

# FCC Test Report

# Report No.: AGC01284230801FR01

FCC ID	:	T4K-AT500MII
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	CB RADIO
BRAND NAME	:	N/A
MODEL NAME	:	AT-500M II
APPLICANT	:	Qixiang Electron Science & Technology Co., Ltd.
DATE OF ISSUE	:	Aug. 11, 2023
STANDARD(S)	:	FCC Part 95 Subpart D
<b>REPORT VERSION</b>	:	V 1.0







# **REPORT REVISE RECORD**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug. 11, 2023	Valid	Initial Release



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# 1. GENERAL INFORMATION

Applicant	Qixiang Electron Science & Technology Co., Ltd.		
Address	Qixiang Building, Tangxi Industrial Zone, Luojiang District, Quanzhou, Fujian, China		
Manufacturer	Qixiang Electron Science & Technology Co., Ltd.		
Address	Qixiang Building, Tangxi Industrial Zone, Luojiang District, Quanzhou, Fujian, China		
Factory	Qixiang Electron Science & Technology Co., Ltd.		
Address	Qixiang Building, Tangxi Industrial Zone, Luojiang District, Quanzhou, Fujian, China		
Product Designation	CB RADIO		
Brand Name	N/A		
Test Model	AT-500M II		
Deviation from Standard	No any deviation from the test method		
Date of receipt of test item	Aug. 01, 2023		
Date of Test	Aug. 01, 2023~Aug. 11, 2023		
Test Result	Pass		

#### WE HEREBY CERTIFY THAT:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI/TIA-382-A-1998. The sample tested as described in this report is in compliance with the FCC Rules Part 95. The test results of this report relate only to the tested sample identified in this report.

Bibo zhang Prepared By Bibo Zhang Aug. 11, 2023 (Project Engineer) Reviewed By Calvin Liu Aug. 11, 2023 (Reviewer) x Iran Approved By Max Zhang Aug. 11, 2023 Authorized Officer



# **2. PRODUCT INFORMATION**

#### 2.1 PRODUCT TECHNICAL DESCRIPTION

Hardware Version	1.0
Software Version	1.0
Power Supply	DC 12V/DC 24V
Communication Type	Voice / Tone only
Operation Frequency Range	26.965MHz-27.405MHz
Modulation Type	AM/FM
Channel Separation	10 KHz
Emission Designator	AM: 8K00A3E FM: 8K00F3E
Number of Channels:	40 Channels
Rated Output Power	4W (It was fixed by the manufacturer, any individual can't arbitrarily change it.)
Maximum Transmitter Power	AM: 35.97dBm FM:35.72dBm
Antenna Designation	Detachable
Antenna Type	External antenna
Antenna Gain	0dBi (Typical), 5dBi (Max)
Frequency Tolerance	AM:1.094ppm FM:1.096ppm



#### 2.2 TEST FREQUENCY LIST

#### According to ANSI C63.26 section 5.1.2.1:

Measurements of transmitters shall be performed and, if required, reported for each frequency band in which the EUT can be operated with the device transmitting at the number of frequencies in each band specified in Table 2.

Frequency range Over which EUT operates	Number of Frequencies	Location in frequency range of operation	
1 MHz or less	1 Middle		
1 MHz to 10 MHz	2	1 near top and 1 near bottom	
More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom	

	Operation Frequency Each of Channel				
	CBRS	CBRS			
Channel	Frequency	Channel	Frequency		
1	26.965 MHz	21	27.215 MHz		
2	26.975 MHz	22	27.225 MHz		
3	26.985 MHz	23	27.255 MHz		
4	27.005 MHz	24	27.235 MHz		
5	27.015 MHz	25	27.245 MHz		
6	27.025 MHz	26	27.265 MHz		
7	27.035 MHz	27	27.275 MHz		
8	27.055 MHz	28	27.285 MHz		
9	27.065 MHz	29	27.295 MHz		
10	27.075 MHz	30	27.305 MHz		
11	27.085 MHz	31	27.315 MHz		
12	27.105 MHz	32	27.325 MHz		
13	27.115 MHz	33	27.335 MHz		
14	27.125 MHz	34	27.345 MHz		
15	27.135 MHz	35	27.355 MHz		
16	27.155 MHz	36	27.365 MHz		
17	27.165 MHz	37	27.375 MHz		
18	27.175 MHz	38	27.385 MHz		
19	27.185 MHz	39	27.395 MHz		
20	27.205 MHz	40	27.405 MHz		



### 2.3 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: **T4K-AT500MII**, filing to comply with Part 2, Part 95 of the Federal Communication Commission rules.

#### 2.4 TEST METHODOLOGY

The tests were performed according to following standards:

No.	Identity	Document Title
1	FCC 47 CFR Part 95	Personal Radio Services
2	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
3	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
4	ANSI EIA/TIA 382-A-1989	Minimum standards – Citizens band radio service amplitude modulated (AM) transceivers operating in the 27MHz band.

#### 2.5 CALCULATION OF EMISSION INDICATORS

FCC Rules and Regulations Part 2.202: Necessary Bandwidth and Emission Bandwidth

#### For AM Mode (ChannelSpacing: 10kHz)

Emission Designator 8K00A3E

Bn = 2M, M may vary between 4000 and 10000 depending on the quality desired.

Speech and music, M = 4000, Bandwidth: 8000 Hz= 8 kHz

A3E portion of the designator represents an AM voice transmission.

Therefore, the entire designator for 10 kHz channel spacing AM mode is 8K00A3E.

#### For FM Mode (ChannelSpacing: 10kHz)

Emission Designator 8K00F3E

Bn = 2M, M may vary between 4000 and 10000 depending on the quality desired. Speech and music, M = 4000, Bandwidth: 8000 Hz= 8 kHz

F3E portion of the designator represents an FM voice transmission.

Therefore, the entire designator for 10 kHz channel spacing FM mode is 8K00F3E.

#### 2.6 STATEMENT - COMPLIANCE TO §95.977

§95.977 CBRS tone transmissions.

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

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



#### 2.7 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

#### 2.8 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.



## **3. TEST ENVIRONMENT**

#### 3.1 ADDRESS OF THE TEST LABORATORY

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

#### **3.2 TEST FACILITY**

The test facility is recognized, certified, or accredited by the following organizations:

#### CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

#### **IC-Registration No.: 24842**

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.



#### **3.3 ENVIRONMENTAL CONDITIONS**

	NORMAL CONDITIONS	EXTREME CONDITIONS	
Temperature range (°C)	15 - 35	-20 - 50	
Relative humidty range	20 % - 75 %	20 % - 75 %	
Pressure range (kPa)	86 - 106	86 - 106	
Power supply	DC 12V	LV: DC 10.2V/HV:DC 13.8V	
Power supply         DC 24V         LV: DC 20.4V/HV:DC 27.6V			
Note: The Extreme Temperature and Extreme Voltages declared by the manufacturer.			

