FCC Test Report

Report No.: AGC02294201002FE10

FCC ID	:	2AJGM-UV5RPRO
PRODUCT DESIGNATION	:	Two-way radio
BRAND NAME	:	POFUNG,BAOFENG
MODEL NAME	:	UV-5R Pro, UV-5RX, UV-5RS, UV-5RA, UV-5R Plus, GR5, TR-818
APPLICANT	:	PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY
DATE OF ISSUE	:	Nov. 10, 2020
STANDARD(S)	:	FCC Part 90 Rules
REPORT VERSION	:	V 1.0

***A**ttestation of **G**lobal **C**ompliance (Shenzhen) Co., Ltd*

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Nov. 10, 2020	Valid	Initial Release

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1. VERIFICATION OF COMPLIANCE

Applicant:	PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY
Address	3/F FULOK BLDG 131-133 WING LOK ST SHEUNG WAN, Hong Kong
Manufacturer:	PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY
Address	3/F FULOK BLDG 131-133 WING LOK ST SHEUNG WAN, Hong Kong
Factory	PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY
Address	3/F FULOK BLDG 131-133 WING LOK ST SHEUNG WAN, Hong Kong
Product Designation:	Two-way radio
Brand Name:	POFUNG,BAOFENG
Test Model	UV-5R Pro
Serial Model	UV-5RX, UV-5RS, UV-5RA, UV-5R Plus, GR5, TR-818
Difference Description	1. PCB&RF specifications are the same, only the appearance design & model are different 2. GR5, UV-5RS, TR-818 have no physical "Band" key installed
Measurement Procedure	TIA/EIA 603-E-2016
Deviation	No any deviation from the test method.
Date of Test:	Oct. 28, 2020~Nov. 10, 2020
Condition of Test Sample	Normal
Test Result	Pass

WE HEREBY CERTIFY THAT:

The above equipment was tested by Shenzhen Attestation of Global Compliance Science & Technology 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-603-E (2016). The sample tested as described in this report is in compliance with the FCC Rules Part 90 requirements.The test results of this report relate only to the tested sample identified in this report.

Prepared By — Donjon Huang (Project Engineer) — Nov. 10, 2020

Reviewed By — Calvin Liu (Reviewer) — Nov. 10, 2020

Approved By — Forrest Lei (Authorized Officer) — Nov. 10, 2020

2. GENERAL INFORMATION

2.1PRODUCT DESCRIPTION

The EUT is a **Two-way radio** designed for voice communication. It is designed by way of utilizing the FM modulation achieves the system operating.

A major technical description of EUT is described as following:

Communication Type	Voice/ Tone only	
Hardware Version	5RTS.V06	
Software Version	V1.2	
Modulation	FM	
Emission Type	11K0F3E	
Emission Bandwidth	VHF: 10.17KHz(2W-12.5 KHz) UHF:10.17KHz(2W-12.5KHz)	
Peak Frequency Deviation	1.72KHz	
Audio Frequency Response	6.07dB	
Maximum Transmitter Power	VHF: 32.89dBm(2W-12.5 KHz) UHF: 32.94dBm(2W-12.5 KHz)	
Output power Modification	2W (It was fixed by the manufacturer, any individual can't arbitrarily change it.)	
Data Rate	B12.5KHz(Channel Spacing)	
Antenna Designation	Detachable	
Antenna Gain	1.50dBi	
Power Supply	DC 7.4V,1800mAh by battery, charging for DC8.4V	
Limiting Voltage	DC 6.29V-8.51V	
Operation Frequency Range and Channel	Frequency Range: 150MH to 174 MHz(VHF); 400 MHz to 480 MHz (UHF) Channel Separation: 12.5KHz(Analog)	
	Bottom Channel: 150.025MHz Middle Channel: 155.025MHz Middle Channel: 161.610MHz High Channel: 173.975MHz	Bottom Channel: 400.025MHz Middle Channel: 435.025MHz Middle Channel: 454.025MHz High Channel: 479.975MHz
Frequency Tolerance	1.092ppm	

Frequency Range (MHz)	Rated Transmit Power(W)(Conducted)	Transmit Mode/Emission Designator
150-174	2W	11K0F3E(Analog Vioce;NB)
400-480	2W	11K0F3E(Analog Vioce;NB)

Channel No. (6.25KHz)	Channel No. (12.5KHz)	12.5KHz Channel Spaced 400MHz Band Plan(MHz)
1	1-2	150.025
2		
3	3-4	155.025
4		
5	5-6	173.975
6		

Channel No. (6.25KHz)	Channel No. (12.5KHz)	12.5KHz Channel Spaced 400MHz Band Plan(MHz)
1	1-2	400.025
2		
3	3-4	455.025
4		
5	5-6	479.975
6		

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

For FM Mode (ChannelSpacing:12.5kHz)

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

For FM Mode (Channel Spacing: 20kHz)

Emission Designator 16K0F3E
In this case, the maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.
BW = 2(M+D) = 2*(3.0 kHz + 5.0 kHz) = 16 kHz = 16K0
F3E portion of the designator represents an FM voice transmission
Therefore, the entire designator for 20 kHz channel spacing FM mode is 16K0F3E.

For FM Mode (Channel Spacing: 25kHz)

Emission Designator 16K0F3E
In this case, the maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.
BW = 2(M+D) = 2*(3.0 kHz + 5.0 kHz) = 16 kHz = 16K0
F3E portion of the designator represents an FM voice transmission
Therefore, the entire designator for 25 kHz channel spacing FM mode is 16K0F3E.

2.2RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: **2AJGM-UV5RPRO ,** filing to comply with Part 2, Part 90 of the Federal Communication Commission rules.

2.3 TEST METHODOLOGY

The tests were performed according to following standards:
FCC Part 90 Private Land Mobile Radio Services
FCC Part 2 Frequency allocations and radio treaty matters, general rules and regulations.
TIA/EIA 603 E: March 2016 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
KDB579009 D03 v01: Applications Part 90 Refarming Bands.
KDB971168 D01 v02r02: Measurement Guidance For Certification Of Licensed Digital Transmitters

2.4 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

2.5 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.

2.6 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

2.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. SYSTEM TEST CONFIGURATION

3.1EUT 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.

3.2 EUT EXERCISE

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

3.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±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%.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, Uc = ±0.8dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %
- Uncertainty of Frequency: Uc = ±2 %
- Uncertainty of FM deviation: Uc=±2 %
- Uncertainty of Audio Level: Uc=±0.98dB
- Uncertainty of Modulation Limiting: Uc=0.42 %
- Uncertainty of Transient Frequency Behavior: Uc=6.8%

3.5 CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System

Table 2-1 Equipment Used in Tested System

Item	Equipment	Model No.	Identifier	Note
1	Two-way radio	UV-5R Pro	FCC ID: 2AJGM-UV5RPRO	EUT
2	Adapter	480-10050-E.S	Input: AC 100-240V 50/60Hz 0.25A Output: DC 10V 0.5A	Accessory
3	Charger	CH-5	Input: DC 10V 0.5A Output: DC 8.4V 0.4A	Accessory
4	Battery	BL-5	DC 3.7V 1800mAh	Accessory
5	Back clip	N/A	N/A	Accessory

Note：The battery is full-charged during the test

4. SUMMARY OF TEST RESULTS

Item	FCC Rules	Description Of Test	Result
1	FCC PART 90	Antenna Equipment	Pass
2	§90.205& 2.1046	Maximum Transmitter Power	Pass
3	§90.207& 2.1047	Modulation Characteristic	Pass
4	§2.1047	Audio Low Pass Filter Response	Pass
5	§90.209& 2.1049	Occupied Bandwidth	Pass
6	§90.210& 2.1049	Emission Mask	Pass
7	§90.213& 2.1055	Frequency Tolerance	Pass
8	§90.214	Transmitter Frequency Behavior	Pass
9	§90.210& 2.1051	Spurious Emission on Antenna Port	Pass
10	§90.210& 2.1053	Spurious Ratiated Emission	Pass

LIST OF EQUIPMENTS USED

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9020A	W1312-60196	Aug. 21, 2020	Aug. 20, 2021
EXA Signal Analyzer	Aglient	N9020A	MY52090123	Sep. 03, 2020	Sep. 02, 2021
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.16, 2019	Sep.15, 2021
preamplifier	ChengYi	EMC184045SE	980508	Oct. 29, 2019	Oct. 28, 2020
preamplifier	ChengYi	EMC184045SE	980508	Oct. 27, 2020	Oct. 26, 2021
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 17, 2019	May. 16, 2021
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun. 09, 2020	Jun. 08, 2021
HORN ANTENNA	EM	EM-AH-10180	/	Feb. 28, 2020	Feb. 27, 2021
SIGNAL GENERATOR	AGILENT	E4421B	MY43351603	Jun. 09, 2020	Jun. 08, 2021
SIGNAL GENERATOR	R&S	SMT03	A0304261	Jun. 09, 2020	Jun. 08, 2021
ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 09, 2019	Jan. 08, 2021
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 20, 2019	Sep. 19, 2021
Modulation Domain Analyzer	HP	53310A	3121A02467	Jul. 03, 2020	Jul. 02, 2022
RF Communication Test Set	HP	8920B	--	Sep. 03, 2020	Sep. 02, 2021
Attenuator	Weinachel Corp	58-30-33	ML030	Oct. 26, 2020	Oct. 25, 2021
RF Cable	R&S	1#	--	Each time	N/A
RF Cable	R&S	2#	--	Each time	N/A
Fliter-UHF	Microwave	N25155M2	498705	May. 11, 2020	May. 10, 2021
Fliter-VHF	Microwave	N26460M1	498703	May. 11, 2020	May. 10, 2021

NOTE: 8920B can generate audio modulation frequency.

5. DESCRIPTION OF TEST MODES

RF TEST MODES

The EUT (**Two-way radio**) has been tested under normal operating condition. (The top channel, the middle channel and the bottom channel) are chosen for testing at each channel separation.

NO.	TEST MODE DESCRIPTION	CHANNEL SEPARATION
1	TX Bottom channel	12.5 kHz
2	TX Middle channel	12.5 kHz
3	TX Middle channel	12.5 kHz
4	TX Top channel	12.5 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. For Conducted Test method, a temporary antenna connector is provided by the manufacture.
4. Manufacturers use computer PC programming software to switch and operate frequency points, refer to the instructions for details

6. FREQUENCY TOLERANCE

6.1 PROVISIONS APPLICABLE

a). According to FCC §2.1055 and §90.213, the frequency stability shall be measured with variation of ambient temperature from –30℃ to +50℃ centigrade.

b). According to FCC Part 2 Section 2.1055(d)(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 manufacturer.

c). According to FCC Part 90 Section 90.213, the frequency tolerance must be maintained within 0.00025% for 12.5 KHz channel separation and 0.0001% for 6.25 KHz channel separation.

