

RF Test Report

Project Number: 5149429**Offer Number:** SUW-202312005691**Report Number:** 5149429EMC01**Revision Level:** 2**Client:** iKeyless, LLC**Equipment Under Test:** Keyless Entry Remote Control**Model / HVIN:** URSSA-G040**FCC ID:** X32-URSSG040**IC:** 8797A-URSSG040**Applicable Standards:** FCC Part 15 Subpart C, § 15.231 Periodic Operation in the band 40.66-40.77MHz and above 70MHz**ANSI C63.10:** 2013**RSS-210, Issue 10 (Annex A)****RSS-GEN Issue 5****Report Issue Date:** 27 February 2024**Report Revision Date:** 03 July 2024**Test Result:** Compliant

FOR THE SCOPE OF ACCREDITATION UNDER CERTIFICATE NUMBER: 3212.01

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1 Summary of Test Results

Test Description	Test Specification	Test Result
Antenna requirement	47 CFR Part 15, Subpart C 15.203	Compliant
Field strength of fundamental	15.231(b); RSS-210 A.1.2(a) ANSI C63.10:2013, Section 6.5	Compliant
Field strength of spurious radiation	15.231(b); RSS-210 A.1.2(b) ANSI C63.10:2013, Section 6.5	Compliant
Bandwidth	15.231(c); RSS-210 A.1.3 ANSI C63.10:2013, Section 6.9	Compliant
Deactivation time (manual)	15.231(a)(1); RSS-210 A.1.1(a) ANSI C63.10:2013, Section 7.4	Compliant
Polling transmissions	15.231(a)(3); RSS-210 A.1.1(c)	N/A ¹
Transmission time for setup	15.231(a)(5) ANSI C63.10:2013, Section 7.4	N/A ²
Frequency stability	15.231(d) ANSI C63.10:2013, Section 6.8	N/A ³

Note 1: Not applicable since this device does not use polling or supervision transmissions.

Note 2: Not applicable since the transmission duration limits in paragraph (a)(1) are met.

Note 3: Not applicable since this device does not operate within the frequency band 40.66-40.70MHz.

1.1 Modifications Required for Compliance

None

2 General Information

2.1 Client Information

Name: iKeyless, LLC
Address: 12101 Sycamore Station Place
City, State, Zip, Country: Louisville, KY 40299

2.2 Test Laboratory

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

Accrediting Body: A2LA
Type of lab: Testing Laboratory
Certificate Number: 3212.01
ISED CAB Identifier: US0186
FCC Designation Number: US1126

2.3 General Information of EUT

Type of Product: Keyless Entry Remote Control
Product Marketing Name (PMN): URSSA-G040
Model Number (HVIN): URSSA-G040
Firmware Version ID (FVIN): URSSA-F040
Sample ID: 1 through 4 (SUW_SP_20240200531 through 534)
FCC ID: X32-URSSG040
IC: 8797A-URSSG040

Frequency Range: 313.55 – 434.18 MHz (See table 2)
Modulation: ASK / FSK (See table 2)
Antenna: PCB trace loop (315MHz: -13.4 dBi, 434MHz: -9.5 dBi)

Rated Voltage: 3Vdc CR2032 coin cell battery
Test Voltage: 3Vdc CR2032 coin cell battery

Sample Received Date: 09 February 2024
Dates of testing: 12 February to 3 July 2024

2.4 Operating Modes and Conditions

The EUT was powered by one standard CR2032 coin cell battery during testing. Four samples were provided to SGS: Each key fob activated 4 test modes and had 1 single transmission mode. The test modes were configured by the client such that a button press would start a continuous transmit signal using the same modulation and power as a normal transmit signal but with a higher duty cycle than normal to make most testing easier. Pressing the panic button would shut off the test mode. Pressing a different button activated a new mode. The lock button activated the single transmission mode which utilized a normal transmit signal and was used to test the deactivation time as well as the normal operational duty cycle.

(Table 2)

Transmission Setups Configuration:

15 total combinations of Carrier Frequency and modulations.

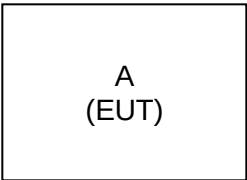
		Carrier	Modulation	Baud Rate
Sample 1	Setup 1	315.00MHz	FSK +/-25kHz	2kbit/s
	Setup 2	433.92MHz	FSK +/-35kHz	4kbit/s
	Setup 3	315.00MHz	ASK	2kbit/s
	Setup 4	315.00MHz	FSK +/-37kHz	8kbit/s
Sample 2	Setup 1	433.92MHz	ASK	4.2kbit/s
	Setup 2	433.92MHz	FSK +/-30kHz	4.2kbit/s
	Setup 3	315.00MHz	ASK	4.2kbit/s
	Setup 4	315.00MHz	FSK +/-30kHz	4.2kbit/s
Sample 3	Setup 1	433.92MHz	AKS	2.1kbit/s
	Setup 2	433.92MHz	FSK +/-14kHz	9.6kbit/s
	Setup 3	433.92MHz	FSK +/-30kHz	9.6kbit/s
	nothing	nothing	nothing	nothing
Sample 4	Setup 1	313.55MHz	FSK +/-16kHz	7.8kbit/s
	Setup 2	314.15MHz	FSK +/-16kHz	7.8kbit/s
	Setup 3	433.66MHz	FSK +/-16kHz	7.8kbit/s
	Setup 4	434.18MHz	FSK +/-16kHz	7.8kbit/s

Operating Instructions:

Lock: transmits single press mode packets

Unlock: Sends packets in continuous mode

2.5 EUT Connection Block Diagram – Radiated Measurements



Inside Chamber

Outside Chamber

2.6 System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
A	iKeyless LLC	Keyless Entry Remote Control	300-0271	(Samples 1 through 4) SUW_SP_20240200531 through 534

3 Antenna Requirement

3.1 Result

Test Description	Test Specification	Test Result
Antenna requirement	FCC 15.203	Compliant

3.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

3.3 Conclusion

The antenna in the device is a loop PCB trace antenna. It is permanently attached and thus meets the antenna requirement.

4 Field Strength of Fundamental

4.1 Test Result

Test Description	Test Specification		Test Result
Field strength of fundamental	15.231(b)	RSS-210 A.1.2	Compliant
	ANSI C63.10:2013, Section 6.5		

4.2 Test Method

The test data was measured using a Peak detector. Average measurements were made by correcting the peak value with the duty cycle correction factor. The receiver's resolution bandwidth was set to 120 kHz for measurements taken in the 30MHz to 1GHz frequency range and 1MHz for measurements for 1GHz and higher. Measurements were made with the antenna positioned at a 3m distance from the EUT in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency. The radiated measurements were recorded and compared to the limits indicated in the table below.

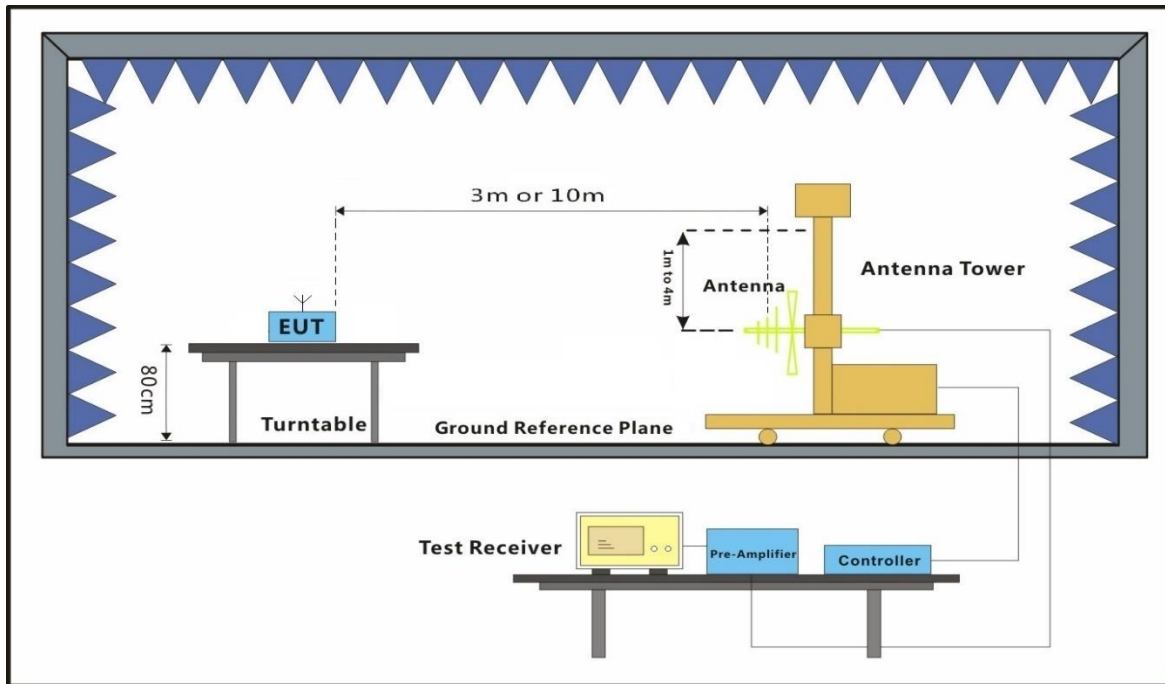
The EUT was oriented in each of its three orthogonal axes and data for each was reported.

Limits for average value of emissions measured at 3m distance

Fundamental frequency (MHz)	FCC	RSS-210
	Field strength of fundamental (microvolts/meter)	Field strength of fundamental (microvolts/meter)
40.66-40.70	2,250	Not allowed
70-130	1,250	
130-174	1,250 to 3,750 ¹	
174-260	3,750	
260-470	3,750 to 12,500 ¹	
Above 470	12,500	

1) Linear interpolations

4.3 Test Setup Diagram



4.4 Test Site

10m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 22.07 °C

Relative Humidity: 26.3 %

Atmospheric Pressure: 98.58 kPa

4.5 Test Equipment

Test End Date: 12-Feb-2024		Tester: SGM			
Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	3-Jan-2024	3-Jan-2025
RF CABLE (TS8997)	141	HUBER & SUHNER	B095585	7-Jul-2023	7-Jul-2024
NEAR FIELD PROBES	N/A	COM-POWER CORPORATION	16016	CNR	CNR
ANTENNA, BILOG	JB6	SUNOL	B079690	19-Apr-2022	19-Apr-2024
N to N RF Cable	EM-B810NM-276	ECHELON	24000	15-Jan-2024	15-Jan-2025
RF CABLE	SF106	HUBER & SUHNER	B079713	22-Aug-2023	22-Aug-2024
RF CABLE, NM TO NM.	90-195-157	ELEDYNE STORM MICROWAVE	21019	14-Mar-2023	14-Mar-2024
RF CABLE RIGHT ANGLE NM TO NM 0.01-19CHZ	90-076-020	ELEDYNE STORM MICROWAVE	20132	13-Mar-2023	13-Mar-2024
LOW NOISE AMPLIFIER	ZKL-2+	MINI-CIRCUITS	B079800	14-Sep-2023	14-Sep-2024
EMI TEST RECEIVER	ESW44	ROHDE & SCHWARZ	22027	3-Oct-2023	3-Oct-2024

Software: "RSE 30-1000 MHz T7 220318" TILE7 profile dated 18 March 2022

Retesting on 07/03/24

3m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 24.85 °C

Relative Humidity: 51.9 %

Atmospheric Pressure: 98.77 kPa

4.6 Test Equipment

Test End
Date: 3-Jul-2024

Tester: SGM

Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
ANTENNA, BILOG	JB6	SUNOL	B079689	16-May-2024	16-May-2026
N to N RF Cable	EM-B810NM-276	ECHELON	23007	31-Mar-2024	31-Mar-2025
N-FEMALE TO N-MALE RF CABLE	EM-B810NMNF-118	ECHELON	23010	20-May-2024	20-May-2025
RF CABLE NM TO NM, 0.01-18GHZ	90-195-118	TELEDYNE STORM MICROWAVE	20125	8-Aug-2023	8-Aug-2024
RF CABLE	SF106	HUBER & SUHNER	B085895	20-Mar-2024	20-Mar-2025
LOW NOISE AMPLIFIER	ZKL-2+	MINI-CIRCUITS	B079817	7-Aug-2023	7-Aug-2024
EMI TEST RECEIVER	ESW44	ROHDE & SCHWARZ	22032	15-Nov-2023	15-Nov-2024

Software: "RSE 30-1000 MHz T7 220318" TILE7 profile dated 18 March 2022

4.7 Duty Cycle Correction Factor (DCCF)

Sample 1 Setup 1 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	24.63	100.0	24.63	-12.16

Sample 1 Setup 2 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	29.71	100.0	29.71	-10.54

Sample 1 Setup 3 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	46.7	100.0	46.7	-6.61

Sample 1 Setup 4 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	11.97	100.0	11.97	-18.44

Sample 2 Setup 1 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	34.3	95.3	35.99	-8.88

Sample 2 Setup 2 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	34.3	95.3	35.99	-8.88

Sample 2 Setup 3 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	34.3	95.3	35.99	-8.88

Sample 2 Setup 4 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	34.0	95.3	35.68	-8.95

Sample 3 Setup 1 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	47.19	88.46	53.35	-5.46

Sample 3 Setup 2 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	12.78	28.75	44.45	-7.04

Sample 3 Setup 3 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	2.08	18.03	11.54	-18.76

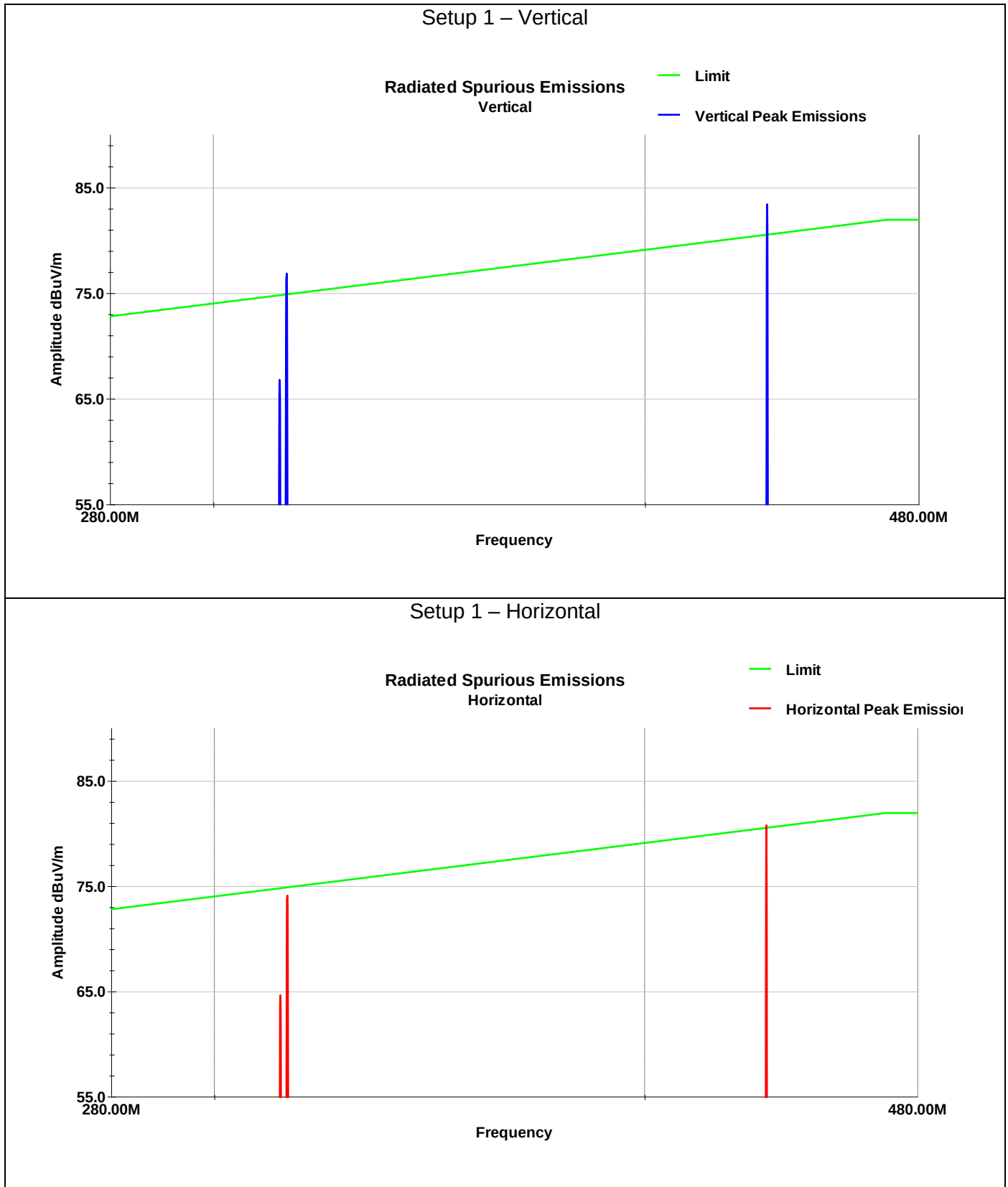
Sample 4 Setup 1 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	24.97	100.00	24.97	-12.05

Sample 4 Setup 2 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	24.97	100.00	24.97	-12.05

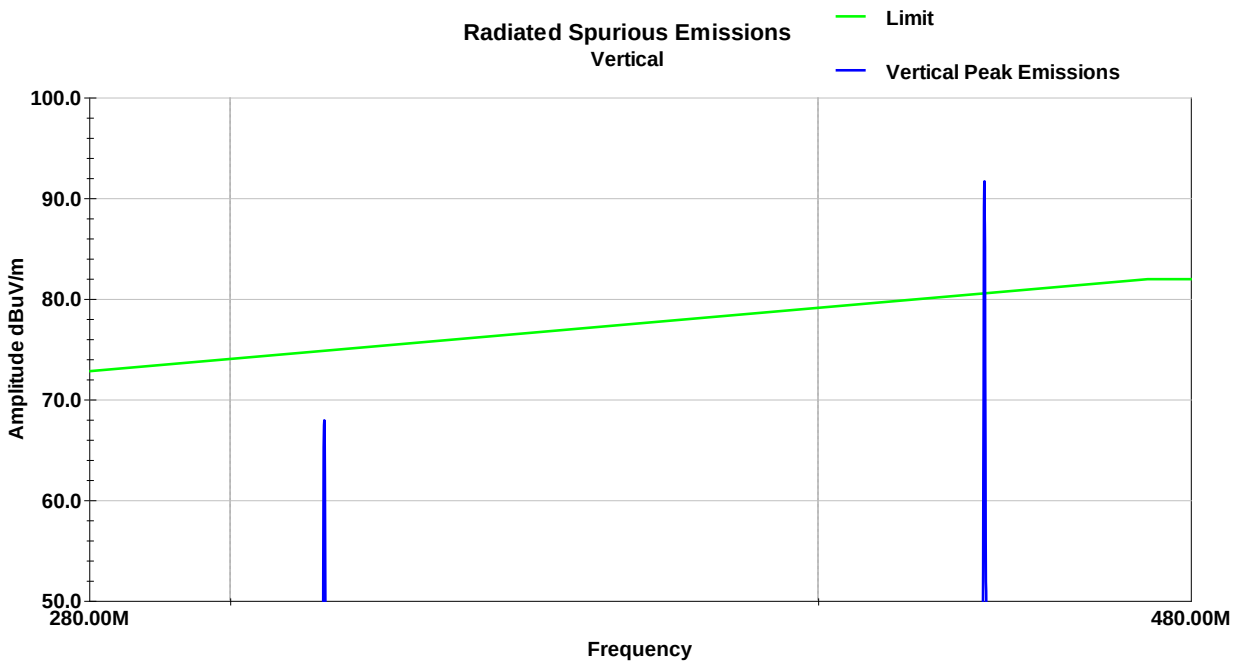
Sample 4 Setup 3 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	24.97	100.00	24.97	-12.05

Sample 4 Setup 4 Duty Cycle				
Configuration	TX ON (ms)	Period, T (ms)	Duty Cycle (%)	DCCF (dB)
Normal	24.97	100.00	24.97	-12.05