#### **3.4 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%.

Test Items	Measurement Uncertainty	
Frequency stability	±0.5%	
Transmitter power conducted	±0.8dB	
Transmitter power Radiated	±1.3dB	
Conducted spurious emission 9kHz-40 GHz	±2.7dB	
Conducted Emission	±3.2 dB	
Radiated Emission below 1GHz	±3.9 dB	
Radiated Emission above 1GHz	±4.8 dB	
Occupied Channel Bandwidth	±2 %	
FM deviation	±2 %	
Audio level	±0.98dB	
Low Pass Filter Response	±0.65dB	
Modulation Limiting	0.42 %	
Transient Frequency Behavior	6.8 %	



#### 3.5 LIST OF EQUIPMENTS USED

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESCI	10096	Feb. 18, 2023	Feb. 17, 2024
EXA Signal Analyzer	Aglient	N9020A	MY53300860	Jun. 01, 2023	May 31, 2024
EXA Signal Analyzer	Aglient	N9020A	MY52090123	Jun. 02, 2023	Jun. 01 2024
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Oct. 31, 2021	Oct. 30, 2023
preamplifier	ChengYi	EMC184045SE	980508	Sep. 29, 2021	Sep. 28, 2023
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Mar. 23, 2023	Mar. 22, 2024
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun. 03, 2023	Jun. 02, 2024
HORN ANTENNA	EM	EM-AH-10180	/	Feb. 22 2023	Feb. 21 2024
SIGNAL GENERATOR	AGILENT	N5182A	MY50140530	Jun. 01, 2023	May 31, 2024
SIGNAL GENERATOR	AGILENT	N5182B	MY53050647	Mar. 03, 2023	Mar. 02, 2024
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 05, 2023	Jan. 04, 2025
ANTENNA	SCHWARZBECK	VULB9168	D69250	May 11, 2023	May 10, 2025
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Small environmental tester	ESPEC	SH-242		Aug. 03, 2023	Aug. 02, 2024
RF Communication Test Set	HP	8920B	US35010161	Jun. 02, 2023	Jun. 01 2024
Attenuator	Weinachel Corp	58-30-33	ML030	Jun. 01, 2023	May 31, 2024
RF Cable	R&S	1#		Each time	N/A
RF Cable	R&S	2#		Each time	N/A
Fliter-VHF	Microwave	N26460M1	498703	May 05, 2023	May 04, 2024



# **4.SYSTEM TEST CONFIGURATION**

#### **4.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

#### 4.2 EUT EXERCISE

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

#### **4.3 CONFIGURATION OF TESTED SYSTEM**

Fig. 2-1 Configuration of Tested System

EUT

Table 2-1 Equipment Used in Tested System

### 4.4 EQUIPMENT USED IN TESTED SYSTEM

The Following Peripheral Devices And Interface Cables Were Connected During The Measurement: Test Accessories Come From The Laboratory

Item	Equipment	Model No.	Model No. Identifier	
1	Load Antenna	HG-E10	Terminator DC -3G 50W	Accessories

#### ☑ Test Accessories Come From The Manufacturer

Item	Equipment	Model No. Identifier		Note
1	CB Radio	AT-500M II	FCC ID: T4K-AT500MII	EUT
2	Hand microphone	N/A	N/A	Accessories



#### **4.5 SUMMARY OF TEST RESULTS**

Item	FCC Rules	Description of Test	Result
1	§ 95.967& 2.1046(a)	Maximum Transmitter Power	Pass
2	§95.975& 2.1047(a) (b)	Modulation Limit	Pass
3	§95.975& 2.1047(a)	Audio Frequency Response	Pass
4	§95.973& 2.1049	Emission Bandwidth	Pass
5	§95.979& 2.1049	Emission Mask	Pass
6	§95.965& 2.1055(a) (1)	Frequency Stability	Pass
7	§95.979& 2.1051	Spurious Emission on Antenna Port	Pass
8	§95.979& 2.1053	Ratiated Spurious Emission	Pass



# **5. DESCRIPTION OF TEST MODES**

The EUT (**CB RADIO**) has been tested under normal operating condition. (CBRS TX) are chosen for testing at each channel separation.

NO.	TEST MODE DESCRIPTION	CHANNEL SEPARATION
1	CBRS TX CHANNEL 1	10.0 kHz
2	CBRS TX CHANNEL 20	10.0 kHz
3	CBRS TX CHANNEL 40	10.0 kHz

Note:

- 1. Only the result of the worst case was recorded in the report, if no other cases.
- 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
- 3. Manufacturers use computer PC programming software to switch and operate frequency points, refer to the instructions for details



# **6.FREQUENCY STABILITY**

#### **6.1 PROVISIONS APPLICABLE**

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

#### 6.2 MEASUREMENT PROCEDURE

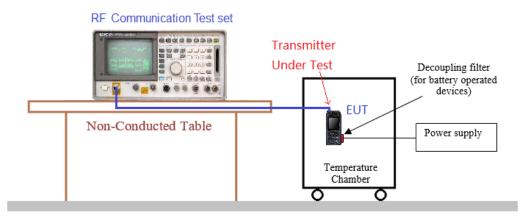
#### 6.2.1 Frequency stability versus environmental temperature

- 1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.
- 2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1kHz and Video Resolution Bandwidth to 1kHz and Frequency Span to 50kHz.Record this frequency as reference frequency.
- 3. Set the temperature of chamber to 50°C. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
- 4. Repeat step 2 with a 10<sup>°</sup>C decreased per stage until the lowest temperature -30<sup>°</sup>C is measured, record all measured frequencies on each temperature step.

#### 6.2.2 Frequency stability versus input voltage

- Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used. The EUT shall be powered by DC 12V/24V.
- 2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 kHz and Video Resolution Bandwidth to 1kHz. Record this frequency as reference frequency.
- 3. Supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

#### 6.3 MEASUREMENT SETUP





#### **6.4 MEASUREMENT RESULTS**

10 kHz Channel Separation, AM modulation, Assigned Frequency For CBRS							
Test conditions		Frequency error (ppm)					
Voltage	Temp	Г	Test Frequency (MHz	<u>z</u> )	Limit (ppm)	Result	
(V)	(°C)	26.965MHz	27.205MHz	27.405MHz	(PP)		
	-30	0.866	0.653	0.541			
	-20	0.874	0.752	0.786			
	-10	0.503	1.087	0.729	_		
	0	0.761	0.696	0.676			
12.0	10	1.072	0.578	0.868			
	20	0.690	0.727	0.602	50	Pass	
	30	0.983	0.795	0.685	-		
	40	0.623	0.635	0.679			
	50	0.945	0.708	0.792	-		
13.8	20	0.508	1.002	1.056			
10.2	20	0.831	0.903	1.092			

10 kHz Channel Separation, FM modulation, Assigned Frequency For CBRS							
Test conditions		F	Frequency error (ppm	ו)			
Voltage	Temp	7	Test Frequency (MHz	<u>z</u> )	Limit (ppm)	Result	
(V)	(°C)	26.965MHz	27.205MHz	27.405MHz	(FF)		
	-30	0.590	0.586	1.012			
	-20	1.093	0.600	0.798			
	-10	1.033	0.935	0.860		Pass	
	0	0.647	1.012	0.734			
12.0	10	0.910	0.922	0.602			
	20	0.942	0.866	0.706	50		
	30	0.718	1.069	0.705			
	40	0.537	0.696	0.794			
	50	0.612	0.902	0.627			
13.8	20	0.924	1.038	0.740			
10.2	20	0.852	0.552	0.707			



10 kHz Channel Separation, AM modulation, Assigned Frequency For CBRS							
Test o	Test conditions		Frequency error (ppm)				
Voltage	Temp	٦	est Frequency (MHz	<u>z</u> )	Limit (ppm)	Result	
(V)	(°C)	26.965MHz	27.205MHz	27.405MHz	(PP)		
	-30	0.615	0.519	0.728			
	-20	0.548	1.059	0.917			
	-10	0.752	0.512	0.963			
	0	0.850	0.839	0.933			
24.0	10	0.558	0.710	0.963			
	20	0.864	0.721	0.546	50	Pass	
	30	0.713	1.094	0.696			
	40	0.764	0.571	0.636			
	50	0.527	0.629	1.009			
27.6	20	0.935	0.748	0.708			
20.4	20	0.566	1.047	0.571			

10 kHz Channel Separation, FM modulation, Assigned Frequency For CBRS						
Test conditions		Frequency error (ppm)				
Voltage	Temp	Г	Test Frequency (MHz	<u>z</u> )	Limit (ppm)	Result
(V)	(°C)	26.965MHz	27.205MHz	27.405MHz	(pp)	
	-30	0.918	0.830	0.713		
	-20	1.052	0.877	1.003	-	
	-10	0.539	0.892	0.733		
	0	0.806	0.549	1.043	-	
24.0	10	1.096	0.944	0.780	-	
	20	0.697	0.710	0.969	50	Pass
	30	0.909	0.626	0.607	-	
	40	0.735	0.764	0.797	-	
	50	0.994	0.568	0.919	-	
27.6	20	0.898	1.025	0.992		
20.4	20	0.676	0.886	0.591		



# 7. EMISSION BANDWIDTH

## 7.1 PROVISIONS APPLICABLE

#### FCC Part 95.973, FCC Part 2.1049

Each CBRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the emission type under test.