6.2 MEASUREMENT PROCEDURE

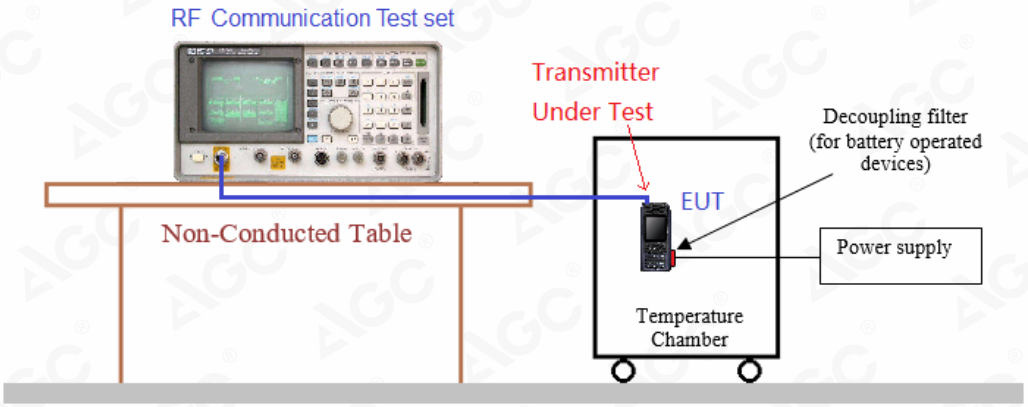
6.2.1 Frequency stability versus environmental temperature

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℃. 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℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

6.2.2 Frequency stability versus input voltage

1. 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 7.4V.
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 TEST SETUP BLOCK DIAGRAM



6.4 TEST RESULTS

VHF:

(1) Frequency stability versus input voltage (Supply nominal voltage is 7.40V)**-2W-12.5KHz**

Environment Temperature(℃)	Power Supply (V)	Reference Frequency				Limit: ppm
		150.025MHz	155.025MHz	161.610MHz	173.975MHz	
50	DC 7.40 V	0.608	0.653	0.929	0.685	5
40	DC 7.40 V	1.092	0.970	0.673	0.349	
30	DC 7.40 V	0.940	0.526	0.881	0.343	
20	DC 7.40 V	1.037	0.725	0.998	0.359	
10	DC 7.40 V	0.851	0.738	0.812	0.523	
0	DC 7.40 V	0.671	1.047	0.741	0.503	
-10	DC 7.40 V	0.717	0.907	0.539	0.542	
-20	DC 7.40 V	0.583	0.725	0.697	0.549	
-30	DC 7.40 V	0.953	0.895	0.509	0.895	
Result	Pass					

(2) Frequency stability versus input voltage (Battery endpoint is 6.29V) **-2W-12.5KHz**

Environment Temperature(℃)	Power Supply (V)	Reference Frequency				Limit: ppm
		150.025MHz	155.025MHz	161.610MHz	173.975MHz	
50	DC 6.29 V	0.841	0.856	0.548	0.424	5
40	DC 6.29 V	0.525	0.925	0.928	0.759	
30	DC 6.29 V	0.949	0.942	0.605	0.941	
20	DC 6.29 V	0.988	0.940	1.050	0.592	
10	DC 6.29 V	0.795	0.980	1.049	0.710	
0	DC 6.29 V	0.686	0.730	0.594	0.874	
-10	DC 6.29 V	0.675	1.006	0.893	0.718	
-20	DC 6.29 V	0.944	0.874	0.539	0.383	
-30	DC 6.29 V	0.566	0.588	0.761	0.462	
Result	Pass					

(1) Frequency stability versus input voltage (Supply nominal voltage is 7.4V)**-2W-12.5KHz**

Environment Temperature(℃)	Power Supply (V)	Reference Frequency				Limit: ppm
		400.025MHz	435.025MHz	454.025MHz	479.975MHz	
50	DC 7.40 V	0.841	0.616	0.651	0.385	2.5
40	DC 7.40 V	0.505	0.783	0.861	0.341	
30	DC 7.40 V	0.890	0.947	0.785	0.933	
20	DC 7.40 V	0.552	1.052	0.778	0.982	
10	DC 7.40 V	1.034	1.076	1.045	0.526	
0	DC 7.40 V	0.870	0.781	0.661	0.479	
-10	DC 7.40 V	0.745	0.514	1.078	0.522	
-20	DC 7.40 V	0.844	0.915	0.553	0.557	
-30	DC 7.40 V	0.819	0.701	0.761	0.372	
Result	Pass					

(2) Frequency stability versus input voltage (Battery endpoint is 6.29V) **-2W-12.5KHz**

Environment Temperature(℃)	Power Supply (V)	Reference Frequency				Limit: ppm
		400.025MHz	435.025MHz	454.025MHz	479.975MHz	
50	DC 6.29 V	1.080	0.849	0.716	0.585	2.5
40	DC 6.29 V	0.977	1.036	0.806	0.618	
30	DC 6.29 V	0.767	1.023	0.703	0.348	
20	DC 6.29 V	0.888	0.510	0.945	0.454	
10	DC 6.29 V	0.618	0.594	0.815	0.639	
0	DC 6.29 V	1.028	0.563	0.859	0.364	
-10	DC 6.29 V	0.638	0.726	0.729	0.798	
-20	DC 6.29 V	0.502	0.909	0.539	0.742	
-30	DC 6.29 V	0.789	0.747	1.009	0.490	
Result	Pass					

Note: 1.Battery terminal voltage is declared and specified by the manufacturer.
2. All test values are in “ppm”

7. EMISSION BANDWIDTH

7.1 PROVISIONS APPLICABLE

For FCC Part 90 requirements:

The authorized bandwidth shall be 11.25 KHz for 12.5 KHz channel separation and 6 KHz for 6.25 KHz channel separation.

7.2 MEASUREMENT PROCEDURE

1). The EUT was placed on a turn table which is 0.8m above ground plane.

2). The EUT was modulated by 2.5 KHz Sine wave audio signal, The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing).

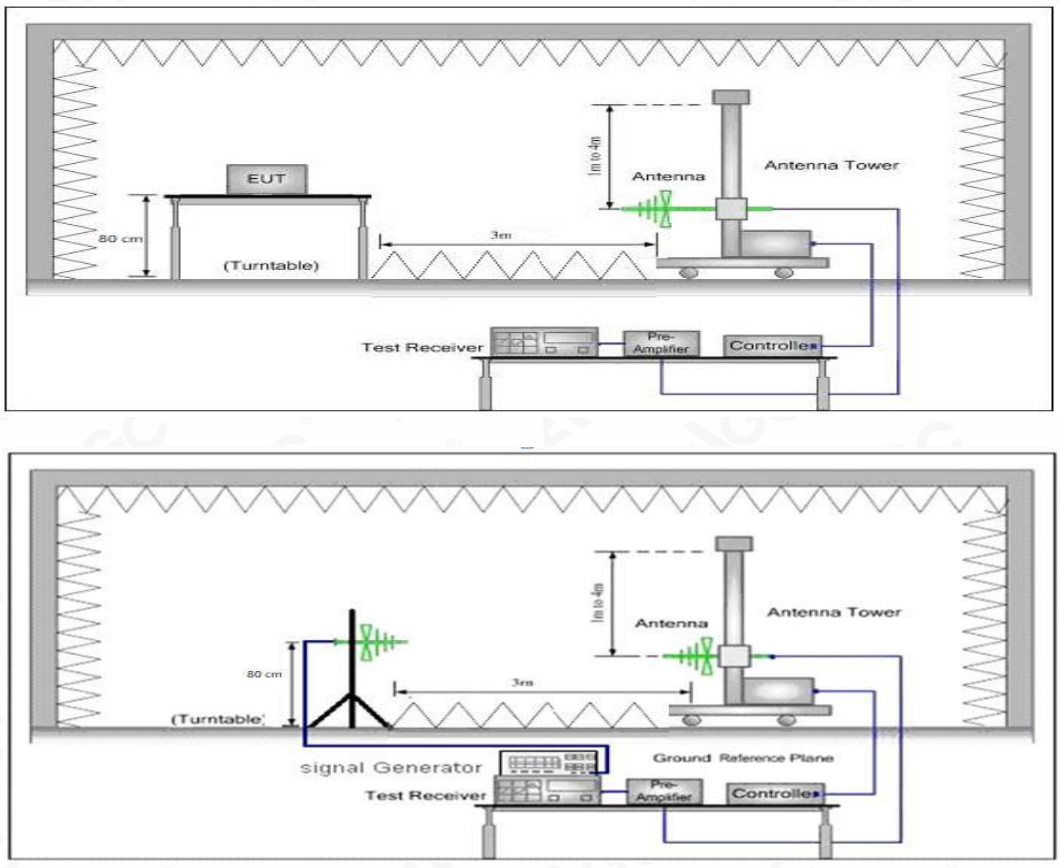
3). Set SPA Center Frequency = fundamental frequency, RBW=100Hz.VBW= 300 Hz, Span =50 KHz.

4). Set SPA Max hold. Mark peak, -26 dB.

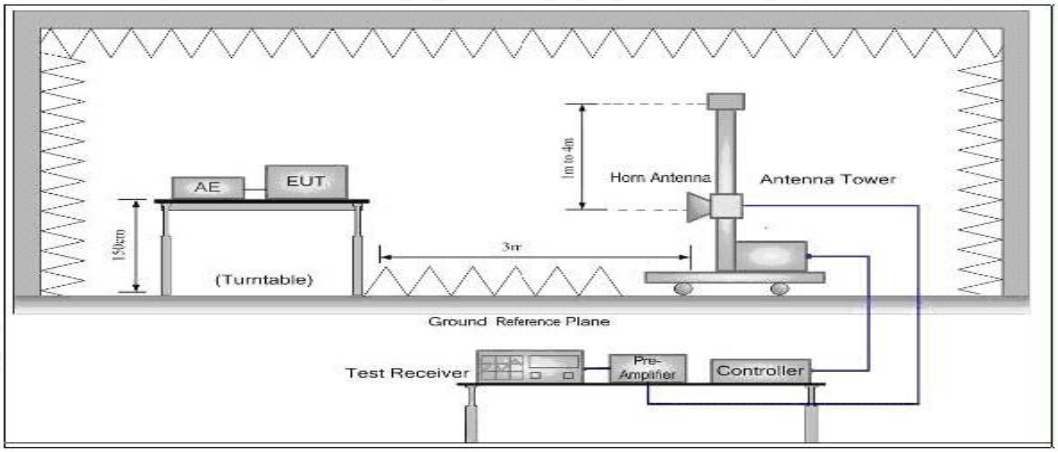
7.3 TEST SETUP BLOCK DIAGRAM

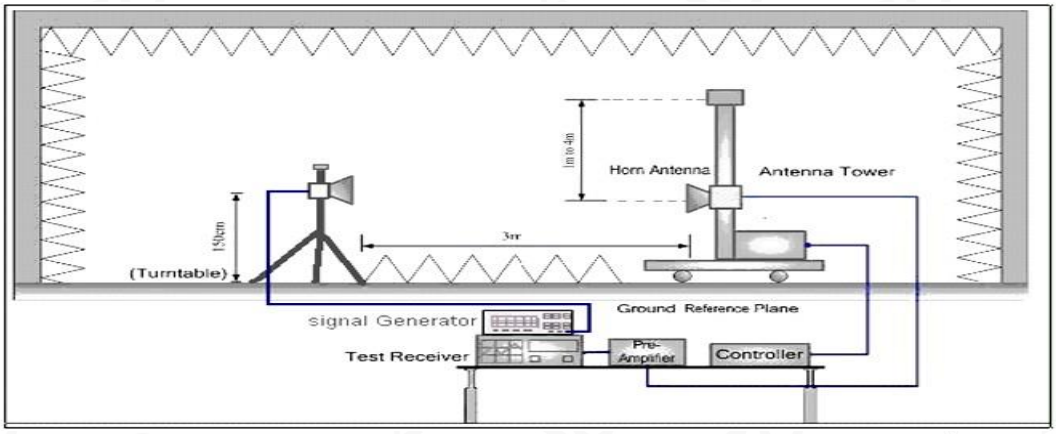
Radiation method:

Radiated Below1GHz

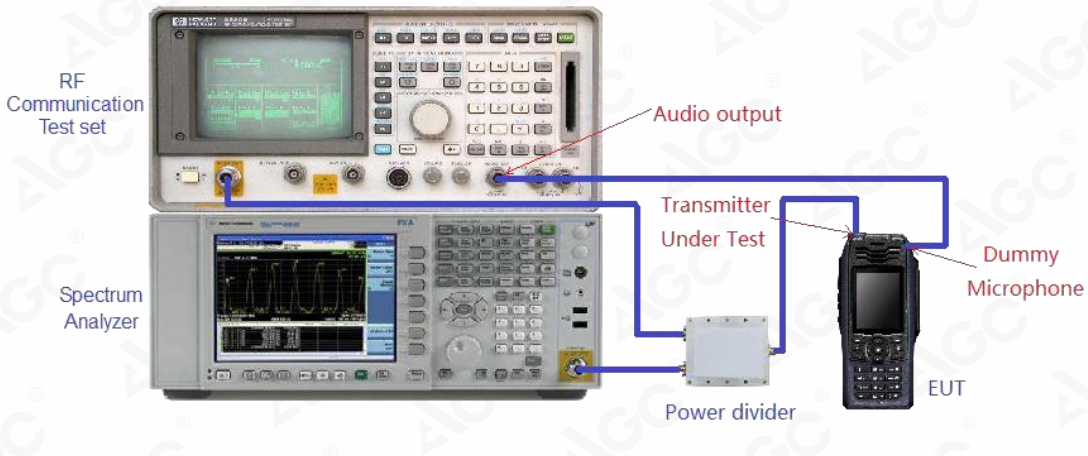


Radiated Above 1 GHz





Conduction method:

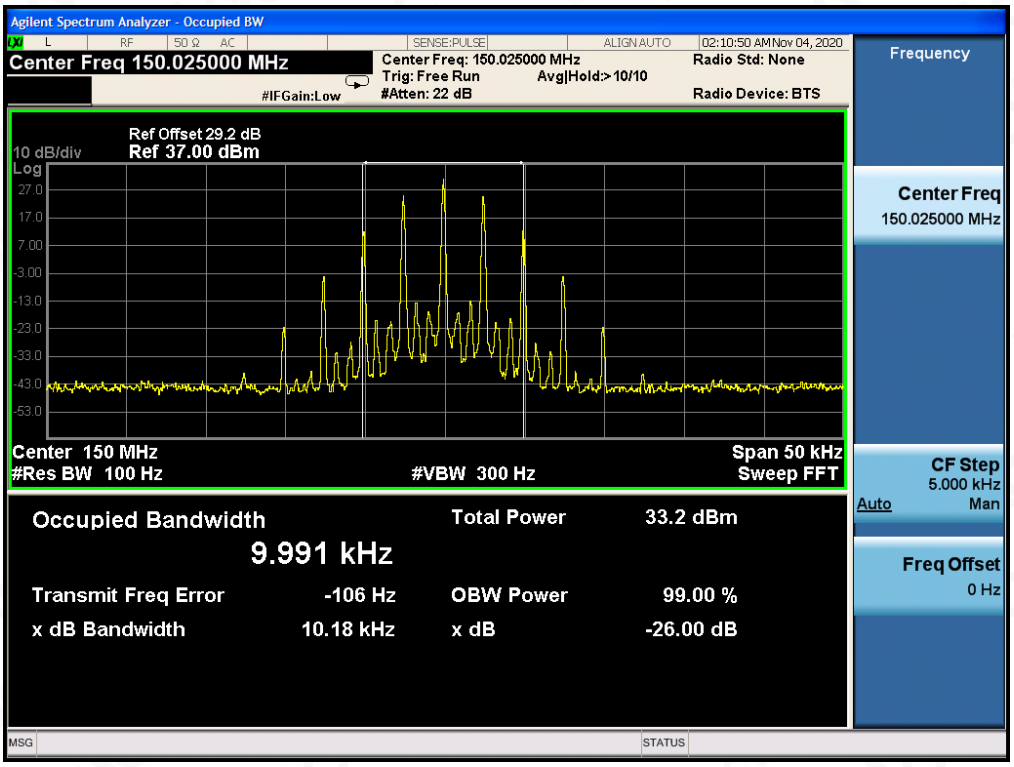


7.4 MEASUREMENT RESULT

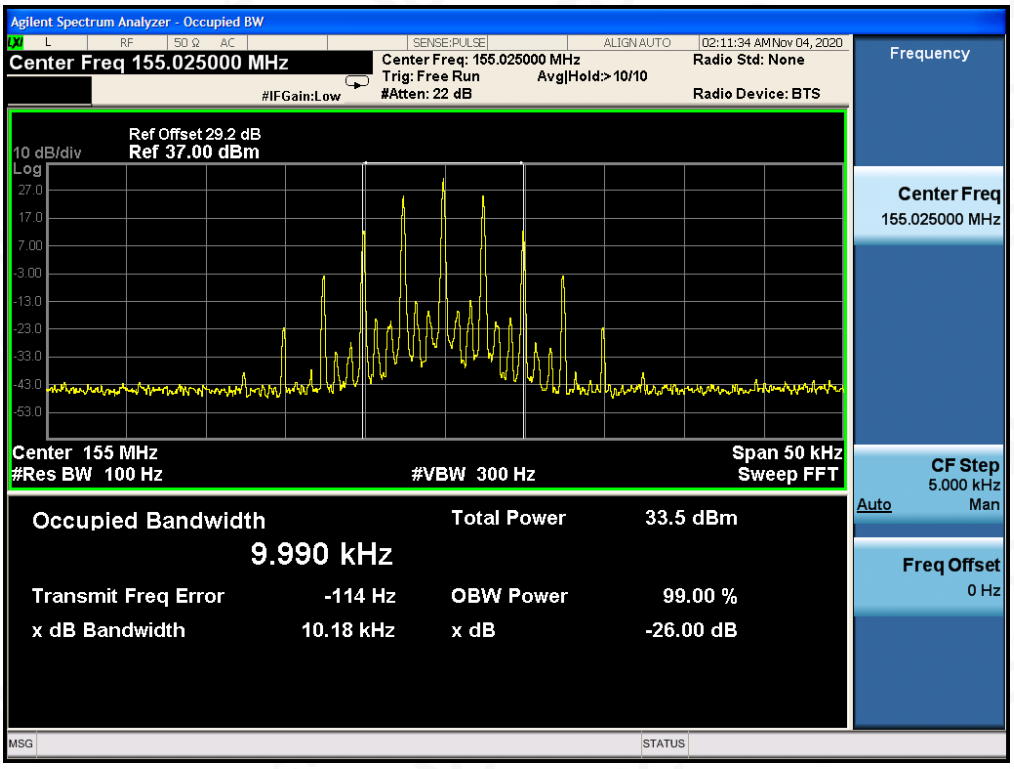
VHF:

Emission Bandwidth Measurement Result				
Operating Frequency	12.5 KHz Channel Separation			
	Occupied Bandwidth	Emission Bandwidth	Limits	Result
150.025MHz	9.991 KHz	10.18 KHz	11.25 KHz	Pass
155.025MHz	9.990 KHz	10.18 KHz	11.25 KHz	Pass
161.610MHz	9.989 KHz	10.19 KHz	11.25 KHz	Pass
173.975MHz	9.990 KHz	10.18 KHz	11.25 KHz	Pass

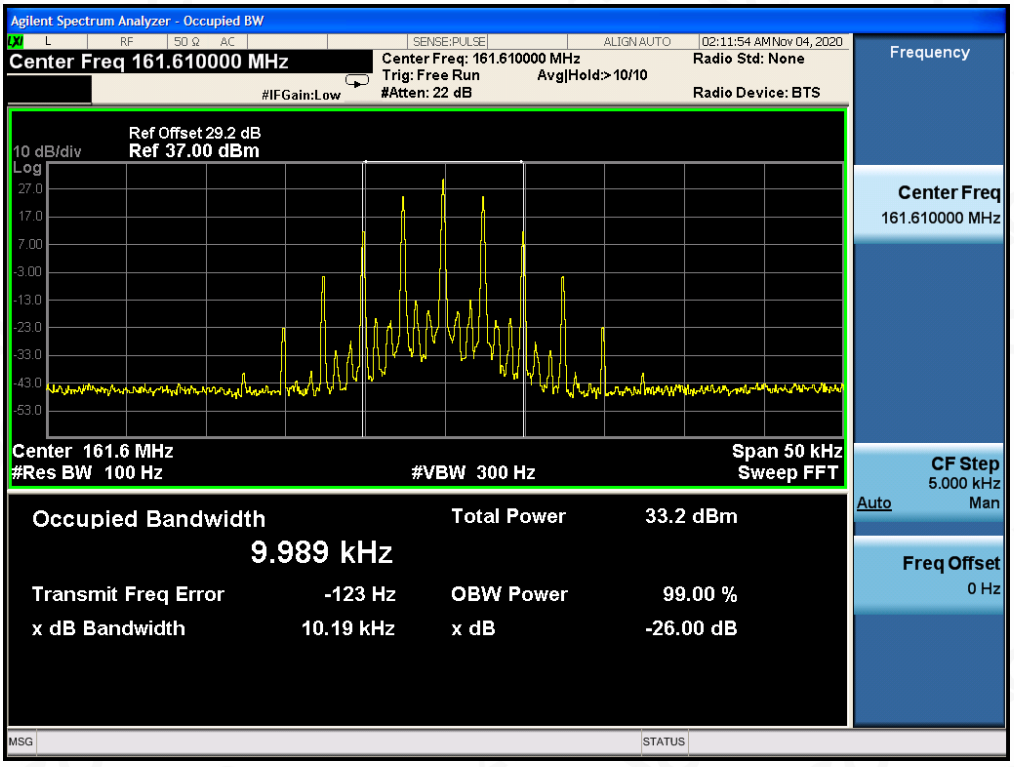
Occupied bandwidth of Bottom Channel (150.025MHz)-2W



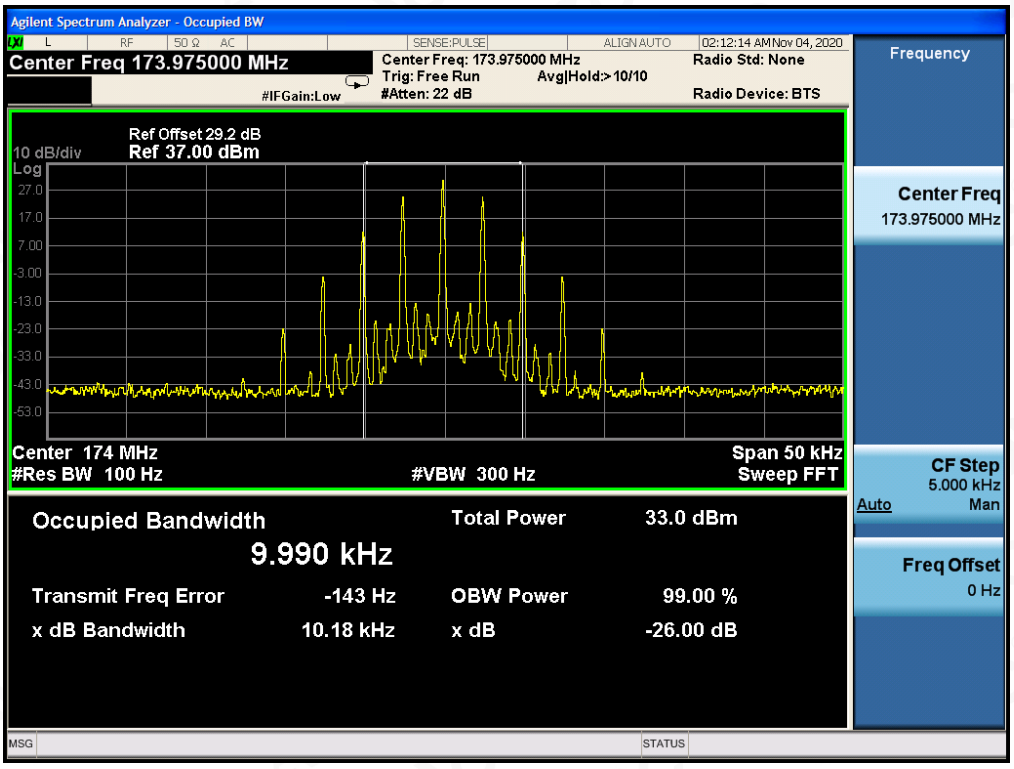
Occupied bandwidth of Bottom Channel (155.025MHz)-2W



