

RADIO REPORT FCC 47 CFR Part 15C ISED Canada RSS-247 Digital transmission systems operating within the 2400.0 MHz - 2483.5 MHz band	
Report Reference No	G0M-2205-1448-TFC247BL-V03
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAkks - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A DAkks - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Schneider Electric Buildings LLC
Address	839 North Perryville IL 61107 Rockford USA
Test Specification	47 CFR Part 15C RSS-247, Issue 2, 2017-02 RSS-Gen, Issue 5, Amendment 2, 2021-02
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Radio Module (not sold separately, module is part of the commercial products)
Model(s)	EBIOTPCWM
Additional Model(s)	None
Brand Name(s)	None
Hardware Version(s)	P0070 Main_07
Software Version(s)	nRF SDK v1.9.1
FCC ID	DVE-EBIOTPCWM
IC	24775-EBIOTPCWM
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	2022-07-04	
Report:		
Compiled by	Odai Qawasmeh	
Tested by (+ signature) (Responsible for Test)	Dr.-Ing. Dhamia Almozani	
Approved by (+ signature) (Test Lab Engineer)	Burkhard Pudell	
Date of Issue	2022-12-08	
Total number of pages	86	
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:		
The Model of the radio module is EBIOTPCWM, and the commercial name TR Module. To make the report easier to read, the Model is later in the test results referred as "TR Module".		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2022-11-17	Initial Release	
02	2022-11-29	Replaced document: G0M-2205-1448-TFC247BL-V01 Replaced by: G0M-2205-1448-TFC247BL-V02 Reason: - Product Description changed - Setup photos added in section 3.8	O. Qawasmeh
03	2022-12-08	Replaced document: G0M-2205-1448-TFC247BL-V02 Replaced by: G0M-2205-1448-TFC247BL-V03 Reason: - HMN removed	Dr.-Ing. Dhamia Almozani

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

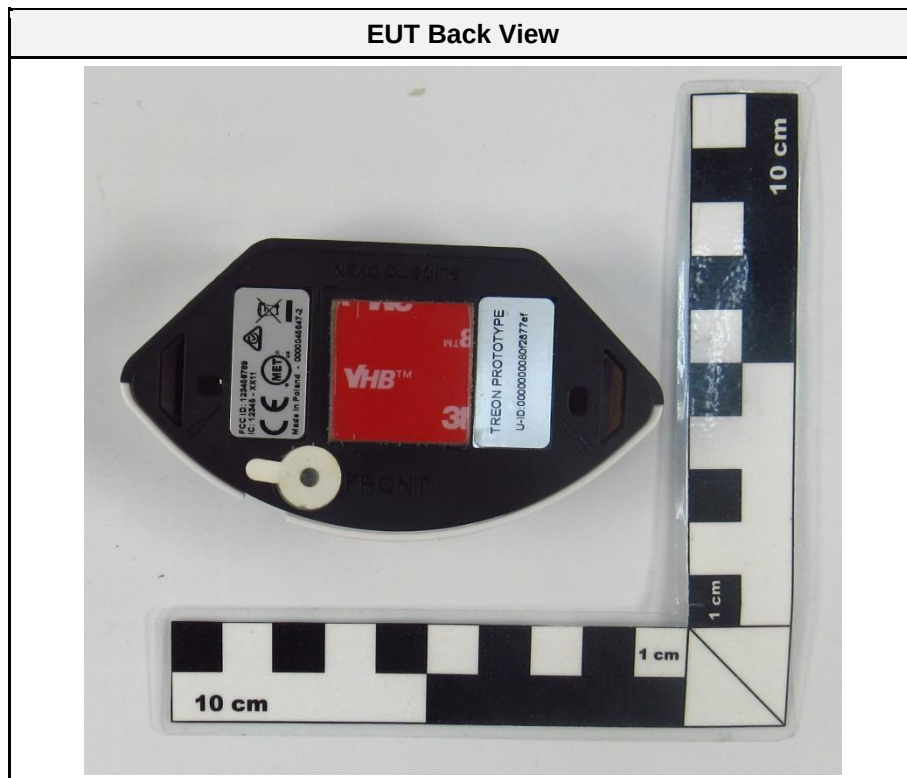
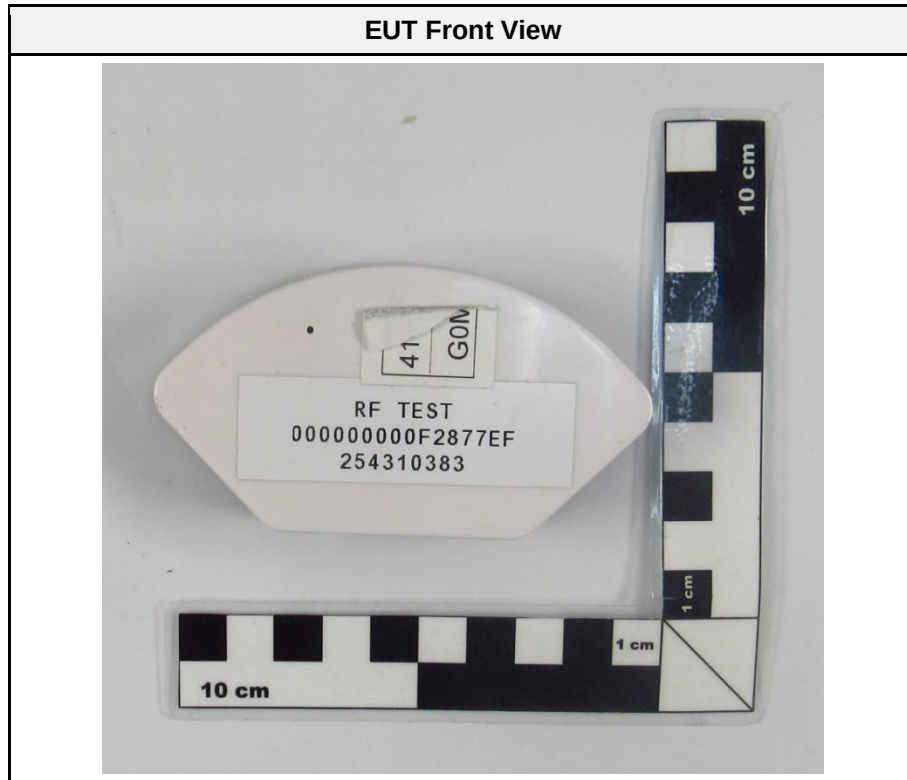
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1 Equipment (Test Item) Under Test

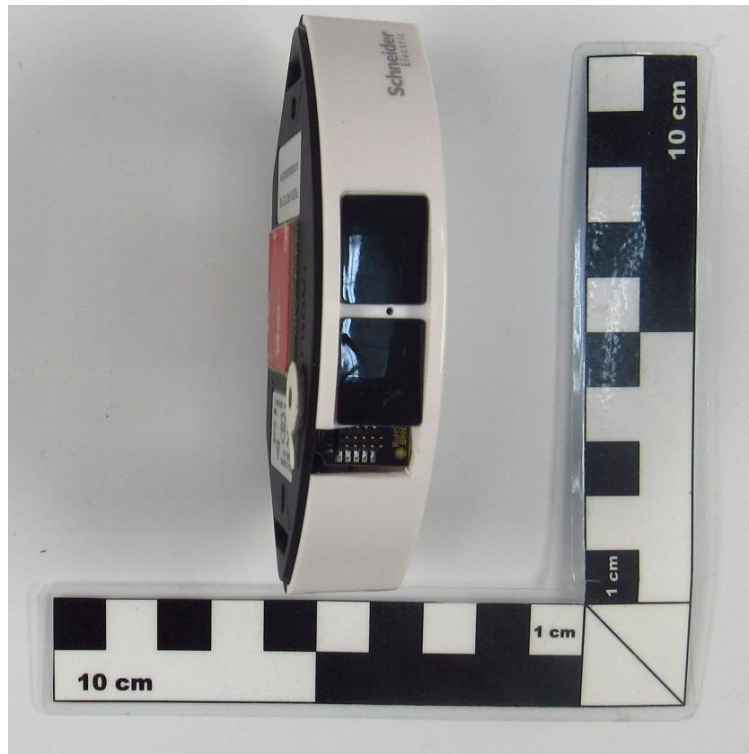
Description	Radio Module (not sold separately, module is part of the commercial products)	
Model	EBIOTPCWM	
Additional Model(s)	None	
Brand Name(s)	None	
Serial Number(s)	Prototype Prototype	Radiated Test Sample ID 41177 Conducted Test Sample ID 40102
Hardware Version(s)	P0070 Main_07	
Software Version(s)	nRF SDK v1.9.1	
PMN	EBIOTPCWM	
HVIN	EBIOTPCWM	
FVIN	Wirepas Mesh Version 5.2.0.53	
FCC ID	DVE-EBIOTPCWM	
IC	24775-EBIOTPCWM	
Equipment type	Radio Module	
Radio type	Transceiver	
Assigned frequency bands	2400.0 MHz - 2483.5 MHz	
Radio technology	Bluetooth LE 5.0	
Bluetooth Specification	LE 1M PHY	Yes
	LE 2M PHY	No
	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	
Antenna	Type	Integrated
	Model	Treon
	Manufacturer	Treon Oy
	Gain	4.8 dBi (declared by customer)
Supply Voltage	V _{NOM}	+3 VDC
Operating Temperature	T _{NOM}	25 °C
Manufacturer	Treon Oy Visiokatu 6 33720 Tampere FINLAND	

1.1 Photos – Equipment External

Comment: Device, with white and black plastic covers, is the device used only as the test jig/test environment in this test case.



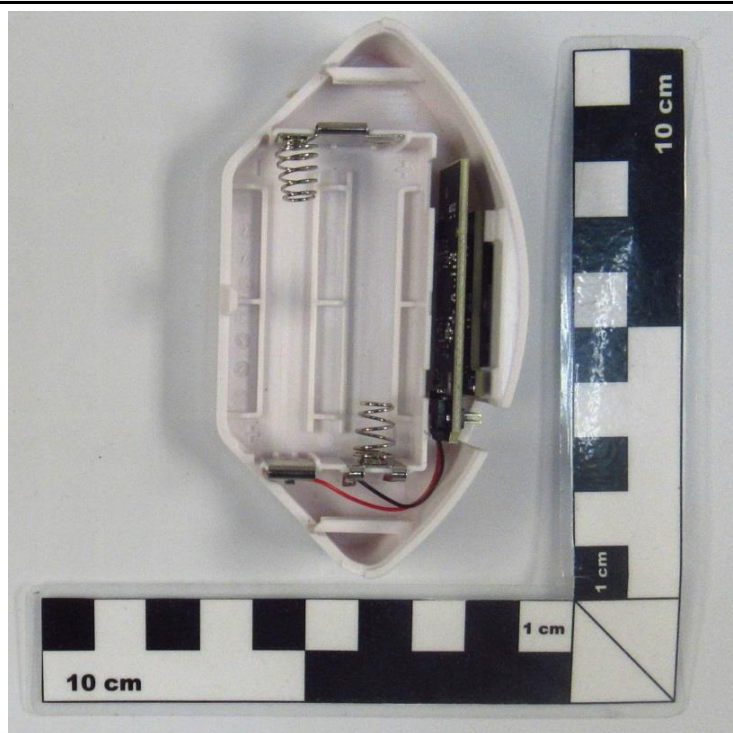
EUT Top View



EUT Bottom View



EUT opened

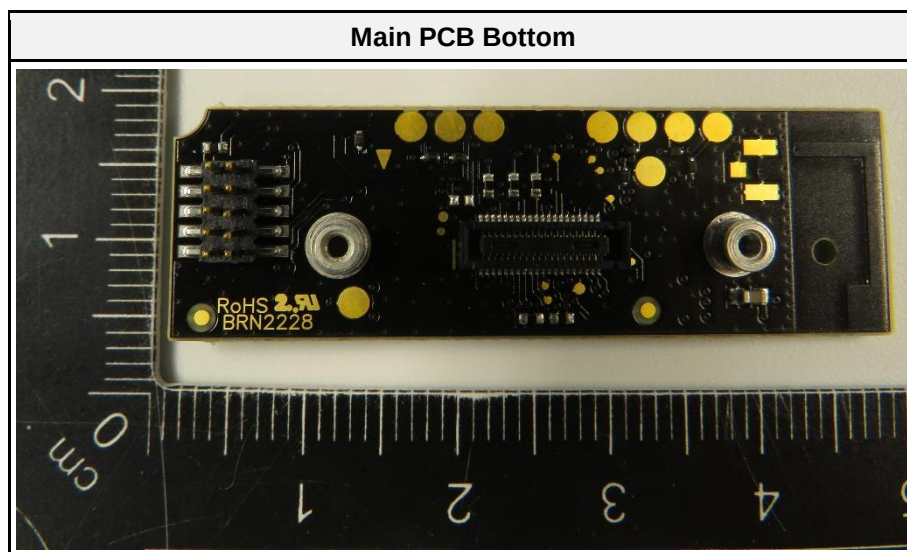
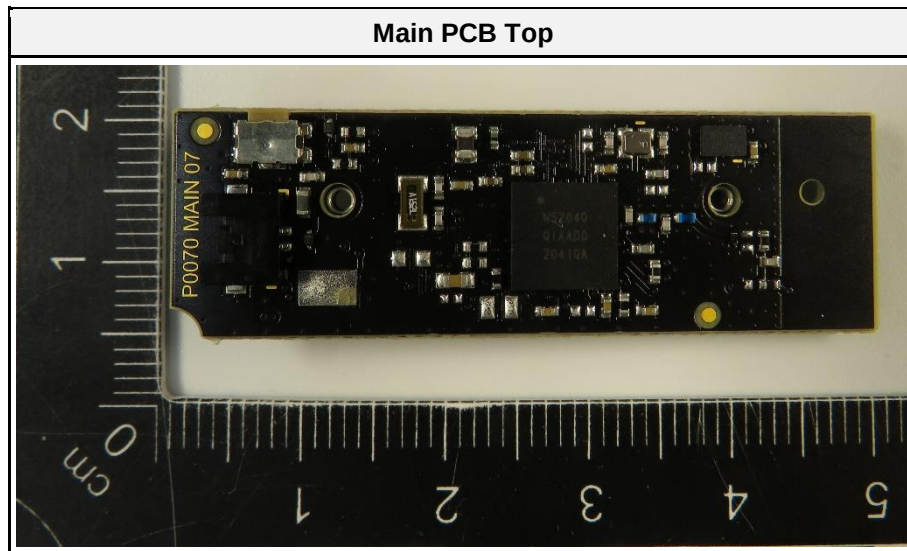


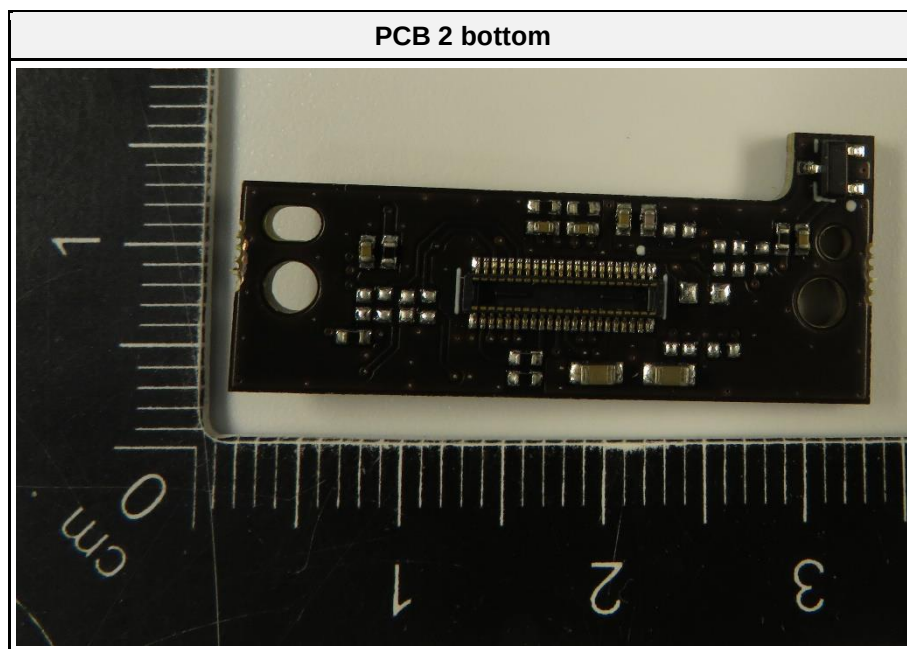
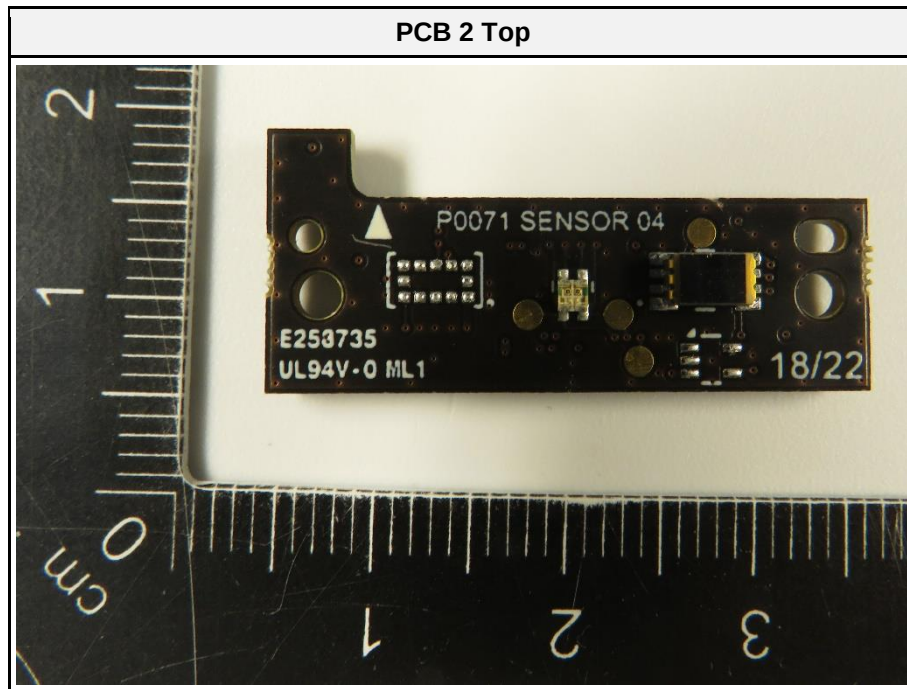
EUT conducted Sample



1.2 Photos – Equipment Internal

Comment: Device, with white and black plastic covers, is the device used only as the test jig/test environment in this test case. TR Module is the PCB/Module seen inside the test jig device.





1.3 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
SFT	nRF_DTM_x64	-	-	DTM Configuration
AE	Laptop	Lenovo	-	DTM Configuration
AE	UART Interface	-	-	DTM Configuration
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment: an Eurofins laptop with DTM from Nordic Semiconductor was used to activate the EUT.				

1.4 Test Modes

Mode	Description
GFSK	Mode = Transmit Modulation = GFSK Data rate = 1 Mbit/s Packet Type = LE-PHY Packet Length = 193 Bytes Duty cycle = 86%
Receive	Mode = Receive
Comment:	

1.5 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx	0	2402
F2	Tx / Rx	19	2440
F3	Tx	39	2480

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 dB μ V. 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:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

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

Limit:

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

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

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.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dB μ V + 26 dB/m	= 47.5 dB μ V/m	:	47.5 dB μ V/m - 57.0 dB μ V/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15C, ISED RSS-247				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
ISED RSS-Gen, Issue 5 A2 (section 6.7)	Occupied Bandwidth	ANSI C63.10-2013	N/R	Informational only
FCC § 15.247(a)(2) ISED RSS-247, Issue 2 (section 5.2)	6 dB Bandwidth	ANSI C63.10-2013	PASS	
FCC § 15.247(b) ISED RSS-247, Issue 2 (section 5.4)	Maximum peak conducted power	ANSI C63.10-2013	PASS	
FCC § 15.247(e) ISED RSS-247, Issue 2 (section 5.2)	Power spectral density	ANSI C63.10-2013	PASS	
FCC § 15.207 ISED RSS-247, Issue 2 (section 3.1)	AC power line conducted emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Band edge compliance	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Conducted spurious emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) FCC § 15.209 ISED RSS-Gen, Issue 5 A2 (section 6.13)	Transmitter radiated spurious emissions	ANSI C63.10-2013	PASS	
ISED RSS-247, Issue 2 (section 3.1)	Receiver radiated spurious emissions	ANSI C63.4-2014	PASS	
Comment:				

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 - Occupied bandwidth

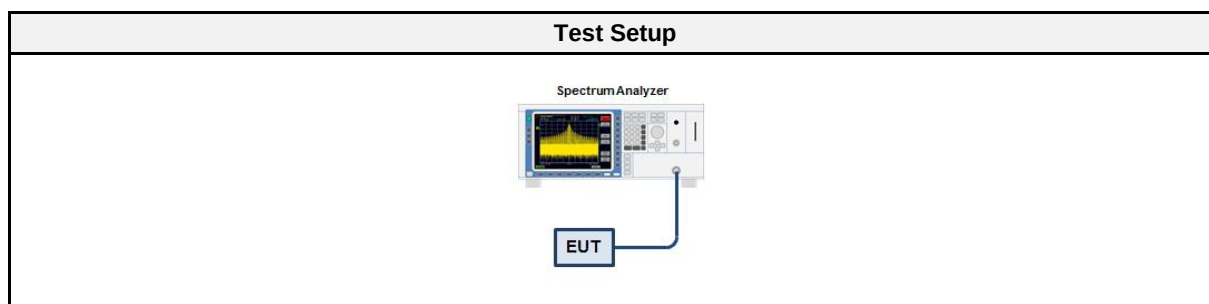
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen, Issue 5 A2 (section 6.7)
Measurement Method	ANSI C63.10 6.9.3
Measurement Uncertainty	$\pm 1.26 \%$
Test Sample ID	40102
Operator	Dr.-Ing. Dhamia Almozani
Date	2022-06-14

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01407	2021-08	2022-08
Cable	Gigalane	CAAT	EF00779	2022-02	2023-02

3.1.5 Procedure

Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth 4. The occupied bandwidth is measured with the build-in analyzer function

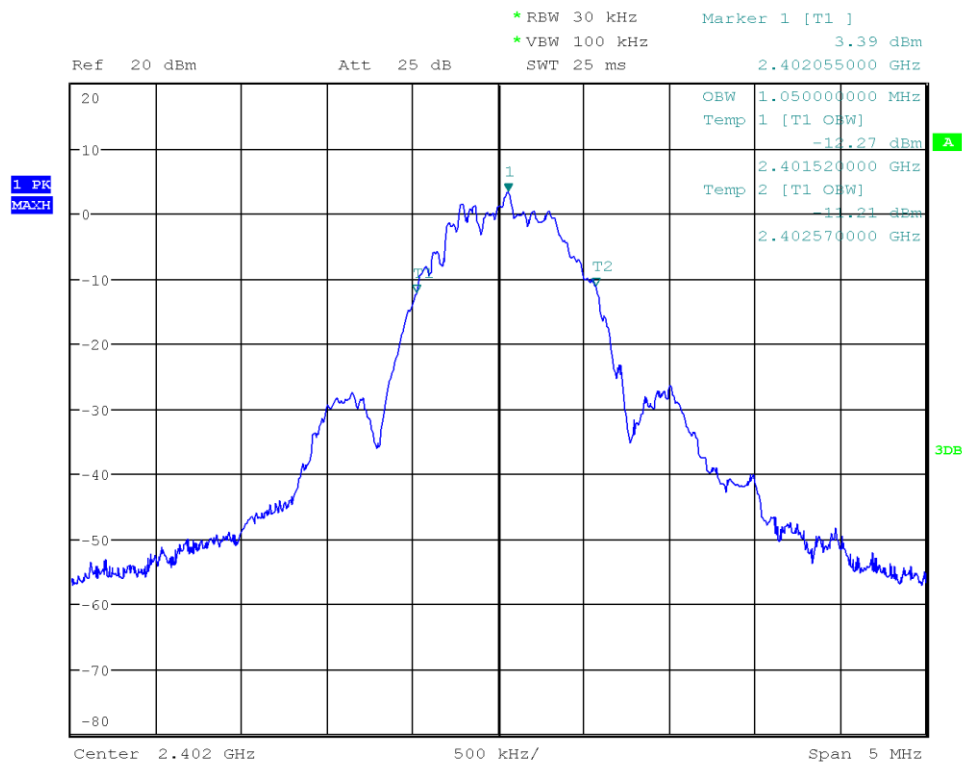
3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK	2402	1.050
GFSK	2440	1.050
GFSK	2480	1.055

Test Report No.: G0M-2205-1448-TFC247BL-V03

Occupied Bandwidth

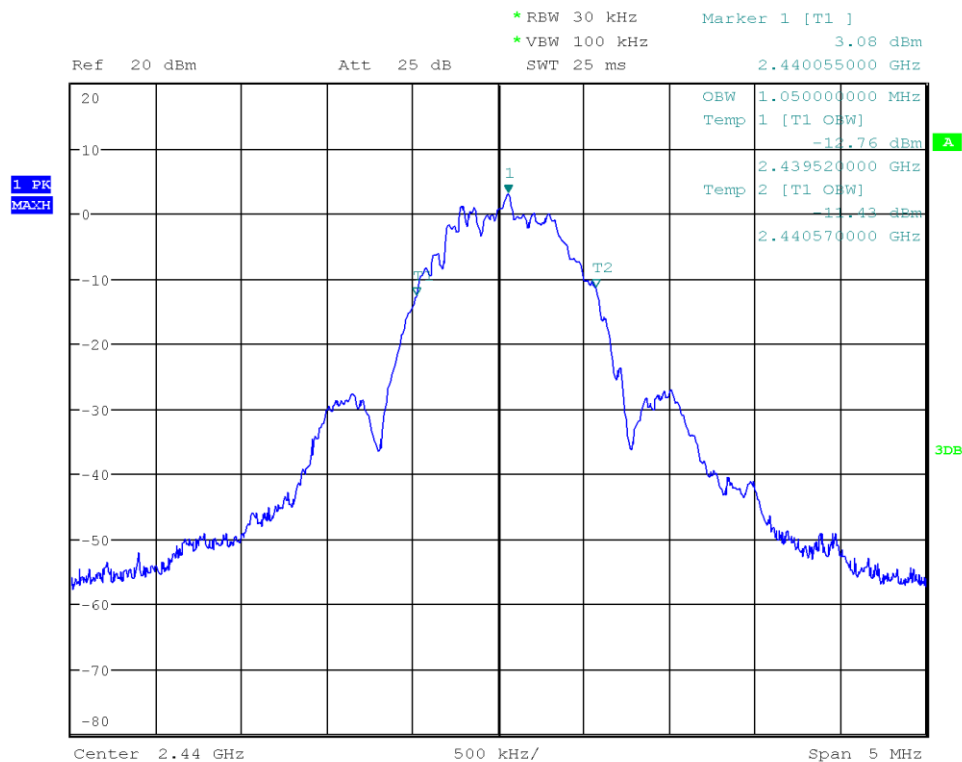
Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Occupied Bandwidth [MHz]: 1.050



