

RADIO REPORT FCC 47 CFR Part 15C ISED Canada RSS-247 Digital transmission systems operating within the 2400 – 2483.5 MHz band	
Report Reference No	G0M-1905-8256-TFC247BL-V01
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-2 DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	BIOTRONIK SE & Co. KG
Address	Woermannkehe 1 12359 Berlin GERMANY
Test Specification	According to FCC/ISED rules
Standard	47 CFR Part 15C RSS-247, Issue 2, 2017-02 RSS-Gen, Issue 5, Amendment 1, 2019-03
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	programming device for BIOTRONIK pacemakers, ICDs, CRT-devices and ICMs
Model(s)	Renamic Neo
Additional Model(s)	None
Brand Name(s)	BIOTRONIK
Hardware Version(s)	A.x
Software Version(s)	Porto_BT: 15.68.7.p167
FCC-ID	QRI-RENAMICNEO
IC	4708A-RENAMICNEO
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 - 23 °C	
Test Lab Humidity	32 – 38 %	
Date of receipt of test item	2019-05-22	
Report:		
Compiled by	Abdullah Al Jamal	
Tested by (+ signature) (Responsible for Test)	Abdullah Al Jamal	
Approved by (+ signature) (Head of Lab)	Christian Weber	
Date of Issue	2019-12-17	
Total number of pages	112	
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:		
Internal equipment photos provided by applicant.		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2019-12-17	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.....	6
1.1	Photos – Equipment External	7
1.2	Photos – Equipment Internal	14
1.3	Photos – Test Setup.....	24
1.4	Support Equipment.....	25
1.5	Test Modes	26
1.6	Test Frequencies.....	27
1.7	Sample emission level calculation.....	28
2	Result Summary.....	29
3	Test Conditions and Results.....	30
3.1	Test Conditions and Results - Occupied bandwidth.....	30
3.2	Test Conditions and Results - 6 dB bandwidth.....	34
3.3	Test Conditions and Results - Maximum peak conducted output power	38
3.4	Test Conditions and Results - Power spectral density	40
3.5	Test Conditions and Results - AC powerline conducted emissions.....	44
3.6	Test Conditions and Results - Band-edge compliance.....	47
3.7	Test Conditions and Results - Conducted spurious emissions.....	50
3.8	Test Conditions and Results - Transmitter radiated emissions	55
3.9	Test Conditions and Results - Receiver radiated emissions	58
ANNEX A	Transmitter spurious emissions	61
ANNEX B	Receiver spurious emissions	101

1 Equipment (Test Item) Under Test

Description	programming device for BIOTRONIK pacemakers, ICDs, CRT-devices and ICMs	
Model	Renamic Neo	
Additional Model(s)	None	
Brand Name(s)	BIOTRONIK	
Serial Number(s)	80001072 (Test sample 24167) 80001091 (Test sample 24164)	
Hardware Version(s)	A.x	
Software Version(s)	Porto_BT: 15.68.7.p167	
PMN	Renamic Neo	
HVIN	Renamic Neo	
FVIN	N/A	
HMN	N/A	
FCC-ID	QRI-RENAMICNEO	
IC	4708A-RENAMICNEO	
Equipment type	End Product	
Radio type	Transceiver	
Assigned frequency bands	2400 - 2483.5 MHz	
Radio technology	Bluetooth LE	
Modulation	GFSK	
Number of antenna ports	1	
Antenna	Type	Integrated antenna
	Model	Not specified
	Manufacturer	Not specified
	Gain	4.22 dBi
Supply Voltage	V _{NOM}	120 VAC
Operating Temperature	T _{NOM}	23 °C
AC/DC-Adaptor	Model	ATM090T-P190
	Vendor	Adapter Tech
	Input	100 VAC – 240 VDC
	Output	19 VDC
Manufacturer	BIOTRONIK SE & Co. KG Woermannkehre 1 12359 Berlin GERMANY	

1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
None.				
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment: None.				

1.5 Test Modes

Mode	Description
GFSK	Mode = Transmit Modulation = GFSK Spreading = None Duty cycle = 64%
Receive	Mode = Receive
Comment: None.	

1.6 Test Frequencies

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

1.7 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:

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

Net:

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

Limit:

This is the FCC Class B radiated emission limit (in units of 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:

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

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 dBμV + 26 dB/m	= 47.5 dBμV/m	:	47.5 dBμV/m - 57.0 dBμV/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 (section 6.6)	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)(1) 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 (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 C63.10-2013	PASS	
Comment: None.				

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

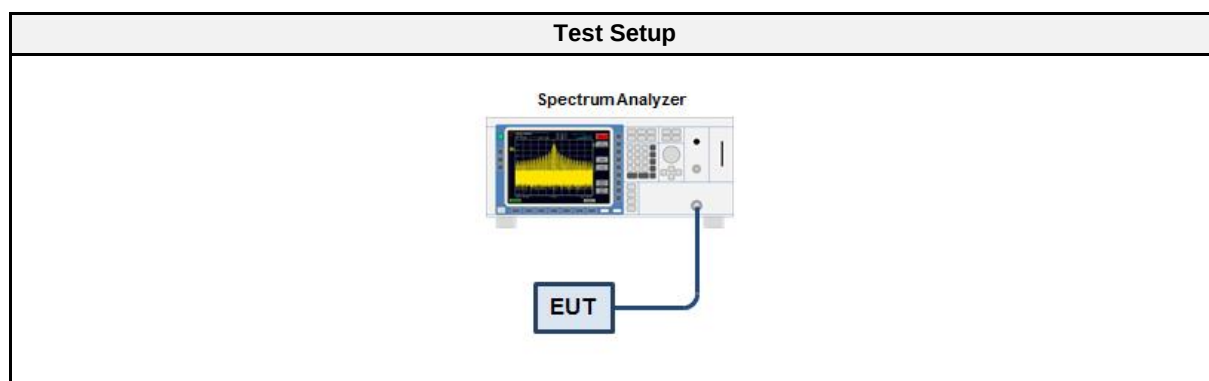
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen, Issue 5 (section 6.6)
Measurement Method	ANSI C63.10 6.9.3
Operator	Abdullah Al Jamal
Date	2019-06-06

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 Analyzer	R&S	FSW 43	EF00896	2018-07	2019-07

3.1.5 Procedure

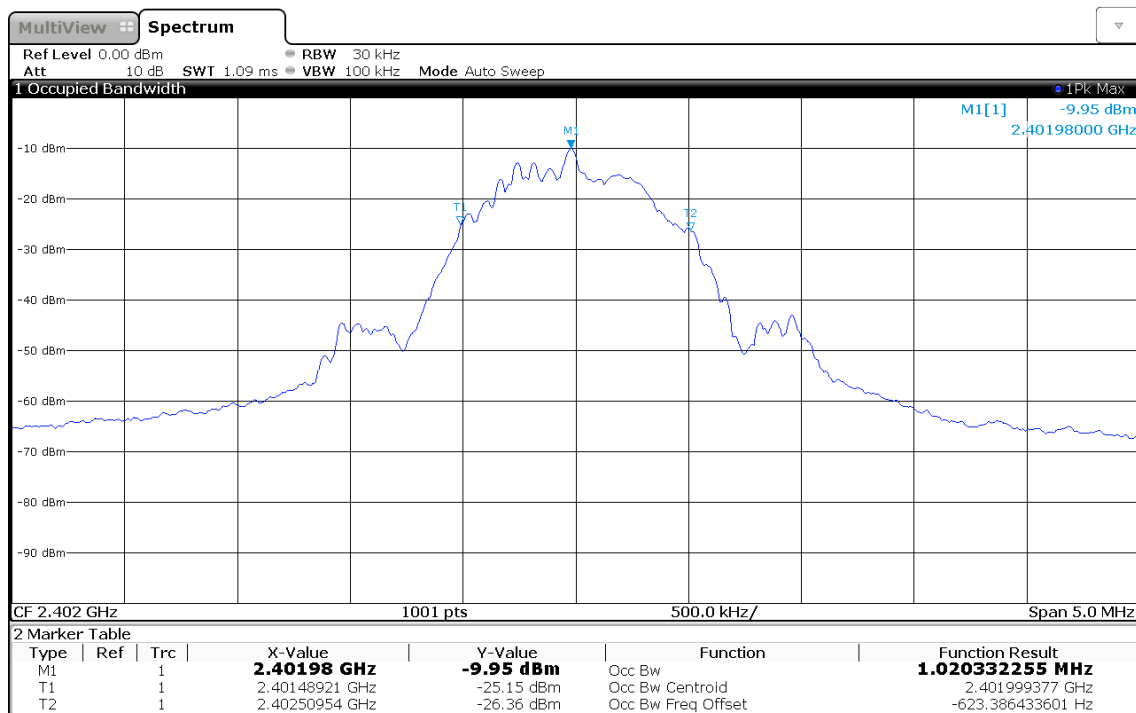
Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth 4. The occupied bandwidth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

3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK	2402	1.020
GFSK	2440	1.021
GFSK	2480	1.023

Occupied Bandwidth

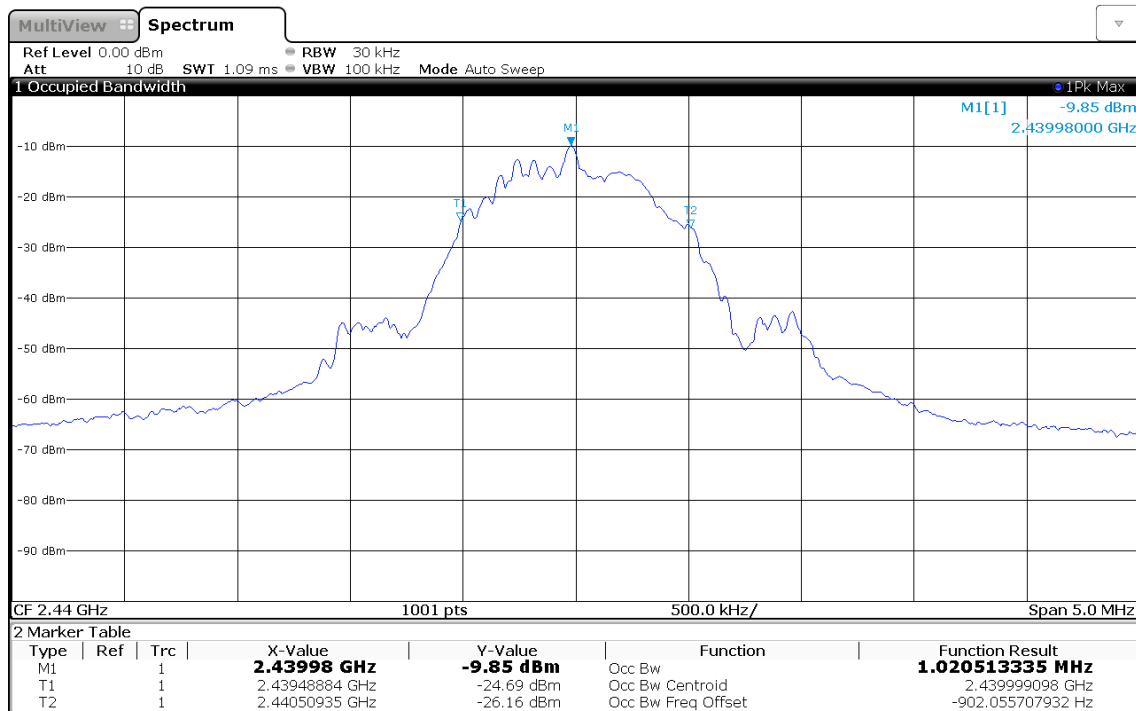
Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Occupied Bandwidth [MHz]: 1.020



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Occupied Bandwidth

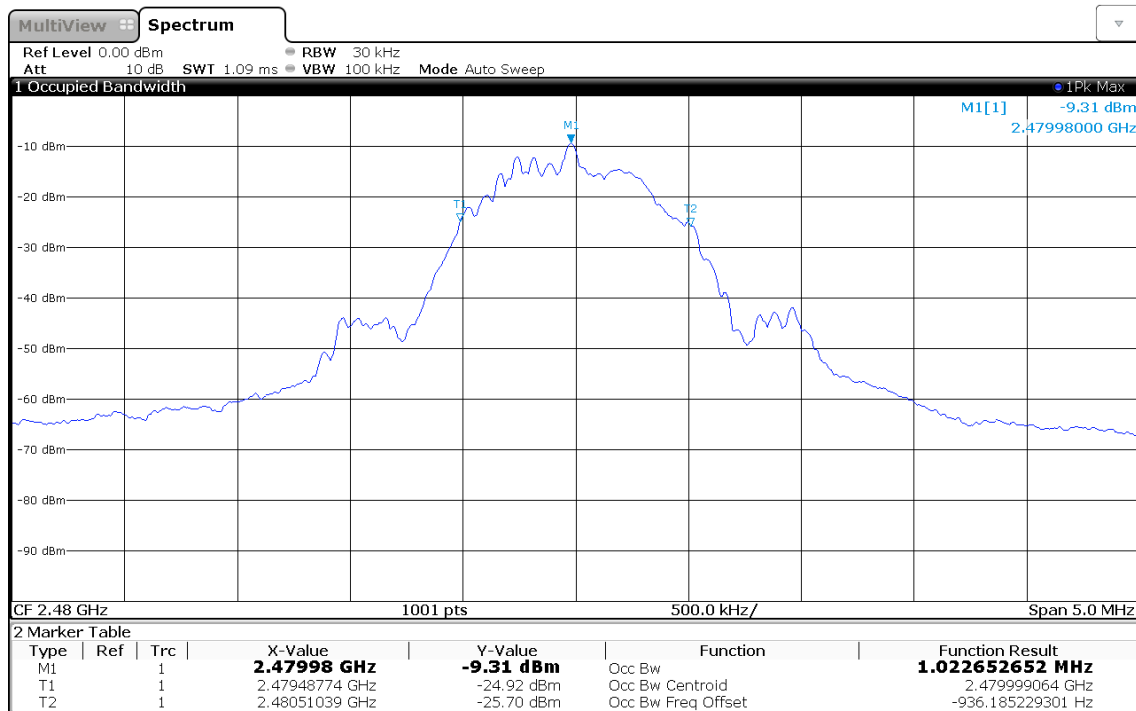
Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Occupied Bandwidth [MHz]: 1.021



15:13:26 06.06.2019

Occupied Bandwidth

Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 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: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Occupied Bandwidth [MHz]: 1.023



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3.2 Test Conditions and Results - 6 dB bandwidth

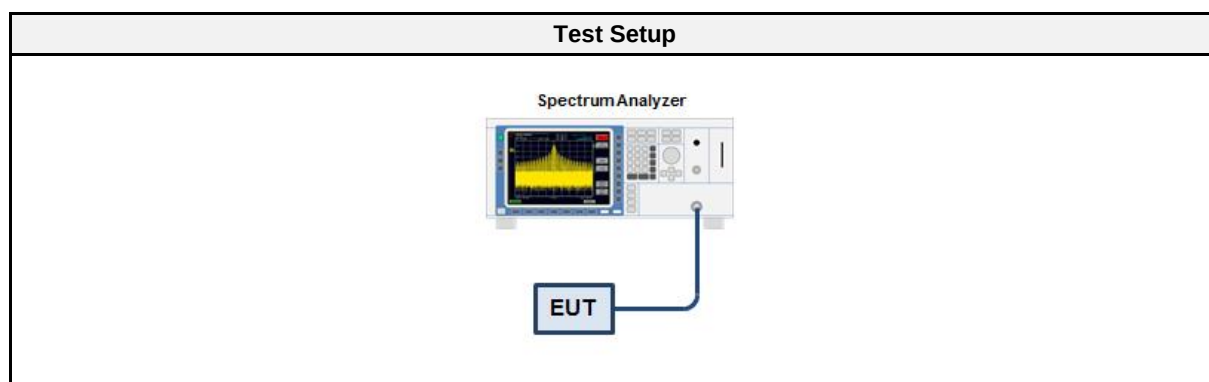
3.2.1 Information

Test Information	
Reference	FCC § 15.247(a)(2); ISED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.8
Operator	Abdullah Al Jamal
Date	2019-06-06

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 Analyzer	R&S	FSW 43	EF00896	2018-07	2019-07

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

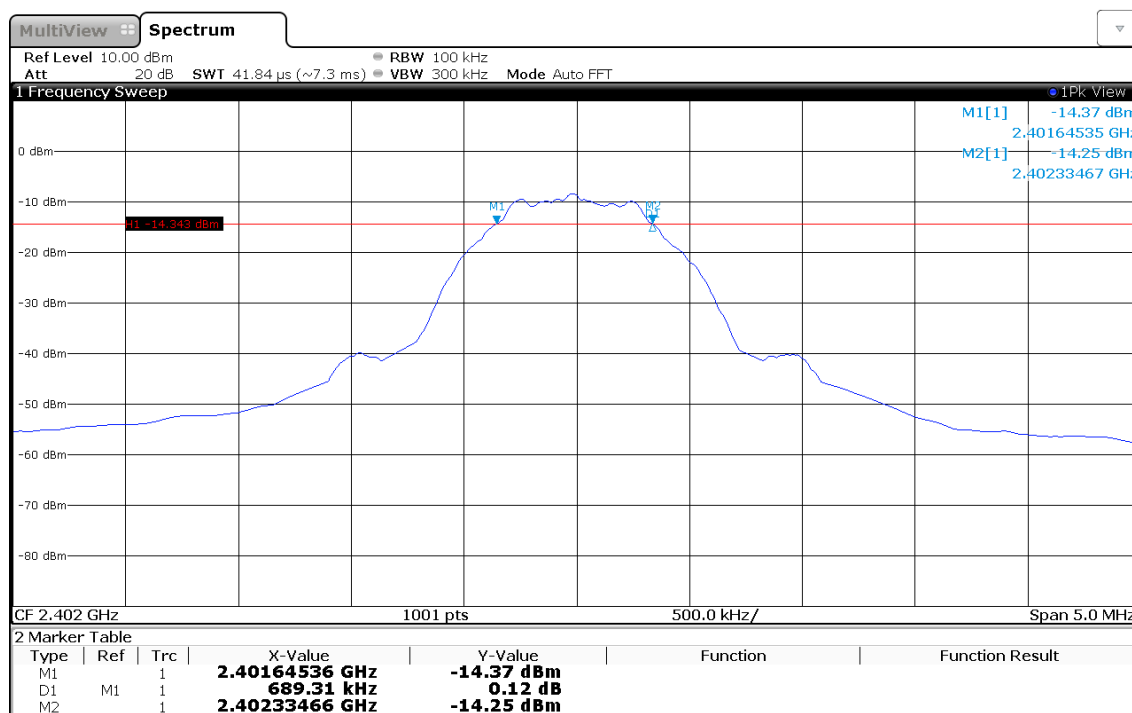
Test Results				
Mode	Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Verdict
GFSK	2402	689	500	PASS
GFSK	2440	679	500	PASS
GFSK	2480	709	500	PASS

Test Report No.: G0M-1905-8256-TFC247BL-V01

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

DTS (6 dB) Bandwidth

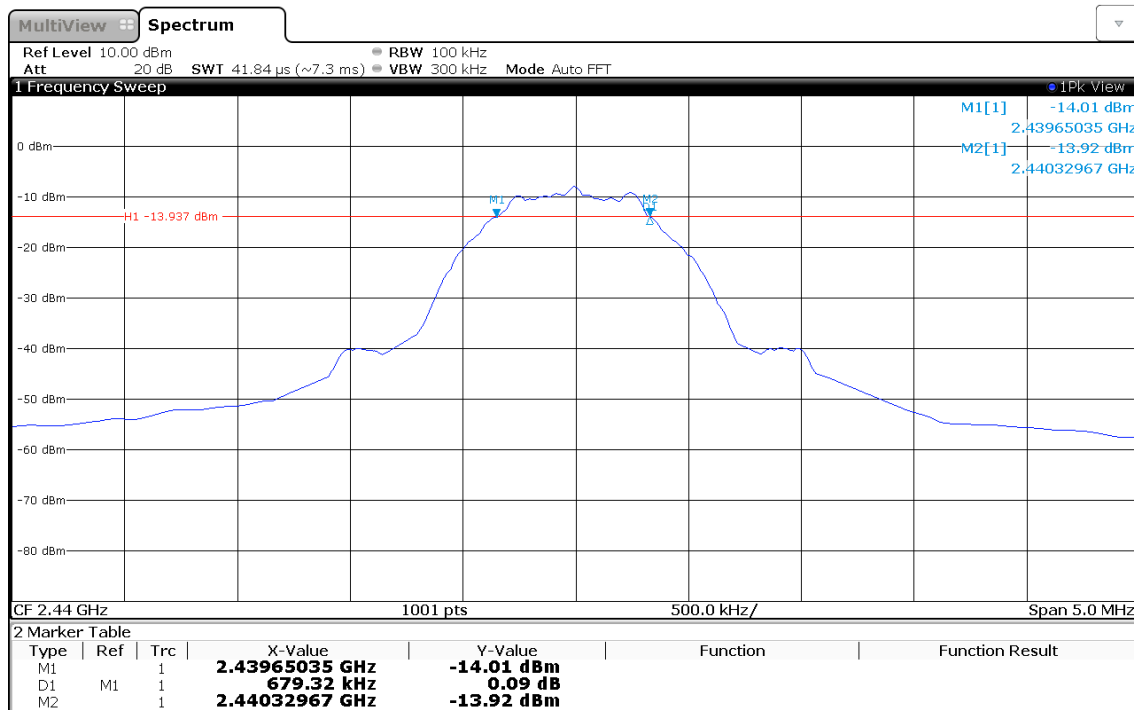
Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.8.1 Option 1
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Lower Frequency [MHz]: 2401.645
 Upper Frequency [MHz]: 2402.335
 6 dB Bandwidth [kHz]: 689



15:17:47 06.06.2019

DTS (6 dB) Bandwidth

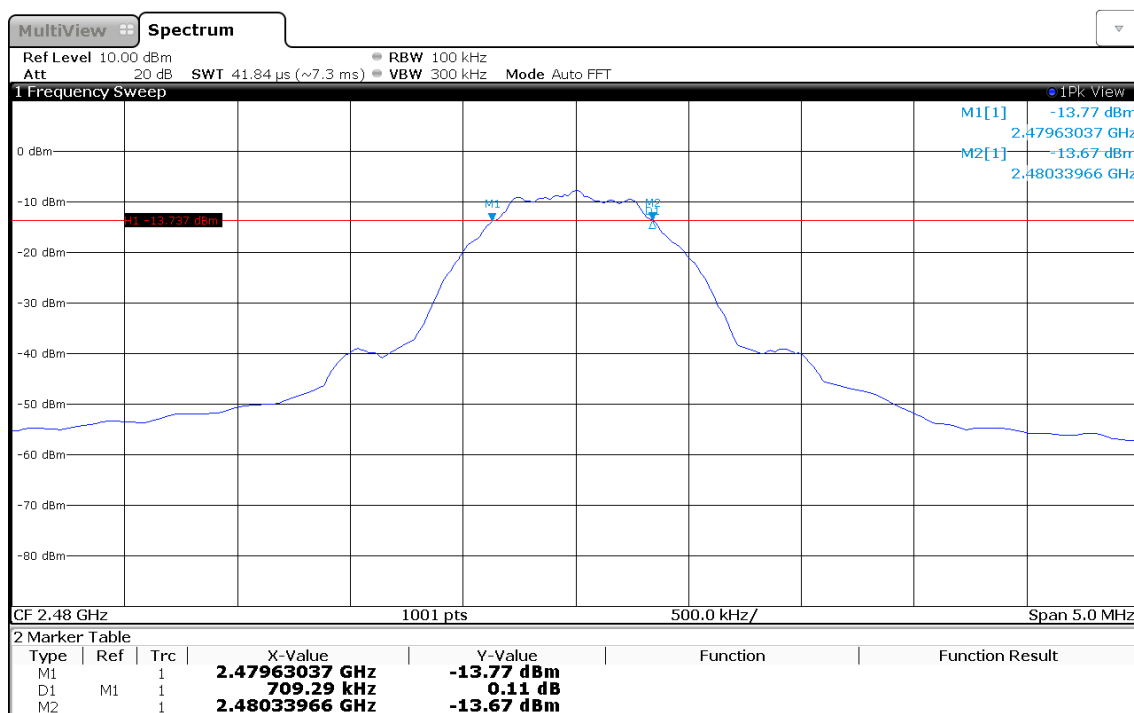
Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.8.1 Option 1
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Lower Frequency [MHz]: 2439.650
 Upper Frequency [MHz]: 2440.330
 6 dB Bandwidth [kHz]: 679



15:17:11 06.06.2019

DTS (6 dB) Bandwidth

Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 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: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Lower Frequency [MHz]: 2479.630
 Upper Frequency [MHz]: 2480.340
 6 dB Bandwidth [kHz]: 709



15:16:29 06.06.2019

3.3 Test Conditions and Results - Maximum peak conducted output power

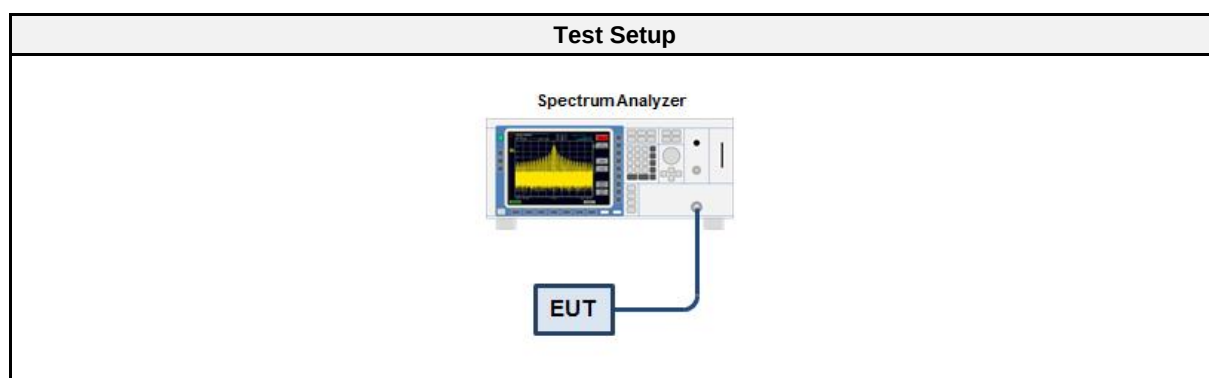
3.3.1 Information

Test Information	
Reference	FCC § 15.247(b)(1); ISED RSS-247, Issue 2 (section 5.4)
Measurement Method	ANSI C63.10 11.9.1
Operator	Abdullah Al Jamal
Date	2019-06-06

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 Analyzer	R&S	FSW 43	EF00896	2018-07	2019-07

3.3.5 Procedure

Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Analyzer resolution bandwidth is set $\geq$ 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	0.977	0.0013	1.0	PASS
2440	1.235	0.0013	1.0	PASS
2480	2.481	0.0018	1.0	PASS

3.4 Test Conditions and Results - Power spectral density

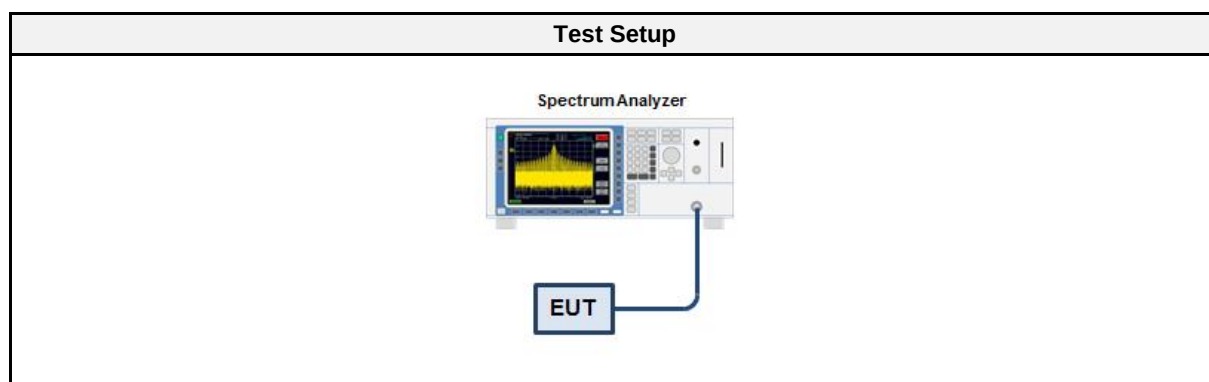
3.4.1 Information

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
Operator	Abdullah Al Jamal
Date	2019-06-06

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 Analyzer	R&S	FSW 43	EF00896	2018-07	2019-07