(a) AM and FM. The authorized bandwidth for emission type A3E and F3E is 8 kHz.

(b)SSB.The authorized bandwidth for emission types J3E, R3E, and H3E is 4 kHz.

#### 7.2 MEASUREMENT PROCEDURE

- 1. Connect the equipment as illustrated
- The EUT was modulated by 2.5kHz sine wave audio signal; the level of the audio signal employed is 16dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz for 12.5kHz channel spacing).
- 3. Spectrum set as follow:

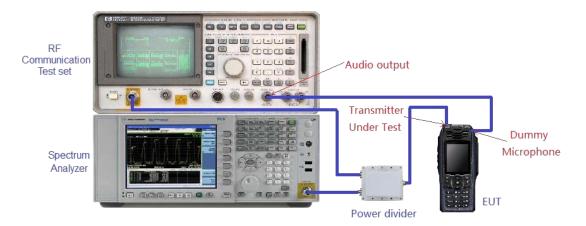
Centre frequency = the nominal EUT channel center frequency,

The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of  $1.5 \times OBW$  is sufficient)

RBW = 1% to 5% of the anticipated OBW, VBW  $\,\geq\,3\,\,\times\,$  RBW, Sweep = auto, Detector function = peak, Trace = max hold

- 4. Set 99% Occupied Bandwidth and 26dB Bandwidth
- 5. Measure and record the results in the test report.

#### 7.3 MEASUREMENT SETUP

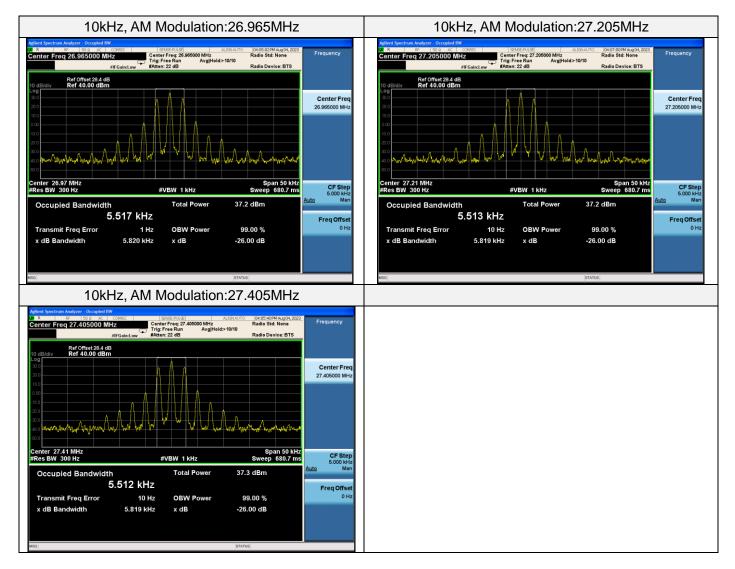




#### 7.4 MEASUREMENT RESULTS

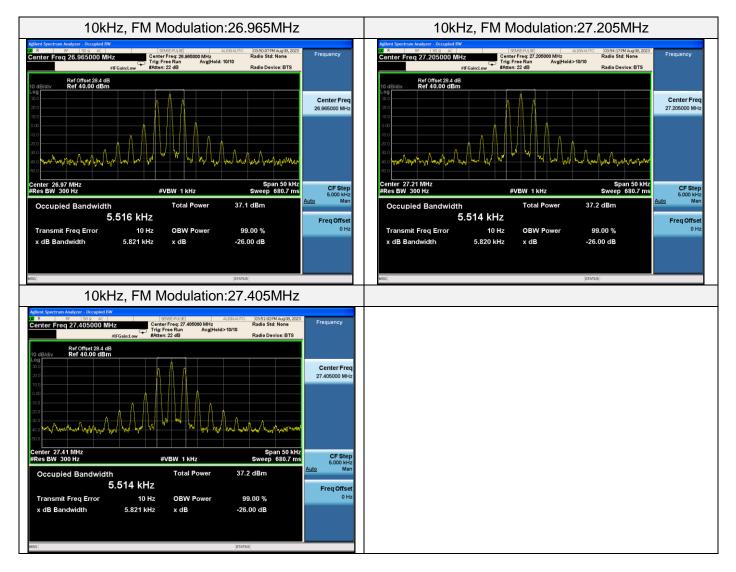
Emission Bandwidth Measurement Result-CBRS-DC 12V					
Operating Frequency	10 kHz Channel Separation				
	Occupied Bandwidth	Emission Bandwidth	Limits	Result	
26.965 MHz	5.517 kHz	5.820 kHz	8.0 kHz	Pass	
27.205 MHz	5.513 kHz	5.819 kHz	8.0 kHz	Pass	
27.405 MHz	5.512 kHz	5.819 kHz	8.0 kHz	Pass	

Test plot as follows:



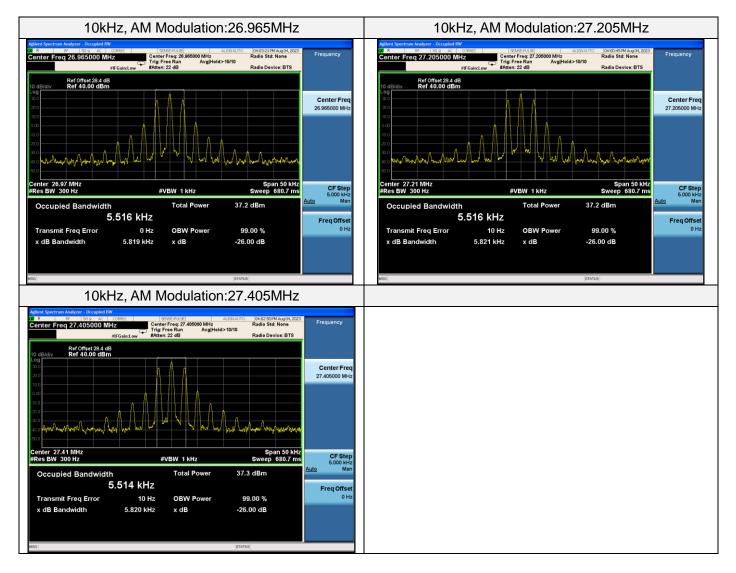


Emission Bandwidth Measurement Result-CBRS-DC 12V					
Operating Frequency	10 kHz Channel Separation				
	Occupied Bandwidth	Emission Bandwidth	Limits	Result	
26.965 MHz	5.516 kHz	5.821 kHz	8.0 kHz	Pass	
27.205 MHz	5.514 kHz	5.820 kHz	8.0 kHz	Pass	
27.405 MHz	5.514 kHz	5.821 kHz	8.0 kHz	Pass	



