Report on the FCC and IC Testing of the Siemens AG

Model: RF695R

In accordance with FCC 47 CFR Part 15C and ISED Canada RSS-247 and ISED Canada RSS-GEN

Product Service

Choose certainty.
Add value.

Prepared for: Siemens AG
Gleiwitzer Str.555
90475 Nürnberg
Germany

FCC ID: NXW-RF69XR
IC: 267X-RF69XR

COMMERCIAL-IN-CONFIDENCE

Date: 2023-10-10
Document Number: TR-713268653-01 | Revision: 1

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Michael Ingerl	2023-10-10	SIGN-ID 841134
Authorised Signatory	Matthias Stumpe	2023-10-10	SIGN-ID 841209

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

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

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Michael Ingerl	2023-10-10	SIGN-ID 841135

Laboratory Accreditation
DAkkS Reg. No. D-PL-11321-11-02
DAkkS Reg. No. D-PL-11321-11-03

Laboratory recognition
Registration No. BNetzA-CAB-16/21-15

ISED Canada test site registration
3050A-2

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C (2020), ISED Canada RSS-247 (2017) and ISED Canada RSS-GEN (2018).

Trade Register Munich
HRB 85742
VAT ID No. DE129484267
Information pursuant to Section 2(1)
DL-InfoV (Germany) at
www.tuvsud.com/imprint

Managing Directors:
Walter Reithmaier (Sprecher / CEO)
Patrick van Welij

Phone: +49 9421 56 82-0
Fax: +49 9421 56 82-199
www.tuvsud.com

TÜV SÜD Product Service GmbH

Äußere Frühlingstraße 45
94315 Straubing
Germany

Product Service

Contents

Product Service

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.

Revision	Description of Change	Date of Revision
0	First Revision	2023-03-10
1	Changed FCC and IC ID (Typo), Added Hopping Mode at Chapter 2.1, Added Transmitting simultaneously info as a note at chapter 1.4.1.	2023-10-10

Table 1

1.2 Introduction

Applicant	Siemens AG
Manufacturer	Siemens AG
Model Number(s)	RF695R (Tested) RF690R
MLFB(s)	RF695R 6GT2 811-7DD20-1AA0 RF690R 6GT2 811-7AD20-1AA0
FCC ID(s)	NXW-RF69XR
IC ID(s)	267X-RF69XR
Serial Number(s)	---
Hardware Version(s)	---
Software Version(s)	---
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C (2020), ISED Canada RSS-247 (2017), ISED Canada RSS-GEN (2018).
Test Plan/Issue/Date	---
Order Number	5683255
Date of Receipt of EUT	2023-02-02
Start of Test	2023-02-08
Finish of Test	2023-03-10
Name of Engineer(s)	Michael Ingerl
Related Document(s)	ANSI C63.10 (2020)

Product Service

1.3 Brief Summary of Results

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

Section	Test Description	Result	Comments/Base Standard
Configuration and Mode: UHF Transmitting, with modulated			
2.1	Authorised Band Edges	Pass	ANSI C63.10 (2020)
2.2	Transmitter Output Power	Pass	ANSI C63.10 (2020)
2.3	Field Strength of any Emission	Pass	ANSI C63.10 (2020)
2.4	Restricted Band Edges	Pass	ANSI C63.10 (2020)
2.5	Bandwidth, Carrier Frequency Separation, Number of Hopping Frequencies and Dwell Time	Pass	ANSI C63.10 (2020)
2.6	Frequency Tolerance Under Temperature Variations	Pass	ANSI C63.10 (2020)

Table 2

Product Service

1.4 Product Information

1.4.1 Technical Description

Equipment characteristics:			
Type of equipment:	RF6xxR UHF RFID Reader		
Type designation:	RF695R (Tested) RF690R		
Power supply:	☐ AC Nominal: Minimum: Maximum: Nominal frequency:	☒ DC Nominal: 24 V Minimum: 19.2 V Maximum: 28.8 V	☐ Battery Nominal:
Application[1]:	Radio Frequency Identification Application		
Kind of equipment	Transceiver		
Equipment class:	Equipment for fixed use		
Frequency range:	902 – 928 MHz		
Channels:	50		
Transmitting simultaneously:	No, only one Antenna port is sending		
Type of Antenna(s)	External Antenna: Siemens SIMATIC RF642A		
Antenna Gain	7 dBi		

[1] Classification according to CEPT/ERC Recommendation 70-03

Product Service

1.5 Deviations from the Standard

1.6 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
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
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.7 Test Location

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

Test Name	Name of Engineer(s)
Authorised Band Edges	Michael Ingerl
Transmitter Output Power	Michael Ingerl
Field Strength of any Emission	Michael Ingerl
Restricted Band Edges	Michael Ingerl
Bandwidth, Carrier Frequency Separation, Number of Hopping Frequencies and Dwell Time	Michael Ingerl
Frequency Tolerance Under Temperature Variations	Michael Ingerl
Conducted Emissions on Mains Terminals	Michael Ingerl

Table 4

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

Product Service

2 Test Details

2.1 Authorised Band Edges

2.1.1 Specification Reference

FCC 47 CFR Part 15C, 15.247 (a) (1) (i)
ISED Canada RSS-247, 5.1 (c)
ISED Canada RSS-GEN

2.1.2 Equipment Under Test and Modification State

RF695R, S/N: --- - Modification State 0

2.1.3 Date of Test

2023-03-09

2.1.4 Test Method

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

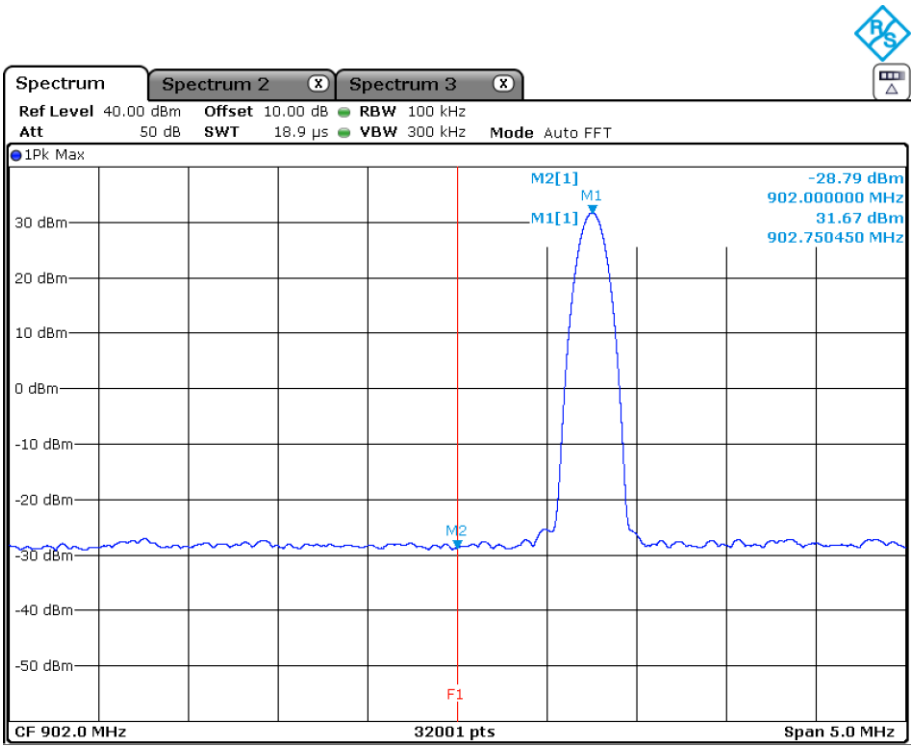
2.1.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	37.0 %