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

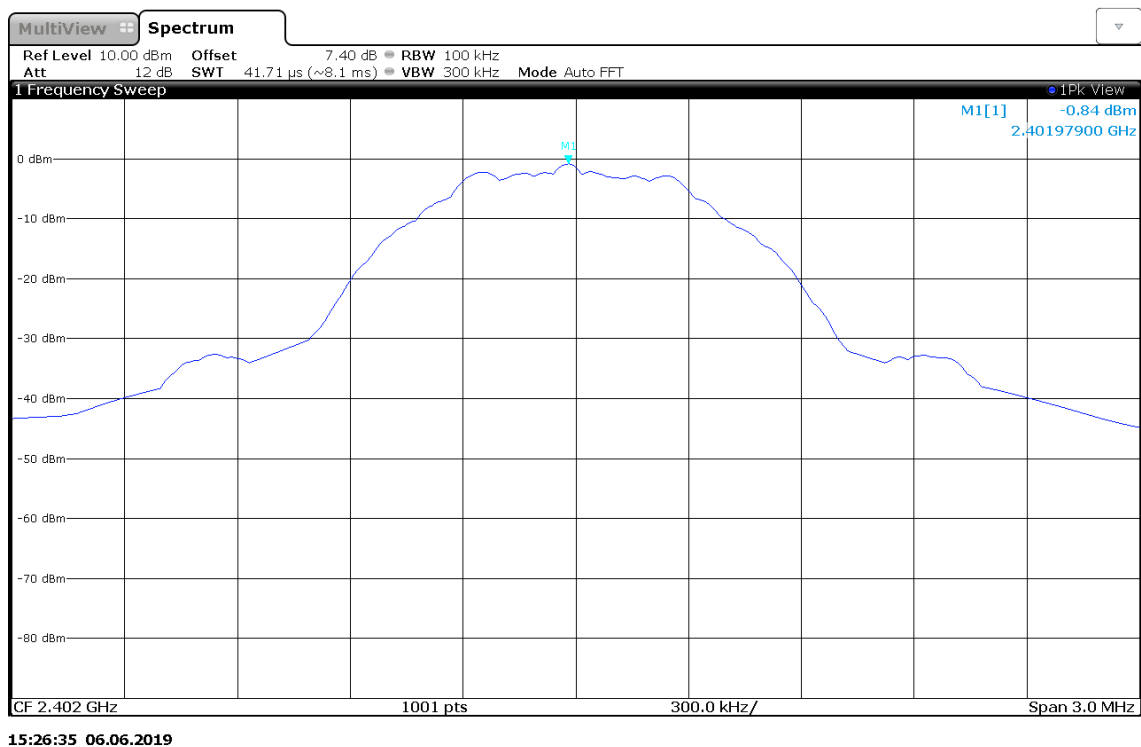
Test Results			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
2402	-0.844	8.0	PASS
2440	-0.459	8.0	PASS
2480	-0.155	8.0	PASS
RBW = 100 kHz			

Test Report No.: G0M-1905-8256-TFC247BL-V01

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

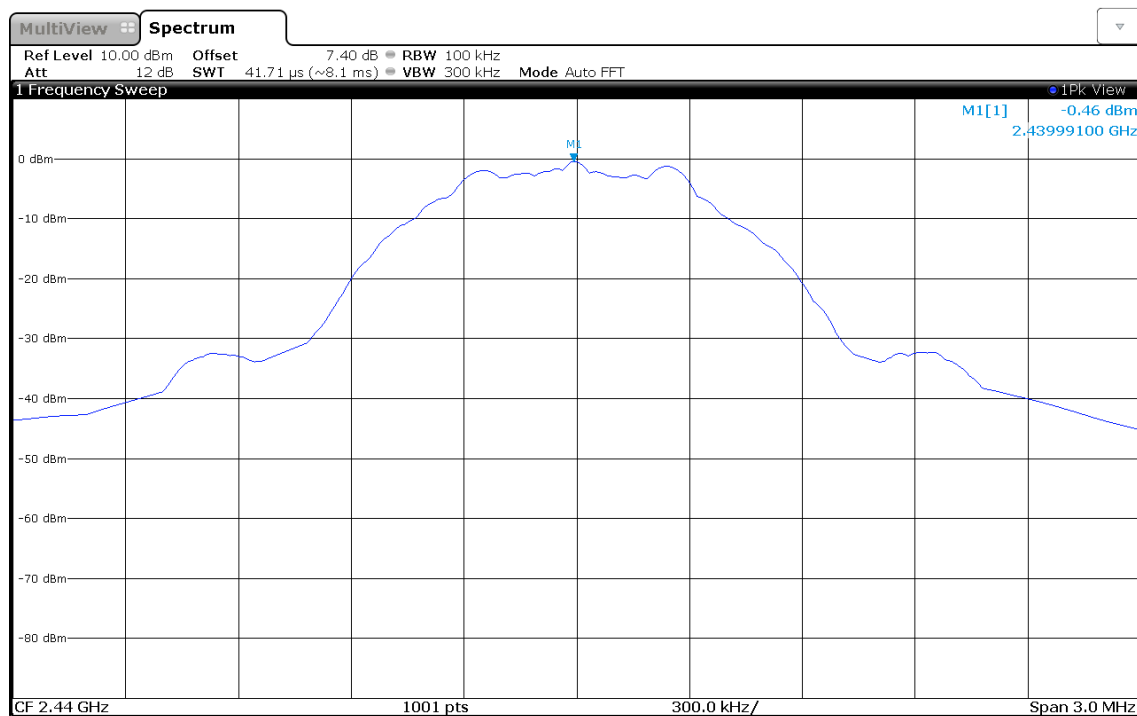
Peak Power Spectral Density

Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 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: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Peak Frequency [MHz]: 2401.979
 Spectral Density [dBm/RBW]: -0.844
 Resolution Bandwidth [kHz]: 100 kHz



Peak Power Spectral Density

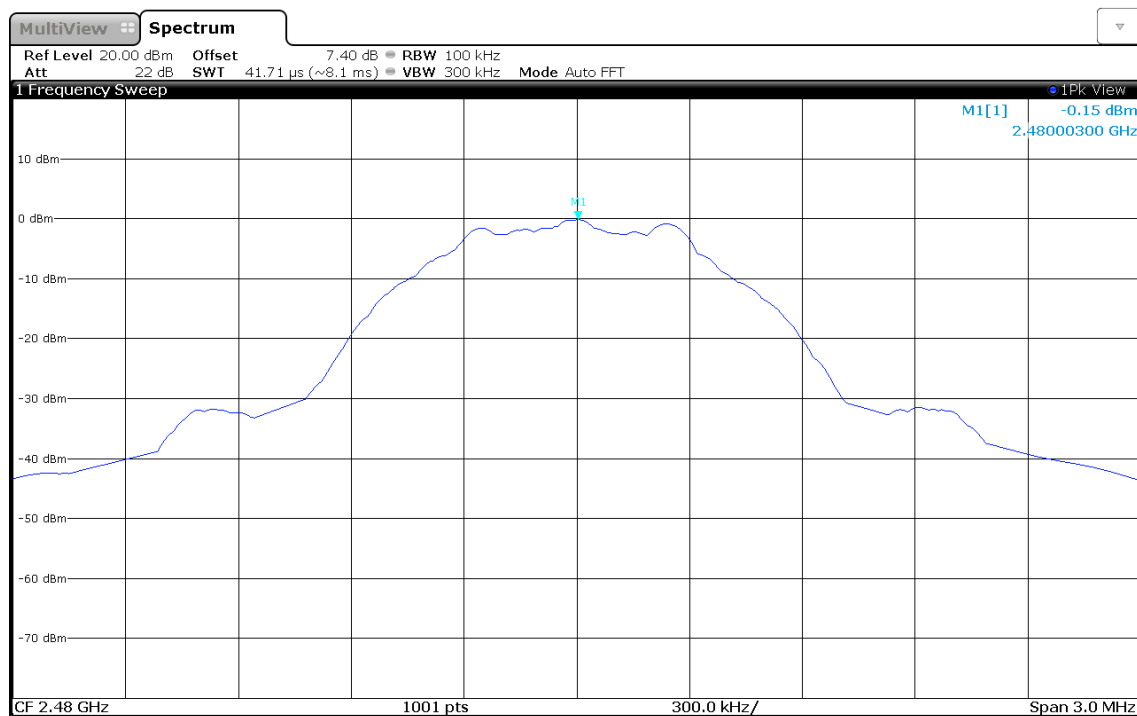
Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Peak Frequency [MHz]: 2439.991
 Spectral Density [dBm/RBW]: -0.459
 Resolution Bandwidth [kHz]: 100 kHz



15:25:45 06.06.2019

Peak Power Spectral Density

Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 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: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Peak Frequency [MHz]: 2480.003
 Spectral Density [dBm/RBW]: -0.155
 Resolution Bandwidth [kHz]: 100 kHz



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3.5 Test Conditions and Results - AC powerline conducted emissions

3.5.1 Information

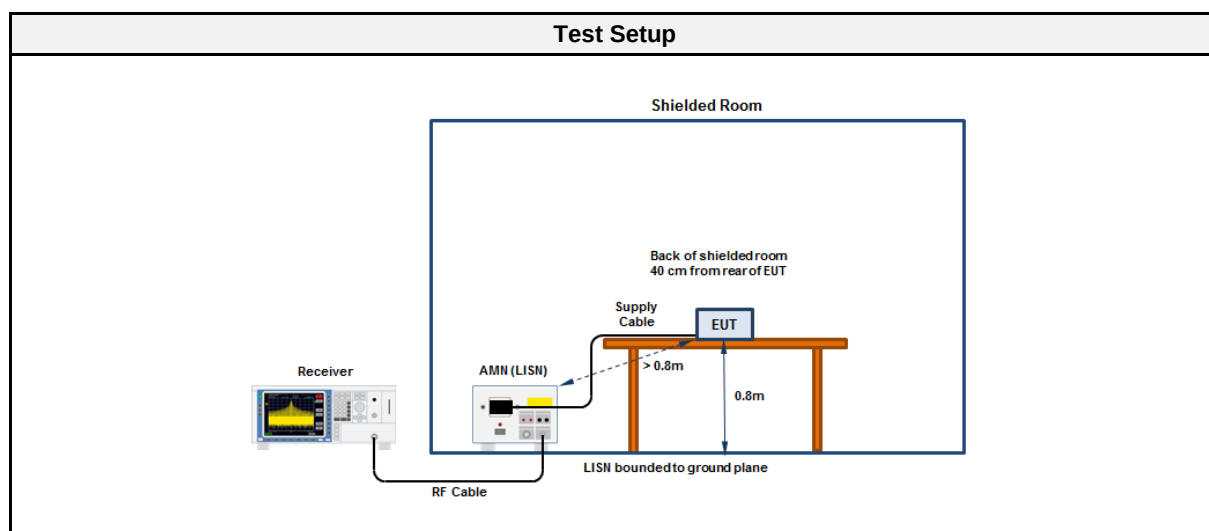
Test Information	
Reference	FCC § 15.207; ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.2
Operator	Abdullah Al Jamal
Date	2019-06-24

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	2016.1.10

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Receiver	R&S	ESU 26	EF00241	2017-07	2019-07
LISN	R&S	ESH3-Z5	EF00036	2017-01	2019-07

EMI voltage test in the ac-mains according to FCC 47 CFR §15.207

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG

EUT Name: Renamic Neo Programming Device

Model: Renamic Neo

Test Site: Eurofins Product Service GmbH

Operator: Abdullah Al Jamal

Test Conditions: Tnom: 25.6°C, Unom: 120 VAC (external power supply)

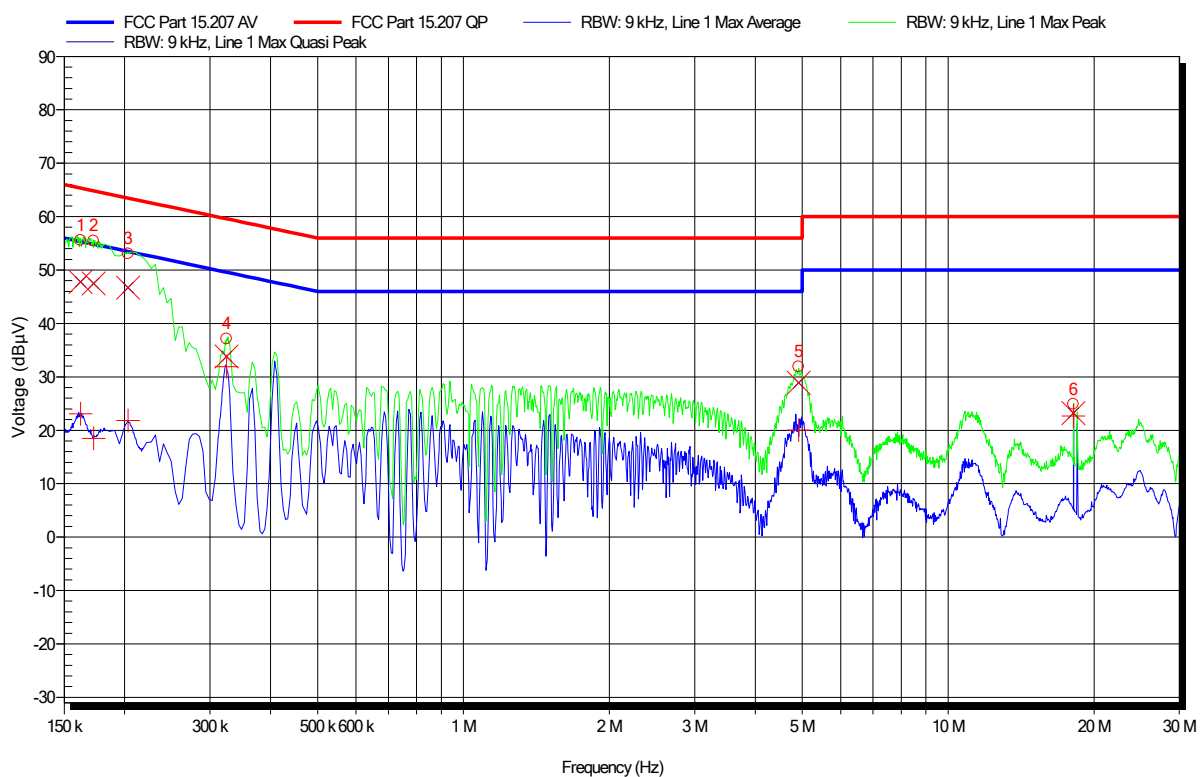
LISN: ESH3-Z5 (L)

Mode: 2440 MHz

Test Date: 2019-06-24

Note:

Index 47



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	162.15 kHz	47.81 dBμV	65.35 dBμV	-17.55 dB	Pass
2	172.5 kHz	47.47 dBμV	64.84 dBμV	-17.37 dB	Pass
3	203.1 kHz	46.72 dBμV	63.48 dBμV	-16.76 dB	Pass
4	324.6 kHz	33.79 dBμV	59.59 dBμV	-25.8 dB	Pass
5	4.916 MHz	28.91 dBμV	56 dBμV	-27.09 dB	Pass
6	18.139 MHz	23.22 dBμV	60 dBμV	-36.78 dB	Pass

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	162.15 kHz	23.08 dBμV	55.35 dBμV	-32.27 dB	Pass
2	172.5 kHz	18.45 dBμV	54.84 dBμV	-36.38 dB	Pass
3	203.1 kHz	21.82 dBμV	53.48 dBμV	-31.67 dB	Pass
4	324.6 kHz	31.88 dBμV	49.59 dBμV	-17.71 dB	Pass
5	4.916 MHz	20.04 dBμV	46 dBμV	-25.96 dB	Pass
6	18.139 MHz	22.64 dBμV	50 dBμV	-27.36 dB	Pass

EMI voltage test in the ac-mains according to FCC 47 CFR §15.207

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG

EUT Name: Renamic Neo Programming Device

Model: Renamic Neo

Test Site: Eurofins Product Service GmbH

Operator: Abdullah Al Jamal

Test Conditions: Tnom: 25.6°C, Unom: 120 VAC (external power supply)

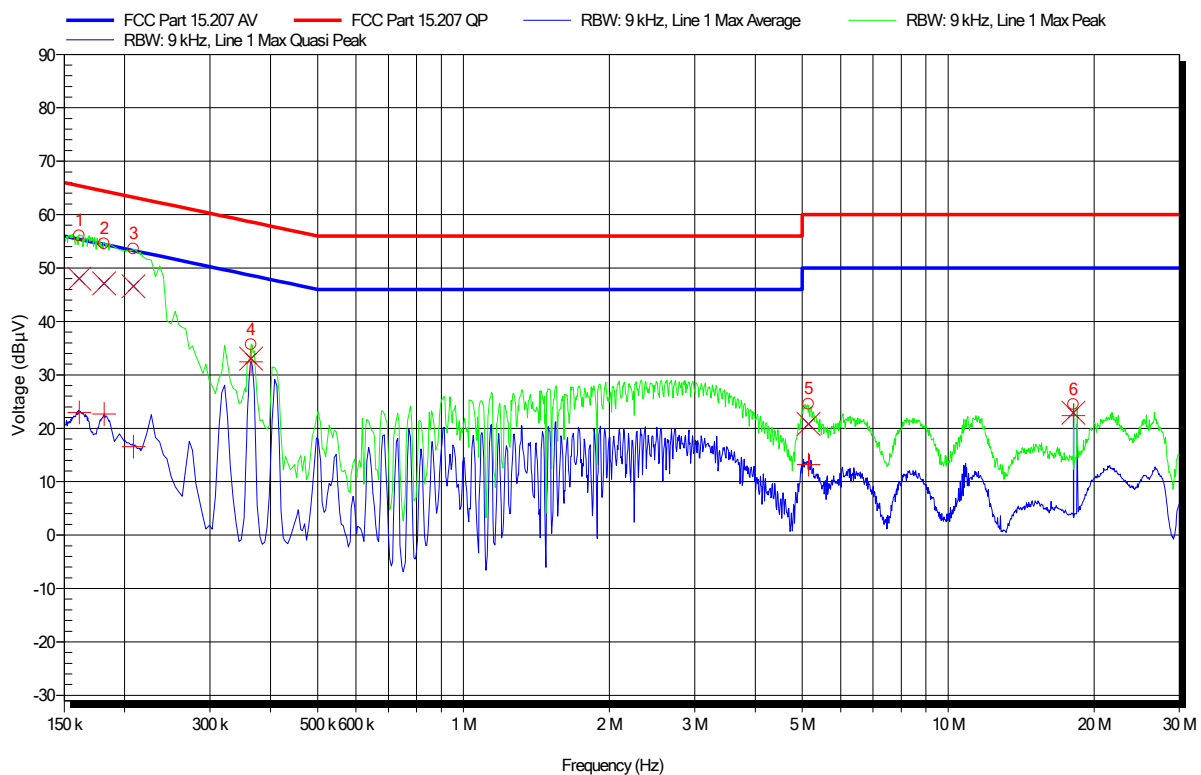
LISN: ESH3-Z5 (N)

Mode: 2440 MHz

Test Date: 2019-06-24

Note:

Index 46



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	161.25 kHz	48.02 dBμV	65.4 dBμV	-17.38 dB	Pass
2	181.5 kHz	47.13 dBμV	64.42 dBμV	-17.29 dB	Pass
3	208.5 kHz	46.58 dBμV	63.26 dBμV	-16.69 dB	Pass
4	364.65 kHz	33.03 dBμV	58.62 dBμV	-25.59 dB	Pass
5	5.15 MHz	20.78 dBμV	60 dBμV	-39.22 dB	Pass
6	18.139 MHz	22.93 dBμV	60 dBμV	-37.07 dB	Pass

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	161.25 kHz	22.98 dBμV	55.4 dBμV	-32.42 dB	Pass
2	181.5 kHz	22.67 dBμV	54.42 dBμV	-31.75 dB	Pass
3	208.5 kHz	16.55 dBμV	53.26 dBμV	-36.71 dB	Pass
4	364.65 kHz	32.45 dBμV	48.62 dBμV	-16.17 dB	Pass
5	5.15 MHz	13.19 dBμV	50 dBμV	-36.81 dB	Pass
6	18.139 MHz	22.39 dBμV	50 dBμV	-27.61 dB	Pass

3.6 Test Conditions and Results - Band-edge compliance

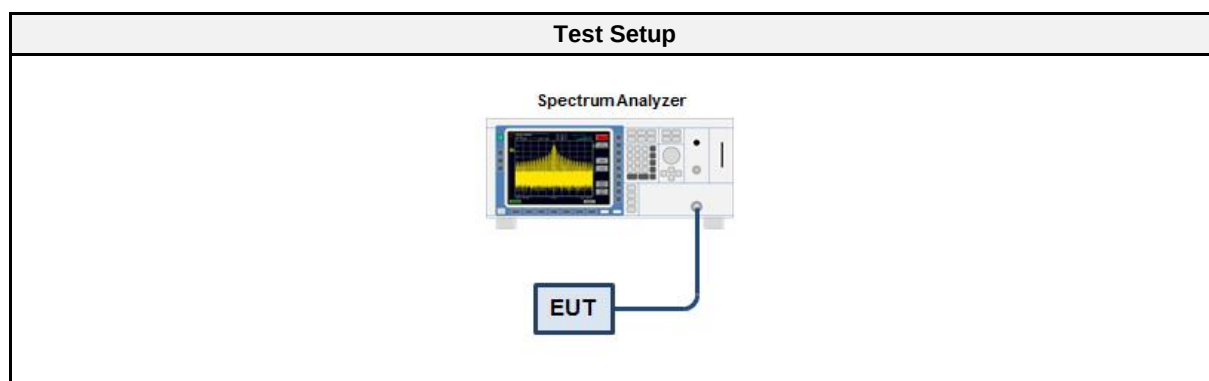
3.6.1 Information

Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Method	ANSI C63.10 11.13
Operator	Abdullah Al Jamal
Date	2019-06-06

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 Analyzer	R&S	FSW 43	EF00896	2018-07	2019-07

3.6.5 Procedure

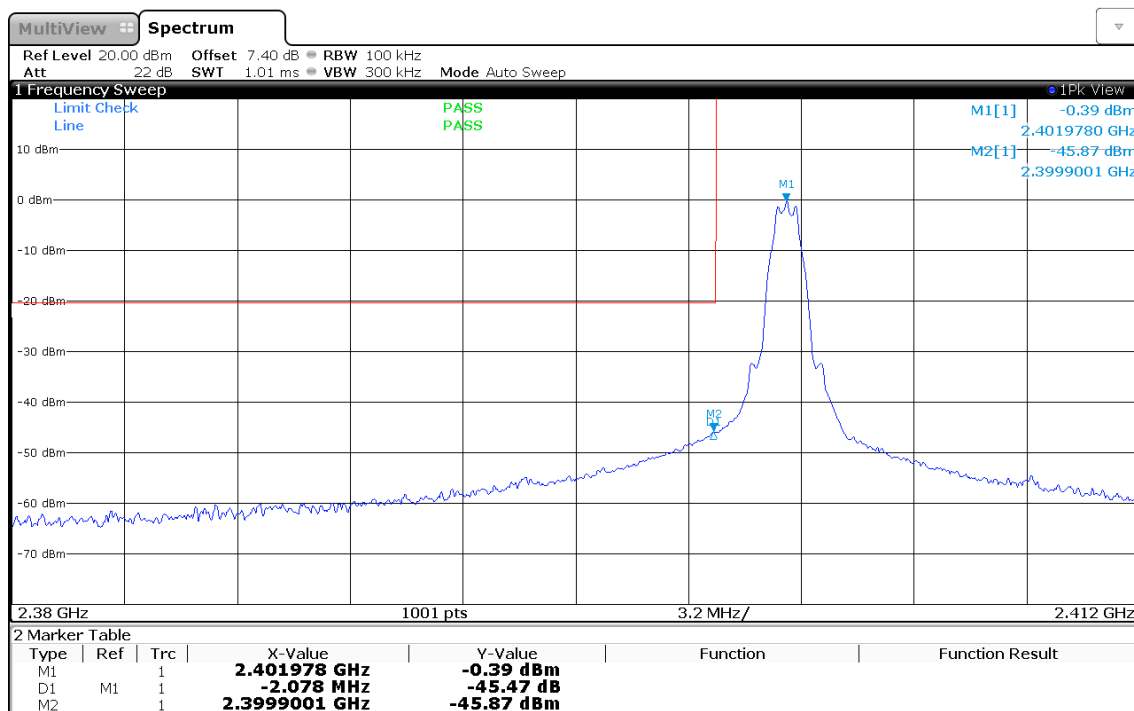
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and outside frequency band 5. Band edge 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	-45.48	-20	PASS
GFSK	2480	-52.09	-20	PASS

Emissions in nonrestricted frequency bands at the Band-edge

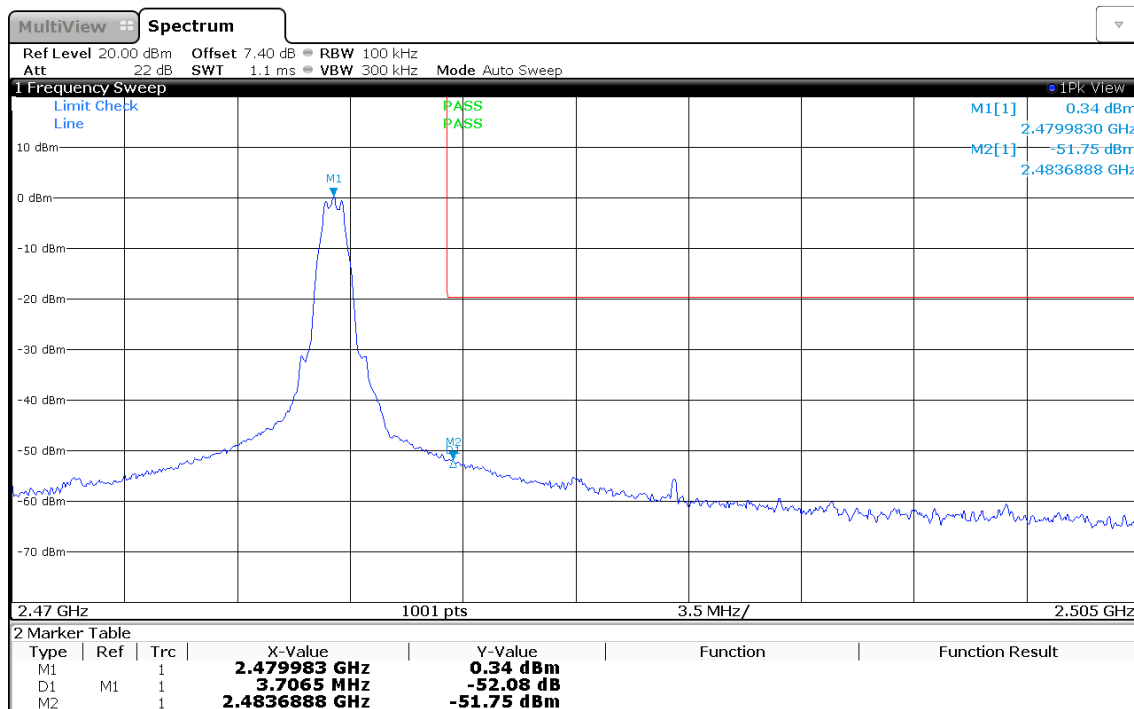
Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 7.8.6, 6.10.4
 Operating Conditions: Tnom/Vnom
 Operator: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Band-edge: Lower
 In-band Frequency [MHz]: 2401.978
 Max. in-band Level [dBm/100 kHz]: -0.39
 Out-of-band Frequency [MHz]: 2399.9
 Max. out-of-band Level [dBm/100 kHz]: -45.865
 Attenuation [dB]: -45.48



15:28:30 06.06.2019

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 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: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Band-edge: Upper
 In-band Frequency [MHz]: 2479.983
 Max. in-band Level [dBm/100 kHz]: 0.339
 Out-of-band Frequency [MHz]: 2483.689
 Max. out-of-band Level [dBm/100 kHz]: -51.746
 Attenuation [dB]: -52.09



15:29:21 06.06.2019

3.7 Test Conditions and Results - Conducted spurious emissions

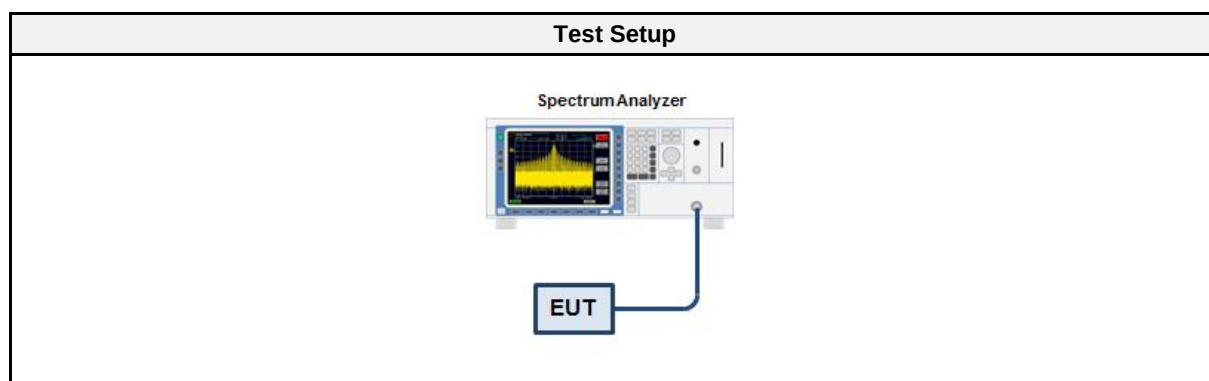
3.7.1 Information

Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Method	ANSI C63.10 11.11
Operator	Abdullah Al Jamal
Date	2019-06-06

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 Analyzer	R&S	FSW 43	EF00896	2018-07	2019-07

3.7.5 Procedure

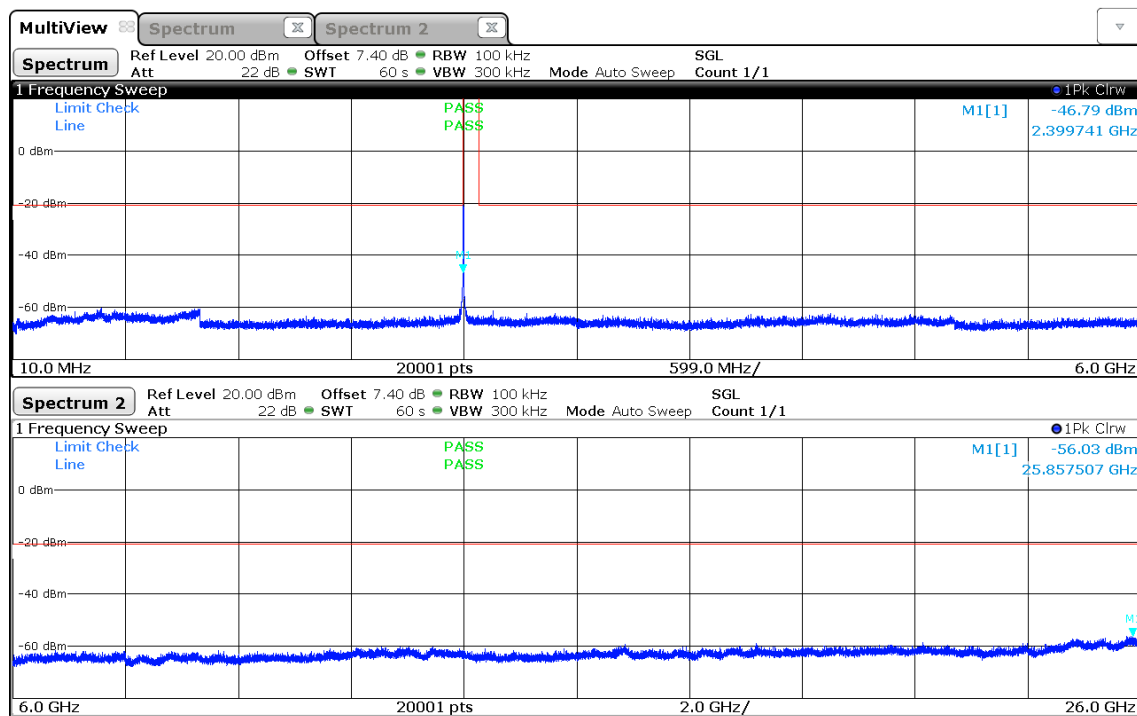
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and outside frequency band 5. Band edge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

