Report On

FCC and Industry Canada Testing of the
Naim Audio Ltd BLUE
In accordance with FCC 47 CFR Part 15C
and Industry Canada RSS-247

COMMERCIAL-IN-CONFIDENCE

FCC ID: 2ACURBLUE
IC: 12217A-BLUE

Document 75935062 Report 03 Issue 1 August 2016

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REPORT ON

FCC and Industry Canada Testing of the
Naim Audio Ltd BLUE
In accordance with FCC 47 CFR Part 15C
and Industry Canada RSS-247

Document 75935062 Report 03 Issue 1

August 2016

PREPARED FOR

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APPROVED BY

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Authorised Signatory

DATED 03 August 2016

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C and Industry Canada RSS-247. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

J Tuckwell

UKAS TESTING 0141

Product Service

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Product Service

SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Naim Audio Ltd BLUE
In accordance with FCC 47 CFR Part 15C and Industry Canada RSS-247

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC and Industry Canada Testing of the Naim Audio Ltd BLUE to the requirements of FCC 47 CFR Part 15C and Industry Canada RSS-247.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Naim Audio Ltd
Model Number(s)	BLUE
Serial Number(s)	Not Serialised (75935062_TSR0001)
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C (2015) Industry Canada RSS-247 (Issue 1, 2015)
Incoming Release Date	Application Form 22 June 2016
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	P-079412 24 May 2016
Start of Test	20 June 2016
Finish of Test	19 July 2016
Name of Engineer(s)	J Tuckwell D Ralley
Related Document(s)	ANSI C63.10: 2013

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C and Industry Canada RSS-247 is shown below.

Section	Specification Clause		Test Description	Result	Comments/Base Standard
	Part 15C	RSS-247			
Bluetooth					
2.1	15.247 (b)(4)	5.4(2)	Peak EIRP	Pass	
2.2	15.247 (d), 15.205 and 15.209	5.5	Spurious Radiated Emissions	Pass	

Product Service

1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION		
Model Name/Number	BLUE	
Part Number	BLUE	
Hardware Version	BTM875	
Software Version	a40-ARM-ATC-SPDIF-WithLL_HD_AAC_20160509	
FCC ID (if applicable)		2ACURBLUE
Industry Canada ID (if applicable)		12217A-BLUE
Technical Description (Please provide a brief description of the intended use of the equipment)		This is to be approved as a standalone Bluetooth module intended to be fitted to Naim Audio products to connect to external Bluetooth devices to stream audio playback through the Naim product. UART or USB communication protocol to be used

POWER SOURCE				
☐	AC mains	State voltage		
AC supply frequency	(Hz)			
	VAC			
	Max Current			
	Hz			
☐	Single phase	☐	Three phase	
And / Or				
☒	External DC supply			
	Nominal voltage	5 V	Max Current	0.4 A
	Extreme upper voltage	5.25 V		
	Extreme lower voltage	4.75 V		
Battery				
☐	Nickel Cadmium	☐	Lead acid (Vehicle regulated)	
☐	Alkaline	☐	Leclanche	
☐	Lithium	☐	Other Details :	
	Volts nominal.			
End point voltage as quoted by equipment manufacturer			V	

Product Service

FREQUENCY INFORMATION				
Frequency Range	2402 to2480	MHz		
Channel Spacing (where applicable)				
Receiver Frequency Range (if different)	to	MHz		
Channel Spacing (if different)				
Test Frequencies*	Bottom	2402	MHz	Channel Number (if applicable)
	Middle	2411	MHz	Channel Number (if applicable)
	Top	2480	MHz	Channel Number (if applicable)
Intermediate Frequencies			MHz	
Highest Internally Generated Frequency :			MHz	

POWER CHARACTERISTICS				
Maximum TX power	4dBM	W		
Minimum TX power	-6dBM	W (if variable)		
Is transmitter intended for :				
Continuous duty			☒ Yes	☐ No
Intermittent duty			☐ Yes	☐ No
If intermittent state DUTY CYCLE				
Transmitter ON	seconds			
Transmitter OFF	seconds			

ANTENNA CHARACTERISTICS						
☒	Antenna connector			State impedance	50	Ohm
☐	Temporary antenna connector			State impedance		Ohm
☐	Integral antenna	Type		State impedance		dBi
☒	External antenna	Type	PCB conductor	State impedance	10	dBi

MODULATION CHARACTERISTICS			
☐	Amplitude	☒	Frequency
☐	Phase	☐	Other (please provide details):
Can the transmitter operate un-modulated?		☒ Yes	☐ No

CLASS OF EMISSION USED	
ITU designation or Class of Emission:	
1	
(if applicable) 2	Yes
(if applicable) 3	
If more than three classes of emission, list separately:	

Product Service

BATTERY POWER SUPPLY	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

ANCILLARIES (If applicable)	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

EXTREME CONDITIONS					
Extreme test voltages (Max)	5.25	V	Extreme test voltages (Min)	4.75	V
Nominal DC Voltage	5	V	DC Maximum Current	0.4	A
Maximum temperature	85	°C	Minimum temperature	-40	°C

I hereby declare that that the information supplied is correct and complete.