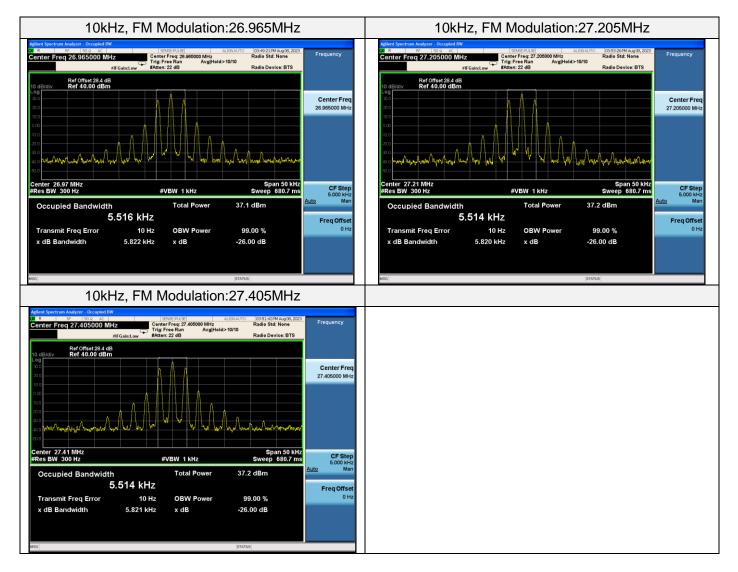


Emission Bandwidth Measurement Result-CBRS-DC 24V					
	10 kHz Channel Separation				
Operating Frequency	Occupied Bandwidth	Emission Bandwidth	Limits	Result	
26.965 MHz	5.516 kHz	5.819 kHz	8.0 kHz	Pass	
27.205 MHz	5.516 kHz	5.821 kHz	8.0 kHz	Pass	
27.405 MHz	5.514 kHz	5.820 kHz	8.0 kHz	Pass	





Emission Bandwidth Measurement Result-CBRS DC 24V					
Operating Frequency	10 kHz Channel Separation				
	Occupied Bandwidth	Emission Bandwidth	Limits	Result	
26.965 MHz	5.516 kHz	5.822 kHz	8.0 kHz	Pass	
27.205 MHz	5.514 kHz	5.820 kHz	8.0 kHz	Pass	
27.405 MHz	5.514 kHz	5.821 kHz	8.0 kHz	Pass	





# 8. RATIATED SPURIOUS EMISSION

#### **8.1 PROVISIONS APPLICABLE**

#### FCC Part 95.979(a), FCC Part 2.1049

Each CBRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) as specified in the applicable paragraphs listed in the following table:

Emission type	Paragraph
A3E,F3E	(1), (3), (5), (6)
H3E, J3E, R3E	(2), (4), (5), (6)

(1) 25 dB (decibels) in the frequency band 4 kHz to 8 kHz removed from the channel center frequency;

(2) 25 dB in the frequency band 2 kHz to 6 kHz removed from the channel center frequency;

(3) 35 dB in the frequency band 8 kHz to 20 kHz removed from the channel center frequency;

(4) 35 dB in the frequency band 6 kHz to 10 kHz removed from the channel center frequency;

(5) 53 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 250% of the authorized bandwidth.

(6) 60 dB in any frequency band centered on a harmonic (i.e., an integer multiple of two or more times) of the carrier frequency.

#### 8.2 MEASUREMENT PROCEDURE

- 1. EUT was placed on a 0.8 or 1.5meter 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 disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made. The radiated emission measurements of all transmit frequencies in all channels were measured with peak detector.
- 2. 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.
- 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 (Pr).
- 4. 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 any reprint interfere, with the radiation pattern of the internation of the interest is connected to the substitution antenna. A power (PMea) is applied to the input of the substitution of the input of the i

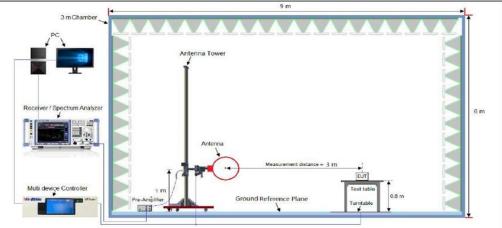
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substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

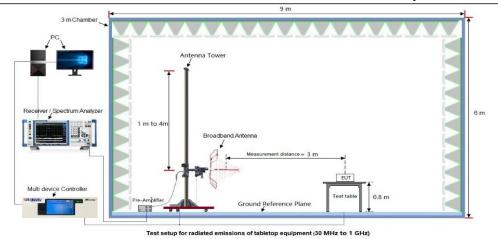
- A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test
- 6. The measurement results are obtained as described below: Power(EIRP)=PMea- PAg Pcl Ga The measurement results are amend as described below:Power(EIRP)=PMea- Pcl Ga
- 7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
- 8. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.
- 9. Test the EUT in the lowest channel, the middle channel the Highest channel

#### 8.3 MEASUREMENT SETUP

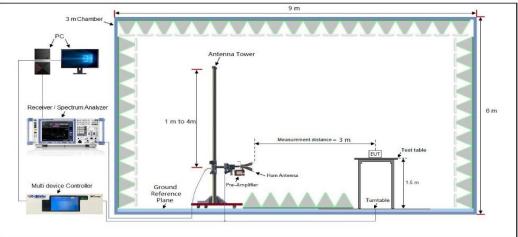


#### Radiated Emissions Below 30MHz Test Setup

Radiated Emissions Below 30MHz-1GHz Test Setup







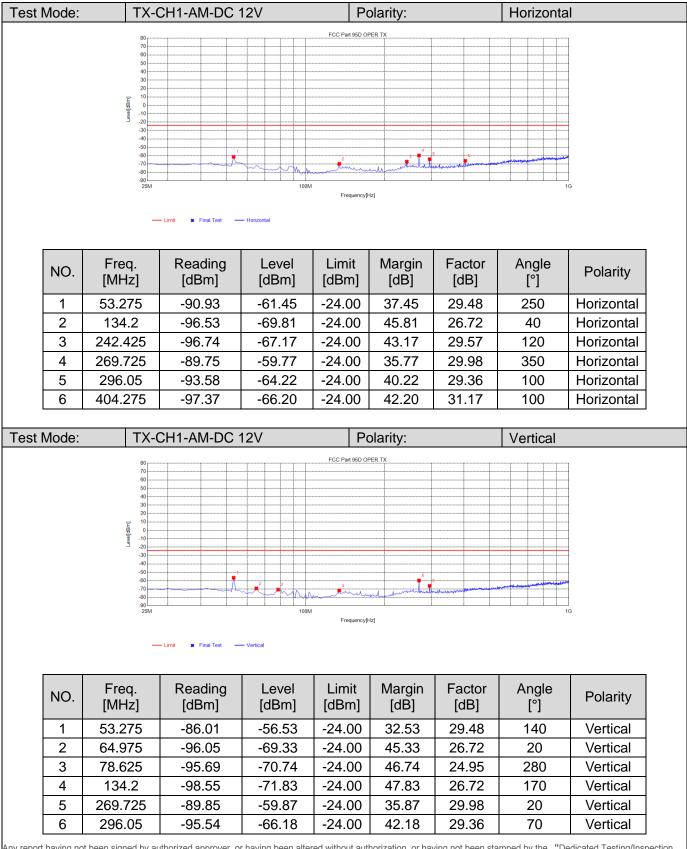
#### **Radiated Emissions Above 1GHz Test Setup**

