

Radio Test Report

Report No: CTA231205003W02

Issued for

BTECH (Baofeng Tech)

702N industrial Ave, Arlington, South Dakota, US

Product Name: Two way radio

Brand Name: BTECH

Model Name: UV-PRO

Series Model(s) N/A

FCC ID: 2AGND-UV-PRO

Test Standards: FCC Part 90

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the ShenZhen CTA Test Services Co., Ltd.



TEST REPORT**Applicant's Name**.....: STS2307060

Address.....: BTECH (Baofeng Tech)

Manufacture's Name.....: BTECH (Baofeng Tech)

Address.....: 702N industrial Ave, Arlington, South Dakota, US

Product Description

Product Name: Two way radio

Brand Name: BTECH

Model Name.....: UV-PRO

Series Model: N/A

Test Standards.....: FCC Part 90

Test Procedure: C63.26-2015

This device described above has been tested by CTA, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the ShenZhen CTA Test Services Co., Ltd.

Date of Test.....:

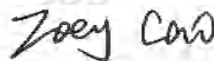
Date of receipt of test item.....: 14 July 2023

Date of performance of tests ..: 14 July 2023 ~ 04 Dec. 2023

Date of Issue: 04 Dec. 2023

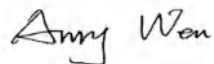
Test Result: Pass

Testing Engineer :



(Zoey Cao)

Technical Manager :



(Amy Wen)

Authorized Signatory :



(Eric Wang)

Table of Contents

Page

1. SUMMARY OF TEST RESULTS	6
1.1 TEST FACILITY	7
1.2 MEASUREMENT UNCERTAINTY	7
2. GENERAL INFORMATION	8
2.1 GENERAL DESCRIPTION OF EUT	8
2.2 EUT OPERATION MODE	10
2.3 DESCRIPTION OF TEST MODES	10
2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	11
2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	12
2.6 TEST EQUIPMENT	13
3. MAXIMUM TRANSMITTER POWER	15
3.1 LIMITS	15
3.2 TEST PROCEDURE	15
3.3 DEVIATION FROM TEST STANDARD	15
3.4 TEST SETUP BLOCK DIAGRAM	15
3.5 TEST RESULT	15
4. OCCUPIED BANDWIDTH	17
4.1 LIMIT	17
4.2 MEASUREMENT PROCEDURE	17
4.3 TEST SETUP BLOCK DIAGRAM	17
4.4 TEST RESULT	18
5. EMISSION MASK	33
5.1 PROVISIONS APPLICABLE	33
5.2 MEASUREMENT PROCEDURE	33
5.3 TEST SETUP BLOCK DIAGRAM	33
5.4 MEASUREMENT RESULT	34
6. TRANSMITTER RADIATED SPURIOUS EMSSION	49
6.1 PROVISIONS APPLICABLE	49
6.2TEST PROCEDURE	49
6.3 TEST CONFIGURATION	50
6.4 TEST RESULT	51
7. SPURIOUS EMSSION ON ANTENNA PORT	65
7.1 PROVISIONS APPLICABLE	65
7.2 MEASUREMENT PROCEDURE	65
7.3 TEST SETUP BLOCK DIAGRAM	65

Table of Contents

Page

7.4 TEST RESULT	66
8. FREQUENCY STABILITY	80
8.1 PROVISIONS APPLICABLE	80
8.2 MEASUREMENT PROCEDURE	80
8.3 TEST SETUP BLOCK DIAGRAM	80
8.4 TEST RESULT	81
9. TRANSIENT FREQUENCY BEHAVIOR	92
9.1 PROVISIONS APPLICABLE	92
9.2 MEASUREMENT PROCEDURE	92
9.3 TEST SETUP BLOCK DIAGRAM	93
9.4 TEST RESULT	94
10. MODULATION CHARACTERISTIC	96
10.1 LIMIT	96
10.2 TEST PROCEDURE	96
10.3 TEST RESULT	97
11. PHOTOS OF TEST SETUP	109

Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	04 Dec. 2023	CTA231205003W02	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

Emission			
Standard	Item	Result	Remarks
FCC Part 90.205	Maximum Transmitter Power	PASS	
FCC Part 90.209	Occupied Bandwidth	PASS	
FCC Part 90.210	Emission Mask	PASS	
FCC Part 90.210	Transmitter Radiated Spurious Emssion	PASS	
FCC Part 90.210	Spurious Emssion on Antenna Port	PASS	
FCC Part 90.213	Frequency Stability Test	PASS	
FCC Part 90.214	Transient Frequency Behavior	PASS	
FCC Part 2.1047	Modulation Characteristic	PASS	

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report.

1.1 TEST FACILITY

Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

FCC test Firm Registration Number: 517856

IC test Firm Registration Number: 27890

A2LA Certificate No.: 6534.01

IC CAB ID: CN0127

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Test	Range	Measurement Uncertainty
Radiated Emission	30~1000MHz	4.06 dB
Radiated Emission	1~18GHz	5.14 dB
Radiated Emission	18-40GHz	5.38 dB
Conducted Disturbance	0.15~30MHz	2.14 dB
Output Peak power	30MHz~18GHz	0.55 dB
Power spectral density	/	0.57 dB
Spectrum bandwidth	/	1.1%
Radiated spurious emission (30MHz-1GHz)	30~1000MHz	4.10 dB
Radiated spurious emission (1GHz-18GHz)	1~18GHz	4.32 dB
Radiated spurious emission (18GHz-40GHz)	18-40GHz	5.54 dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Two way radio
Brand Name:	BTECH
Model Name:	UV-PRO
Series Model:	N/A
Model Difference description:	N/A
Operation Frequency Range	150.8-162.0125MHz,173.2-173.4MHz,421-512MHz
Maximum Transmitter Power:	37.68dBm
Channel Separation:	12.5KHz,25KHz
Modulation type:	F3E
Raing:	Input: DC 5V Output: 5W
Battery :	Rated Voltage: 7.4V Charge Limit Voltage: 5V Capacity: 2600mAh
Temperature Range:	-30°C-50°C
Test frequency list:	See Note 3
Software version number:	0.6.2
Hardware version number:	1.0

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	BTECH	UV-PRO L	External	N/A	1.6dBi	Antenna

The EUT antenna is External Antenna. No antenna other than that furnished by the responsible party shall be used with the device.

3. Test frequency list

12.5KHz:

150.8 MHz - 162.0125 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	150.8125	2	150.825	3	150.8375	4	150.85
.....	.....	448	156.4	.....	.....	.....	.....
893	161.9625	894	161.975	895	161.9875	896	162

173.2 MHz - 173.4 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	173.2125	2	173.225	3	173.2375	4	173.25
.....	.....	8	173.3	.....	.....	.....	.....
12	173.35	13	173.3625	14	173.375	15	173.3875

421 MHz - 512 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	421.0125	2	421.025	3	421.0375	4	421.05
.....	.....	3640	466.5	.....	.....	.....	.....
7276	511.95	7277	511.9625	7278	511.975	7279	511.9875

25KHz:

150.8 MHz - 162.0125 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	150.825	2	150.85	3	150.875	4	150.9
.....	.....	224	156.4	.....	.....	.....	.....
444	161.9	445	161.925	446	161.95	447	161.975

173.2 MHz - 173.4 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	173.225	2	173.25	3	173.275	4	173.3
5	173.325	6	173.35	7	173.375		

421 MHz - 512 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	421.025	2	421.05	3	421.075	4	421.1
.....	.....	1820	466.5	.....	.....	.....	.....
3636	511.9	3637	511.925	3638	511.95	3639	511.975

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above listed frequency for testing.

2.2 EUT OPERATION MODE

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

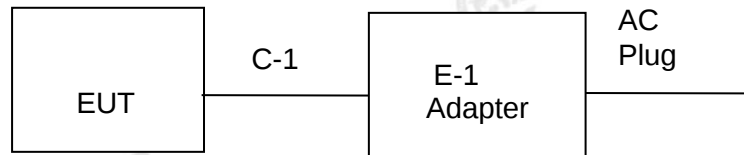
2.3 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

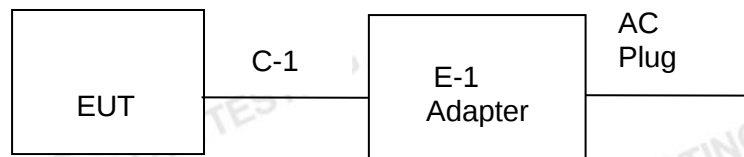
Test Mode	Power level	Modulation Type	Channel Separation	Frenquency
Mode1	Low power	F3E	12.5kHz	Low channel(150.8125MHz)
				Mid channel(156.4MHz)
				High channel(162MHz)
Mode2	High power			Low channel(150.8125MHz)
				Mid channel(156.4MHz)
				High channel(162MHz)
Mode3	Low power			Mid channel(173.3MHz)
Mode4	High power			Mid channel(173.3MHz)
Mode5	Low power			Low channel(421.0125MHz)
				Mid channel(466.5MHz)
				High channel(511.9875MHz)
Mode6	High power			Low channel(421.0125MHz)
				Mid channel(466.5MHz)
				High channel(511.9875MHz)
Mode7	Low power		25kHz	Low channel(150.825MHz)
				Mid channel(156.4MHz)
				High channel(161.975MHz)
Mode8	High power			Low channel(150.825MHz)
				Mid channel(156.4MHz)
				High channel(161.975MHz)
Mode9	Low power			Mid channel(173.3MHz)
Mode10	High power			Mid channel(173.3MHz)
Mode11	Low power			Low channel(421.025MHz)
				Mid channel(466.5MHz)
		High channel(511.9875MHz)		
Mode12	High power	Low channel(421.025MHz)		
		Mid channel(466.5MHz)		
		High channel(511.975MHz)		

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Emission Test



2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND 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.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-1	Adapter	HUAWEI	HW-050450C00	N/A	N/A
C-1	DC Cable	N/A	N/A	80cm	N/A

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.6 TEST EQUIPMENT

Test Equipment	Manufacturer	Model No.	Equipment No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	CTA-308	2023/08/02	2024/08/01
LISN	R&S	ENV216	CTA-314	2023/08/02	2024/08/01
EMI Test Receiver	R&S	ESPI	CTA-307	2023/08/02	2024/08/01
EMI Test Receiver	R&S	ESCI	CTA-306	2023/08/02	2024/08/01
Spectrum Analyzer	Agilent	N9020A	CTA-301	2023/08/02	2024/08/01
Spectrum Analyzer	R&S	FSP	CTA-337	2023/08/02	2024/08/01
Vector Signal generator	Agilent	N5182A	CTA-305	2023/08/02	2024/08/01
Analog Signal Generator	R&S	SML03	CTA-304	2023/08/02	2024/08/01
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	R&S	CTA-302	2023/08/02	2024/08/01
Temperature and humidity meter	Chigo	ZG-7020	CTA-326	2023/08/02	2024/08/01
Ultra-Broadband Antenna	Schwarzbeck	VULB9163	CTA-310	2023/10/17	2024/10/16
Horn Antenna	Schwarzbeck	BBHA 9120D	CTA-309	2023/10/13	2024/10/12
Loop Antenna	Zhinan	ZN30900C	CTA-311	2023/10/17	2024/10/16
Horn Antenna	Beijing Hangwei Dayang	OBH100400	CTA-336	2021/08/07	2024/08/06
Amplifier	Schwarzbeck	BBV 9745	CTA-312	2023/08/02	2024/08/01
Amplifier	Taiwan chengyi	EMC051845B	CTA-313	2023/08/02	2024/08/01
Directional coupler	NARDA	4226-10	CTA-303	2023/08/02	2024/08/01
High-Pass Filter	XingBo	XBLBQ-GTA18	CTA-402	2023/08/02	2024/08/01
High-Pass Filter	XingBo	XBLBQ-GTA27	CTA-403	2023/08/02	2024/08/01
Automated filter bank	Tonscend	JS0806-F	CTA-404	2023/08/02	2024/08/01
Power Sensor	Agilent	U2021XA	CTA-405	2023/08/02	2024/08/01
Amplifier	Schwarzbeck	BBV9719	CTA-406	2023/08/02	2024/08/01
Intercom comprehensive tester	HP	8920A	CTA-501	2023/03/01	2024/02/29

Test Equipment	Manufacturer	Model No.	Version number	Calibration Date	Calibration Due Date
EMI Test Software	Tonscend	TS®JS32-RE	5.0.0.2	N/A	N/A
EMI Test Software	Tonscend	TS®JS32-CE	5.0.0.1	N/A	N/A
RF Test Software	Tonscend	TS®JS1120-3	3.1.65	N/A	N/A
RF Test Software	Tonscend	TS®JS1120	3.1.46	N/A	N/A

3. MAXIMUM TRANSMITTER POWER

3.1 LIMITS

Per FCC Part 2.1046 and Part 90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List [available in accordance with §90.203(a)(1)] for transmitters included in this list or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

3.2 TEST PROCEDURE

Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted below: If the power output is adjustable, measurements shall be made for the highest and lowest power levels. The EUT connect to the Spectrum Analyzer through 30 dB attenuator.

3.3 DEVIATION FROM TEST STANDARD

No deviation

3.4 TEST SETUP BLOCK DIAGRAM



3.5 TEST RESULT

Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Test Results (dBm)	Test Results (W)	Rated Output Power(W)	Limit (W)
12.5KHz	Low Power	Lowest	150.8125	33.730	2.36	2.0	1.6-2.4
		Middle	156.4000	33.610	2.30		
		Highest	162.0000	33.310	2.14		
		Middle	173.3000	33.330	2.15		
		Lowest	421.0125	33.780	2.39		
		Middle	466.5000	33.630	2.31		
		Highest	511.9875	33.350	2.16		
	High Power	Lowest	150.8125	37.600	5.75	5.0	4.0-6.0
		Middle	156.4000	37.400	5.50		
		Highest	162.0000	37.620	5.78		
		Middle	173.3000	37.280	5.35		
		Lowest	421.0125	37.650	5.82		
		Middle	466.5000	37.680	5.86		
		Highest	511.9875	37.090	5.12		

Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Test Results (dBm)	Test Results (W)	Rated Output Power(W)	Limit (W)
25KHz	Low Power	Lowest	150.8250	33.652	2.32	2.0	1.6-2.4
		Middle	156.4000	33.489	2.23		
		Highest	161.9750	33.338	2.16		
		Middle	173.3000	33.325	2.15		
		Lowest	421.0250	33.686	2.34		
		Middle	466.5000	33.593	2.29		
		Highest	511.9750	33.433	2.20		
	High Power	Lowest	150.8250	37.652	5.82	5.0	4.0-6.0
		Middle	156.4000	37.459	5.57		
		Highest	161.9750	37.618	5.78		
		Middle	173.3000	37.211	5.26		
		Lowest	421.0250	37.614	5.77		
		Middle	466.5000	37.568	5.71		
		Highest	511.9750	37.106	5.14		

Note: The rated low power is 2W, the power limits is 1.6 W-2.4W.

The rated high power is 5W, the power limits is 4.0 W-6.0W.

4. OCCUPIED BANDWIDTH

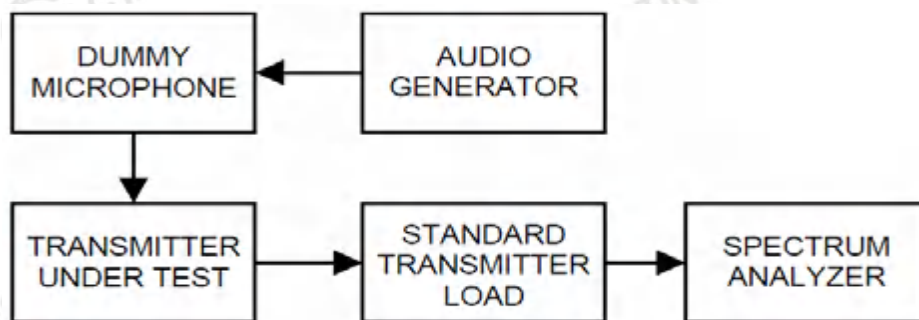
4.1 LIMIT

Occupied Bandwidth: The EUT was connected to the spectrum analyzer via the main RF connector, and through an appropriate attenuator. The EUT was controlled to transmit its maximum power. Then the bandwidth of 99% power can be measured by the spectrum analyzer. The maximum authorized bandwidth shall not be more than that normally authorized for digital data mode.

4.2 MEASUREMENT PROCEDURE

- a. The EUT was connected to the spectrum analyzer through sufficient attenuation.
- b. Set EUT as digital data mode.
- c. Set SPA Center Frequency=fundamental frequency, RBW=300Hz, VBW=3KHz, span =15KHz or 30KHz.
- e Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth.

4.3 TEST SETUP BLOCK DIAGRAM



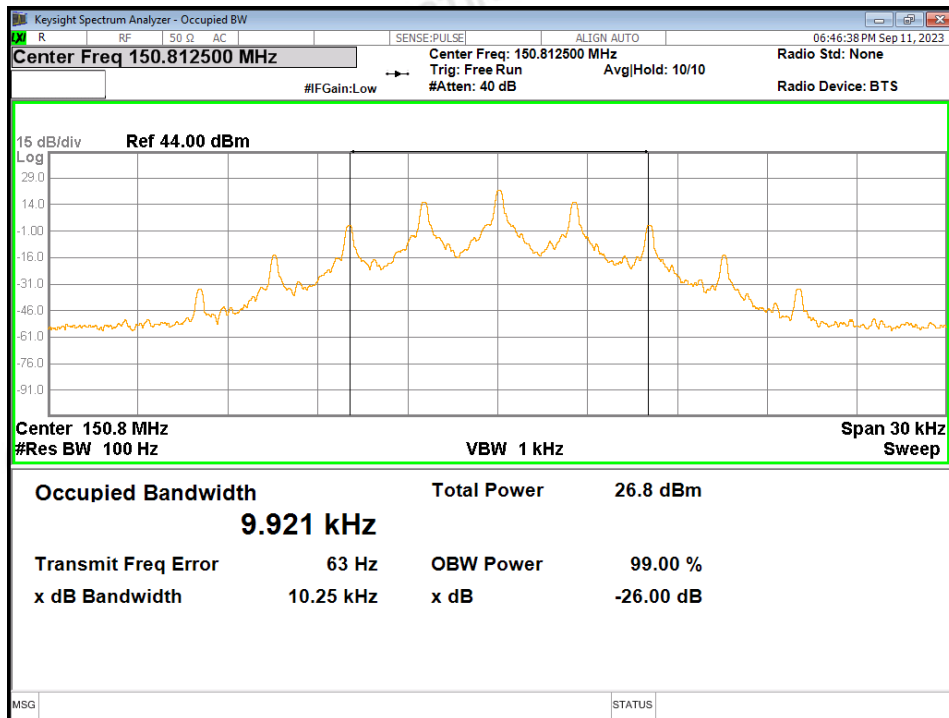
4.4 TEST RESULT

Channel Bandwidth	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)		Limits (KHz)
				99%	26dB	
12.5KHz	Low Power	Lowest	150.8125	9.921	10.250	11.25
		Middle	156.4000	9.920	10.270	
		Highest	162.0000	9.932	10.240	
		Middle	173.3000	9.937	10.220	
		Lowest	421.0125	9.926	10.250	
		Middle	466.5000	9.930	10.240	
		Highest	511.9875	9.931	10.220	
	High Power	Lowest	150.8125	9.924	10.250	
		Middle	156.4000	9.912	10.310	
		Highest	162.0000	9.932	10.230	
		Middle	173.3000	9.930	10.230	
		Lowest	421.0125	9.930	10.230	
		Middle	466.5000	9.925	10.240	
		Highest	511.9875	9.932	10.240	

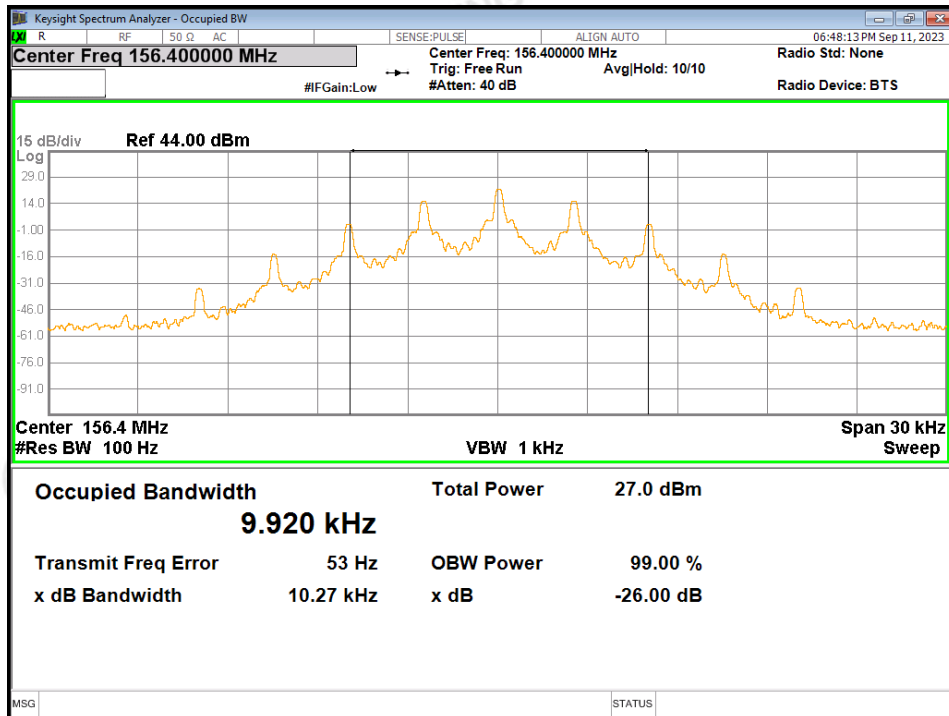
Channel Sparation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)		Limits (KHz)
				99%	26dB	
25KHz	Low Power	Lowest	150.8250	14.708	15.960	20
		Middle	156.4000	14.926	15.910	
		Highest	161.9750	14.823	15.870	
		Middle	173.3000	14.843	15.940	
		Lowest	421.0250	14.816	16.450	
		Middle	466.5000	14.643	16.120	
		Highest	511.9750	14.838	15.790	
	High Power	Lowest	150.8250	14.796	15.850	
		Middle	156.4000	14.805	15.970	
		Highest	161.9750	14.828	15.950	
		Middle	173.3000	14.814	16.160	
		Lowest	421.0250	14.854	16.310	
		Middle	466.5000	14.798	15.860	
		Highest	511.9750	14.713	15.930	

12.5 kHz:

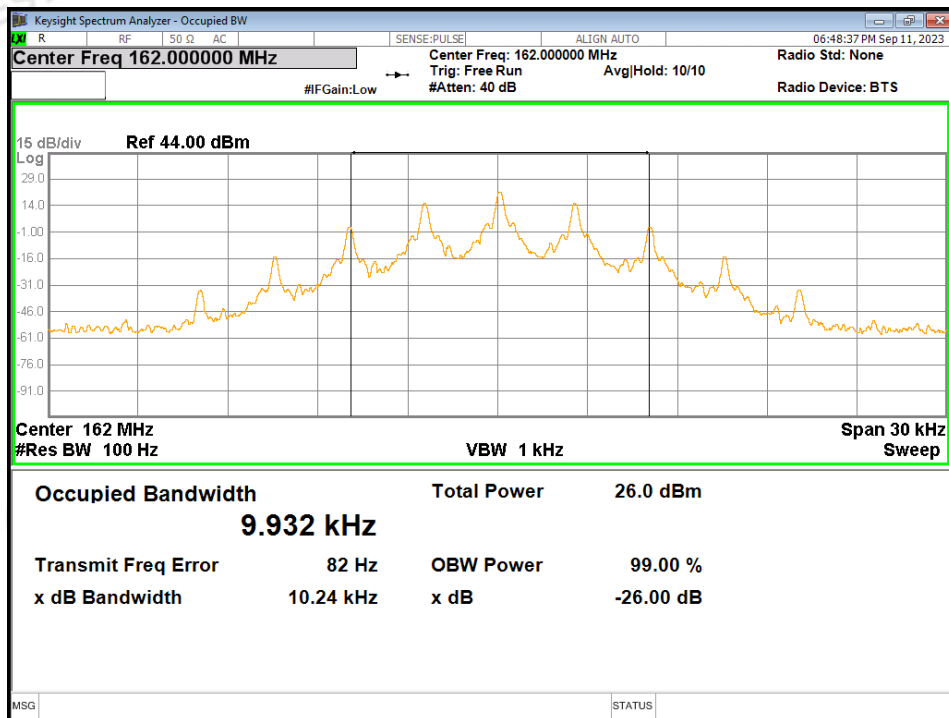
Mode1-150.8125MHz-Low Power



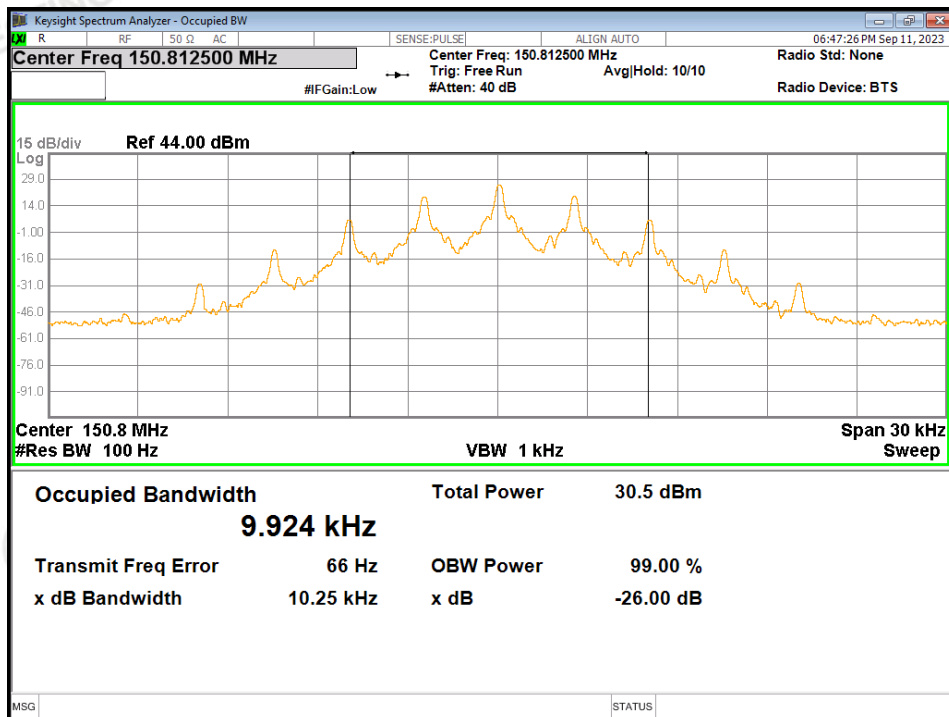
Mode1-156.4MHz-Low Power



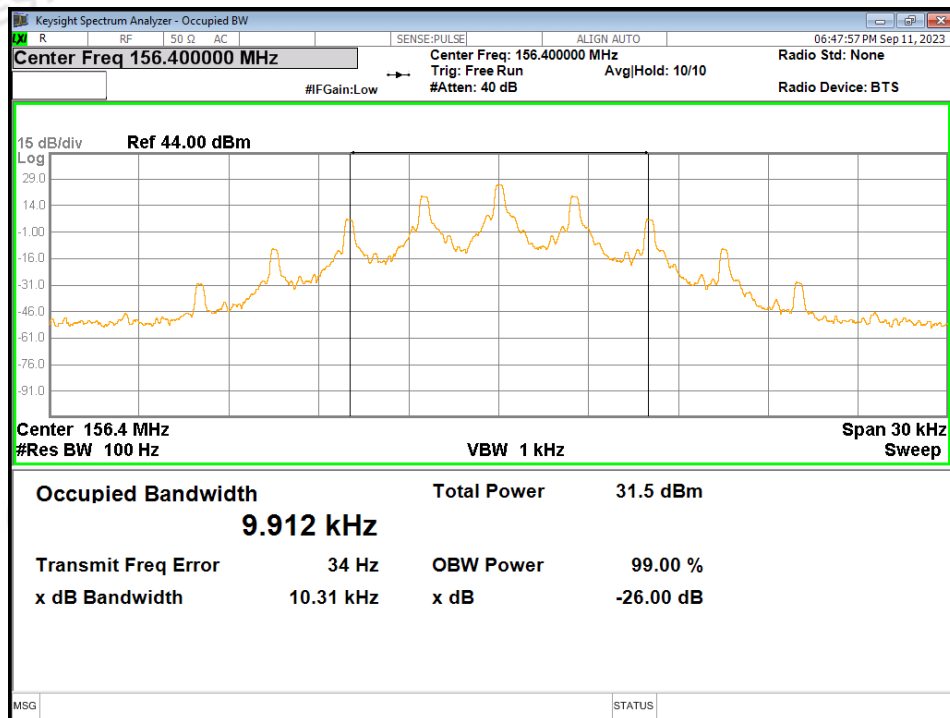
Mode1-162MHz-Low Power



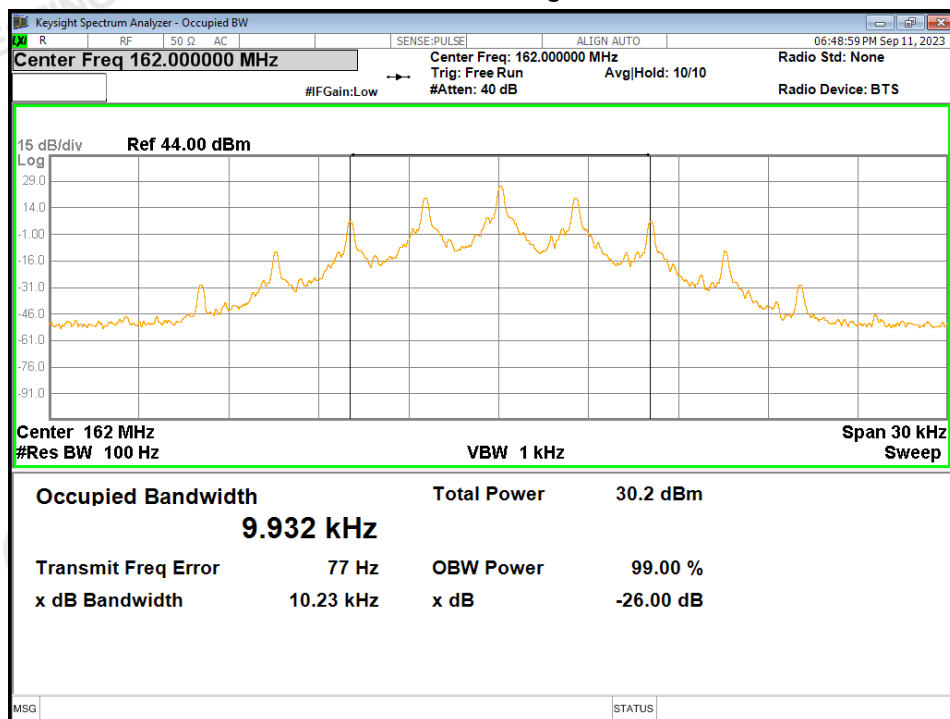
Mode2-150.8125MHz-High Power



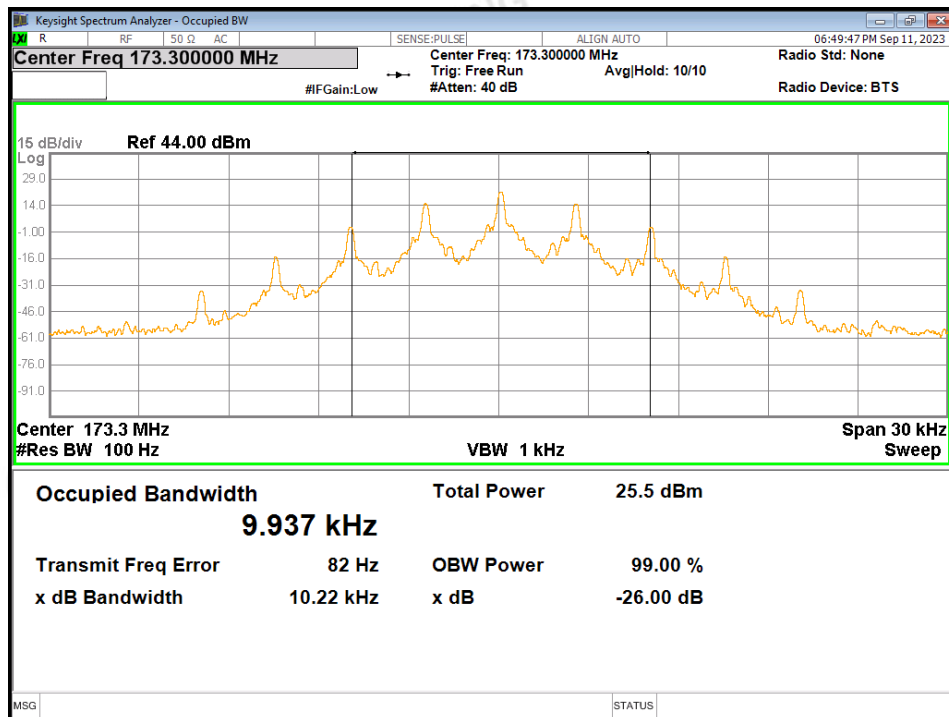
Mode2-156.4MHz-High Power



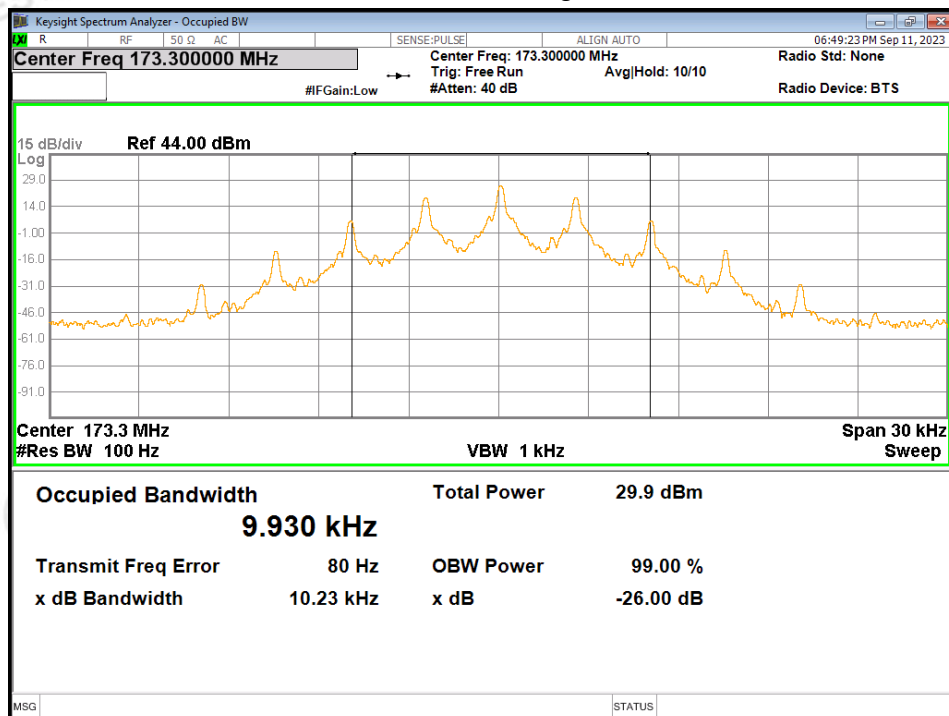
Mode2-162MHz-High Power



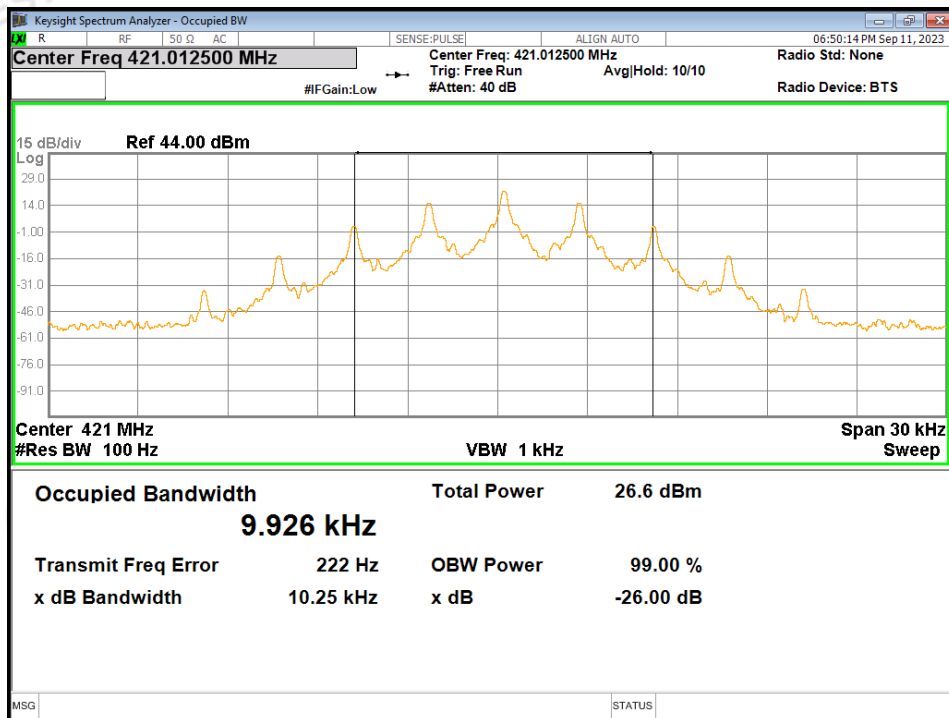
Mode3-173.3MHz-Low Power



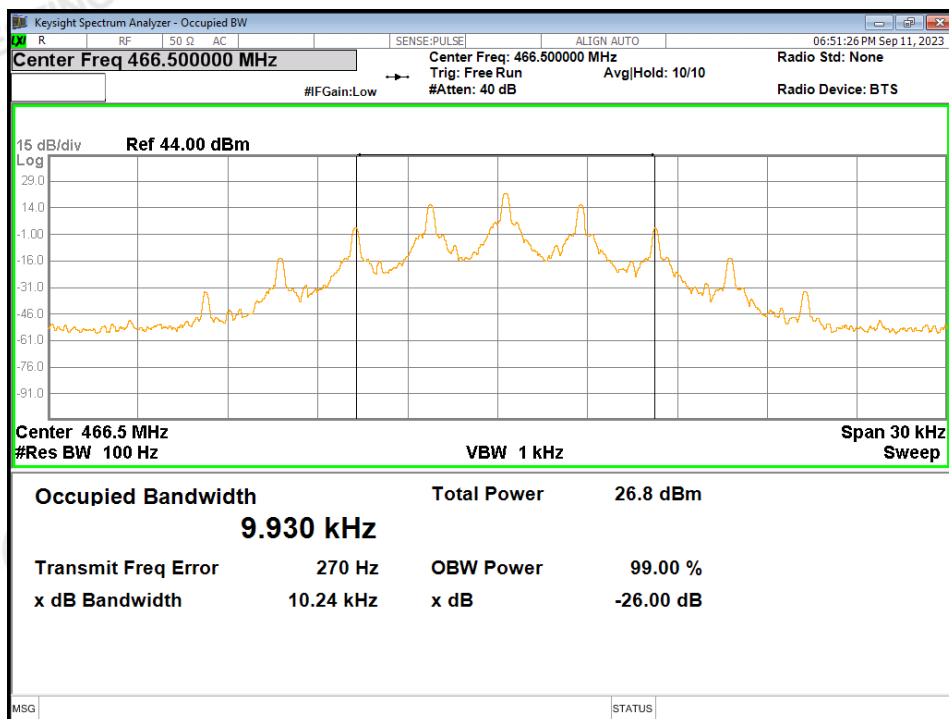
Mode4-173.3MHz-High Power



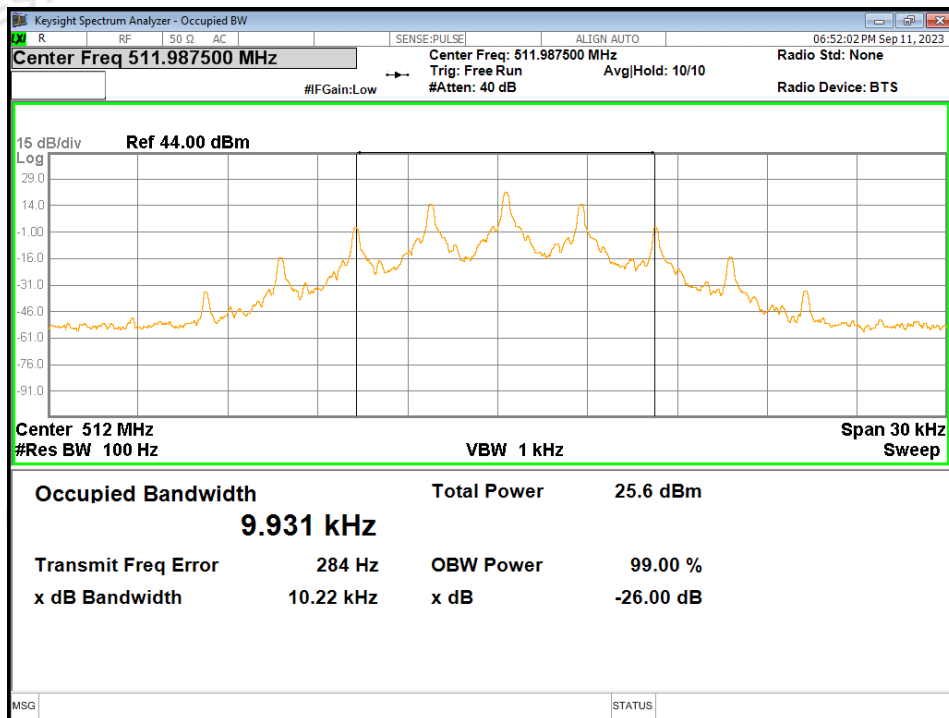
Mode5-421.0125MHz-Low Power



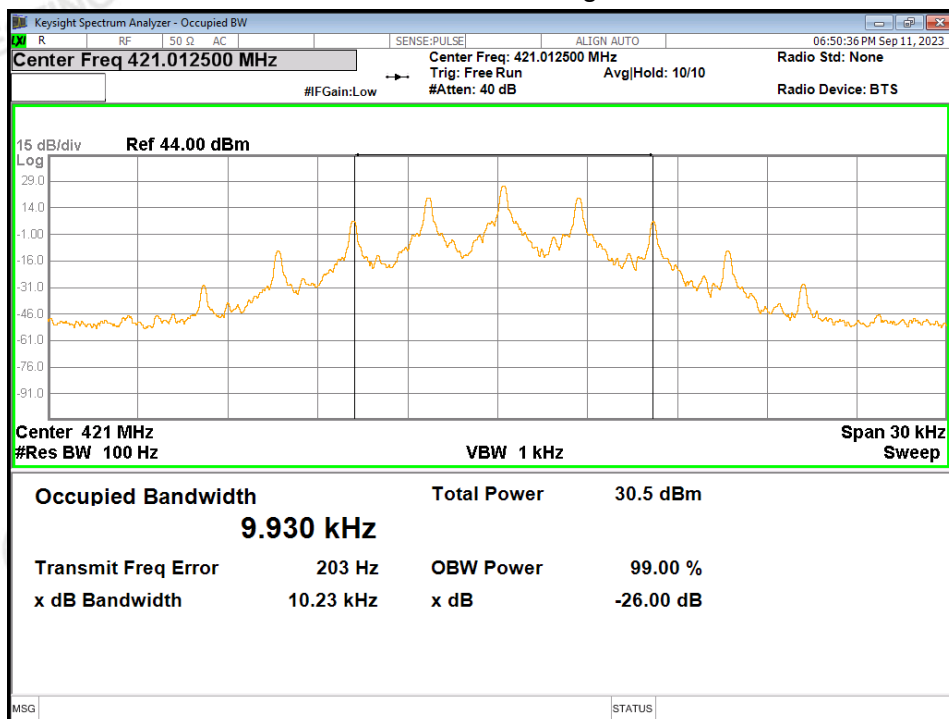
Mode5-466.5MHz-Low Power



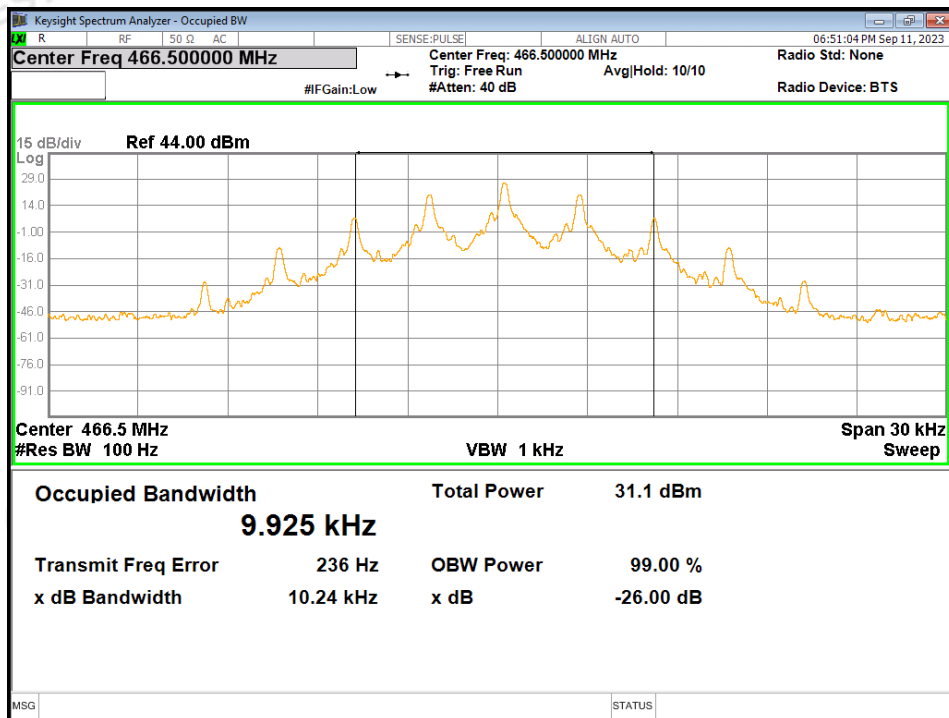
Mode5-511.9875MHz-Low Power



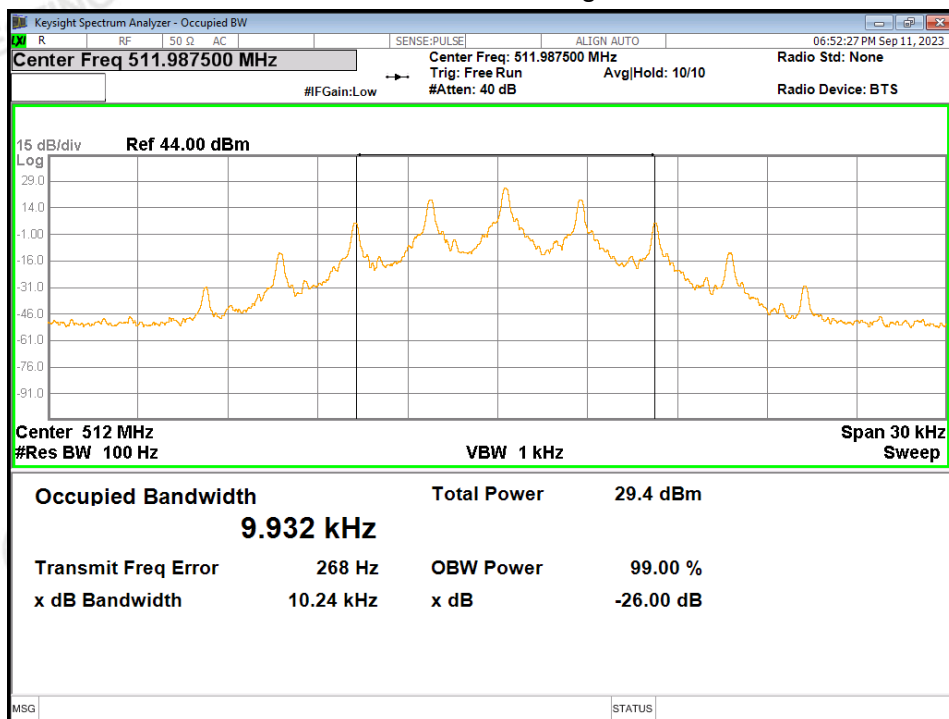
Mode6-421.0125MHz-High Power



Mode6-466.5MHz-High Power

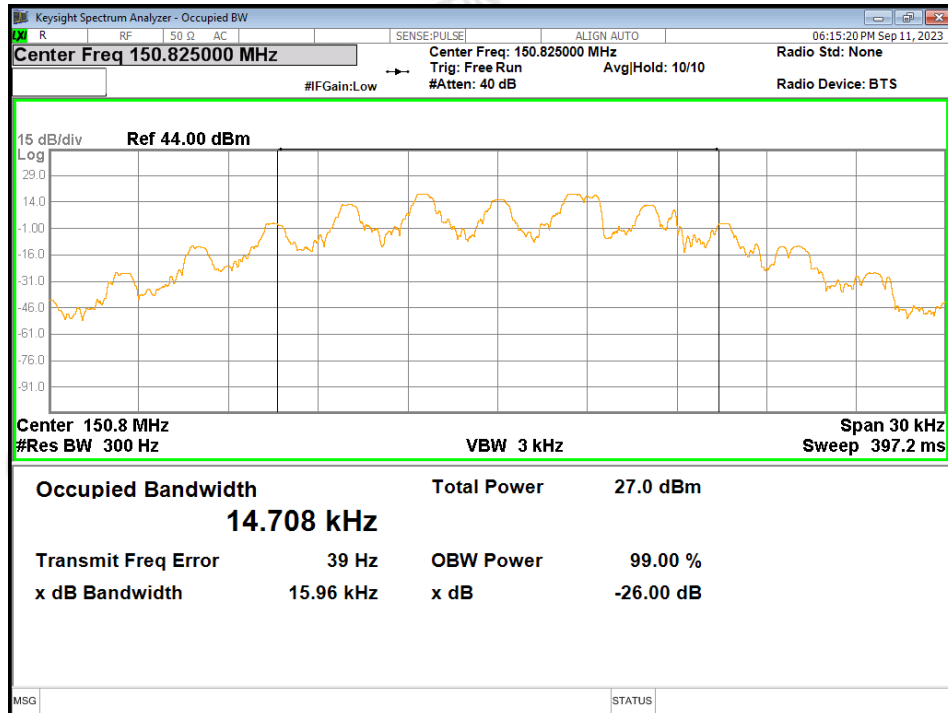


Mode6-511.9875MHz-High Power

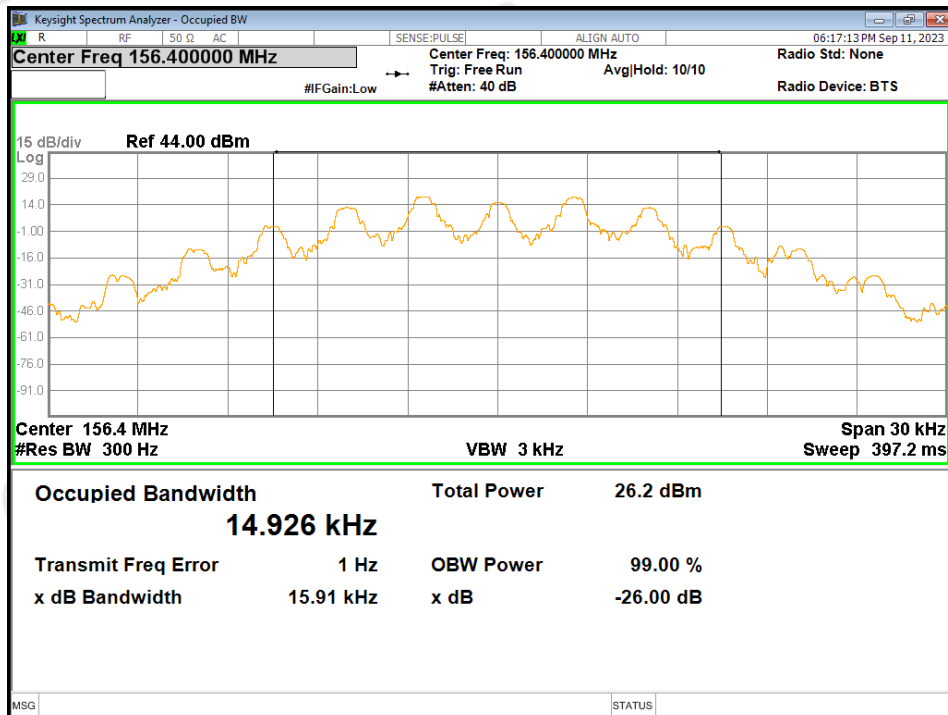


25 kHz:

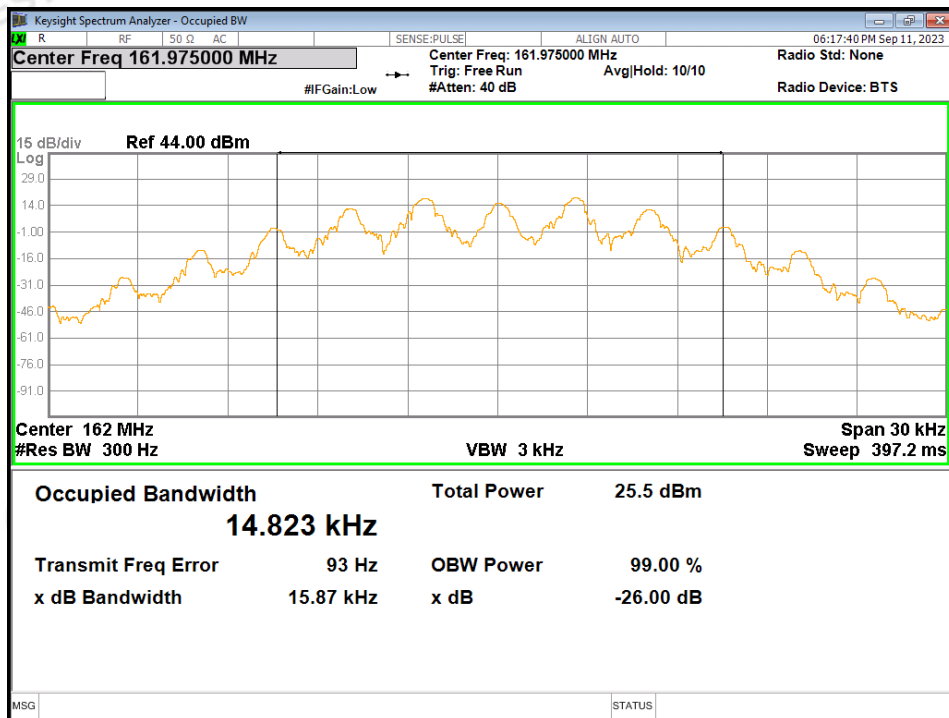
Mode7-150.825MHz-Low Power



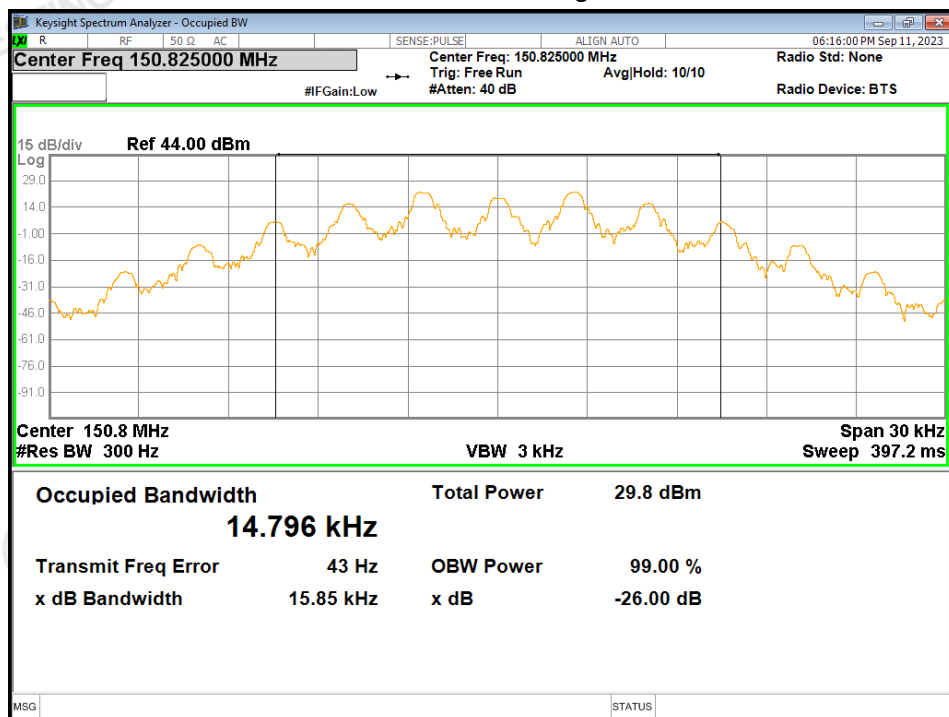
Mode7-156.4MHz-Low Power



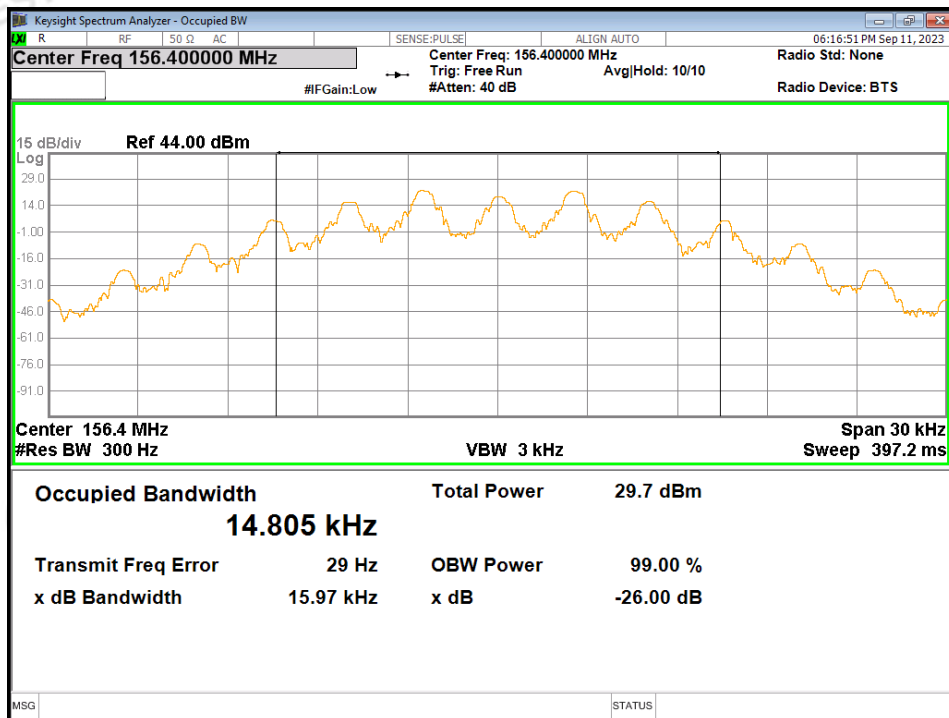
Mode7-161.975MHz-Low Power



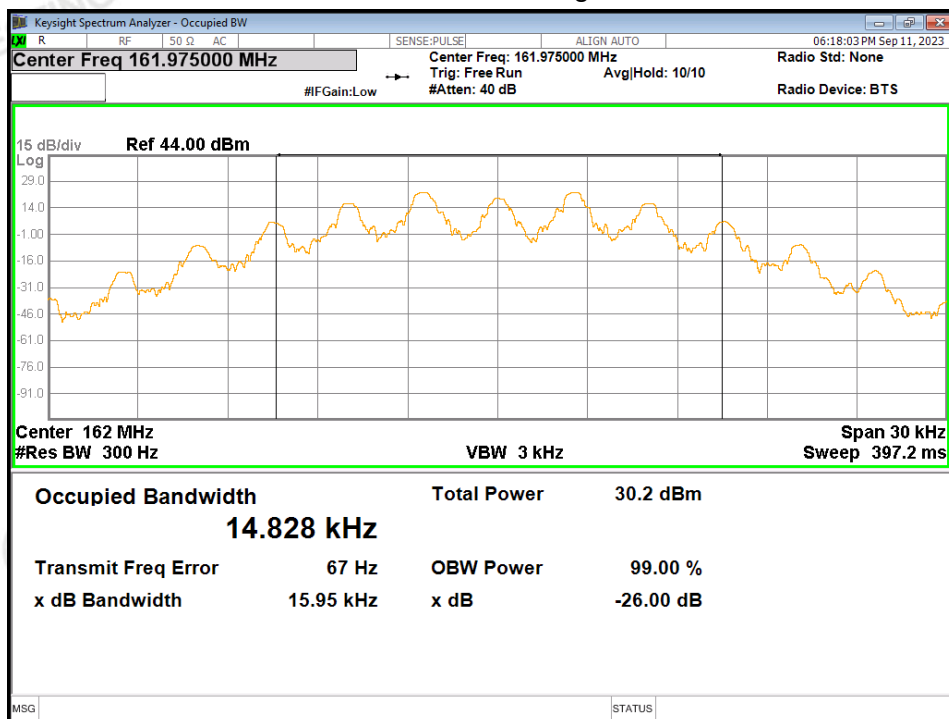
Mode8-150.825MHz-High Power



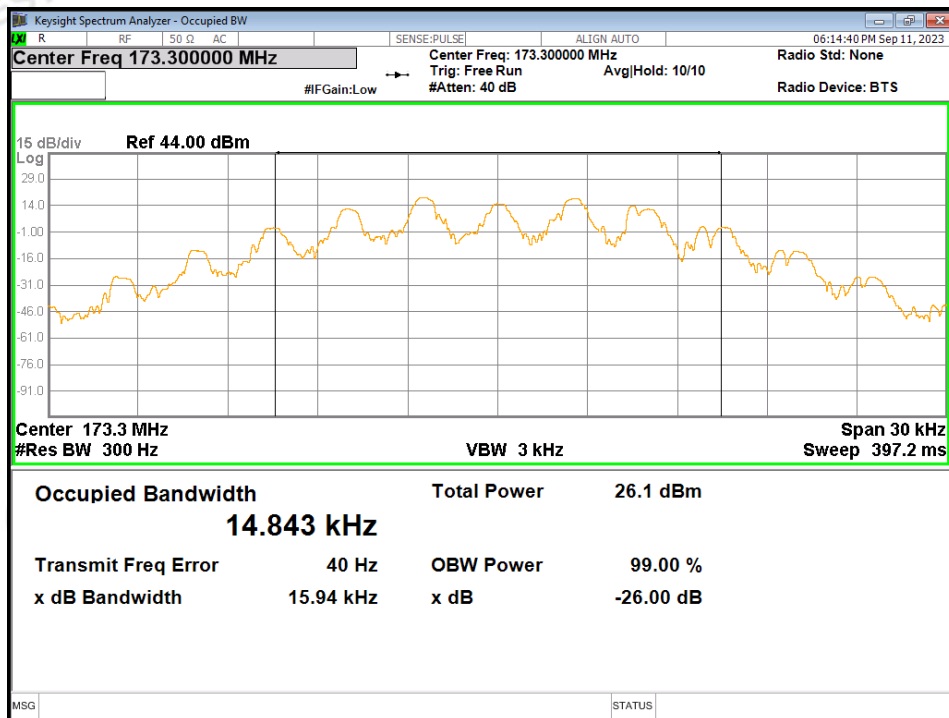
Mode8-156.4MHz-High Power



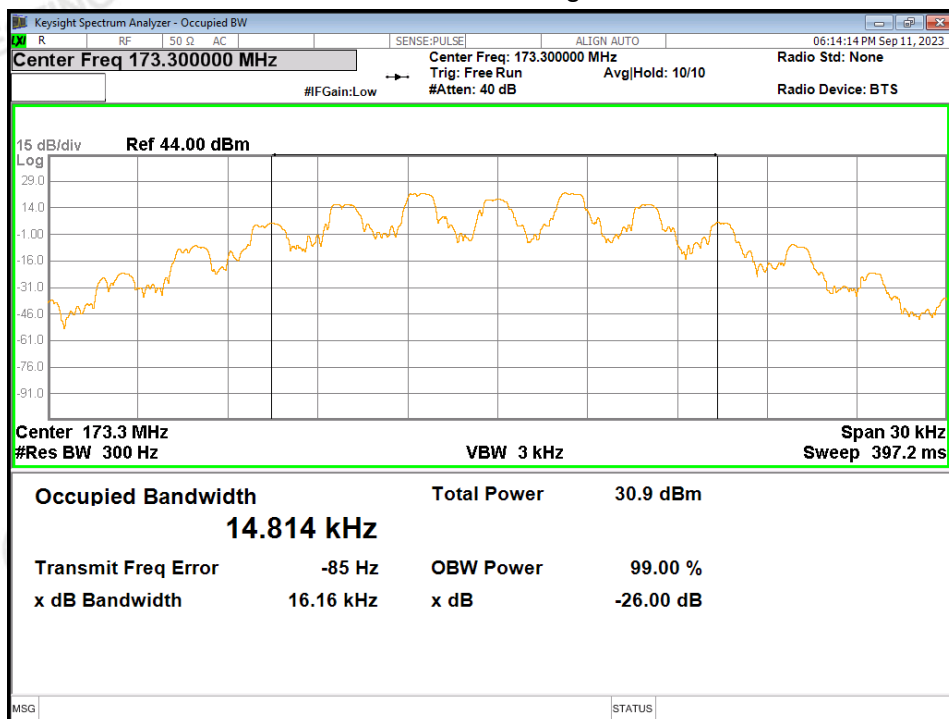
Mode8-161.975MHz-High Power



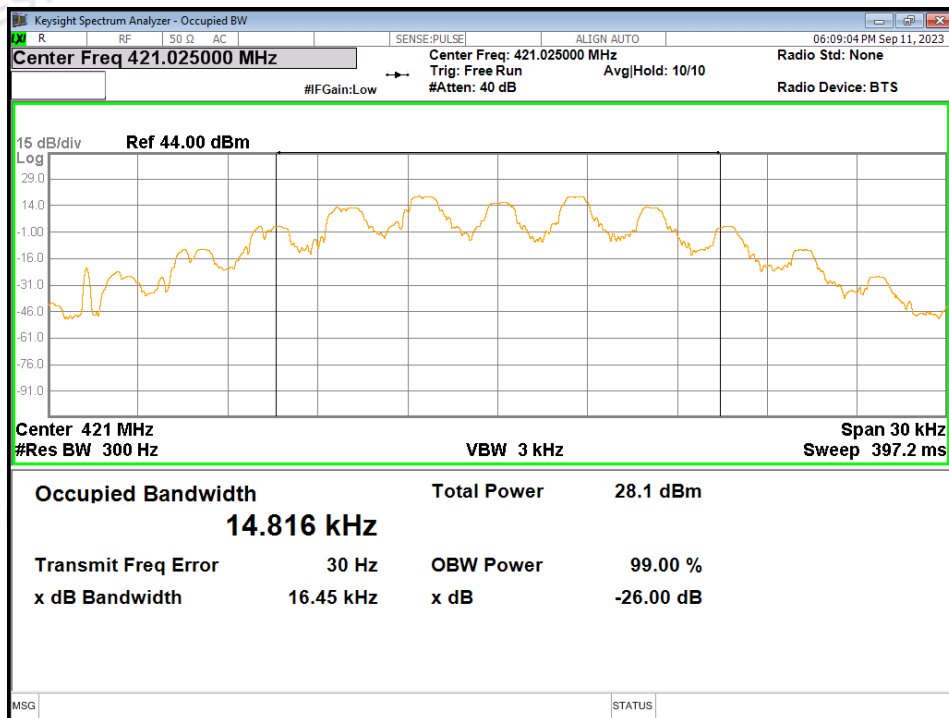
Mode9-173.3MHz-Low Power



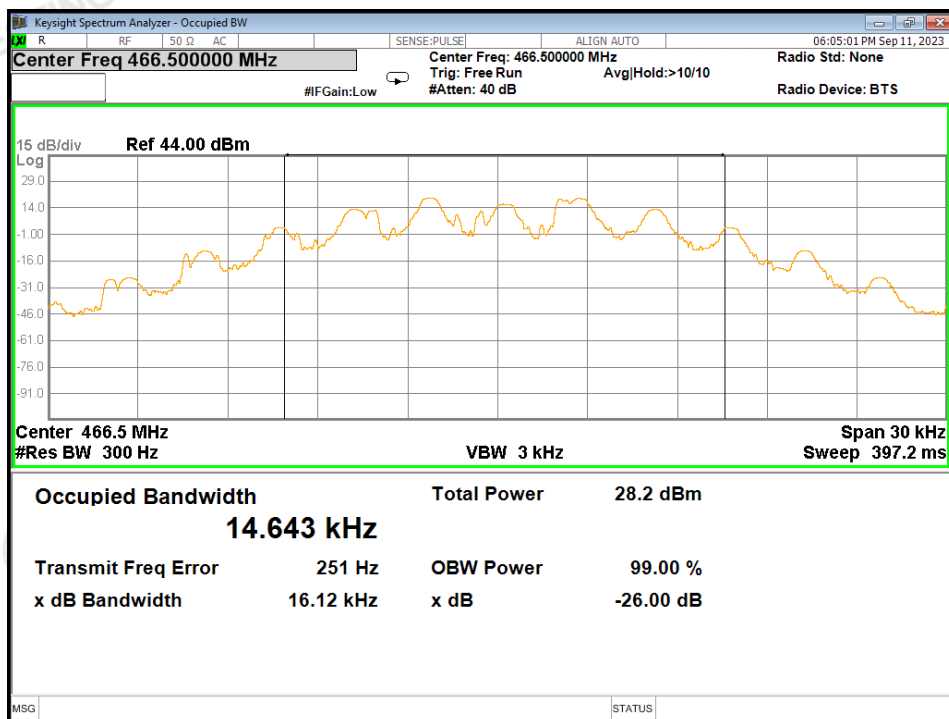
Mode10-173.3MHz-High Power



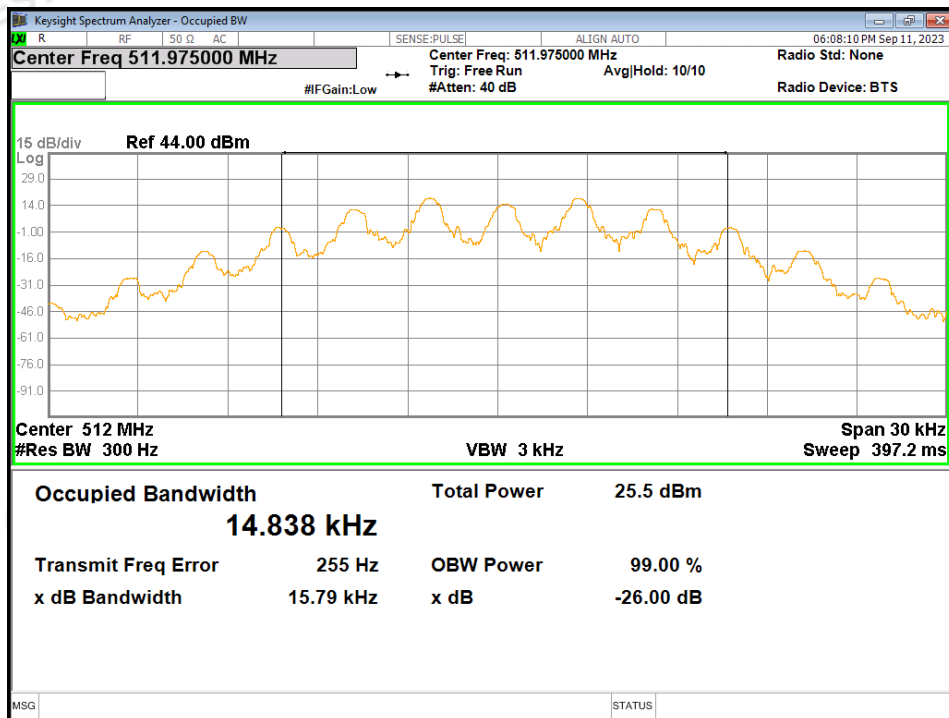
Mode11-421.025MHz-Low Power



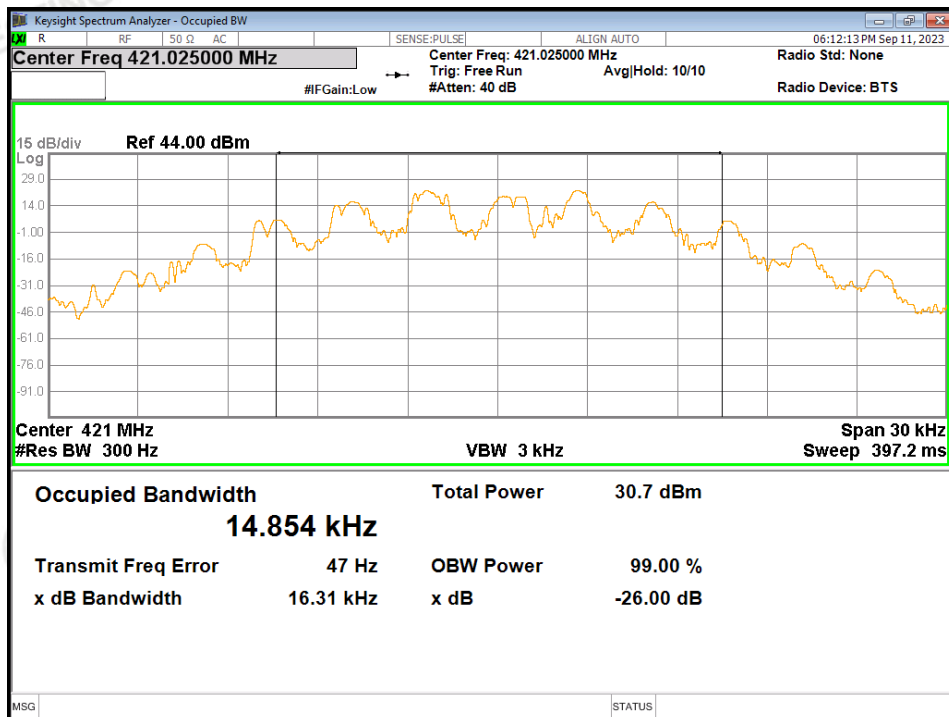
Mode11-466.5MHz-Low Power



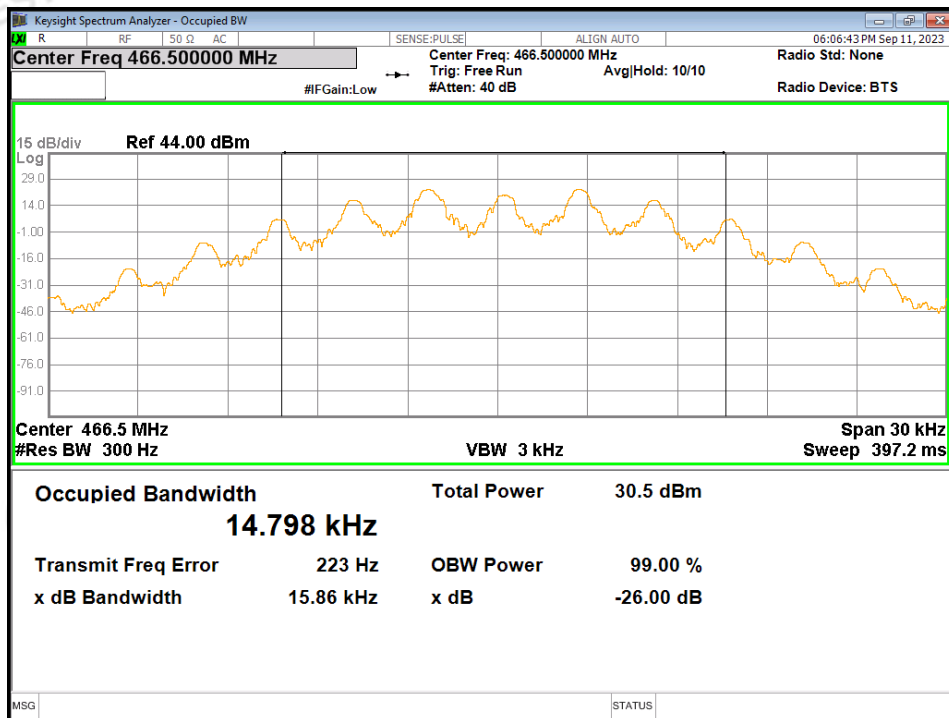
Mode11-511.975MHz-Low Power



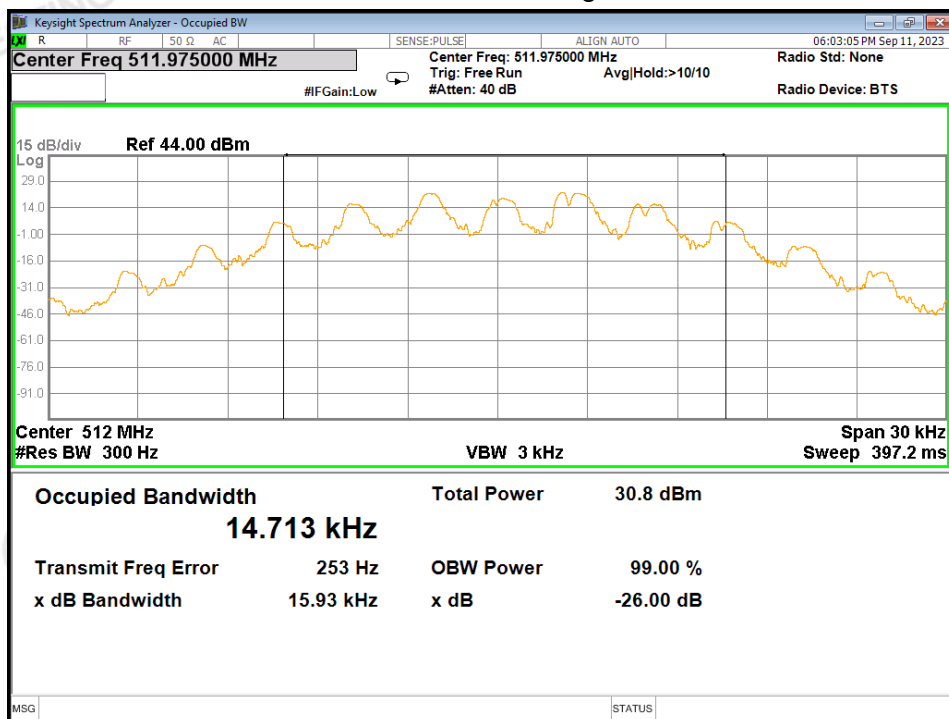
Mode12-421.025MHz-High Power



Mode12-466.5MHz-High Power



Mode12-511.975MHz-High Power



5. EMISSION MASK

5.1 PROVISIONS APPLICABLE

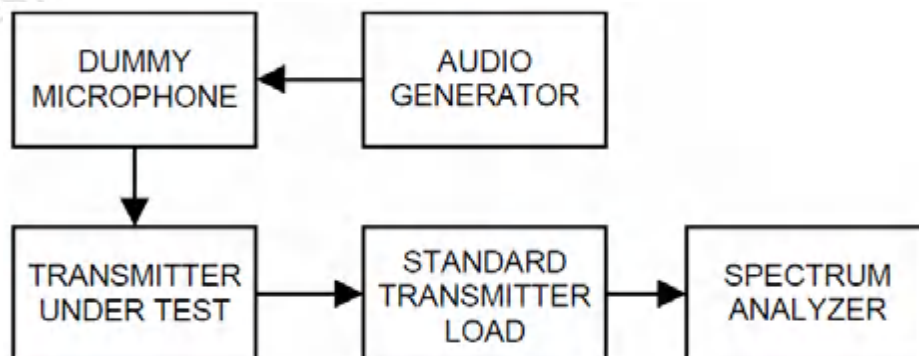
(h) Emission Mask H. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least $107 \log (f_d/4)$ dB;
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least $40.5 \log (f_d/1.16)$ dB;
- (4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least $116 \log (f_d/6.1)$ dB;
- (5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least $43 + 10 \log (P)$ dB.

5.2 MEASUREMENT PROCEDURE

- a. The EUT was connected to the spectrum analyzer through sufficient attenuation.
- b. Set EUT as digital data mode.
- c. Set SPA Center Frequency=fundamental frequency, RBW=1kHz, VBW=3KHz, span =100KHz.

5.3 TEST SETUP BLOCK DIAGRAM



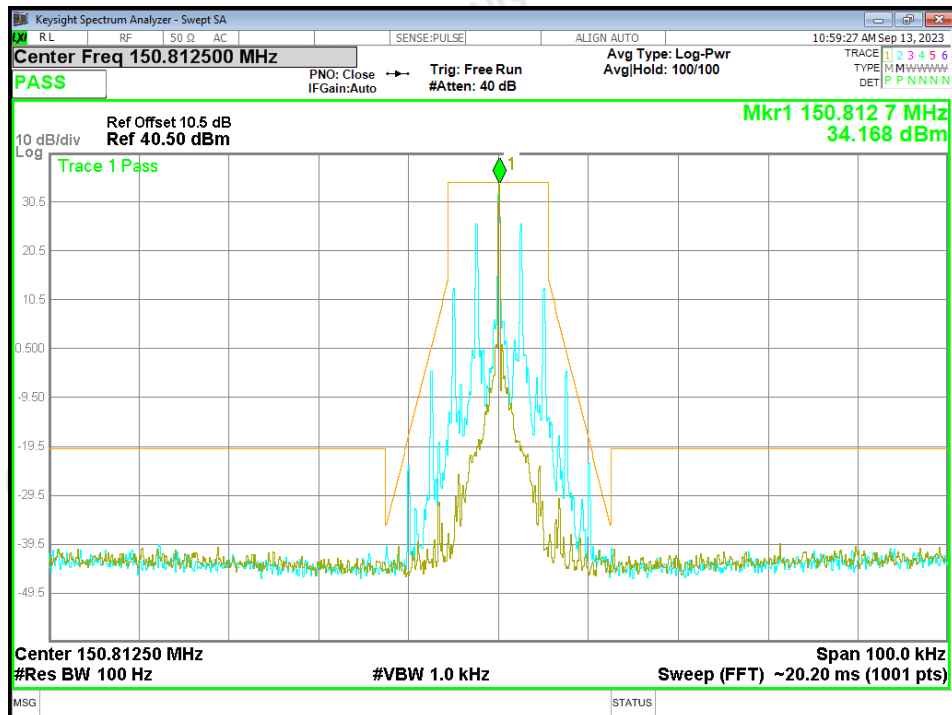
5.4 MEASUREMENT RESULT

Channel Bandwidth	Operation Mode	Test Channel	Test Frequency (MHz)	Applicable Mask	Result
12.5KHz	Low Power	Lowest	150.8125	D	PASS
		Middle	156.4000	D	PASS
		Highest	162.0000	D	PASS
		Middle	173.3000	D	PASS
		Lowest	421.0125	D	PASS
		Middle	466.5000	D	PASS
		Highest	511.9875	D	PASS
	High Power	Lowest	150.8125	D	PASS
		Middle	156.4000	D	PASS
		Middle	162.0000	D	PASS
		Highest	173.3000	D	PASS
		Lowest	421.0125	D	PASS
		Middle	466.5000	D	PASS
		Highest	511.9875	D	PASS

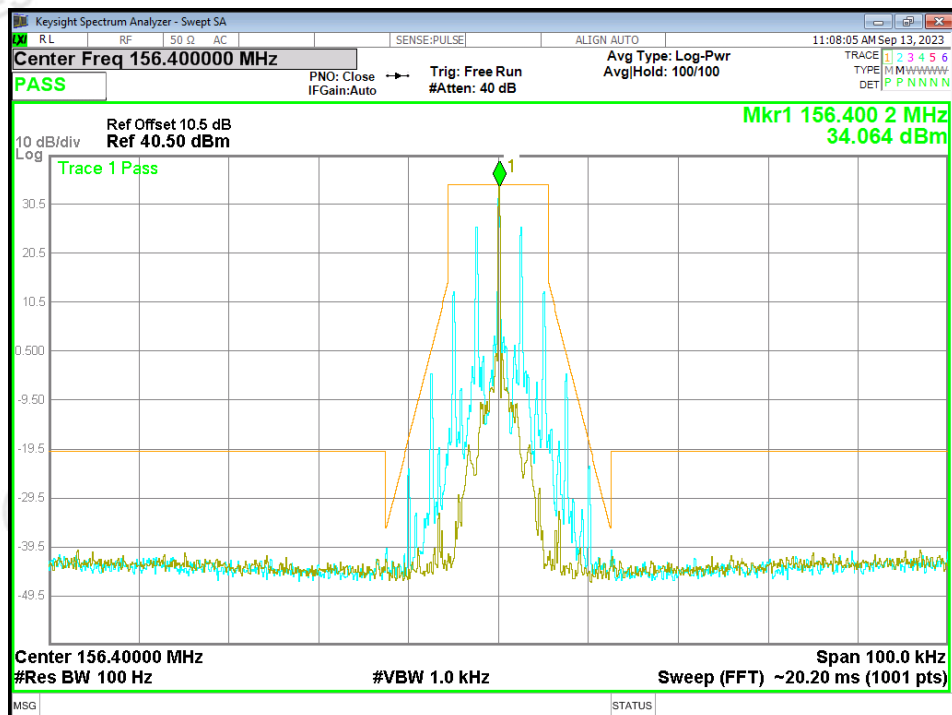
Channel Bandwidth	Operation Mode	Test Channel	Test Frequency (MHz)	Applicable Mask	Result
25KHz	Low Power	Lowest	150.8250	B	PASS
		Middle	156.4000	B	PASS
		Highest	161.9750	B	PASS
		Middle	173.3000	B	PASS
		Lowest	421.0250	B	PASS
		Middle	466.5000	B	PASS
		Highest	511.9750	B	PASS
	High Power	Lowest	150.8250	B	PASS
		Middle	156.4000	B	PASS
		Middle	161.9750	B	PASS
		Highest	173.3000	B	PASS
		Lowest	421.0250	B	PASS
		Middle	466.5000	B	PASS
		Highest	511.9750	B	PASS

12.5 KHz:

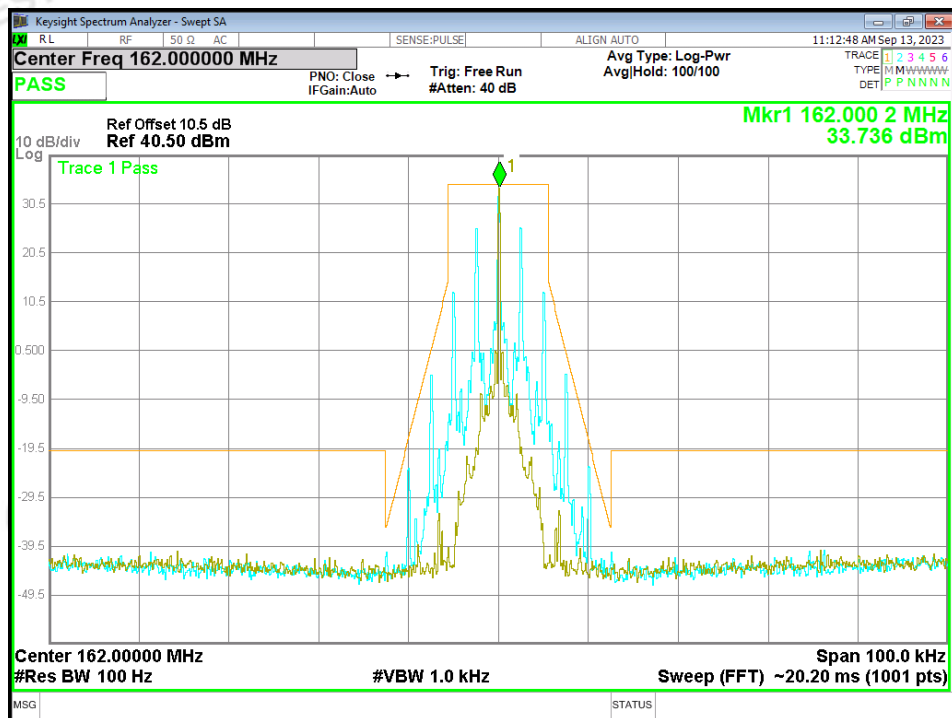
Mode1-150.8125MHz-Low Power



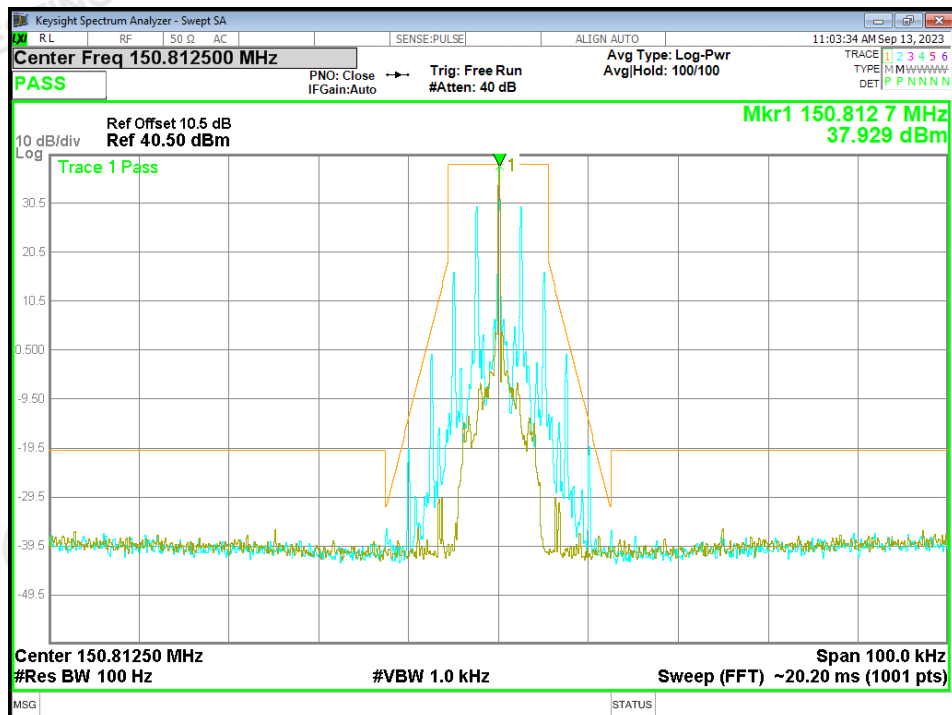
Mode1-156.4MHz-Low Power



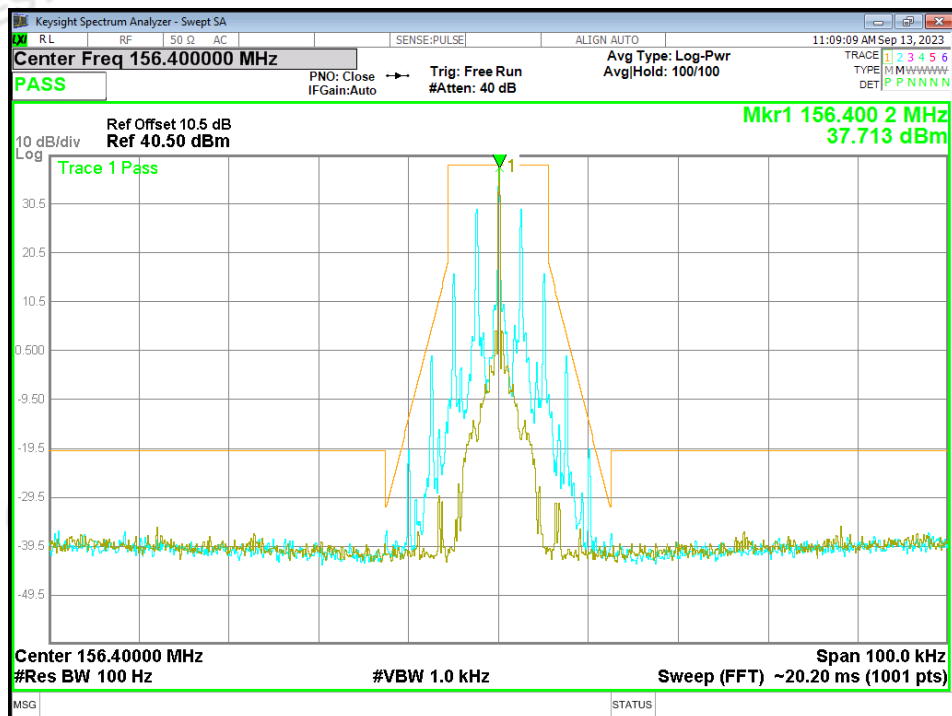
Mode1-162MHz-Low Power



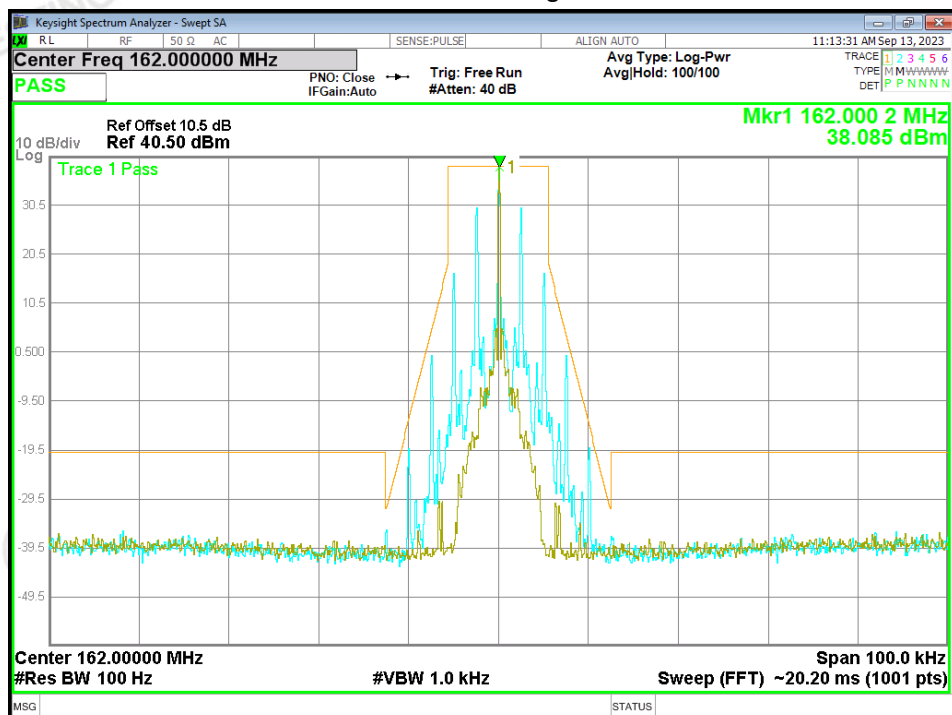
Mode2-150.8125MHz-High Power



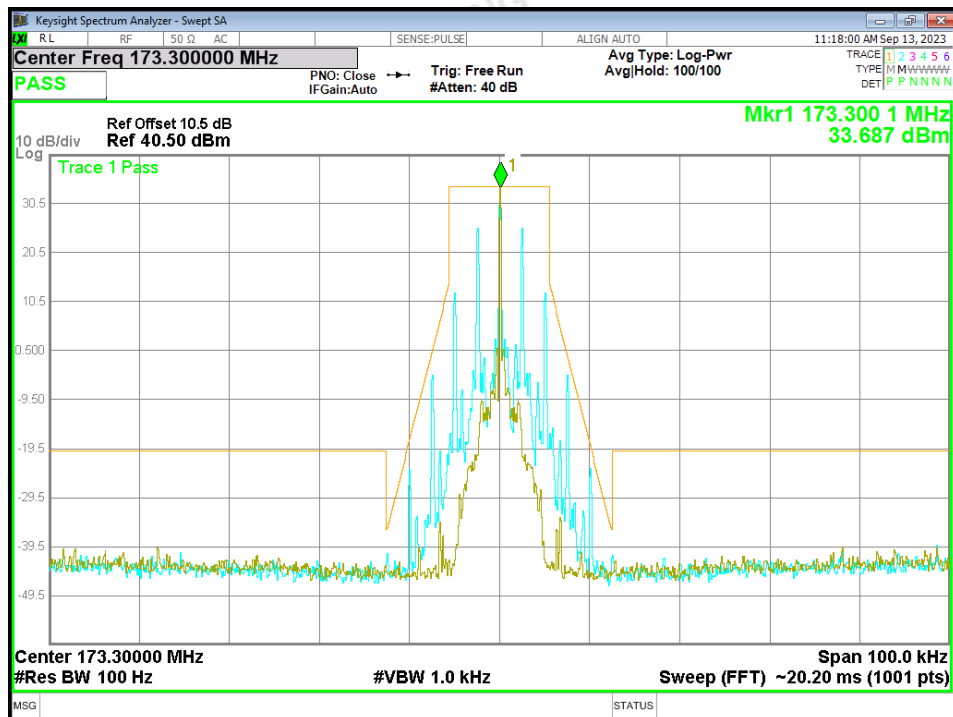
Mode2-156.4MHz-High Power



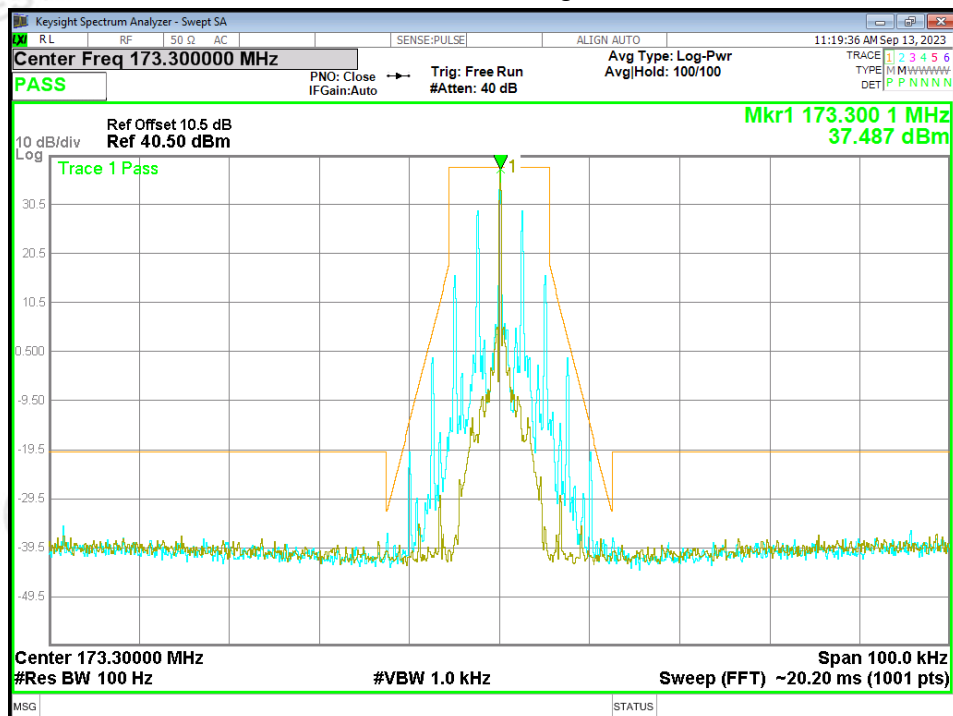
Mode2-162MHz-High Power



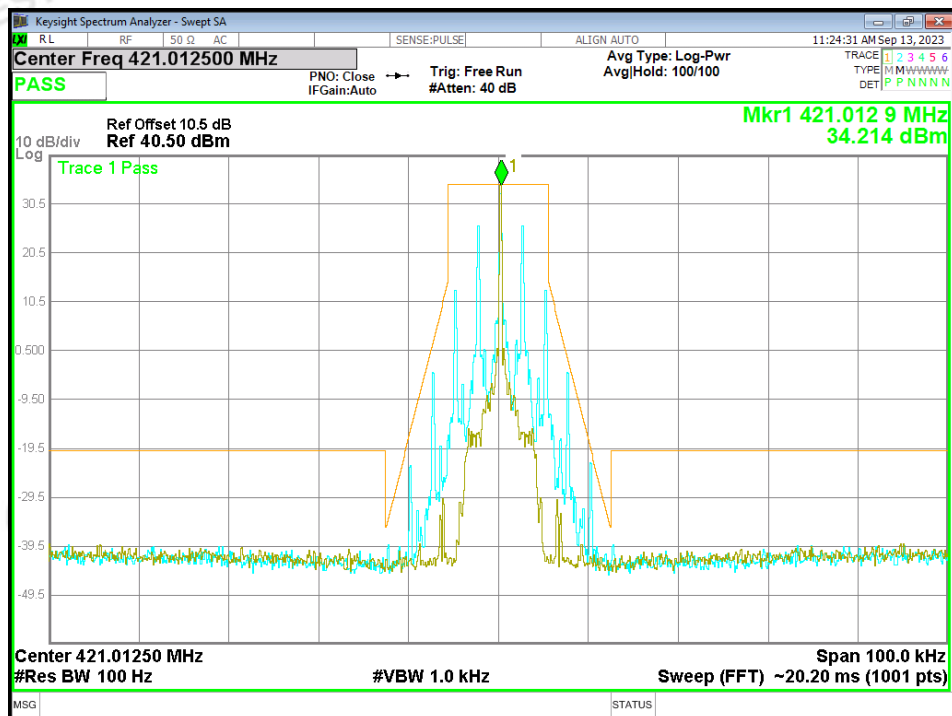
Mode3-173.3MHz-Low Power



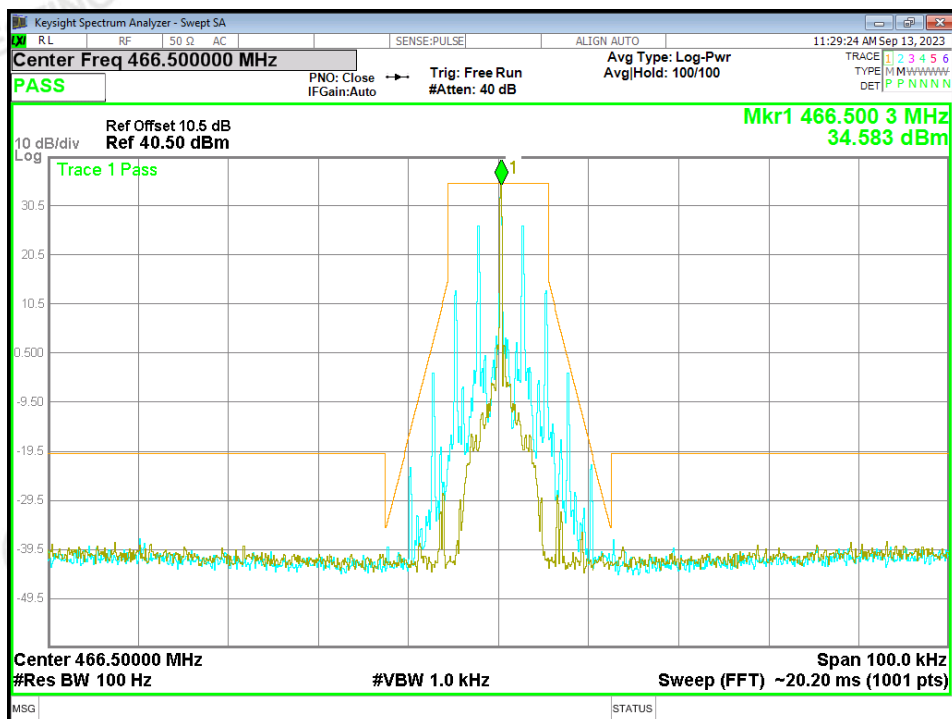
Mode4-173.3MHz-High Power



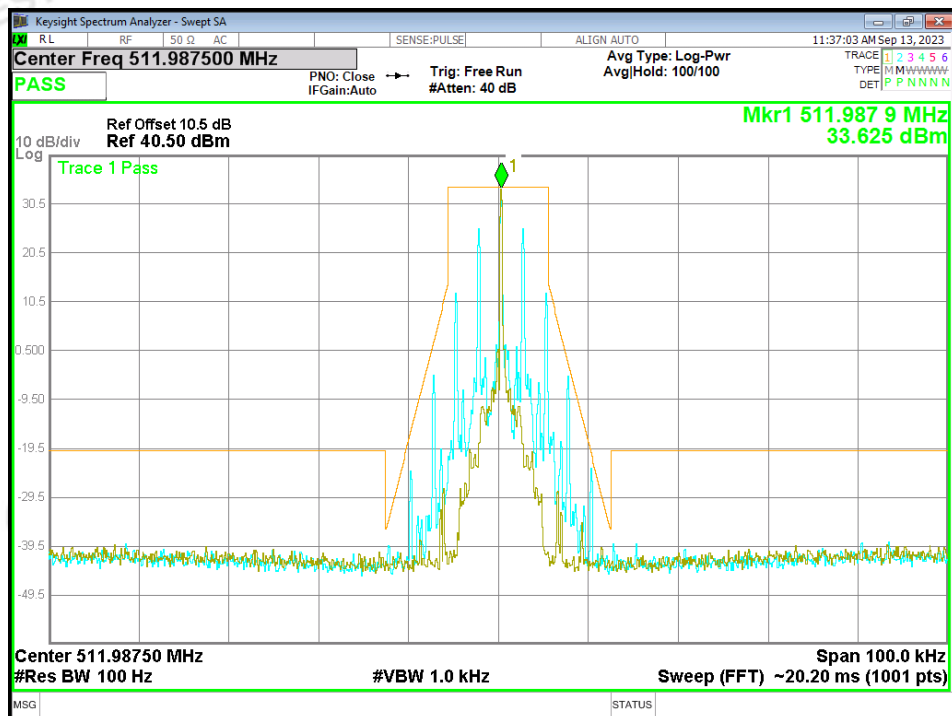
Mode5-421.0125MHz-Low Power



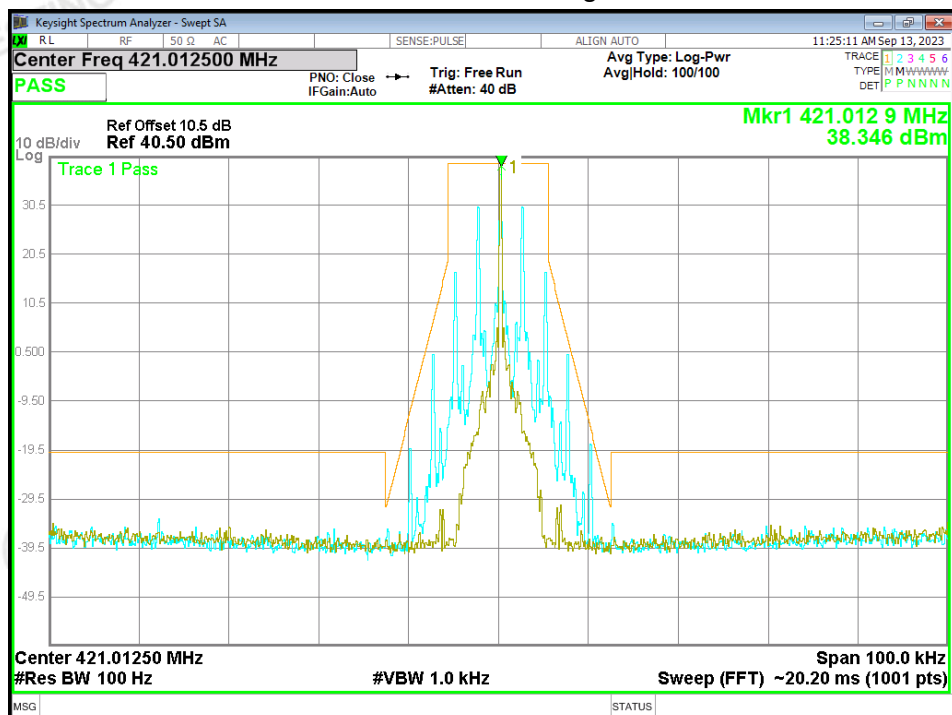
Mode5-466.5MHz-Low Power



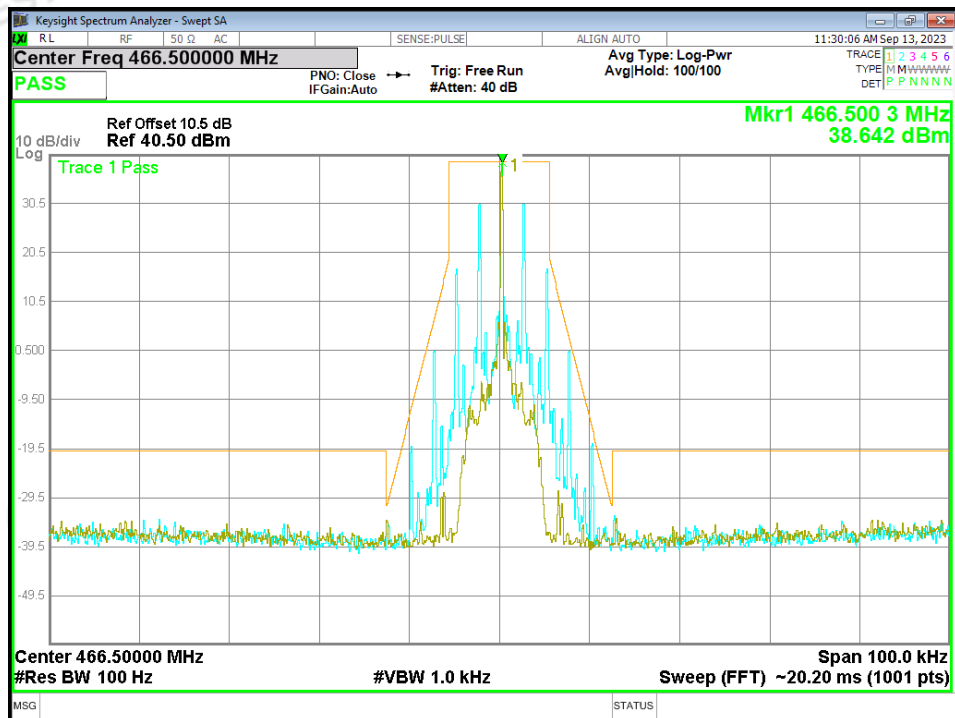
Mode5-511.9875MHz-Low Power



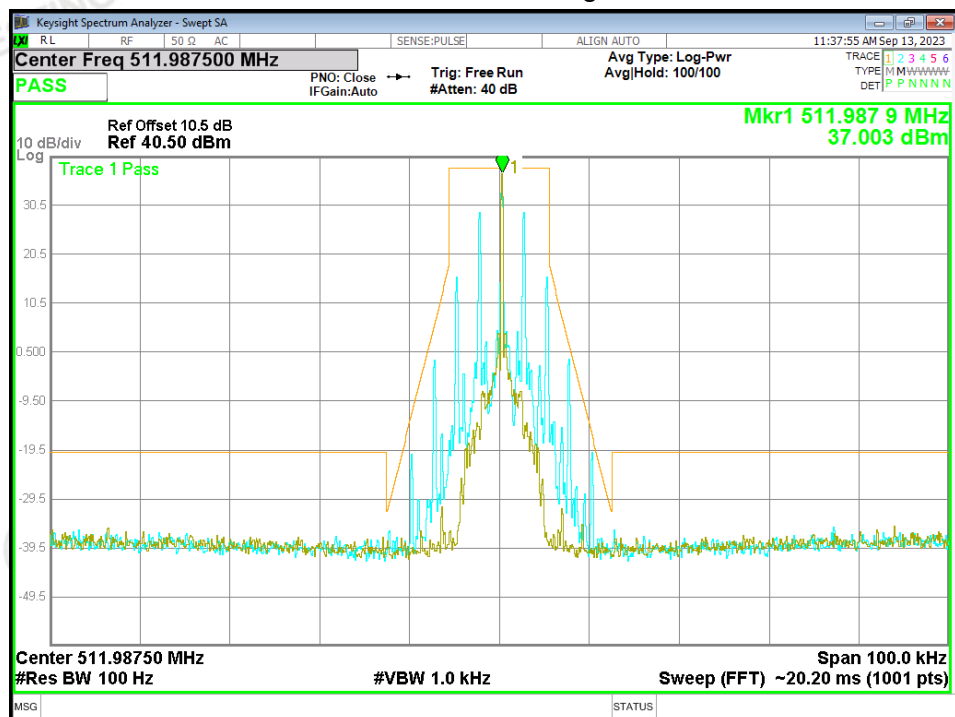
Mode6-421.0125MHz-High Power



Mode6-466.5MHz-High Power

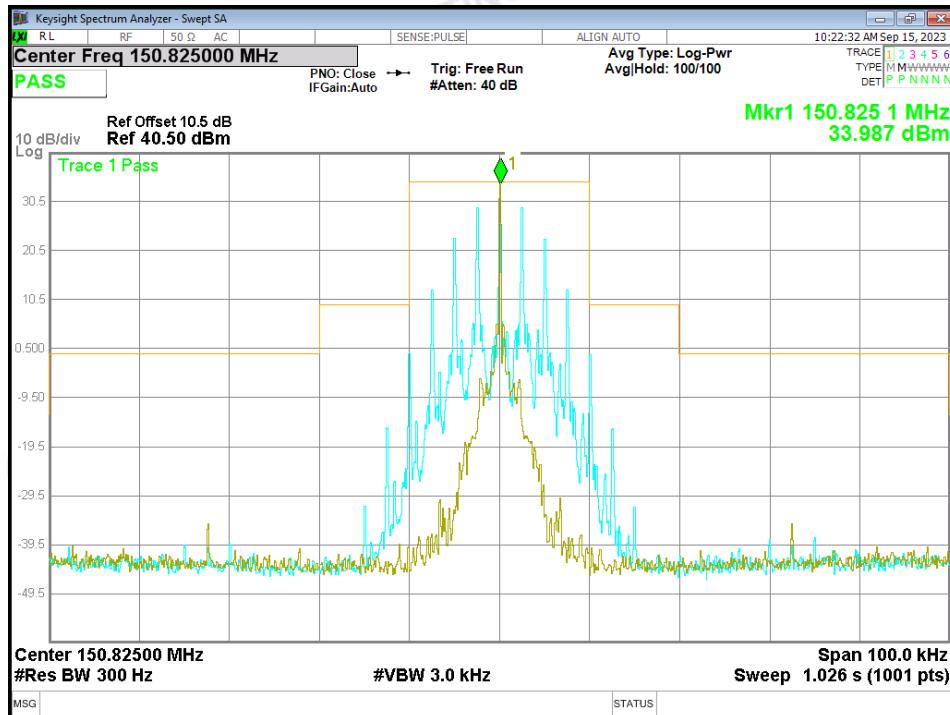


Mode6-511.9875MHz-High Power

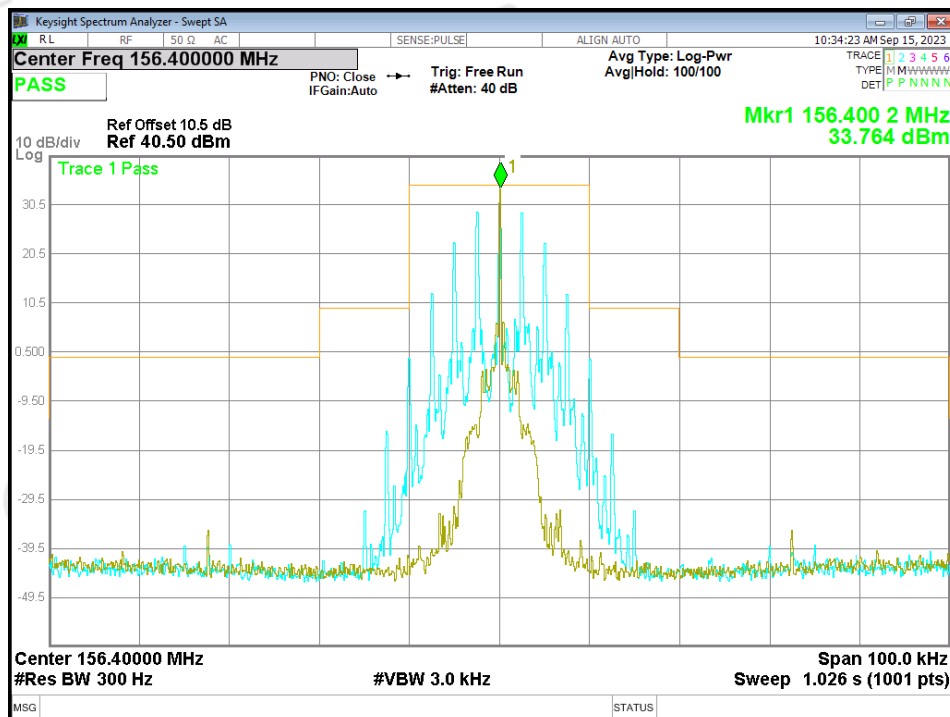


25 kHz:

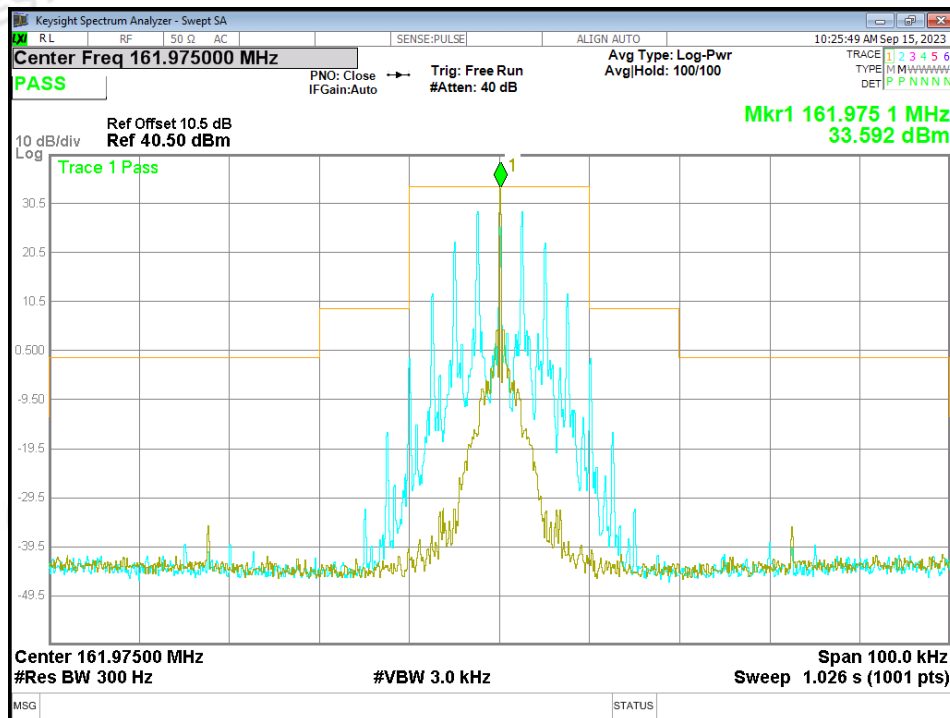
Mode7-150.825MHz-Low Power



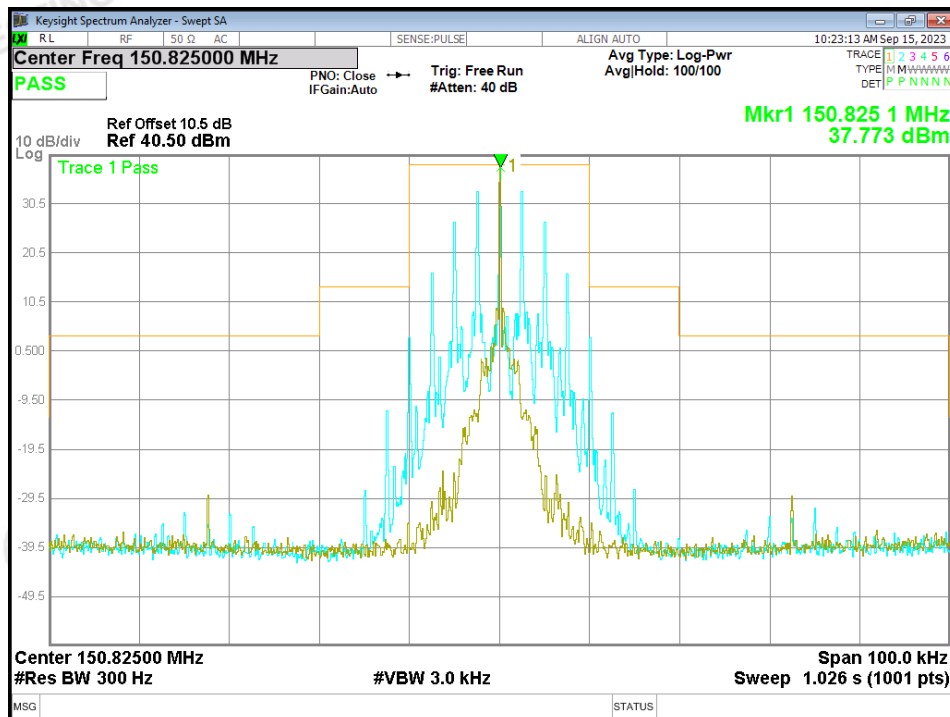
Mode7-156.4MHz-Low Power



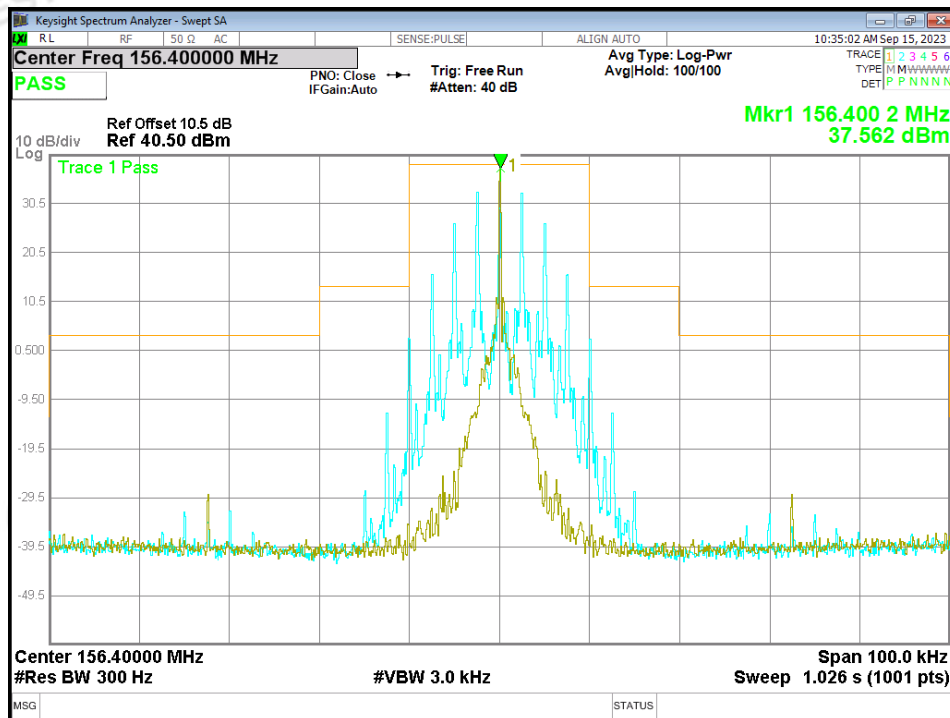
Mode7-161.975MHz-Low Power



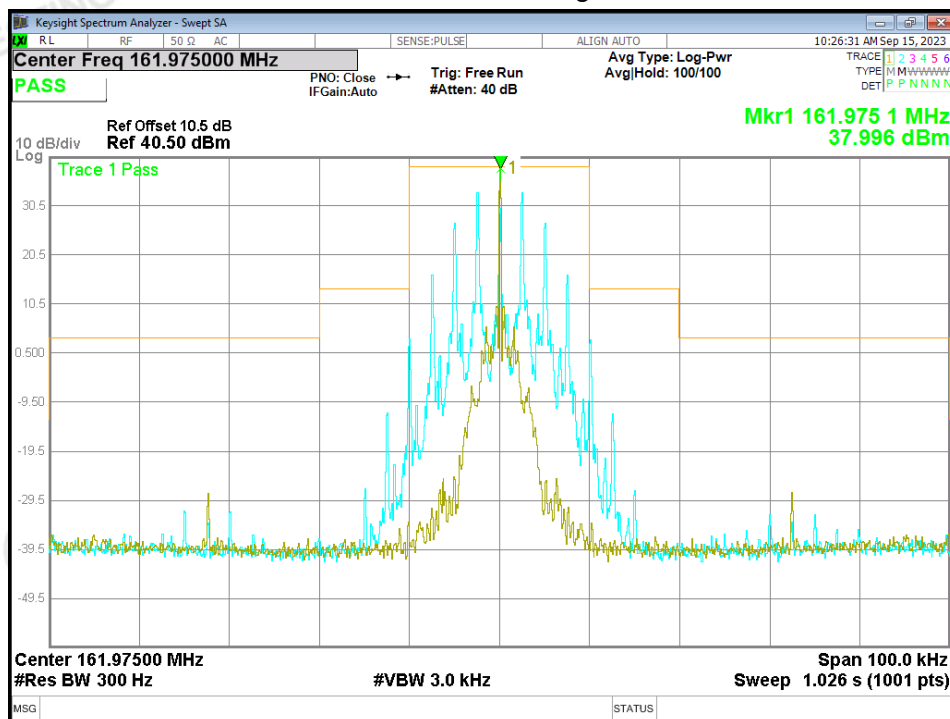
Mode8-150.825MHz-High Power



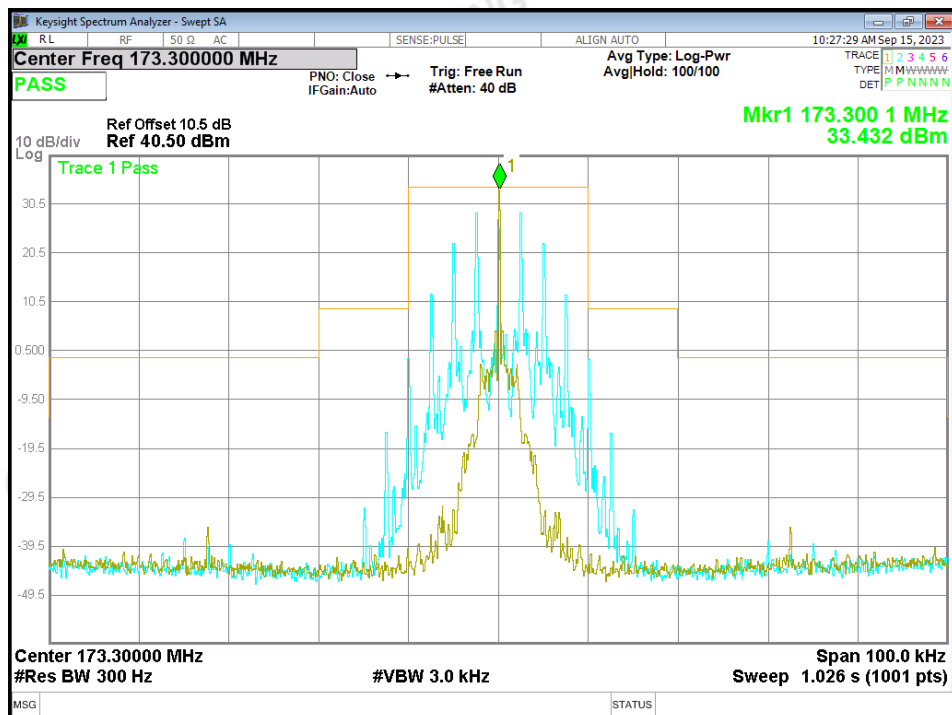
Mode8-156.4MHz-High Power



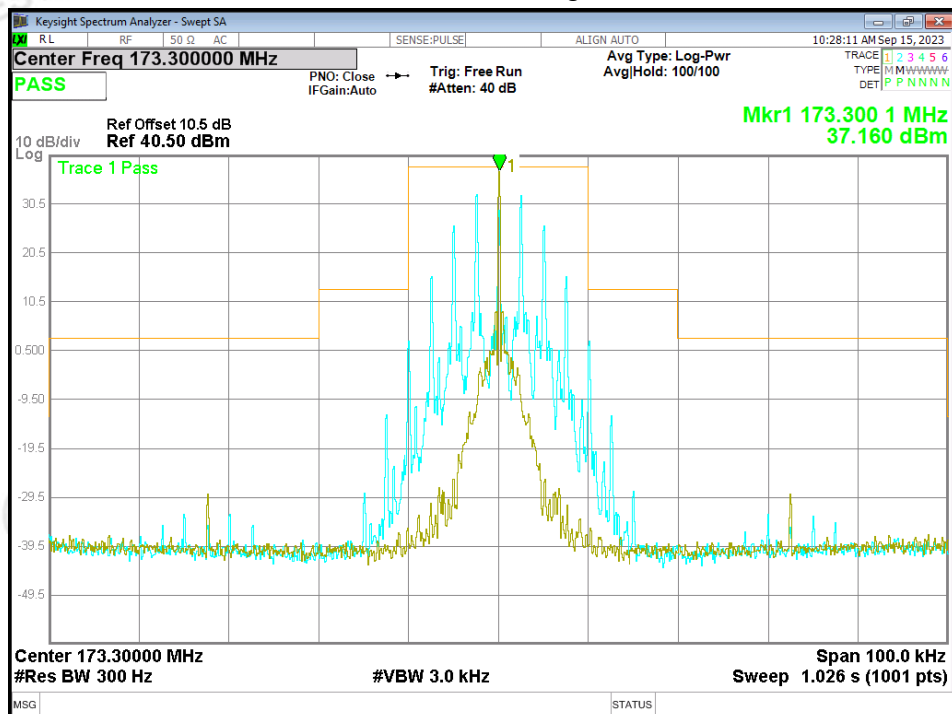
Mode8-161.975MHz-High Power



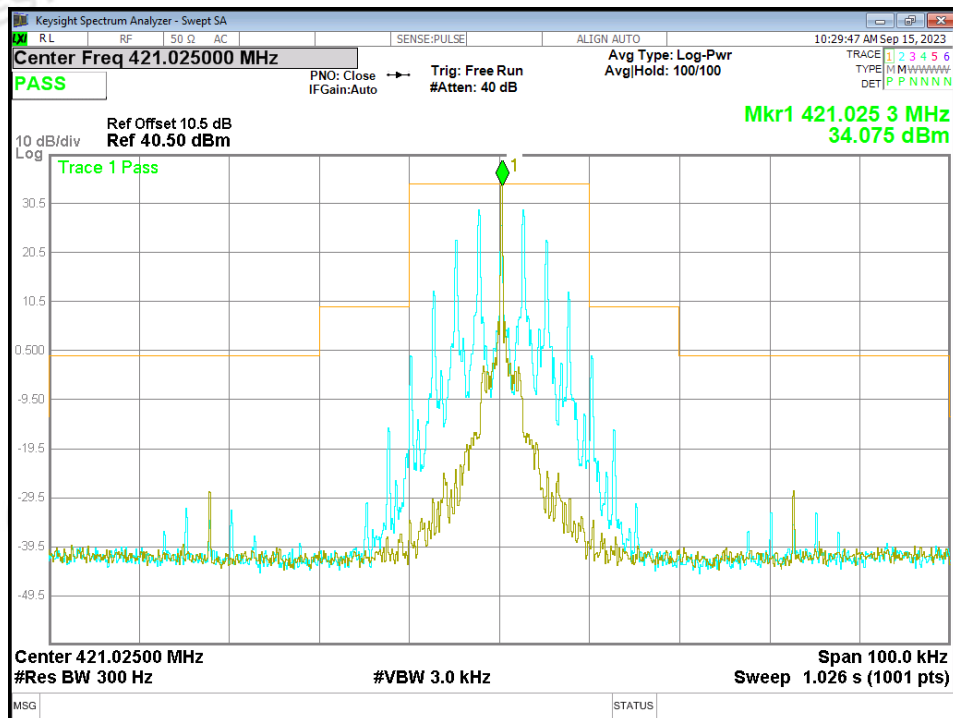
Mode9-173.3MHz-Low Power



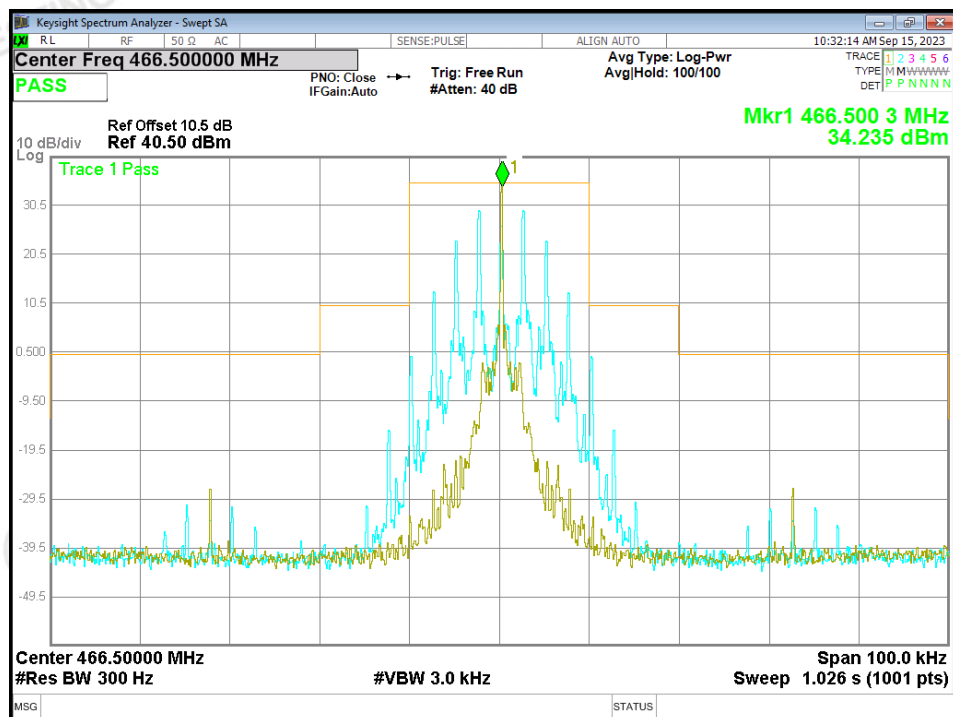
Mode10-173.3MHz-High Power



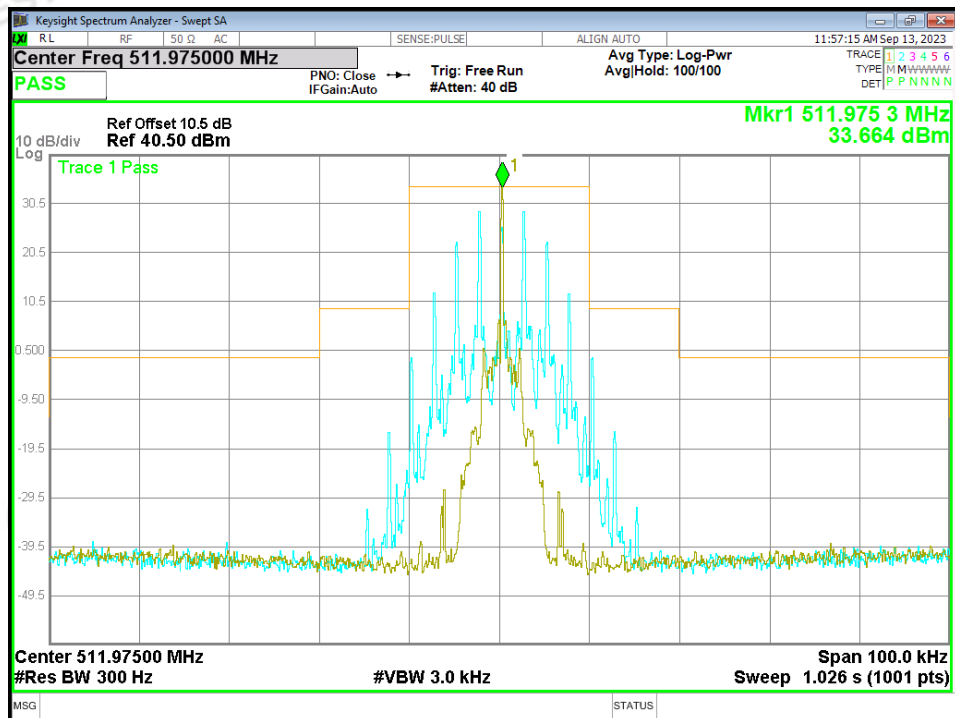
Mode11-421.025MHz-Low Power



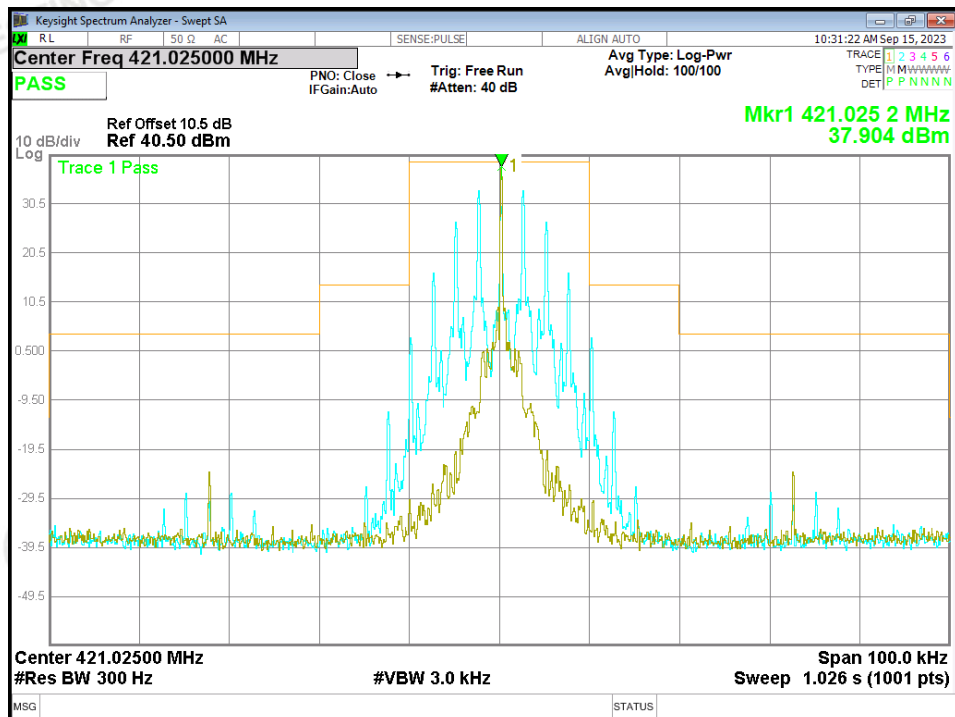
Mode11-466.5MHz-Low Power



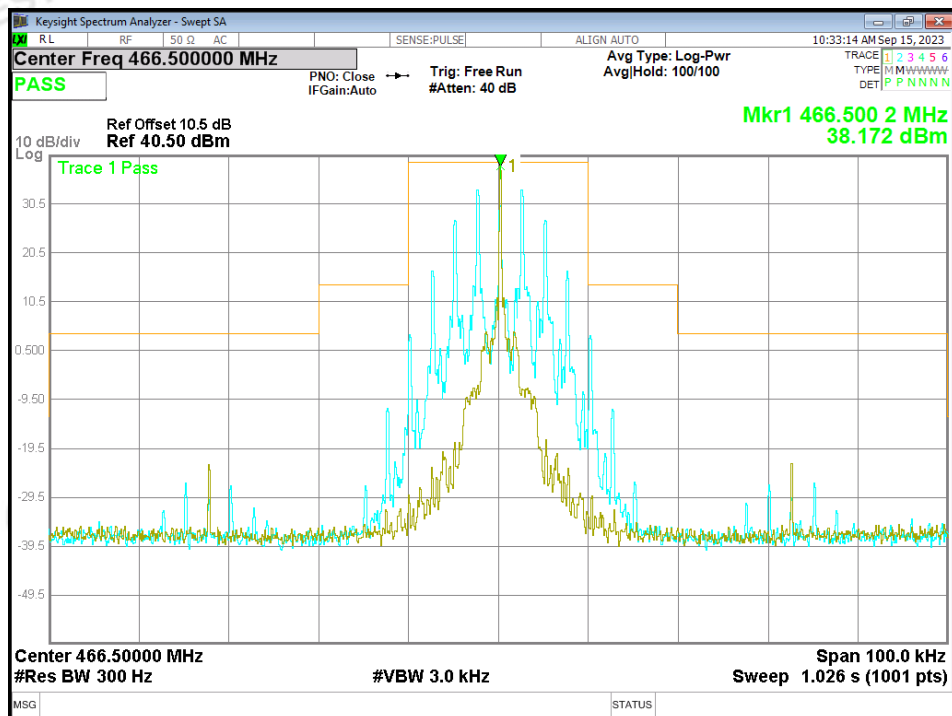
Mode11-511.975MHz-Low Power



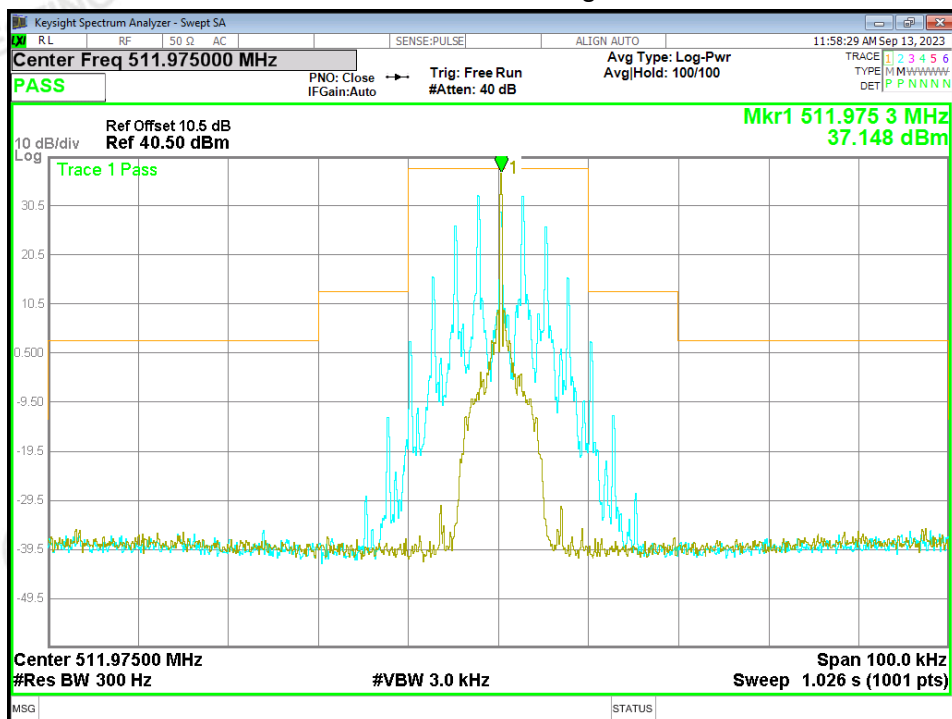
Mode12-421.025MHz-High Power



Mode12-466.5MHz-High Power



Mode12-511.975MHz-High Power



6. TRANSMITTER RADIATED SPURIOUS EMISSION

6.1 PROVISIONS APPLICABLE

According to the TIA/EIA 603 test method, and according to Section 90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least $107 \log (f_d/4)$ dB;
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least $40.5 \log (f_d/1.16)$ dB;
- (4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least $116 \log (f_d/6.1)$ dB;
- (5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least $43 + 10 \log (P)$ dB.

For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

- (1) On any frequency removed from the assigned frequency by more than 75 kHz, the attenuation of any emission must be at least $43 + 10 \log (P_{\text{watts}})$ dB.

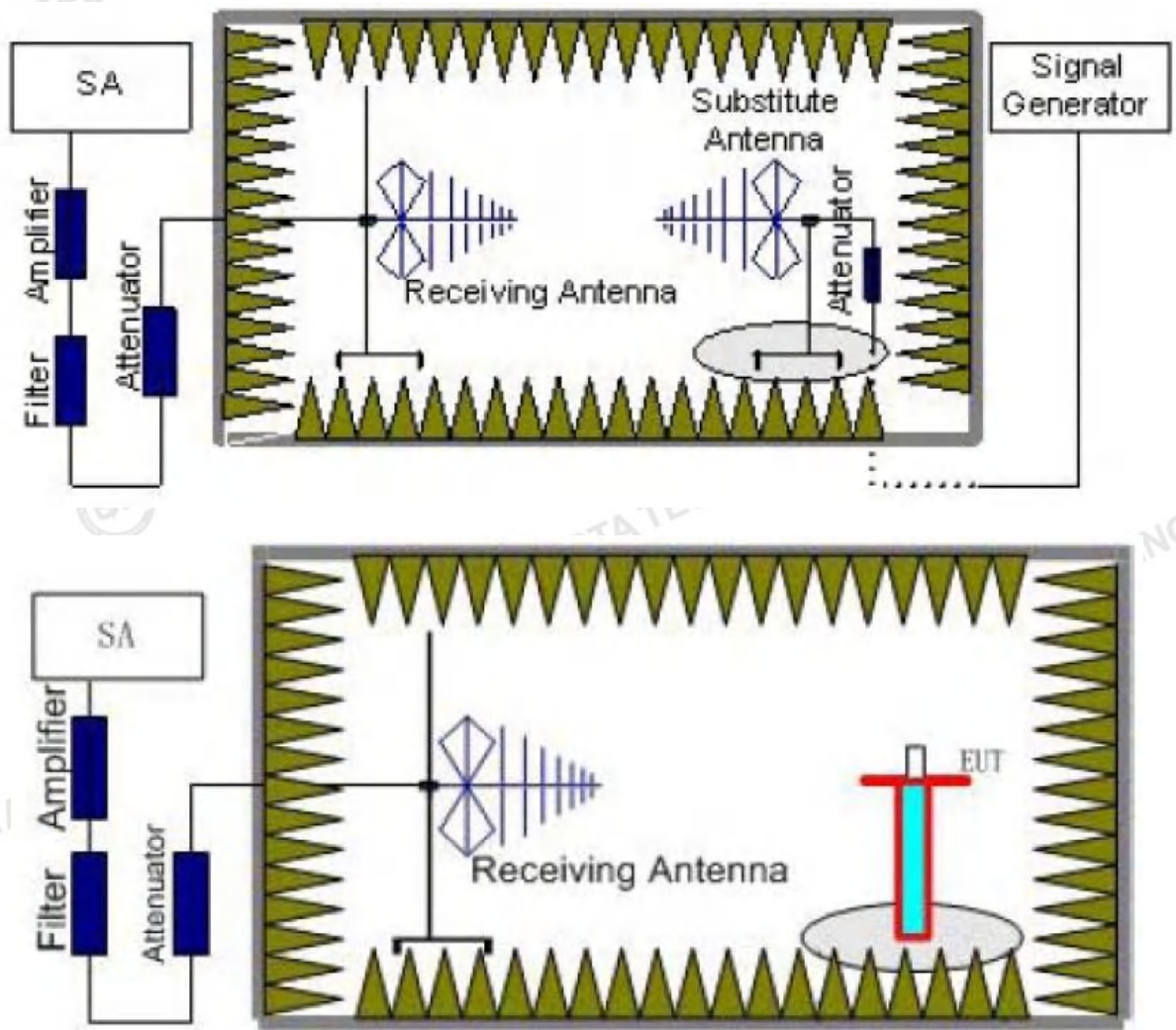
6.2 TEST PROCEDURE

- a. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. for emission measurements. The height of receiving antenna is 1.50 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in six channels were measured with peak detector.
- b. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
- c. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz for above 1GHz and RBW=100KHz, VBW=300KHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (P_r).
- d. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
- e. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test. The measurement results are obtained as described below:

Amplifier for substitution test; The measurement results are amend as described below:

$$\text{Power(EIRP)} = P_{\text{Mea}} - P_{\text{cl}} + G_a$$

6.3 TEST CONFIGURATION



6.4 TEST RESULT

12.5 KHz:

Mode2-150.8125MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
603.270	-47.58	6.23	-20.0	-27.58	92.80	Horizontal	Vertical	Pass
754.105	-28.12	7.21	-20.0	-8.12	92.80	Horizontal	Vertical	Pass
904.940	-28.87	9.01	-20.0	-8.87	122.10	Horizontal	Vertical	Pass
1357.250	-30.34	13.59	-20.0	-10.34	156.10	Horizontal	Vertical	Pass
1659.000	-38.12	11.95	-20.0	-18.12	170.90	Horizontal	Vertical	Pass
3167.000	-35.60	3.29	-20.0	-15.60	327.10	Horizontal	Vertical	Pass

Mode2-150.8125MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
603.270	-45.60	4.82	-20.0	-25.60	177.00	Vertical	Vertical	Pass
754.105	-27.65	7.30	-20.0	-7.65	259.10	Vertical	Vertical	Pass
904.940	-34.75	8.38	-20.0	-14.75	360.00	Vertical	Vertical	Pass
1357.250	-29.48	13.47	-20.0	-9.48	240.70	Vertical	Vertical	Pass
1658.750	-33.81	11.80	-20.0	-13.81	202.10	Vertical	Vertical	Pass
4675.250	-40.47	5.03	-20.0	-20.47	59.30	Vertical	Vertical	Pass

Mode2-156.4MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
625.701	-24.42	7.27	-20.0	-4.42	257.40	Horizontal	Vertical	Pass
782.114	-37.75	6.89	-20.0	-17.75	248.40	Horizontal	Vertical	Pass
1094.750	-42.74	12.08	-20.0	-22.74	244.40	Horizontal	Vertical	Pass
1407.750	-35.93	14.05	-20.0	-15.93	253.60	Horizontal	Vertical	Pass
2659.000	-39.12	18.87	-20.0	-19.12	241.30	Horizontal	Vertical	Pass
3128.250	-44.38	3.04	-20.0	-24.38	250.10	Horizontal	Vertical	Pass

Mode2-156.4MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
625.701	-23.42	5.32	-20.0	-3.42	247.80	Vertical	Vertical	Pass
782.114	-34.61	6.69	-20.0	-14.61	175.50	Vertical	Vertical	Pass
1095.000	-41.19	8.83	-20.0	-21.19	204.20	Vertical	Vertical	Pass
1407.750	-35.41	13.77	-20.0	-15.41	204.20	Vertical	Vertical	Pass
1720.500	-34.24	11.90	-20.0	-14.24	198.00	Vertical	Vertical	Pass
3128.250	-43.98	2.41	-20.0	-23.98	248.10	Vertical	Vertical	Pass

Mode2-162MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
648.011	-21.67	6.75	-20.0	-1.67	77.60	Horizontal	Vertical	Pass
810.122	-50.02	6.19	-20.0	-30.02	224.60	Horizontal	Vertical	Pass
901.060	-51.83	8.86	-20.0	-31.83	245.00	Horizontal	Vertical	Pass
1458.250	-41.13	13.31	-20.0	-21.13	240.10	Horizontal	Vertical	Pass
2435.750	-33.06	19.49	-20.0	-13.06	237.10	Horizontal	Vertical	Pass
3888.250	-46.14	4.05	-20.0	-26.14	342.30	Horizontal	Vertical	Pass

Mode2-162MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
648.011	-21.44	5.23	-20.0	-1.44	84.40	Vertical	Vertical	Pass
734.705	-48.90	7.84	-20.0	-28.90	84.40	Vertical	Vertical	Pass
810.122	-45.62	6.27	-20.0	-25.62	181.80	Vertical	Vertical	Pass
1458.250	-41.27	13.34	-20.0	-21.27	279.30	Vertical	Vertical	Pass
2438.500	-32.42	19.22	-20.0	-12.42	39.30	Vertical	Vertical	Pass
3888.250	-47.72	3.14	-20.0	-27.72	238.20	Vertical	Vertical	Pass

Mode4-173.3MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
519.971	-68.14	1.63	-20.0	-48.14	85.20	Horizontal	Vertical	Pass
693.238	-35.55	4.89	-20.0	-15.55	244.50	Horizontal	Vertical	Pass
866.625	-62.09	7.49	-20.0	-42.09	238.60	Horizontal	Vertical	Pass
1386.500	-39.65	13.98	-20.0	-19.65	153.60	Horizontal	Vertical	Pass
2438.500	-32.71	19.47	-20.0	-12.71	49.20	Horizontal	Vertical	Pass
4159.250	-44.40	4.19	-20.0	-24.40	337.40	Horizontal	Vertical	Pass

Mode4-173.3MHz-Low Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
519.850	-66.34	4.71	-20.0	-46.34	165.60	Vertical	Vertical	Pass
693.238	-30.72	6.62	-20.0	-10.72	198.40	Vertical	Vertical	Pass
866.625	-49.36	8.22	-20.0	-29.36	355.90	Vertical	Vertical	Pass
1386.500	-38.54	13.72	-20.0	-18.54	248.50	Vertical	Vertical	Pass
2616.750	-26.29	17.81	-20.0	-6.29	12.10	Vertical	Vertical	Pass
4159.250	-47.32	3.90	-20.0	-27.32	131.70	Vertical	Vertical	Pass

Mode6-421.0125MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
239.156	-76.21	-1.04	-20.0	-56.21	339.50	Horizontal	Vertical	Pass
631.521	-50.23	7.26	-20.0	-30.23	152.30	Horizontal	Vertical	Pass
842.132	-25.78	7.33	-20.0	-5.78	255.80	Horizontal	Vertical	Pass
1263.000	-26.19	12.88	-20.0	-6.19	116.40	Horizontal	Vertical	Pass
1684.000	-26.76	11.50	-20.0	-6.76	47.90	Horizontal	Vertical	Pass
4631.250	-25.24	4.65	-20.0	-5.24	236.00	Horizontal	Vertical	Pass

Mode6-421.0125MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
133.911	-76.35	-1.37	-20.0	-56.35	17.60	Vertical	Vertical	Pass
631.521	-53.33	5.24	-20.0	-33.33	35.20	Vertical	Vertical	Pass
842.132	-22.86	7.72	-20.0	-2.86	35.20	Vertical	Vertical	Pass
1263.000	-22.51	13.34	-20.0	-2.51	63.70	Vertical	Vertical	Pass
2526.250	-30.97	17.91	-20.0	-10.97	180.20	Vertical	Vertical	Pass
3789.250	-32.03	2.83	-20.0	-12.03	114.60	Vertical	Vertical	Pass

Mode6-466.5MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
256.616	-75.58	-1.40	-20.0	-55.58	322.30	Horizontal	Vertical	Pass
591.994	-51.25	6.30	-20.0	-31.25	77.20	Horizontal	Vertical	Pass
933.070	-32.39	8.68	-20.0	-12.39	50.10	Horizontal	Vertical	Pass
1399.500	-22.56	14.15	-20.0	-2.56	91.20	Horizontal	Vertical	Pass
1866.000	-24.89	14.49	-20.0	-4.89	342.90	Horizontal	Vertical	Pass
3732.000	-27.10	3.72	-20.0	-7.10	229.30	Horizontal	Vertical	Pass

Mode6-466.5MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
136.094	-75.81	-1.29	-20.0	-55.81	289.80	Vertical	Vertical	Pass
591.994	-49.91	5.04	-20.0	-29.91	41.80	Vertical	Vertical	Pass
933.070	-38.23	9.75	-20.0	-18.23	94.60	Vertical	Vertical	Pass
1399.500	-22.48	13.83	-20.0	-2.48	175.00	Vertical	Vertical	Pass
1866.250	-27.28	13.87	-20.0	-7.28	175.00	Vertical	Vertical	Pass
3732.000	-29.19	2.69	-20.0	-9.19	261.70	Vertical	Vertical	Pass

Mode6-511.9875MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
35.214	-77.20	-1.88	-20.0	-57.20	337.00	Horizontal	Vertical	Pass
414.969	-72.54	2.51	-20.0	-52.54	209.80	Horizontal	Vertical	Pass
573.442	-62.63	6.17	-20.0	-42.63	248.10	Horizontal	Vertical	Pass
1536.000	-20.60	12.72	-20.0	-0.60	173.20	Horizontal	Vertical	Pass
2560.250	-23.84	18.50	-20.0	-3.84	349.20	Horizontal	Vertical	Pass
4096.000	-30.40	3.93	-20.0	-10.40	336.10	Horizontal	Vertical	Pass

Mode6-511.9875MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
31.940	-79.53	-4.92	-20.0	-59.53	8.70	Vertical	Vertical	Pass
154.160	-75.91	-1.78	-20.0	-55.91	97.00	Vertical	Vertical	Pass
591.994	-61.30	5.04	-20.0	-41.30	111.50	Vertical	Vertical	Pass
1536.000	-21.33	12.55	-20.0	-1.33	23.30	Vertical	Vertical	Pass
2438.500	-30.07	19.22	-20.0	-10.07	222.80	Vertical	Vertical	Pass
3584.000	-32.67	2.28	-20.0	-12.67	98.90	Vertical	Vertical	Pass

25 KHz:

Mode8-150.825MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
603.270	-48.66	6.23	-13.0	-35.66	256.80	Horizontal	Vertical	Pass
754.105	-31.93	7.21	-13.0	-18.93	89.70	Horizontal	Vertical	Pass
904.940	-31.96	9.01	-13.0	-18.96	86.90	Horizontal	Vertical	Pass
1357.500	-28.56	13.59	-13.0	-15.56	246.50	Horizontal	Vertical	Pass
2615.750	-26.72	18.27	-13.0	-13.72	219.40	Horizontal	Vertical	Pass
4826.250	-37.03	4.76	-13.0	-24.03	189.10	Horizontal	Vertical	Pass

Mode8-150.825MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
603.270	-38.59	4.82	-13.0	-25.59	176.70	Vertical	Vertical	Pass
754.105	-19.99	7.30	-13.0	-6.99	254.50	Vertical	Vertical	Pass
904.940	-34.71	8.38	-13.0	-21.71	0.80	Vertical	Vertical	Pass
1357.250	-29.52	13.47	-13.0	-16.52	229.90	Vertical	Vertical	Pass
1659.000	-32.81	11.80	-13.0	-19.81	212.60	Vertical	Vertical	Pass
3201.750	-37.21	2.65	-13.0	-24.21	1.70	Vertical	Vertical	Pass

Mode8-156.4MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
625.701	-21.52	7.27	-13.0	-8.52	263.50	Horizontal	Vertical	Pass
782.114	-36.62	6.89	-13.0	-23.62	243.20	Horizontal	Vertical	Pass
938.526	-53.63	8.29	-13.0	-40.63	121.50	Horizontal	Vertical	Pass
1407.750	-33.72	14.05	-13.0	-20.72	262.60	Horizontal	Vertical	Pass
2633.750	-26.80	18.56	-13.0	-13.80	76.70	Horizontal	Vertical	Pass
4848.750	-40.18	4.77	-13.0	-27.18	64.00	Horizontal	Vertical	Pass

Mode8-156.4MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
625.701	-23.81	5.32	-13.0	-10.81	86.90	Vertical	Vertical	Pass
782.114	-32.42	6.69	-13.0	-19.42	268.20	Vertical	Vertical	Pass
938.526	-41.78	10.08	-13.0	-28.78	336.70	Vertical	Vertical	Pass
1407.750	-33.18	13.77	-13.0	-20.18	232.30	Vertical	Vertical	Pass
1720.500	-32.86	11.90	-13.0	-19.86	193.10	Vertical	Vertical	Pass
4848.750	-40.01	5.58	-13.0	-27.01	31.00	Vertical	Vertical	Pass

Mode8-161.975MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
648.011	-20.19	6.75	-13.0	-7.19	274.60	Horizontal	Vertical	Pass
810.122	-51.24	6.19	-13.0	-38.24	316.00	Horizontal	Vertical	Pass
901.909	-53.87	8.89	-13.0	-40.87	312.90	Horizontal	Vertical	Pass
1458.250	-40.85	13.31	-13.0	-27.85	238.30	Horizontal	Vertical	Pass
2617.500	-25.96	18.30	-13.0	-12.96	96.90	Horizontal	Vertical	Pass
3888.250	-46.90	4.05	-13.0	-33.90	357.30	Horizontal	Vertical	Pass

Mode8-161.975MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
648.011	-18.51	5.23	-13.0	-5.51	359.70	Vertical	Vertical	Pass
810.122	-48.29	6.27	-13.0	-35.29	190.30	Vertical	Vertical	Pass
972.113	-54.49	10.26	-13.0	-41.49	11.80	Vertical	Vertical	Pass
1458.250	-40.45	13.34	-13.0	-27.45	270.30	Vertical	Vertical	Pass
2465.500	-30.05	18.65	-13.0	-17.05	285.40	Vertical	Vertical	Pass
3888.000	-46.99	3.14	-13.0	-33.99	199.60	Vertical	Vertical	Pass

Mode10-173.3MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
612.000	-58.30	6.78	-13.0	-45.30	189.10	Horizontal	Vertical	Pass
693.238	-35.76	4.89	-13.0	-22.76	287.00	Horizontal	Vertical	Pass
867.231	-56.63	7.52	-13.0	-43.63	189.10	Horizontal	Vertical	Pass
2465.250	-32.99	19.17	-13.0	-19.99	126.40	Horizontal	Vertical	Pass
2616.250	-32.11	18.28	-13.0	-19.11	260.70	Horizontal	Vertical	Pass
4280.750	-45.11	4.38	-13.0	-32.11	327.10	Horizontal	Vertical	Pass

Mode10-173.3MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
605.453	-47.81	4.90	-13.0	-34.81	163.80	Vertical	Vertical	Pass
693.238	-29.51	6.62	-13.0	-16.51	360.20	Vertical	Vertical	Pass
866.625	-48.01	8.22	-13.0	-35.01	360.20	Vertical	Vertical	Pass
1386.500	-40.88	13.72	-13.0	-27.88	253.30	Vertical	Vertical	Pass
2617.250	-25.38	17.81	-13.0	-12.38	193.10	Vertical	Vertical	Pass
4159.250	-46.86	3.90	-13.0	-33.86	213.80	Vertical	Vertical	Pass

Mode12-421.025MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
31.698	-76.80	-1.90	-13.0	-63.80	195.60	Horizontal	Vertical	Pass
631.521	-39.50	7.26	-13.0	-26.50	210.10	Horizontal	Vertical	Pass
842.132	-24.91	7.33	-13.0	-11.91	73.90	Horizontal	Vertical	Pass
1684.000	-26.18	11.50	-13.0	-13.18	161.30	Horizontal	Vertical	Pass
2526.250	-30.42	18.67	-13.0	-17.42	343.80	Horizontal	Vertical	Pass
4631.250	-26.56	4.65	-13.0	-13.56	228.90	Horizontal	Vertical	Pass

Mode12-421.025MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
133.548	-76.17	-1.39	-13.0	-63.17	298.10	Vertical	Vertical	Pass
621.094	-61.17	5.39	-13.0	-48.17	190.70	Vertical	Vertical	Pass
842.132	-23.12	7.72	-13.0	-10.12	28.90	Vertical	Vertical	Pass
1263.000	-22.96	13.34	-13.0	-9.96	153.90	Vertical	Vertical	Pass
2526.250	-30.95	17.91	-13.0	-17.95	174.90	Vertical	Vertical	Pass
3789.250	-27.75	2.83	-13.0	-14.75	206.40	Vertical	Vertical	Pass

Mode12-466.5MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
31.698	-76.97	-1.90	-13.0	-63.97	65.90	Horizontal	Vertical	Pass
591.994	-49.87	6.30	-13.0	-36.87	83.50	Horizontal	Vertical	Pass
933.070	-32.39	8.68	-13.0	-19.39	89.30	Horizontal	Vertical	Pass
1399.500	-23.25	14.15	-13.0	-10.25	95.70	Horizontal	Vertical	Pass
1866.000	-32.30	14.49	-13.0	-19.30	101.90	Horizontal	Vertical	Pass
3732.000	-27.88	3.72	-13.0	-14.88	244.10	Horizontal	Vertical	Pass

Mode12-466.5MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
130.759	-76.35	-1.49	-13.0	-63.35	232.30	Vertical	Vertical	Pass
591.994	-49.23	5.04	-13.0	-36.23	59.70	Vertical	Vertical	Pass
933.070	-35.46	9.75	-13.0	-22.46	119.30	Vertical	Vertical	Pass
1399.500	-23.26	13.83	-13.0	-10.26	201.50	Vertical	Vertical	Pass
1866.000	-31.23	13.87	-13.0	-18.23	159.50	Vertical	Vertical	Pass
3732.000	-30.35	2.69	-13.0	-17.35	105.40	Vertical	Vertical	Pass

Mode12-511.975MHz-High Power-H

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
38.972	-76.34	-1.85	-13.0	-63.34	175.80	Horizontal	Vertical	Pass
566.289	-60.55	5.57	-13.0	-47.55	348.50	Horizontal	Vertical	Pass
918.278	-64.14	9.53	-13.0	-51.14	36.90	Horizontal	Vertical	Pass
1407.000	-49.56	14.06	-13.0	-36.56	288.90	Horizontal	Vertical	Pass
2469.750	-29.92	19.11	-13.0	-16.92	273.40	Horizontal	Vertical	Pass
3912.500	-41.94	4.09	-13.0	-28.94	172.10	Horizontal	Vertical	Pass

Mode12-511.975MHz-High Power-V

Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
135.488	-75.64	-1.31	-13.0	-62.64	163.80	Vertical	Vertical	Pass
570.047	-67.66	5.98	-13.0	-54.66	140.00	Vertical	Vertical	Pass
952.955	-63.14	10.07	-13.0	-50.14	202.70	Vertical	Vertical	Pass
1272.000	-50.21	13.25	-13.0	-37.21	348.10	Vertical	Vertical	Pass
2631.500	-26.63	18.05	-13.0	-13.63	170.20	Vertical	Vertical	Pass
3909.750	-46.44	3.18	-13.0	-33.44	227.70	Vertical	Vertical	Pass

Note: $EIRP = P_{Mea}(dBm) - P_{cl}(dB) + G_a(dBi)$

We were not recorded other points as values lower than limits

7. SPURIOUS EMISSION ON ANTENNA PORT

7.1 PROVISIONS APPLICABLE

According to the TIA/EIA 603 test method, and according to Section 90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least $107 \log (f_d/4)$ dB;
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least $40.5 \log (f_d/1.16)$ dB;
- (4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least $116 \log (f_d/6.1)$ dB;
- (5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least $43 + 10 \log (P)$ dB.

For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

- (1) On any frequency removed from the assigned frequency by more than 75 kHz, the attenuation of any emission must be at least $43 + 10 \log (P_{\text{watts}})$ dB.

7.2 MEASUREMENT PROCEDURE

- a. The EUT was connected to the spectrum analyzer through sufficient attenuation.
- b. Sufficient scans were taken to show any out of band emission up to 10th. Harmonic for the lower and the highest frequency range.
- c. Set EUT as digital data mode.
- d. Set RBW 100kHz, VBW 300 kHz in the frequency band 30MHz to 1GHz, while set RBW=1MHz. VBW=3MHz from the 1GHz to 10th Harmonic.

7.3 TEST SETUP BLOCK DIAGRAM



12.5 kHz:

Keysight Spectrum Analyzer - Swept SA

RL 50 Ω AC SENSE:PULSE ALIGN AUTO 09:48:42 AM Sep 13, 2023

Marker 1 151.25000000 MHz PNO: Fast IFGain:Low Trig: Free Run Atten: 40 dB Avg Type: Log-Pwr AvgHold: 30/30

TRACE 1 2 3 4 5 6
TYPE M M M M M M M M
DET P N N N N N N N

Ref Offset 10.5 dB
Ref 40.50 dBm

10 dB/div
Log

Mkr1 151.25 MHz
37.946 dBm

Start 30.0 MHz Stop 1.0000 GHz
#Res BW 100 kHz #VBW 300 kHz Sweep 92.73 ms (1001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	151.25 MHz	37.946 dBm			
2	N	1	f	301.60 MHz	-24.362 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

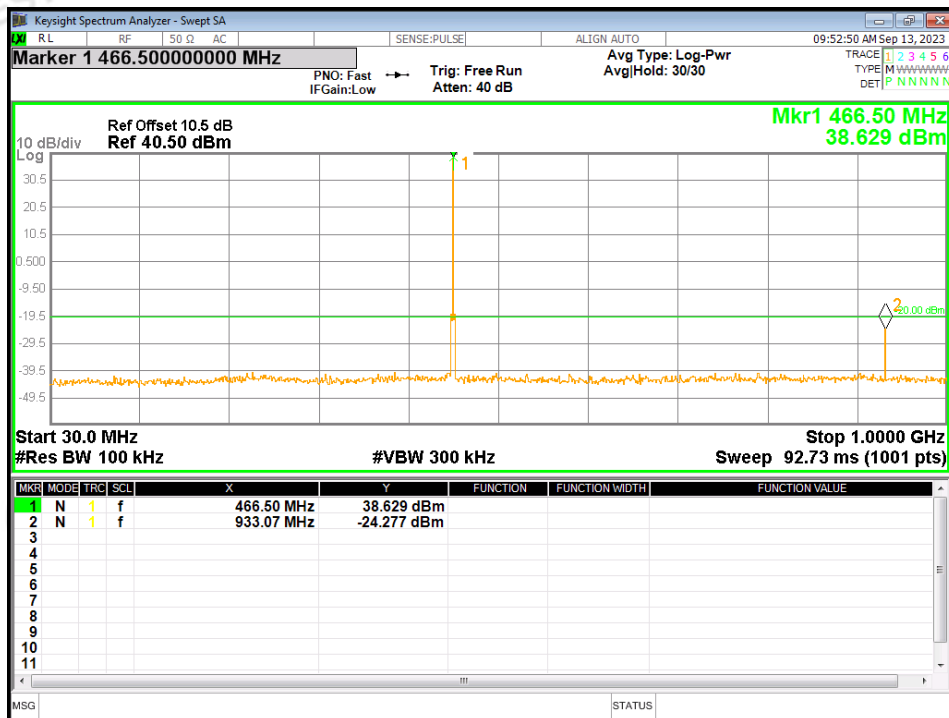
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[illegible][illegible]

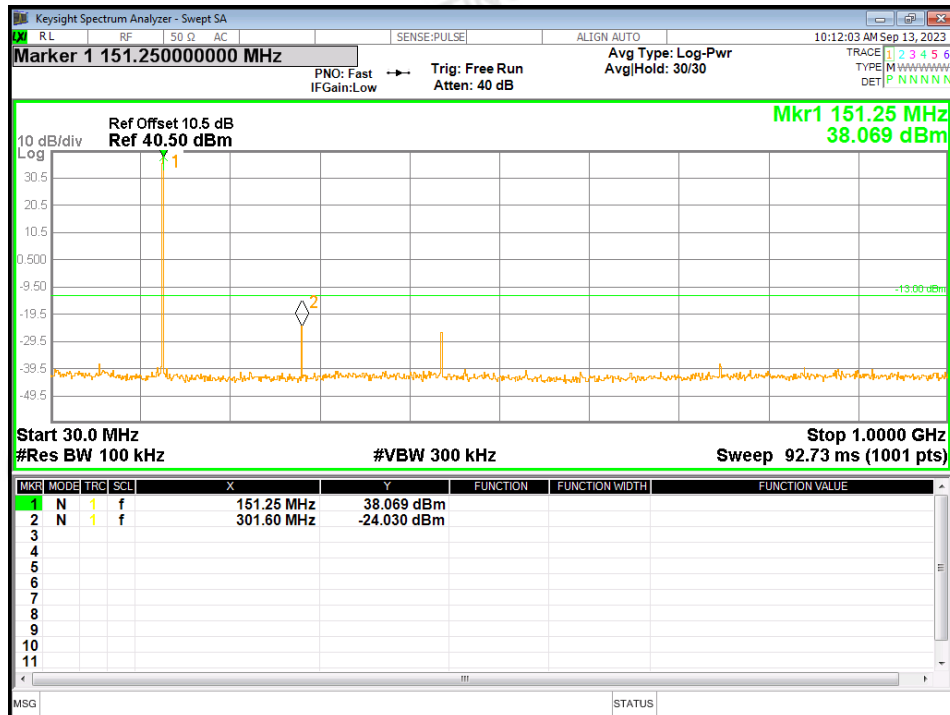
Mode6-466.5MHz 30MHz-1GHz



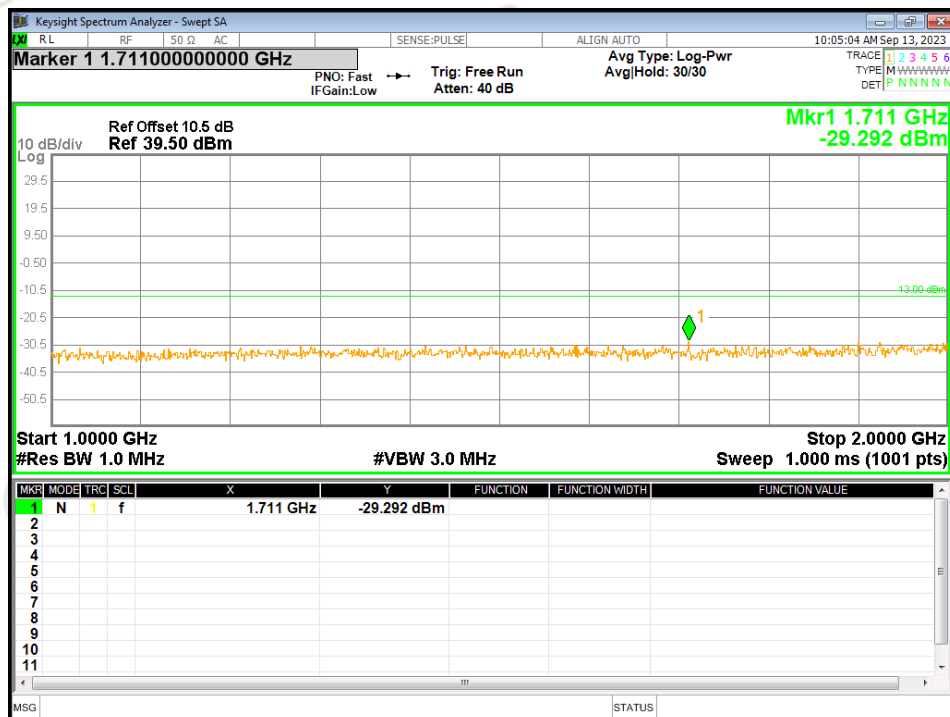
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25 kHz:

Mode8-150.825MHz 30MHz-1GHz



Mode8-150.825MHz 1GHz-2GHz



[illegible][illegible]

[illegible][illegible]

8. FREQUENCY STABILITY

8.1 PROVISIONS APPLICABLE

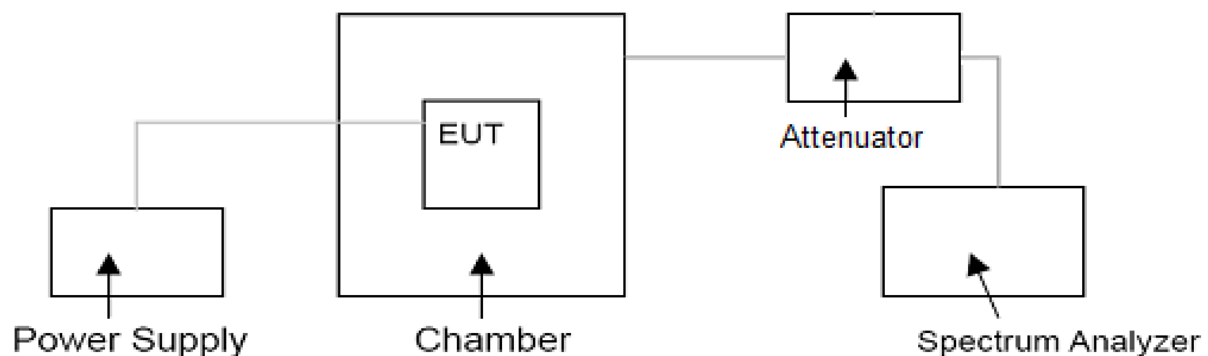
- 1) According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C centigrade.
- 2) According to FCC Part 2 Section 2.1055 (a) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
- 3) Vary primary supply voltage from 85 to 115 percent of the nominal value.
- 4)

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	^{1 2 3} 100	100	200
25-50	20	20	50
72-76	5		50
150-174	^{5 11} 5	⁶ 5	^{4 6} 50
216-220	1.0		1.0
220-222 ¹²	0.1	1.5	1.5
421-512	^{7 11 14} 2.5	⁸ 5	⁸ 5
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	¹⁴ 0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928 ¹³	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	⁹ 300	300	300
Above 2450 ¹⁰			

8.2 MEASUREMENT PROCEDURE

- a. The EUT was connected to the spectrum analyzer through sufficient attenuation.
- b. The EUT was set in the climate chamber and connected to an external DC power supply
- c. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded.
- d. For Frequency stability Vs. Voltage the EUT was connected to a DC power supply and the voltage was adjusted in the required ranges. The result was recorded.

8.3 TEST SETUP BLOCK DIAGRAM



8.4 TEST RESULT

12.5 KHz:

Low Power

Low Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 1	30	Normal Voltage	150.8125	150.81251	0.066	2.5ppm	PASS
	-20		150.8125	150.81251	0.066		
	-10		150.8125	150.81258	0.530		
	0		150.8125	150.81252	0.133		
	10		150.8125	150.81257	0.464		
	20		150.8125	150.81250	0.000		
	30		150.8125	150.81247	-0.199		
	40		150.8125	150.81253	0.199		
	50		150.8125	150.81247	-0.199		
	20	Maximum Voltage	150.8125	150.81248	-0.133		
	20	BEP	150.8125	150.81254	0.265		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 1	30	Normal Voltage	156.4000	156.40002	0.128	2.5ppm	PASS
	-20		156.4000	156.40001	0.064		
	-10		156.4000	156.40001	0.064		
	0		156.4000	156.40003	0.192		
	10		156.4000	156.39993	-0.448		
	20		156.4000	156.39996	-0.256		
	30		156.4000	156.39996	-0.256		
	40		156.4000	156.39997	-0.192		
	50		156.4000	156.39999	-0.064		
	20	Maximum Voltage	156.4000	156.39998	-0.128		
	20	BEP	156.4000	156.39992	-0.512		

High Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 1	30	Normal Voltage	162.0000	162.00002	0.123	2.5ppm	PASS
	-20		162.0000	162.00003	0.185		
	-10		162.0000	162.00000	0.000		
	0		162.0000	162.00004	0.247		
	10		162.0000	161.99999	-0.062		
	20		162.0000	162.00000	0.000		
	30		162.0000	162.00001	0.062		
	40		162.0000	162.00001	0.062		
	50		162.0000	162.00004	0.247		
	20	Maximum Voltage	162.0000	161.99998	-0.123		
	20	BEP	162.0000	162.00003	0.185		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 3	30	Normal Voltage	173.3000	173.30003	0.173	2.5ppm	PASS
	-20		173.3000	173.30002	0.115		
	-10		173.3000	173.29997	-0.173		
	0		173.3000	173.30001	0.058		
	10		173.3000	173.29993	-0.404		
	20		173.3000	173.30000	0.000		
	30		173.3000	173.30000	0.000		
	40		173.3000	173.30001	0.058		
	50		173.3000	173.29998	-0.115		
	20	Maximum Voltage	173.3000	173.29996	-0.231		
	20	BEP	173.3000	173.30001	0.058		

Low Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 5	30	Normal Voltage	421.0125	421.01258	0.190	2.5ppm	PASS
	-20		421.0125	421.01263	0.309		
	-10		421.0125	421.01283	0.784		
	0		421.0125	421.01215	-0.831		
	10		421.0125	421.01219	-0.736		
	20		421.0125	421.01275	0.594		
	30		421.0125	421.01246	-0.095		
	40		421.0125	421.01267	0.404		
	50		421.0125	421.01230	-0.475		
	20	Maximum Voltage	421.0125	421.01219	-0.736		
	20	BEP	421.0125	421.01261	0.261		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 5	30	Normal Voltage	466.5000	466.49999	-0.021	2.5ppm	PASS
	-20		466.5000	466.49983	-0.364		
	-10		466.5000	466.50025	0.536		
	0		466.5000	466.50001	0.021		
	10		466.5000	466.49957	-0.922		
	20		466.5000	466.50026	0.557		
	30		466.5000	466.50004	0.086		
	40		466.5000	466.50024	0.514		
	50		466.5000	466.50005	0.107		
	20	Maximum Voltage	466.5000	466.49967	-0.707		
	20	BEP	466.5000	466.50002	0.043		

High Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 5	30	Normal Voltage	511.9875	511.98758	0.156	2.5ppm	PASS
	-20		511.9875	511.98758	0.156		
	-10		511.9875	511.98779	0.566		
	0		511.9875	511.98793	0.840		
	10		511.9875	511.98746	-0.078		
	20		511.9875	511.98782	0.625		
	30		511.9875	511.98754	0.078		
	40		511.9875	511.98774	0.469		
	50		511.9875	511.98762	0.234		
	20	Maximum Voltage	511.9875	511.98726	-0.469		
	20	BEP	511.9875	511.98763	0.254		

High Power

Low Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 2	30	Normal Voltage	150.8125	150.81251	0.066	2.5ppm	PASS
	-20		150.8125	150.81247	-0.199		
	-10		150.8125	150.81249	-0.066		
	0		150.8125	150.81249	-0.066		
	10		150.8125	150.81251	0.066		
	20		150.8125	150.81251	0.066		
	30		150.8125	150.81256	0.398		
	40		150.8125	150.81243	-0.464		
	50		150.8125	150.81248	-0.133		
	20	Maximum Voltage	150.8125	150.81245	-0.332		
	20	BEP	150.8125	150.81242	-0.530		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 2	30	Normal Voltage	156.4000	156.40003	0.192	2.5ppm	PASS
	-20		156.4000	156.40001	0.064		
	-10		156.4000	156.39993	-0.448		
	0		156.4000	156.40000	0.000		
	10		156.4000	156.40004	0.256		
	20		156.4000	156.40004	0.256		
	30		156.4000	156.39995	-0.320		
	40		156.4000	156.39992	-0.512		
	50		156.4000	156.40005	0.320		
	20	Maximum Voltage	156.4000	156.39994	-0.384		
	20	BEP	156.4000	156.40000	0.000		

High Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 2	30	Normal Voltage	162.0000	161.99998	-0.123	2.5ppm	PASS
	-20		162.0000	162.00001	0.062		
	-10		162.0000	162.00006	0.370		
	0		162.0000	162.00008	0.494		
	10		162.0000	162.00003	0.185		
	20		162.0000	161.99995	-0.309		
	30		162.0000	162.00003	0.185		
	40		162.0000	162.00006	0.370		
	50		162.0000	162.00004	0.247		
	20	Maximum Voltage	162.0000	161.99998	-0.123		
	20	BEP	162.0000	162.00004	0.247		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 4	30	Normal Voltage	173.3000	173.30006	0.346	2.5ppm	PASS
	-20		173.3000	173.30000	0.000		
	-10		173.3000	173.30000	0.000		
	0		173.3000	173.29996	-0.231		
	10		173.3000	173.30008	0.462		
	20		173.3000	173.30002	0.115		
	30		173.3000	173.29999	-0.058		
	40		173.3000	173.30001	0.058		
	50		173.3000	173.30002	0.115		
	20	Maximum Voltage	173.3000	173.30001	0.058		
	20	BEP	173.3000	173.29997	-0.173		

Low Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 6	30	Normal Voltage	421.0125	421.01246	-0.095	2.5ppm	PASS
	-20		421.0125	421.01266	0.380		
	-10		421.0125	421.01236	-0.333		
	0		421.0125	421.01263	0.309		
	10		421.0125	421.01219	-0.736		
	20		421.0125	421.01261	0.261		
	30		421.0125	421.01254	0.095		
	40		421.0125	421.01281	0.736		
	50		421.0125	421.01255	0.119		
	20	Maximum Voltage	421.0125	421.01229	-0.499		
	20	BEP	421.0125	421.01214	-0.855		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 6	30	Normal Voltage	466.5000	466.49972	-0.600	2.5ppm	PASS
	-20		466.5000	466.49989	-0.236		
	-10		466.5000	466.49974	-0.557		
	0		466.5000	466.49959	-0.879		
	10		466.5000	466.49974	-0.557		
	20		466.5000	466.50039	0.836		
	30		466.5000	466.50020	0.429		
	40		466.5000	466.49998	-0.043		
	50		466.5000	466.49986	-0.300		
	20	Maximum Voltage	466.5000	466.49985	-0.322		
	20	BEP	466.5000	466.49969	-0.665		

High Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 6	30	Normal Voltage	511.9875	511.98723	-0.527	2.5ppm	PASS
	-20		511.9875	511.98788	0.742		
	-10		511.9875	511.98790	0.781		
	0		511.9875	511.98740	-0.195		
	10		511.9875	511.98734	-0.313		
	20		511.9875	511.98739	-0.215		
	30		511.9875	511.98723	-0.527		
	40		511.9875	511.98742	-0.156		
	50		511.9875	511.98718	-0.625		
	20	Maximum Voltage	511.9875	511.98753	0.059		
	20	BEP	511.9875	511.98749	-0.020		

25 KHz:

Low Power

Low Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 7	30	Normal Voltage	150.8250	150.82506	0.398	2.5ppm	PASS
	-20		150.8250	150.82500	0.000		
	-10		150.8250	150.82504	0.265		
	0		150.8250	150.82505	0.332		
	10		150.8250	150.82502	0.133		
	20		150.8250	150.82503	0.199		
	30		150.8250	150.82502	0.133		
	40		150.8250	150.82492	-0.530		
	50		150.8250	150.82496	-0.265		
	20	Maximum Voltage	150.8250	150.82499	-0.066		
	20	BEP	150.8250	150.82506	0.398		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 7	30	Normal Voltage	156.4000	156.39999	-0.064	2.5ppm	PASS
	-20		156.4000	156.40000	0.000		
	-10		156.4000	156.40000	0.000		
	0		156.4000	156.40001	0.064		
	10		156.4000	156.40004	0.256		
	20		156.4000	156.39996	-0.256		
	30		156.4000	156.39999	-0.064		
	40		156.4000	156.39991	-0.575		
	50		156.4000	156.39999	-0.064		
	20	Maximum Voltage	156.4000	156.40003	0.192		
	20	BEP	156.4000	156.39999	-0.064		

High Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 7	30	Normal Voltage	161.9750	161.97498	-0.123	2.5ppm	PASS
	-20		161.9750	161.97498	-0.123		
	-10		161.9750	161.97501	0.062		
	0		161.9750	161.97502	0.123		
	10		161.9750	161.97505	0.309		
	20		161.9750	161.97501	0.062		
	30		161.9750	161.97501	0.062		
	40		161.9750	161.97498	-0.123		
	50		161.9750	161.97493	-0.432		
	20	Maximum Voltage	161.9750	161.97500	0.000		
	20	BEP	161.9750	161.97498	-0.123		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 9	30	Normal Voltage	173.3000	173.29995	-0.289	2.5ppm	PASS
	-20		173.3000	173.29998	-0.115		
	-10		173.3000	173.29993	-0.404		
	0		173.3000	173.29996	-0.231		
	10		173.3000	173.29999	-0.058		
	20		173.3000	173.30007	0.404		
	30		173.3000	173.29994	-0.346		
	40		173.3000	173.29999	-0.058		
	50		173.3000	173.29997	-0.173		
	20	Maximum Voltage	173.3000	173.29997	-0.173		
	20	BEP	173.3000	173.29992	-0.462		

Low Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 11	30	Normal Voltage	421.0250	421.02493	-0.166	2.5ppm	PASS
	-20		421.0250	421.02471	-0.689		
	-10		421.0250	421.02460	-0.950		
	0		421.0250	421.02475	-0.594		
	10		421.0250	421.02498	-0.048		
	20		421.0250	421.02487	-0.309		
	30		421.0250	421.02518	0.428		
	40		421.0250	421.02539	0.926		
	50		421.0250	421.02483	-0.404		
	20	Maximum Voltage	421.0250	421.02474	-0.618		
	20	BEP	421.0250	421.02468	-0.760		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 11	30	Normal Voltage	466.5000	466.50007	0.150	2.5ppm	PASS
	-20		466.5000	466.49979	-0.450		
	-10		466.5000	466.50038	0.815		
	0		466.5000	466.50003	0.064		
	10		466.5000	466.49989	-0.236		
	20		466.5000	466.49985	-0.322		
	30		466.5000	466.50022	0.472		
	40		466.5000	466.49971	-0.622		
	50		466.5000	466.50009	0.193		
	20	Maximum Voltage	466.5000	466.50000	0.000		
	20	BEP	466.5000	466.50020	0.429		

High Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 11	30	Normal Voltage	511.9750	511.97466	-0.664	2.5ppm	PASS
	-20		511.9750	511.97499	-0.020		
	-10		511.9750	511.97503	0.059		
	0		511.9750	511.97510	0.195		
	10		511.9750	511.97531	0.605		
	20		511.9750	511.97501	0.020		
	30		511.9750	511.97508	0.156		
	40		511.9750	511.97497	-0.059		
	50		511.9750	511.97479	-0.410		
	20	Maximum Voltage	511.9750	511.97528	0.547		
	20	BEP	469.9875	469.98747	-0.064		

High Power

Low Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 8	30	Normal Voltage	150.8250	150.82500	0.000	2.5ppm	PASS
	-20		150.8250	150.82496	-0.265		
	-10		150.8250	150.82506	0.398		
	0		150.8250	150.82496	-0.265		
	10		150.8250	150.82496	-0.265		
	20		150.8250	150.82494	-0.398		
	30		150.8250	150.82502	0.133		
	40		150.8250	150.82502	0.133		
	50		150.8250	150.82498	-0.133		
	20	Maximum Voltage	150.8250	150.82499	-0.066		
	20	BEP	150.8250	150.82504	0.265		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 8	30	Normal Voltage	156.4000	156.40000	0.000	2.5ppm	PASS
	-20		156.4000	156.40002	0.128		
	-10		156.4000	156.39993	-0.448		
	0		156.4000	156.40002	0.128		
	10		156.4000	156.39993	-0.448		
	20		156.4000	156.40001	0.064		
	30		156.4000	156.39999	-0.064		
	40		156.4000	156.40004	0.256		
	50		156.4000	156.40000	0.000		
	20	Maximum Voltage	156.4000	156.39996	-0.256		
	20	BEP	156.4000	156.40001	0.064		

High Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 8	30	Normal Voltage	161.9750	161.97502	0.123	2.5ppm	PASS
	-20		161.9750	161.97496	-0.247		
	-10		161.9750	161.97492	-0.494		
	0		161.9750	161.97496	-0.247		
	10		161.9750	161.97499	-0.062		
	20		161.9750	161.97500	0.000		
	30		161.9750	161.97501	0.062		
	40		161.9750	161.97501	0.062		
	50		161.9750	161.97496	-0.247		
	20	Maximum Voltage	161.9750	161.97500	0.000		
	20	BEP	161.9750	161.97499	-0.062		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 10	30	Normal Voltage	173.3000	173.30005	0.289	2.5ppm	PASS
	-20		173.3000	173.30002	0.115		
	-10		173.3000	173.30004	0.231		
	0		173.3000	173.30001	0.058		
	10		173.3000	173.29995	-0.289		
	20		173.3000	173.30008	0.462		
	30		173.3000	173.29999	-0.058		
	40		173.3000	173.30003	0.173		
	50		173.3000	173.30002	0.115		
	20	Maximum Voltage	173.3000	173.30005	0.289		
	20	BEP	173.3000	173.30003	0.173		

Low Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 12	30	Normal Voltage	421.0250	421.02487	-0.309	2.5ppm	PASS
	-20		421.0250	421.02531	0.736		
	-10		421.0250	421.02528	0.665		
	0		421.0250	421.02475	-0.594		
	10		421.0250	421.02482	-0.428		
	20		421.0250	421.02513	0.309		
	30		421.0250	421.02500	0.000		
	40		421.0250	421.02501	0.024		
	50		421.0250	421.02475	-0.594		
	20	Maximum Voltage	421.0250	421.02461	-0.926		
	20	BEP	421.0250	421.02498	-0.048		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 12	30	Normal Voltage	466.5000	466.49974	-0.557	2.5ppm	PASS
	-20		466.5000	466.49974	-0.557		
	-10		466.5000	466.49995	-0.107		
	0		466.5000	466.49976	-0.514		
	10		466.5000	466.50000	0.000		
	20		466.5000	466.50041	0.879		
	30		466.5000	466.50007	0.150		
	40		466.5000	466.49962	-0.815		
	50		466.5000	466.49996	-0.086		
	20	Maximum Voltage	466.5000	466.50009	0.193		
	20	BEP	466.5000	466.50018	0.386		

High Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 12	30	Normal Voltage	511.9750	511.97502	0.039	2.5ppm	PASS
	-20		511.9750	511.97514	0.273		
	-10		511.9750	511.97487	-0.254		
	0		511.9750	511.97469	-0.605		
	10		511.9750	511.97507	0.137		
	20		511.9750	511.97474	-0.508		
	30		511.9750	511.97505	0.098		
	40		511.9750	511.97518	0.352		
	50		511.9750	511.97501	0.020		
	20	Maximum Voltage	511.9750	511.97509	0.176		
	20	BEP	469.9875	469.98749	-0.021		

9. TRANSIENT FREQUENCY BEHAVIOR

9.1 PROVISIONS APPLICABLE

Section 90.214

Transient frequencies must be within the maximum frequency difference limits during the time intervals indicated:

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

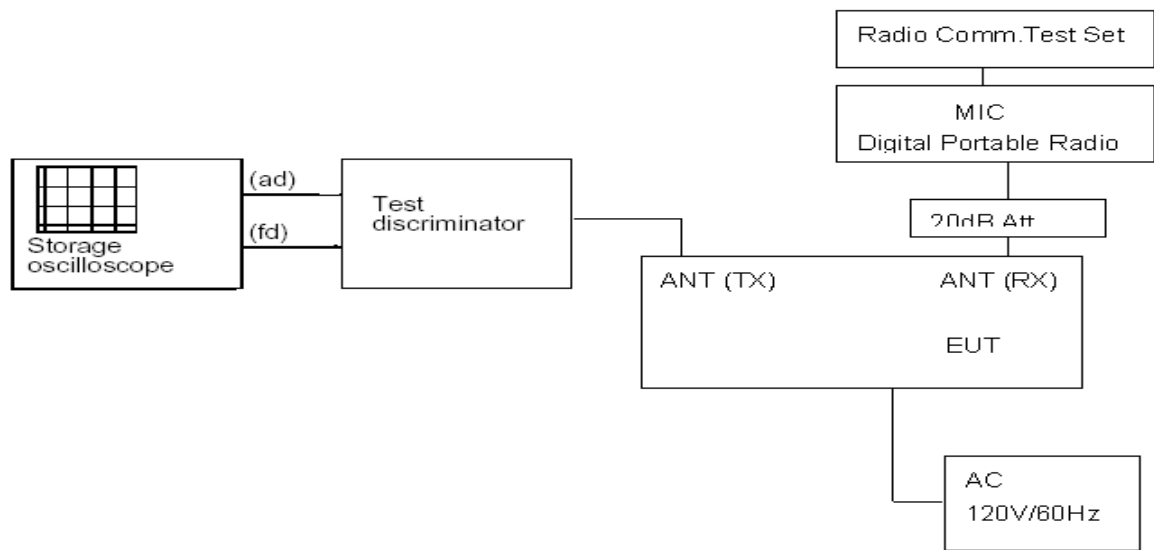
- t_{on} is the instant when a 1 KHz test signal is completely suppressed, including any capture time due to phasing.
 t_1 is the time period immediately following t_{on} .
 t_2 is the time period immediately following t_1 .
 t_3 is the time period from the instant when the transmitter is turned off until t_{off} .
 t_{off} is the instant when the 1 KHz test signal starts to rise.
- During the time from the end of t_2 to the beginning of t_3 , the frequency difference must not exceed the limits specified in § 90.213.
- Difference between the actual transmitter frequency and the assigned transmitter frequency.
- If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

9.2 MEASUREMENT PROCEDURE

Use Digital portable radio which manufactured by VictelGlobal Communications Corporation

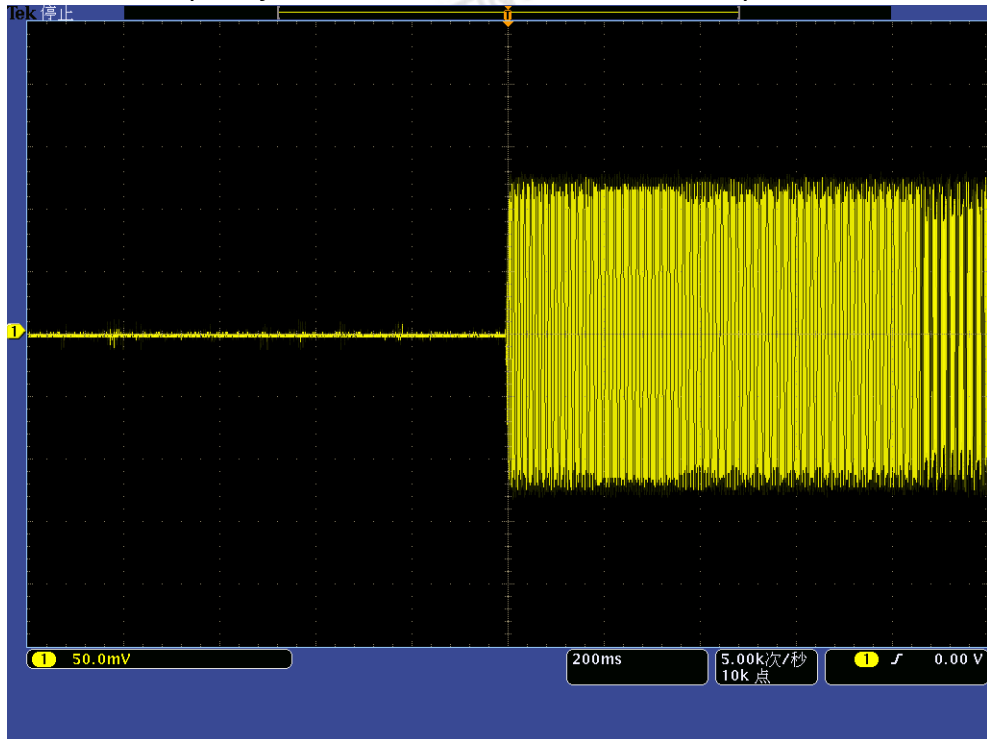
- Limited which uses same protocol as the DUT connect to RX antenna by 20Att in order to avoid damaging DUT;
- Connect DUT into Test discriminator and Storage Oscilloscope and keep DUT stats ON;
- Inut 1KHz signal into digital portable radio;
- Set the modulation domain analyzer to trigger on the rising edge of the waveform in order to capture a single-shot turn-on of the transmitter signals;
- Keep the digital protable radio in OFF state and Key the PTT of digital portable radio;
Observe the stored oscilloscope of modulation domain analyzer.The signal trace shall be
- maintained within the allowable limits during the periods t_1 and t_2 ,and shall also remain within limits following t_2 ;
- Adjust the modulation domain anzlyzer to trigger on the falling edge of the transmitter waveform in order to capture a single-shot turn-off transmitter of the transmitter signal.
- Keep the digital portable radio in ON state and Unkey the PTT of digital portable radio;
- Observe the stored oscilloscope of modulation domain analyzer.The signal trace shall be maintained within the allowable limits during the period t_3

9.3 TEST SETUP BLOCK DIAGRAM

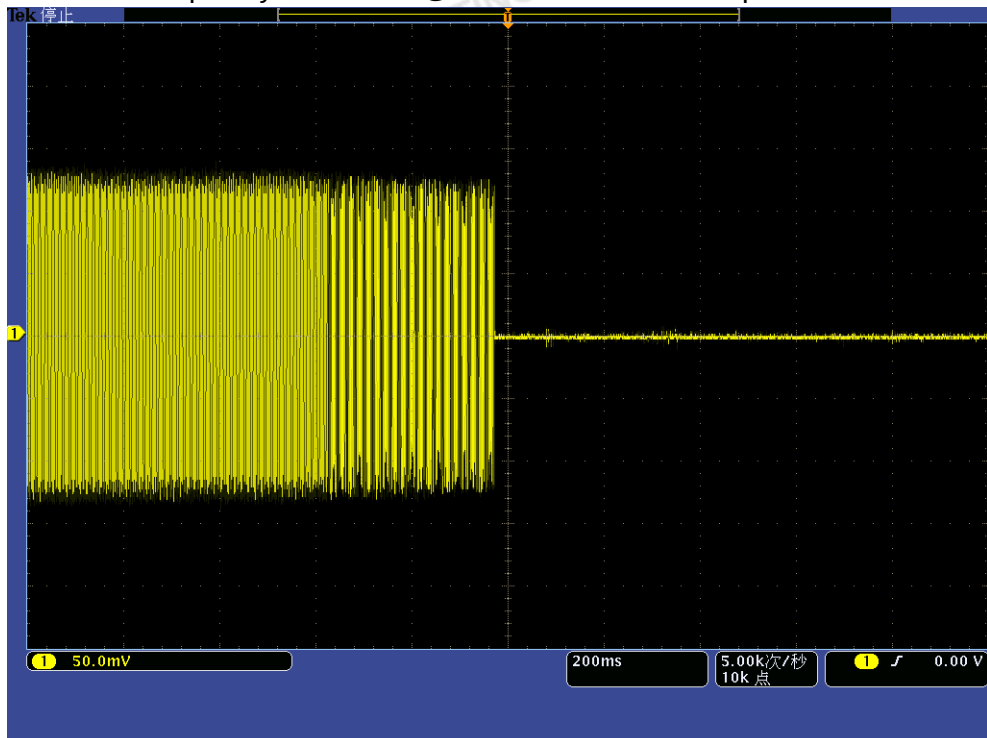


9.4 TEST RESULT

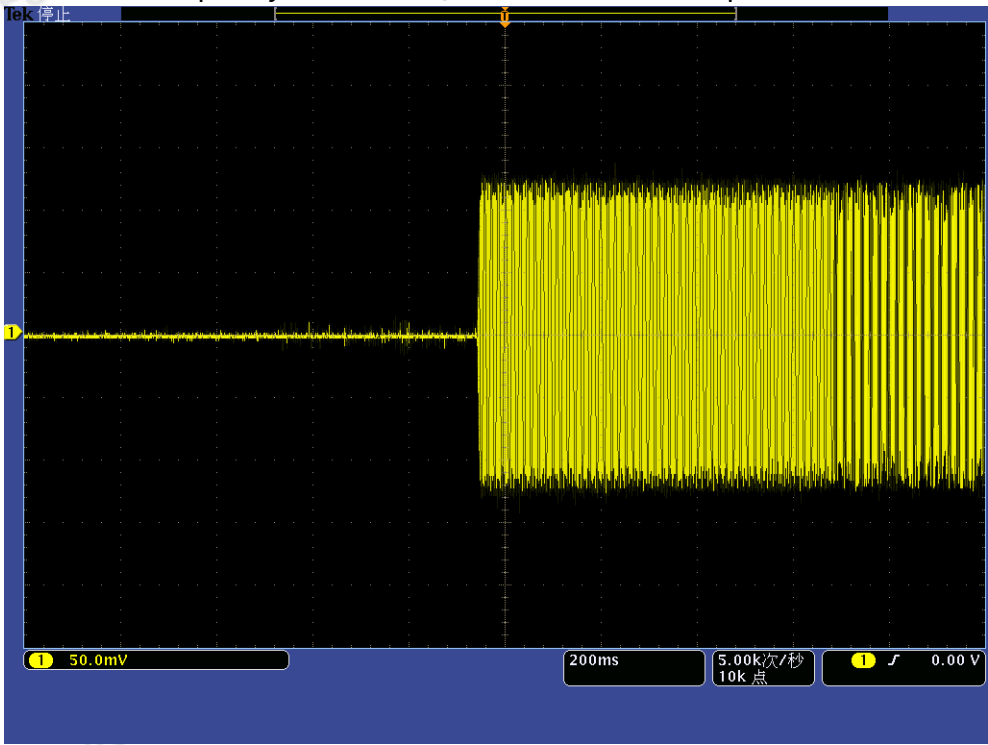
Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation-----Off – On



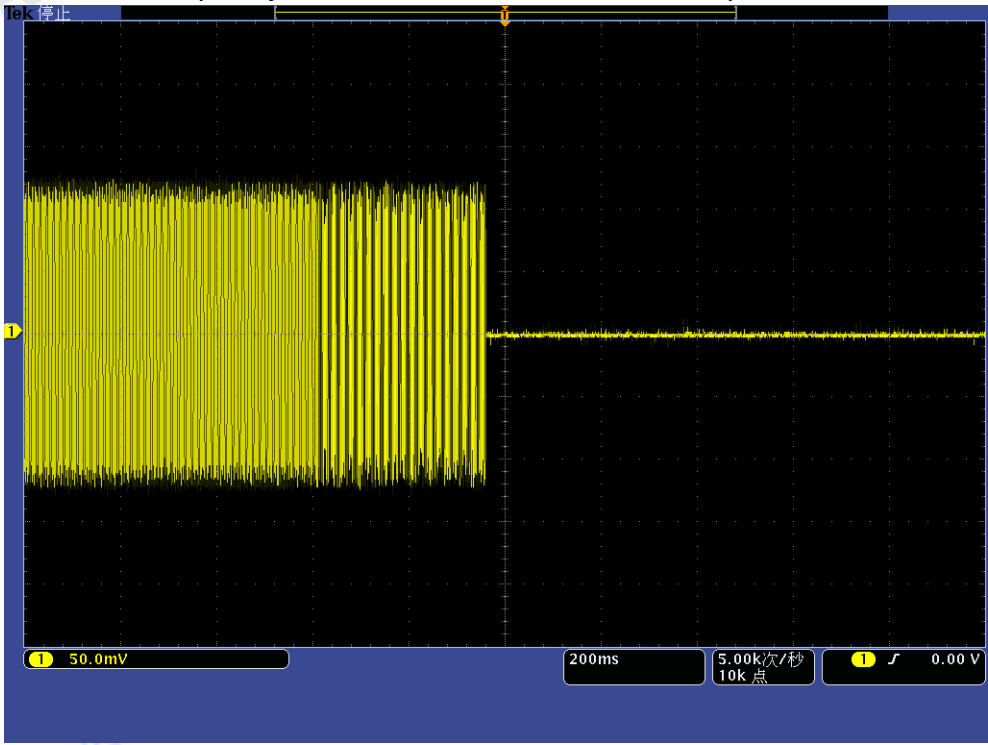
Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation-----On – Off



Transmitter Frequency Behaviour @ 25 KHz Channel Separation-----Off – On



Transmitter Frequency Behaviour @ 25 KHz Channel Separation-----On – Off



10. MODULATION CHARACTERISTIC

10.1 LIMIT

FCC Part 2.1047

- (a) Equipment which utilizes voice modulated communication show 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.
- (b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

10.2 TEST PROCEDURE

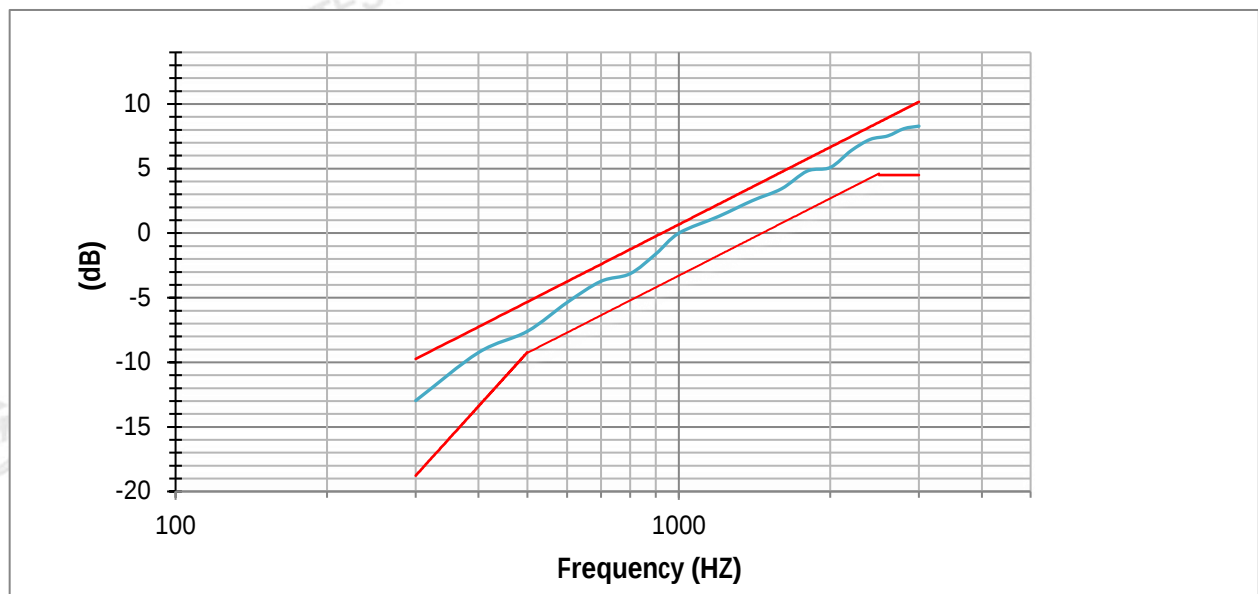
The test procedure please reference ANSI C63.26-2015.

10.3 TEST RESULT

10.3.1 Audio Frequency Response

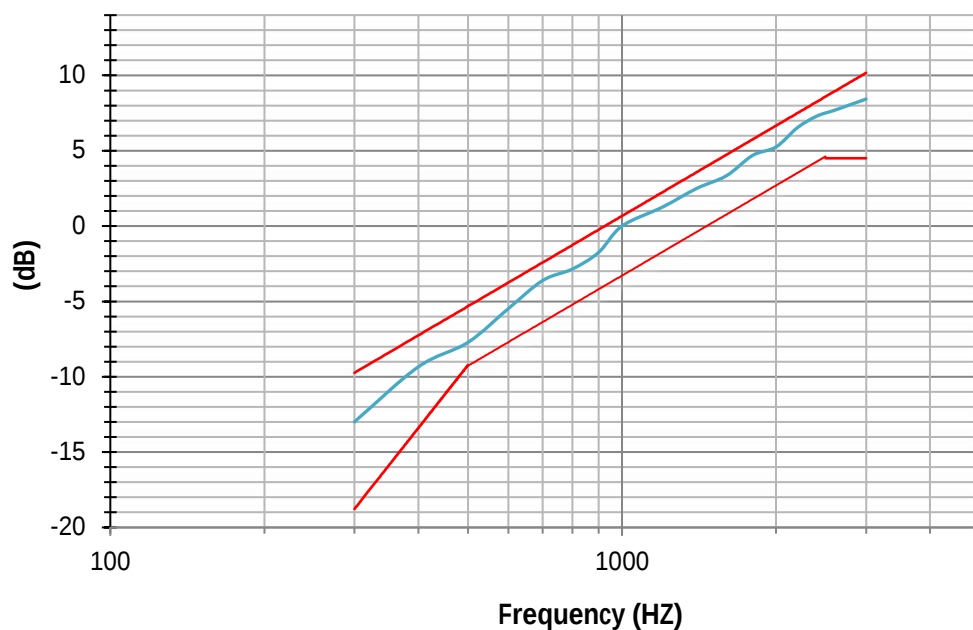
(Modulation Type:GFSK,Channel Separation:12.5kHz)- Low Power

Audio Frequency(Hz)	Audio Frequency Response(dB)	Result
300	-12.97	PASS
400	-9.24	
500	-7.60	
600	-5.36	
700	-3.73	
800	-3.14	
900	-1.61	
1000	0.00	
1200	1.30	
1400	2.52	
1600	3.44	
1800	4.81	
2000	5.09	
2200	6.39	
2400	7.26	
2600	7.53	
2800	8.09	
3000	8.29	



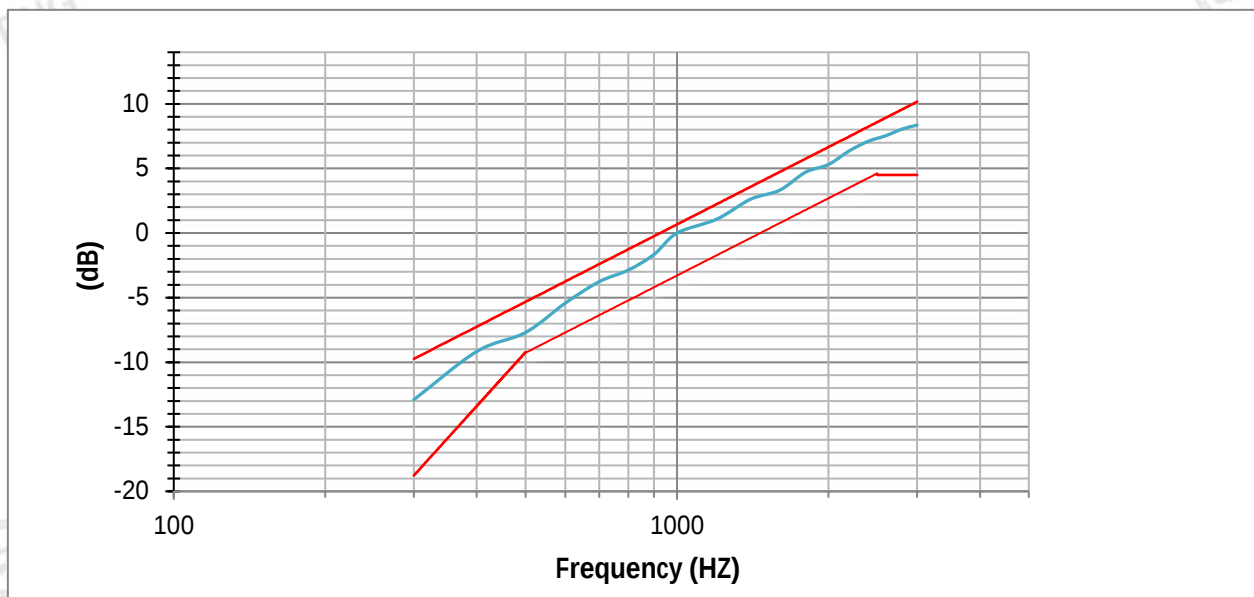
(Modulation Type:GFSK,Channel Separation:12.5kHz)- High Power

Audio Frequency	Audio Frequency Response	Result
(Hz)	(dB)	
300	-12.99	PASS
400	-9.34	
500	-7.72	
600	-5.47	
700	-3.61	
800	-2.85	
900	-1.75	
1000	0.00	
1200	1.26	
1400	2.50	
1600	3.34	
1800	4.69	
2000	5.25	
2200	6.52	
2400	7.29	
2600	7.68	
2800	8.07	
3000	8.43	



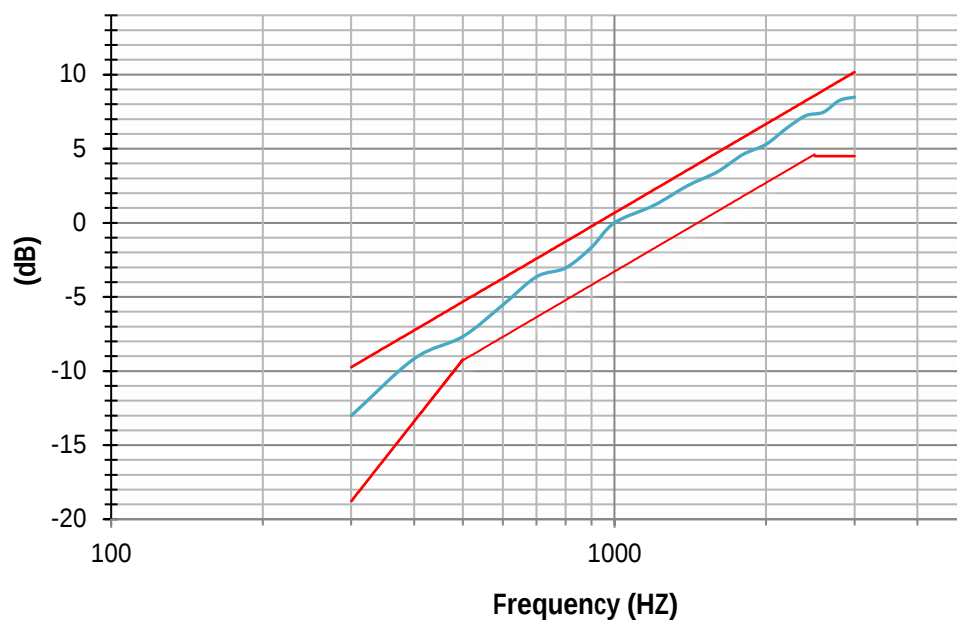
(Modulation Type:GFSK,Channel Separation:25kHz)- Low Power

Audio Frequency(Hz)	Audio Frequency Response(dB)	Result
300	-12.90	PASS
400	-9.17	
500	-7.70	
600	-5.42	
700	-3.77	
800	-2.87	
900	-1.66	
1000	0.00	
1200	1.08	
1400	2.62	
1600	3.32	
1800	4.71	
2000	5.31	
2200	6.37	
2400	7.11	
2600	7.54	
2800	8.05	
3000	8.36	



(Modulation Type:GFSK,Channel Separation:25kHz)- High Power

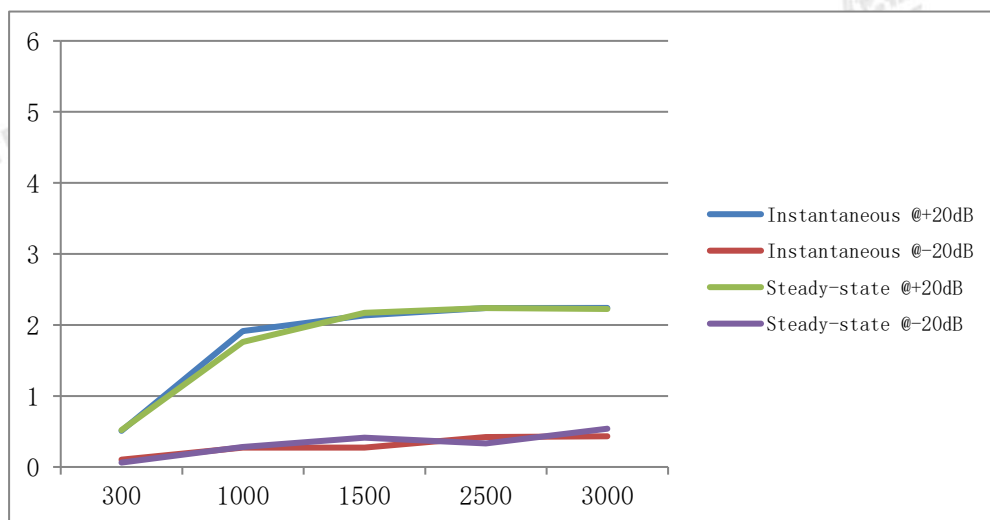
Audio Frequency	Audio Frequency Response	Result
(Hz)	(dB)	PASS
300	-13.01	
400	-9.17	
500	-7.67	
600	-5.54	
700	-3.64	
800	-3.04	
900	-1.66	
1000	0.00	
1200	1.19	
1400	2.52	
1600	3.43	
1800	4.61	
2000	5.29	
2200	6.39	
2400	7.23	
2600	7.46	
2800	8.26	
3000	8.48	



10.3.2 Modulation Limiting

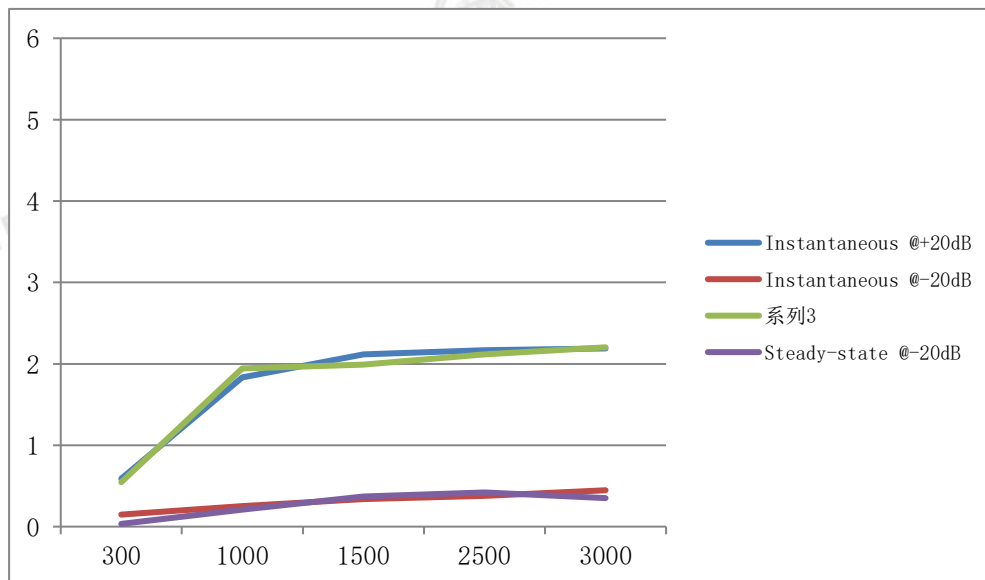
(Modulation Type:GFSK,Channel Separation:12.5kHz)- Low Power

Channl 800						
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)	Result
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)		
300	0.509	0.103	0.519	0.062	±2.5	Pass
1000	1.916	0.273	1.762	0.282		
1500	2.133	0.271	2.172	0.414		
2500	2.238	0.42	2.238	0.33		
3000	2.24	0.432	2.227	0.539		



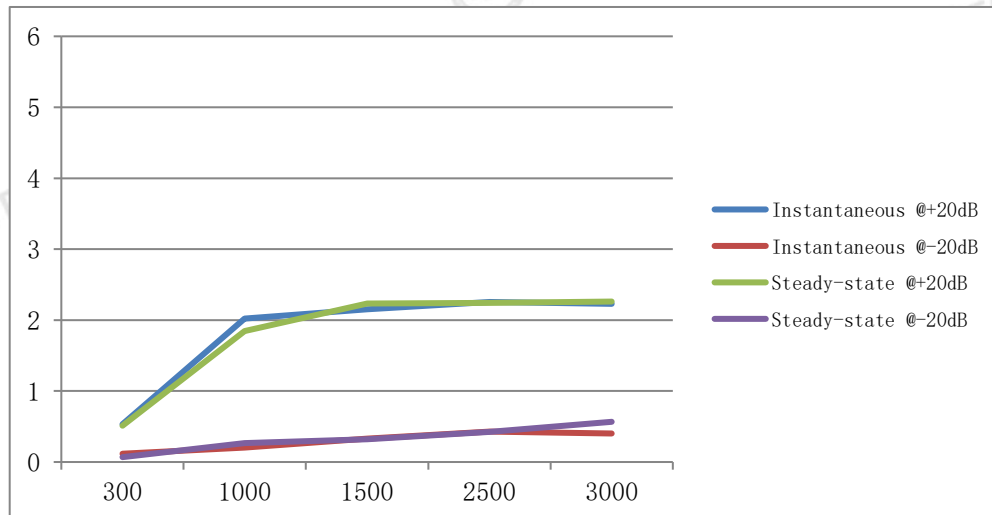
(Modulation Type:GFSK,Channel Separation:12.5kHz)- High Power

Channl 800						
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)	Result
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)		
300	0.589	0.148	0.547	0.034	±2.5	Pass
1000	1.835	0.251	1.942	0.209		
1500	2.115	0.338	1.989	0.369		
2500	2.169	0.38	2.117	0.42		
3000	2.189	0.447	2.203	0.35		



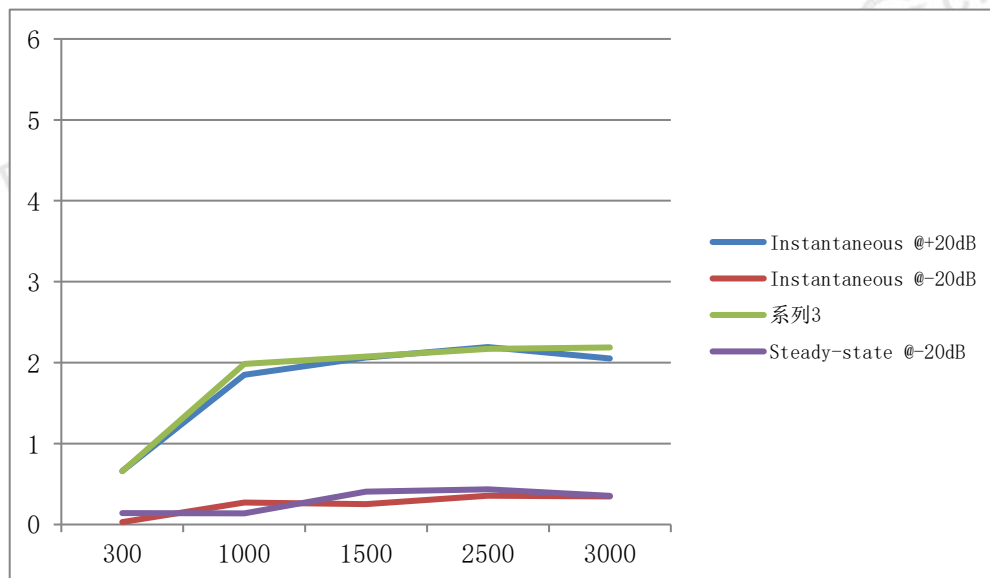
(Modulation Type:GFSK,Channel Separation:25kHz)- Low Power

Channl 800						
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)	Result
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)		
300	0.533	0.117	0.512	0.069	±2.5	Pass
1000	2.021	0.205	1.844	0.269		
1500	2.152	0.329	2.234	0.319		
2500	2.256	0.429	2.241	0.423		
3000	2.231	0.4	2.262	0.567		



(Modulation Type:GFSK,Channel Separation:25kHz)- High Power

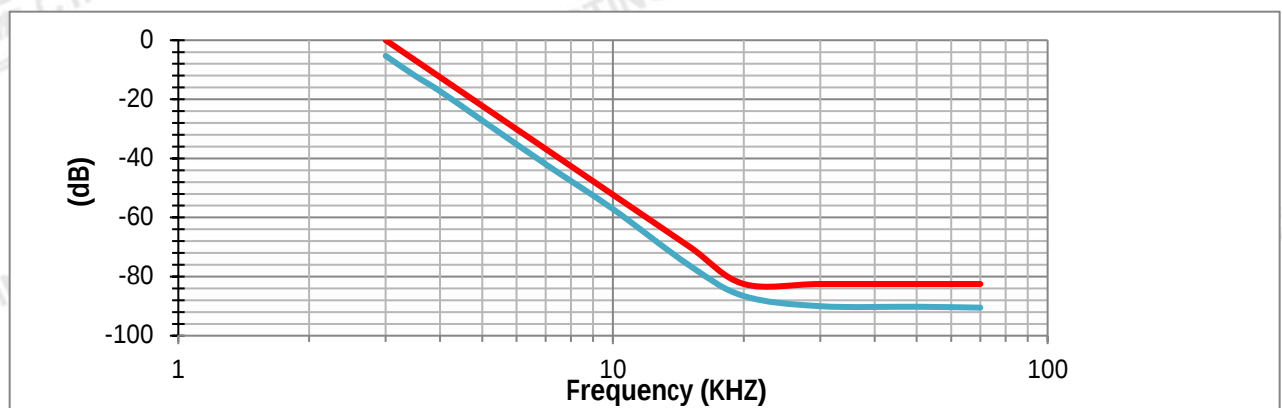
Channl 800						
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)	Result
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)		
300	0.661	0.03	0.658	0.143	±2.5	Pass
1000	1.851	0.27	1.984	0.138		
1500	2.063	0.253	2.074	0.407		
2500	2.193	0.356	2.172	0.435		
3000	2.053	0.345	2.188	0.354		



10.3.3 Audio Low Pass Filter Response

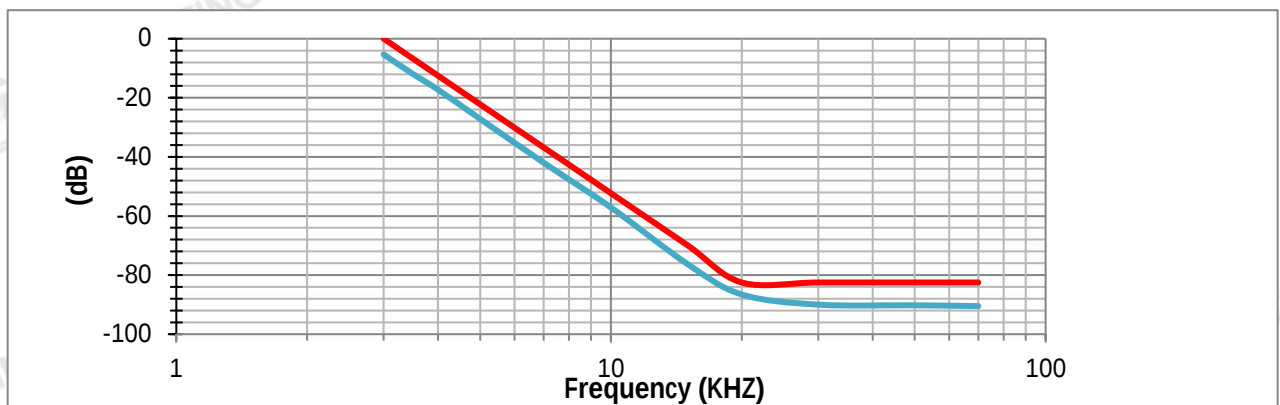
(Modulation Type:GFSK,Channel Separation:12.5kHz)- Low Power

Audio Frequency(KHz)	Limit	Response Attenuation(dB)	Result
3	0	-5.30	Pass
3.5	-6.7	-11.96	
4	-12.5	-17.25	
5	-22.2	-27.15	
7	-36.8	-41.97	
10	-52.3	-57.15	
15	-69.9	-76.24	
20	-82.5	-86.57	
30	-82.5	-90.01	
50	-82.5	-90.20	
70	-82.5	-90.50	



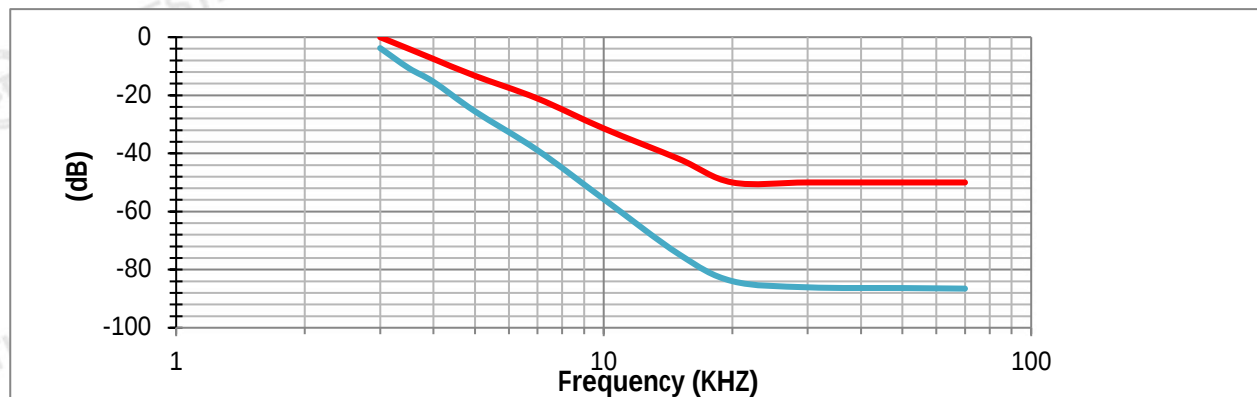
(Modulation Type:GFSK,Channel Separation:12.5kHz)- High Power

Audio Frequency(KHz)	Limit	Response Attenuation(dB)	Result
3	0	-5.34	Pass
3.5	-6.7	-11.91	
4	-12.5	-17.24	
5	-22.2	-27.14	
7	-36.8	-41.96	
10	-52.3	-57.13	
15	-69.9	-76.26	
20	-82.5	-86.56	
30	-82.5	-90.00	
50	-82.5	-90.22	
70	-82.5	-90.49	



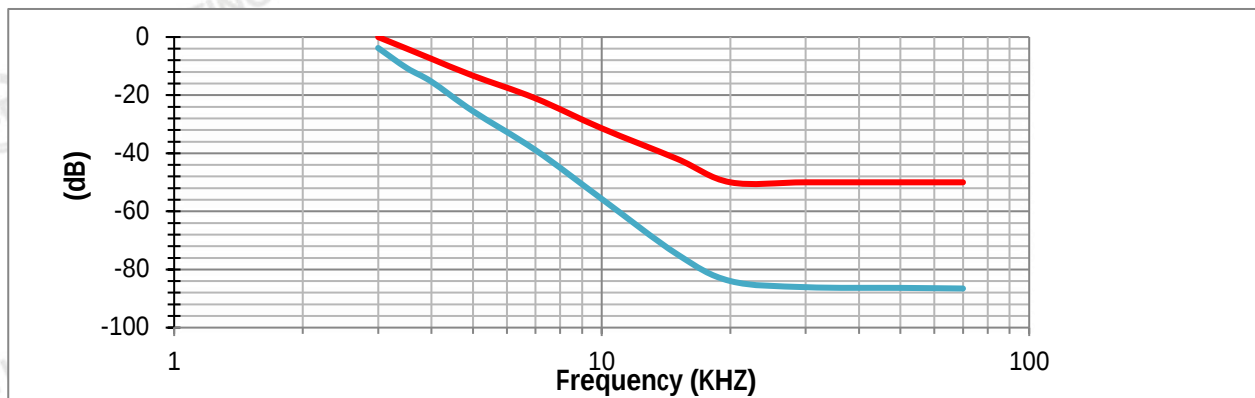
(Modulation Type:GFSK,Channel Separation:25kHz)- Low Power

Audio Frequency(KHz)	Limit	Response Attenuation(dB)	Result
3	0	-3.75	Pass
3.5	-4	-10.65	
4	-7.5	-15.38	
5	-13.3	-25.53	
7	-21.1	-38.90	
10	-31.4	-55.71	
15	-41.9	-74.70	
20	-50	-83.97	
30	-50	-86.08	
50	-50	-86.34	
70	-50	-86.53	



(Modulation Type:GFSK,Channel Separation:25kHz)- High Power

Audio Frequency(KHz)	Limit	Response Attenuation(dB)	Result
3	0	-3.76	Pass
3.5	-4	-10.66	
4	-7.5	-15.37	
5	-13.3	-25.51	
7	-21.1	-38.91	
10	-31.4	-55.70	
15	-41.9	-74.71	
20	-50	-83.98	
30	-50	-86.08	
50	-50	-86.33	
70	-50	-86.54	



11. PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

*****END OF THE REPORT*****