



Radio Test Report

Report No.: STS2512548W02

Issued for

Archimedes Innovation Technology Co., Ltd.

Room 604, Building 37, No. 333, Qinjiang Road, Xuhui District,
Shanghai, China

Product Name: Geodetic GNSS Receiver

Brand Name: 

Model Name: AR15

Series Model(s) N/A

FCC ID: 2BQV3-AL16

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 STS Test Services Co., Ltd.

**TEST REPORT****Applicant's Name**.....: Archimedes Innovation Technology Co., Ltd.Address.....: Room 604, Building 37, No. 333, Qinjiang Road, Xuhui District,
Shanghai, China**Manufacture's Name**.....: Archimedes Innovation Technology Co., Ltd.Address.....: Room 604, Building 37, No. 333, Qinjiang Road, Xuhui District,
Shanghai, China**Product Description**

Product Name: Geodetic GNSS Receiver

Brand Name: 

Model Name.....: AR15

Series Model: N/A

Test Standards.....: FCC Part 90

Test Procedure: ANSI C63.26-2015

This device described above has been tested by STS, 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.

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Date of Test.....:

Date of receipt of test item.....: 26 July 2025

Date of performance of tests.: 26 July 2025 ~ 18 Aug. 2025

Date of Issue.....: 15 Jan. 2026

Test Result.....: Pass

Testing Engineer:



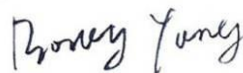
(Lenon Hou)

Technical Manager:



(Skylar Li)

Authorized Signatory:



(Bovey Yang)





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	8
2.3 DESCRIPTION OF TEST MODES	9
2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	9
2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	10
2.6 TEST EQUIPMENT	11
3. MAXIMUM TRANSMITTER POWER	12
3.1 LIMITS	12
3.2 TEST PROCEDURE	12
3.3 DEVIATION FROM TEST STANDARD	12
3.4 TEST SETUP BLOCK DIAGRAM	12
3.5 TEST RESULT	12
4. OCCUPIED BANDWIDTH	15
4.1 LIMIT	15
4.2 MEASUREMENT PROCEDURE	15
4.3 TEST SETUP BLOCK DIAGRAM	15
4.4 TEST RESULT	15
5. EMISSION MASK	18
5.1 PROVISIONS APPLICABLE	18
5.2 MEASUREMENT PROCEDURE	18
5.3 TEST SETUP BLOCK DIAGRAM	18
5.4 MEASUREMENT RESULT	19
6. TRANSMITTER RADIATED SPURIOUS EMSSION	21
6.1 PROVISIONS APPLICABLE	21
6.2TEST PROCEDURE	21
6.3 TEST CONFIGURATION	22
6.4 TEST RESULT	23
7. SPURIOUS EMSSION ON ANTENNA PORT	29
7.1 PROVISIONS APPLICABLE	29
7.2 MEASUREMENT PROCEDURE	29
7.3 TEST SETUP BLOCK DIAGRAM	29



Table of Contents	Page
7.4 TEST RESULT	30
8. FREQUENCY STABILITY	33
8.1 PROVISIONS APPLICABLE	33
8.2 MEASUREMENT PROCEDURE	33
8.3 TEST SETUP BLOCK DIAGRAM	33
8.4 TEST RESULT	34
9. TRANSIENT FREQUENCY BEHAVIOR	36
9.1 PROVISIONS APPLICABLE	36
9.2 MEASUREMENT PROCEDURE	36
9.3 TEST SETUP BLOCK DIAGRAM	37
9.4 TEST RESULT	38
10. MODULATION CHARACTERISTIC	39
10.1 LIMIT	39
10.2 TEST PROCEDURE	39
10.3 TEST RESULT	40
11. PHOTOS OF TEST SETUP	43

**Revision History**

Rev.	Issue Date	Report No.	Effect Page	Contents
00	18 Aug. 2025	STS2507163W02	ALL	Initial Issue
01	15 Jan. 2026	STS2512548W02	ALL	Update model, remove laser function. Retesting low-frequency stray radiation.



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 STS TEST SERVICES CO., LTD

Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.68\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.988\text{dB}$
3	All emissions, radiated 30-1GHz	$\pm 5.6\text{dB}$
4	All emissions, radiated 1G-6GHz	$\pm 5.5\text{dB}$
5	All emissions, radiated >6G	$\pm 5.8\text{dB}$
6	Conducted Emission (9KHz-150KHz)	$\pm 3.37\text{dB}$
7	Conducted Emission (150KHz-30MHz)	$\pm 3.83\text{dB}$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name	Geodetic GNSS Receiver
Brand Name	
Model Name	AR15
Series Model	N/A
Model Difference description	N/A
Operation Frequency Range	410MHz - 470MHz
Maximum Transmitter Power	33dBm
Channel Separation:	12.5KHz
Modulation type	FM
Rating	Input: 5V $\sim$ 3A or 15V $\sim$ 2A
Adapter	N/A
Battery	N/A
Temperature Range	0 $^{\circ}$ C-40 $^{\circ}$ C
Test frequency list	See Note 3
Software version number	N/A
Hardware version number	N/A

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	N/A	AR15	External	N/A	2	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:

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	410.125	2	410.250	3	410.375	4	410.500
.....		211	440.125				
418	469.5	419	469.625	420	469.75	421	469.875

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	Modulation Type	Channel Separation	Frequency
Mode1	GFSK	12.5kHz	Low channel(410.125MHz)
			Mid channel(440.125MHz)
			High channel(469.875MHz)

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.

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

Item	Shielded Type	Ferrite Core	Length	Note
N/A	N/A	N/A	N/A	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

RF Radiation Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2025.02.24	2026.02.23
Wireless Communications Test Set	R&S	CMW 500	117239	2024.09.23	2025.09.22
Pre-Amplifier(0.1M-3GHz)	EM	EM330	060665	2025.02.22	2026.02.21
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2024.09.23	2025.09.22
Positioning Controller	MF	MF-7802	MF-780208587	N/A	N/A
Signal Analyzer	R&S	FSV 40-N	101823	2024.09.23	2025.09.22
Switch Control Box	N/A	N/A	N/A	N/A	N/A
Filter Box	BALUN Technology	SU319E	BL-SZ1530051	N/A	N/A
Video Controller	SKET	FCS C-3	N/A	N/A	N/A
Bilog Antenna	TESEQ	CBL6111D	34678	2024.09.30	2025.09.29
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2024.09.25	2025.09.24
Antenna Mast	MF	MFA-440H	N/A	N/A	N/A
Turn Table	MF	N/A	N/A	N/A	N/A
AC Power Source	APC	KDF-11010G	F214050035	N/A	N/A
DC Power Supply	Zhaoxin	RXN 605D	20R605D11010081	N/A	N/A
Test SW	EMC Test Software	15.2.0.339			
RF Connected Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2025.02.24	2026.02.23
Universal Radio communication tester	R&S	CMU200	119907	2025.02.22	2026.02.21
Signal Generator	Agilent	N5182A	MY46240556	2024.09.23	2025.09.22
Signal Analyzer	Agilent	N9020A	MY52440124	2025.02.22	2026.02.21
Intercom comprehensive tester	HP	8920A	348A05658	2025.02.22	2026.02.21
Temperature & Humidity Test Chamber	Safety test	AG80L	171200018	2025.02.22	2026.02.21
Programmable Power Supply	Agilent	E3642A	MY40002025	2024.09.23	2025.09.22
Attenuator	HP	8494B	DC-18G	2025.02.25	2026.02.24
AC Power Source	APC	KDF-11010G	F214050035	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

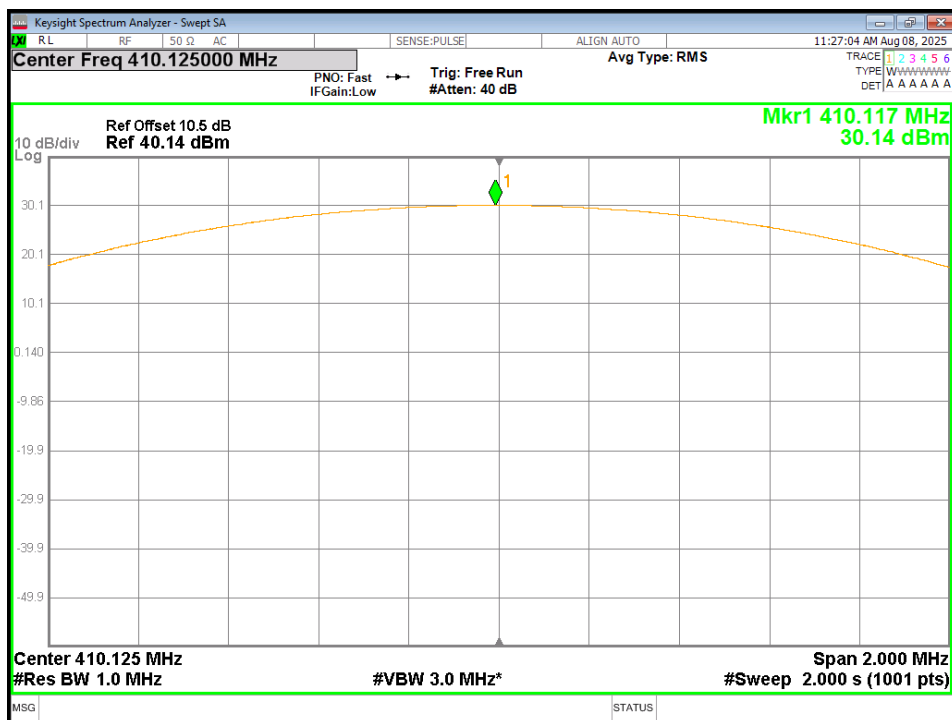
Modulation Type	Channel Sparation	Test Channel	Test Frequency (MHz)	Test Results (dBm)	Test Results (W)	Rated Output Power(W)	Limit (W)
FM	12.5KHz	Lowest	410.1250	30.140	1.03	1.0	0.8-1.2
		Middle	440.1250	30.500	1.12		
		Highest	469.8750	29.200	0.83		

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

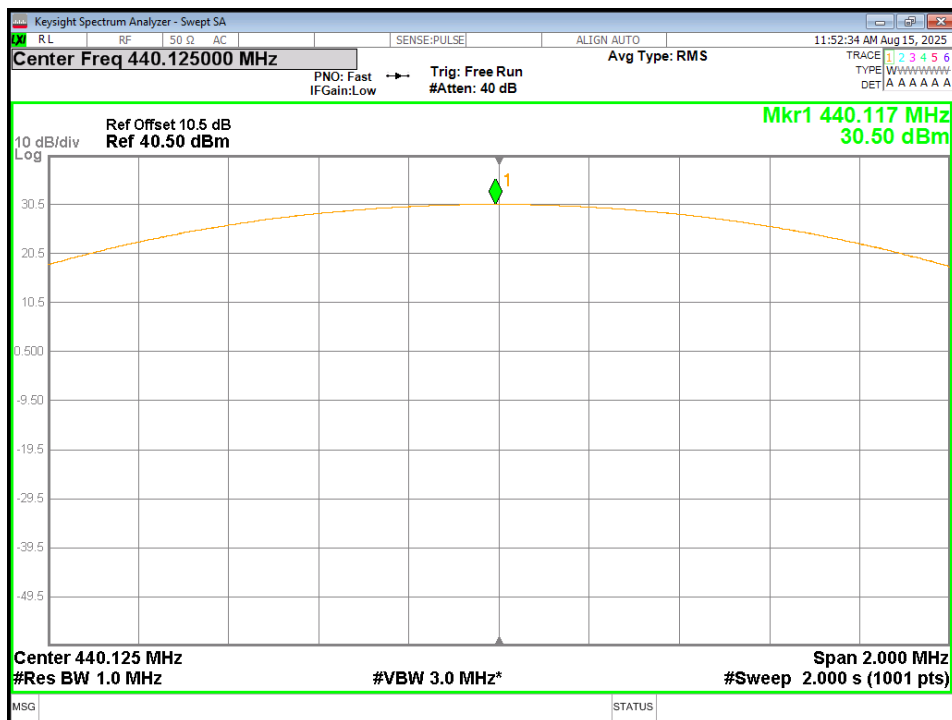
The rated high power is 5W, the power limits is 4.0 W-6.0W.



