FCC Part 90 Rules
Test Report

Report No.: AGC00725200401FE10

FCC ID	:	PH3DR-06TA
PRODUCT DESIGNATION	:	VHF FM MOBILE TRANSCEIVER
BRAND NAME	:	ALINCO
MODEL NAME	:	DR-06TA
APPLICANT	:	Alinco Incorporated, Electronics Division
DATE OF ISSUE	:	Apr. 30, 2020
STANDARD(S)	:	FCC Part 90 Rules
REPORT VERSION	:	V 1.0

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

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr. 30, 2020	Valid	Initial Release

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1. VERIFICATION OF COMPLIANCE

Applicant:	Alinco Incorporated, Electronics Division
Address	Yodoyabashi Dai Building 13F,4-4-9 Korasibashi, Chuo-ku Osaka,541-0043 Japan
Manufacturer:	Alinco Incorporated, Electronics Division
Address	Yodoyabashi Dai Building 13F,4-4-9 Korasibashi, Chuo-ku Osaka,541-0043 Japan
Factory	Alinco Incorporated, Electronics Division
Address	Yodoyabashi Dai Building 13F,4-4-9 Korasibashi, Chuo-ku Osaka,541-0043 Japan
Product Designation:	VHF FM MOBILE TRANSCEIVER
Brand Name:	ALINCO
Test Model	DR-06TA
Date of Test:	Apr. 02, 2020~Apr. 30, 2020

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	Calvin Liu Calvin Liu (Project Engineer)	Apr. 30, 2020
Reviewed By	Max Zhang Max Zhang (Reviewer)	Apr. 30, 2020
Approved By	Forrest Lei Forrest Lei Authorized Officer	Apr. 30, 2020

2. GENERAL INFORMATION

2.1PRODUCT DESCRIPTION

The EUT is a **VHF FM MOBILE TRANSCEIVER** designed for voice/data communication. It is designed by way of utilizing the FM/4FSK modulation achieves the system operating.

A major technical description of EUT is described as following:

Communication Type	Voice
Hardware Version	V1.0
Software Version	V1.0
Modulation	FM
Emission Type	16K0F3E(Wideband Analog FM Voice)
Emission Bandwidth	15.299 KHz
Peak Frequency Deviation	1.85KHz
Audio Frequency Response	7.60dB
Maximum Transmitter Power	46.90dBm(48.98W)
Output power Modification	50W (It was fixed by the manufacturer, any individual can't arbitrarily change it.)
Antenna Designation	Detachable
Antenna type	External antenna
Antenna Gain	0dBi
Power Supply	DC 13.80V
Limiting Voltage	DC 11.73 V~ 15.87V
Operation Frequency Range and Channel	Frequency Range: 44.950 MHz to 47.930 MHz Channel Separation: 20 KHz(Analog)
	Bottom Channel: 44.970MHz Middle Channel: 46.020MHz High Channel: 47.910MHz
Frequency Tolerance	1.083ppm

Frequency Range (MHz)	Rated Transmit Power(W)(Conducted)	Transmit Mode/Emission Designator
44.950-47.930	50W	16K0F3E(Analog Vioce;NB)

Channel No. (10KHz)	Channel No. (20KHz)	20KHz Channel Spaced 40MHz Band Plan(MHz)
1	1-2	44.970
2		
3	3-4	46.020
4		
5	5-6	47.910
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
F3E 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: **PH3DR-06TA,** filing to comply with Part 2 and Part 90 of the Federal Communication Commission rules.

2.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI/TIA-603-E (2016).

2.4 TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong,China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

2.5 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

2.6 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 GENERAL TECHNICAL REQUIREMENTS

For FCC Part 90 requirements:

(1). Section 90.205 : RF Output Power

(2). Section 90.207 : Modulation Characteristic

(3). Section 90.209 : Occupied Bandwidth

(4). Section 90.210 : Emission Mask

(5). Section 90.213 : Frequency Tolerance

(6). Section 90.210 : Spurious Emission on Antenna Port

(7). Section 90.210 : Spurious Ratiated Emission

3.4CONFIGURATION 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	VHF FM MOBILE TRANSCEIVER	DR-06TA	FCC ID: PH3DR-06TA	EUT
2	Hand microphone	DR-06TA	N/A	Accessories

4. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§90.205& 2.1046	Maximum Transmitter Power	Compliant
§90.207& 2.1047	Modulation Characteristic	Compliant
§90.209& 2.1049	Occupied Bandwidth	Compliant
§90.210& 2.1049	Emission Mask	Compliant
§90.213& 2.1055	Frequency Tolerance	Compliant
§90.210& 2.1051	Spurious Emission on Antenna Port	Compliant
§90.210& 2.1053	Spurious Ratiated Emission	Compliant

LIST OF EQUIPMENTS USED

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun. 12, 2019	Jun.11 , 2020
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 18, 2019	Dec. 17, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.16, 2019	Sep.15, 2020
preamplifier	ChengYi	EMC184045SE	980508	Sep. 23, 2019	Sep. 22, 2020
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 26, 2018	May. 25, 2020
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun. 12, 2019	Jun.11 , 2020
HORN ANTENNA	EM	EM-AH-10180	/	Feb. 26, 2020	Feb. 25, 2021
SIGNAL GENERATOR	AGILENT	E4421B	122501288	May. 13, 2019	May. 12, 2020
SIGNAL GENERATOR	R&S	SMT03	A0304261	Jun. 12, 2019	Jun.11 , 2020
ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 09, 2019	Jan. 08, 2021
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.24, 2019	Sep.23, 2020
Modulation Domain Analyzer	HP	53310A	3121A02467	Oct. 08, 2019	Oct. 07, 2020
Small environmental tester	ESPEC	SH-242	--	Feb. 26, 2020	Feb. 25, 2021
RF Communication Test Set	HP	8920B	--	Jun. 12, 2019	Jun.11 , 2020
Attenuator	Weinachel Corp	58-30-33	ML030	Jun. 12, 2019	Jun.11 , 2020
Vector Analyzer	Agilent	E4440A	--	Feb. 26, 2020	Feb. 25, 2021
RF Cable	R&S	1#	--	Each time	N/A
RF Cable	R&S	2#	--	Each time	N/A

5. DESCRIPTION OF TEST MODES

RF TEST MODES

The EUT (**VHF FM MOBILE TRANSCEIVER**) 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 MODES	CHANNEL SEPARATION
1	Low Channel	20 KHz
2	Middle Channel	20 KHz
3	High Channel	20 KHz

Note: Only the result of the worst case was recorded in the report.

6. FREQUENCY TOLERANCE

6.1 PROVISIONS APPLICABLE

a). According to FCC §2.1055, §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 requirements are as follows:

MINIMUM FREQUENCY STABILITY

[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	1 2 3 100	100	200
25-50	20	20	50

6.2 MEASUREMENT PROCEDURE

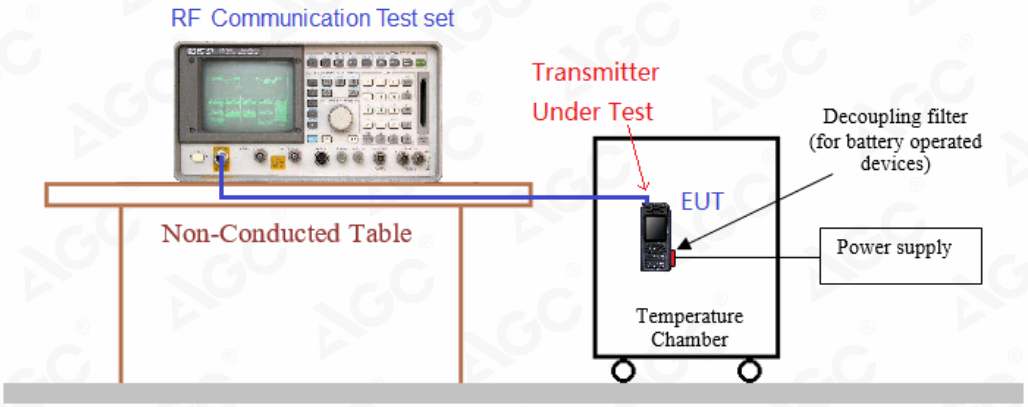
6.2.1 Frequency stability versus environmental temperature

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 13.80V.
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

(1) Frequency stability versus input voltage (Supply nominal voltage is 13.80V)

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		44.970MHz	46.020MHz	47.910MHz	
50	DC 13.80 V	0.767	0.653	0.544	20
40	DC 13.80 V	0.837	0.930	0.693	
30	DC 13.80 V	1.009	1.080	0.924	
20	DC 13.80 V	1.037	0.668	0.762	
10	DC 13.80 V	0.818	0.584	0.745	
0	DC 13.80 V	0.890	0.931	0.807	
-10	DC 13.80 V	0.691	0.662	0.979	
-20	DC 13.80 V	0.535	0.565	0.677	
-30	DC 13.80 V	0.953	0.933	0.937	
Result	Pass				

(2) Frequency stability versus input voltage (The voltage endpoint is 11.73V)

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		44.970MHz	46.020MHz	47.910MHz	
50	DC 11.73 V	0.751	0.957	0.557	20
40	DC 11.73 V	0.781	0.739	0.470	
30	DC 11.73 V	0.519	0.964	0.466	
20	DC 11.73 V	0.525	0.647	0.806	
10	DC 11.73 V	0.919	0.911	0.322	
0	DC 11.73 V	0.796	0.308	0.314	
-10	DC 11.73 V	0.583	0.704	0.317	
-20	DC 11.73 V	0.673	0.497	0.762	
-30	DC 11.73 V	0.571	0.589	0.981	
Result	Pass				

(3) Frequency stability versus input voltage (Supply limit voltage is 15.78V)

Environment Temperature(℃)	Power Supply (V)	Reference Frequency			Limit: ppm
		44.970MHz	46.020MHz	47.910MHz	
50	DC 15.78 V	0.941	0.653	0.565	20
40	DC 15.78 V	0.690	0.913	1.046	
30	DC 15.78 V	1.068	0.737	0.877	
20	DC 15.78 V	0.993	0.525	0.804	
10	DC 15.78 V	0.860	1.004	0.537	
0	DC 15.78 V	0.632	0.905	0.958	
-10	DC 15.78 V	0.605	0.712	1.083	
-20	DC 15.78 V	0.944	0.725	0.891	
-30	DC 15.78 V	0.574	0.936	0.661	
Result	Pass				

7. EMISSION BANDWIDTH

7.1 PROVISIONS APPLICABLE

FCC Part 90.209 & FCC Part 2.1049:

The authorized bandwidth shall be 20 KHz for 20 KHz channel separation.

7.2 MEASUREMENT PROCEDURE

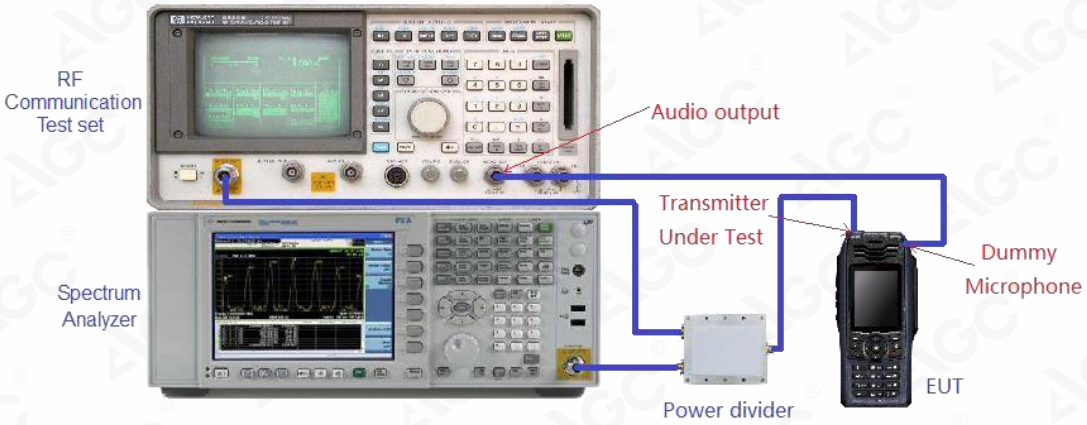
1). The EUT was placed on a turn table which is 0.8m above ground plane.

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.

