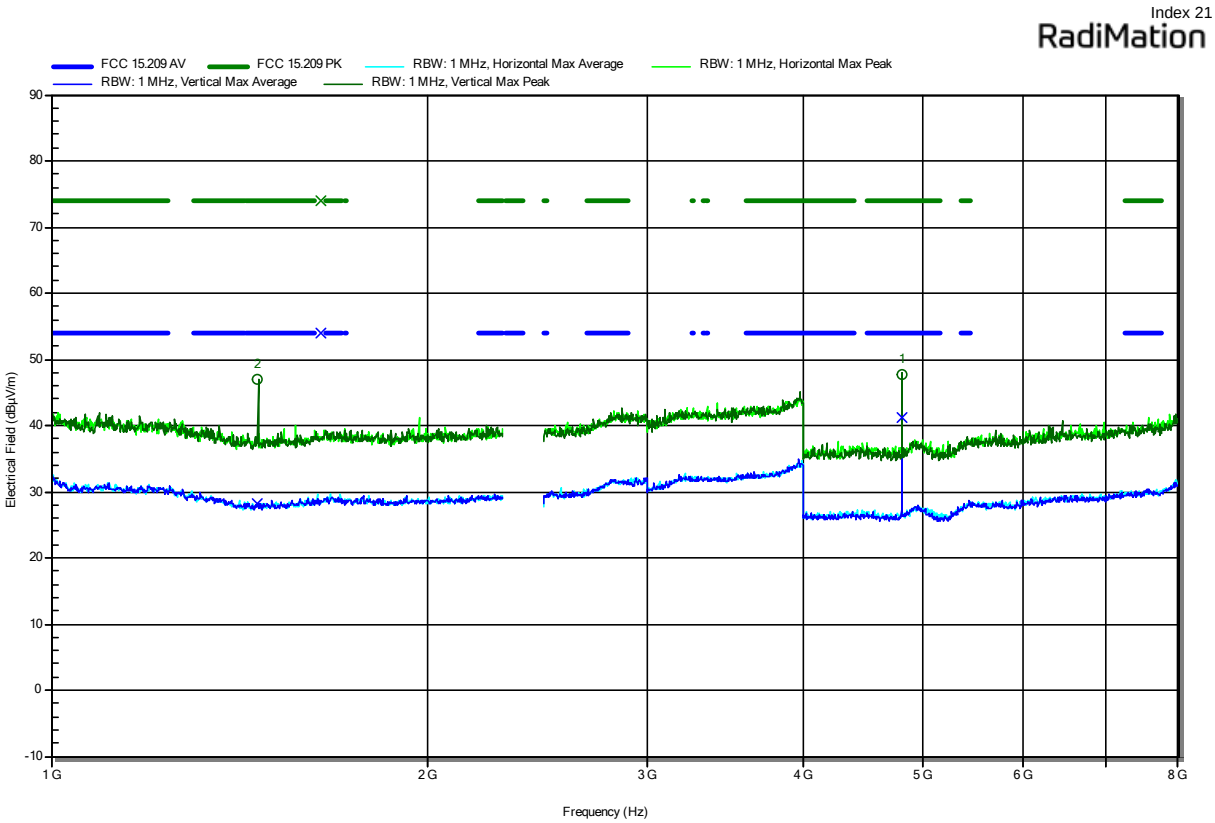
Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2405-2567
Applicant:	STEINER-Optik GmbH
Model Description:	Scope with Bluetooth and Display
Model:	STEINER eRanger8 2-16x50mm
Test Sample ID:	48943
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Offorji
Measurement software:	RadiMation, version 2023.2.6
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3 V DC (Lithium Battery)
Antenna:	Schwarzbeck VULB 9168
Measurement distance:	3 m
Mode:	Tx; BLE, 2402 MHz, 2 Mbps
Test Date:	2024-10-04



Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2405-2567
Applicant:	STEINER-Optik GmbH
Model Description:	Scope with Bluetooth and Display
Model:	STEINER eRanger8 2-16x50mm
Test Sample ID:	48943
Test Site:	Eurofins Product Service GmbH
Operator:	Godson Offorji
Measurement software:	RadiMation, version 2024.1.3
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3 V DC (Lithium Battery)
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; BLE, 2402 MHz, 2 Mbps
Test Date:	2024-10-04