#### 8.4 MEASUREMENT RESULTS

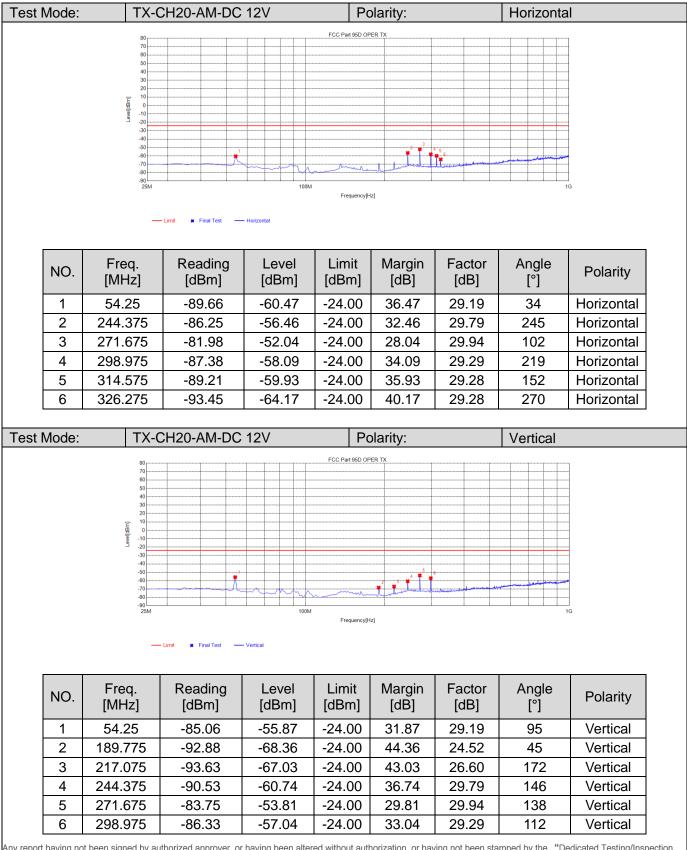
Preliminary calculation	Final Result
P(dBm)=30+10log 【P(W)】=36.02dBm	Limit= Preliminary calculation-60dB=-24dBm

- 1. Factor=Antenna Factor + Cable loss. (Below 1GHz)
- 2. Factor=Antenna Factor+ Cable loss -Pre-amplifier. (Above 1 GHz)
- 3. Margin=Limit-Level
- 4. the unwanted emission should be attenuated below TP by at least 60 dB.
- 5. In the frequency range of 9KHz-30MHz, in addition to displaying the Fundamental level, the radiated spurious emission level is much less than 60dB of the carrier power, so it is ignored.

