


# TEST REPORT


**Test Report No. :** UL-RPT-RP14614880JD02E

**Customer** : Apple Inc.  
**Model No. / HVIN** : A2918  
**PMN** : MacBook Pro  
**FCC ID** : BCGA2918  
**ISED Certification No.** : IC: 579C-A2918  
**Technology** : *Bluetooth* – Low Energy  
**Test Standard(s)** : FCC Parts 15.209(a) & 15.247  
Innovation, Science and Economic Development Canada  
RSS-247 Issue 2 February 2017  
RSS-Gen Issue 5 February 2021  
**Test Laboratory** : UL International (UK) Ltd, Basingstoke, Hampshire, RG24 8AH,  
United Kingdom

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3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 1.0.

**Date of Issue:** 08 June 2023

**Checked by:**   
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RF Operations Leader, Radio Laboratory

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Ben Mercer  
Lead Project Engineer, Radio Laboratory



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**UL International (UK) LTD**

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**Customer Information**

<b>Company Name:</b>	Apple Inc.
<b>Address:</b>	One Apple Park Way Cupertino, California 95014 U.S.A.
<b>Contact Name:</b>	Stuart Thomas

**Report Revision History**

<b>Version Number</b>	<b>Issue Date</b>	<b>Revision Details</b>	<b>Revised By</b>
1.0	08/06/2023	Initial Version	Sarah Williams

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## **1 Attestation of Test Results**

### **1.1 Description of EUT**

The equipment under test was a portable laptop computer.

### **1.2 General Information**

<b>Specification Reference:</b>	47CFR15.247
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) – Section 15.247
<b>Specification Reference:</b>	47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) – Section 15.209
<b>Specification Reference:</b>	RSS-Gen Issue 5 February 2021
<b>Specification Title:</b>	General Requirements for Compliance of Radio Apparatus
<b>Specification Reference:</b>	RSS-247 Issue 2 February 2017
<b>Specification Title:</b>	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
<b>Site Registration:</b>	FCC: 685609, ISEDC: 20903
<b>FCC Lab. Designation No.:</b>	UK2011
<b>ISEDC CABID:</b>	UK0001
<b>Location of Testing:</b>	Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, G24 8AH, United Kingdom
<b>Test Dates:</b>	16 March 2023 to 26 April 2023

### **1.3 Summary of Test Results**

<b>FCC Reference (47CFR)</b>	<b>ISED Canada Reference</b>	<b>Measurement</b>	<b>Result</b>
N/A	RSS-Gen 6.7	Transmitter 99% Occupied Bandwidth	Complied
Part 15.247(a)(2)	RSS-Gen 6.7 / RSS-247 5.2(a)	Transmitter Minimum 6 dB Bandwidth	Complied
Part 15.247(b)(3)	RSS-Gen 6.12 / RSS-247 5.4(d)	Transmitter Maximum Peak Output Power	Complied
Part 15.247(e)	RSS-247 5.2(b)	Transmitter Power Spectral Density	Complied
Part 15.247(d) & 15.209(a)	RSS-Gen 6.13 / RSS-247 5.5	Transmitter Radiated Emissions	Complied
Part 15.247(d) & 15.209(a)	RSS-Gen 6.13 / RSS-247 5.5	Transmitter Band Edge Radiated Emissions	Complied

### **1.4 Deviations from the Test Specification**

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

## **2 Summary of Testing**

### **2.1 Facilities and Accreditation**

The test site and measurement facilities used to collect data are located at Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom. The following table identifies which facilities were utilised for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

Site 1	X
Site 2	-
Site 17	X

UL International (UK) Ltd is accredited by the United Kingdom Accreditation Service (UKAS). UKAS is one of the signatories to the International Laboratory Accreditation Co-operation (ILAC) Arrangement for the mutual recognition of test reports. The tests reported herein have been performed in accordance with its terms of accreditation.

### **2.2 Methods and Procedures**

<b>Reference:</b>	ANSI C63.10-2013
<b>Title:</b>	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
<b>Reference:</b>	KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019
<b>Title:</b>	Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of the FCC Rules
<b>Reference:</b>	KDB 662911 D01 Multiple Transmitter Output v02r01 October 31, 2013
<b>Title:</b>	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

## **2.3 Calibration and Uncertainty**

### **Measuring Instrument Calibration**

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

### **Measurement Uncertainty & Decision Rule**

#### **Overview**

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

#### **Decision Rule**

The decision rule applied is based upon the accuracy method criteria. The measurement uncertainty is met and the result is considered in conformance with the requirement criteria if the observed value is within the prescribed limit.

#### **Measurement Uncertainty**

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
99% Occupied Bandwidth	2.4 GHz to 2.4835 GHz	95%	±3.92 %
Minimum 6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±4.59 %
Spectral Power Density	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Conducted Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	±5.32 dB
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±3.30 dB
Radiated Spurious Emissions	1 GHz to 25 GHz	95%	±3.16 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

## 2.4 Test and Measurement Equipment

### Test Equipment Used for Transmitter Conducted Tests

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2042	Thermohygrometer	Testo	608-H1	45046425	09 Dec 2023	12
A2508	Attenuator	AtlanTecRF	AN18-10	821846#3	Calibrated before use	-
M2036	Signal Analyser	Rohde & Schwarz	FSV30	101791	10 Jun 2023	12
G207635	Signal Generator	Rohde & Schwarz	SMCV100B	103200	07 Oct 2025	36

### Test Equipment Used for Transmitter Radiated Emissions Tests

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	09 Dec 2023	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	08 Nov 2023	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	02 Nov 2023	12
A2863	Pre-Amplifier	Keysight	8449B	3008A02100	07 Nov 2023	12
A223628	Pre-Amplifier	Atlantic Microwave	A-LNAKX-380116-S5S5	210837001	03 Nov 2023	12
A3265	Pre-Amplifier	Schwarzbeck	BBV 9721	9721-069	31 Oct 2023	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	00653	02 Nov 2023	12
A2890	Antenna	Schwarzbeck	HWRD 750	014	02 Nov 2023	12
A2892	Antenna	Schwarzbeck	BBHA 9170	9170-727	31 Oct 2023	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#2	25 Jan 2024	12
A2914	High Pass Filter	AtlanTecRF	AFH-03000	2155	25 Jan 2024	12
A2947	High Pass Filter	AtlanTecRF	AFH-07000	1601900001	25 Jan 2024	12
M2040	Thermohygrometer	Testo	608-H1	45124934	09 Dec 2023	12
K0001	3m RSE Chamber	Rainford EMC	N/A	N/A	05 Sep 2023	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	19 May 2023	12
A3165	Mag Loop Antenna	ETS-Lindgren	6502	00224383	05 May 2023	12
A3161	Antenna	Teseq, Inc	CBL6111D	50859	03 May 2023	12
A3113	Attenuator	AtlanTecRF	AN18-06	219706#3	03 May 2023	12
A3085	Low Pass Filter	AtlanTecRF	AFL-02000	18051600014	26 Jan 2024	12
A3154	Pre Amplifier	Com Power	PAM-103	18020012	18 Aug 2023	12

**Test and Measurement Equipment (continued)****Test Equipment Used for Transmitter Band Edge Radiated Emissions Tests**

<b>Asset No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
M2040	Thermohygrometer	Testo	608-H1	45046641	09 Dec 2023	12
K0001	3m RSE Chamber	Rainford EMC	N/A	N/A	05 Sep 2023	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	19 May 2023	12
A3179	Pre-Amplifier	Hewlett Packard	8449B	3008A00934	14 Sep 2023	12
A3138	Antenna	Schwarzbeck	BBHA 9120 B	00702	22 Aug 2023	12
A2523	Attenuator	AtlanTecRF	AN18W5-10	832827#1	26 Jan 2024	12
M2003	Thermohygrometer	Testo	608-H1	45046641	09 Dec 2023	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	08 Nov 2023	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	02 Nov 2023	12
A2863	Pre-Amplifier	Keysight	8449B	3008A02100	07 Nov 2023	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#2	25 Jan 2024	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	00653	02 Nov 2023	12



### **3 Equipment Under Test (EUT)**

#### **3.1 Identification of Equipment Under Test (EUT)**

<b>Brand Name:</b>	Apple
<b>Model Name or Number / HVIN:</b>	A2918
<b>PMN:</b>	MacBook Pro
<b>Test Sample Serial Number:</b>	VXT97D7WDV <i>(Conducted sample)</i>
<b>Hardware Version:</b>	REV 1.0
<b>Software Version:</b>	22E21820r
<b>FCC ID:</b>	BCGA2918
<b>ISED Canada Certification Number:</b>	IC: 579C-A2918
<b>Date of Receipt:</b>	06 April 2023

<b>Brand Name:</b>	Apple
<b>Model Name or Number / HVIN:</b>	A2918
<b>PMN:</b>	MacBook Pro
<b>Test Sample Serial Number:</b>	J5047MKVKJ <i>(Radiated sample)</i>
<b>Hardware Version:</b>	REV 1.0
<b>Software Version:</b>	22E21820r
<b>FCC ID:</b>	BCGA2918
<b>ISED Canada Certification Number:</b>	IC: 579C-A2918
<b>Date of Receipt:</b>	14 March 2023

#### **3.2 Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

### 3.3 Additional Information Related to Testing

<b>Technology Tested:</b>	<i>Bluetooth</i> Low Energy (Digital Transmission System)		
<b>Type of Unit:</b>	Transceiver		
<b>Channel Spacing:</b>	2 MHz		
<b>Modulation:</b>	GFSK		
<b>Data Rate: LE1M</b>	1 Mbps		
<b>Data Rate: LE2M</b>	2 Mbps		
<b>Power Supply Requirement(s):</b>	Nominal	12 VDC via 120 VAC 60 Hz AC/DC supply	
<b>Maximum Conducted Output Power:</b>	11.7 dBm		
<b>Transmit Frequency Range:</b>	2400 MHz to 2483.5 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	37	2402
	Middle	17	2440
	Top	39	2480

### 3.4 Description of Available Antennas

The radio utilizes three integrated antennas, with the following maximum gain:

Antenna Port	Frequency Range (MHz)	Antenna Gain (dBi)
Core 0	2400 to 2480	5.0
Core 1	2400 to 2480	5.8
Dedicated Core	2400 to 2480	5.8

The EUT also supports TxBF with unequal gains and equal transmit powers. Calculations for directional gain were in accordance with KDB 662911 D01 v02r01 Section F)2)d)(i). Directional gain of Core 0 & Core 1 was calculated as:

$$N_{ANT} = 2, G_{Core0} = 5.0 \text{ dBi}, G_{Core1} = 5.8 \text{ dBi}$$

$$\begin{aligned} \text{Directional Gain} &= 10 \log \left[ \frac{\left( 10^{\frac{G_1}{20}} + 10^{\frac{G_2}{20}} + \dots + 10^{\frac{G_N}{20}} \right)^2}{N_{ANT}} \right] = 10 \log \left[ \frac{\left( 10^{\frac{G_1}{20}} + 10^{\frac{G_2}{20}} \right)^2}{2} \right] \\ &= 10 \log \left[ \frac{\left( 10^{\frac{5.0}{20}} + 10^{\frac{5.8}{20}} \right)^2}{2} \right] = 8.4 \text{ dBi} \end{aligned}$$

### **3.5 Description of Test Setup**

#### **Support Equipment**

The following support equipment was used to exercise the EUT during testing:

<b>Description:</b>	Test Laptop
<b>Brand Name:</b>	Apple
<b>Model Name or Number:</b>	MacBook Pro
<b>Serial Number:</b>	FVFDH03JQ05G

<b>Description:</b>	USB Diagnostic Cable
<b>Brand Name:</b>	Apple
<b>Model Name or Number:</b>	Chimp
<b>Serial Number:</b>	30A99B

<b>Description:</b>	MicroSD Card
<b>Brand Name:</b>	Sandisk Edge
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	SD Card Adaptor
<b>Brand Name:</b>	Verbatim
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Power Adaptor
<b>Brand Name:</b>	Apple
<b>Model Name or Number:</b>	A1632
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Personal Hands Free (PHF)
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	HDMI Cable. Length 3 m.
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

**Support Equipment (continued)**

<b>Description:</b>	USB-C Dock Termination Hub
<b>Brand Name:</b>	Lenovo
<b>Model Name or Number:</b>	LDC-G2
<b>Serial Number:</b>	ZKW1XQR0

<b>Description:</b>	USB-C to A Adaptor. Quantity 2.
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	USB-C Cable. Length 3 m. Quantity 2.
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

## **Operating Modes**

The EUT was tested in the following operating mode(s):

- Transmitting at maximum power in *Bluetooth* LE mode with modulation, maximum possible data length available and Pseudorandom Bit Sequence 9.
- Transmitting at maximum power in *Bluetooth* LE2M mode with modulation, maximum possible data length available and Pseudorandom Bit Sequence 9.