Product Service

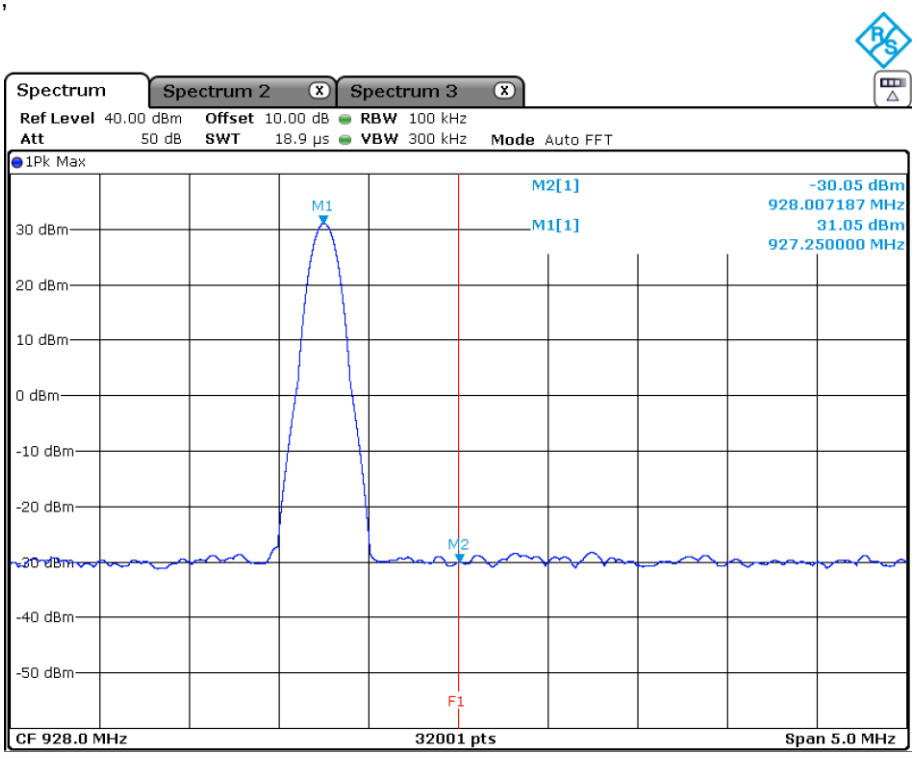
2.1.6 Test Results

Continuously transmitting



Date: 9.MAR.2023 19:01:48

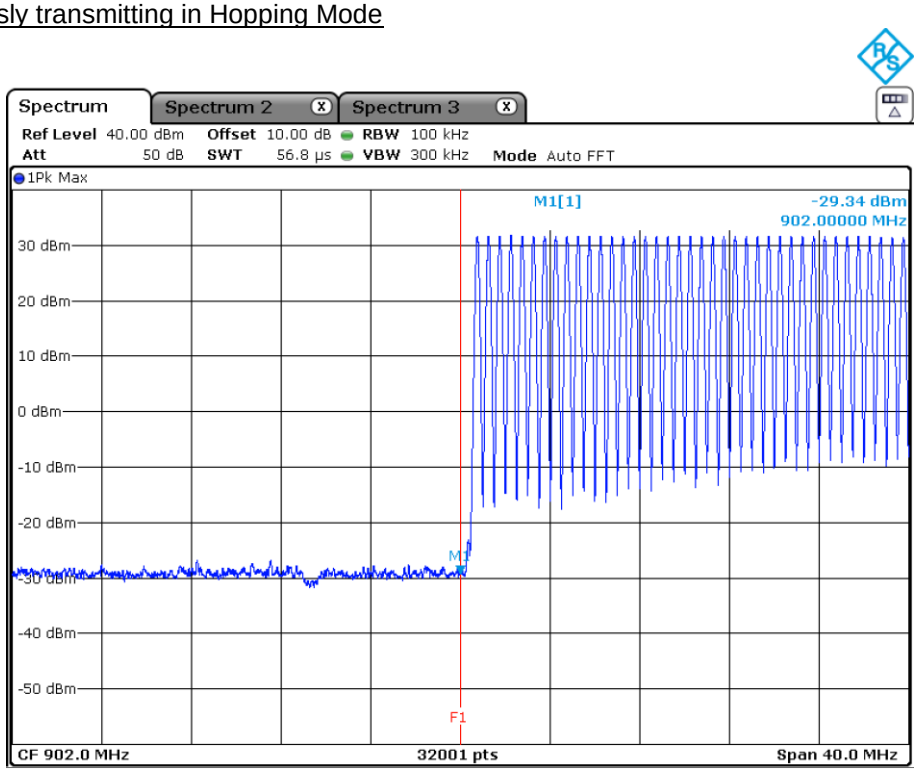
,



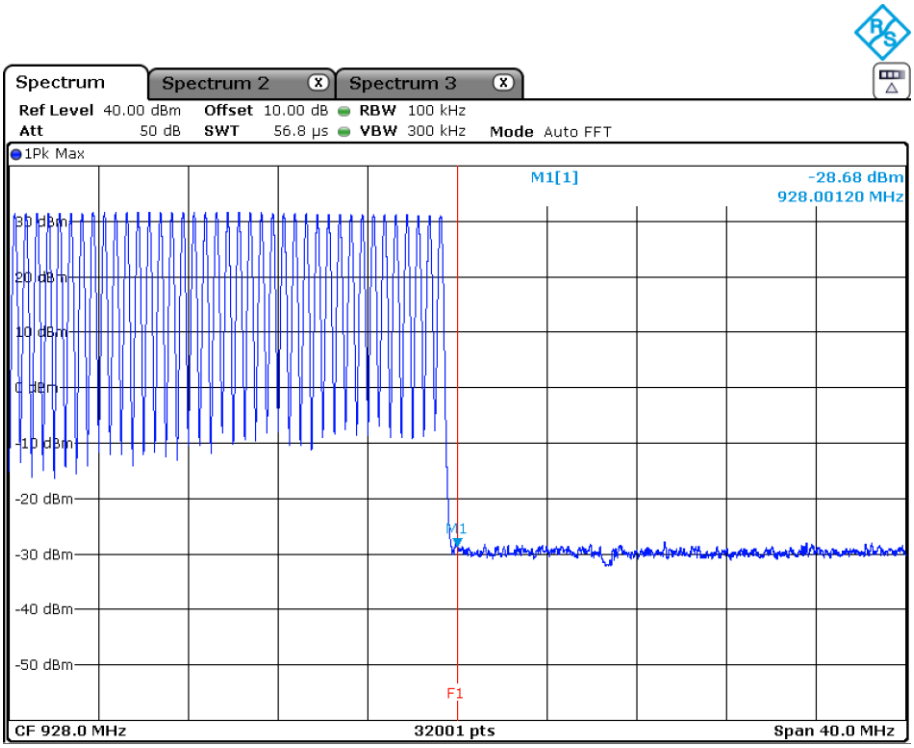
Date: 9.MAR.2023 19:02:34

Product Service

Continuously transmitting in Hopping Mode



Date: 9.MAR.2023 18:44:29



Date: 9.MAR.2023 18:46:33

Product Service

2.1.7 Test Location and Test Equipment Used

This test was carried out in a non shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	12	2024-02-29

Table 5

Product Service

2.2 Transmitter Output Power

2.2.1 Specification Reference

FCC 47 CFR Part 15C, 15.247 (b) (2)
ISED Canada RSS-247, 5.4 (a)
ISED Canada RSS-GEN

2.2.2 Equipment Under Test and Modification State

RF695R, S/N: --- - Modification State 0

2.2.3 Date of Test

2023-03-09

2.2.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.3, 6.4 and 6.5.

2.2.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	37.0 %

2.2.6 Test Results

Continuously transmitting

Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
902,75	24.38	30
915,25	24.26	30
927,25	24.09	30

Note: The tested Antenna Port is the worst-case Port (Pre-tests made for the worst-case)
Measured conducted without Antenna Gain added.

Product Service

2.2.7 Test Location and Test Equipment Used

This test was carried out in a non shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	12	2024-02-29
Switching device	Rohde & Schwarz	OSP120 for TS8997	20248	36	2023-11-30
EMC measurement software	Rohde & Schwarz	EMC32 TS8997 – V10.60.00	44381	---	---
Switching device	Rohde & Schwarz	OSP120 for TS8997	38807	36	2023-11-30

Table 6

Product Service

2.3 Field Strength of any Emission

2.3.1 Specification Reference

FCC 47 CFR Part 15C, 15.209
ISED Canada RSS-247, 5.5
ISED Canada RSS-GEN, 6.13

2.3.2 Equipment Under Test and Modification State

RF695R, S/N: --- - Modification State 0

2.3.3 Date of Test

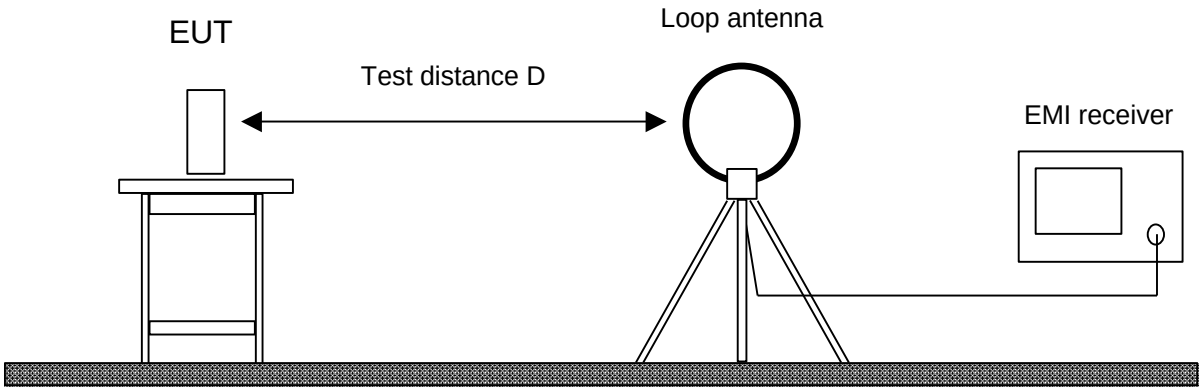
2023-02-08 - 2023-03-09

2.3.4 Test Method

The test was performed according to ANSI C63.10, sections 11.11 and 11.12

Prescans are performed in six positions of the EUT to get the full spectrum of emission caused by the EUT with the measuring antenna raised and lowered from 1 m to 4 m with vertical and horizontal polarisation to find the combination of table position, antenna height and antenna polarisation for the maximum emission levels.
Data reduction is applied to these results to select those levels having less margin than 10 dB or exceeding the limit using subranges and limited number of maximums.
Further maximisation for adjusting the maximum position is following.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

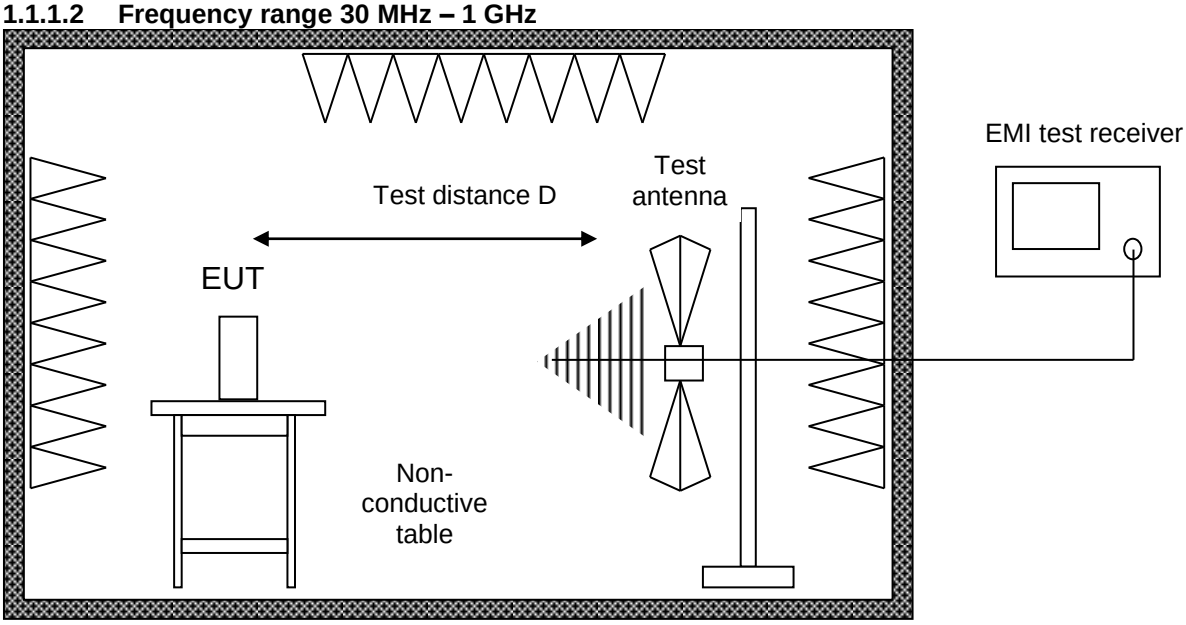
1.1.1.1 Frequency range 9 kHz – 30 MHz



The EUT was placed on a non-conductive table, 0.8 m above the ground.
Radiated emissions in the frequency 9 kHz – 30 MHz is measured within a semi-anechoic room with an active loop antenna with the measurement detector set to peak. In addition in the frequency range 9 kHz to 490 kHz also an average detector was used. The measurement bandwidth of the receiver was set to 300 Hz in the frequency range 9 kHz to 150 kHz and 10 kHz in the frequency range 150 kHz to 30 MHz. Prescans were performed in six positions of the EUT.
For final measurements the detector was set to CISPR quasi-peak and in addition to CISPR average in the frequency range 9 kHz to 490 kHz with a resolution bandwidth 200 Hz in the frequency range 9 kHz to 150 kHz and 9 kHz in the frequency range 150 kHz to 30 MHz. Final tests were performed immediately after a final frequency and zoom (for drifting disturbances) and maximum adjustment.

Product Service

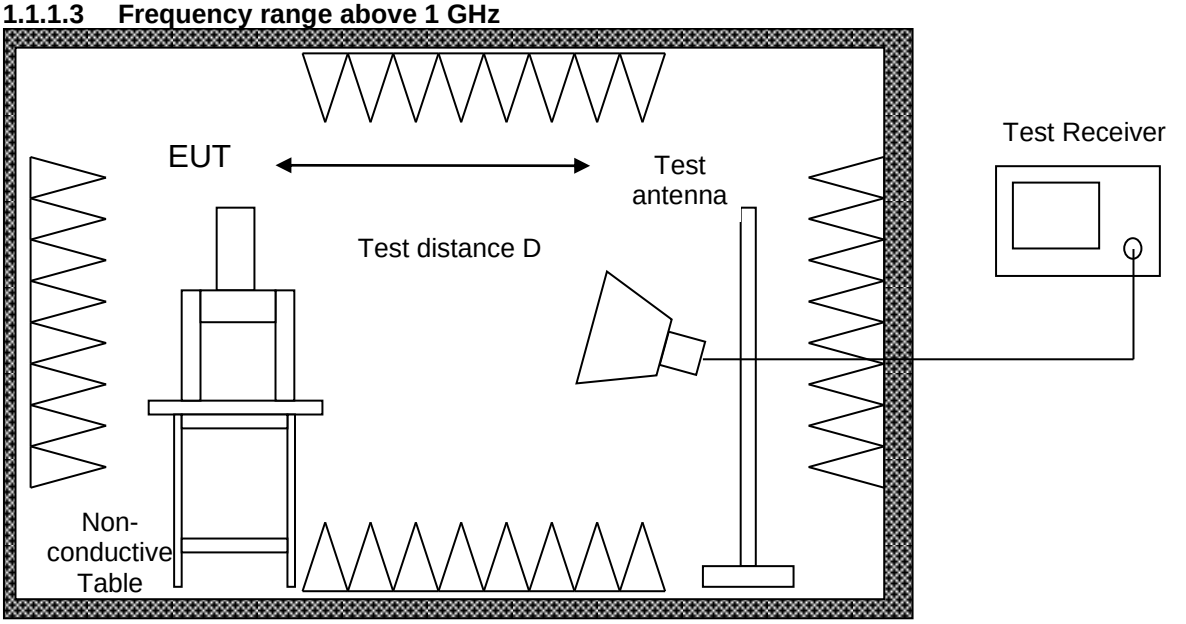
1.1.1.2 Frequency range 30 MHz – 1 GHz



Alternate test site (semi anechoic room)

The EUT was placed on a non-conductive table, 0.8 m above the ground plane
Radiated emissions in the frequency range 30 MHz – 1 GHz is measured within a semi-anechoic room with groundplane complying with the NSA requirements of ANSI C63.4. for alternative test sites. A linear polarised logarithmic periodic antenna combined with a 4:1 broadband dipole (“Trilog broadband antenna”) is used.
For prescan tests the test receiver is set to peak-detector with a bandwidth of 120 kHz.
With the measurement bandwidth of the test receiver set to 120 kHz CISPR quasi-peak detector is selected for final measurements following immediately after a final frequency zoom (for drifting disturbances) and maximum adjustment.

1.1.1.3 Frequency range above 1 GHz



Fully anechoic room

The EUT was placed on a non-conductive table, 1.5 m above the ground plane

Product Service

Radiated emission tests above 1 GHz are performed in a fully anechoic room with the S_{VSWR} requirements of ANSI C63.4. Measurements are performed both in the horizontal and vertical planes of polarisation using a test receiver with the detector function set to peak and average and the resolution bandwidth set to 1 MHz. Testing above 1 GHz is performed with horn antennas with the EUT in boresight of the antenna.
For prescan tests the test receiver is set to peak- and average-detector with a bandwidth of 1 MHz. With the measurement bandwidth of the test receiver set to 1 MHz and peak- and CISPR average-detector is selected for final measurements following immediately after a final frequency zoom (for drifting disturbances) and maximum adjustment.