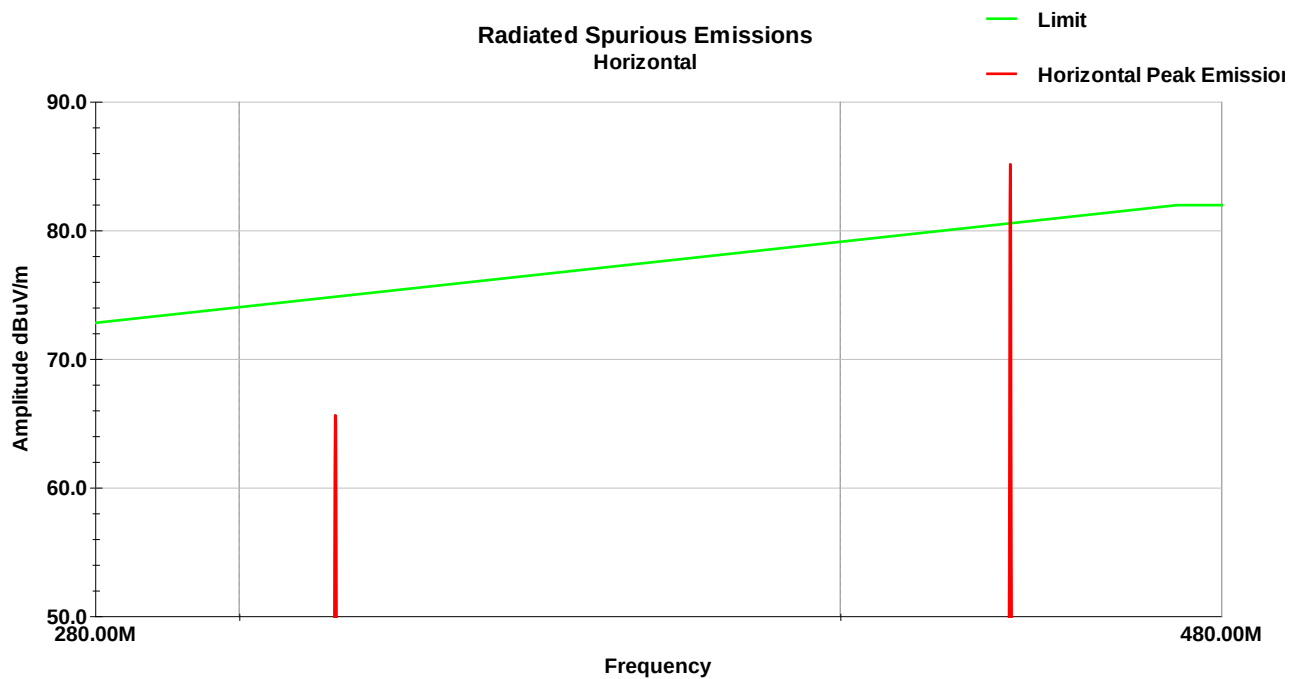
4.8 Test Data – Plots



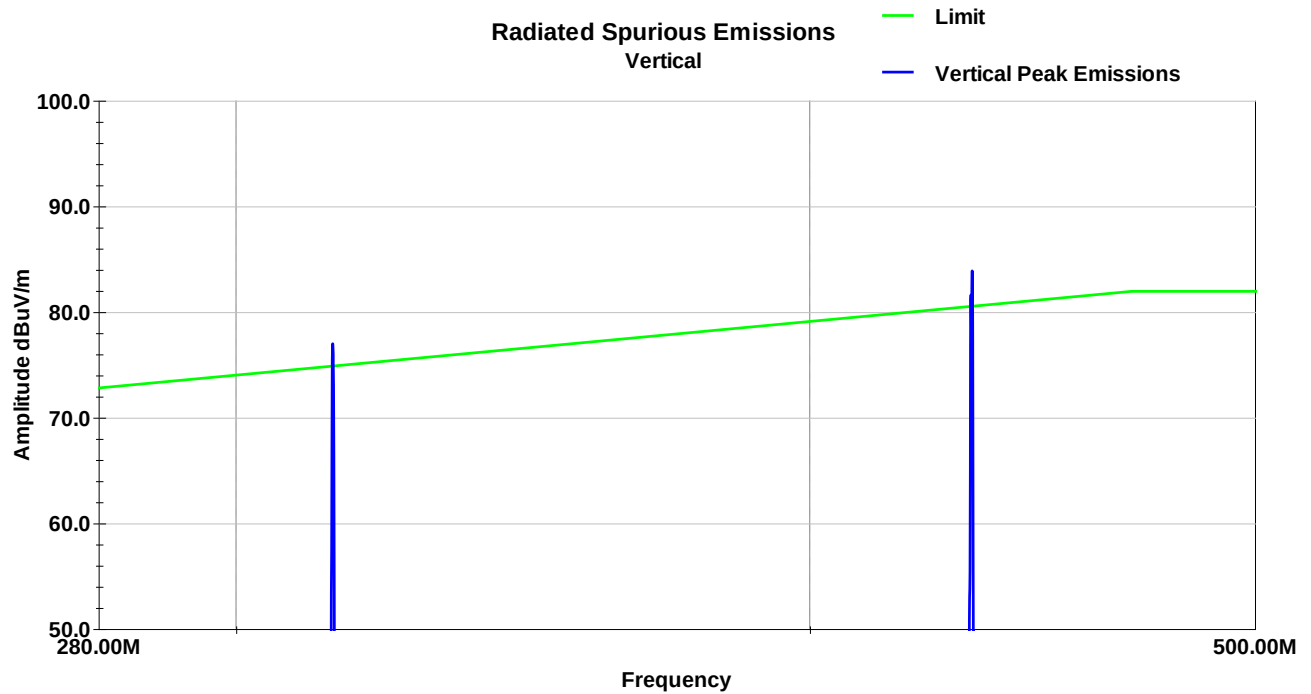
Setup 2 – Vertical



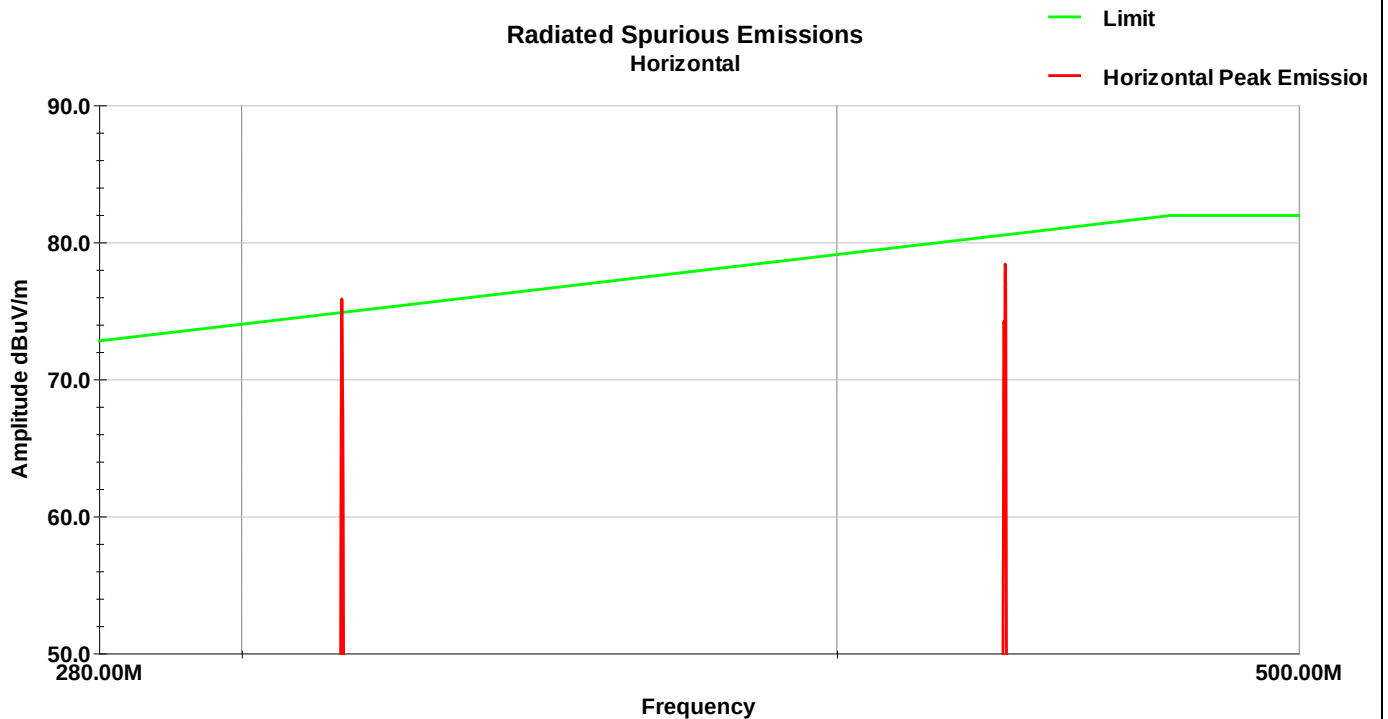
Setup 2 – Horizontal



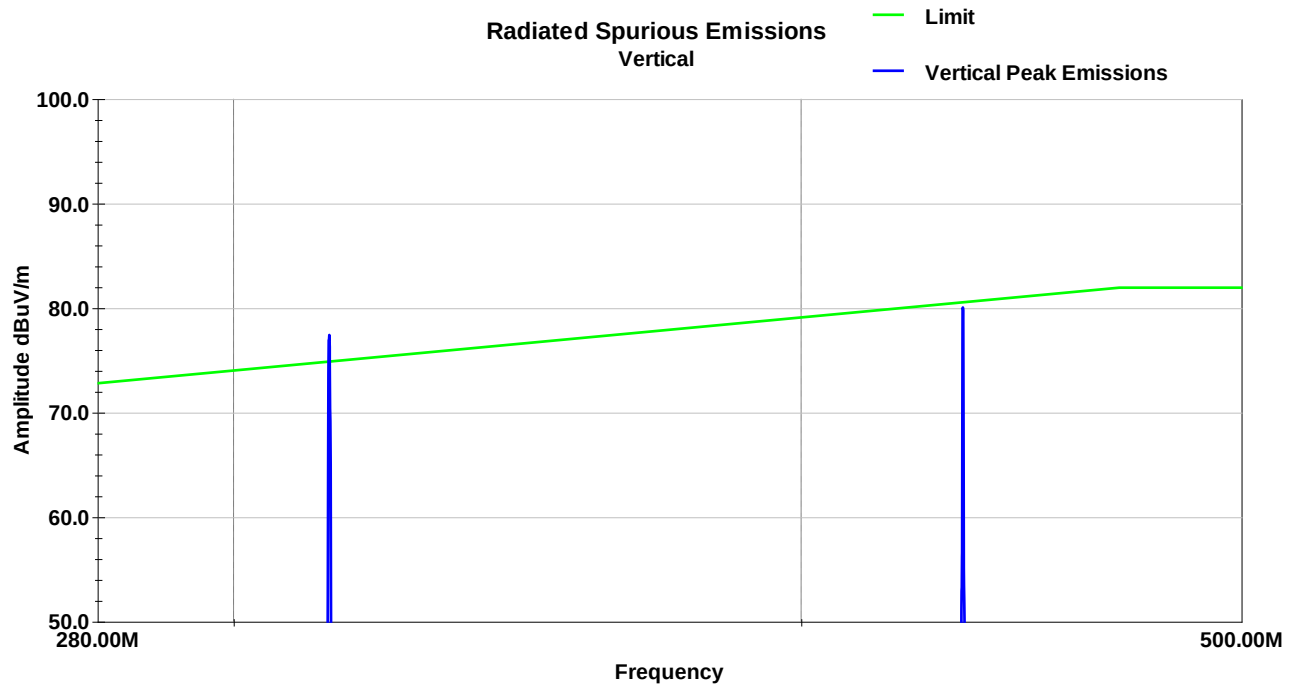
Setup 3 – Vertical



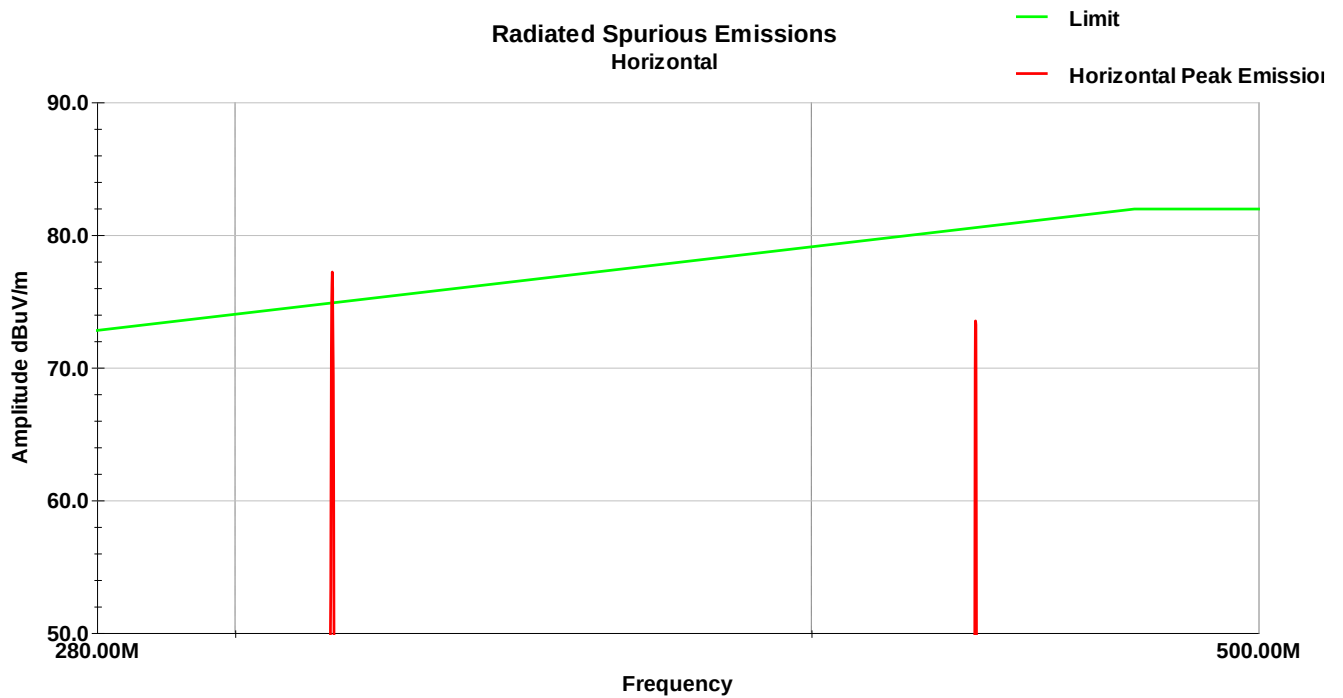
Setup 3 – Horizontal



Setup 4 – Vertical



Setup 4 – Horizontal



4.9 Test Data – Tabular

Setup Sample#	EUT Orientation	Antenna Polarity	Frequency (MHz)	Raw Pk (dBuV)	AF (dB/m)	Loss (dB)	DCCF (dB)	Amp (dB)	Avg Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1.1	Z	V	315.00	89.9	18.5	2.0	-12.16	31.6	66.6400	74.2	-7.560
1.2	Z	V	433.92	96	21.0	2.2	-8.88	31.5	78.8200	80.1	-1.280
1.3	Z	V	433.92	91.9	21.0	2.2	-5.46	31.5	78.1400	80.1	-1.960
1.4	Z	V	313.55	89.9	18.5	2.0	-12.05	31.6	66.7500	74.2	-7.450
1.1	Z	H	315.00	86.3	18.5	2.0	-12.16	31.6	63.0400	74.2	-11.160
1.2	Z	H	433.92	89.8	21.0	2.2	-8.88	31.5	72.6200	80.1	-7.480
1.3	Z	H	433.92	89.8	21.0	2.2	-5.46	31.5	76.0400	80.1	-4.060
1.4	Z	H	313.55	86.3	18.5	2.0	-12.05	31.6	63.1500	74.2	-11.050
2.1	Z	V	433.92	98.7	21	2.2	-10.54	31.5	79.8600	80.1	-0.240
2.2	Z	V	433.92	88.3	21	2.2	-8.88	31.5	71.1200	80.1	-8.980
2.3	Z	V	433.92	88.5	21	2.2	-7.04	31.5	73.1600	80.1	-6.940
2.4	Z	V	314.15	81.6	18.5	2	-12.05	31.6	58.4500	74.2	-15.750
2.1	Z	H	433.92	92.1	21	2.2	-10.54	31.5	73.2600	80.1	-6.840
2.2	Z	H	433.92	92.1	21	2.2	-8.88	31.5	74.9200	80.1	-5.180
2.3	Z	H	433.92	92.1	21	2.2	-7.04	31.5	76.7600	80.1	-3.340
2.4	Z	H	314.15	77.4	18.5	2	-12.05	31.6	54.2500	74.2	-19.950
3.1	Z	V	315.00	90.3	18.5	2.0	-6.61	31.6	72.5900	74.2	-1.610
3.2	Z	V	315.00	90.3	18.5	2.0	-8.88	31.6	70.3200	74.2	-3.880
3.3	Z	V	433.92	93.0	21.0	2.2	-18.76	31.5	65.9400	80.1	-14.160
3.4	Z	V	433.66	93.0	21.0	2.2	-12.05	31.5	72.6500	80.1	-7.450
3.1	Z	H	315.00	81	18.5	2.0	-6.61	31.6	63.2900	74.2	-10.910
3.2	Z	H	315.00	81	18.5	2.0	-8.88	31.6	61.0200	74.2	-13.180
3.3	Z	H	433.92	86.5	21.0	2.2	-18.76	31.5	59.4400	80.1	-20.660
3.4	z	H	433.66	86.5	21.0	2.2	-12.05	31.5	66.1500	80.1	-13.950
4.1	Z	V	315.00	92	18.5	2	-18.44	31.6	62.4600	74.2	-11.740
4.2	Z	V	315.00	92	18.5	2	-8.95	31.6	71.9500	74.2	-2.250
4.3	Z	V	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.4	Z	V	434.18	88.2	21	2.2	-12.05	31.5	67.8500	80.2	-12.350
4.1	Z	H	315.00	84.8	18.5	2	-18.44	31.6	55.2600	74.2	-18.940
4.2	Z	H	315.00	84.8	18.5	2	-8.95	31.6	64.7500	74.2	-9.450
4.3	Z	H	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.4	Z	H	434.18	81.2	21	2.2	-12.05	31.5	60.8500	80.2	-19.350

DCCF = Duty Cycle Correction Factor

Avg Value = Raw Pk + AF + Loss + DCCF - Amp

Margin = Ave Value - Limit

5 Field Strength of Spurious Radiation

5.1 Test Result

Test Description	Test Specification		Test Result
Field strength of spurious emissions	15.231(b)	RSS-210, A.1.2	Compliant
	ANSI C63.10:2013, Section 6.5		

5.2 Test Method

Exploratory scans were performed using the max hold function and incorporating a Peak detector and using TILE! software. The final test data was measured using a Quasi-Peak detector below 1GHz and a Peak detector above 1GHz. For harmonics of the fundamental, Average measurements were made by correcting the peak value with the duty cycle correction factor. For emissions other than harmonics of the fundamental, the Average measurements were made using the Average detector. The receiver's resolution bandwidth was set to 120 kHz for measurements taken in the 30MHz to 1GHz frequency range and 1MHz for measurements for 1GHz and higher. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency. The radiated measurements were recorded and compared to the limits indicated in the table below.

The EUT was oriented in each of its three orthogonal axes and data for each was reported.

Limits for average value of emissions measured at 3m distance

Fundamental frequency (MHz)	FCC	RSS-210
	Field strength of spurious emission (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	225	Not allowed
70-130	125	
130-174	125 to 375 ¹	
174-260	375	
260-470	375 to 1250 ¹	
Above 470	1250	

1) Linear interpolations

Spurious emissions shall meet the average limits shown in the table above or to the general limits in §15.209, whichever limit permits a higher field strength.