Name: Asjhley Harper Position held: ComplianceEngineer
Date: 22 June 2016

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Naim Audio Ltd BLUE. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 5 V DC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

Industry Canada Company Address Code
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard were made during testing.

1.7 MOIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.

Product Service

SECTION 2

TEST DETAILS

FCC and Industry Canada Testing of the
Naim Audio Ltd BLUE
In accordance with FCC 47 CFR Part 15C and Industry Canada RSS-247

2.1 PEAK EIRP

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (b)(4)
Industry Canada RSS-247, Clause 5.4(2)

2.1.2 Equipment Under Test and Modification State

BLUE S/N: Not Serialised (75935062_TSR0001) - Modification State 0

2.1.3 Date of Test

7 July 2016

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The test was performed in accordance with KDB 558074 D01 V03r02, clause 9.1.1 and Industry Canada RSS-Gen, clause 6.12.

Remarks

The plots on the following pages are for illustration purposes only. The final measured result is obtained after a substitution procedure.

2.1.6 Environmental Conditions

Ambient Temperature	20.3°C
Relative Humidity	42.0%

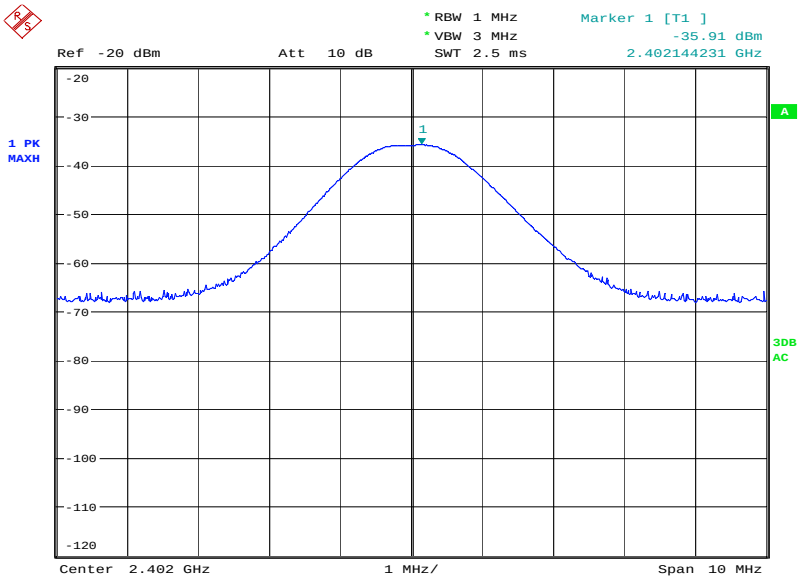
Product Service

2.1.7 Test Results

Bluetooth, EIRP Peak Power Results

2402 MHz		2441 MHz		2480 MHz	
dBm	mW	dBm	mW	dBm	mW
12.00	15.85	13.20	20.89	13.17	20.75

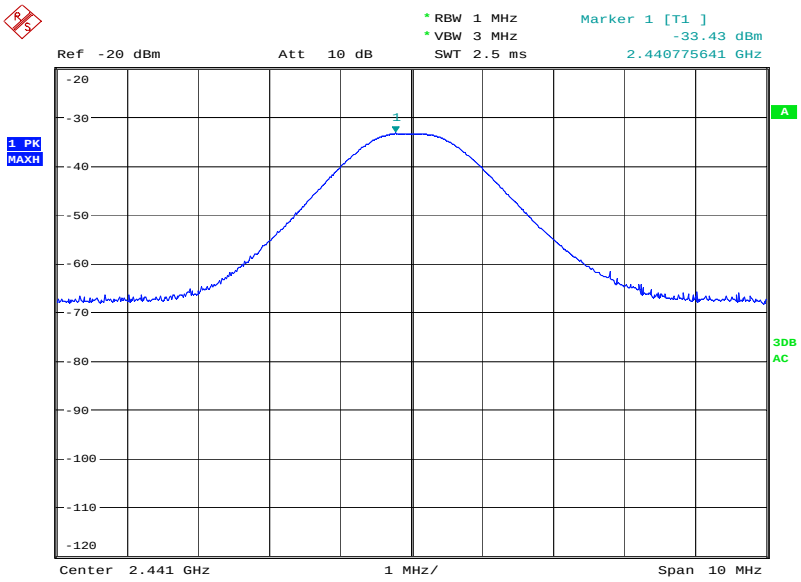
Bluetooth, 2402 MHz, EIRP Peak Power Plot