2.3.5 Environmental Conditions

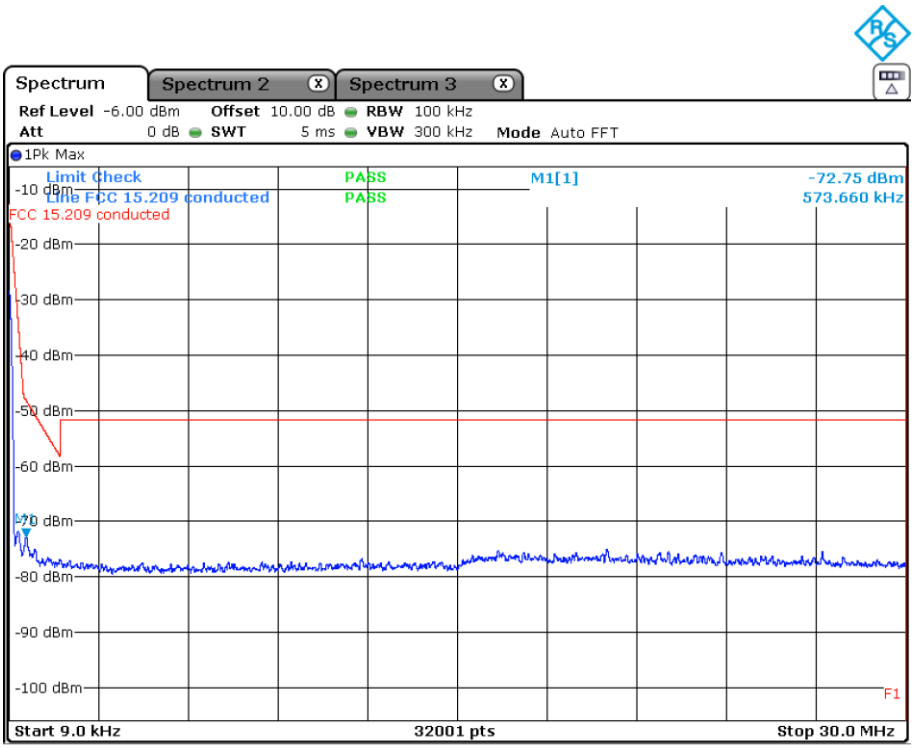
Ambient Temperature	20.0 °C
Relative Humidity	33.0 %

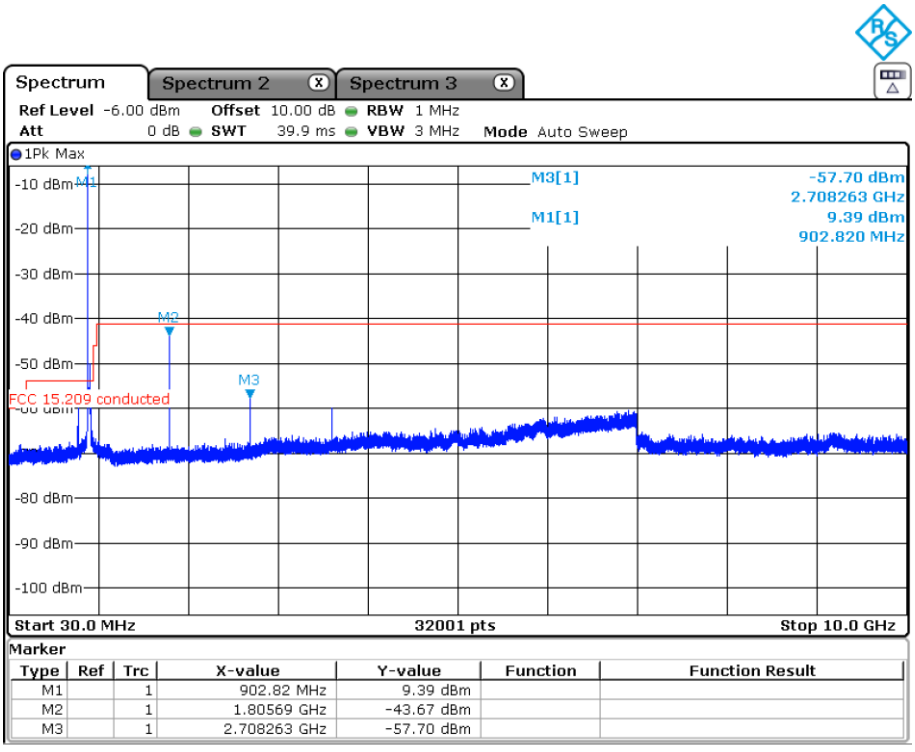
Product Service

2.3.6 Test Results

Conducted Measurement:

Channel: 902.75 MHz



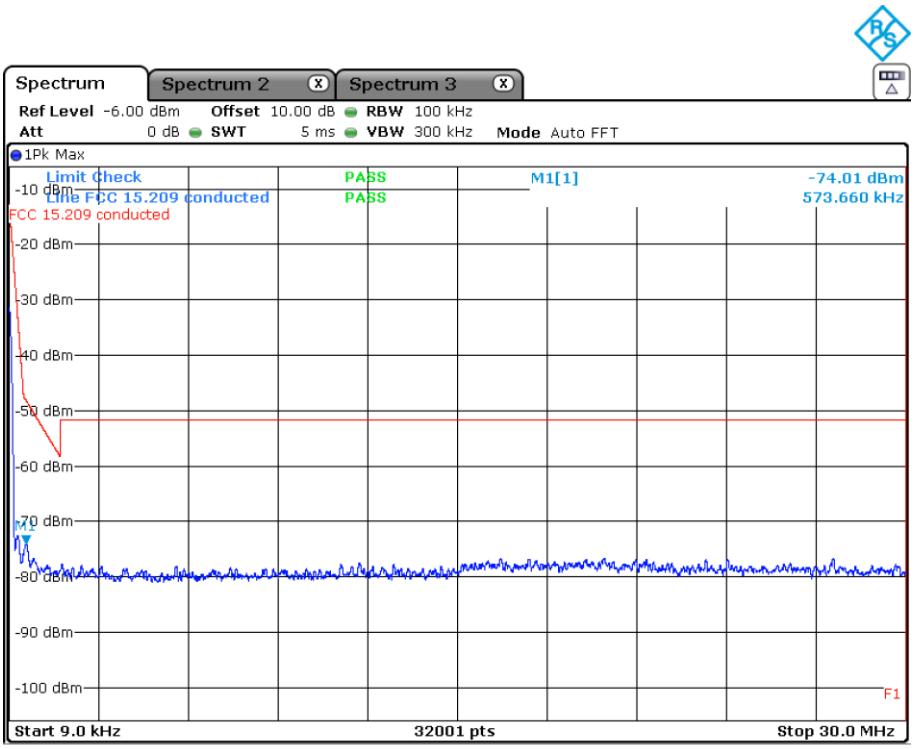


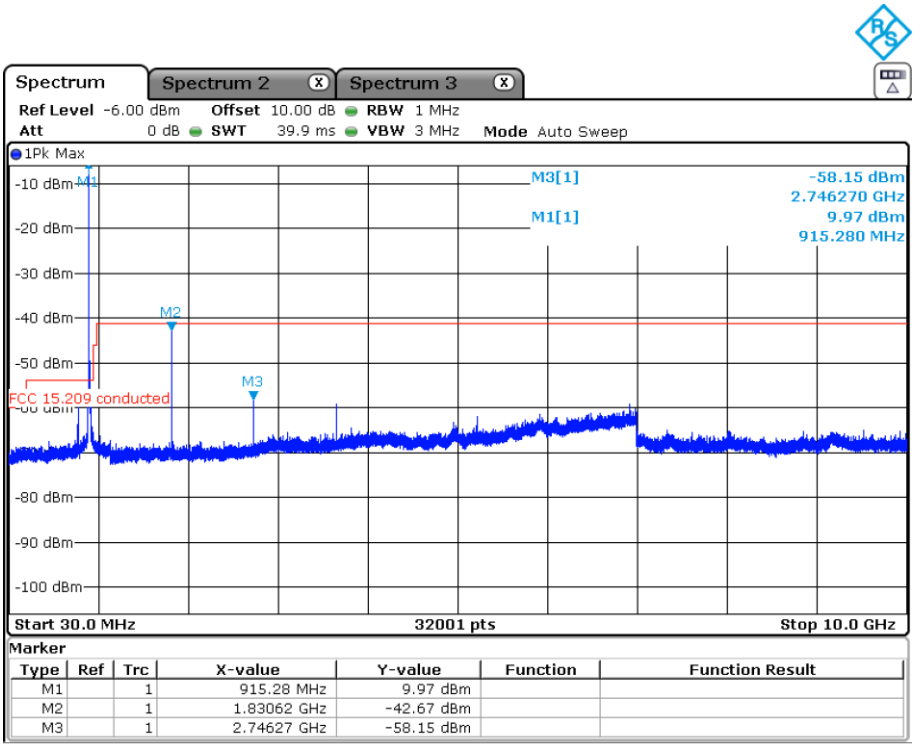
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	902.82 MHz	9.39 dBm		
M2		1	1.80569 GHz	-43.67 dBm		
M3		1	2.708263 GHz	-57.70 dBm		

Product Service

Channel: 915.25 MHz



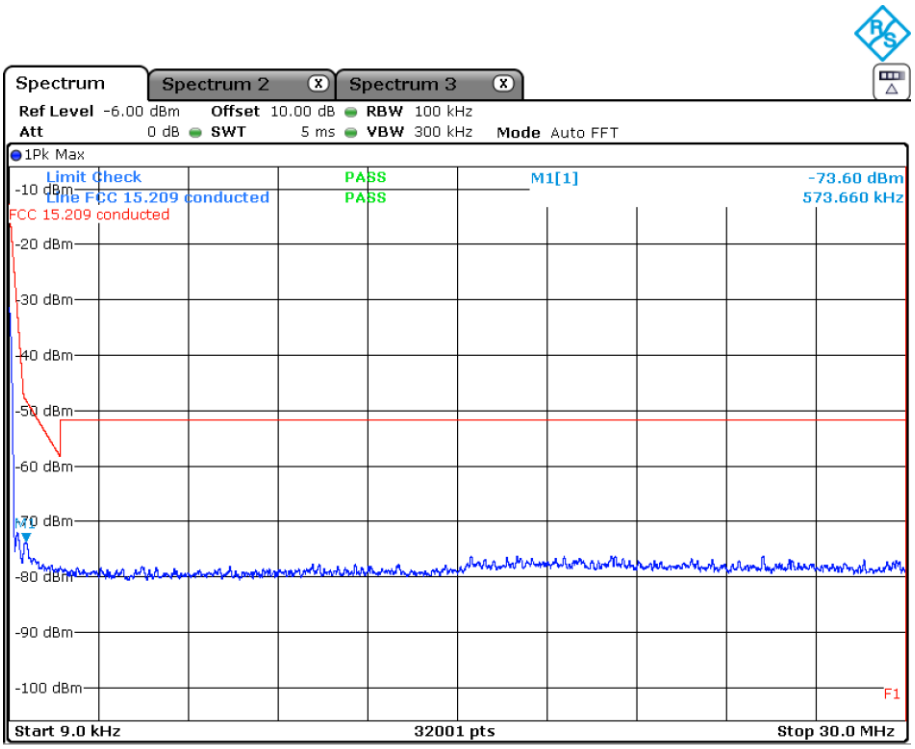


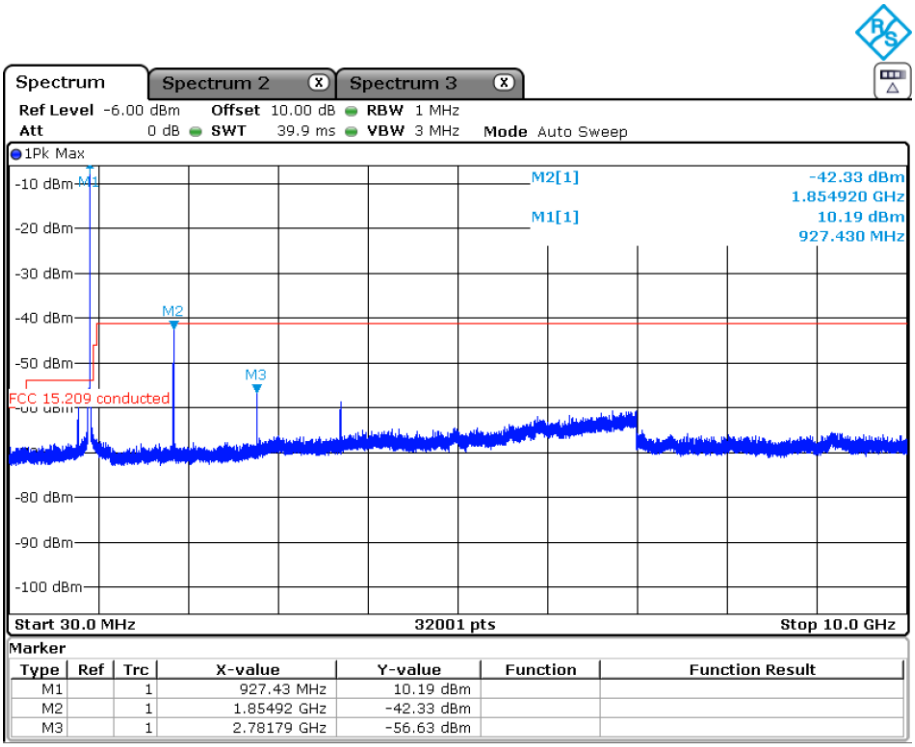
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	915.28 MHz	9.97 dBm		
M2		1	1.83062 GHz	-42.67 dBm		
M3		1	2.74627 GHz	-58.15 dBm		

