

RADIO REPORT FCC 47 CFR Part 95I Medical Device Radiocommunication Service (MedRadio) ISED RSS-243 Medical Devices Operating in the 401 – 406 MHz Frequency Band	
Report Reference No	G0M-1905-8256-TFC95IMR-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 95I RSS-243, Issue 3, 2010-02 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)	ULP_LOW_RIO_0_13
FCC-ID	QRI-RENAMICNEO
IC	4708A-RENAMICNEO
Test Result	PASSED

Test Report No.: G0M-1905-8256-TFC95IMR-V01

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

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	Wilfried Treffke	
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke	
Approved by (+ signature) (Head of Lab)	Christian Weber	
Date of Issue	2019-12-17	
Total number of pages	114	
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 test sample includes two identical ULP-AMI-P/MICS telemetry 402-405MHz RF-components where each is connected to a dedicated antenna. The full test for all conducted and monitoring tests are carried out on antenna port 2, partial tests were carried out on the antenna port 1. Radiated spurious emission tests are measured at both RF-modules got alternated switched on and off.		

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

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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)	80001071	
Hardware Version(s)	A.x	
Software Version(s)	ULP_LOW_RIO_0_13	
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	402 - 405 MHz	
Radio technology	MedRadio (MICS) programmer / control transmitter	
Modulation	FSK	
Emission designator	F1D	
Number of channels	9	
Channel spacing	300 kHz	
Spectrum access	LBT/AFA	
Number of antenna ports	2	
Antenna 1	Type	Integrated
	Model	LP11
	Manufacturer	BIOTRONIK SE & Co KG
	Gain	0.34 dBi (by antenna pattern measurement)
Antenna 2	Type	Integrated
	Model	LP12
	Manufacturer	BIOTRONIK SE & Co KG
	Gain	0.85 dBi (by antenna pattern measurement)
Supply Voltage	V _{NOM}	120 VAC
	V _{MIN}	102 VAC
	V _{MAX}	183 VAC
Operating Temperature	T _{NOM}	20 °C
	T _{MIN}	0 °C
	T _{MAX}	55 °C
AC/DC-Adaptor	Model	ATM090T-P190
	Vendor	Adapter Tech
	Input	100 VAC – 240 VAC
	Output	19 VDC
Manufacturer	BIOTRONIK SE & Co. KG Woermannkehre 1 12359 Berlin GERMANY	

1.5 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	400 MHz Implant Simulator	BIOTRONIK SE & Co KG	Engenieering tool/implant	ULPAMI - companion device
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.6 Test mode duty cycle

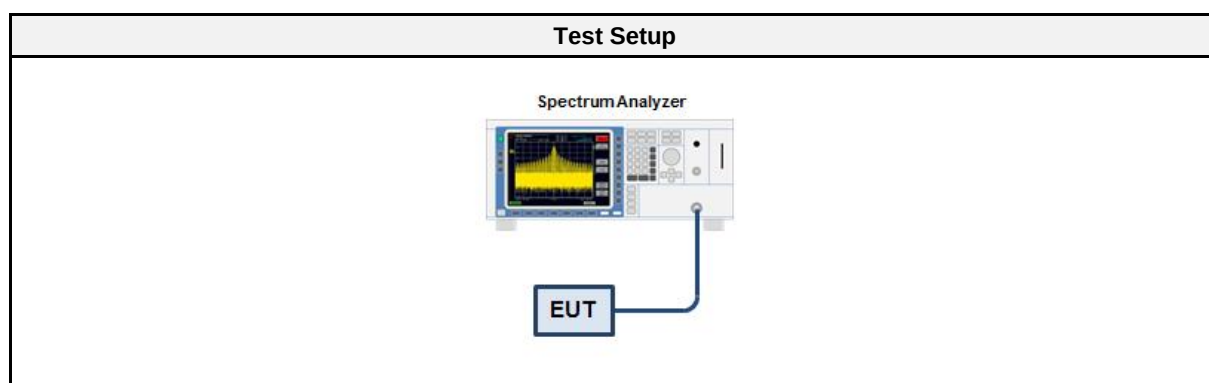
1.6.1 Information

Test Information	
Measurement Method	ANSI C63.10 11.6

1.6.2 Requirements

Requirements	
Duty cycle	Duty cycle correction
$\geq 98 \%$	No correction required
$< 98 \%$	Correction required ($10 \times \log_{10}(1/DC)$)

1.6.3 Setup



1.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

1.6.5 Procedure

Test Procedure
- EUT set to test mode - Span is set to zero span - Detector set to peak - Sweep time is set long enough to capture at least 5 bursts - Envelope peak value of emission spectrum is selected - The maximum burst duration T_{ON} is measured using two markers set to the start and the end of the longest burst - The minimum idle duration T_{OFF} is measured using two markers set to the start and the end of the shortest idle period - The duty cycle is calculated by $DC = T_{ON} / (T_{ON} + T_{OFF})$ - The duty cycle correction is calculated by $DC = 10 \times \log_{10}(T_{ON} / (T_{ON} + T_{OFF}))$

1.6.6 Results

Duty Cycle Results		
Mode	Duty Cycle	Correction Factor [dB]
Modulated 1	100 %	0
Modulated 1	99 %	0

1.7 Test Modes

Mode	Description
Unmodulated	Mode = Transmit Modulation = None
Modulated 1	Mode = Transmit Modulation = 2-FSK Power level = maximum Antenna 2
Modulated 2	Mode = Transmit Modulation = 2-FSK Power level = maximum Antenna 1 and antenna 2 (alternated)
Receive	Mode = Receive Modulation = 2-FSK
Normal	Mode = Regular data connection to companion device
Comment:	

1.8 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	8	402.45
F2	Tx / Rx	0	403.65
F3	Tx / Rx	7	404.85
F4	Tx / Rx	4	403.35

1.9 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 95I, 15C, ISED RSS-243, ISED RSS-Gen				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
ISED RSS-243 3.2 ISED RSS-Gen 6.7	Occupied Bandwidth	ANSI C63.10 6.9.3	N/R	Informational only
FCC 95.2573(a) ISED RSS-243 3.6	Emission Bandwidth	ANSI C63.10 6.9.2 ETSI EN 301 839 5.3.2	PASS	
FCC 95.2565 ISED RSS-243 3.3, 5.3	Frequency stability	ETSI EN 301 839 5.3.1	PASS	
FCC 95.2567(a), 95.2569 ISED RSS-243 5.4	Transmitter output power	ETSI EN 301 839 5.3.3	PASS	
FCC 95.2579 ISED RSS-243 3.4, 5.5	Band edge compliance	ANSI C63.10 6.10	PASS	
FCC 95.2579 ISED RSS-243 3.4, 5.5	Transmitter unwanted emissions	ANSI C63.10 6.10	PASS	
ISED RSS-243 3.5, 5.6 ISED RSS-Gen 7.3	Receiver spurious emissions	ANSI C63.10 6.10	PASS	
FCC 15.207 ISED RSS-Gen 7.2, 8.8	AC power line conducted emissions	ANSI C63.10 6.2	PASS	
FCC 95.2559(a)(3),(a)(4) ISED RSS-243 3.6, 5.7.1	System threshold power levels	ETSI EN 301 839 5.3.7.1.3	PASS	
FCC 95.2559(a)(1) ISED RSS-243 3.6, 5.7.2	Monitoring system bandwidth	ETSI EN 301 839 5.3.7.1.4	PASS	
FCC 95.2559(a)(2) ISED RSS-243 3.6, 5.7.3	Scan cycle time	ETSI EN 301 839 5.3.7.1.5	PASS	
FCC 95.2559(a)(2) ISED RSS-243 3.6, 5.7.4	Minimum channel monitoring period	ETSI EN 301 839 5.3.7.1.5	PASS	
FCC 95.2559(a)(5) ISED RSS-243 3.6, 5.7.5	Channel Access	ETSI EN 301 839 5.3.7.1.6	PASS	
FCC 95.2559(a)(5) ISED RSS-243 3.6, 5.7.6	Discontinuation of MICS of MEDS session	ETSI EN 301 839 5.3.7.1.7	PASS	
FCC 95.2559(a)(6) ISED RSS-243 3.6, 5.7.7	Use of the pre-scanned alternate channel	ETSI EN 301 839 5.3.7.1.8	N/A	
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

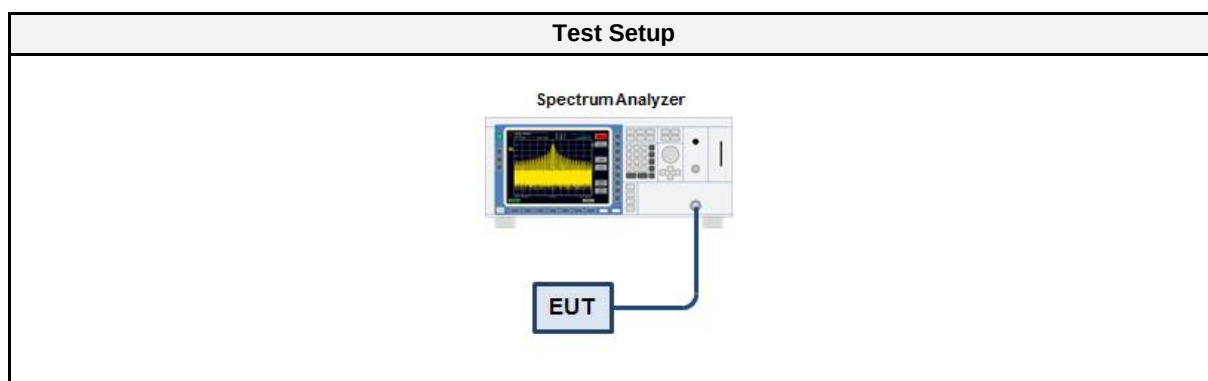
3.1.1 Information

Test Information	
Reference	ISED RSS-243 3.2, RSS-Gen 6.6
Measurement Method	ANSI C63.10 6.9.3
Operator	Wilfried Treffke
Date	2019-06-04

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	FSU 26	EF01407	2018-12	2019-12

3.1.5 Procedure

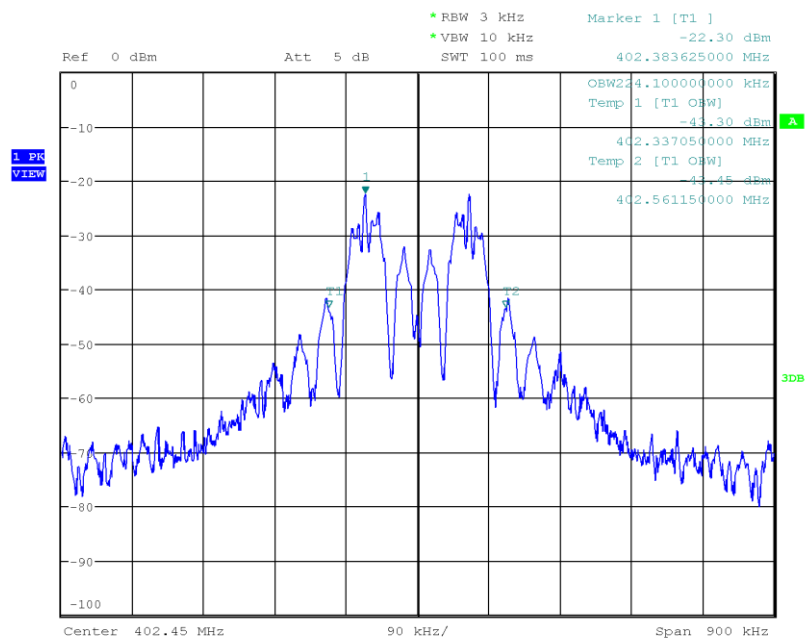
Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set 1 % to 5 % of the bandwidth 4. The occupied bandwidth (99%) is measured with the build-in analyzer function

3.1.6 Results

Test Results		
Mode	Channel [MHz]	Bandwidth [MHz]
Modulated 1 (32 kbps)	402.45	224.100
Modulated 1 (32 kbps)	403.65	227.925
Modulated 1 (32 kbps)	404.85	226.575
Modulated 1 (64 kbps)	402.45	296.100
Modulated 1 (64 kbps)	403.65	286.875
Modulated 1 (64 kbps)	404.85	289.800
Modulated 1 (164 kbps)	402.45	199.575
Modulated 1 (164 kbps)	403.65	198.450
Modulated 1 (164 kbps)	404.85	200.475
Modulated 1 (197 kbps)	402.45	229.500
Modulated 1 (197 kbps)	403.65	228.825
Modulated 1 (197 kbps)	404.85	229.950

Occupied Bandwidth RSS-243

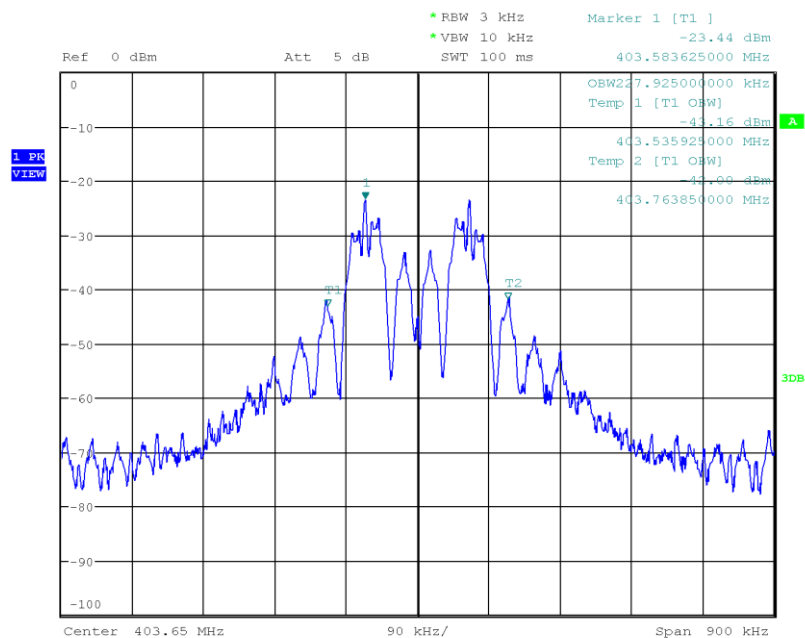
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 32 kbps, Channel: 8, 402.45 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 224.100



Date: 4.JUN.2019 06:12:37

Occupied Bandwidth RSS-243

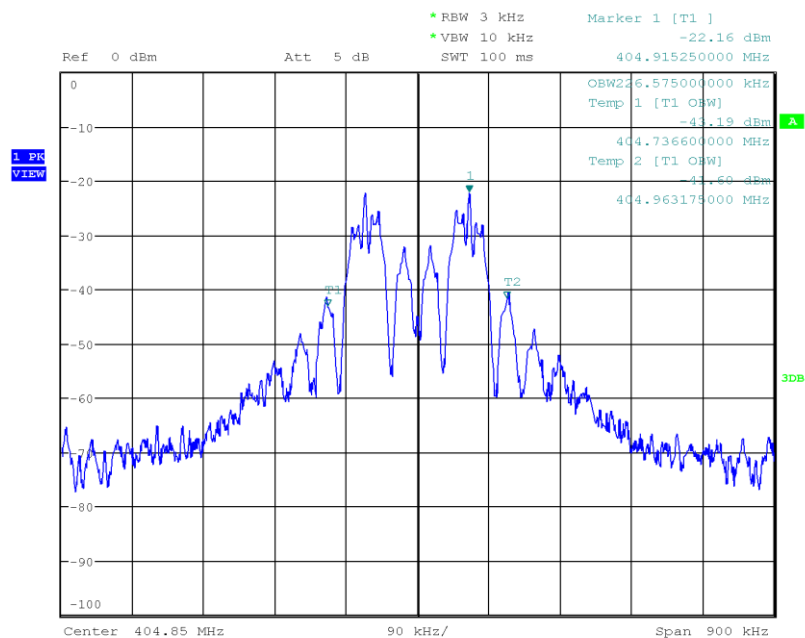
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 32 kbps, Channel: 0, 403.65 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 227.925



Date: 4.JUN.2019 05:45:20

Occupied Bandwidth RSS-243

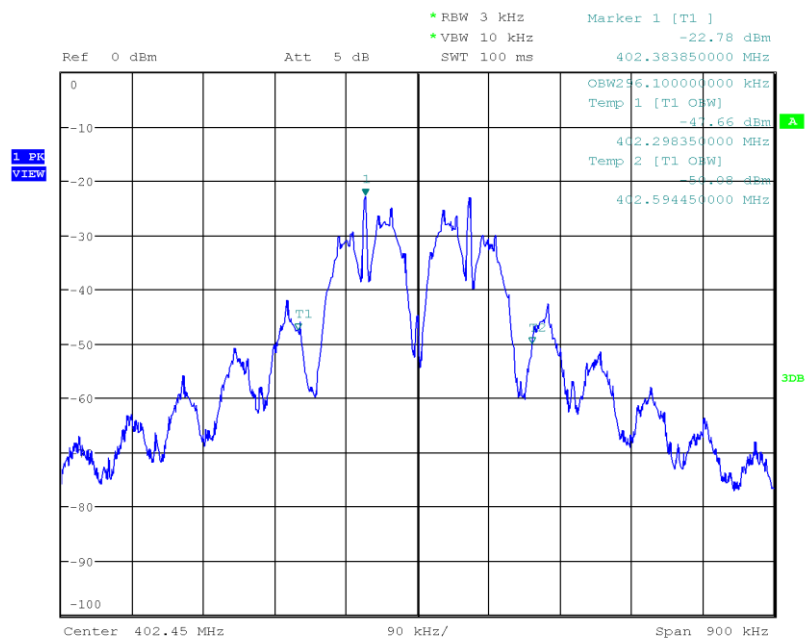
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 32 kbps, Channel: 7, 404.85 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 226.575



Date: 4.JUN.2019 06:40:34

Occupied Bandwidth RSS-243

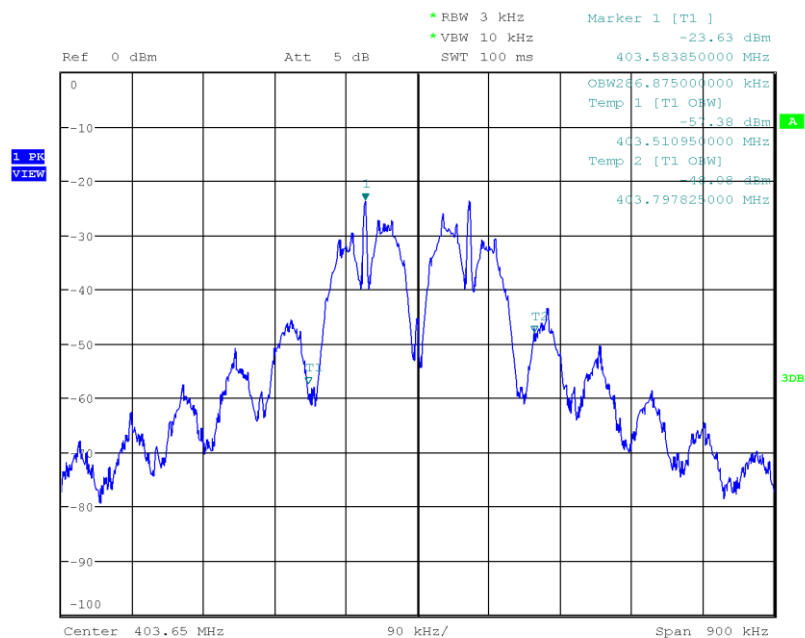
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 64 kbps, Channel: 8, 402.45 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 296.100



Date: 4.JUN.2019 06:14:54

Occupied Bandwidth RSS-243

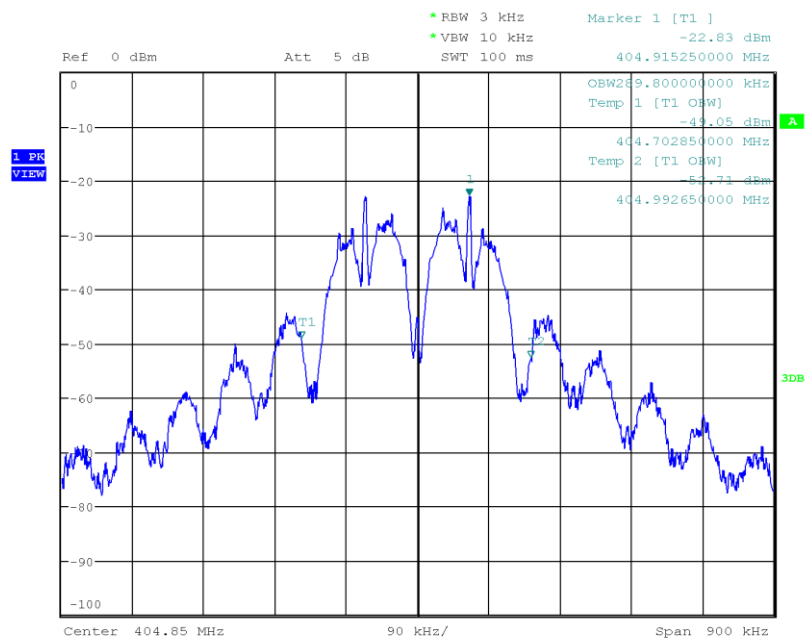
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 64 kbps, Channel: 0, 403.65 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 286.875



Date: 4.JUN.2019 06:07:45

Occupied Bandwidth RSS-243

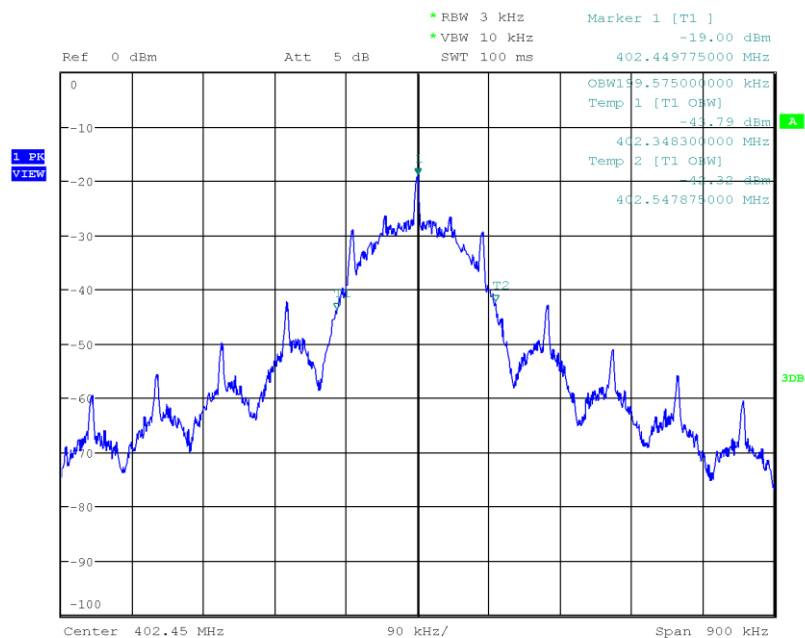
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 64 kbps, Channel: 7, 404.85 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 289.800



Date: 4.JUN.2019 06:42:07

Occupied Bandwidth RSS-243

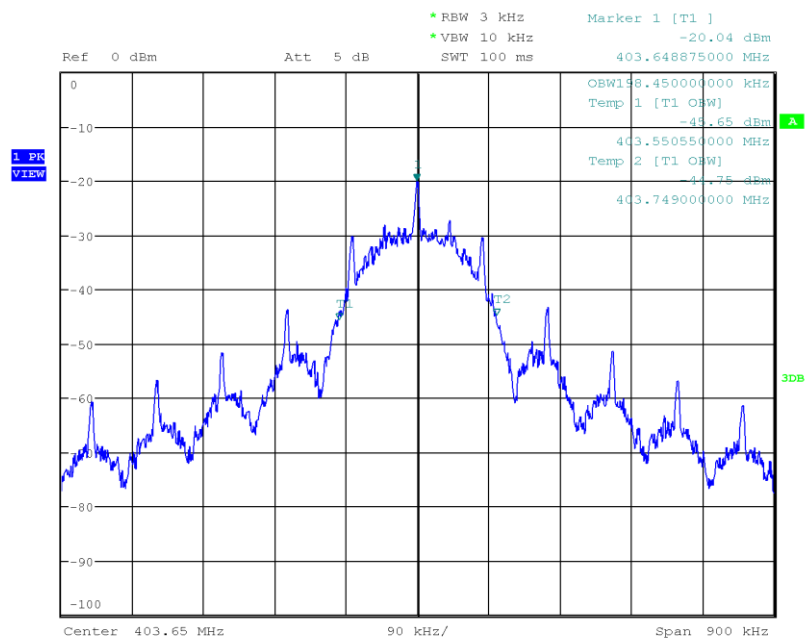
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 164kbps, Channel: 8, 402.45 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 199.575



Date: 4.JUN.2019 06:18:37

Occupied Bandwidth RSS-243

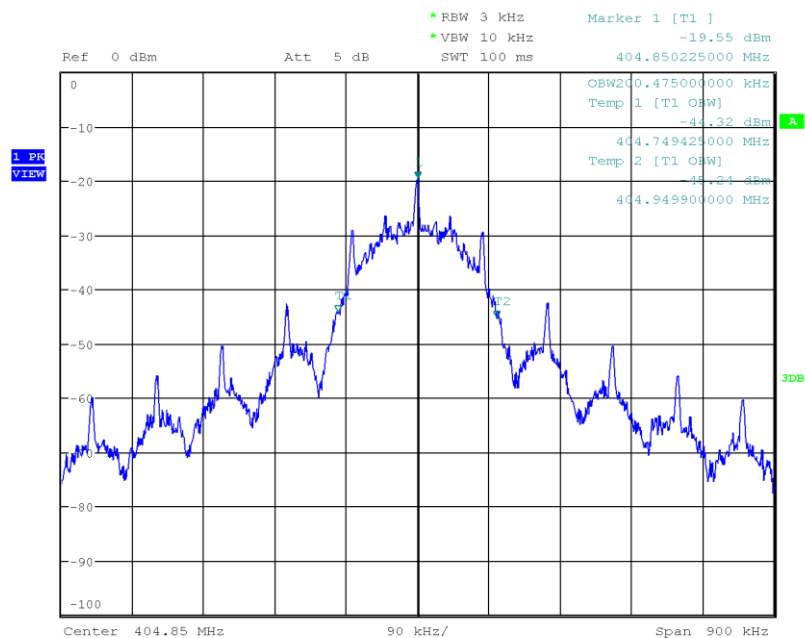
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 164kbps, Channel: 0, 403.65 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 198.450



Date: 4.JUN.2019 06:10:50

Occupied Bandwidth RSS-243

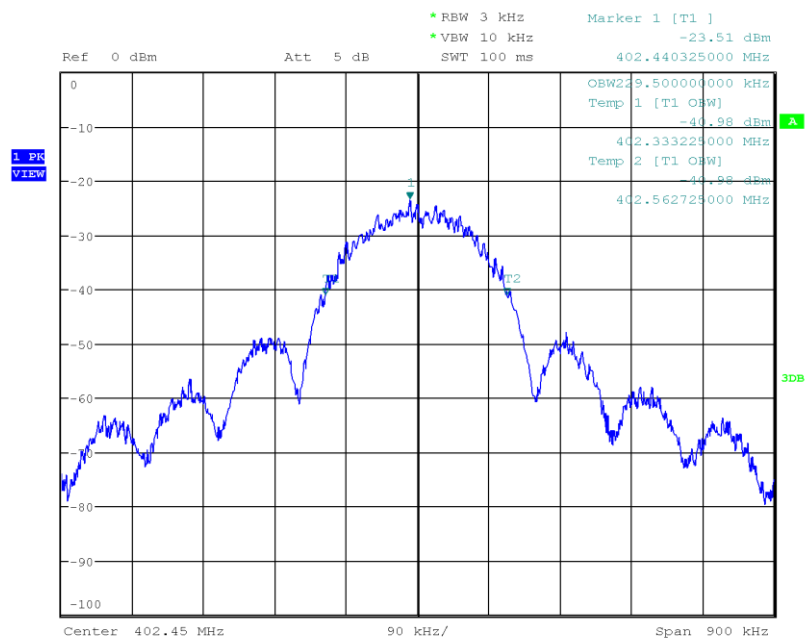
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 164kbps, Channel: 7, 404.85 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 200.475



Date: 4.JUN.2019 06:44:10

Occupied Bandwidth RSS-243

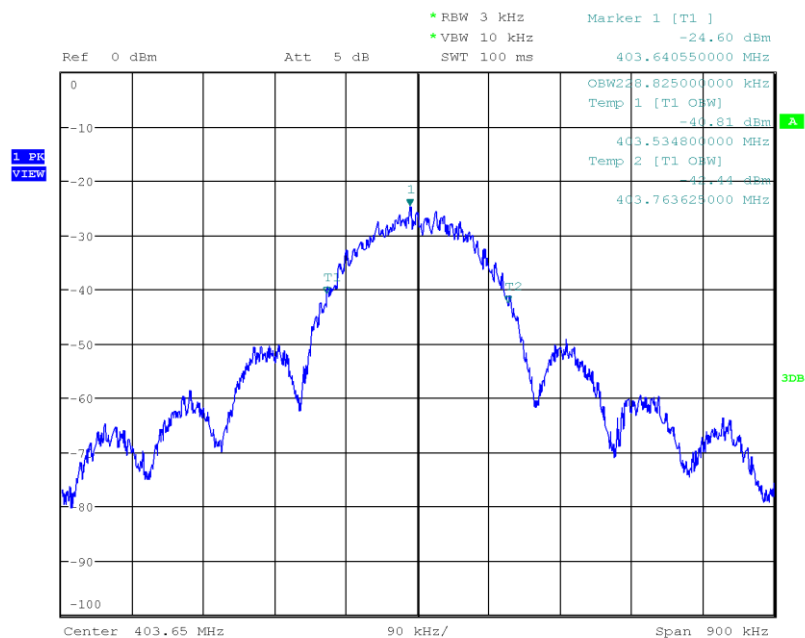
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 197kbps, Channel: 8, 402.45 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 229.500