## **Configuration and Peripherals**

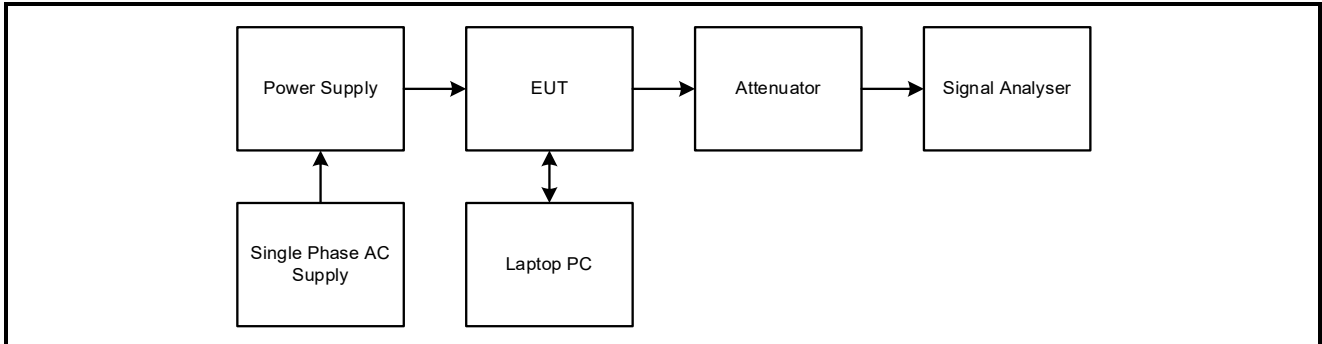
The EUT was tested in the following configuration(s):

- Controlled in test mode using a set of commands entered into a terminal application on the EUT supplied by the customer. The commands were used to enable a continuous transmission and to select the test channels as required.
- The EUT has a dedicated core (core 2), which operates in SISO mode only, in addition to two cores which operate in both SISO and TxBF modes. Core 0 & Core 1 are identical but have unequal gains therefore conducted tests have been performed on the Core with the highest antenna gain. Modes tested were.
  - LE1M / SISO / Core 1
  - LE2M / SISO / Core 1
  - LE1M / SISO / Core 2
  - LE2M / SISO / Core 2
  - LE1M / Beamforming / Core 0 + Core 1
  - LE2M / Beamforming / Core 0 + Core 1
- The customer supplied U.FL RF cables with the EUT in order to perform conducted measurements. This measured additional path loss was included in any path loss calculations.
- The EUT was powered from a 120 VAC 60 Hz single phase mains supply.
- Transmitter radiated spurious emissions tests were performed with the EUT transmitting in LE2M Beamforming Core 0 + Core 1 mode, as this mode was found to transmit the highest power and spectral density.
- Radiated spurious emissions were performed with the EUT in the position that produced worst case with respect to emissions. All ports were terminated into suitable terminations and placed under the turntable.

**Test Setup Diagrams**

**Conducted Tests:**

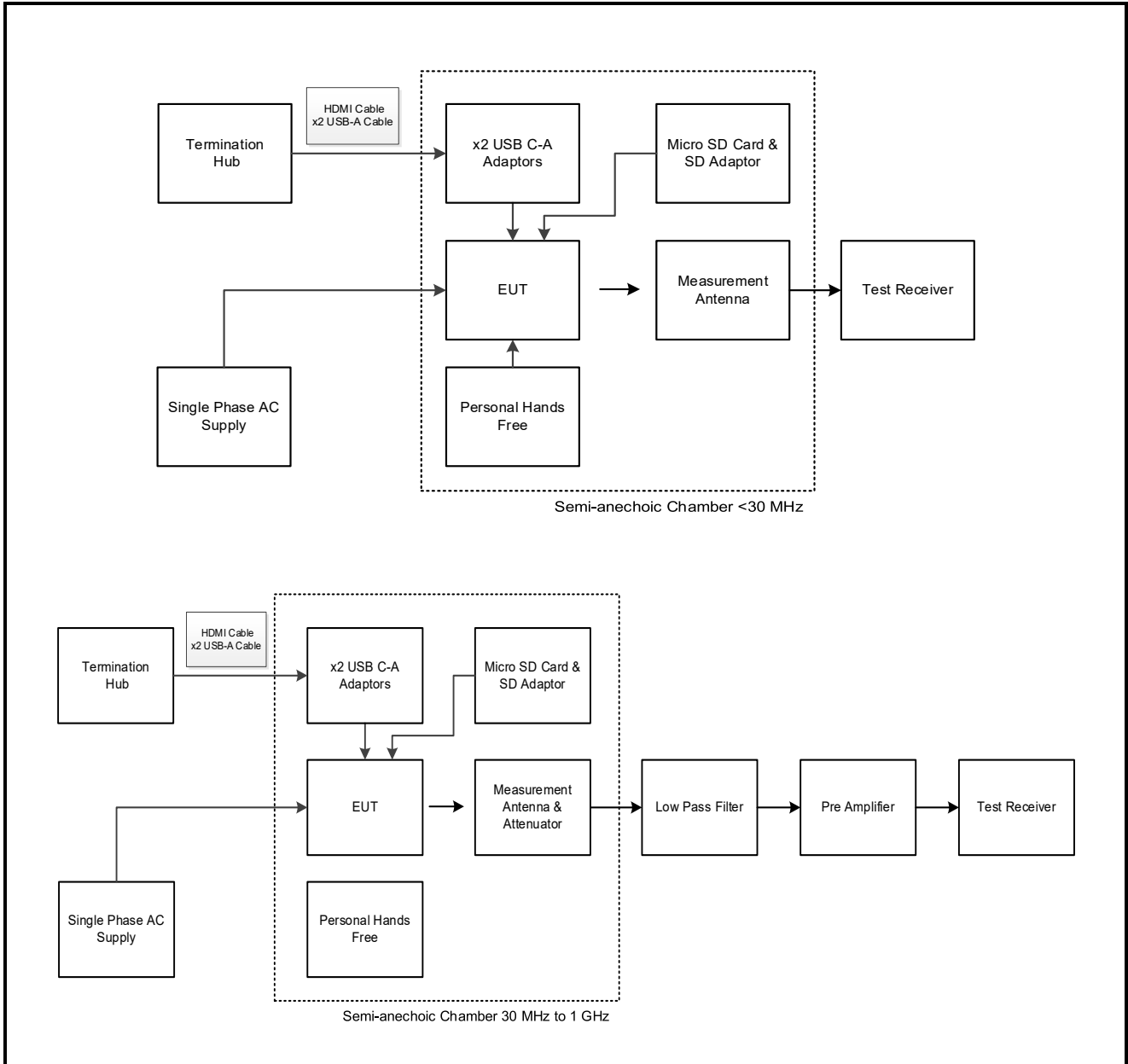
**Test Setup for Transmitter Conducted Tests**



**Test Setup Diagrams (continued)**

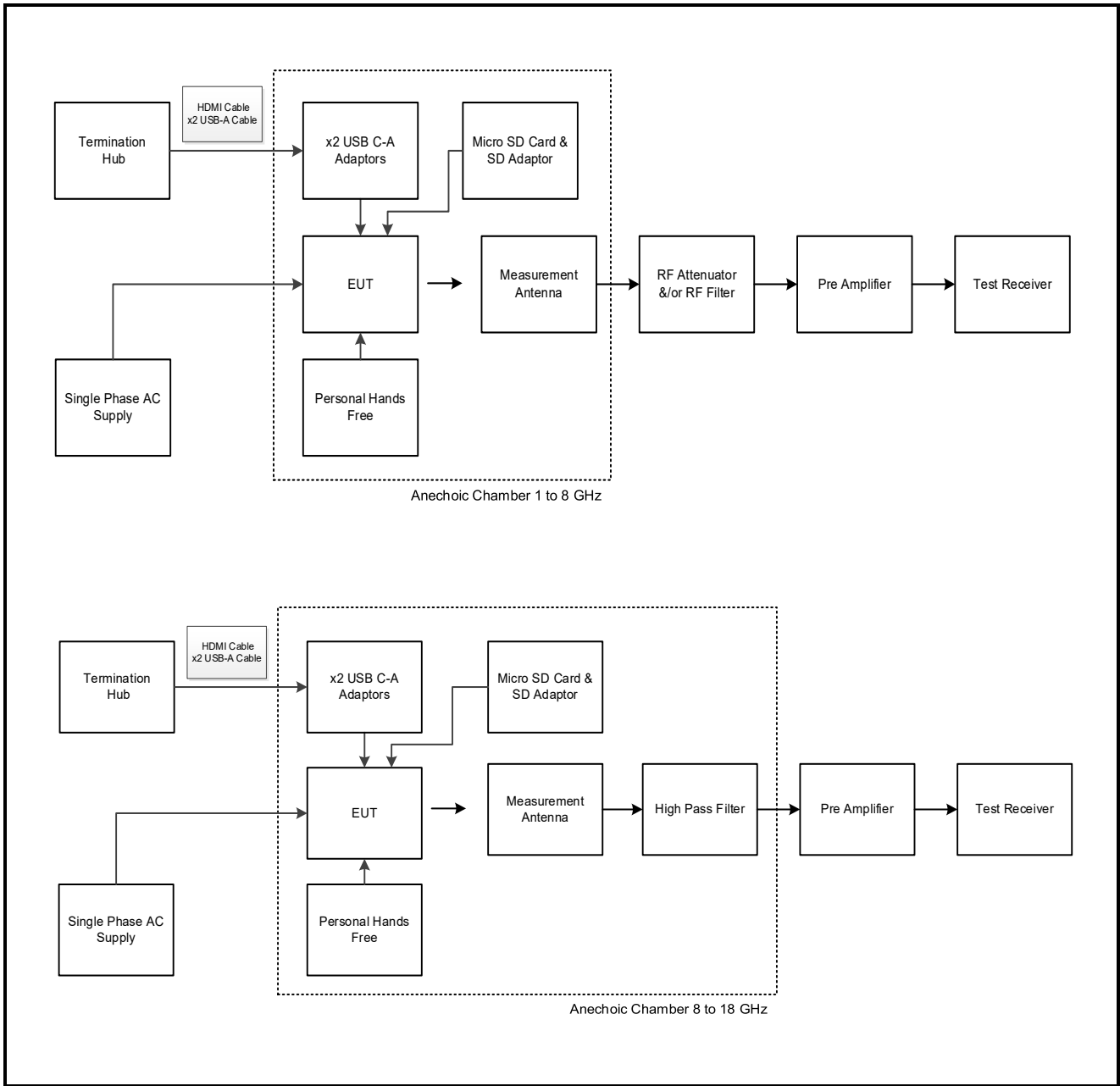
**Radiated Tests:**

**Test Setup for Transmitter Radiated Emissions**



**Test Setup Diagrams (continued)**

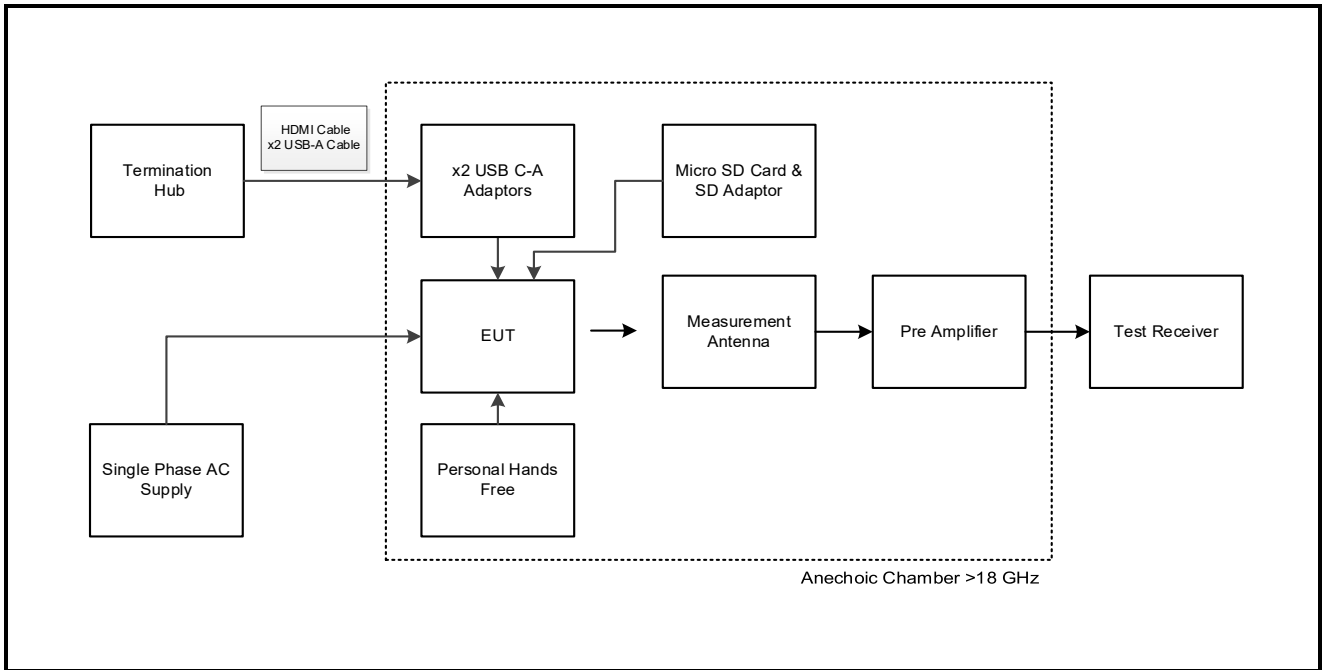
**Test Setup for Transmitter Radiated Emissions (continued)**





**Test Setup Diagrams (continued)**

**Test Setup for Transmitter Radiated Emissions (continued)**



## **4 Antenna Port Test Results**

### **4.1 Transmitter 99% Occupied Bandwidth**

#### **Test Summary:**

<b>Test Engineers:</b>	Max Passell & Jiyu Zou	<b>Test Date:</b>	20 April 2023
<b>Test Sample Serial Number:</b>	VXT97D7WDV		

<b>FCC Reference:</b>	N/A
<b>ISED Canada Reference:</b>	RSS-Gen 6.7
<b>Test Method Used:</b>	RSS-Gen 6.7 and Notes below

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	32

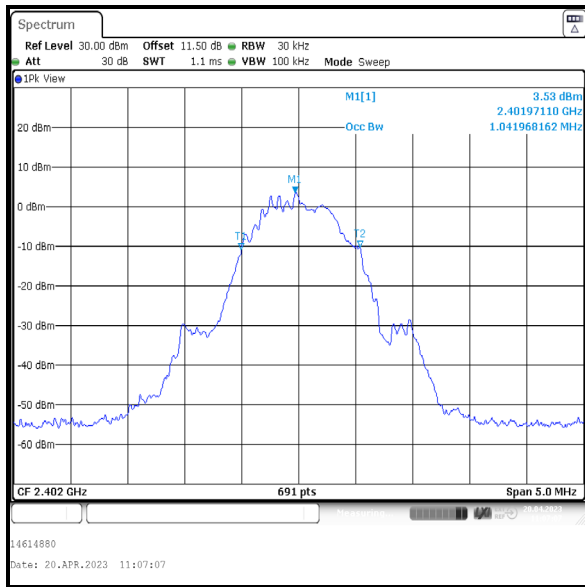
#### **Note(s):**

1. The 99% emission bandwidth was measured using the signal analyser occupied bandwidth function. The resolution bandwidth was set in the range of 1% to 5% of the occupied bandwidth and the video bandwidth set to 3 times the resolution bandwidth. The span was set to capture all products of the modulation process including emission skirts.
2. The signal analyser resolution bandwidth was set to 30 kHz and video bandwidth 100 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 5 MHz. The signal analyser function set the measurements to be made at 99% of the emission bandwidth. The results are given in the tables below.
3. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.