Date: 7.JUL.2016 17:43:47

Product Service

Bluetooth, 2441 MHz, EIRP Peak Power Plot



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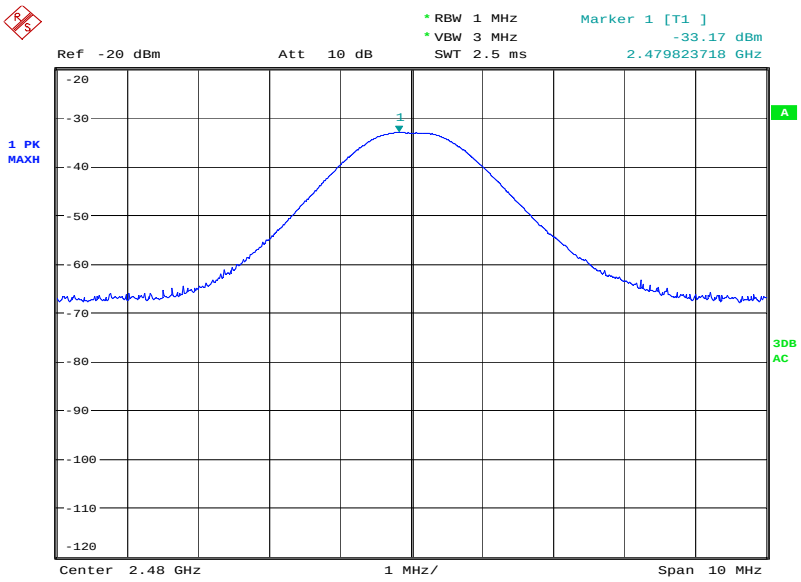
Bluetooth, 2480 MHz, EIRP Peak Power Plot



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FCC 47 CFR Part 15, Limit Clause 15.247 (b)(4)

36.0 dBm or 4000 mW

Industry Canada RSS-247, Limit Clause, 5.4(2)

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W and the e.i.r.p. shall not exceed 4 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W and the e.i.r.p. shall not exceed 0.5 W if the hopset uses less than 75 hopping channels.

2.2 SPURIOUS RADIATED EMISSIONS

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d), 15.205 and 15.209
Industry Canada RSS-247, Clause 5.5

2.2.2 Equipment Under Test and Modification State

BLUE S/N: Not Serialised (75935062_TSR0001) - Modification State 0

2.2.3 Date of Test

20 June 2016, 21 June 2016 & 7 July 2016

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The test was performed in accordance with ANSI C63.10, clause 6.3, 6.5 and 6.6.

Remarks

An emission at 882 MHz was found to be an ambient. This was confirmed when power to the EUT was removed and emission was still present.

2.2.6 Environmental Conditions

Ambient Temperature	19.0 - 20.3°C
Relative Humidity	42.0 - 69.0%

Product Service

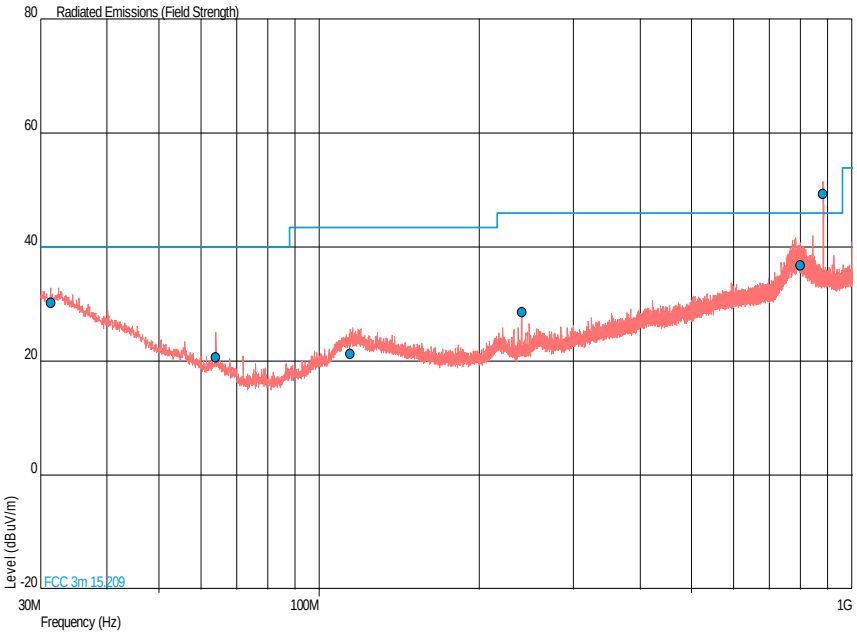
2.2.7 Test Results

5 V DC Supply

Bluetooth, 2402 MHz, 3DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
31.341	30.3	-9.7	32.7	-67.3	8	1.00	Vertical
64.003	20.7	-19.3	10.8	-89.2	13	1.00	Vertical
114.307	21.3	-22.2	11.6	-138.4	261	1.17	Horizontal
239.987	28.6	-17.4	26.9	-173.1	0	1.08	Horizontal
800.127	36.8	-9.2	69.2	-130.8	172	1.00	Horizontal
882.080	49.3	3.3	291.7	91.7	7	1.00	Horizontal