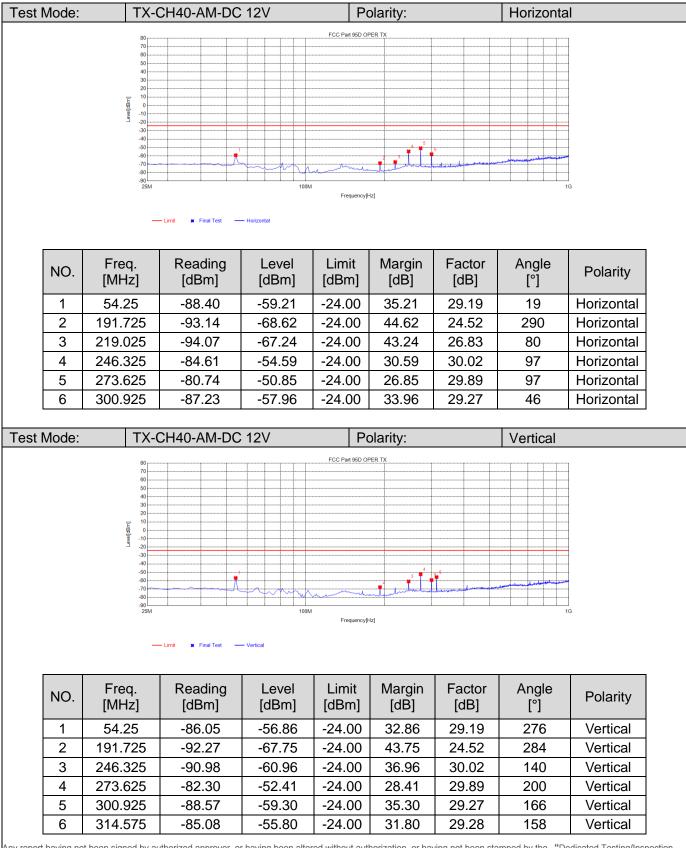






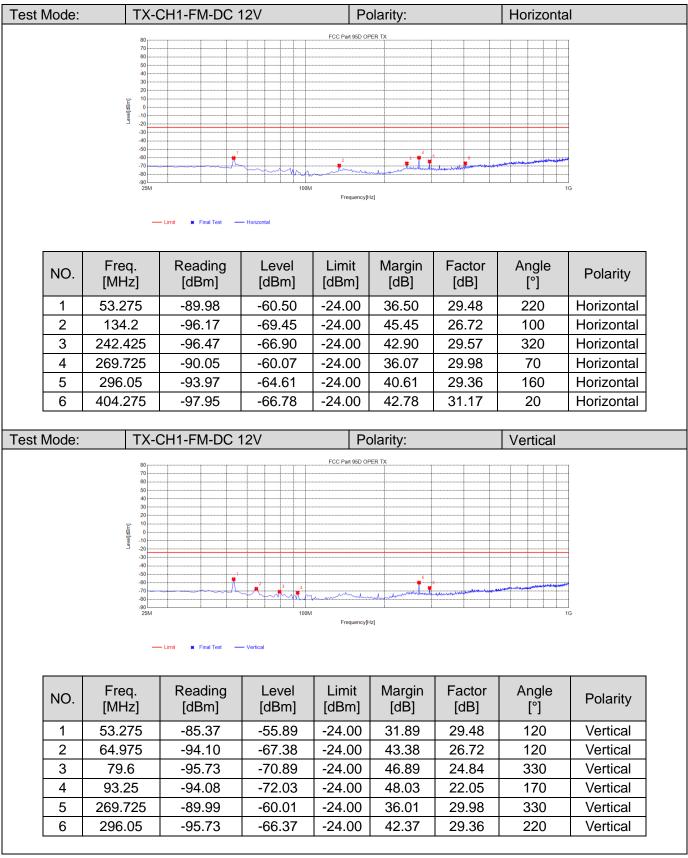




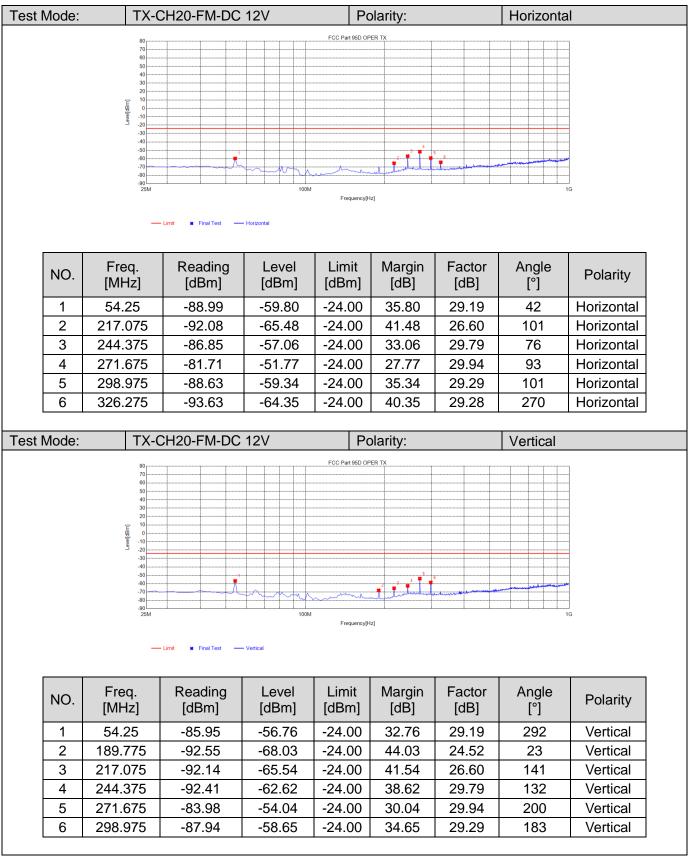


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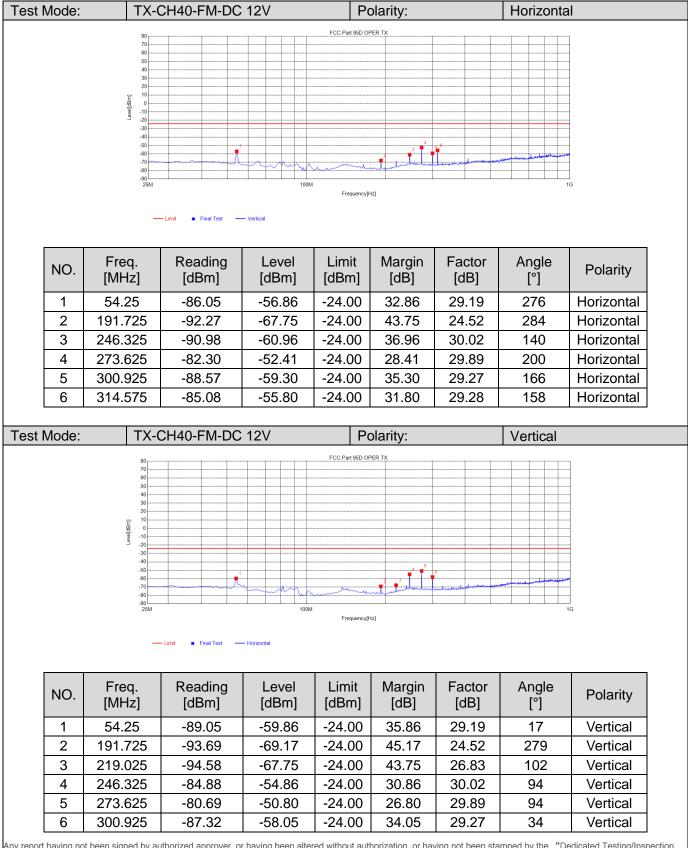
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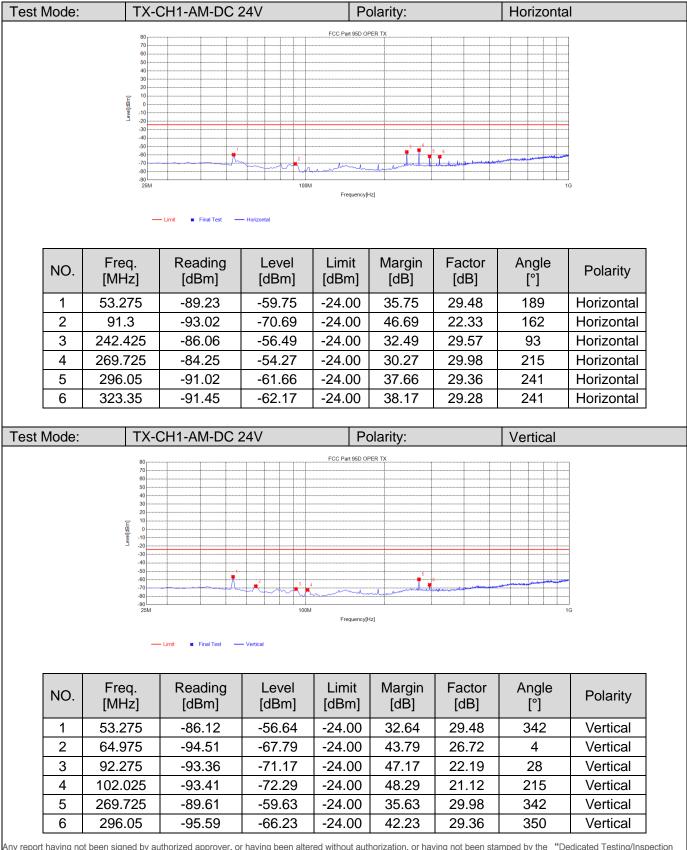
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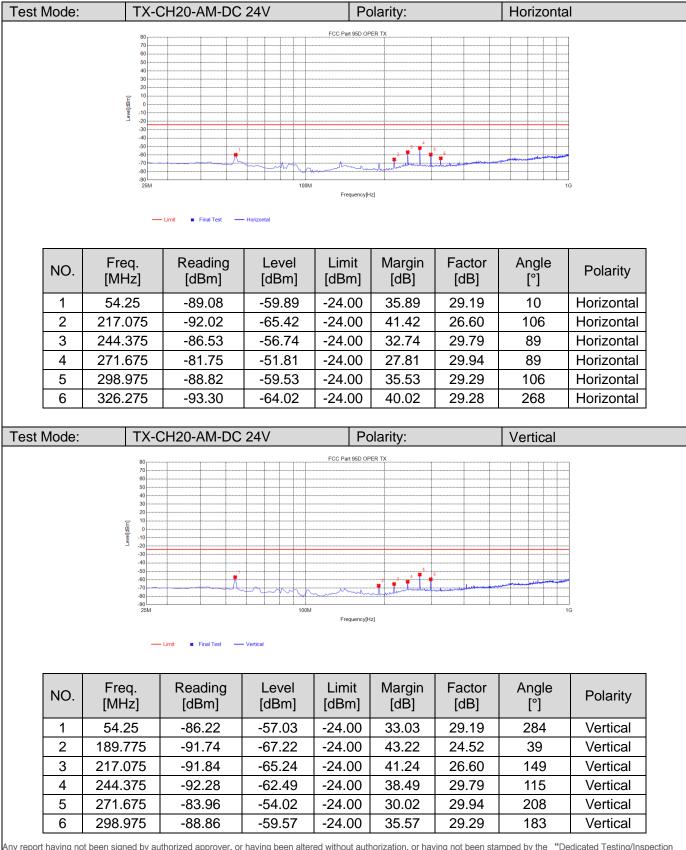