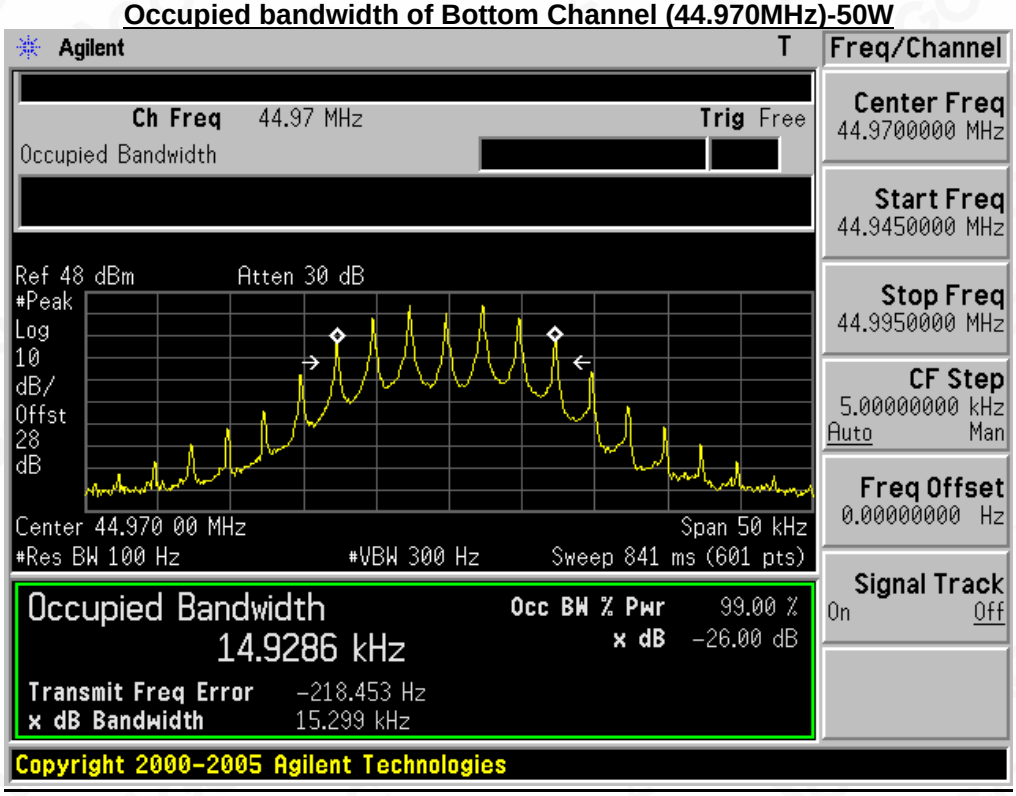
7.3 TEST SETUP BLOCK DIAGRAM



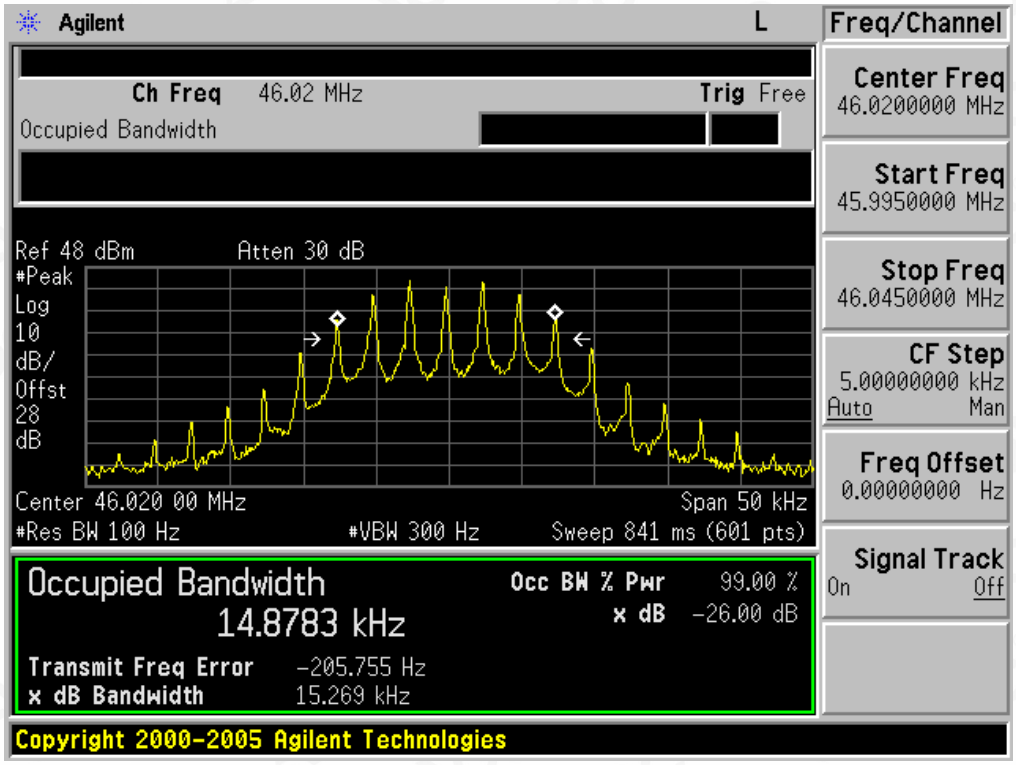
7.4 MEASUREMENT RESULT

26 dB Bandwidth Measurement Result			
Operating Frequency	20 KHz Channel Separation		
	Test Data	Limits	Result
44.970MHz	15.299 KHz	20 KHz	Pass
46.020MHz	15.269 KHz	20 KHz	Pass
47.910MHz	15.256 KHz	20 KHz	Pass

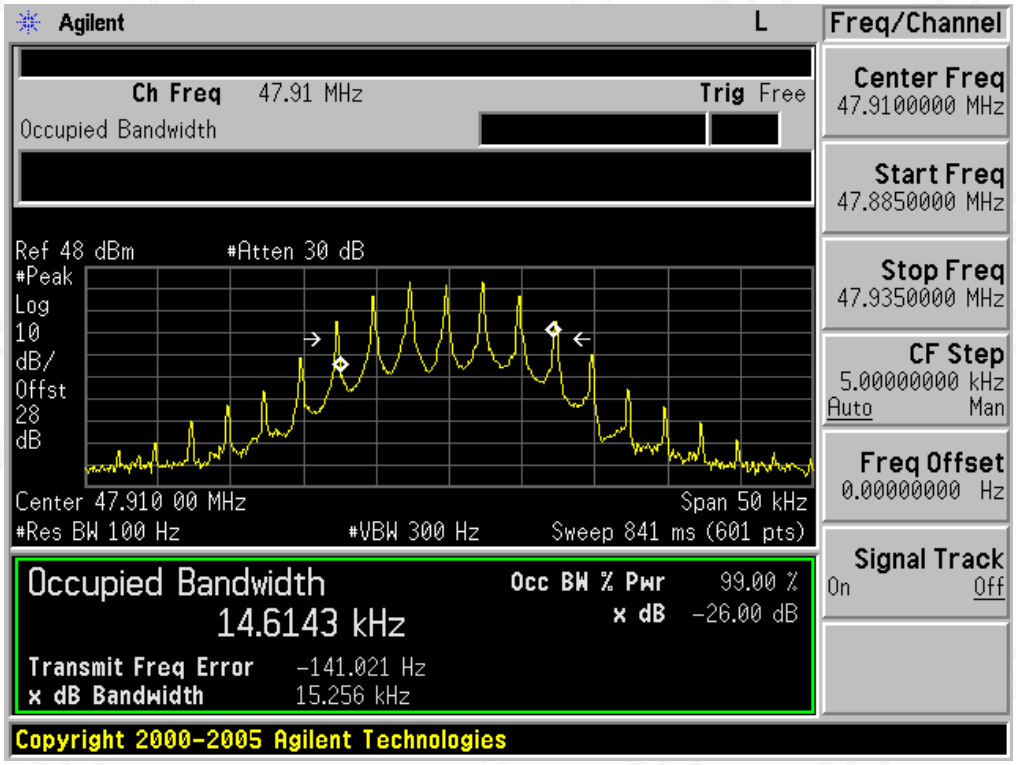
Occupied bandwidth of Bottom Channel (44.970MHz)-50W



Occupied bandwidth of Middle Channel (46.020MHz)-50W



Occupied bandwidth of Top Channel (47.910MHz)-50W



8. SPURIOUS RATIATED EMISSION

8.1 PROVISIONS APPLICABLE

According to FCC §2.1053 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 B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1).On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2).On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3).On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

8.2 MEASUREMENT PROCEDURE

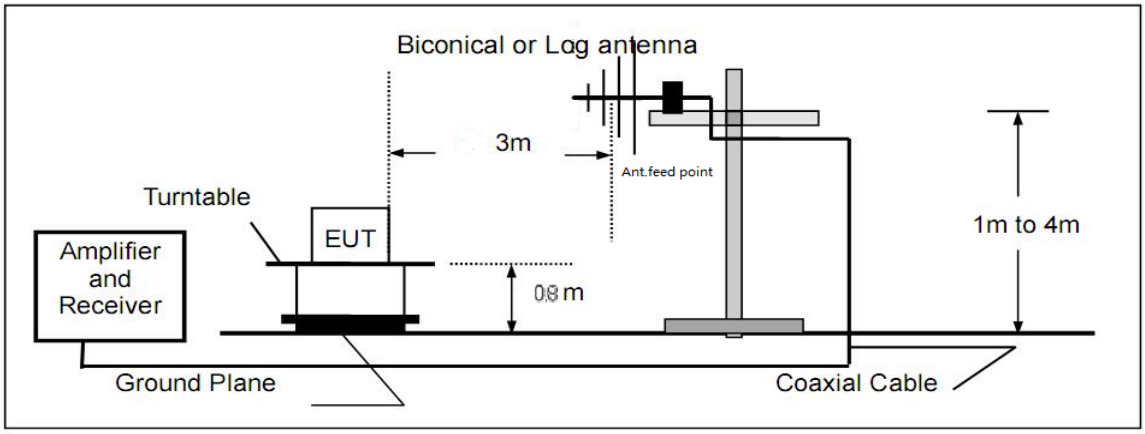
(1)On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
(2)The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
(3)The output of the antenna shall be connected 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.

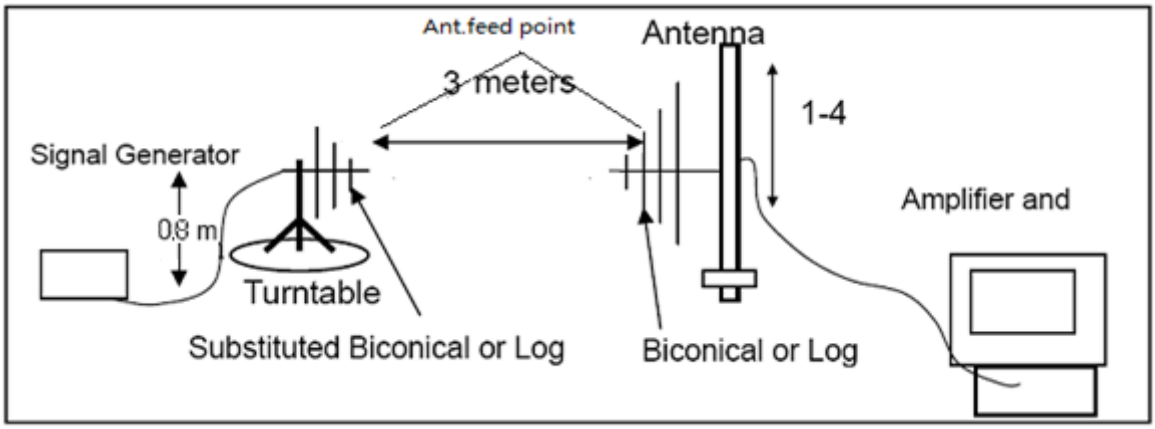
(8)The maximum signal level detected by the measuring receiver shall be noted.
(9)The measurement shall be repeated with the test antenna set to horizontal polarization.
(10) Replace the antenna with a proper Antenna (substitution antenna).
(11)The substitution antenna shall be oriented for vertical 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