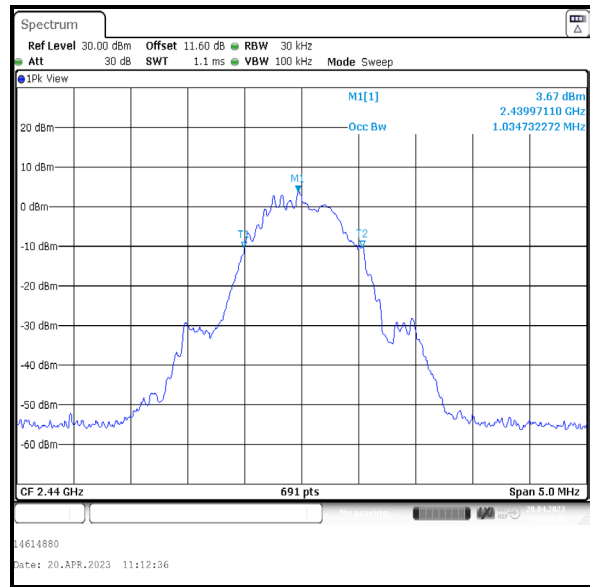
**Transmitter 99% Occupied Bandwidth (continued)**

**Results: LE1M / SISO / Core 1**

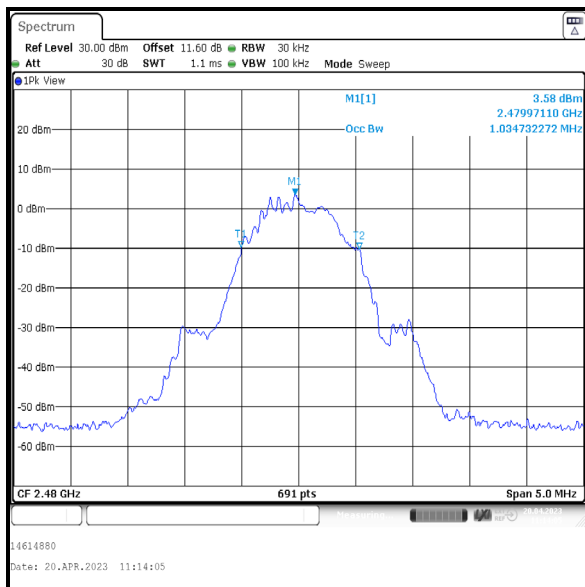
Channel	99% Occupied Bandwidth (kHz)
Bottom	1041.968
Middle	1034.732
Top	1034.732



Bottom Channel



Middle Channel

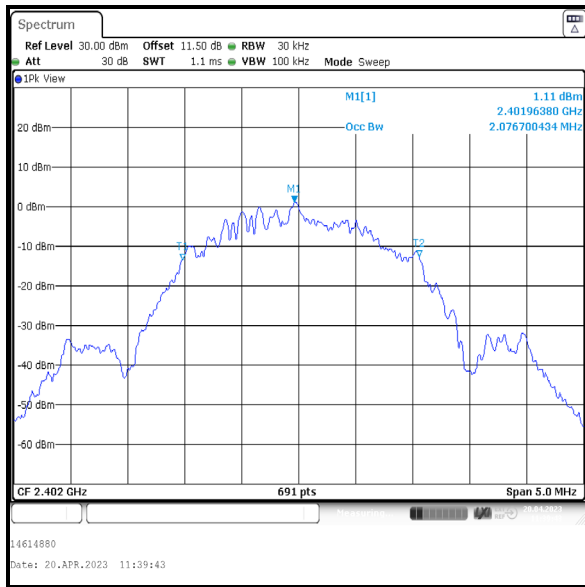


Top Channel

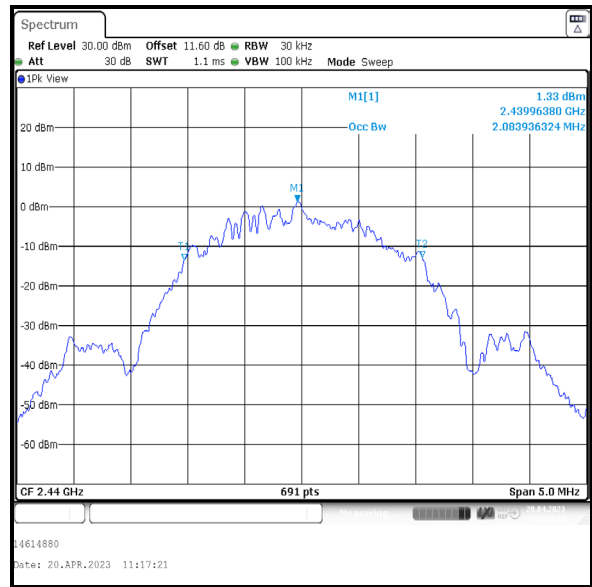
**Transmitter 99% Occupied Bandwidth (continued)**

**Results: LE2M / SISO / Core 1**

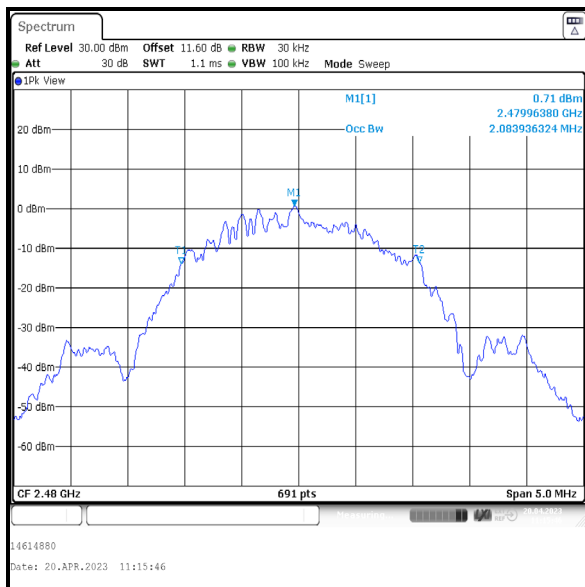
Channel	99% Occupied Bandwidth (kHz)
Bottom	2076.700
Middle	2083.936
Top	2083.936



**Bottom Channel**



**Middle Channel**

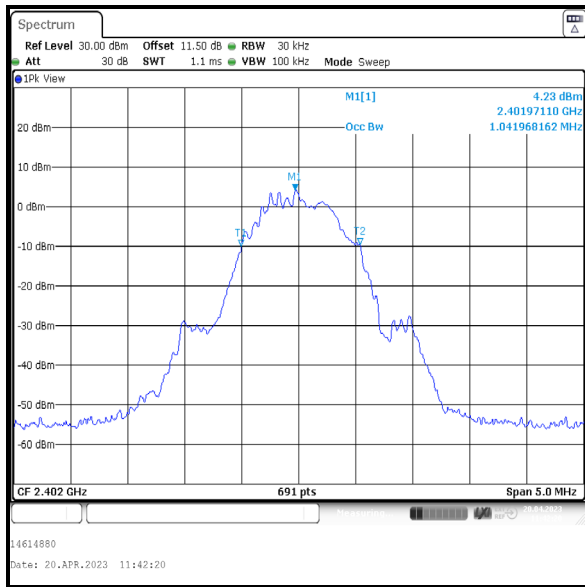


**Top Channel**

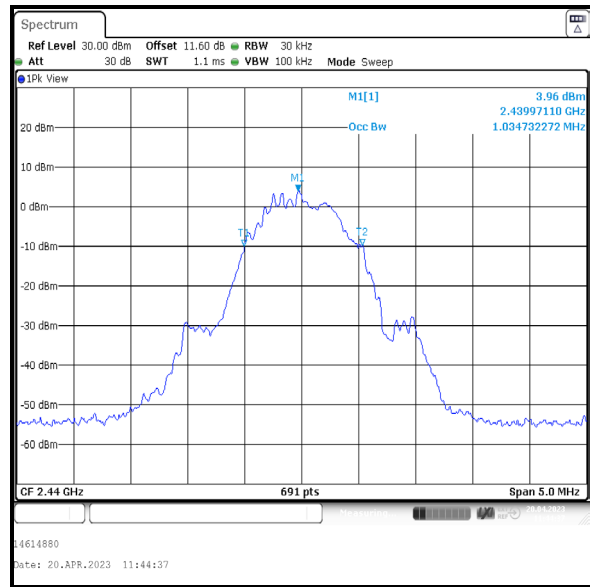
**Transmitter 99% Occupied Bandwidth (continued)**

**Results: LE1M / SISO / Core 2**

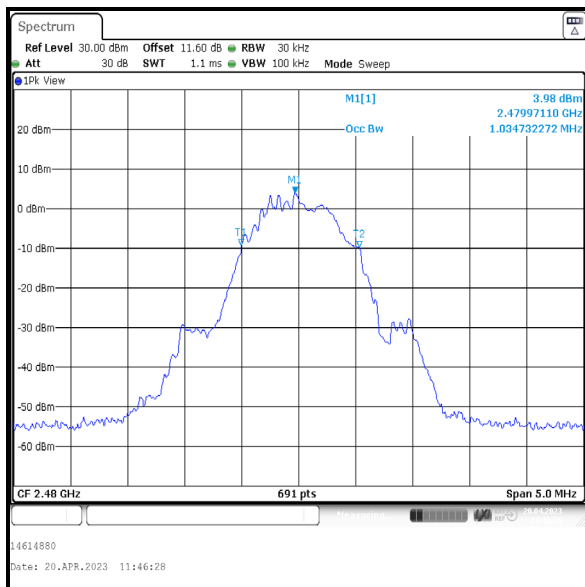
Channel	99% Occupied Bandwidth (kHz)
Bottom	1041.968
Middle	1034.732
Top	1034.732



**Bottom Channel**



**Middle Channel**

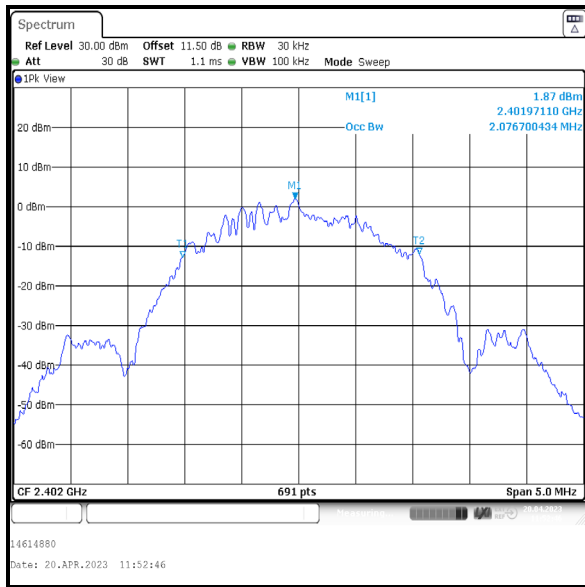


**Top Channel**

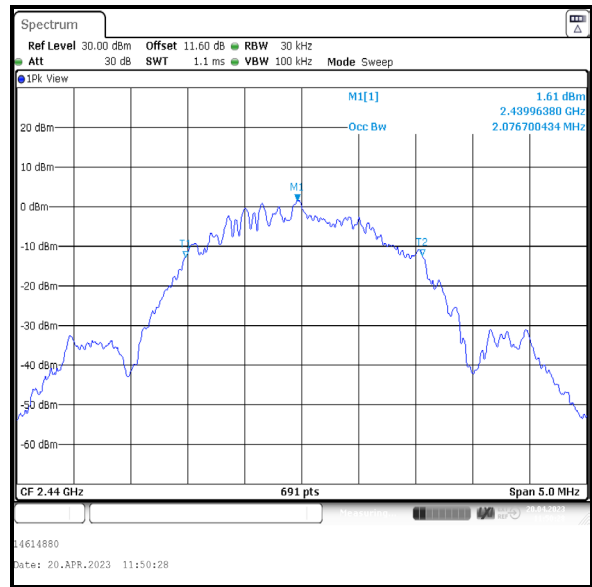
**Transmitter 99% Occupied Bandwidth (continued)**

