

Test Report

Product	Beat Gateway		
Name and address of the applicant	Assa Abloy Global Solutions Czech Republic s.r.o. Chlumecká 3203, Horní Počernice 198 00 Prague, Czech Republic		
Name and address of the manufacturer	Assa Abloy Global Solutions Czech Republic s.r.o. Chlumecká 3203, Horní Počernice 198 00 Prague, Czech Republic		
Model	BGW/A1 BGW/A2		
Rating	BGW/A1: 6VDC (Primary Battery CR-P2) BGW/A2: 12-24 V _{DC}		
Trademark	ASSA ABLOY		
Additional information	Bluetooth Low Energy, LTE		
Tested according to	FCC Part 15.247 FCC Part 22C FCC Part 24C FCC Part 27C		ISED Canada RSS-247, Issue 3 ISED Canada RSS-130, Issue 2 ISED Canada RSS-132, Issue 4 ISED Canada RSS-133, Issue 6 ISED Canada RSS-139, Issue 4
Order number	PRJ0027408		
Tested in period	2024-02-14		
Issue date	2024-03-21		
Name and address of the testing laboratory	 Nemko Scandinavia AS Instituttveien 6 2007 Kjeller, Norway www.nemko.com CAB Number: FCC: NO0001 ISED: NO0470 ISED No: 2040D-1   An accredited technical test executed under the Norwegian accreditation scheme		
 Prepared by [Frode Sveinsen]  Approved by [Jan G Eriksen]			
This report was originally distributed electronically with digital signatures. For more information, please contact Nemko Scandinavia AS.			

Revision history

Revision	Date	Comment	Sign
A	2024-03-21	First edition	FS

GENERAL REMARKS

This report applies only to the sample(s) tested. It is the manufacturer's responsibility to ensure the additional production units of this product are manufactured with identical electrical and mechanical components. The manufacturer is solely responsible for any modifications to the product that could result in non-compliance with the relevant regulations.

This report shall not be reproduced, except in full, without the written approval of Nemko.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Group accepts no responsibility for damage suffered by any third party because of decisions made or actions based on this report.

Opinions expressed within this report regarding general assessments and qualifications for PASS or FAIL to the standards limits and requirements, are not part of the current accreditation. Neither are opinions expressed regarding model variants covered by the testing of this report.

CALIBRATION

All instruments used in the tests given in this test report are calibrated and traceable to national or international standards. Between calibrations all test set-ups are controlled and verified on a regular basis by periodic checks to ensure, with 95% confidence, that the instruments remain within the calibrated levels.

MEASUREMENT UNCERTAINTY

Measurement uncertainties are calculated or considered for all instruments and instrument set-ups used during these tests. Uncertainty figures are found in a separate clause in this report.

CONTENTS

1	INFORMATION	4
1.1	Test Item	4
1.2	Normal test condition	4
1.3	Test Engineers	4
1.4	Antenna Requirement	5
1.5	EUT Operating Modes	5
1.6	Comments	5
2	TEST REPORT SUMMARY	6
2.1	General	6
2.2	Test Summary	6
3	TEST RESULTS	7
3.1	Radiated Emissions, 30 – 4000 MHz	7
4	Measurement Uncertainty	19
5	LIST OF TEST EQUIPMENT	20
6	BLOCK DIAGRAM	21
6.1	Test Site Radiated Emission	21

1 INFORMATION

1.1 Test Item

Name	Beat Gateway
Model/version	BGW/A1 BGW/A2
FCC ID	2BFGYBGWA12
ISED ID	32212-BGWA12
Serial number	PRJ00274080005
Hardware identity and/or version	1.0.0
Software identity and/or version	0.0.1
Antenna Connector	BLE: RP-SMA LTE-M: SMA
Antennas	Linx Technologies ANT-2.4-LCW-RPS (2400-2500 MHz) Quectel YECT002AA (700-960, 1710-2690 MHz) Dual Mode Antenna: 2J6947B (Cable length Min 20 cm, Max 2 m)
Diversity or Smart Antennas	No
Power Supply	BGW/A1: Primary Batteries (6V _{DC} , 2x CR-P2 or 4x CR-P2) BGW/A2: External DC Supply (12-24V _{DC})
Interfaces	USB-C, only used for setup and updates

Description of Test Item

The EUT is a wireless gateway with Bluetooth Low Energy and LTE-M wireless interfaces.

The EUT uses LTE-M modem to communicate with internet and BLE to communicate with locking devices.

The LTE-M modem is a Quectel BG95-M3 modem (FCC ID: XMR201910BG95M3, IC: 10224A-2019BG95M3)

All tests were performed on a BGW/A2 with powered from a regulated DC Power Supply.

1.2 Normal test condition

Temperature:	20 - 24 °C
Relative humidity:	20 - 50 %
Normal test voltage:	12 V DC (DC Supply Voltage)

The values are the limit registered during the test period.

1.3 Test Engineers

Frode Sveinsen

1.4 Antenna Requirement

Does the EUT have detachable antenna(s)?	☒ YES	☐ NO
If detachable, is the antenna connector non-standard?	☒ YES	☐ NO
The BLE transceiver have a RP-SMA connector, the LTE module has a standard SMA connector.		

Requirement: FCC 15.203, 15.204

1.5 EUT Operating Modes

Description of operating modes	The BLE transceiver was programmed using the Nordic Semiconductor nRF test software from a computer. The computer was connected to the USB-C interface when programming. The LTE module was controlled by the CMW500 radiocommunications tester and was set to transmit with maximum output power on a channel in the center of each of the supported frequency bands. The LTE module supports only LTE, GSM or WCDMA is not supported.
--------------------------------	--

1.6 Comments

The measurements were performed with the EUT powered by 12 V DC from a regulated power supply. It was checked that power variations between 85% of 12V DC and 115% of 24V DC, did not have any influence on the measurements.

2 TEST REPORT SUMMARY

2.1 General

The tests were conducted on a sample of the equipment for demonstrating compliance with one or more of the following standards.