3.7.6 Results

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

Conducted Spurious Emissions

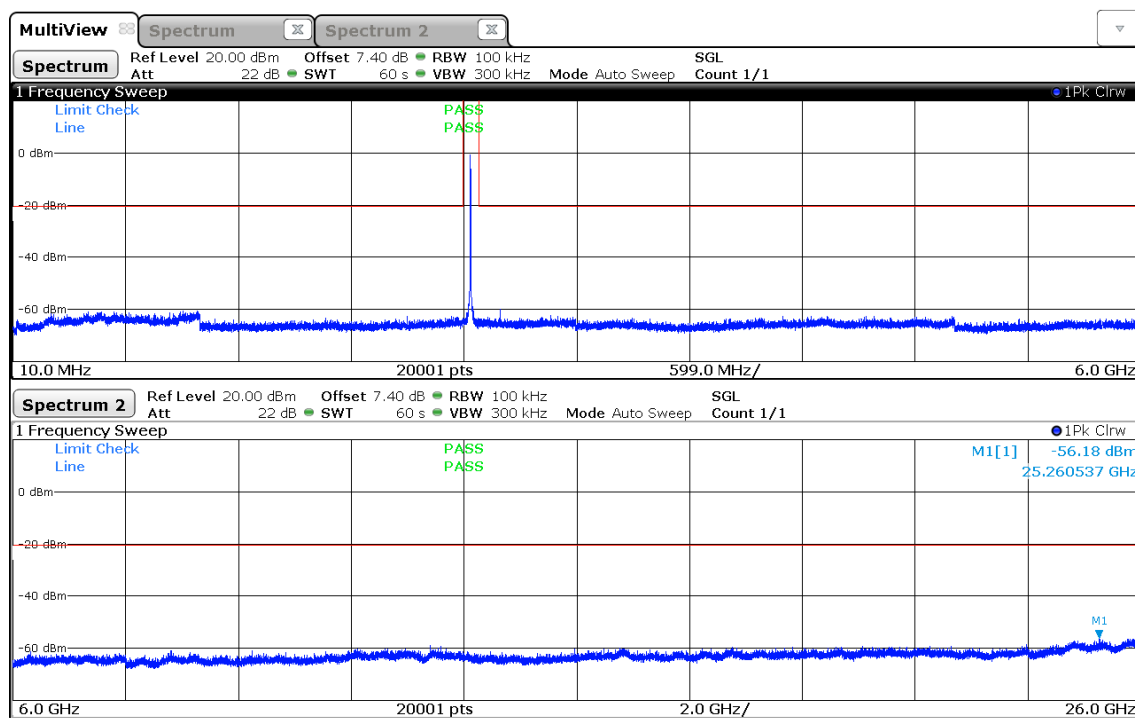
Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Max. in-band Frequency [MHz]: 2402.0
 Max. in-band Level [dBm/100 kHz]: -0.7
 Out-of-band Limit [dBm/100 kHz]: -20.7



15:42:40 06.06.2019

Conducted Spurious Emissions

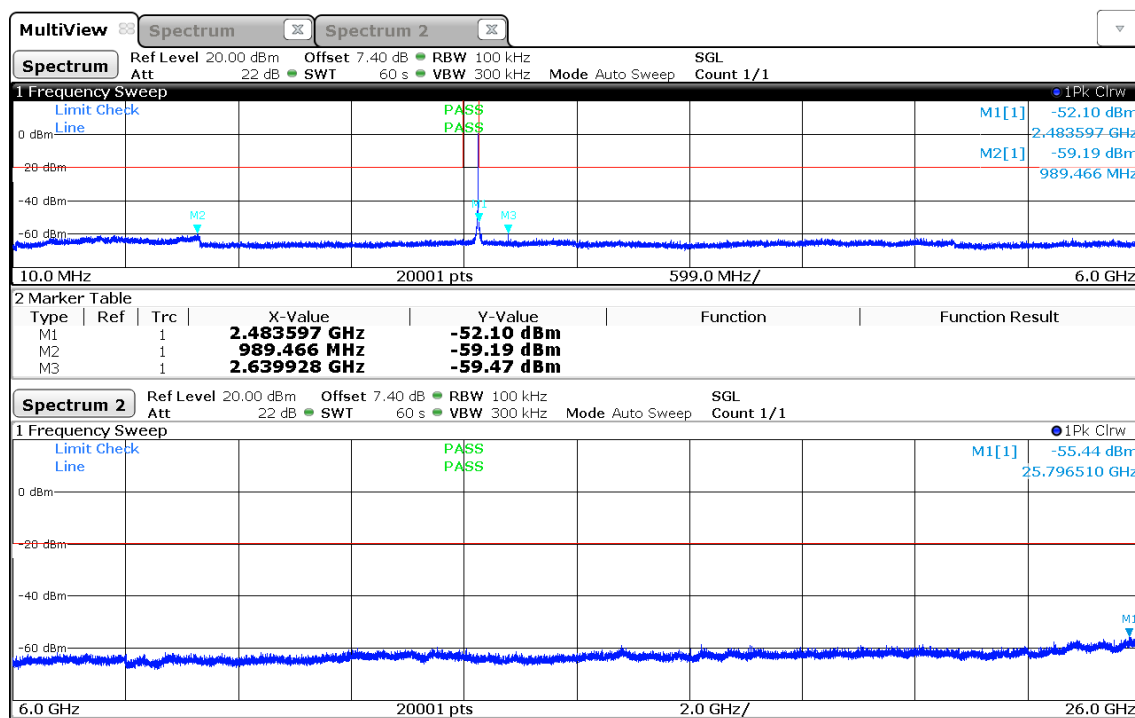
Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Max. in-band Frequency [MHz]: 2440.0
 Max. in-band Level [dBm/100 kHz]: -0.5
 Out-of-band Limit [dBm/100 kHz]: -20.5



15:37:12 06.06.2019

Conducted Spurious Emissions

Project Number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 Model Description: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Sample ID: 24167
 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: Abdullah Al Jamal
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-06
 Max. in-band Frequency [MHz]: 2480.0
 Max. in-band Level [dBm/100 kHz]: 0.2
 Out-of-band Limit [dBm/100 kHz]: -19.8



15:34:13 06.06.2019

3.8 Test Conditions and Results - Transmitter radiated emissions

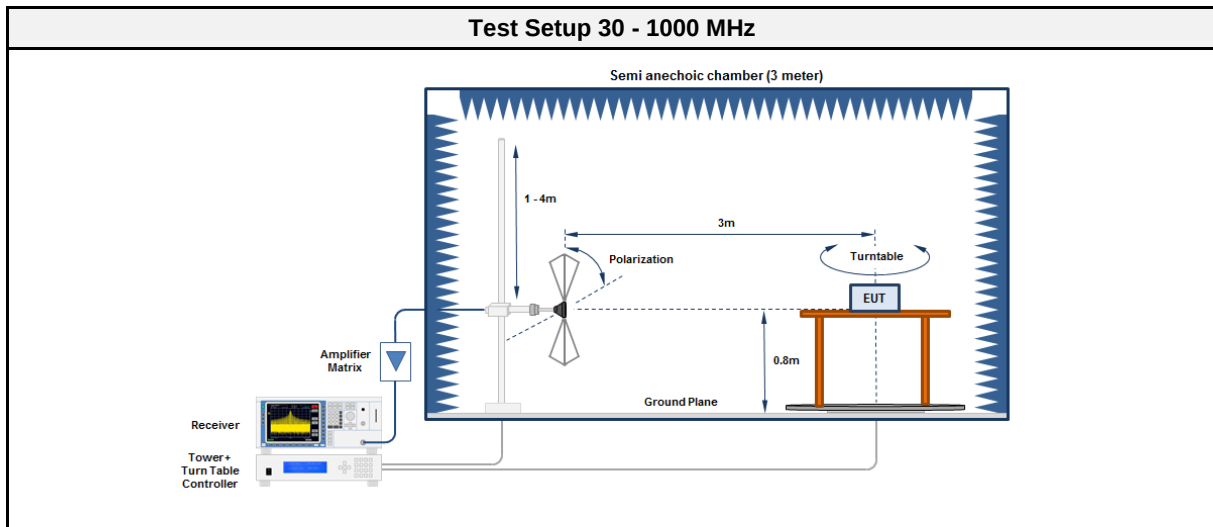
3.8.1 Information

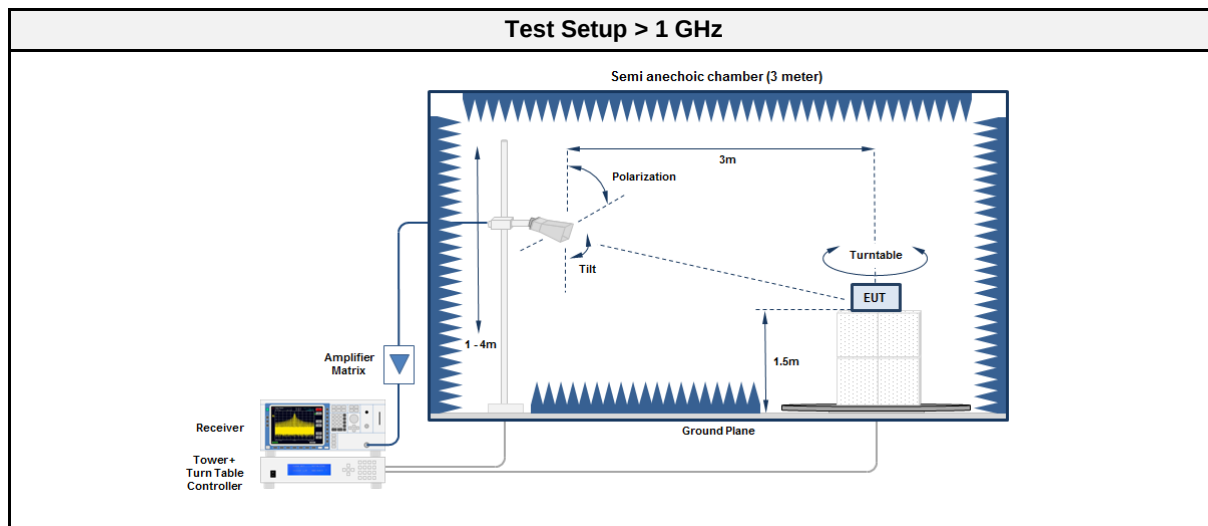
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209; ISSED RSS-Gen, Issue 5 (section 6.13)
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Abdullah Al Jamal
Date	2019-06-20

3.8.2 Limits

Limits			
Frequency [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	2015.2.4

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2018-08	2019-08
Antenna	R&S	VULB 9162	EF00978	2016-11	2019-11

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2018-08	2019-08
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2016-09	2019-09
Antenna	Amplifier Research	AT4560	EF01152	2018-10	2019-10

3.8.5 Procedure

Test Procedure 30 - 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	No significant emissions detected.					
2440						
2480	168.942	33.74	pk	hor	43.52	-09.78

3.9 Test Conditions and Results - Receiver radiated emissions

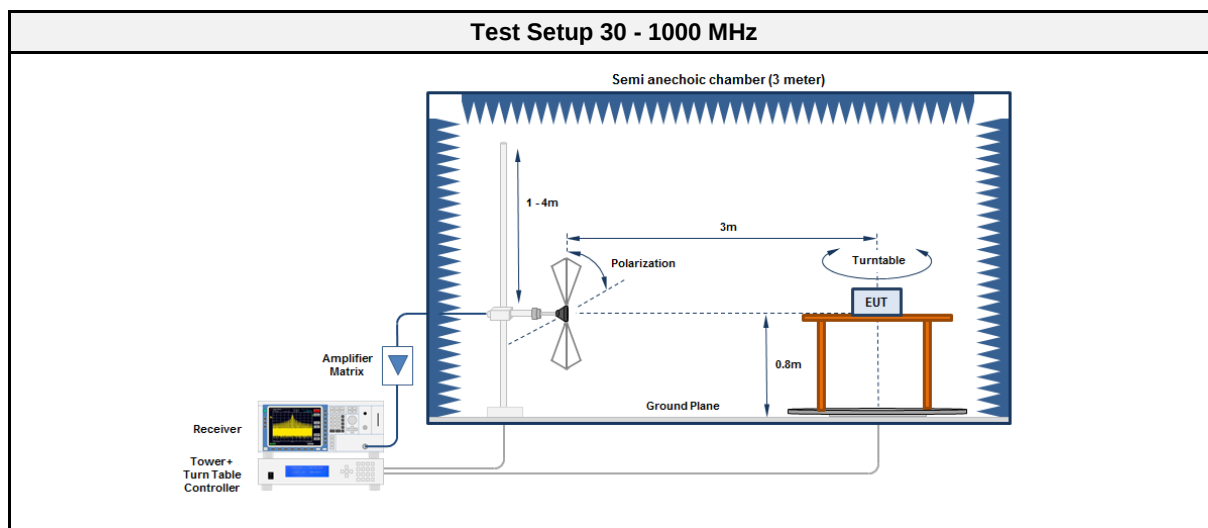
3.9.1 Information

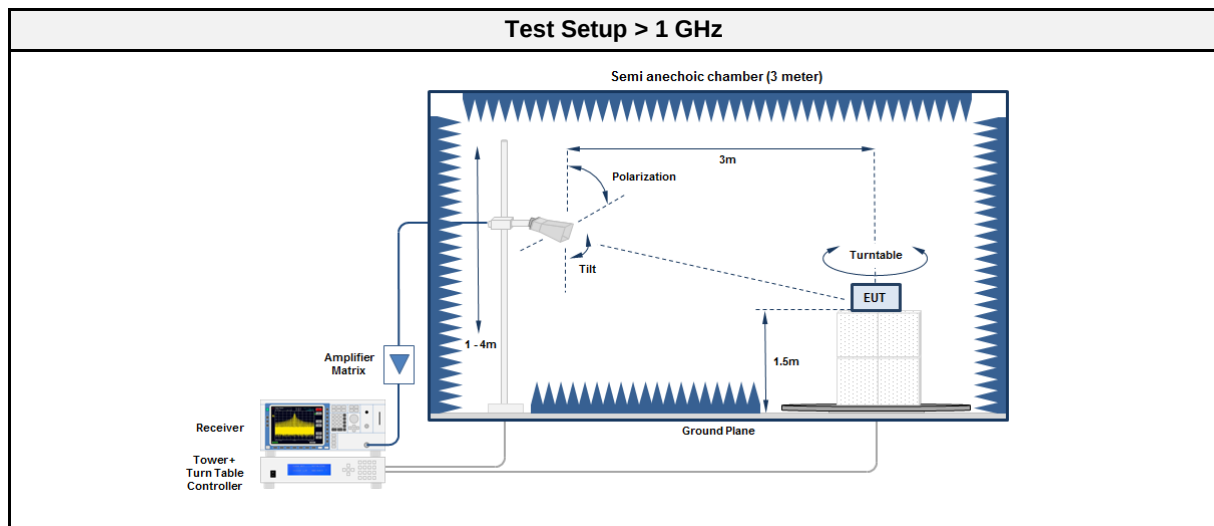
Test Information	
Reference	ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.5, 6.6, 11.12
Operator	Abdullah Al Jamal
Date	2019-06-17

3.9.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [dB μ 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	2015.2.4

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2018-08	2019-08
Antenna	R&S	VULB 9162	EF00978	2016-11	2019-11

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2018-08	2019-08
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2016-09	2019-09
Antenna	Amplifier Research	AT4560	EF01152	2018-10	2019-10

3.9.5 Procedure

Test Procedure 30 - 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

3.9.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
2440	31.088	33.15	pk	ver	40.00	-06.85
2440	182.048	34.90	pk	hor	43.50	-08.60
2440	319.04	35.38	pk	hor	46.00	-10.62
2440	319.04	31.86	pk	ver	46.00	-14.14
2440	531.52	31.91	pk	ver	46.00	-14.09
2440	637.76	38.76	pk	hor	46.00	-07.24
2440	639.04	30.72	pk	ver	46.00	-15.28
2440	1307	46.81	pk	hor	53.98	-07.17
2440	1331	41.54	pk	ver	53.98	-12.44
2440	14451	47.75	pk	ver	53.98	-06.23

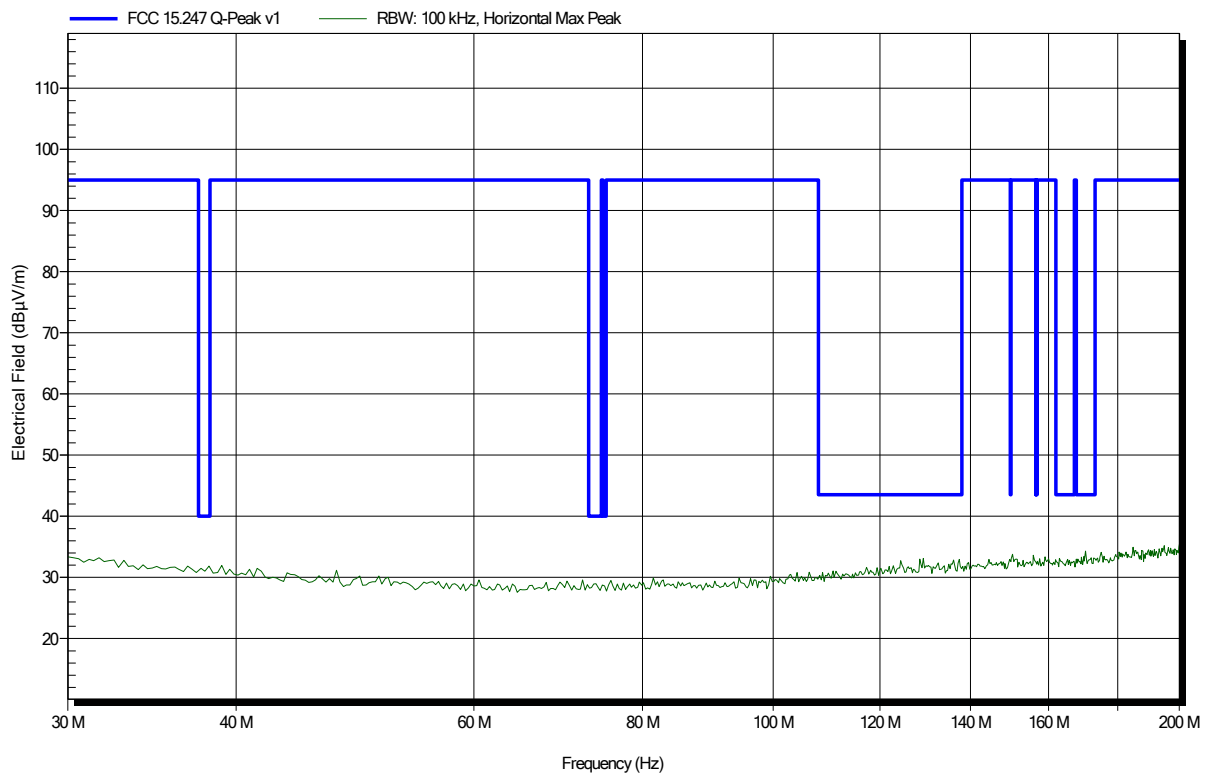
ANNEX A Transmitter spurious emissions

Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Rohde & Schwarz HK 116, Horizontal
Measurement distance: 3 m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note:

Index 65

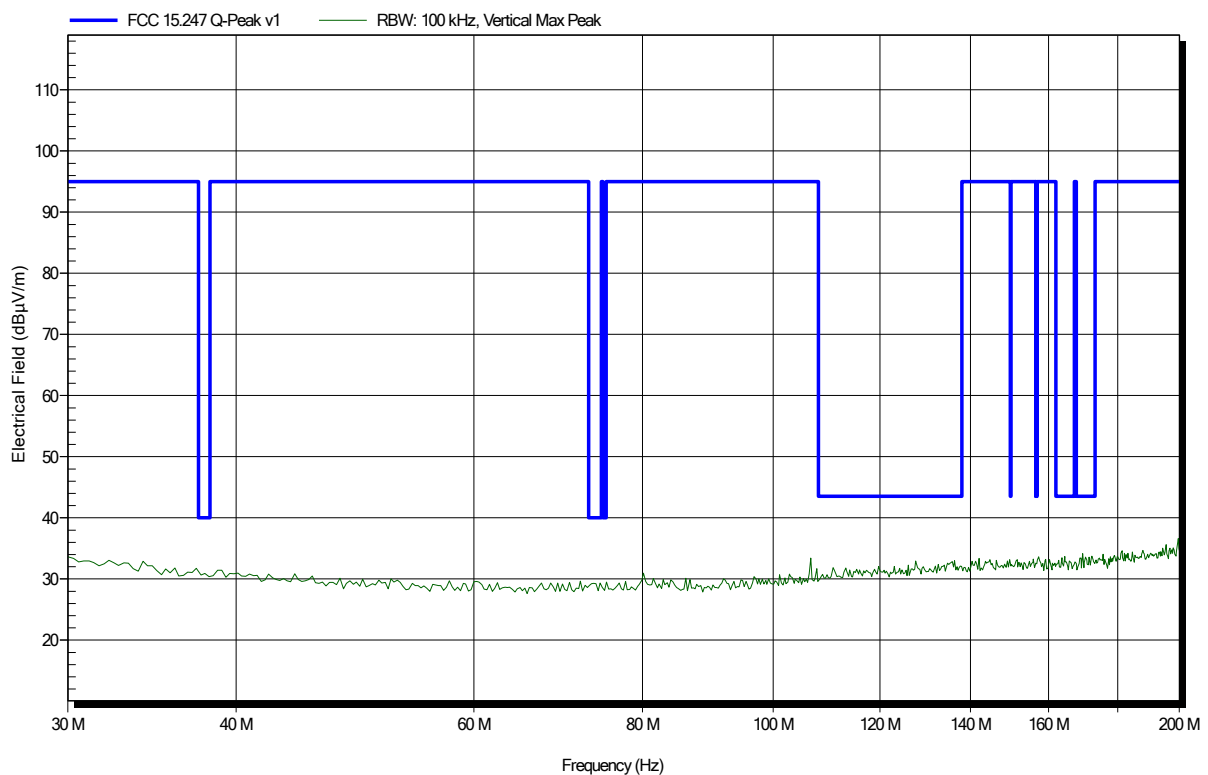


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Rohde & Schwarz HK 116, Vertical
Measurement distance: 3 m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note:

Index 64

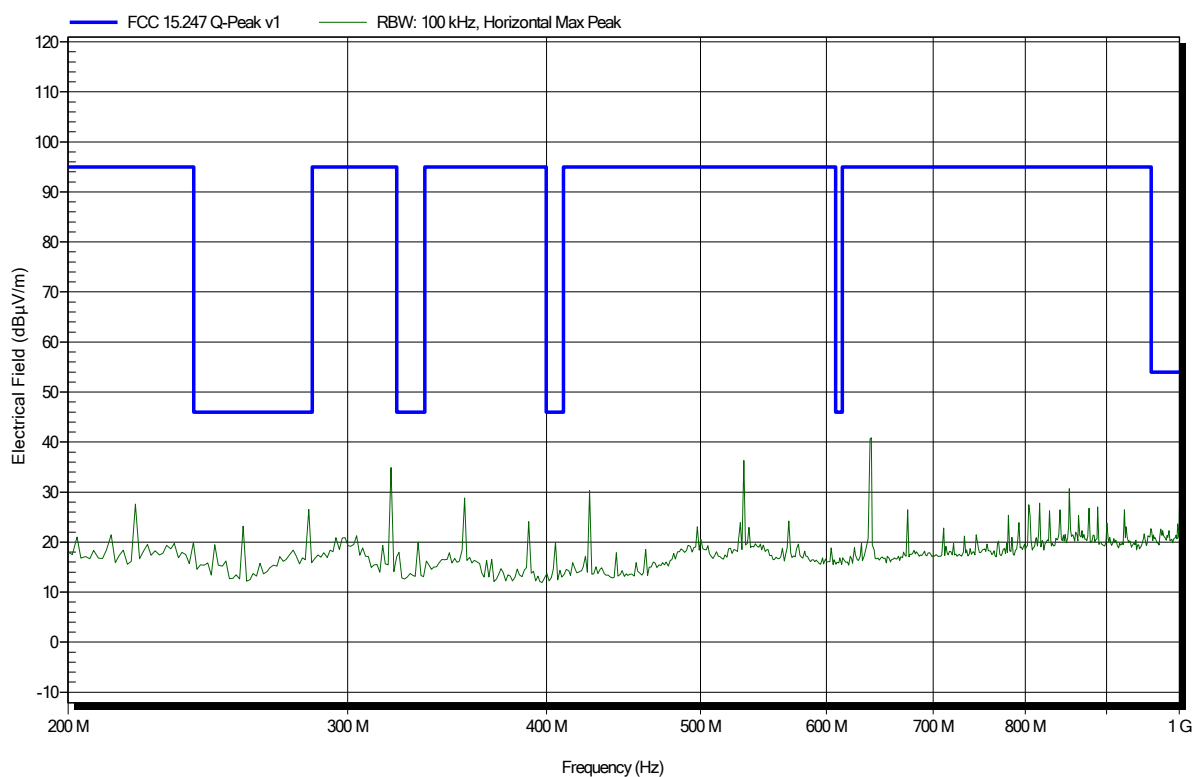


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note:

Index 55

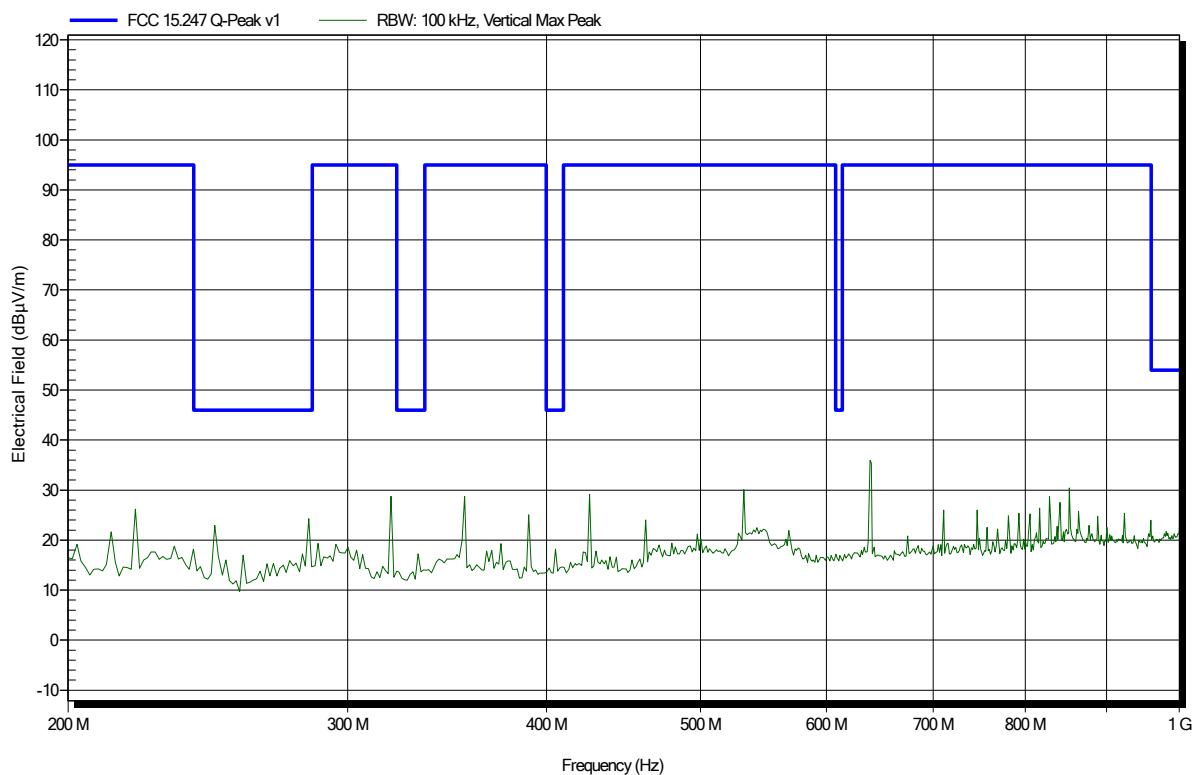


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note:

Index 56



Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG

EUT Name: Renamic Neo Programming Device

Model: Renamic Neo

Test Site: Eurofins Product Service GmbH

Operator: Abdullah Al Jamal

Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)