Date: 14.JUN.2022 14:02:44

Occupied Bandwidth

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Occupied Bandwidth [MHz]: 1.050



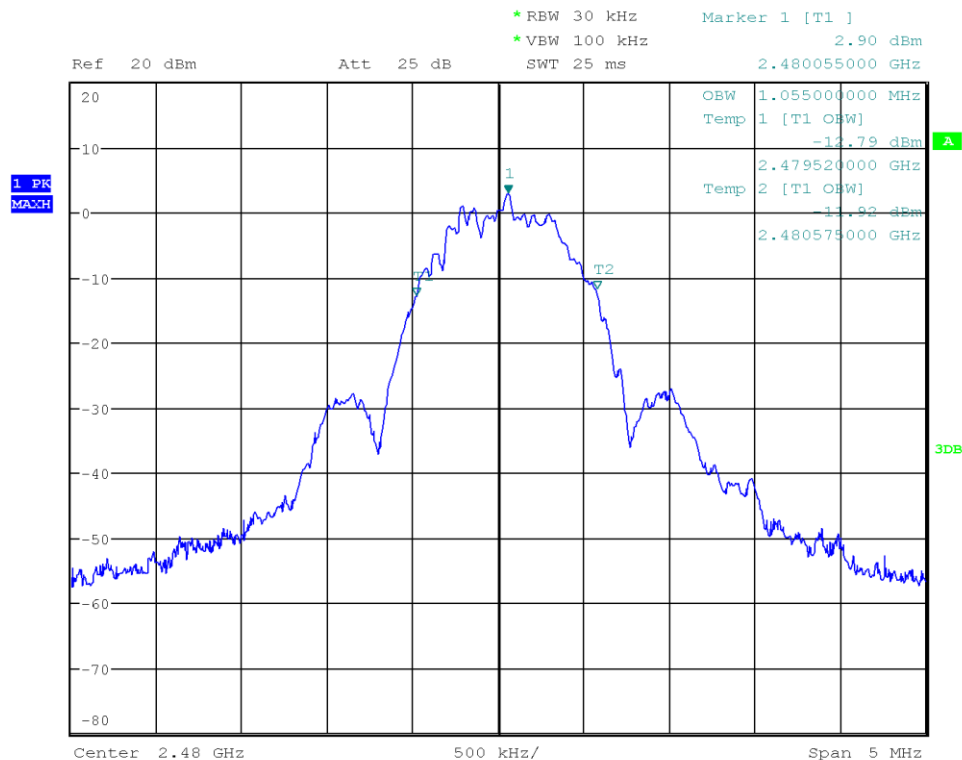
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Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 39, 2480 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Occupied Bandwidth [MHz]: 1.055



Date: 14.JUN.2022 14:07:35

3.2 Test Conditions and Results - 6 dB bandwidth

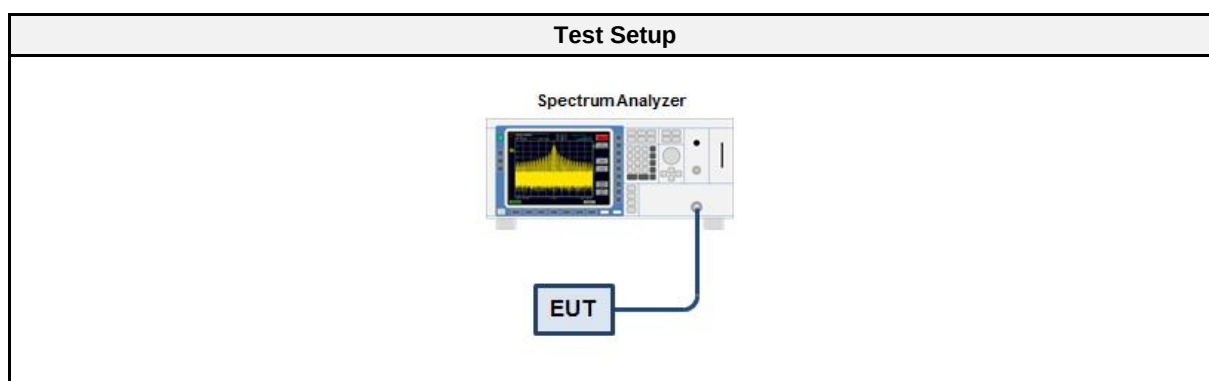
3.2.1 Information

Test Information	
Reference	FCC § 15.247(a)(2); ISED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.8
Measurement Uncertainty	± 1.26 %
Operator	Dr.-Ing. Dhamia Almozani
Date	2022-06-14

3.2.2 Limits

Limits
≥ 500kHz

3.2.3 Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01407	2021-08	2022-08
Cable	Gigalane	CAAAT	EF00779	2022-02	2023-02

3.2.5 Procedure

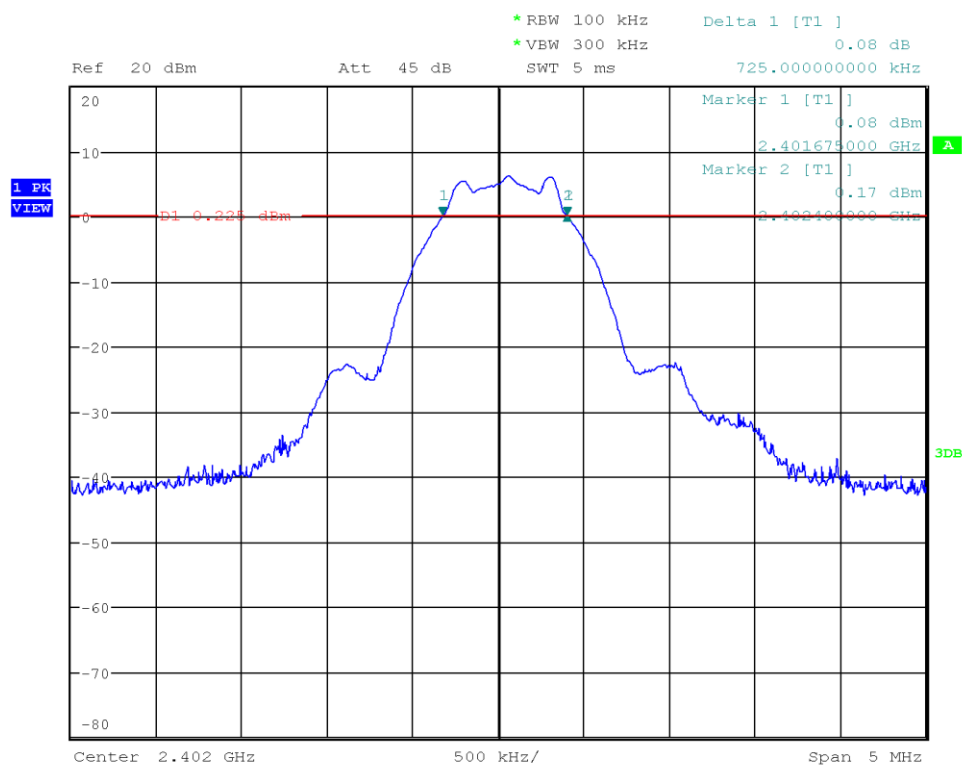
Test Procedure
1. EUT set to test mode 2. Span set to at least twice the emission spectrum 3. Detector set to peak and max hold and RBW is set to 100 kHz 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak 6. Marker on envelope of spectrum is set to level of -6 dB to the right of the peak 7. 6 dB Bandwidth is determined by marker frequency separation

3.2.6 Results

Test Results				
Mode	Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Verdict
GFSK	2402	725	500	PASS
GFSK	2440	715	500	PASS
GFSK	2480	725	500	PASS

DTS (6 dB) Bandwidth

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.8.1 Option 1
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Lower Frequency [MHz]: 2401.675
 Upper Frequency [MHz]: 2402.400
 6 dB Bandwidth [kHz]: 725



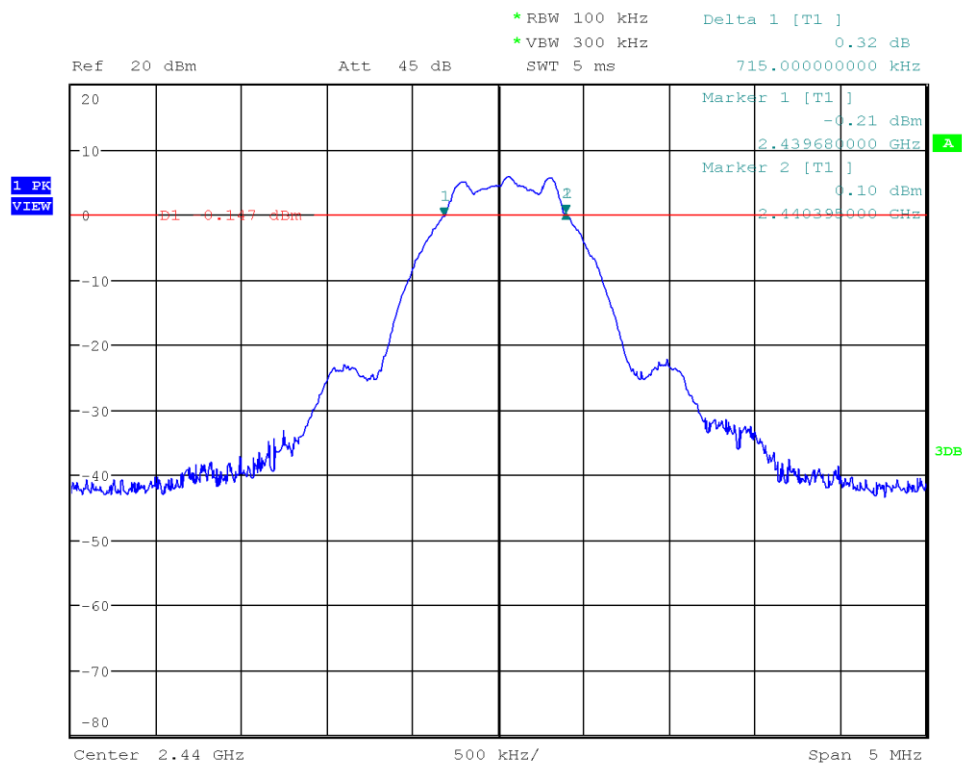
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Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

DTS (6 dB) Bandwidth

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.8.1 Option 1
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Lower Frequency [MHz]: 2439.680
 Upper Frequency [MHz]: 2440.395
 6 dB Bandwidth [kHz]: 715



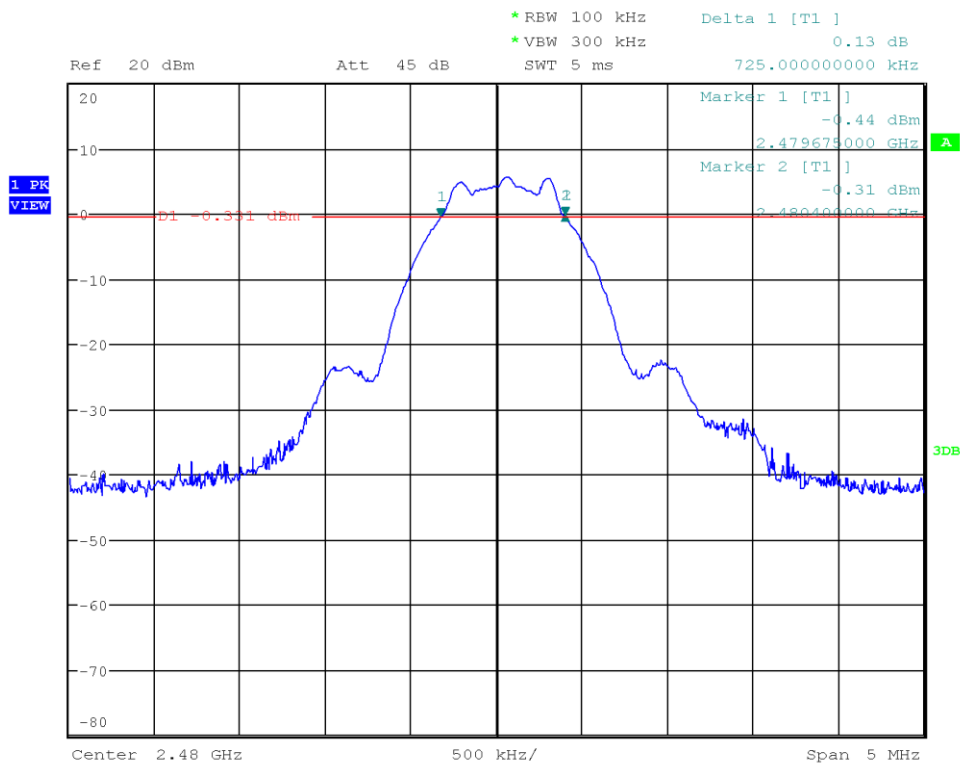
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Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

DTS (6 dB) Bandwidth

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.8.1 Option 1
 Operational Mode: GFSK, Channel: 39, 2480 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Lower Frequency [MHz]: 2479.675
 Upper Frequency [MHz]: 2480.400
 6 dB Bandwidth [kHz]: 725



Date: 14.JUN.2022 14:39:57

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

3.3 Test Conditions and Results - Maximum peak conducted output power

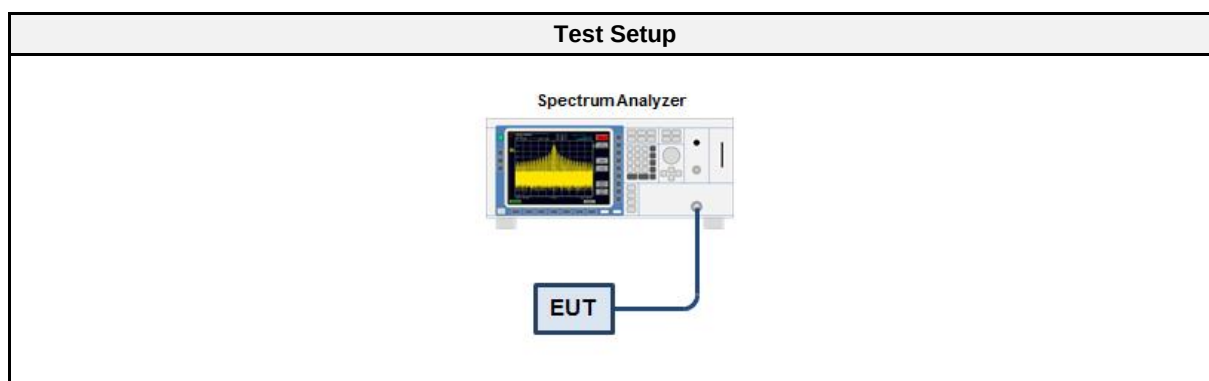
3.3.1 Information

Test Information	
Reference	FCC § 15.247(b); ISSED RSS-247, Issue 2 (section 5.4)
Measurement Method	ANSI C63.10 11.9.1
Measurement Uncertainty	± 2.86 dB
Operator	Dr.-Ing. Dhamia Almozani
Date	2022-06-14

3.3.2 Limits

Limits
1 W (30 dBm)
The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.3 Setup



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01407	2021-08	2022-08
Cable	Gigalane	CAAAT	EF00779	2022-02	2023-02

3.3.5 Procedure

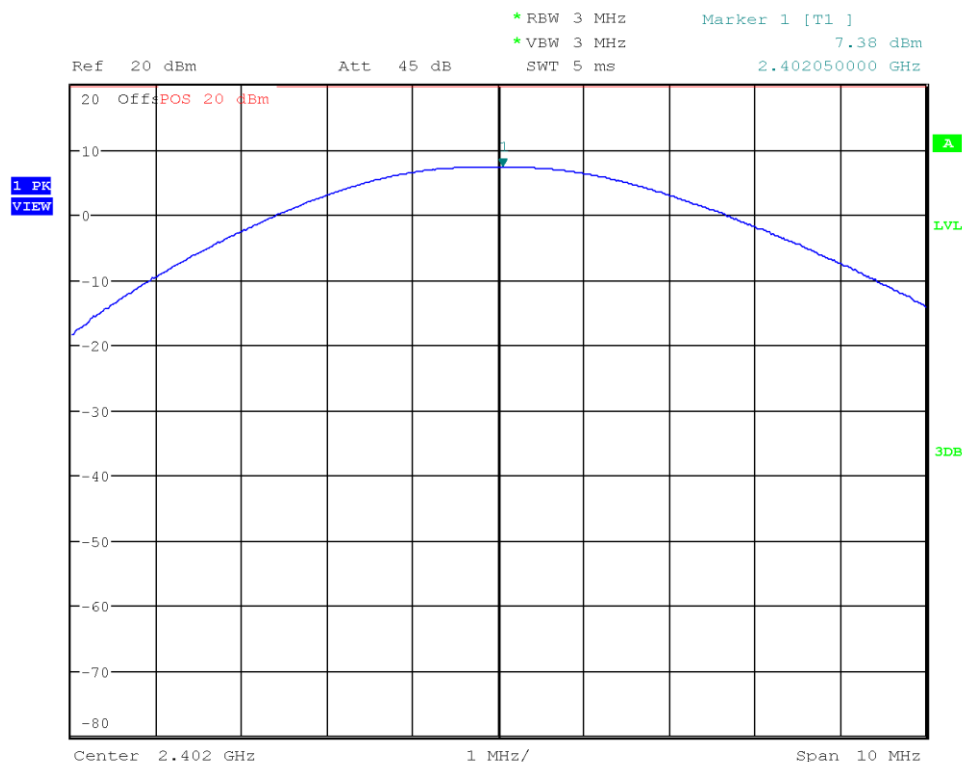
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Analyzer resolution bandwidth is set ≥ DTS bandwidth 3. Detector set to peak and max hold 4. Sweep time is set to auto 5. After the trace has stabilized a marker is set to peak of envelope

3.3.6 Results

Test Results				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2402	7.377	0.0055	1.0	PASS
2440	6.986	0.0050	1.0	PASS
2480	6.894	0.0049	1.0	PASS

Peak Conducted Output Power

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Peak Power [dBm]: 7.377
 Peak Power [W]: 0.0055



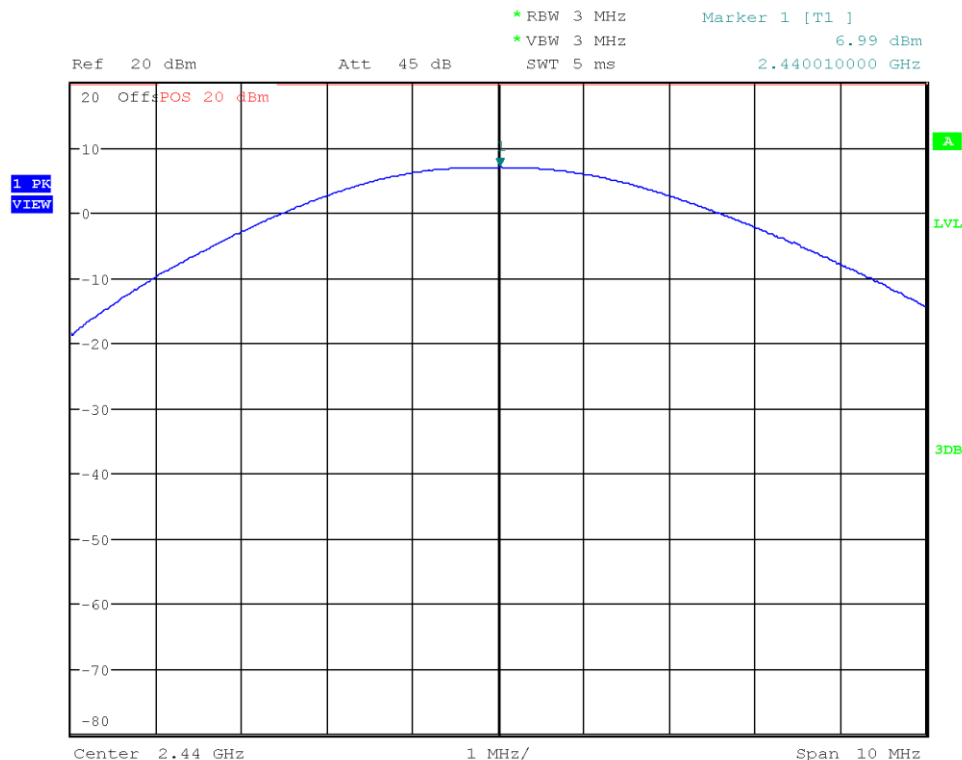
Date: 14.JUN.2022 13:53:13

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Peak Conducted Output Power

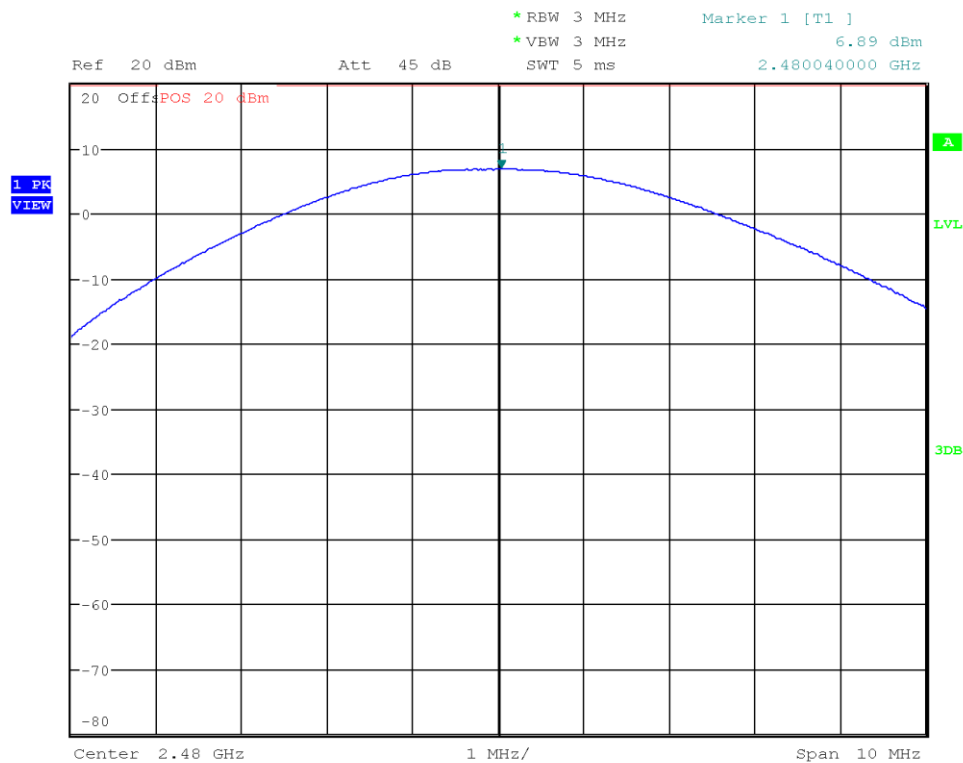
Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Peak Power [dBm]: 6.986
 Peak Power [W]: 0.0050



Date: 14.JUN.2022 13:53:58

Peak Conducted Output Power

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: GFSK, Channel: 39, 2480 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Peak Power [dBm]: 6.894
 Peak Power [W]: 0.0049



Date: 14.JUN.2022 13:54:49

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

3.4 Test Conditions and Results - Power spectral density

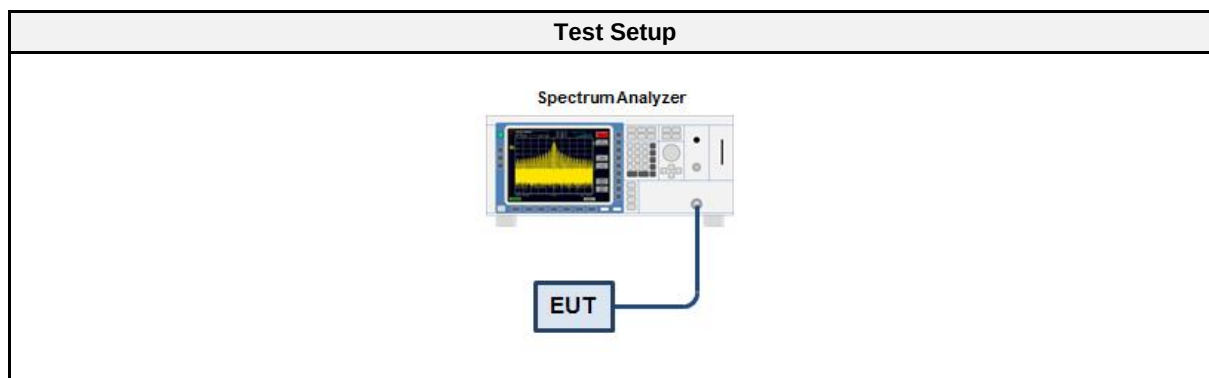
3.4.1 Information

Test Information	
Reference	FCC § 15.247(e); ISSED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Measurement Uncertainty	± 2.86 dB
Operator	Dr.-Ing. Dhamia Almozani
Date	2022-06-14

3.4.2 Limits

Limits
8 dBm / 3 kHz

3.4.3 Setup



3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01407	2021-08	2022-08
Cable	Gigalane	CAAAT	EF00779	2022-02	2023-02