Bluetooth, 2402 MHz, 3DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot

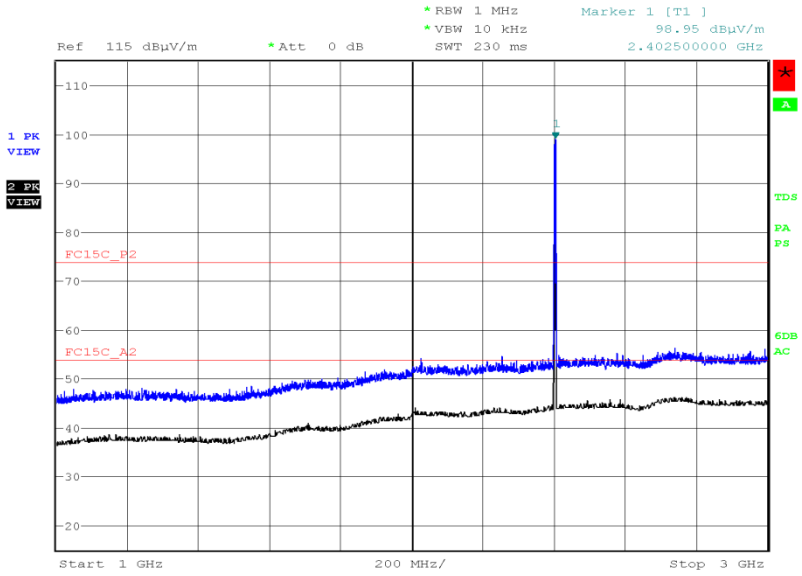


Bluetooth, 2402 MHz, 3DH5, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
4804.00	49.25	46.50	290.07	211.35	235	161	Horizontal
7206.00	53.65	48.31	316.96	260.32	0	150	Vertical

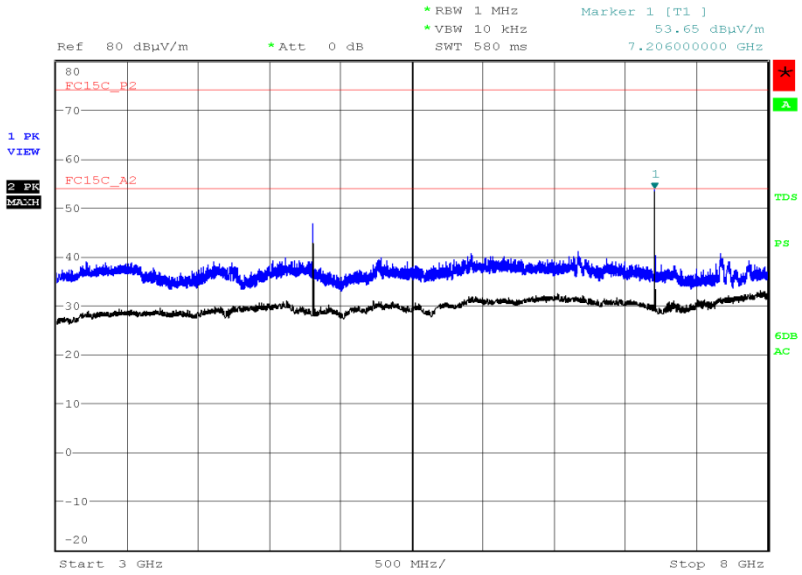
No other emissions were detected within 10 dB of the limit.

Bluetooth, 2402 MHz, 3DH5, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Date: 20.JUN.2016 14:32:24

Bluetooth, 2402 MHz, 3DH5, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



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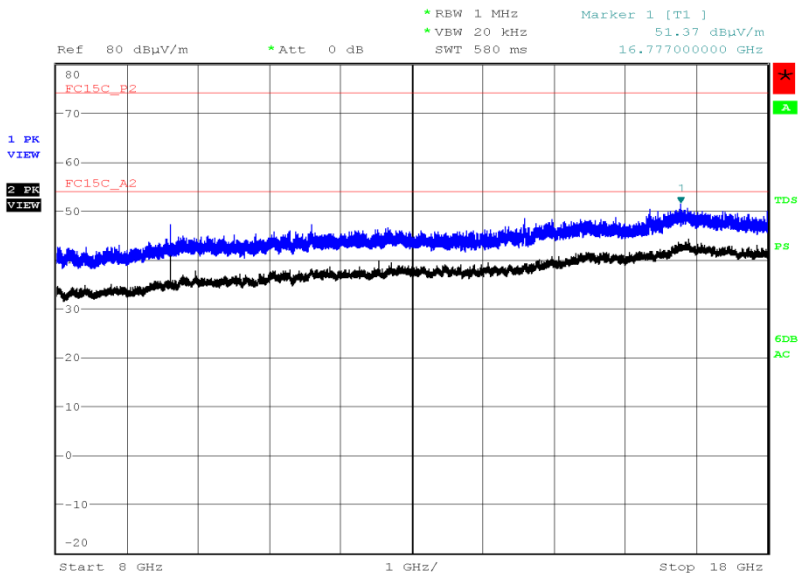
Bluetooth, 2402 MHz, 3DH5, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



