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# FCC Part 90& Part 22 Rules Test Report

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Report No.: AGC02294190601FE10

**FCC ID** : 2AJGM- DMV1

**PRODUCT DESIGNATION** : DIGITAL PORTABLE RADIO

**BRAND NAME** : BAOFENG, Pofung

**MODEL NAME** : DM-V1, ZT-N2, GT-V1, TC-828, AR-D2U, FB-22, RH-S2, TR-28D,  
TF-200, BF-TC20

**CLIENT** : PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY

**DATE OF ISSUE** : June 14, 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

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V1.0	/	June 14, 2019	Valid	Initial Release



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## 1. VERIFICATION OF COMPLIANCE

<b>Applicant:</b>	PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY
<b>Address</b>	3/F FULOK BLDG 131-133 WING LOK ST SHEUNG WAN, Hong Kong
<b>Manufacturer:</b>	PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY
<b>Address</b>	3/F FULOK BLDG 131-133 WING LOK ST SHEUNG WAN, Hong Kong
<b>Factory</b>	PO FUNG ELECTRONIC(HK) INTERNATIOANL GROUP COMPANY
<b>Address</b>	3/F FULOK BLDG 131-133 WING LOK ST SHEUNG WAN, Hong Kong
<b>Product Designation:</b>	DIGITAL PORTABLE RADIO
<b>Brand Name:</b>	BAOFENG, Pofung
<b>Test Model</b>	DM-V1
<b>Serial Model</b>	ZT-N2, GT-V1, TC-828, AR-D2U, FB-22, RH-S2, TR-28D, TF-200, BF-TC20
<b>Difference Description</b>	All the same except the brand name and model name.
<b>Date of Test:</b>	June 06, 2019~June 14, 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) June 14, 2019

Reviewed By   
 Max Zhang(Zhang Yi) June 14, 2019

Approved By   
 Forrest Lei(Lei Yonggang)  
 Authorized Officer June 14, 2019



## 2. GENERAL INFORMATION

### 2.1 PRODUCT DESCRIPTION

The EUT is a **DIGITAL PORTABLE 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	DM-V1-V04
Software Version	V1.00.54
Modulation	FM/4FSK
Emission Type	7K60FXD/7K60FXE/11K0F3E
Emission Bandwidth	Analog:10.550 KHz(2W-12.5 KHz), 10.227 KHz(0.5W-12.5 KHz) Digital: 9.908 KHz(2W-12.5KHz), 9.712 KHz(0.5W-12.5KHz)
Peak Frequency Deviation	1.88KHz
Audio Frequency Response	11.55dB
Maximum Transmitter Power	Analog: 32.51dBm(2W-12.5 KHz), 26.81dBm (0.5W-12.5 KHz) Digital: 32.47dBm(2W-12.5KHz), 26.77dBm (0.5W-12.5KHz)
Output power Modification	2W/0.5W (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	2.15dBi
Power Supply	DC 3.7V, 2000mAh (by battery) charging for DC 5V
Limiting Voltage	DC 3V-4.26V
Operation Frequency Range and Channel	Frequency Range:400 MHz to 470 MHz (UHF) Channel Separation: 12.5KHz(Digital/ Analog) Bottom Channel: 400.025MHz Middle Channel: 453.225MHz Middle Channel: 454.025MHz (Top)High Channel: 469.975MHz
Frequency Tolerance	1.098ppm



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Frequency Range (MHz)	Rated Transmit Power(W)(Conducted)	Transmit Mode/Emission Designator
400-470	0.5W/2W	11K0F3E(Analog Voice;NB)
400-470	0.5W/2W	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	469.975
6		



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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)

$B_n = 2XM + 2XDK = 11.0 \text{ KHz}$

Emission designator: 11K0F3E

9600 Digital Voice/data (12.5KHz)

Calculation:

Data rate in bps(R)=9600

Deviation Peak deviation of carrier(D)=2359.585

Constant factor (K): 1 (default)

$B_n = 3.86D + 1.27RK = 3.86(2359.585) + 0.27(9600)(1) = 11.7 \text{ KHz}$

Emission designator: 11K0FXD



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

This submittal(s) (test report) is intended for FCC ID: **2AJGM- DMV1**, 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

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



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### 3. SYSTEM TEST CONFIGURATION

#### 3.1 EUT CONFIGURATION

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

#### 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



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### 3.4 CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System



Table 2-1 Equipment Used in Tested System

Item	Equipment	Model No.	Identifier	Note
1	DIGITAL PORTABLE RADIO	DM-V1	FCC ID: 2AJGM- DMV1	EUT
2	Desktop charger	N/A	DC 5V, 300mA	Accessory
3	Jacket	N/A	N/A	Accessory
4	Battery	DM-V1	DC 3.7V 2000mAh	Accessory



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#### 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



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**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
TEST RECEIVER	R&S	ESCI	10096	Jun. 10, 2019	Jun. 09, 2020
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
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun. 10, 2019	Jun. 09, 2020
HORN ANTENNA	EM	EM-AH-10180	/	Mar.01, 2018	Feb.29, 2020
SIGNAL GENERATOR	AGILENT	E4421B	122501288	May. 13, 2019	May. 12, 2020
SIGNAL GENERATOR	R&S	SMT03	A0304261	Jun. 12, 2018	Jun.11 , 2019
SIGNAL GENERATOR	R&S	SMT03	A0304261	Jun. 10, 2019	Jun. 09, 2020
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. 25, 2019	Feb. 24, 2020
RF Communication Test Set	HP	8920B	--	Jun. 12, 2018	Jun.11 , 2019
RF Communication Test Set	HP	8920B	--	Jun. 10, 2019	Jun. 09, 2020
Attenuator	Weinachel Corp	58-30-33	ML030	Jun. 12, 2018	Jun.11 , 2019
Attenuator	Weinachel Corp	58-30-33	ML030	Jun. 10, 2019	Jun. 09, 2020
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



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## 5. DESCRIPTION OF TEST MODES

### RF TEST MODES

The EUT (**DIGITAL PORTABLE 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  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  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

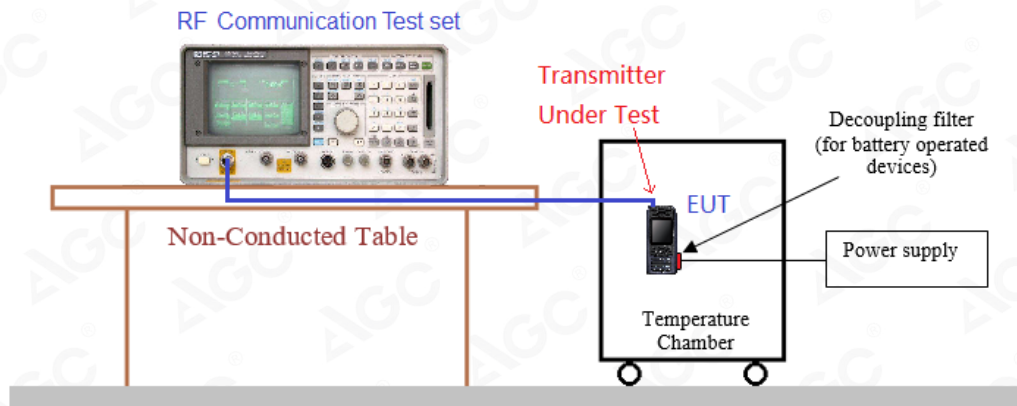
1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.
2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz. Record this frequency as reference frequency.
3. Set the temperature of chamber to  $50^{\circ}\text{C}$ . Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a  $10^{\circ}\text{C}$  decreased per stage until the lowest temperature  $-30^{\circ}\text{C}$  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  $15^{\circ}\text{C}$  to  $25^{\circ}\text{C}$ . Otherwise, an environment chamber set for a temperature of  $20^{\circ}\text{C}$  shall be used. The EUT shall be powered by DC 3.7V.
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**



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### 6.4 TEST RESULTS

UHF:

Analog:

(1) Frequency stability versus input voltage (Supply nominal voltage is 3.70V)-2W-12.5KHz

Environment Temperature(°C)	Power (V)	Reference Frequency			Limit: ppm
		400.025MHz	454.025MHz	469.975MHz	
50	DC 3.70 V	0.462	0.653	0.716	2.5
40	DC 3.70 V	0.723	0.984	0.539	
30	DC 3.70 V	1.088	0.544	0.689	
20	DC 3.70 V	0.586	0.967	0.960	
10	DC 3.70 V	0.828	1.068	0.973	
0	DC 3.70 V	0.533	0.533	0.827	
-10	DC 3.70 V	0.687	0.687	0.814	
-20	DC 3.70 V	0.841	0.593	0.502	
-30	DC 3.70 V	0.684	0.709	0.942	
Result	Pass				

(2) Frequency stability versus input voltage (Battery endpoint is 3V) -2W-12.5KHz

Environment Temperature(°C)	Power Supply (V)	Reference Frequency			Limit: ppm
		400.025MHz	454.025MHz	469.975MHz	
50	DC 3.00 V	0.378	0.844	0.874	2.5
40	DC 3.00 V	1.000	0.740	0.344	
30	DC 3.00 V	0.567	0.514	0.433	
20	DC 3.00 V	0.810	0.947	0.769	
10	DC 3.00 V	0.582	0.859	0.318	
0	DC 3.00 V	0.480	0.776	0.818	
-10	DC 3.00 V	0.460	0.638	0.432	
-20	DC 3.00 V	0.905	0.904	0.574	
-30	DC 3.00 V	0.414	0.579	0.978	
Result	Pass				



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(3) Frequency stability versus input voltage (Supply nominal voltage is 3.70V)-0.5W-12.5KHz

Environment Temperature(°C)	Power (V)	Reference Frequency			Limit: ppm
		400.025MHz	454.025MHz	469.975MHz	
50	DC 3.70 V	0.751	0.653	0.654	2.5
40	DC 3.70 V	0.635	0.873	0.679	
30	DC 3.70 V	0.760	0.599	1.035	
20	DC 3.70 V	0.674	1.049	0.759	
10	DC 3.70 V	0.809	1.036	0.735	
0	DC 3.70 V	0.820	0.875	0.502	
-10	DC 3.70 V	0.508	0.978	0.647	
-20	DC 3.70 V	0.745	0.906	0.906	
-30	DC 3.70 V	0.919	0.624	0.906	
Result	Pass				

(4) Frequency stability versus input voltage (Battery endpoint is 3V) -0.5W-12.5KHz

Environment Temperature(°C)	Power (V)	Reference Frequency			Limit: ppm
		400.025MHz	454.025MHz	469.975MHz	
50	DC 3.00 V	0.949	0.400	0.493	2.5
40	DC 3.00 V	0.547	0.737	0.472	
30	DC 3.00 V	0.343	0.650	0.547	
20	DC 3.00 V	0.459	0.877	0.750	
10	DC 3.00 V	0.753	0.822	0.319	
0	DC 3.00 V	0.989	0.842	0.804	
-10	DC 3.00 V	0.845	0.374	0.799	
-20	DC 3.00 V	0.481	0.341	0.990	
-30	DC 3.00 V	0.814	0.760	0.920	
Result	Pass				



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**Digital:**
**(1) Frequency stability versus input voltage (Supply nominal voltage is 3.70V)-2W-12.5KHz**

Environment Temperature(°C)	Power (V)	Reference Frequency			Limit: ppm
		400.025MHz	454.025MHz	469.975MHz	
50	DC 3.70 V	0.975	0.653	0.740	2.5
40	DC 3.70 V	0.580	0.840	1.095	
30	DC 3.70 V	0.954	1.032	0.777	
20	DC 3.70 V	1.049	0.511	0.868	
10	DC 3.70 V	1.048	0.839	0.914	
0	DC 3.70 V	0.774	0.704	0.818	
-10	DC 3.70 V	0.863	0.976	1.098	
-20	DC 3.70 V	0.539	0.719	0.703	
-30	DC 3.70 V	0.912	0.988	0.577	
Result	Pass				

**(2) Frequency stability versus input voltage(Battery endpoint is 3V) -2W-12.5KHz**

Environment Temperature(°C)	Power (V)	Reference Frequency			Limit: ppm
		400.025MHz	454.025MHz	469.975MHz	
50	DC 3.00 V	0.704	0.727	0.645	2.5
40	DC 3.00 V	0.499	0.822	0.903	
30	DC 3.00 V	0.648	0.388	0.631	
20	DC 3.00 V	0.842	0.604	0.935	
10	DC 3.00 V	0.746	0.851	0.647	
0	DC 3.00 V	0.741	0.754	0.421	
-10	DC 3.00 V	0.880	0.641	0.740	
-20	DC 3.00 V	0.844	0.650	0.485	
-30	DC 3.00 V	0.447	0.946	0.662	
Result	Pass				



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**(3) Frequency stability versus input voltage (Supply nominal voltage is 3.70V)-0.5W-12.5KHz**

Environment Temperature(°C)	Power (V)	Reference Frequency			Limit: ppm
		400.025MHz	454.025MHz	469.975MHz	
50	DC 3.70 V	0.828	0.653	1.057	2.5
40	DC 3.70 V	1.065	0.779	1.022	
30	DC 3.70 V	0.839	1.095	0.935	
20	DC 3.70 V	0.713	0.618	0.983	
10	DC 3.70 V	0.841	0.557	0.714	
0	DC 3.70 V	0.765	0.882	1.082	
-10	DC 3.70 V	0.704	0.892	0.763	
-20	DC 3.70 V	0.948	0.899	1.095	
-30	DC 3.70 V	0.837	0.975	0.528	
Result		Pass			

**(4) Frequency stability versus input voltage (Battery endpoint is 3V) -0.5W-12.5KHz**

Environment Temperature(°C)	Power (V)	Reference Frequency			Limit: ppm
		400.025MHz	454.025MHz	469.975MHz	
50	DC 3.00 V	0.647	0.747	0.773	2.5
40	DC 3.00 V	0.304	0.731	0.374	
30	DC 3.00 V	0.450	0.415	0.349	
20	DC 3.00 V	0.476	0.559	0.611	
10	DC 3.00 V	0.541	0.587	0.941	
0	DC 3.00 V	0.413	0.954	0.846	
-10	DC 3.00 V	0.526	0.384	0.513	
-20	DC 3.00 V	0.803	0.841	0.320	
-30	DC 3.00 V	0.889	0.739	0.990	
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.

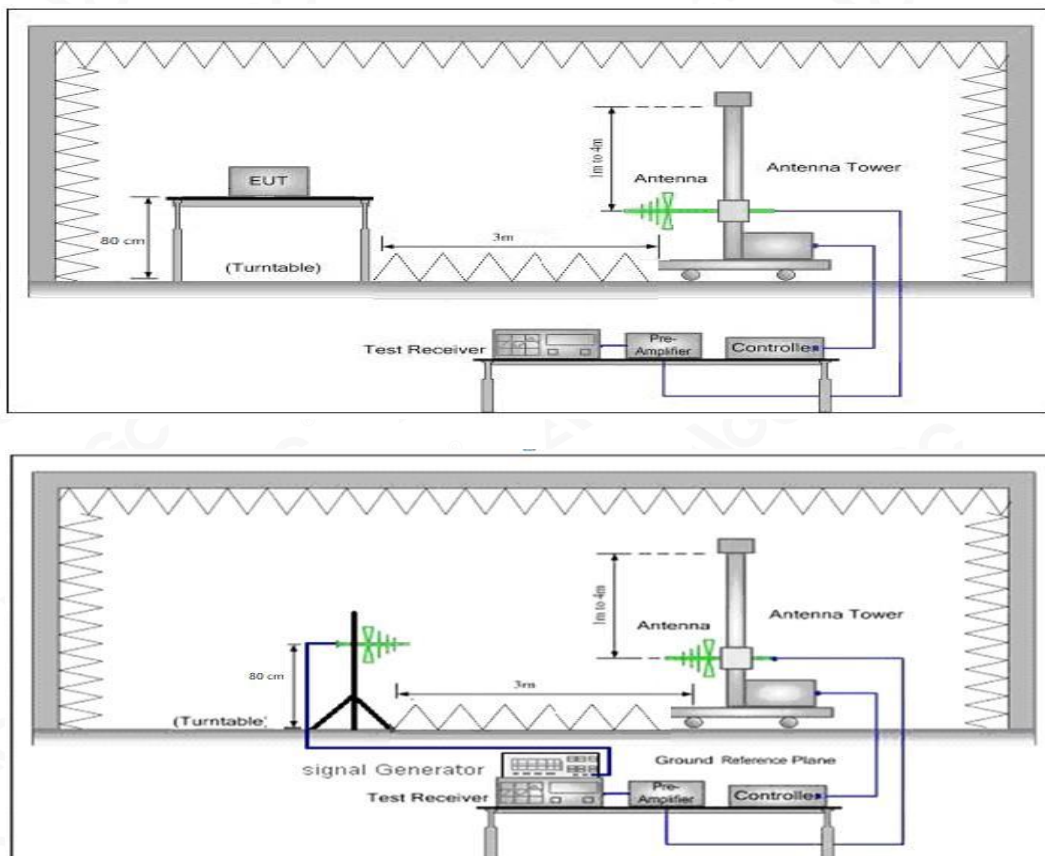
### 7.2 MEASUREMENT PROCEDURE

- 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.