410.125 MHz

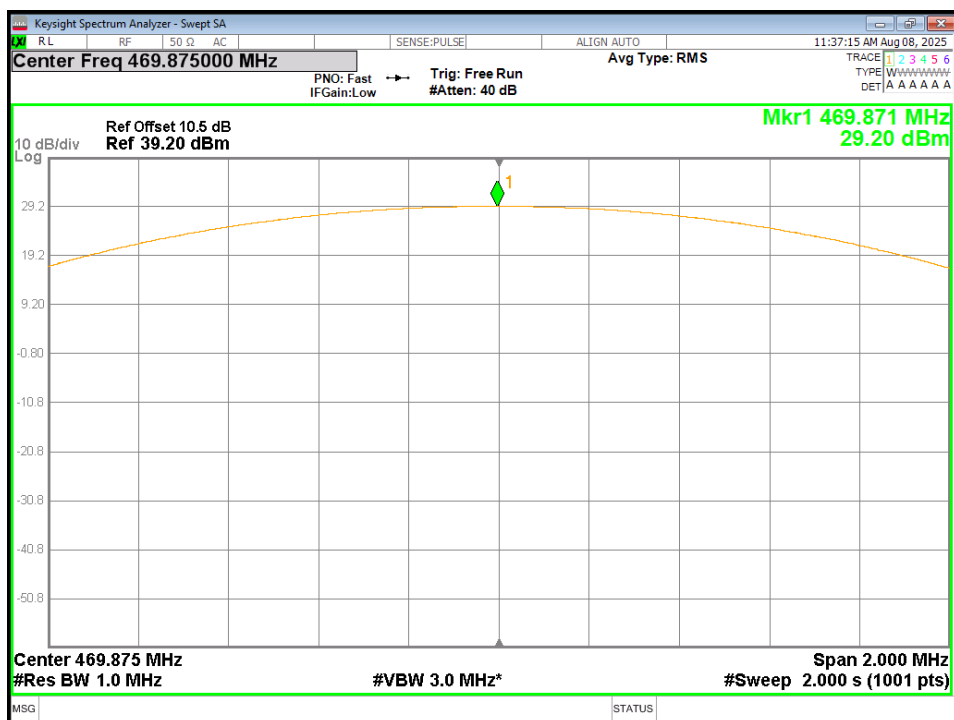


440.125 MHz





469.875 MHz



4. OCCUPIED BANDWIDTH

4.1 LIMIT

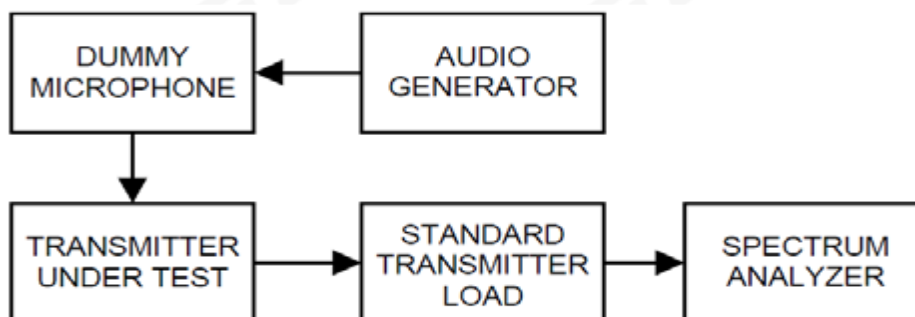
Occupied Bandwidth: The EUT was connected to the spectrum analyzer via the main RF connector, and through an appropriate attenuator. The EUT was controlled to transmit its maximum power. Then the bandwidth of 99% power can be measured by the spectrum analyzer.

The maximum authorized bandwidth shall not be more than that normally authorized for digital data mode.

4.2 MEASUREMENT PROCEDURE

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

4.3 TEST SETUP BLOCK DIAGRAM

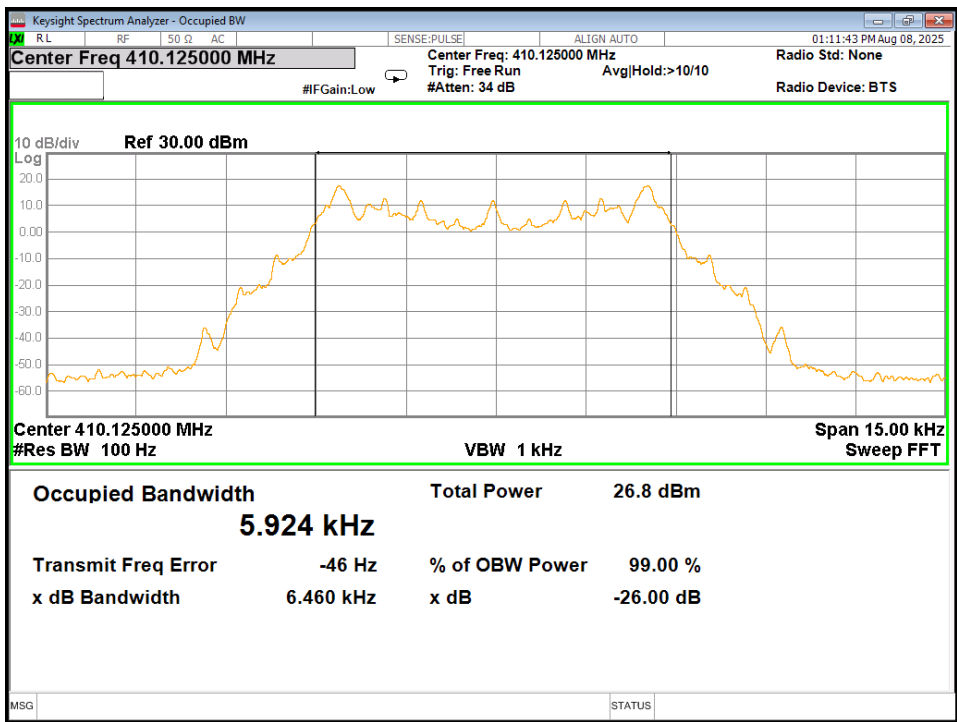


4.4 TEST RESULT

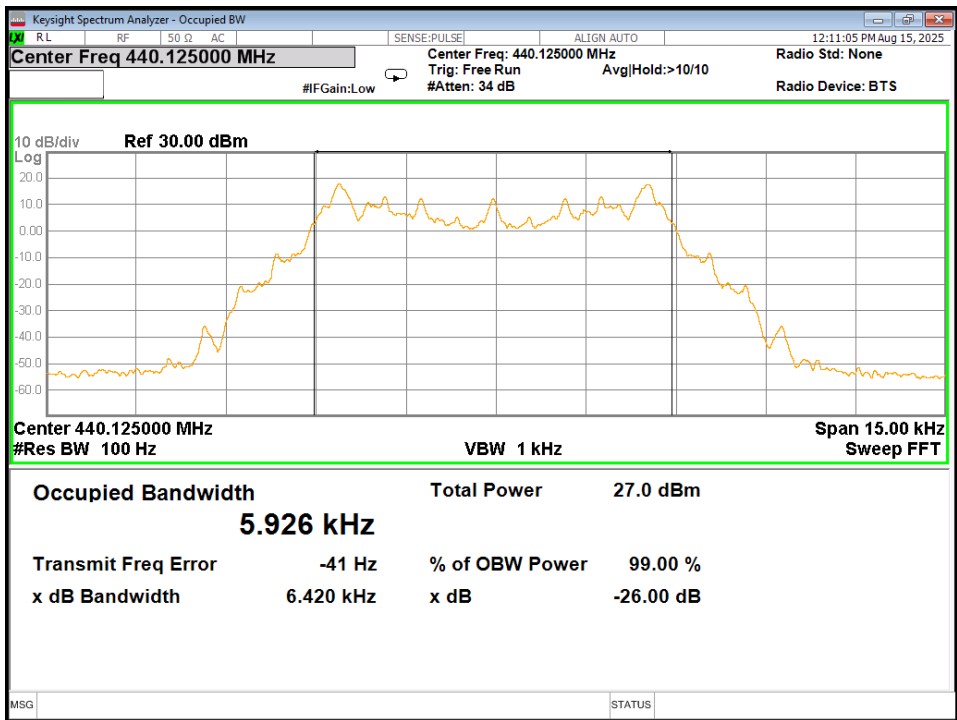
Modulation Type	Channel Bandwidth	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)		Limits (KHz)
				99%	26dB	
FM	12.5KHz	Lowest	410.1250	5.924	6.460	11.25
		Middle	440.1250	5.926	6.420	
		Highest	469.8750	5.926	6.448	