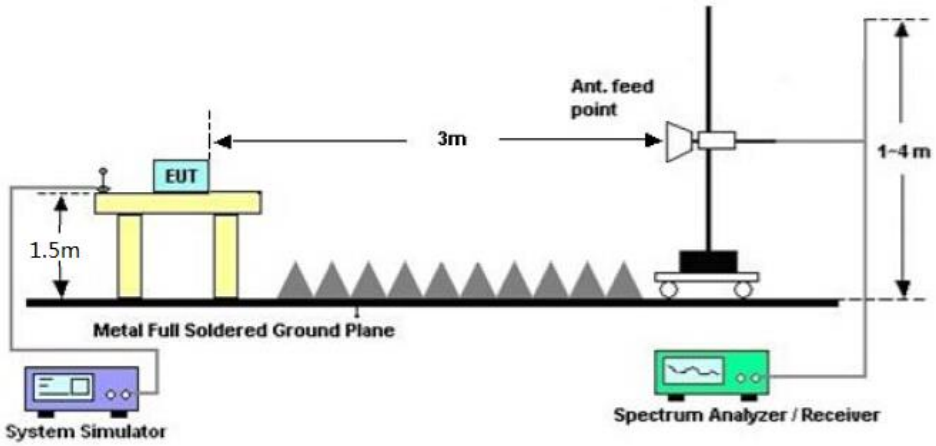
SUBSTITUTION METHOD: (Radiated Emissions)

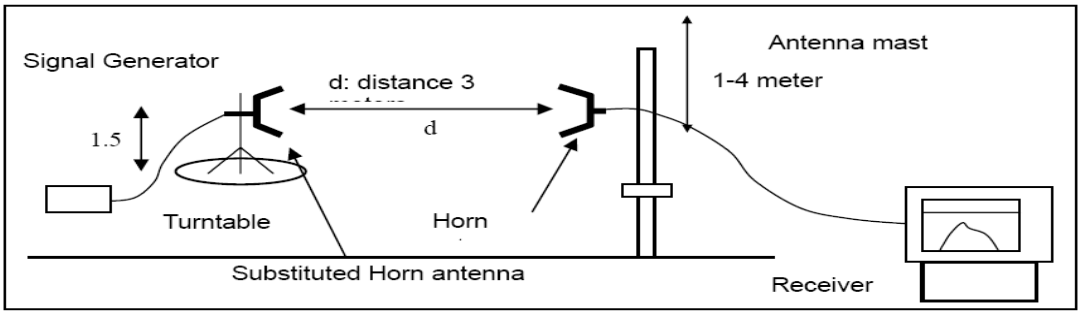
Radiated Below1GHz





Radiated Above 1 GHz





8.4 MEASUREMENT RESULTS:

Applicable Standard

FCC §2.1053, and §90.210

On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth:

At least 43 + 10 log (P) dB.

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) =43+10log (50) =59.99 (dB)—50W 46.99-59.99=-13dBm

Measurement Result for 20 KHz Channel Separation @ 44.970MHz-50W

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
44.970	H	0		pass
89.940	H	-35.88	-13	pass
134.910	H	-36.15	-13	pass
179.880	H	-38.97	-13	pass
224.850	H	-41.81	-13	pass
269.820	H	-42.17	-13	pass
314.790	H	-44.45	-13	pass
359.760	H	-44.54	-13	pass
404.730	H	-45.95	-13	pass
449.700	H	-50.02	-13	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
44.970	V	0		pass
89.940	V	-34.75	-13	pass
134.910	V	-38.01	-13	pass
179.880	V	-41.10	-13	pass
224.850	V	-42.04	-13	pass
269.820	V	-43.28	-13	pass
314.790	V	-45.45	-13	pass
359.760	V	-47.25	-13	pass
404.730	V	-49.05	-13	pass
449.700	V	-49.71	-13	pass

Measurement Result for 20 KHz Channel Separation @ 46.020MHz-50W

Emission Frequency (MHz)	Ant. Polarity(H/H)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
46.020	H	0		pass
92.040	H	-35.30	-13	pass
138.060	H	-36.88	-13	pass
184.080	H	-39.50	-13	pass
230.100	H	-39.06	-13	pass
276.120	H	-40.77	-13	pass
322.140	H	-40.12	-13	pass
368.160	H	-42.55	-13	pass
414.180	H	-41.36	-13	pass
460.200	H	-44.12	-13	pass

Emission Frequency (MHz)	Ant. Polarity(H/H)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
46.020	V	0		pass
92.040	V	-32.49	-13	pass
138.060	V	-36.28	-13	pass
184.080	V	-38.43	-13	pass
230.100	V	-37.21	-13	pass
276.120	V	-38.89	-13	pass
322.140	V	-44.13	-13	pass
368.160	V	-43.02	-13	pass
414.180	V	-43.08	-13	pass
460.200	V	-49.51	-13	pass

Measurement Result for 20 KHz Channel Separation @ 47.910MHz-50W

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
47.910	H	0		pass
95.820	H	-31.36	-13	pass
143.730	H	-31.49	-13	pass
191.640	H	-32.64	-13	pass
239.550	H	-34.69	-13	pass
287.460	H	-39.74	-13	pass
335.370	H	-41.59	-13	pass
383.280	H	-47.07	-13	pass
431.190	H	-47.89	-13	pass
479.100	H	-49.21	-13	pass

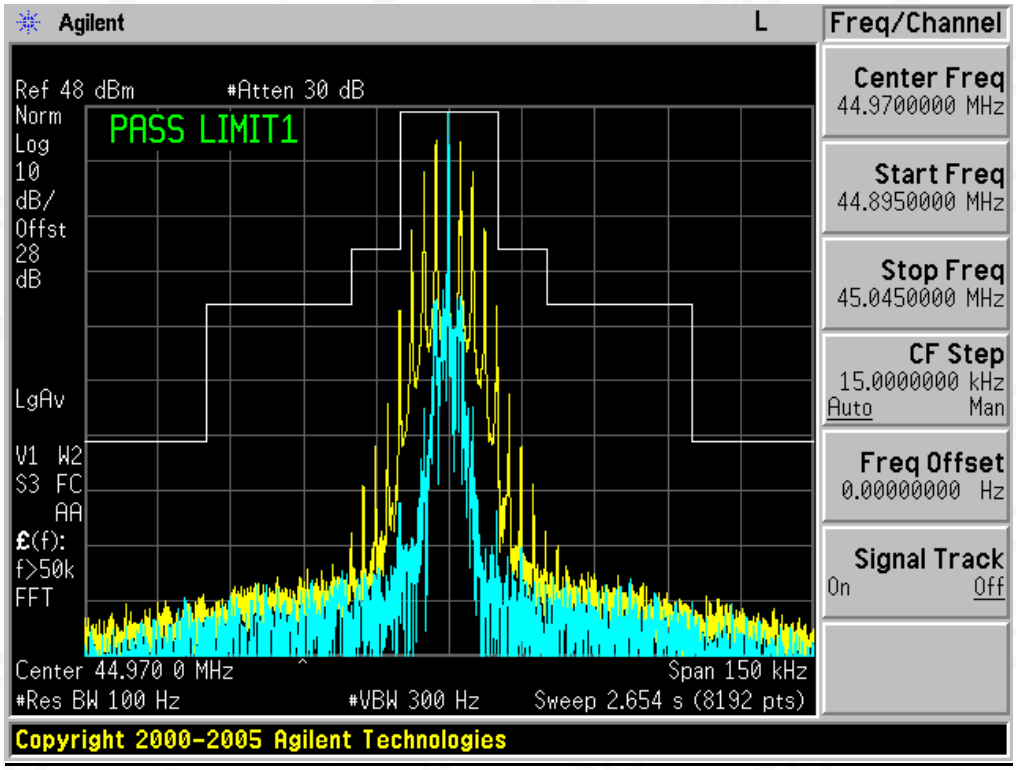
Emission Frequency (MHz)	Ant. Polarity(H/H)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
47.910	V	0		pass
95.820	V	-33.44	-13	pass
143.730	V	-32.46	-13	pass
191.640	V	-36.79	-13	pass
239.550	V	-40.03	-13	pass
287.460	V	-37.08	-13	pass
335.370	V	-38.38	-13	pass
383.280	V	-42.45	-13	pass
431.190	V	-43.53	-13	pass
479.100	V	-46.51	-13	pass

8.5 EMISSION MASK PLOT

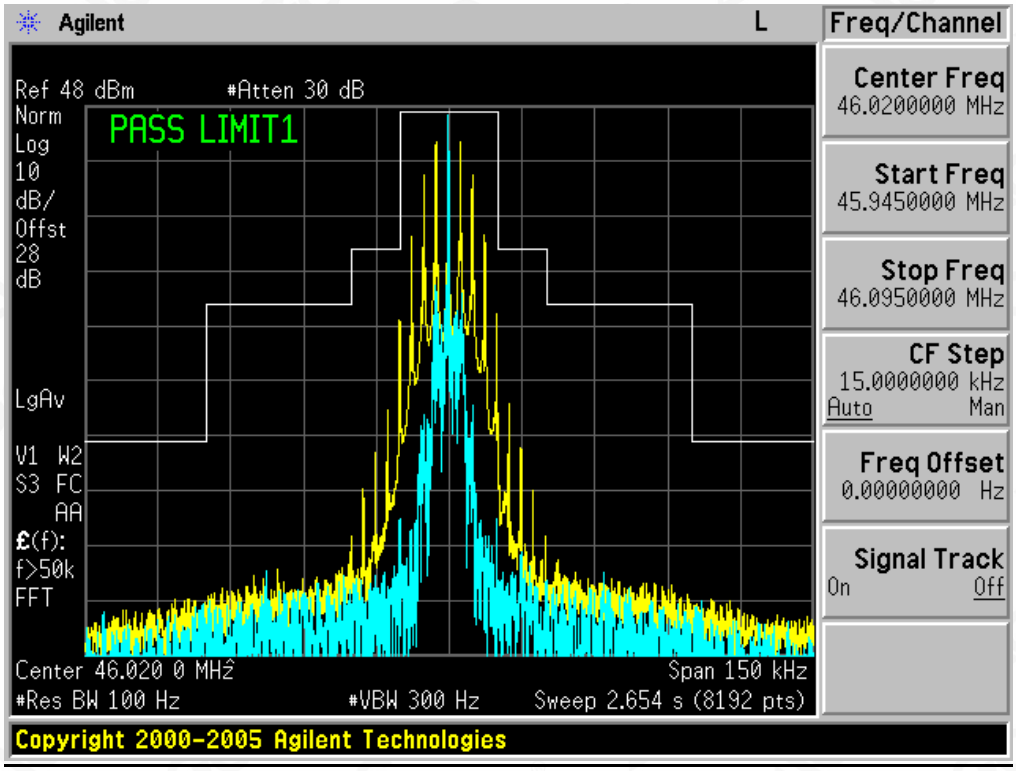
The detailed procedure employed for Emission Mask measurements are specified as following:

- The transmitter shall be modulated by a 2.5 kHz 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.

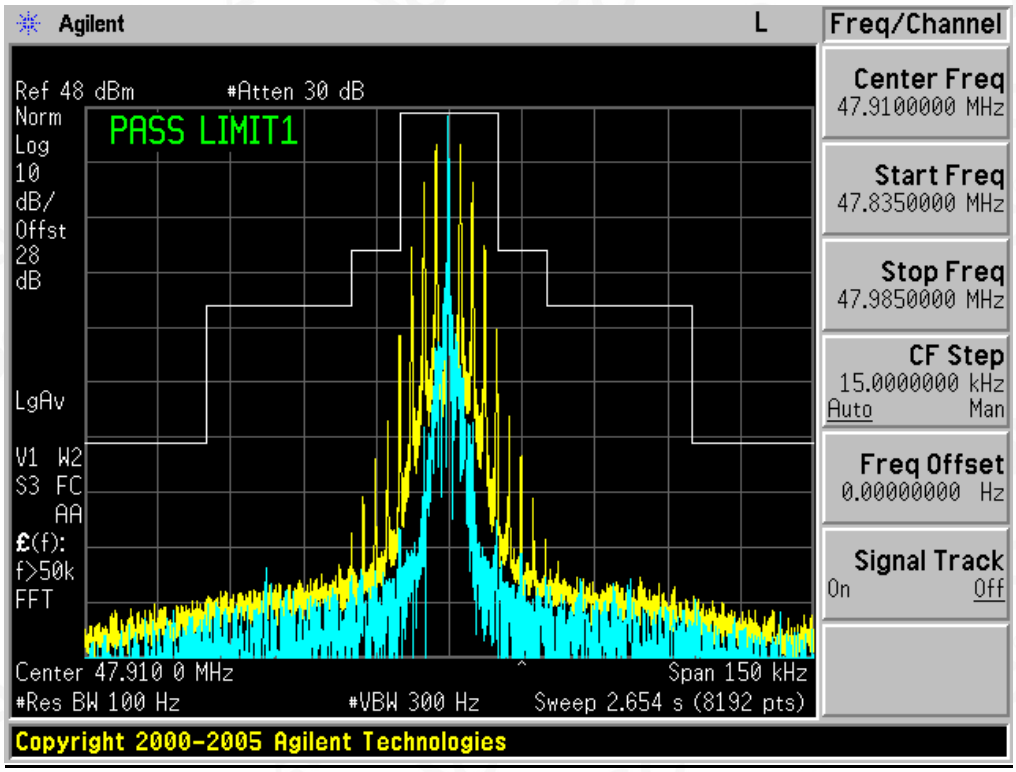
The Worst Emission Mask B for (44.970MHz) of 20 KHz channel Separation (50W)



The Worst Emission Mask B for (46.020MHz) of 20 KHz channel Separation (50W)



The Worst Emission Mask B for (47.910MHz) of 20 KHz channel Separation (50W)



9. MODULATION CHARACTERISTICS

9.1 PROVISIONS APPLICABLE

According to FCC§2.1047 and §90.207, for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

9.2 MEASUREMENT METHOD

9.2.1 Modulation Limit

(1). Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.