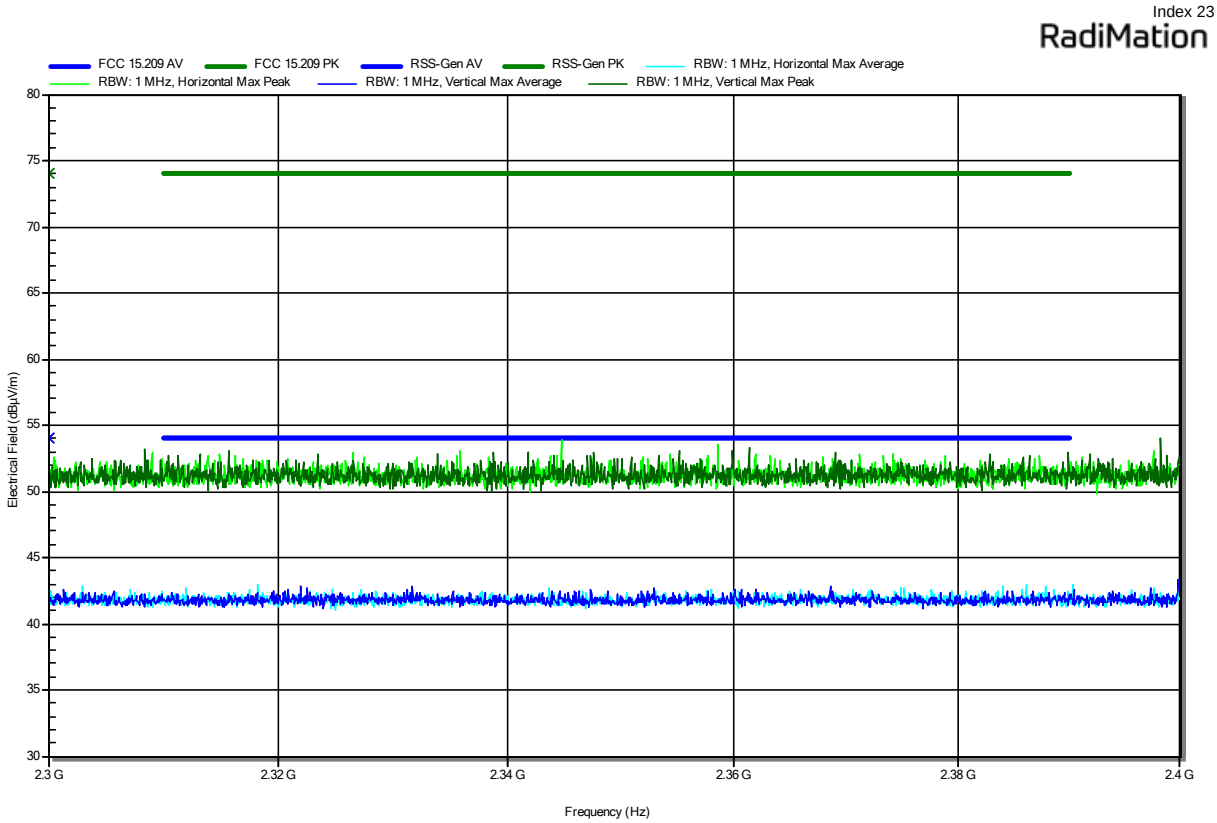


Peak Number	Frequency (MHz)	Peak (dBµV/m)	Peak (dBµV/m)	Limit	Peak Difference (dB)	Peak Status	Polarization
1	4803.2	47.67	74		-26.33	Pass	Vertical
2	1464.4467	46.92	74		-27.08	Pass	Vertical

Peak Number	Frequency (MHz)	Average (dBµV/m)	Average (dBµV/m)	Limit	Average Difference (dB)	Average Status	Polarization
1	4803.2	41.1	54		-12.9	Pass	Vertical
2	1464.4467	28.28	54		-25.72	Pass	Vertical