Product Service

Channel: 927.25 MHz





Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	927.43 MHz	10.19 dBm		
M2		1	1.85492 GHz	-42.33 dBm		
M3		1	2.78179 GHz	-56.63 dBm		

Product Service

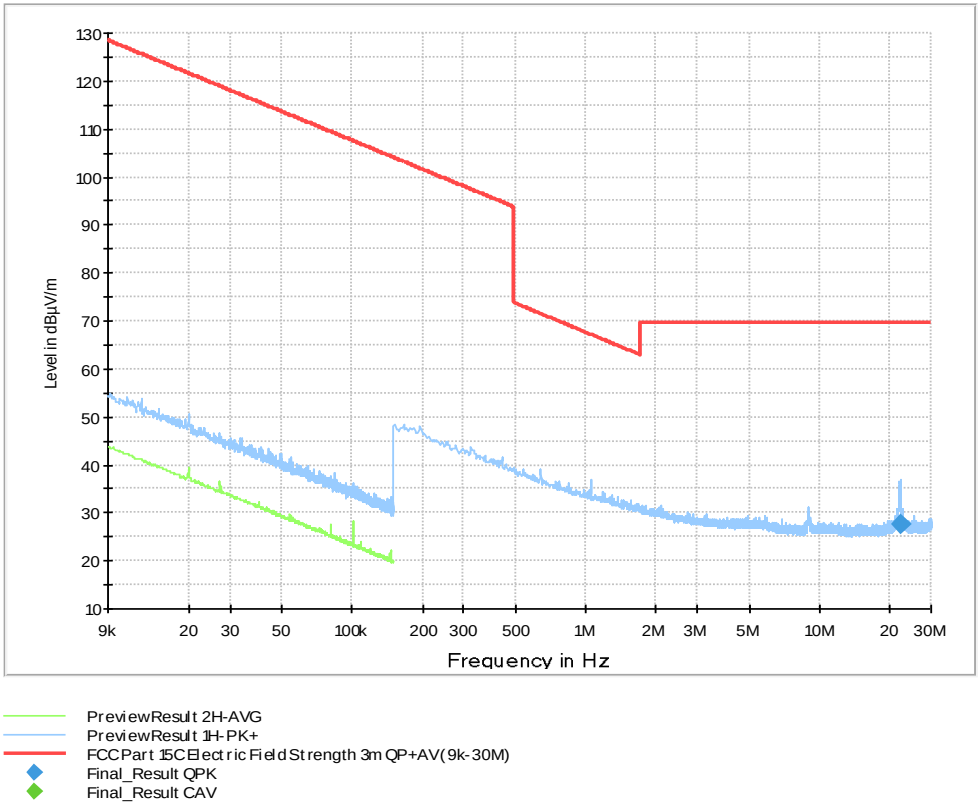
Radiated Measurement:

Frequency range	*Test distance*
9 kHz to 4 GHz	3 m
4 GHz to 10 GHz	1 m

Table 7

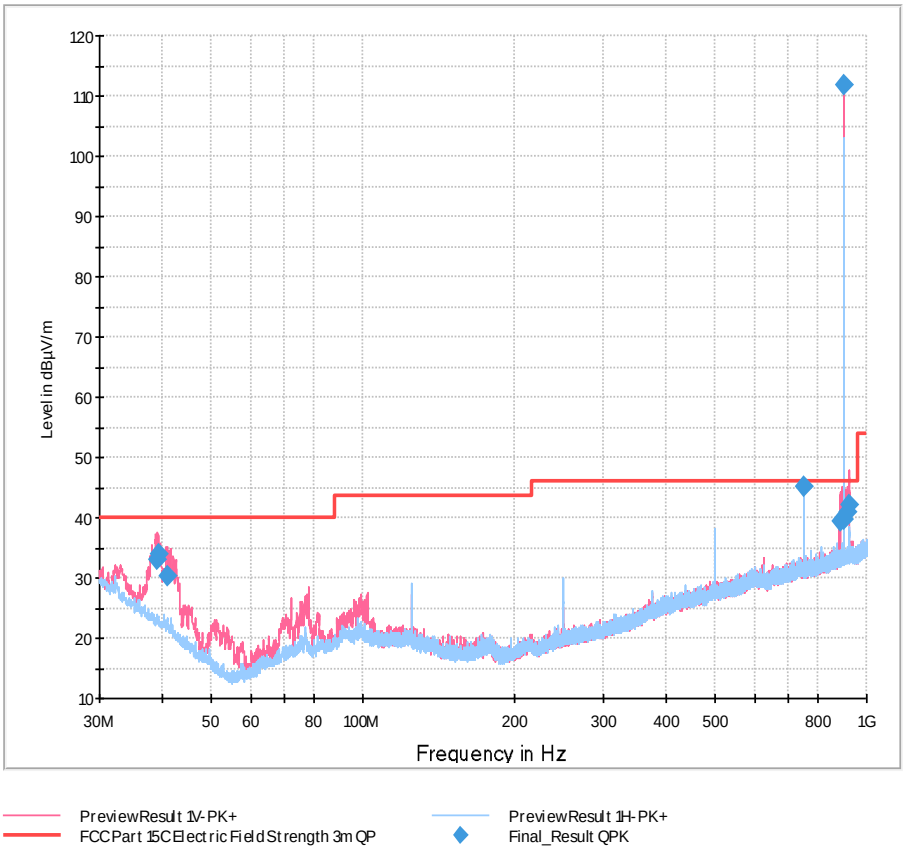
The tested orientation is the worst-case position (Pre-scans made for the worst-case orientation)

Channel: 902.75 MHz



Final Results 1:

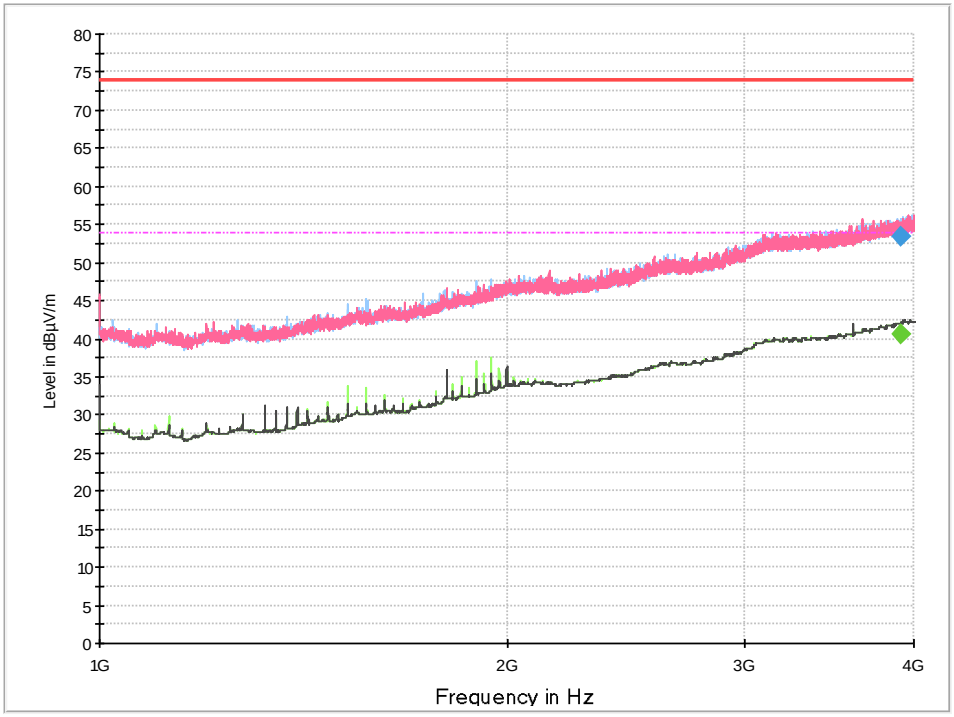
Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
22.173000	27.52	69.54	42.02	1000.0	9.000	100.0	H	118.0	19.0



Final Results 1:

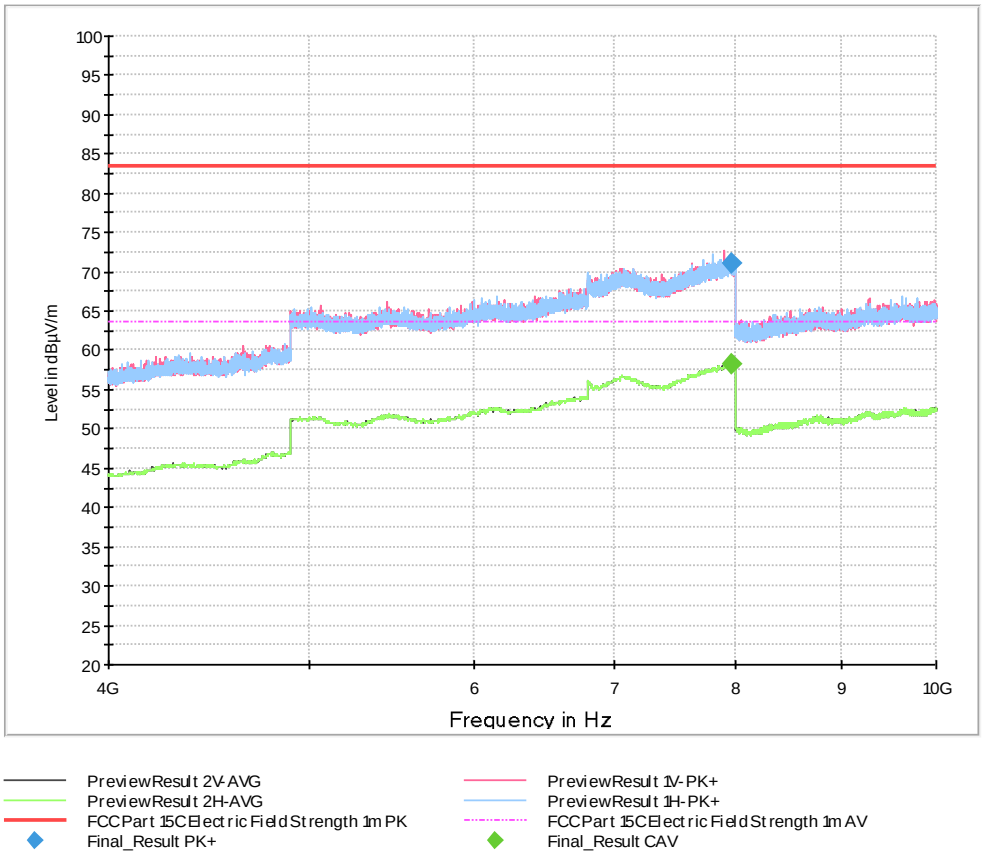
Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
39.180000	33.04	40.00	6.96	1000.0	120.000	106.0	V	169.0	20.1
39.240000	33.93	40.00	6.07	1000.0	120.000	100.0	V	200.0	20.1
40.920000	30.44	40.00	9.56	1000.0	120.000	105.0	V	-82.0	19.0
750.000000	45.18	46.02	0.84	1000.0	120.000	100.0	H	73.0	28.6
885.480000	39.28	46.02	6.74	1000.0	120.000	110.0	V	20.0	30.3
898.290000	39.73	46.02	6.29	1000.0	120.000	190.0	V	20.0	30.5
902.760000	111.87	#1	#1	1000.0	120.000	201.0	V	-9.0	30.6
914.970000	40.94	46.02	5.08	1000.0	120.000	110.0	V	-14.0	30.8
922.140000	42.19	46.02	3.83	1000.0	120.000	110.0	V	5.0	30.8