410.125 MHz

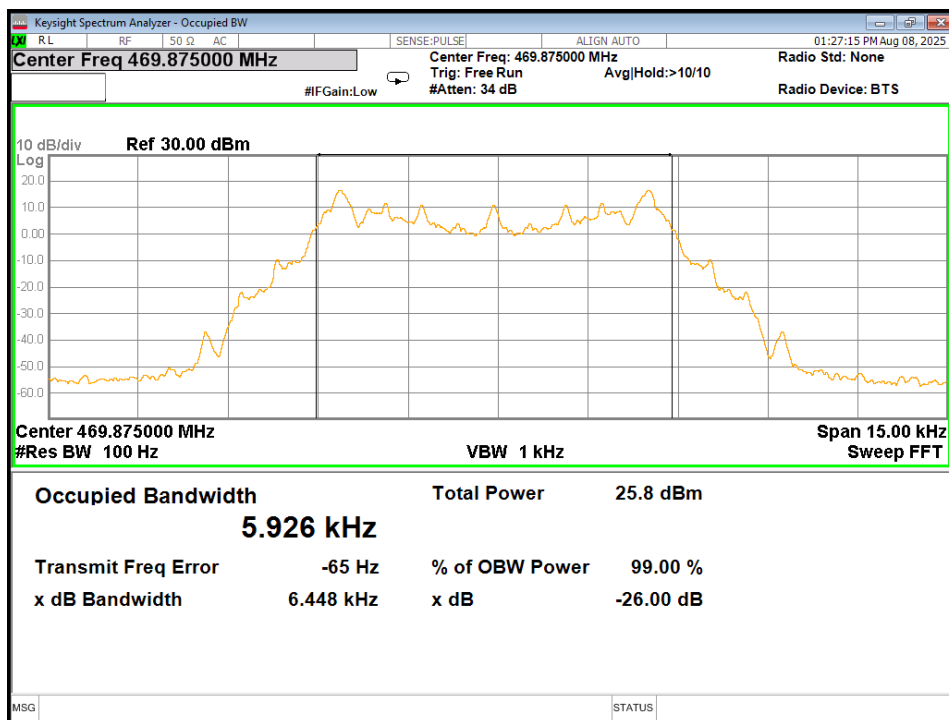


440.125 MHz





469.875 MHz



5. EMISSION MASK

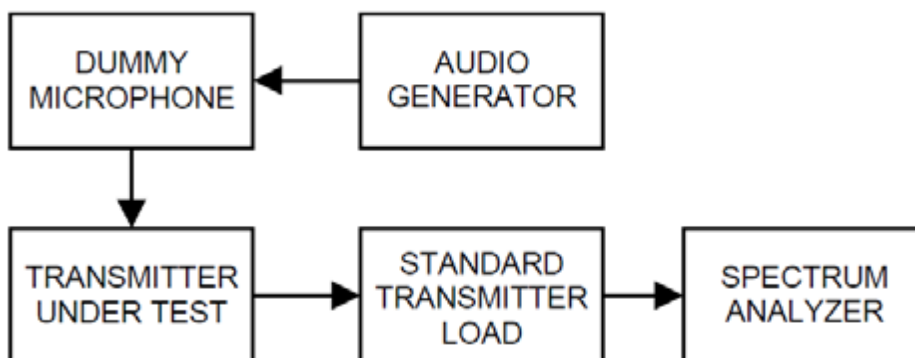
5.1 PROVISIONS APPLICABLE

- (d) *Emission Mask D—12.5 kHz channel bandwidth equipment.* For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:
- (1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : 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 5.625 kHz but no more than 12.5 kHz: At least $7.27(f_d - 2.88 \text{ kHz})$ dB.
 - (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation.
 - (4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

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

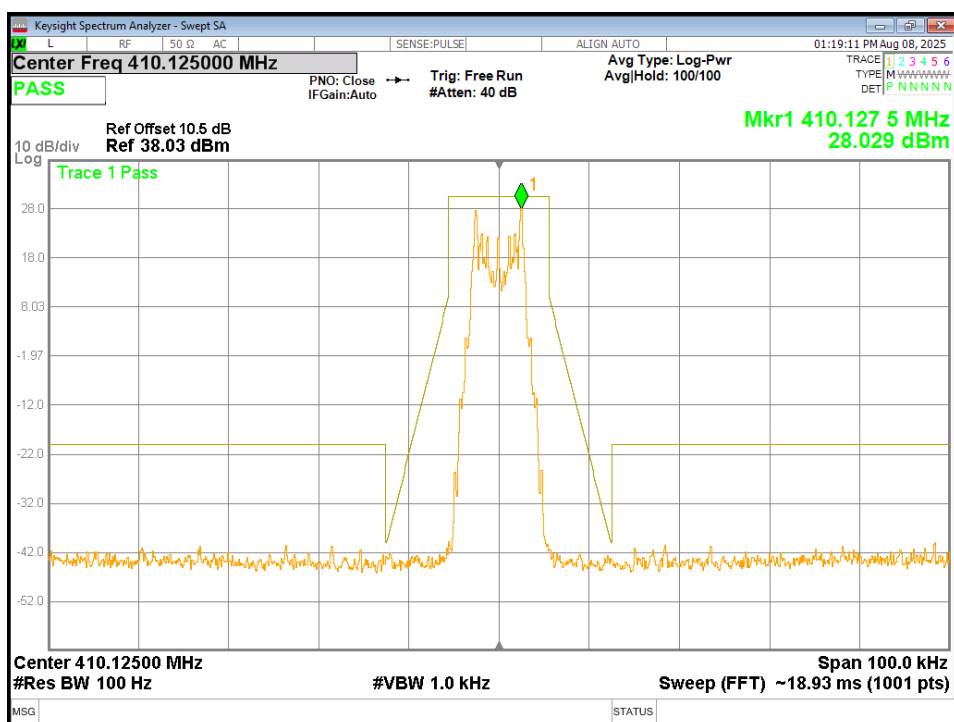




5.4 MEASUREMENT RESULT

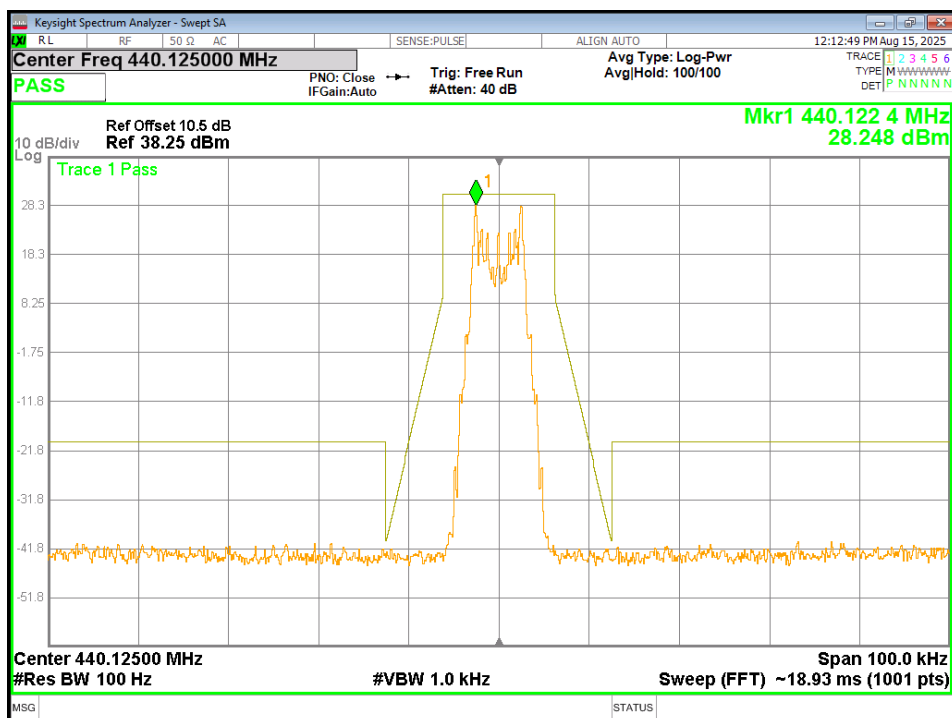
Modulation Type	Channel Bandwidth	Test Channel	Test Frequency (MHz)	Applicable Mask	Result
GFSK	12.5KHz	Lowest	410.1250	D	PASS
		Middle	440.1250	D	PASS
		Highest	469.8750	D	PASS

410.125 MHz

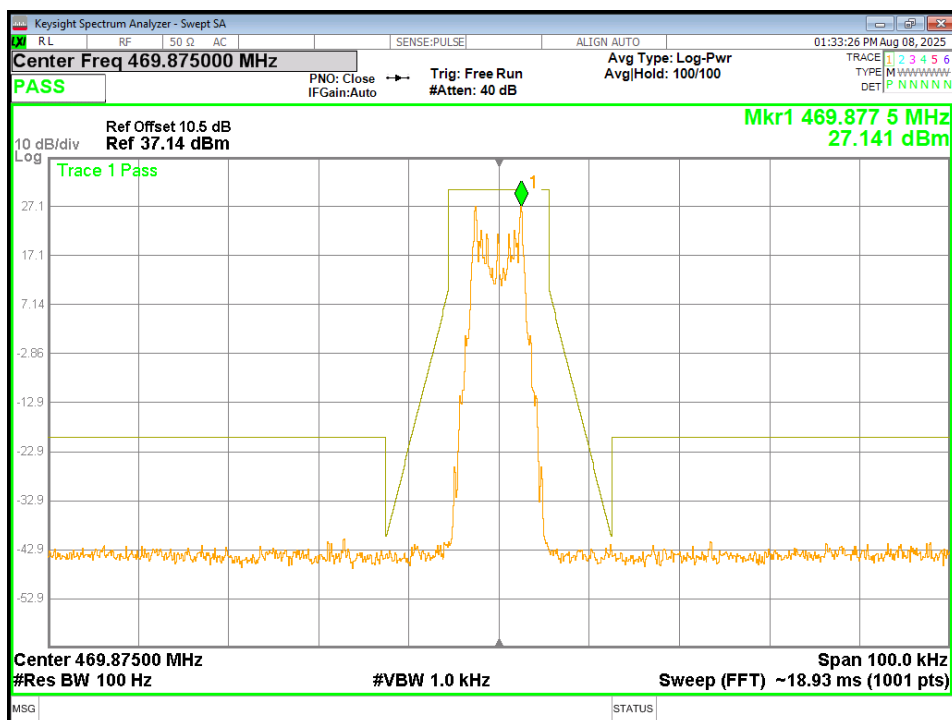




440.125 MHz



469.875 MHz





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.