Antenna: Schwarzbeck BBHA 9120D, Horizontal

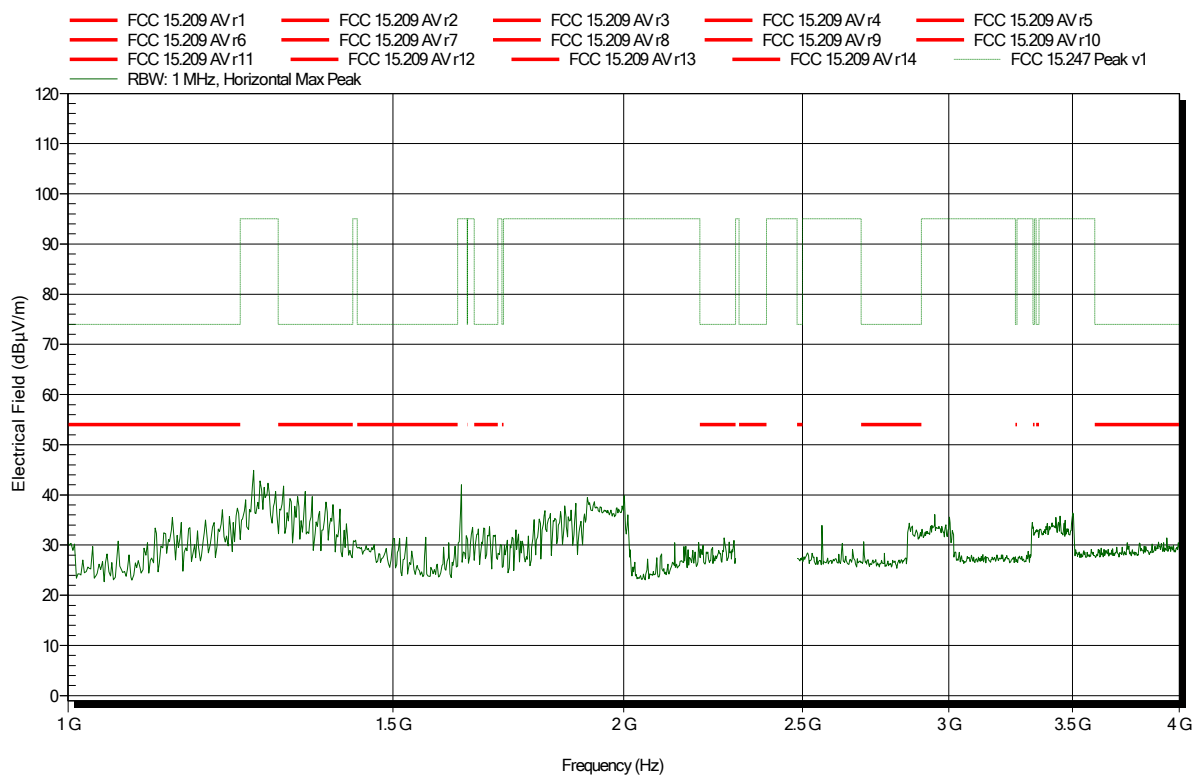
Measurement distance: 1 m converted to 3m

Mode: TX; LE -- 2402 MHz

Test Date: 2019-06-20

Note:

Index 22

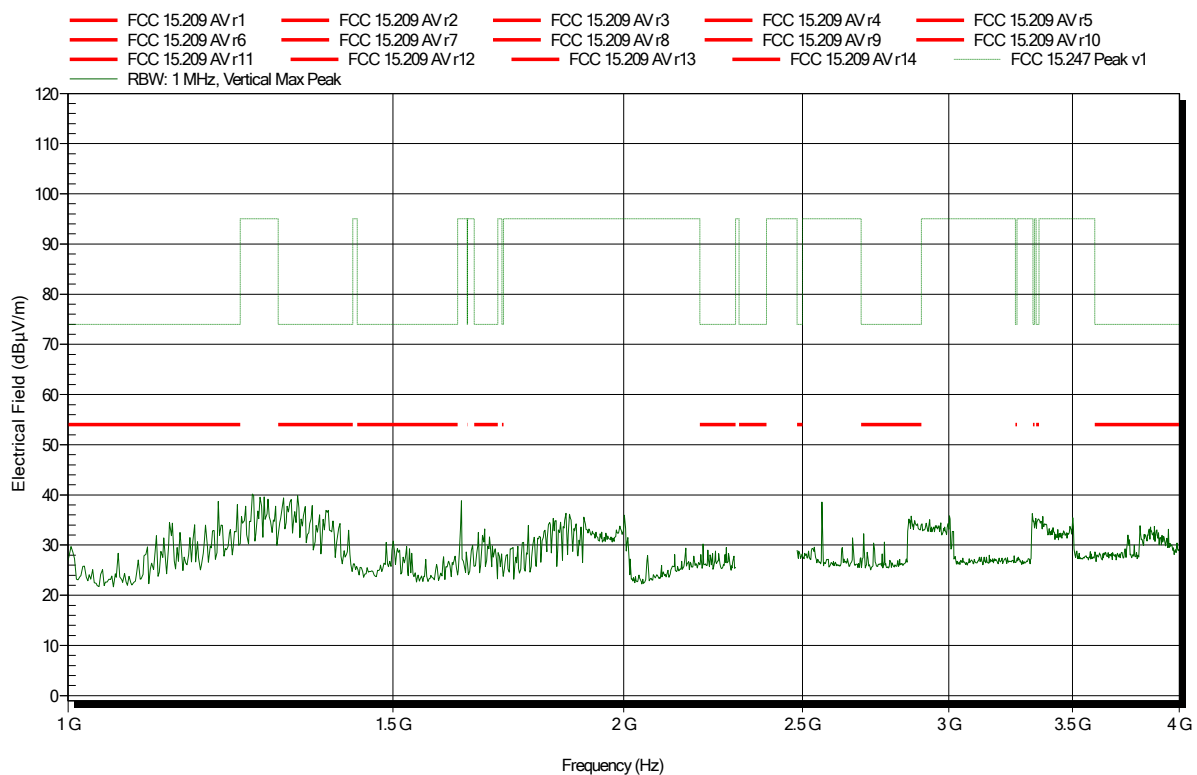


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note:

Index 30

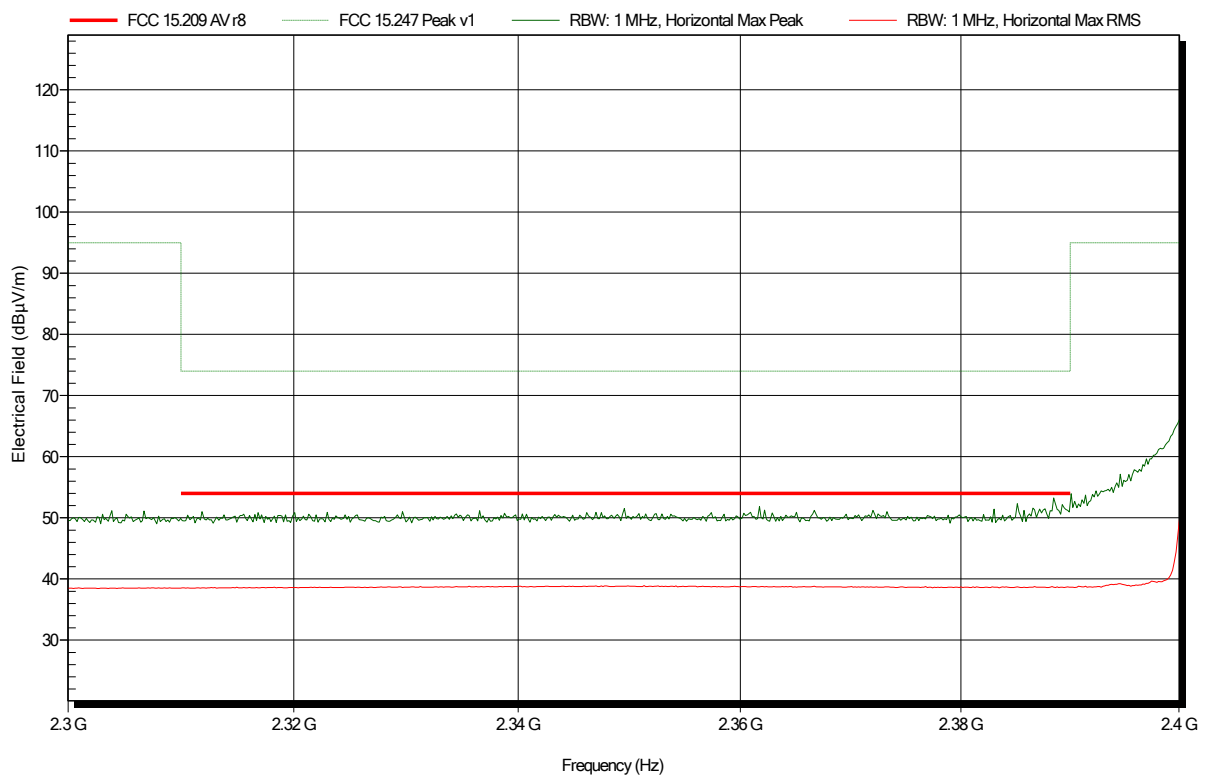


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note: lower bandedge

Index 23

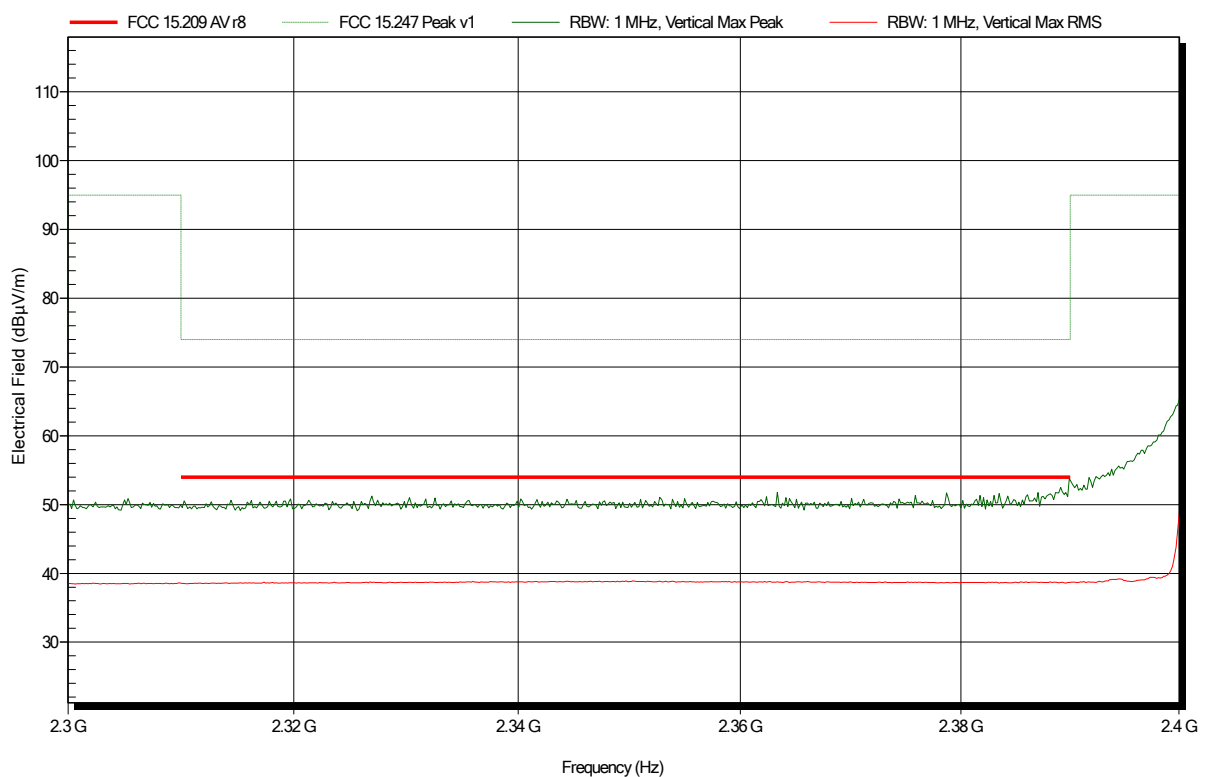


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note: lower bandedge

Index 29

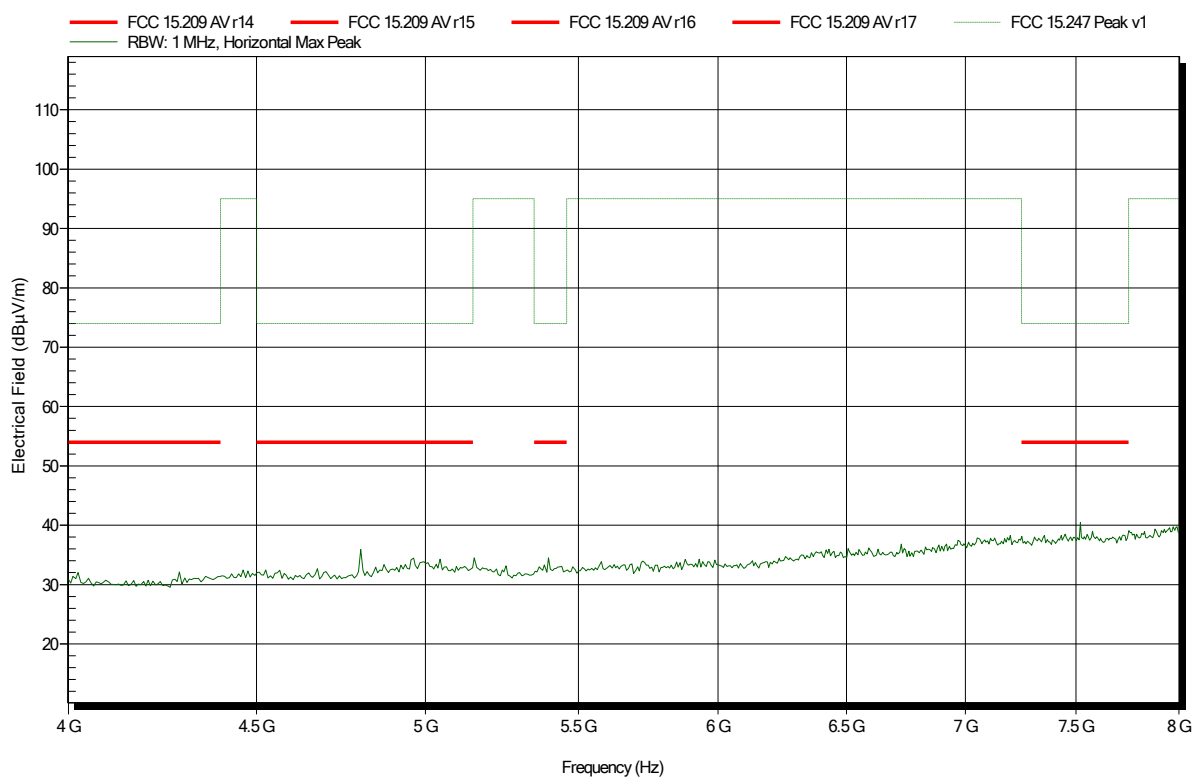


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note:

Index 25

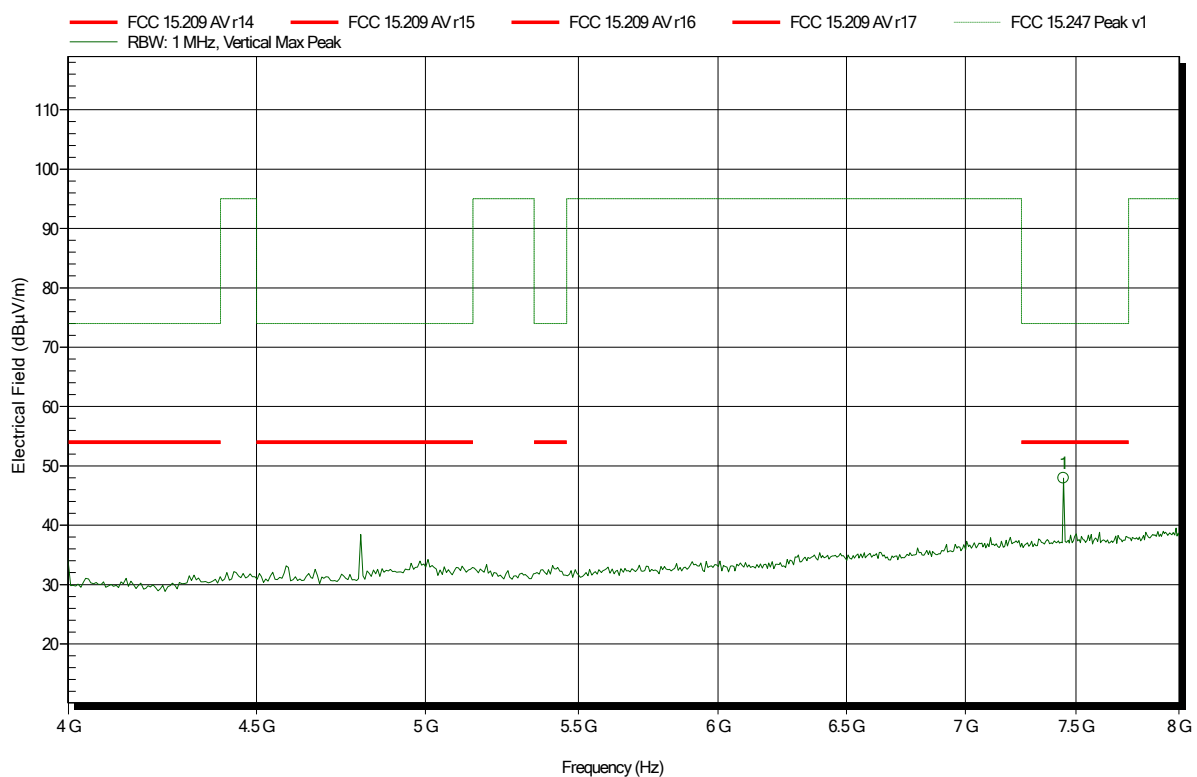


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note:

Index 28



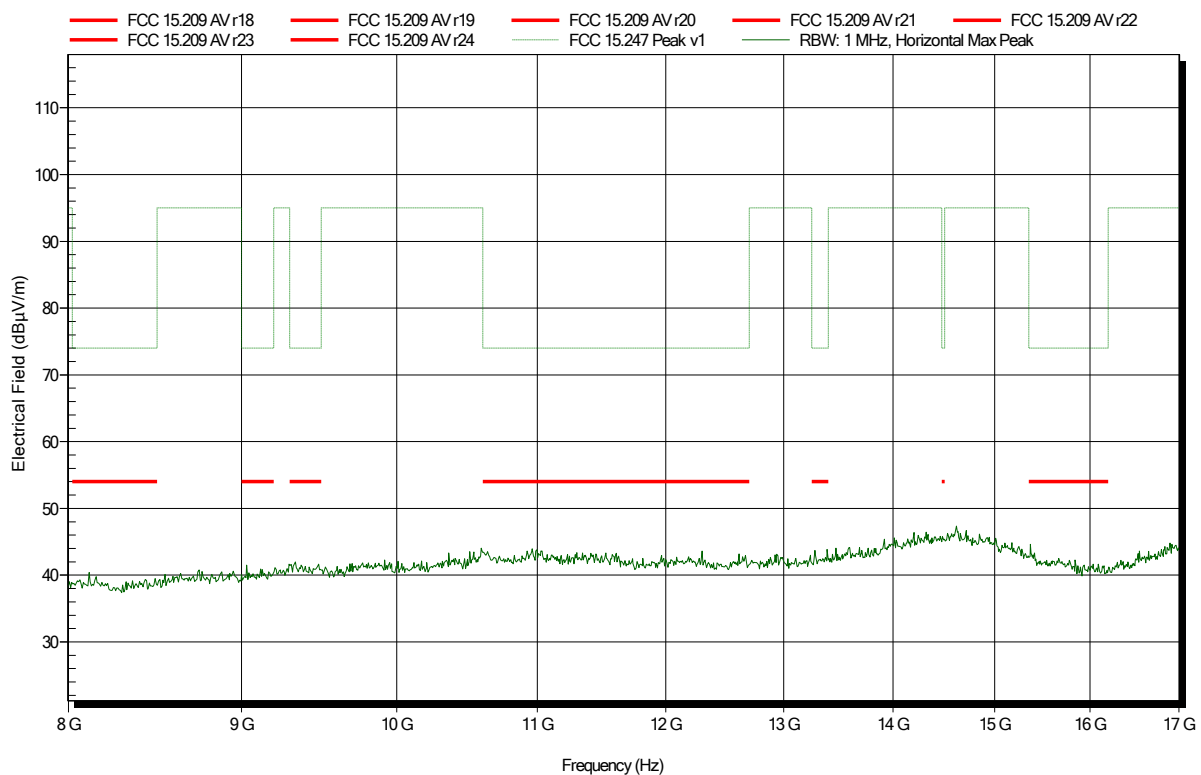
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.442 GHz	47.95 dBμV/m	74 dBμV/m	-26.05 dB	Pass

Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; LE -- 2402 MHz
 Test Date: 2019-06-20
 Note:

Index 26

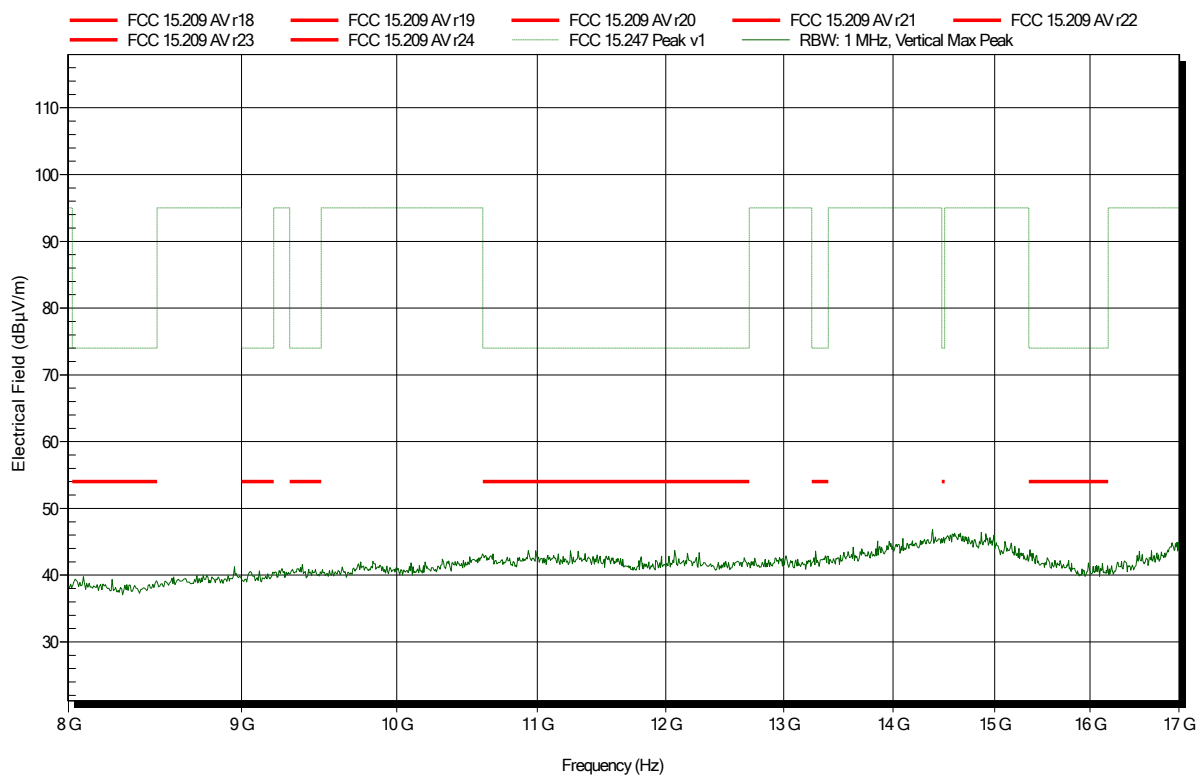


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note:

Index 27

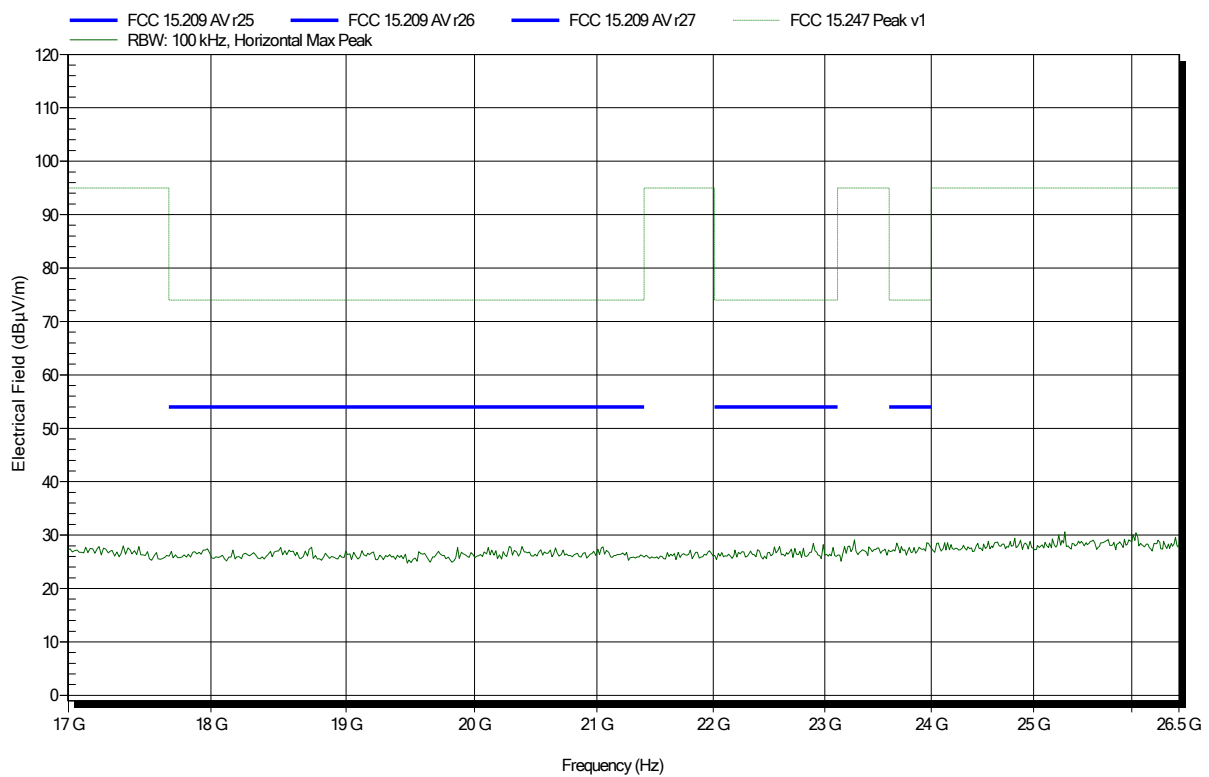


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Amplifier Research AT4560, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; LE -- 2402 MHz
 Test Date: 2019-06-20
 Note:

Index 50

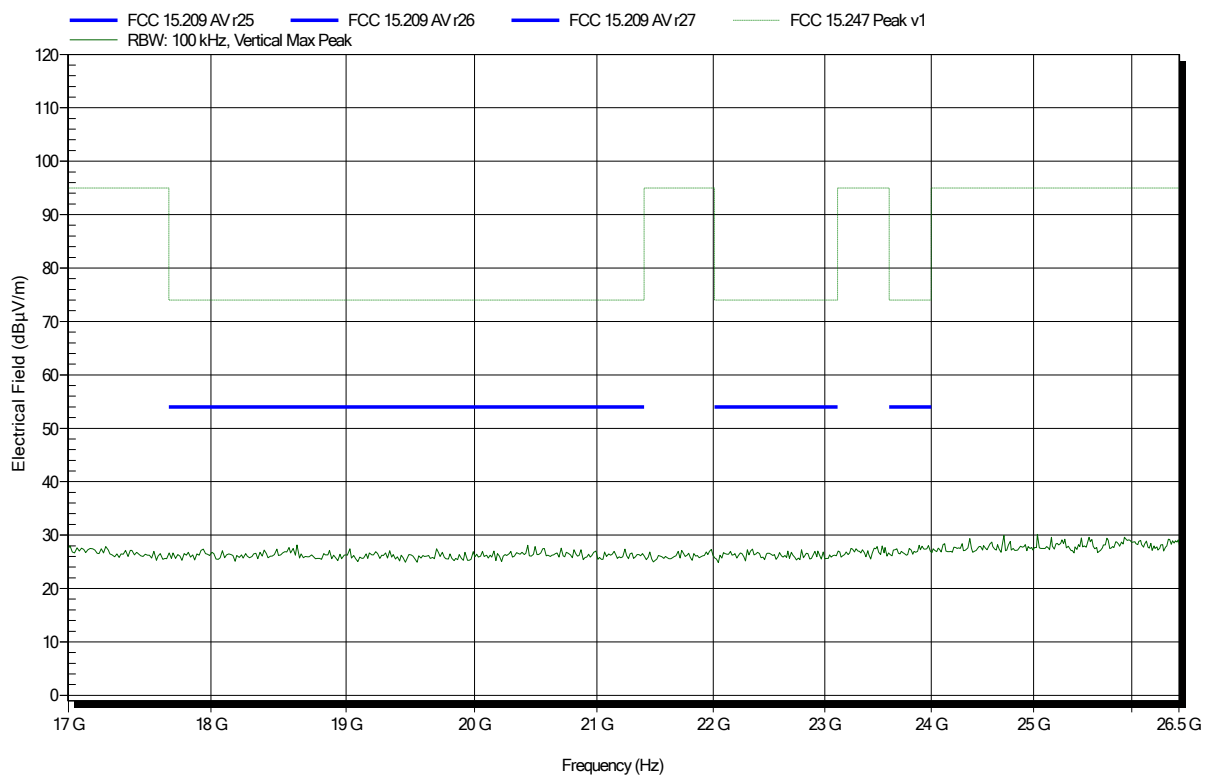


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Amplifier Research AT4560, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2402 MHz
Test Date: 2019-06-20
Note:

Index 54

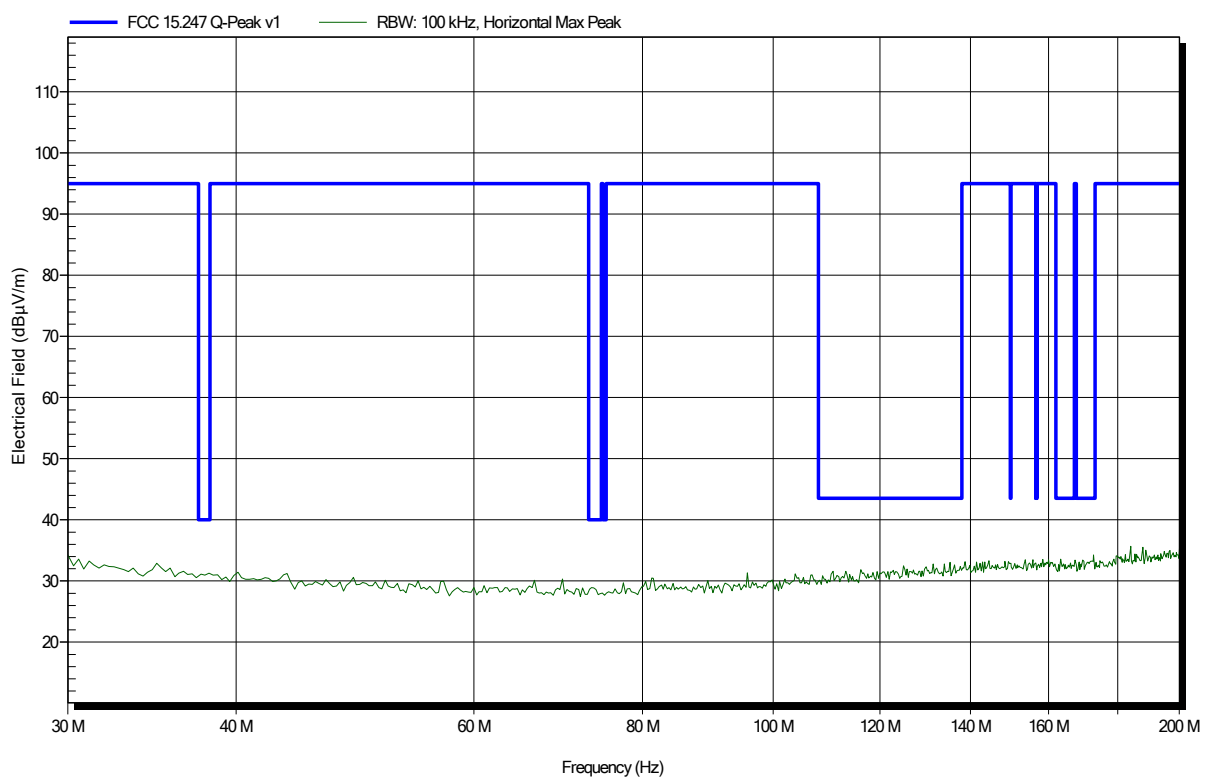


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Rohde & Schwarz HK 116, Horizontal
Measurement distance: 3 m
Mode: TX; LE -- 2440 MHz
Test Date: 2019-06-20
Note:

Index 66

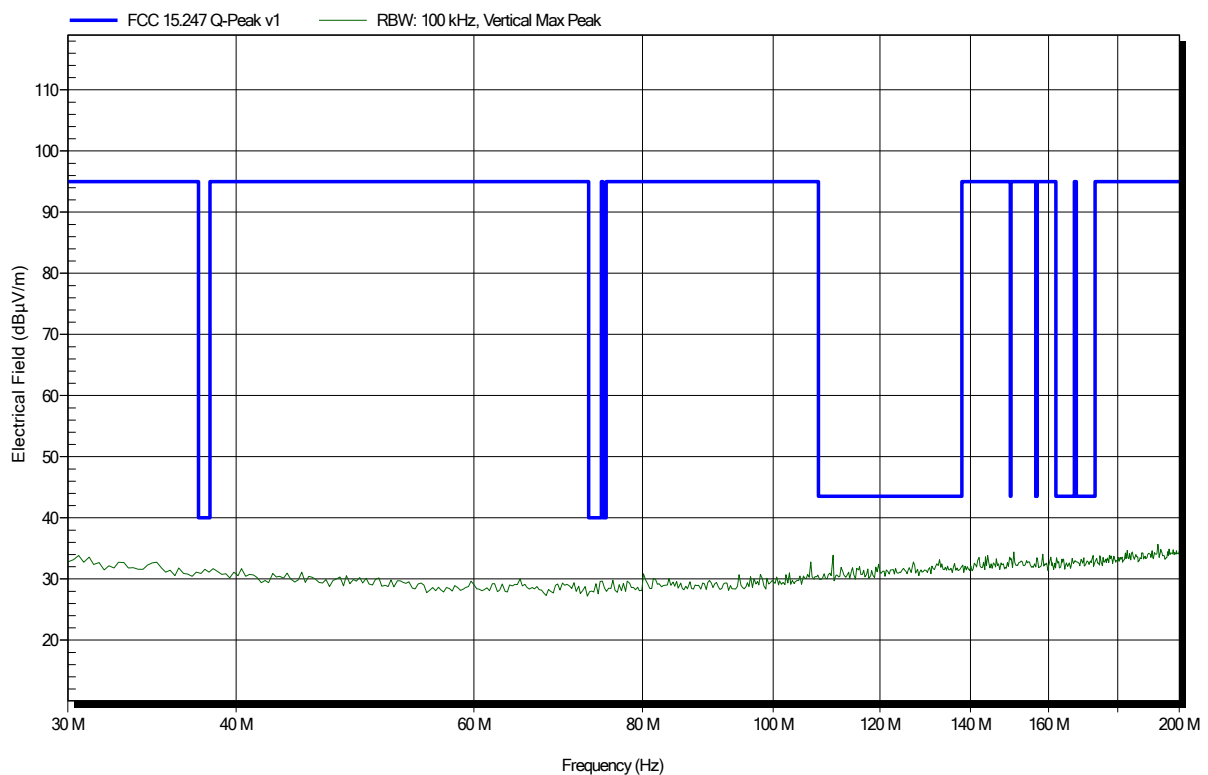


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Rohde & Schwarz HK 116, Vertical
Measurement distance: 3 m
Mode: TX; LE -- 2440 MHz
Test Date: 2019-06-20
Note:

Index 63

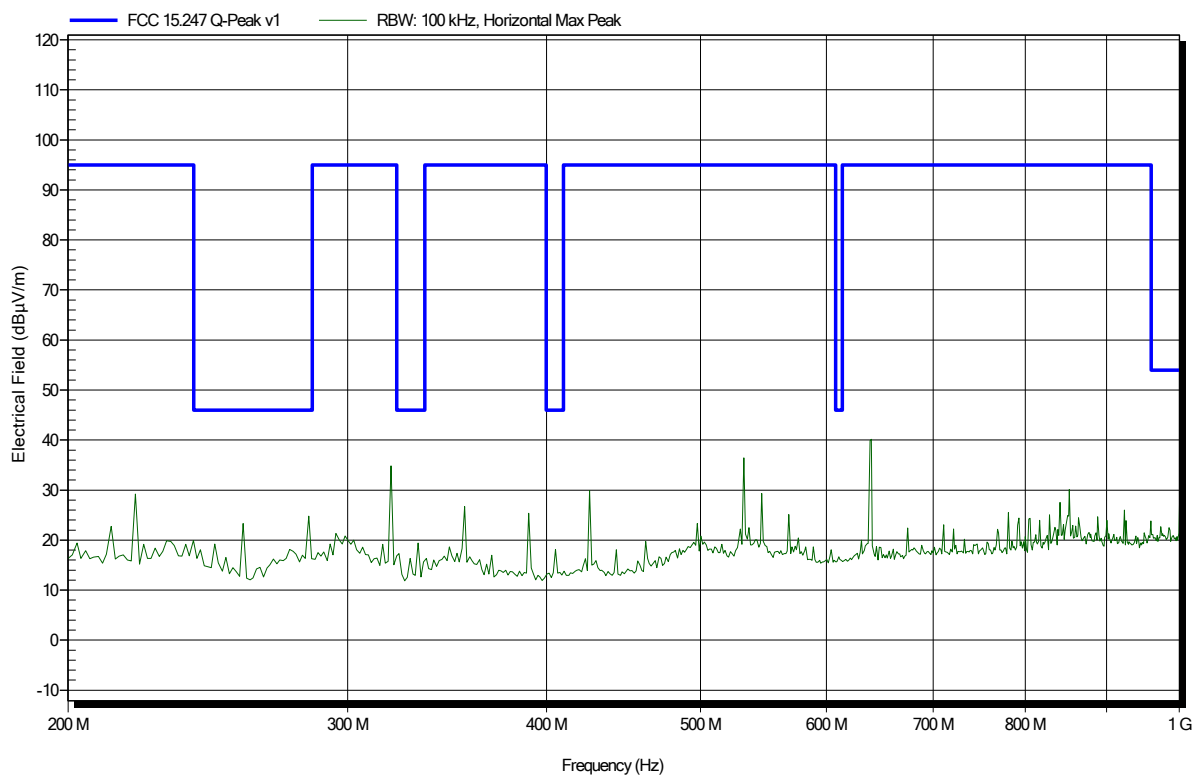


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; LE -- 2440 MHz
Test Date: 2019-06-20
Note:

Index 58

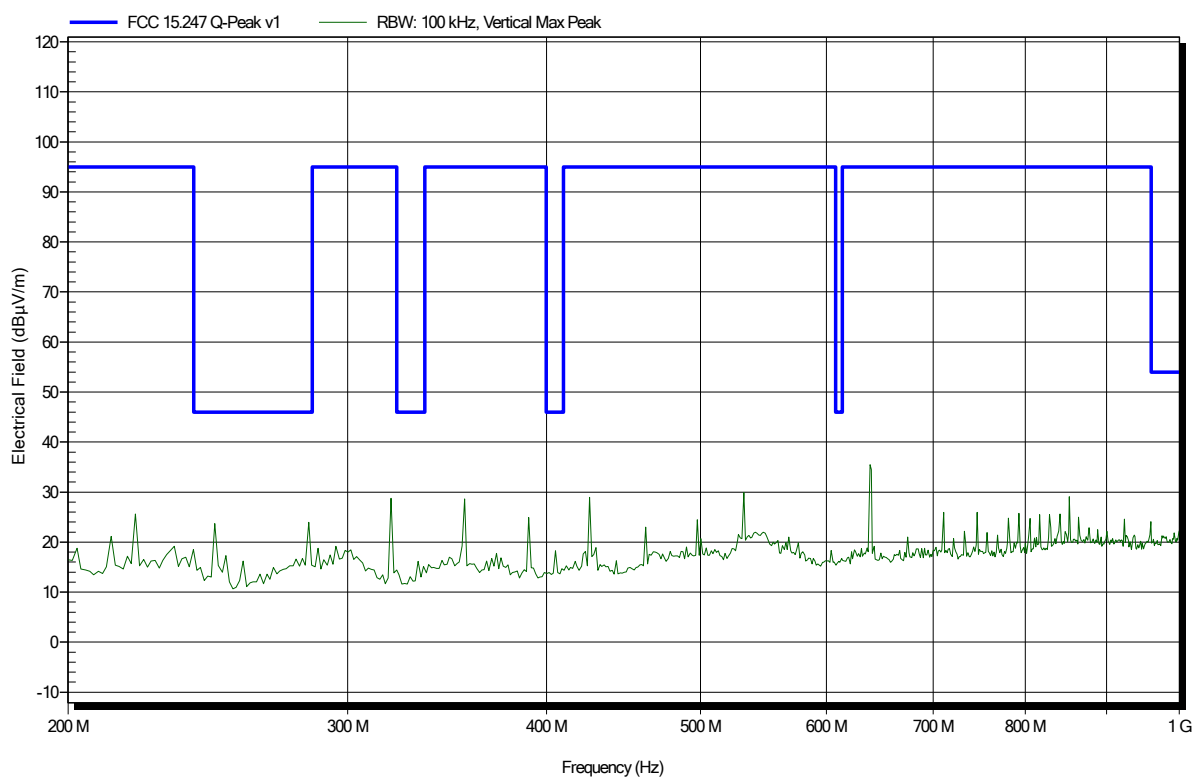


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; LE -- 2440 MHz
 Test Date: 2019-06-20
 Note:

Index 57



Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG

EUT Name: Renamic Neo Programming Device

Model: Renamic Neo

Test Site: Eurofins Product Service GmbH

Operator: Abdullah Al Jamal

Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)

Antenna: Schwarzbeck BBHA 9120D, Horizontal

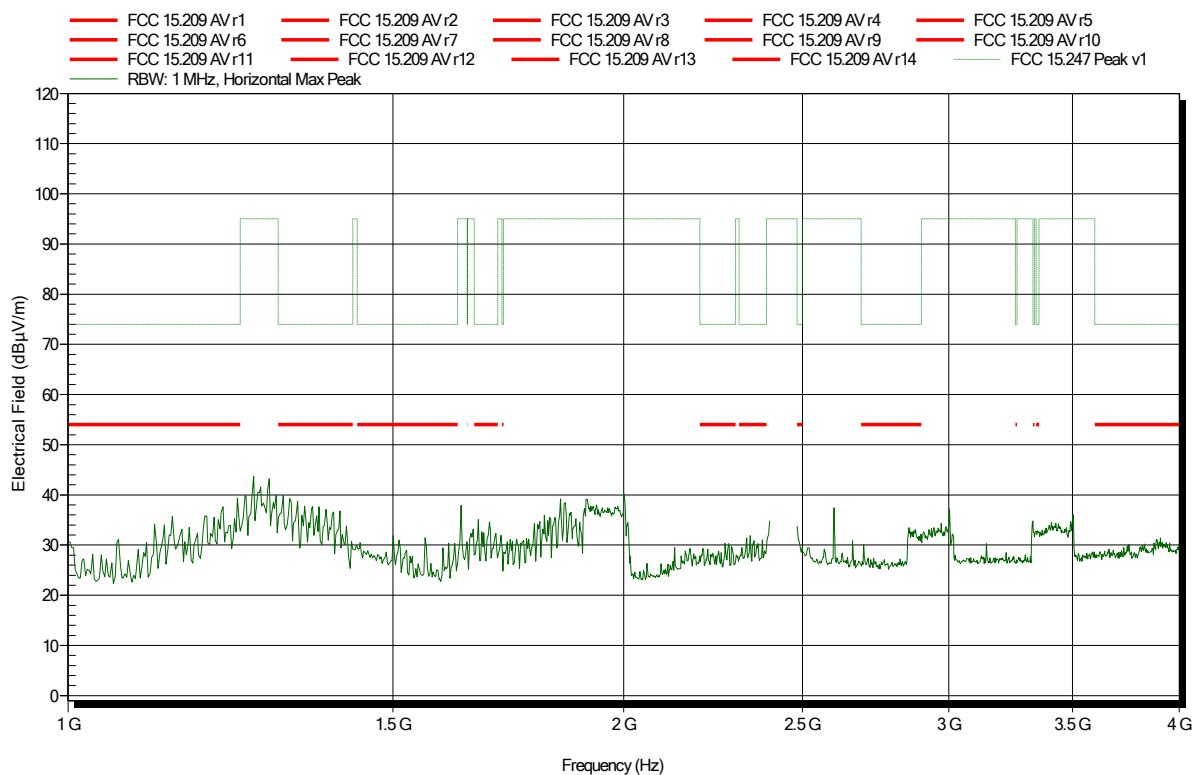
Measurement distance: 1 m converted to 3m

Mode: TX; LE -- 2440 MHz

Test Date: 2019-06-20

Note:

Index 36



Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG

EUT Name: Renamic Neo Programming Device

Model: Renamic Neo

Test Site: Eurofins Product Service GmbH

Operator: Abdullah Al Jamal

Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)

Antenna: Schwarzbeck BBHA 9120D, Vertical

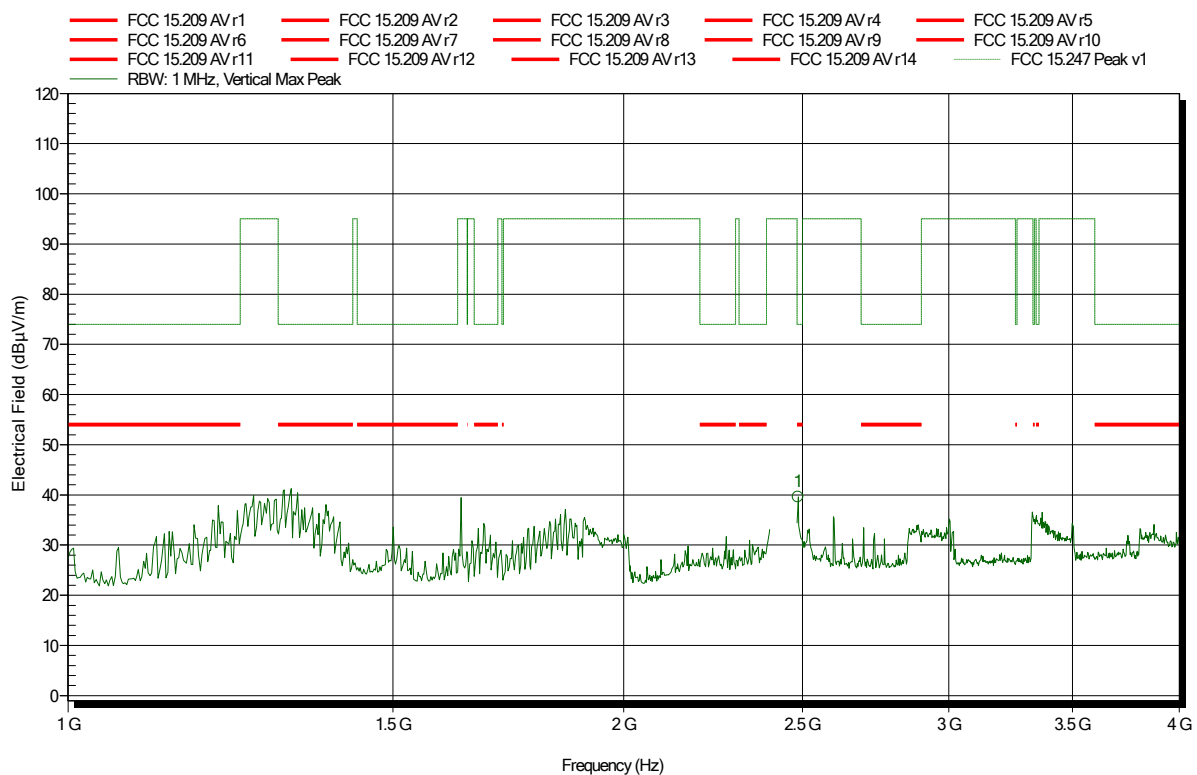
Measurement distance: 1 m converted to 3m

Mode: TX; LE -- 2440 MHz

Test Date: 2019-06-20

Note:

Index 31



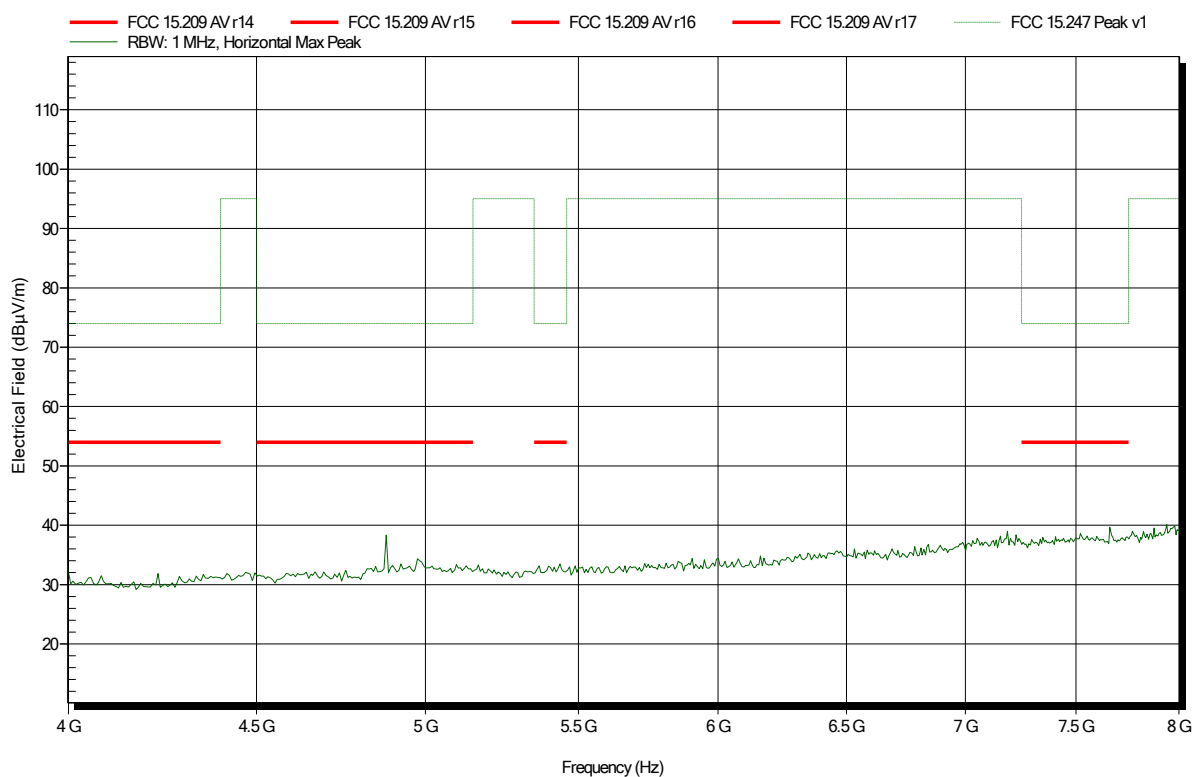
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4859 GHz	39.58 dBµV/m	74 dBµV/m	-34.42 dB	Pass

Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2440 MHz
Test Date: 2019-06-20
Note:

Index 37

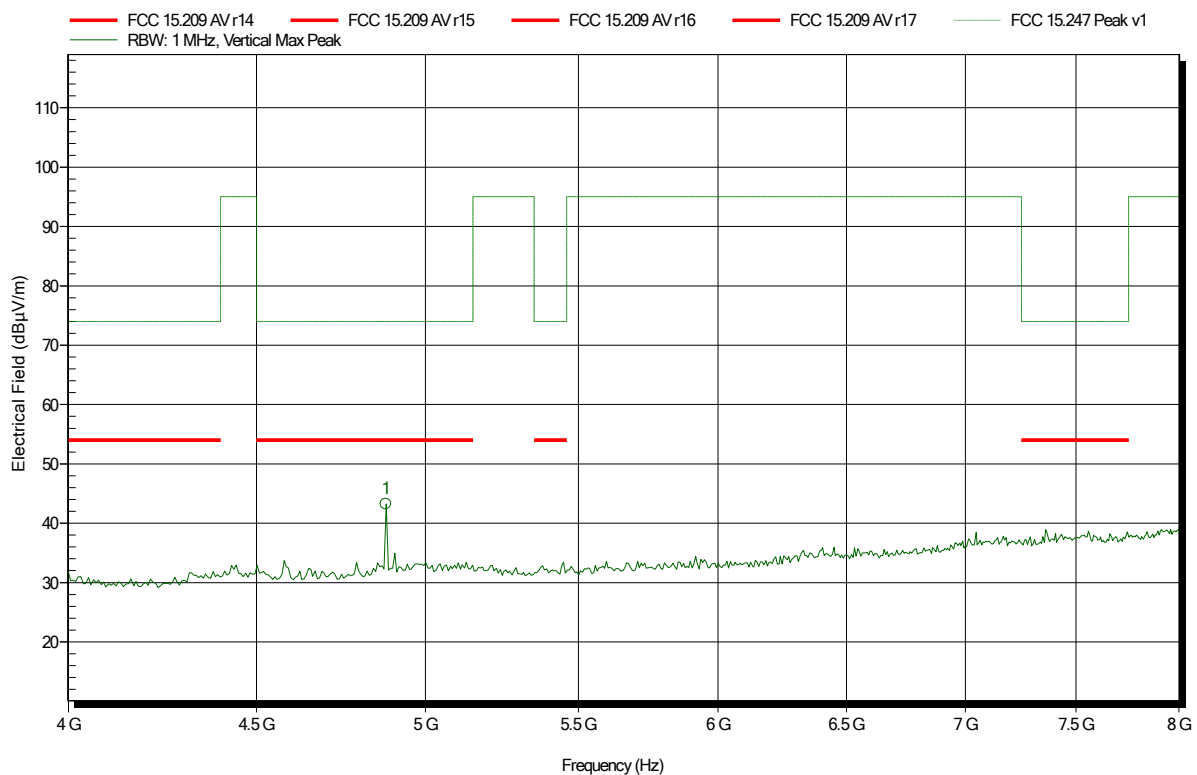


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; LE -- 2440 MHz
 Test Date: 2019-06-20
 Note:

Index 32



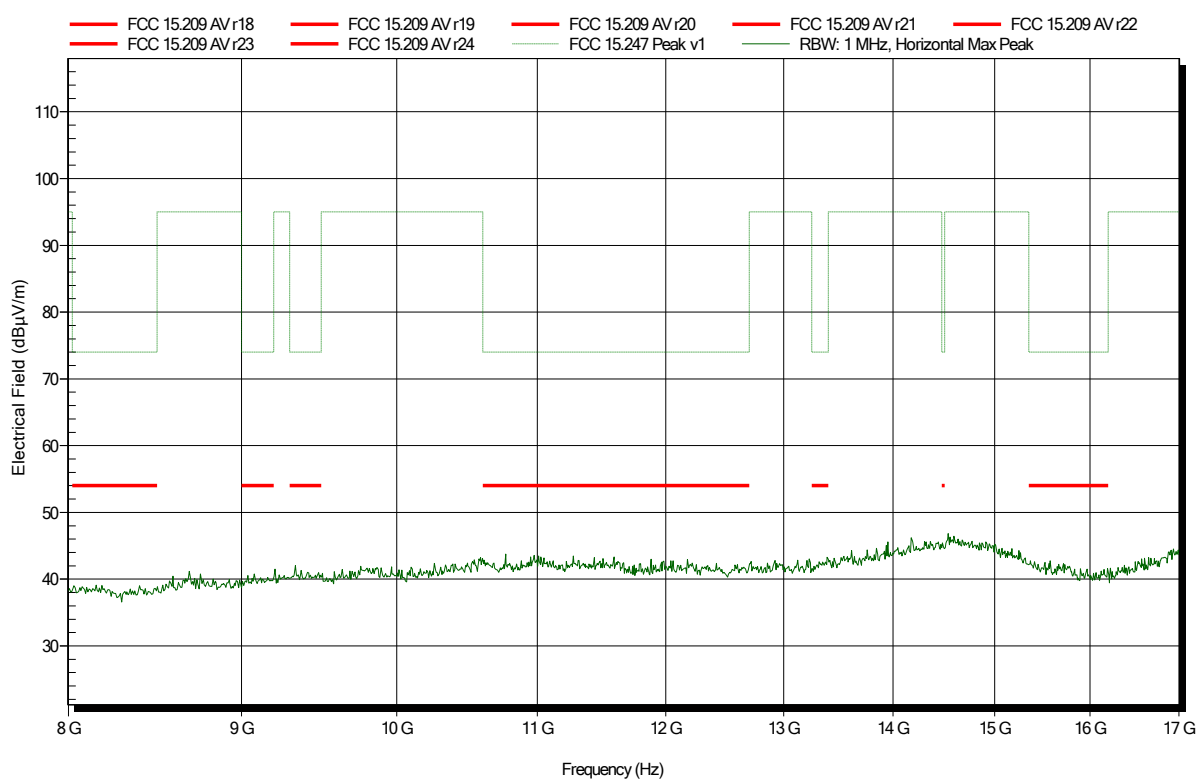
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.878 GHz	43.24 dBμV/m	74 dBμV/m	-30.76 dB	Pass

Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; LE -- 2440 MHz
 Test Date: 2019-06-20
 Note:

Index 34

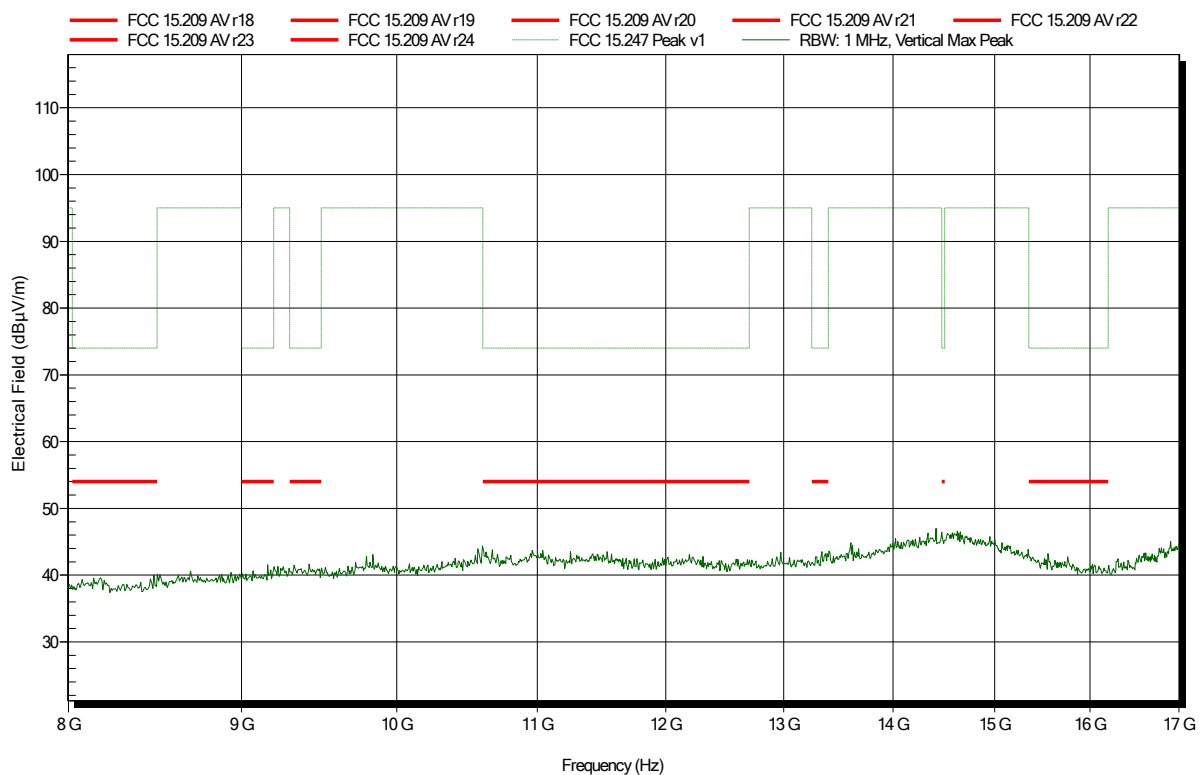


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2440 MHz
Test Date: 2019-06-20
Note:

Index 33

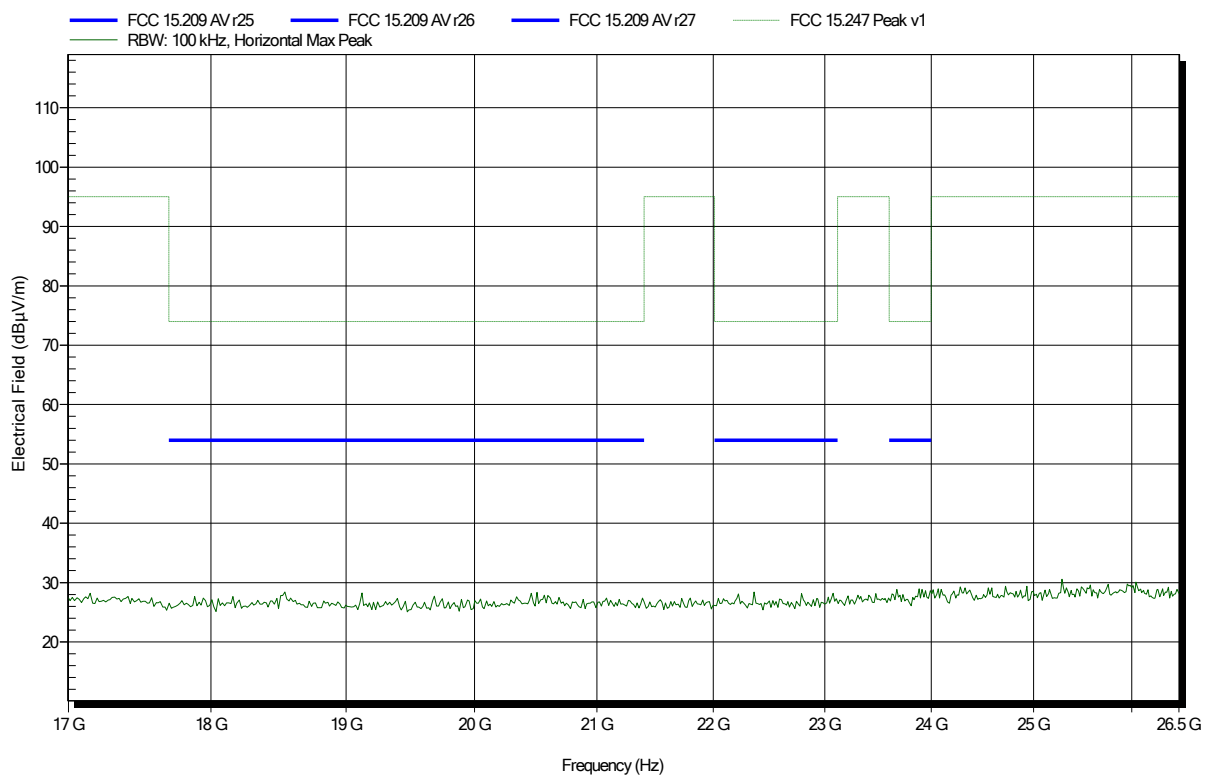


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Amplifier Research AT4560, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; LE -- 2440 MHz
 Test Date: 2019-06-20
 Note:

Index 49

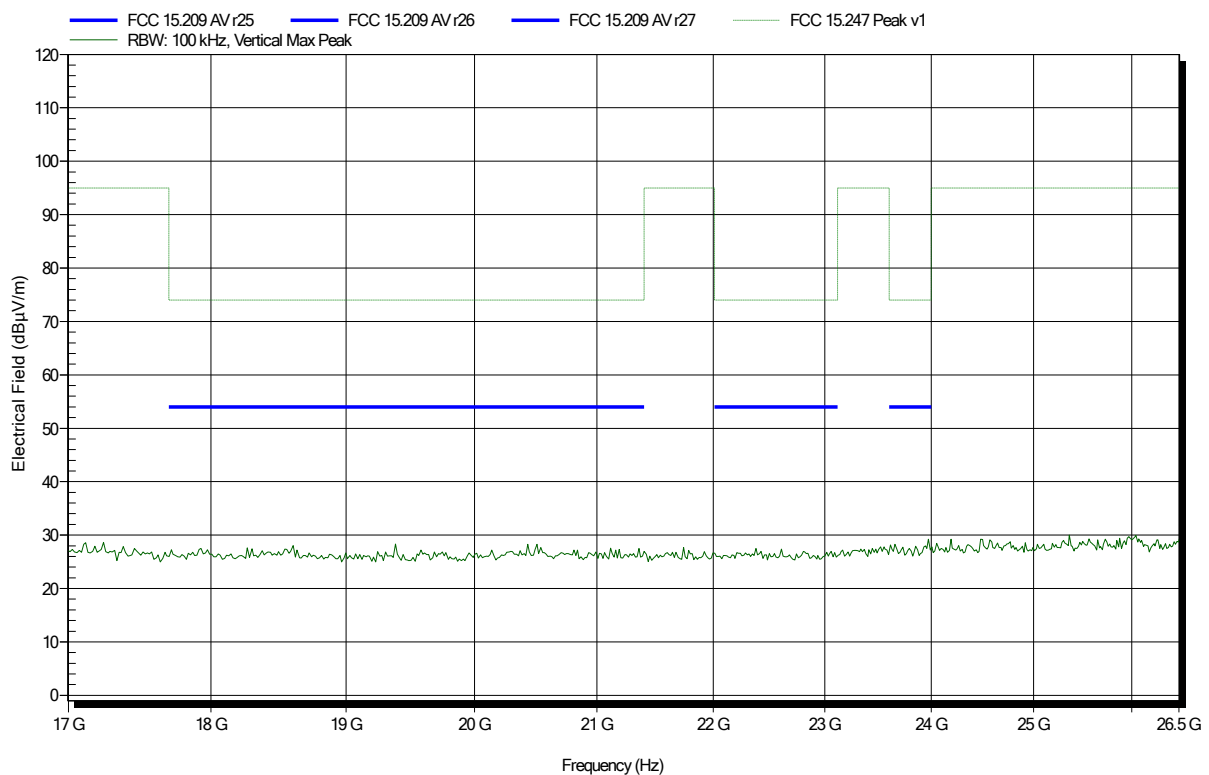


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Amplifier Research AT4560, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; LE -- 2440 MHz
 Test Date: 2019-06-20
 Note:

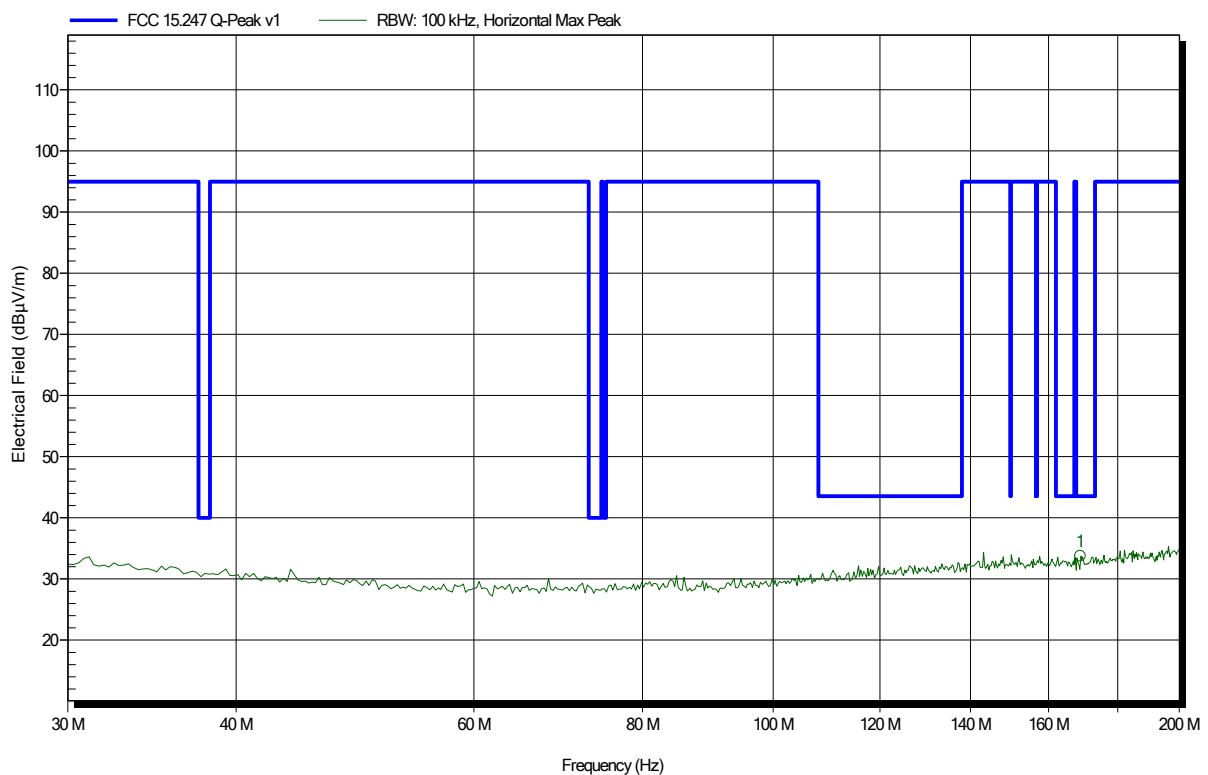
Index 53



Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; LE -- 2480 MHz
 Test Date: 2019-06-20
 Note:

Index 61



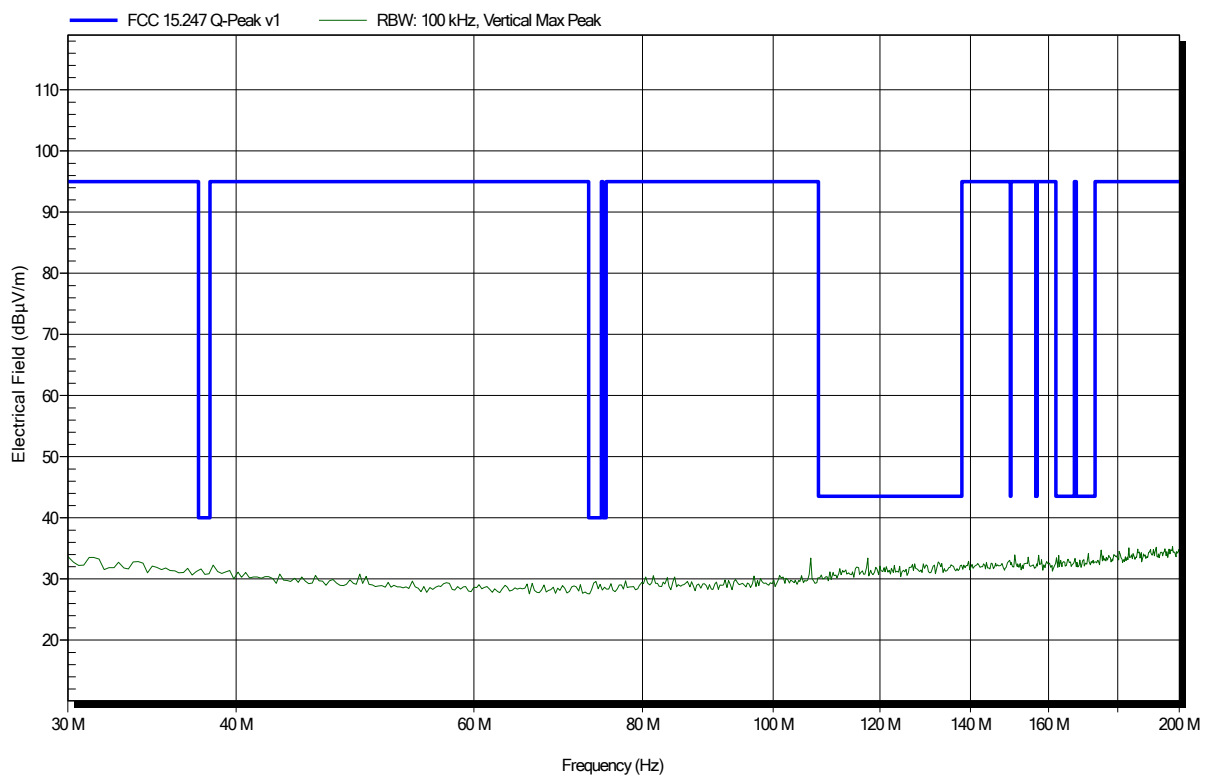
Frequency	Peak	Peak Limit	Peak Difference	Status
168.942 MHz	33.74 dBµV/m	43.52 dBµV/m	-9.78 dB	Pass

Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; LE -- 2480 MHz
 Test Date: 2019-06-20
 Note:

Index 62

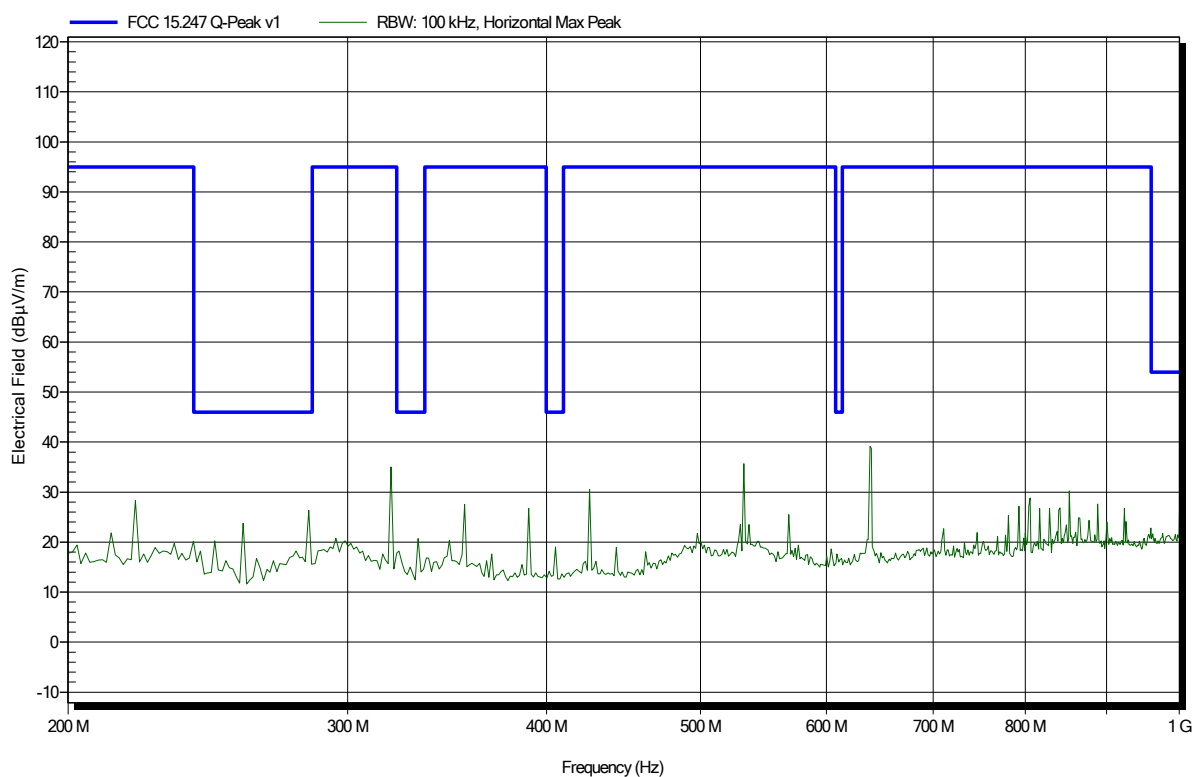


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; LE -- 2480 MHz
Test Date: 2019-06-20
Note:

Index 59

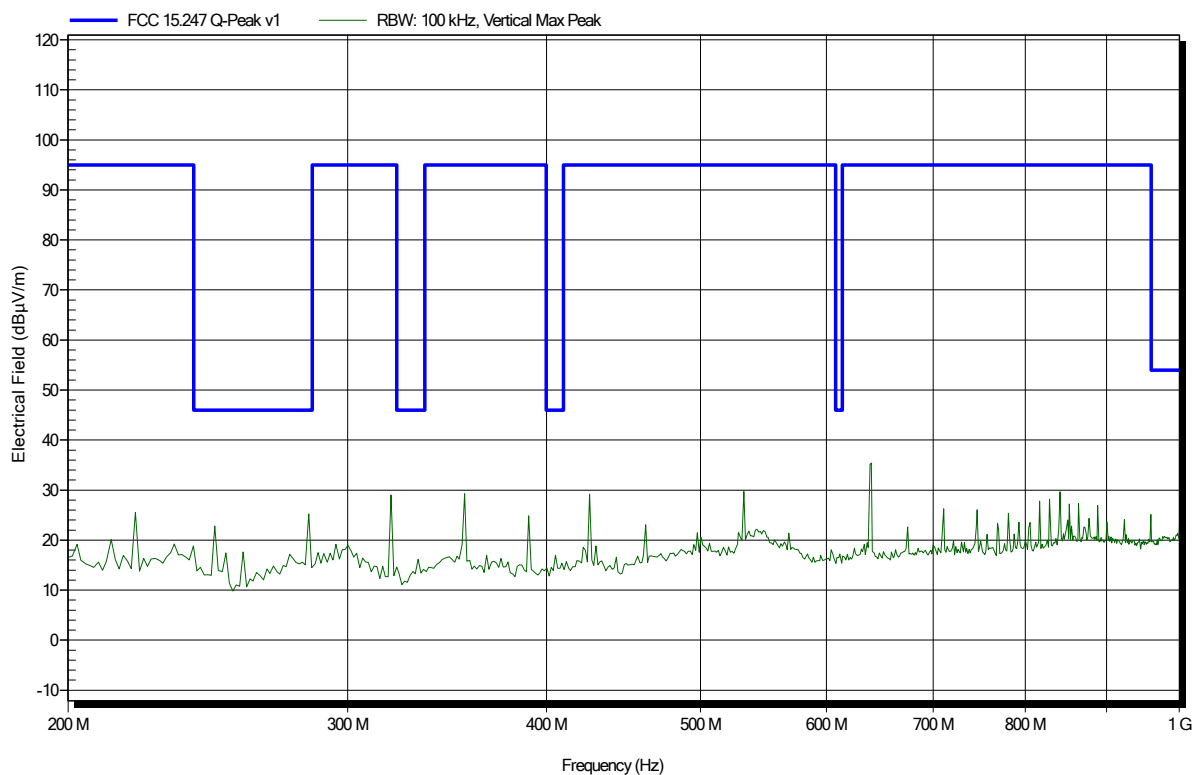


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: TX; LE -- 2480 MHz
Test Date: 2019-06-20
Note:

Index 60



Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG

EUT Name: Renamic Neo Programming Device

Model: Renamic Neo

Test Site: Eurofins Product Service GmbH

Operator: Abdullah Al Jamal

Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)

Antenna: Schwarzbeck BBHA 9120D, Horizontal

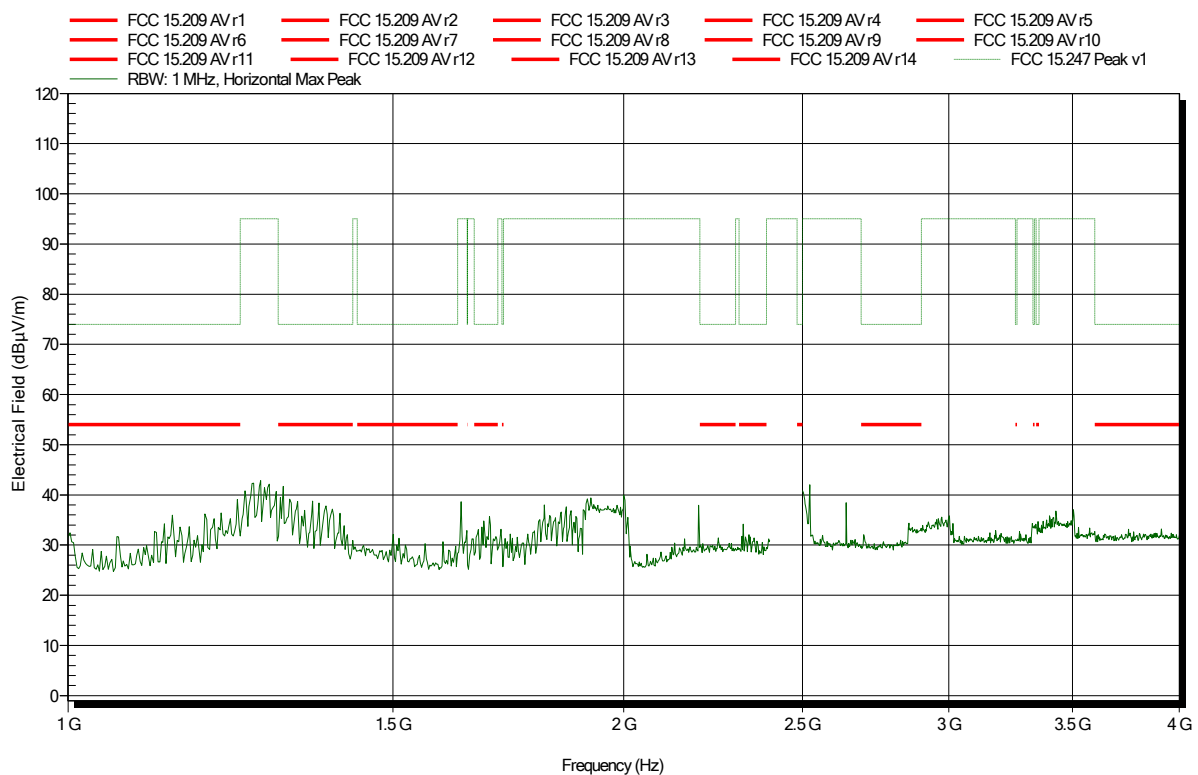
Measurement distance: 1 m converted to 3m

Mode: TX; LE -- 2480 MHz

Test Date: 2019-06-20

Note:

Index 38



Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG

EUT Name: Renamic Neo Programming Device

Model: Renamic Neo

Test Site: Eurofins Product Service GmbH

Operator: Abdullah Al Jamal

Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)

Antenna: Schwarzbeck BBHA 9120D, Vertical

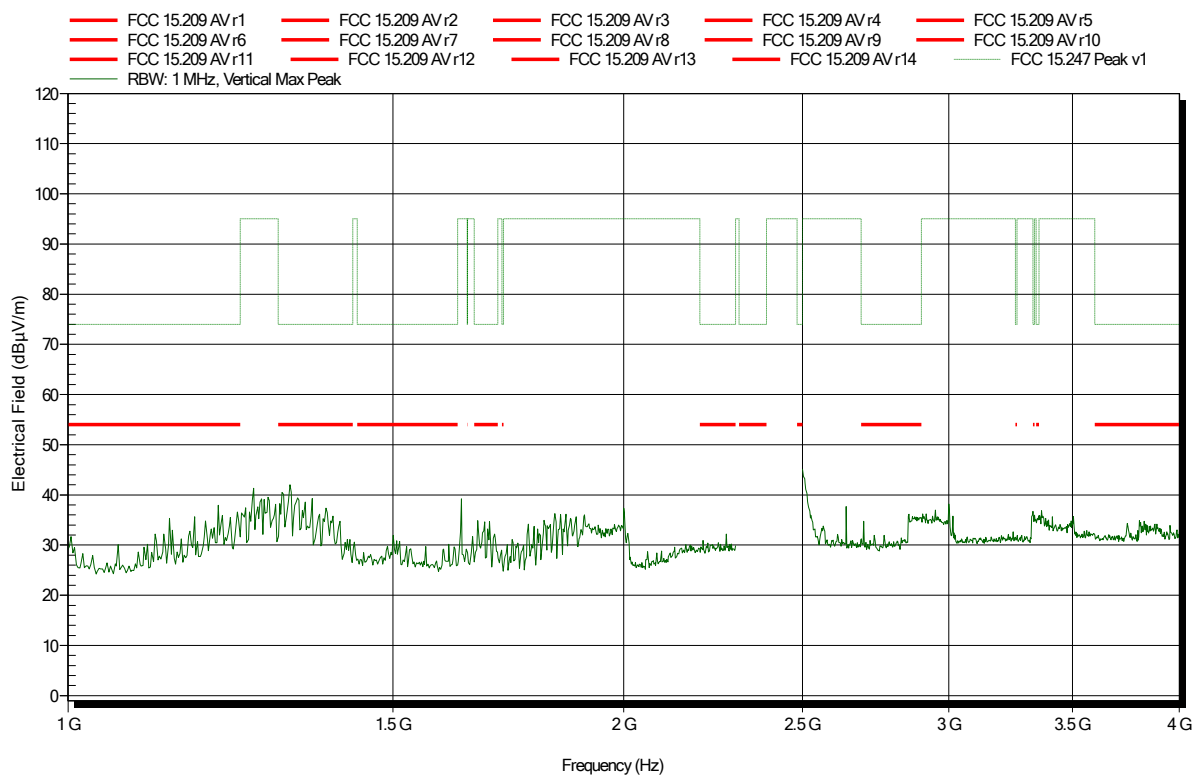
Measurement distance: 1 m converted to 3m

Mode: TX; LE -- 2480 MHz

Test Date: 2019-06-20

Note:

Index 44

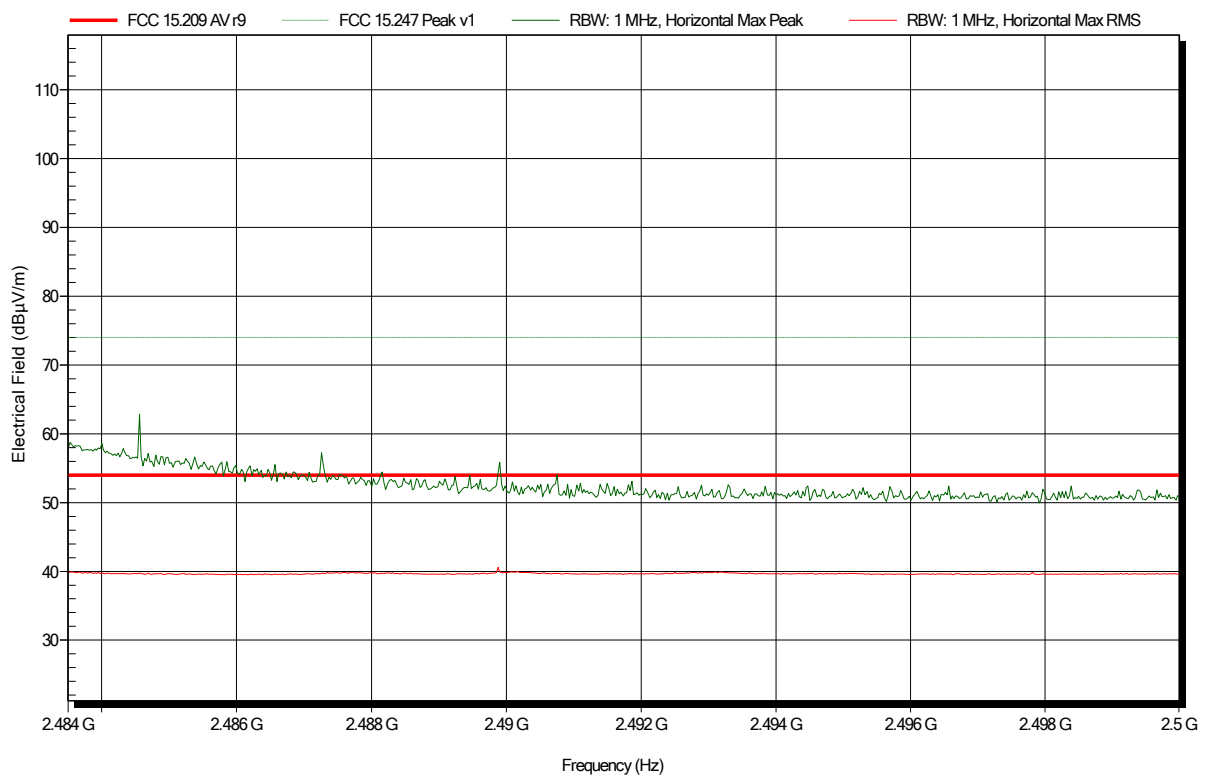


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; LE -- 2480 MHz
 Test Date: 2019-06-20
 Note: upper bandedge