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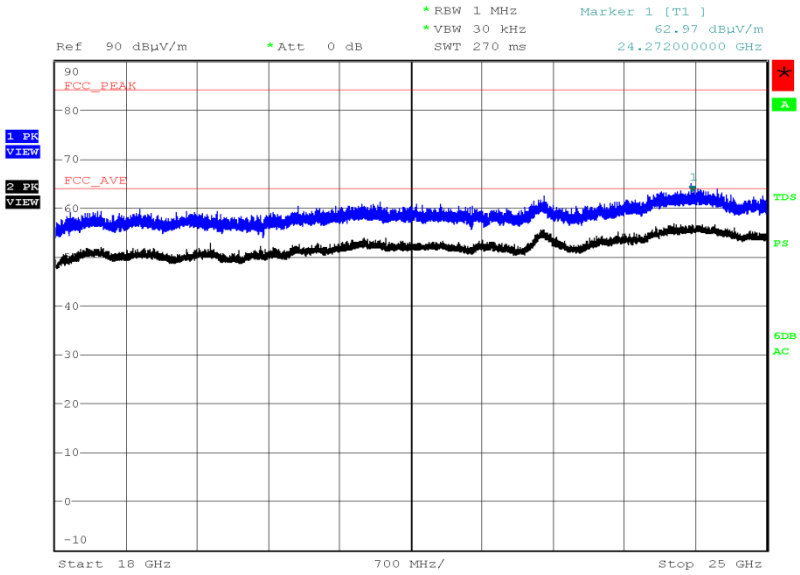
Product Service

Bluetooth, 2402 MHz, 3DH5, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot

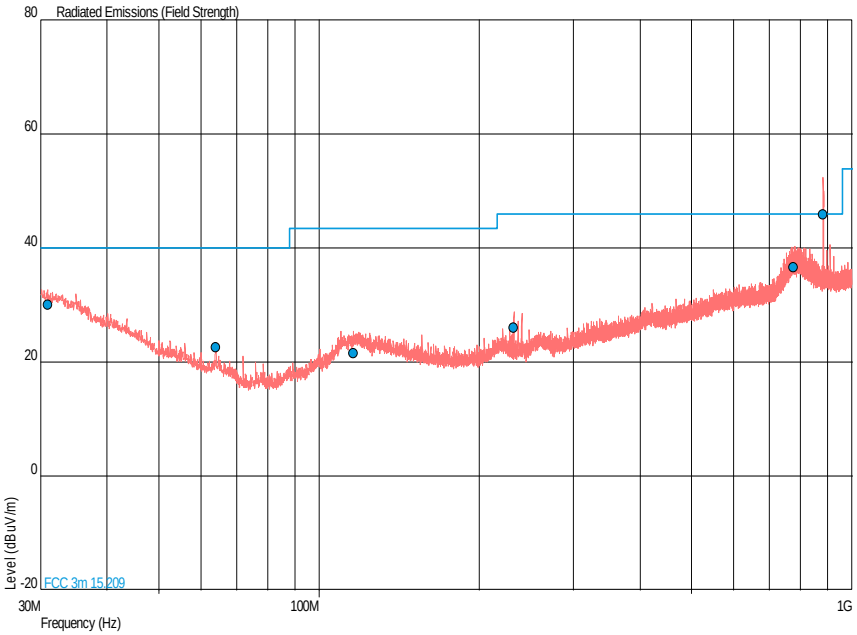


Date: 21.JUN.2016 14:58:29

Bluetooth, 2441 MHz, 3DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.963	30.1	-9.9	32.0	-68.0	48	1.00	Horizontal
64.003	22.7	-17.3	13.6	-86.4	305	1.17	Vertical
115.856	21.6	-21.9	12.0	-138.0	170	1.00	Horizontal
231.980	26.0	-20.0	20.0	-180.0	191	1.08	Horizontal
774.833	36.6	-9.4	67.6	-132.4	153	1.00	Horizontal
881.745	45.9	-0.1	197.2	-2.8	44	2.30	Horizontal

Bluetooth, 2441 MHz, 3DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot

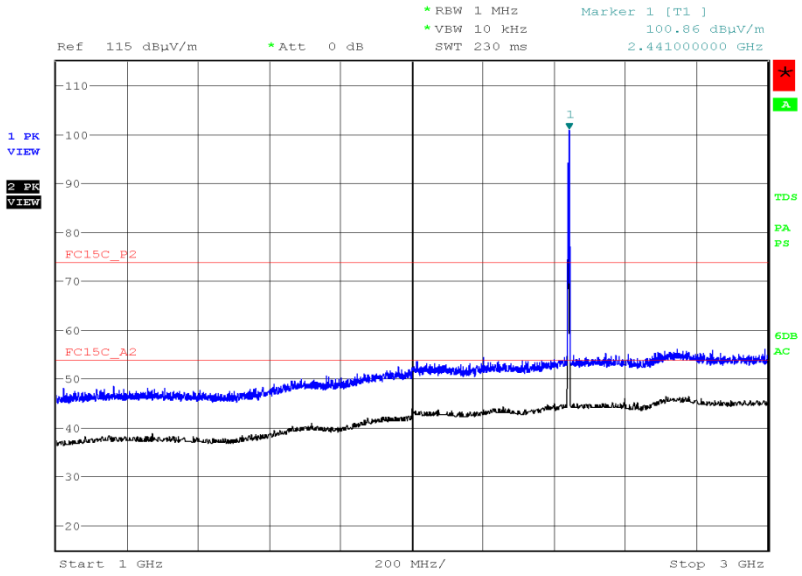


Bluetooth, 2441 MHz, 3DH5, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
4882.00	50.28	48.65	326.59	270.71	235	150	Horizontal
7323.50	52.90	51.20	441.57	363.08	0	150	Horizontal

