FCC and ISED Canada Radio Testing of the

Sensus Metering Systems Inc.
CPTP100A

In accordance with FCC 47 CFR Part 24 Subpart D, Part 101 Subpart C and ISED Canada's Radio Standards Specifications RSS-119, RSS-134

America

Add value.
Inspire trust.

Prepared for: Sensus Metering Systems Inc.
639 Davis Drive
Morrisville, NC 27560

FCC ID: SDBCPTP100A
IC: 2220A-CPTP100A

COMMERCIAL-IN-CONFIDENCE

Document Number: TP0721003891.200 | Issue: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Authorized Signatory	Dave Ernest	2025 -February-25	
Testing	Thierry Jean-Charles	2025-February-25	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

FCC Accreditation	Innovation, Science, and Economic Development Canada Accreditation
Designation Number US1063 Tampa, FL Test Laboratory	Site Number 2087A-2 Tampa, FL Test Laboratory

EXECUTIVE SUMMARY
Samples of this product were tested and found to be in compliance with FCC Part 24 Subpart D, Part 101 Subpart C and ISED Canada's RSS-119, RSS-134.

A2LA Cert. No. 2955.15

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Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2025-February-25

1.2 Introduction

The purpose of this report is to demonstrate compliance with the FCC's Code of Federal Regulations Part 24 Subpart D, Part 101 Subpart C and Innovation Science and Economic Development Canada's Radio Standards Specification RSS-119, RSS-134 for the tests documented herein.

Applicant	Sensus Metering Systems Inc.
Manufacturer	Sensus Metering Systems Inc.
Applicant's Email Address	tyler.leeson@xylem.com
Model Number(s)	CPTP100A
Serial Number(s)	Radiated Spurious Emissions: 120500780; KDS TCXO 120500802; TXC TCXO RF Conducted Measurements: 327504120500786; KDS TCXO 327504120500794; TXC TCXO
FCC ID	SDBCPTP100A
ISED Certification Number	2220A-CPTP100A
Hardware Version(s)	6.1
Software Version(s)	R1.2.18
Number of Samples Tested	4
Test Specification/Issue/Date	US Code of Federal Regulations (CFR): Title 47, Part 24, Subpart D: Personal Communications Services – 2024 US Code of Federal Regulations (CFR): Title 47, Part 101, Subpart C: Fixed Microwave Services -2024 Industry Canada Radio Standards Specification: RSS-119 - Land Mobile and Fixed Equipment Operating in the Frequency Range 27.41-960 MHz, Issue 12, May 2015, Amendment (April 1, 2022) Industry Canada Radio Standards Specification: RSS-134 - 900 MHz Narrowband Personal Communication Service, Issue 2, February 2016
Test Plan/Issue/Date	2024-August-14
Order Number	0721003891
Date	2024-September-08
Date of Receipt of EUT	2024-September-27
Start of Test	2024-October-01
Finish of Test	2024-October-24
Name of Engineer(s)	Thierry Jean-Charles
Related Document(s)	US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures - 2024

Innovation, Science and Economic Development Canada Radio Standards Specification: RSS-GEN - General Requirements for Compliance of Radio Apparatus, Issue 5, Amendment 1, March 2019

ANSI C63.26: 2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with 24 Subpart D, Part 101 Subpart C and ISED Canada's RSS-119, RSS-134 is shown below.

Table 1.3-1: Test Result Summary

Test Parameter	Test Plan (Yes/No)	Test Results	FCC 47 CFR Rule Part	ISED Canada's RSS	Test Report Page No.
RF Power Output	Yes	Pass	2.1046; 24.132; 101.113(a)	RSS-Gen 6.12; RSS-119 5.4; RSS-134 4.3(a), (b)	12
Out of Band Unwanted Emissions	Yes	Pass	2.1051; 24.133 a(1), a(2); 101.111 a(6)	RSS-Gen 6.13; RSS-119 5.8.6; RSS-134 4.4	20
Occupied Bandwidth	Yes	Pass	2.1049; 101.109	RSS-Gen 6.7	34
Spurious Emissions at Antenna Terminals	Yes	Pass	2.1051; 24.133 a(1), a(2); 101.111 a(6)	RSS-Gen 6.13; RSS-119 5.8.6; RSS-134 4.4	51
Field Strength of Spurious Radiation	Yes	Pass	2.1053; 24.133 a(1), a(2); 101.111a(6)	RSS-Gen 6.13; RSS-119 5.8.6; RSS-134 4.4	60
Frequency Stability	Yes	Pass	2.1055; 24.135; 101.107	RSS-Gen 6.11; RSS-119 5.3; RSS-134 4.5	74

1.4 Product Information

1.4.1 Technical Description

The equipment under test was the CPTP100A which is a test point to be used with Cathodic Protection. The device will measure, filter, and alert on AC voltage detected on a gas pipeline.

Technical Details

Mode of Operation	Flexnet Radio
Frequency Range:	901 - 960 MHz
Antenna Type/Gain:	PCB Trace Folded monopole / 0 dBi
Input Power:	3.6 VDC

The CPTP100A transmitters produce 6 distinct modulation formats. The emissions designators for the modulation types used by the CPTP100A transmitters are as follows:

EMISSIONS DESIGNATORS:

Normal Mode	9K60F2D (7-FSK)
Double Density Mode	9K60F2D (13-FSK)
C&I Mode	4K80F2D (7-FSK)
Boost Mode	1K10F2D (7-FSK)
MPass Mode (5 kbps)	5K90F1D (2-GFSK)
MPass Mode (10 kbps)	11K8F1D (2-GFSK)

A full description and detailed product specification details are available from the manufacturer.

Table 1.4.1-1 – Cable Descriptions

Cable/Port	Description
Power Leads	1.7 m, Not Shielded, EUT to DC Power Supply

Table 1.4.1-2 – Support Equipment Descriptions

Make/Model	Description
Lambda / LA-200	Regulated DC Power Supply, SN: LA2-AA20-45 0470

Declaration of Build Status

EQUIPMENT DESCRIPTION	
Model Name/Number	CPTP100A
Part Number	5396310139333
Hardware Version	6.1
Software Version	R1.2.18
FCC ID (if applicable)	SDBCPTP100A
ISED ID (if applicable)	2220A-CPTP100A
Technical Description (Please provide a brief description of the intended use of the equipment)	The device will measure, filter, and alert on AC voltage detected on a gas pipeline.

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	**31.25 MHz**
Lowest frequency generated or used in the device or on which the device operates or tunes	32.768kHz
Class A Digital Device (Use in commercial, industrial or business environment) ☐ Class B Digital Device (Use in residential environment only) ☒	

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
	☐	☐	
External DC	Nominal Voltage		Maximum Current
Battery	Nominal Voltage		Battery Operating End Point Voltage
	3.7		3.7

EXTREME CONDITIONS					
Maximum temperature	+65.6	°C	Minimum temperature	-34.4	°C

Ancillaries
Please list all ancillaries which will be used with the device.

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

Name: Tyler Leeson

Position held: Product Regulatory Compliance Engineer Date: 11/19/2024

1.4.2 Modes of Operation

The tested mode of operation was the Flexnet radio in continuous transmit mode. The EUT was configured using the Sensus FieldLogic NAMU 2.4.34.0 software tool. The TX output power of the radio was not configurable.

1.4.3 Monitoring of Performance

The following performance attributes were monitored:

1. Transmitter Output Power
2. Transmitter Emissions Masks
3. Transmitter Occupied Bandwidth
4. Transmitter Spurious Emissions at the Antenna Port
5. Transmitter Radiated Spurious Emissions
6. Transmitter Frequency Stability over Temperature and Voltage

The EUT offers two TCXO alternate parts (KDS, TXC). Full testing was performed on one TCXO variant while spot check measurements were performed on the second variant as deemed applicable.

The EUT was configured with power leads for testing purposes. The RF conducted measurements were performed for the EUT configured with an RF connector at the antenna port to allow direct coupling to a spectrum analyzer.

The EUT is designed to operate in multiple bands under the requirements of CFR 47 Parts 24 and 101. The following is a list of the frequency bands of operation sorted based on the FCC rule parts in which the band is associated.

CFR Title 47 Rule Part	ISED Canada RSS	Frequency Band of Operation (MHz)
24D	134	901.0 - 902.0
24D	134	930.0 - 931.0
24D	134	940.0 - 941.0
101	119	928.85 - 929.0
101	119	932.0 - 932.5
101	119	941.0 - 941.5
101	N/A	959.85 - 960.0

Based on the requirements set forth in accordance 47 CFR 2.1046-2.1057 as stated above, the methodology in selecting the places to test in the available bands of operation is outlined in the following table.

CFR Title 47 Rule Part	ISED Canada RSS	Frequency Band of Operation (MHz)	Location in the Range of Operation	Approx. Test Freq.
24D	134	901.0 - 902.0	Middle	901.5000
101	119	928.85 - 929.0	Middle	928.9250
24D	134	930.0 - 931.0	Middle	930.5000
101	119	932.0 - 932.5	Middle	932.2500
24D	134	940.0 - 941.0	1 near top and 1 near bottom	940.0125
101	119	941.0 - 941.5		941.4875
101	N/A	959.85 – 960.0	Middle	959.9250

1.4.4 Performance Criteria

The parameters evaluated are summarized below.

Table 1.4.4-1 - Performance Criteria

Parameter	Requirement
RF Output Power	FCC 47 CFR Part 2.1046; 24.132; 101.113(a) ISED Canada RSS-119 5.4; RSS-134 4.3(a),(b)
Out-of-Band Unwanted Emissions	FCC 47 CFR Parts: 2.1051; 24.133 a(1), a(2); 101.111 a(6) ISED Canada RSS-119 5.8.6; RSS-134 4.4
Occupied Bandwidth	ISED Canada RSS-GEN 6.7
Unwanted Emissions at the Antenna Terminal	FCC 47 CFR Parts: 2.1051; 24.133 a(1), a(2); 101.111 a(6) ISED Canada RSS-119 5.8.6; RSS-134 4.4
Radiated Spurious Emissions	FCC 47 CFR Parts: 2.1053; 24.133 a(1), a(2); 101.111 a(6) ISED Canada RSS-119 5.8.6; RSS-134 4.4
Frequency Stability	FCC Parts: 2.1055; 24.135, 101.107 ISED Canada RSS-119 5.3, RSS-134 4.5

1.5 Deviations from the Standard

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

1.6 EUT Modification Record

The table below details modifications made to the EUT during the test program. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
None			

1.7 Test Location

TÜV SÜD Product Service conducted the following tests at our Tampa FL Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
DC Powered, Operating		
RF Power Output	Thierry Jean-Charles	A2LA
Out of Band Emissions	Thierry Jean-Charles	A2LA
Occupied Bandwidth	Thierry Jean-Charles	A2LA
Spurious Emissions at the Antenna Terminal	Thierry Jean-Charles	A2LA
Field Strength of Spurious Radiation	Thierry Jean-Charles	A2LA
Frequency Stability	Thierry Jean-Charles	A2LA

Office Address:

TÜV SÜD America, Inc.
5610 W. Sligh Ave, Suite 100
Tampa, FL 33634
USA

2 Test Details

2.1 RF Power Output

2.1.1 Specification Reference

FCC 47 CFR Part 2.1046; 24.132; 101.113(a)
ISED Canada RSS-119 5.4; RSS-134 4.3(a),(b)

2.1.2 Equipment Under Test and Modification State

327504120500786; KDS TCXO
327504120500794; TXC TCXO

2.1.3 Date of Test

2024-October-01 to 2024-October-11

2.1.4 Test Method

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer through 30 dB of passive attenuation. The resolution and video bandwidths of the spectrum analyzer were set at sufficient levels, >> signal bandwidth.

2.1.5 Environmental Conditions

Ambient Temperature	23 - 25.2 °C
Relative Humidity	46.7 - 48.1 %
Atmospheric Pressure	1012.2 - 1016.6 mbar

2.1.6 Test Results

Table 2.1.6-1 – FCC Part 24.132 Limits

Station Type	Frequency Range (MHz)	E.R.P. Limits (Watts)	E.R.P. Limits (dBm)
Stations	901 - 902	7	38.45
Mobile Stations	930 – 931 940 – 941	7	38.45
Base Stations	930 – 931 940 – 941	3500	65.44

Table 2.1.6-2 – FCC Part 101.113 Limits

Frequency Range (MHz)	E.I.R.P. Limits Fixed (dBW)	E.I.R.P. Limits Mobile (dBW)
928 - 929	17	
932 – 932.5	17	
941 – 941.5	30	14
952 - 960	40	14

FCC 47 CFR Part 2.1046; 24.132; ISED Canada RSS-134 4.3(a),(b)

CPTP100A - TXC TCXO

Table 2.1.6-3 - RF Output Power – TXC TCXO – FCC 47 CFR Part 24.132; ISED Canada RSS-134 4.3

Frequency MHz	Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Margin (dB)
901.5	30.00	0	27.85	38.45	10.6

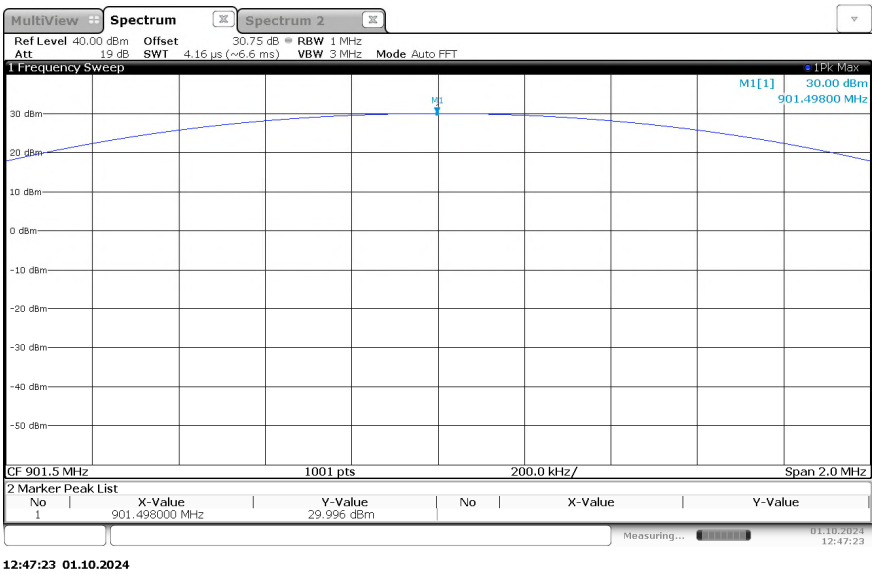

Figure 2.1.6-1 - RF Output Power – TXC TCXO – 901.5 MHz

CPTP100A - KDS TCXO

Table 2.1.6-4 - RF Output Power – KDS TCXO – FCC 47 CFR Part 24.132; ISED Canada RSS-134 4.3

Frequency MHz	Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Margin (dB)
901.5	30.01	0	27.86	38.45	10.59
930.5	29.63	0	27.48	38.45	10.97
940.0124	29.40	0	27.25	38.45	11.20

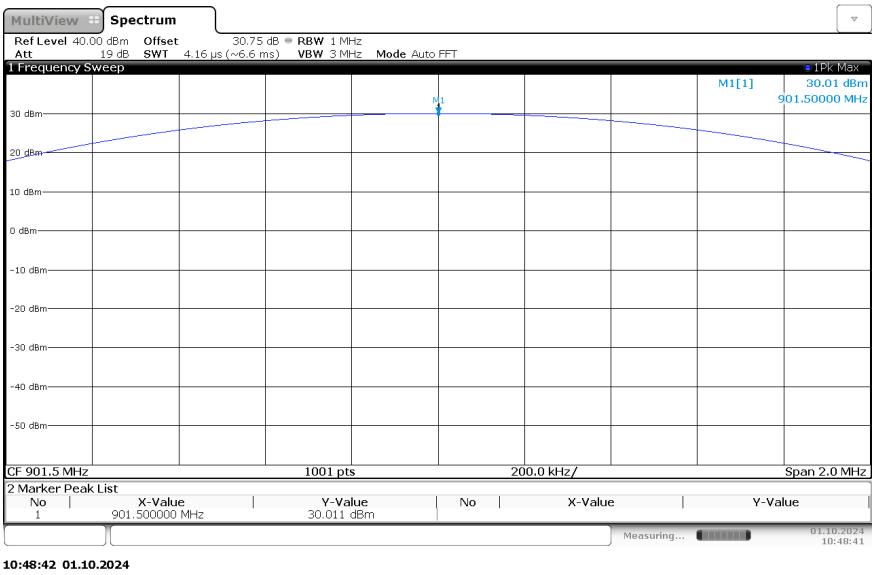

Figure 2.1.6-2 - RF Output Power – KDS TCXO – 901.5 MHz

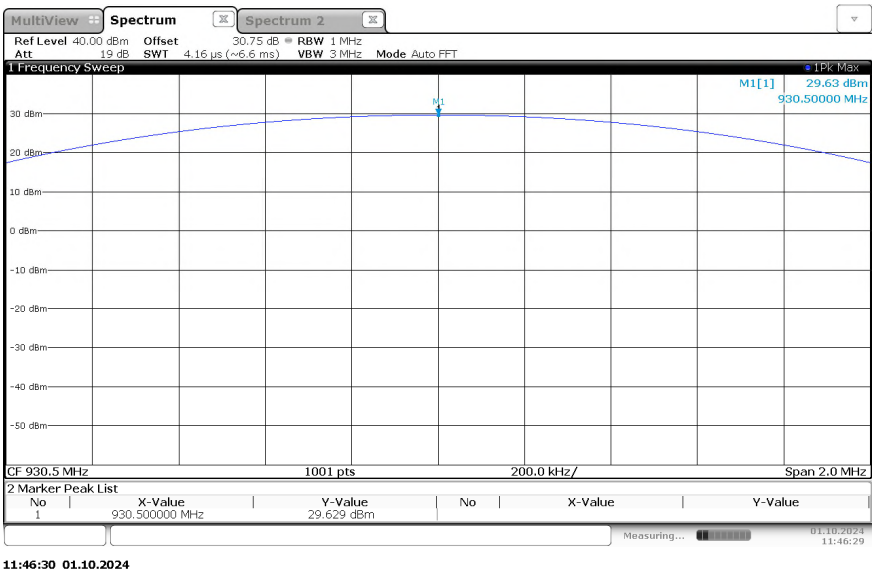

Figure 2.1.6-3 - RF Output Power – KDS TCXO – 930.5 MHz

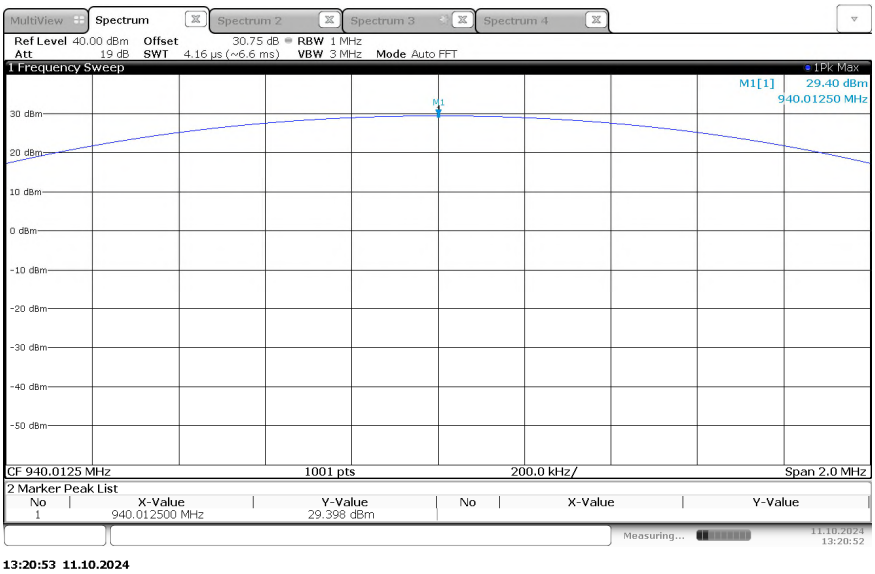

Figure 2.1.6-4 - RF Output Power – KDS TCXO – 940.0125 MHz

FCC 47 CFR Part 2.1046; 101.113(a); ISED Canada RSS-119 5.4

Table 2.1.6-5 - RF Output Power – KDS TCXO – FCC 47 CFR Part 101.113(a); ISED Canada RSS-119 5.4

Frequency MHz	Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
928.925	29.66	0	29.66	47	17.34
932.25	29.57	0	29.57	47	17.43
941.4875	29.38	0	29.38	44	14.62
959.925	29.06	0	29.06	44	14.94

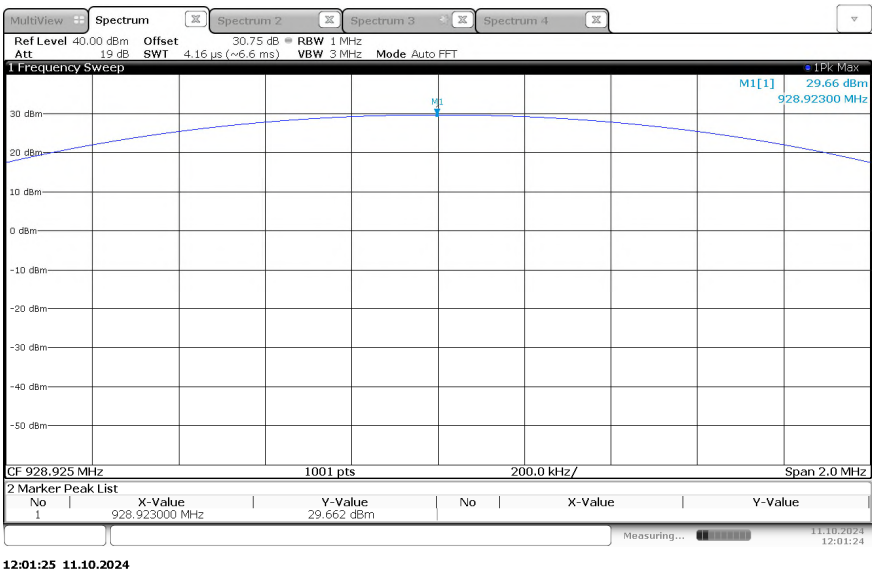

Figure 2.1.6-5 - RF Output Power – KDS TCXO – 928.925 MHz

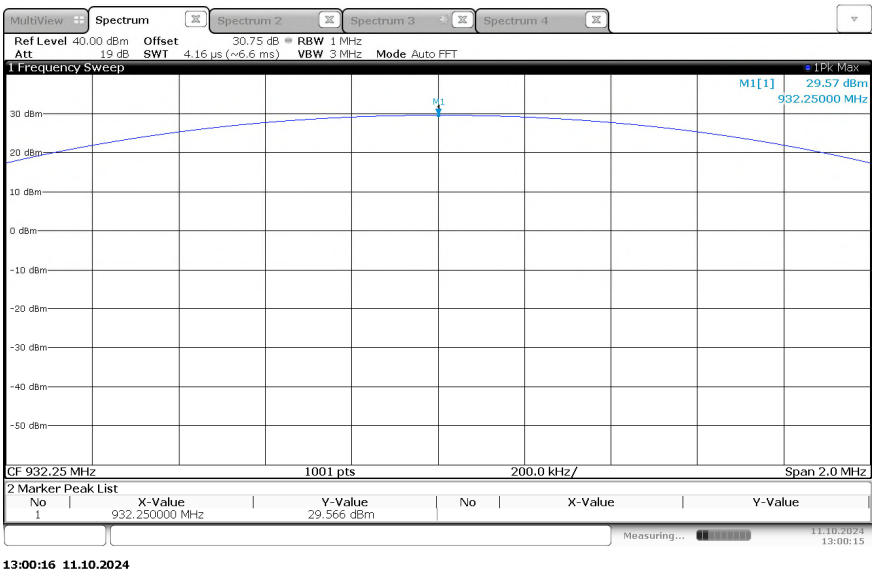

Figure 2.1.6-6 - RF Output Power – KDS TCXO – 932.25 MHz

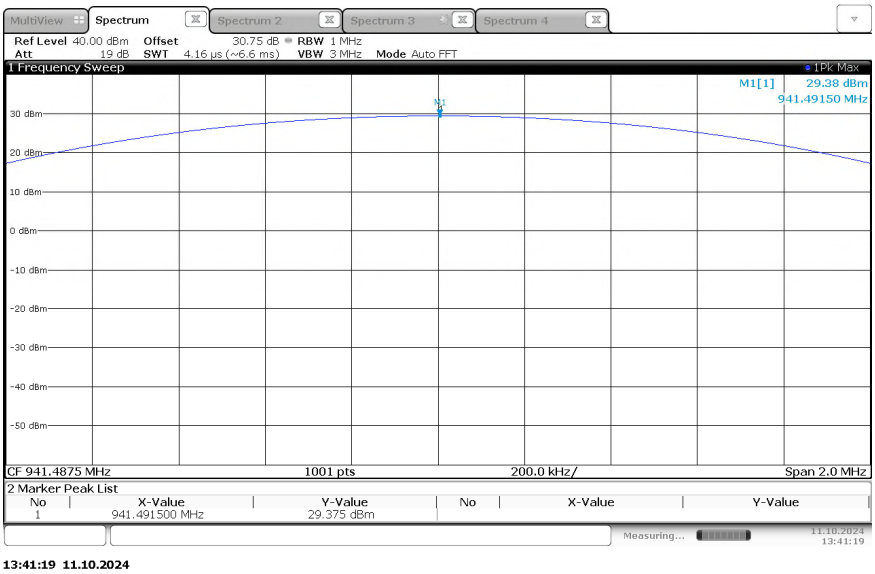

Figure 2.1.6-7 - RF Output Power – KDS TCXO – 941.4875 MHz

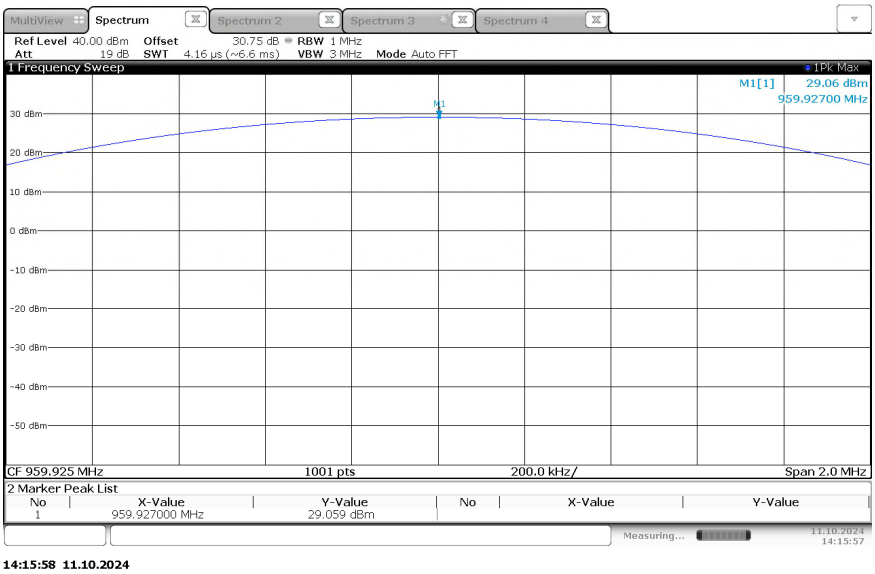

Figure 2.1.6-8 - RF Output Power – KDS TCXO – 959.925 MHz

2.1.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Digital MultiMeter	Fluke	115	BEMC02108	N/A	12	25-Jan-2025
Duratest 175 Cable 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	30-Oct-2024
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	2.90 SP1	12	03-Jun-2025
DC Power Supply	Xantrex	HPD-60-5	TAME01064	N/A	N/A	NCR
30 dB Fixed Attenuator	Mini-Circuits	BW-S30W5+	TEMC00264	N/A	12	06-Apr-2025

TU - Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

2.2 Out of Band Unwanted Emissions

2.2.1 Specification Reference

FCC 47 CFR Parts: 2.1051; 24.133 a(1), a(2); 101.111 a(6)
ISED Canada RSS-119 5.8.6; RSS-134 4.4

2.2.2 Equipment Under Test and Modification State

327504120500794; TXC TCXO

2.2.3 Date of Test

2024-October-14

2.2.4 Test Method

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer through a 30 dB passive attenuator. The spectrum analyzer resolution and video bandwidths were set to 300 Hz and 3000 Hz, respectively. The internal correction factors of the spectrum analyzer were employed to correct any cable or attenuator losses. Results of the test are shown below for all modes of operation.