3.4.5 Procedure

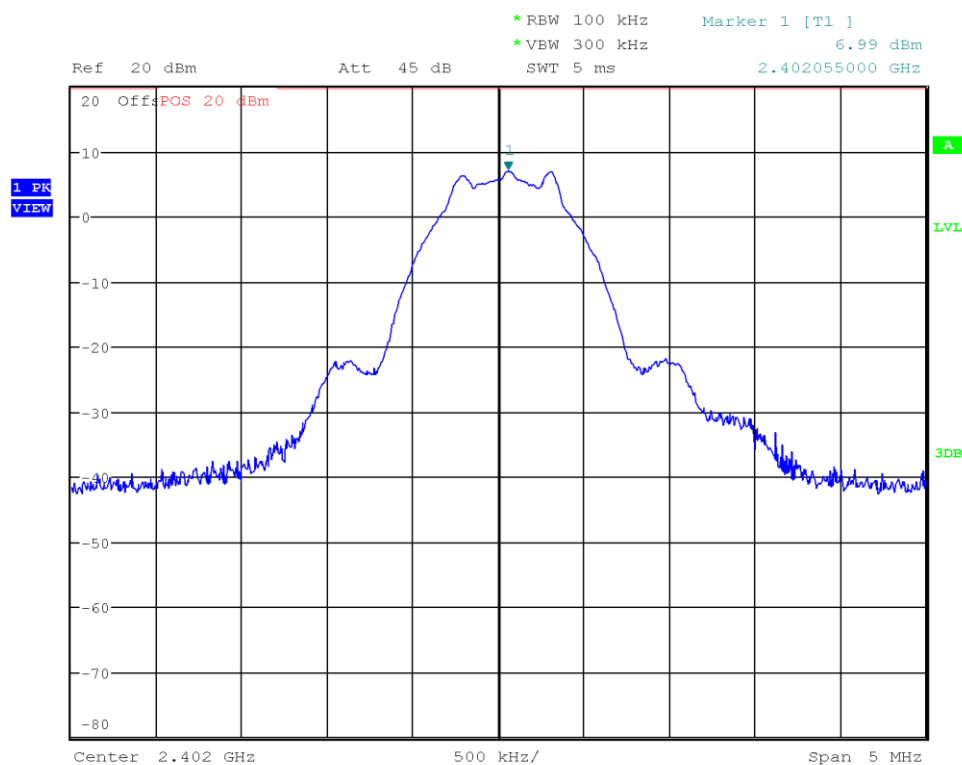
Test Procedure
1. EUT set to test mode 2. The analyzer is set to DTS channel center frequency with a span of 1.5 times the DTS bandwidth 3. The RBW is set to 100 kHz with VBW $\geq$ RBW and the detector is set to peak with max hold 4. After the trace has stabilized a marker is set to the envelope maximum 5. If the power spectral density is above the limit the RBW is reduced (not lower than 3 kHz) and the measurement is repeated 6. If the EUT has more than one transmit chain the procedure is repeated for each transmit chain

3.4.6 Results

Test Results			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
2402	6.990	8.0	PASS
2440	6.631	8.0	PASS
2480	6.440	8.0	PASS
RBW = 100 kHz			

Peak Power Spectral Density

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Peak Frequency [MHz]: 2402.055
 Spectral Density [dBm/RBW]: 6.990
 Resolution Bandwidth [kHz]: 100 kHz



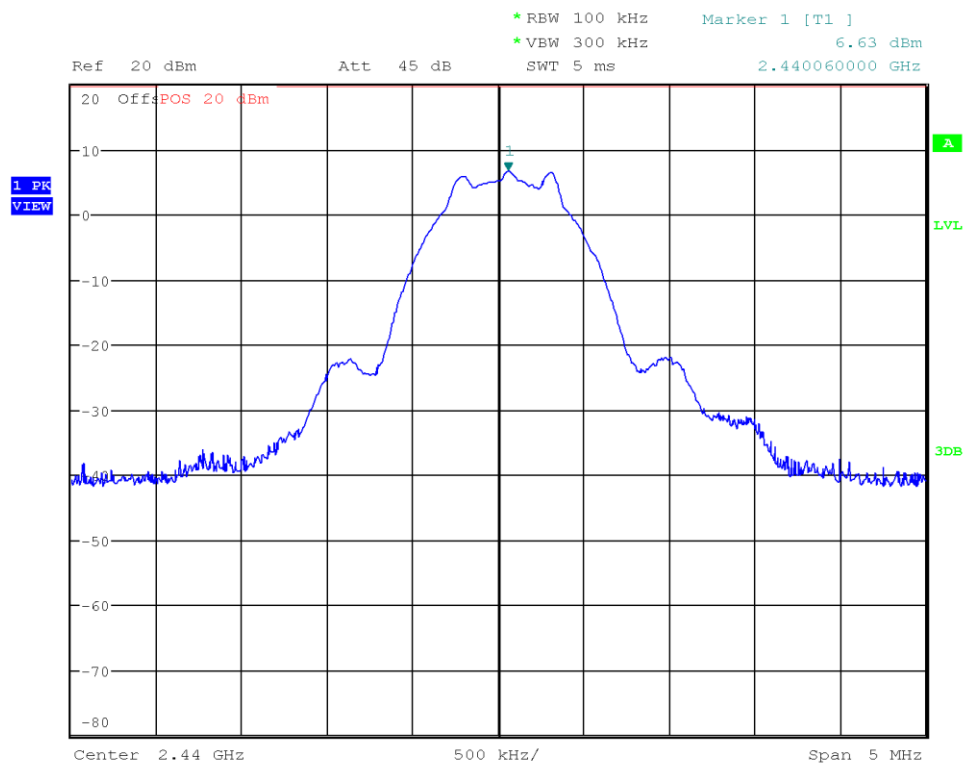
Date: 14.JUN.2022 13:46:03

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Peak Power Spectral Density

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Peak Frequency [MHz]: 2440.060
 Spectral Density [dBm/RBW]: 6.631
 Resolution Bandwidth [kHz]: 100 kHz



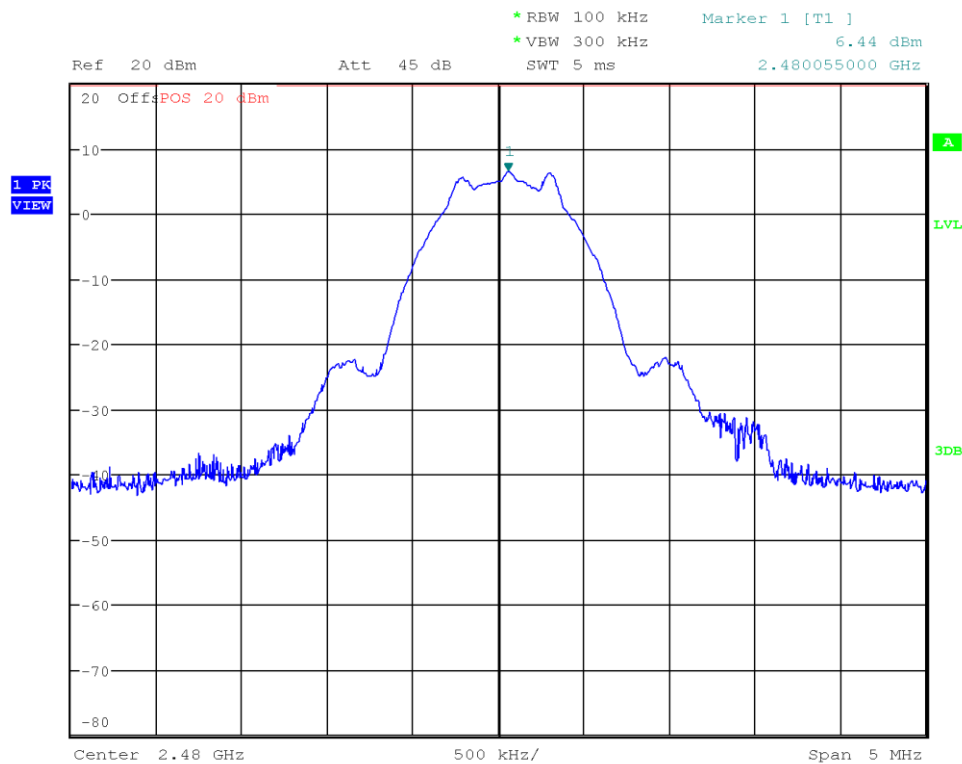
Date: 14.JUN.2022 13:48:18

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Peak Power Spectral Density

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: GFSK, Channel: 39, 2480 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Peak Frequency [MHz]: 2480.055
 Spectral Density [dBm/RBW]: 6.440
 Resolution Bandwidth [kHz]: 100 kHz



Date: 14.JUN.2022 13:49:30

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

3.5 Test Conditions and Results - AC powerline conducted emissions

3.5.1 Information

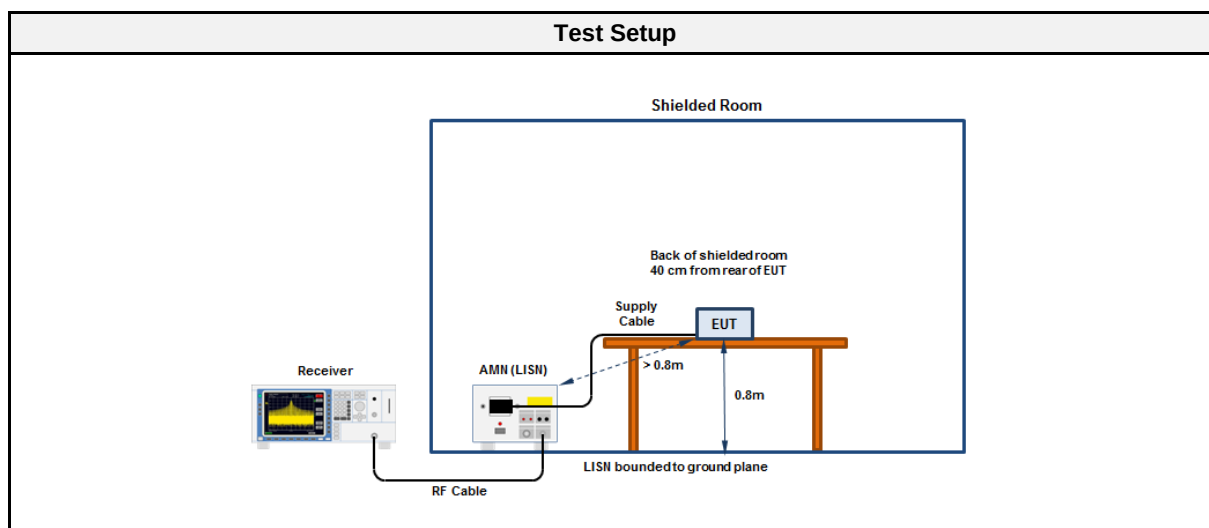
Test Information	
Reference	FCC § 15.207; ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.2
Measurement Uncertainty	± 3.82 dB
Operator	Odai Qawasmeh
Date	2022-09-28

3.5.2 Limits

Limits		
Frequency [MHz]	Quasi-Peak [dBμV]	Average [dBμV]
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

* Limit decreases linearly with the logarithm of the frequency

3.5.3 Setup



3.5.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

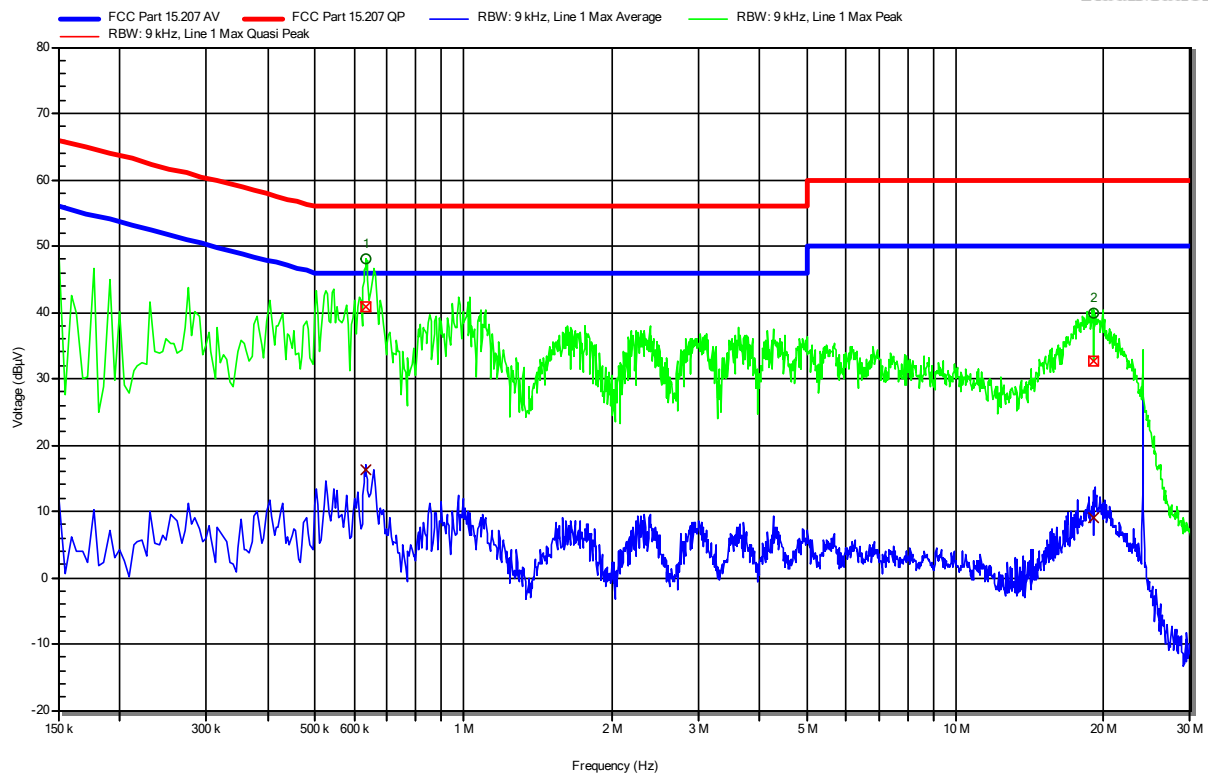
Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESR7	EF00943	2022-07	2023-07
Pulse Limiter	R&S	ESH3-Z2	EF01222	2021-07	2023-07
LISN	Schwarzbeck	NSLK 8127 RC	EF01592	2021-07	2023-07

Conducted emissions at the mains power port according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Test Date: 2022-09-28
 Operating Conditions: ambient temperature: 20 °Celsius
 power input:
 LISN: Schwarzbeck NSLK 8127 RC L1
 Operational Mode: Wirepas, GFSK, 2440 MHz, 1Mbit/s, PRBS9, 193 Bytes
 EUT Configuration:
 Applied to Port: 120 VAC / 60 Hz
 Note 1:

Index 48

Radiation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	632.85 kHz	40.96 dBμV	56 dBμV	-15.04 dB	Pass	Line 1
2	19.125 MHz	32.63 dBμV	60 dBμV	-27.37 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	632.85 kHz	16.24 dBμV	46 dBμV	-29.76 dB	Pass	Line 1
2	19.125 MHz	8.94 dBμV	50 dBμV	-41.06 dB	Pass	Line 1

Test Report No.: G0M-2205-1448-TFC247BL-V03

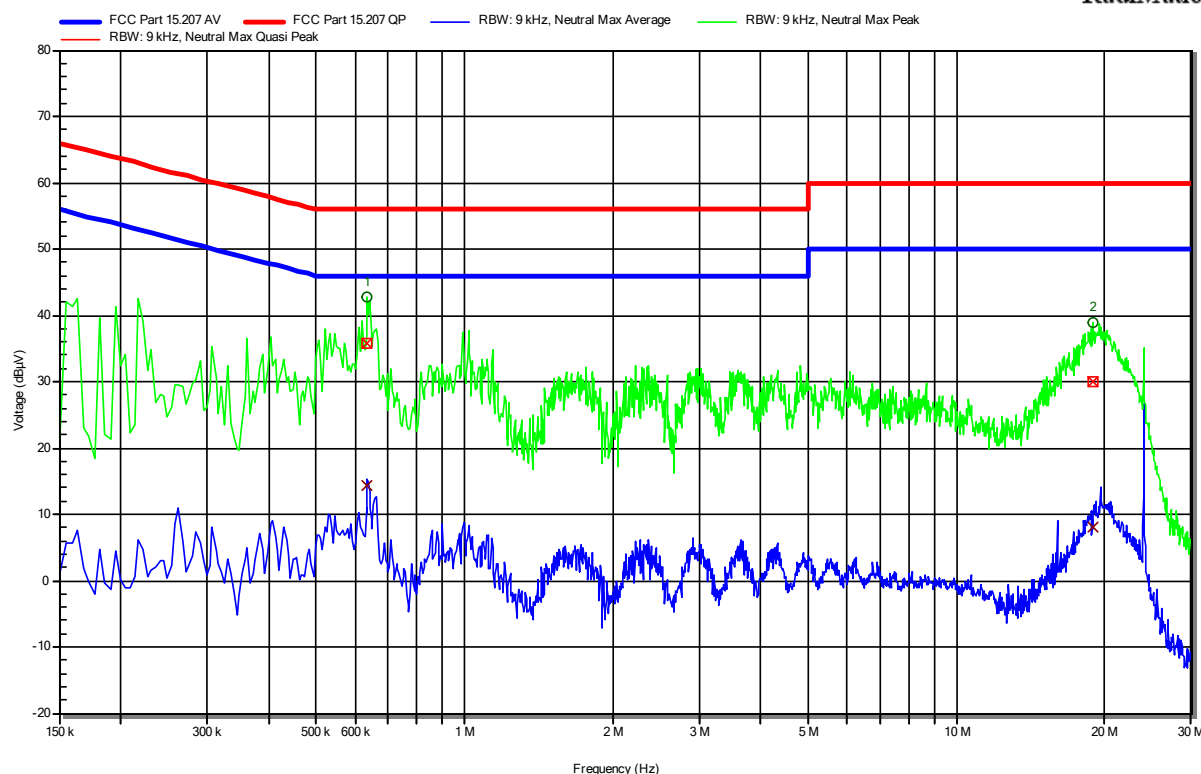
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Test Date: 2022-09-28
 Operating Conditions: ambient temperature: 20 °Celsius
 power input:
 LISN: Schwarzbeck NSLK 8127
 Operational Mode: Wirepas, GFSK, 2440 MHz, 1Mbit/s, PRBS9, 193 Bytes
 EUT Configuration:
 Applied to Port: 120 VAC / 60 Hz
 Note 1:

Index 49

Radiation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	635.1 kHz	35.71 dBμV	56 dBμV	-20.29 dB	Pass	Neutral
2	18.871 MHz	29.91 dBμV	60 dBμV	-30.09 dB	Pass	Neutral

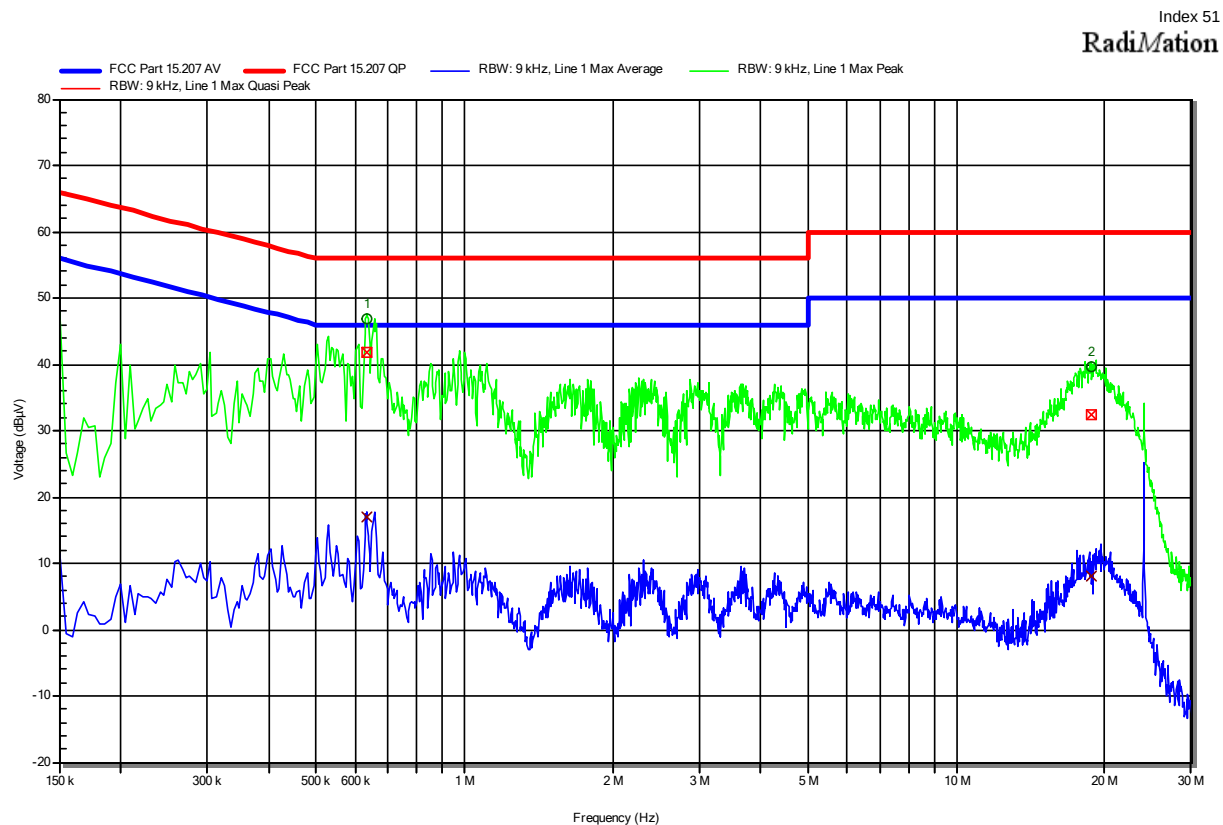
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	635.1 kHz	14.42 dBμV	46 dBμV	-31.58 dB	Pass	Neutral
2	18.871 MHz	8.01 dBμV	50 dBμV	-41.99 dB	Pass	Neutral

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to RSS-247, RSS-Gen

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Test Date: 2022-09-28
 Operating Conditions: ambient temperature: 24 °Celsius
 power input:
 LISN: Schwarzbeck NSLK 8127 RC L1
 Operational Mode: Wirepas, GFSK, 2440 MHz
 EUT Configuration:
 Applied to Port: 120 VAC / 60 Hz
 Note 1:



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	631.95 kHz	41.78 dBµV	56 dBµV	-14.22 dB	Pass	Line 1
2	18.86 MHz	32.47 dBµV	60 dBµV	-27.53 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	631.95 kHz	16.91 dBµV	46 dBµV	-29.09 dB	Pass	Line 1
2	18.86 MHz	8.05 dBµV	50 dBµV	-41.95 dB	Pass	Line 1

Test Report No.: G0M-2205-1448-TFC247BL-V03

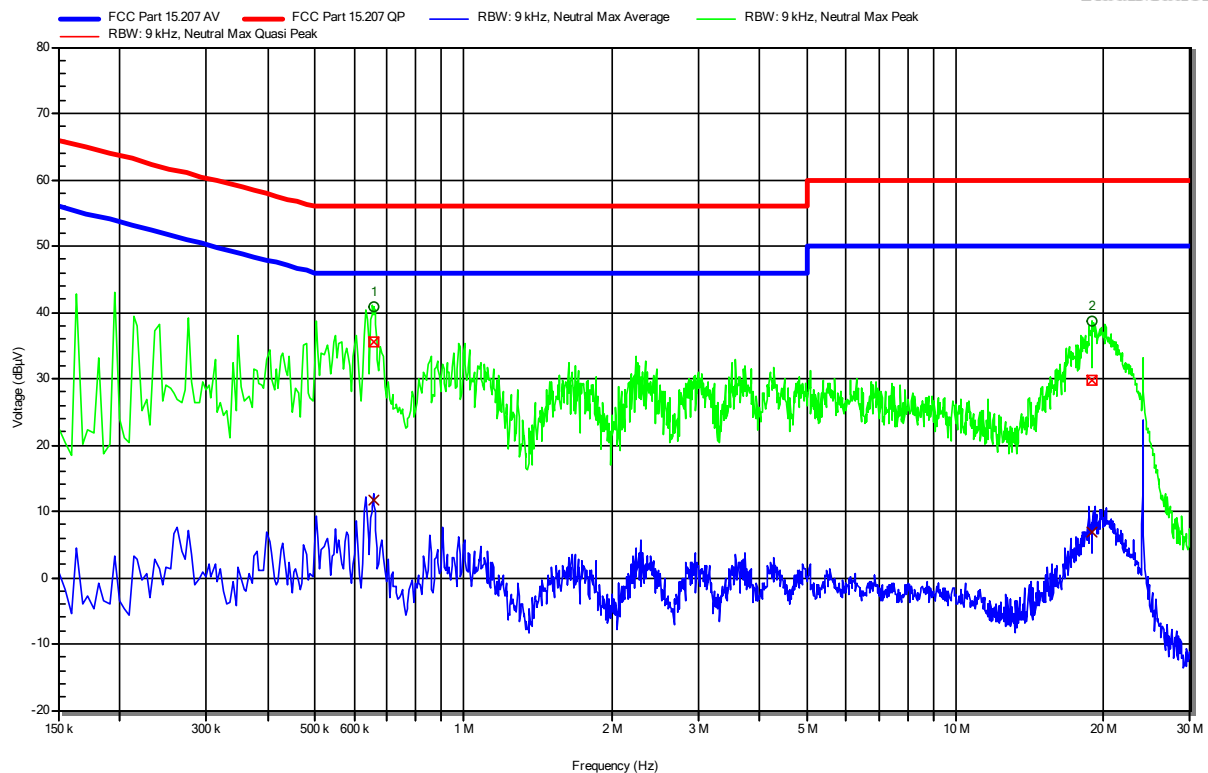
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to RSS-247, RSS-Gen

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Test Date: 2022-09-28
 Operating Conditions: ambient temperature: 24 °Celsius
 power input:
 LISN: Schwarzbeck NSLK 8127
 Operational Mode: Wirepas, GFSK, 2440 MHz
 EUT Configuration:
 Applied to Port: 120 VAC / 60 Hz
 Note 1:

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Radiation



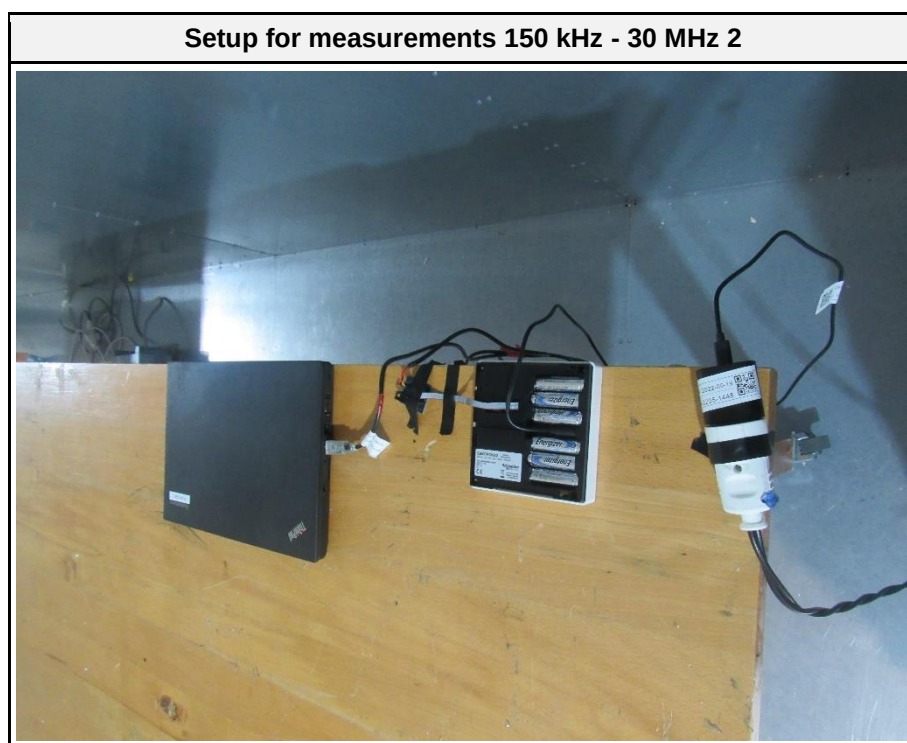
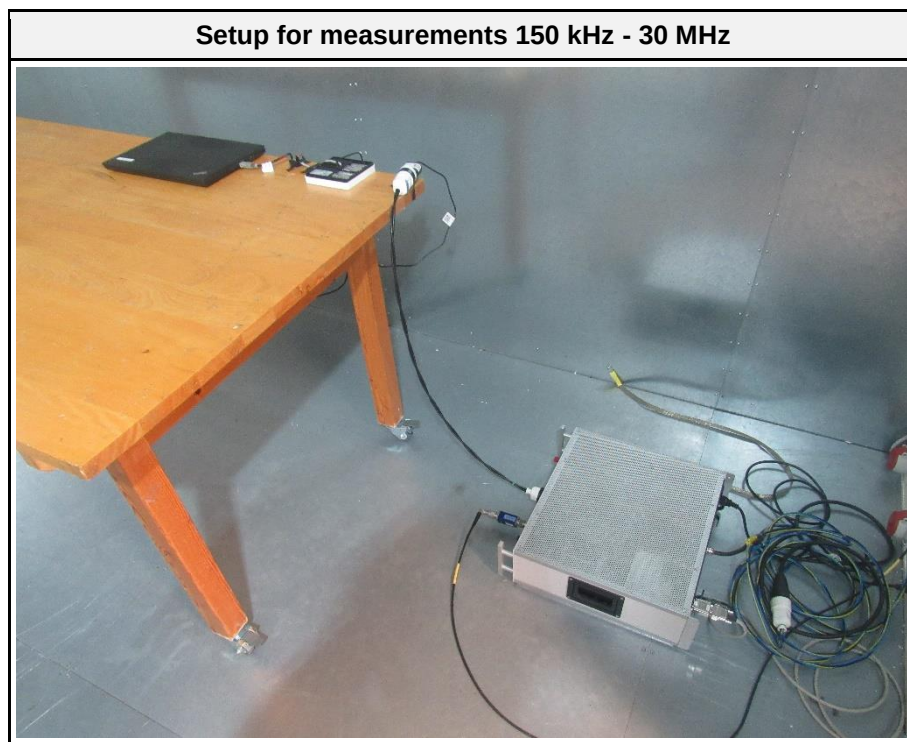
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	656.7 kHz	35.51 dBµV	56 dBµV	-20.49 dB	Pass	Neutral
2	18.889 MHz	29.84 dBµV	60 dBµV	-30.16 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	656.7 kHz	11.67 dBµV	46 dBµV	-34.33 dB	Pass	Neutral
2	18.889 MHz	6.95 dBµV	50 dBµV	-43.05 dB	Pass	Neutral

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

3.5.5 Setup Photos



3.6 Test Conditions and Results - Band-edge compliance

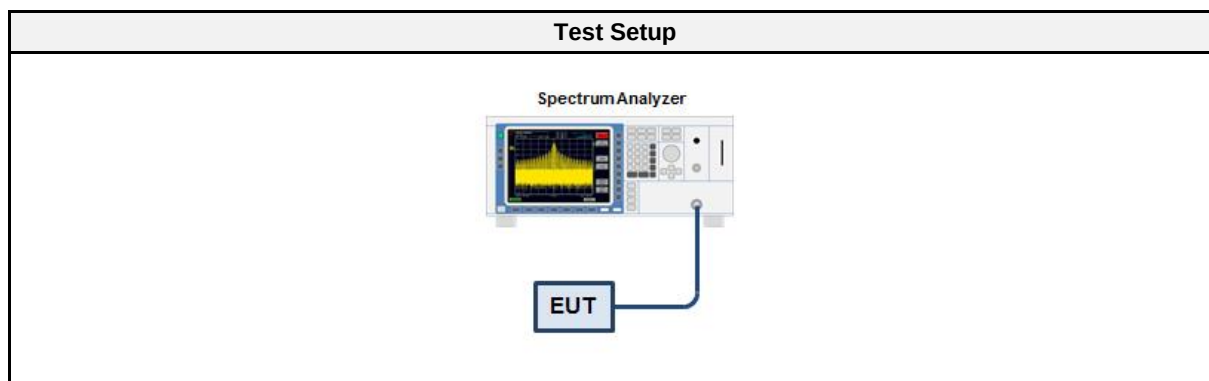
3.6.1 Information

Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 3.64 dB
Measurement Method	ANSI C63.10 11.13
Operator	Dr.-Ing. Dhamia Almozani
Date	2022-06-14

3.6.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.6.3 Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01407	2021-08	2022-08
Cable	Gigalane	CAAAT	EF00779	2022-02	2023-02

3.6.5 Procedure

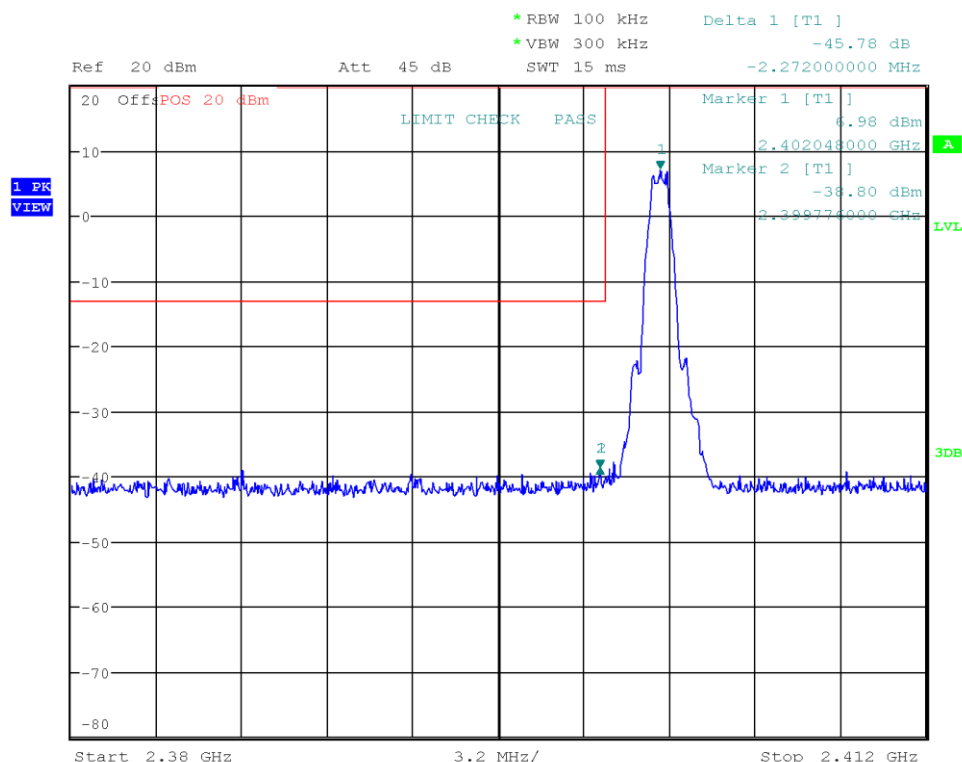
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and outside frequency band 5. Band edge attenuation is determined from level difference

3.6.6 Results

Test Results				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
GFSK	2402	-38.802	-20	PASS
GFSK	2480	-38.505	-20	PASS

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 7.8.6, 6.10.4
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Band-edge: Lower
 In-band Frequency [MHz]: 2402.048
 Max. in-band Level [dBm/100 kHz]: 6.982
 Out-of-band Frequency [MHz]: 2399.776
 Max. out-of-band Level [dBm/100 kHz]: -38.802
 Attenuation [dB]: -45.78



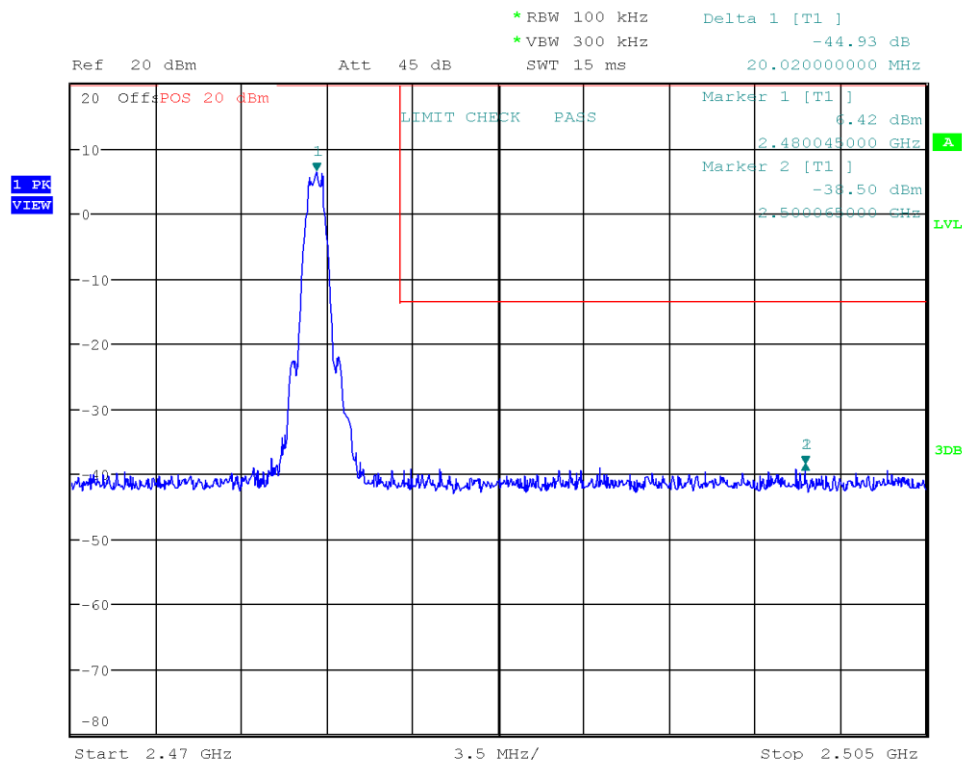
Date: 14.JUN.2022 14:45:35

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 7.8.6, 6.10.4
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Band-edge: Upper
 In-band Frequency [MHz]: 2480.045
 Max. in-band Level [dBm/100 kHz]: 6.423
 Out-of-band Frequency [MHz]: 2500.065
 Max. out-of-band Level [dBm/100 kHz]: -38.505
 Attenuation [dB]: -44.93



Date: 14.JUN.2022 14:47:30

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

3.7 Test Conditions and Results - Conducted spurious emissions

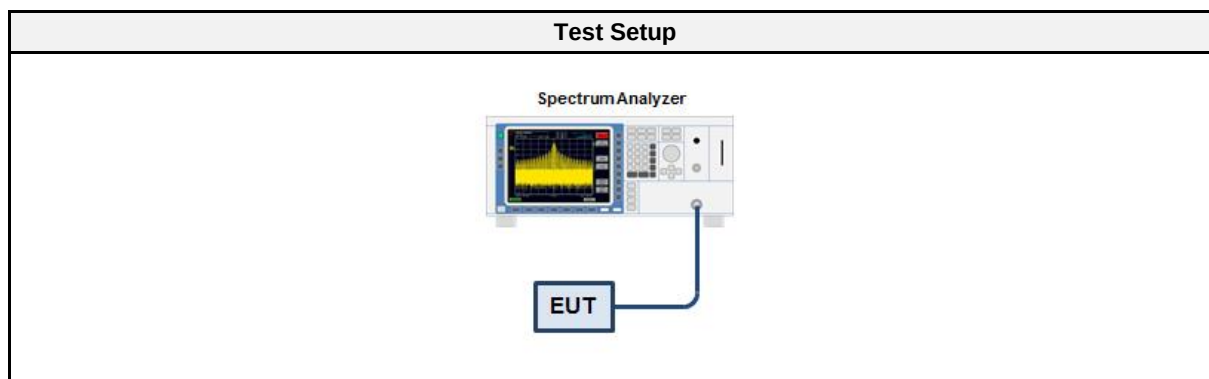
3.7.1 Information

Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 4.25 dB
Measurement Method	ANSI C63.10 11.11
Operator	Dr.-Ing. Dhamia Almozani
Date	2022-06-14

3.7.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.7.3 Setup



3.7.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01407	2021-08	2022-08
Cable	Gigalane	CAAAT	EF00779	2022-02	2023-02

3.7.5 Procedure

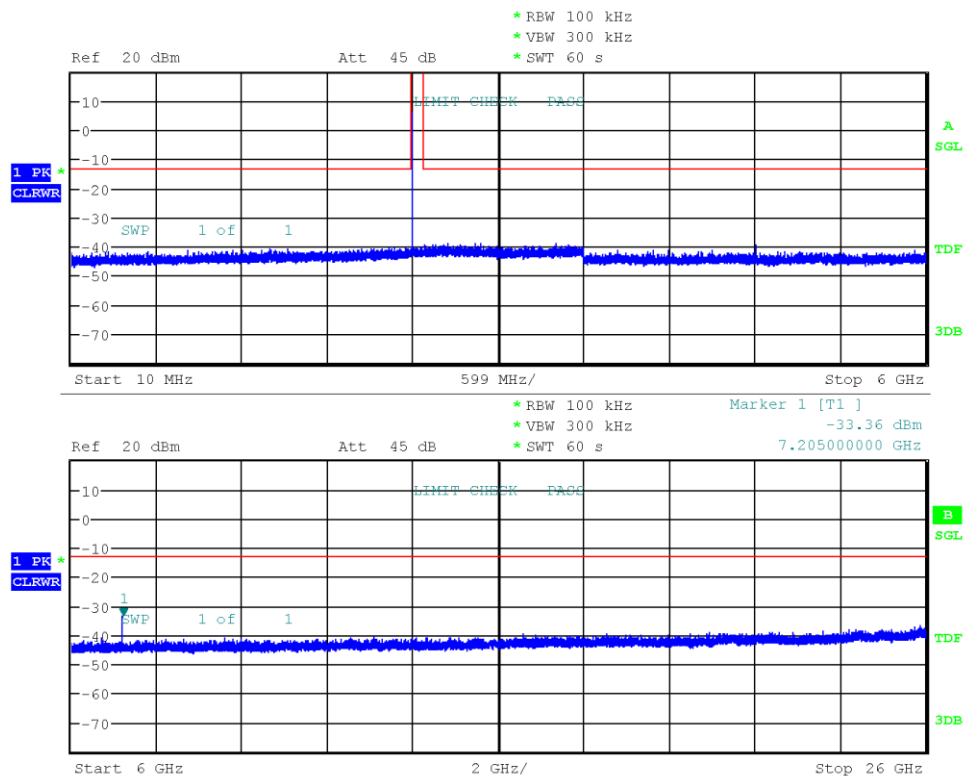
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels outside frequency band

3.7.6 Results

Test Results		
Mode	Channel [MHz]	Verdict
GFSK	2402	PASS
GFSK	2440	PASS
GFSK	2480	PASS

Conducted Spurious Emissions

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Max. in-band Frequency [MHz]: 2402.1
 Max. in-band Level [dBm/100 kHz]: 6.9
 Out-of-band Limit [dBm/100 kHz]: -13.1



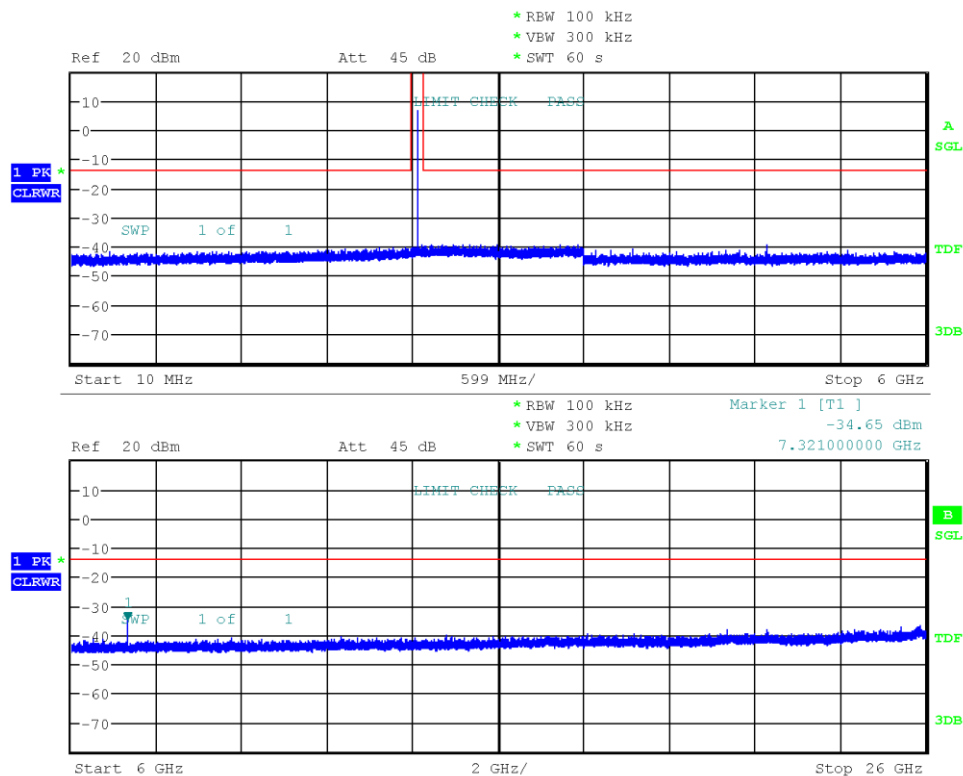
Date: 14.JUN.2022 14:18:45

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted Spurious Emissions

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Max. in-band Frequency [MHz]: 2440.1
 Max. in-band Level [dBm/100 kHz]: 6.6
 Out-of-band Limit [dBm/100 kHz]: -13.4



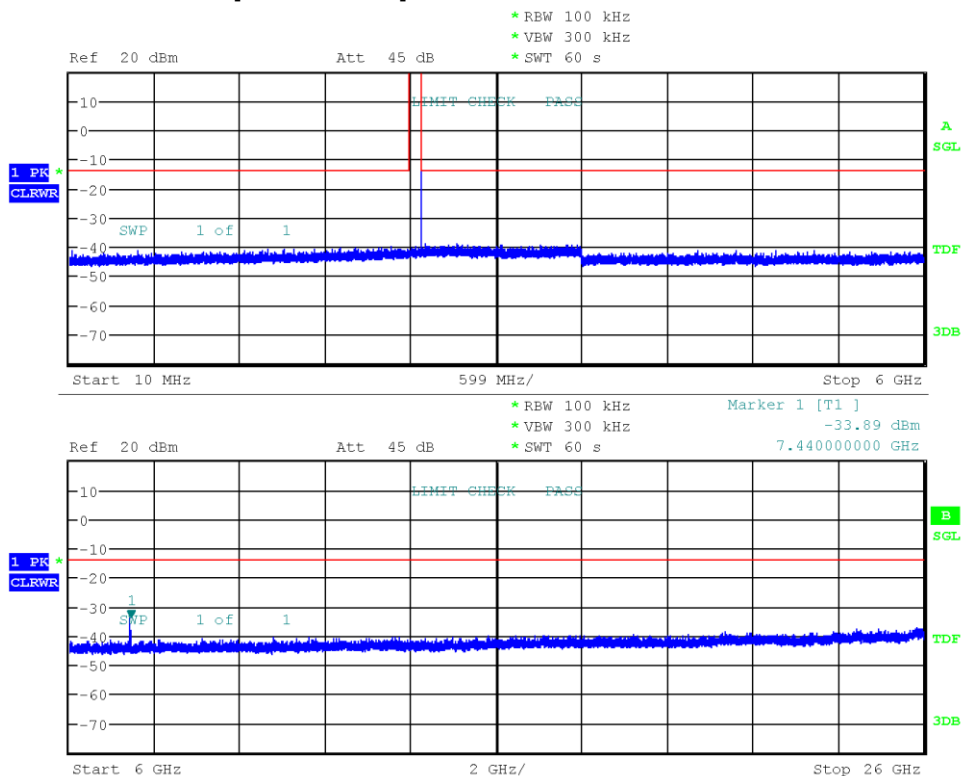
Date: 14.JUN.2022 14:26:20

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted Spurious Emissions

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 40102
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 39, 2480 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Dhamia Almozani
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-06-14
 Max. in-band Frequency [MHz]: 2480.1
 Max. in-band Level [dBm/100 kHz]: 6.4
 Out-of-band Limit [dBm/100 kHz]: -13.6



Date: 14.JUN.2022 14:29:52

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

3.8 Test Conditions and Results - Transmitter radiated emissions

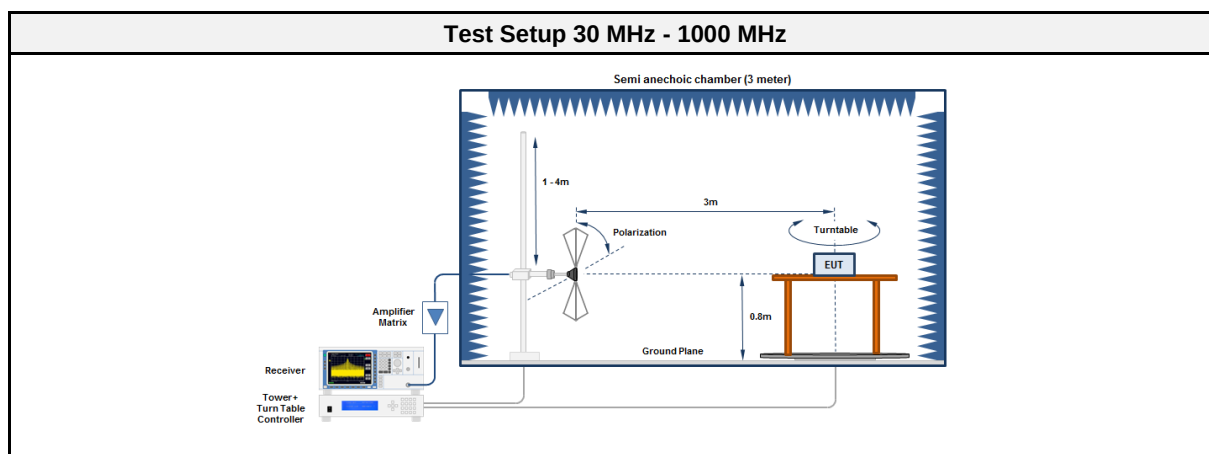
3.8.1 Information

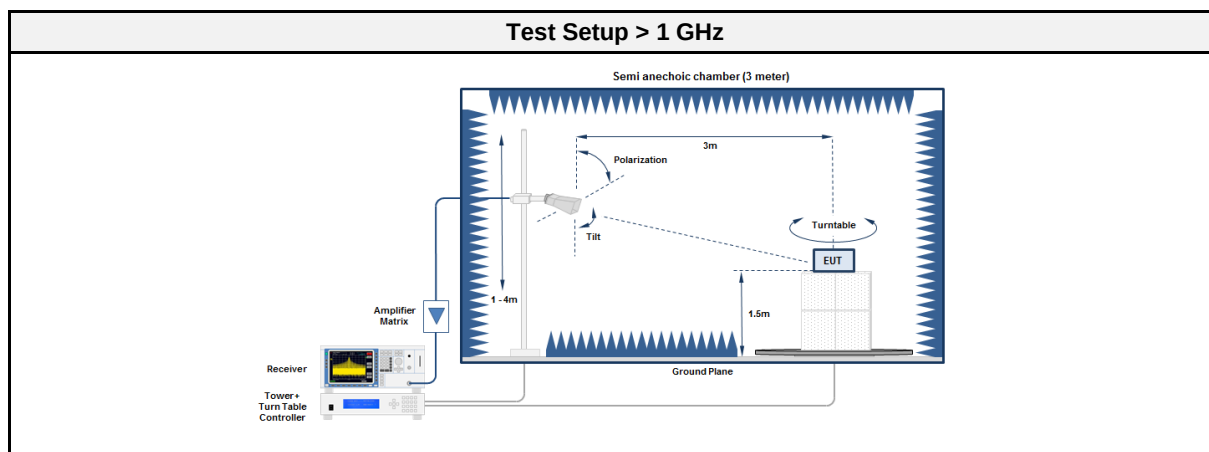
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209; ISSED RSS-Gen, Issue 5 A2 (section 6.13)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Odai Qawasmeh
Date	2022-09-01

3.8.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [$\mu\text{V/m}$]	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

3.8.3 Setup





3.8.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2023-01
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00187	2022-06	2025-06

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC2	EF01616	2021-09	2022-09
Spectrum analyzer	R&S	FSW43	EF00896	2022-08	2023-08
Antenna	Schwarzbeck	BBHA 9120B	EF01678	2021-03	2024-03
Antenna	Schwarzbeck	HWRD 650	EF01679	2021-03	2024-03
Antenna	Amplifier Research	AT4560	EF00302	2021-06	2023-06