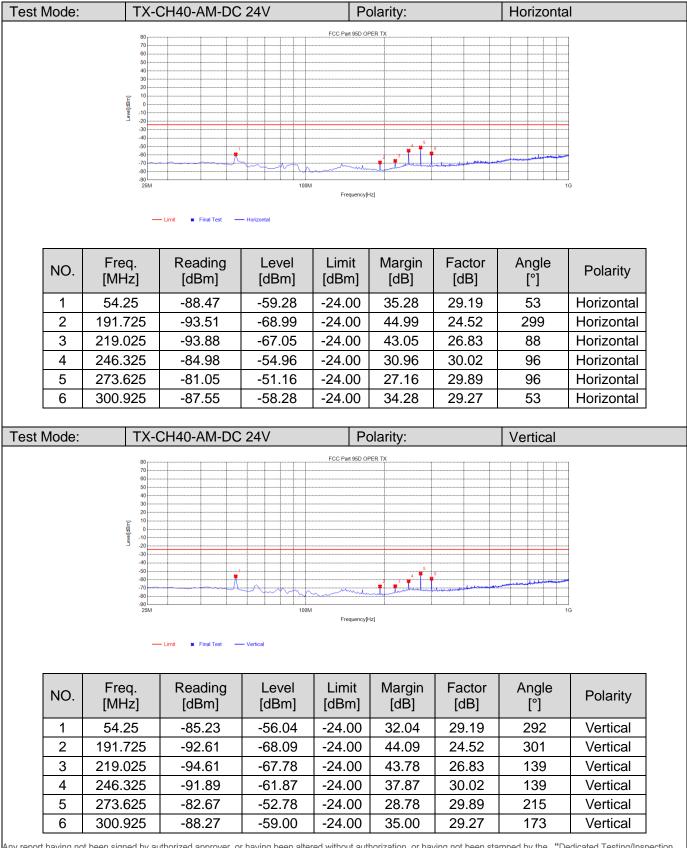






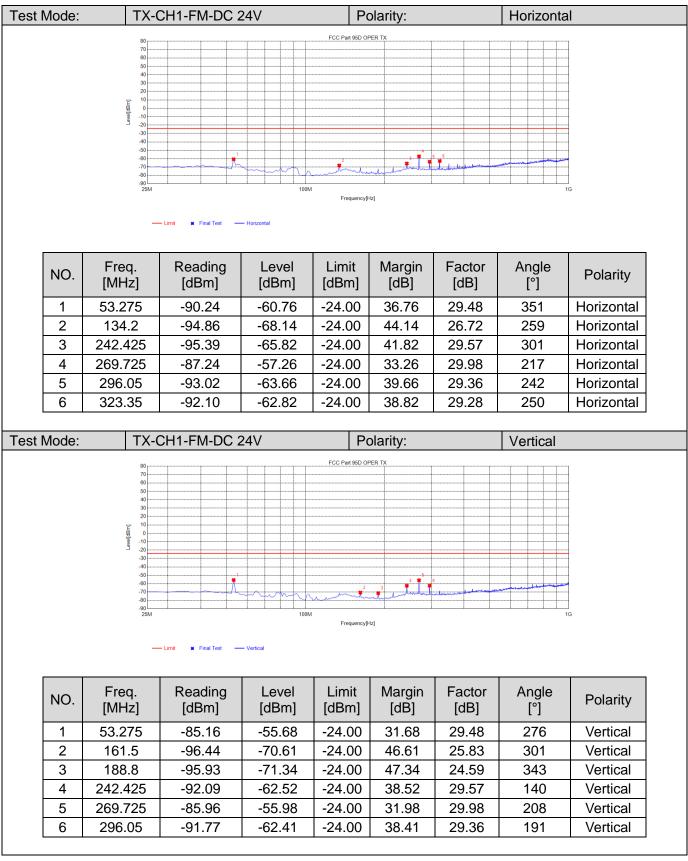




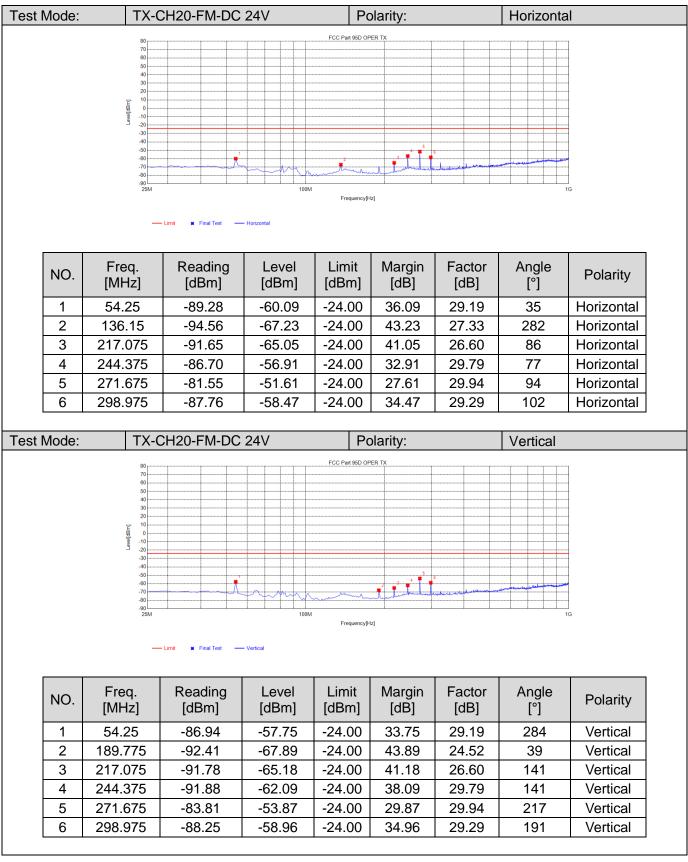


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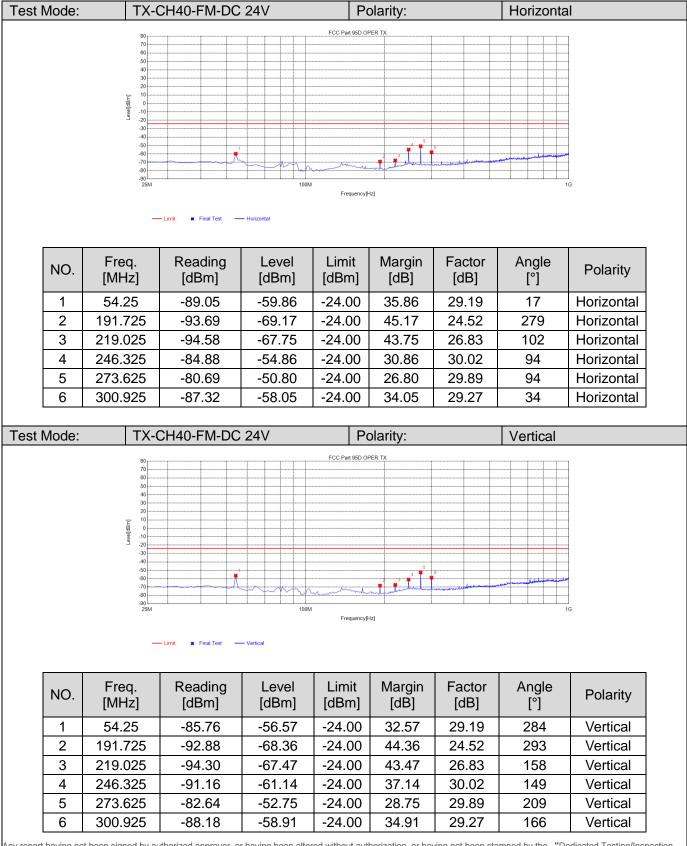
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#### **8.5 EMISSION MASK PLOT**

The detailed procedure employed for Emission Mask measurements are specified as following:

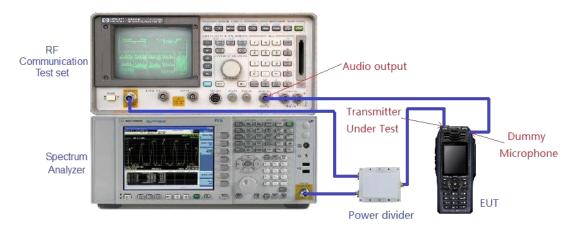
-Connect the equipment as illustrated.