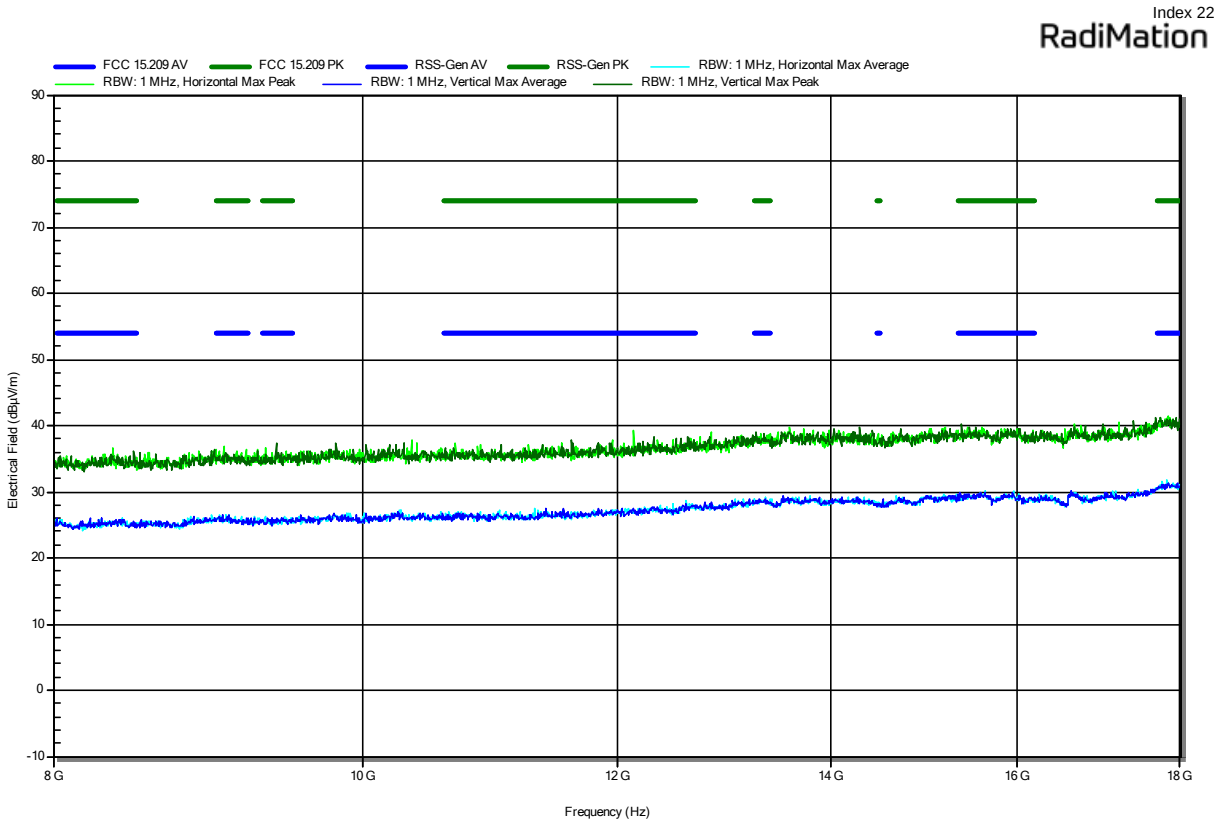
Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2405-2567
Applicant:	STEINER-Optik GmbH
Model Description:	Scope with Bluetooth and Display
Model:	STEINER eRanger8 2-16x50mm
Test Sample ID:	48943
Test Site:	Eurofins Product Service GmbH
Operator:	Godson Offorji
Measurement software:	RadiMation, version 2024.1.3
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3 V DC (Lithium Battery)
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; BLE, 2402 MHz, 2 Mbps
Test Date:	2024-10-04
Note:	Band edge check