3.8.5 Procedure

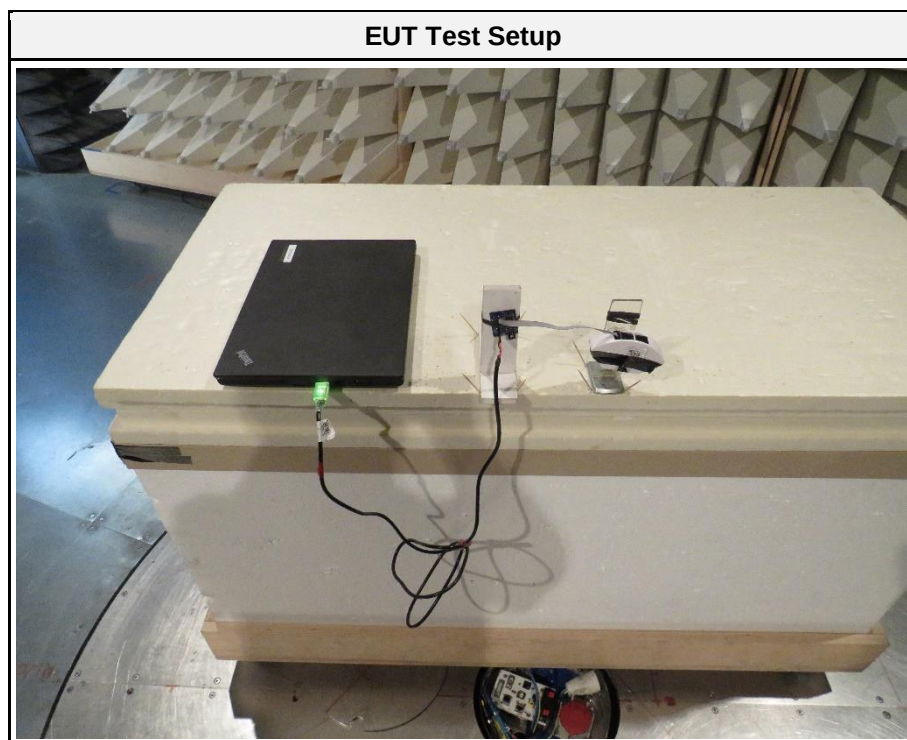
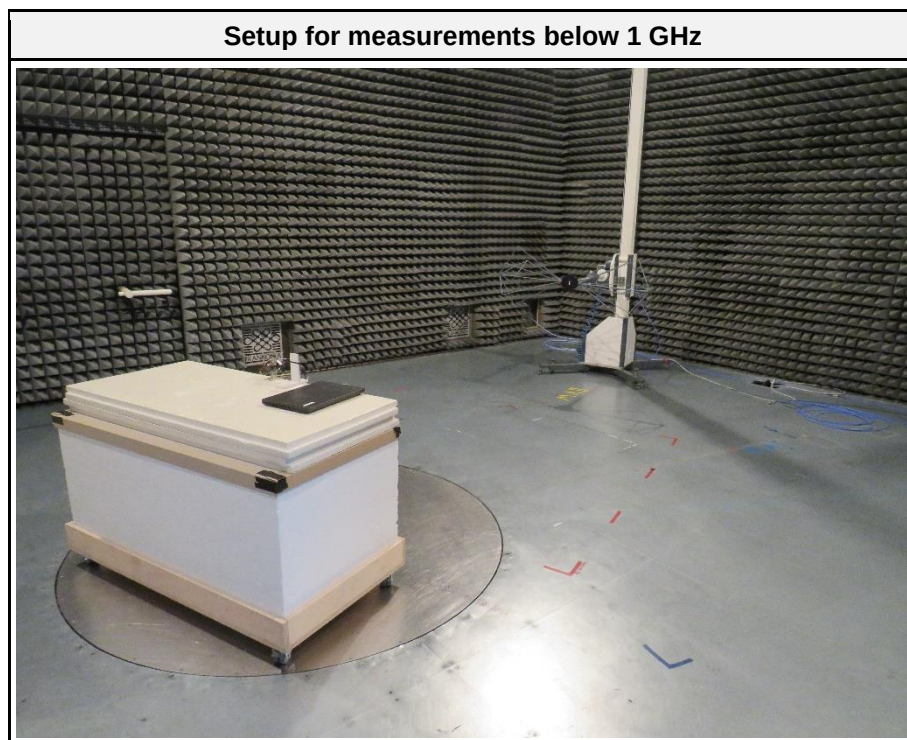
Test Procedure 30 MHz - 1000 MHz	
1.	EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground
2.	EUT set to test mode
3.	The receiver is set to peak detection with max hold
4.	The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m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

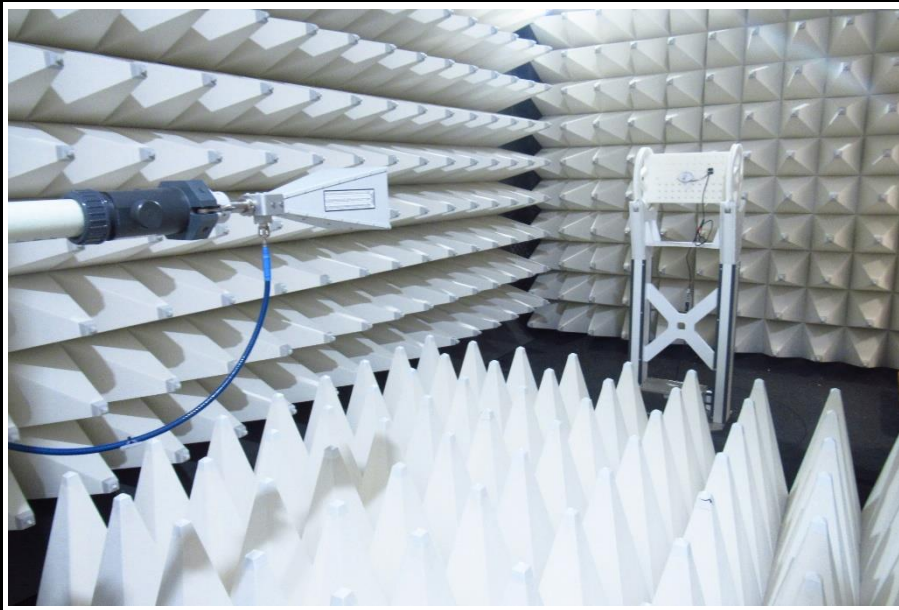
3.8.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
2402	119.9939	36.30	qpk	ver	43.50	-07.17
2402	120.0277	34.80	qpk	ver	43.50	-08.77
2402	135.9993	26.10	pk	ver	43.50	-17.44
2402	240.24	32.80	pk	hor	46.00	-13.24
2402	408	27.50	pk	hor	46.00	-18.51
2402	2369.9	53.28	pk	ver	74.00	-20.72
2402	2369.9	43.07	avg	ver	54.00	-10.93
2402	2721.9	44.86	pk	hor	74.00	-29.14
2402	2721.9	38.93	avg	hor	54.00	-15.07
2402	4803.6	42.81	pk	ver	74.00	-31.19
2402	4803.6	35.54	avg	ver	54.00	-18.46
2402	12011	44.81	pk	ver	74.00	-29.19
2402	12011	38.46	avg	ver	54.00	-15.54
2402	18127	47.59	pk	ver	74.00	-26.41
2402	18127	35.19	avg	ver	54.00	-18.81
2440	120.015	34.90	qpk	ver	43.50	-08.67
2440	120.0192	35.20	qpk	ver	43.50	-08.37
2440	240.52	32.80	pk	hor	46.00	-13.23
2440	408	27.30	pk	hor	46.00	-18.67
2440	7319.3	54.55	pk	ver	74.00	-19.45
2440	7319.3	51.14	avg	ver	54.00	-02.86
2440	12201	44.43	pk	ver	74.00	-29.57
2440	12201	37.22	avg	ver	54.00	-16.78
2440	18571	47.80	pk	ver	74.00	-26.20
2440	18571	35.08	avg	ver	54.00	-18.92
2480	119.998	35.10	qpk	ver	43.50	-08.45
2480	120.0362	34.20	qpk	ver	43.50	-09.28
2480	240.06	33.50	pk	hor	46.00	-12.51
2480	408	26.80	pk	hor	46.00	-19.23
2480	2483.5	52.61	pk	ver	74.00	-21.39
2480	2483.5	44.73	avg	ver	54.00	-09.27
2480	4960	46.03	pk	ver	74.00	-27.97
2480	4960	41.88	avg	ver	54.00	-12.12
2480	7439	53.89	pk	hor	74.00	-20.11
2480	7439	50.25	avg	hor	54.00	-03.75
2480	12401	43.78	pk	ver	74.00	-30.22
2480	12401	36.39	avg	ver	54.00	-17.61
2480	18036	46.61	pk	ver	74.00	-27.39
2480	18036	35.22	avg	ver	54.00	-18.78

3.8.7 Setup Photos



Setup for measurements above 1 GHz



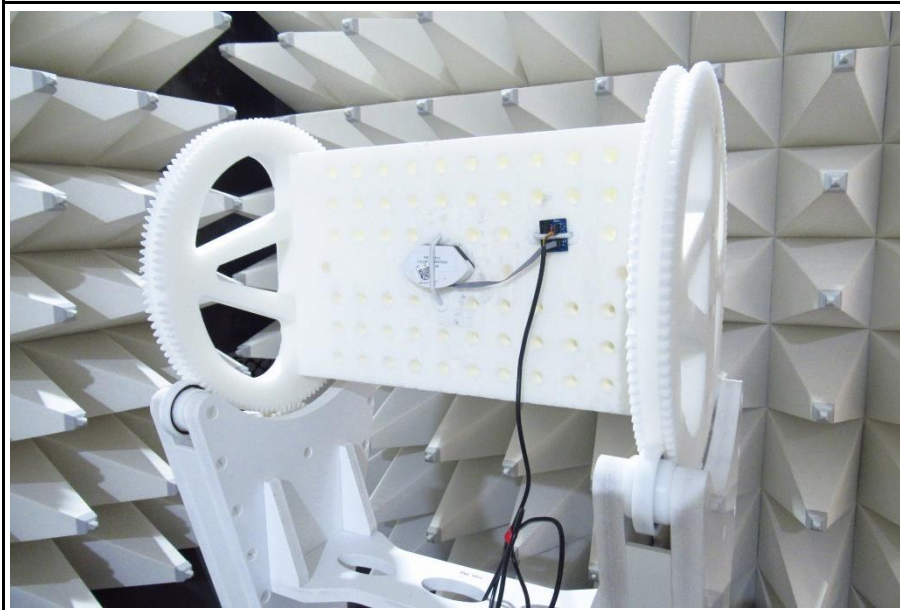
Setup for measurements above 1 GHz (EUT Side)



Setup for measurements above 1 GHz (EUT Side)



EUT Test Setup



3.9 Test Conditions and Results - Receiver radiated emissions

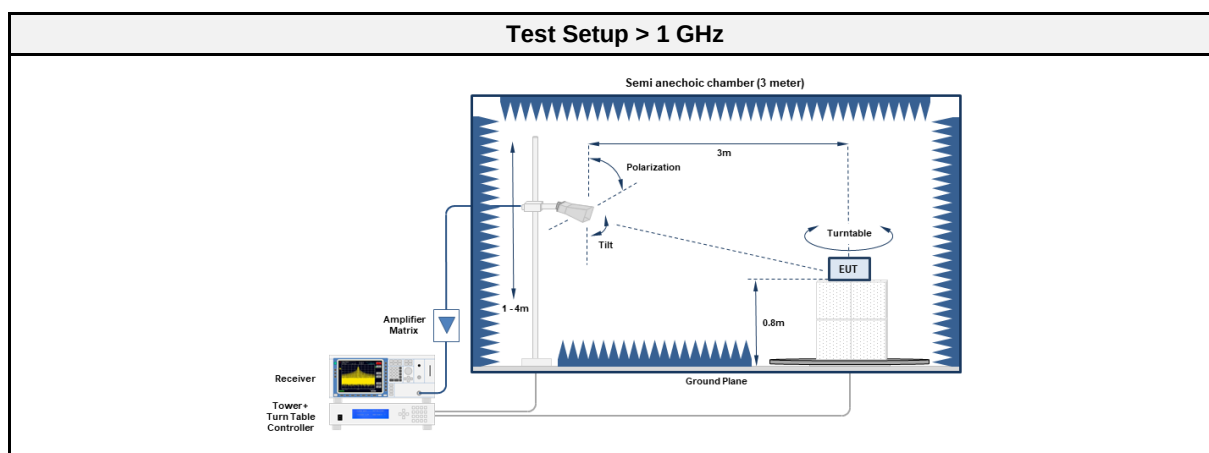
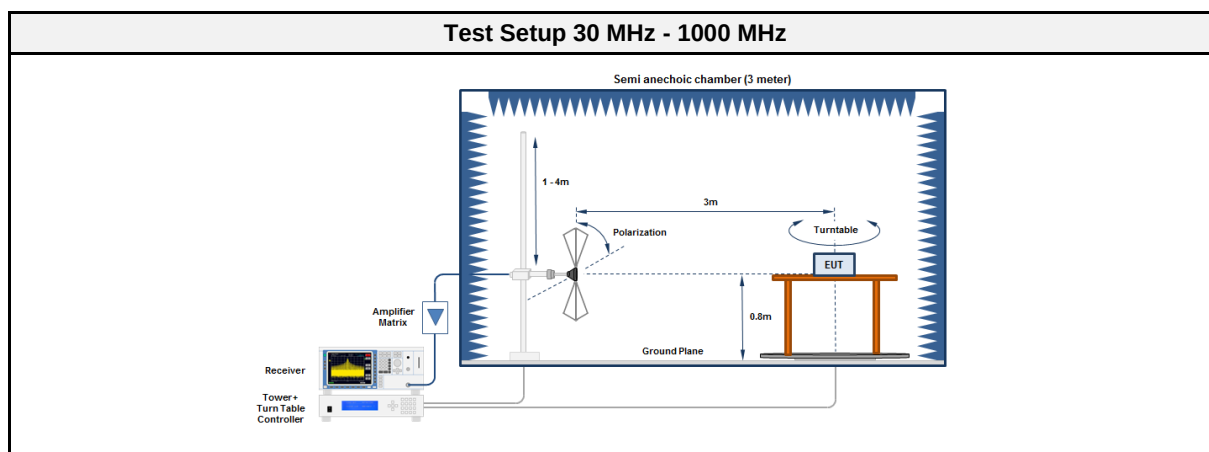
3.9.1 Information

Test Information	
Reference	ISED RSS-247, Issue 2 (section 3.1)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.4-2014 8.1-8.3
Operator	Odai Qawasmeh
Date	2022-09-01

3.9.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [$\mu\text{V/m}$]	Measurement distance [m]
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

3.9.3 Setup



3.9.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2023-01
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00187	2022-06	2025-06

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF01616	2021-09	2022-09
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2023-01
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10
Antenna	Schwarzbeck	HWRD 650	EF01679	2021-03	2024-03

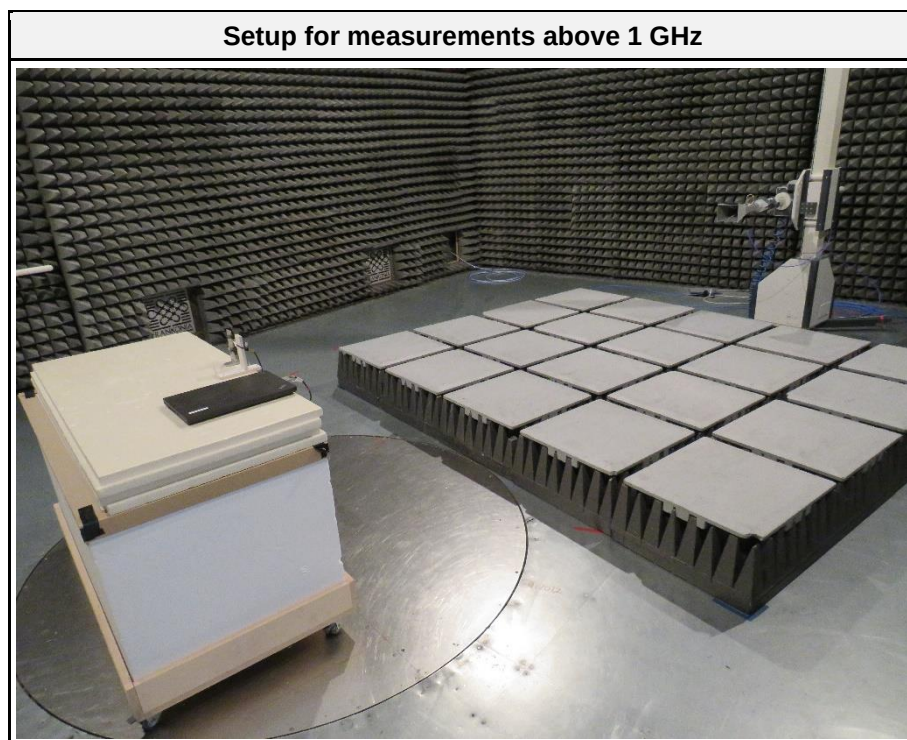
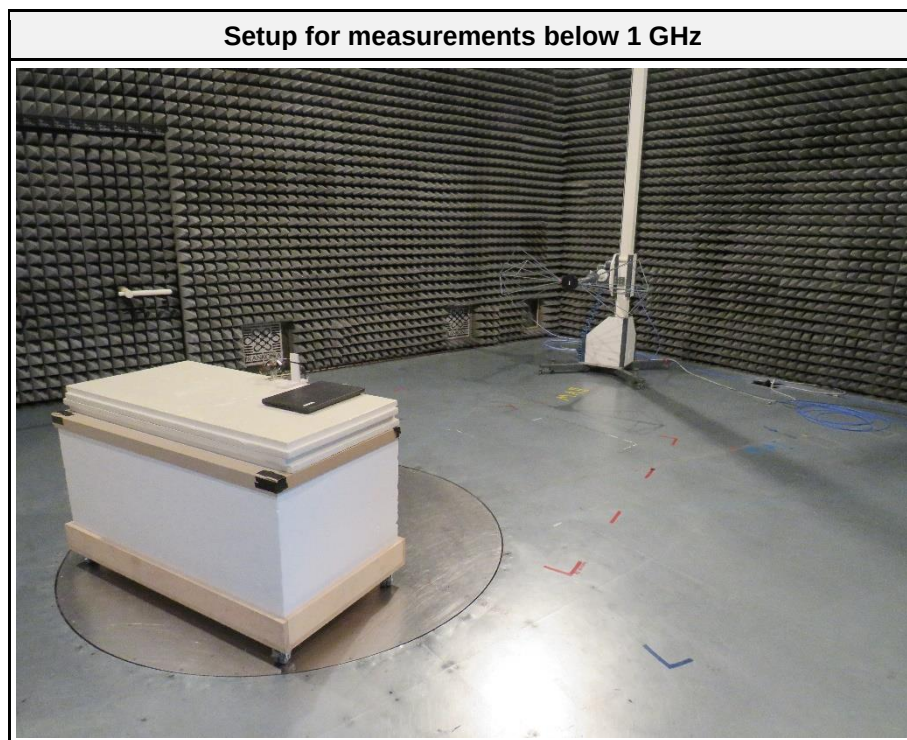
3.9.5 Procedure

Test Procedure
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT is 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

3.9.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
2440	48.0455	24.30	pk	ver	40.00	-15.71
2440	48.054	22.90	pk	ver	40.00	-17.13
2440	120.0192	34.90	qpk	ver	43.50	-08.63
2440	120.0745	34.60	qpk	ver	43.50	-08.94
2440	143.9941	32.80	qpk	ver	43.50	-10.66
2440	144.1933	32.80	pk	ver	43.50	-10.71
2440	191.9848	34.30	qpk	ver	43.50	-09.23
2440	192.0143	35.40	qpk	ver	43.50	-08.09
2440	215.84	26.60	pk	ver	43.50	-16.90
2440	240.02	32.90	pk	hor	46.00	-13.09
2440	6418	50.08	pk	ver	74.00	-23.92
2440	6418	41.74	avg	ver	53.98	-12.24
2440	17835	47.36	pk	ver	74.00	-26.64
2440	17835	37.11	avg	ver	53.98	-16.87

3.9.7 Setup Photos



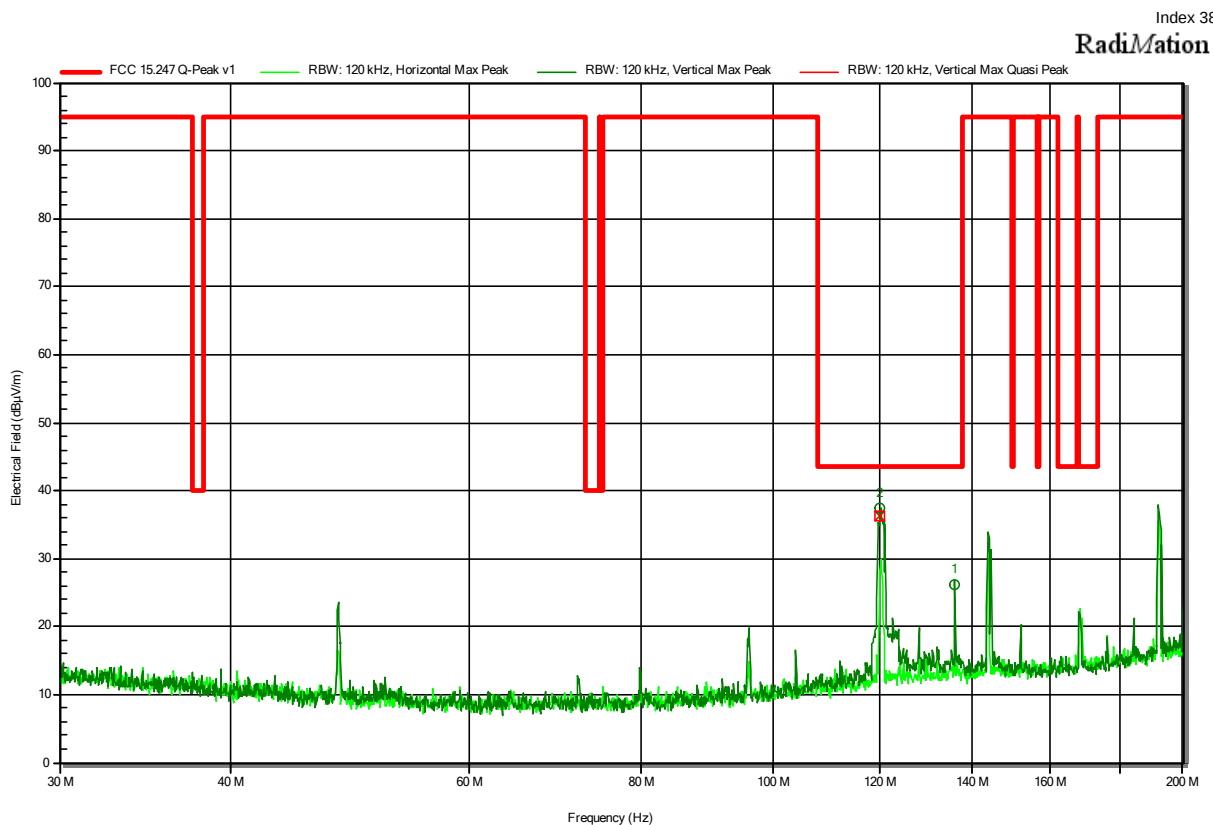
EUT Test Setup



ANNEX A Transmitter spurious emissions

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2402 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
135.9993 MHz	26.1 dBμV/m	43.5 dBμV/m	-17.44 dB	Pass	Vertical
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Polarization
119.9939 MHz	36.3 dBμV/m	43.5 dBμV/m	-7.17 dB	Pass	Vertical

Test Report No.: G0M-2205-1448-TFC247BL-V03

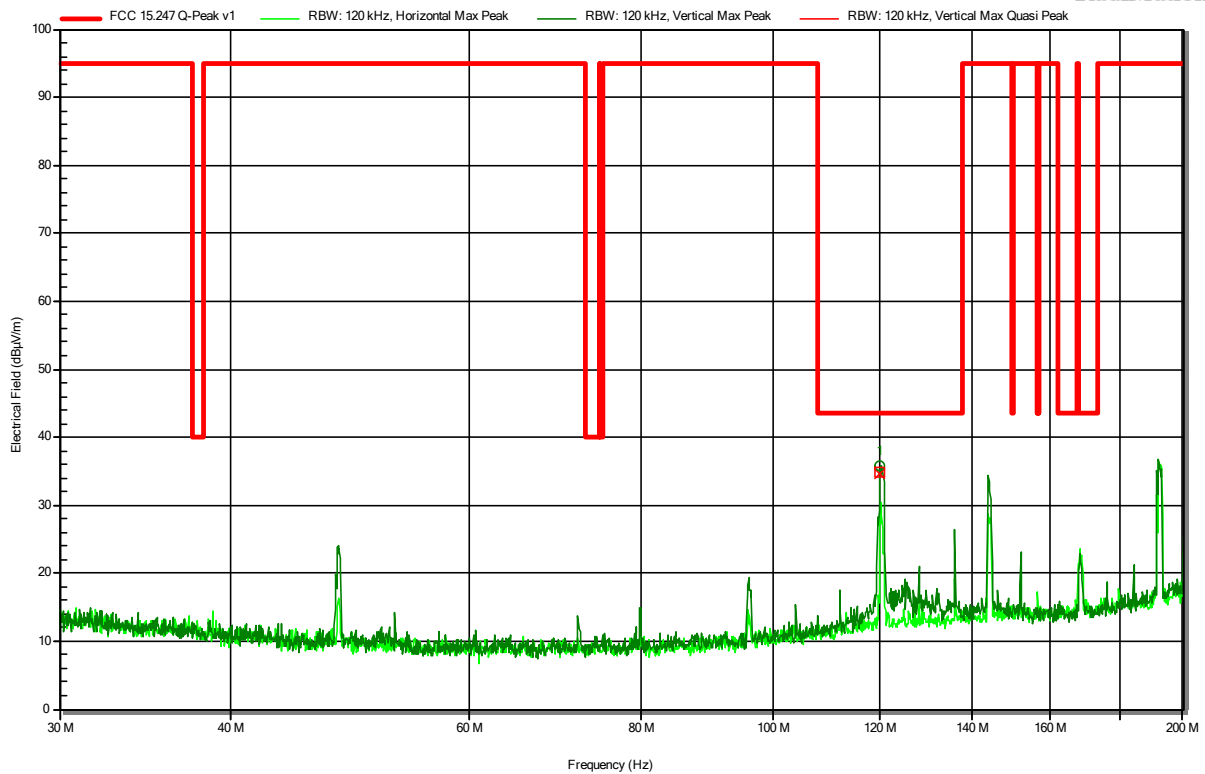
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2402 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT horizontal