2.2.5 Environmental Conditions

Ambient Temperature	23 - 25.2 °C
Relative Humidity	46.7 - 48.1 %
Atmospheric Pressure	1012.2 - 1016.6 mbar

2.2.6 Test Results

DC Powered Operating

FCC 47 CFR Parts: 2.1053; 24.133 a(1), a(2); ISED Canada RSS-134 4.4

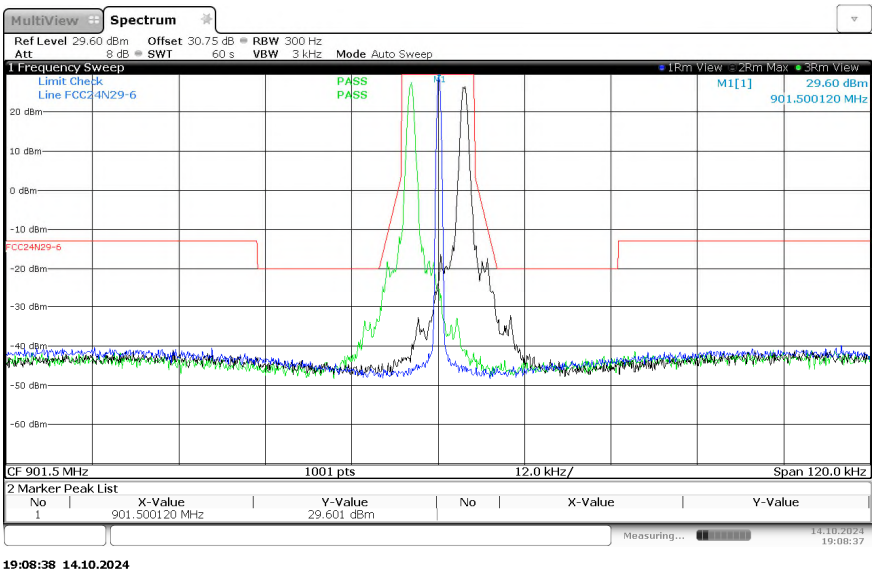

Figure 2.2.6-1 - Emissions Mask – TXC TCXO – 901.5 MHz - 12.5 kHz Channel Spacing- Boost Mode – Offset Channel +/- 6 (+/- 3600)

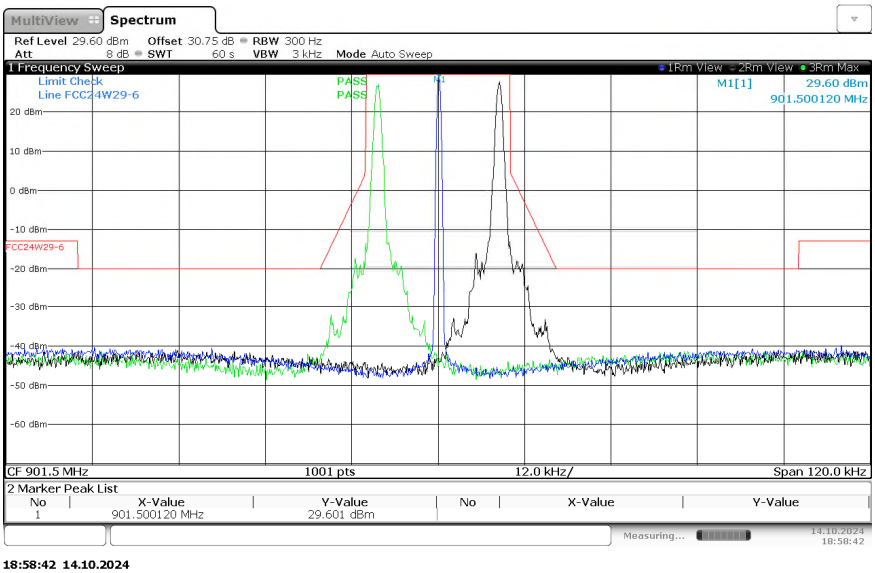

Figure 2.2.6-2 - Emissions Mask – TXC TCXO – 901.5 MHz - 25 kHz Channel Spacing- Boost Mode – Offset Channel +/- 14 (+/- 8400)

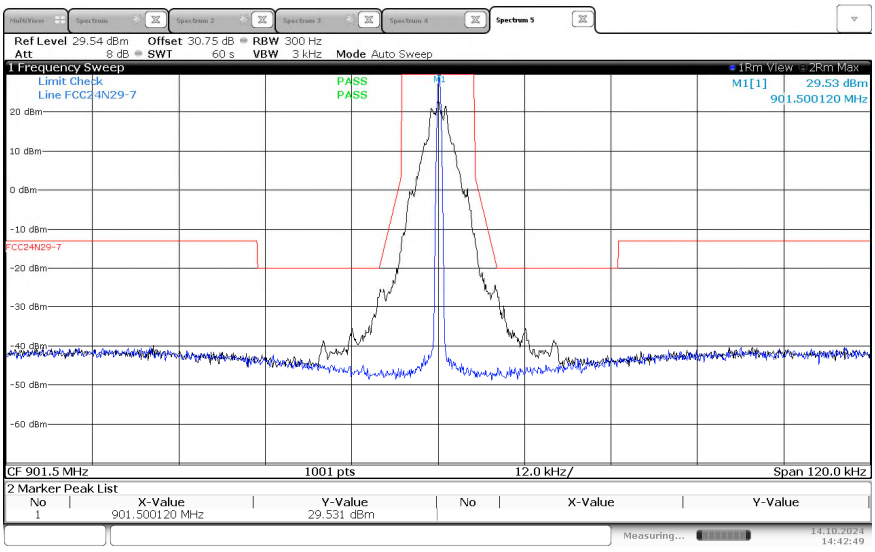

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Figure 2.2.6-3 - Emissions Mask – TXC TCXO – 901.5 MHz - 12.5 kHz Channel Spacing- C&I Mode

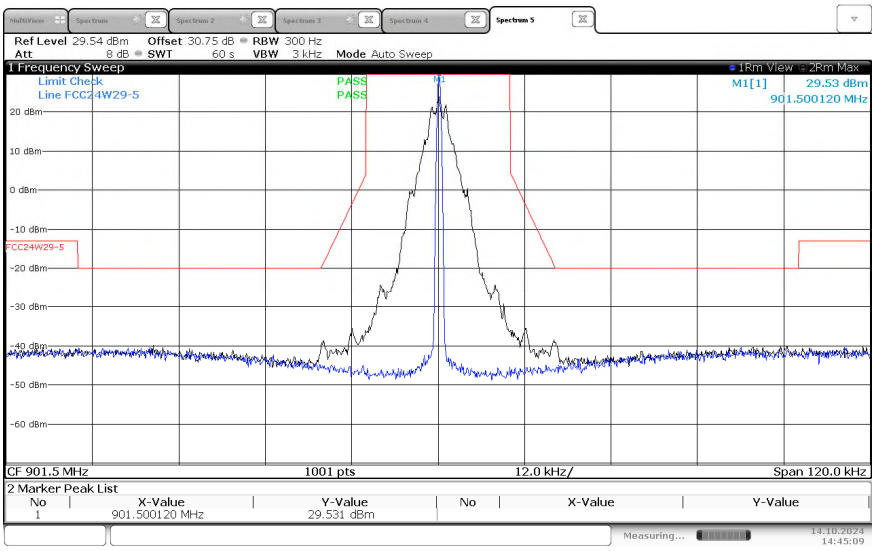

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Figure 2.2.6-4 - Emissions Mask – TXC TCXO – 901.5 MHz - 25 kHz Channel Spacing- C&I Mode

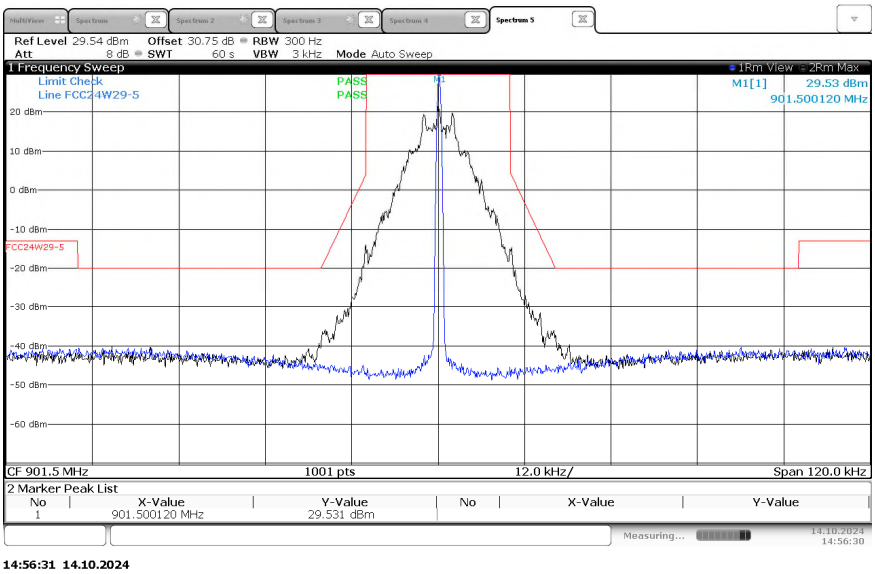


Figure 2.2.6-5 - Emissions Mask – TXC TCXO – 901.5 MHz - 25 kHz Channel Spacing- Normal Mode

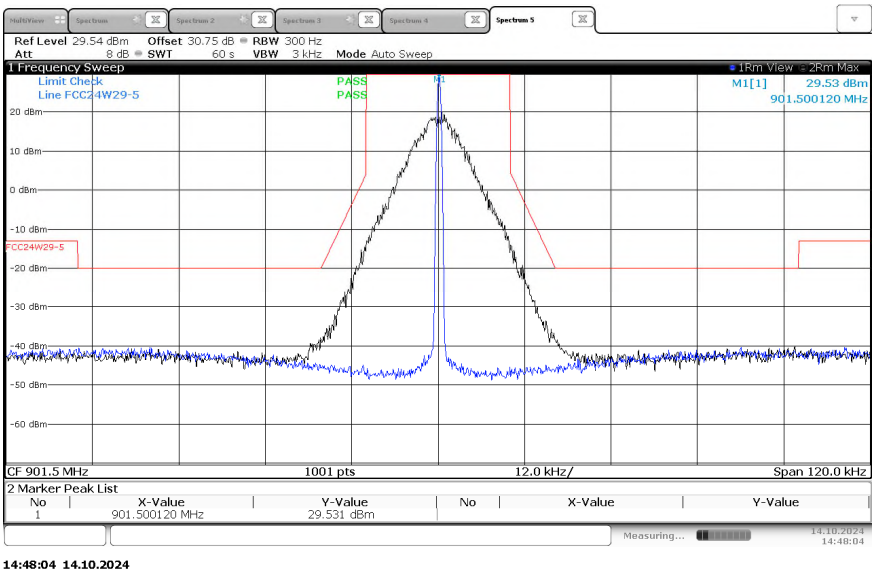


Figure 2.2.6-6 - Emissions Mask – TXC TCXO – 901.5 MHz - 25 kHz Channel Spacing- Double Density Mode

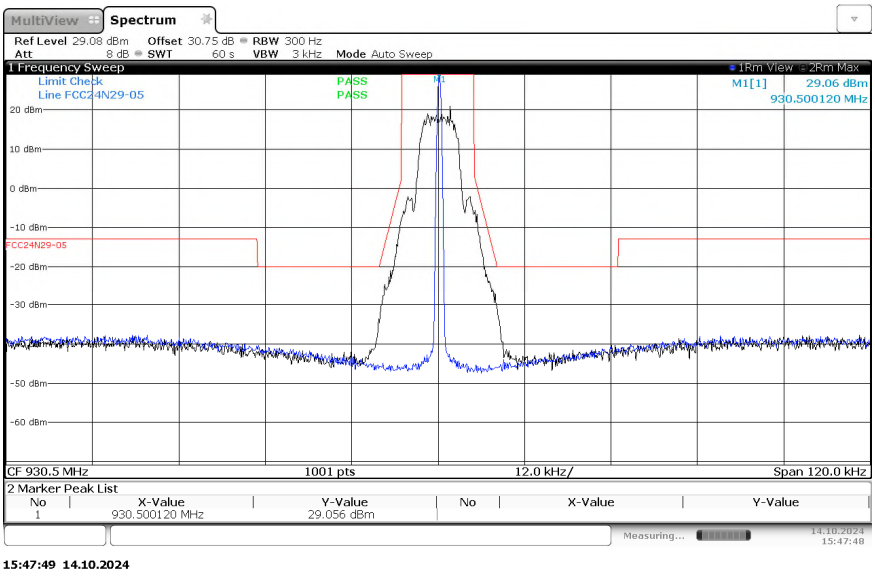


Figure 2.2.6-7 - Emissions Mask – TXC TCXO – 930.5 MHz - 12.5 kHz Channel Spacing - mPass5k Mode

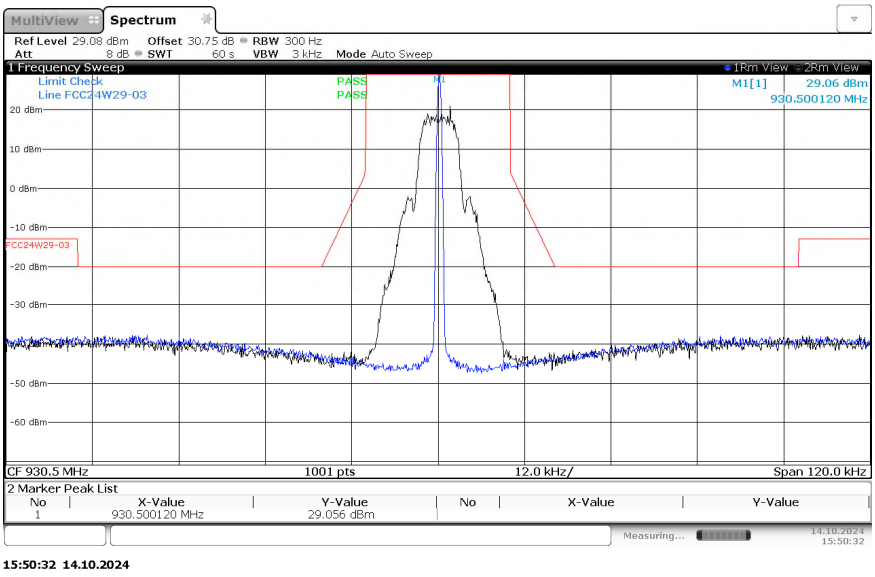


Figure 2.2.6-8 - Emissions Mask – TXC TCXO – 930.5 MHz - 12.5 kHz Channel Spacing - mPass5k Mode

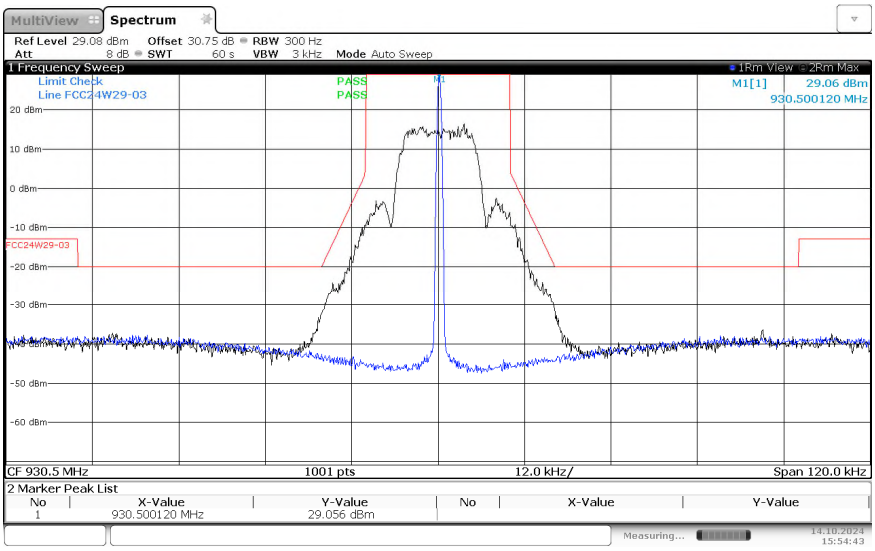


Figure 2.2.6-9 - Emissions Mask – TXC TCXO – 930.5 MHz - 25 kHz Channel Spacing - mPass5k Mode

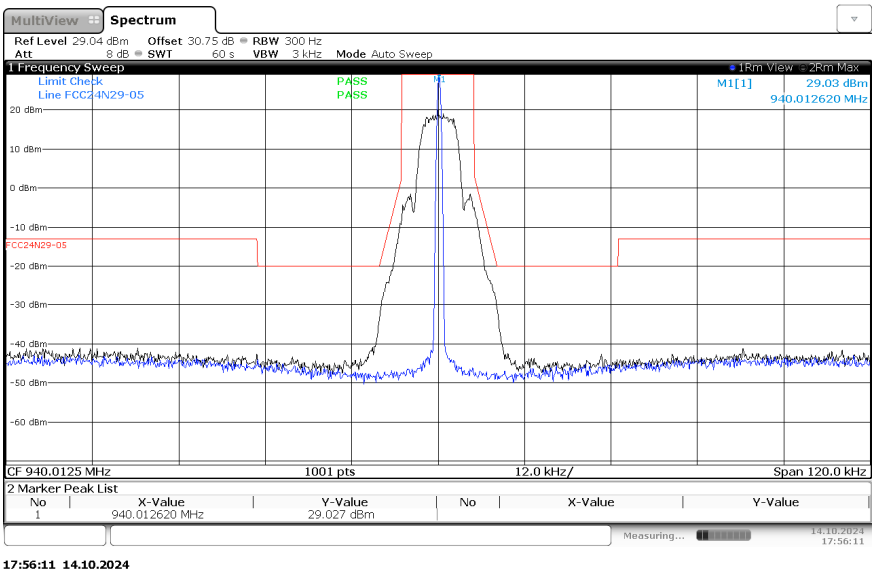


Figure 2.2.6-10 - Emissions Mask – TXC TCXO – 940.0125 MHz - 12.5 kHz Channel Spacing - mPass5k Mode

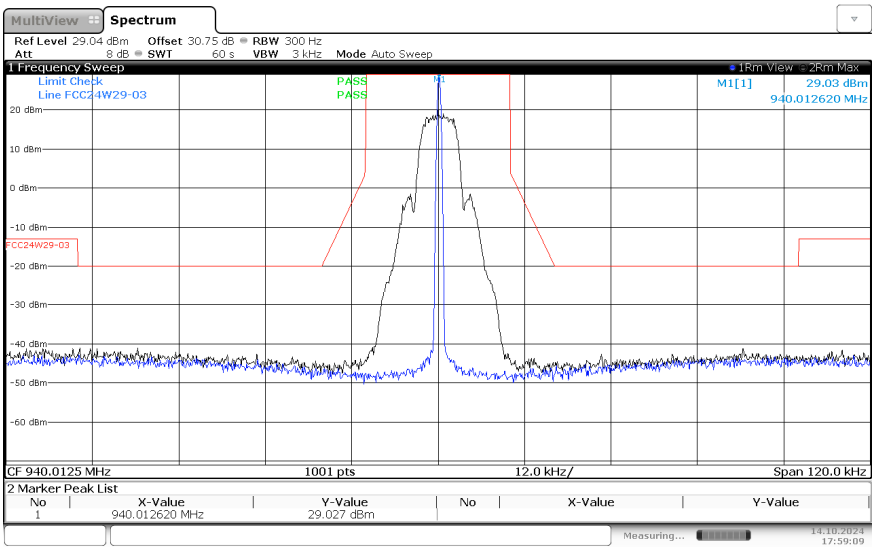


Figure 2.2.6-11 - Emissions Mask – TXC TCXO – 940.0125 MHz - 25 kHz Channel Spacing-mPass5k Mode

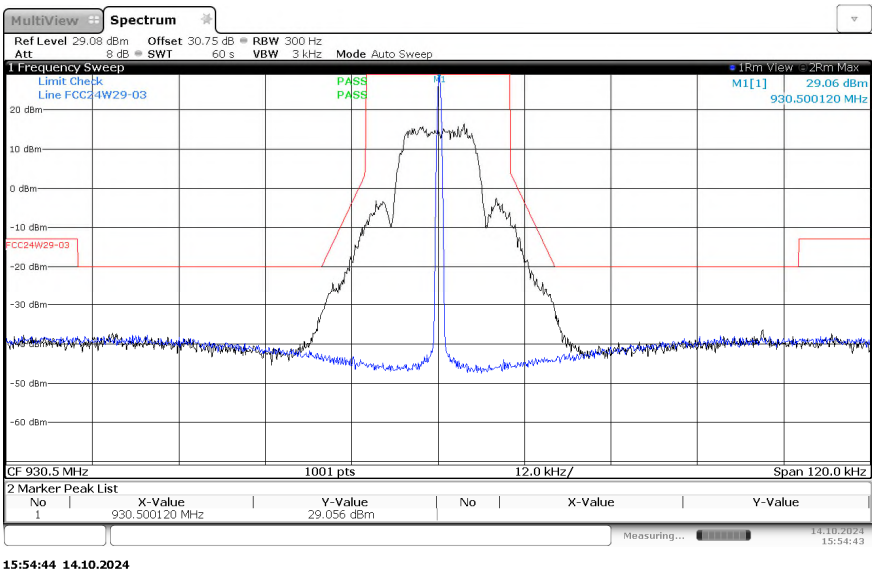


Figure 2.2.6-12 - Emissions Mask – TXC TCXO – 940.0125 MHz - 25 kHz Channel Spacing-Mpass10k Mode