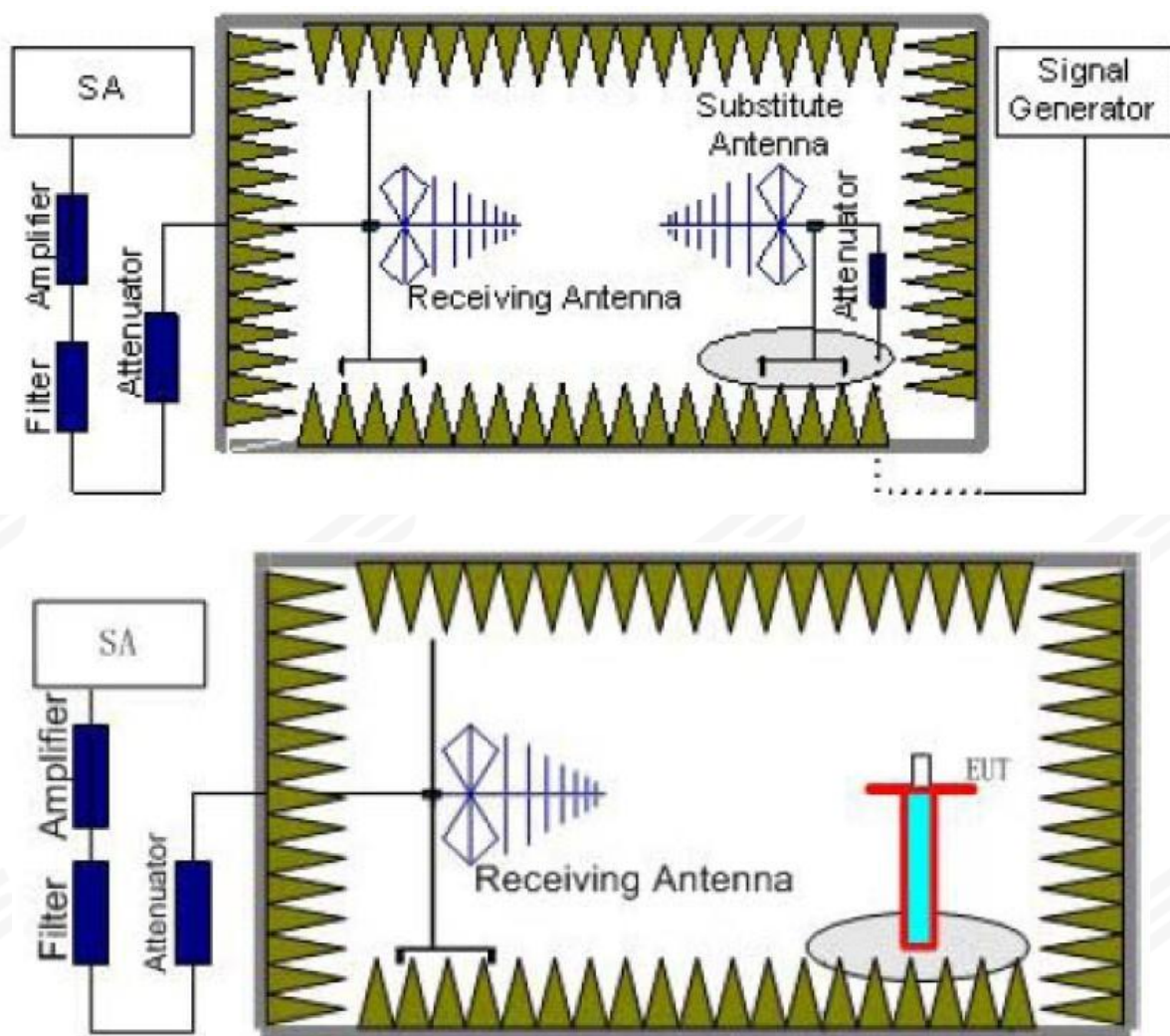
For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

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

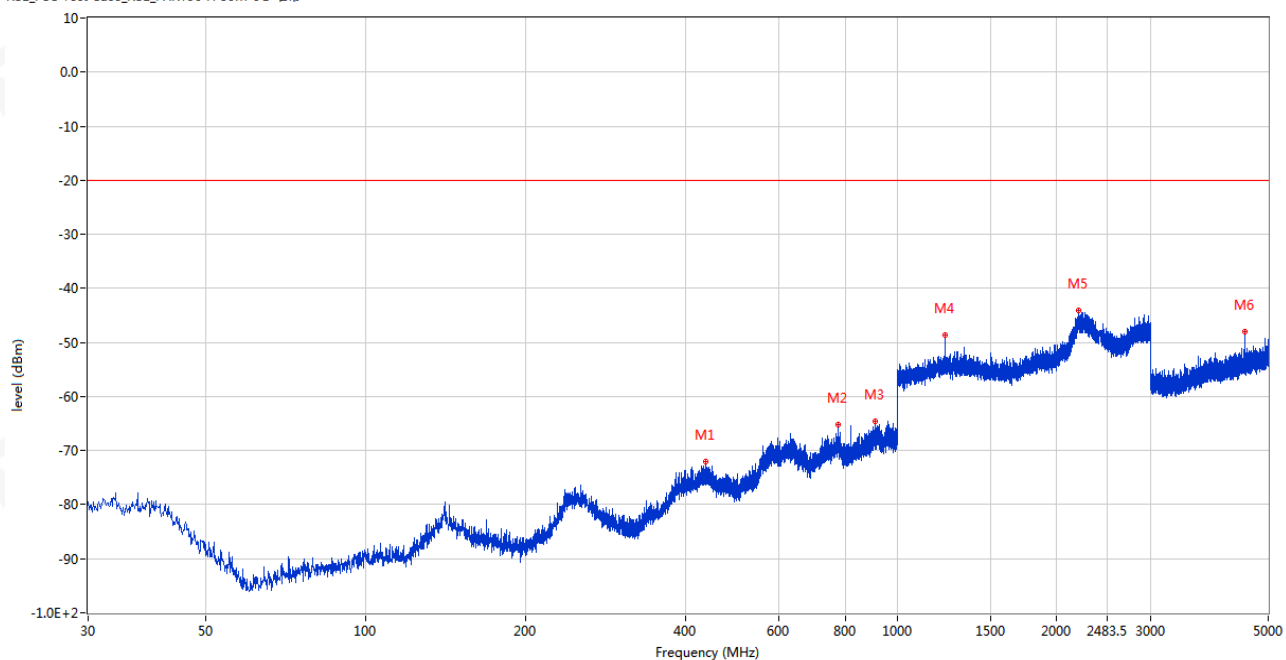
6.3 TEST CONFIGURATION



6.4 TEST RESULT

Low-H

RSE_FCC Test Case_RSE_PART90 H 30M-5G-窄带

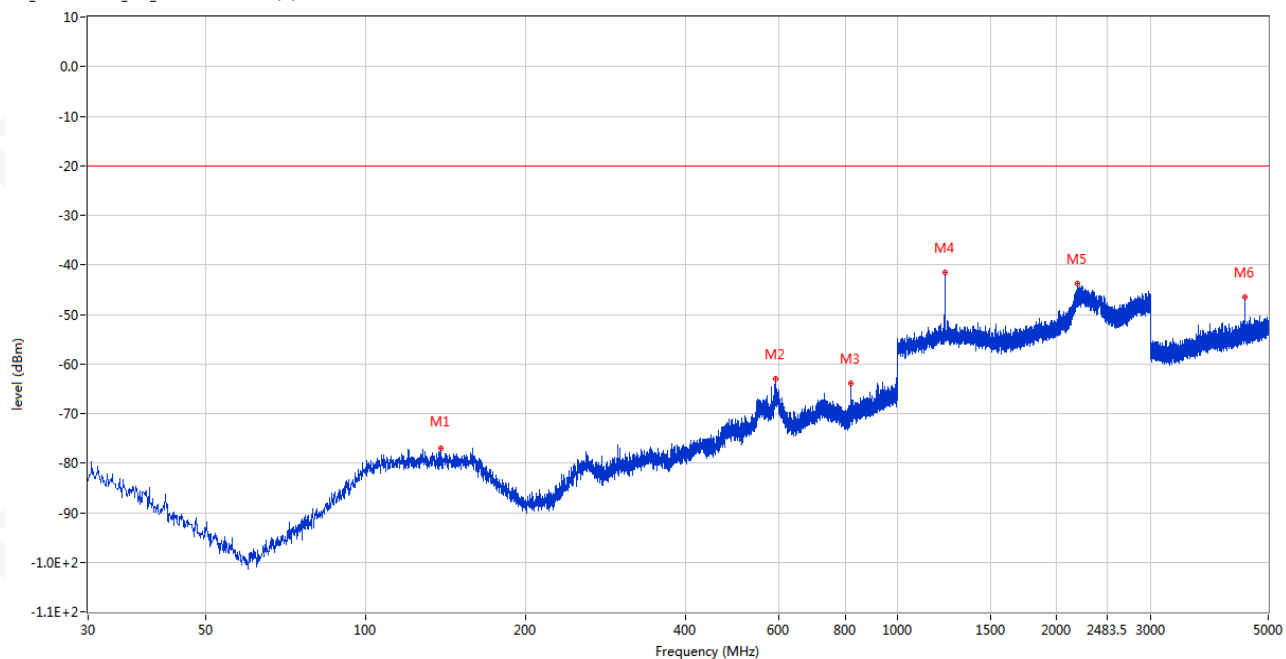


Frequency (MHz)	Result (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Table (o)	ANT	EUT	Verdict
437.036	-71.96	3.71	-20.0	51.96	298.90	Horizontal	Vertical	Pass
775.445	-65.25	7.05	-20.0	45.25	246.50	Horizontal	Vertical	Pass
909.063	-64.50	9.17	-20.0	44.50	5.40	Horizontal	Vertical	Pass
1230.250	-48.54	12.68	-20.0	28.54	305.30	Horizontal	Vertical	Pass
2193.000	-44.17	19.40	-20.0	24.17	255.00	Horizontal	Vertical	Pass
4511.750	-48.08	4.41	-20.0	28.08	90.30	Horizontal	Vertical	Pass



Low-V

RSE_FCC Test Case_RSE_PART90 V 30M-5G-窄带

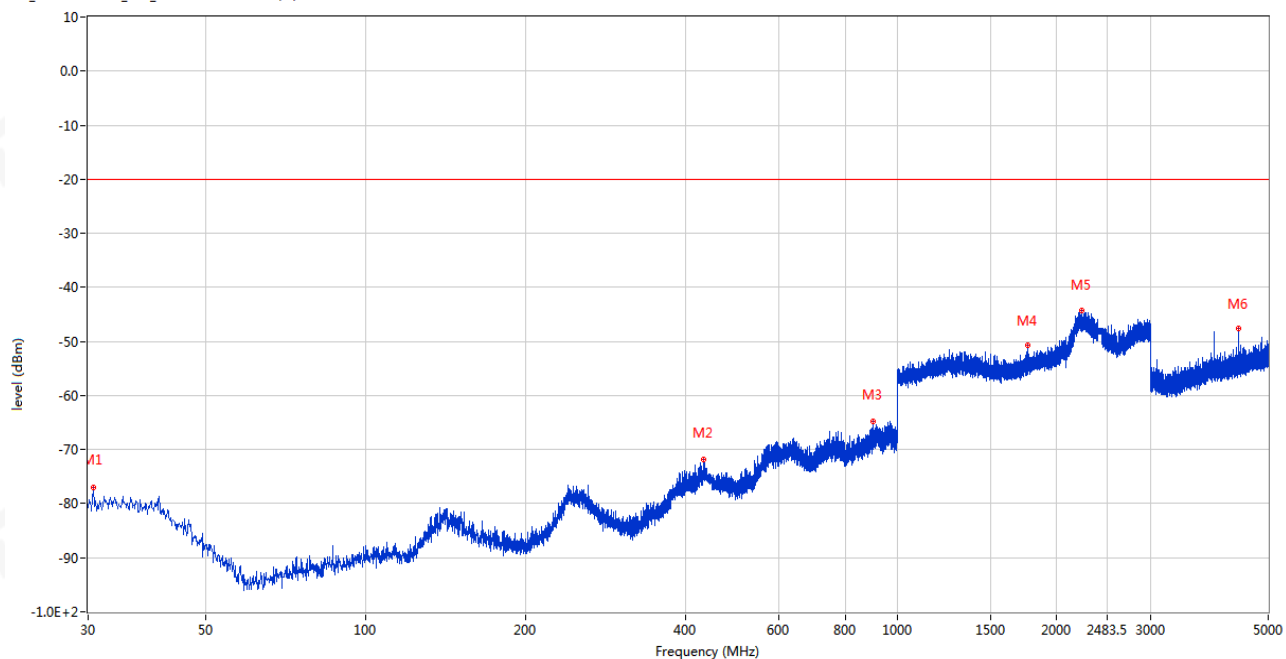


Frequency (MHz)	Result (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Table (o)	ANT	EUT	Verdict
138.155	-76.95	-1.21	-20.0	56.95	100.60	Vertical	Vertical	Pass
590.417	-62.92	5.11	-20.0	42.92	260.30	Vertical	Vertical	Pass
820.308	-63.87	6.75	-20.0	43.87	1.30	Vertical	Vertical	Pass
1230.500	-41.73	12.68	-20.0	21.73	5.20	Vertical	Vertical	Pass
2192.500	-43.83	19.38	-20.0	23.83	0.00	Vertical	Vertical	Pass
4511.750	-46.48	4.41	-20.0	26.48	276.60	Vertical	Vertical	Pass