Standard	Description
FCC CFR 47 Part 15.247	Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz
FCC CFR 47 Part 22C	Public Mobile Services
FCC CFR 47 Part 24C	Personal Communications Services
FCC CFR 47 Part 27C	Miscellaneous Wireless Communications Services
ISED RSS-247, Issue 3	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ISED RSS-GEN Issue 5	General Requirements for Compliance of Radio Apparatus
ISED RSS-130, Issue 2	Equipment Operating in the Frequency Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz
ISED RSS-132, Issue 4	Cellular Systems Operating in the Bands 824-849 MHz and 869-894 MHz
ISED RSS-133, Issue 6, Amendment 1	2 GHz Personal Communications Services
ISED RSS-139, Issue 4	Advanced Wireless Services Equipment Operating in the Bands 1710-1780 MHz and 2110-2200 MHz

The following reference standards and documents were used for one or more measurements:

Standard	Description
ANSI C63.4-2014	Unintentional Radiators
ANSI C63.10-2013	Intentional Radiators
ANSI C63.26-2015	Licensed Transmitters
FCC KDB 558074 D01	15.247 Measurement Guidance for DTS and Frequency Hopping Systems
FCC KDB 412172 D01	Determining ERP and EIRP
FCC KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters
FCC KDB 996369 D04	Module Integration Guide

All measurements are traceable to national standards.

A description of the test facility is on file with FCC and ISED Canada.

☒ New Submission	☒ Production Unit
☐ Class II Permissive Change	☐ Pre-production Unit
DTS Equipment Class	☐ Family Listing

2.2 Test Summary

Name of test	FCC Part 15 reference	RSS-247 Issue 3, RSS-GEN Issue 5 reference	ANSI C63.10-2013 Reference	Result
Spurious Emissions (Radiated)	15.247(c) 15.109(a) 15.209(a)	3.3 (RSS-247) 7.3 (RSS-GEN) 8.9 (RSS-GEN)	6.3, 6.5, 6.6, 6.10 11.12, 11.13 (DTS)	Pass

3 TEST RESULTS

3.1 Radiated Emissions, 30 – 4000 MHz

FCC Part 15.209 (a)

ISED Canada RSS-GEN Issue 5, Clause 7.3/8.9

Measurement procedure: ANSI C63.10-2013 Clause 11.12

Test Results: Complies

Measurement Data:

Detector: Peak

Bandwidth: RBW/VBW = 100/300 kHz below 1 GHz, 1/3 MHz above 1 GHz

Measuring distance 3 m

Tested with BLE transmitting on ch19 and LTE connected to the CMW500 with both transmitting at maximum output power.

Band Reject and High Pass Filters were used in front of the pre-amplifier in order to suppress the LTE and BLE carriers.

Antenna factor, amplifier gain and cable loss are included in spectrum analyzer "Transducer factor".

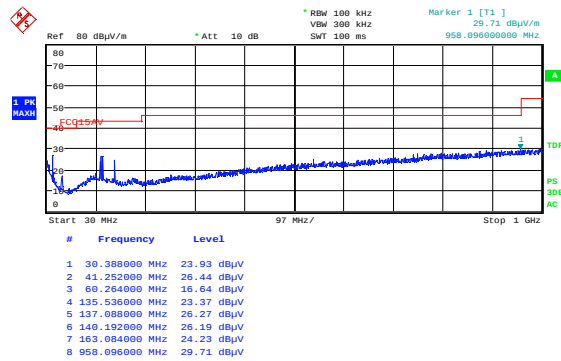
See attached plots.

Requirements/Limit

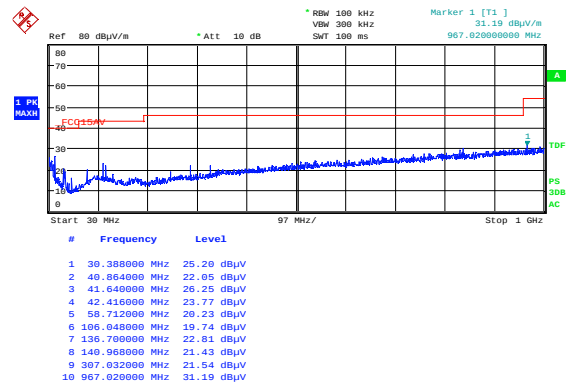
FCC	Part 15.209 @ frequencies defined in §15.205	
ISED Canada	RSS-GEN Issue 5, Clause 8.9 @ frequencies defined in clause 8.10	
Frequency	Radiated emission limit @3 meters, Quasi Peak Detector	
30 – 88 MHz	100 µV/m	40.0 dBµV/m
88 – 216 MHz	150 µV/m	43.5 dBµV/m
216 – 960 MHz	200 µV/m	46.0 dBµV/m
960 – 1000 MHz	500 µV/m	54.0 dBµV/m
Frequency	Average Detector	Peak Detector
1 – 26 GHz	54.0 dBµV/m	74.0 dBµV/m

Linx+Quectel Antenna

BLE 2440 + LTE B02, Ch19000 (1890 MHz)



Date: 14.FEB.2024 16:15:56

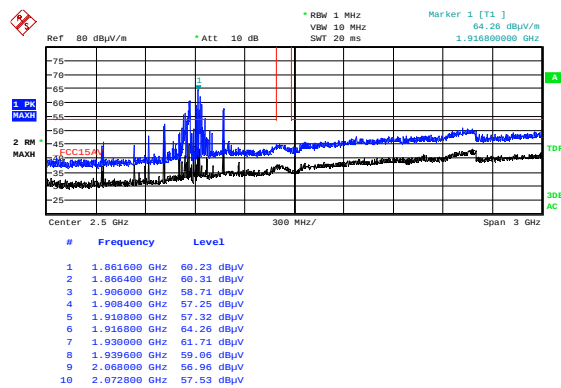


Date: 14.FEB.2024 16:14:00

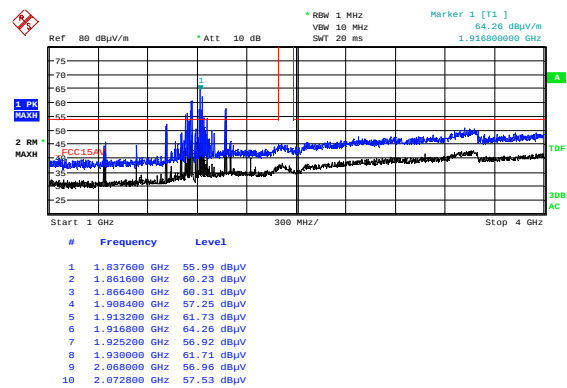
Radiated Emissions 30 - 1000 MHz, HP

VP

BLE 2440 + LTE B02, Ch19000 (1890 MHz)