Index 39

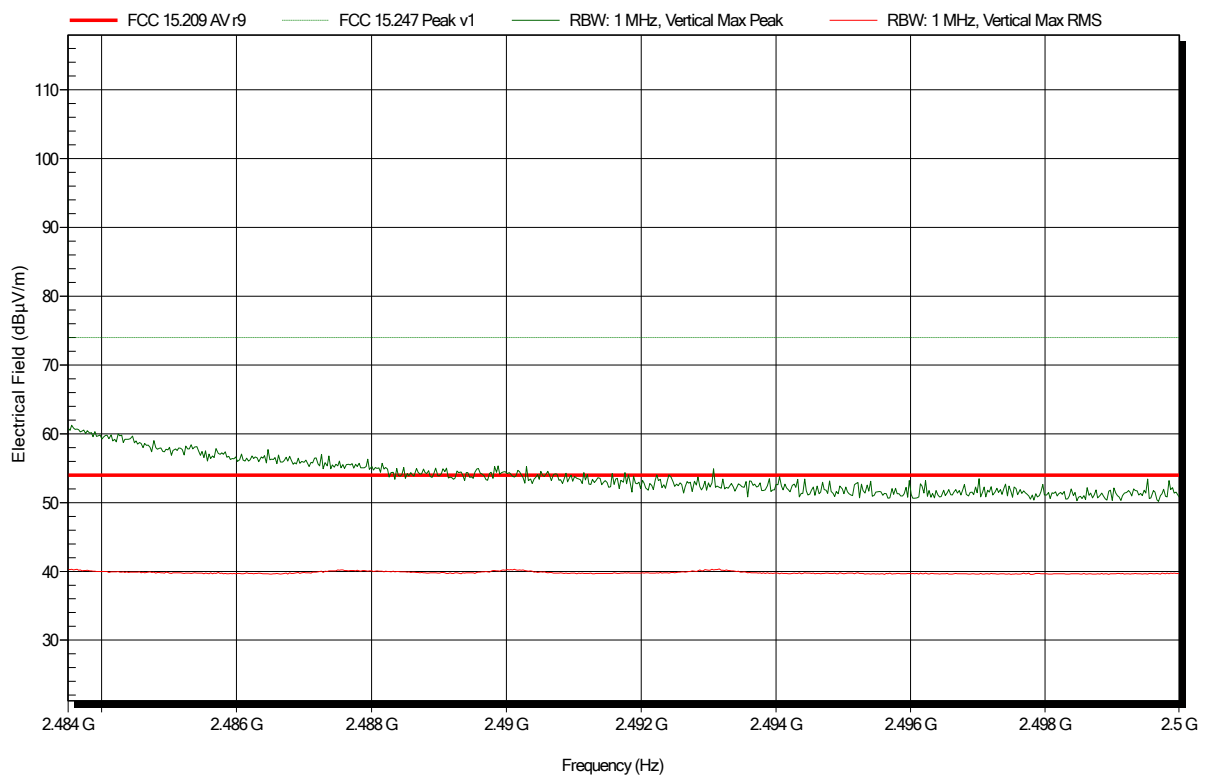


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; LE -- 2480 MHz
 Test Date: 2019-06-20
 Note: upper bandedge

Index 45

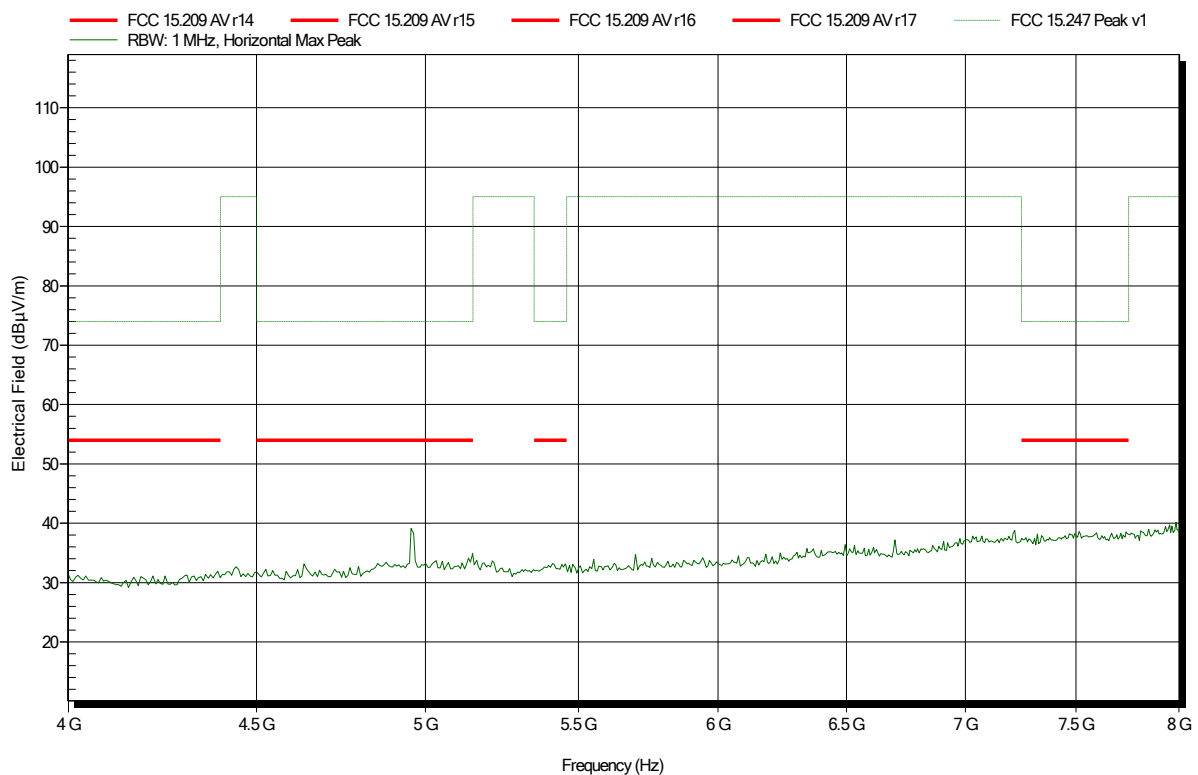


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2480 MHz
Test Date: 2019-06-20
Note:

Index 40

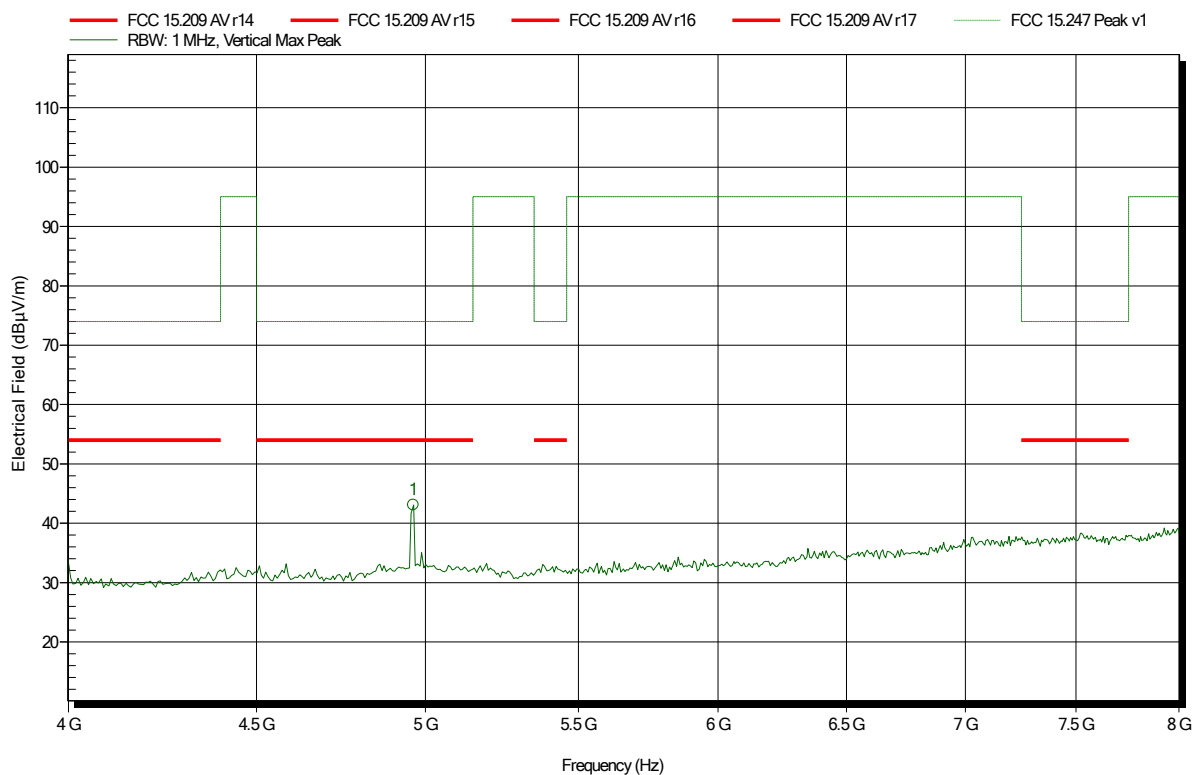


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2480 MHz
Test Date: 2019-06-20
Note:

Index 43



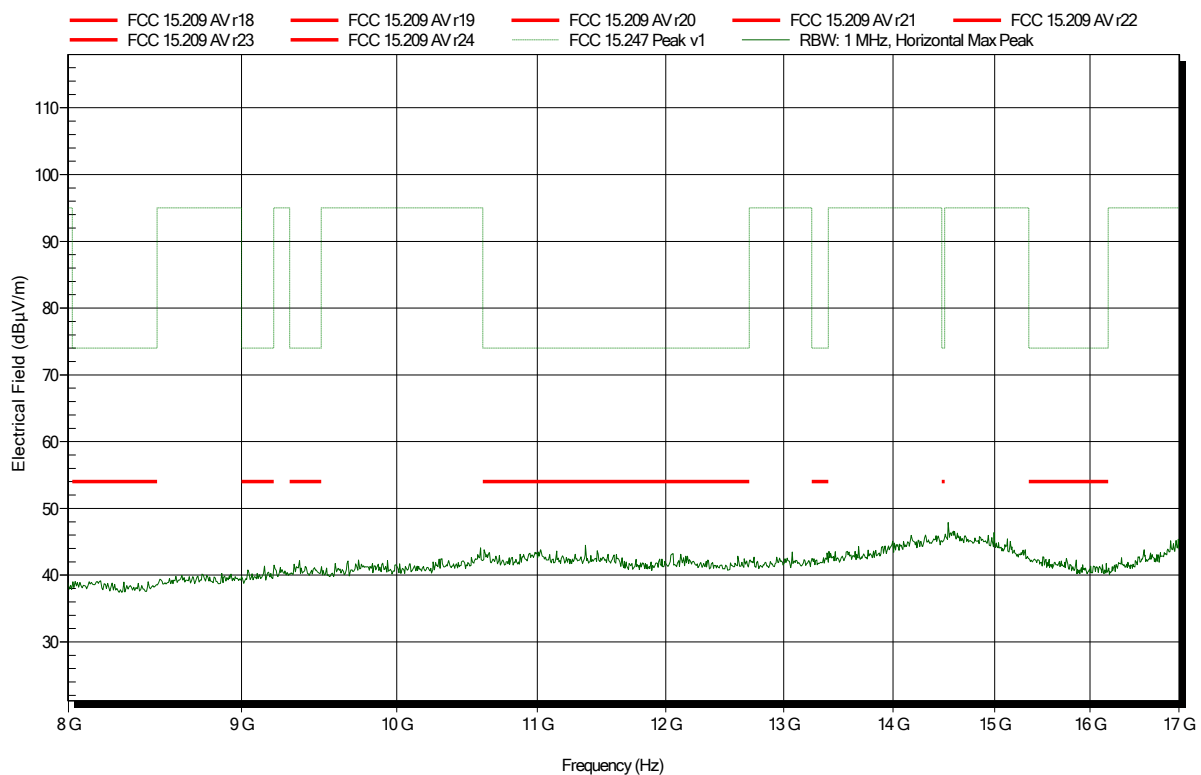
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.962 GHz	43.08 dBµV/m	74 dBµV/m	-30.92 dB	Pass

Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2480 MHz
Test Date: 2019-06-20
Note:

Index 41

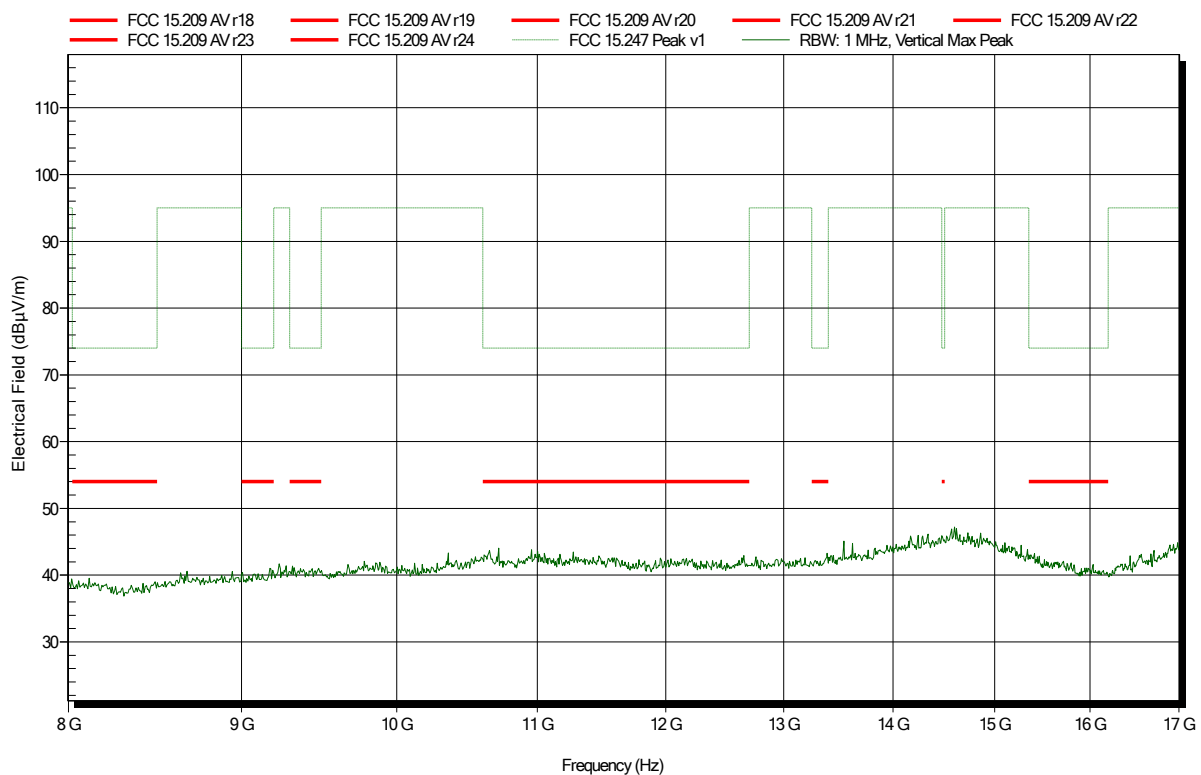


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2480 MHz
Test Date: 2019-06-20
Note:

Index 42

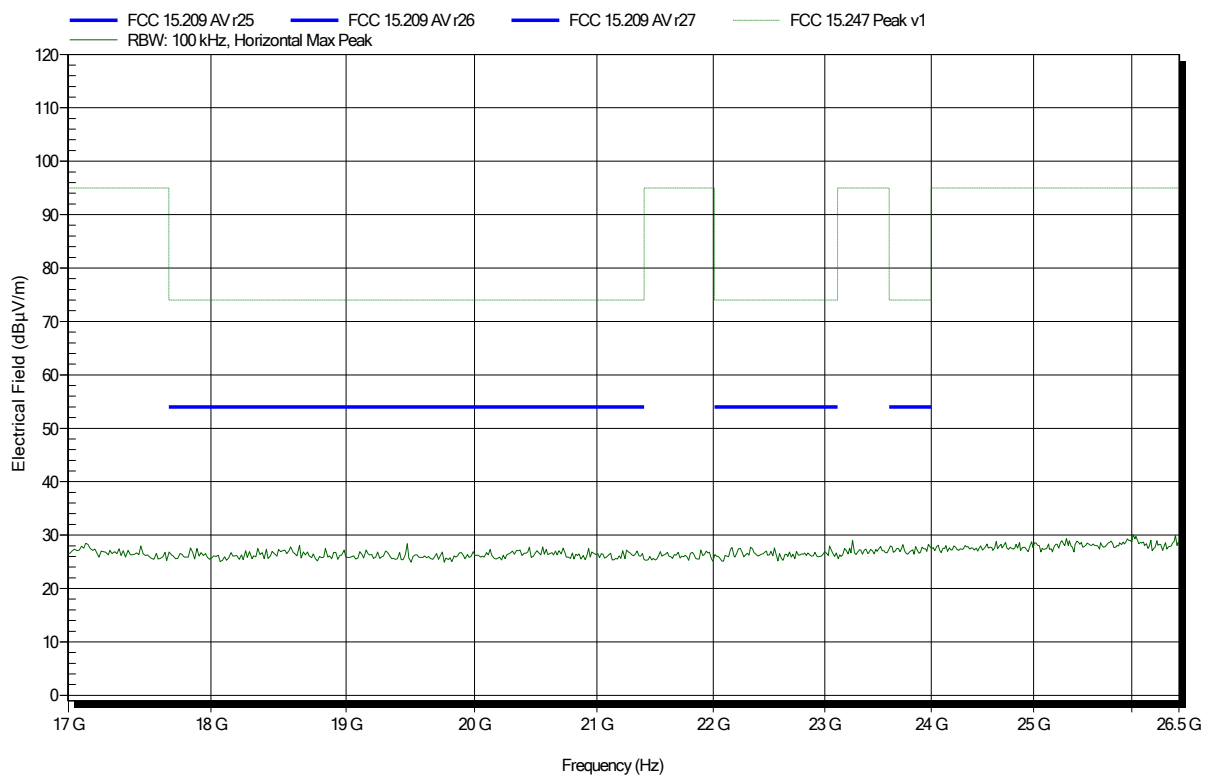


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Amplifier Research AT4560, Horizontal
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2480 MHz
Test Date: 2019-06-20
Note:

Index 51

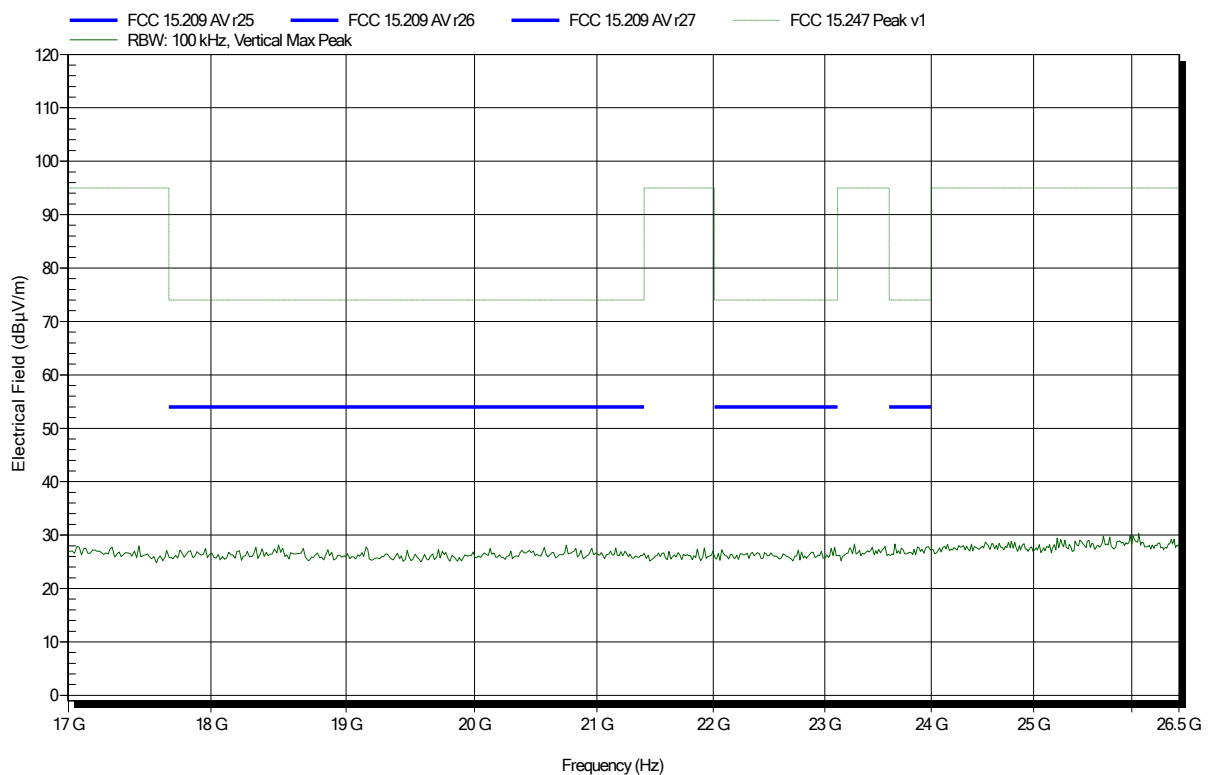


Spurious emissions according to FCC 47 CFR §15.247

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Amplifier Research AT4560, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; LE -- 2480 MHz
Test Date: 2019-06-20
Note:

Index 52



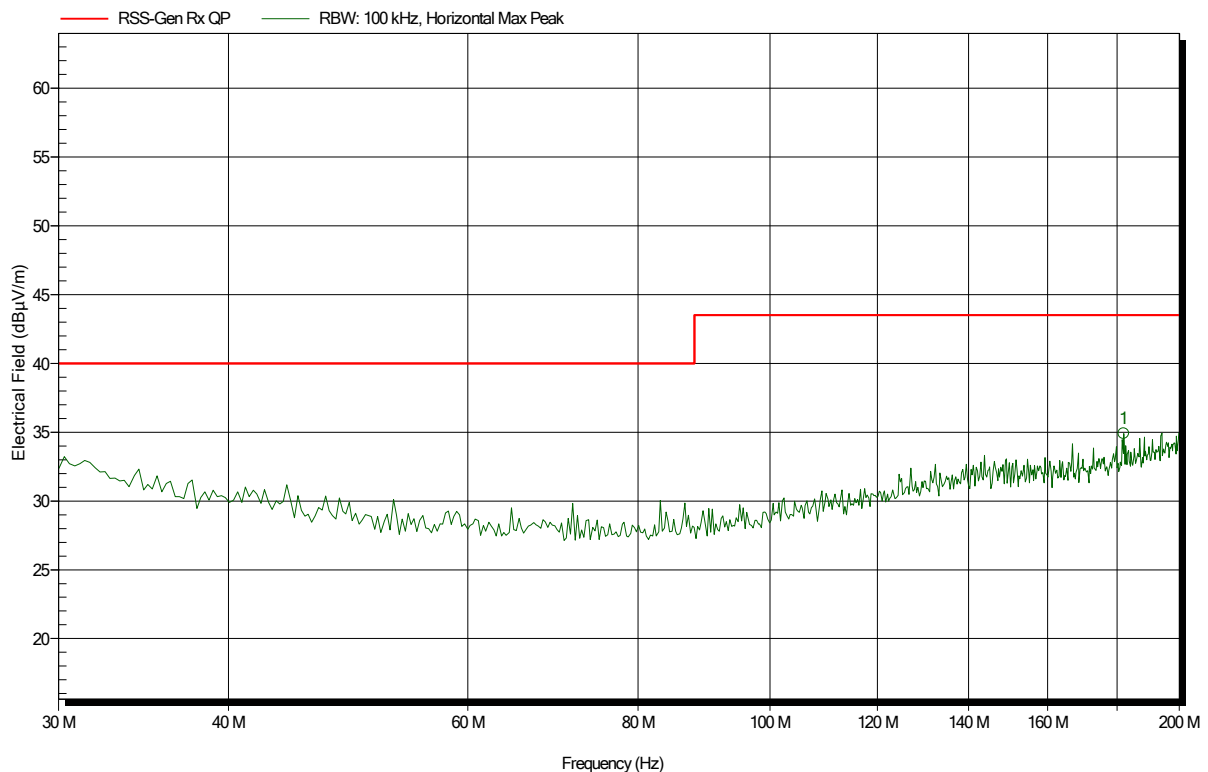
ANNEX B Receiver spurious emissions

Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: RX; 2440 MHz
 Test Date: 2019-06-17
 Note:

Index 1

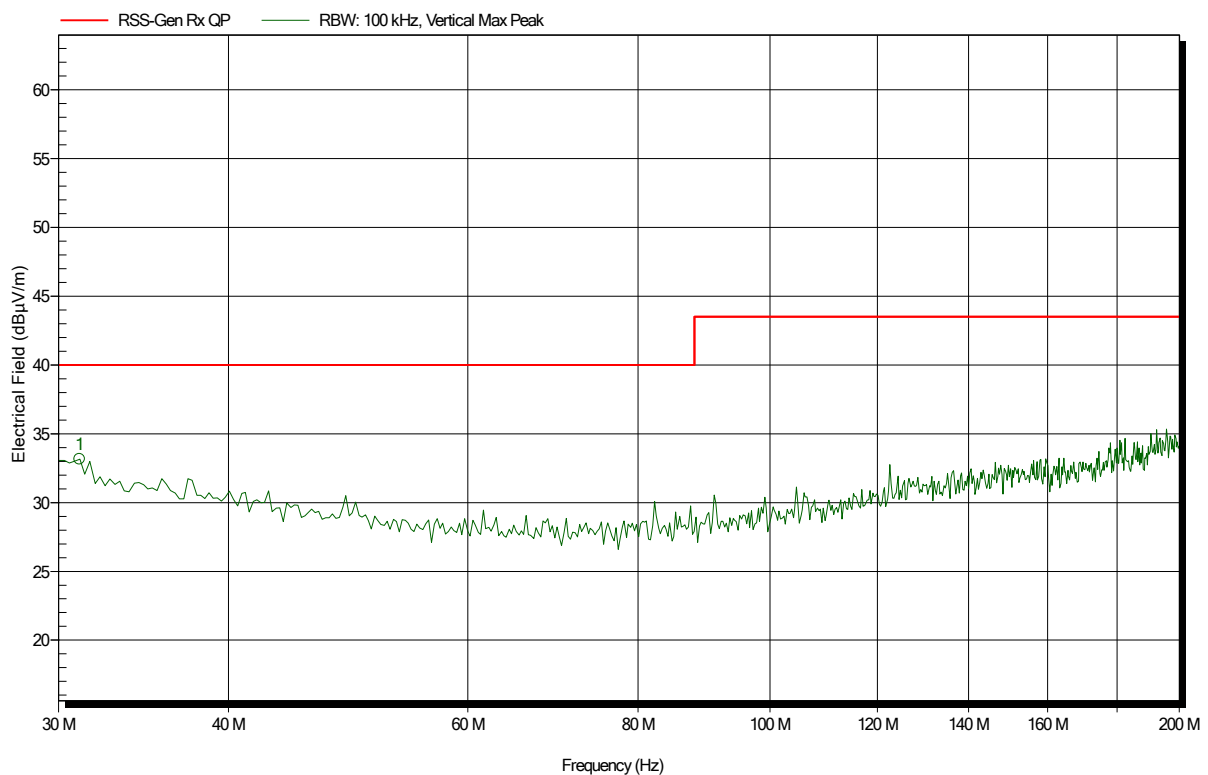


Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
182.048 MHz	34.9 dBµV/m	43.5 dBµV/m	-8.6 dB	Pass	180 Degree	1.2 m

Spurious emissions according to ISSED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: RX; 2440 MHz
 Test Date: 2019-06-17
 Note:

Index 2



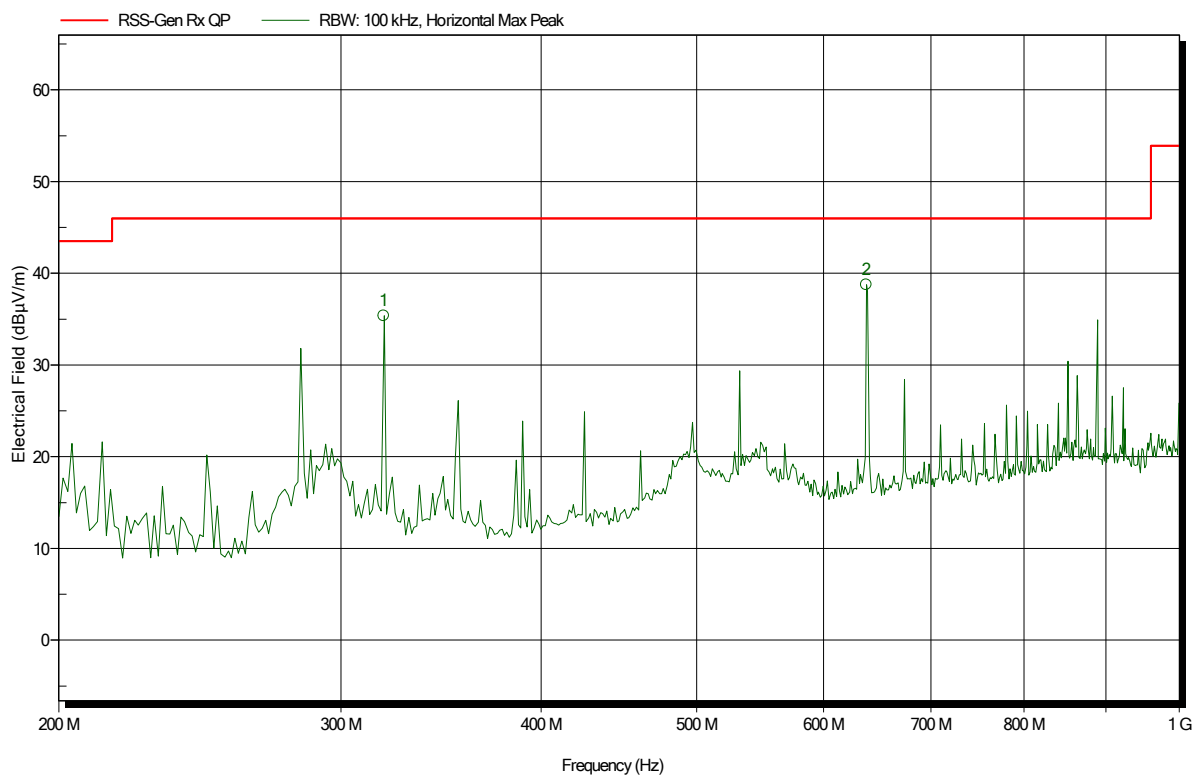
Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
31.088 MHz	33.15 dBµV/m	40 dBµV/m	-6.85 dB	Pass	225 Degree	1.2 m

Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: RX; 2440 MHz
Test Date: 2019-06-17
Note:

Index 3



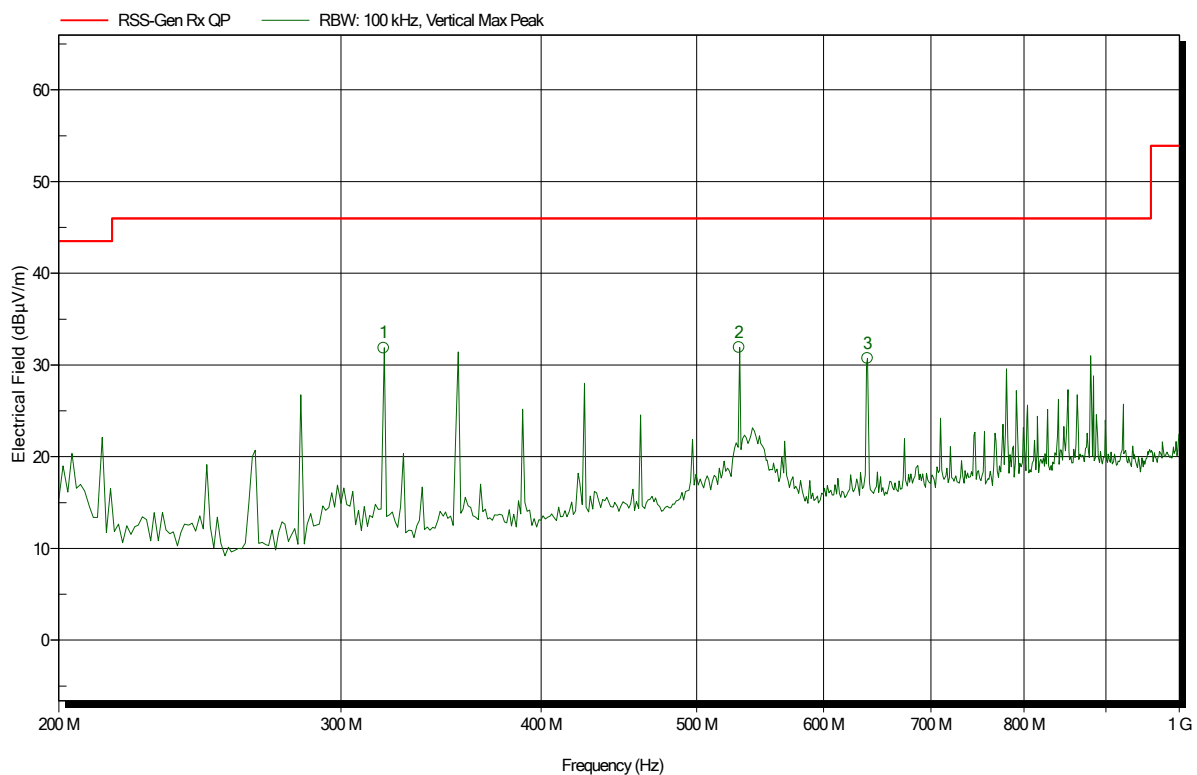
Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
319.04 MHz	35.38 dBµV/m	46 dBµV/m	-10.62 dB	Pass	112 Degree	1.2 m
637.76 MHz	38.76 dBµV/m	46 dBµV/m	-7.24 dB	Pass	247 Degree	1.2 m

Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: RX; 2440 MHz
 Test Date: 2019-06-17
 Note:

Index 4



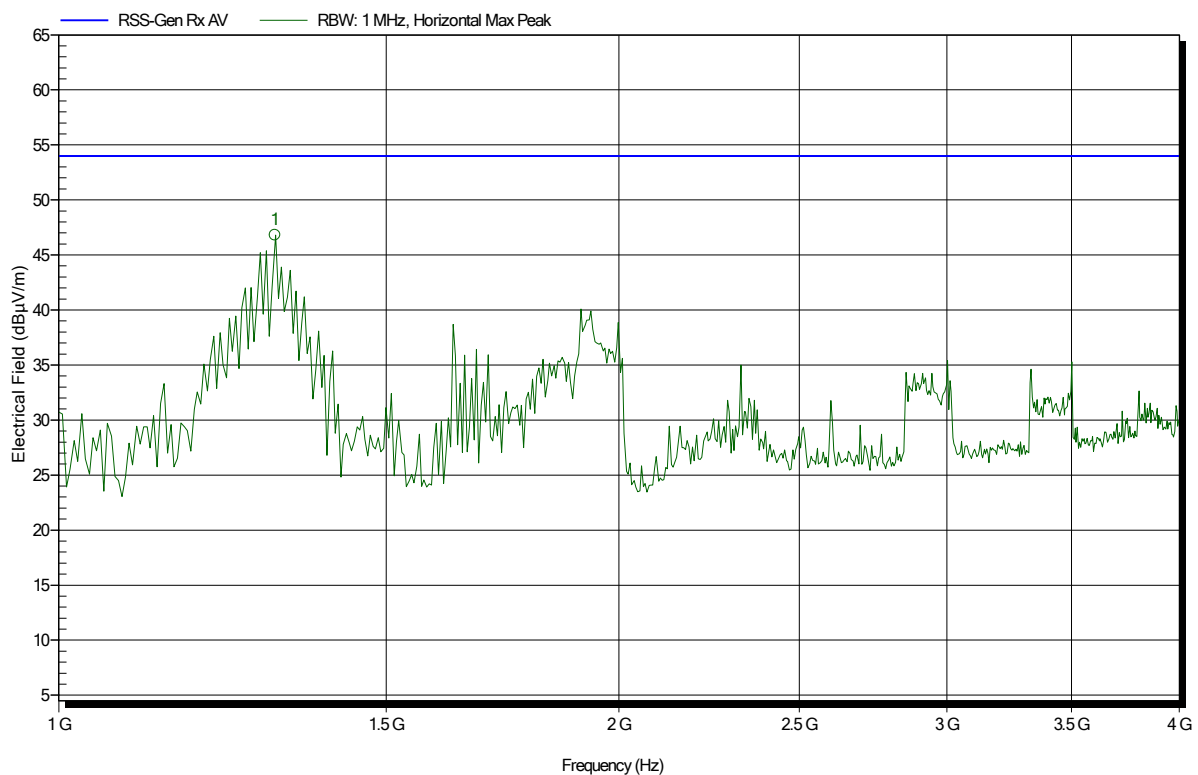
Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
319.04 MHz	31.86 dBμV/m	46 dBμV/m	-14.14 dB	Pass	112 Degree	1.2 m
531.52 MHz	31.91 dBμV/m	46 dBμV/m	-14.09 dB	Pass	337 Degree	1.2 m
639.04 MHz	30.72 dBμV/m	46 dBμV/m	-15.28 dB	Pass	247 Degree	1.2 m

Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m
 Mode: RX; 2440 MHz
 Test Date: 2019-06-17
 Note:

Index 5



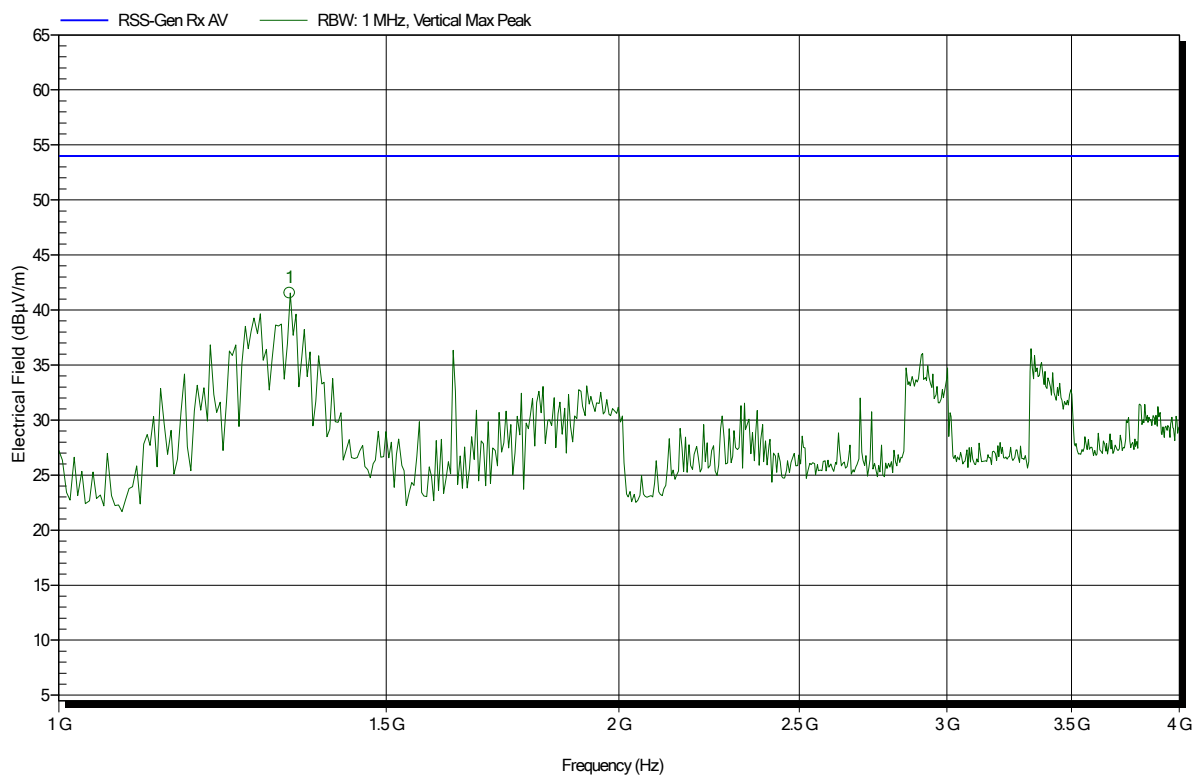
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.307 GHz	46.81 dBµV/m	53.98 dBµV/m	-7.17 dB	Pass

Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m
Mode: RX; 2440 MHz
Test Date: 2019-06-17
Note:

Index 12



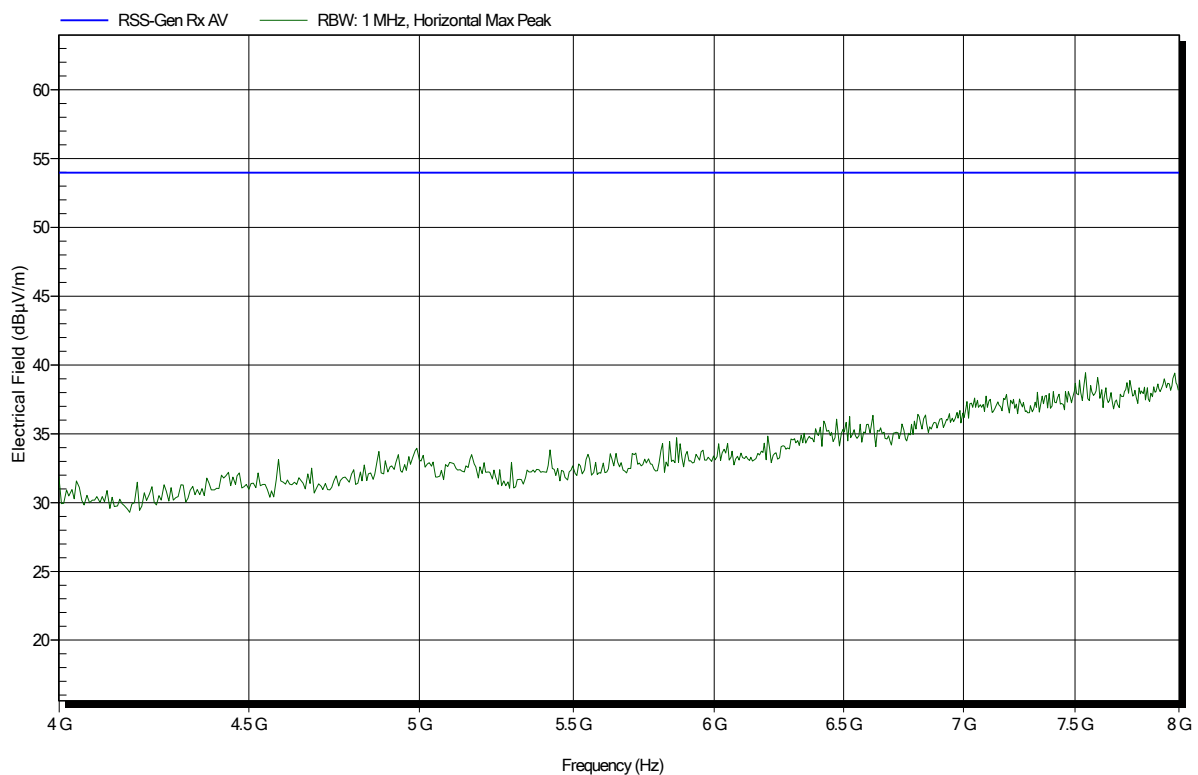
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.331 GHz	41.54 dBµV/m	53.98 dBµV/m	-12.44 dB	Pass

Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m
 Mode: RX; 2440 MHz
 Test Date: 2019-06-17
 Note:

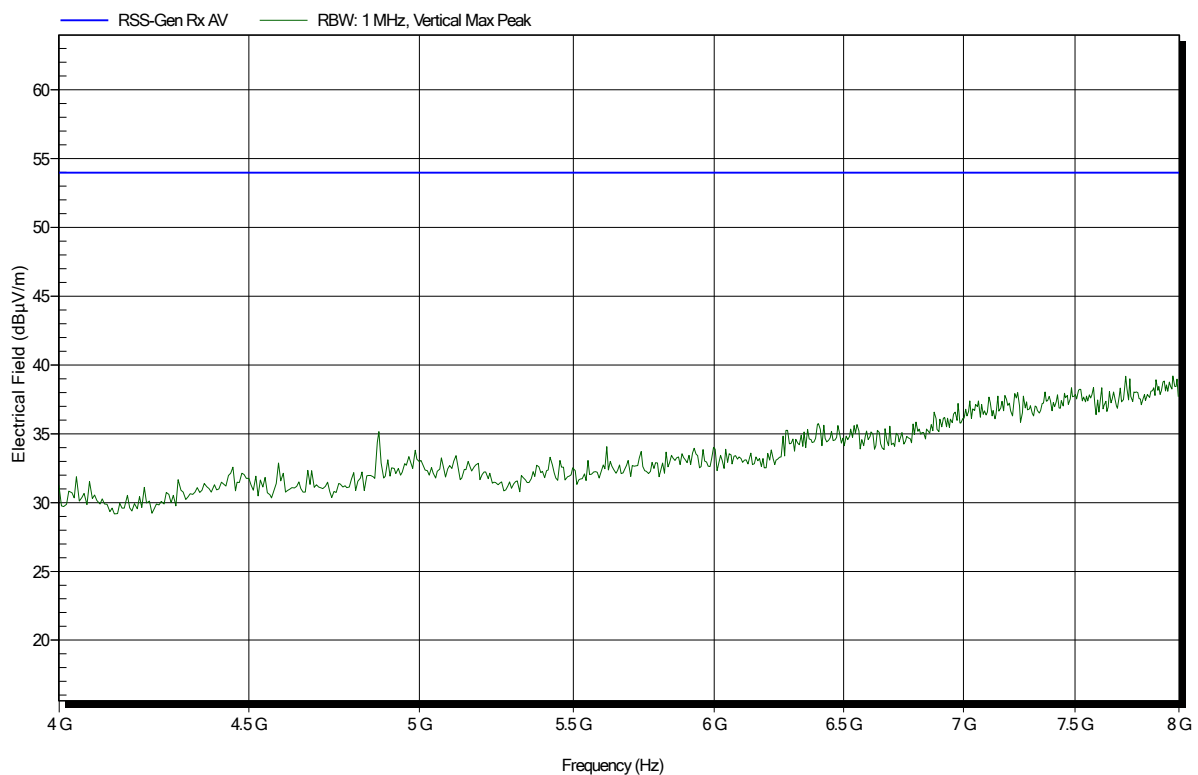
Index 6



Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256
 Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m
 Mode: RX; 2440 MHz
 Test Date: 2019-06-17
 Note:

Index 11

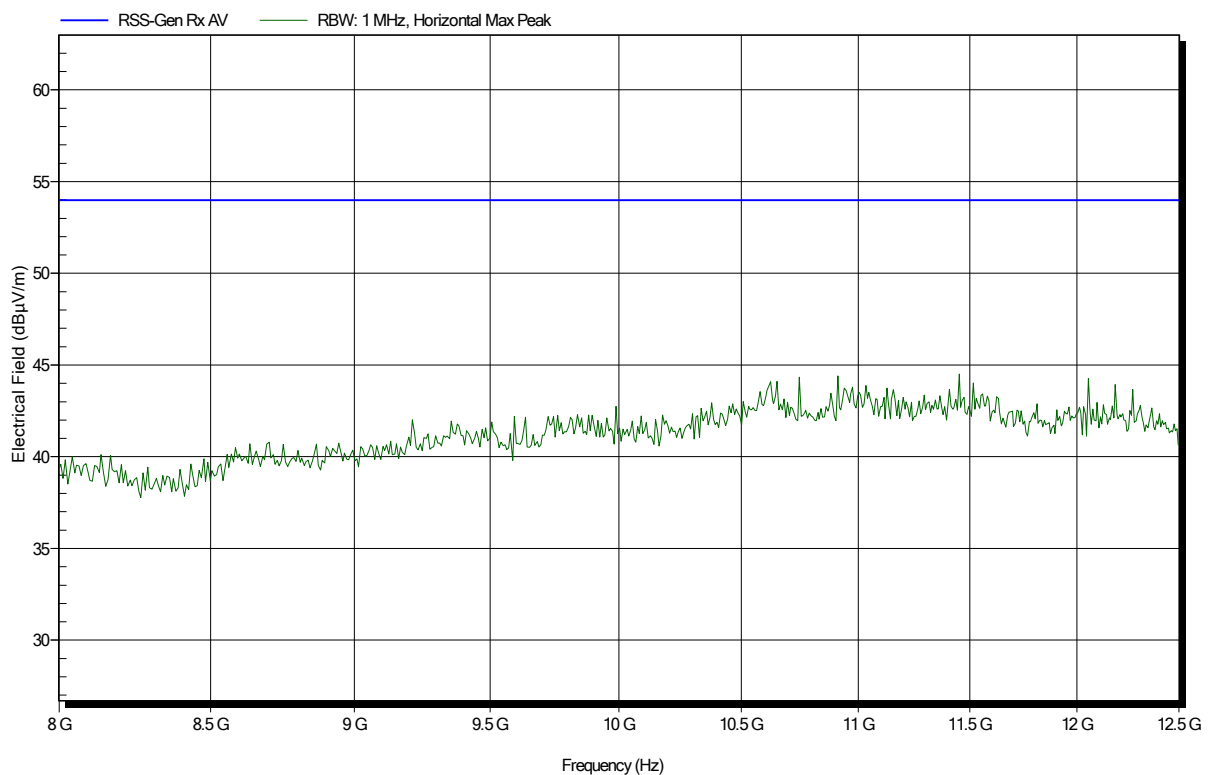


Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
EUT Name: Renamic Neo Programming Device
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Abdullah Al Jamal
Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 1 m converted to 3m
Mode: RX; 2440 MHz
Test Date: 2019-06-17
Note:

Index 7

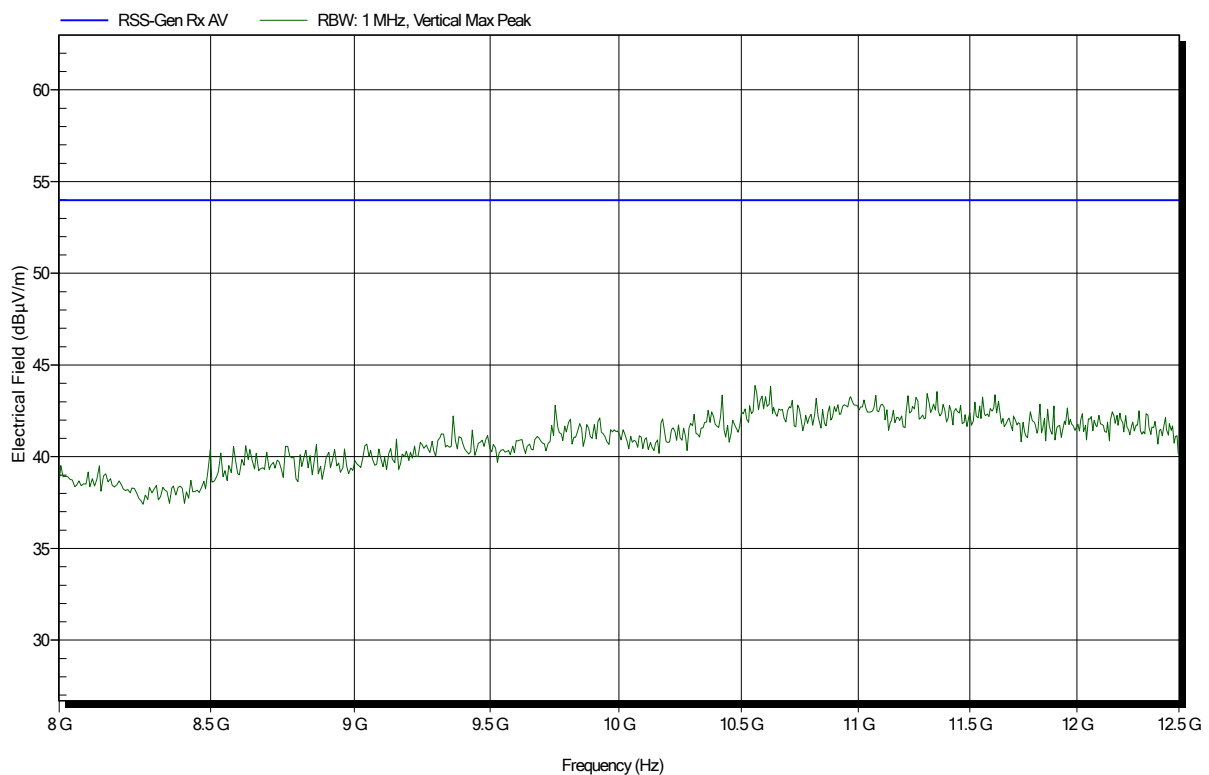


Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: RX; 2440 MHz
 Test Date: 2019-06-17
 Note:

Index 10

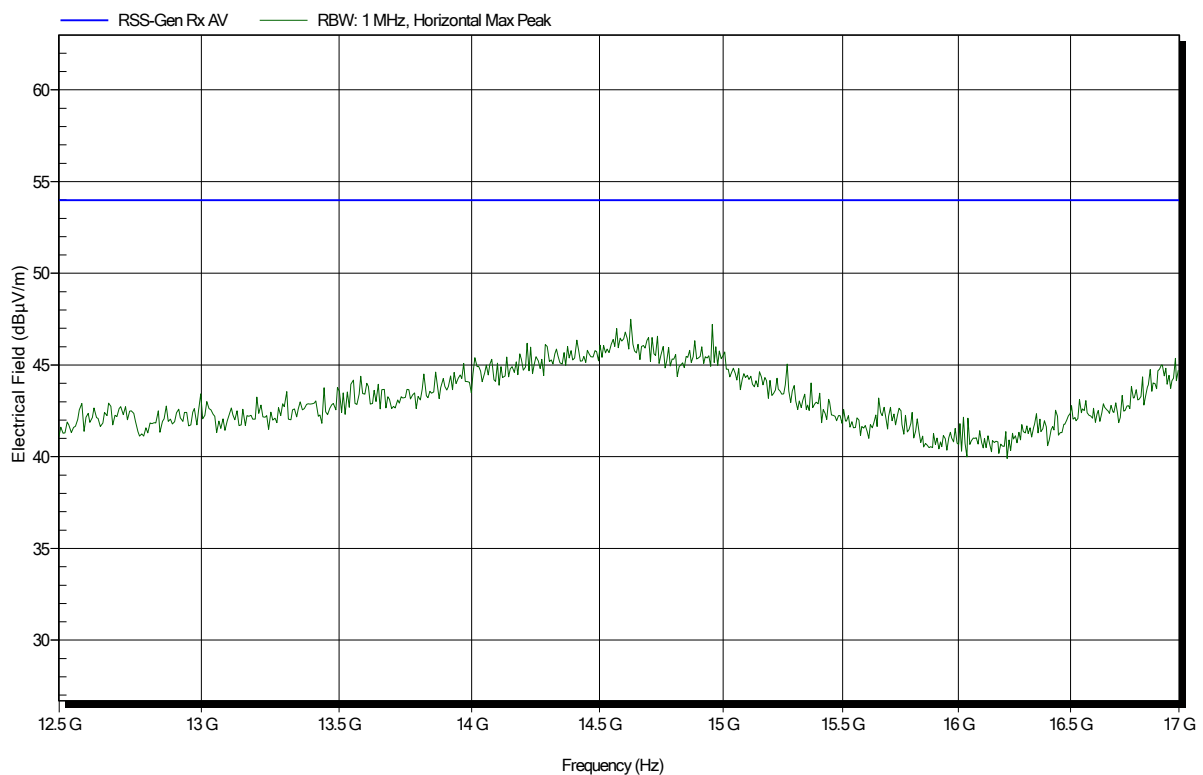


Spurious emissions according to ISED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG
 EUT Name: Renamic Neo Programming Device
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Abdullah Al Jamal
 Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)
 Antenna: Schwarzbek BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: RX; 2440 MHz
 Test Date: 2019-06-17
 Note:

Index 8



Spurious emissions according to ISCED RSS-247 Issue 2 (February 2017)

Project number: G0M-1905-8256

Applicant: BIOTRONIK SE & Co. KG

EUT Name: Renamic Neo Programming Device

Model: Renamic Neo

Test Site: Eurofins Product Service GmbH

Operator: Abdullah Al Jamal

Test Conditions: Tnom: 25.6°C, Vnom: 120 VAC (external power supply)

Antenna: Schwarzbeck BBHA 9120D, Vertical

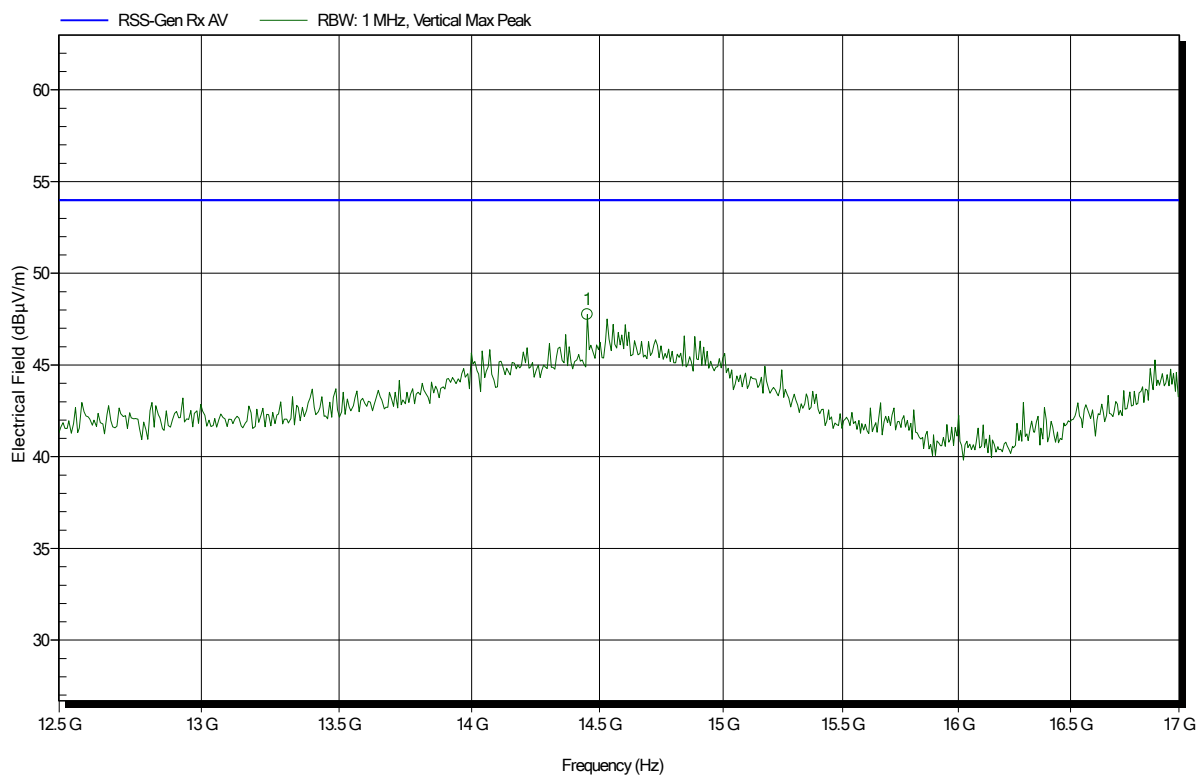
Measurement distance: 1 m converted to 3m

Mode: RX; 2440 MHz

Test Date: 2019-06-17

Note:

Index 9



Frequency	Peak	Peak Limit	Peak Difference	Status
14.451 GHz	47.75 dBµV/m	53.98 dBµV/m	-6.23 dB	Pass