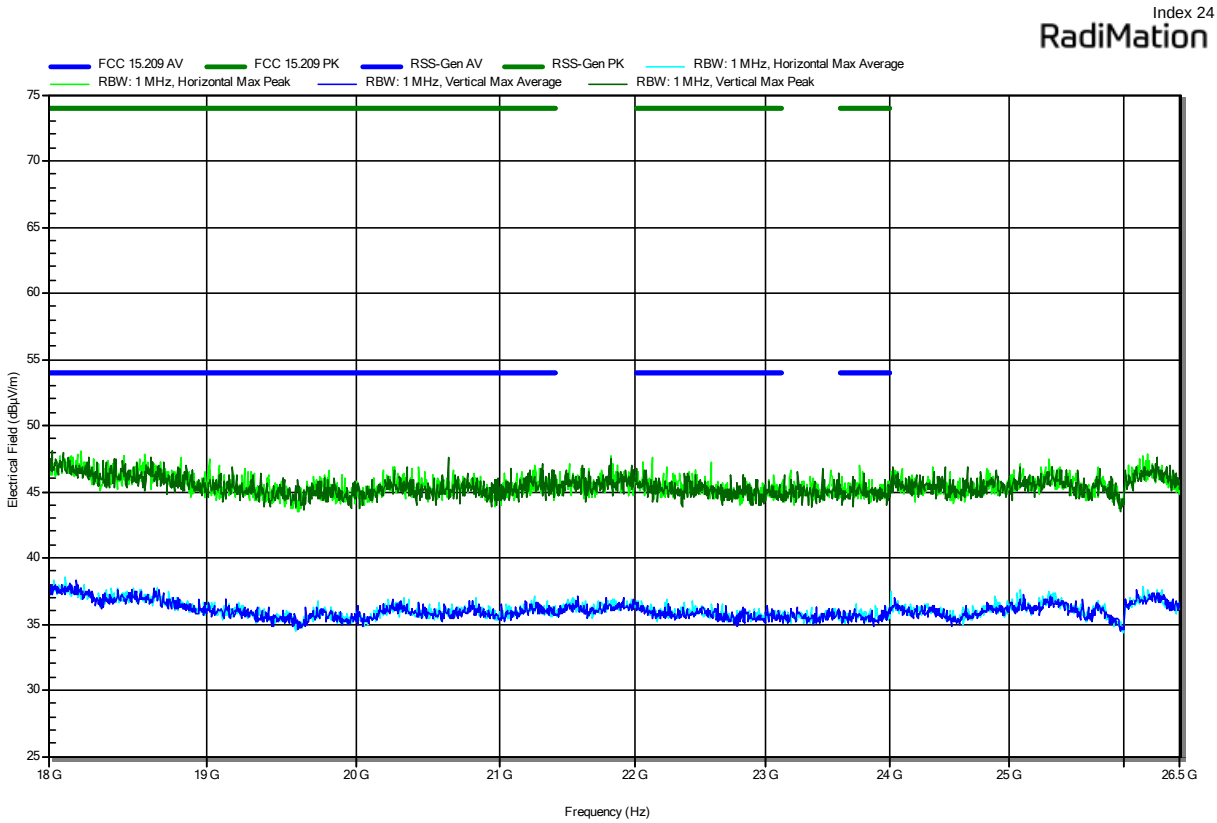
Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2405-2567
Applicant:	STEINER-Optik GmbH
Model Description:	Scope with Bluetooth and Display
Model:	STEINER eRanger8 2-16x50mm
Test Sample ID:	48943
Test Site:	Eurofins Product Service GmbH
Operator:	Godson Offorji
Measurement software:	RadiMation, version 2024.1.3
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3 V DC (Lithium Battery)
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; BLE, 2402 MHz, 2 Mbps
Test Date:	2024-10-04



Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2405-2567
Applicant:	STEINER-Optik GmbH
Model Description:	Scope with Bluetooth and Display
Model:	STEINER eRanger8 2-16x50mm
Test Sample ID:	48943
Test Site:	Eurofins Product Service GmbH
Operator:	Godson Offorji
Measurement software:	RadiMation, version 2024.1.3
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3 V DC (Lithium Battery)
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; BLE, 2402 MHz, 2 Mbps
Test Date:	2024-10-04



=== End of test report ===