**Results: LE2M / SISO / Core 2**

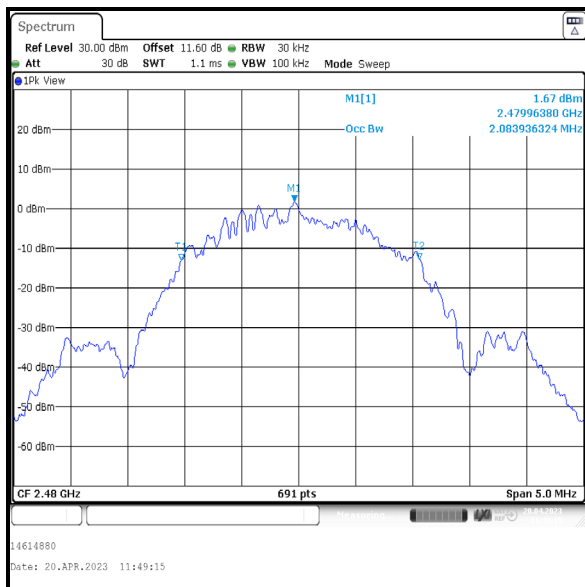
Channel	99% Occupied Bandwidth (kHz)
Bottom	2076.700
Middle	2076.700
Top	2083.936



**Bottom Channel**



**Middle Channel**

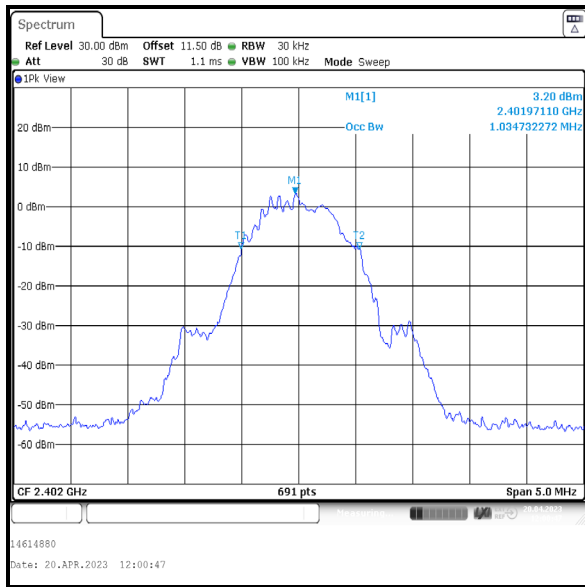


**Top Channel**

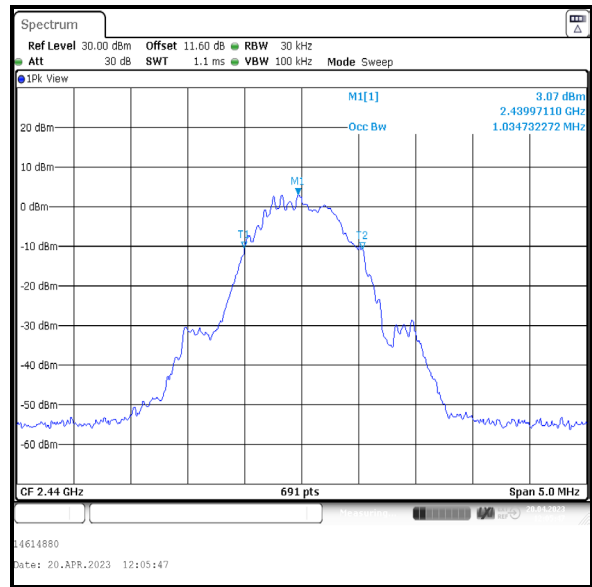
**Transmitter 99% Occupied Bandwidth (continued)**

**Results: LE1M / Beamforming / Core 0**

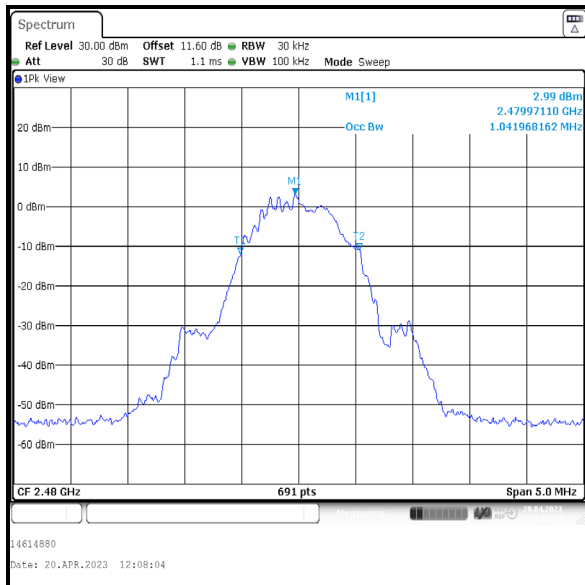
Channel	99% Occupied Bandwidth (kHz)
Bottom	1034.732
Middle	1034.732
Top	1041.968



**Bottom Channel**



**Middle Channel**

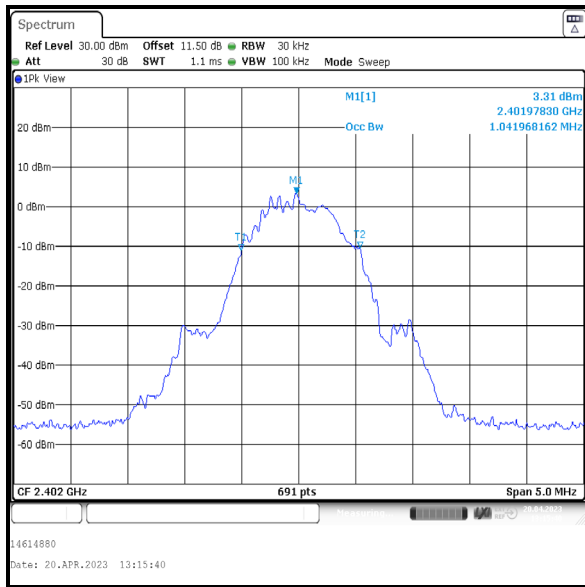


**Top Channel**

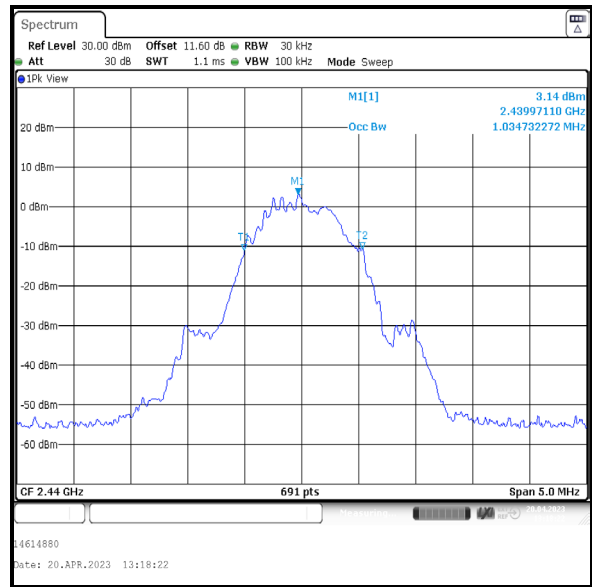
**Transmitter 99% Occupied Bandwidth (continued)**

**Results: LE1M / Beamforming / Core 1**

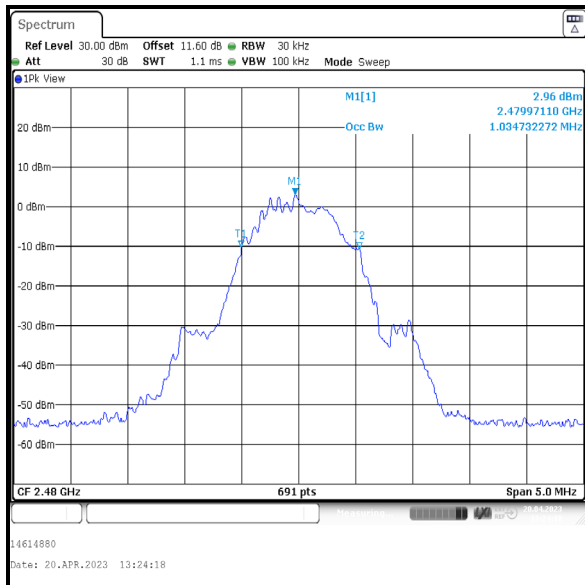
Channel	99% Occupied Bandwidth (kHz)
Bottom	1041.968
Middle	1034.732
Top	1034.732



**Bottom Channel**



**Middle Channel**



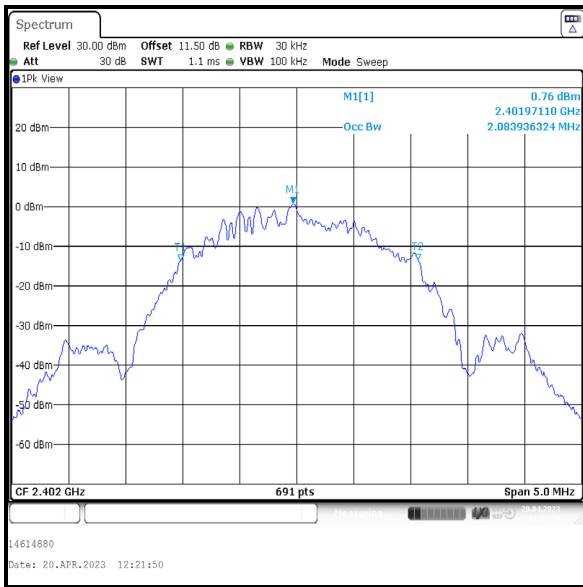
**Top Channel**



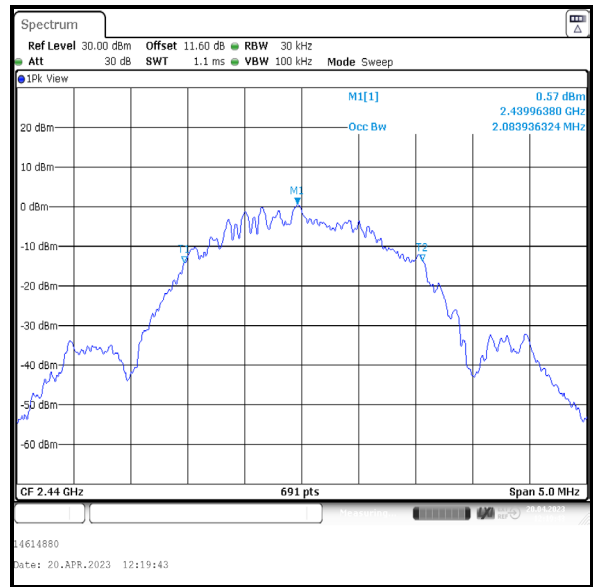
**Transmitter 99% Occupied Bandwidth (continued)**

**Results: LE2M / Beamforming / Core 0**

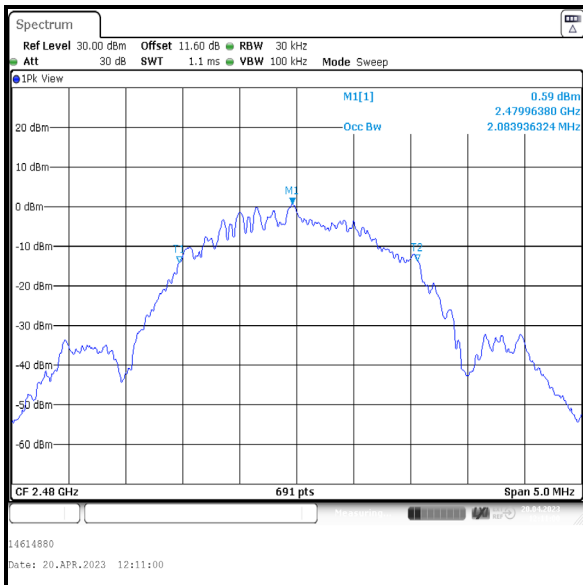
Channel	99% Occupied Bandwidth (kHz)
Bottom	2083.936
Middle	2083.936
Top	2083.936



**Bottom Channel**



**Middle Channel**

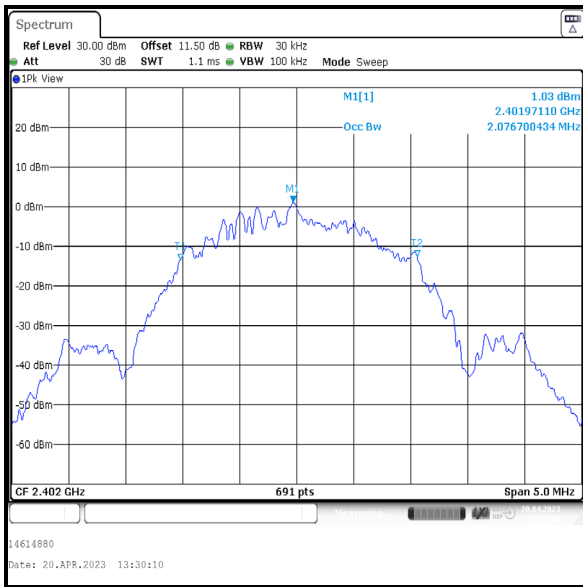


**Top Channel**

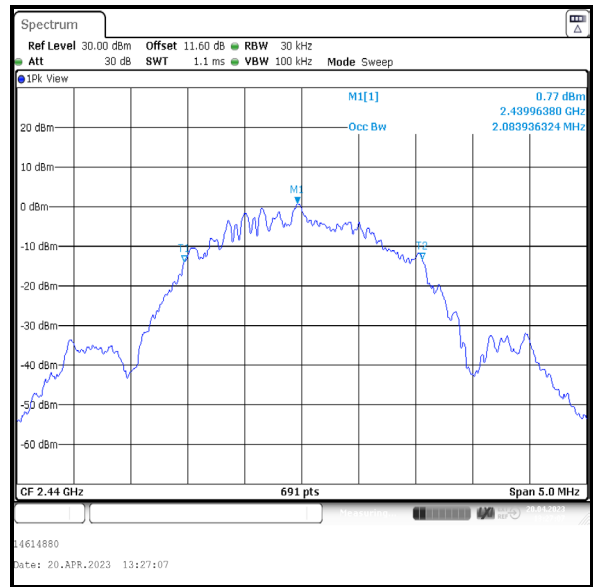
**Transmitter 99% Occupied Bandwidth (continued)**

**Results: LE2M / Beamforming / Core 1**

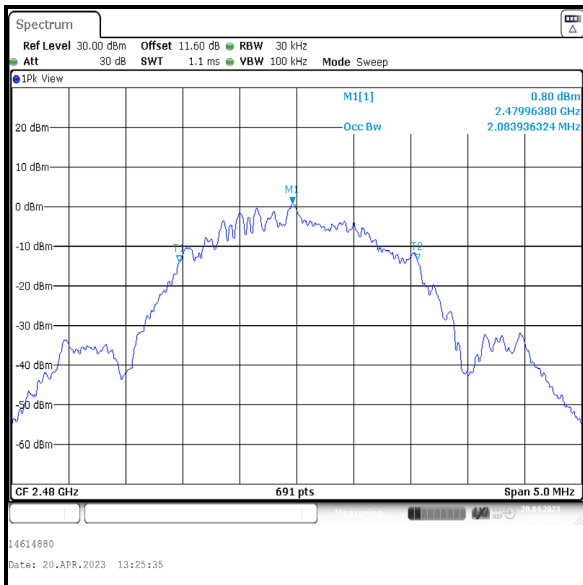
Channel	99% Occupied Bandwidth (kHz)
Bottom	2076.700
Middle	2083.936
Top	2083.936



**Bottom Channel**



**Middle Channel**



**Top Channel**

## **4.2 Transmitter Minimum 6 dB Bandwidth**

### **Test Summary:**

<b>Test Engineers:</b>	Max Passell & Jiyu Zou	<b>Test Dates:</b>	19 April 2023 & 20 April 2023
<b>Test Sample Serial Number:</b>	VXT97D7WDV		

<b>FCC Reference:</b>	Part 15.247(a)(2)
<b>ISED Canada Reference:</b>	RSS-Gen 6.7 / RSS-247 5.2(a)
<b>Test Method Used:</b>	FCC KDB 558074 Section 8.2 referencing ANSI C63.10 Section 11.8.1

### **Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	32 to 42

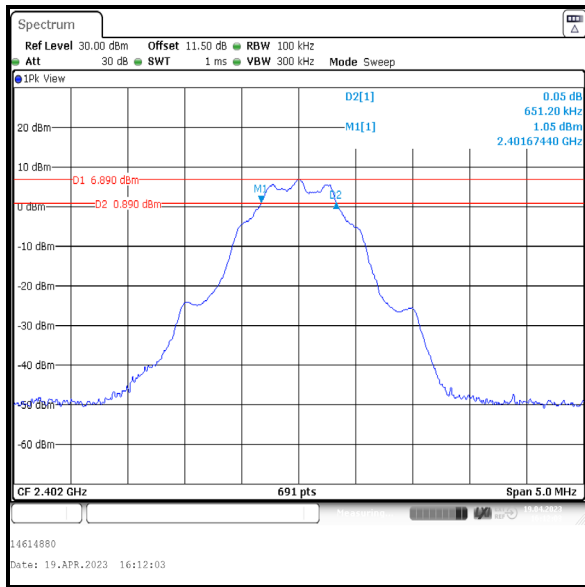
### **Note(s):**

1. 6 dB DTS bandwidth tests were performed using a signal analyser in accordance with ANSI C63.10 Section 11.8.1 Option 1 measurement procedure. The signal analyser resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The DTS bandwidth was measured at 6 dB down from the peak of the signal.
2. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.

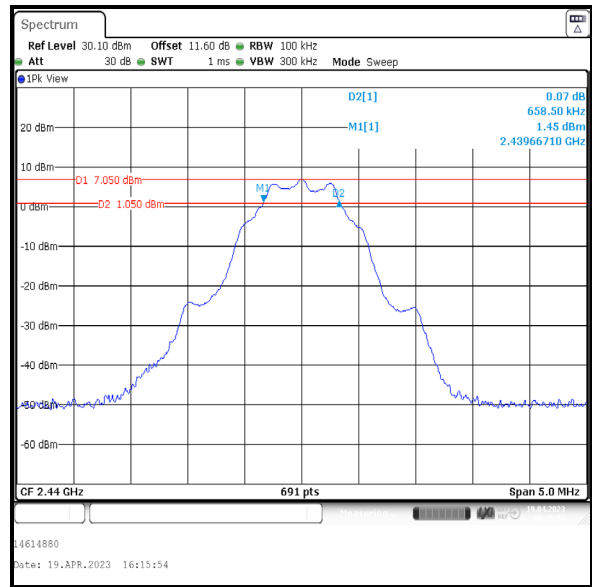
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: LE1M / SISO / Core 1**

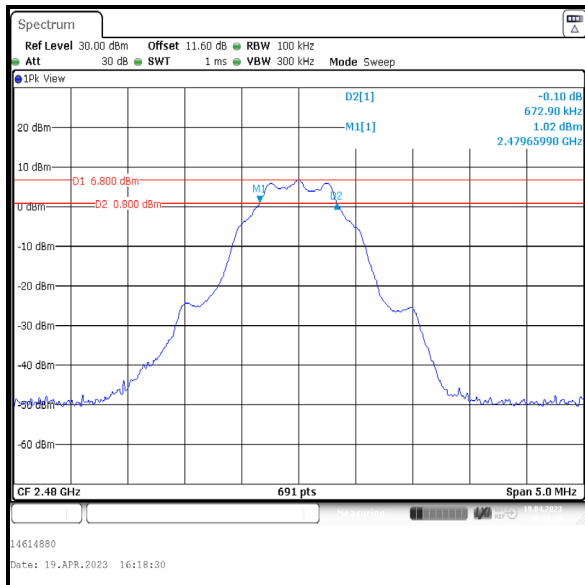
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	651.200	≥500	151.200	Complied
Middle	658.500	≥500	158.500	Complied
Top	672.900	≥500	172.500	Complied



**Bottom Channel**



**Middle Channel**

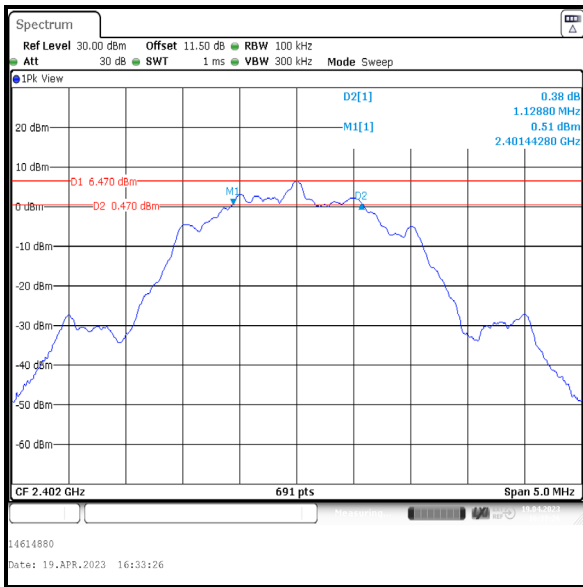


**Top Channel**

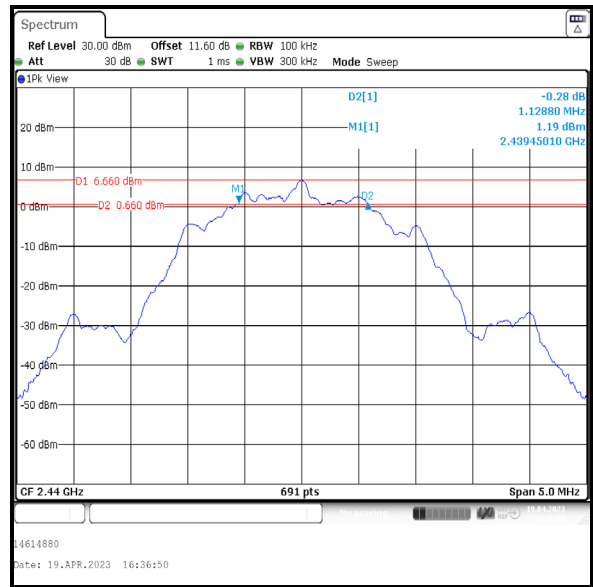
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: LE2M / SISO / Core 1**

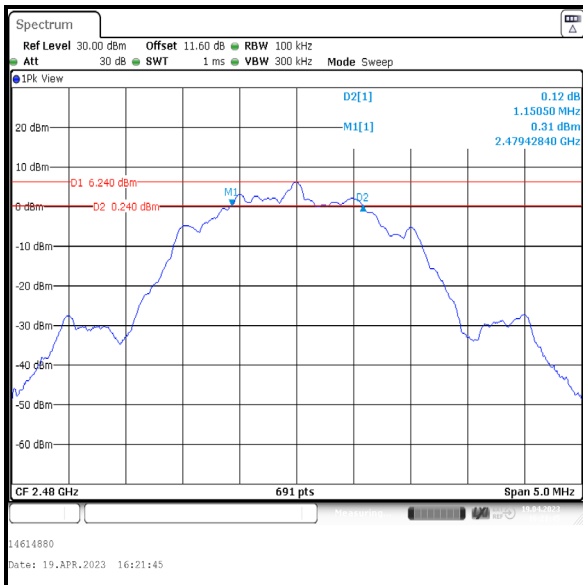
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	1128.800	≥500	628.800	Complied
Middle	1128.800	≥500	628.800	Complied
Top	1150.500	≥500	650.500	Complied



Bottom Channel



Middle Channel

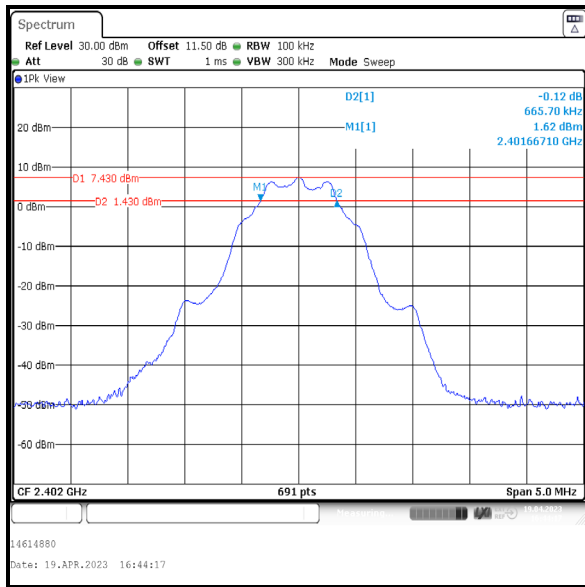


Top Channel

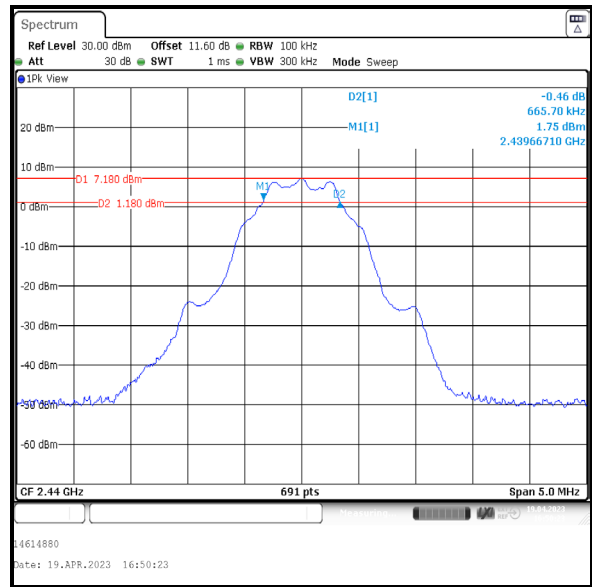
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: LE1M / SISO / Core 2**