Middle-H

RSE_FCC Test Case_RSE_PART90 H 30M-5G-窄带

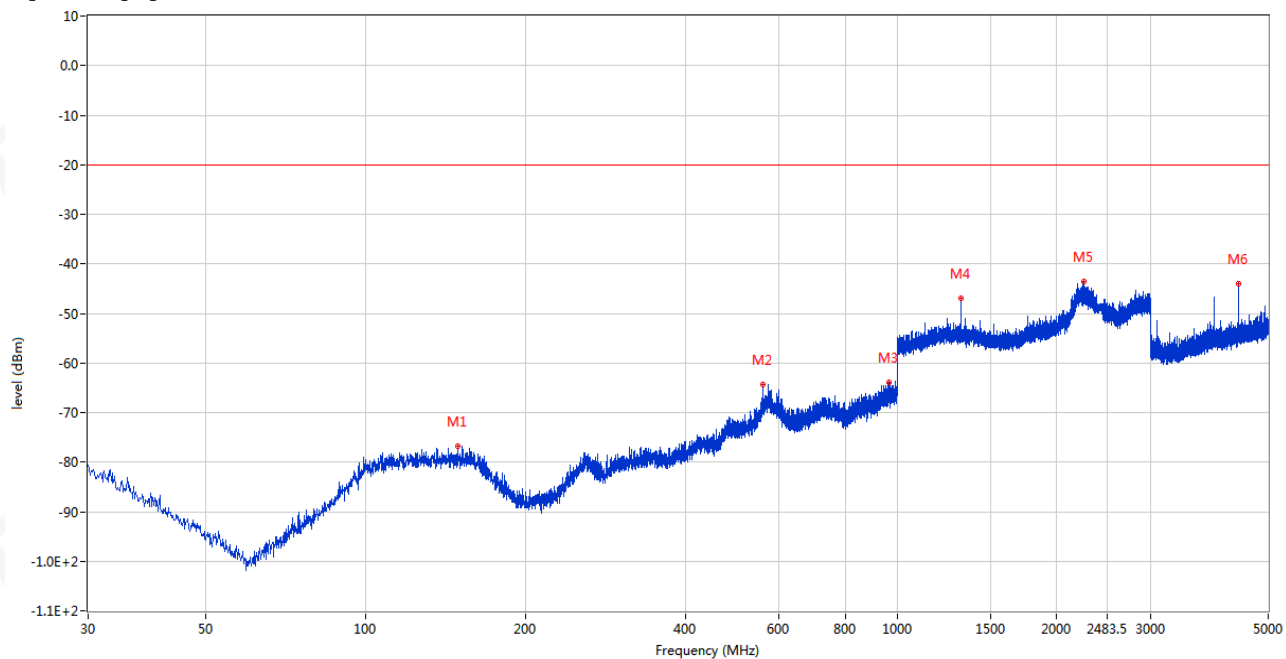


Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
30.727	-76.93	-1.91	-20.0	56.93	189.90	Horizontal	Vertical	Pass
432.914	-71.90	3.47	-20.0	51.90	74.60	Horizontal	Vertical	Pass
899.969	-64.83	8.82	-20.0	44.83	261.00	Horizontal	Vertical	Pass
1761.000	-50.67	12.36	-20.0	30.67	167.70	Horizontal	Vertical	Pass
2223.250	-44.31	19.64	-20.0	24.31	296.40	Horizontal	Vertical	Pass
4401.500	-47.61	3.81	-20.0	27.61	194.80	Horizontal	Vertical	Pass



Middle -V

RSE_FCC Test Case_RSE_PART90 V 30M-5G-窄带

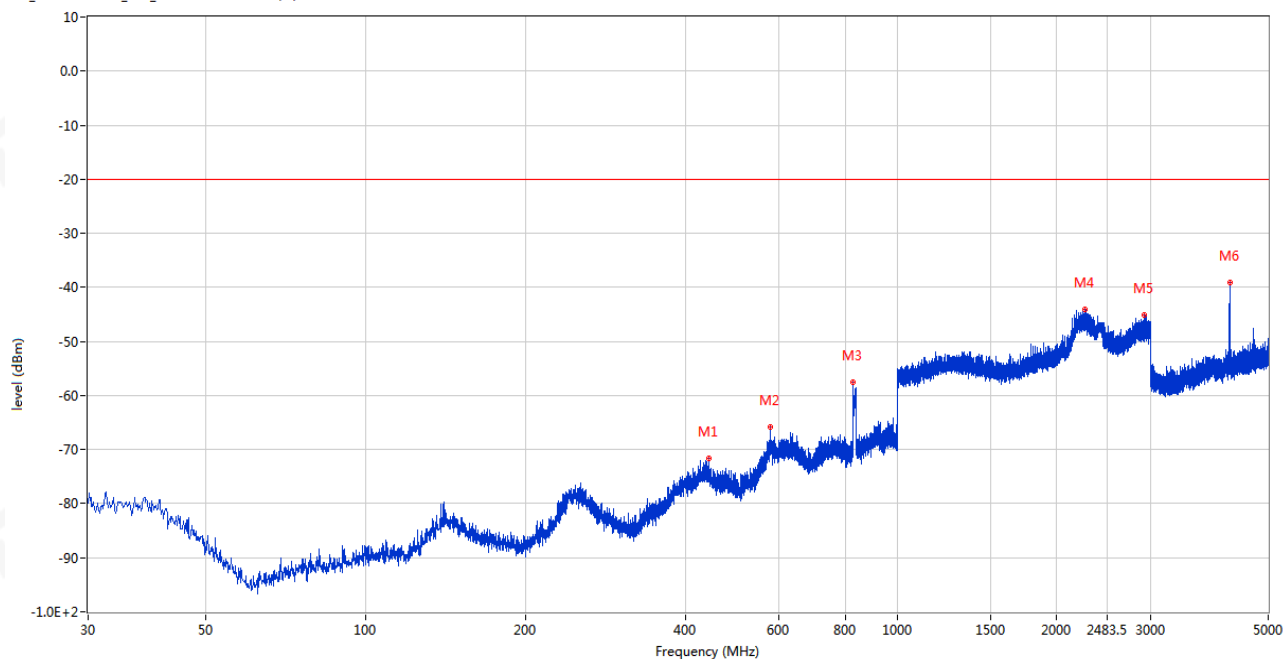


Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
148.946	-76.76	-1.54	-20.0	56.76	230.90	Vertical	Vertical	Pass
560.105	-64.33	6.43	-20.0	44.33	36.80	Vertical	Vertical	Pass
965.686	-63.93	10.13	-20.0	43.93	22.30	Vertical	Vertical	Pass
1320.500	-46.98	12.44	-20.0	26.98	21.40	Vertical	Vertical	Pass
2253.500	-43.54	19.65	-20.0	23.54	276.30	Vertical	Vertical	Pass
4401.750	-43.97	3.81	-20.0	23.97	179.90	Vertical	Vertical	Pass



High-H

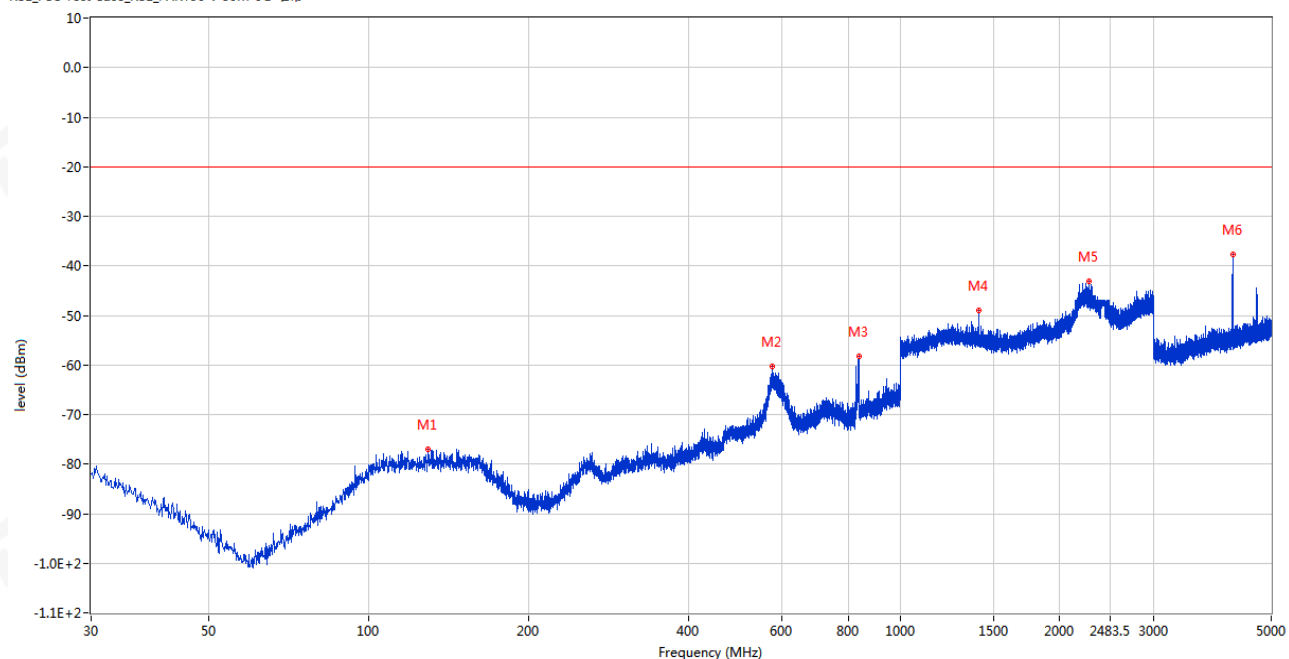
RSE_FCC Test Case_RSE_PART90 H 30M-5G-窄带



