Test Report Serial Number:	**45461895 R1.0**
Test Report Date:	**16 October 2023**
Project Number:	**1640**

EMC Test Report - New Filing

Applicant:

President Electronics USA
1007 Collier Center Way
Naples, FL, 34110
USA

FCC ID:	IC Registration Number
2AEOCPC213	**-**
Product Model Number / HVIN	Product Name / PMN
George FCC	**-**

In Accordance With:

FCC 47 CFR Part 95 Subpart D, Part 15 Subpart B
Licensed Non-Broadcast Station Transmitter (TNB)

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada

Test Lab Certificate: 2470.01

IC Registration 3874A

FCC Registration: CA3874

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1.0 REVISION HISTORY

Revision History				
Samples Tested By:	Art Voss, P.Eng.	**Date(s) of Evaluation:**		20 September - 4 October, 2023
Report Prepared By:	Art Voss, P.Eng.	**Report Reviewed By:**		Art Voss
Report Revision	**Description of Revision**	**Revised Section**	**Revised By**	**Revision Date**
0.1	Draft	n/a	Art Voss	13 October 2023
1.0	Initial Release	n/a	Art Voss	16 October 2023

2.0 CLIENT AND DUT INFORMATION

Client Information	
Applicant Name (FCC)	**President Electronics USA**
Applicant Address (FCC)	1007 Collier Center Way
	Naples, FL, 34110
	USA
DUT Information	
Device Identifier(s):	**FCC ID:** **2AEOCPC213**
Device Type:	Mobile 4W AM / FM , 12W AM SSB CBRS Transceiver
Device Model(s) / HVIN:	George FCC
Device Marketing Name / PMN:	George FCC
Firmware Version ID Number / FVIN:	-
Host Marketing Name / HMN:	-
Test Sample Serial No.:	TA Sample No. 1
Equipment Class (FCC):	Licensed Non-Broadcast Station Transmitter (TNB)
Transmit Frequency Range:	26.965MHz - 27.405MHz
Test Channels:	40 Channels
Manuf. Max. Rated Output Power:	4W (36dBm) DSB, 12W (40.8dBm) SSB
Manuf. Max. Rated BW/Data Rate:	8kHz DSB, 4kHz SSB
Antenna Make and Model:	n/a
Antenna Type and Gain:	0dBi (Typical), 3dBi (Max)
Modulation:	AM / FM
Mode:	Simplex
DUT Power Source:	12VDC
DUT Dimensions [WxLxH]	185mm x 172mm x56mm
Deviation(s) from standard/procedure:	None
Modification of DUT:	None

3.0 SCOPE

Preface:

This Certification Report was prepared on behalf of:

President Electronics USA

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

Device Description:

The George FCC is Mobile 4W AM / FM, 12W AM SSB CBRS Transceiver.

Application:

This is an application for a New Certification, Single.

Regulatory Requirement:

As per FCC 47 CFR 2 Subpart I , Equipment Authorization is require for this *Equipment* by means of Certification in accordance with FCC 47 CFR §95 Subpart D, (CBRS), and ANSI C63.26.

Scope of Work:

The scope of this investigation is limited only to the evaluation of the George FCC to determine compliance to the *Rules* identified herein.

RF Exposure:

As per FCC 47 CFR §2.1091, an RF Exposure (MPE) evaluation is required for this *Equipment* and the results of the RF Exposure (MPE) evaluation appear in a separate report.

4.0 TEST RESULT SUMMARY

TEST SUMMARY					
Referenced Standard(s):		**FCC CFR Title 47 Parts 2, 95D, 15B**			
Section	**Description of Test**	**Procedure Reference**	**Applicable Rule Part(s) FCC**	**Test Date**	**Result**
7.0	Conducted Power (Fundamental) Compliance to §2.1033(c)(8)	ANSI/TIA/EIA-382-A ANSI/TIA-603-E ANSI C63.26:2015 ANSI C63.4:2014	§2.1046 §2.1033(c)(8) §95.967	20 Sep 2023	**Complies**
8.0	Modulation Response	ANSI/TIA/EIA-382-A ANSI/TIA-603-E ANSI C63.26:2015 ANSI C63.4:2014	§2.1047 §95.975 §95.977	25 - 27 Sep, 2023	**Complies**
9.0	Occupied Bandwidth	ANSI/TIA/EIA-382-A ANSI C63.26:2015 ANSI C63.4:2014	§2.1049 §95.973	27 Sep 2023	**Complies**
	Emission Mask	ANSI/TIA/EIA-382-A ANSI C63.26:2015 ANSI C63.4:2014	§2.1049 §95.979	27 Sep 2023	**Complies**
10.0	Conducted TX Spurious Emissions	ANSI/TIA/EIA-382-A ANSI C63.26:2015 ANSI C63.4:2014	§2.1051 §95.979	28 Sep 2023	**Complies**
11.0	Radiated TX Spurious Emissions	ANSI/TIA/EIA-382-A ANSI C63.26:2015 ANSI C63.4:2014	§2.1053 §95.979	3 Oct 2023	**Complies**
12.0	Radiated Receiver Emissions	ANSI C63.26:2015 ANSI C63.4:2014	§15 Subpart B §15.109(d)	3 Oct 2023	**Complies**
13.0	Frequency Stability	ANSI/TIA/EIA-382-A ANSI C63.26:2015 ANSI C63.4:2014	§2.1055 §95.965	4 Oct 2023	**Complies**

Test Station Day Log					
Date	Ambient Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Test Station	Tests Performed Section(s)
20 Sep 2023	24.2	15	101.1	**EMC**	**7**
25 Sep 2023	23.6	16	101.5	**EMC**	**8**
26 Sep 2023	23.8	16	101.3	**EMC**	**8**
27 Sep 2023	24.3	17	101.1	**EMC**	**8, 9**
28 Sep 2023	23.6	16	101.4	**EMC**	**10**
3 Oct 2023	17.0	64	101.4	**OATS**	**11, 12**
4 Oct 2023	20.2	55	102.2	**TC**	**13**

EMC - EMC Test Bench
SAC - Semi-Anechoic Chamber
OATS - Open Area Test Site
TC - Temperature Chamber
LISN - LISN Test Area
ESD - ESD Test Bench
IMM - Immunity Test Area
RI - Radiated Immunity Chamber

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.

Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.

13 October 2023
Date

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. F. VOSS
31327

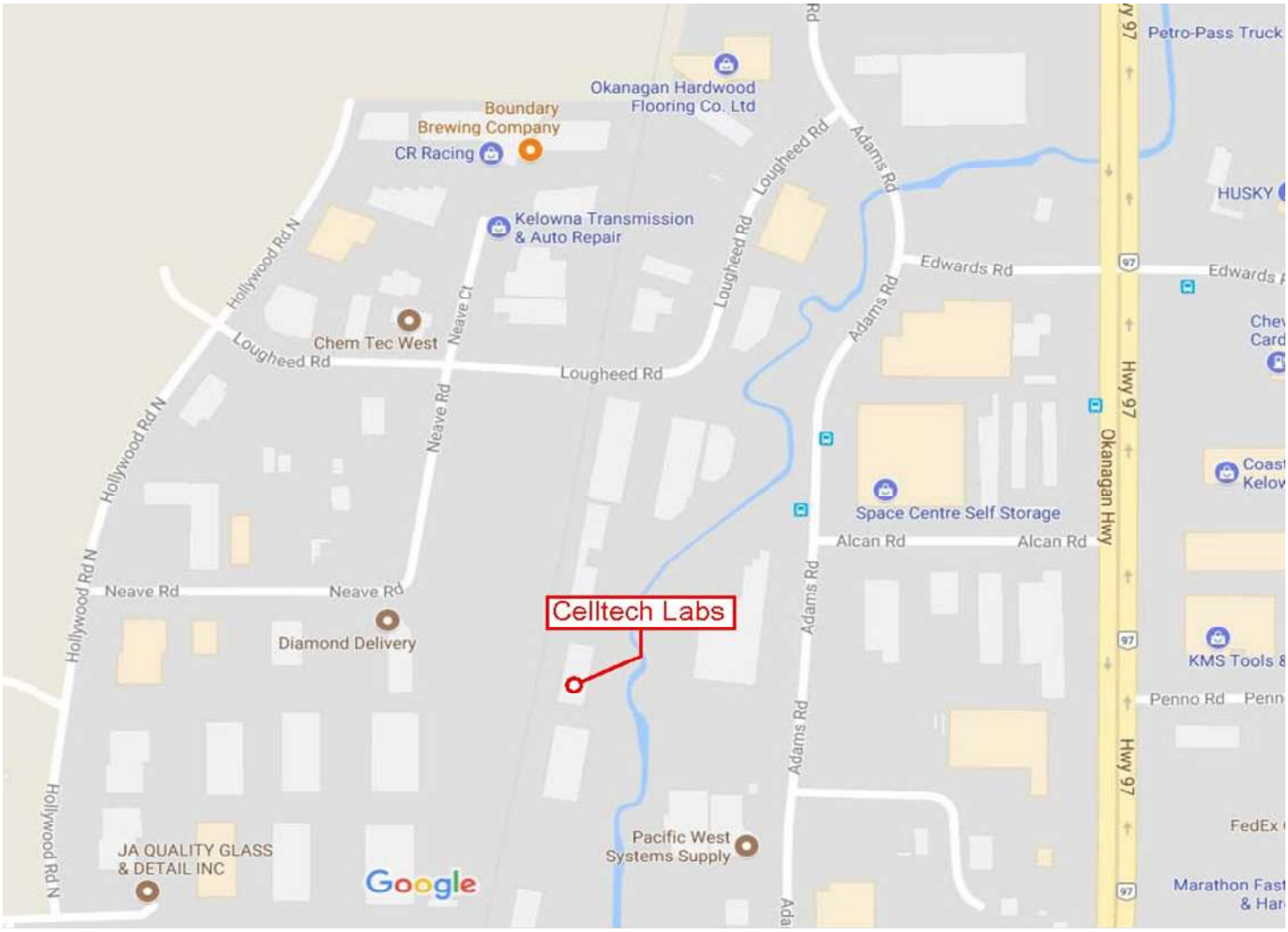
5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
ANSI C63.4-2014	American National Standard of Procedures for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electric and Electronic Equipment in the Range of 9kHz to 40GHz
ANSI C63.26-2015	American National Standard of Procedures for Compliance Testing of Transmitters Used in Licensed Radio Services
ANSI/TIA-382-A	Minimum Standards - Citizens Band Radio Service Amplitude Modulated (AM) Transceivers Operating in the 27 MHz Band (Revision of EIA-382)
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (Revision of TIA-603-D)
CFR Title 47: Part 2:	Code of Federal Regulations Telecommunication Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR Title 47: Part 2: Subpart (2.1091):	Code of Federal Regulations Telecommunication Frequency Allocations and Radio Treaty Matters; General Rules and Regulations Radiofrequency radiation exposure evaluation: mobile devices.
CFR Title 47: Part 15: Subpart B:	Code of Federal Regulations Telecommunication Radio Frequency Devices Unintentional Radiators
CFR Title 47: Part 95: Subpart D:	Code of Federal Regulations Telecommunication Personal Radio Service Citizens Band Radio Service (CBRS)

6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874 and Industry Canada under Test Site File Number IC 3874A. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 CONDUCTED POWER

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §2.1033(c)(8), §95.967
Procedural Reference	EIA/TIA-382-A, TIA-603-E

Limits	
47 CFR §95.967	(a) When transmitting amplitude modulated (AM) voice signals or frequency modulated (FM) voice signals, the mean carrier power must not exceed 4 Watts.
	(b) When transmitting single sideband (SSB) voice signals, the peak envelope power must not exceed 12 Watts..

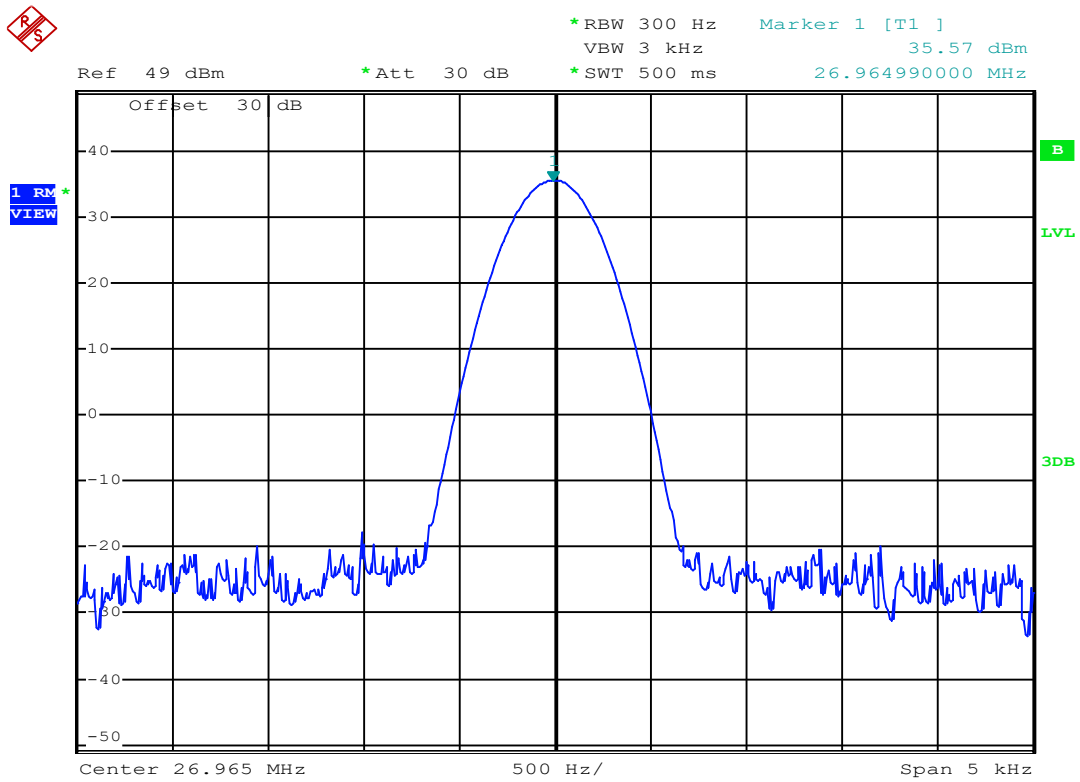
General Procedure	
EIA/TIA-382-A	**19. TRANSMITTER CARRIER POWER OUTPUT** Transmitter Carrier Power Output for this service is the power (rms) available at the output terminals of the transmitter when the output terminals are connected to a standard output load. This measurement shall be performed without modulation, at standard test. conditions.
TIA-603-E	**2.2.1 Conducted Carrier Output Power Rating** The conducted carrier power output rating for a transmitter is the power available at the output terminals of the transmitter when the output terminals are connected to the standard transmitter load.

Test Setup	Appendix A - Figure A.1

Measurement Procedure
AM / FM Operation: DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device.
SSB Operation: A two-tone modulation signal was connected to the DUT's audio input. DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The modulation signal was increased until there was no further increase in output power. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device.

Plot 7.1 – Conducted Output Power, Channel 1, AM

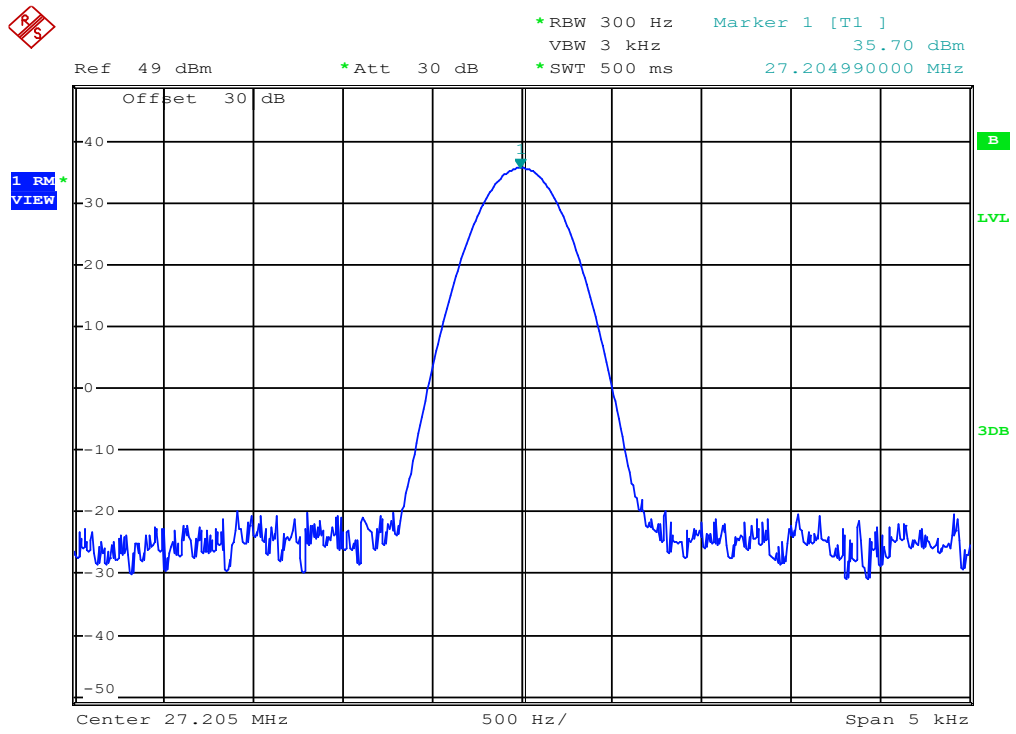
Conducted Power:



Channel:	1	**Channel Frequency:**	26.965	MHz
Mode:	AM	**Modulation:**	AM	
		Measured Power:	35.57	dBm

Plot 7.2 – Conducted Output Power, Channel 20, AM

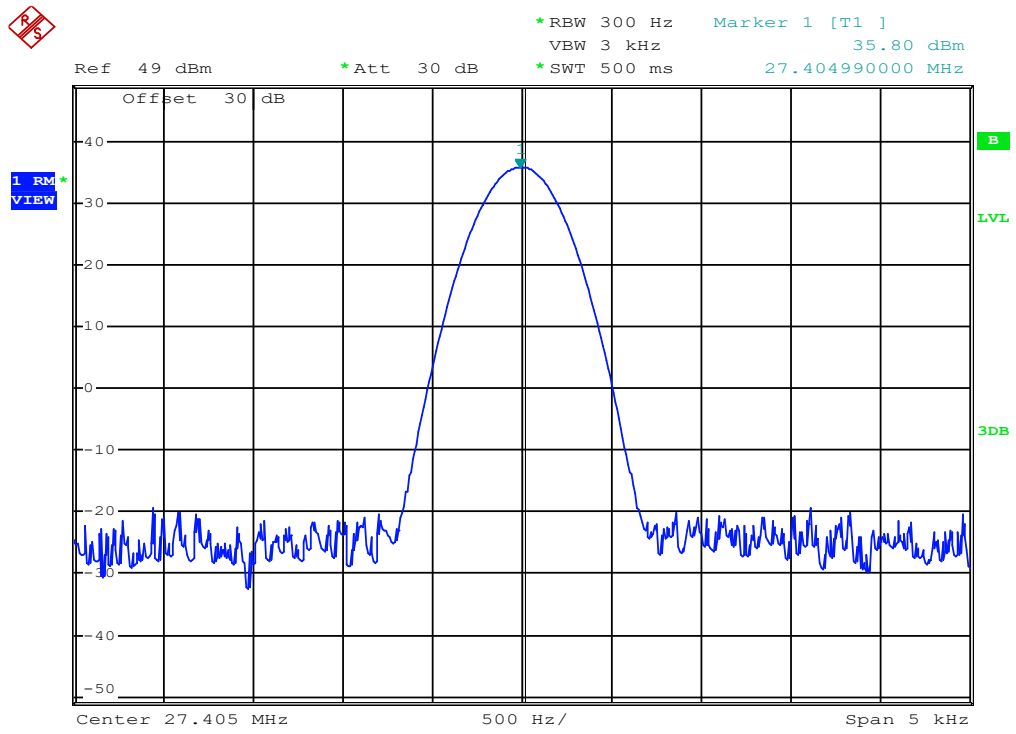
Conducted Power:



Channel:	20	**Channel Frequency:**	27.205	MHz
Mode:	AM	**Modulation:**	AM	
		Measured Power:	35.7	dBm

Plot 7.3 – Conducted Output Power, Channel 40, AM

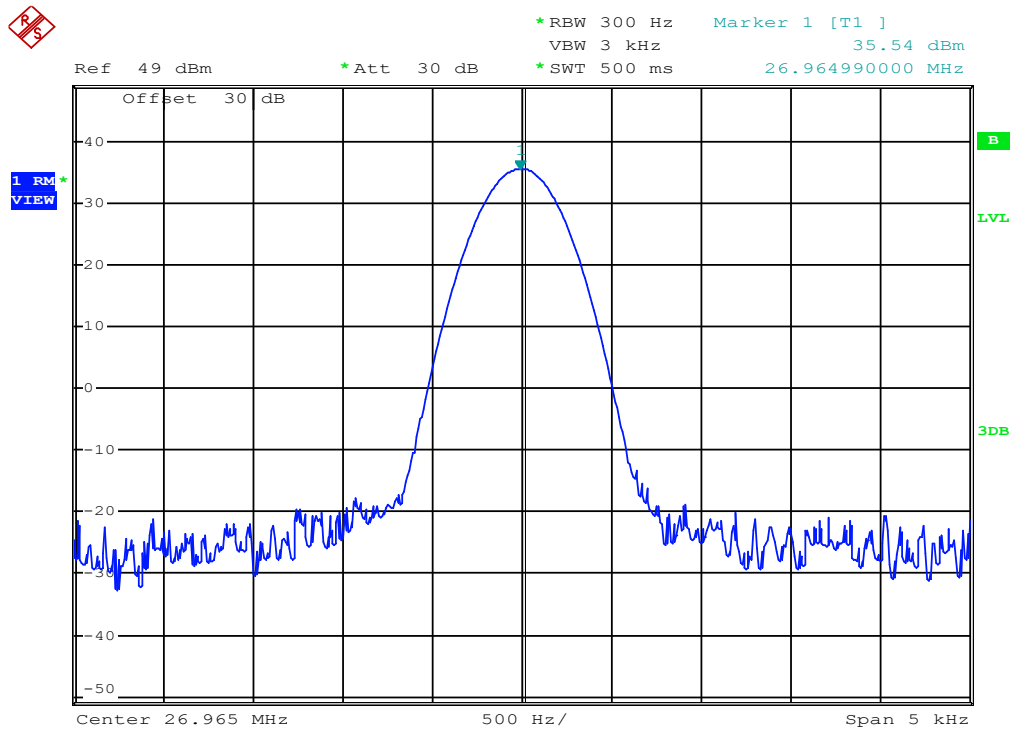
Conducted Power:



Channel:	40	**Channel Frequency:**	27.405	MHz
Mode:	AM	**Modulation:**	AM	
		Measured Power:	35.8	dBm

Plot 7.4 – Conducted Output Power, Channel 1, FM

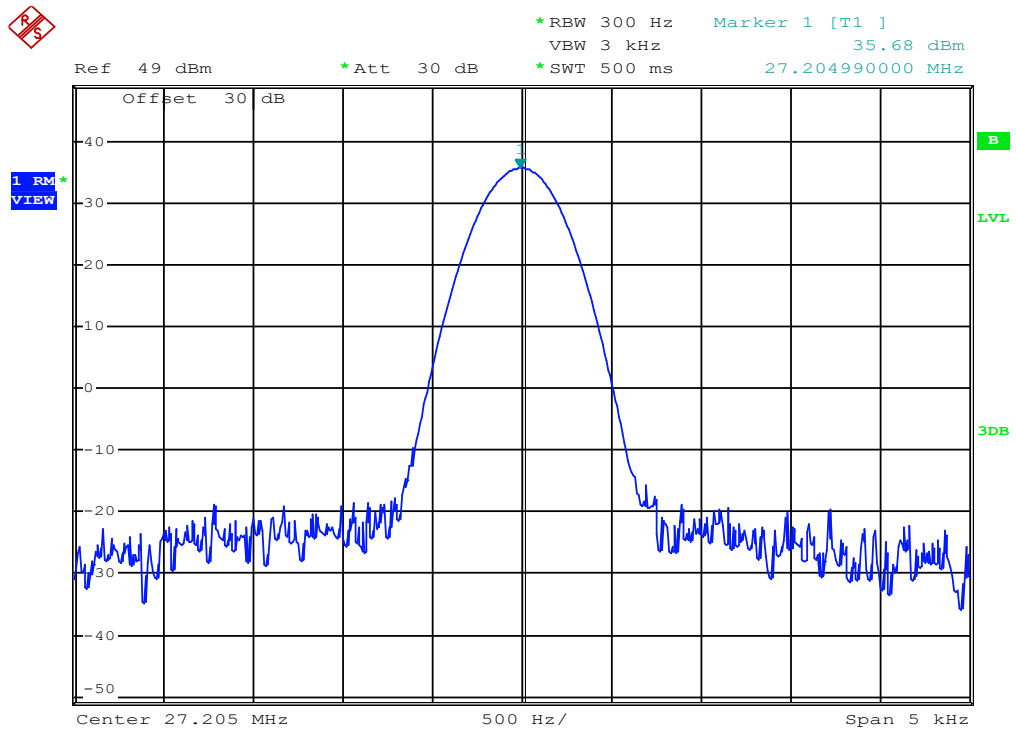
Conducted Power:



Channel:	1		**Channel Frequency:**	26.965	MHz
Mode:	FM		**Modulation:**	FM	
			Measured Power:	35.54	dBm

Plot 7.5 – Conducted Output Power, Channel 20, FM

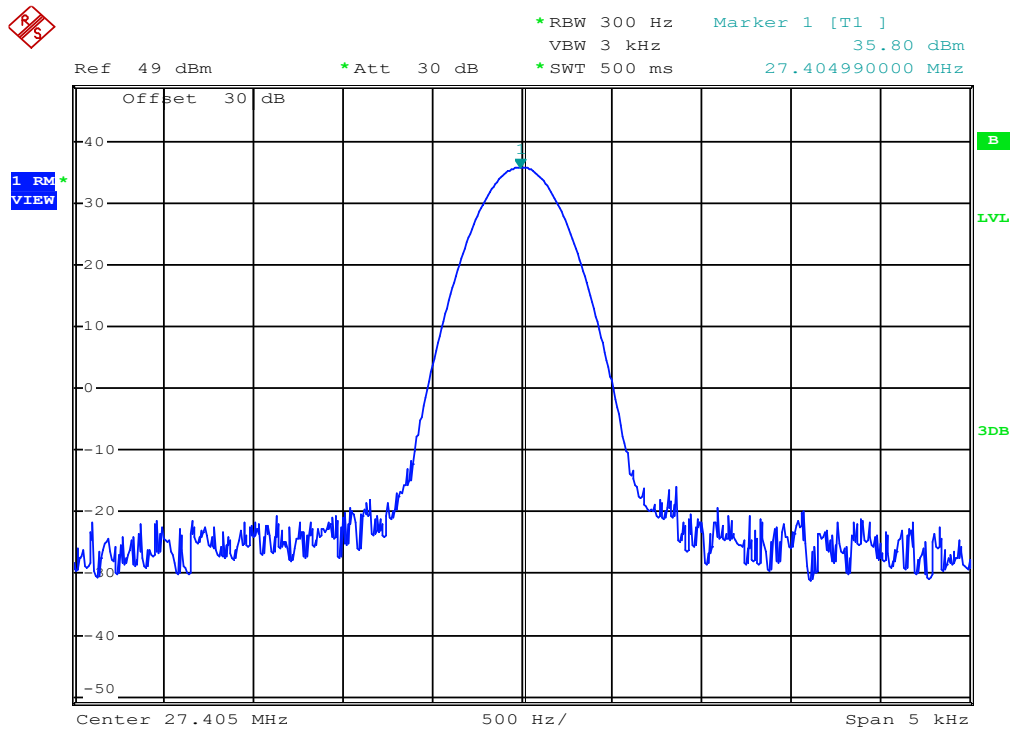
Conducted Power:



Channel:	20	**Channel Frequency:**	27.205	MHz
Mode:	FM	**Modulation:**	FM	
		Measured Power:	35.68	dBm

Plot 7.6 – Conducted Output Power, Channel 40, FM

Conducted Power:



Channel:	40	**Channel Frequency:**	24.405	MHz
Mode:	FM	**Modulation:**	FM	
		Measured Power:	35.8	dBm

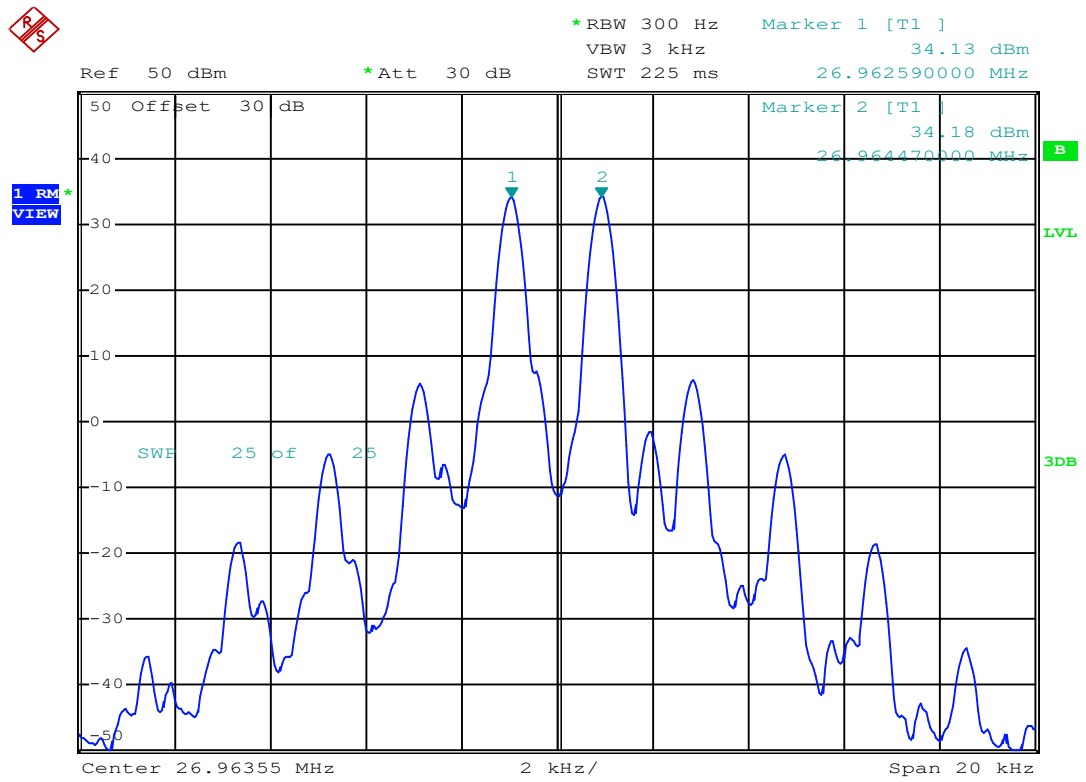
Table 7.1 – Summary of Conducted Power Measurements (RMS)

Conducted Power Measurement Results:						
Channel Number	Channel Frequency (MHz)	Mode	Modulation	Measured Power [P_{Meas}] (dBm)	Limit [P_{Lim}] (dBm)	Margin (dB)
1	26.97	AM	AM	35.57	36	0.43
20	27.21			35.70		0.30
40	27.41			35.80		0.20
1	26.97	FM	FM	35.54		0.46
20	27.21			35.68		0.32
40	24.41			35.80		0.20
					Result:	Complies

Conducted Margin = P_{Limit} - P_{Meas}

Plot 7.7 – Conducted Output Power, Channel 1, AM Lower Side Band

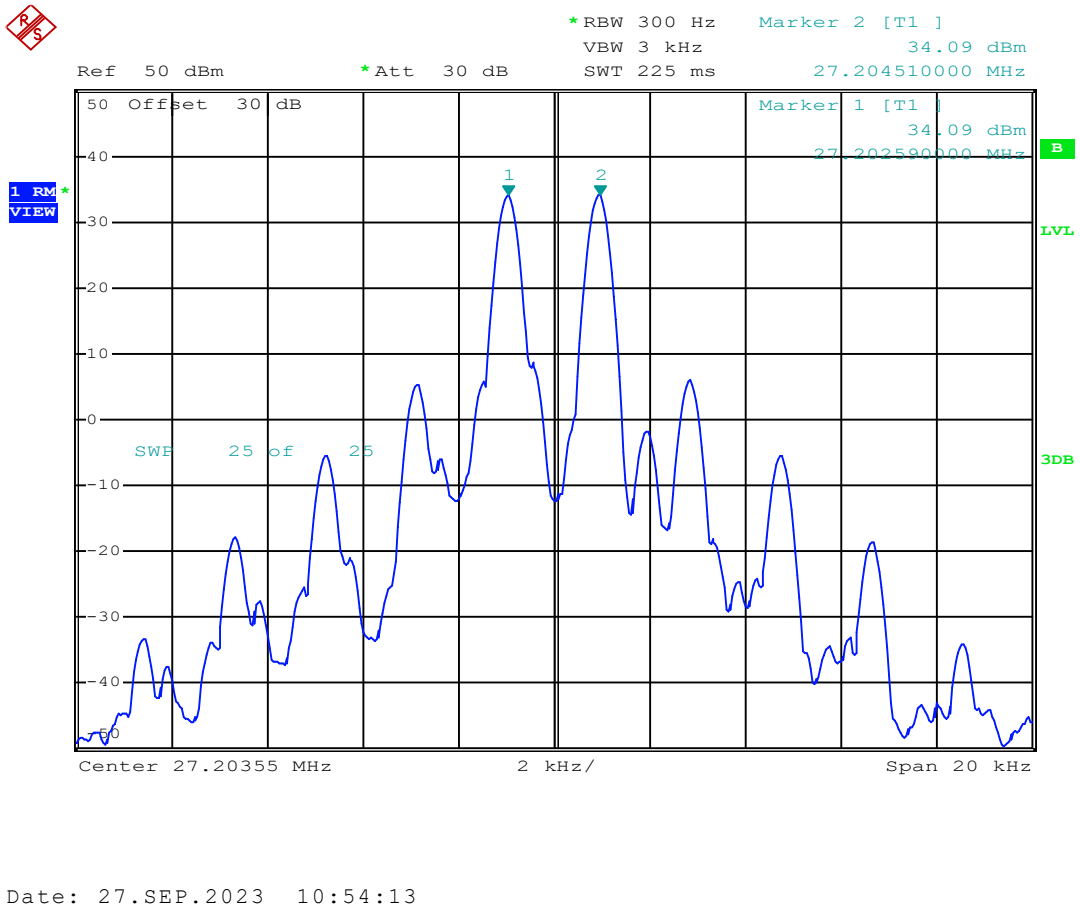
Conducted Power:



Channel:	**1**	**Channel Frequency:**	**26.965**	**MHz**
Mode:	**LSB**	**Modulation:**	**AM**	
		Measured Average Power:	**34.18**	**dBm**

Plot 7.8 – Conducted Output Power, Channel 20, AM Lower Side Band

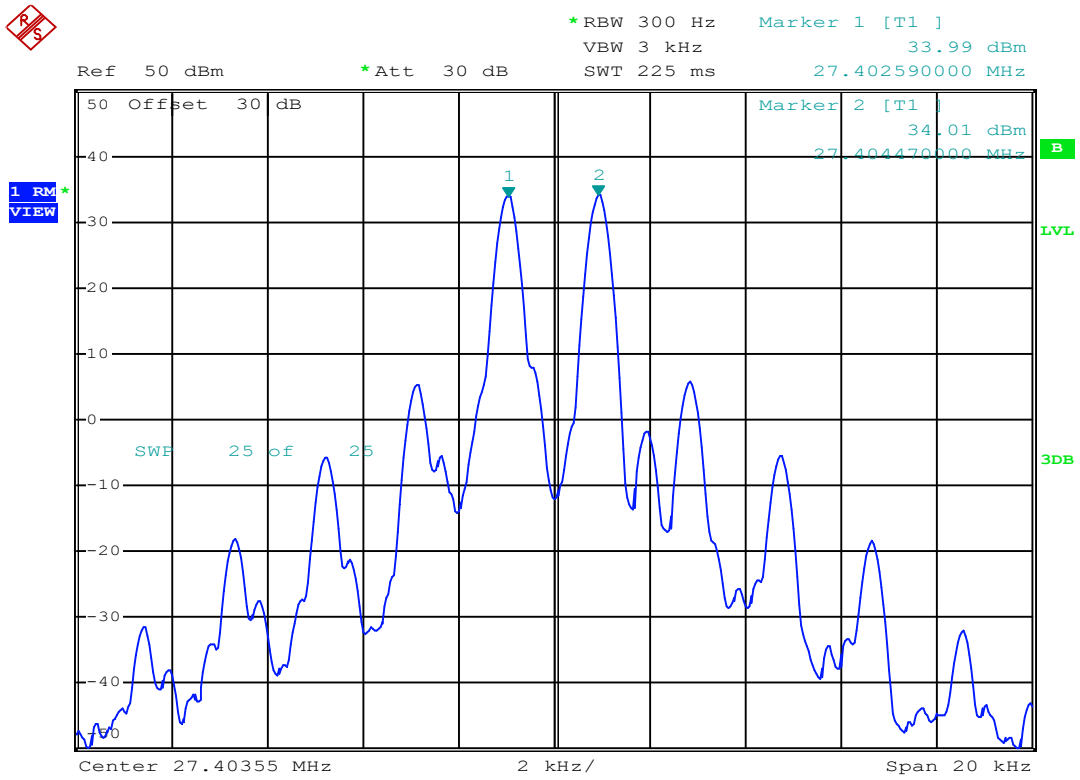
Conducted Power:



Channel:	**20**		**Channel Frequency:**	**27.205**	**MHz**
Mode:	**LSB**		**Modulation:**	**AM**	
			Measured Average Power:	**34.09**	**dBm**

Plot 7.9 – Conducted Output Power, Channel 40, AM Lower Side Band

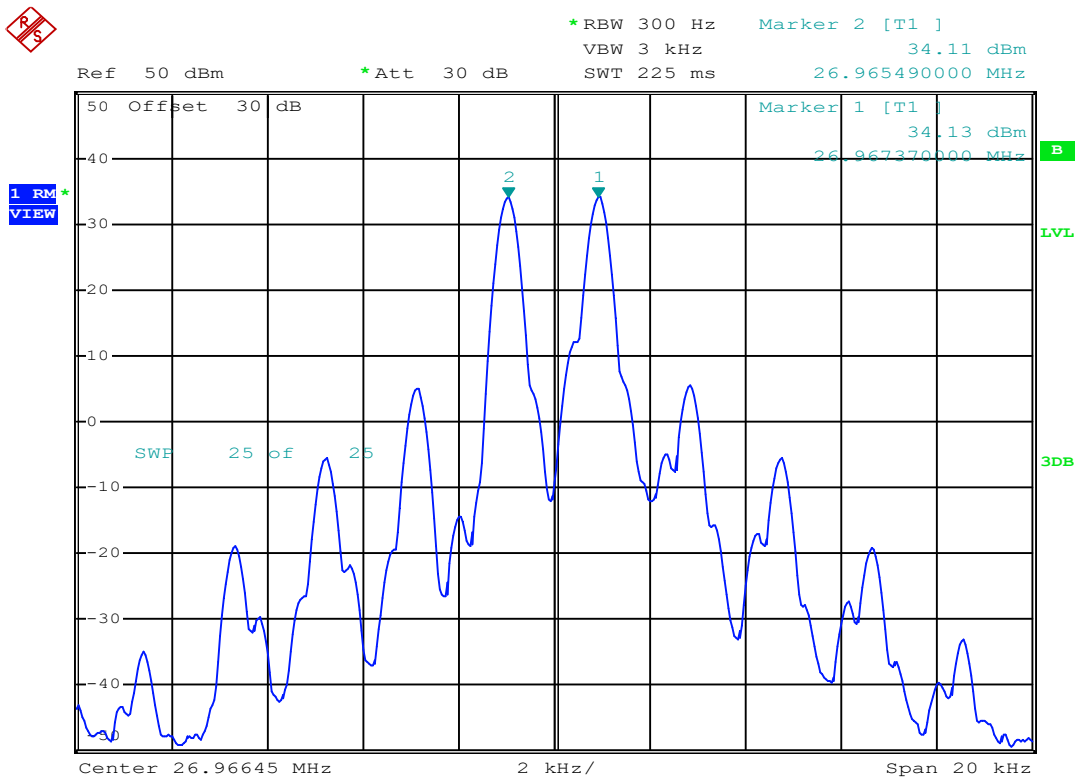
Conducted Power:



Channel:	**40**	**Channel Frequency:**	**27.405**	**MHz**
Mode:	**LSB**	**Modulation:**	**AM**	
		Measured Average Power:	**34.01**	**dBm**

Plot 7.10 – Conducted Output Power, Channel 1, AM Upper Side Band

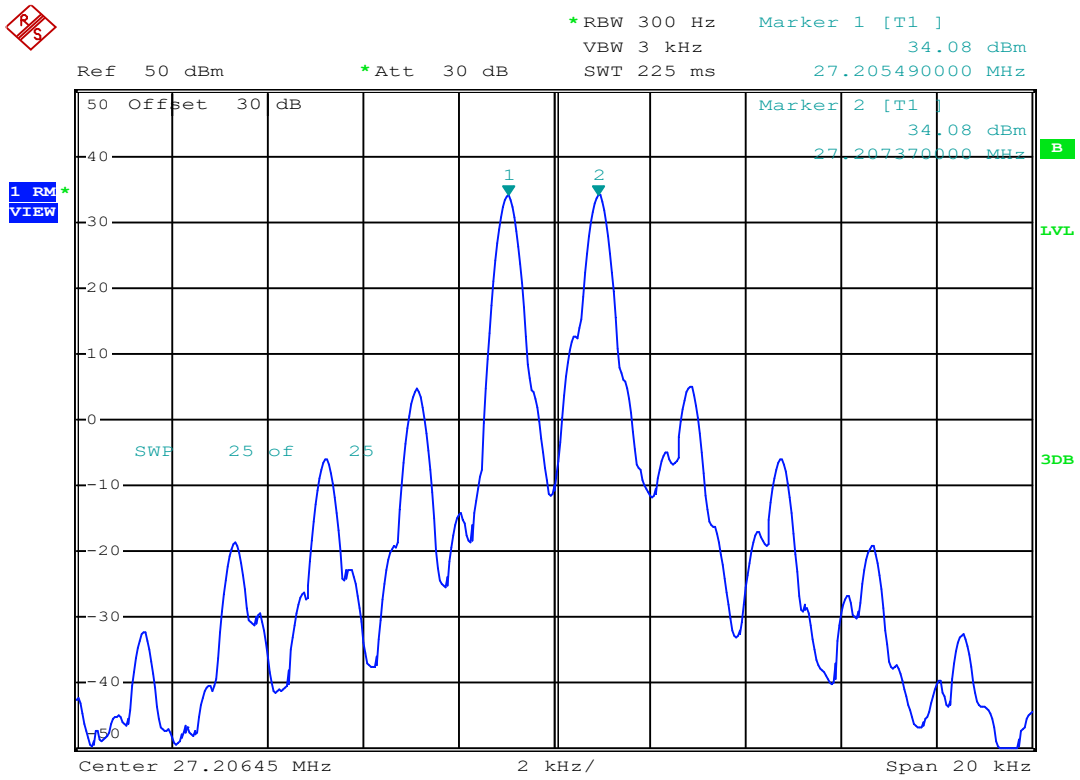
Conducted Power:



Channel:	1	**Channel Frequency:**	26.965	MHz
Mode:	USB	**Modulation:**	AM	
		Measured Average Power:	34.13	dBm

Plot 7.11 – Conducted Output Power, Channel 20, AM Upper Side Band

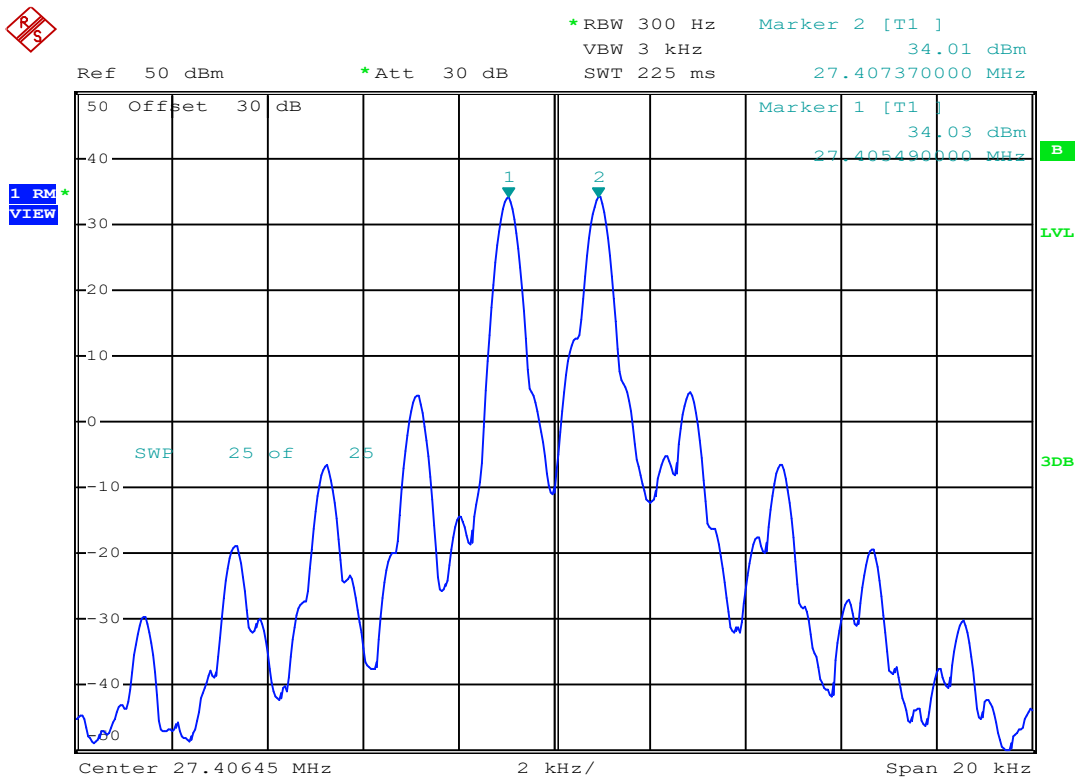
Conducted Power:



Channel:	**20**	**Channel Frequency:**	**27.205** **MHz**
Mode:	**USB**	**Modulation:**	**AM**
		Measured Average Power:	**34.08** **dBm**

Plot 7.12 – Conducted Output Power, Channel 20, AM Upper Side Band

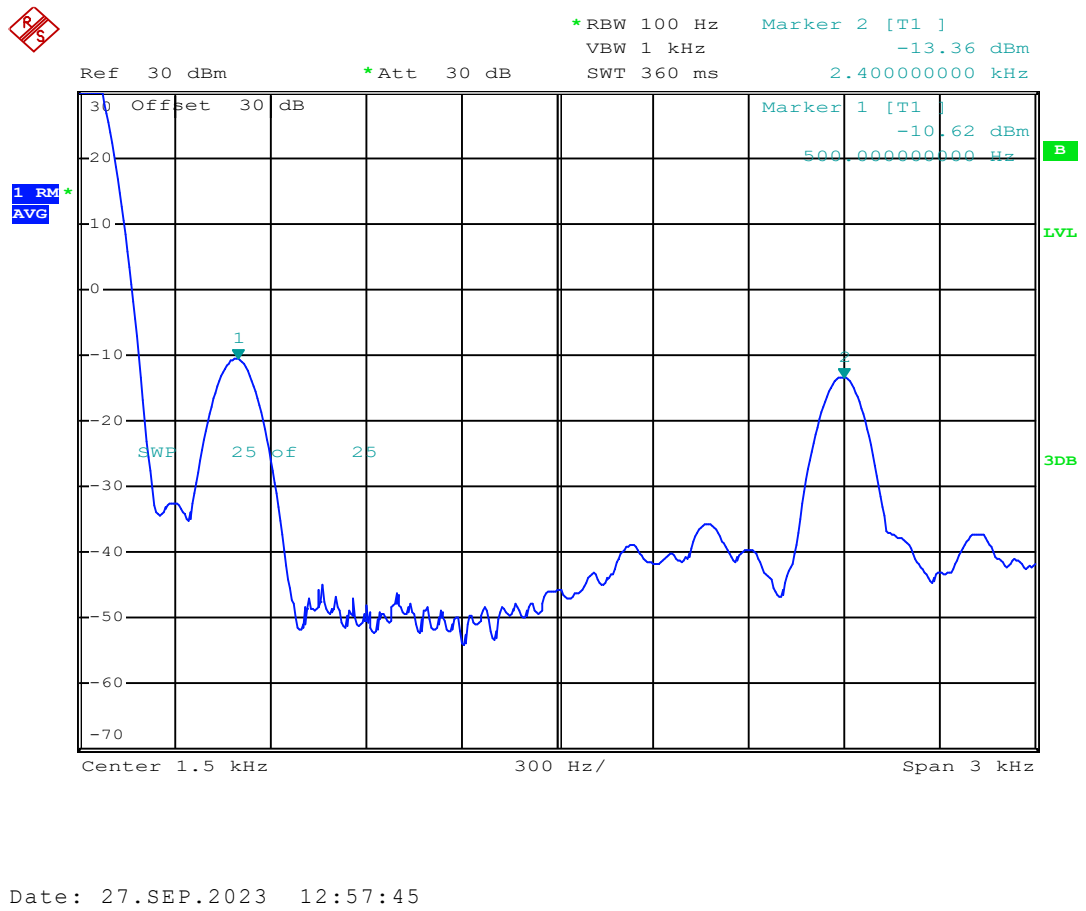
Conducted Power:



Channel:	40	**Channel Frequency:**	27.405 MHz
Mode:	USB	**Modulation:**	AM
		Measured Average Power:	34.03 dBm

Plot 7.13 – Two-Tone Input Signal AM Lower Side Band

Two-Tone Input

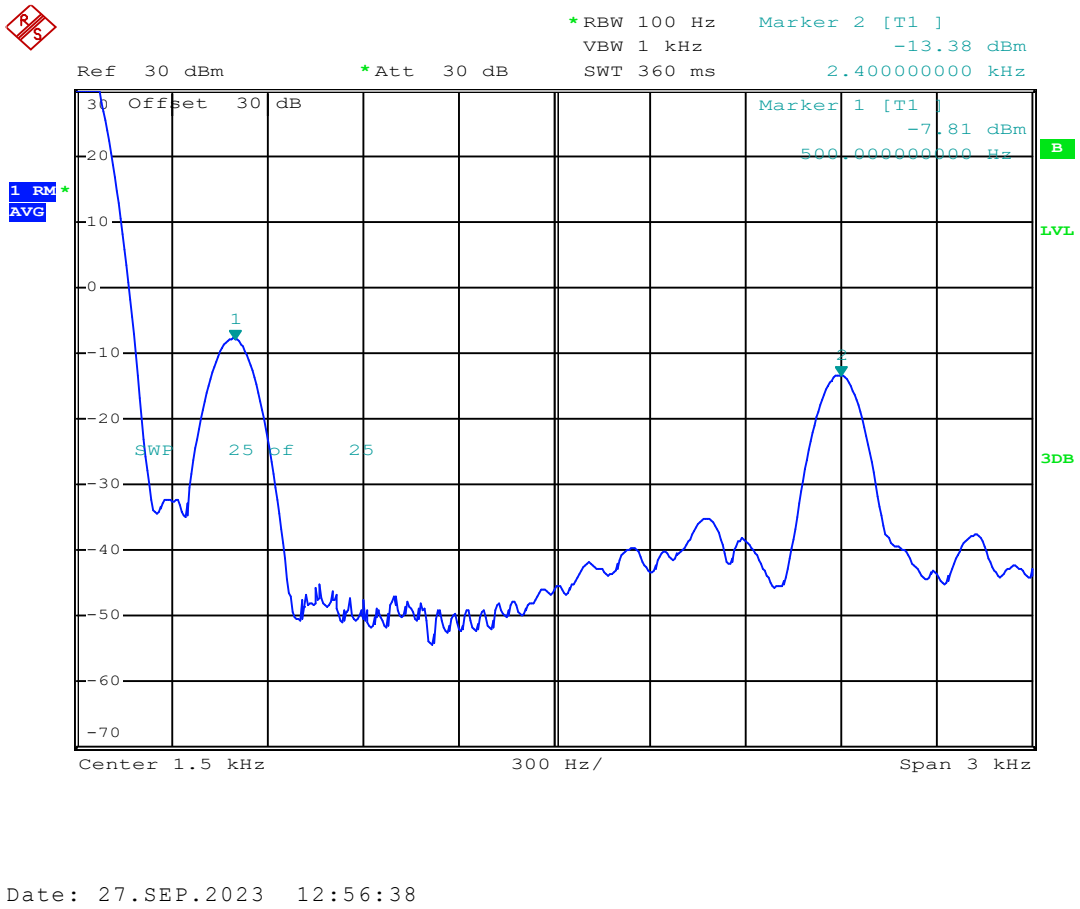


Modulation:	**CW**	**Tone 1:**	**500** **Hz**
Mode:	**LSB**	**Tone 2:**	**2400** **Hz**

Adjusted to create equal amplitudes of DUT output power on both tones.

Plot 7.14 – Two-Tone Input Signal AM Upper Side Band

Two-Tone Input



Modulation:	**CW**	**Tone 1:**	**500** **Hz**
Mode:	**USB**	**Tone 2:**	**2400** **Hz**

Adjusted to create equal amplitudes of DUT output power on both tones.

Table 7.2 Summary of Conducted Power Measurements (RMS)

Conducted Power Measurement Results:							
Channel Number	Channel Frequency (MHz)	Mode	Modulation	Measured Power [P_{Meas}] (dBm)	Measured PEP [P_{PEP}] (dBm	Limit [P_{Lim}] (dBm)	Margin (dB)
1	26.97	LSB	AM	34.18	37.18	40.8	3.62
20	27.21	LSB	AM	34.09	37.09	40.8	3.71
40	27.41	LSB	AM	34.01	37.01	40.8	3.79
1	26.97	USB	AM	34.13	37.13	40.8	3.67
20	27.21	USB	AM	34.08	37.08	40.8	3.72
40	27.41	USB	AM	34.03	37.03	40.8	3.77
CW	500.00	LSB	2400.00		3.00	40.8	37.80
CW	500.00	USB	2400.00		3.00	40.8	37.80
						Result:	Complies

Measure Peak Envelope Power is Twice the Measured Average Power

Measure Peak Envelope Power $P_{PEP} = P_{Meas} + 3dB$

Conducted Margin = $P_{Limit} - P_{PEP}$

Table 7.3 – Compliance to §2.1033(c)(8) – 13.8VDC, AM, FM

FCC CFR 47 §2.1033(c)(8): Power to Transmitter: AM	
Measured Receiver Current:	IRx = 0.26A
Measured Total Current:	ITx = 2.42A
Transmitter Current (ITx - IRx):	IXmitter = 2.16A
Power to Transmitter:	(13.8VDC)(0.2.16) = 29.8W
Result:	Complies

FCC CFR 47 §2.1033(c)(8): Power to Transmitter: FM	
Measured Receiver Current:	IRx = 0.26A
Measured Total Current:	ITx = 2.41A
Transmitter Current (ITx - IRx):	IXmitter = 2.11A
Power to Transmitter:	(13.8VDC)(0.2.41) = 29.7W
Result:	Complies

FCC CFR 47 §2.1033(c)(8): Power to Transmitter: AM LSB	
Measured Receiver Current:	IRx = 0.29A
Measured Total Current:	ITx = 3.05A
Transmitter Current (ITx - IRx):	IXmitter = 2.76A
Power to Transmitter:	(13.8VDC)(2.76) = 38.1W
Result:	Complies

FCC CFR 47 §2.1033(c)(8): Power to Transmitter: AM USB	
Measured Receiver Current:	IRx = 0.29A
Measured Total Current:	ITx = 3.05A
Transmitter Current (ITx - IRx):	IXmitter = 2.76A
Power to Transmitter:	(13.8VDC)(2.76) = 38.1W
Result:	Complies

Statement - Compliance to §95.977

§95.977 CBRS tone transmissions.
In addition to the tones permitted under §95.377, CBRS transmitter types may be designed to transmit brief tones to indicate the beginning or end of a transmission.

This device is capable of transmitting a brief (less than one second) audio tone, “Roger Beep”, when the PTT button is released on the microphone indicating end of transmission. This function is user selectable and complies with the requirements of §95.377. See User’s Manual.

8.0 MODULATION RESPONSE

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1047, §95.975**

Limits	
47 CFR §2.1047	a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted.
47 CFR §95.975	Each CBRS transmitter type must be designed such that the modulation characteristics are in compliance with the rules in this section. (a) When emission type A3E is transmitted with voice modulation, the modulation percentage must be at least 85%, but not more than 100%. (b) When emission type A3E is transmitted by a CBRS transmitter having a transmitter output power of more than 2.5 W, the transmitter must contain a circuit that automatically prevents the modulation percentage from exceeding 100%. (c) When emission type F3E is transmitted the peak frequency deviation shall not exceed ±2 kHz.

Measurement Procedure	
TIA 382 25.2	**Transmitter Audio Frequency Response** Operate the transmitter under standard test conditions and monitor the output with a modulation monitor or calibrated test receiver. The audio input signal applied through a suitable impedance matching network, as specified by the manufacturer, shall be adjusted to obtain 50% modulation at the maximum audio frequency response of the transmitter, and this point shall be taken as the 0 dB reference level. Vary the modulating frequency from 100 Hz to 10,000 Hz and record the input levels necessary to maintain a constant 50% modulation. Graph the audio level in dB relative to the 0 dB reference level as a function of the modulating frequency. Record any audio frequency where it is impossible to perform the measurement.
TIA-603-E	**2.2.6 Audio Frequency Response** 2.2.6.2.1 Constant deviation test method (300 Hz to 3000 Hz) a) Connect the equipment as illustrated. b) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤50 Hz to ≥15,000 Hz. Turn the de-emphasis function off. c) Set the DMM to measure rms voltage. d) Adjust the transmitter per the manufacturer's procedure for full rated system deviation. e) Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation. f) Set the test receiver to measure rms deviation and record the deviation reading. g) Record the DMM reading as V_{REF} . h) Set the audio frequency generator to the desired test frequency between 300 Hz and 3000 Hz. i) Vary the audio frequency generator output level until the deviation reading that was recorded in step f) is obtained. j) Record the DMM reading as V_{FREQ} . k) Calculate the audio frequency response at the present frequency as: audio frequency response= $20\text{Log}(V_{FREQ}/V_{REF})$

TIA 382 24.2.2	**Transmitter Modulation Limiting** The transmitter is modulated by a sinusoidal audio signal applied to the microphone input jack. First the audio input frequency is adjusted to deliver 50% modulation at the audio frequency that produces the maximum modulation level. Record the modulation input level (mV) and use this level as 0 dB for plotting modulation limiting. Increment the audio signal level to 40 dB above the reference level. Record the modulation level (%). Repeat the measurements using a 400 Hz and a 2500 Hz sinusoidal audio signal. Record the modulation level (%). Perform for both positive and negative modulation.
TIA-603-E	**2.2.3 Transmitter Modulation Limiting** a) Connect the equipment as illustrated. b) Adjust the transmitter per the manufacturer's procedure for full rated system deviation. c) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤0.25 Hz to ≥15,000 Hz. Turn the de-emphasis function off. d) Apply a 1000 Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain 60% of full rated system deviation. e) Increase the level from the audio frequency generator by 20 dB in one step (rise time between the 10% and 90% points shall be 0.1 second maximum). f) Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level. g) With the level from the audio frequency generator held constant at the level obtained in step e), slowly vary the audio frequency from 300 Hz to 3000 Hz and observe the steady-state deviation. Record the maximum deviation. h) Set the test receiver to measure peak negative deviation and repeat steps d) through g).

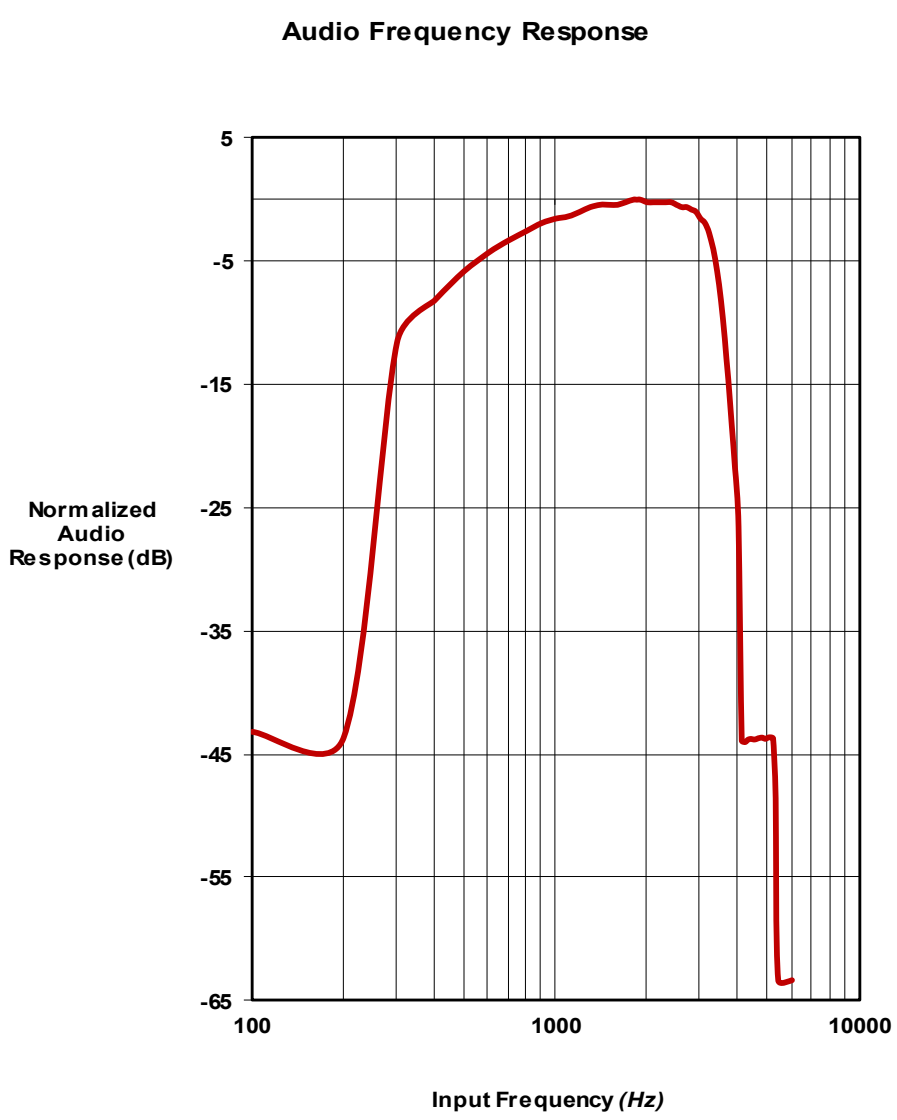
ANSI C63.26	**5.3 Modulation Characteristics** **5.3.1 c)** Single-sideband and independent-sideband radiotelephone transmitters that employ a device or circuit to limit peak envelope power. A curve showing the peak envelope output power versus the modulation input voltage shall be supplied. Radiotelephone transmitters equipped with a device to limit modulation or peak envelope power shall be modulated as follows. For single-sideband and independent-sideband transmitters, the input level of the modulating signal shall be 10 dB greater than that necessary to produce rated peak envelope power.
	5.3.2 c) 2) Single sideband transmitters in A3E or J3E emission modes—when modulated by two tones at frequencies of 400 Hz and 1800 Hz (for 3.0 kHz authorized bandwidth), or 500 Hz and 2100 Hz (for 3.5 kHz authorized bandwidth), or 500 Hz and 2400 Hz (for 4.0 kHz authorized bandwidth), applied simultaneously. The input levels of the tones shall be so adjusted that the two principal frequency components of the RF signal produced are equal in magnitude.

Test Setup	**Appendix A Figure A.2**

Plot 8.1 – Audio Frequency and Low Pass Filter Response, AM

Audio Frequency and Low Pass Filter Response

Measured Audio Response		
Freq	Audio Response (@ 50% MI)	
(Hz)	*(mV)*	*(dB)**
100	590.00	-43.161
300	15.50	-11.551
500	8.00	-5.806
700	6.00	-3.307
900	5.10	-1.896
1100	4.80	-1.369
1300	4.40	-0.613
1500	4.30	-0.414
1700	4.20	-0.209
1850	**4.10**	**0.000**
2000	4.20	-0.209
2200	4.20	-0.209
2400	4.20	-0.209
2600	4.40	-0.613
2800	4.50	-0.809
3000	4.90	-1.548
3200	5.60	-2.708
3400	8.00	-5.806
3600	15.00	-11.266
3800	34.00	-18.374
4000	87.00	-26.535
4200	650.00	-44.003
4400	630.00	-43.731
4600	630.00	-43.731
4800	624.00	-43.648
5000	623.00	-43.634
5200	628.00	-43.704
5400	6000.00	-63.307
6000	6000.00	-63.307
7500	6000.00	-63.307
1000	6000.00	-63.307
*** Normalize to 1850Hz**		

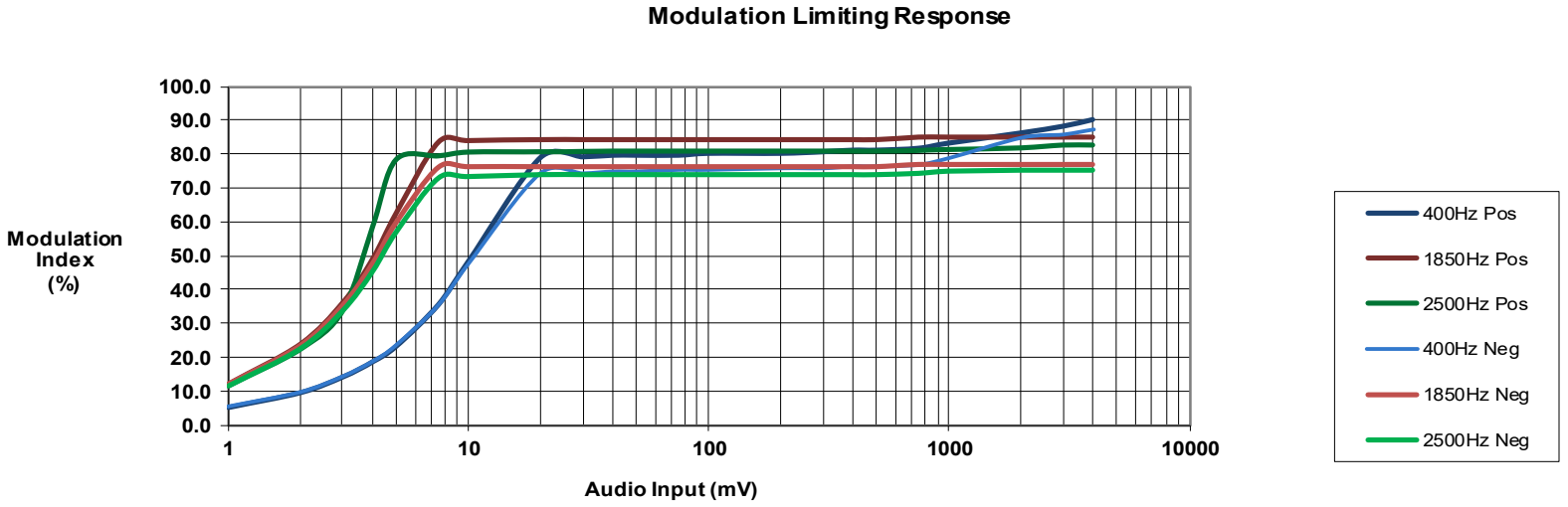


Note: 50% MI could not be achieved above 5400Hz.

Audio Frequency at -6dB Attenuation:	3300Hz
Audio Frequency @ Maximum Response (f_{MAX}):	1850Hz
Audio Input @ Maximum Response (V_{MAX}):	4.1mV
Result:	Complies

Plot 8.2 – Modulation Limiting Response, AM

Modulation Limiting Response



Measured Modulation Response [Modulation Index (%)]

Freq (Hz)	Audio Input (mV)																						Deviation
	1	2	3	4	5	7.5	10	20	30	40	50	75	100	200	300	400	500	750	1000	2000	3000	4000	
400	5.2	9.6	14.2	18.7	23.2	35.5	48.2	78.8	79.0	79.5	79.5	79.5	80.0	80.0	80.5	81.0	81.0	81.5	83.0	86.0	88.0	90.0	Positive
1850	12.0	23.9	36.1	49.1	62.5	83.5	84.0	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3	85.0	85.0	85.0	85.0	85.0	
2500	11.4	22.4	33.8	58.8	78.5	79.6	80.7	80.8	80.9	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.2	81.5	82.0	82.8	82.8	
400	5.3	9.6	14.2	18.6	23.4	35.3	47.5	74.5	74.5	75.0	75.0	75.5	75.5	76.0	76.0	76.5	76.5	77.0	79.0	85.0	86.0	87.5	Negative
1850	12.0	23.5	35.3	47.6	59.5	75.8	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.6	76.6	76.6	76.6	76.6	
2500	11.5	22.6	33.8	45.5	57.0	73.0	73.4	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.4	75.0	75.3	75.3	75.3	

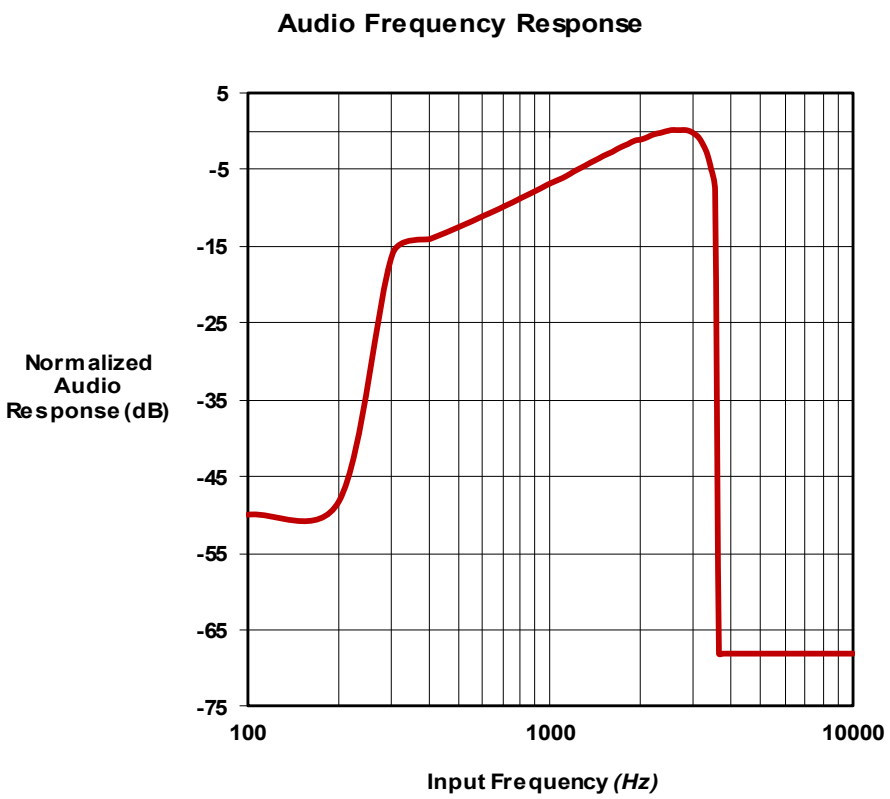
Audio Frequency @ Maximum Deviation (f_{MAX}):	1850Hz
Audio Input @ Maximum Deviation (V_{MAX}):	4.1mV
V_{MAX} + 40dB:	410mV
Maximum Measured Modulation Index:	90%
Result:	Complies

Plot 8.3 – Audio Frequency and Low Pass Filter Response, FM

Audio Frequency and Low Pass Filter Response (FM)

Measured Audio Response		
Freq	Audio Response (@ 20% Deviation)	
(Hz)	*(mV)*	*(dB)**
200	609.00	-48.271
400	12.00	-14.162
600	8.50	-11.167
800	6.50	-8.837
1000	5.20	-6.899
1200	4.35	-5.348
1400	3.70	-3.943
1600	3.25	-2.816
1800	2.90	-1.827
2000	2.70	-1.206
2200	2.50	-0.537
2400	2.40	-0.183
2600	2.35	0.000
2650	**2.35**	**0.000**
2800	2.35	0.000
3000	2.50	-0.537
3200	2.95	-1.975
3400	4.25	-5.146
3600	6000.00	-68.142

*** Normalize to 2650Hz**

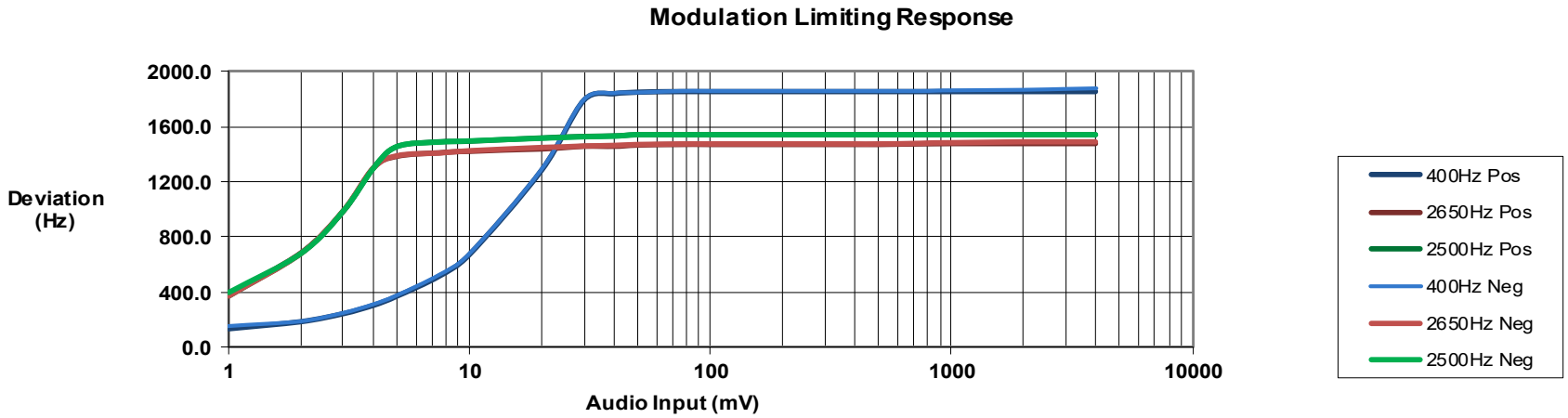


Note: 20% Deviation (+/-400Hz) could not be achieved above 3600Hz.

Audio Frequency at -6dB Attenuation:	3450Hz
Audio Frequency @ Maximum Response (f_{MAX}):	2650Hz
Audio Input @ Maximum Response (V_{MAX}):	2.35mV
Result:	Complies

Plot 8.4 – Modulation Limiting Response, FM

Modulation Limiting Response (FM)



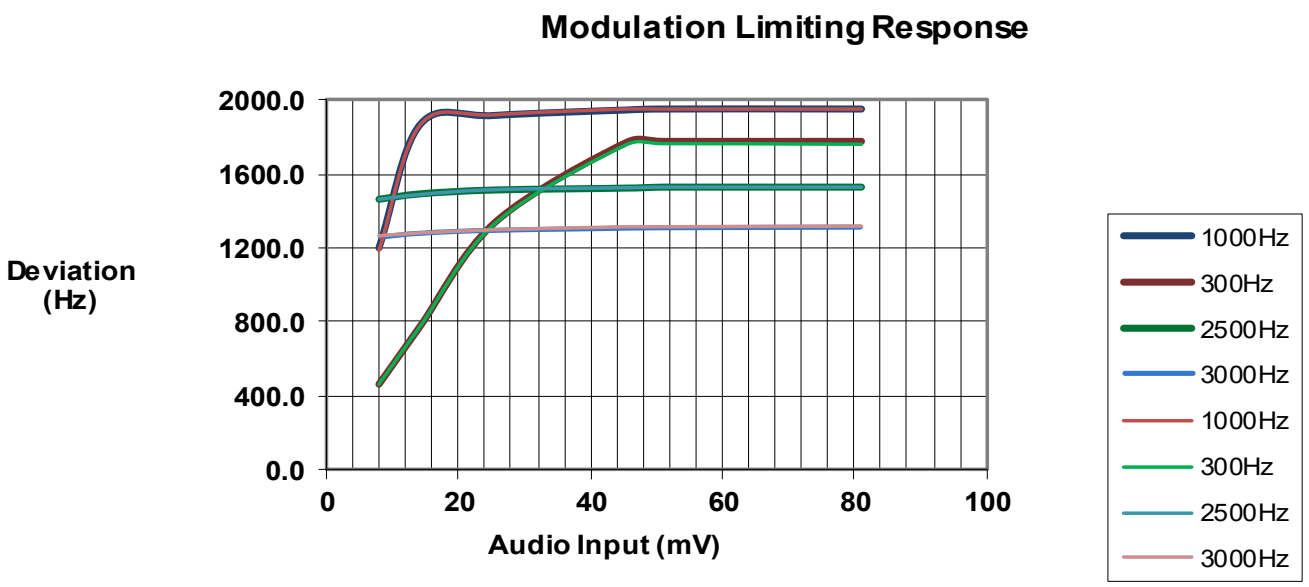
Measured Modulation Response: Frequency Deviation (Hz)

Freq (Hz)	Audio Input (mV)																						Deviation
	1	2	3	4	5	7.5	10	20	30	40	50	75	100	200	300	400	500	750	1000	2000	3000	4000	
400	140	192	250	310	375	520	675	1285	1790	1835	1845	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	Positive
2650	380	684	991	1303	1388	1414	1425	1442	1460	1460	1470	1475	1475	1475	1475	1475	1475	1478	1480	1480	1480	1480	
2500	375	685	990	1300	1455	1490	1495	1518	1529	1532	1541	1541	1541	1541	1541	1541	1541	1541	1541	1541	1541	1541	
400	155	190	250	312	376	525	676	1290	1798	1845	1850	1860	1860	1860	1860	1860	1860	1860	1865	1869	1875	1880	Negative
2650	375	685	995	1301	1390	1410	1426	1449	1460	1465	1471	1475	1475	1475	1475	1475	1475	1480	1485	1490	1490	1490	
2500	395	680	990	1300	1460	1491	1500	1520	1530	1535	1545	1545	1545	1545	1545	1545	1545	1545	1545	1545	1545	1545	

Audio Frequency @ Maximum Response (f_{MAX}):	2650Hz
Audio Input @ Maximum Response (V_{MAX}):	2.35mV
V_{MAX} + 40dB:	235mV
Maximum Measured Deviation:	1880Hz
Result:	**Complies**

Plot 8.5 – Modulation Limiting Response, FM (ANSI C63.26)

Modulation Limiting Response (FM): ANSI C63.26

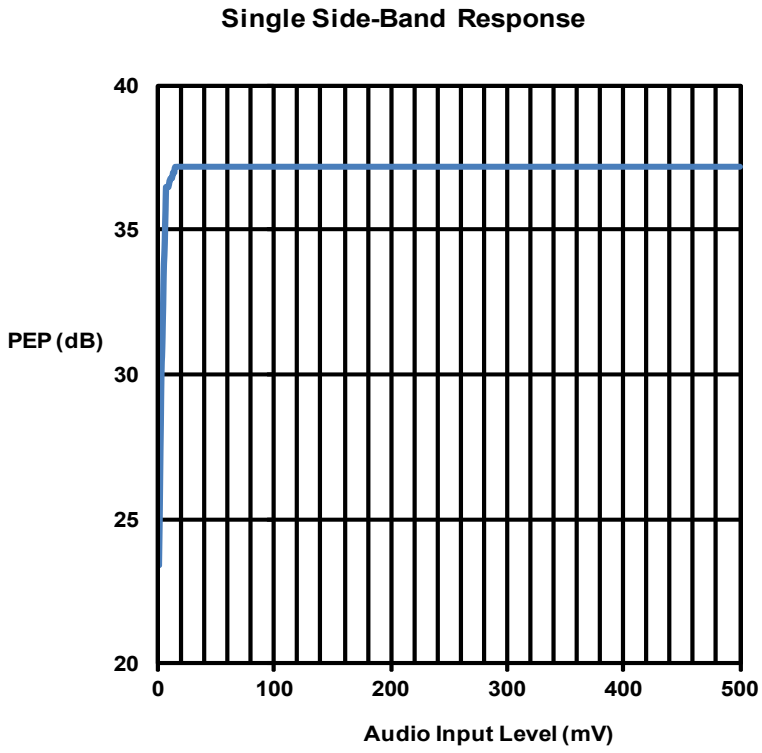


Measured Modulation Response: Frequency Deviation (Hz)							
Freq (Hz)	Audio Input (mV)						Deviation
	+0dB	+5dB	+10dB	+15dB	+16dB	+20dB	
	8.1	14.40	25.61	45.55	51.11	81.00	
1000	1205	1865	1910	1940	1945	1945	Positive
300	460	775	1332	1765	1770	1770	
2500	1461	1490	1510	1520	1525	1525	
3000	1265	1285	1300	1310	1313	1315	
1000	1190	1863	1915	1945	1945	1945	Negative
300	458	776	1333	1762	1768	1765	
2500	1465	1489	1513	1522	1525	1525	
3000	1270	1283	1298	1312	1312	1316	
Audio Input @ 1000Hz @ 60% Deviation (+/- 1.2kHz) (V_{0dB}):							8.1 mV
Maximum Measured Deviation:							1425 Hz
Result:							Complies

Plot 8.6 – Modulation Limiting Response, AM LSB (ANSI C63.26)

Audio Response

Single Side Band Two-Tone Audio Response 500H & 2.4kHz	
Input *(mV)*	**PEP *(dBm)***
1	23.4
2	26.5
3	29.8
4	31.3
5	33.5
6	34.7
7	36.5
8	36.5
9	36.5
10	36.7
11	36.8
12	36.8
13	37.0
14	37.0
15	37.2
20	37.2
50	37.2
100	37.2
500	37.2

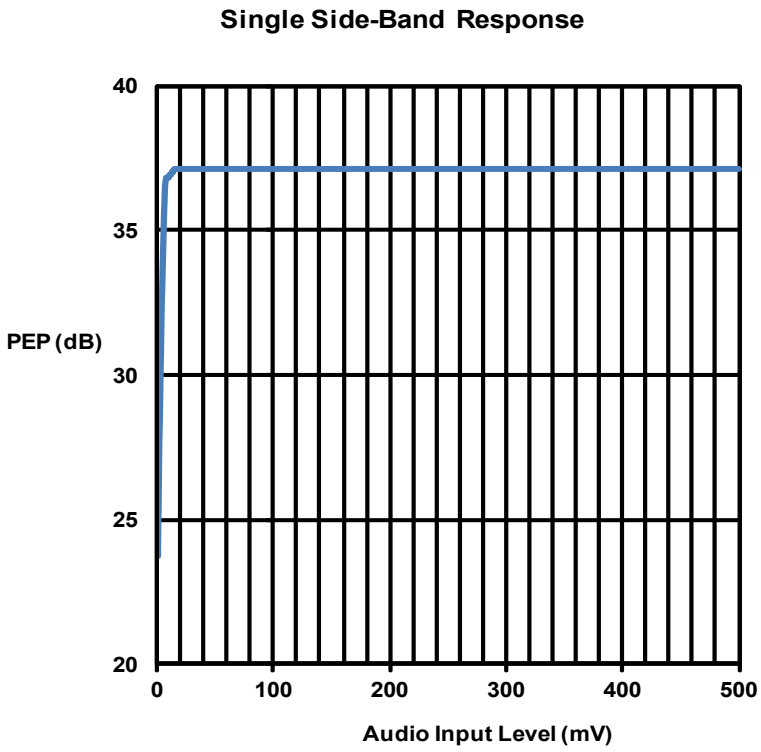


Maximum Peak Envelope Power:	**37.2dBm (5.2W)**
Limit:	**40.8dBm (12W)**
	Complies

Plot 8.7 – Modulation Limiting Response, AM USB (ANSI C63.26)

Audio Response

Single Side Band Two-Tone Audio Response 500H & 2.4kHz	
Input *(mV)*	PEP *(dBm)*
1	23.7
2	27.2
3	29.5
4	32.0
5	33.7
6	35.3
7	36.5
8	36.8
9	36.8
10	36.8
11	36.9
12	36.9
13	37.0
14	37.0
15	37.1
20	37.1
50	37.1
100	37.1
500	37.1



Maximum Peak Envelope Power:	37.1dBm (5.1W)
Limit:	40.8dBm (12W)
	Complies

9.0 OCCUPIED BANDWIDTH AND EMISSION MASKS

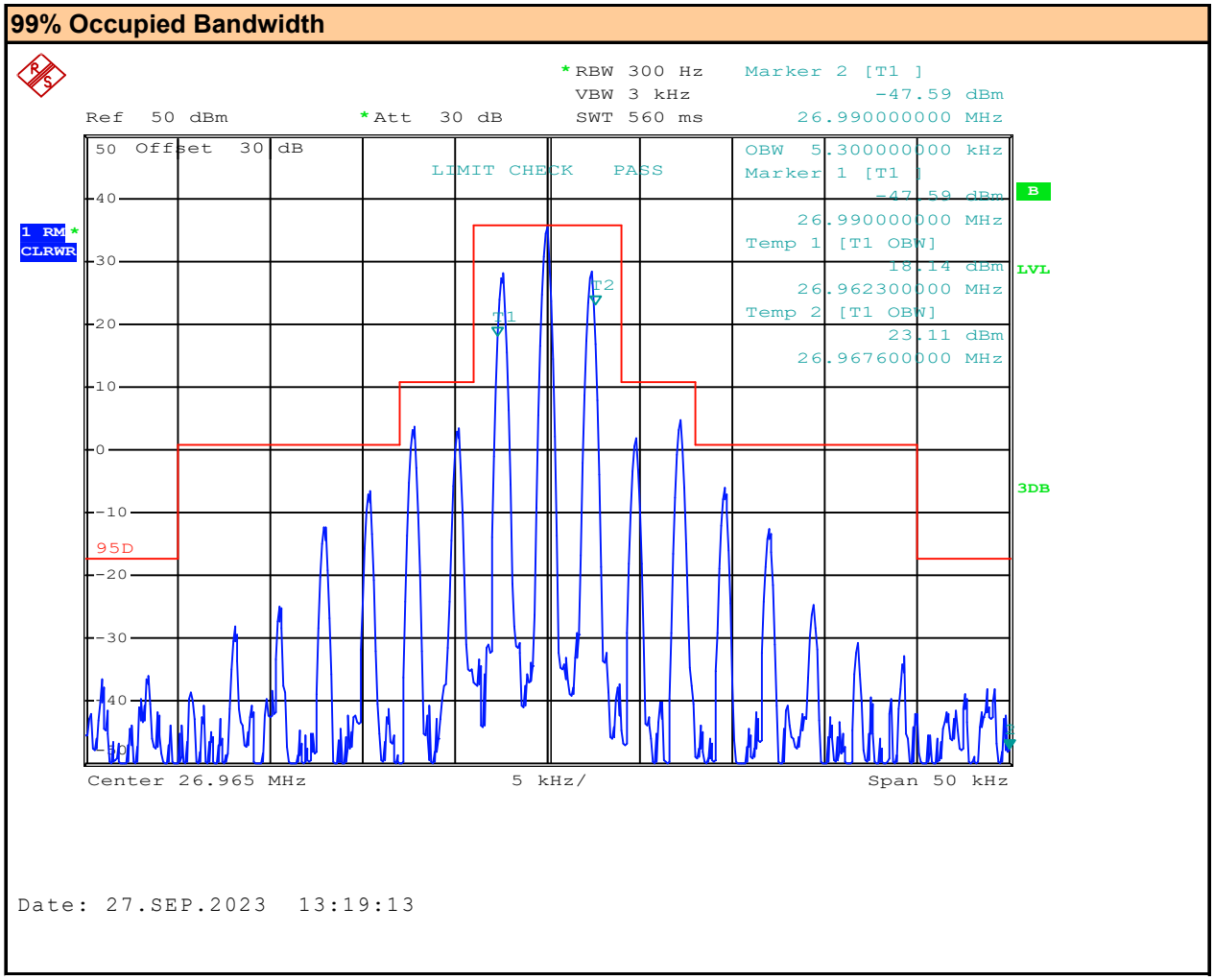
Test Conditions	
Normative Reference	**FCC 47 CFR §2.1049, §95.973**

Limits	
47 CFR §95.973	Each CBRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the emission type under test. **(a) AM and FM** The authorized bandwidth for emission types A3E and F3E is 8 kHz.
47 CFR §95.979	Each CBRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section. **(a) Attenuation requirements** The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) as specified in the applicable paragraphs listed in the following table: For A3E and F3E (1), (3), (5), (6) **(1)** 25 dB (decibels) in the frequency band 4 kHz to 8 kHz removed from the channel center frequency; **(3)** 35 dB in the frequency band 8 kHz to 20 kHz removed from the channel center frequency; **(5)** 53 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 250% of the authorized bandwidth. **(6)** 60 dB in any frequency band centered on a harmonic (i.e., an integer multiple of two or more times) of the carrier frequency.

Measurement Procedure
TIA 382 23.2 Transmitter Modulation Occupied Bandwidth The transmitter is modulated by a sinusoidal audio signal applied to the microphone input jack. First, the frequency is adjusted to deliver 50% modulation at the highest audio response level (minimum applied audio level). Then the audio signal level is increased 16 dB and the audio frequency is readjusted to 2500 Hz The analyzer is adjusted to display each of the discrete modulation sidebands and their respective harmonic products within +/- 50 kHz of the carrier frequency.

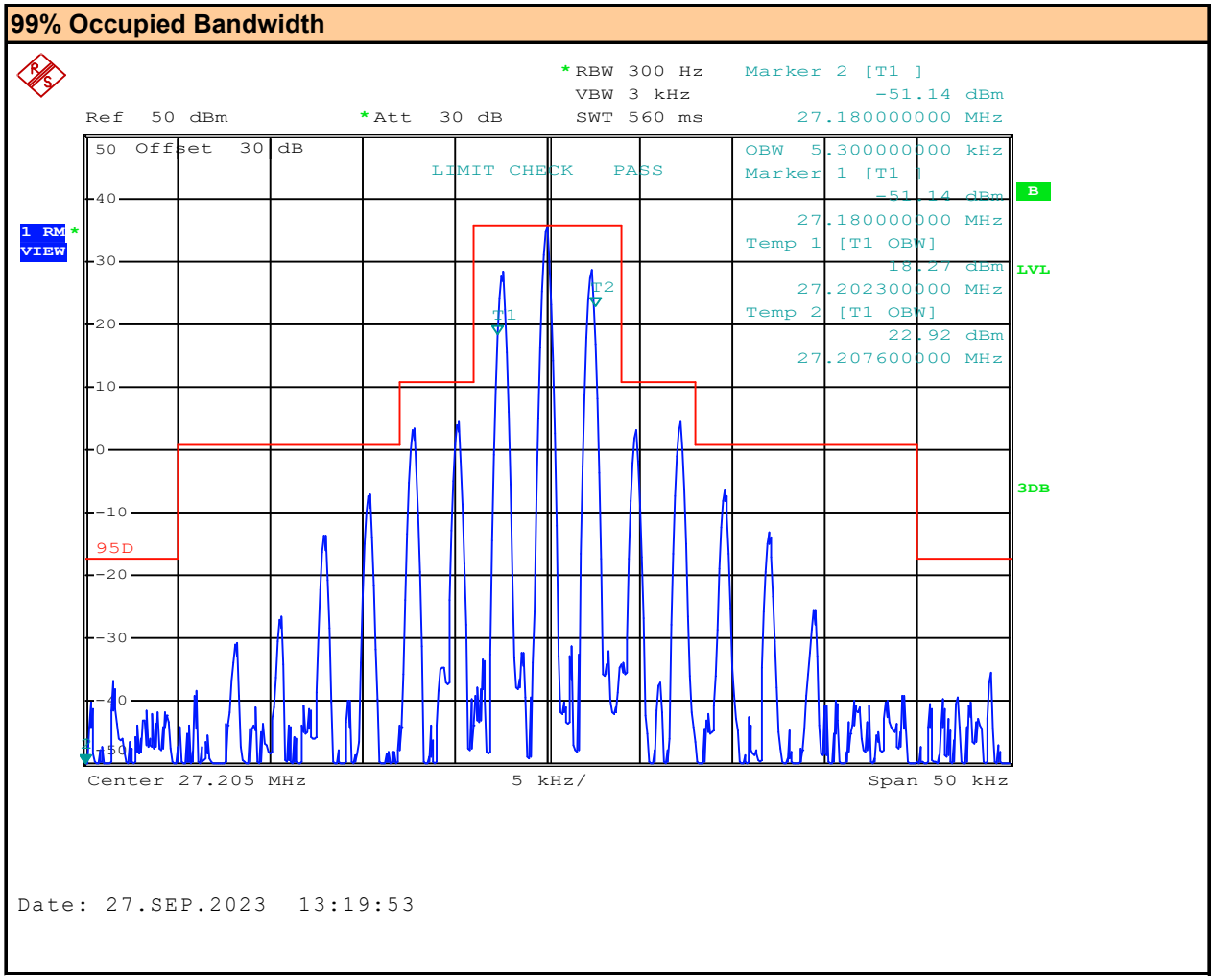
Test Setup	Appendix A Figure A.1

Plot 9.1 – Occupied Bandwidth, Channel 1, AM



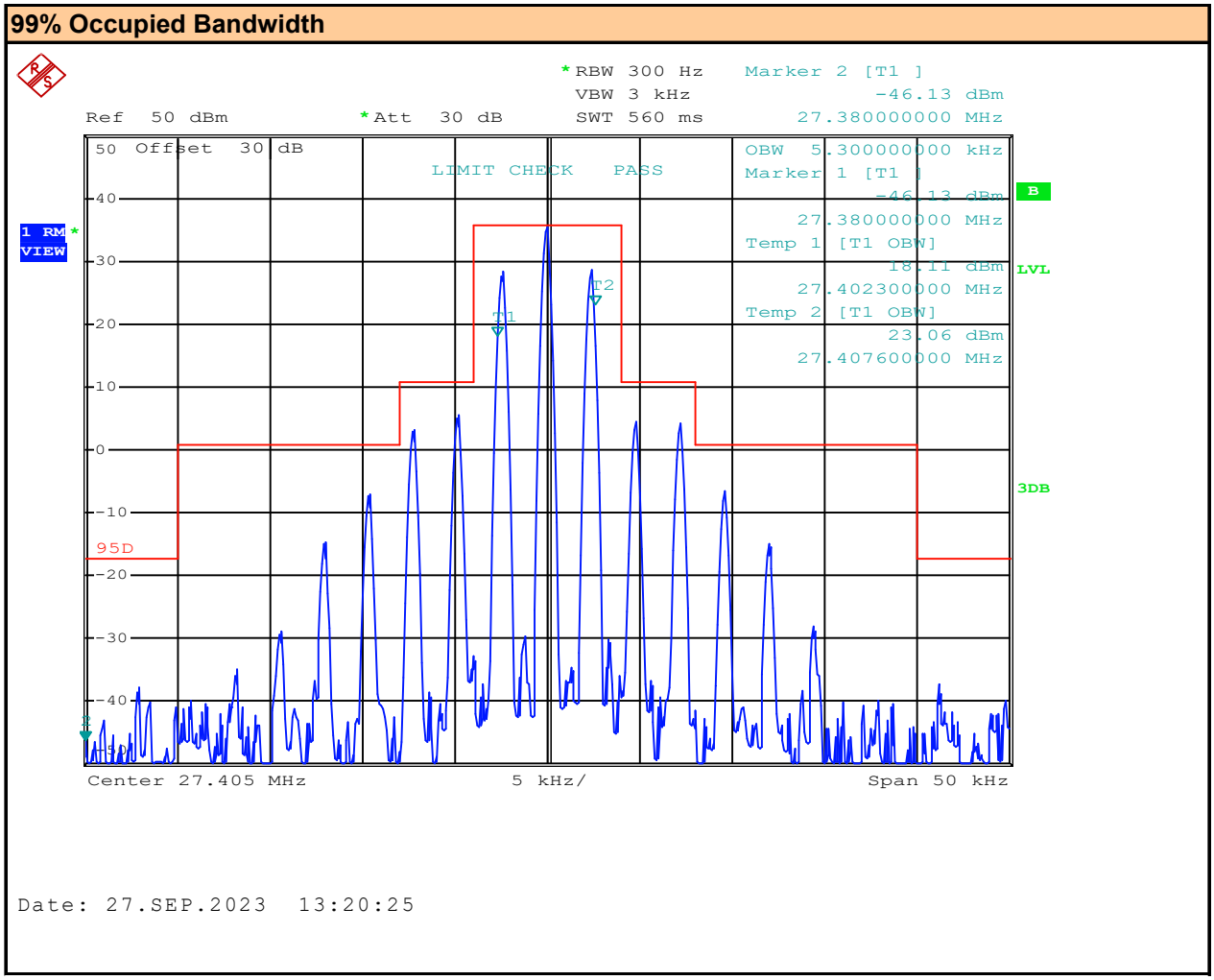
Channel:	**1**	**Channel Frequency:**	**26.965** **MHz**
Modulation:	**AM**	**Measured Occupied Bandwidth:**	**5.3** **kHz**

Plot 9.2 – Occupied Bandwidth, Channel 20, AM



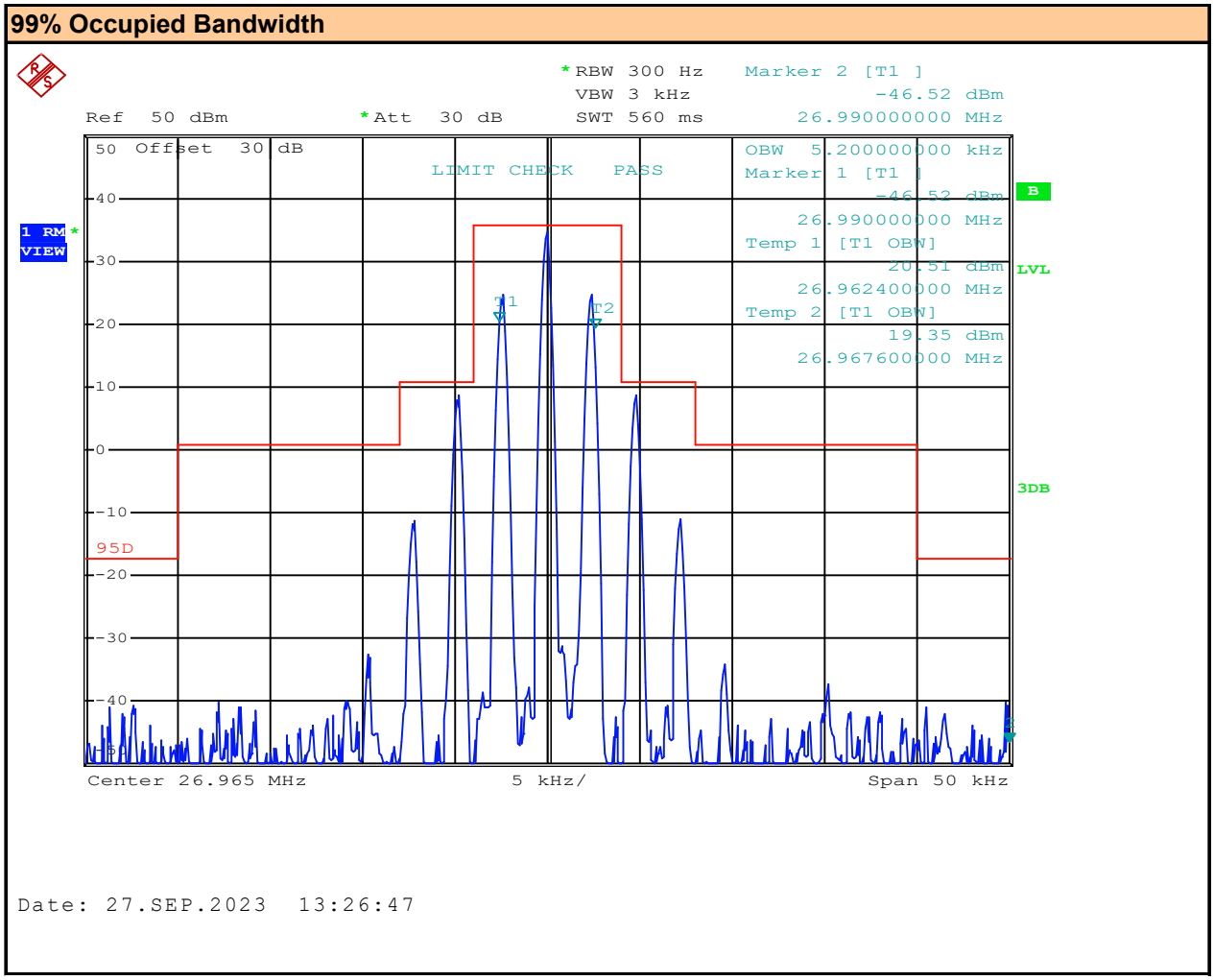
Channel:	**20**	**Channel Frequency:**	**27.205** **MHz**
Modulation:	**AM**	**Measured Occupied Bandwidth:**	**5.3** **kHz**

Plot 9.3 – Occupied Bandwidth, Channel 40, AM



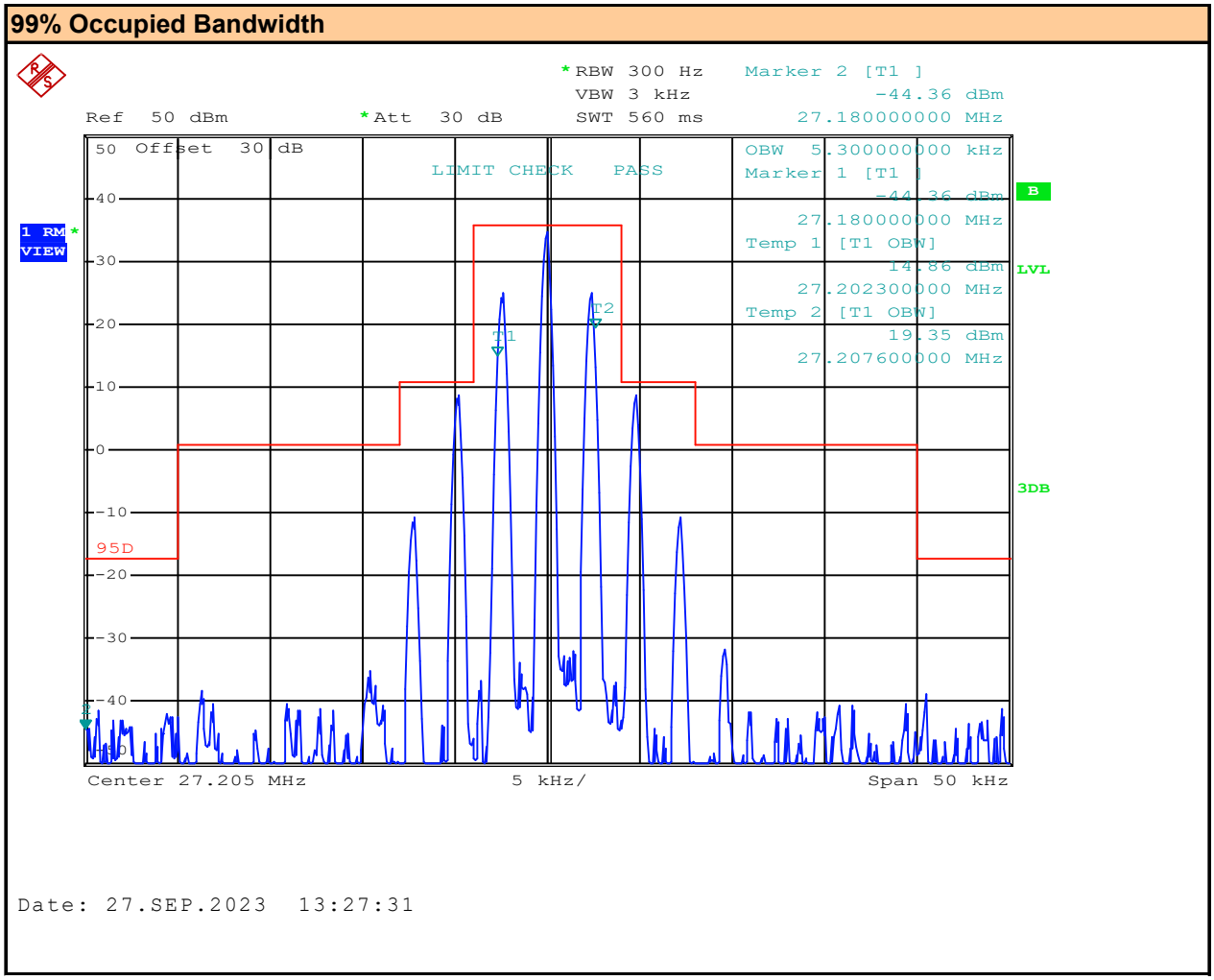
Channel:	**40**	**Channel Frequency:**	**27.405** **MHz**
Modulation:	**AM**	**Measured Occupied Bandwidth:**	**5.3** **kHz**

Plot 9.4 – Occupied Bandwidth, Channel 1, FM



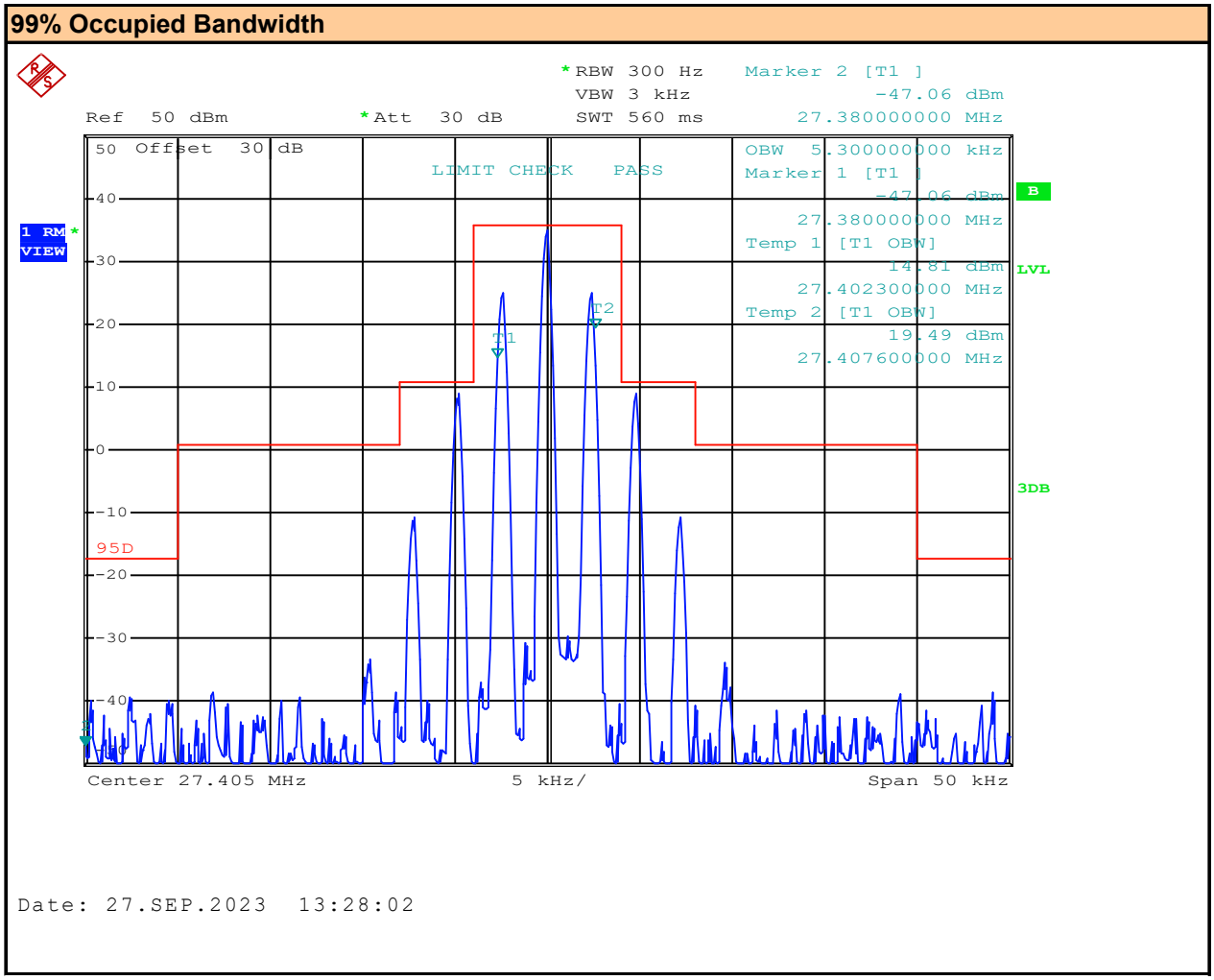
Channel:	1	**Channel Frequency:**	26.965 MHz
Modulation:	FM	**Measured Occupied Bandwidth:**	5.2 kHz

Plot 9.5 – Occupied Bandwidth, Channel 20, FM



Channel:	**20**	**Channel Frequency:**	**27.205** **MHz**
Modulation:	**FM**	**Measured Occupied Bandwidth:**	**5.3** **kHz**

Plot 9.6 – Occupied Bandwidth, Channel 40, FM



Channel:	**40**	**Channel Frequency:**	**27.405** **MHz**
Modulation:	**FM**	**Measured Occupied Bandwidth:**	**5.3** **kHz**

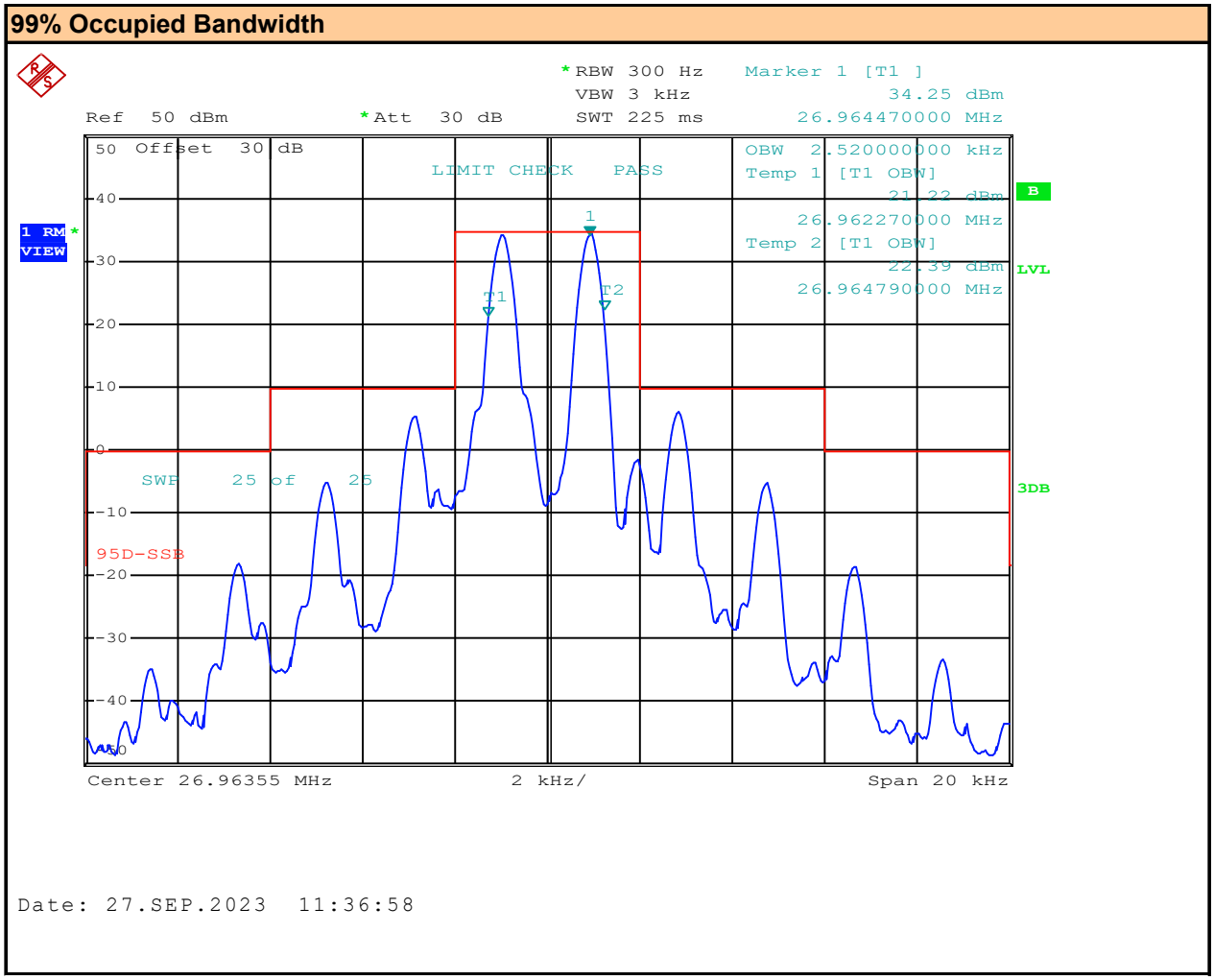
Test Conditions	
Normative Reference	**FCC 47 CFR §2.1049, §95.973**

Limits	
47 CFR §95.973	Each CBRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the emission type under test. **(b) SSB** The authorized bandwidth for emission types J3E, R3E, and H3E is 4 kHz.
47 CFR §95.979	Each CBRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section. **(a) Attenuation requirements** The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) as specified in the applicable paragraphs listed in the following table: H3E, J3E and R3E (2), (4), (5), (6) **(2)** 25 dB in the frequency band 2 kHz to 6 kHz removed from the channel center frequency; **(4)** 35 dB in the frequency band 6 kHz to 10 kHz removed from the channel center frequency; **(5)** 53 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 250% of the authorized bandwidth. **(6)** 60 dB in any frequency band centered on a harmonic (i.e., an integer multiple of two or more times) of the carrier frequency.

Measurement Procedure
SSB Operation: A two-tone modulation signal was connected to the DUT's audio input. DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The modulation signal was increased until there was no further increase in output power then increased by 10dB. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device.

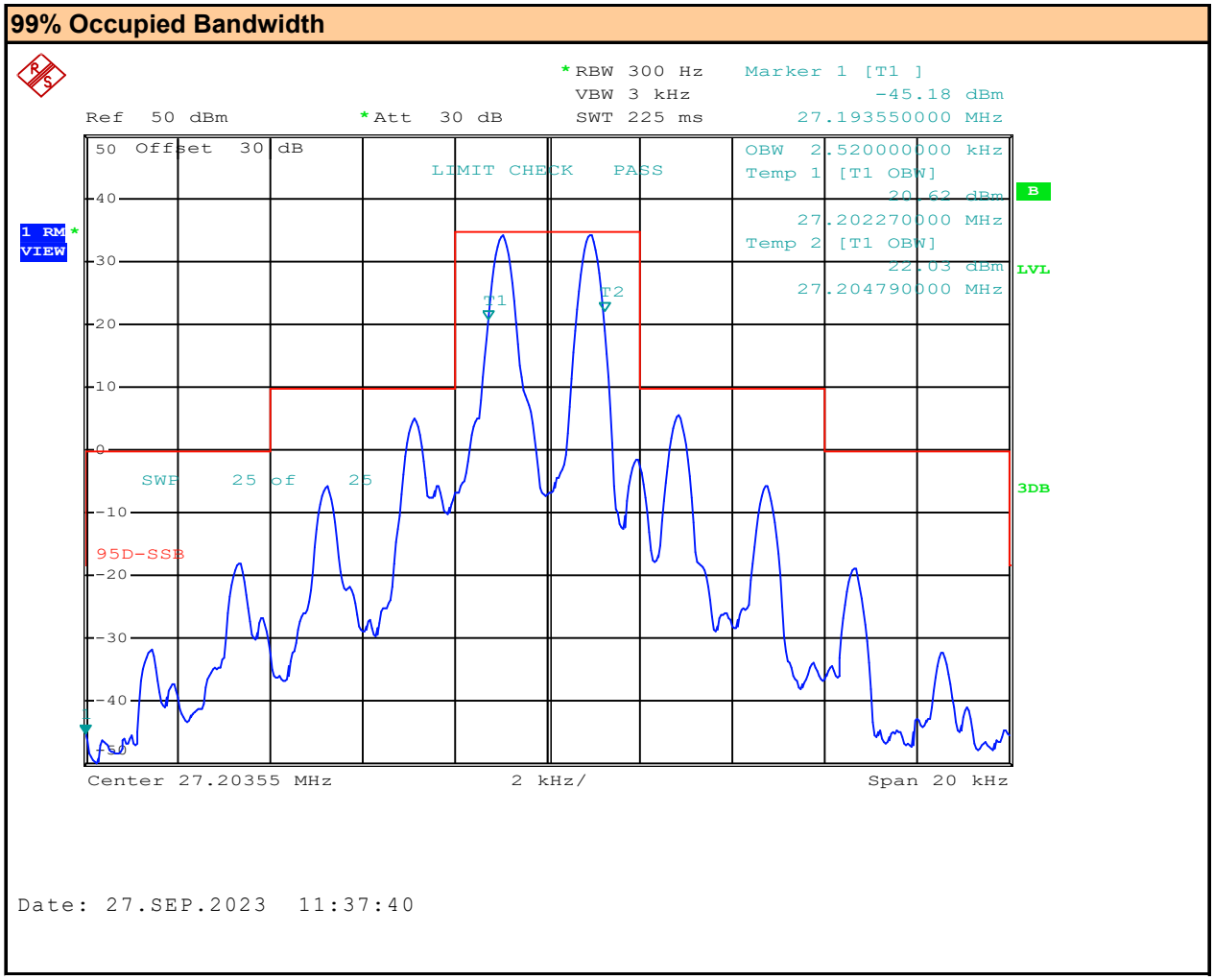
Test Setup	Appendix A Figure A.1

Plot 9.7 – Occupied Bandwidth, Channel 1, AM, Lower Side Band



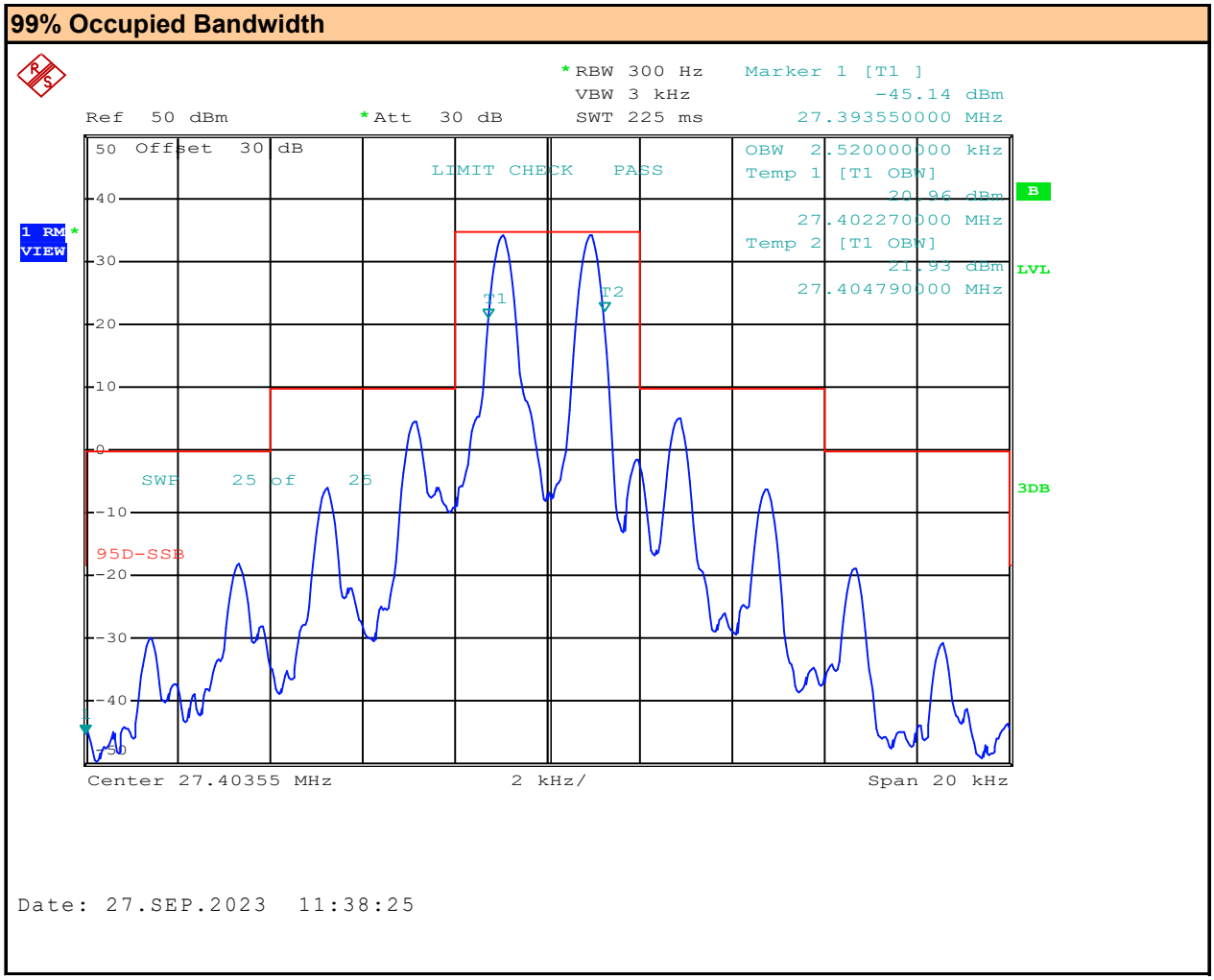
Channel:	**1**	**Channel Frequency:**	**26.965** **MHz**
Modulation:	**AM LSB**	**Measured Occupied Bandwidth:**	**2.52** **kHz**

Plot 9.8 – Occupied Bandwidth, Channel 20, AM, Lower Side Band



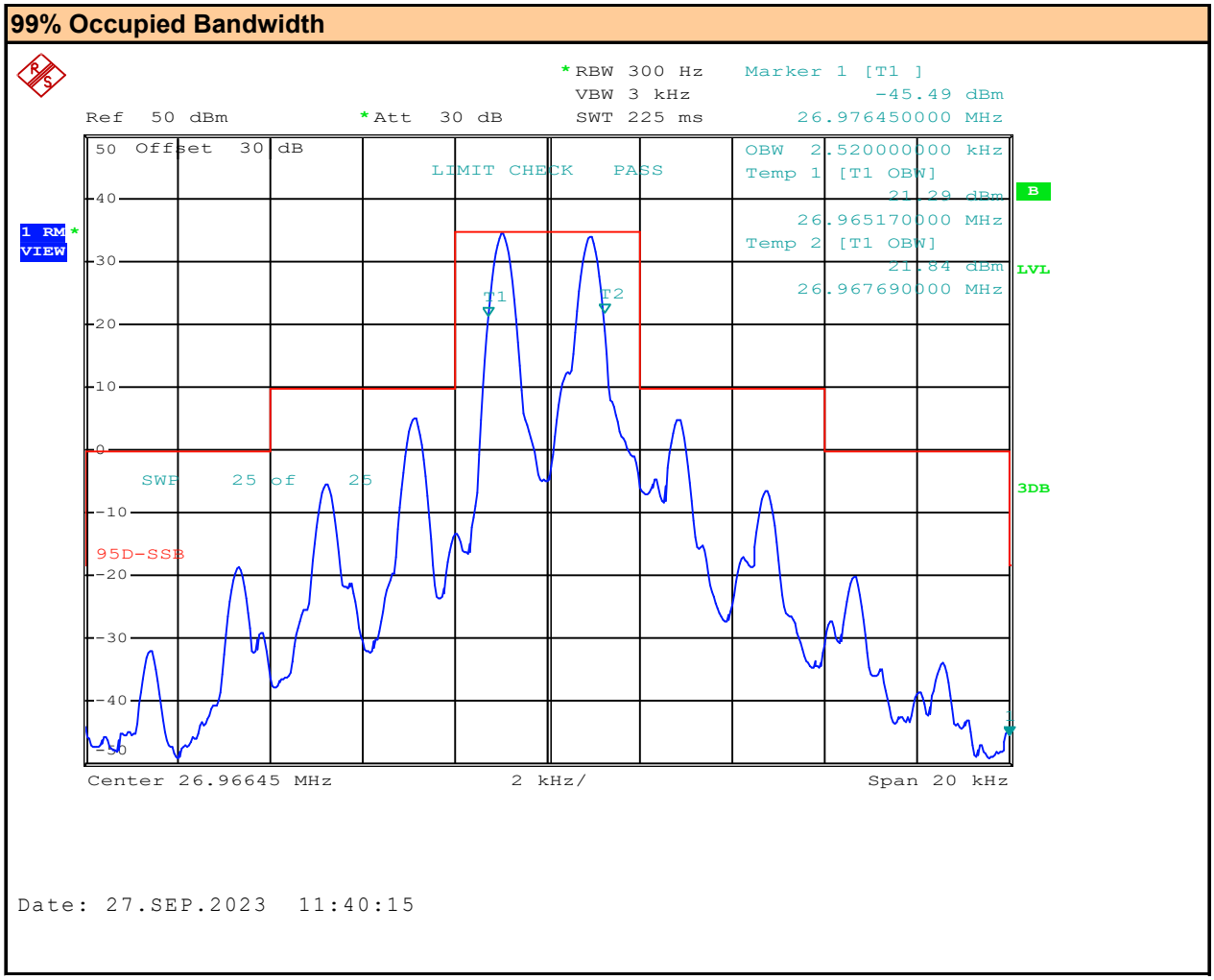
Channel:	**20**	**Channel Frequency:**	**27.205** **MHz**
Modulation:	**AM LSB**	**Measured Occupied Bandwidth:**	**2.52** **kHz**

Plot 9.9 – Occupied Bandwidth, Channel 40, AM, Lower Side Band



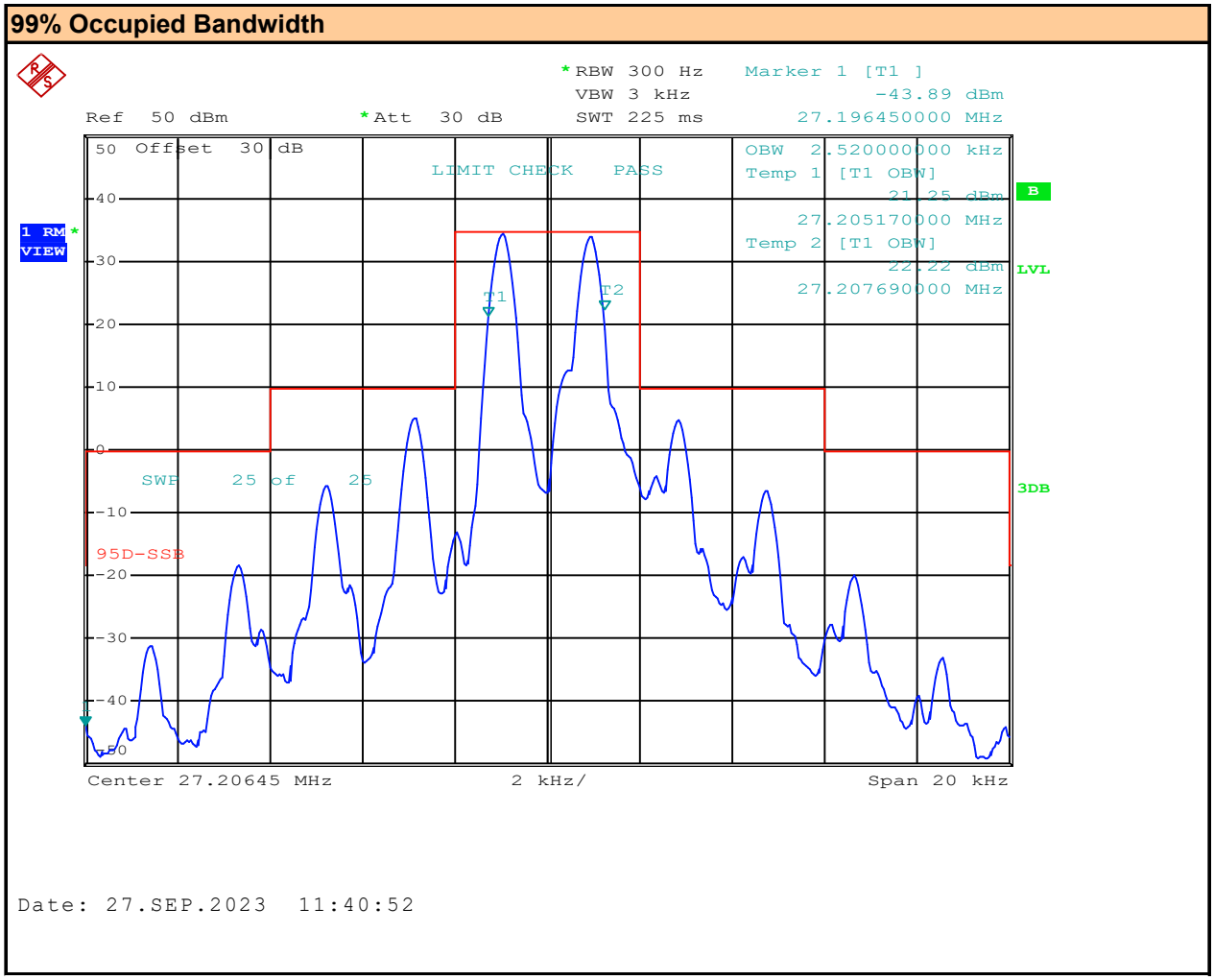
Channel:	**40**	**Channel Frequency:**	**27.405** **MHz**
Modulation:	**AM LSB**	**Measured Occupied Bandwidth:**	**2.52** **kHz**

Plot 9.10 – Occupied Bandwidth, Channel 1, AM, Upper Side Band



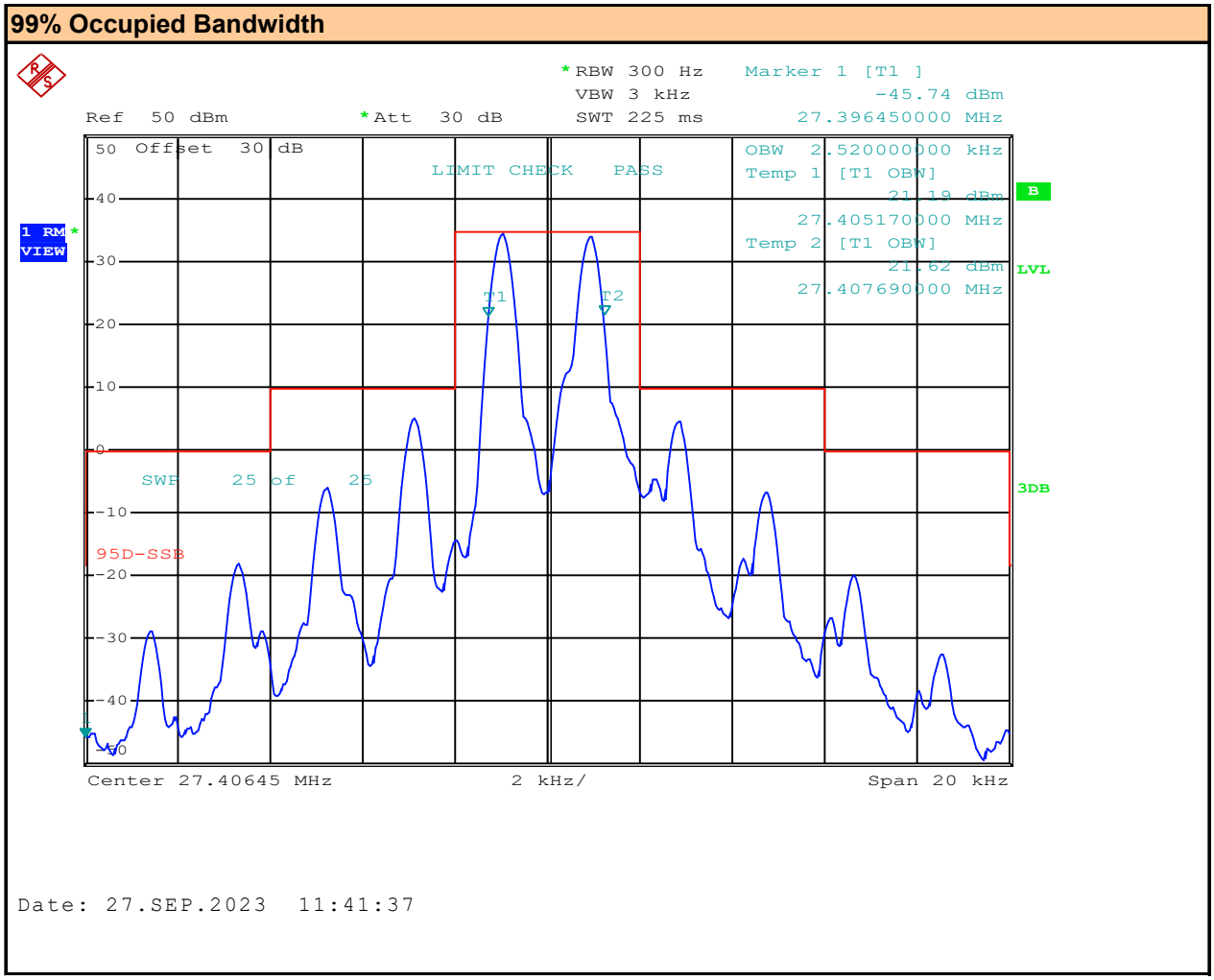
Channel:	**1**	**Channel Frequency:**	**26.965** **MHz**
Modulation:	**AM USB**	**Measured Occupied Bandwidth:**	**2.52** **kHz**

Plot 9.11 – Occupied Bandwidth, Channel 20, AM, Upper Side Band



Channel:	**20**	**Channel Frequency:**	**27.205** **MHz**
Modulation:	**AM USB**	**Measured Occupied Bandwidth:**	**2.52** **kHz**

Plot 9.12 – Occupied Bandwidth, Channel 40, AM, Upper Side Band



Channel:	**40**	**Channel Frequency:**	**27.405** **MHz**
Modulation:	**AM USB**	**Measured Occupied Bandwidth:**	**2.52** **kHz**

Table 9.1 - Summary of Occupied Bandwidth and Emission Mask Results

99% Occupied Bandwidth / Emissions Mask Results:						
Channel Number	Channel Frequency (MHz)	Modulation	Measured Occupied Bandwidth (kHz)	Limit (kHz)	Emission Designator	Emissions Mask Results
1	26.965	AM	5.30	8.00	5K30A3E	PASS
20	27.205		5.30		5K30A3E	PASS
40	27.405		5.30		5K30A3E	PASS
1	26.965	FM	5.20		5K20F3E	PASS
20	27.205		5.30		5K30F3E	PASS
40	27.405		5.30		5K30F3E	PASS
1	26.965	AM LSB	2.52	4.00	2K52J3E	PASS
20	27.205		2.52		2K52J3E	PASS
40	27.405		2.52		2K52J3E	PASS
1	26.965	AM USB	2.52		2K52J3E	PASS
20	27.205		2.52		2K52J3E	PASS
40	27.405		2.52		2K52J3E	PASS
					Result:	Complies

10 CONDUCTED OUT OF BAND SPURIOUS EMISSIONS

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1049, §95.973**

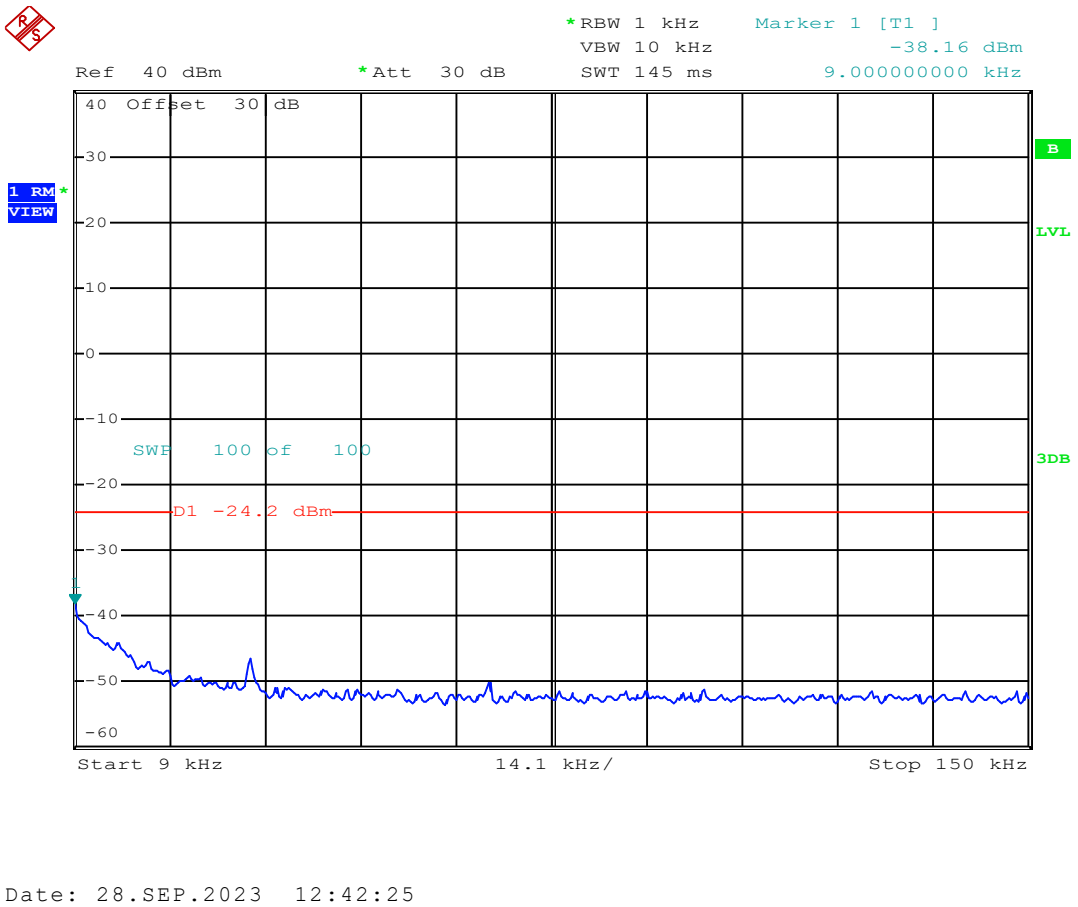
Limits	
47 CFR §95.973	Each CBRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the emission type under test. **(a) AM and FM** The authorized bandwidth for emission types A3E and F3E is 8 kHz.
47 CFR §95.979	Each CBRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section. **(a) Attenuation requirements** The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) as specified in the applicable paragraphs listed in the following table: For A3E and F3E (1), (3), (5), (6) **(1)** 25 dB (decibels) in the frequency band 4 kHz to 8 kHz removed from the channel center frequency; **(3)** 35 dB in the frequency band 8 kHz to 20 kHz removed from the channel center frequency; **(5)** 53 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 250% of the authorized bandwidth. **(6)** 60 dB in any frequency band centered on a harmonic (i.e., an integer multiple of two or more times) of the carrier frequency.

Measurement Procedure
TIA 382 23.2 Transmitter Modulation Occupied Bandwidth The transmitter is modulated by a sinusoidal audio signal applied to the microphone input jack. First, the frequency is adjusted to deliver 50% modulation at the highest audio response level (minimum applied audio level). Then the audio signal level is increased 16 dB and the audio frequency is readjusted to 2500 Hz The analyzer is adjusted to display each of the discrete modulation sidebands and their respective harmonic products within +/- 50 kHz of the carrier frequency.

Test Setup	Appendix A Figure A.1

Plot 10.1 – Conducted Out of Band Emissions, 9kHz to 150kHz, Channel 20, AM

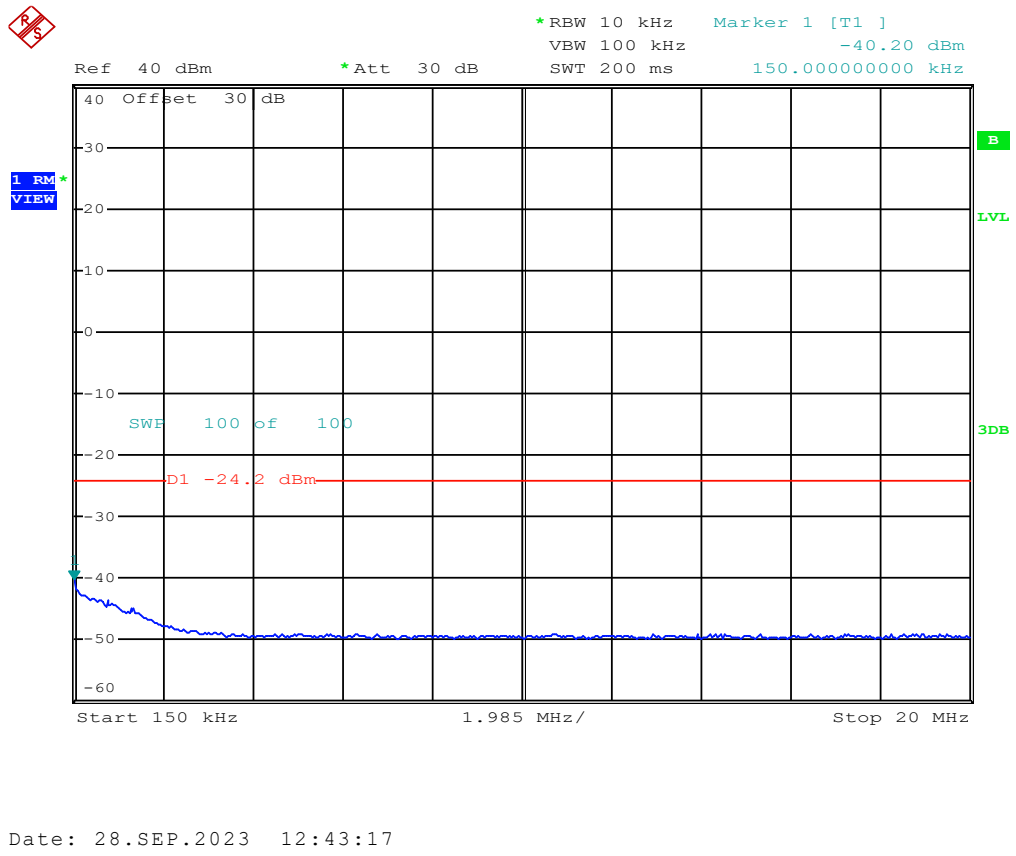
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM**	**Emission Frequency:**	**ND**	**MHz**
		Measured Emission:	**ND**	**dBm**

Plot 10.2 – Conducted Out of Band Emissions, 150kHz – 20MHz, Channel 20, AM

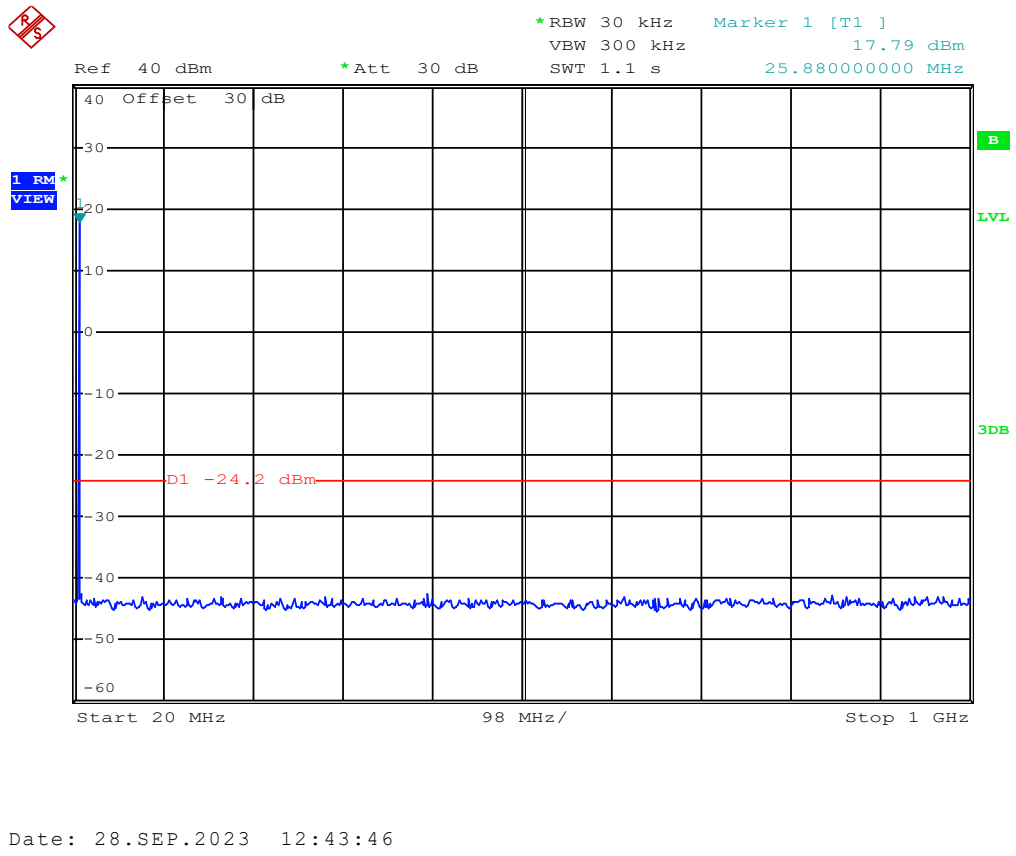
Conducted Spurious Emissions:



Channel:	**20**		**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM**		**Emission Frequency:**	**ND**	**MHz**
			Measured Emission:	**ND**	**dBm**

Plot 10.3 – Conducted Out of Band Emissions, 20 – 1000MHz, Channel 20, AM

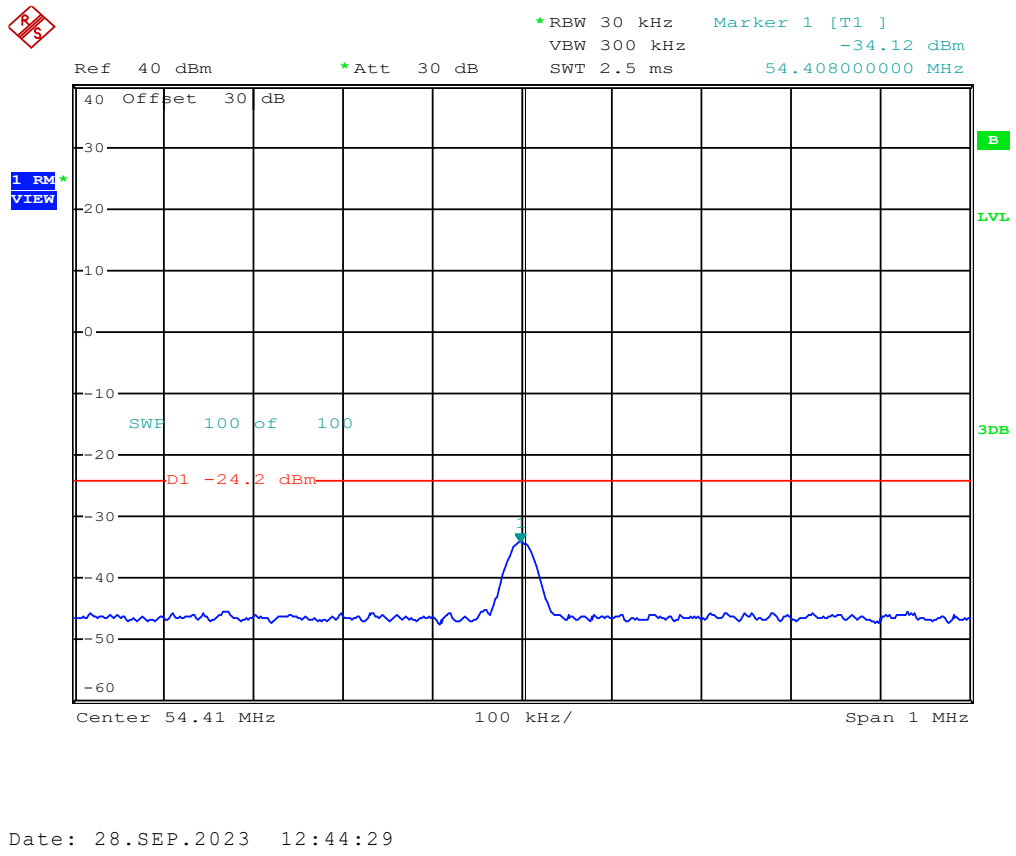
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM**	**Emission Frequency:**	**ND**	**MHz**
Marker 1 = Fundamental		**Measured Emission:**	**ND**	**dBm**

Plot 10.4 – Conducted Out of Band Emissions, 2nd Harmonic, Channel 20, AM

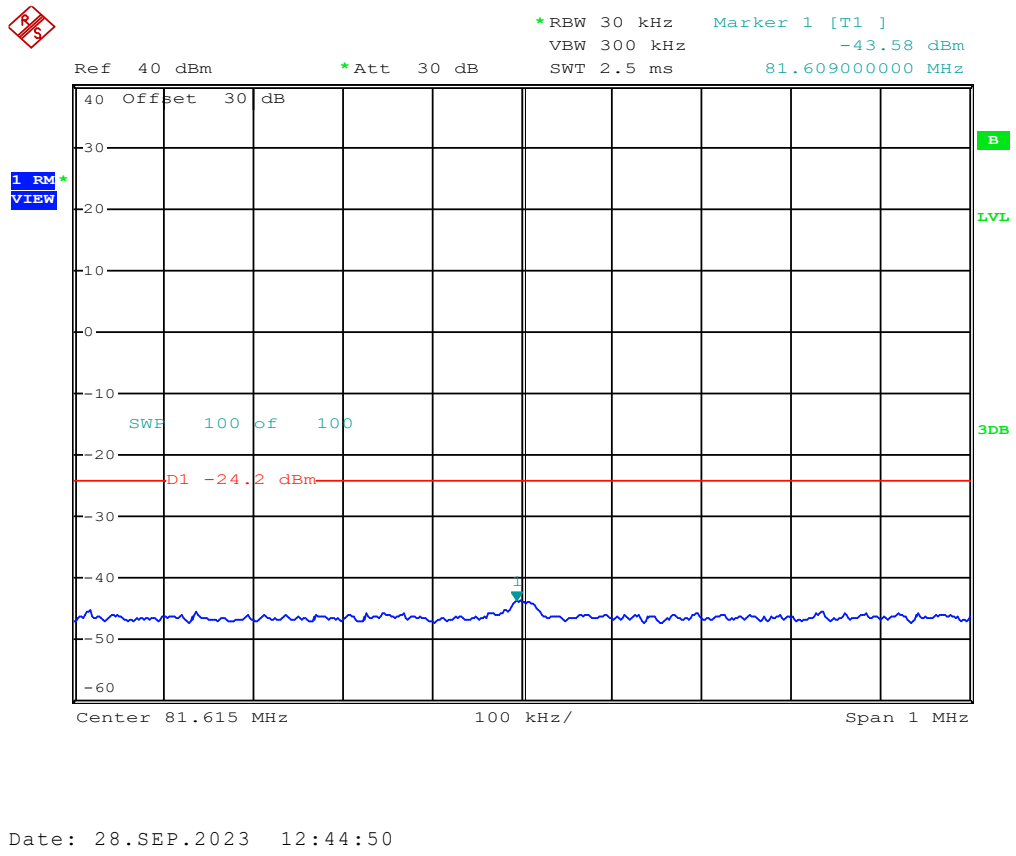
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM**	**Emission Frequency:**	**54.408**	**MHz**
		Measured Emission:	**-34.12**	**dBm**

Plot 10.5 – Conducted Out of Band Emissions, 3rd Harmonic, Channel 20, AM

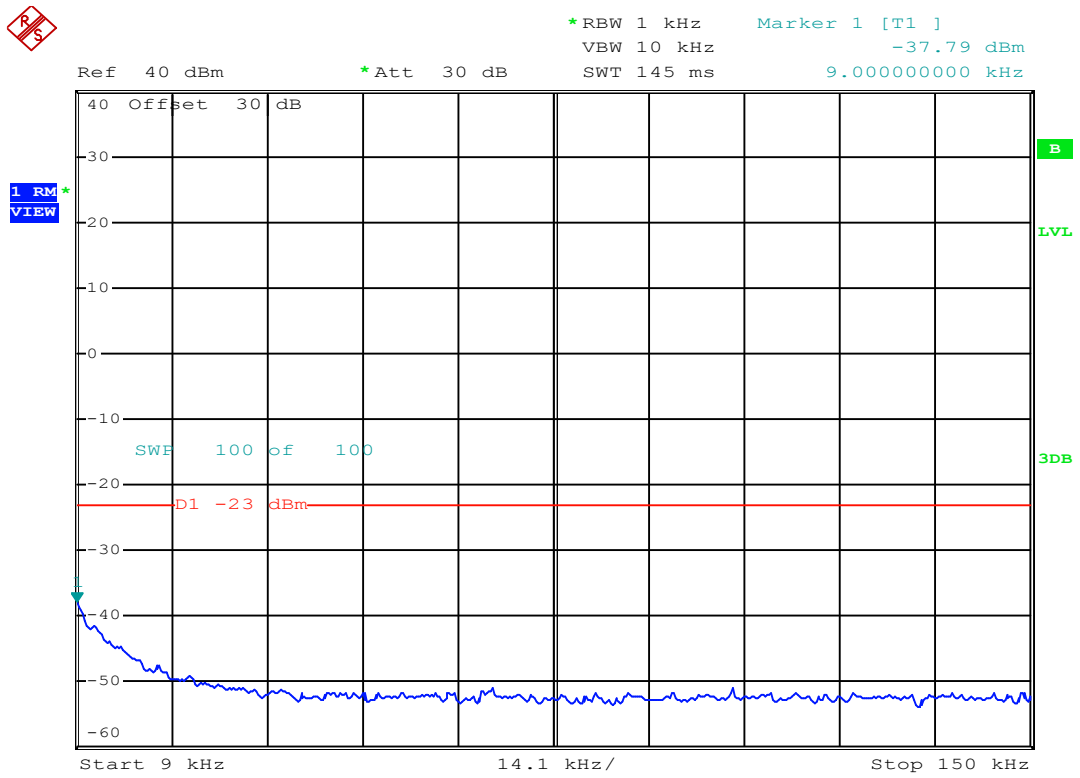
Conducted Spurious Emissions:



Channel:	**20**		**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM**		**Emission Frequency:**	**81.609**	**MHz**
			Measured Emission:	**-43.58**	**dBm**

Plot 10.6 – Conducted Out of Band Emissions, 9kHz to 150kHz, Channel 20, FM

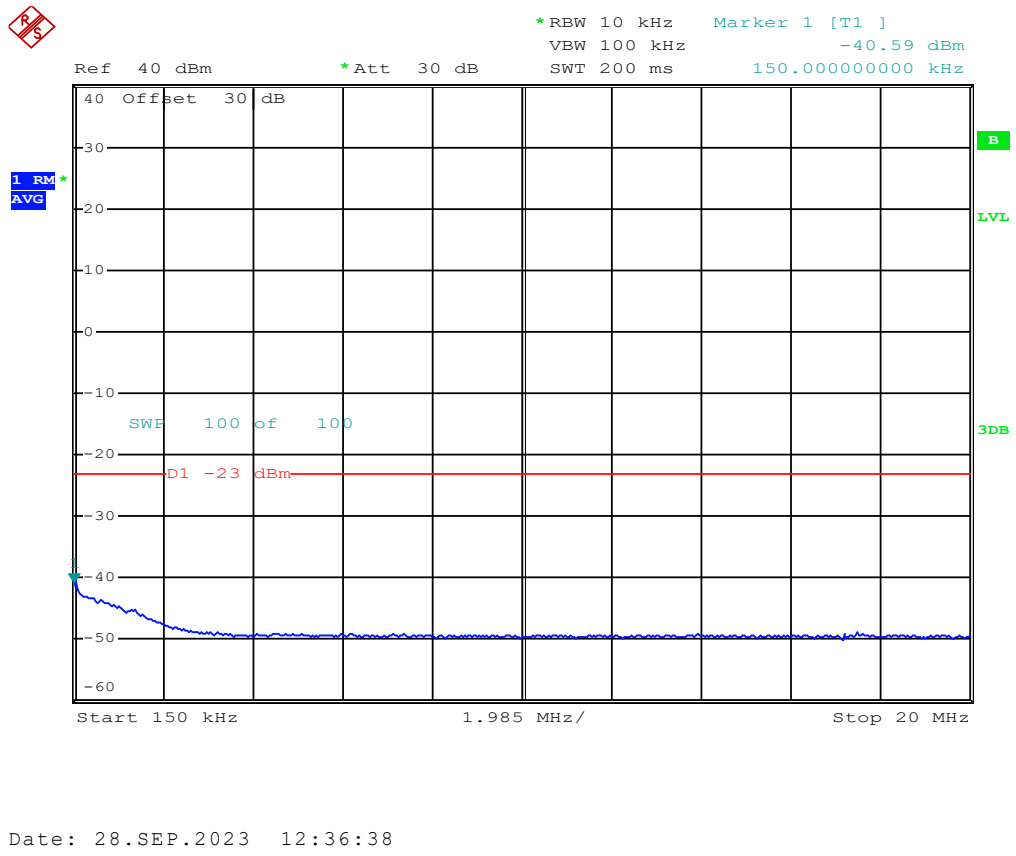
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**FM**	**Emission Frequency:**	**ND**	**MHz**
		Measured Emission:	**ND**	**dBm**

Plot 10.7 – Conducted Out of Band Emissions, 150kHz – 20MHz, Channel 20, FM

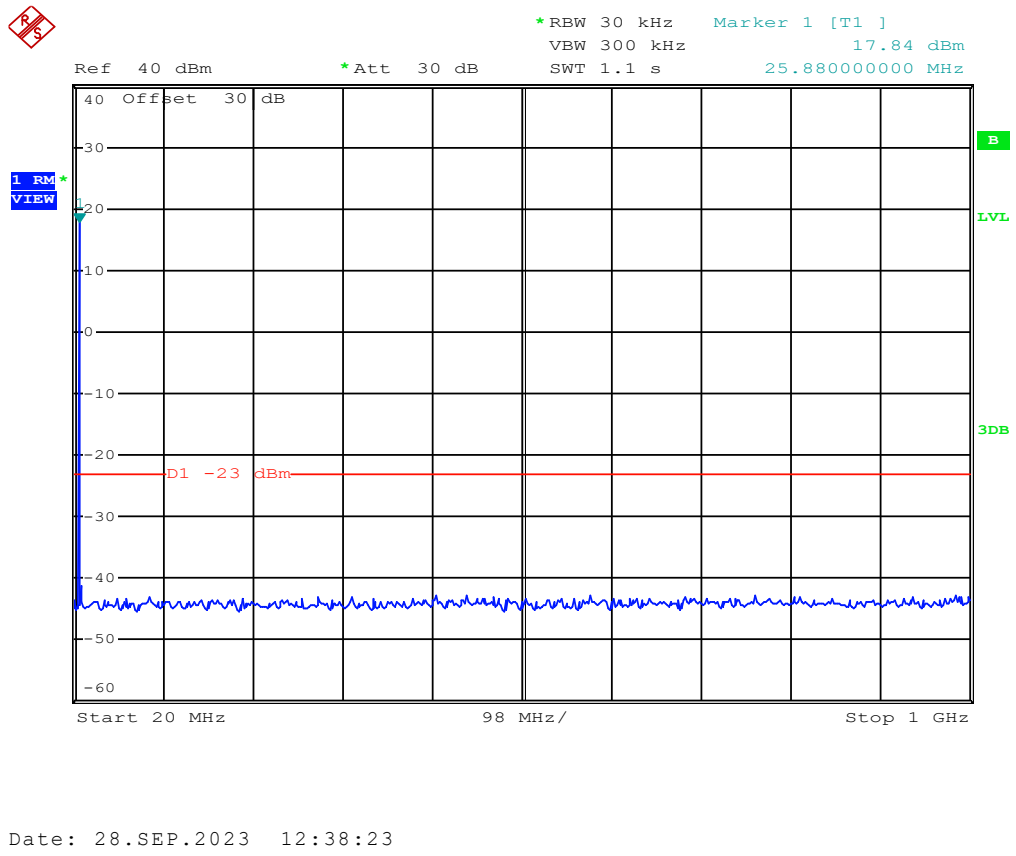
Conducted Spurious Emissions:



Channel:	**20**		**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**FM**		**Emission Frequency:**	**ND**	**MHz**
			Measured Emission:	**ND**	**dBm**

Plot 10.8 – Conducted Out of Band Emissions, 20 – 1000MHz, Channel 20, FM

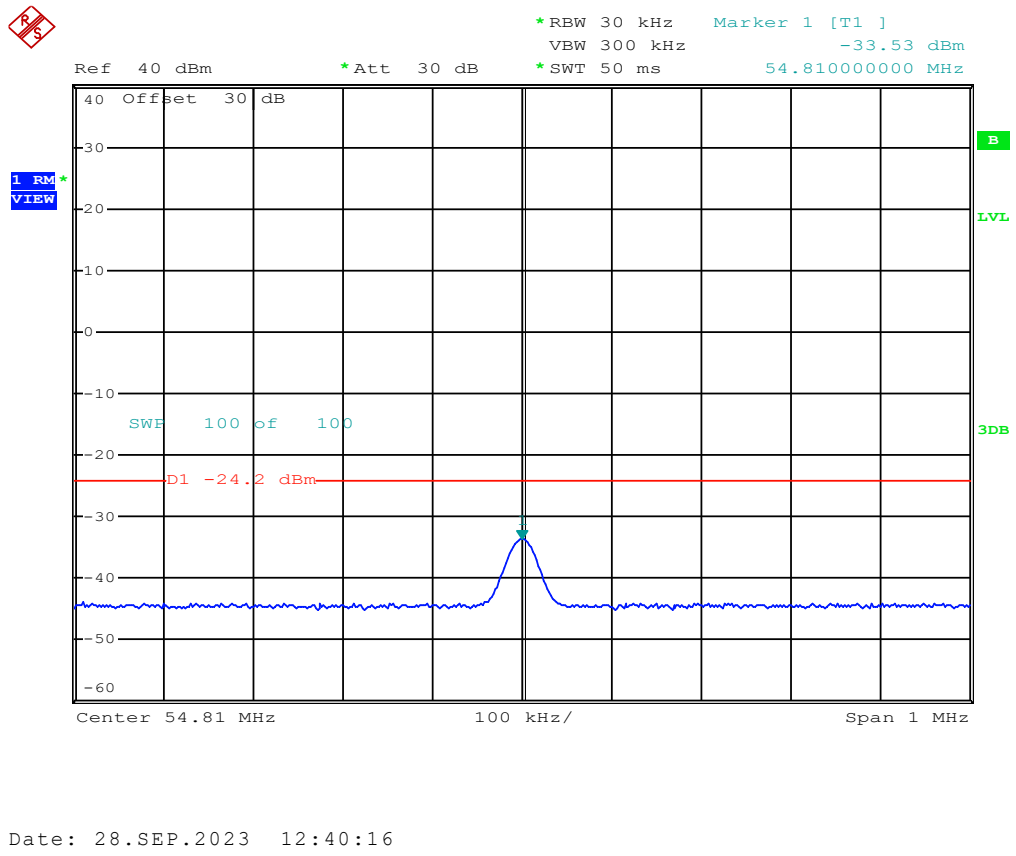
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**FM**	**Emission Frequency:**	**ND**	**MHz**
Marker 1 = Fundamental		**Measured Emission:**	**ND**	**dBm**

Plot 10.9 – Conducted Out of Band Emissions, 2nd Harmonic, Channel 20, FM

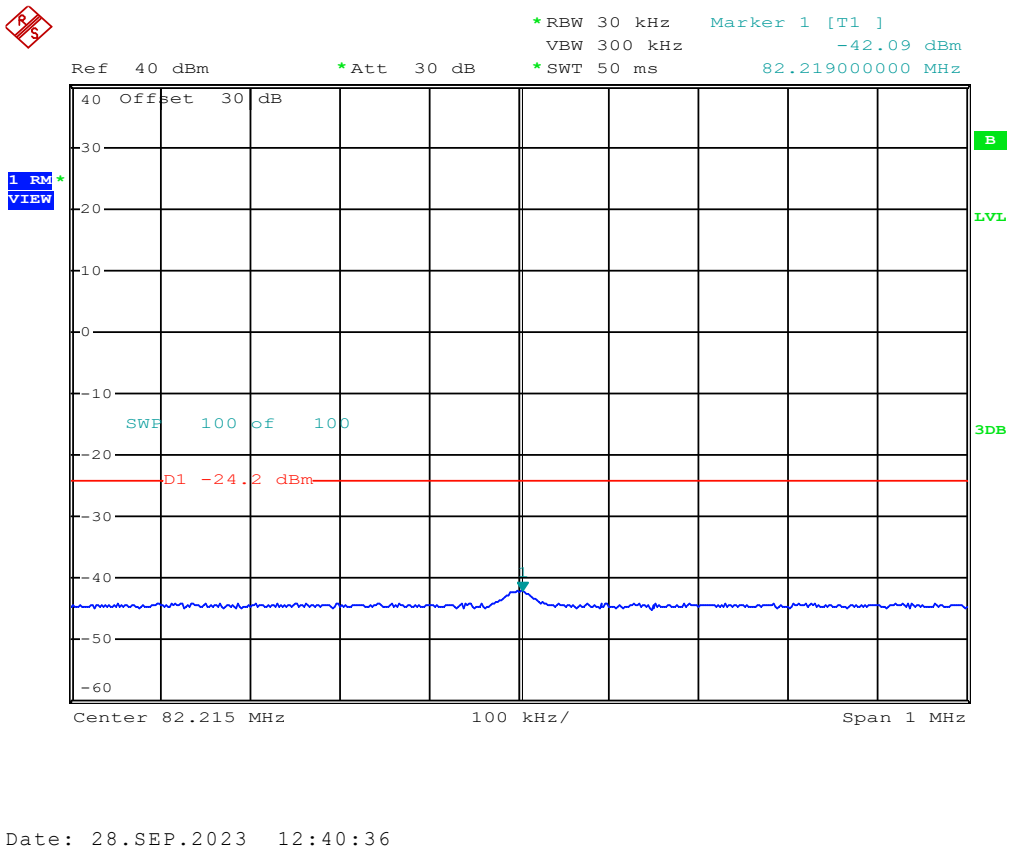
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**FM**	**Emission Frequency:**	**54.81**	**MHz**
		Measured Emission:	**-33.53**	**dBm**

Plot 10.10 – Conducted Out of Band Emissions, 3rd Harmonic, Channel 20, FM

Conducted Spurious Emissions:



Channel:	**20**		**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**FM**		**Emission Frequency:**	**82.219**	**MHz**
			Measured Emission:	**-42.09**	**dBm**

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1049, §95.973**

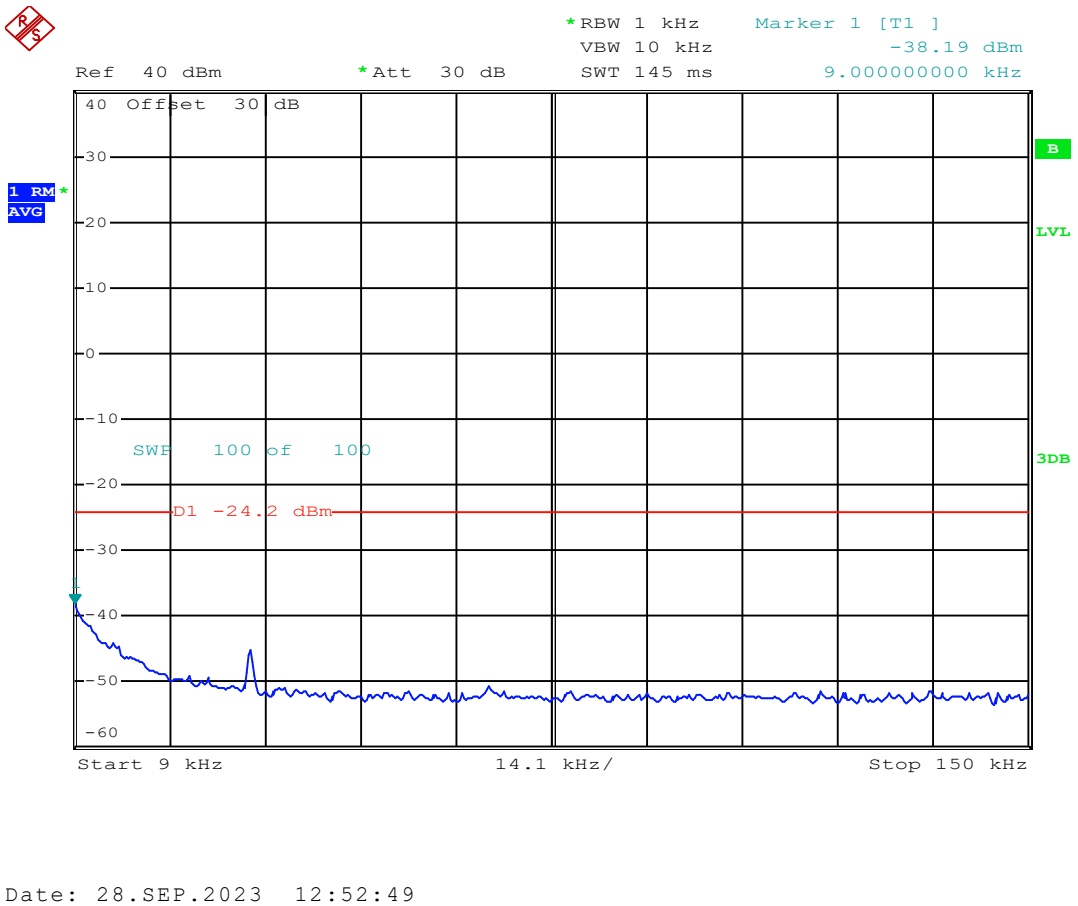
Limits	
47 CFR §95.973	Each CBRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the emission type under test. **(b) SSB** The authorized bandwidth for emission types J3E, R3E, and H3E is 4 kHz.
47 CFR §95.979	Each CBRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section. **(a) Attenuation requirements** The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) as specified in the applicable paragraphs listed in the following table: H3E, J3E and R3E (2), (4), (5), (6) **(2)** 25 dB in the frequency band 2 kHz to 6 kHz removed from the channel center frequency; **(4)** 35 dB in the frequency band 6 kHz to 10 kHz removed from the channel center frequency; **(5)** 53 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 250% of the authorized bandwidth. **(6)** 60 dB in any frequency band centered on a harmonic (i.e., an integer multiple of two or more times) of the carrier frequency.

Measurement Procedure
SSB Operation: A two-tone modulation signal was connected to the DUT's audio input. DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The modulation signal was increased until there was no further increase in output power then increased by 10dB. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device.

Test Setup	Appendix A Figure A.1

Plot 10.11 – Conducted Out of Band Emissions, 9kHz to 150kHz, Channel 20, AM, LSB

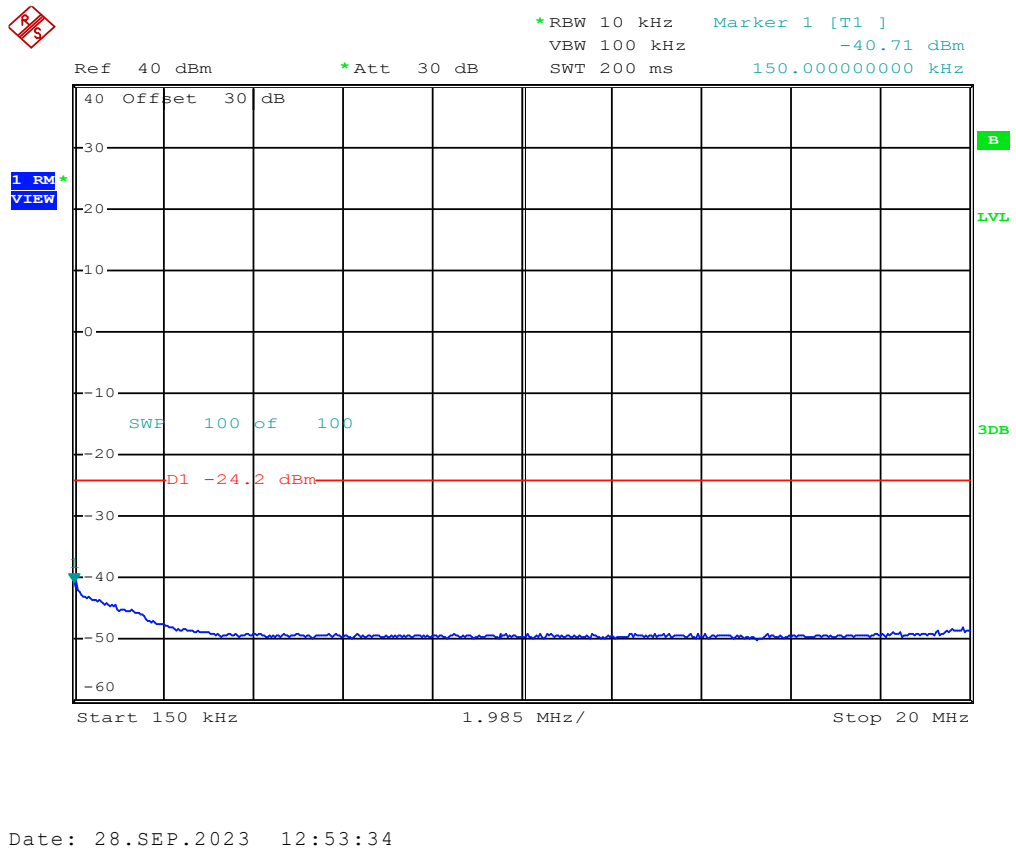
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM LSB**	**Emission Frequency:**	**ND**	**MHz**
		Measured Emission:	**ND**	**dBm**

Plot 10.12 – Conducted Out of Band Emissions, 150kHz – 20MHz, Channel 20, AM, LSB

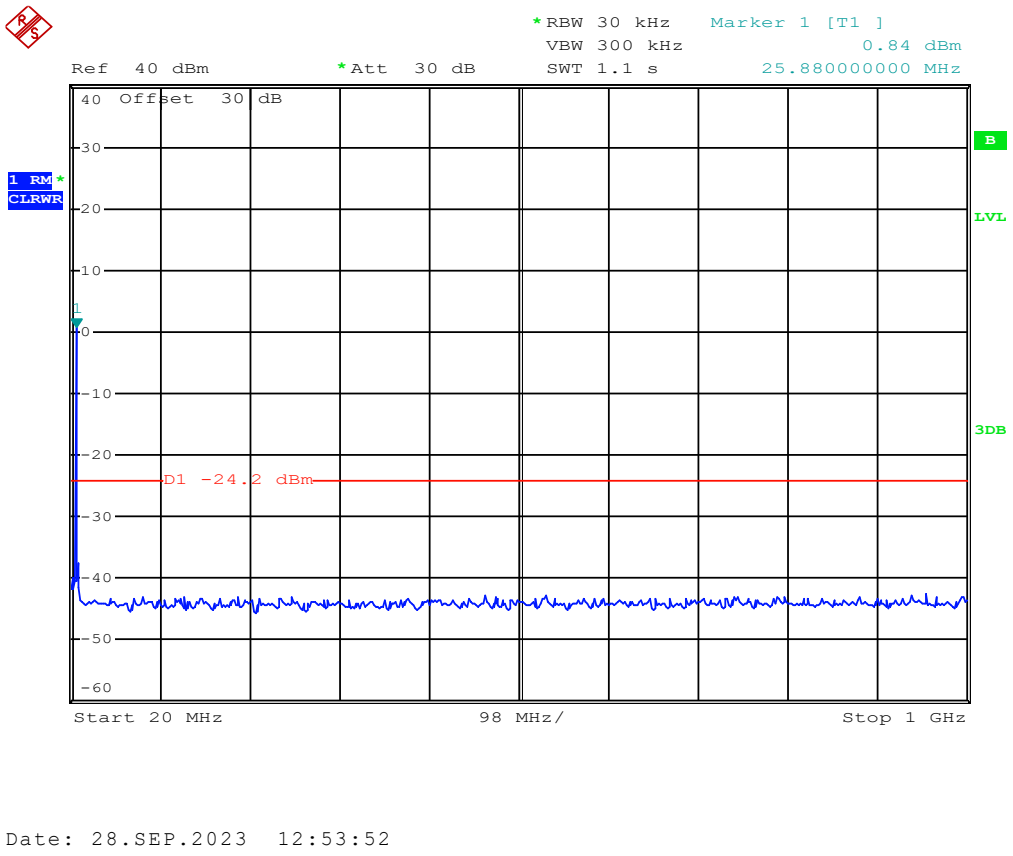
Conducted Spurious Emissions:



Channel:	**20**		**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM LSB**		**Emission Frequency:**	**ND**	**MHz**
			Measured Emission:	**ND**	**dBm**

Plot 10.13 – Conducted Out of Band Emissions, 20 – 1000MHz, Channel 20, AM, LSB

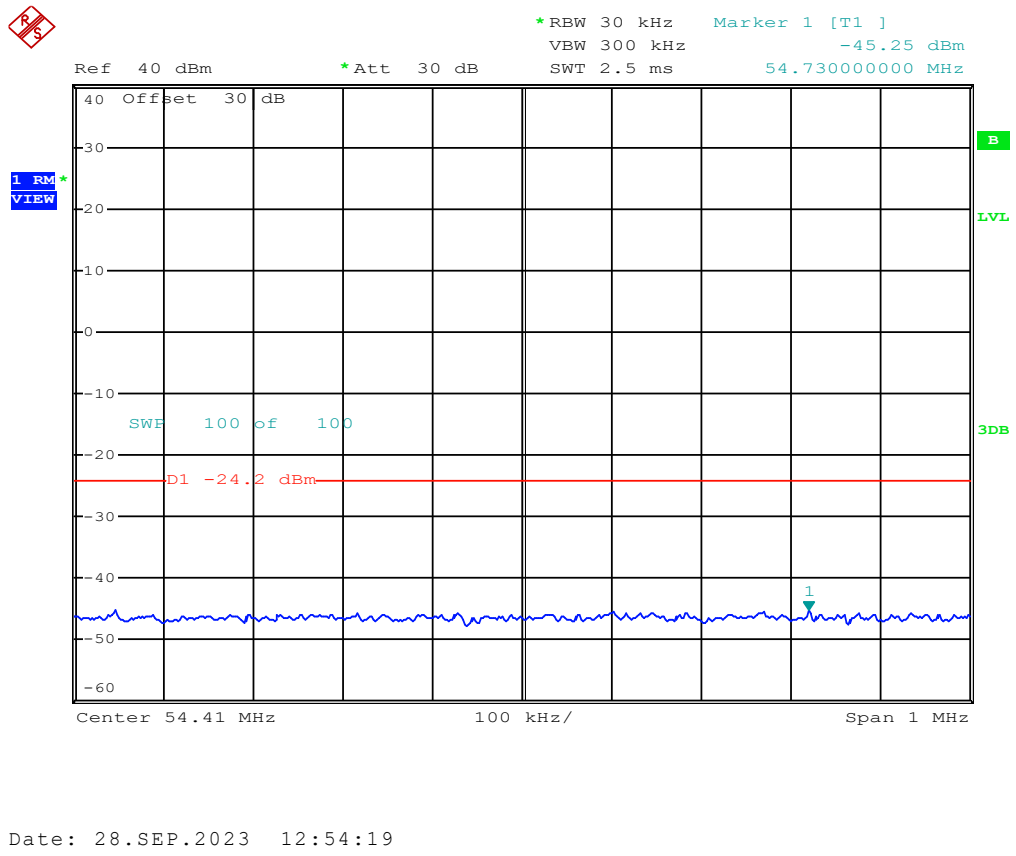
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM LSB**	**Emission Frequency:**	**ND**	**MHz**
Marker 1 = Fundamental		**Measured Emission:**	**ND**	**dBm**

Plot 10.14 – Conducted Out of Band Emissions, 2nd Harmonic, Channel 20, AM, LSB

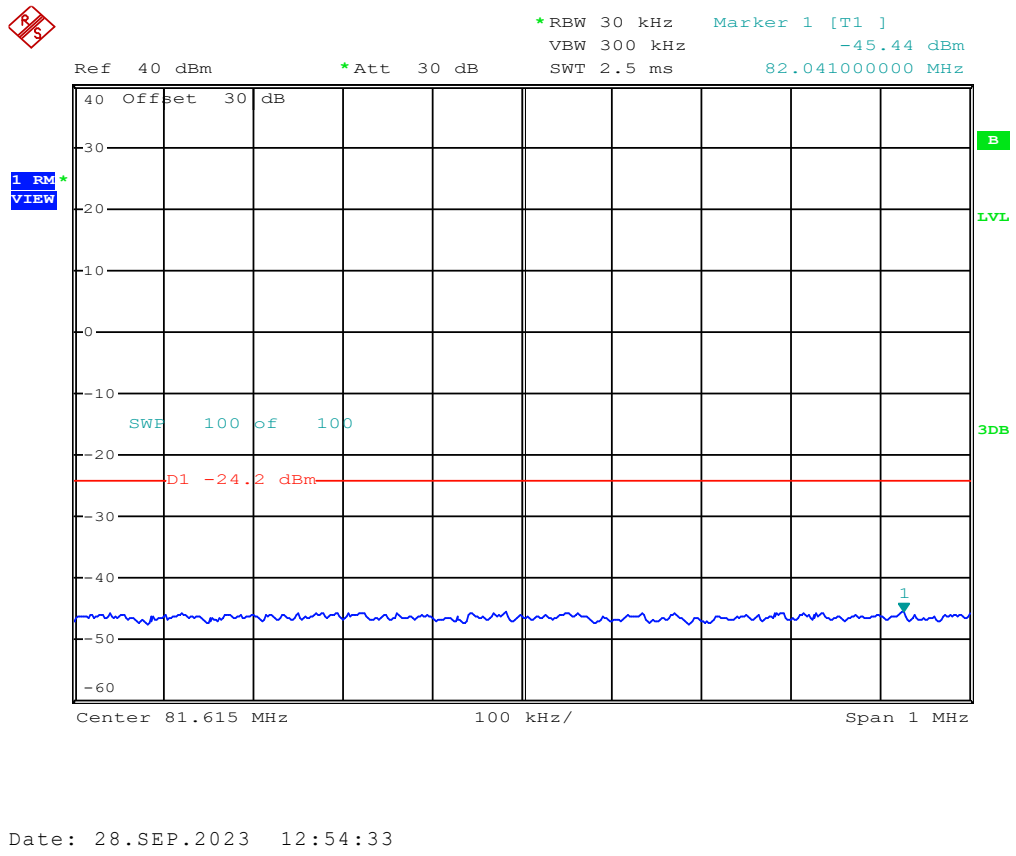
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM LSB**	**Emission Frequency:**	**ND**	**MHz**
		Measured Emission:	**ND**	**dBm**

Plot 10.15 – Conducted Out of Band Emissions, 3rd Harmonic, Channel 20, AM, LSB

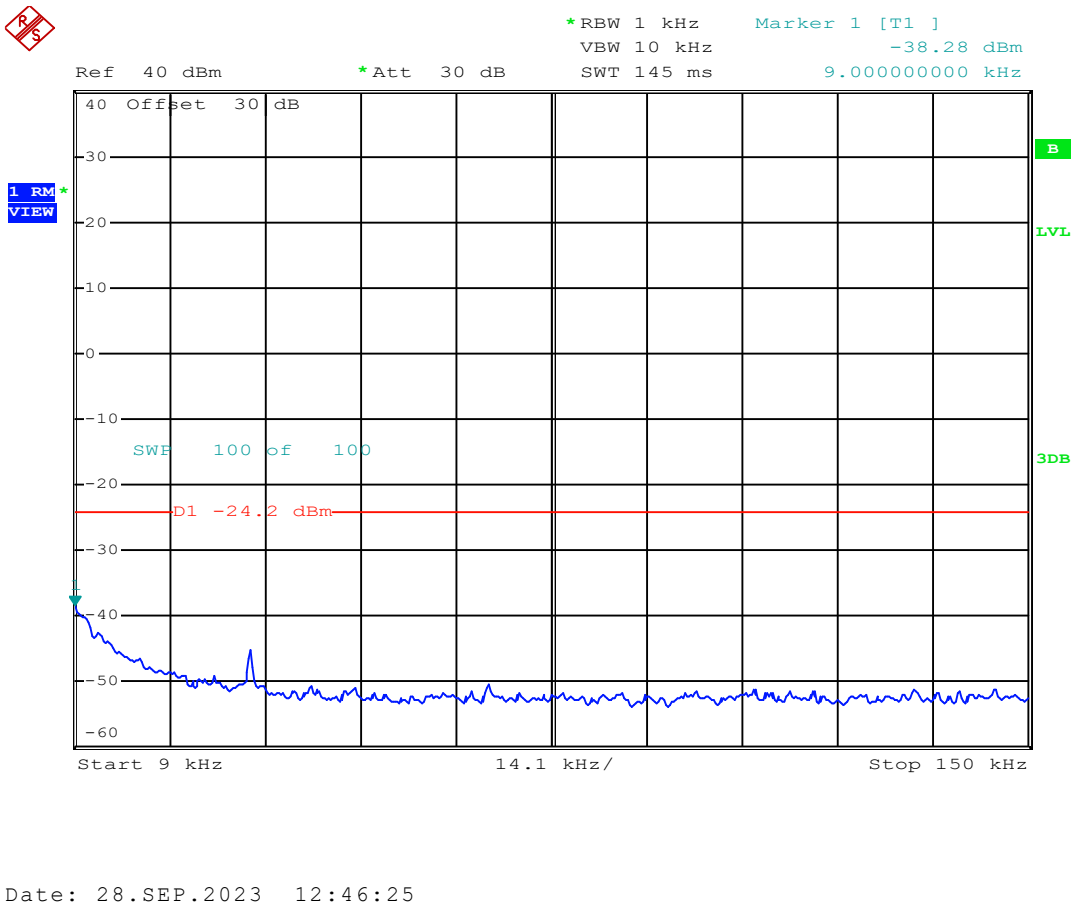
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM LSB**	**Emission Frequency:**	**ND**	**MHz**
		Measured Emission:	**ND**	**dBm**

Plot 10.16 – Conducted Out of Band Emissions, 9kHz to 150kHz, Channel 20, AM, USB

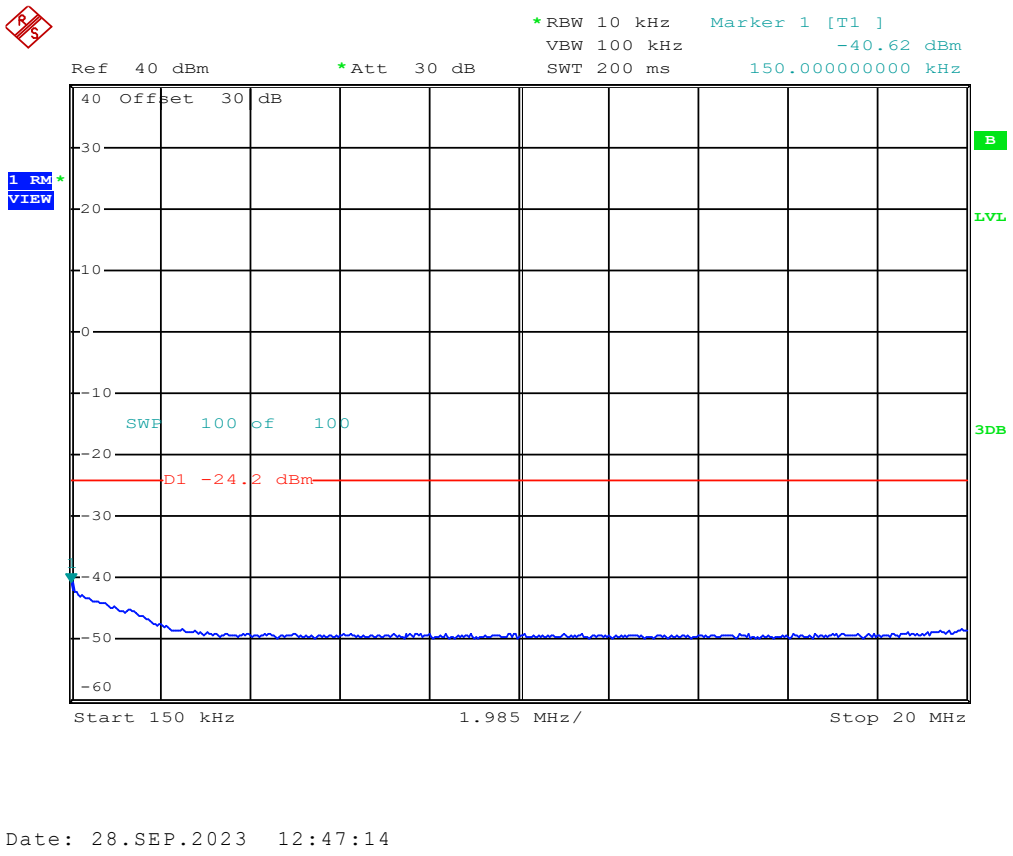
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM USB**	**Emission Frequency:**	**ND**	**MHz**
		Measured Emission:	**ND**	**dBm**

Plot 10.17 – Conducted Out of Band Emissions, 150kHz – 20MHz, Channel 20, AM, USB

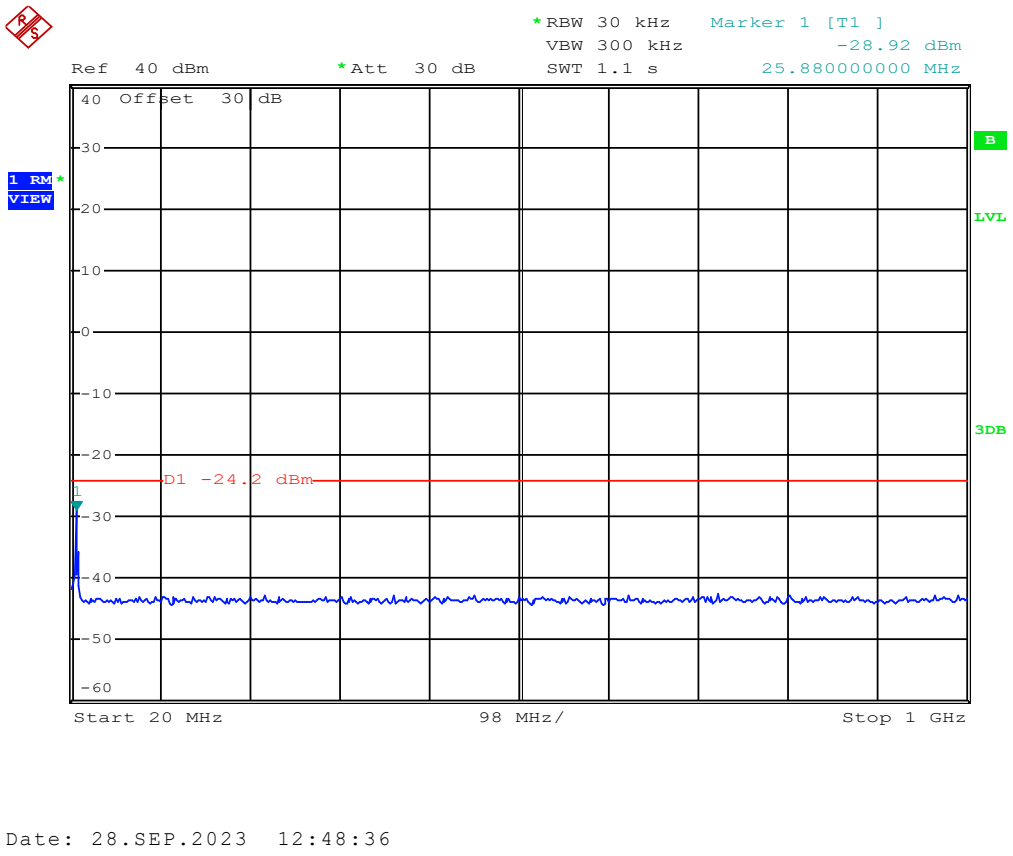
Conducted Spurious Emissions:



Channel:	**20**		**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM USB**		**Emission Frequency:**	**ND**	**MHz**
			Measured Emission:	**ND**	**dBm**

Plot 10.18 – Conducted Out of Band Emissions, 20 – 1000MHz, Channel 20, AM, USB

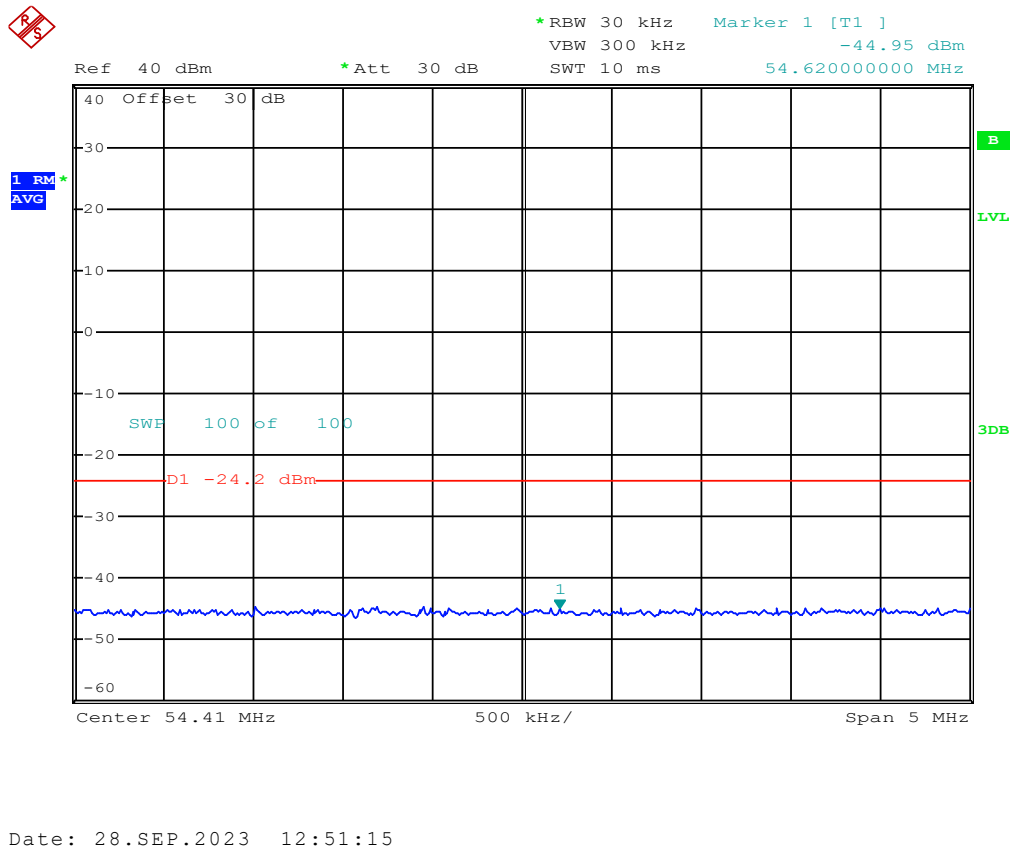
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM USB**	**Emission Frequency:**	**ND**	**MHz**
Marker 1 = Fundamental		**Measured Emission:**	**ND**	**dBm**

Plot 10.19 – Conducted Out of Band Emissions, 2nd Harmonic, Channel 20, AM, USB

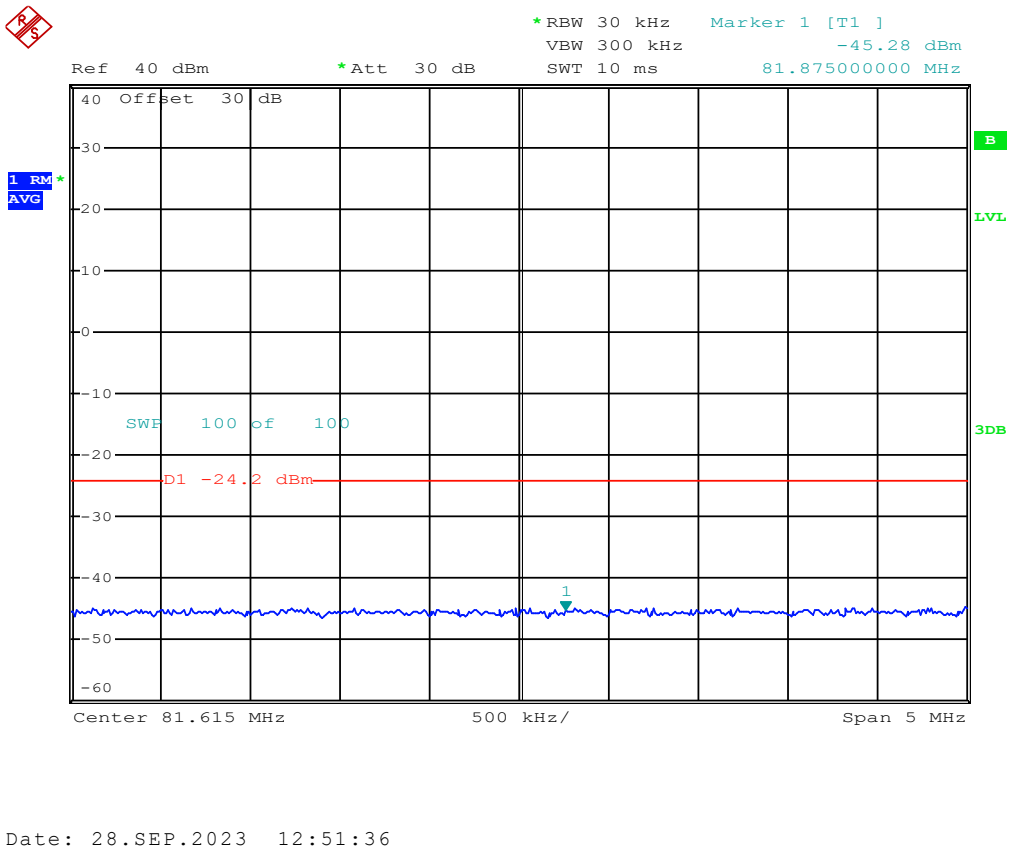
Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM USB**	**Emission Frequency:**	**ND**	**MHz**
		Measured Emission:	**ND**	**dBm**

Plot 10.20 – Conducted Out of Band Emissions, 3rd Harmonic, Channel 20, AM, USB

Conducted Spurious Emissions:



Channel:	**20**	**Channel Frequency:**	**27.205**	**MHz**
Modulation:	**AM USB**	**Emission Frequency:**	**ND**	**MHz**
		Measured Emission:	**ND**	**dBm**

Table 10.1 – Summary of Conducted Out of Band Emissions

Conducted Spurious Emissions Measurement Results:								
Channel Number	Frequency (MHz)	Modulation	Emission Power [P_{Em}] (dBm)	Emission Frequency (MHz)	Fundamental Measurment [P_{Fund}] (dBm)	Attenuation [Atten] (dB)	Limit (dB)	Margin (dB)
20	27.205	AM	-34.12	54.408	35.80	69.92	60	9.92
			-43.58	81.609	35.80	79.38		19.38
		FM	-33.53	54.810	35.80	69.33		9.33
			-42.09	82.219	35.80	77.89		17.89
								Complies

Attenuation [Atten] = [P_{Fund}] - [P_{Em}]
Margin = Attenuation - Limit
ND = None Detected

11.0 RADIATED SPURIOUS TX EMISSIONS

Test Procedure	
Normative Reference	**FCC 47 CFR §15.109, ICES-003(6.2)** **ANSI C63.4:2014**

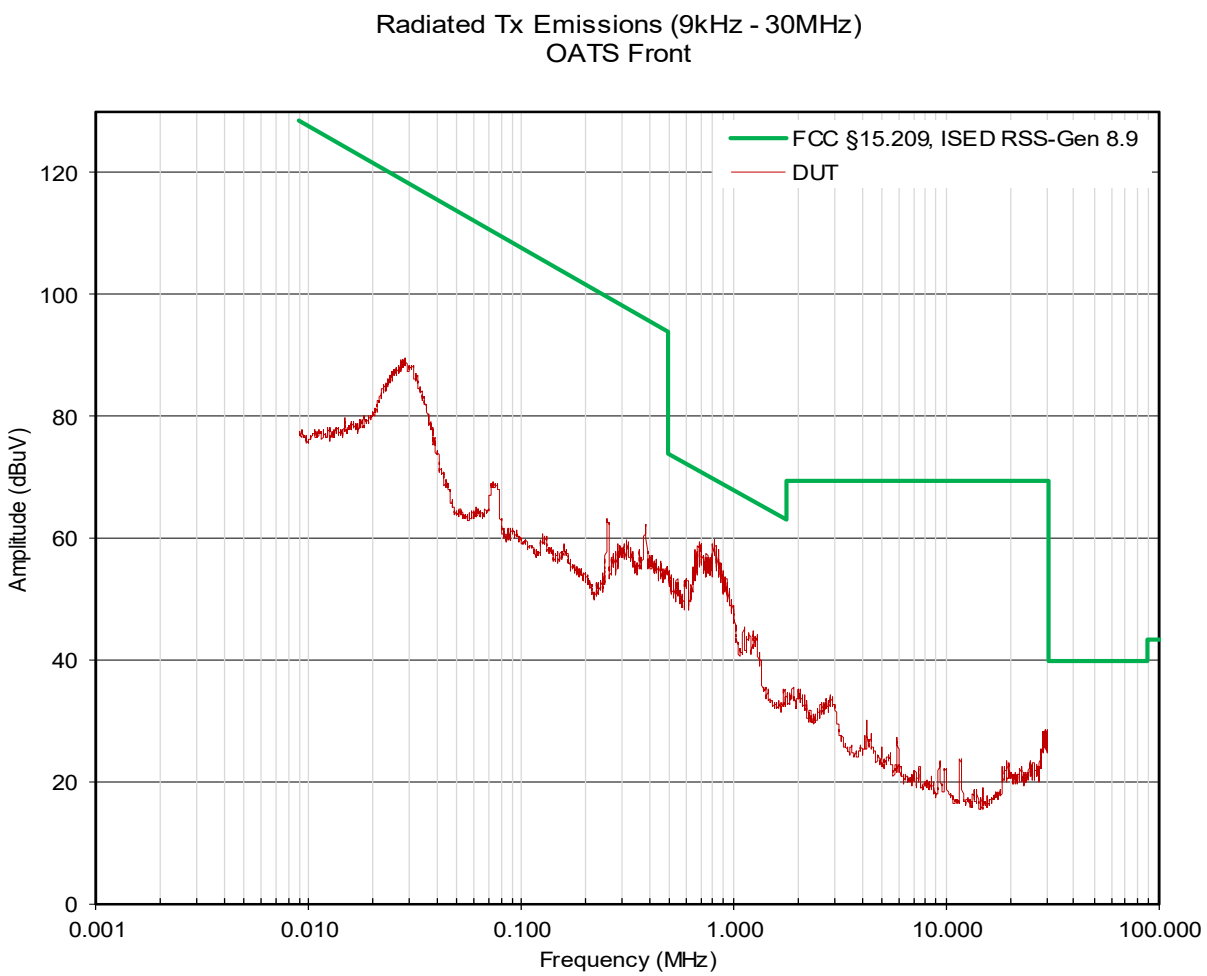
Limits	
47 CFR §15.109	(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values: 30-88MHz: 40dBuV/m 88-216MHz: 43.5dBuV/m 216-960MHz: 46dBuV/m > 960MHz: 54dBuV/m

Test Setup	Appendix A Figure A.3

Measurement Procedure
The DUT was set up as per ANSI C63.4:2014. Emissions were scanned between 30MHz and 1000MHz. The turntable was rotated 360 degrees and the antenna was elevated to 4m to optimize the measured emissions.

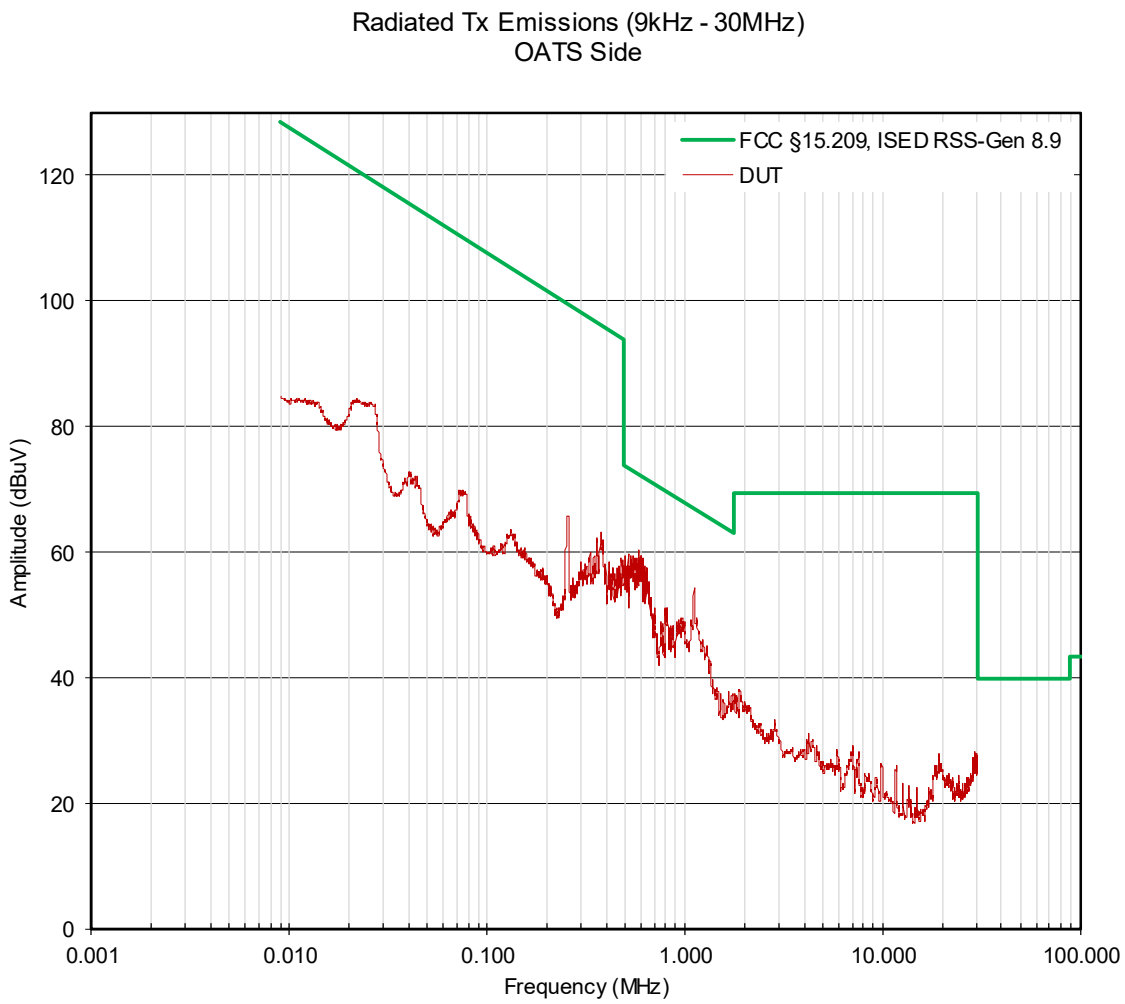
Plot 11.1 – Radiated Spurious Emissions OATS, 9kHz - 30MHz, without Accessories, Front

Radiated Tx Emissions:



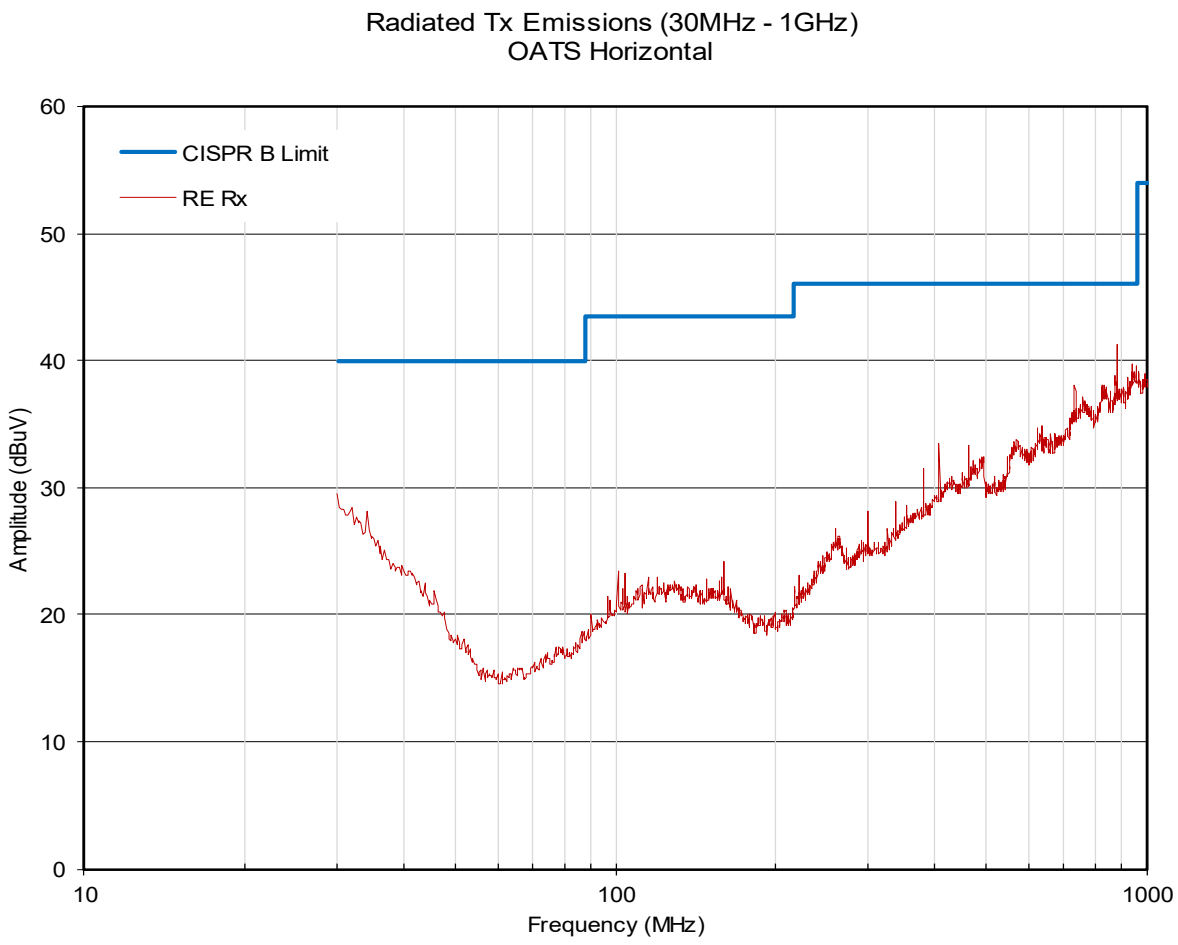
Plot 11.2 – Radiated Spurious Emissions OATS, 9kHz - 30MHz, without Accessories, Side

Radiated Tx Emissions:



Plot 11.3 – Radiated Spurious Emissions OATS, 30 - 1000MHz, without Accessories, Horizontal

Radiated Tx Emissions:



Plot 11.4 – Radiated Spurious Emissions OATS, 30 - 1000MHz, without Accessories, Vertical

Radiated Tx Emissions:

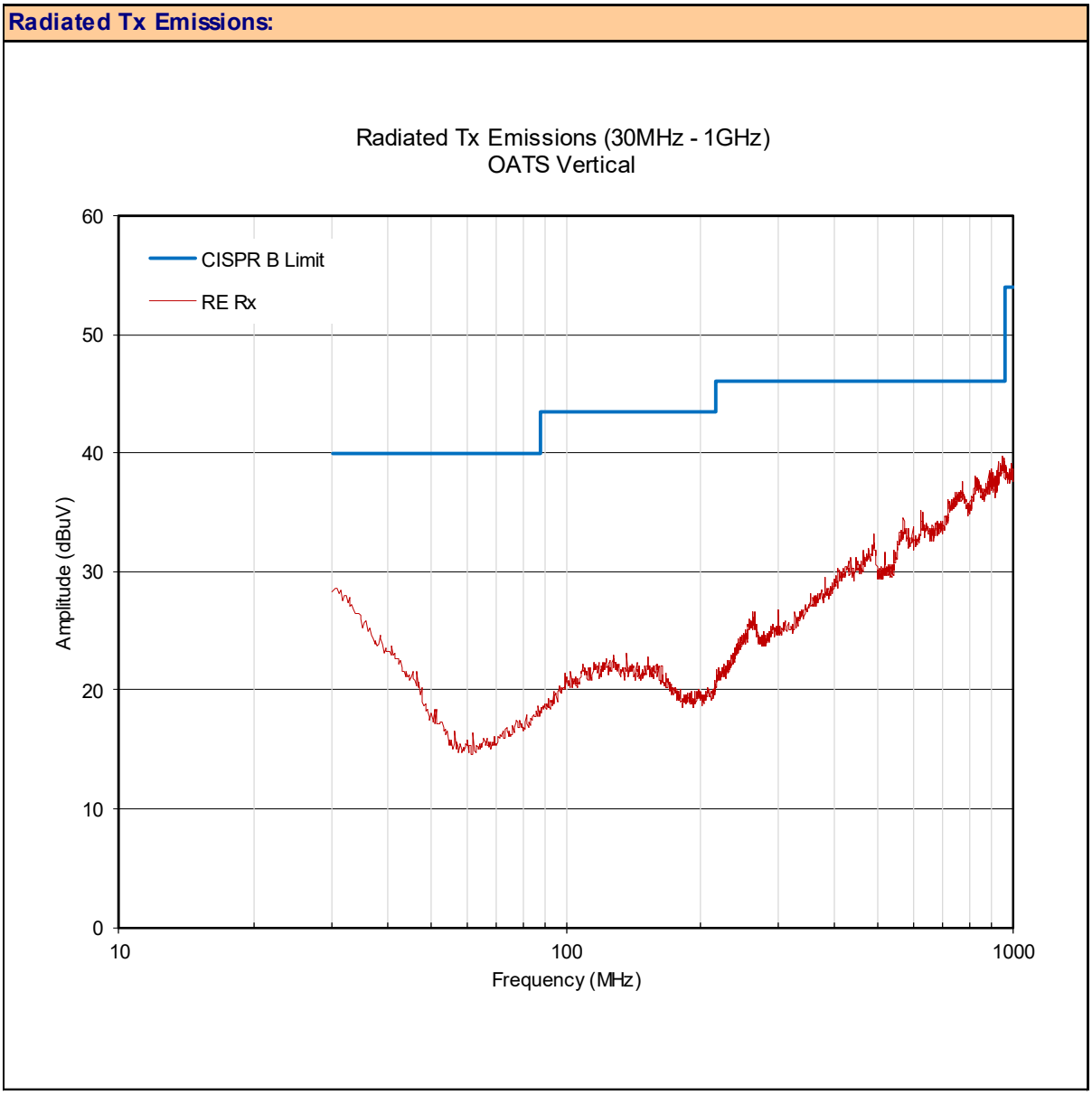


Table 11.1 – Summary of Radiated Tx Emissions, without Accessories

Summary of Radiated Tx Emissions w/o Accessories									
Measured Frequency Range (MHz)	Antenna Polarization	Emission Frequency (MHz)	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
.009 - 30	Front	**0.703**	47.83 AV	10.07	0.44	0.00 (3)	**58.3** (2)	70.7	**12.3**
.009 - 30	Front	**0.808**	49.32 AV	10.04	0.44	0.00 (3)	**59.8** (2)	69.5	**9.7**
.009 - 30	Front	**1.170**	33.63 AV	10.32	0.45	0.00 (3)	**44.4** (2)	66.2	**21.8**
.009 - 30	Side	**0.591**	48.40 AV	10.06	0.44	0.00 (3)	**58.9** (2)	72.2	**13.3**
.009 - 30	Side	**0.806**	39.32 AV	10.04	0.44	0.00 (3)	**49.8** (2)	69.5	**19.7**
.009 - 30	Side	**1.120**	42.23 AV	10.33	0.45	0.00 (3)	**53.0** (2)	66.6	**13.6**
30-1000	Horizontal	**380.50**	9.31 AV	20.40	1.86	0.00 (3)	**31.6** (2)	45.0	**13.4**
30-1000	Horizontal	**407.10**	9.46 AV	21.50	1.93	0.00 (3)	**32.9** (2)	45.0	**12.1**
30-1000	Horizontal	**407.80**	10.01 AV	21.50	1.93	0.00 (3)	**33.4** (2)	45.0	**11.6**
30-1000	Horizontal	**461.70**	8.77 AV	22.50	2.08	0.00 (3)	**33.3** (2)	45.0	**11.7**
30-1000	Horizontal	**878.90**	8.99 AV	29.30	2.89	0.00 (3)	**41.2** (2)	45.0	**3.8**
30-1000	Vertical	**ND**	**ND** AV	-	-	0.00 (3)	**ND** (2)	-	**-**
							Results:	**Complies**	

ND: No Emissions Detected above ambient or within 20dB of the limit

(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor

(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF^E + L_C - G_A$

Where ACF^E is the Electric Antenna Correction Factor

Table 11.2 – Summary of Radiated Tx Emissions, without Accessories, <30MHz

Summary of Radiated Tx Emissions ISED RSS-Gen 6.5 (Below 30MHz) w/o Accessories									
Measured Frequency Range (MHz)	Antenna Polarization	Emission Frequency (MHz)	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF^H] (dB/Ωm)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [H_{Corr}] (dBuA/m)	Limit (dBuA/m)	Margin (dB)
.009 - 30	Front	**0.5930**	47.83 AV	-41.43	0.44	0.00 (3)	6.84 (2)	19.2	**12.3**
.009 - 30	Front	**0.7030**	49.32 AV	-41.46	0.44	0.00 (3)	8.30 (2)	18.0	**9.7**
.009 - 30	Front	**0.8180**	33.63 AV	-41.18	0.45	0.00 (3)	-7.10 (2)	14.7	**21.8**
.009 - 30	Side	**0.5960**	48.40 AV	-41.44	0.44	0.00 (3)	7.40 (2)	20.7	**13.3**
.009 - 30	Side	**0.8140**	39.32 AV	-41.46	0.44	0.00 (3)	-1.70 (2)	18.0	**19.7**
.009 - 30	Side	**1.1200**	42.23 AV	-41.17	0.45	0.00 (3)	1.50 (2)	15.1	**13.6**

ND: No Emissions Detected above ambient or within 20dB of the limit

(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor

(3) External Amplier not used

$H_{Corr}(dBuA/m) = E_{Meas}(dBuV) + ACF^H(dB/\Omega m) + L_C - G_A$

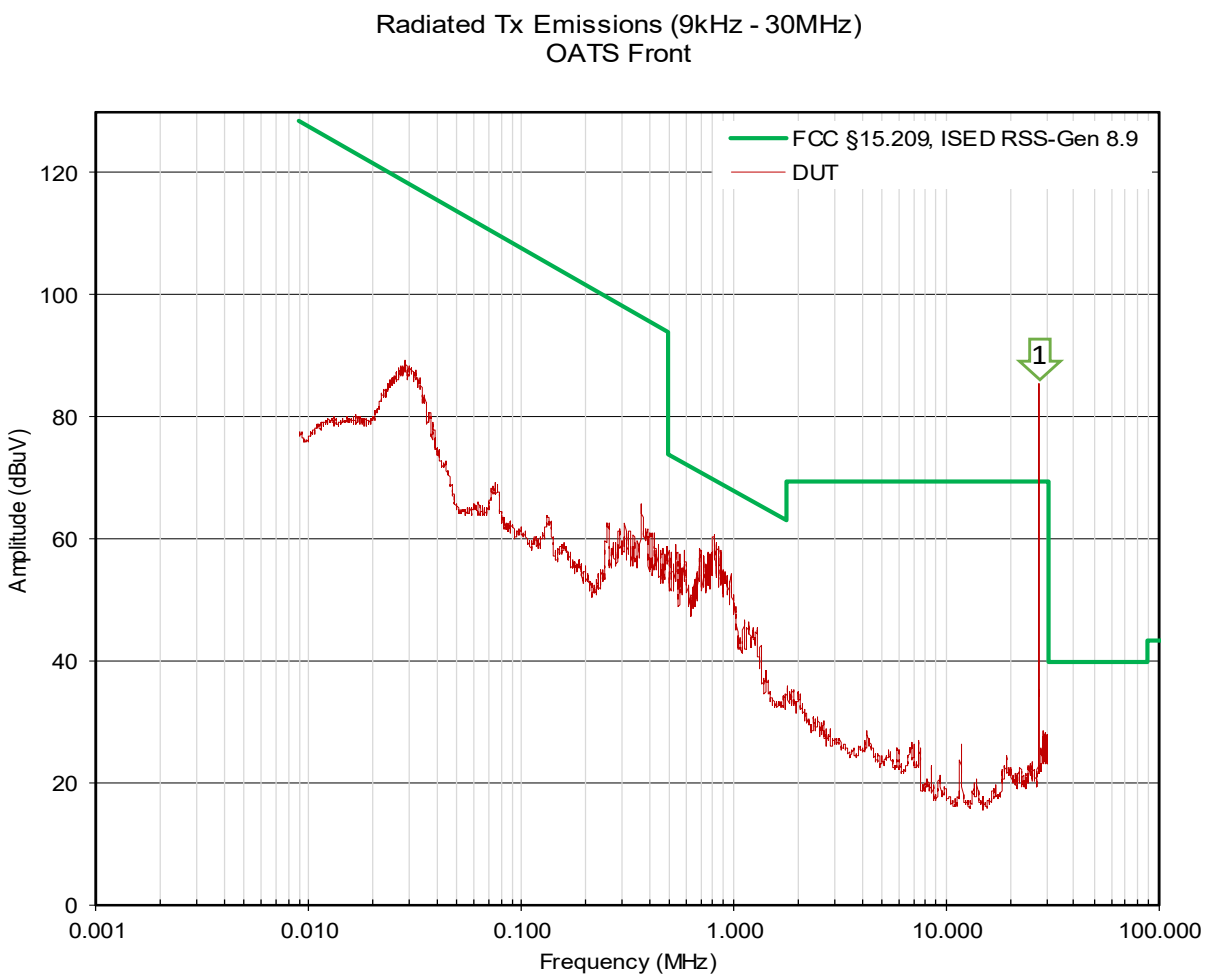
Where ACF^H is the Magnetic Antenna Correction Factor

$ACF^H(dB/\Omega m) = ACF^E(dB/m) - Z0(dB\Omega)$

Where $Z_0 = 120\pi\Omega = 377\Omega$, $Z_0(dB\Omega) = 20Log(377) = 51.5dB\Omega$

Plot 11.5 – Radiated Spurious Emissions OATS, 9kHz - 30MHz, with Accessories, Front

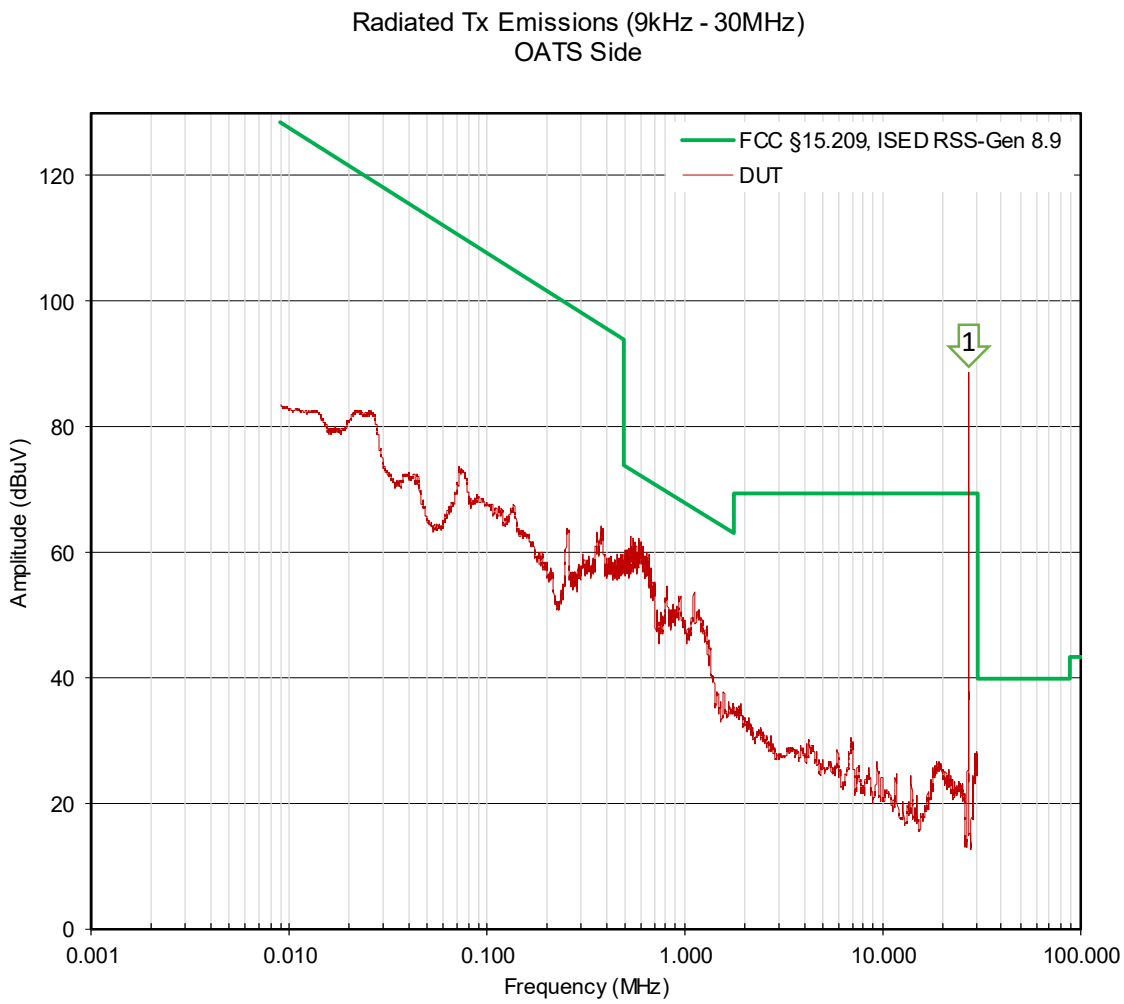
Radiated Rx Emissions:



Marker 1 = Fundamental

Plot 11.6 – Radiated Spurious Emissions OATS, 9kHz - 30MHz, with Accessories, Side

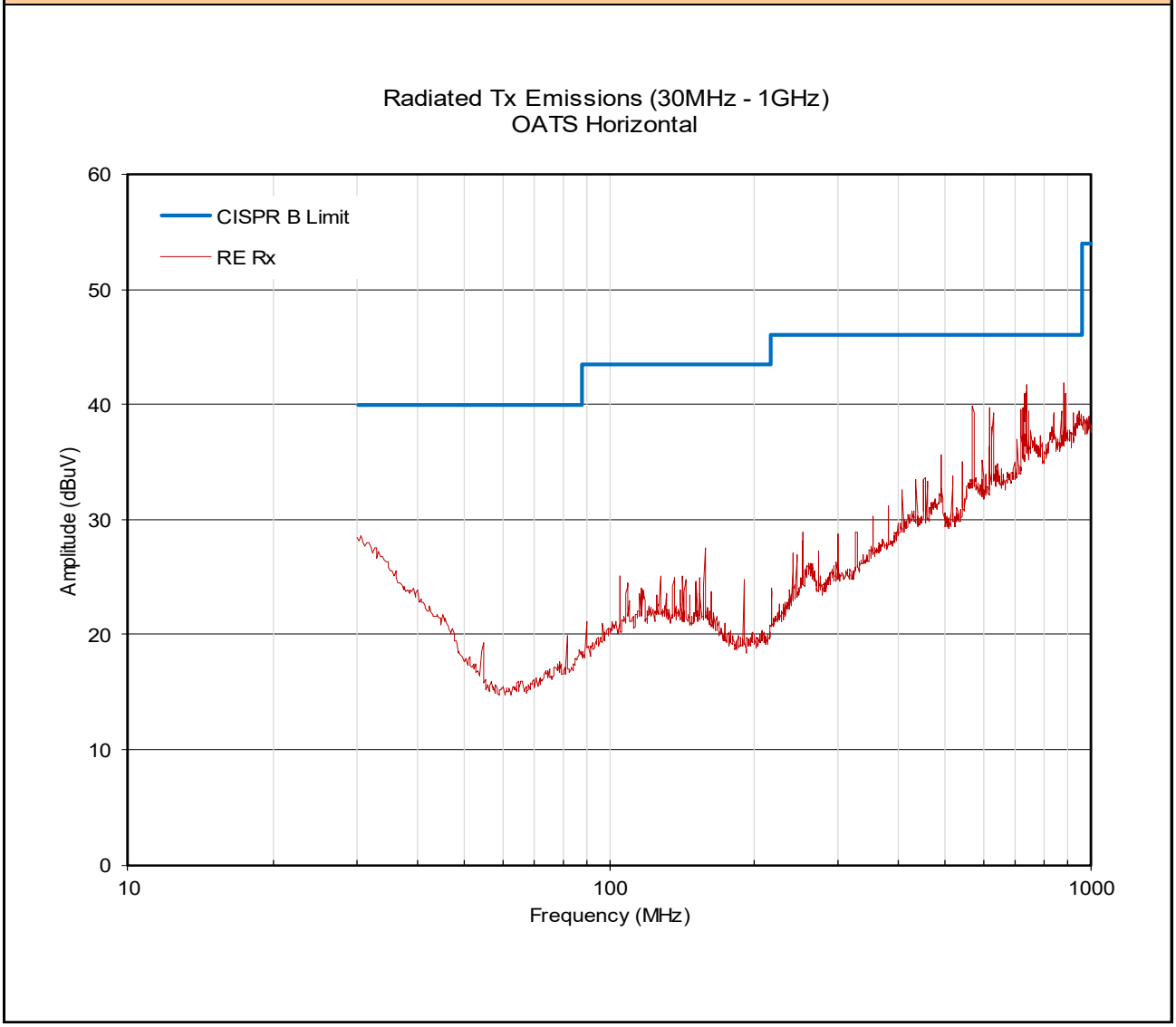
Radiated Rx Emissions:



Marker 1 = Fundamental

Plot 11.7 – Radiated Spurious Emissions OATS, 30 - 1000MHz, with Accessories, Horizontal

Radiated Tx Emissions:



Plot 11.8 – Radiated Spurious Emissions OATS, 30 - 1000MHz, with Accessories, Vertical

Radiated Tx Emissions:

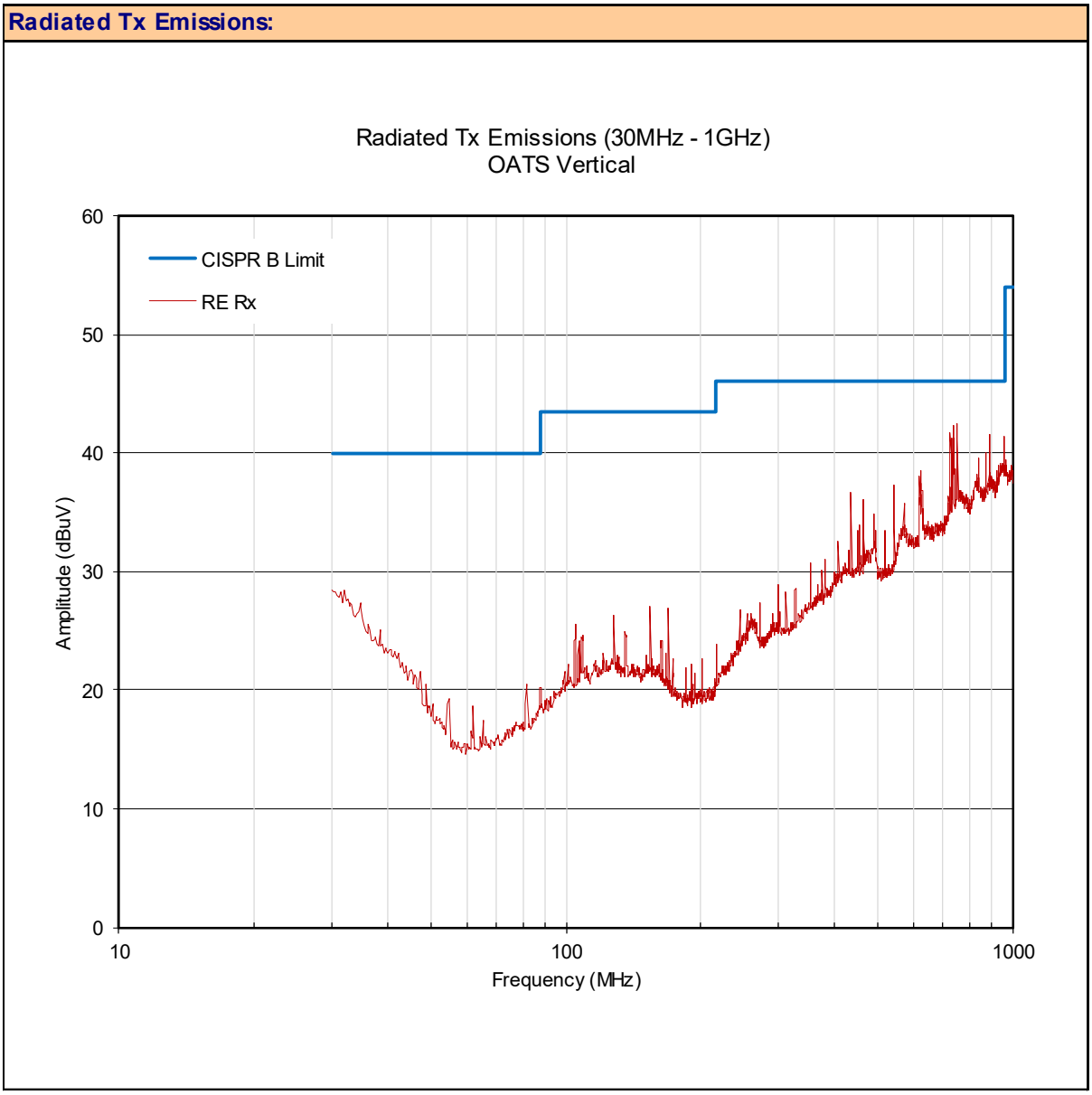


Table 11.3 – Summary of Radiated Tx Emissions, with Accessories

Summary of Radiated Tx Emissions w/ Accessories									
Measured Frequency Range (MHz)	Antenna Polarization	Emission Frequency (MHz)	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
.009 - 30	Front	**0.540**	47.34 AV	10.02	0.44	0.00 (3)	**57.8** (2)	73.0	**15.2**
.009 - 30	Front	**0.700**	47.89 AV	10.07	0.44	0.00 (3)	**58.4** (2)	70.7	**12.3**
.009 - 30	Front	**0.806**	49.22 AV	10.04	0.44	0.00 (3)	**59.7** (2)	69.5	**9.8**
.009 - 30	Front	**1.120**	35.33 AV	10.33	0.45	0.00 (3)	**46.1** (2)	66.6	**20.5**
.009 - 30	Side	**0.541**	51.34 AV	10.02	0.44	0.00 (3)	**61.8** (2)	72.9	**11.1**
.009 - 30	Side	**0.592**	51.29 AV	10.06	0.44	0.00 (3)	**61.8** (2)	72.2	**10.4**
.009 - 30	Side	**0.810**	43.52 AV	10.04	0.44	0.00 (3)	**54.0** (2)	69.4	**15.4**
.009 - 30	Side	**1.110**	41.73 AV	10.33	0.45	0.00 (3)	**52.5** (2)	66.7	**14.2**
30-1000	Horizontal	**157.98**	10.80 AV	15.50	1.20	0.00 (3)	**27.5** (2)	43.5	**16.0**
30-1000	Horizontal	**190.11**	9.72 AV	13.70	1.31	0.00 (3)	**24.7** (2)	43.5	**18.8**
30-1000	Horizontal	**570.20**	11.73 AV	25.80	2.34	0.00 (3)	**39.9** (2)	45.0	**5.1**
30-1000	Horizontal	**617.80**	11.67 AV	25.58	2.44	0.00 (3)	**39.7** (2)	45.0	**5.3**
30-1000	Horizontal	**738.20**	10.57 AV	28.52	2.67	0.00 (3)	**41.8** (2)	45.0	**3.2**
30-1000	Horizontal	**878.90**	9.69 AV	29.30	2.9	0.00 (3)	**41.9** (2)	45.0	**3.1**
30-1000	Vertical	**105.06**	9.01 AV	15.60	1.01	0.00 (3)	**25.6** (2)	43.5	**17.9**
30-1000	Vertical	**154.74**	10.03 AV	15.83	1.19	0.00 (3)	**27.0** (2)	43.5	**16.5**
30-1000	Vertical	**169.86**	11.03 AV	14.71	1.24	0.00 (3)	**27.0** (2)	43.5	**16.5**
30-1000	Vertical	**434.40**	11.84 AV	22.00	2.00	0.00 (3)	**35.8** (2)	45.0	**9.2**
30-1000	Vertical	**461.70**	11.57 AV	22.50	2.08	0.00 (3)	**36.1** (2)	45.0	**8.9**
30-1000	Vertical	**543.60**	11.28 AV	23.80	2.3	0.00 (3)	**37.4** (2)	45.0	**7.6**
30-1000	Vertical	**622.70**	10.03 AV	26.07	2.45	0.00 (3)	**38.6** (2)	45.0	**6.4**
30-1000	Vertical	**726.30**	10.91 AV	28.20	2.65	0.00 (3)	**41.8** (2)	45.0	**3.2**
30-1000	Vertical	**753.60**	9.80 AV	28.70	2.70	0.00 (3)	**41.2** (2)	45.0	**3.8**
							Results:	**Complies**	

ND: No Emissions Detected above ambient or within 20dB of the limit

(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor

(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF^E + L_C - G_A$

Where ACF^E is the Electric Antenna Correction Factor

Table 11.4 – Summary of Radiated Tx Emissions, with Accessories < 30MHz

Summary of Radiated Tx Emissions ISED RSS-Gen 6.5 (Below 30MHz) w/ Accessories									
Measured Frequency Range (MHz)	Antenna Polarization	Emission Frequency (MHz)	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF^H] (dB/Ωm)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [H_{Corr}] (dBuA/m)	Limit (dBuA/m)	Margin (dB)
.009 - 30	Front	**0.5930**	47.34 AV	-41.48	0.44	0.00 (3)	6.30 (2)	21.5	**15.2**
.009 - 30	Front	**0.5930**	47.89 AV	-41.43	0.44	0.00 (3)	6.90 (2)	19.2	**12.3**
.009 - 30	Front	**0.5930**	49.22 AV	-41.46	0.44	0.00 (3)	8.20 (2)	18.0	**9.8**
.009 - 30	Side	**0.5930**	35.33 AV	-41.17	0.45	0.00 (3)	-5.40 (2)	15.1	**20.5**
.009 - 30	Side	**0.5930**	51.34 AV	-41.48	0.44	0.00 (3)	10.30 (2)	21.4	**11.1**
.009 - 30	Side	**0.5930**	51.29 AV	-41.44	0.44	0.00 (3)	10.30 (2)	20.7	**10.4**
.009 - 30	Side	**0.5930**	43.52 AV	-41.46	0.44	0.00 (3)	2.50 (2)	17.9	**15.4**
.009 - 30	Side	**0.5930**	41.73 AV	-41.17	0.45	0.00 (3)	1.00 (2)	15.2	**14.2**

ND: No Emissions Detected above ambient or within 20dB of the limit

(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor

(3) External Amplier not used

$H_{Corr}(dBuA/m) = E_{Meas}(dBuV) + ACF^H(dB/\Omega m) + L_C - G_A$

Where ACF^H is the Magnetic Antenna Correction Factor

$ACF^H(dB/\Omega m) = ACF^E(dB/m) - Z0(dB\Omega)$

Where $Z_0 = 120\pi\Omega = 377\Omega$, $Z_0(dB\Omega) = 20Log(377) = 51.5dB\Omega$

12.0 RADIATED SPURIOUS RX EMISSIONS

Test Procedure	
Normative Reference	**FCC 47 CFR §15.109, ICES-003(6.2)** **ANSI C63.4:2014**

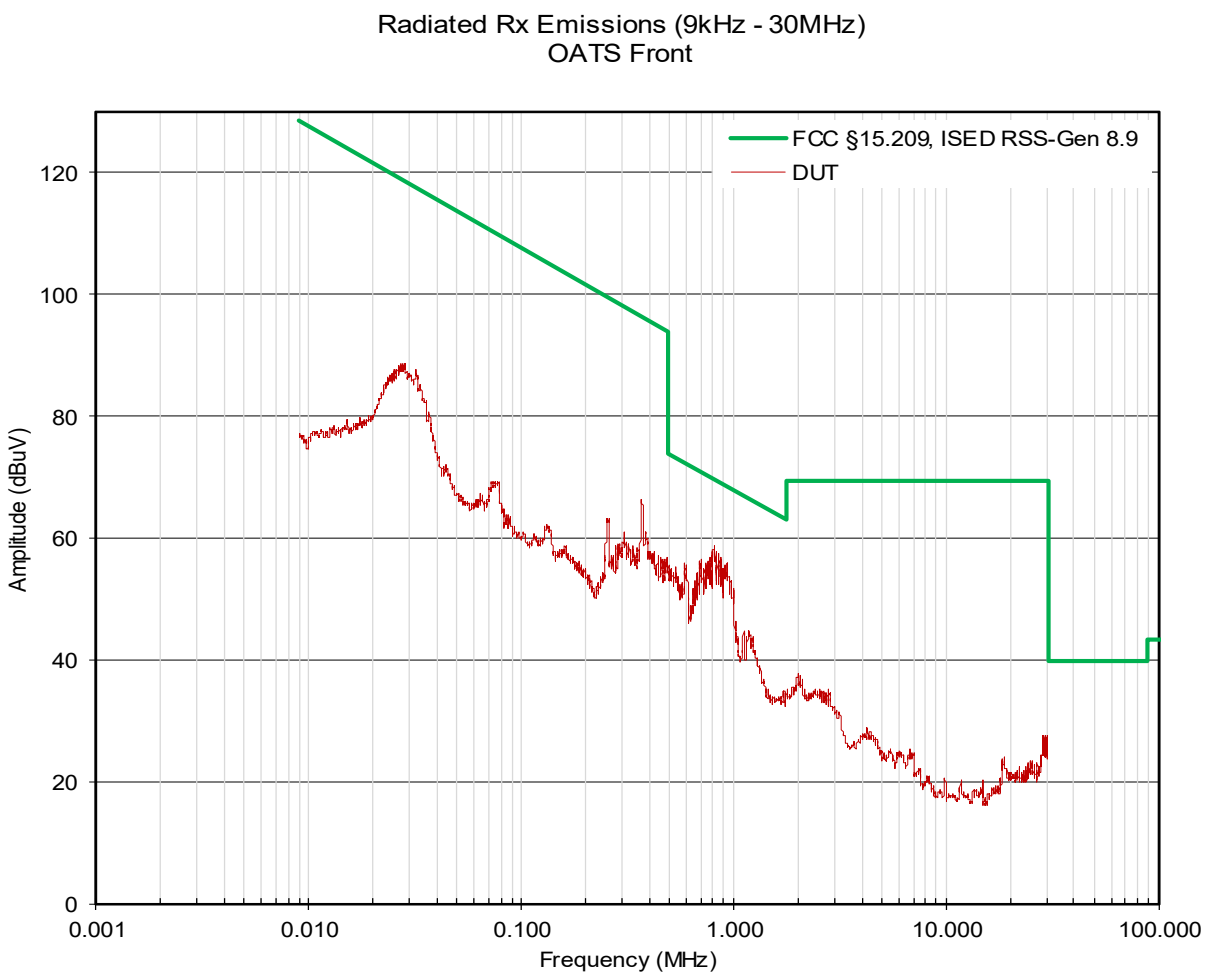
Limits	
47 CFR §15.109	(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values: 30-88MHz: 40dBuV/m 88-216MHz: 43.5dBuV/m 216-960MHz: 46dBuV/m > 960MHz: 54dBuV/m

Test Setup	Appendix A Figure A.3

Measurement Procedure
The DUT was set up as per ANSI C63.4:2014. Emissions were scanned between 30MHz and 1000MHz. The turntable was rotated 360 degrees and the antenna was elevated to 4m to optimize the measured emissions.

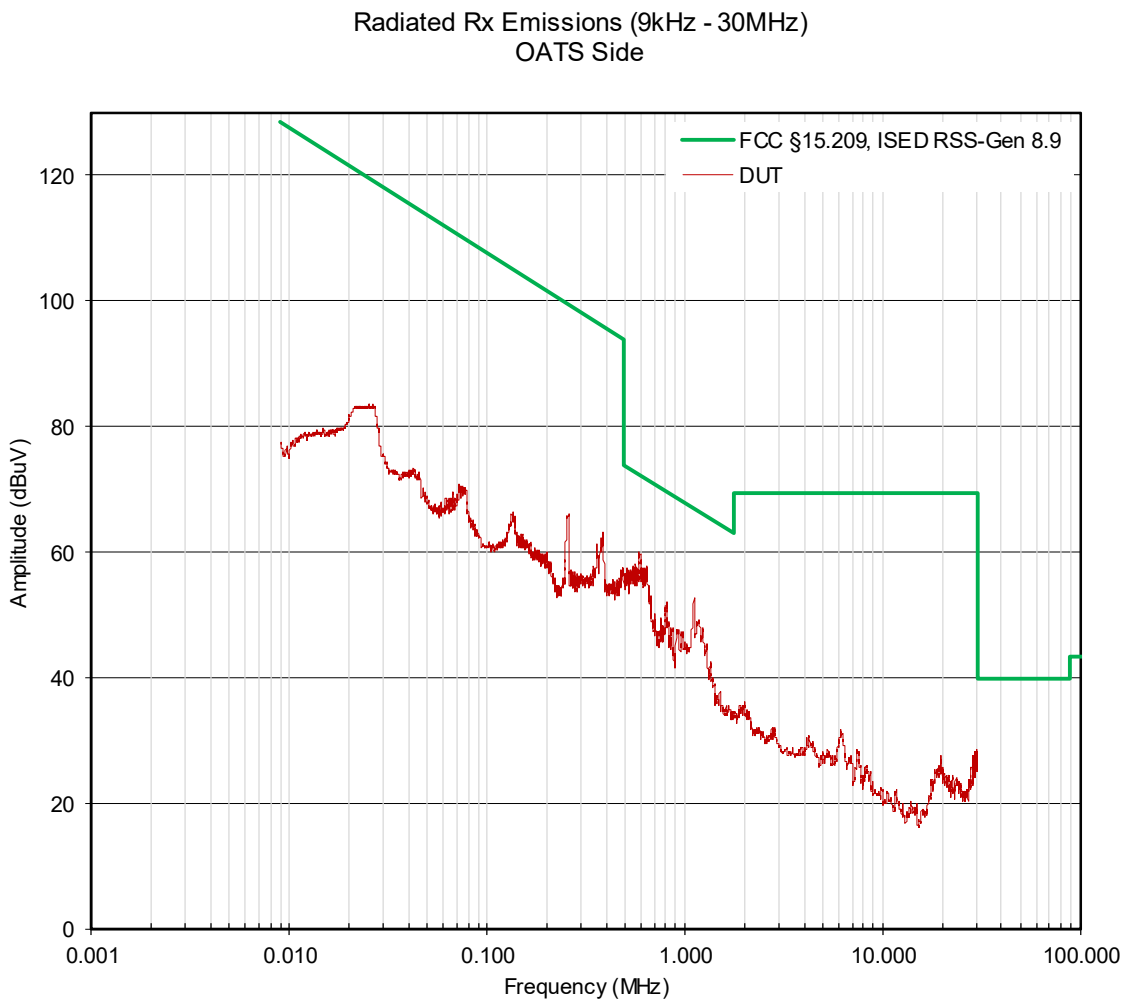
Plot 12.1 – Radiated Rx Emissions OATS, 9kHz - 30MHz, Front

Radiated Rx Emissions:



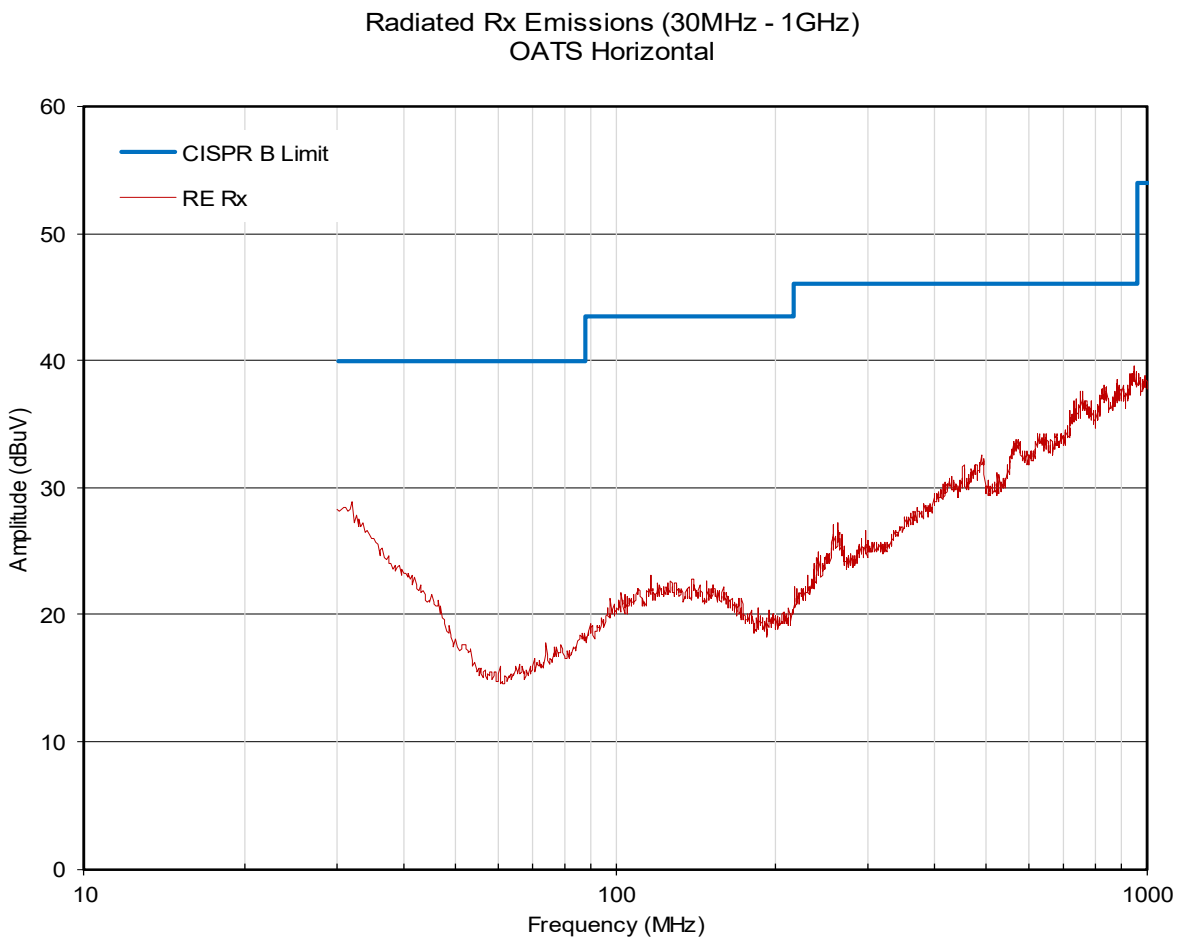
Plot 12.2 – Radiated Rx Emissions OATS, 9kHz - 30MHz, Side

Radiated Rx Emissions:



Plot 12.3– Radiated Spurious Emissions OATS, 30 - 1000MHz, Horizontal

Radiated Rx Emissions:



Plot 12.4– Radiated Spurious Emissions OATS, 30 - 1000MHz, Vertical

Radiated Rx Emissions:

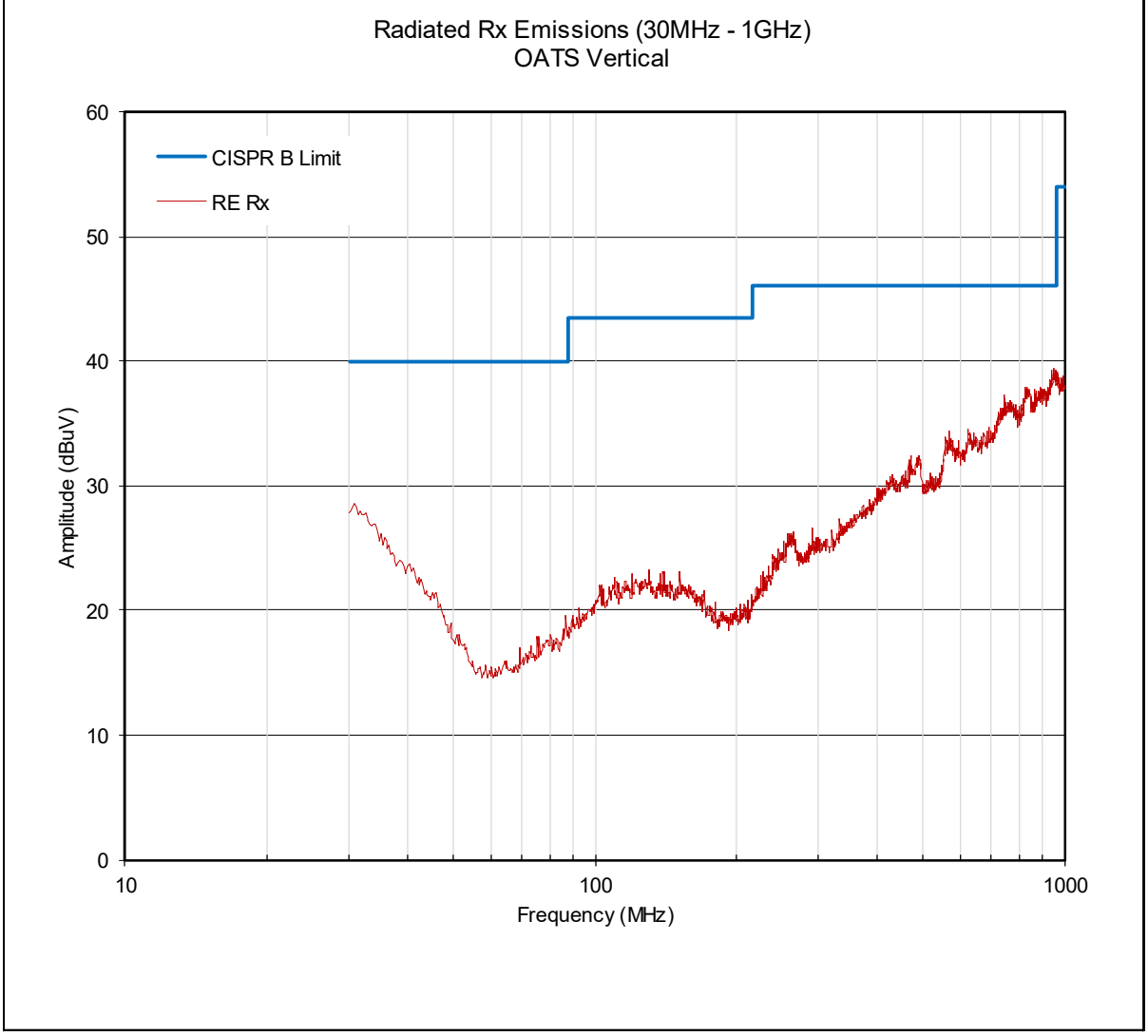


Table 12.1 – Summary of Radiated Rx Emissions

Summary of Radiated Rx Emissions									
Measured Frequency Range (MHz)	Antenna Polarization	Emission Frequency (MHz)	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
.009 - 30	Front	**0.5930**	44.39 AV	10.06440	0.4419	0.00 (3)	**54.9** (2)	72.1	**17.2**
.009 - 30	Front	**0.7030**	44.99 AV	10.06910	0.4427	0.00 (3)	**55.5** (2)	70.7	**15.2**
.009 - 30	Front	**0.8180**	46.92 AV	10.03820	0.4436	0.00 (3)	**57.4** (2)	69.3	**11.9**
.009 - 30	Side	**0.5960**	48.19 AV	10.06680	0.4419	0.00 (3)	**58.7** (2)	72.1	**13.4**
.009 - 30	Side	**0.8140**	40.12 AV	10.03860	0.4436	0.00 (3)	**50.6** (2)	69.4	**18.8**
.009 - 30	Side	**1.1200**	40.43 AV	10.32640	0.4460	0.00 (3)	**51.2** (2)	66.6	**15.4**
30-1000	Vertical	**ND**	**ND**	-	-	0.00 (3)	**ND** (2)	-	**-**
30-1000	Horizontal	**ND**	**ND**	-	-	0.00 (3)	**ND** (2)	-	**-**
							Results:	**Complies**	

ND: No Emissions Detected above ambient or within 20dB of the limit

(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor

(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF^E + L_C - G_A$

Where ACF^E is the Electric Antenna Correction Factor

Table 12.2 – Summary of Radiated Rx Emissions, <30MHz

Summary of Radiated Rx Emissions ISED RSS-Gen 6.5 (Below 30MHz)									
Measured Frequency Range (MHz)	Antenna Polarization	Emission Frequency (MHz)	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF^H] (dB/Ωm)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [H_{Corr}] (dBuA/m)	Limit (dBuA/m)	Margin (dB)
.009 - 30	Front	**0.5930**	44.39 AV	-41.44	0.44	0.00 (3)	3.40 (2)	20.6	**17.2**
.009 - 30	Front	**0.7030**	44.99 AV	-41.43	0.44	0.00 (3)	4.00 (2)	19.2	**15.2**
.009 - 30	Front	**0.8180**	46.92 AV	-41.46	0.44	0.00 (3)	5.90 (2)	17.8	**11.9**
.009 - 30	Side	**0.5960**	48.19 AV	-41.43	0.44	0.00 (3)	7.20 (2)	20.6	**13.4**
.009 - 30	Side	**0.8140**	40.12 AV	-41.46	0.44	0.00 (3)	-0.90 (2)	17.9	**18.8**
.009 - 30	Side	**1.1200**	40.43 AV	-41.17	0.45	0.00 (3)	-0.30 (2)	15.1	**15.4**

ND: No Emissions Detected above ambient or within 20dB of the limit

(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor

(3) External Amplier not used

$H_{Corr}(dBuA/m) = E_{Meas}(dBuV) + ACF^H(dB/\Omega m) + L_C - G_A$

Where ACF^H is the Magnetic Antenna Correction Factor

$ACF^H(dB/\Omega m) = ACF^E(dB/m) - Z0(dB\Omega)$

Where $Z_0 = 120\pi\Omega = 377\Omega$, $Z_0(dB\Omega) = 20Log(377) = 51.5dB\Omega$

13.0 FREQUENCY STABILITY

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1055, §95.965, RSS-Gen, ANSI C63.10**

Limits	
47 CFR §95.965	Each CBRS transmitter type must be designed such that the transmit carrier frequency (or in the case of SSB transmissions, the reference frequency) remains within 50 parts-per-million of the channel center frequencies specified in §95.963 under all normal operating conditions.

Measurement Procedure

47 CFR §2.1055 Frequency Stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

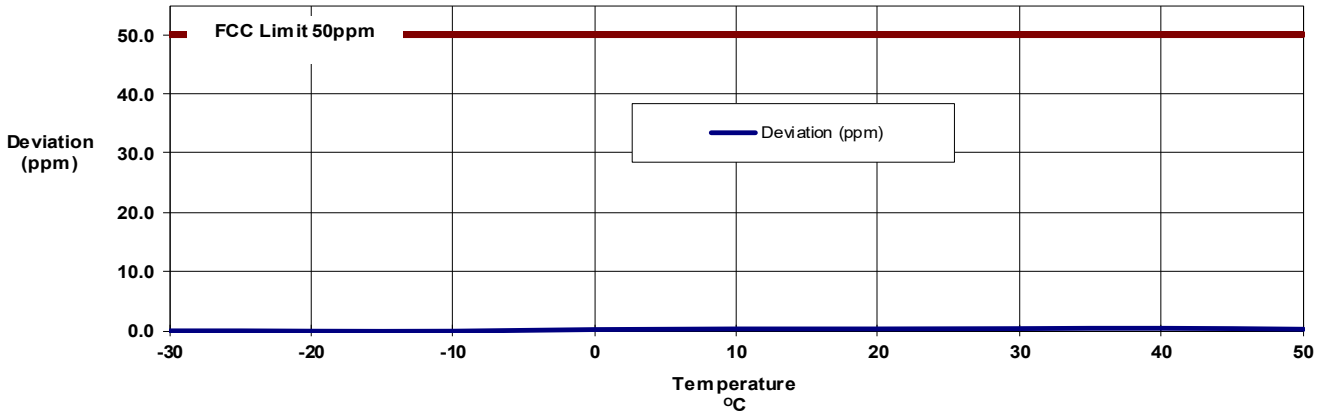
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

Test Setup	Appendix A Figure A.4

Table 13.1 – Summary of Frequency Stability Results (AM)

Frequency Stability

Nominal Frequency (MHz):	27.205
Nominal Channel BW (KHz):	CW
Nominal Voltage (VDC):	13.8
Nominal Temperature (°C):	20



Frequency Stability Measurements (Temperature)

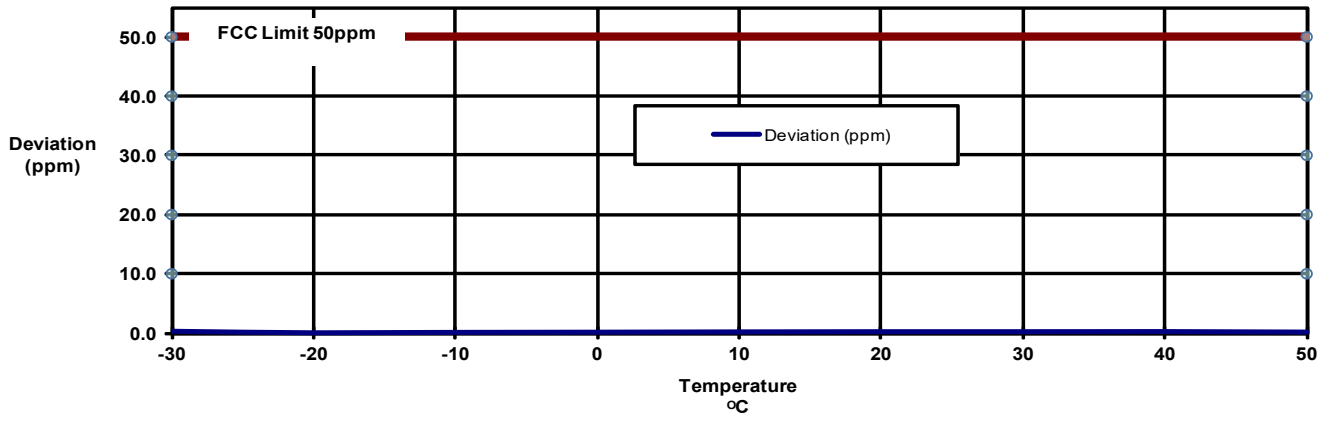
Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
-30		27.2049986	-1	0.05
-20		27.2050006	1	0.02
-10		27.2050003	0	0.01
0		27.2050040	4	0.15
10	27.205000	27.2050056	6	0.21
20		27.2050058	6	0.21
30		27.2050069	7	0.25
40		27.2050074	7	0.27
50		27.2050050	5	0.18
			Maximum Deviation:	0.27
			Maximum Limit:	50.00
			Result:	Complies

Frequency Stability Measurements (Voltage)

Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
27.6 (115%)		27.2050051	5	0.19
13.8	27.205000	27.2050058	6	0.21
11.73 (85%)		27.2050060	6	0.22
		Maximum Deviation:		0.22
		Maximum Limit:		50.00
		Result:		Complies

Table 13.2 – Summary of Frequency Stability Results (FM)

Frequency Stability	
Nominal Frequency (MHz):	27.205
Nominal Channel BW (KHz):	CW
Nominal Voltage (VDC):	13.8
Nominal Temperature (°C):	20



Frequency Stability Measurements (Temperature)				
Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
-30	27.205000	27.2049900	-10	0.37
-20		27.2050006	1	0.02
-10		27.2050034	3	0.12
0		27.2050041	4	0.15
10		27.2050063	6	0.23
20		27.2050075	8	0.28
30		27.2050074	7	0.27
40		27.2050081	8	0.30
50		27.2050053	5	0.19
			Maximum Deviation:	0.37
			Maximum Limit:	50.00
			Result:	Complies

Frequency Stability Measurements (Voltage)				
Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
27.6 (115%)	27.205000	27.2050071	7	0.26
13.8		27.2050075	8	0.28
11.73 (85%)		27.2050082	8	0.30
			Maximum Deviation:	0.30
			Maximum Limit:	50.00
			Result:	Complies

APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT

Table A.1 – Setup - Conducted Measurements Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
00241	R&S	FSU40	Spectrum Analyzer

Figure A.1 – Test Setup Conducted Measurements

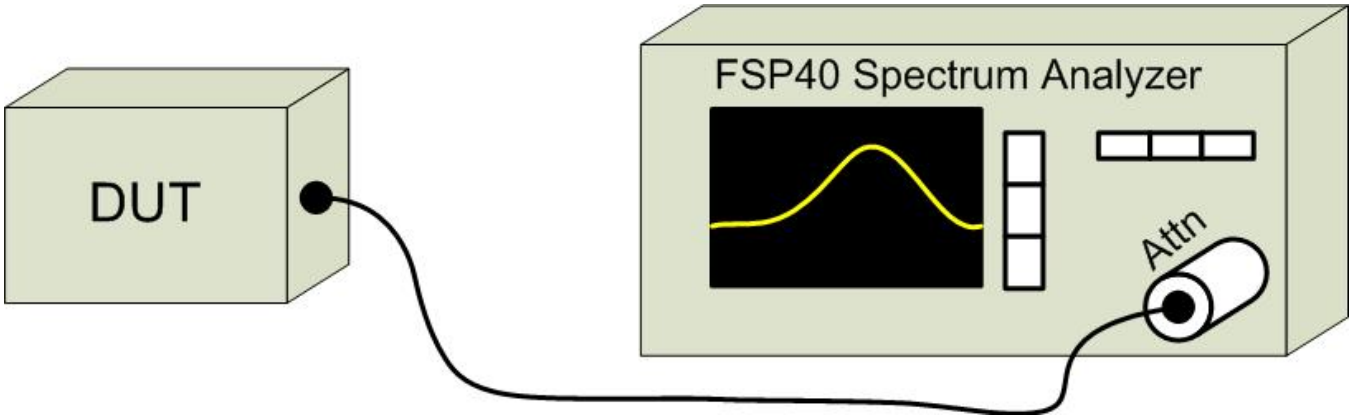


Table A.2 – Setup - Audio Modulation Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
00028	HP	8901A	Modulation Analyzer
00027	HP	8903B	Audio Analyzer/Generator

Figure A.2 – Test Setup Audio Modulation Response Measurements

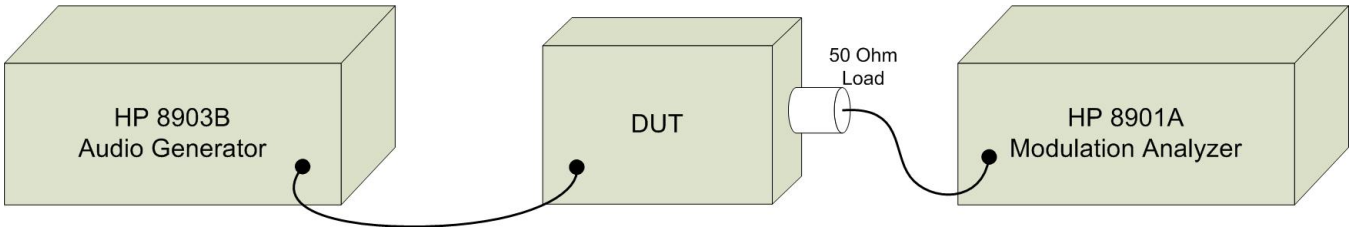


Table A.3 – Setup - Radiated Emissions Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
00051	HP	8566B	Spectrum Analyzer
00049	HP	85650A	Quasi-peak Adapter
00047	HP	85685A	RF Preselector
00072	EMCO	2075	Mini-mast
00073	EMCO	2080	Turn Table
00071	EMCO	2090	Multi-Device Controller
00265	Miteq	JS32-00104000-58-5P	Microwave L/N Amplifier
00241	R&S	FSU40	Spectrum Analyzer
00050	Chase	CBL-6111A	Bilog Antenna
00275	Coaxis	LMR400	25m Cable
00276	Coaxis	LMR400	4m Cable
00278	TILE	34G3	TILE Test Software
00034	ETS	3115	Double Ridged Guide Horn

CNR: Calibration Not Required
COU: Calibrate On Use

Figure A.3 – Test Setup Radiated Emissions Measurements Below 30MHz

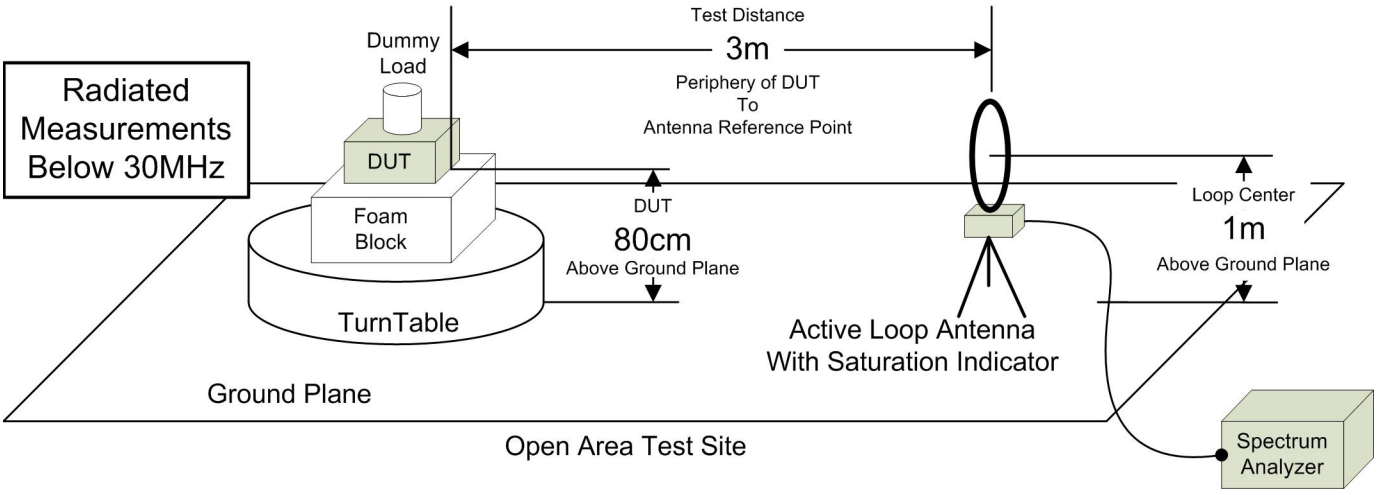


Figure A.4 – Test Setup Radiated Emissions Measurements 30-1000MHz

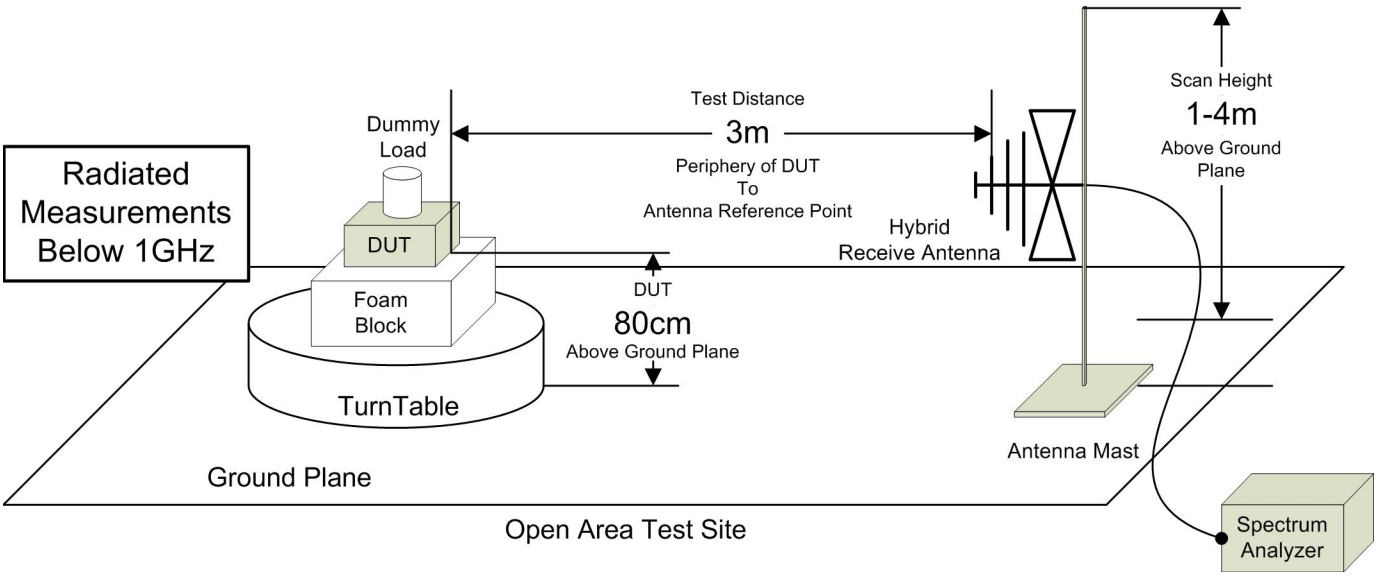


Figure A.5 – Test Setup Radiated Emissions Measurements 30-1000MHz

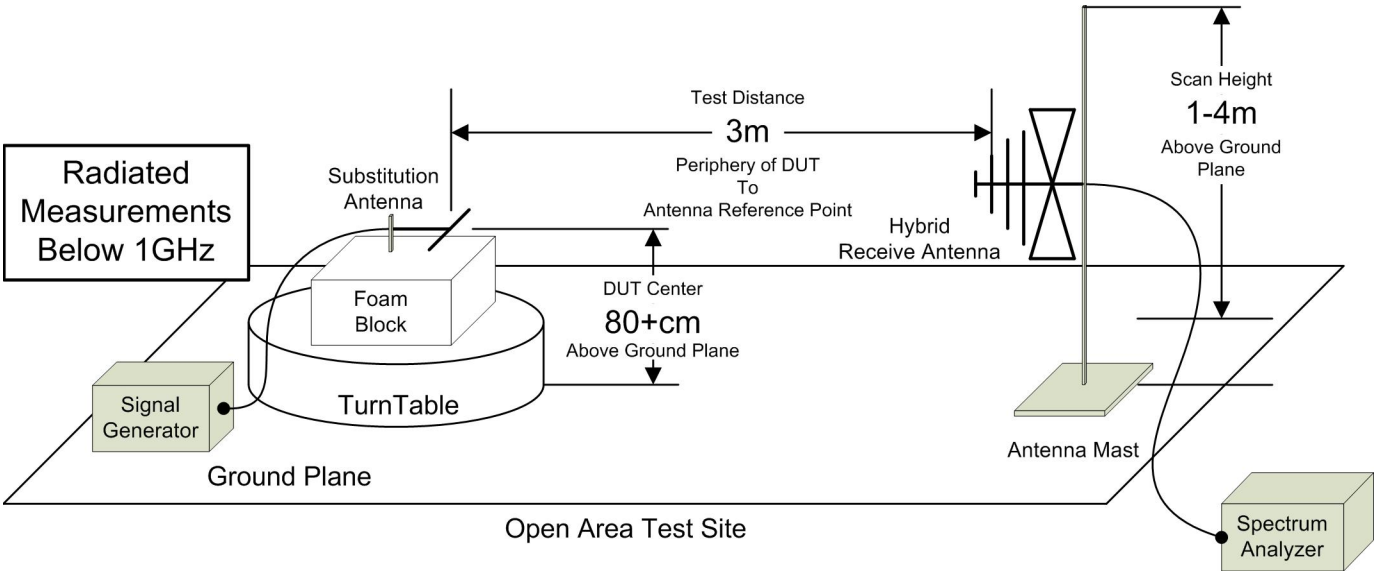
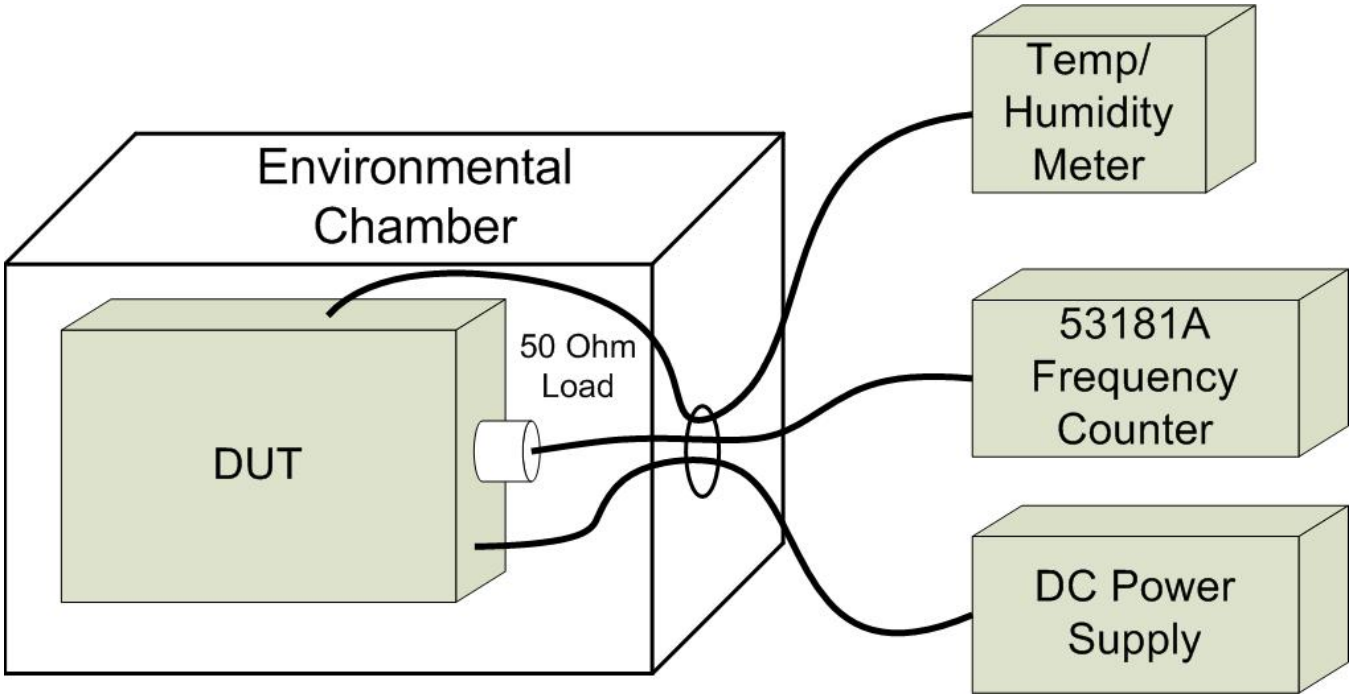


Table A.4 – Setup - Frequency Stability Measurement Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
n/a	ESPEC	ECT-2	Environmental Chamber
00003	HP	53181A	Frequency Counter
n/a	HP	E3611A	Power Supply
00234	VWR	61161-378	Temp/Humidity Meter

Figure A.6 – Test Setup Frequency Stability Measurements



APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List							
Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval	Calibration Due
00050	Chase	CBL-6111A	1607	Bilog Antenna	16 Nov 2020	Triennial	16 Nov 2023
00035	ETS	3115	6276	Double Ridged Guide Horn	4 Mar 2022	Triennial	4 Mar 2025
00085	EMCO	6502	9203-2724	Loop Antenna	6 Sep 2022	Triennial	6 Sep 2025
00223	HP	8901A	3749A07154	Modulation Analyzer	10 Dec 2020	Triennial	10 Dec 2023
00224	HP	8903B	3729A18691	Audio Analyzer	11 Dec 2020	Triennial	11 Dec 2023
00241	R&S	FSU40	100500	Spectrum Analyzer	10 Aug 2021	Triennial	10 Aug 2024
00005	HP	8648D	3847A00611	Signal Generator	28 Jun 2023	Triennial	28 Jun 2026
00003	HP	53181A	3736A05175	Frequency Counter	28 Jun 2023	Triennial	28 Jun 2026
00250	Circuit Test	DMR-1800	TE182	Digital Multi-Meter - DVM	26 Jun 2023	Triennial	26 Jun 2026
00071	EMCO	2090	9912-1484	Multi-Device Controller	n/a	n/a	n/a
00072	EMCO	2075	0001-2277	Mini-mast	n/a	n/a	n/a
00073	EMCO	2080	0002-1002	Turn Table	n/a	n/a	n/a
00081	ESPEC	ECT-2	0510154-B	Environmental Chamber	NCR	n/a	CNR
00234	VWR	61161-378	140320430	Temp/Humidity Meter	New	Triennial	New
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable	COU	n/a	COU
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable	COU	n/a	COU
00275	TMS	LMR400	n/a	25m Cable	COU	n/a	COU
00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a	NCR

NCR: No Calibration Required
COU: Calibrate On Use

APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

CISPR 16-4 Measurement Uncertainty (U_{LAB})	
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of k=2	
Radiated Emissions 30MHz - 200MHz	
U_{LAB} = 5.14dB U_{CISPR} = 6.3dB	
Radiated Emissions 200MHz - 1000MHz	
U_{LAB} = 5.90dB U_{CISPR} = 6.3dB	
Radiated Emissions 1GHz - 6GHz	
U_{LAB} = 4.80dB U_{CISPR} = 5.2dB	
Radiated Emissions 6GHz - 18GHz	
U_{LAB} = 5.1dB U_{CISPR} = 5.5dB	
Power Line Conducted Emissions 9kHz to 150kHz	
U_{LAB} = 2.96dB U_{CISPR} = 3.8dB	
Power Line Conducted Emissions 150kHz to 30MHz	
U_{LAB} = 3.12dB U_{CISPR} = 3.4dB	
If the calculated uncertainty **U_{lab}** is **less** than **U_{CISPR}** then:	
1	Compliance is deemed to occur if **NO** measured disturbance exceeds the disturbance limit
2	Non-Compliance is deemed to occur if **ANY** measured disturbance **EXCEEDS** the disturbance limit
If the calculated uncertainty **U_{lab}** is **greater** than **U_{CISPR}** then:	
3	Compliance is deemed to occur if **NO** measured disturbance, increased by (**U_{lab} - U_{CISPR}**), exceeds the disturbance limit
4	Non-Compliance is deemed to occur if **ANY** measured disturbance, increased by (**U_{lab} - U_{CISPR}**), **EXCEEDS** the disturbance limit

Other Measurement Uncertainties (U_{LAB})
RF Conducted Emissions 9kHz - 40GHz
U_{LAB} = 1.0dB U_{CISPR} = n/a
Frequency/Bandwidth 9kHz - 40GHz
U_{LAB} = 0.1ppm U_{CISPR} = n/a
Temperature
U_{LAB} = 1^{O}C U_{CISPR} = n/a

END OF REPORT