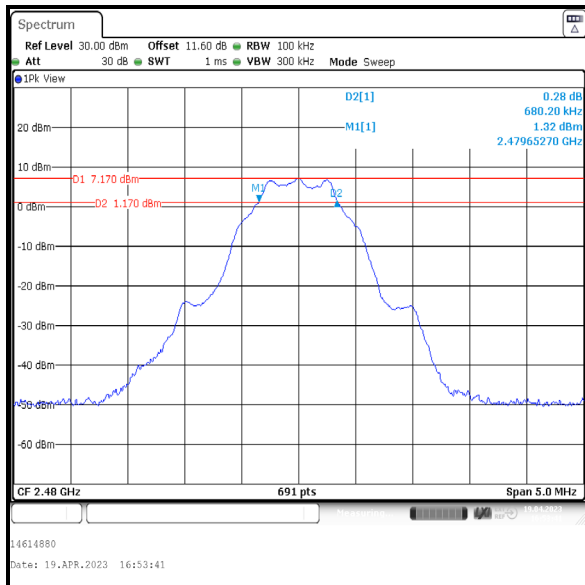
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	665.700	≥500	165.700	Complied
Middle	665.700	≥500	165.700	Complied
Top	680.200	≥500	180.200	Complied



**Bottom Channel**



**Middle Channel**

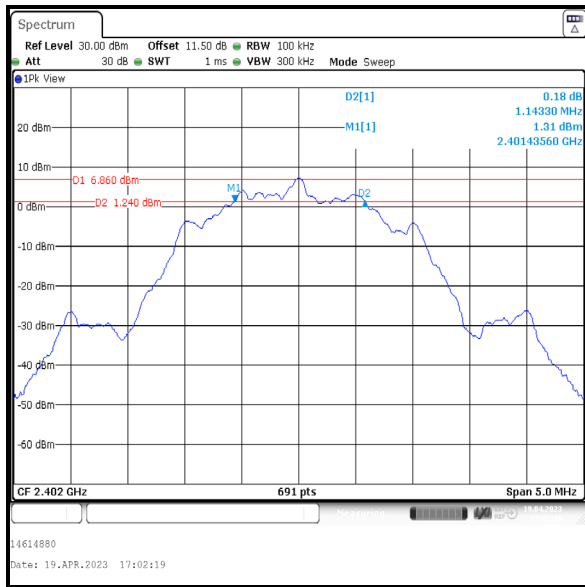


**Top Channel**

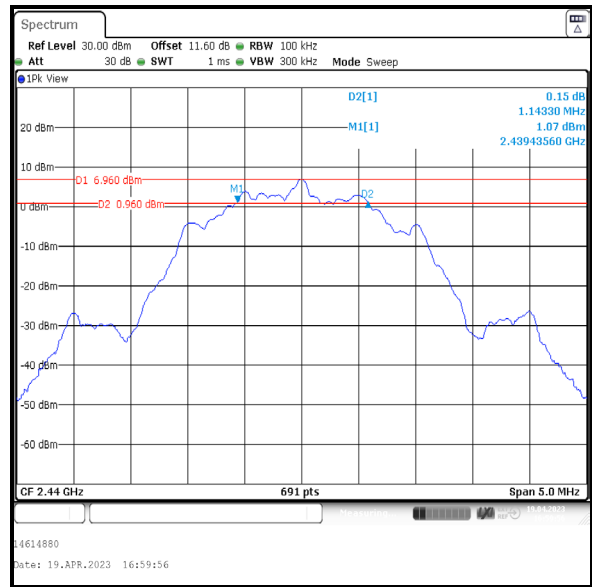
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: LE2M / SISO / Core 2**

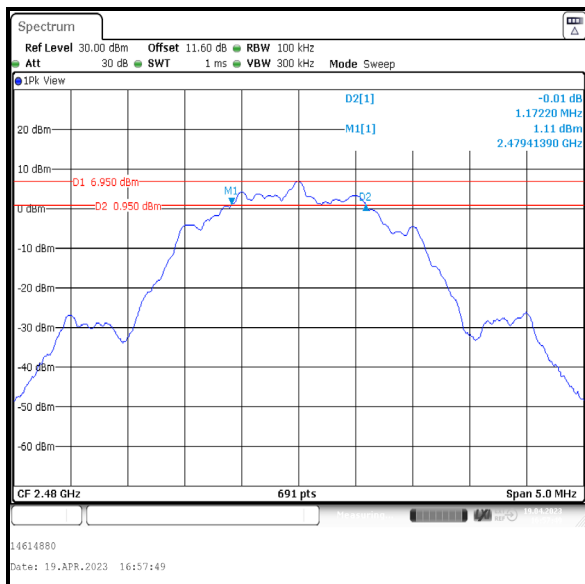
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	1143.300	≥500	643.300	Complied
Middle	1143.300	≥500	643.300	Complied
Top	1172.200	≥500	672.200	Complied



**Bottom Channel**



**Middle Channel**

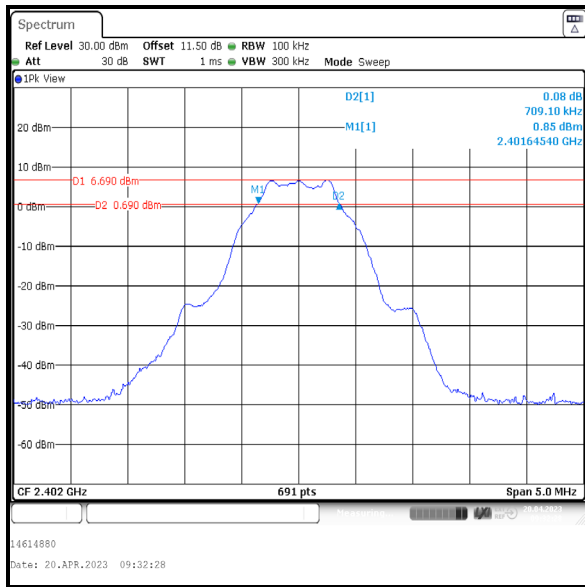


**Top Channel**

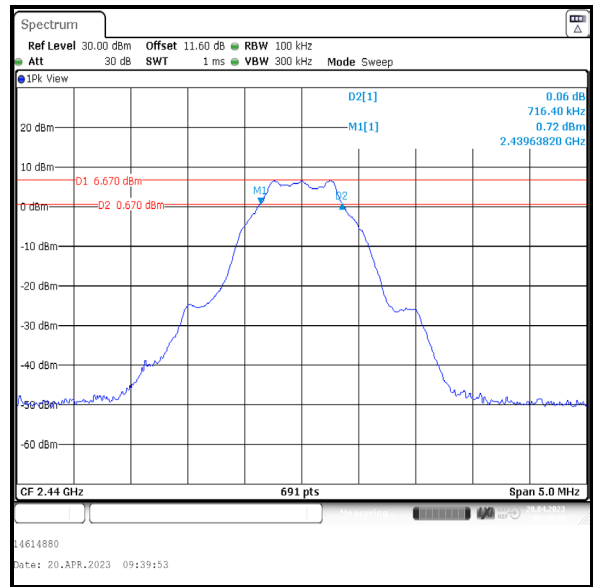
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: LE1M / Beamforming / Core 0**

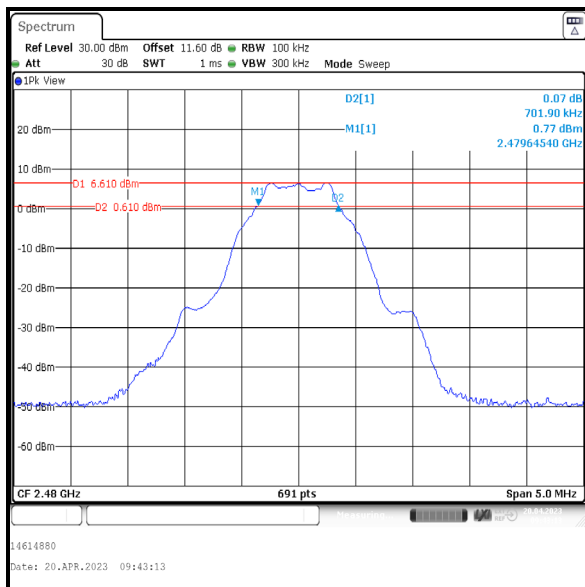
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	709.100	≥500	209.100	Complied
Middle	716.400	≥500	216.400	Complied
Top	701.900	≥500	201.900	Complied



**Bottom Channel**



**Middle Channel**



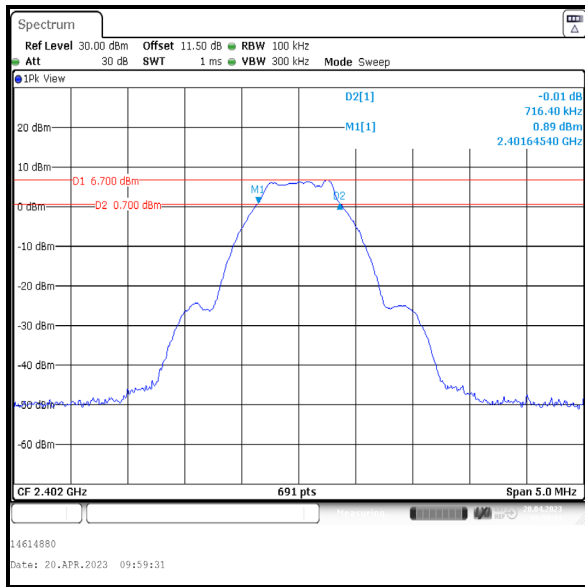
**Top Channel**



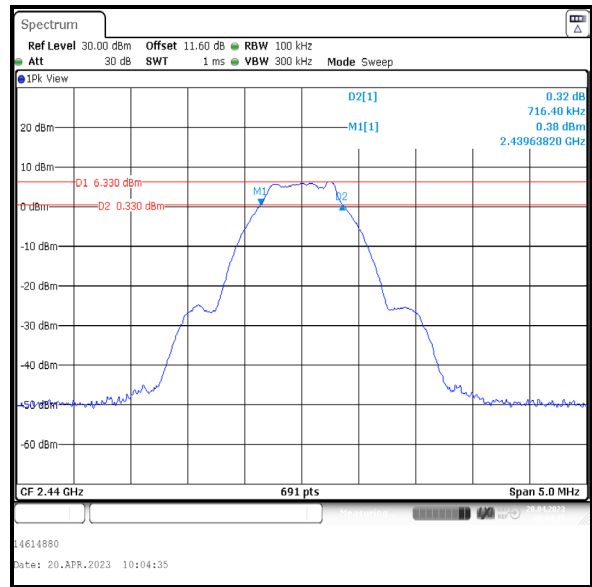
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: LE1M / Beamforming / Core 1**

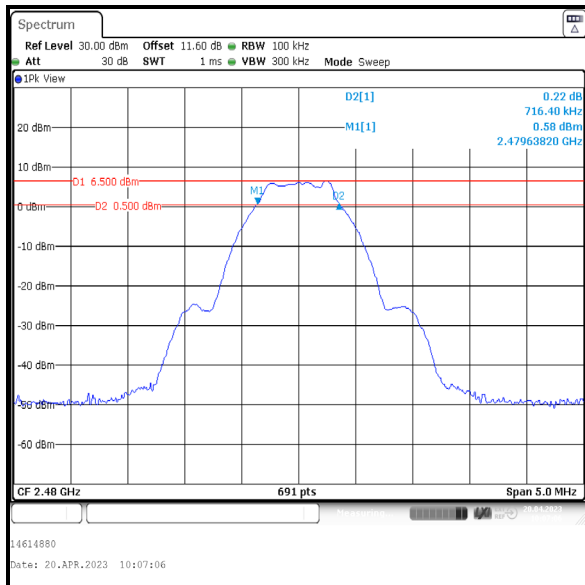
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	716.400	≥500	216.400	Complied
Middle	716.400	≥500	216.400	Complied
Top	716.400	≥500	216.400	Complied



Bottom Channel



Middle Channel

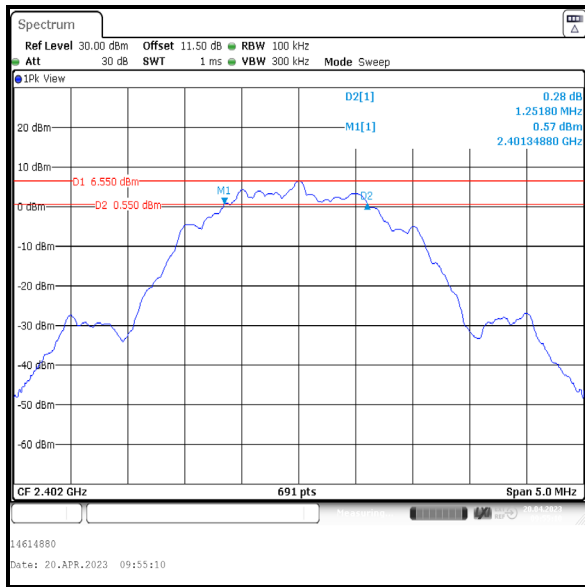


Top Channel

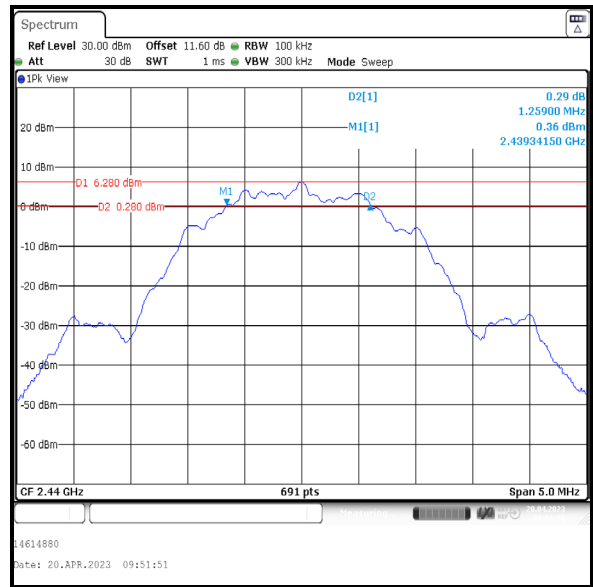
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: LE2M / Beamforming / Core 0**