-Spectrum set as follow:

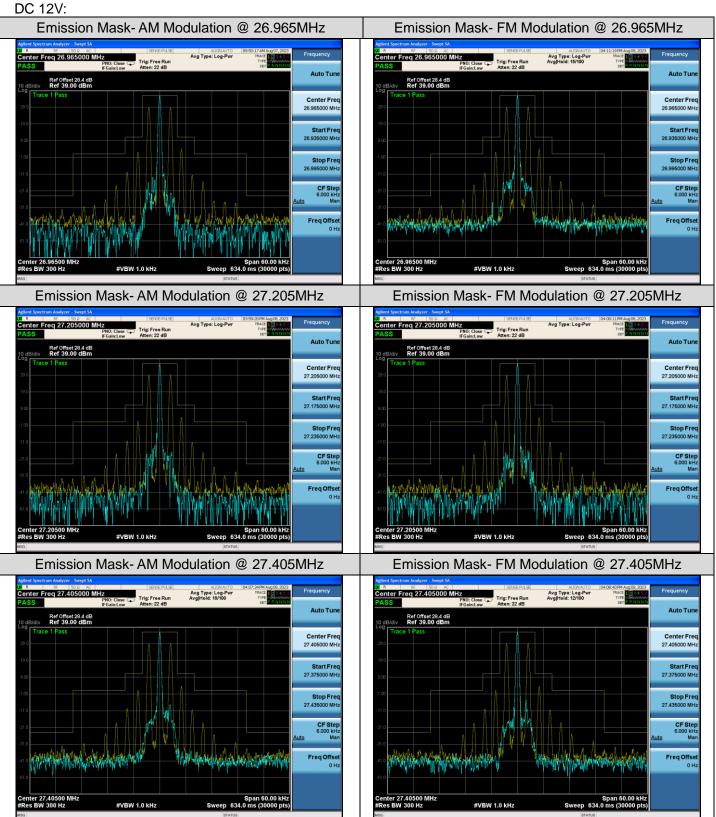
- 1. Centre frequency = fundamental frequency, Span=60kHz for 10kHz , RBW=300Hz, VBW=1000Hz ;
- 2. Sweep = auto, Detector function = peak, Trace = max hold
- 3. Key the transmitter, and set the level of the unmodulated carrier to a full scale reference line. This is the 0dB reference for the measurement.
- Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation

The input level shall be established at the frequency of maximum response of the audio modulating circuit.

- 5. Transmitters employing digital modulation techniques that bypass the limiter and the audio low-pass filter shall be modulated as specified by the manufacturer.
- 6. Measure and record the results in the test report.







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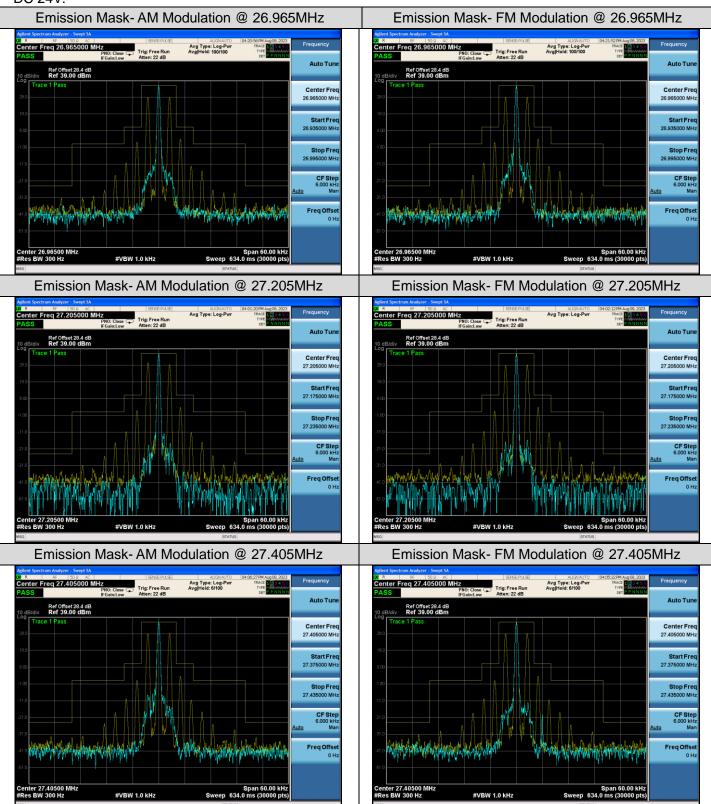
 Attestation of Global Compliance(Shenzhen)Co., Ltd

 Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

 Tel: +86-755 2523 4088
 E-mail: agc@agccert.com



DC 24V:





# 9. SPURIOUS EMISSION ON ANTENNA PORT

### 9.1 PROVISIONS APPLICABLE

Please refer to FCC 47 CFR 2.1051, 2.1057 & 95.979 for specification details. Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules	Attenuation Limit (dBc)
§ 95.979	At least 53 + 10 log (P) dB
§ 95.979	60 dB in any frequency band centered on a harmonic (i.e., an integer multiple of two or more times) of the carrier frequency.

53 + 10 log (Pwatts)

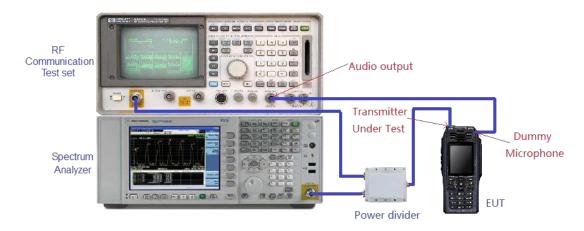
Calculation: Limit (dBm) =EL-53-10log10 (TP) Notes: EL is the emission level of the Output Power expressed in dBm, In this application, the EL is P( dBm). Limit (dBm) = P( dBm)-53-10 log (Pwatts) = -23 dBm

Note:Unwanted spurious limit is -23dBm, and the main wave frequency multiplication limit is -24dBm. After evaluat ion, a stricter limit of -24dBm is used to evaluate unwanted spurious and main wave frequency multiplication.

#### 9.2 MEASUREMENT METHOD

- 1. The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation.
- 2. The resolution bandwidth of the spectrum analyzer was set to 100 kHz. Sufficient scans were taken to
- 3. show any out of band emission up to 10th . Harmonic for the lower and the highest frequency range.
- Set RBW 1 kHz, VBW 3 kHz in the frequency band 9KHz to 150KHz; Set RBW 10 kHz, VBW 30 kHz in the frequency band 150KHz to 20MHz; Set RBW 100 kHz, VBW 300 kHz in the frequency band 20MHz to 1GHz; While set RBW=1MHz.VBW=3MHz from the 1GHz to 10th Harmonic.
- 5. The audio input was set the unmodulated carrier, the resulting picture is print out for each channel separation.

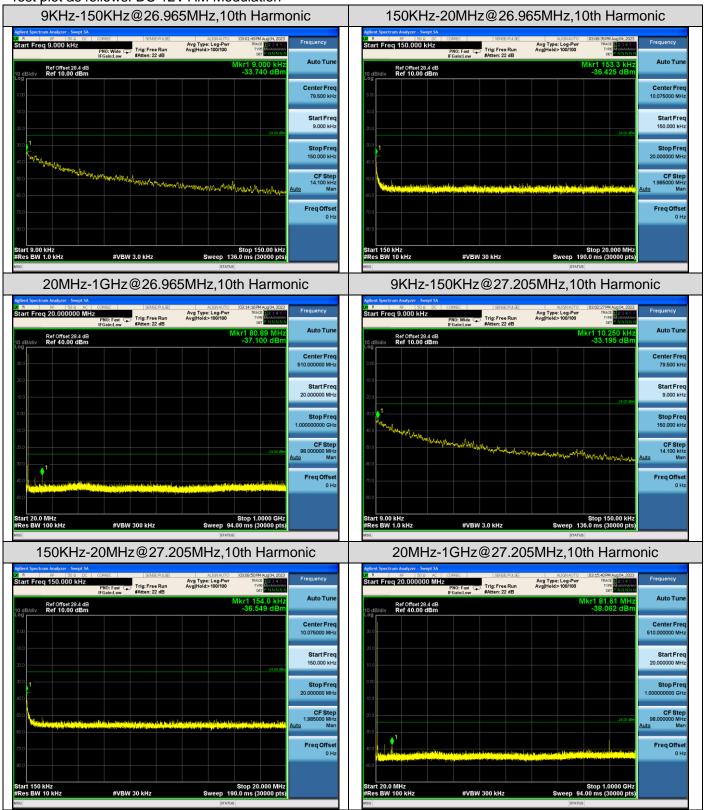
#### 9.3 MEASUREMENT SETUP





#### 9.4 MEASUREMENT RESULTS

#### Test plot as follows: DC 12V AM Modulation



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