Date: 4.JUN.2019 06:21:32

Occupied Bandwidth RSS-243

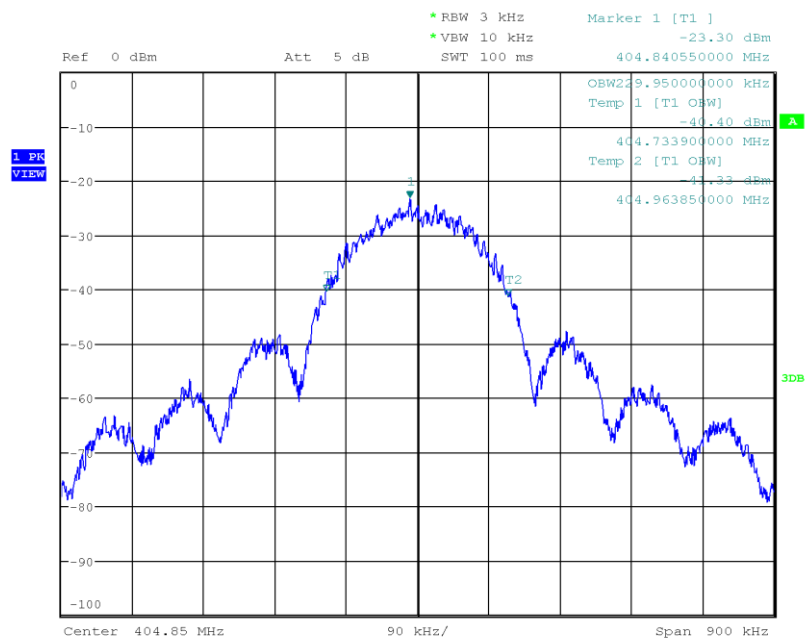
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 197kbps, Channel: 0, 403.65 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 228.825



Date: 4.JUN.2019 05:13:48

Occupied Bandwidth RSS-243

Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Method: RSS-Gen Issue 4 6.6 (Occupied Bandwidth)
 Operational Mode: 2FSK, 197kbps, Channel: 7, 404.85 MHz
 Operating Conditions: Tnom / Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Occupied Bandwidth [kHz]: 229.950



Date: 4.JUN.2019 06:46:01

3.2 Test Conditions and Results - Emission bandwidth

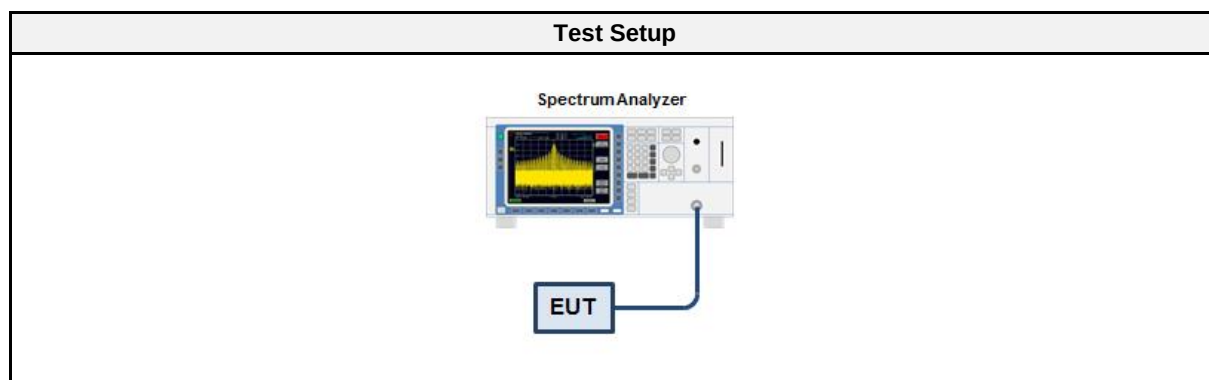
3.2.1 Information

Test Information	
Reference	FCC 95.2573(a) ISED RSS-243 3.6
Measurement Method	ANSI C63.10 6.9.2 ETSI EN 301 839 5.3.2
Operator	Wilfried Treffke
Date	2019-06-04

3.2.2 Limits

Limits
≤ 300 kHz

3.2.3 Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

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 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -20 dB to the left of the peak 6. Marker on envelope of spectrum is set to level of -20 dB to the right of the peak 7. 20dB Bandwidth is determined by marker frequency separation

3.2.6 Results

Test Results		
Mode	Channel [MHz]	Bandwidth [MHz]
Modulated 1 (64 kbps)	402.45	281.025
Modulated 1 (64 kbps)	403.65	231.975
Modulated 1 (64 kbps)	404.85	280.575

20 dB Bandwidth FCC

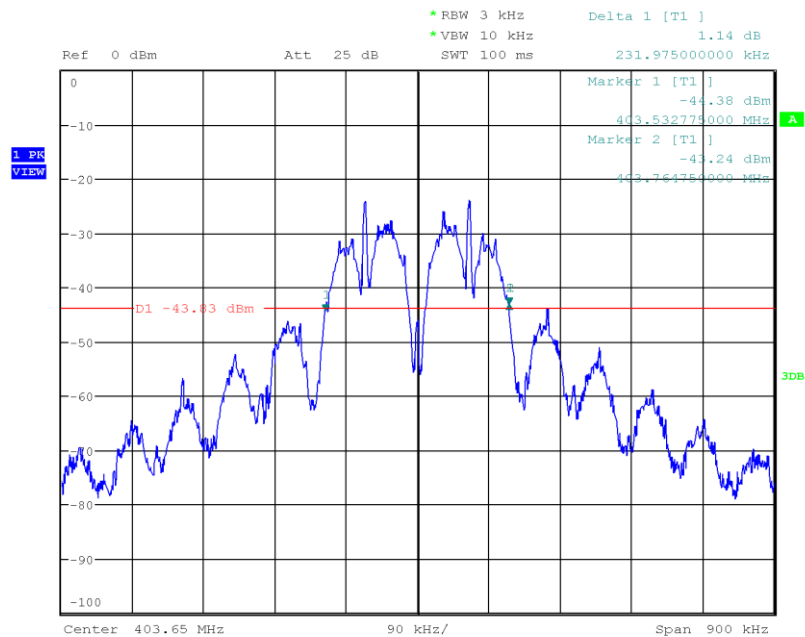
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Standards: FCC 95.627
 Reference Method: 47 CFR § 95.627(a)(6)(i)
 Operational Mode: 2FSK, 64 kbps, Channel: 8, 402.45 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Lower Frequency [MHz]: 402.285
 Upper Frequency [MHz]: 402.566
 20 dB Bandwidth [kHz]: 281.025



Date: 4.JUN.2019 09:13:30

20 dB Bandwidth FCC

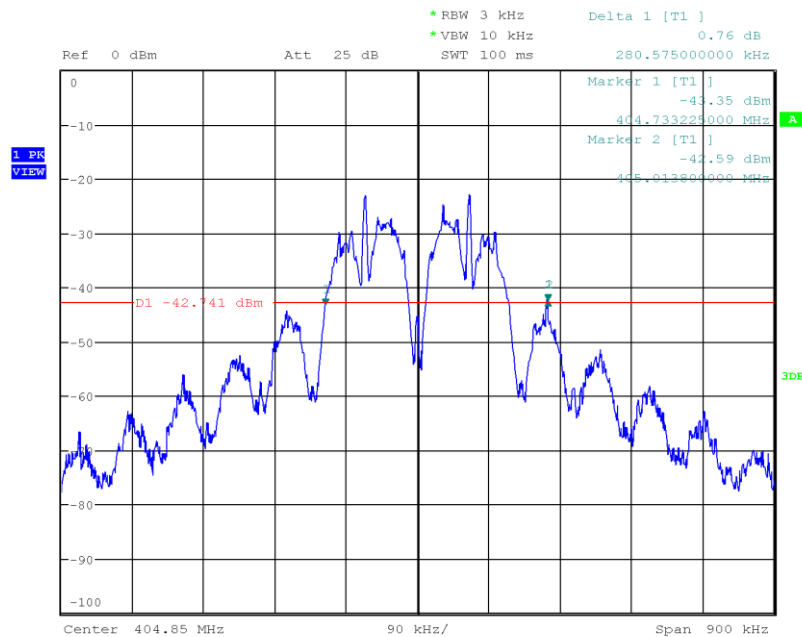
Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Standards: FCC 95.627
 Reference Method: 47 CFR § 95.627(a)(6)(i)
 Operational Mode: 2FSK, 64 kbps, Channel: 0, 403.65 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Lower Frequency [MHz]: 403.533
 Upper Frequency [MHz]: 403.765
 20 dB Bandwidth [kHz]: 231.975



Date: 4.JUN.2019 09:18:35

20 dB Bandwidth FCC

Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Reference Standards: FCC 95.627
 Reference Method: 47 CFR § 95.627(a)(6)(i)
 Operational Mode: 2FSK, 64 kbps, Channel: 7, 404.85 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-04
 Lower Frequency [MHz]: 404.733
 Upper Frequency [MHz]: 405.014
 20 dB Bandwidth [kHz]: 280.575



Date: 4.JUN.2019 09:21:15

3.3 Test Conditions and Results - Frequency stability

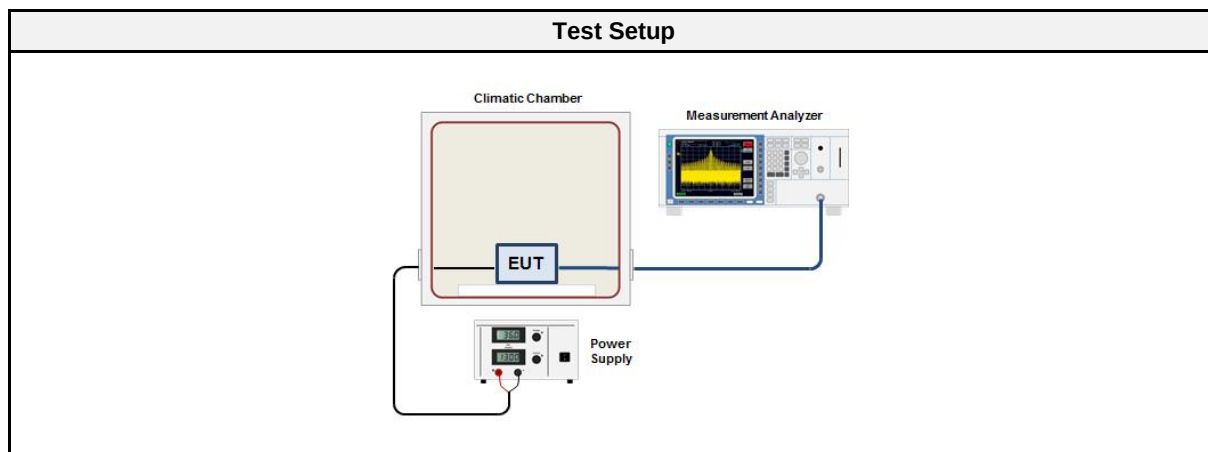
3.3.1 Information

Test Information	
Reference	FCC 95.2565 ISED RSS-243 3.3, 5.3
Measurement Method	ETSI EN 301 839 5.3.1
Operator	Wilfried Treffke
Date	2019-06-05

3.3.2 Limits

Limits
$\leq \pm 100$ ppm

3.3.3 Setup



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.3.5 Procedure

Test Procedure
1. EUT set to test mode with supply voltage and temperature set to nominal conditions 2. EUT transmits without modulation 3. Detector set to peak and max hold 4. Peak of emission is measured using a frequency counter 5. The frequency error is determined as the deviation of the emission frequency from the nominal frequency stated by the customer.

3.3.6 Results

Test Results				
Channel [MHz]	Temperature [°C]	Supply voltage [VDC]	Frequency [MHz]	Drift [ppm]
402.45	0	120	402.450308	00.77
402.45	10	120	402.450347	00.86
402.45	20	120	402.449524	-01.18
402.45	30	120	402.449614	-00.96
402.45	40	120	402.449220	-01.94
402.45	50	120	402.449072	-02.31
402.45	55	120	402.449147	-02.12
403.65	0	120	403.650393	00.97
403.65	10	120	403.650421	01.04
403.65	20	120	403.649688	-00.77
403.65	30	120	403.649659	-00.84
403.65	40	120	403.649289	-01.76
403.65	50	120	403.649155	-02.09
403.65	55	120	403.649248	-01.86
404.85	0	120	404.850479	01.18
404.85	10	120	404.850505	01.25
404.85	20	120	404.849600	-00.99
404.85	30	120	404.849729	-00.67
404.85	40	120	404.849366	-01.57
404.85	50	120	404.849235	-01.89
404.85	55	120	404.849345	-01.62

3.4 Test Conditions and Results - Transmitter output power

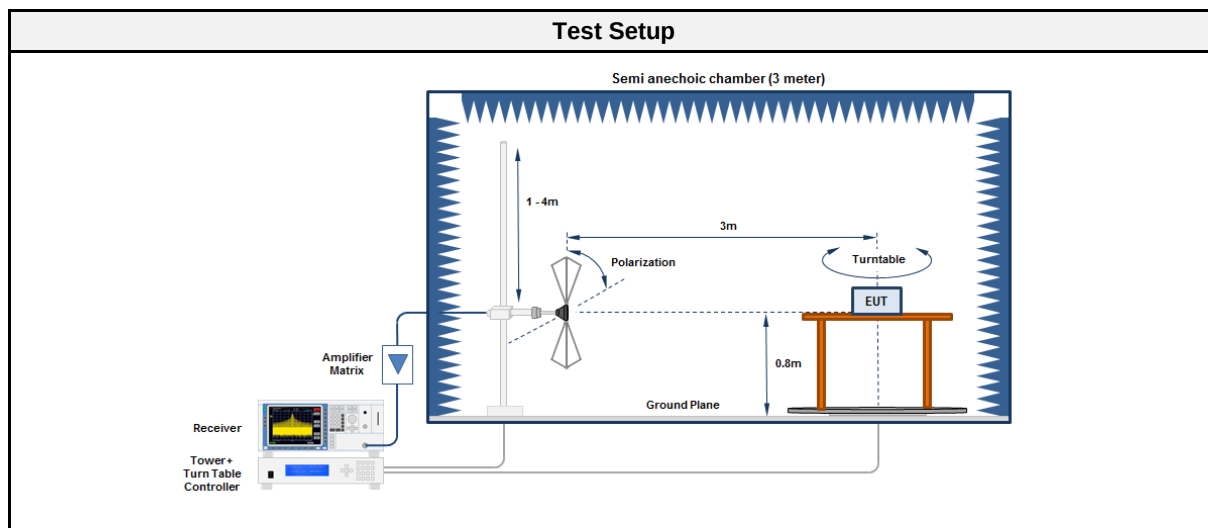
3.4.1 Information

Test Information	
Reference	FCC 95.2567(a), 95.2569 ISED RSS-243 5.4
Measurement Method	EN 301 839 5.3.3
Operator	Wilfried Treffke
Date	2019-06-03

3.4.2 Limits

Limits
$\leq 25 \mu\text{W}$ (-16 dBm) e.i.r.p.

3.4.3 Setup



3.4.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

3.4.5 Procedure

Test Procedure
1. EUT set to test frequency with modulation 2. Measurement polarization is set to vertical 3. Span it set according to measurement range and detector is set to peak and max hold 4. Resolution bandwidth is set to be at least twice the emission bandwidth 5. During the sweep the EUT is rotated to obtain maximum emission level 6. Measurement is repeated with horizontal measurement polarization

3.4.6 Results

Test Results – antenna 1				
Channel [MHz]	Emission Level [dBm e.i.r.p.]	Detector	Limit [dBm e.i.r.p.]	Margin [dB]
402.45	-17.0	pk	-16	-01.00
403.65	-17.4	pk	-16	-01.40
404.85	-17.6	pk	-16	-01.60

Test Results – antenna 2				
Channel [MHz]	Emission Level [dBm e.i.r.p.]	Detector	Limit [dBm e.i.r.p.]	Margin [dB]
402.45	-16.4	pk	-16	-00.40
403.65	-17.1	pk	-16	-01.10
404.85	-16.2	pk	-16	-00.20

3.5 Test Conditions and Results - Band-edge and In-band Emissions

3.5.1 Information

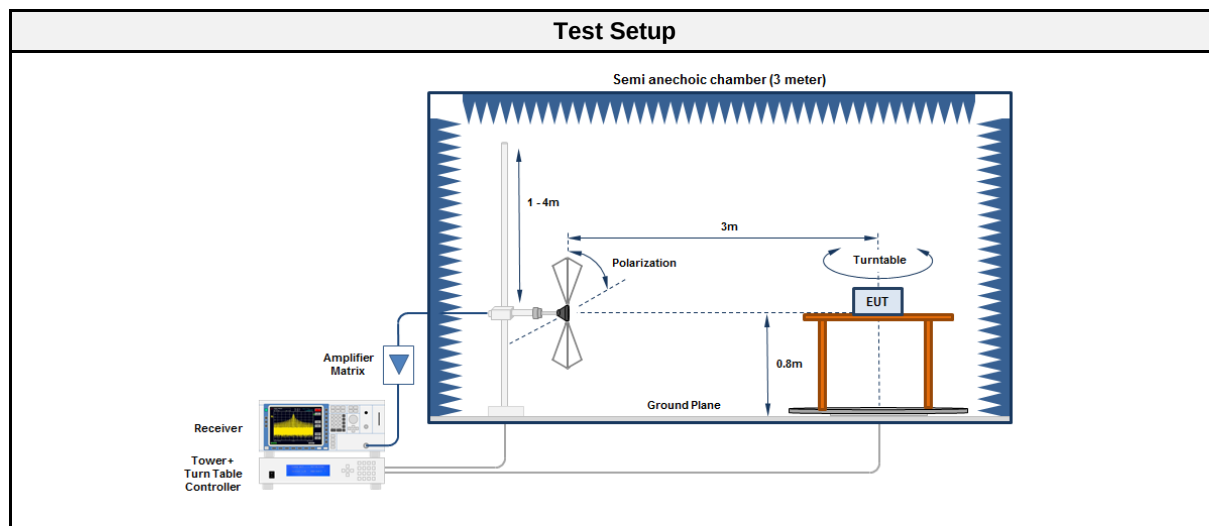
Test Information	
Reference	FCC 95.2579 ISED RSS-243 3.4, 5.5
Measurement Method	ANSI C63.10 6.10
Operator	Wilfried Treffke
Date	2019-06-21

3.5.2 Limits

Limits FCC	
Frequency range	Limit
402 MHz – 250 kHz $\leq f \leq$ 402 MHz	20 dB below maximum permitted output power
402 MHz < $f <$ 150 kHz - f_c	20 dB below transmitter output power
150 kHz + $f_c < f <$ 405 MHz	20 dB below transmitter output power
405 MHz $\leq f \leq$ 405 MHz + 250 kHz	20 dB below maximum permitted output power
Limits ISED	
Frequency range	Limit
402 MHz – 250 kHz < $f <$ 150 kHz- f_c	20 dB below maximum permitted output power
150 kHz+ $f_c < f <$ 405 MHz + 250 kHz	20 dB below maximum permitted output power

The FCC limits are more stringent than the ISED limits, that is why the FCC limits are used to fulfil the band-edge emission requirements

3.5.3 Setup



3.5.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

3.5.5 Procedure

Test Procedure	
1.	EUT set to test frequency with modulation
2.	Measurement polarization is set to vertical
3.	Span it set according to measurement range
4.	Resolution bandwidth is set to 1% of the emission bandwidth and detector is set to peak
5.	During the sweep the EUT is rotated to obtain maximum emission level
6.	Measurement is repeated with horizontal measurement polarization

3.5.6 Results

Test Results					
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Pol.	Limit [dBμV/m]	Margin [dB]
402.45	401.974	27.05	hor	59.40	-32.35
402.45	401.974	28.59	ver	59.40	-30.81
402.45	402.3	43.32	hor	54.00	-10.68
402.45	402.3	42.44	ver	54.00	-11.56
402.45	402.627	40.76	hor	54.00	-13.24
402.45	402.627	41.90	ver	54.00	-12.10
404.85	404.7	41.73	hor	55.00	-13.27
404.85	404.7	42.03	ver	55.00	-12.97
404.85	405.03	42.75	hor	59.40	-16.65
404.85	405.03	43.23	ver	59.40	-16.17

3.6 Test Conditions and Results - Transmitter unwanted emissions

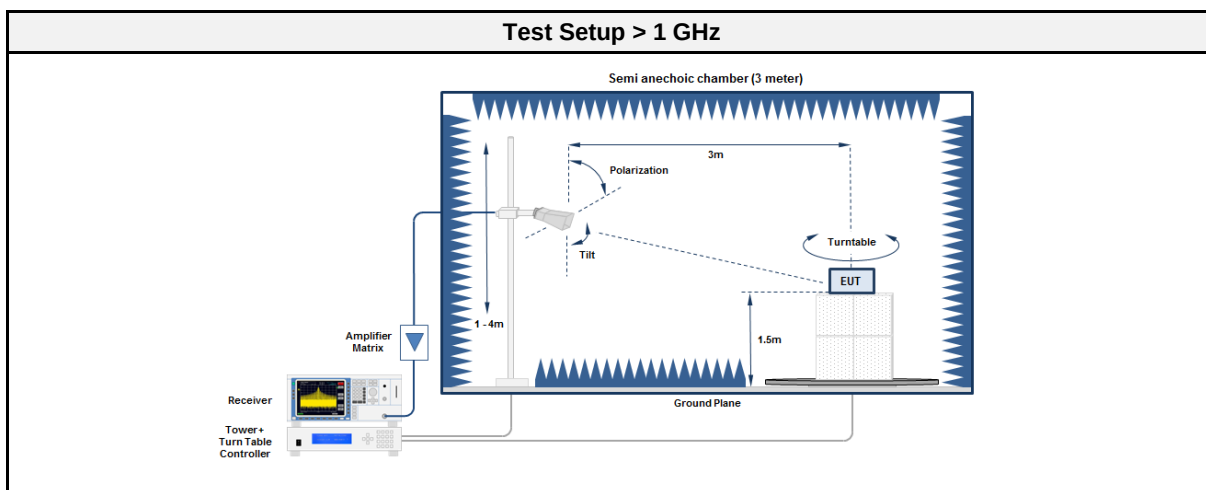
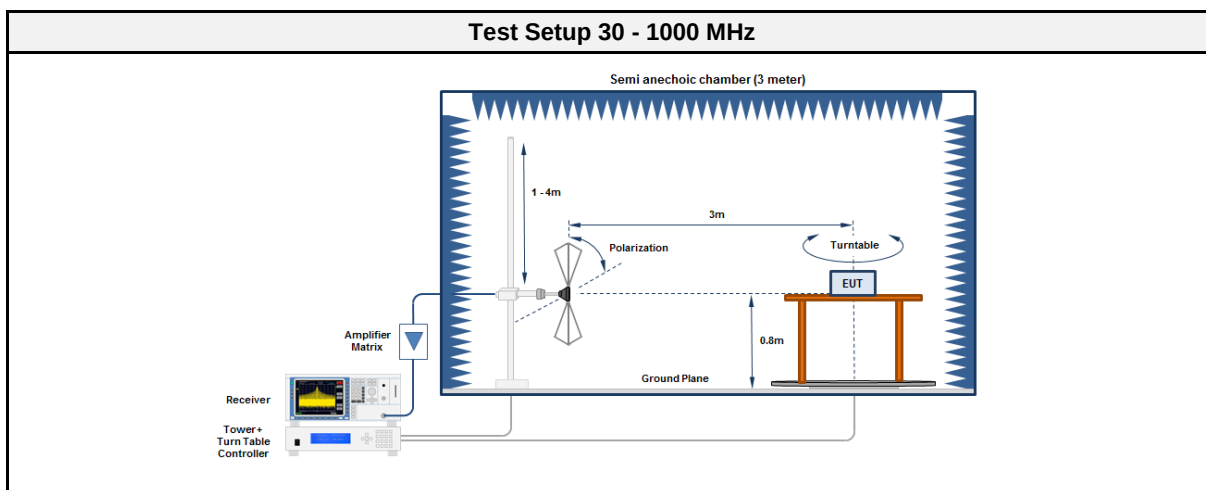
3.6.1 Information

Test Information	
Reference	FCC 95.2579 ISED RSS-243 3.4, 5.5
Measurement Method	ANSI C63.10 6.10
Operator	Wilfried Treffke
Date	2019-06-21

3.6.2 Limits

Limits				
Frequency range [MHz]	Detector	Limit [$\mu\text{V/m}$]	Limit [$\text{dB}\mu\text{V/m}$]	Limit Distance [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3

3.6.3 Setup



3.6.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	R&S	HK 116	EF00030	2019-04	2022-04
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2016-09	2019-09

3.6.5 Procedure

Test Procedure
1. EUT set to test mode 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 4. Markers are set to peak emission levels within restricted bands

3.6.6 Results

Test Results							
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Limit dist. [m]	Margin [dB]
402.45	212.933	25.02	pk	hor	43.50	3	-18.48
402.45	284.063	29.08	pk	hor	46.00	3	-16.92
402.45	319.627	33.00	pk	hor	46.00	3	-13.00
402.45	319.627	32.14	pk	ver	46.00	3	-13.86
402.45	355.192	28.60	pk	hor	46.00	3	-17.40
402.45	355.192	31.60	pk	ver	46.00	3	-14.40
402.45	401.75	29.89	pk	hor	46.00	3	-16.11
402.45	401.75	31.48	pk	ver	46.00	3	-14.52
402.45	425.266	30.47	pk	ver	46.00	3	-15.53
402.45	532.016	34.96	pk	hor	46.00	3	-11.04
402.45	532.016	36.10	pk	ver	46.00	3	-09.90
402.45	805.563	36.30	pk	hor	46.00	3	-09.70
402.45	805.563	35.11	pk	ver	46.00	3	-10.89
402.45	1136	51.31	pk	ver	54.00	3	-02.69
402.45	1236	52.62	pk	ver	54.00	3	-01.38
402.45	1259	48.67	pk	hor	54.00	3	-05.33
402.45	1349	50.14	pk	ver	54.00	3	-03.86
402.45	1420	47.03	pk	ver	54.00	3	-06.97
402.45	1978	45.08	pk	hor	54.00	3	-08.92
404.85	212.933	26.53	pk	hor	43.50	3	-16.97
404.85	284.063	28.31	pk	hor	46.00	3	-17.69
404.85	319.627	32.87	pk	hor	46.00	3	-13.13
404.85	319.627	30.81	pk	ver	46.00	3	-15.19
404.85	355.192	29.03	pk	hor	46.00	3	-16.97
404.85	355.192	30.39	pk	ver	46.00	3	-15.61
404.85	390.757	27.58	pk	ver	46.00	3	-18.42
404.85	401.75	29.38	pk	hor	46.00	3	-16.62
404.85	401.75	28.37	pk	ver	46.00	3	-17.63
404.85	405.25	39.42	pk	hor	46.00	3	-06.58
404.85	405.25	39.58	pk	ver	46.00	3	-06.42
404.85	532.016	34.13	pk	hor	46.00	3	-11.87
404.85	532.016	34.98	pk	ver	46.00	3	-11.02
404.85	810.328	37.20	pk	hor	46.00	3	-08.80
404.85	810.328	36.68	pk	ver	46.00	3	-09.32
404.85	1136	52.31	pk	ver	54.00	3	-01.69
404.85	1212	52.37	pk	hor	54.00	3	-01.63
404.85	1235	47.42	pk	ver	54.00	3	-06.58
404.85	1308	51.45	pk	hor	54.00	3	-02.55
404.85	1381	47.74	pk	ver	54.00	3	-06.26
404.85	1631	46.96	pk	ver	54.00	3	-07.04
404.85	1997	46.38	pk	hor	54.00	3	-07.62