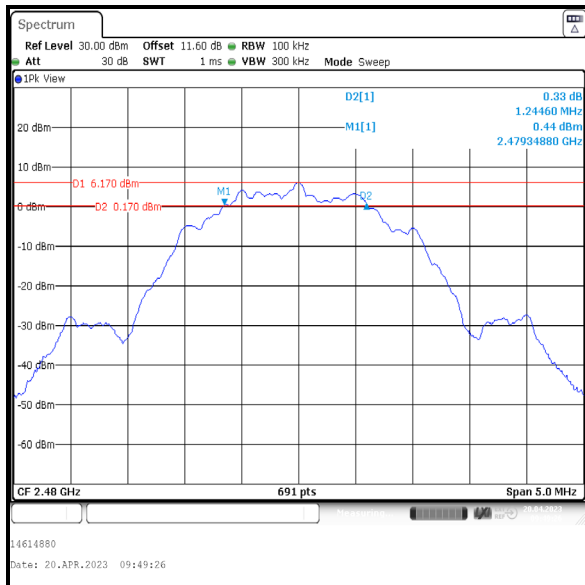
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	1251.800	≥500	751.800	Complied
Middle	1259.000	≥500	759.000	Complied
Top	1244.600	≥500	744.600	Complied



**Bottom Channel**



**Middle Channel**

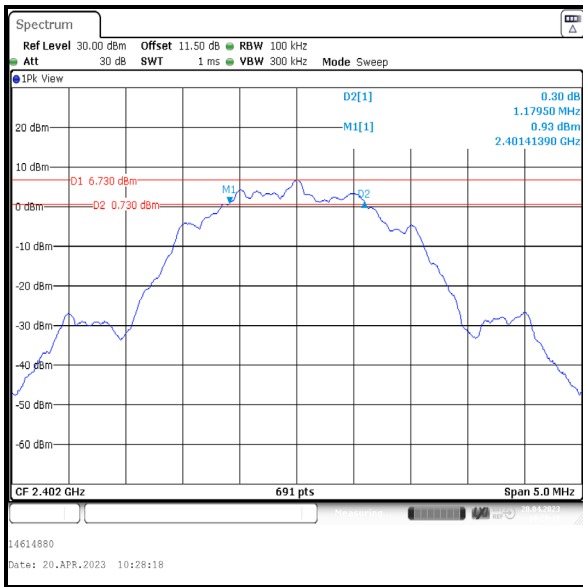


**Top Channel**

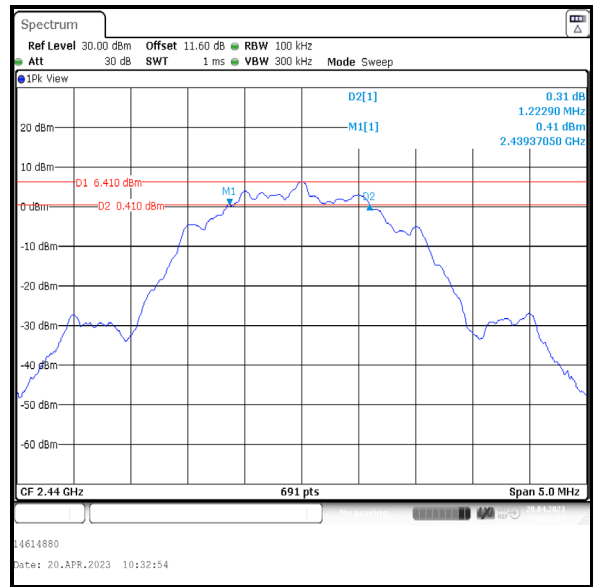
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: LE2M / Beamforming / Core 1**

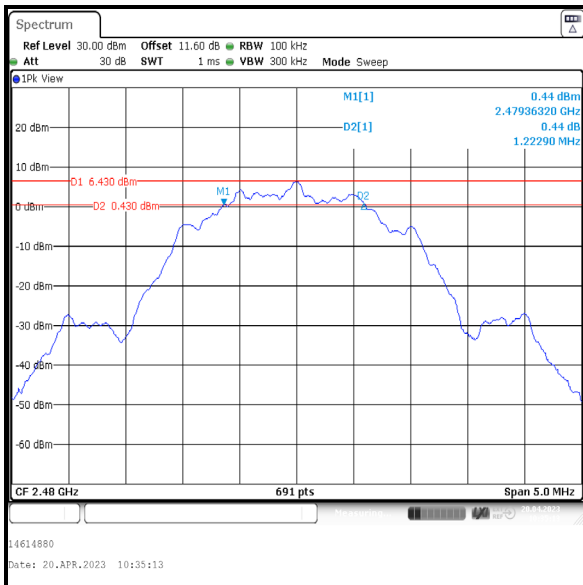
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	1179.500	≥500	679.500	Complied
Middle	1222.900	≥500	722.900	Complied
Top	1222.900	≥500	722.900	Complied



Bottom Channel



Middle Channel



Top Channel

### **4.3 Transmitter Maximum Peak Output Power**

#### **Test Summary:**

<b>Test Engineers:</b>	Max Passell & Jiyu Zou	<b>Test Date:</b>	25 April 2023
<b>Test Sample Serial Number:</b>	VXT97D7WDV		

<b>FCC Reference:</b>	Part 15.247(b)(3)
<b>ISED Canada Reference:</b>	RSS-Gen 6.12 / RSS-247 5.4(d)
<b>Test Method Used:</b>	FCC KDB 558074 Section 8.3.1.1 referencing ANSI C63.10 Section 11.9.1.1 and Notes below

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	30

#### **Note(s):**

1. Conducted power tests were performed using a signal analyser in accordance with ANSI C63.10 Section 11.9.1.1 with the RBW  $\geq$  DTS bandwidth procedure.
2. For LE1M, the signal analyser resolution bandwidth was set to 1 MHz and video bandwidth of 3 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to equal to or greater than three times the RBW. A marker was placed at the peak of the signal and the results recorded in the tables below.
3. For LE2M, the signal analyser resolution bandwidth was set to 2 MHz and video bandwidth of 10 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to equal to or greater than three times the RBW. A marker was placed at the peak of the signal and the results recorded in the tables below.
4. For beamforming modes, conducted power was measured on Core 0 & Core 1 and then combined using the measure-and-sum technique stated in FCC KDB 662911 D01 Section E1). For EIRP, the directional antenna gain was added to the conducted output power.
5. For beamforming modes, the limit for conducted output power has been reduced by the same amount in dB that the directional gain of the antenna exceeds 6 dBi, in accordance with 15.247(b)(4).
6. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.

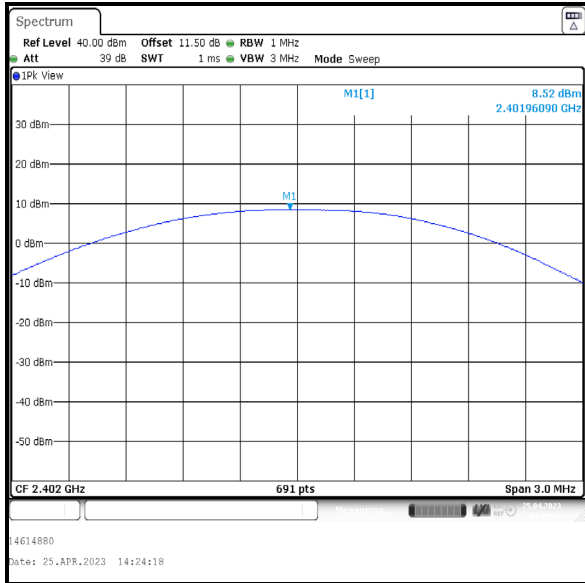
**Transmitter Maximum Peak Output Power (continued)****Results: LE1M / SISO / Core 1**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	8.5	30.0	21.5	Complied
Middle	8.7	30.0	21.3	Complied
Top	8.5	30.0	21.5	Complied

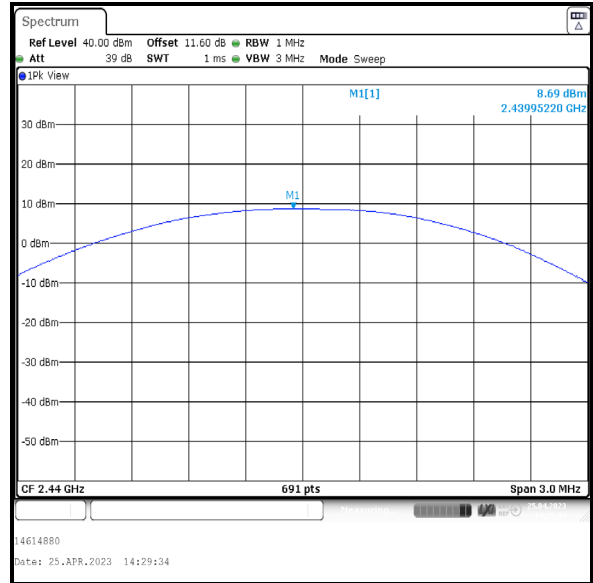
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	8.5	5.8	14.3	36.0	21.7	Complied
Middle	8.7	5.8	14.5	36.0	21.5	Complied
Top	8.5	5.8	14.3	36.0	21.7	Complied

**Transmitter Maximum Peak Output Power (continued)**

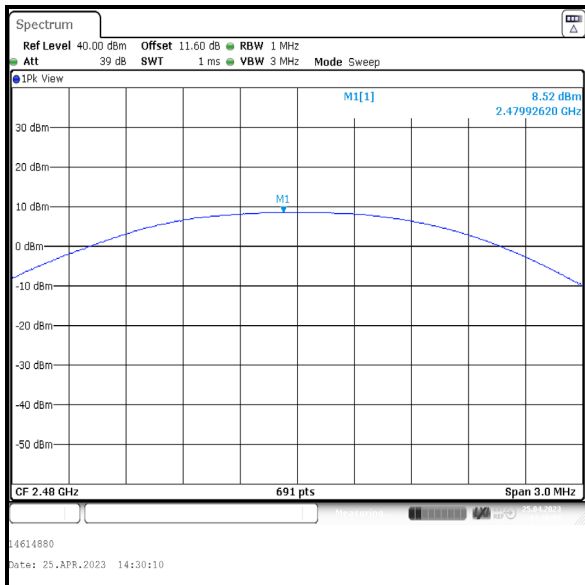
**Results: LE1M / SISO / Core 1**



**Bottom Channel**



**Middle Channel**



**Top Channel**

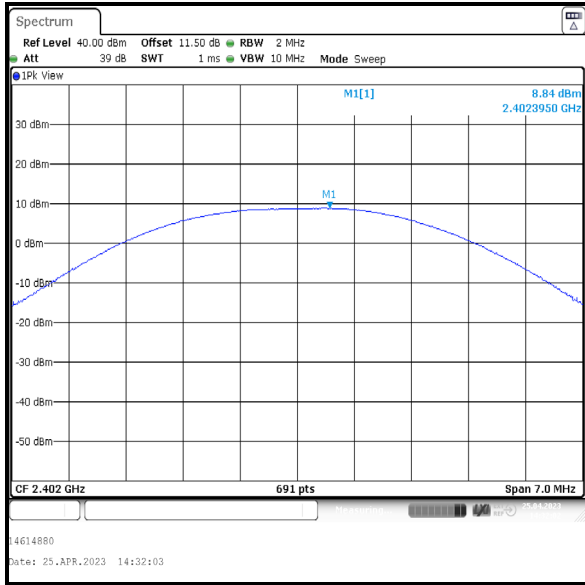
**Transmitter Maximum Peak Output Power (continued)****Results: LE2M / SISO / Core 1**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	8.8	30.0	21.2	Complied
Middle	9.0	30.0	21.0	Complied
Top	8.4	30.0	21.6	Complied

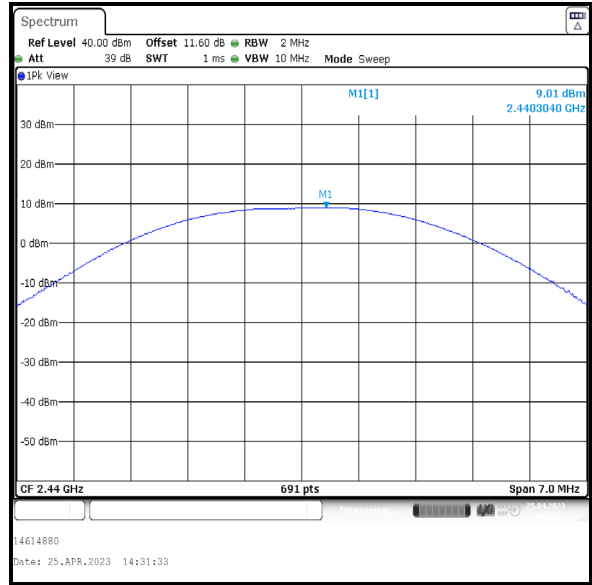
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	8.8	5.8	14.6	36.0	21.4	Complied
Middle	9.0	5.8	14.8	36.0	21.2	Complied
Top	8.4	5.8	14.2	36.0	21.8	Complied