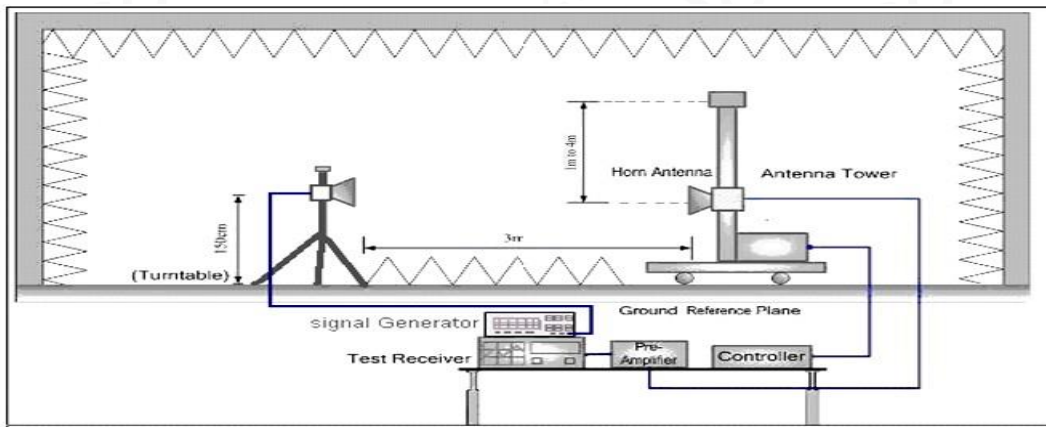
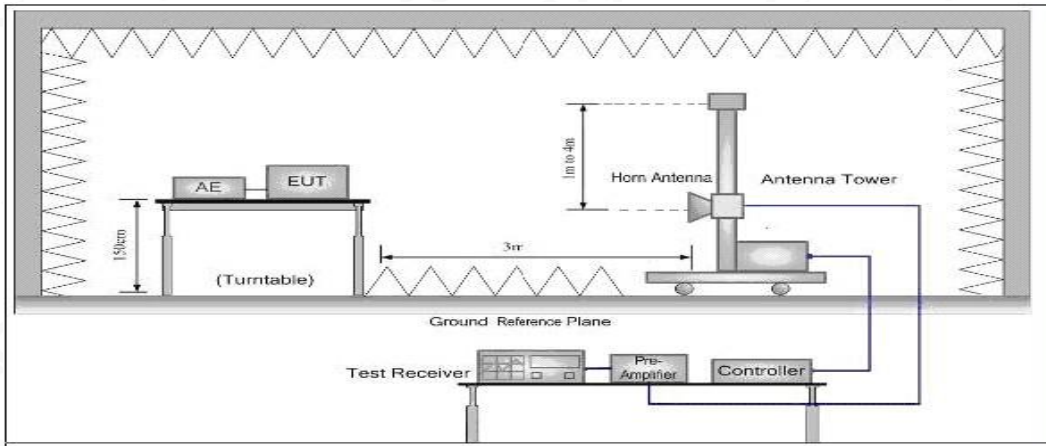
### 7.3 TEST SETUP BLOCK DIAGRAM

Radiation method:

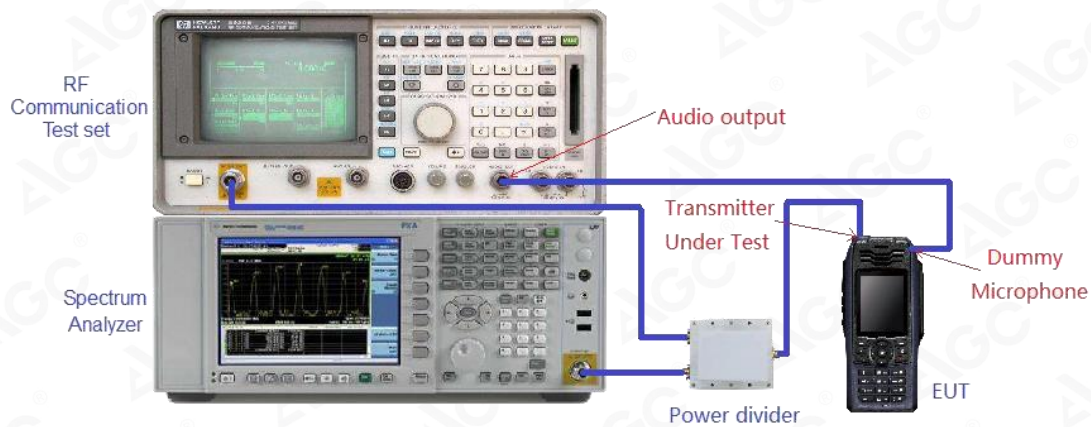
#### Radiated Below 1GHz



### Radiated Above 1 GHz



### Conduction method:



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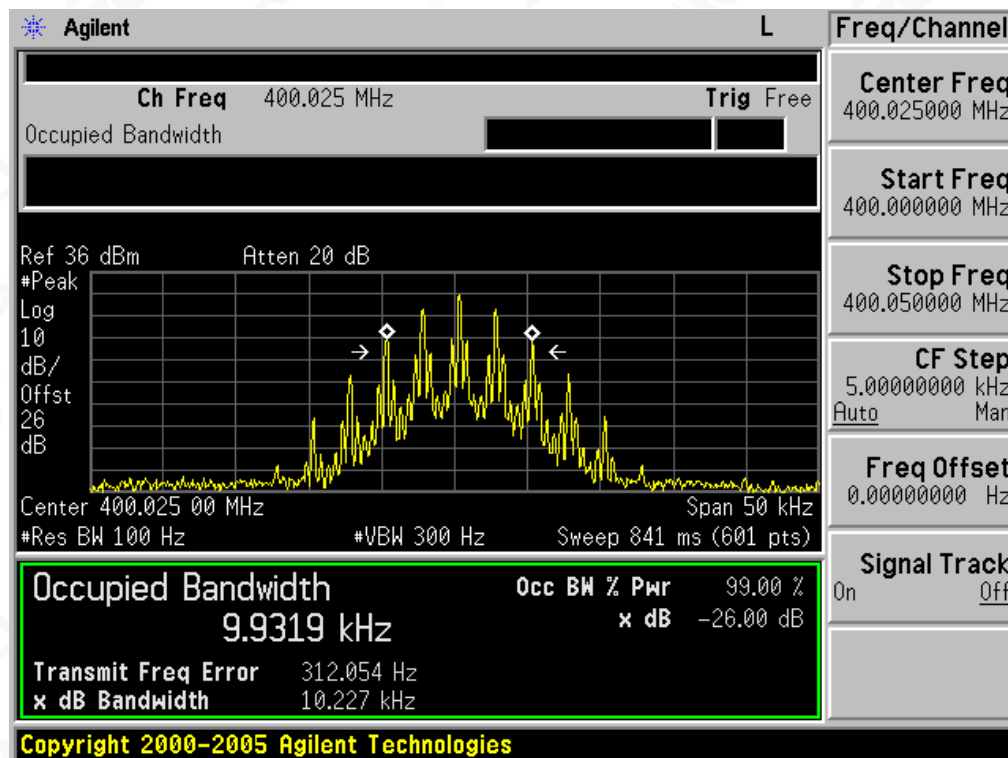
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### 7.4 MEASUREMENT RESULT

UHF:  
Analog:12.5KHz

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	10.227 KHz	11.25 KHz	Pass
453.225MHz	10.212 KHz	11.25 KHz	Pass
454.025MHz	10.211 KHz	11.25 KHz	Pass
469.975MHz	10.222 KHz	11.25 KHz	Pass

#### Occupied bandwidth of Bottom Channel (400.025MHz)-0.5W



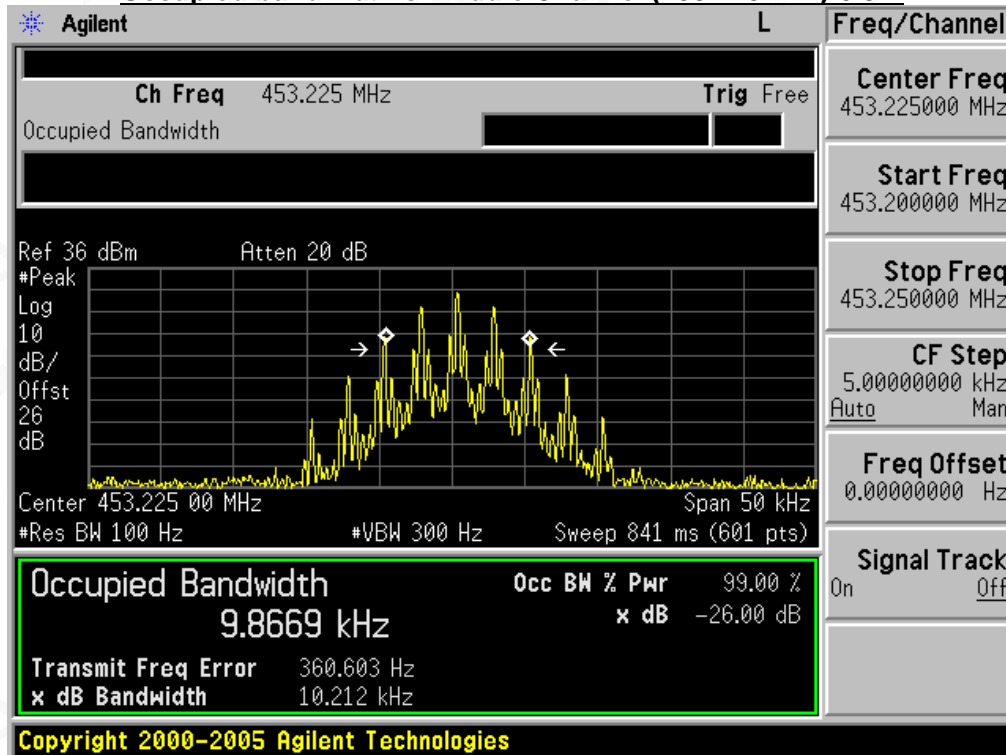
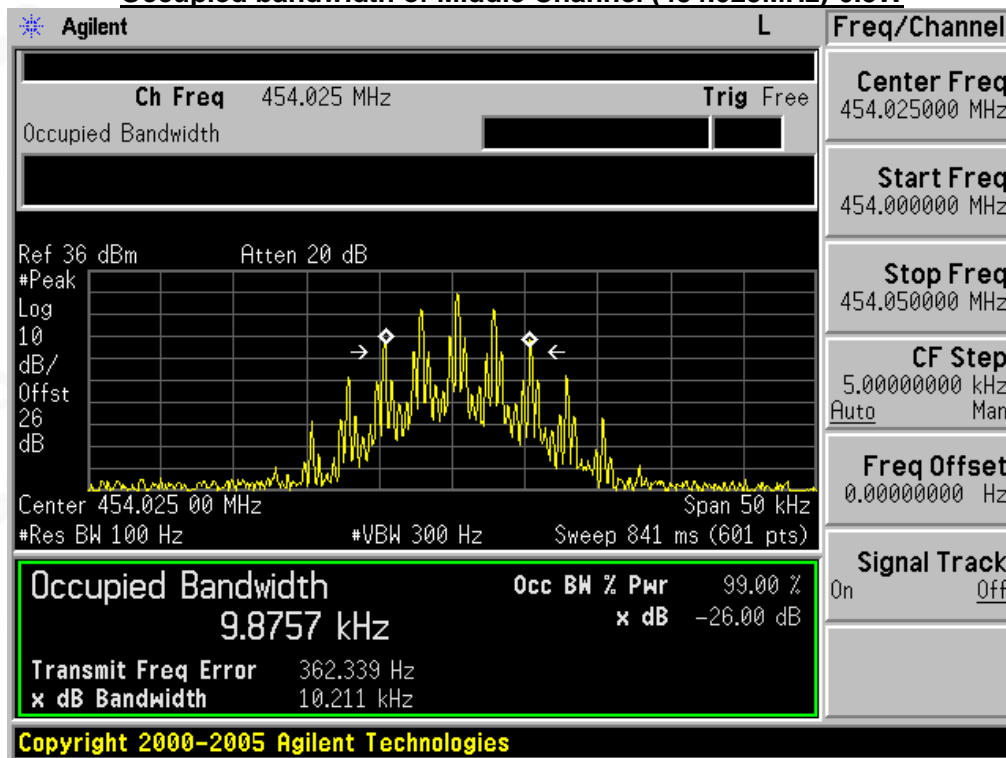
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**Occupied bandwidth of Middle Channel (453.225MHz)-0.5W**

**Occupied bandwidth of Middle Channel (454.025MHz)-0.5W**


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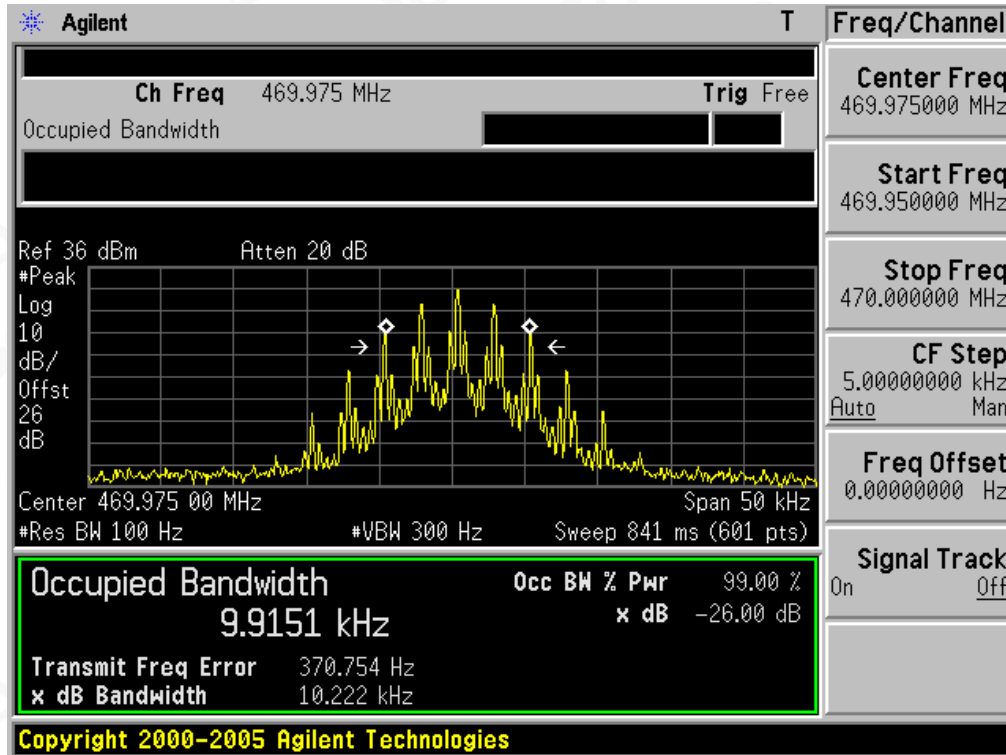
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**Occupied bandwidth of Top Channel (469.975MHz)-0.5W**



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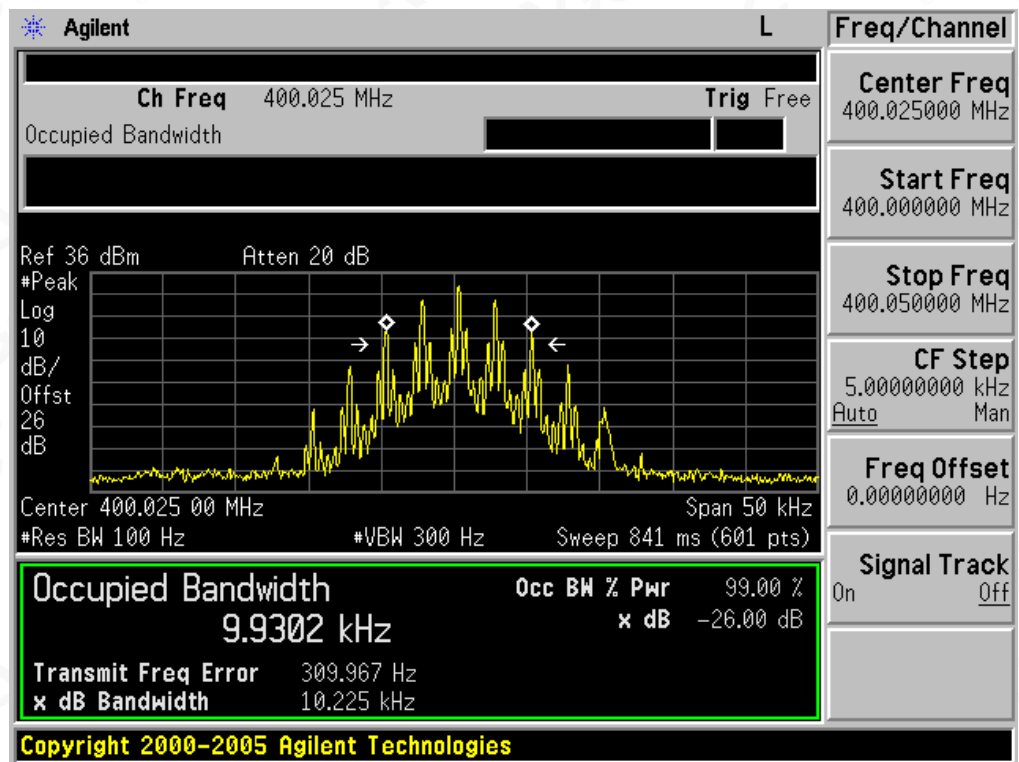
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26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	10.225 KHz	11.25 KHz	Pass
453.225MHz	10.211 KHz	11.25 KHz	Pass
454.025MHz	10.212 KHz	11.25 KHz	Pass
469.975MHz	10.550 KHz	11.25 KHz	Pass