Occupied bandwidth of Bottom Channel (161.610MHz)-2W



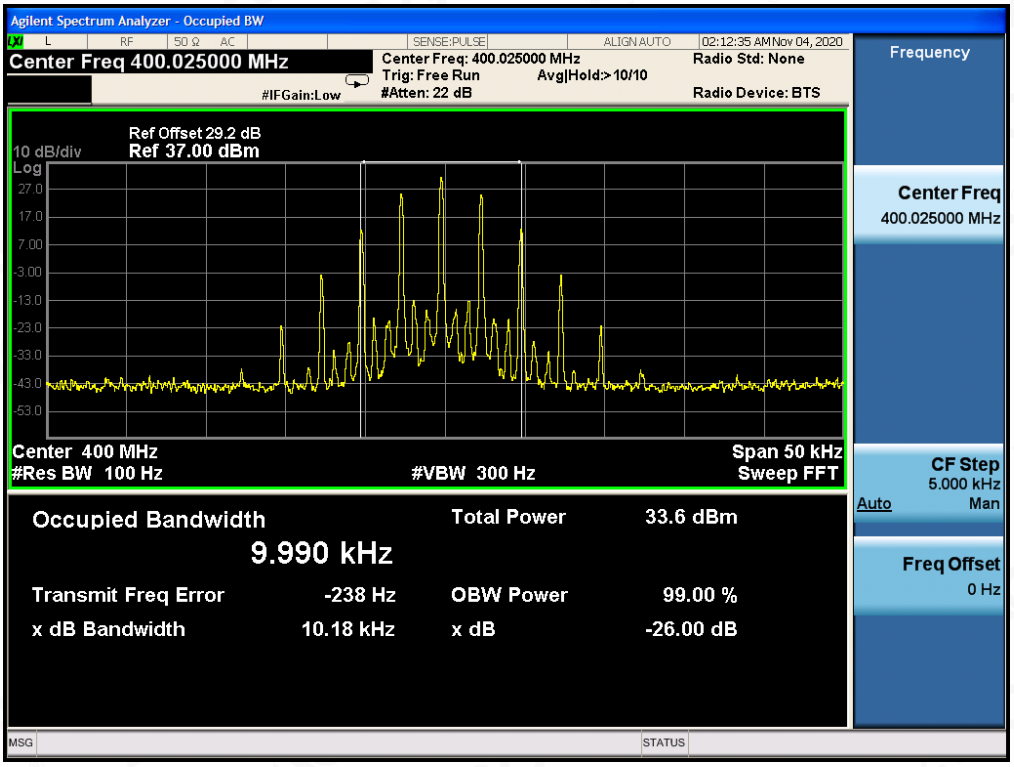
Occupied bandwidth of Bottom Channel (173.975MHz)-2W



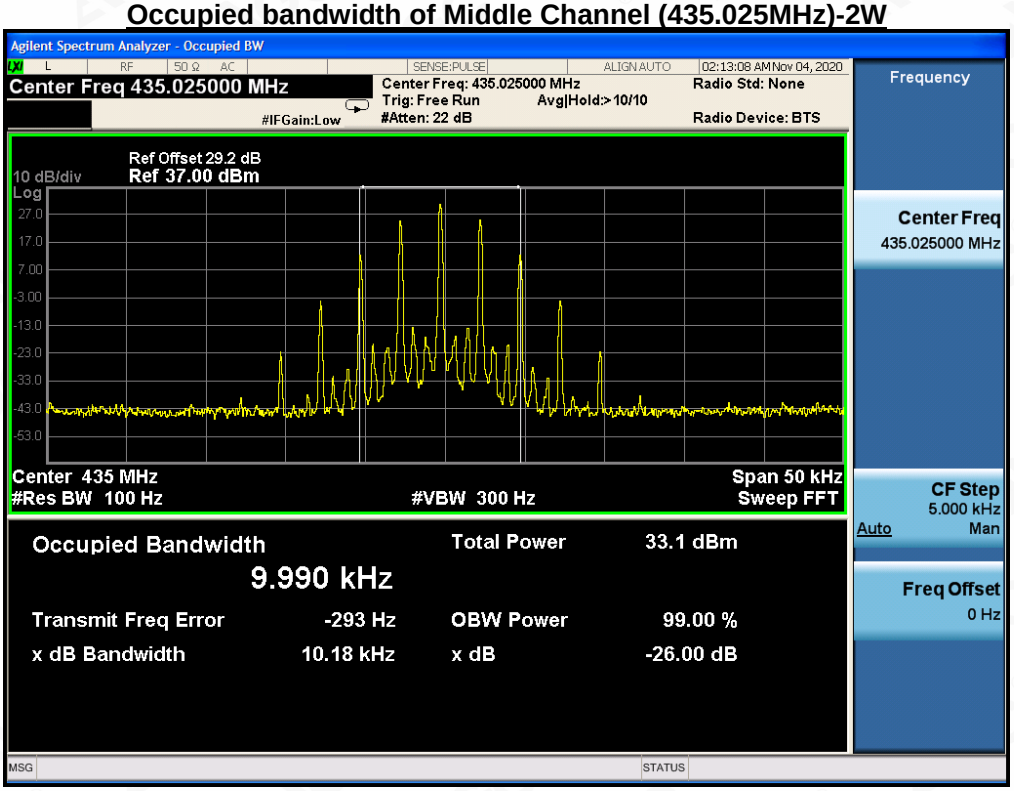
UHF:

Emission Bandwidth Measurement Result				
Operating Frequency	12.5 KHz Channel Separation			
	Occupied Bandwidth	Emission Bandwidth	Limits	Result
400.025MHz	9.990 KHz	10.18 KHz	11.25 KHz	Pass
435.025MHz	9.990 KHz	10.18 KHz	11.25 KHz	Pass
454.025MHz	9.991 KHz	10.18 KHz	11.25 KHz	Pass
479.975MHz	9.990 KHz	10.18 KHz	11.25 KHz	Pass

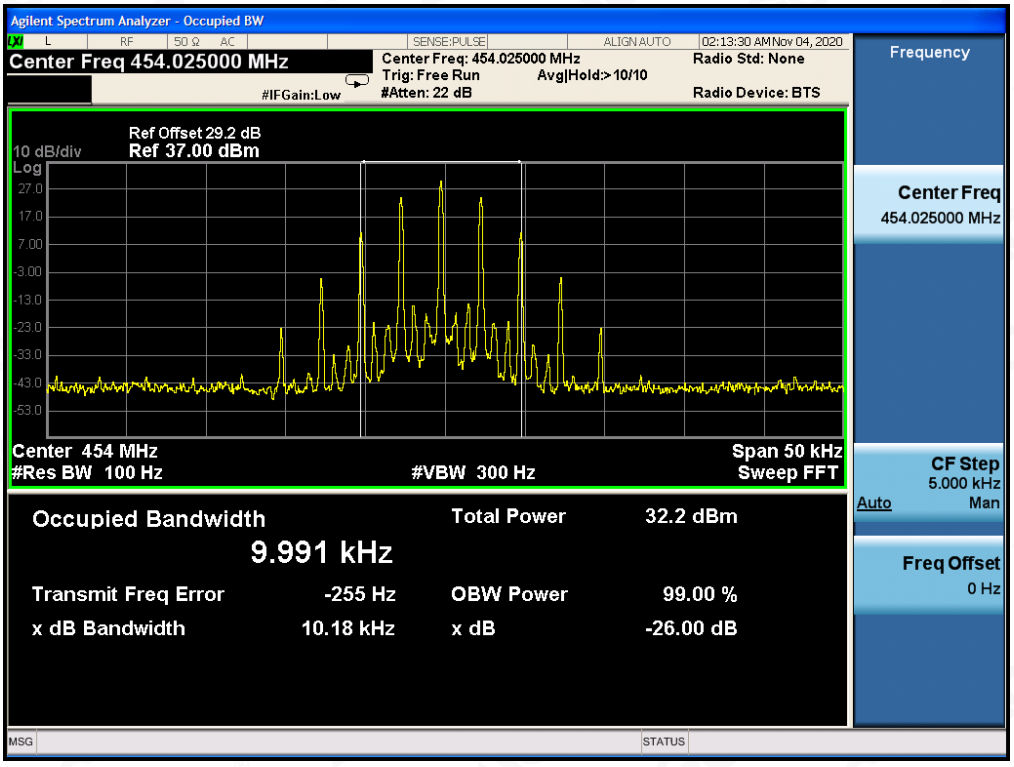
Occupied bandwidth of Bottom Channel (400.025MHz)-2W



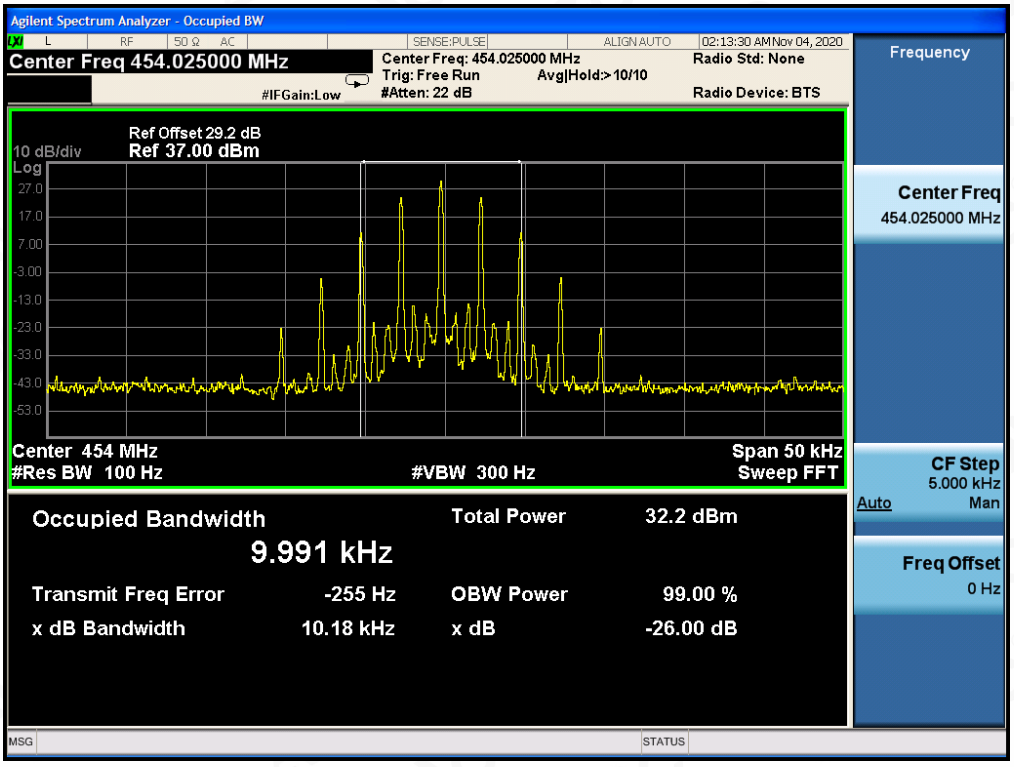
Occupied bandwidth of Middle Channel (435.025MHz)-2W



Occupied bandwidth of Middle Channel (454.025MHz)-2W



Occupied bandwidth of Top Channel (479.975MHz)-2W



8. UNWANTED RADIATION

8.1 PROVISIONS APPLICABLE

According to FCC §2.1049 and §90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with each channel separation.