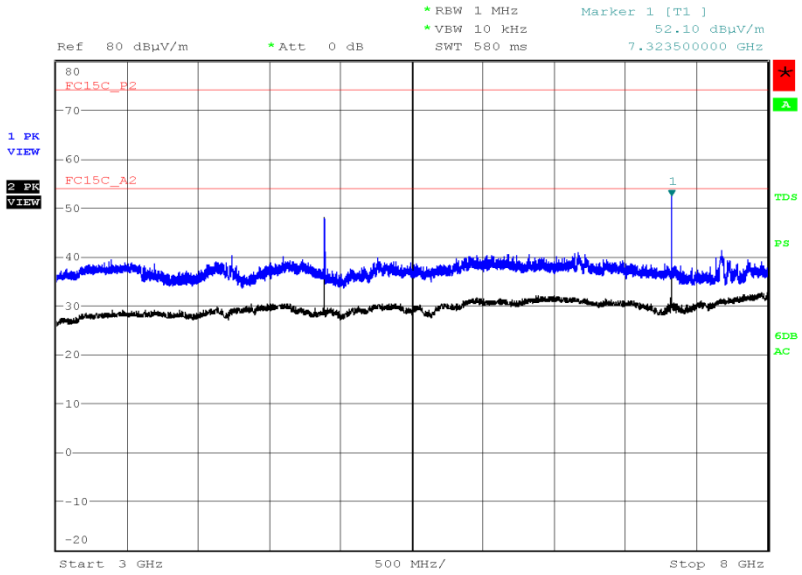
No other emissions were detected within 10 dB of the limit.

Bluetooth, 2441 MHz, 3DH5, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Product Service

Bluetooth, 2441 MHz, 3DH5, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



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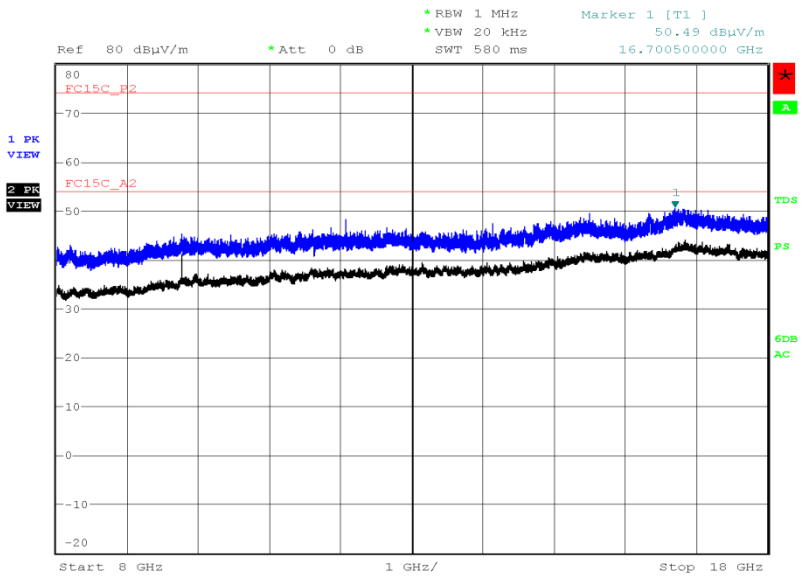
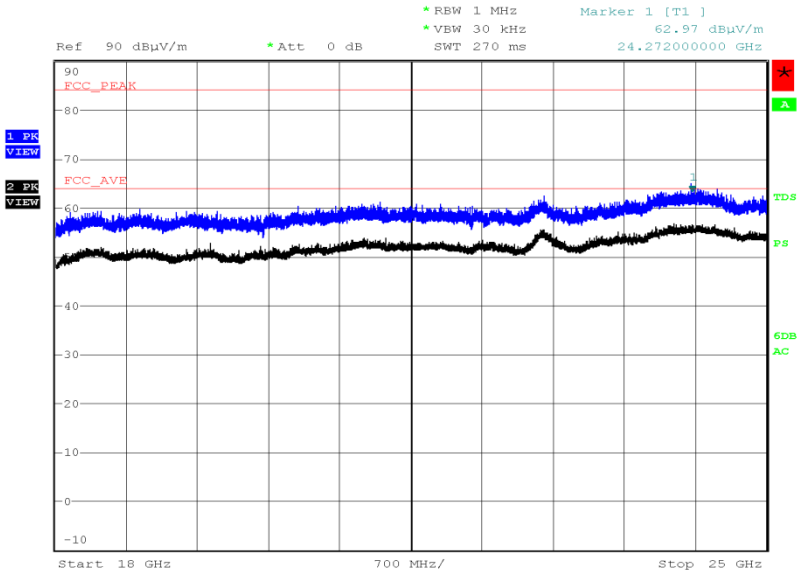
Bluetooth, 2441 MHz, 3DH5, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 21.JUN.2016 09:20:58

Product Service

Bluetooth, 2441 MHz, 3DH5, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot

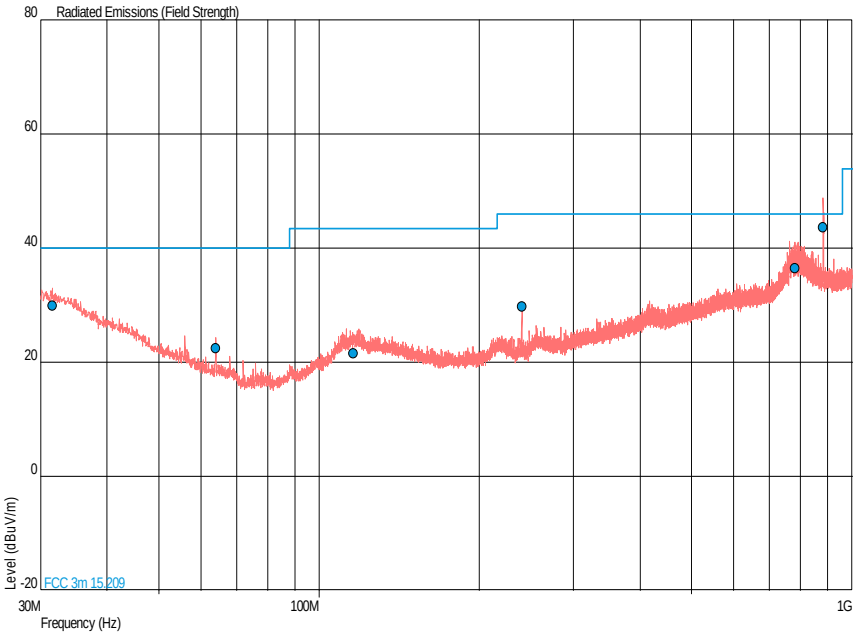


Date: 21.JUN.2016 14:58:29

Bluetooth, 2480 MHz, 3DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
31.564	30.0	-10.0	31.6	-68.4	102	1.00	Vertical
64.000	22.5	-17.5	13.3	-86.7	267	1.00	Vertical
115.892	21.6	-21.9	12.0	-138.0	317	1.86	Vertical
240.009	29.8	-16.2	30.9	-169.1	0	1.17	Horizontal
781.243	36.4	-9.6	66.1	-133.9	178	1.00	Horizontal
882.642	43.6	-2.4	151.4	-48.6	352	1.00	Horizontal

Bluetooth, 2480 MHz, 3DH5, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot

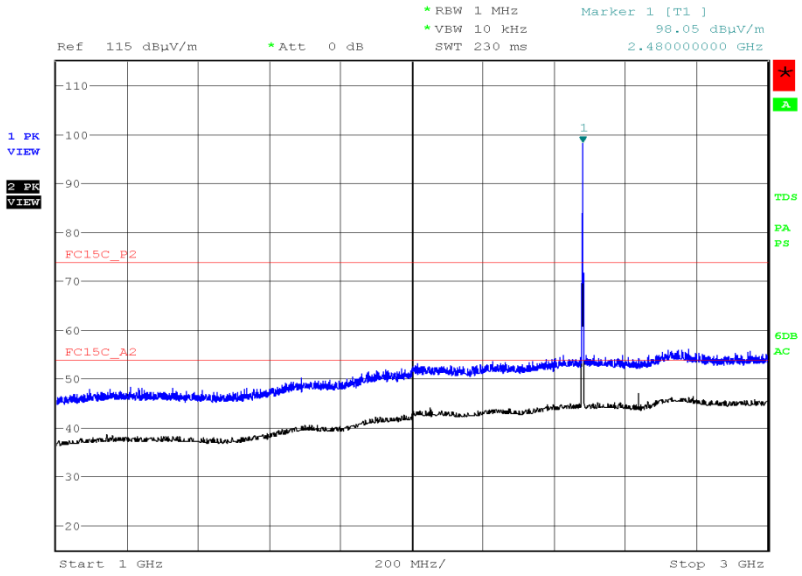


Bluetooth, 2480 MHz, 3DH5, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
4960.00	51.21	49.91	363.50	312.97	168	317	Horizontal
7440.50	54.99	52.03	561.69	399.48	0	140	Vertical

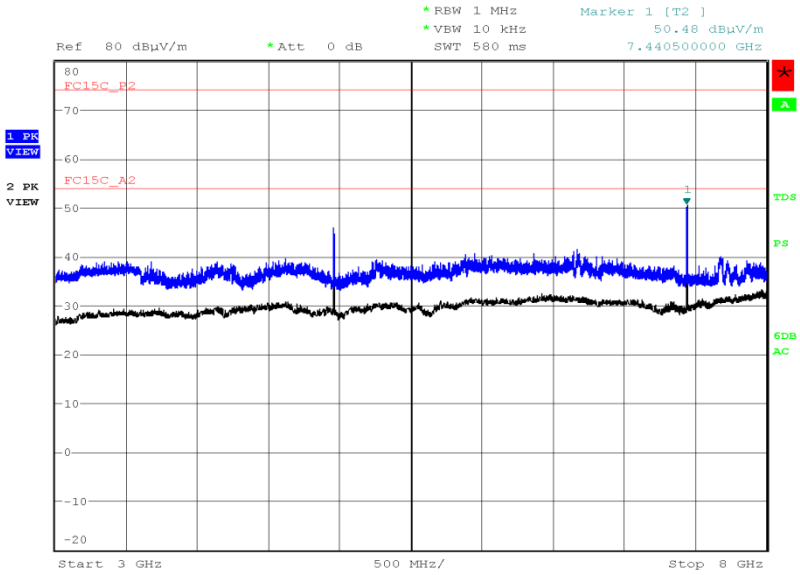
No other emissions were detected within 10 dB of the limit.