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



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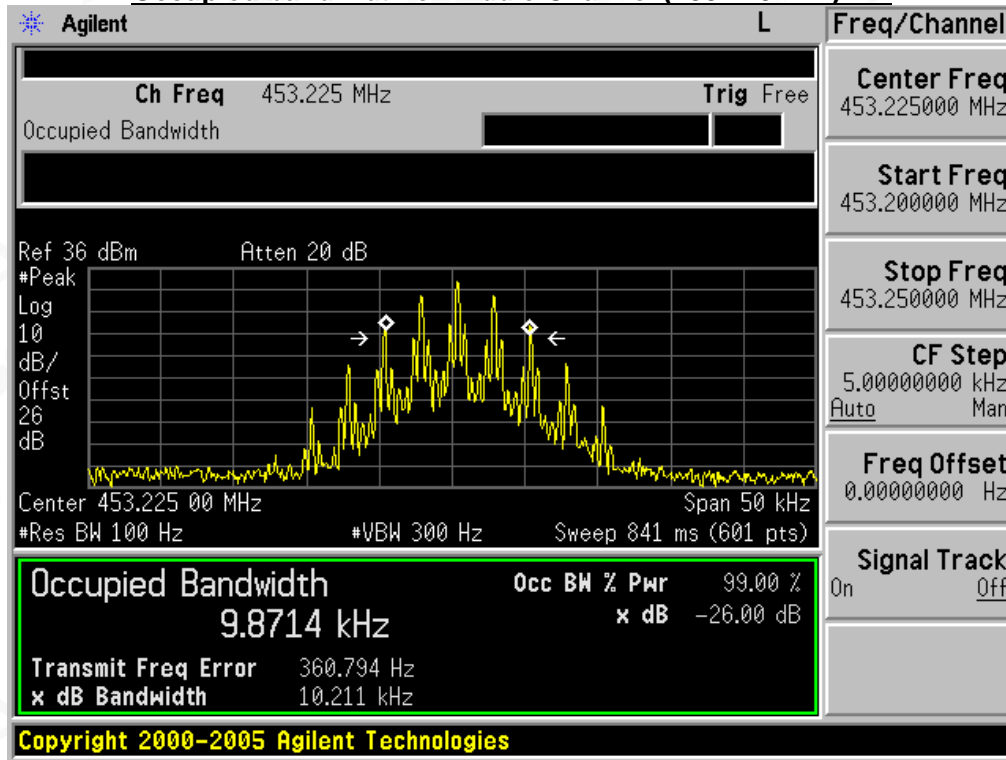
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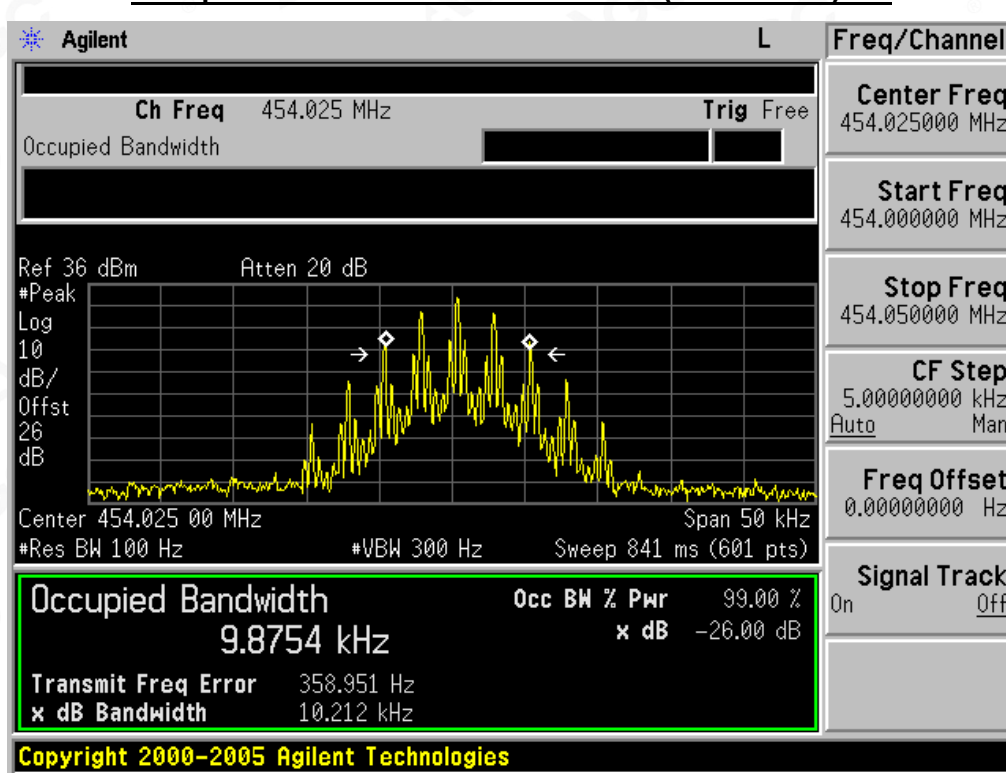
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**Occupied bandwidth of Middle Channel (453.225MHz)-2W**



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



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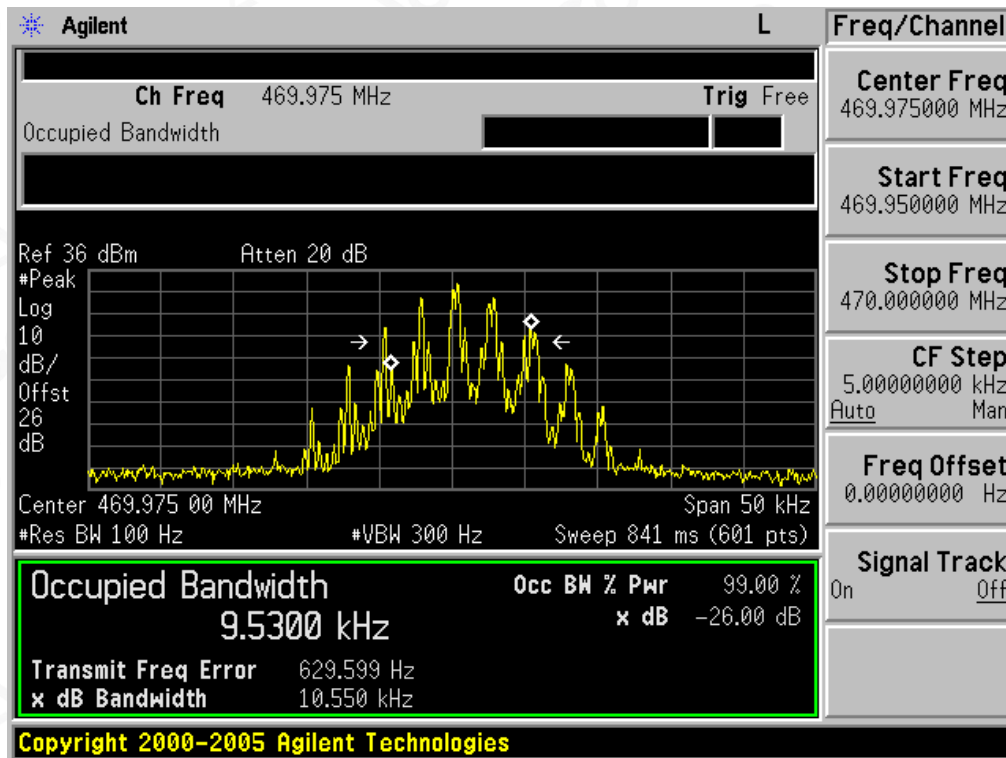
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**Occupied bandwidth of Top Channel (469.975MHz)-2W**



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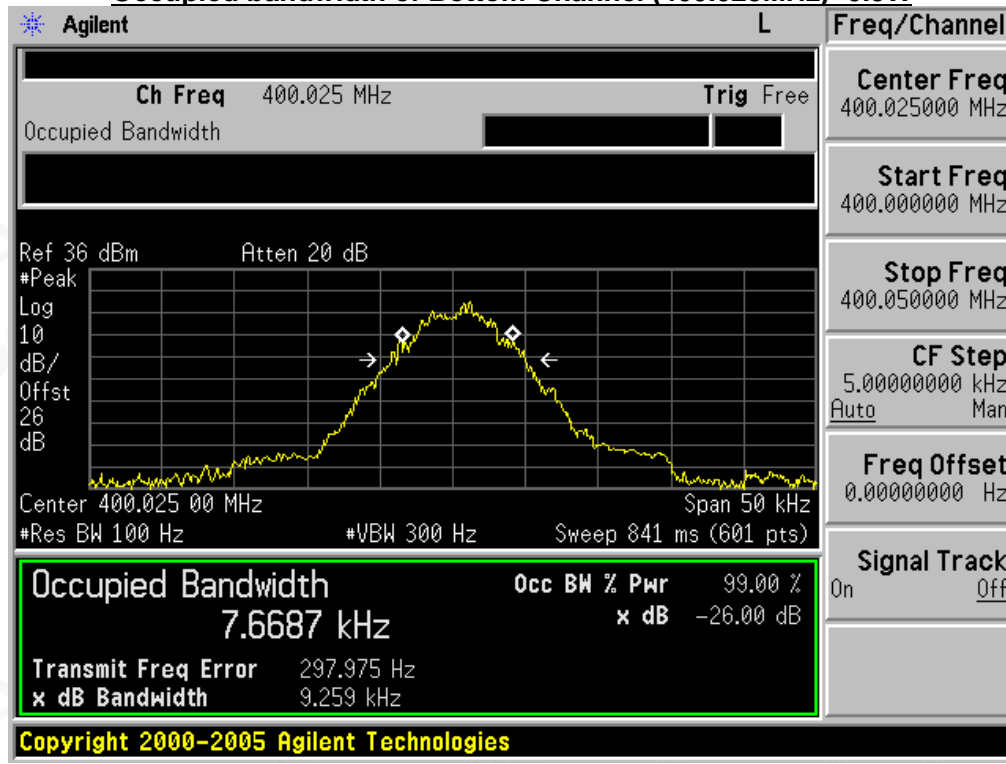
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**Digital:  
TEST RESULTS**

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	9.259 KHz	11.25 KHz	Pass
453.225MHz	9.503 KHz	11.25 KHz	Pass
454.025MHz	9.712 KHz	11.25 KHz	Pass
469.975MHz	9.472 KHz	11.25 KHz	Pass

**Occupied bandwidth of Bottom Channel (400.025MHz) -0.5W**



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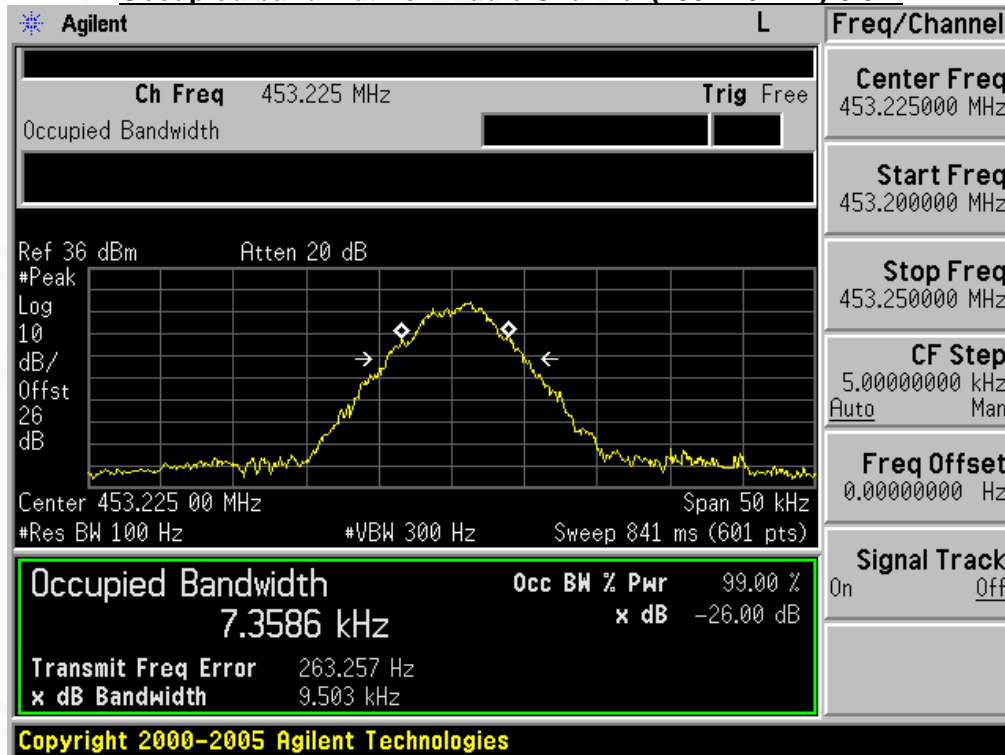
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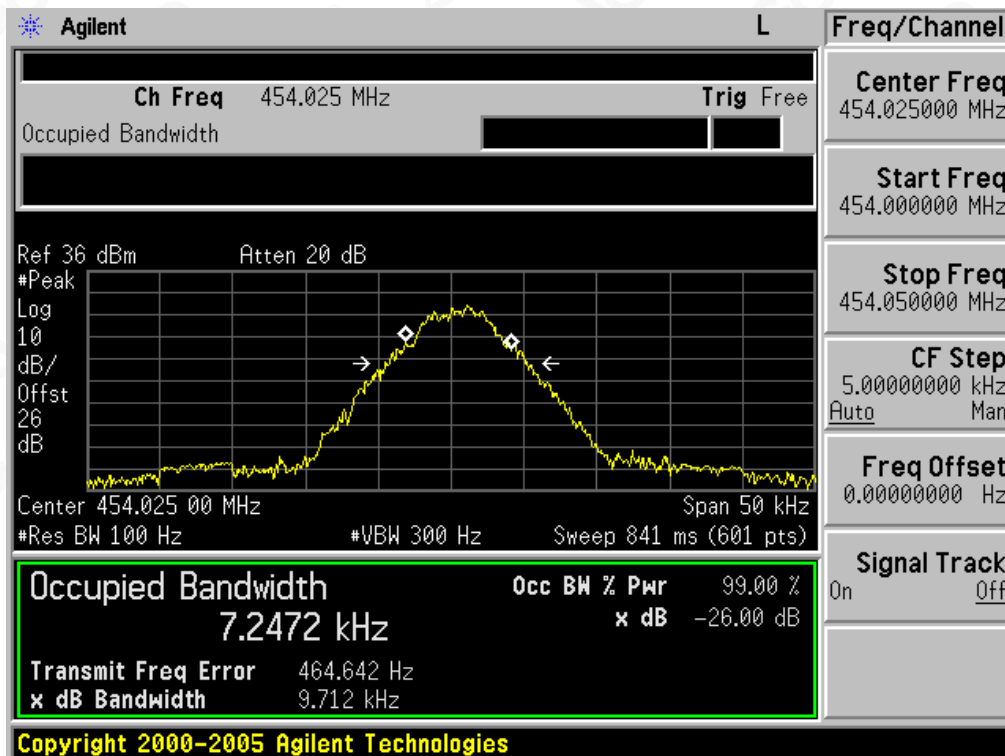
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**Occupied bandwidth of Middle Channel (453.225MHz)-0.5W**



**Occupied bandwidth of Middle Channel (454.025MHz)-0.5W**



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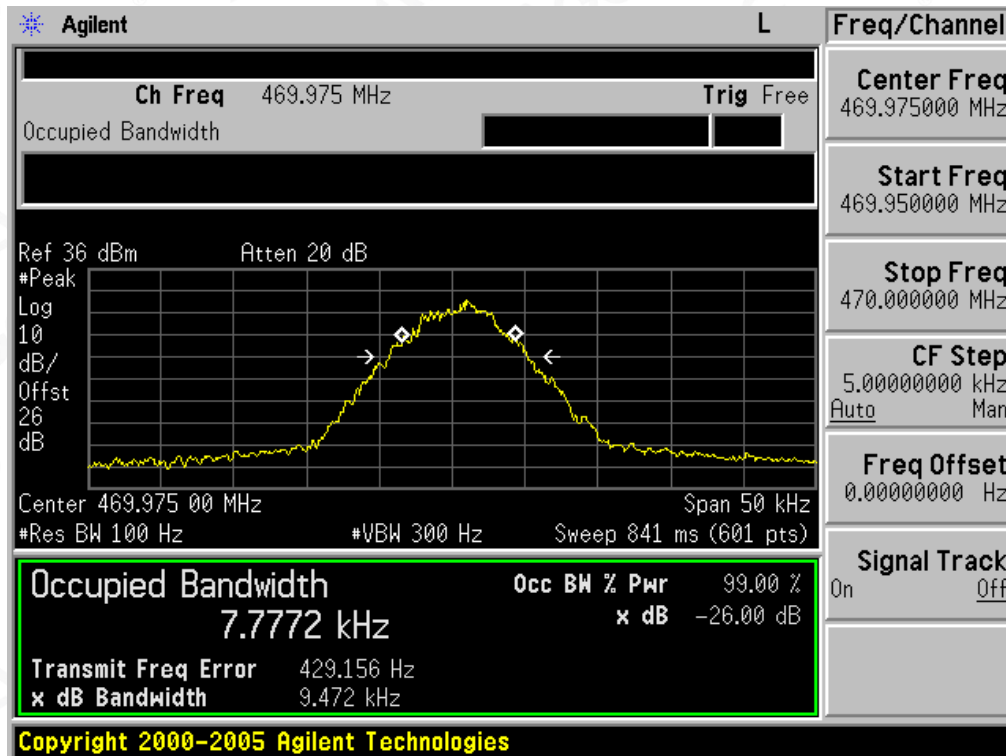
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**Occupied bandwidth of Top Channel (469.975MHz )-0.5W**



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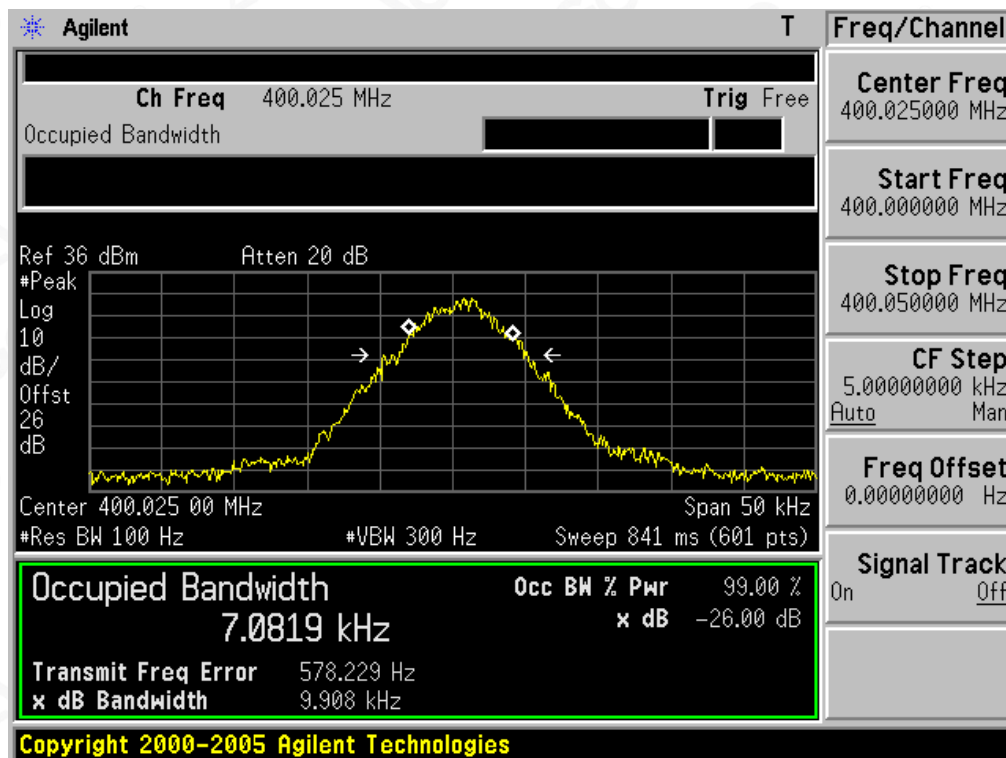
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**TEST RESULTS**

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	9.908 KHz	11.25 KHz	Pass
453.225MHz	9.857 KHz	11.25 KHz	Pass
454.025MHz	9.554 KHz	11.25 KHz	Pass
469.975MHz	9.671 KHz	11.25 KHz	Pass

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



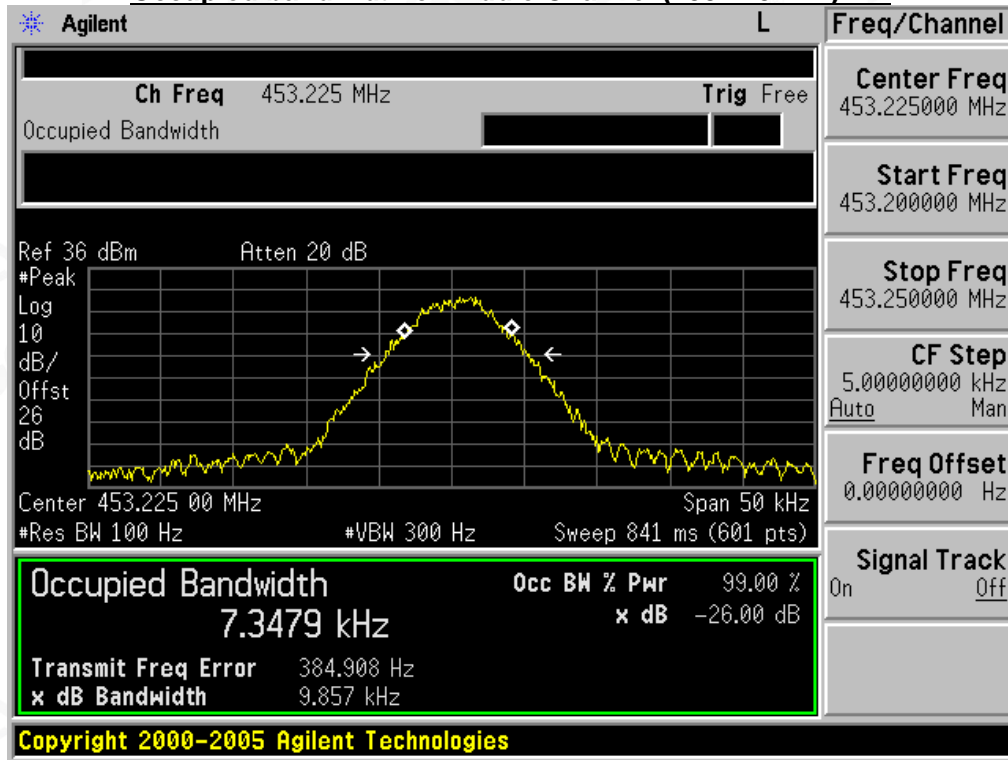
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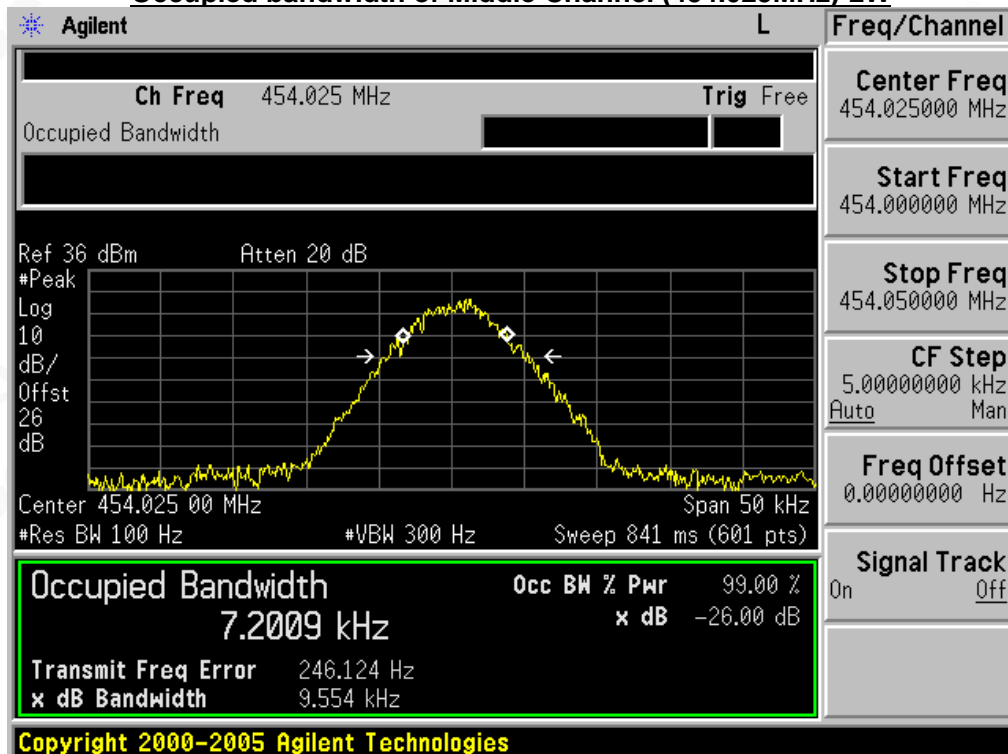
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### Occupied bandwidth of Middle Channel (453.225MHz)-2W



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



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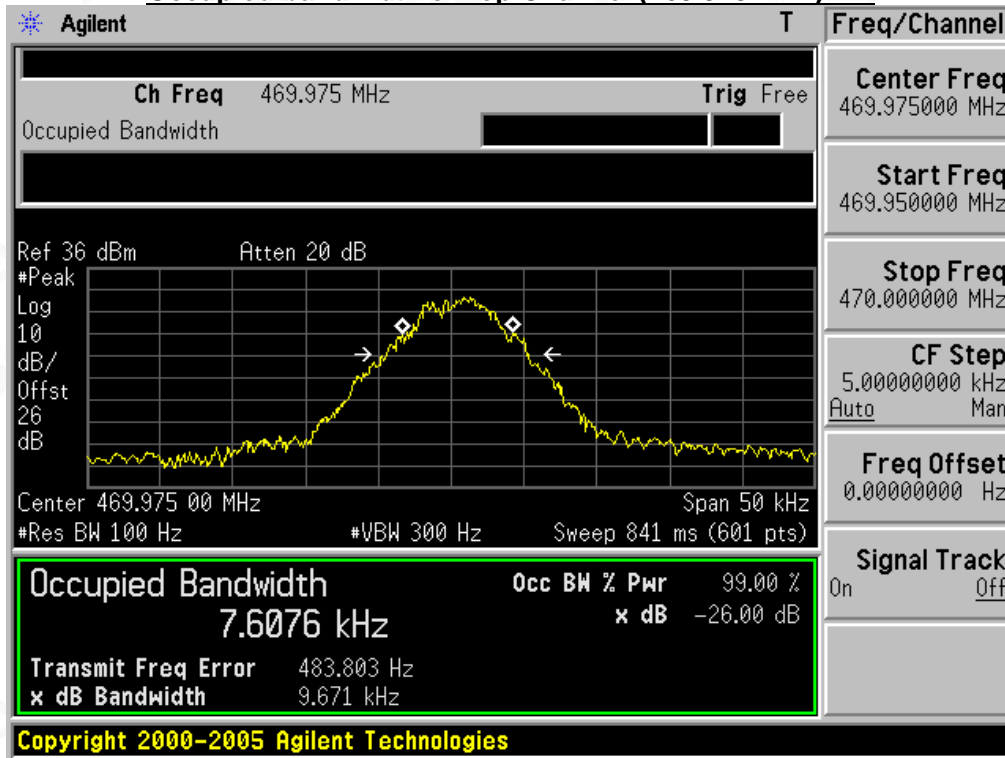
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**Occupied bandwidth of Top Channel (469.975MHz )-2W**



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## 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  $f_0$  to 5.625 KHz removed from  $f_0$ : Zero dB.
- (2). On any frequency removed from the center of the authorized bandwidth by a displacement Frequency ( $f_d$  in KHz)  $f_0$  of more than 5.625 KHz but no more than 12.5 KHz: At least  $7.27(f_d - 2.88 \text{ KHz})$  dB
- (3). On any frequency removed from the center of the authorized bandwidth by a displacement Frequency ( $f_d$  in KHz)  $f_0$  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 then be rotated through  $360^\circ$  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.

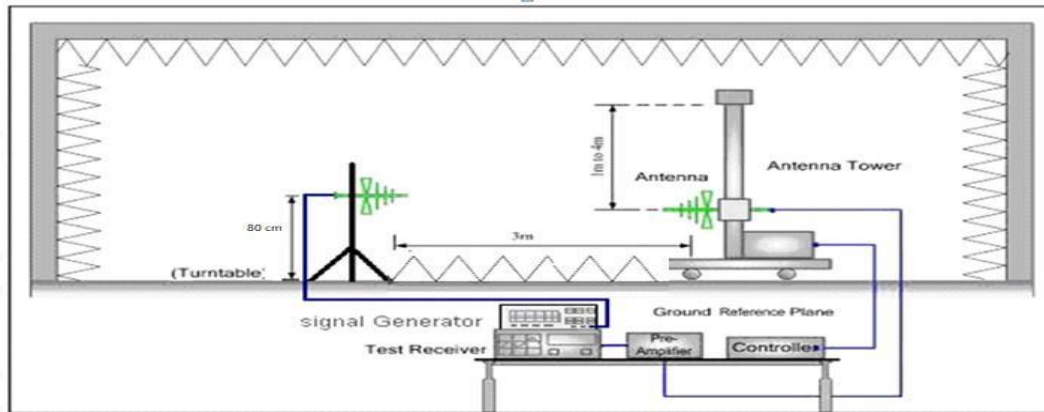
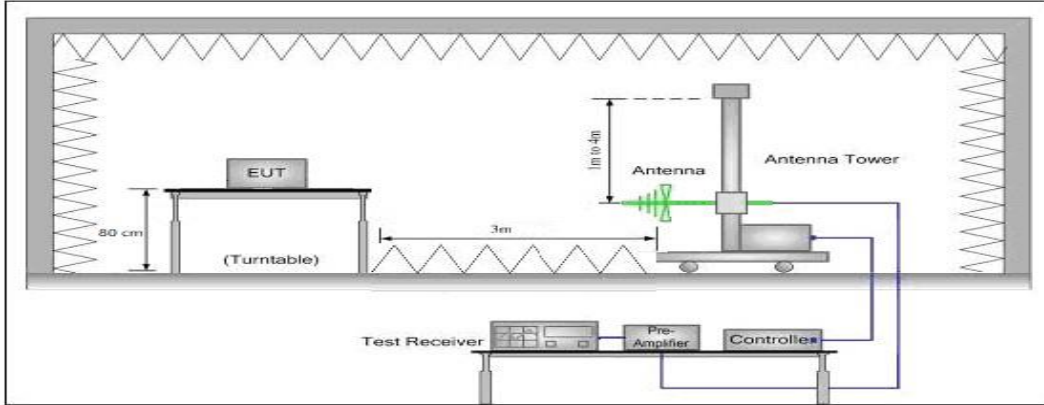


### 8.3 TEST SETUP BLOCK DIAGRAM

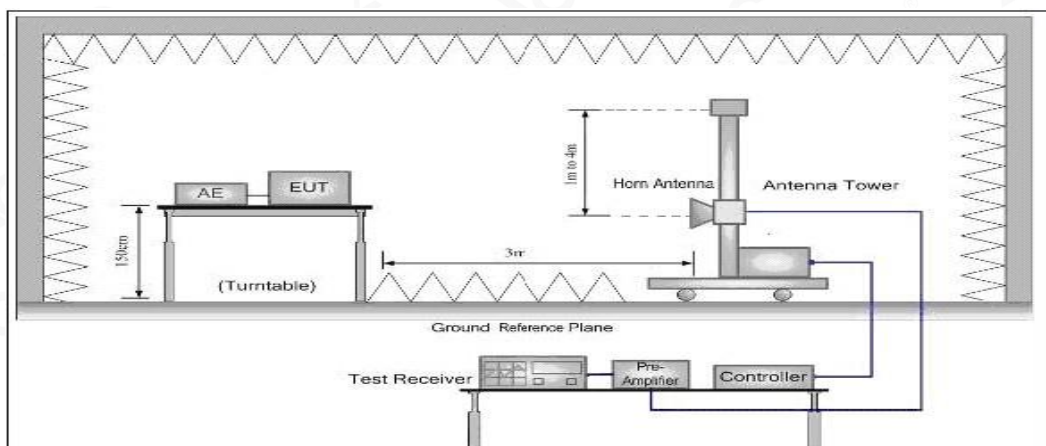
#### SUBSTITUTION METHOD: (Radiated Emissions)

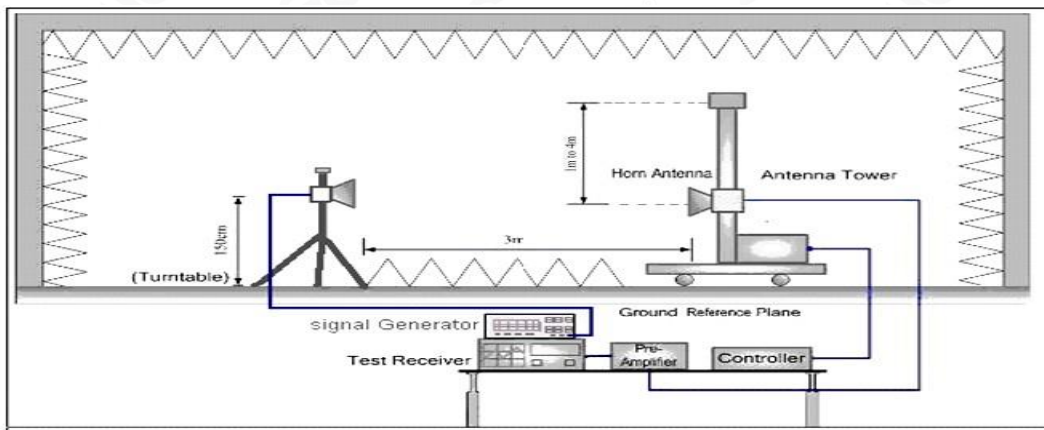
Radiation method:

#### Radiated Below 1GHz



#### 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 ( $f_d$  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<sup>th</sup> 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  $50+10 \log (P) = 50+10 \log (2) = 53.01$  (dB)—2W    33.01-53.01=-20 dBm**

**At least  $50+10 \log (P) = 50+10 \log (0.5) = 47$  (dB)—0.5W    26.99-47≈-20dBm**



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UHF:  
Analog:

**TEST RESULTS--2W**  
**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	-34.2	-20	pass
1200.075	H	-35.3	-20	pass
1600.100	H	-36.8	-20	pass
2000.125	H	-39.1	-20	pass
2400.150	H	-39.4	-20	pass
2800.175	H	-40.2	-20	pass
3200.200	H	-51.8	-20	pass
3600.225	H	-51.9	-20	pass
4000.250	H	-52.8	-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	-34.9	-20	pass
1200.075	V	-36.9	-20	pass
1600.100	V	-38.2	-20	pass
2000.125	V	-41.2	-20	pass
2400.150	V	-42.3	-20	pass
2800.175	V	-48.7	-20	pass
3200.200	V	-50.1	-20	pass
3600.225	V	-51.3	-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	V	0		pass
908.050	V	-33.2	-20	pass
1362.075	V	-35.4	-20	pass
1816.100	V	-36.9	-20	pass
2270.125	V	-44.1	-20	pass
2724.150	V	-46.3	-20	pass
3178.175	V	-48.7	-20	pass
3632.200	V	-51.4	-20	pass
4086.225	V	-51.9	-20	pass
4540.250	V	-52.7	-20	pass



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Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	H	0		pass
908.050	H	-34.3	-20	pass
1362.075	H	-35.8	-20	pass
1816.100	H	-38.7	-20	pass
2270.125	H	-39.9	-20	pass
2724.150	H	-41.9	-20	pass
3178.175	H	-42.6	-20	pass
3632.200	H	-45.5	-20	pass
4086.225	H	-49.4	-20	pass
4540.250	H	-50.8	-20	pass

**Measurement Result for 12.5 KHz Channel Separation @ 469.975MHz**

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
469.975	H	0		pass
939.950	H	-37.6	-20	pass
1409.925	H	-39.1	-20	pass
1879.900	H	-39.6	-20	pass
2349.875	H	-41.5	-20	pass
2819.850	H	-42.9	-20	pass
3289.825	H	-44.3	-20	pass
3759.800	H	-48.6	-20	pass
4229.775	H	-50.1	-20	pass
4699.750	H	-52.1	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
469.975	V	0		pass
939.950	V	-35.3	-20	pass
1409.925	V	-36.4	-20	pass
1879.900	V	-38.3	-20	pass
2349.875	V	-39.1	-20	pass
2819.850	V	-40.9	-20	pass
3289.825	V	-41.4	-20	pass
3759.800	V	-48.5	-20	pass
4229.775	V	-49.7	-20	pass
4699.750	V	-50.5	-20	pass



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Tel: +86-755 2523 4088

E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

**TEST RESULTS—0.5W**

**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	-37.4	-20	pass
1200.075	H	-39.4	-20	pass
1600.100	H	-40.3	-20	pass
2000.125	H	-41.4	-20	pass
2400.150	H	-42.5	-20	pass
2800.175	H	-46.3	-20	pass
3200.200	H	-49.4	-20	pass
3600.225	H	-50.1	-20	pass
4000.250	H	-51.9	-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	-37.1	-20	pass
1200.075	V	-38.3	-20	pass
1600.100	V	-39.9	-20	pass
2000.125	V	-40.6	-20	pass
2400.150	V	-41.7	-20	pass
2800.175	V	-43.2	-20	pass
3200.200	V	-49.3	-20	pass
3600.225	V	-50.7	-20	pass
4000.250	V	-51.6	-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	-38.1	-20	pass
1362.075	H	-38.9	-20	pass
1816.100	H	-40.1	-20	pass
2270.125	H	-41.7	-20	pass
2724.150	H	-42.8	-20	pass
3178.175	H	-47.9	-20	pass
3632.200	H	-48.3	-20	pass
4086.225	H	-50.4	-20	pass
4540.250	H	-52.1	-20	pass



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Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Service Hotline:400 089 2118



Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	V	0		pass
908.050	V	-38.2	-20	pass
1362.075	V	-37.6	-20	pass
1816.100	V	-39.4	-20	pass
2270.125	V	-42.5	-20	pass
2724.150	V	-46.6	-20	pass
3178.175	V	-48.8	-20	pass
3632.200	V	-50.2	-20	pass
4086.225	V	-50.7	-20	pass
4540.250	V	-51.1	-20	pass

**Measurement Result for 12.5 KHz Channel Separation @ 469.975MHz**

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
469.975	H	0		pass
939.950	H	-38.6	-20	pass
1409.925	H	-38.9	-20	pass
1879.900	H	-36.7	-20	pass
2349.875	H	-39.3	-20	pass
2819.850	H	-40.5	-20	pass
3289.825	H	-46.4	-20	pass
3759.800	H	-49.3	-20	pass
4229.775	H	-51.4	-20	pass
4699.750	H	-52.9	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
469.975	V	0		pass
939.950	V	-36.3	-20	pass
1409.925	V	-35.2	-20	pass
1879.900	V	-38.4	-20	pass
2349.875	V	-39.5	-20	pass
2819.850	V	-40.3	-20	pass
3289.825	V	-45.2	-20	pass
3759.800	V	-46.3	-20	pass
4229.775	V	-49.3	-20	pass
4699.750	V	-51.1	-20	pass



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E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

Digital:

**TEST RESULTS-2W**  
**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	-36.3	-20	pass
1200.075	H	-36.7	-20	pass
1600.100	H	-37.5	-20	pass
2000.125	H	-38.3	-20	pass
2400.150	H	-41.0	-20	pass
2800.175	H	-42.1	-20	pass
3200.200	H	-46.8	-20	pass
3600.225	H	-49.6	-20	pass
4000.250	H	-50.8	-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	-37.1	-20	pass
1200.075	V	-37.8	-20	pass
1600.100	V	-38.6	-20	pass
2000.125	V	-39.7	-20	pass
2400.150	V	-40.1	-20	pass
2800.175	V	-45.3	-20	pass
3200.200	V	-48.8	-20	pass
3600.225	V	-51.2	-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	-37.4	-20	pass
1362.075	H	-38.5	-20	pass
1816.100	H	-35.3	-20	pass
2270.125	H	-38.1	-20	pass
2724.150	H	-40.4	-20	pass
3178.175	H	-44.3	-20	pass
3632.200	H	-48.4	-20	pass
4086.225	H	-51.1	-20	pass
4540.250	H	-52.0	-20	pass



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Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	V	0		pass
908.050	V	-36.4	-20	pass
1362.075	V	-37.1	-20	pass
1816.100	V	-38.9	-20	pass
2270.125	V	-40.1	-20	pass
2724.150	V	-40.7	-20	pass
3178.175	V	-44.6	-20	pass
3632.200	V	-45.9	-20	pass
4086.225	V	-49.7	-20	pass
4540.250	V	-51.7	-20	pass

**Measurement Result for 12.5 KHz Channel Separation @ 469.975MHz**

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
469.975	H	0		pass
939.950	H	-36.4	-20	pass
1409.925	H	-38.3	-20	pass
1879.900	H	-39.4	-20	pass
2349.875	H	-40.3	-20	pass
2819.850	H	-43.4	-20	pass
3289.825	H	-48.3	-20	pass
3759.800	H	-49.4	-20	pass
4229.775	H	-50.1	-20	pass
4699.750	H	-51.6	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
469.975	V	0		pass
939.950	V	-36.6	-20	pass
1409.925	V	-35.8	-20	pass
1879.900	V	-37.3	-20	pass
2349.875	V	-41.1	-20	pass
2819.850	V	-43.3	-20	pass
3289.825	V	-45.9	-20	pass
3759.800	V	-47.0	-20	pass
4229.775	V	-51.4	-20	pass
4699.750	V	-52.2	-20	pass



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E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

**TEST RESULTS-0.5W**  
**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	-37.6	-20	pass
1200.075	H	-39.1	-20	pass
1600.100	H	-40.2	-20	pass
2000.125	H	-44.7	-20	pass
2400.150	H	-45.8	-20	pass
2800.175	H	-48.4	-20	pass
3200.200	H	-50.1	-20	pass
3600.225	H	-51.3	-20	pass
4000.250	H	-52.0	-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	-37.7	-20	pass
1200.075	V	-38.3	-20	pass
1600.100	V	-40.1	-20	pass
2000.125	V	-41.9	-20	pass
2400.150	V	-42.6	-20	pass
2800.175	V	-45.4	-20	pass
3200.200	V	-49.5	-20	pass
3600.225	V	-50.2	-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	-35.3	-20	pass
1362.075	H	-36.8	-20	pass
1816.100	H	-37.6	-20	pass
2270.125	H	-38.7	-20	pass
2724.150	H	-44.2	-20	pass
3178.175	H	-46.7	-20	pass
3632.200	H	-48.5	-20	pass
4086.225	H	-50.0	-20	pass
4540.250	H	-51.1	-20	pass



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Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
454.025	V	0		pass
908.050	V	-37.4	-20	pass
1362.075	V	-38.3	-20	pass
1816.100	V	-41.0	-20	pass
2270.125	V	-42.5	-20	pass
2724.150	V	-44.9	-20	pass
3178.175	V	-45.3	-20	pass
3632.200	V	-50.6	-20	pass
4086.225	V	-51.9	-20	pass
4540.250	V	-52.3	-20	pass

**Measurement Result for 12.5 KHz Channel Separation @ 469.975MHz**

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
469.975	H	0		pass
939.950	H	-37.2	-20	pass
1409.925	H	-37.9	-20	pass
1879.900	H	-38.5	-20	pass
2349.875	H	-41.3	-20	pass
2819.850	H	-45.5	-20	pass
3289.825	H	-47.9	-20	pass
3759.800	H	-48.2	-20	pass
4229.775	H	-50.4	-20	pass
4699.750	H	-51.6	-20	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result (dBm)	Limit (dBm)	Result(P/F)
469.975	V	0		pass
939.950	V	-37.9	-20	pass
1409.925	V	-38.5	-20	pass
1879.900	V	-39.3	-20	pass
2349.875	V	-41.0	-20	pass
2819.850	V	-45.6	-20	pass
3289.825	V	-48.4	-20	pass
3759.800	V	-49.7	-20	pass
4229.775	V	-50.5	-20	pass
4699.750	V	-51.3	-20	pass



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### 8.5 EMISSION MASK PLOT

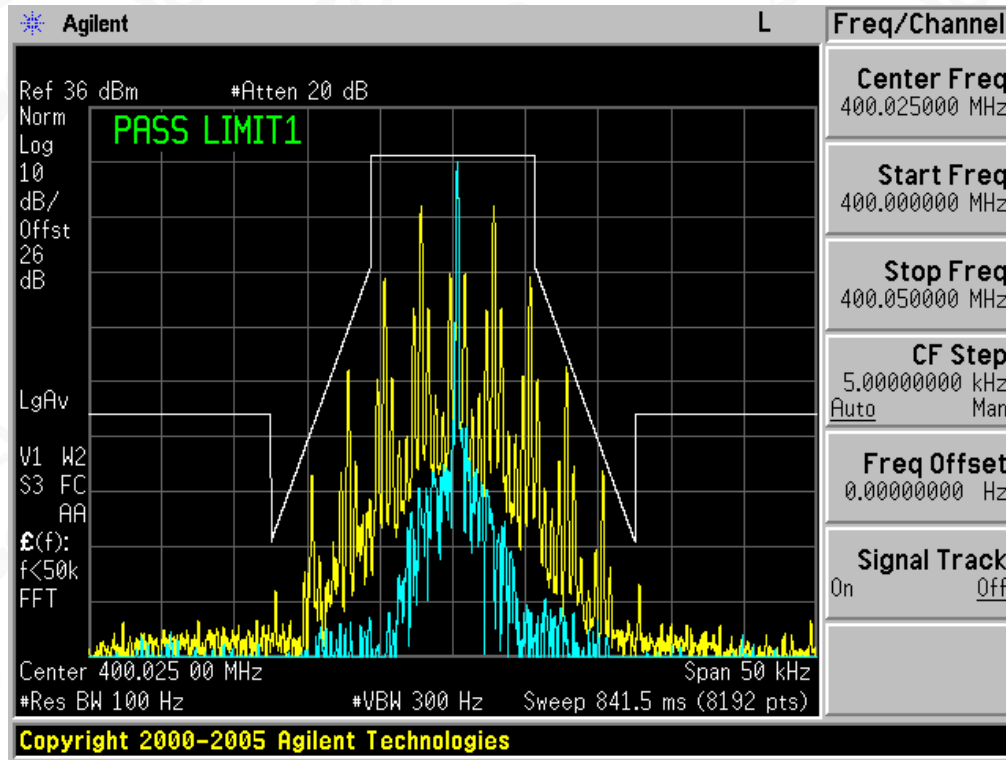
The detailed procedure employed for Emission Mask measurements are specified as following:

- 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 (0.5W)



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

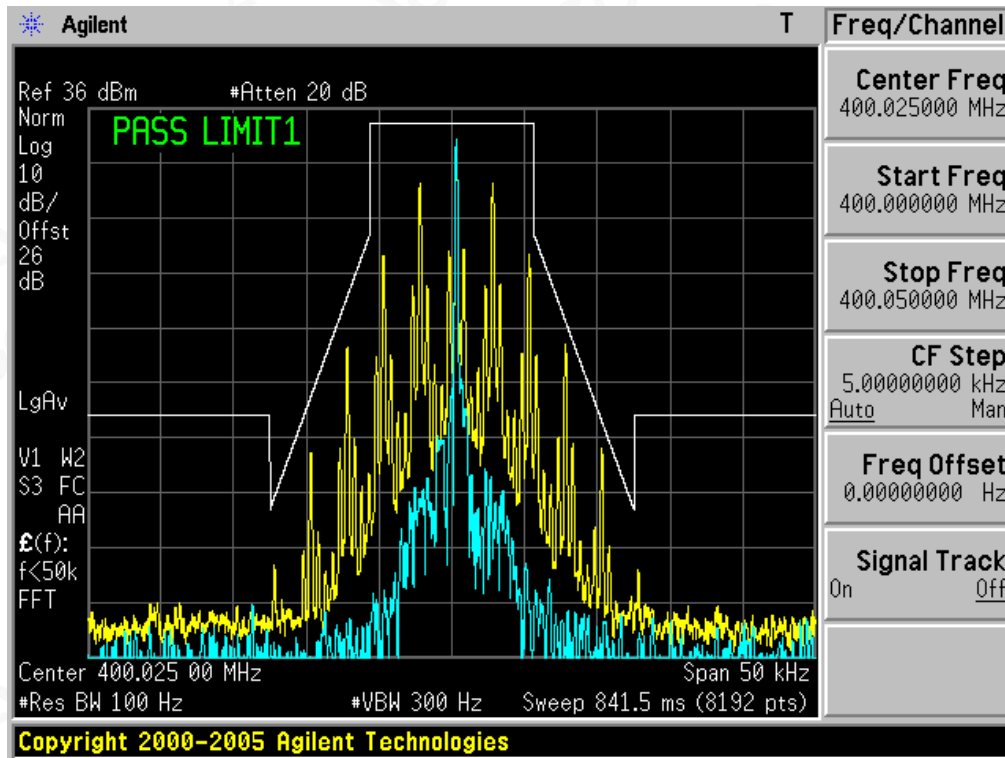
Add: 2/F., Building 2, No.1-4, Chaxi Sanwei Technial Industrial Park, Gushu,  
Xixiang, Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755 2523 4088

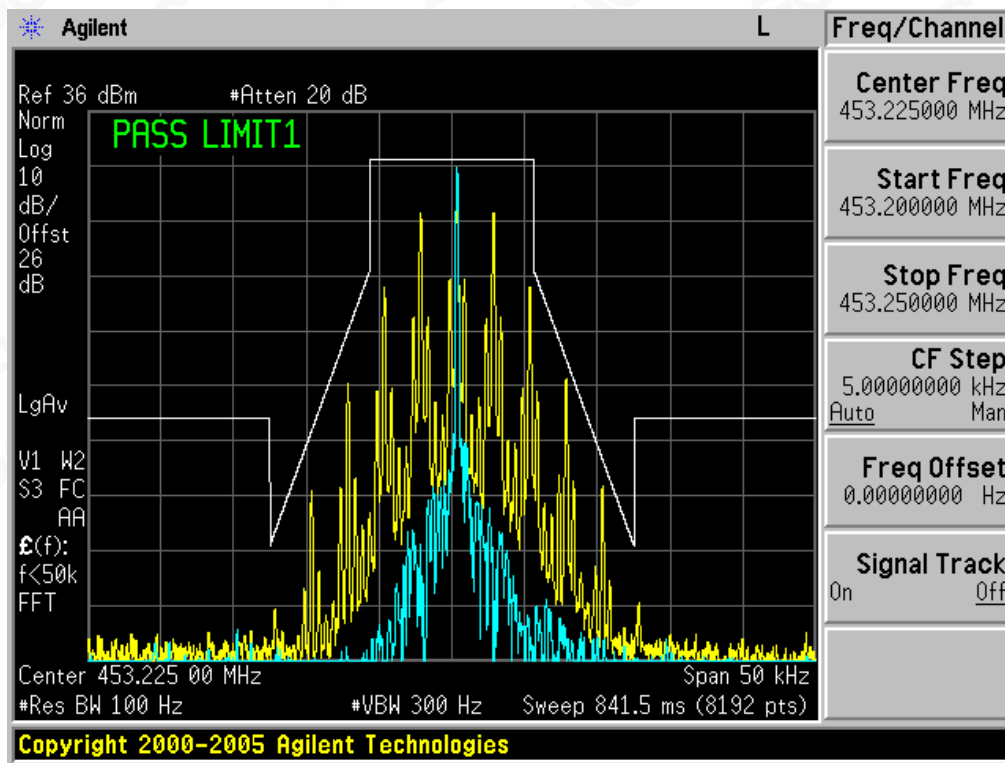
E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

**The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (2W)**



**The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (0.5W)**



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

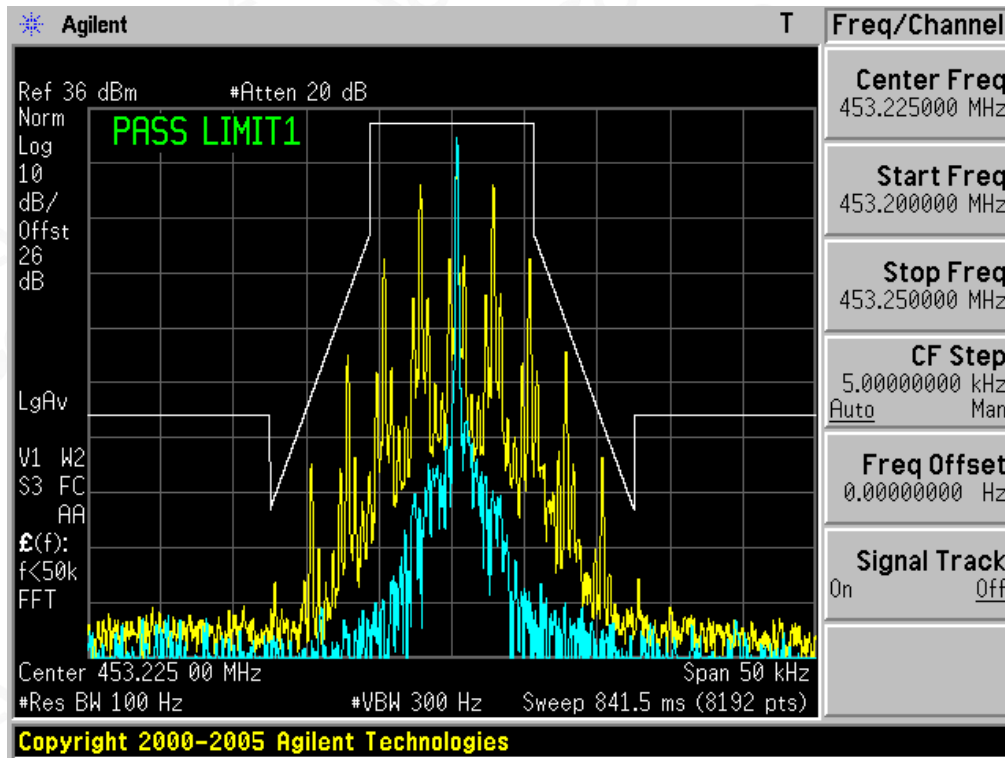
Add: 2/F., Building 2, No.1-4, Chaxi Sanwei Technial Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755 2523 4088

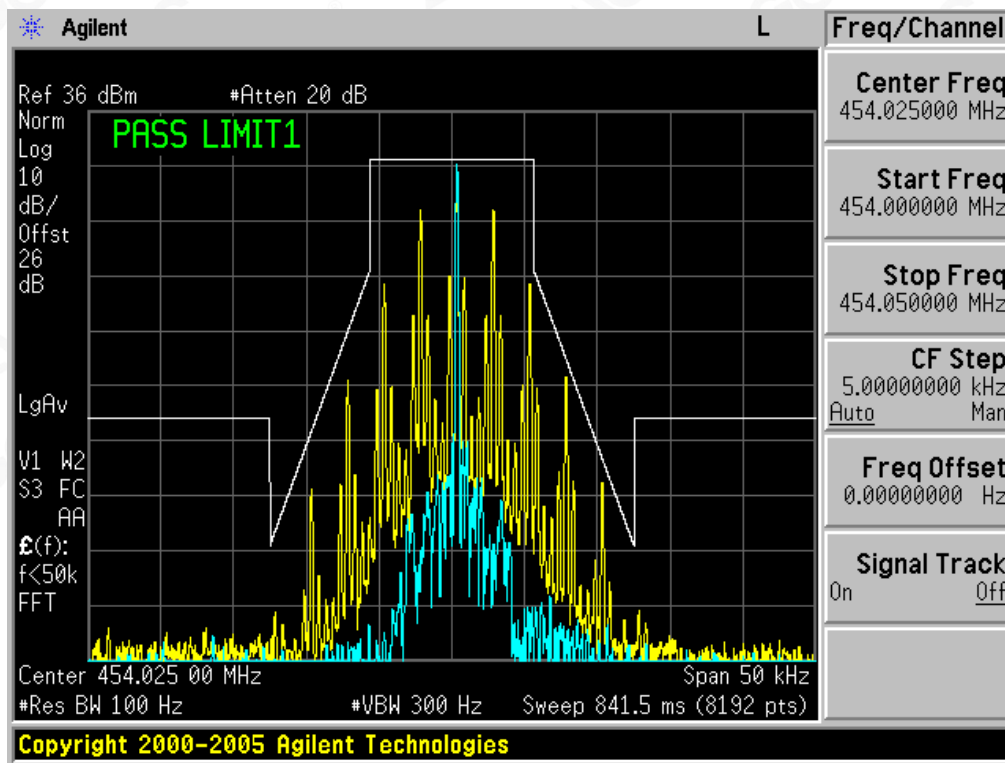
E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

**The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (2W)**



**The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (0.5W)**



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

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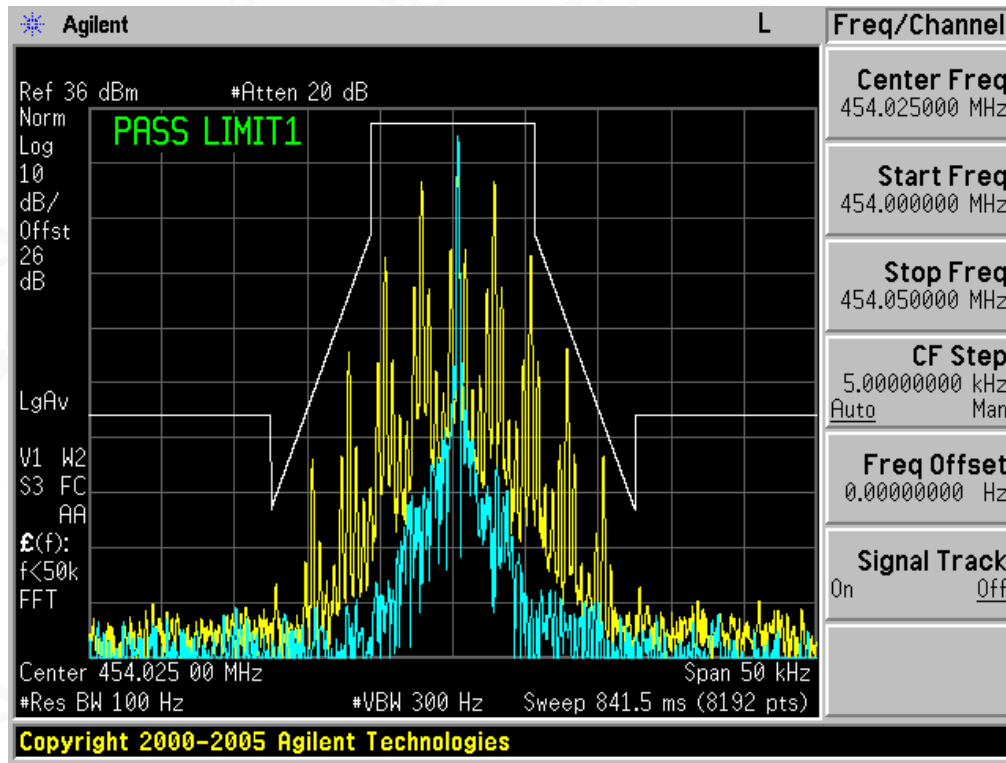
Tel: +86-755 2523 4088

E-mail: agc@agc-cert.com

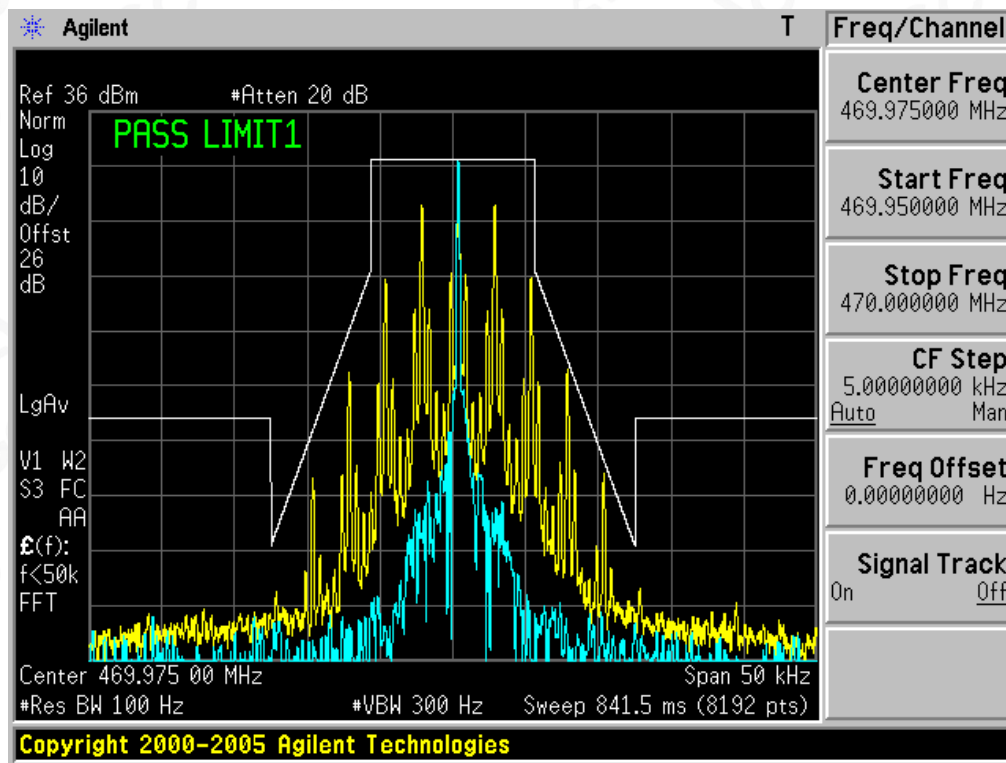
Service Hotline:400 089 2118



**The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (2W)**



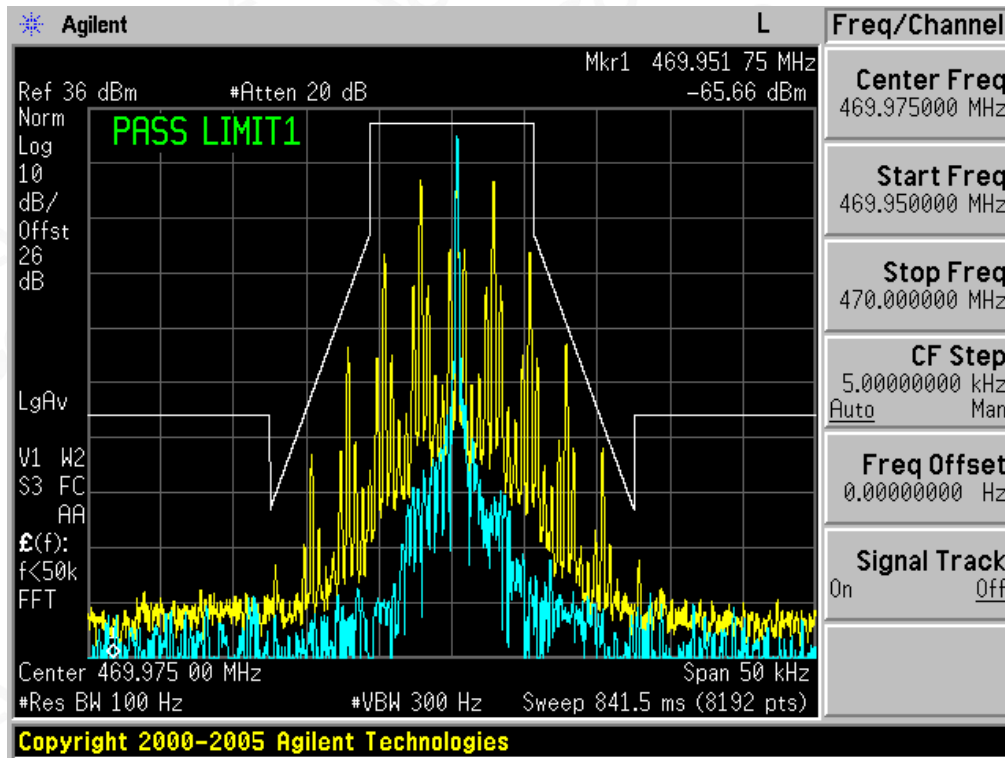
**The Worst Emission Mask D for (469.975 MHz) of 12.5 KHz channel Separation (0.5W)**



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**The Worst Emission Mask D for (469.975 MHz) of 12.5 KHz channel Separation (2W)**



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Add: 2/F., Building 2, No.1-4, Chaxi Sanwei Technial Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China

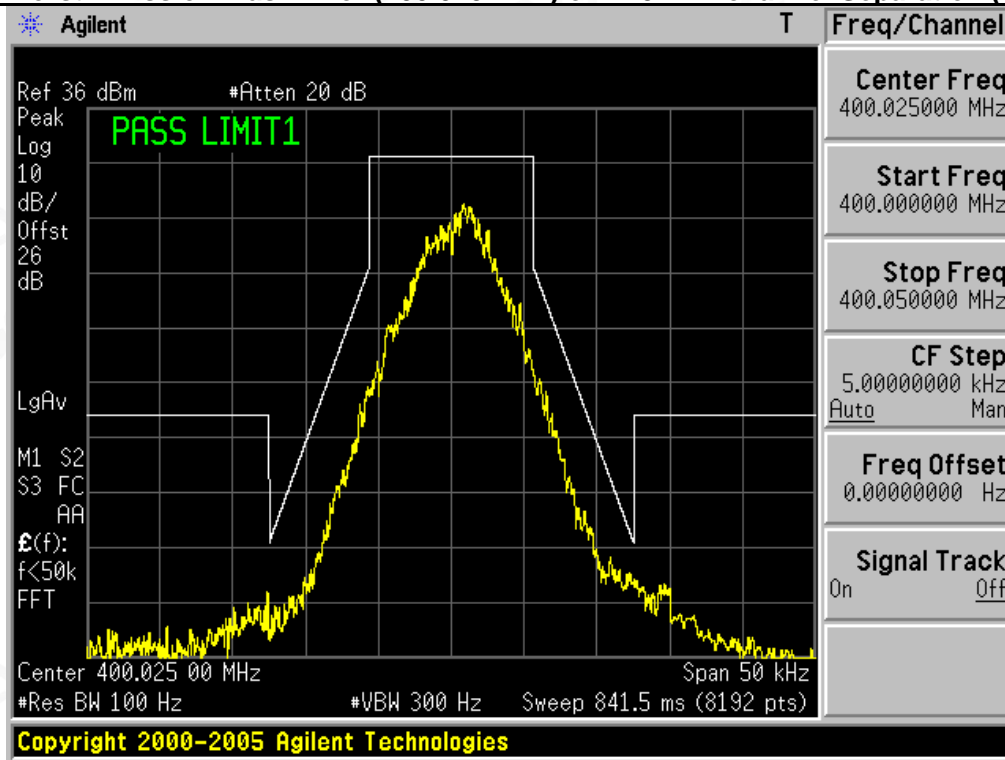
Tel: +86-755 2523 4088

E-mail: agc@agc-cert.com

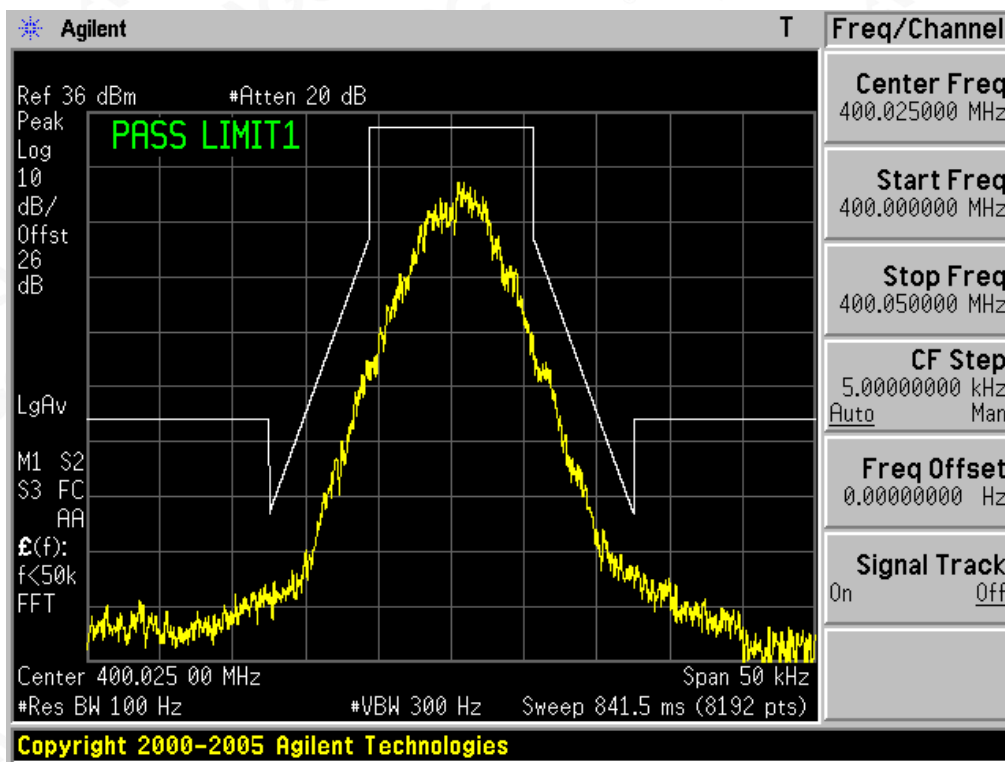
Service Hotline:400 089 2118

Digital:

**The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (0.5W)**



**The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (2W)**



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

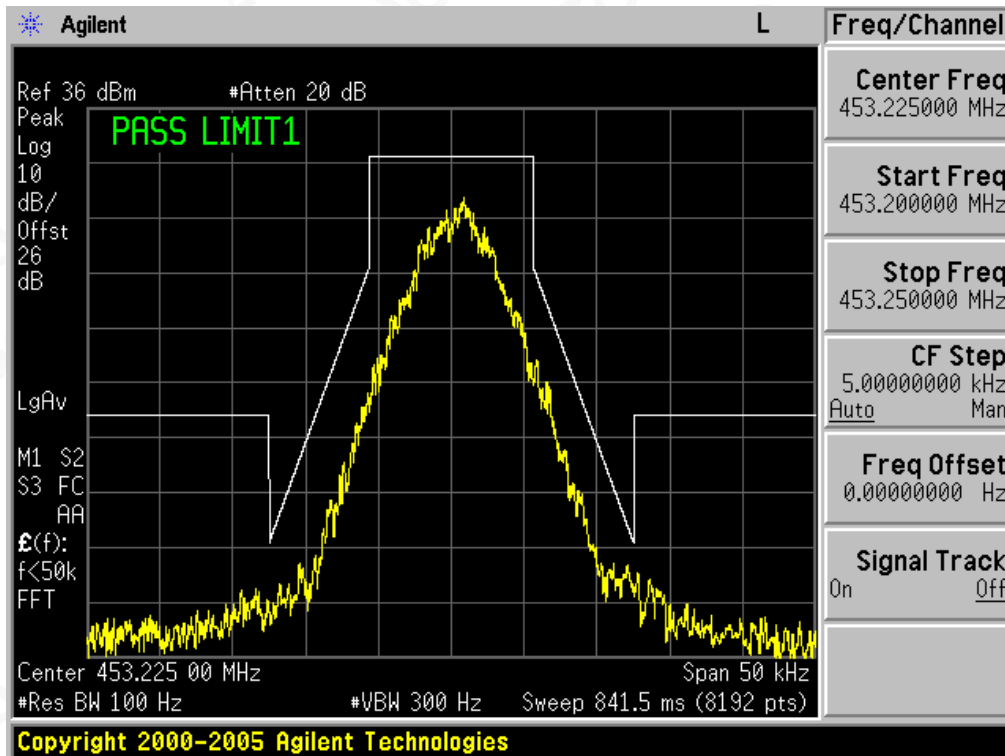
Add: 2/F., Building 2, No.1-4, Chaxi Sanwei Technial Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755 2523 4088

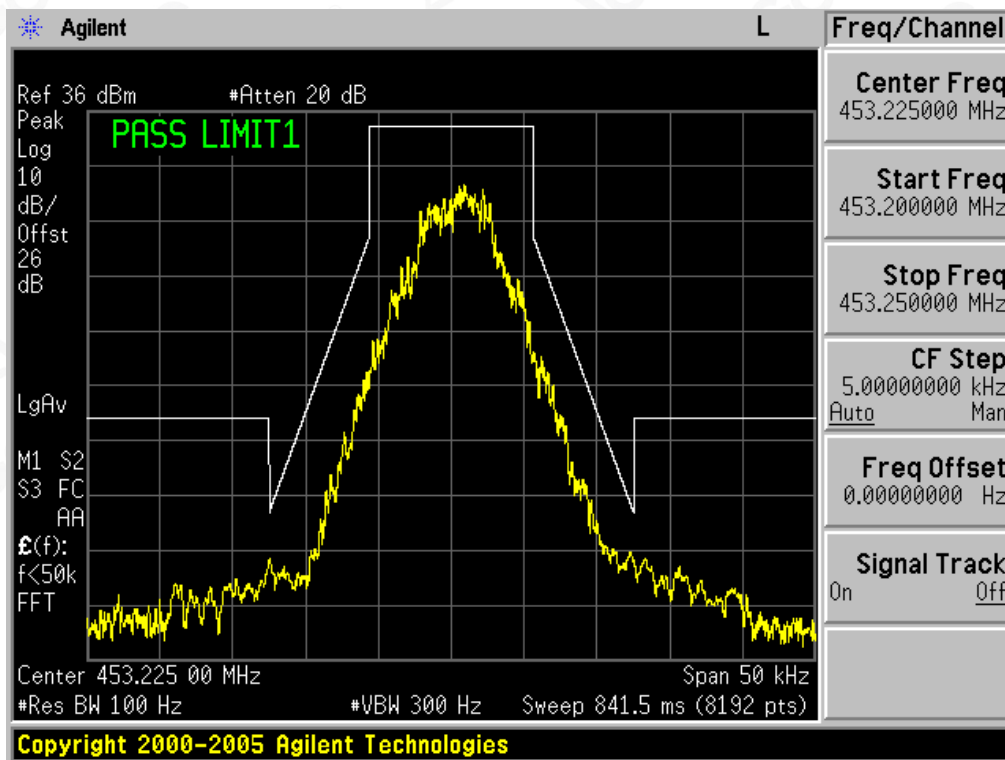
E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

**The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (0.5W)**



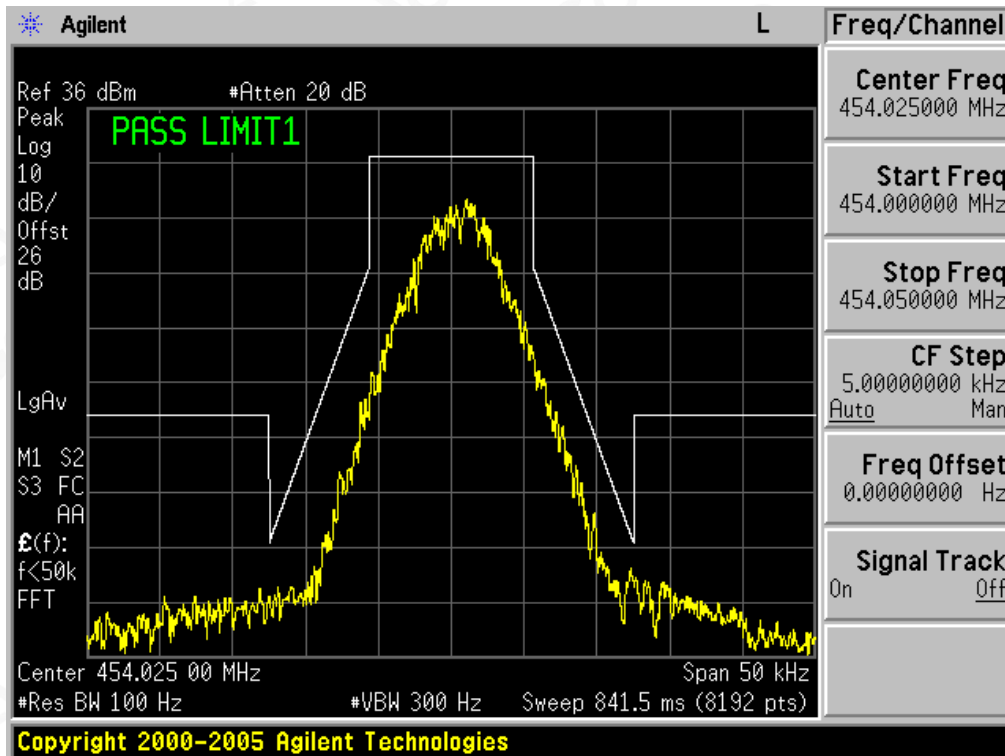
**The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (2W)**



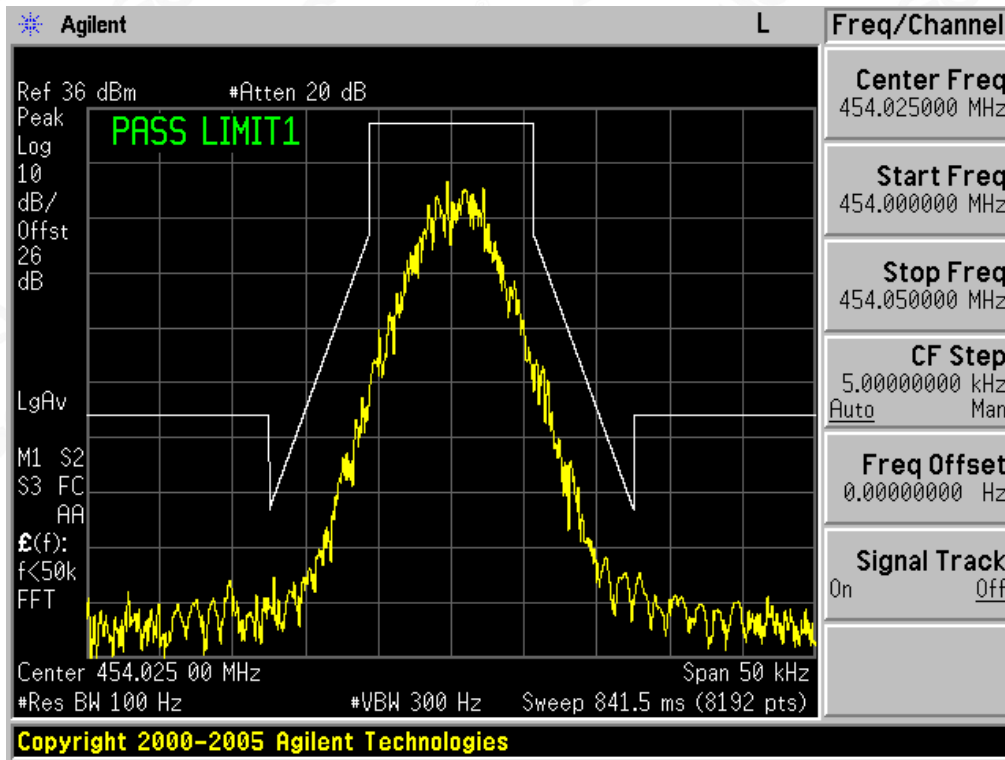
Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2, No.1-4, Chaxi Sanwei Technial Industrial Park, Gushu,  
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**The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (0.5W)**



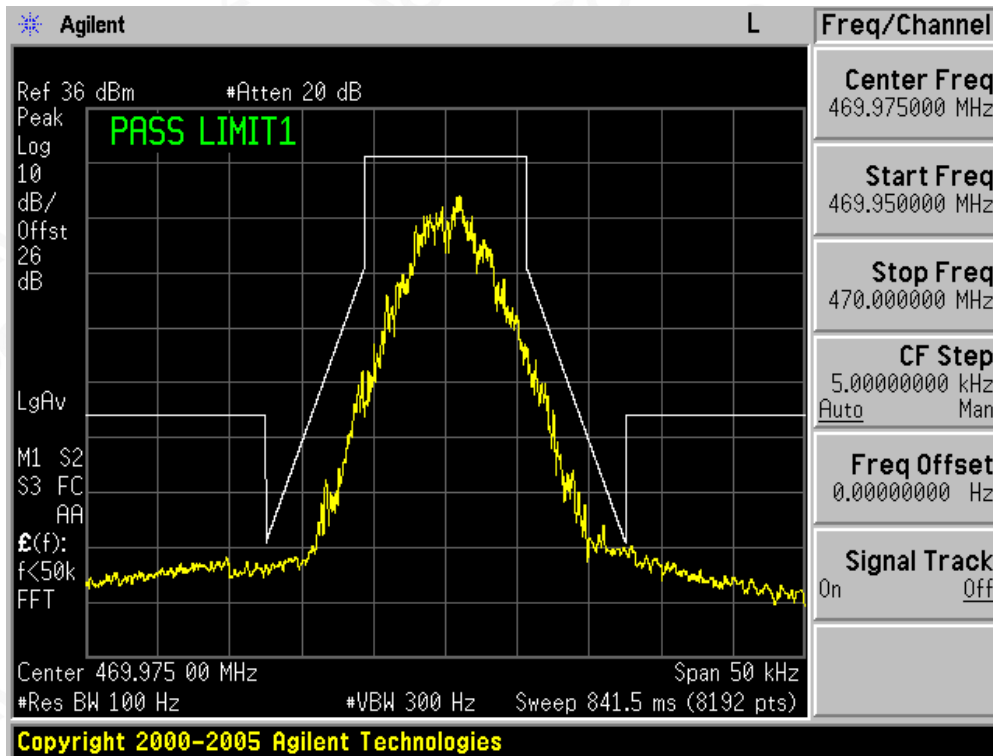
**The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (2W)**



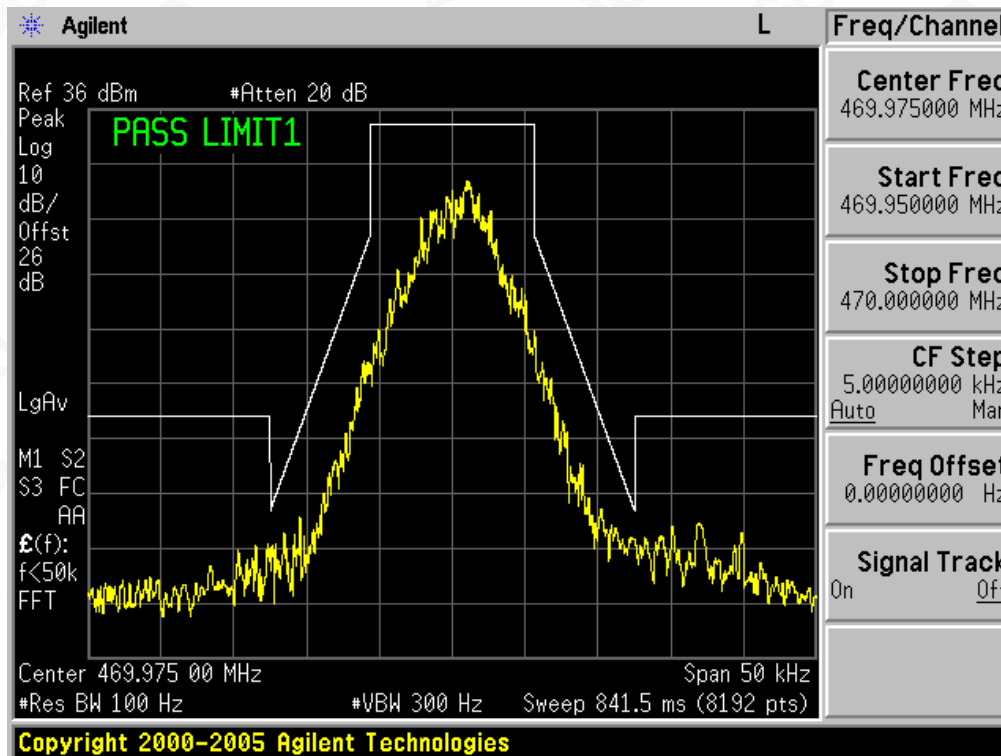
Attestation of Global Compliance(Shenzhen)Co.,Ltd.

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Xixiang, Bao'an District, Shenzhen, Guangdong, China  
Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Service Hotline:400 089 2118

**The Worst Emission Mask D for (469.975 MHz) of 12.5 KHz channel Separation (0.5W)**



**The Worst Emission Mask D for (469.975 MHz) of 12.5 KHz channel Separation (2W)**



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

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E-mail: agc@agc-cert.com

Service Hotline:400 089 2118

## 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.

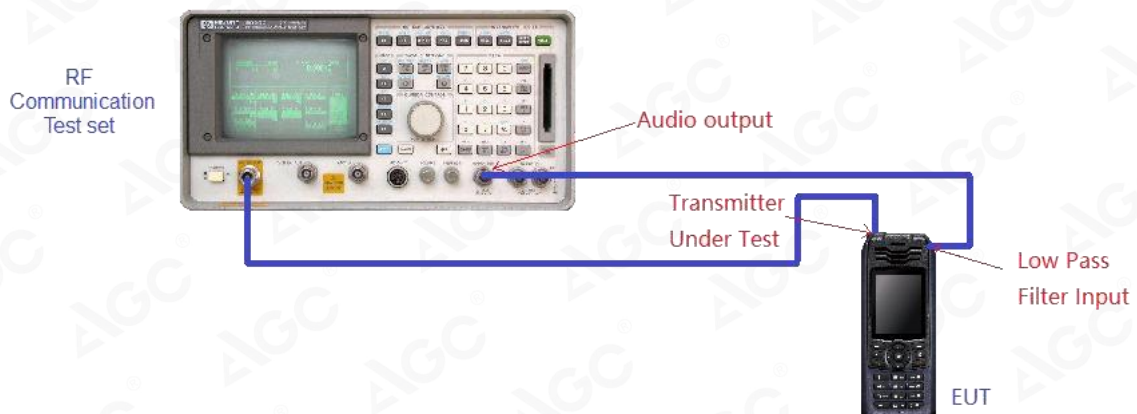
### 9.2 MEASUREMENT METHOD

#### 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 =  $20\log_{10}(\text{Deviation of test frequency}/\text{Deviation of 1 KHz reference})$ .



### 9.3 MEASUREMENT RESULT

UHF:

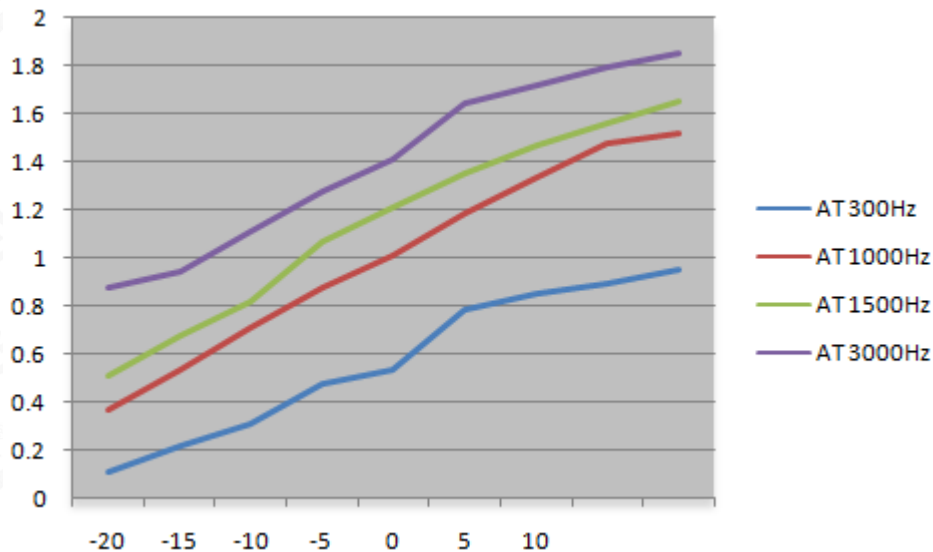
Analog:

#### TEST RESULT TS FOR H POWER H LEVEL

(A). MODULATION LIMIT:

##### High 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	0.11	0.37	0.51	0.88
-15	0.22	0.54	0.68	0.95
-10	0.31	0.71	0.82	1.11
-5	0.48	0.88	1.07	1.28
0	0.53	1.01	1.21	1.41
+5	0.78	1.19	1.35	1.64
+10	0.85	1.34	1.47	1.72
+15	0.89	1.48	1.56	1.79
+20	0.95	1.52	1.65	1.85



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



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**(B). AUDIO FREQUENCY RESPONSE:**  
**High Channel @ 12.5 KHz Channel Separations**

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.16	-9.90
400	0.21	-7.54
500	0.38	-2.38
600	0.47	-0.54
700	0.52	0.34
800	0.69	2.80
900	0.75	3.52
1000	0.86	4.71
1200	0.91	5.20
1400	1.02	6.19
1600	1.11	6.93
1800	1.26	8.03
2000	1.38	8.82
2400	1.41	9.00
2500	1.59	10.05
2800	1.63	10.26
3000	1.78	11.03
3200	1.89	11.55
3600	1.65	10.37
4000	1.11	6.93
4500	0.93	5.39
5000	0.84	4.51
5500	0.52	0.34
6000	0.24	-6.38
6500	0.11	-13.15
7000	0.08	-15.92
7500	0.05	-20.00
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--



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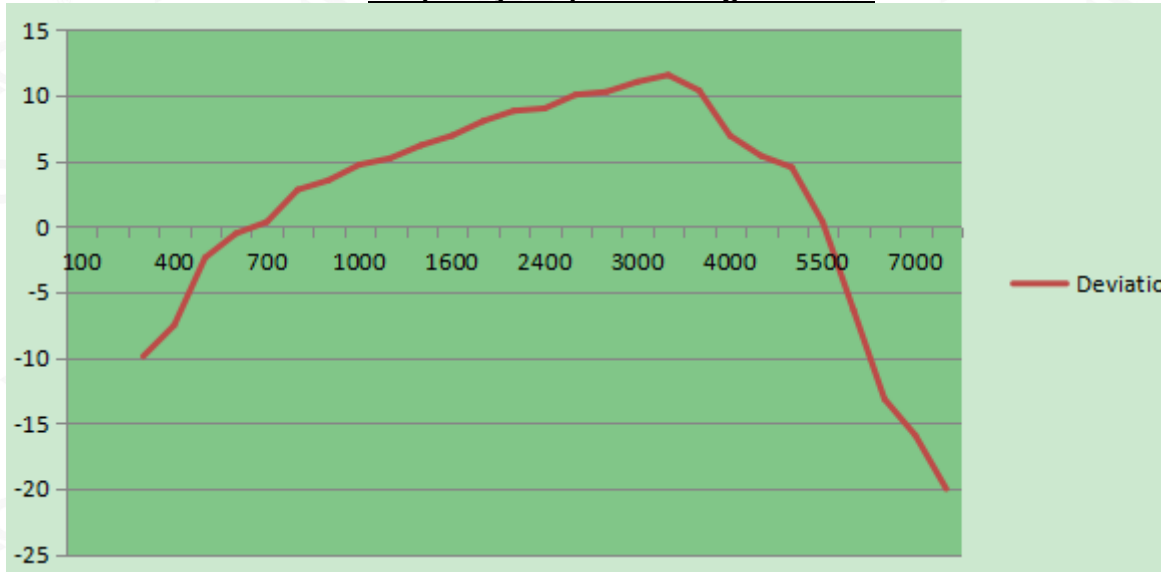
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**Frequency Response of High Channel**



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



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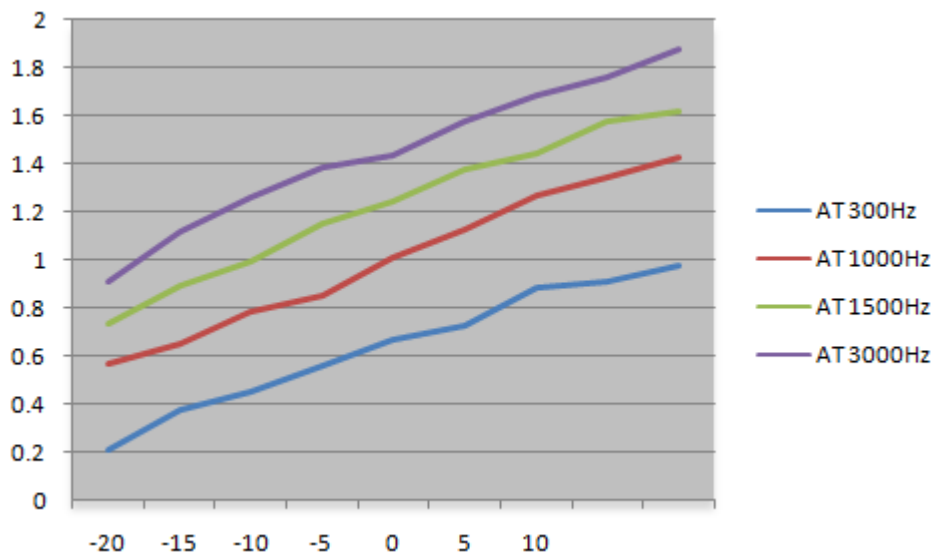
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**Digital:**  
**(A). MODULATION LIMIT:**

**High 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	0.21	0.57	0.73	0.91
-15	0.38	0.65	0.89	1.12
-10	0.45	0.79	0.99	1.26
-5	0.56	0.85	1.15	1.39
0	0.67	1.01	1.24	1.44
+5	0.73	1.13	1.38	1.58
+10	0.89	1.27	1.44	1.69
+15	0.91	1.35	1.58	1.76
+20	0.98	1.43	1.62	1.88



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



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**(B). AUDIO FREQUENCY RESPONSE:**

**High Channel @ 12.5 KHz Channel Separations---H Power**

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.07	-17.08
400	0.11	-13.15
500	0.25	-6.02
600	0.33	-3.61
700	0.39	-2.16
800	0.42	-1.51
900	0.54	0.67
1000	0.67	2.54
1200	0.78	3.86
1400	0.89	5.01
1600	0.97	5.76
1800	1.12	7.00
2000	1.25	7.96
2400	1.44	9.19
2500	1.61	10.16
2800	1.74	10.83
3000	1.87	11.46
3200	1.53	9.71
3600	1.24	7.89
4000	1.05	6.44
4500	0.73	3.29
5000	0.51	0.17
5500	0.23	-6.74
6000	0.11	-13.15
6500	0.07	-17.08
7000	0.03	-24.44
7500	0.01	-33.98
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--



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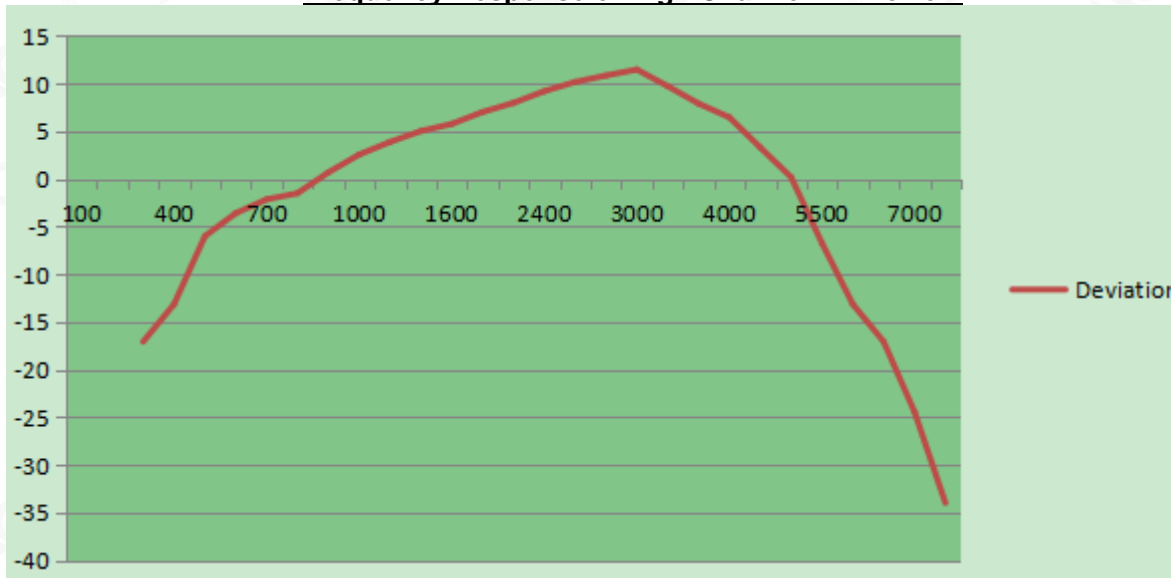
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### Frequency Response of High Channel---H Power



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



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## 10. MAXIMUM 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.

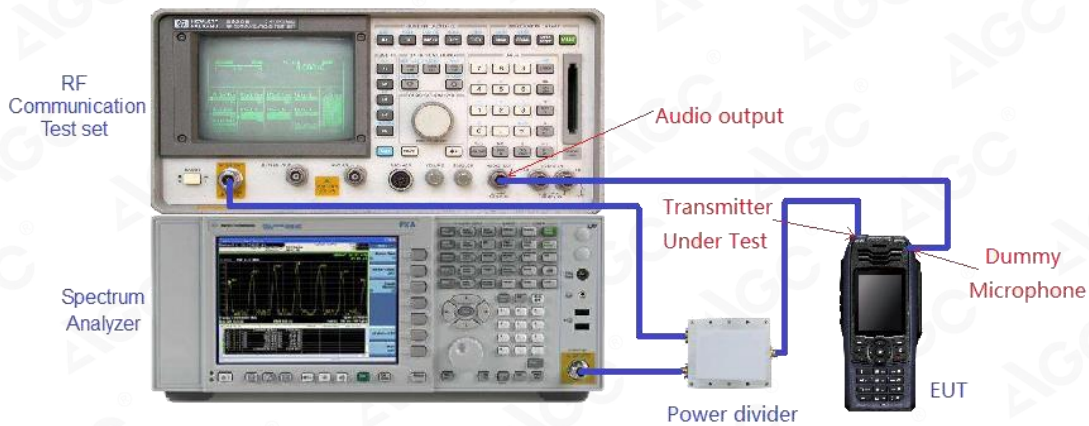
In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the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

$$\text{EIRP} = \text{"Read Value"} + \text{Measured substitution value} + 2.15.$$

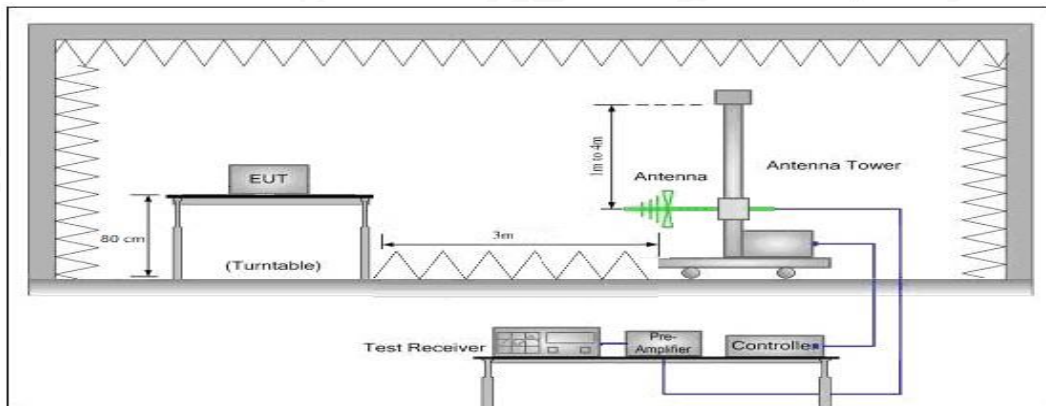
### 10.3 TEST CONFIGURATION

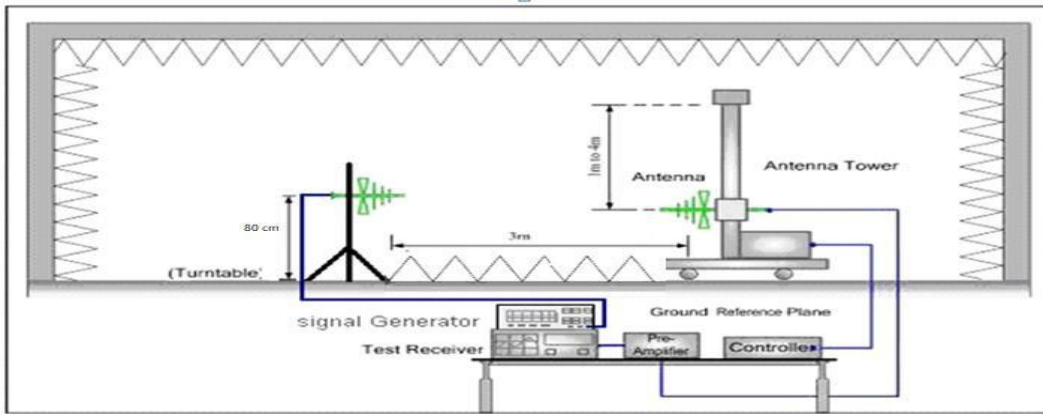
#### Conducted Output Power:



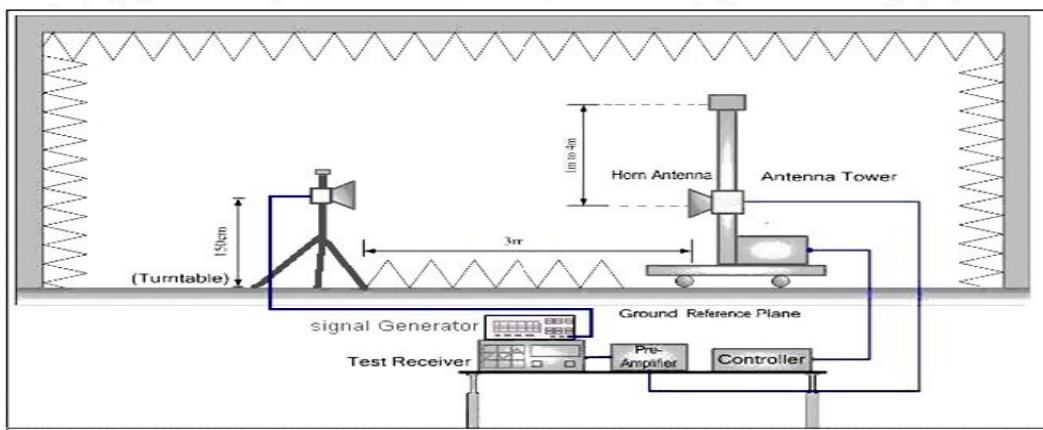
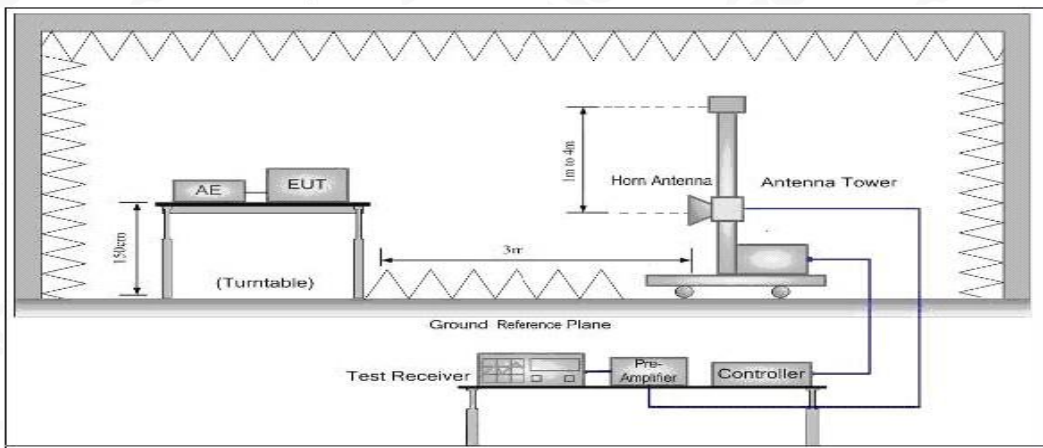
#### Effective Radiated Power

#### Radiated Below 1GHz





**Radiated Above 1 GHz**



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#### 10.4 TEST RESULT

The maximum Conducted Power (CP) for VHF/UHF is  
Analog: 2W/0.5 W for 12.5 KHz Channel Separation VHF  
Analog: 2W/0.5 W for 12.5 KHz Channel Separation UHF  
Digital: 2W/0.5 W for 12.5 KHz Channel Separation VHF  
Digital: 2W/0.5 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



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UHF:  
Analog:

Conducted Power Measurement Results-2W		
Channel Separation	Channel	Measurement Result (dBm)
		For 33dBm(2W)
12.5 KHz	Bottom(400.025MHz)	32.43
	Middle(453.225MHz)	<b>32.51</b>
	Middle(454.025MHz)	32.37
	Top (469.975MHz )	32.44

Radiated Power Measurement Results-2W		
Channel Separation	Channel	Measurement Result (dBm)
		For 33dBm(2W)
12.5 KHz	Bottom(400.025MHz)	32.37
	Middle(453.225MHz)	<b>32.46</b>
	Middle(454.025MHz)	32.33
	Top (469.975MHz )	32.39

Conducted Power Measurement Results-0.5W		
Channel Separation	Channel	Measurement Result (dBm)
		For 26.99dBm(0.5W)
12.5 KHz	Bottom(400.025MHz)	26.72
	Middle(453.225MHz)	<b>26.81</b>
	Middle(454.025MHz)	26.66
	Top (469.975MHz )	26.59

Radiated Power Measurement Results-0.5W		
Channel Separation	Channel	Measurement Result (dBm)
		For 26.99dBm(0.5W)
12.5 KHz	Bottom(400.025MHz)	26.65
	Middle(453.225MHz)	<b>26.73</b>
	Middle(454.025MHz)	26.60
	Top (469.975MHz )	26.53



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