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
441.644	-71.71	3.73	-20.0	51.71	39.20	Horizontal	Vertical	Pass
578.535	-65.85	6.59	-20.0	45.85	84.20	Horizontal	Vertical	Pass
826.006	-57.62	6.58	-20.0	37.62	358.70	Horizontal	Vertical	Pass
2258.500	-44.06	19.60	-20.0	24.06	152.90	Horizontal	Vertical	Pass
2919.750	-45.04	17.55	-20.0	25.04	126.40	Horizontal	Vertical	Pass
4229.000	-39.08	3.35	-20.0	19.08	120.70	Horizontal	Vertical	Pass

High -V

RSE_FCC Test Case_RSE_PART90 V 30M-5G-窄带



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
129.304	-76.98	-1.55	-20.0	56.98	255.90	Vertical	Vertical	Pass
574.049	-60.33	5.80	-20.0	40.33	95.90	Vertical	Vertical	Pass
836.919	-58.31	7.52	-20.0	38.31	129.40	Vertical	Vertical	Pass
1409.500	-49.01	12.20	-20.0	29.01	351.60	Vertical	Vertical	Pass
2268.000	-43.19	19.50	-20.0	23.19	314.20	Vertical	Vertical	Pass
4229.000	-37.69	3.35	-20.0	17.69	312.00	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 $40.5 \log(f_d/1.6)$ 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.

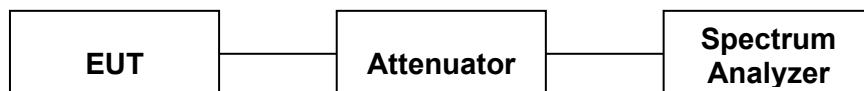
For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

- (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.

