

	FCC TEST REPORT					
	FCC 47 CFR Part 15C Industry Canada RSS-310					
License exempt radio equipment						
Report Reference No	G0M-1509-5046-TFC209LP-V01					
Testing Laboratory	Eurofins Product Service GmbH					
Address :	Storkower Str. 38c 15526 Reichenwalde Germany					
Accreditation:						
	A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Filed Test Laboratory, RegNo.: 96970 IC OATS Filing assigned code: 3470A					
Applicant's name:	Biotronik SE & Co. KG					
Address:						
	12359 Berlin GERMANY					
Test specification:						
Standard:	47 CFR Part 15C RSS-310, Issue 3, 2010-12 RSS-Gen, Issue 4, 2014-11 ANSI C63.4:2014					
Test scope:	complete Radio compliance test (C2PC)					
Equipment under test (EUT):						
Product description	Pacemaker family PRIMUS NXT					
Model No.	Eluna 8 HF-T					
Additional Model(s)	see page5: List of Models to be included in the family					
Brand Name(s)	BIOTRONIK					
Hardware version	ASM-0217_0B with BOM-0288_06_396062 (2230-04)					
Firmware / Software version	7300RomRev_01.02/7474RamRev_04.02					
	FCC-ID: QRIPRIMUSNXT IC: 4708A-PRIMUSNXT					
Test result	Passed					



Possible test case verdicts:
- neither assessed nor tested N/N
- required by standard but not appl. to test object: N/A
- required by standard but not tested: N/T
- not required by standard for the test object N/R
- 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: 2015-10-02
Date (s) of performance of tests: 2015-10-05 – 2015-10-08
Compiled by: Wilfried Treffke
Tested by (+ signature)       Wilfried Treffke         (Responsible for Test)       Wilfried Treffke         Approved by (+ signature)       C. Wegen
Approved by (+ signature): (Head of Lab)
Date of issue: 2015-11-11
Total number of pages: 31
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.
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laboratory.



#### Additional comments:

Family Explanation Primus NXT

All devices feature the two RF-Telemetry functions Home Monitoring and wireless Wand. RF-Telemetry functions are using the MICS-Band (402MHz – 405MHz). A "-T" inside the name of the device represents a device containing Home Monitoring capabilities. HF-T are triple-chamber devices. (Master for all tests) DR-T are dual-chamber devices. SR-T are single-chamber devices. DR are dual-chamber without home monitoring. SR are single-chamber without home capabilities.

All of these differences are only relevant in terms of medical aspects. They do not interfere with the RF-performance.

Evaluation measurements were performed for worst case antenna selection and the Eluna 8 HF-T was selected. The model Eluna 8 HF-T, as the most complex model, was selected for the measurements.



BIOTRONIK excellence for life

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To whom it may concern

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Berlin, October 20, 2015

Gentlemen,

Herewith we, BIOTRONIK SE & Co. KG, declare the following changes that were done to the already approved product family PRIMUS NXT (FCC-ID: QRIPRIMUSNXT)

The major change filed under application is:

Change 1:	The SAW filter was changed from the Vectron 403A to the Vectron 403B.
Change 2:	Matching components for the SAW filter were changed
	(L804 was 11nH and is now 36nH, L808 was 27nH and is now 30nH).
Change 3:	The antenna design was modified to improve manufacturability. The electrical
	length remains the same.

According to our internal design validation no difference in conducted output power was observed as part of the design change.

If you have any questions regarding this application, please feel free to contact

Contact name Dirk König Company nameBIOTRONIK SE & CO. KG Phone No.: +49 (0) 30 68905 1291

Sincerely, u

Signature Dirk König Manager Regulatory Affairs BIOTRONIK SE & CO. KG

> BIOTRONIK SE & Co. KG Woermannkehre 1 12359 Berlin Steuer-Nr.: 30/062/05167 USt.-Ident Nr.: DE136651322

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### PRIMUS NXT product family Family Certification List of the models to be included in the family

Applicant:

BIOTRONIK SE & Co. KG

Certification Number: QRIPRIMUSNXT

Model	Description			
Eluna 8 SR	One chamber, Coil telemetry and RF Transceiver			
Eluna 8 SR-T	One chamber, Coil telemetry and RF Transceiver			
Eluna 8 DR	Two chambers , Coil telemetry and RF Transceiver			
Eluna 8 DR-T	Two chamber , Coil telemetry and RF Transceiver			
Eluna 8 HF-T	Three chambers, Coil telemetry and RF Transceiver			
Epyra 6 SR-T	One chamber, Coil telemetry and RF Transceiver			
Epyra 6 DR-T	Two chambers , Coil telemetry and RF Transceiver			
Epyra 8 SR-T	One chamber, Coil telemetry and RF Transceiver			
Epyra 8 DR-T	Two chambers , Coil telemetry and RF Transceiver			
Epyra 8 HF-T	Three chambers, Coil telemetry and RF Transceiver			
Etrinsa 6 SR	One chamber, Coil telemetry and RF Transceiver			
Etrinsa 6 SR-T	One chamber, Coil telemetry and RF Transceiver			
Etrinsa 6 DR	Two chambers , Coil telemetry and RF Transceiver			
Etrinsa 6 DR-T	Two chambers , Coil telemetry and RF Transceiver			
Etrinsa 8 SR-T	One chamber, Coil telemetry and RF Transceiver			
Etrinsa 8 DR-T	Two chambers , Coil telemetry and RF Transceiver			
Etrinsa 8 HF-T	Three chambers, Coil telemetry and RF Transceiver			

The BIOTRONIK PRIMUS NXT family of products includes the following models:

#### Eluna, Epyra and Etrinsa.

All models comprise identical internal electronic including a low frequency telemetry coil and packaged in titanium cases with a header where the leads connect.

All devices include additional an internal RF Transceiver and an antenna within the header. The internal electronic of HF-T devices differs slightly from SR and DR devices to include the third channel electronic. Therefore the device under test is three chambers model Eluna 8 HF-T.

The PRIMUS NXT models contain a different therapeutic feature set. The features differ only by the number of connectable leads and software.



### **Version History**

Version	Issue Date	Remarks	Revised by
01	2015-11-11	Initial Release	



### **REPORT INDEX**

1	EQUIPMENT (TEST ITEM) DESCRIPTION	8
1.1	Photos – Equipment External	9
1.1	Photos – Equipment internal	13
1.2	Photos – Test setup	15
1.3	Photos – Auxiliary/Associated Equipment	16
1.4	Supporting Equipment Used During Testing	17
1.5	Test Modes	18
1.6	Test Equipment Used During Testing	19
1.7	Sample emission level calculation	20
2	RESULT SUMMARY	21
3	TEST CONDITIONS AND RESULTS	22
3.1	Test Conditions and Results – Occupied Bandwidth	22
3.2	Test Conditions and Results – Fundamental field strength emissions	24
3.4	Test Conditions and Results – Receiver radiated emissions	26
ANN ANN		28 30

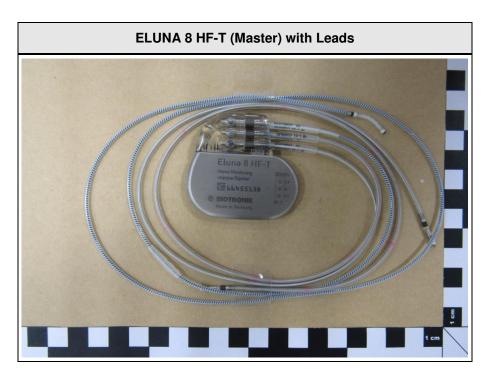


### 1 Equipment (Test item) Description

Description	Pacemaker fai	Pacemaker family PRIMUS NXT			
Model	Eluna 8 HF-T	Eluna 8 HF-T			
Additional Model(s)	see page5: Lis	t of I	Models to be included in the family		
Brand Name(s)	BIOTRONIK				
Serial number	66455138				
Hardware version	ASM-0217_0B	8 with	BOM-0288_06_396062 (2230-04)		
Software / Firmware version	7300RomRev_	_01.0	02/7474RamRev_04.02		
FCC-ID	QRIPRIMUSN	ХT			
IC	4708A-PRIMU	SNX	Т		
Equipment type	End product				
Radio type	Transceiver				
Radio technology	custom				
Operating frequency range	64 kHz				
Frequency range	F <sub>MID</sub> 64 kHz				
Modulations	ООК				
Number of channels	1				
Channel spacing	None				
Number of antennas	1				
	Туре	inte	grated		
Antenna	Model	loop	o antenna		
Antenna	Manufacturer	Biotronik SE & Co. KG			
	Gain unspecified		pecified		
Manufacturer	Biotronik SE & Co. KG Woermannkehre 1 12359 Berlin GERMANY				
	V <sub>NOM</sub>		3.0 VDC (Lithium-Battery)		
Power supply	V <sub>MIN</sub>		N/A		
	V <sub>MIN</sub> N/A				
	Model		N/A		
AC/DC-Adaptor	Vendor		N/A		
	Input		N/A		
	Output		N/A		



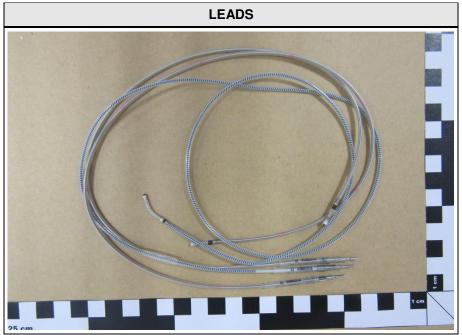
#### 1.1 Photos – Equipment External



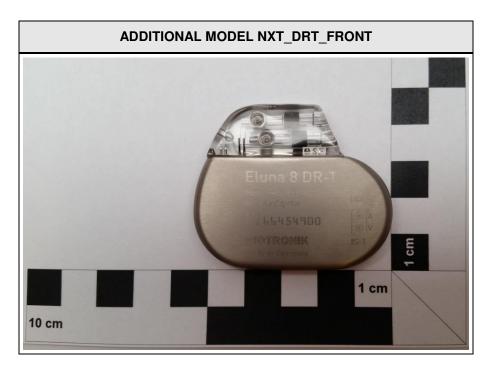






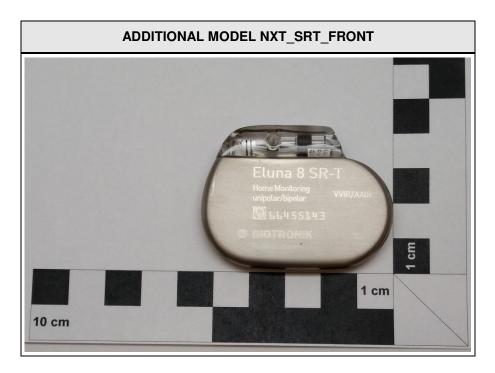


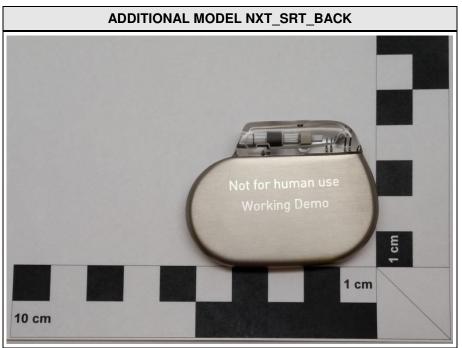






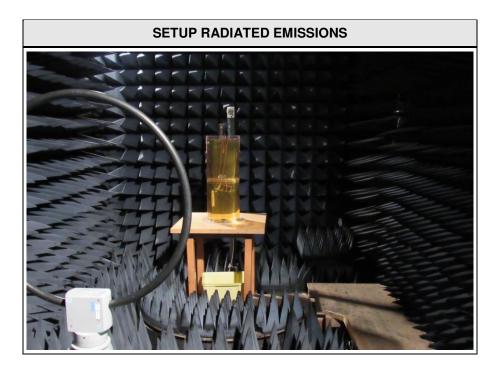








#### 1.2 Photos – Test setup





#### 1.3 Photos – Auxiliary/Associated Equipment





#### 1.4 Supporting Equipment Used During Testing

Product Type*	Device	Device Manufacturer Mod		Comments		
AE1	Programer	Biotronik	Biotronik USB TelBox 64kHz sys			
*Note: Use	*Note: Use the following abbreviations:					
AE :	AE : Auxiliary/Associated Equipment, or					
SIM : Simulator (Not Subjected to Test)						
CABL : Connecting cables						



#### 1.5 Test Modes

Mode #	Description			
	General conditions:	EUT powered by fully charged battery		
Single	Mode = standalone transmit Modulation = OOK Power level = Maximum			
	General conditions:	EUT powered by fully charged battery		
Receive Radio conditions:		Mode = standalone receive Modulation = OOK		



#### 1.6 Test Equipment Used During Testing

Measurement Software					
Description Manufacturer Name Version					
EMC Test Software Dare Instruments Radimation 201					

Occupied Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2015-02	2016-02

Field strength emissions						
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due	
Semi-anechoic chamber	Frankonia	AC 1	EF00062	-	-	
Spectrum Analyzer	R&S	FSIQ26	EF00242	2015-04	2016-04	
Loop antenna	R&S	HFH2-Z2	EF00184	2014-11	2016-11	



#### 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  $dB\mu V$ . Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

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

Reading on Analyzer  $(dB\mu V) + A.F. (dB) = Net field strength <math>(dB\mu V/m)$ 

Net:

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

Limit:

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

Limit (dB
$$\mu$$
V/m) = 20\*log ( $\mu$ V/m)

Margin:

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

Example only:

Reading + AF =	Net Reading	:	Net reading - FCC limit = Margin
$21.5 dB\mu V + 26 dB =$	47.5 dBµV/m	:	$47.5 \text{ dB}\mu\text{V/m} - 57.0 \text{ dB}\mu\text{V/m} = -9.5 \text{ dB}$



### 2 Result Summary

FCC 47 CFR Part 15C, IC RSS-310					
Product Specific Standard Section	Requirement – Test	Reference Method	Result	Remarks	
RSS-Gen 6.6	Occupied Bandwidth	RSS-Gen 6.6	N/R	Informational only	
FCC 15.201(a), FCC 15.209 IC RSS-310 3.7	Field strength emissions	ANSI C63.4	PASS		
IC RSS-310 2.3 IC RSS-Gen 7.1	Receiver radiated spurious emissions	ANSI C63.4	PASS		
Remarks:	•		•		

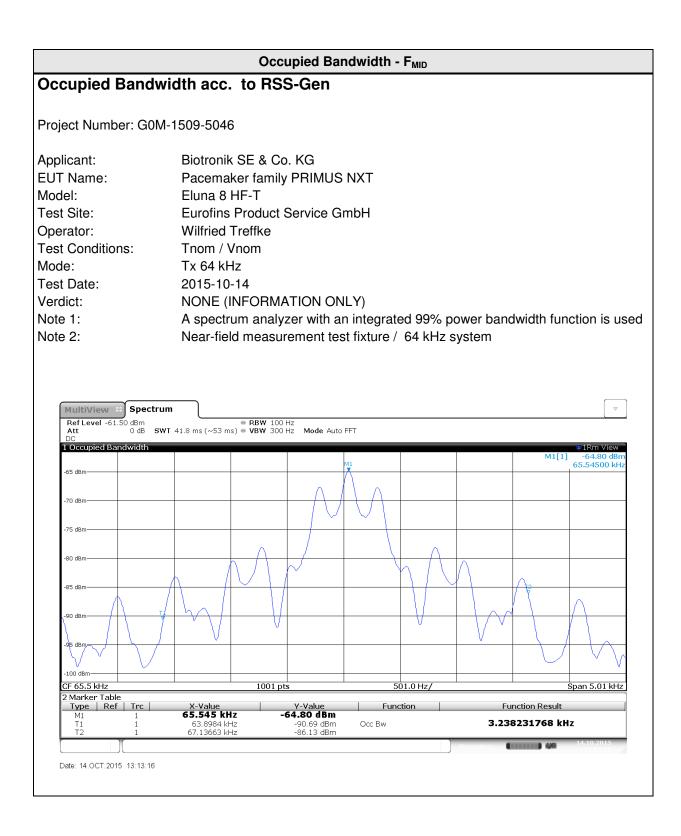


### 3 Test Conditions and Results

#### 3.1 Test Conditions and Results – Occupied Bandwidth

Occupied Bandwidth acc. to IC RSS-Gen Verdict: PASS					
Test according to measurement reference		Reference Method			
		RSS-Gen 6.6			
Test freque		Tested frequencies			
restrieque	ency range	F <sub>MID</sub>			
EUT tes	st mode	Single			
		Limits			
	1	None (Informational only)			
		Test setup			
Spectrum Analyzer EUT					
Test procedure					
<ol> <li>EUT set to test mode (Communication tester is used if needed)</li> <li>Span set to at least twice the emission spectrum</li> <li>Resolution bandwidth set to 1 % of span</li> <li>Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function</li> </ol>					
Test results					
Channel	Frequency [kHz]	z] Occupied Bandwidth [kHz]			
F <sub>MID</sub>	64	3.238			
Comments: Measurement is applicable to all variants					





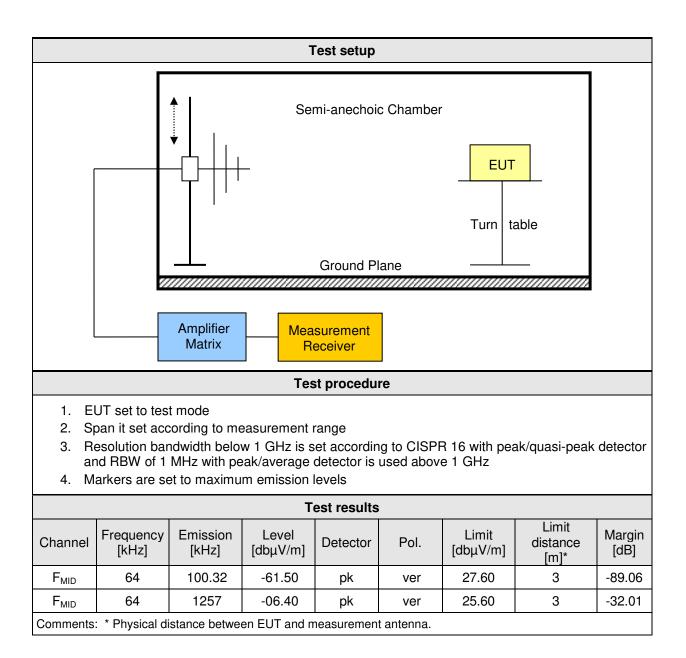


#### 3.2 Test Conditions and Results – Fundamental field strength emissions

Field strength emissions acc. to FCC 47 CFR 15.201 / IC RSS-310 Verdict: PASS						
Test according referenced		Reference Method				
standards		FCC 15.2	01(a) + 15.209 / IC F	RSS-310 3.7		
Test according	to	Reference Method				
measurement refe	erence		ANSI C63.4			
Toot froquency re			Tested frequencies	3		
Test frequency ra	ange	9 kHz – 10 <sup>th</sup> Harmonic				
EUT test mod	le	Single				
Limits						
Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/m]	Limit Distance [m]		
0.009 - 0.490	Quasi-Peak	2400/F[kHz]	48.5 – 13.8	300		
0.490 – 1.705	Quasi-Peak	2400/F[kHz]	13.8 – 1.4	30		
1.705 – 30	Quasi-Peak	30	29.5	30		
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		

The emission limits shown in the above table are based on measurements employing a CISPR quasipeak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.







#### 3.4 Test Conditions and Results – Receiver radiated emissions

Receiver radiated emis	sions acc.	to l	C RSS-310		Verdict: PASS			
Test according referenced standards		Reference Method						
			IC RSS-310 3.7					
Test according to		Reference Method						
measurement refere			ANSI C63.4					
Tool frequency rea	~~		Tested frequencies					
Test frequency range			30 MHz – 5 <sup>th</sup> Harmonic					
EUT test mode				Receive				
		-	Limits					
Frequency range [MHz]	Detecto	r	Limit [µV/m]	Limit [dBµV/m	I] Limit Distance [m]			
0.009 - 0.490	Quasi-Pe	ak	2400/F[kHz]	48.5 – 13.8	300			
0.490 – 1.705	Quasi-Pe	ak	2400/F[kHz]	13.8 – 1.4	30			
1.705 – 30	Quasi-Pe	ak	30	29.5	30			
30 – 88	Quasi-Pe	ak	100	40	3			
88 – 216	Quasi-Pe	ak	150	43.5	3			
216 – 960	Quasi-Pe	ak	200	46	3			
960 – 1000	Quasi-Pe	ak	500	54	3			
> 1000	Average		500	54	3			
			Test setup					
	+  -		Semi-anechoic C Ground Plan	EU Turn	Ttable			
Amplifier Matrix Measurement Receiver								



#### **Test procedure**

- 1. EUT set to receive mode (Communication tester is used if needed)
- 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

Test results						
Channel	Frequency [kHz]	Emission [kHz]	Emission Level [dbµV/m]	Det.	Limit [dBdµV/m]	Margin [dBµV/m]
F <sub>MID</sub>	64	100.36	-60.60	pk	27.6	-88.17
F <sub>MID</sub>	64	25278	-05.30	pk	29.5	-34.81
Comments:						

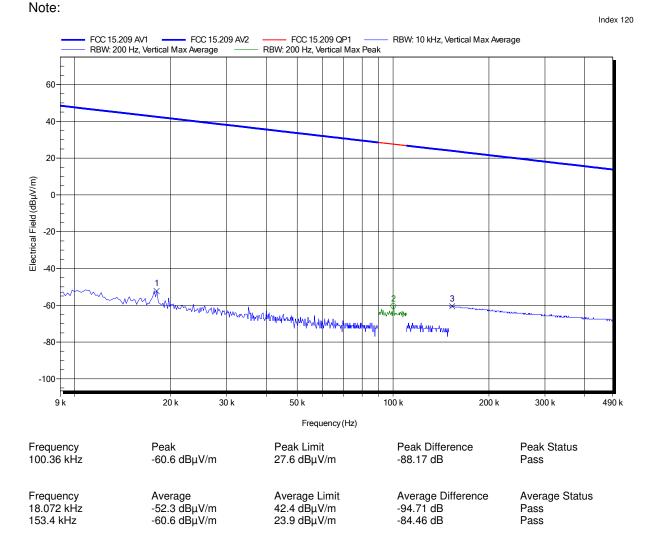


### ANNEX A Transmitter radiated spurious emissions

#### Spurious emissions according to FCC 15.209

Project number: G0M-1509-5046

Applicant: EUT Name: Model: Test Site: Operator: Test Conditions: Antenna: Measurement distance: Mode:	Biotronik SE & Co. KG Pacemaker family PRIMUS NXT Eluna 8 HF-T Eurofins Product Service GmbH Treffke Tnom: 25°C, Vnom: 3V DC battery Rohde & Schwarz HFH 2-Z2 3 m converted to 300 m TX; 64 kHz
Mode:	TX; 64 kHz
Test Date:	2015-10-07



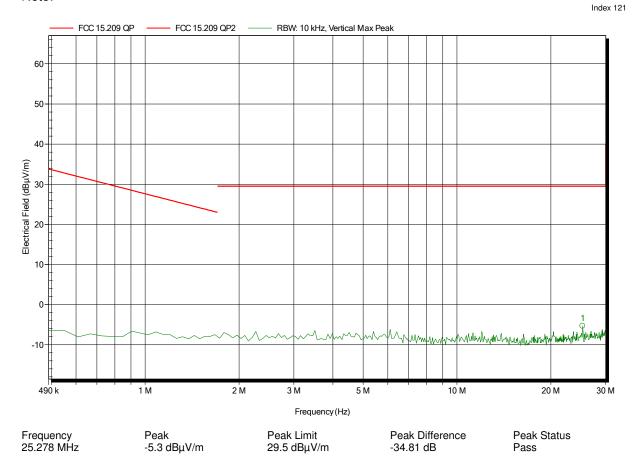


#### Spurious emissions according to FCC 15.209

Project number: G0M-1509-5046

Applicant: EUT Name:
Model:
Test Site:
Operator:
Test Conditions:
Antenna:
Measurement distance:
Mode:
Test Date:
Note:

Biotronik SE & Co. KG Pacemaker family PRIMUS NXT Eluna 8 HF-T Eurofins Product Service GmbH Treffke Tnom: 25°C, Vnom: 3V DC battery Rohde & Schwarz HFH 2-Z2 3 m converted to 30 m TX; 64 kHz 2015-10-07



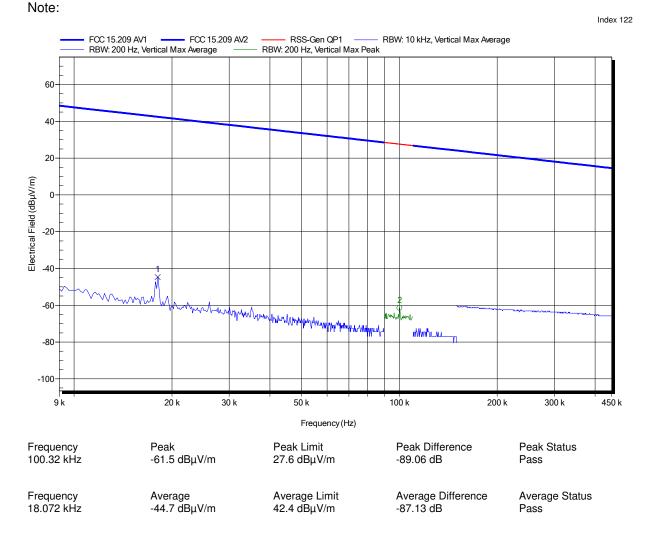


### ANNEX B Receiver radiated spurious emissions

#### Spurious emissions according to RSS-Gen

Project number: G0M-1509-5046

Applicant:	Biotronik SE & Co. KG
EUT Name:	Pacemaker family PRIMUS NXT
Model:	Eluna 8 HF-T
Test Site:	Eurofins Product Service GmbH
Operator:	Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3 V DC battery
Antenna:	Rohde & Schwarz HFH 2-Z2
Measurement distance:	3 m converted to 300 m
Mode:	RX; 64 kHz
Test Date:	2015-10-07
A.L	





#### Spurious emissions according to RSS-Gen

Project number: G0M-1509-5046

Applicant: EUT Name: Model: Test Site: Operator: Test Conditions: Antenna: Measurement distance: Mode: Test Date: Note: Biotronik SE & Co. KG Pacemaker family PRIMUS NXT Eluna 8 HF-T Eurofins Product Service GmbH Treffke Tnom: 25°C, Vnom: 3 V DC battery Rohde & Schwarz HFH 2-Z2 3 m converted to 30 m RX; 64 kHz 2015-10-07