5.3 Test Site

10m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 22.85 °C

Relative Humidity: 45.4 %

Atmospheric Pressure: 97.97 kPa

5.4 Test Equipment

30 – 1000 MHz

Test End Date: 12-Feb-2024		Tester: SGM			
Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
ANTENNA, BILOG	JB6	SUNOL	B079690	19-Apr-2022	19-Apr-2024
N to N RF Cable	EM-B810NM-276	ECHELON	24000	15-Jan-2024	15-Jan-2025
RF CABLE	SF106	HUBER & SUHNER	B079713	22-Aug-2023	22-Aug-2024
RF CABLE, NM TO NM.	90-195-157	TELEDYNE STORM MICROWAVE	21019	14-Mar-2023	14-Mar-2024
RF CABLE RIGHT ANGLE	90-076-020	TELEDYNE STORM MICROWAVE	20132	13-Mar-2023	13-Mar-2024
LOW NOISE AMPLIFIER	ZKL-2+	MINI-CIRCUITS	B079800	14-Sep-2023	14-Sep-2024
EMI TEST RECEIVER	ESW44	ROHDE & SCHWARZ	22027	3-Oct-2023	3-Oct-2024

1-6 GHz

Test End Date: 12-Feb-2024		Tester: SGM			
Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	15-Aug-2022	15-Aug-2024
N to N RF Cable	EM-B810NM-276	ECHELON	24000	15-Jan-2024	15-Jan-2025
RF CABLE RIGHT ANGLE NM TO NM, 0.01-18GHZ	90-076-020	TELEDYNE STORM MICROWAVE	20132	13-Mar-2023	13-Mar-2024
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	10-Oct-2023	10-Oct-2024
EMI TEST RECEIVER	ESW44	ROHDE & SCHWARZ	22027	3-Oct-2023	3-Oct-2024

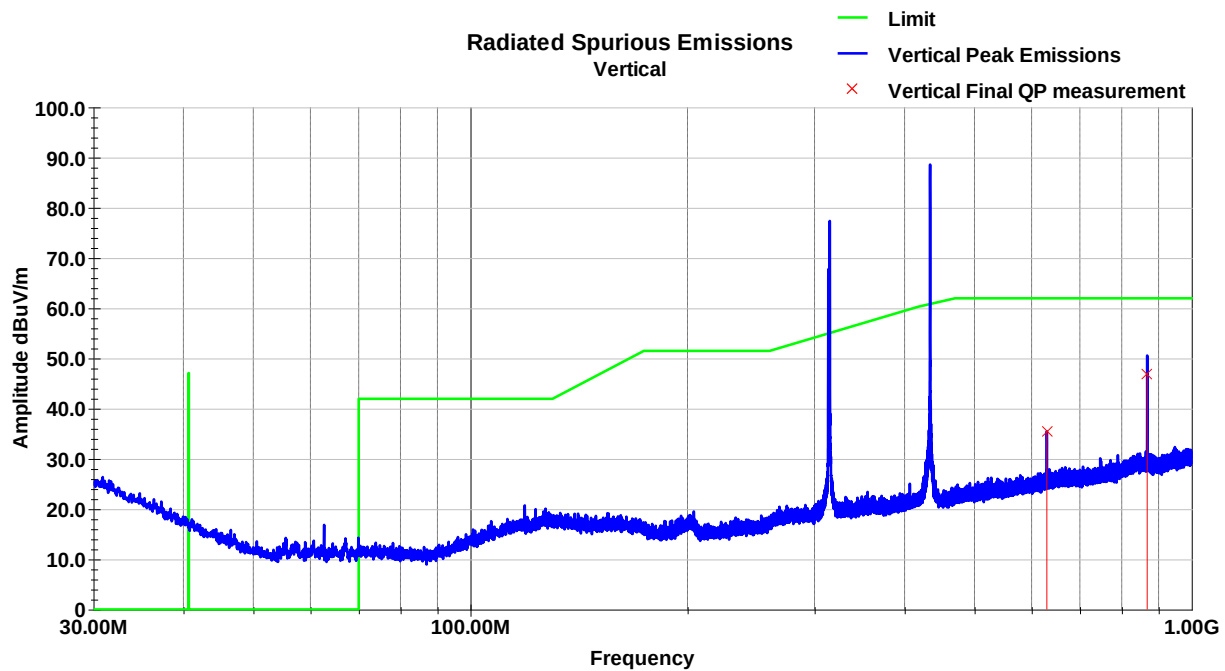
Software: "RSE 30-1000 MHz T7 220318" TILE7 profile dated 18 March 2022

5.5 Test Data – Below 1 GHz

5.5.1 Z-Axis

Only intentional radiator exceeds spurious emission limit. No set limits between 30MHz to 40.66 MHz and 40.77 to 70 MHz.

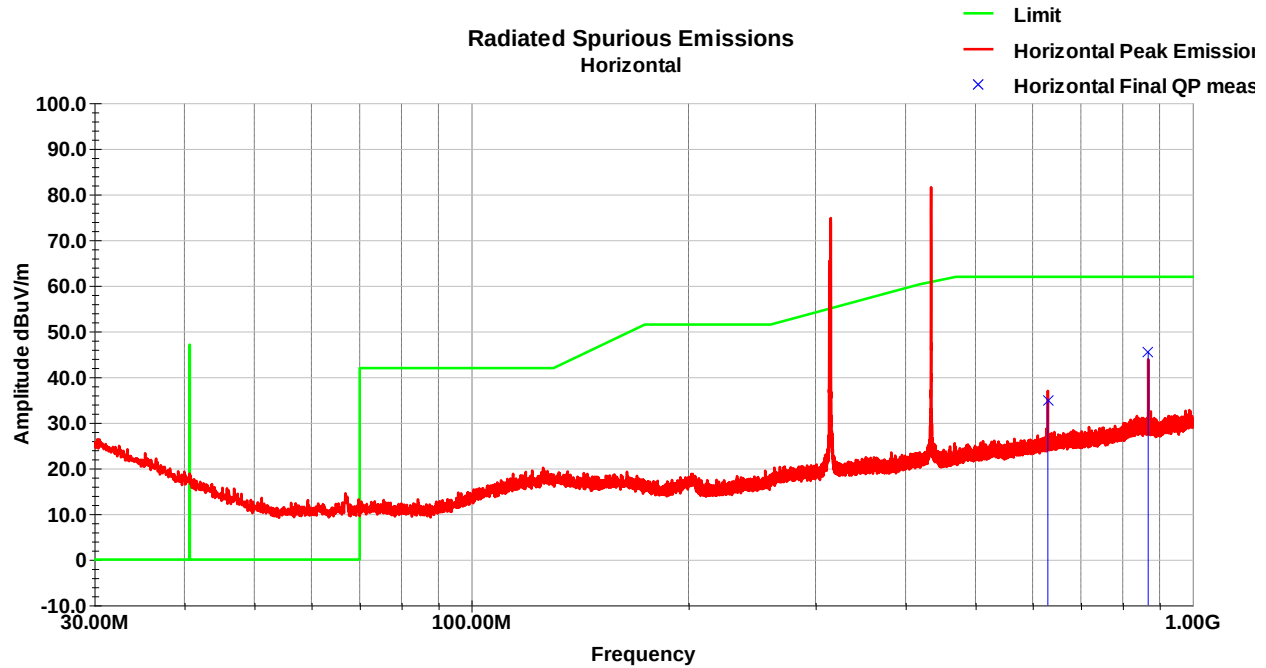
Vertical – Setup 1



Vertical – Setup 1 - Tabular Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
630.07	40.1	V	94.0	175.0	24.0	2.6	31.3	35.6	61.9	-26.4
867.82	48.2	V	276.0	114.0	26.8	2.8	31.2	46.7	61.9	-15.2
QP Value = Raw QP + AF + Loss - Amp										
Margin = QP Value - Limit										

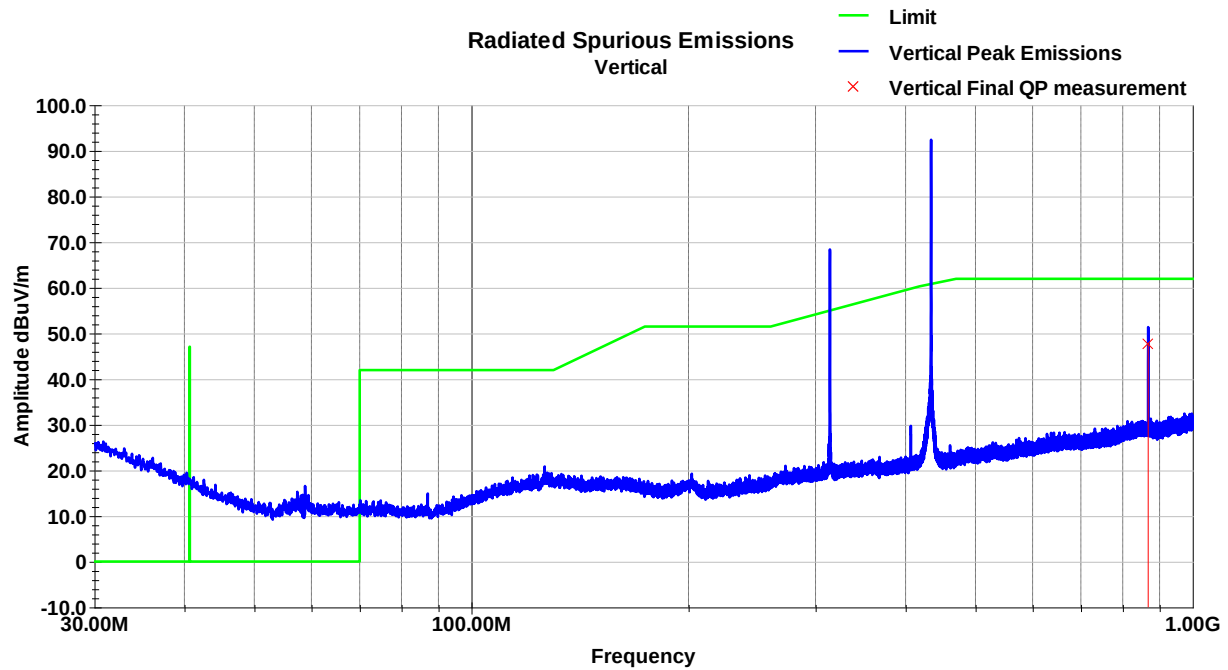
Horizontal – Setup 1



Horizontal – Setup 1 – Tabular Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
630.05	39.5	H	187.0	100.0	24.0	2.6	31.3	34.9	61.9	-27.0
867.85	46.9	H	26.0	218.0	26.8	2.8	31.2	45.4	61.9	-16.6
QP Value = Raw QP + AF + Loss - Amp										
Margin = QP Value - Limit										

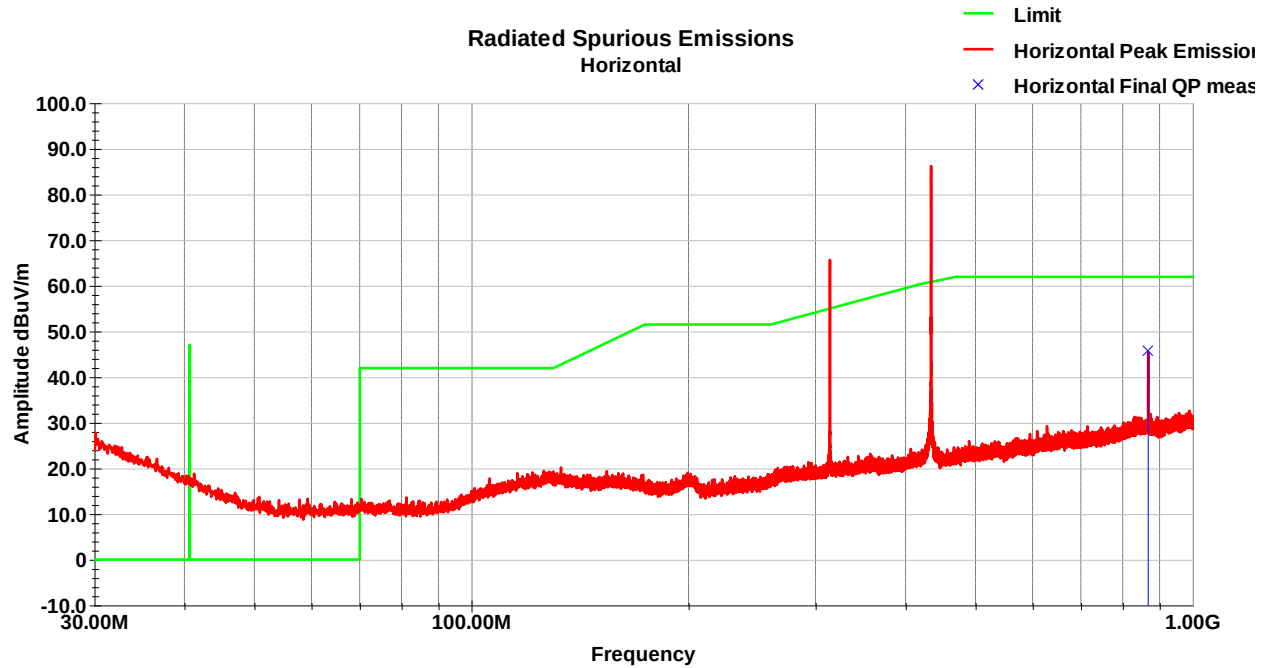
Vertical - Setup 2 - Plot



Vertical – Setup 2 – Tabular Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
867.82	49.3	V	111.0	114.0	26.8	2.8	31.2	47.8	61.9	-14.1
QP Value = Raw QP + AF + Loss - Amp										
Margin = QP Value - Limit										

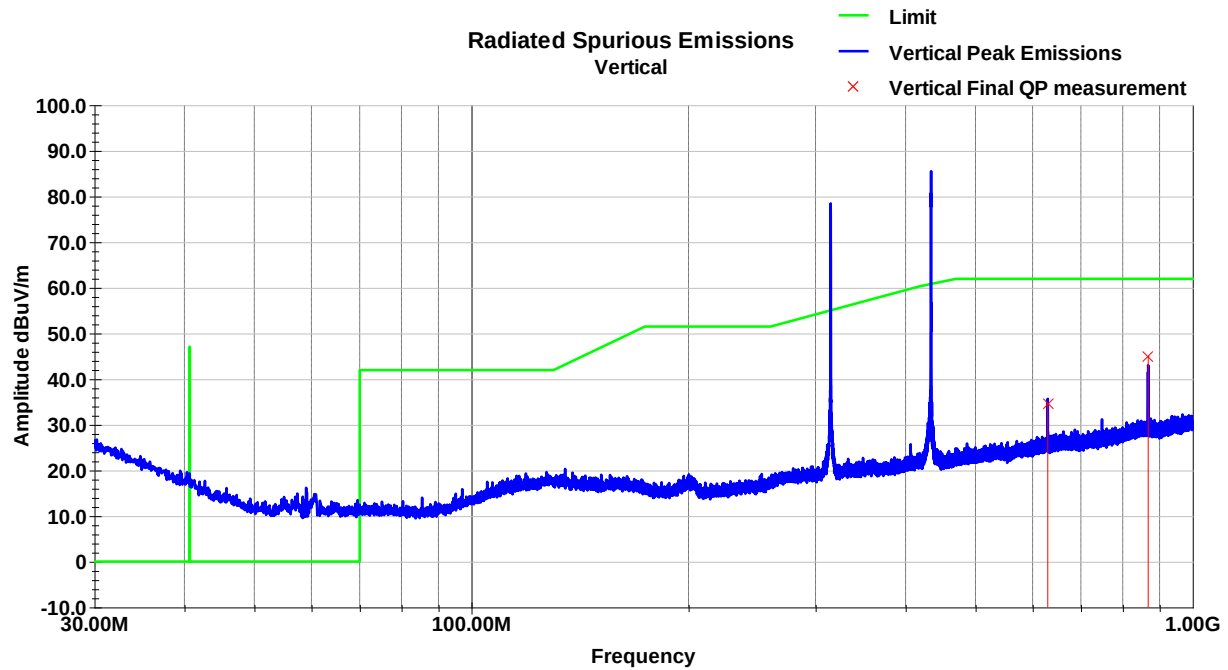
Horizontal – Setup 2 - Plot



Horizontal – Setup 2 – Tabular Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
867.91	47.2	H	189.0	219.0	26.8	2.8	31.2	45.7	61.9	-16.3
QP Value = Raw QP + AF + Loss - Amp										
Margin = QP Value - Limit										

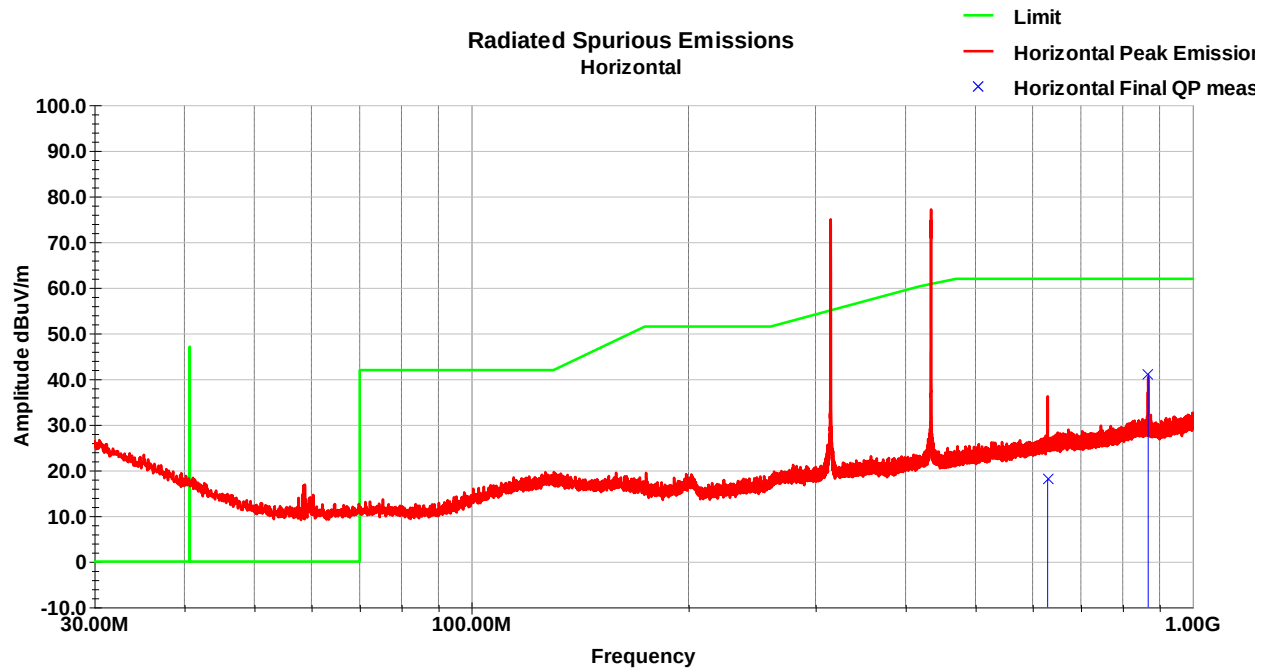
Vertical - Setup 3 - Plot



Vertical - Setup 3 - Tabular Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
629.83	39.2	V	100.0	175.0	24.0	2.6	31.3	34.7	61.9	-27.3
867.77	46.5	V	268.0	100.0	26.8	2.8	31.2	45.0	61.9	-16.9
QP Value = Raw QP + AF + Loss - Amp										
n = QP Value - Limit										

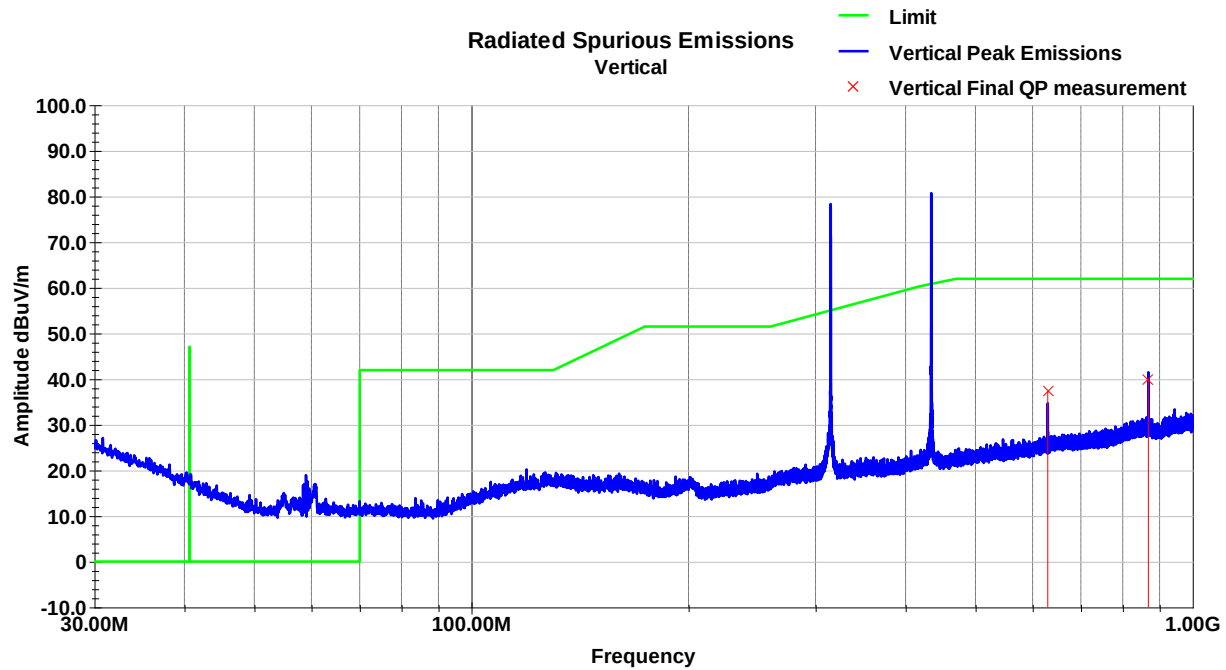
Horizontal – Setup 3 - Plot



Horizontal – Setup 3 – Tabular Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
629.66	22.6	H	359.0	100.0	24.0	2.6	31.3	18.0	61.9	-43.9
867.90	42.5	H	181.0	219.0	26.8	2.8	31.2	41.0	61.9	-20.9
QP Value = Raw QP + AF + Loss - Amp										
Margin = QP Value - Limit										

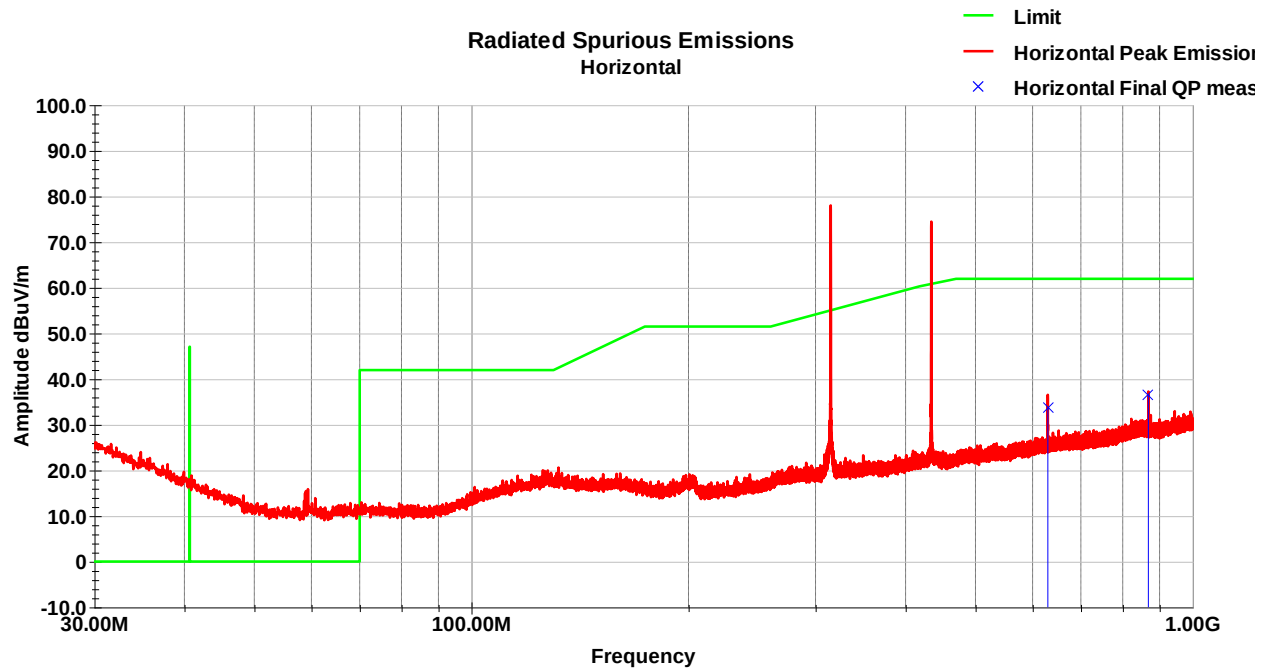
Vertical - Setup 4 – Plot



Vertical - Setup 4 - Tabular Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
629.73	41.9	V	91.0	175.0	24.0	2.6	31.3	37.3	61.9	-24.6
868.40	41.5	V	94.0	100.0	26.8	2.8	31.2	40.0	61.9	-22.0
QP Value = Raw QP + AF + Loss - Amp										
Margin = QP Value - Limit										

Horizontal – Setup 4 - Plot

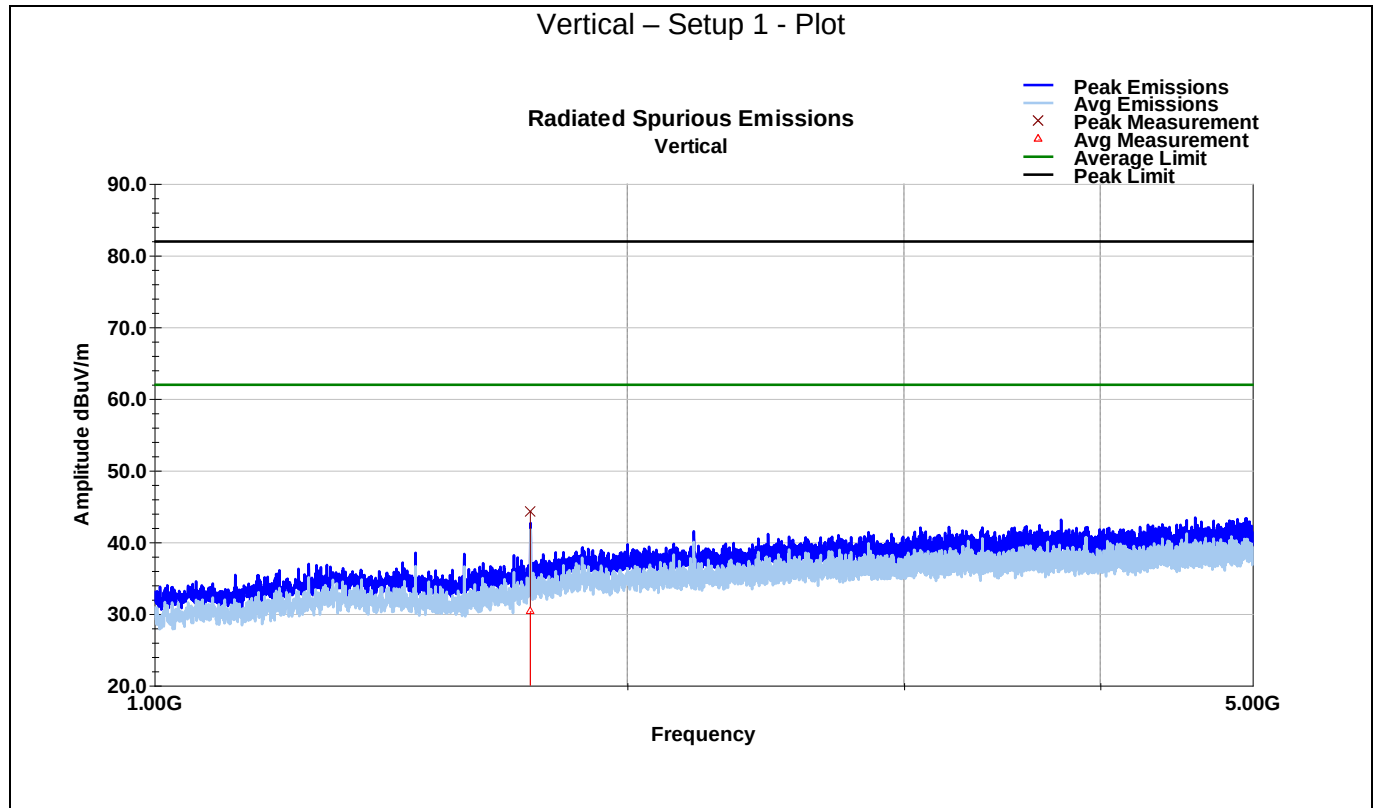


Horizontal – Setup 4 – Tabular Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
629.90	38.4	H	190.0	100.0	24.0	2.6	31.3	33.8	61.9	-28.2
868.38	38.0	H	181.0	220.0	26.8	2.8	31.2	36.5	61.9	-25.4
QP Value = Raw QP + AF + Loss - Amp										
Margin = QP Value - Limit										

5.6 Test Data – Above 1 GHz

5.6.1 Z-Axis



Vertical – Tabular Data

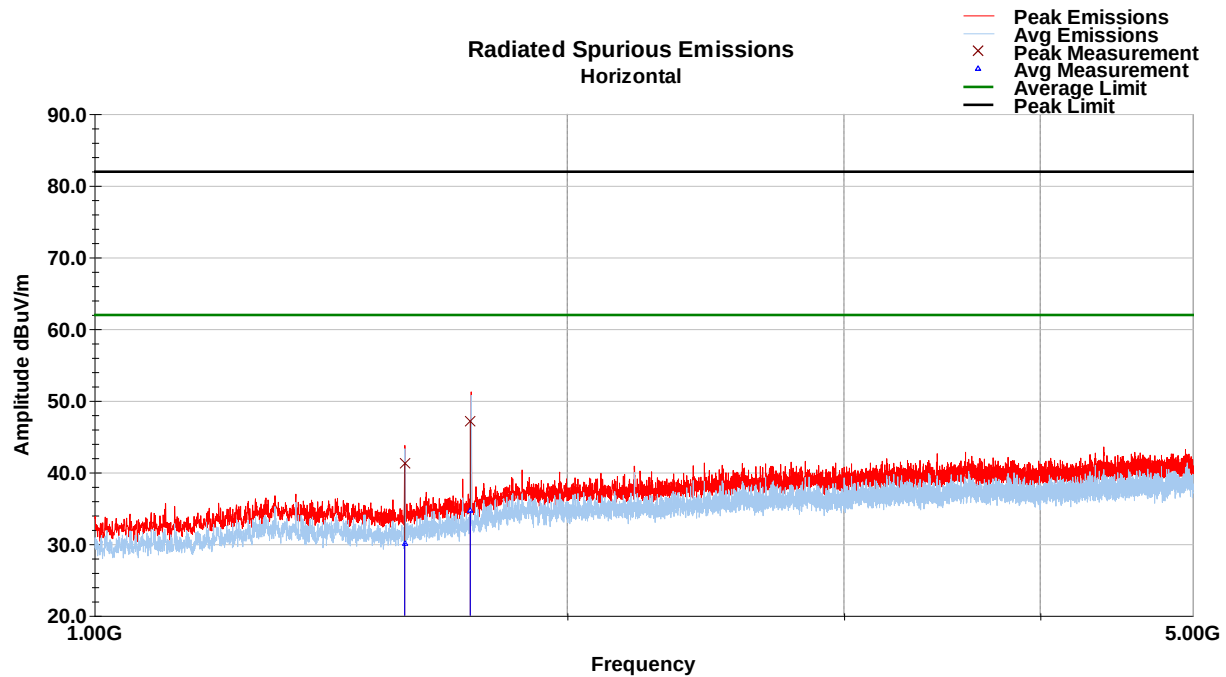
Peak Data

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
1735.32	55.5	V	186.0	132.0	30.0	1.6	42.8	44.3	81.9	-37.6
Final Pk = Raw Pk + AF + Loss - Amp										
Margin = Final Pk - Limit										

Average Data

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Avg dBuV/m	Limit (dBuV/m)	Margin (dB)
1735.32	41.6	V	186.0	132.0	30.0	1.6	42.8	30.4	61.9	-31.6
Final Avg = Raw Avg + AF + Loss - Amp										
Margin = Final Avg - Limit										

Horizontal – Setup 1 - Plot



Horizontal – Setup 1 - Tabular Data

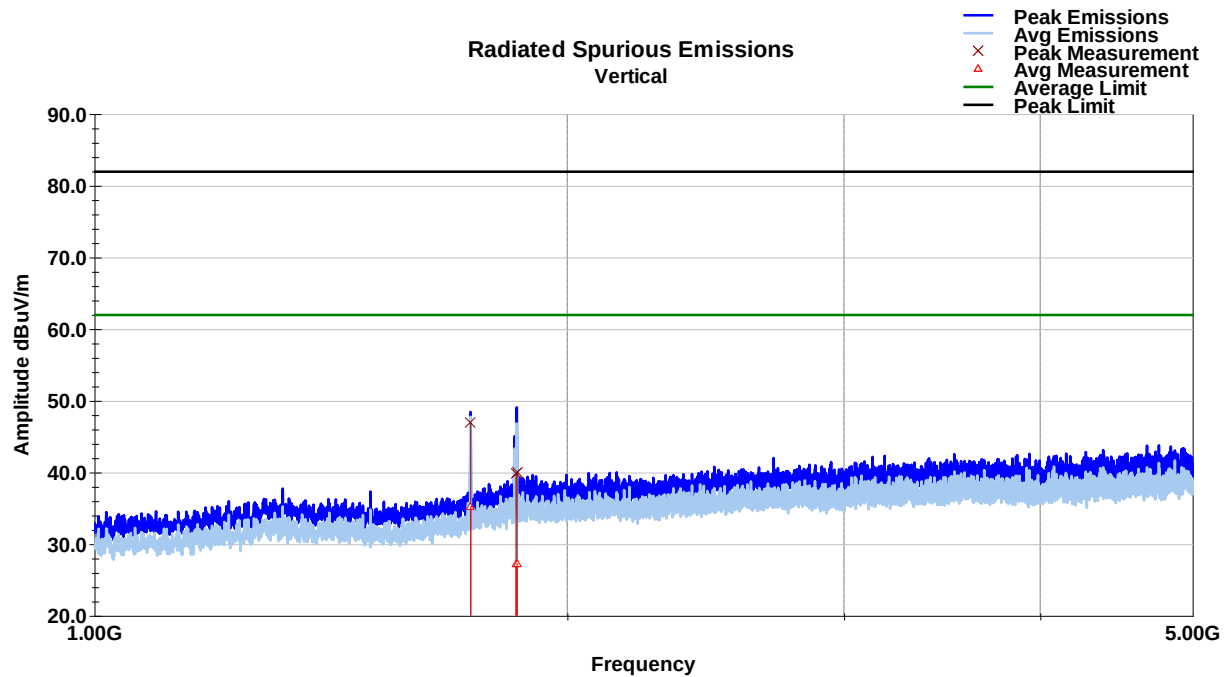
Peak Data

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
1575.92	54.3	H	89.0	104.0	28.3	1.5	42.9	41.2	81.9	-40.7
1734.92	58.3	H	102.0	106.0	30.0	1.6	42.8	47.1	81.9	-34.8
Final Pk = Raw Pk + AF + Loss - Amp										
Margin = Final Pk - Limit										

Average Data

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Avg Value dBuV/m	Limit (dBuV/m)	Margin (dB)
1575.92	43.2	H	89.0	104.0	28.3	1.5	42.9	30.1	61.9	-31.8
1734.92	45.8	H	102.0	106.0	30.0	1.6	42.8	34.6	61.9	-27.3
Final Avg = Raw Avg + AF + Loss - Amp										
Margin = Final Avg - Limit										

Vertical – Setup 2 - Plot



Vertical – Setup 2 - Tabular Data

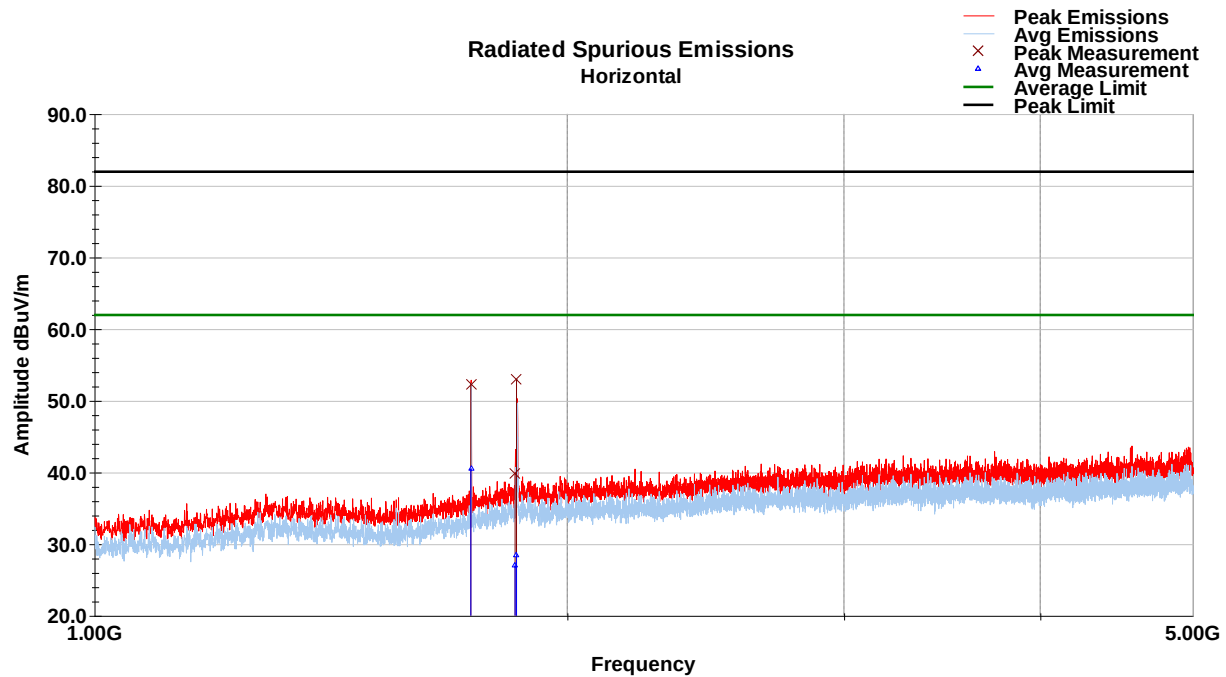
Peak Data

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
1736.12	58.1	V	195.0	217.0	30.0	1.6	42.8	46.9	81.9	-35.1
1855.28	49.4	V	194.0	189.0	31.3	1.7	42.6	39.8	81.9	-42.2
1858.32	49.7	V	254.0	190.0	31.3	1.7	42.6	40.1	81.9	-41.9
Final Pk = Raw Pk + AF + Loss - Amp										
Margin = Final Pk - Limit										

Average

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Avg dBuV/m	Limit (dBuV/m)	Margin (dB)
1736.12	46.5	V	195.0	217.0	30.0	1.6	42.8	35.3	61.9	-26.7
1855.28	36.8	V	194.0	189.0	31.3	1.7	42.6	27.2	61.9	-34.7
1858.32	36.9	V	254.0	190.0	31.3	1.7	42.6	27.3	61.9	-34.7
Final Avg = Raw Avg + AF + Loss - Amp										
Margin = Final Avg - Limit										

Horizontal – Setup 2 - Plot



Horizontal – Setup 2 - Tabular Data

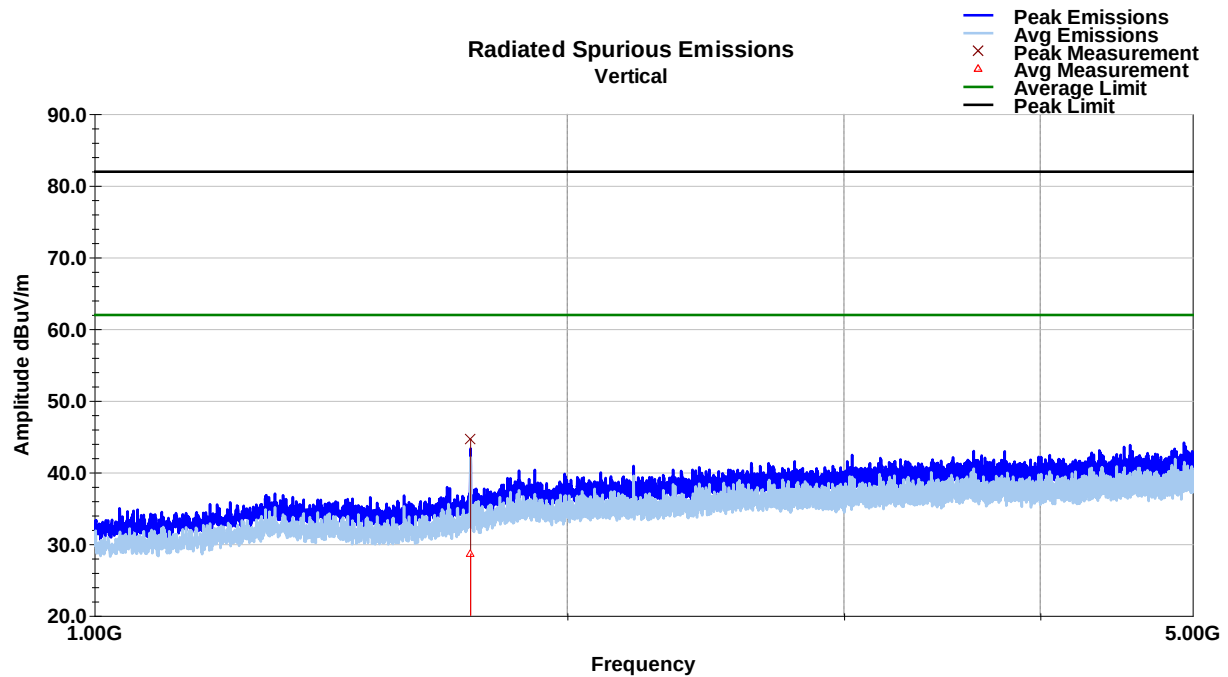
Peak Data

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
1736.36	63.5	H	92.0	110.0	30.0	1.6	42.8	52.3	81.9	-29.6
1852.72	49.5	H	18.0	157.0	31.3	1.7	42.6	39.9	81.9	-42.0
1856.80	62.6	H	339.0	100.0	31.3	1.7	42.6	53.0	81.9	-29.0
Final Pk = Raw Pk + AF + Loss - Amp										
Margin = Final Pk - Limit										

Average Data

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Avg Value dBuV/m	Limit (dBuV/m)	Margin (dB)
1736.36	51.7	H	92.0	110.0	30.0	1.6	42.8	40.5	61.9	-21.4
1852.72	36.7	H	18.0	157.0	31.3	1.7	42.6	27.1	61.9	-34.8
1856.80	38.2	H	339.0	100.0	31.3	1.7	42.6	28.6	61.9	-33.4
Final Avg = Raw Avg + AF + Loss - Amp										
Margin = Final Avg - Limit										

Vertical – Setup 3 - Plot



Vertical – Tabular Data

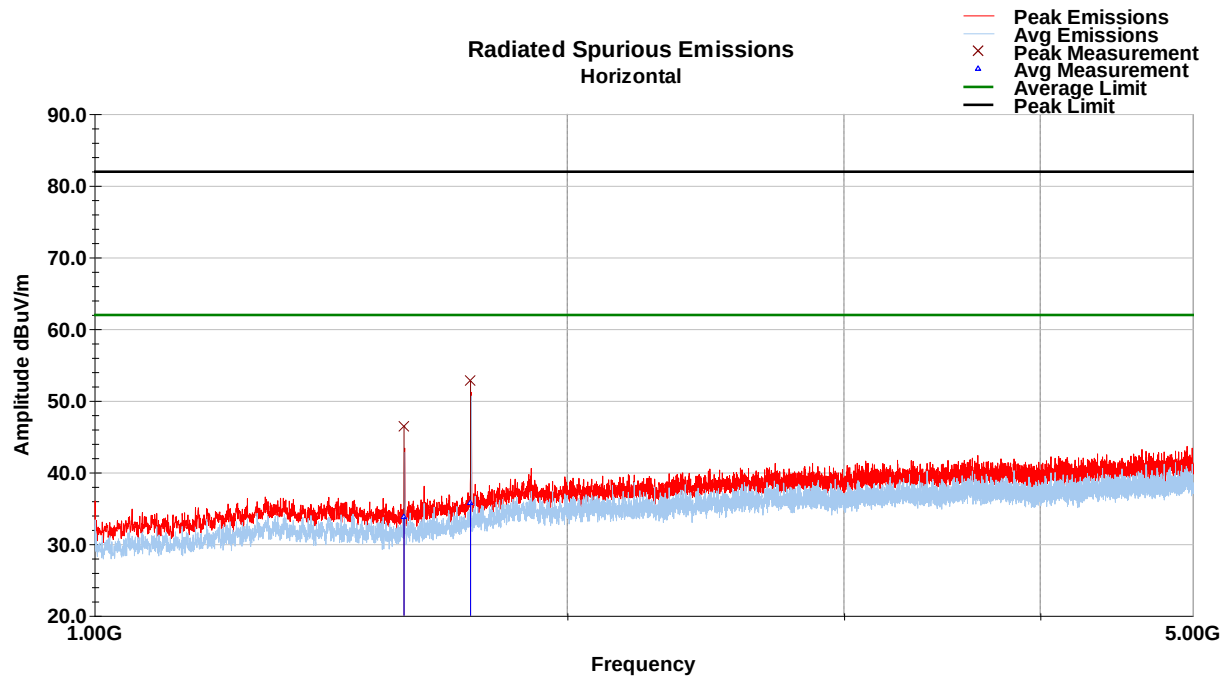
Peak Data

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
1735.88	55.8	V	201.0	250.0	30.0	1.6	42.8	44.6	81.9	-37.3
Final Pk = Raw Pk + AF + Loss - Amp										
Margin = Final Pk - Limit										

Average Data

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Avg dBuV/m	Limit (dBuV/m)	Margin (dB)
1735.88	39.9	V	201.0	250.0	30.0	1.6	42.8	28.7	61.9	-33.3
Final Avg = Raw Avg + AF + Loss - Amp										
Margin = Final Avg - Limit										

Horizontal – Setup 3 - Plot



Horizontal – Setup 3 - Tabular Data

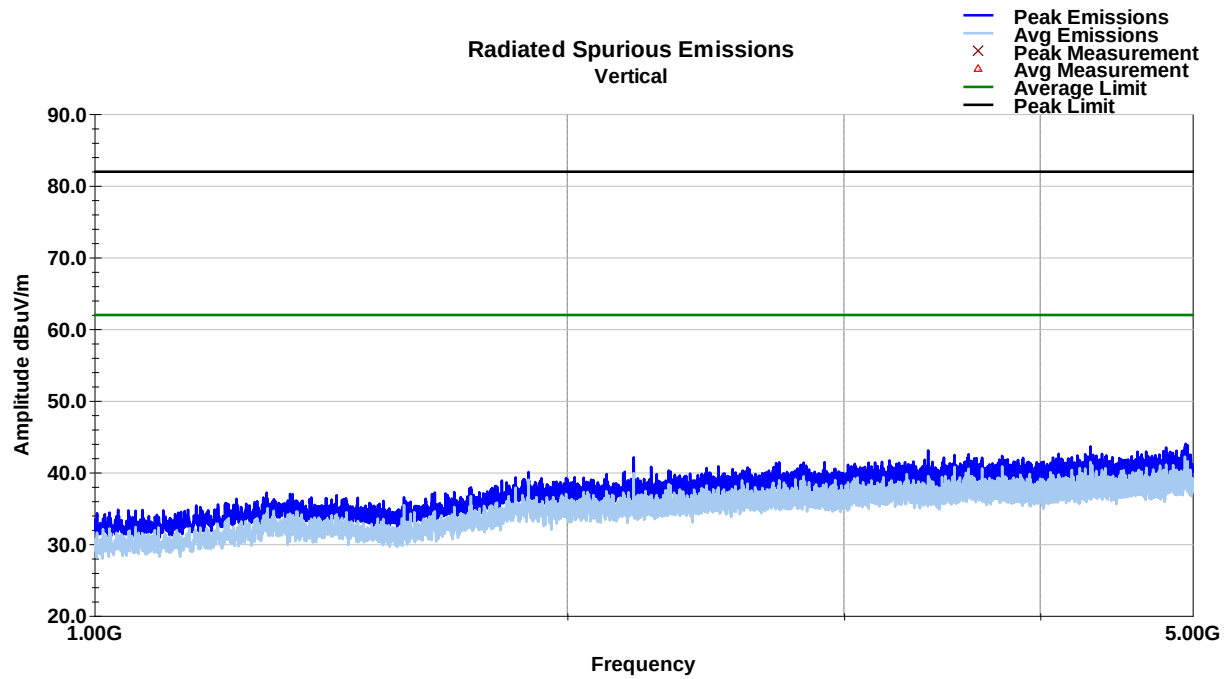
Peak Data

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
1574.56	59.5	H	89.0	126.0	28.3	1.5	42.9	46.4	81.9	-35.5
1735.76	64.0	H	98.0	102.0	30.0	1.6	42.8	52.8	81.9	-29.2
Final Pk = Raw Pk + AF + Loss - Amp										
Margin = Final Pk - Limit										

Average Data

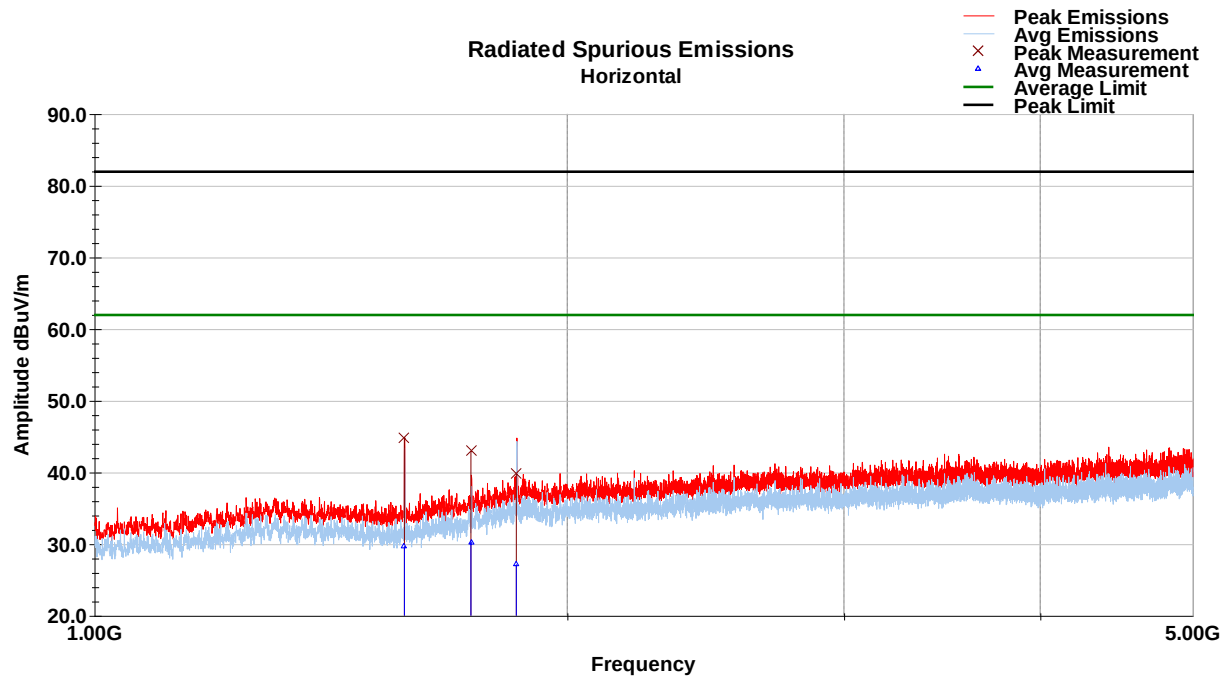
Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Avg Value dBuV/m	Limit (dBuV/m)	Margin (dB)
1574.56	46.8	H	89.0	126.0	28.3	1.5	42.9	33.8	61.9	-28.2
1735.76	47.0	H	98.0	102.0	30.0	1.6	42.8	35.8	61.9	-26.1
Final Avg = Raw Avg + AF + Loss - Amp										
Margin = Final Avg - Limit										

Vertical – Setup 4 – Plot



Vertical – Setup 4 – Tabular Data

Horizontal – Setup 4 – Plot



Horizontal – Setup 4 - Tabular Data

Peak Data

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
1575.44	57.9	H	84.0	124.0	28.3	1.5	42.9	44.8	81.9	-37.1
1736.64	54.2	H	113.0	152.0	30.0	1.6	42.8	43.0	81.9	-39.0
1856.16	49.4	H	48.0	125.0	31.3	1.7	42.6	39.8	81.9	-42.2
Final Pk = Raw Pk + AF + Loss - Amp										
Margin = Final Pk - Limit										

Average Data

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Avg Value dBuV/m	Limit (dBuV/m)	Margin (dB)
1575.44	42.7	H	84.0	124.0	28.3	1.5	42.9	29.7	61.9	-32.3
1736.64	41.5	H	113.0	152.0	30.0	1.6	42.8	30.3	61.9	-31.6
1856.16	36.7	H	48.0	125.0	31.3	1.7	42.6	27.1	61.9	-34.8
Final Avg = Raw Avg + AF + Loss - Amp										
Margin = Final Avg - Limit										

6 Bandwidth

6.1 Test Result

Test Description	Test Specification		Test Result
20 dB Bandwidth	15.231(c)	RSS-210 A.1.3	Compliant

6.2 Test Method

The procedures from ANSI C63.10 (2013) clause 6.9 were used to determine the 20 dB bandwidth.

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.80 °C

Relative Humidity: 46.8 %

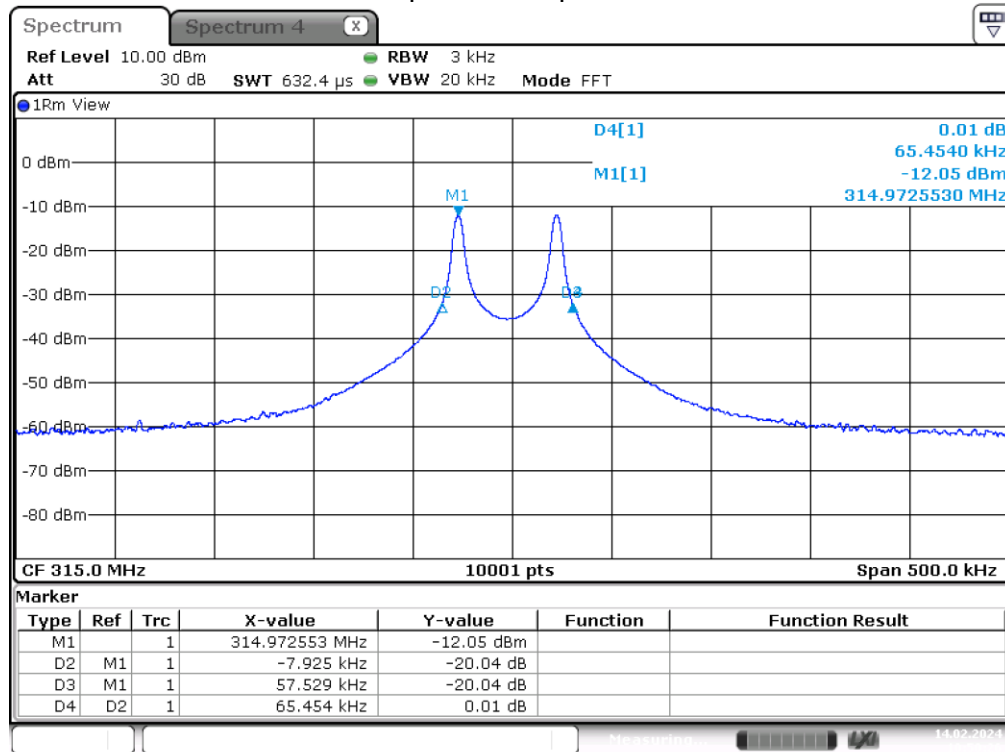
Atmospheric Pressure: 98.23 kPa

6.4 Test Equipment

Test End Date: 12-Feb-2024		Tester: SGM			
Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
TSTPASS SWITCHBOX	SB2	TSTPASS	23009	10-Apr-2023	10-Apr-2024
RF CABLE SMA TO SMA, 0.01-40GHZ	084-0505-059	DYNE STORM MICROV	20108	13-Mar-2023	13-Mar-2024
NEAR FIELD PROBES	N/A	4-POWER CORPORAT	16016	CNR	CNR

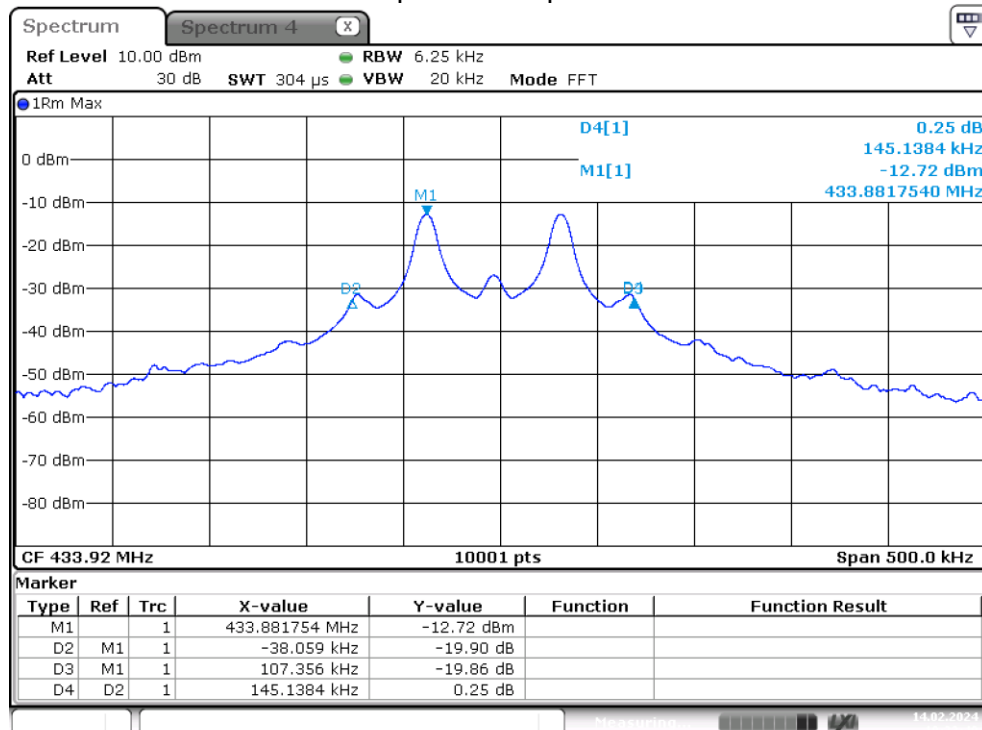
6.5 Test Data

Sample 1 - Setup 1 - Plot



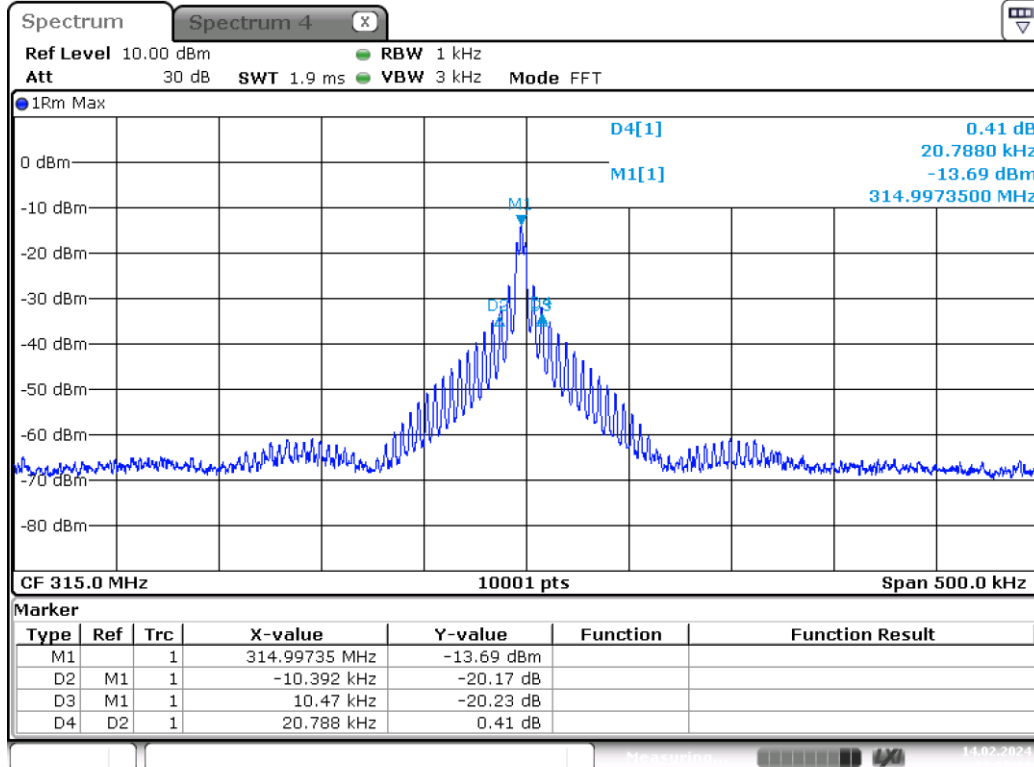
Date: 14.FEB.2024 10:50:26

Sample 1 - Setup 2 - Plot

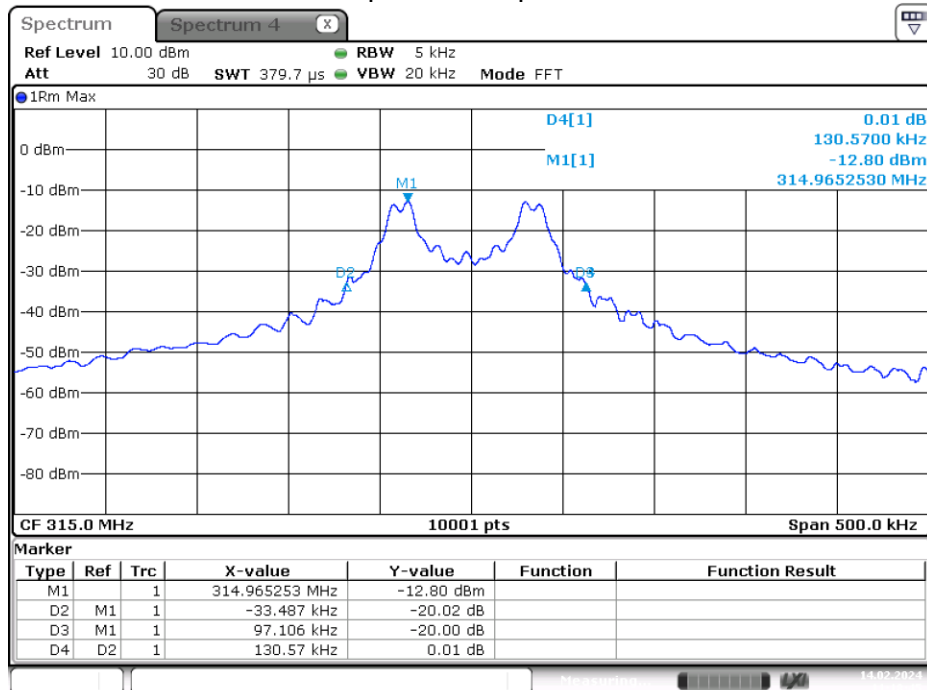


Date: 14.FEB.2024 10:23:40

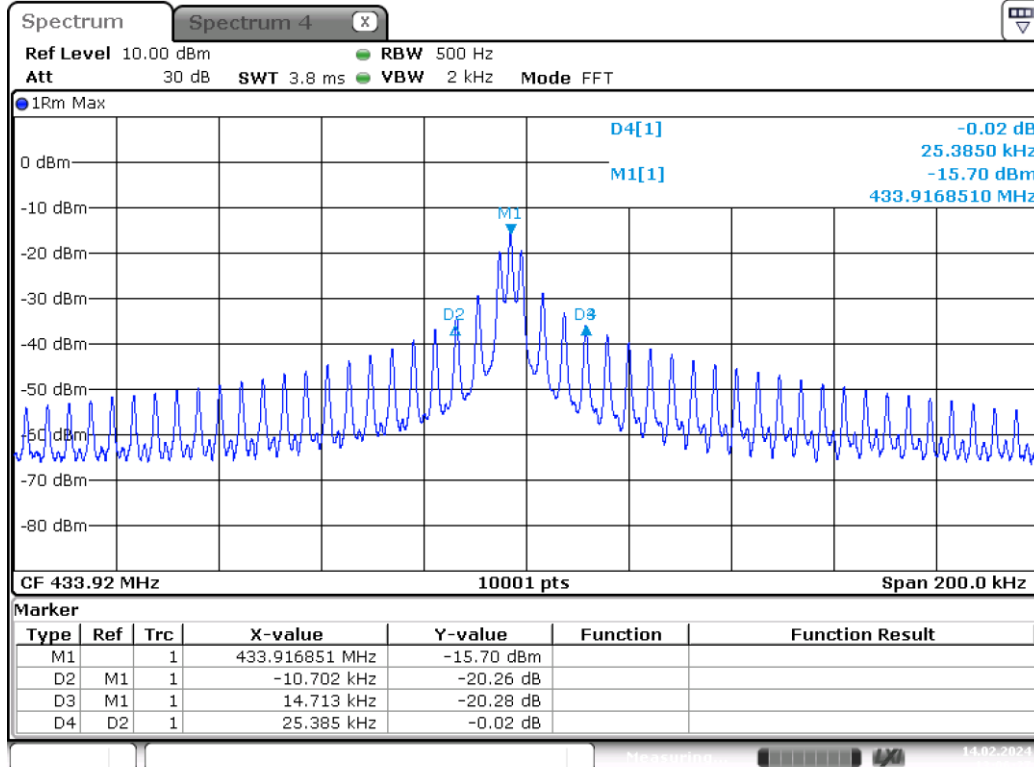
Sample 1 - Setup 3 - Plot



Sample 1 - Setup 4 - Plot

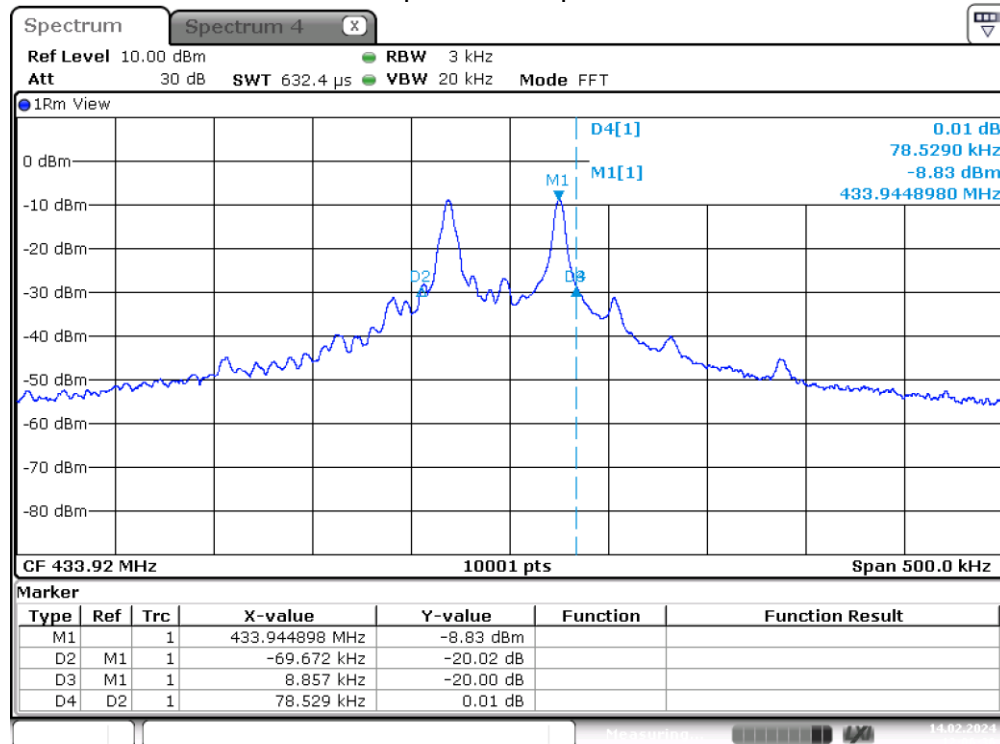


Sample 2 – Setup 1 - Plot



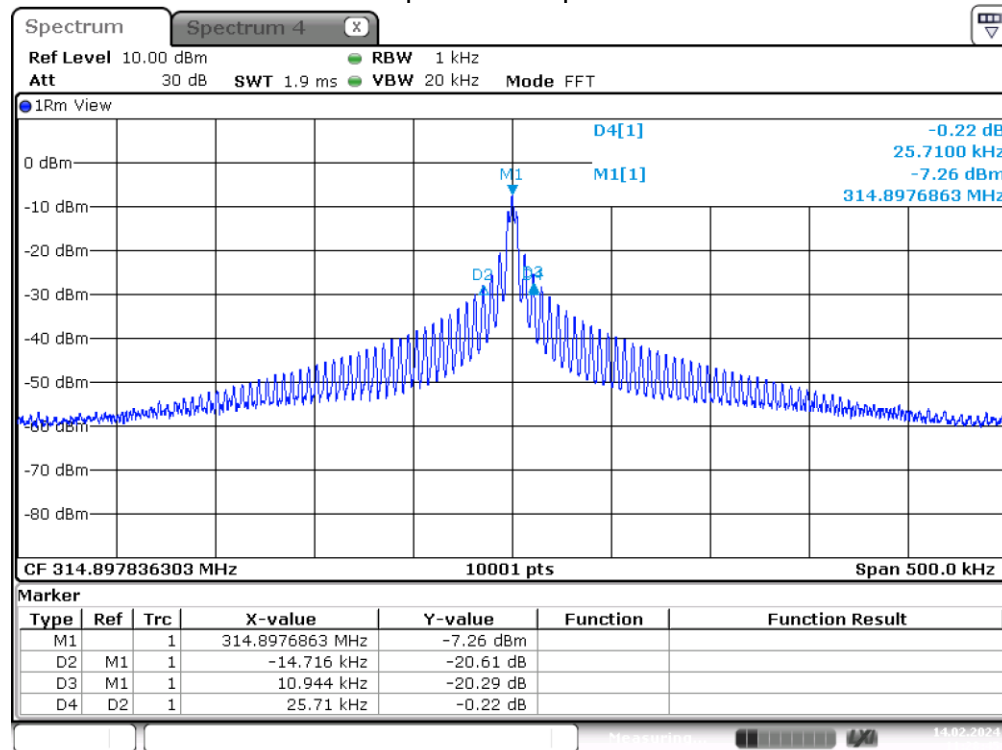
Date: 14.FEB.2024 13:06:27

Sample 2 – Setup 2 - Plot

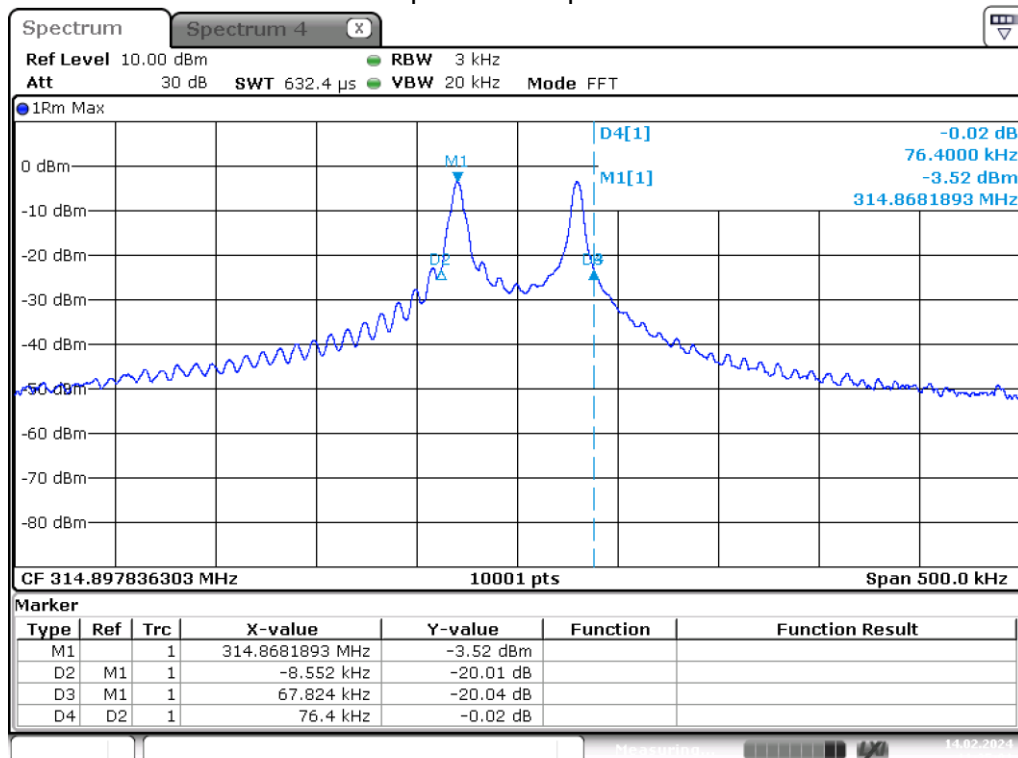


Date: 14.FEB.2024 12:06:36

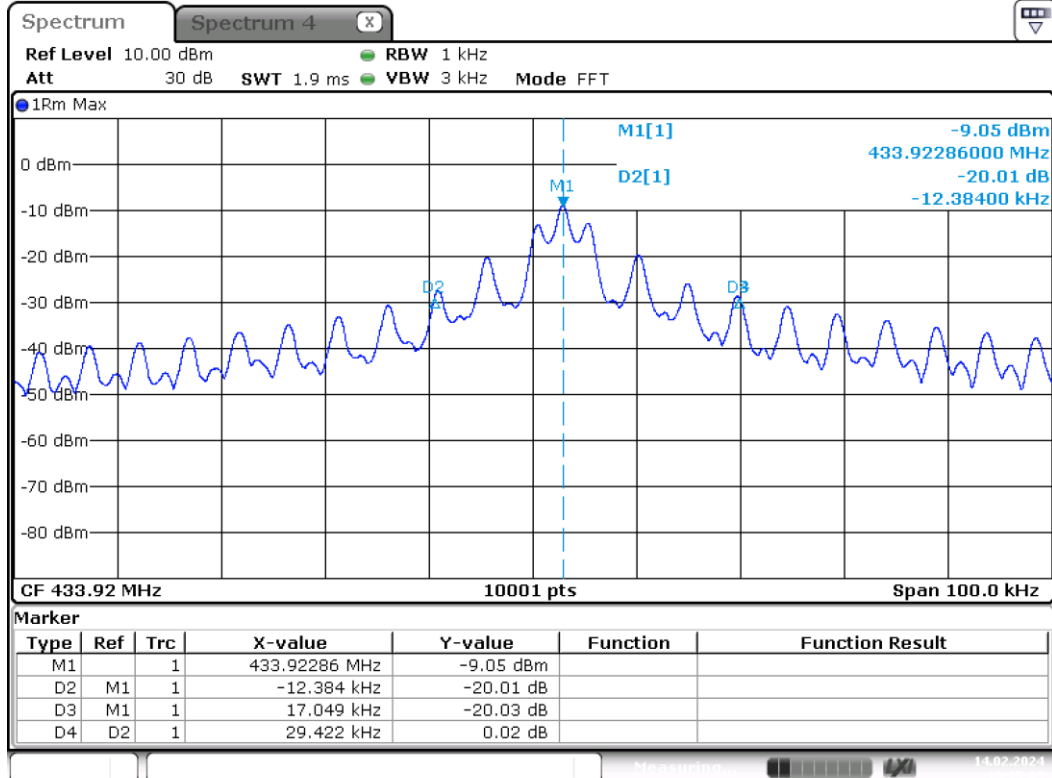
Sample 2 – Setup 3 - Plot



Sample 2 – Setup 4 - Plot

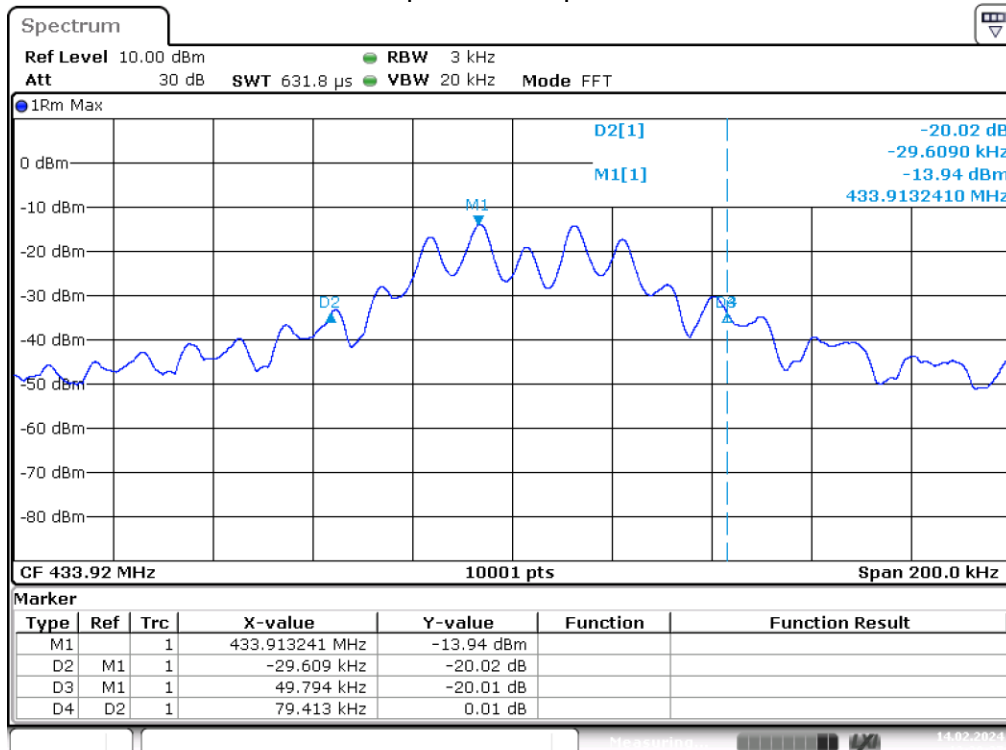


Sample 3 – Setup 1 - Plot



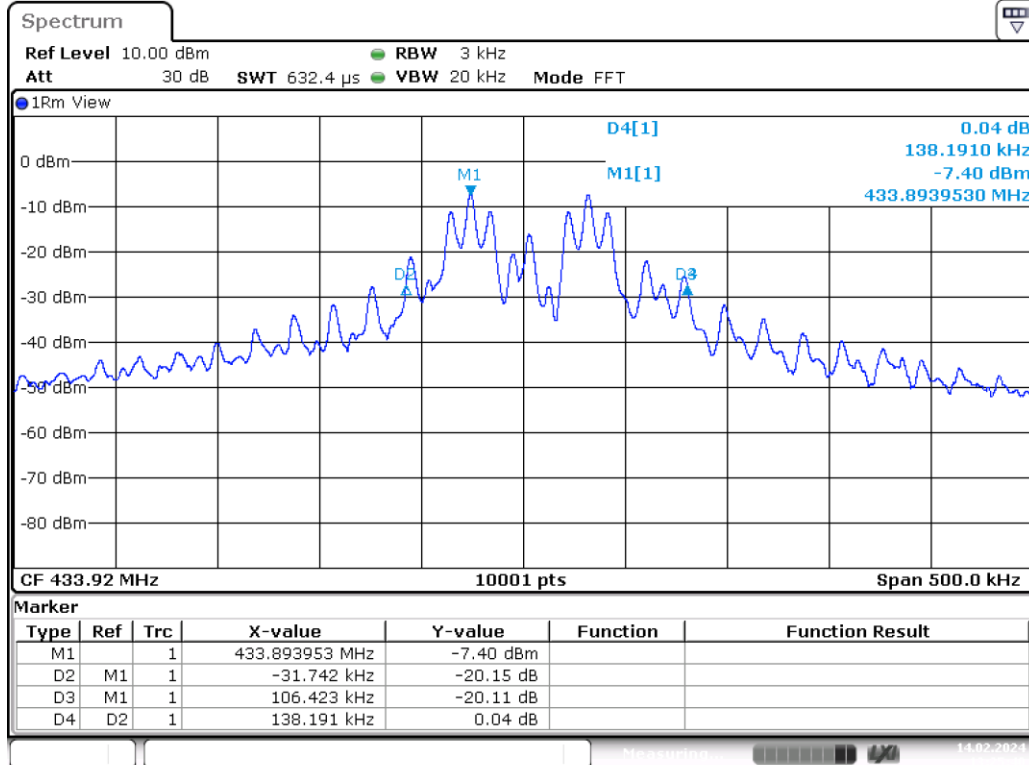
Date: 14.FEB.2024 13:15:03

Sample 3 – Setup 2 - Plot



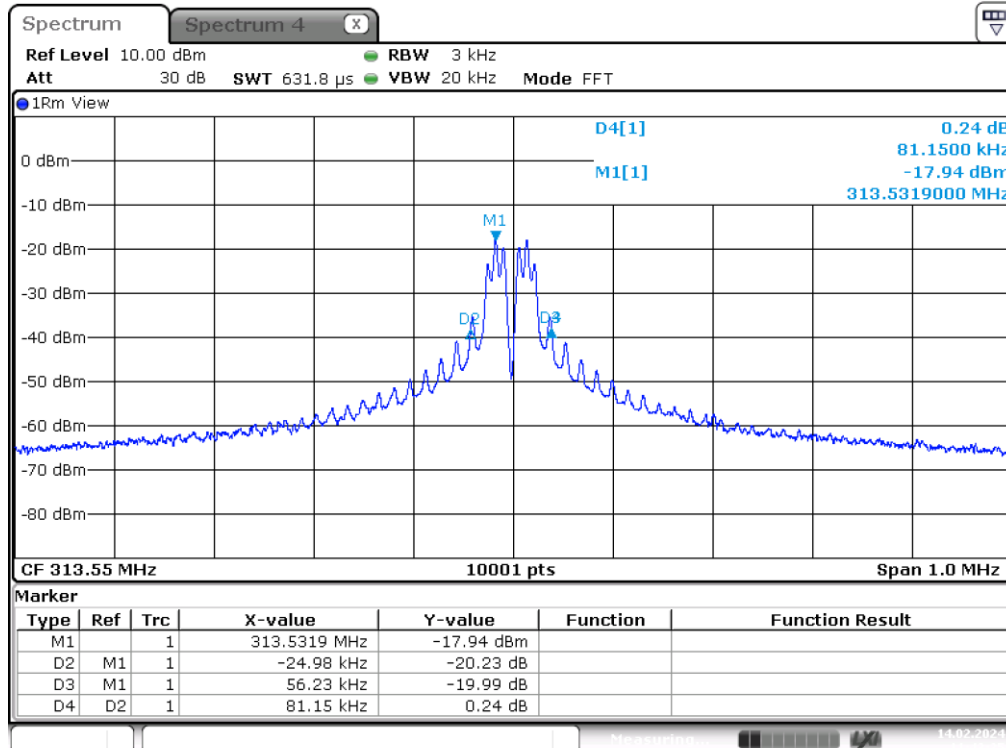
Date: 14.FEB.2024 13:20:37

Sample 3 – Setup 3 - Plot



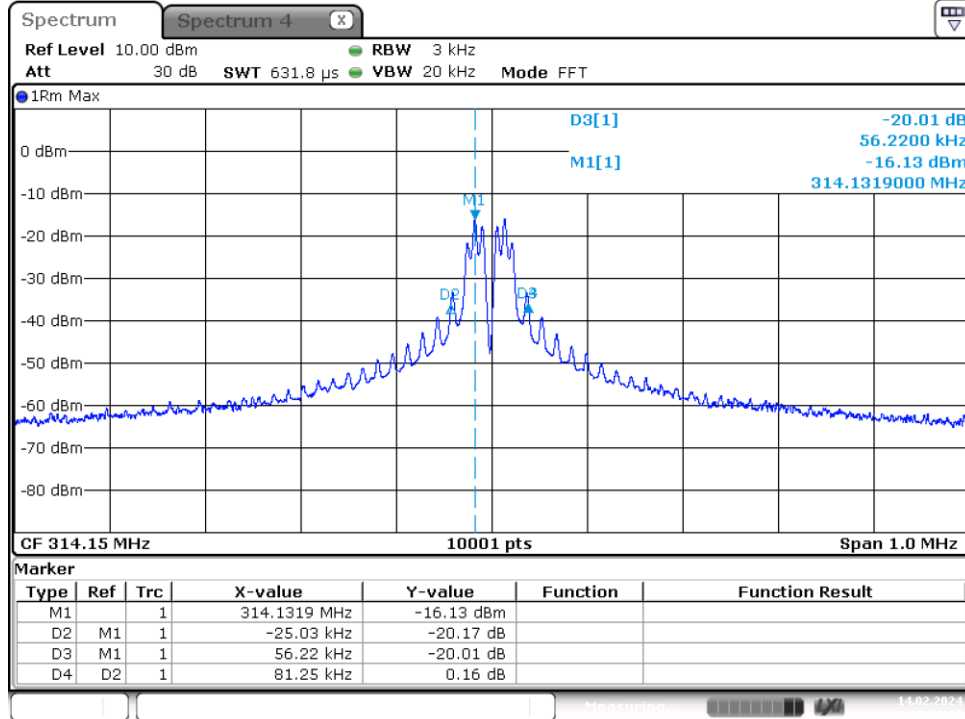
Date: 14.FEB.2024 13:25:40

Sample 4 – Setup 1 - Plot



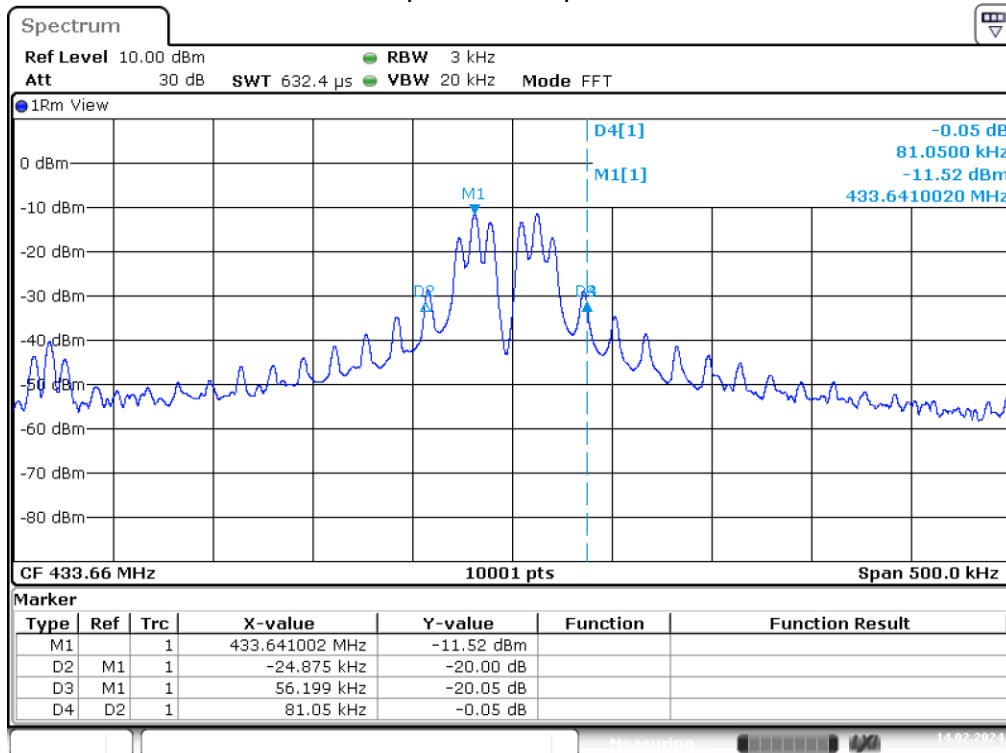
Date: 14.FEB.2024 11:43:25

Sample 4 – Setup 2 - Plot



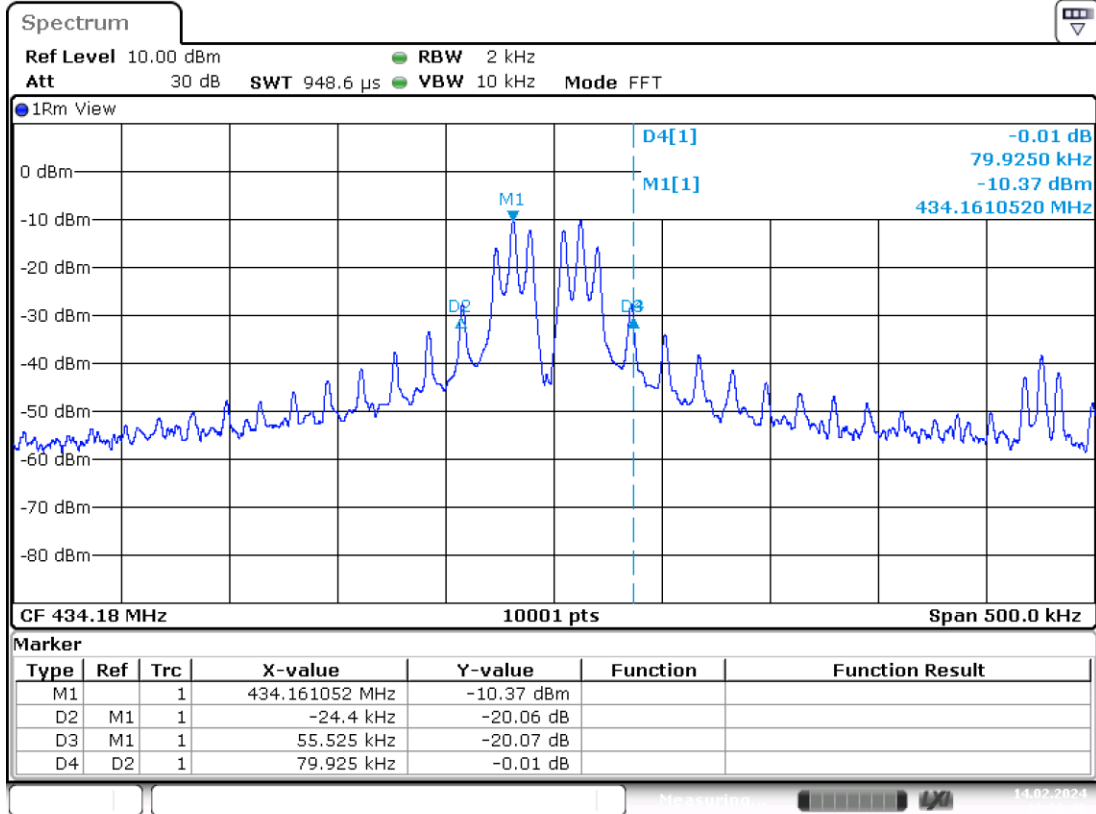
Date: 14.FEB.2024 11:51:19

Sample 4 – Setup 3 - Plot



Date: 14.FEB.2024 13:32:58

Sample 4 – Setup 4 - Plot



Date: 14.FEB.2024 13:38:46

The maximum allowable bandwidth is 0.25% of 315MHz which is 787.5kHz. The maximum allowable bandwidth of 433MHz is 1.083 MHz.

The maximum measured bandwidth derived from the plots above is 145.138kHz.

The EUT complies with the limit.

7 Deactivation Time

7.1 Test Result

Test Description	Test Specification		Test Result
Deactivation time, manual	15.231(a)(1)	RSS-210 A.1.1a	Compliant
	ANSI C63.10:2013, Section 7.4		

7.2 Test Method

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

7.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 20.77 °C

Relative Humidity: 23 %

Atmospheric Pressure: 98.92 kPa

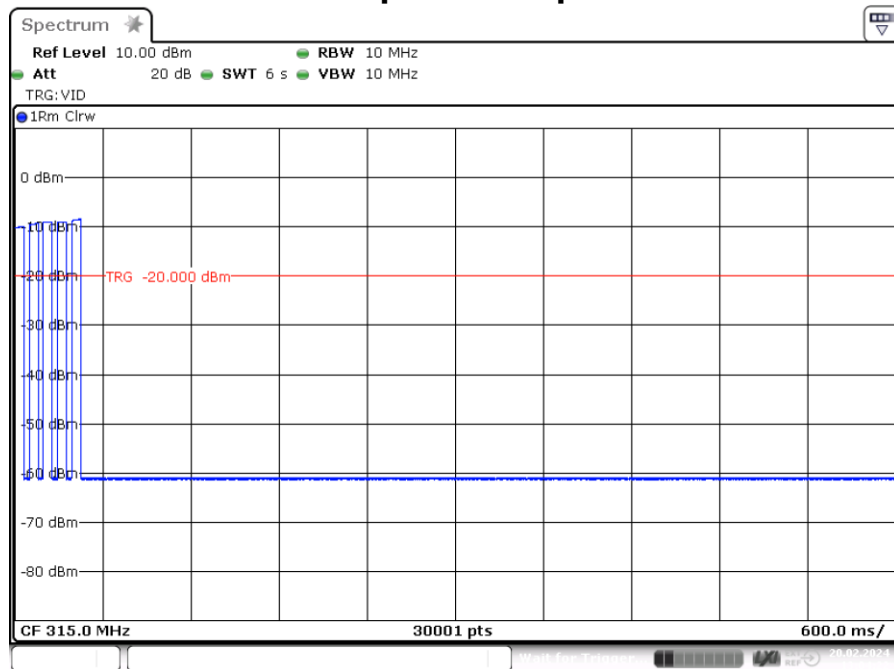
7.4 Test Equipment

Test End Date: 20-Feb-2024		Tester: SGM			
Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
TSTPASS SWITCHBOX	SB2	TSTPASS	23009	10-Apr-2023	10-Apr-2024
RF CABLE SMA TO SMA, 0.01-40GHZ	084-0505-059	TELEDYNE STORM MICROWAVE	20108	13-Mar-2023	13-Mar-2024
NEAR FIELD PROBES	N/A	COM-POWER CORPORATION	16016	CNR	CNR
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	3-Jan-2024	3-Jan-2025

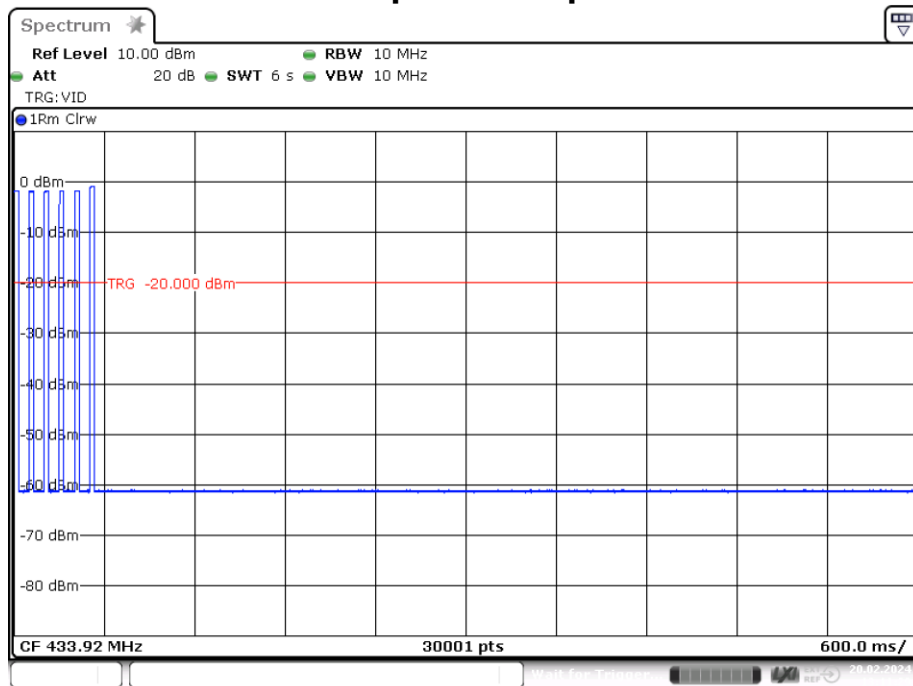
CNR = Calibration not required

7.5 Test Data

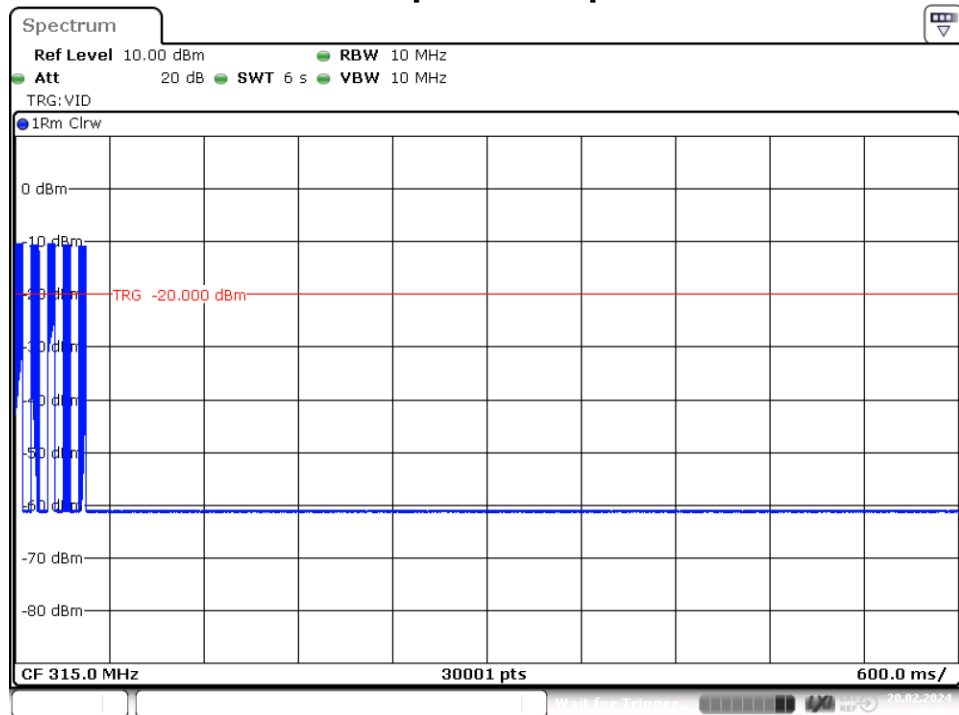
Sample 1 Setup 1



Sample 1 Setup 2

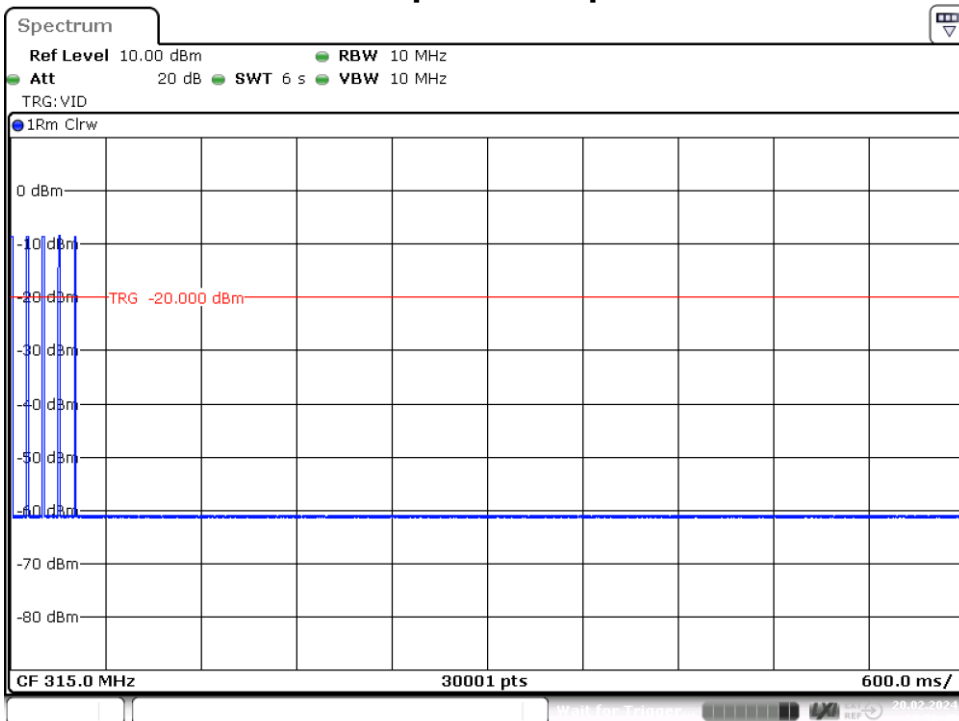


Sample 1 Setup 3



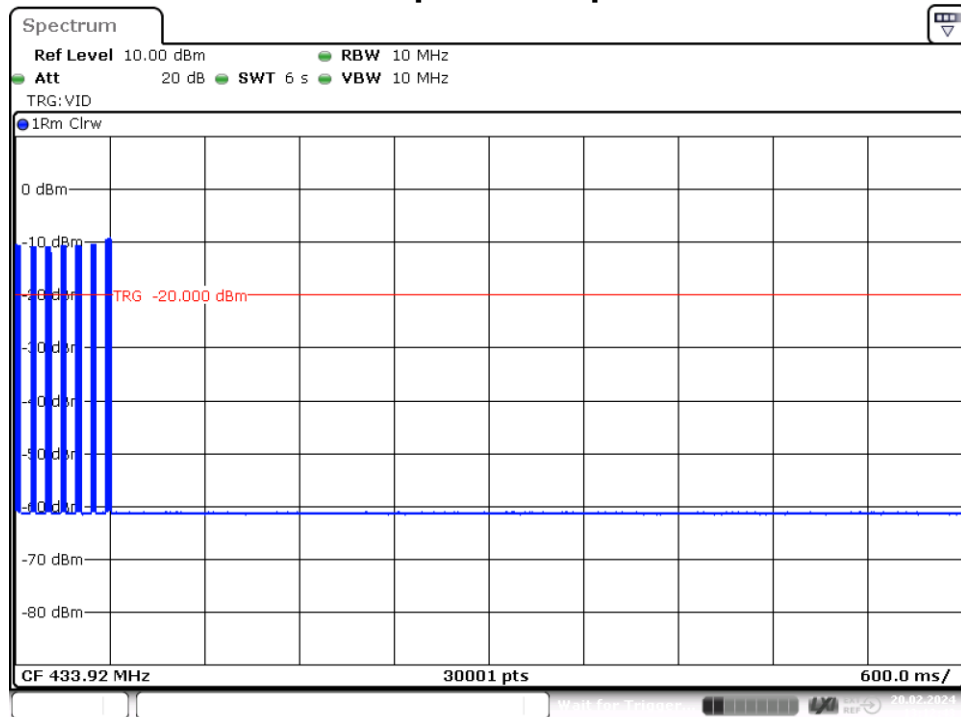
Date: 20.FEB.2024 13:08:07

Sample 1 Setup 4

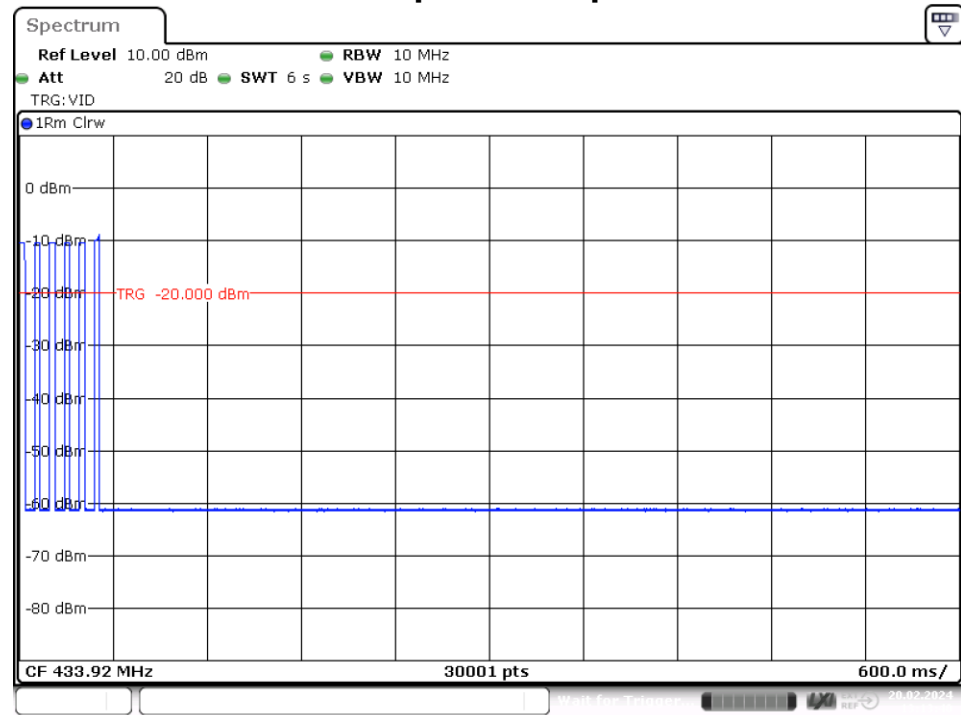


Date: 20.FEB.2024 13:08:47

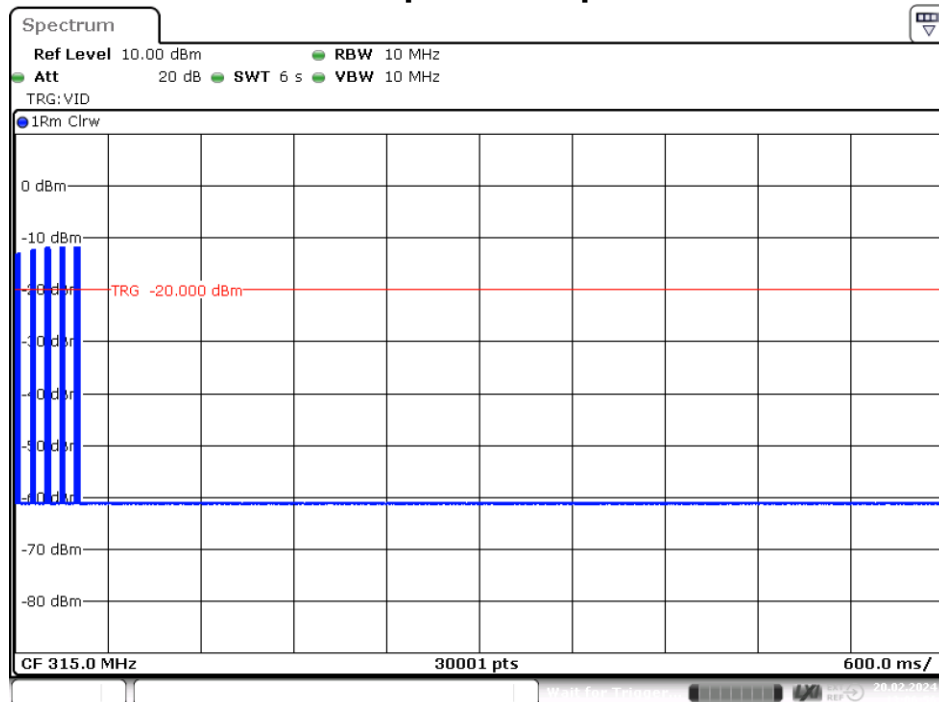
Sample 2 Setup 1



Sample 2 Setup 2

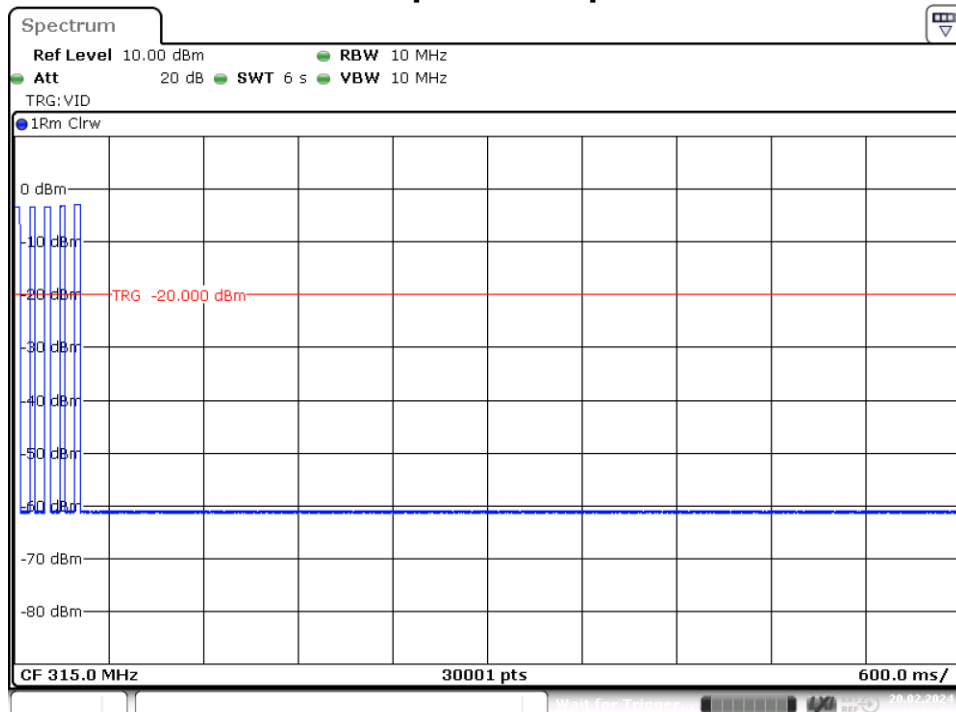


Sample 2 Setup 3



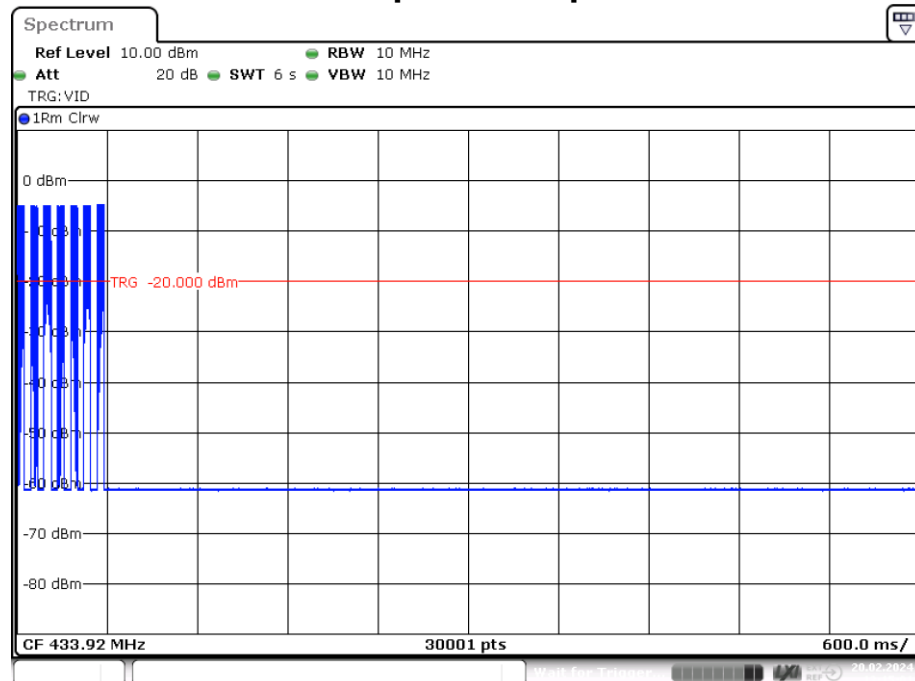
Date: 20.FEB.2024 13:06:57

Sample 2 Setup 4



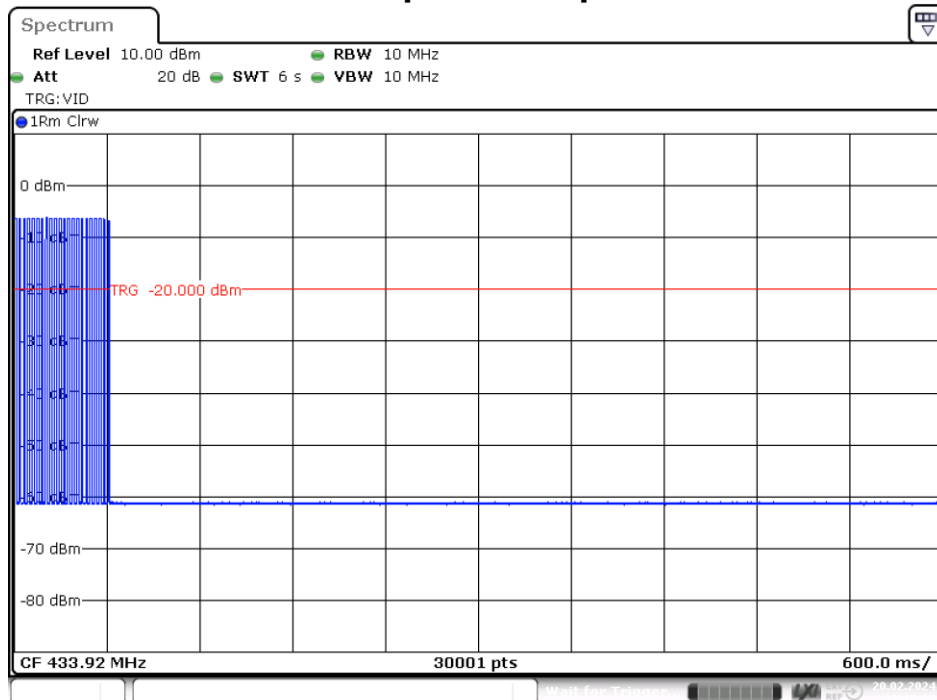
Date: 20.FEB.2024 13:10:29

Sample 3 Setup 1



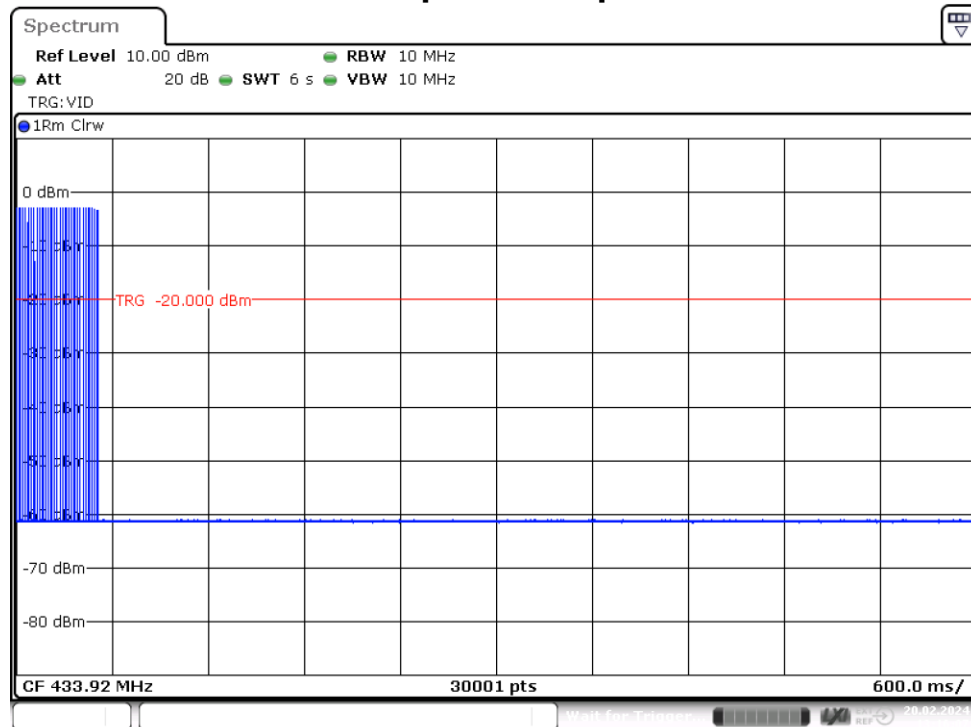
Date: 20.FEB.2024 13:15:01

Sample 3 Setup 2

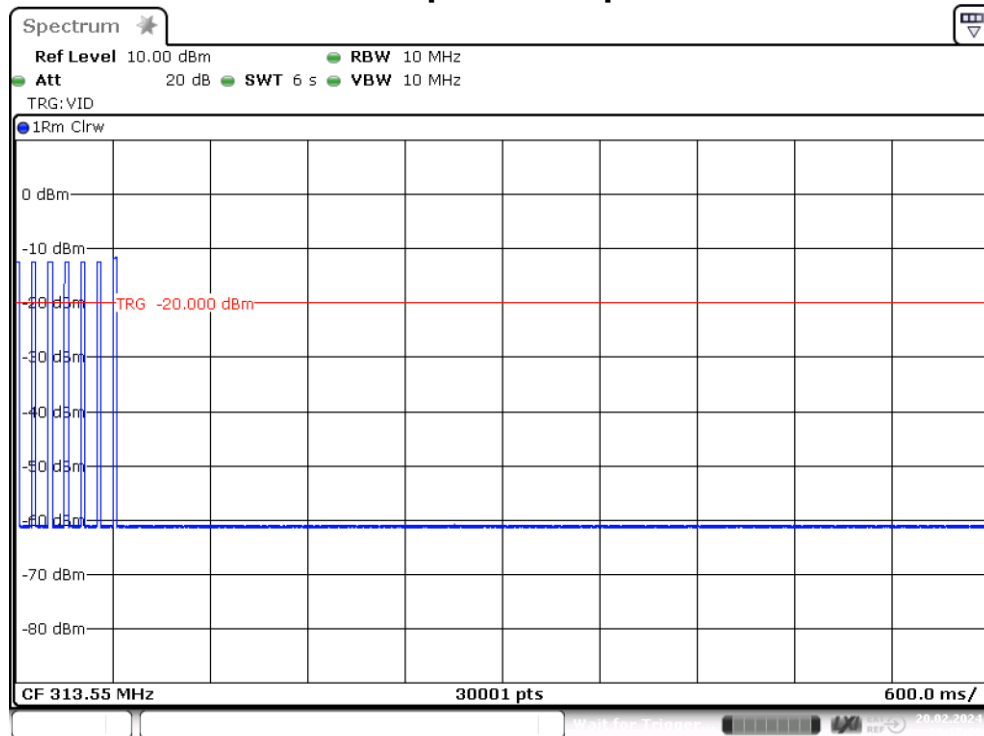


Date: 20.FEB.2024 13:15:37

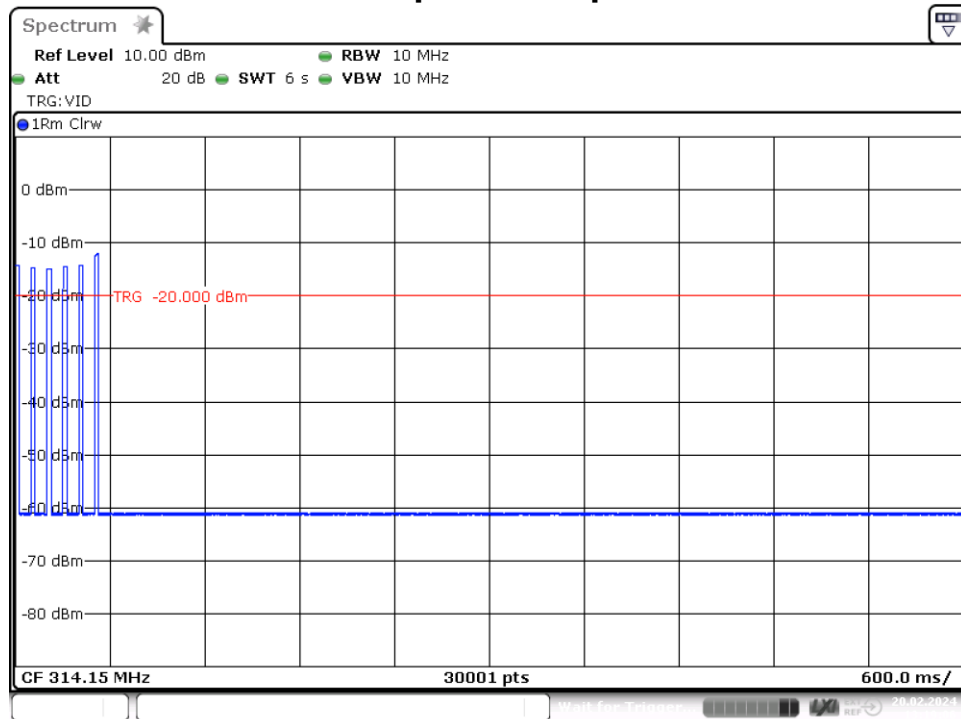
Sample 3 Setup 3



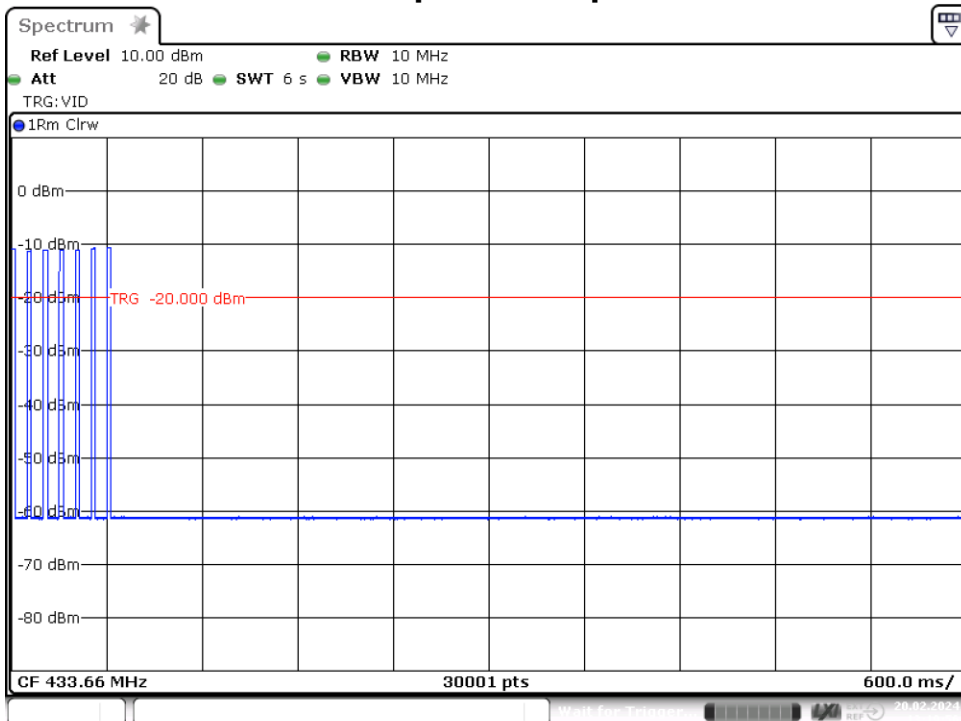
Sample 4 Setup 1



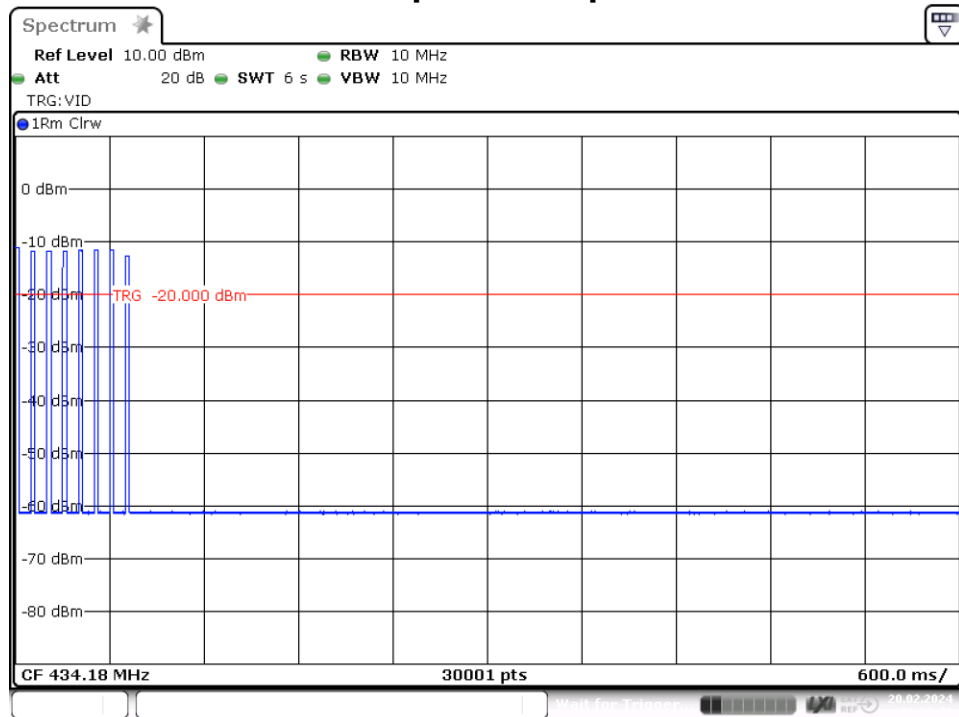
Sample 4 Setup 2



Sample 4 Setup 3



Sample 4 Setup 4



Date: 20.FEB.2024 13:20:44

On average, the transmitters deactivated within 0.4 to 0.6 seconds of the button being released and no transmissions were detected within 5 seconds of release.

8 Revision History

Revision Level	Description of changes	Revision Date
-	Draft Release	27 February 2024
0	Initial Release	21 March 2024
1	Calculations in table 4.8 were corrected.	06 May 2024
2	Retest data with corrected test data was added to section 4.	03 July 2024