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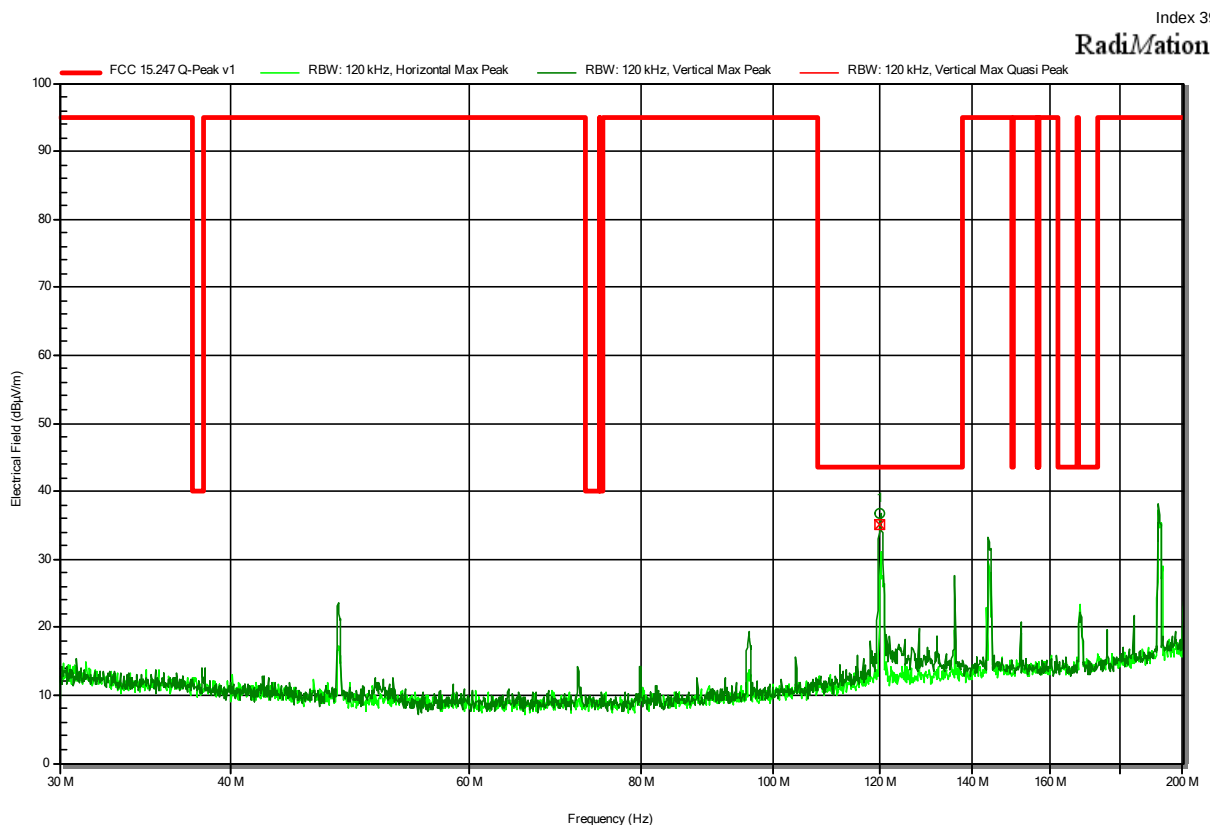
RadiMation



Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Polarization
120.0277 MHz	34.8 dBμV/m	43.5 dBμV/m	-8.77 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2440 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT vertical



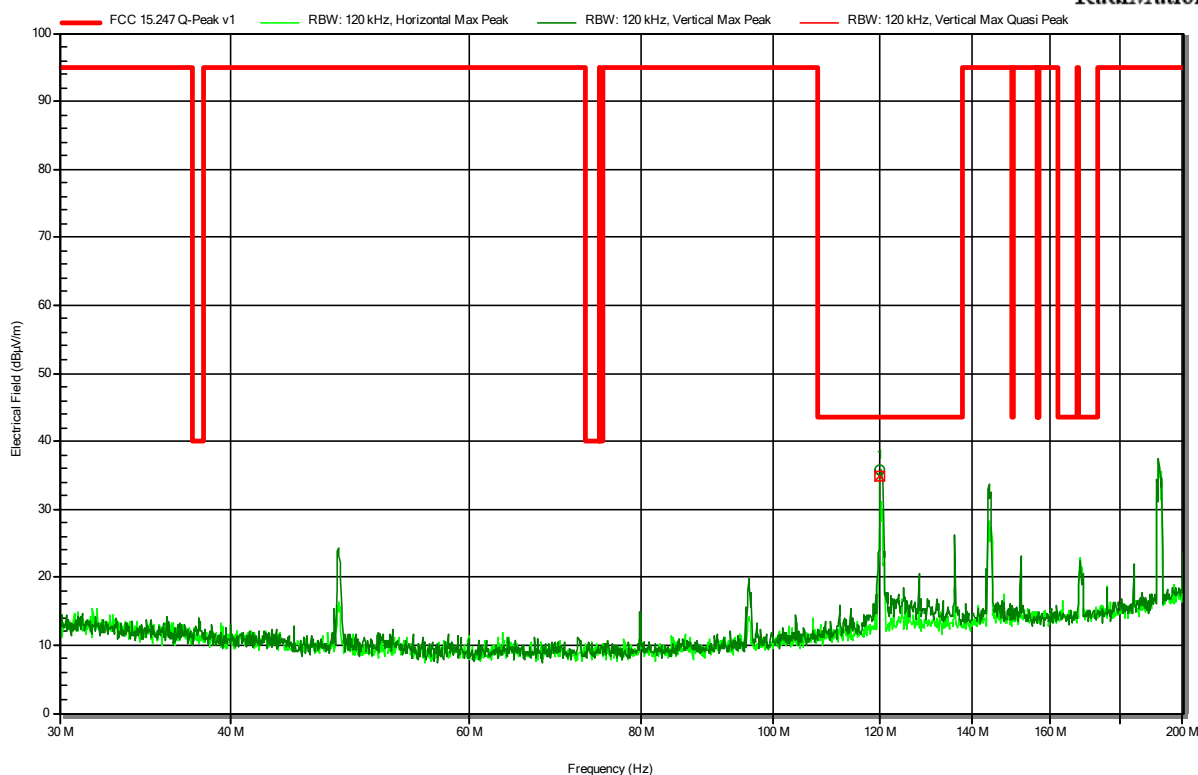
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Polarization
120.0192 MHz	35.2 dBμV/m	43.5 dBμV/m	-8.37 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2440 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT horizontal

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RadiMation



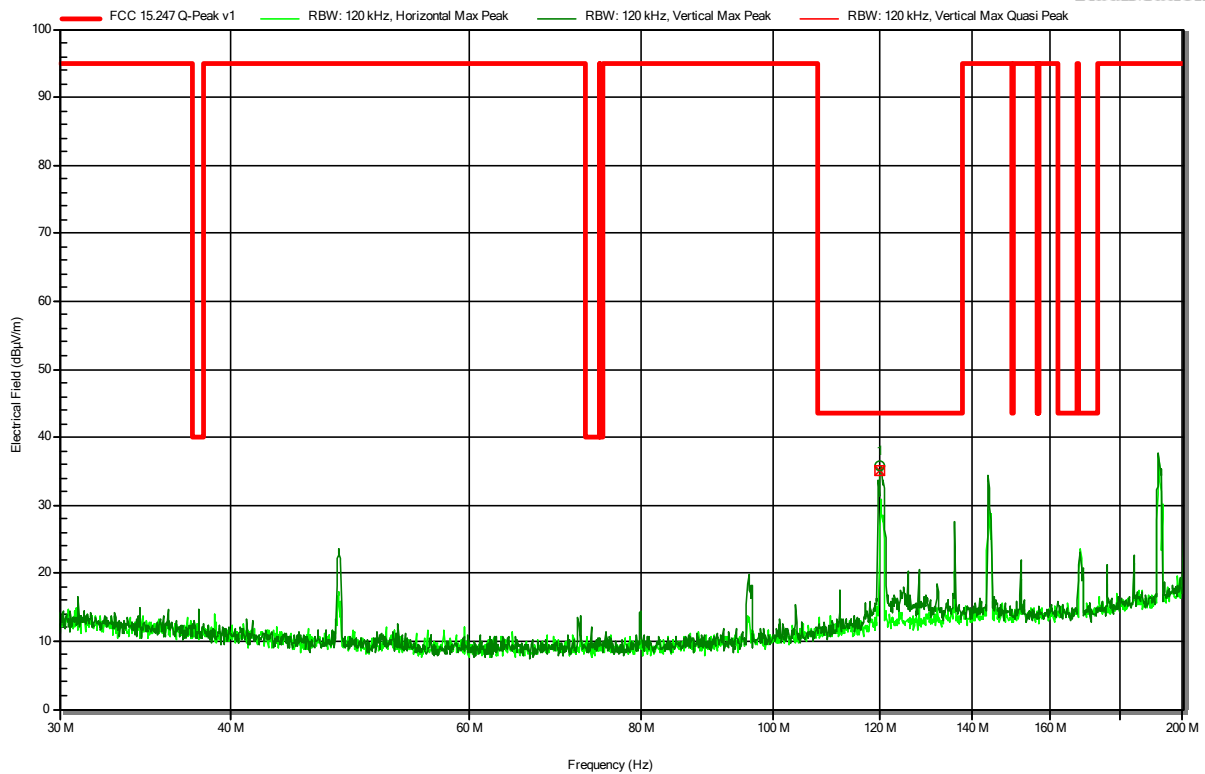
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Polarization
120.015 MHz	34.9 dBμV/m	43.5 dBμV/m	-8.67 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2480 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT vertical

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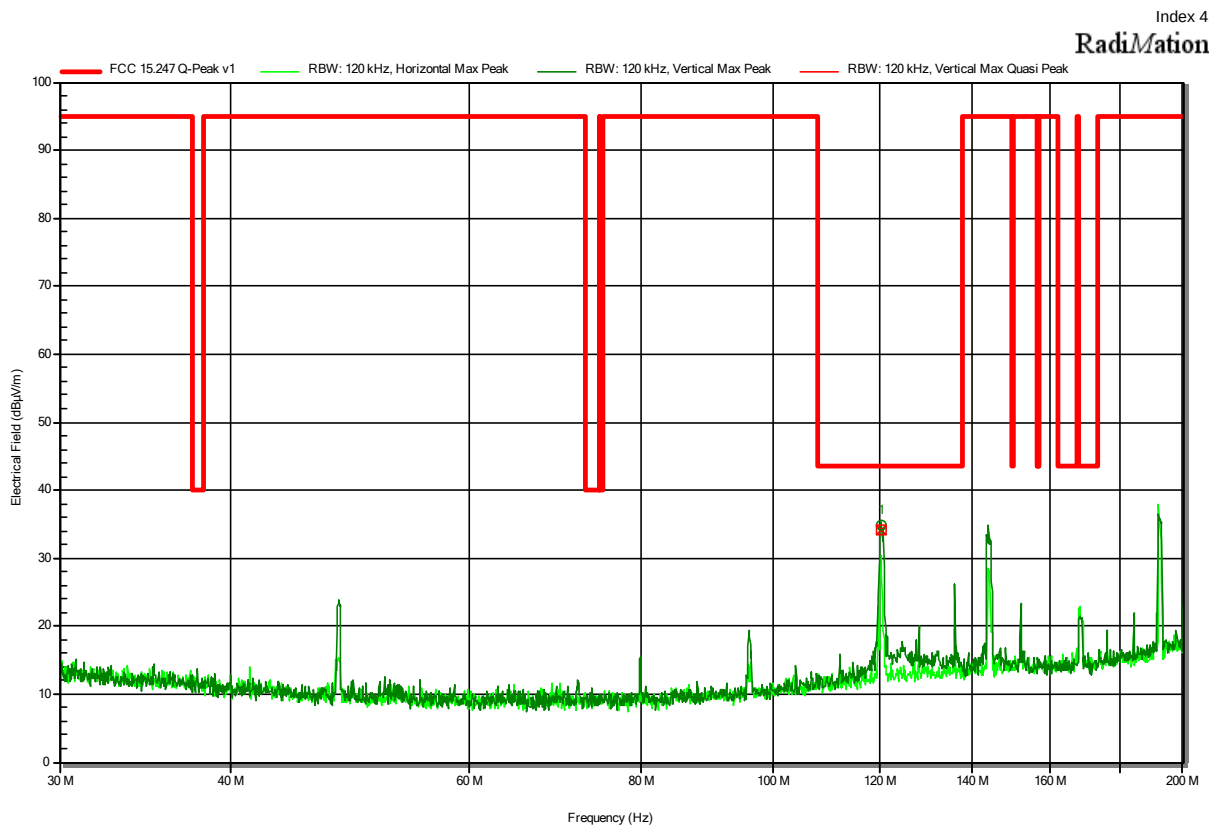
RadiMation



Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Polarization
119.998 MHz	35.1 dBμV/m	43.5 dBμV/m	-8.45 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2480 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT horizontal



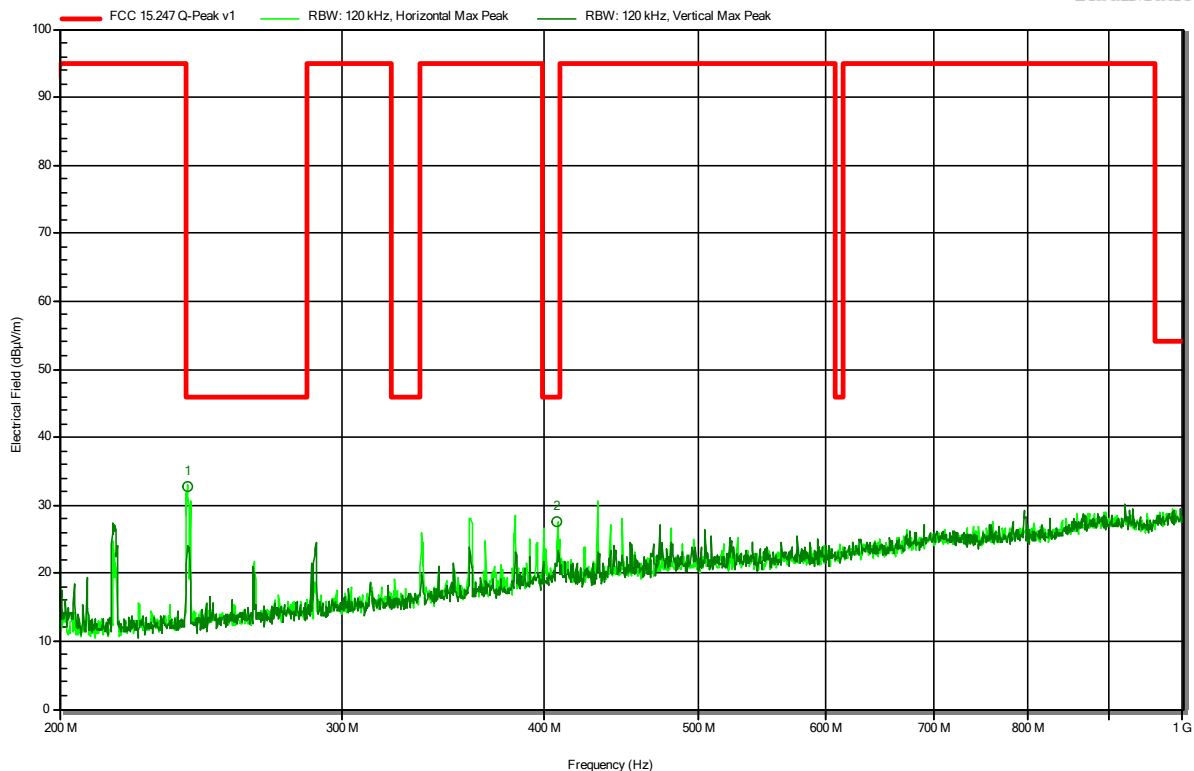
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Polarization
120.0362 MHz	34.2 dBµV/m	43.5 dBµV/m	-9.28 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HL 223
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2402 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT vertical

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RadiMation



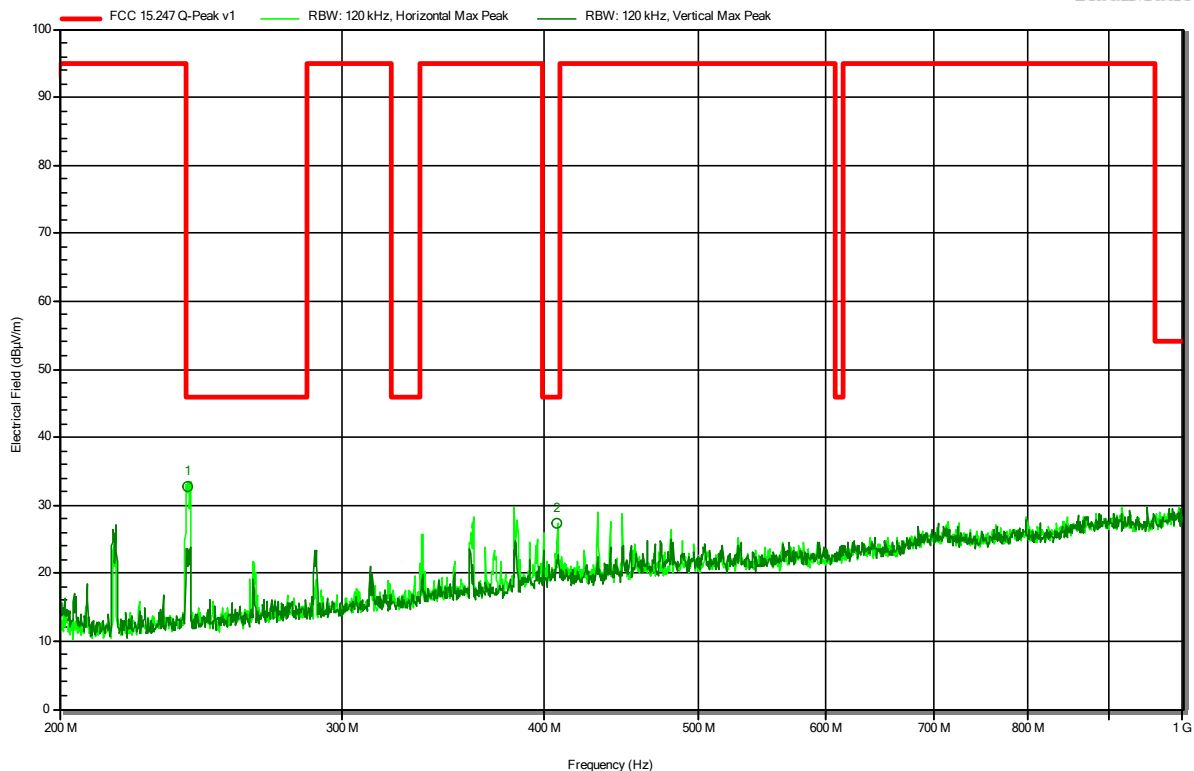
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
240.24 MHz	32.8 dBμV/m	46 dBμV/m	-13.24 dB	Pass	Horizontal
408 MHz	27.5 dBμV/m	46 dBμV/m	-18.51 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HL 223
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2440 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT vertical

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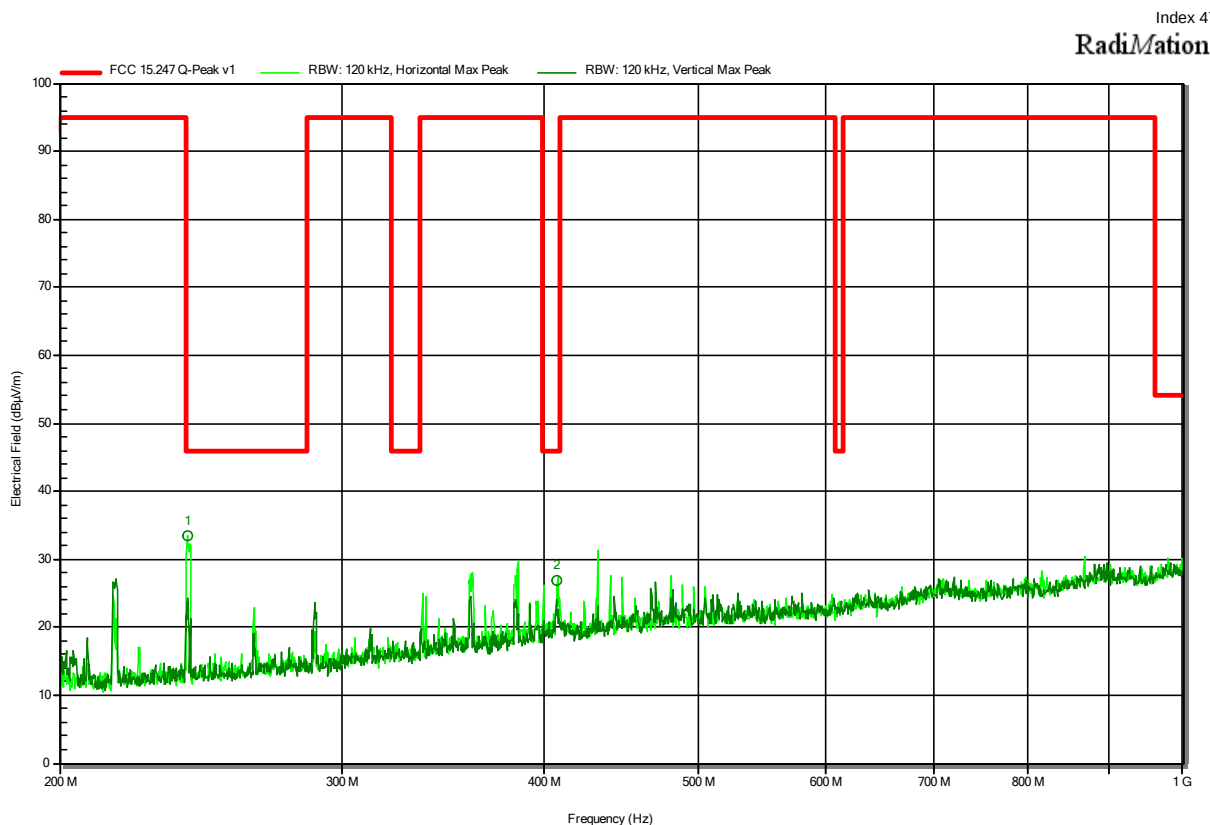
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
240.52 MHz	32.8 dBμV/m	46 dBμV/m	-13.23 dB	Pass	Horizontal
408 MHz	27.3 dBμV/m	46 dBμV/m	-18.67 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

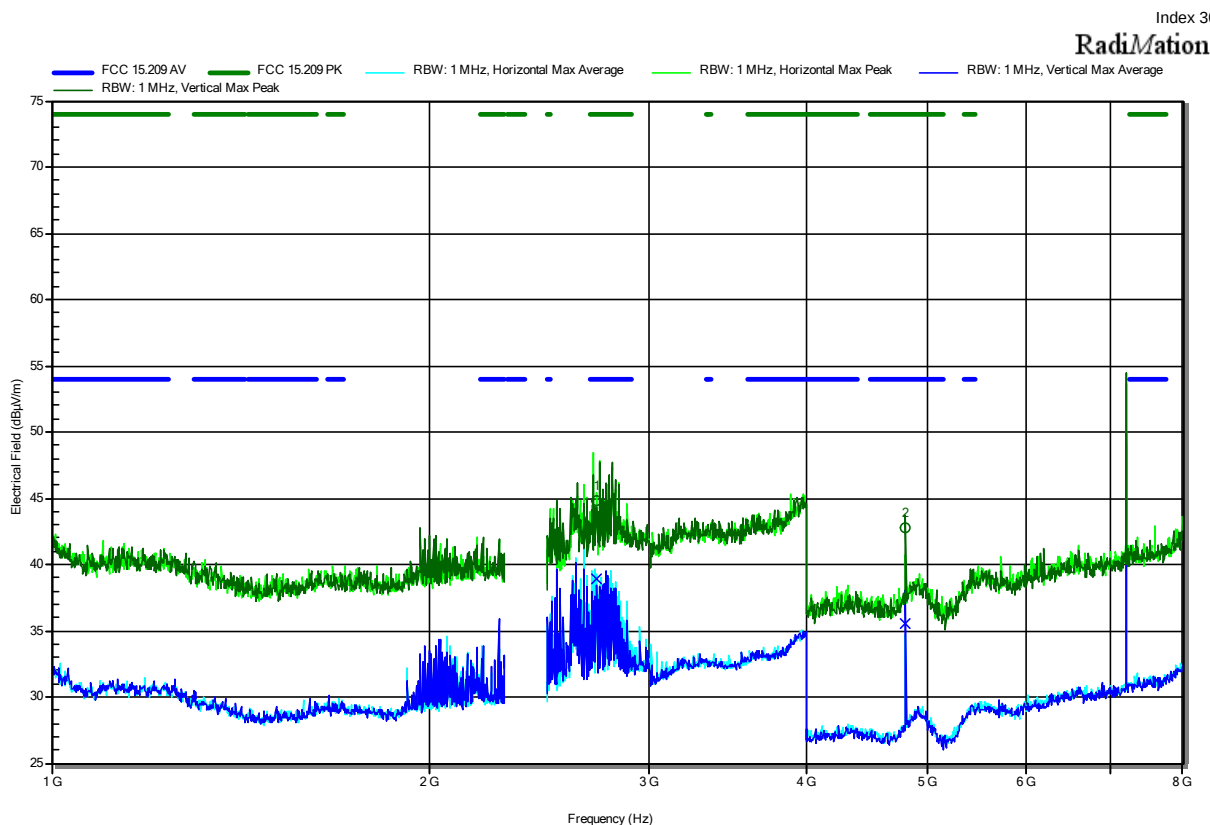
Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HL 223
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2480 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
240.06 MHz	33.5 dBμV/m	46 dBμV/m	-12.51 dB	Pass	Horizontal
408 MHz	26.8 dBμV/m	46 dBμV/m	-19.23 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2402 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-08-31
 Note: EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.7219 GHz	44.86 dBμV/m	74 dBμV/m	-29.14 dB	Pass	Horizontal
4.8036 GHz	42.81 dBμV/m	74 dBμV/m	-31.19 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.7219 GHz	38.93 dBμV/m	54 dBμV/m	-15.07 dB	Pass	Horizontal
4.8036 GHz	35.54 dBμV/m	54 dBμV/m	-18.46 dB	Pass	Vertical