Bluetooth, 2480 MHz, 3DH5, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Product Service

Bluetooth, 2480 MHz, 3DH5, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



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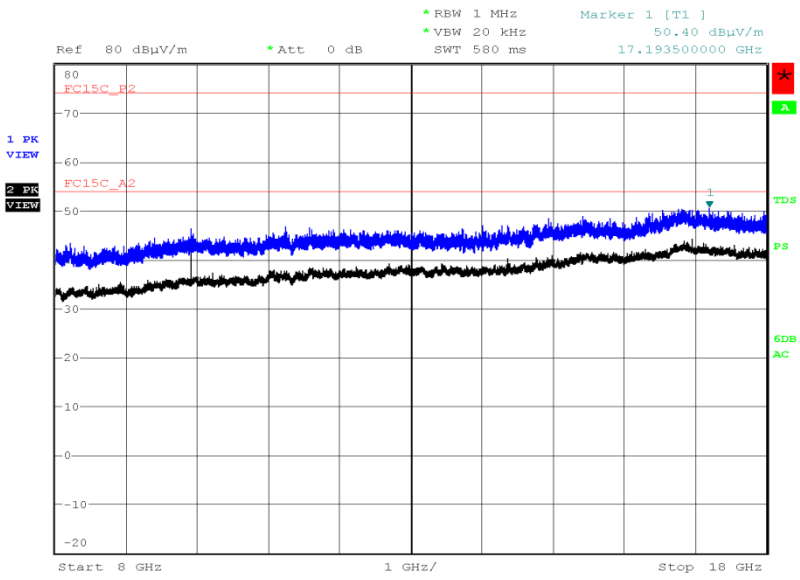
Bluetooth, 2480 MHz, 3DH5, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



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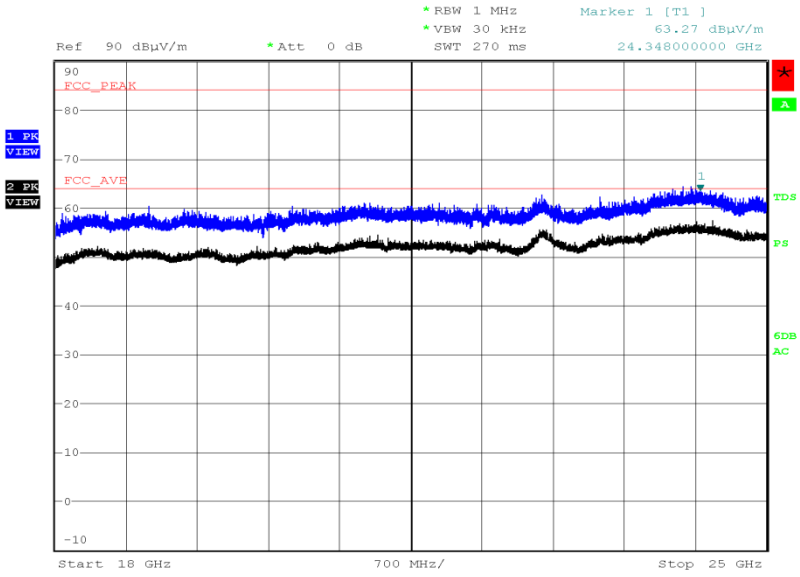
Bluetooth, 2480 MHz, 3DH5, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



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FCC 47 CFR Part 15, Limit Clause 15.247 (d)

Emissions outside the restricted bands shall be at least 20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	74	54

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength			Measurement Distance (m)
	(µV/m)	Average (dBµV/m)	Peak (dBµV/m)	
30-88	100	40.0	60.0	3
88-216	150	43.5	63.5	3
216-960	200	46.0	66.0	3
Above 960	500	54.0	74.0	3

Industry Canada RSS-247, Limit Clause, 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 - Peak EIRP					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	27-Nov-2016
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016
Section 2.2 - Spurious Radiated Emissions					
Pre-Amplifier	Phase One	PS04-0086	1533	12	30-Jul-2016
18GHz - 40GHz Pre-Amplifier	Phase One	PSO4-0087	1534	12	23-Dec-2016
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
Mast Controller	maturo Gmbh	NCD	3917	-	TU
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	6-Oct-2016
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4412	12	23-Mar-2017
Antenna (Bilog)	Chase	CBL6143	2904	12	11-Jun-2017
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016

TU – Traceability Unscheduled

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Peak EIRP	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Spurious Radiated Emissions	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).