#1: Intentional Radiation



Final Results 1:

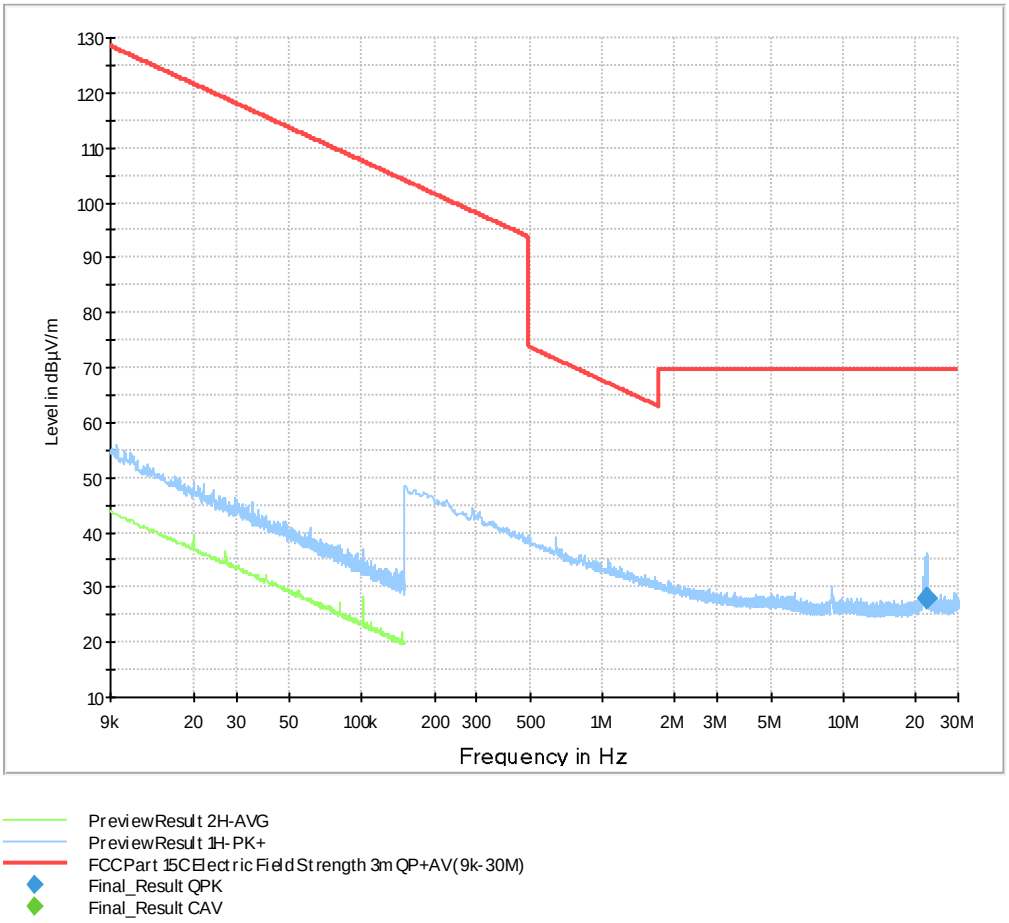
Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
3908.500000	53.46	---	73.98	20.52	1000.0	1000.000	300.0	V	-145.0	46.0
3908.500000	---	40.57	53.98	13.41	1000.0	1000.000	300.0	V	-145.0	46.0



Final Results 1:

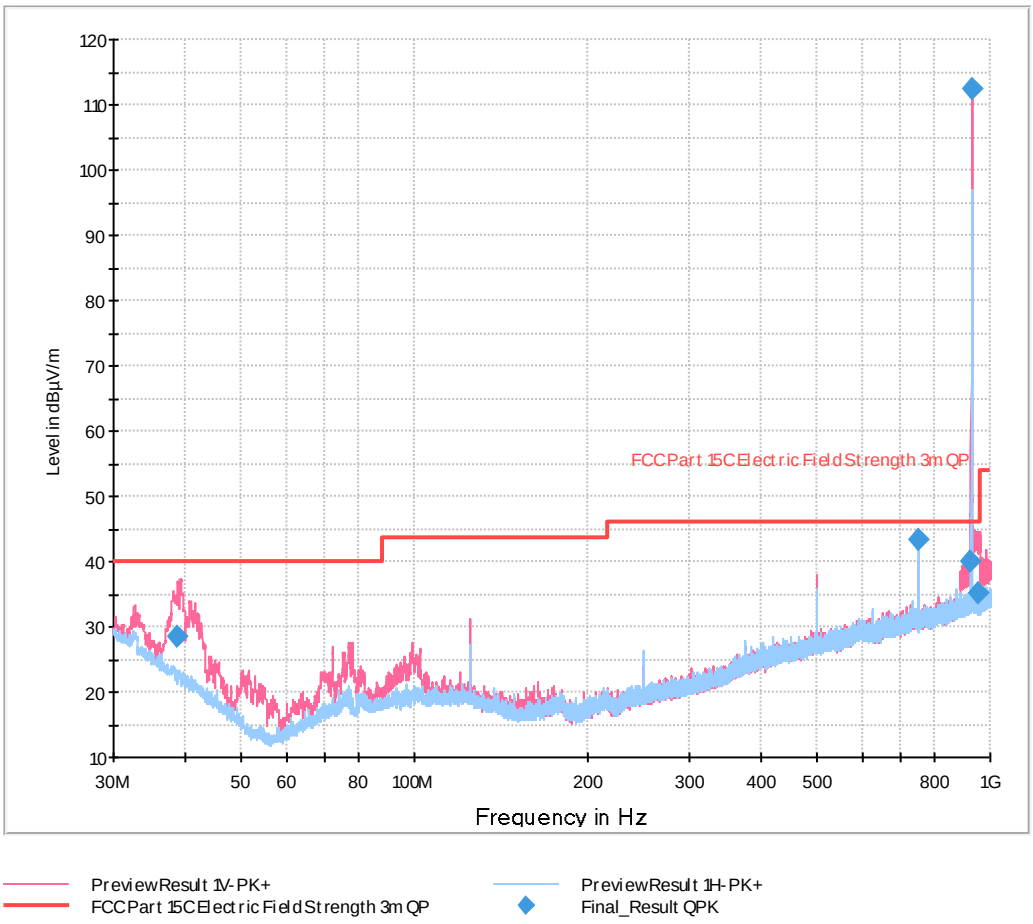
Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
7978.250000	---	58.22	63.50	5.28	1000.0	1000.000	100.0	H	175.0	48.5
7978.250000	71.14	---	83.50	12.36	1000.0	1000.000	100.0	H	175.0	48.5

Channel: 927.25 MHz



Final Results 1:

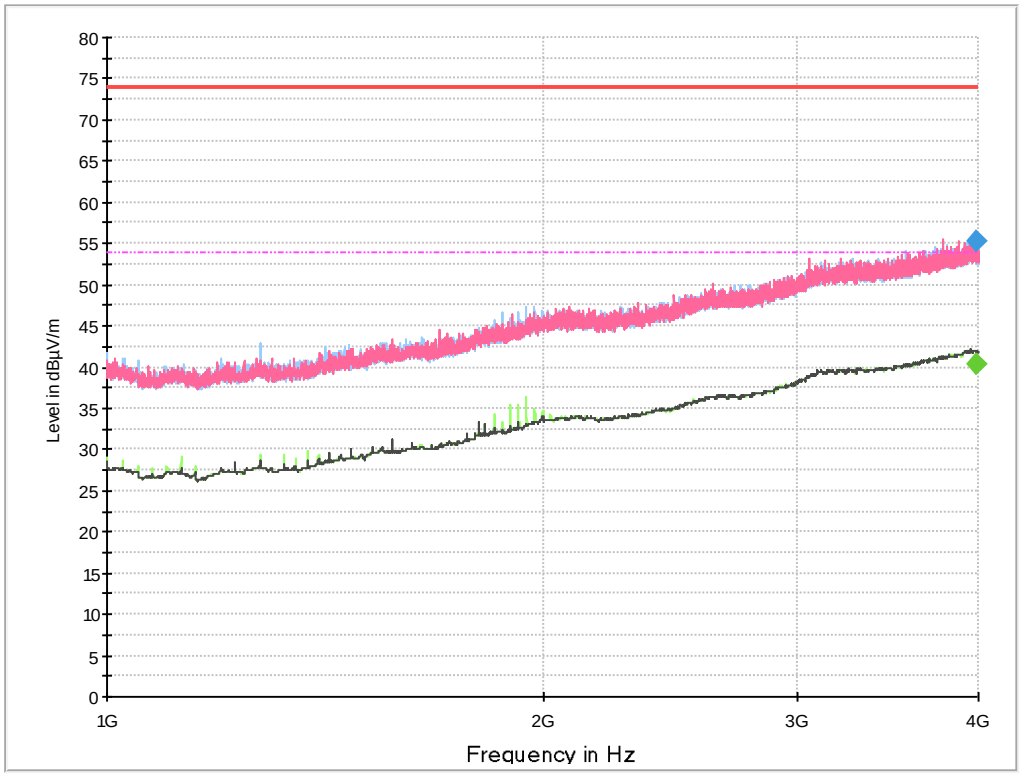
Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
22.107750	27.79	69.54	41.75	1000.0	9.000	100.0	H	3.0	19.0



Final Results 1:

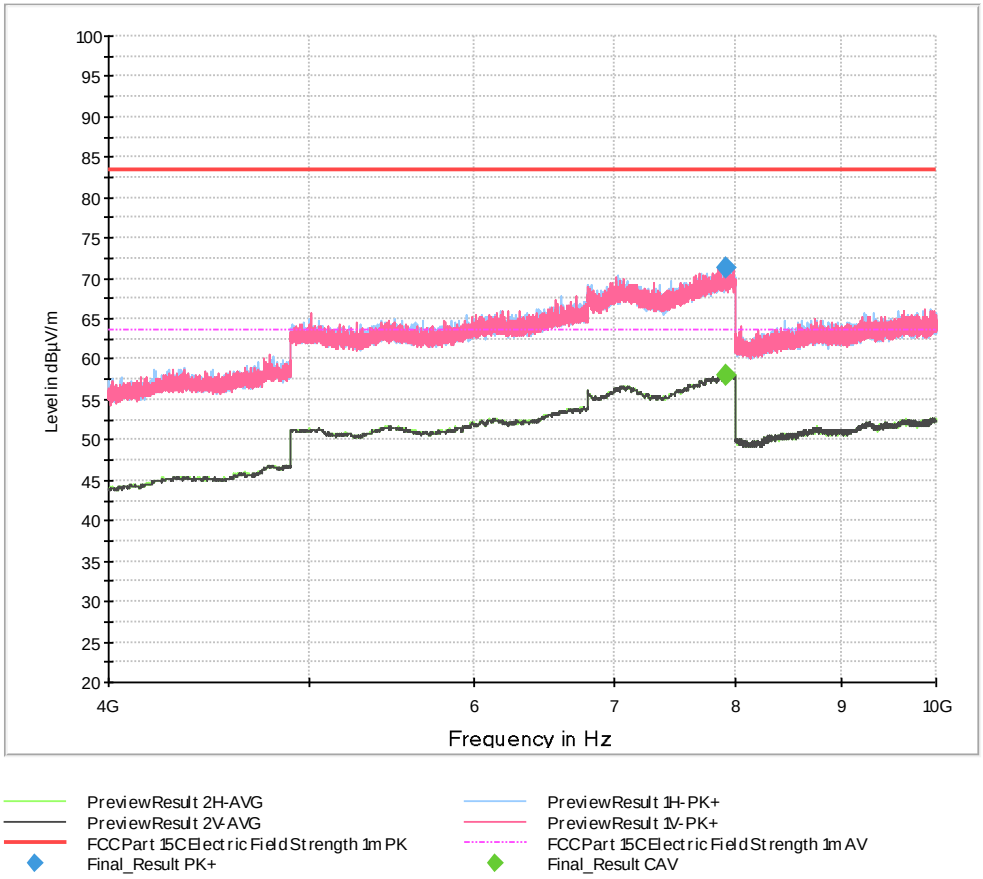
Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
38.850000	28.42	40.00	11.58	1000.0	120.000	105.0	V	176.0	20.3
750.000000	43.33	46.02	2.69	1000.0	120.000	105.0	H	5.0	28.6
921.780000	39.98	46.02	6.04	1000.0	120.000	199.0	V	-5.0	30.8
927.240000	112.39	#1	#1	1000.0	120.000	198.0	V	-10.0	30.8
955.440000	35.10	46.02	10.92	1000.0	120.000	100.0	V	-10.0	30.9

#1: Intentional Radiation



Final Results 1:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
3984.500000	---	40.31	53.98	13.67	1000.0	1000.000	200.0	H	-90.0	39.8
3984.500000	55.17	---	73.98	18.81	1000.0	1000.000	200.0	H	-90.0	39.8



Final Results 1:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
7920.750000	---	58.03	63.50	5.47	1000.0	1000.000	100.0	V	175.0	48.5
7920.750000	71.36	---	83.50	12.14	1000.0	1000.000	100.0	V	175.0	48.5

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	3

Table 8 - FCC Limit

NOTE: The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.

ISED Canada RSS-247, Limit Clause 4.4

Under no circumstance shall the level of any unwanted emissions exceed the level of the fundamental emissions.

ISED Canada RSS-Gen, Limit Clause 8.9

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30

Table 9 - IC Limit, Below 30 MHz

Frequency (MHz)	Field Strength (µV/m at 3 metres)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 10 - IC Limit, Above 30 MHz

Product Service

2.3.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 11 and a non shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2023-04-30
Loop antenna	Schwarzbeck	FMZB 1519 B	44334	36	2024-01-31
ULTRALOG Antenna	Rohde & Schwarz	HL562E	38401	36	2026-01-31
Horn antenna	Rohde & Schwarz	HF907	40089	24	2024-10-31
Semi anechoic room	Rohde & Schwarz	No. 11	---	---	---
EMC measurement software	Rohde & Schwarz	EMC32 Emission K11 – V11.50	42986	---	---
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	12	2024-02-29

Table 11

Product Service

2.4 Restricted Band Edges

2.4.1 Specification Reference

FCC 47 CFR Part 15C, 15.205
ISED Canada RSS-247
ISED Canada RSS-GEN, 8.10

2.4.2 Equipment Under Test and Modification State

RF695R, S/N: --- - Modification State 0

2.4.3 Date of Test

2023-02-08 - 2023-03-09

2.4.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.13.1.

2.4.5 Test Results

No emission above FCC 47 CFR §15.209 found outside of operational frequency band 902 MHz to 928 MHz. See chapter ‘2.3 Field Strength of any Emission’ and ‘2.1 Authorised Band Edges’.

Product Service

2.5 Bandwidth, Carrier Frequency Separation, Number of Hopping Frequencies and Dwell Time

2.5.1 Specification Reference

FCC 47 CFR Part 15C, 15.247 (a) (1) (i)
ISED Canada RSS-247, 5.1 (c)
ISED Canada RSS-GEN, 6.7

2.5.2 Equipment Under Test and Modification State

RF695R, S/N: --- - Modification State 0

2.5.3 Date of Test

2023-03-09

2.5.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.9.1.

2.5.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	37.0 %

2.5.6 Test Results

Continuously transmitting

Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (kHz)
902.75	78.8	81.7	250
915.25	77.0	79.3	250
927.25	70.7	79.8	250

Table 12

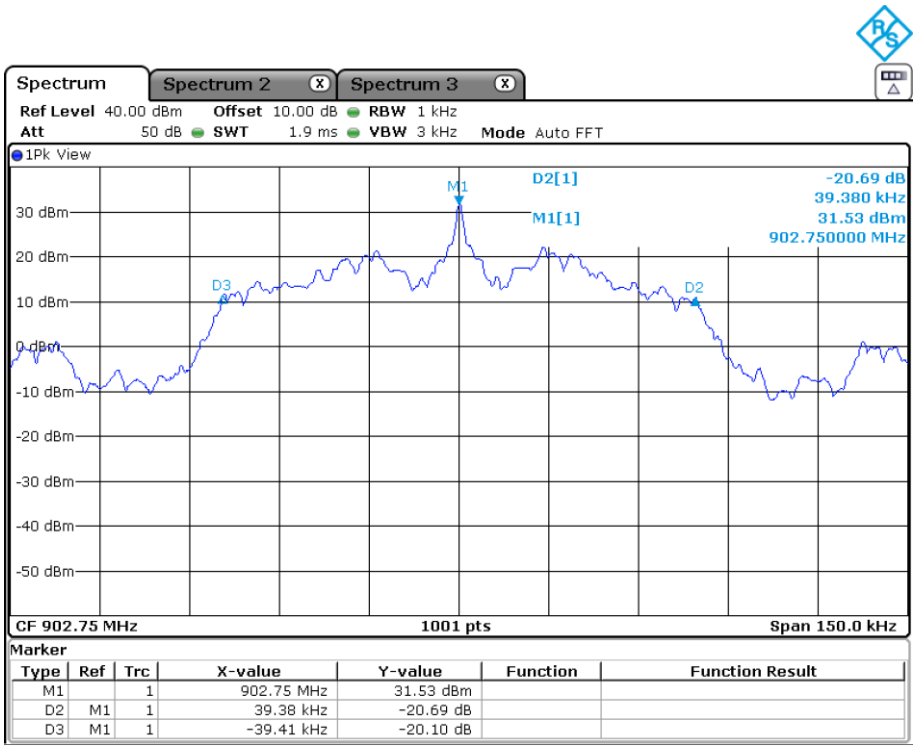
Continuously transmitting in Hopping Mode

Channels	Carrier Frequency Seperation (kHz)	Length (ms)	Shipments occurring within 20s	Dwell Time (ms)	Limit (ms)
50	499.0	191.7	2	383.4	400

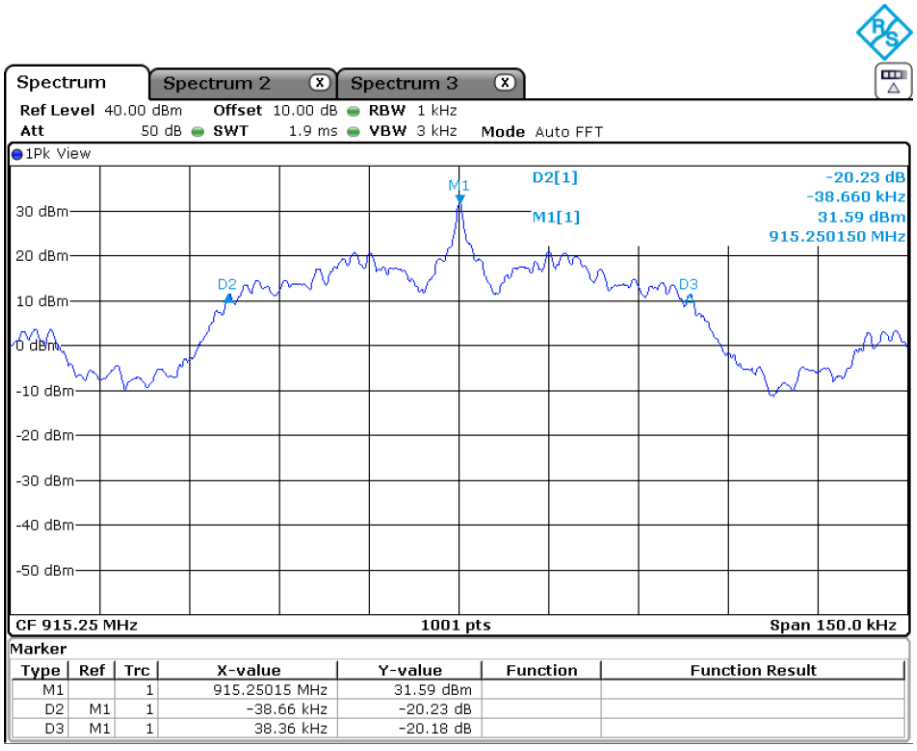
Table 13

Product Service

20dB Bandwidth

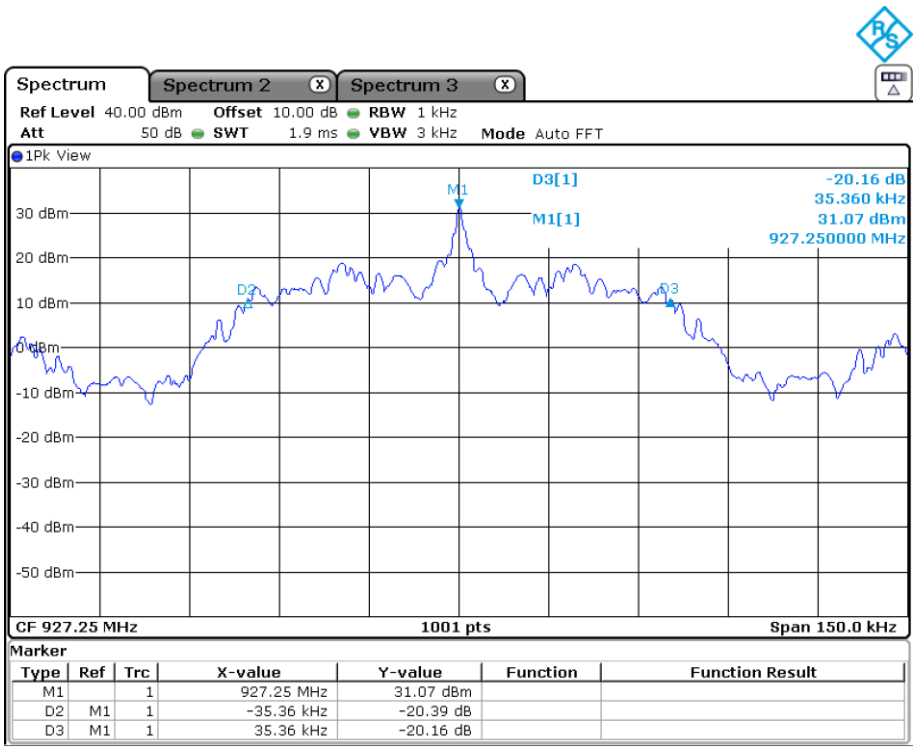


Date: 9.MAR.2023 17:53:21



Date: 9.MAR.2023 17:55:03

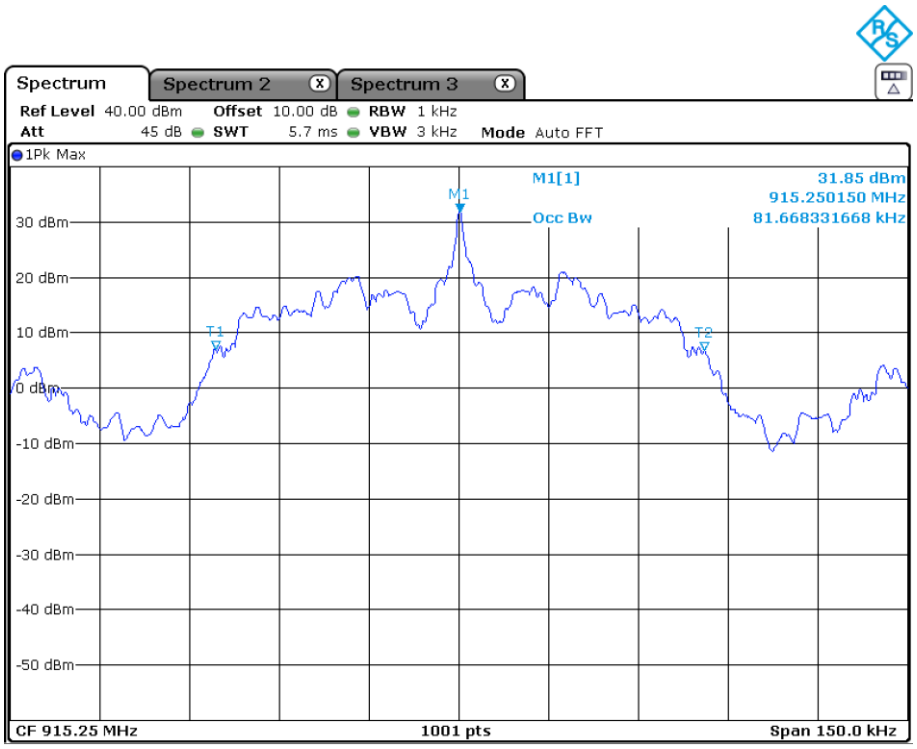
Product Service



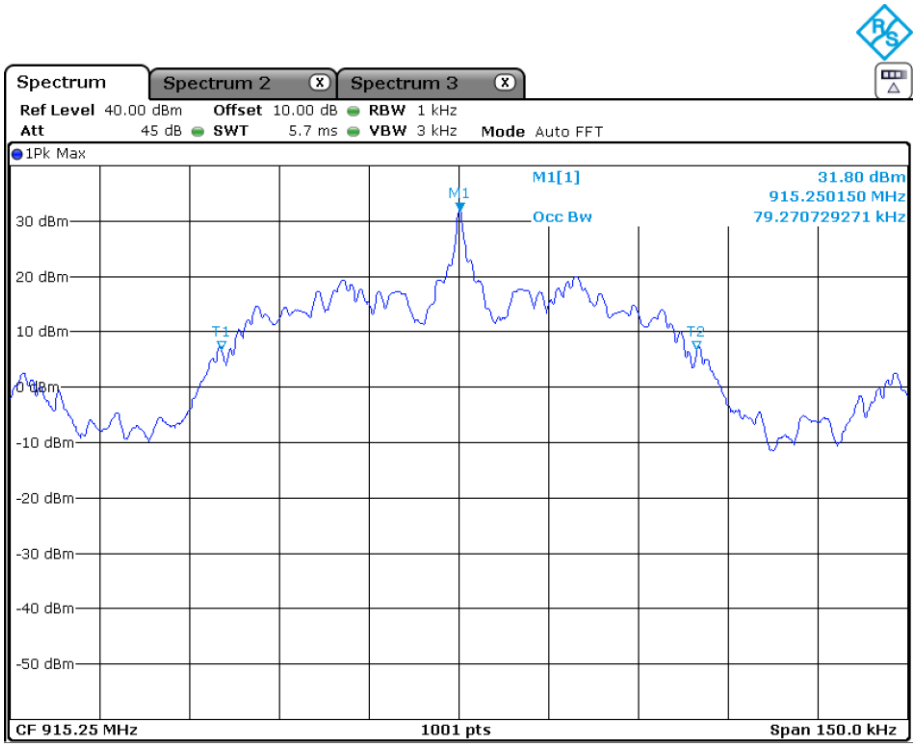
Date: 9.MAR.2023 17:59:04

Product Service

99% Bandwidth

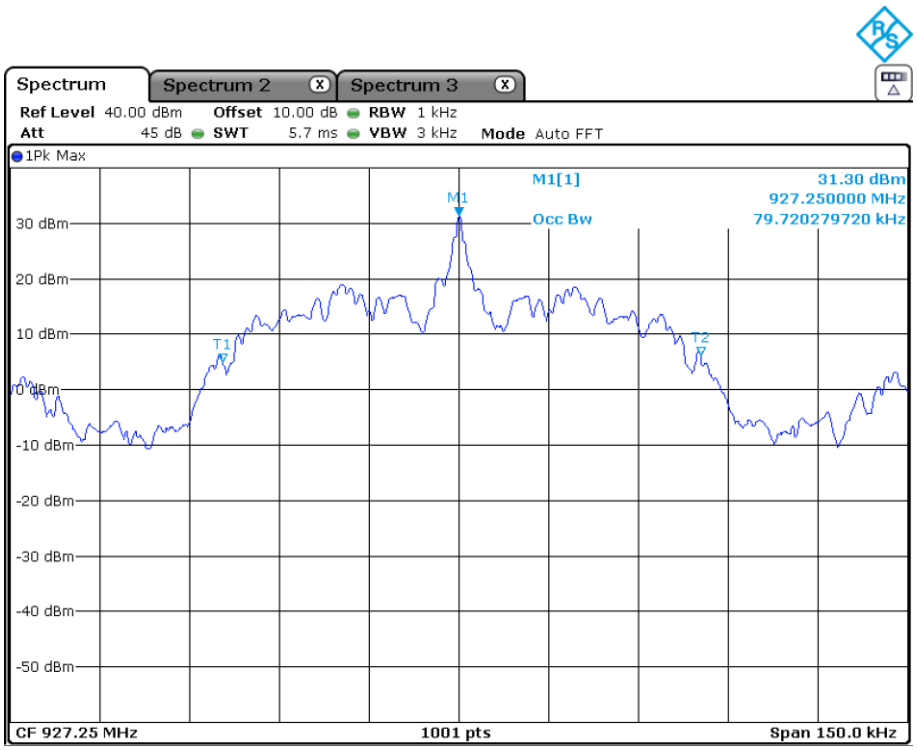


Date: 9.MAR.2023 18:03:02



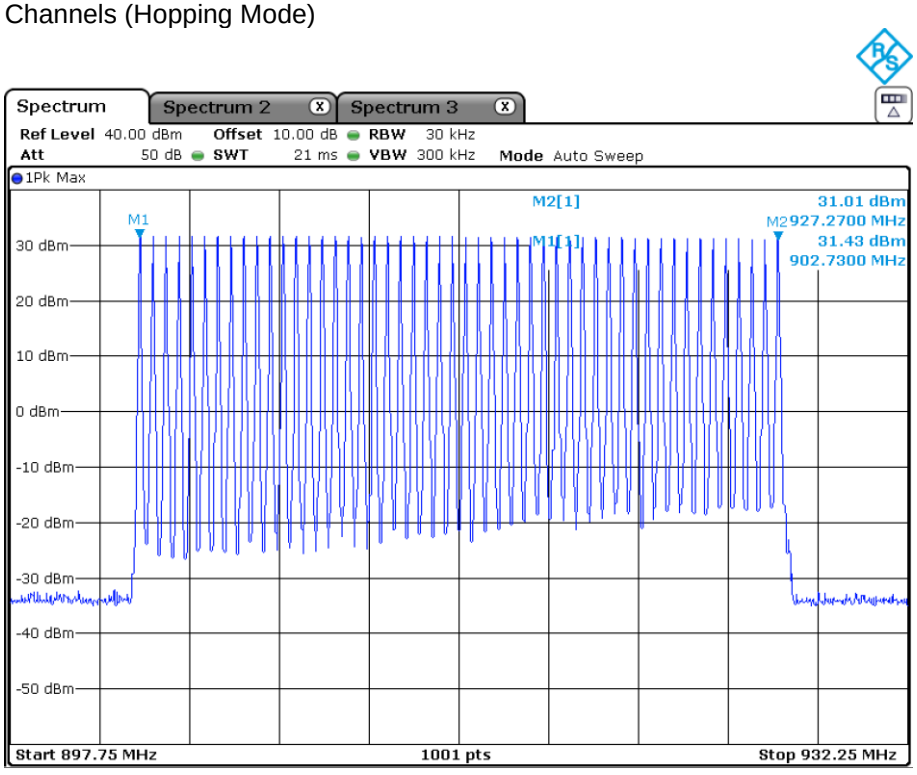
Date: 9.MAR.2023 18:02:30

Product Service



Date: 9.MAR.2023 18:01:30

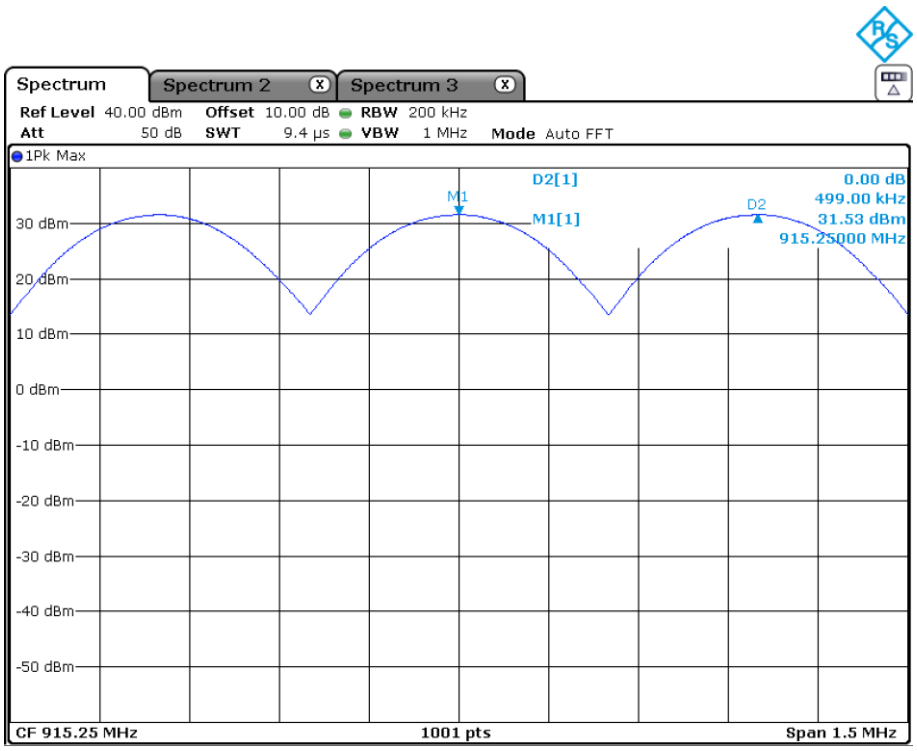
Channels (Hopping Mode)



Date: 9.MAR.2023 18:13:27

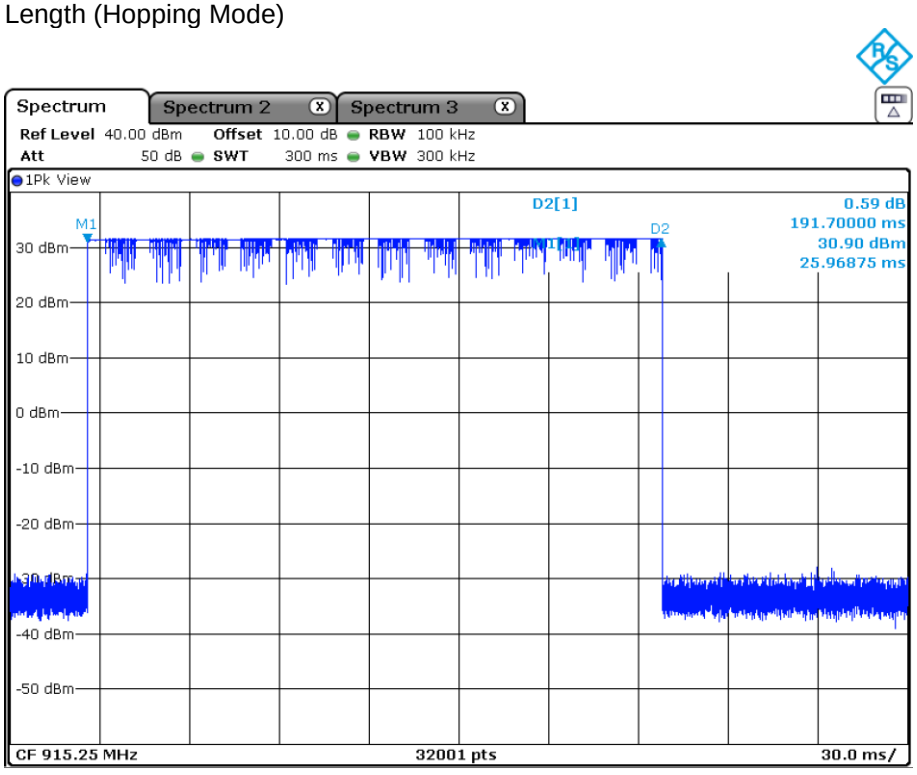
Carrier Frequency separation (Hopping Mode)

Product Service



Date: 9.MAR.2023 18:08:37

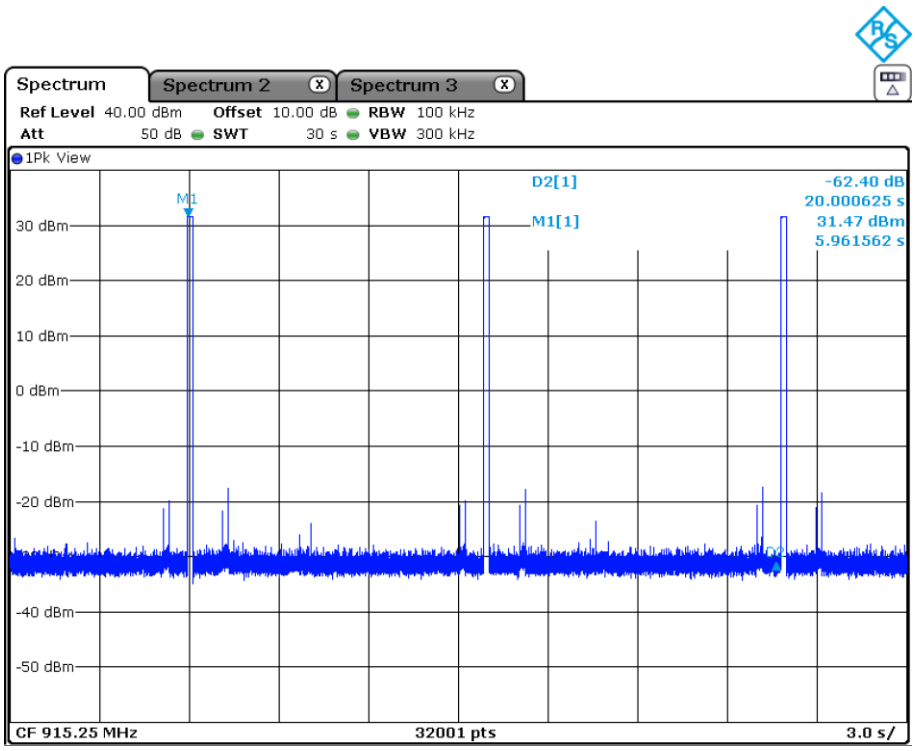
Length (Hopping Mode)



Date: 9.MAR.2023 18:17:49

Period (Hopping Mode)

Product Service



Date: 9.MAR.2023 18:28:43

2.5.7 Test Location and Test Equipment Used

This test was carried out in a non shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	12	2024-02-29

Product Service

2.6 Frequency Tolerance Under Temperature Variations

2.6.1 Specification Reference

FCC 47 CFR Part 15C
ISED Canada RSS-247
ISED Canada RSS-GEN, 6.11

2.6.2 Equipment Under Test and Modification State

RF695R, S/N: --- - Modification State 0

2.6.3 Date of Test

2023-03-07

2.6.4 Environmental Conditions

Ambient Temperature	20,0 °C
Relative Humidity	39,0 %

2.6.5 Test Results

Continuously transmitting

Temperature	Voltage	Frequency (MHz)	Frequency Deviation (%)	Frequency (MHz)	Frequency Deviation (%)
-30.0 °C	24 V DC	902.75	0.0049	927.25	0.0050
-20.0 °C	24 V DC	902.75	0.0050	927.25	0.0053
-10.0 °C	24 V DC	902.75	0.0051	927.25	0.0051
0.0 °C	24 V DC	902.75	0.0056	927.25	0.0052
+10.0 °C	24 V DC	902.75	0.0053	927.25	0.0053
+20.0 °C	24 V DC	902.75	0.0049	927.25	0.0050
+30.0 °C	24 V DC	902.75	0.0051	927.25	0.0051
+40.0 °C	24 V DC	902.75	0.0049	927.25	0.0059
+50.0 °C	24 V DC	902.75	0.0051	927.25	0.0057

Table 14 - Frequency Tolerance Under Temperature Variation

Temperature	Voltage	Frequency (MHz)	Frequency Deviation (%)	Frequency (MHz)	Frequency Deviation (%)
+20.0 °C	19.2 V DC	902.75	0.0050	927.25	0.0052
+20.0 °C	24 V DC	902.75	0.0047	927.25	0.0049
+20.0 °C	28.8 V DC	902.75	0.0056	927.25	0.0058

Table 15 - Frequency Tolerance Under Voltage Variation

Product Service

2.6.6 Test Location and Test Equipment Used

This test was carried out in a non shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Signal and Spectrum Analysator	Rohde & Schwarz	FSV40	20219	12	2024-02-29
Temperature test chamber	Feutron	KPK200-2	19868	18	2024-08-31

Table 16

Product Service

2.7 Conducted Emissions on Mains Terminals

2.7.1 Specification Reference

FCC 47 CFR Part 15 C, Clause 15.207
ISED RSS-Gen, Clause 8.8

2.7.2 Equipment Under Test and Modification State

RF695R, S/N: --- - Modification State 0

2.7.3 Date of Test

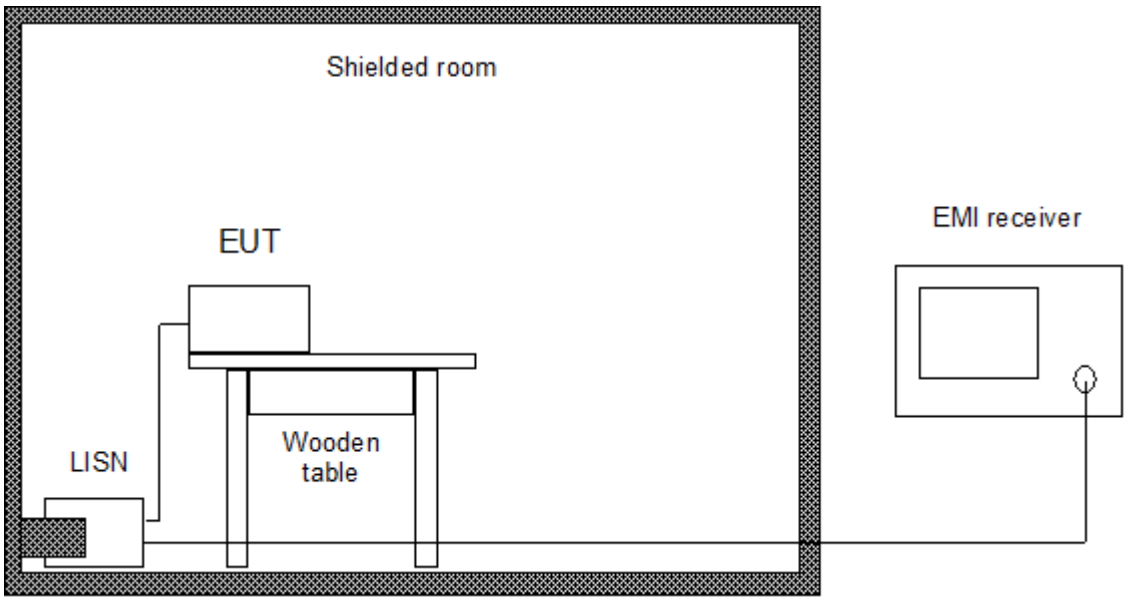
2023-03-10

2.7.4 Environmental Conditions

Ambient Temperature	21 °C
Relative Humidity	39 %

2.7.5 Test Method

The test was performed according to ANSI C63.10, section 6.2.



The EUT was placed on a non-conductive table 0.8 m above a reference ground plane and 0.4 m away from a vertical coupling plane.
All power was connected to the EUT through an Line Impedance Stabilization Network (LISN). Conducted disturbance voltage measurements on mains lines were made at the output of the LISN. The LISN was placed 0.8 m from the boundary of the EUT and bounded to the reference ground plane. To simplify testing with quasi-peak and linear average (cispr-average) detector the following procedure is used:
First the whole spectrum of emission caused by the equipment under test (EUT) is recorded with the detectors set to peak and average using CISPR bandwidth of 10 kHz. After that all emission levels having less margin than 10 dB to or exceeding the average limit are retested with the detectors set to quasi-peak and average. If the average limit is kept with quasi-peak levels measurement with average detector is optional. In cases of emission levels between quasi-peak and average limit an additional measurement with average detector has to be performed.
According to ANSI C63.10, section 6.2.5, testing of intentional radiators with frequencies below 30 MHz shall be performed using a suitable dummy load connected to the antenna output terminals. Otherwise the tests shall be performed with the integral or a representative antenna and, if adjustable, fully extended. Testing with

Product Service

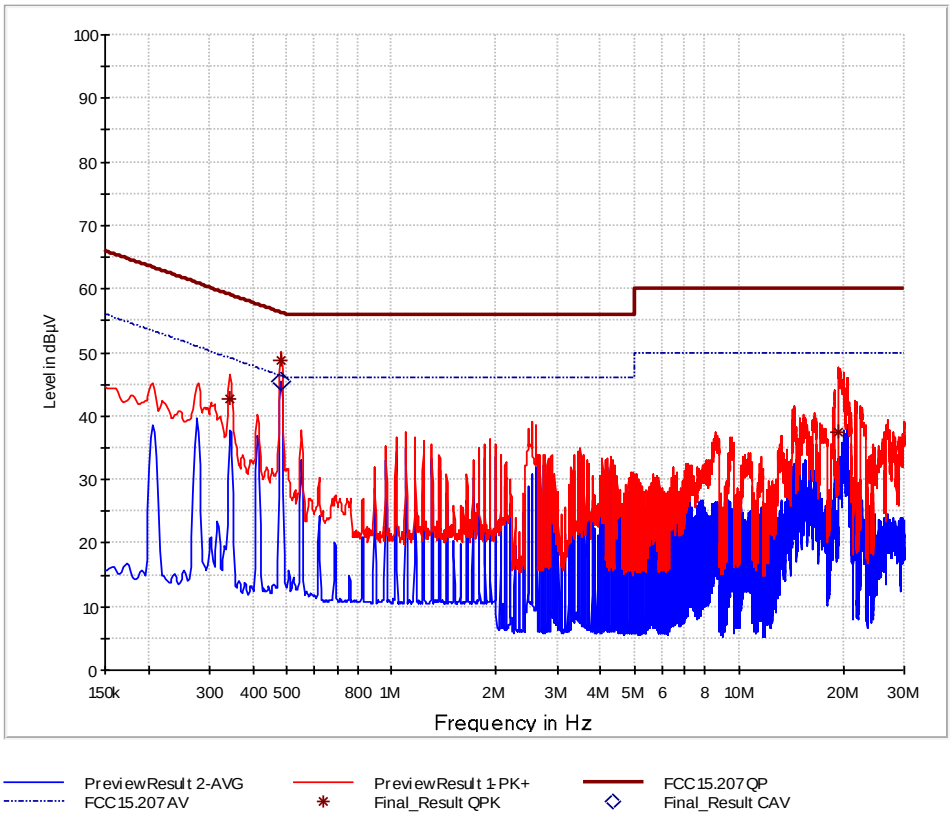
a dummy load may be necessary to distinguish (unintentional) conducted emissions on the supply lines form (intentional) emissions radiated by the antenna and coupling directly to supply lines and/or LISN. The usage of a dummy load has to be stated in the appropriate test record(s) and notes should be added to clarify the test setup.

2.7.6 Test Results

Sample calculation:
Final Value (dBµV) = Reading Value (dBµV) + (Cable attenuation (dB) + LISN Transducer (dB))

Continuously transmitting

Line: L1 and N



Final Results 1:

Frequency MHz	*QuasiPeak dBµV*	*CAverage dBµV*	*Limit dBµV*	*Margin dB*	*Meas. Time ms*	*Bandwidth kHz*	*Line*	*Corr. dB*
0.343500	42.77	---	59.12	16.34	1000.0	9.000	L1	10.0
0.483000	---	45.52	46.29	0.77	1000.0	9.000	N	10.0
0.483000	48.66	---	56.29	7.63	1000.0	9.000	N	10.0
19.477500	37.42	---	60.00	22.58	1000.0	9.000	N	10.3

Product Service

2.7.7 Test Location and Test Equipment Used

This test was carried out in a shielded room- cabin no. 9

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz GmbH & Co. KG	ESU8	19904	12	2024-02-29
V-network	Rohde & Schwarz GmbH & Co. KG	ENV216	39908	12	2023-03-31
EMC measurement software	Rohde & Schwarz GmbH & Co. KG	EMC32 Immunity K9 – V10.60.20	44380	---	---
Shielded room	Albatross Projects GmbH	Cabin no. 9	21083	---	---

Table 17

Product Service

3 Measurement Uncertainty

The measurement uncertainty in the laboratory is less than or equal to the maximum measurement uncertainty according to CISPR16-4-2: 2011 + A1 + A2 + Cor1 (U_{CISPR}). This normative regulation means that the measured value is also the value to be assessed in relation to the limit value.

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

Radio Testing			
Test Name	kp	Expanded Uncertainty	Note
Occupied Bandwidth	2.0	±1.14 %	2
RF-Frequency error	1.96	±1 · 10-7	7
RF-Power, conducted carrier	2	±0.079 dB	2
RF-Power uncertainty for given BER	1.96	+0.94 dB / -1.05	7
RF power, conducted, spurious emissions	1.96	+1.4 dB / -1.6 dB	7
RF power, radiated			
25 MHz – 4 GHz	1.96	+3.6 dB / -5.2 dB	8
1 GHz – 18 GHz	1.96	+3.8 dB / -5.6 dB	8
18 GHz – 26.5 GHz	1.96	+3.4 dB / -4.5 dB	8
40 GHz – 170 GHz	1.96	+4.2 dB / -7.1 dB	8
Spectral Power Density, conducted	2.0	±0.53 dB	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	±2,89 %	2
6 kHz – 25 kHz	2	±0.2 dB	2
Maximum frequency deviation for FM	2	±2,89 %	2
Adjacent channel power 25 MHz – 1 GHz	2	±2.31 %	2
Temperature	2	±0.39 K	4
(Relative) Humidity	2	±2.28 %	2
DC- and low frequency AC voltage			
DC voltage	2	±0.01 %	2
AC voltage up to 1 kHz	2	±1.2 %	2
Time	2	±0.6 %	2

Table 18

Product Service

Radio Interference Emission Testing			
Test Name	kp	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Field strength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

Table 19

Product Service

Immunity Testing			
Test Name	kp	Expanded Uncertainty	Note
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Table 20

Note 1:
The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 2:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 3:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2.05, providing a level of confidence of p = 95.45%
Note 4:
It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.
Note 5:
The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 6:
The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 7:
The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) to is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%
Note 8:
The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%