FCC Part 90& Part 22 Rules Test Report

Report No.: AGC02415190302FE10

FCC ID	:	Q9SAWR-D6500
PRODUCT DESIGNATION	:	DMR RADIO
BRAND NAME	:	ADVANCED WIRELESS COMMUNICATIONS
MODEL NAME	:	AWR-D6500
CLIENT	:	Northfield Telecommunications, Inc. d/b/a Advanced Wireless Communications
DATE OF ISSUE	:	Apr. 28, 2019
STANDARD(S)	:	FCC Part 90 Rules FCC Part 22 Rules
REPORT VERSION	:	V 1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr. 28, 2019	Valid	Initial Release

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1. VERIFICATION OF COMPLIANCE

Applicant:	Northfield Telecommunications, Inc. d/b/a Advanced Wireless Communications
Address	20809 Kensington Blvd Lakeville, MN 55044, USA
Manufacturer:	Fujian New Century Communications Co., Ltd
Address	No. 1 Fengshou Road, Quanzhou City, Fujian Province, China
Factory	Fujian New Century Communications Co., Ltd
Address	No. 1 Fengshou Road, Quanzhou City, Fujian Province, China
Product Designation:	DMR RADIO
Brand Name:	ADVANCED WIRELESS COMMUNICATIONS
Test Model	AWR-D6500
Date of Test:	Mar. 25, 2019~Apr. 28, 2019

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 and FCC Rules Part 22 requirements

The test results of this report relate only to the tested sample identified in this report.

Tested By

Calvin Liu(Liu Junchen) Apr. 28, 2019

Reviewed By

Max Zhang(Zhang Yi) Apr. 28, 2019

Approved By

Forrest Lei(Lei Yonggang)
Authorized Officer Apr. 28, 2019

2. GENERAL INFORMATION

2.1PRODUCT DESCRIPTION

The EUT is a **DMR RADIO** 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 / Data
Hardware Version	C7000-DM850-MIN-6
Software Version	7.8.72
Modulation	FM/4FSK
Emission Type	7K60FXD/7K60FXE/11K0F3E
Emission Bandwidth	Analog:10.260KHz(5W-12.5 KHz),10.260KHz(1W-12.5 KHz) Digital: 9.947KHz(5W-12.5KHz), 9.633KHz(1W-12.5KHz)
Peak Frequency Deviation	1.93KHz
Audio Frequency Response	10.93dB
Maximum Transmitter Power	Analog: 36.85dBm(5W-12.5 KHz), 29.65dBm (1W-12.5 KHz) Digital: 36.62dBm(5W-12.5KHz), 29.47dBm (1W-12.5KHz)
Output power Modification	5W/1W (It was fixed by the manufacturer, any individual can't arbitrarily change it.)
Data Rate	9600bps/12.5KHz(Channel Spacing)
Antenna Designation	Detachable
Antenna Gain	1.7dBi
Power Supply	DC 7.4V, 2000mAh (by battery) charging for DC 8.4V
Limiting Voltage	DC 6V-8.51V
Operation Frequency Range and Channel	Frequency Range:400 MHz to 480 MHz (UHF) Channel Separation: 12.5KHz(Digital/ Analog)
	Bottom Channel: 400.025MHz Middle Channel: 453.225MHz Middle Channel: 454.025MHz (Top)High Channel: 479.975MHz
Frequency Tolerance	1.088ppm

Frequency Range (MHz)	Rated Transmit Power(W)(Conducted)	Transmit Mode/Emission Designator
400-480	1W/5W	11K0F3E(Analog Vioce;NB)
400-480	1W/5W	7K60FXD/7K60FXW(9600Data/Digital Voice NB)

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	440.025
4		
5	5-6	479.975
6		

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

Voice –FM Analog (12.5KHz)

Calculation:

Max modulation (M) in kHz : 3.0

Max deviation(D) in kHz:2.5

Constant factor (K): 1(assumed)

Bn= 2XM +2XDK=11.0 KHz

Emission designator: 11K0F3E

9600 Digital Vioce/date (12.5KHz)

Calculation:

Data rate in bps(R)=9600

Deviation Peak deviation of carrier(D)=2359.585

Constant factor (K): 1 (default)

Bn= 3.86D+1.27RK= 3.86(2359.585)+0.27(9600)(1)=11.7KHz

Emission designator: 11K0FXD

2.2RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: **Q9SAWR-D6500 ,** filing to comply with Part 2, Part 22, 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& Part 22 requirements:

(1). Section 90.205 &22.565: RF Output Power

(2). Section 90.207: Modulation Characteristic

(3). Section 90.209 &22.359: Occupied Bandwidth

(4). Section 90.210&22.359: Emission Mask

(5). Section 90.213&22.355: Frequency Tolerance

(6). Section 90.214: Transient Frequency Behavior

3.4CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System

EUT

Table 2-1 Equipment Used in Tested System

Item	Equipment	Model No.	Identifier	Note
1	DMR RADIO	AWR-D6500	Q9SAWR-D6500	EUT
2	Battery	AWB-D6500	DC 7.4V 2000mAh	Accessory
3	Back clip	N/A	N/A	Accessory
4	Charger	CH500S	Output:8.4V 0.5A	Accessory
5	Adapter	NLB100120W1A5S95	AC:100-240V~50/60Hz 0.35A DC:12V 1A	Accessory

4. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§90.205 & 22.565	Maximum Transmitter Power	Compliant
§90.207	Modulation Characteristic	Compliant
§90.209& 22.359	Occupied Bandwidth	Compliant
§90.210& 22.359	Emission Mask	Compliant
§90.213& 22.355	Frequency Tolerance	Compliant
§90.214	Transient Frequency Behavior	Compliant

LIST OF EQUIPMENTS USED

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun. 12, 2018	Jun. 11, 2019
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 20, 2018	Dec. 19, 2019
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.18, 2018	Sep.17, 2019
preamplifier	ChengYi	EMC184045SE	980508	Oct.31, 2018	Oct 30, 2019
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 26, 2018	May. 25, 2020
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun. 12, 2018	Jun. 11, 2019
HORN ANTENNA	EM	EM-AH-10180	/	Mar.01, 2018	Feb.29, 2020
SIGNAL GENERATOR	AGILENT	E4421B	122501288	May. 15, 2018	May. 14, 2019
SIGNAL GENERATOR	R&S	SMT03	A0304261	Jun. 12, 2018	Jun. 11, 2019
ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 09, 2019	Jan. 08, 2020
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.26, 2018	Sep.25, 2019
Modulation Domain Analyzer	HP	53310A	3121A02467	Nov. 01, 2018	Oct. 31, 2019
Small environmental tester	ESPEC	SH-242	--	Feb. 27, 2018	Feb. 26, 2019
Small environmental tester	ESPEC	SH-242	--	Feb. 25, 2019	Feb. 24, 2020
RF Communication Test Set	HP	8920B	--	Jun. 12, 2018	Jun. 11, 2019
Loop Antenna	LAPLACE	RF300	--	Feb. 21, 2018	Feb. 20, 2019
Loop Antenna	LAPLACE	RF300	--	Feb. 19, 2019	Feb. 18, 2020
Attenuator	JFW	50FHC-006-50	--	June 12, 2018	June 11, 2019
Vector Analyzer	Agilent	E4440A	--	Mar. 01, 2018	Feb. 28, 2019
Vector Analyzer	Agilent	E4440A	--	Feb. 27, 2019	Feb. 26, 2020
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 (**DMR 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.

Analog:

No.	TEST MODES	CHANNEL SEPARATION
1	Low Channel	12.5 KHz
2	Middle Channel	12.5 KHz
3	High Channel	12.5 KHz

Digital:

No.	TEST MODES	CHANNEL SEPARATION
1	Low Channel	12.5 KHz
2	Middle Channel	12.5 KHz
3	High Channel	12.5 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, § 22.355 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

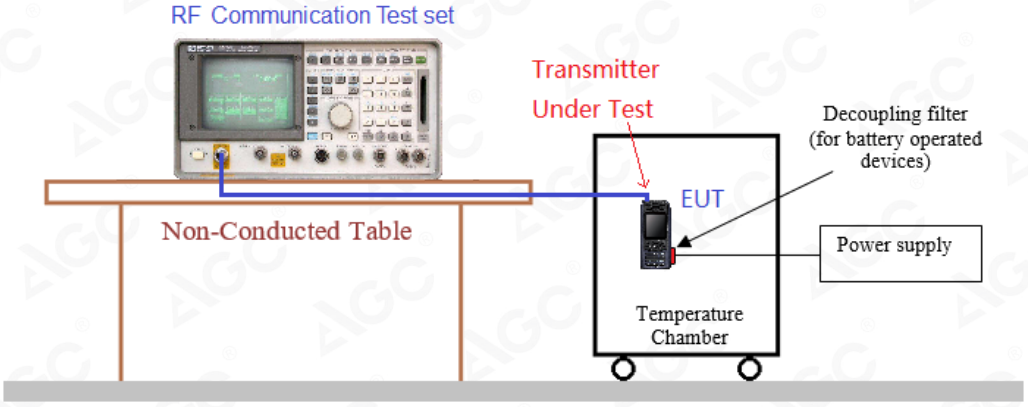
6.2.1 Frequency stability versus environmental temperature

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
UHF:
Analog:

(1) Frequency stability versus input voltage (Supply nominal voltage is 7.40V)**-5W-12.5KHz**

Environment Temperature(℃)	Power (V)	Reference Frequency 400.025MHz	454.025MHz	479.975MHz	Limit: ppm
50	DC 7.40 V	1.047	0.802	0.666	2.5
40	DC 7.40 V	0.842	1.085	0.743	
30	DC 7.40 V	0.726	0.901	0.689	
20	DC 7.40 V	0.998	0.629	0.871	
10	DC 7.40 V	0.675	0.779	0.793	
0	DC 7.40 V	1.073	0.570	0.926	
-10	DC 7.40 V	0.833	1.039	0.731	
-20	DC 7.40 V	0.767	0.561	0.734	
-30	DC 7.40 V	0.974	0.677	0.745	
Result	Pass				

(2) Frequency stability versus input voltage (Battery endpoint is 6V) **-5W-12.5KHz**

Environment Temperature(℃)	Power Supply (V)	Reference Frequency 400.025MHz	454.025MHz	479.975MHz	Limit: ppm
50	DC 6.00 V	0.574	0.553	0.625	2.5
40	DC 6.00 V	0.875	0.574	0.966	
30	DC 6.00 V	0.776	0.597	0.602	
20	DC 6.00 V	0.615	0.816	0.911	
10	DC 6.00 V	0.689	1.065	0.514	
0	DC 6.00 V	0.804	0.725	1.070	
-10	DC 6.00 V	0.595	1.017	0.758	
-20	DC 6.00 V	0.796	0.876	1.027	
-30	DC 6.00 V	0.960	0.978	1.038	
Result	Pass				

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

Environment Temperature(℃)	Power (V)	Reference Frequency 400.025MHz	454.025MHz	479.975MHz	Limit: ppm
50	DC 7.40 V	0.778	0.616	0.623	2.5
40	DC 7.40 V	0.657	0.543	0.875	
30	DC 7.40 V	0.513	0.503	0.972	
20	DC 7.40 V	0.954	0.805	0.753	
10	DC 7.40 V	1.036	0.704	0.518	
0	DC 7.40 V	0.706	0.897	0.825	
-10	DC 7.40 V	0.843	0.526	0.843	
-20	DC 7.40 V	0.819	0.905	0.584	
-30	DC 7.40 V	0.642	0.871	0.687	
Result	Pass				

(4) Frequency stability versus input voltage (Battery endpoint is 6V) **-1W-12.5KHz**

Environment Temperature(℃)	Power (V)	Reference Frequency 400.025MHz	454.025MHz	479.975MHz	Limit: ppm
50	DC 6.00 V	0.610	1.017	0.519	2.5
40	DC 6.00 V	0.679	0.779	0.722	
30	DC 6.00 V	0.828	1.018	0.896	
20	DC 6.00 V	1.008	1.043	0.763	
10	DC 6.00 V	1.069	0.534	0.809	
0	DC 6.00 V	0.608	0.801	0.962	
-10	DC 6.00 V	0.701	0.580	0.940	
-20	DC 6.00 V	0.975	1.035	0.593	
-30	DC 6.00 V	0.776	0.831	0.716	
Result	Pass				

Digital:

(1) Frequency stability versus input voltage (Supply nominal voltage is 7.40V)**-5W-12.5KHz**

Environment Temperature(℃)	Power (V)	Reference Frequency 400.025MHz	454.025MHz	479.975MHz	Limit: ppm
50	DC 7.40 V	1.042	0.700	0.981	2.5
40	DC 7.40 V	0.825	0.981	0.687	
30	DC 7.40 V	0.788	0.896	0.957	
20	DC 7.40 V	0.879	1.013	0.856	
10	DC 7.40 V	0.540	**1.088**	0.622	
0	DC 7.40 V	0.918	0.962	0.997	
-10	DC 7.40 V	0.731	1.083	1.034	
-20	DC 7.40 V	0.759	0.931	0.967	
-30	DC 7.40 V	0.866	0.893	0.958	
Result	Pass				

(2) Frequency stability versus input voltage(Battery endpoint is 6V) **-5W-12.5KHz**

Environment Temperature(℃)	Power (V)	Reference Frequency 400.025MHz	454.025MHz	479.975MHz	Limit: ppm
50	DC 6.00 V	0.980	0.811	0.828	2.5
40	DC 6.00 V	0.638	0.694	0.965	
30	DC 6.00 V	0.878	0.561	0.743	
20	DC 6.00 V	0.767	0.999	0.556	
10	DC 6.00 V	0.982	0.998	0.953	
0	DC 6.00 V	0.570	1.004	0.858	
-10	DC 6.00 V	0.678	1.012	0.980	
-20	DC 6.00 V	0.501	0.693	0.501	
-30	DC 6.00 V	0.571	1.047	0.729	
Result	Pass				

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

Environment Temperature(℃)	Power (V)	Reference Frequency 400.025MHz	454.025MHz	479.975MHz	Limit: ppm
50	DC 7.40 V	0.843	0.841	0.707	2.5
40	DC 7.40 V	0.666	0.841	1.000	
30	DC 7.40 V	0.905	0.668	0.800	
20	DC 7.40 V	0.824	0.988	1.010	
10	DC 7.40 V	0.766	0.691	0.594	
0	DC 7.40 V	0.574	1.052	0.919	
-10	DC 7.40 V	0.745	0.765	0.903	
-20	DC 7.40 V	0.651	0.963	0.732	
-30	DC 7.40 V	0.728	0.791	0.756	
Result	Pass				

(4) Frequency stability versus input voltage (Battery endpoint is 6V) **-1W-12.5KHz**

Environment Temperature(℃)	Power (V)	Reference Frequency 400.025MHz	454.025MHz	479.975MHz	Limit: ppm
50	DC 6.00 V	0.979	1.010	0.902	2.5
40	DC 6.00 V	0.582	1.022	1.003	
30	DC 6.00 V	0.709	0.675	1.087	
20	DC 6.00 V	0.791	0.934	0.852	
10	DC 6.00 V	0.552	0.790	0.797	
0	DC 6.00 V	0.665	0.680	1.051	
-10	DC 6.00 V	0.504	0.982	0.649	
-20	DC 6.00 V	0.995	1.032	0.580	
-30	DC 6.00 V	0.687	1.045	1.032	
Result	Pass				

7. EMISSION BANDWIDTH

7.1 PROVISIONS APPLICABLE

FCC Part 90 & FCC Part 22:

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).

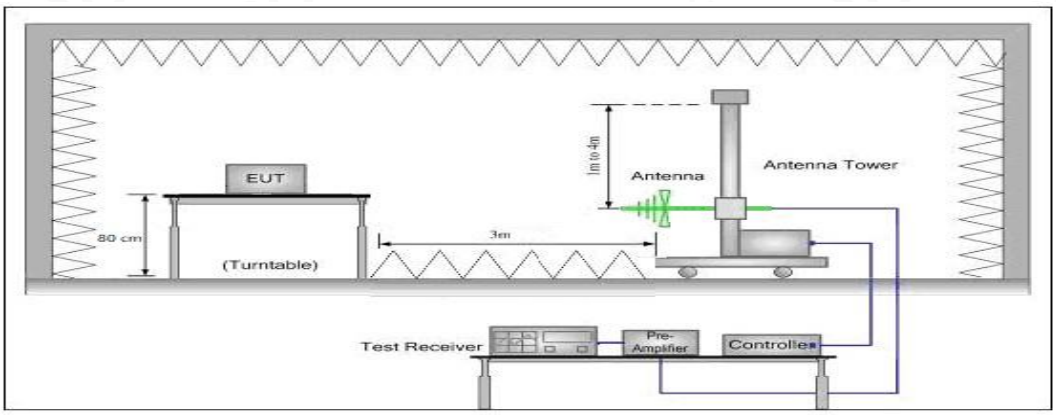
3). Set SPA Center Frequency = fundamental frequency, RBW=100Hz.VBW= 300 Hz, Span =50 KHz.

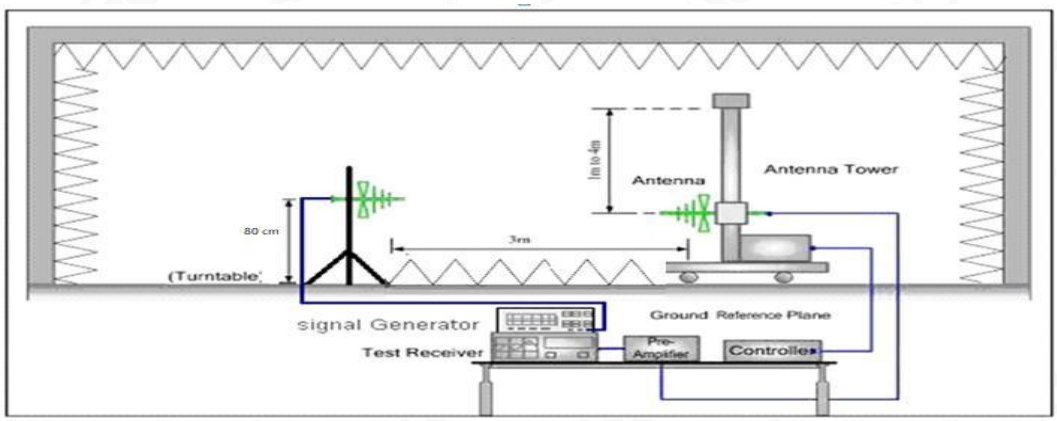
4). Set SPA Max hold. Mark peak, -26 dB.

7.3 TEST SETUP BLOCK DIAGRAM

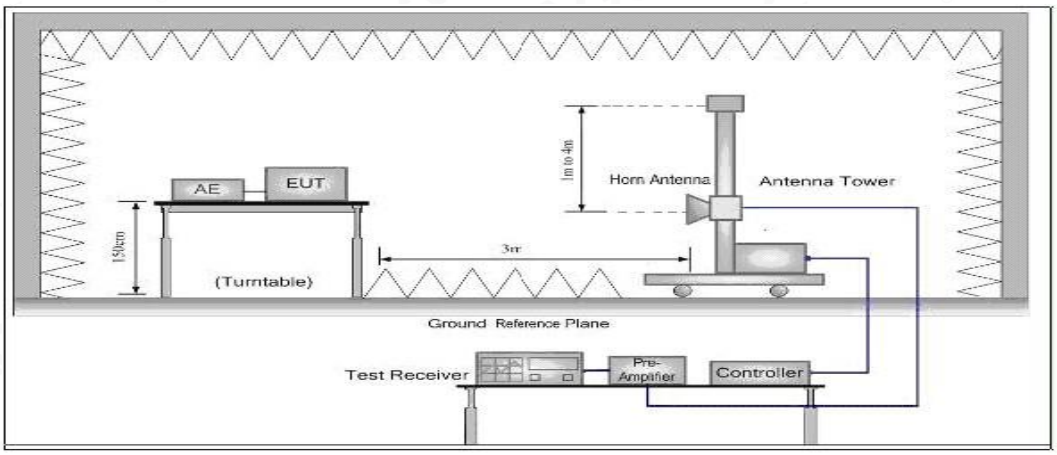
Radiation method:

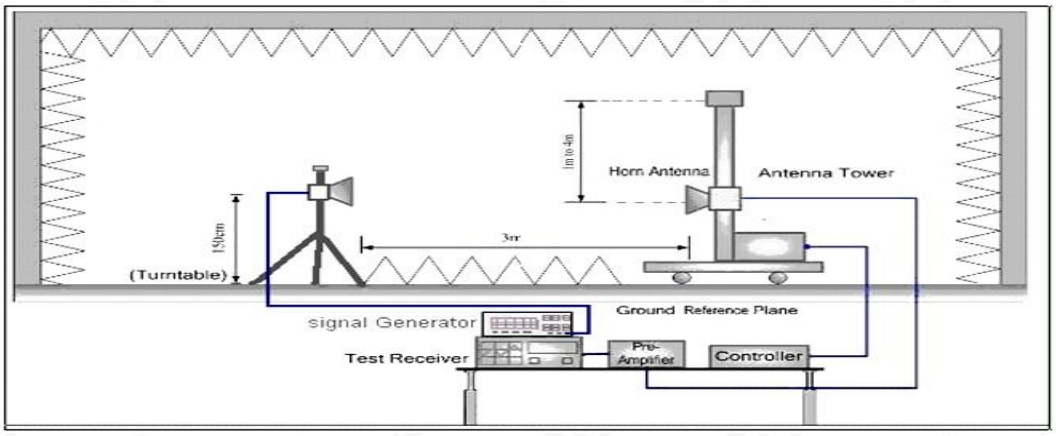
Radiated Below1GHz



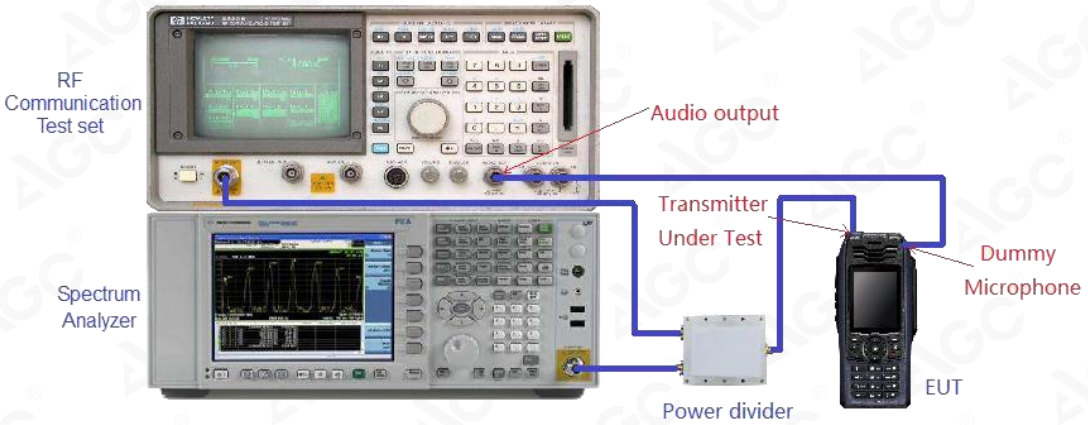


Radiated Above 1 GHz





Conduction method:

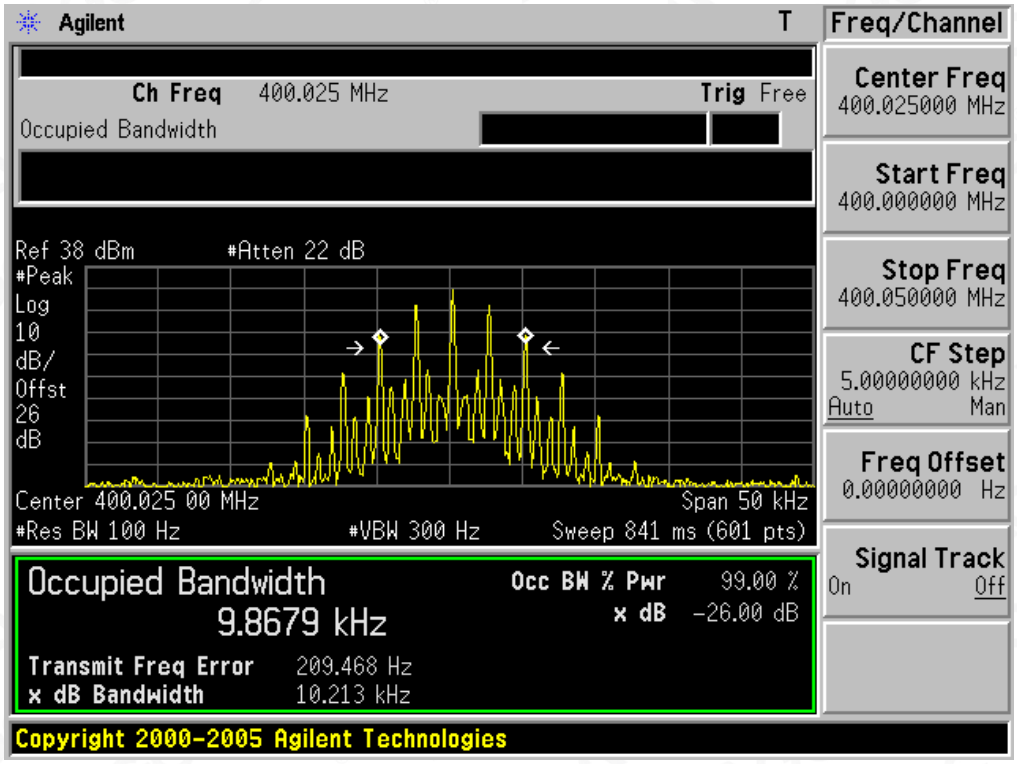


7.4 MEASUREMENT RESULT

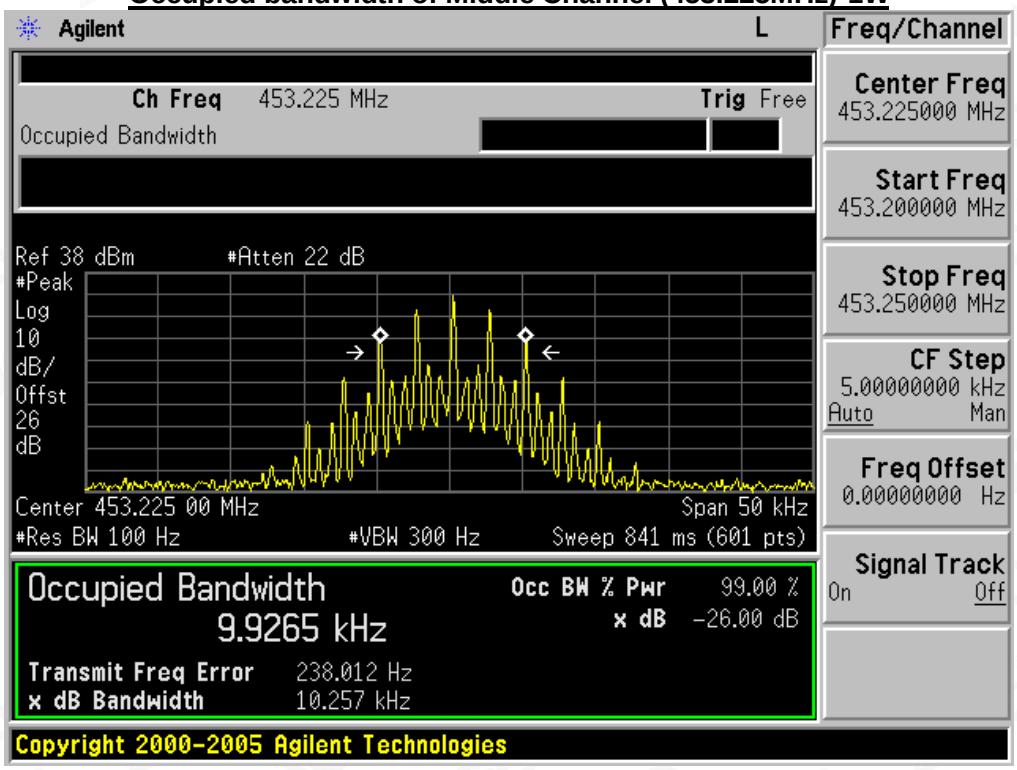
UHF:
Analog:12.5KHz

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	10.213KHz	11.25 KHz	Pass
453.225MHz	10.257KHz	11.25 KHz	Pass
454.025MHz	10.260KHz	11.25 KHz	Pass
479.975MHz	10.218KHz	11.25 KHz	Pass

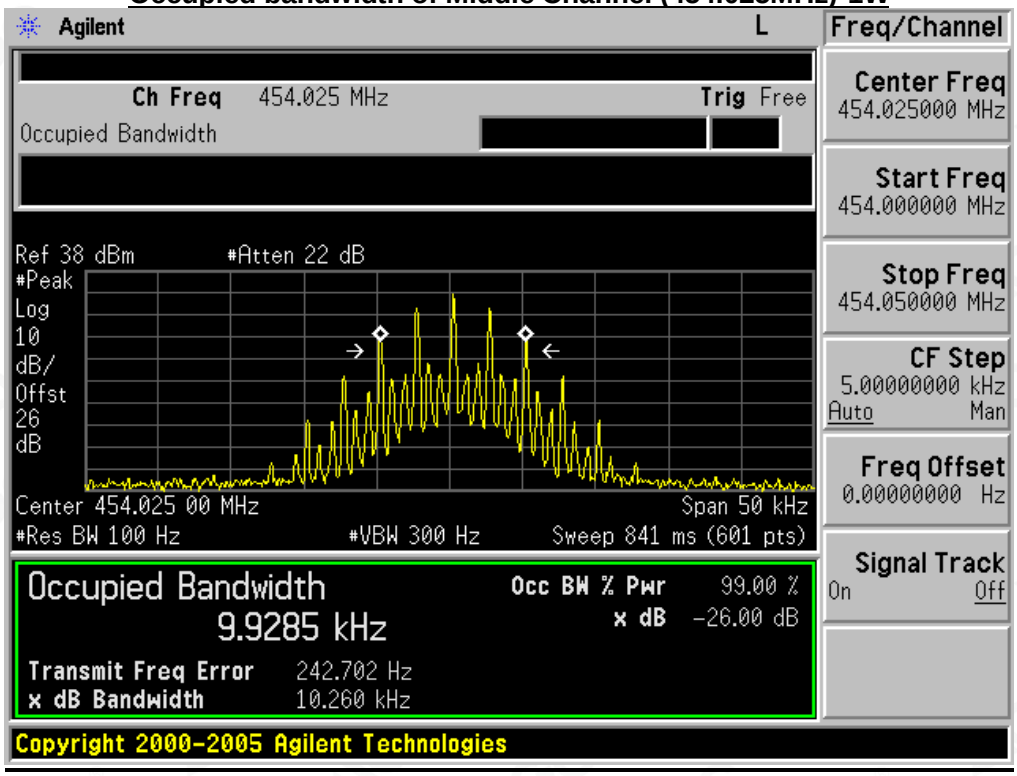
Occupied bandwidth of Bottom Channel (400.025MHz)-1W



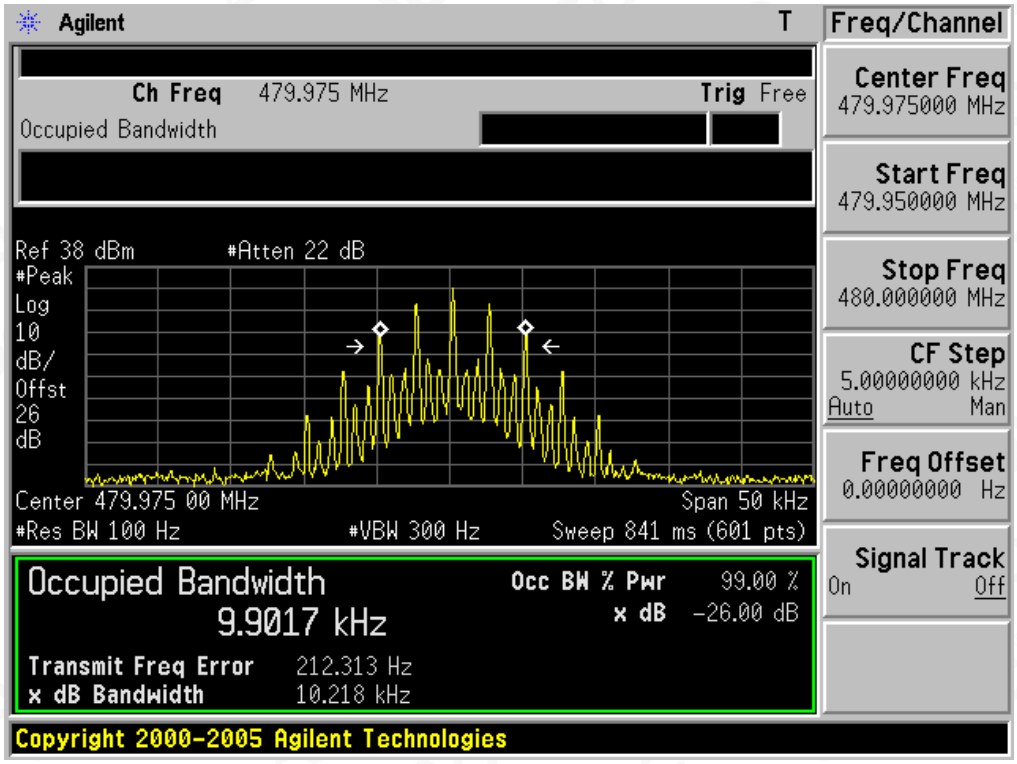
Occupied bandwidth of Middle Channel (453.225MHz)-1W



Occupied bandwidth of Middle Channel (454.025MHz)-1W

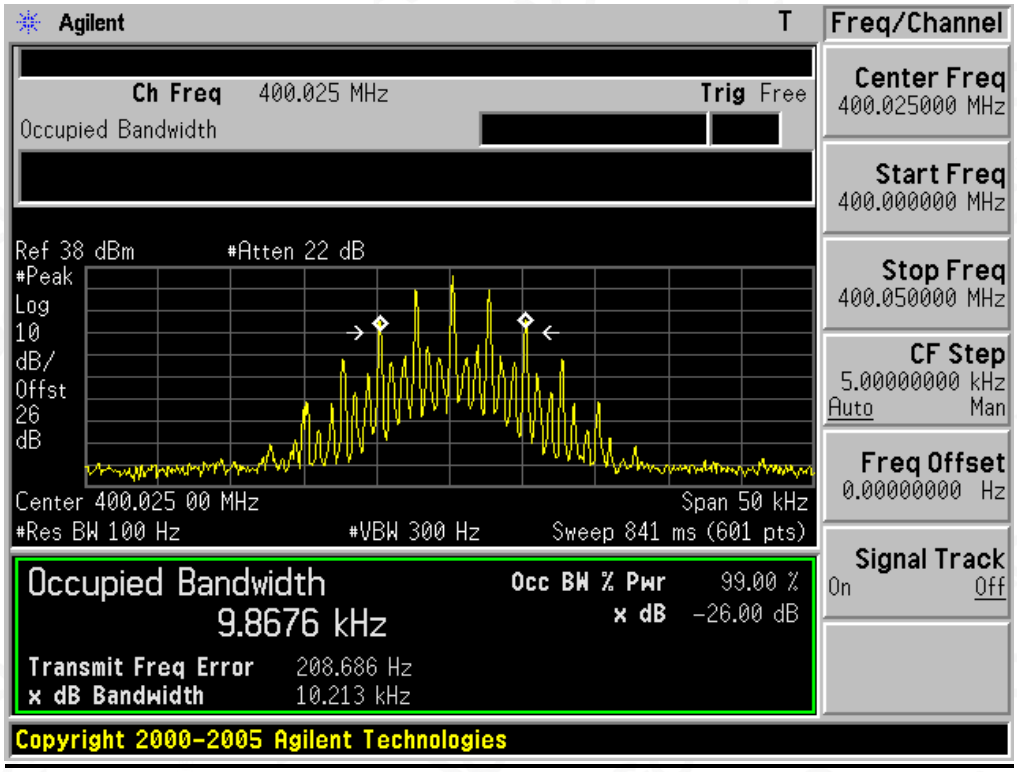


Occupied bandwidth of Top Channel (479.975MHz)-1W

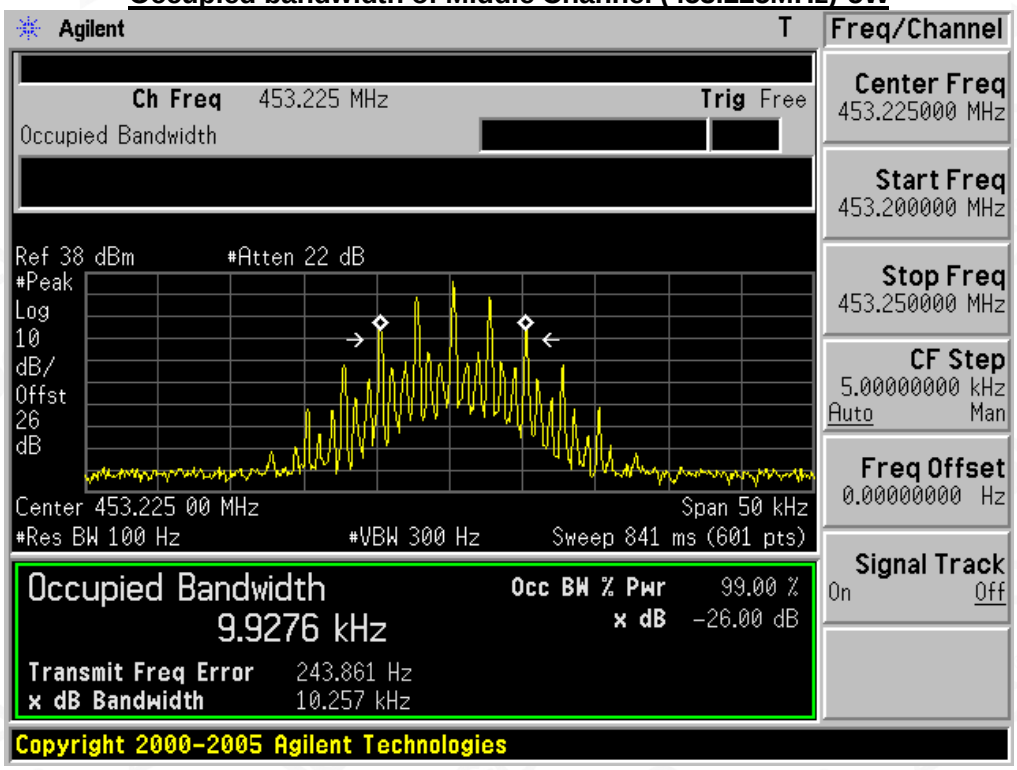


26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	10.213KHz	11.25 KHz	Pass
453.225MHz	10.257KHz	11.25 KHz	Pass
454.025MHz	10.260KHz	11.25 KHz	Pass
479.975MHz	10.257MHz	11.25 KHz	Pass

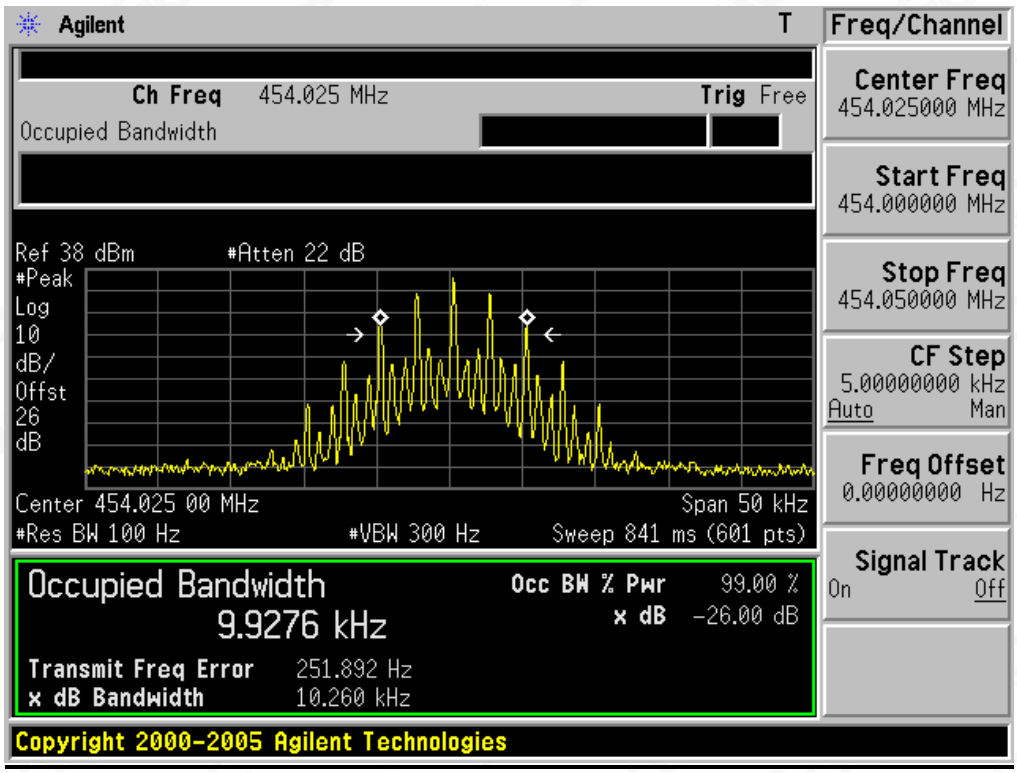
Occupied bandwidth of Bottom Channel (400.025MHz)-5W



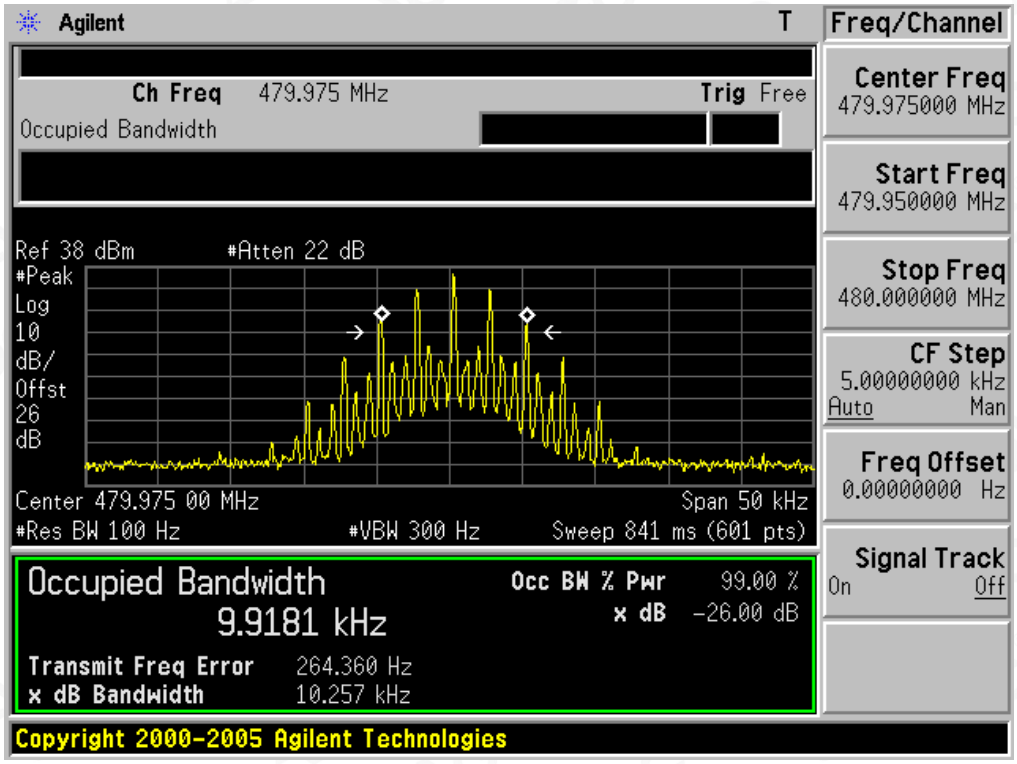
Occupied bandwidth of Middle Channel (453.225MHz)-5W



Occupied bandwidth of Middle Channel (454.025MHz)-5W



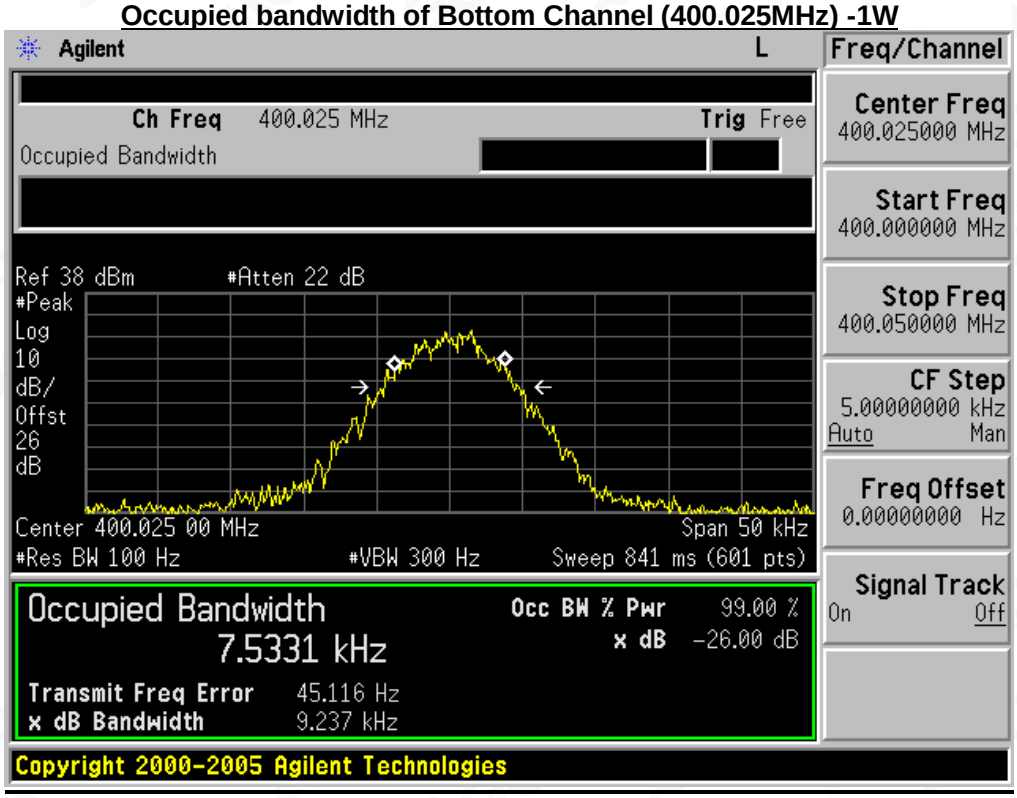
Occupied bandwidth of Top Channel (479.975MHz)-5W



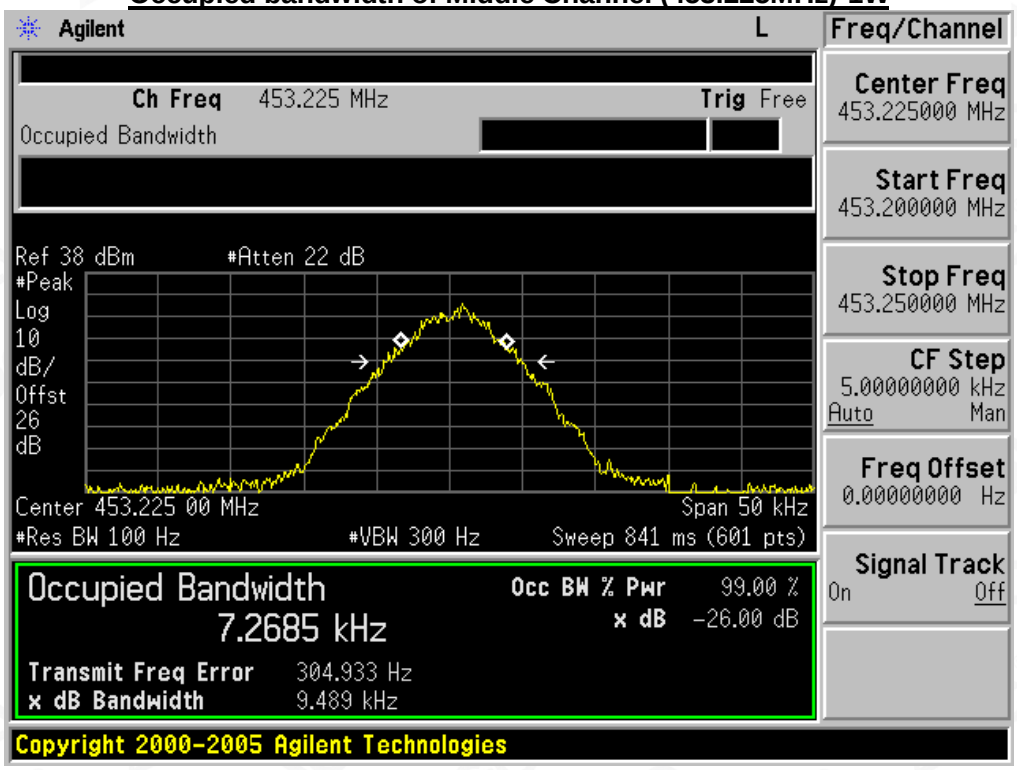
Digital:
TEST RESULTS

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	9.237KHz	11.25 KHz	Pass
453.225MHz	9.489KHz	11.25 KHz	Pass
454.025MHz	9.633KHz	11.25 KHz	Pass
479.975MHz	9.521KHz	11.25 KHz	Pass

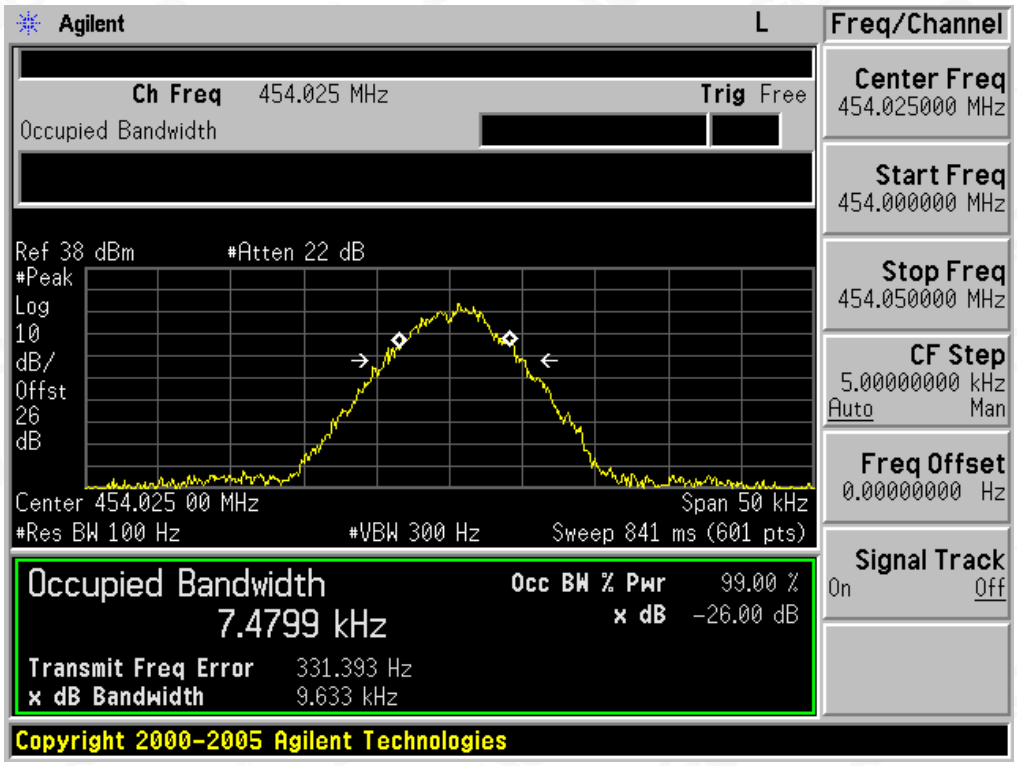
Occupied bandwidth of Bottom Channel (400.025MHz) -1W



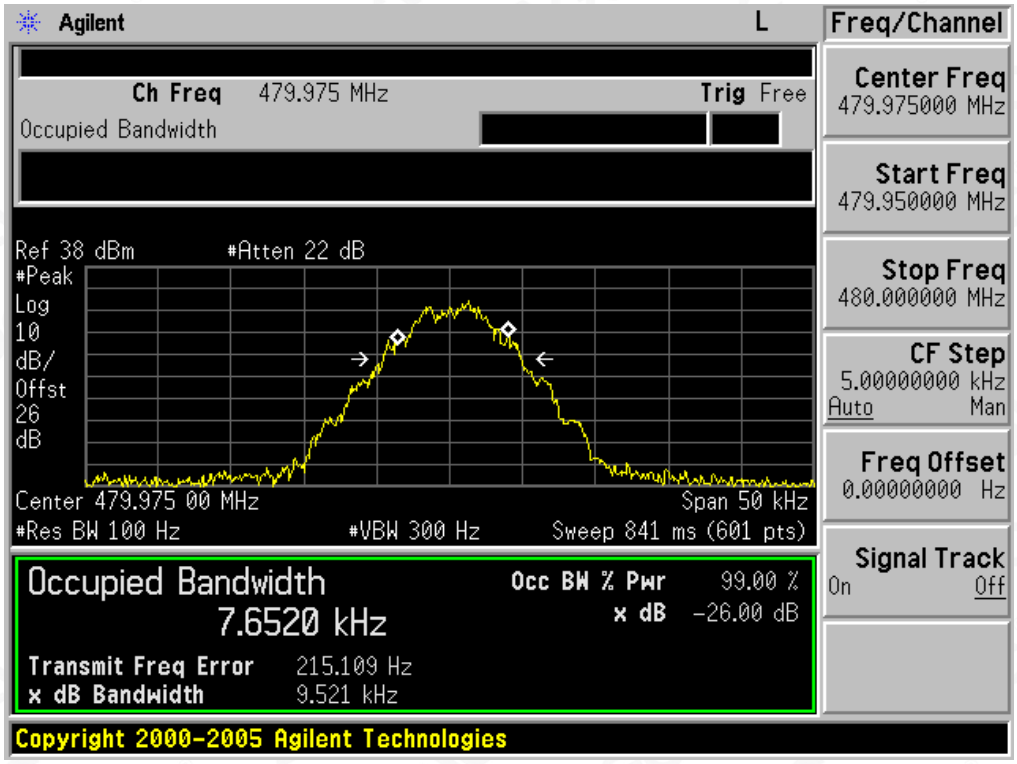
Occupied bandwidth of Middle Channel (453.225MHz)-1W



Occupied bandwidth of Middle Channel (454.025MHz)-1W



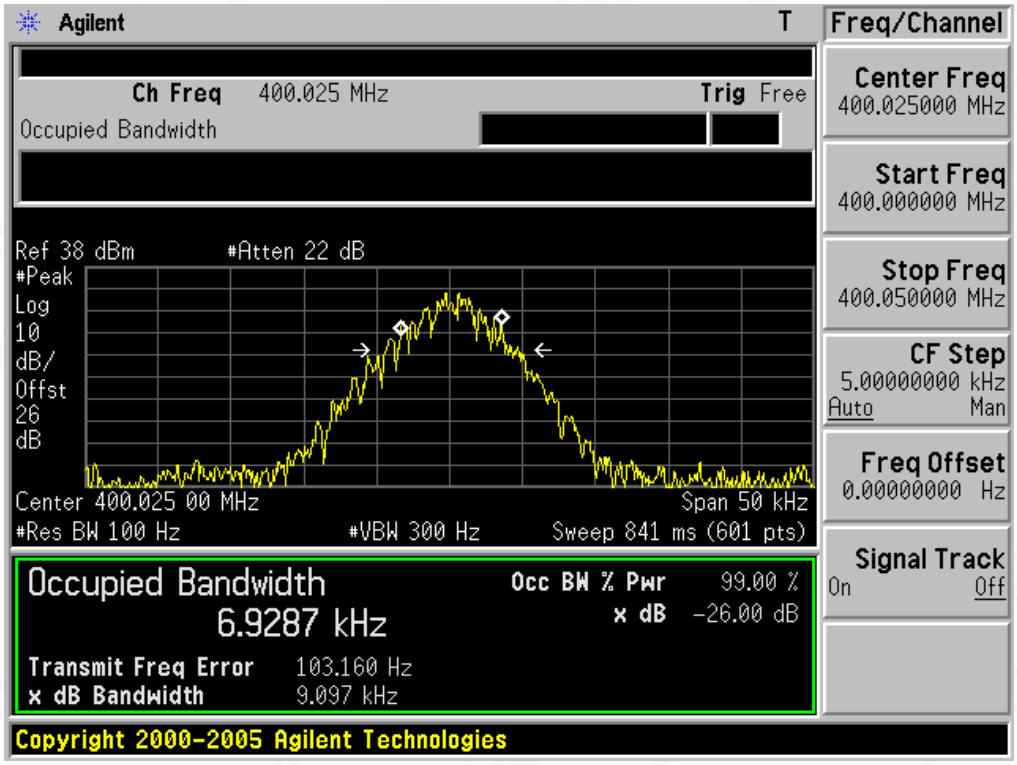
Occupied bandwidth of Top Channel (479.975MHz)-1W



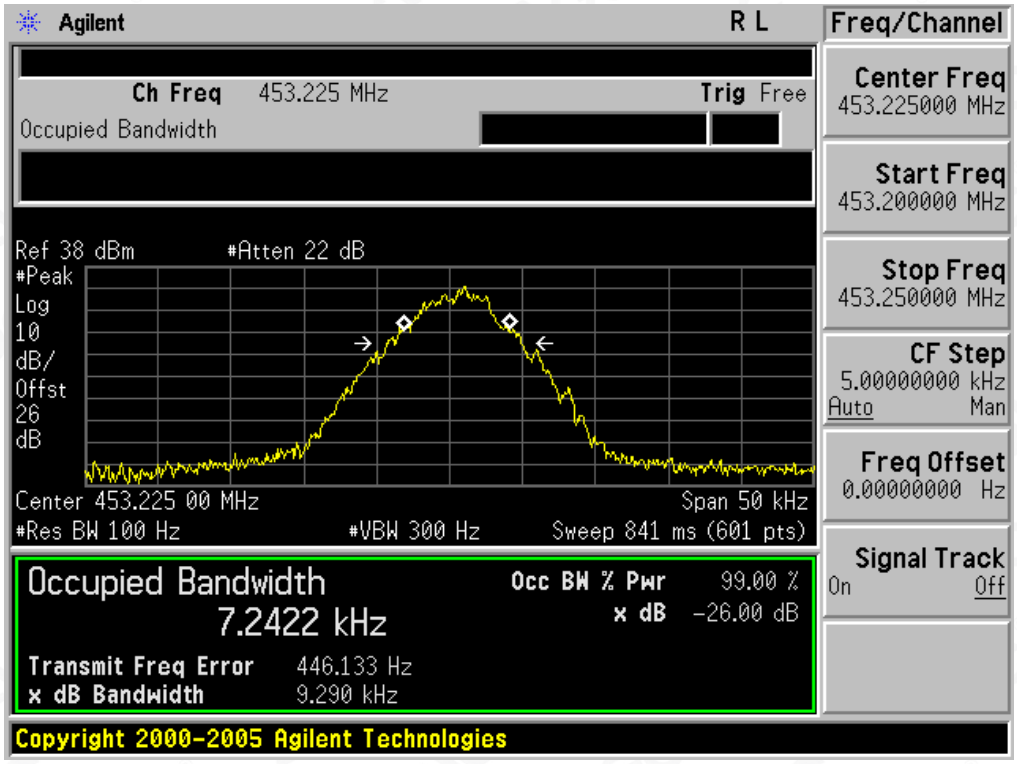
TEST RESULTS

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	9.097KHz	11.25 KHz	Pass
453.225MHz	9.290KHz	11.25 KHz	Pass
454.025MHz	8.730KHz	11.25 KHz	Pass
479.975MHz	9.947KHz	11.25 KHz	Pass

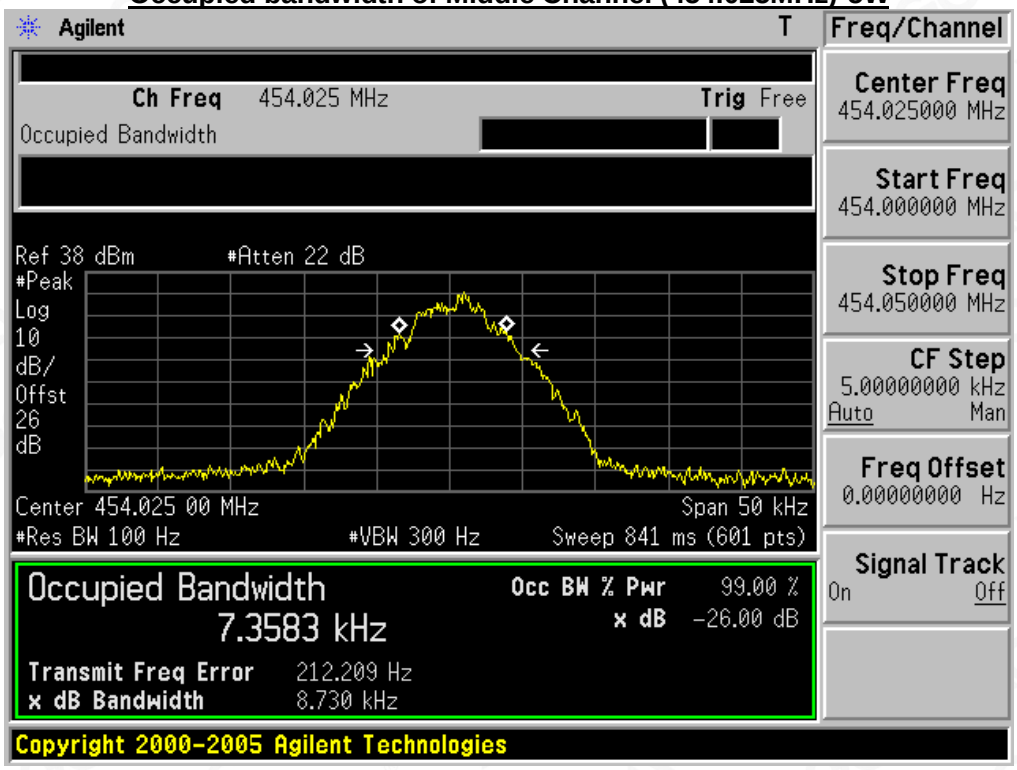
Occupied bandwidth of Bottom Channel (400.025MHz)-5W



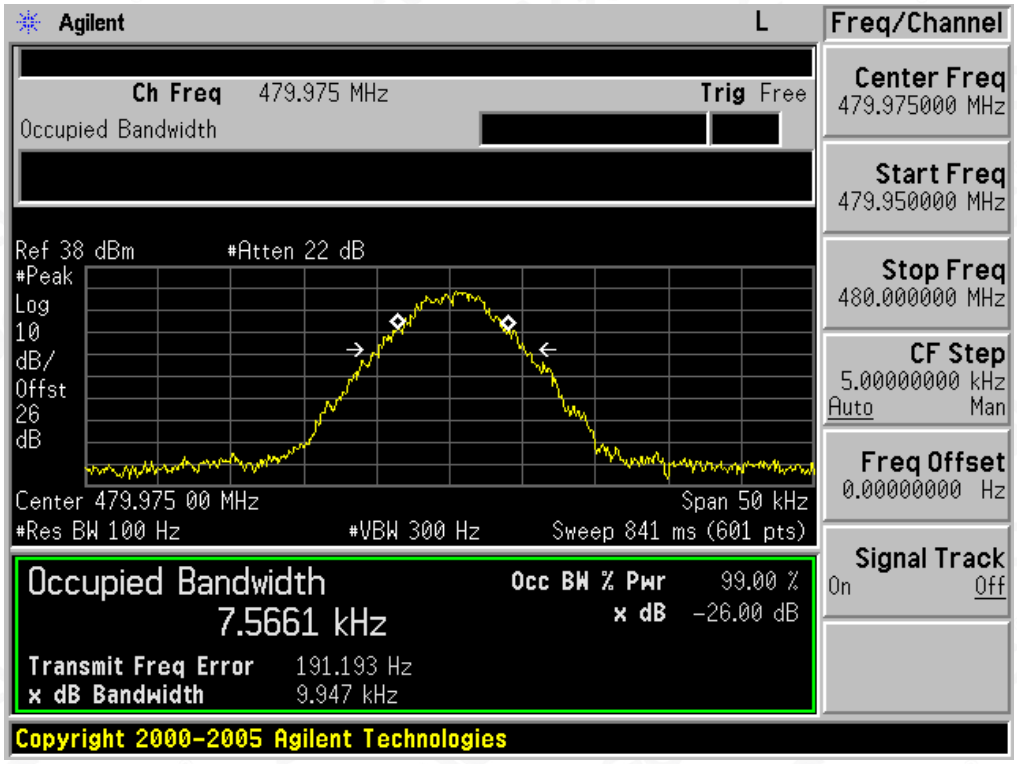
Occupied bandwidth of Middle Channel (453.225MHz)-5W



Occupied bandwidth of Middle Channel (454.025MHz)-5W



Occupied bandwidth of Top Channel (479.975MHz)-5W



8. UNWANTED RADIATION

8.1 PROVISIONS APPLICABLE

8.1.1 According to FCC §2.1049, §22.359 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.

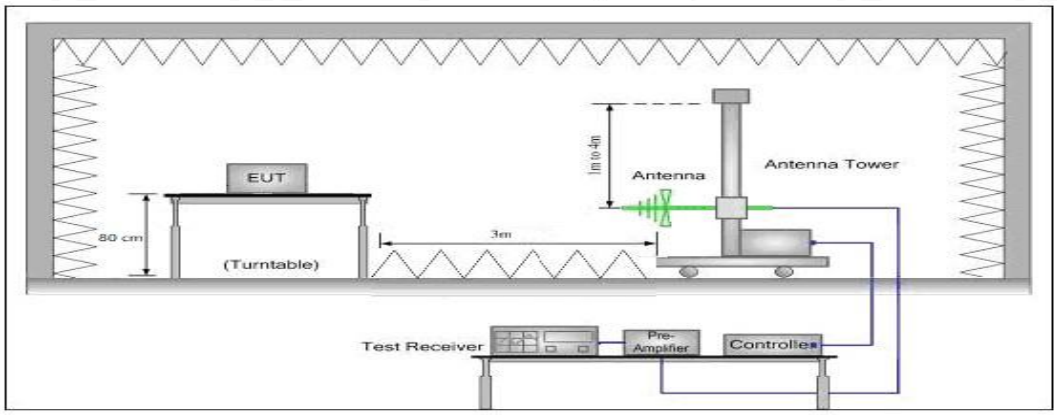
(17)The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

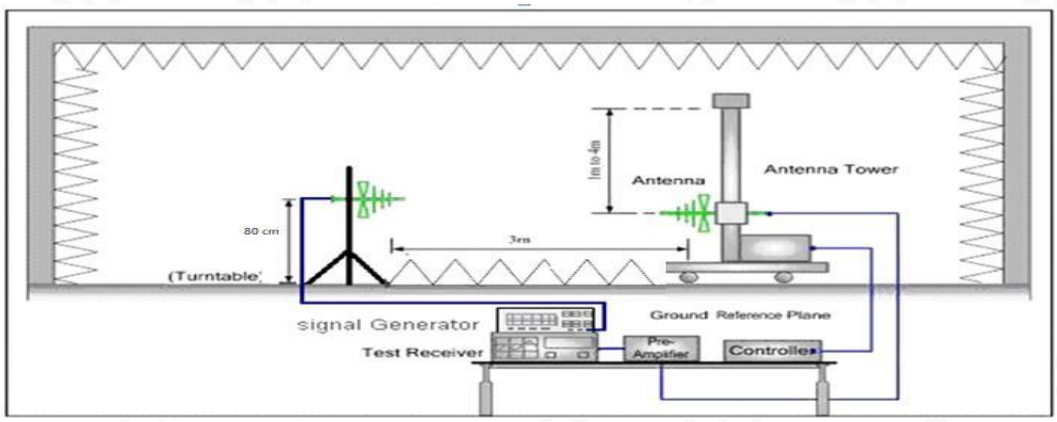
8.3 TEST SETUP BLOCK DIAGRAM

SUBSTITUTION METHOD: (Radiated Emissions)

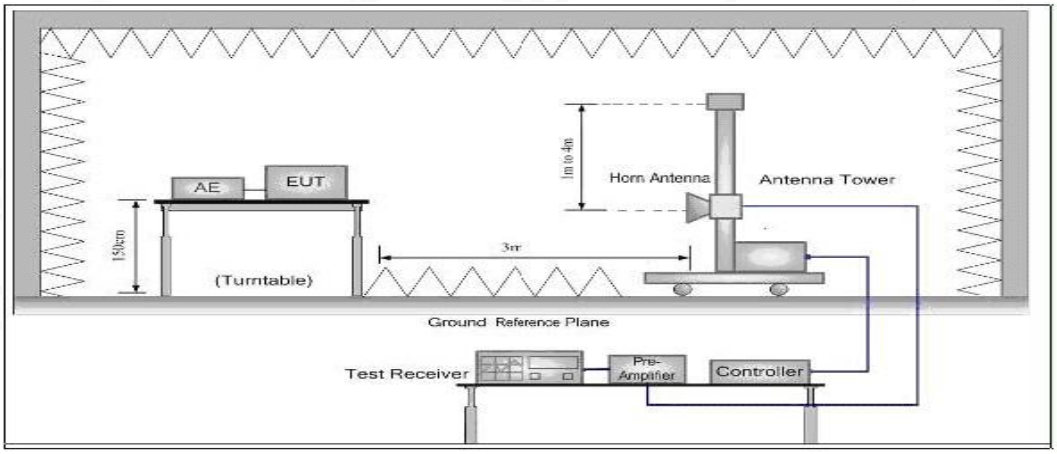
Radiation method:

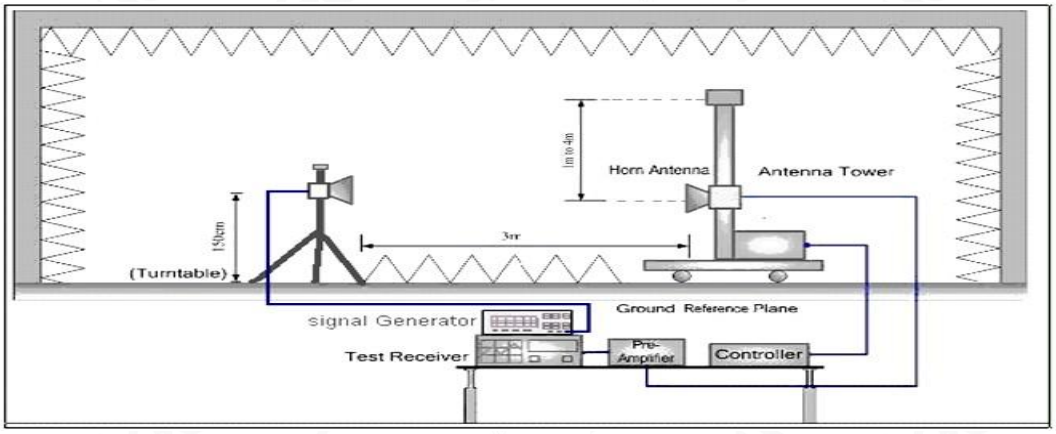
Radiated Below1GHz





Radiated Above 1 GHz





8.4 MEASUREMENT RESULTS:

Applicable Standard

FCC §2.1053, §22.359 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;th 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 (5) =56.99 (dB)—5W 36.99-56.99=-20 dBm

At least 50+10 log (P) =50+10log (1) =50 (dB)—1W 30-50=-20dBm

UHF:
Analog:

TEST RESULTS--5W
Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
400.025	H	0		pass
800.050	H	-33.5	-20	pass
1200.075	H	-34.2	-20	pass
1600.100	H	-38.1	-20	pass
2000.125	H	-39.9	-20	pass
2400.150	H	-39.7	-20	pass
2800.175	H	-40.1	-20	pass
3200.200	H	-46.7	-20	pass
3600.225	H	-52.7	-20	pass
4000.250	H	-53.3	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
400.025	V	0		pass
800.050	V	-36.7	-20	pass
1200.075	V	-38.9	-20	pass
1600.100	V	-39.2	-20	pass
2000.125	V	-40.8	-20	pass
2400.150	V	-41.5	-20	pass
2800.175	V	-42.9	-20	pass
3200.200	V	-43.7	-20	pass
3600.225	V	-49.5	-20	pass
4000.250	V	-52.2	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	V	0		pass
908.050	V	-36.6	-20	pass
1362.075	V	-38.3	-20	pass
1816.100	V	-39.8	-20	pass
2270.125	V	-43.4	-20	pass
2724.150	V	-45.1	-20	pass
3178.175	V	-49.4	-20	pass
3632.200	V	-50.2	-20	pass
4086.225	V	-50.8	-20	pass
4540.250	V	-52.7	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	H	0		pass
908.050	H	-35.3	-20	pass
1362.075	H	-36.2	-20	pass
1816.100	H	-37.9	-20	pass
2270.125	H	-38.5	-20	pass
2724.150	H	-41.6	-20	pass
3178.175	H	-42.6	-20	pass
3632.200	H	-44.5	-20	pass
4086.225	H	-48.7	-20	pass
4540.250	H	-52.8	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
479.975	H	0		pass
959.950	H	-37.4	-20	pass
1439.925	H	-38.1	-20	pass
1919.900	H	-39.2	-20	pass
2399.875	H	-40.7	-20	pass
2879.850	H	-42.5	-20	pass
3359.825	H	-43.8	-20	pass
3839.800	H	-48.9	-20	pass
4319.775	H	-50.6	-20	pass
4799.750	H	-51.1	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
479.975	V	0		pass
959.950	V	-35.5	-20	pass
1439.925	V	-36.3	-20	pass
1919.900	V	-38.2	-20	pass
2399.875	V	-39.9	-20	pass
2879.850	V	-40.3	-20	pass
3359.825	V	-42.6	-20	pass
3839.800	V	-48.5	-20	pass
4319.775	V	-49.7	-20	pass
4799.750	V	-51.9	-20	pass

TEST RESULTS—1W

Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
400.025	H	0		pass
800.050	H	-37.9	-20	pass
1200.075	H	-39.4	-20	pass
1600.100	H	-39.9	-20	pass
2000.125	H	-42.9	-20	pass
2400.150	H	-43.5	-20	pass
2800.175	H	-46.6	-20	pass
3200.200	H	-50.1	-20	pass
3600.225	H	-52.3	-20	pass
4000.250	H	-55.6	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
400.025	V	0		pass
800.050	V	-38.9	-20	pass
1200.075	V	-39.4	-20	pass
1600.100	V	-39.5	-20	pass
2000.125	V	-39.8	-20	pass
2400.150	V	-43.6	-20	pass
2800.175	V	-44.2	-20	pass
3200.200	V	-48.7	-20	pass
3600.225	V	-50.8	-20	pass
4000.250	V	-52.5	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	H	0		pass
908.050	H	-38.3	-20	pass
1362.075	H	-38.5	-20	pass
1816.100	H	-39.4	-20	pass
2270.125	H	-39.6	-20	pass
2724.150	H	-41.7	-20	pass
3178.175	H	-46.8	-20	pass
3632.200	H	-47.3	-20	pass
4086.225	H	-52.5	-20	pass
4540.250	H	-53.1	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	V	0		pass
908.050	V	-38.1	-20	pass
1362.075	V	-39.2	-20	pass
1816.100	V	-40.4	-20	pass
2270.125	V	-40.5	-20	pass
2724.150	V	-45.3	-20	pass
3178.175	V	-48.8	-20	pass
3632.200	V	-49.6	-20	pass
4086.225	V	-53.9	-20	pass
4540.250	V	-54.5	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
479.975	H	0		pass
959.950	H	-37.6	-20	pass
1439.925	H	-38.3	-20	pass
1919.900	H	-39.4	-20	pass
2399.875	H	-40.8	-20	pass
2879.850	H	-41.7	-20	pass
3359.825	H	-48.5	-20	pass
3839.800	H	-50.2	-20	pass
4319.775	H	-51.8	-20	pass
4799.750	H	-53.3	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
479.975	V	0		pass
959.950	V	-38.6	-20	pass
1439.925	V	-39.7	-20	pass
1919.900	V	-40.5	-20	pass
2399.875	V	-44.1	-20	pass
2879.850	V	-45.3	-20	pass
3359.825	V	-47.5	-20	pass
3839.800	V	-50.9	-20	pass
4319.775	V	-51.1	-20	pass
4799.750	V	-52.2	-20	pass

Digital:

TEST RESULTS-5W

Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
400.025	H	0		pass
800.050	H	-37.2	-20	pass
1200.075	H	-37.5	-20	pass
1600.100	H	-39.2	-20	pass
2000.125	H	-39.8	-20	pass
2400.150	H	-40.5	-20	pass
2800.175	H	-41.3	-20	pass
3200.200	H	-45.2	-20	pass
3600.225	H	-49.6	-20	pass
4000.250	H	-51.7	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
400.025	V	0		pass
800.050	V	-36.6	-20	pass
1200.075	V	-36.9	-20	pass
1600.100	V	-37.5	-20	pass
2000.125	V	-39.2	-20	pass
2400.150	V	-44.6	-20	pass
2800.175	V	-45.1	-20	pass
3200.200	V	-49.3	-20	pass
3600.225	V	-49.7	-20	pass
4000.250	V	-51.8	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	H	0		pass
908.050	H	-35.4	-20	pass
1362.075	H	-36.7	-20	pass
1816.100	H	-37.5	-20	pass
2270.125	H	-39.8	-20	pass
2724.150	H	-40.2	-20	pass
3178.175	H	-42.6	-20	pass
3632.200	H	-46.7	-20	pass
4086.225	H	-49.2	-20	pass
4540.250	H	-51.1	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	V	0		pass
908.050	V	-36.5	-20	pass
1362.075	V	-38.8	-20	pass
1816.100	V	-39.3	-20	pass
2270.125	V	-39.9	-20	pass
2724.150	V	-40.8	-20	pass
3178.175	V	-41.9	-20	pass
3632.200	V	-46.3	-20	pass
4086.225	V	-50.5	-20	pass
4540.250	V	-50.8	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
479.975	H	0		pass
959.950	H	-36.4	-20	pass
1439.925	H	-36.8	-20	pass
1919.900	H	-37.0	-20	pass
2399.875	H	-39.5	-20	pass
2879.850	H	-42.8	-20	pass
3359.825	H	-43.4	-20	pass
3839.800	H	-48.1	-20	pass
4319.775	H	-50.8	-20	pass
4799.750	H	-52.2	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
479.975	V	0		pass
959.950	V	-37.1	-20	pass
1439.925	V	-38.2	-20	pass
1919.900	V	-39.5	-20	pass
2399.875	V	-41.8	-20	pass
2879.850	V	-47.2	-20	pass
3359.825	V	-47.5	-20	pass
3839.800	V	-51.4	-20	pass
4319.775	V	-52.3	-20	pass
4799.750	V	-52.9	-20	pass

TEST RESULTS-1W

Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
400.025	H	0		pass
800.050	H	-37.5	-20	pass
1200.075	H	-37.9	-20	pass
1600.100	H	-39.2	-20	pass
2000.125	H	-39.6	-20	pass
2400.150	H	-40.5	-20	pass
2800.175	H	-40.9	-20	pass
3200.200	H	-50.6	-20	pass
3600.225	H	-51.2	-20	pass
4000.250	H	-52.4	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
400.025	V	0		pass
800.050	V	-37.6	-20	pass
1200.075	V	-37.8	-20	pass
1600.100	V	-39.7	-20	pass
2000.125	V	-40.5	-20	pass
2400.150	V	-42.9	-20	pass
2800.175	V	-44.2	-20	pass
3200.200	V	-49.3	-20	pass
3600.225	V	-50.5	-20	pass
4000.250	V	-51.9	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	H	0		pass
908.050	H	-38.3	-20	pass
1362.075	H	-39.2	-20	pass
1816.100	H	-40.1	-20	pass
2270.125	H	-42.1	-20	pass
2724.150	H	-45.4	-20	pass
3178.175	H	-46.2	-20	pass
3632.200	H	-49.4	-20	pass
4086.225	H	-50.8	-20	pass
4540.250	H	-53.5	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	V	0		pass
908.050	V	-37.6	-20	pass
1362.075	V	-38.0	-20	pass
1816.100	V	-39.2	-20	pass
2270.125	V	-40.7	-20	pass
2724.150	V	-41.9	-20	pass
3178.175	V	-43.9	-20	pass
3632.200	V	-47.7	-20	pass
4086.225	V	-50.2	-20	pass
4540.250	V	-52.8	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
479.975	H	0		pass
959.950	H	-38.8	-20	pass
1439.925	H	-38.5	-20	pass
1919.900	H	-39.1	-20	pass
2399.875	H	-40.6	-20	pass
2879.850	H	-43.4	-20	pass
3359.825	H	-49.5	-20	pass
3839.800	H	-51.7	-20	pass
4319.775	H	-52.2	-20	pass
4799.750	H	-53.3	-20	pass

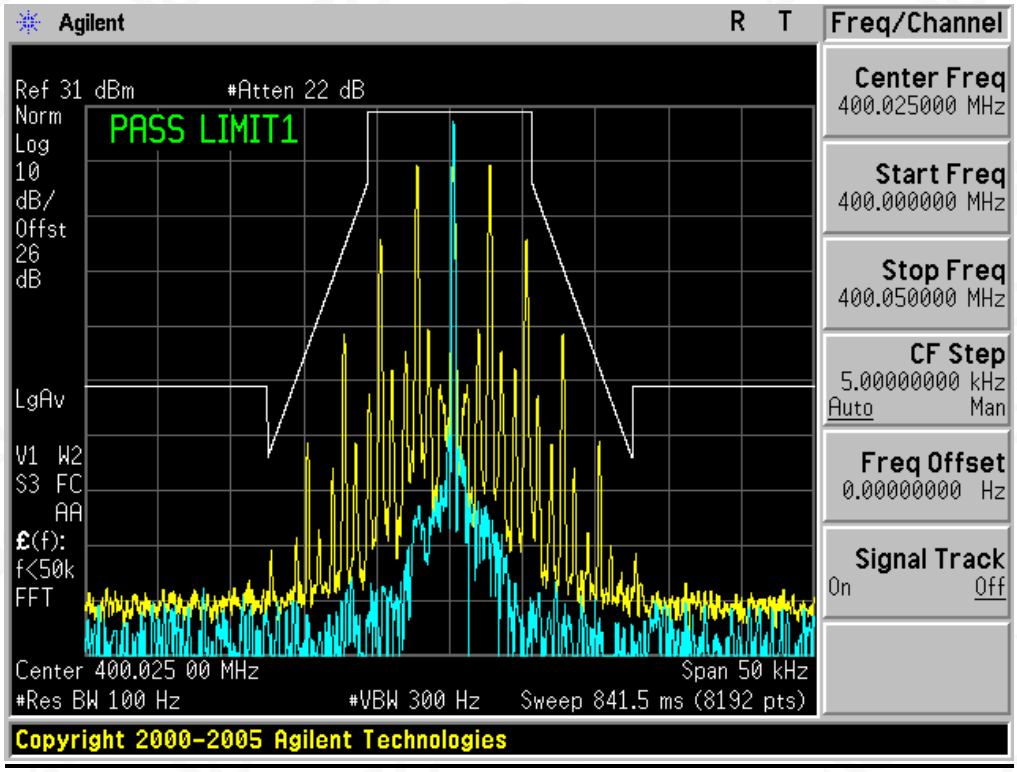
Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
479.975	V	0		pass
959.950	V	-37.9	-20	pass
1439.925	V	-38.2	-20	pass
1919.900	V	-39.1	-20	pass
2399.875	V	-40.4	-20	pass
2879.850	V	-43.6	-20	pass
3359.825	V	-47.7	-20	pass
3839.800	V	-48.3	-20	pass
4319.775	V	-50.8	-20	pass
4799.750	V	-52.9	-20	pass

8.5 EMISSION MASK PLOT

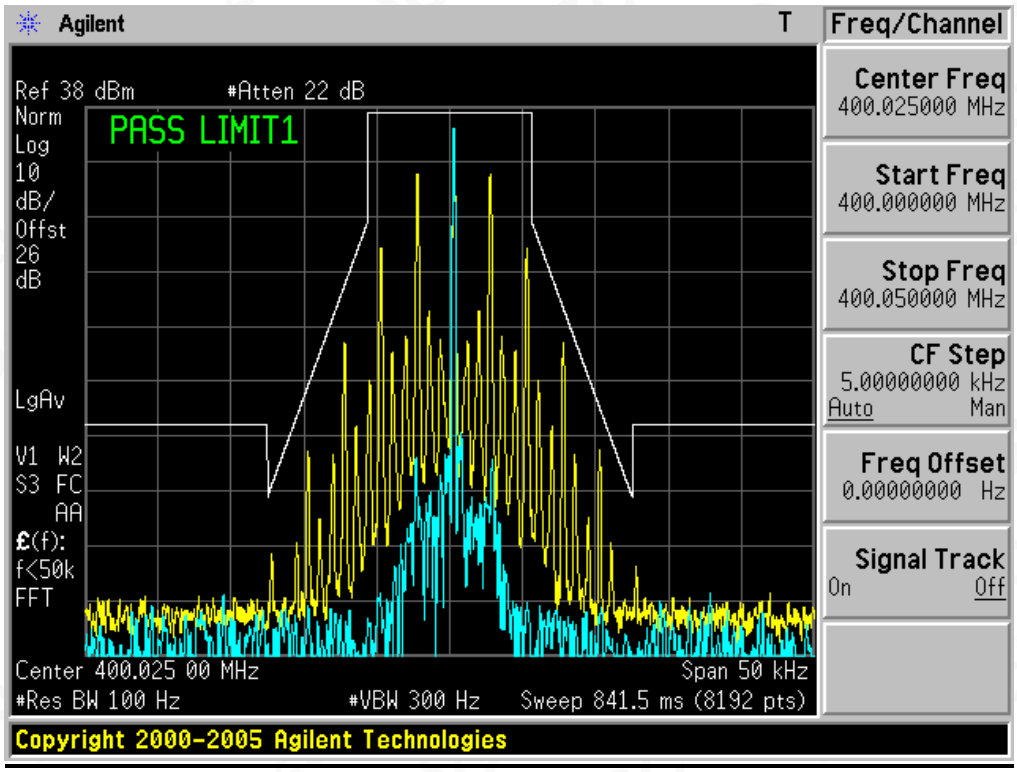
The detailed procedure employed for Emission Mask measurements are specified as following:
- The transmitter shall be modulated by a 2.5 kHz audio signal,
- The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz.

UHF:
Analog:

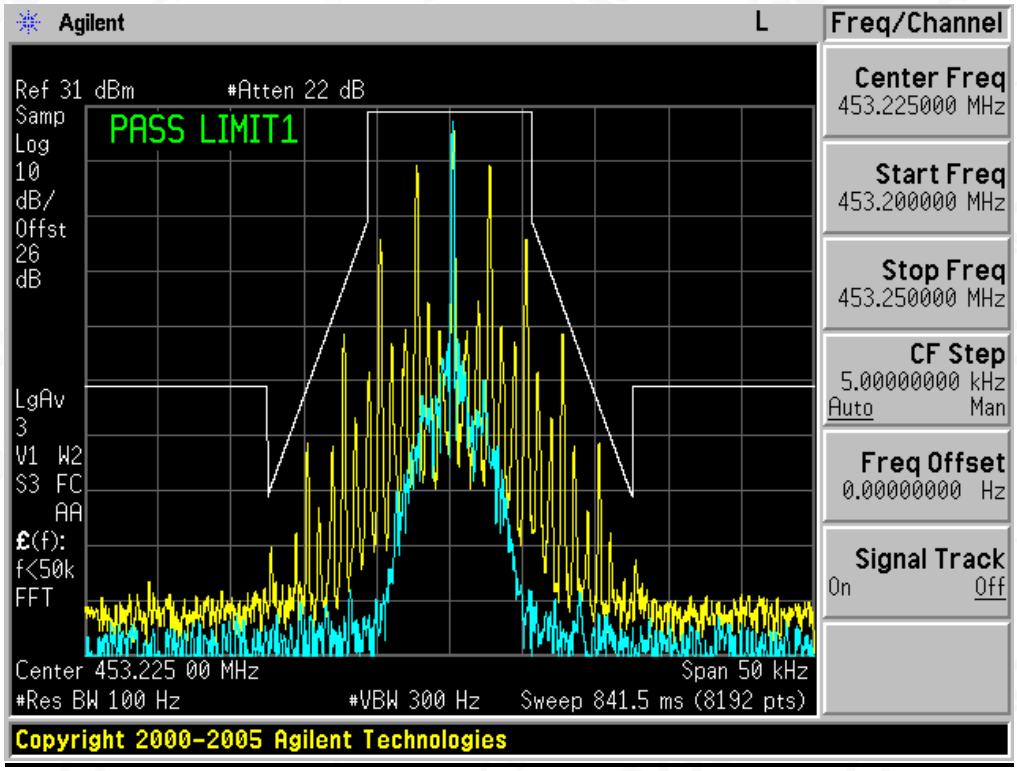
The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (1W)



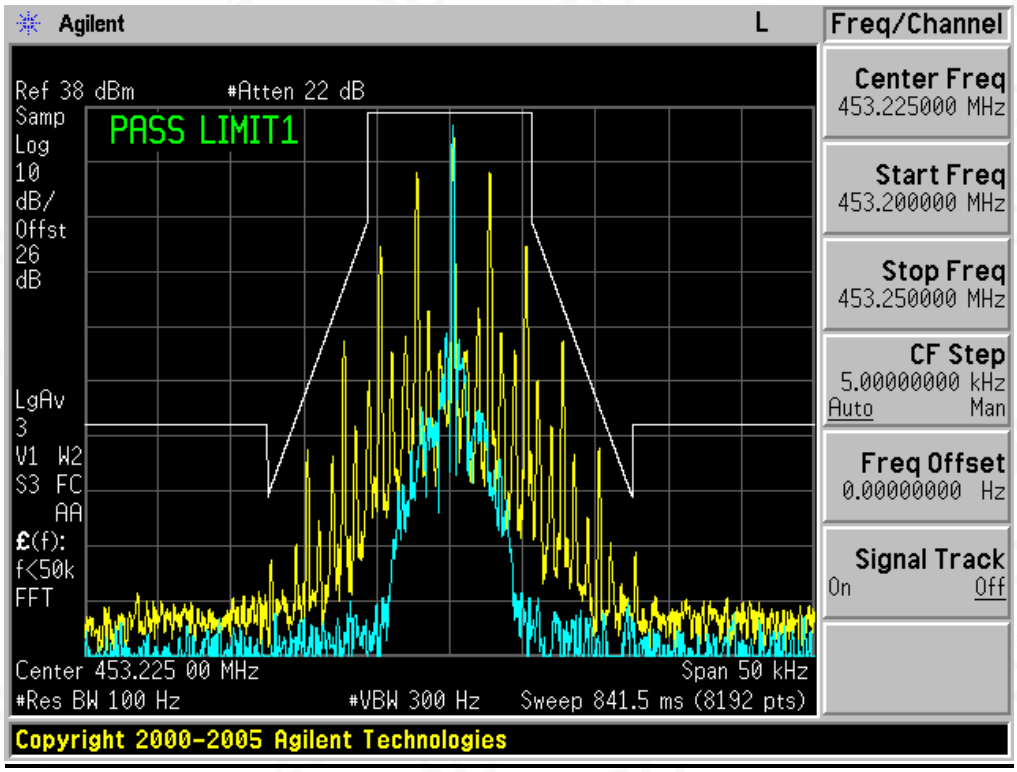
The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (5W)



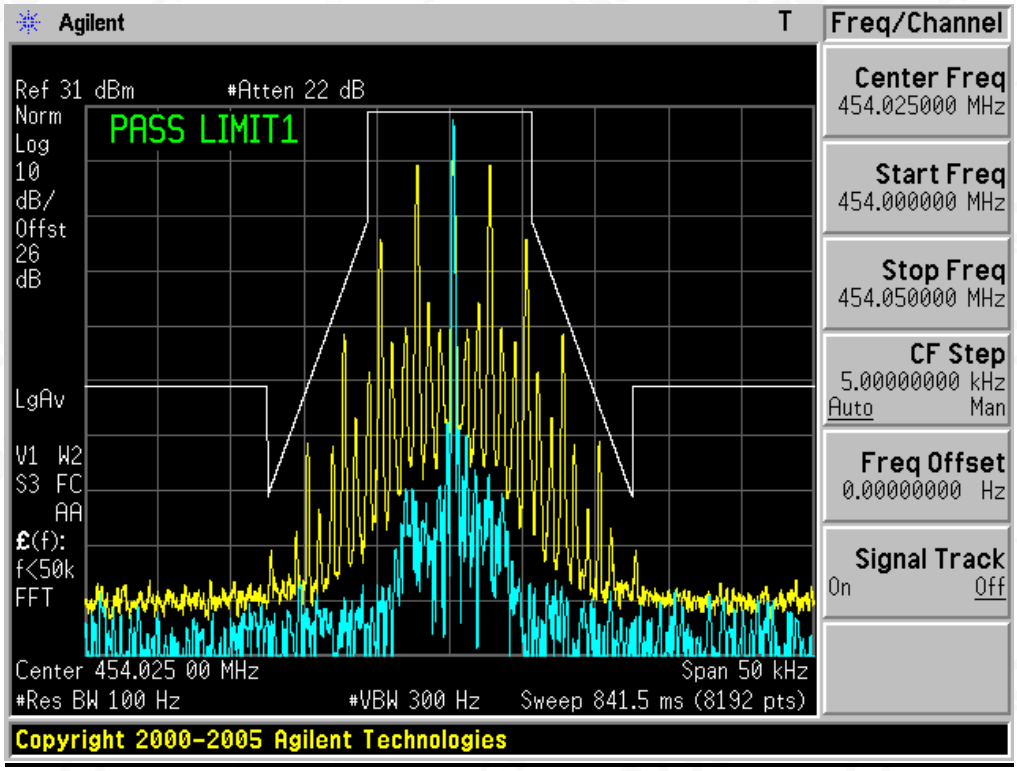
The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (1W)



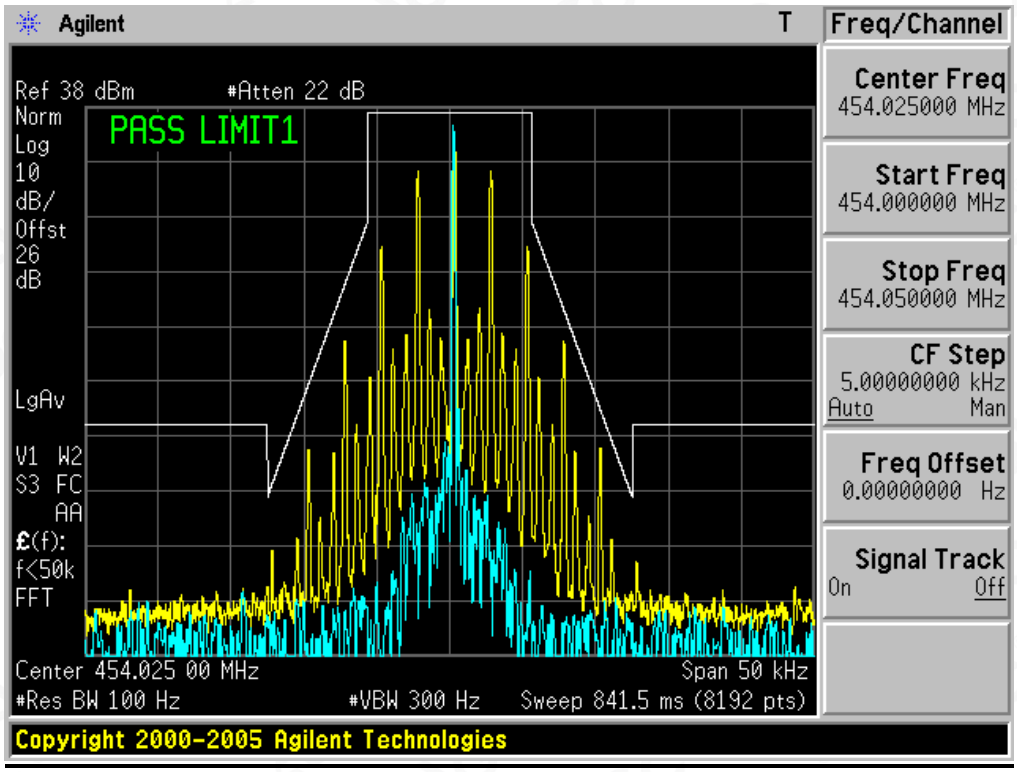
The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (5W)



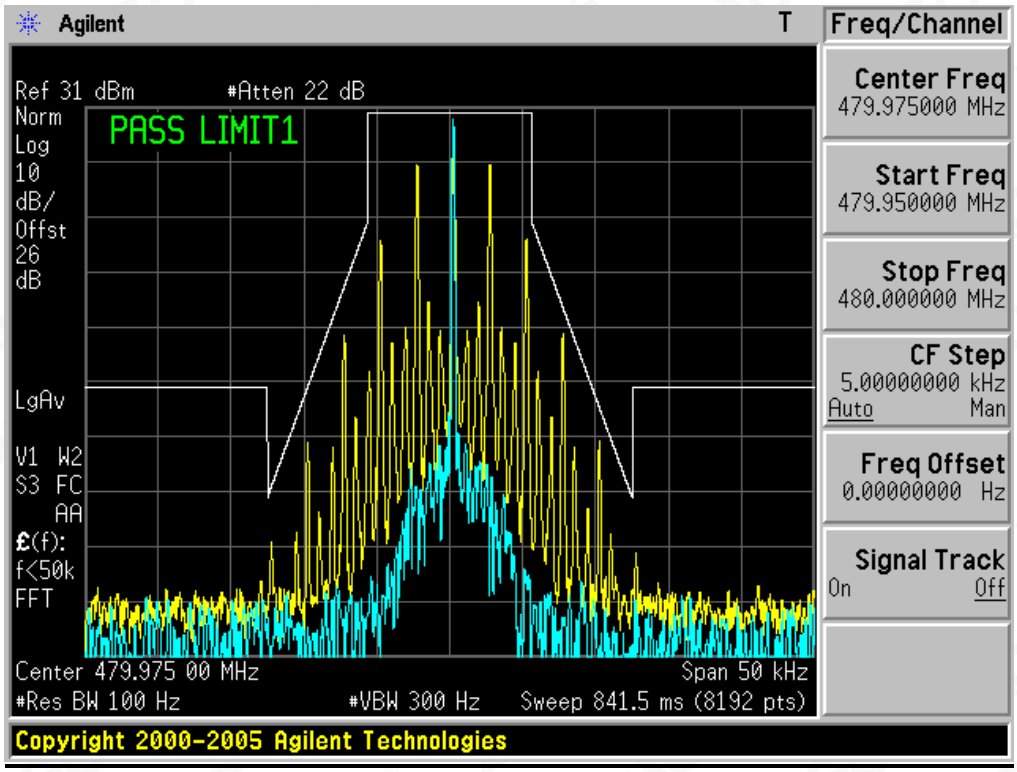
The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (1W)



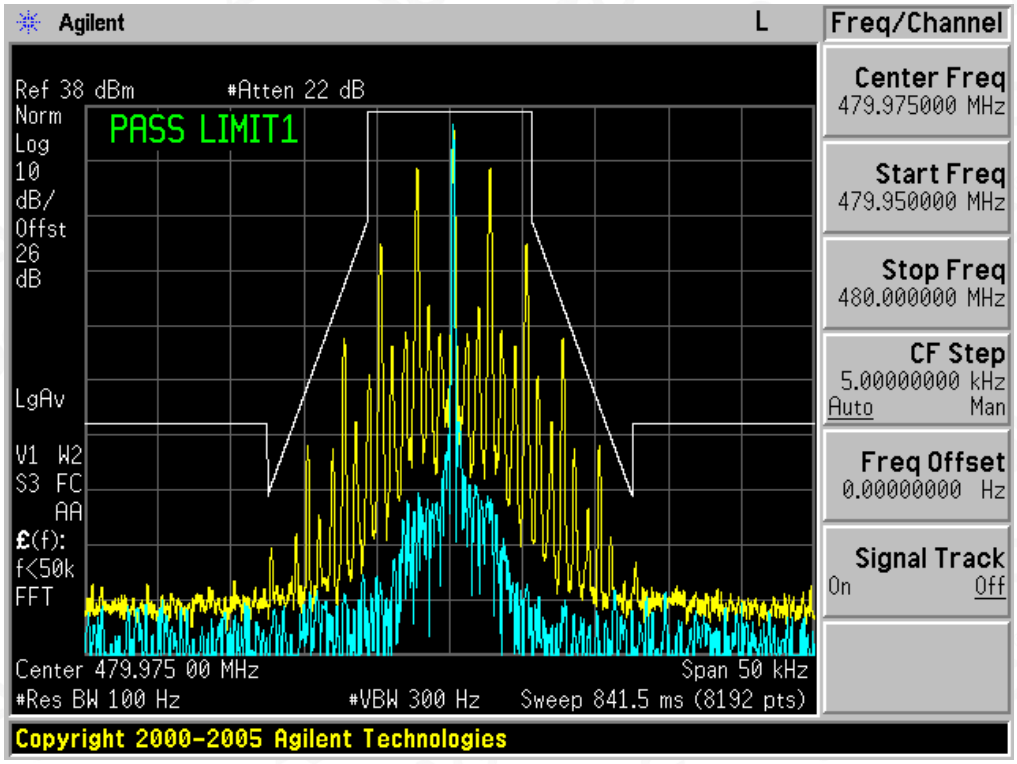
The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (5W)



The Worst Emission Mask D for (479.975 MHz) of 12.5 KHz channel Separation (1W)

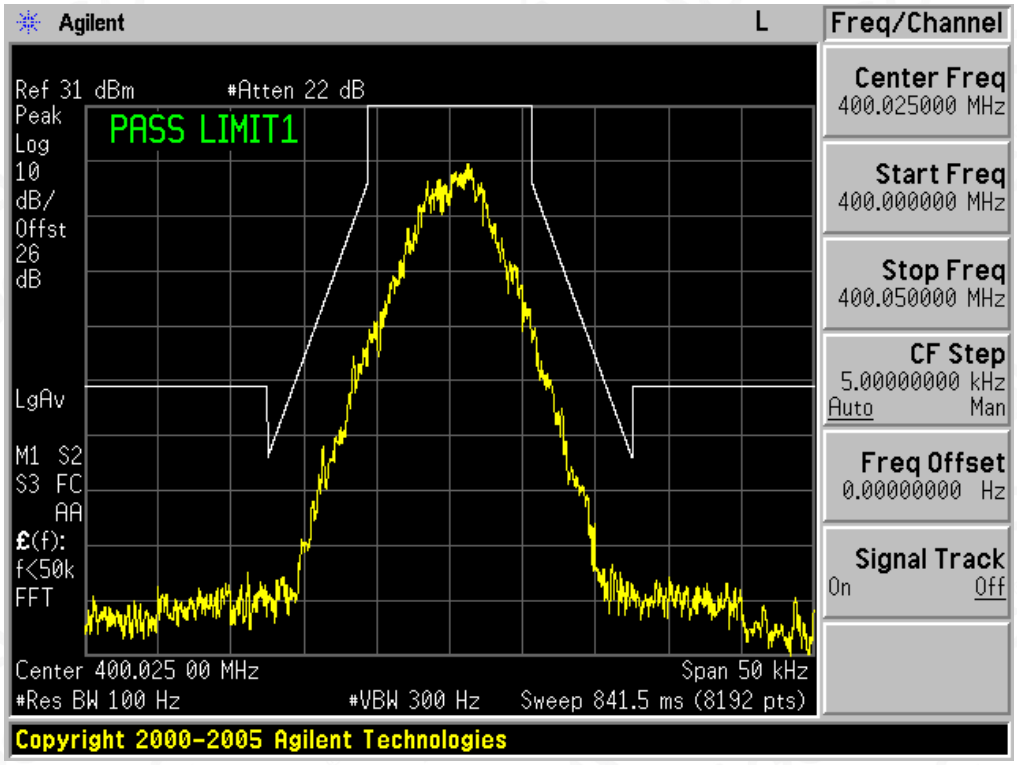


The Worst Emission Mask D for (479.975 MHz) of 12.5 KHz channel Separation (5W)

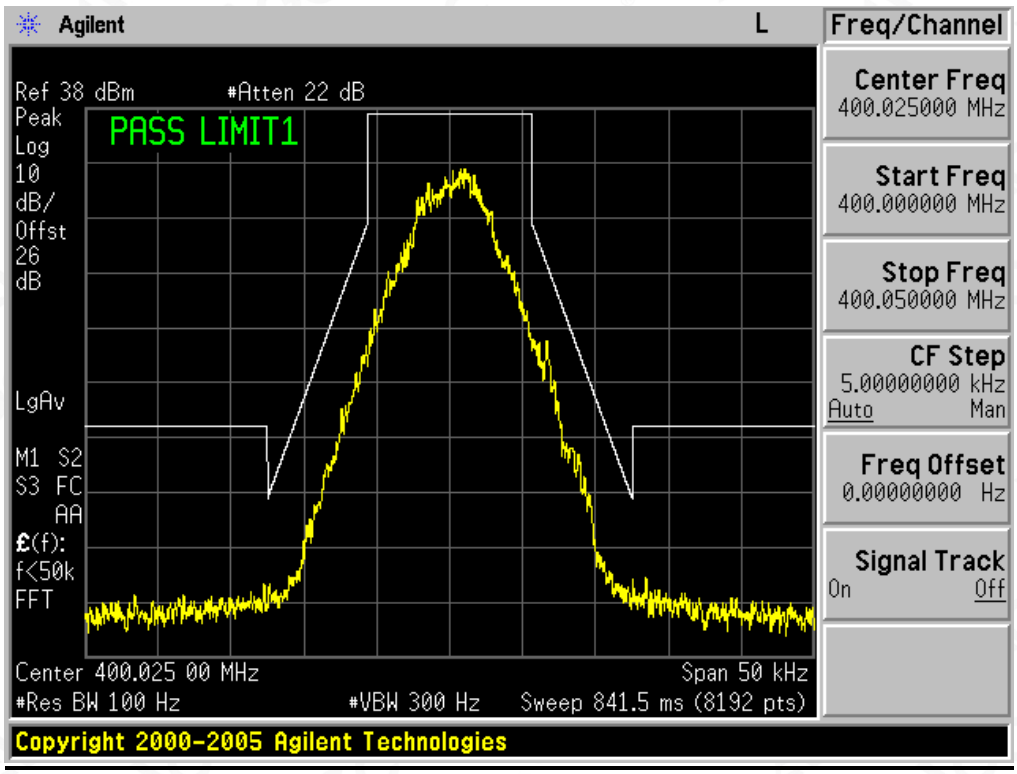


Digital:

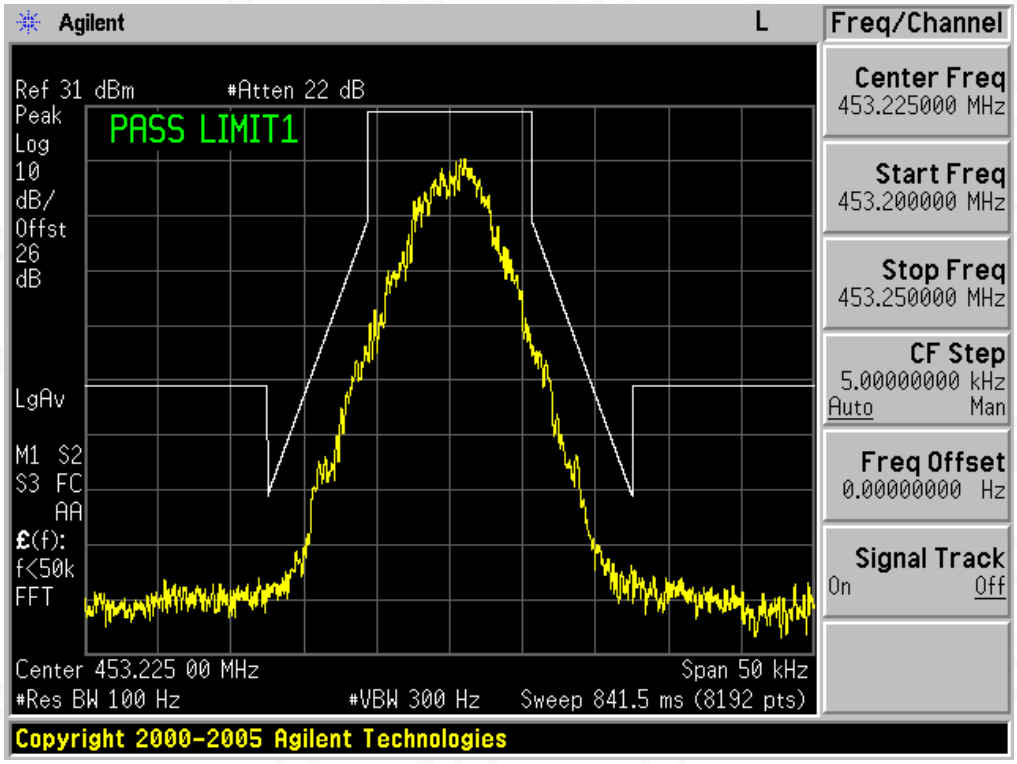
The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (1W)



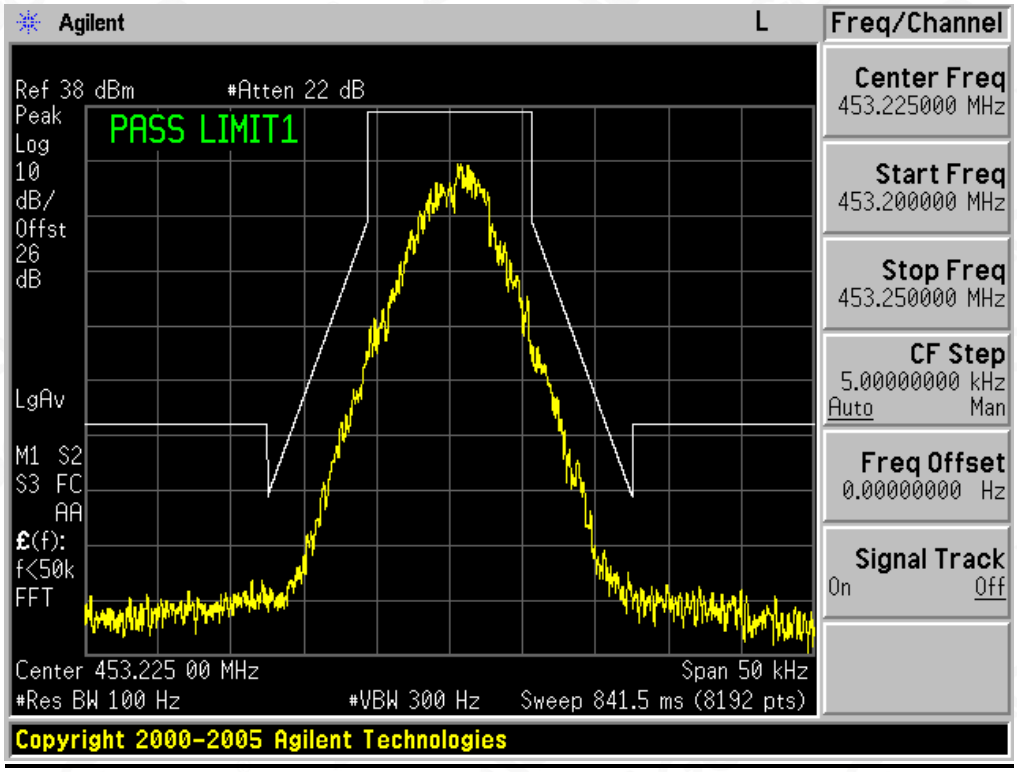
The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (5W)



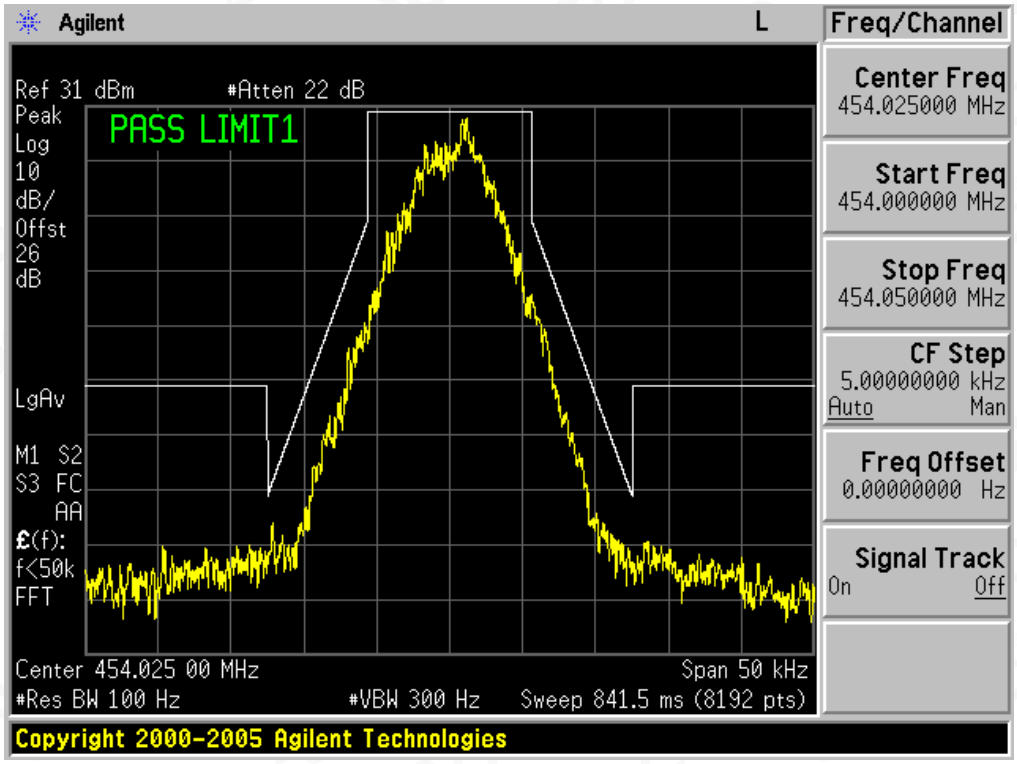
The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (1W)



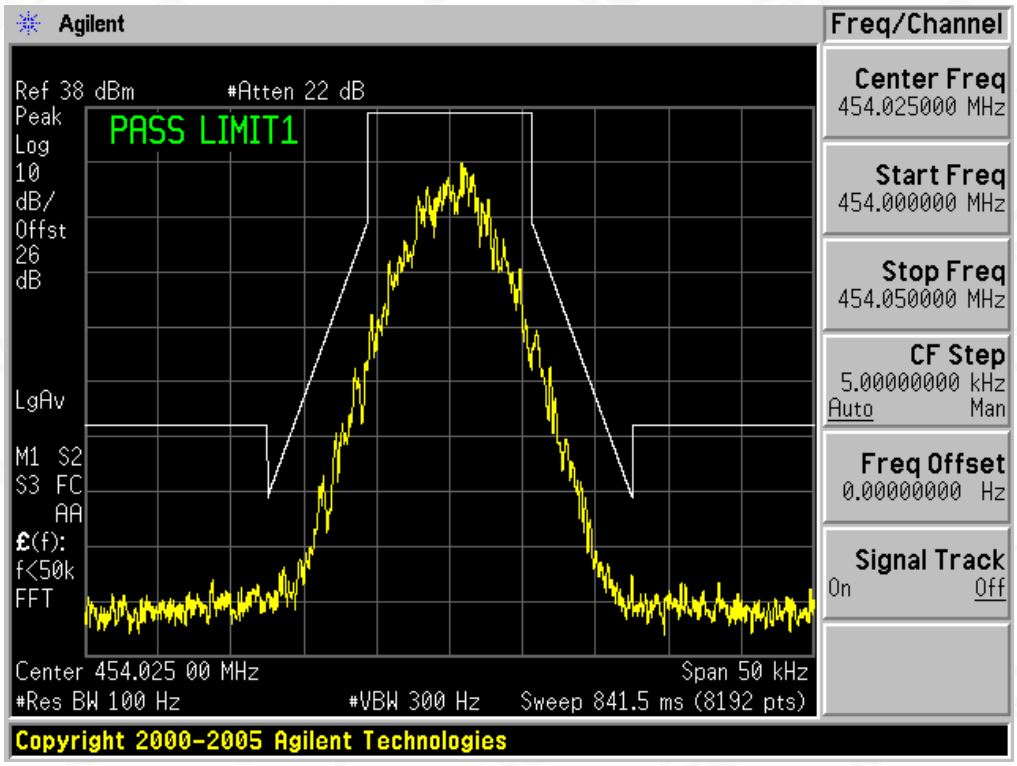
The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (5W)



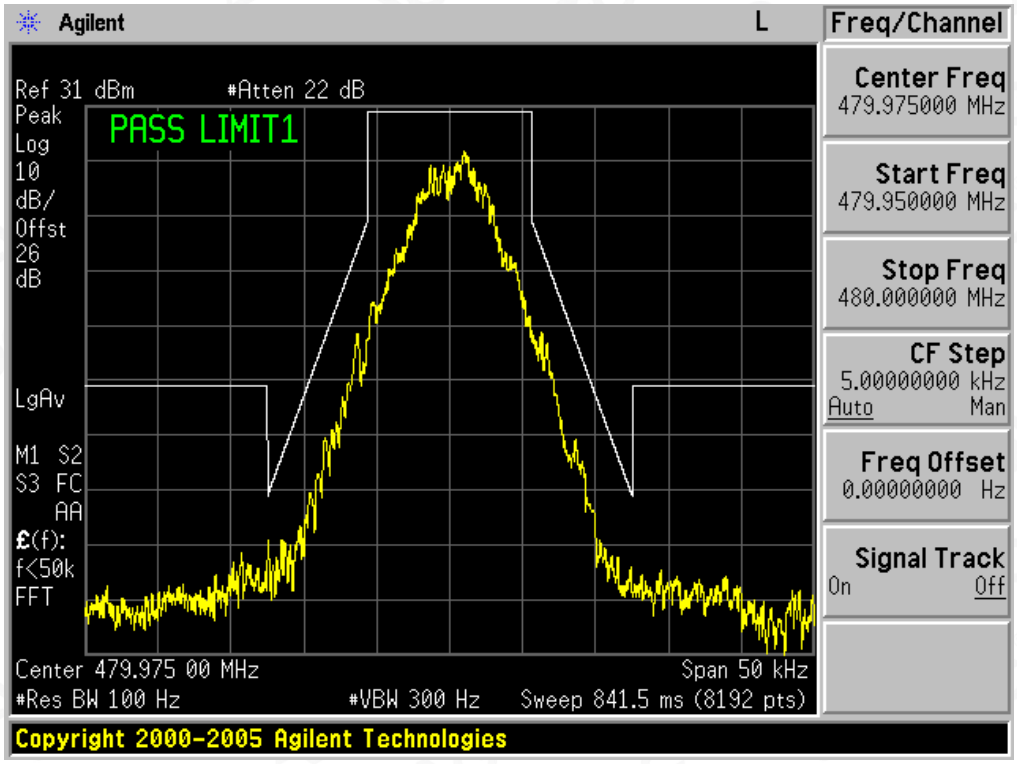
The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (1W)



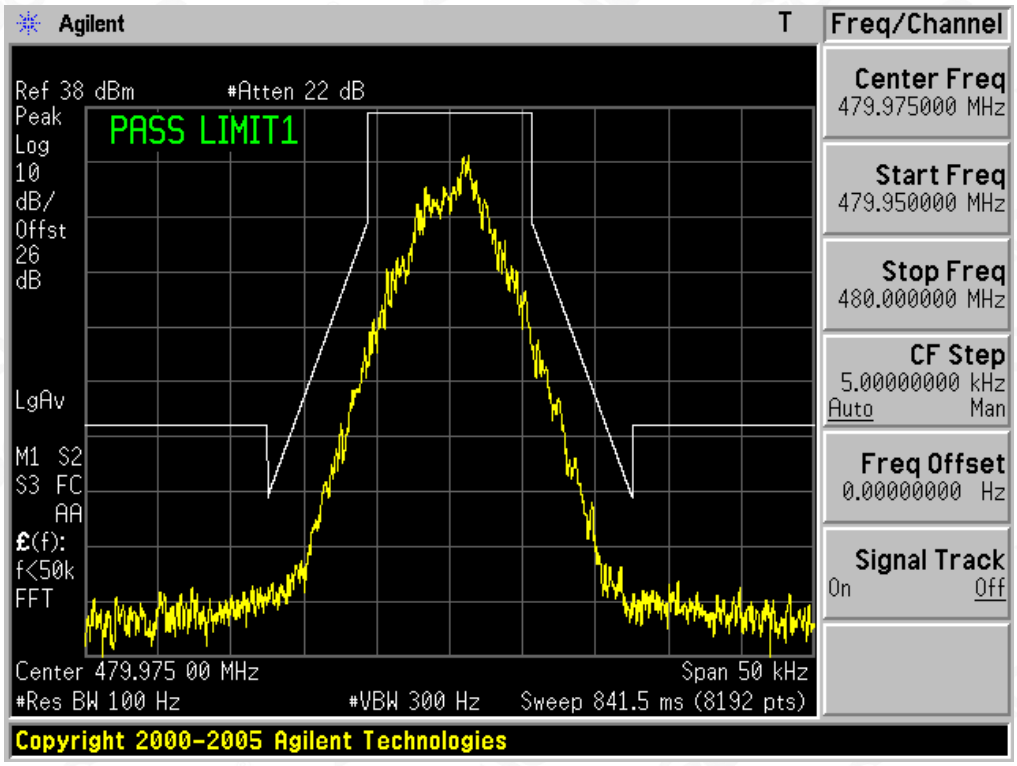
The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (5W)



The Worst Emission Mask D for (479.975 MHz) of 12.5 KHz channel Separation (1W)



The Worst Emission Mask D for (479.975 MHz) of 12.5 KHz channel Separation (5W)



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.

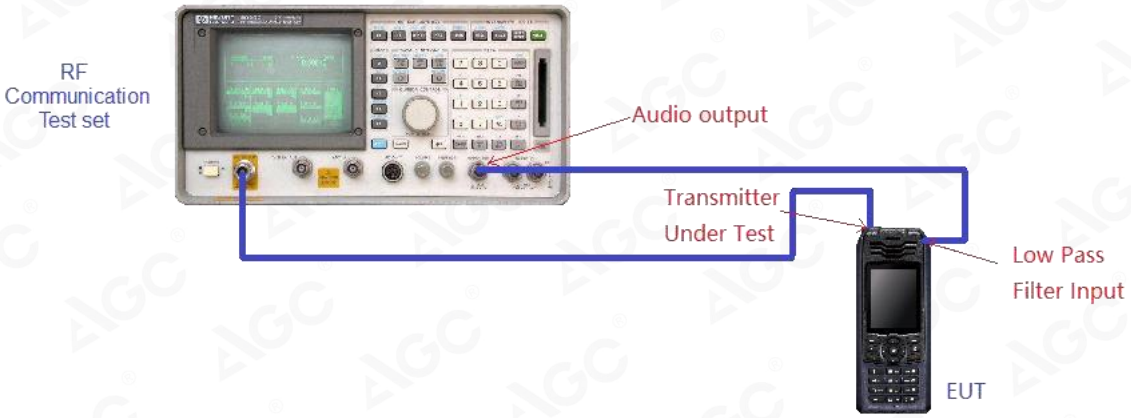
9.2.2 Audio Frequency Response

(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).

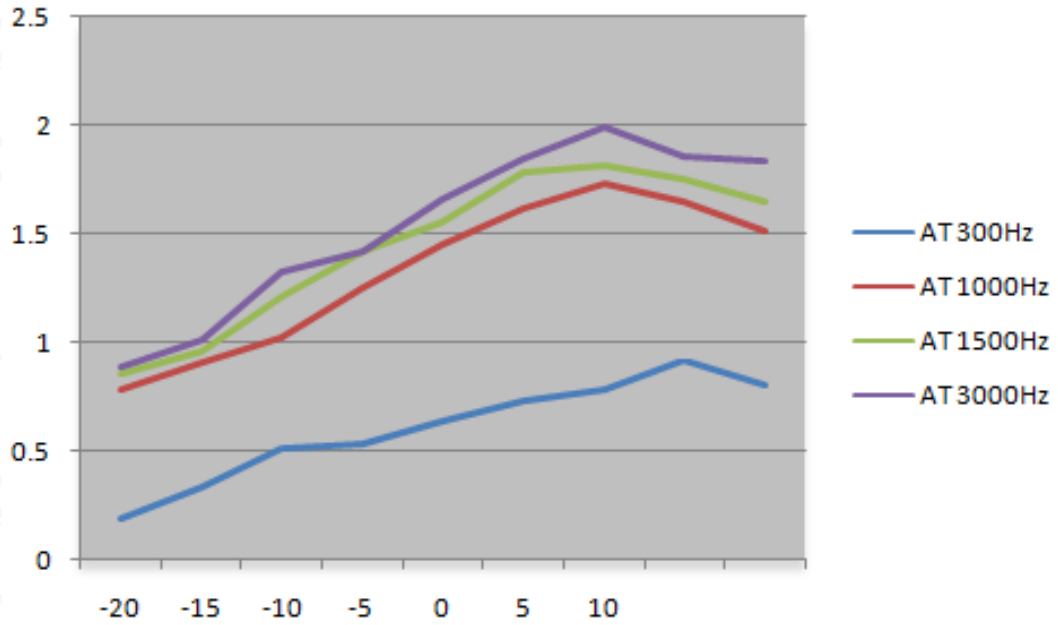


9.3 MEASUREMENT RESULT

UHF:
Analog:
TEST RESULT TS FOR H POWER H LEVEL
(A). MODULATION LIMIT:

Bottom Channel @ 12.5 KHz Channel Separations

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	0.19	0.78	0.85	0.89
-15	0.34	0.91	0.96	1.01
-10	0.51	1.02	1.21	1.33
-5	0.53	1.25	1.42	1.42
0	0.64	1.45	1.56	1.66
+5	0.73	1.62	1.79	1.84
+10	0.78	1.73	1.82	1.99
+15	0.92	1.65	1.76	1.86
+20	0.81	1.51	1.65	1.83



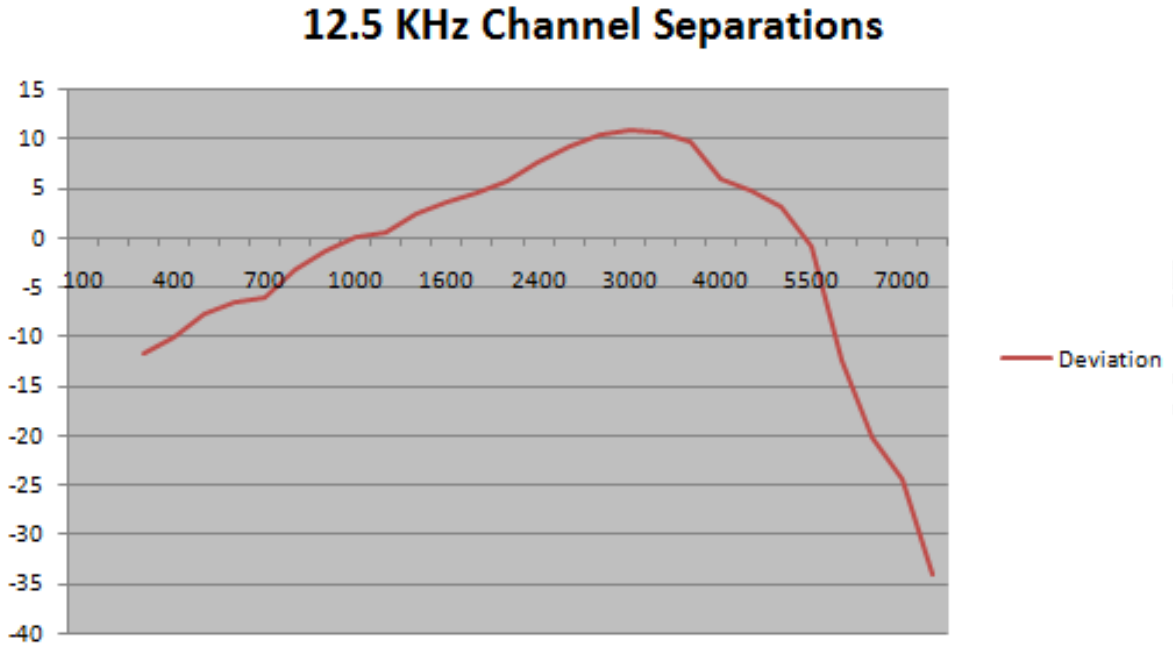
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

Bottom Channel @ 12.5 KHz Channel Separations

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.13	-11.70
400	0.16	-9.90
500	0.21	-7.54
600	0.24	-6.38
700	0.25	-6.02
800	0.35	-3.10
900	0.43	-1.31
1000	0.51	0.17
1200	0.54	0.67
1400	0.66	2.41
1600	0.77	3.75
1800	0.85	4.61
2000	0.96	5.67
2400	1.21	7.68
2500	1.45	9.25
2800	1.65	10.37
3000	1.76	10.93
3200	1.72	10.73
3600	1.54	9.77
4000	1.01	6.11
4500	0.86	4.71
5000	0.73	3.29
5500	0.45	-0.92
6000	0.12	-12.40
6500	0.05	-20.00
7000	0.03	-24.44
7500	0.01	-33.98
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of High Channel

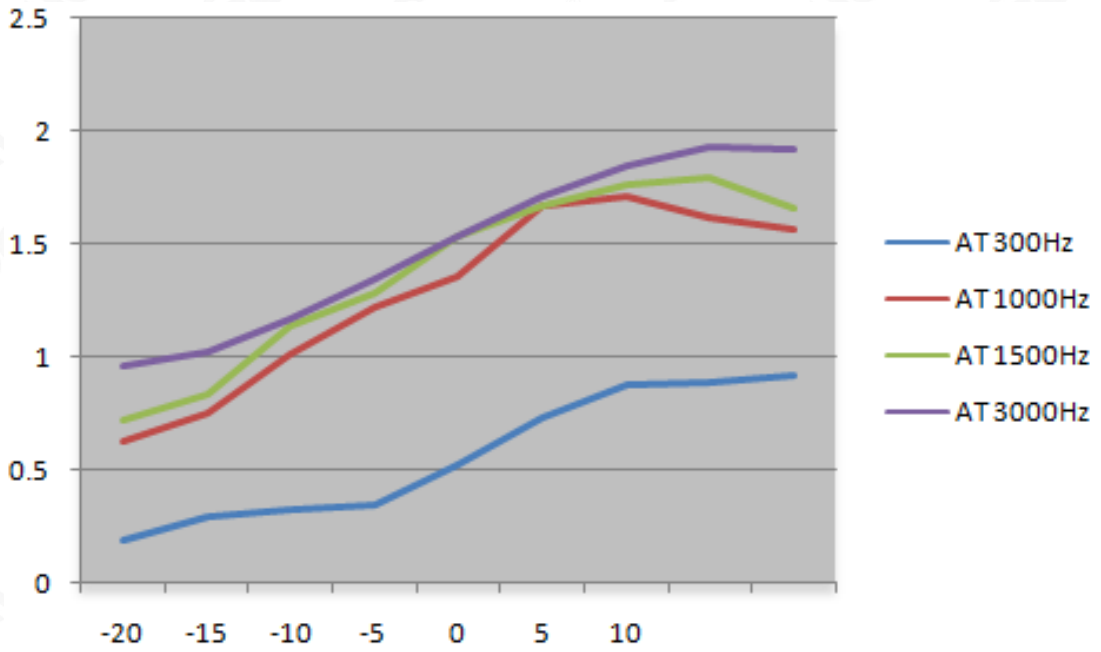


Note: All the modes had been tested, but only the worst data recorded in the report.

Digital:
(A). MODULATION LIMIT:

Bottom Channel @ 12.5 KHz Channel Separations---H Power

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	0.19	0.63	0.72	0.96
-15	0.29	0.75	0.83	1.02
-10	0.33	1.01	1.14	1.17
-5	0.35	1.22	1.28	1.35
0	0.52	1.36	1.53	1.53
+5	0.73	1.67	1.67	1.71
+10	0.88	1.71	1.76	1.85
+15	0.89	1.62	1.79	1.93
+20	0.92	1.56	1.65	1.92



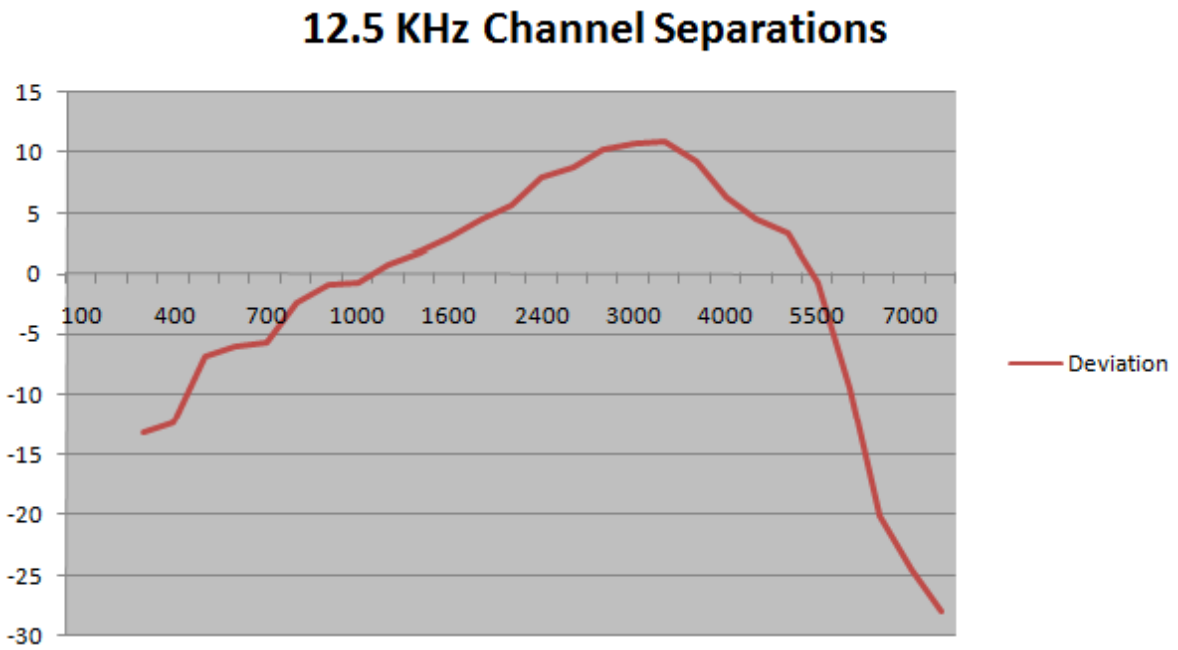
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

Bottom Channel @ 12.5 KHz Channel Separations---H Power

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.11	-13.15
400	0.12	-12.40
500	0.23	-6.74
600	0.25	-6.02
700	0.26	-5.68
800	0.38	-2.38
900	0.45	-0.92
1000	0.46	-0.72
1200	0.55	0.83
1400	0.62	1.87
1600	0.71	3.05
1800	0.83	4.40
2000	0.95	5.58
2400	1.24	7.89
2500	1.38	8.82
2800	1.62	10.21
3000	1.73	10.78
3200	1.75	10.88
3600	1.45	9.25
4000	1.02	6.19
4500	0.84	4.51
5000	0.73	3.29
5500	0.46	-0.72
6000	0.17	-9.37
6500	0.05	-20.00
7000	0.03	-24.44
7500	0.02	-27.96
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of High Channel---H Power



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 § 22.565 and §90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

10.2 TEST PROCEDURE

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

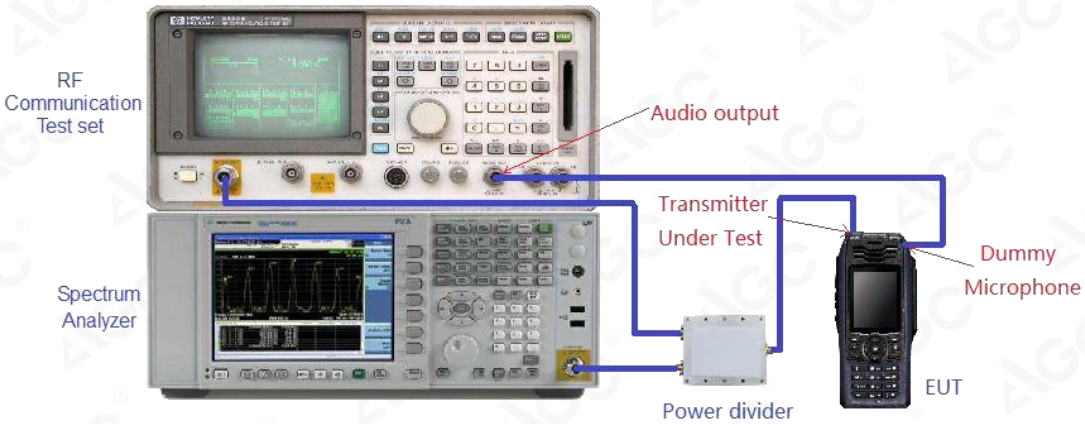
In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the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

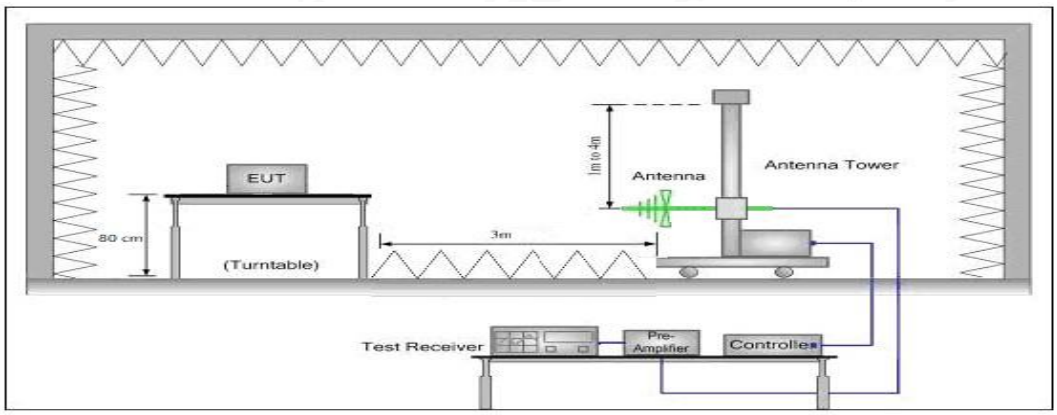
10.3 TEST CONFIGURATION

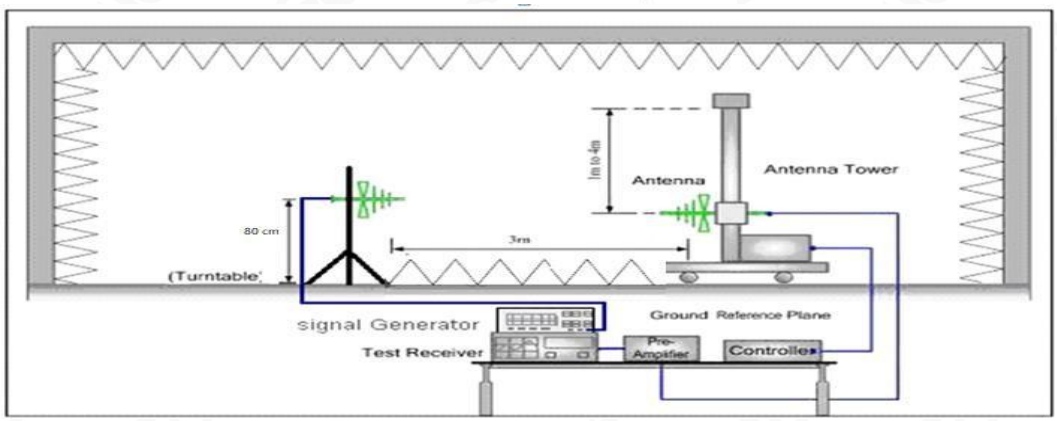
Conducted Output Power:



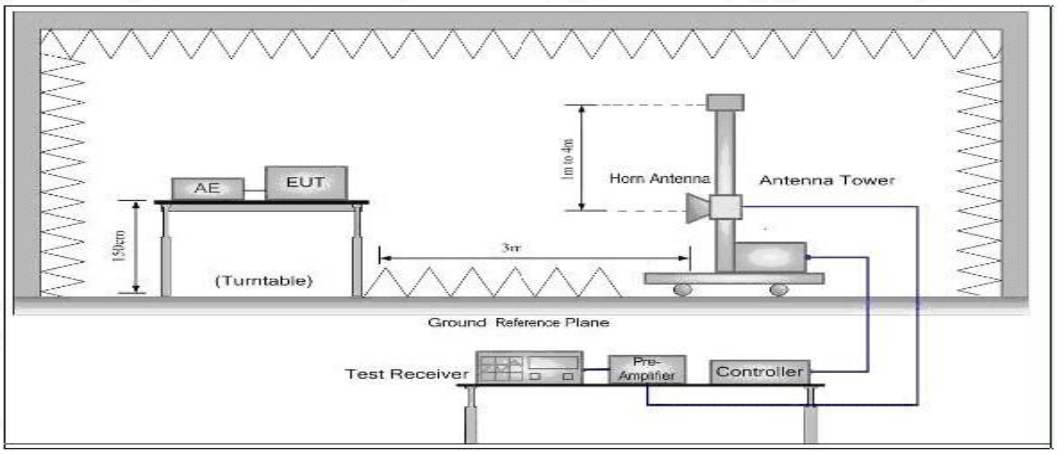
Effective Radiated Power

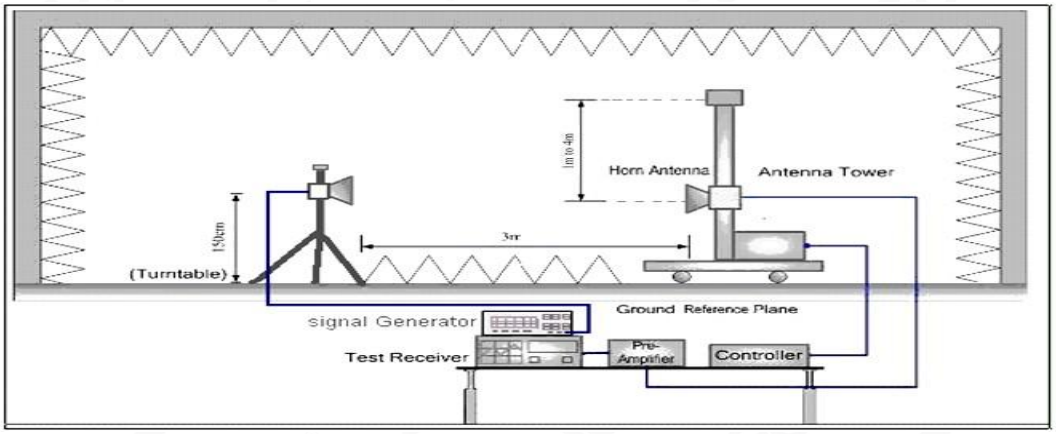
Radiated Below1GHz





Radiated Above 1 GHz





10.4 TEST RESULT

The maximum Conducted Power (CP) for VHF/UHF is

Analog: 5W/1 W for 12.5 KHz Channel Separation UHF

Digital: 5W/1 W for 12.5 KHz Channel Separation UHF

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

UHF:
Analog:

Conducted Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.68
	Middle(453.225MHz)	36.73
	Middle(454.025MHz)	36.67
	Top (479.975MHz)	36.85

Radiated Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.63
	Middle(453.225MHz)	36.66
	Middle(454.025MHz)	36.62
	Top (479.975MHz)	36.74

Conducted Power Measurement Results-1W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.54
	Middle(453.225MHz)	29.56
	Middle(454.025MHz)	29.62
	Top (479.975MHz)	29.65

Radiated Power Measurement Results-1W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.47
	Middle(453.225MHz)	29.49
	Middle(454.025MHz)	29.53
	Top (479.975MHz)	29.55

Digital:
Data + voice:

Conducted Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.55
	Middle(453.225MHz)	36.57
	Middle(454.025MHz)	36.62
	Top (479.975MHz)	36.57

Radiated Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.43
	Middle(453.225MHz)	36.45
	Middle(454.025MHz)	36.51
	Top (479.975MHz)	36.52

Date transmission mode:

Conducted Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.50
	Middle(453.225MHz)	36.42
	Middle(454.025MHz)	36.44
	Top (479.975MHz)	36.47

Radiated Power Measurement Results-5W		
Channel Separation	Channel	Measurement Result (dBm)
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.37
	Middle(453.225MHz)	36.38
	Middle(454.025MHz)	36.40
	Top (479.975MHz)	36.41

Data + voice:

Conducted Power Measurement Results-1W		
Channel Separation	Channel	Measurement Result (dBm)
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.47
	Middle(453.225MHz)	29.42
	Middle(454.025MHz)	29.44
	Top (479.975MHz)	29.45

Radiated Power Measurement Results-1W		
Channel Separation	Channel	Measurement Result (dBm)
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.41
	Middle(453.225MHz)	29.35
	Middle(454.025MHz)	29.38
	Top (479.975MHz)	29.40

Data transmission mode:

Conducted Power Measurement Results-1W		
Channel Separation	Channel	Measurement Result (dBm) For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.32
	Middle(453.225MHz)	29.35
	Middle(454.025MHz)	29.30
	Top (479.975MHz)	29.39

Radiated Power Measurement Results-1W		
Channel Separation	Channel	Measurement Result (dBm) For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.27
	Middle(453.225MHz)	29.29
	Middle(454.025MHz)	29.25
	Top (479.975MHz)	29.33

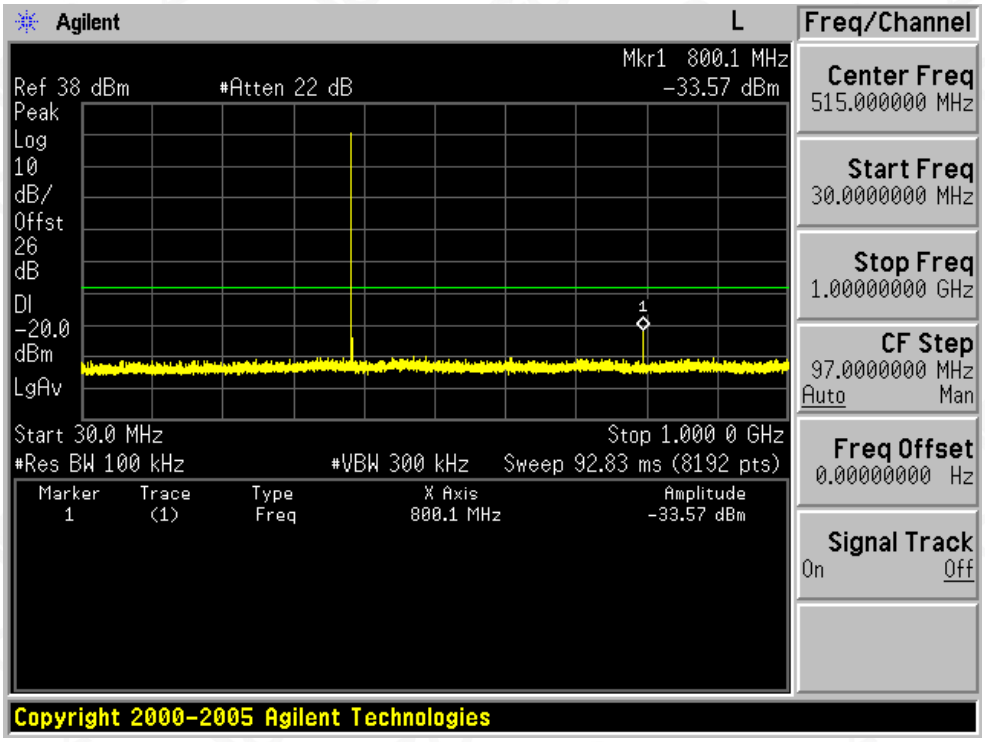
10.5 CONDUCT SPURIOUS PLOT

UHF:

Analog:

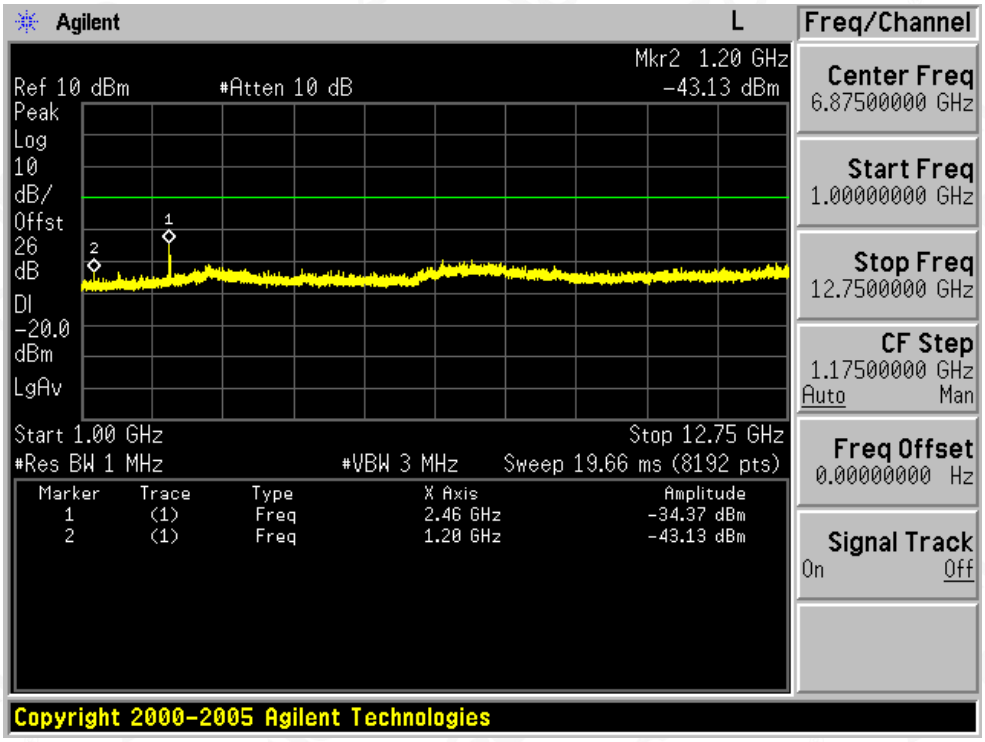
Conducted Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



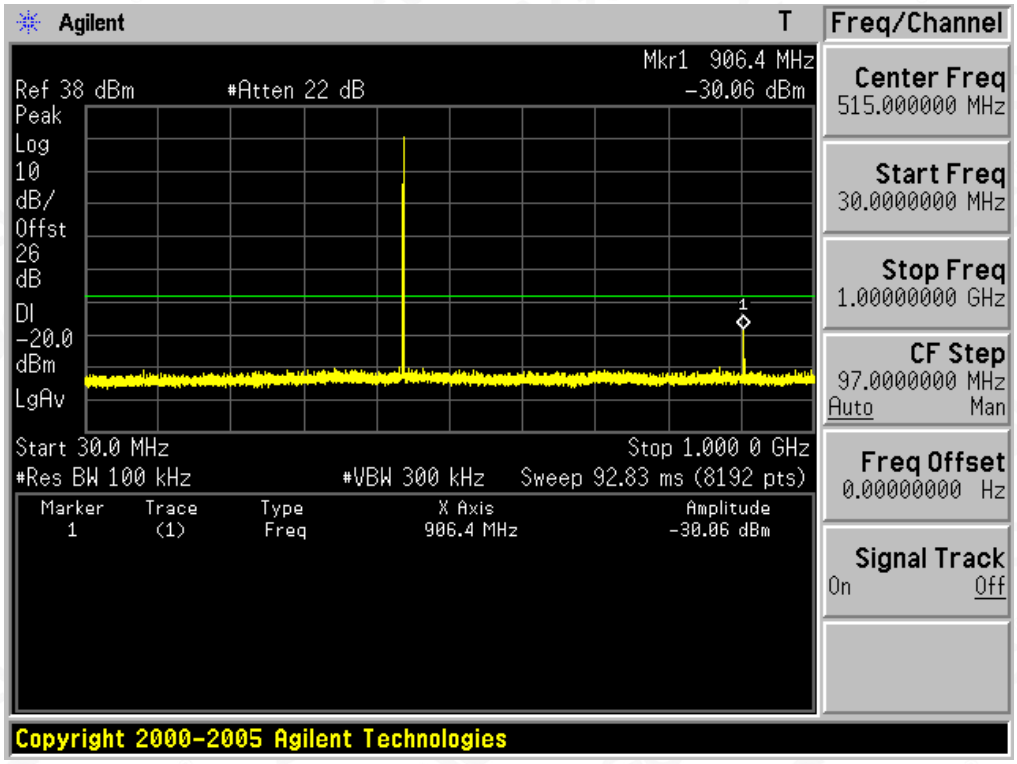
Conduct Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



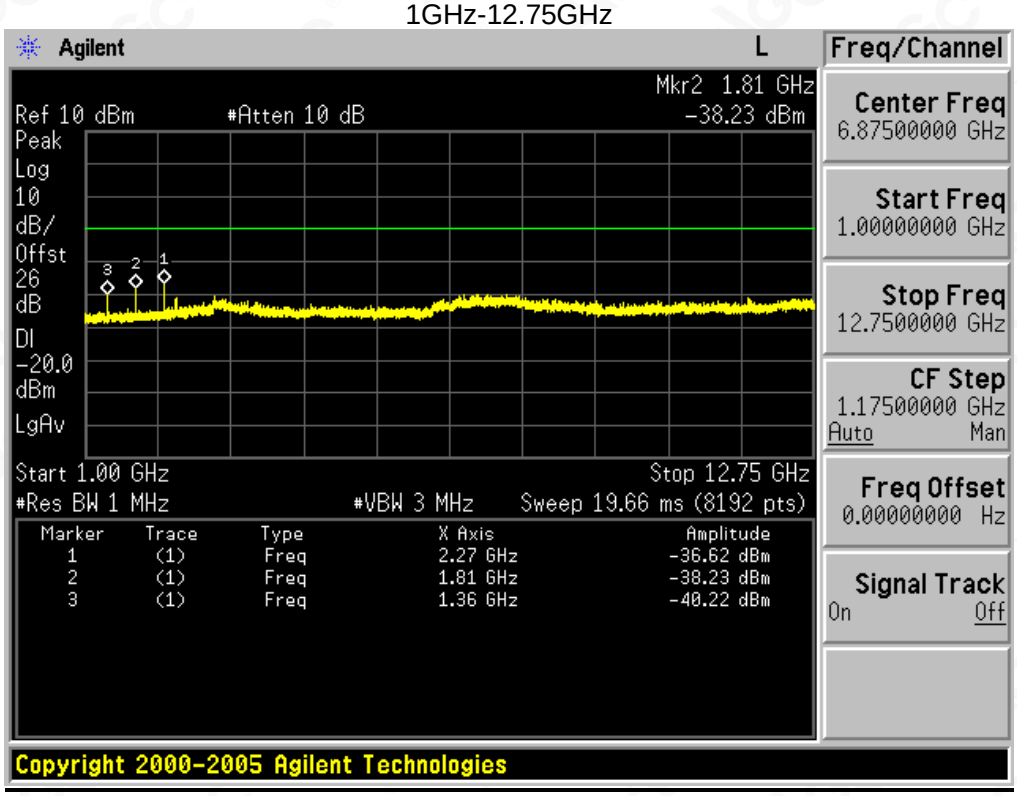
Conducted Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



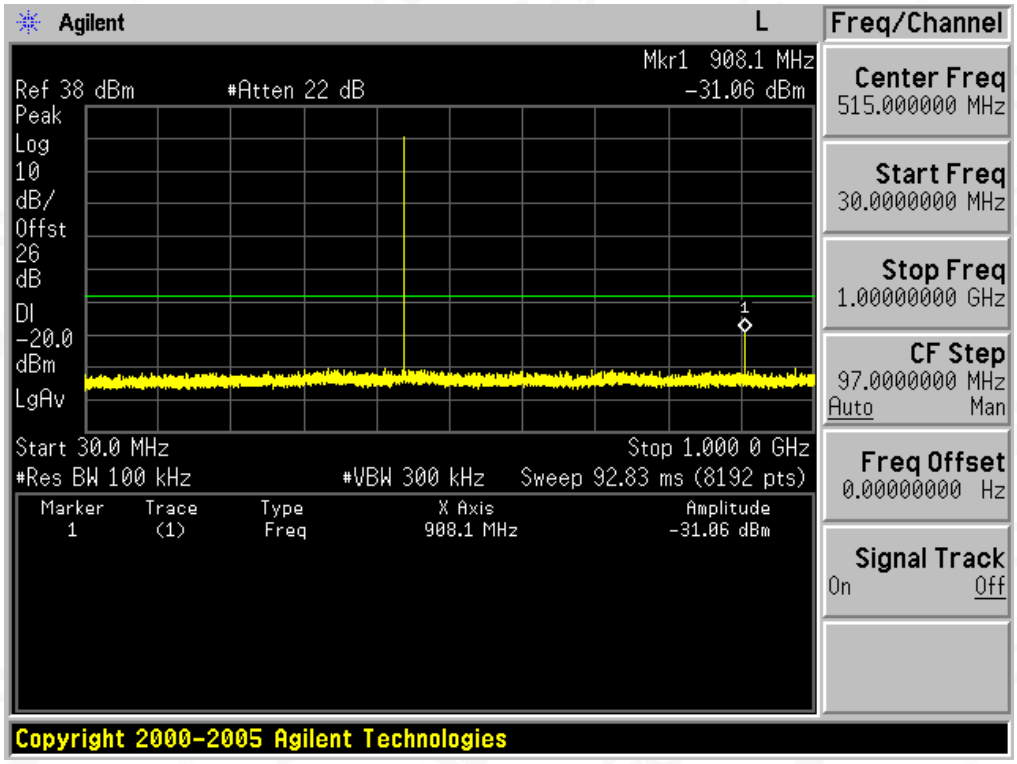
Conduct Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



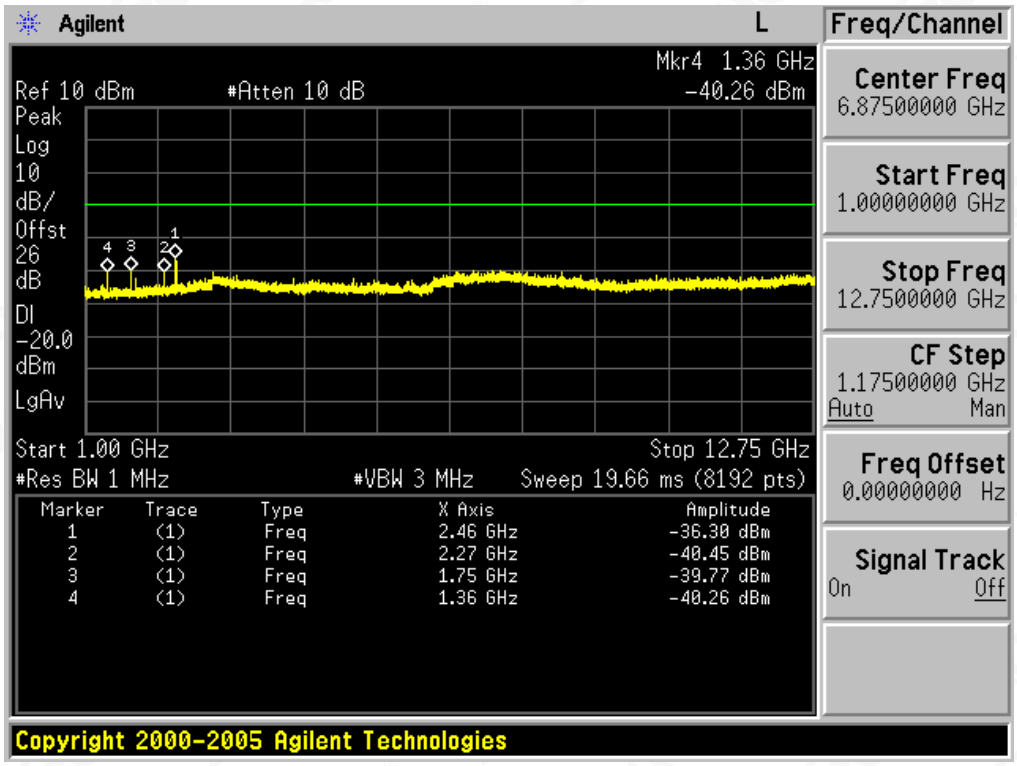
Conducted Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



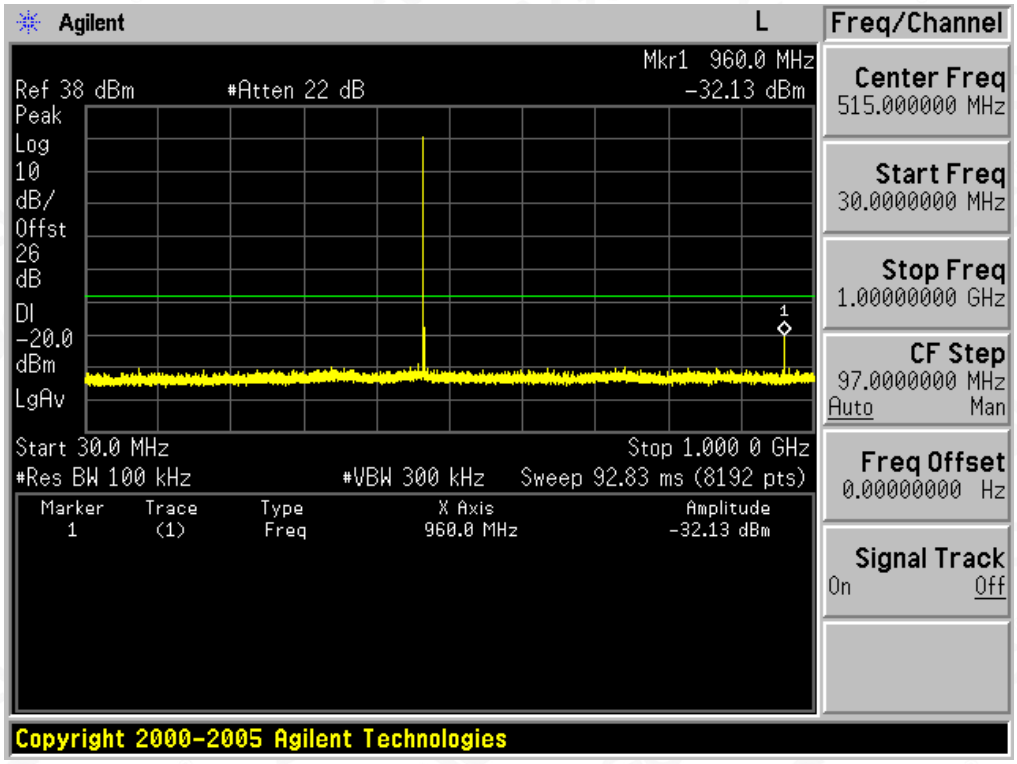
Conduct Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



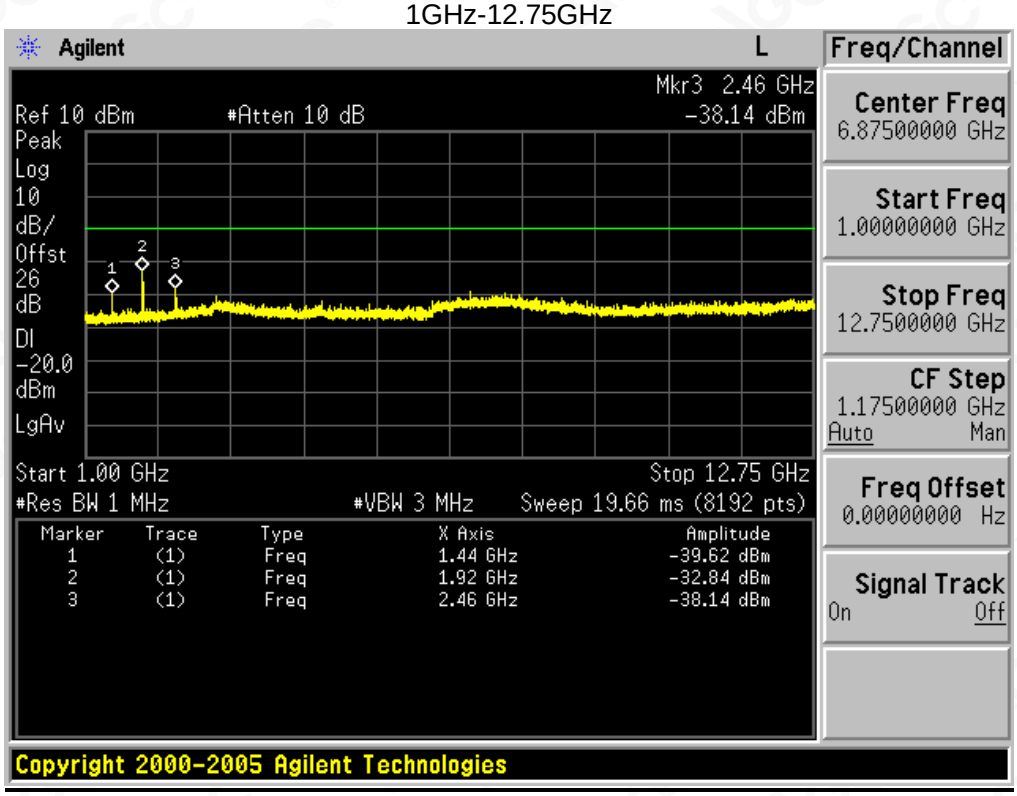
Conducted Spurious Emission (worst) @ 479.975MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



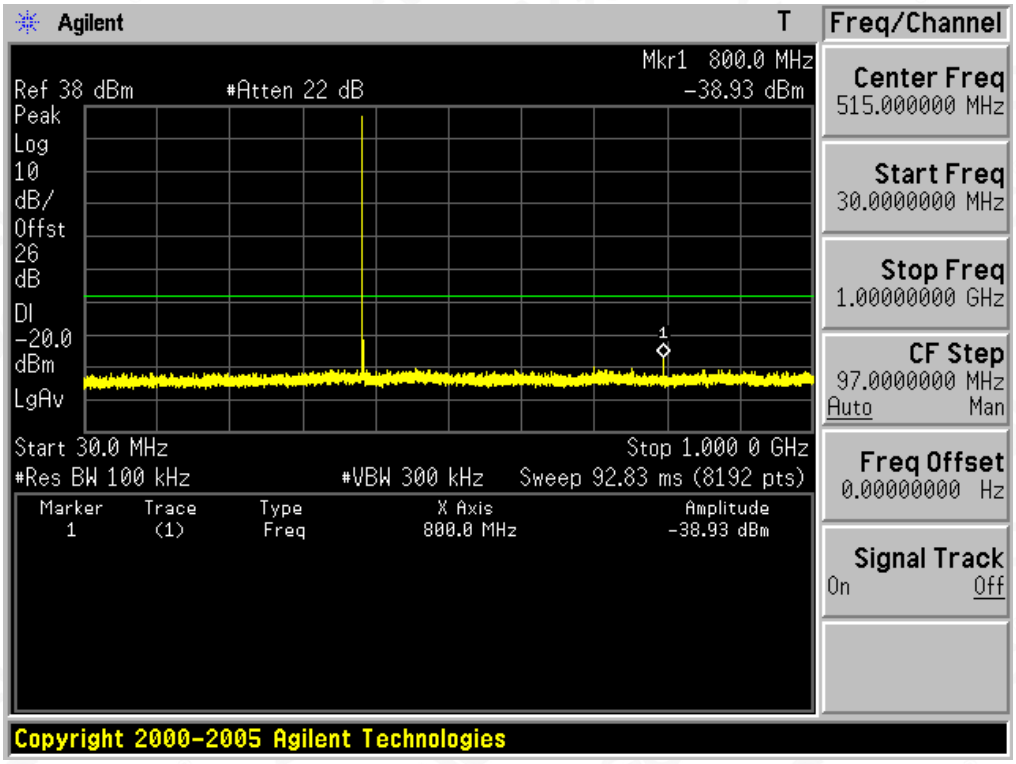
Conduct Spurious Emission (worst) @ 479.975MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



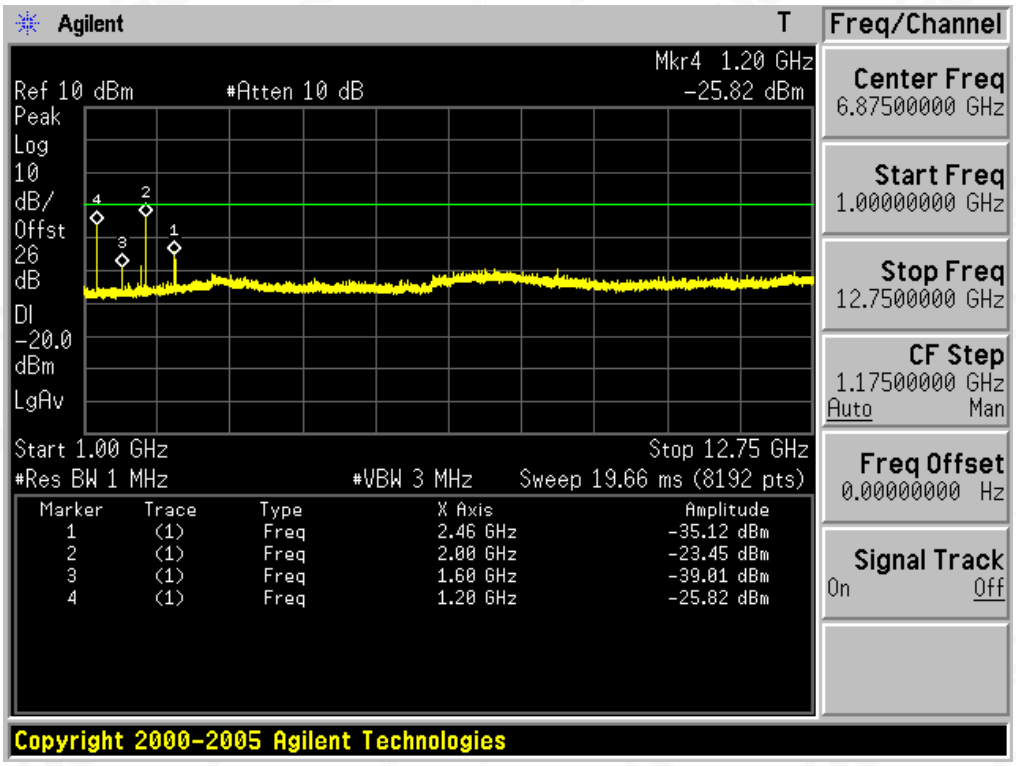
Conducted Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



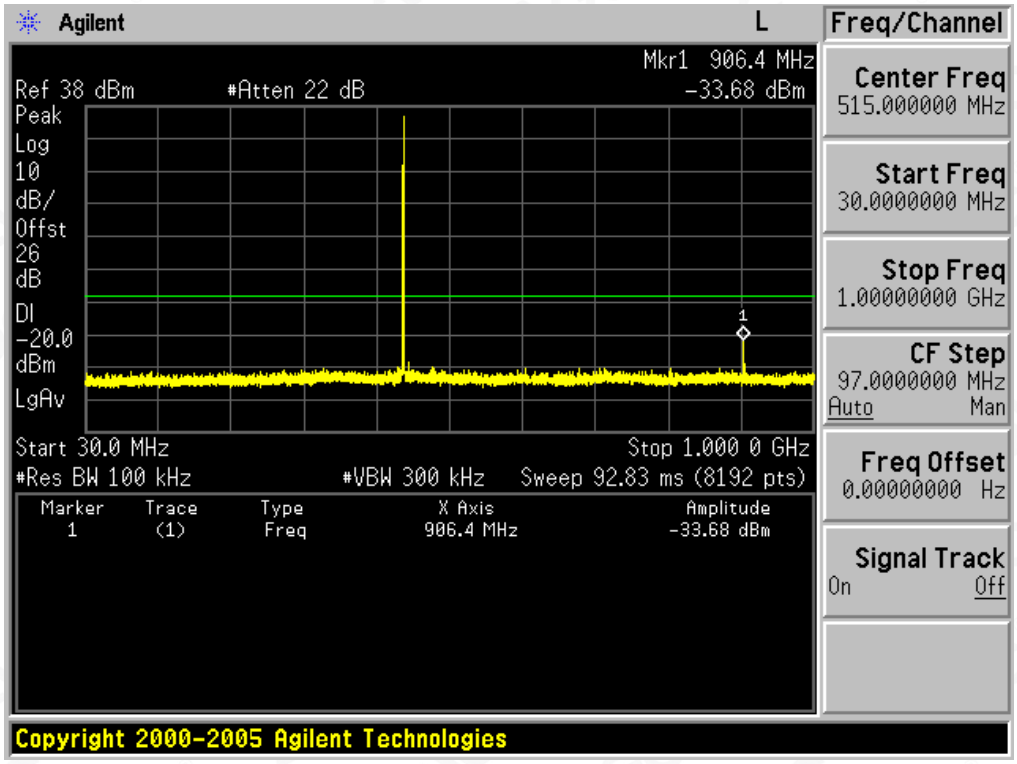
Conduct Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



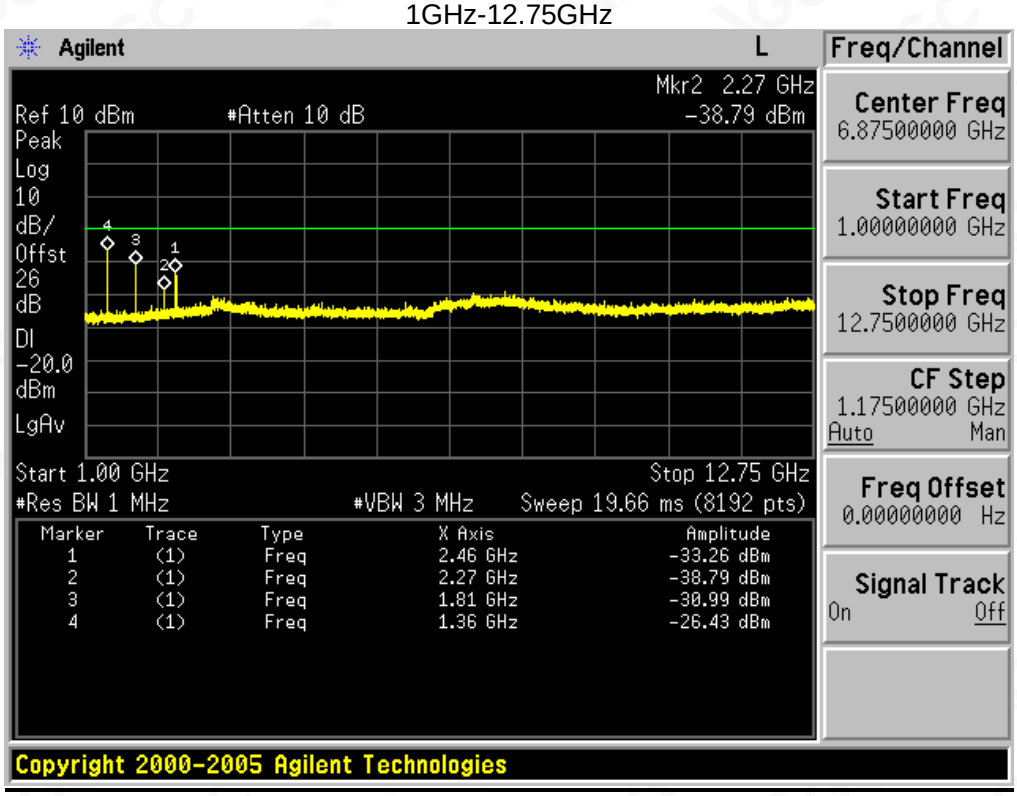
Conducted Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



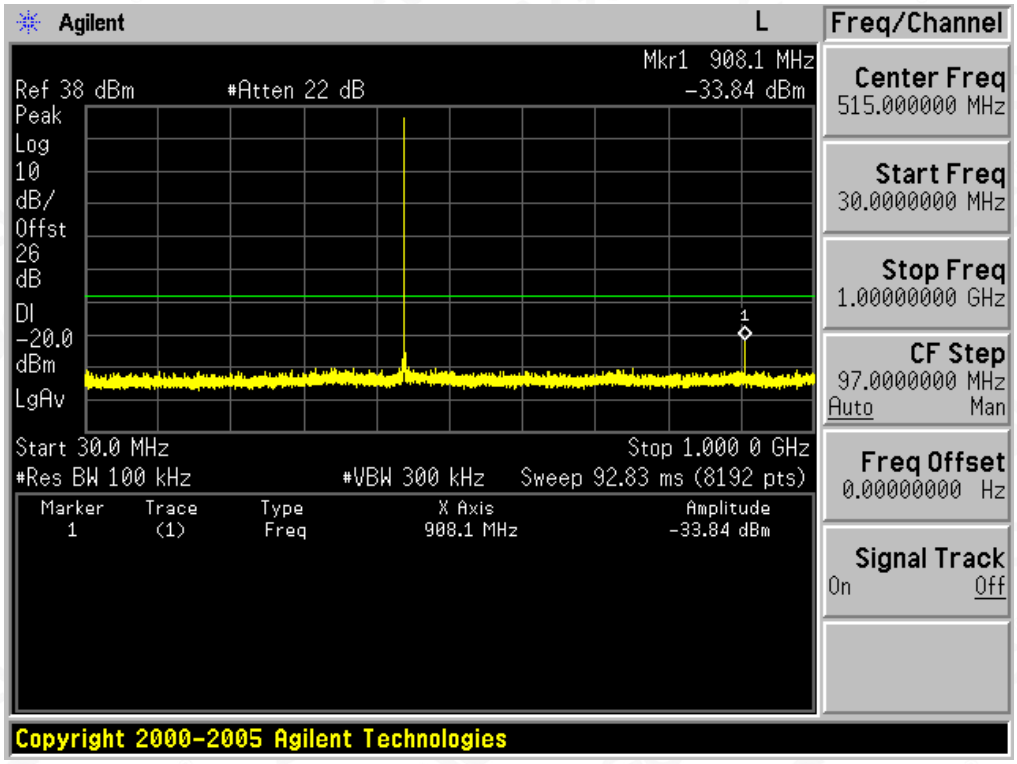
Conduct Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



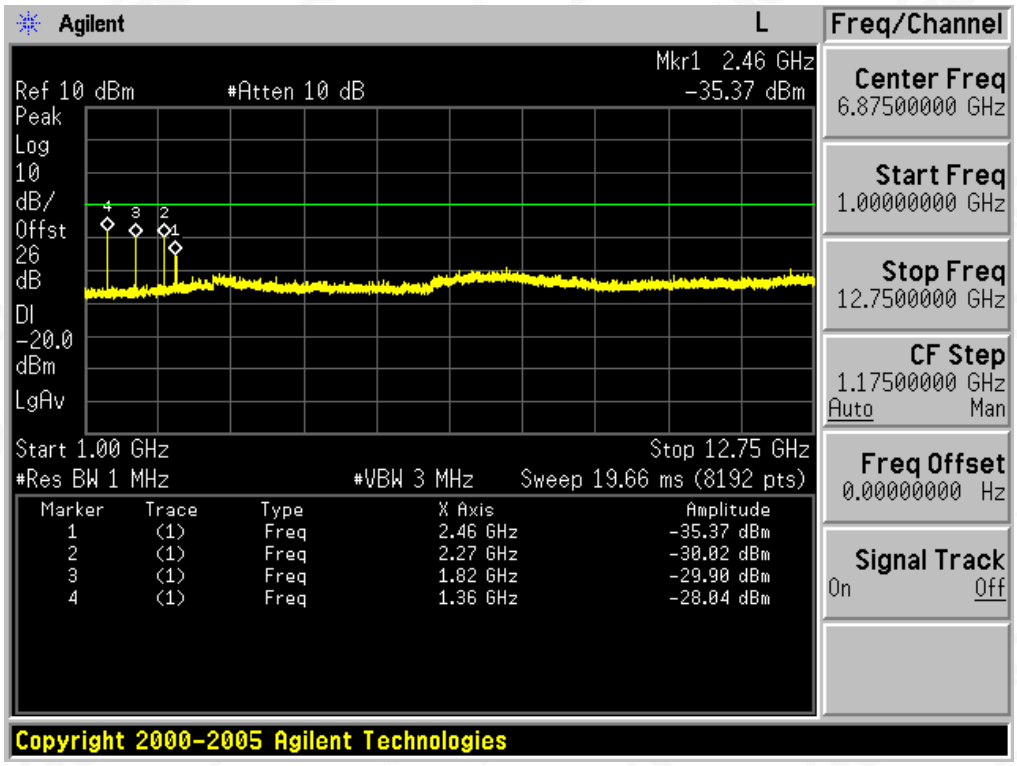
Conducted Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



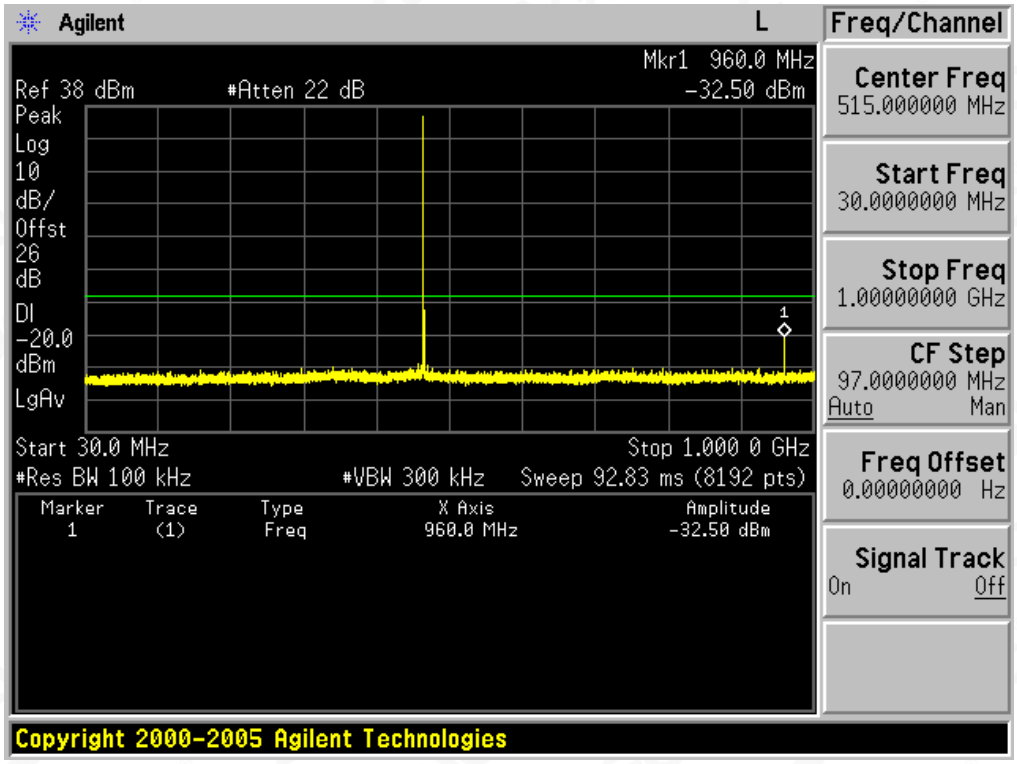
Conduct Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



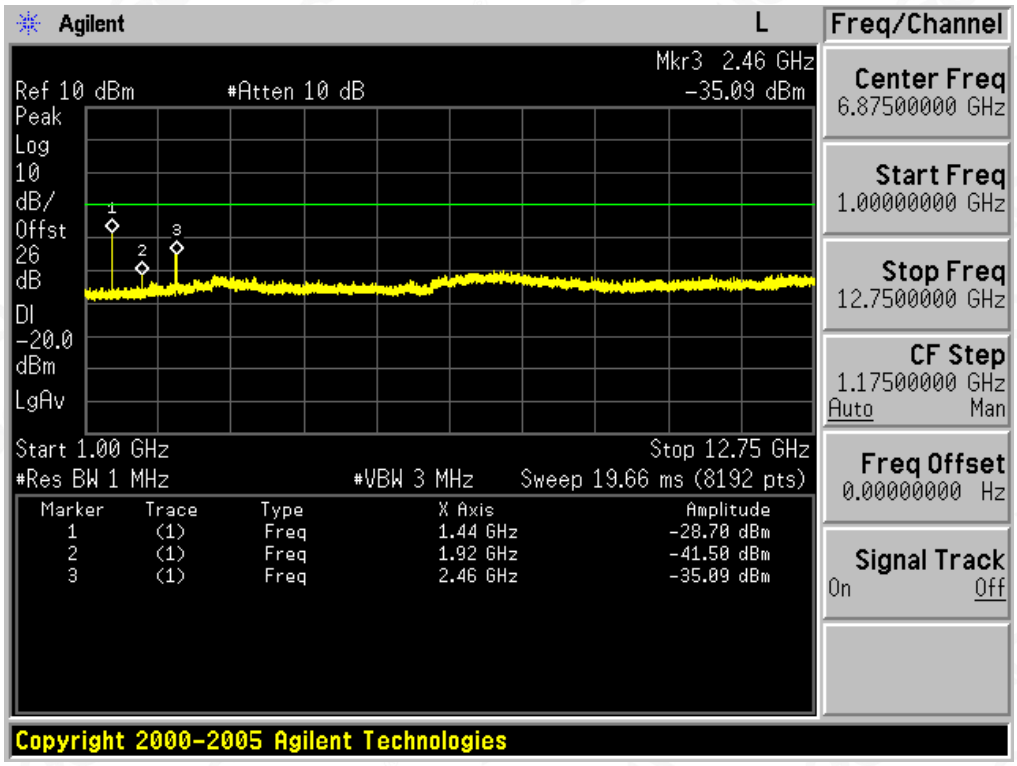
Conducted Spurious Emission (worst) @ 479.975MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



Conduct Spurious Emission (worst) @ 479.975MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz

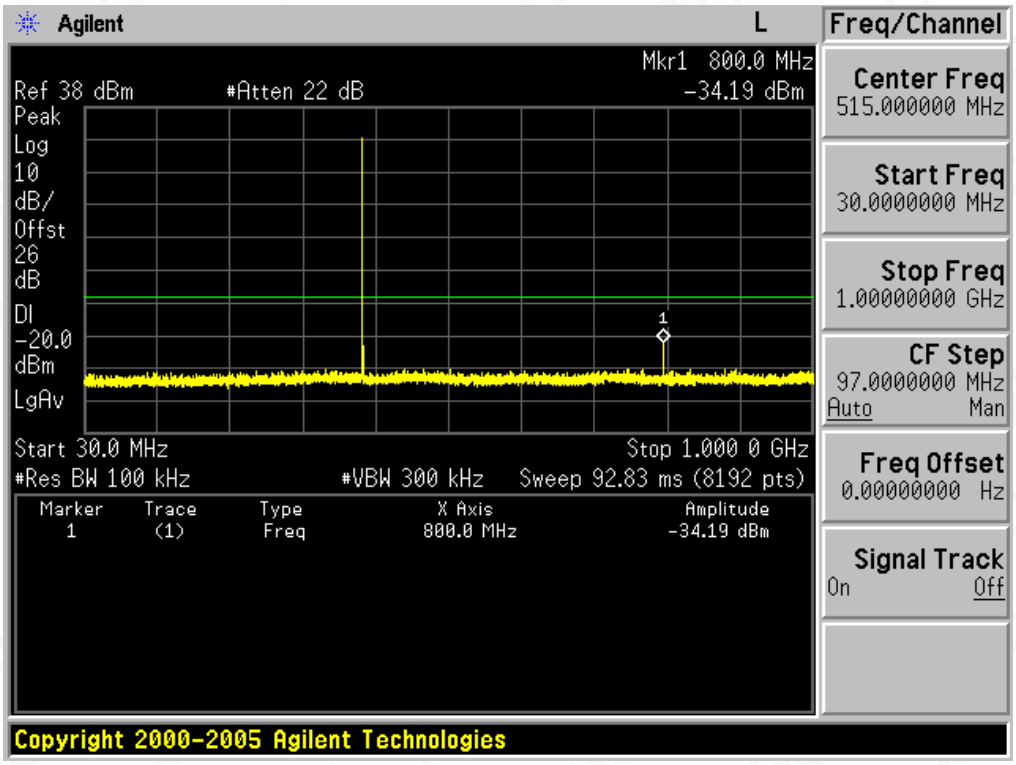


Note: All the test frequencies was tested, but only the worst data be recorded in this part.

Digital:

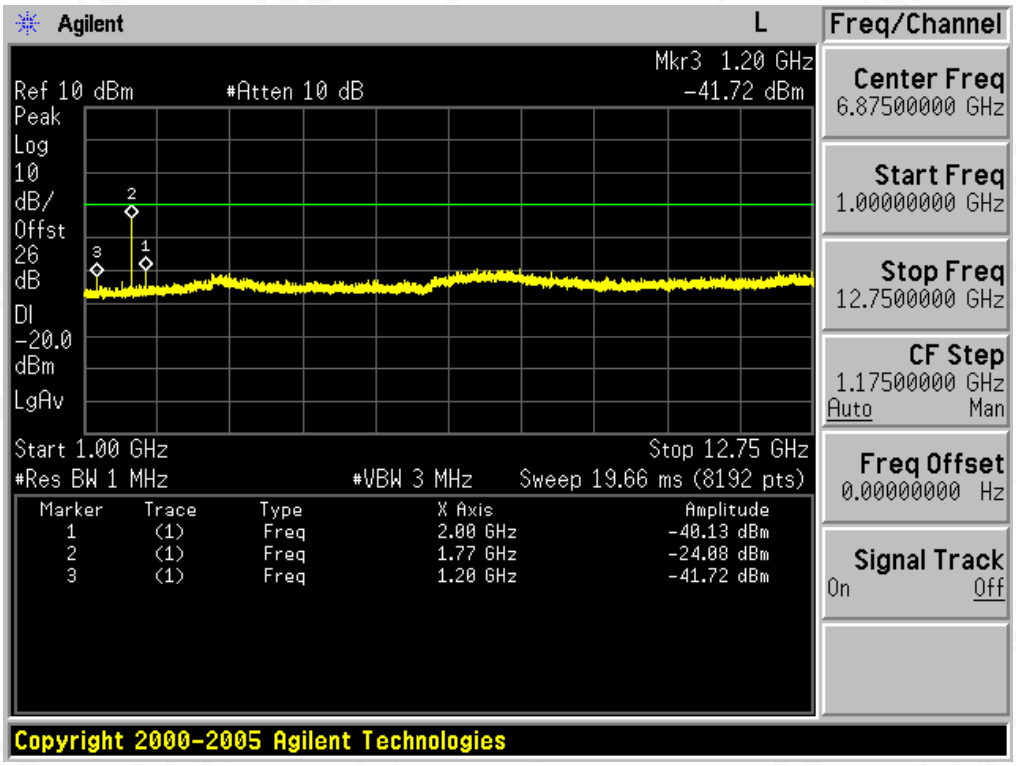
Conducted Spurious Emission (worst) @400.025MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



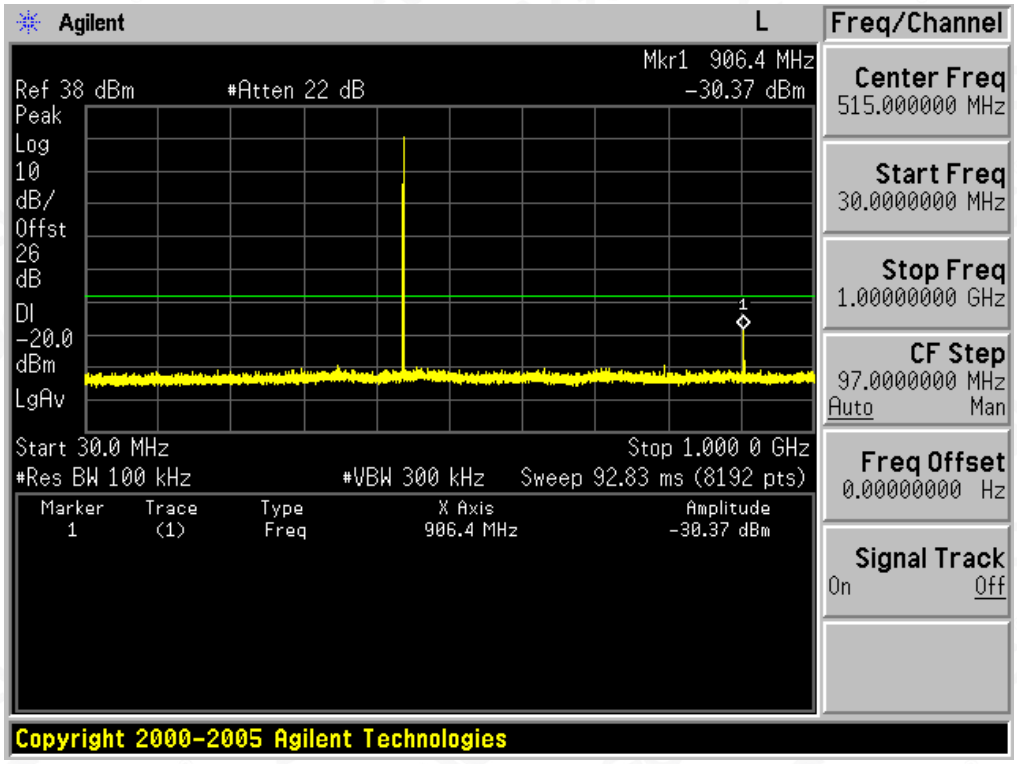
Conduct Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



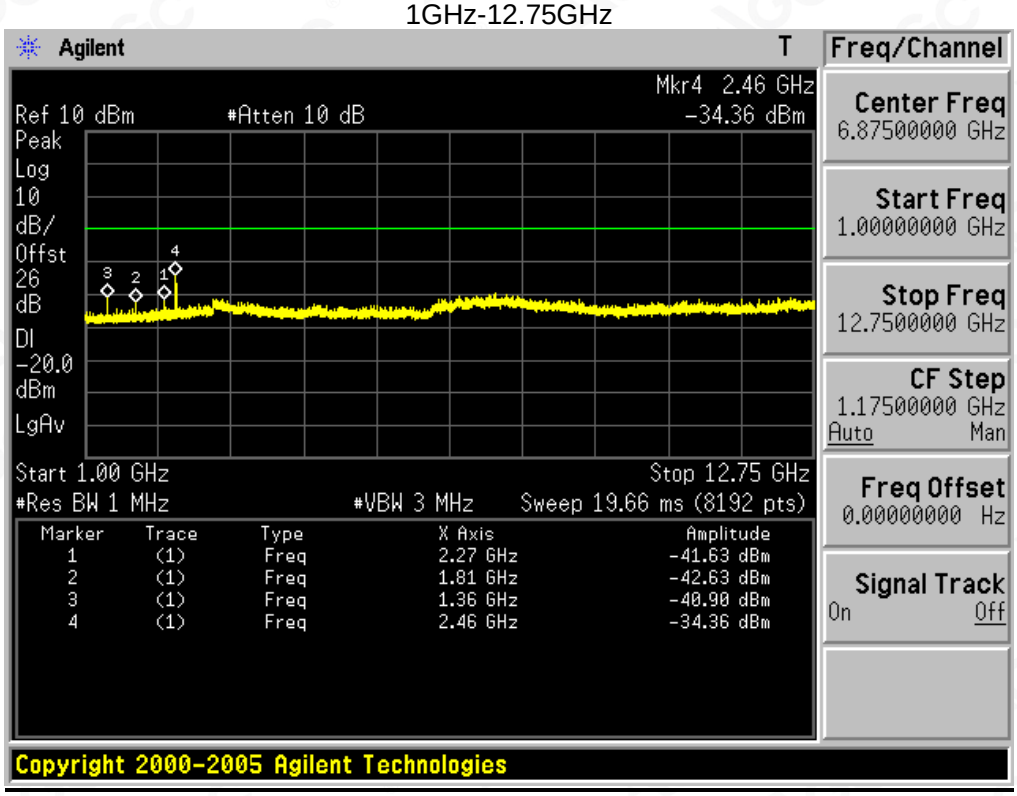
Conducted Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



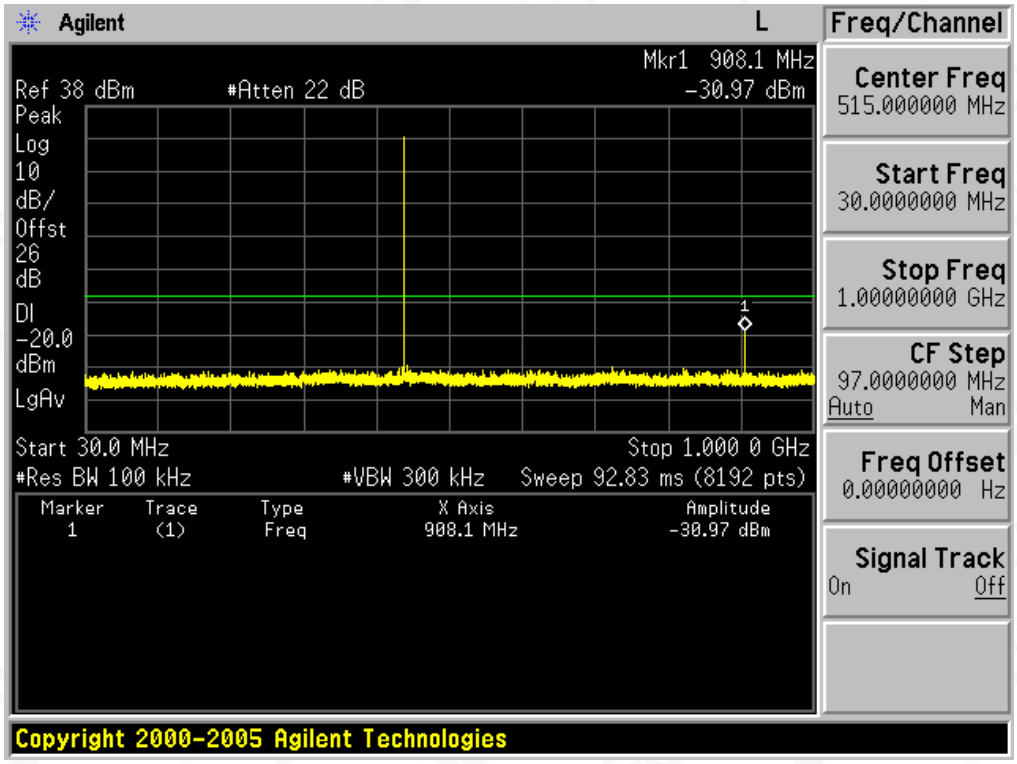
Conduct Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



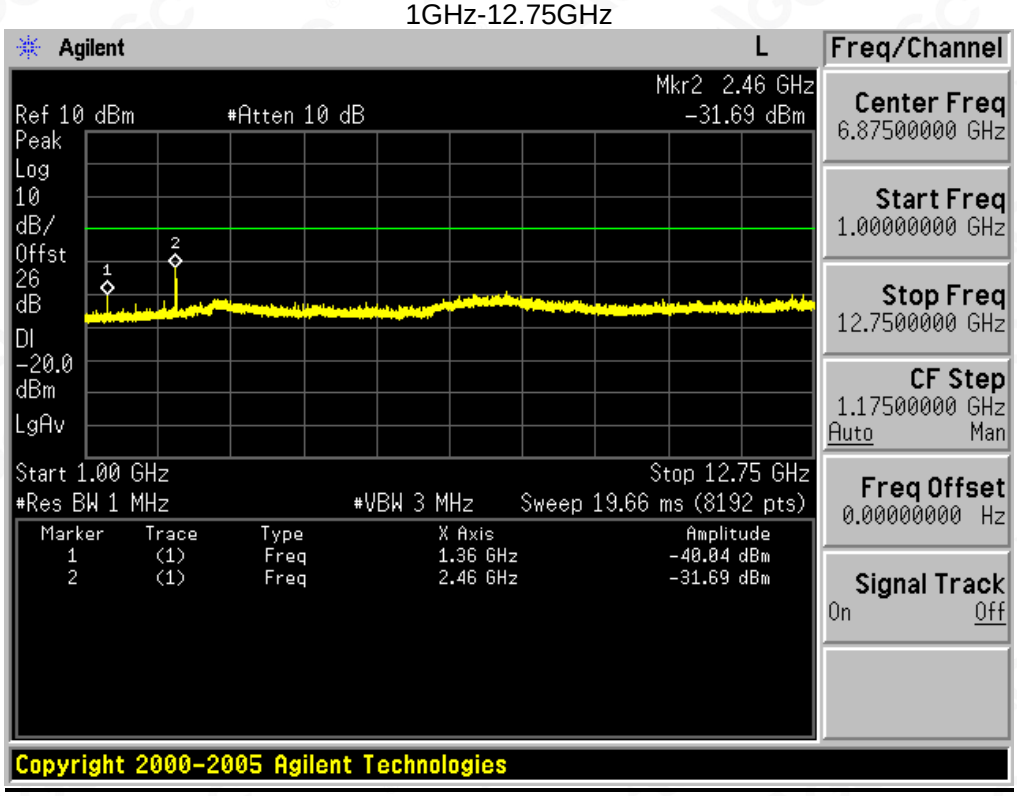
Conducted Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



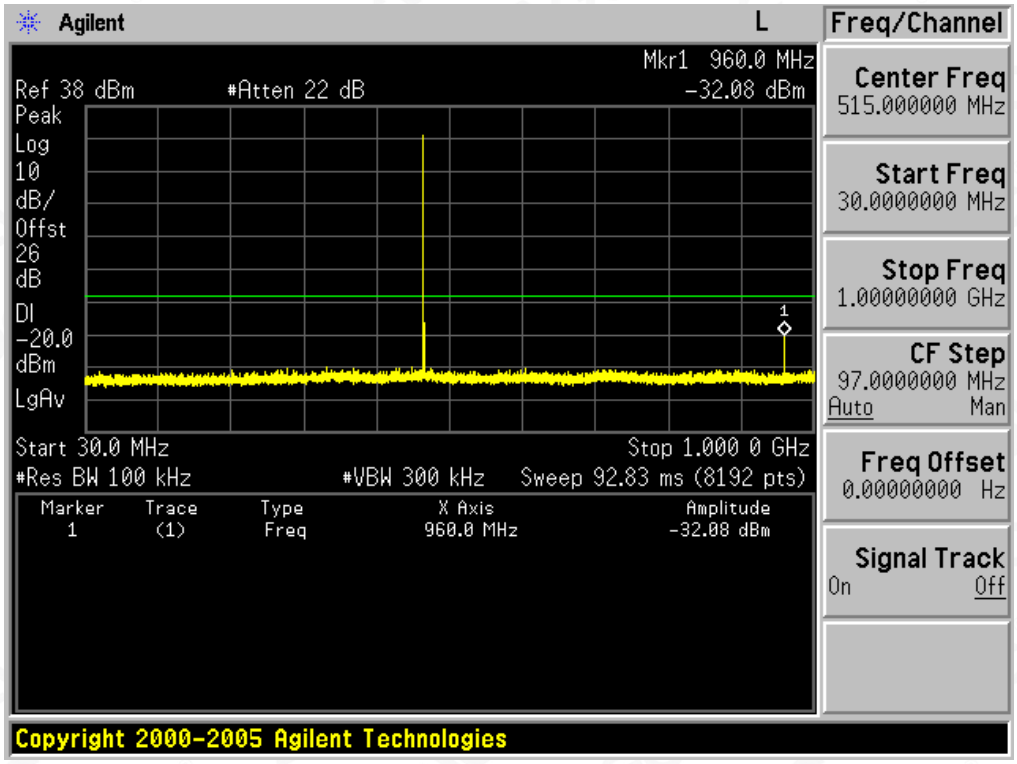
Conduct Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-1W

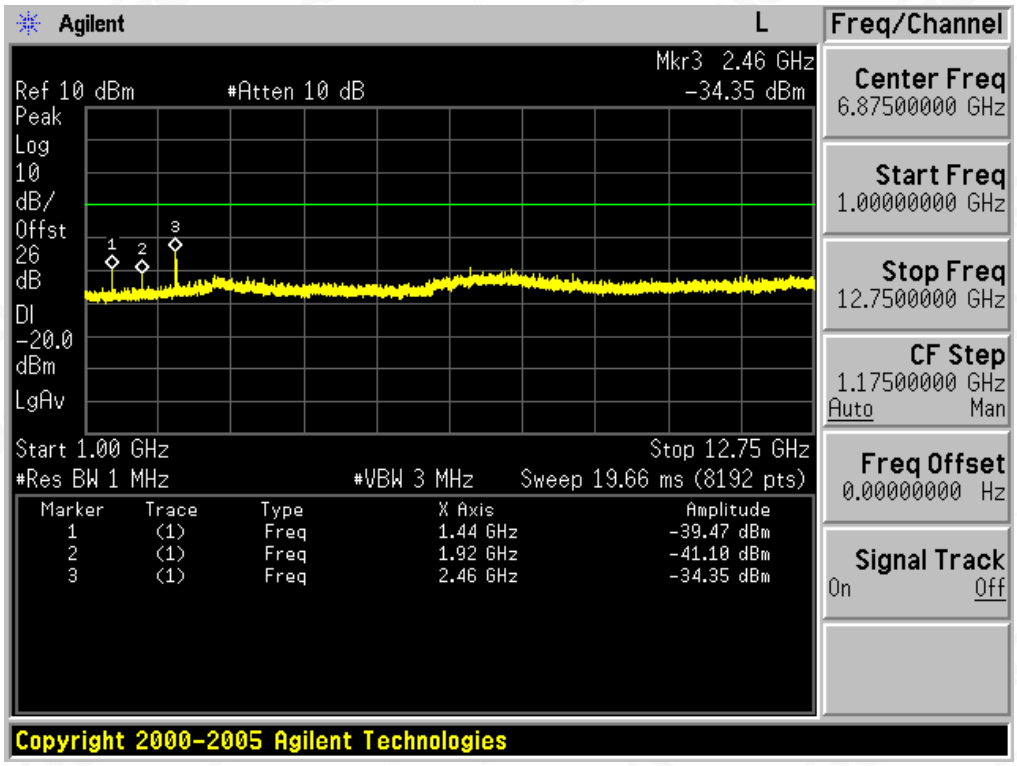
1GHz-12.75GHz



Conducted Spurious Emission (worst) @ 479.975 MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



Conduct Spurious Emission (worst) @ 479.975 MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz