RADIO REPORT

FCC 47 CFR Part 15C
ISED Canada RSS-247

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

Report Reference No	G0M-2012-9529-TFC247ZB-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	Renesas Electronics Germany GmbH
Address	Grenzstraße 28 01109 Dresden GERMANY
Test Specification	47 CFR Part 15C RSS-247, Issue 2, 2017-02 RSS-Gen, Issue 5, Amendment 1, 2019-03
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Customer programmable Bluetooth LE module with integrated antenna
Model(s) A	RYZ012A100FZ00#HD0
Additional Model(s) B	Customer programmable Bluetooth LE module with external antenna RYZ012B100FZ00#HD0
Brand Name(s)	None
Hardware Version(s)	1
Software Version(s)	1
FCC ID	COR-RYZ012X1
IC	24477-RYZ012X1
Test Result	**PASSED**

Possible test case verdicts:		
Required by standard but not tested	N/T	
Not required by standard	N/R	
Not applicable to EUT	N/A	
Test object does meet the requirement	P(PASS)	
Test object does not meet the requirement	F(FAIL)	
Testing:		
Test Lab Temperature	20 °C - 30 °C	
Test Lab Humidity	25 % - 55 %	
Date of receipt of test item	2021-01-22	
Report:		
Compiled by	Charline Graf	
Tested by (+ signature) (Responsible for Test)	Charline Graf	.....
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke	W. Treffke .....
Approved by (+ signature) (Deputy Head of Lab)	Toralf Jahn	T. J .....
Date of Issue	2021-04-13	
Total number of pages	161	
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:		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2021-04-13	Initial Release	

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
DSSS	Direct Sequence Spread Spectrum
EUT	Equipment Under Test
FCC	Federal Communications Commission
IEEE 802.15.4	MAC and PHY Layer for Wireless Personal Area Networks
ISED	Innovation, Science and Economic Development Canada
O-QPSK	Offset-Quadrature Phase Shift Keying
QPSK	Quadrature Phase Shift Keying
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V_{NOM}	Nominal supply voltage

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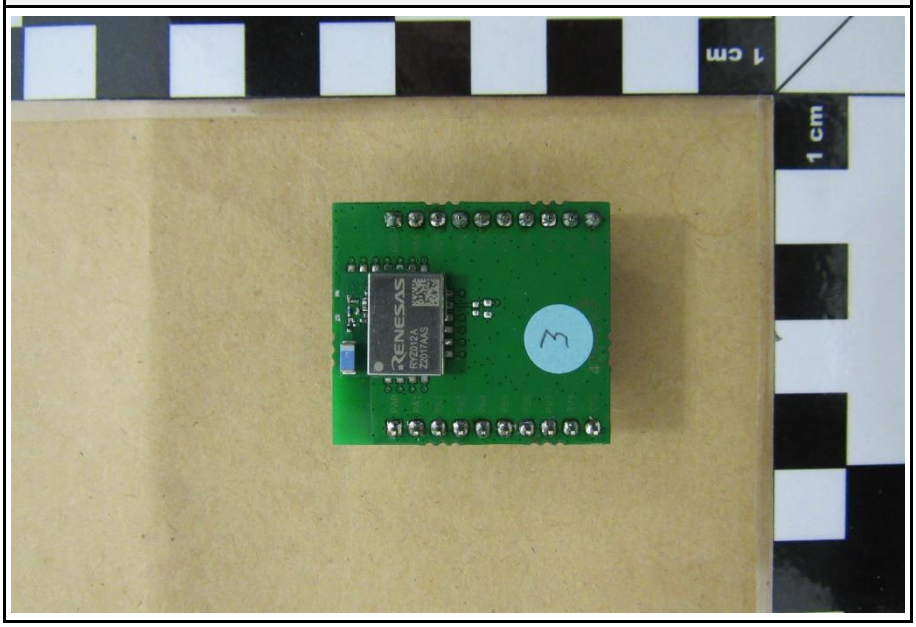
1 Equipment (Test Item) Under Test

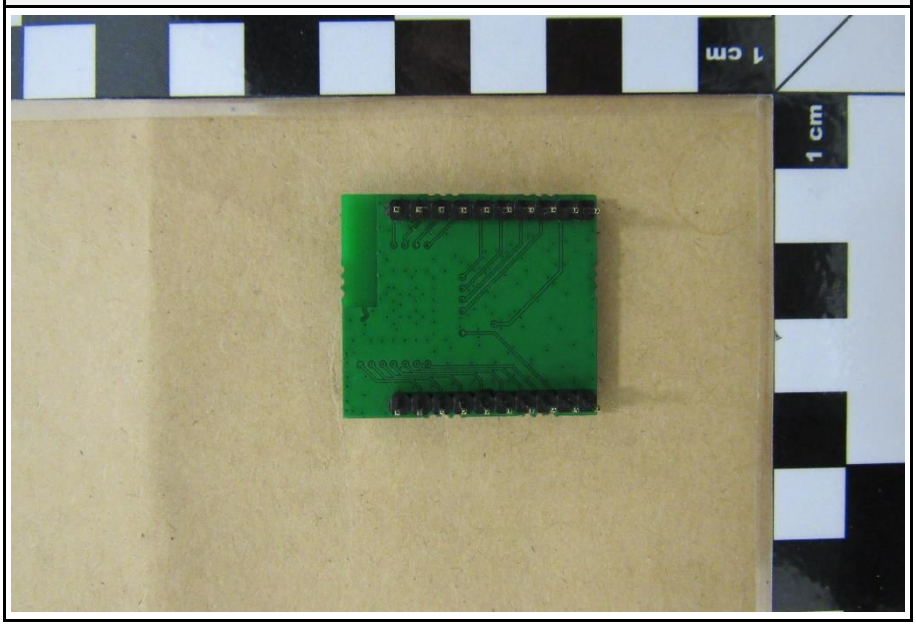
Description	Customer programmable Bluetooth LE module with integrated antenna	
Model A	RYZ012A100FZ00#HD0	
Additional Model(s) B	Customer programmable Bluetooth LE module with external antenna RYZ012B100FZ00#HD0	
Brand Name(s)	None	
Serial Number(s)	None	
Hardware Version(s)	1	
Software Version(s)	1	
PMN	A: RYZ012A1 B: RYZ012B1	
HVIN	A: RYZ012A1 B: RYZ012B1	
FVIN	A: N/A B: N/A	
HMN	A: N/A B: N/A	
FCC ID	COR-RYZ012X1	
IC	24477-RYZ012X1	
Equipment type	End Product	
Radio type	Transceiver	
Assigned frequency bands	2400.0 MHz - 2483.5 MHz	
Radio technology	IEEE 802.15.4	
Modulation	O-QPSK	
Number of antenna ports	2	
Antenna 1	Type	Integrated
	Model	RFANT3216120A5T
	Manufacturer	Walsin Technology
	Gain	2.0 dBi
Antenna 2	Type	External
	Model	W1095K
	Manufacturer	PulseLarsen Antennas
	Gain	1.0 dBi
Supply Voltage	V_{NOM}	3.3 VDC
Operating Temperature	T_{NOM}	25 °C
Manufacturer	Renesas Electronics America, Inc. 6024 Silver Creek Valley Road CA 95138 San Jose USA	

1.1 Photos – Equipment

Model A: PCB front side – antenna 1



Model A: PCB back side – antenna 1

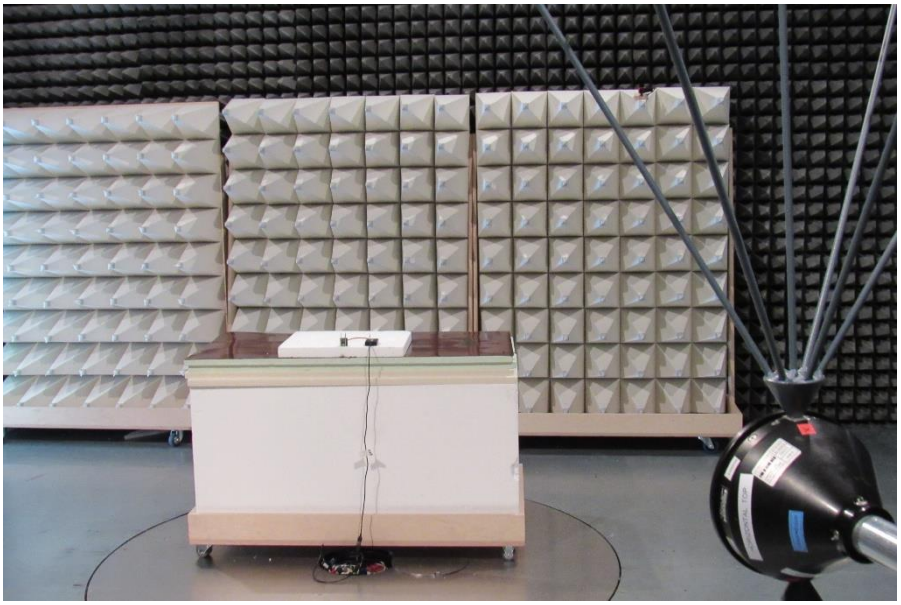


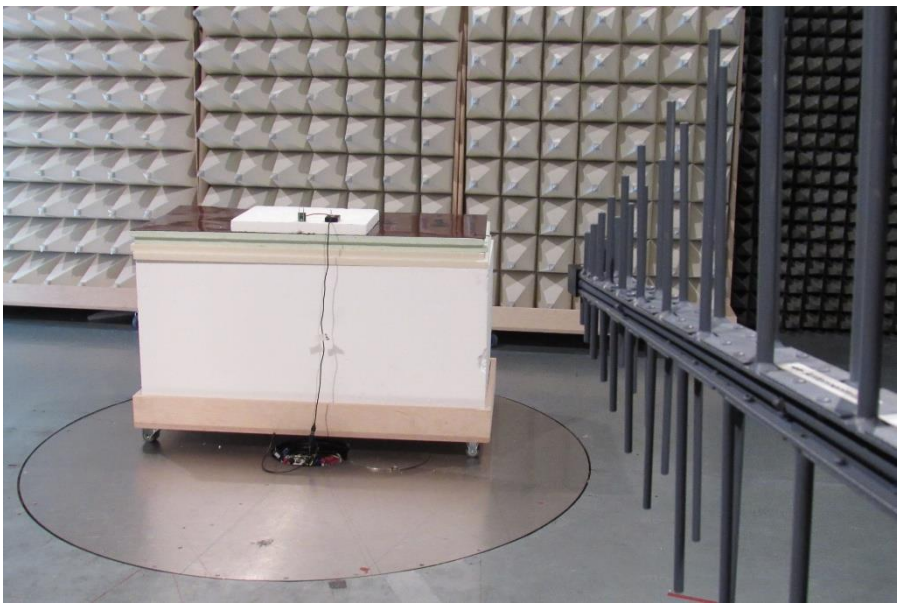
Model B: PCB front side – antenna 2

Model B: PCB back side – antenna 2

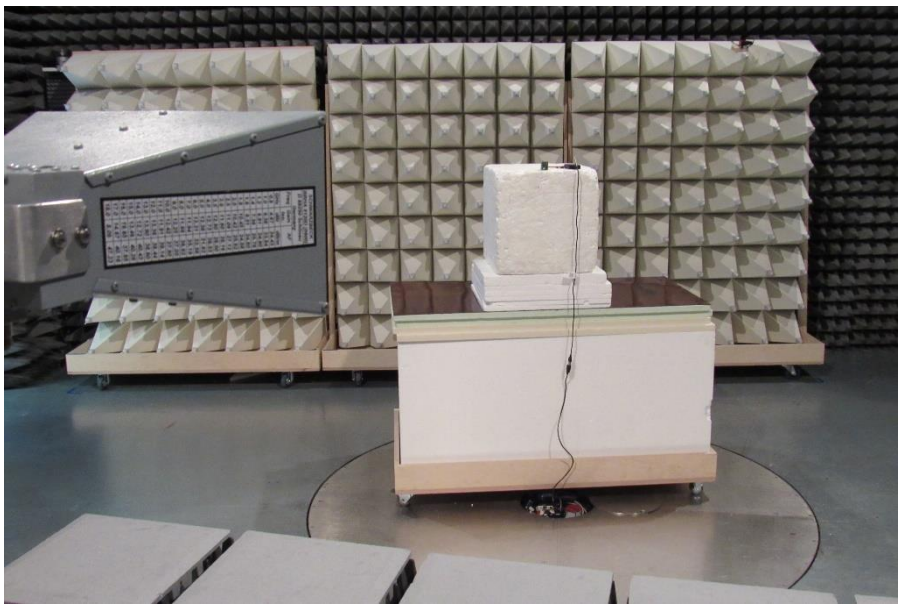
Programming adapter

1.2 Photos – Test Setup

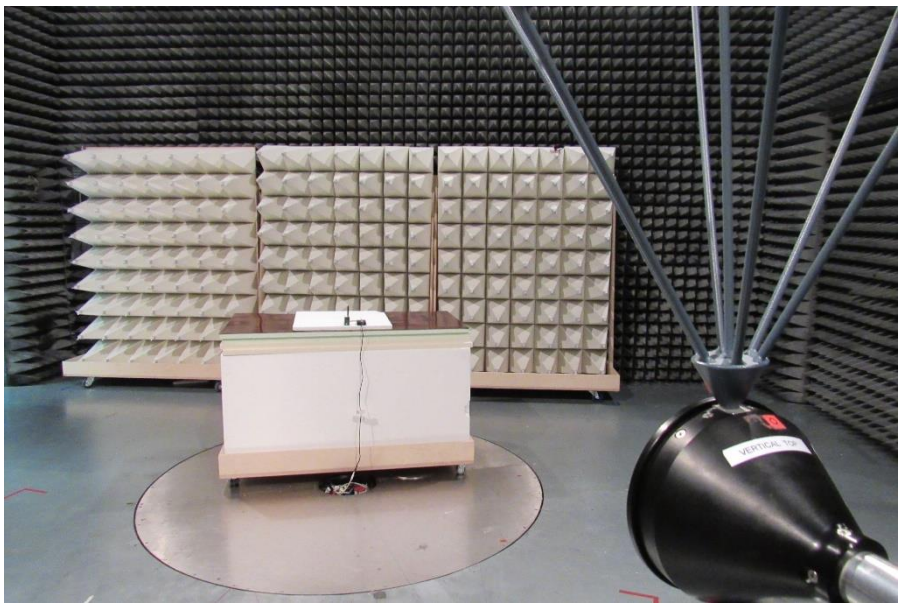
Integrated antenna - 30MHz - 200MHz


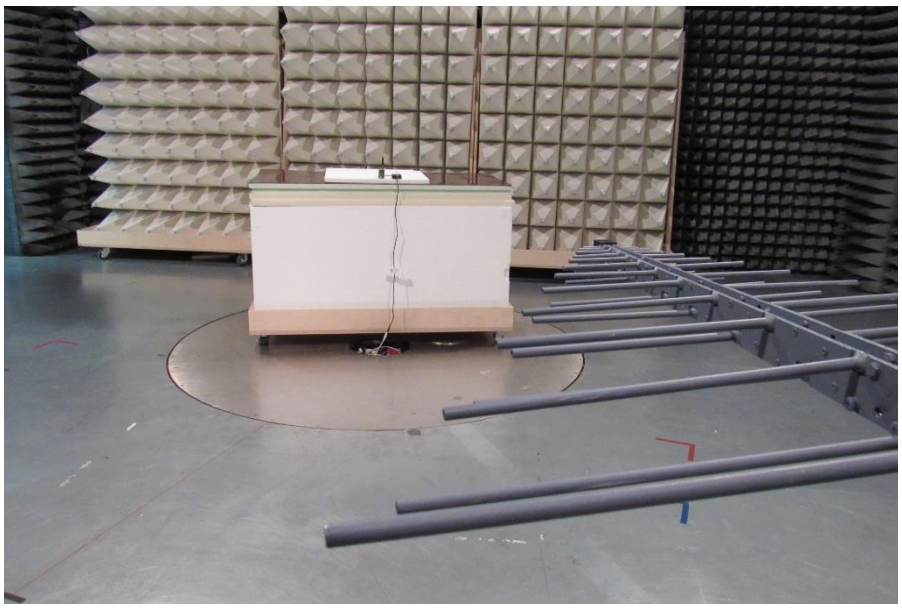
Integrated antenna - 200MHz - 1GHz


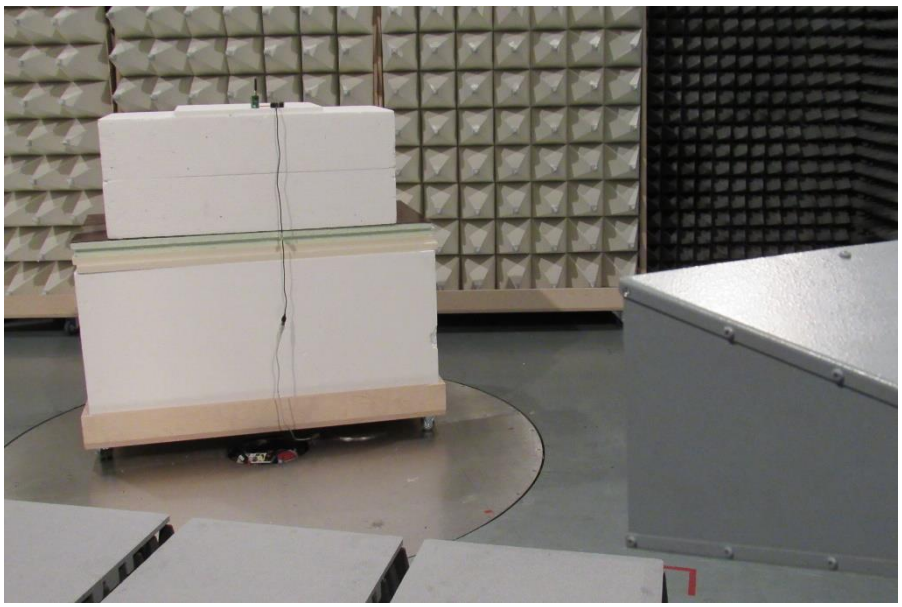
Integrated antenna above 1 GHz

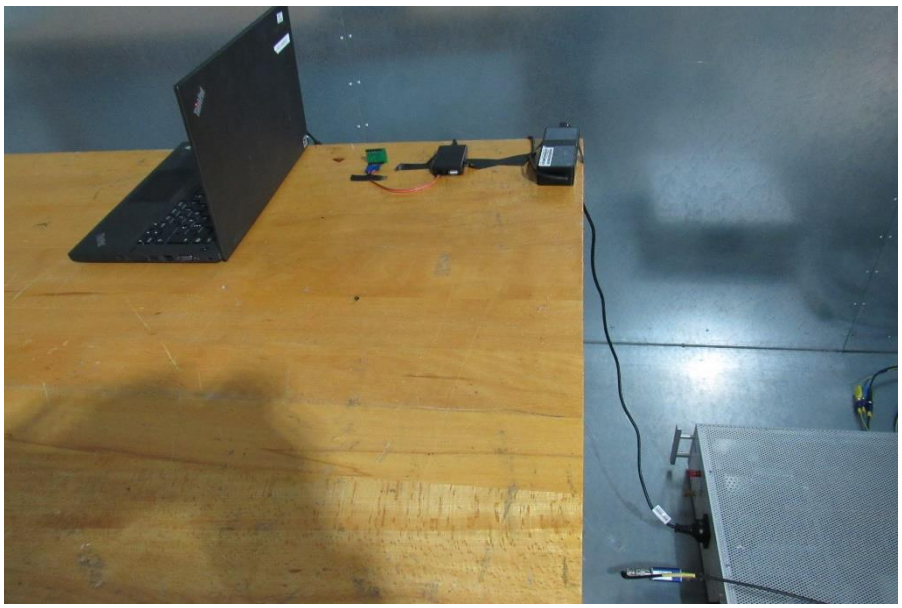


External antenna - 30MHz - 200MHz



External antenna - 200MHz - 1GHz


External antenna - above 1 GHz


AC-power line


1.3 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Programming adapter	Telink	EVK TLSR8266BR56	-
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.4 Operational duty cycle

1.4.1 Information

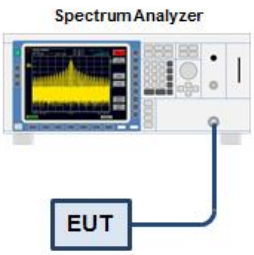
Test Information	
Measurement Method	ANSI C63.10 11.6

1.4.2 Requirements

Requirements	
Duty cycle	Duty cycle correction
≥ 98 %	No correction required
< 98 %	Correction required (10 x Log_{10}(1/DC)

1.4.3 Setup

Test Setup



1.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Cable (diverse)	– (diverse)	– (diverse)	EF00779	2020-12	2021-12
Spectrum analyzer	R & S	FSU43	EF01631	2020-07	2021-07

1.4.5 Procedure

Test Procedure

1. EUT set to test mode
2. Span is set to zero span
3. Detector set to peak
4. Sweep time is set to 100ms
5. Envelope peak value of emission spectrum is selected
6. Record one complete pulse train including blank intervals.
7. The maximum burst duration T_{ON} is measured using two markers set to the start and the end of the longest burst
8. The minimum idle duration T_{OFF} is measured using two markers set to the start and the end of the shortest idle period
9. The duty cycle is calculated by DC = T_{ON} / (100ms)
10. The duty cycle correction is calculated by DC = 10 x Log_{10}(T_{ON} /(100))

1.4.6 Results

Duty Cycle Results		
Mode	Duty Cycle [@100 ms]	Correction Factor [dB]
IEEE 802.15.4	0.333	-4.77
Comments:	*Duty Cycle declared by customer	

1.5 Test Modes

Mode	Description
DSSS O-QPSK	Mode = Transmit Modulation = O-QPSK Spreading = DSSS Data rate = 250 kbps Chip rate = 2000 kbps Duty cycle = 33% Power level = 10 dBm
Receive	Mode = Receive (Scan)
Comment: Duty Cycle is declared by the customer	

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	11	2405
F2	Tx / Rx	18	2440
F3	Tx / Rx	26	2475

1.7 Sample emission level calculation

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

Reading:

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

A.F.:

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

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

Limit (dBµV/m) = 20*log (µV/m)

Margin:

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

Example only:

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

2 Result Summary

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

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

3 Test Conditions and Results

3.1 Test Conditions and Results - Occupied bandwidth

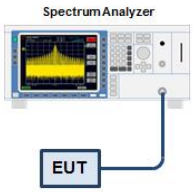
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen, Issue 5 (section 6.7)
Measurement Method	ANSI C63.10 6.9.3
Measurement Uncertainty	± 1.26 %
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Test Sample ID	21802
Operator	Charline Graf
Date	2021-01-25

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup

Test Setup


3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Cable (diverse)	– (diverse)	– (diverse)	EF00779	2020-12	2021-12
Spectrum Analyser	R&S	FSU 43	EF01631	2020-07	2021-07

3.1.5 Procedure

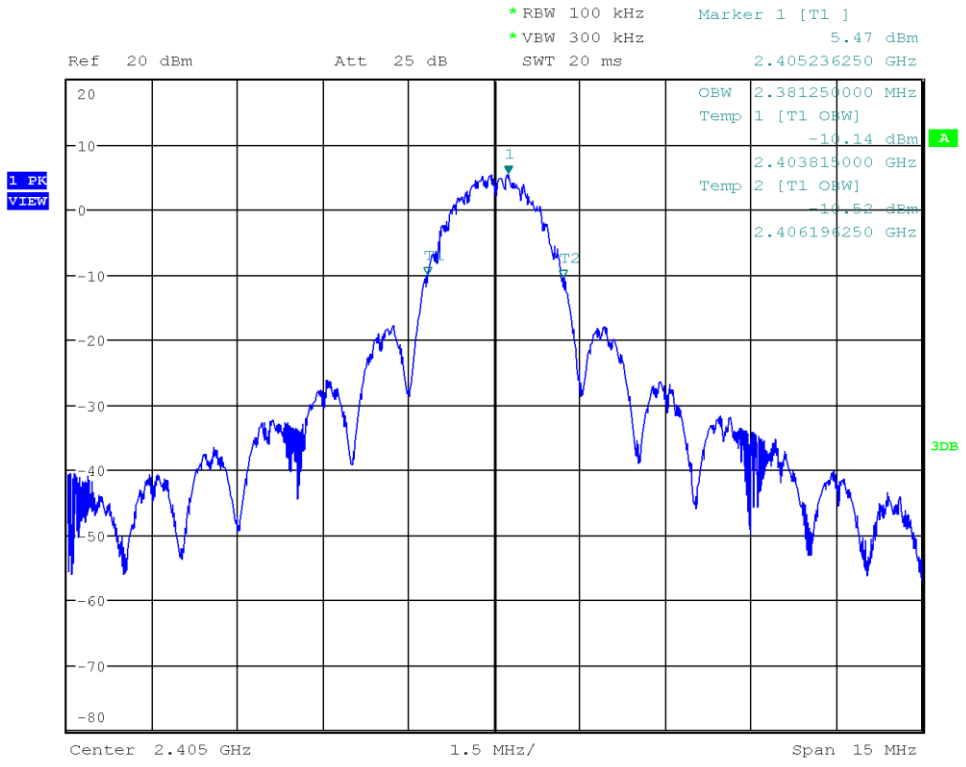
Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth 4. The occupied bandwidth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

3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
O-QPSK	2405	2.381
O-QPSK	2440	2.389
O-QPSK	2475	2.377

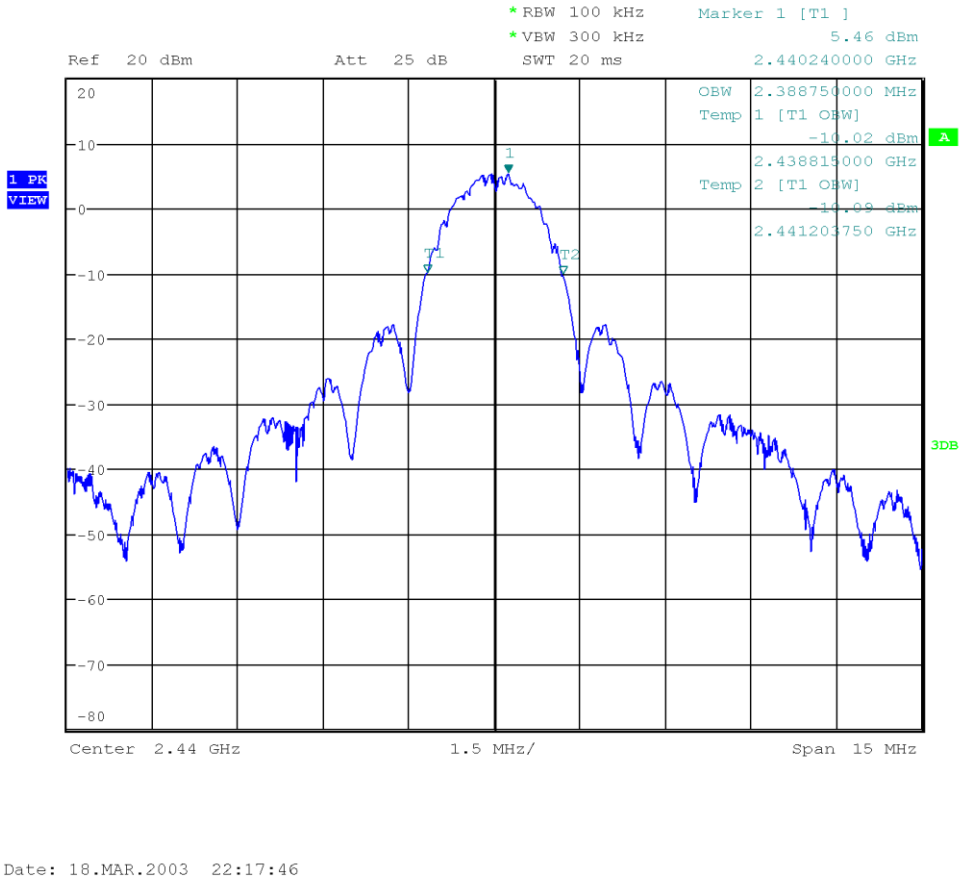
Occupied Bandwidth

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 11, 2405 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Occupied Bandwidth [MHz]:	2.381



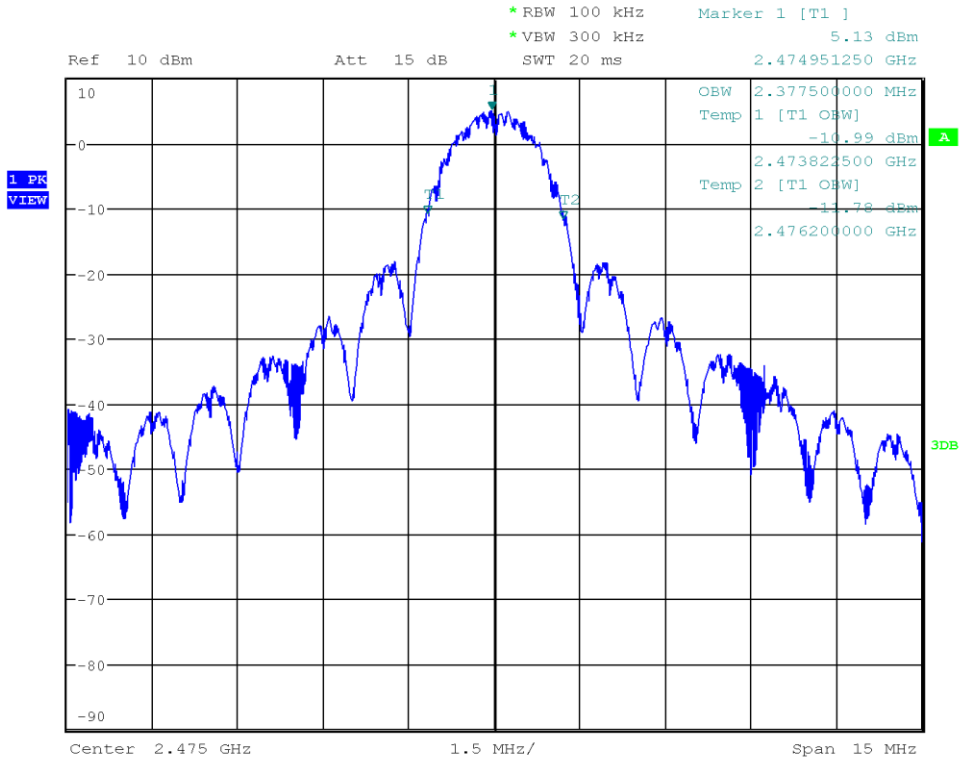
Occupied Bandwidth

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 18, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Occupied Bandwidth [MHz]:	2.389



Occupied Bandwidth

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 25, 2475 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Occupied Bandwidth [MHz]:	2.377



Date: 18.MAR.2003 22:18:24

3.2 Test Conditions and Results - 6 dB bandwidth

3.2.1 Information

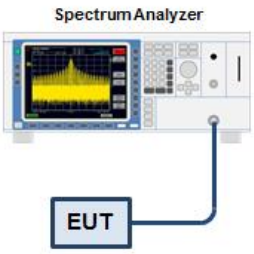
Test Information	
Reference	FCC § 15.247(a)(2); ISED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.8
Measurement Uncertainty	± 1.26 %
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Operator	Charline Graf
Date	2021-01-25

3.2.2 Limits

Limits
≥ 500kHz

3.2.3 Setup

Test Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Cable (diverse)	– (diverse)	– (diverse)	EF00779	2020-12	2021-12
Spectrum Analyser	R&S	FSU 43	EF01631	2020-07	2021-07

3.2.5 Procedure

Test Procedure

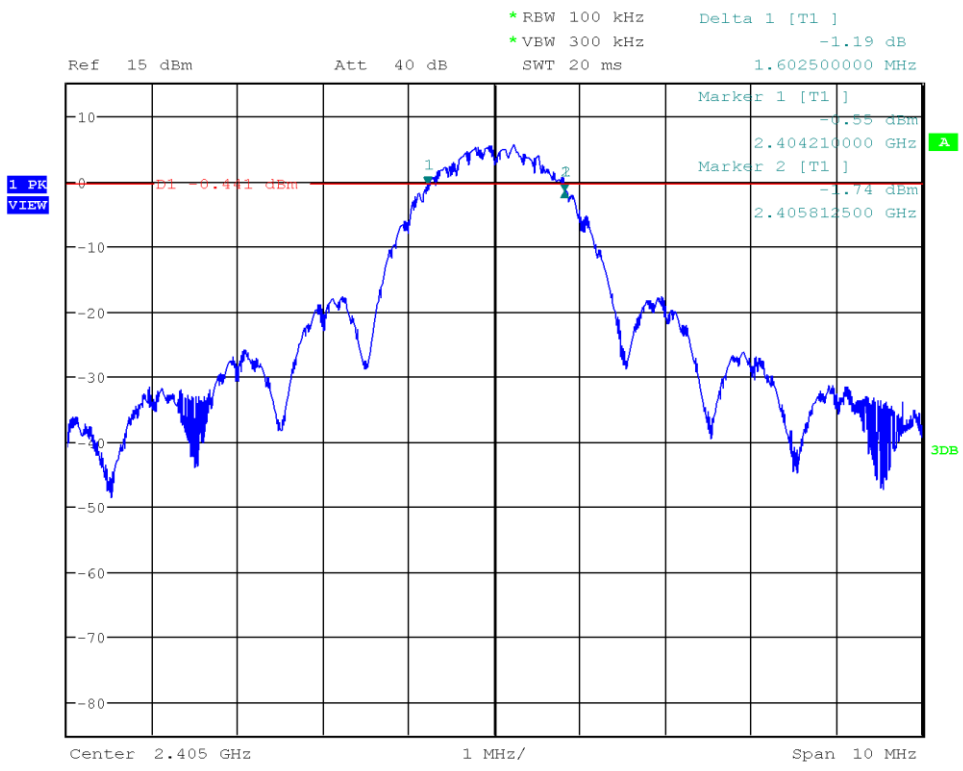
1. EUT set to test mode
2. Span set to at least twice the emission spectrum
3. Detector set to peak and max hold and RBW is set to 100 kHz
4. Envelope peak value of emission spectrum is selected
5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak
6. Marker on envelope of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

3.2.6 Results

Test Results				
Mode	Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Verdict
O-QPSK	2405	1602.5	500	PASS
O-QPSK	2440	1600.0	500	PASS
O-QPSK	2475	1595.0	500	PASS

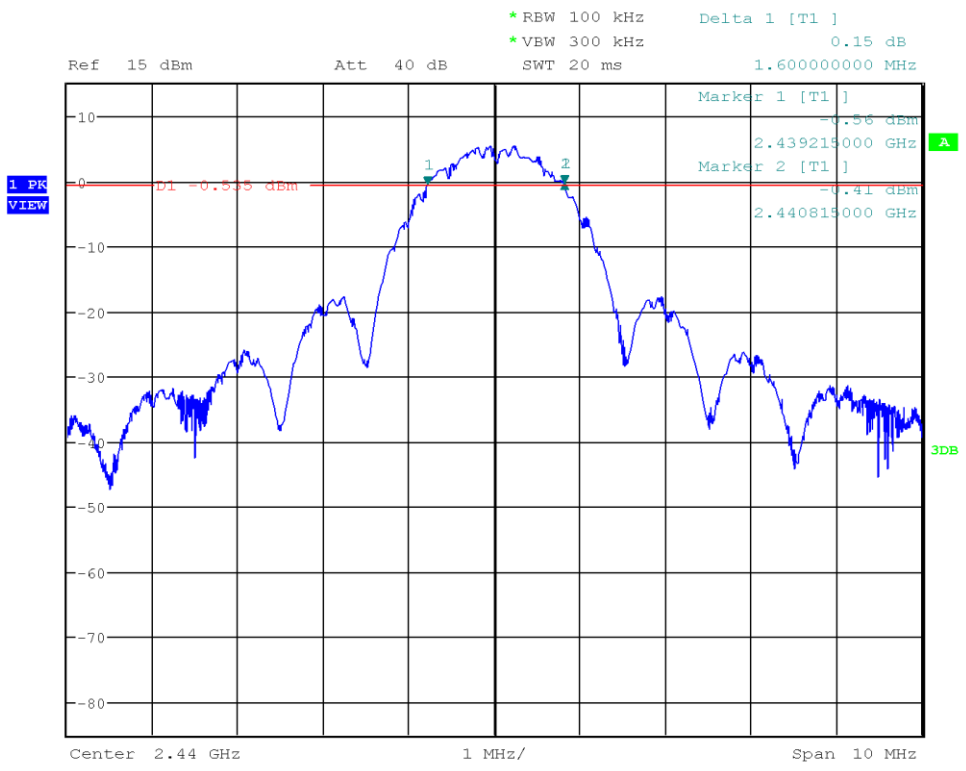
DTS (6 dB) Bandwidth

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 11, 2405 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Lower Frequency [MHz]:	2404.210
Upper Frequency [MHz]:	2405.812
6 dB Bandwidth [kHz]:	1602.5



DTS (6 dB) Bandwidth

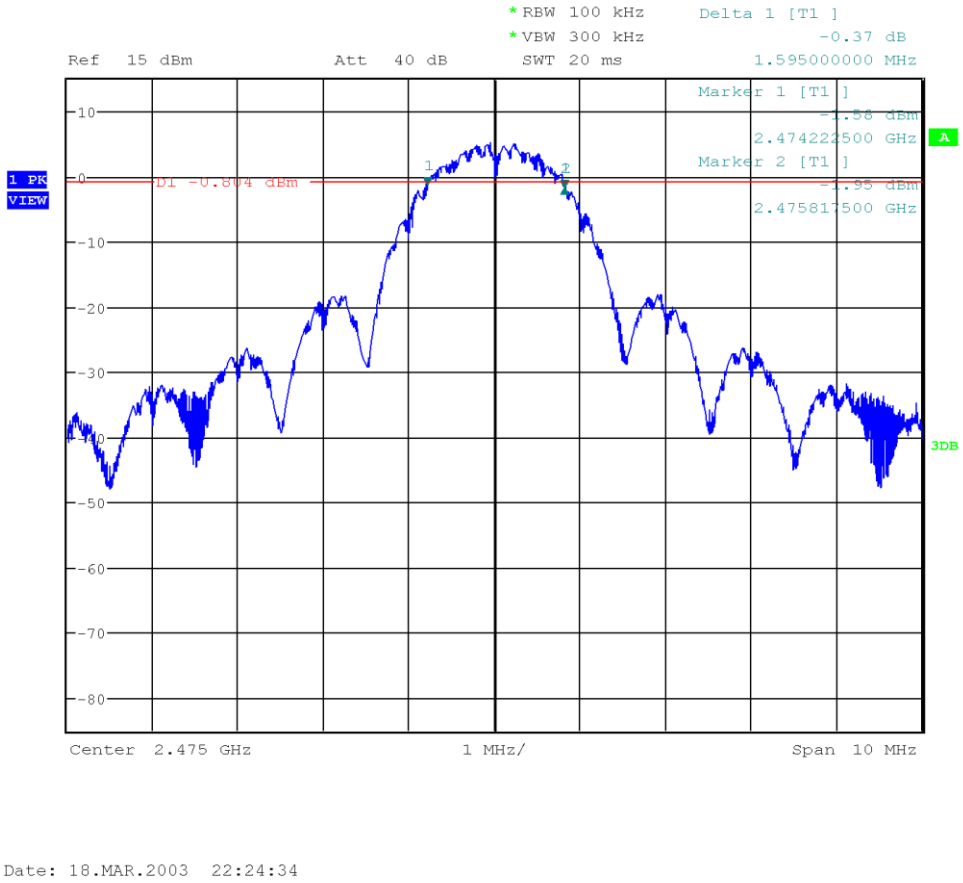
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 18, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Lower Frequency [MHz]:	2439.215
Upper Frequency [MHz]:	2440.815
6 dB Bandwidth [kHz]:	1600.0



Date: 18.MAR.2003 22:24:00

DTS (6 dB) Bandwidth

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 25, 2475 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Lower Frequency [MHz]:	2474.222
Upper Frequency [MHz]:	2475.818
6 dB Bandwidth [kHz]:	1595.0



3.3 Test Conditions and Results - Maximum peak conducted output power

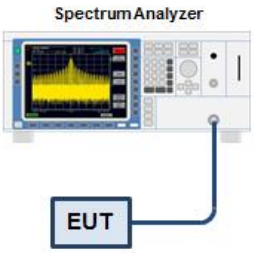
3.3.1 Information

Test Information	
Reference	FCC § 15.247(b); ISED RSS-247, Issue 2 (section 5.4)
Measurement Method	ANSI C63.10 11.9.1
Measurement Uncertainty	± 2.86 dB
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Operator	Charline Graf
Date	2021-01-25

3.3.2 Limits

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

3.3.3 Setup

Test Setup


3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Cable (diverse)	– (diverse)	– (diverse)	EF00779	2020-12	2021-12
Spectrum Analyser	R&S	FSU 43	EF01631	2020-07	2021-07

3.3.5 Procedure

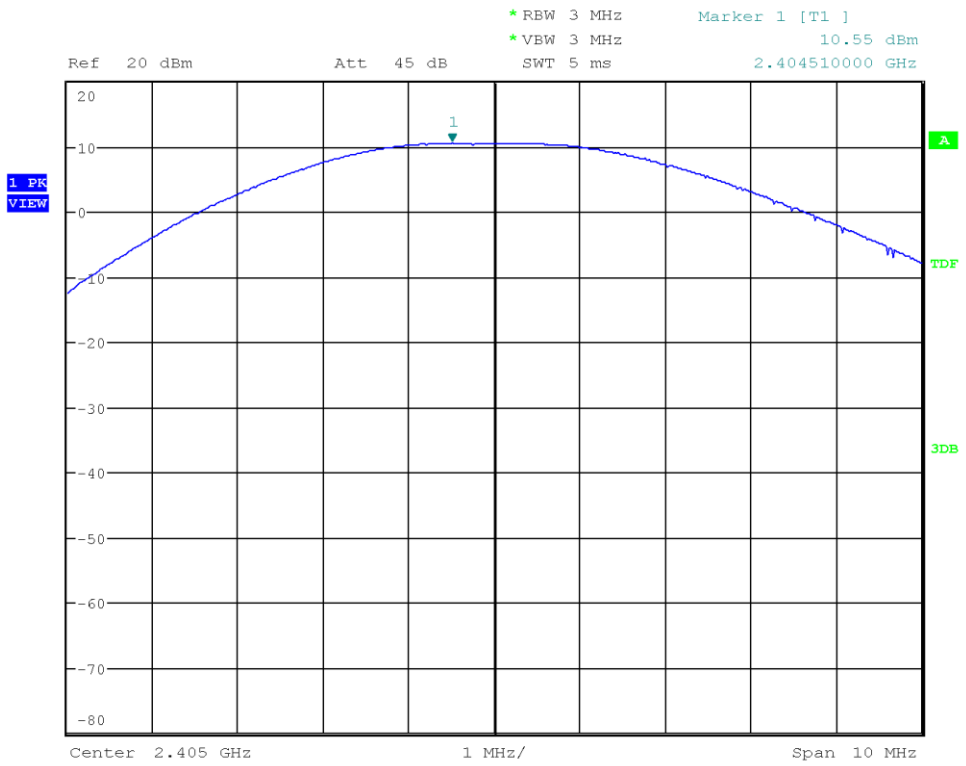
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Analyzer resolution bandwidth is set ≥ DTS bandwidth 3. Detector set to peak and max hold 4. Sweep time is set to auto 5. After the trace has stabilized a marker is set to peak of envelope

3.3.6 Results

Test Results				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2405	10.551	0.0113	1.0	PASS
2440	10.449	0.0111	1.0	PASS
2475	10.215	0.0105	1.0	PASS

Peak Conducted Output Power

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.9.1.1
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 11, 2405 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Peak Power [dBm]:	10.551
Peak Power [W]:	0.011353



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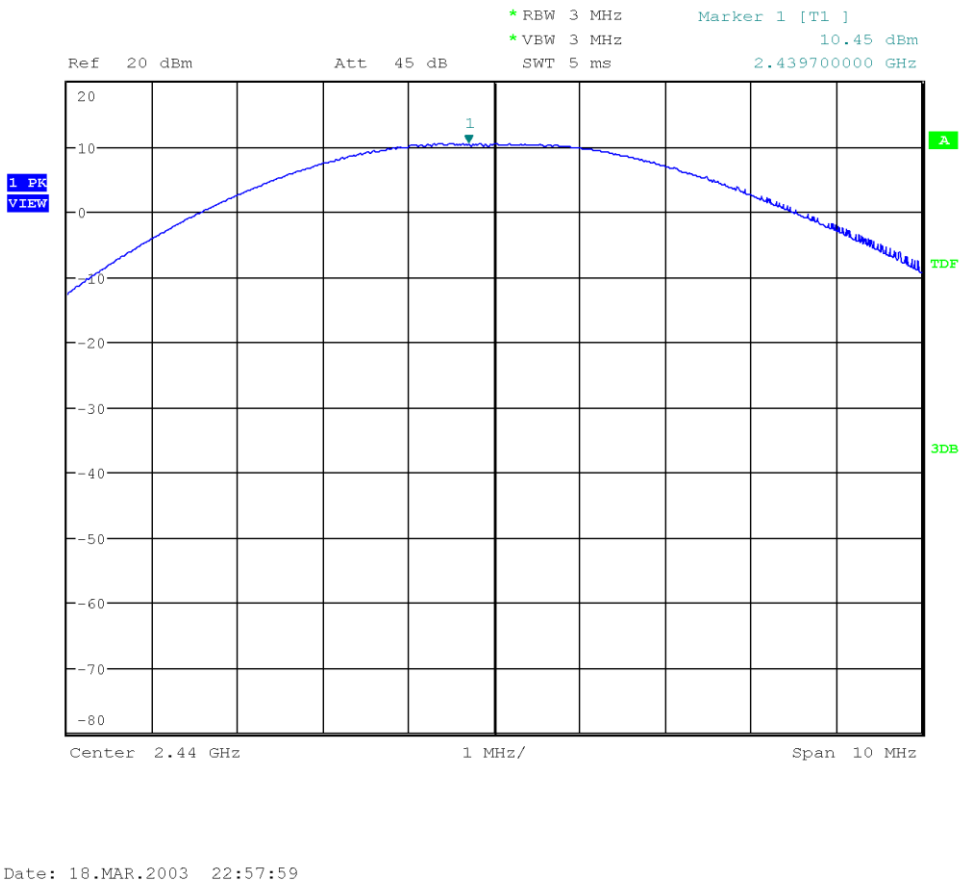
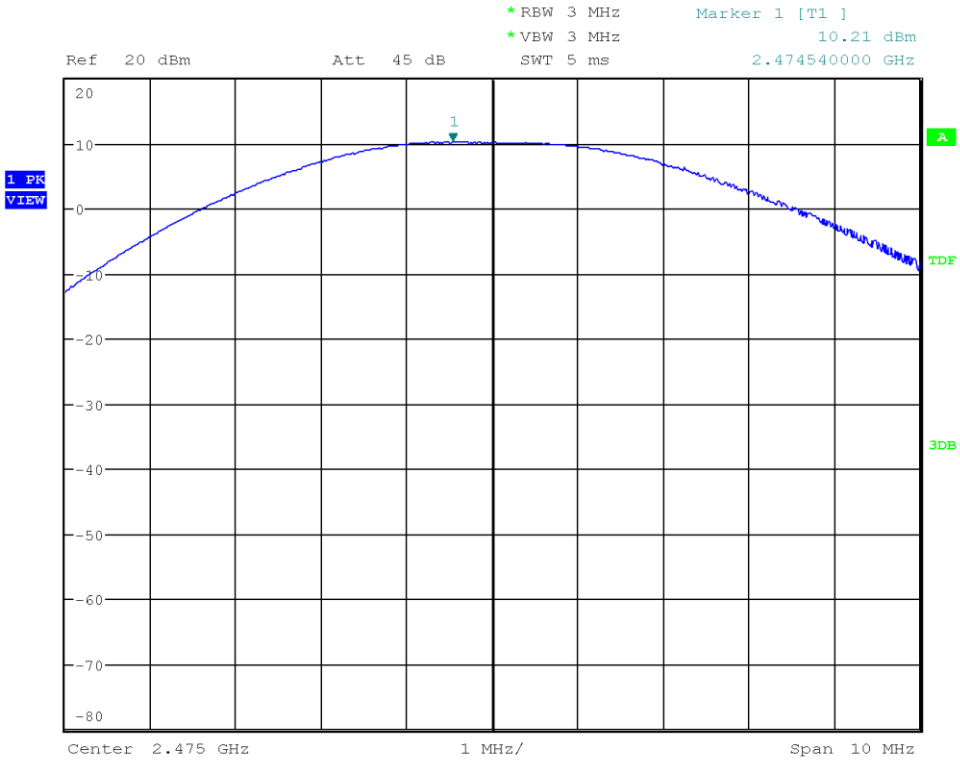
Peak Conducted Output Power

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.9.1.1
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 18, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Peak Power [dBm]:	10.449
Peak Power [W]:	0.011089



Peak Conducted Output Power

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.9.1.1
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 25, 2475 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Peak Power [dBm]:	10.215
Peak Power [W]:	0.010508



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3.4 Test Conditions and Results - Power spectral density

3.4.1 Information

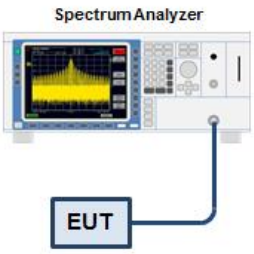
Test Information	
Reference	FCC § 15.247(e); ISED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Measurement Uncertainty	± 2.86 dB
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Operator	Charline Graf
Date	2021-01-25

3.4.2 Limits

Limits
8 dBm / 3 kHz

3.4.3 Setup

Test Setup



3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Cable (diverse)	– (diverse)	– (diverse)	EF00779	2020-12	2021-12
Spectrum Analyser	R&S	FSU 43	EF01631	2020-07	2021-07

3.4.5 Procedure

Test Procedure

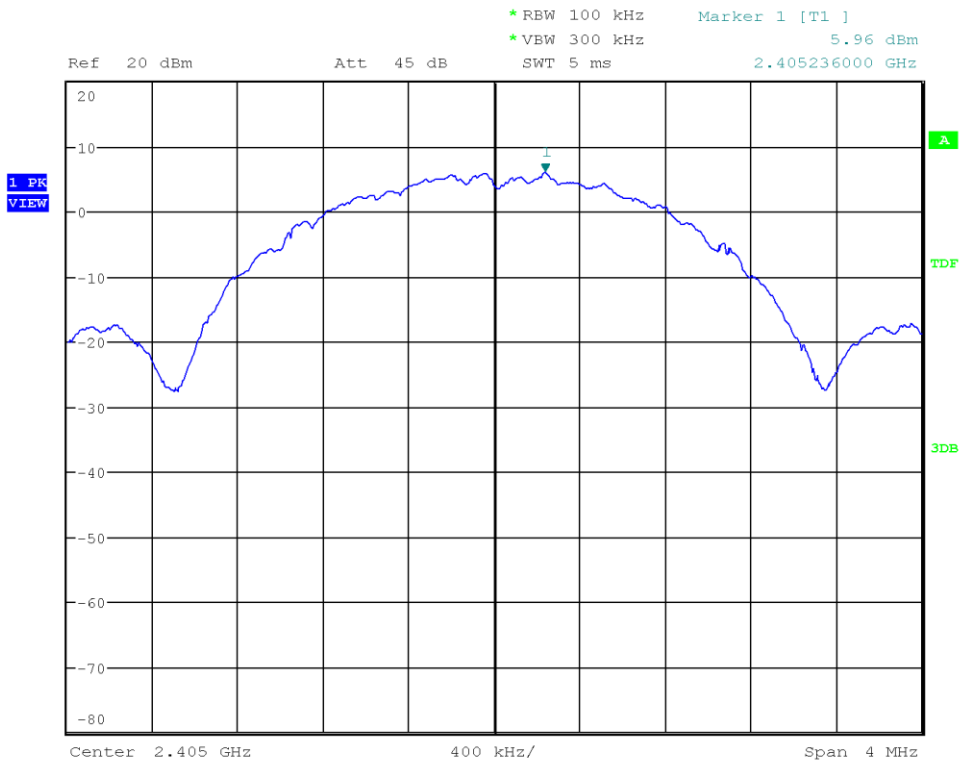
1. EUT set to test mode
2. The analyzer is set to DTS channel center frequency with a span of 1.5 times the DTS bandwidth
3. The RBW is set to 100 kHz with VBW ≥ RBW and the detector is set to peak with max hold
4. After the trace has stabilized a marker is set to the envelope maximum
5. If the power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

3.4.6 Results

Test Results			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
2405	5.955	8.0	PASS
2440	5.828	8.0	PASS
2475	5.667	8.0	PASS
RBW = 100 kHz			

Peak Power Spectral Density

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 11, 2405 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Peak Frequency [MHz]:	2405.236
Spectral Density [dBm/RBW]:	5.955
Resolution Bandwidth [kHz]:	100 kHz



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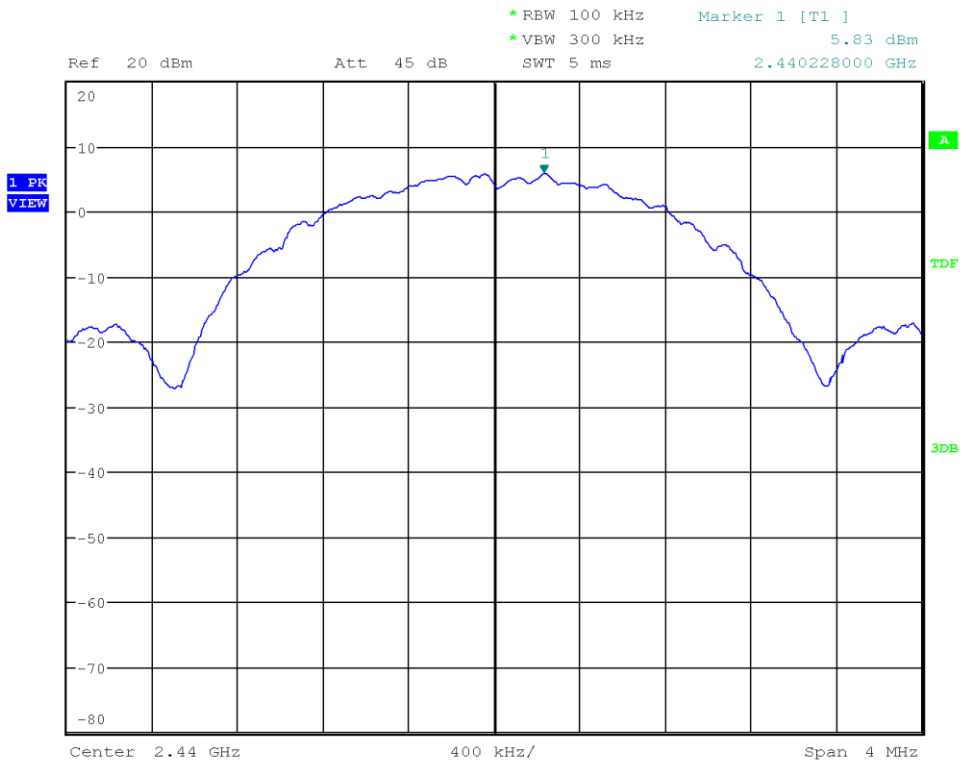
Peak Power Spectral Density

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 18, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Peak Frequency [MHz]:	2440.228
Spectral Density [dBm/RBW]:	5.828
Resolution Bandwidth [kHz]:	100 kHz



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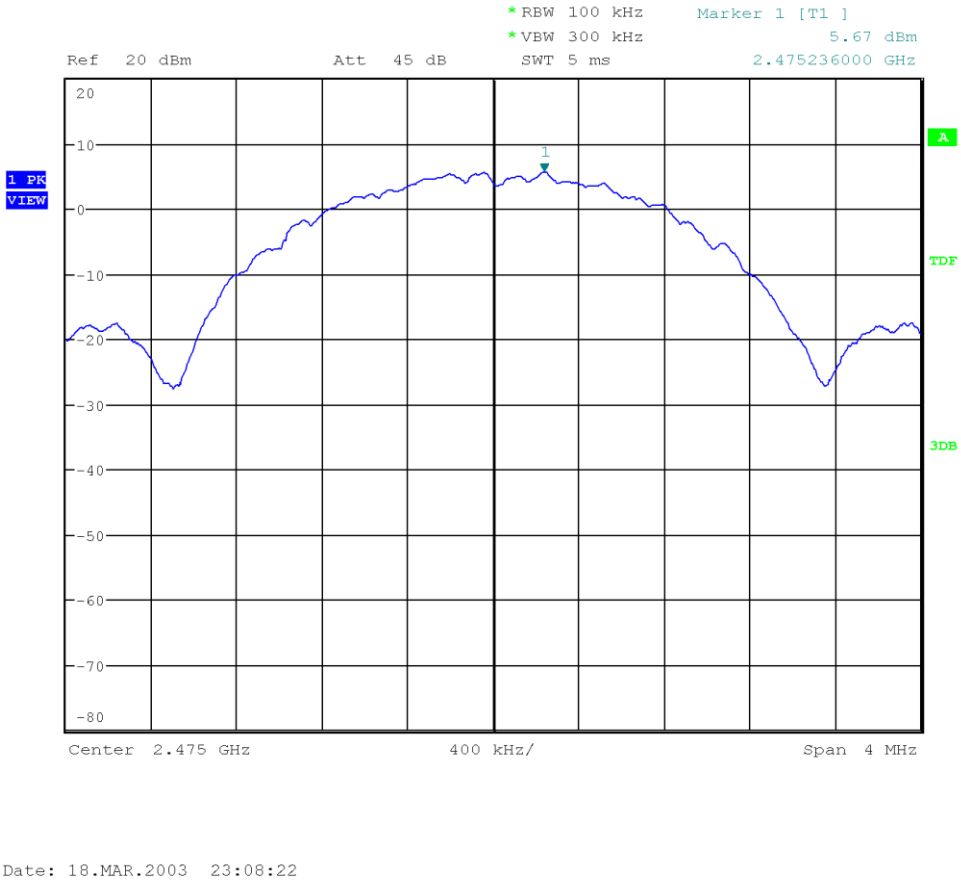
Peak Power Spectral Density

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 25, 2475 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Peak Frequency [MHz]:	2475.236
Spectral Density [dBm/RBW]:	5.667
Resolution Bandwidth [kHz]:	100 kHz



3.5 Test Conditions and Results - AC powerline conducted emissions

3.5.1 Information

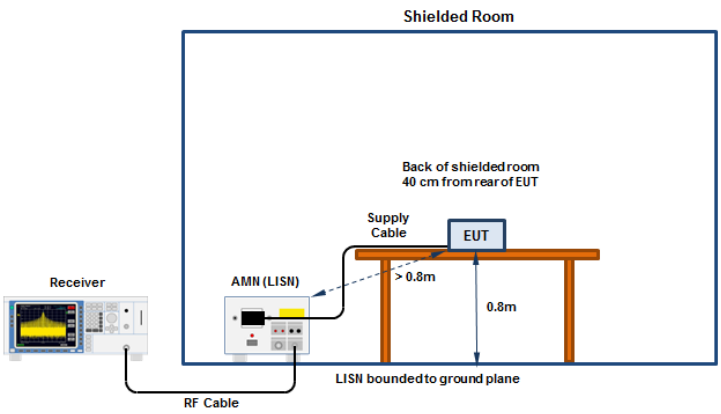
Test Information	
Reference	FCC § 15.207; ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.2
Measurement Uncertainty	± 3.82 dB
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Operator	Charline Graf
Date	2021-01-26

3.5.2 Limits

Limits		
Frequency [MHz]	Quasi-Peak [dBµV]	Average [dBµV]
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50
* Limit decreases linearly with the logarithm of the frequency		

3.5.3 Setup

Test Setup



3.5.4 Equipment

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

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESR7	EF00943	2020-07	2021-07
Pulse Limiter	R&S	ESH3-Z2	EF01222	2020-07	2021-07
LISN	Schwarzbeck	NSLK 8127 RC	EF01592	2020-07	2021-07

Conducted emissions at the mains power port
according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Ms. Graf
Test Date:	2021-01-26
Operating Conditions:	ambient temperature: False power input: 3.3 VDC
LISN:	Schwarzbeck NSLK 8127 RC L
Operational Mode & EUT Configuration:	ZigBee, 2440 MHz
Applied to Port:	Mains

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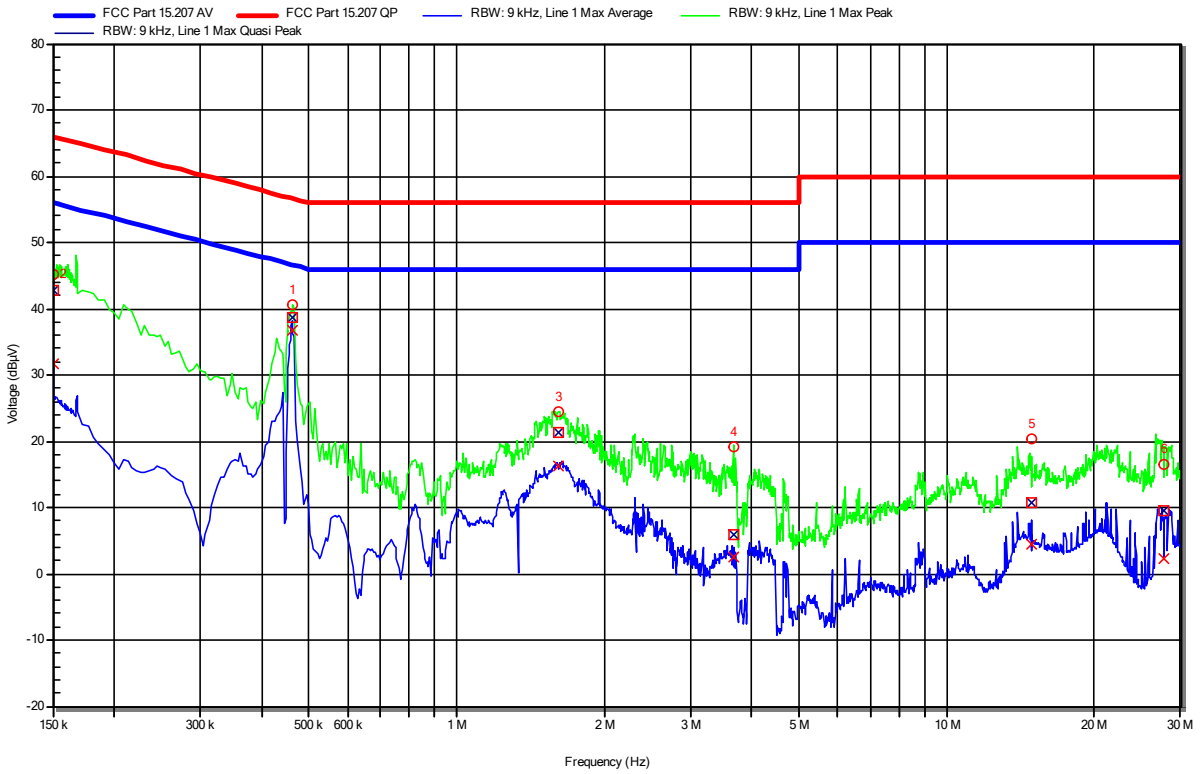
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	463.65 kHz	38.75 dBµV	56.63 dBµV	-17.88 dB	Pass	Line 1
2	150 kHz	42.79 dBµV	66 dBµV	-23.21 dB	Pass	Line 1
3	1.617 MHz	21.41 dBµV	56 dBµV	-34.59 dB	Pass	Line 1
4	3.671 MHz	5.93 dBµV	56 dBµV	-50.07 dB	Pass	Line 1
5	14.928 MHz	10.84 dBµV	60 dBµV	-49.16 dB	Pass	Line 1
6	27.663 MHz	9.4 dBµV	60 dBµV	-50.6 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	463.65 kHz	36.75 dBµV	46.63 dBµV	-9.88 dB	Pass	Line 1
2	150 kHz	31.59 dBµV	56 dBµV	-24.41 dB	Pass	Line 1
3	1.617 MHz	16.3 dBµV	46 dBµV	-29.7 dB	Pass	Line 1
4	3.671 MHz	2.45 dBµV	46 dBµV	-43.55 dB	Pass	Line 1
5	14.928 MHz	4.43 dBµV	50 dBµV	-45.57 dB	Pass	Line 1
6	27.663 MHz	2.27 dBµV	50 dBµV	-47.73 dB	Pass	Line 1

Conducted emissions at the mains power port
according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Ms. Graf
Test Date:	2021-01-26
Operating Conditions:	ambient temperature: False power input: 3.3 VDC
LISN:	Schwarzbeck NSLK 8127 RC N
Operational Mode & EUT Configuration:	ZigBee, 2440 MHz
Applied to Port:	Mains

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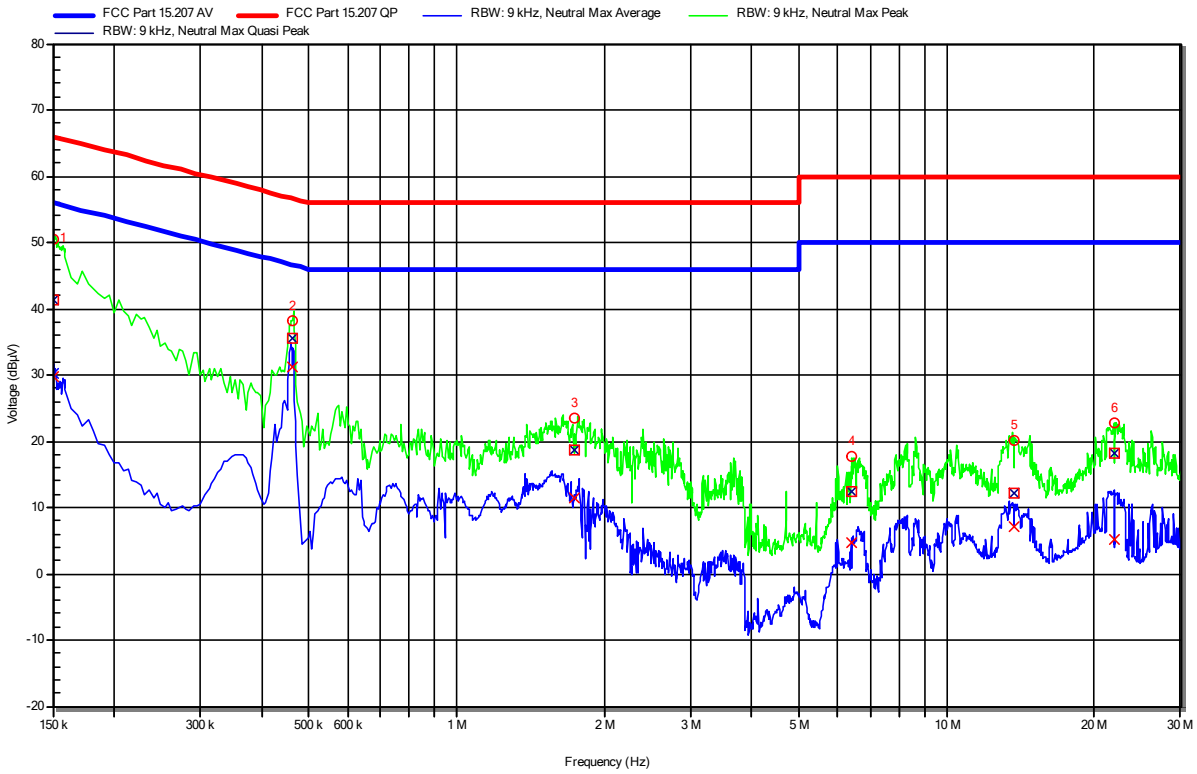
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	150.45 kHz	41.33 dBµV	65.98 dBµV	-24.64 dB	Pass	Neutral
2	462.75 kHz	35.62 dBµV	56.64 dBµV	-21.02 dB	Pass	Neutral
3	1.743 MHz	18.7 dBµV	56 dBµV	-37.3 dB	Pass	Neutral
4	6.374 MHz	12.34 dBµV	60 dBµV	-47.66 dB	Pass	Neutral
5	13.705 MHz	12.15 dBµV	60 dBµV	-47.85 dB	Pass	Neutral
6	22.034 MHz	18.11 dBµV	60 dBµV	-41.89 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150.45 kHz	29.88 dBµV	55.98 dBµV	-26.1 dB	Pass	Neutral
2	462.75 kHz	31.16 dBµV	46.64 dBµV	-15.48 dB	Pass	Neutral
3	1.743 MHz	11.52 dBµV	46 dBµV	-34.48 dB	Pass	Neutral
4	6.374 MHz	4.63 dBµV	50 dBµV	-45.37 dB	Pass	Neutral
5	13.705 MHz	7.01 dBµV	50 dBµV	-42.99 dB	Pass	Neutral
6	22.034 MHz	5.22 dBµV	50 dBµV	-44.78 dB	Pass	Neutral

3.6 Test Conditions and Results - Band-edge compliance

3.6.1 Information

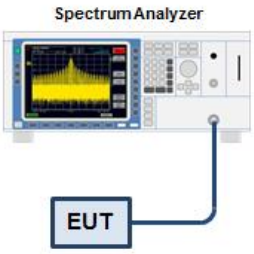
Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 3.64 dB
Measurement Method	ANSI C63.10 11.13
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Operator	Charline Graf
Date	2021-01-25

3.6.2 Limits

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

3.6.3 Setup

Test Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Cable (diverse)	– (diverse)	– (diverse)	EF00779	2020-12	2021-12
Spectrum Analyser	R&S	FSU 43	EF01631	2020-07	2021-07

3.6.5 Procedure

Test Procedure

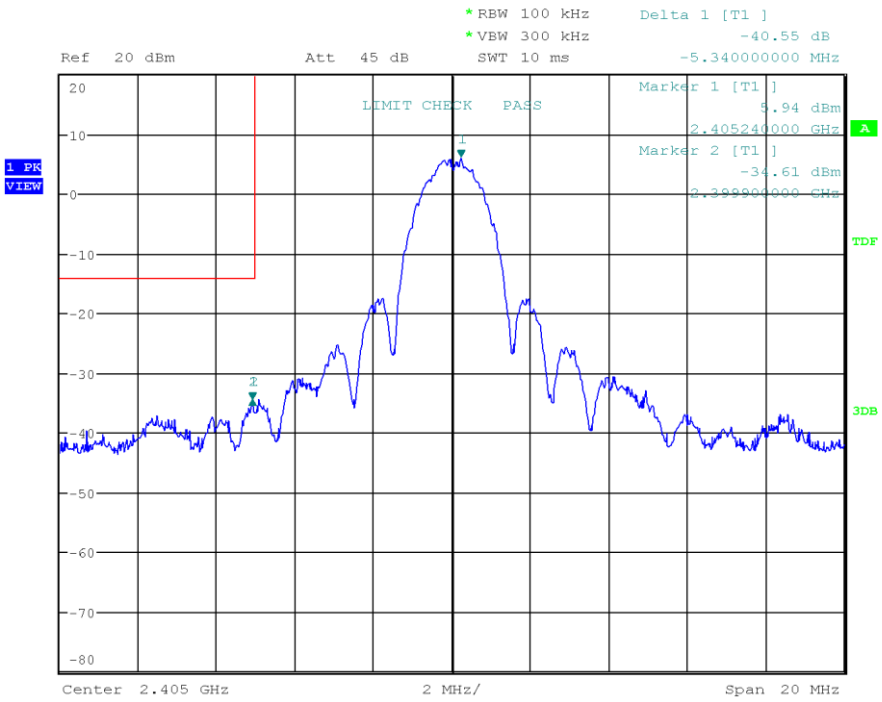
1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is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

3.6.6 Results

Test Results				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
O-QPSK	2405	-34.606	-20	PASS
O-QPSK	2475	-43.318	-20	PASS

Emissions in non-restricted frequency bands at the Band-edge

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 11, 2405 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Band-edge	Lower
In-band Frequency [MHz]:	2405.24
Max. in-band Level [dBm/100 kHz]:	5.942
Out-of-band Frequency [MHz]:	2399.9
Max. out-of-band Level [dBm/100 kHz]:	-34.606
Attenuation [dB]:	-40.55



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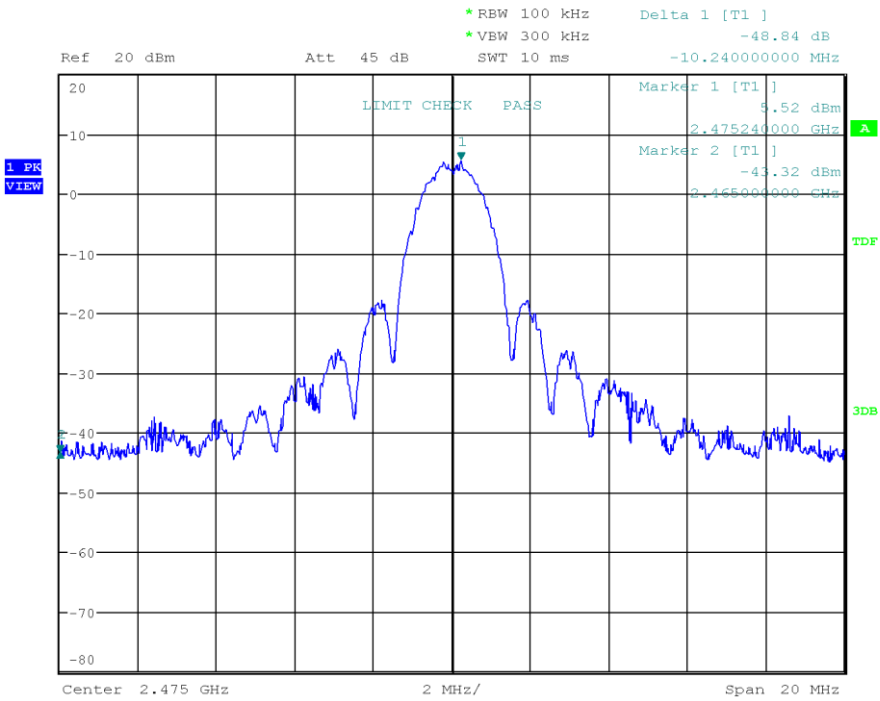
Emissions in non-restricted frequency bands at the Band-edge

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 25, 2475 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Band-edge	Lower
In-band Frequency [MHz]:	2475.24
Max. in-band Level [dBm/100 kHz]:	5.523
Out-of-band Frequency [MHz]:	2465.0
Max. out-of-band Level [dBm/100 kHz]:	-43.318
Attenuation [dB]:	-48.84



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3.7 Test Conditions and Results - Conducted spurious emissions

3.7.1 Information

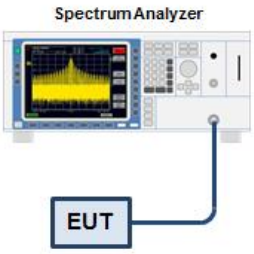
Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 4.25 dB
Measurement Method	ANSI C63.10 11.11
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Operator	Charline Graf
Date	2021-01-25

3.7.2 Limits

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

3.7.3 Setup

Test Setup



3.7.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Cable (diverse)	– (diverse)	– (diverse)	EF00779	2020-12	2021-12
Spectrum Analyser	R&S	FSU 43	EF01631	2020-07	2021-07

3.7.5 Procedure

Test Procedure

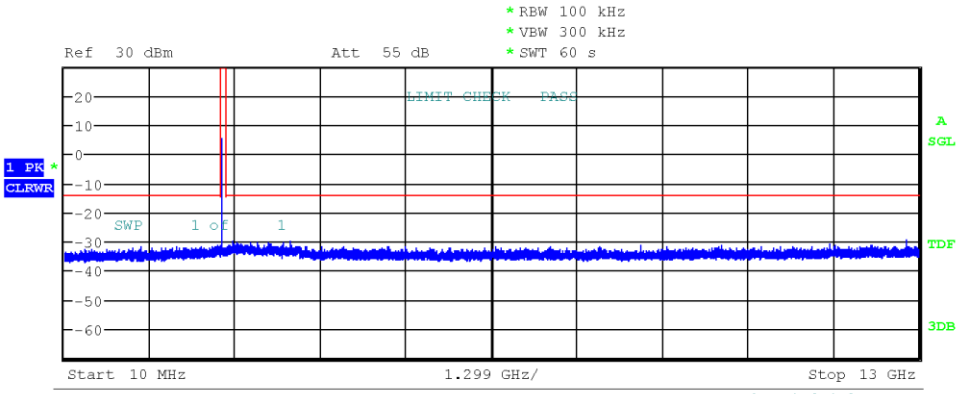
1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels outside frequency band

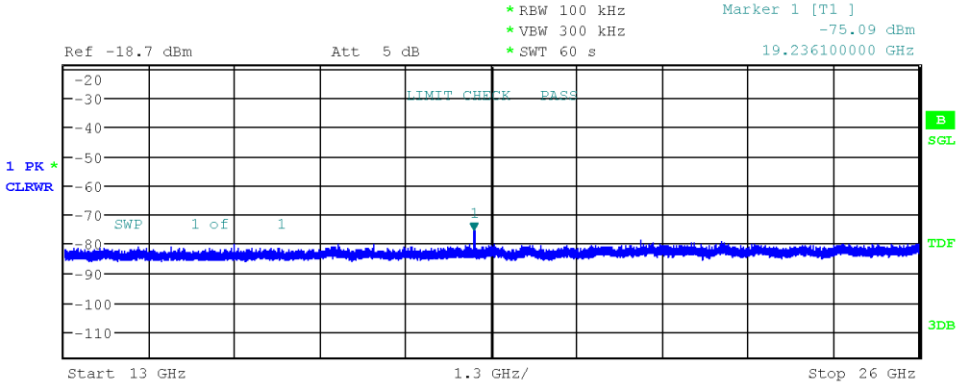
3.7.6 Results

Test Results		
Mode	Channel [MHz]	Verdict
O-QPSK	2405	PASS
O-QPSK	2440	PASS
O-QPSK	2475	PASS

Conducted Spurious Emissions

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 11, 2405 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Max. in-band Frequency [MHz]:	2405.0
Max. in-band Level [dBm/100 kHz]:	5.8
Out-of-band Limit [dBm/100 kHz]:	-14.2





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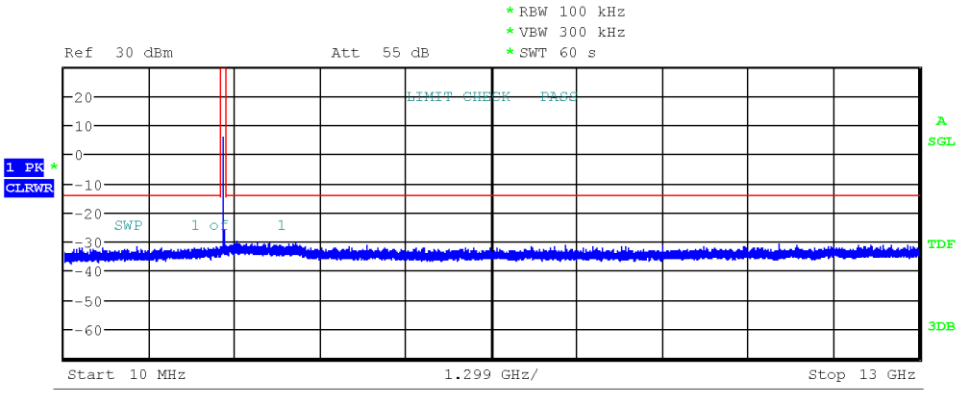
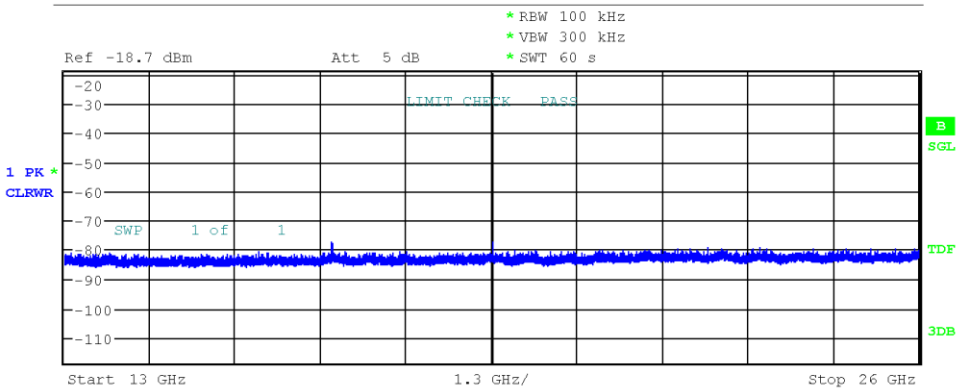
Conducted Spurious Emissions

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 18, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Max. in-band Frequency [MHz]:	2440.2
Max. in-band Level [dBm/100 kHz]:	5.8
Out-of-band Limit [dBm/100 kHz]:	-14.2

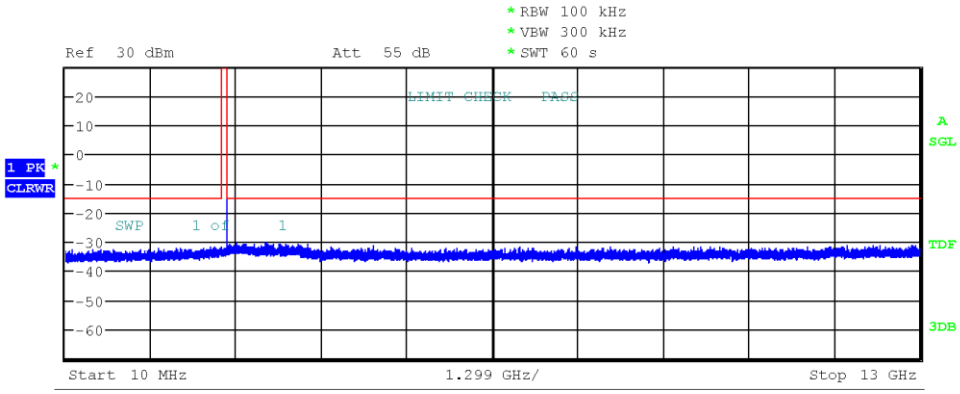


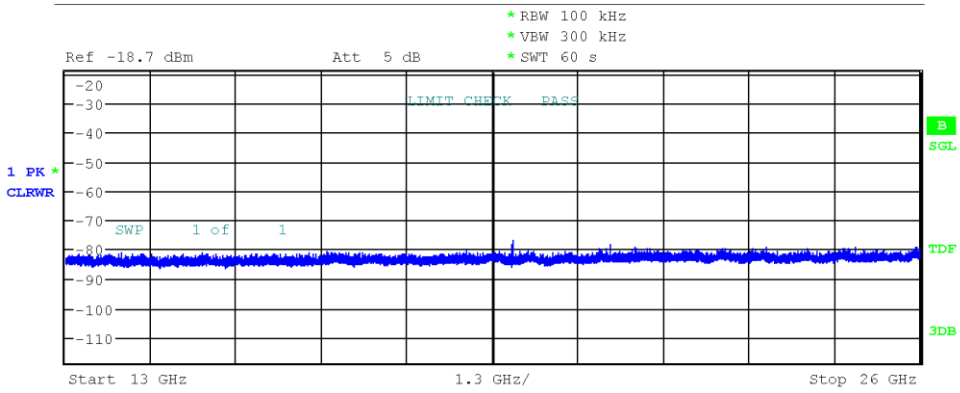


Date: 18.MAR.2003 23:30:43

Conducted Spurious Emissions

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module with integrated antenna
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32802
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.15.4 (DSSS/250 kbps), Channel: 25, 2475 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Charline Graf
Test Site:	Eurofins Product Service GmbH
Test Date:	2021-01-25
Max. in-band Frequency [MHz]:	2474.9
Max. in-band Level [dBm/100 kHz]:	5.5
Out-of-band Limit [dBm/100 kHz]:	-14.5





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3.8 Test Conditions and Results - Transmitter radiated emissions

3.8.1 Information

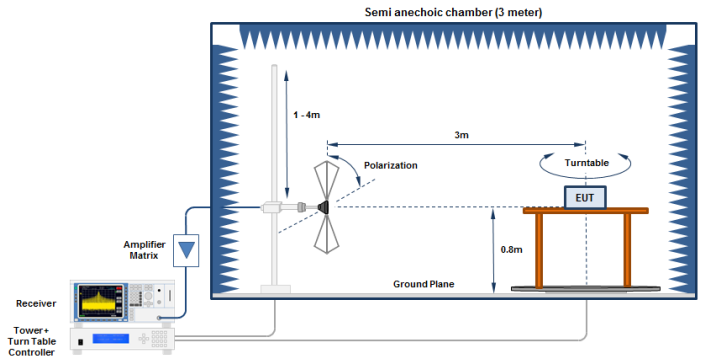
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209; ISED RSS-Gen, Issue 5 (section 6.13)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12; KDB Publication 558074 D01 v05r01
Operator	Charline Graf
Date	2021-01-21

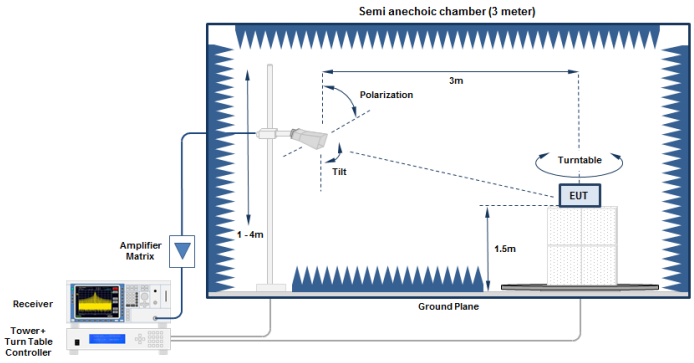
3.8.2 Limits

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

3.8.3 Setup

Test Setup 30 MHz - 1000 MHz



Test Setup > 1 GHz


3.8.4 Equipment

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

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2020-07	2021-07
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	R&S	ESU 26	EF00887	2020-07	2021-07
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10
Antenna	Amplifier Research	AT4560	EF00302	2019-05	2021-05

3.8.5 Procedure

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

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

Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using a peak detector. 6. Then the operational duty cycle of the EUT is subtracted from the Peak reading to derive the RMS average value.

3.8.6 Results

Test Results – integrated antenna						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2405	119.904	36.20	pk	ver	43.52	-07.32
2405	126.715	40.97	pk	hor	43.52	-02.55
2405	2400	49.94	pk	hor	74.00	-24.06
2405	4808	50.77	pk	hor	74.00	-23.23
2405	4808	49.43	pk	hor	74.00	-24.57
2405	4808	50.69	pk	ver	74.00	-23.31
2405	4808	45.92	avg	ver	54.00	-8.08
2405	4808	49.29	pk	ver	74.00	-24.71
2405	7218	56.66	pk	hor	74.00	-17.34
2405	7218	51.89	avg	hor	54.00	-2.11
2405	7218	55.98	pk	hor	74.00	-18.02
2405	7218	51.21	avg	hor	54.00	-2.79
2405	7218	54.97	pk	ver	74.00	-19.03
2405	7218	50.20	avg	ver	54.00	-3.80
2405	7218	55.39	pk	ver	74.00	-18.61
2405	7218	50.62	avg	ver	54.00	-3.38
2440	71.955	39.53	pk	ver	95.00	-55.47
2440	600	36.55	pk	hor	95.00	-58.45
2440	960.256	38.93	pk	hor	54.00	-15.07
2440	960.256	37.62	pk	ver	54.00	-16.38
2440	4878	50.64	pk	hor	74.00	-23.36
2440	4878	51.55	pk	hor	74.00	-22.45

2440	4878	47.57	pk	ver	74.00	-26.43
2440	4878	47.13	pk	ver	74.00	-26.87
2440	7321	52.07	pk	hor	74.00	-21.93
2440	7321	53.90	pk	ver	74.00	-20.1
2440	7321	49.13	avg	ver	54.00	-4.87
2440	7321	54.59	pk	ver	74.00	-19.41
2440	7321	49.82	avg	ver	54.00	-04.18
2440	7327	53.12	pk	hor	74.00	-20.88
2475	71.955	41.21	pk	ver	95.00	-53.79
2475	119.904	36.94	pk	ver	43.52	-06.58
2475	960.256	39.12	pk	hor	54.00	-14.88
2475	960.256	37.66	pk	ver	54.00	-16.34
2475	4949	51.07	pk	hor	74.00	-22.93
2475	4949	50.05	pk	hor	74.00	-23.95
2475	4949	48.59	pk	ver	74.00	-25.41
2475	4949	48.03	pk	ver	74.00	-25.97
2475	7429	53.71	pk	hor	74.00	-20.29
2475	7429	48.94	avg	hor	54.00	-5.06
2475	7429	50.19	pk	hor	74.00	-23.81
2475	7429	53.06	avg	ver	54.00	-00.94
2475	7423	51.37	pk	ver	54.00	-02.63
Comments:	AVG value is calculated from peak value by duty cycle correction of -4.77 dB					

Test Results – external antenna						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2405	960.256	38.71	pk	hor	54.00	-15.29
2405	960.256	38.23	pk	ver	54.00	-15.77
2405	2387	54.88	pk	hor	74.00	-19.12
2405	2387	50.11	avg	hor	54.00	-03.89
2405	7218	50.41	pk	hor	74.00	-23.59
2440	239.744	37.49	pk	hor	95.00	-57.51
2440	960.256	38.68	pk	hor	54.00	-15.32
2440	960.256	38.51	pk	ver	54.00	-15.49
2440	2500	51.46	pk	ver	74.00	-22.54
2440	7321	52.52	pk	hor	74.00	-21.48
2440	7321	48.58	pk	ver	74.00	-25.42
2475	239.744	37.72	pk	hor	95.00	-57.28
2475	960.256	38.49	pk	ver	54.00	-15.51
2475	2502	57.19	pk	ver	74.00	-16.81
2475	2502	52.42	avg	ver	54.00	-01.58
2475	7423	49.39	pk	ver	74.00	-24.61
2475	7429	52.50	pk	hor	74.00	-21.50
Comments:	AVG value is calculated from peak value by duty cycle correction of -4.77 dB					

3.9 Test Conditions and Results - Receiver radiated emissions

3.9.1 Information

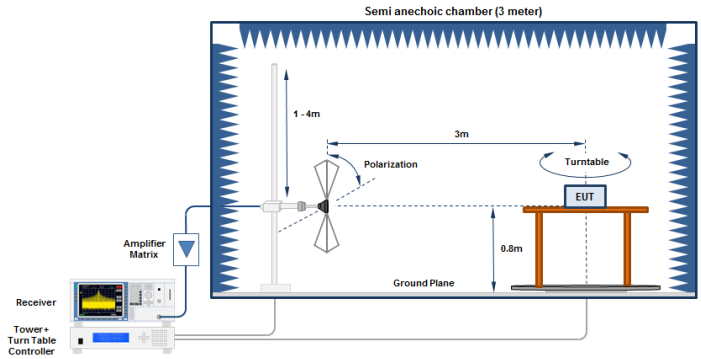
Test Information	
Reference	ISED RSS-247, Issue 2 (section 3.1)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.5, 6.6, 11.12
Operator	Charline Graf
Date	2021-01-21

3.9.2 Limits

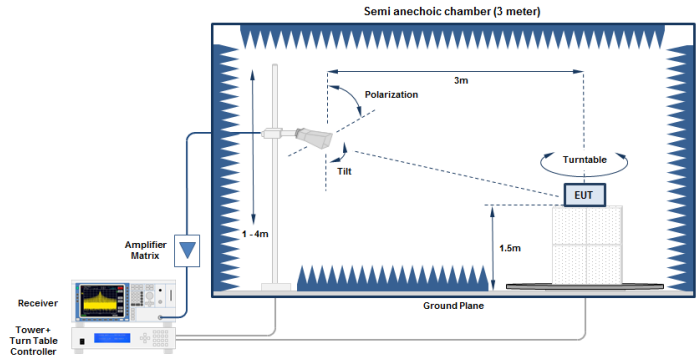
Limits			
Frequency range [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.9.3 Setup

Test Setup 30 MHz - 1000 MHz



Test Setup > 1 GHz



3.9.4 Equipment

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

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Cable (diverse)	– (diverse)	– (diverse)	EF00779	2020-12	2021-12
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2020-07	2021-07
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
Cable (diverse)	– (diverse)	– (diverse)	EF00779	2020-12	2021-12
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	ESU 26	EF00887	2020-07	2021-07
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10
Antenna	Amplifier Research	AT4560	EF00302	2019-05	2021-05

3.9.5 Procedure

Test Procedure 30 - 1000 MHz

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

Test Procedure > 1 GHz

1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground
2. EUT set to test mode
3. The receiver is set to peak detection with max hold
4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5. All significant emissions are measured again using a peak detector
6. Then the operational duty cycle of the EUT is subtracted from the Peak reading to derive the RMS average value.

3.9.6 Results

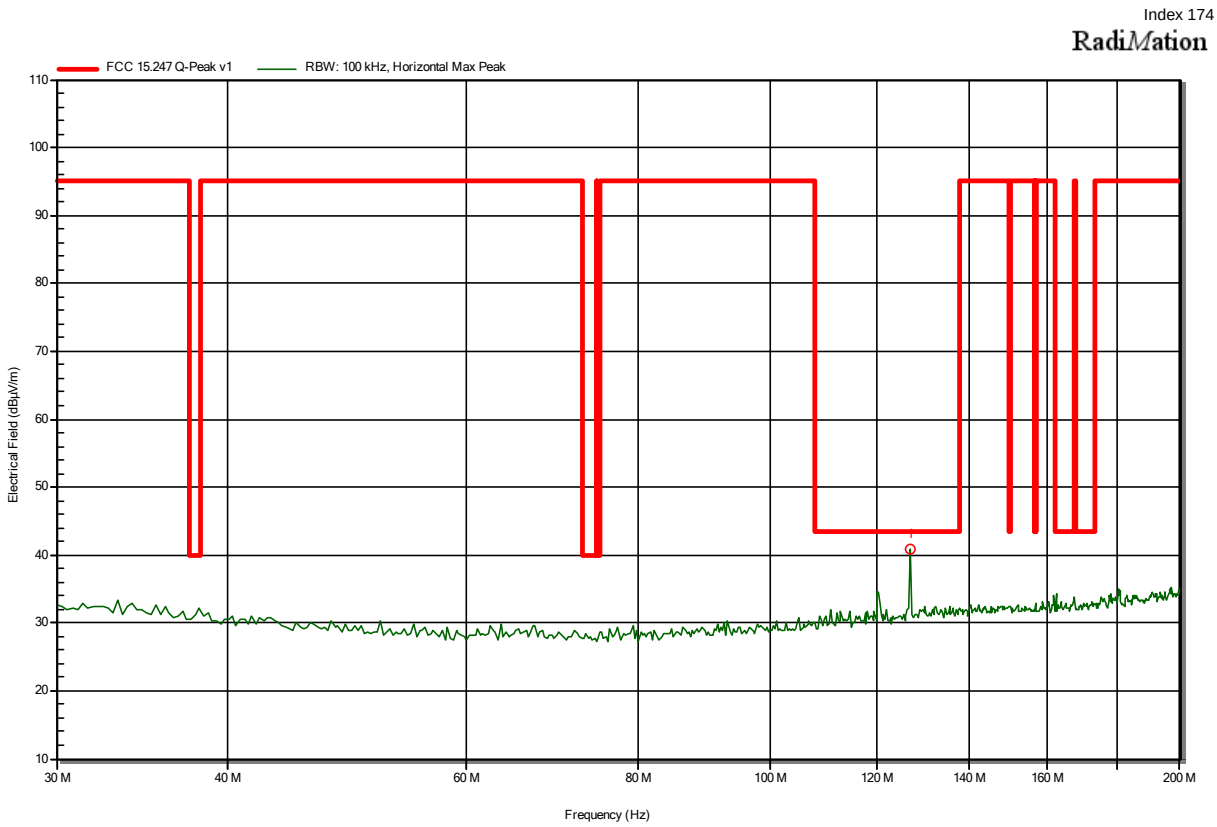
Test Results – integrated antenna						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
Receive	59.968	36.07	pk	ver	40.00	-03.93
Receive	885.897	29.18	pk	hor	46.00	-16.82
Receive	960.256	38.97	pk	hor	53.90	-14.93
Receive	960.256	38.70	pk	ver	53.90	-15.20
Receive	4801	39.75	pk	hor	53.98	-14.23
Receive	4801	41.87	pk	ver	53.98	-12.11

Test Results – external antenna						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
Receive	31.09	38.84	pk	ver	40.00	-01.16
Receive	31.362	38.17	pk	hor	40.00	-01.83
Receive	59.968	37.82	pk	ver	40.00	-02.18
Receive	83.942	37.99	pk	ver	40.00	-02.01
Receive	239.744	34.02	pk	hor	46.00	-11.98
Receive	239.744	29.70	pk	ver	46.00	-16.30
Receive	960.256	38.05	pk	hor	53.90	-15.85
Receive	960.256	34.07	pk	ver	53.90	-19.83
Receive	4955	40.51	pk	ver	53.98	-13.47

ANNEX A Transmitter spurious emissions – integrated antenna

Radiated Spurious Emissions according to FCC 47 CFR 15.247

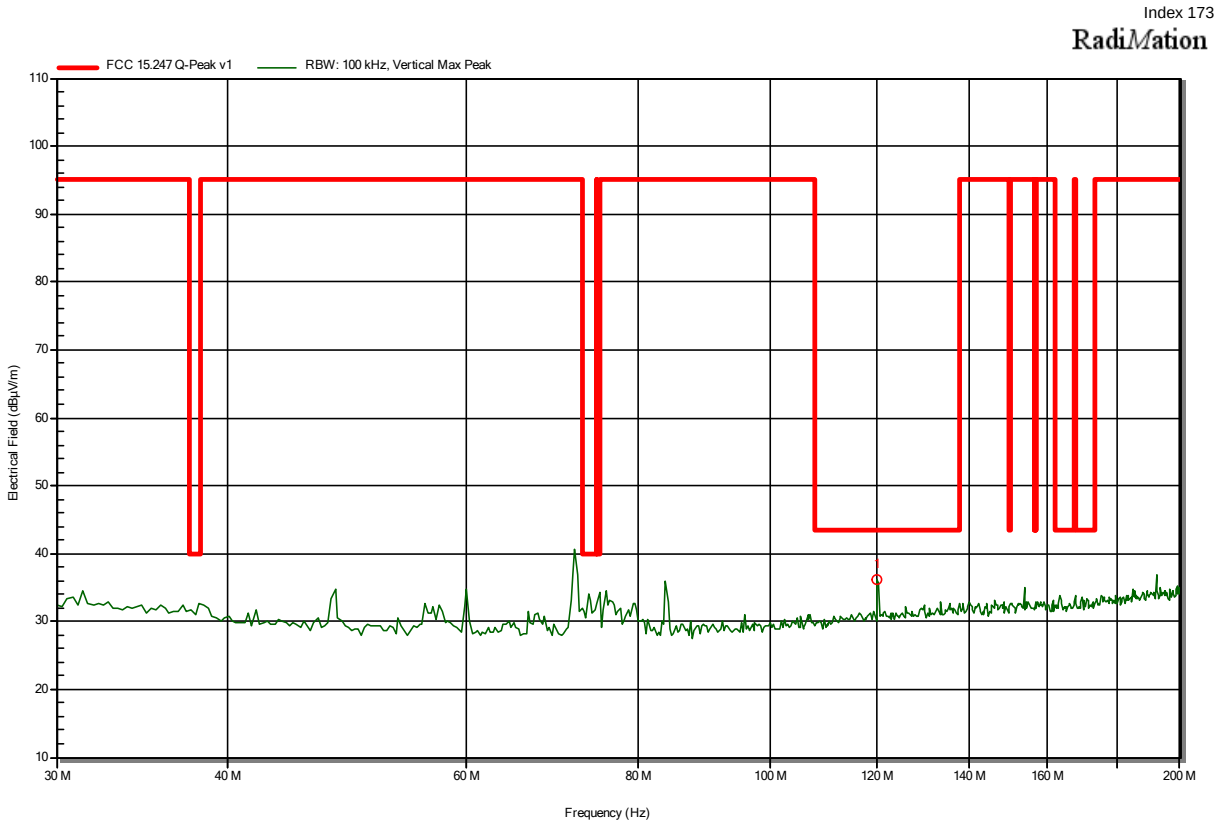
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
126.715 MHz	40.97 dBµV/m	43.52 dBµV/m	-2.55 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

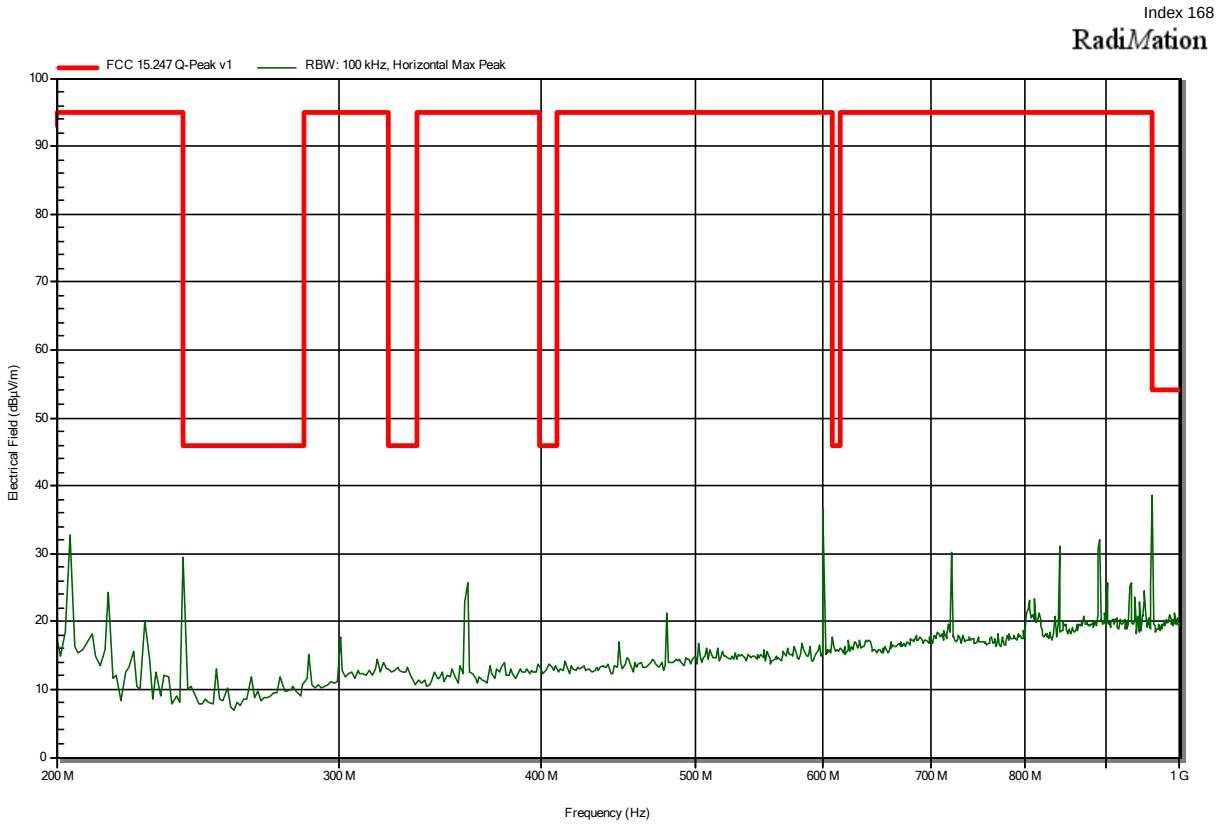
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
119.904 MHz	36.2 dBµV/m	43.52 dBµV/m	-7.32 dB	Pass

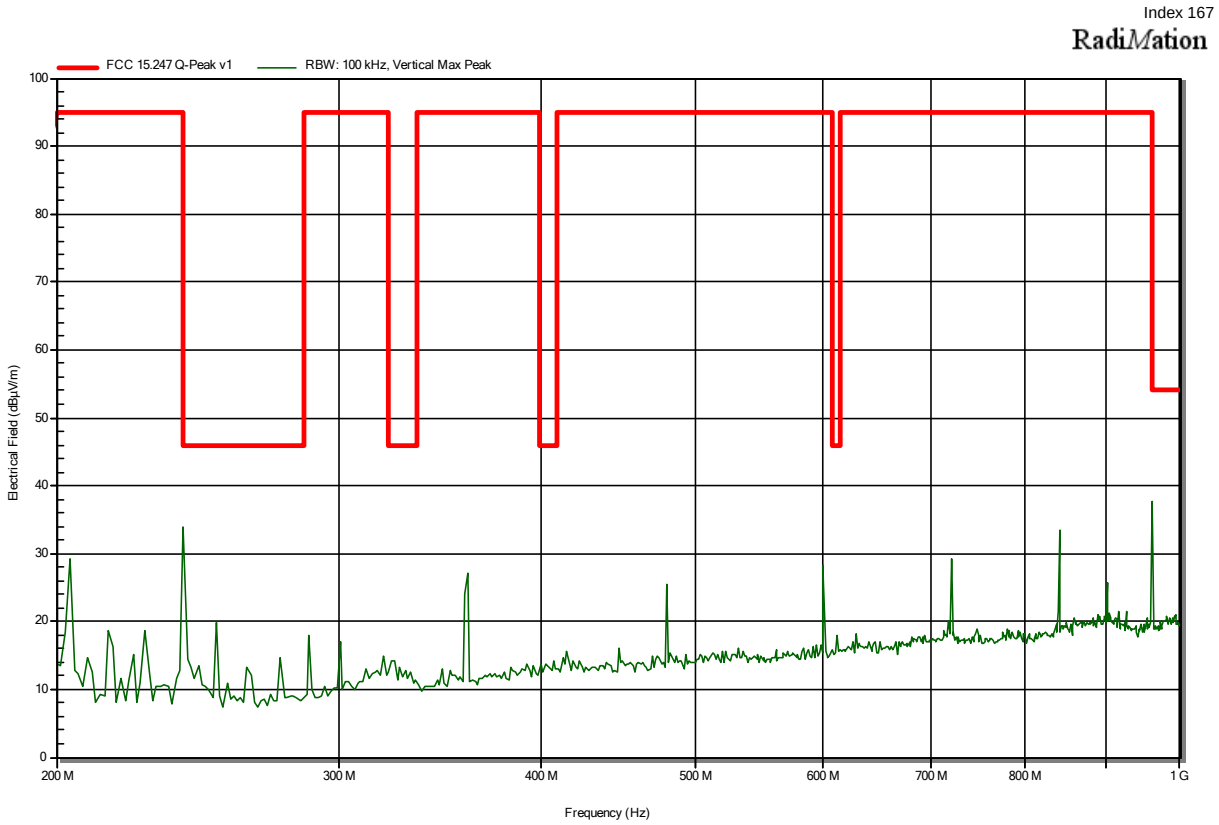
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



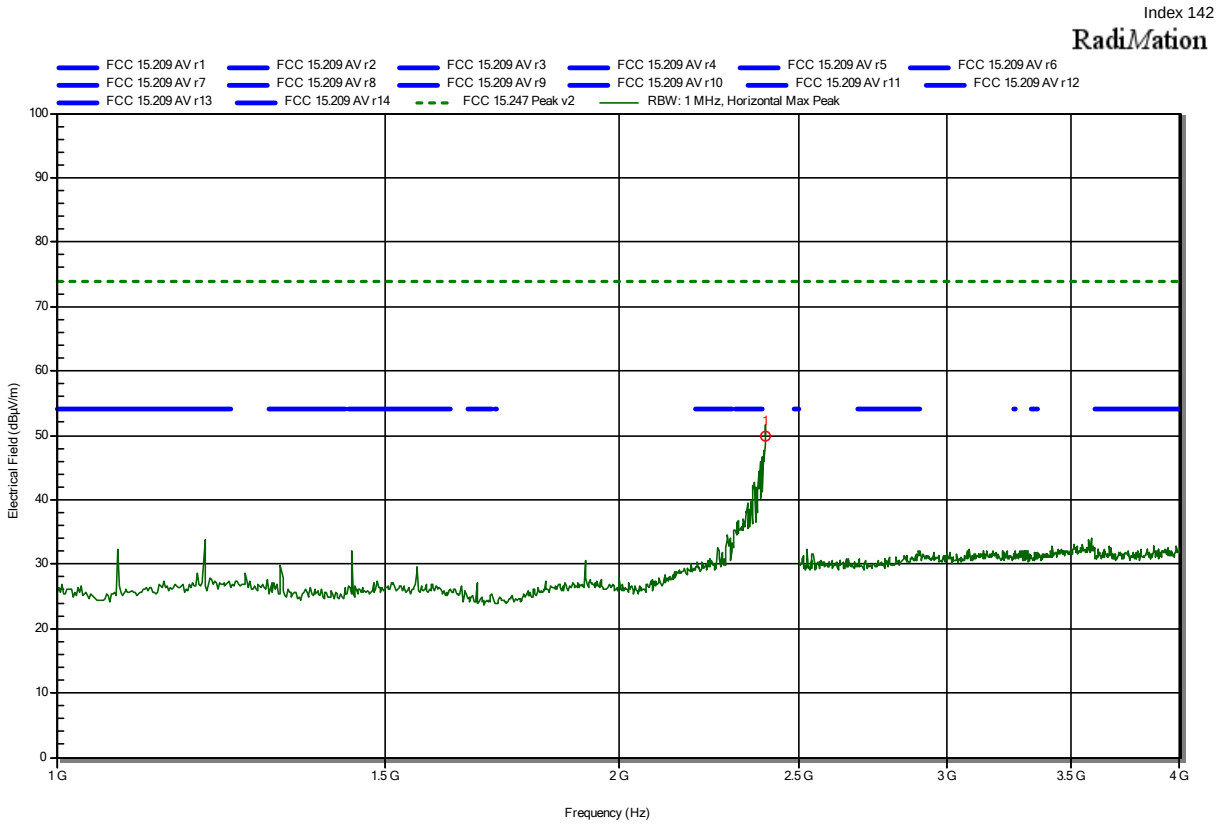
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

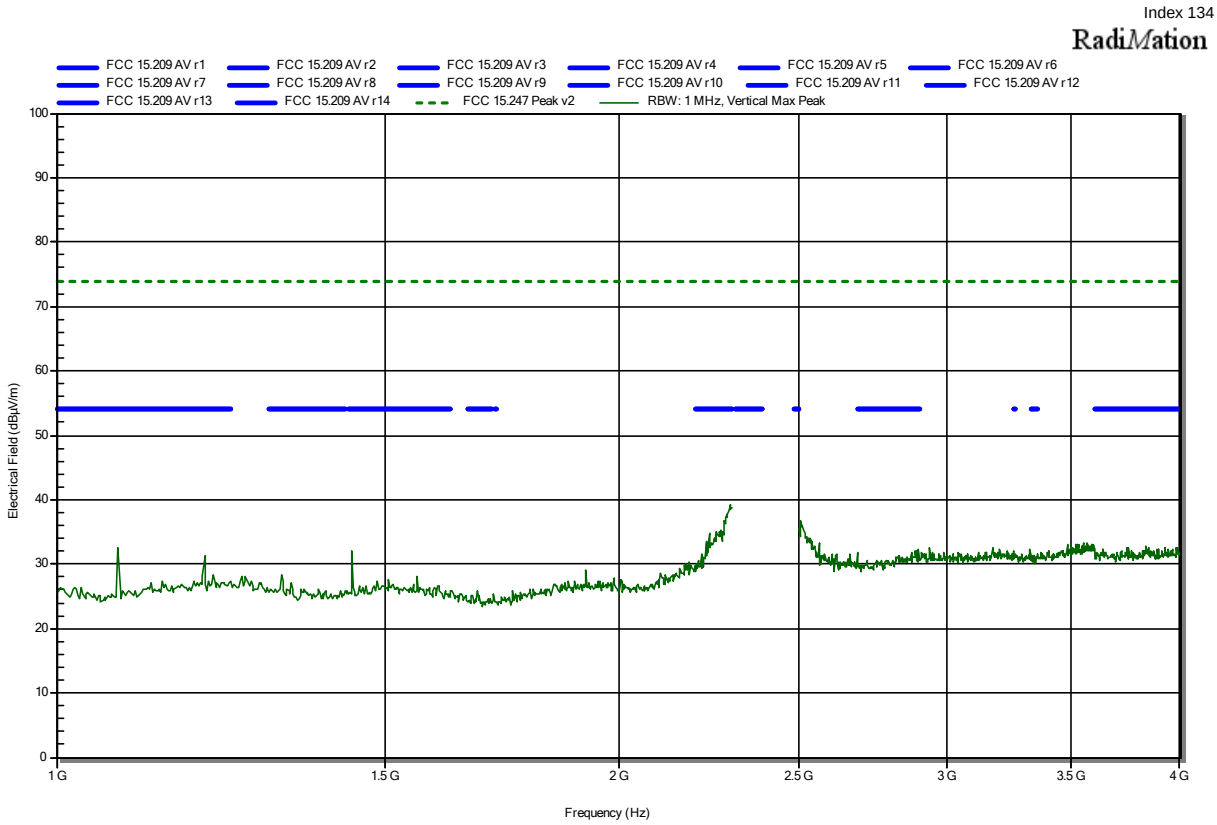
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4 GHz	49.94 dBµV/m	74 dBµV/m	-24.06 dB	Pass

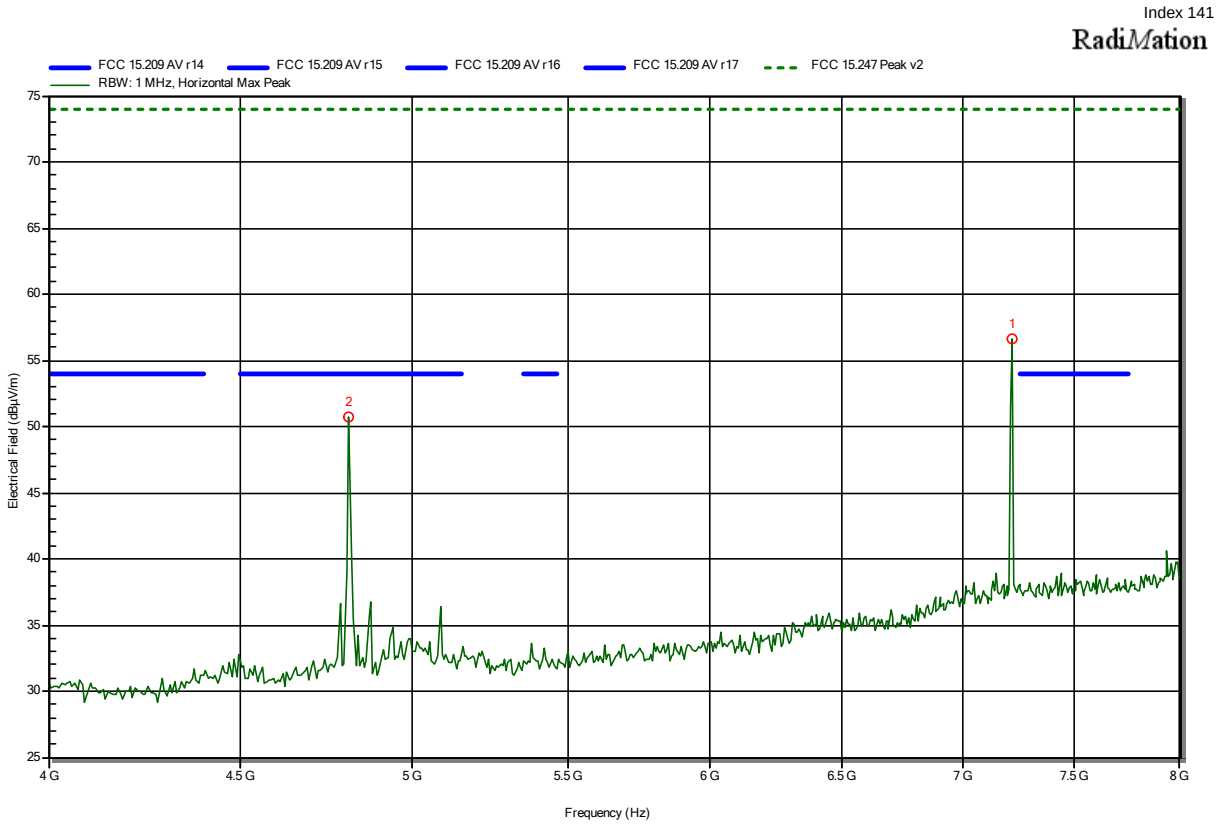
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

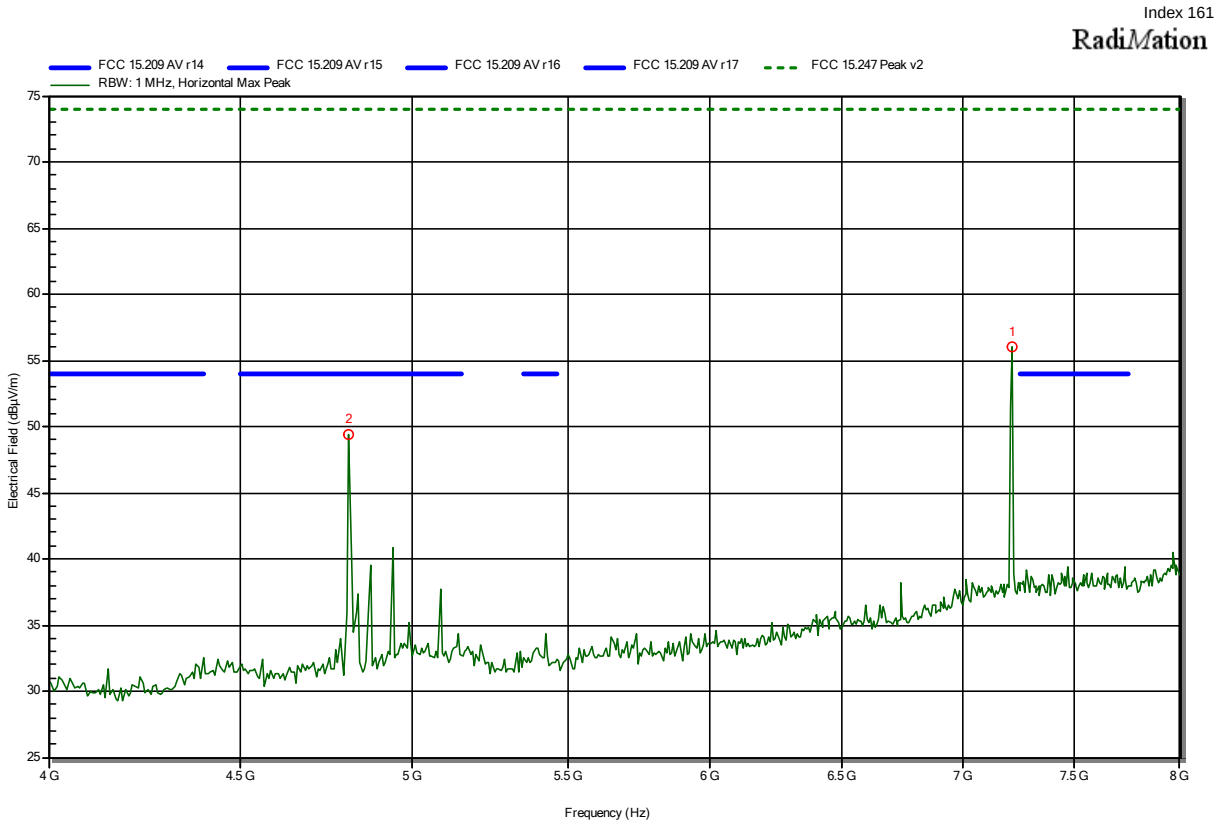
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.808 GHz	50.77 dBµV/m	74 dBµV/m	-23.23 dB	Pass
7.218 GHz	56.66 dBµV/m	74 dBµV/m	-17.34 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

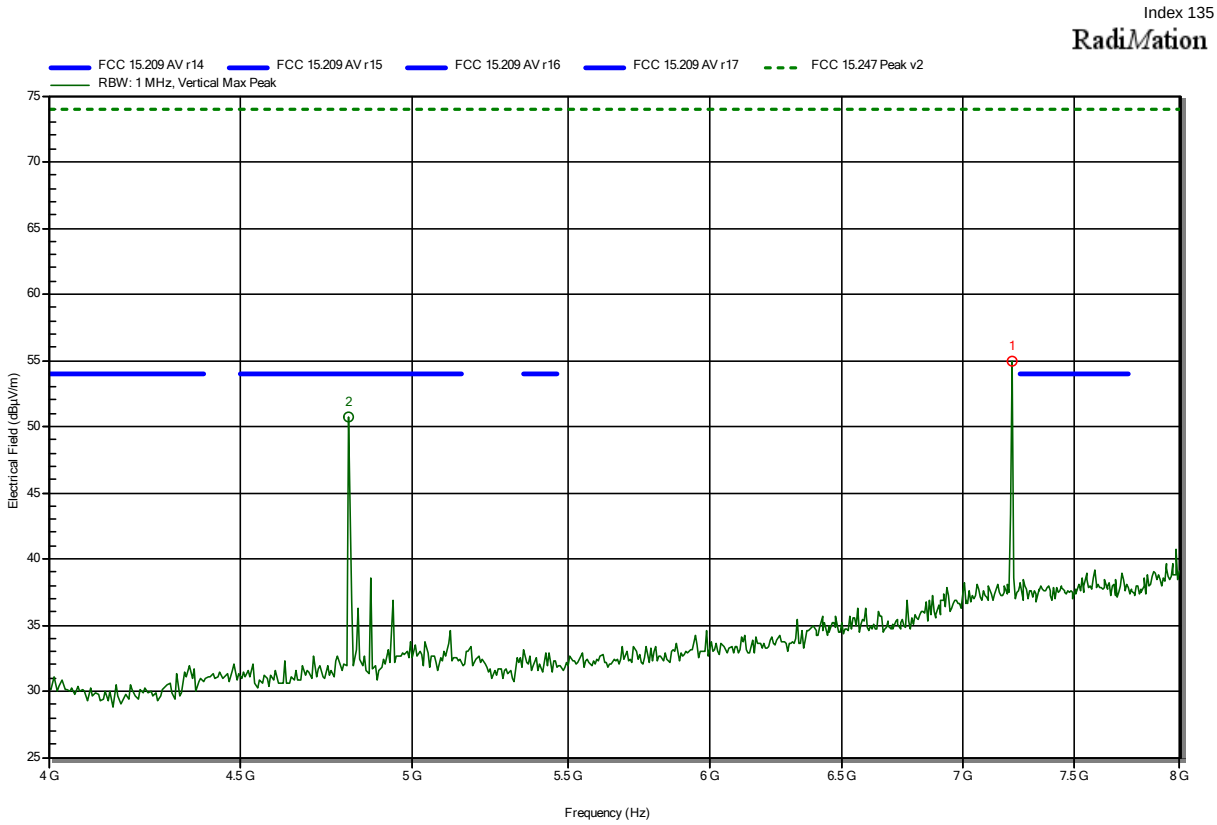
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT horizontal



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.808 GHz	49.43 dBµV/m	74 dBµV/m	-24.57 dB	Pass
7.218 GHz	55.98 dBµV/m	74 dBµV/m	-18.02 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

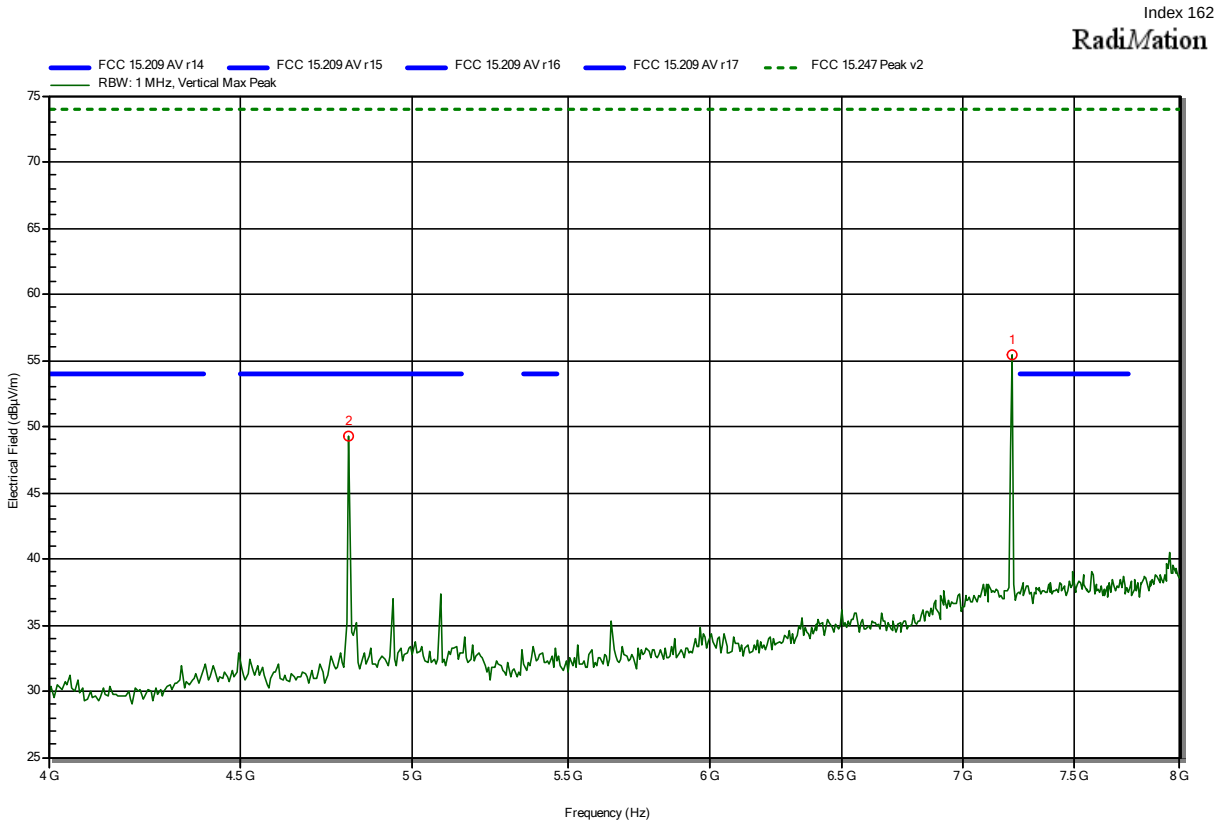
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Rx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.808 GHz	50.69 dBµV/m	74 dBµV/m	-23.31 dB	Pass
7.218 GHz	54.97 dBµV/m	74 dBµV/m	-19.03 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

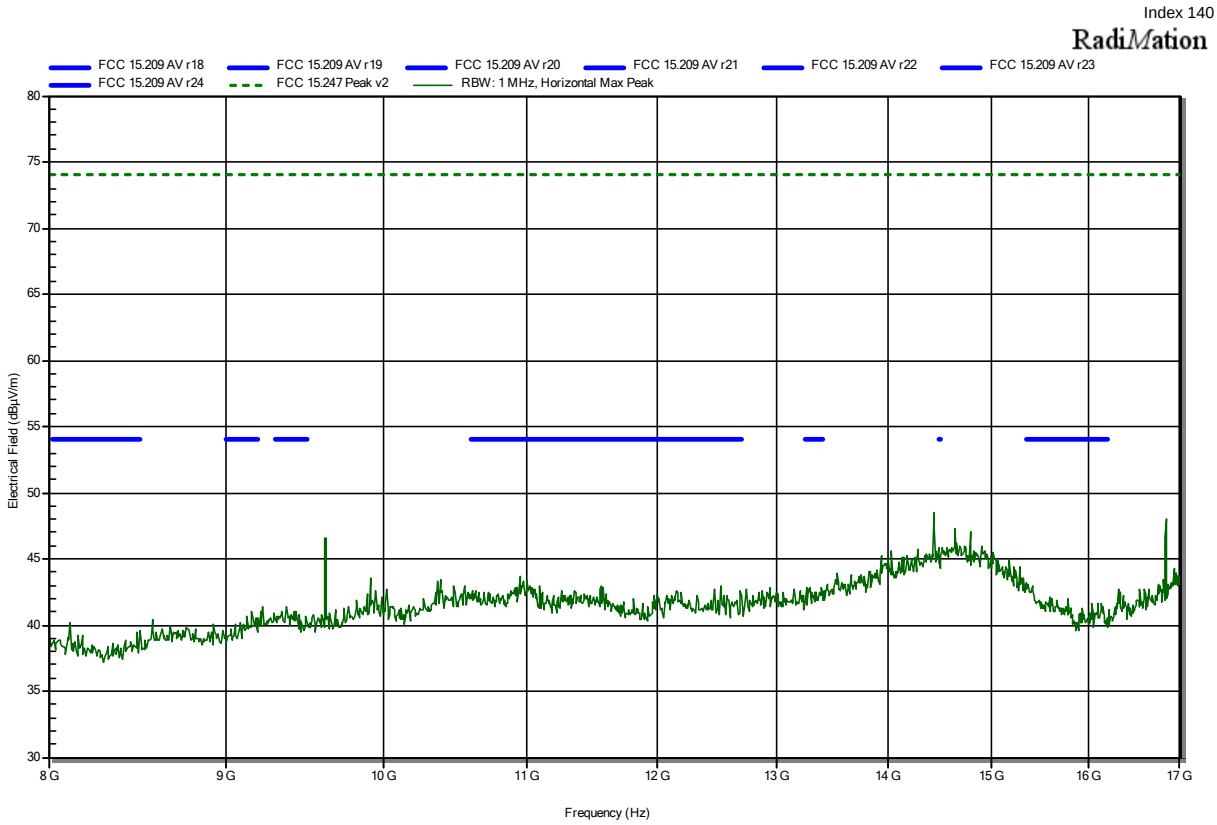
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Rx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT horizontal



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.808 GHz	49.29 dBµV/m	74 dBµV/m	-24.71 dB	Pass
7.218 GHz	55.39 dBµV/m	74 dBµV/m	-18.61 dB	Pass

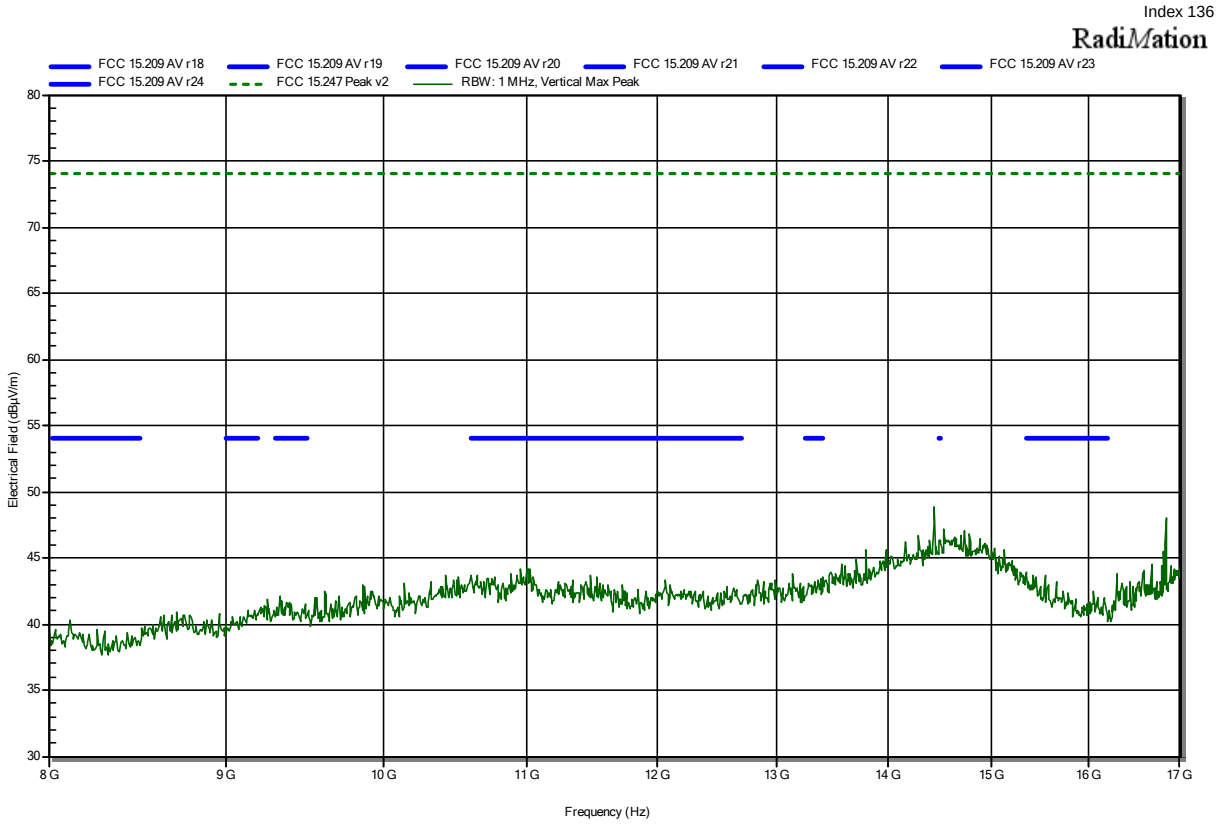
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



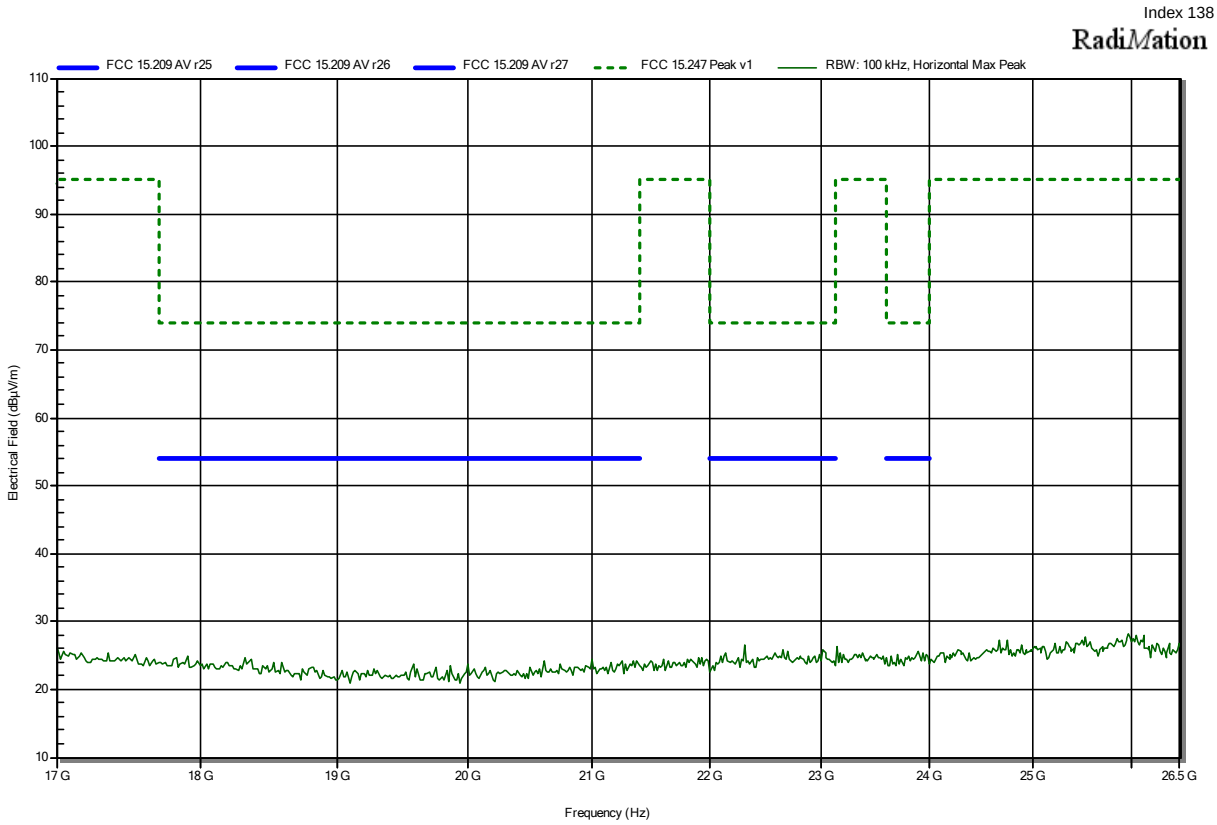
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



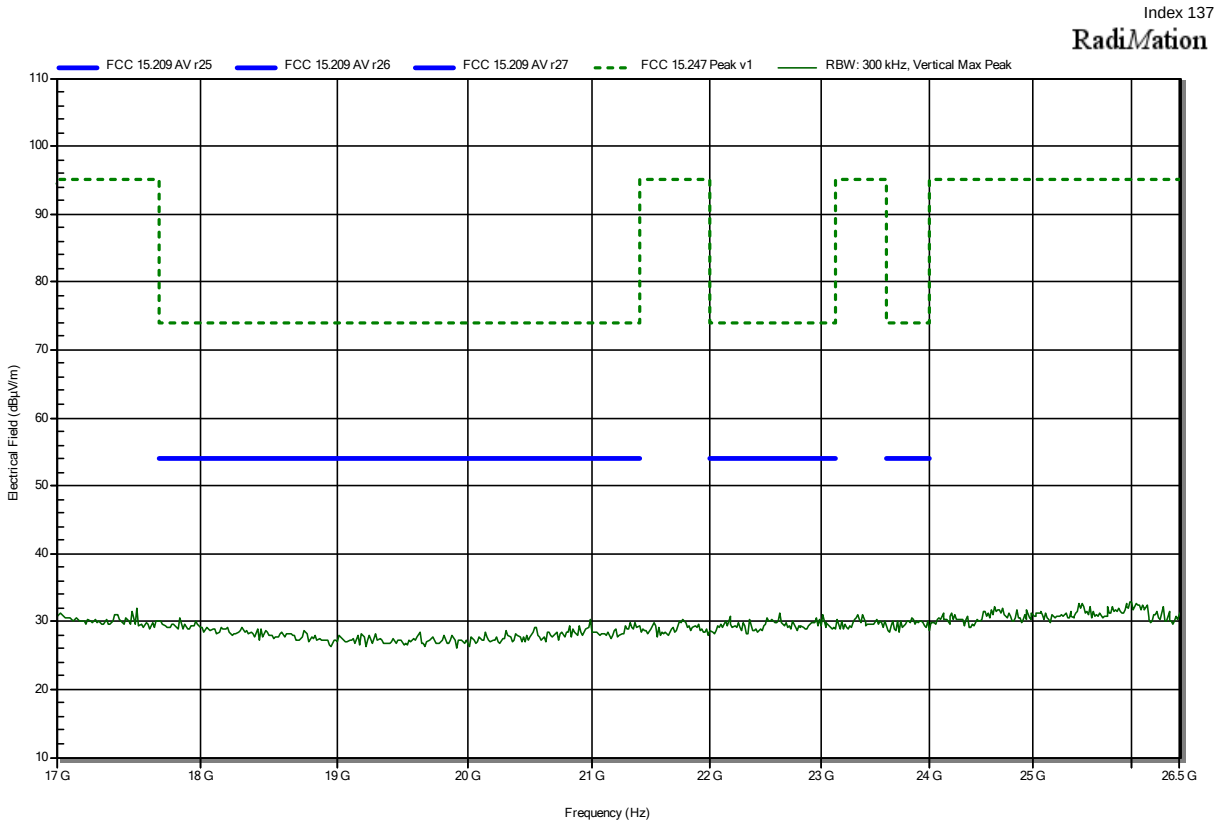
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



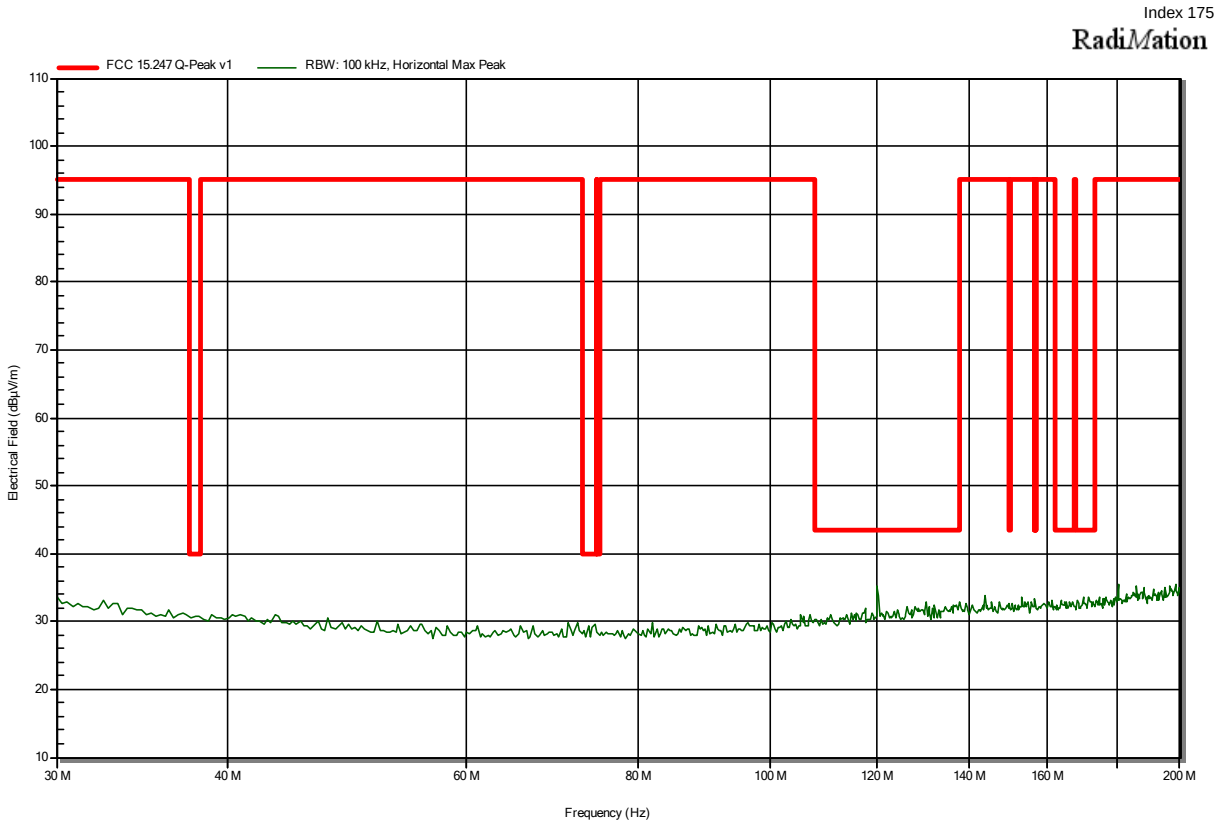
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



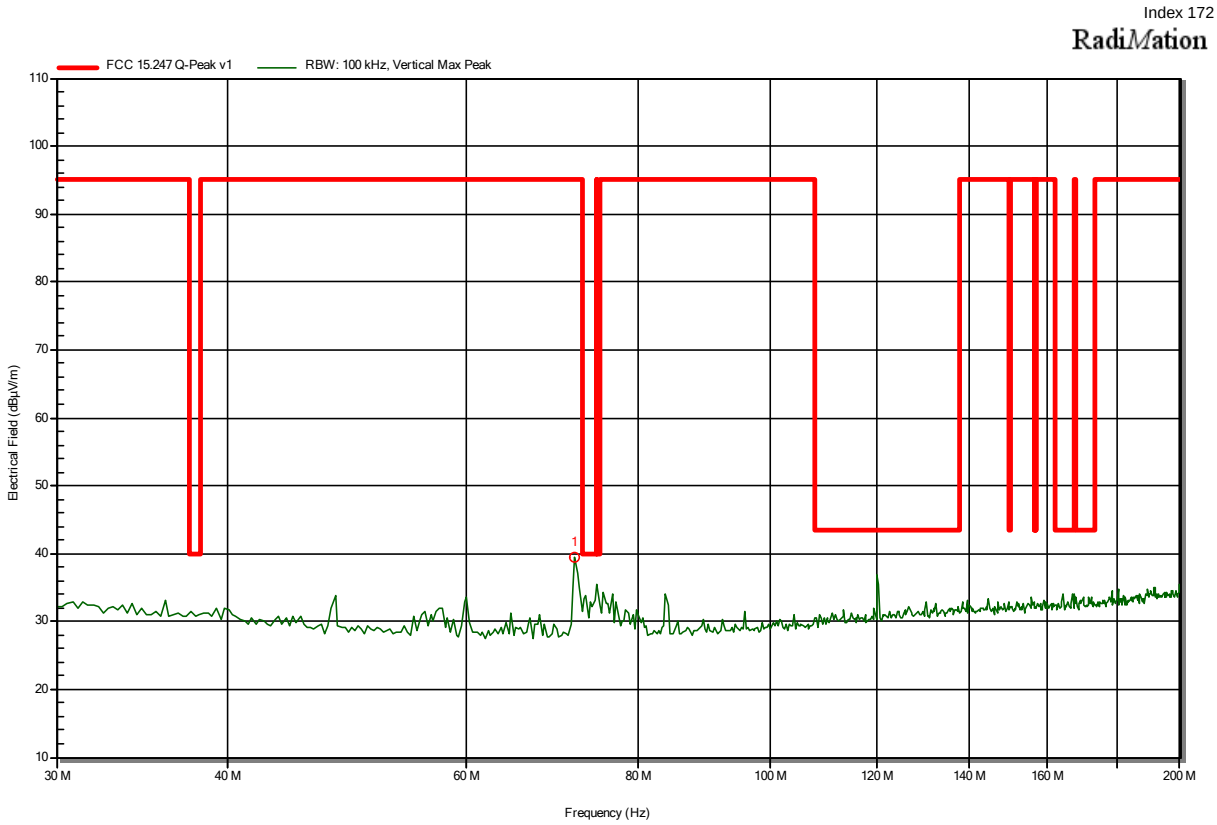
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

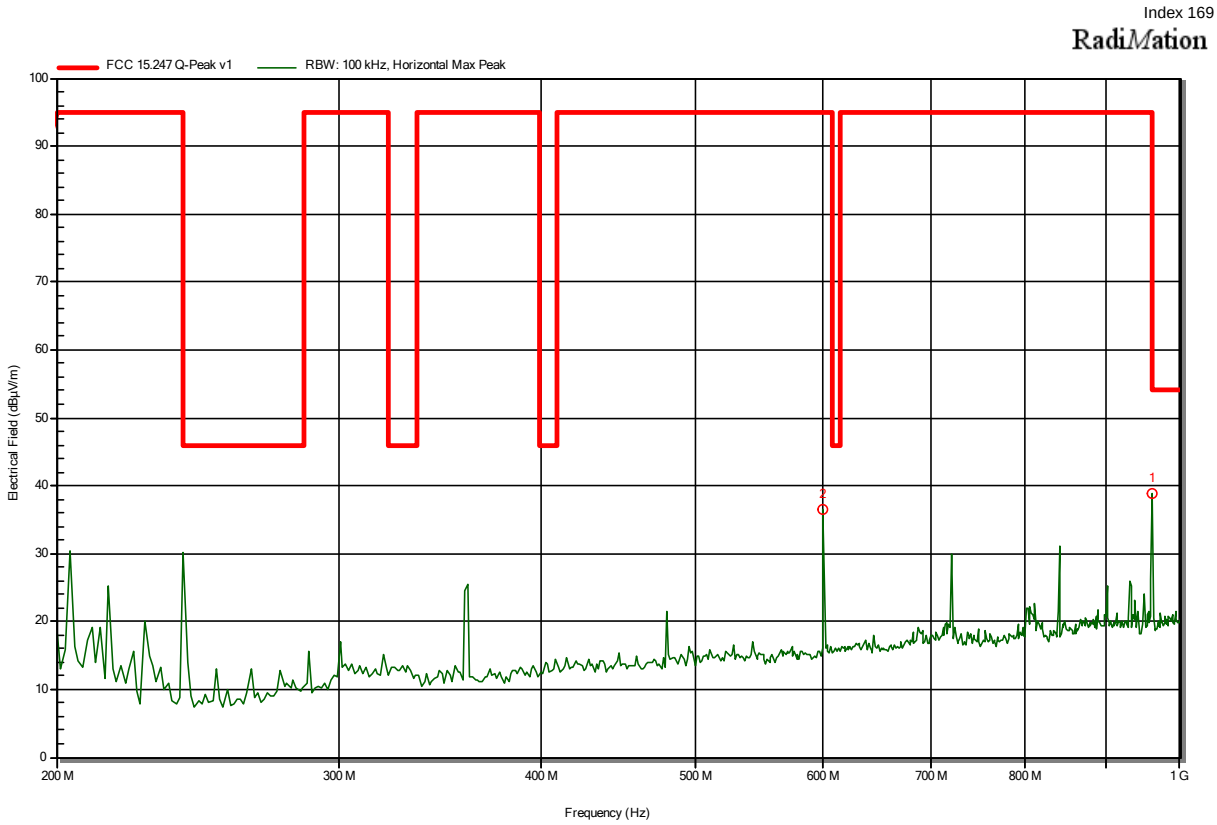
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
71.955 MHz	39.53 dBµV/m	95 dBµV/m	-55.47 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

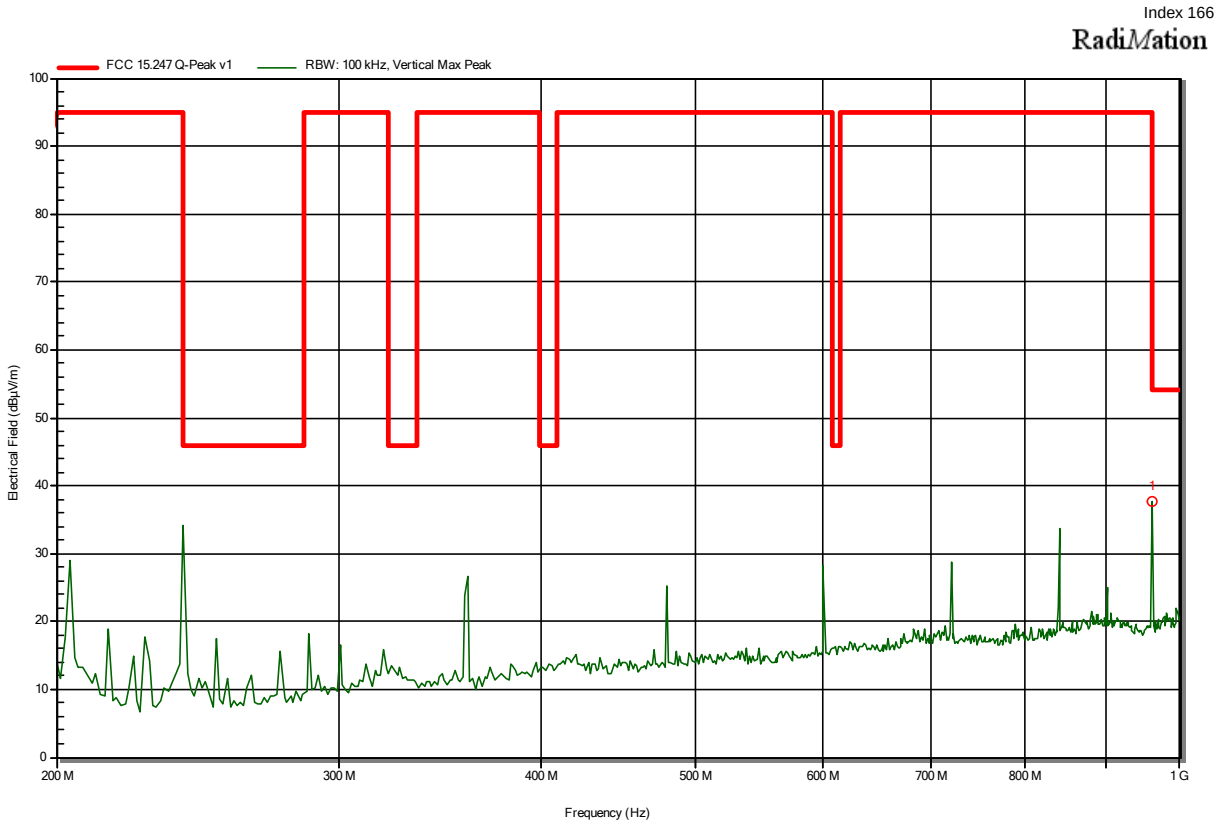
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
600 MHz	36.55 dBµV/m	95 dBµV/m	-58.45 dB	Pass
960.256 MHz	38.93 dBµV/m	54 dBµV/m	-15.07 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

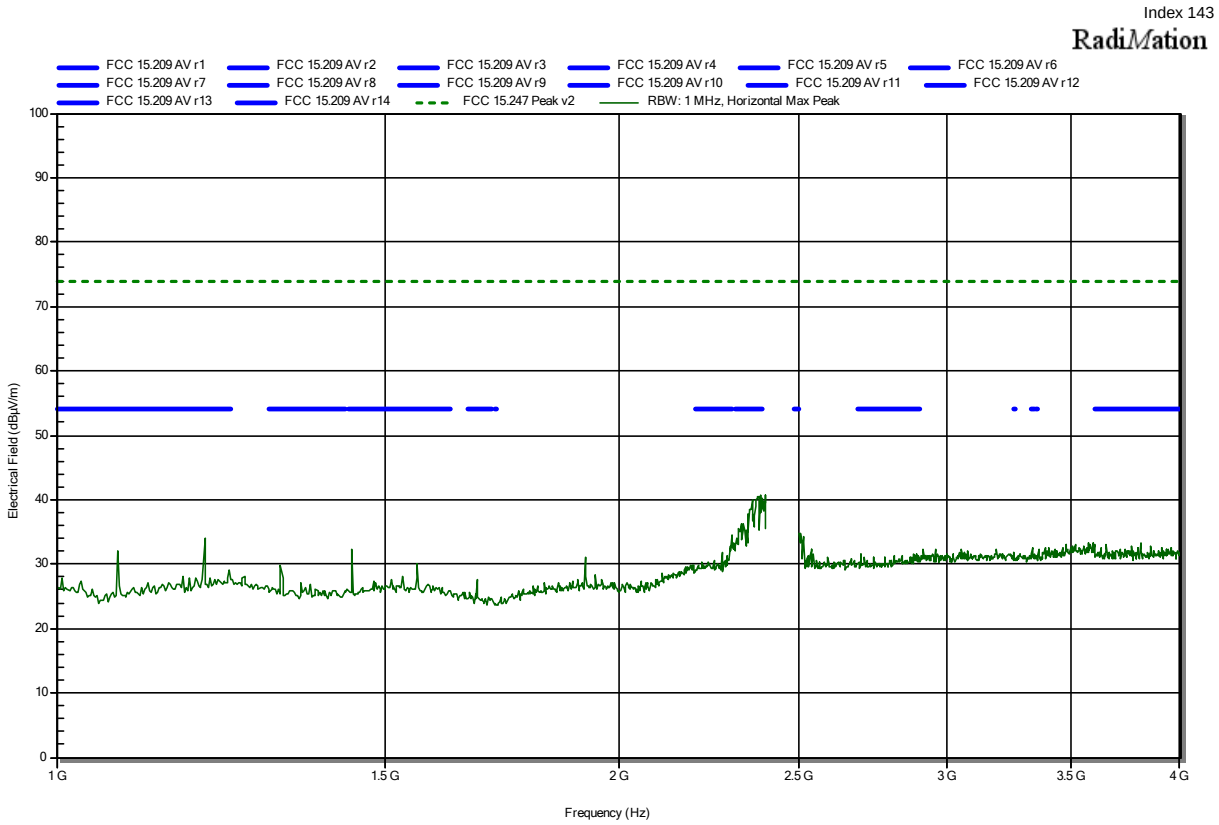
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
960.256 MHz	37.62 dBµV/m	54 dBµV/m	-16.38 dB	Pass

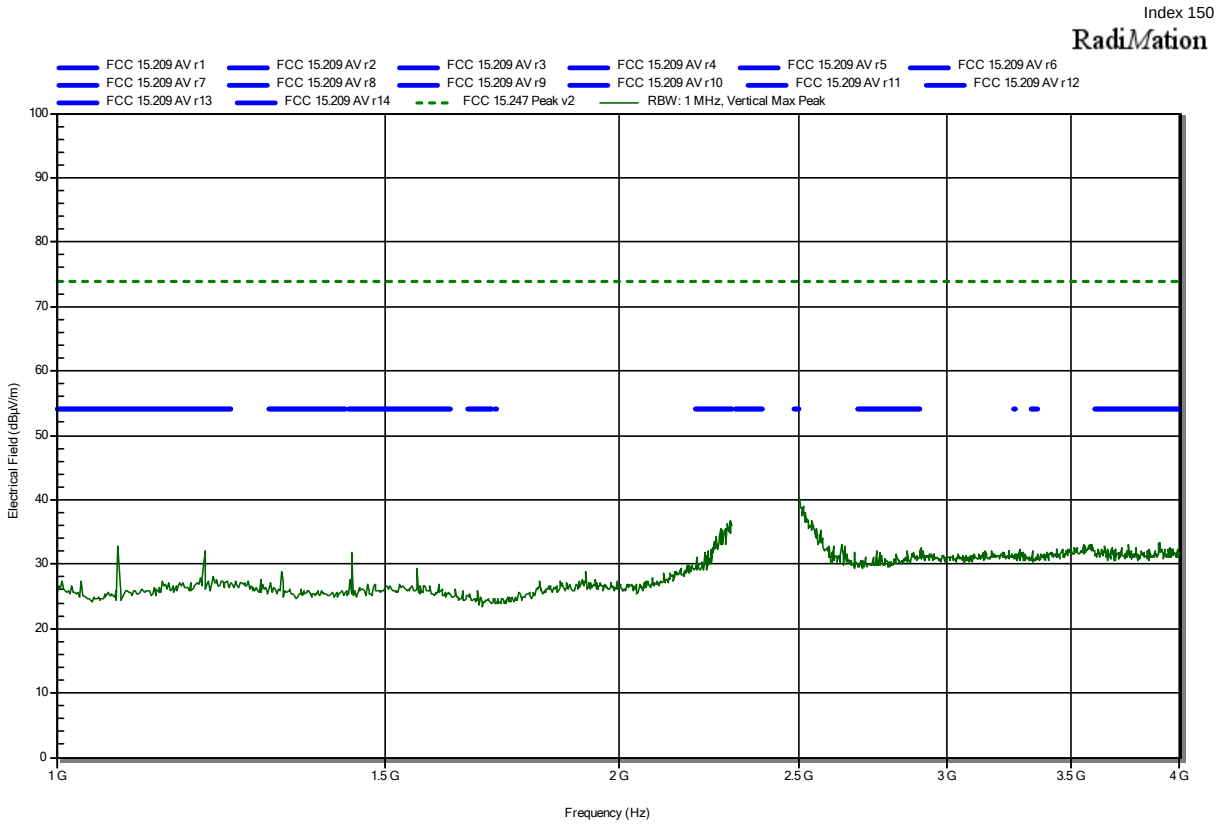
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



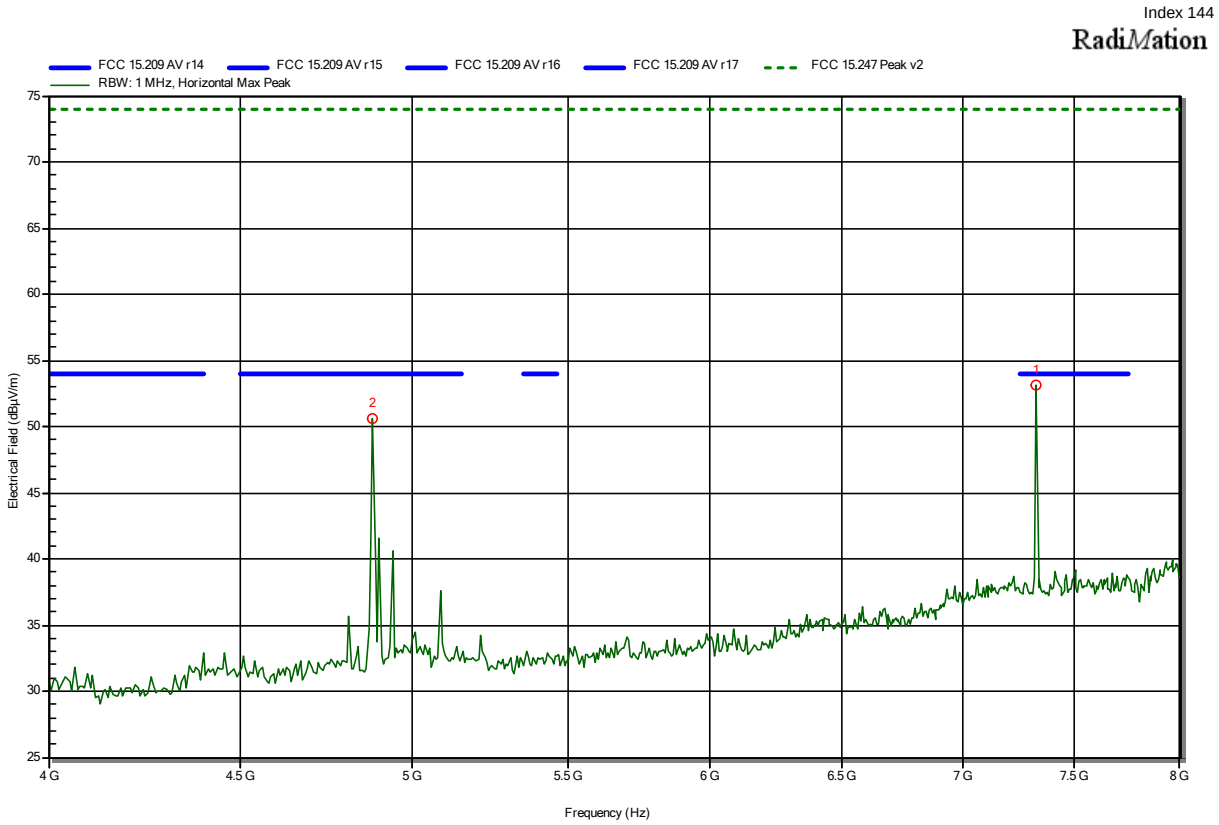
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

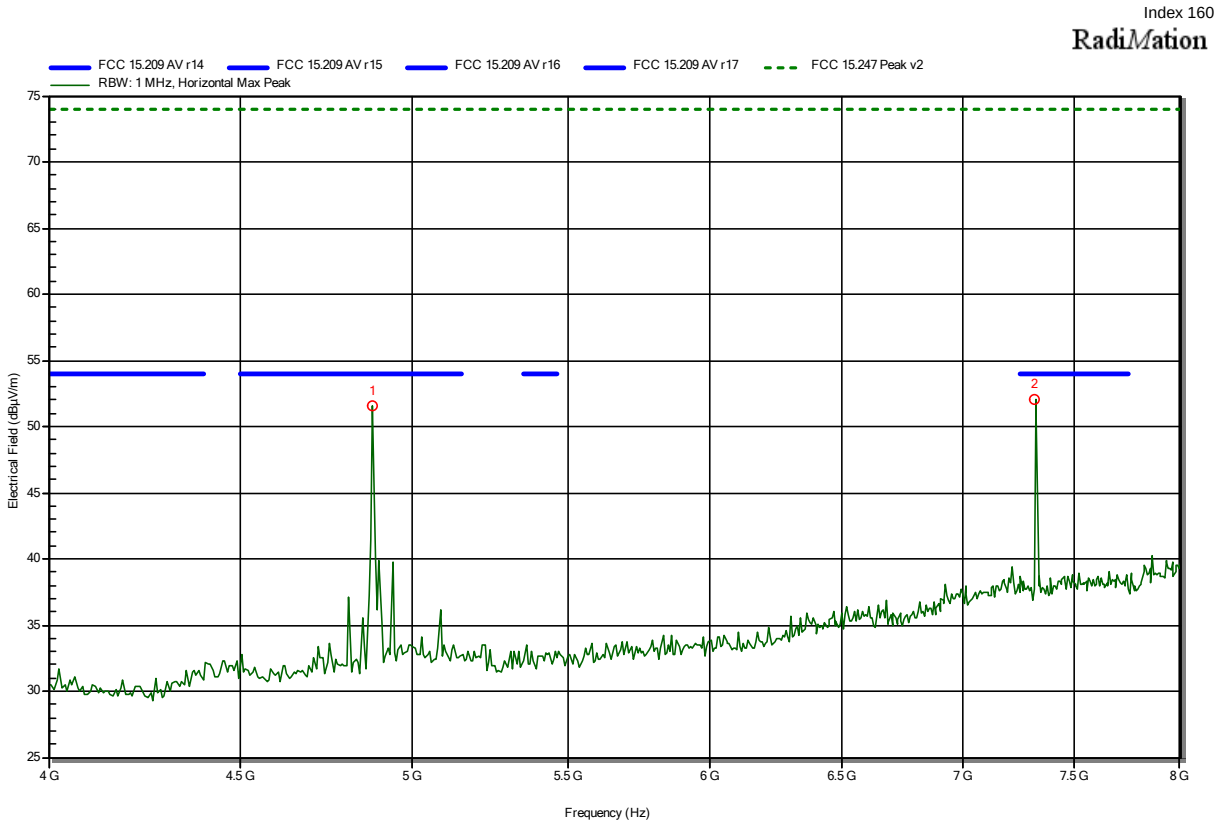
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.878 GHz	50.64 dBµV/m	74 dBµV/m	-23.36 dB	Pass
7.327 GHz	53.12 dBµV/m	74 dBµV/m	-20.88 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

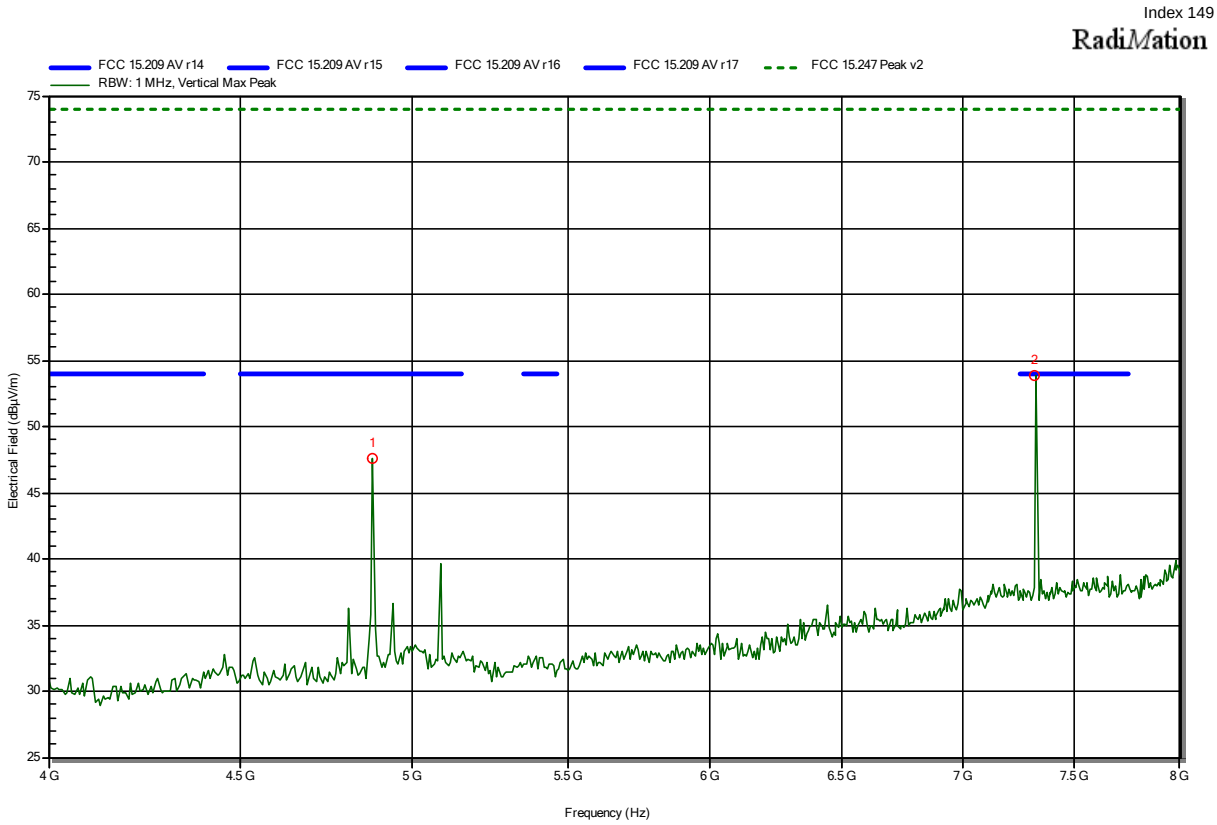
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT horizontal



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.878 GHz	51.55 dBµV/m	74 dBµV/m	-22.45 dB	Pass
7.321 GHz	52.07 dBµV/m	74 dBµV/m	-21.93 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

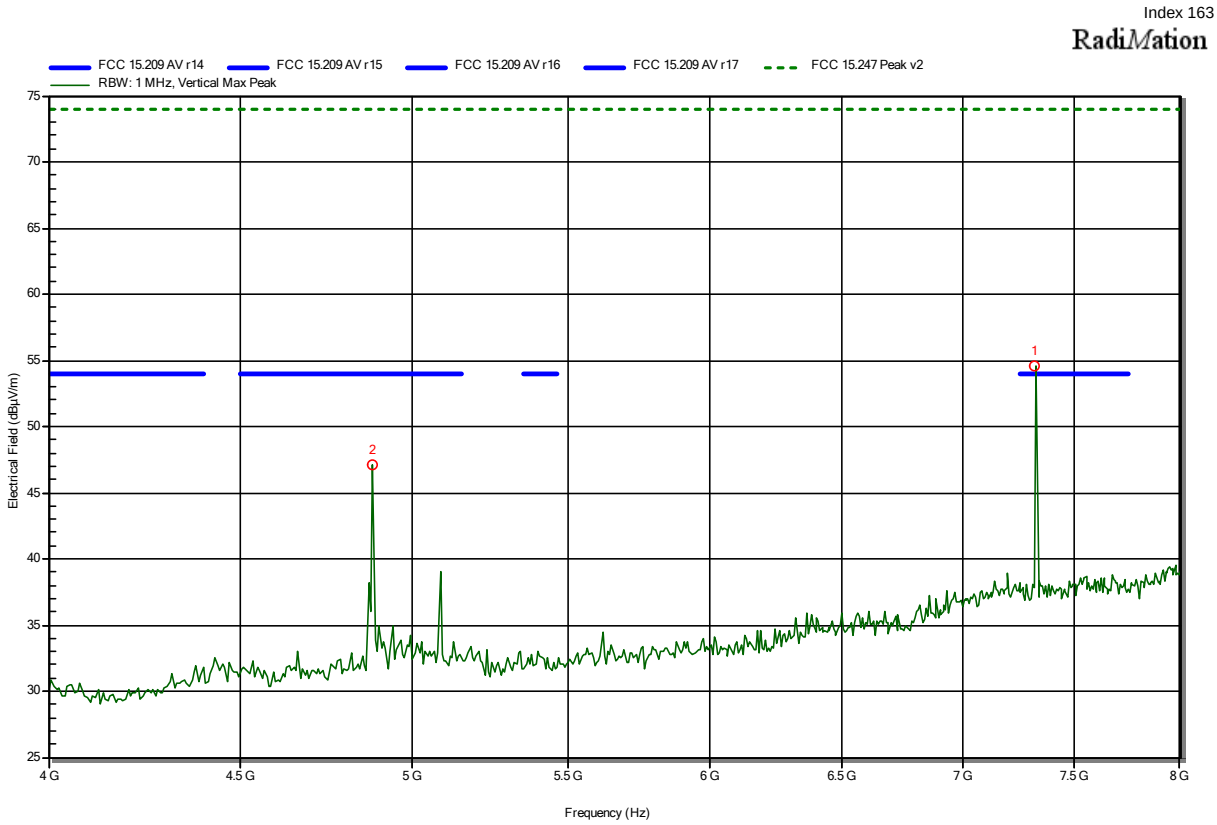
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Rx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.878 GHz	47.57 dBµV/m	74 dBµV/m	-26.43 dB	Pass
7.321 GHz	53.9 dBµV/m	74 dBµV/m	-20.1 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

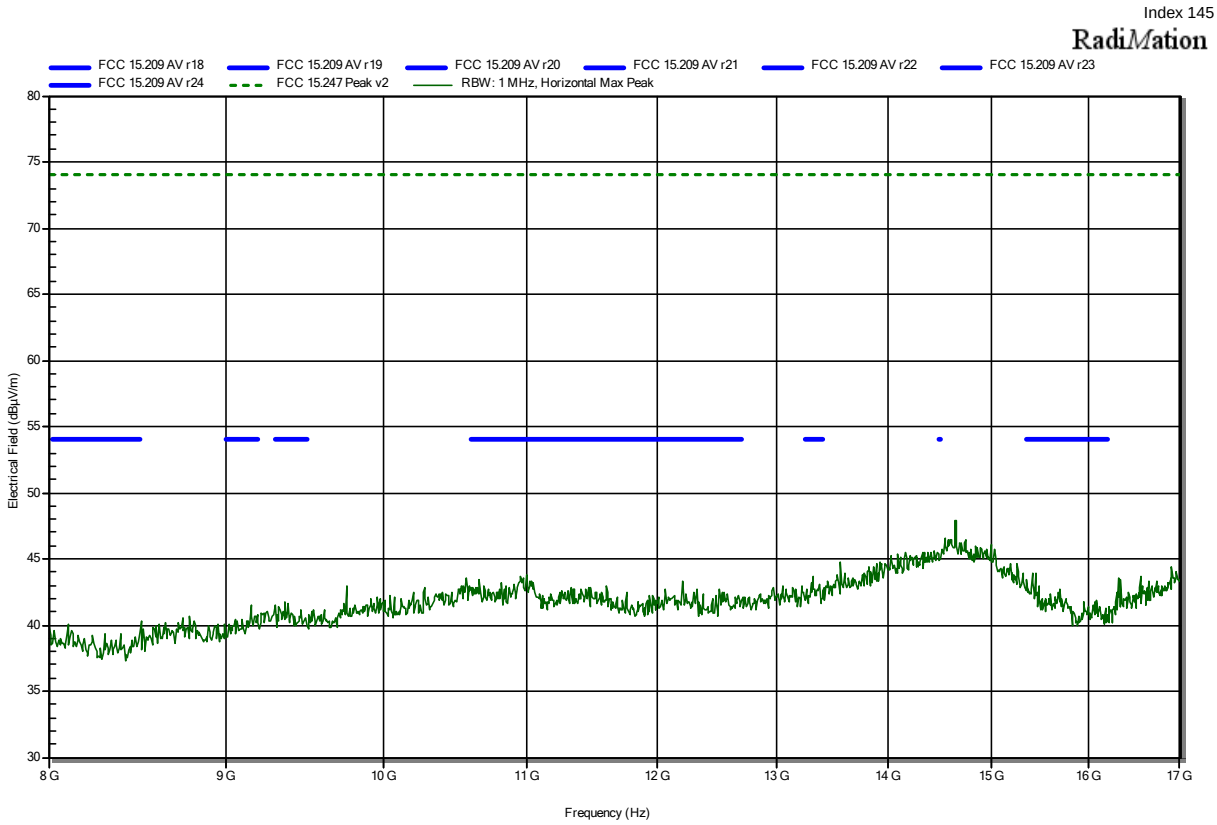
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Rx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT horizontal



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.878 GHz	47.13 dBµV/m	74 dBµV/m	-26.87 dB	Pass
7.321 GHz	54.59 dBµV/m	74 dBµV/m	-19.41 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



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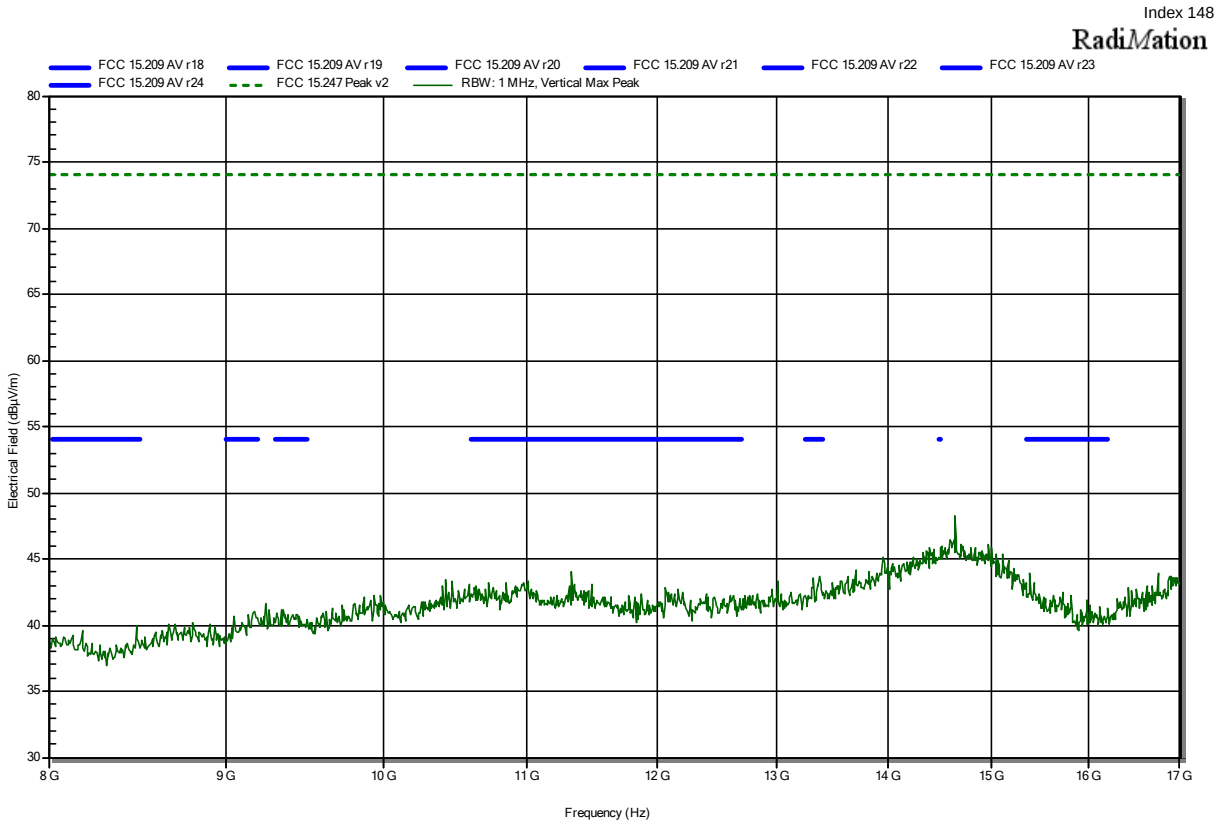
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



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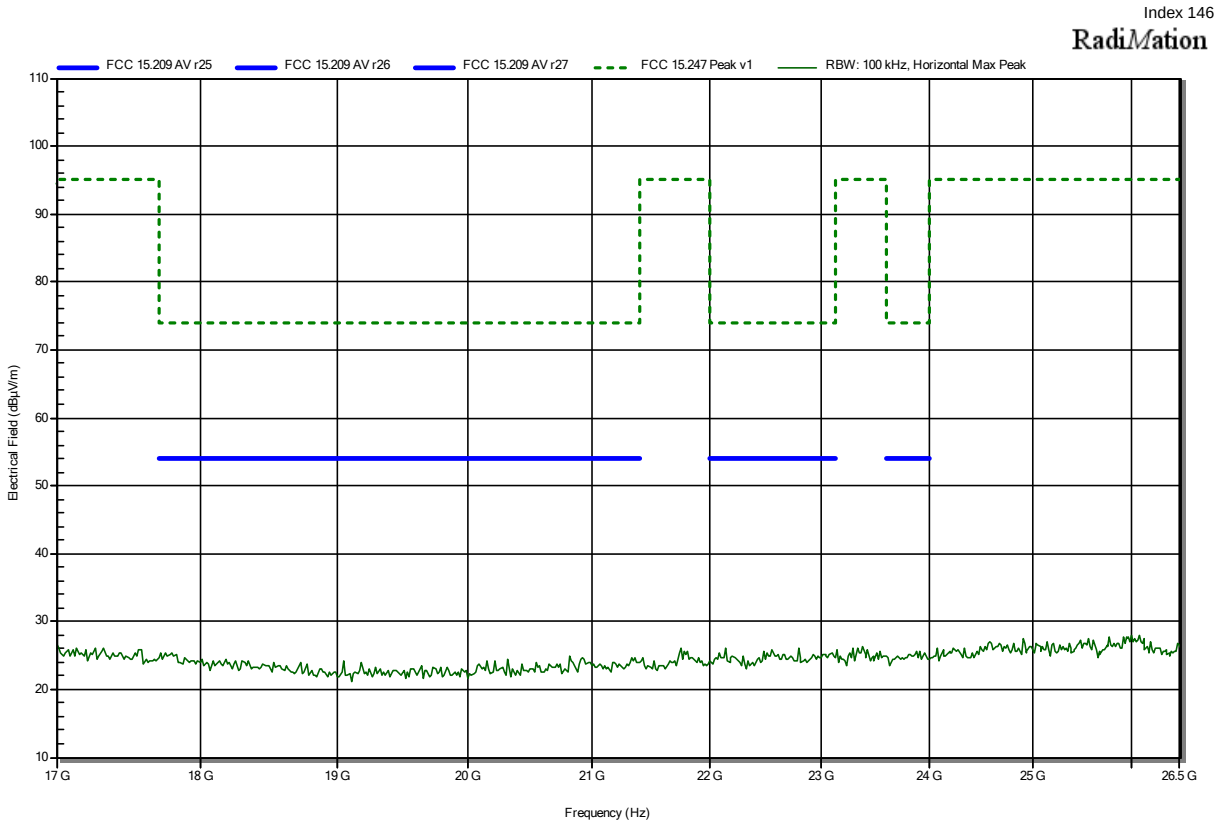
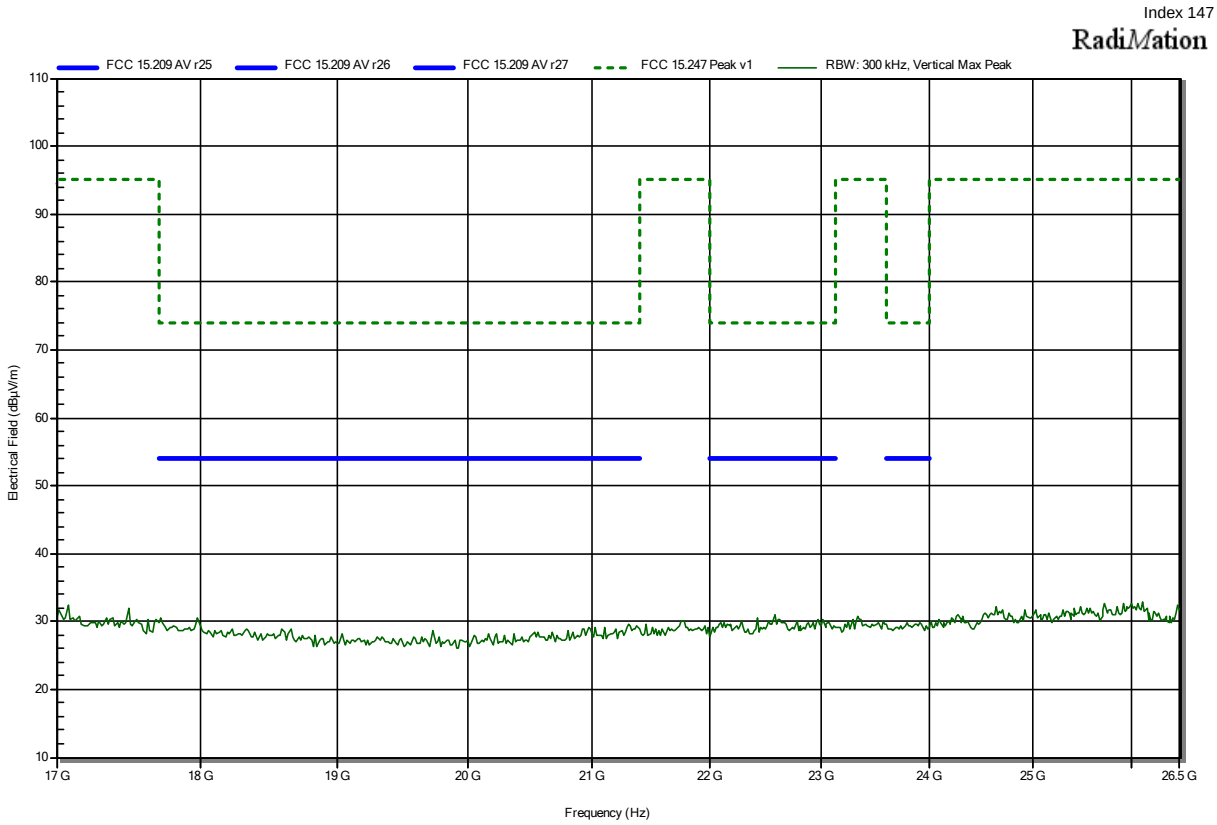
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



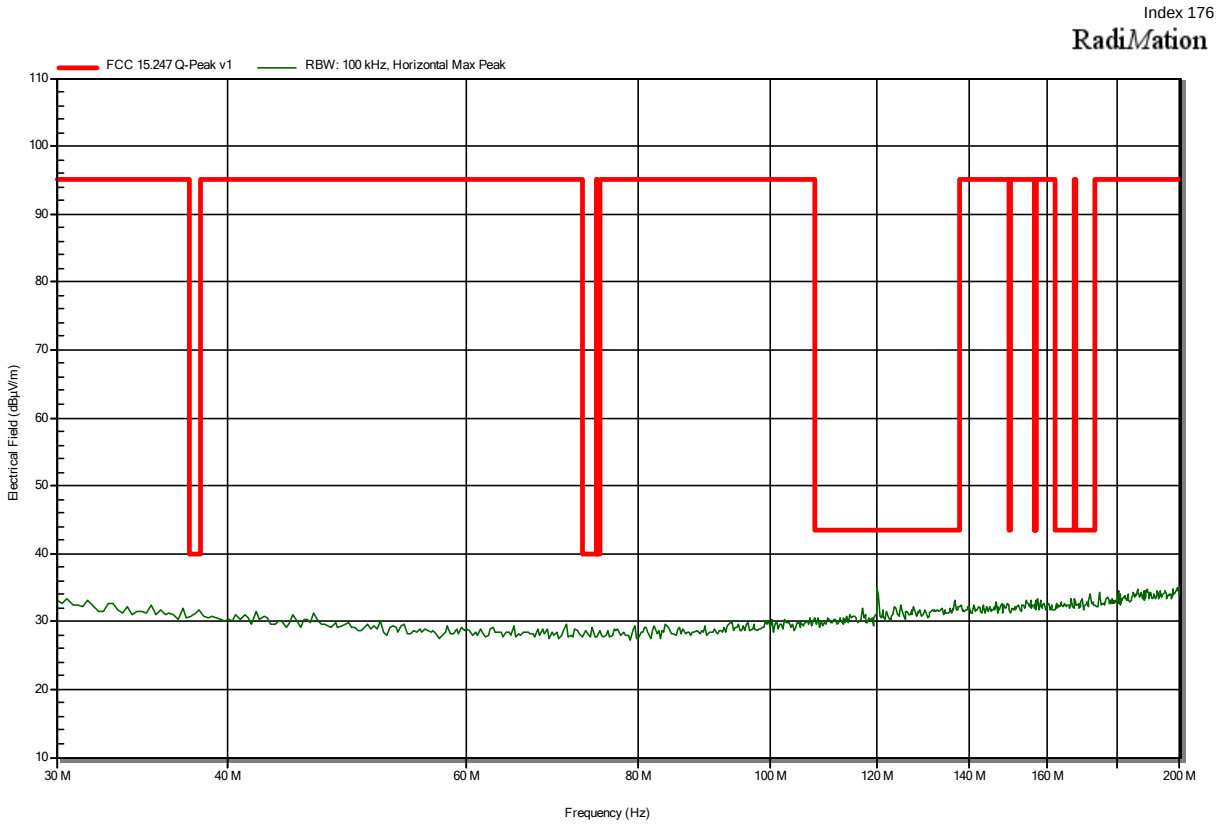
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



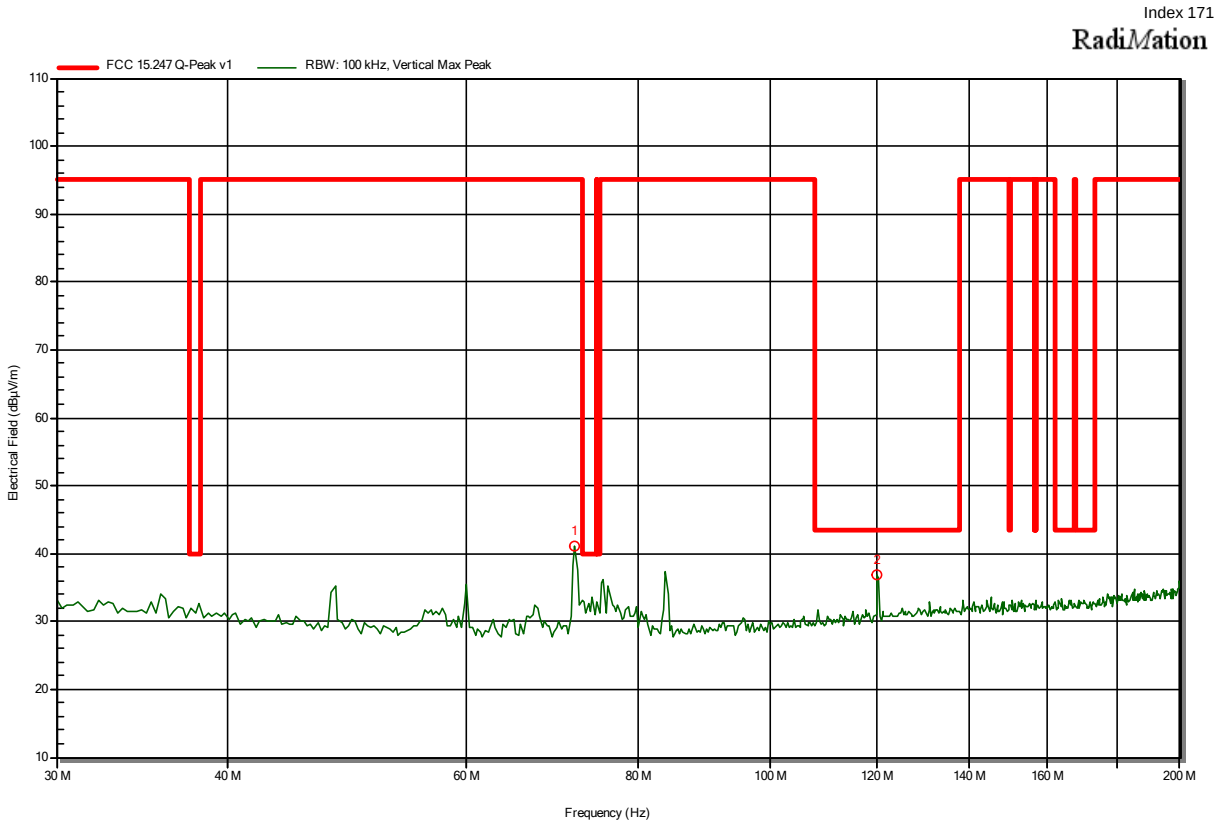
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

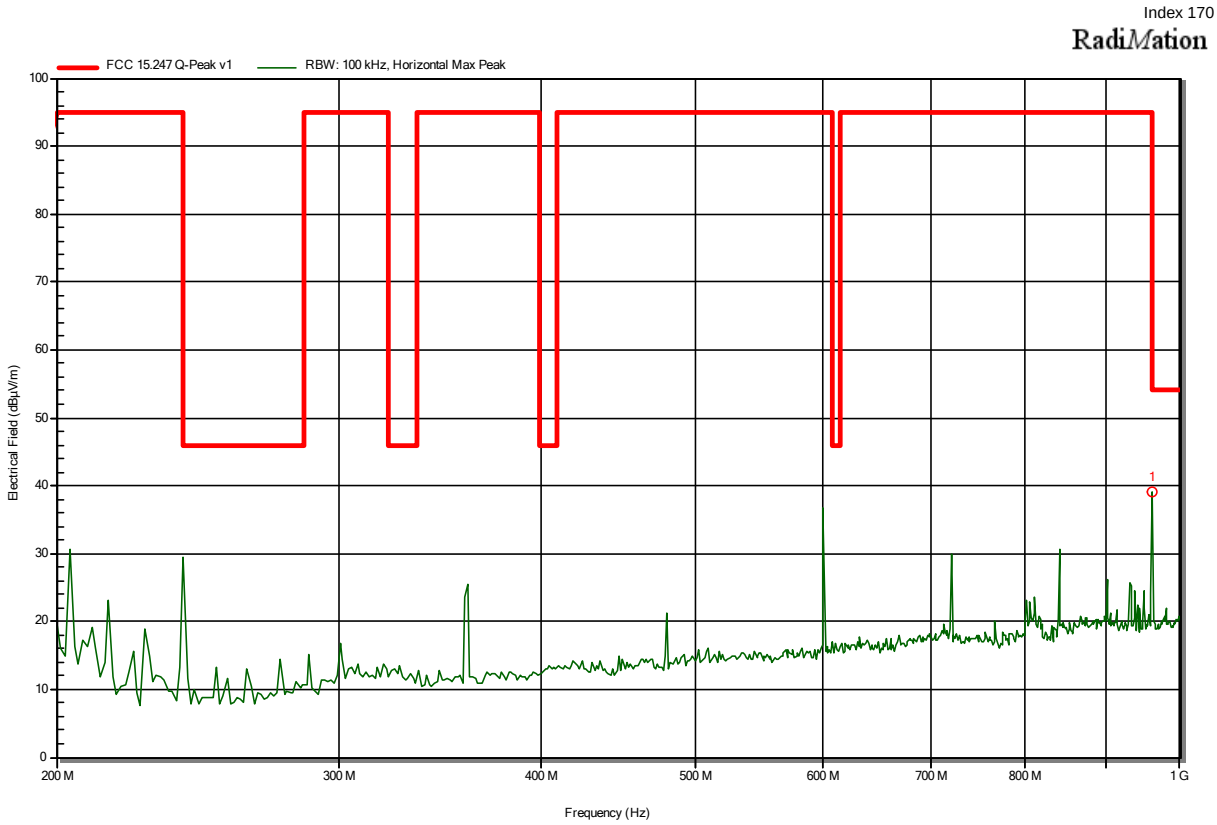
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
71.955 MHz	41.21 dBµV/m	95 dBµV/m	-53.79 dB	Pass
119.904 MHz	36.94 dBµV/m	43.52 dBµV/m	-6.58 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

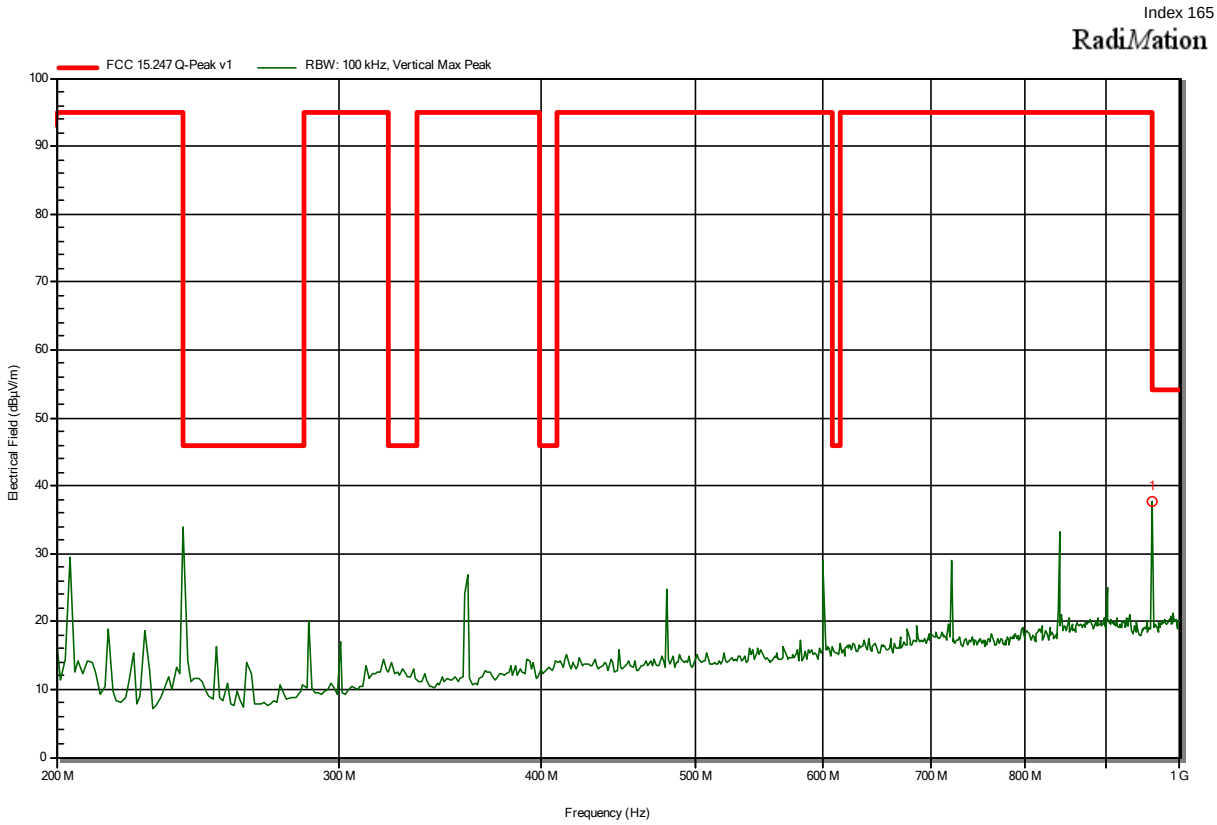
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
960.256 MHz	39.12 dBµV/m	54 dBµV/m	-14.88 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

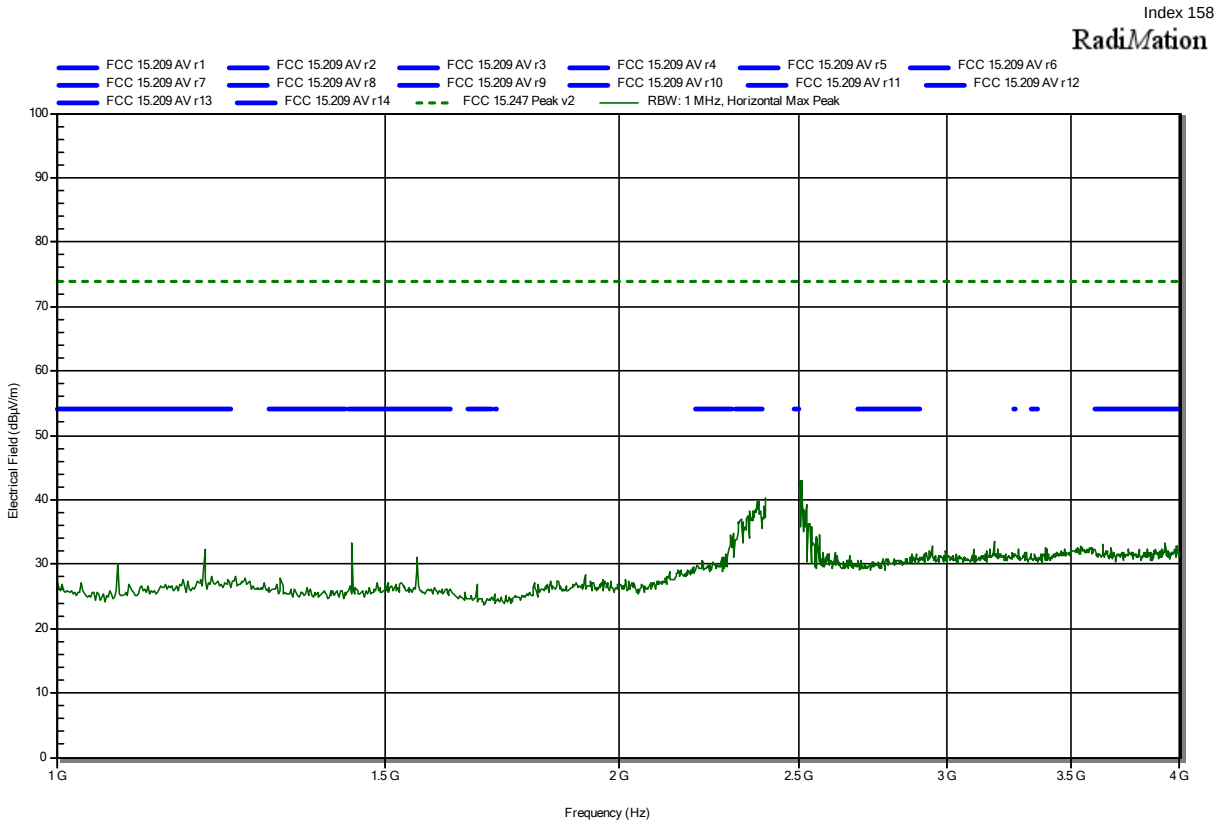
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
960.256 MHz	37.66 dBµV/m	54 dBµV/m	-16.34 dB	Pass

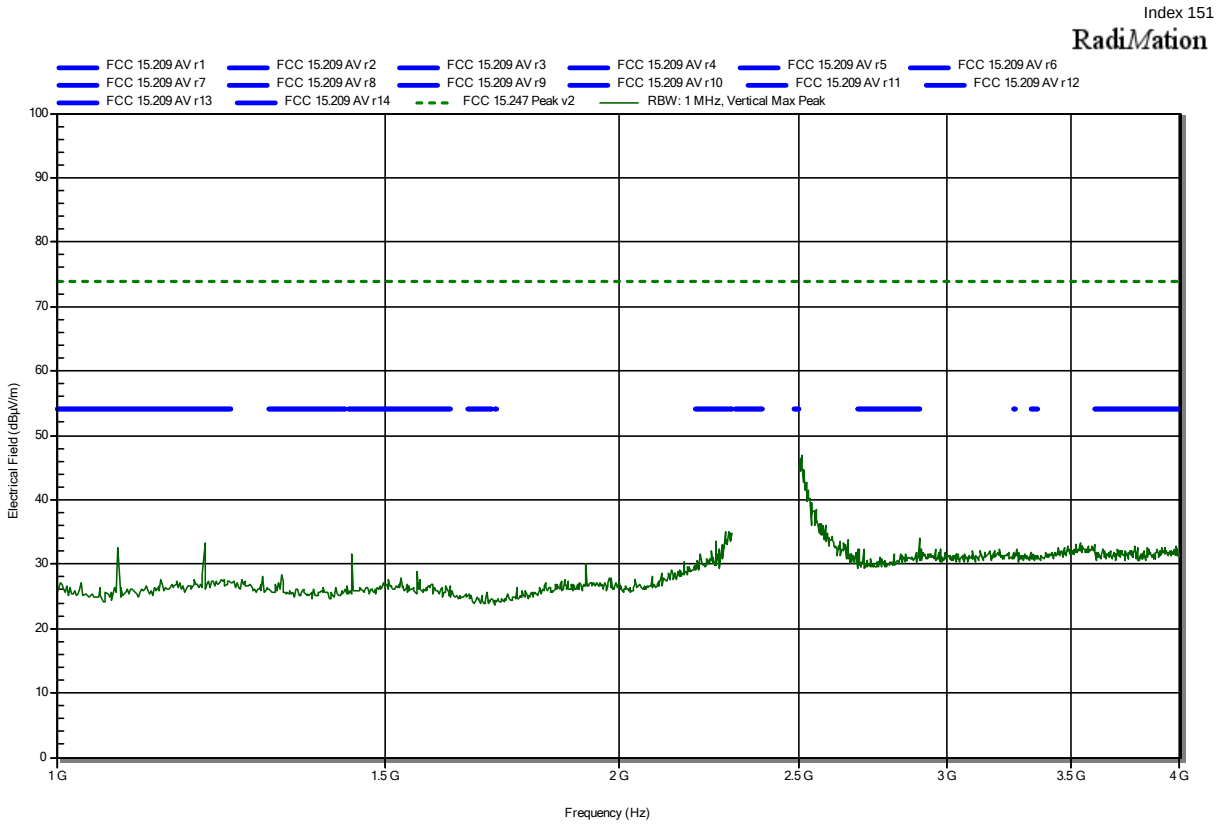
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



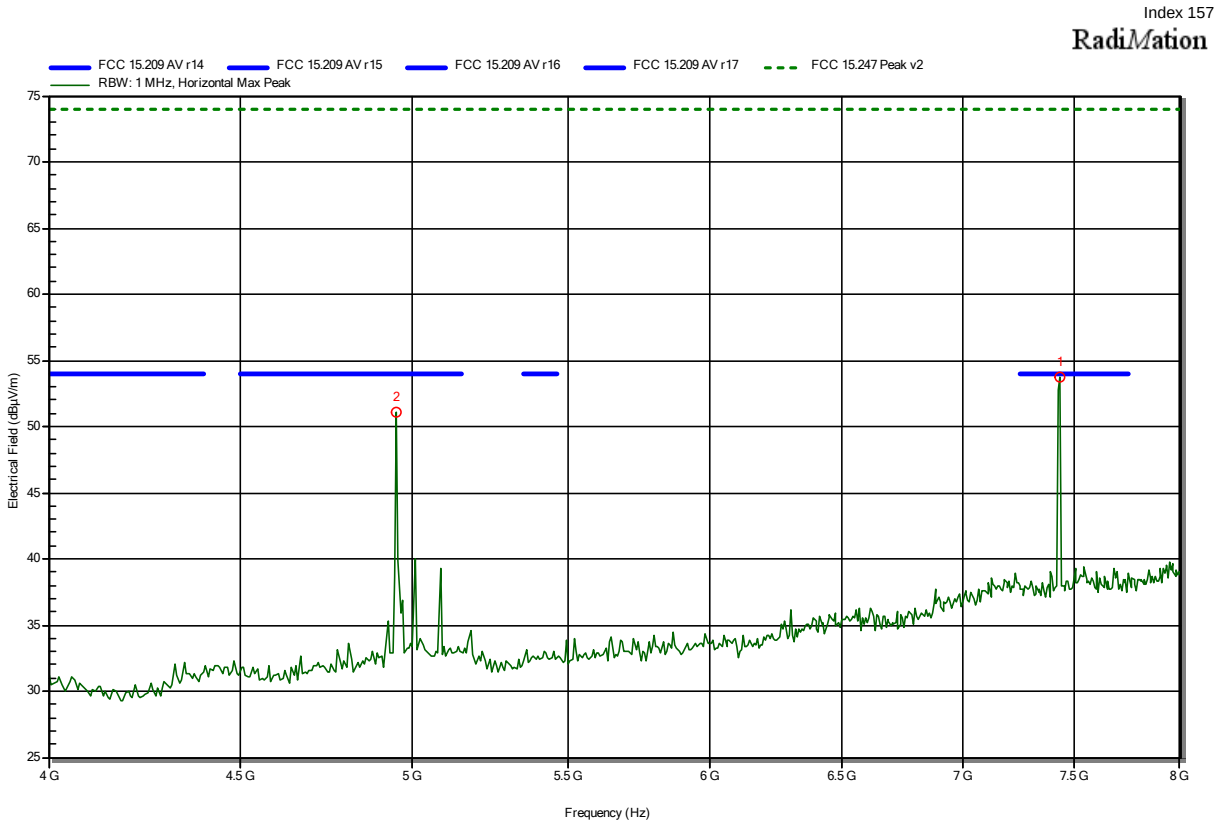
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

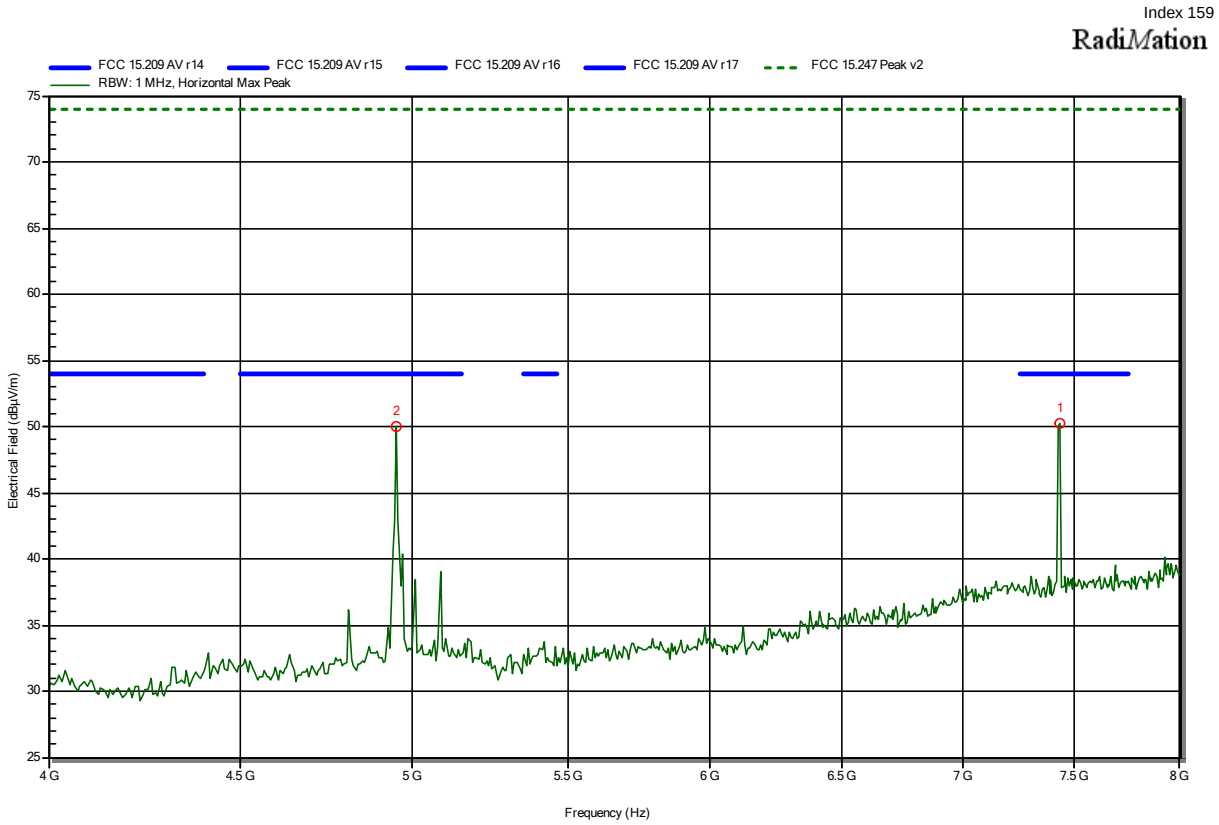
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.949 GHz	51.07 dBµV/m	74 dBµV/m	-22.93 dB	Pass
7.429 GHz	53.71 dBµV/m	74 dBµV/m	-20.29 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

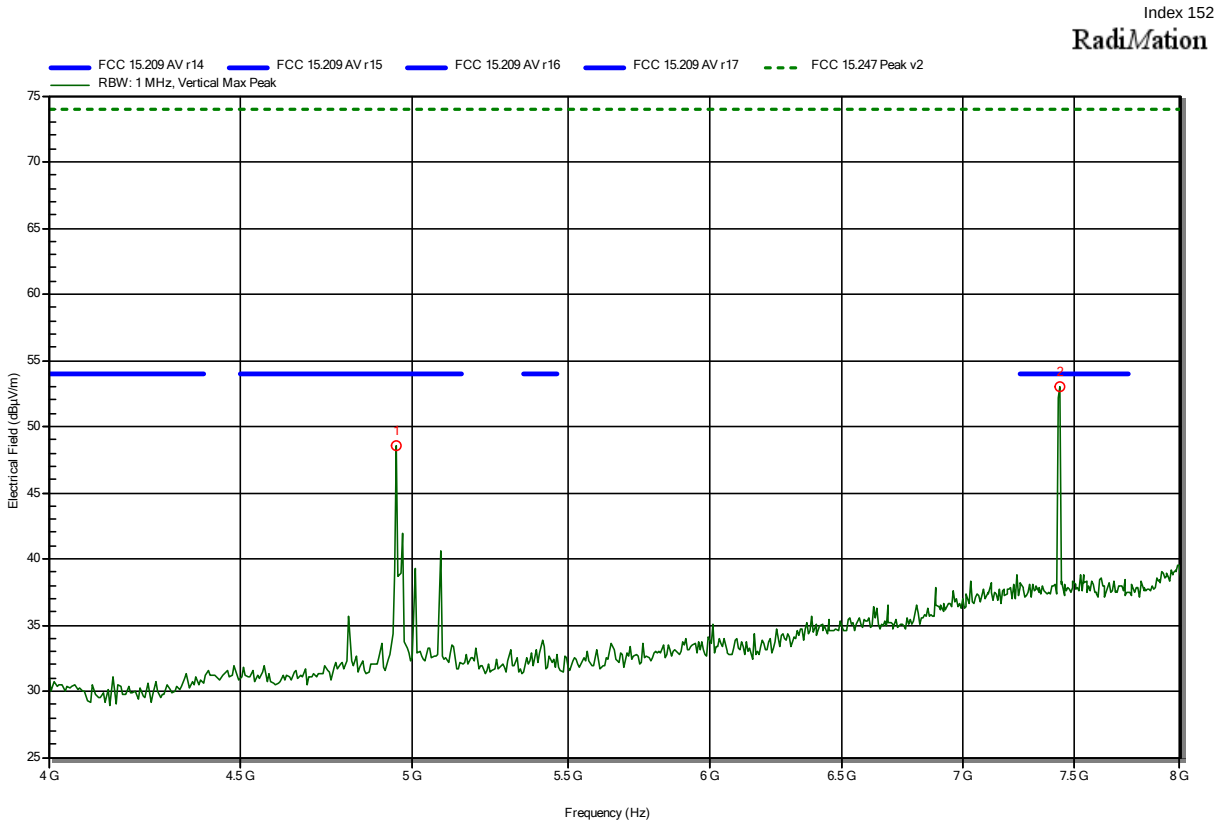
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT horizontal



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.949 GHz	50.05 dBµV/m	74 dBµV/m	-23.95 dB	Pass
7.429 GHz	50.19 dBµV/m	74 dBµV/m	-23.81 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

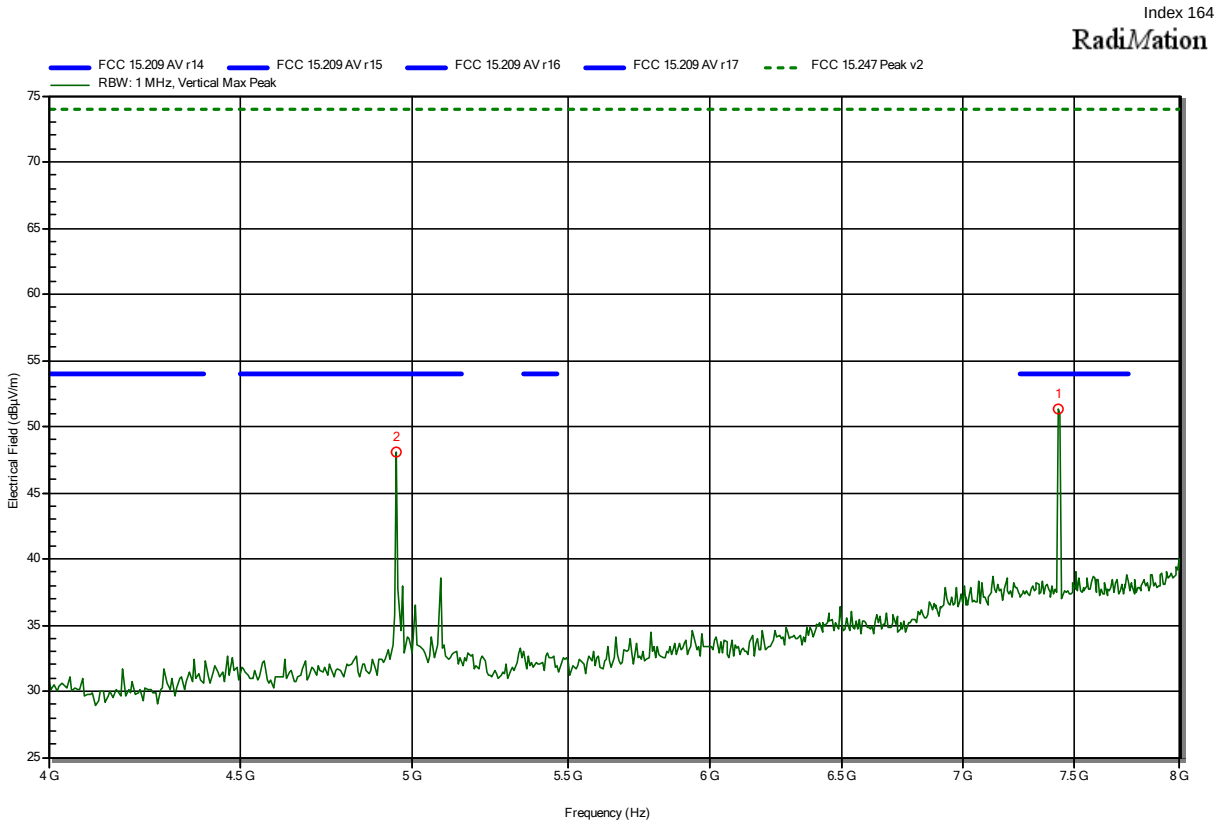
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Rx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.949 GHz	48.59 dBµV/m	74 dBµV/m	-25.41 dB	Pass
7.429 GHz	53.06 dBµV/m	74 dBµV/m	-20.94 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

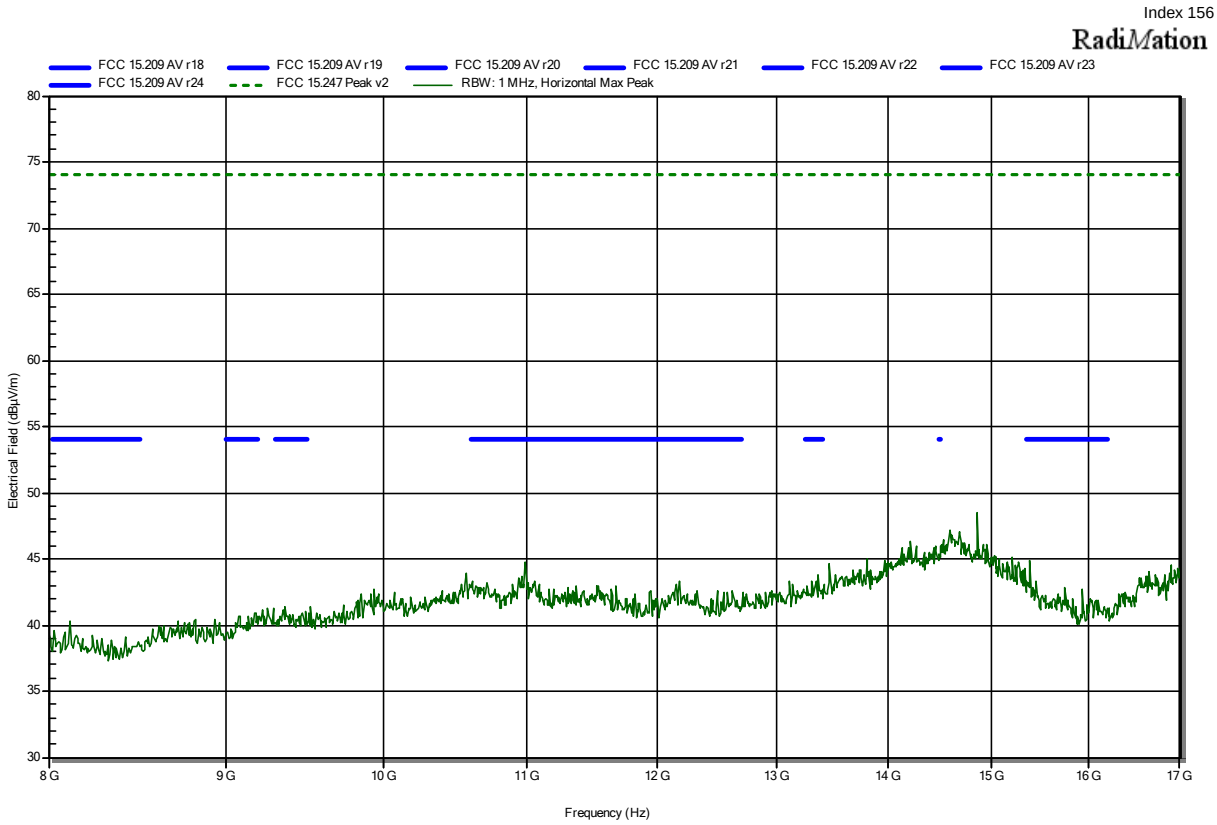
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Rx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT horizontal



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.949 GHz	48.03 dBµV/m	74 dBµV/m	-25.97 dB	Pass
7.423 GHz	51.37 dBµV/m	74 dBµV/m	-22.63 dB	Pass

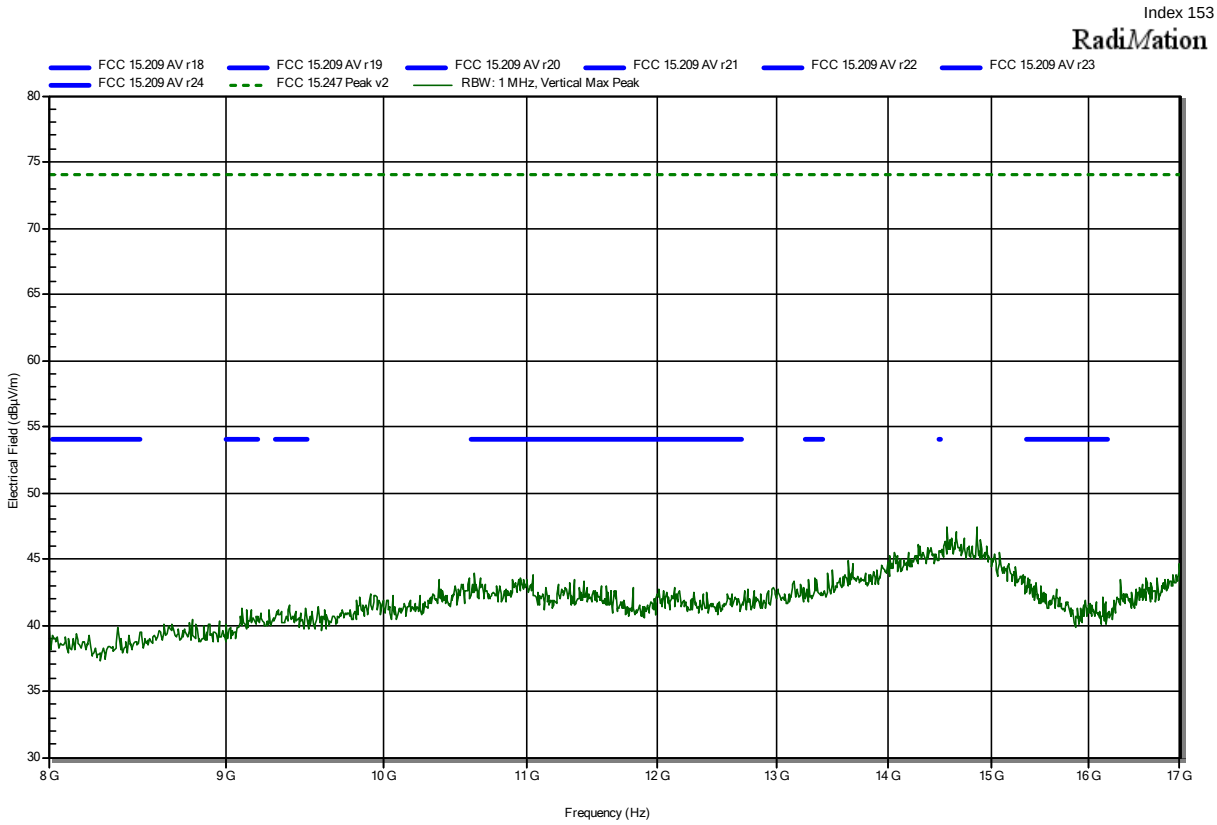
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



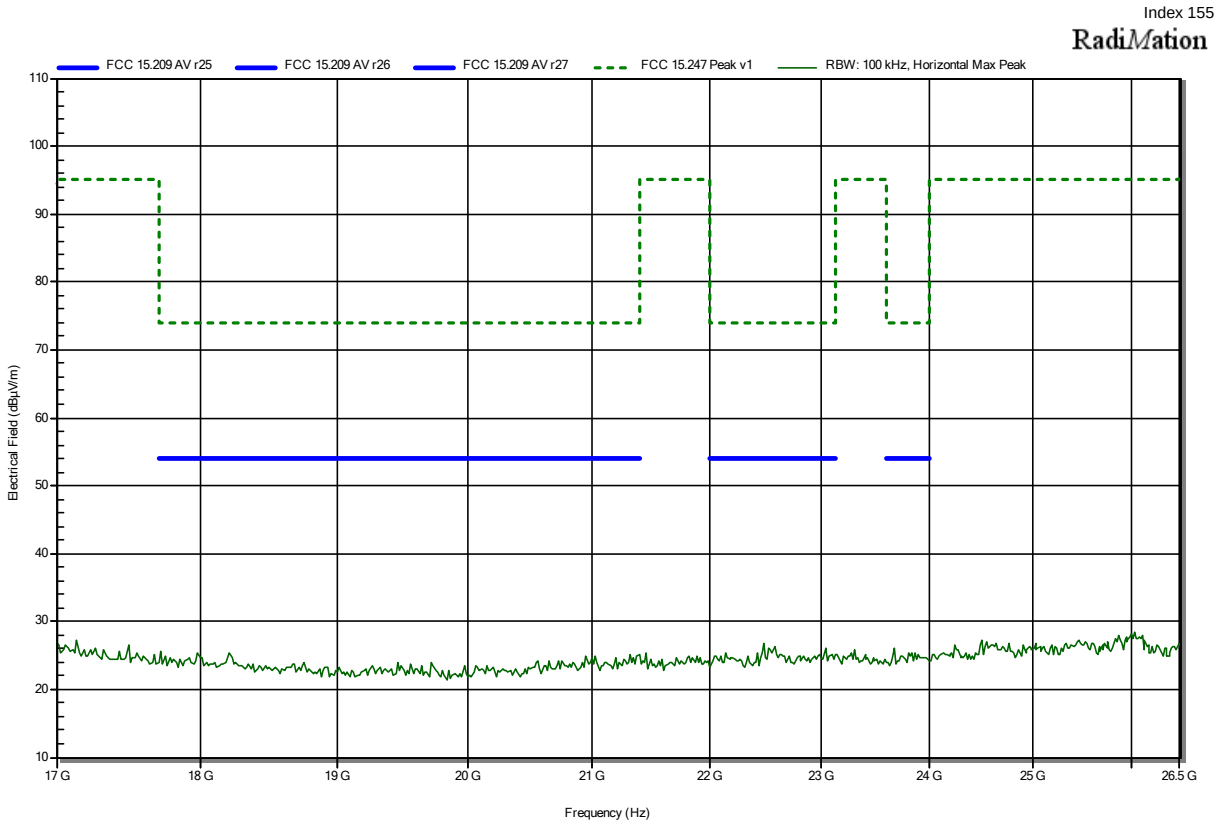
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



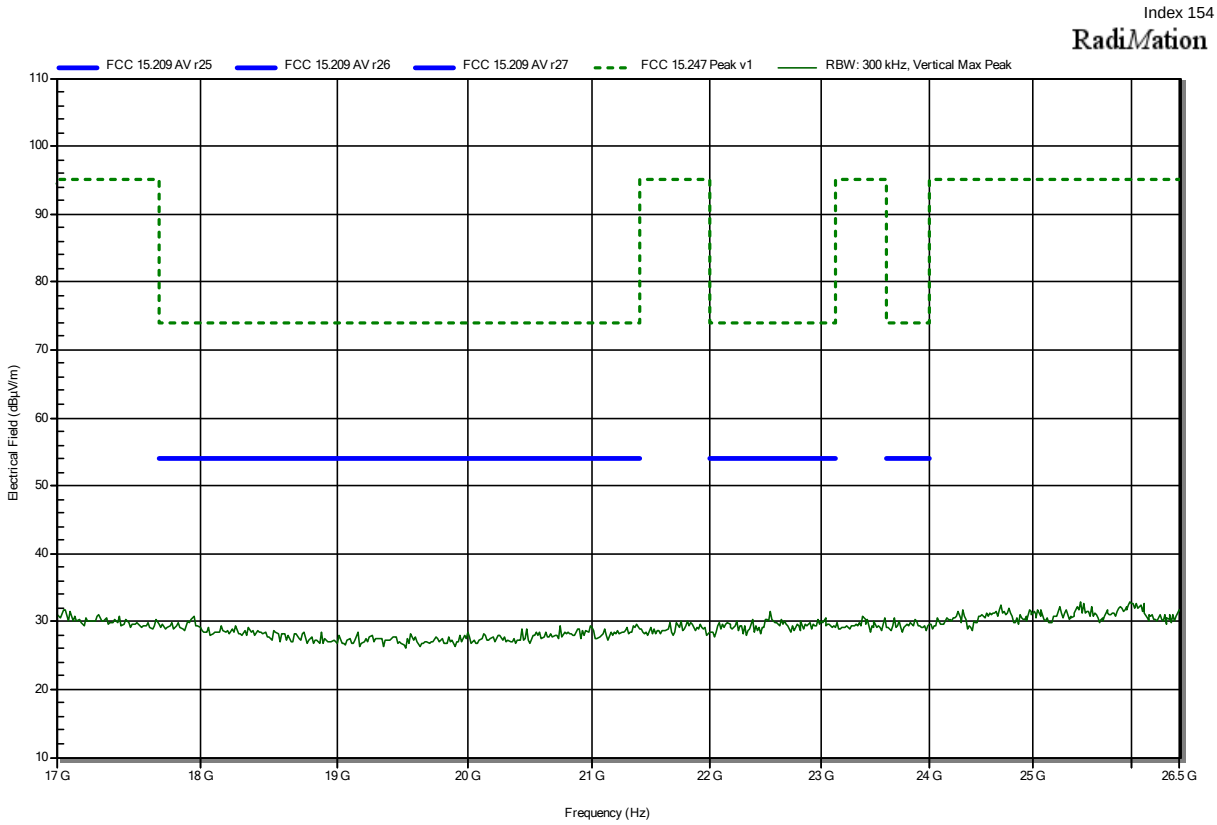
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

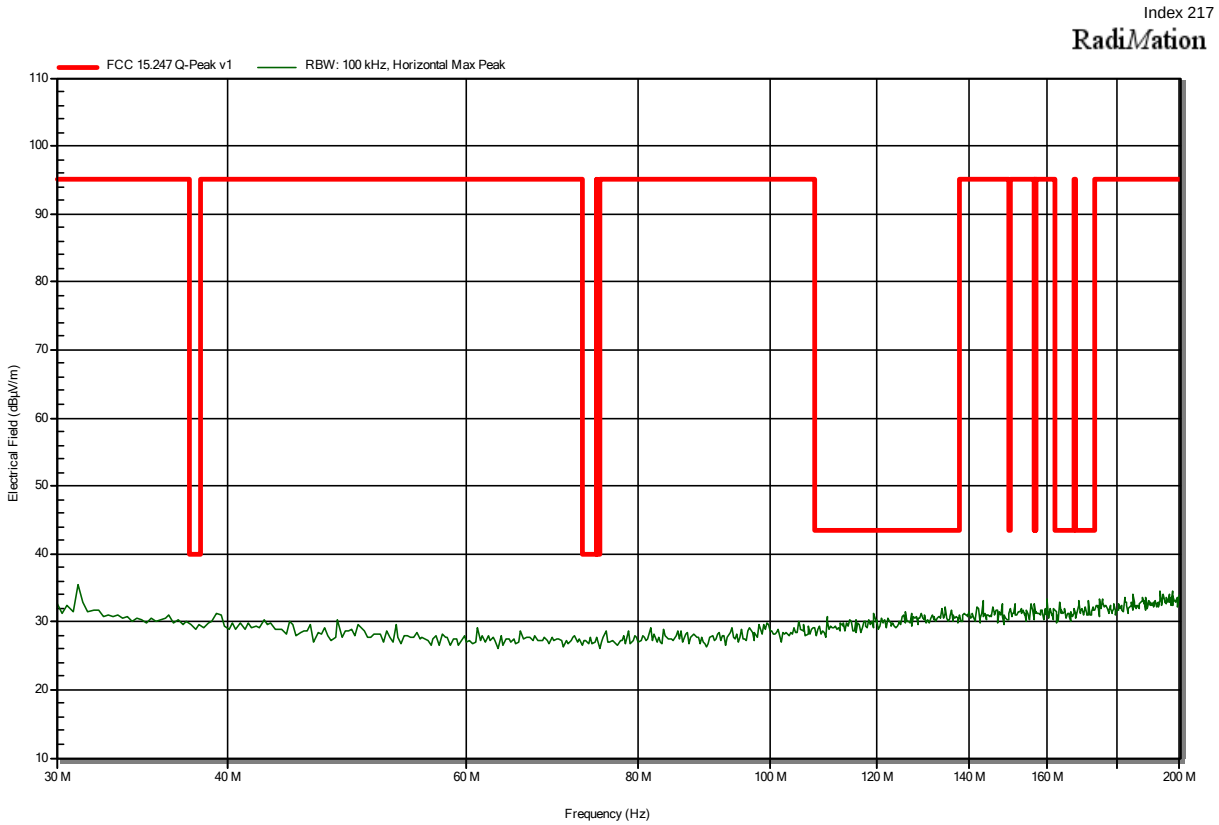
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-21
Note:	EUT vertical



ANNEX B Transmitter spurious emissions – external antenna

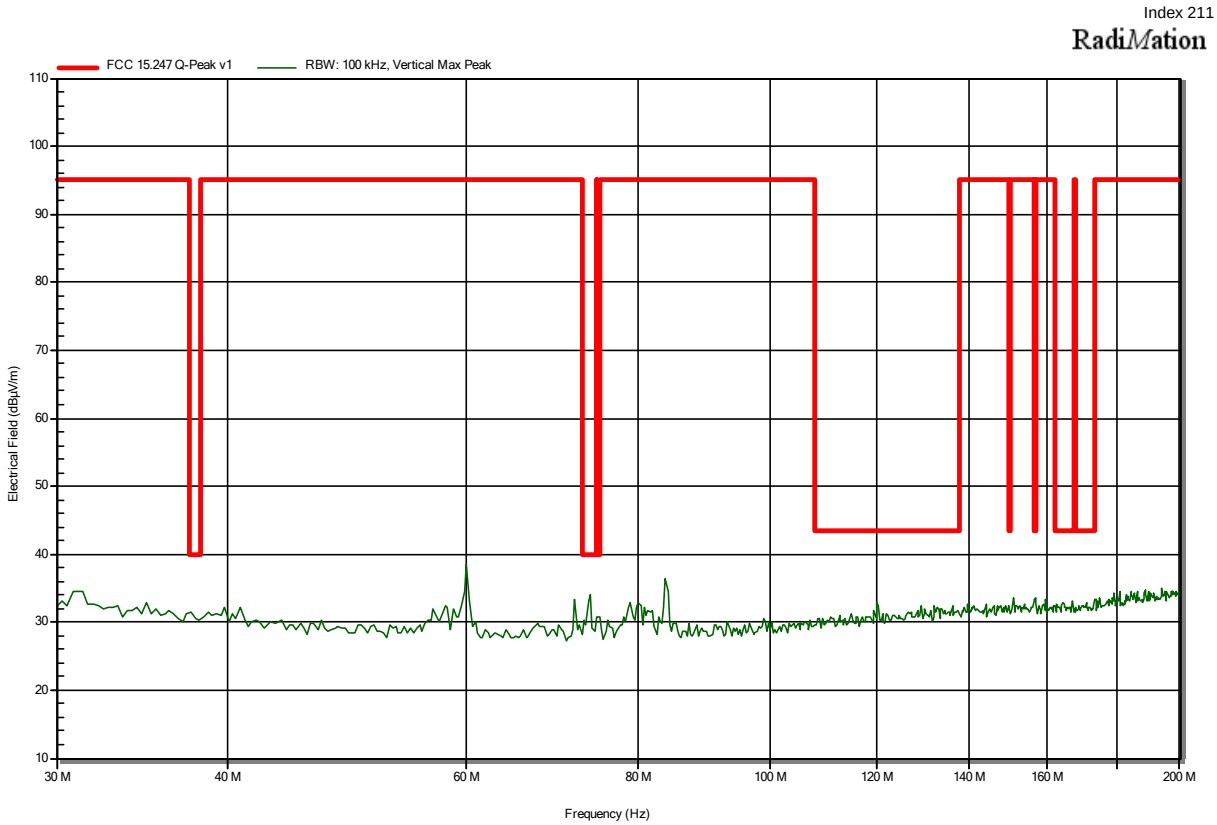
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



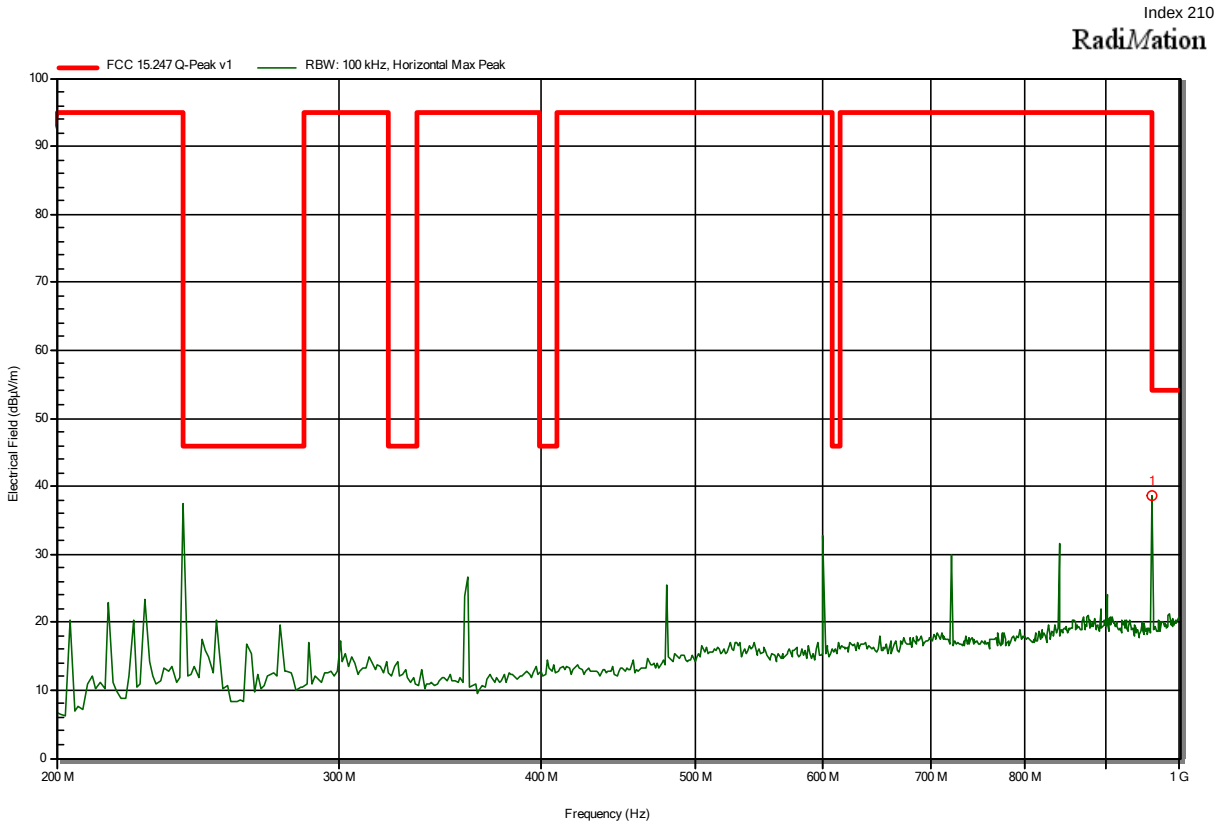
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

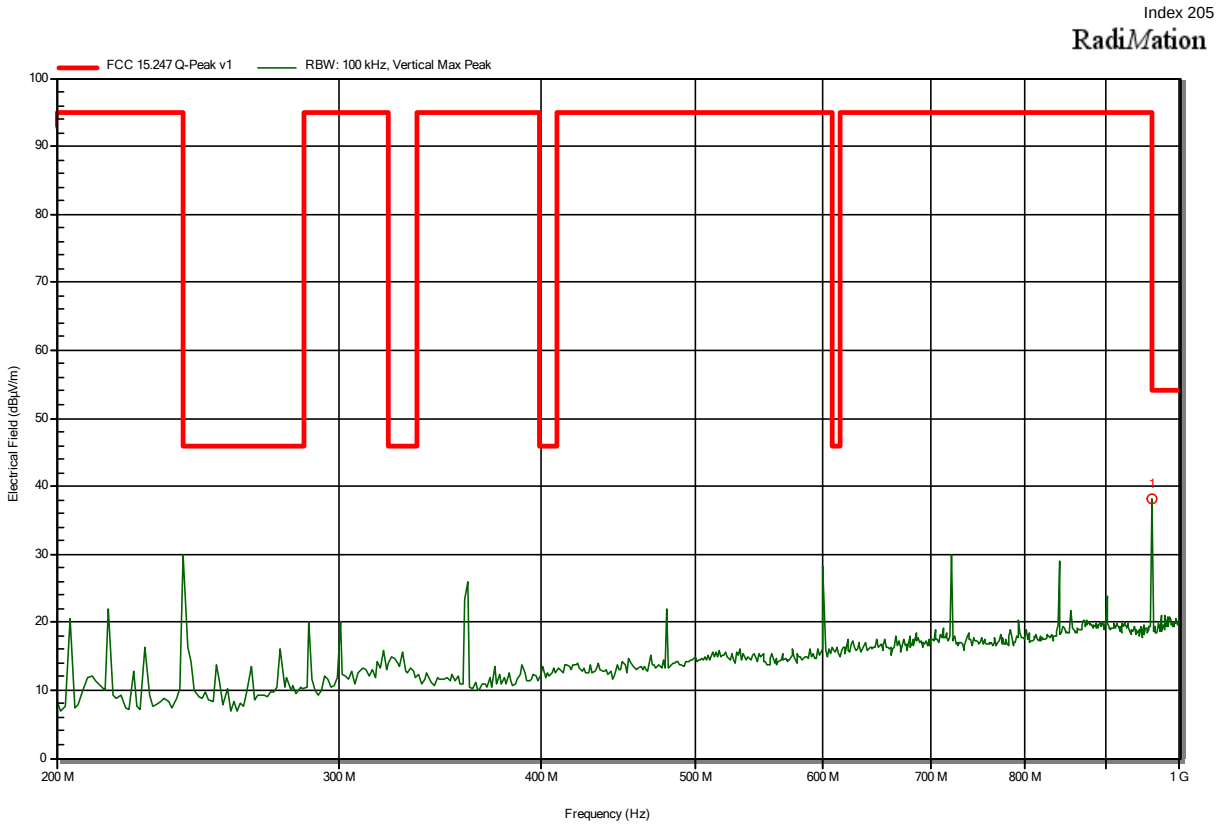
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
960.256 MHz	38.71 dBµV/m	54 dBµV/m	-15.29 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

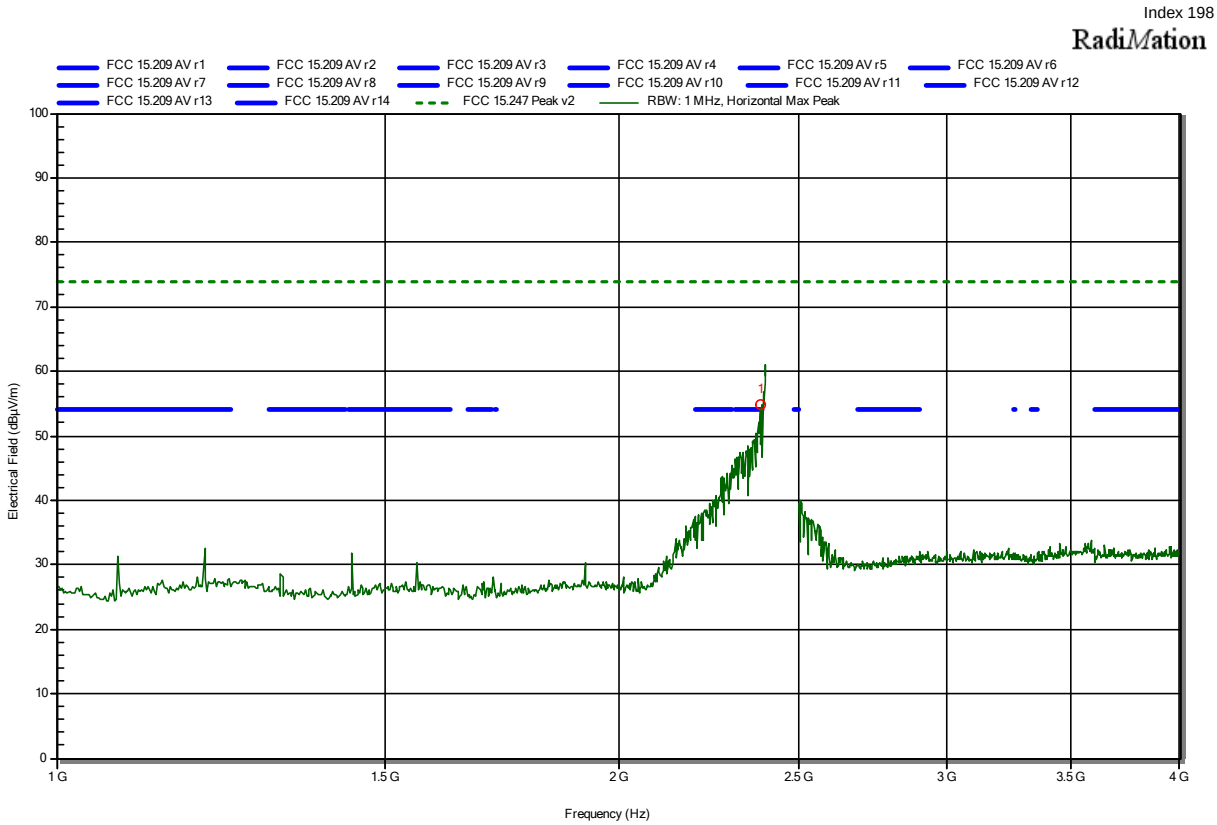
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
960.256 MHz	38.23 dBµV/m	54 dBµV/m	-15.77 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical

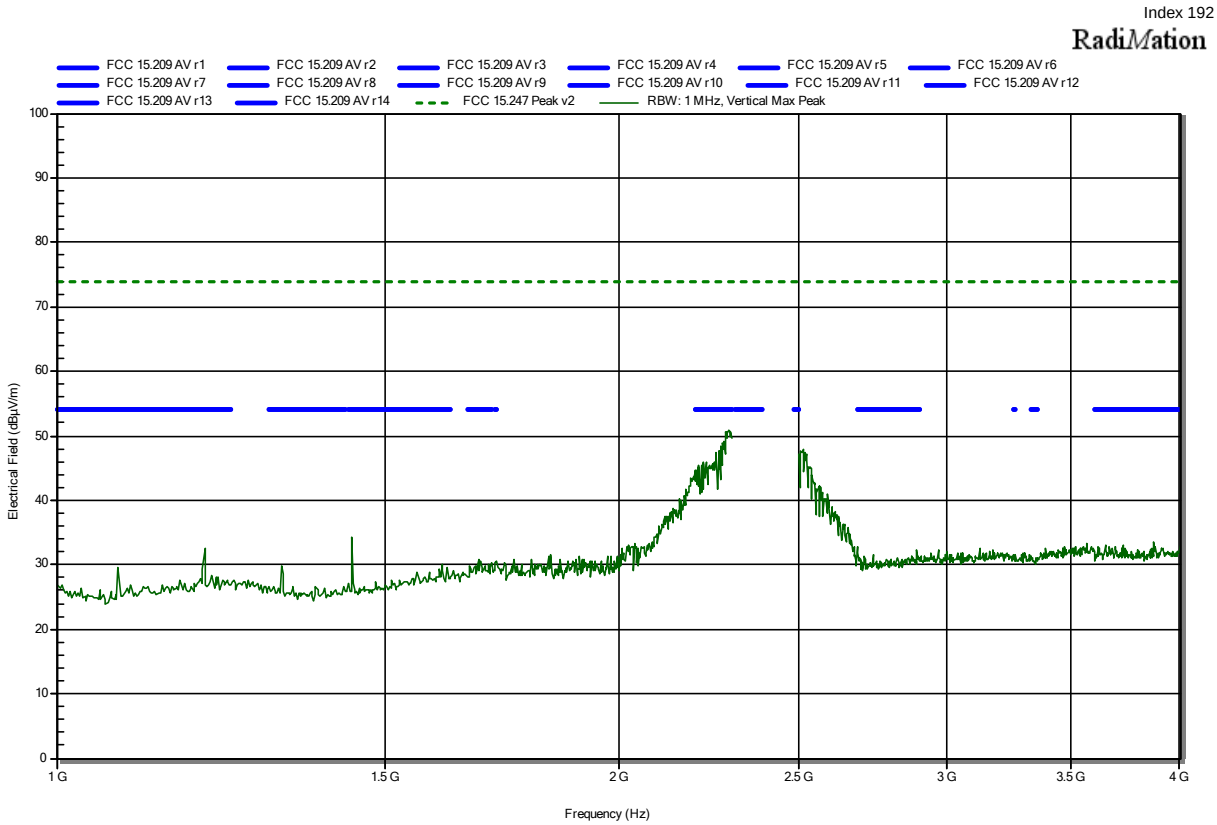


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.387 GHz	54.88 dBµV/m	74 dBµV/m	-19.12 dB	Pass

Frequency	Average	Average Limit	Peak Difference	Peak Status
2.387 GHz	50.11 dBµV/m	54 dBµV/m	-3.89 dB	Pass

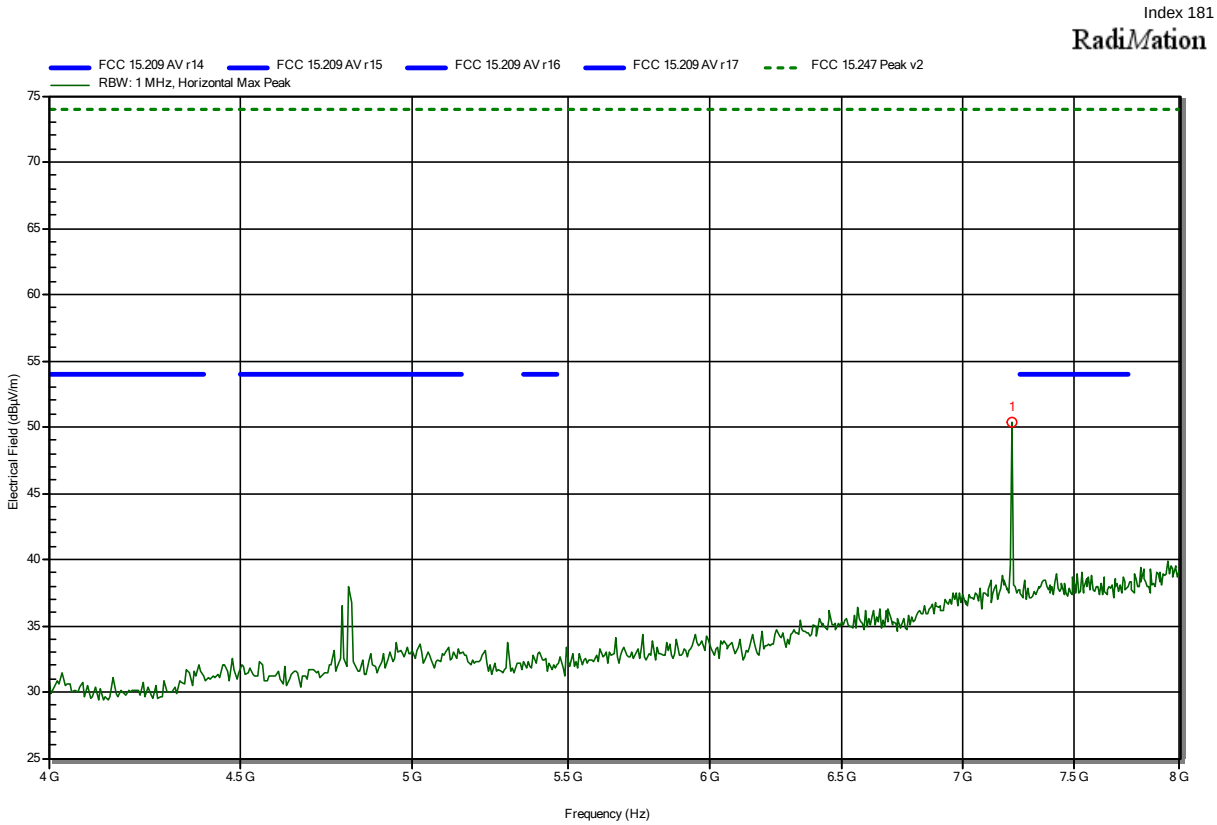
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

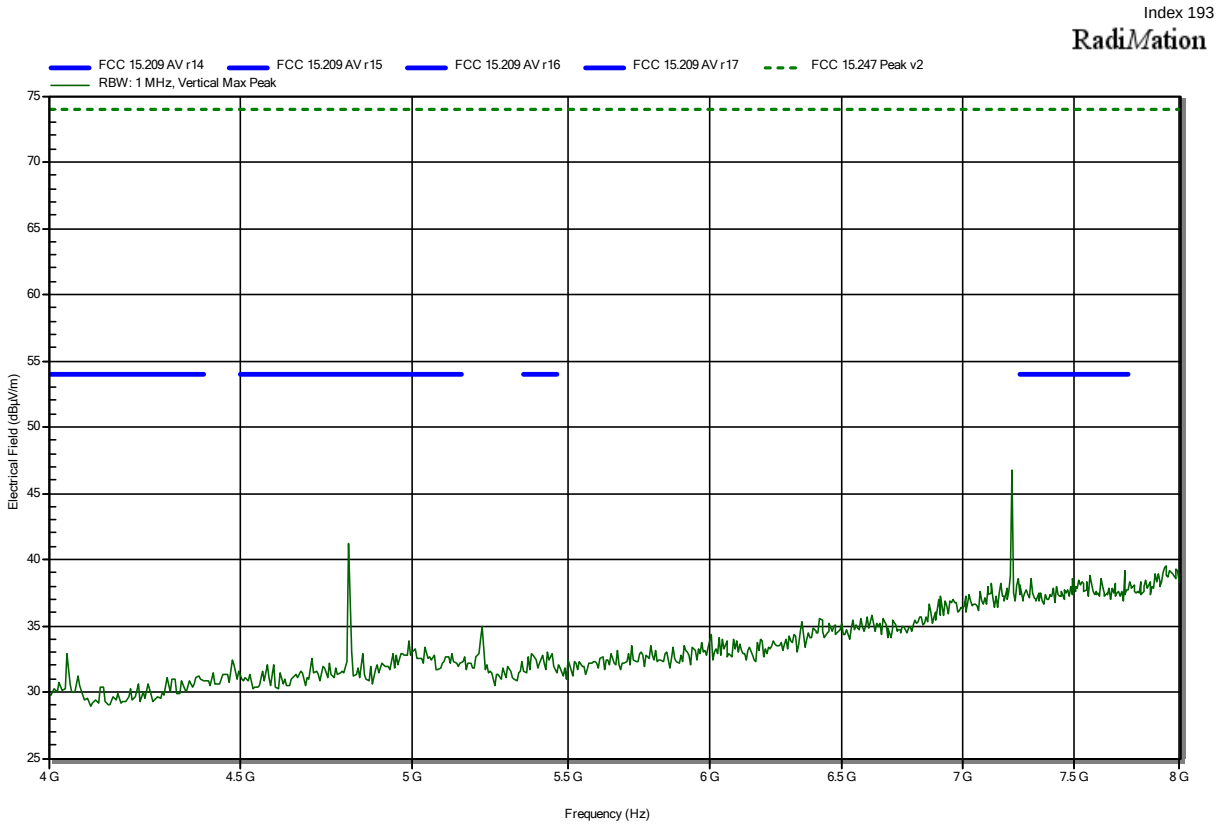
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.218 GHz	50.41 dBµV/m	74 dBµV/m	-23.59 dB	Pass

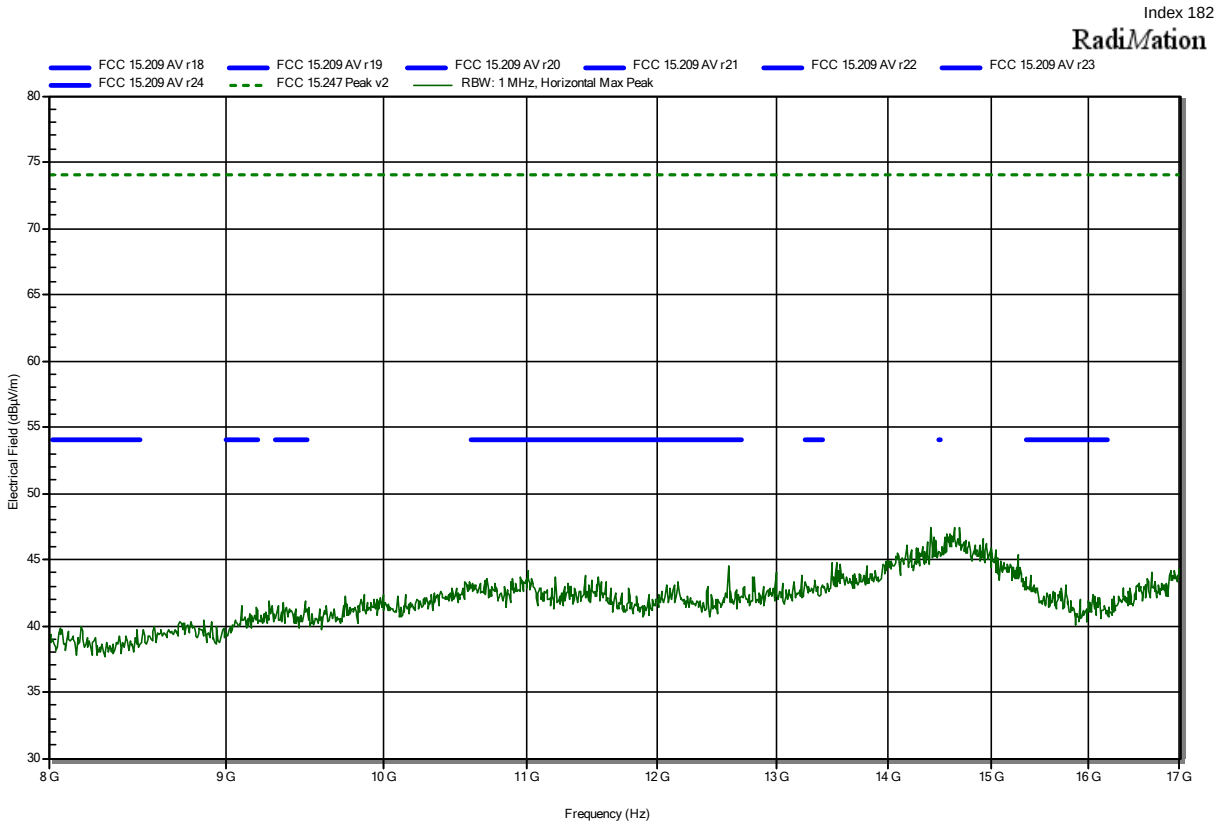
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



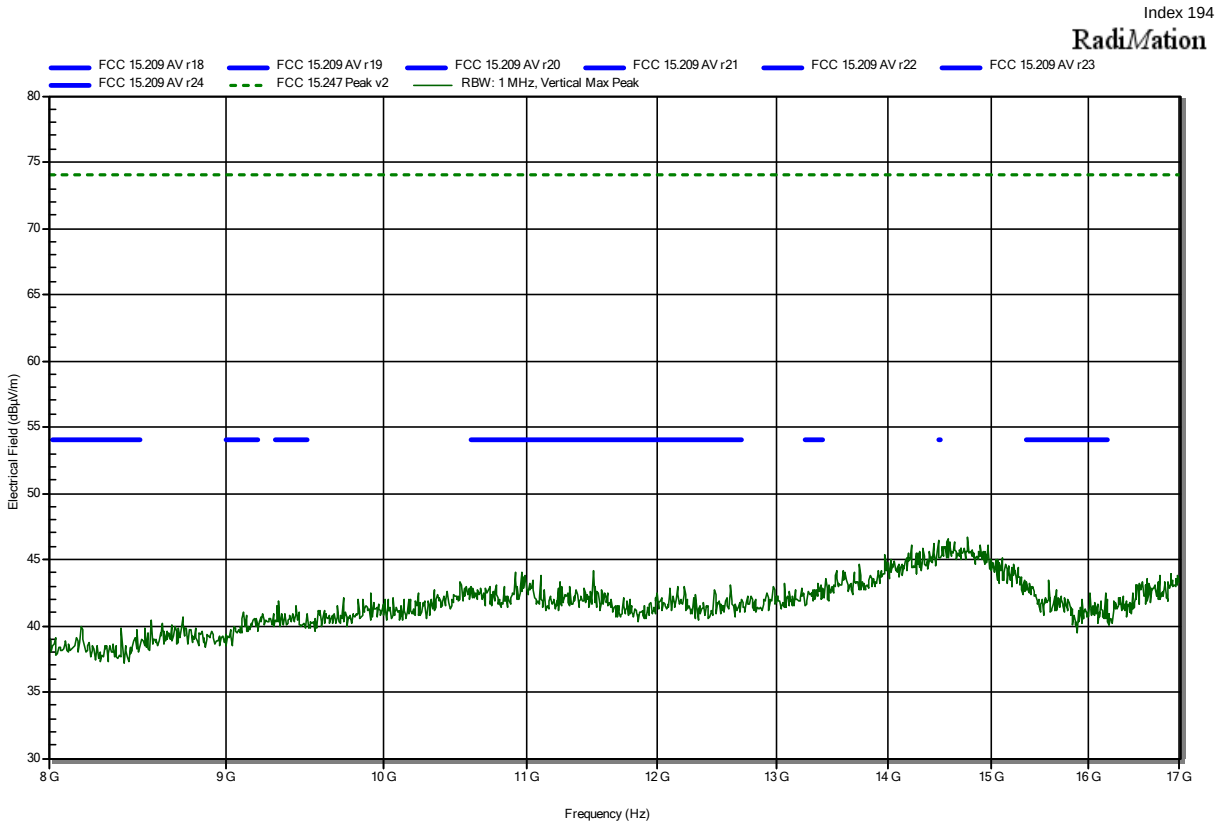
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



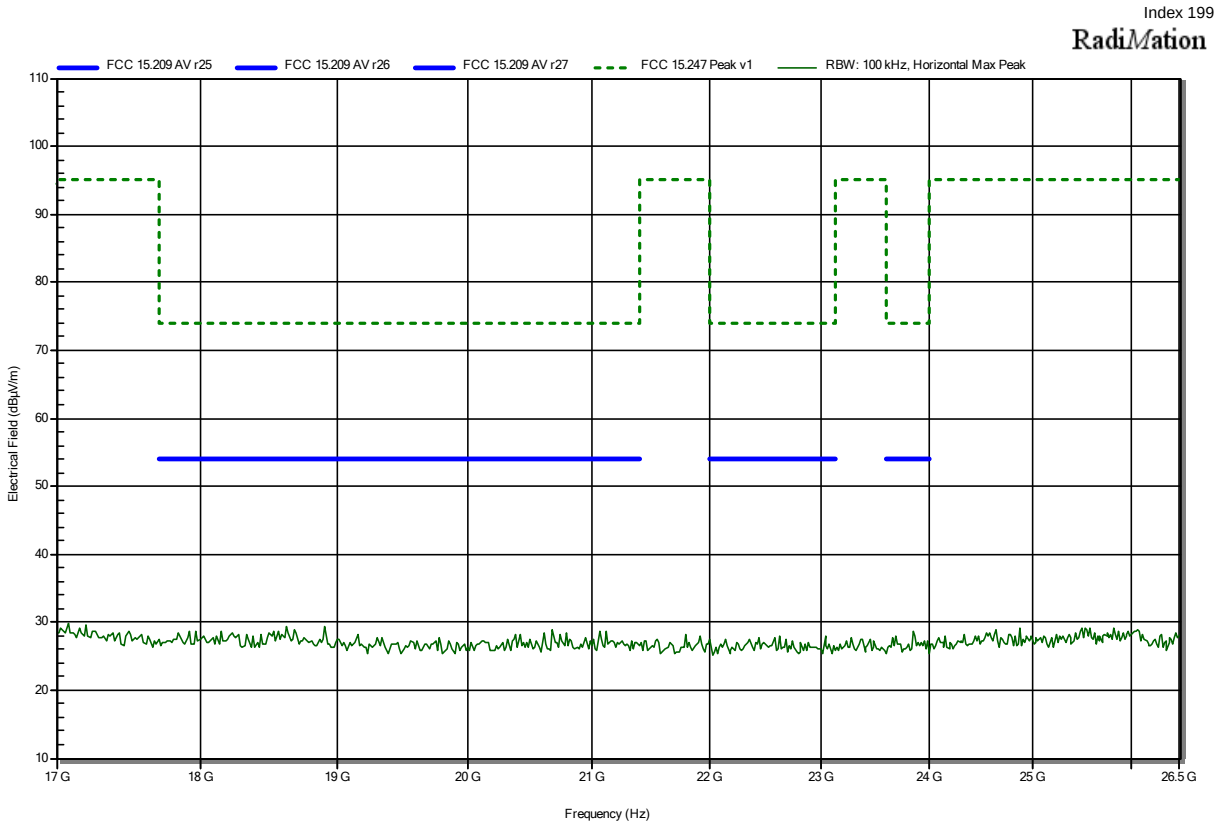
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



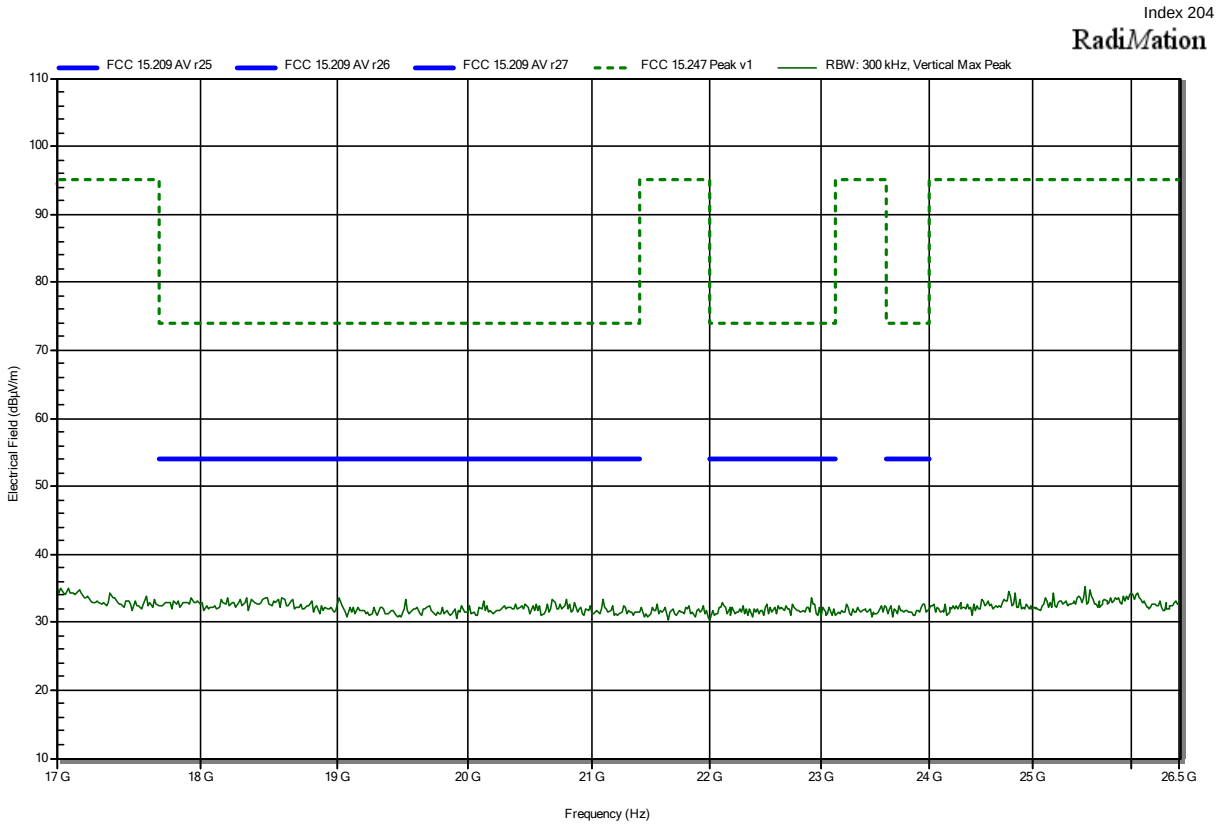
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



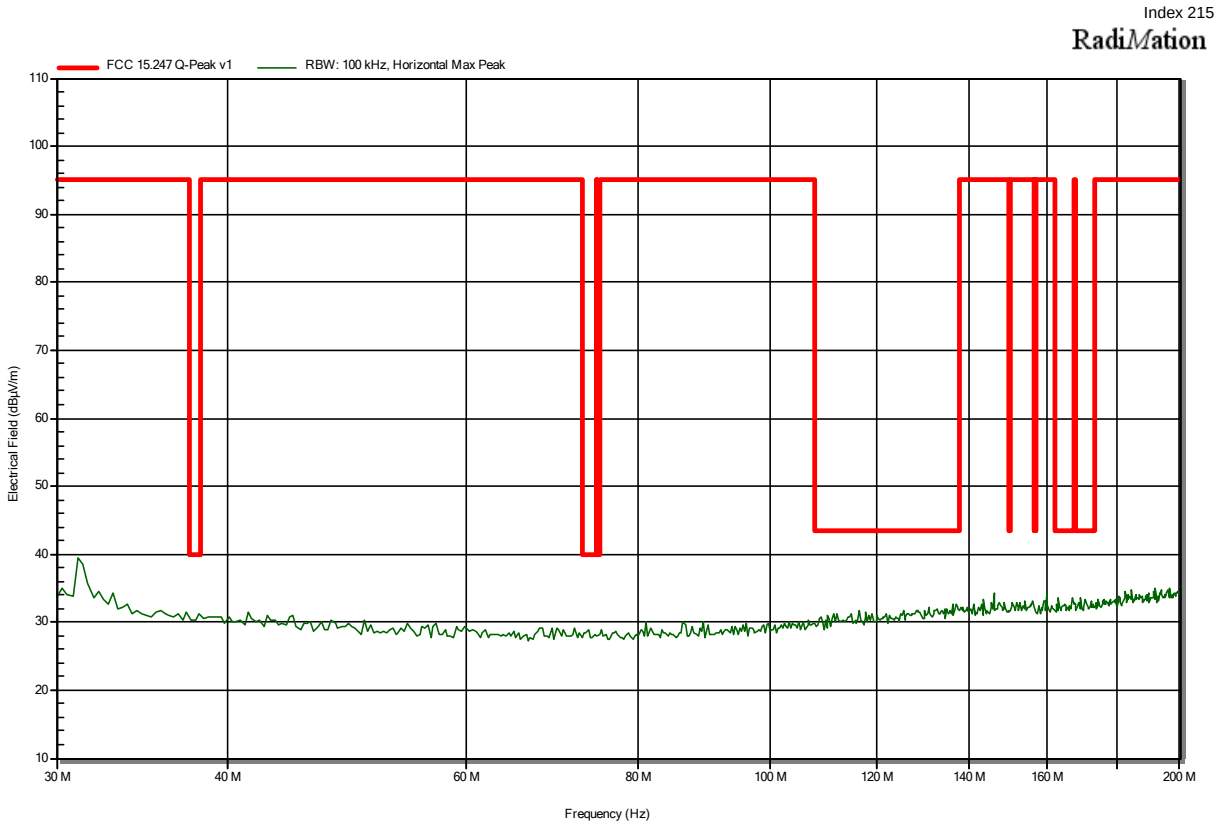
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2405 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



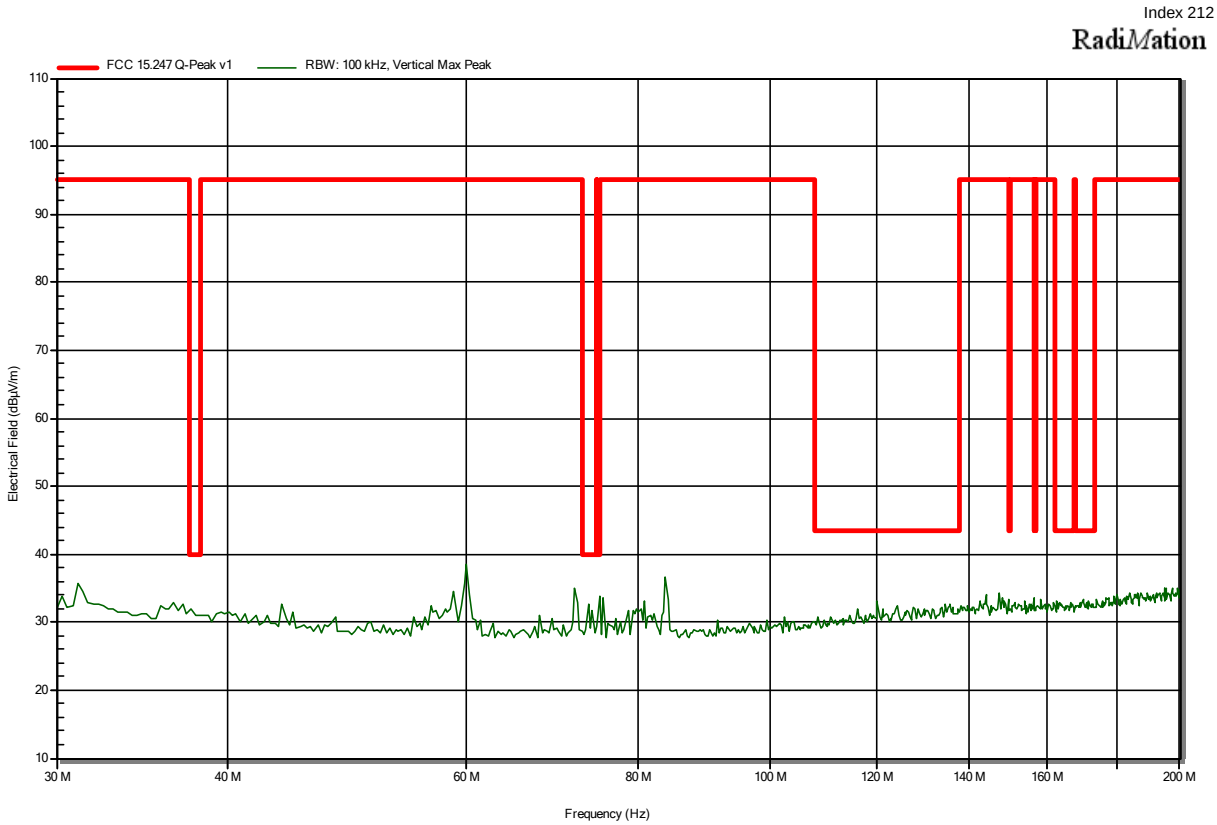
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



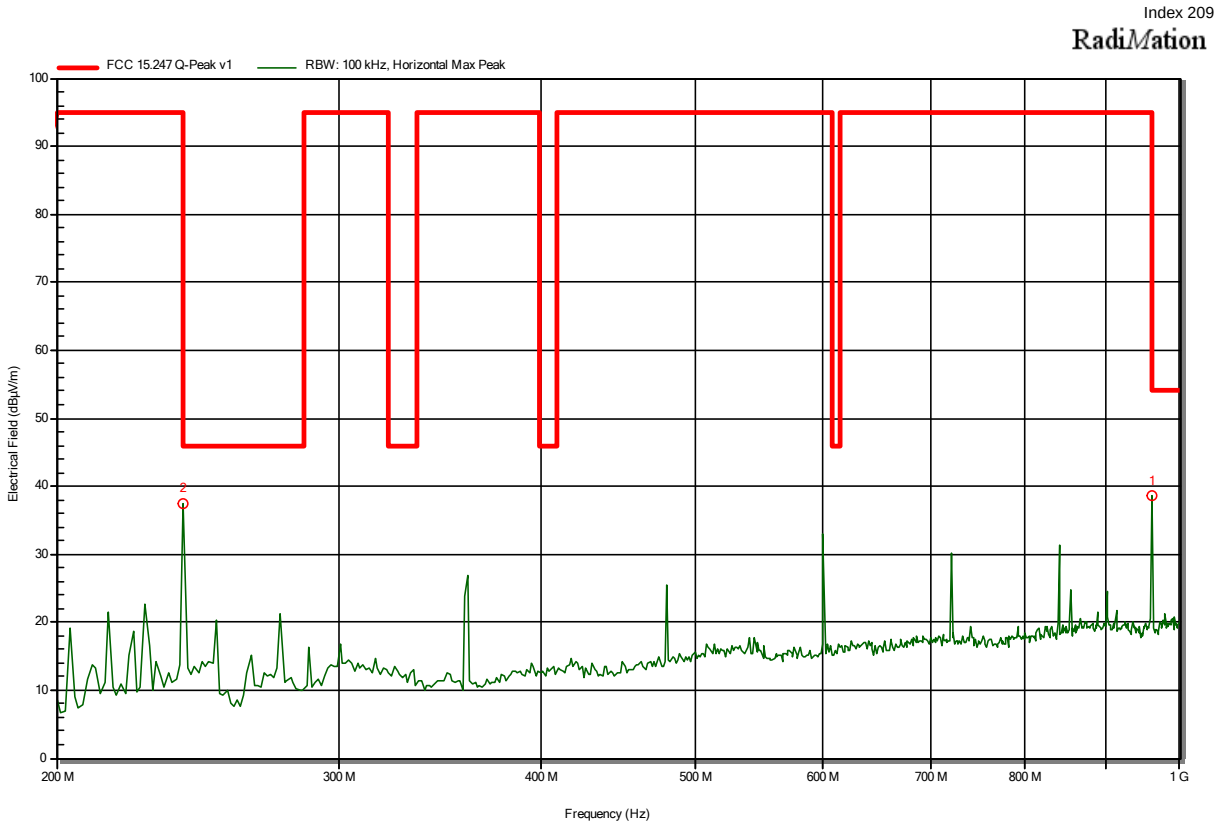
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

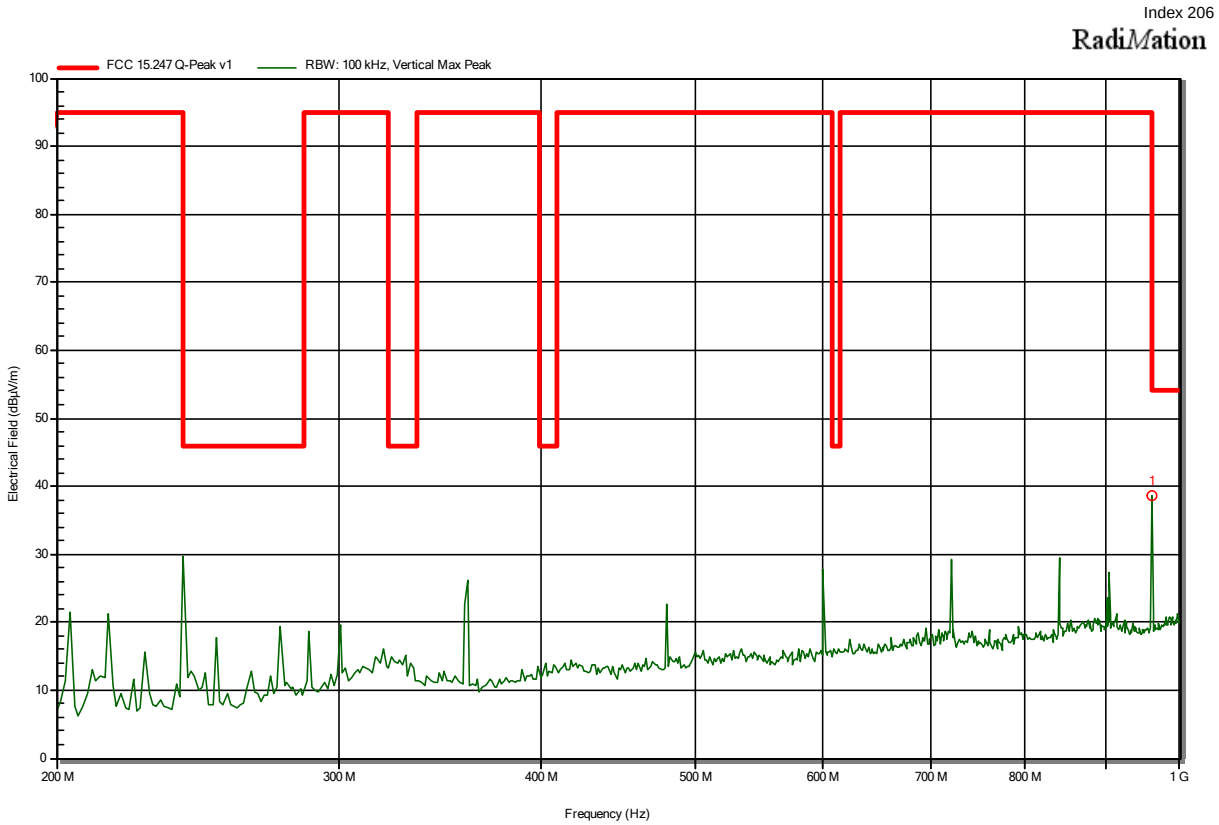
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
239.744 MHz	37.49 dBµV/m	95 dBµV/m	-57.51 dB	Pass
960.256 MHz	38.68 dBµV/m	54 dBµV/m	-15.32 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

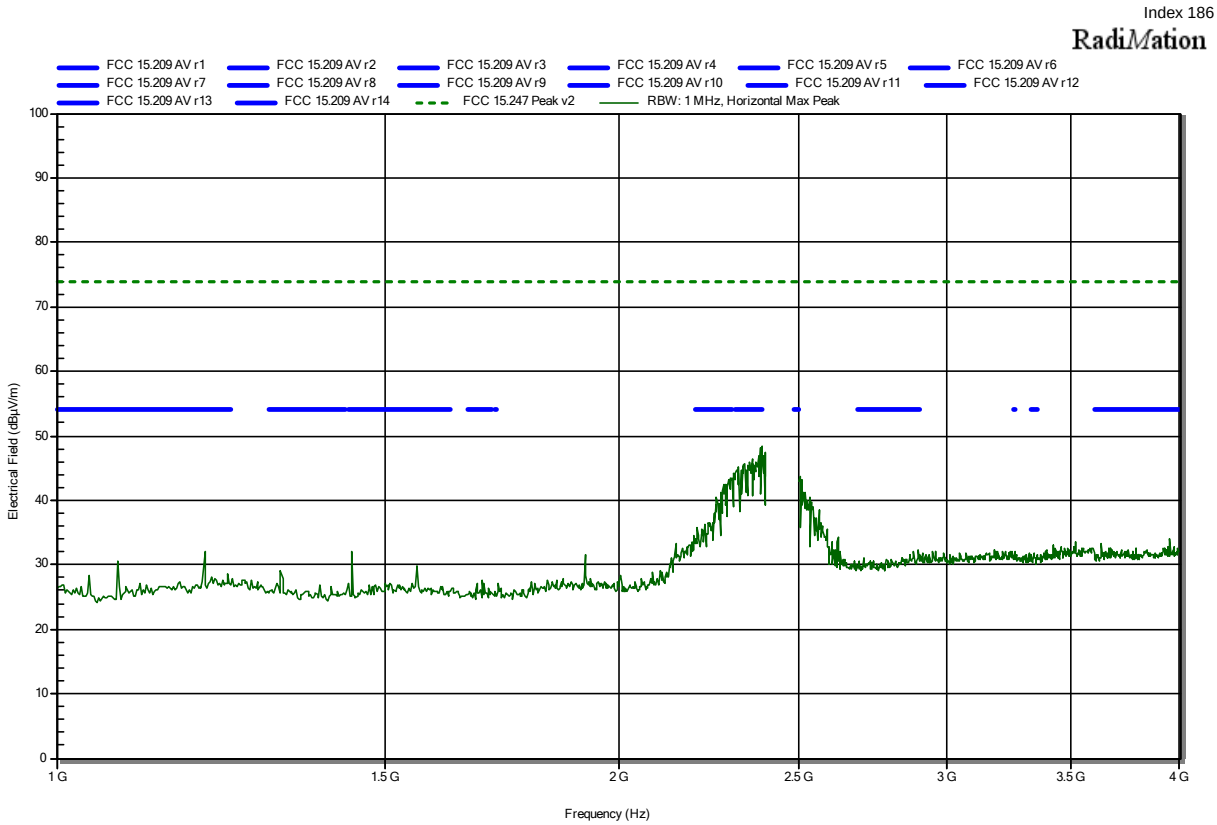
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
960.256 MHz	38.51 dBµV/m	54 dBµV/m	-15.49 dB	Pass

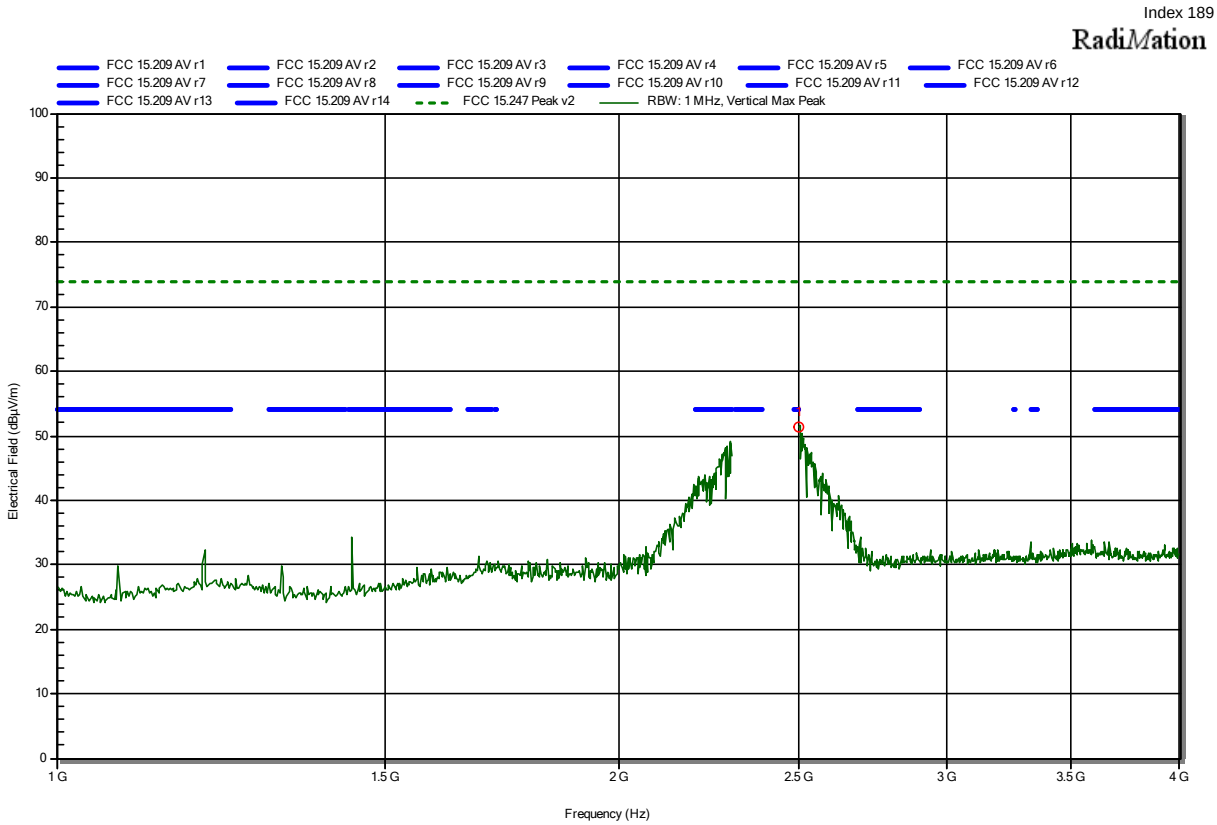
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

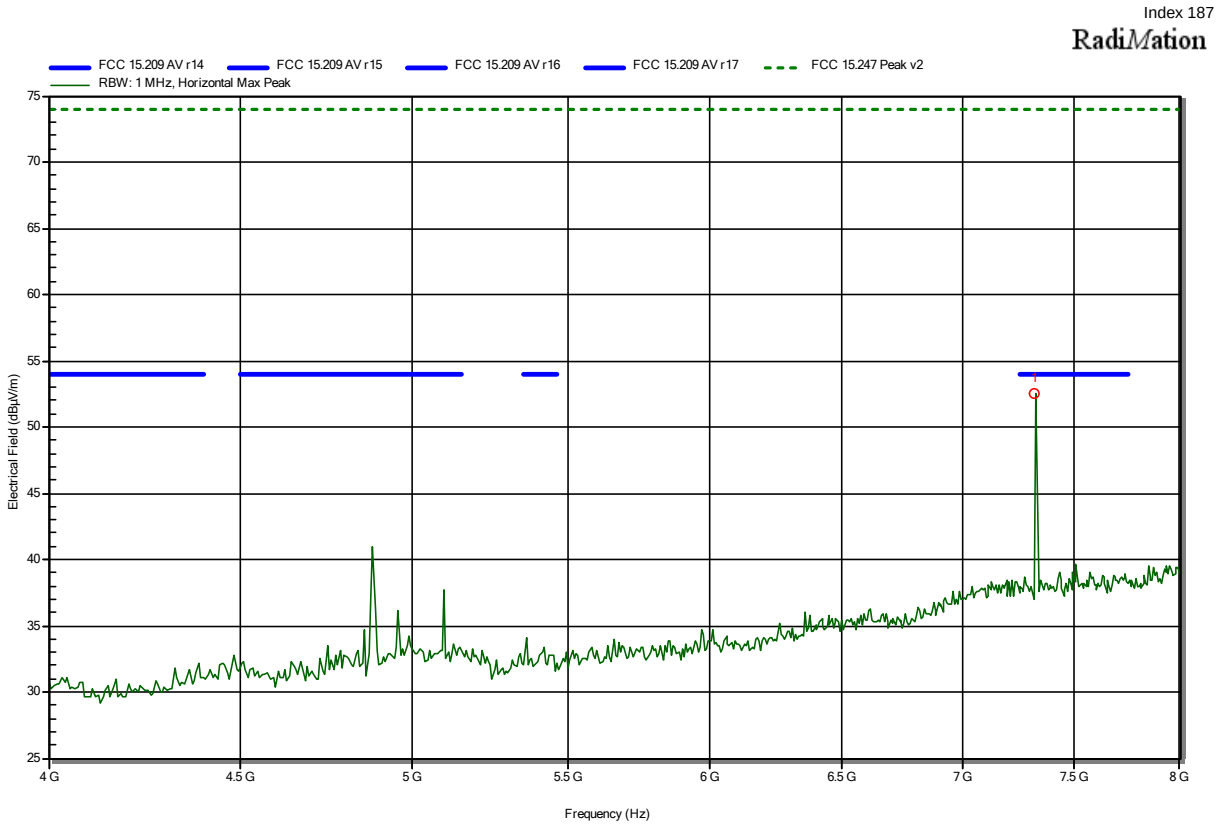
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.5 GHz	51.46 dBµV/m	74 dBµV/m	-22.54 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

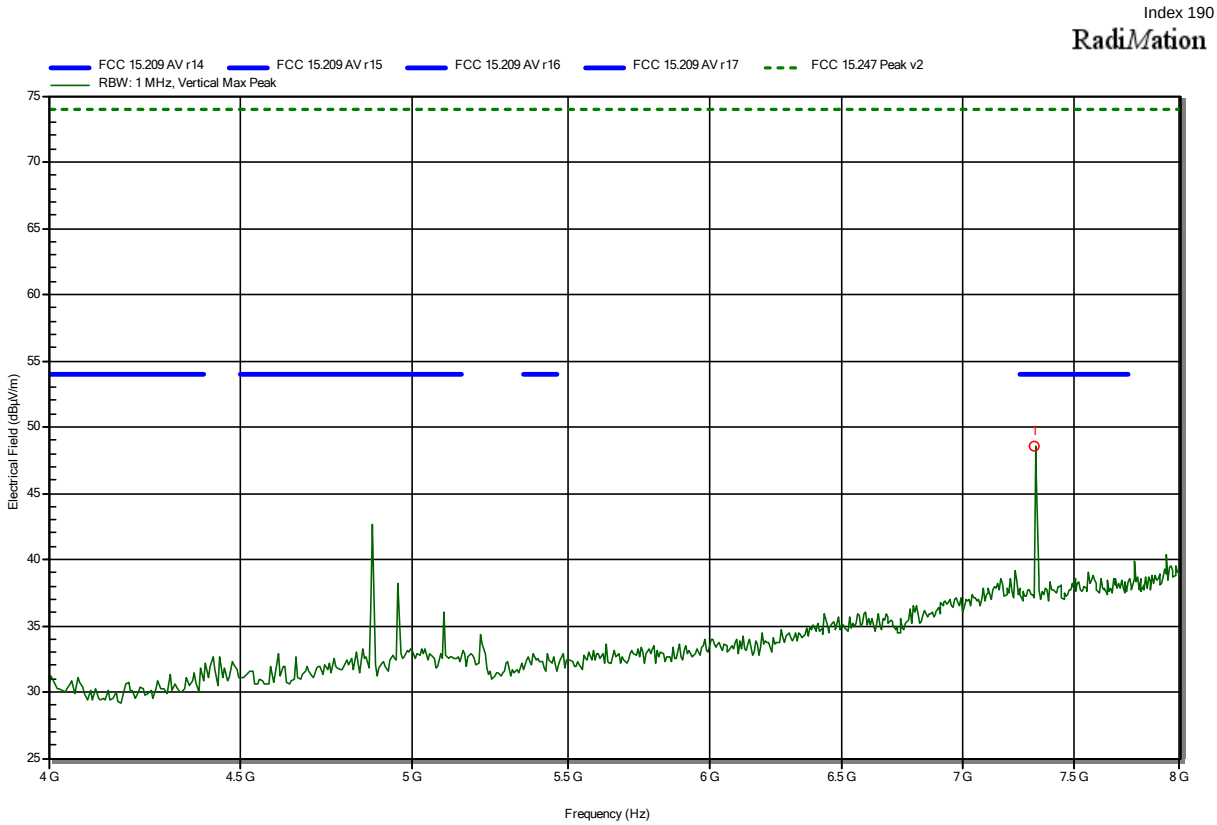
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.321 GHz	52.52 dBµV/m	74 dBµV/m	-21.48 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

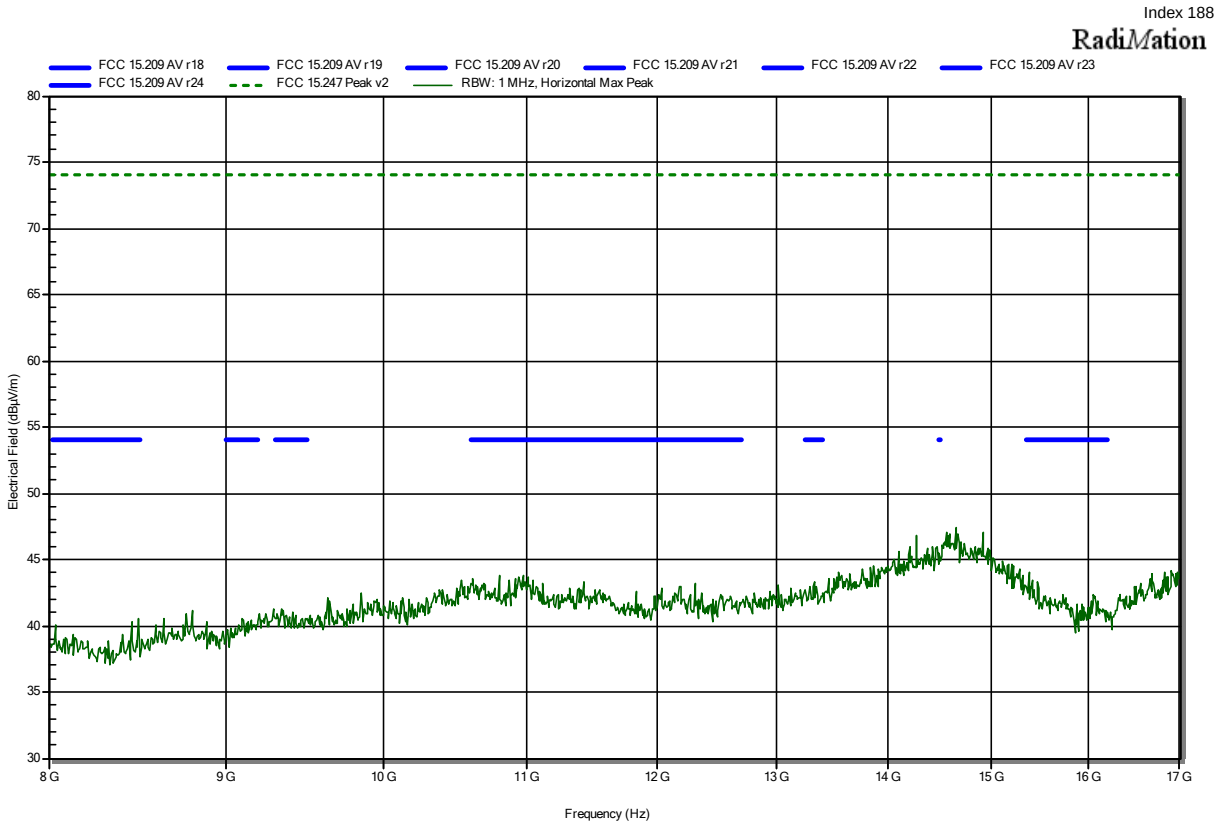
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.321 GHz	48.58 dBµV/m	74 dBµV/m	-25.42 dB	Pass

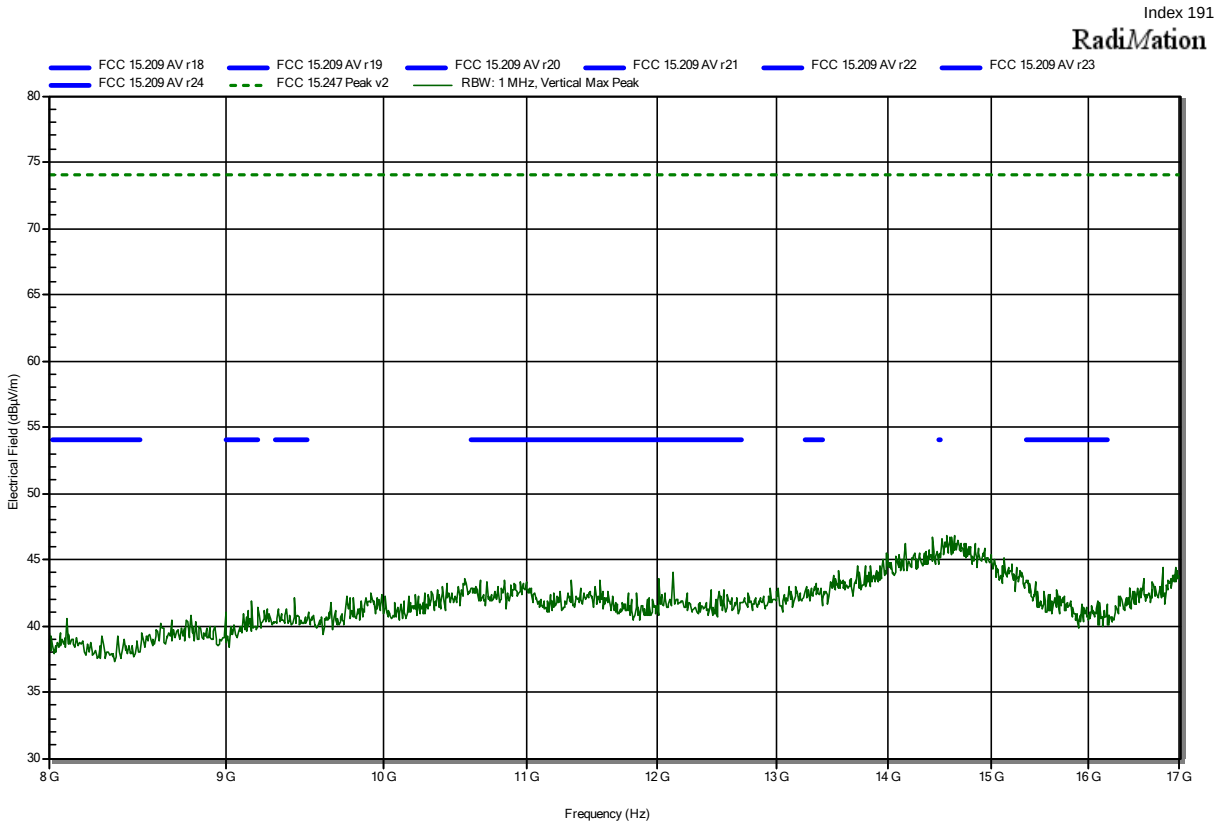
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



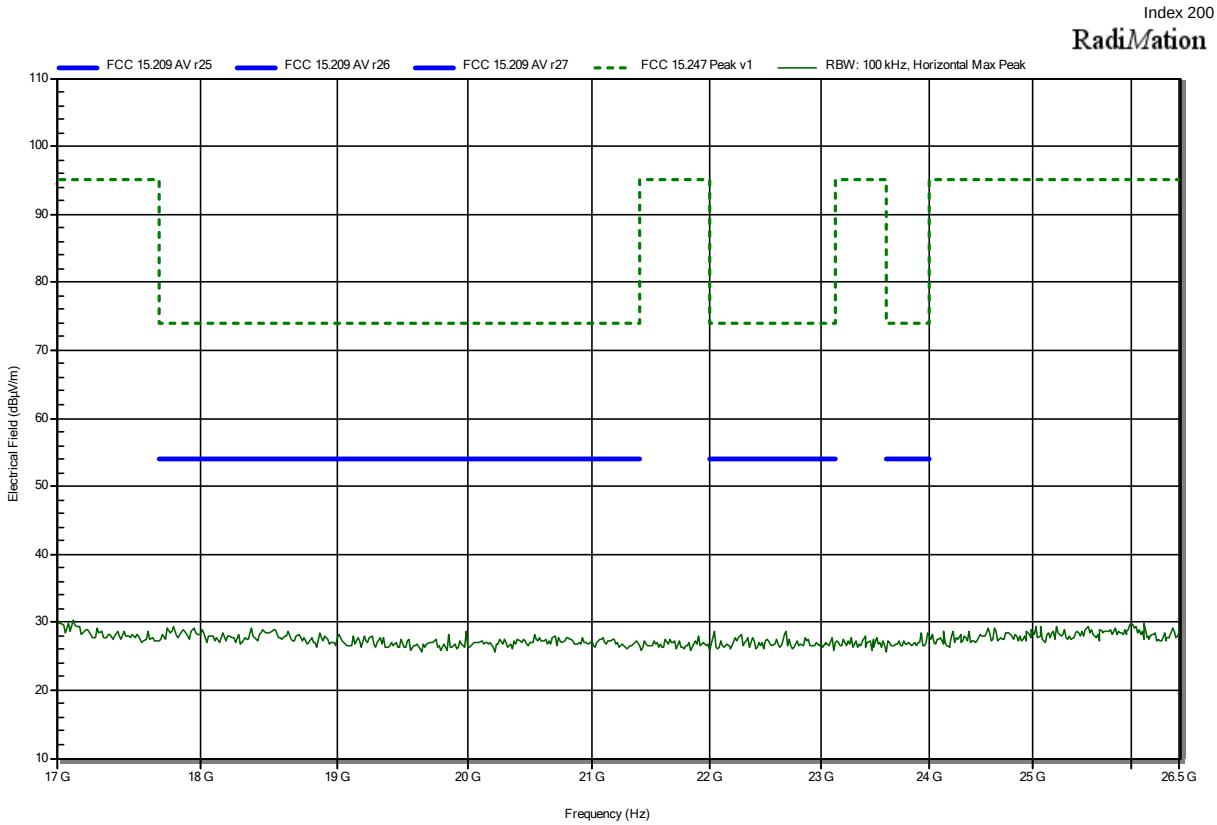
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



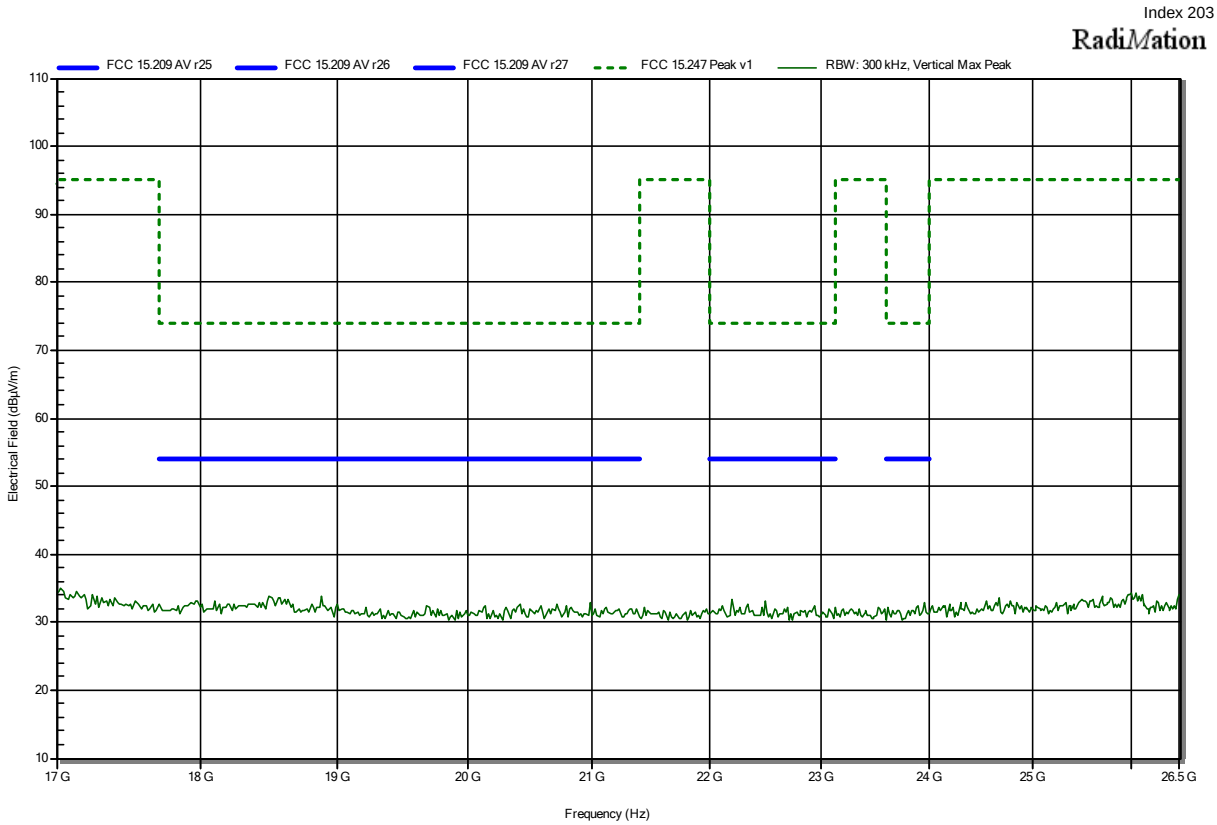
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



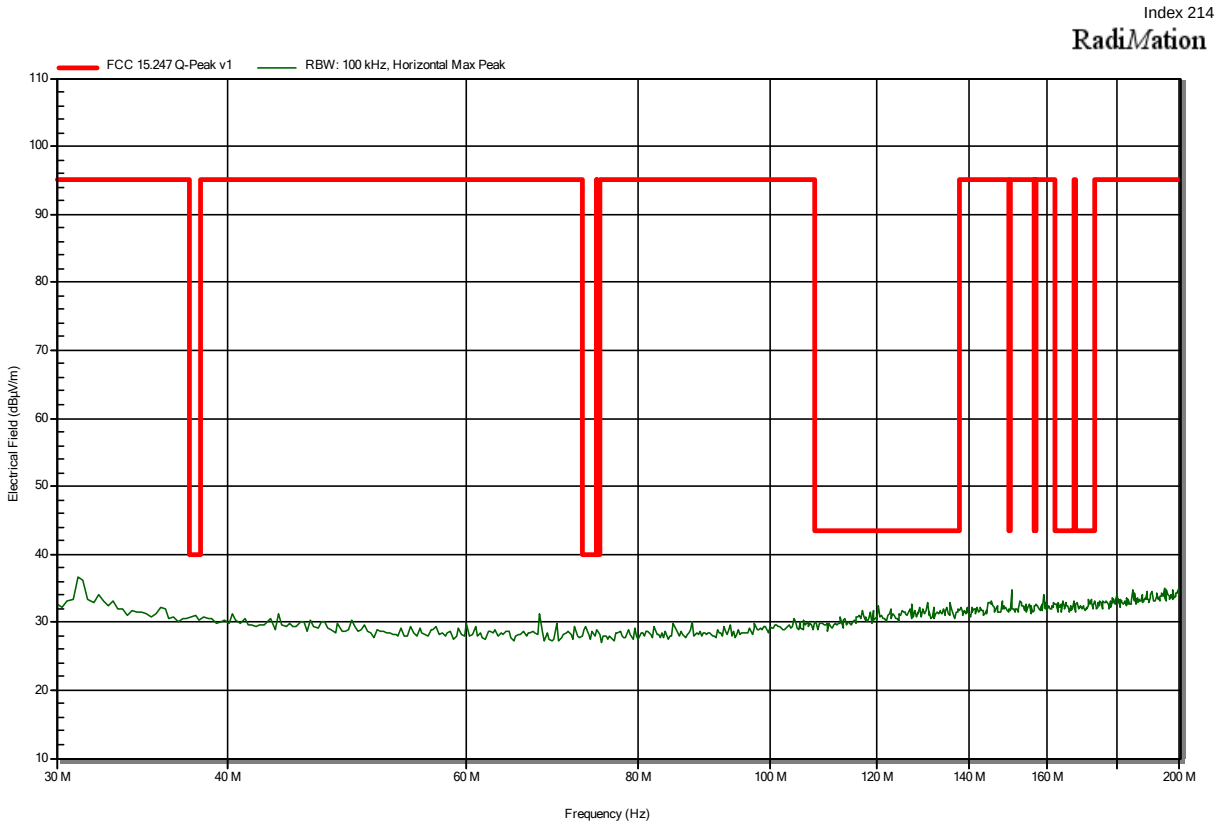
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2440 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



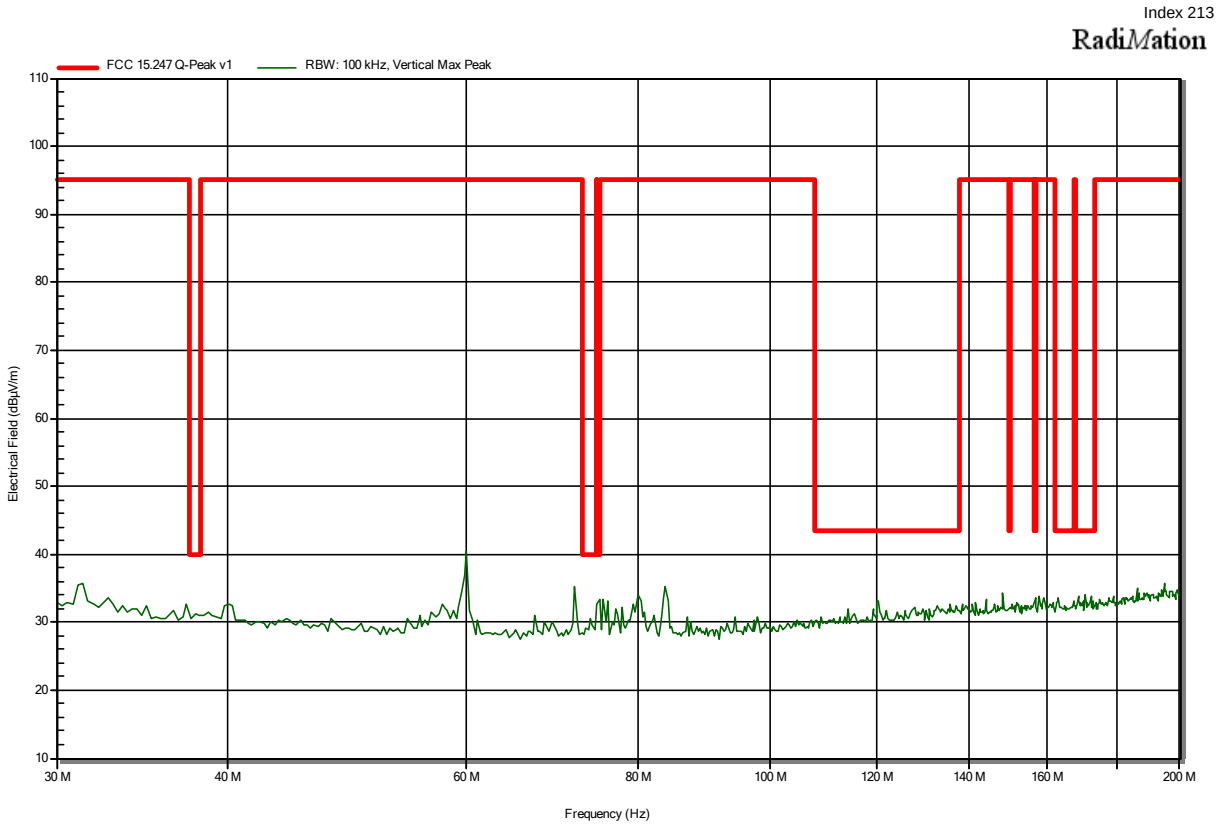
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



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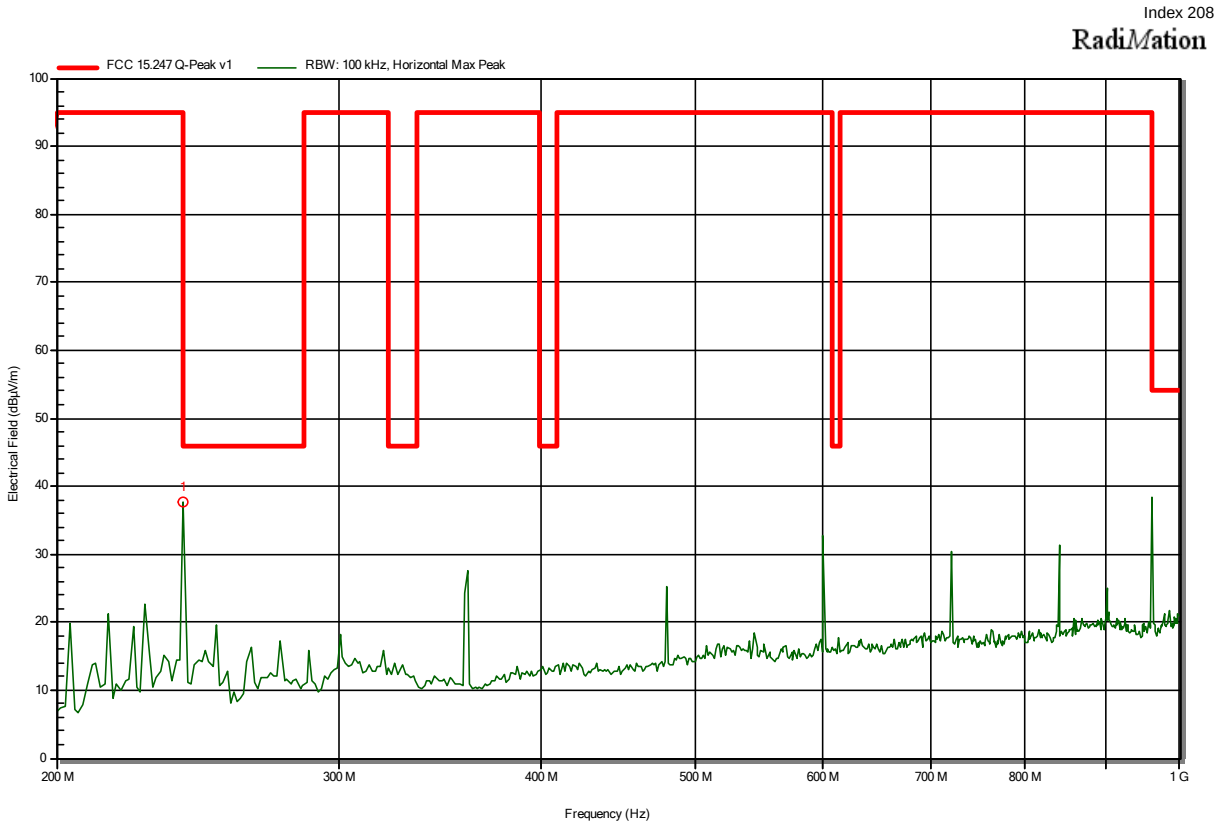
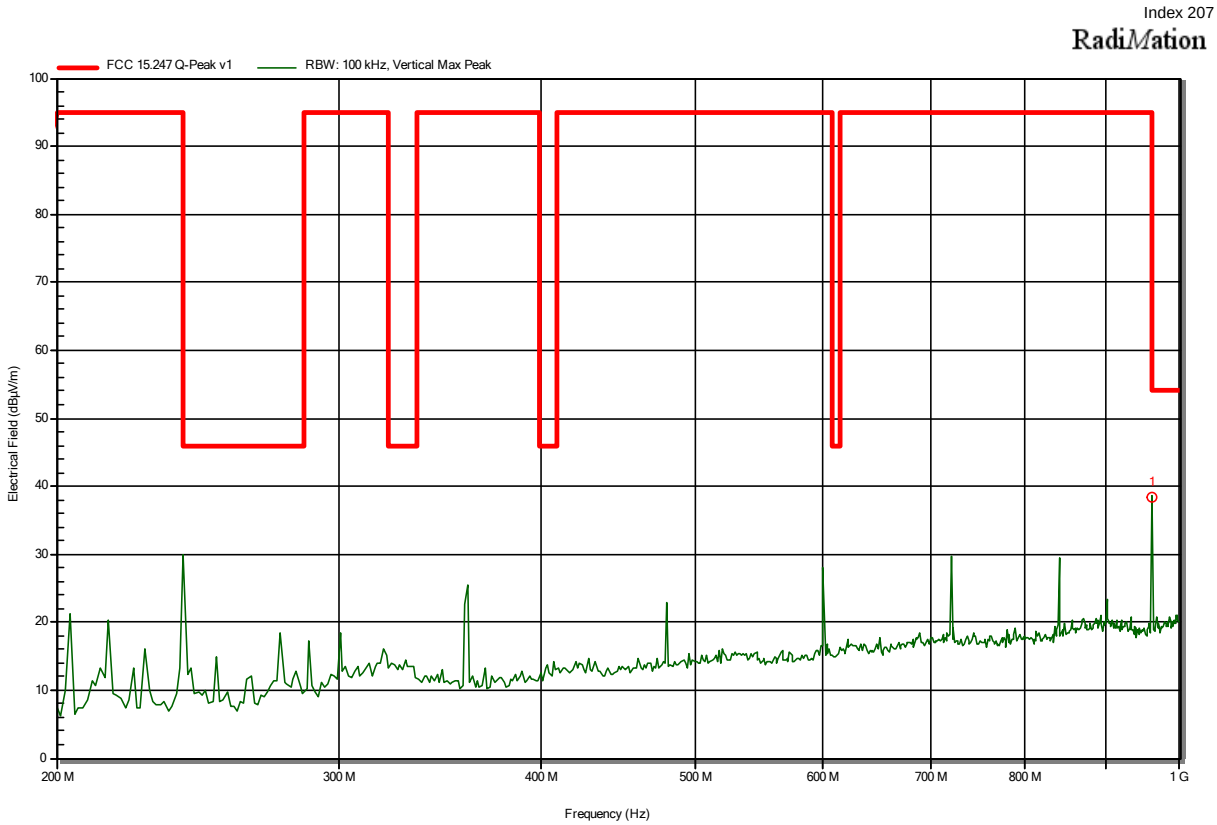
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
239.744 MHz	37.72 dBµV/m	95 dBµV/m	-57.28 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

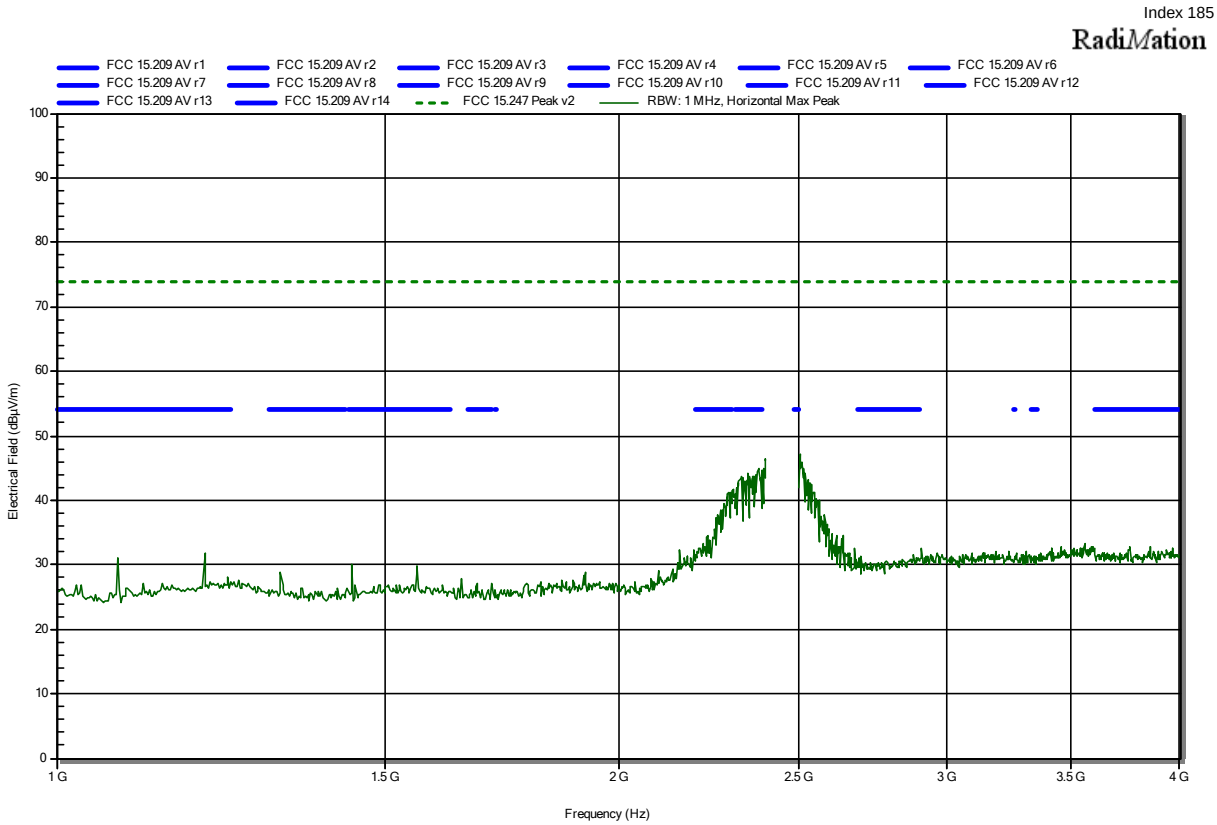
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-29
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
960.256 MHz	38.49 dBµV/m	54 dBµV/m	-15.51 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
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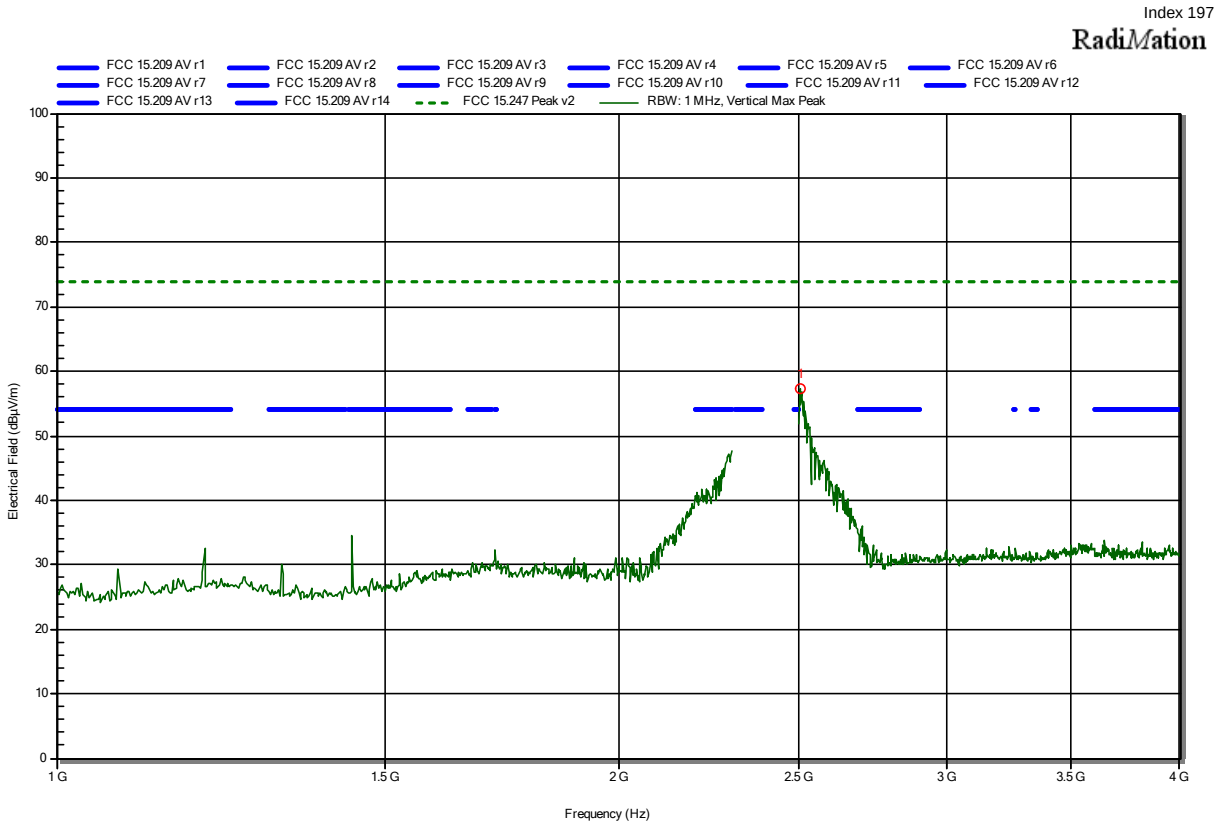
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical

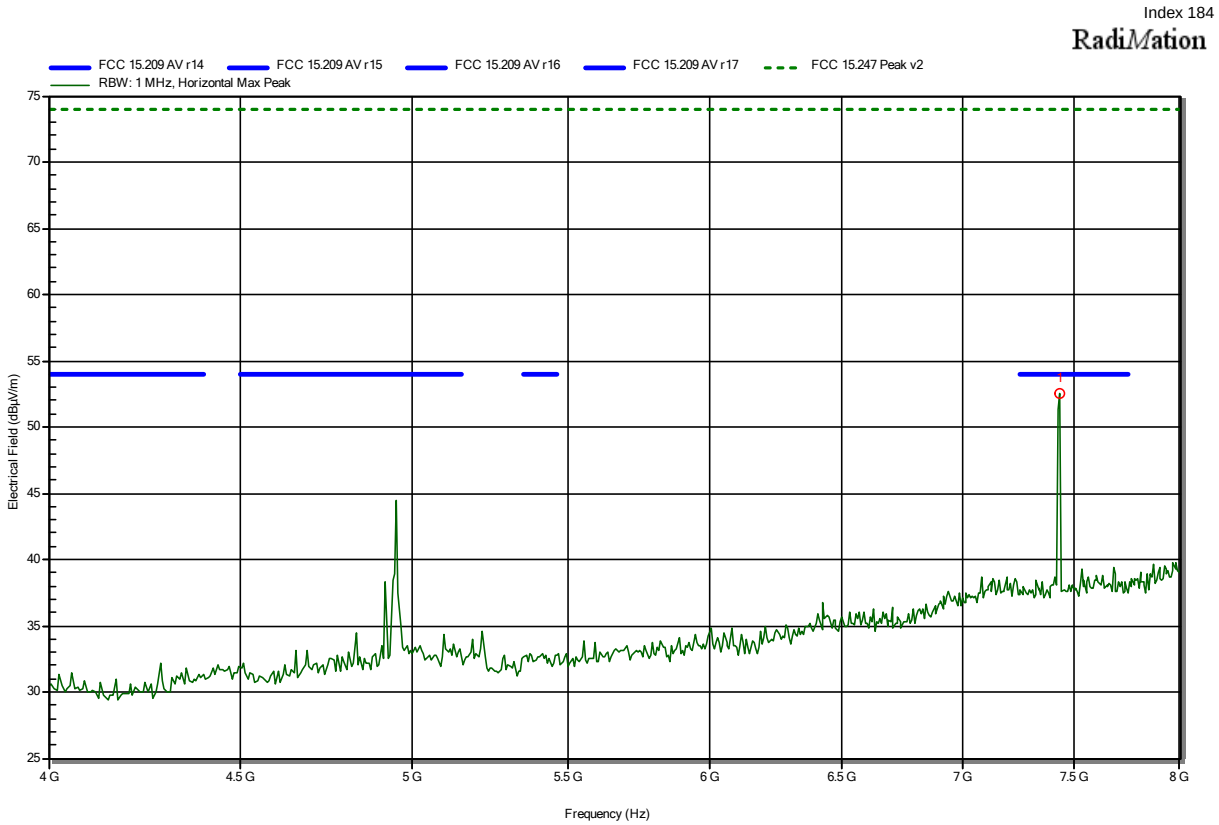


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.502 GHz	57.19 dBµV/m	74 dBµV/m	-16.81 dB	Pass

Frequency	Average	Average Limit	Peak Difference	Peak Status
2.502 GHz	52.42 dBµV/m	54 dBµV/m	-1.58 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

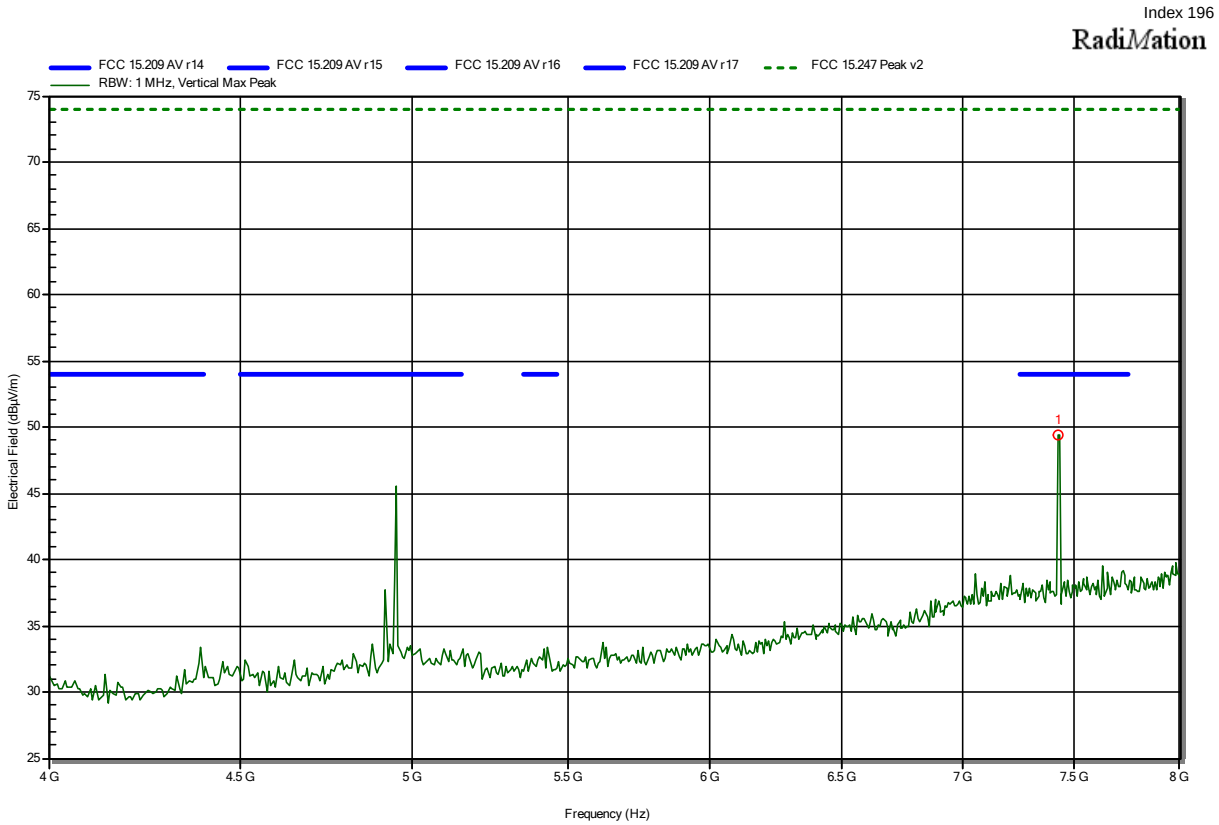
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.429 GHz	52.5 dBµV/m	74 dBµV/m	-21.5 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

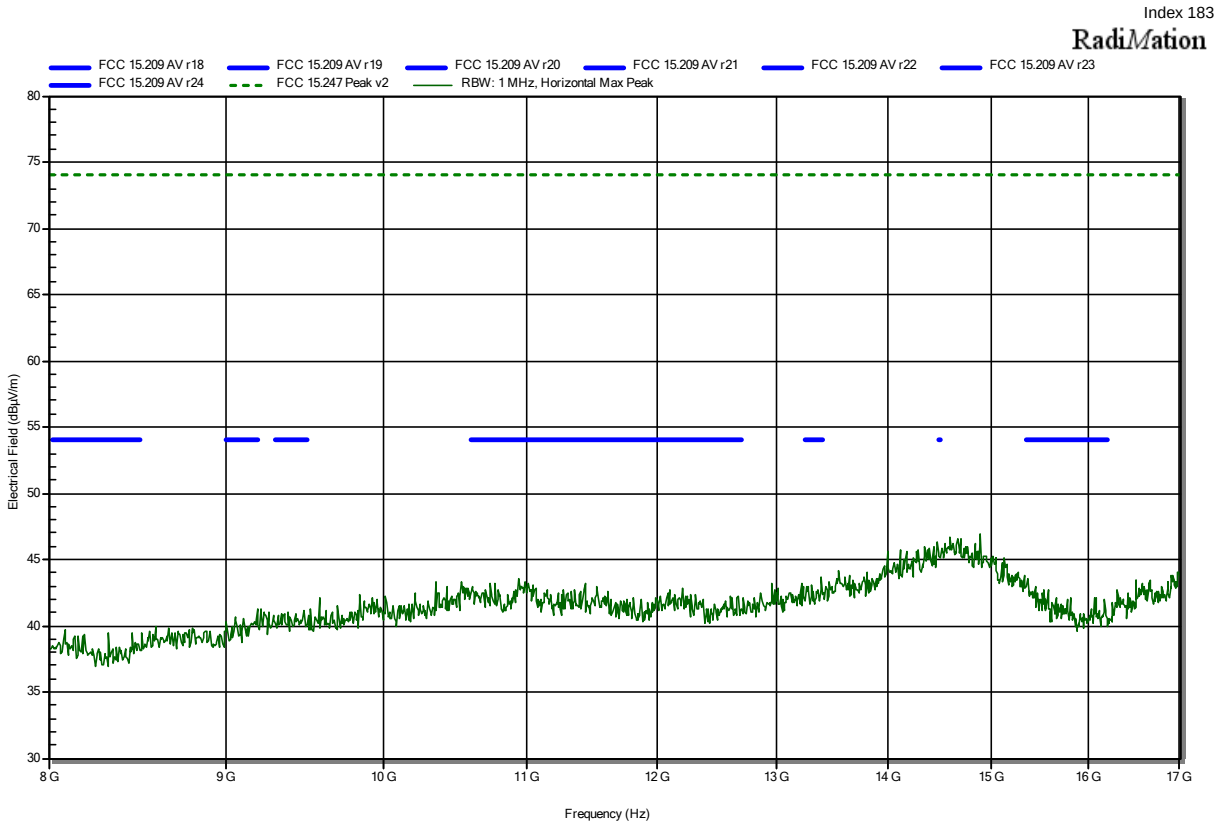
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.423 GHz	49.39 dBµV/m	74 dBµV/m	-24.61 dB	Pass

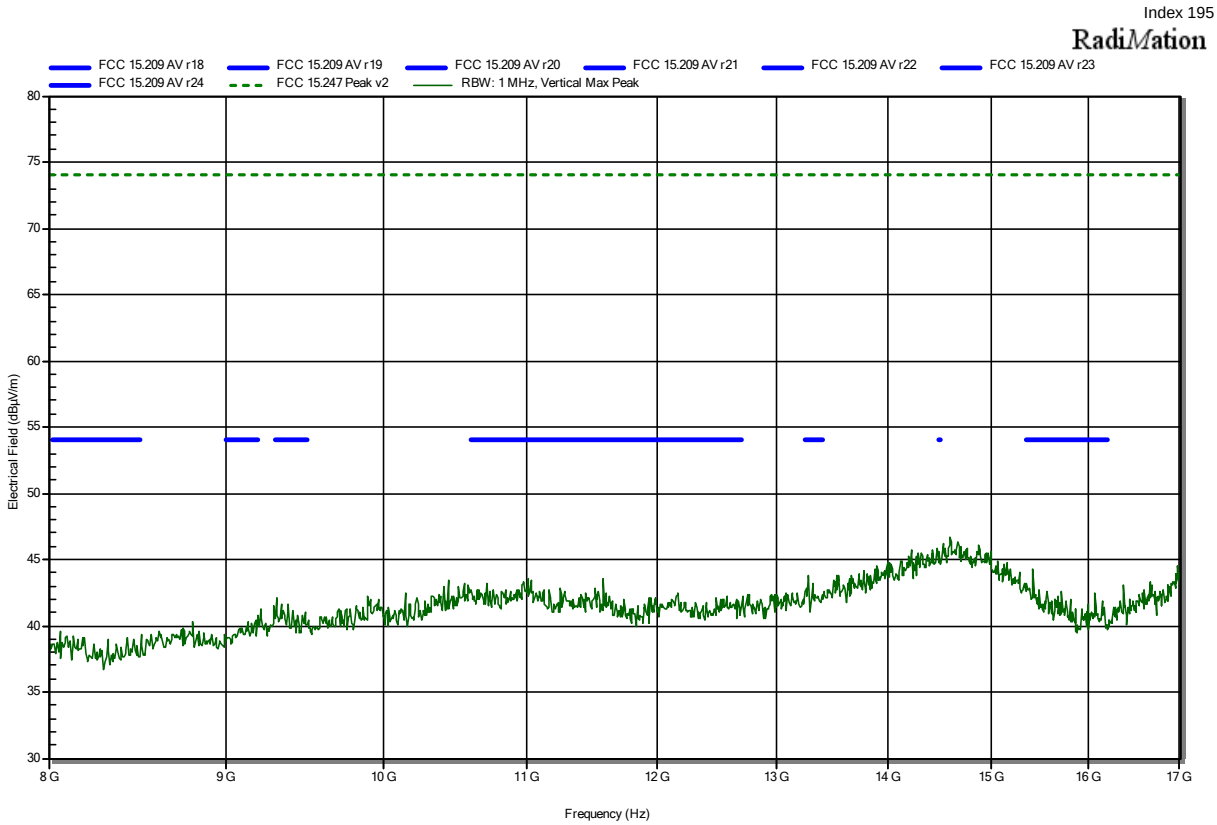
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



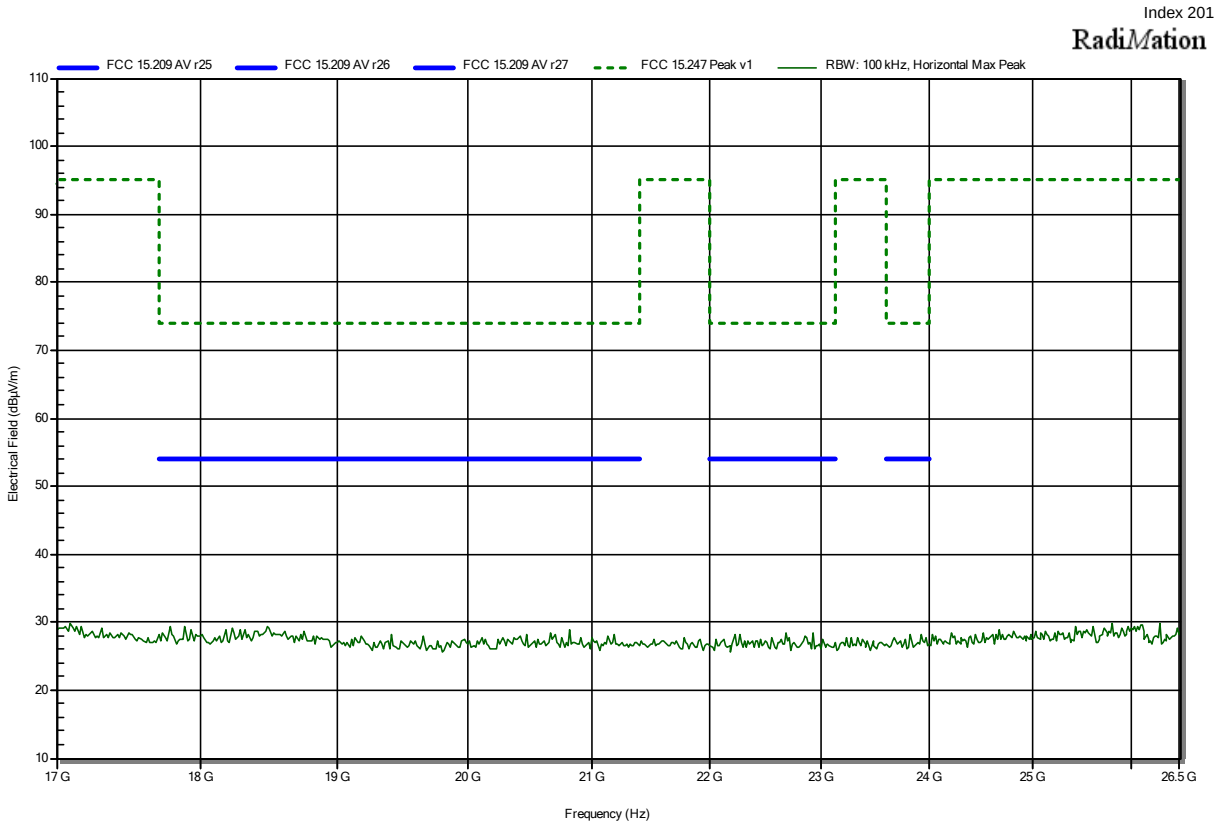
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



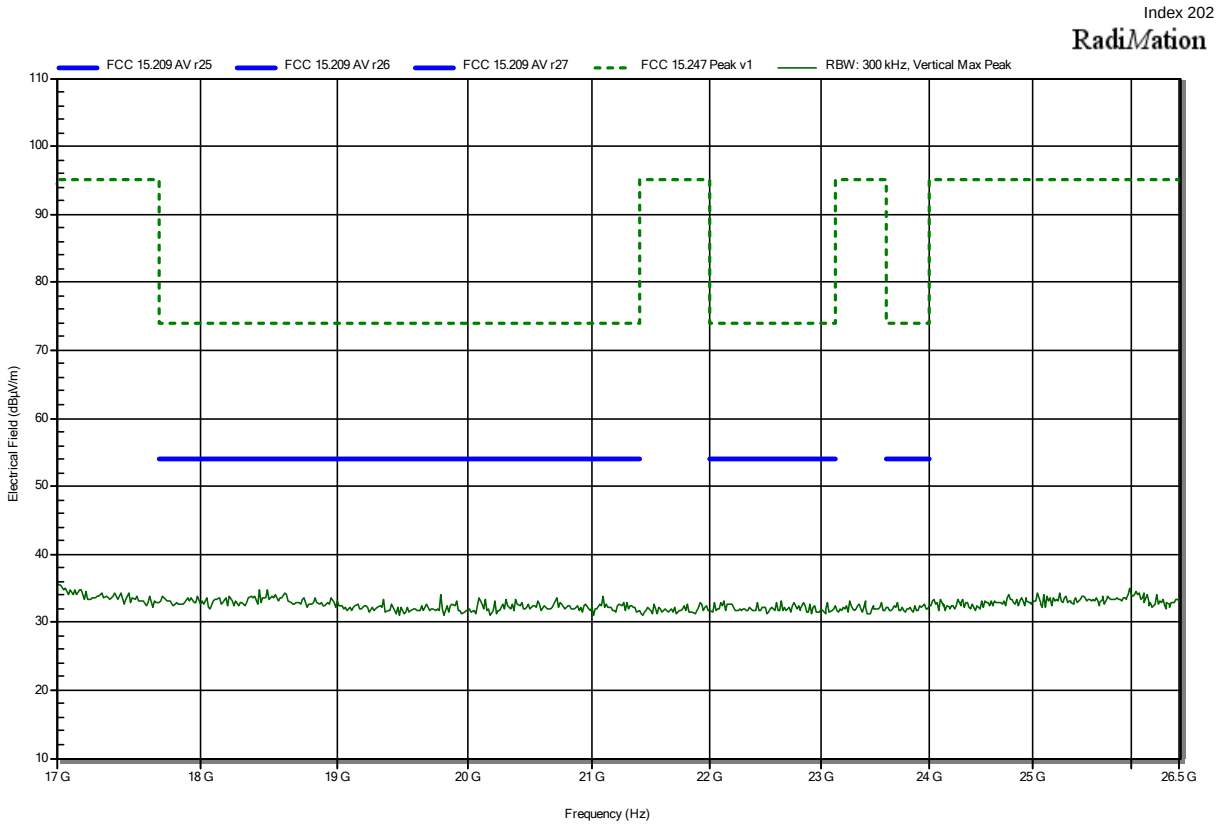
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



Radiated Spurious Emissions according to FCC 47 CFR 15.247

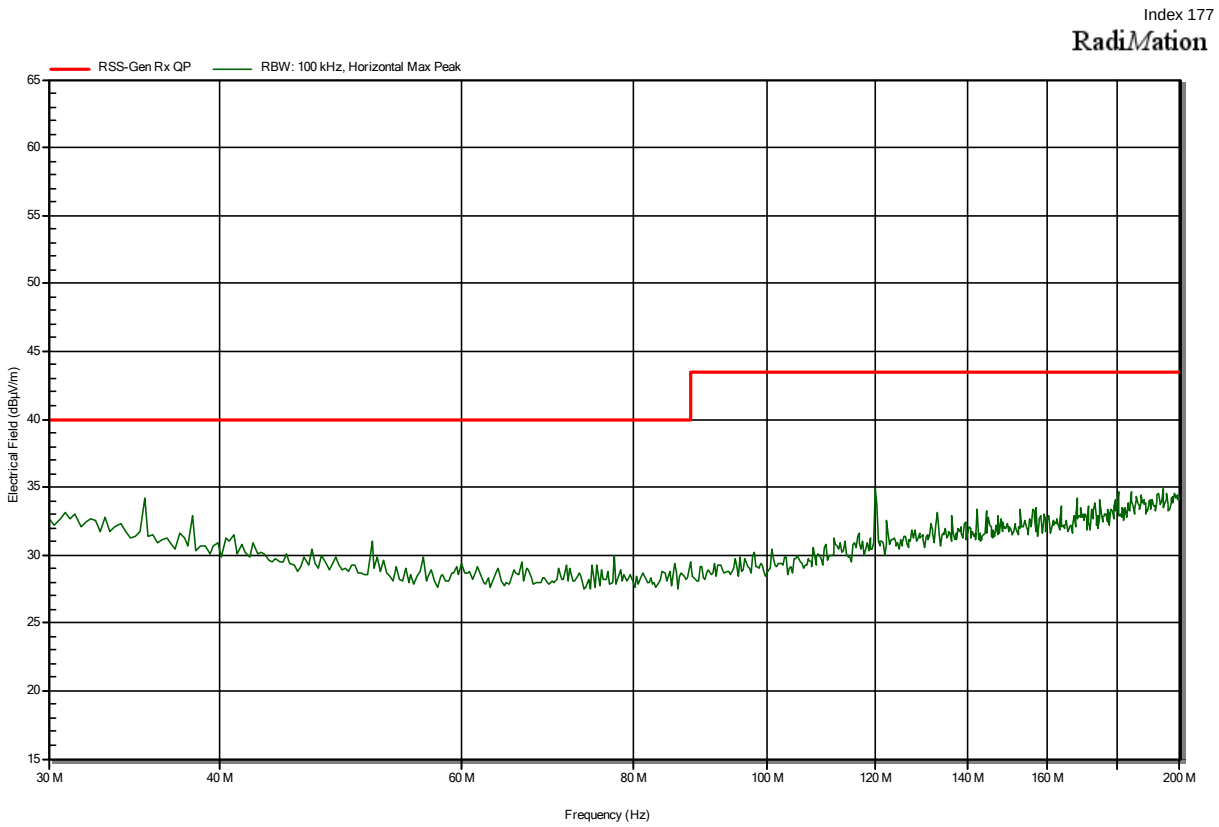
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 25 °Celsius, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Tx; ZigBee, 2475 MHz, PRBS9, 10 dBm
Test Date:	2021-01-28
Note:	EUT vertical



ANNEX C Receiver spurious emissions – integrated antenna

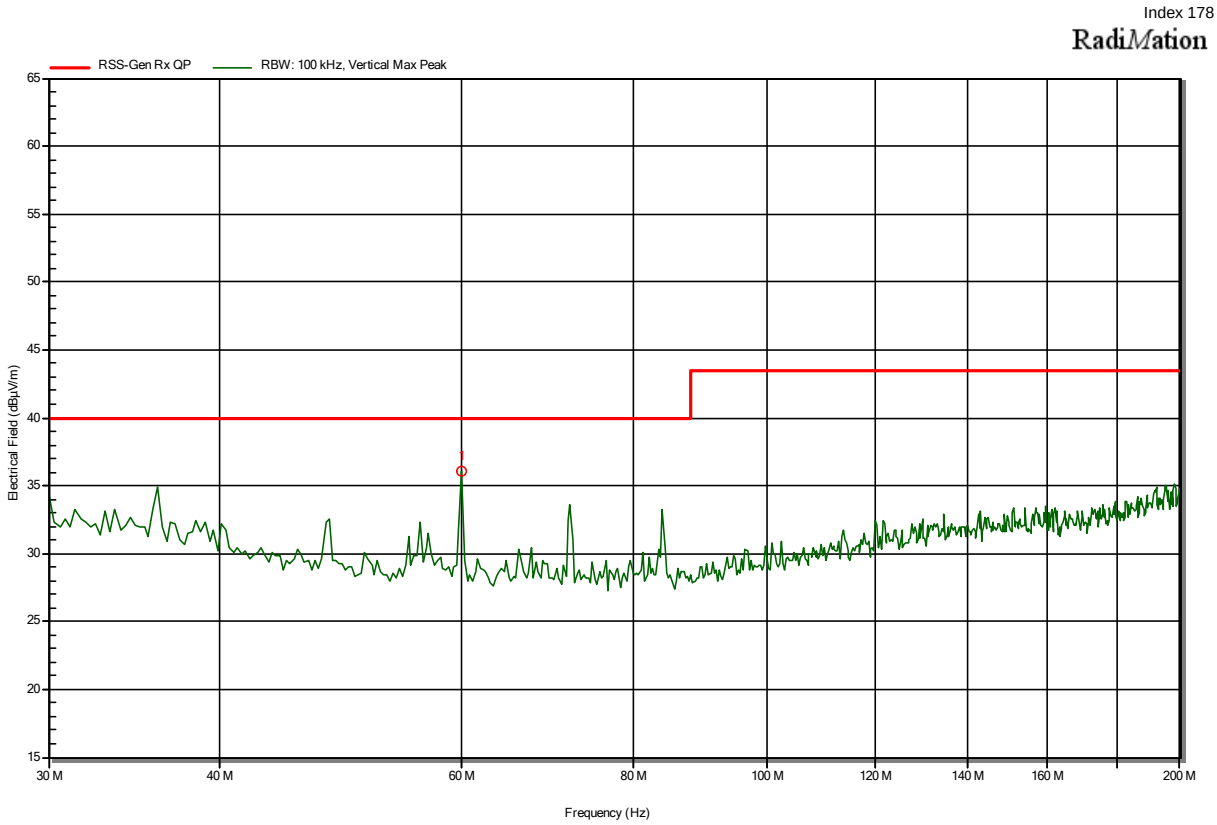
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-21
Note:	



Radiated Spurious Emissions according to FCC 47 CFR 15.247

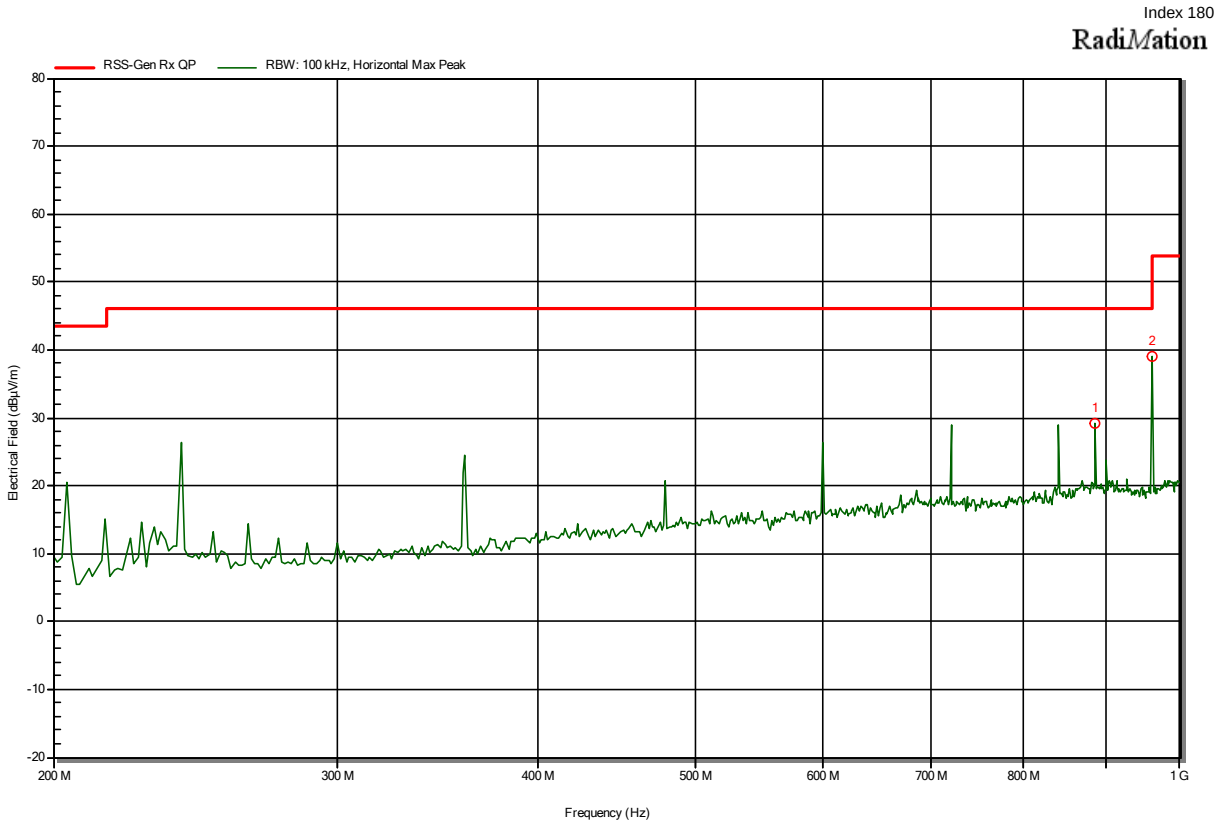
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-21
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
59.968 MHz	36.07 dBµV/m	40 dBµV/m	-3.93 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-21
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
885.897 MHz	29.18 dBµV/m	46 dBµV/m	-16.82 dB	Pass
960.256 MHz	38.97 dBµV/m	53.9 dBµV/m	-14.93 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-21
Note:	

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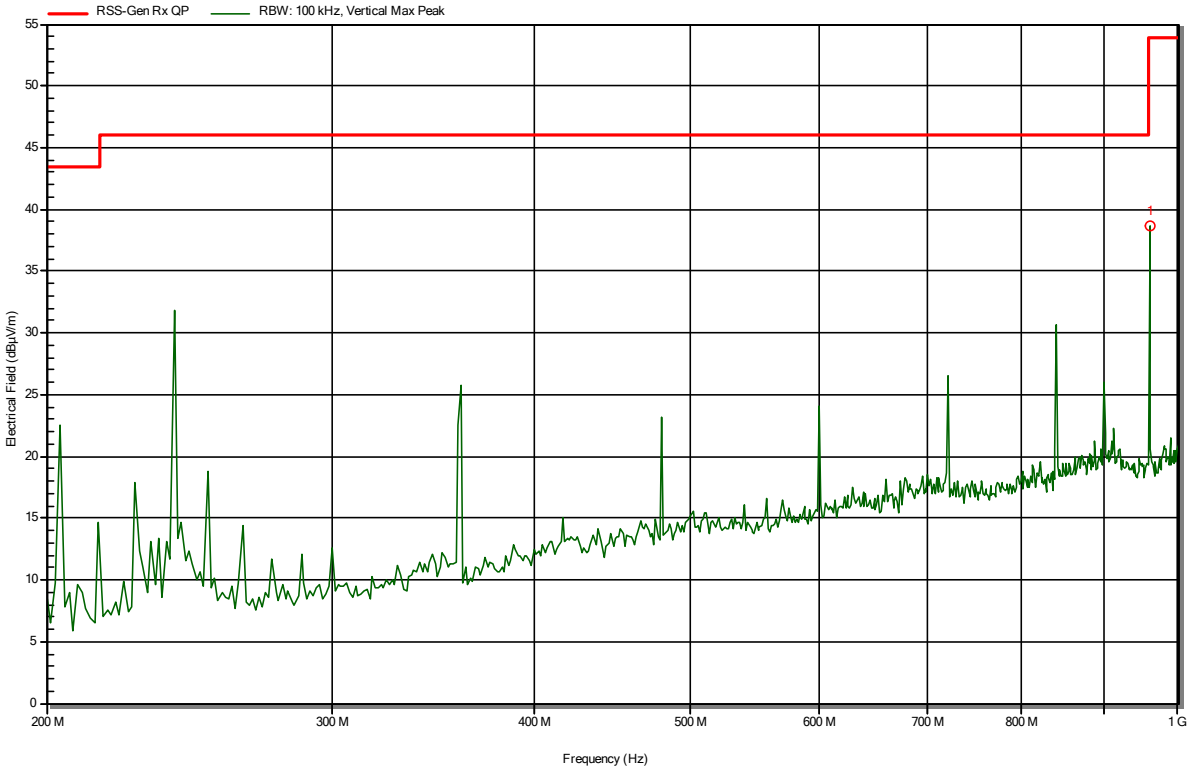
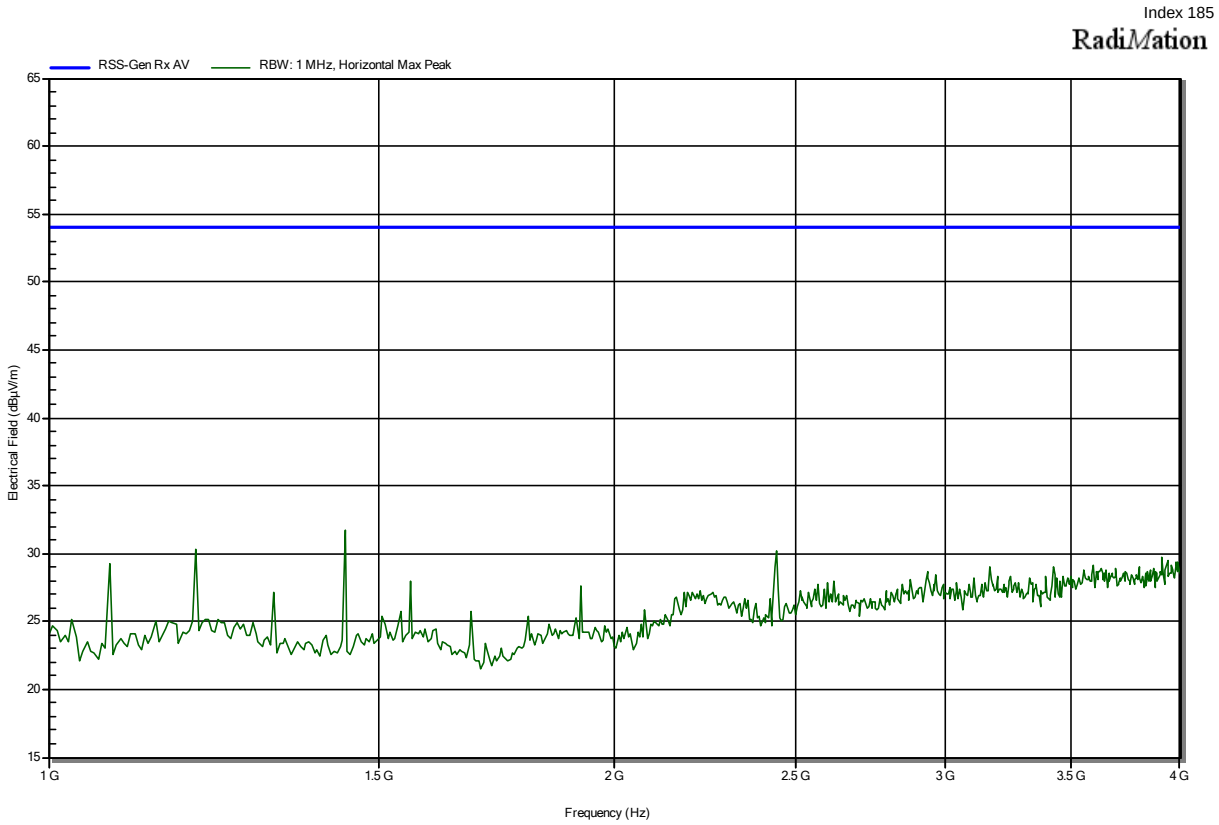


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
960.256 MHz	38.7 dBµV/m	53.9 dBµV/m	-15.2 dB	Pass

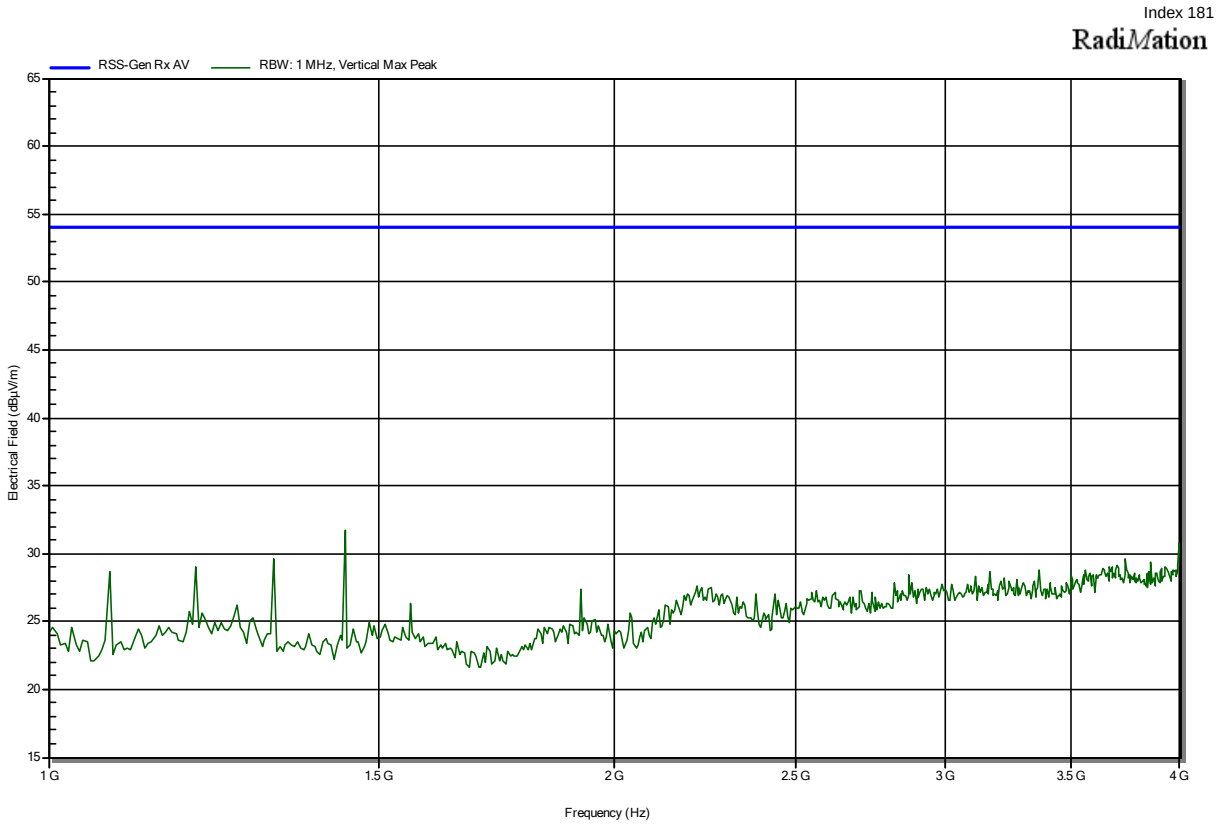
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-21
Note:	



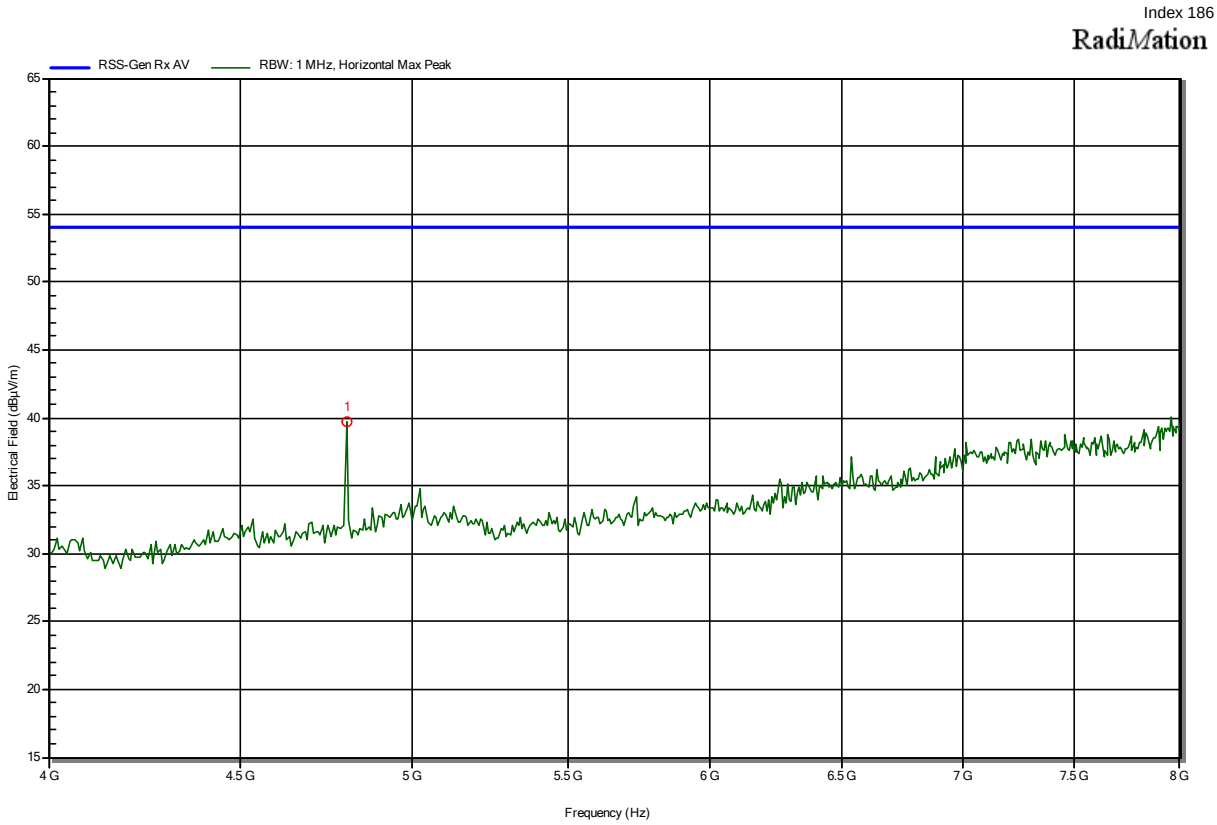
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-21
Note:	



Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-21
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.801 GHz	39.75 dBµV/m	53.98 dBµV/m	-14.23 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-21
Note:	

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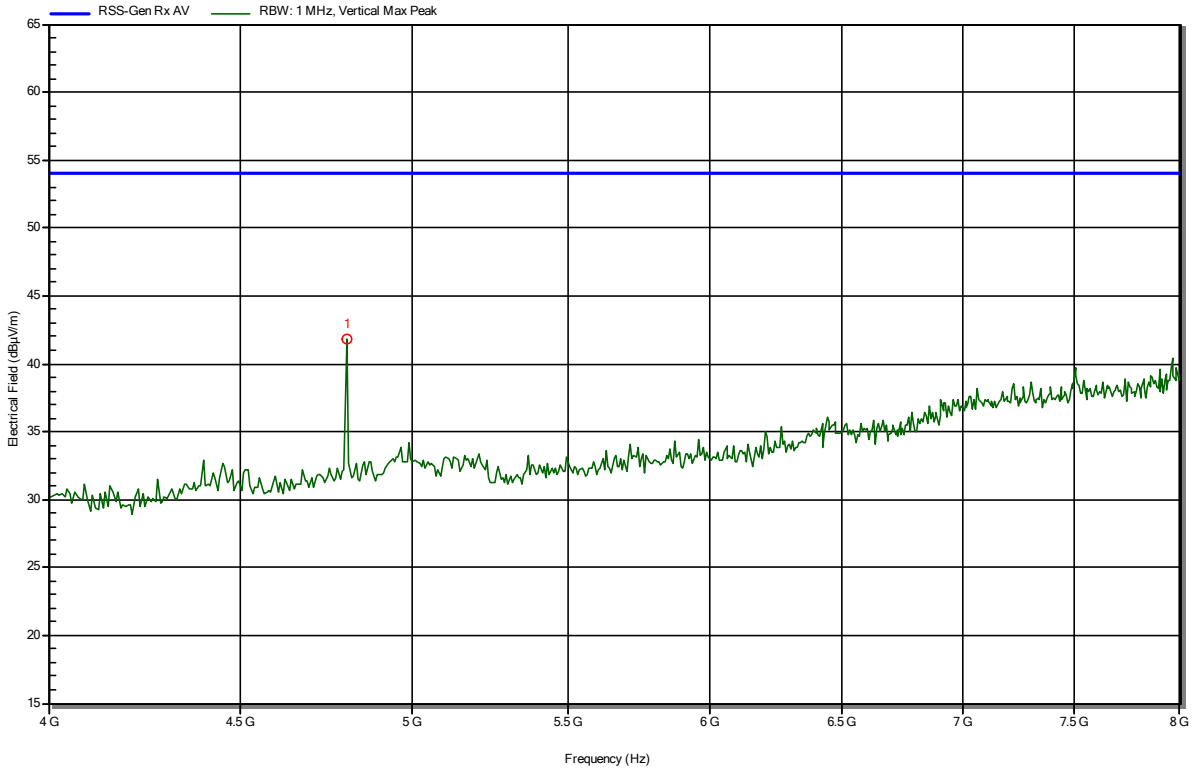
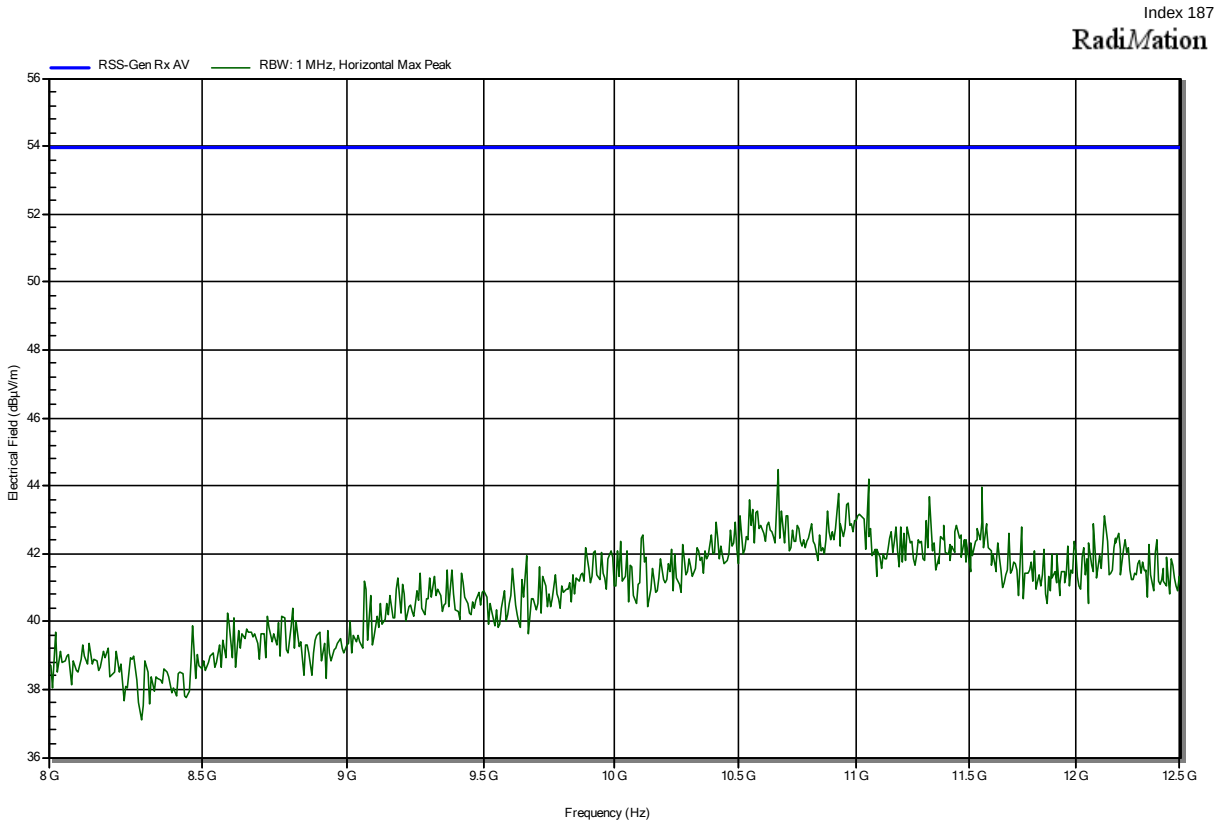
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.801 GHz	41.87 dBµV/m	53.98 dBµV/m	-12.11 dB	Pass

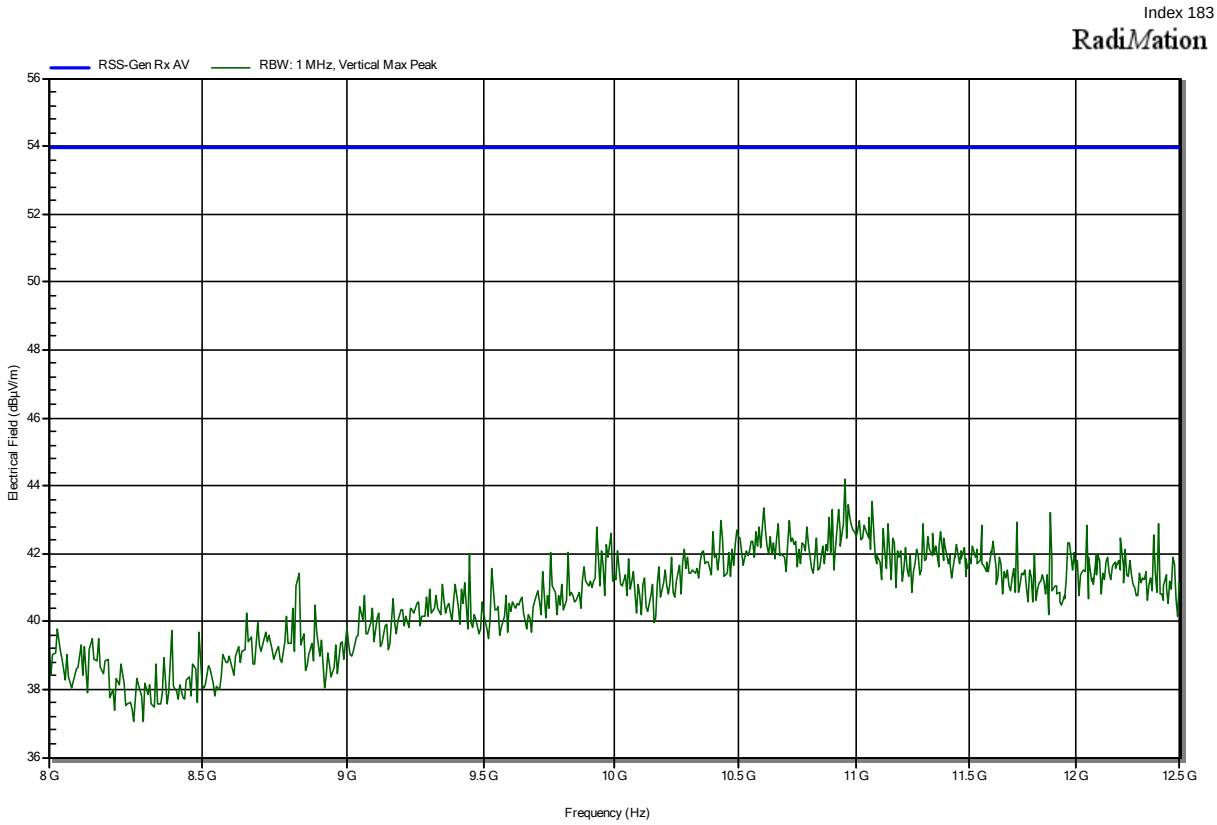
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-21
Note:	



Radiated Spurious Emissions according to FCC 47 CFR 15.247

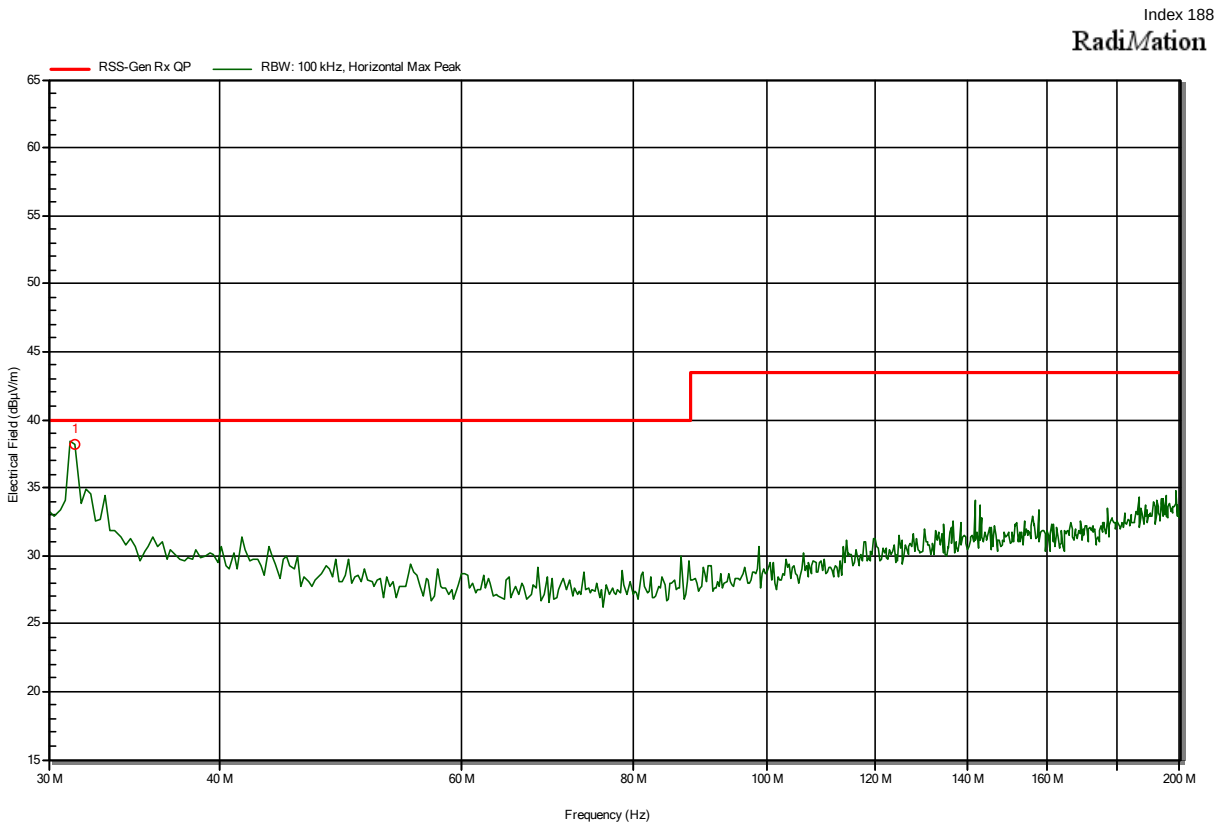
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012A000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-21
Note:	



ANNEX D Receiver spurious emissions – external antenna

Radiated Spurious Emissions according to FCC 47 CFR 15.247

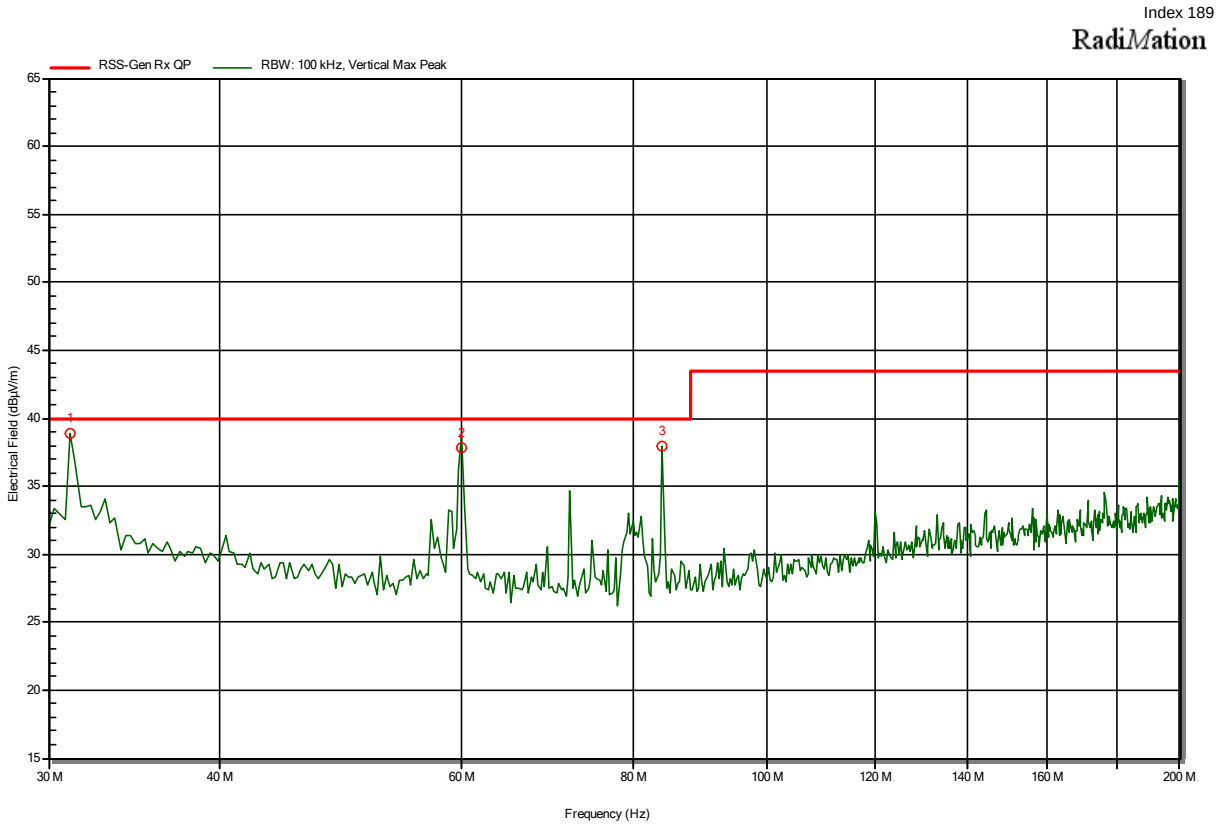
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-29
Note:	EIT vertical, external antenna



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
31.362 MHz	38.17 dBµV/m	40 dBµV/m	-1.83 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

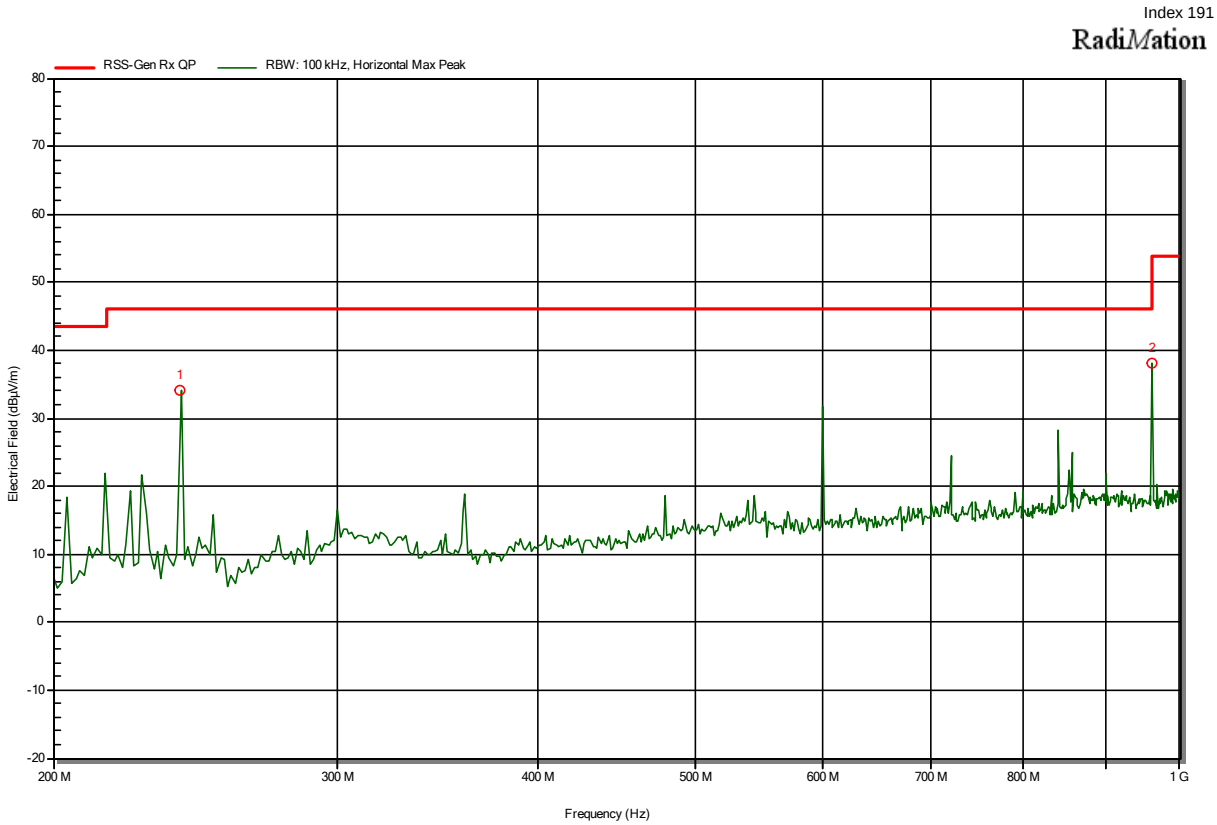
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-29
Note:	EUT vertical, external antenna



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
31.09 MHz	38.84 dBµV/m	40 dBµV/m	-1.16 dB	Pass
59.968 MHz	37.82 dBµV/m	40 dBµV/m	-2.18 dB	Pass
83.942 MHz	37.99 dBµV/m	40 dBµV/m	-2.01 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

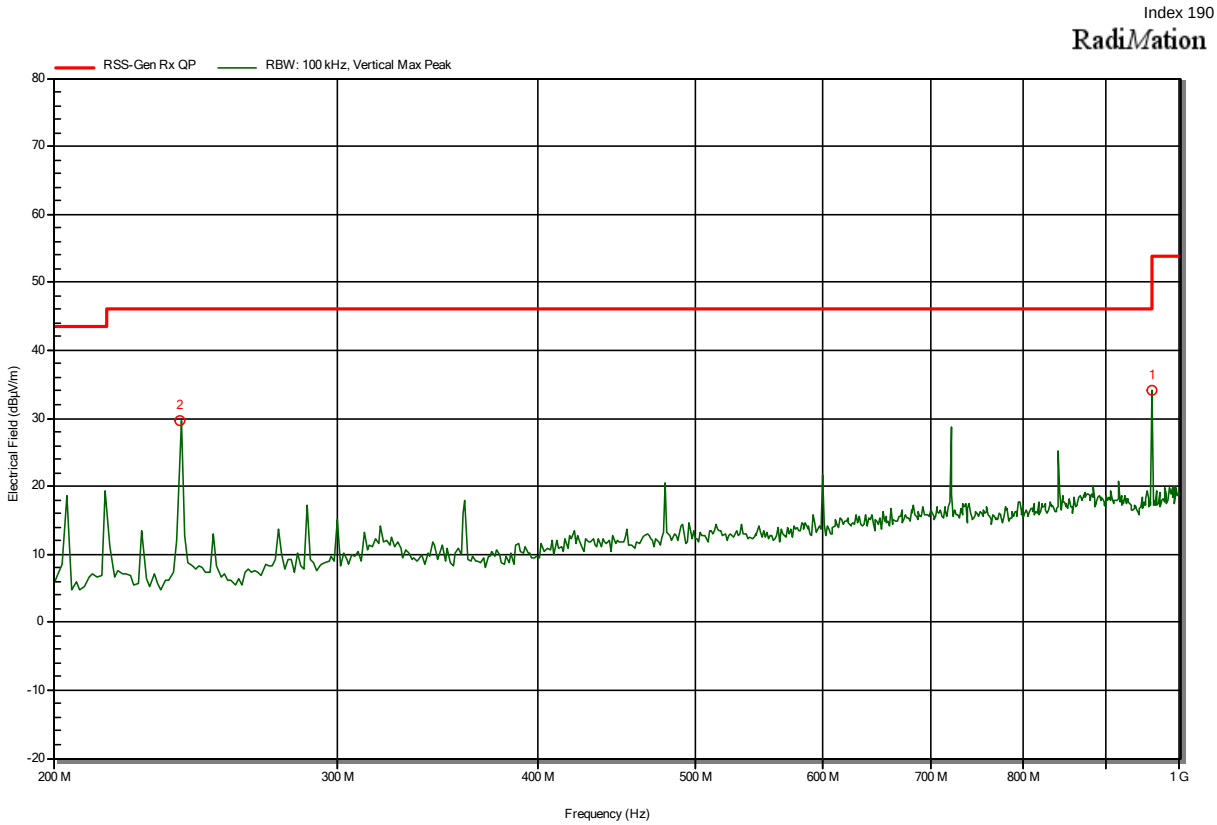
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-29
Note:	EUT vertical, external antenna



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
239.744 MHz	34.02 dBµV/m	46 dBµV/m	-11.98 dB	Pass
960.256 MHz	38.05 dBµV/m	53.9 dBµV/m	-15.85 dB	Pass

Radiated Spurious Emissions according to FCC 47 CFR 15.247

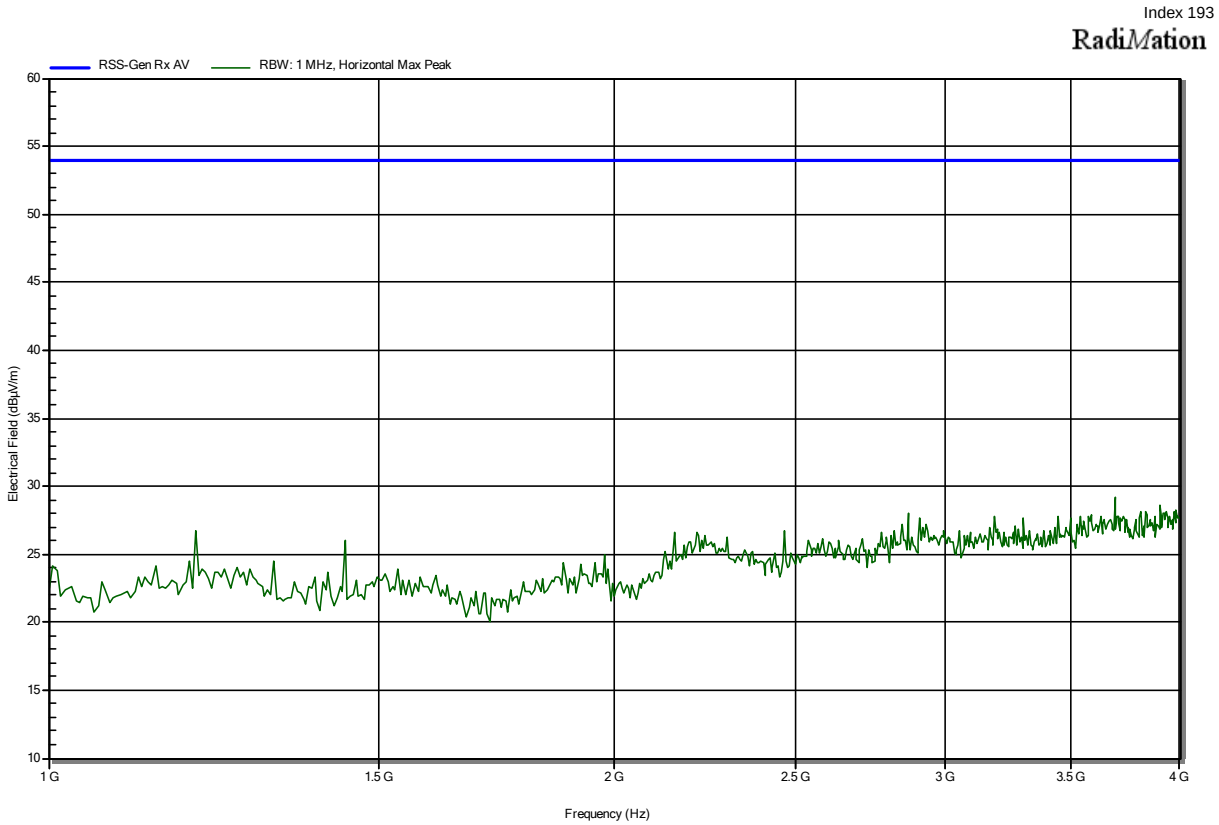
Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-29
Note:	EUT vertical, external antenna



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
239.744 MHz	29.7 dBµV/m	46 dBµV/m	-16.3 dB	Pass
960.256 MHz	34.07 dBµV/m	53.9 dBµV/m	-19.83 dB	Pass

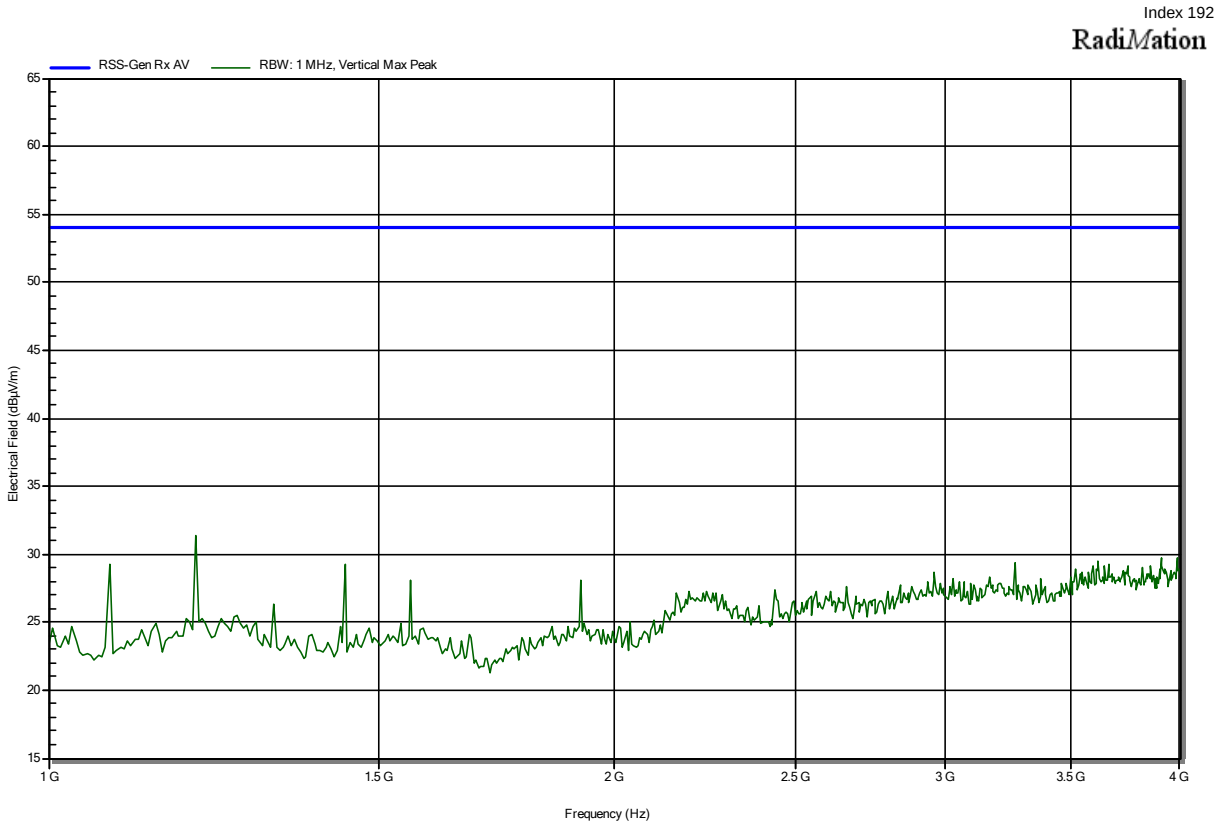
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-29
Note:	EUT vertical, external antenna



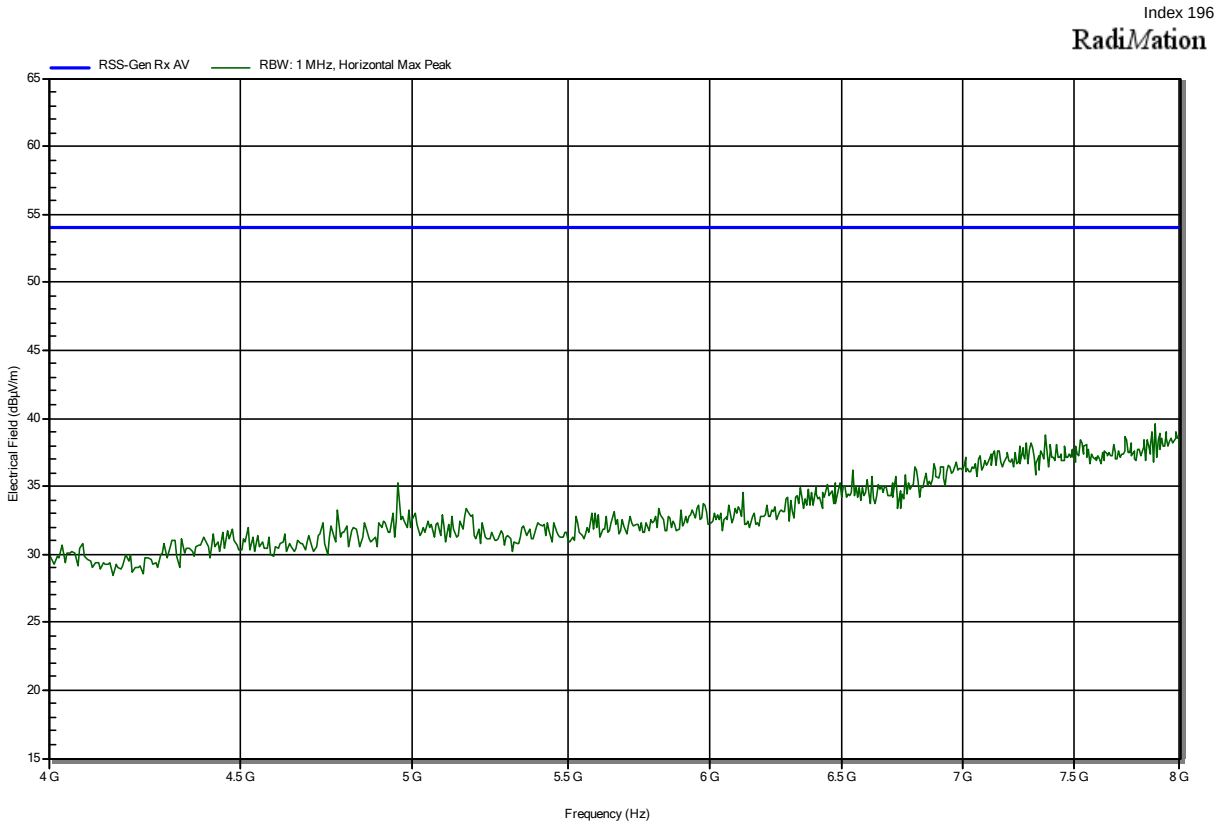
Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-29
Note:	EUT vertical, external antenna



Radiated Spurious Emissions according to FCC 47 CFR 15.247

Project Number:	G0M-2012-9529
Applicant:	Renesas Electronics Germany GmbH
Model Description:	Customer programmable Bluetooth LE module
Model:	RYZ012B000FZ00#HD0
Test Sample ID:	32801
Test Site:	Eurofins Product Service GmbH
Operator:	Charline Graf
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 24 °Celsius, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m, converted to 3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-29
Note:	EUT vertical, external antenna



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Model:	RYZ012B000FZ00#HD0
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Operator:	Charline Graf
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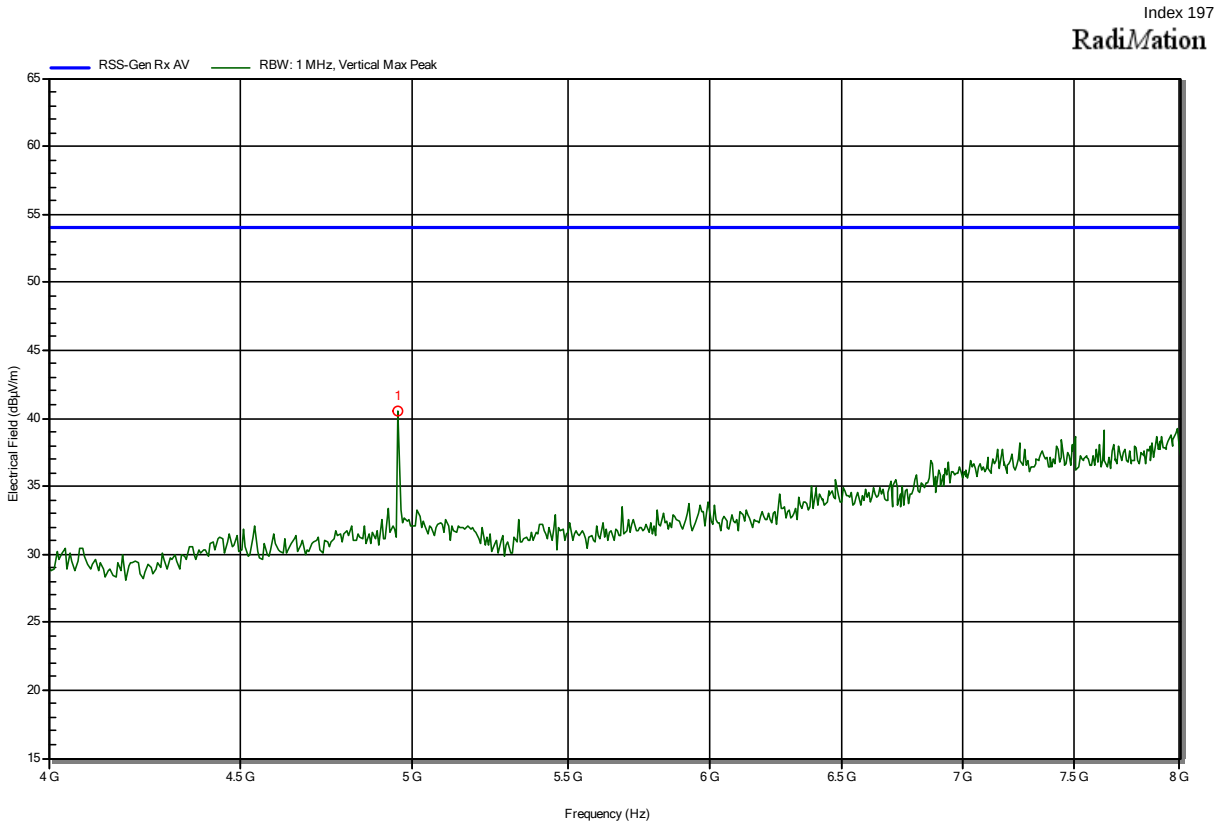
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m, converted to 3 m
Mode:	Rx; ZigBee, receive mode
Test Date:	2021-01-29
Note:	EUT vertical, external antenna



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.955 GHz	40.51 dBµV/m	53.98 dBµV/m	-13.47 dB	Pass

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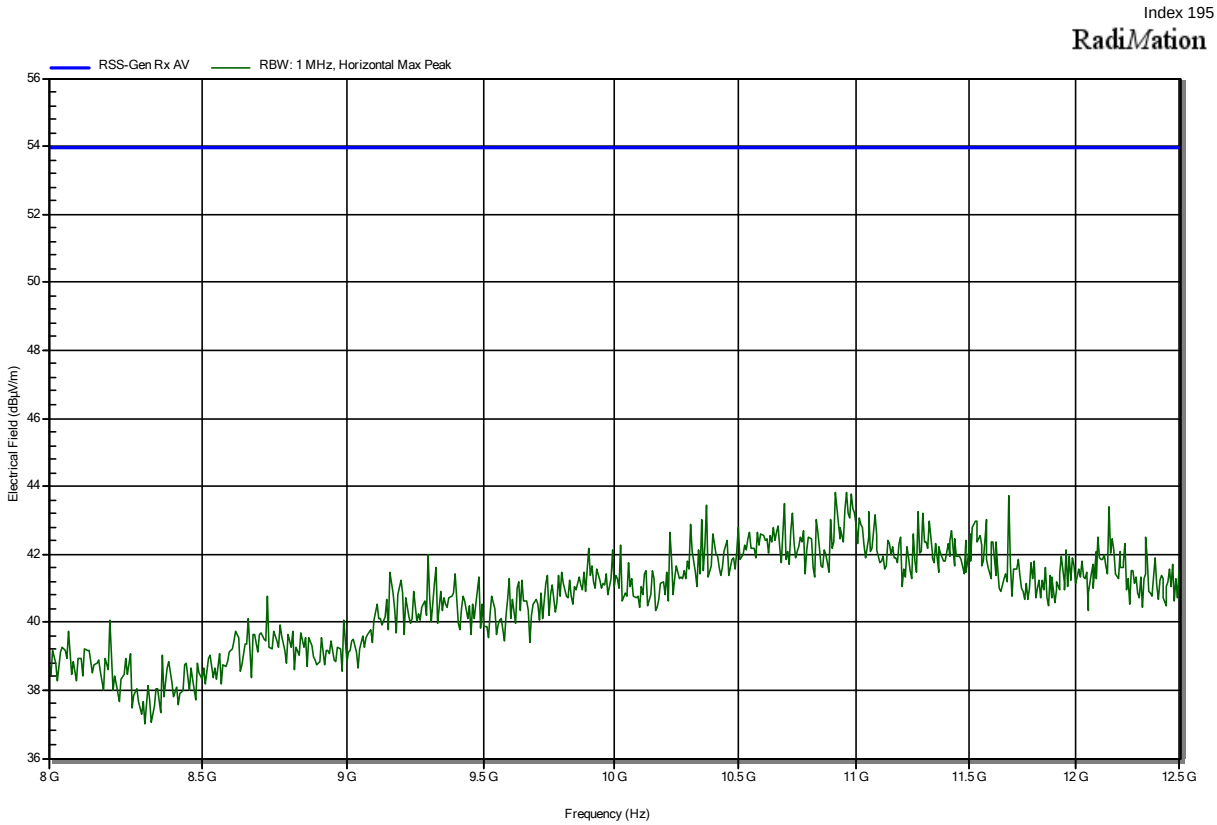

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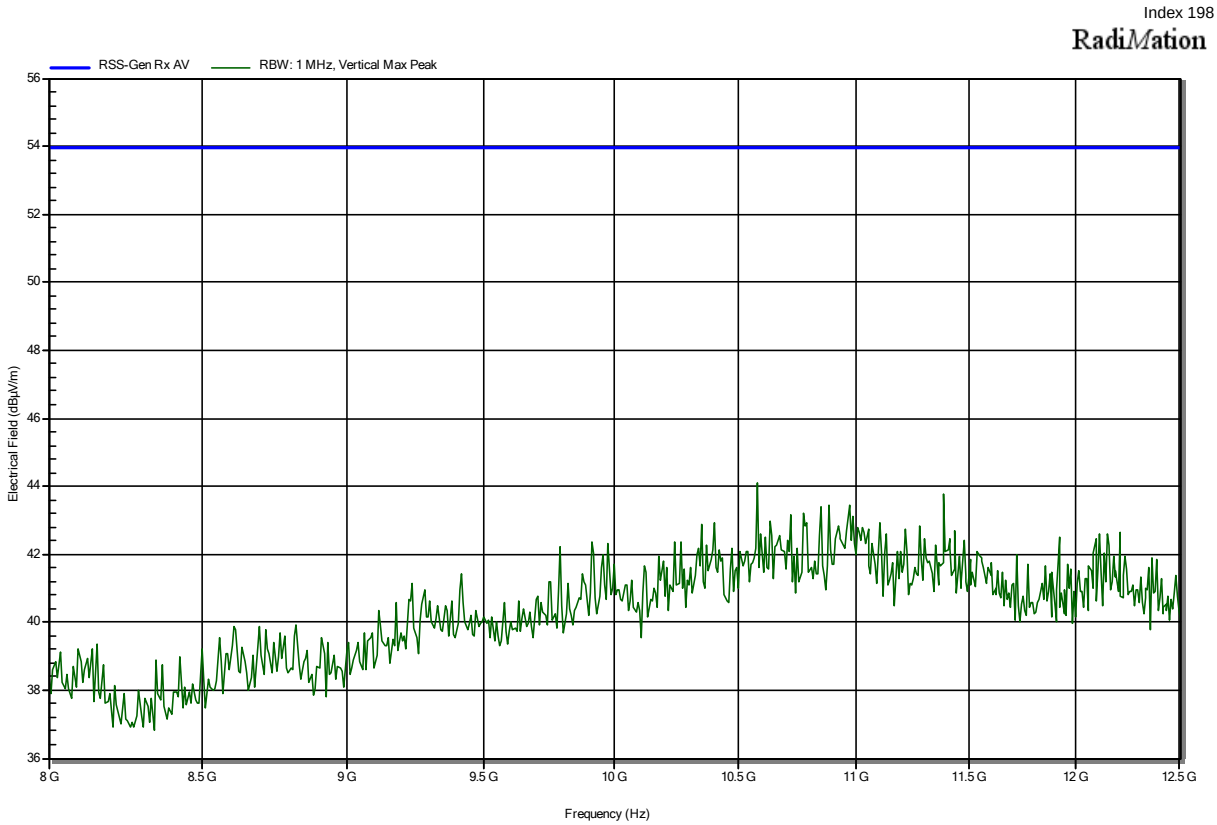

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