FCC Parts 2, 22, 74, 90 (Subpart I) RSS-119

RF Test Report

Report No.: FCC_IC_RF_SL20081101-ICOM-007_Rev 1.0

FCCID: AFJ417900

IC ID: 202D-417900

Test Model: IP730D

Received Date: 10/11/2020

Test Date: 10/11/2020 - 04/28/2021

Issued Date: 04/28/2021

Applicant: Icom Inc.

Address: 1-1-32 Kamiminami Hirano-ku, Osaka Japan 547-0003, Japan

Manufacturer: Icom Inc.

Address: 1-1-32 Kamiminami Hirano-ku, Osaka Japan 547-0003, Japan

Issued By: Bureau Veritas Consumer Products Services, Inc.

Lab Address: 775 Montague Expressway, Milpitas, CA 95035

Test Location (1): 775 Montague Expressway, Milpitas, CA 95035

ACCREDITED
TESTING CERT # 2742-01

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Release Control Record

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FCC_IC_RF_SL20081101-ICOM-007	Orignal Release	11/23/ 2020
FCC_IC_RF_SL20081101-ICOM-007_Rev 1.0	Revise the incorrect test result	04/28/ 2021

1 Certificate of Conformity

Product: Two Way Radio

Brand: Icom

Test Model: IP730D

Sample Status: Engineering sample

Applicant: Icom Inc.

Test Date: 10/11/2020 -11/23/2020

Standards: FCC Parts 2, 22, 74, 90 (Subpart I) RSS-119

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc., Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Gary Chou

Prepared by : _____ , **Date:** 04/28/2021

Gary Chou / Compliance Engineer

Deon

Approved by : _____ , **Date:** 04/28/2021

Deon Dai / Engineer Reviewer

2 Summary of Test Results

The EUT has been tested according to the following specifications:

FCC Parts 2, 22, 74, 90 (Subpart I) RSS-119		
CLAUSE	**TEST PARAMETER**	**RESULTS**
TRANSMITTING PHENOMENA		
§1.1310 and §2.1093	RF Exposure	Pass
§2.1046; § 22.727; §74.461; §90.205	RF Output Power	Pass
§2.1047;§90.207	Modulation Characteristic	Pass
§2.1049;§22.357;§ 22.731; §74.462; §90.209; §90.210	Occupied Bandwidth	Pass
§2.1051; §22.861; §74.462; §90.210	Spurious Emission at Antenna Terminal	Pass
§2.1053;§22.861; §74.462;§90.210	Spurious Radiated Emissions	Pass
§2.1055; § 22.355; §74.464;§90.213	Frequency Stability	Pass
§90.214 RSS-119 § 5.9	Transient Frequency Behavior	Pass

3 EQUIPMENT LIST

For spurious emissions test:

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer KEYSIGHT	N9030B	MY55330108	07/07/2020	07/07/2021
Horn Antenna ETS-Lindgren	3117	218554	07/24/2020	07/24/2021
Horn Antenna A.H. SYSTEMS, INC	SAS-571	411	07/20/2018	07/20/2021
Biconilog Antenna Sunol	JB1	A030702	03/04/2021	03/04/2022
Pre-Amplifier RF-Lambda	RAMP00M50GA	17032300048	06/18/2020	06/18/2021
Tuned Dipole Antenna 30 - 1000 MHz (4pcs set)	AD-100	40133	01/20/2021	01/20/2022

For other test items:

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Spectrum Analyzer	N9020A (MXA)	MY5124010	07/21/2020	07/22/2022
Test Equity Environment Chamber	1007H	61201	12/16/2020	12/16/2022
MXG-B RF Vector Signal Generator	N5182B	MY56200550	11/01/2019	11/01/2022
Modulation Analyzer HP	8901B	3226A04414	10/05/2019	10/05/2022
Waveform Generator Tabor Electronic	WW1072	207593	7/17/2020	7/17/2022
Oscilloscope Rohde & Schwarz	FSIQ26	831927/008	11/12/2020	11/12/2022

2.1. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.85 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.63 dB
Radiated Emissions above 1 GHz	Above 1GHz	4.58 dB

2.2. Modification Record

There were no modifications required for compliance.

3. General Information

3.1 General Description of EUT

Product	Two Way Radio
Model No.	IP730D
Power Supply Rating (Maximun)	7.5Vdc/ 1.8A
Power Supply Rating (Receive)	Receive stan-by 300mA Receive max audio 520 mA (INT SP)
Modulation Type	BT-BDR/EDR: GFSK, π/4-DQPSK, 8DPSK, BT LE: GFSK UMTS: QPSK, 16QAM LTE: QPSK/16QAM Land Mobile :Analog, 4FSK
Operating Frequency	BT-BDR/EDR/LE : 2402MHz ~ 2480MHz Cellular : UMTS : BAND 2 1850 MHz-1910 MHz BAND 5 824 MHz-849 MHz LTE : BAND 2 1850 MHz- 1910 MHz BAND 4 1710 MHz- 1755 MHz BAND 12 699 MHz- 712 MHz Land Mobile : 136 MHz- 174 MHz
Antenna Info	BT/ LE: PCB Antenna, -1.5dBi
	Cellular (WCDMA/ LTE): Chip Antenna WCDMA Band 2/ 4: 2.6dBi, Band 5: 1 dBi LTE Band 12: 1.3 dBi
	Land Mobile: Monopole Antenna

VHF Antennas			Gain
FA-SC25V	136–150 MHz	1/4 herical whip antenna	-2.5 dBi
FA-SC28V	148–162 MHz	1/4 herical whip antenna	-2.4 dBi
FA-SC29V	160–174 MHz	1/4 herical whip antenna	-2.5 dBi
FA-SC55V	150–174 MHz	1/4 herical whip antenna	-4.5 dBi
VHF Stubby Antennas			
FA-SC27VS	142–150 MHz	1/4 herical whip antenna	-11.5 dBi
FA-SC56VS	150–162 MHz	1/4 herical whip antenna	-17.1 dBi
FA-SC57VS	160–174 MHz	1/4 herical whip antenna	-17.3 dBi
VHF Cut Antennas			
FA-SC61VC	136–174 MHz	1/4 herical whip antenna	

Temperature Operating Range	-20 °C ~ 55 °C	
I/O Ports	Refer to user's manual	
Optional Accessories	**Description**	**Part Number**
Battery A	Li-Ion, 3350 mAh	BP-303
Battery B	Li-Ion, 2010 mAh	BP-302
Battery C	5 AA Battery Case	BP-305
Antenna A	136 – 150 MHz	FA-SC25V
Antenna B	136 – 144 MHz	FA-SC-26VS
Antenna C	142 – 150 MHz	FA-SC27VS
Antenna D	148 – 162 MHz	FA-SC28V

Antenna E	160 – 174 MHz	FA-SC29V
Antenna F	150 – 174 MHz	FA-SC55V
Antenna G	150 – 162 MHz	FA-SC56VS
Antenna H	160 – 174 MHz	FA-SC57VS
Antenna I	136 – 174 MHz	FA-SC61VC
Audio Accessory A	Tie Clip Microphone	HM-163MC
Audio Accessory B	Speaker Microphone	HM-184
Audio Accessory C	Speaker Microphone	HM-222H
Audio Accessory D	Speaker Microphone	HM-236
Audio Accessory E	Tie Clip Microphone with Sub PTT Button	HM-238MC
Audio Accessory F	Speaker Microphone	HM-222
Audio Accessory G	Earphone Adapter	AD-135
Audio Accessory H	Earphone	SP-16BW
Audio Accessory I	Tube Earphone	SP-26
Audio Accessory J	Tube Earphone	SP-27
Audio Accessory K	Earhook Earphone	SP-28
Audio Accessory L	Earhook Earphone	SP-29
Audio Accessory M	Earphone	SP-40
Audio Accessory N	Earhook Type Headset	HS-94
Audio Accessory O	Neck Arm Type Headset	HS-95
Audio Accessory P	Headset with Throat Microphone	HS-97
Audio Accessory Q	Bluetooth Headset	VS-3
Audio Accessory R	PTT Switch Cable	VS-5MC
Audio Accessory S	PTT Switch Cable	VS-4MC
Audio Accessory T	External Speaker Microphone	HM-184H
Audio Accessory U	Earphone Adapter	AD-135
Audio Accessory V	External Speaker Microphone	HM-245T
Body Worn Accessory A	Belt Clip	MB-133
Body Worn Accessory B	Belt Clip	MB-136
Body Worn Accessory C	Belt Hanger	MB-96F
Body Worn Accessory D	Belt Hanger	MB-96FL
Body Worn Accessory E	Belt Hanger	MB-96N
Body Worn Accessory F	Shoulder Strap	MB-57L
Body Worn Accessory G	Carrying Case	LC-195
Emission Designation*:	Analog :11K0F3E/ Digital : 4K00F1D, 4K00F1E	

Note* :

1.

FOR FM MODE (CHANNEL SPACING: 12.5 KHZ)
Emission Designator 11K0F3E
In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation. BW = 2(M+D) = 2*(3.0 kHz + 2.5 kHz) = 11 kHz = 11K0
F3E portion of the designator represents an FM voice transmission
Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

Bandwidth: 11.0 kHz
Modulation Type: [F] Angle-modulated, straight FM
Modulation Nature: [3] Single analog channel
Information Type: [E] Telephony, voice, sound broadcastin

2.

FOR DIGITAL MODE (6.25KHZ CHANNELIZATION, DIGITAL VOICE/ DATA)
EMISSION DESIGNATOR: 4K00F1D, 4K00F1E.

4K00F1D--
Bandwidth: 4.00 kHz
Modulation Type: [F] Angle-modulated, straight FM
Modulation Nature: [1] Digital, on-off or quantized, no modulation
Information Type: [D] Data, telemetry, telecommand
Emissions Designator Notes: 4K00F1D 6.25 kHz data NXDN (Narrow IDAS, NEXEDGE)
Radio Reference Identified Designator: 4K00F1D NXDN 6.25 kHz data (IDAS, NEXEDGE)

4K00F1E--
Bandwidth: 4.00 kHz
Modulation Type: [F] Angle-modulated, straight FM
Modulation Nature: [1] Digital, on-off or quantized, no modulation
Information Type: [E] Telephony, voice, sound broadcasting
Emissions Designator Notes: 4K00F1E 6.25 kHz voice NXDN (Narrow IDAS, NEXEDGE)
Radio Reference Identified Designator: 4K00F1E NXDN 6.25 kHz digital voice (IDAS, NEXEDGE

Note:

1. The above EUT information was declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or User's Manual.

3.2 Power Setting

Freq. (MHz)	Power Setting	
136.025	High Power	Default
	Low Power	Default
173.975	High Power	Default
	Low Power	Default
155.025	High Power	Default
	Low Power	Default

Note:
For Transmit Power level:

The high rated power level is 5W, and low rated power level is 1W. (Limit: <6W for high power level, < 1.2W for low power level), to change the power output level please reference the user's menual.

For Change Transmit Channel:

Please reference the user's menual.

3.3 General Description of Applied Standards

The EUT is a Land Mobile Service product, according to the specifications of the manufacturers; it must comply with the requirements of the following standards:

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 22 – Public Mobile Service

Part 74 – Experimental Radio, Auxiliary, Special Broadcast and other Program Distributonal Service.

Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA 603-D

All test items have been performed and recorded as per the above standards.

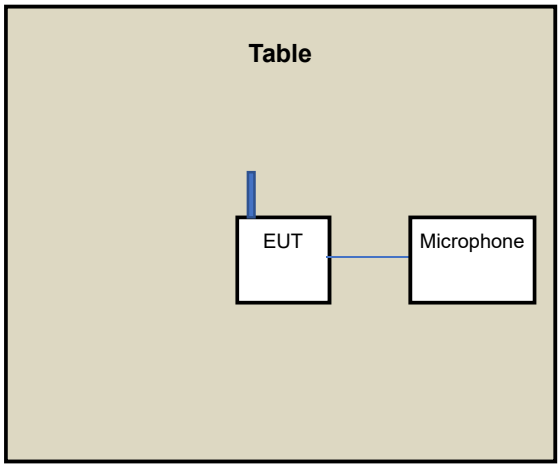
3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
-	DC Power Supply	RIGOL	DP712	DP7B182100068	DOC	-

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
-	-	-	-	-	-	-

3.5 Configuration of System under Test



3.6 FCC §1.1310 & §2.1093 - RF EXPOSURE

APPLICABLE STANDARD

FCC§1.1310 and §2.1093.

TEST RESULT

Compliance, please refer to the SAR report

3.7 FCC §2.1046 & § 22.727 & §74.461 & §90.205- RF OUTPUT POWER

OPERATING FREQUENCY RANGE	136.025~173.975 MHz

APPLICABLE STANDARD

FCC §2.1046, § 22.727, §74.461 and §90.205

TEST PROCEDURE

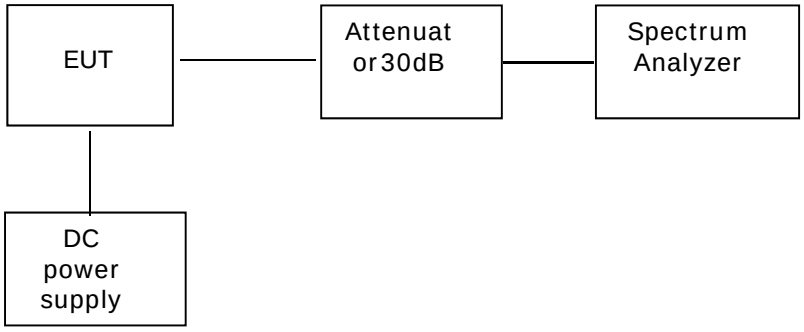
Conducted RF Output Power:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

RBW	VBW
100 kHz	300 kHz

Configuration of System under Test



TEST DATA

ENVIRONMENTAL CONDITIONS

Temperature:	24.5℃
Relative Humidity:	67 %
ATM Pressure:	100.4 kPa

Test Mode: Transmitting

Test Result: Compliance. Please refer to following table.

Modulation Mode	Channel Separation	f_c MHz	Reading (W) High Power Level	Current(A)	Note
Digital	6.25kHz	136.025	4.8	1.16	FCC part 90 FCC part 22 FCC part 74
		155.025	4.8	1.65	
		173.975	4.76	1.56	
Analog	12.5kHz	136.025	4.74	1.14	
		155.025	4.72	1.64	
		173.975	4.83	1.58	

Voltage and Current through the final High Power

Modulation Mode	Channel Separation	f_c MHz	Voltage(V)	Current(A)
Digital	6.25kHz	136.025	5	0.94
		155.025	5	1.43
		173.975	5	1.34
Analog	12.5kHz	136.025	5	0.92
		155.025	5	1.42
		173.975	5	1.36

Modulation Mode	Channel Separation	f_c	Reading (W)	Current	Note
		MHz	Low Power Level		
Digital	6.25kHz	136.025	1.35	0.66	FCC part 90 FCC part 22 FCC part 74
		155.025	1.43	0.65	
		173.975	1.40	0.67	
Analog	12.5kHz	136.025	1.41	0.65	
		155.025	1.45	0.64	
		173.975	1.34	0.69	

Voltage and Current through the final Low Power

Modulation Mode	Channel Separation	f_c	Voltage(V)	Current(A)
		MHz		
Digital	6.25kHz	136.025	5	0.44
		155.025	5	0.43
		173.975	5	0.45
Analog	12.5kHz	136.025	5	0.43
		155.025	5	0.42
		173.975	5	0.47

Note:
The high rated power level is 5W, and low rated power level is 1W. (Limit: <6W for high power level, < 1.2W for low power level)

3.8 MODULATION CHARACTERISTIC

APPLICABLE STANDARD

§ 2.1047(a) & 90.242(b)(8)

LIMIT

§ **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. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

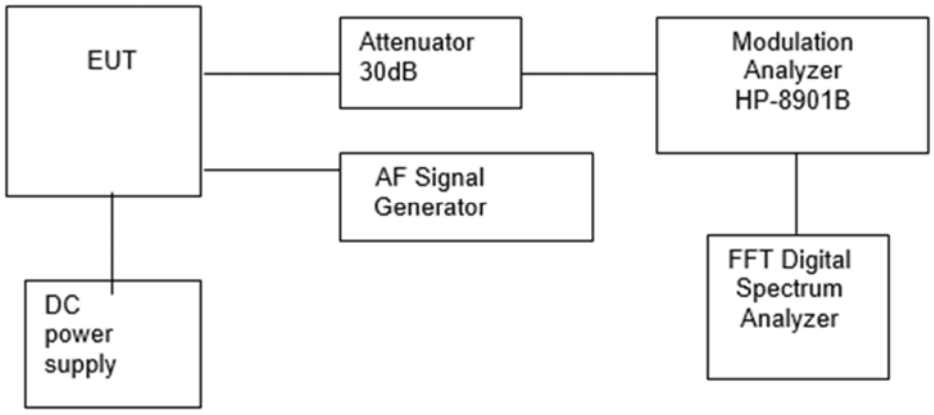
§ 90.242(b)(8): Recommended audio filter attenuation characteristics are given below:

Audio band	Minimum Attenuation Rel. to 1 kHz Attenuation
3 –20 KHz	60 $\log_{10}$(f/3) dB where f is in kHz
20 – 30 KHz	50dB

TEST PROCEDURE

The rated audio input signal was applied to the input of the audio low-pass filter (or of all modulation stages) using an audio oscillator, this input signal level and its corresponding output signal were then measured and recorded using the FFT Digital Spectrum Analyzer. Tests were repeated at different audio signal frequencies from 0 to50 KHz.

Configuration of System under Test



TEST DATA

ENVIRONMENTAL CONDITIONS

Temperature:	24.5 ℃
Relative Humidity:	67 %
ATM Pressure:	100.4 kPa

Mode: Transmitting

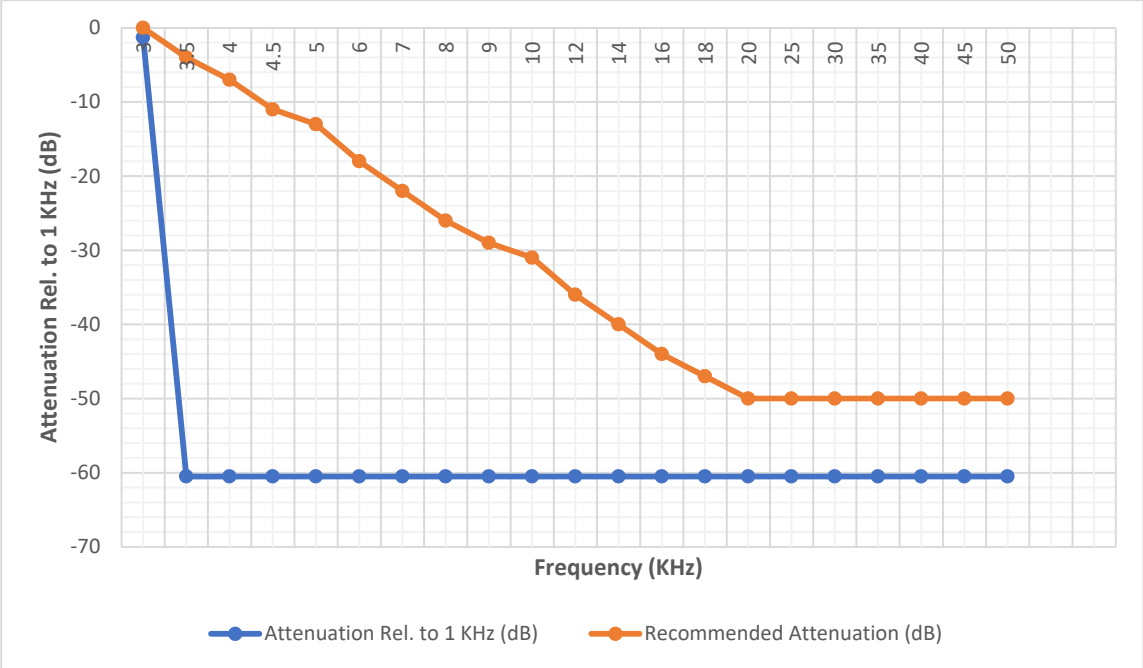
Result: Compliance.

Audio Frequency Response – 6.25kHz

Carrier Frequency: 155.025 MHz

Remark: Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 kHz in comparison with the recommended audio filter attenuation.

Frequency (KHz)	Audio In (dBV)	Audio Out (dBV)	Attenuation (Out - In) (dB)	Attenuation Rel. to 1 KHz(dB)	Recommended Attenuation (dB)
3	-35.92	-60	-24.08	-1.2	0
3.5	-35.92	-60	-24.08	-60.5	-4
4	-35.92	-60	-24.08	-60.5	-7
4.5	-35.92	-60	-24.08	-60.5	-11
5	-35.92	-60	-24.08	-60.5	-13
6	-35.92	-60	-24.08	-60.5	-18
7	-35.92	-60	-24.08	-60.5	-22
8	-35.92	-60	-24.08	-60.5	-26
9	-35.92	-60	-24.08	-60.5	-29
10	-35.92	-60	-24.08	-60.5	-31
12	-35.92	-60	-24.08	-60.5	-36
14	-35.92	-60	-24.08	-60.5	-40
16	-35.92	-60	-24.08	-60.5	-44
18	-35.92	-60	-24.08	-60.5	-47
20	-35.92	-60	-24.08	-60.5	-50
25	-35.92	-60	-24.08	-60.5	-50
30	-35.92	-60	-24.08	-60.5	-50
35	-35.92	-60	-24.08	-60.5	-50
40	-35.92	-60	-24.08	-60.5	-50
45	-35.92	-60	-24.08	-60.5	-50
50	-35.92	-60	-24.08	-60.5	-50

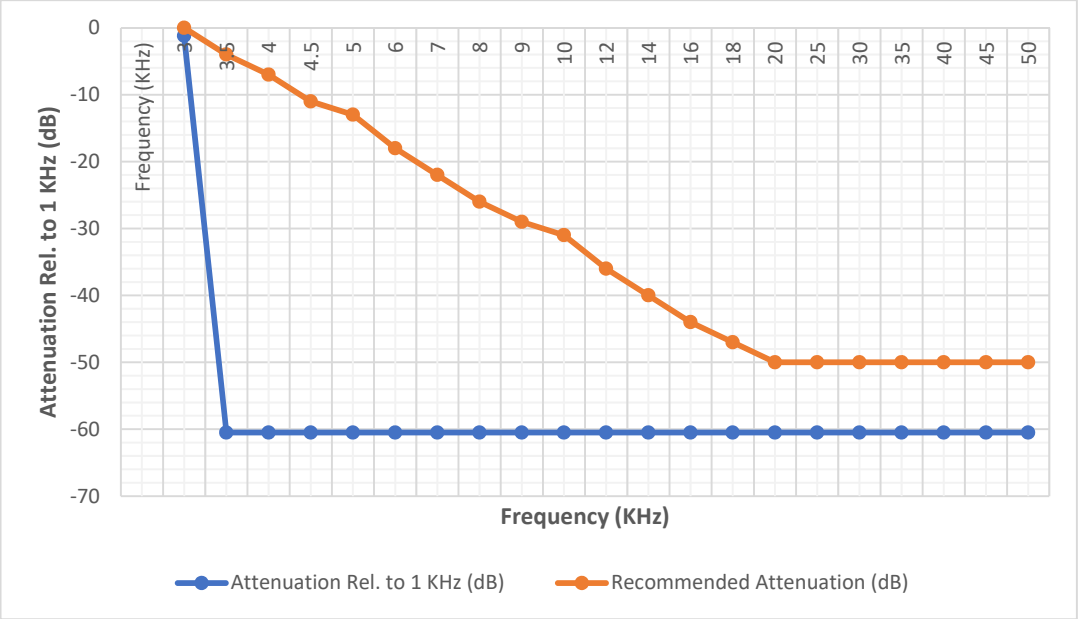

0
-10
-20
-30
-40
-50
-60
-70
Attenuation Rel. to 1 KHz (dB)
3
3.5
4
4.5
5
6
7
8
9
10
12
14
16
18
20
25
30
35
40
45
50
Frequency (KHz)
Attenuation Rel. to 1 KHz (dB)
Recommended Attenuation (dB)

Audio Frequency Response – 12.5kHz

Carrier Frequency: 155.025 MHz

Remark: Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 kHz in comparison with the recommended audio filter attenuation.

Frequency (KHz)	Audio In (dBV)	Audio Out (dBV)	Attenuation (Out - In) (dB)	Attenuation Rel. to 1 KHz(dB)	Recommended Attenuation (dB)
3	-35.92	-60	-24.08	-1.3	0
3.5	-35.92	-60	-24.08	-60.5	-4
4	-35.92	-60	-24.08	-60.5	-7
4.5	-35.92	-60	-24.08	-60.5	-11
5	-35.92	-60	-24.08	-60.5	-13
6	-35.92	-60	-24.08	-60.5	-18
7	-35.92	-60	-24.08	-60.5	-22
8	-35.92	-60	-24.08	-60.5	-26
9	-35.92	-60	-24.08	-60.5	-29
10	-35.92	-60	-24.08	-60.5	-31
12	-35.92	-60	-24.08	-60.5	-36
14	-35.92	-60	-24.08	-60.5	-40
16	-35.92	-60	-24.08	-60.5	-44
18	-35.92	-60	-24.08	-60.5	-47
20	-35.92	-60	-24.08	-60.5	-50
25	-35.92	-60	-24.08	-60.5	-50
30	-35.92	-60	-24.08	-60.5	-50
35	-35.92	-60	-24.08	-60.5	-50
40	-35.92	-60	-24.08	-60.5	-50
45	-35.92	-60	-24.08	-60.5	-50
50	-35.92	-60	-24.08	-60.5	-50


0
-10
-20
-30
-40
-50
-60
-70
Attenuation Rel. to 1 KHz (dB)
Frequency (KHz)
3
3.5
4
4.5
5
6
7
8
9
10
12
14
16
18
20
25
30
35
40
45
50
Frequency (KHz)
Attenuation Rel. to 1 KHz (dB)
Recommended Attenuation (dB)

3.9 MODULATION LIMITING

APPLICABLE STANDARD

§ 2.1047 (b), 74.463& 90.210

LIMIT

§ **2.1047(b):** Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

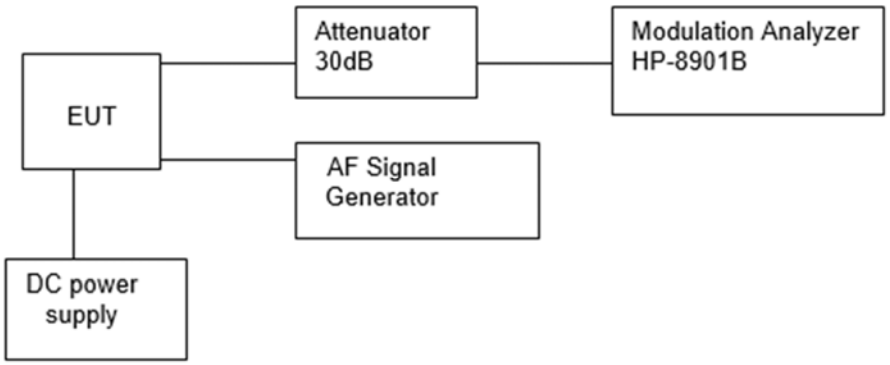
Recommended frequency deviation characteristics are given below:

- 1.25 kHz for 6.25 kHz Channel Spacing System
- 2.5 KHz for 12.5 kHz Channel Spacing System

TEST PROCEDURE

The rated audio input signal was applied to the input of the audio low-pass filter (or of all modulation stages) using an audio oscillator, this input signal level and its corresponding output signal were then measured and recorded using the FFT Digital Spectrum Analyzer. Tests were repeated at different audio signal frequencies from 0 to50 KHz.

Configuration of System under Test



TEST DATA

ENVIRONMENTAL CONDITIONS

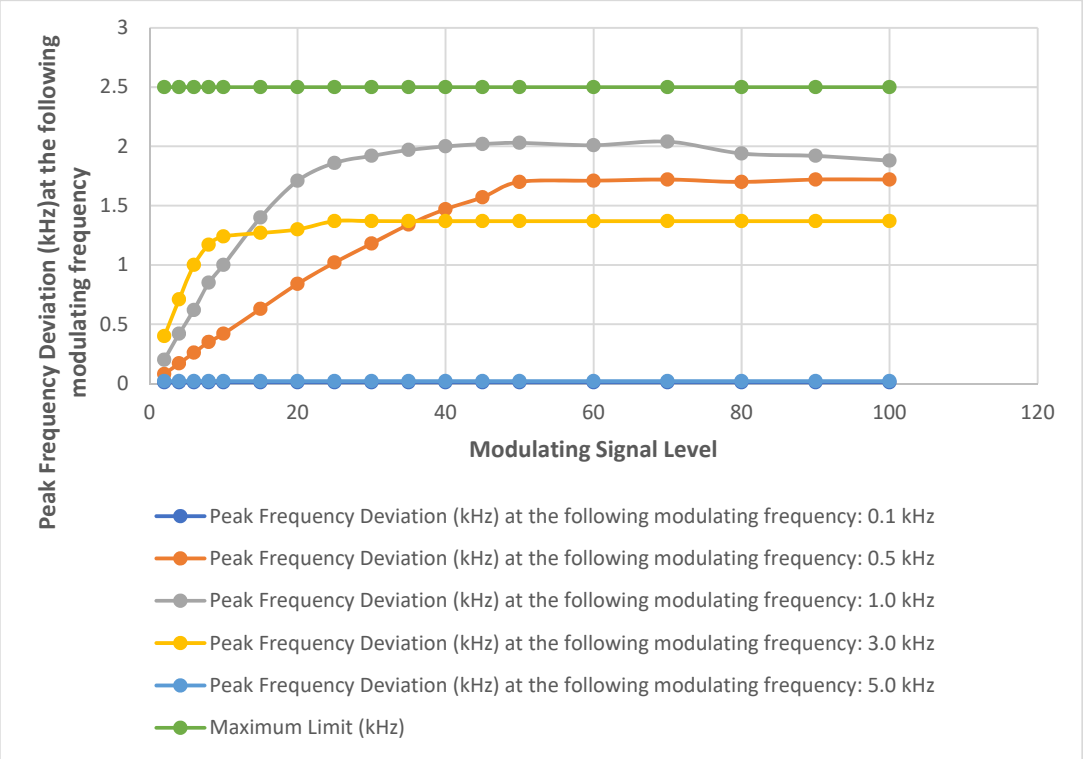
Temperature:	24.5 ℃
Relative Humidity:	67 %
ATM Pressure:	100.4 kPa

Mode: Transmitting

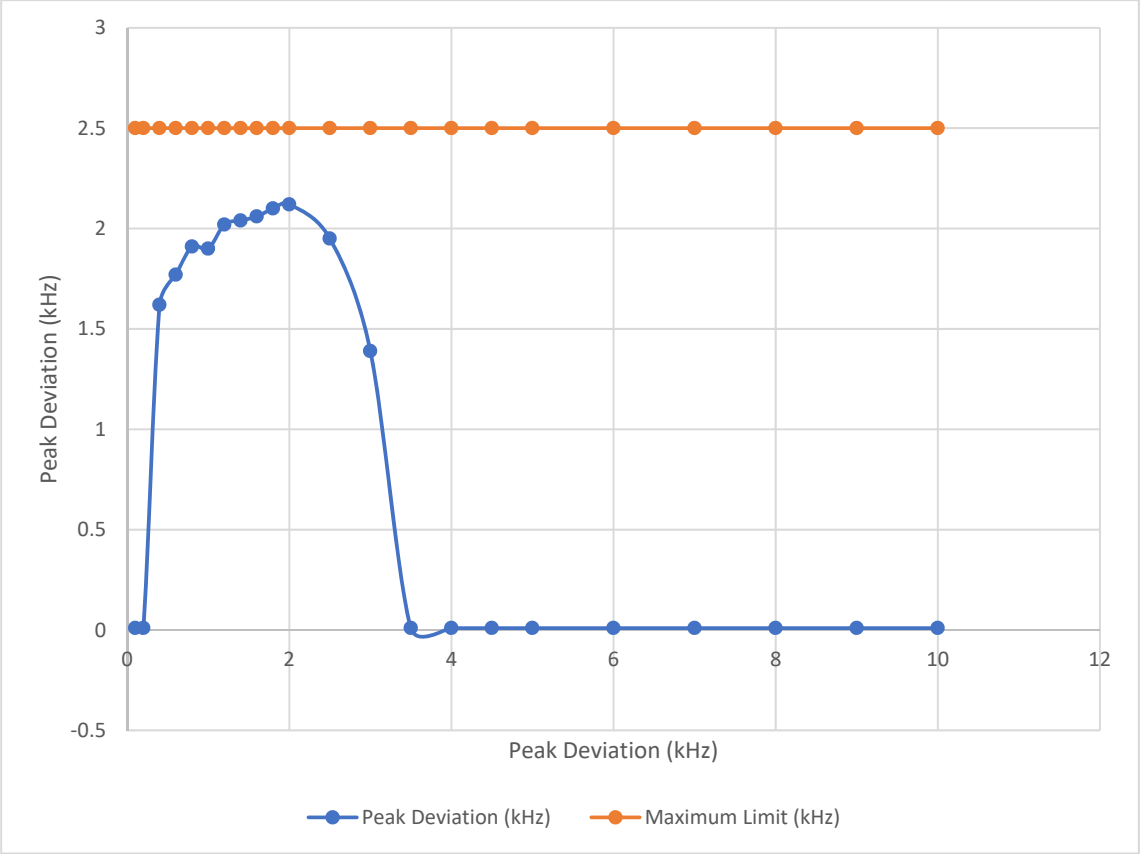
Result: Compliance.

MODULATION LIMITING
Voice Modulation Limiting for 6.25 KHz Channel Spacing Operation
Carrier Frequency: 155.025 MHz

Modulating Signal Level	Peak Frequency Deviation (kHz) at the following modulating frequency:					Maximum Limit
(mVrms)	0.1 kHz	0.5 kHz	1.0 kHz	3.0 kHz	5.0 kHz	(kHz)
2	0.01	0.08	0.2	0.4	0.02	2.5
4	0.01	0.17	0.42	0.71	0.02	2.5
6	0.01	0.26	0.62	1	0.02	2.5
8	0.01	0.35	0.85	1.17	0.02	2.5
10	0.01	0.42	1	1.24	0.02	2.5
15	0.01	0.63	1.4	1.27	0.02	2.5
20	0.01	0.84	1.71	1.3	0.02	2.5
25	0.01	1.02	1.86	1.37	0.02	2.5
30	0.01	1.18	1.92	1.37	0.02	2.5
35	0.01	1.34	1.97	1.37	0.02	2.5
40	0.01	1.47	2	1.37	0.02	2.5
45	0.01	1.57	2.02	1.37	0.02	2.5
50	0.01	1.7	2.03	1.37	0.02	2.5
60	0.01	1.71	2.01	1.37	0.02	2.5
70	0.01	1.72	2.04	1.37	0.02	2.5
80	0.01	1.7	1.94	1.37	0.02	2.5
90	0.01	1.72	1.92	1.37	0.02	2.5
100	0.01	1.72	1.88	1.37	0.02	2.5

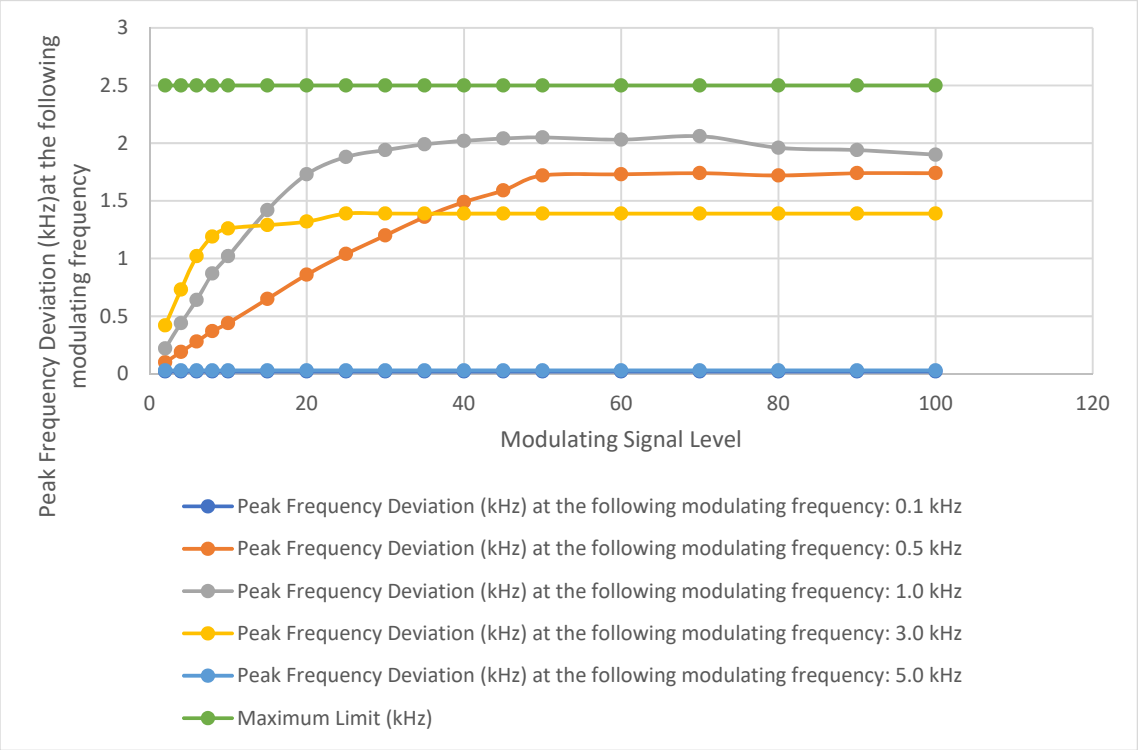

Peak Frequency Deviation (kHz)at the following modulating frequency
3
2.5
2
1.5
1
0.5
0
0
20
40
60
80
100
120
Modulating Signal Level
Peak Frequency Deviation (kHz) at the following modulating frequency: 0.1 kHz
Peak Frequency Deviation (kHz) at the following modulating frequency: 0.5 kHz
Peak Frequency Deviation (kHz) at the following modulating frequency: 1.0 kHz
Peak Frequency Deviation (kHz) at the following modulating frequency: 3.0 kHz
Peak Frequency Deviation (kHz) at the following modulating frequency: 5.0 kHz
Maximum Limit (kHz)

Voice Signal Input Level	= STD MOD Level + 16 dB =20log (16)+16 = 40.08dB(mVrms) = 100.95Vrms	
Modulation Frequency (kHz)	**Peak Deviation (kHz)**	**Maximum Limit (kHz)**
0.1	0.01	2.5
0.2	0.01	2.5
0.4	1.62	2.5
0.6	1.77	2.5
0.8	1.91	2.5
1	1.9	2.5
1.2	2.02	2.5
1.4	2.04	2.5
1.6	2.06	2.5
1.8	2.1	2.5
2	2.12	2.5
2.5	1.95	2.5
3	1.39	2.5
3.5	0.01	2.5
4	0.01	2.5
4.5	0.01	2.5
5	0.01	2.5
6	0.01	2.5
7	0.01	2.5
8	0.01	2.5
9	0.01	2.5
10	0.01	2.5

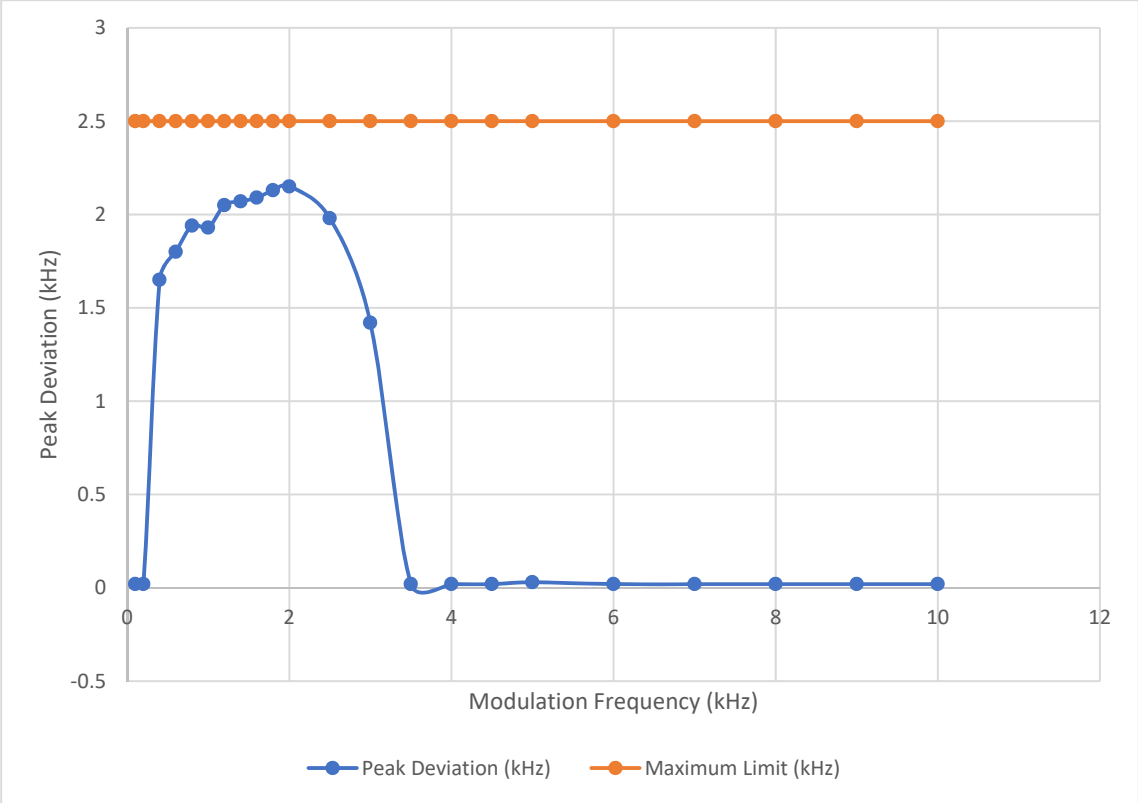

3
2.5
2
1.5
1
0.5
0
-0.5
Peak Deviation (kHz)
0
2
4
6
8
10
12
Peak Deviation (kHz)
Peak Deviation (kHz)
Maximum Limit (kHz)

MODULATION LIMITING
Voice Modulation Limiting for 12.5 KHz Channel Spacing Operation
Carrier Frequency: 155.025 MHz

Modulating Signal Level	Peak Frequency Deviation (kHz) at the following modulating frequency:					Maximum Limit
(mVrms)	0.1 kHz	0.5 kHz	1.0 kHz	3.0 kHz	5.0 kHz	(kHz)
2	0.02	0.10	0.22	0.42	0.03	2.5
4	0.02	0.19	0.44	0.73	0.03	2.5
6	0.02	0.28	0.64	1.02	0.03	2.5
8	0.02	0.37	0.87	1.19	0.03	2.5
10	0.02	0.44	1.02	1.26	0.03	2.5
15	0.02	0.65	1.42	1.29	0.03	2.5
20	0.02	0.86	1.73	1.32	0.03	2.5
25	0.02	1.04	1.88	1.39	0.03	2.5
30	0.02	1.20	1.94	1.39	0.03	2.5
35	0.02	1.36	1.99	1.39	0.03	2.5
40	0.02	1.49	2.02	1.39	0.03	2.5
45	0.02	1.59	2.04	1.39	0.03	2.5
50	0.02	1.72	2.05	1.39	0.03	2.5
60	0.02	1.73	2.03	1.39	0.03	2.5
70	0.02	1.74	2.06	1.39	0.03	2.5
80	0.02	1.72	1.96	1.39	0.03	2.5
90	0.02	1.74	1.94	1.39	0.03	2.5
100	0.02	1.74	1.90	1.39	0.03	2.5


Peak Frequency Deviation (kHz)at the following modulating frequency
3
2.5
2
1.5
1
0.5
0
0
20
40
60
80
100
120
Modulating Signal Level
Peak Frequency Deviation (kHz) at the following modulating frequency: 0.1 kHz
Peak Frequency Deviation (kHz) at the following modulating frequency: 0.5 kHz
Peak Frequency Deviation (kHz) at the following modulating frequency: 1.0 kHz
Peak Frequency Deviation (kHz) at the following modulating frequency: 3.0 kHz
Peak Frequency Deviation (kHz) at the following modulating frequency: 5.0 kHz
Maximum Limit (kHz)

Voice Signal Input Level = STD MOD Level + 16 dB =20log (16)+16 = 40.08dB(mVrms) = 100.95Vrms		
Modulation Frequency (kHz)	**Peak Deviation (kHz)**	**Maximum Limit (kHz)**
0.1	0.02	2.5
0.2	0.02	2.5
0.4	1.65	2.5
0.6	1.80	2.5
0.8	1.94	2.5
1.0	1.93	2.5
1.2	2.05	2.5
1.4	2.07	2.5
1.6	2.09	2.5
1.8	2.13	2.5
2.0	2.15	2.5
2.5	1.98	2.5
3.0	1.42	2.5
3.5	0.02	2.5
4.0	0.02	2.5
4.5	0.02	2.5
5.0	0.03	2.5
6.0	0.02	2.5
7.0	0.02	2.5
8.0	0.02	2.5
9.0	0.02	2.5
10.0	0.02	2.5


3
2.5
2
1.5
1
0.5
0
-0.5
Peak Deviation (kHz)
0
2
4
6
8
10
12
Modulation Frequency (kHz)
Peak Deviation (kHz)
Maximum Limit (kHz)

3.10 OCCUPIED BANDWIDTH & EMISSION MASK

APPLICABLE STANDARD

FCC §2.1049, §22.357, § 22.731, §74.462, §90.209 and §90.210

LIMIT

Emissions shall be attenuated below the mean output power of the transmitter as follows:

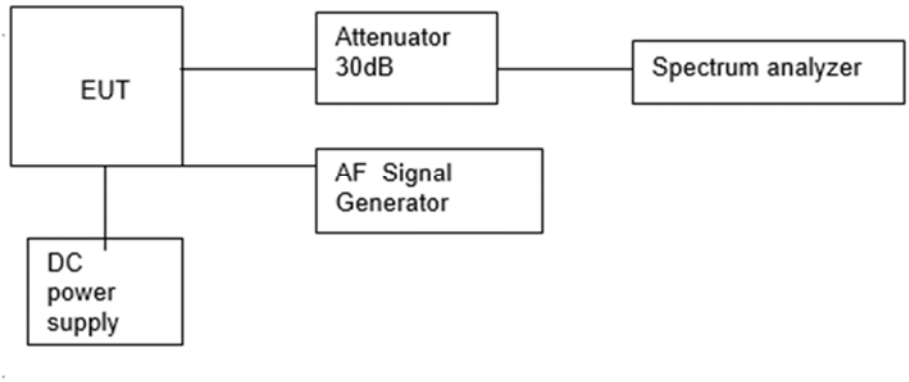
Frequency Range (MHz)	Channel Spacing (KHz)	FCC Applicable ask
136-174	12.5	Mask D – Voice & Data
136-174	6.25	Mask E – Voice & Data

TEST PROCEDURE

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

Configuration of System under Test



TEST DATA

Environmental Conditions

Temperature:	24.5℃
Relative Humidity:	67 %
ATM Pressure:	100.4 kPa

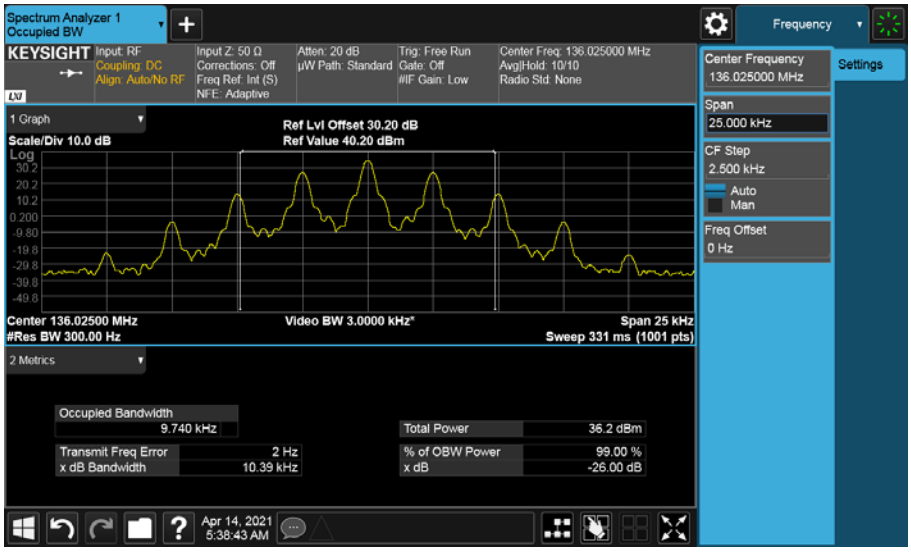
Mode: Transmitting

Result: Compliance.

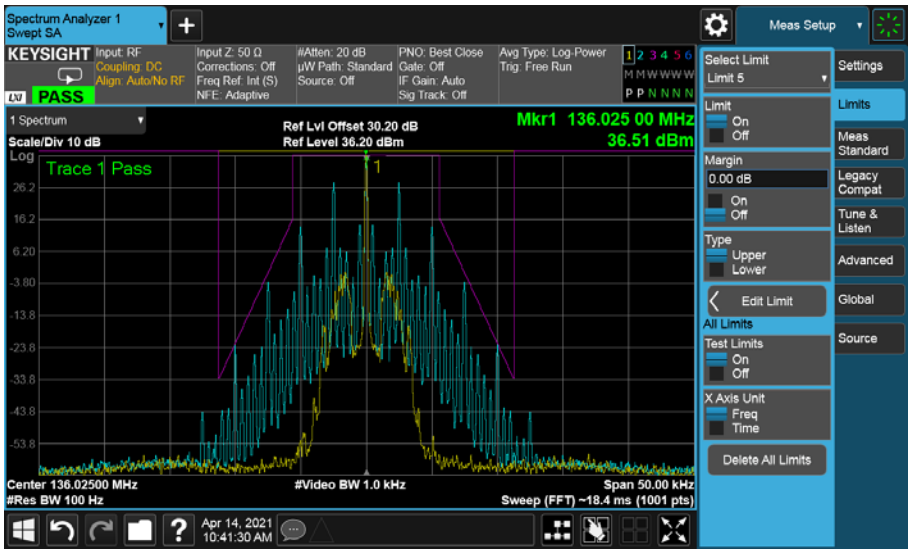
	Modulation Mode	Channel Separation	f_c	99% Occupied Bandwidth	26 dB Bandwidth	Note
			MHz	kHz	kHz	
High Power	Digital 4K00F1D/ 4K00F1E	6.25kHz	136.025	3.0	4.61	FCC part 90 FCC part 22 FCC part 74
			155.025	3.26	4.39	
			173.975	3.25	4.35	
	FM with 2.5 KHz sine wave signal	12.5KHz	136.025	9.74	10.39	
			155.025	9.73	10.39	
			173.975	9.73	10.39	

	Modulation Mode	Channel Separation	f_c	99% Occupied Bandwidth	26 dB Bandwidth	Note
			MHz	kHz	kHz	
Low Power	Digital 4K00F1D/ 4K00F1E	6.25kHz	136.025	3.48	4.85	FCC part 90 FCC part 22 FCC part 74
			155.025	3.47	4.77	
			173.975	3.50	4.90	
	FM with 2.5 KHz sine wave signal	12.5KHz	136.025	9.73	10.39	
			155.025	9.73	10.39	
			173.975	9.73	10.39	

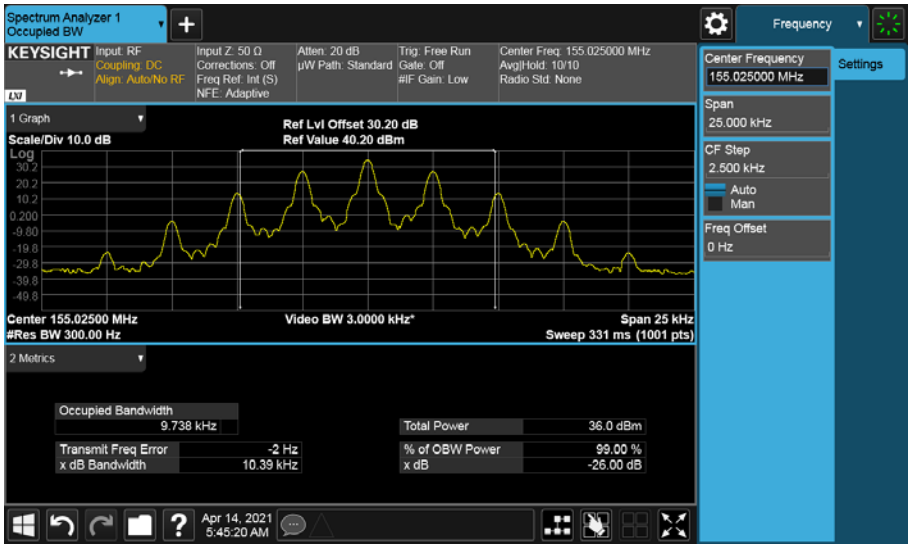
12.5kHz (FM with 2.5 KHz sine wave signal), Frequency 136.025 MHz: 99% Occupied & 26 dB Bandwidth, High power



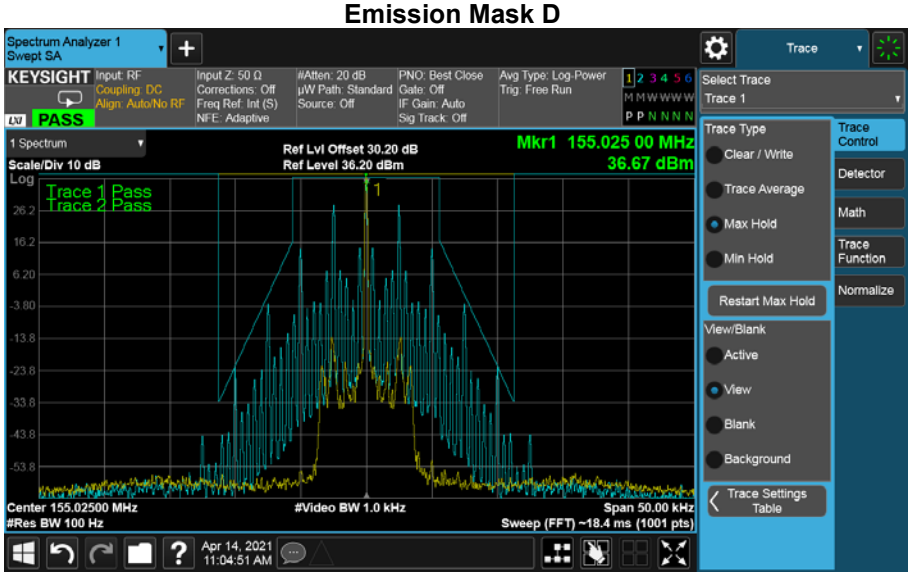
Emission Mask D



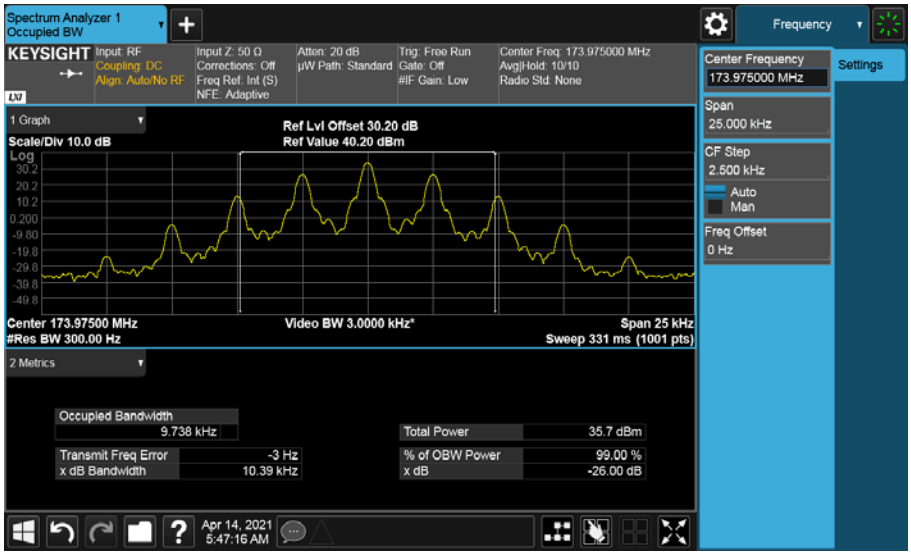
12.5kHz (FM with 2.5 KHz sine wave signal), Frequency 155.025 MHz: 99% Occupied & 26 dB Bandwidth, High power



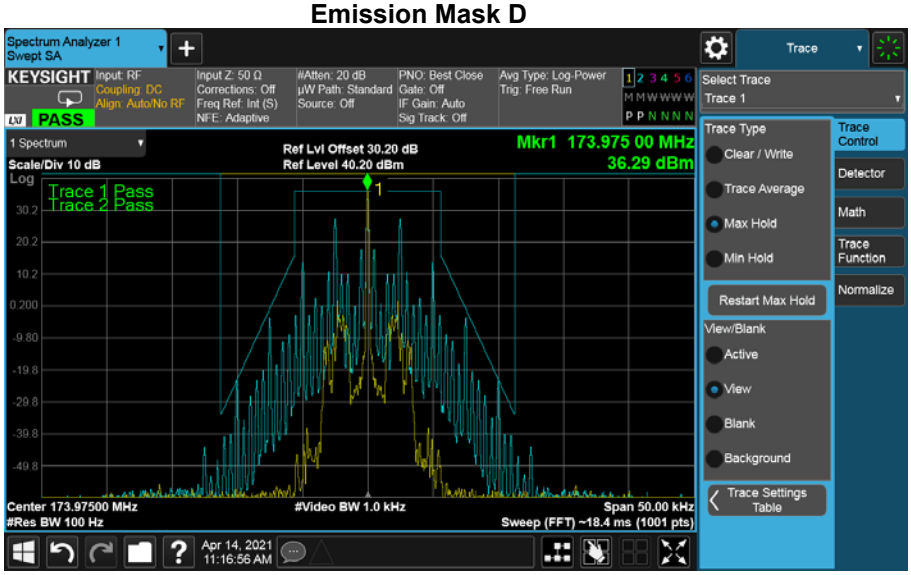
Emission Mask D



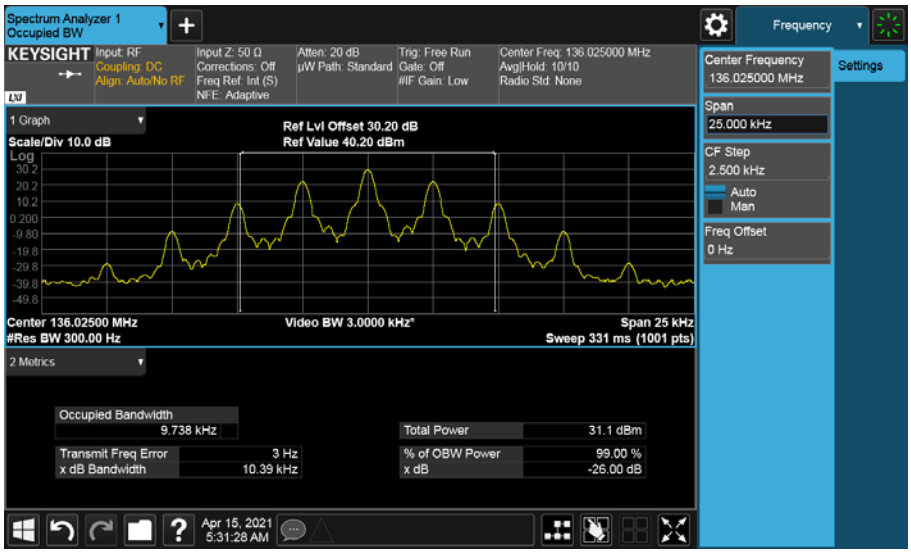
12.5kHz (FM with 2.5 KHz sine wave signal), Frequency 173.975 MHz: 99% Occupied & 26 dB Bandwidth, High power



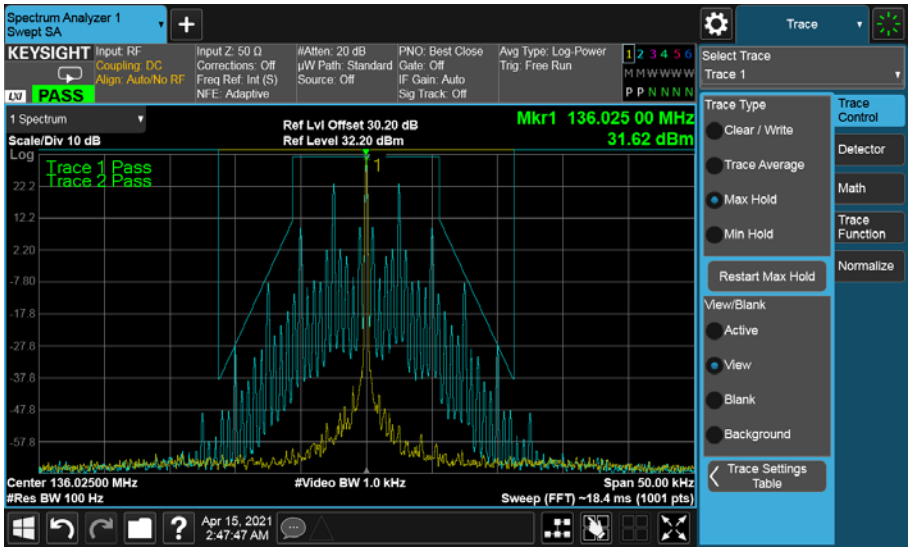
Emission Mask D



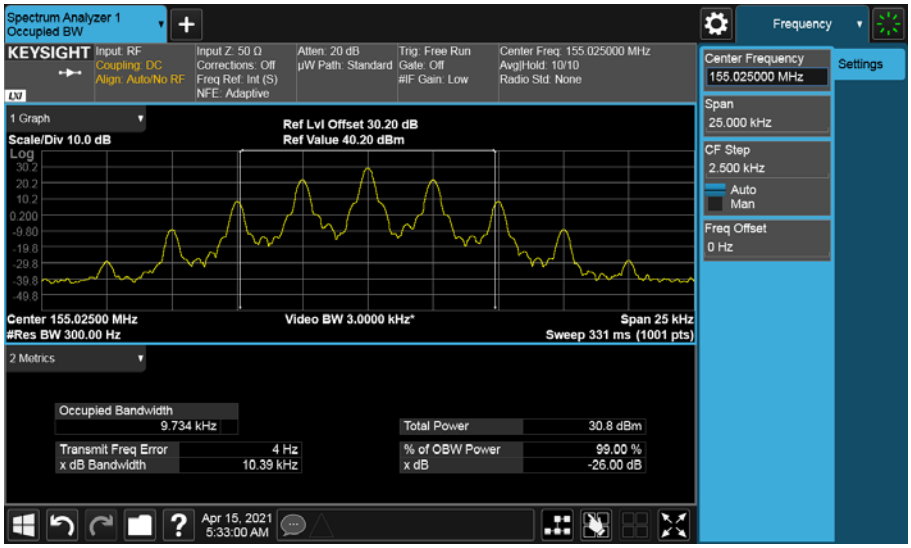
12.5kHz (FM with 2.5 KHz sine wave signal), Frequency 136.025 MHz: 99% Occupied & 26 dB Bandwidth, Low power



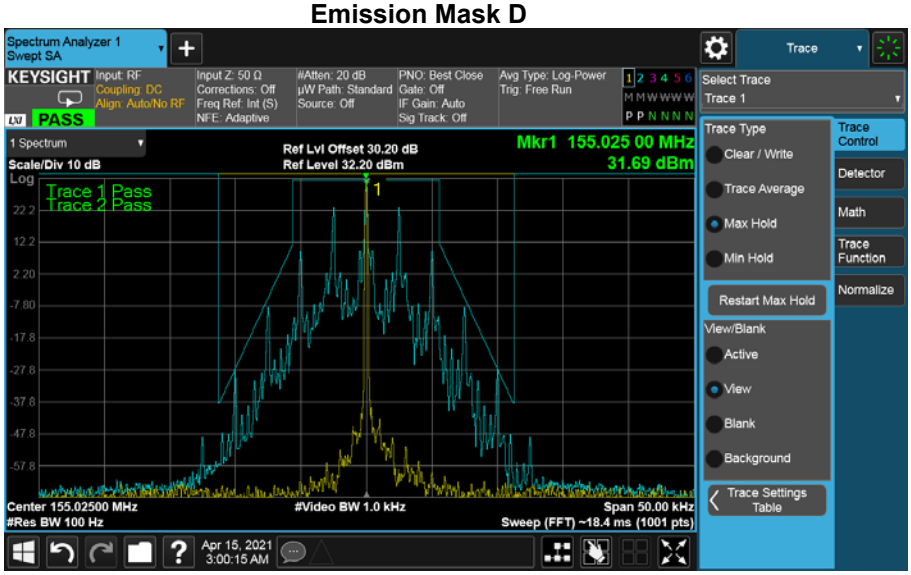
Emission Mask D



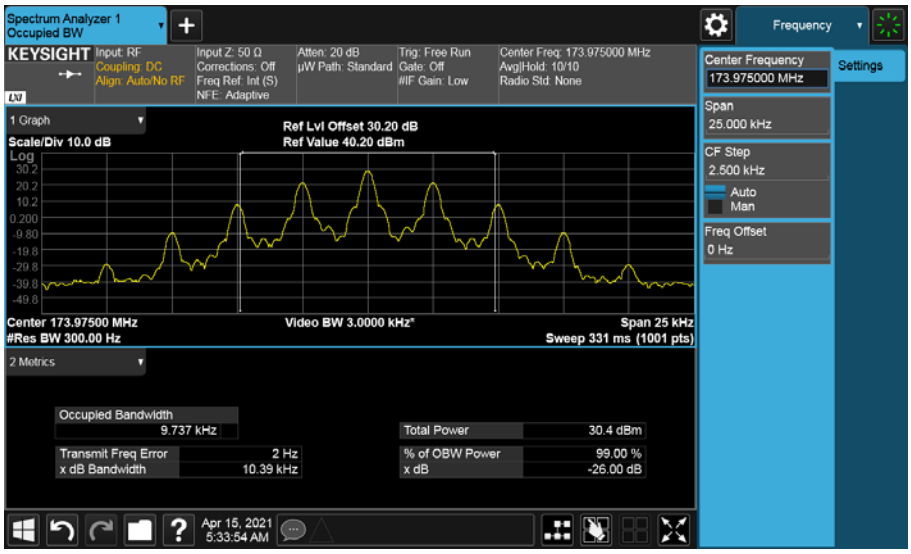
12.5kHz (FM with 2.5 KHz sine wave signal), Frequency 155.025 MHz: 99% Occupied & 26 dB Bandwidth, Low power



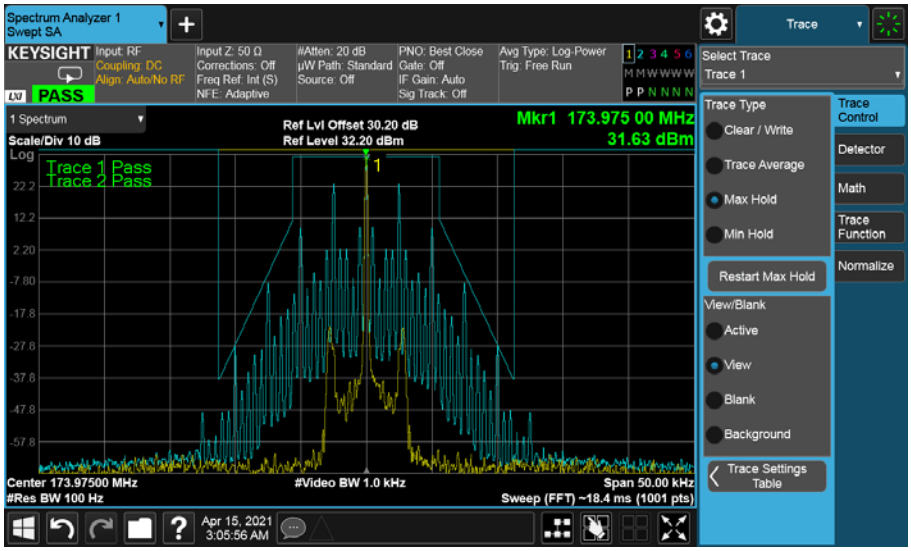
Emission Mask D



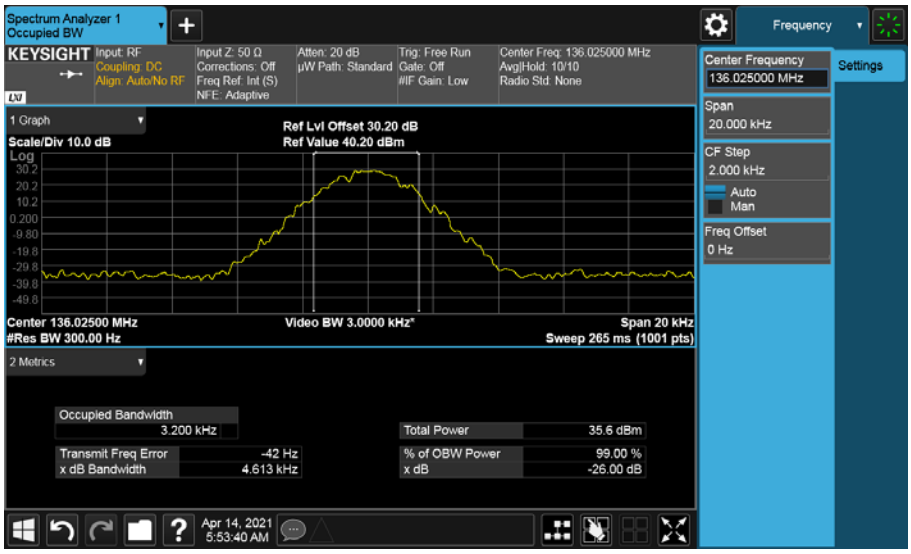
12.5kHz (FM with 2.5 KHz sine wave signal), Frequency 173.975 MHz: 99% Occupied & 26 dB Bandwidth, Low power



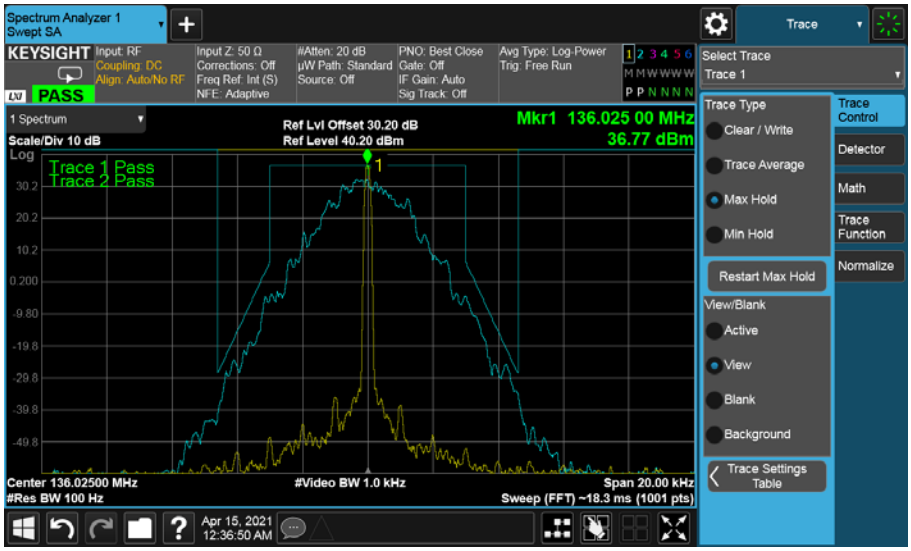
Emission Mask D



6.25kHz Digital (F1D, F1E)), Frequency 136.025 MHz:
99% Occupied & 26 dB Bandwidth, High power

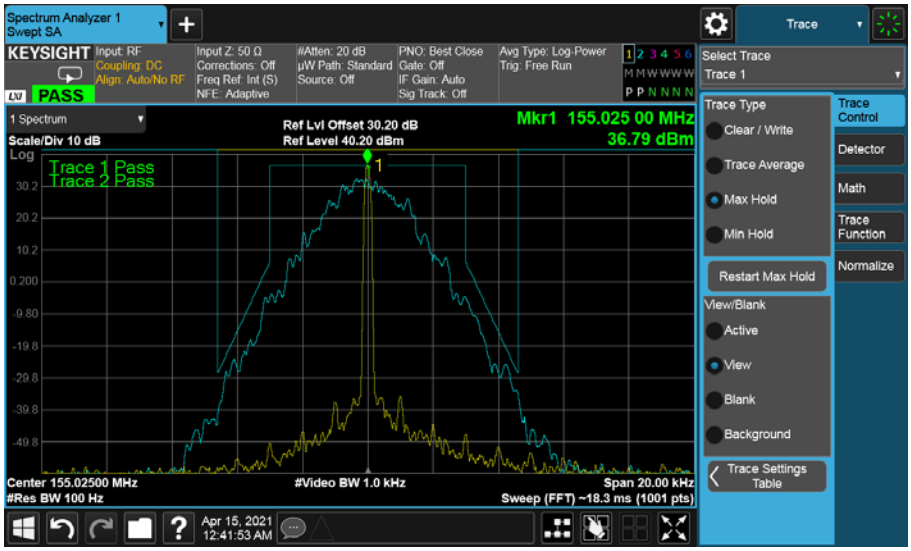


Emission Mask E

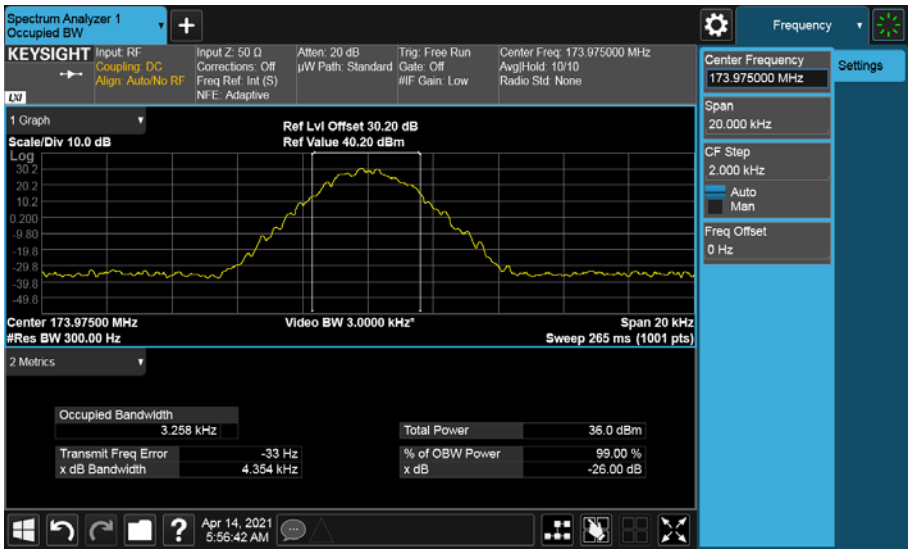


6.25kHz Digital (F1D, F1E), Frequency 155.025 MHz:
99% Occupied & 26 dB Bandwidth, High power

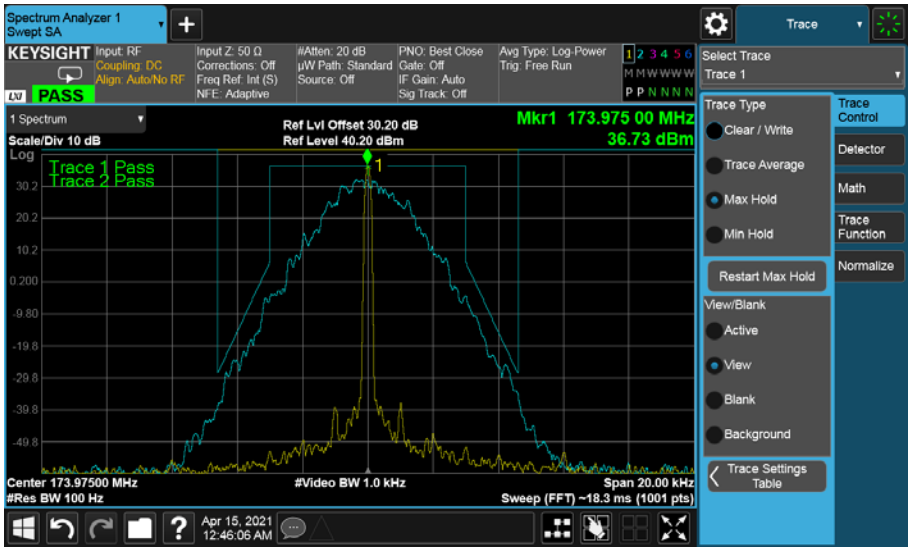
Emission Mask E



6.25kHz Digital (F1D, F1E), Frequency 173.975 MHz:
99% Occupied & 26 dB Bandwidth, High power

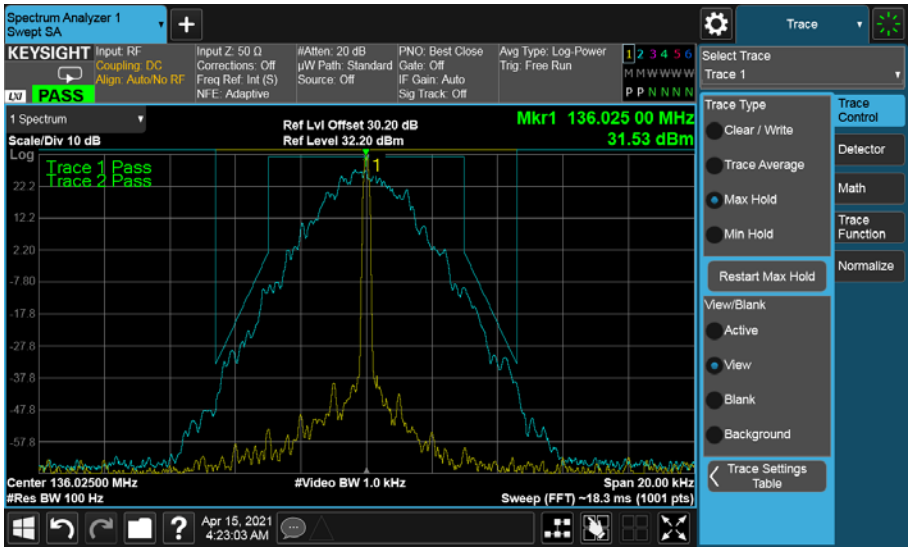


Emission Mask E



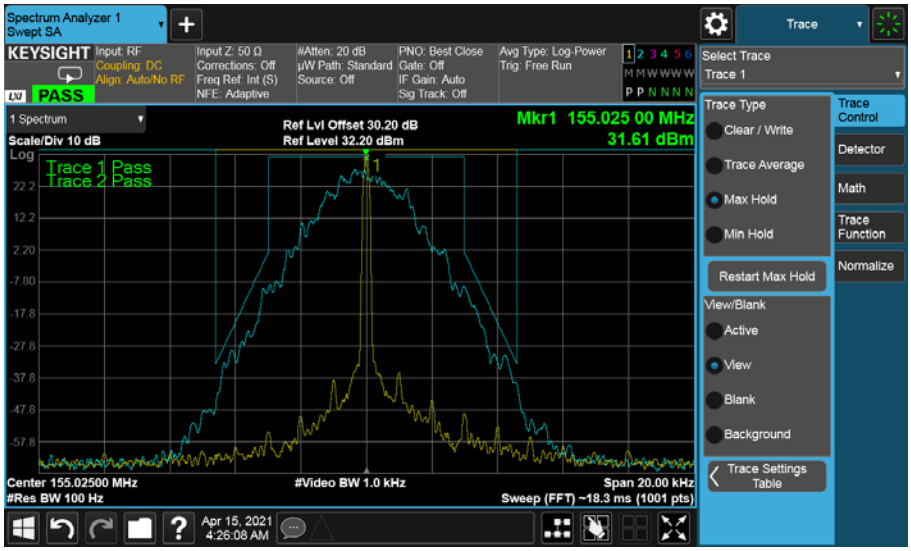
6.25kHz Digital (F1D, F1E), Frequency 136.025 MHz:
99% Occupied & 26 dB Bandwidth, Low power

Emission Mask E

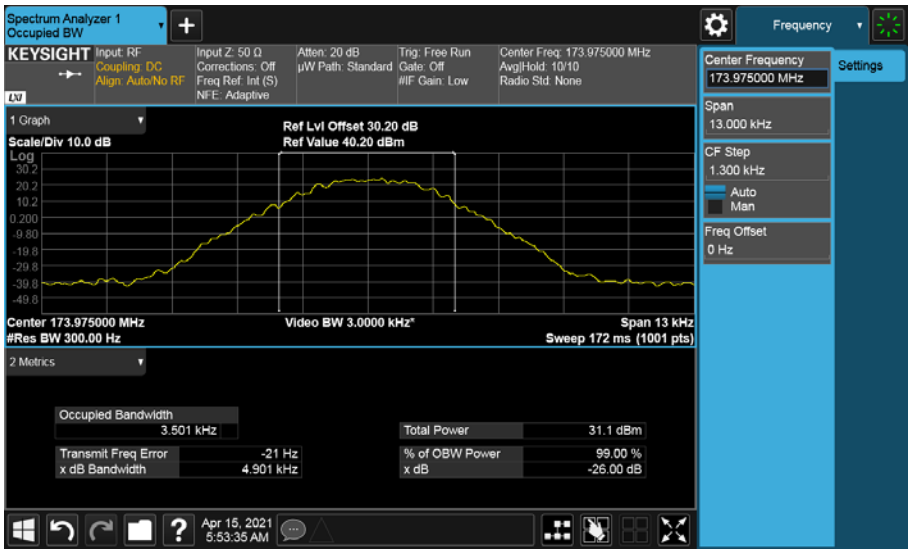


6.25kHz Digital (F1D, F1E), Frequency 155.025 MHz:
99% Occupied & 26 dB Bandwidth, Low power

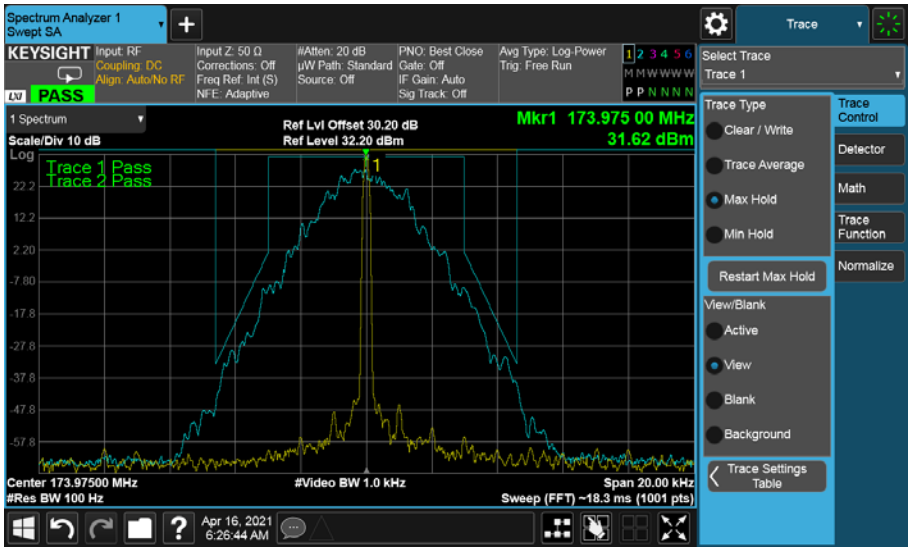
Emission Mask E



6.25kHz Digital (F1D, F1E), Frequency 173.975 MHz:
99% Occupied & 26 dB Bandwidth, Low power



Emission Mask E



3.11 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

APPLICABLE STANDARD

FCC §2.1051, §74.462 and §90.210

LIMIT

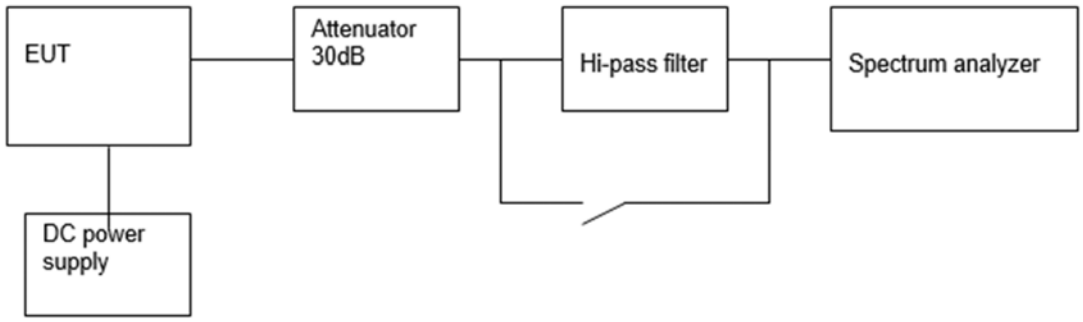
Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules	Attenuation Limit (dBc)
§ 90.210(d)	At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.
§ 90.210(e)	At least 55 + 10 log (P) or 65 dB, whichever is the lesser attenuation.

TEST PROCEDURE

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz, and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Configuration of System under Test



TEST DATA

ENVIRONMENTAL CONDITIONS

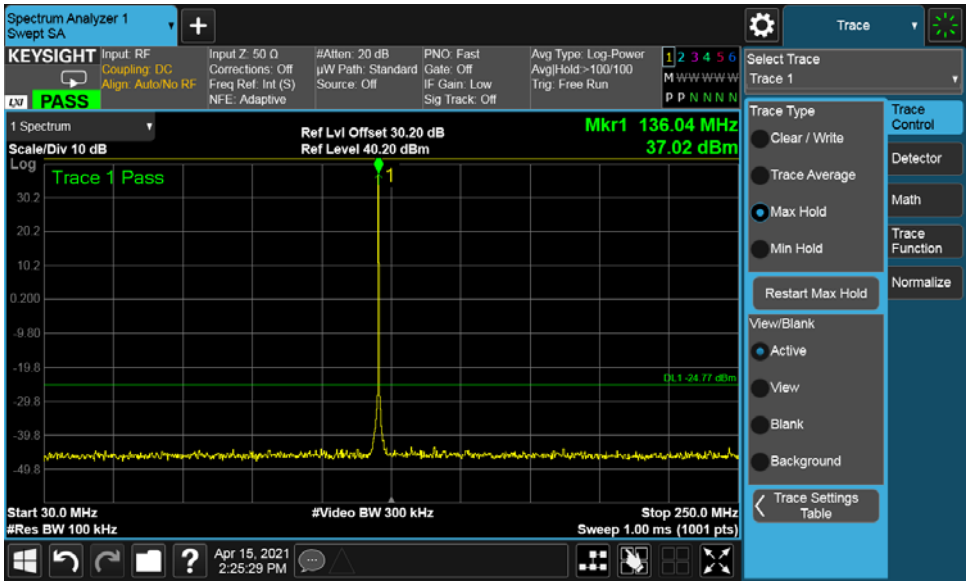
Temperature:	24.5℃
Relative Humidity:	67 %
ATM Pressure:	100.4 kPa

Note: There was no difference in spurious/harmonic emissions on the pre-scans for different channel spacing and modulation types. Therefore, the rf spurious/harmonic emissions in this section would be performed for Digital modulation with 6.25 kHz channel spacing and the more stringent limit of 55 + 10*log(P), High power would be applied for worst case.

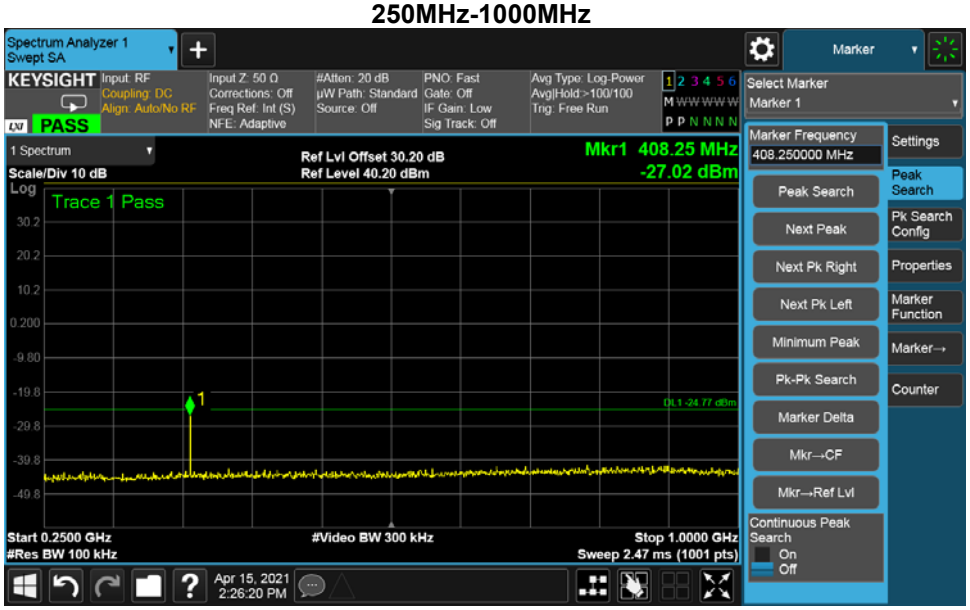
Test Mode: Transmitting

Result: Compliance.

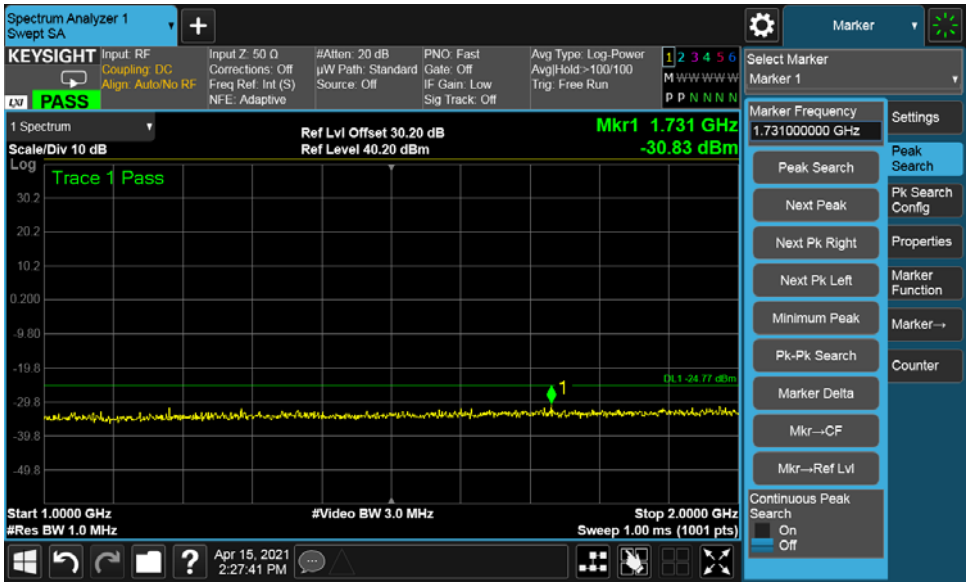
6.25kHz Digital (F1D, F1E), Frequency 136.025 MHz, High power 30MHz-250MHz



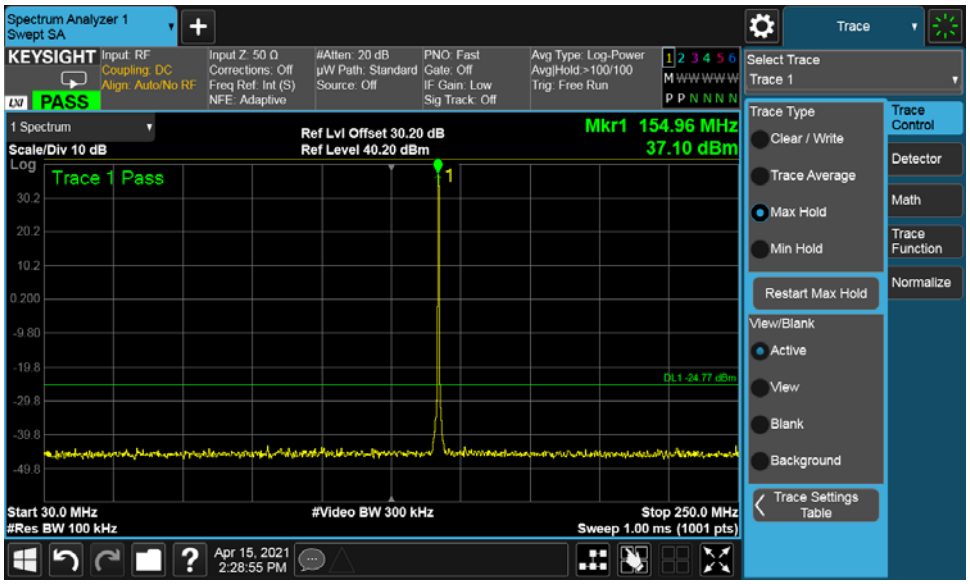
6.25kHz Digital (F1D, F1E), Frequency 136.025 MHz, High power 250MHz-1000MHz



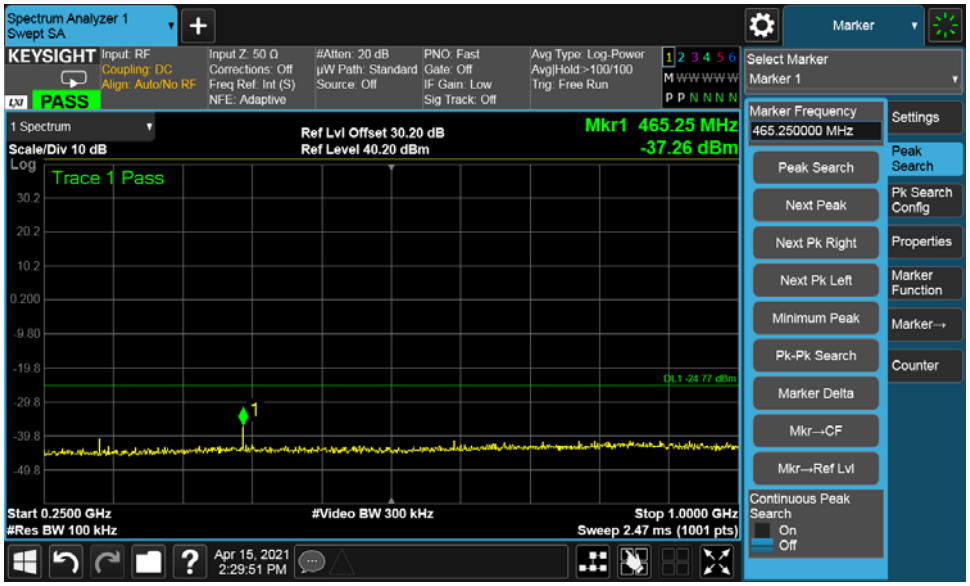
6.25kHz Digital (F1D, F1E), Frequency 136.025 MHz, High power
1Ghz - 2GHz



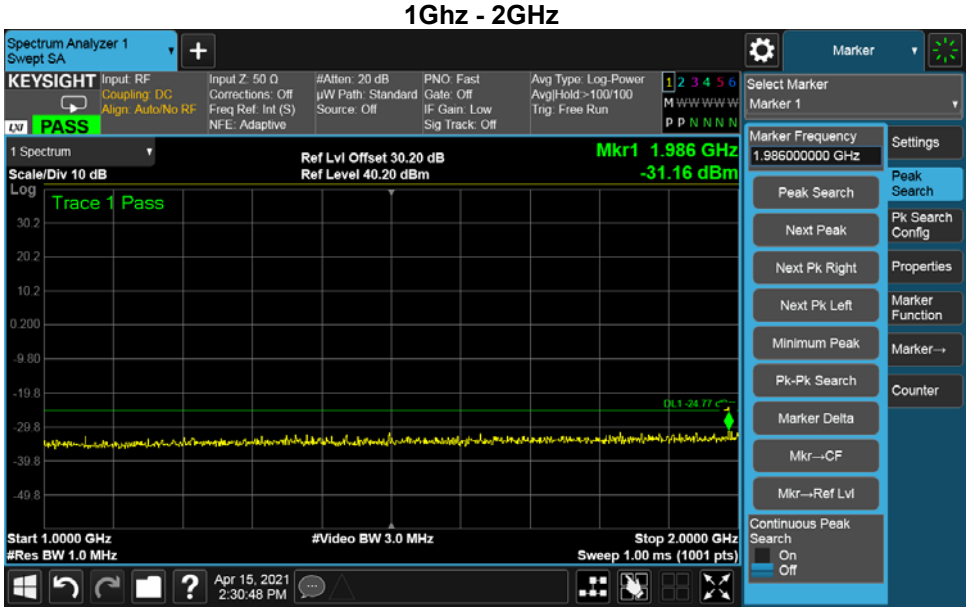
6.25kHz Digital (F1D, F1E), Frequency 155.025 MHz, High power 30MHz-250MHz



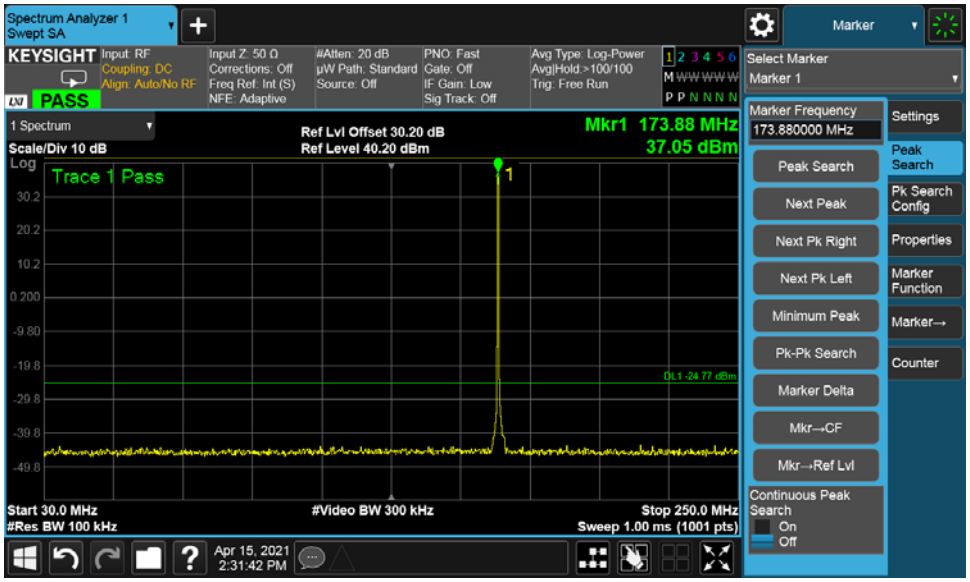
6.25kHz Digital (F1D, F1E), Frequency 155.025 MHz, High power 250MHz-1000MHz



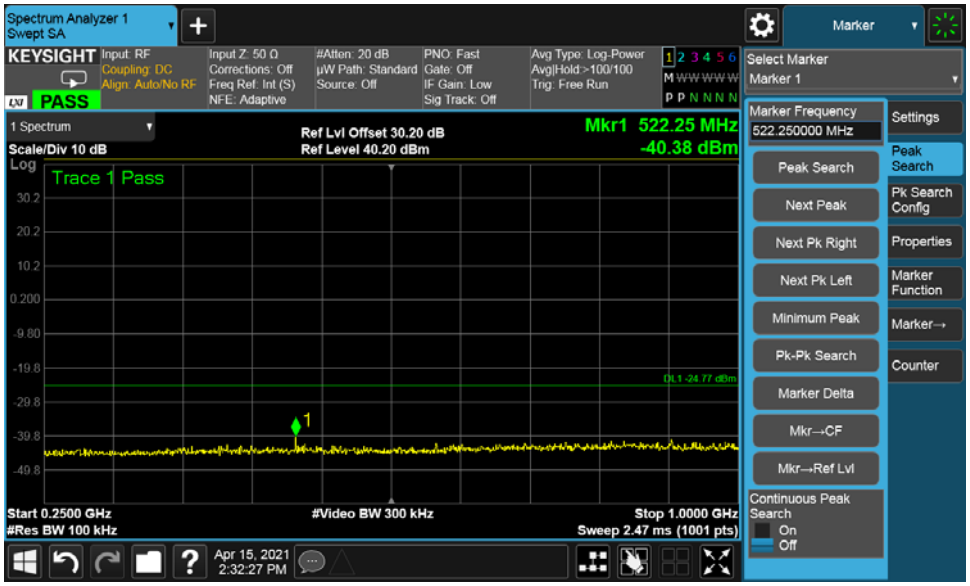
6.25kHz Digital (F1D, F1E), Frequency 155.025 MHz, High power
1Ghz - 2GHz



6.25kHz Digital (F1D, F1E), Frequency 173.975 MHz, High power 30MHz-250MHz

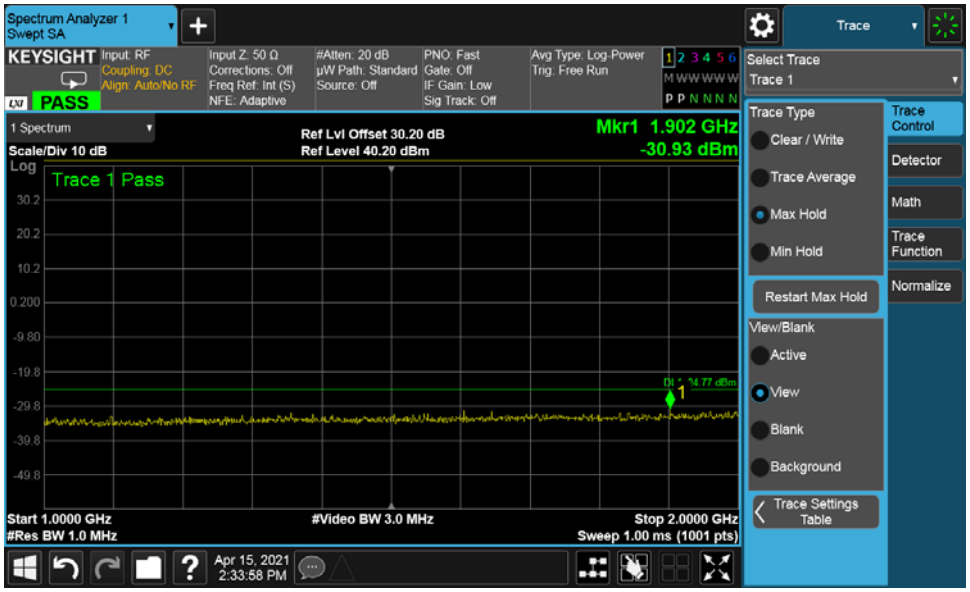


6.25kHz Digital (F1D, F1E), Frequency 173.975 MHz, High power 250MHz-1000MHz



6.25kHz Digital (F1D, F1E), Frequency 173.975 MHz, High power

1Ghz - 2GHz



3.12 FCC §2.1053; §22.861; §74.462 & §90.210 - RADIATED SPURIOUS EMISSIONS

APPLICABLE STANDARD

FCC §2.1053, §90.210

LIMIT

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules	Attenuation Limit (dBc)
§ 90.210(d)	At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.
§ 90.210(e)	At least 55 + 10 log (P) or 65 dB, whichever is the lesser attenuation.

TEST PROCEDURE

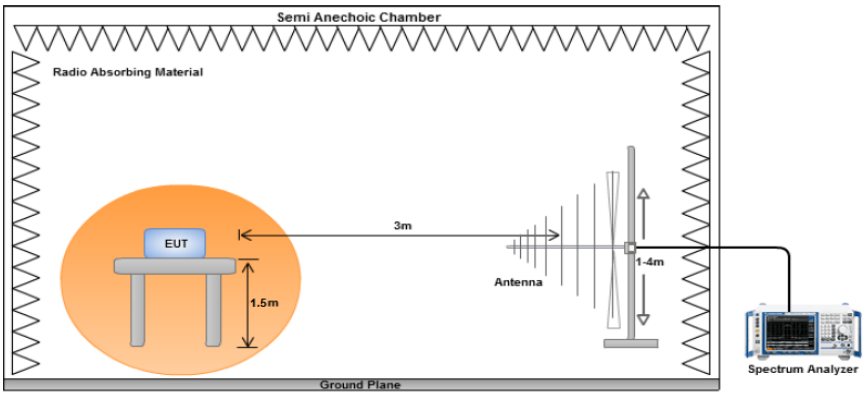
The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT .The test was performed by placing the EUT on 3-orthogonal axis.

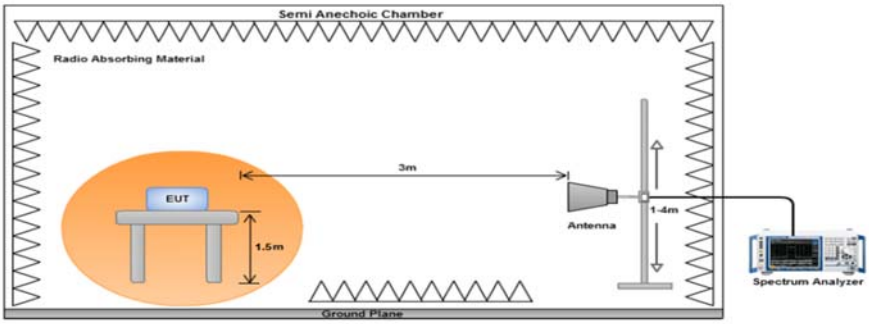
The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

TEST SETUP



Test Setup below 1GHz



Test Setup above 1GHz

TEST DATA

Remarks:

• The RF spurious/harmonic emission characteristics for different channel spacing are indistinguishable.

• There was no difference in spurious/harmonic emissions on the pre-scans for different channel spacing and modulation types. Therefore, the rf spurious/harmonic emissions in this section would be performed for Digital modulation with 6.25 kHz channel spacing and the more stringent limit of 55 + 10*log(P), for worst case.

ENVIRONMENTAL CONDITIONS

Temperature:	22.1~23.8 ℃
Relative Humidity:	52 ~ 58 %
ATM Pressure:	100.5 kPa

Mode: Transmitting

Result: Compliance.

Below 1GHz Worst-case Data

OPERATING STATE	Transmitting 136.025MHz	SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
272.05	-72.62	324	125	V	272.05	-67.43	0	0.23	-67.66	-25	-42.66
272.05	-75.53	167	150	H	272.05	-68.29	0	0.23	-68.52	-25	-43.52
408.075	-70.17	256	124	V	408.075	-65.54	0	0.72	-66.26	-25	-41.26
408.075	-73.49	428	153	H	408.075	-67.39	0	0.72	-68.11	-25	-43.11
544.1	-70.25	324	126	V	544.1	-64.49	0	0.74	-65.23	-25	-40.23
544.1	-73.67	189	152	H	544.1	-67.72	0	0.74	-68.46	-25	-43.46

OPERATING STATE	Transmitting 155.025MHz	SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
310.05	-72.98	155	134	V	310.05	-67.53	0	0.23	-67.76	-25	-42.76
310.05	-75.2	34	142	H	310.05	-68.22	0	0.23	-68.45	-25	-43.45
465.075	-70.34	257	129	V	465.075	-65.33	0	0.72	-66.05	-25	-41.05
465.075	-73.04	341	163	H	465.075	-67.59	0	0.72	-68.31	-25	-43.31
620.1	-70.28	264	127	V	620.1	-64.18	0	0.74	-64.92	-25	-39.92
620.1	-73.16	189	137	H	620.1	-67.42	0	0.74	-68.16	-25	-43.16

OPERATING STATE	Transmitting 173.975MHz	SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
347.95	-72.73	237	138	V	347.95	-67.27	0	0.23	-67.5	-25	-42.5
347.95	-75.54	433	151	H	347.95	-68.39	0	0.23	-68.62	-25	-43.62
521.925	-70.36	128	143	V	521.925	-65.42	0	0.72	-66.14	-25	-41.14
521.925	-73.43	367	129	H	521.925	-67.87	0	0.72	-68.59	-25	-43.59
695.9	-70.19	469	152	V	695.9	-64.67	0	0.74	-65.41	-25	-40.41
695.9	-73.26	872	118	H	695.9	-67.18	0	0.74	-67.92	-25	-42.92

Above 1GHz

Frequency Range	1GHz ~ 12.75GHz	Operating Channel	136.025 MHz

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1088.2	-48.98	266	200	V	1088.2	-77.62	7.92	1.14	-70.84	-25	-45.84
1088.2	-47.86	271	189	H	1088.2	-78.61	7.92	1.14	-71.83	-25	-46.83
1244.2	-50.01	217	126	V	1244.2	-77.14	8.36	1.32	-70.1	-25	-45.1
1244.2	-50.21	265	255	H	1244.2	-78.28	8.36	1.32	-71.24	-25	-46.24
1360.2	-50.42	247	159	V	1360.2	-77.37	8.42	1.43	-70.38	-25	-45.38
1360.2	-50.39	216	167	H	1360.2	-78.53	8.42	1.43	-71.54	-25	-46.54

Frequency Range	1GHz ~ 12.75GHz	Operating Channel	155.025 MHz

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1085.17	-48.28	226	195	V	1085.17	-77.37	7.92	1.14	-70.59	-25	-45.59
1085.17	-47.46	253	185	H	1085.17	-78.44	7.92	1.14	-71.66	-25	-46.66
1240.2	-50.53	216	121	V	1240.2	-77.27	8.36	1.32	-70.23	-25	-45.23
1240.2	-50.19	237	236	H	1240.2	-78.89	8.36	1.32	-71.85	-25	-46.85
1395.22	-50.37	249	161	V	1395.22	-77.46	8.42	1.43	-70.47	-25	-45.47
1395.22	-50.17	227	158	H	1395.22	-78.69	8.42	1.43	-71.7	-25	-46.7

Frequency Range	1GHz ~ 12.75GHz	Operating Channel	173.975 MHz

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Hgt (cm)	Pol (V/H)	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1043.85	-48.53	227	187	V	1043.85	-77.14	7.92	1.14	-70.36	-25	-45.36
1043.85	-47.17	246	181	H	1043.85	-78.35	7.92	1.14	-71.57	-25	-46.57
1217.82	-50.46	228	125	V	1217.82	-77.27	8.36	1.32	-70.23	-25	-45.23
1217.82	-50.73	246	241	H	1217.82	-78.36	8.36	1.32	-71.32	-25	-46.32
1391.8	-50.28	257	156	V	1391.8	-77.17	8.42	1.43	-70.18	-25	-45.18
1391.8	-50.46	226	127	H	1391.8	-78.82	8.42	1.43	-71.83	-25	-46.83

3.13 FREQUENCY STABILITY

APPLICABLE STANDARD

FCC §2.1055, § 22.355, §74.464, §90.213

LIMIT

§ 90.213 Transmitters used must have minimum frequency stability as specified in the following table.

Frequency Range (MHz)	Channel Bandwidth (KHz)	Frequency Tolerance (ppm)		
		Fixed and Base Stations	Mobile Stations	
			> 2 W	≤ 2 W
150-174 MHz	6.25	1.0	2.0	2.0
	12.5	2.5	5.0	5.0
	25	5.0	5.0	50.0*
421-512 MHz	6.25	0.5	1.0	1.0
	12.5	1.5	2.5	2.5
	25	2.5	5.0	5.0

In the 150-174 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth or designed to operate on a frequency specifically designated for itinerant use or designed for low-power operation of two watts or less, must have a frequency stability of 5.0 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 2.0 ppm.

§ 22.355 Transmitters used must have minimum frequency stability as specified in the following table.

TABLE C–1—FREQUENCY TOLERANCE FOR TRANSMITTERS IN THE PUBLIC MOBILE SERVICES

Frequency range (MHz)	Base, fixed (ppm)	Mobile ≤3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

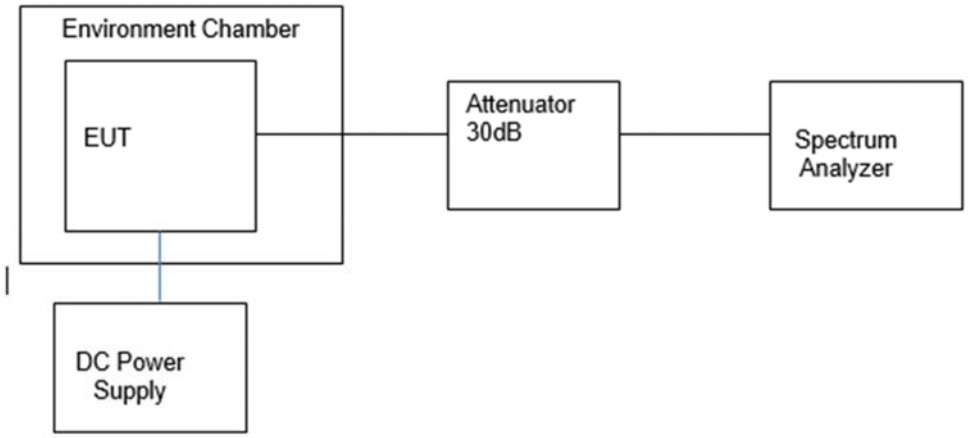
§ 74.464 - For operations on frequencies above 25 MHz using authorized bandwidths up to 30 kHz, the licensee of a remote pickup broadcast station or system shall maintain the operating frequency of each station in compliance with the frequency tolerance requirements of §90.213 of this chapter. For all other operations, the licensee of a remote pickup broadcast station or system shall maintain the operating frequency of each station in accordance with the following:

Frequency range	Tolerance (percent)	
	Base station	Mobile station
25 to 30 MHz:		
3 W or less	.002	.005
Over 3 W	.002	.002
30 to 300 MHz:		
3 W or less	.0005	.005
Over 3 W	.0005	.0005
300 to 500 MHz, all powers	.00025	.0005

TEST PROCEDURE

Refer to Section 8.6 of this test report and ANSI/TIA/EIA-603-D-2010, Section 2.

Configuration of System under Test



TEST DATA

ENVIRONMENTAL CONDITIONS

Temperature:	24.5 ℃
Relative Humidity:	67 %
ATM Pressure:	100.4 kPa

Test Mode: Transmitting

Result: Compliance.

Test Result:

6.25kHz, Reference Frequency: 155.025 MHz, Limit: ±5 ppm			
Temperature (°C)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.5	155.02526	1.677149
-20	7.5	155.02525	1.612643
-10	7.5	155.02524	1.548137
0	7.5	155.02523	1.483632
10	7.5	155.02522	1.419126
20	7.5	155.02521	1.354620
30	7.5	155.02523	1.483632
40	7.5	155.02524	1.548137
50	7.5	155.02525	1.612643
20	6.375(-15%)	155.02521	1.354620
20	8.625(+15%)	155.02520	1.290114

12.5kHz, Reference Frequency: 155.025 MHz, Limit: ±5 ppm			
Temperature (°C)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.5	155.02526	1.677149
-20	7.5	155.02525	1.612643
-10	7.5	155.02524	1.548137
0	7.5	155.02523	1.483632
10	7.5	155.02522	1.419126
20	7.5	155.02521	1.354620
30	7.5	155.02523	1.483632
40	7.5	155.02524	1.548137
50	7.5	155.02525	1.612643
20	6.375(-15%)	155.02521	1.354620
20	8.625(+15%)	155.02520	1.290114

3.14 FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

APPLICABLE STANDARD

Regulations: FCC §90.214
Test method: ANSI/TIA-603-D 2010, section 2.2.19.3

LIMIT

Time intervals [1, 2]	Maximum frequency difference [3]	All equipment	
		150 to 174 MHz	421 to 512MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 KHz Channels			
t_1 [4] ……..	± 25.0 KHz	5.0 ms	10.0 ms
t_2 …….	± 12.5 KHz	20.0 ms	25.0 ms
t_3 [4] ……..	± 25.0 KHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 KHz Channels			
t_1 [4] ……..	± 12.5 KHz	5.0 ms	10.0 ms
t_2 …….	± 6.25 KHz	20.0 ms	25.0 ms
t_3 [4] ……..	± 12.5 KHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 KHz Channels			
t_1 [4] ……..	±6.25 KHz	5.0 ms	10.0 ms
t_2 ……	±3.125 KHz	20.0 ms	25.0 ms
t_3 [4] ……..	±6.25 KHz	5.0 ms	10.0 ms

TEST PROCEDURE

a) Connect the EUT and test equipment as shown on the following block diagram.

b) Set the Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.

c) Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at
±12.5 kHz deviation and set its output level to -100dBm.

d) Turn on the transmitter.

e) Supply sufficient attenuation via the RF attenuator to provide an input level to the Spectrum Analyzer that is 40 dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the Spectrum Analyzer as P_0.

f) Turn off the transmitter.

g) Adjust the RF level of the signal generator to provide RF power equal to P_0. This signal generator RF level shall be maintained throughout the rest of the measurement.

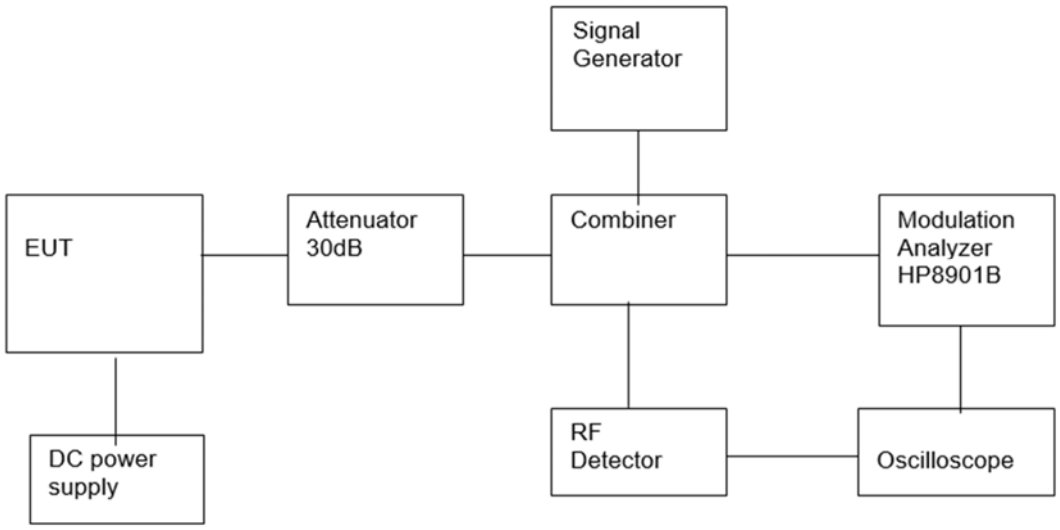
h) Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30

dB when the transmitter is turned on.

i) Adjust the vertical amplitude control of the spectrum analyzer to display the 1000 Hz at ±4 divisions vertically centered on the display. Set trigger mode of the Spectrum Analyzer to "Video", and tune the "trigger level" on suitable level. Then set the "tiger offset" to -10ms for turn on and -15ms for turn off.

j) Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 kHz test signal is completely suppressed is considered to be t_{on}. The trace should be maintained within the allowed divisions during the period t_1 and t_2.

k) Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period t_3.



TEST DATA

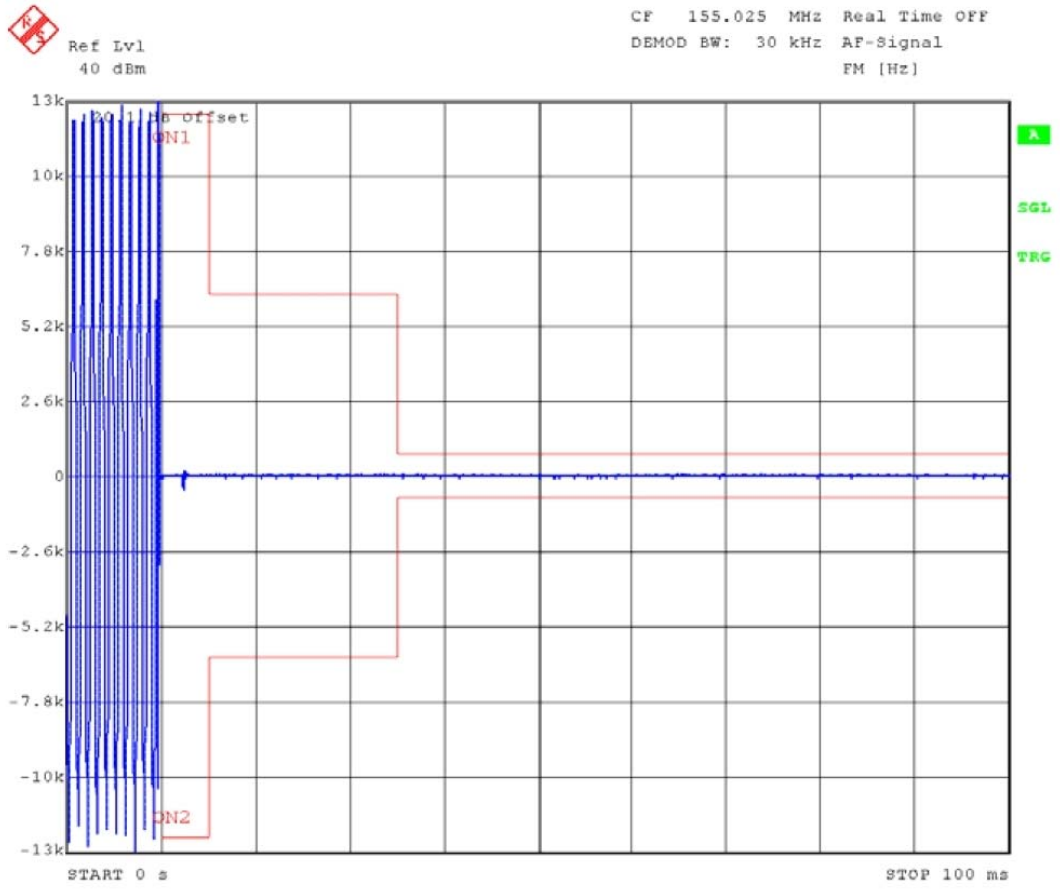
ENVIRONMENTAL CONDITIONS

Temperature:	24.5℃
Relative Humidity:	67 %
ATM Pressure:	100.4kPa

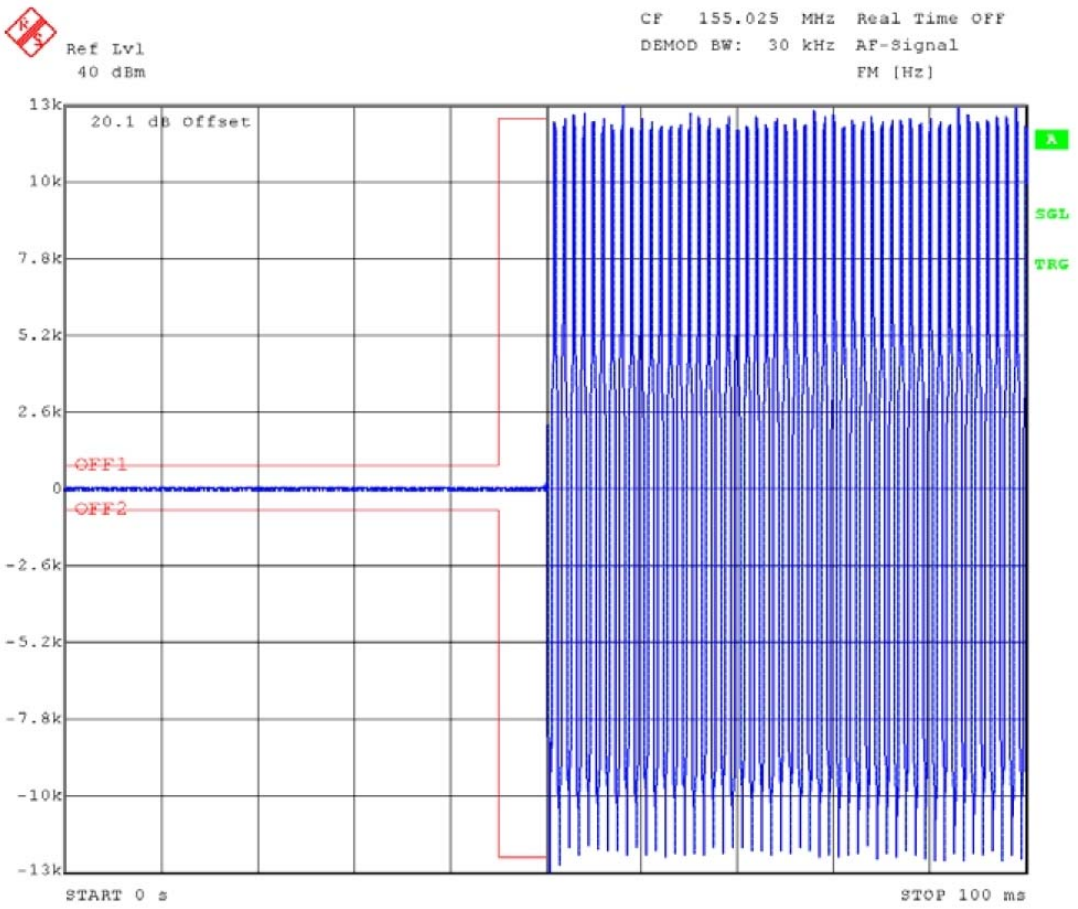
Test Result:

Channel Spacing (kHz)	Transient Period (ms)	Transient Frequency	Result
6.25	<5(t_1)	±12.5 kHz	Pass
	<20(t_2)	±6.25 kHz	
12.5	<5(t_3)	±12.5 kHz	

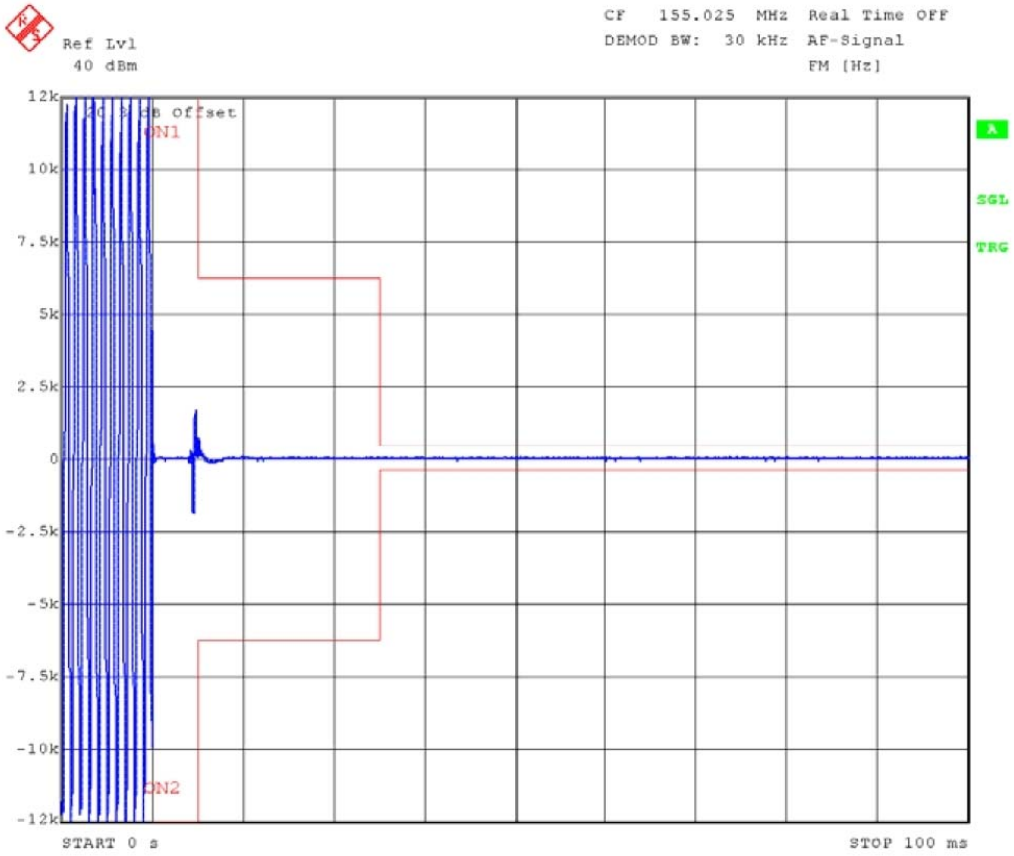
Test Frequency:	155.025 MHz
Channel Spacing:	6.25 kHz
Power:	5 W
Test Conditions:	Switch on condition t_{on}, t_1, and t_2



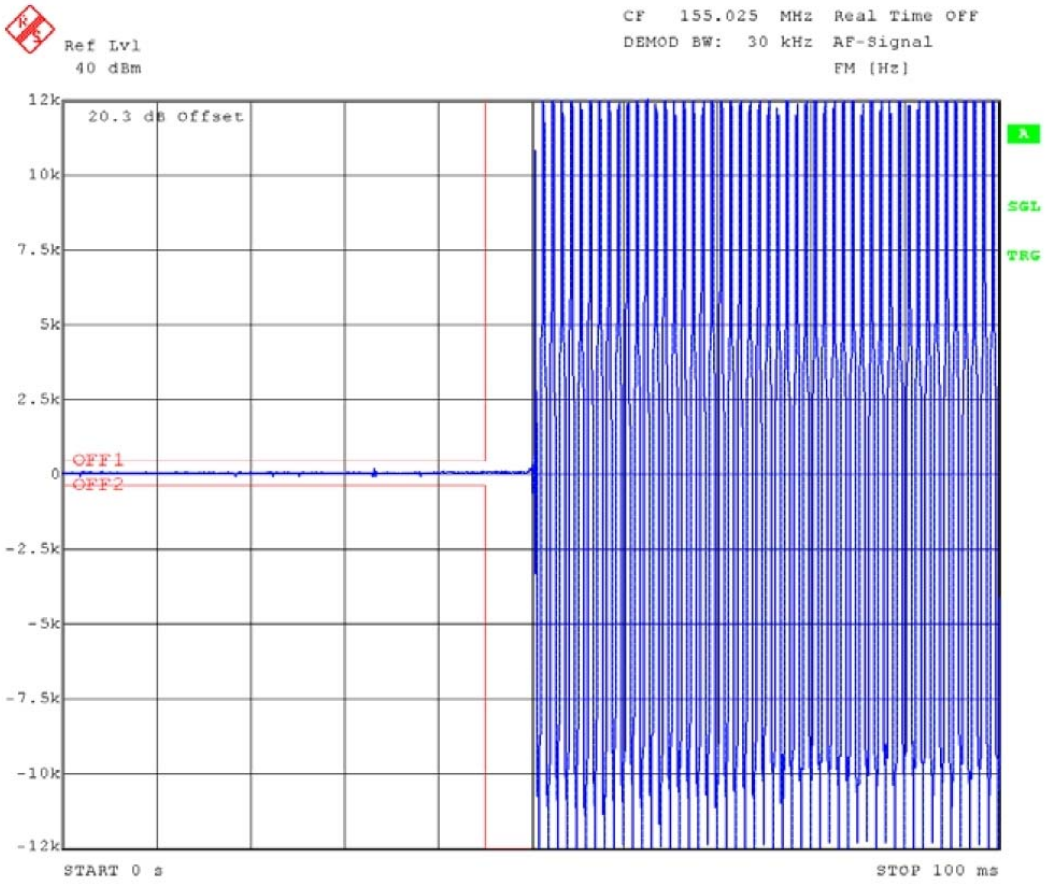
Test Frequency:	155.025 MHz
Channel Spacing:	6.25 kHz
Power:	5 W
Test Conditions:	Switch off condition t_3, t_{off}



Test Frequency:	155.025 MHz
Channel Spacing:	12.25 kHz
Power:	5 W
Test Conditions:	Switch on condition t_{on}, t_1, and t_2



Test Frequency:	155.025 MHz
Channel Spacing:	12.5 kHz
Power:	5 W
Test Conditions:	Switch off condition t_3, t_{off}



4. Information on the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can also be found on our web site.

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