FCC 47 CFR Parts: 2.1053; 101.111 a(6); ISED Canada RSS-119 5.8.6

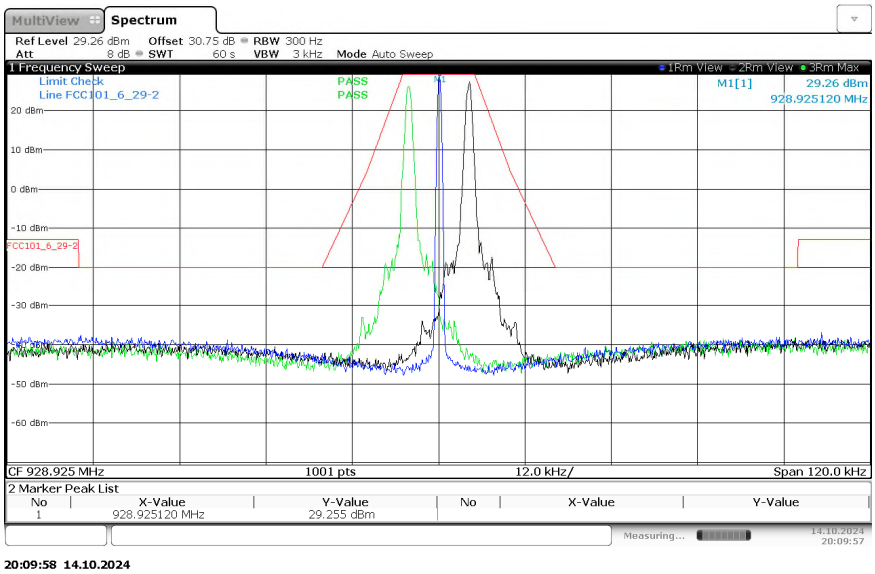


Figure 2.2.6-13 - Emissions Mask – TXC TCXO – 928.925 MHz - 25 kHz Channel Spacing- Boost Mode – Offset Channel +/- 7 (+/- 4200)

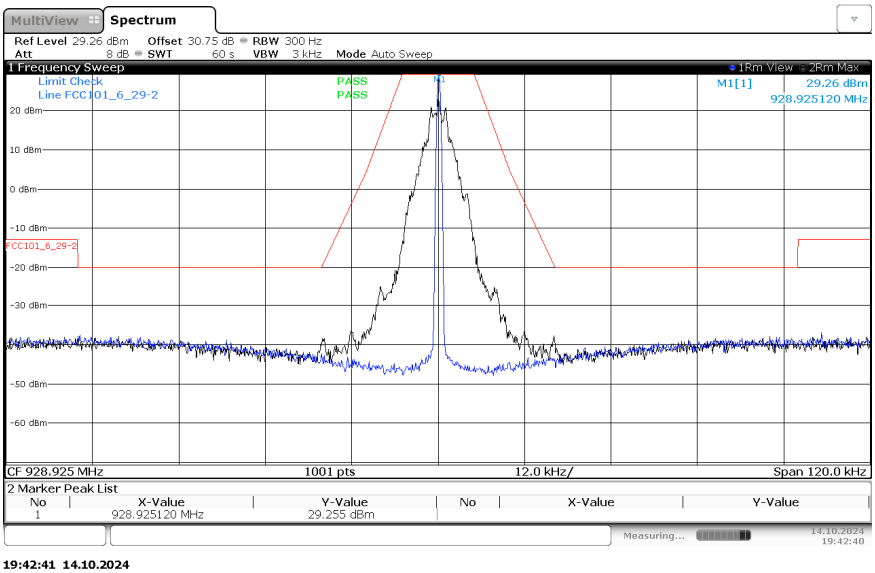
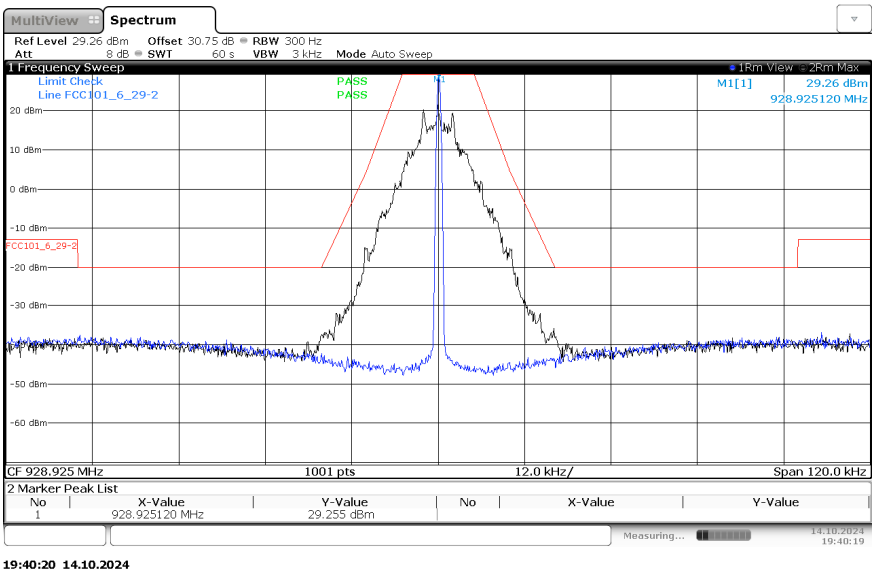
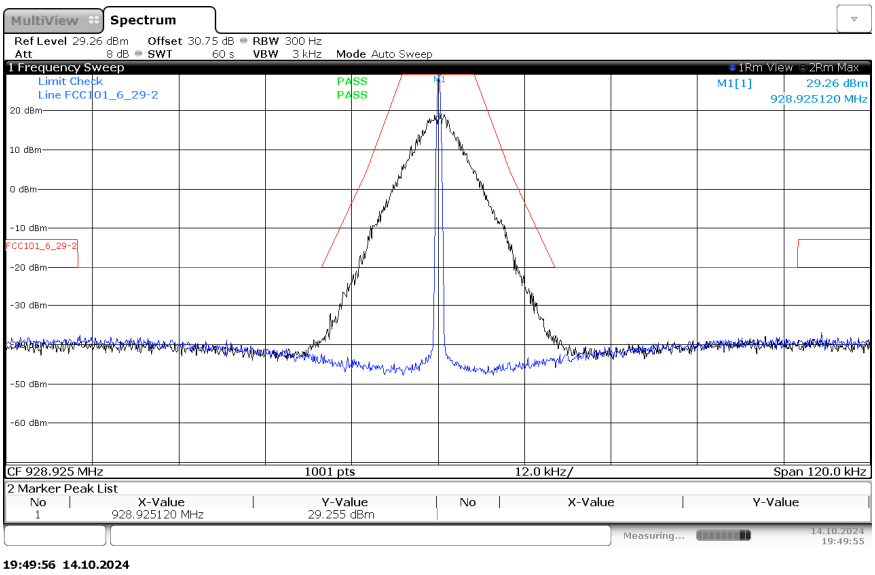


Figure 2.2.6-14 - Emissions Mask – TXC TCXO – 928.925 MHz - 25 kHz Channel Spacing- C&I Mode



19:40:20 14.10.2024

Figure 2.2.6-15 - Emissions Mask – TXC TCXO – 928.925 MHz - 25 kHz Channel Spacing- Normal Mode



19:49:56 14.10.2024

Figure 2.2.6-16 - Emissions Mask – TXC TCXO – 928.925 MHz - 25 kHz Channel Spacing- Double Density Mode

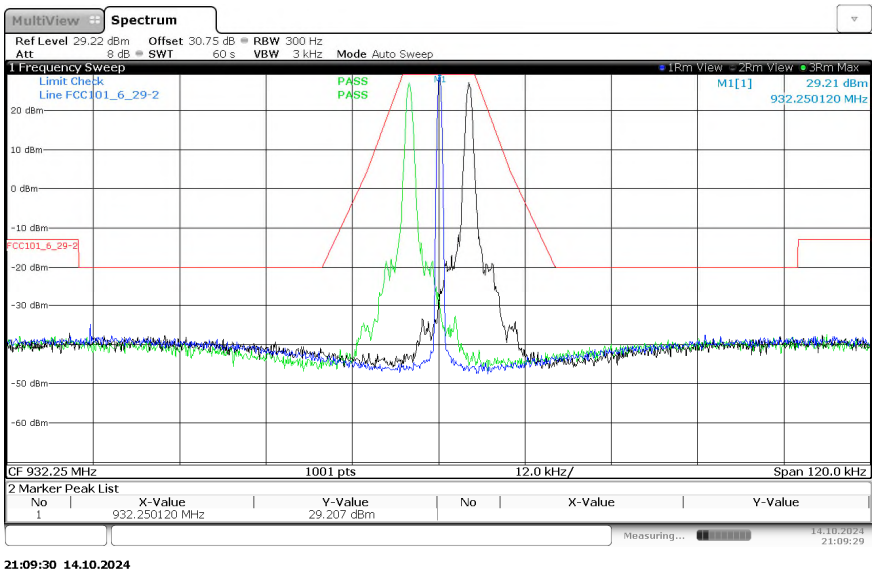


Figure 2.2.6-17 - Emissions Mask – TXC TCXO – 932.25 MHz - 25 kHz Channel Spacing- Boost Mode – Offset Channel +/- 7 (+/- 4200)

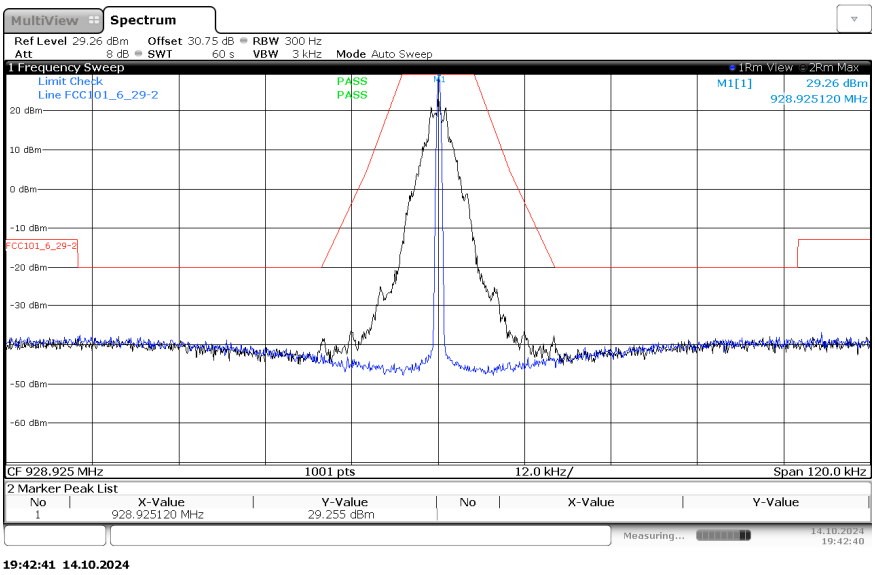


Figure 2.2.6-18 - Emissions Mask – TXC TCXO – 932.25 MHz - 25 kHz Channel Spacing- C&I Mode

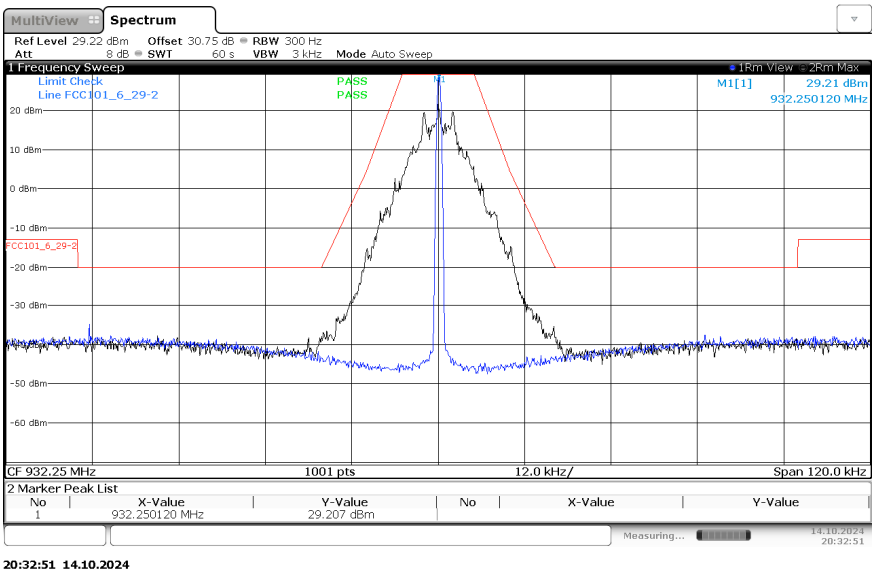


Figure 2.2.6-19 - Emissions Mask – TXC TCXO – 932.25 MHz - 25 kHz Channel Spacing- Normal Mode

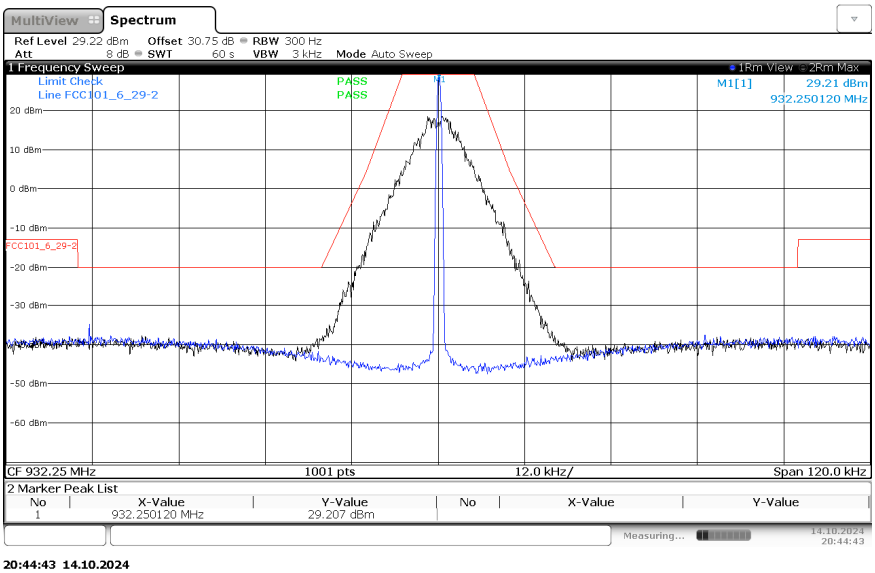


Figure 2.2.6-20 - Emissions Mask – TXC TCXO – 932.25 MHz - 25 kHz Channel Spacing- Double Density Mode

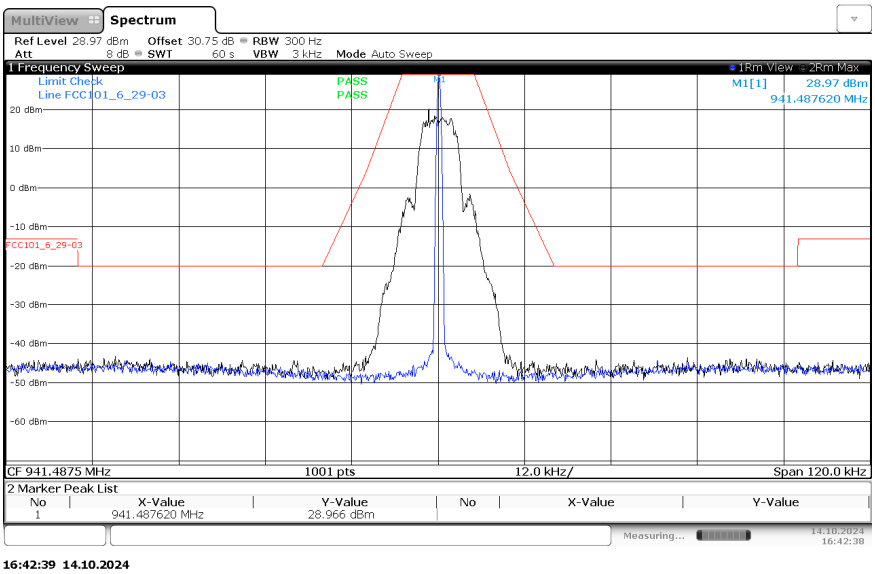


Figure 2.2.6-21 - Emissions Mask – TXC TCXO – 941.4875 MHz - 25 kHz Channel Spacing-mPass5k Mode

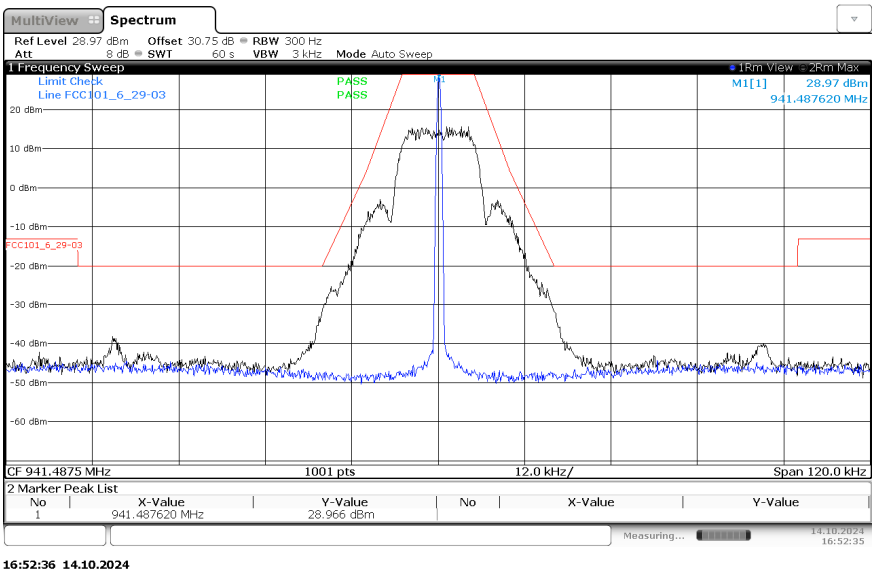


Figure 2.2.6-22 - Emissions Mask – TXC TCXO – 941.4875 MHz - 25 kHz Channel Spacing-Mpass10k Mode

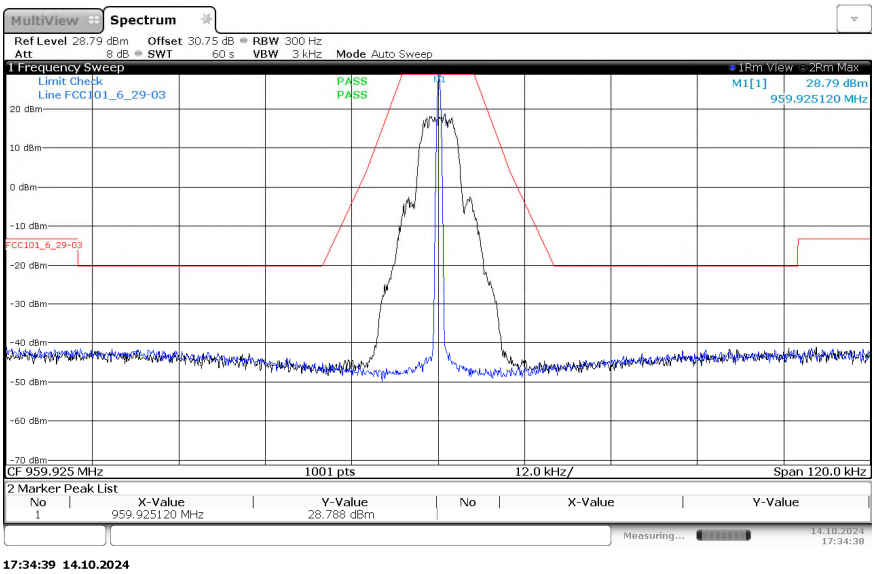


Figure 2.2.6-23 - Emissions Mask – TXC TCXO – 959.925 MHz - 25 kHz Channel Spacing-mPass5k Mode

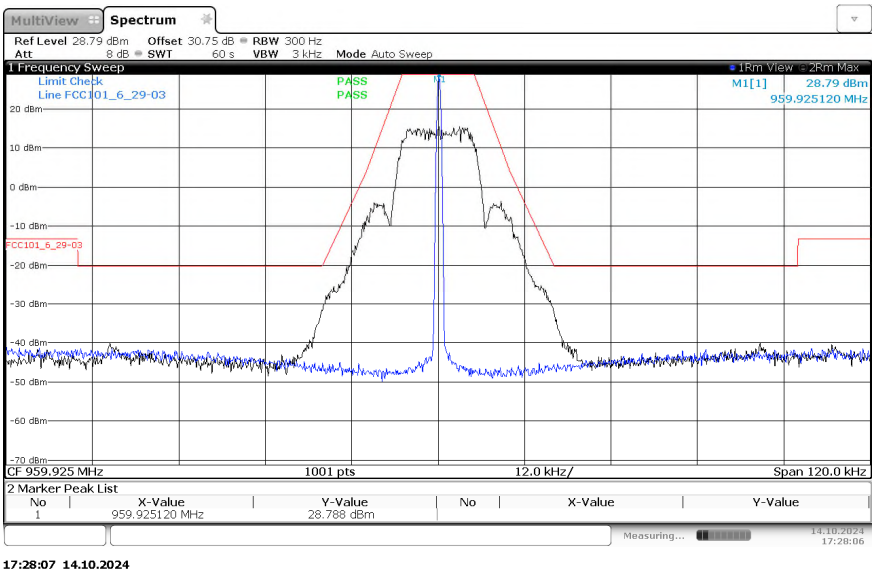


Figure 2.2.6-24 - Emissions Mask – TXC TCXO – 959.925 MHz - 25 kHz Channel Spacing-Mpass10k Mode

2.2.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Digital MultiMeter	Fluke	115	BEMC02108	N/A	12	25-Jan-2025
Duratest 175 Cable 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	30-Oct-2024
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	2.90 SP1	12	03-Jun-2025
DC Power Supply	Xantrex	HPD-60-5	TAME01064	N/A	N/A	NCR
30 dB Fixed Attenuator	Mini-Circuits	BW-S30W5+	TEMC00264	N/A	12	06-Apr-2025

TU - Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

2.3 Occupied Bandwidth

2.3.1 Specification Reference

FCC Section 2.1049; ISED Canada RSS-GEN 6.7

2.3.2 Equipment Under Test and Modification State

327504120500794; TXC TCXO

2.3.3 Date of Test

2024-October-01 to 2024-October-11

2.3.4 Test Method

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer through suitable of passive attenuation. The internal correction factors of the spectrum analyzer were employed to correct for any cable and attenuator losses.

The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts. The nominal IF filter 3 dB bandwidth (RBW) is in the range of 1% to 5% of the OBW, and the VBW was set ≥ 3 × RBW. The reference level was set to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. The measurements were made using the spectrum analyzer's 99% BW function.

