REP031862

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	**ETSI EN 300 328 V2.2.2 (2019-07)** Wideband transmission systems; Data transmission equipment operating in the 2.4 GHz band; Harmonised Standard for access to radio spectrum **ETSI EN 301 908-13 V13.2.1 (2022-02)** IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 13: Evolved Universal Terrestrial; Radio Access (E-UTRA) User Equipment (UE)
Order number	PRJ0027408
Tested in period	2024-01-16 to 2024-01-30
Issue date	2024-03-21
Name and address of the testing laboratory	Nemko Scandinavia AS Instituttveien 6 2007 Kjeller, Norway www.nemko.com **An accredited technical test executed under the Norwegian accreditation scheme**

Prepared by [Frode Sveinsen]	Approved by [Jan G Eriksen]

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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.

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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.

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1 Test Information

1.1 Tested Item

Name	**Beat Gateway**
Model/version	**BGW/A1** **BGW/A2**
Serial number	**PRJ00274080005**
Hardware identity and/or version	**1.0.0**
Software identity and/or version	**0.0.1**
Frequency Range	**BLE: 2402 – 2480 MHz** **LTE: 703-748, 832-862, 880-915, 1710-1785, 1920-1980 MHz**
Number of Channels	**BLE: 40**
Channel Spacing	**BLE: 2 MHz** **LTE: 100 kHz**
Operating Mode	**Bluetooth Low Energy ☒ 1MHz ☐ 2MHz** **LTE B1, B3, B8, B20, B28**
Type of Modulation	**BLE : GFSK** **LTE : QPSK, 16QAM**
Rated Output Power	**BLE: 5 mW** **LTE: 200 mW**
Power Source	**BGW/A1: Primary Batteries ($6V_{DC}$, 2x CR-P2 or 4x CR-P2)** **BGW/A2: External DC Supply ($12\text{-}24V_{DC}$)**
Antenna Connector	**BLE: RP-SMA** **LTE: SMA**
Antenna Type	**BLE Antenna: Linx Technologies ANT-2.4-LCW-RPS (2400-2500 MHz)** **LTE Antenna: Quectel YECT002AA (700-960, 1710-2690 MHz)** **Dual Mode Antenna: 2J6947B (Cable length Min 20 cm, Max 2 m)**
Diversity or Smart Antennas	**No**

Description of Tested Device(s)

The EUT is a wireless gateway with Bluetooth Low Energy and LTE-M wireless interfaces.
The EUT uses LTE-M (Quectel BG95-M3 modem) to communicate with internet and BLE to communicate with locking devices.
All tests were performed on a BGW/A2 with powered from a regulated DC Power Supply.

1.2 Normal test condition

Temperature	**20.0 – 23.3 ºC**
Relative humidity	**20.0 – 44.0 %**
Normal test voltage	**12 V DC**

The values are the limit registered during the test period.
All tests have been performed with the EUT powered from a regulated power supply.

1.3 Test Engineer

Frode Sveinsen

1.4 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 each band.

1.5 Other Comments

The EUT have been tested to the radiated emissions tests in ETSI EN 300328 V2.2.2 with BLE and LTE both operating simultaneously.

2 TEST REPORT SUMMARY

2.1 General

The tests were conducted on a sample of the equipment for demonstrating compliance with the following standards:

Standard	Description
EN 300 328 V2.2.2 (2019-07)	Wideband Transmission systems; Data transmission equipment operating in the 2,4GHz band; Harmonized Standard for access to radio spectrum
EN 301 908 V13.2.1 (2022-02)	IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 13: Evolved Universal Terrestrial; Radio Access (E-UTRA) User Equipment (UE)

The test methods have been in accordance with TM-NO-WLS-500, TM-NO-WLS-204A and EN 300 328 where applicable. Radiated tests were performed is accordance with TM-NO-WLS-500, TM-NO-WLS-204A and EN 300 328.

Radiated emissions are made in a 3m fully anechoic chamber.

☒ **Production Unit**
☐ **Pre-production Unit**

2.2 Abbreviations

N/A Not applicable. The testcase is not applicable for the tested equipment.

N/T Not tested. The testcase is not covered by this test report.

2.3 Test Summary

Harmonized Standards		
Test Name	**Reference** **Clause No**	**Verdict**
Transmitter unwanted emissions in the spurious domain	4.3.1.10, 4.3.2.9, 5.4.9 (EN 300 328) 4.2.4, 5.3.3 (EN 301 908-13)	**Pass***

*Only emissions in the spurious domain caused by Intermodulation between BLE and LTE have been considered.

3 Test Results

3.1 Transmitter spurious emissions - Radiated (Operating)

ETSI EN 300328 Clause 4.3.2.9

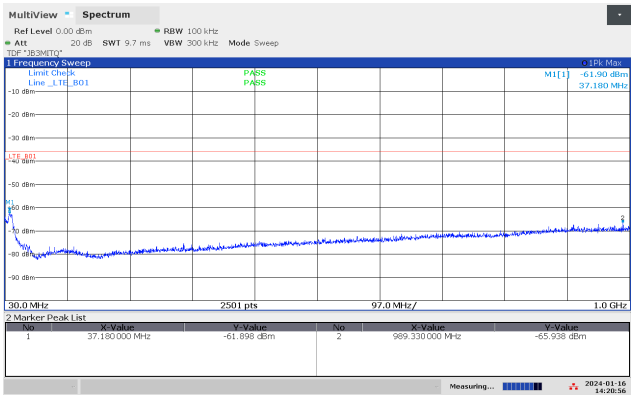
Frequency (MHz)	Spurious Emission Level (dBm)
	1Mbps
30 – 1000 MHz (limit: -54 dBm)	< -60
30 – 1000 MHz (limit: -36 dBm)	< -50
1000 – 12750 MHz	< -35

Measured values were corrected after substitution.

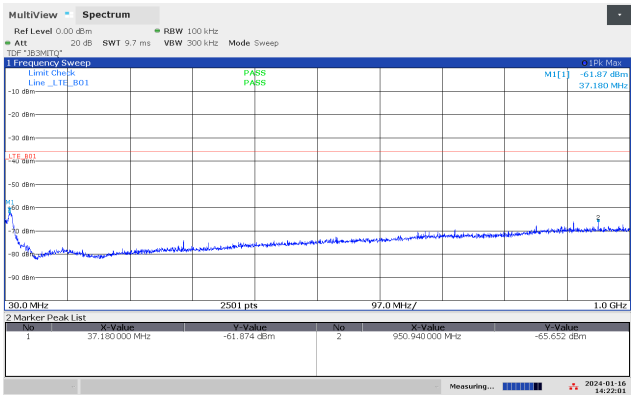
Limits:

Frequency Range	Maximum power e.r.p. (≤ 1 GHz) e.i.r.p (> 1 GHz)	Bandwidth
30 MHz to 47 MHz 74 MHz to 87.5 MHz 118 MHz to 174 MHz 230 MHz to 470 MHz 694 MHz to 1 GHz	-36 dBm	100 kHz
47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 694 MHz	-54 dBm	100 kHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

LINX+Quectel Antenna



Emissions 30-1000 MHz, BLE 2440 + LTE B01 Ch18300, VP



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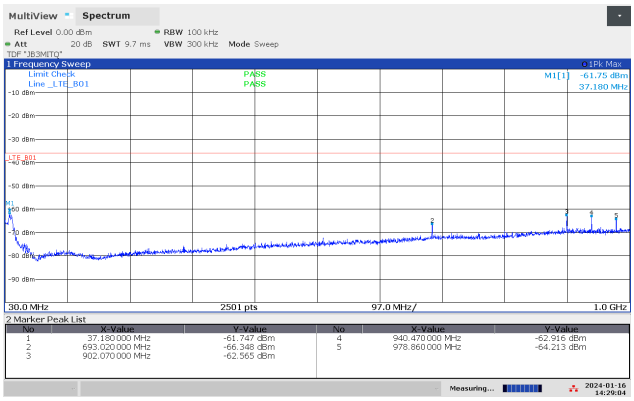

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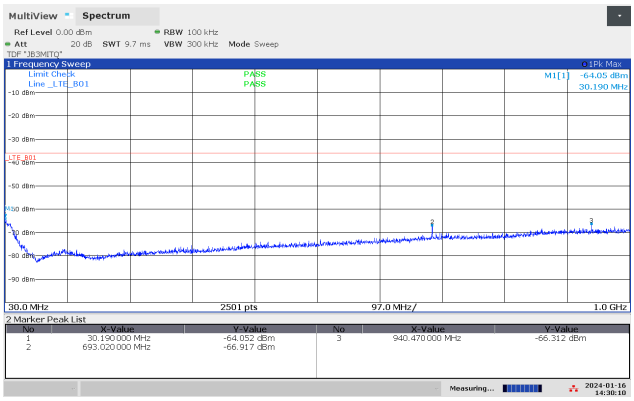

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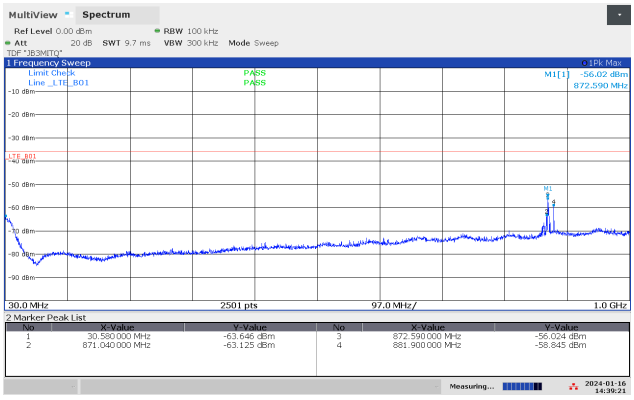

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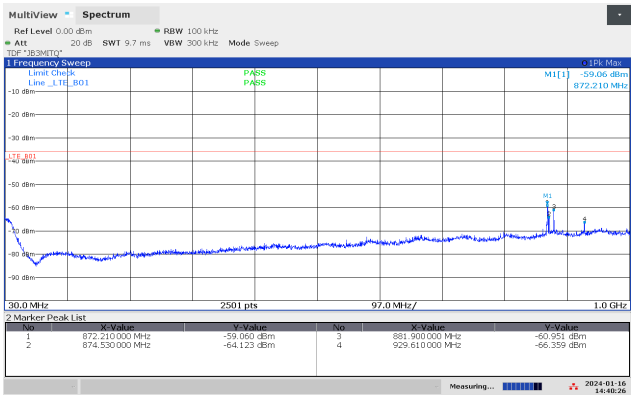

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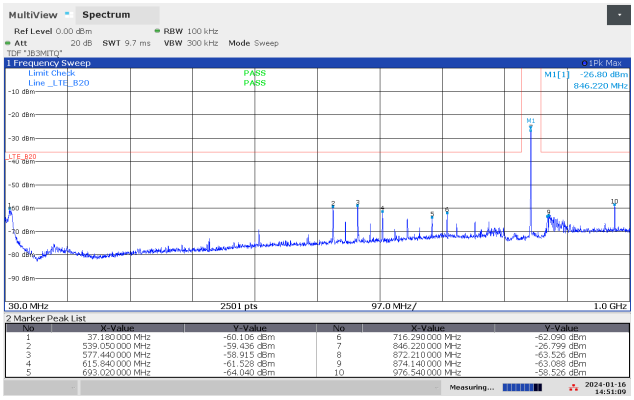

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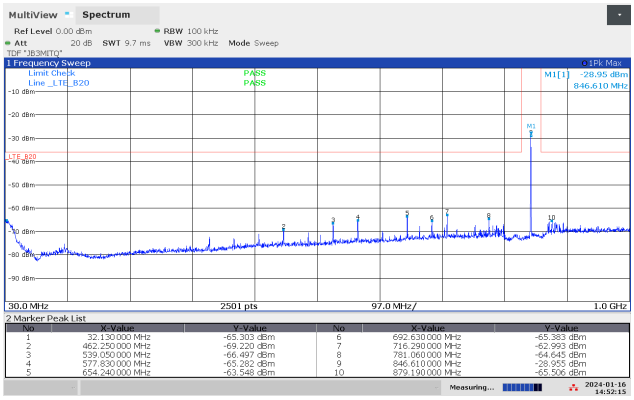

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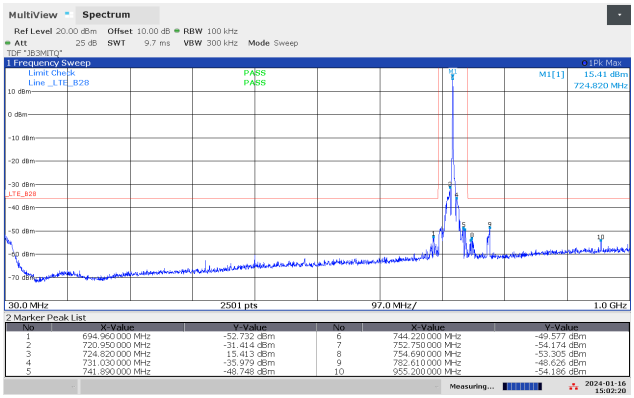
LINX+Quectel Antenna



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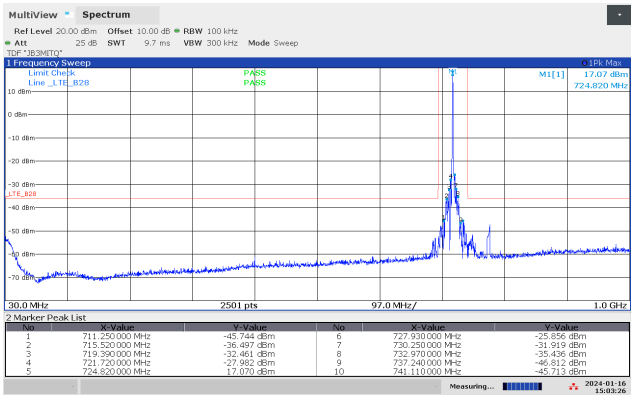

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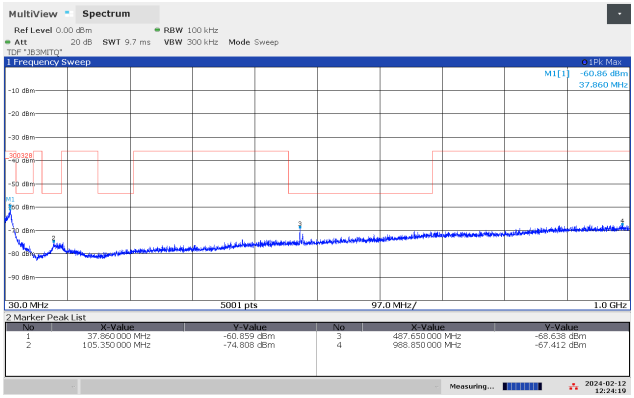
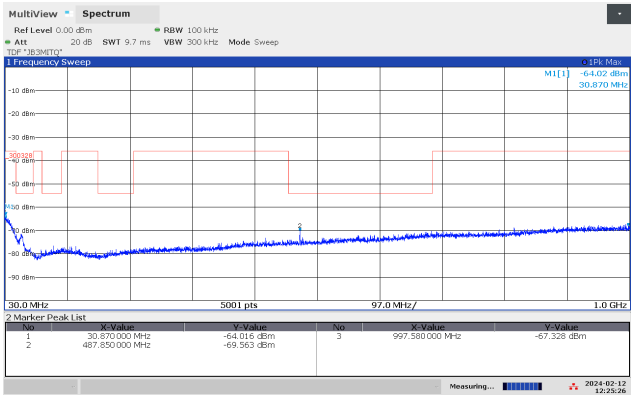


Emissions 30-1000 MHz, BLE 2440 + LTE B01 Ch18300, EUT XY, VP



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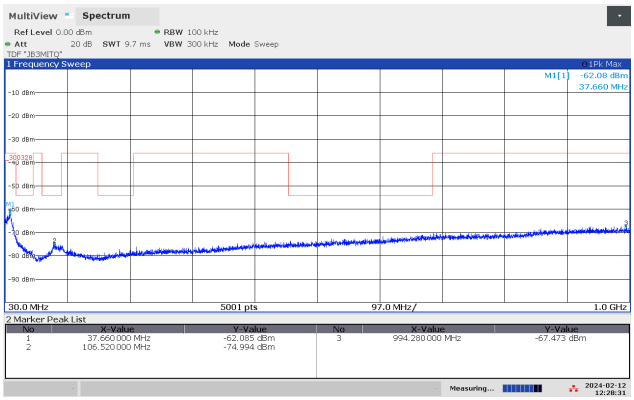
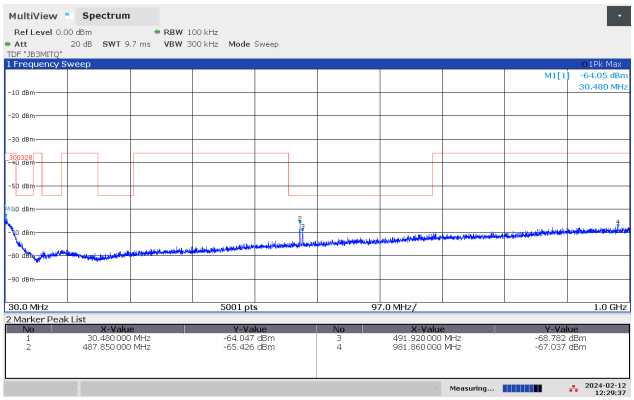


Emissions 30-1000 MHz, BLE 2440 + LTE B01 Ch18300, EUT YZ, VP



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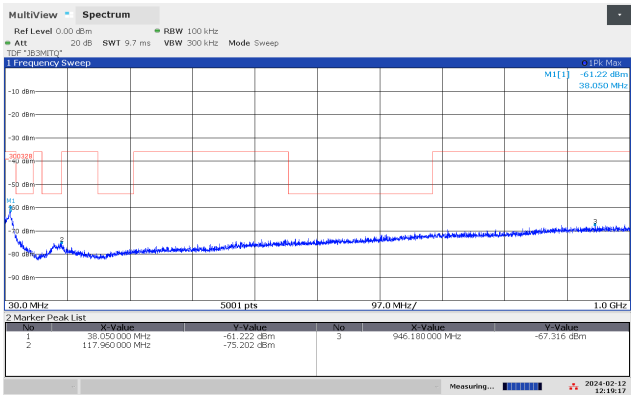

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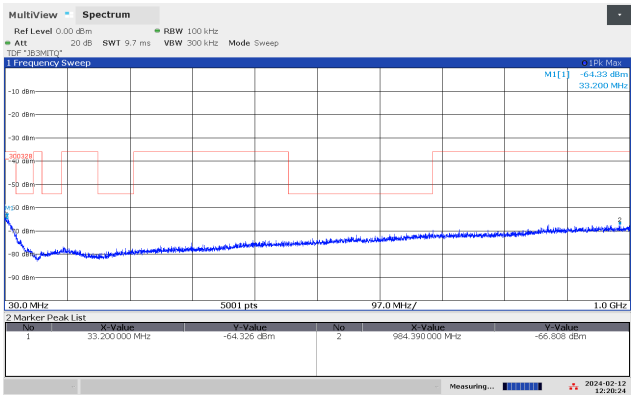

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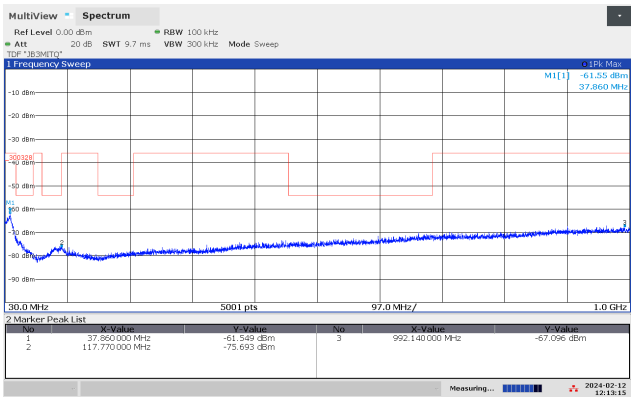
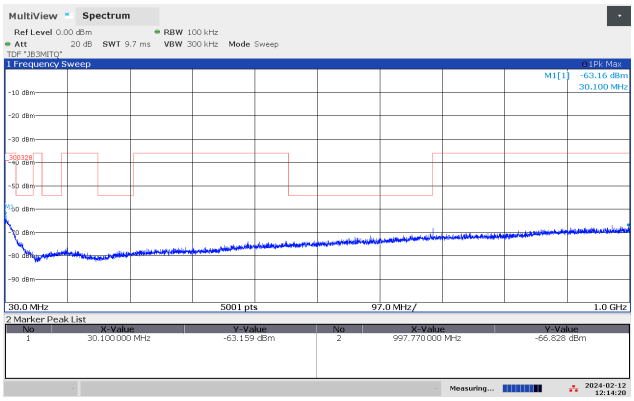


Emissions 30-1000 MHz, BLE 2440 + LTE B03 Ch19575, EUT YZ, VP



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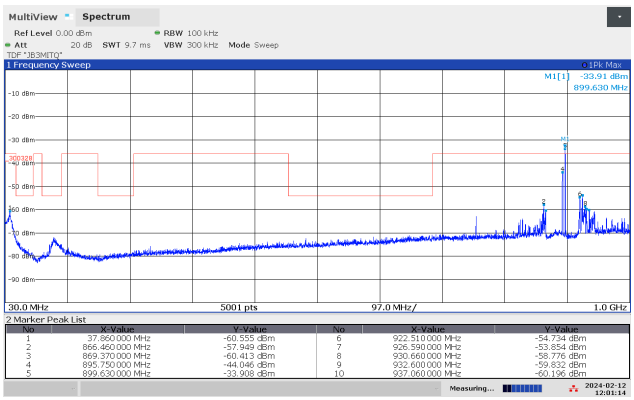
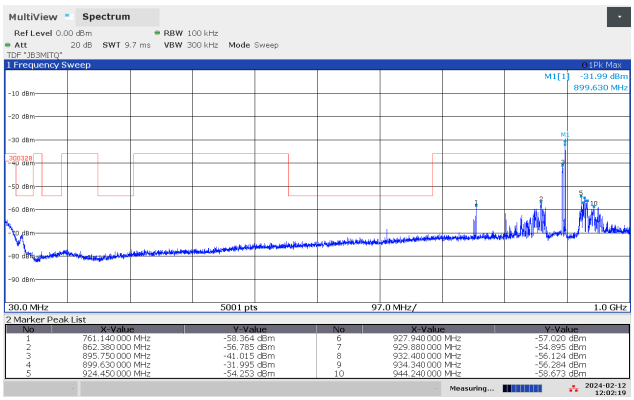


Emissions 30-1000 MHz, BLE 2440 + LTE B08 Ch21625, EUT XY, VP



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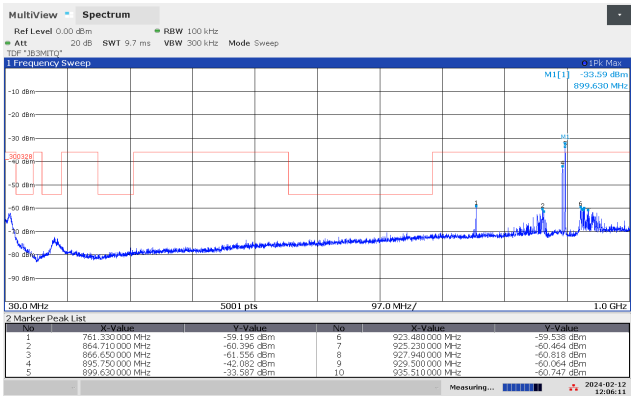
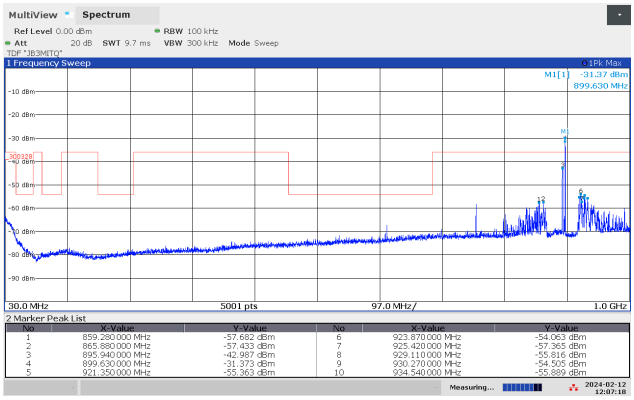


Emissions 30-1000 MHz, BLE 2440 + LTE B08 Ch21625, EUT YZ, VP



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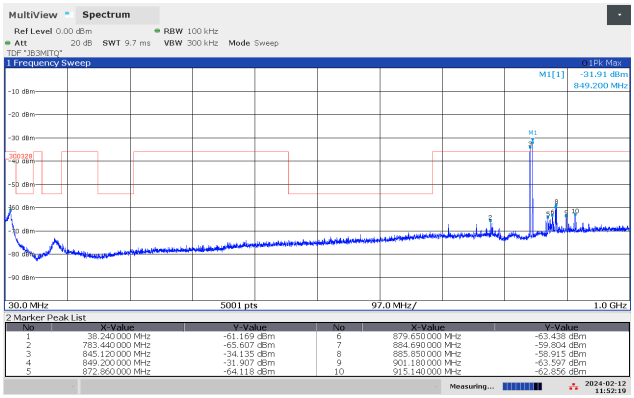
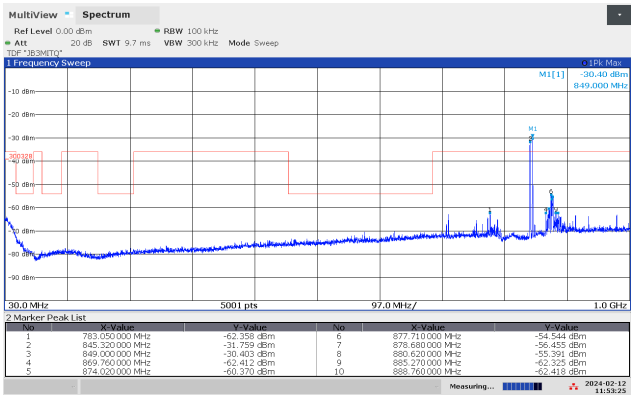


Emissions 30-1000 MHz, BLE 2440 + LTE B20 Ch24300, EUT XY, VP



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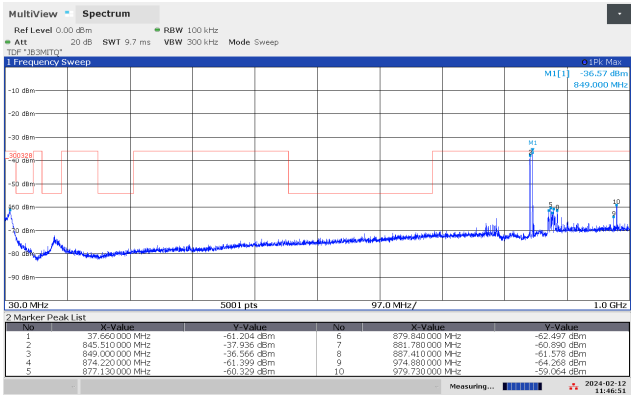
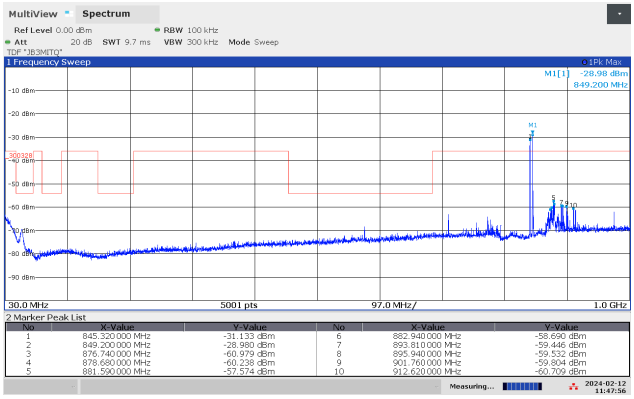


Emissions 30-1000 MHz, BLE 2440 + LTE B20 Ch24300, EUT YZ, VP



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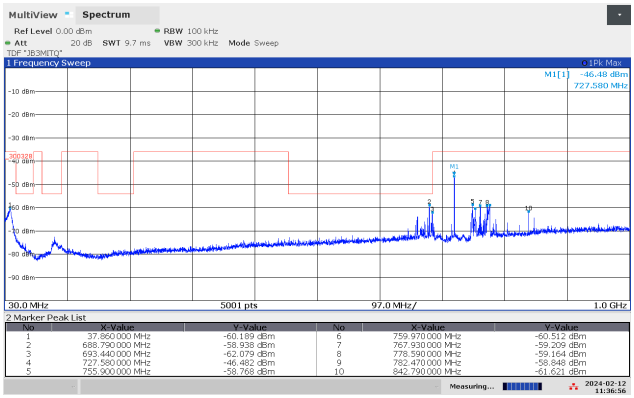
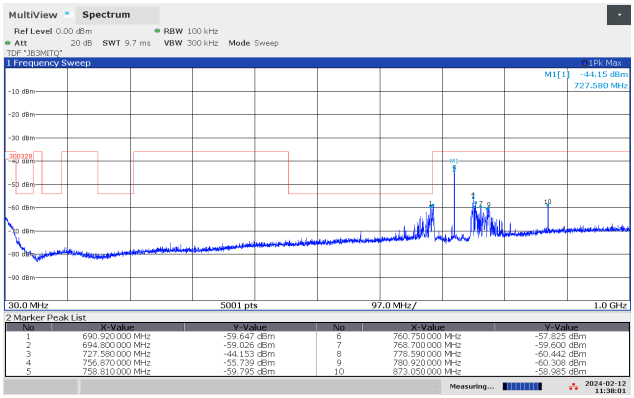


Emissions 30-1000 MHz, BLE 2440 + LTE B28 Ch27435, EUT XY, VP



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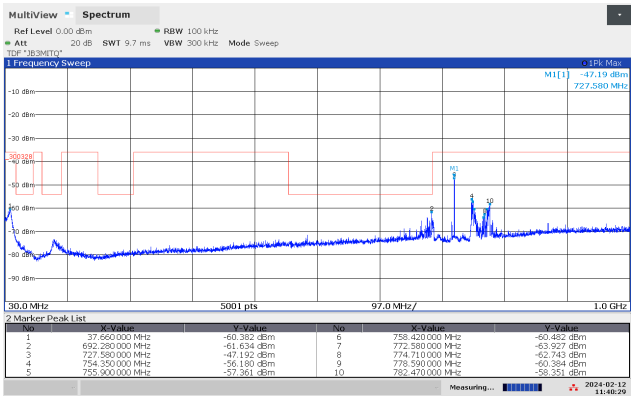
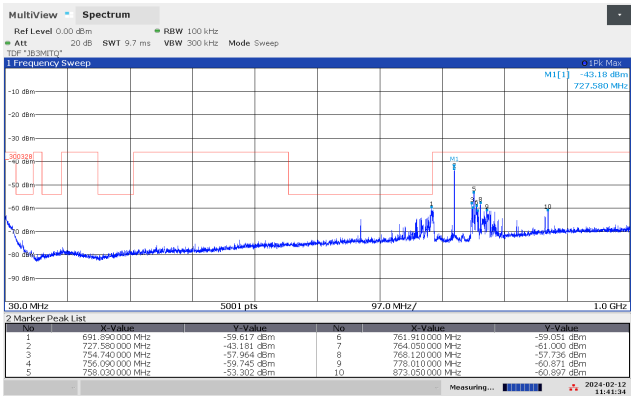


Emissions 30-1000 MHz, BLE 2440 + LTE B28 Ch27435, EUT YZ, VP



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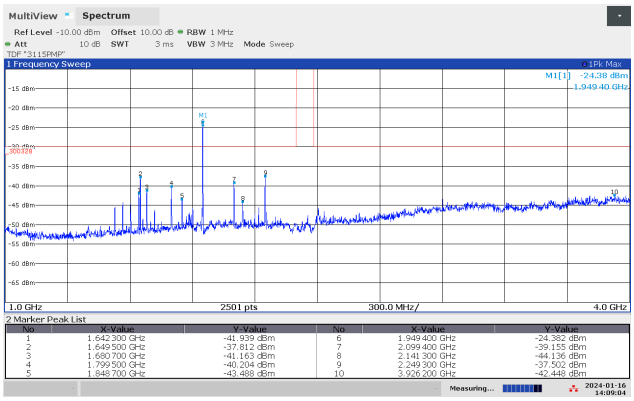
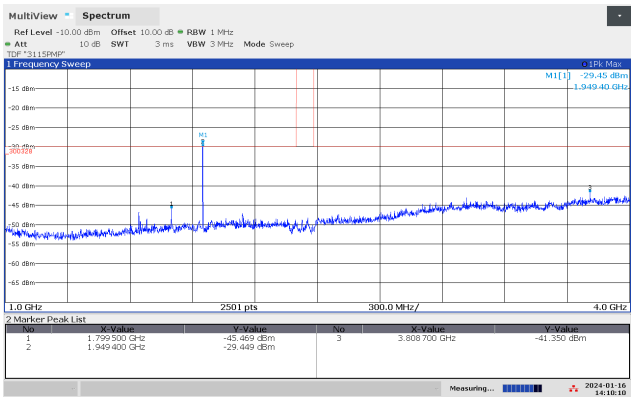
LINX Antenna



Emissions 1-4 GHz, BLE 2440 + LTE B01 Ch18300, VP



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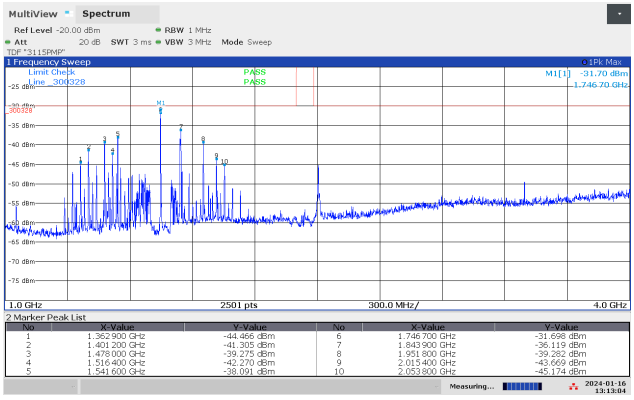
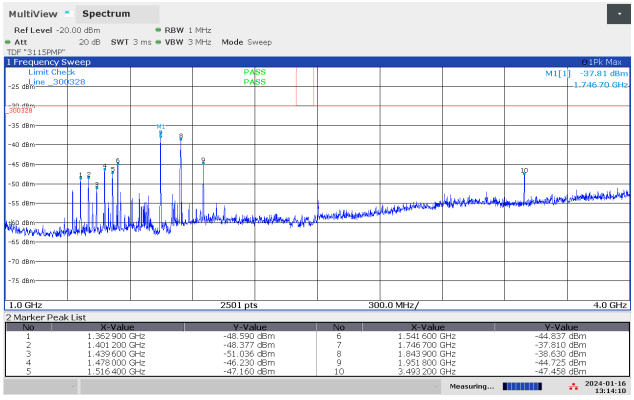


Emissions 1-4 GHz, BLE 2440 + LTE B03 Ch19575, VP



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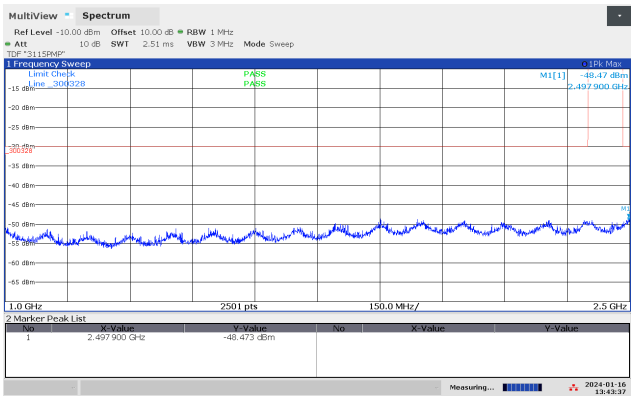
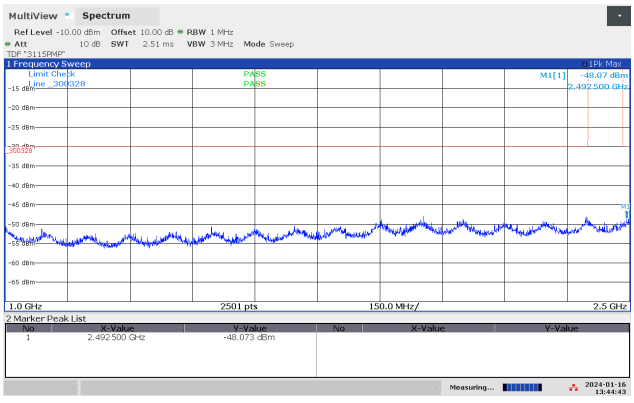


Emissions 1-2.5 GHz, BLE 2440 + LTE B08 Ch19575, VP



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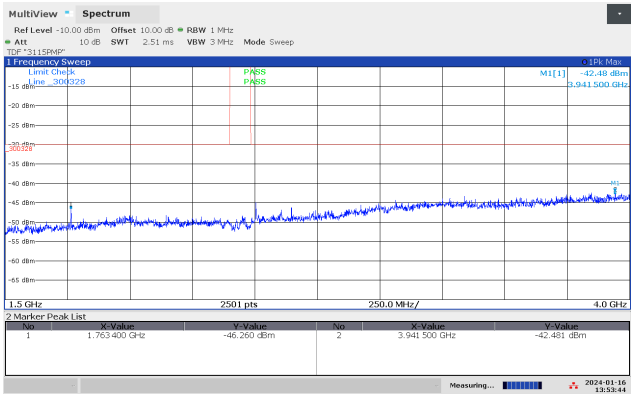
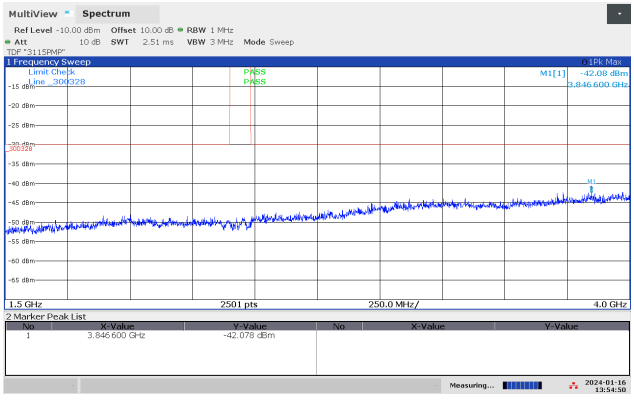


Emissions 1.5-4 GHz, BLE 2440 + LTE B08 Ch19575, VP



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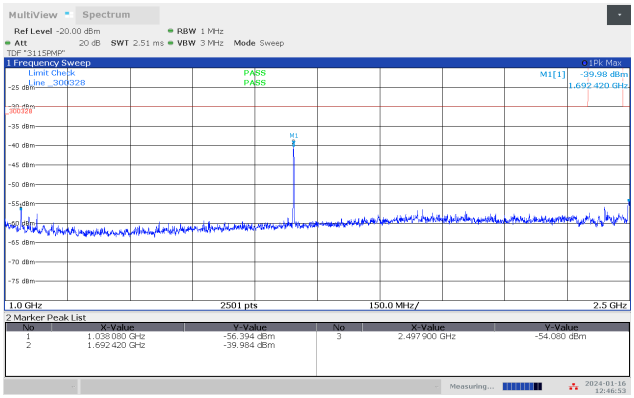
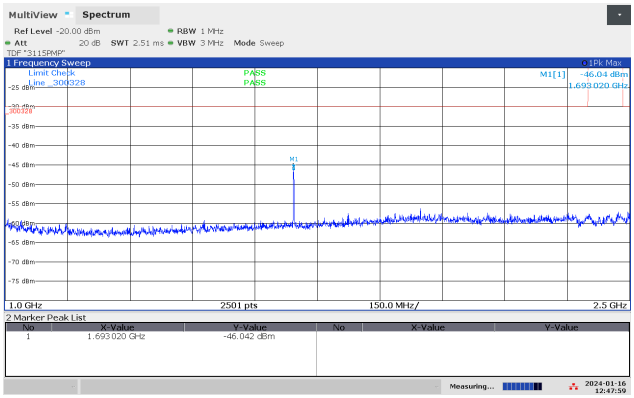
LINX Antenna



Emissions 1-2.5 GHz, BLE 2440 + LTE B20 Ch124300, VP



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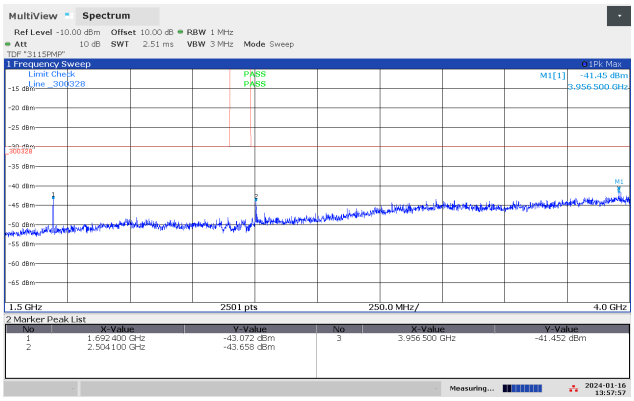
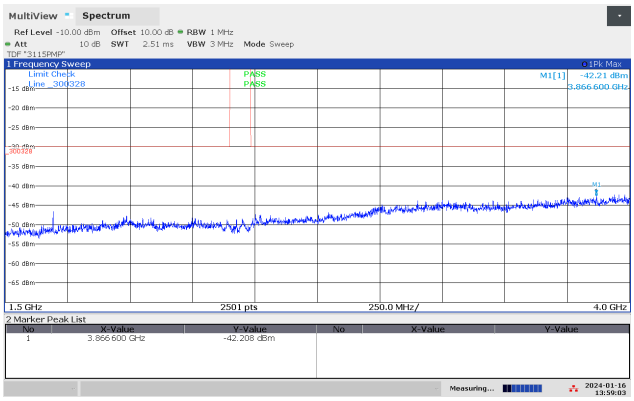


Emissions 1.5-4 GHz, BLE 2440 + LTE B20 Ch124300, VP



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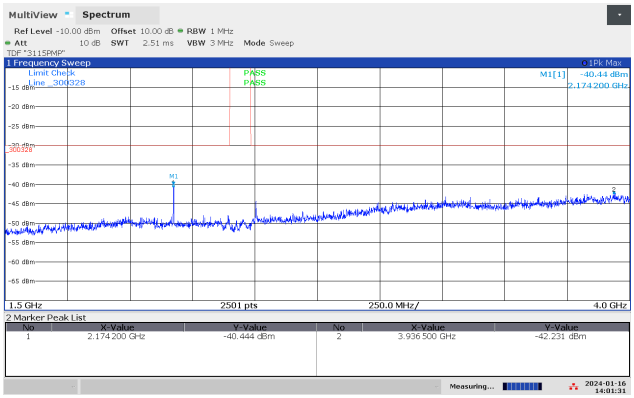
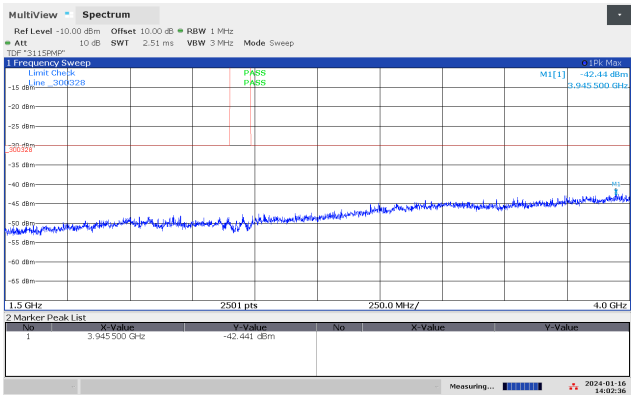
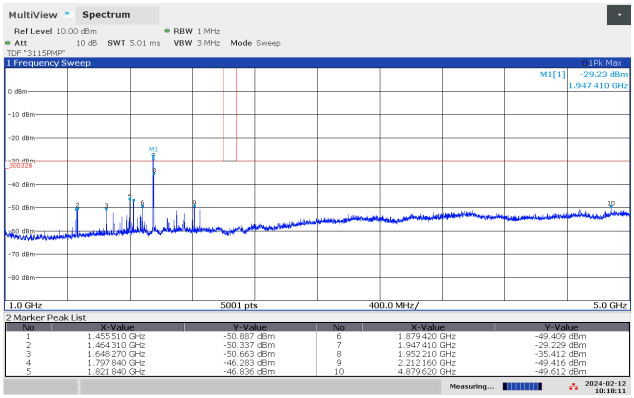


Emissions 1.5-4 GHz, BLE 2440 + LTE B28 Ch27435, VP

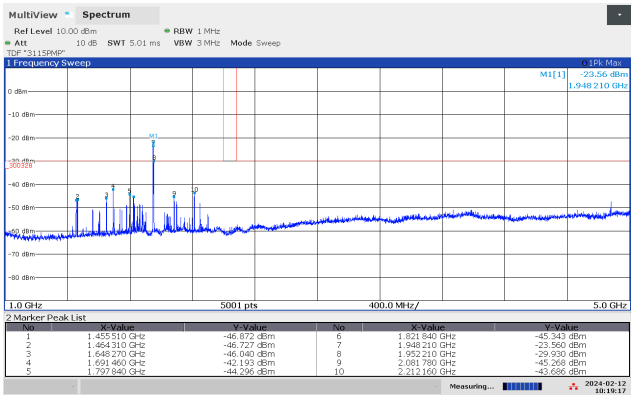


HP

2J Antenna



Emissions 1-5 GHz, BLE 2440 + LTE B01 Ch18300, EUT XY, VP



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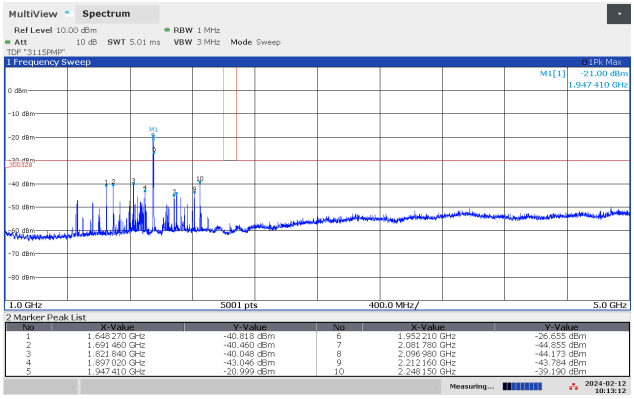
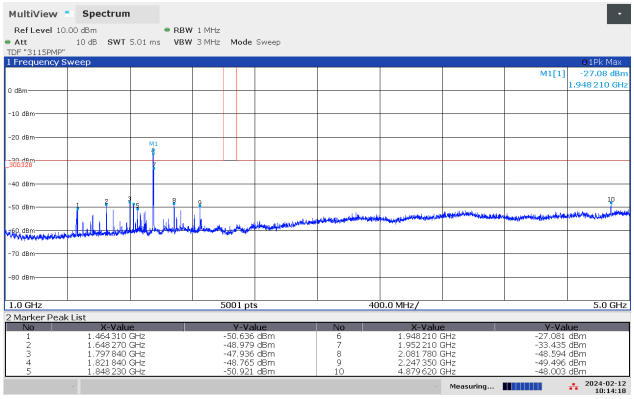


Emissions 1-5 GHz, BLE 2440 + LTE B01 Ch18300, EUT YZ, VP



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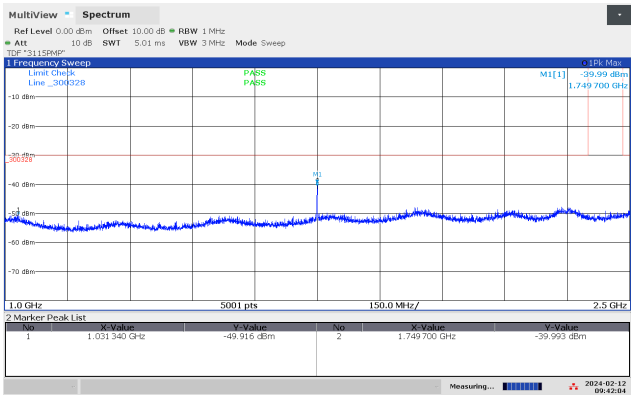
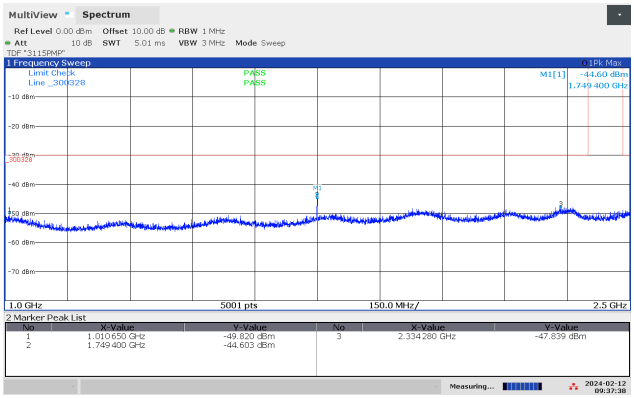


Emissions 1-2.5 GHz, BLE 2436 + LTE B03 Ch19575, EUT YZ, VP



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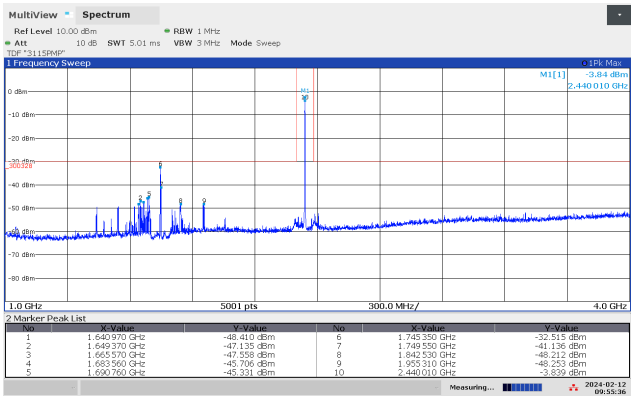
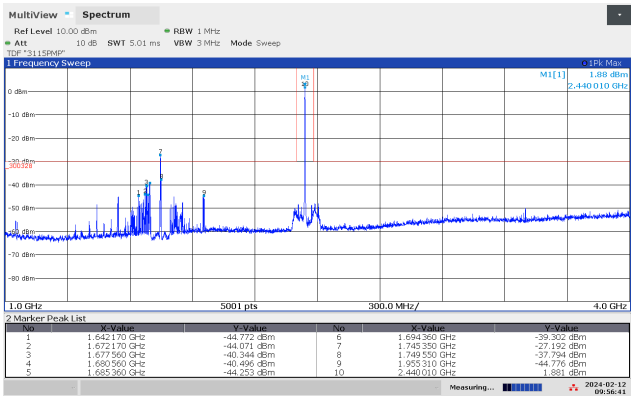
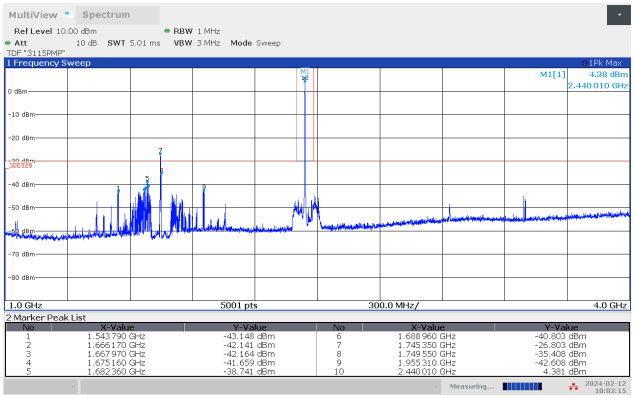


Emissions 1-4 GHz, BLE 2440 + LTE B03 Ch19575, EUT XY, VP

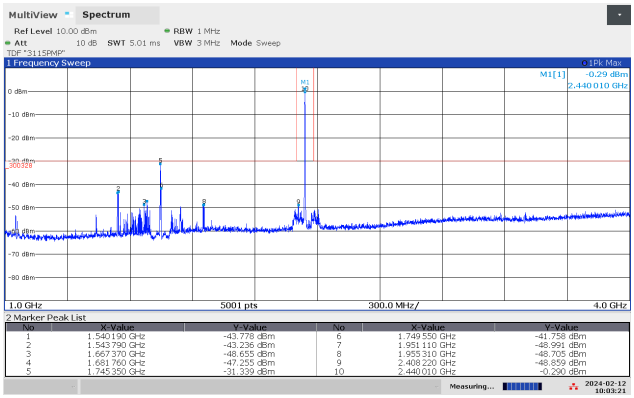


HP

2J Antenna



Emissions 1-4 GHz, BLE 2440 + LTE B03 Ch19575, EUT YZ, VP



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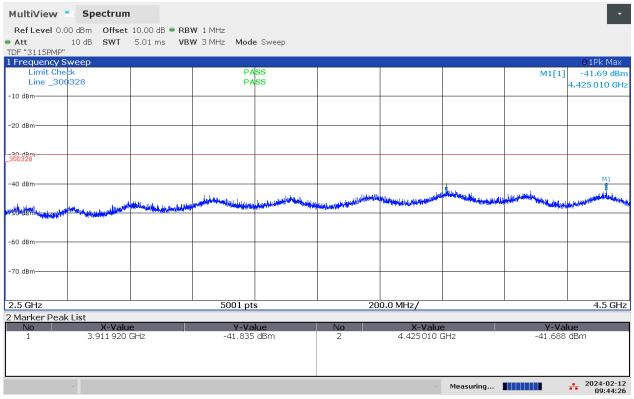
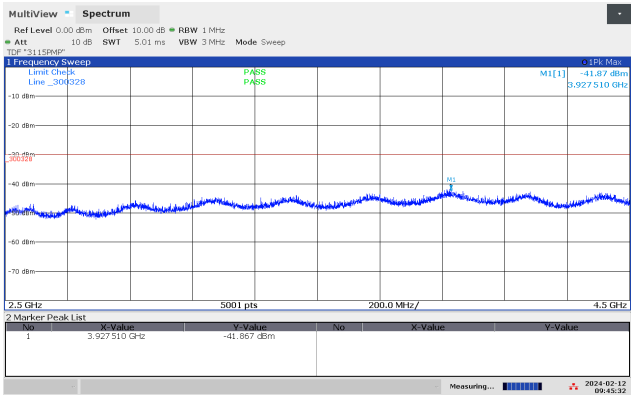


Emissions 2.5-4.5 GHz, BLE 2440 + LTE B03 Ch19575, EUT YZ, VP



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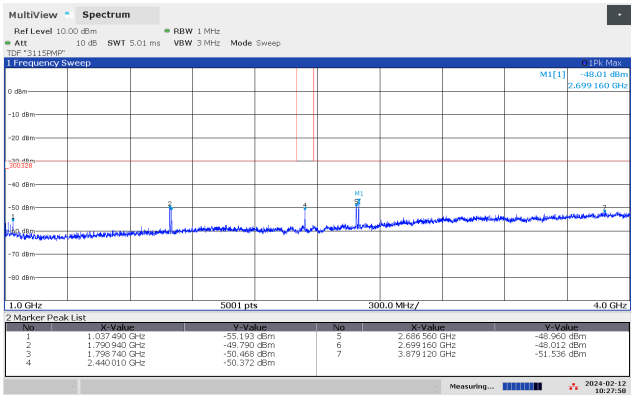
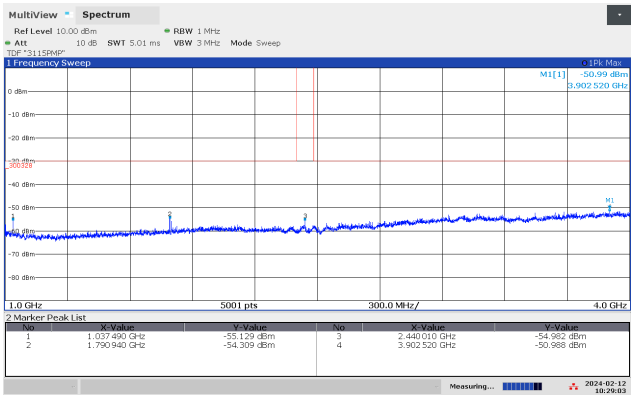


Emissions 1-4 GHz, BLE 2440 + LTE B08 Ch21625, EUT XY, VP



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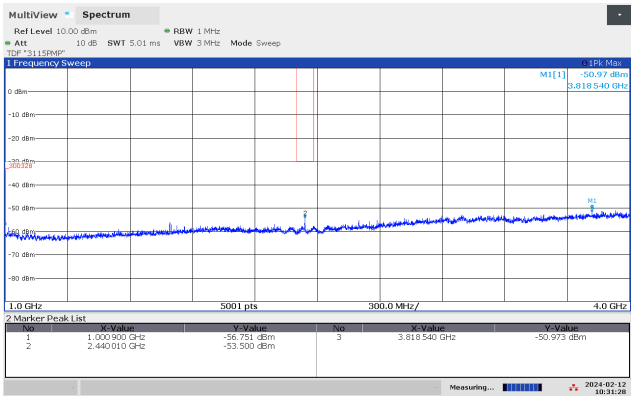
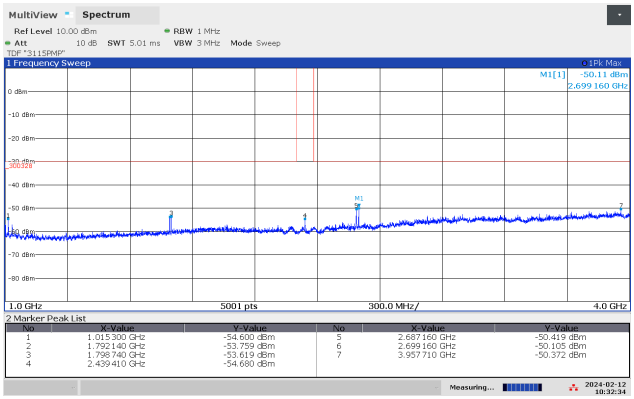


Emissions 1-4 GHz, BLE 2440 + LTE B08 Ch21625, EUT YZ, VP



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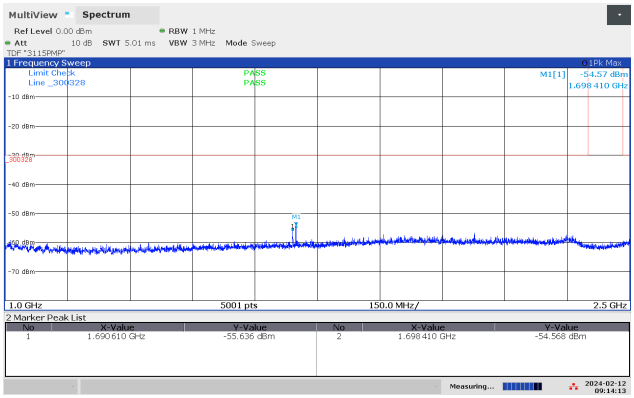
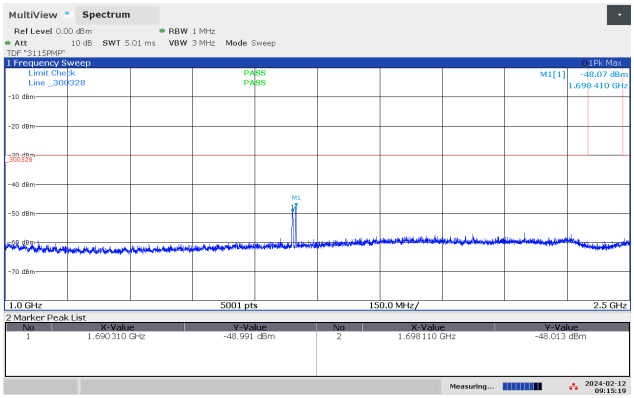
2J Antenna



Emissions 1-2.5 GHz, BLE 2436 + LTE B20 Ch24300, EUT XY, VP



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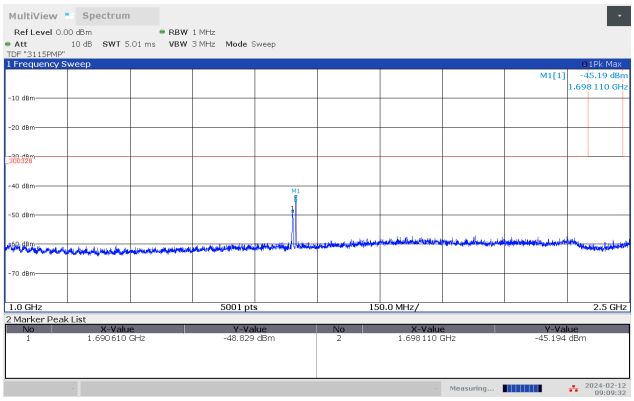
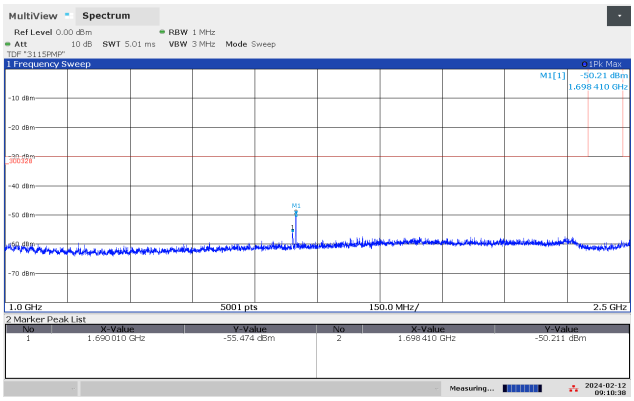


Emissions 1-2.5 GHz, BLE 2436 + LTE B20 Ch24300, EUT YZ, VP



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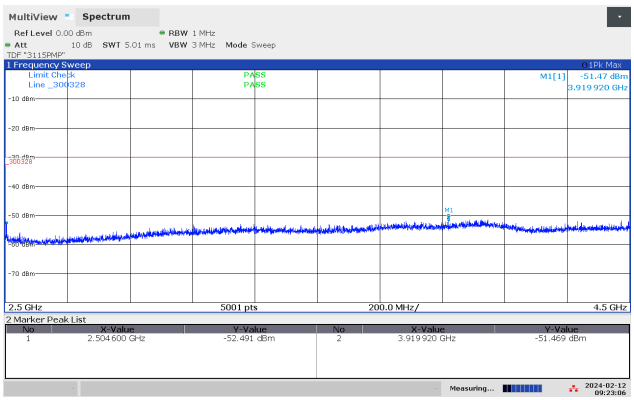
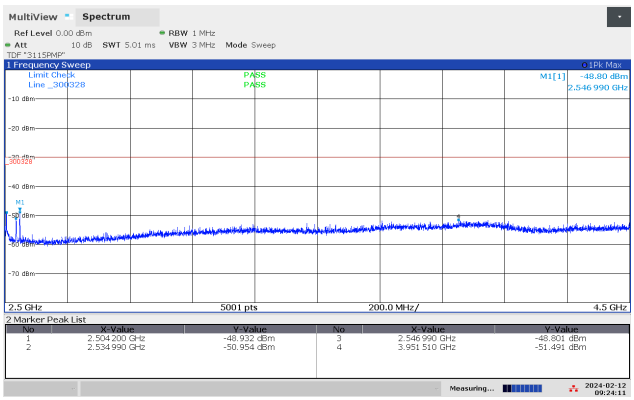


Emissions 2.5-4.5 GHz, BLE 2436 + LTE B20 Ch24300, EUT XY, VP



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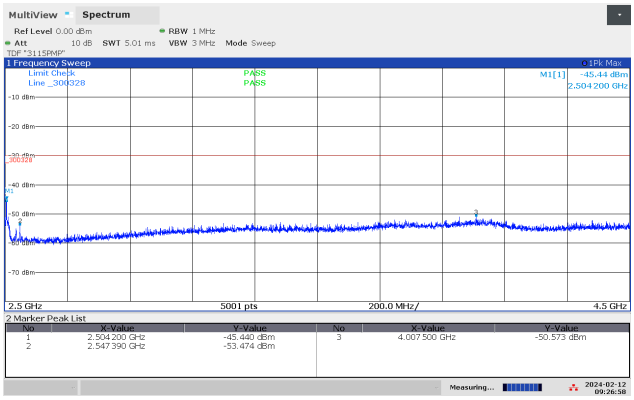
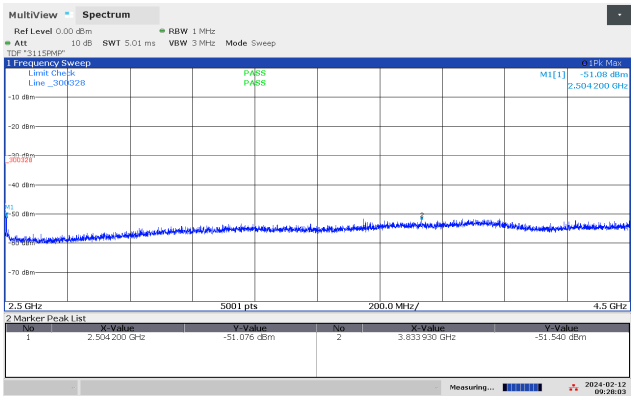
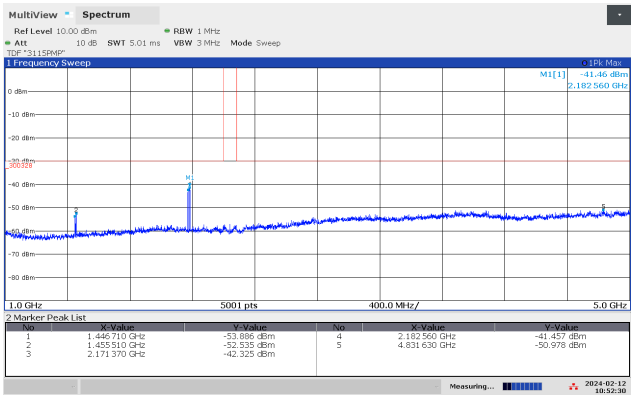


Emissions 2.5-4.5 GHz, BLE 2436 + LTE B20 Ch24300, EUT YZ, VP

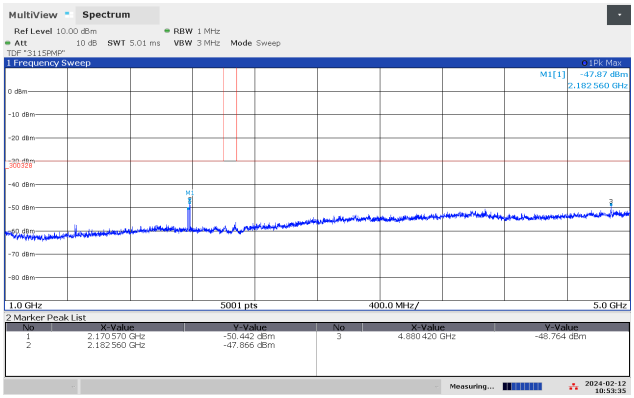


HP

2J Antenna



Emissions 1-5 GHz, BLE 2440 + LTE B28 Ch27435, EUT XY, VP



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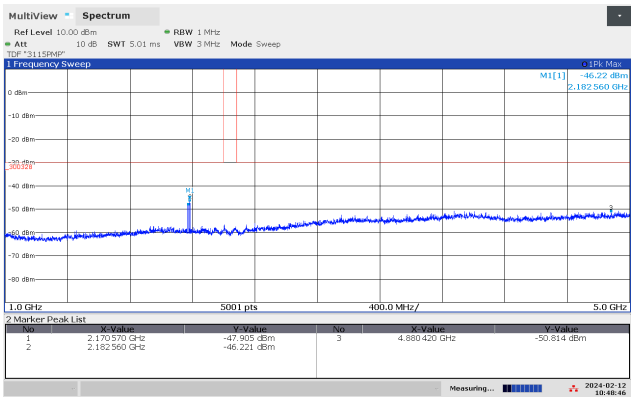
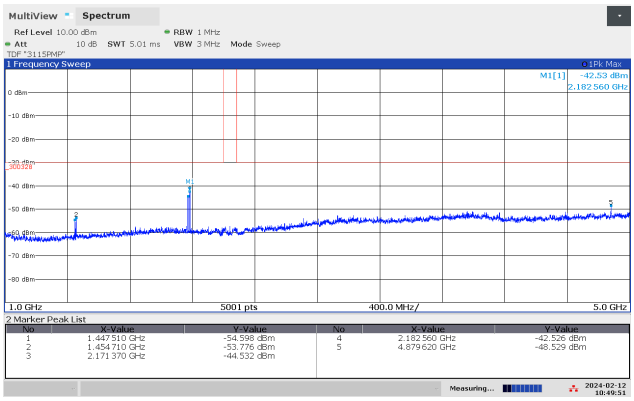


Emissions 1-5 GHz, BLE 2440 + LTE B28 Ch27435, EUT YZ, VP



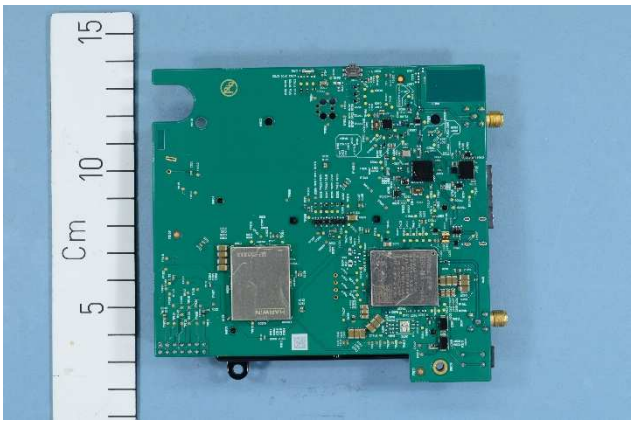
HP

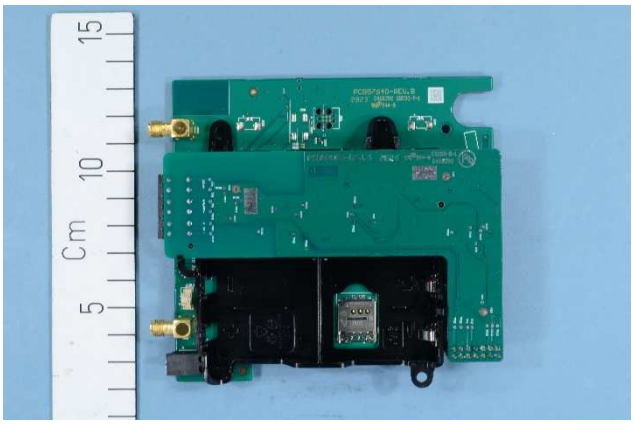
4 Measurement Uncertainty

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

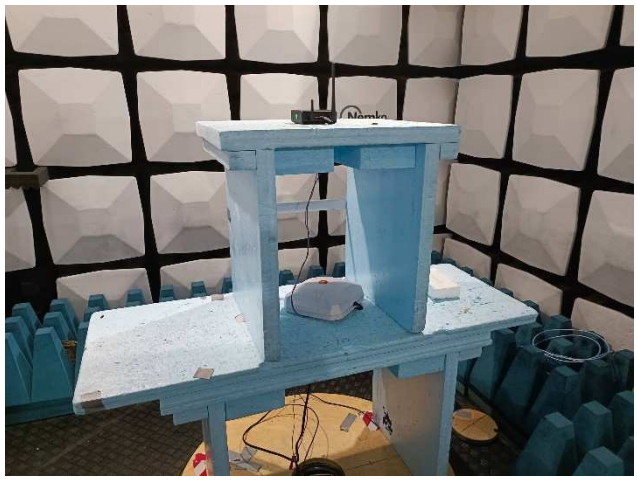
All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2

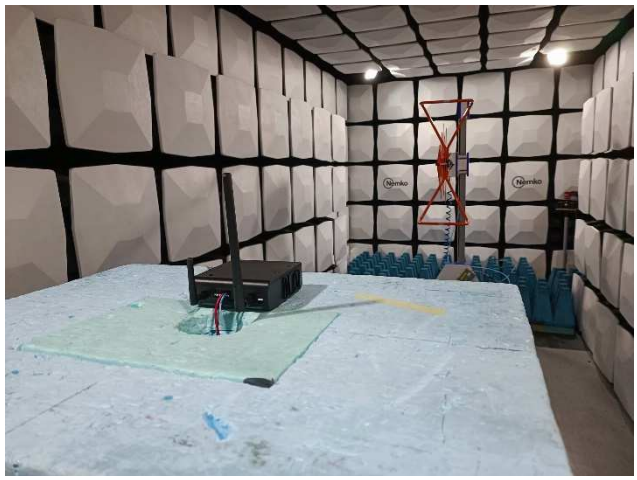
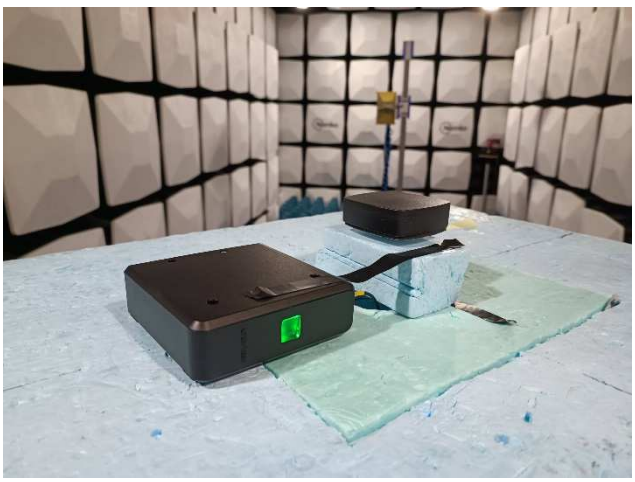
5 Photos of the EUT





6 Test Set-up Photos


7 Test Equipment Used

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 testhouse.

No.	Instrument	Type of instrument	Manufacturer	Ref. no.	Cal Date	Cal Due
1	FSW26	Spectrum Analyzer	Rohde & Schwarz	LR 1640	2024-01	2025-01
2	SMB100A	RF Signal Generator	Rohde & Schwarz	LR 1790	2023-01	2025-01
3	LNA-40-00101800	Pre-Amplifier	NardaMiteq	LR 1747	2023-08	2024-08
4	3115	Double Ridged Horn Antenna	EMCO	LR 1330	2022-11	2027-11
5	JB1	Bilog Antenna	SunAR	LR 1734	2022-11	2025-11
6	N0324415	BandStop Filter	Microwave Circuits	LR 1760	COU	
7	WLK5-1100-1485-7000-40SS	Low Pass Filter (1 GHz)	Wainwright Inst.	LR 1762	COU	
8	WRCGV14-693.5-703.5-746.5-756.5-70EE	Band Reject Filter (703.5-746.5 MHz)	Wainwright Inst.	LR 1794	COU	
9	WRCGV8-790.5-810.5-865.5-885.5-40EE	Band Reject Filter (810.5-865.5 MHz)	Wainwright Inst.	LR 1795	COU	
10	N0417483	Band Reject Filter (1710-1785MHz)	Microwave Circuits	LR 1767	COU	
11	N0408981	Band Reject Filter (880-915MHz)	Microwave Circuits	LR 1766	COU	
12	6HC1500/18000-3-KK	High Pass Filter (1.5 GHz)	Trilithic Inc.	LR 1612	COU	
13	WLK5-1100-1485-7000-40SS	Low Pass Filter	Wainwright Inst.	LR 1761	COU	
14	9205B	Power Supply	BK Precision	LR 1844	COU	
15	Model 87V	Multimeter	Fluke	LR 1597	2023-04	2024-04
16	CMW500	Radiocommunications Tester	Rohde & Schwarz	LR 1791	2022-02	2024-02

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