(2). Repeat step 1 with input frequency changing to 300, 1000, 1500 and 3000Hz in sequence.

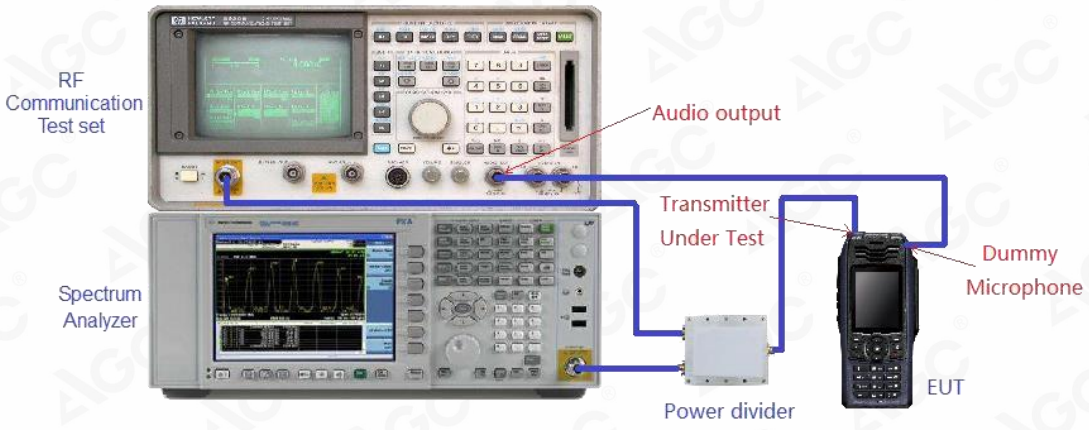
9.2.2 Audio Frequency Response

(1). Configure the EUT as shown in figure 1.

(2). Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0 dB).

(3). Vary the Audio frequency from 100 Hz to 10 KHz and record the frequency deviation.

(4). Audio Frequency Response = 20log10 (Deviation of test frequency/Deviation of 1 KHz reference).

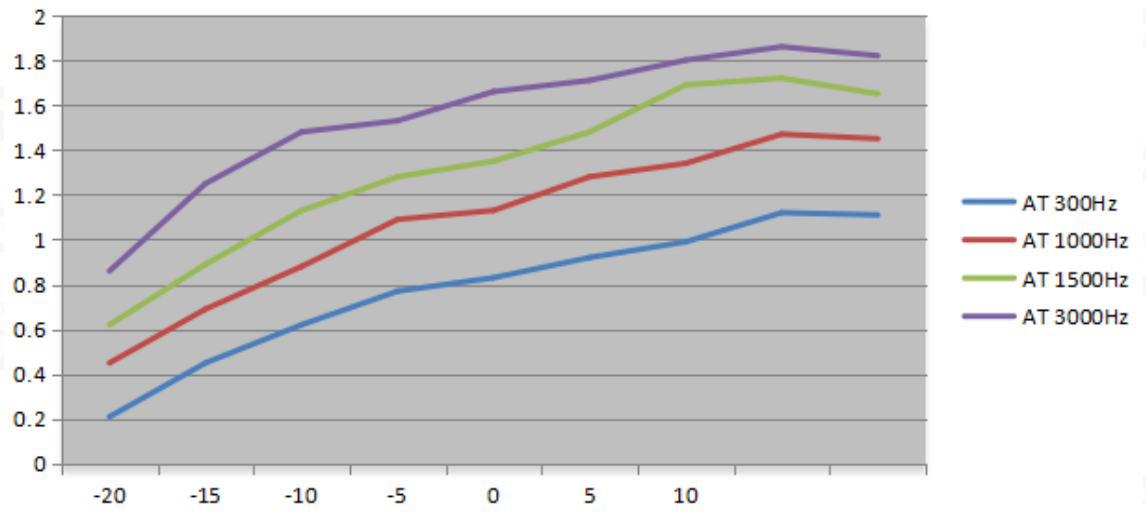


9.3 MEASUREMENT RESULT

(A). MODULATION LIMIT

Middle Channel @ 20 KHz Channel Separations-50W

Modulation Level (dB)	Peak Freq. Deviation At 300 Hz	Peak Freq. Deviation At 1000 Hz	Peak Freq. Deviation At 1500 Hz	Peak Freq. Deviation At 3000 Hz
-20	0.30	0.42	0.58	0.79
-15	0.41	0.63	0.77	1.03
-10	0.58	0.80	1.09	1.12
-5	0.73	1.10	1.12	1.25
0	0.89	1.19	1.25	1.34
+5	0.95	1.24	1.34	1.59
+10	0.90	1.31	1.58	1.66
+15	1.09	1.45	1.63	1.78
+20	1.11	1.52	1.67	1.85



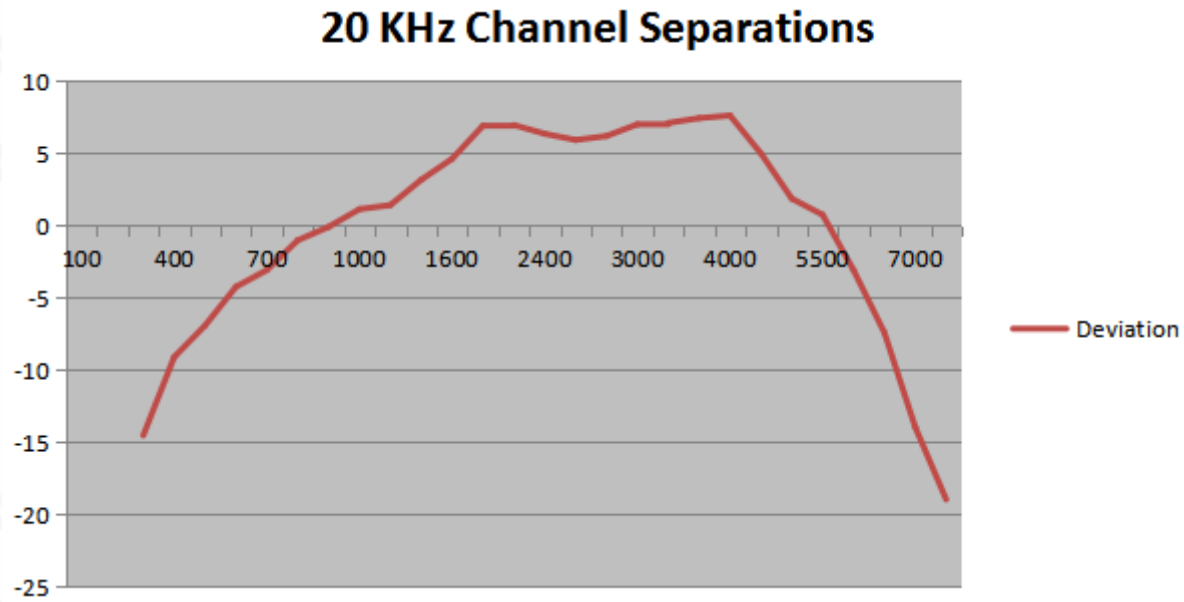
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

Middle Channel @ 20 KHz Channel Separations-50W

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.15	-14.54
400	0.28	-9.12
500	0.36	-6.94
600	0.49	-4.26
700	0.56	-3.10
800	0.71	-1.04
900	0.79	-0.11
1000	0.91	1.12
1200	0.94	1.40
1400	1.15	3.15
1600	1.36	4.61
1800	1.77	6.90
2000	1.78	6.95
2400	1.66	6.34
2500	1.58	5.91
2800	1.63	6.18
3000	1.79	7.00
3200	1.81	7.09
3600	1.88	7.42
4000	1.92	7.60
4500	1.42	4.98
5000	0.99	1.85
5500	0.87	0.73
6000	0.56	-3.10
6500	0.34	-7.43
7000	0.16	-13.98
7500	0.09	-18.98
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of Middle Channel



Note: All the modes had been tested, but only the worst data recorded in the report.

10. MAXIMUMN TRANSMITTER POWER (CONDUCTED OUTPUT POWER) PEAK POWER

10.1 PROVISIONS APPLICABLE

Per FCC §2.1046 § and §90.205(b): 25-50 MHz. The maximum transmitter output power is 300 watts.

10.2 TEST PROCEDURE

The RF output of Two-way Radio was conducted to a spectrum analyzer through an appropriate attenuator.

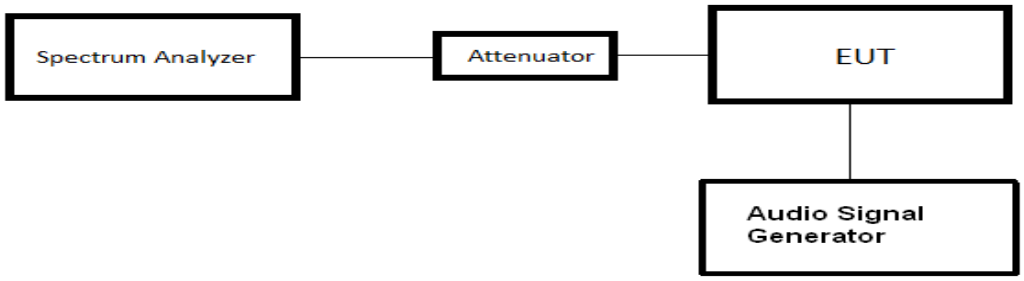
In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the 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.

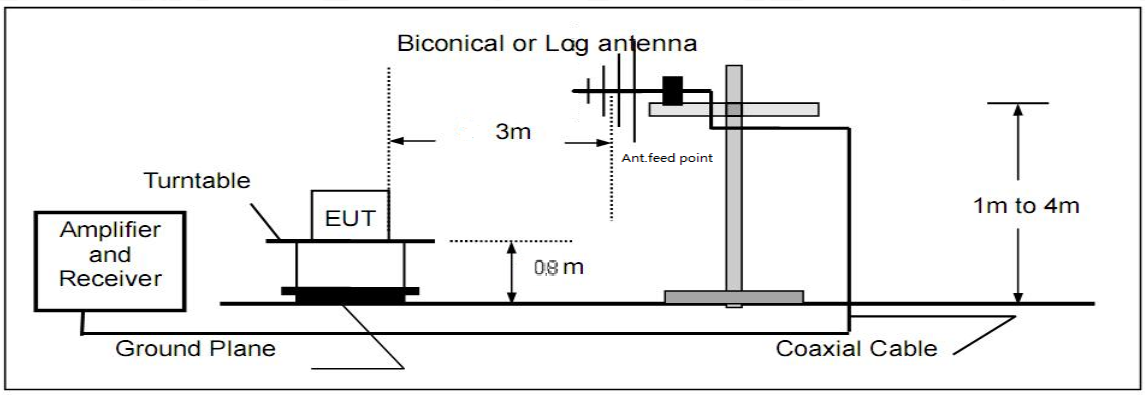
10.3 TEST CONFIGURATION

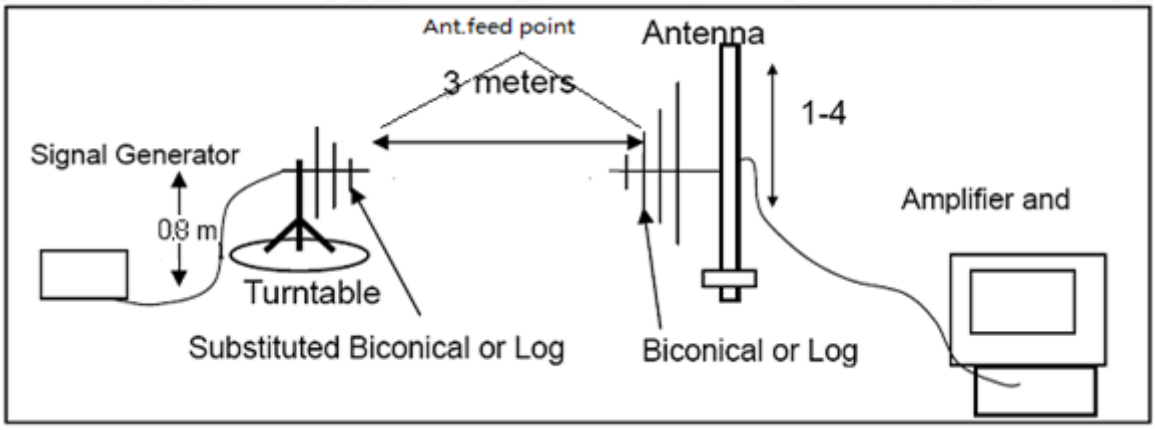
Conducted Output Power:



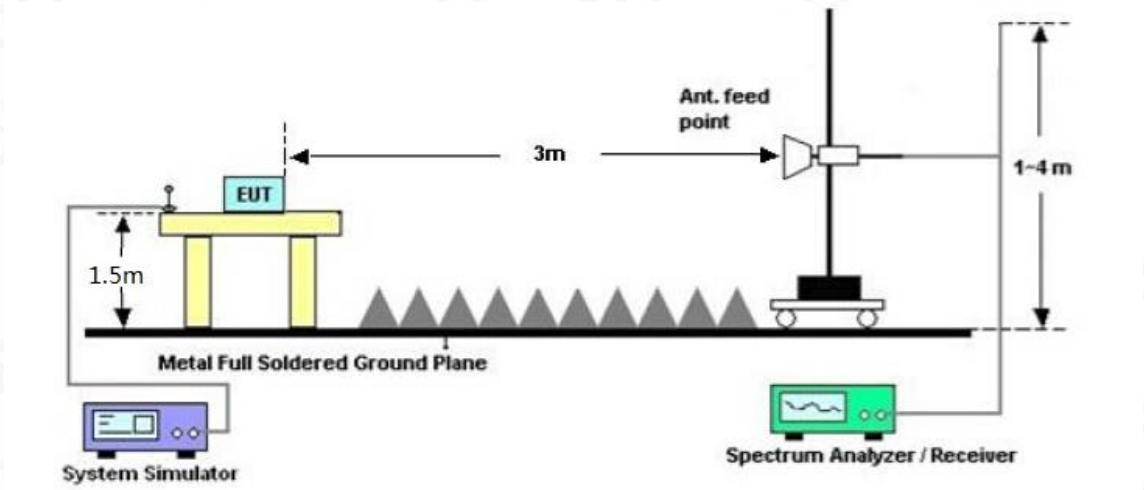
Effective Radiated Power

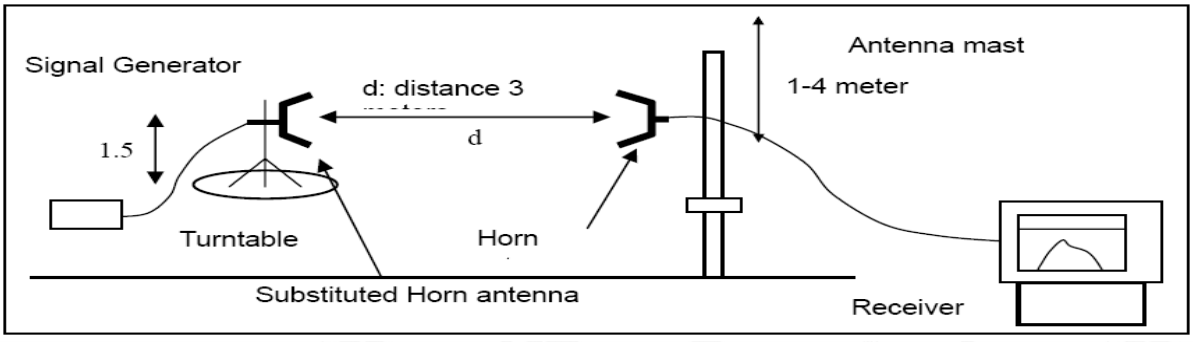
Radiated Below1GHz





Radiated Above 1 GHz





10.4 TEST RESULT

The maximum Conducted Power (CP) for (44.950MHz-47.930MHz) is 50W for 20 KHz Channel Separation

Calculation Formula: CP = R + A + L

Note:

CP: The final Conducted Power

R : The reading value from spectrum analyzer

A : The attenuation value of the used attenuator

L : The loss of all connection cables

Conducted Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 46.99dBm(50W)
20 KHz	Bottom(44.970MHz)	46.89
	Middle(46.020MHz)	46.85
	Top (47.910MHz)	46.90

Radiated Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 46.99dBm(50W)
20 KHz	Bottom(44.970MHz)	46.84
	Middle(46.020MHz)	46.82
	Top (47.910MHz)	46.79

11. SPURIOUS EMISSION ON ANTENNA PORT

11.1 PROVISIONS APPLICABLE

Please refer to FCC 47 CFR 2.1051, 2.1057 & 90.210 for specification details.
Emissions shall be attenuated below the mean output power of the transmitter as follows:

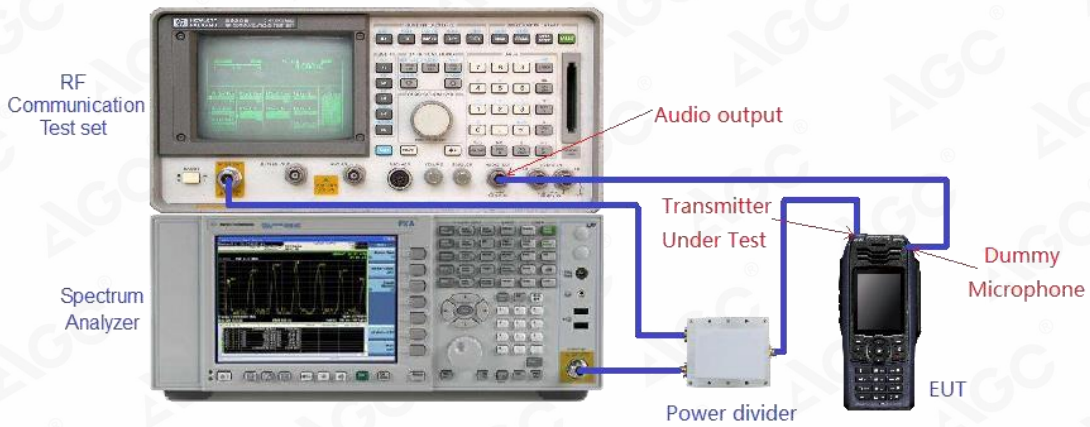
FCC Rules	Attenuation Limit (dBc)
§ 90.210	At least 43 + 10 log (P) dB

43 +10 log (Pwatts)
Note: In general, the worse case attenuation requirement shown above was applied.
Calculation: Limit (dBm) =EL-43-10log10 (TP)
EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is P(dBm)
Limit (dBm) = P(dBm)-43-10 log (Pwatts) = -13dBm

11.2 TEST PROCEDURE

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 show any out of band emission up to 10th . Harmonic for the lower and the highest frequency range.
3. Set RBW 100 kHz, VBW 300 kHz in the frequency band 30MHz to 1GHz,while set RBW=1MHz.VBW=3MHz from the 1GHz to 10th Harmonic.
4. The audio input was set the unmodulated carrier, the resulting picture is print out for each channel separation.

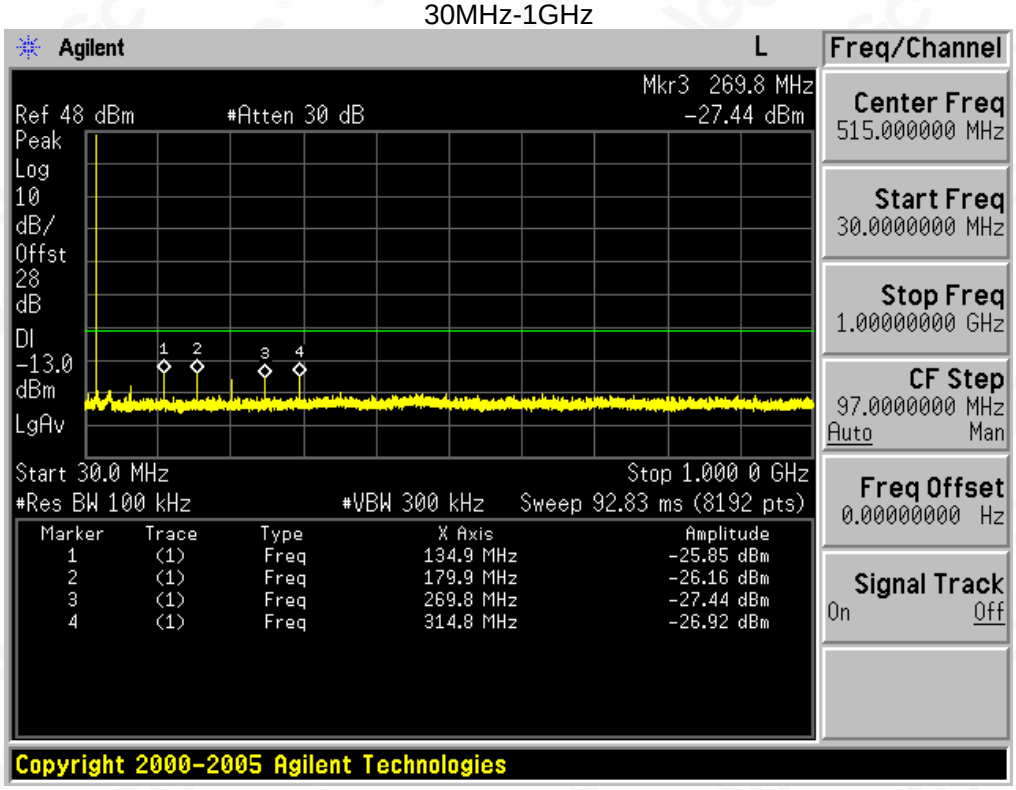
11.3 TEST CONFIGURATION



11.4 TEST RESULT

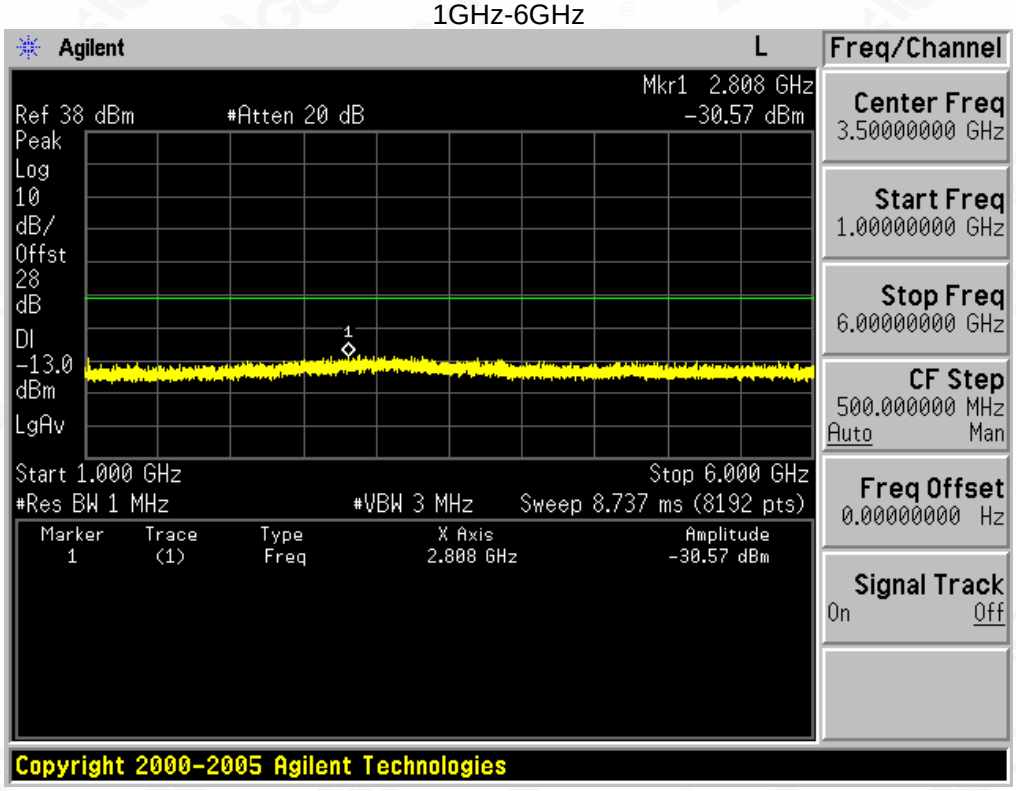
Conducted Spurious Emission (worst) @44.970MHz With 20 KHz Channel Separation-50W