2.3.5 Environmental Conditions

Ambient Temperature	23 - 25.2 °C
Relative Humidity	46.7 - 48.1 %
Atmospheric Pressure	1012.2 - 1016.6 mbar

2.3.6 Test Results

FCC 47 CFR Parts: 2.1053; 24.133 a(1), a(2); ISED Canada RSS-134 4.4

Table 2.3.6-1 - 99% Bandwidth – TXC TCXO – 901.5 MHz

Frequency (MHz)	ISED Canada Rule Part	Mode	99% Bandwidth (kHz)
901.5	RSS-134	Boost	1.3138
901.5	RSS-134	C&I	6.1804
901.5	RSS-134	Normal	11.8461
901.5	RSS-134	Double Density	13.6109

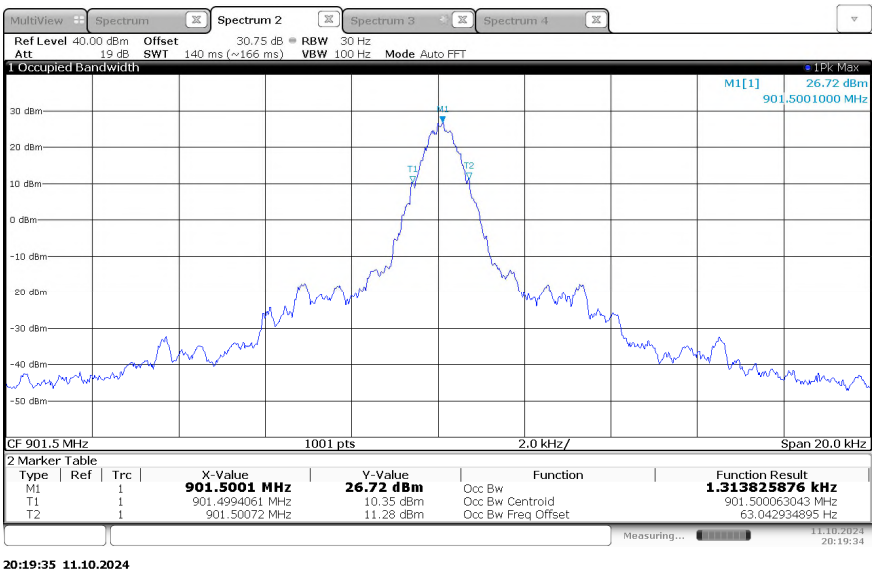


Figure 2.3.6-1 - 99% Bandwidth – TXC TCXO – 901.5 MHz - Boost Mode

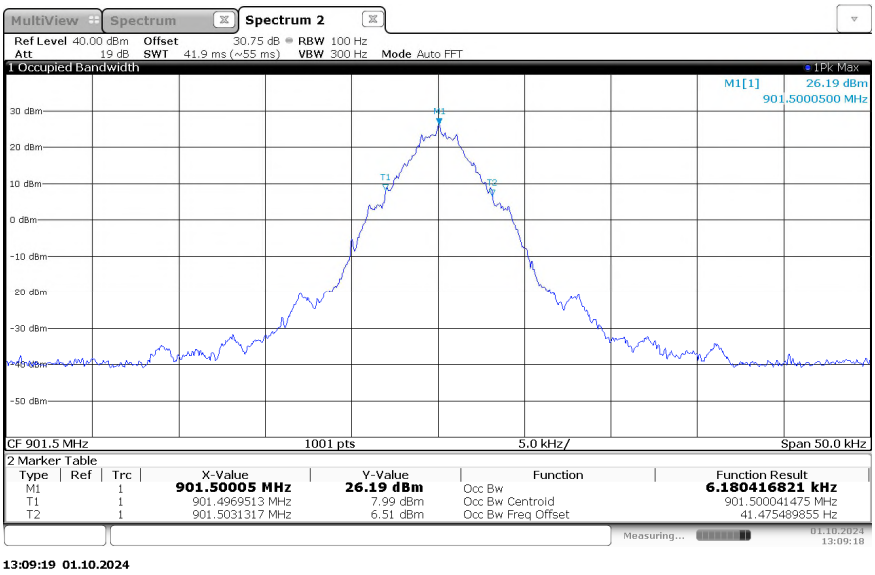


Figure 2.3.6-2 - 99% Bandwidth – TXC TCXO – 901.5 MHz - C&I Mode

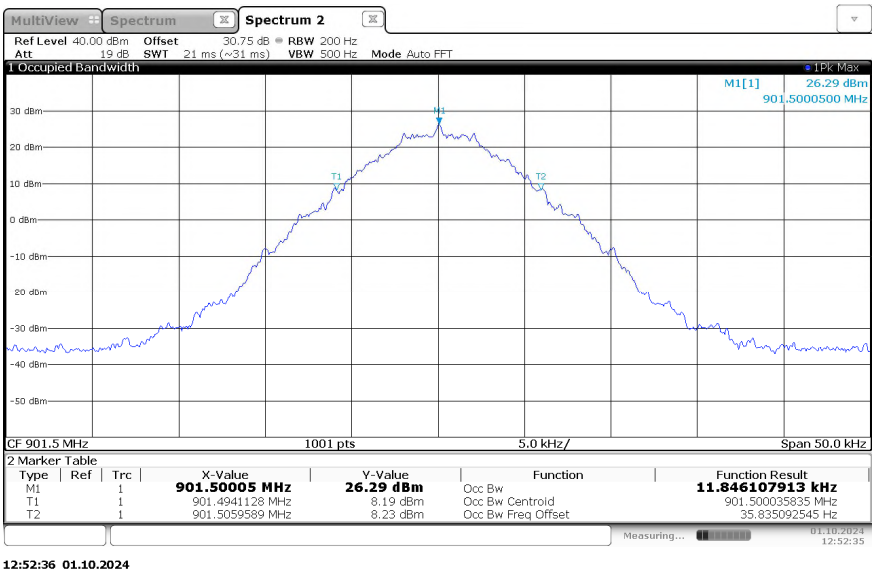


Figure 2.3.6-3 - 99% Bandwidth – TXC TCXO – 901.5 MHz - Normal Mode

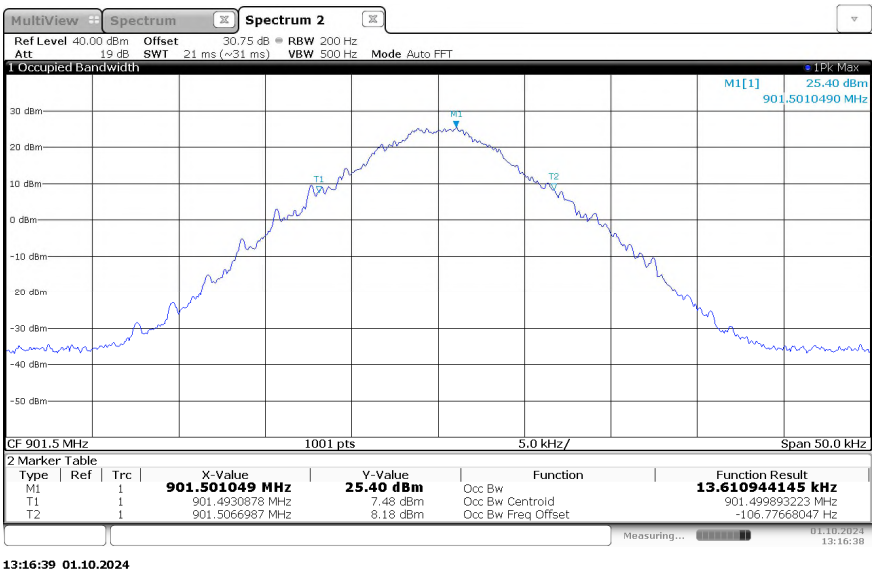


Figure 2.3.6-4 - 99% Bandwidth – TXC TCXO – 901.5 MHz - Double Density Mode

Table 2.3.6-2 - 99% Bandwidth – TXC TCXO – 928.925 MHz

Frequency (MHz)	ISED Canada Rule Part	Mode	99% Bandwidth (kHz)
928.925	RSS-119	Boost	1.2432
928.925	RSS-119	C&I	6.2119
928.925	RSS-119	Normal	11.8758
928.925	RSS-119	Double Density	13.1935

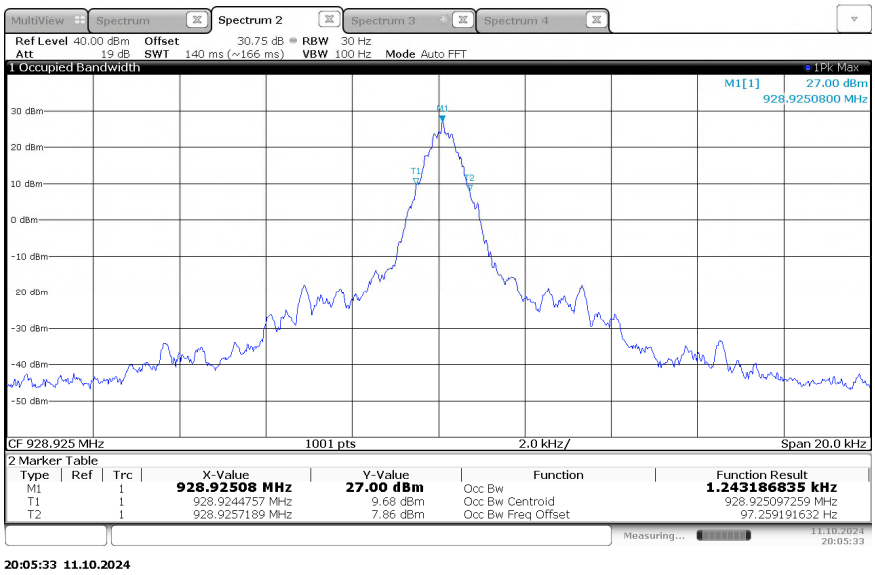
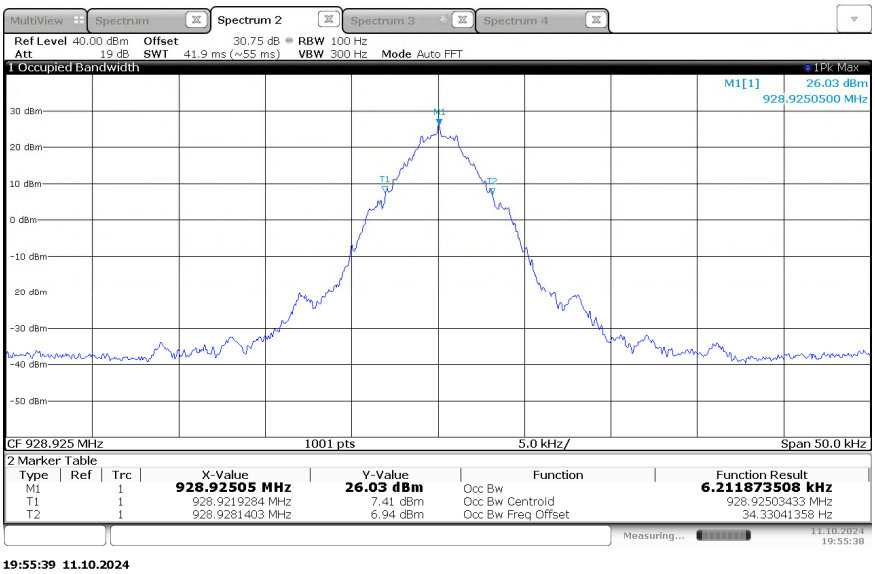
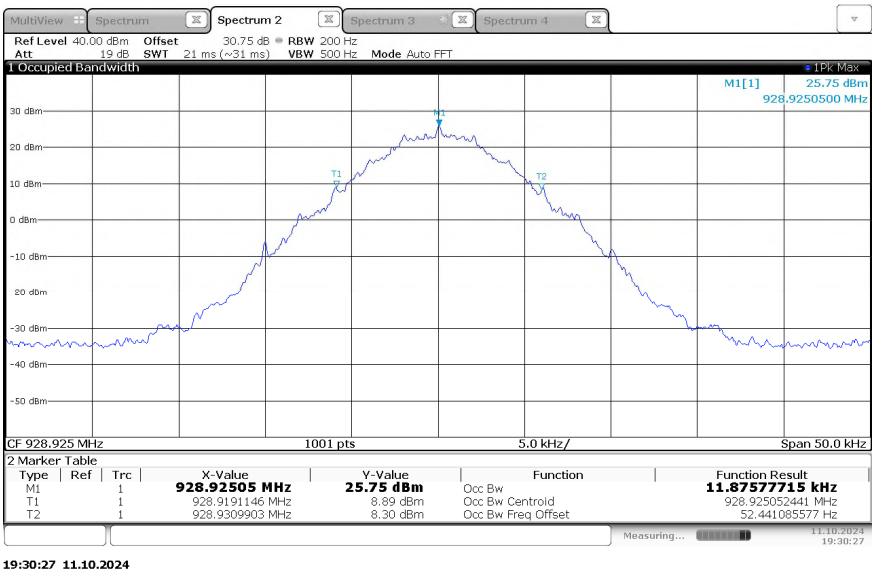


Figure 2.3.6-5 - 99% Bandwidth – TXC TCXO – 928.925 MHz - Boost Mode



19:55:39 11.10.2024

Figure 2.3.6-6 - 99% Bandwidth – TXC TCXO – 928.925 MHz - C&I Mode



19:30:27 11.10.2024

Figure 2.3.6-7 - 99% Bandwidth – TXC TCXO – 928.925 MHz - Normal Mode

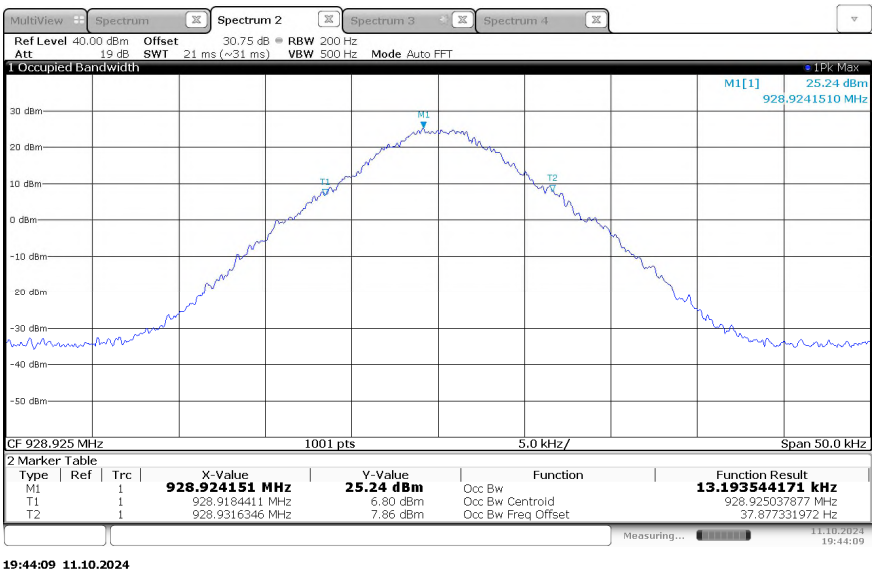


Figure 2.3.6-8 - 99% Bandwidth – TXC TCXO – 928.925 MHz - Double Density Mode

Table 2.3.6-3 - 99% Bandwidth – TXC TCXO – 930.5 MHz

Frequency (MHz)	ISED Canada Rule Part	Mode	99% Bandwidth (kHz)
930.5	RSS-134	mPass5k	5.7980
930.5	RSS-134	mPass10k	11.8406

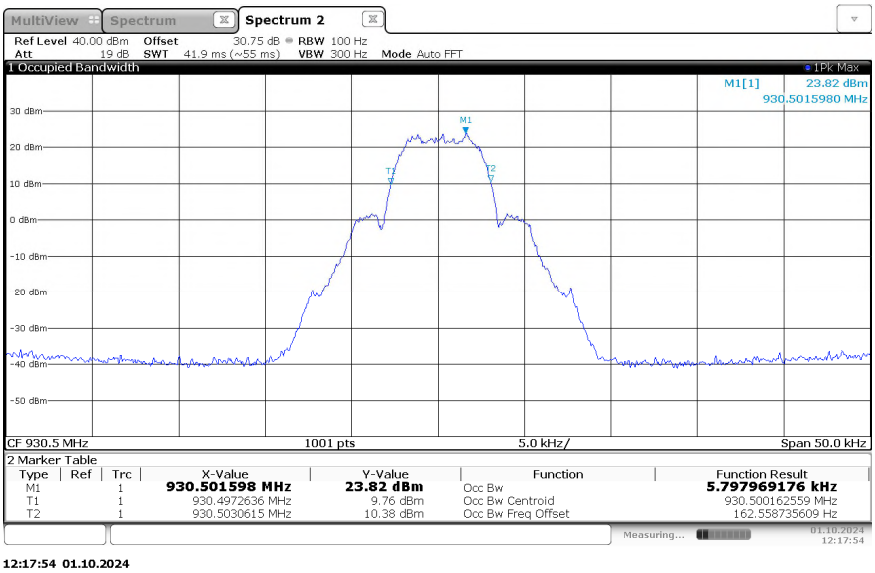


Figure 2.3.6-9 - 99% Bandwidth – TXC TCXO – 930.5 MHz - mPass5k Mode

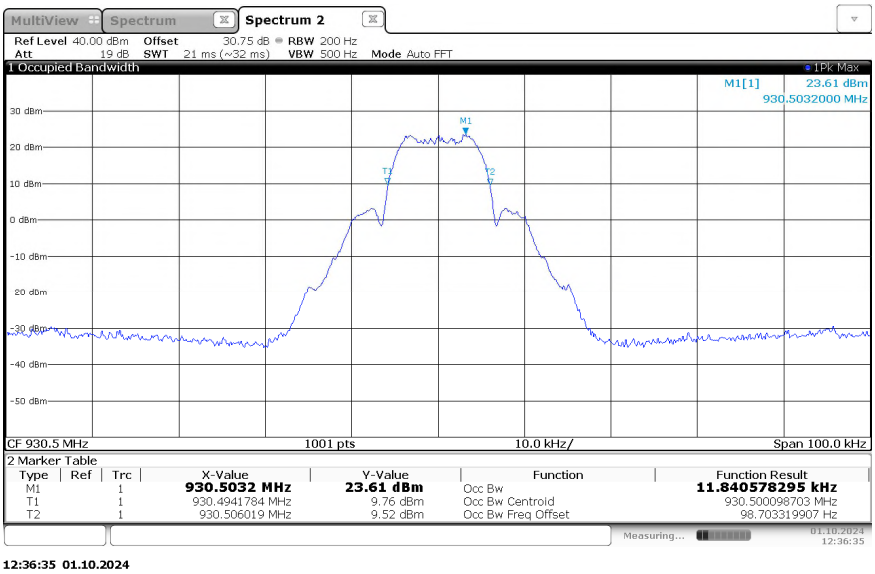


Figure 2.3.6-10 - 99% Bandwidth – TXC TCXO – 930.5 MHz - Mpass10k Mode

Table 2.3.6-4 - 99% Bandwidth – TXC TCXO – 932.25 MHz

Frequency (MHz)	ISED Canada Rule Part	Mode	99% Bandwidth (kHz)
932.25	RSS-119	Boost	1.2937
932.25	RSS-119	C&I	6.1415
932.25	RSS-119	Normal	11.9009
932.25	RSS-119	Double Density	13.4007

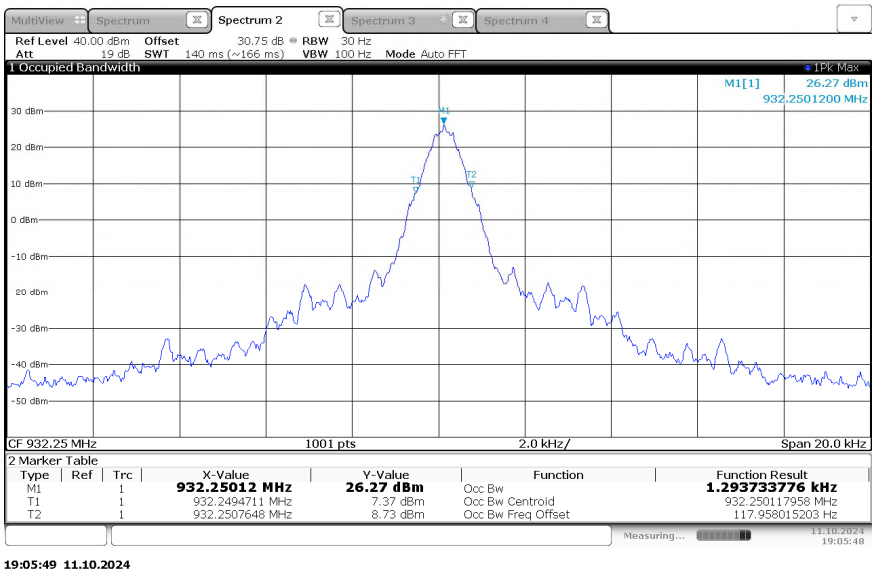


Figure 2.3.6-11 - 99% Bandwidth – TXC TCXO – 932.25 MHz - Boost Mode

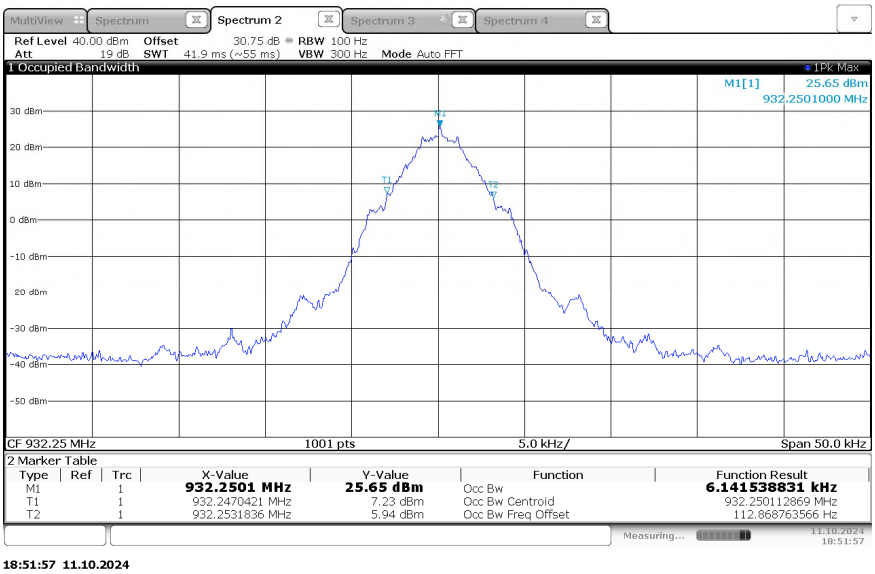


Figure 2.3.6-12 - 99% Bandwidth – TXC TCXO – 932.25 MHz - C&I Mode

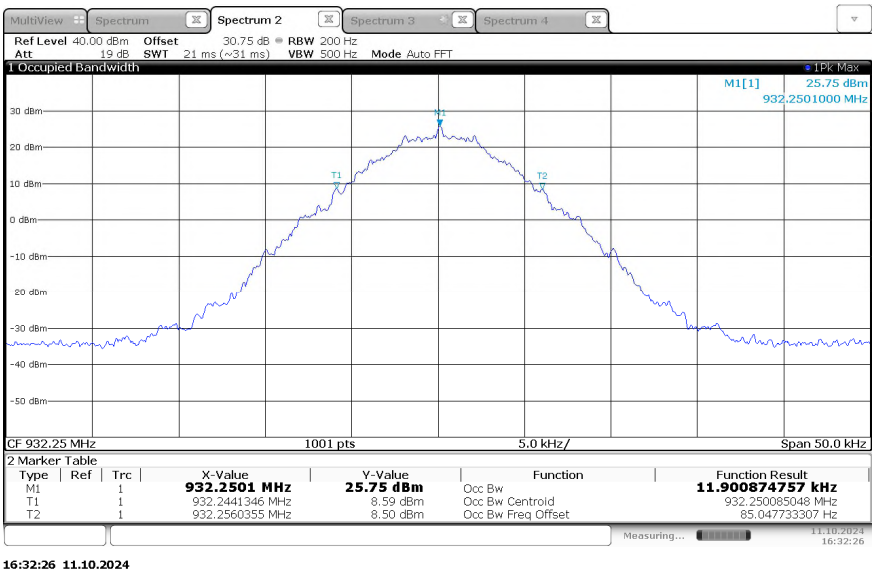


Figure 2.3.6-13 - 99% Bandwidth – TXC TCXO – 932.25 MHz - Normal Mode

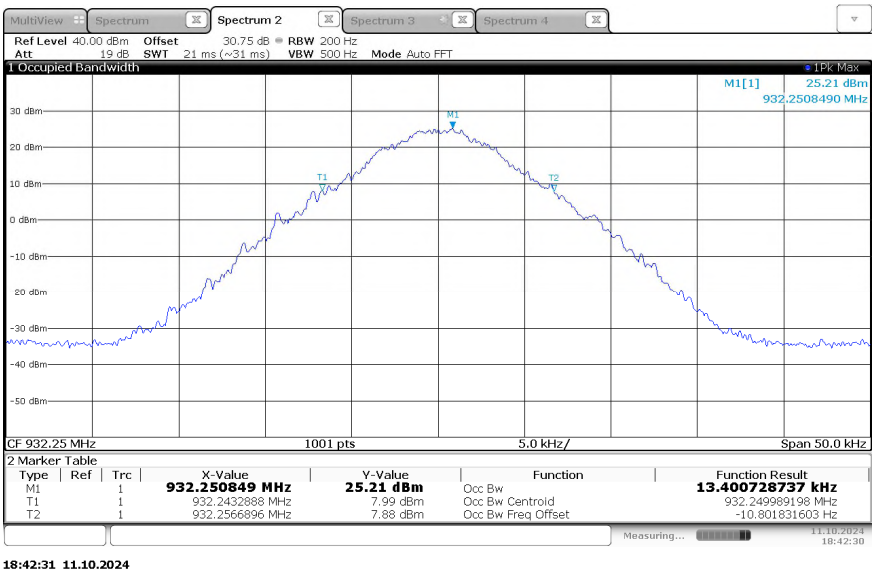


Figure 2.3.6-14 - 99% Bandwidth – TXC TCXO – 932.25 MHz - Double Density Mode

Table 2.3.6-5 - 99% Bandwidth – TXC TCXO – 940.0125 MHz

Frequency (MHz)	ISED Canada Rule Part	Mode	99% Bandwidth (kHz)
940.0125	RSS-134	mPass5k	5.8254
940.0125	RSS-134	mPass10k	11.9453

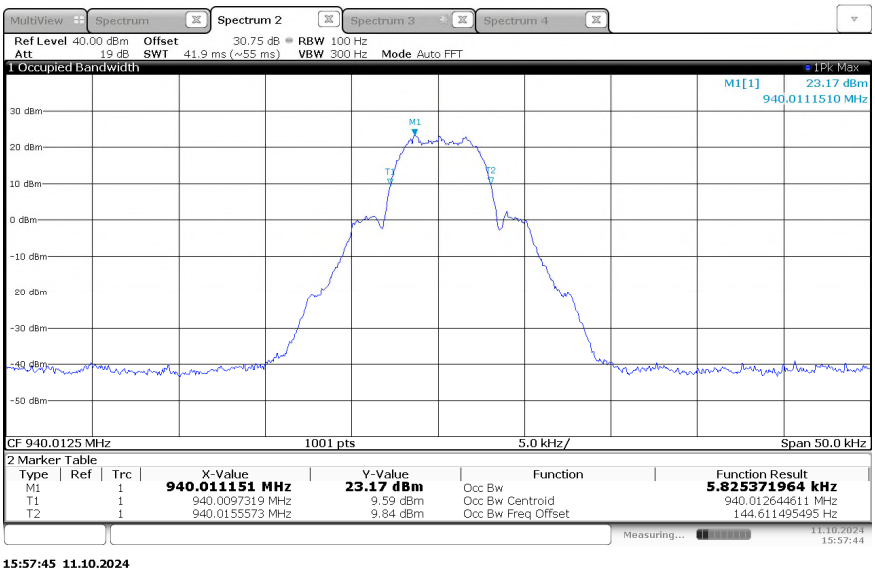


Figure 2.3.6-15 - 99% Bandwidth – TXC TCXO – 940.0125 MHz - mPass5k Mode

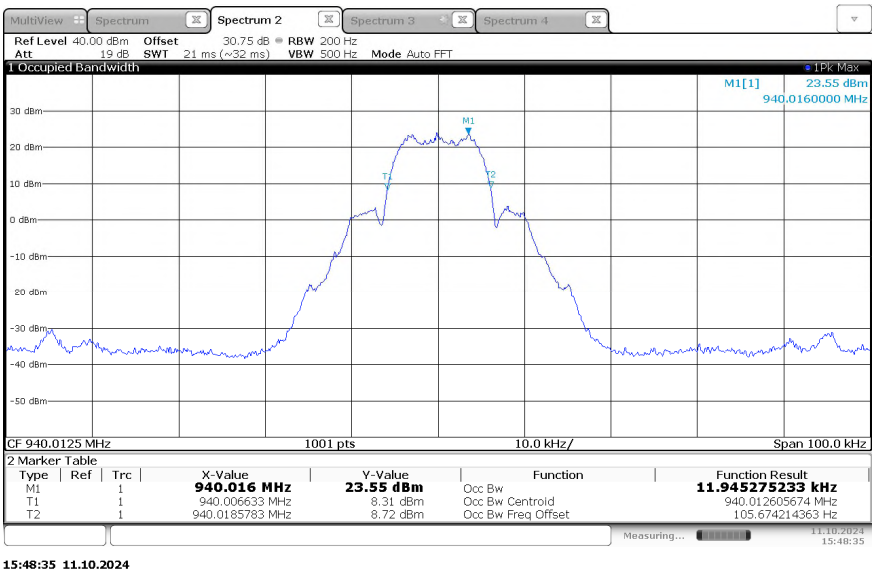


Figure 2.3.6-16 - 99% Bandwidth – TXC TCXO – 940.0125 MHz - Mpass10k Mode

Table 2.3.6-6 - 99% Bandwidth – TXC TCXO – 941.4875 MHz

Frequency (MHz)	ISED Canada Rule Part	Mode	99% Bandwidth (kHz)
941.4875	RSS-119	mPass5k	5.8234
941.4875	RSS-119	mPass10k	11.8457