Date: 14.FEB.2024 10:29:53



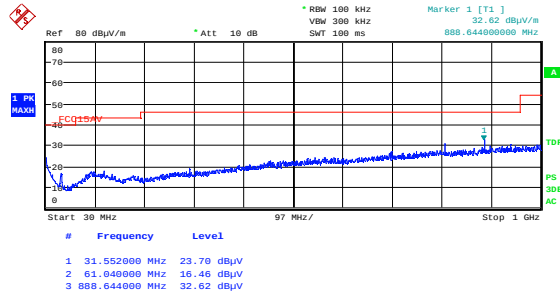
Date: 14.FEB.2024 10:27:57

Radiated Emissions 1000-4000 MHz, HP

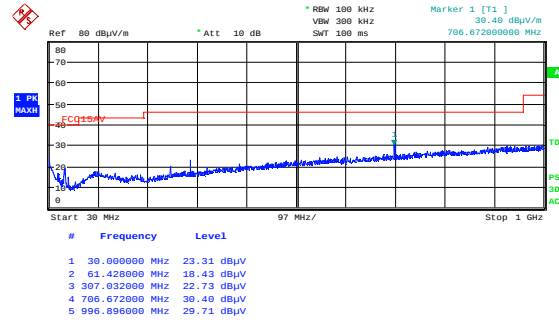
VP

Linx+Quectel Antenna

BLE 2440 + LTE B04, Ch20200 (1735 MHz)



Date: 14.FEB.2024 16:29:23

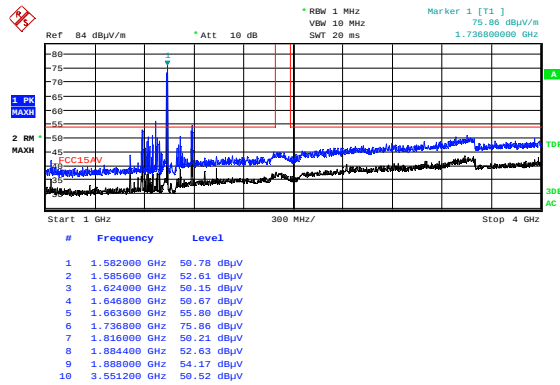


Date: 14.FEB.2024 16:18:28

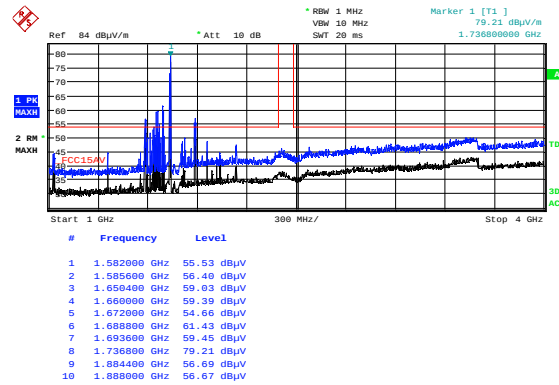
Radiated Emissions 30 - 1000 MHz, HP

VP

BLE 2440 + LTE B04, Ch20200 (1735 MHz)



Date: 14.FEB.2024 10:48:22



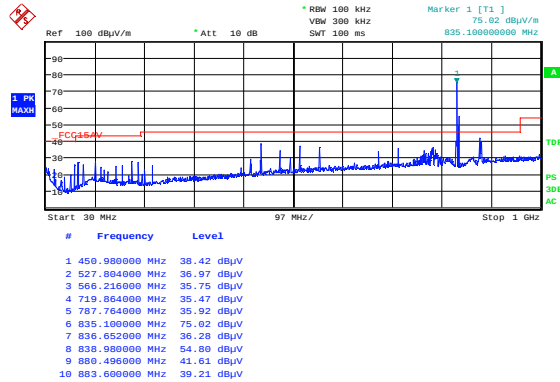
Date: 14.FEB.2024 10:46:27

Radiated Emissions 1000-4000 MHz, HP

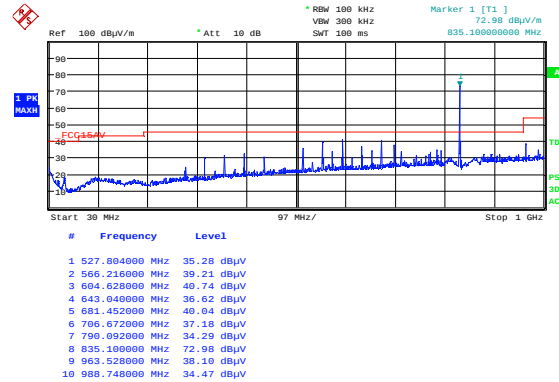
VP

Linx+Quectel Antenna

BLE 2440 + LTE B05, Ch20525 (836.5 MHz)



Date: 14.FEB.2024 16:33:33

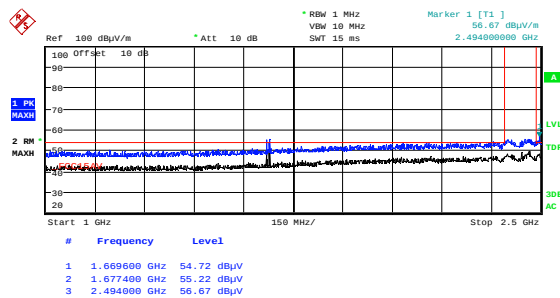


Date: 14.FEB.2024 16:31:37

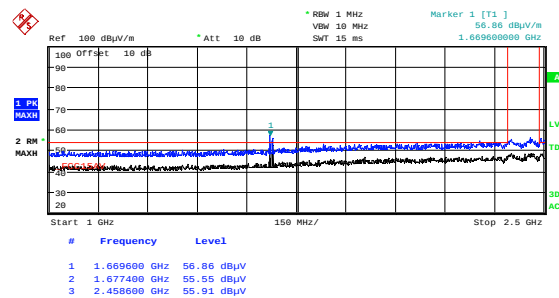
Radiated Emissions 30 - 1000 MHz, HP

VP

BLE 2440 + LTE B05, Ch20525 (836.5 MHz)



Date: 14.FEB.2024 11:05:59



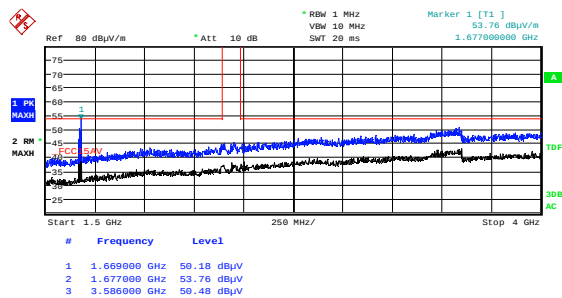
Date: 14.FEB.2024 11:04:03

Radiated Emissions 1000-2500 MHz, HP

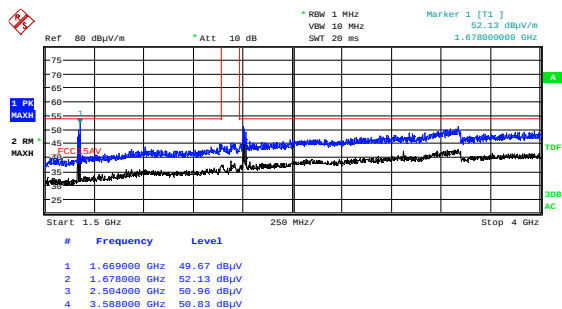
VP

Linx+Quectel Antenna

BLE 2440 + LTE B05, Ch20525 (836.5 MHz)



Date: 14.FEB.2024 11:18:06

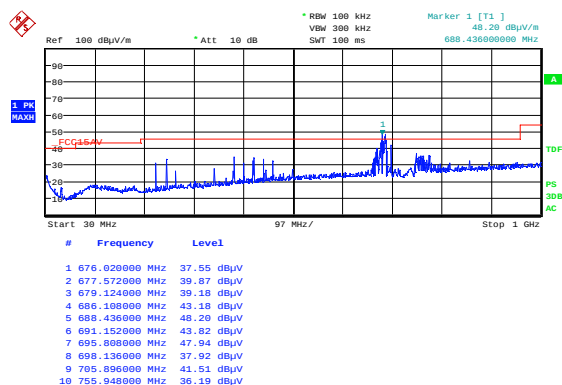


Date: 14.FEB.2024 11:16:10

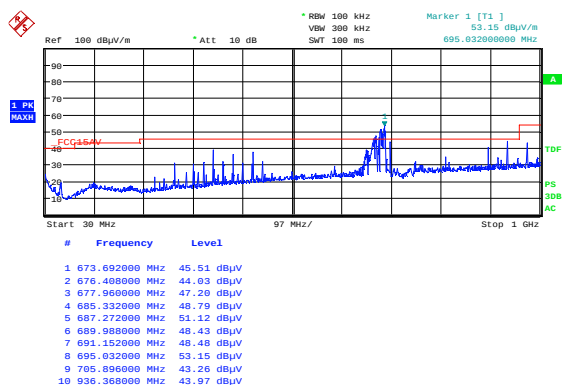
Radiated Emissions 1500-4000 MHz, HP

VP

BLE 2440 + LTE B12, Ch23095 (707.5 MHz)



Date: 14.FEB.2024 16:43:44



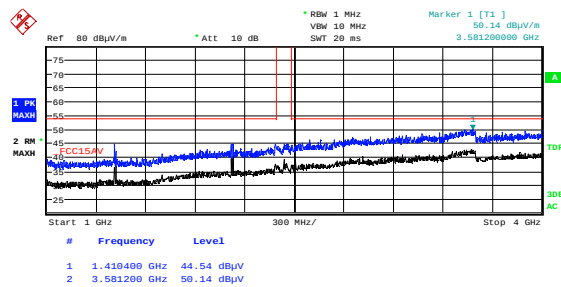
Date: 14.FEB.2024 16:41:49

Radiated Emissions 30 - 1000 MHz, HP

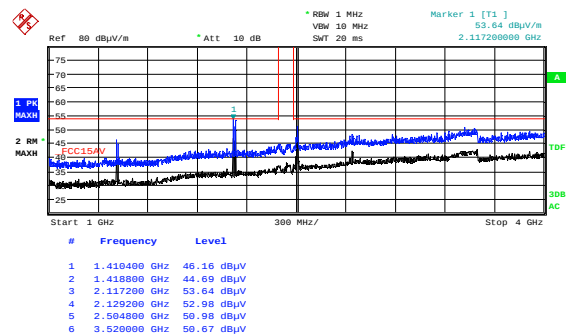
VP

Linx+Quectel Antenna

BLE 2440 + LTE B12, Ch23095 (707.5 MHz)



Date: 14.FEB.2024 12:04:44

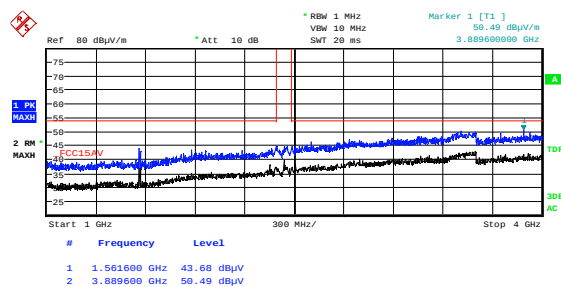


Date: 14.FEB.2024 12:02:48

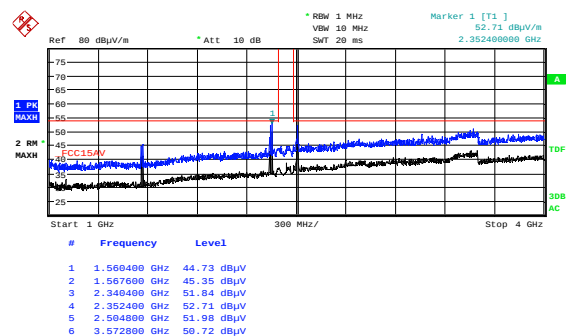
Radiated Emissions 1000-4000 MHz, HP

VP

BLE 2440 + LTE B13, Ch23230 (782 MHz)



Date: 14.FEB.2024 11:34:16



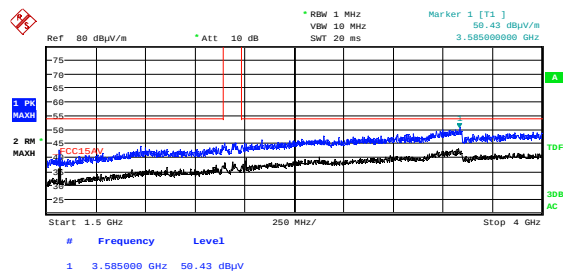
Date: 14.FEB.2024 11:32:20

Radiated Emissions 1000-4000 MHz, HP

VP

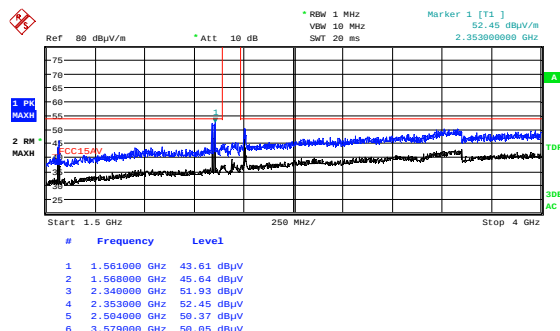
Linx+Quectel Antenna

BLE 2440 + LTE B13, Ch23230 (782 MHz)



Date: 14.FEB.2024 11:27:02

Radiated Emissions 1500-4000 MHz, HP

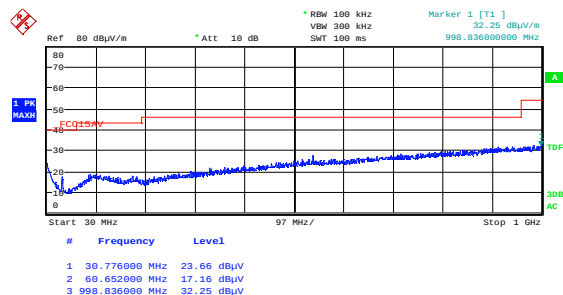


Date: 14.FEB.2024 11:25:06

VP

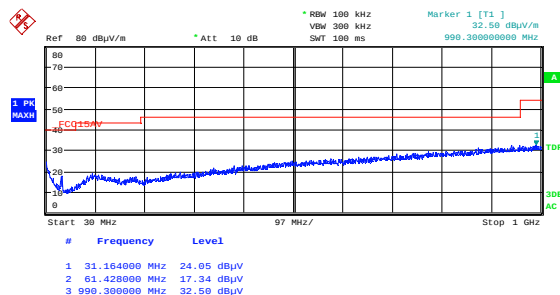
2J Antenna

BLE 2440 + LTE B02, Ch19000 (1890 MHz)



Date: 14.FEB.2024 15:42:58

Radiated Emissions 30 - 1000 MHz, HP

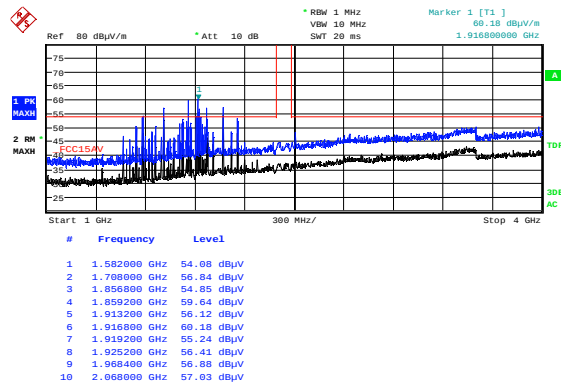


Date: 14.FEB.2024 15:41:02

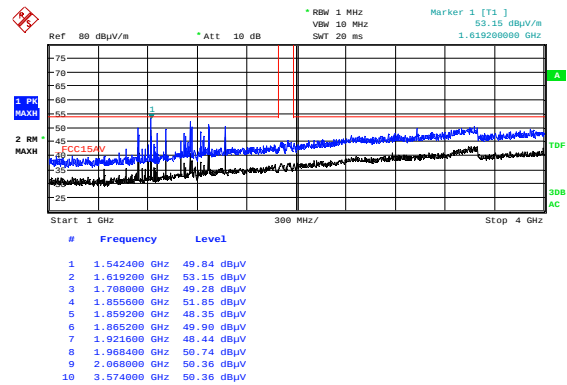
VP

2J Antenna

BLE 2440 + LTE B02, Ch19000 (1890 MHz)



Date: 14.FEB.2024 13:39:34

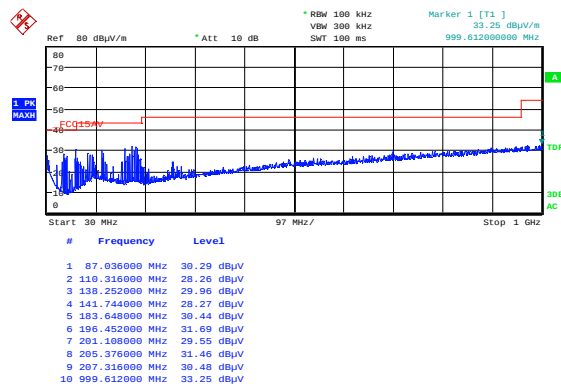


Date: 14.FEB.2024 13:28:37

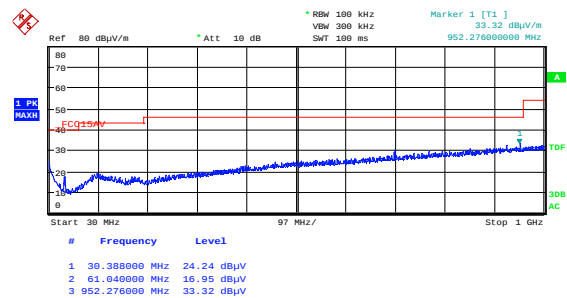
Radiated Emissions 1000-4000 MHz, HP

VP

BLE 2440 + LTE B04, Ch20200 (1735 MHz)



Date: 14.FEB.2024 15:27:31



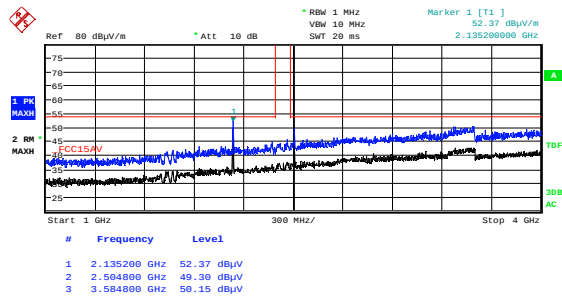
Date: 14.FEB.2024 15:25:36

Radiated Emissions 30 - 1000 MHz, HP

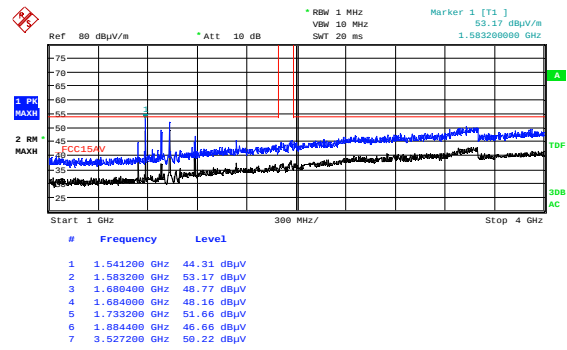
VP

2J Antenna

BLE 2440 + LTE B04, Ch20200 (1735 MHz)



Date: 14.FEB.2024 13:57:07

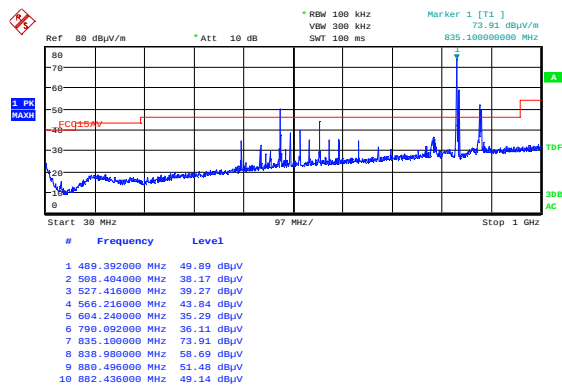


Date: 14.FEB.2024 13:55:11

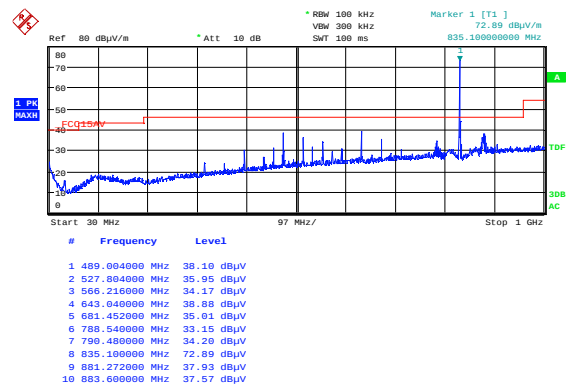
Radiated Emissions 1000-4000 MHz, HP

VP

BLE 2440 + LTE B05, Ch20525 (836.5 MHz)



Date: 14.FEB.2024 15:16:13



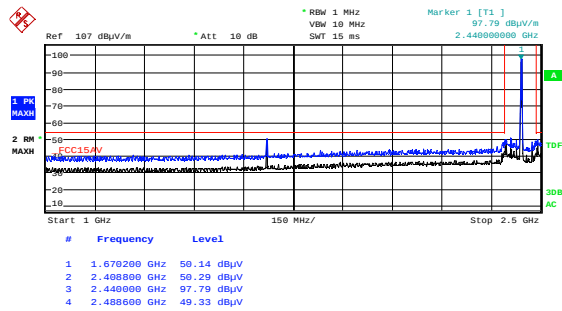
Date: 14.FEB.2024 15:14:17

Radiated Emissions 30 - 1000 MHz, HP

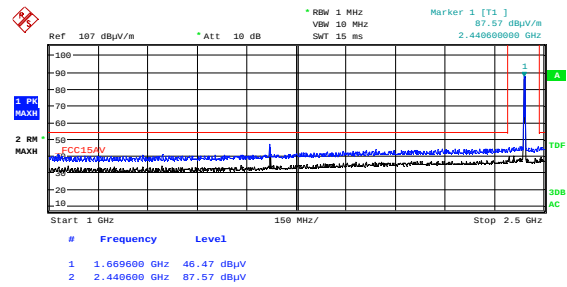
VP

2J Antenna

BLE 2440 + LTE B05, Ch20525 (836.5 MHz)



Date: 14.FEB.2024 14:14:46

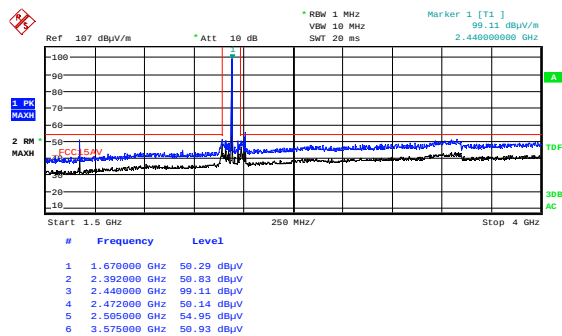


Date: 14.FEB.2024 14:12:50

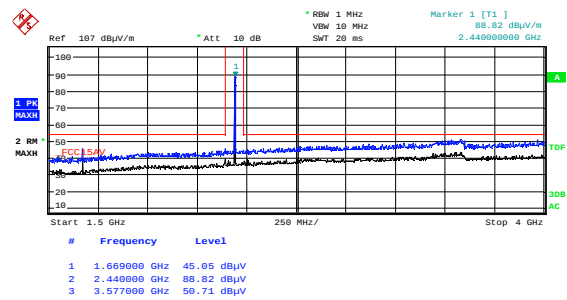
Radiated Emissions 1000-2500 MHz, HP

VP

BLE 2440 + LTE B05, Ch20525 (836.5 MHz)



Date: 14.FEB.2024 14:22:03



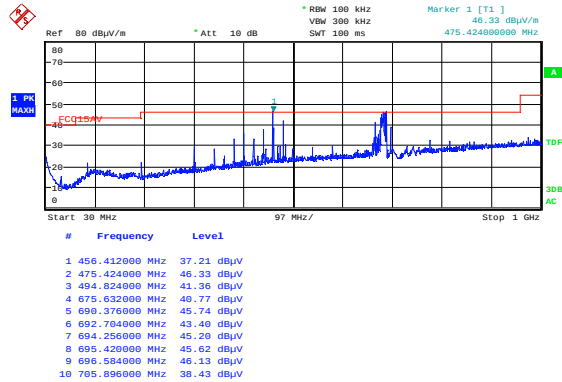
Date: 14.FEB.2024 14:20:07

Radiated Emissions 1500-4000 MHz, HP

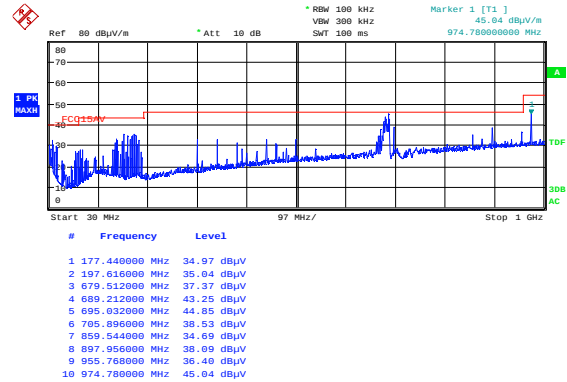
VP

2J Antenna

BLE 2440 + LTE B12, Ch23095 (707.5 MHz)



Date: 14.FEB.2024 15:05:08

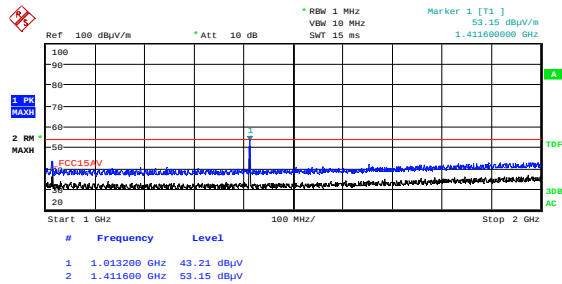


Date: 14.FEB.2024 15:03:12

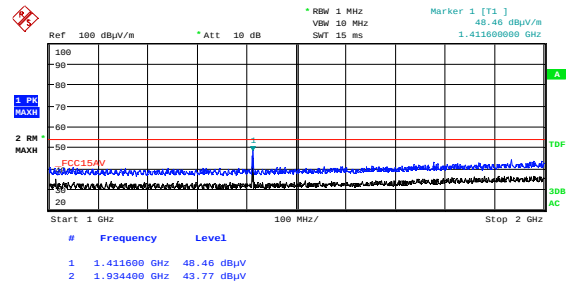
Radiated Emissions 30 - 1000 MHz, HP

VP

BLE 2440 + LTE B12, Ch23095 (707.5 MHz)



Date: 14.FEB.2024 14:39:27



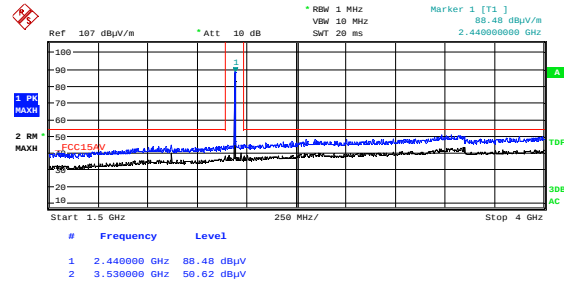
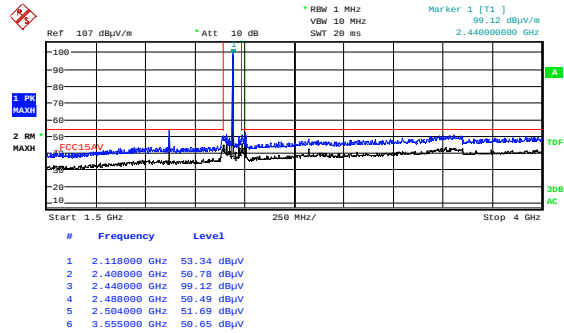
Date: 14.FEB.2024 14:37:31

Radiated Emissions 1000-2000 MHz, HP

VP

2J Antenna

BLE 2440 + LTE B12, Ch23095 (707.5 MHz)



Date: 14.FEB.2024 14:31:47

Date: 14.FEB.2024 14:29:51

Radiated Emissions 1500-4000 MHz, HP

VP

4 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item		Uncertainty
Spurious Emissions, Radiated	< 1 GHz	±2.5 dB
	> 1 GHz	±2.2 dB
Temperature Uncertainty		±1 °C

All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2

5 LIST OF TEST EQUIPMENT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

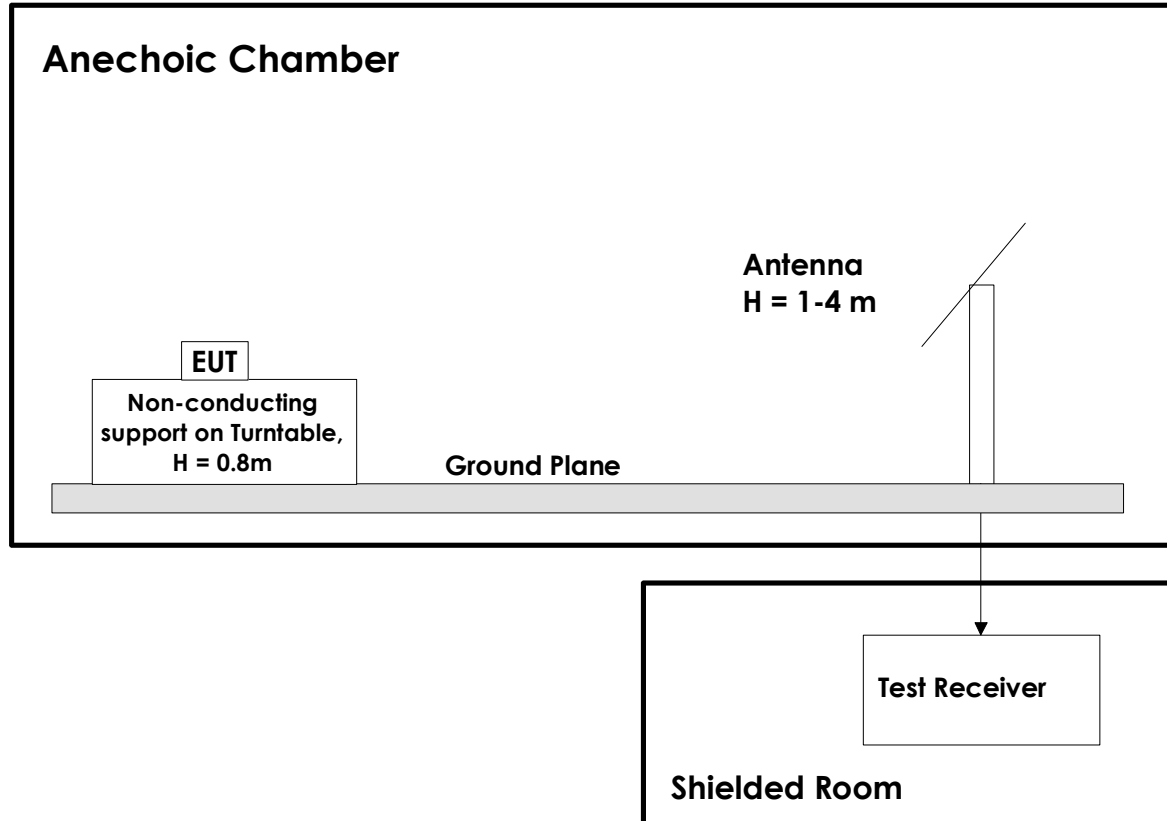
No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2024-01	2025-01
2	6810.17B	Attenuator	Suhner	LR 1669	2023-05	2024-05
3	JB3	BiLog Antenna	Sunol	N-4525	2023-04	2026-04
4	310	Preamplifier	Sonoma Inst.	LR 1686	2023-08	2024-08
5	3115	Horn Antenna	EMCO	LR 1226	2022-12	2027-12
6	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2023-08	2024-08
7	WLK5-1100-1485-7000-40SS	Low Pass Filter (1 GHz)	Wainwright Inst.	LR 1761	COU	
8	WRCJV12-1870-1880-1900-1910-80EE	Band Reject Filter (1880-1900 MHz)	Wainwright Inst.	LR 1662	COU	
9	WRCGV14-693.5-703.5-746.5-756.5-70EE	Band Reject Filter (703.5-746.5 MHz)	Wainwright Inst.	LR 1794	COU	
10	WRCGV8-790.5-810.5-865.5-885.5-40EE	Band Reject Filter (810.5-865.5 MHz)	Wainwright Inst.	LR 1795	COU	
11	NO324415	Band Reject Filter (2400-2484 MHz)	Microwave Circuits	LR 1760	COU	
12	N0319501	Band Reject Filter (1920-1980 MHz)	Microwave Circuits	LR 1765	COU	
13	N0417483	Band Reject Filter (1710-1785MHz)	Microwave Circuits	LR 1767	COU	
14	9205B	Power Supply	BK Precision	LR 1846	COU	
15	Model 87V	Multimeter	Fluke	LR 1597	2023-04	2024-04
16	CMW500	Radiocommunications Tester	Rohde % Schwarz	LR 1791	2022-02	2024-02
17	ST18/SMA/N/36	RF Cable	Suhner	LR 1628	COU	

The software listed below has been used for one or more tests.

No.	Manufacturer	Name	Version	Comment
1	Nemko	RSPlot	1.0.8.0	Screenshots from R&S Spectrum Analyzers

6 BLOCK DIAGRAM

6.1 Test Site Radiated Emission



This test setup is used for all radiated emissions tests. For frequencies below 30 MHz the measuring distance is 10m, for all other frequencies it is 3m or 1m. Emissions above 1 GHz are measured with a Spectrum Analyzer and Horn Antenna. For measurements above 18 GHz the test receiver is moved inside the anechoic chamber and located next to the antenna to minimize the cable loss. All measurements at 1GHz and above were performed with turntable height 1.5m and with the ground plane covered by absorbers. A pre-amplifier is used for all measurements above 30 MHz, and High-Pass or Band-Pass filter is used for all harmonics.