Emission Mask D -for 12.5 KHz Channel Separation:

(1).On any frequency removed from the center of the authorized bandwidth fo to 5.625 KHz removed from fo: Zero dB.

(2).On any frequency removed from the center of the authorized bandwidth by a displacement Frequency (fd in KHz) fo of more than 5.625 KHz but no more than 12.5 KHz: At least 7.27(fd-2.88 KHz) dB

(3).On any frequency removed from the center of the authorized bandwidth by a displacement Frequency (fd in KHz)fo of more than 12.5 KHz: At least 50+10 log(P) dB or 70 dB, whichever is lesser attenuation.

8.2 MEASUREMENT PROCEDURE

(1)On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

(2)The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.

(3)The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

(4)The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

(5)The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.

(6)The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

(7)The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.

(8)The maximum signal level detected by the measuring receiver shall be noted.

(9)The measurement shall be repeated with the test antenna set to horizontal polarization.

(10) Replace the antenna with a proper Antenna (substitution antenna).

(11)The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.

(12)The substitution antenna shall be connected to a calibrated signal generator.

(13)If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

(14)The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

(15)The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

(16)The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

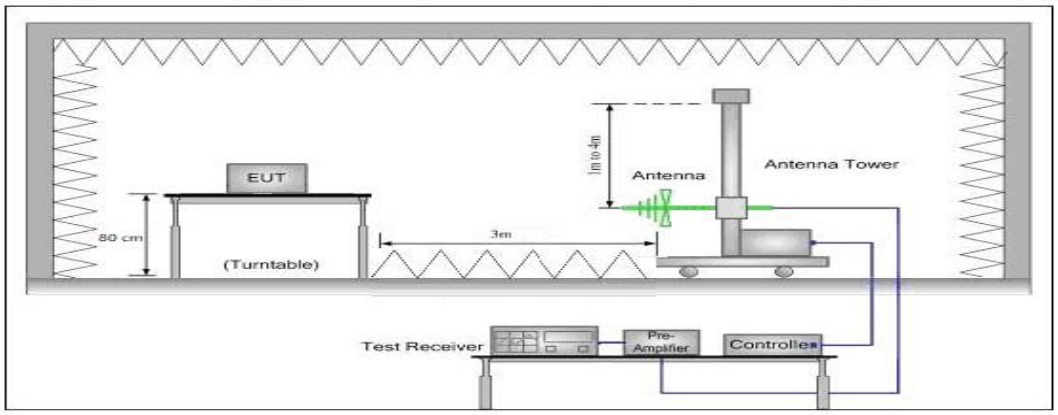
(17)The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

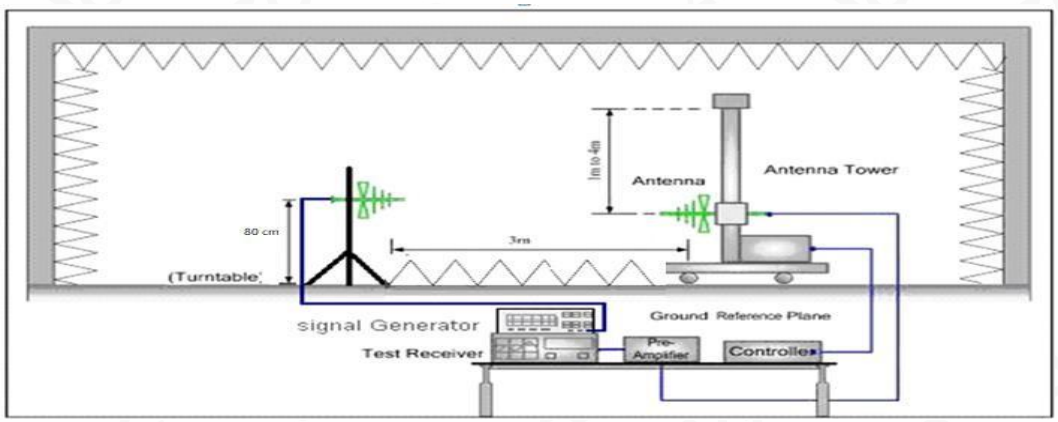
8.3 TEST SETUP BLOCK DIAGRAM

SUBSTITUTION METHOD: (Radiated Emissions)

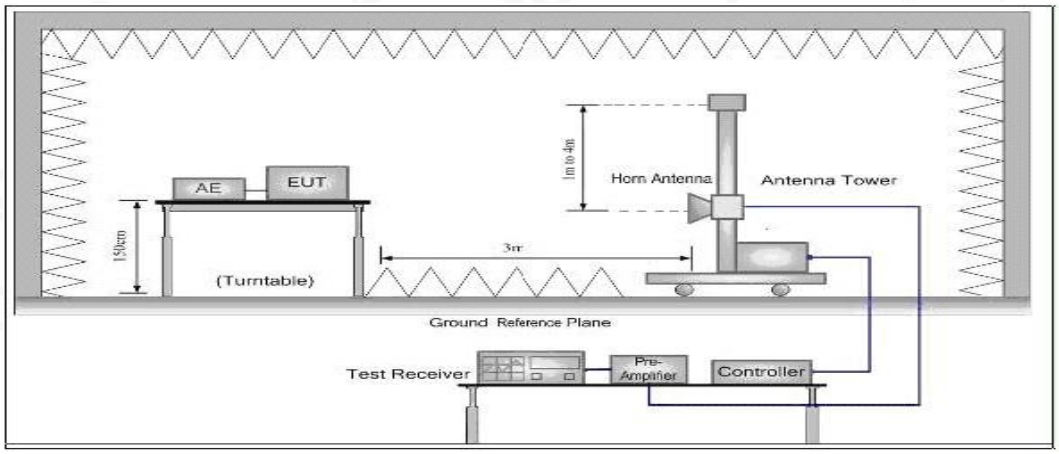
Radiation method:

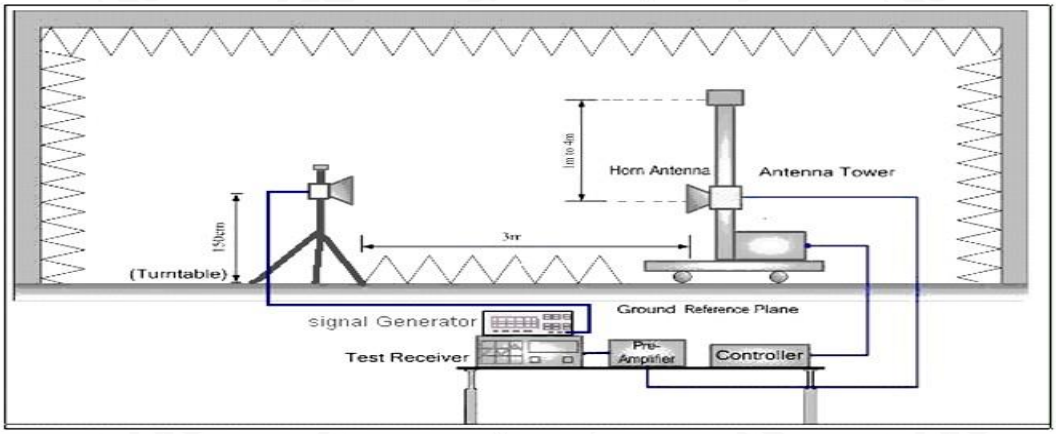
Radiated Below1GHz





Radiated Above 1 GHz





8.4 MEASUREMENT RESULTS:

Applicable Standard

FCC §2.1053 and §90.210

On any frequency removed from the center of the authorized bandwidth by a displacement

Frequency (fd in KHz)for of more than 12.5 KHz: at least 50+10 log(P) dB or 70 dB, whichever is lesser attenuation.

Test Procedure

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

In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power for each degree interval. The “Read Value” is the spectrum reading of maximum power value.

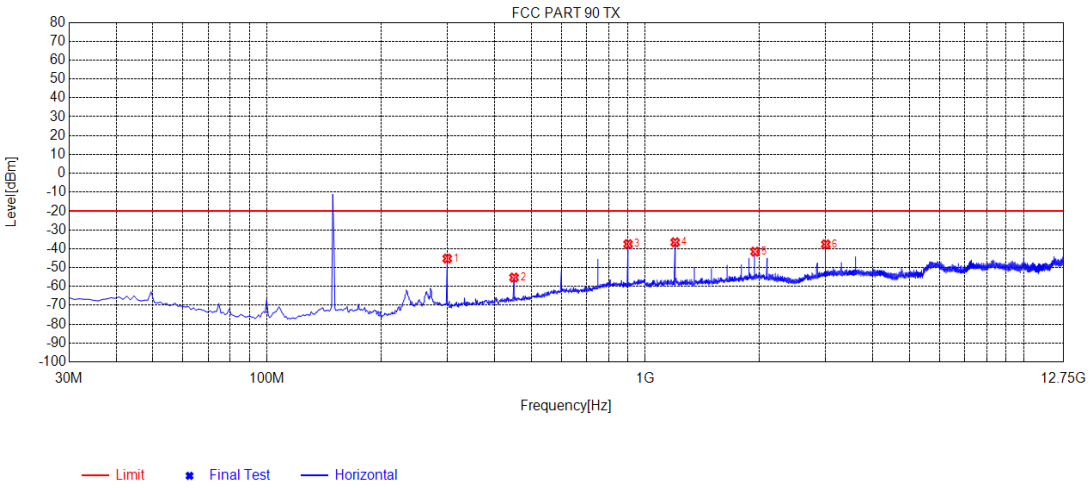
The substitution antenna is substituted for DUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the Measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.

EIRP = “Read Value” + Measured substitution value + 2.15.

Limit: At least 50+10 log (P) =50+10log (2) =53.01 (dB)—2W 33.01-53.01=-20dBm

VHF:

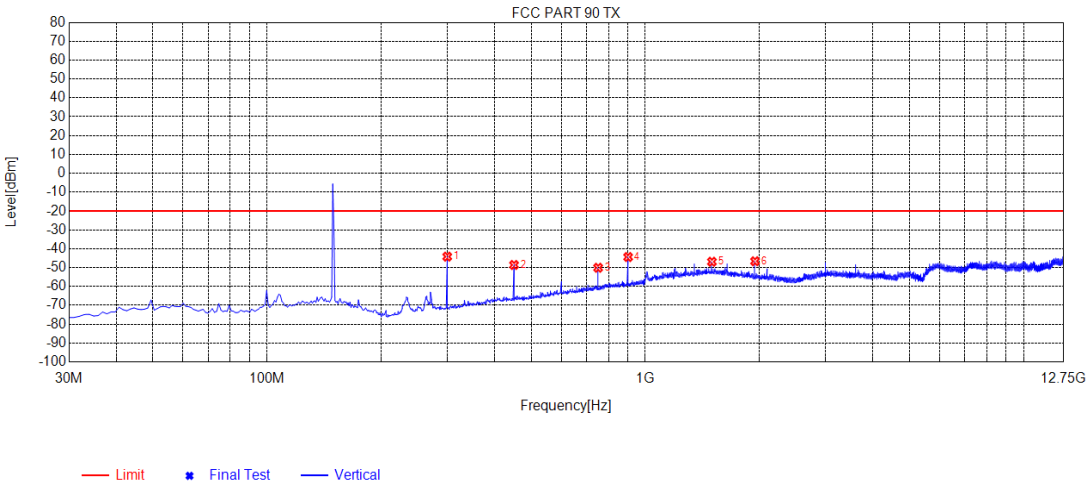
Measurement Result for 12.5 KHz Channel Separation @ 150.025MHz-2W-Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	299.6600	-77.22	-45.23	-20.00	25.23	31.99	300	Horizontal
2	450.0100	-90.66	-55.28	-20.00	35.28	35.38	349	Horizontal
3	901.0600	-80.51	-37.55	-20.00	17.55	42.96	300	Horizontal
4	1199.7700	-32.77	-36.61	-20.00	16.61	-3.84	246	Horizontal
5	1950.6701	-41.70	-41.54	-20.00	21.54	0.16	166	Horizontal
6	3001.2251	-40.97	-37.68	-20.00	17.68	3.29	349	Horizontal

RESULT: PASS

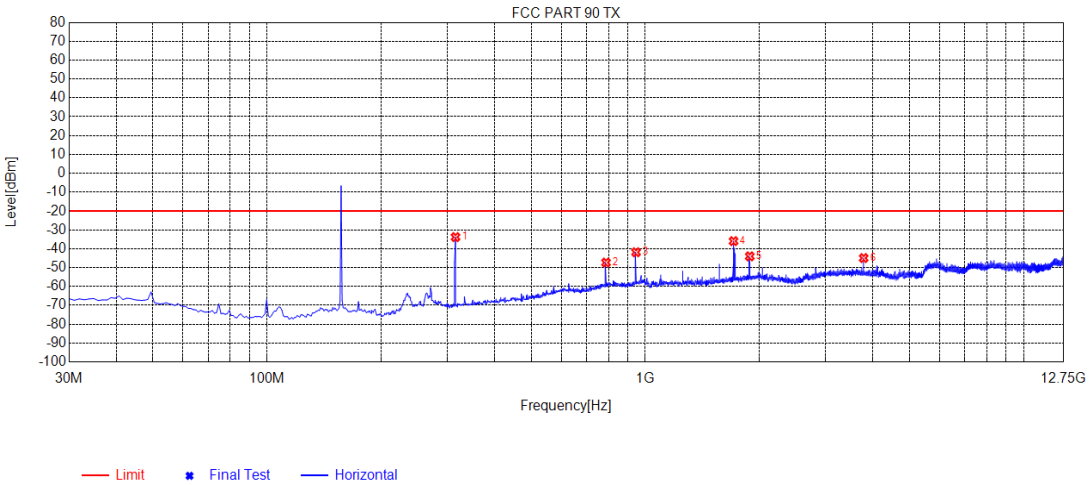
Measurement Result for 12.5 KHz Channel Separation @ 150.025MHz-2W-Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	299.6600	-75.13	-44.20	-20.00	24.20	30.93	24	Vertical
2	450.0100	-84.30	-48.61	-20.00	28.61	35.69	304	Vertical
3	750.7100	-91.52	-50.09	-20.00	30.09	41.43	291	Vertical
4	901.0600	-87.71	-44.39	-20.00	24.39	43.32	351	Vertical
5	1500.6001	-49.07	-46.91	-20.00	26.91	2.16	318	Vertical
6	1950.6701	-47.21	-46.63	-20.00	26.63	0.58	224	Vertical

RESULT: PASS

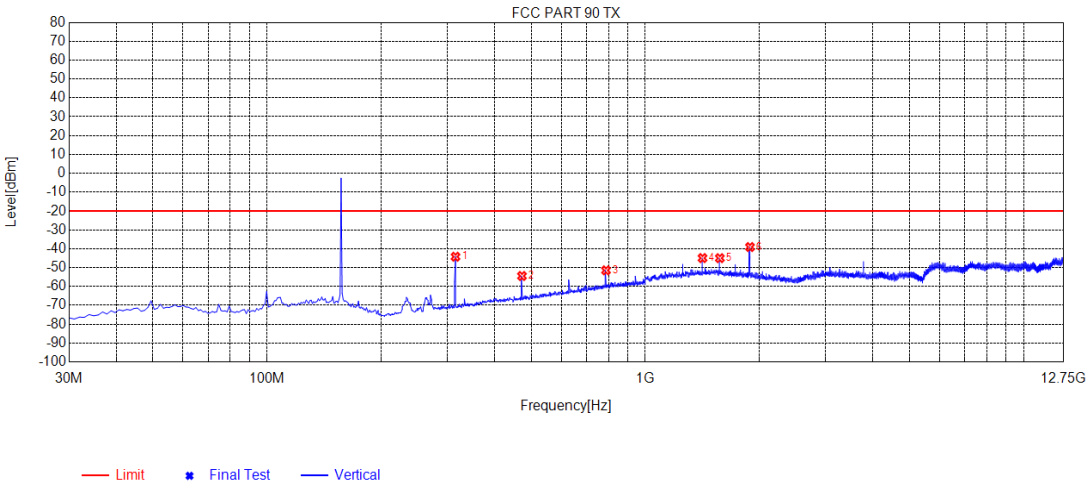
Measurement Result for 12.5 KHz Channel Separation @ 155.025MHz-2W-Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	315.1800	-66.17	-33.84	-20.00	13.84	32.33	268	Horizontal
2	787.5700	-90.34	-47.33	-20.00	27.33	43.01	125	Horizontal
3	945.6800	-85.81	-41.88	-20.00	21.88	43.93	294	Horizontal
4	1712.1212	-34.36	-35.98	-20.00	15.98	-1.62	1	Horizontal
5	1889.5640	-43.75	-44.05	-20.00	24.05	-0.30	164	Horizontal
6	3779.1529	-49.45	-44.95	-20.00	24.95	4.50	10	Horizontal

RESULT: PASS

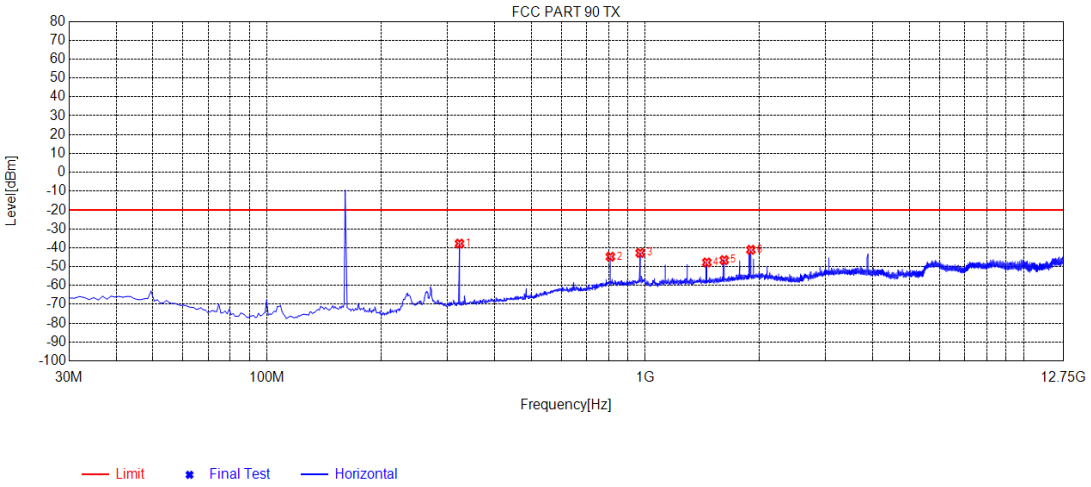
Measurement Result for 12.5 KHz Channel Separation @ 155.025MHz-2W-Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	315.1800	-75.79	-44.24	-20.00	24.24	31.55	52	Vertical
2	472.3200	-90.46	-54.46	-20.00	34.46	36.00	0	Vertical
3	787.5700	-93.60	-51.47	-20.00	31.47	42.13	224	Vertical
4	1417.1667	-46.57	-44.96	-20.00	24.96	1.61	0	Vertical
5	1574.6325	-46.90	-45.00	-20.00	25.00	1.90	331	Vertical
6	1891.9142	-39.89	-39.10	-20.00	19.10	0.79	0	Vertical

RESULT: PASS

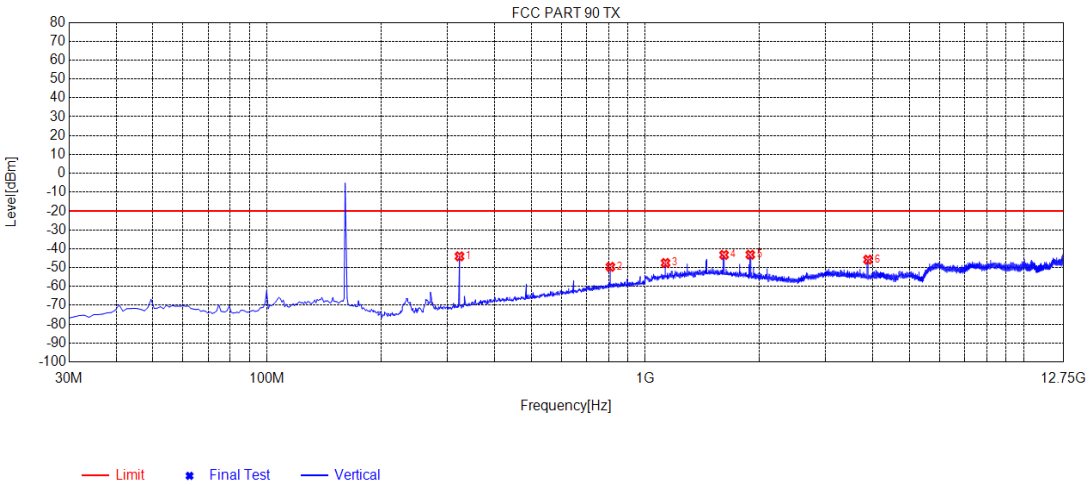
Measurement Result for 12.5 KHz Channel Separation @ 161.610MHz-2W-Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	322.9400	-70.34	-37.82	-20.00	17.82	32.52	293	Horizontal
2	808.9100	-88.14	-44.76	-20.00	24.76	43.38	55	Horizontal
3	969.9300	-87.24	-42.78	-20.00	22.78	44.46	332	Horizontal
4	1454.7705	-44.52	-47.82	-20.00	27.82	-3.30	175	Horizontal
5	1616.9367	-44.24	-46.58	-20.00	26.58	-2.34	148	Horizontal
6	1902.4902	-40.92	-41.12	-20.00	21.12	-0.20	95	Horizontal

RESULT: PASS

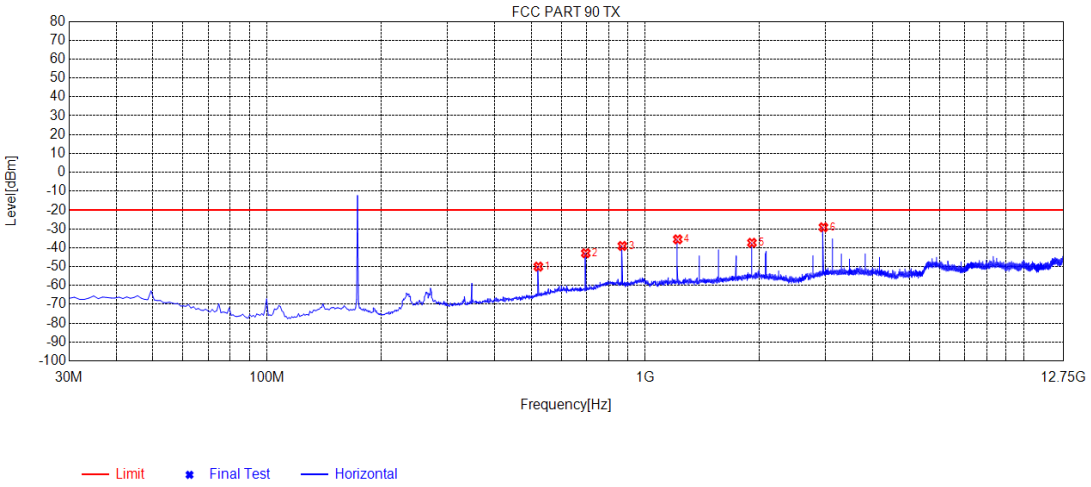
Measurement Result for 12.5 KHz Channel Separation @ 161.610MHz-2W-Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	322.9400	-75.90	-44.04	-20.00	24.04	31.86	213	Vertical
2	808.9100	-92.07	-49.62	-20.00	29.62	42.45	304	Vertical
3	1131.6132	-47.26	-47.55	-20.00	27.55	-0.29	318	Vertical
4	1615.7616	-45.02	-43.27	-20.00	23.27	1.75	304	Vertical
5	1895.4395	-43.96	-43.18	-20.00	23.18	0.78	122	Vertical
6	3879.0379	-49.01	-45.78	-20.00	25.78	3.23	331	Vertical

RESULT: PASS

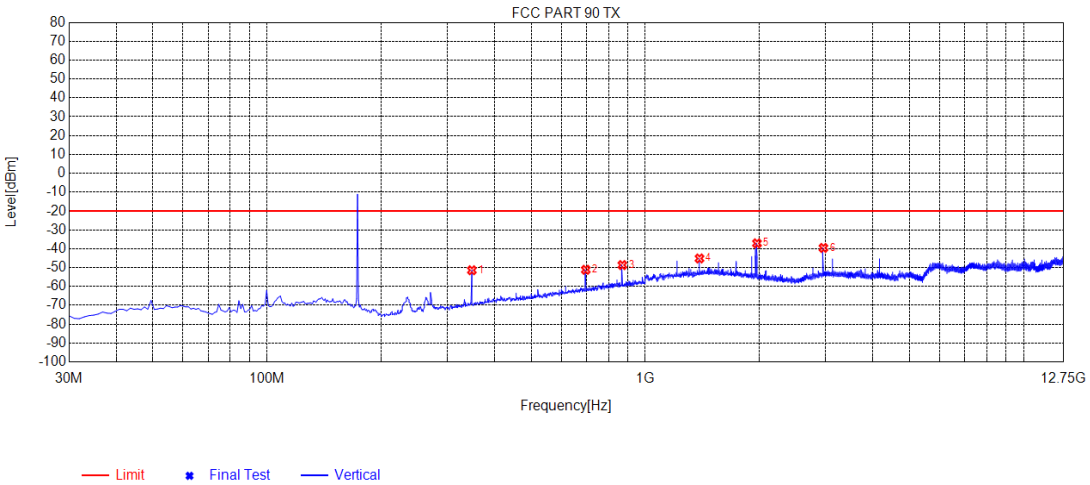
Measurement Result for 12.5 KHz Channel Separation @ 173.975MHz-2W-Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	521.7900	-87.12	-50.02	-20.00	30.02	37.10	9	Horizontal
2	696.3900	-83.01	-42.90	-20.00	22.90	40.11	230	Horizontal
3	870.0200	-82.16	-39.08	-20.00	19.08	43.08	309	Horizontal
4	1218.5719	-31.76	-35.56	-20.00	15.56	-3.80	256	Horizontal
5	1914.2414	-37.27	-37.38	-20.00	17.38	-0.11	163	Horizontal
6	2957.7458	-32.05	-29.16	-20.00	9.16	2.89	347	Horizontal

RESULT: PASS

Measurement Result for 12.5 KHz Channel Separation @ 173.975MHz-2W-Vertical

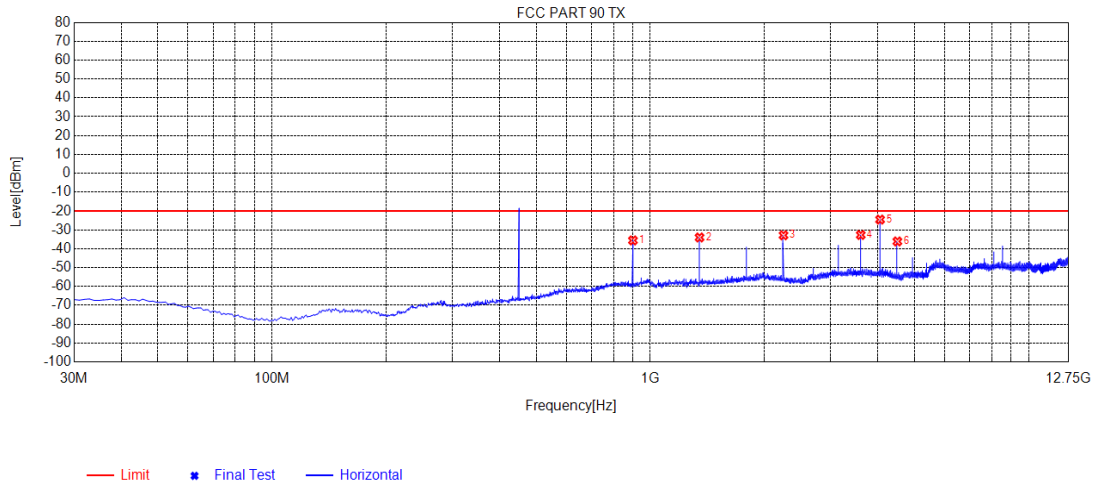


NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	348.1600	-84.30	-51.41	-20.00	31.41	32.89	65	Vertical
2	696.3900	-91.57	-51.16	-20.00	31.16	40.41	251	Vertical
3	870.0200	-91.70	-48.67	-20.00	28.67	43.03	331	Vertical
4	1391.3141	-46.61	-45.17	-20.00	25.17	1.44	331	Vertical
5	1974.1724	-37.65	-37.15	-20.00	17.15	0.50	144	Vertical
6	2957.7458	-42.43	-39.58	-20.00	19.58	2.85	5	Vertical

RESULT: PASS

UHF:

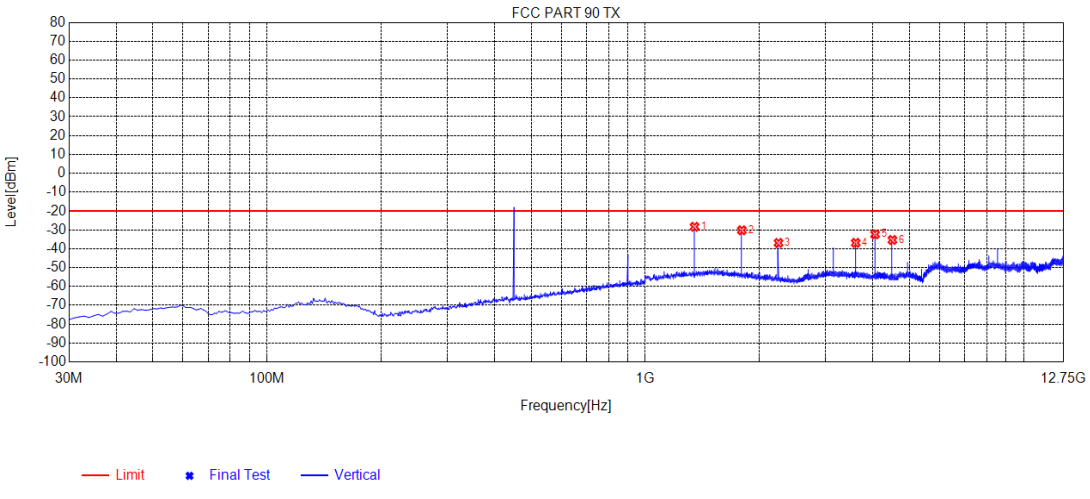
Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz-2W-Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	900.0900	-78.55	-35.61	-20.00	15.61	42.94	297	Horizontal
2	1350.1850	-30.52	-34.04	-20.00	14.04	-3.52	83	Horizontal
3	2250.3250	-32.41	-32.87	-20.00	12.87	-0.46	216	Horizontal
4	3600.5351	-36.99	-32.70	-20.00	12.70	4.29	337	Horizontal
5	4050.6051	-29.17	-24.55	-20.00	4.55	4.62	9	Horizontal
6	4500.6751	-39.62	-36.14	-20.00	16.14	3.48	43	Horizontal

RESULT: PASS

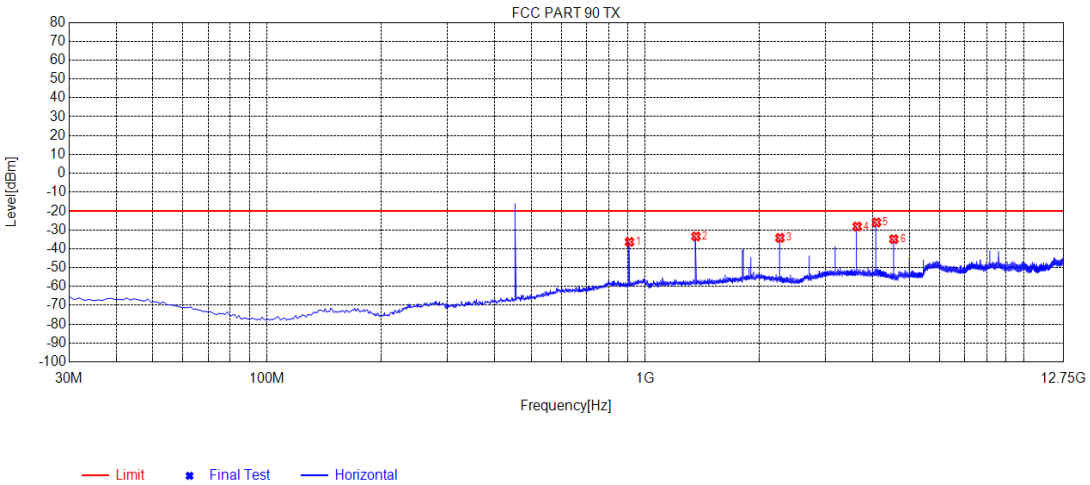
Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz-2W-Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	1350.1850	-29.55	-28.38	-20.00	8.38	1.17	278	Vertical
2	1800.2550	-31.32	-30.21	-20.00	10.21	1.11	160	Vertical
3	2250.3250	-36.59	-36.93	-20.00	16.93	-0.34	359	Vertical
4	3600.5351	-40.01	-36.90	-20.00	16.90	3.11	0	Vertical
5	4050.6051	-35.64	-32.37	-20.00	12.37	3.27	318	Vertical
6	4500.6751	-38.43	-35.37	-20.00	15.37	3.06	343	Vertical

RESULT: PASS

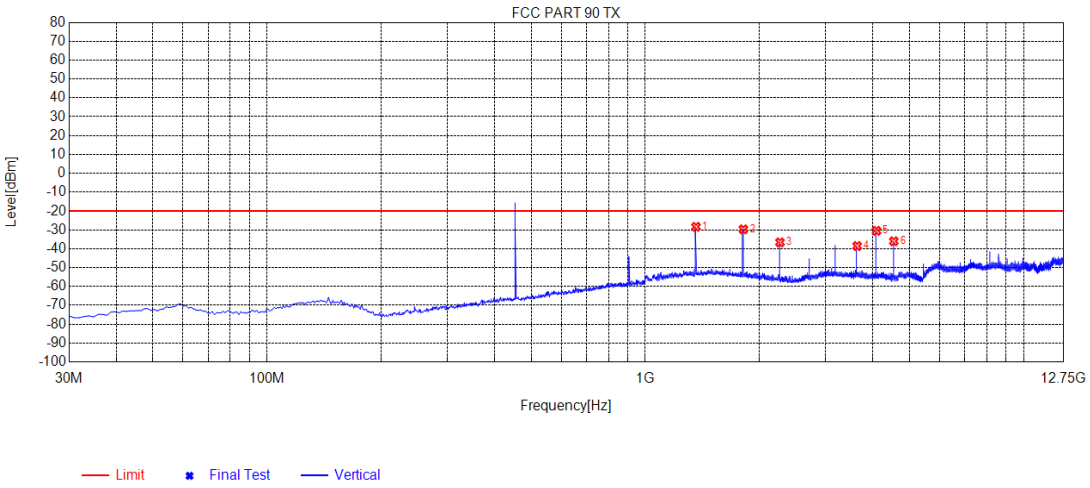
Measurement Result for 12.5 KHz Channel Separation @ 435.025MHz-2W-Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	908.8200	-79.52	-36.39	-20.00	16.39	43.13	282	Horizontal
2	1361.9362	-29.98	-33.48	-20.00	13.48	-3.50	70	Horizontal
3	2270.3020	-33.72	-34.25	-20.00	14.25	-0.53	70	Horizontal
4	3632.2632	-32.56	-28.23	-20.00	8.23	4.33	1	Horizontal
5	4085.8586	-30.61	-26.08	-20.00	6.08	4.53	30	Horizontal
6	4540.6291	-38.45	-34.95	-20.00	14.95	3.50	57	Horizontal

RESULT: PASS

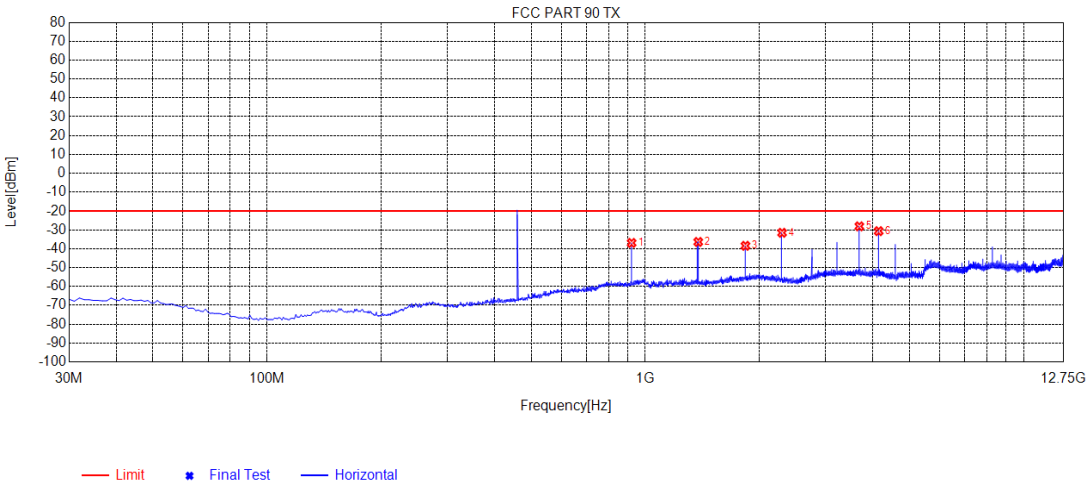
Measurement Result for 12.5 KHz Channel Separation @ 435.025MHz-2W-Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	1361.9362	-29.63	-28.39	-20.00	8.39	1.24	304	Vertical
2	1816.7067	-30.77	-29.72	-20.00	9.72	1.05	198	Vertical
3	2270.3020	-36.23	-36.63	-20.00	16.63	-0.40	39	Vertical
4	3632.2632	-41.70	-38.58	-20.00	18.58	3.12	64	Vertical
5	4085.8586	-33.75	-30.50	-20.00	10.50	3.25	318	Vertical
6	4540.6291	-39.17	-36.04	-20.00	16.04	3.13	351	Vertical

RESULT: PASS

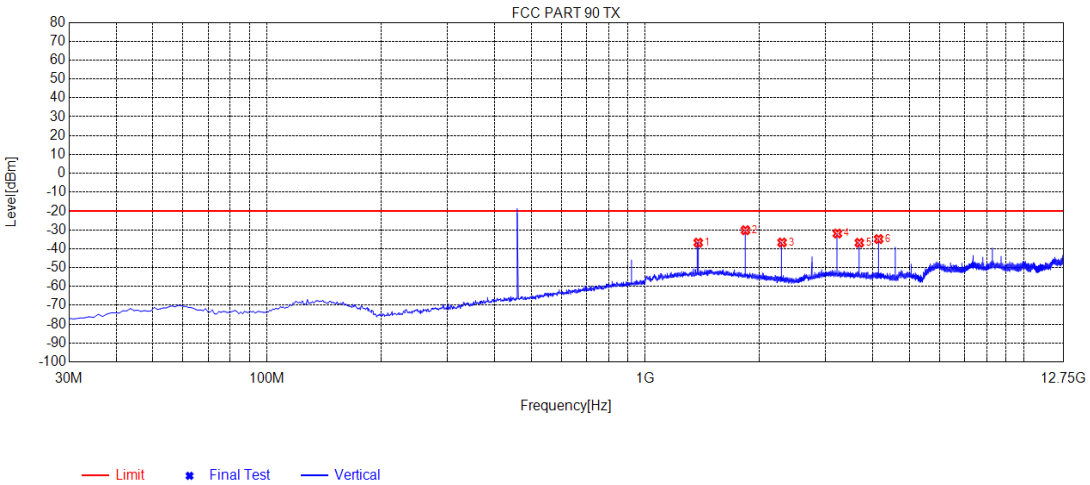
Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz-2W-Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	920.4600	-80.30	-36.92	-20.00	16.92	43.38	285	Horizontal
2	1380.7381	-32.95	-36.41	-20.00	16.41	-3.46	59	Horizontal
3	1840.2090	-37.78	-38.45	-20.00	18.45	-0.67	10	Horizontal
4	2299.6800	-30.91	-31.56	-20.00	11.56	-0.65	258	Horizontal
5	3680.4430	-32.52	-28.13	-20.00	8.13	4.39	337	Horizontal
6	4139.9140	-35.07	-30.68	-20.00	10.68	4.39	18	Horizontal

RESULT: PASS

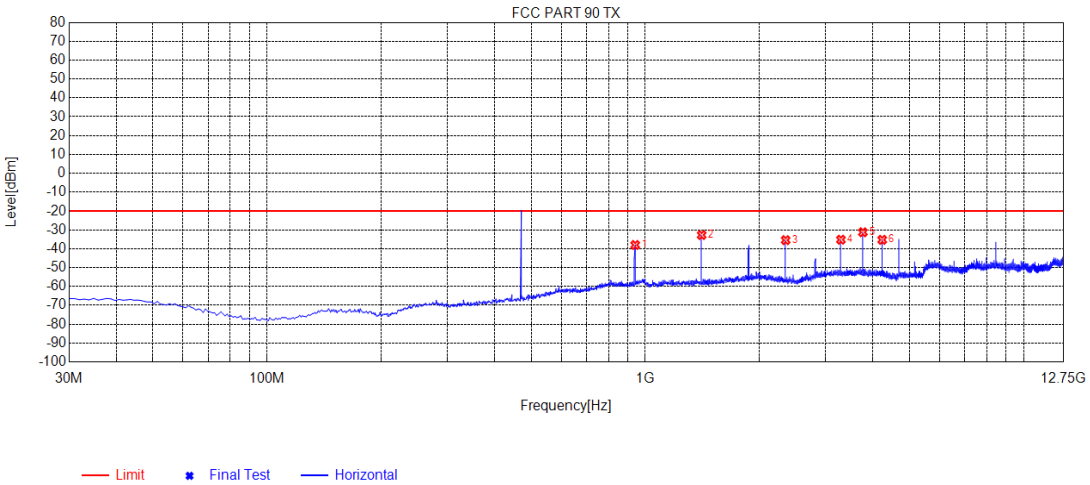
Measurement Result for 12.5 KHz Channel Separation @454.025MHz-2W-Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	1380.7381	-38.19	-36.82	-20.00	16.82	1.37	118	Vertical
2	1840.2090	-31.16	-30.19	-20.00	10.19	0.97	171	Vertical
3	2299.6800	-36.22	-36.71	-20.00	16.71	-0.49	13	Vertical
4	3220.9721	-35.08	-31.94	-20.00	11.94	3.14	0	Vertical
5	3680.4430	-40.00	-36.86	-20.00	16.86	3.14	0	Vertical
6	4139.9140	-38.11	-34.88	-20.00	14.88	3.23	317	Vertical

RESULT: PASS

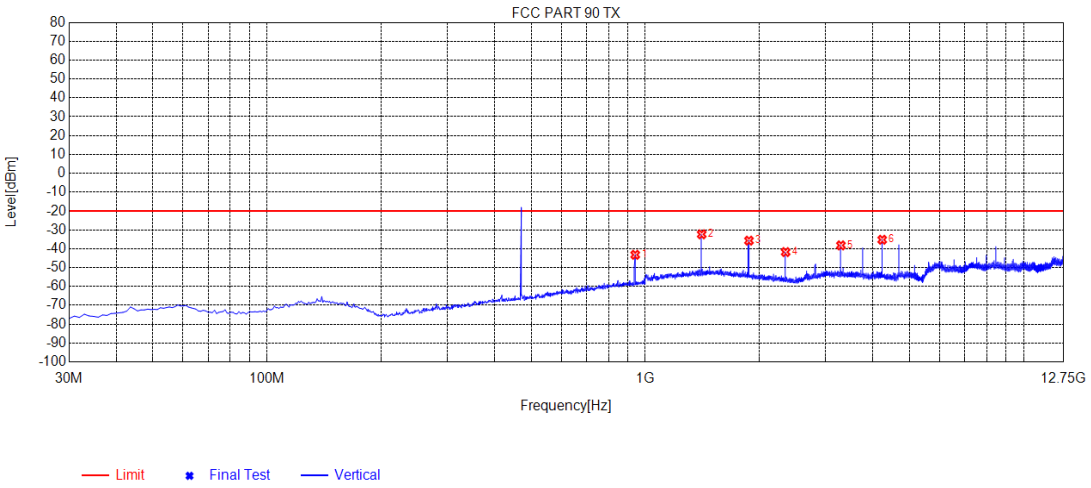
Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz-2W-Horizontal



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	940.8300	-81.85	-38.02	-20.00	18.02	43.83	294	Horizontal
2	1410.1160	-29.34	-32.74	-20.00	12.74	-3.40	96	Horizontal
3	2350.2100	-34.60	-35.45	-20.00	15.45	-0.85	96	Horizontal
4	3290.3040	-39.03	-35.22	-20.00	15.22	3.81	307	Horizontal
5	3760.3510	-35.76	-31.28	-20.00	11.28	4.48	360	Horizontal
6	4230.3980	-39.44	-35.28	-20.00	15.28	4.16	9	Horizontal

RESULT: PASS

Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz-2W-Vertical



NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	940.8300	-86.95	-43.22	-20.00	23.22	43.73	0	Vertical
2	1410.1160	-33.92	-32.36	-20.00	12.36	1.56	0	Vertical
3	1880.1630	-36.54	-35.71	-20.00	15.71	0.83	157	Vertical
4	2350.2100	-41.13	-41.77	-20.00	21.77	-0.64	37	Vertical
5	3290.3040	-41.35	-38.23	-20.00	18.23	3.12	290	Vertical
6	4230.3980	-38.42	-35.24	-20.00	15.24	3.18	318	Vertical

RESULT: PASS

Note:
1. Factor=Antenna Factor + Cable loss. (Below 1GHz)
2. Factor=Antenna Factor+ Cable loss-Pre-amplifier.(Above 1 GHz)
3. Margin=Limit- Level

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=50KHz for 12.5kHz and 25kHz channel spacing, RBW=100Hz, VBW=300Hz for 12.5kHz, RBW=300Hz, VBW=1000Hz for 25kHz,Sweep = auto, Detector function = peak, Trace = max hold
2. 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.
3. 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(Rated system deviation is 2.5 kHz for 12.5kHz channel spacing). The input level shall be established at the frequency of maximum response of the audio modulating circuit.
4. Transmitters employing digital modulation techniques that bypass the limiter and the audio low-pass filter shall be modulated as specified by the manufacturer
5. Measure and record the results in the test report.