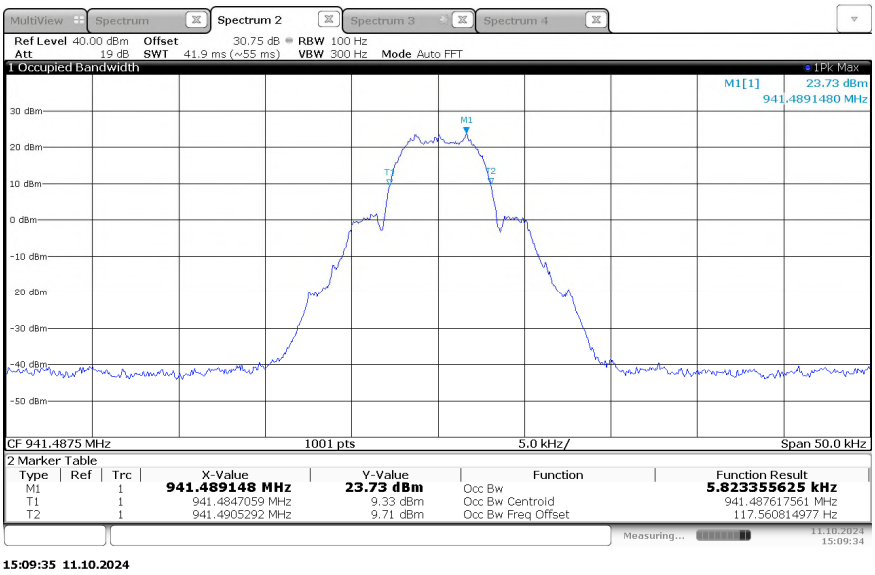


Figure 2.3.6-17 - 99% Bandwidth – TXC TCXO – 941.4875 MHz - mPass5k Mode

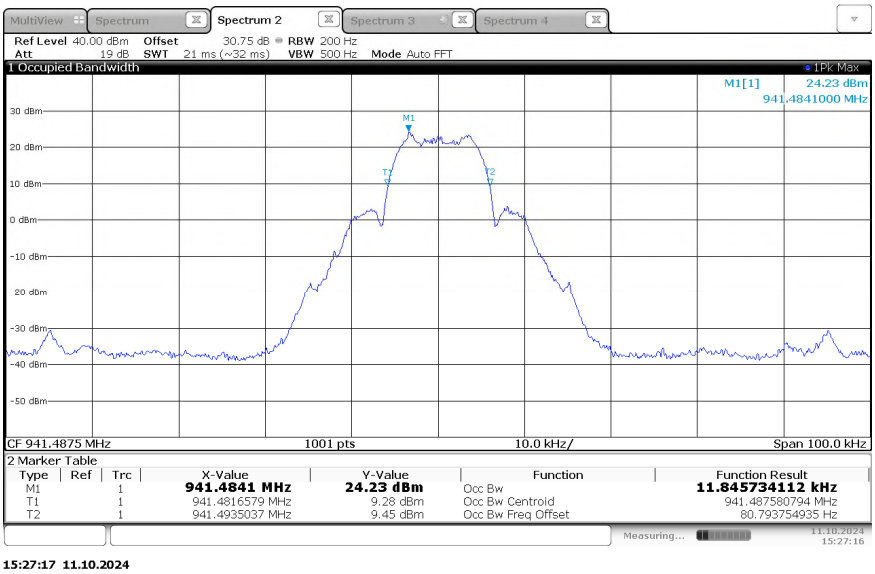


Figure 2.3.6-18 - 99% Bandwidth – TXC TCXO – 941.4875 MHz - Mpass10k Mode

Table 2.3.6-7 - 99% Bandwidth – TXC TCXO – 941.4875 MHz

Frequency (MHz)	ISED Canada Rule Part	Mode	99% Bandwidth (kHz)
959.925	RSS-119	mPass5k	5.8166
959.925	RSS-119	mPass10k	11.8520

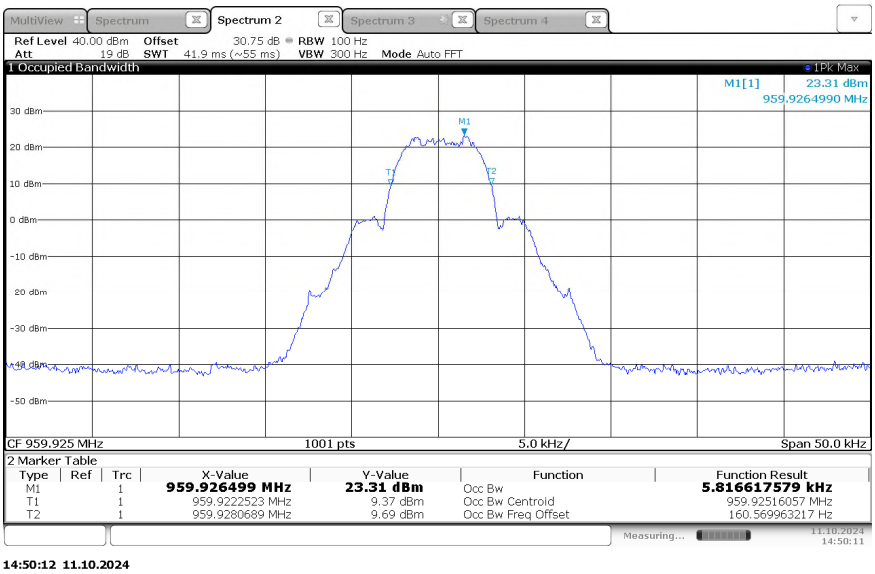


Figure 2.3.6-19 - 99% Bandwidth – TXC TCXO – 959.925 MHz - mPass5k Mode

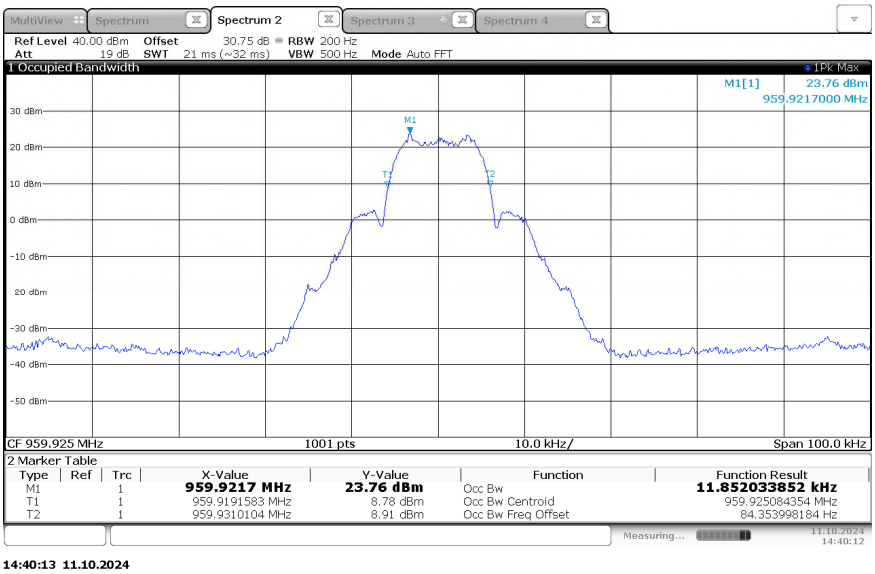


Figure 2.3.6-20 - 99% Bandwidth – TXC TCXO – 959.925 MHz - Mpass10k Mode

2.3.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Digital MultiMeter	Fluke	115	BEMC02108	N/A	12	25-Jan-2025
Duratest 175 Cable 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	30-Oct-2024
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	2.90 SP1	12	03-Jun-2025
DC Power Supply	Xantrex	HPD-60-5	TAME01064	N/A	N/A	NCR
30 dB Fixed Attenuator	Mini-Circuits	BW-S30W5+	TEMC00264	N/A	12	06-Apr-2025

TU - Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

2.4 Spurious Emissions at Antenna Terminals

2.4.1 Specification Reference

FCC 47 CFR Parts: 2.1051; 24.133 a(1), a(2); 101.111 a(6)
ISED Canada RSS-119 5.8.6; RSS-134 4.4

2.4.2 Equipment Under Test and Modification State

327504120500786; KDS TCXO
327504120500794; TXC TCXO

2.4.3 Date of Test

2024-October-07 to 2024-October-11

2.4.4 Test Method

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer through a 30 dB passive attenuator. The spectrum analyzer resolution bandwidth was set to 100 kHz below 1000 MHz and 1 MHz above 1000 MHz. The internal correction factors of the spectrum analyzer were employed to correct for any cable or attenuator. The spectrum was investigated in accordance with CFR 47 Part 2.1057

2.4.5 Environmental Conditions

Ambient Temperature	23 - 25.2 °C
Relative Humidity	46.7 - 48.1 %
Atmospheric Pressure	1012.2 - 1016.6 mbar

2.4.6 Test Results

DC Powered, Operating

FCC Part 24.133a(1),(a2); ISED Canada RSS-134 4.4

Table 2.4.6-1 – Conducted Spurious – TXC TCXO – 901.5 MHz

Fundamental Frequency (MHz)	Spurious Frequency (MHz)	Spurious (dBm)	Limit (dBm)	Margin (dB)
901.5	1803	-28.33	-13	15.33

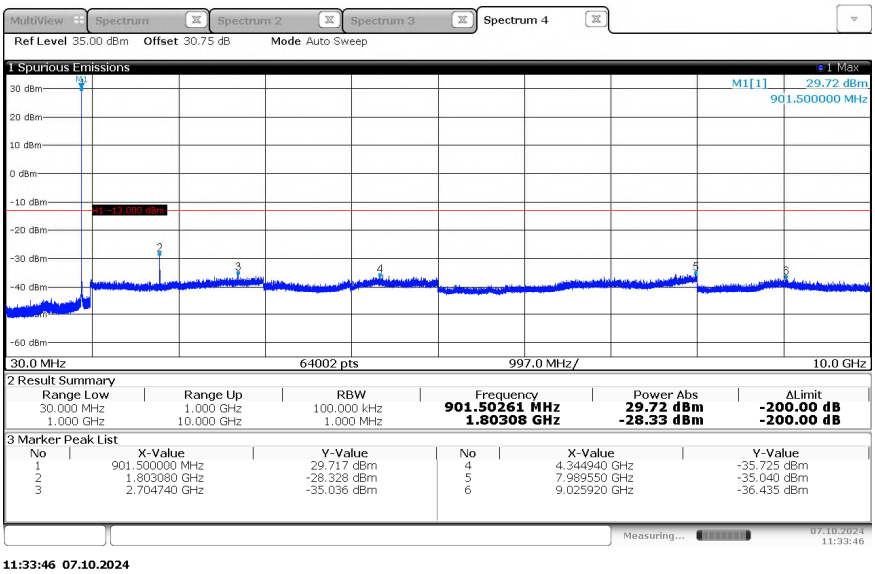


Figure 2.4.6-1 - Transmitter Conducted Spurious Emissions – TXC TCXO – 901.5 MHz - Normal Mode

Table 2.4.6-2 – Conducted Spurious – TXC TCXO – 930.5 MHz

Fundamental Frequency (MHz)	Spurious Frequency (MHz)	Spurious (dBm)	Limit (dBm)	Margin (dB)
930.5	1861	-30.62	-13	17.62

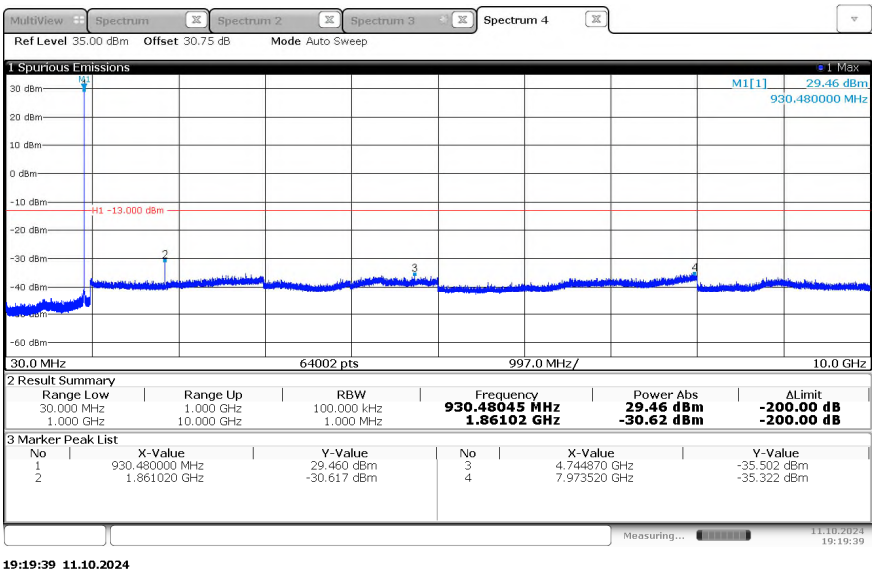


Figure 2.4.6-2 - Transmitter Conducted Spurious Emissions – TXC TCXO – 930.5 MHz - mPass5k Mode

Table 2.4.6-3 – Conducted Spurious – TXC TCXO – 940.0125 MHz

Fundamental Frequency (MHz)	Spurious Frequency (MHz)	Spurious (dBm)	Limit (dBm)	Margin (dB)
940.0125	1880.025	-31.32	-13	18.32

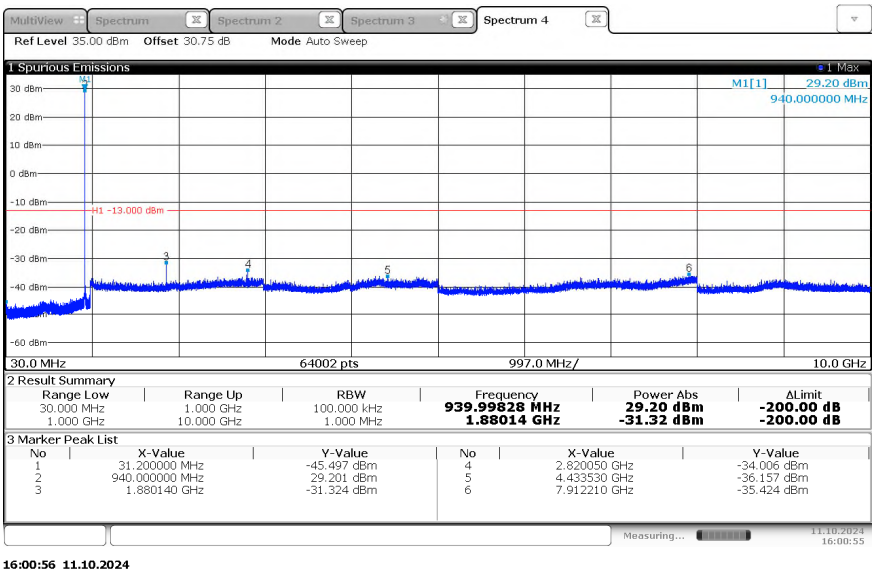


Figure 2.4.6-3 - Transmitter Conducted Spurious Emissions – TXC TCXO – 940.0125 MHz - mPass5k Mode

FCC 47 CFR Parts: 101.111 a(6), ISED Canada RSS-119 5.8.6

Table 2.4.6-4 – Conducted Spurious – TXC TCXO – 928.925 MHz

Fundamental Frequency (MHz)	Spurious Frequency (MHz)	Spurious (dBm)	Limit (dBm)	Margin (dB)
928.925	1857.85	-30.43	-13	17.43

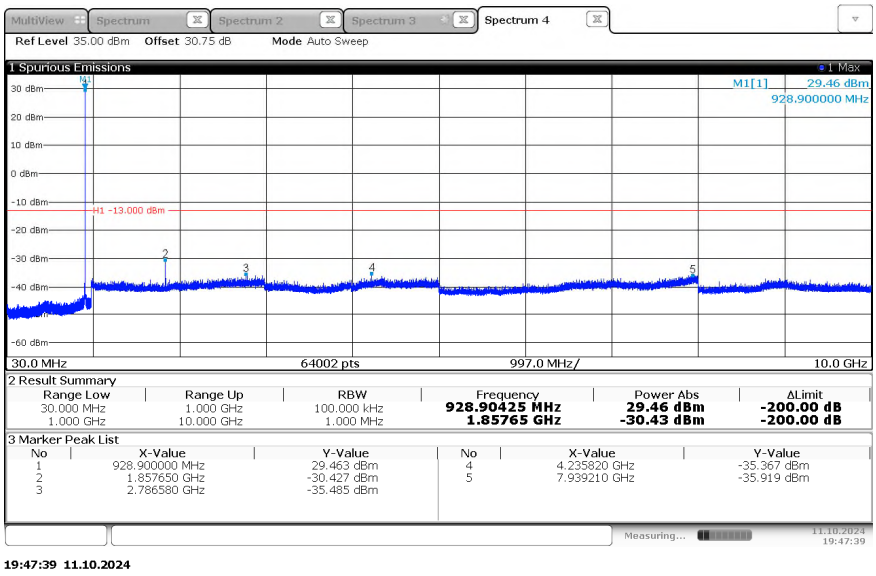


Figure 2.4.6-4 - Transmitter Conducted Spurious Emissions – TXC TCXO – 928.925 MHz - Normal Mode

Table 2.4.6-5 – Conducted Spurious – TXC TCXO – 932.25 MHz

Fundamental Frequency (MHz)	Spurious Frequency (MHz)	Spurious (dBm)	Limit (dBm)	Margin (dB)
932.25	1864.5	-30.74	-13	17.74

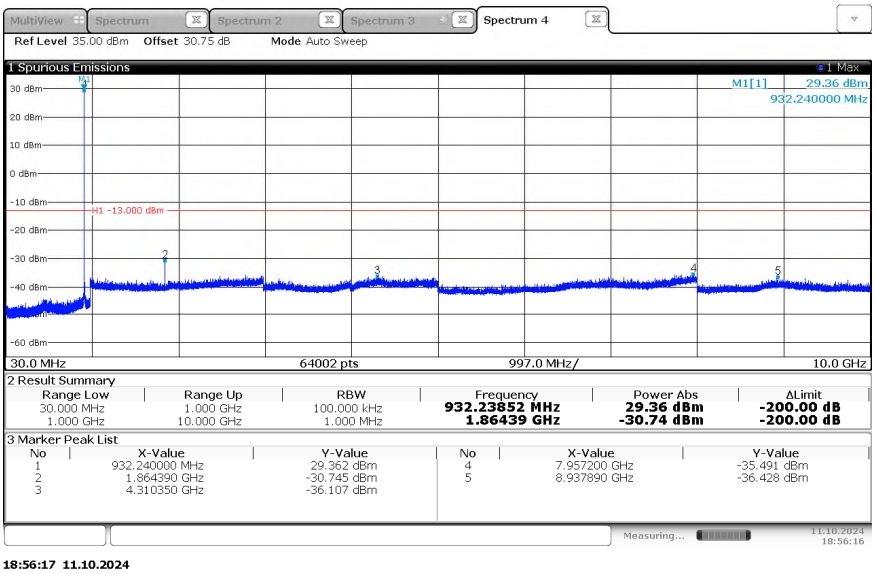


Figure 2.4.6-5 - Transmitter Conducted Spurious Emissions – TXC TCXO – 932.25 MHz - Normal Mode

Table 2.4.6-6 – Conducted Spurious – TXC TCXO – 941.4875 MHz

Fundamental Frequency (MHz)	Spurious Frequency (MHz)	Spurious (dBm)	Limit (dBm)	Margin (dB)
941.4875	1882.975	-31.38	-13	18.38

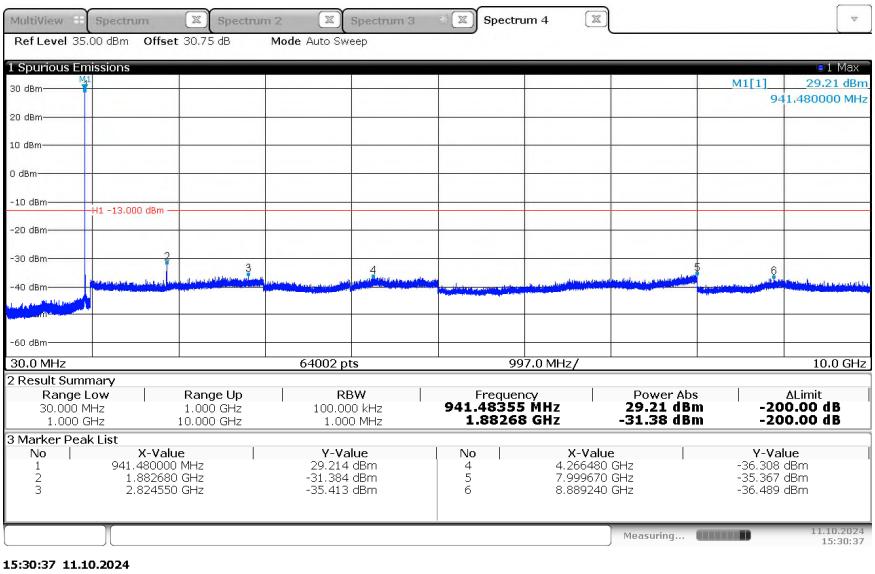


Figure 2.4.6-6 - Transmitter Conducted Spurious Emissions – TXC TCXO – 941.4875 MHz - mPass5k Mode

Table 2.4.6-7 – Conducted Spurious – TXC TCXO – 959.925 MHz

Fundamental Frequency (MHz)	Spurious Frequency (MHz)	Spurious (dBm)	Limit (dBm)	Margin (dB)
959.925	1919.85	-31.97	-13	18.97

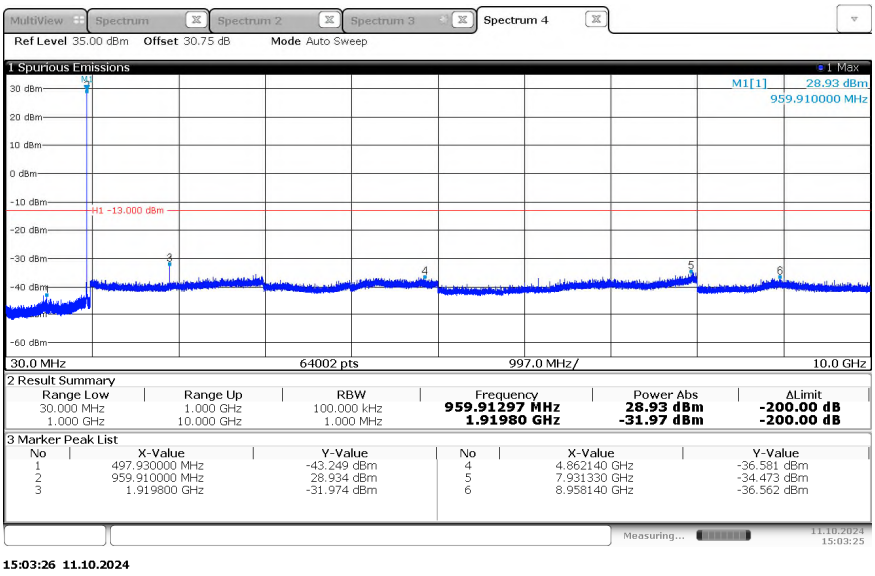


Figure 2.4.6-7 - Transmitter Conducted Spurious Emissions – TXC TCXO – 959.925 MHz - mPass5k Mode

2.4.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Digital MultiMeter	Fluke	115	BEMC02108	N/A	12	25-Jan-2025
Duratest 175 Cable 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	30-Oct-2024
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	2.90 SP1	12	03-Jun-2025
DC Power Supply	Xantrex	HPD-60-5	TAME01064	N/A	N/A	NCR
30 dB Fixed Attenuator	Mini-Circuits	BW-S30W5+	TEMC00264	N/A	12	06-Apr-2025

TU - Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

2.5 Field Strength of Spurious Radiation

2.5.1 Specification Reference

FCC 47 CFR Parts: 2.1053; 24.133 a(1), a(2); 101.111 a(6)
ISED Canada RSS-119 5.8.6; RSS-134 4.4

2.5.2 Equipment Under Test and Modification State

120500780; KDS TCXO
120500802; TXC TCXO

2.5.3 Date of Test

2024-October-17 to 2024-October-26

2.5.4 Test Method

The EUT was evaluated in accordance to ANSI C63.26:2015 Section 5.5.3 Measurement of Spurious Emissions using Substitution Method.