30MHz-1GHz



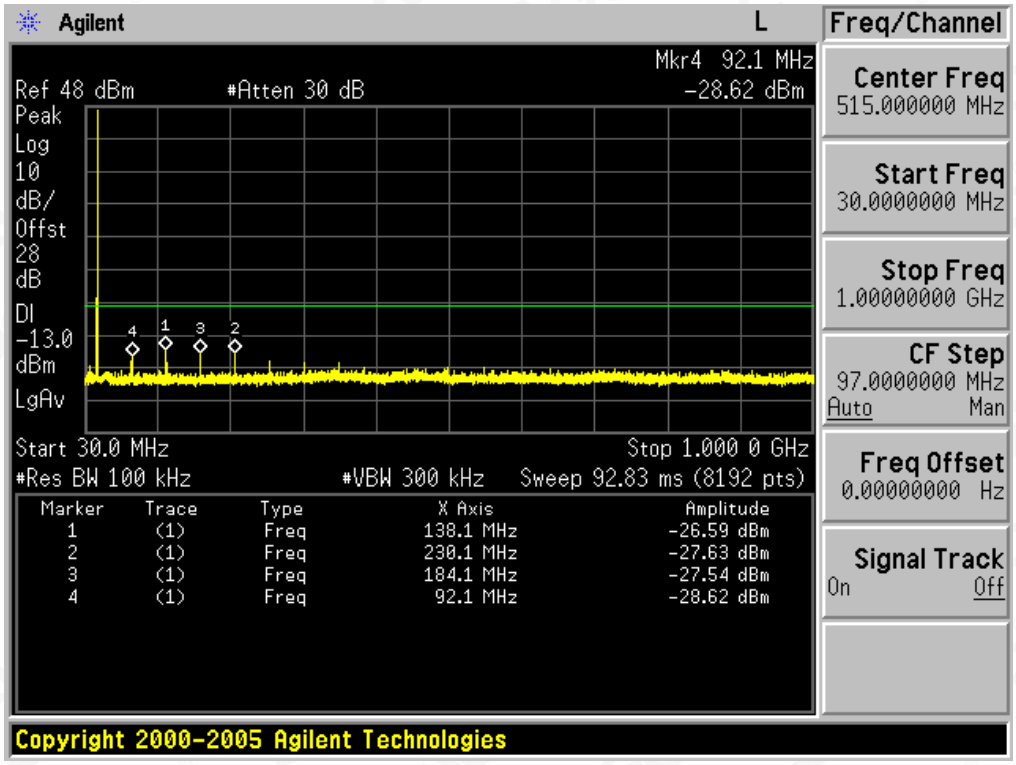
Conduct Spurious Emission (worst) @ 44.970MHz With 20 KHz Channel Separation-50W

1GHz-6GHz



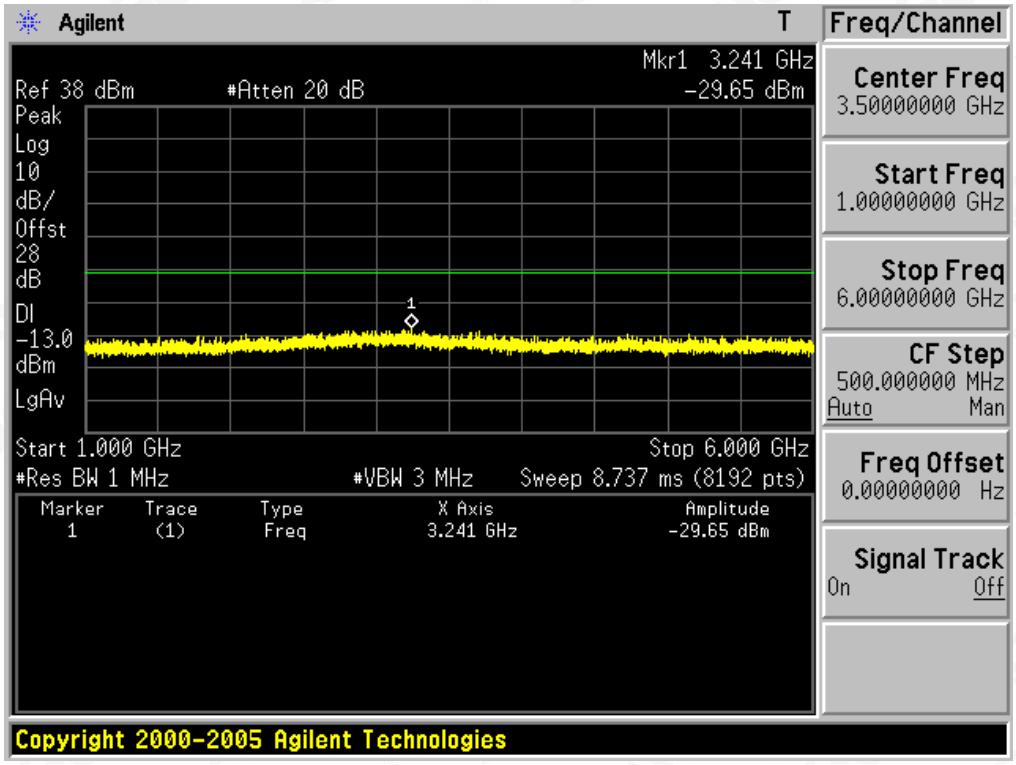
Conducted Spurious Emission (worst) @46.020MHz With 20 KHz Channel Separation-50W

30MHz-1GHz



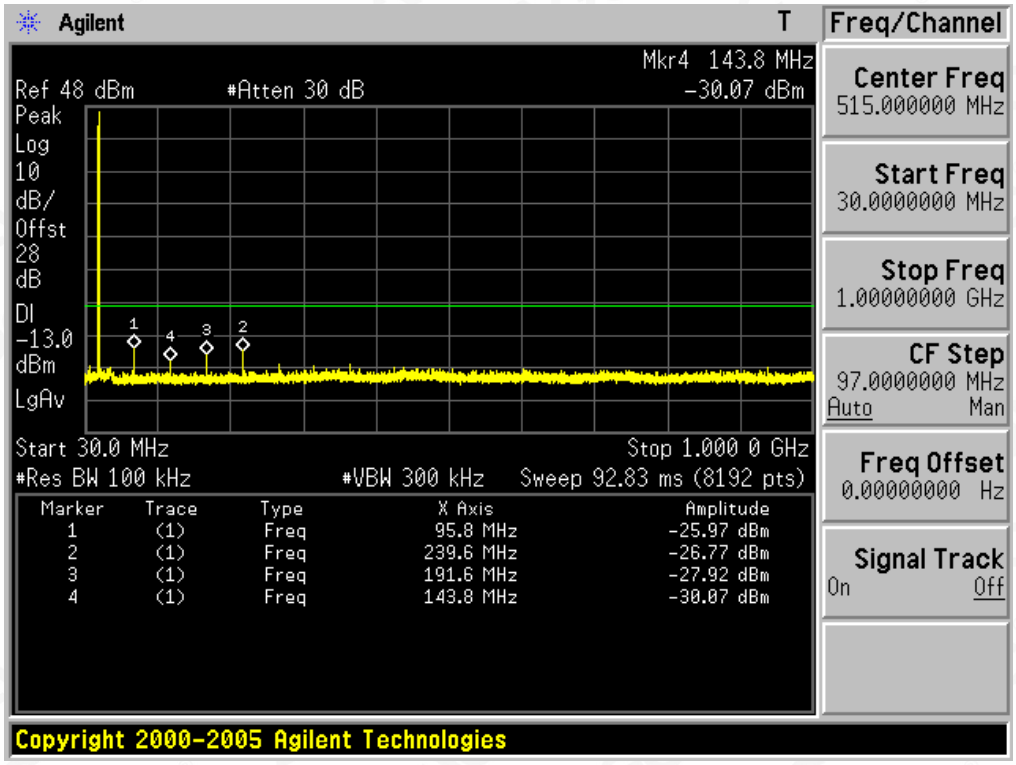
Conduct Spurious Emission (worst) @ 46.020MHz With 20 KHz Channel Separation-50W

1GHz-6GHz



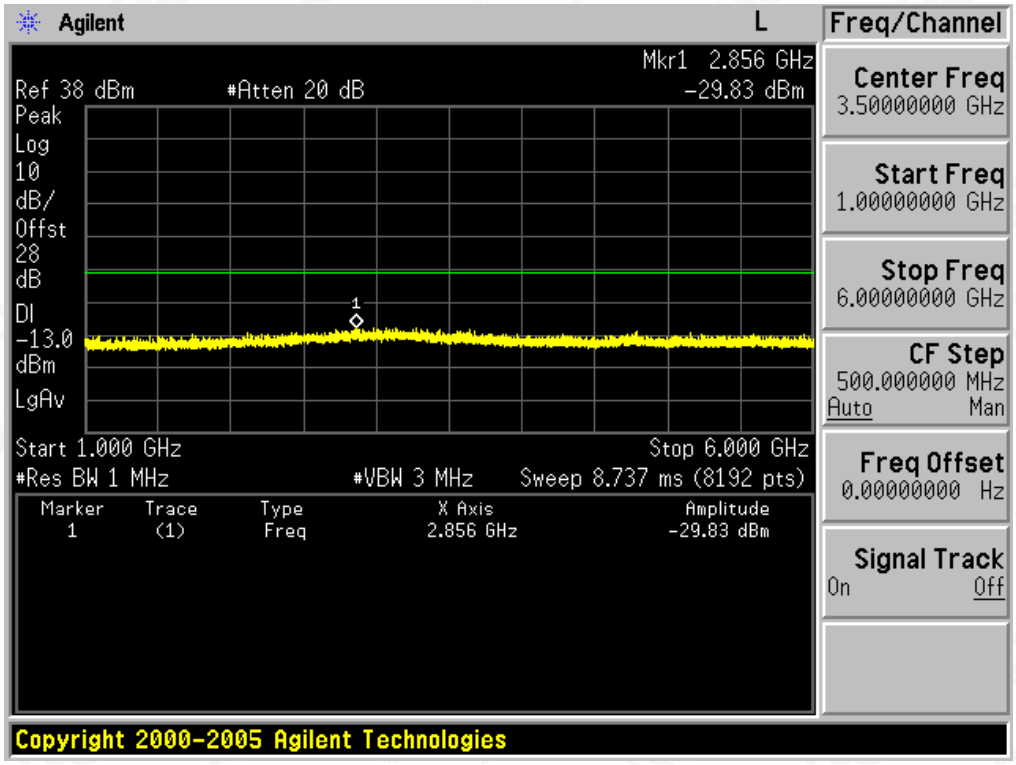
Conducted Spurious Emission (worst) @47.910MHz With 20 KHz Channel Separation-50W

30MHz-1GHz



Conduct Spurious Emission (worst) @ 47.910MHz With 20 KHz Channel Separation-50W

1GHz-12.75GHz



12. AUDIO LOW PASS FILTER RESPONSE

12.1.TEST LIMITS

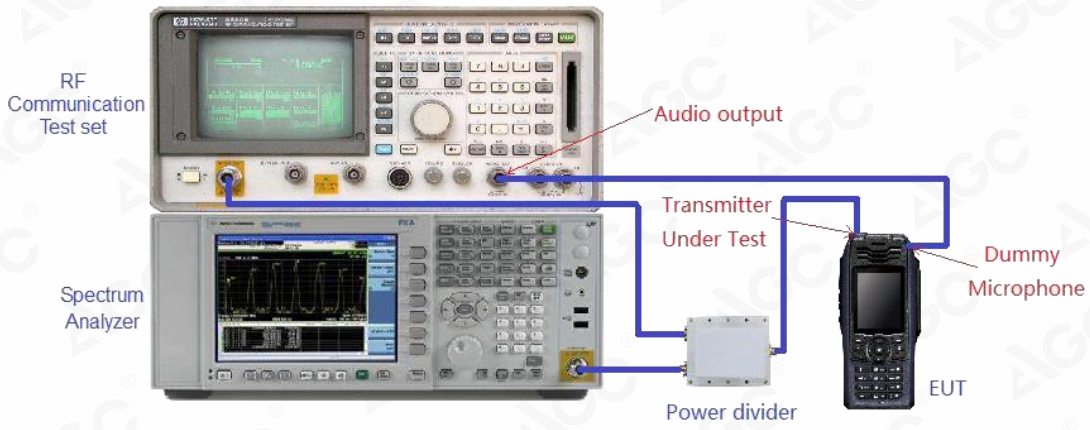
2.1047(a): Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
90.242(b)(8): Recommended audio filter attenuation characteristics are given below:

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

12.2. METHOD OF MEASUREMENTS

The rated audio input signal was applied to the input of the audio low-pass filter (or of all modulation stages) using an audio oscillator, this input signal level and its corresponding output signal were then measured and recorded using the FFT Digital Spectrum Analyzer. Tests were repeated at different audio signal frequencies from 0 to 50 KHz.