**Transmitter Maximum Peak Output Power (continued)**

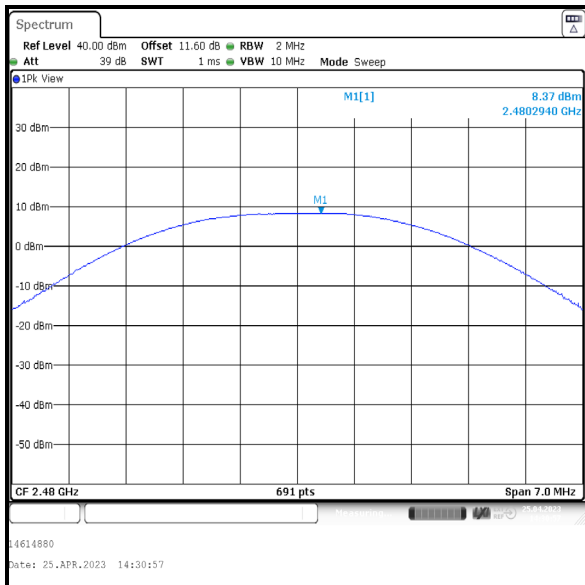
**Results: LE2M / SISO / Core 1**



**Bottom Channel**



**Middle Channel**



**Top Channel**



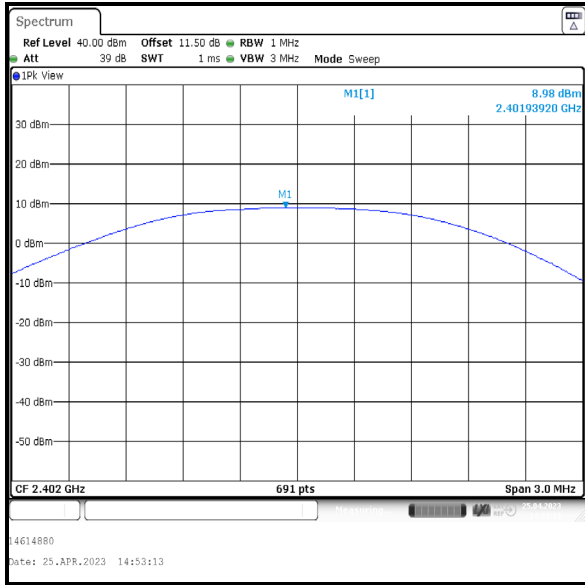
**Transmitter Maximum Peak Output Power (continued)****Results: LE1M / SISO / Core 2**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	9.0	30.0	21.0	Complied
Middle	8.7	30.0	21.3	Complied
Top	8.7	30.0	21.3	Complied

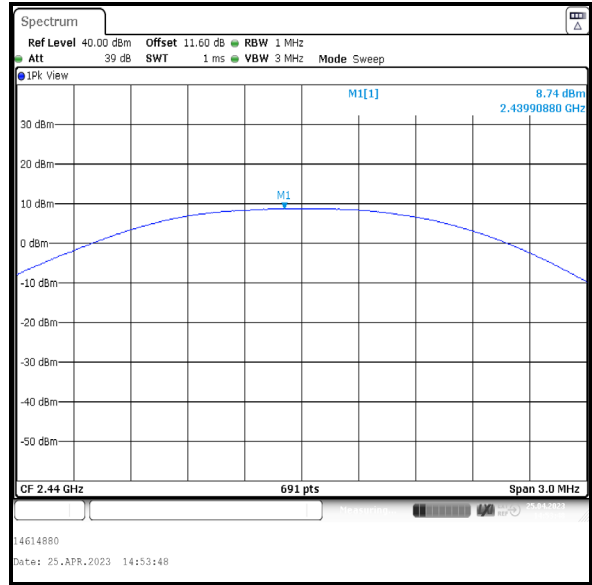
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	9.0	5.8	14.8	36.0	21.2	Complied
Middle	8.7	5.8	14.5	36.0	21.5	Complied
Top	8.7	5.8	14.5	36.0	21.5	Complied

**Transmitter Maximum Peak Output Power (continued)**

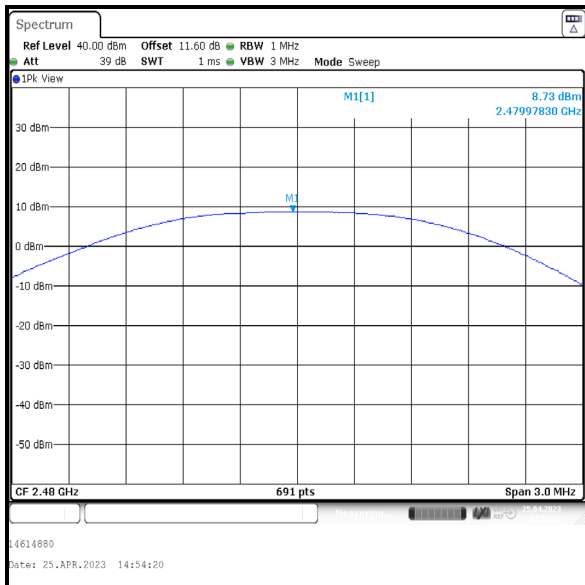
**Results: LE1M / SISO / Core 2**



**Bottom Channel**



**Middle Channel**



**Top Channel**

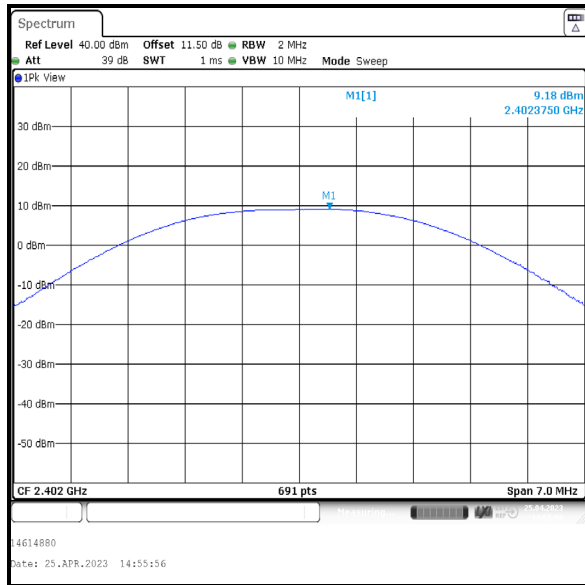
**Transmitter Maximum Peak Output Power (continued)****Results: LE2M / SISO / Core 2**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	9.2	30.0	20.8	Complied
Middle	8.9	30.0	21.1	Complied
Top	9.0	30.0	21.0	Complied

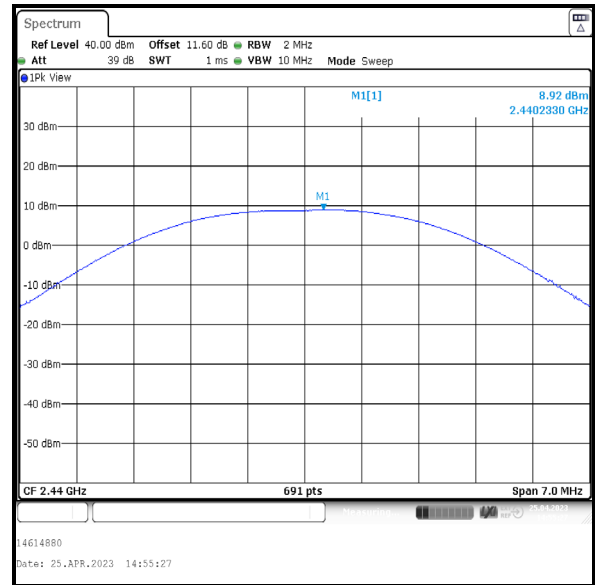
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	9.2	5.8	15.0	36.0	21.0	Complied
Middle	8.9	5.8	14.7	36.0	21.3	Complied
Top	9.0	5.8	14.8	36.0	21.2	Complied

**Transmitter Maximum Peak Output Power (continued)**

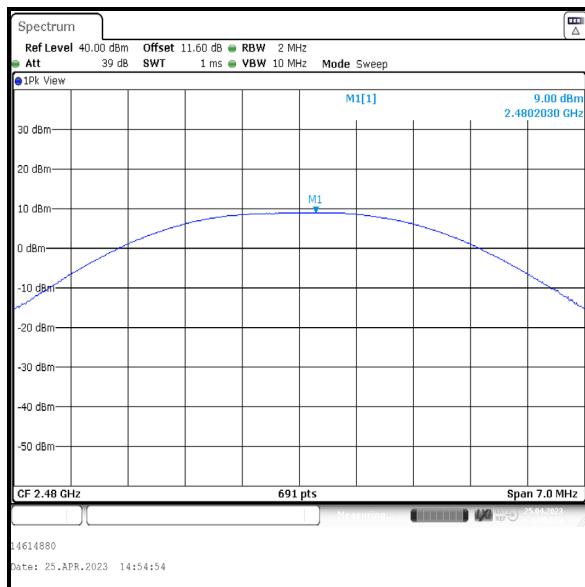
**Results: LE2M / SISO / Core 2**



**Bottom Channel**



**Middle Channel**



**Top Channel**

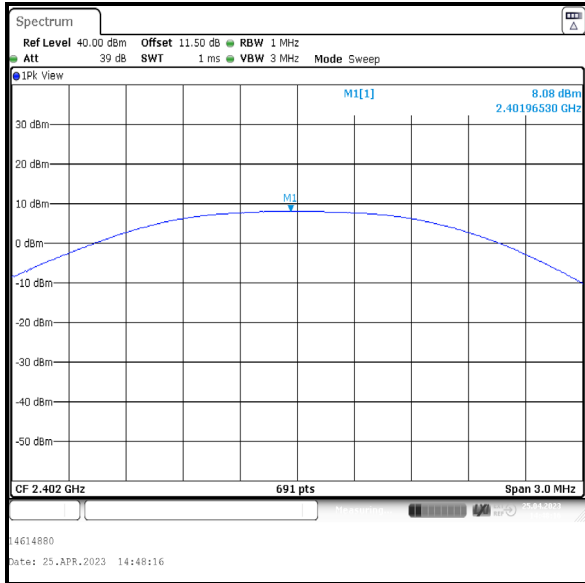
**Transmitter Maximum Peak Output Power (continued)****Results: LE1M / Beamforming**

Channel	Conducted Peak Power Core 0 (dBm)	Conducted Peak Power Core 1 (dBm)	Combined Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	8.1	8.7	11.4	27.6	16.2	Complied
Middle	8.0	8.2	11.1	27.6	16.5	Complied
Top	7.7	8.1	10.9	27.6	16.7	Complied

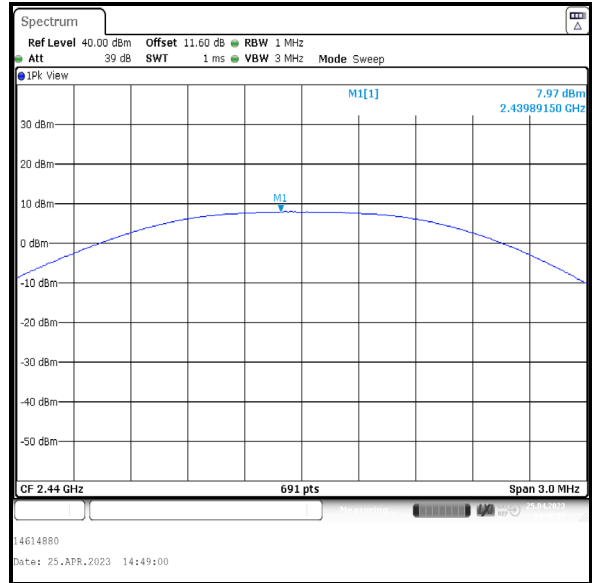
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
Bottom	11.4	8.4	19.8	36.0	16.2	Complied
Middle	11.1	8.4	19.5	36.0	16.5	Complied
Top	10.9	8.4	19.3	36.0	16.7	Complied

**Transmitter Maximum Peak Output Power (continued)**

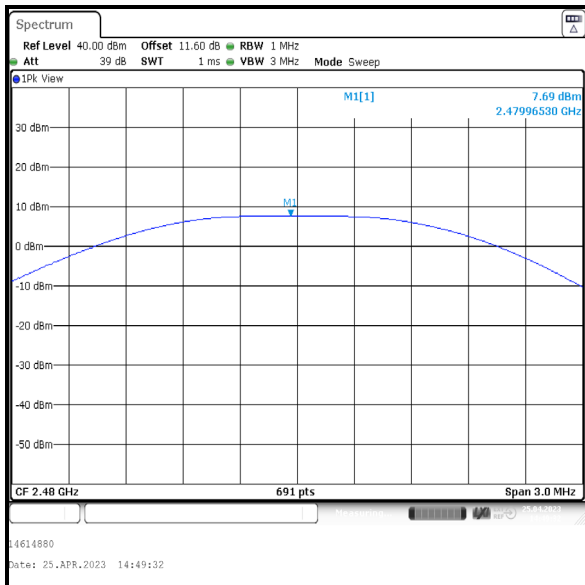
**Results: LE1M / Beamforming / Core 0**



**Bottom Channel**



**Middle Channel**



**Top Channel**