Radiated emissions tests were made over the frequency range of 30 MHz to 10 times the highest fundamental frequency. The equipment under test is placed in the Semi-Anechoic Chamber on a RF transparent table at the turntable center. For each spurious emission, the antenna mast is raised and lowered from one (1) to four (4) meters and the turntable is rotated 360º and the maximum reading on the spectrum analyzer is recorded. This was repeated for both horizontal and vertical polarizations of the receive antenna.

The equipment under test is then replaced with a substitution antenna fed by a signal generator. The signal generator's frequency is set to that of the spurious emission recorded from the equipment under test. The antenna mast is raised and lowered from one (1) to four (4) meters to obtain a maximum reading on the spectrum analyzer. The output of the signal generator is then adjusted until the reading on the spectrum analyzer matches that obtained from the equipment under test. The signal generator level is recorded. The power in dBm of each spurious emission is calculated by correcting the signal generator level for the cable loss and gain of the substitution antenna referenced to a dipole. The spectrum was investigated in accordance to FCC CFR 47 Part 2.1057.

The magnitude of all spurious emissions not reported were attenuated below the noise floor of the measurement system and therefore not specified in this report. Results are shown below.

2.5.5 Environmental Conditions

Ambient Temperature	23.2 - 24.8 °C
Relative Humidity	32.1 - 43 %
Atmospheric Pressure	1016.6 - 1020.8 mbar

2.5.6 Test Results

DC Powered, Operating

FCC Part 24.133a(1),(a2); ISED Canada RSS-134 4.4

CPTP100A - KDS TCXO

Table 2.5.6-1 - Transmitter Radiated Spurious Emissions – KDS TCXO – 901.5 MHz - Normal Mode

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Antenna Polarity (H/V)	Spurious ERP (dBm)	Limit (dBm)	Margin (dB)
1803	62.22	H	-44.62	-13.00	31.62
2704.5	59.96	H	-43.33	-13.00	30.33
3606	54.20	H	-48.31	-13.00	35.31
4507.5	54.35	H	-45.70	-13.00	32.70
5409	43.70	H	-57.95	-13.00	44.95
6310.5	47.68	H	-48.42	-13.00	35.42
7212	46.55	H	-53.08	-13.00	40.08
8113.5	45.08	H	-51.56	-13.00	38.56
9015	43.04	H	-52.78	-13.00	39.78
1803	60.42	V	-45.71	-13.00	32.71
2704.5	61.43	V	-41.53	-13.00	28.53
3606	53.55	V	-48.93	-13.00	35.93
4507.5	56.34	V	-42.72	-13.00	29.72
5409	44.72	V	-57.02	-13.00	44.02
6310.5	44.31	V	-53.11	-13.00	40.11
7212	44.49	V	-55.12	-13.00	42.12
8113.5	48.03	V	-49.13	-13.00	36.13
9015	42.13	V	-58.11	-13.00	45.11

CPTP100A - TXC TCXO

Table 2.5.6-2 - Transmitter Radiated Spurious Emissions – TXC TCXO – 901.5 MHz - Normal Mode

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Antenna Polarity (H/V)	Spurious ERP (dBm)	Limit (dBm)	Margin (dB)
1803	56.30	H	-51.08	-13.00	38.08
2704.5	67.42	H	-34.76	-13.00	21.76
3606	55.92	H	-46.36	-13.00	33.36
4507.5	56.97	H	-42.65	-13.00	29.65
5409	43.38	H	-58.27	-13.00	45.27
6310.5	49.47	H	-45.84	-13.00	32.84
7212	47.47	H	-52.14	-13.00	39.14
8113.5	46.21	H	-50.43	-13.00	37.43
9015	44.82	H	-51.00	-13.00	38.00
1803	58.41	V	-47.99	-13.00	34.99
2704.5	61.70	V	-41.26	-13.00	28.26
3606	52.93	V	-49.55	-13.00	36.55
4507.5	51.22	V	-49.68	-13.00	36.68
5409	43.92	V	-57.82	-13.00	44.82
6310.5	43.92	V	-53.50	-13.00	40.50
7212	45.26	V	-54.35	-13.00	41.35
8113.5	47.12	V	-50.04	-13.00	37.04
9015	41.75	V	-58.49	-13.00	45.49

Table 2.5.6-3 - Transmitter Radiated Spurious Emissions – TXC TCXO – 930.5 MHz - mPass5k Mode

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Antenna Polarity (H/V)	Spurious ERP (dBm)	Limit (dBm)	Margin (dB)
1861	62.65	H	-42.24	-13.00	29.24
2791.5	57.73	H	-45.93	-13.00	32.93
3722	55.59	H	-46.46	-13.00	33.46
4652.5	50.11	H	-50.52	-13.00	37.52
5583	43.30	H	-60.81	-13.00	47.81
6513.5	47.06	H	-49.63	-13.00	36.63
7444	43.64	H	-57.63	-13.00	44.63
8374.5	46.73	H	-49.98	-13.00	36.98
9305	41.61	H	-61.11	-13.00	48.11
1861	61.45	V	-43.75	-13.00	30.75
2791.5	63.41	V	-39.23	-13.00	26.23
3722	54.98	V	-46.75	-13.00	33.75
4652.5	51.70	V	-47.77	-13.00	34.77
5583	43.12	V	-59.61	-13.00	46.61
6513.5	44.50	V	-54.40	-13.00	41.40
7444	42.29	V	-59.87	-13.00	46.87
8374.5	43.42	V	-56.50	-13.00	43.50
9305	40.18	V	-59.33	-13.00	46.33

Table 2.5.6-4 - Transmitter Radiated Spurious Emissions – TXC TCXO – 940.0125 MHz - mPass5k Mode

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Antenna Polarity (H/V)	Spurious ERP (dBm)	Limit (dBm)	Margin (dB)
1880.025	58.54	H	-47.43	-13.00	34.43
2820.0375	61.63	H	-41.44	-13.00	28.44
3760.05	53.99	H	-48.66	-13.00	35.66
4700.0625	51.30	H	-48.89	-13.00	35.89
5640.075	43.86	H	-59.25	-13.00	46.25
6580.0875	46.63	H	-50.78	-13.00	37.78
7520.1	42.82	H	-58.45	-13.00	45.45
8460.1125	43.93	H	-55.82	-13.00	42.82
9400.125	40.45	H	-58.07	-13.00	45.07
1880.025	55.96	V	-49.88	-13.00	36.88
2820.0375	62.54	V	-40.37	-13.00	27.37
3760.05	55.99	V	-45.28	-13.00	32.28
4700.0625	51.63	V	-47.57	-13.00	34.57
5640.075	43.39	V	-58.79	-13.00	45.79
6580.0875	44.91	V	-54.38	-13.00	41.38
7520.1	41.95	V	-60.48	-13.00	47.48
8460.1125	43.59	V	-56.83	-13.00	43.83
9400.125	39.89	V	-60.53	-13.00	47.53

FCC 47 CFR Parts: 101.111 a(6), ISED Canada RSS-119 5.8.6

Table 2.5.6-5 - Transmitter Radiated Spurious Emissions – TXC TCXO – 928.925 MHz - Normal Mode

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Antenna Polarity (H/V)	Spurious ERP (dBm)	Limit (dBm)	Margin (dB)
1857.85	61.24	H	-43.99	-13.00	30.99
2786.775	53.41	H	-51.30	-13.00	38.30
3715.7	53.16	H	-49.63	-13.00	36.63
4644.625	48.60	H	-53.21	-13.00	40.21
5573.55	41.98	H	-64.45	-13.00	51.45
6502.475	45.38	H	-52.07	-13.00	39.07
7431.4	44.18	H	-55.89	-13.00	42.89
8360.325	46.29	H	-50.59	-13.00	37.59
9289.25	41.69	H	-58.99	-13.00	45.99
1857.85	59.45	V	-46.18	-13.00	33.18
2786.775	56.17	V	-47.01	-13.00	34.01
3715.7	54.10	V	-47.95	-13.00	34.95
4644.625	48.41	V	-53.16	-13.00	40.16
5573.55	42.68	V	-59.20	-13.00	46.20
6502.475	44.44	V	-53.94	-13.00	40.94
7431.4	41.39	V	-58.91	-13.00	45.91
8360.325	42.26	V	-57.07	-13.00	44.07
9289.25	40.06	V	-58.98	-13.00	45.98

Table 2.5.6-6 - Transmitter Radiated Spurious Emissions – TXC TCXO – 932.25 MHz - Normal Mode

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Antenna Polarity (H/V)	Spurious ERP (dBm)	Limit (dBm)	Margin (dB)
1864.5	61.30	H	-44.08	-13.00	31.08
2796.75	59.60	H	-43.50	-13.00	30.50
3729	54.44	H	-48.25	-13.00	35.25
4661.25	51.28	H	-48.81	-13.00	35.81
5593.5	43.96	H	-59.85	-13.00	46.85
6525.75	46.52	H	-50.98	-13.00	37.98
7458	43.67	H	-56.66	-13.00	43.66
8390.25	43.20	H	-57.21	-13.00	44.21
9322.5	41.78	H	-56.66	-13.00	43.66
1864.5	59.28	V	-46.61	-13.00	33.61
2796.75	63.38	V	-39.40	-13.00	26.40
3729	53.36	V	-49.24	-13.00	36.24
4661.25	48.67	V	-52.31	-13.00	39.31
5593.5	43.19	V	-61.24	-13.00	48.24
6525.75	43.76	V	-56.29	-13.00	43.29
7458	41.68	V	-59.63	-13.00	46.63
8390.25	42.69	V	-58.31	-13.00	45.31
9322.5	40.93	V	-60.64	-13.00	47.64

Table 2.5.6-7 - Transmitter Radiated Spurious Emissions – TXC TCXO – 941.4875 MHz - mPass5k Mode

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Antenna Polarity (H/V)	Spurious ERP (dBm)	Limit (dBm)	Margin (dB)
1882.975	55.75	H	-50.30	-13.00	37.30
2824.4625	62.10	H	-40.98	-13.00	27.98
3765.95	57.63	H	-44.21	-13.00	31.21
4707.4375	54.77	H	-44.26	-13.00	31.26
5648.925	44.39	H	-57.21	-13.00	44.21
6590.4125	46.56	H	-50.94	-13.00	37.94
7531.9	42.74	H	-59.66	-13.00	46.66
8473.3875	42.96	H	-58.26	-13.00	45.26
9414.875	40.44	H	-59.80	-13.00	46.80
1882.975	58.77	V	-46.67	-13.00	33.67
2824.4625	63.17	V	-39.45	-13.00	26.45
3765.95	56.12	V	-45.05	-13.00	32.05
4707.4375	51.39	V	-48.27	-13.00	35.27
5648.925	43.57	V	-58.53	-13.00	45.53
6590.4125	44.82	V	-53.20	-13.00	40.20
7531.9	41.97	V	-62.43	-13.00	49.43
8473.3875	43.06	V	-55.93	-13.00	42.93
9414.875	39.16	V	-59.11	-13.00	46.11

Table 2.5.6-8 - Transmitter Radiated Spurious Emissions – TXC TCXO – 959.925 MHz - mPass5k Mode

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Antenna Polarity (H/V)	Spurious ERP (dBm)	Limit (dBm)	Margin (dB)
1919.85	59.49	H	-46.87	-13.00	33.87
2879.775	61.49	H	-40.59	-13.00	27.59
3839.7	60.31	H	-40.62	-13.00	27.62
4799.625	54.95	H	-43.54	-13.00	30.54
5759.55	46.85	H	-51.98	-13.00	38.98
6719.475	47.27	H	-50.54	-13.00	37.54
7679.4	42.81	H	-58.82	-13.00	45.82
8639.325	43.97	H	-55.14	-13.00	42.14
9599.25	41.34	H	-60.97	-13.00	47.97
1919.85	58.98	V	-47.02	-13.00	34.02
2879.775	66.48	V	-34.80	-13.00	21.80
3839.7	59.11	V	-41.24	-13.00	28.24
4799.625	50.82	V	-48.61	-13.00	35.61
5759.55	42.96	V	-59.68	-13.00	46.68
6719.475	46.63	V	-52.44	-13.00	39.44
7679.4	41.91	V	-62.13	-13.00	49.13
8639.325	43.70	V	-53.71	-13.00	40.71
9599.25	40.93	V	-60.80	-13.00	47.80

Representative Plots

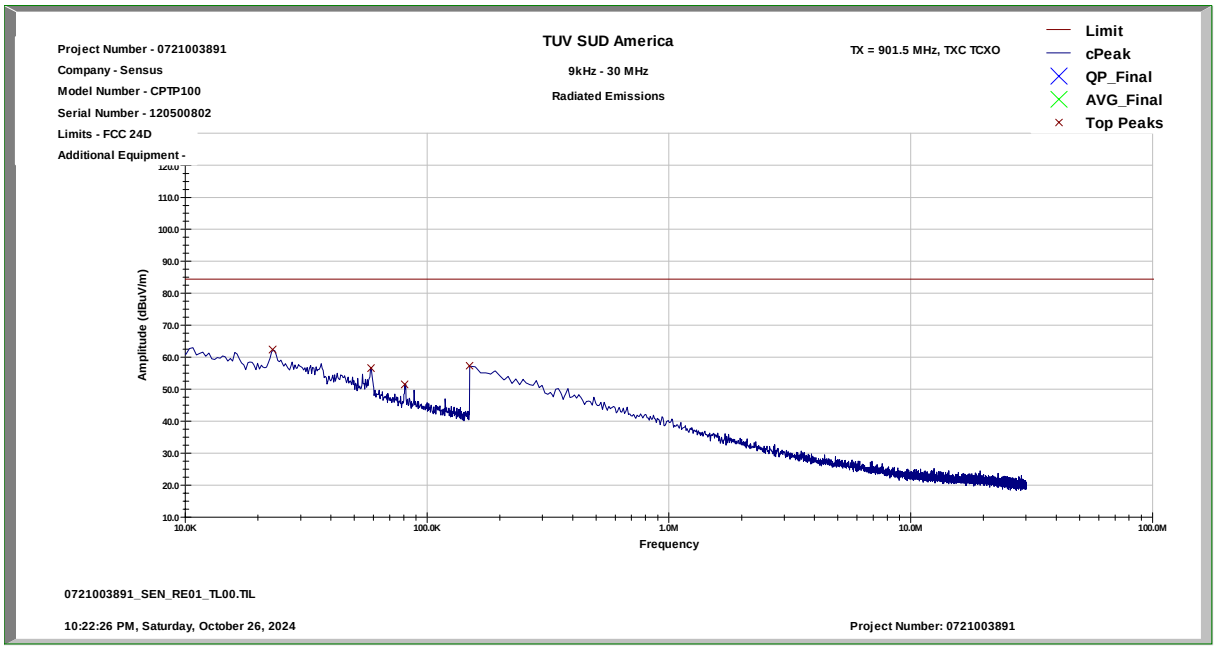


Figure 2.5.6-1 - Transmitter Radiated Spurious Emissions – TXC TCXO – 901.5 MHz - Normal Mode – 9 kHz – 30 MHz – Vertical Polarization

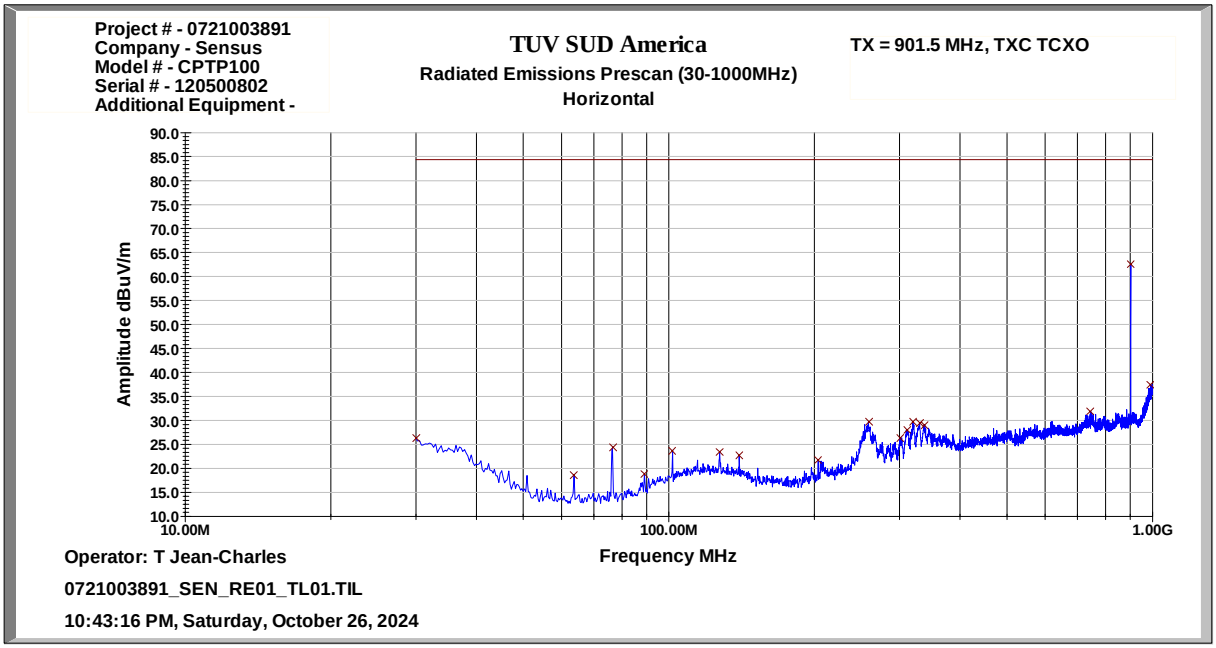


Figure 2.5.6-2 - Transmitter Radiated Spurious Emissions – TXC TCXO – 901.5 MHz - Normal Mode – 30 MHz – 1 GHz – Horizontal Polarization

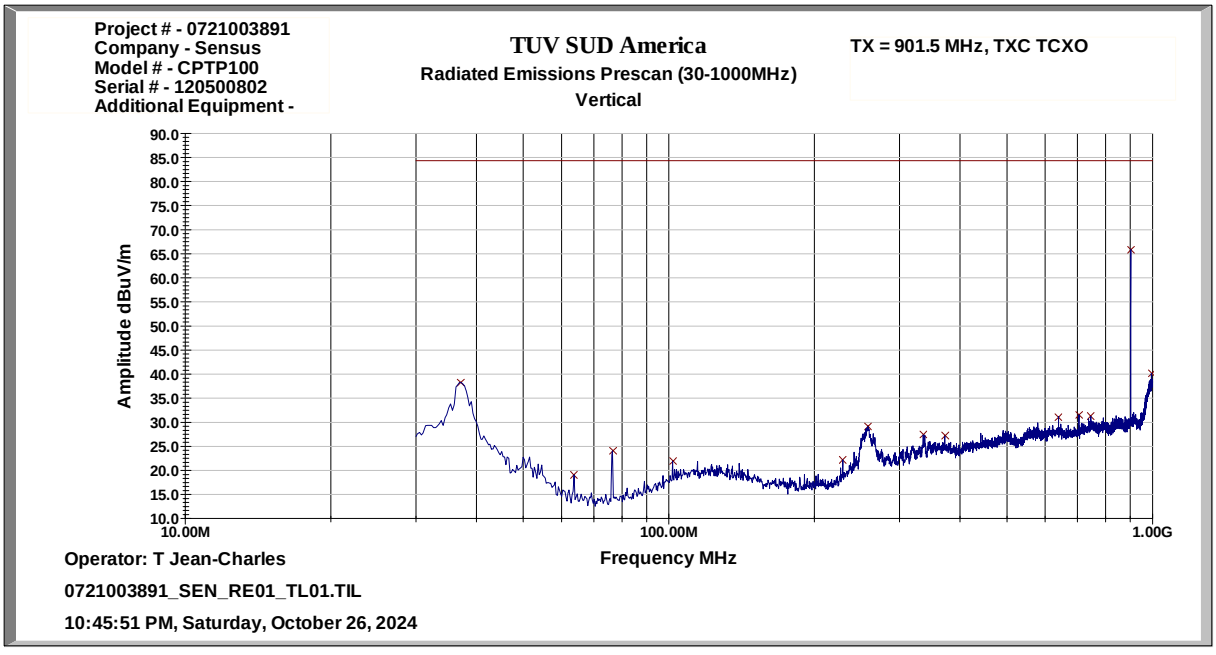


Figure 2.5.6-3 - Transmitter Radiated Spurious Emissions – TXC TCXO – 901.5 MHz - Normal Mode – 30 MHz – 1 GHz – Vertical Polarization

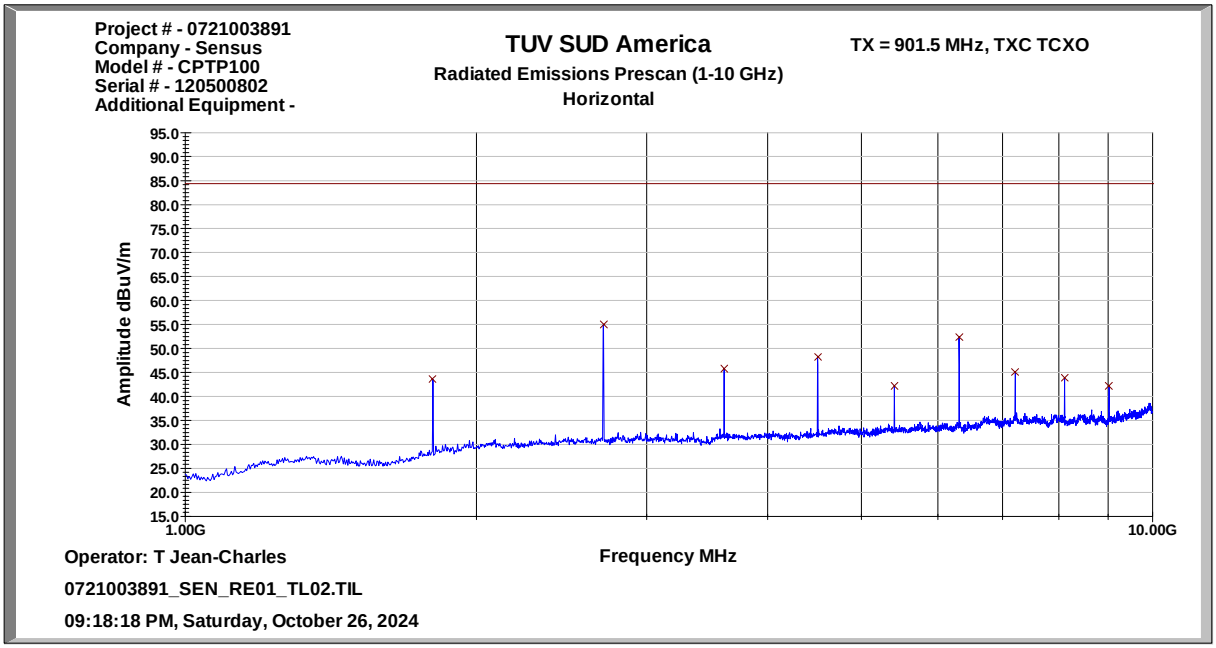


Figure 2.5.6-4 - Transmitter Radiated Spurious Emissions – TXC TCXO – 901.5 MHz - Normal Mode – 1 GHz – 10 GHz – Horizontal Polarization

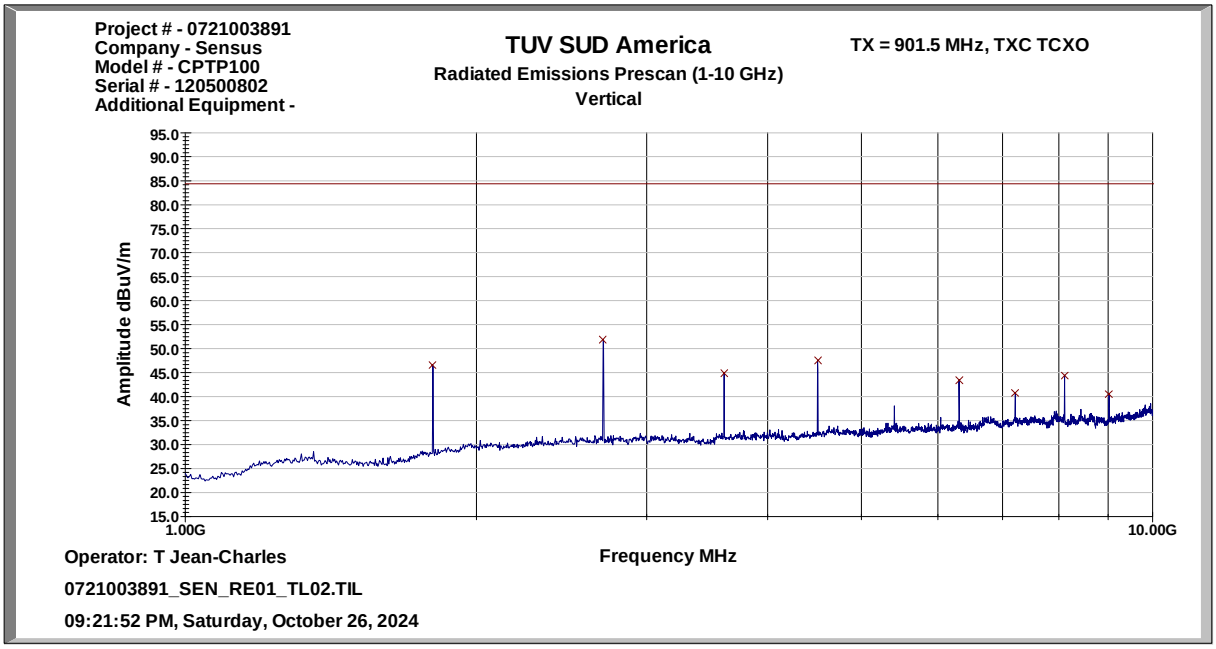


Figure 2.5.6-5 - Transmitter Radiated Spurious Emissions – TXC TCXO – 901.5 MHz - Normal Mode – 1 GHz – 10 GHz – Vertical Polarization

2.5.7 Sample Calculations

ERP = Pgen – Cables Loss + Substitution Antenna Gain [dBd]

Where:
ERP is the EUT radiated Power in dBm
Pgen is the signal generator setting [dBm]
Cable Loss is the Transmit cable loss [dB]
Substitution Antenna Gain [dBd] = 10 Log (antenna numeric gain) – 2.15.

Example Calculation
Radiated Power: -52 – 7.16 + 7.862 = -51.298 dBm
Margin: -13 –(-51.298) = 38.298 dBm

2.5.8 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Active Loop Antenna	EMCO	6502	BEMC00078	N/A	24	06-Sep-2025
100Hz-26.5GHz EMC analyzer/HYZ	Hewlett Packard	E7405A	BEMC00523	A.14.06	12	25-Jun-2025
Linear Polarized Horn antenna, 1-18 GHz	EMCO	3115	BEMC02006	N/A	24	12-Feb-2026
Notch Filter	Trilithic, Inc.	7NM867/122-X1-AA	BEMC02069	N/A	12	29-Nov-2024
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
Digital MultiMeter	Fluke	115	BEMC02108	N/A	12	25-Jan-2025
Synthesized Signal Generator 0.05 - 26 GHz	Hewlett Packard	8673D	BEMC02126	N/A	24	26-Jun-2026
PE-P160 40 GHz Cable	Pasternack	PE360-396	BEMC02147	N/A	12	10-Jun-2025
BI LOG PERIODIC, ANTENNA	Schaffner	CBL6112B	TEMC00005	N/A	24	07-Nov-2025
EMC Chamber	Panashield	N/A	TEMC00031	N/A	24	19-Oct-2025
Double Ridge Guide Horn	ETS Lindgren	3117	TEMC00061	N/A	24	15-Feb-2026
Microwave Preamplifier	Com-Power Corporation	PAM-118A	TEMC00160	N/A	12	28-Nov-2024
1.2 GHz High Pass Filter	Micro-Tronics	HPM50108-01	TEMC00175	N/A	12	19-Feb-2025
DC to 18 GHz Cable	SSI Technologies	2801-03-03-360/WN	TEMC00293	N/A	12	05-Apr-2025

TU - Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

2.6 Frequency Stability

2.6.1 Specification Reference

FCC Section 2.1055; FCC Section 24.135, 101.107
ISED Canada RSS-119 5.3, RSS-134 4.5

2.6.2 Equipment Under Test and Modification State

327504120500786; KDS TCXO
327504120500794; TXC TCXO

2.6.3 Date of Test

2024-October-01 to 2024-October-07

2.6.4 Test Method

The equipment under test is placed inside an environmental chamber. The RF output is directly coupled to the input of the measurement equipment and a power supply is attached to the primary supply voltage.

Frequency measurements were made at the extremes of the of temperature range -30º C to +50º C and at intervals of 10º C at normal supply voltage. Sufficient time to stabilize all components of the equipment was allowed at each frequency measurement. At a temperature 20º C the supply voltage was reduced to the battery operating endpoint. The maximum variation of frequency was recorded.

2.6.5 Environmental Conditions

Ambient Temperature	24.2 °C
Relative Humidity	45.1 %
Atmospheric Pressure	1014.7 mbar

2.6.6 Test Results

Table 2.6.6-1 - FCC Part 24.135 Frequency Stability Limits

Frequency Range MHz	Percent	PPM
901 - 902	±0.0001	±1.0
930 - 931		
940 - 941		

Table 2.6.6-2 - FCC Part 101.107 Frequency Stability Limits

Frequency Range MHz	Percent	PPM
928 – 929	±0.0005	±5.0
932 – 932.5	±0.00015	±1.5
941 – 941.5	±0.00015	±1.5
952 – 960	±0.0005	±5.0

Note: The most stringent limit of 1.0 ppm was used across all the bands of operation.

CPTP100A - KDS TCXO

Frequency Stability

Frequency (MHz): 901.499993
Deviation Limit (PPM): 1
Nominal Voltage (VDC): 3.6

Temperature	Frequency	Frequency Error	Voltage	Voltage
C	MHz	(PPM)	(%)	(VDC)
-30 C	**901.499935**	**-0.065**	100%	3.60
-20 C	**901.499888**	**-0.117**	100%	3.60
-10 C	**901.500122**	**0.143**	100%	3.60
0 C	**901.500093**	**0.111**	100%	3.60
10 C	**901.500083**	**0.100**	100%	3.60
20 C	**901.499993**	**0.000**	100%	3.60
30 C	**901.500198**	**0.227**	100%	3.60
40 C	**901.500174**	**0.200**	100%	3.60
50 C	**901.499950**	**-0.049**	100%	3.60
20 C	**901.499984**	**-0.011**	Endpoint	3.30

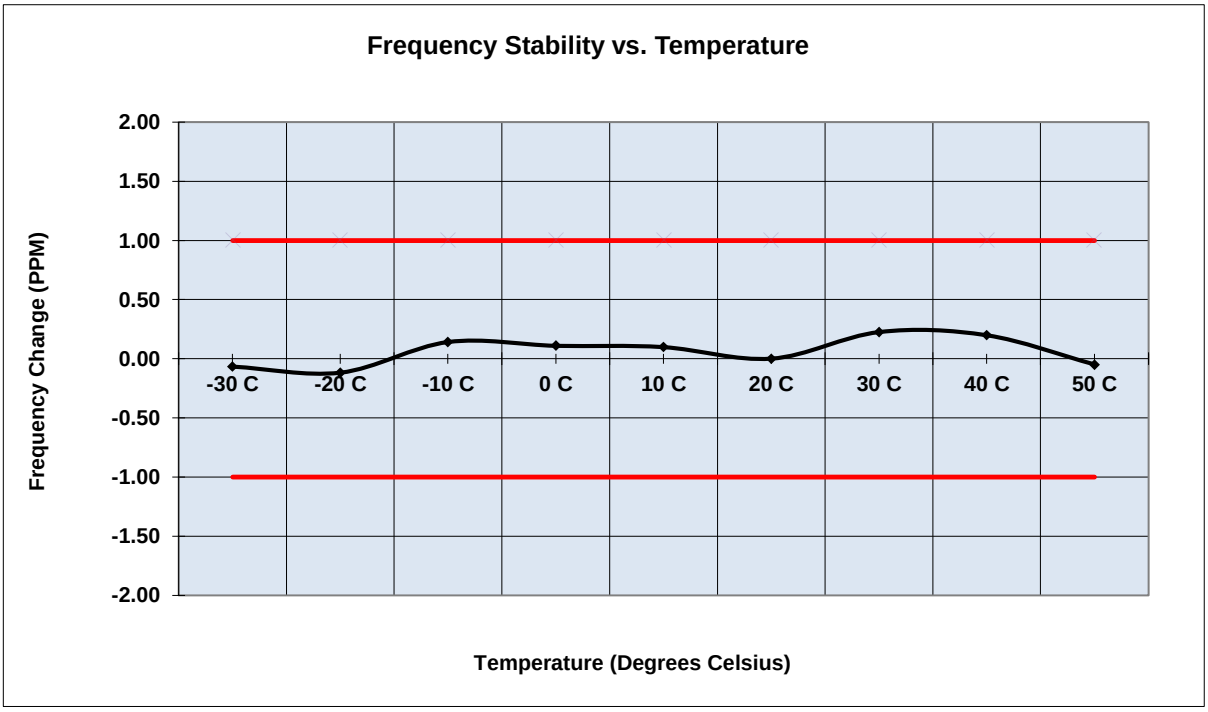


Figure 2.6.6-1 - Frequency Stability – KDS TCXO – 901.5 MHz

Frequency Stability

Frequency (MHz): 930.5000
Deviation Limit (PPM): 1
Nominal Voltage (VDC): 3.6

Temperature	Frequency	Frequency Error	Voltage	Voltage
C	MHz	(PPM)	(%)	(VDC)
-30 C	**930.499904**	**-0.071**	100%	3.60
-20 C	**930.499951**	**-0.020**	100%	3.60
-10 C	**930.500102**	**0.143**	100%	3.60
0 C	**930.500070**	**0.108**	100%	3.60
10 C	**930.500050**	**0.087**	100%	3.60
20 C	**930.499970**	**0.000**	100%	3.60
30 C	**930.500180**	**0.226**	100%	3.60
40 C	**930.500154**	**0.198**	100%	3.60
50 C	**930.499913**	**-0.061**	100%	3.60
20 C	**930.499957**	**-0.014**	Endpoint	3.30

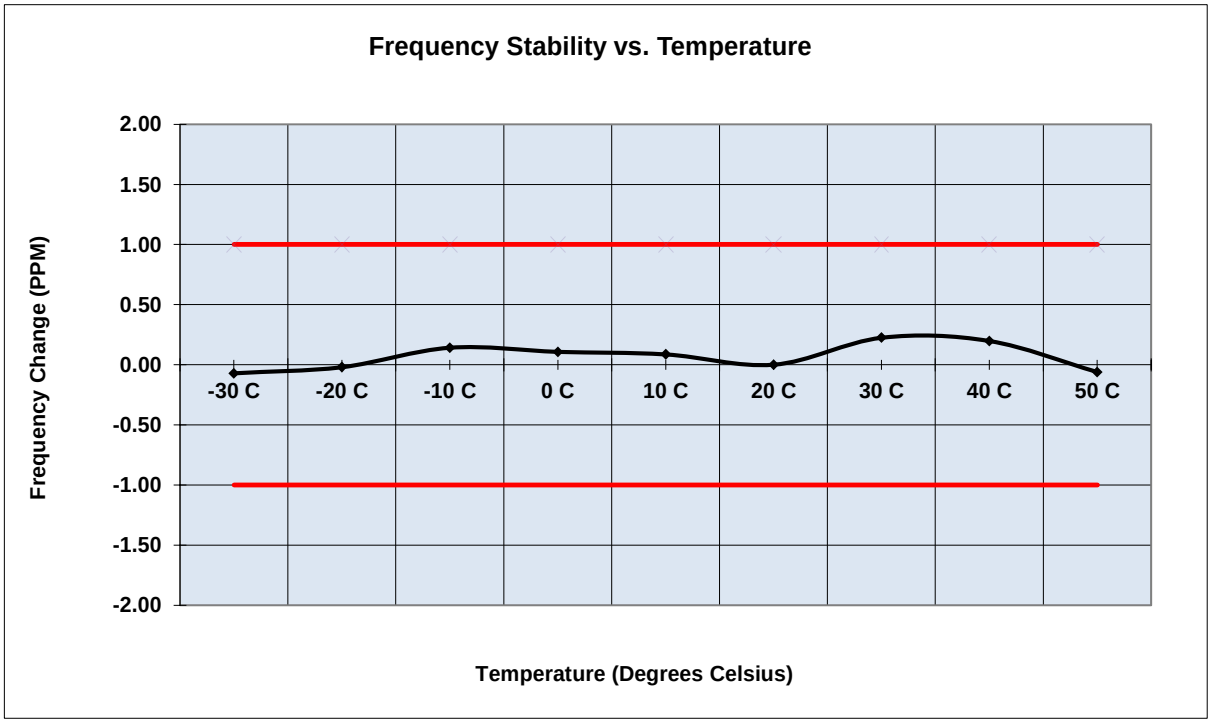


Figure 2.6.6-2 - Frequency Stability – KDS TCXO – 930.5 MHz

Frequency Stability

Frequency (MHz): 959.9250
Deviation Limit (PPM): 1
Nominal Voltage (VDC): 3.6

Temperature	Frequency	Frequency Error	Voltage	Voltage
C	MHz	(PPM)	(%)	(VDC)
-30 C	**959.924912**	**-0.078**	100%	3.60
-20 C	**959.924980**	**-0.006**	100%	3.60
-10 C	**959.925123**	**0.142**	100%	3.60
0 C	**959.925100**	**0.119**	100%	3.60
10 C	**959.925066**	**0.083**	100%	3.60
20 C	**959.924986**	**0.000**	100%	3.60
30 C	**959.925207**	**0.230**	100%	3.60
40 C	**959.925196**	**0.218**	100%	3.60
50 C	**959.924925**	**-0.064**	100%	3.60
20 C	**959.924975**	**-0.011**	Endpoint	3.30

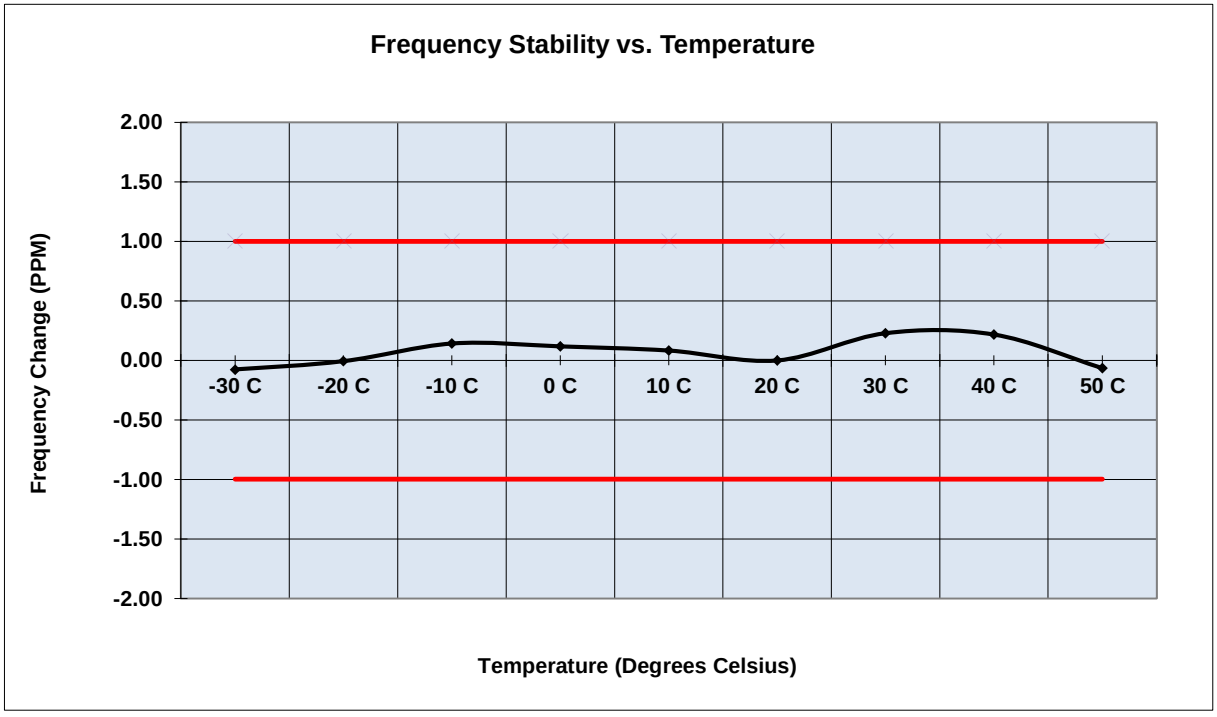


Figure 2.6.6-3 - Frequency Stability – KDS TCXO – 959.925 MHz

CPTP100A - TXC TCXO

Frequency Stability

Frequency (MHz): 901.500001
Deviation Limit (PPM): 1
Nominal Voltage (VDC): 3.6

Temperature	Frequency	Frequency Error	Voltage	Voltage
C	MHz	(PPM)	(%)	(VDC)
-30 C	**901.500226**	**0.250**	100%	3.60
-20 C	**901.500155**	**0.171**	100%	3.60
-10 C	**901.500132**	**0.145**	100%	3.60
0 C	**901.500104**	**0.114**	100%	3.60
10 C	**901.500100**	**0.110**	100%	3.60
20 C	**901.500001**	**0.000**	100%	3.60
30 C	**901.499933**	**-0.074**	100%	3.60
40 C	**901.499973**	**-0.031**	100%	3.60
50 C	**901.500021**	**0.023**	100%	3.60
20 C	**901.499984**	**-0.018**	Endpoint	3.30

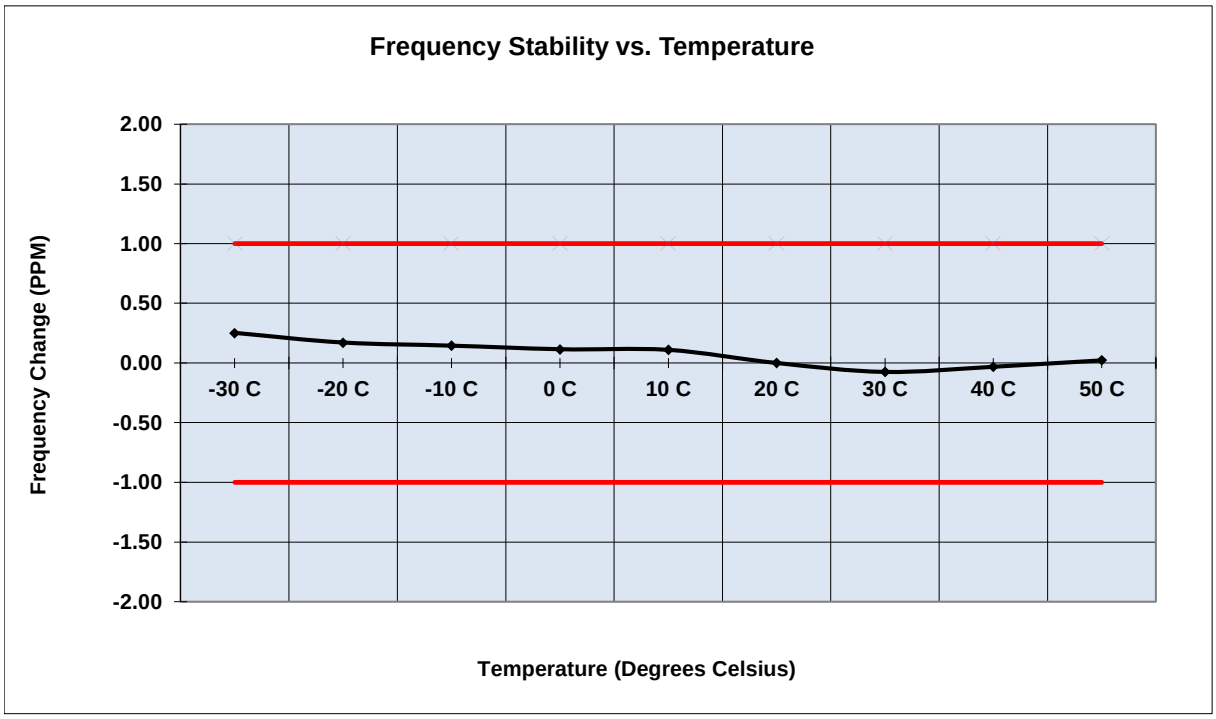


Figure 2.6.6-4 - Frequency Stability – TXC TCXO – 901.5 MHz

Frequency Stability

Frequency (MHz): 930.5000
Deviation Limit (PPM): 1
Nominal Voltage (VDC): 3.6

Temperature	Frequency	Frequency Error	Voltage	Voltage
C	MHz	(PPM)	(%)	(VDC)
-30 C	**930.500265**	**0.236**	100%	3.60
-20 C	**930.500208**	**0.175**	100%	3.60
-10 C	**930.500172**	**0.136**	100%	3.60
0 C	**930.500157**	**0.120**	100%	3.60
10 C	**930.500145**	**0.107**	100%	3.60
20 C	**930.500045**	**0.000**	100%	3.60
30 C	**930.499962**	**-0.089**	100%	3.60
40 C	**930.500013**	**-0.035**	100%	3.60
50 C	**930.499995**	**-0.054**	100%	3.60
20 C	**930.500015**	**-0.032**	Endpoint	3.30

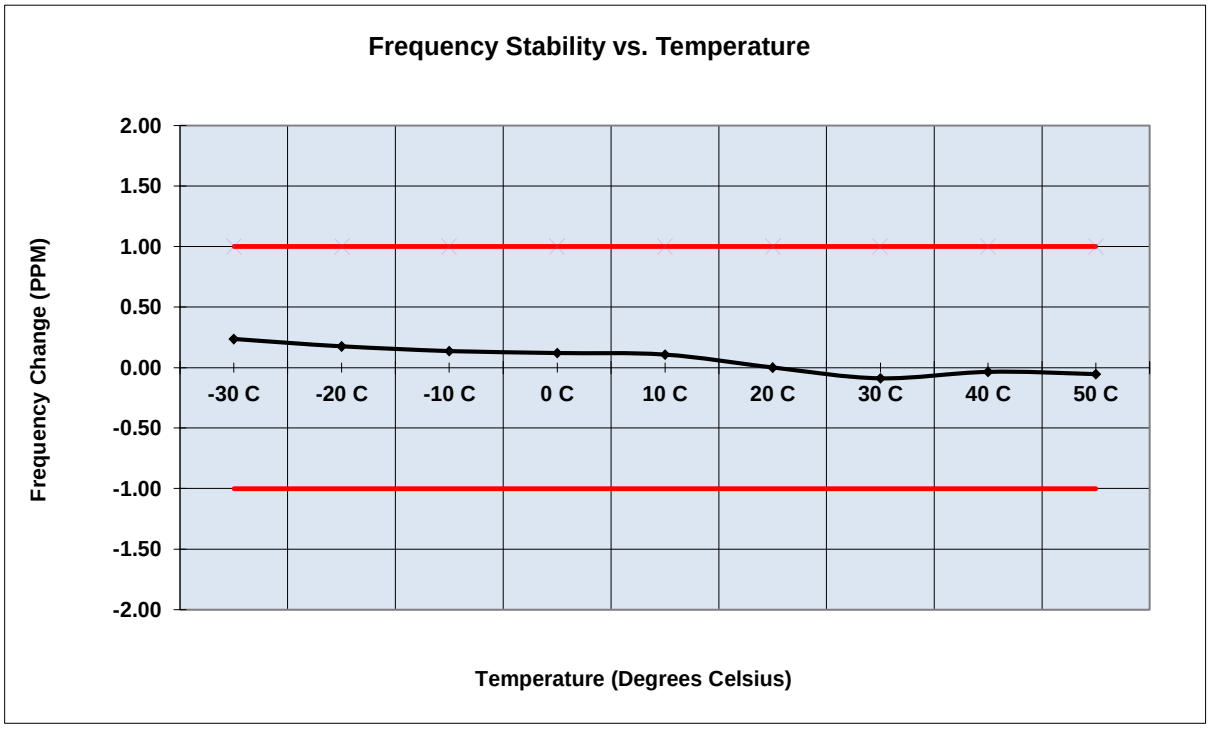


Figure 2.6.6-5 - Frequency Stability – TXC TCXO – 930.5 MHz

Frequency Stability

Frequency (MHz): 959.9250
Deviation Limit (PPM): 1
Nominal Voltage (VDC): 3.6

Temperature	Frequency	Frequency Error	Voltage	Voltage
C	MHz	(PPM)	(%)	(VDC)
-30 C	**959.925294**	**0.272**	100%	3.60
-20 C	**959.925183**	**0.156**	100%	3.60
-10 C	**959.925127**	**0.098**	100%	3.60
0 C	**959.925133**	**0.104**	100%	3.60
10 C	**959.925062**	**0.030**	100%	3.60
20 C	**959.925033**	**0.000**	100%	3.60
30 C	**959.924963**	**-0.073**	100%	3.60
40 C	**959.924972**	**-0.064**	100%	3.60
50 C	**959.924936**	**-0.101**	100%	3.60
20 C	**959.924972**	**-0.064**	Endpoint	3.30

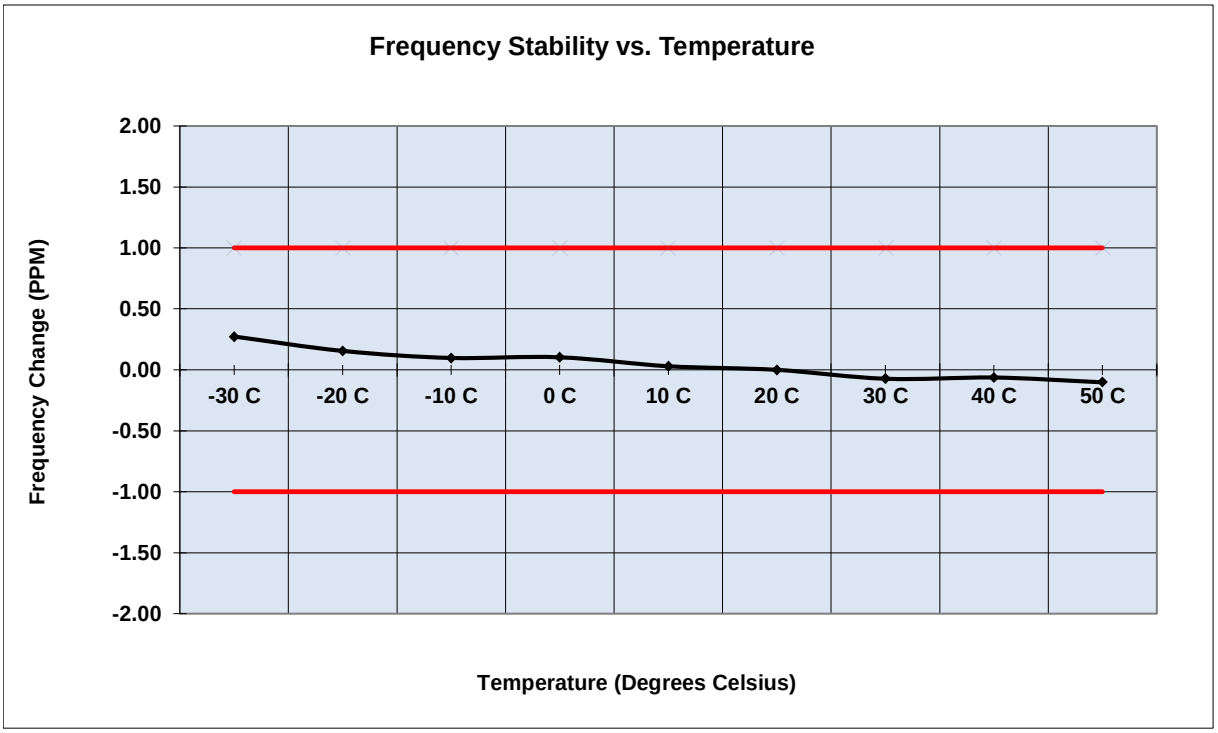


Figure 2.6.6-6 - Frequency Stability – TXC TCXO – 959.925 MHz

2.6.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Digital Thermometer	Omega Engineering, Inc.	MDSS41-TC	BEMC00002	N/A	24	19-Sep-2025
Digital MultiMeter	Fluke	115	BEMC02108	N/A	12	25-Jan-2025
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	2.90 SP1	12	03-Jun-2025
DC Power Supply 0-60V/0-35A	Hewlett Packard	6674A	DEMC780	N/A	N/A	NCR
Temperature Test Chamber	Sun Electronic Systems, Inc.	EC127	TEMC00242	5.10	N/A	NCR
30 dB Fixed Attenuator	Mini-Circuits	BW-S30W5+	TEMC00264	N/A	12	06-Apr-2025
Flexible Test Cable	Mini-Circuits	ULC-8FT-SMSM+	TEMC00267	N/A	12	08-Mar-2025

TU - Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR - No Calibration Required

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Digital Thermometer	Omega Engineering, Inc.	MDSS41-TC	BEMC00002	N/A	24	19-Sep-2025
Active Loop Antenna	EMCO	6502	BEMC00078	N/A	24	06-Sep-2025
100Hz-26.5GHz EMC analyzer/HYZ	Hewlett Packard	E7405A	BEMC00523	A.14.06	12	25-Jun-2025
Linear Polarized Horn antenna, 1-18 GHz	EMCO	3115	BEMC02006	N/A	24	12-Feb-2026
Notch Filter	Trilithic, Inc.	7NM867/122-X1-AA	BEMC02069	N/A	12	29-Nov-2024
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
Digital MultiMeter	Fluke	115	BEMC02108	N/A	12	25-Jan-2025
Duratest 175 Cable 26.5GHz	Teledyne Storm Products	921-0101-036	BEMC02112	N/A	12	30-Oct-2024
Synthesized Signal Generator 0.05 - 26 GHz	Hewlett Packard	8673D	BEMC02126	N/A	24	26-Jun-2026
PE-P160 40 GHz Cable	Pasternack	PE360-396	BEMC02147	N/A	12	10-Jun-2025
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	2.90 SP1	12	03-Jun-2025
DC Power Supply 0-60V/0-35A	Hewlett Packard	6674A	DEMC780	N/A	N/A	NCR
DC Power Supply	Xantrex	HPD-60-5	TAME01064	N/A	N/A	NCR
BI LOG PERIODIC, ANTENNA	Schaffner	CBL6112B	TEMC00005	N/A	24	07-Nov-2025
EMC Chamber	Panashield	N/A	TEMC00031	N/A	24	19-Oct-2025
Double Ridge Guide Horn	ETS Lindgren	3117	TEMC00061	N/A	24	15-Feb-2026
Microwave Preamplifier	Com-Power Corporation	PAM-118A	TEMC00160	N/A	12	28-Nov-2024
1.2 GHz High Pass Filter	Micro-Tronics	HPM50108-01	TEMC00175	N/A	12	19-Feb-2025
Temperature Test Chamber	Sun Electronic Systems, Inc.	EC127	TEMC00242	5.10	N/A	NCR

30 dB Fixed Attenuator	Mini-Circuits	BW-S30W5+	TEMC00264	N/A	12	06-Apr-2025
Flexible Test Cable	Mini-Circuits	ULC-8FT-SMSM+	TEMC00267	N/A	12	08-Mar-2025
DC to 18 GHz Cable	SSI Technologies	2801-03-03-360/WN	TEMC00293	N/A	12	05-Apr-2025

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable
NCR - No Calibration Required

4 Diagram of Test Set-ups

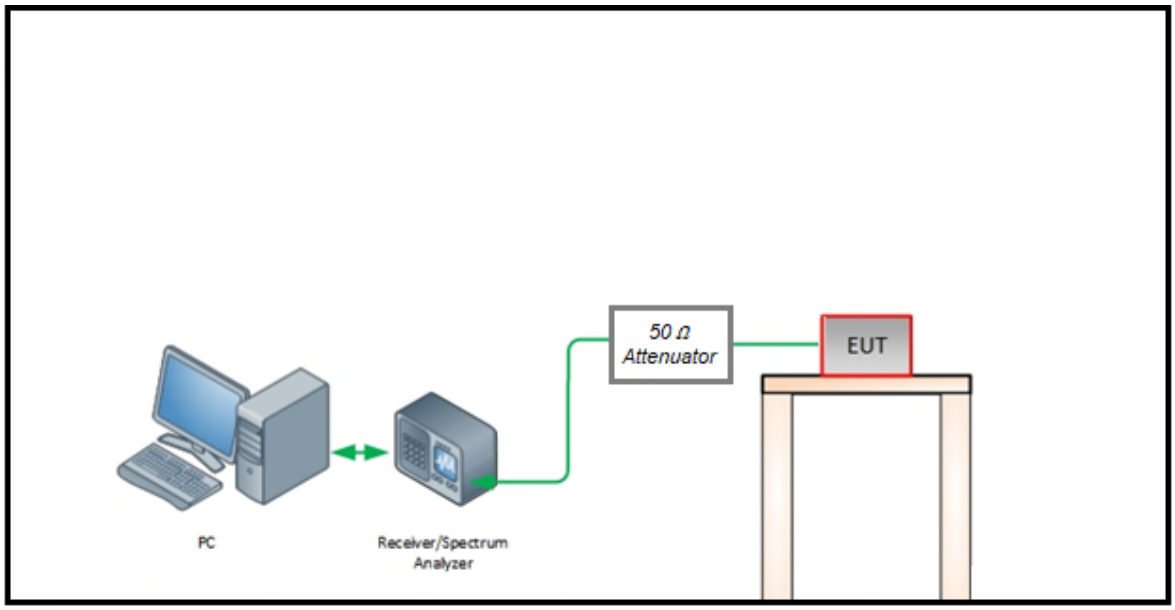


Figure 4-1 – RF Conducted Emissions Test Setup up, General Measurements

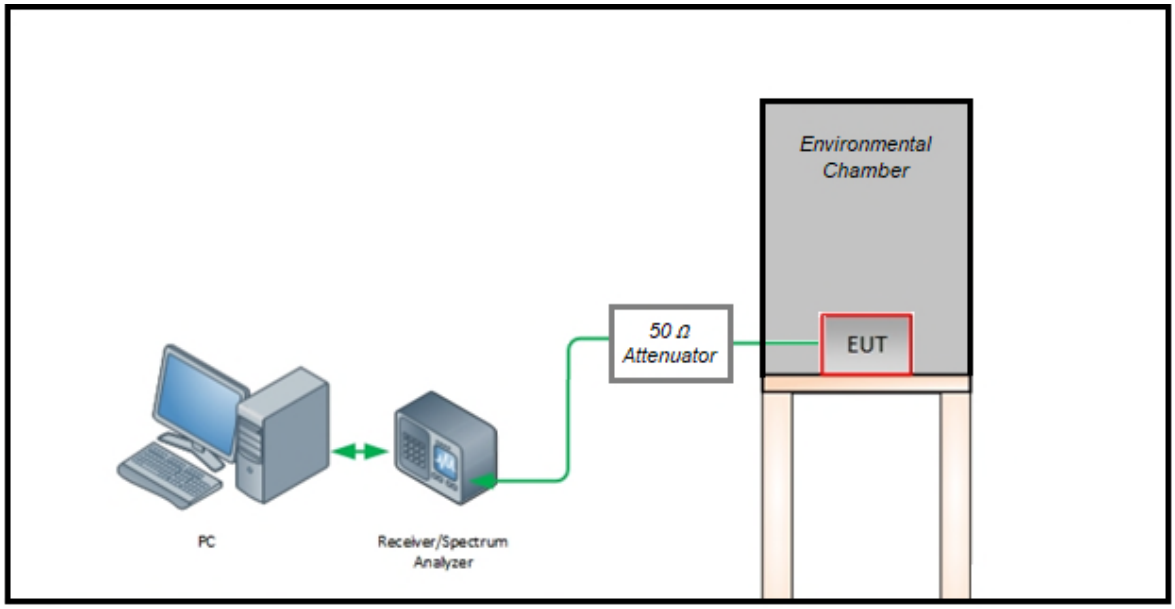


Figure 4-2 – RF Conducted Emissions Test Setup up, Extreme Conditions

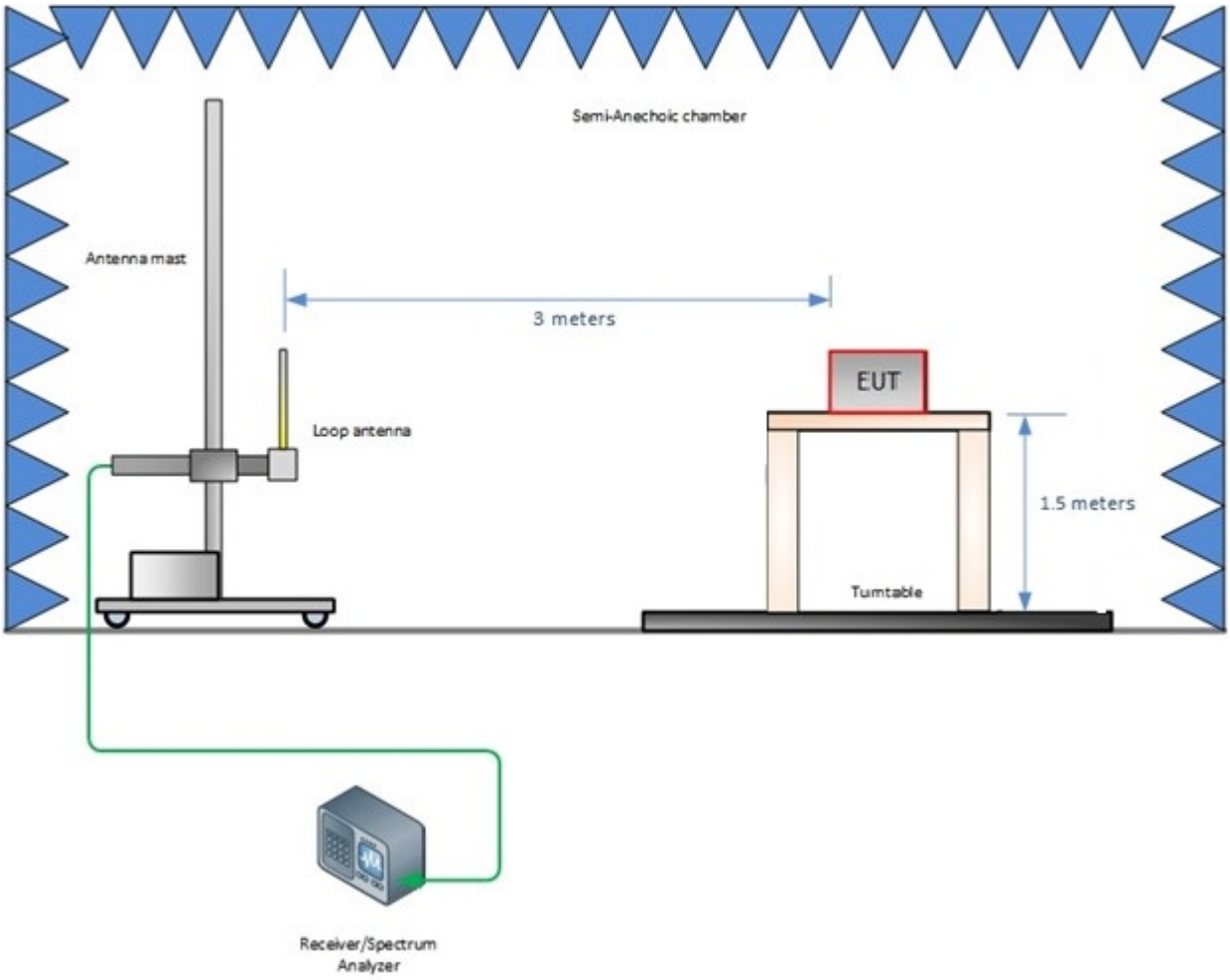


Figure 4-3 – Radiated Emissions Test Setup up to 30 MHz

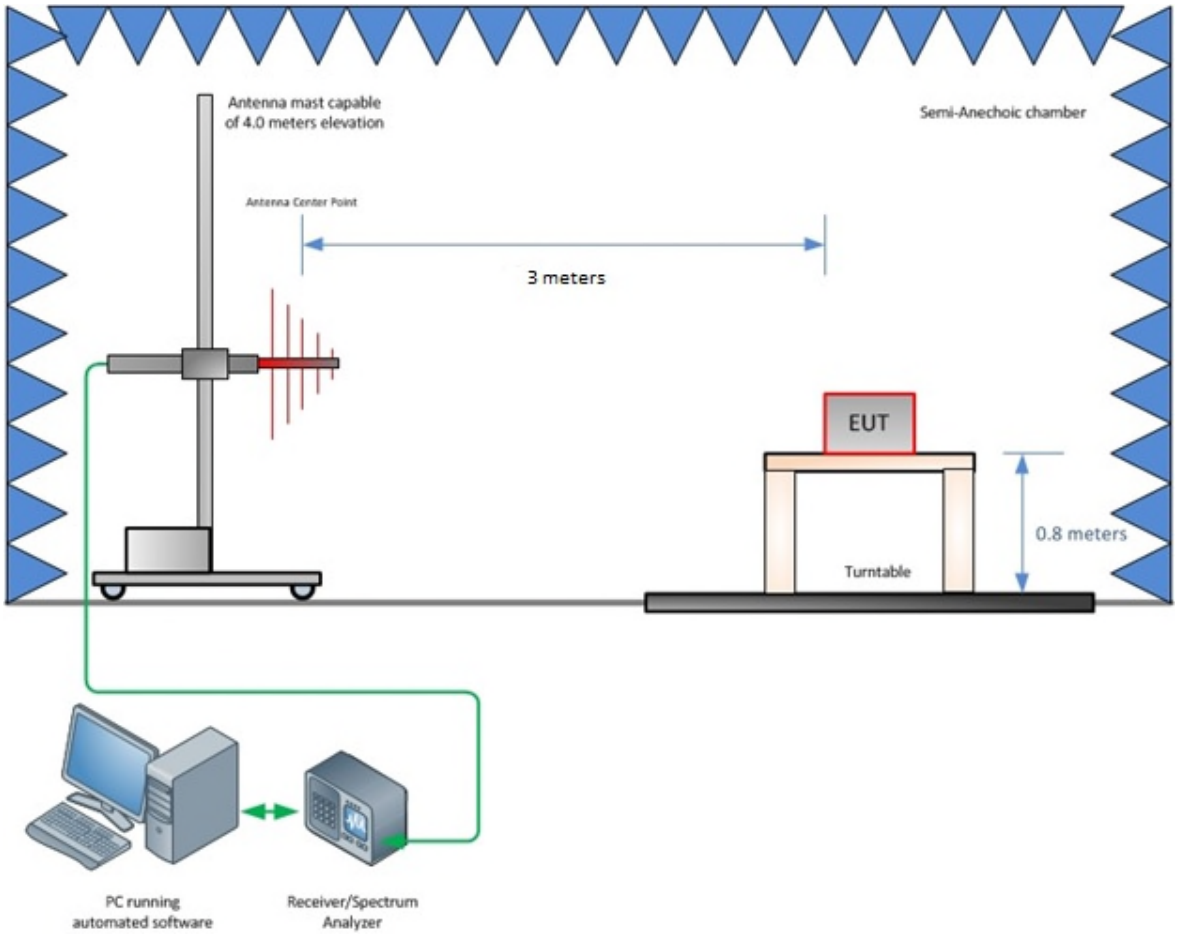


Figure 4-4 – Radiated Emissions Test Setup up to 1 GHz

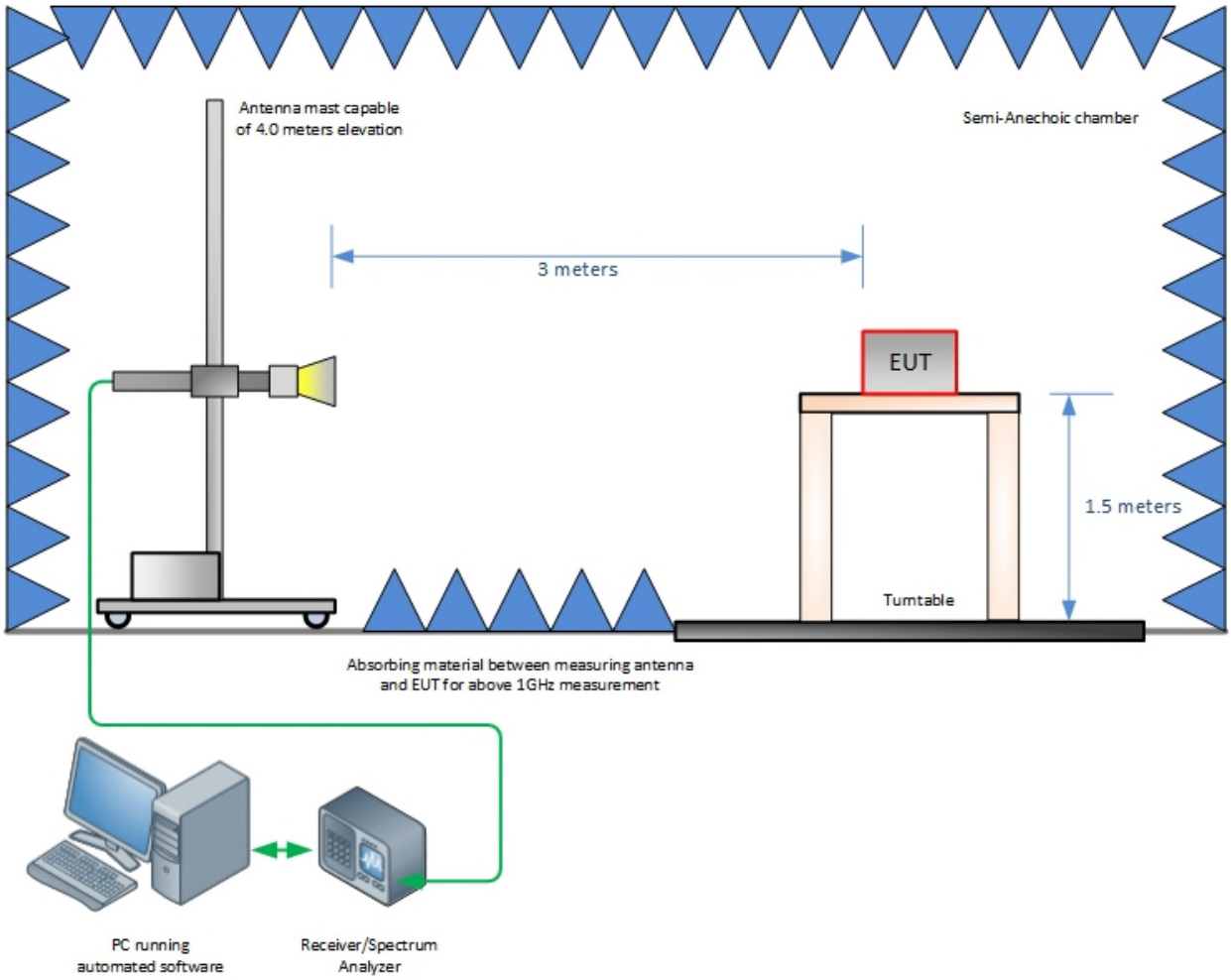


Figure 4-5 – Radiated Emissions Test Setup above 1 GHz

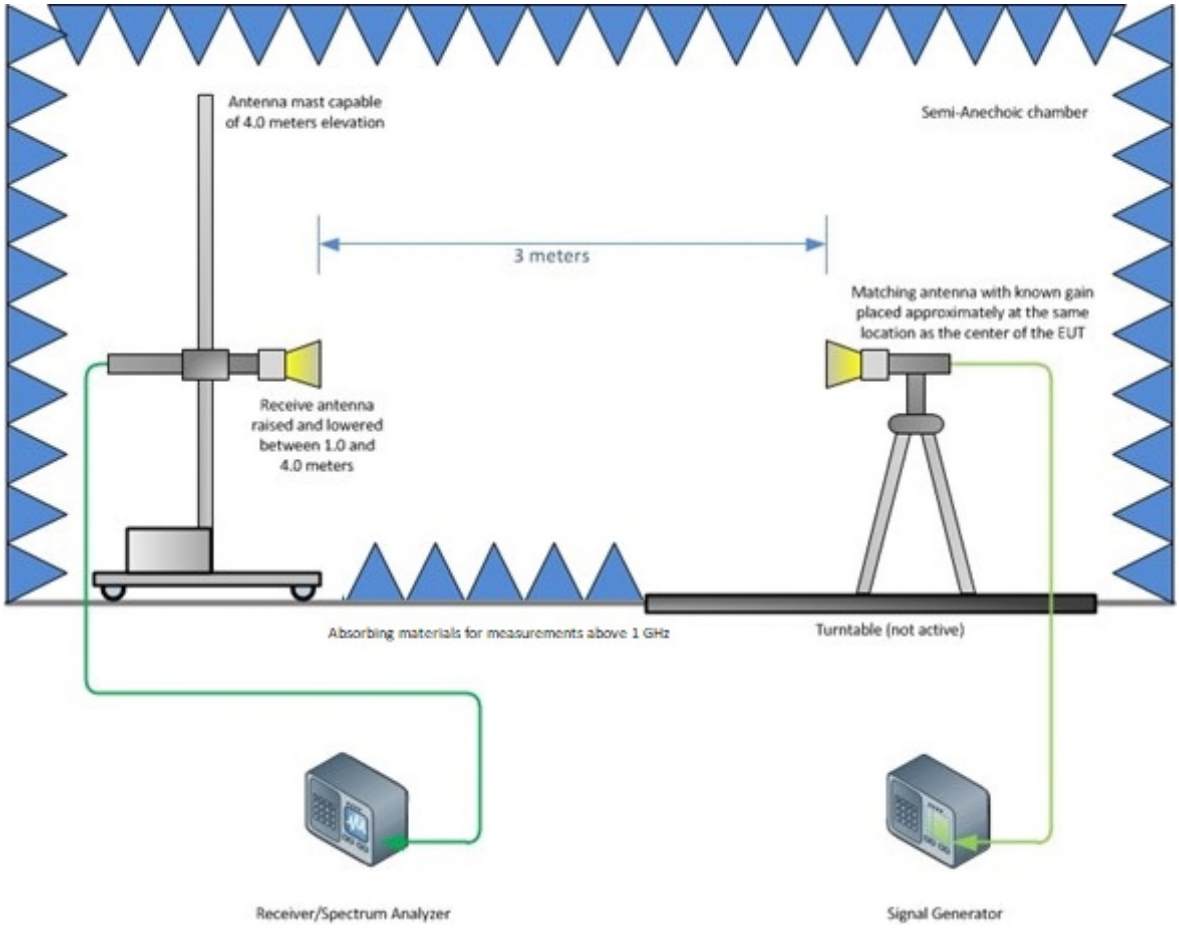


Figure 4-6 – Substitution Test Setup above 1 GHz

5 Measurement Uncertainty

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

Table 5-1 - Values of U_{cispr} and U_{Lab}

Measurement	U_{cispr}	U_{Lab}
Conducted disturbance (mains port) (9 kHz – 150 kHz) (150 kHz – 30 MHz)	 3.8 dB 3.4 dB	 3.71 dB 3.31 dB
Conducted disturbance (telecom port) (150 kHz – 30 MHz 55 dB LCL) (150 kHz – 30 MHz 65 dB LCL) (150 kHz – 30 MHz 75 dB LCL)	 5.0 dB 5.0 dB 5.0 dB	 4.11 dB 4.50 dB 4.94 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1 000 MHz) (1 – 6 GHz) (6-18 GHz)	 6.3 dB 5.2 dB 5.5 dB	 5.94 dB 5.07 dB 5.07 dB

Notes:

U_{cispr} resembles a value of measurement uncertainty for a specific test, which was determined by considering uncertainties associated with the quantities listed in CISPR 16-4-2:2011.

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