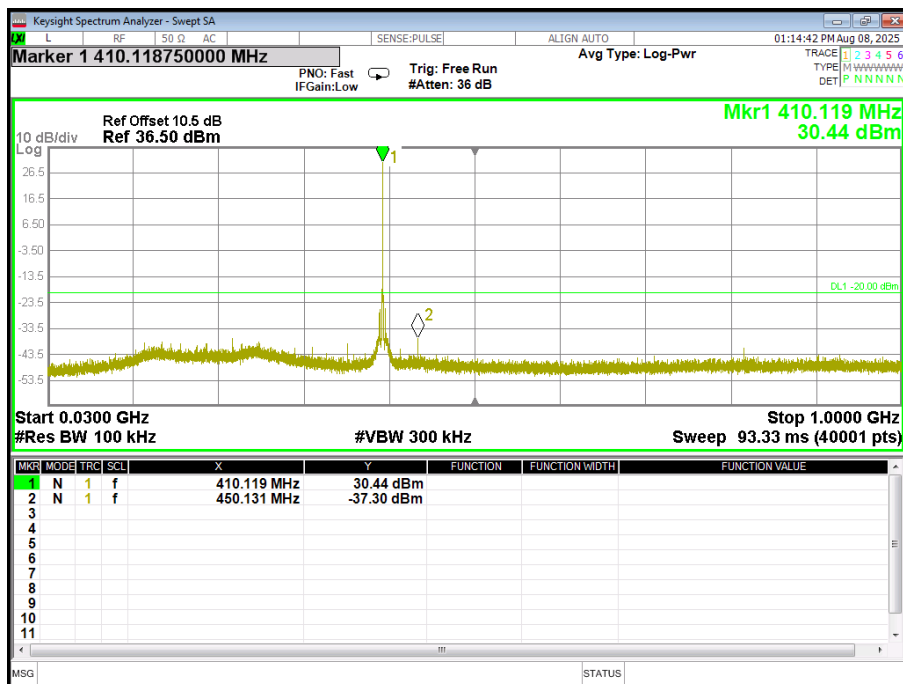
7.3 TEST SETUP BLOCK DIAGRAM



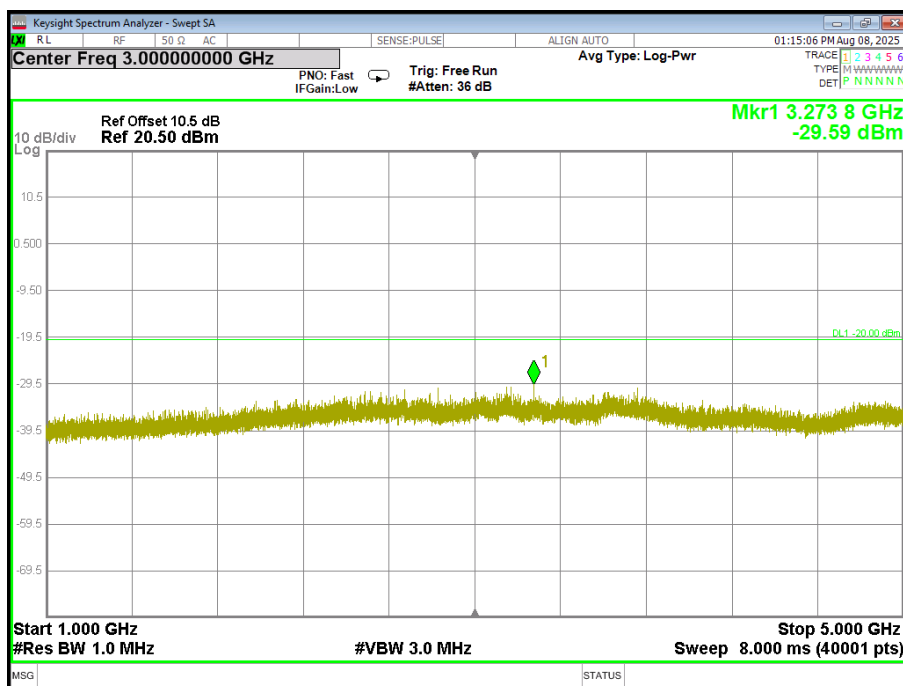


7.4 TEST RESULT

410.125 MHz 30MHz-1GHz

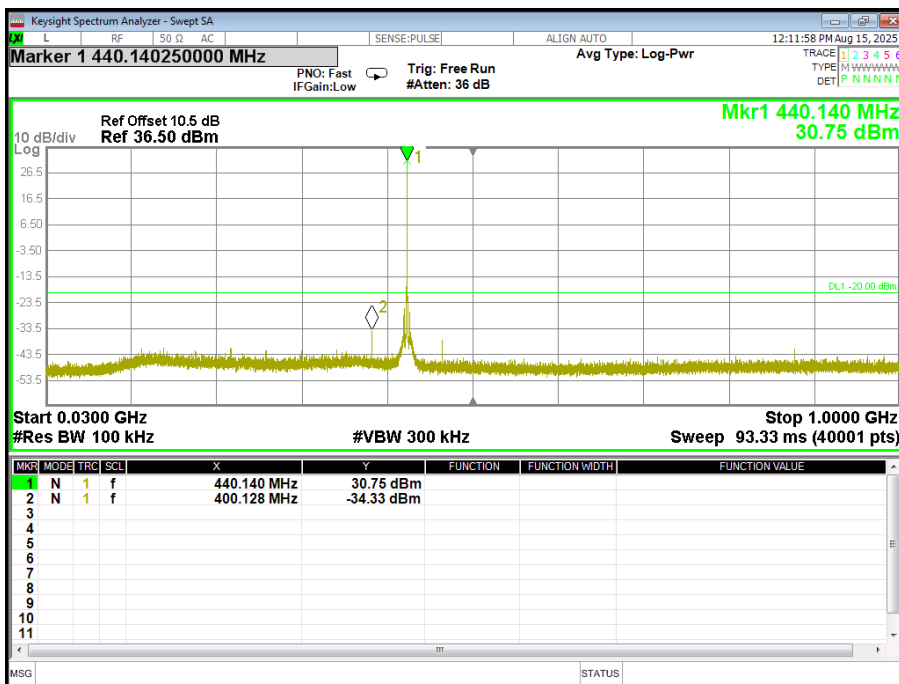


410.125 MHz 1GHz-5GHz

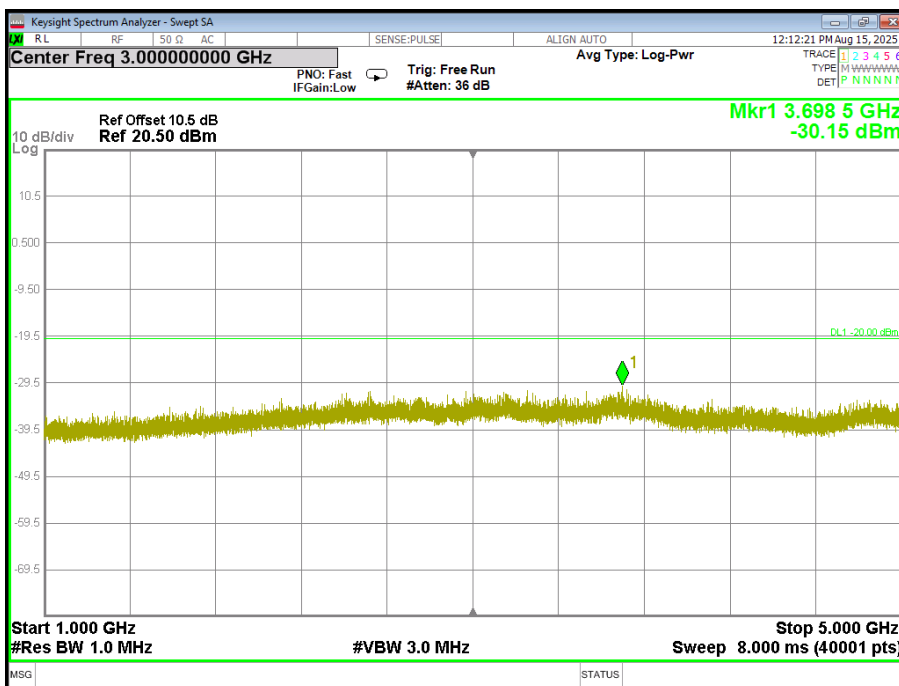




440.125 MHz 30MHz-1GHz

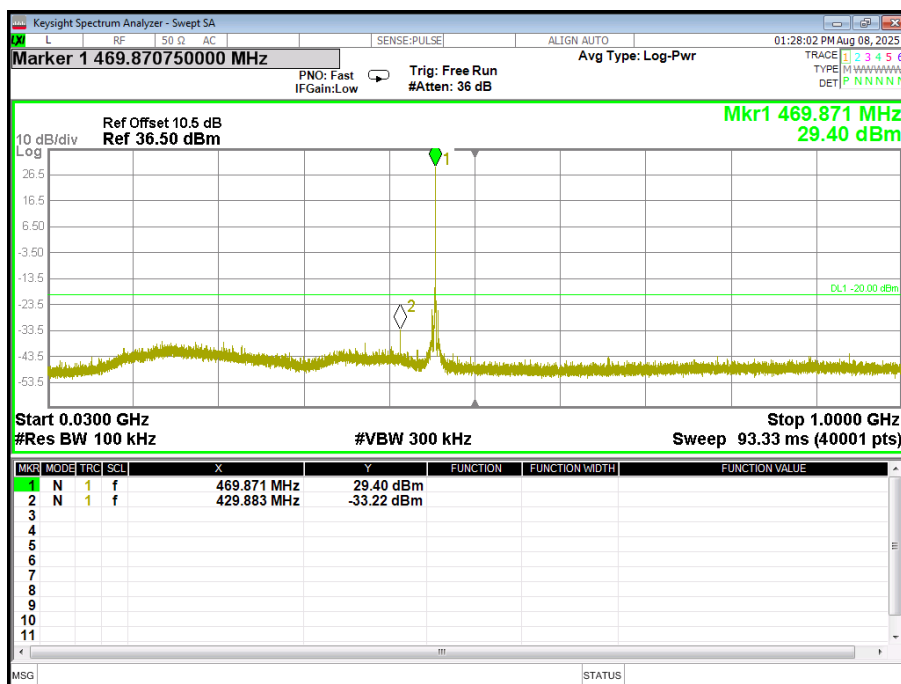


440.125 MHz 1GHz-5GHz

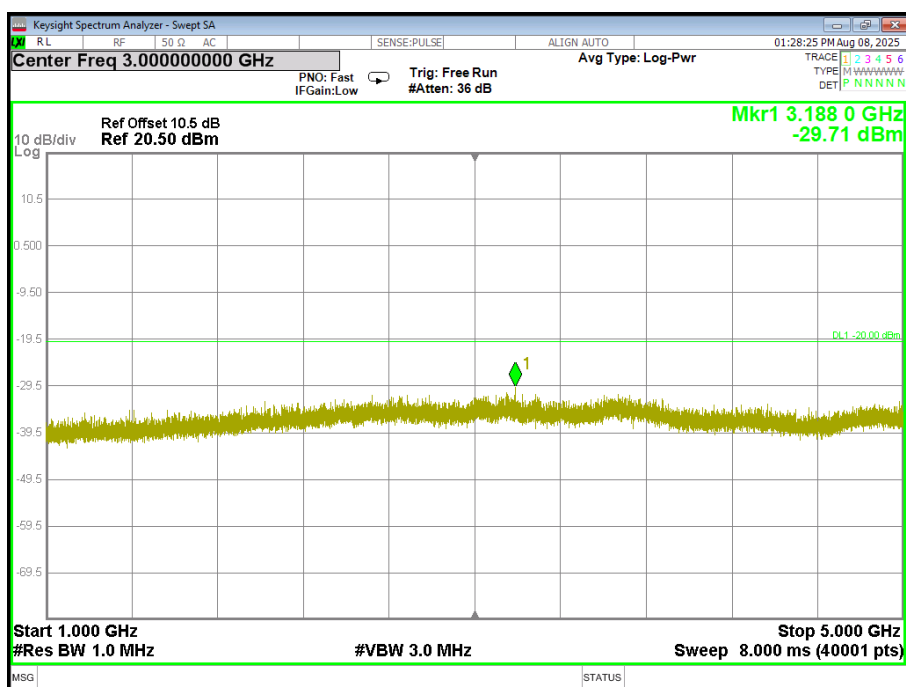




469.875 MHz 30MHz-1GHz



469.875 MHz 1GHz-5GHz



8. FREQUENCY STABILITY

8.1 PROVISIONS APPLICABLE

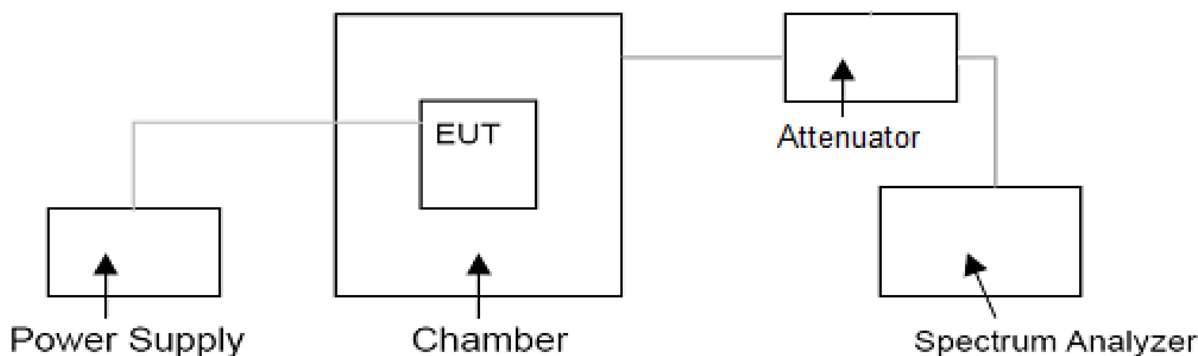
- 1) According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C centigrade.
- 2) According to FCC Part 2 Section 2.1055 (a) (2), for battery powered equipment, the frequency stability shall be measured with reducing 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 ¹ 100	100	200
25-50	20	20	50
72-76	5		50
150-174	5 ¹ 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 ¹ 11 ¹⁴ 2.5	8 ⁵	8 ⁵
806-809	14 ¹ 1.0	1.5	1.5
809-824	14 ¹ 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 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 ³ 300	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

Low Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 1	25	Normal Voltage	410.1250	410.12495	-0.122	2.5ppm	PASS
	-20		410.1250	410.12497	-0.073		
	-10		410.1250	410.12497	-0.073		
	0		410.1250	410.12499	-0.024		
	10		410.1250	410.12498	-0.049		
	20		410.1250	410.12495	-0.122		
	30		410.1250	410.12494	-0.146		
	40		410.1250	410.12492	-0.195		
	50		410.1250	410.12494	-0.146		
	20	Maximum Voltage	410.1250	410.12494	-0.146		
	20	BEP	410.1250	410.12492	-0.195		

Middle Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 1	25	Normal Voltage	440.1250	440.12495	-0.114	2.5ppm	PASS
	-20		440.1250	440.12495	-0.114		
	-10		440.1250	440.12495	-0.114		
	0		440.1250	440.12496	-0.091		
	10		440.1250	440.12495	-0.114		
	20		440.1250	440.12495	-0.114		
	30		440.1250	440.12494	-0.136		
	40		440.1250	440.12491	-0.204		
	50		440.1250	440.12491	-0.204		
	20	Maximum Voltage	440.1250	440.12491	-0.204		
	20	BEP	440.1250	440.12492	-0.182		



High Channel							
Operation Mode	Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Deviation (ppm)	Limits	Result
Mode 1	25	Normal Voltage	469.8750	469.87495	-0.106	2.5ppm	PASS
	-20		469.8750	469.87495	-0.106		
	-10		469.8750	469.87493	-0.149		
	0		469.8750	469.87490	-0.213		
	10		469.8750	469.87487	-0.277		
	20		469.8750	469.87486	-0.298		
	30		469.8750	469.87487	-0.277		
	40		469.8750	469.87490	-0.213		
	50		469.8750	469.87487	-0.277		
	20	Maximum Voltage	469.8750	469.87489	-0.234		
	20	BEP	469.8750	469.87488	-0.255		

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

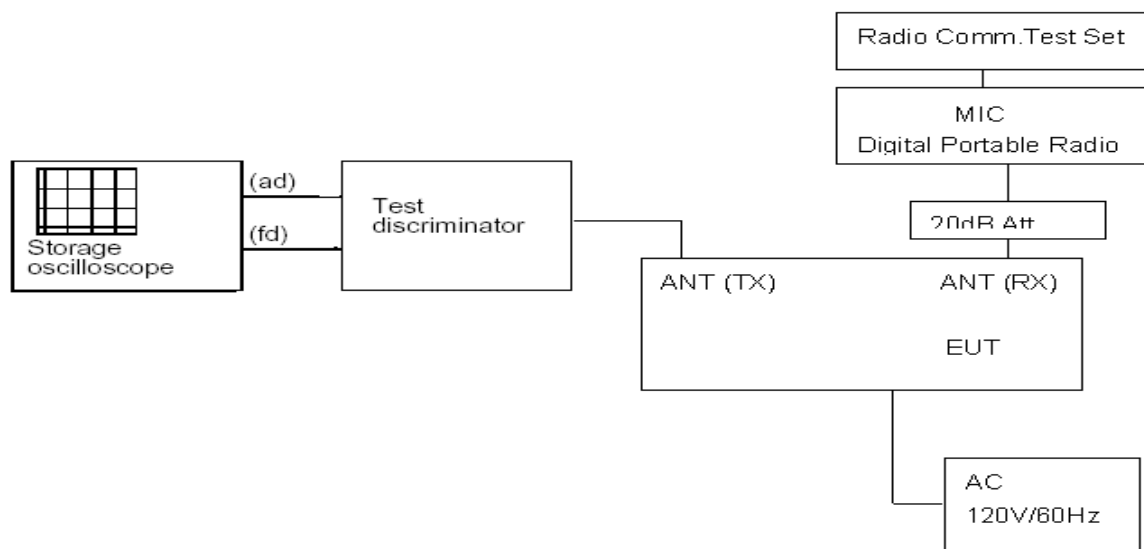
1. t_{on} is the instant when a 1 KHz test signal is completely suppressed, including any capture time due to phasing.
t₁ is the time period immediately following t_{on}.
t₂ is the time period immediately following t₁.
t₃ is the time period from the instant when the transmitter is turned off until t_{off}.
t_{off} is the instant when the 1 KHz test signal starts to rise.
2. During the time from the end of t₂ to the beginning of t₃, the frequency difference must not exceed the limits specified in § 90.213.
3. Difference between the actual transmitter frequency and the assigned transmitter frequency.
4. 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 VicitelGlobal Communications Corporation

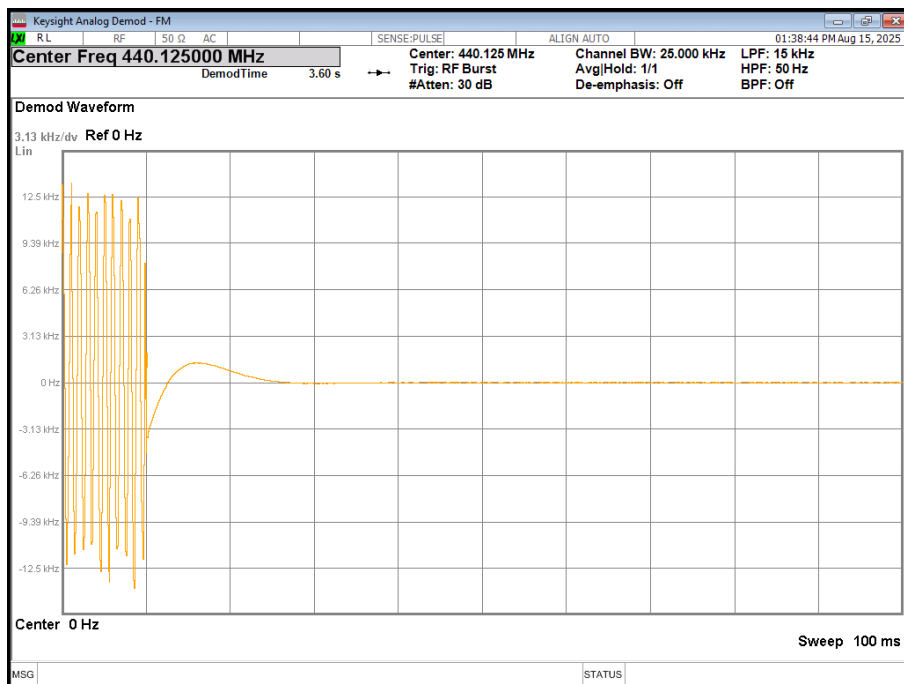
- Limited which uses same protocol as the DUT connect to RX antenna by 20Att in order to avoid damaging DUT;
- Connect DUT into Test discriminator and Storage Oscilloscope and keep DUT stats ON;
- Inut 1KHz signal into digital portable radio;
- Set the modulation domain analyzer to trigger on the rising 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 t₁ and t₂,and shall also remain within limits following t₂;
- 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 t₃

9.3 TEST SETUP BLOCK DIAGRAM

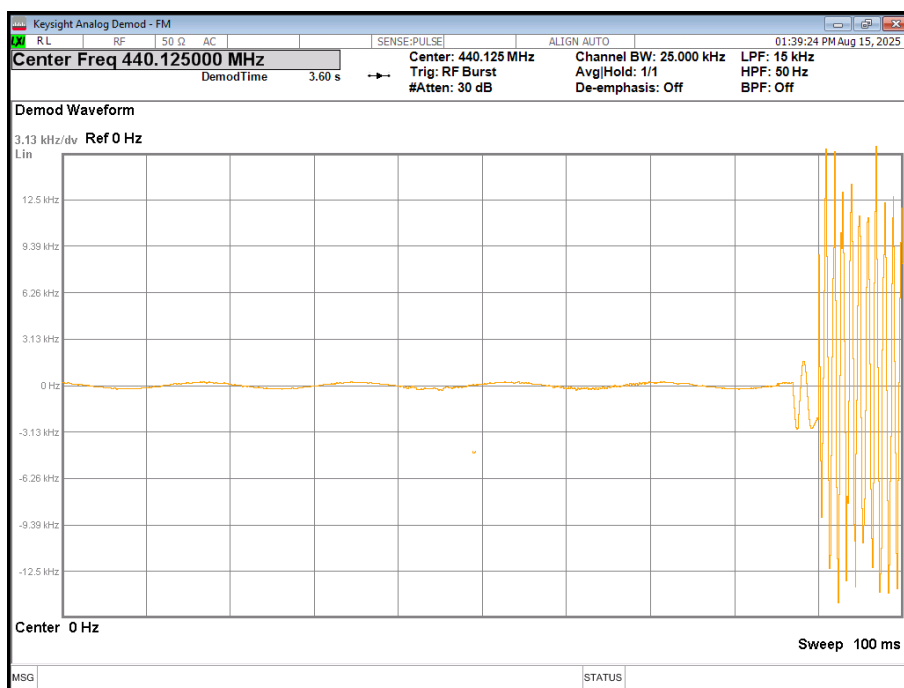


9.4 TEST RESULT

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



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





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

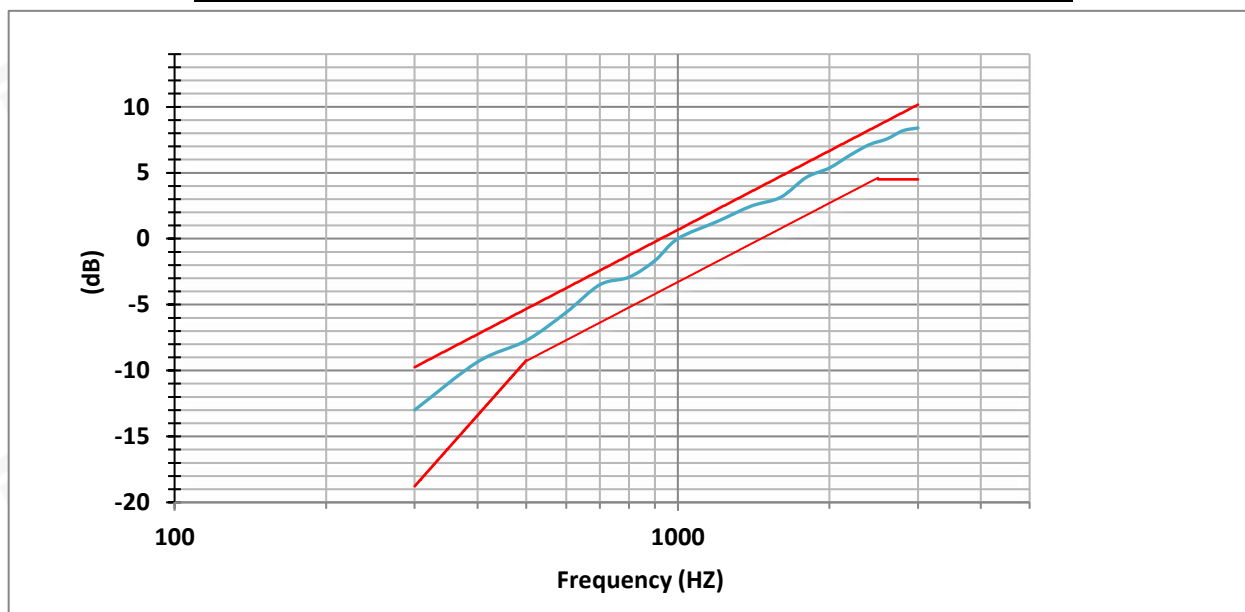
The test procedure please reference ANSI C63.26-2015.

10.3 TEST RESULT

10.3.1 Audio Frequency Response

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

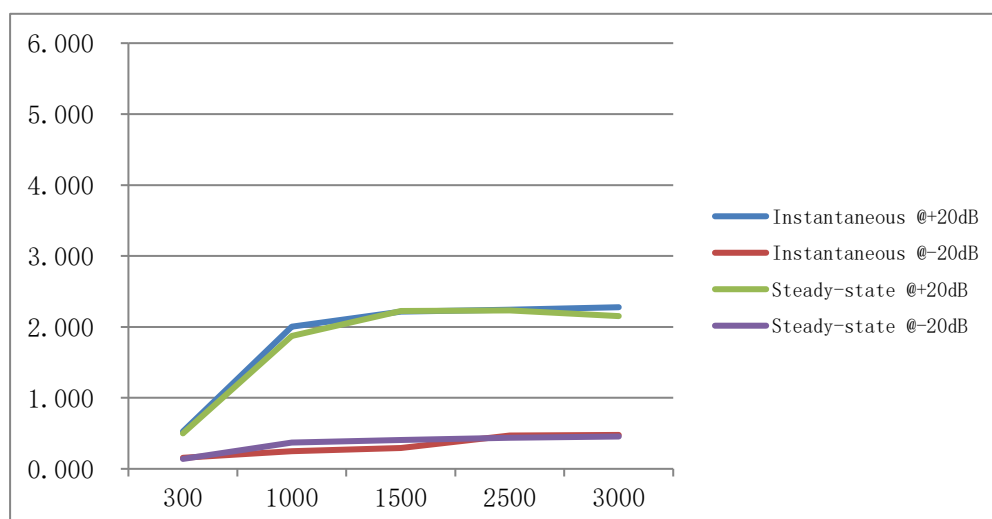
Audio Frequency(Hz)	Audio Frequency Response(dB)	Result
300	-12.99	PASS
400	-9.35	
500	-7.72	
600	-5.59	
700	-3.49	
800	-2.92	
900	-1.67	
1000	0.00	
1200	1.32	
1400	2.48	
1600	3.14	
1800	4.65	
2000	5.36	
2200	6.34	
2400	7.13	
2600	7.56	
2800	8.19	
3000	8.40	



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	0.527	0.156	0.500	0.140	±2.5	Pass
1000	2.002	0.247	1.872	0.369		
1500	2.218	0.292	2.224	0.408		
2500	2.243	0.470	2.233	0.437		
3000	2.278	0.478	2.154	0.456		

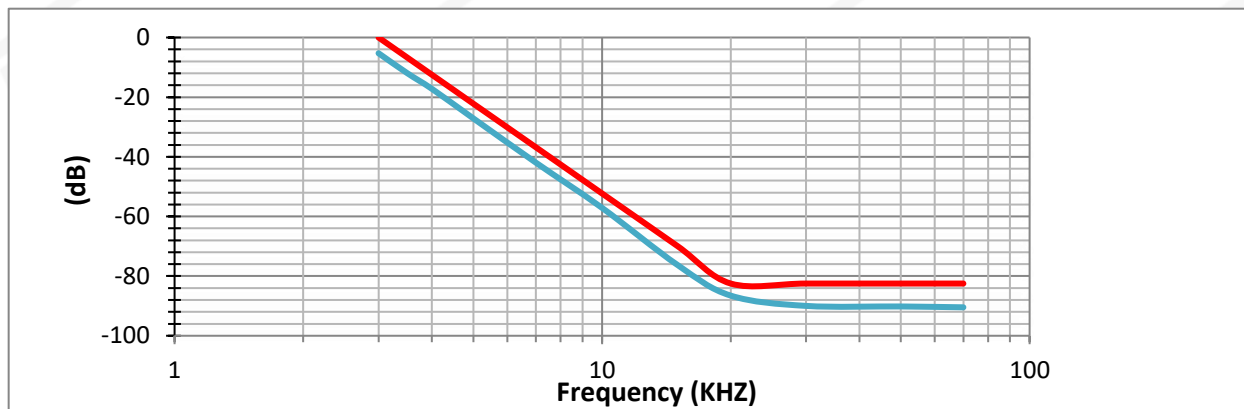




10.3.3 Audio Low Pass Filter Response

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

Audio Frequency(KHz)	Limit	Response Attenuation(dB)	Result
3	0	-5.28	PASS
3.5	-6.7	-11.94	
4	-12.5	-17.23	
5	-22.2	-27.13	
7	-36.8	-41.95	
10	-52.3	-57.13	
15	-69.9	-76.23	
20	-82.5	-86.55	
30	-82.5	-89.99	
50	-82.5	-90.18	
70	-82.5	-90.47	





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※※※※※