3.7 Test Conditions and Results - Receiver spurious emissions

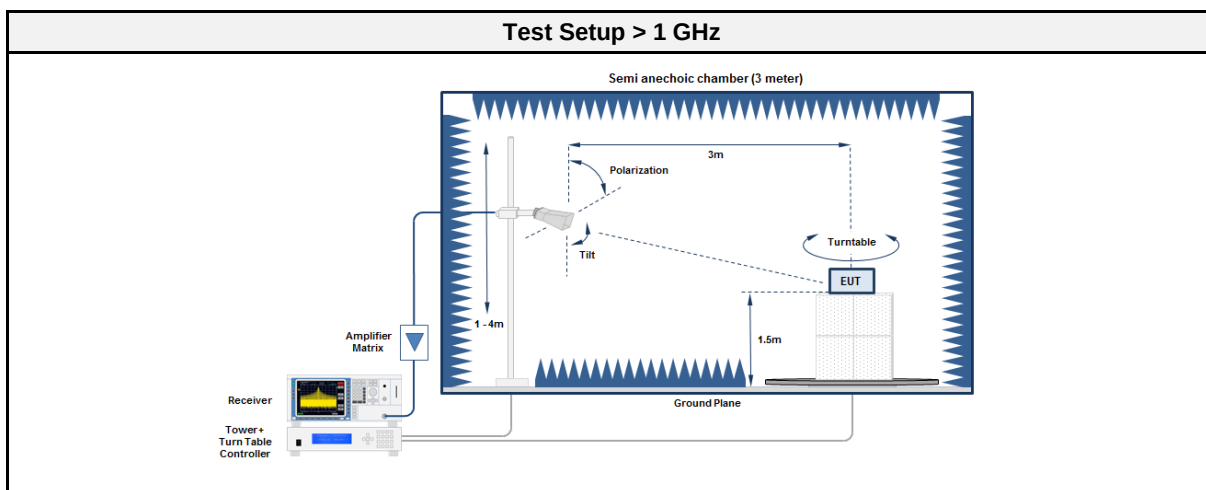
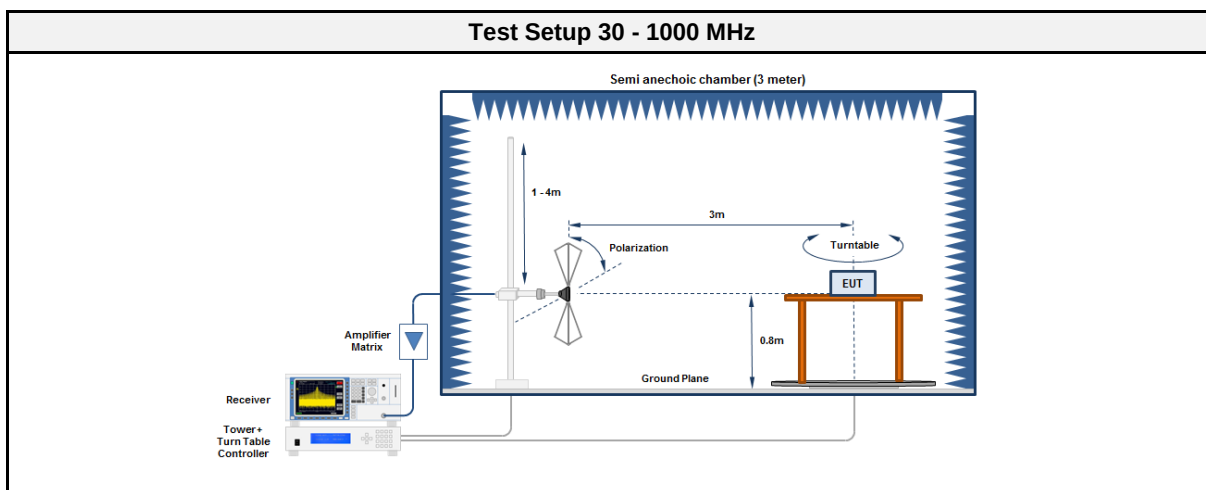
3.7.1 Information

Test Information	
Reference	ISED RSS-243 3.5, 5.6 ISED RSS-Gen 7.3
Measurement Method	ANSI C63.10 6.10
Operator	Wilfried Treffke
Date	2019-06-21

3.7.2 Limits

Limits				
Frequency range [MHz]	Detector	Limit [$\mu\text{V/m}$]	Limit [$\text{dB}\mu\text{V/m}$]	Limit Distance [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3

3.7.3 Setup



3.7.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	R&S	HK 116	EF00030	2019-04	2022-04
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2016-09	2019-09

3.7.5 Procedure

Test Procedure	
1. EUT set to receive mode 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 4. Markers are set to peak emission levels	

3.7.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Emission Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
403.65	319.231	33.66	pk	hor	46.00	-12.34
403.65	319.231	32.44	pk	ver	46.00	-13.56
403.65	355.128	28.61	pk	hor	46.00	-17.39
403.65	355.128	31.53	pk	ver	46.00	-14.47
403.65	425.641	30.06	pk	ver	46.00	-15.94
403.65	532.051	34.96	pk	hor	46.00	-11.04
403.65	532.051	35.55	pk	ver	46.00	-10.45
403.65	567.949	27.50	pk	hor	46.00	-18.50
403.65	850	28.31	pk	ver	46.00	-17.69
403.65	923.077	28.41	pk	hor	46.00	-17.59
403.65	1136	52.87	pk	ver	53.90	-01.03
403.65	1260	47.65	pk	hor	53.90	-06.25
403.65	1314	49.34	pk	ver	53.90	-04.56
403.65	1385	47.85	pk	ver	53.90	-06.05
403.65	1630	47.31	pk	ver	53.90	-06.59
403.65	1981	45.83	pk	hor	53.90	-08.07

3.8 Test Conditions and Results - AC power line conducted emissions

3.8.1 Information

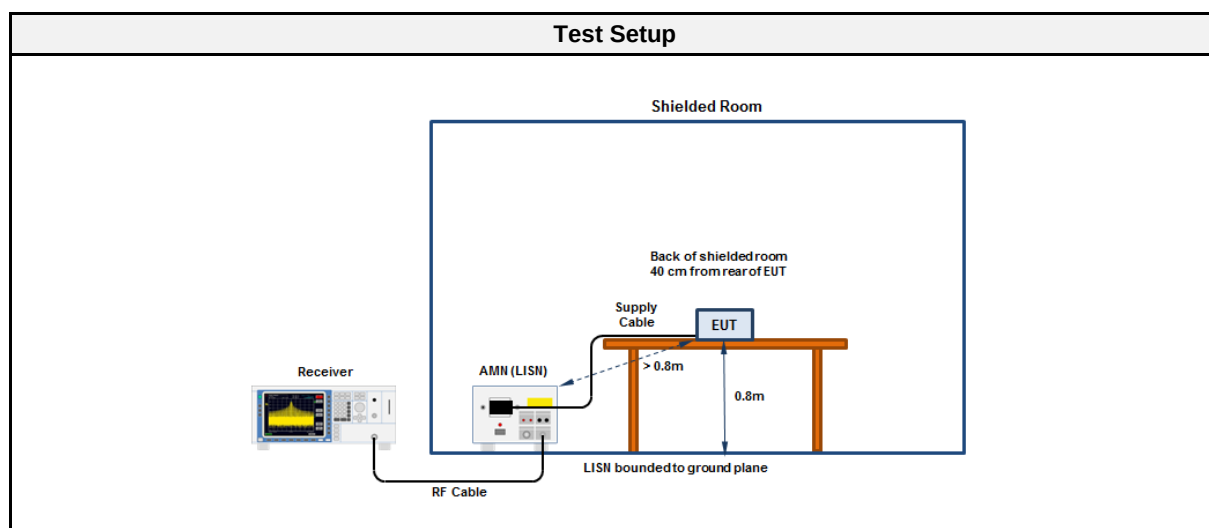
Test Information	
Reference	FCC 15.207 ISED RSS-Gen 7.2, 8.8
Measurement Method	ANSI C63.10 6.2
Operator	Wilfried Treffke
Date	2019-07-10

3.8.2 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

3.8.3 Setup



3.8.4 Equipment

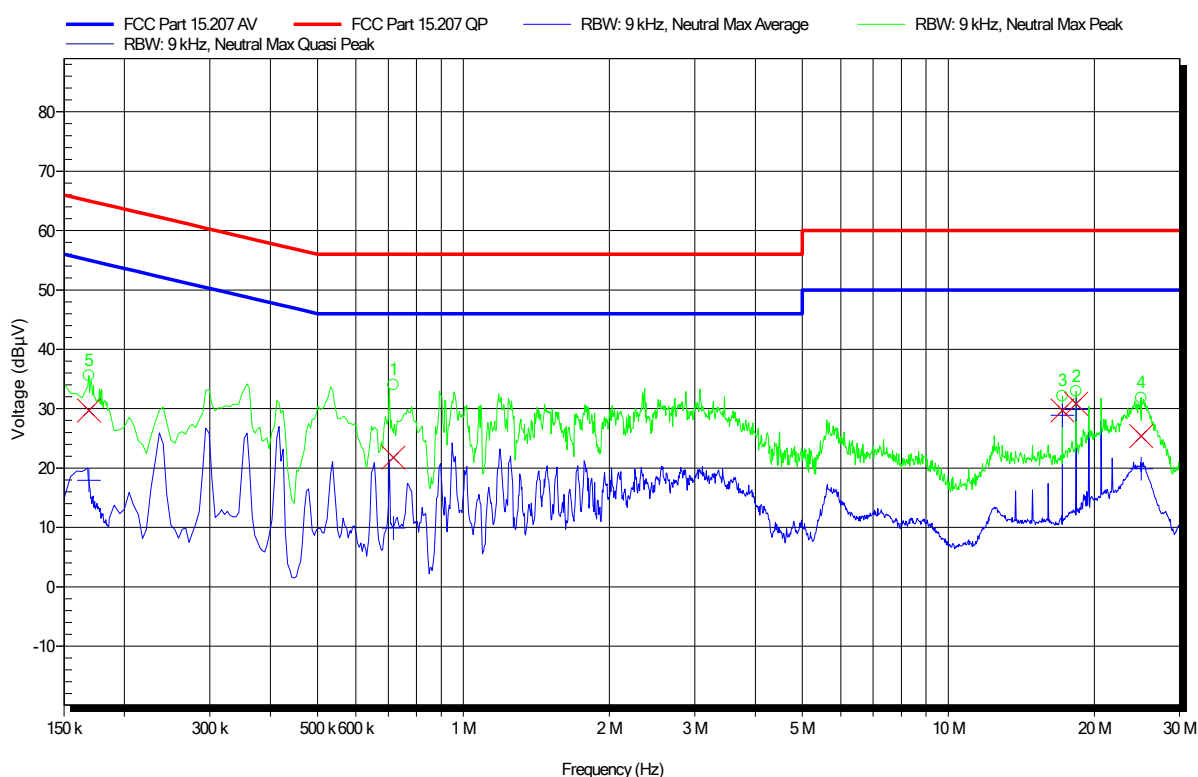
Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Receiver	R&S	ESU 26	EF00241	2017-07	2019-07
LISN	R&S	ESH3-Z5	EF00036	2017-01	2019-07

EMI voltage test in the ac-mains according to FCC part 15 C

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 22.5°C, Vnom: 120 VAC
 LISN: ESH3-Z5 (N)
 Mode: 403.65 MHz; antenna 1+2
 Test Date: 2019-07-10
 Note:

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Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	717 kHz	21.79 dBμV	56 dBμV	-34.21 dB	Pass
2	18.343 MHz	30.83 dBμV	60 dBμV	-29.17 dB	Pass
3	17.197 MHz	29.69 dBμV	60 dBμV	-30.31 dB	Pass
4	24.999 MHz	25.38 dBμV	60 dBμV	-34.62 dB	Pass
5	168.9 kHz	29.69 dBμV	65.01 dBμV	-35.33 dB	Pass

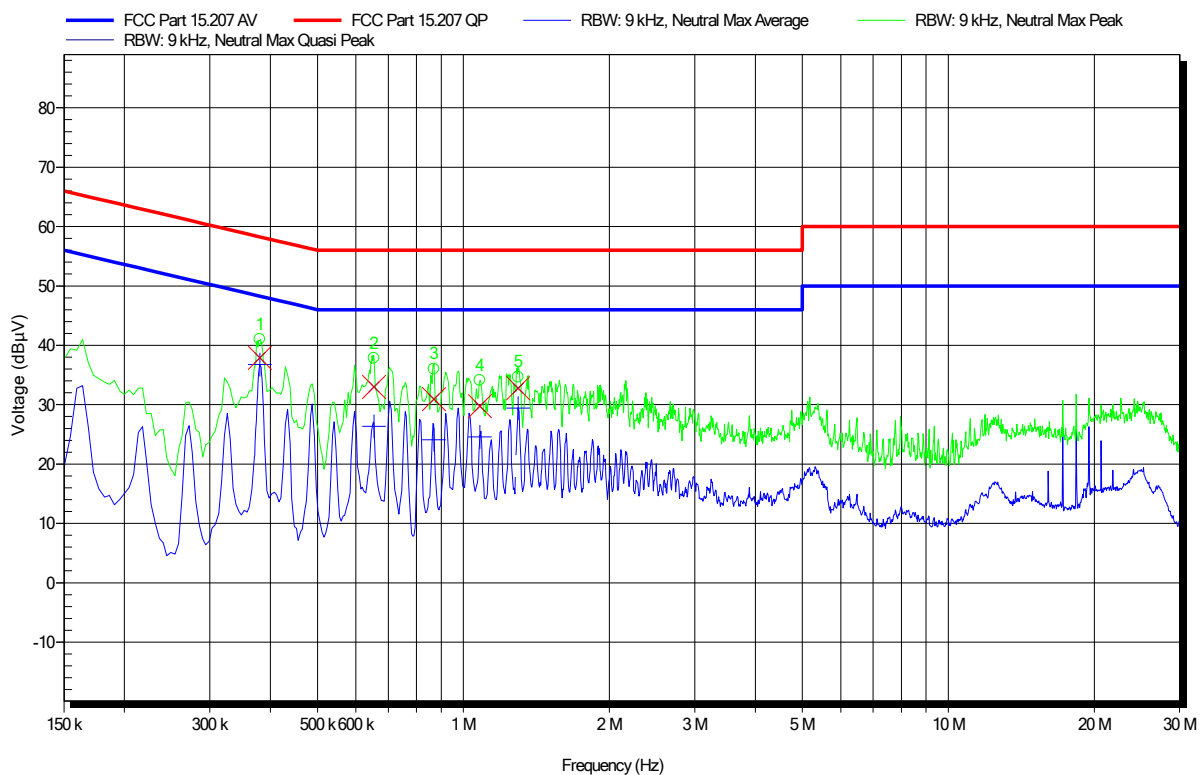
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	717 kHz	9.92 dBμV	46 dBμV	-36.08 dB	Pass
2	18.343 MHz	29.84 dBμV	50 dBμV	-20.16 dB	Pass
3	17.197 MHz	28.9 dBμV	50 dBμV	-21.1 dB	Pass
4	24.999 MHz	19.89 dBμV	50 dBμV	-30.11 dB	Pass
5	168.9 kHz	17.94 dBμV	55.01 dBμV	-37.08 dB	Pass

EMI voltage test in the ac-mains according to FCC part 15 C

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Mr. Treffke
Test Conditions: Tnom: 22.5°C, Vnom: 120 VAC
LISN: ESH3-Z5 (L)
Mode: 403.65 MHz; antenna 1+2
Test Date: 2019-07-10
Note:

Index 45



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	380.4 kHz	37.87 dBμV	58.27 dBμV	-20.4 dB	Pass
2	654 kHz	32.99 dBμV	56 dBμV	-23.01 dB	Pass
3	870 kHz	30.95 dBμV	56 dBμV	-25.05 dB	Pass
4	1.081 MHz	29.76 dBμV	56 dBμV	-26.24 dB	Pass
5	1.297 MHz	32.78 dBμV	56 dBμV	-23.22 dB	Pass

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	380.4 kHz	36.78 dBμV	48.27 dBμV	-11.49 dB	Pass
2	654 kHz	26.33 dBμV	46 dBμV	-19.67 dB	Pass
3	870 kHz	24.1 dBμV	46 dBμV	-21.9 dB	Pass
4	1.081 MHz	24.55 dBμV	46 dBμV	-21.45 dB	Pass
5	1.297 MHz	29.42 dBμV	46 dBμV	-16.58 dB	Pass

3.9 Test Conditions and Results - System threshold power levels

3.9.1 Information

Test Information	
Reference	FCC 95.2559(a)(3),(a)(4) ISED RSS-243 3.6, 5.7.1
Measurement Method	ETSI EN 301 839 5.3.7.1.3
Operator	Wilfried Treffke
Date	2019-06-04

3.9.2 Limits

Limits
$P_{TH} [dBm] = 10 \cdot \log_{10}(EB[Hz]) - 150 + G[dBi]$ P_{TH} = LBT threshold level in dBm EB = Emission bandwidth in Hz G = Monitoring system antenna gain in dBi
If an ULP-AMI device is used to select the frequency of operation for a MICS system, the above LBT threshold level requirement may be adjusted higher by 1 dB for every 1 dB the e.r.p. of the device performing the LBT and AFA function is below the maximum permitted level of -16 dBm e.r.p..

3.9.3 Procedure

Test Procedure
It is not necessary to measure the actual threshold power level of a MICS system; however, it shall be determined that the system uses the LIC selection process if no channel is available with an ambient power level at or below the calculated threshold power level.

3.9.4 Results

Test Results			
Emission bandwidth of companion device [Hz]	Antenna gain [dBi]	Calculated level [dBm]	Measured threshold level [dBm]
254808	0.85	-95.1	-96

3.10 Test Conditions and Results - Monitoring system bandwidth

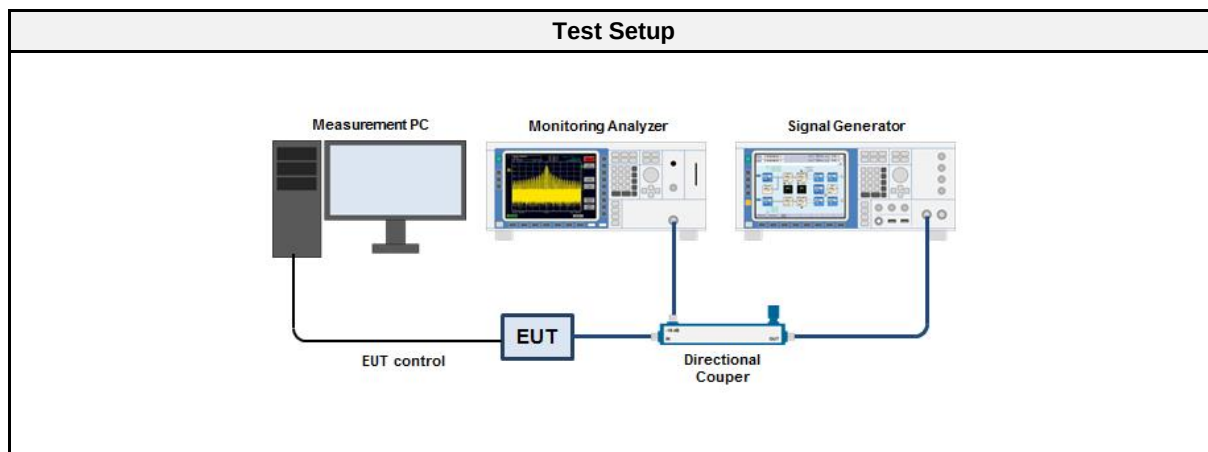
3.10.1 Information

Test Information	
Reference	FCC 95.2559(a)(1) ISED RSS-243 3.6, 5.7.2
Measurement Method	ETSI EN 301 839 5.3.7.1.4
Operator	Wilfried Treffke
Date	2019-06-04

3.10.2 Limits

Limits
≥ Emission bandwidth (equals to measured power level differences ≤ 20 dB)

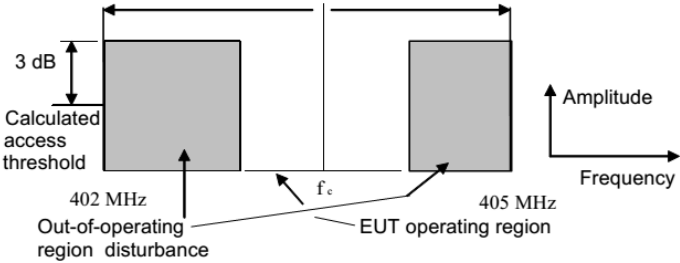
3.10.3 Setup



3.10.4 Equipment

Test Equipment - Conducted measurement					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12
Signal Generator	R&S	SML02	EF00240	2017-07	2019-07

3.10.5 Procedure

Test Procedure	
1.	By administration commands the following channel occupation is simulated to the device so that the EUT can only send on frequency f_c .
	
2.	A CW signal is generated by the signal generator on frequency f_c with a level sufficient to block transmission of the EUT on channel f_c . It is verified that the EUT stops transmission.
3.	A new communication session is established and the level of the signal generator is reduced until the EUT starts to transmit on channel f_c .
4.	Then the frequency of the generator is set to the measured lower edge frequency of the emission bandwidth and the level of the signal generator is increased until the EUT starts to transmit in the out-of-band region again. The signal level is recorded.
5.	The procedure is repeated at the upper edge frequency of the emission bandwidth measurement. The power level difference between the center and the edge frequency is recorded.

3.10.6 Results

Test Results					
Channel [MHz]	Center Interferer Level [dBm]	Edge $\pm$ EBW/2 [kHz]	Edge Interferer Level [dBm]	Level Difference [dB]	Limit [dB]
403.65	403.533	-EBW/2	-95	1	≤ 20
403.65	403.765	+EBW/2	-85	9	≤ 20

3.11 Test Conditions and Results - Scan cycle time

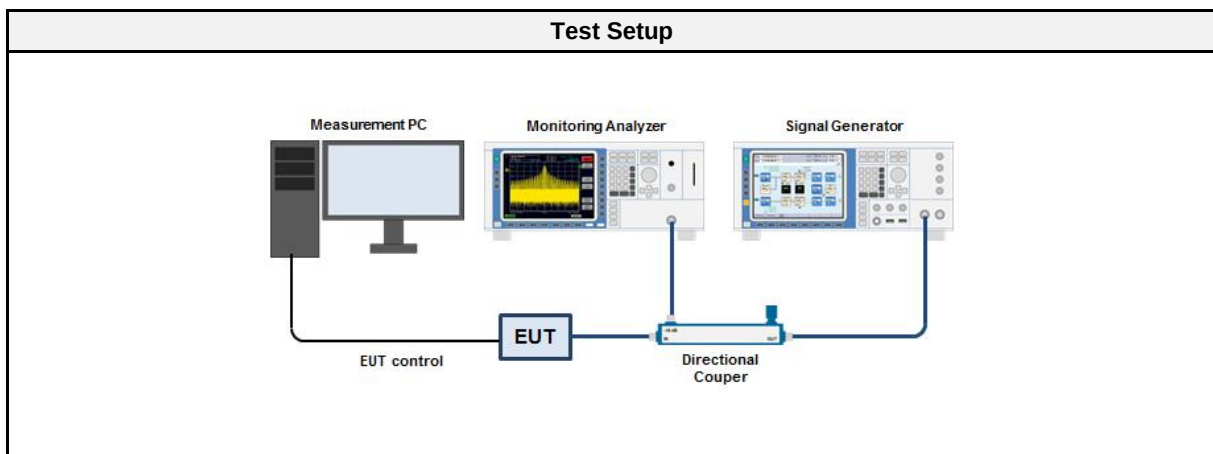
3.11.1 Information

Test Information	
Reference	FCC 95.2559(a)(2) ISED RSS-243 3.6, 5.7.3
Measurement Method	ETSI EN 301 839 5.3.7.1.5
Operator	Wilfried Treffke
Date	2019-06-03

3.11.2 Limits

Limits
≤ 5 s

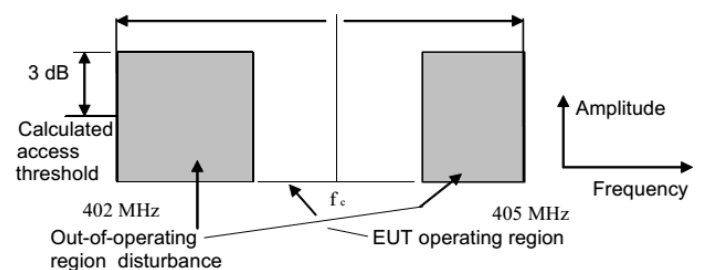
3.11.3 Setup



3.11.4 Equipment

Test Equipment - Conducted measurement					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12
Signal Generator	R&S	SML02	EF00240	2017-07	2019-07

3.11.5 Procedure

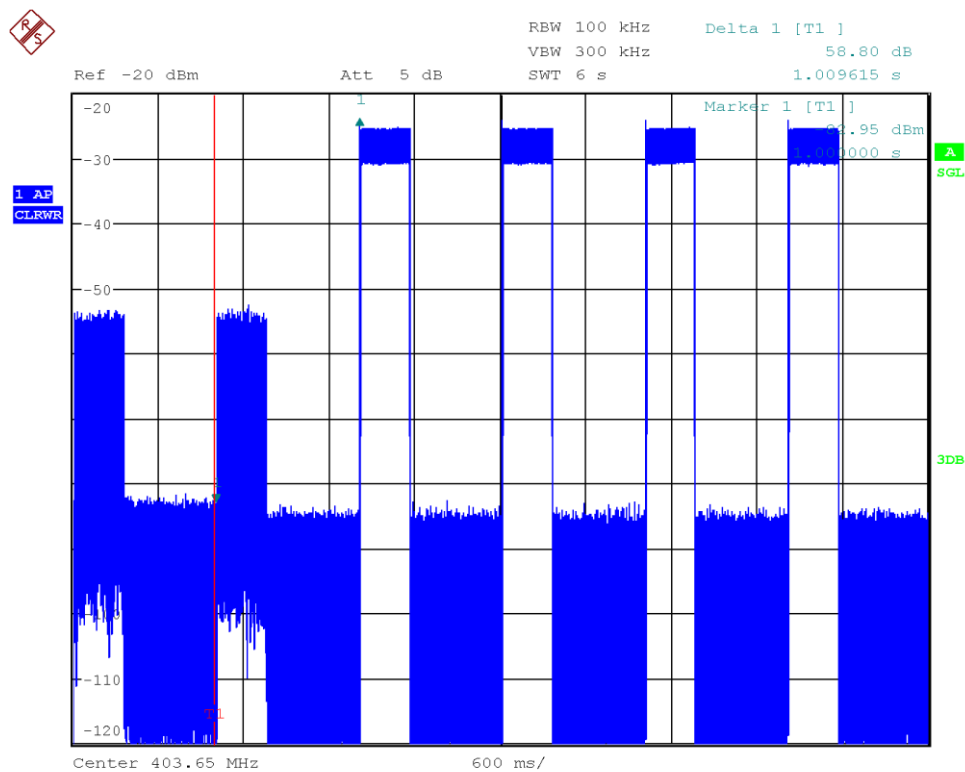
Test Procedure	
1.	By administration commands the following channel occupation is simulated to the device so that the EUT can only send on frequency f_c .
	
2.	A CW signal is generated by the signal generator on frequency f_c with a level 3 dB above the out-of-band region level to block transmission of the EUT on channel f_c . It is verified that the EUT does not transmit on f_c .
3.	The CW interferer is removed, a new communication session is established and the time until the EUT starts to transmit is measured.
4.	If the EUT does not transmit on f_c a 1 second delay is added between the removal of the interferer and the establishment of the communication session. The addition of delay is repeated until the EUT always starts transmission on f_c . The delay time measurement is repeated several times. At the end 1 second is subtracted from all delays measured.

3.11.6 Results

Test Results			
Channel [MHz]	Scan cycle time [s]	Limit [s]	Margin [s]
403.65	1.01	5	-03.99

Spectrum access protocol - System scan cycle time

Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Operator: W. Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-03
 Note 1: Eurofins Product Service GmbH
 Note 2: Limit:< 5 sec; Result: 1.01s



Date: 3.JUN.2019 09:55:33

3.12 Test Conditions and Results - Minimum channel monitoring period

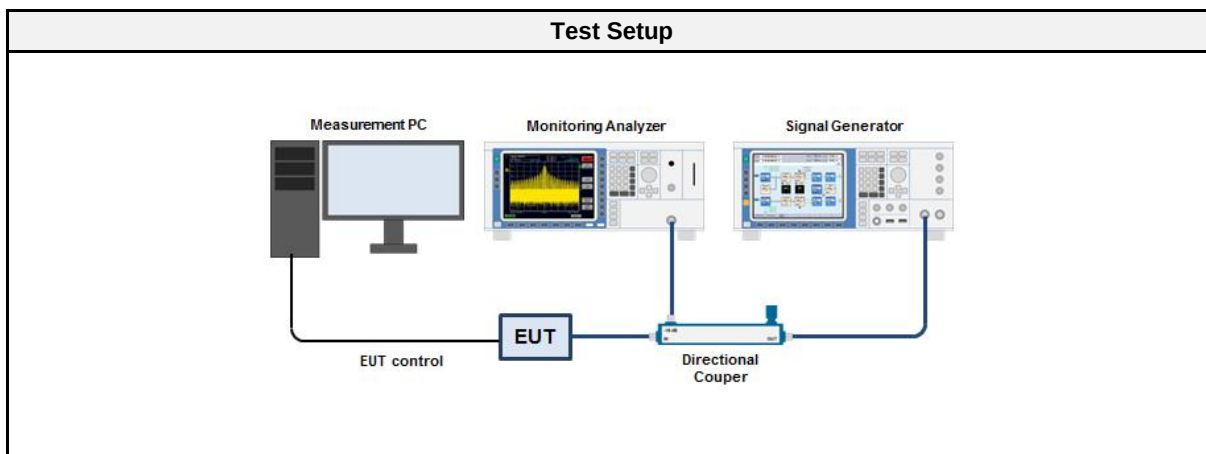
3.12.1 Information

Test Information	
Reference	FCC 95.2559(a)(2) ISED RSS-243 3.6, 5.7.4
Measurement Method	ETSI EN 301 839 5.3.7.1.5
Operator	Wilfried Treffke
Date	2019-06-03

3.12.2 Limits

Limits
≥ 10 ms

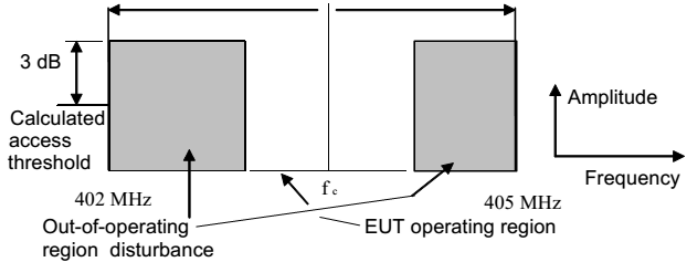
3.12.3 Setup



3.12.4 Equipment

Test Equipment - Conducted measurement					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12
Signal Generator	R&S	SML02	EF00240	2017-07	2019-07

3.12.5 Procedure

Test Procedure	
1.	By administration commands the following channel occupation is simulated to the device so that the EUT can only send on frequency f_c .
	
2.	A CW signal is generated by the signal generator on frequency f_c with a level equal to the out-of-band region level to block transmission of the EUT on channel f_c and the out-of-band interference is removed. It is verified that the EUT does not transmit on f_c .
3.	Then the out-of-band interference level is set to 3 dB higher and it is verified that the EUT transmits on f_c .
4.	The out-of-band interferers are pulsed with a pulse width of 0.1 ms and a repetition frequency of 100Hz. The EUT is placed in a state where it is seeking to initiate a communication session with the ULP-AMI companion device.
5.	The EUT shall not initiate a communication session on a channel different from f_c . This condition is checked more than 10 times.

3.12.6 Results

Test Results				
Channel [MHz]	Interferer Channel	Interferer level [dBm]	Carrier transmit on channel	Result
403.65	403.65	off	403.65	PASS
403.65	403.65	-89.1	403.05	PASS
For practical reasons the test has been performed with a fixed interferer level in the out-of-band region and a pulsed interferer level on center channel. To make sure that the monitoring period requirement was met, it was verified that no communication on center channel had been initiated.				

3.13 Test Conditions and Results - Channel access

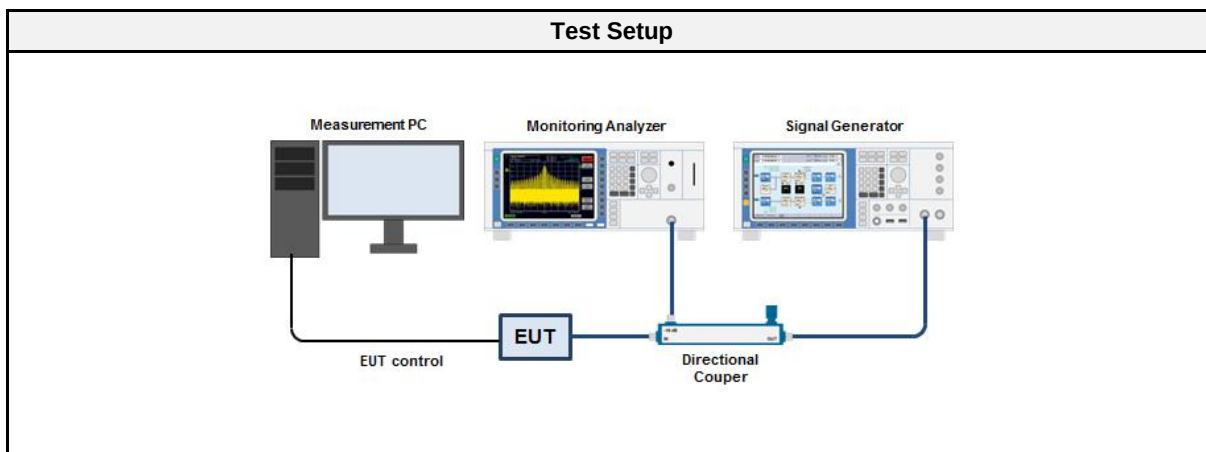
3.13.1 Information

Test Information	
Reference	FCC 95.2559(a)(5) ISED RSS-243 3.6, 5.7.5
Measurement Method	EN 301 839 5.3.7.1.6
Operator	Wilfried Treffke
Date	2019-06-03

3.13.2 Limits

Limits
EUT has to select and transmit on least interfered channel (LIC)

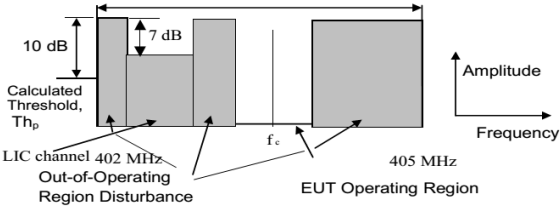
3.13.3 Setup



3.13.4 Equipment

Test Equipment - Conducted measurement					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12
Signal Generator	R&S	SML02	EF00240	2017-07	2019-07

3.13.5 Procedure

Test Procedure	
1.	By administration commands the following channel occupation is simulated to the device so that the EUT can only send on frequency f_c .
	
2.	A CW signal is generated by the signal generator on frequency f_c with a level 3 dB lower than the calculated LBT threshold level. It is determined that the EUT communicates on f_c .
3.	The CW interferer level is increased by 9dB and a new communication session is initiated. Now it is checked that the EUT communicates on the LIC center frequency.

3.13.6 Results

Test Results						
Step	Channel [MHz]	LIC channel	Frequency [MHz]	Interferer level channel 0 [dBm]	Communication channel	Result
1	403.65	0	403.65	off	0	PASS
2	403.65	0	403.65	-98.1	0	PASS
3	403.65	1	403.	-89.1	1	PASS

3.14 Test Conditions and Results - Discontinuation of MICS or MEDS session

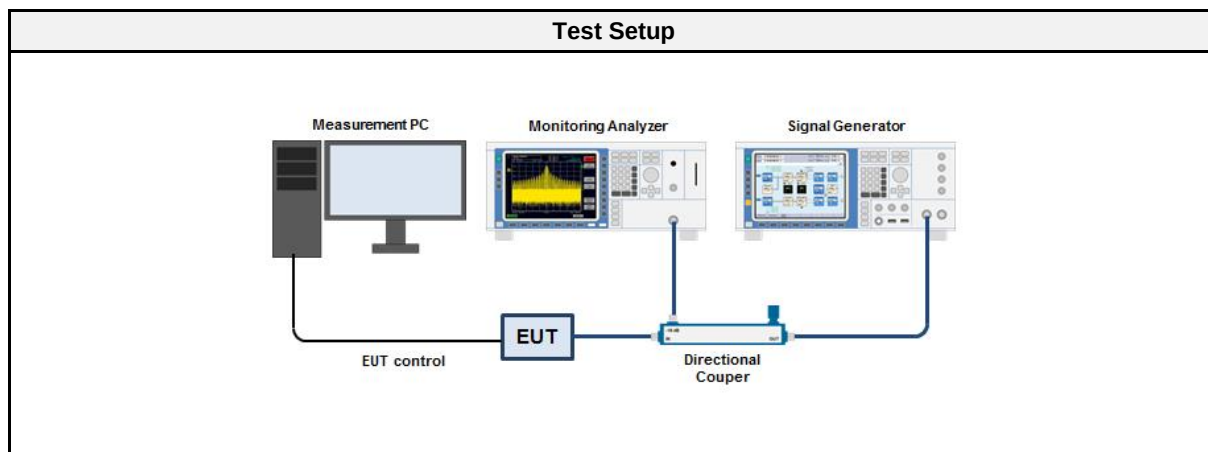
3.14.1 Information

Test Information	
Reference	FCC 95.2559(a)(5) ISED RSS-243 3.6, 5.7.6
Measurement Method	EN 301 839 5.3.7.1.7
Operator	Wilfried Treffke
Date	2019-06-03

3.14.2 Limits

Limits
Cease transmission for silent period ≥ 5 s

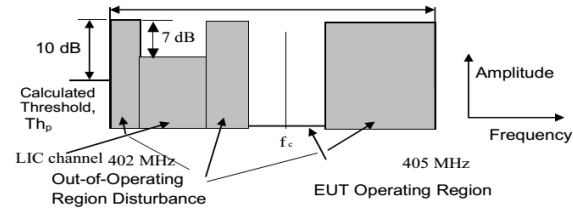
3.14.3 Setup



3.14.4 Equipment

Test Equipment - Conducted measurement					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12
Signal Generator	R&S	SML02	EF00240	2017-07	2019-07

3.14.5 Procedure

Test Procedure	
1.	By administration commands the following channel occupation is simulated to the device so that the EUT can only send on frequency f_c .
	
2.	A CW signal is generated by the signal generator on frequency f_c with a level 9 dB higher than the calculated LBT threshold level. It is determined that the EUT communicates on LIC channel.
3.	The CW interferer level is reduced to a level 3 dB below the threshold level and the ULP-AMI is switched off. The transmission of the EUT (ULP-AMI-P) is captured until the transmission is finished and the time is recorded.
4.	The ULP-AMI is enabled again and the communication session should not restart on LIC channel.

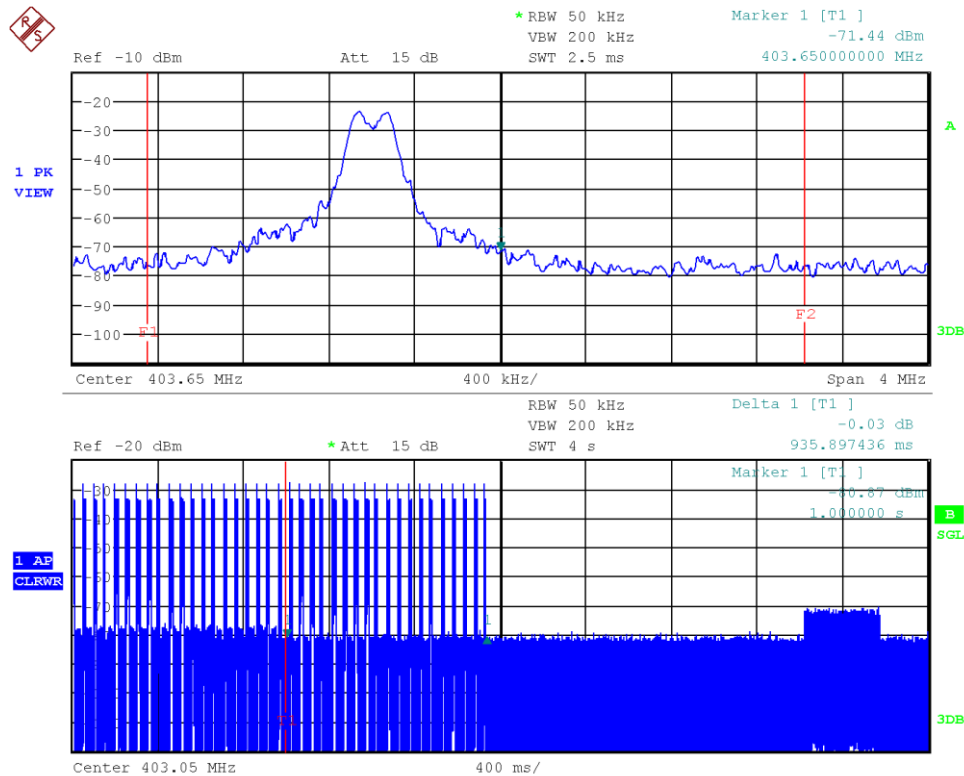
3.14.6 Results

Test Results - Transmission time				
LIC channel [MHz]	Interferer channel [MHz]	Interferer level [dBm]	Transmission time [s]	Limit
403.35	403.65	-79.1	935.9	≥ 5 s

LIC channel [MHz]	Interferer channel [MHz]	Interferer level [dBm]	Restart next communication channel [MHz]	Verdict
403.65	403.65	-98.1	403.65	PASS

Discontinuation of MICS session if a silent period greater than or equal 5 s occurs

Project Number: G0M-1905-8256
 Applicant: Biotronik SE & Co.KG
 Model Description: Renamic Neo Programming
 Model: Renamic Neo
 Test Sample ID: 24166
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2019-06-03
 Note 1: No communication after 935.9 ms silent period @ previous Communication channel / channel 4
 Note 2: Restart next communication channel 0 (403.65 MHz)



Date: 3.JUN.2019 11:11:56

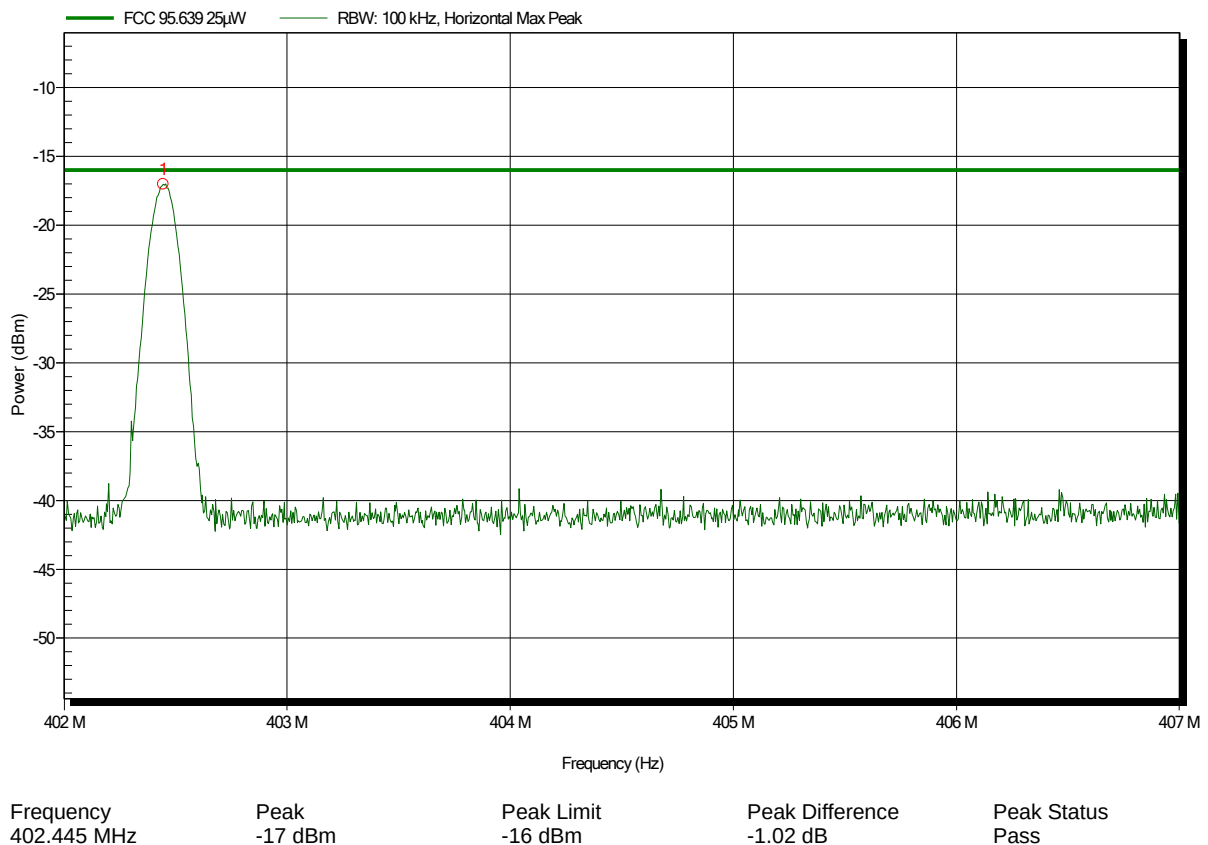
ANNEX A Transmitter output power

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Mr. Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: Tx; CW, Ant.1, 402.45 MHz
Test Date: 2019-06-03
Note: Tx

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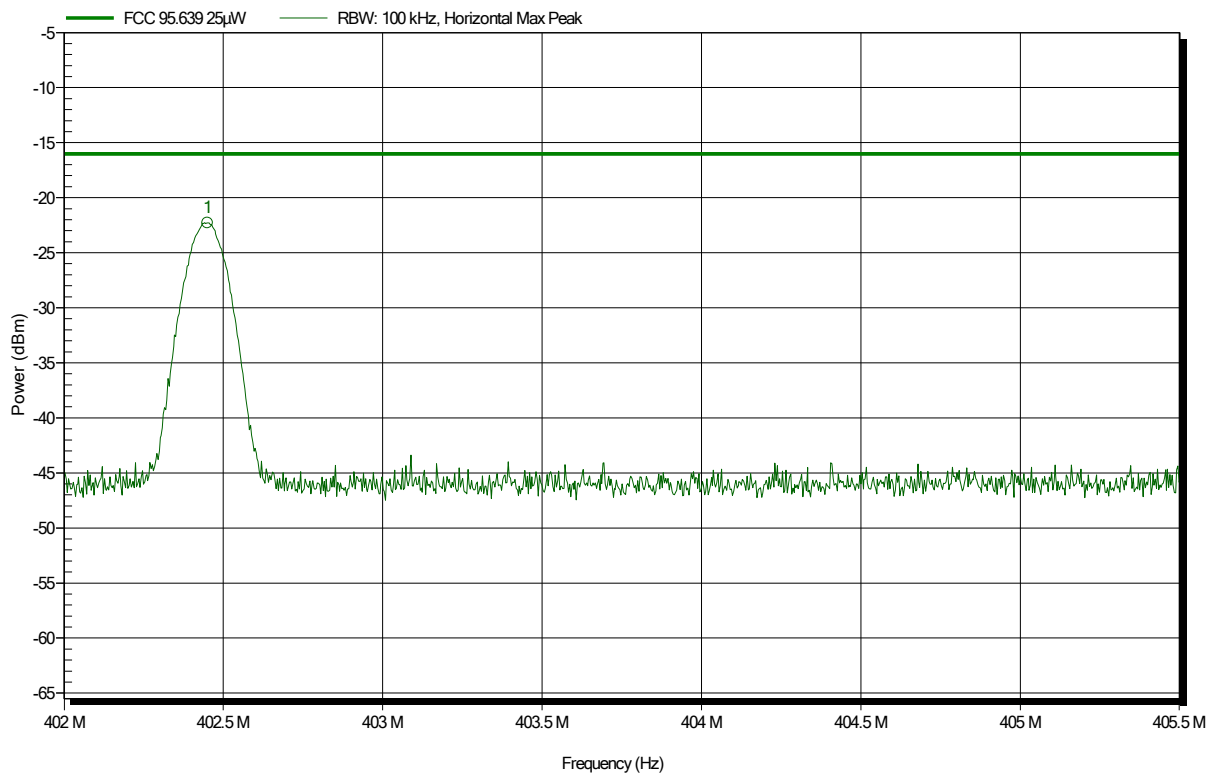


Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; CW, Ant.1, 402.45 MHz
 Test Date: 2019-06-03
 Note: Tx

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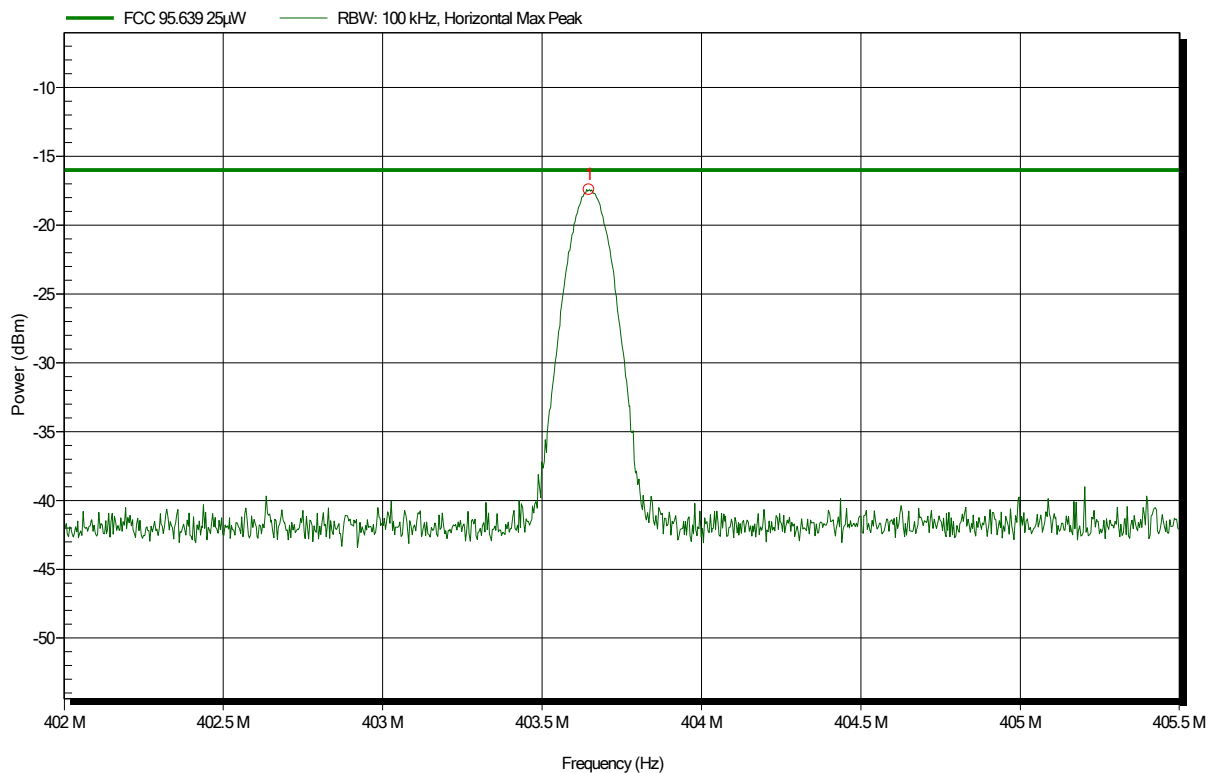
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
402.451 MHz	-22.3 dBm	-16 dBm	-6.29 dB	Pass

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; CW, Ant.1, 403.65 MHz
 Test Date: 2019-06-03
 Note: Tx

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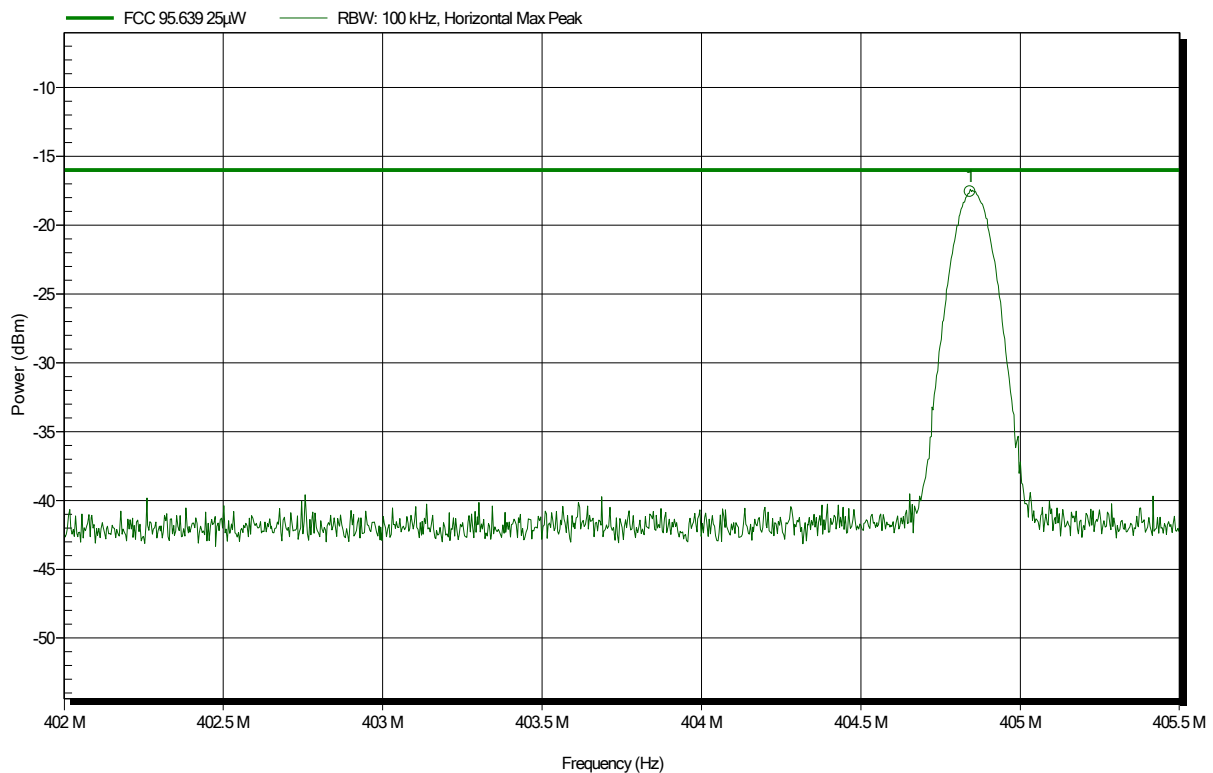
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
403.647 MHz	-17.4 dBm	-16 dBm	-1.41 dB	Pass

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; CW, Ant.1, 404.85 MHz
 Test Date: 2019-06-03
 Note: Tx

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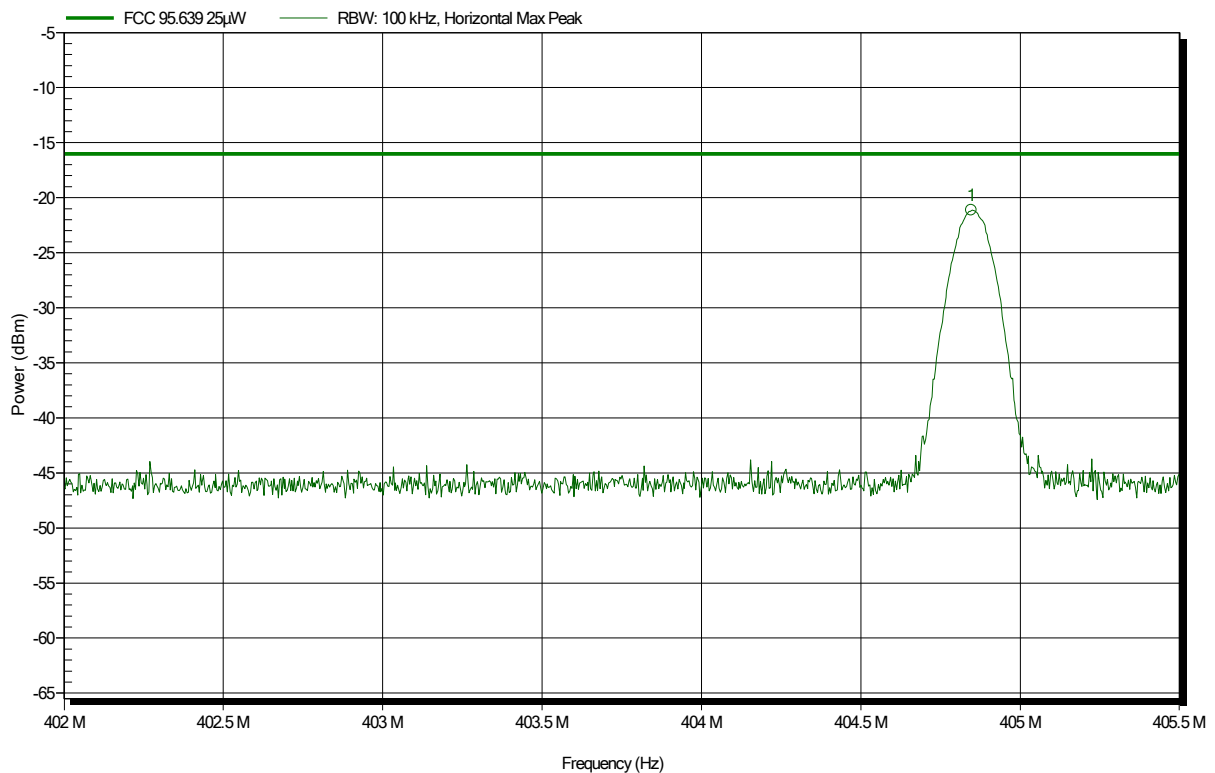
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
404.843 MHz	-17.6 dBm	-16 dBm	-1.56 dB	Pass

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Mr. Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: Tx; CW, Ant.1, 404.85 MHz
Test Date: 2019-06-03
Note: Tx

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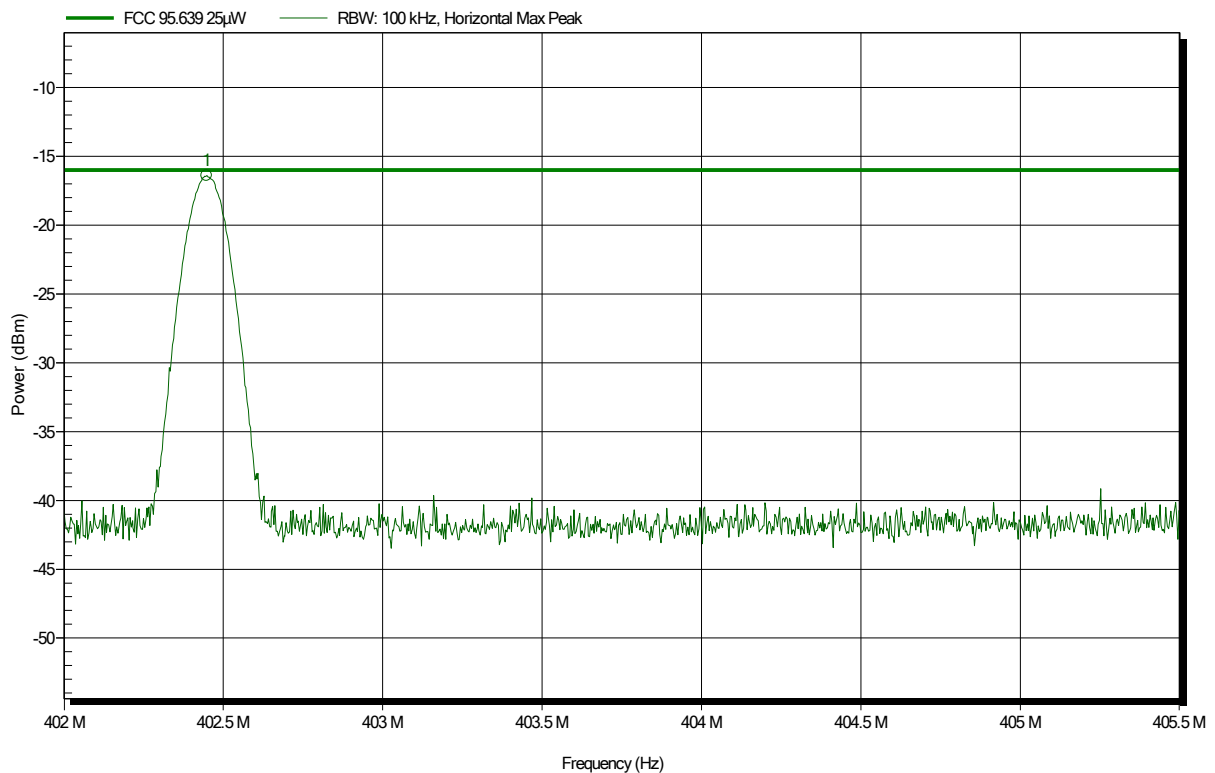
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
404.846 MHz	-21.1 dBm	-16 dBm	-5.12 dB	Pass

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; CW, Ant.2, 402.45 MHz
 Test Date: 2019-06-03
 Note: Tx

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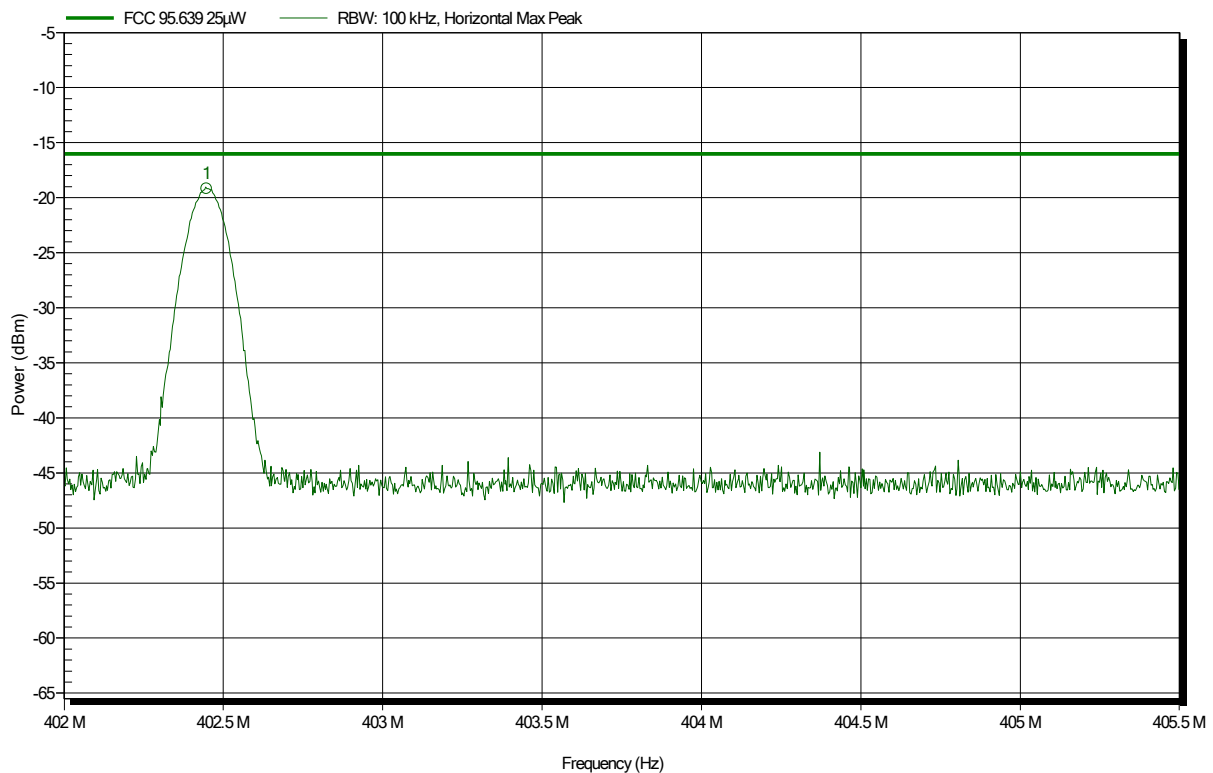
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
402.448 MHz	-16.4 dBm	-16 dBm	-0.38 dB	Pass

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; CW, Ant.2, 402.45 MHz
 Test Date: 2019-06-03
 Note: Tx

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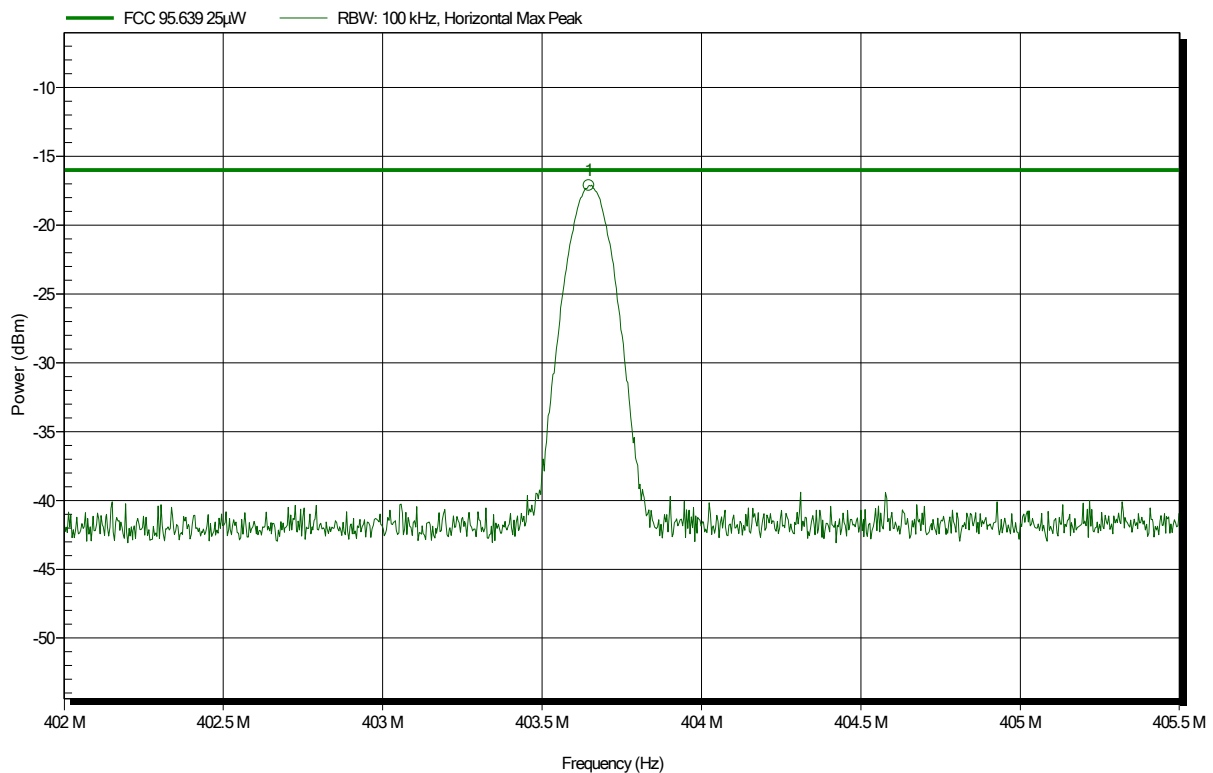
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
402.448 MHz	-19.2 dBm	-16 dBm	-3.17 dB	Pass

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; CW, Ant.2, 403.65 MHz
 Test Date: 2019-06-03
 Note: Tx

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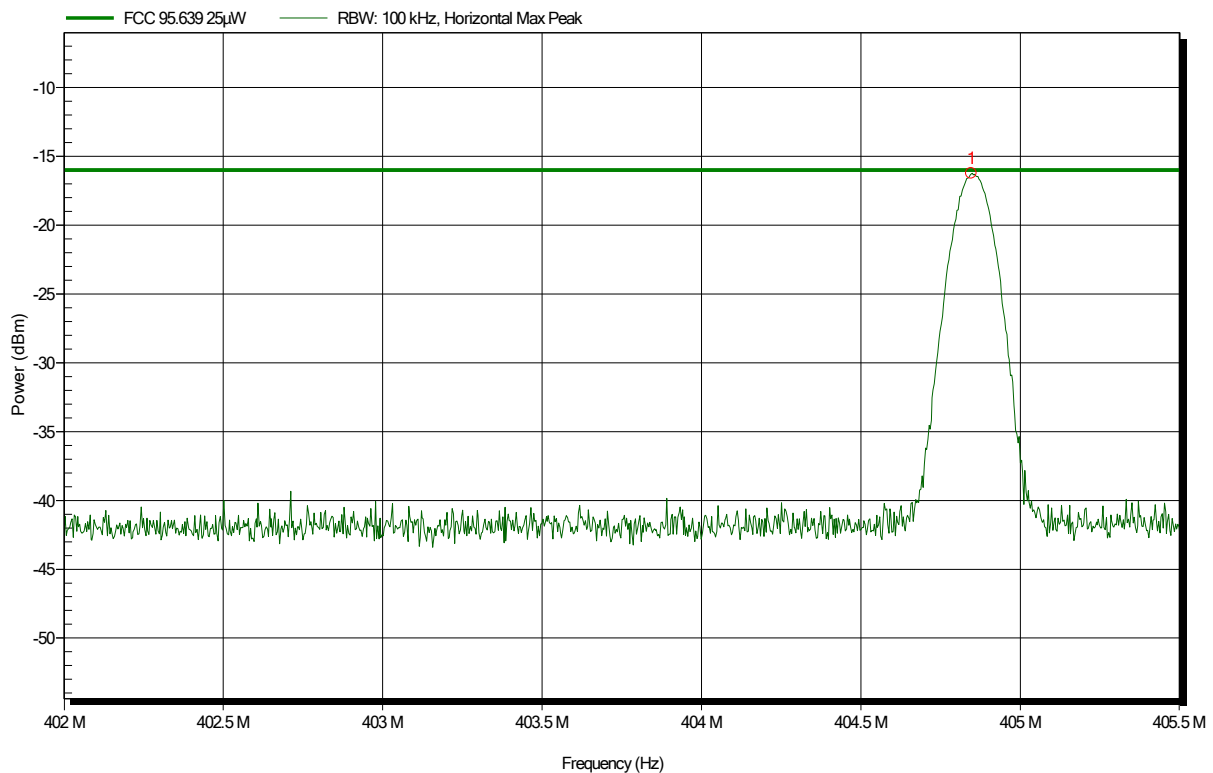
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
403.647 MHz	-17.1 dBm	-16 dBm	-1.12 dB	Pass

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; CW, Ant.2, 404.85 MHz
 Test Date: 2019-06-03
 Note: Tx

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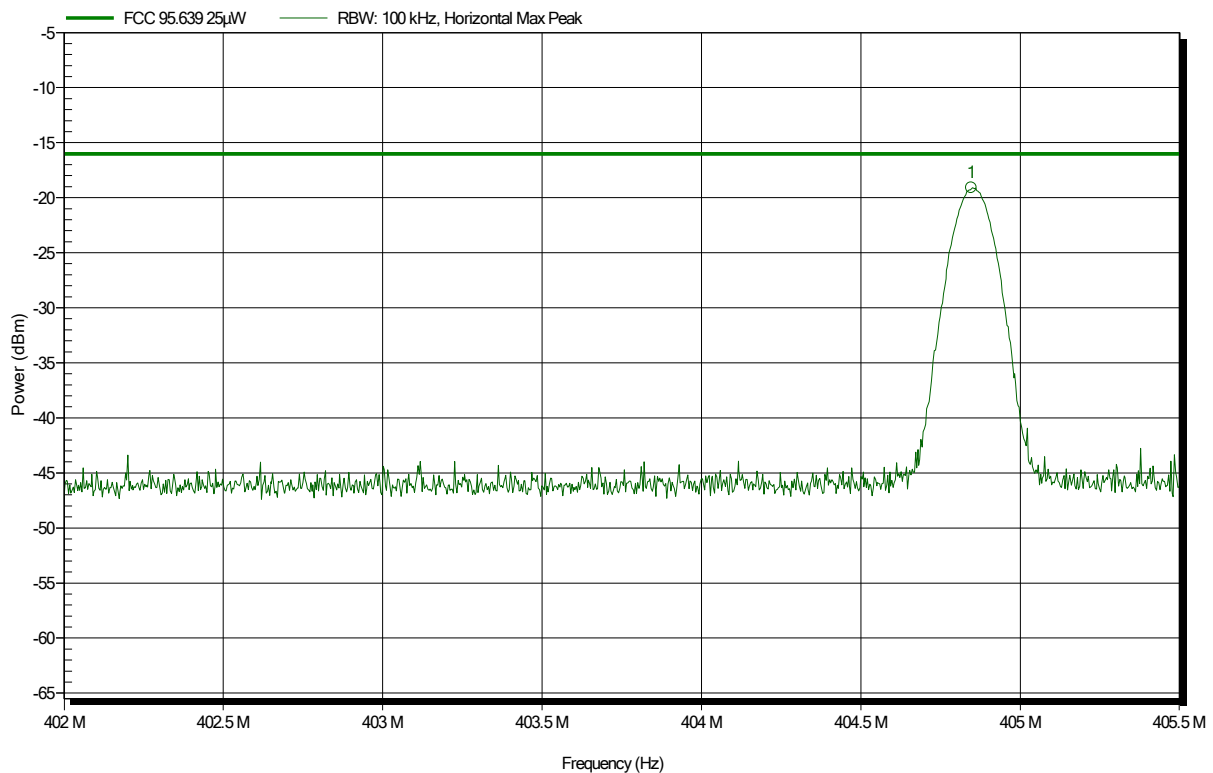
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
404.846 MHz	-16.2 dBm	-16 dBm	-0.22 dB	Pass

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Mr. Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: Tx; CW, Ant.2, 404.85 MHz
Test Date: 2019-06-03
Note: Tx

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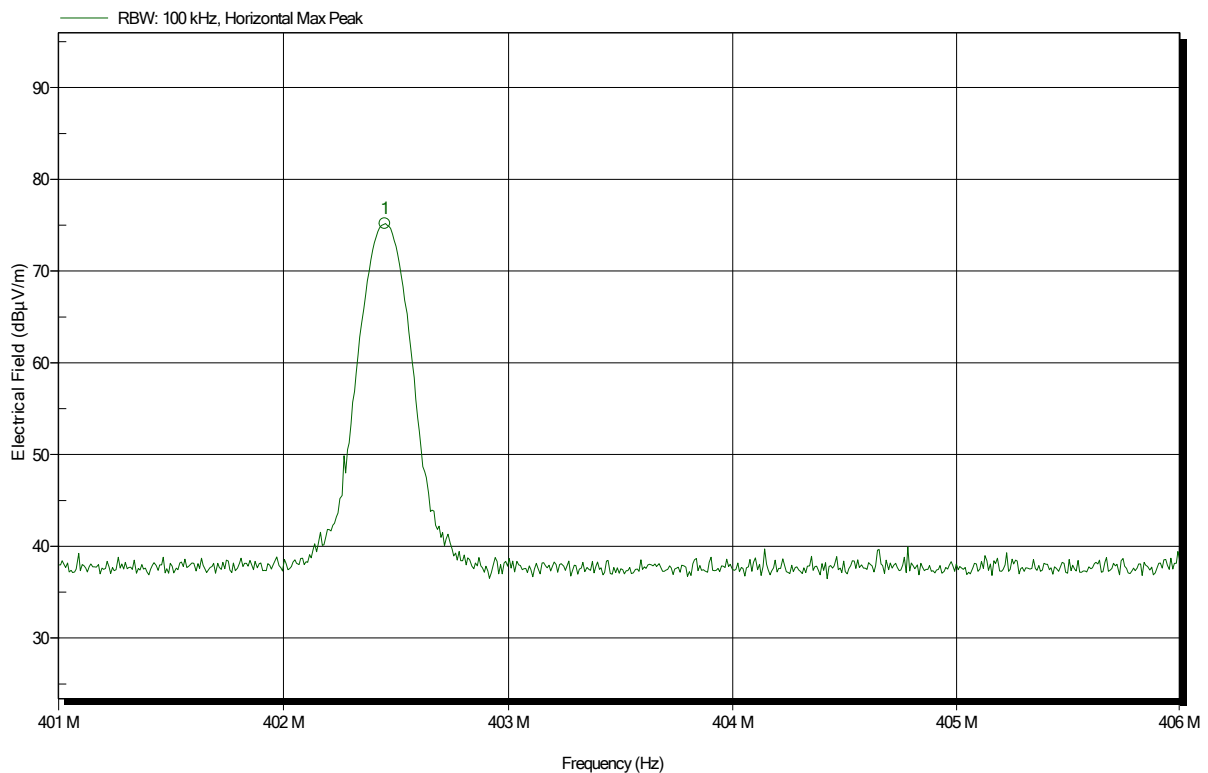
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
404.846 MHz	-19.1 dBm	-16 dBm	-3.1 dB	Pass

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 2-FSK, Ant.1+2, 402.45 MHz
 Test Date: 2019-06-21
 Note: Power dBµV/m ERP

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Frequency 402.45 MHz

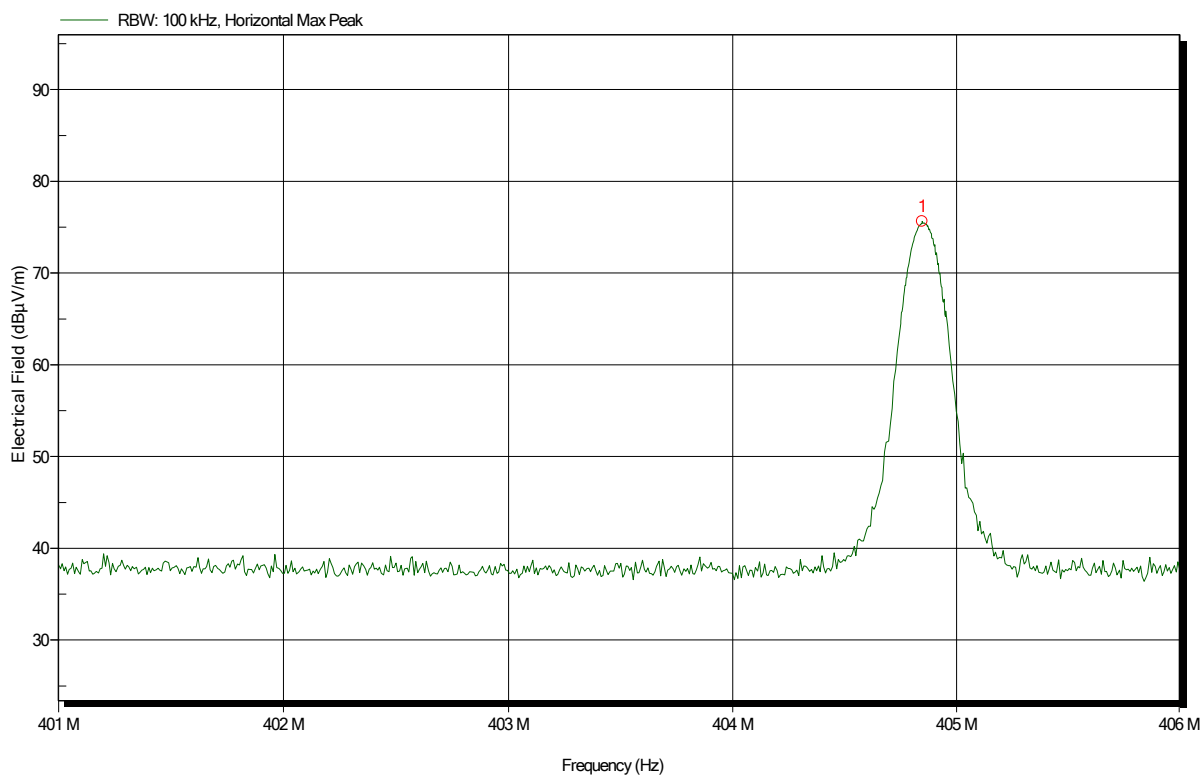
Peak 75.18 dBµV/m

Radiated power according to FCC part 95 MedRadio (402-405MHz)

Order number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 2-FSK, Ant.1+2, 404.85 MHz
 Test Date: 2019-06-21
 Note: Power dBμV/m ERP

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Frequency
404.847 MHz

Peak
75.65 dBμV/m

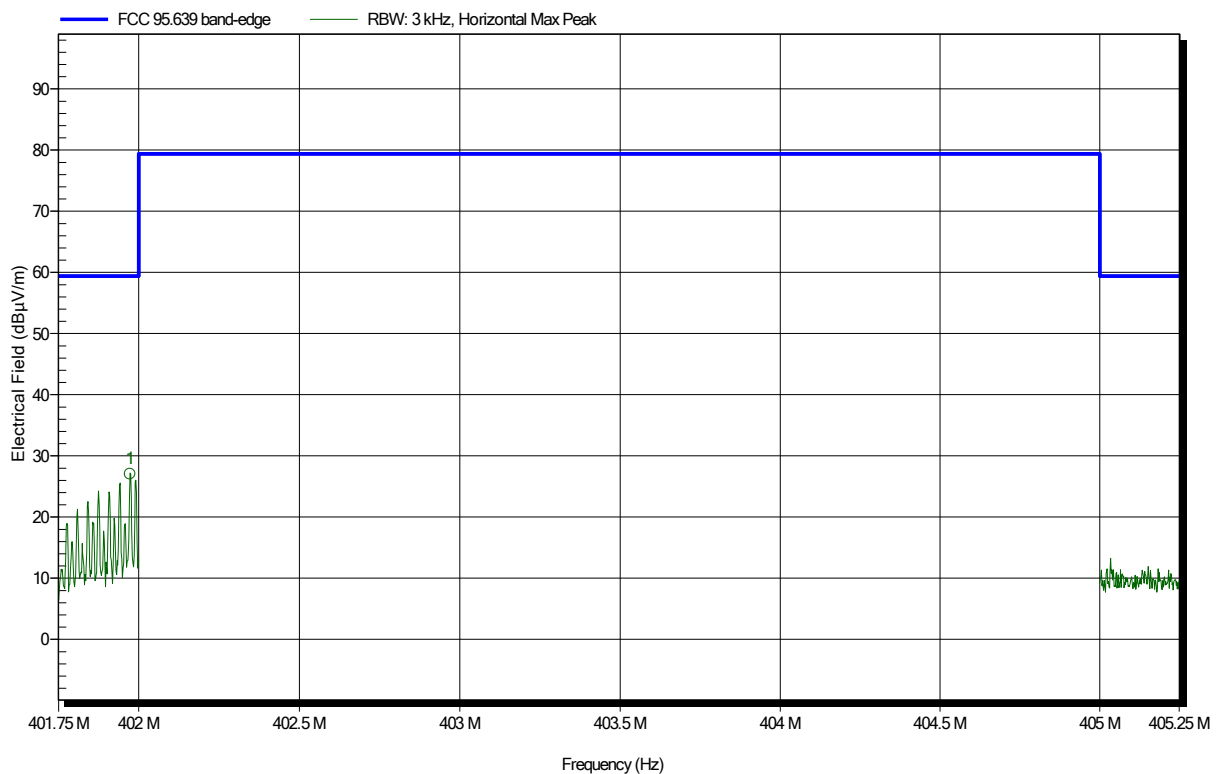
ANNEX B Band-edge and In-band Emissions

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
 Test Date: 2019-06-21
 Note: Band-edge

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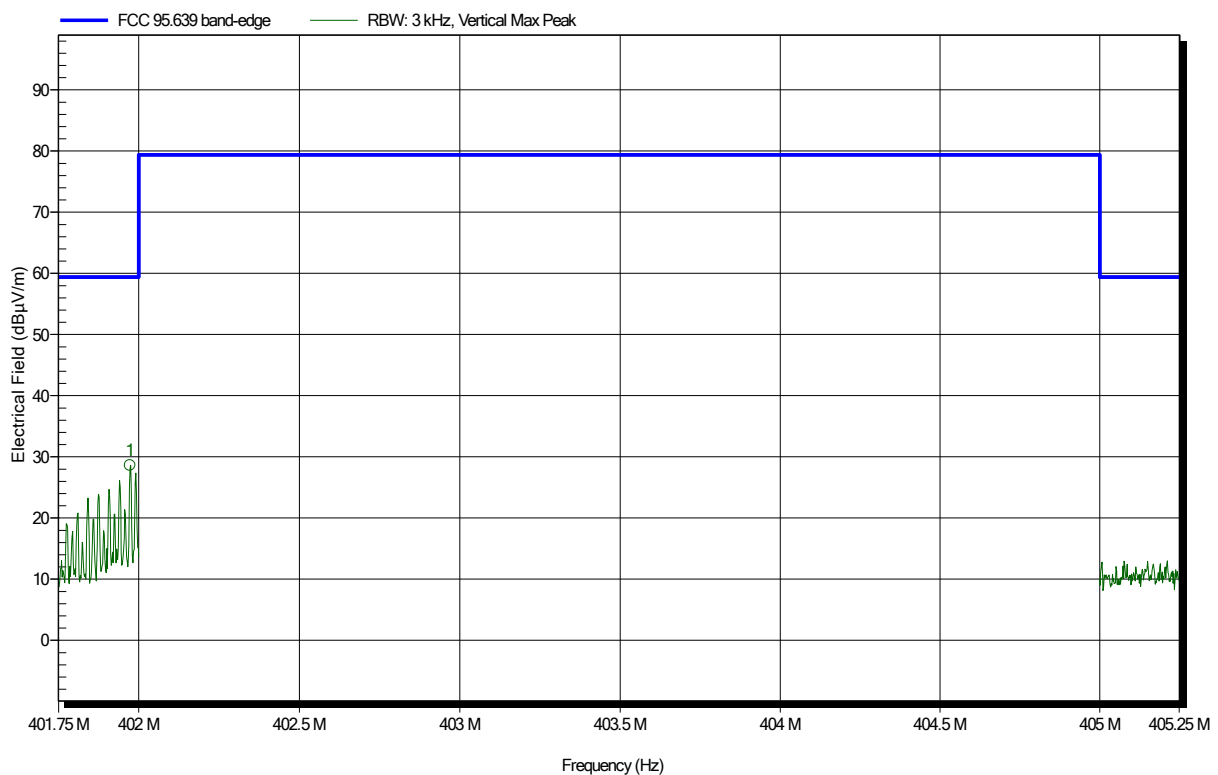
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
401.974 MHz	27.05 dBμV/m	59.4 dBμV/m	-32.35 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
 Test Date: 2019-06-21
 Note: Band-edge

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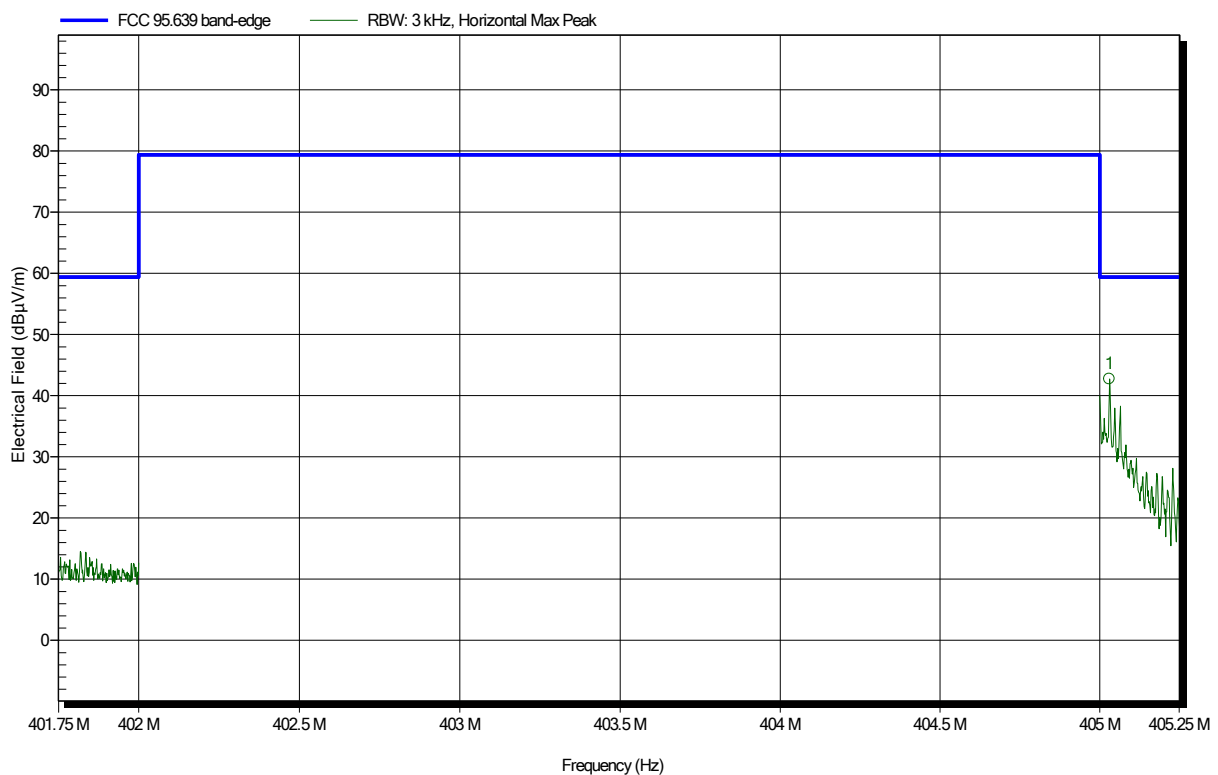
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
401.974 MHz	28.59 dBµV/m	59.4 dBµV/m	-30.81 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
 Test Date: 2019-06-21
 Note: Band-edge

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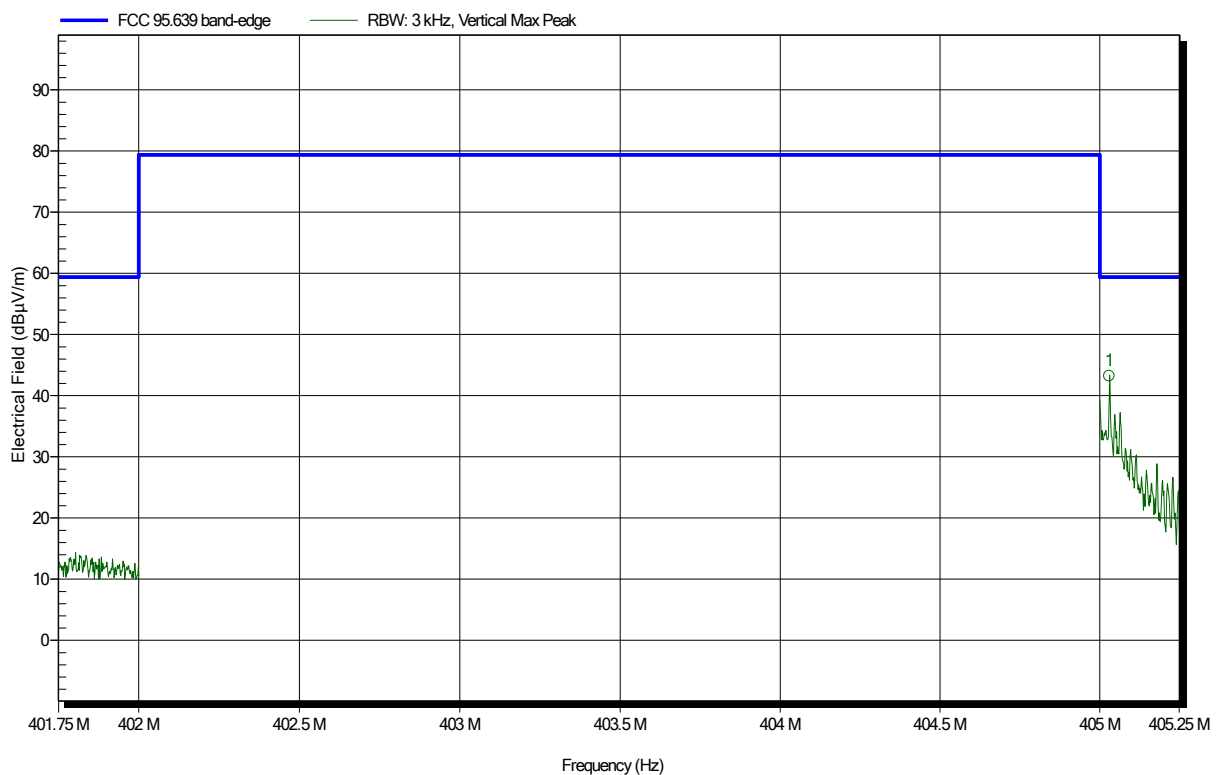
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
405.03 MHz	42.75 dBµV/m	59.4 dBµV/m	-16.65 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
 Test Date: 2019-06-21
 Note: Band-edge

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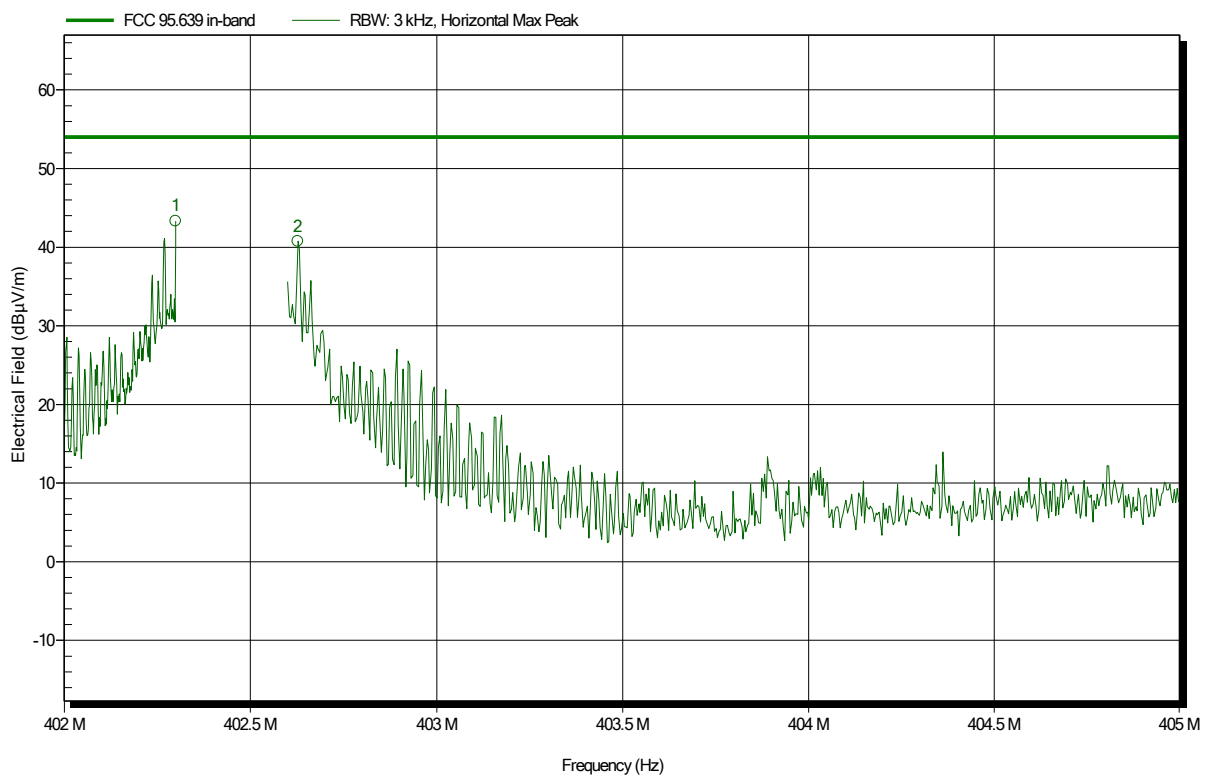
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
405.03 MHz	43.23 dBµV/m	59.4 dBµV/m	-16.17 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
Test Date: 2019-06-21
Note: In-band emissions

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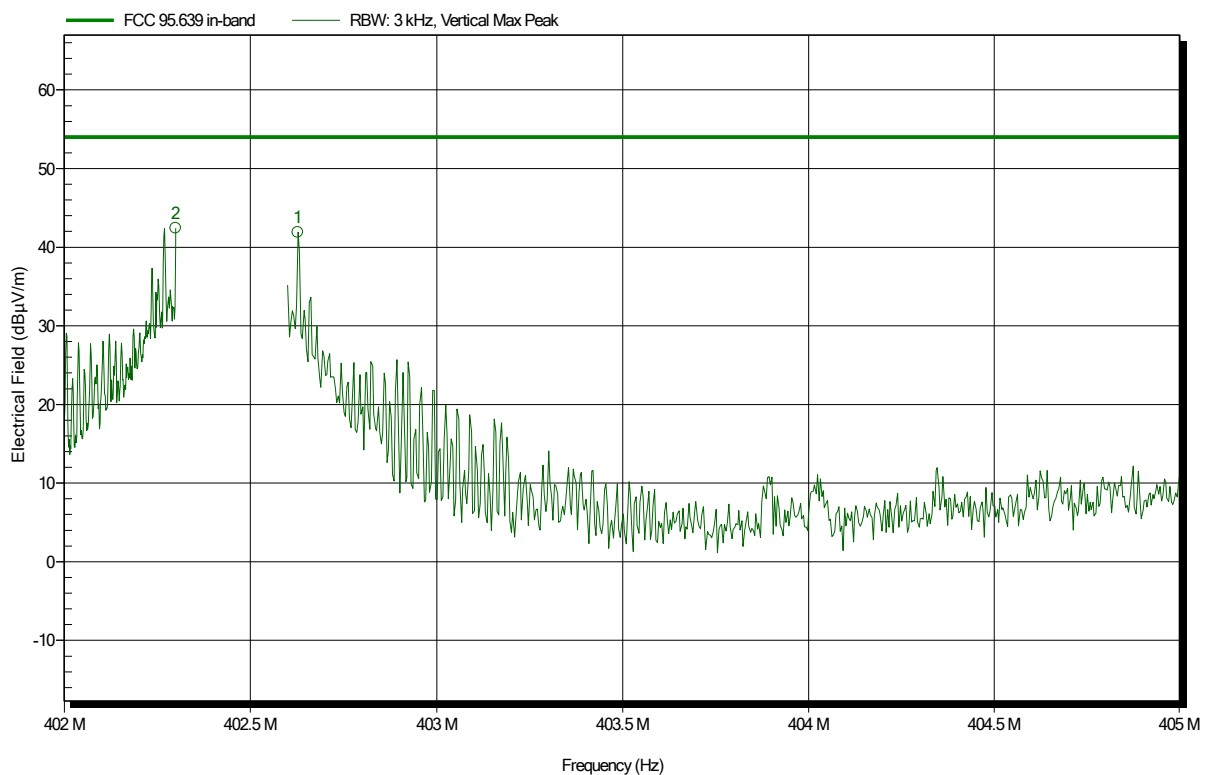
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
402.3 MHz	43.32 dBµV/m	54 dBµV/m	-10.68 dB	Pass
402.627 MHz	40.76 dBµV/m	54 dBµV/m	-13.24 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
Test Date: 2019-06-21
Note: In-band emissions

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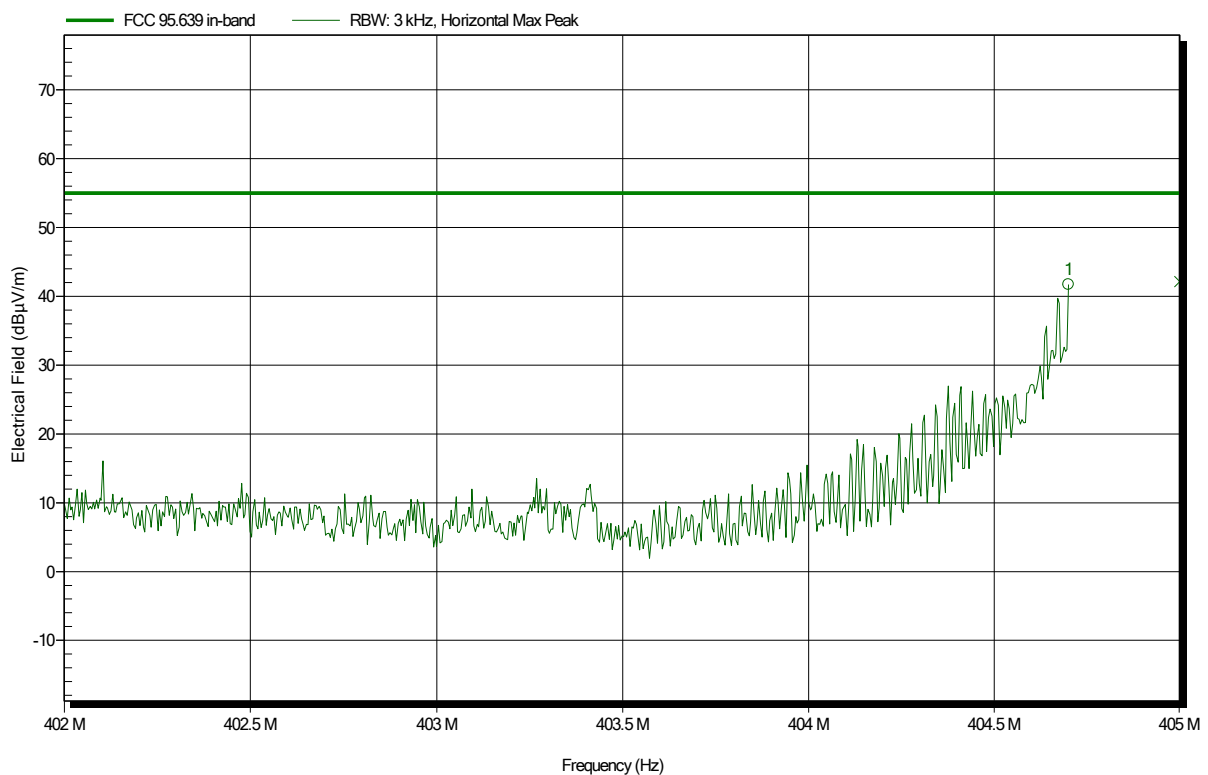
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
402.3 MHz	42.44 dBµV/m	54 dBµV/m	-11.56 dB	Pass
402.627 MHz	41.9 dBµV/m	54 dBµV/m	-12.1 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
Test Date: 2019-06-21
Note: In-band emissions

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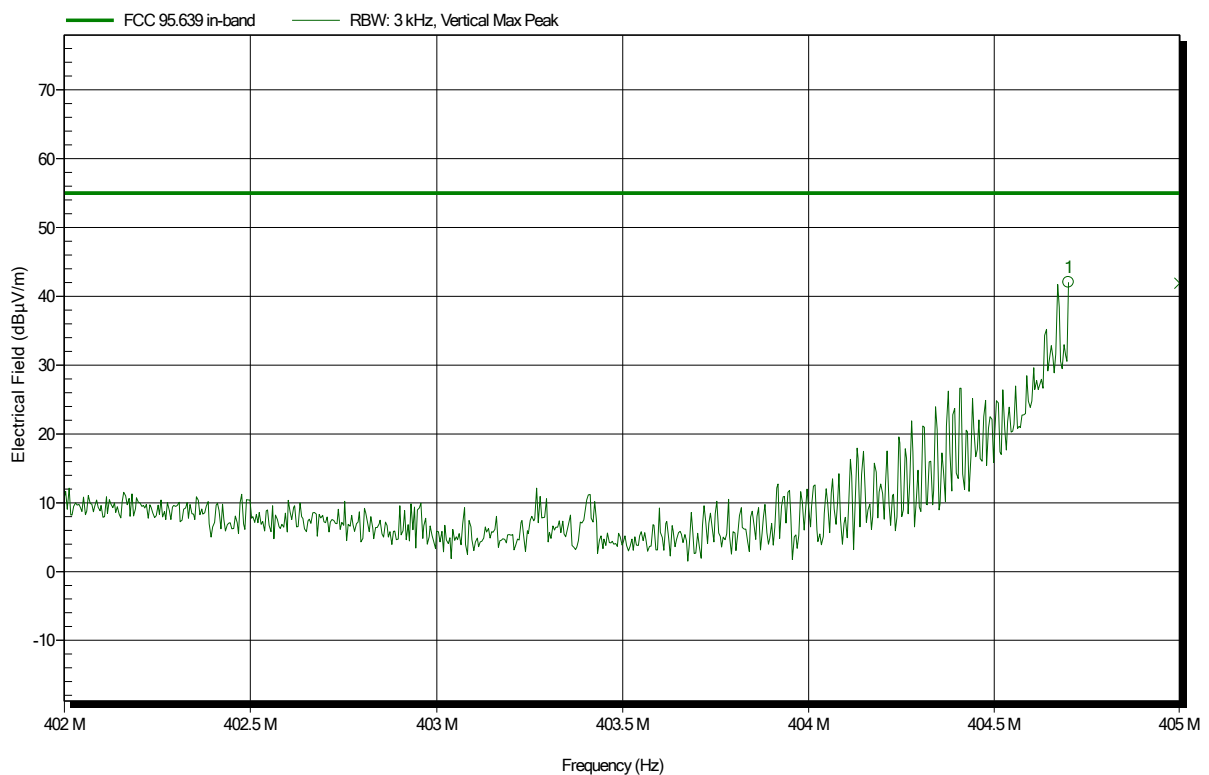
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
404.7 MHz	41.73 dBµV/m	55 dBµV/m	-13.27 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
 Test Date: 2019-06-21
 Note: In-band emissions

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
404.7 MHz	42.03 dBµV/m	55 dBµV/m	-12.97 dB	Pass

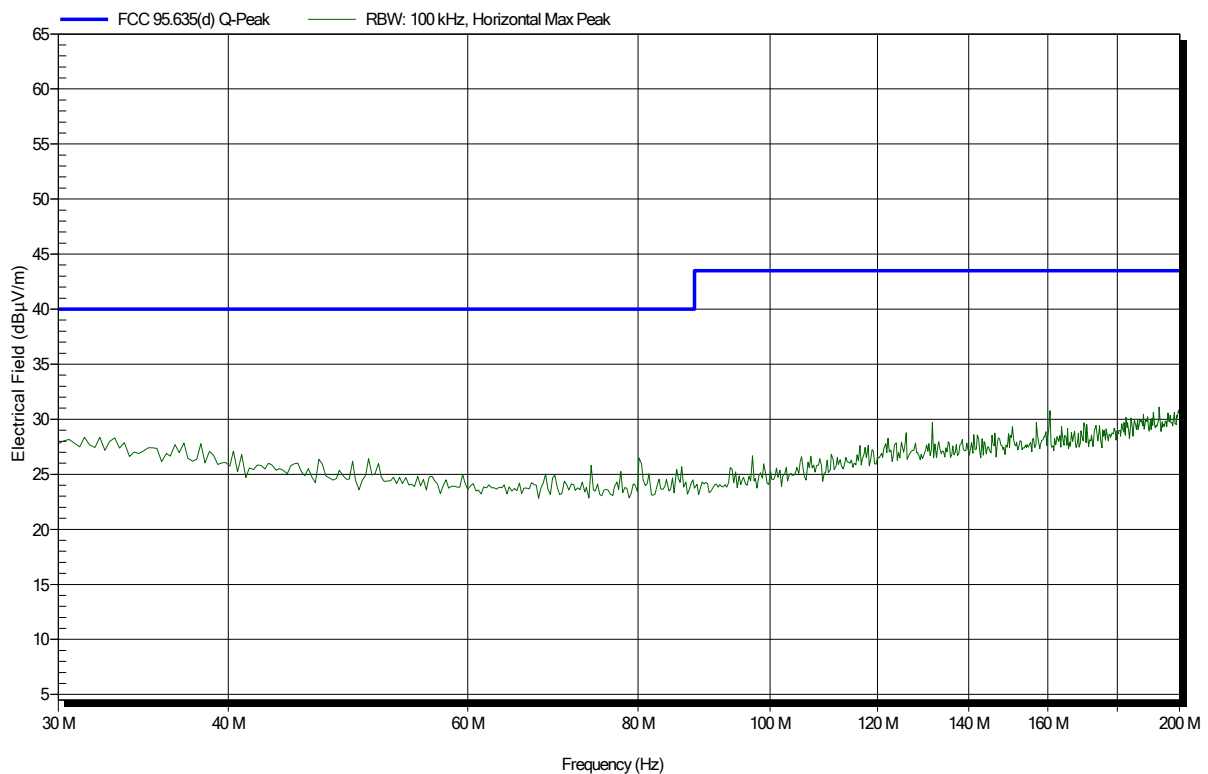
ANNEX C Transmitter spurious emissions

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HK 116, Horizontal
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
Test Date: 2019-06-21
Note:

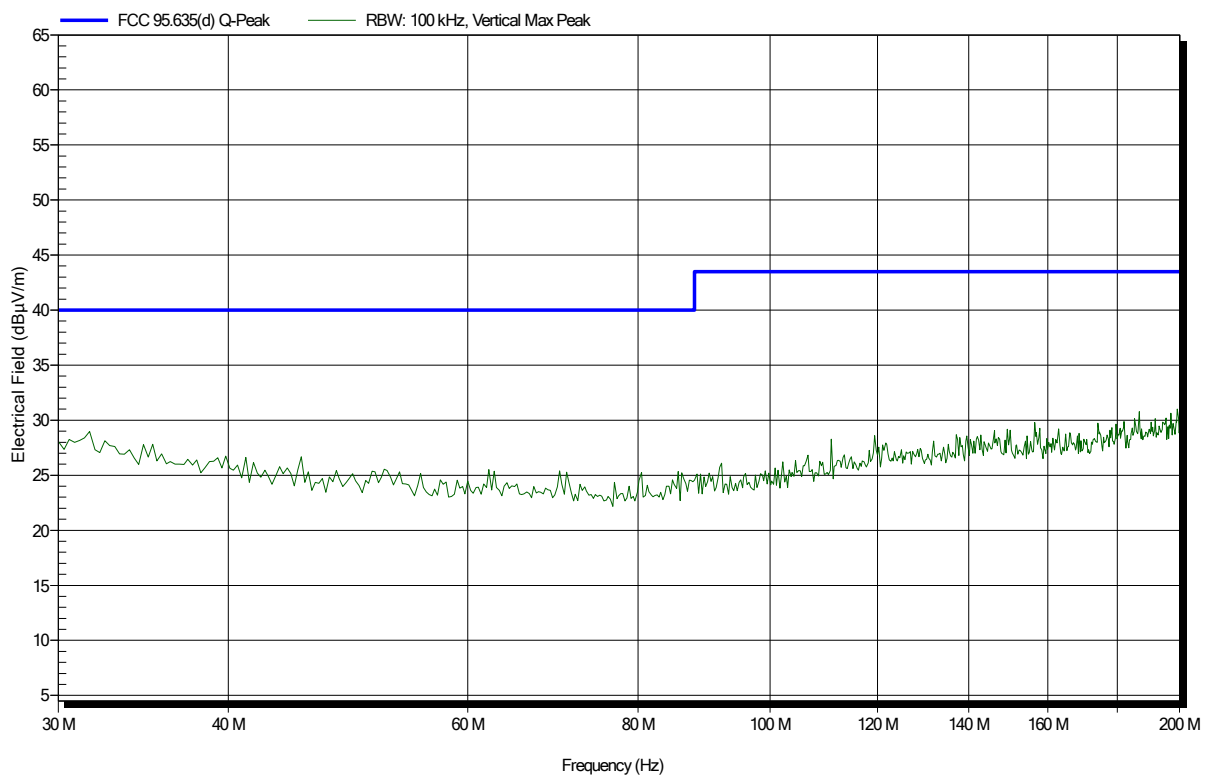
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Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256
 Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
 Test Date: 2019-06-21
 Note:

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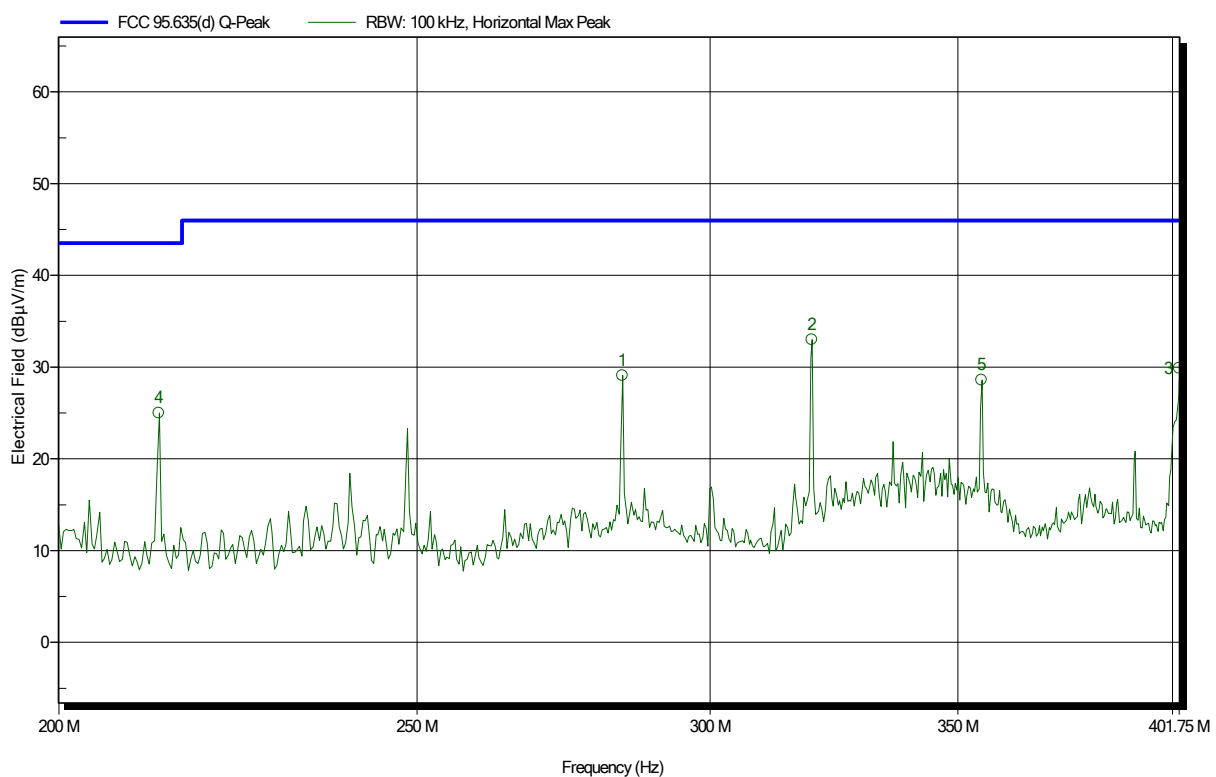


Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
Test Date: 2019-06-21
Note:

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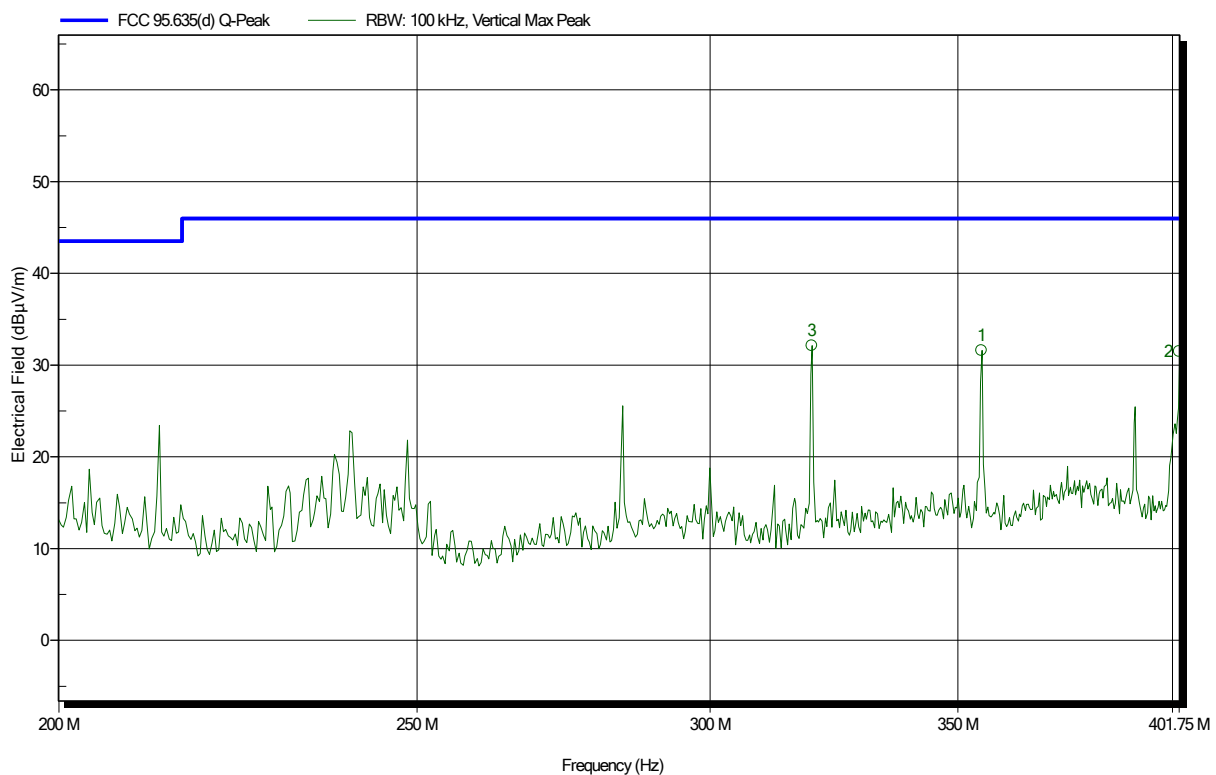
Frequency	Peak	Peak Limit	Peak Difference	Status
212.933 MHz	25.02 dBµV/m	43.5 dBµV/m	-18.48 dB	Pass
284.063 MHz	29.08 dBµV/m	46 dBµV/m	-16.92 dB	Pass
319.627 MHz	33 dBµV/m	46 dBµV/m	-13 dB	Pass
355.192 MHz	28.6 dBµV/m	46 dBµV/m	-17.4 dB	Pass
401.75 MHz	29.89 dBµV/m	46 dBµV/m	-16.11 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
Test Date: 2019-06-21
Note:

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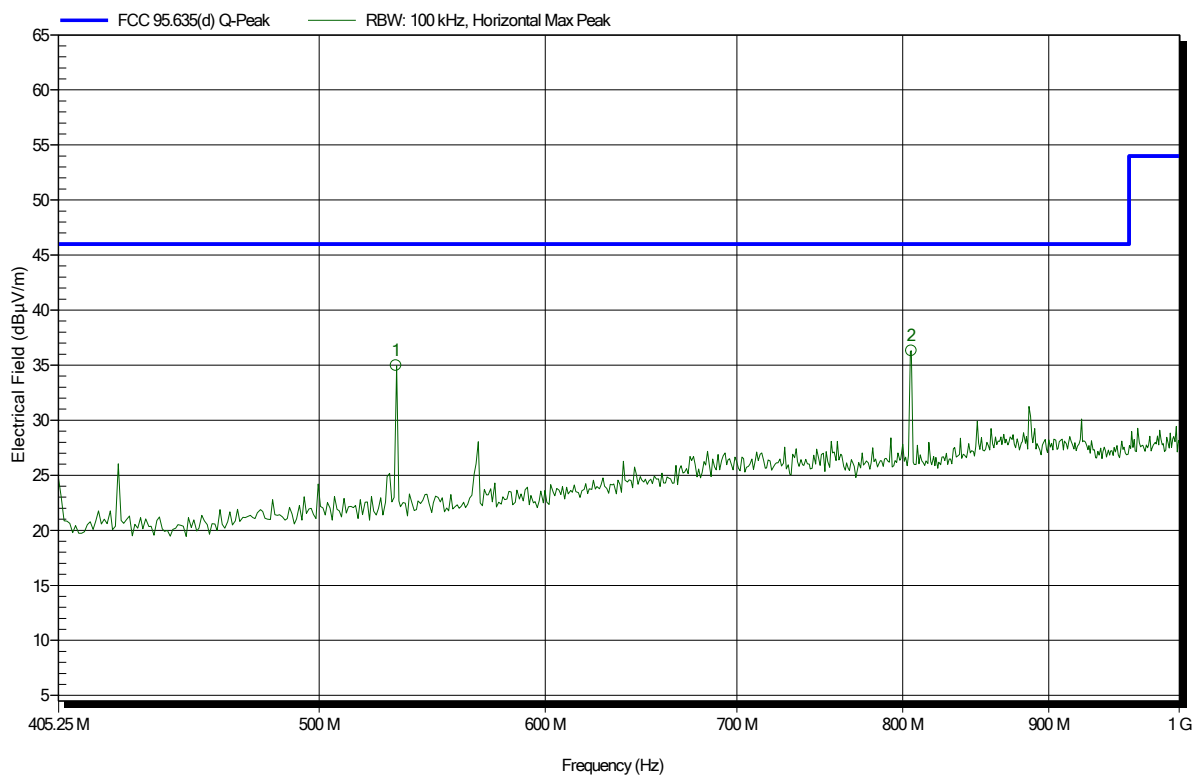


Frequency	Peak	Peak Limit	Peak Difference	Status
319.627 MHz	32.14 dBµV/m	46 dBµV/m	-13.86 dB	Pass
355.192 MHz	31.6 dBµV/m	46 dBµV/m	-14.4 dB	Pass
401.75 MHz	31.48 dBµV/m	46 dBµV/m	-14.52 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256
 Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
 Test Date: 2019-06-21
 Note:

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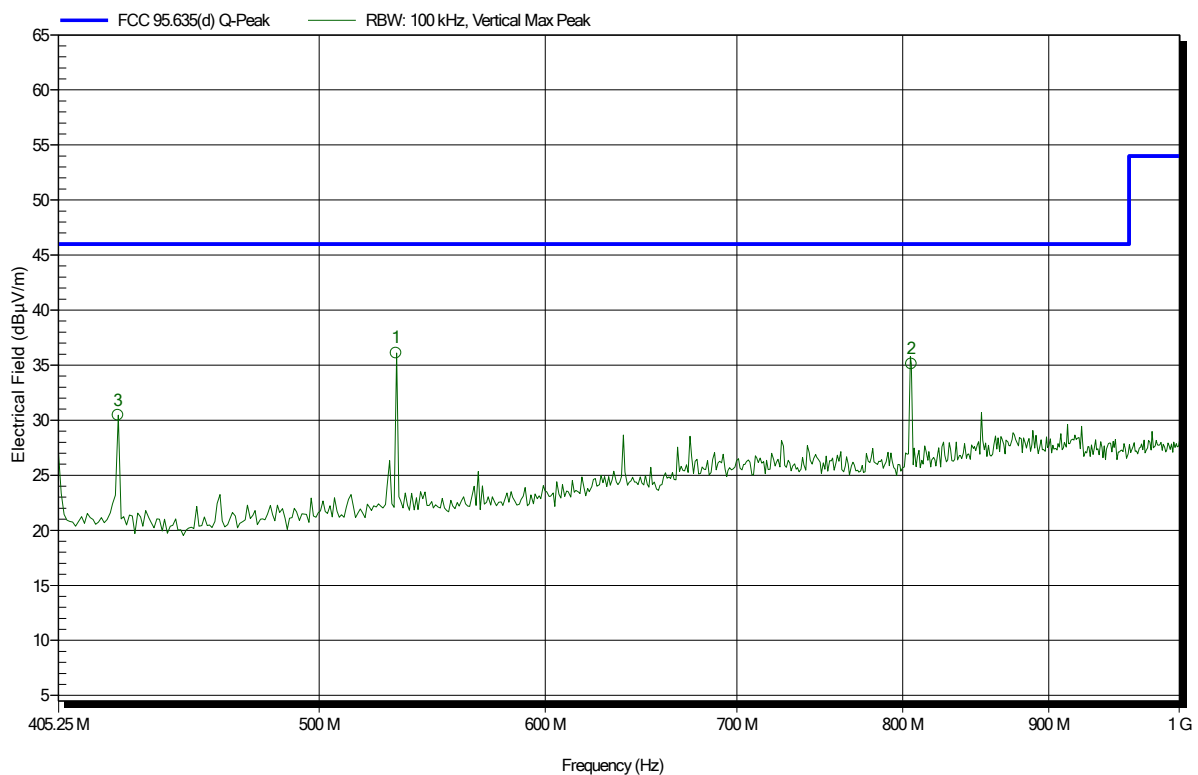
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
532.016 MHz	34.96 dBµV/m	46 dBµV/m	-11.04 dB	Pass
805.563 MHz	36.3 dBµV/m	46 dBµV/m	-9.7 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
 Test Date: 2019-06-21
 Note:

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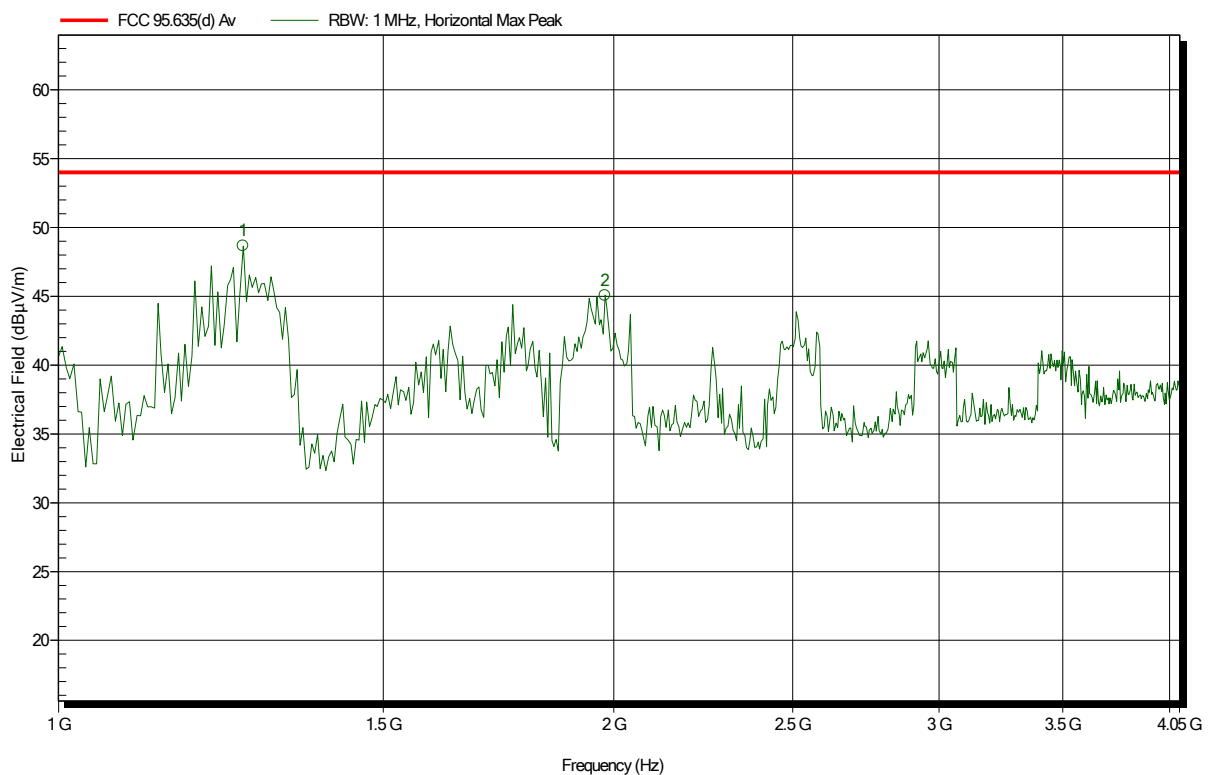


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
425.266 MHz	30.47 dBµV/m	46 dBµV/m	-15.53 dB	Pass
532.016 MHz	36.1 dBµV/m	46 dBµV/m	-9.9 dB	Pass
805.563 MHz	35.11 dBµV/m	46 dBµV/m	-10.89 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256
 Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
 Test Date: 2019-06-21
 Note:

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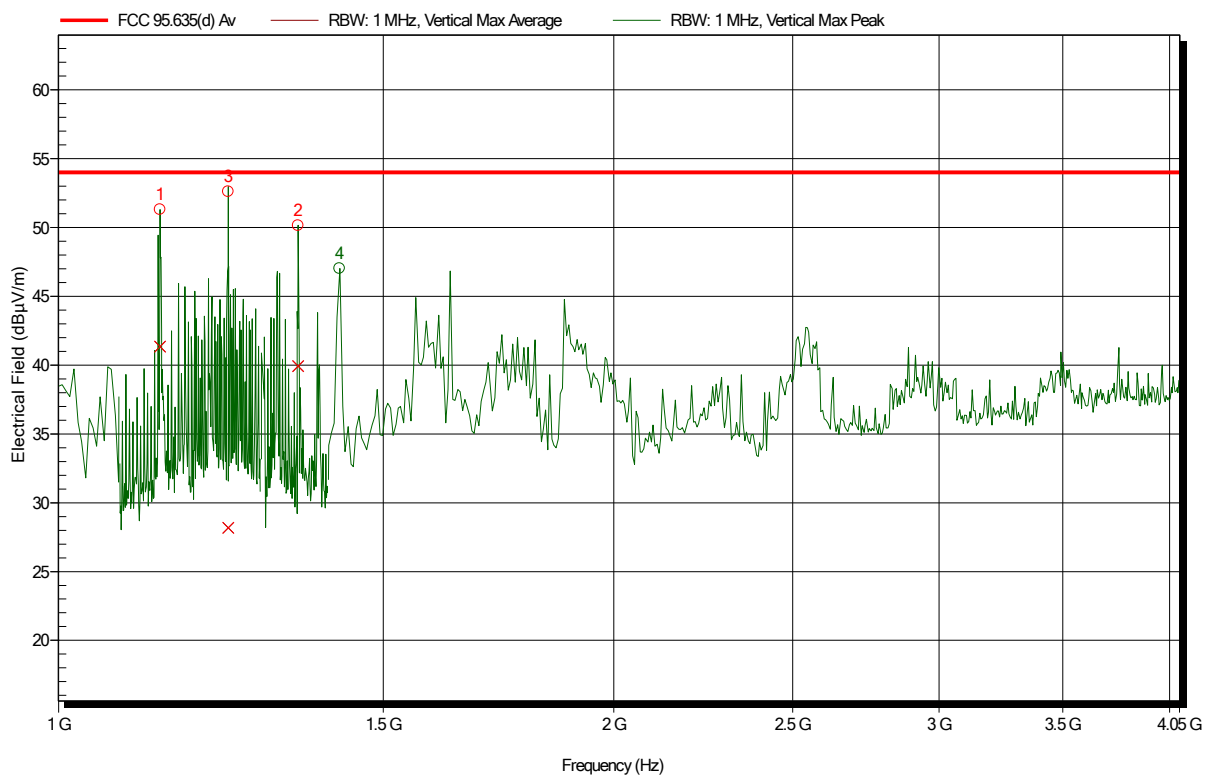
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.259 GHz	48.67 dBµV/m	54 dBµV/m	-5.33 dB	Pass
1.978 GHz	45.08 dBµV/m	54 dBµV/m	-8.92 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 402.45 MHz
 Test Date: 2019-06-21
 Note:

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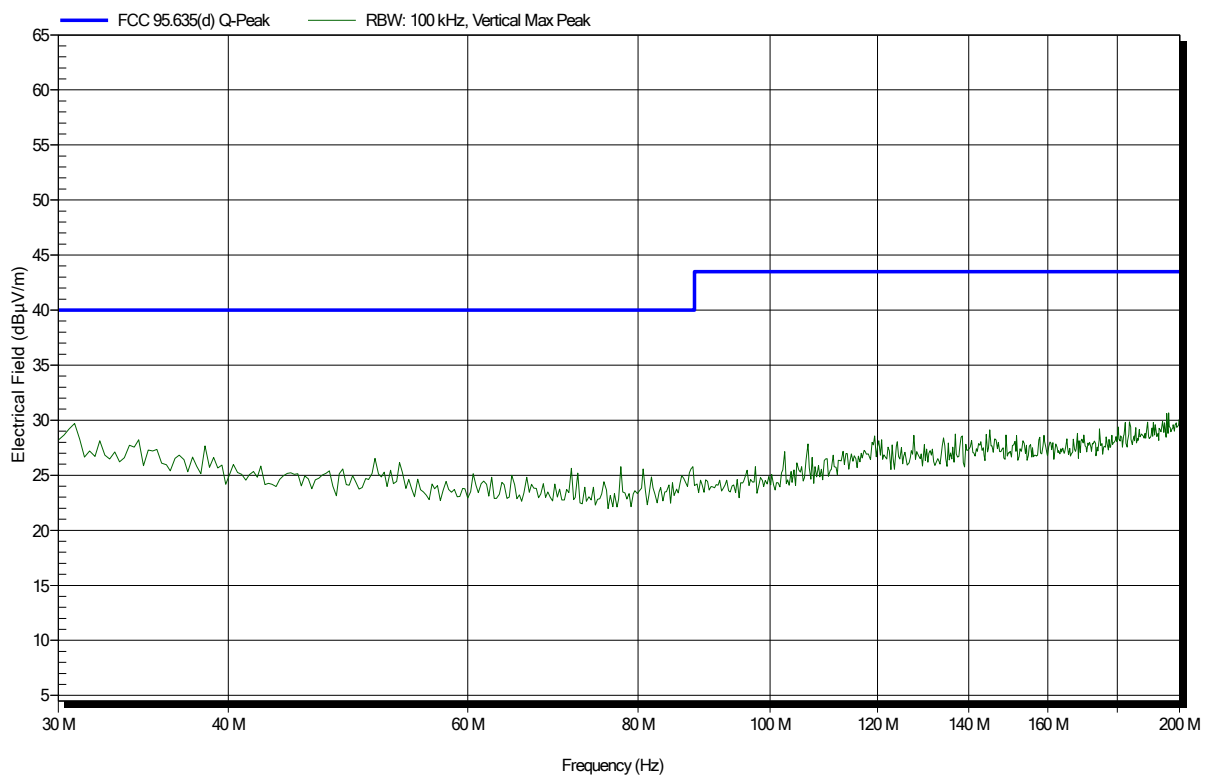


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.136 GHz	51.31 dBµV/m	54 dBµV/m	-2.69 dB	Pass
1.236 GHz	52.62 dBµV/m	54 dBµV/m	-1.38 dB	Pass
1.349 GHz	50.14 dBµV/m	54 dBµV/m	-3.86 dB	Pass
1.42 GHz	47.03 dBµV/m	54 dBµV/m	-6.97 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256
 Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
 Test Date: 2019-06-21
 Note:

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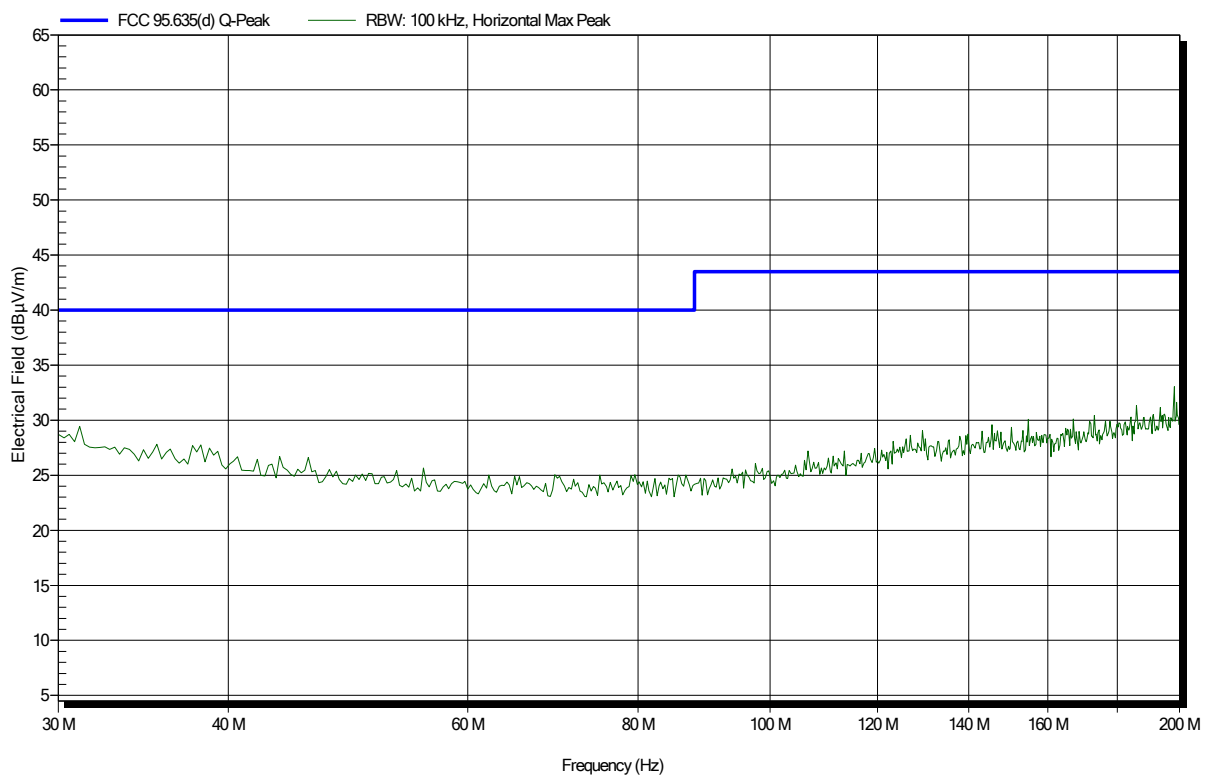


Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
 Test Date: 2019-06-21
 Note:

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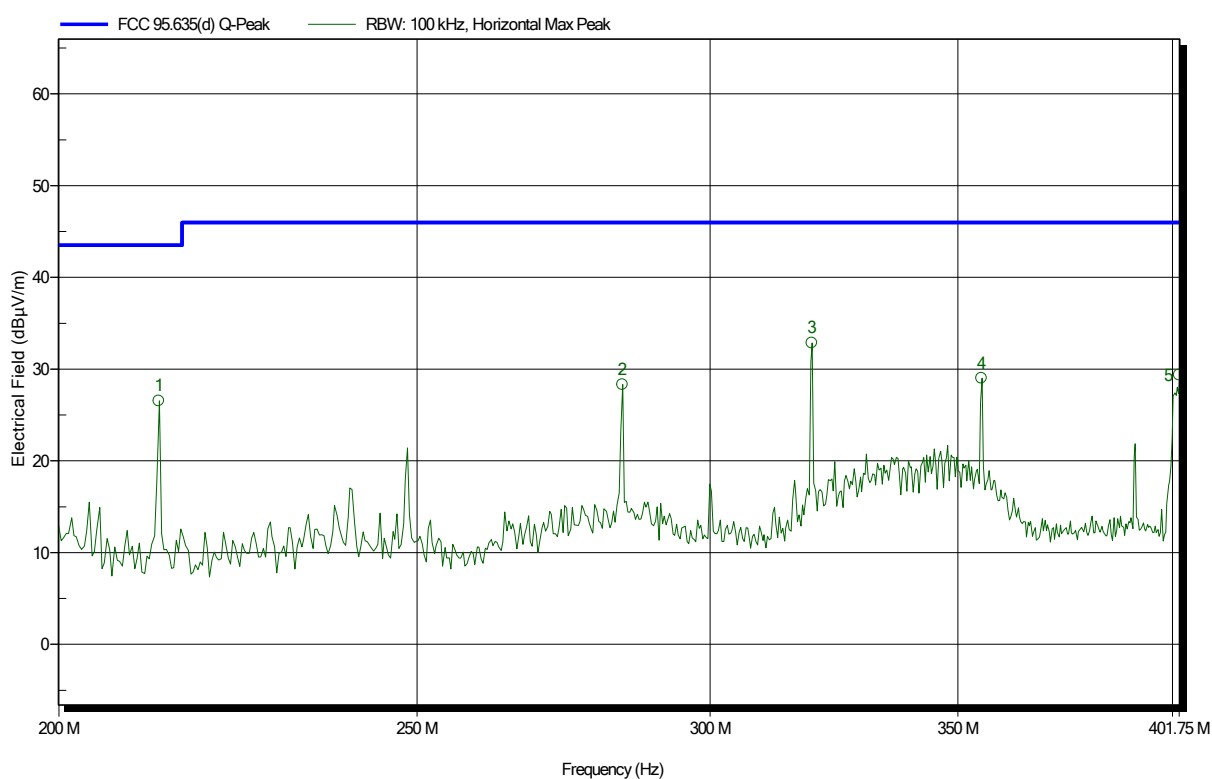


Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
Test Date: 2019-06-21
Note:

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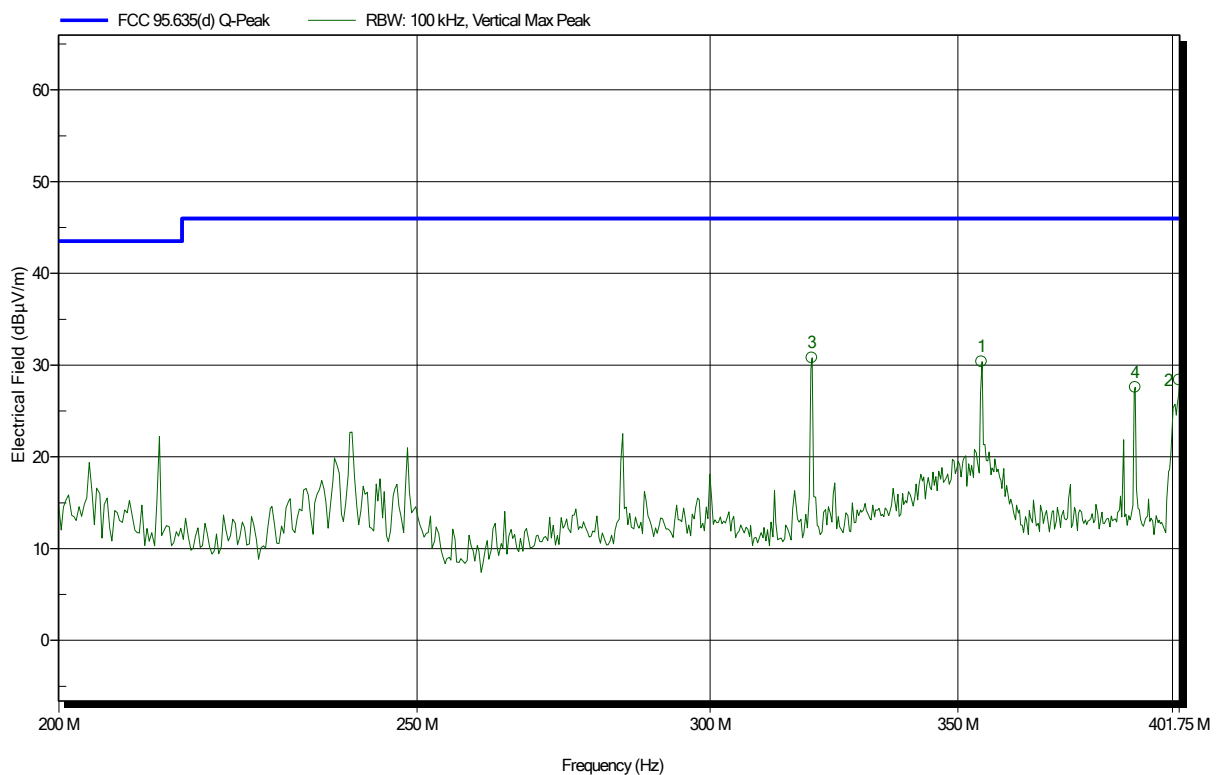
Frequency	Peak	Peak Limit	Peak Difference	Status
212.933 MHz	26.53 dBµV/m	43.5 dBµV/m	-16.97 dB	Pass
284.063 MHz	28.31 dBµV/m	46 dBµV/m	-17.69 dB	Pass
319.627 MHz	32.87 dBµV/m	46 dBµV/m	-13.13 dB	Pass
355.192 MHz	29.03 dBµV/m	46 dBµV/m	-16.97 dB	Pass
401.75 MHz	29.38 dBµV/m	46 dBµV/m	-16.62 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
Test Date: 2019-06-21
Note:

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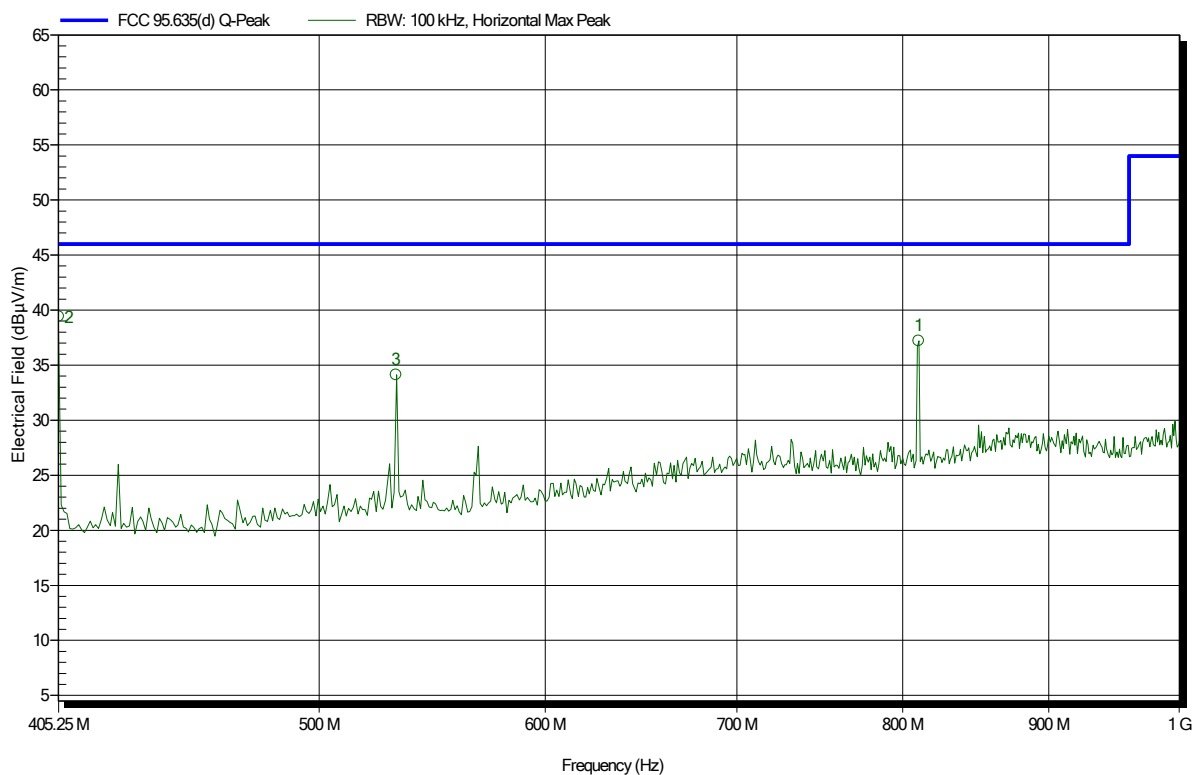
Frequency	Peak	Peak Limit	Peak Difference	Status
319.627 MHz	30.81 dBµV/m	46 dBµV/m	-15.19 dB	Pass
355.192 MHz	30.39 dBµV/m	46 dBµV/m	-15.61 dB	Pass
390.757 MHz	27.58 dBµV/m	46 dBµV/m	-18.42 dB	Pass
401.75 MHz	28.37 dBµV/m	46 dBµV/m	-17.63 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
Test Date: 2019-06-21
Note:

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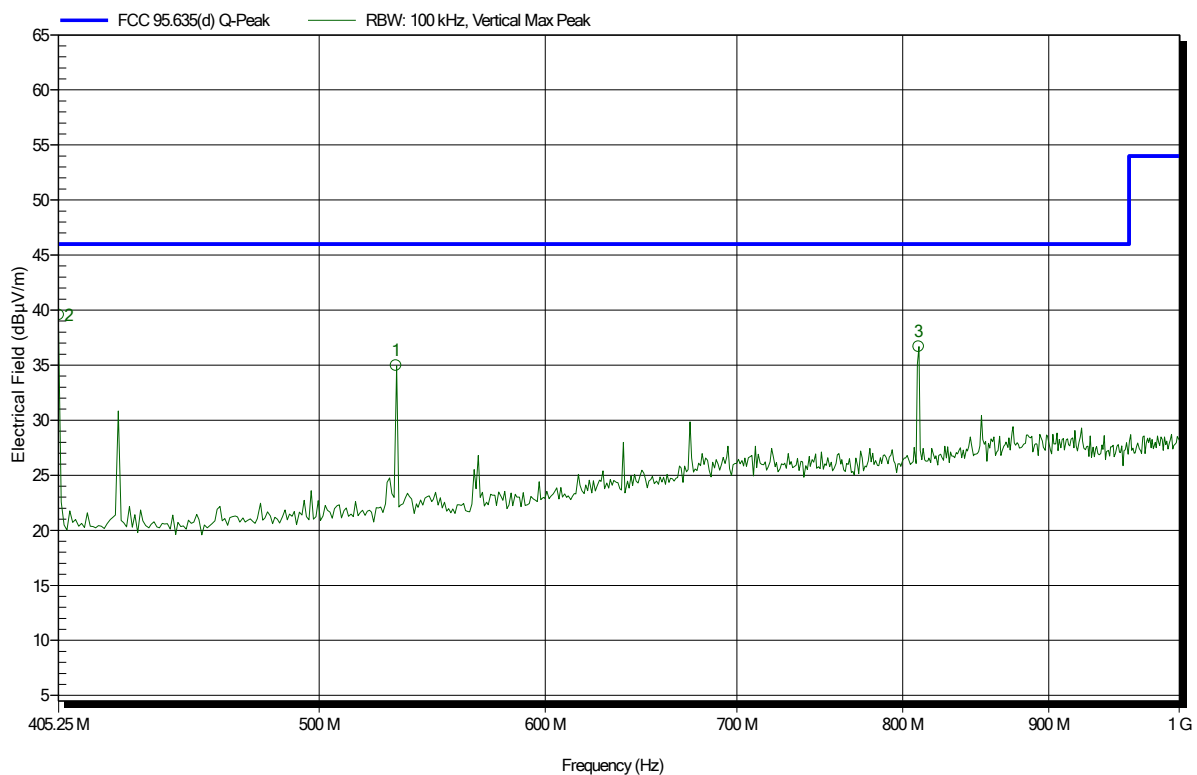
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
405.25 MHz	39.42 dBµV/m	46 dBµV/m	-6.58 dB	Pass
532.016 MHz	34.13 dBµV/m	46 dBµV/m	-11.87 dB	Pass
810.328 MHz	37.2 dBµV/m	46 dBµV/m	-8.8 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
Test Date: 2019-06-21
Note:

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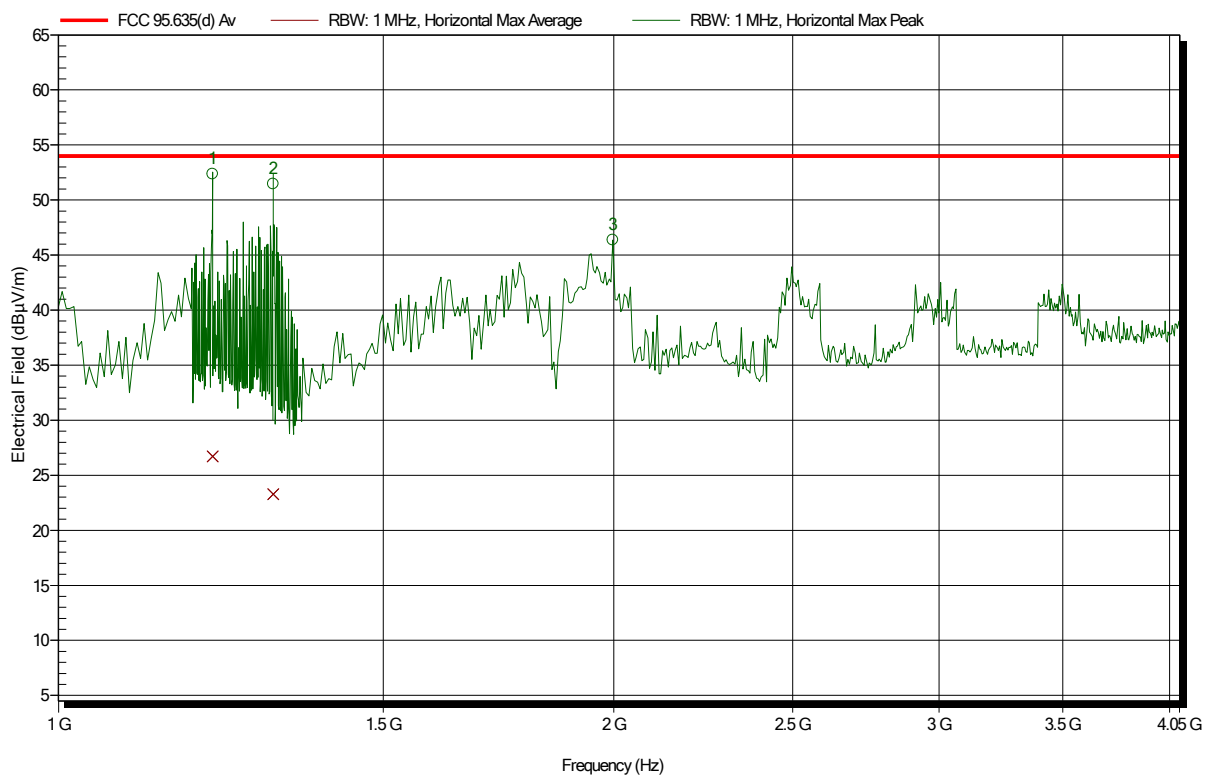
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
405.25 MHz	39.58 dBµV/m	46 dBµV/m	-6.42 dB	Pass
532.016 MHz	34.98 dBµV/m	46 dBµV/m	-11.02 dB	Pass
810.328 MHz	36.68 dBµV/m	46 dBµV/m	-9.32 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 3 m
Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
Test Date: 2019-06-21
Note:

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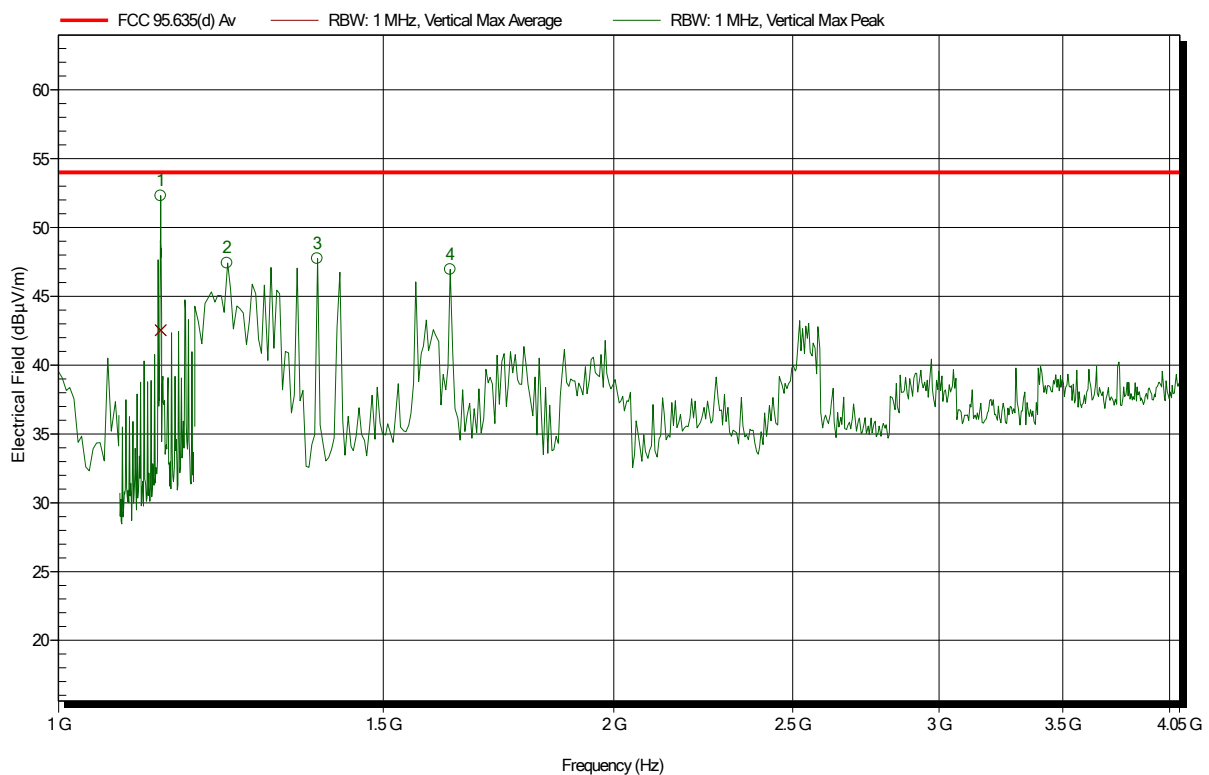
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.212 GHz	52.37 dBμV/m	54 dBμV/m	-1.63 dB	Pass
1.308 GHz	51.45 dBμV/m	54 dBμV/m	-2.55 dB	Pass
1.997 GHz	46.38 dBμV/m	54 dBμV/m	-7.62 dB	Pass

Spurious emissions according to FCC PART 95 I

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; 2-FSK, Ant.1+2, 404.85 MHz
 Test Date: 2019-06-21
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.136 GHz	52.31 dBµV/m	54 dBµV/m	-1.69 dB	Pass
1.235 GHz	47.42 dBµV/m	54 dBµV/m	-6.58 dB	Pass
1.381 GHz	47.74 dBµV/m	54 dBµV/m	-6.26 dB	Pass
1.631 GHz	46.96 dBµV/m	54 dBµV/m	-7.04 dB	Pass

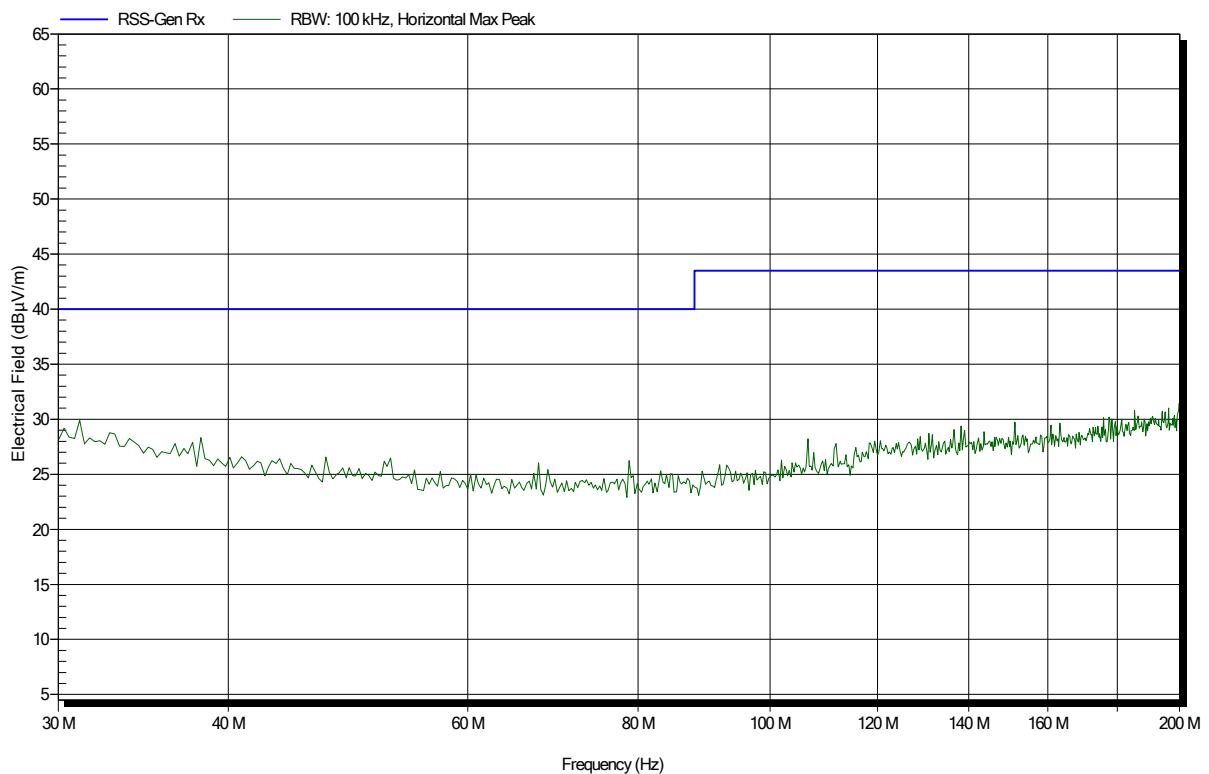
ANNEX D Receiver spurious emissions

Spurious emissions according to ISSED RSS-Gen Issue 5 (April 2018)

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: RX; 403.65 MHz
 Test Date: 2019-06-21
 Note:

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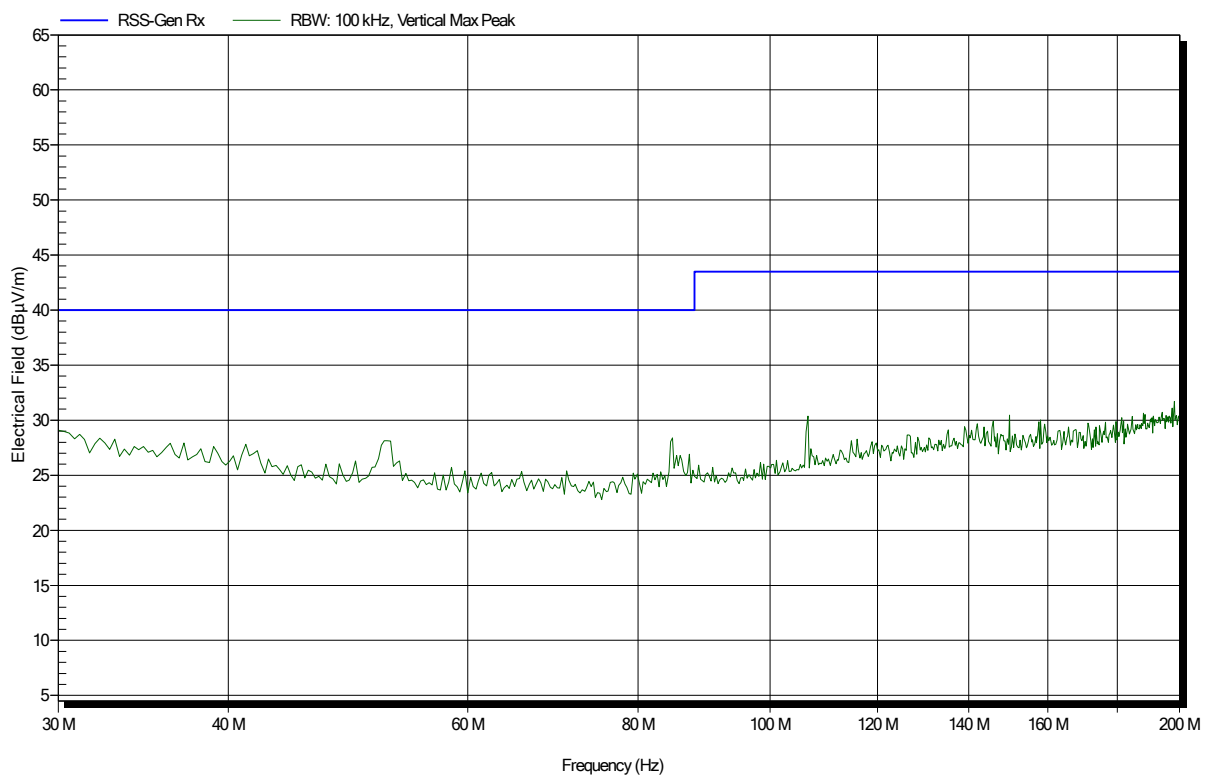


Spurious emissions according to ISED RSS-Gen Issue 5 (April 2018)

Project number: G0M-1905-8256

Applicant: Biotronik
 EUT Name: Renamic
 Model: Renamic Neo
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom: 24°C, Vnom: 120 VAC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: RX; 403.65 MHz
 Test Date: 2019-06-21
 Note:

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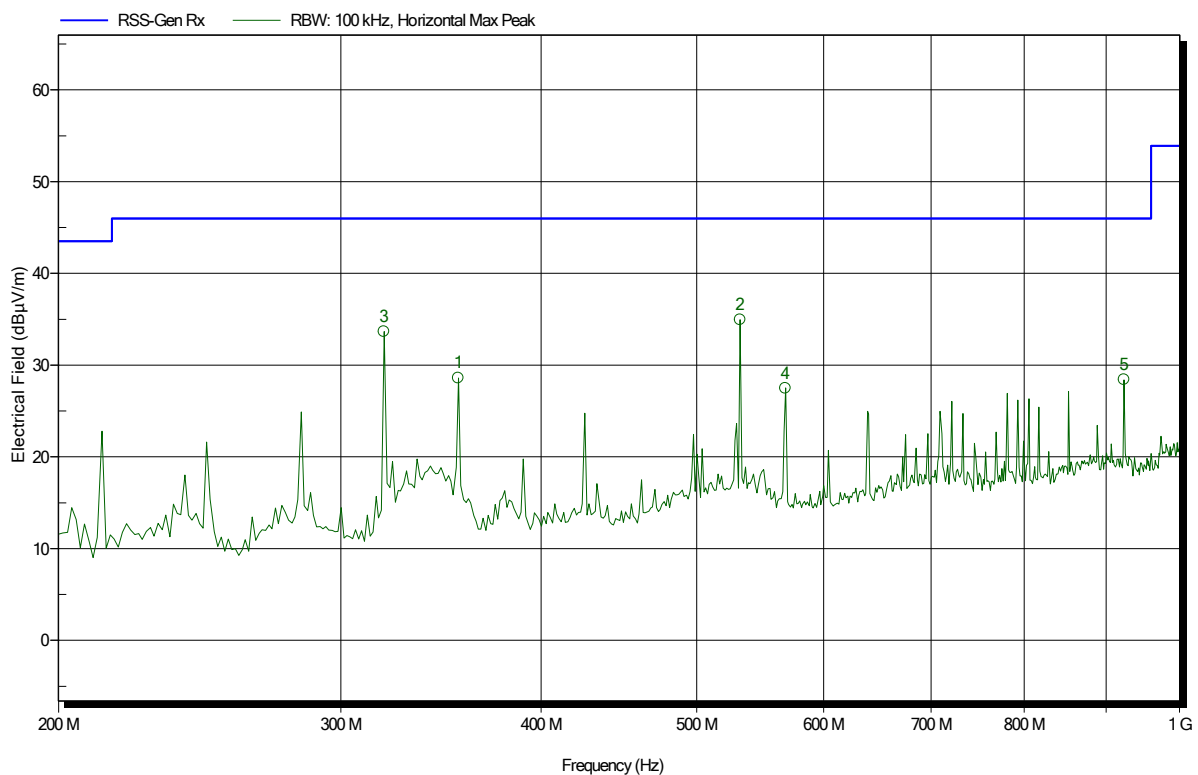


Spurious emissions according to ISED RSS-Gen Issue 5 (April 2018)

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: RX; 403.65 MHz
Test Date: 2019-06-21
Note:

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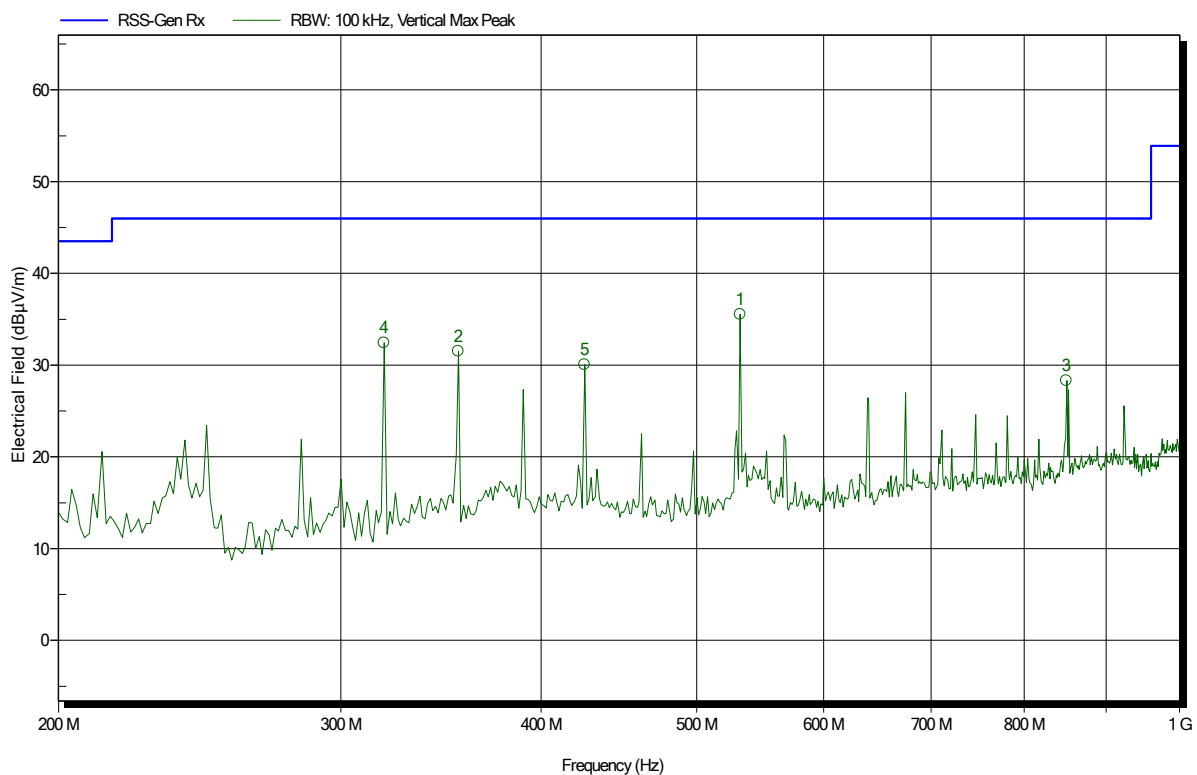
Frequency	Peak	Peak Limit	Peak Difference	Status
319.231 MHz	33.66 dBµV/m	46 dBµV/m	-12.34 dB	Pass
355.128 MHz	28.61 dBµV/m	46 dBµV/m	-17.39 dB	Pass
532.051 MHz	34.96 dBµV/m	46 dBµV/m	-11.04 dB	Pass
567.949 MHz	27.5 dBµV/m	46 dBµV/m	-18.5 dB	Pass
923.077 MHz	28.41 dBµV/m	46 dBµV/m	-17.59 dB	Pass

Spurious emissions according to ISED RSS-Gen Issue 5 (April 2018)

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: RX; 403.65 MHz
Test Date: 2019-06-21
Note:

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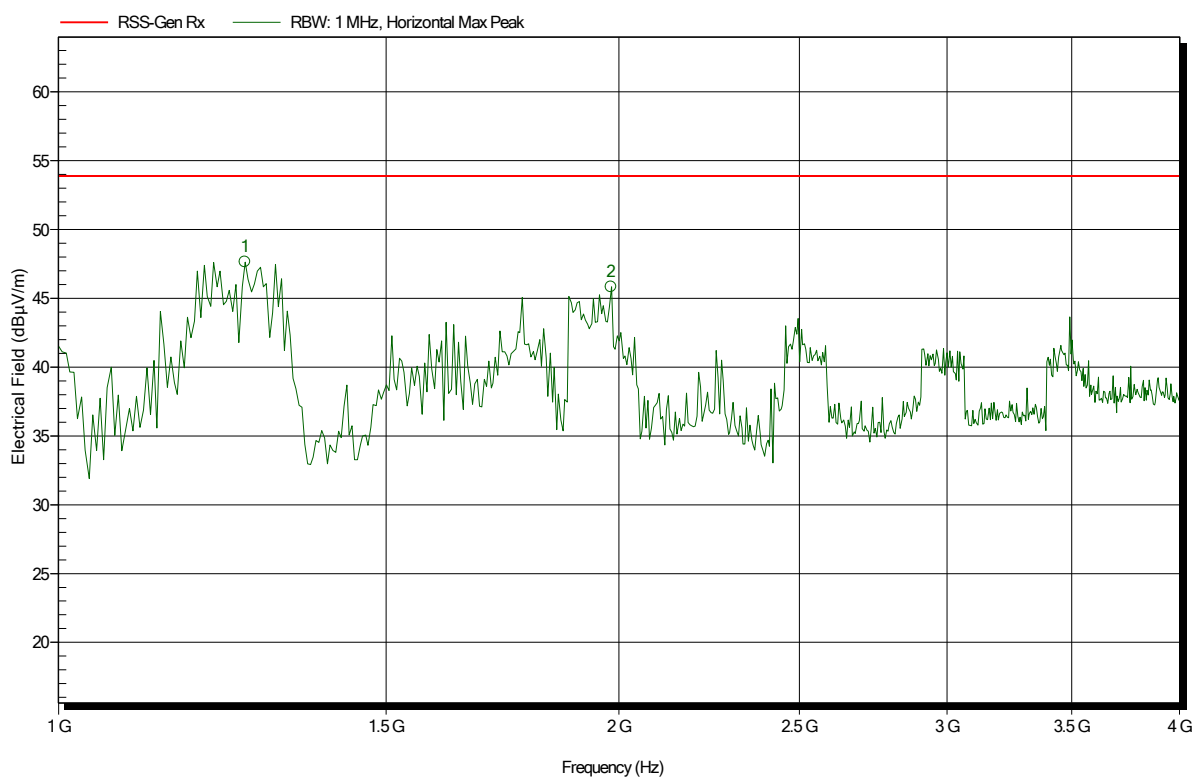
Frequency	Peak	Peak Limit	Peak Difference	Status
319.231 MHz	32.44 dBµV/m	46 dBµV/m	-13.56 dB	Pass
355.128 MHz	31.53 dBµV/m	46 dBµV/m	-14.47 dB	Pass
425.641 MHz	30.06 dBµV/m	46 dBµV/m	-15.94 dB	Pass
532.051 MHz	35.55 dBµV/m	46 dBµV/m	-10.45 dB	Pass
850 MHz	28.31 dBµV/m	46 dBµV/m	-17.69 dB	Pass

Spurious emissions according to ISED RSS-Gen Issue 5 (April 2018)

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 3 m
Mode: RX; 403.65 MHz
Test Date: 2019-06-21
Note:

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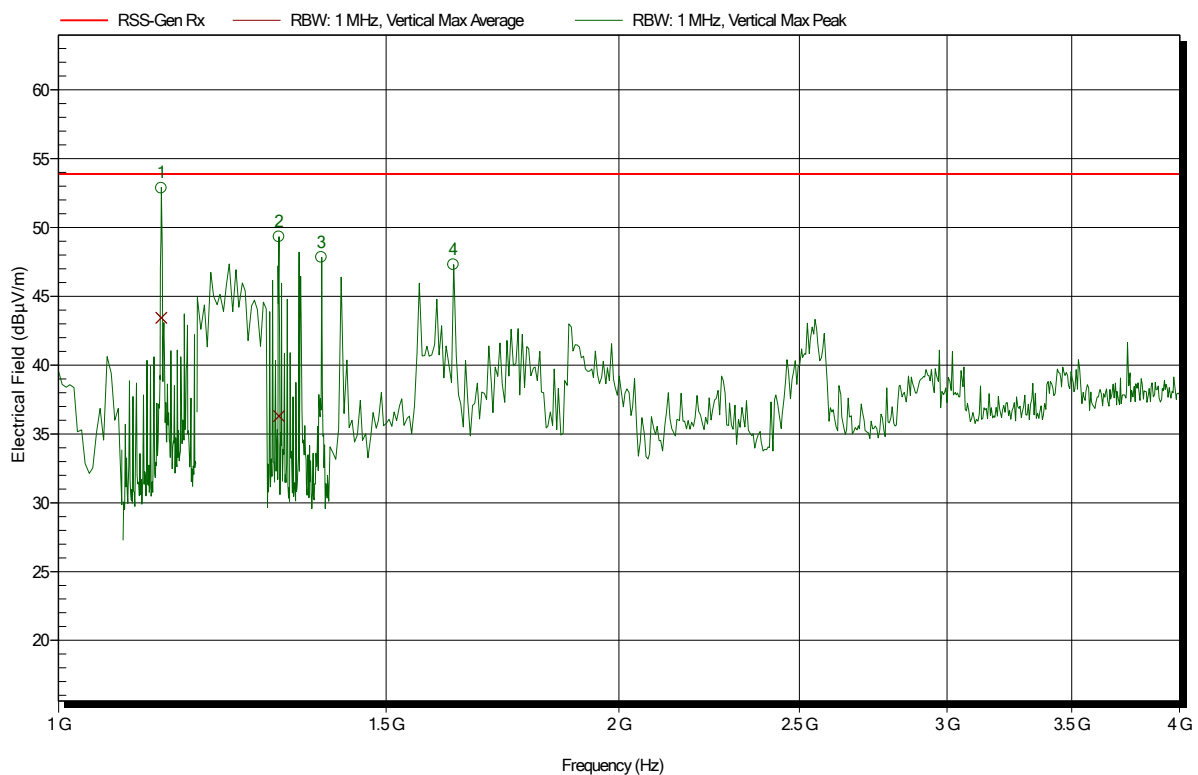
Frequency	Peak	Peak Limit	Peak Difference	Status
1.26 GHz	47.65 dBµV/m	53.9 dBµV/m	-6.25 dB	Pass
1.981 GHz	45.83 dBµV/m	53.9 dBµV/m	-8.07 dB	Pass

Spurious emissions according to ISED RSS-Gen Issue 5 (April 2018)

Project number: G0M-1905-8256

Applicant: Biotronik
EUT Name: Renamic
Model: Renamic Neo
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom: 24°C, Vnom: 120 VAC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 3 m
Mode: RX; 403.65 MHz
Test Date: 2019-06-21
Note:

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Frequency	Peak	Peak Limit	Peak Difference	Status
1.136 GHz	52.87 dBµV/m	53.9 dBµV/m	-1.03 dB	Pass
1.314 GHz	49.34 dBµV/m	53.9 dBµV/m	-4.56 dB	Pass
1.385 GHz	47.85 dBµV/m	53.9 dBµV/m	-6.05 dB	Pass
1.63 GHz	47.31 dBµV/m	53.9 dBµV/m	-6.59 dB	Pass