Test Report No.: G0M-2205-1448-TFC247BL-V03

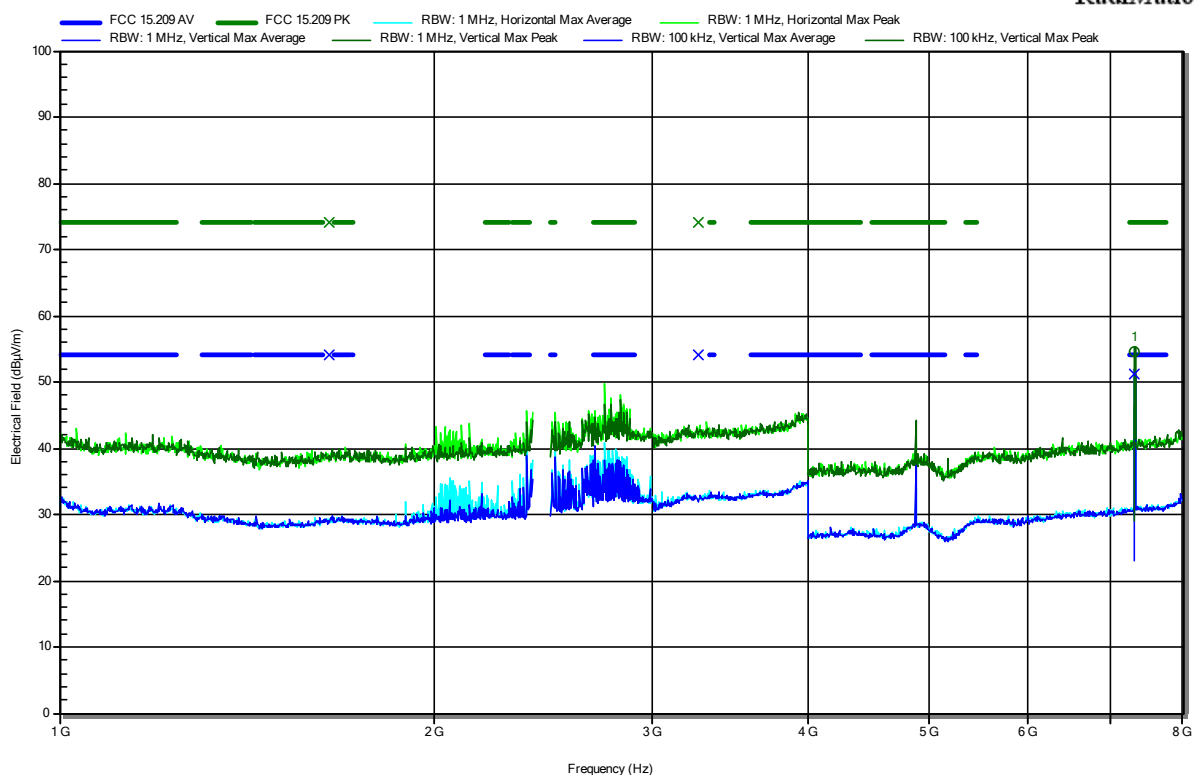
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2440 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT vertical

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RadiMation



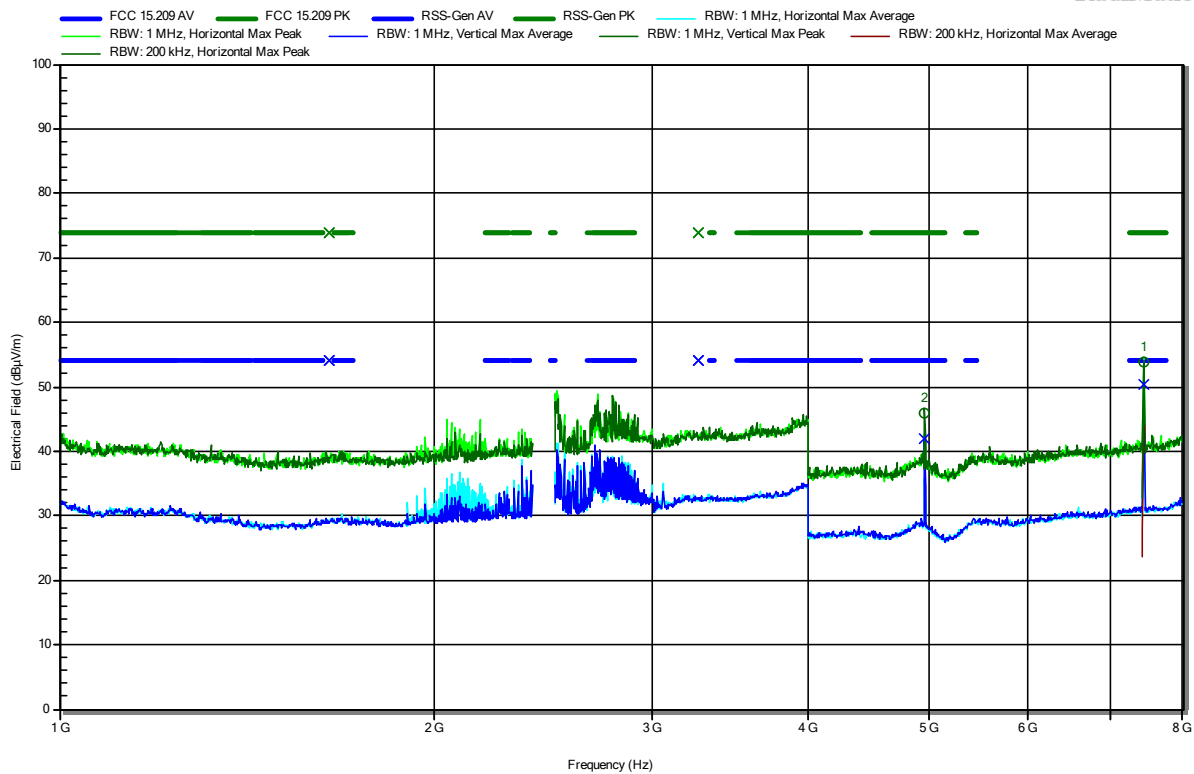
Frequency 7.3193 GHz	Peak 54.55 dBμV/m	Peak Limit 74 dBμV/m	Peak Difference -19.45 dB	Peak Status Pass	Polarization Vertical
Frequency 7.3193 GHz	Average 51.14 dBμV/m	Average Limit 54 dBμV/m	Average Difference -2.86 dB	Average Status Pass	Polarization Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2480 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: EUT vertical

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RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.96 GHz	46.03 dBµV/m	74 dBµV/m	-27.97 dB	Pass	Vertical
7.439 GHz	53.89 dBµV/m	74 dBµV/m	-20.11 dB	Pass	Horizontal

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
4.96 GHz	41.88 dBµV/m	54 dBµV/m	-12.12 dB	Pass	Vertical
7.439 GHz	50.25 dBµV/m	54 dBµV/m	-3.75 dB	Pass	Horizontal

Test Report No.: G0M-2205-1448-TFC247BL-V03

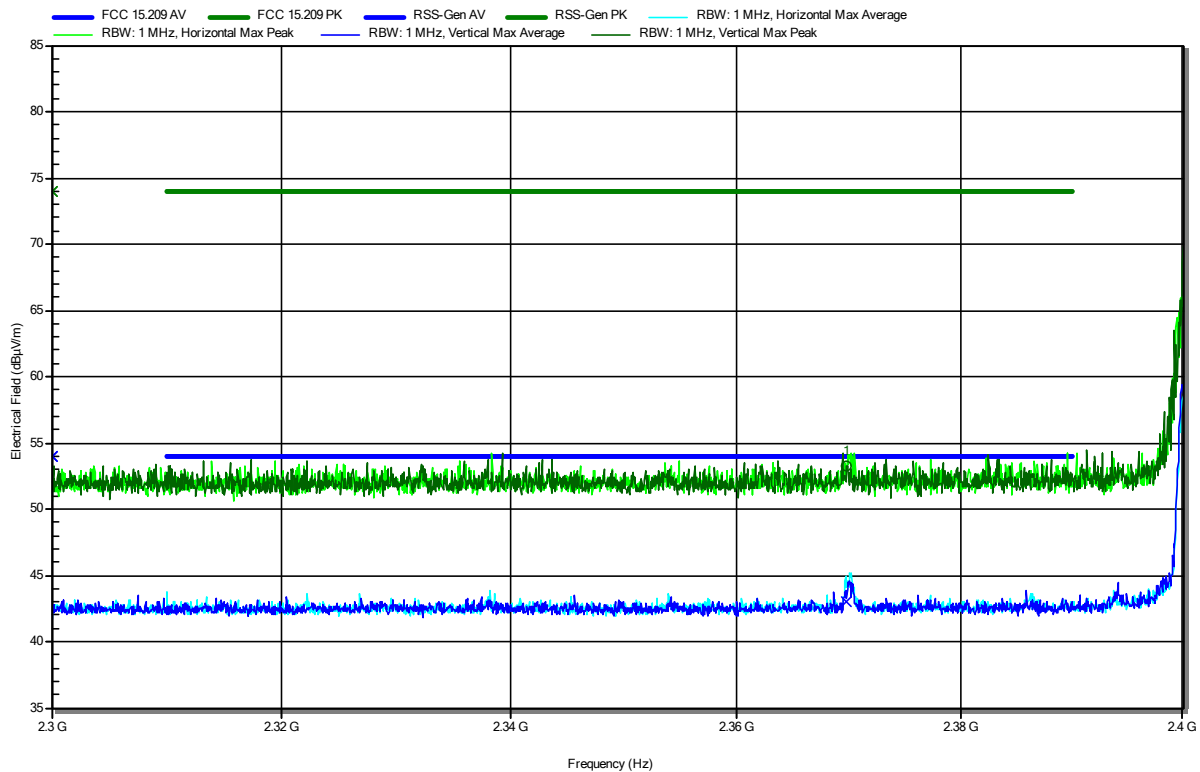
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2402 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: lower bandedge
 EUT vertical

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RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.3699 GHz	53.28 dBμV/m	74 dBμV/m	-20.72 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.3699 GHz	43.07 dBμV/m	54 dBμV/m	-10.93 dB	Pass	Vertical

Test Report No.: G0M-2205-1448-TFC247BL-V03

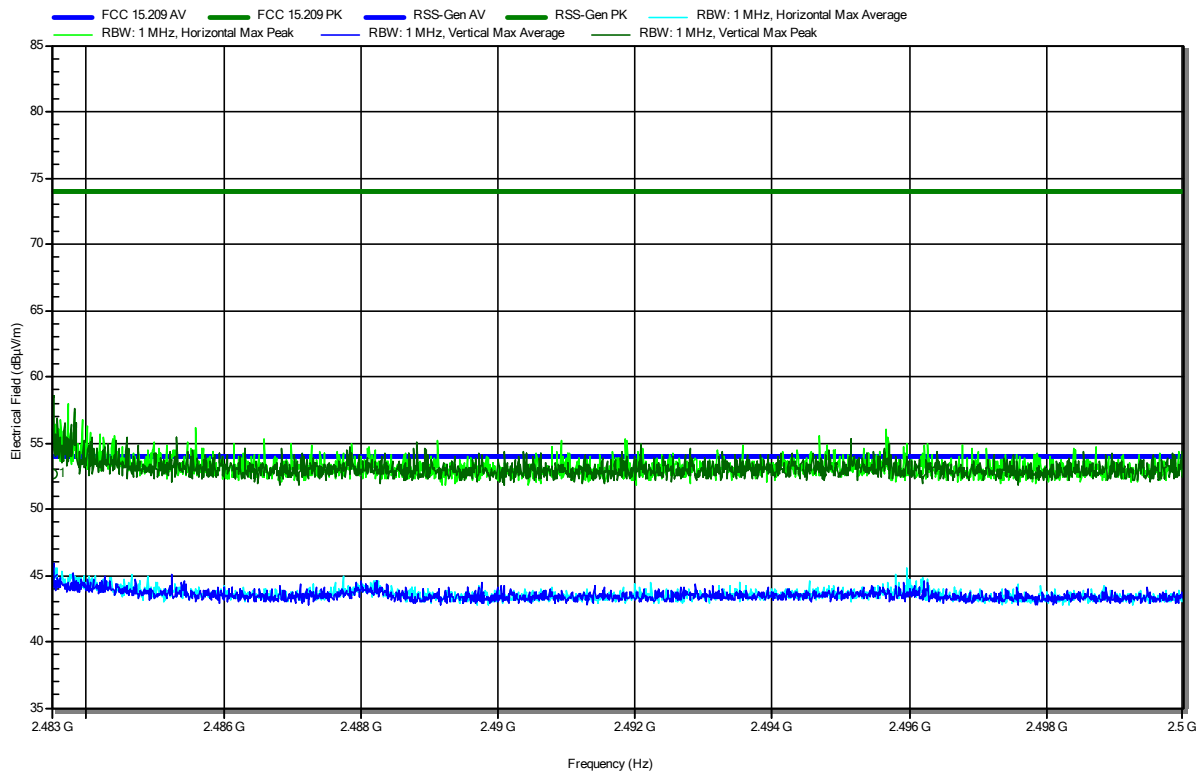
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2480 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-09-01
 Note: upper bandedge
 EUT vertical

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.4835 GHz	52.61 dBμV/m	74 dBμV/m	-21.39 dB	Pass	Vertical

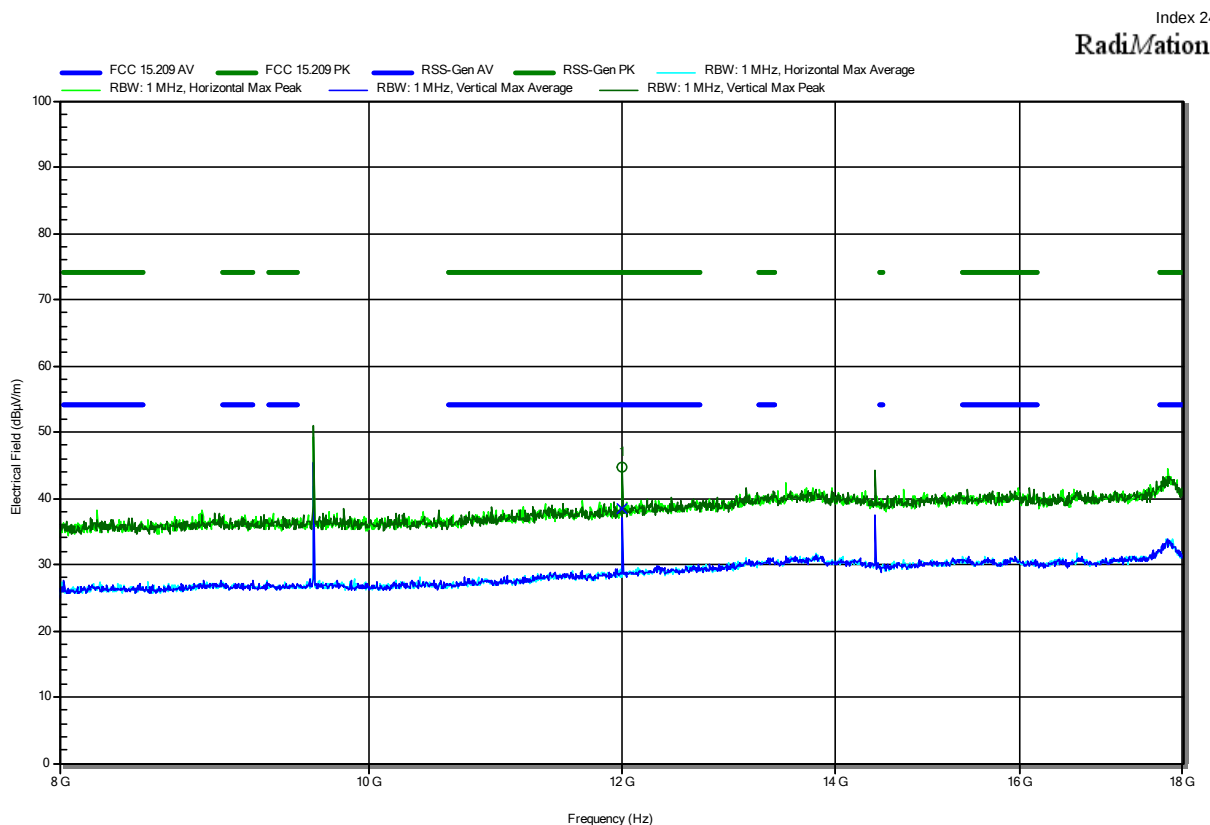
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.4835 GHz	44.73 dBμV/m	54 dBμV/m	-9.27 dB	Pass	Vertical

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Schwarzbeck HWRD 650
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2402 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-08-31
 Note: EUT vertical



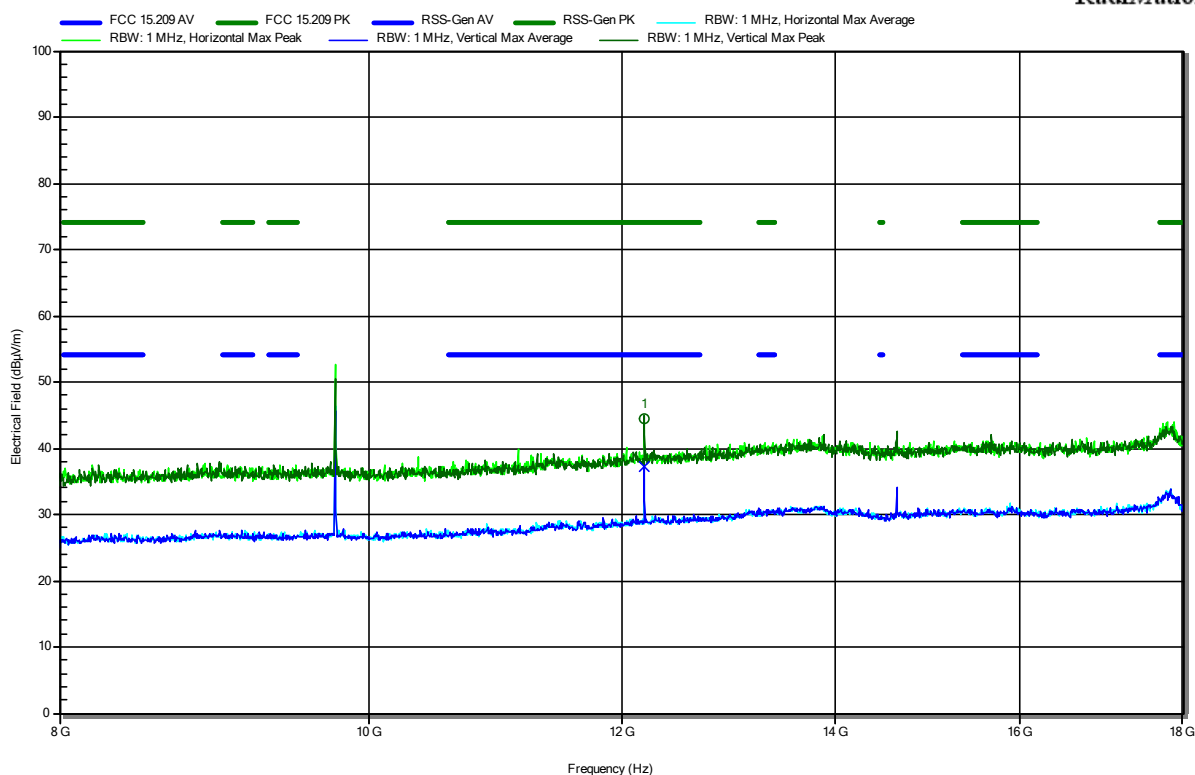
Frequency 12.011 GHz	Peak 44.81 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -29.19 dB	Peak Status Pass	Polarization Vertical
Frequency 12.011 GHz	Average 38.46 dBµV/m	Average Limit 54 dBµV/m	Average Difference -15.54 dB	Average Status Pass	Polarization Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Schwarzbeck HWRD 650
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2440 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-08-31
 Note: EUT vertical

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.201 GHz	44.43 dBV/m	74 dBV/m	-29.57 dB	Pass	Vertical
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
12.201 GHz	37.22 dBV/m	54 dBV/m	-16.78 dB	Pass	Vertical

Test Report No.: G0M-2205-1448-TFC247BL-V03

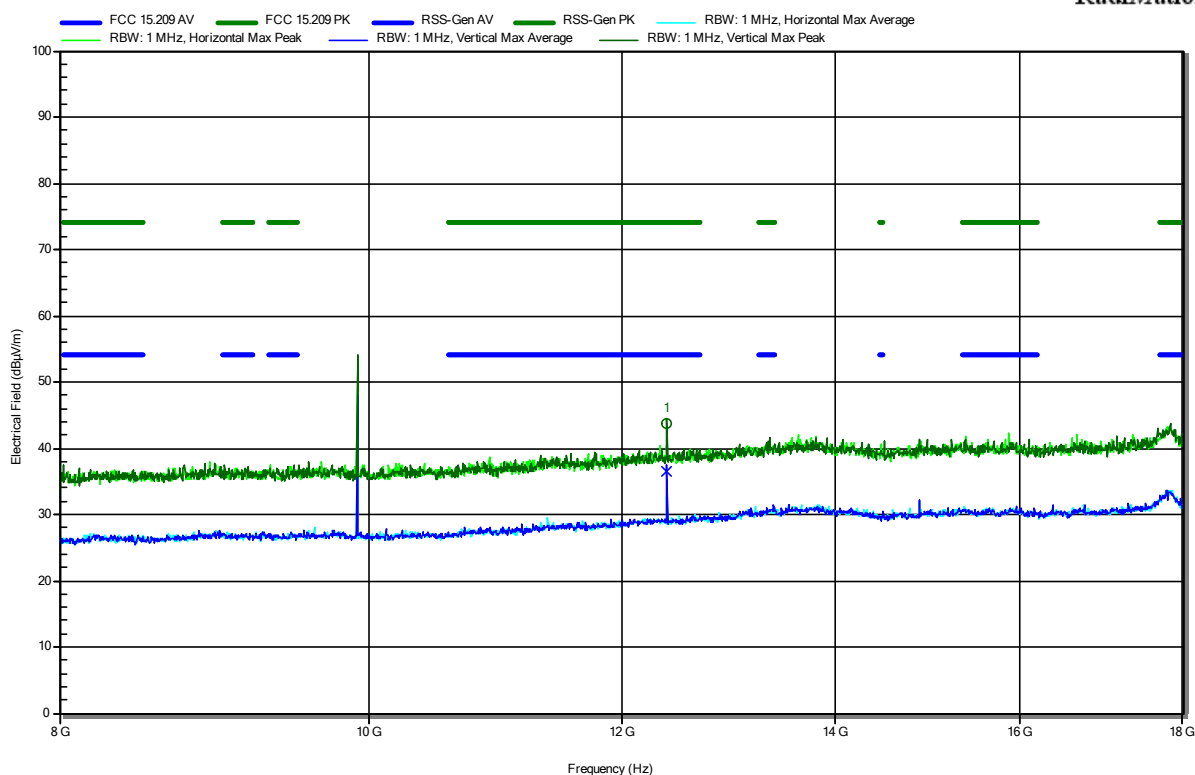
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Schwarzbeck HWRD 650
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2480 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-08-31
 Note: EUT vertical

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RadiMation



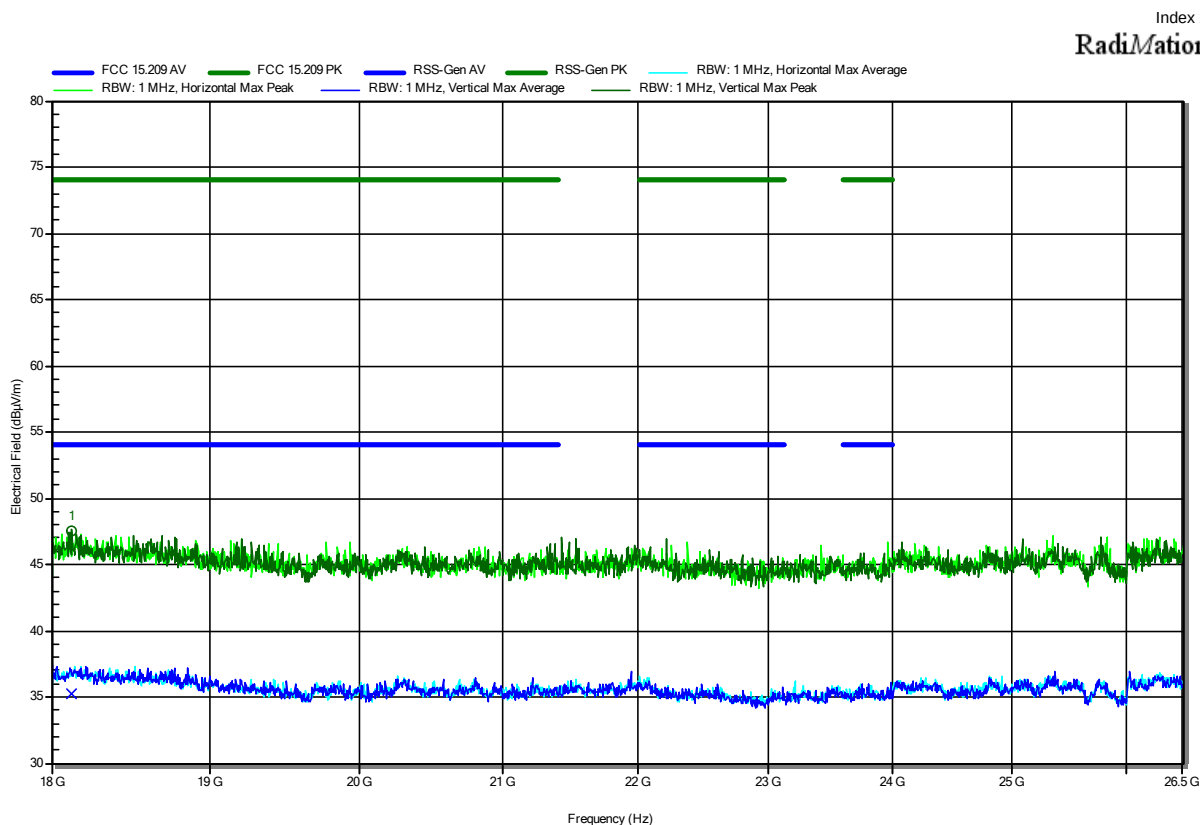
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.401 GHz	43.78 dBμV/m	74 dBμV/m	-30.22 dB	Pass	Vertical
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
12.401 GHz	36.39 dBμV/m	54 dBμV/m	-17.61 dB	Pass	Vertical