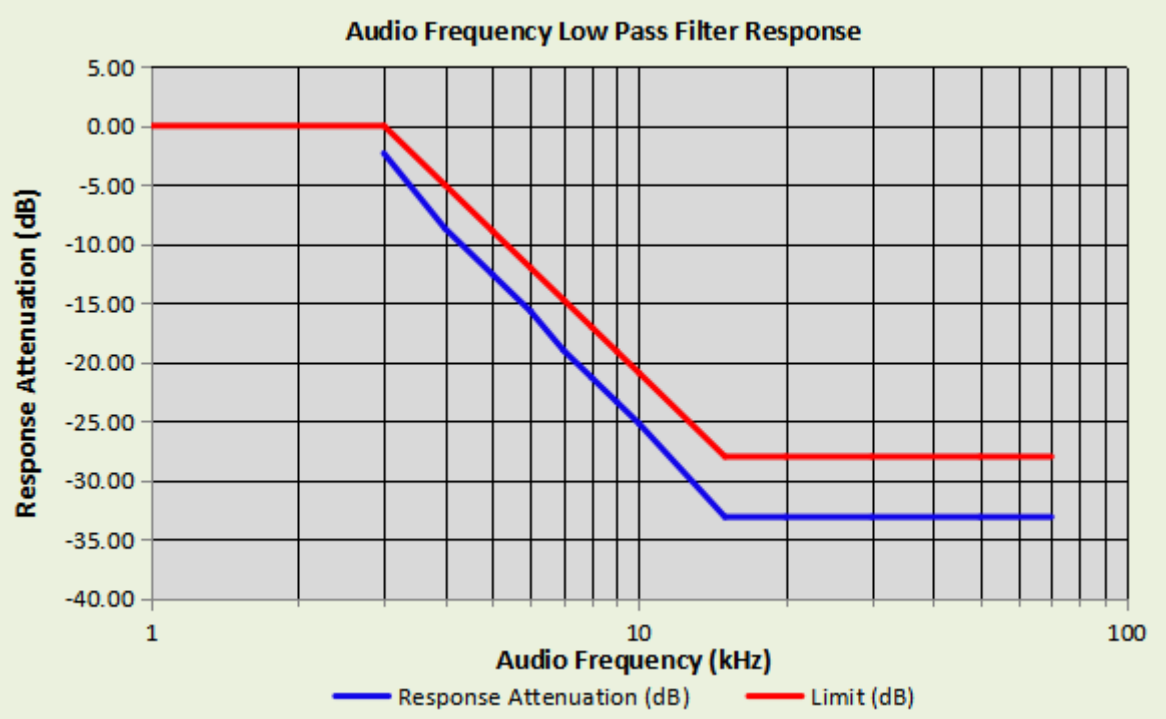
12.3.TEST CONFIGURATION



12.4.MEASURE RESULT

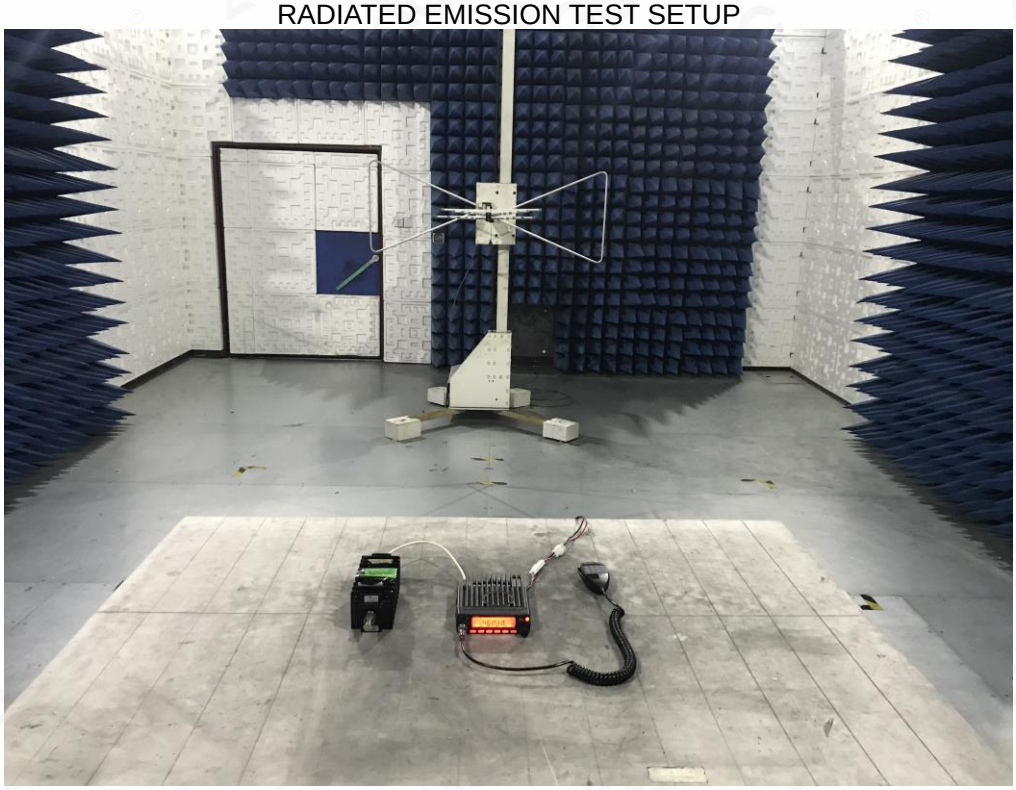
20 KHZ CHANNEL SPACING, F3E, FREQUENCY OF ALL MODULATION STATES-50W

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1	0	/
3	-2.33	0.00
4	-8.68	-5.00
5	-12.55	-8.87
6	-15.72	-12.04
7	-19.00	-14.72
8	-21.32	-17.04
9	-23.36	-19.08
10	-25.20	-20.92
15	-33.11	-28.00
20	-33.11	-28.00
30	-33.11	-28.00
50	-33.11	-28.00
70	-33.11	-28.00

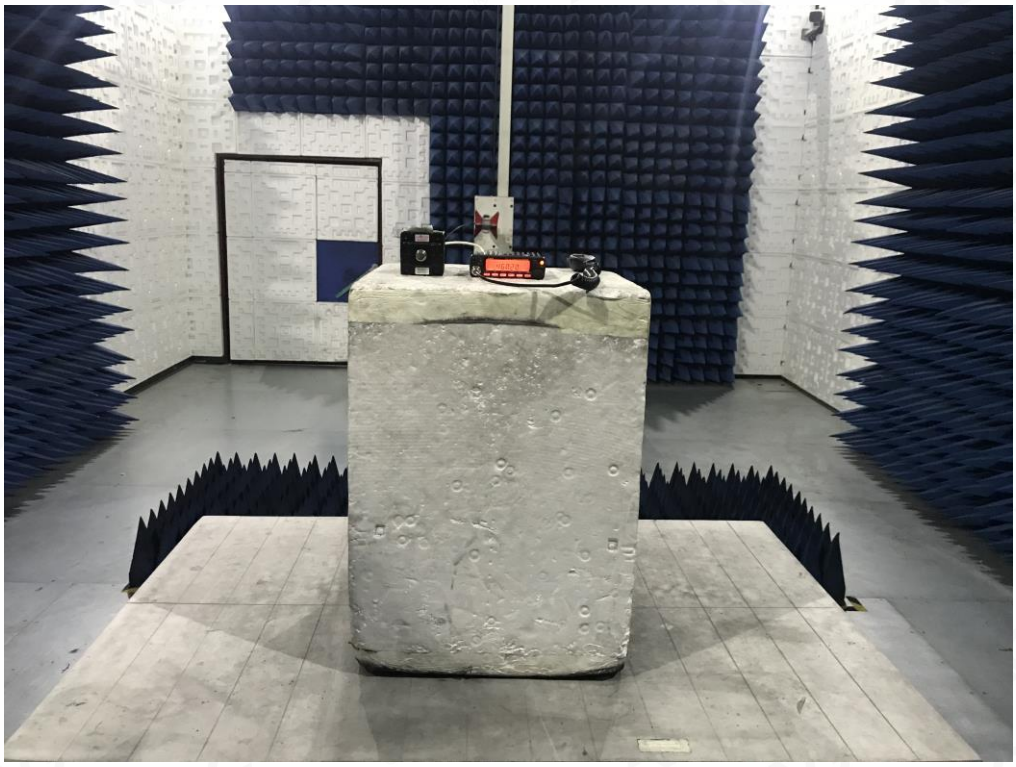


APPENDIX I: PHOTOGRAPHS OF SETUP

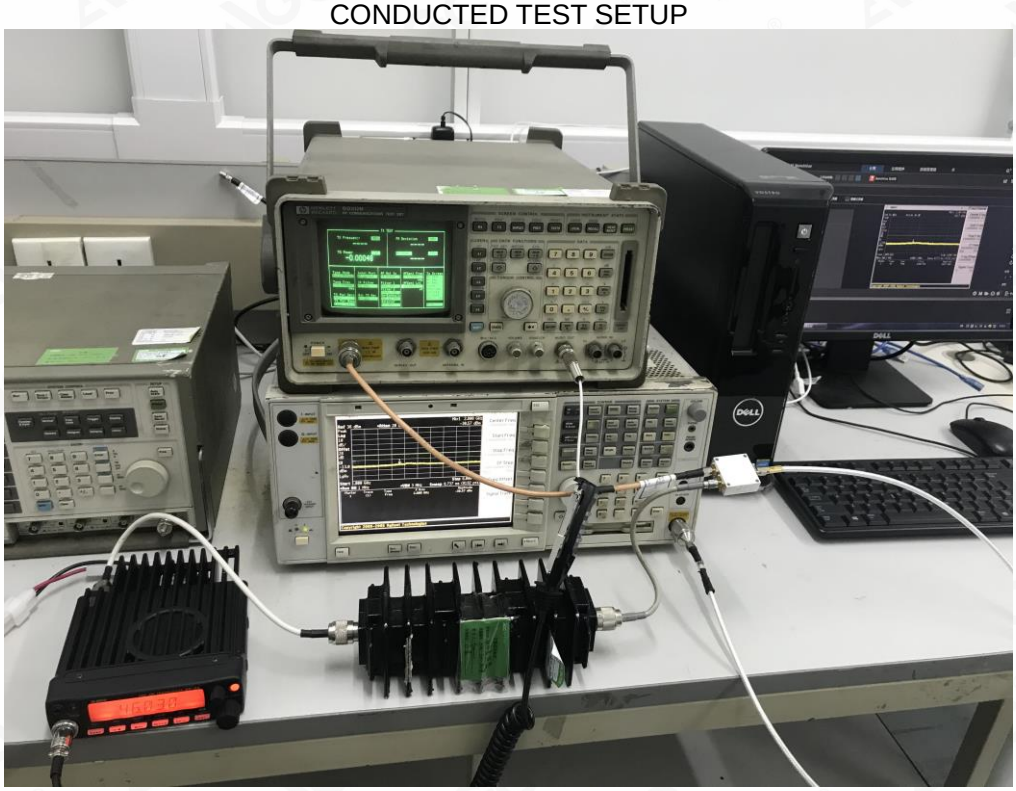
RADIATED EMISSION TEST SETUP



RADIATED EMISSION ABOVE 1G TEST SETUP

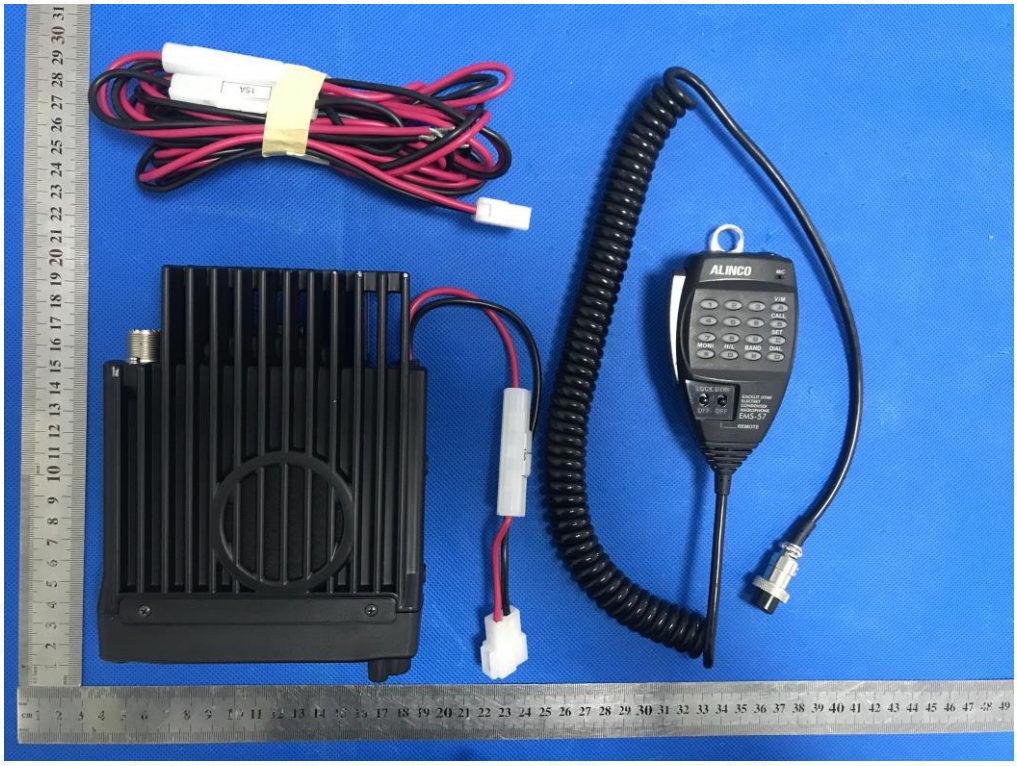


CONDUCTED TEST SETUP



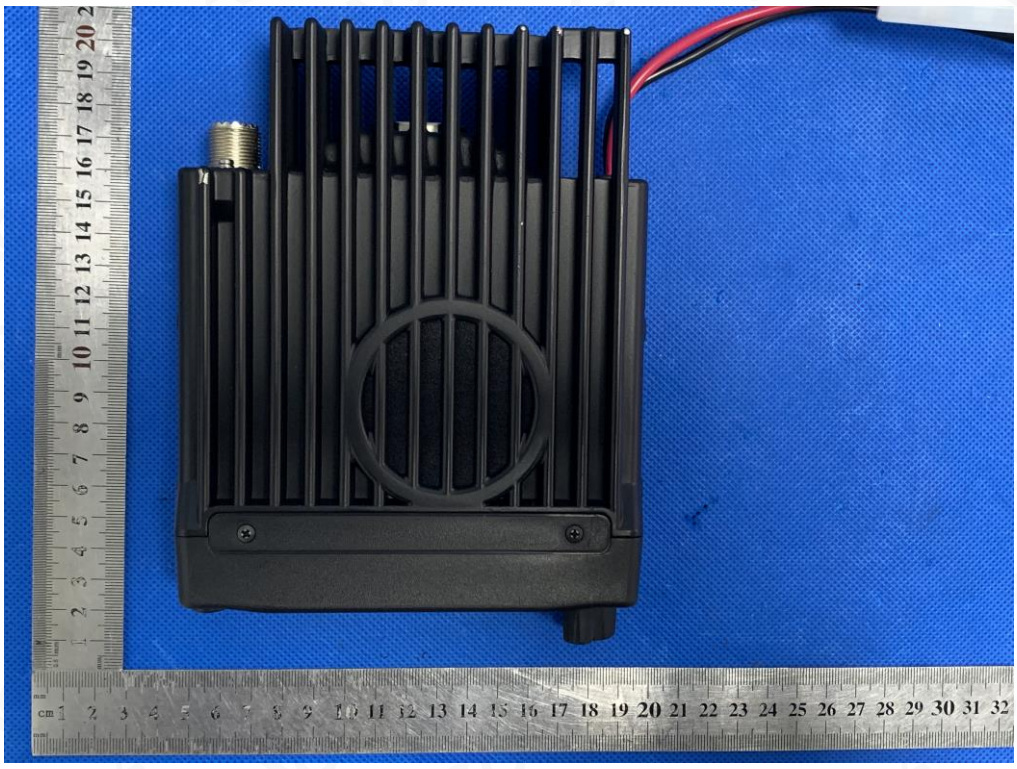
APPENDIX II: EXTERNAL VIEW OF EUT

WHOLE VIEW OF EUT

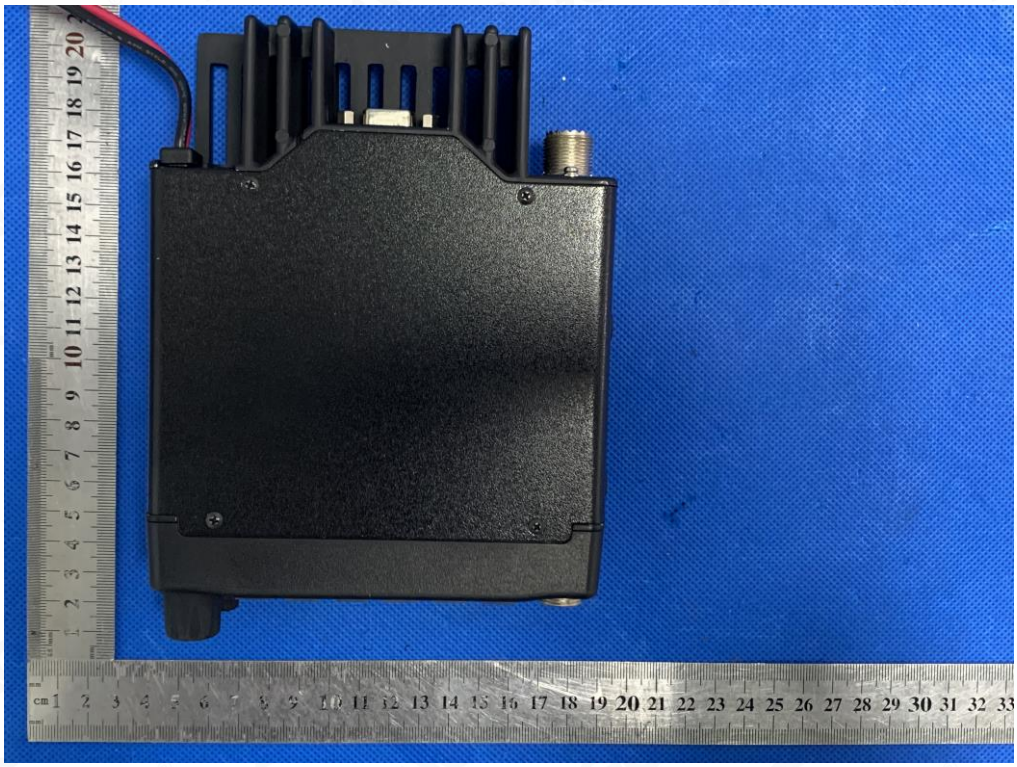


Part I

TOP VIEW OF EUT

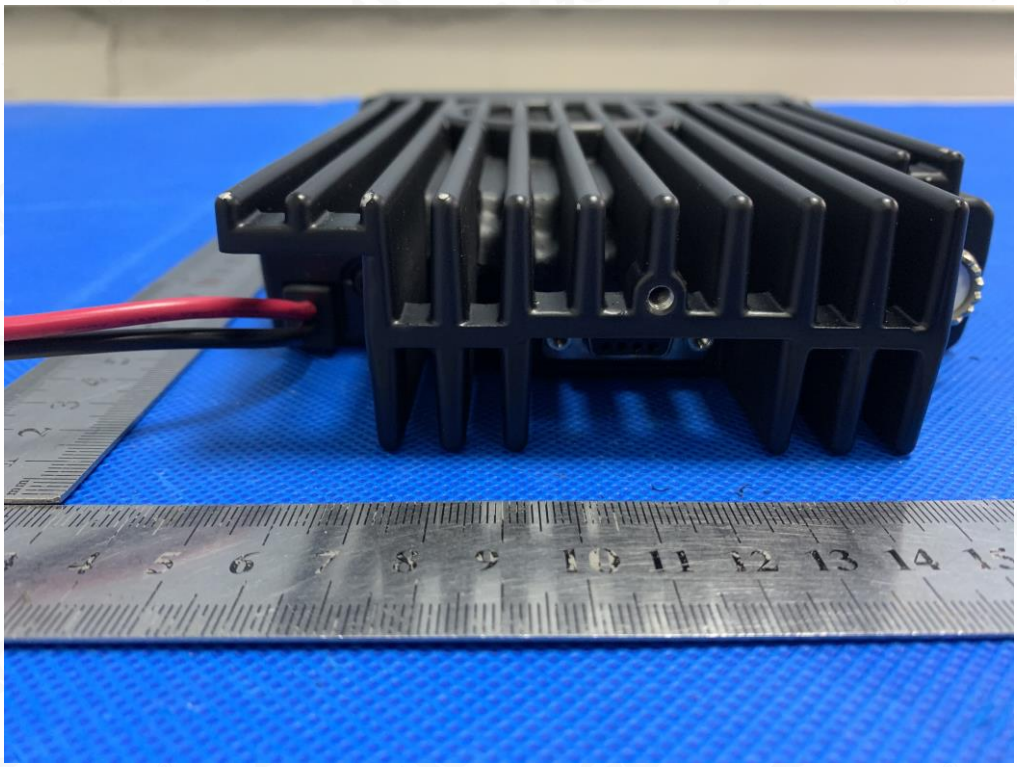


BOTTOM VIEW OF EUT



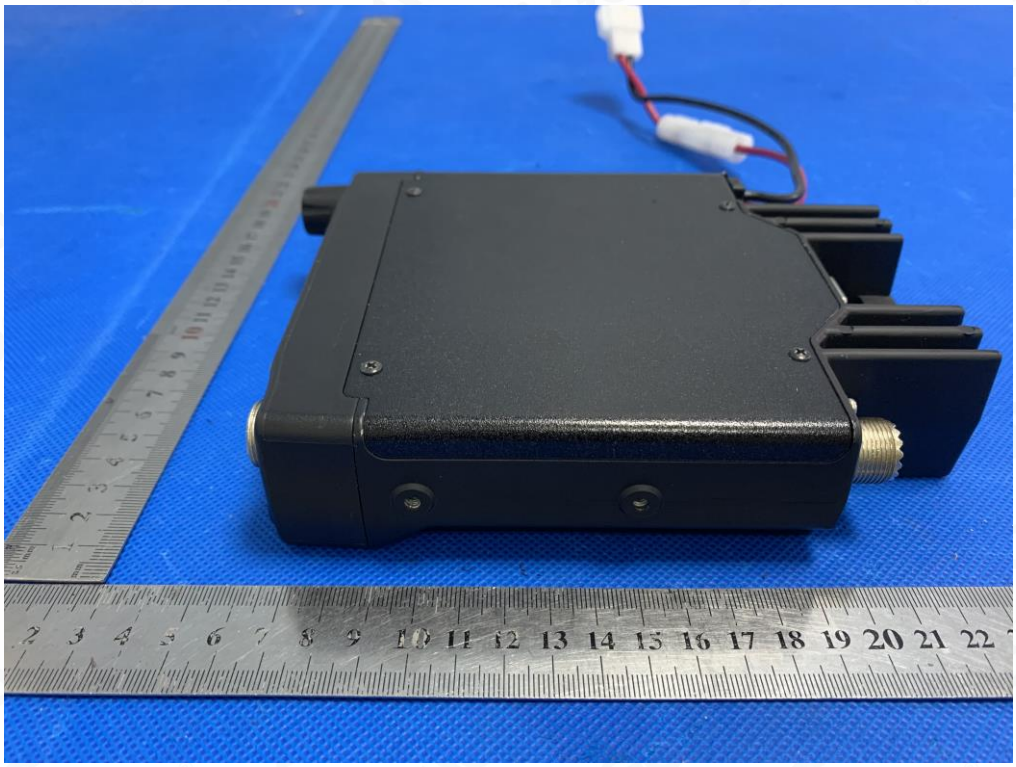
FRONT VIEW OF EUT

BACK VIEW OF EUT



LEFT VIEW OF EUT

RIGHT VIEW OF EUT



Part II

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

FRONT VIEW OF EUT

BACK VIEW OF EUT

LEFT VIEW OF EUT

RIGHT VIEW OF EUT

----END OF REPORT----