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Amplifier Research AT4560
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2402 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-08-31
 Note: EUT vertical



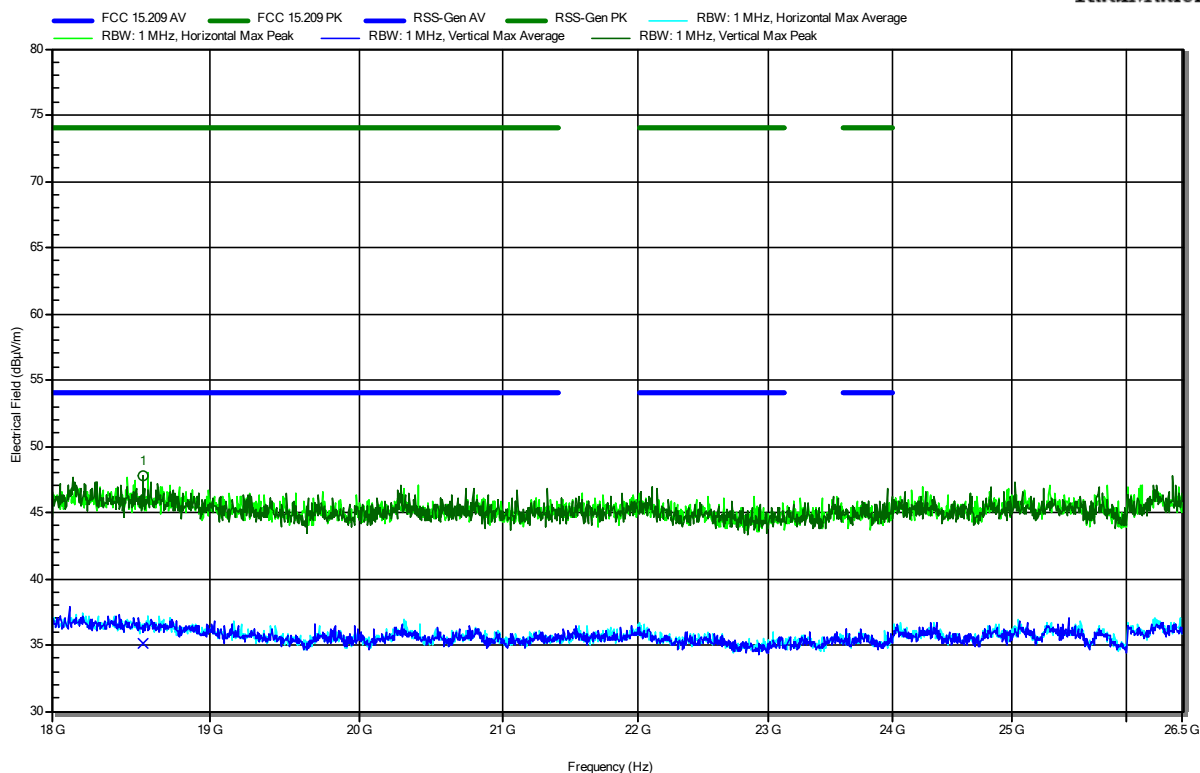
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
18.127 GHz	47.59 dBμV/m	74 dBμV/m	-26.41 dB	Pass	Vertical
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
18.127 GHz	35.19 dBμV/m	54 dBμV/m	-18.81 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Amplifier Research AT4560
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2440 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-08-31
 Note: EUT vertical

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Frequency 18.571 GHz	Peak 47.8 dBμV/m	Peak Limit 74 dBμV/m	Peak Difference -26.2 dB	Peak Status Pass	Polarization Vertical
Frequency 18.571 GHz	Average 35.08 dBμV/m	Average Limit 54 dBμV/m	Average Difference -18.92 dB	Average Status Pass	Polarization Vertical

Test Report No.: G0M-2205-1448-TFC247BL-V03

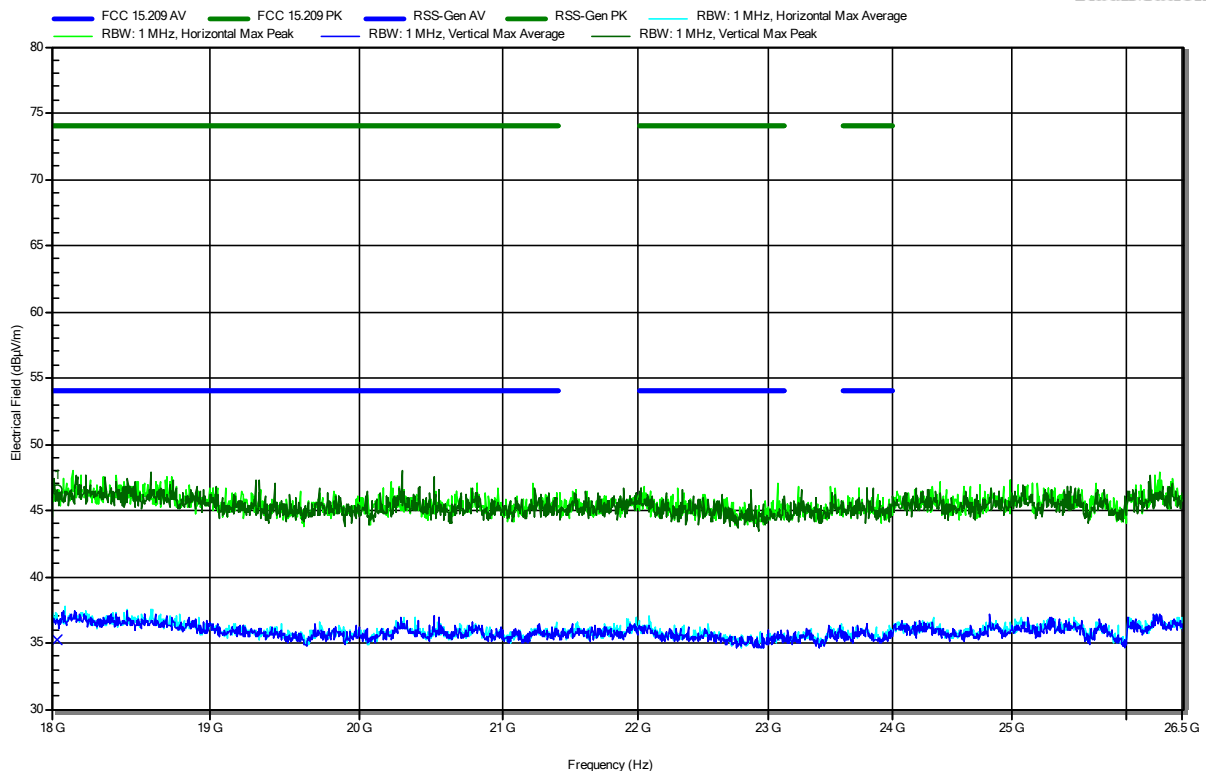
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Amplifier Research AT4560
 Measurement distance: 3 m
 Mode: Tx; Wirepas, GFSK, 2480 MHz, 1Mbit/s, PRBS9, 193 Bytes
 Test Date: 2022-08-31
 Note: EUT vertical

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RadiMation

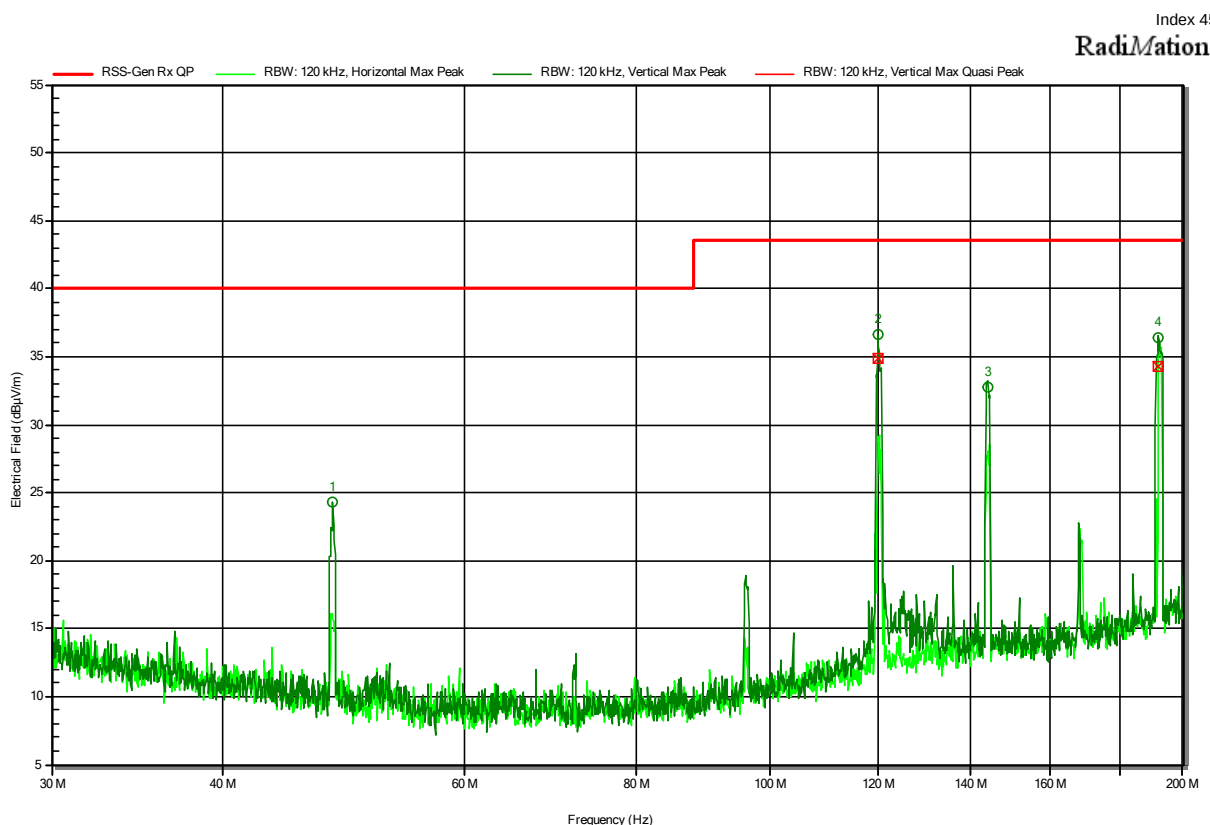


Frequency 18.036 GHz	Peak 46.61 dBμV/m	Peak Limit 74 dBμV/m	Peak Difference -27.39 dB	Peak Status Pass	Polarization Vertical
Frequency 18.036 GHz	Average 35.22 dBμV/m	Average Limit 54 dBμV/m	Average Difference -18.78 dB	Average Status Pass	Polarization Vertical

ANNEX B Receiver spurious emissions

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Rx; Wirepas, GFSK, 2440 MHz
 Test Date: 2022-09-01
 Note: EUT horizontal



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
48.0455 MHz	24.3 dBµV/m	40 dBµV/m	-15.71 dB	Pass	Vertical
144.1933 MHz	32.8 dBµV/m	43.5 dBµV/m	-10.71 dB	Pass	Vertical
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Polarization
120.0192 MHz	34.9 dBµV/m	43.5 dBµV/m	-8.63 dB	Pass	Vertical
191.9848 MHz	34.3 dBµV/m	43.5 dBµV/m	-9.23 dB	Pass	Vertical

Test Report No.: G0M-2205-1448-TFC247BL-V03

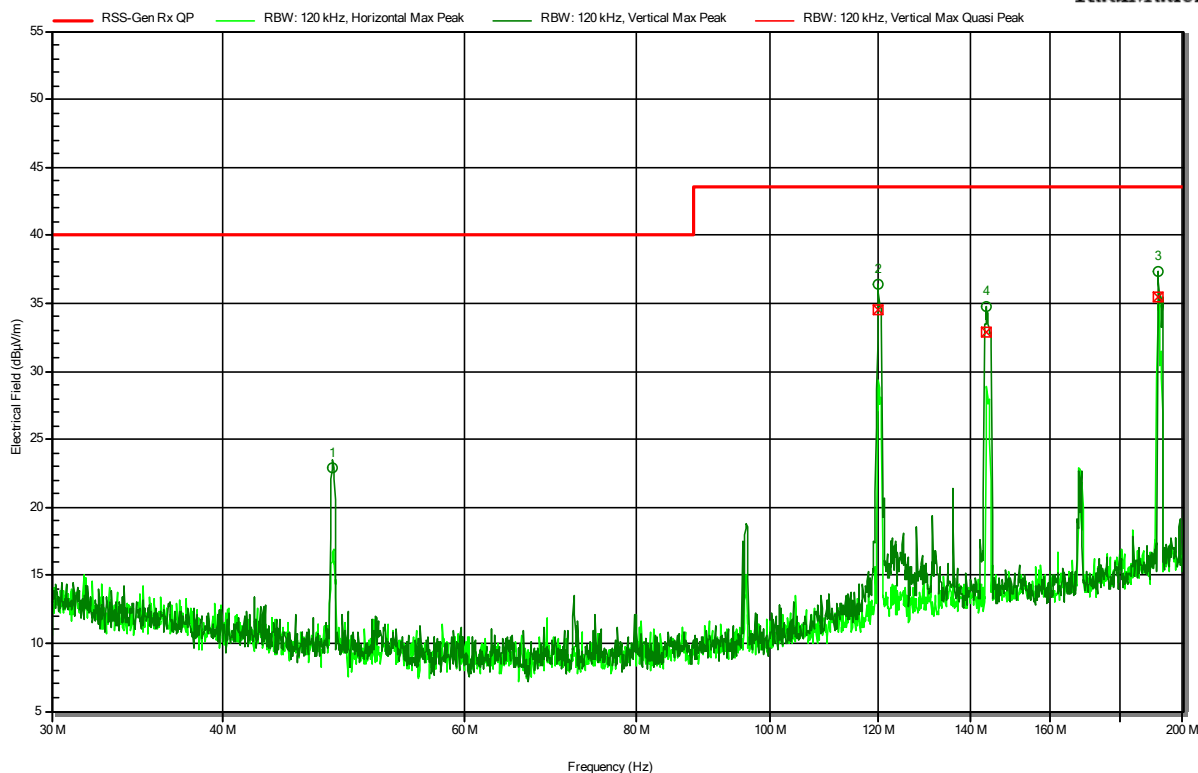
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HK 116
 Measurement distance: 3 m
 Mode: Rx; Wirepas, GFSK, 2440 MHz
 Test Date: 2022-09-01
 Note: EUT vertical

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RadiMation



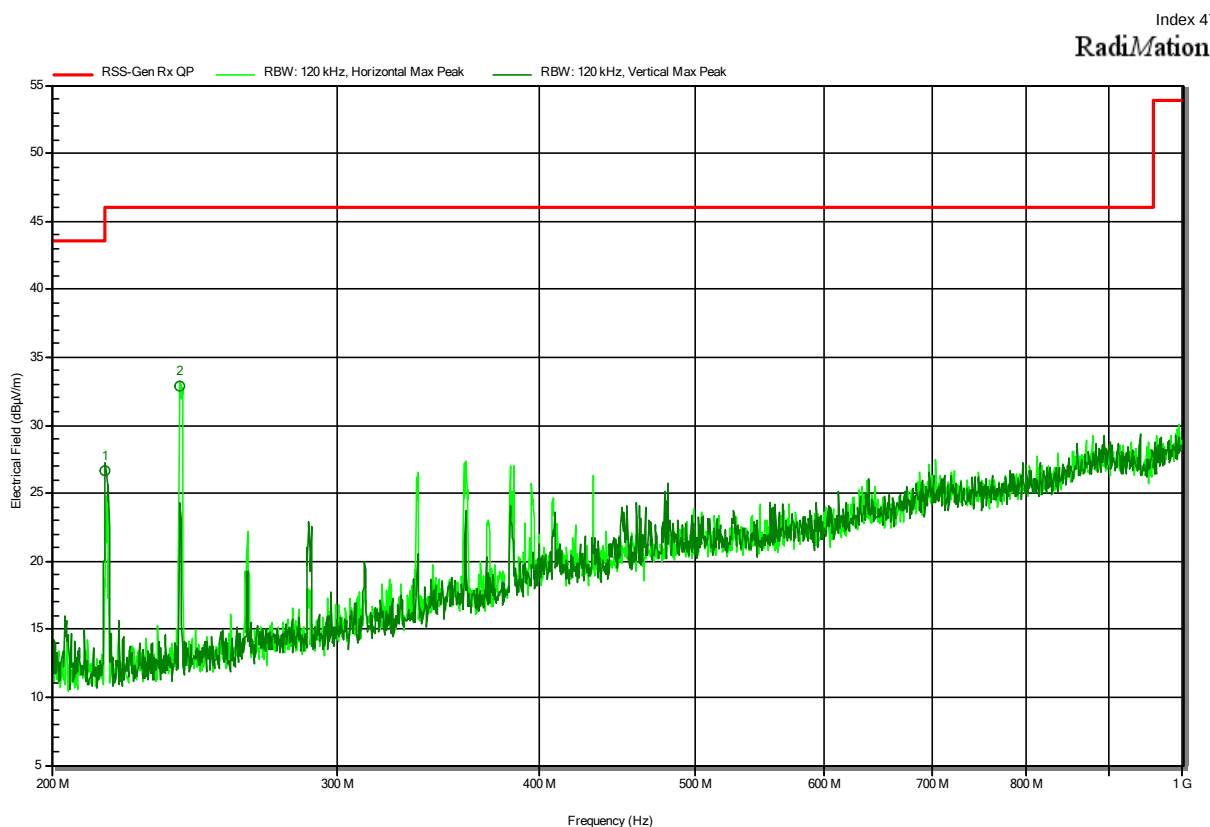
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
48.054 MHz	22.9 dBμV/m	40 dBμV/m	-17.13 dB	Pass	Vertical
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Polarization
120.0745 MHz	34.6 dBμV/m	43.5 dBμV/m	-8.94 dB	Pass	Vertical
143.9941 MHz	32.8 dBμV/m	43.5 dBμV/m	-10.66 dB	Pass	Vertical
192.0143 MHz	35.4 dBμV/m	43.5 dBμV/m	-8.09 dB	Pass	Vertical

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Rohde & Schwarz HL 223
 Measurement distance: 3 m
 Mode: Rx; Wirepas, GFSK, 2440 MHz
 Test Date: 2022-09-01
 Note: EUT vertical



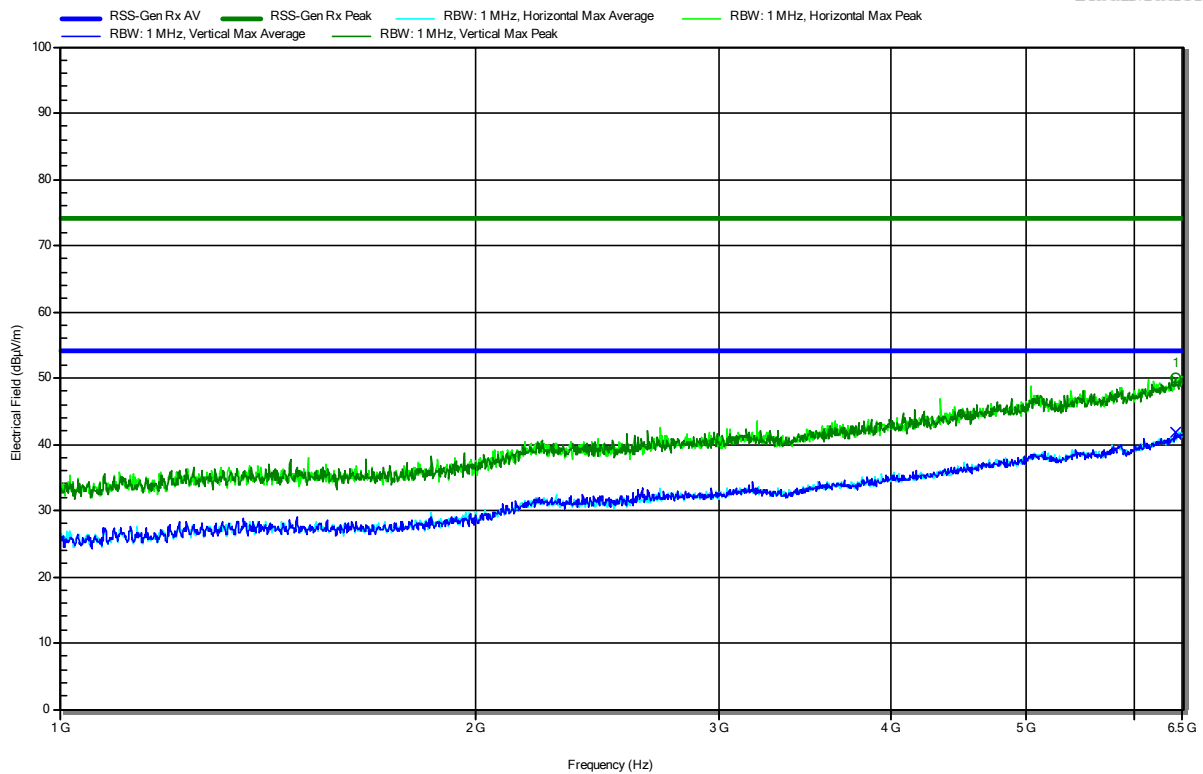
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
215.84 MHz	26.6 dBμV/m	43.5 dBμV/m	-16.9 dB	Pass	Vertical
240.02 MHz	32.9 dBμV/m	46 dBμV/m	-13.09 dB	Pass	Horizontal

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Rx; Wirepas, GFSK, 2440 MHz
 Test Date: 2022-09-01
 Note: EUT vertical

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RadiMation



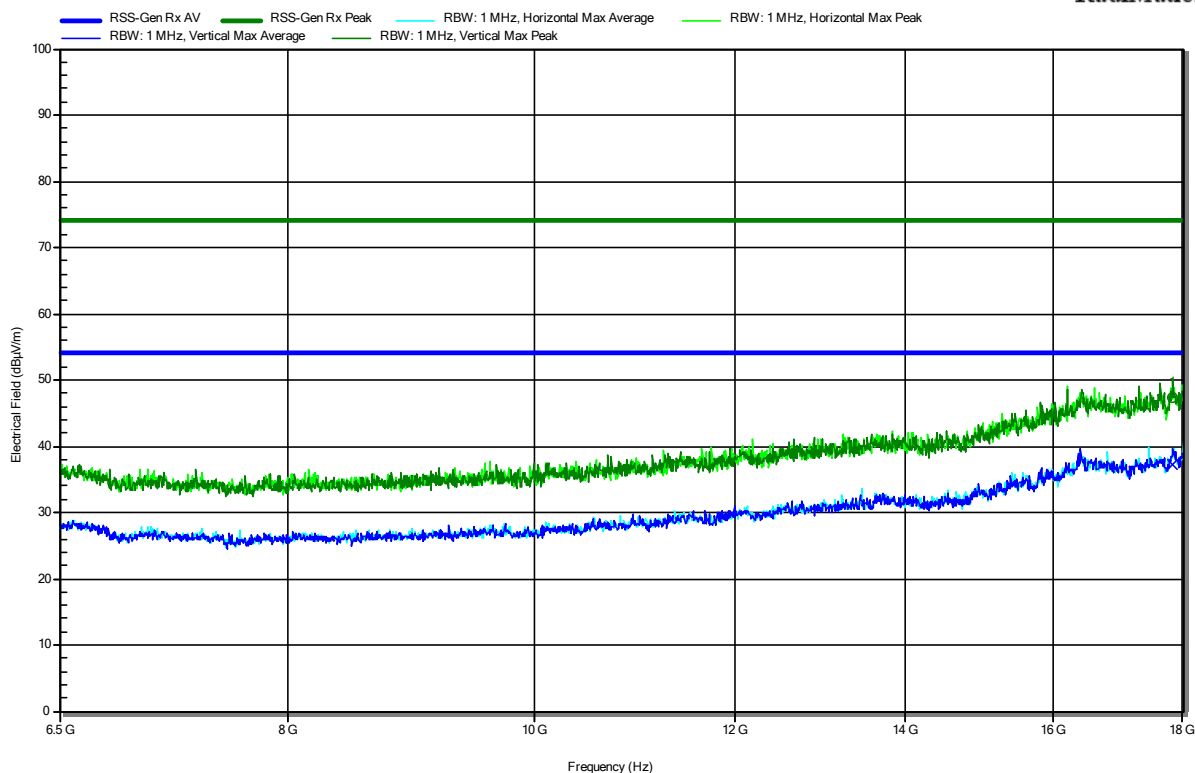
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
6.418 GHz	50.08 dBμV/m	74 dBμV/m	-23.92 dB	Pass	Vertical
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
6.418 GHz	41.74 dBμV/m	53.98 dBμV/m	-12.24 dB	Pass	Vertical

Radiated Spurious Emissions according to 47 CFR Part 15.247, RSS-247

Project Number: G0M-2205-1448
 Applicant: Eurofins Electric & Electronics Finland Oy
 Model Description: TR Module not sold separately, TR Module is part of the commercial products
 Model: TR Module
 Test Sample ID: 41177
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Qawasmeh
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom:
 Antenna: Schwarzbeck HWRD 650
 Measurement distance: 3 m
 Mode: Rx; Wirepas, GFSK, 2440 MHz
 Test Date: 2022-09-01
 Note: EUT vertical

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RadiMation



Frequency 17.835 GHz	Peak 47.36 dBμV/m	Peak Limit 74 dBμV/m	Peak Difference -26.64 dB	Peak Status Pass	Polarization Vertical
Frequency 17.835 GHz	Average 37.11 dBμV/m	Average Limit 53.98 dBμV/m	Average Difference -16.87 dB	Average Status Pass	Polarization Vertical

== END OF TEST REPORT ==

Test Report No.: G0M-2205-1448-TFC247BL-V03

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany