FCC Part 90& Part 22 Rules
Test Report

Test report
On Behalf of
TYT Electronics Co., Ltd.
For
DMR Digital Transceiver
Model No.: MD-430, MD-558, MD-668

FCC ID: PODDMR2W

Prepared for :	**TYT Electronics Co., Ltd.** **Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China.**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China**
Date of Test:	**Dec. 27, 2018~Mar. 05, 2019**
Date of Report:	**Mar. 05, 2019**
Report Number:	**HK1902250301E**

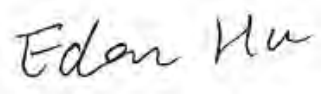
TEST RESULT CERTIFICATION

Applicant's name ..... :	TYT Electronics Co., Ltd.
Address..... :	Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China.
Manufacture's Name..... :	TYT Electronics Co., Ltd.
Address..... :	Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China.
Product description	DMR Digital Transceiver
Brand Name	TYT
Mode Name	MD-430
Serial Name	MD-558, MD-668
Difference Description	All the same except the mode name and appearance.
Standards ..... :	FCC Part 90& Part 22 Rules

Date of Test ..... :	
Date (s) of performance of tests..... :	**Dec. 27, 2018~Mar. 05, 2019**
Date of Issue ..... :	**Mar. 05, 2019**
Test Result ..... :	**Pass**

Testing Engineer : 

(Gary Qian)

Technical Manager : 

(Eden Hu)

Authorized Signatory : 

(Jason Zhou)

Revision	Issue Date	Revisions	Revised By
V1.0	Mar.05, 2019	Initial Issue	Jason Zhou

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

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

A major technical description of EUT is described as following:

Communication Type	Voice / Data
Hardware Version	MD430-MB-V1.4
Software Version	V1.15
Modulation	FM/4FSK
Emission Type	7K60FXD/7K60FXE/11K0F3E
Emission Bandwidth	Analog:10.173KHz(2W-12.5 KHz), 10.203KHz(1W-12.5 KHz) ---UHF Digital: 8.976KHz(2W), 9.127KHz(1W) ---UHF
Peak Frequency Deviation	2.76 KHz
Audio Frequency Response	11.27dB
Maximum Transmitter Power	Analog:32.57 dBm(2W-12.5 KHz), 29.63dBm (1W-12.5 KHz) ---UHF Digital: 32.47 dBm(2W), 29.36dBm (1W) ---UHF
Output power Modification	2W/1W (It was fixed by the manufacturer, any individual can't arbitrarily change it.)
Data Rate	9600bps/12.5KHz(Channel Spacing)
Antenna Designation	Inseparable
Antenna Gain	1.2 dBi
Power Supply	DC 3.7V, 2600mAh (by battery) charging: DC 4.2V 450mA
Adapter Parameter	INPUT：AC 100V-240V , 50/60Hz , 0.1A OUTPUT：DC 5.5V , 500mA
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 Channel: 469.975MHz
Frequency Tolerance	1.097ppm

Frequency Range (MHz)	Rated Transmit Power(W)(Conducted)	Transmit Mode/Emission Designator
400-470	1W/2W	11K0F3E(Analog Vioce;NB)
400-470	1W/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		

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

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: **PODDMR2W ,** filing to comply with Part 2, Part 22, and Part 90 of the Federal Communication Commission rules.

1.3 TEST METHODOLOGY

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

1.4 TEST FACILITY

Site	Shenzhen HUAK Testing Technology Co., Ltd.
Location	1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China
Designation Number	CN1229
Test Firm Registration Number : 616276	

1.5 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

1.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 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.

2.2 EUT EXERCISE

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

2.3 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

2.4 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	DMR Digital Transceiver	MD-430	FCC ID:PODDMR2W	EUT
2	Adapter	CG-Q0510	DC 5.5V 500mA	Accessory
3	Battery	N/A	DC3.7V, 2600mAh	Accessory
4	Desktop charger	N/A	DC 4.2V, 450mA	Accessory
5	Back clip	N/A	N/A	Accessory

3. 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
Receiver	R&S	ESCI 7	HKE-010	Dec. 29, 2017	Dec. 28, 2018
Receiver	R&S	ESCI 7	HKE-010	Dec. 27, 2018	Dec. 26, 2019
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 29, 2017	Dec. 28, 2018
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 27, 2018	Dec. 26, 2019
Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 29, 2017	Dec. 28, 2019
Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 29, 2017	Dec. 28, 2018
Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 27, 2018	Dec. 26, 2019
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	HKE-087	Dec. 29, 2017	Dec. 28, 2019
Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 29, 2017	Dec. 28, 2018
Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 27, 2018	Dec. 26, 2019
Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 29, 2017	Dec. 28, 2019
Loop Antenna	Schewarzbeck	FMZB 1519 B	HKE-014	Dec. 29, 2017	Dec. 28, 2019
Small environmental tester	ESPEC	SH-242	HKE-088	Mar. 02, 2018	Mar. 01, 2019
RF Communication Test Set	HP	HP8920B	HKE-089	June 12, 2018	June 11, 2019
ANTENNA	A.H.	SAS-521-4	HKE-091	Mar. 01, 2018	Feb. 28, 2020
ANTENNA	Schwarzbeck	9168	HKE-095	Mar. 01, 2018	Feb. 28, 2020
HORN ANTENNA	E.M.	EM-AH-10180	HKE-090	Mar. 01, 2018	Feb. 28, 2020
Signal generator	Agilent	N5183A	HKE-071	Dec. 29, 2017	Dec. 28, 2018
Attenuator	JFW	50FHC-006-50	HKE-098	June 12, 2018	June 11, 2019
Vector Analyzer	Agilent	E4440A	HKE-079	Mar. 01, 2018	Feb. 28, 2019
RF Cable	R&S	1#	N/A	Each time	N/A
RF Cable	R&S	2#	N/A	Each time	N/A

4. DESCRIPTION OF TEST MODES

RF TEST MODES

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

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.

5. FREQUENCY TOLERANCE

5.1 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.

5.2 MEASUREMENT PROCEDURE

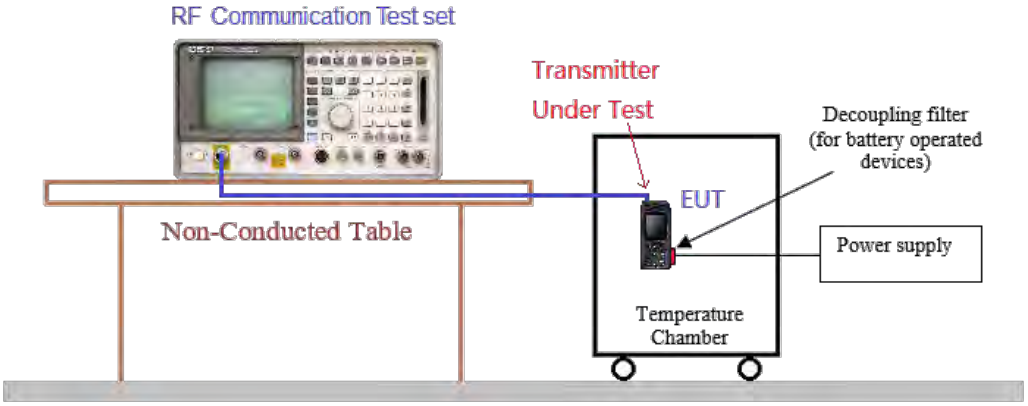
5.2.1 Frequency stability versus environmental temperature

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.

5.2.2 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 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.

5.3 TEST SETUP BLOCK DIAGRAM



5.4 TEST RESULTS

UHF:

Analog:

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

Environment	Power	Reference Frequency			Limit:
	(V)	400.025MHz	454.025MHz	469.975MHz	ppm
50	DC 3.70 V	0.672	0.653	0.897	2.5
40	DC 3.70 V	0.950	0.955	0.894	
30	DC 3.70 V	0.859	0.601	0.587	
20	DC 3.70 V	0.601	1.031	0.683	
10	DC 3.70 V	0.784	0.829	0.673	
0	DC 3.70 V	0.695	1.007	0.572	
-10	DC 3.70 V	1.003	0.782	0.708	
-20	DC 3.70 V	0.711	0.649	0.940	
-30	DC 3.70 V	0.619	0.623	0.922	
Result	Pass				

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

Environment	Power Supply	Reference Frequency			Limit:
	(V)	400.025MHz	454.025MHz	469.975MHz	ppm
50	DC 3.00 V	0.541	0.713	0.997	2.5
40	DC 3.00 V	0.706	0.675	0.819	
30	DC 3.00 V	0.912	0.521	0.896	
20	DC 3.00 V	0.441	0.637	0.518	
10	DC 3.00 V	0.554	0.735	0.711	
0	DC 3.00 V	0.838	0.362	0.968	
-10	DC 3.00 V	0.326	0.423	0.502	
-20	DC 3.00 V	0.336	0.701	0.549	
-30	DC 3.00 V	0.913	0.806	0.498	
Result	Pass				

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

Environment	Power	Reference Frequency			Limit:
	(V)	400.025MHz	454.025MHz	469.975MHz	ppm
50	DC 3.70 V	0.804	0.829	0.926	2.5
40	DC 3.70 V	0.778	0.608	0.788	
30	DC 3.70 V	1.006	0.597	0.657	
20	DC 3.70 V	0.673	0.880	0.917	
10	DC 3.70 V	0.998	0.842	0.630	
0	DC 3.70 V	0.940	1.067	0.878	
-10	DC 3.70 V	0.968	0.653	0.509	
-20	DC 3.70 V	0.934	0.746	0.651	
-30	DC 3.70 V	0.542	0.761	1.061	
Result	Pass				

(4) Frequency stability versus input voltage (Battery endpoint is 3V) **-1W-12.5KHz**

Environment	Power	Reference Frequency			Limit:
	(V)	400.025MHz	454.025MHz	469.975MHz	ppm
50	DC 3.00 V	0.446	0.886	0.677	2.5
40	DC 3.00 V	0.712	0.835	0.437	
30	DC 3.00 V	0.417	0.668	0.869	
20	DC 3.00 V	0.313	0.906	0.882	
10	DC 3.00 V	0.328	0.352	0.821	
0	DC 3.00 V	0.798	0.686	0.809	
-10	DC 3.00 V	0.462	0.527	0.581	
-20	DC 3.00 V	0.981	0.918	0.859	
-30	DC 3.00 V	0.837	0.316	0.927	
Result	Pass				

Digital:

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

Environment	Power	Reference Frequency			Limit:
	(V)	400.025MHz	454.025MHz	469.975MHz	ppm
50	DC 3.70 V	1.002	0.671	0.711	2.5
40	DC 3.70 V	0.755	0.702	0.907	
30	DC 3.70 V	0.614	0.918	0.900	
20	DC 3.70 V	0.917	0.884	0.620	
10	DC 3.70 V	0.544	0.732	0.524	
0	DC 3.70 V	0.713	0.969	0.906	
-10	DC 3.70 V	0.668	0.997	1.081	
-20	DC 3.70 V	1.027	0.516	1.042	
-30	DC 3.70 V	0.930	0.876	1.034	
Result	Pass				

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

Environment	Power	Reference Frequency			Limit:
	(V)	400.025MHz	454.025MHz	469.975MHz	ppm
50	DC 3.00 V	0.694	0.762	0.910	2.5
40	DC 3.00 V	0.910	1.014	0.705	
30	DC 3.00 V	1.053	0.694	0.626	
20	DC 3.00 V	0.764	0.530	0.646	
10	DC 3.00 V	0.745	0.674	0.882	
0	DC 3.00 V	0.726	0.895	0.789	
-10	DC 3.00 V	0.664	0.603	1.008	
-20	DC 3.00 V	1.046	0.790	1.077	
-30	DC 3.00 V	0.678	0.664	**1.097**	
Result	Pass				

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

Environment	Power	Reference Frequency			Limit:
	(V)	400.025MHz	454.025MHz	469.975MHz	ppm
50	DC 3.70 V	0.609	0.808	0.502	2.5
40	DC 3.70 V	1.057	1.045	0.646	
30	DC 3.70 V	1.072	0.682	1.096	
20	DC 3.70 V	0.845	0.868	0.544	
10	DC 3.70 V	0.761	0.537	0.917	
0	DC 3.70 V	0.628	0.752	0.502	
-10	DC 3.70 V	1.036	0.621	0.697	
-20	DC 3.70 V	0.733	0.664	0.663	
-30	DC 3.70 V	0.643	0.795	0.674	
Result	Pass				

(4) Frequency stability versus input voltage (Battery endpoint is 3V) **-1W-12.5KHz**

Environment	Power	Reference Frequency			Limit:
	(V)	400.025MHz	454.025MHz	469.975MHz	ppm
50	DC 3.00 V	0.709	0.985	0.994	2.5
40	DC 3.00 V	0.503	0.755	0.858	
30	DC 3.00 V	0.820	0.651	1.079	
20	DC 3.00 V	0.901	0.754	0.847	
10	DC 3.00 V	0.967	0.644	1.076	
0	DC 3.00 V	0.983	0.927	0.575	
-10	DC 3.00 V	0.917	0.964	1.056	
-20	DC 3.00 V	0.539	1.008	0.858	
-30	DC 3.00 V	0.687	0.626	0.797	
Result	Pass				

6. EMISSION BANDWIDTH

6.1 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.

6.2 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).

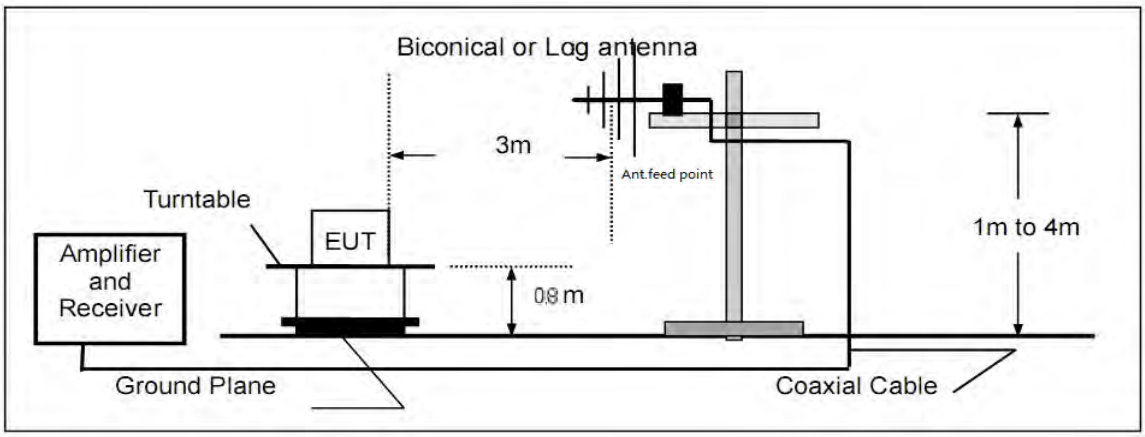
3). Set SPA Center Frequency = fundamental frequency, RBW=100Hz.VBW= 300 Hz, Span =50 KHz.

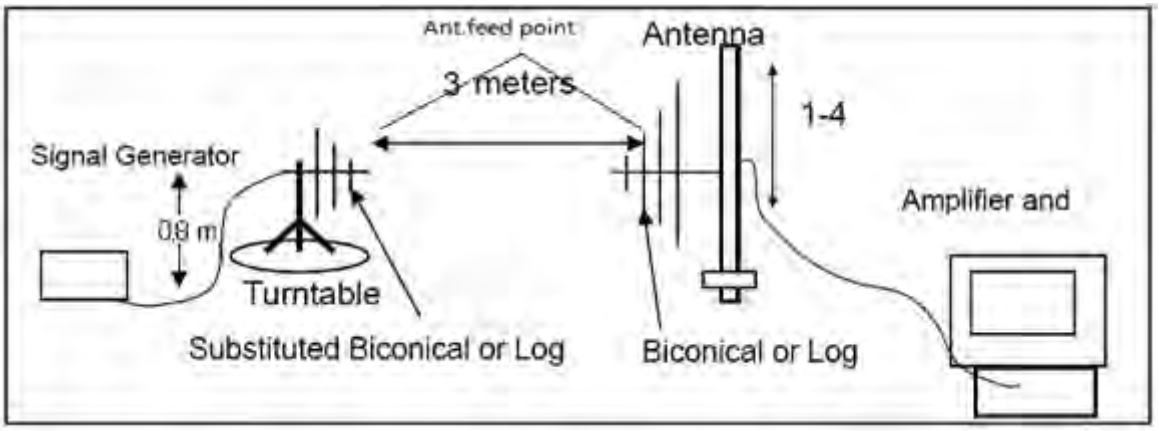
4). Set SPA Max hold. Mark peak, -26 dB.

6.3 TEST SETUP BLOCK DIAGRAM

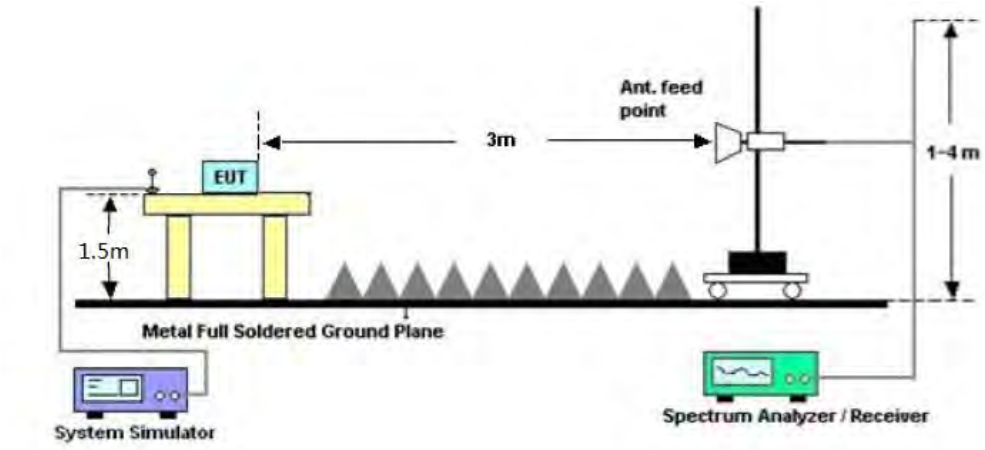
Radiation method:

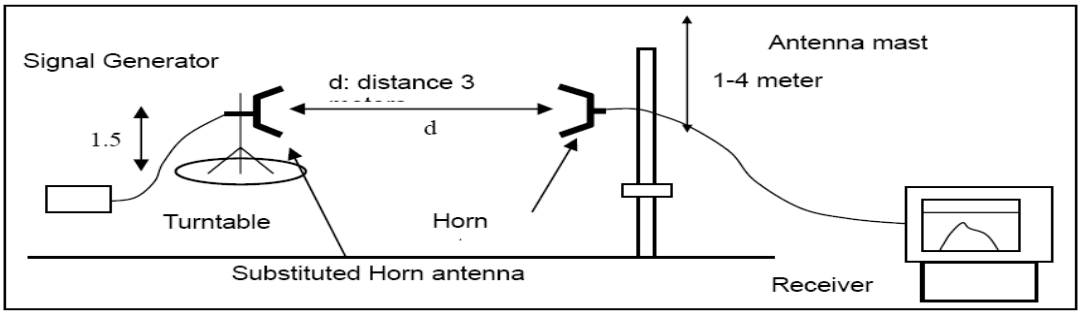
Radiated Below1GHz



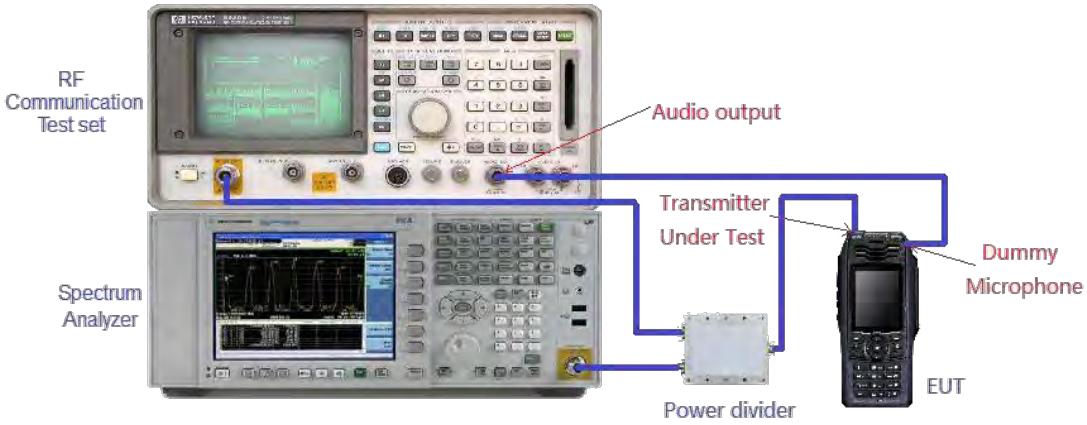


Radiated Above 1 GHz





Conduction method:



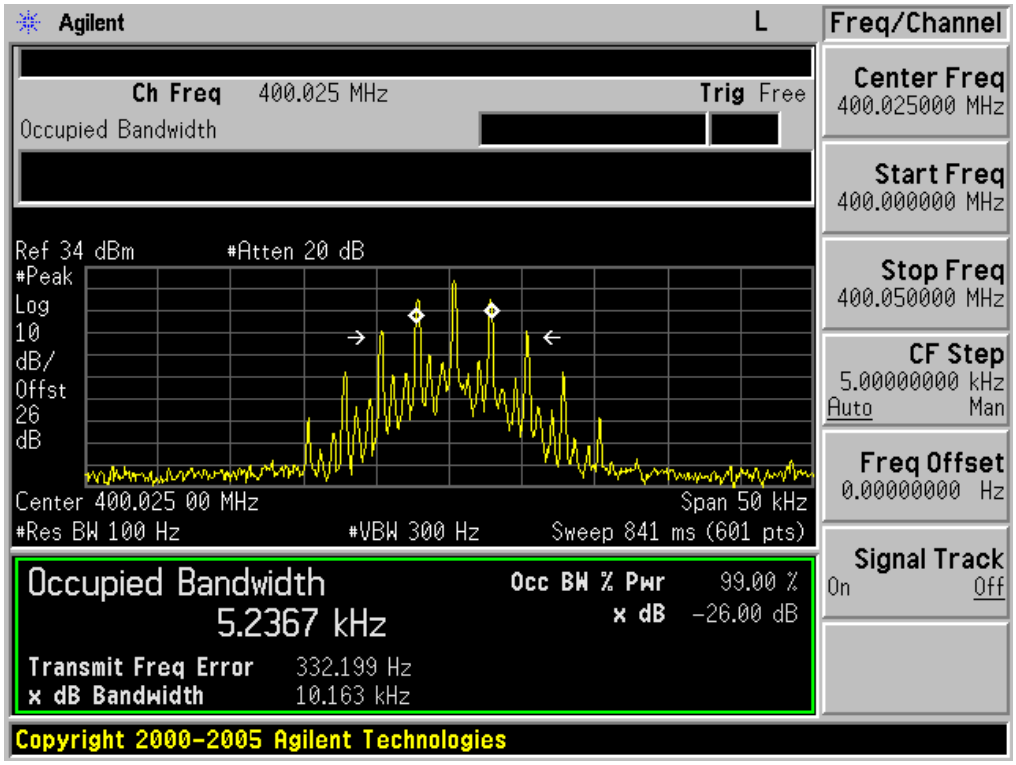
6.4 MEASUREMENT RESULT

UHF:

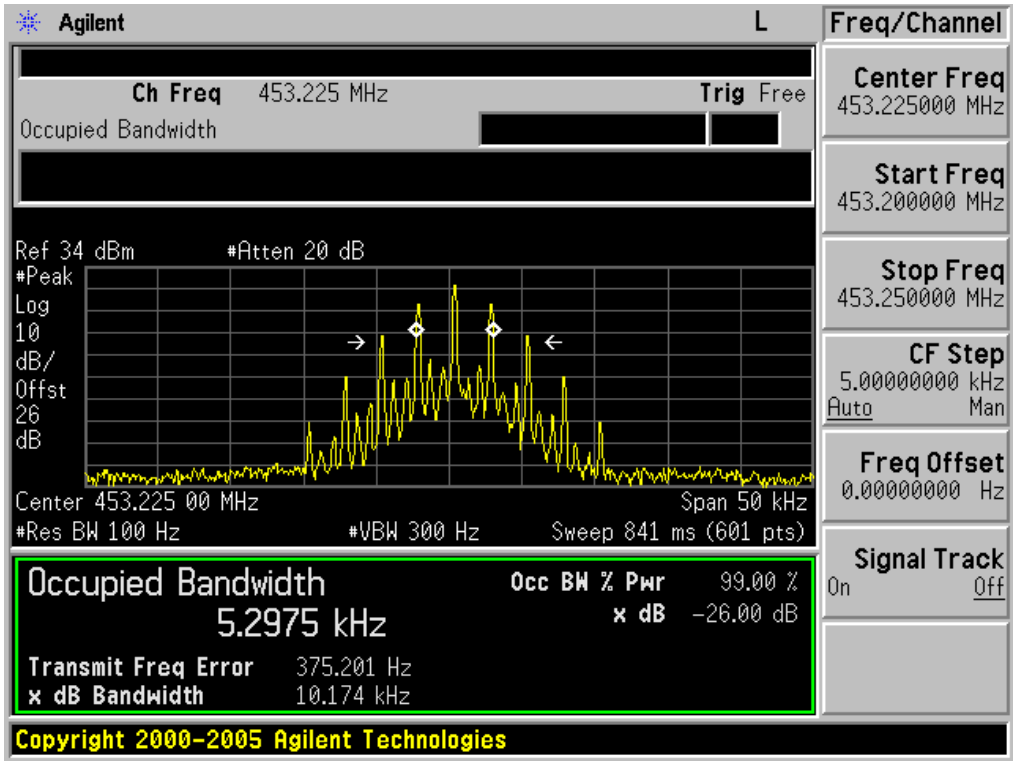
Analog:12.5KHz

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	10.163KHz	11.25 KHz	Pass
453.225MHz	10.174KHz	11.25 KHz	Pass
454.025MHz	10.203KHz	11.25 KHz	Pass
469.975MHz	10.159KHz	11.25 KHz	Pass

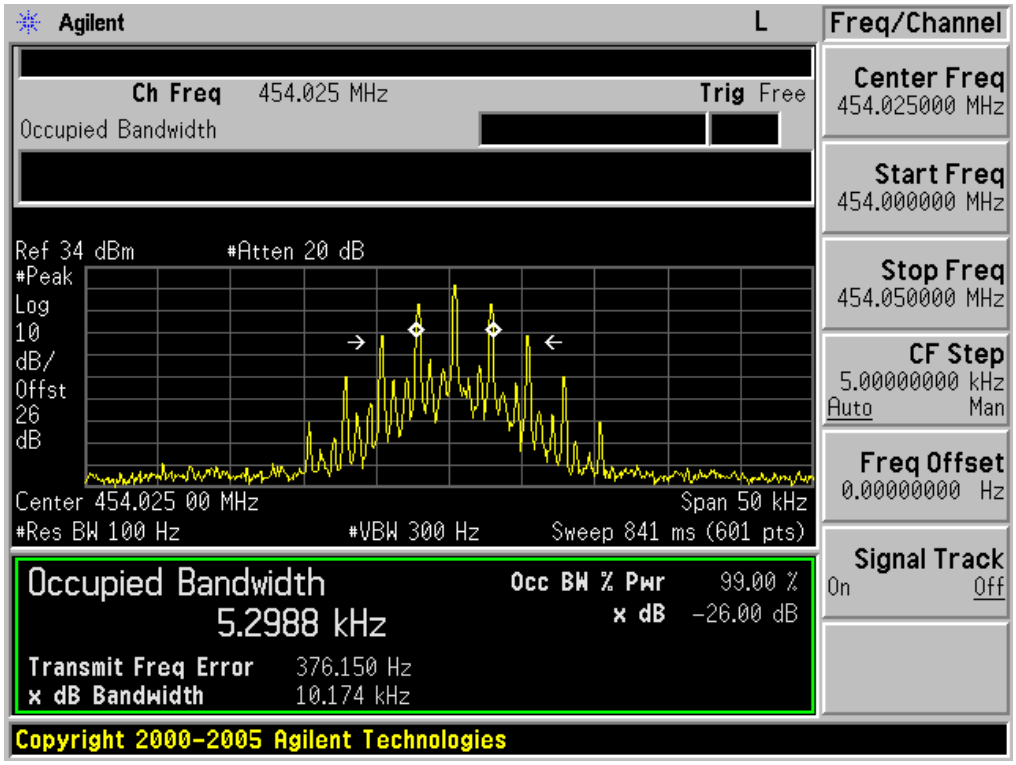
Occupied bandwidth of Bottom Channel (400.025MHz)-1W



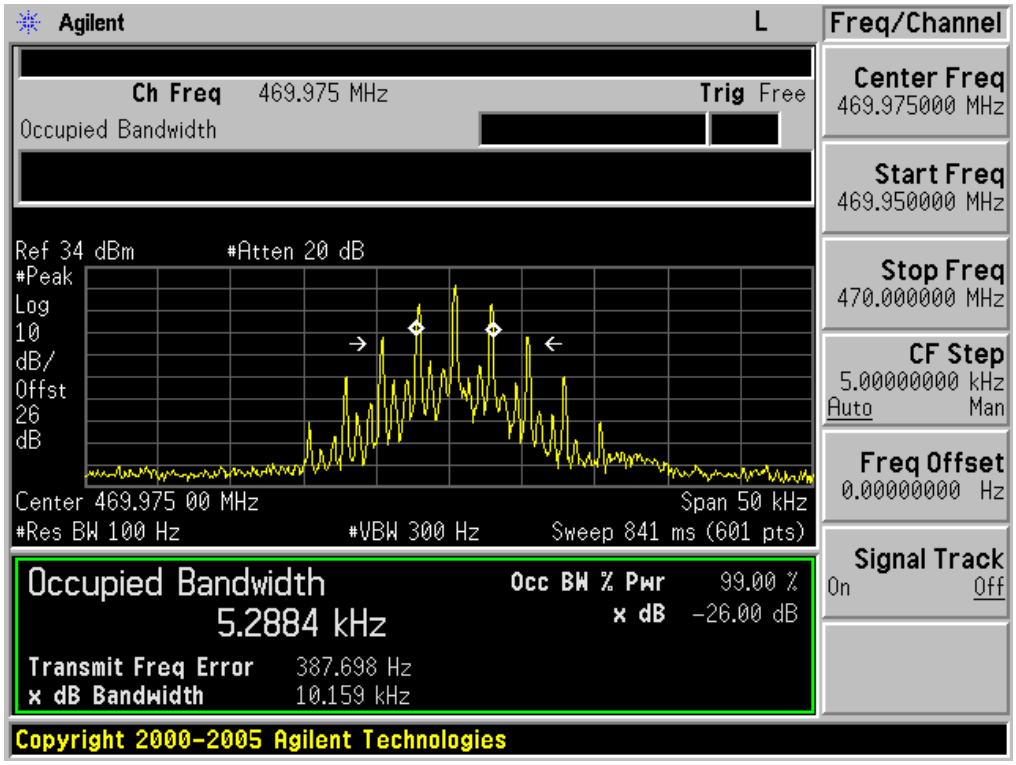
Occupied bandwidth of Middle Channel (453.225MHz)-1W



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

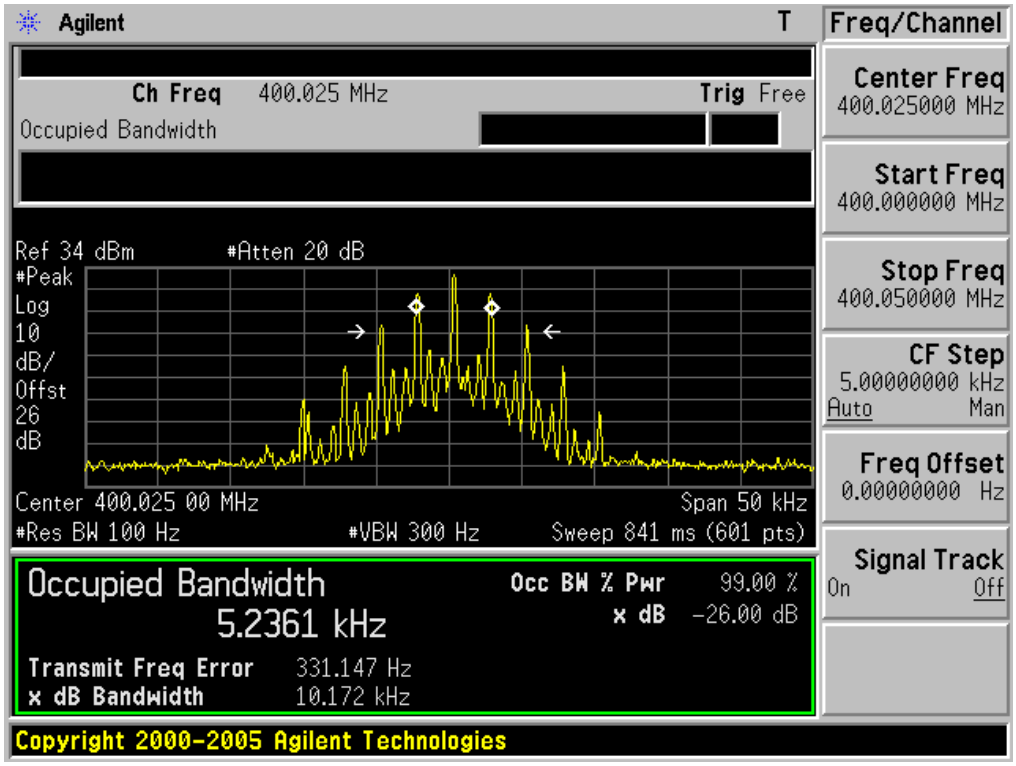


Occupied bandwidth of Top Channel (469.975MHz)-1W

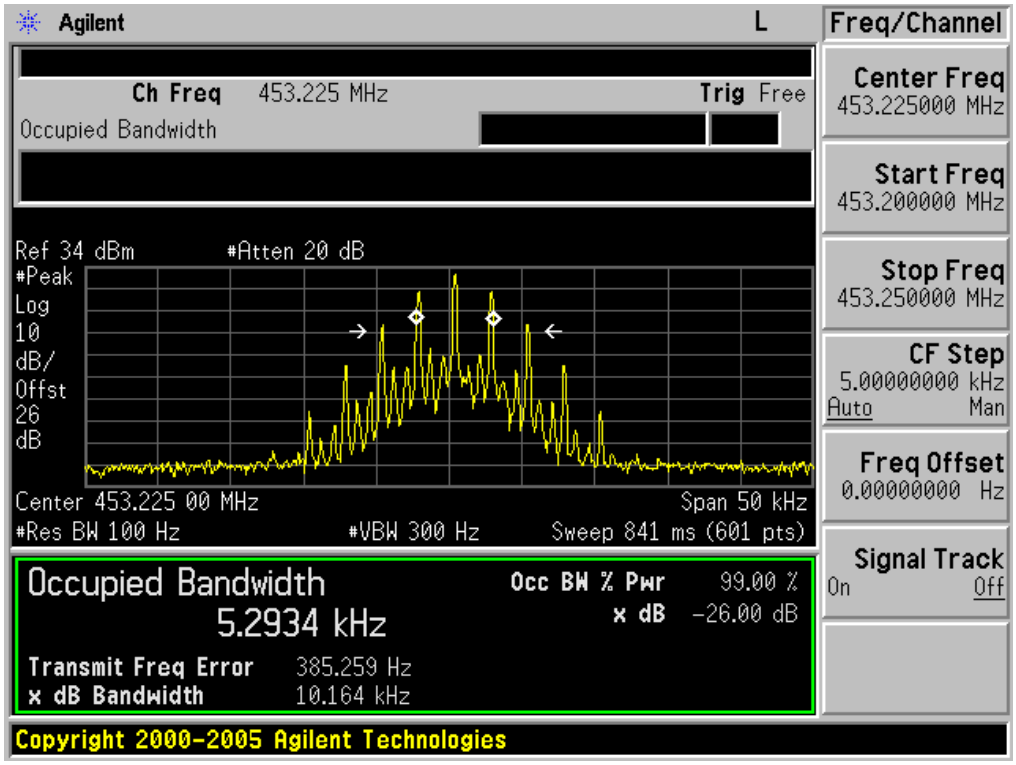


26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	10.172KHz	11.25 KHz	Pass
453.225MHz	10.164KHz	11.25 KHz	Pass
454.025MHz	10.166KHz	11.25 KHz	Pass
469.975MHz	10.173MHz	11.25 KHz	Pass

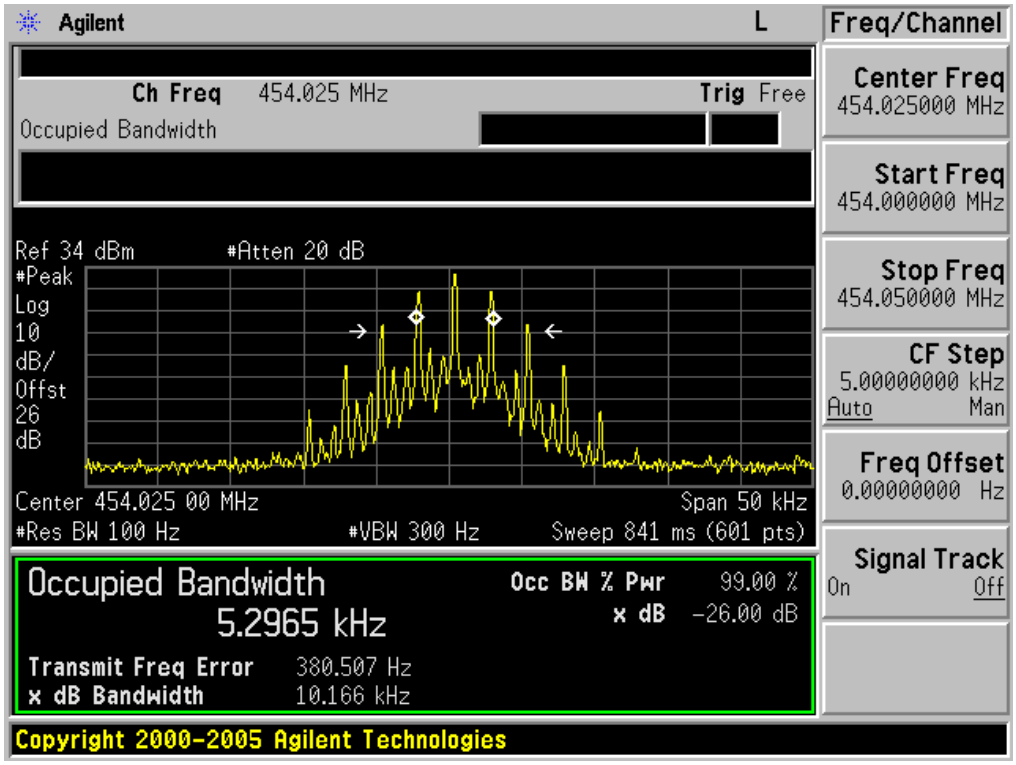
Occupied bandwidth of Bottom Channel (400.025MHz)-2W



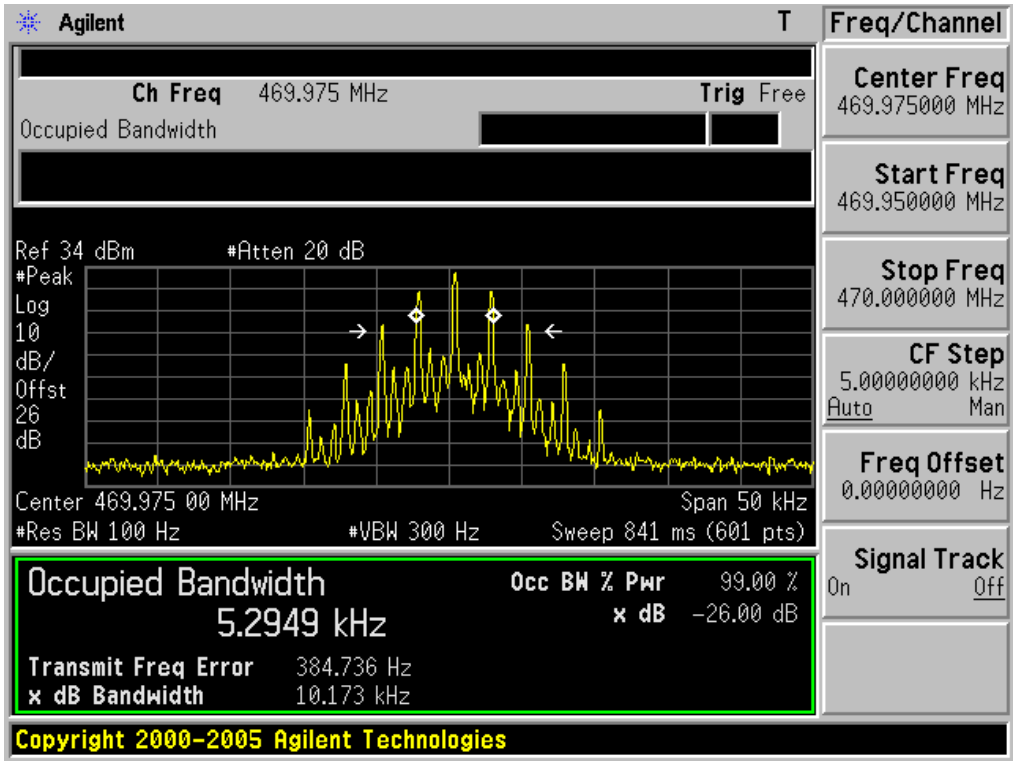
Occupied bandwidth of Middle Channel (453.225MHz)-2W



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



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

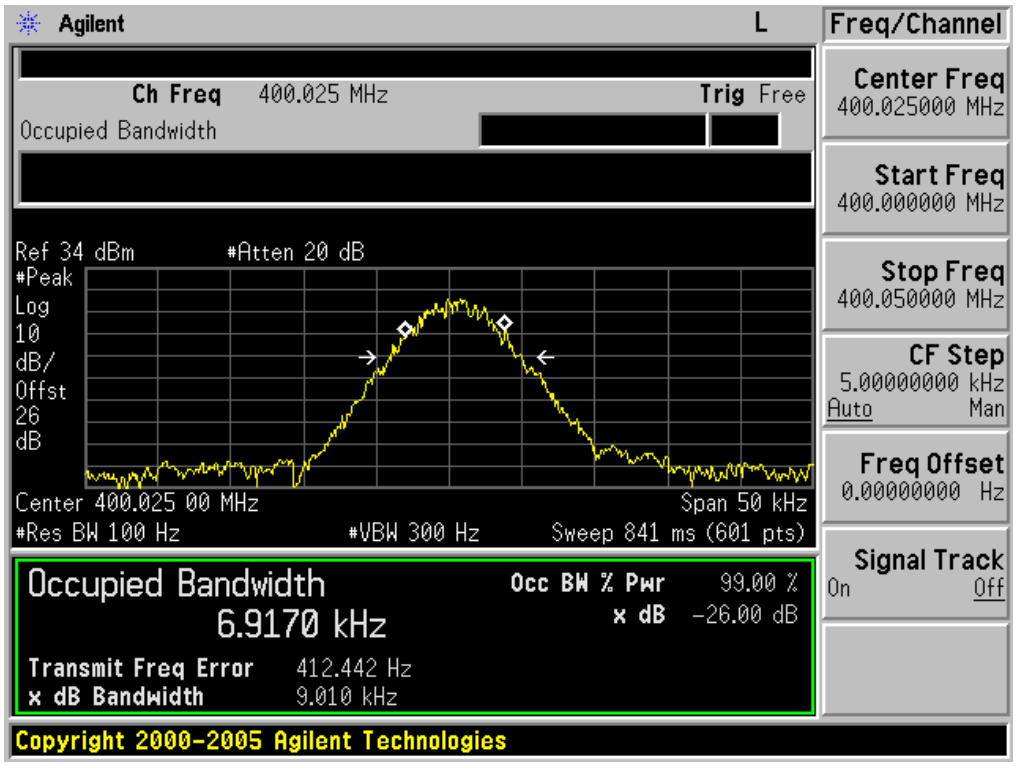


Digital:

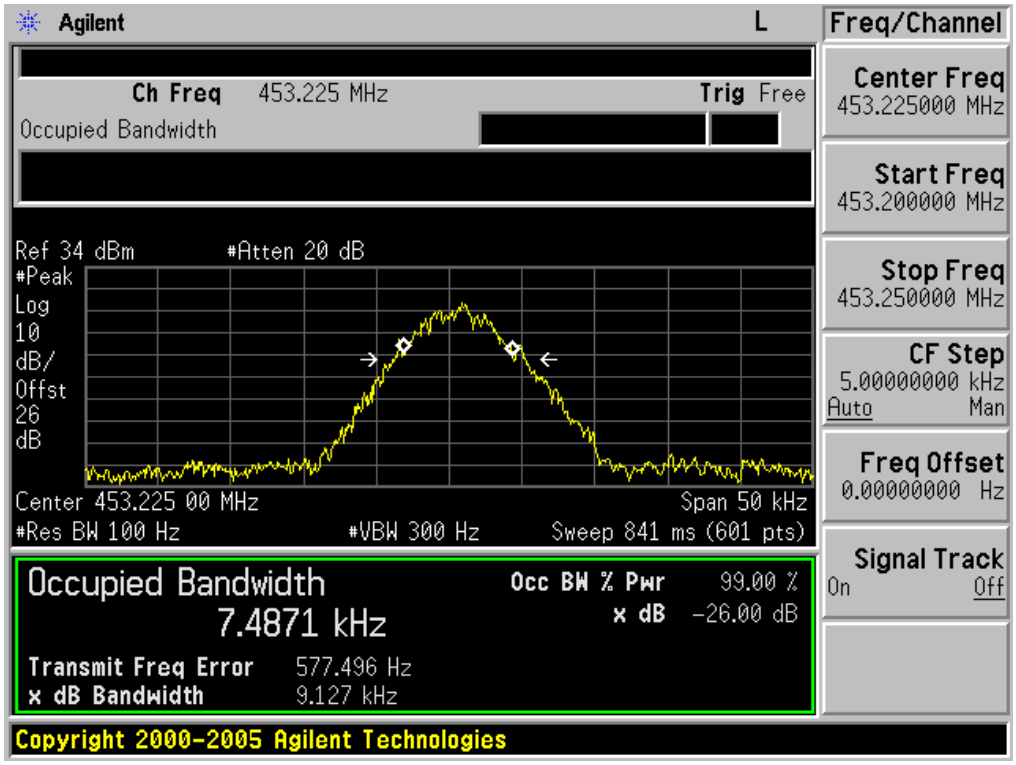
TEST RESULTS

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	9.010KHz	11.25 KHz	Pass
453.225MHz	9.127KHz	11.25 KHz	Pass
454.025MHz	8.891KHz	11.25 KHz	Pass
469.975MHz	8.828KHz	11.25 KHz	Pass

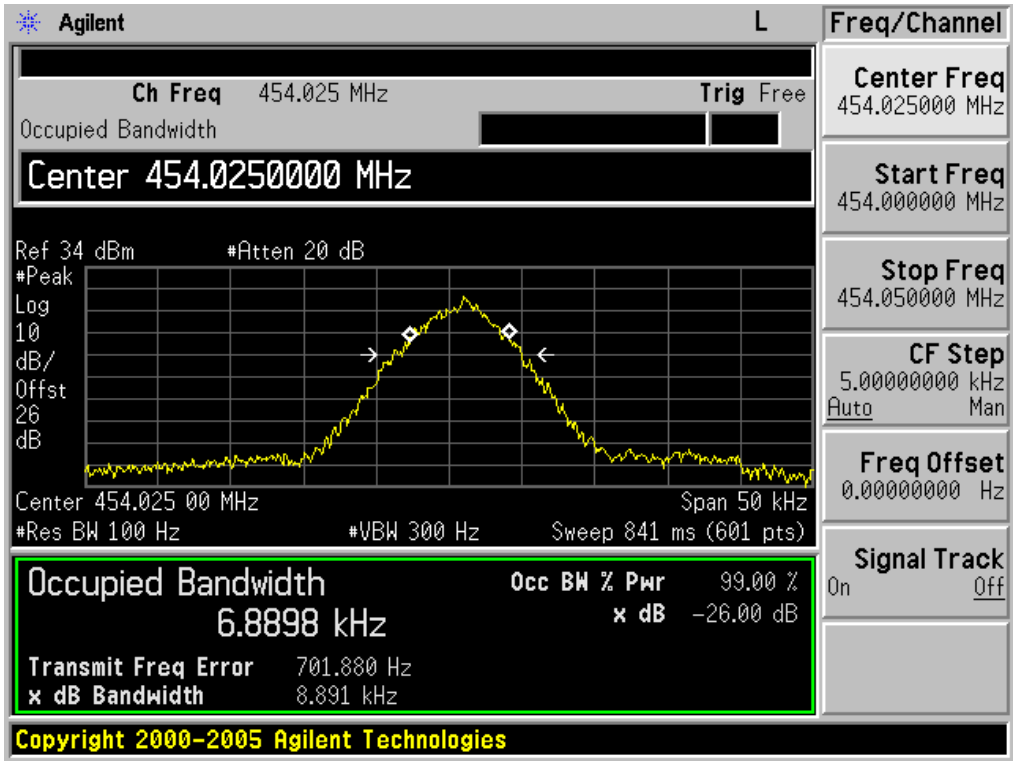
Occupied bandwidth of Bottom Channel (400.025MHz) -1W



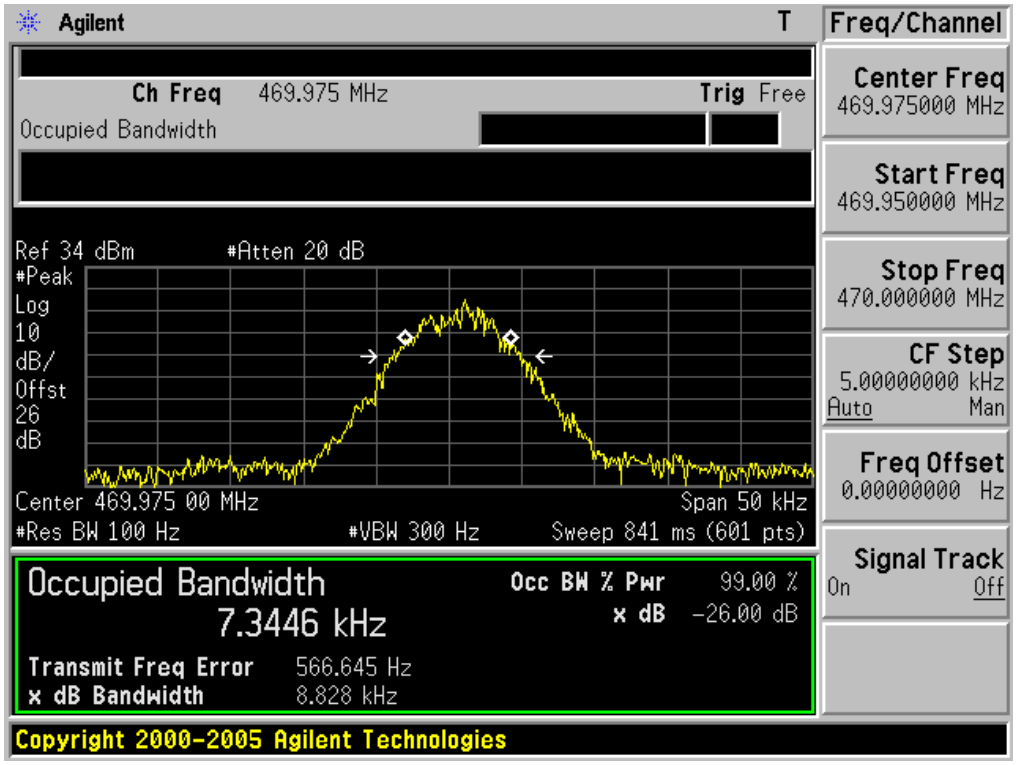
Occupied bandwidth of Middle Channel (453.225MHz)-1W



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



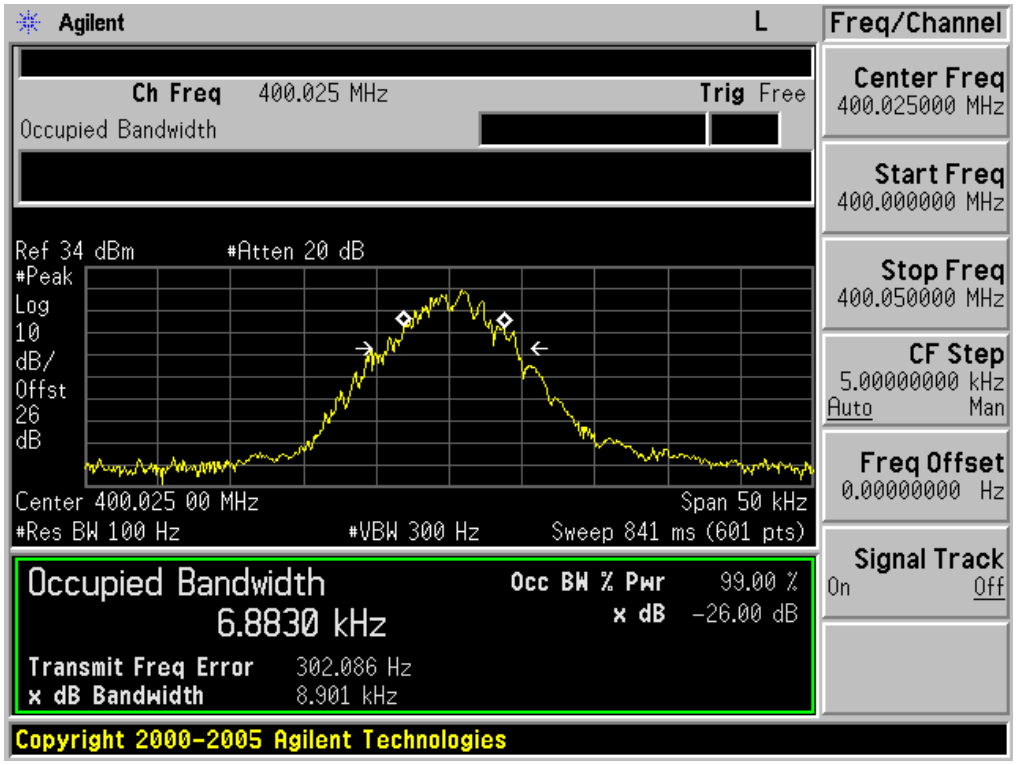
Occupied bandwidth of Top Channel (469.975MHz)-1W



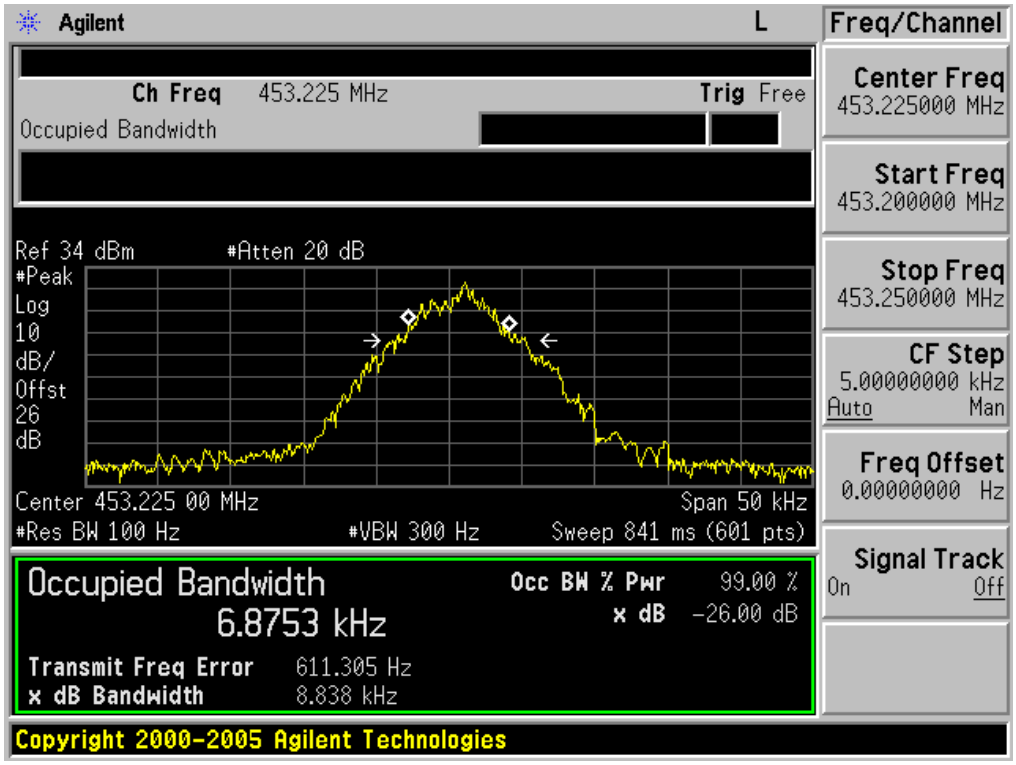
TEST RESULTS

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	8.901KHz	11.25 KHz	Pass
453.225MHz	8.838KHz	11.25 KHz	Pass
454.025MHz	8.554KHz	11.25 KHz	Pass
469.975MHz	8.976KHz	11.25 KHz	Pass

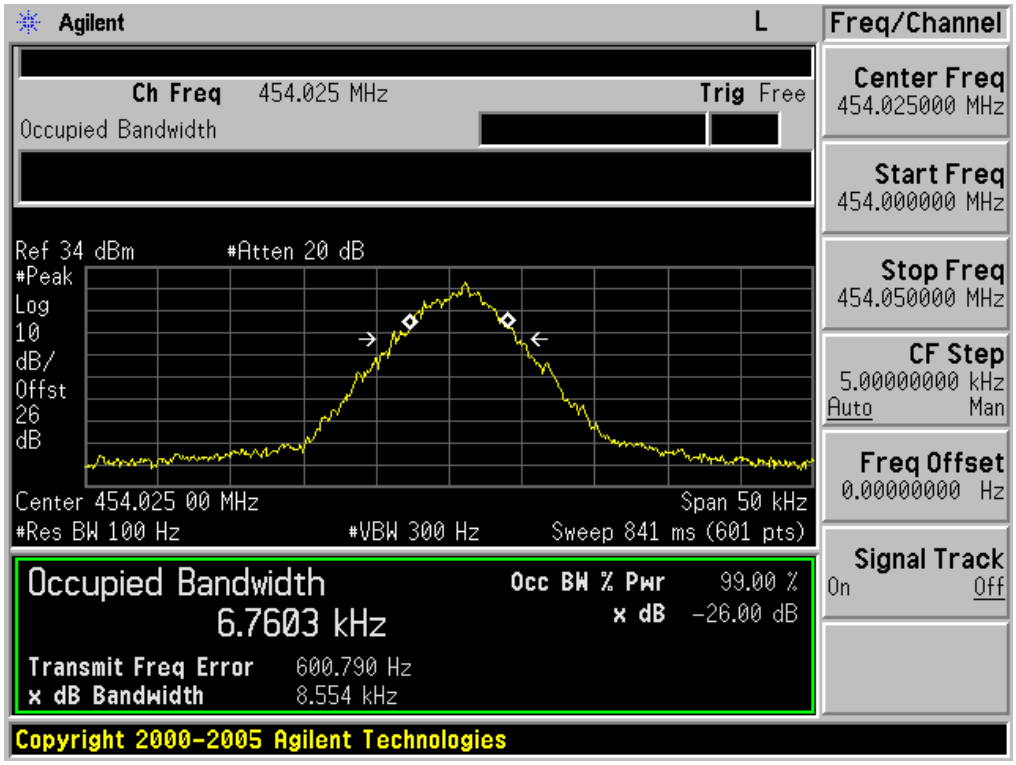
Occupied bandwidth of Bottom Channel (400.025MHz)-2W



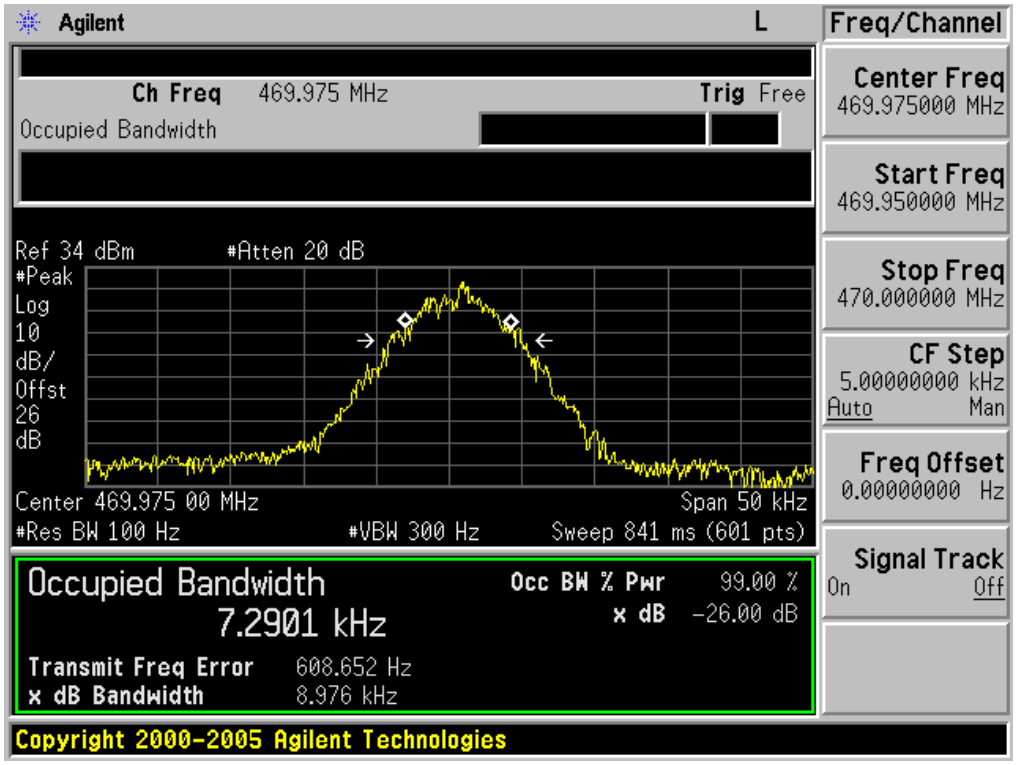
Occupied bandwidth of Middle Channel (453.225MHz)-2W



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



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



7. UNWANTED RADIATION

7.1 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.

7.2 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.

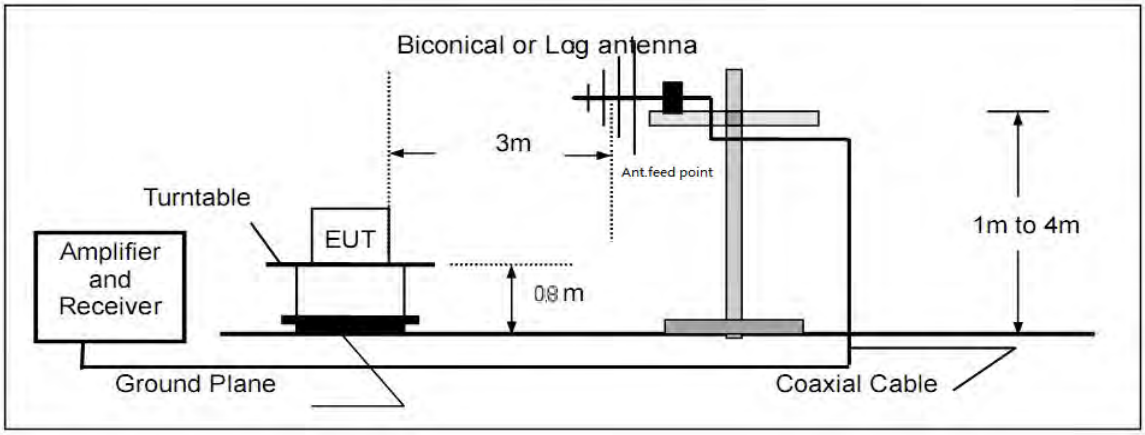
(16)The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

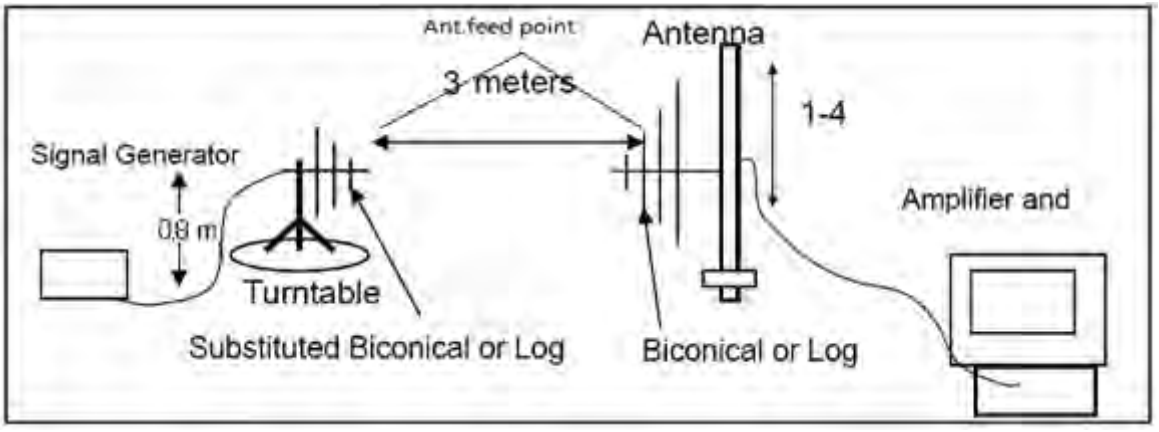
(17)The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

7.3 TEST SETUP BLOCK DIAGRAM

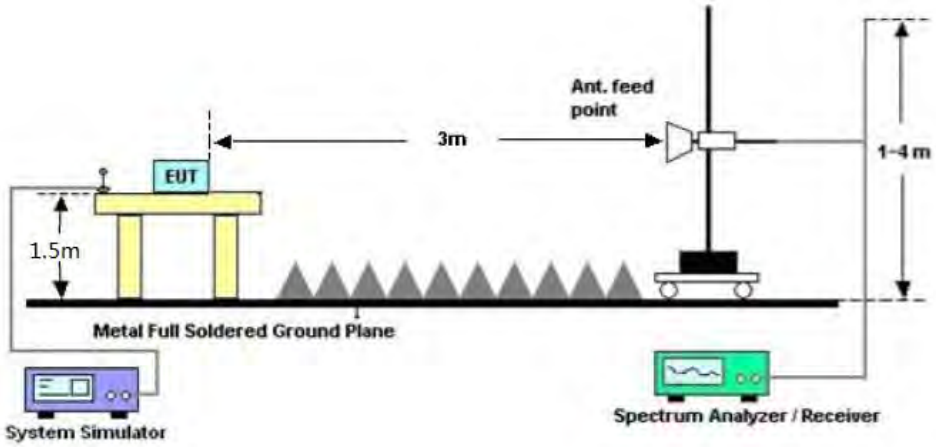
SUBSTITUTION METHOD: (Radiated Emissions)

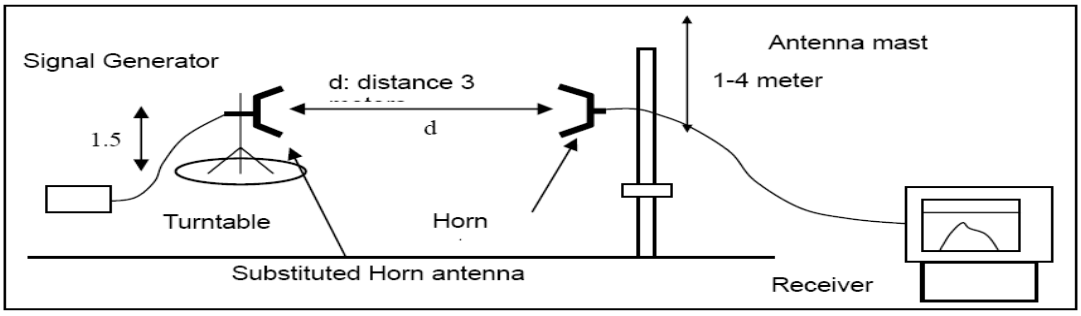
Radiated Below1GHz





Radiated Above 1 GHz





7.4 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, and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10 harmonic.

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

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

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

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

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

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	-34.3	-20	pass
1200.075	H	-36.5	-20	pass
1600.100	H	-37.9	-20	pass
2000.125	H	-39.5	-20	pass
2400.150	H	-39.7	-20	pass
2800.175	H	-42.7	-20	pass
3200.200	H	-44.5	-20	pass
3600.225	H	-43.9	-20	pass
4000.250	H	-46.9	-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	-35.1	-20	pass
1200.075	V	-37.8	-20	pass
1600.100	V	-36.2	-20	pass
2000.125	V	-38.4	-20	pass
2400.150	V	-42.5	-20	pass
2800.175	V	-39.9	-20	pass
3200.200	V	-42.5	-20	pass
3600.225	V	-43.5	-20	pass
4000.250	V	-45.7	-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	-33.2	-20	pass
1362.075	H	-35.3	-20	pass
1816.100	H	-35.9	-20	pass
2270.125	H	-38.9	-20	pass
2724.150	H	-38.6	-20	pass
3178.175	H	-41.7	-20	pass
3632.200	H	-45.2	-20	pass
4086.225	H	-47.4	-20	pass
4540.250	H	-48.6	-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	-35.1	-20	pass
1362.075	V	-33.9	-20	pass
1816.100	V	-36.2	-20	pass
2270.125	V	-37.2	-20	pass
2724.150	V	-39.5	-20	pass
3178.175	V	-41.8	-20	pass
3632.200	V	-42.3	-20	pass
4086.225	V	-44.8	-20	pass
4540.250	V	-46.8	-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	-33.2	-20	pass
1409.925	H	-36.1	-20	pass
1879.900	H	-38.3	-20	pass
2349.875	H	-35.7	-20	pass
2819.850	H	-39.9	-20	pass
3289.825	H	-42.1	-20	pass
3759.800	H	-43.9	-20	pass
4229.775	H	-44.5	-20	pass
4699.750	H	-47.2	-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	-32.5	-20	pass
1409.925	V	-33.1	-20	pass
1879.900	V	-35.3	-20	pass
2349.875	V	-37.4	-20	pass
2819.850	V	-38.2	-20	pass
3289.825	V	-40.9	-20	pass
3759.800	V	-40.9	-20	pass
4229.775	V	-43.3	-20	pass
4699.750	V	-45.5	-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	-40.8	-20	pass
1200.075	H	-41.2	-20	pass
1600.100	H	-43.5	-20	pass
2000.125	H	-45.3	-20	pass
2400.150	H	-46.6	-20	pass
2800.175	H	-47.9	-20	pass
3200.200	H	-49.0	-20	pass
3600.225	H	-50.4	-20	pass
4000.250	H	-51.2	-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	-40.6	-20	pass
1200.075	V	-41.8	-20	pass
1600.100	V	-43.2	-20	pass
2000.125	V	-44.6	-20	pass
2400.150	V	-45.9	-20	pass
2800.175	V	-46.4	-20	pass
3200.200	V	-47.7	-20	pass
3600.225	V	-49.7	-20	pass
4000.250	V	-50.2	-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	H	0		pass
908.050	H	-39.2	-20	pass
1362.075	H	-39.8	-20	pass
1816.100	H	-43.5	-20	pass
2270.125	H	-42.1	-20	pass
2724.150	H	-45.5	-20	pass
3178.175	H	-44.3	-20	pass
3632.200	H	-46.9	-20	pass
4086.225	H	-48.8	-20	pass
4540.250	H	-50.4	-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	-38.6	-20	pass
1362.075	V	-37.9	-20	pass
1816.100	V	-40.1	-20	pass
2270.125	V	-42.4	-20	pass
2724.150	V	-46.7	-20	pass
3178.175	V	-49.3	-20	pass
3632.200	V	-49.5	-20	pass
4086.225	V	-51.2	-20	pass
4540.250	V	-53.8	-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	-40.3	-20	pass
1409.925	H	-40.7	-20	pass
1879.900	H	-42.2	-20	pass
2349.875	H	-44.4	-20	pass
2819.850	H	-47.9	-20	pass
3289.825	H	-48.2	-20	pass
3759.800	H	-49.5	-20	pass
4229.775	H	-51.7	-20	pass
4699.750	H	-52.6	-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	-39.9	-20	pass
1409.925	V	-40.5	-20	pass
1879.900	V	-43.3	-20	pass
2349.875	V	-44.6	-20	pass
2819.850	V	-46.7	-20	pass
3289.825	V	-48.1	-20	pass
3759.800	V	-49.6	-20	pass
4229.775	V	-50.2	-20	pass
4699.750	V	-51.7	-20	pass

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	-34.8	-20	pass
1200.075	H	-35.2	-20	pass
1600.100	H	-36.5	-20	pass
2000.125	H	-38.8	-20	pass
2400.150	H	-39.1	-20	pass
2800.175	H	-41.4	-20	pass
3200.200	H	-42.5	-20	pass
3600.225	H	-43.2	-20	pass
4000.250	H	-44.5	-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	-34.4	-20	pass
1200.075	V	-35.8	-20	pass
1600.100	V	-36.4	-20	pass
2000.125	V	-39.8	-20	pass
2400.150	V	-40.4	-20	pass
2800.175	V	-39.9	-20	pass
3200.200	V	-42.2	-20	pass
3600.225	V	-43.7	-20	pass
4000.250	V	-44.2	-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	H	0		pass
908.050	H	-33.9	-20	pass
1362.075	H	-36.6	-20	pass
1816.100	H	-37.5	-20	pass
2270.125	H	-38.2	-20	pass
2724.150	H	-41.3	-20	pass
3178.175	H	-42.8	-20	pass
3632.200	H	-44.1	-20	pass
4086.225	H	-45.6	-20	pass
4540.250	H	-44.2	-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	-35.7	-20	pass
1362.075	V	-36.3	-20	pass
1816.100	V	-36.4	-20	pass
2270.125	V	-38.1	-20	pass
2724.150	V	-39.1	-20	pass
3178.175	V	-38.6	-20	pass
3632.200	V	-41.8	-20	pass
4086.225	V	-42.7	-20	pass
4540.250	V	-43.9	-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	-33.2	-20	pass
1409.925	H	-33.7	-20	pass
1879.900	H	-35.1	-20	pass
2349.875	H	-38.6	-20	pass
2819.850	H	-40.6	-20	pass
3289.825	H	-39.5	-20	pass
3759.800	H	-41.8	-20	pass
4229.775	H	-42.7	-20	pass
4699.750	H	-43.5	-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	-34.8	-20	pass
1409.925	V	-34.3	-20	pass
1879.900	V	-35.9	-20	pass
2349.875	V	-36.4	-20	pass
2819.850	V	-39.8	-20	pass
3289.825	V	-39.9	-20	pass
3759.800	V	-40.5	-20	pass
4229.775	V	-41.9	-20	pass
4699.750	V	-42.7	-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	-34.2	-20	pass
1200.075	H	-35.3	-20	pass
1600.100	H	-36.5	-20	pass
2000.125	H	-37.4	-20	pass
2400.150	H	-38.2	-20	pass
2800.175	H	-39.2	-20	pass
3200.200	H	-40.6	-20	pass
3600.225	H	-42.4	-20	pass
4000.250	H	-43.9	-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	-34.7	-20	pass
1200.075	V	-35.4	-20	pass
1600.100	V	-38.2	-20	pass
2000.125	V	-39.0	-20	pass
2400.150	V	-40.5	-20	pass
2800.175	V	-42.6	-20	pass
3200.200	V	-45.3	-20	pass
3600.225	V	-44.8	-20	pass
4000.250	V	-45.4	-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	-40.7	-20	pass
1362.075	H	-42.3	-20	pass
1816.100	H	-43.7	-20	pass
2270.125	H	-46.5	-20	pass
2724.150	H	-45.8	-20	pass
3178.175	H	-47.2	-20	pass
3632.200	H	-48.7	-20	pass
4086.225	H	-51.2	-20	pass
4540.250	H	-50.5	-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	-39.2	-20	pass
1362.075	V	-41.1	-20	pass
1816.100	V	-40.7	-20	pass
2270.125	V	-42.8	-20	pass
2724.150	V	-44.1	-20	pass
3178.175	V	-46.6	-20	pass
3632.200	V	-47.7	-20	pass
4086.225	V	-48.0	-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	-38.2	-20	pass
1409.925	H	-39.6	-20	pass
1879.900	H	-38.7	-20	pass
2349.875	H	-42.3	-20	pass
2819.850	H	-43.6	-20	pass
3289.825	H	-45.4	-20	pass
3759.800	H	-48.3	-20	pass
4229.775	H	-49.2	-20	pass
4699.750	H	-49.1	-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	-38.6	-20	pass
1409.925	V	-39.2	-20	pass
1879.900	V	-40.5	-20	pass
2349.875	V	-41.5	-20	pass
2819.850	V	-43.3	-20	pass
3289.825	V	-45.2	-20	pass
3759.800	V	-47.3	-20	pass
4229.775	V	-49.9	-20	pass
4699.750	V	-50.4	-20	pass

7.5 EMISSION MASK PLOT

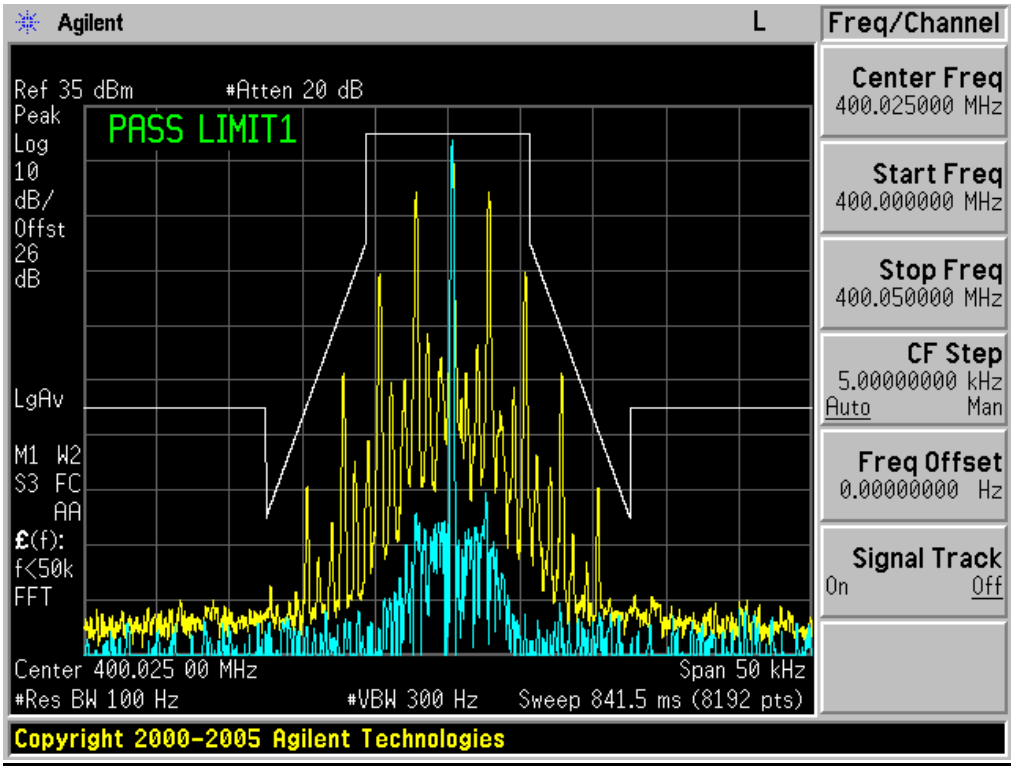
The detailed procedure employed for Emission Mask measurements are specified as following:

- 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.

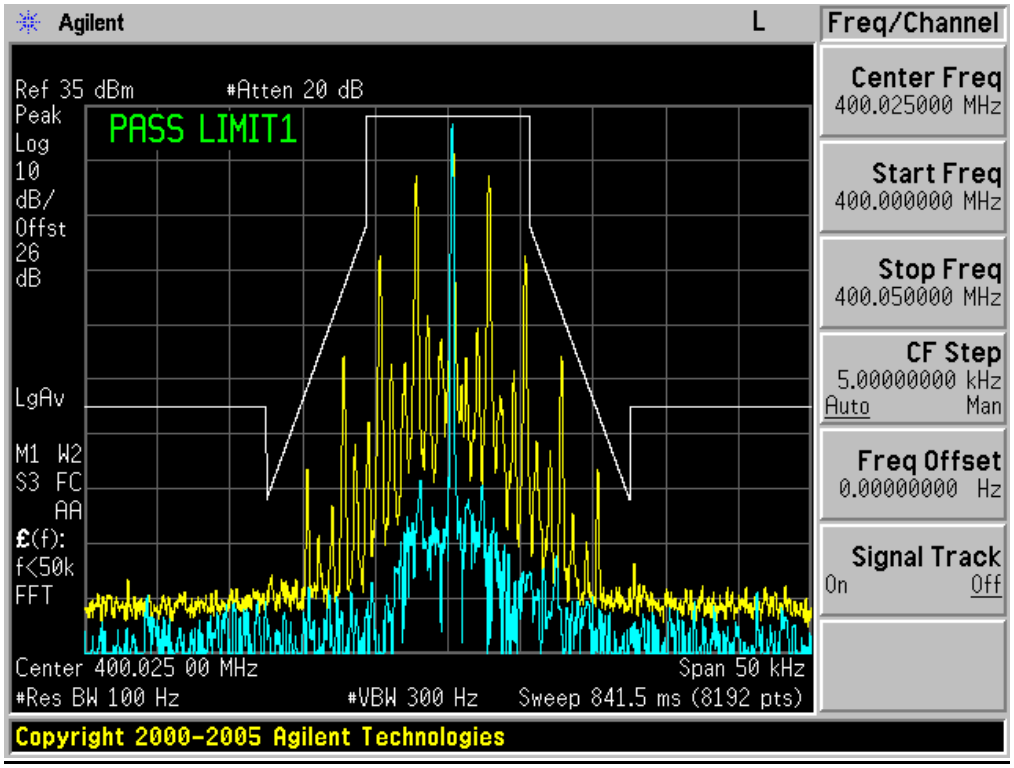
UHF:

Analog:

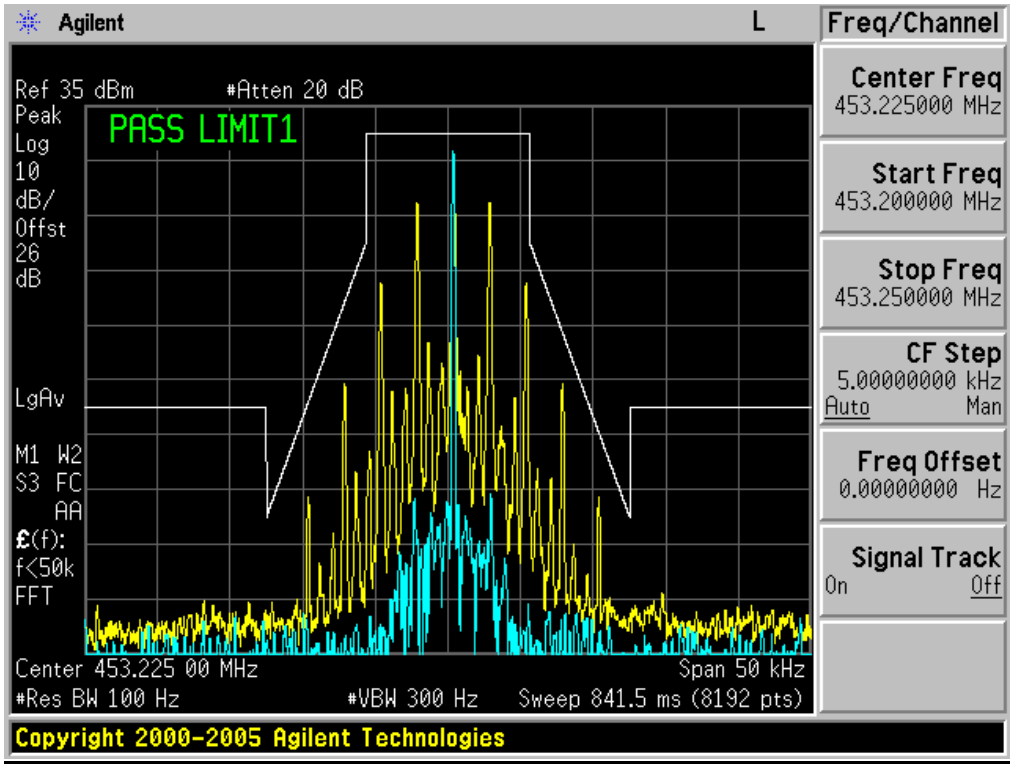
The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (1W)



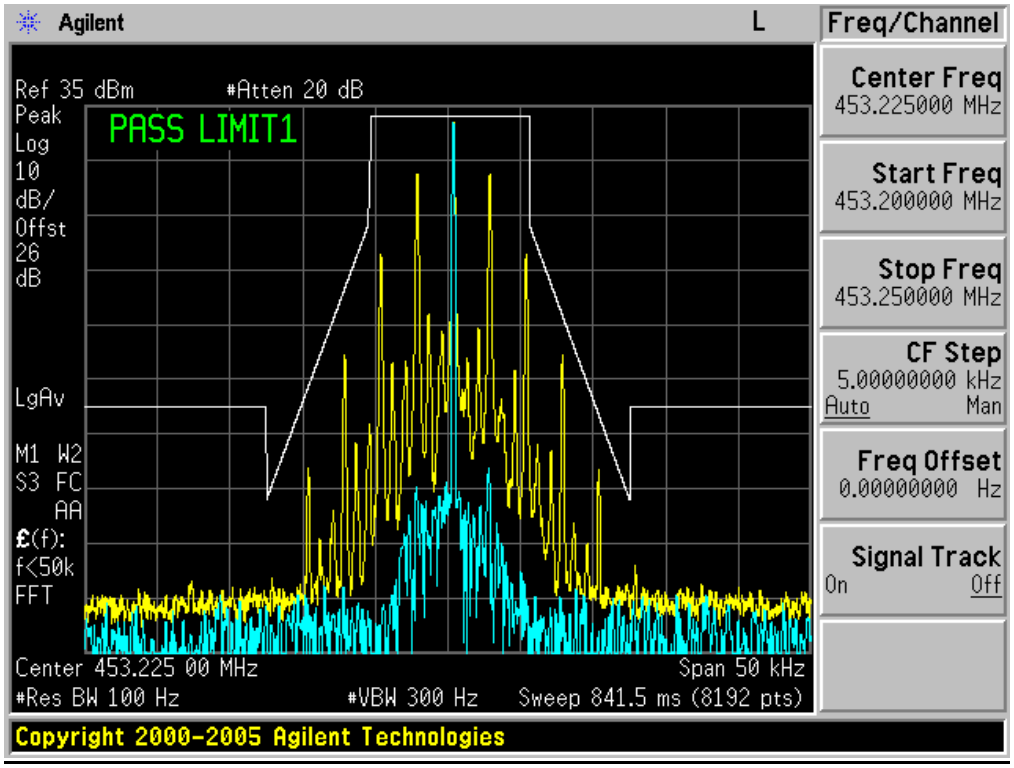
The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (2W)



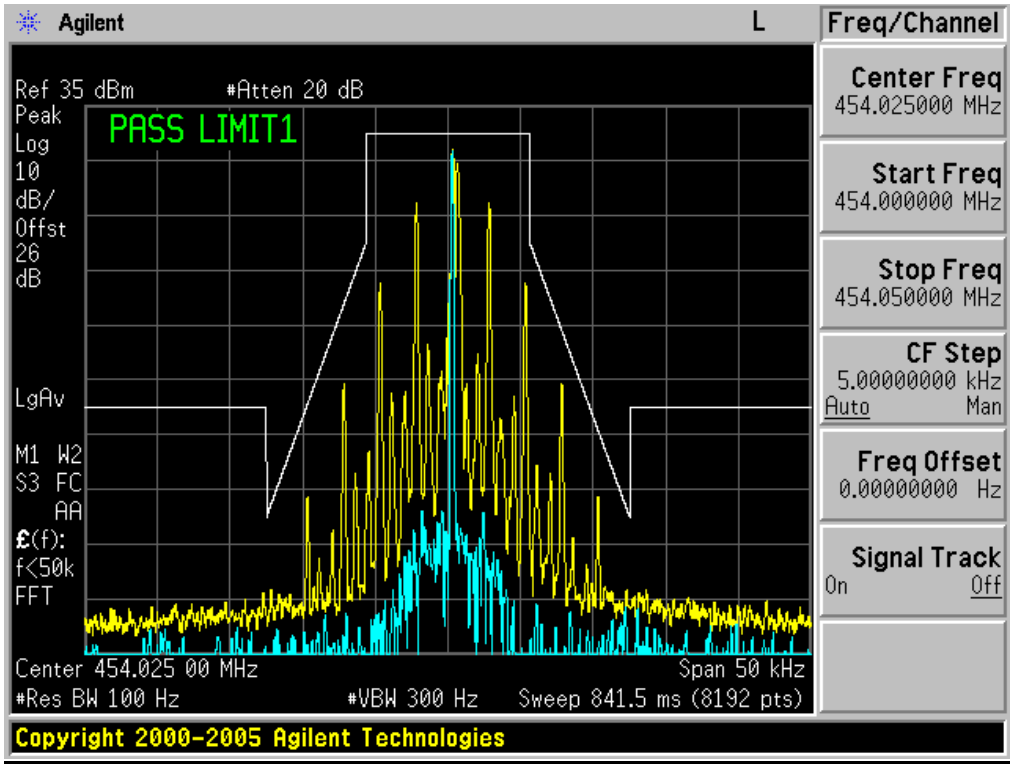
The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (1W)



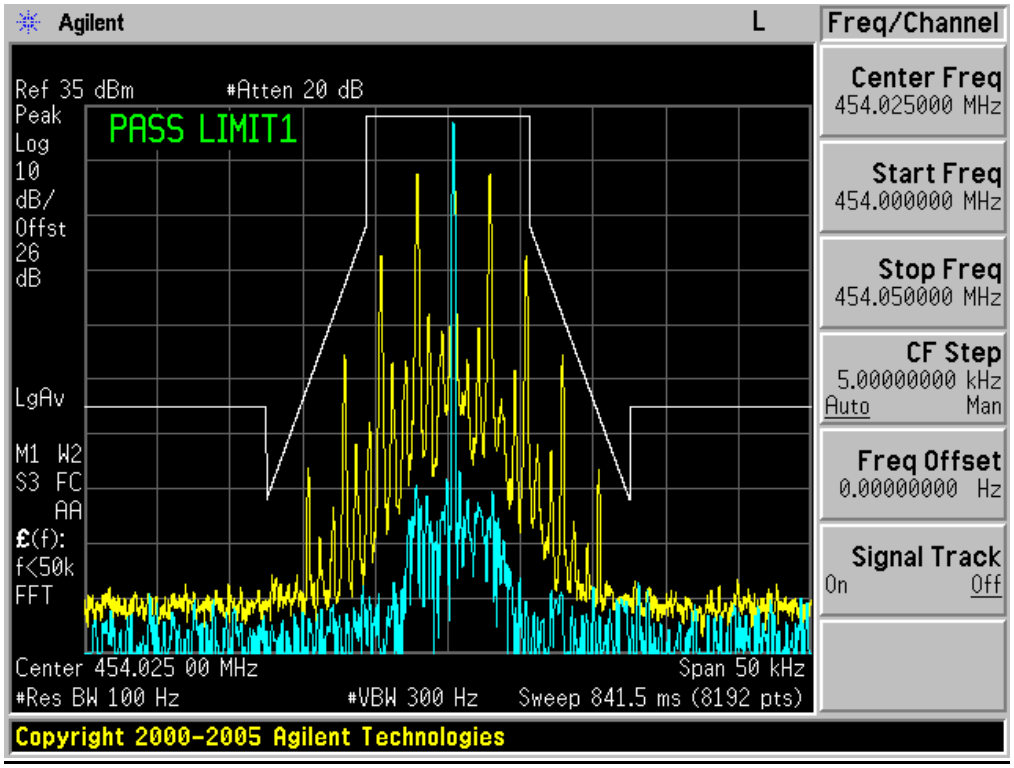
The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (2W)



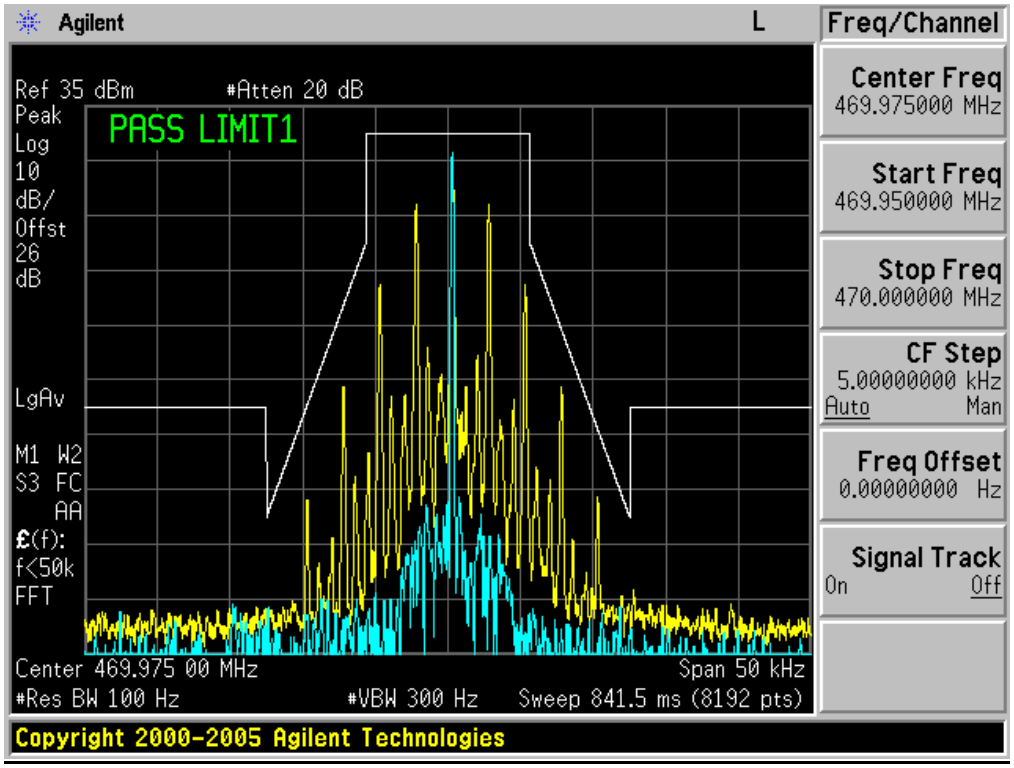
The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (1W)



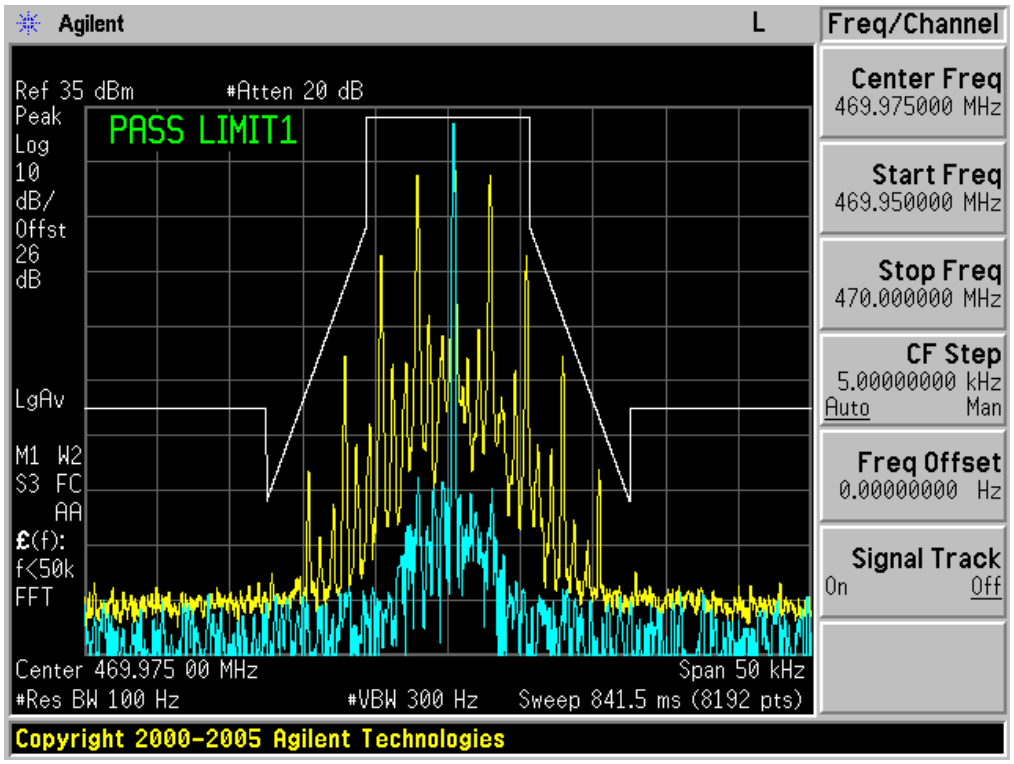
The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (2W)



The Worst Emission Mask D for (469.975 MHz) of 12.5 KHz channel Separation (1W)

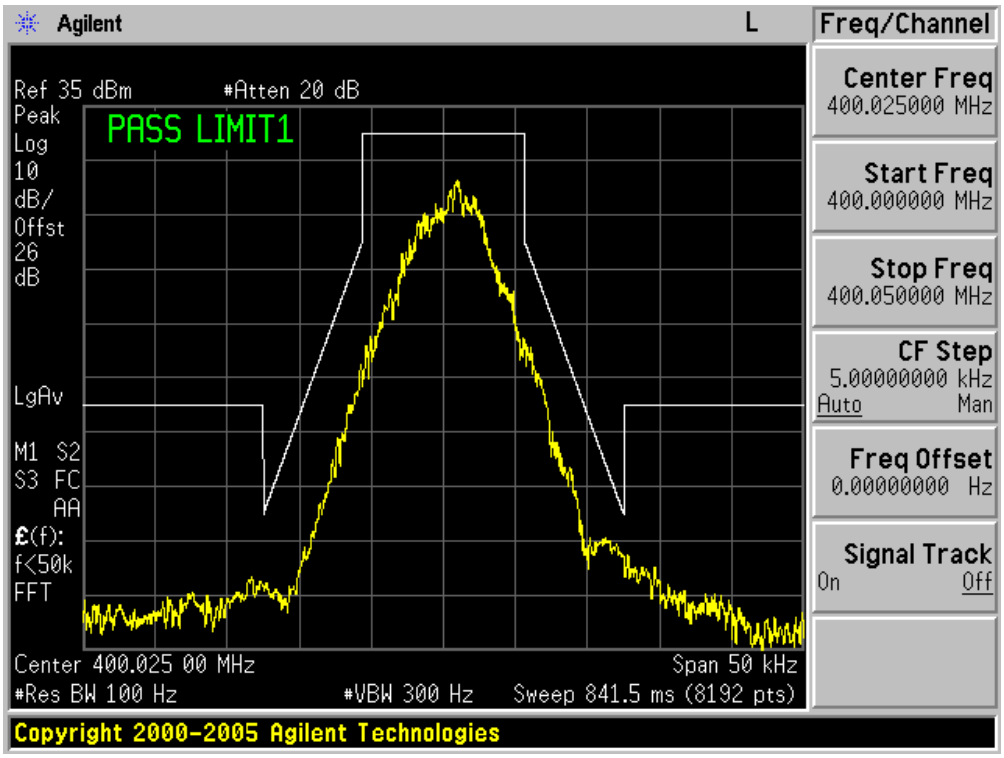


The Worst Emission Mask D for (469.975 MHz) of 12.5 KHz channel Separation (2W)

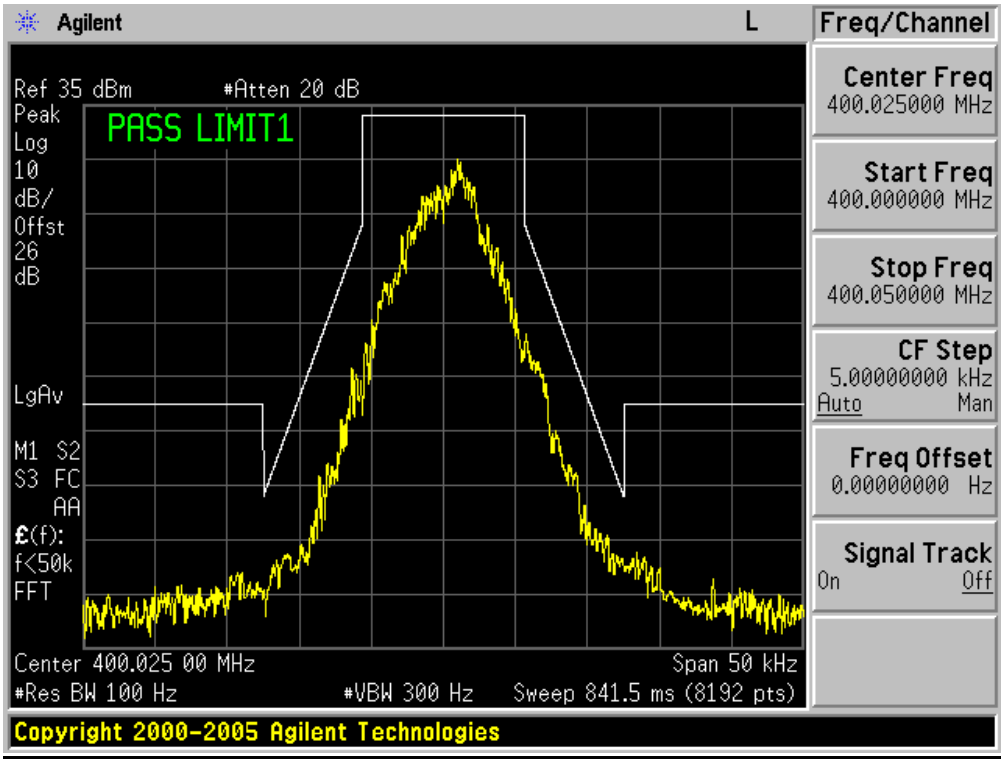


Digital：

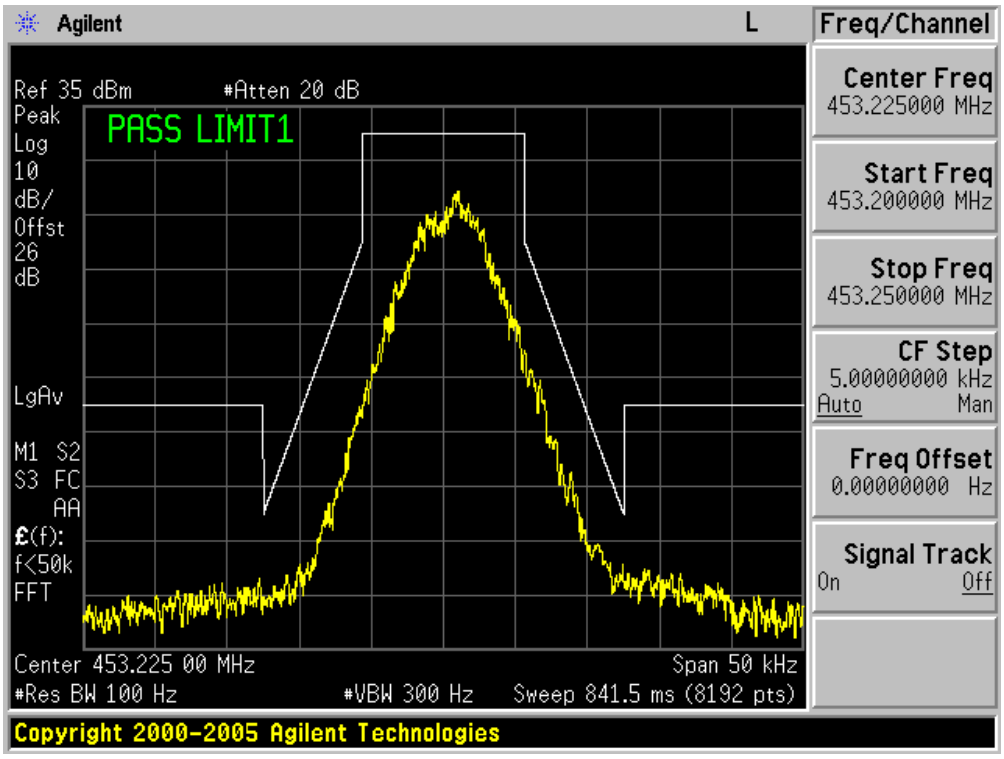
The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (1W)



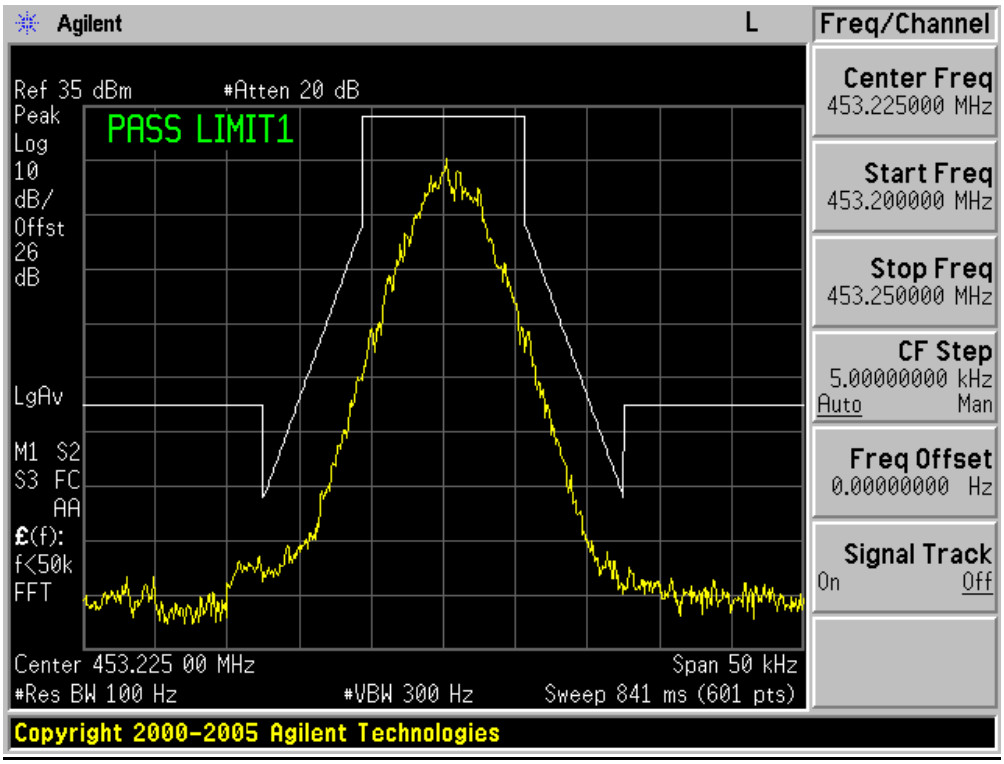
The Worst Emission Mask D for (400.025 MHz) of 12.5 KHz channel Separation (2W)



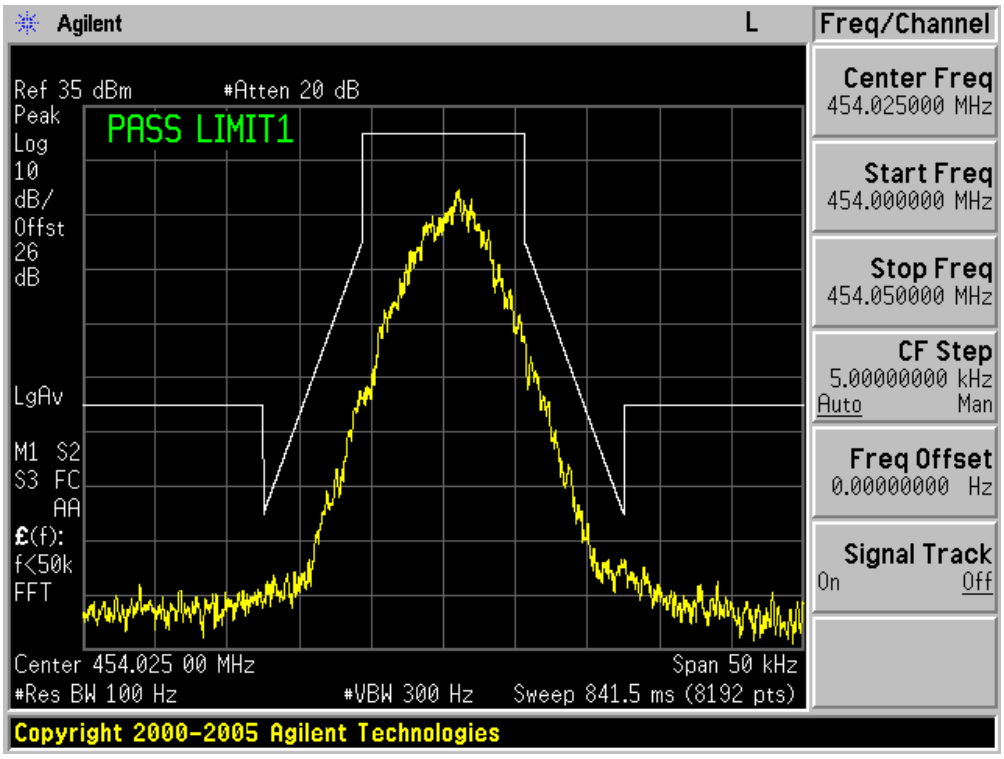
The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (1W)



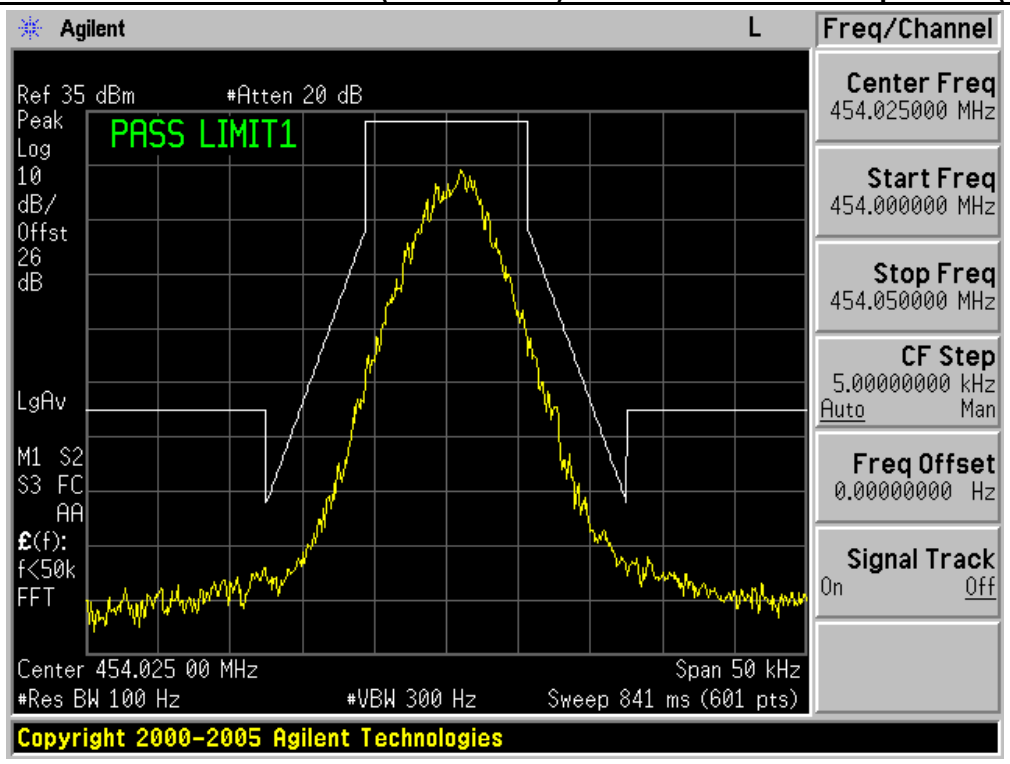
The Worst Emission Mask D for (453.225 MHz) of 12.5 KHz channel Separation (2W)



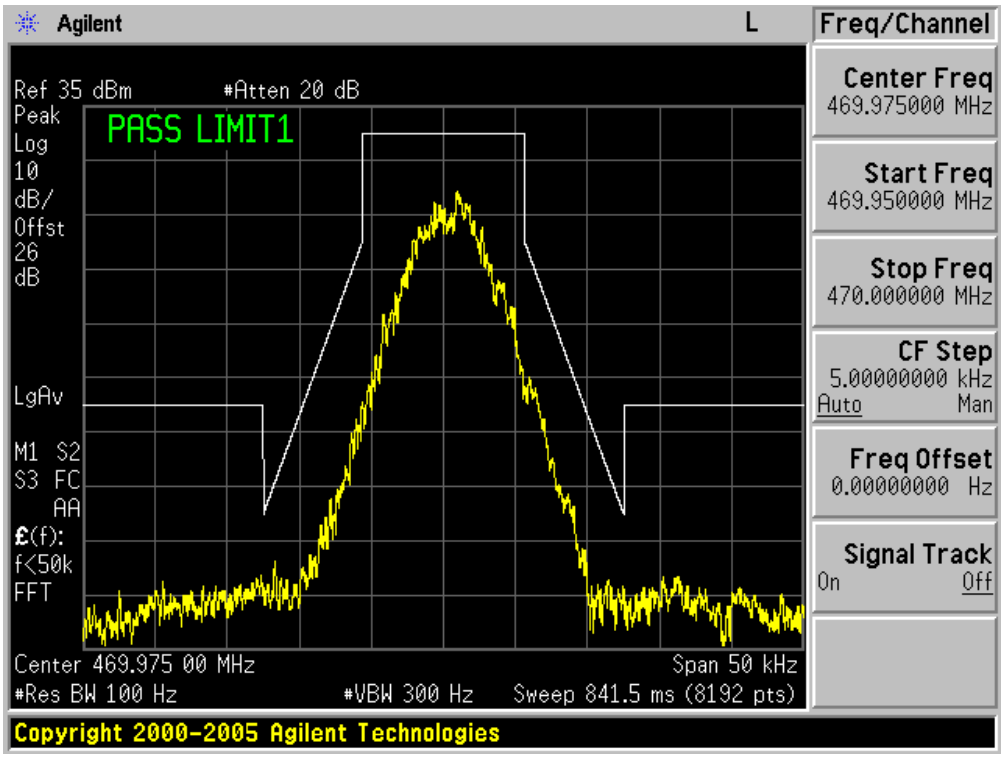
The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (1W)



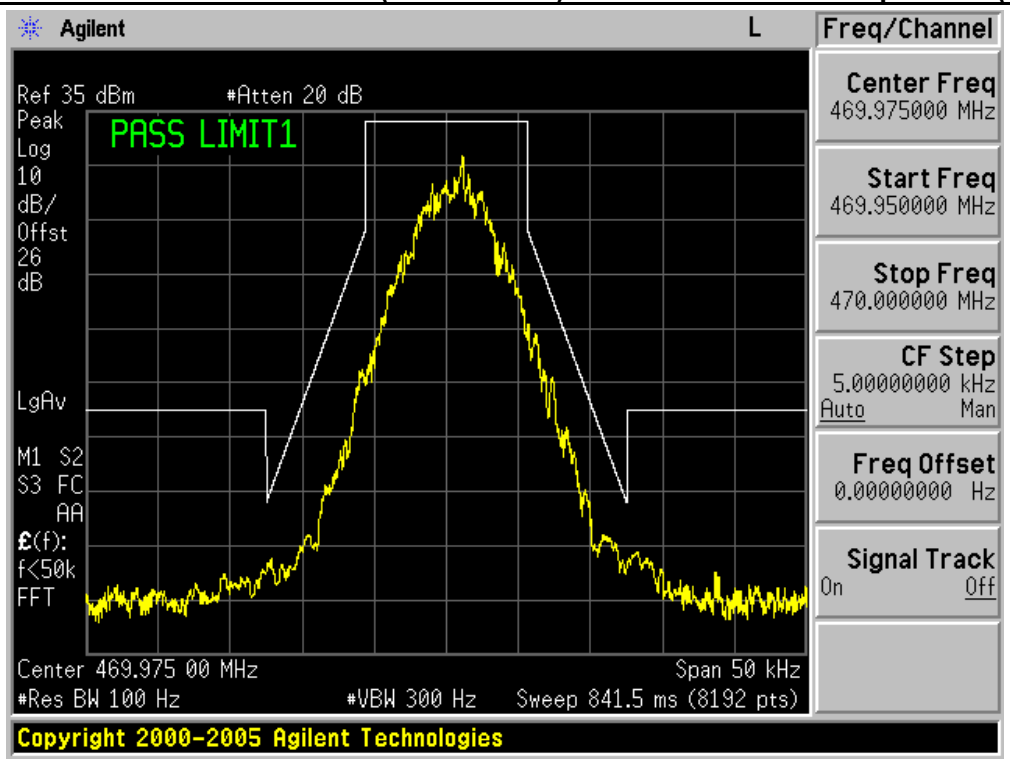
The Worst Emission Mask D for (454.025 MHz) of 12.5 KHz channel Separation (2W)



The Worst Emission Mask D for (469.975 MHz) of 12.5 KHz channel Separation (1W)



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



8. MODULATION CHARACTERISTICS

8.1 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.

8.2 MEASUREMENT METHOD

8.2.1 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.

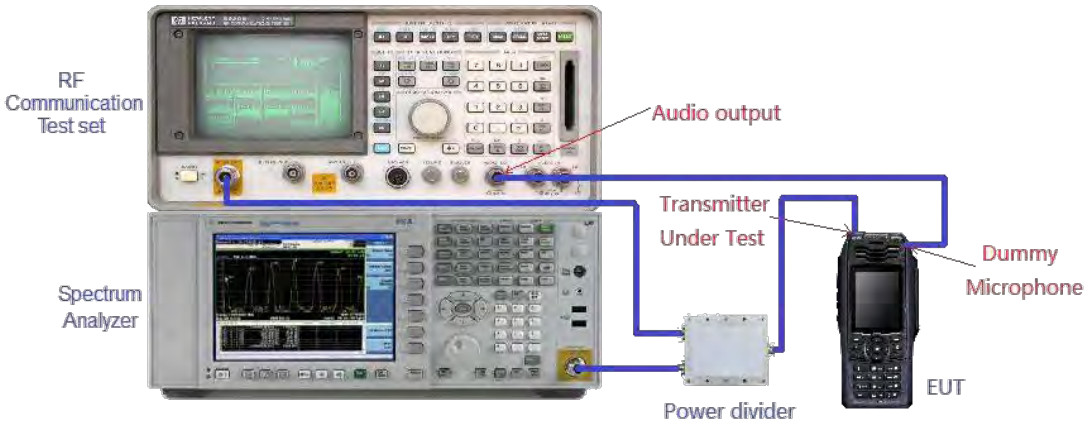
8.2.2 Audio Frequency Response

(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).



8.3 MEASUREMENT RESULT

UHF:

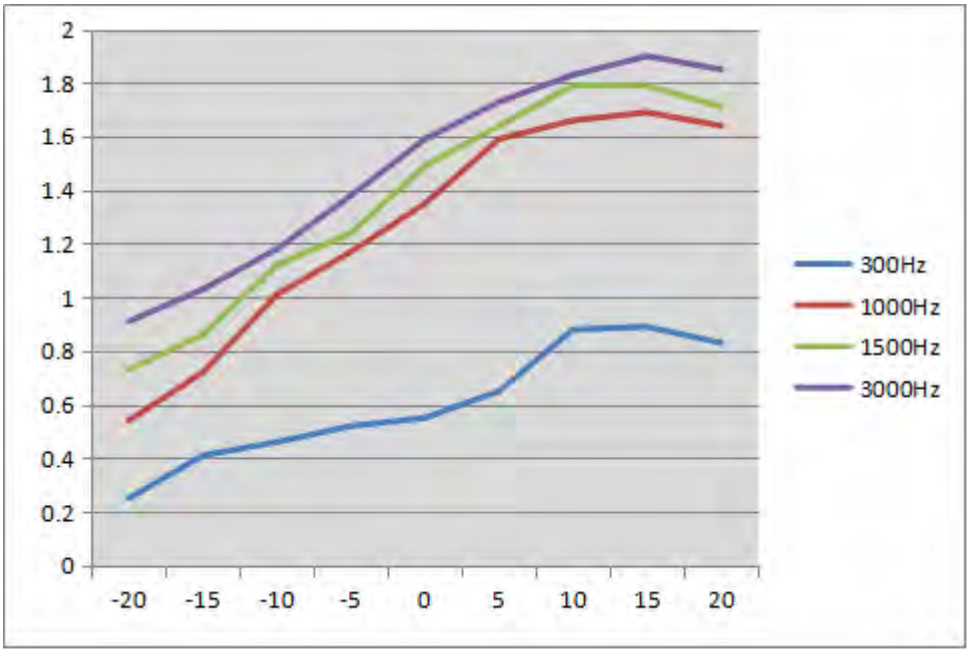
Analog:

TEST RESULT TS FOR H POWER H LEVEL

(A). MODULATION LIMIT:

Middle 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	0.25	0.54	0.73	0.91
-15	0.41	0.72	0.86	1.03
-10	0.46	1.01	1.12	1.18
-5	0.52	1.17	1.24	1.38
0	0.55	1.35	1.49	1.59
+5	0.65	1.59	1.64	1.73
+10	0.88	1.66	1.79	1.83
+15	0.89	1.69	1.79	1.9
+20	0.83	1.64	1.71	1.85



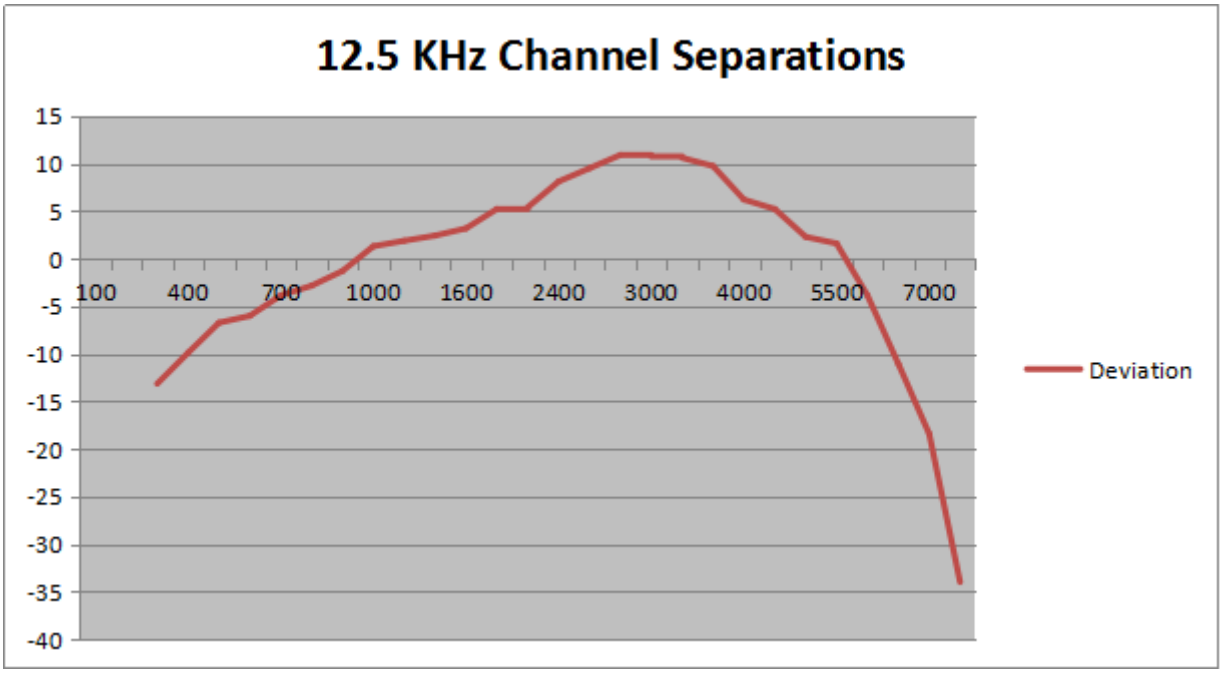
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

Middle Channel @ 12.5 KHz Channel Separations

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.11	-13.15
400	0.16	-9.90
500	0.23	-6.74
600	0.25	-6.02
700	0.32	-3.88
800	0.36	-2.85
900	0.43	-1.31
1000	0.58	1.29
1200	0.62	1.87
1400	0.66	2.41
1600	0.72	3.17
1800	0.91	5.20
2000	0.93	5.39
2400	1.27	8.10
2500	1.49	9.48
2800	1.75	10.88
3000	1.72	10.73
3200	1.69	10.58
3600	1.53	9.71
4000	1.02	6.19
4500	0.91	5.20
5000	0.65	2.28
5500	0.6	1.58
6000	0.32	-3.88
6500	0.14	-11.06
7000	0.06	-18.42
7500	0.01	-33.98
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of High Channel



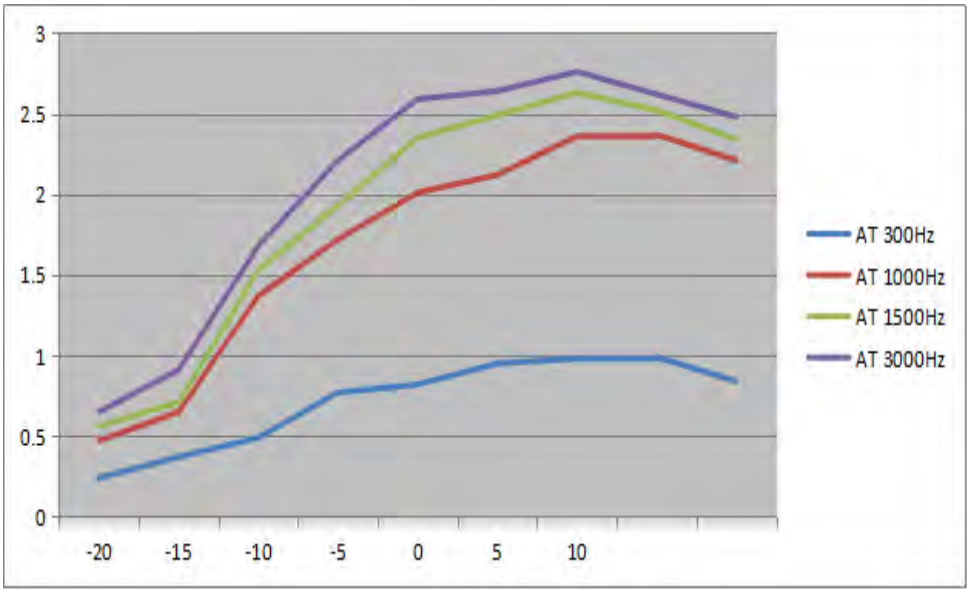
Note: All the modes had been tested, but only the worst data recorded in the report.

Digital:

(A). MODULATION LIMIT:

Top 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	0.24	0.47	0.56	0.65
-15	0.37	0.65	0.71	0.91
-10	0.49	1.37	1.53	1.68
-5	0.77	1.72	1.93	2.21
0	0.82	2.01	2.35	2.59
+5	0.95	2.12	2.49	2.64
+10	0.98	2.36	2.63	2.76
+15	0.99	2.37	2.52	2.62
+20	0.84	2.21	2.34	2.48



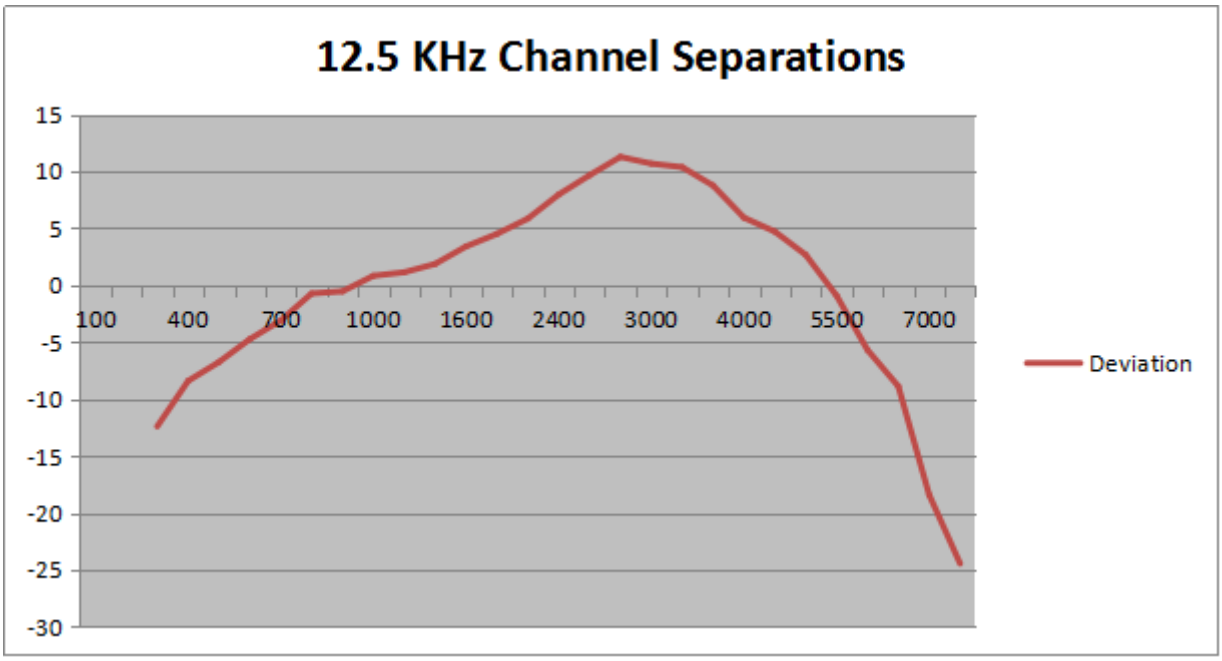
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

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

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.12	-12.40
400	0.19	-8.40
500	0.23	-6.74
600	0.29	-4.73
700	0.35	-3.10
800	0.46	-0.72
900	0.47	-0.54
1000	0.55	0.83
1200	0.57	1.14
1400	0.62	1.87
1600	0.74	3.41
1800	0.84	4.51
2000	0.98	5.85
2400	1.25	7.96
2500	1.52	9.66
2800	1.83	11.27
3000	1.71	10.68
3200	1.65	10.37
3600	1.37	8.76
4000	0.99	5.93
4500	0.86	4.71
5000	0.68	2.67
5500	0.45	-0.92
6000	0.26	-5.68
6500	0.18	-8.87
7000	0.06	-18.42
7500	0.03	-24.44
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of Bottom Channel---H Power



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

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

9.1 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.

9.2 TEST PROCEDURE

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

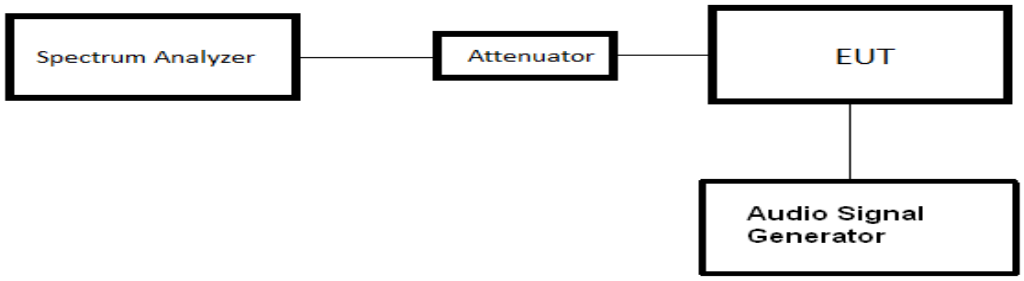
In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the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

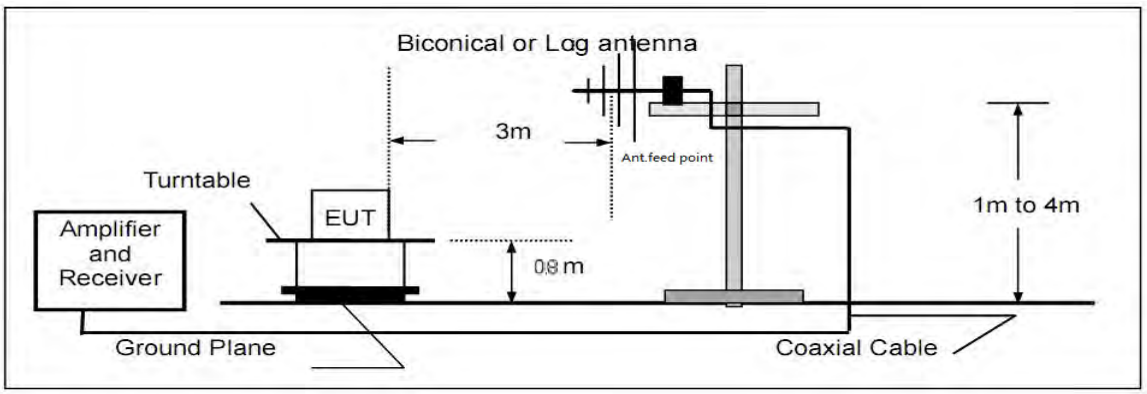
9.3 TEST CONFIGURATION

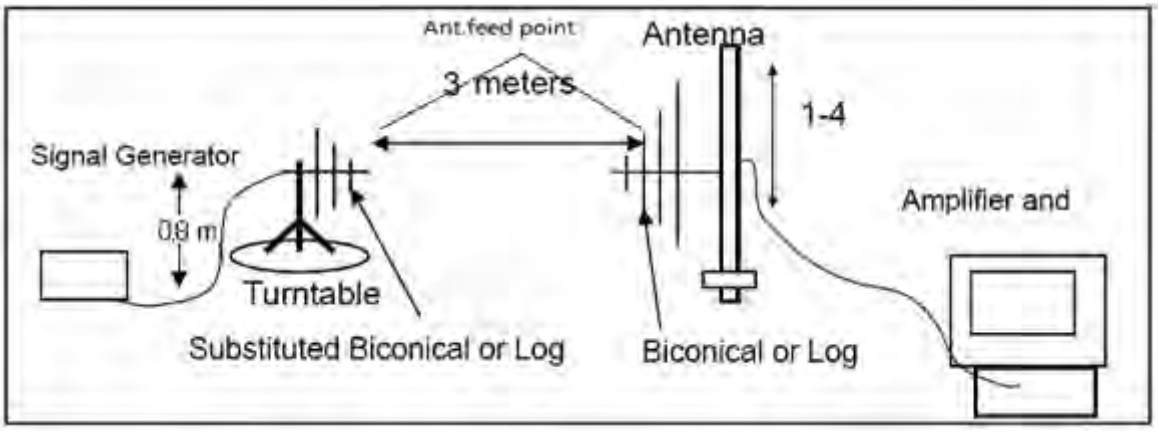
Conducted Output Power:



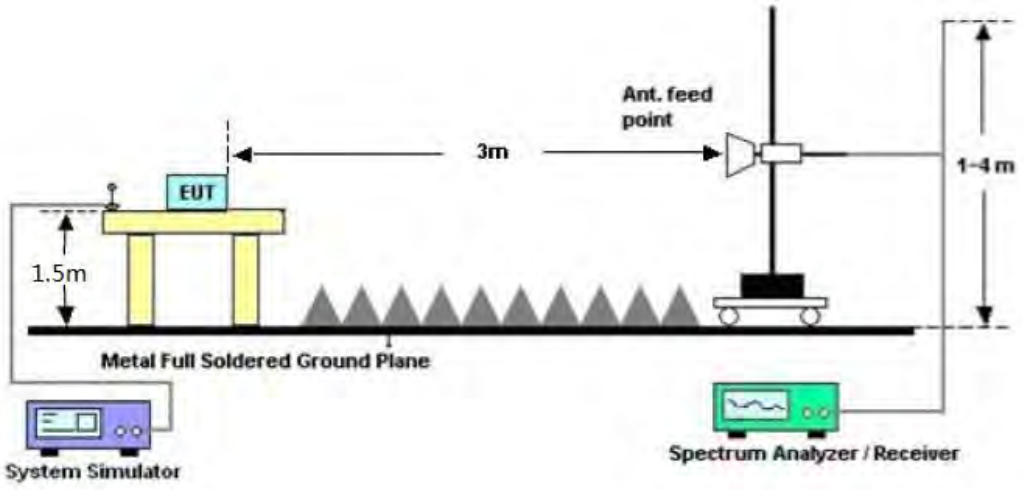
Effective Radiated Power

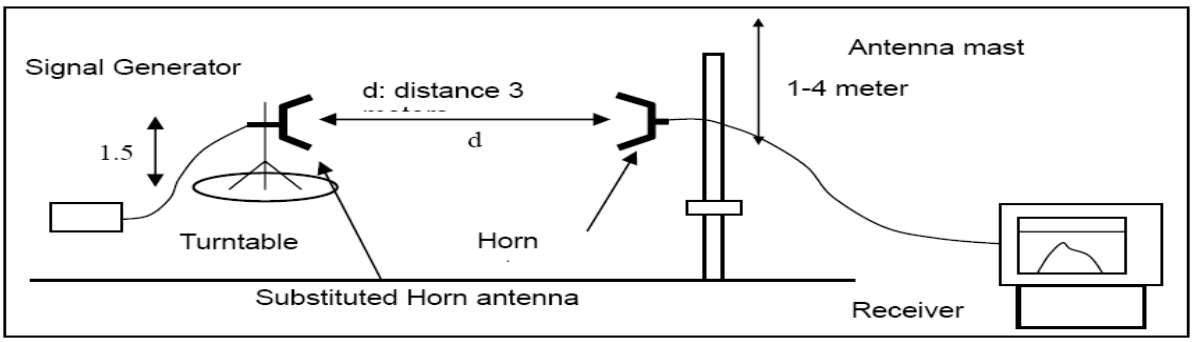
Radiated Below1GHz





Radiated Above 1 GHz





9.4 TEST RESULT

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

Analog: 2W/1 W for 12.5 KHz Channel Separation UHF

Digital: 2W/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-2W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 33.01dBm(2W)
12.5 KHz	Bottom(400.025MHz)	32.52
	Middle(453.225MHz)	32.41
	Middle(454.025MHz)	32.55
	Top (469.975MHz)	32.50

Radiated Power Measurement Results-2W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 33.01dBm(2W)
12.5 KHz	Bottom(400.025MHz)	32.19
	Middle(453.225MHz)	32.16
	Middle(454.025MHz)	32.22
	Top (469.975MHz)	32.21

Conducted Power Measurement Results-1W		
Channel Separation	Channel	Measurement Result (dBm)
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.51
	Middle(453.225MHz)	29.46
	Middle(454.025MHz)	29.63
	Top (469.975MHz)	29.56

Radiated Power Measurement Results-1W		
Channel Separation	Channel	Measurement Result (dBm)
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.31
	Middle(453.225MHz)	29.21
	Middle(454.025MHz)	29.18
	Top (469.975MHz)	29.22

Digital:

Date + voice:

Conducted Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 33.01dBm(2W)
12.5 KHz	Bottom(400.025MHz)	32.43
	Middle(453.225MHz)	32.40
	Middle(454.025MHz)	32.44
	Top (469.975MHz)	32.39

Radiated Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 33.01dBm(2W)
12.5 KHz	Bottom(400.025MHz)	32.28
	Middle(453.225MHz)	32.24
	Middle(454.025MHz)	32.35
	Top (469.975MHz)	32.23

Date transmission mode:

Conducted Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 33.01dBm(2W)
12.5 KHz	Bottom(400.025MHz)	31.98
	Middle(453.225MHz)	31.99
	Middle(454.025MHz)	32.03
	Top (469.975MHz)	31.97

Radiated Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 33.01dBm(2W)
12.5 KHz	Bottom(400.025MHz)	31.93
	Middle(453.225MHz)	31.92
	Middle(454.025MHz)	31.89
	Top (469.975MHz)	31.94

Date + voice:

Conducted Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.33
	Middle(453.225MHz)	29.30
	Middle(454.025MHz)	29.36
	Top (469.975MHz)	29.29

Radiated Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.11
	Middle(453.225MHz)	29.21
	Middle(454.025MHz)	29.25
	Top (469.975MHz)	29.22

Date transmission mode:

Conducted Power Measurement Results		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	28.87
	Middle(453.225MHz)	28.96
	Middle(454.025MHz)	28.85
	Top (469.975MHz)	28.92

Radiated Power Measurement Results		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	28.79
	Middle(453.225MHz)	28.91
	Middle(454.025MHz)	28.85
	Top (469.975MHz)	28.88

10. RANSMITTER FREQUENCY BEHAVIOR

10.1PROVISIONS APPLICABLE

FCC §90.214

Time intervals [1, 2]	Maximum frequency difference [3]	All equipment	
		150 to 174 MHz	421 to 512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels			
t_1 [4]	± 25.0 kHz	5.0 ms	10.0 ms
t_2	± 12.5 kHz	20.0 ms	25.0 ms
t_3 [4]	± 25.0 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
t_1 [4]	± 12.5 kHz	5.0 ms	10.0 ms
t_2	± 6.25 kHz	20.0 ms	25.0 ms
t_3 [4]	± 12.5 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels			
t_1 [4]	± 6.25 kHz	5.0 ms	10.0 ms
t_2	± 3.125 kHz	20.0 ms	25.0 ms
t_3 [4]	± 6.25 kHz	5.0 ms	10.0 ms

[1] t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.
t_1 is the time period immediately following t_{on}.
t_2 is the time period immediately following t_1.
t_3 is the time period from the instant when the transmitter is turned off until t_{off}.
t_{off} is the instant when the 1 kHz test signal starts to rise.
[2] During the time from the end of t_2 to the beginning of t_3, the frequency difference must not exceed the limits specified in § 90.213.
[3] Difference between the actual transmitter frequency and the assigned transmitter frequency.
[4] If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

10.2 TEST METHOD

TIA/EIA-603 2.2.19.3

10.3 DESCRIBE LIMIT LINE OF RANSMITTER FREQUENCY BEHAVIOR

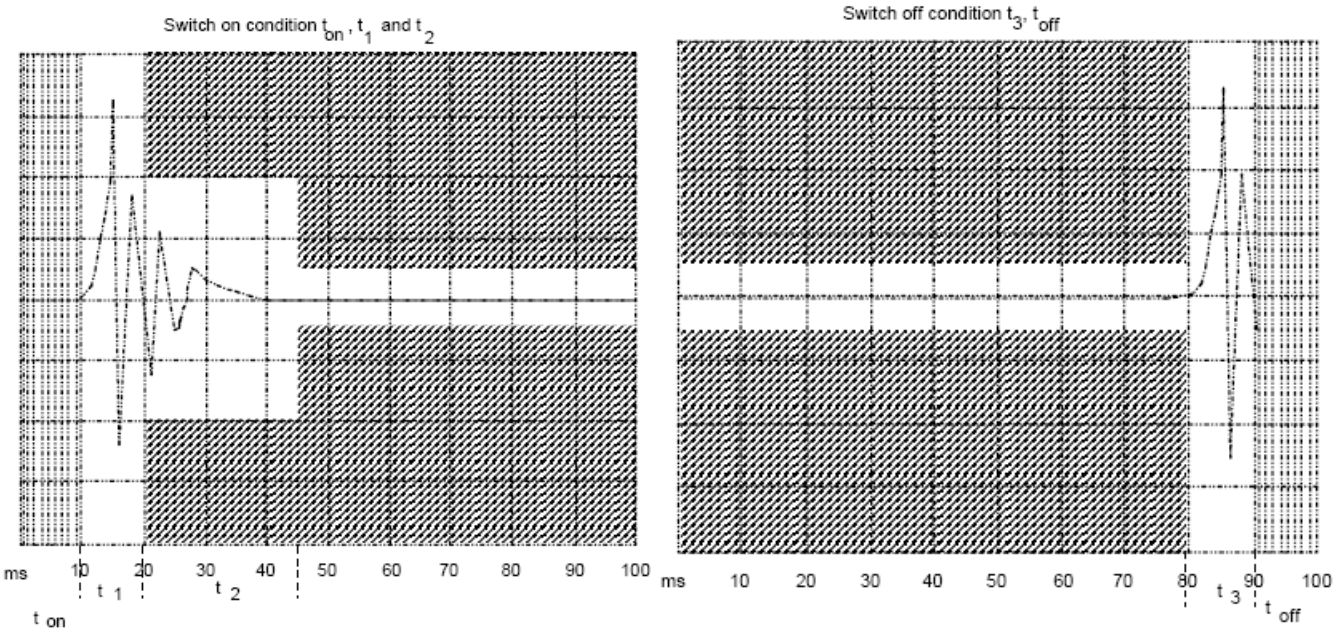
ton: The switch-on instant ton of a transmitter is defined by the condition when the output power, measured at the antenna terminal, exceeds 0,1 % of the full output power (-30 dBc).

t1: period of time starting at ton and finishing according to above 11.1

t2: period of time starting at the end of t1 and finishing according to above 11.1

toff: switch-off instant defined by the condition when the output power falls below 0,1 % of the full output power (-30 dBc).

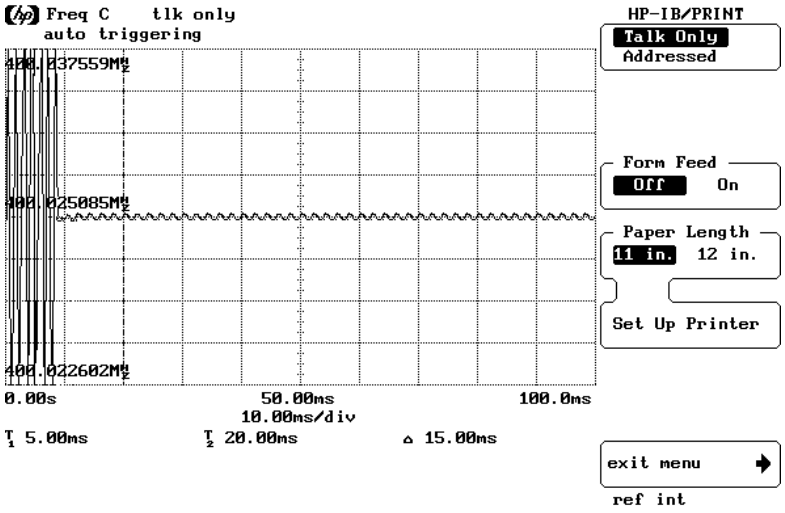
t3: period of time that finishing at toff and starting according to above 11.1



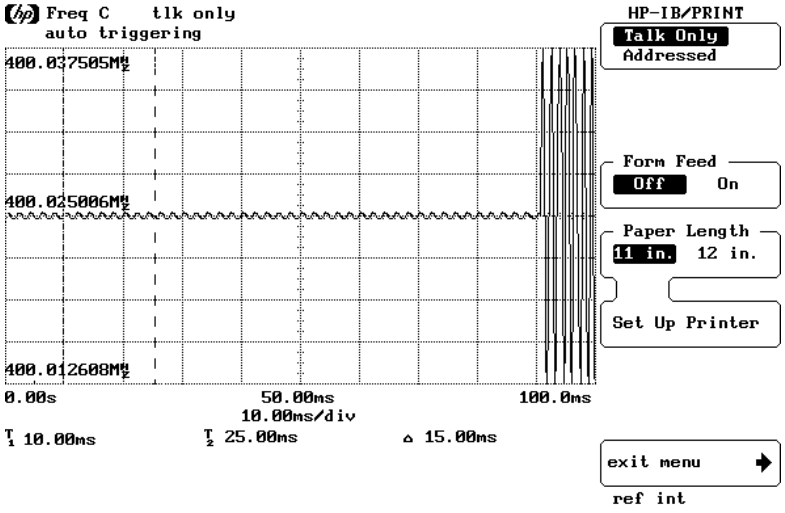
10.4 MEASURE RESULT

UHF:

Transmitter Frequency Behavior @ 12.5 KHz Channel Separation--Off to On



Transmitter Frequency Behavior @ 12.5 KHz Channel Separation--On to Off



11. AUDIO LOW PASS FILTER RESPONSE

11.1.TEST LIMITS

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

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

11.2. METHOD OF MEASUREMENTS

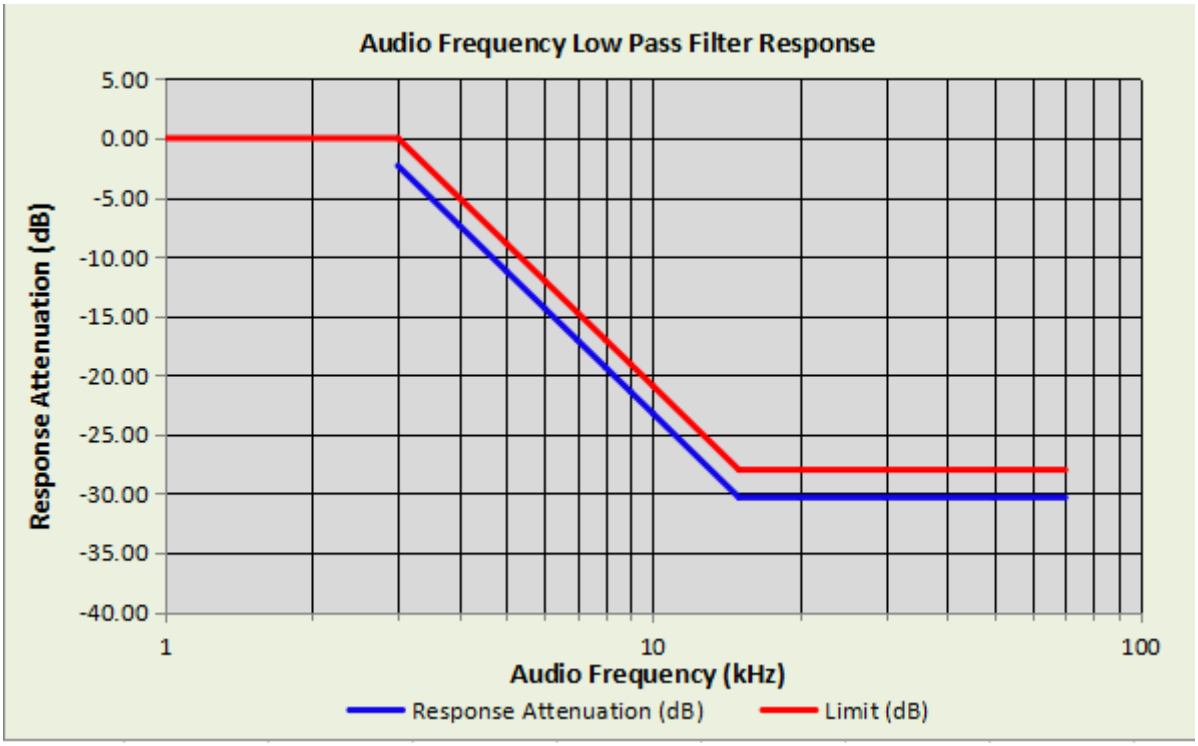
The rated audio input signal was applied to the input of the audio low-pass filter (or of all modulation stages) using an audio oscillator, this input signal level and its corresponding output signal were then measured and recorded using the FFT Digital Spectrum Analyzer. Tests were repeated at different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

11.3.MEASURE RESULT

Analog:

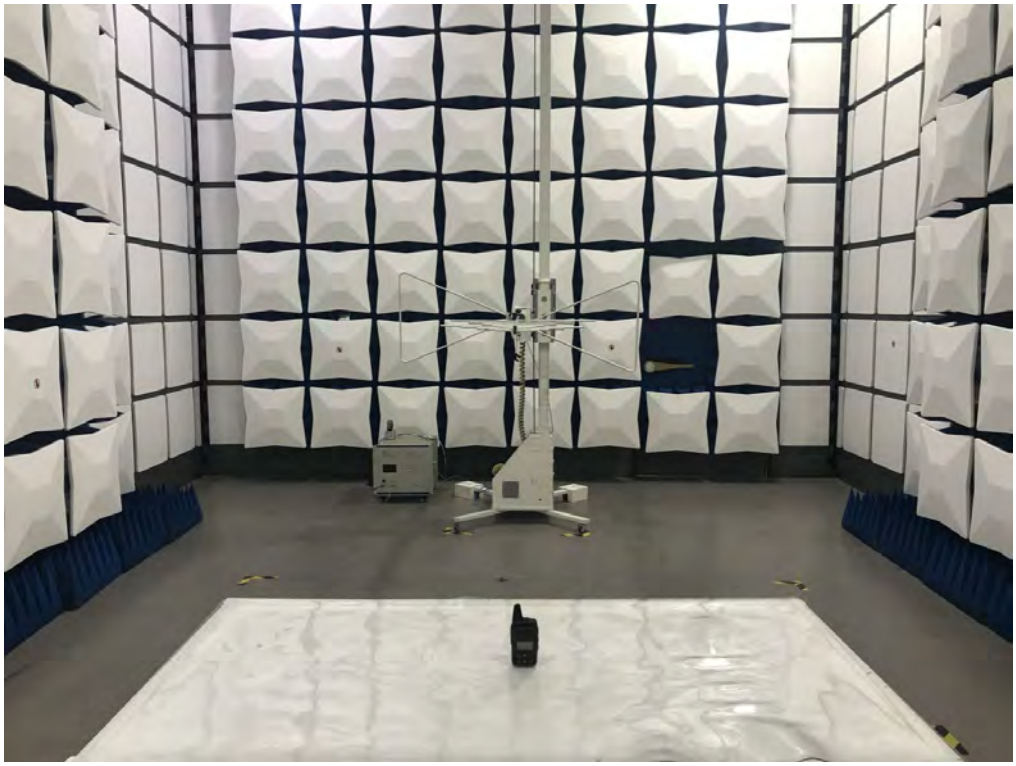
12.5 KHZ CHANNEL SPACING, F3E, FREQUENCY OF ALL MODULATION STATES (TEST RESULT FOR UHF)-2W

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1	0	/
3	-2.33	0.00
4	-7.33	-5.00
5	-11.20	-8.87
6	-14.37	-12.04
7	-17.05	-14.72
8	-19.37	-17.04
9	-21.41	-19.08
10	-23.25	-20.92
15	-30.33	-28.00
20	-30.33	-28.00
30	-30.33	-28.00
50	-30.33	-28.00
70	-30.33	-28.00



APPENDIX I: PHOTOGRAPHS OF SETUP

RADIATED EMISSION TEST SETUP



APPENDIX II PHOTOGRAPHS OF EUT

TOTAL VIEW OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

FRONT VIEW OF EUT

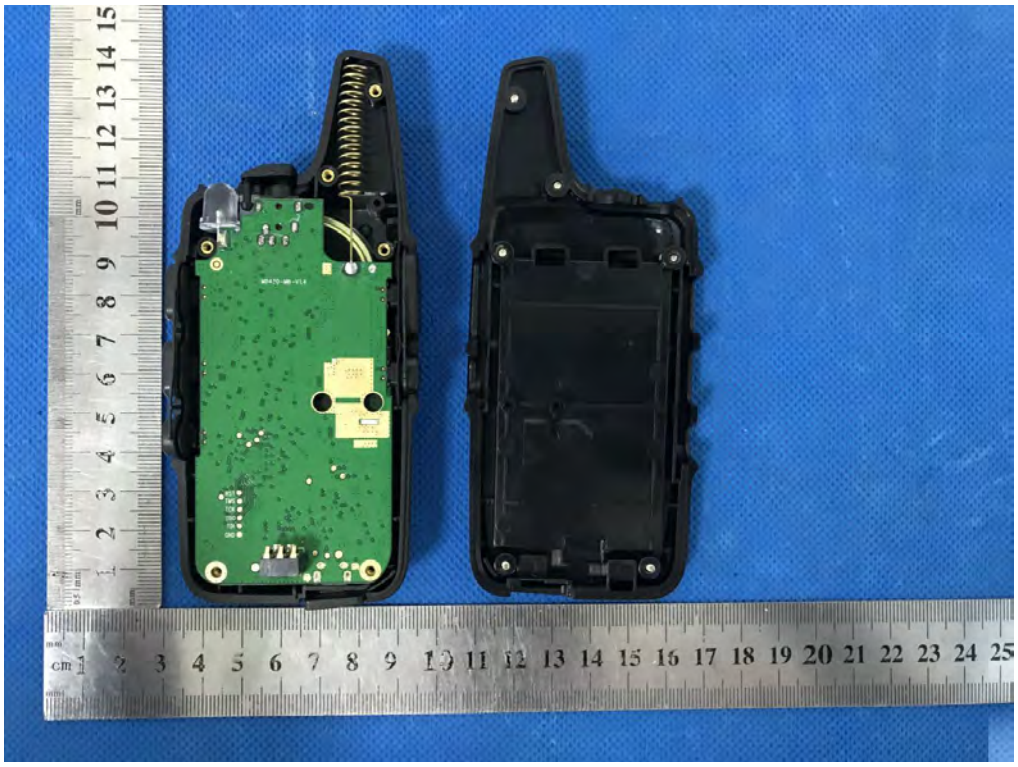
BACK VIEW OF EUT

LEFT VIEW OF EUT

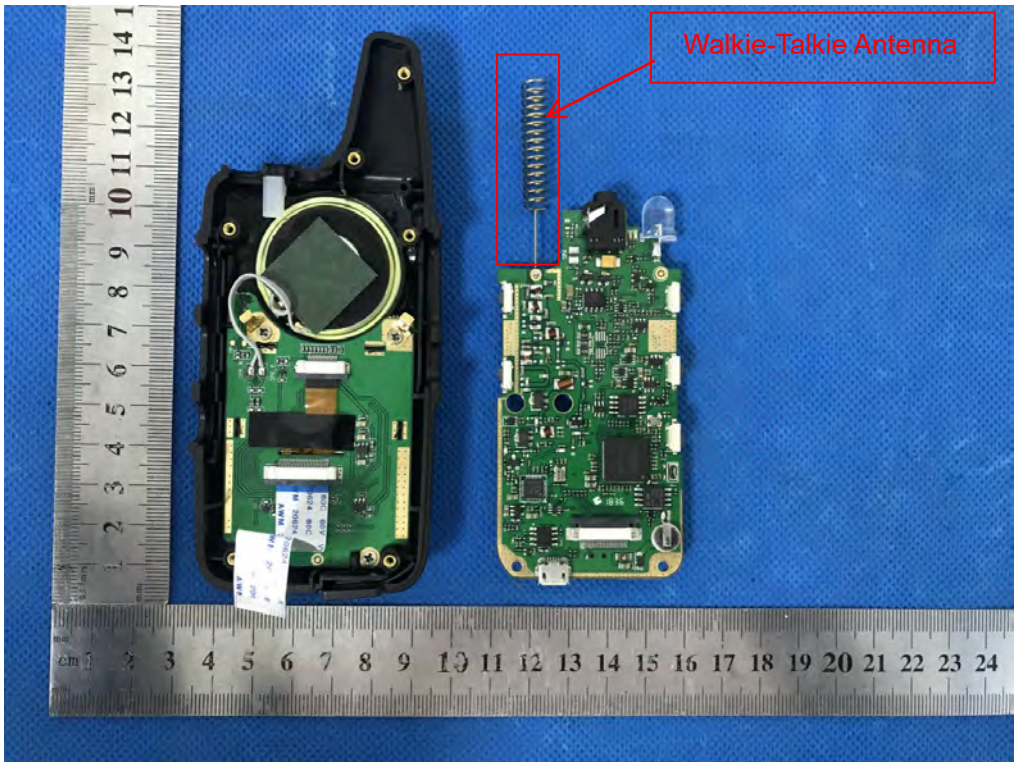
RIGHT VIEW OF EUT

OPEN VIEW-1 OF EUT

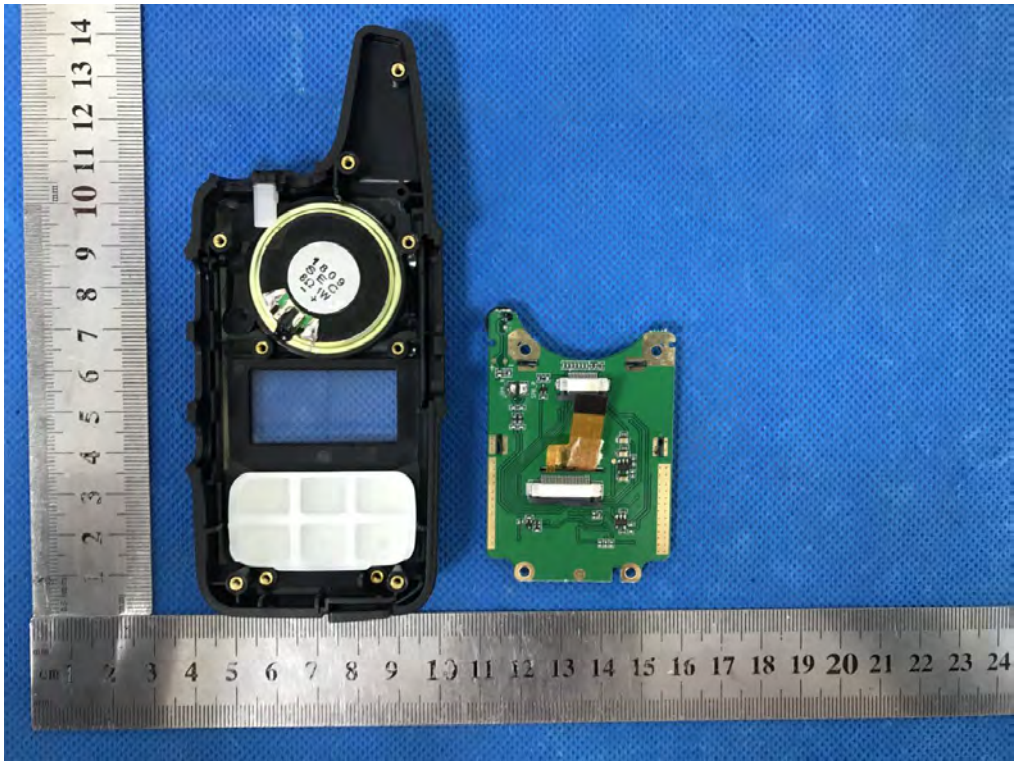
OPEN VIEW-2 OF EUT



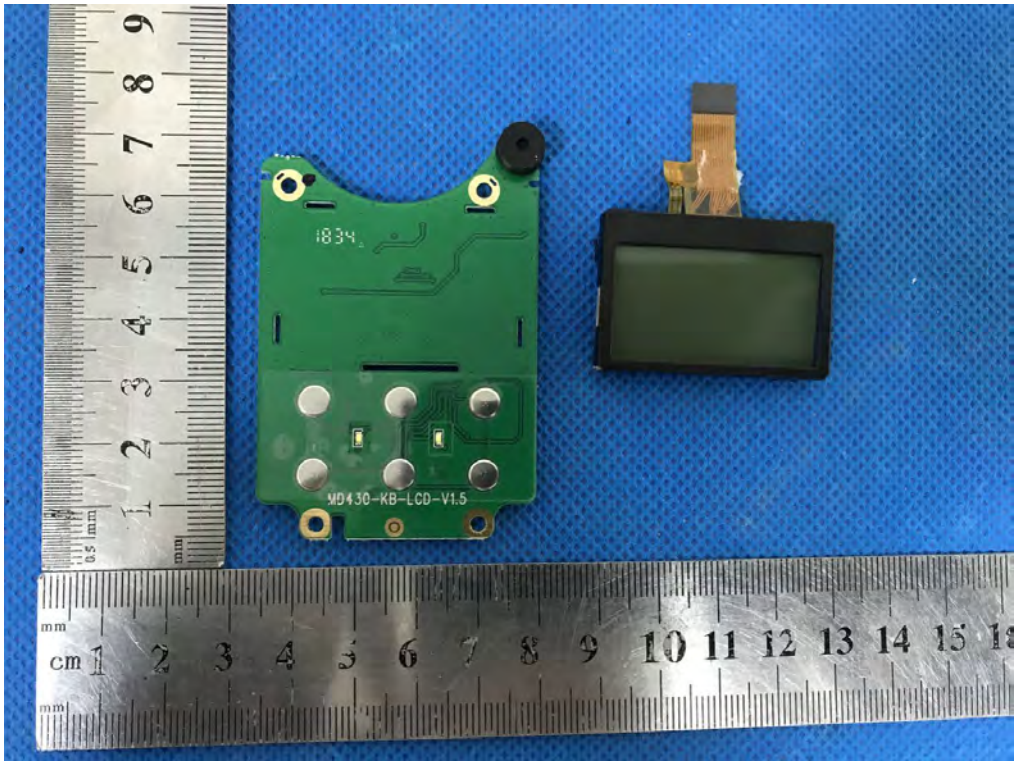
OPEN VIEW-3 OF EUT



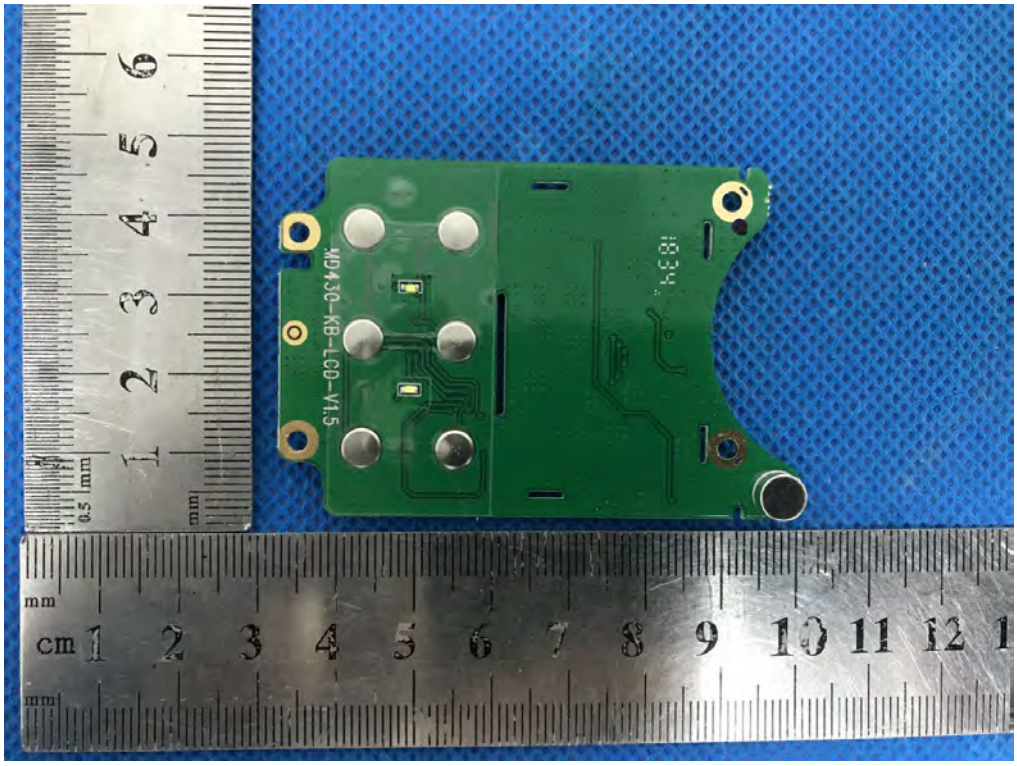
OPEN VIEW OF EUT-4



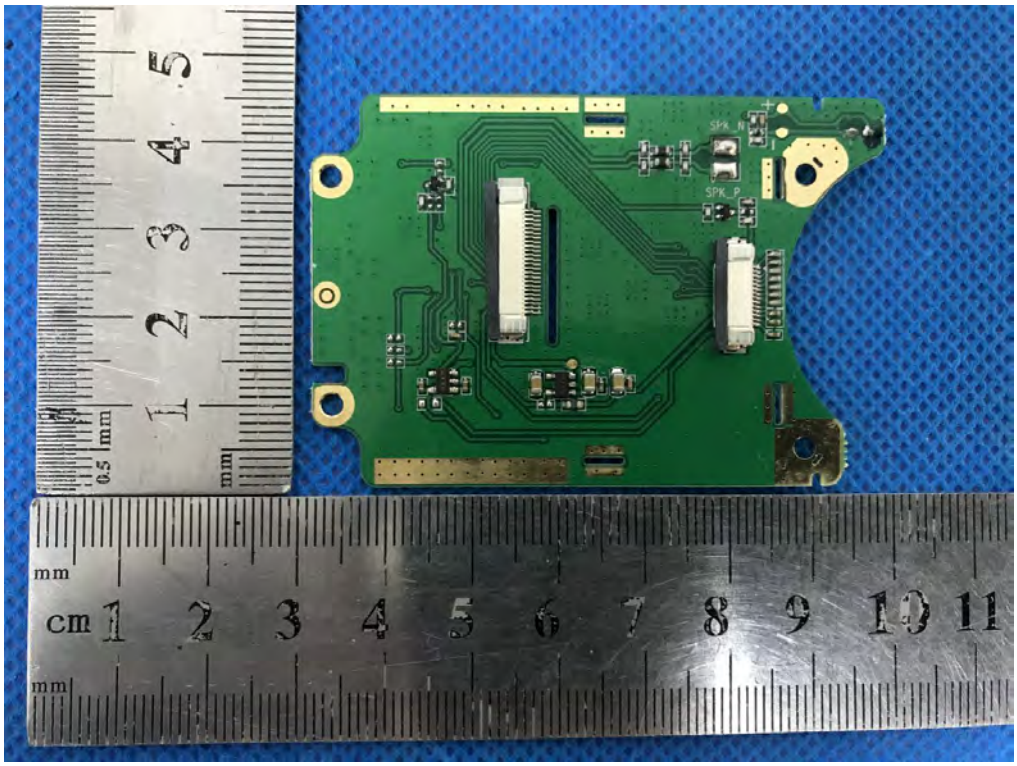
INTERNAL VIEW-1 OF EUT



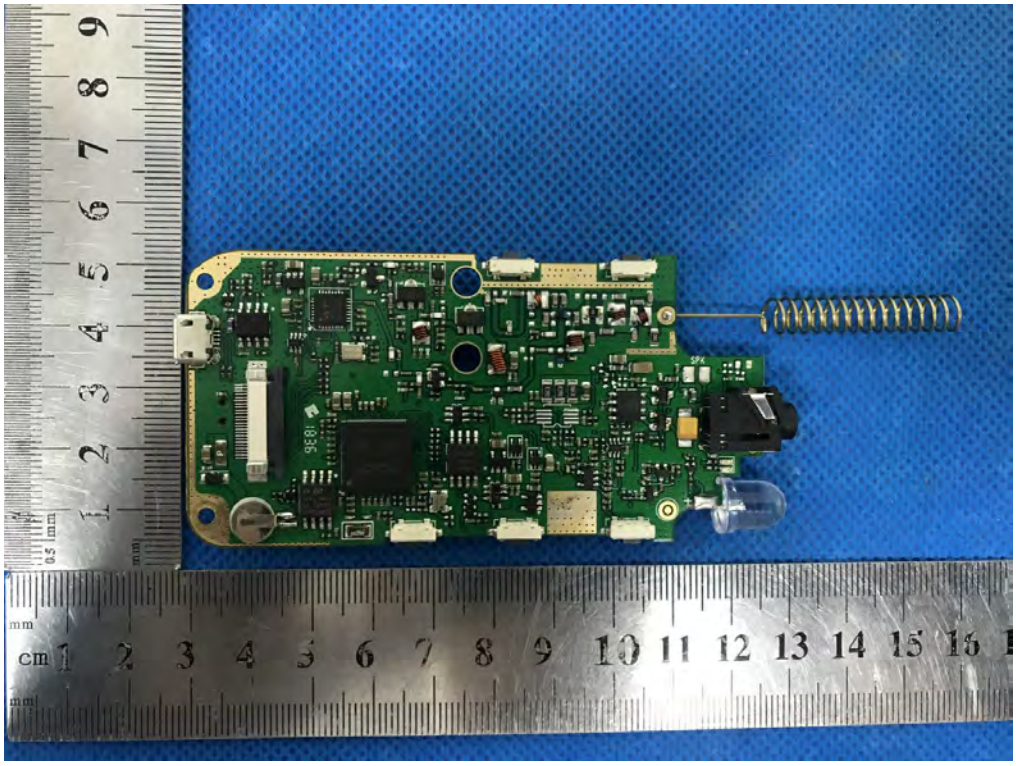
INTERNAL VIEW-2 OF EUT



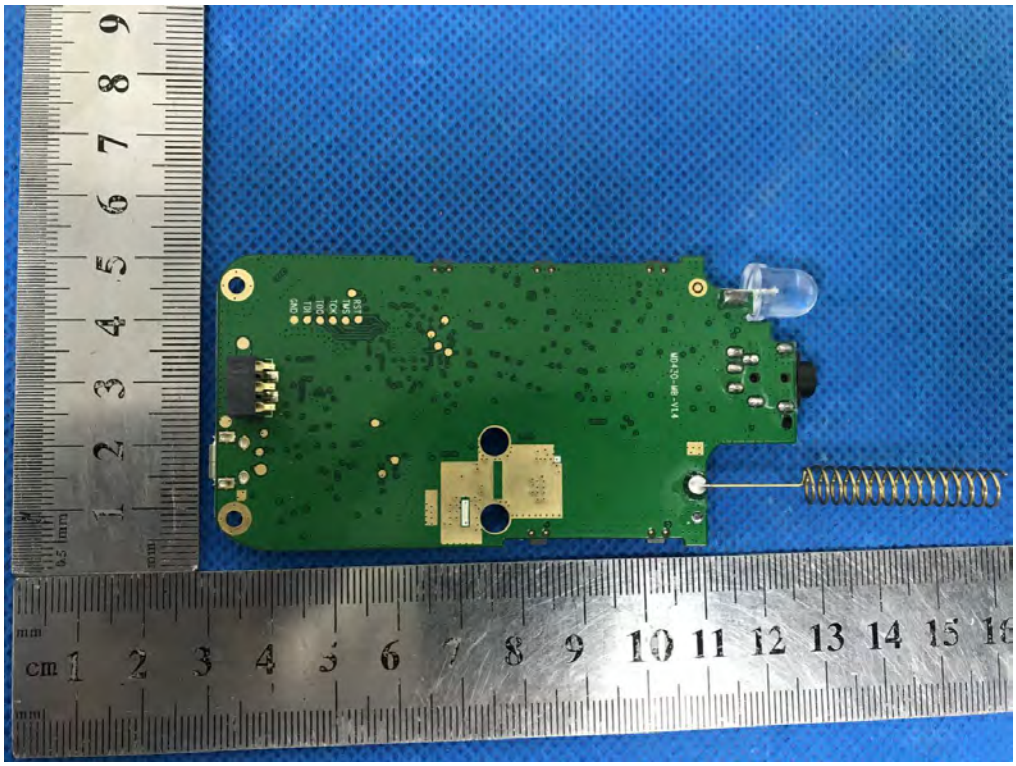
INTERNAL VIEW-3 OF EUT



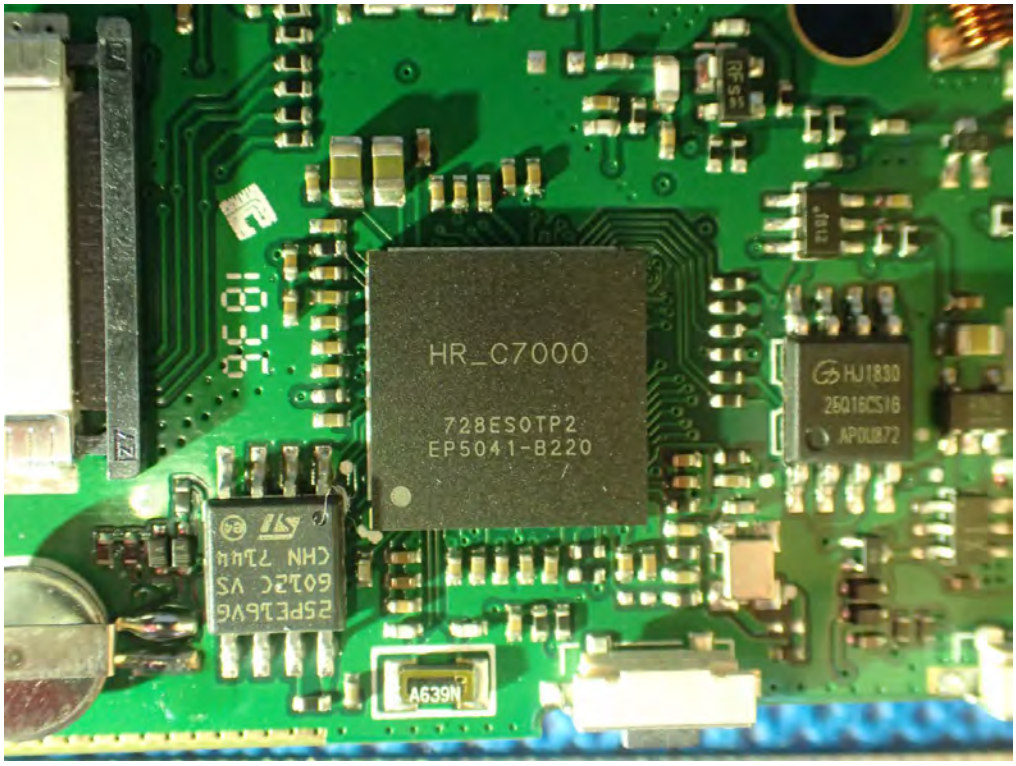
INTERNAL VIEW-4 OF EUT



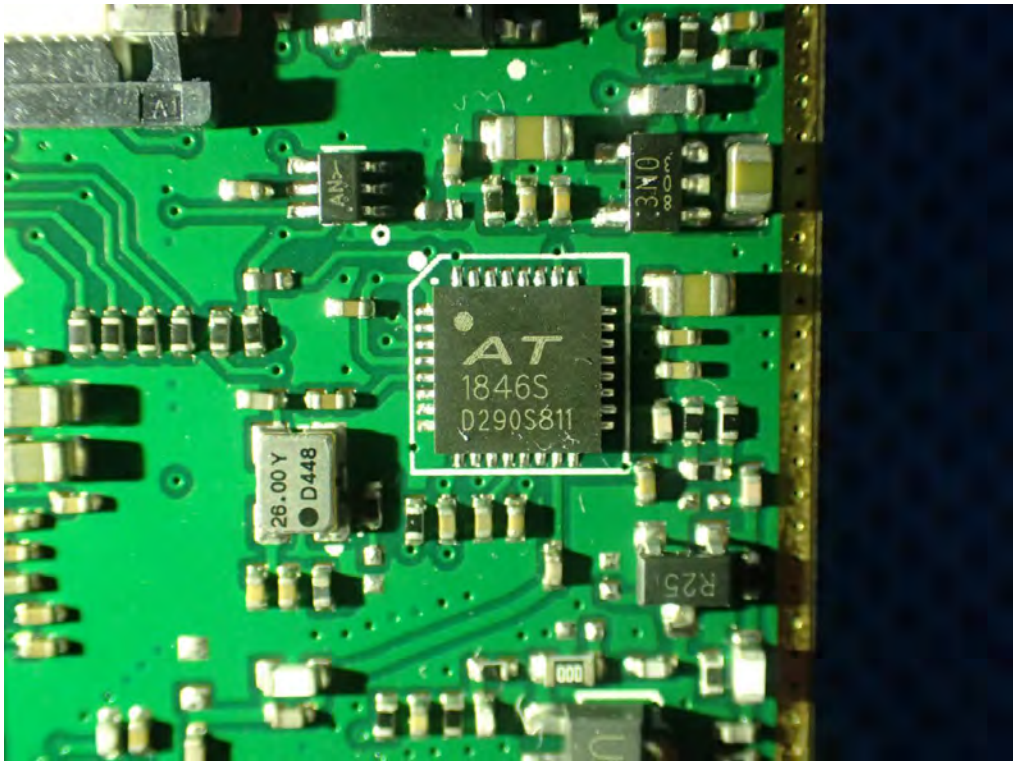
INTERNAL VIEW-5 OF EUT



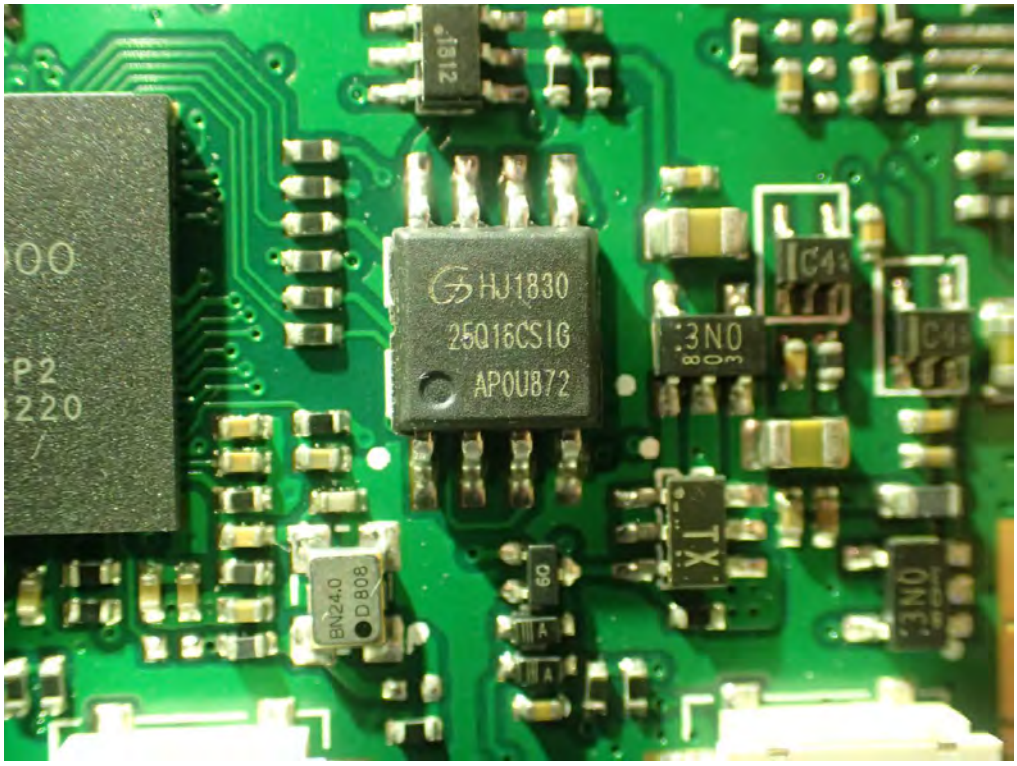
INTERNAL VIEW-6 OF EUT



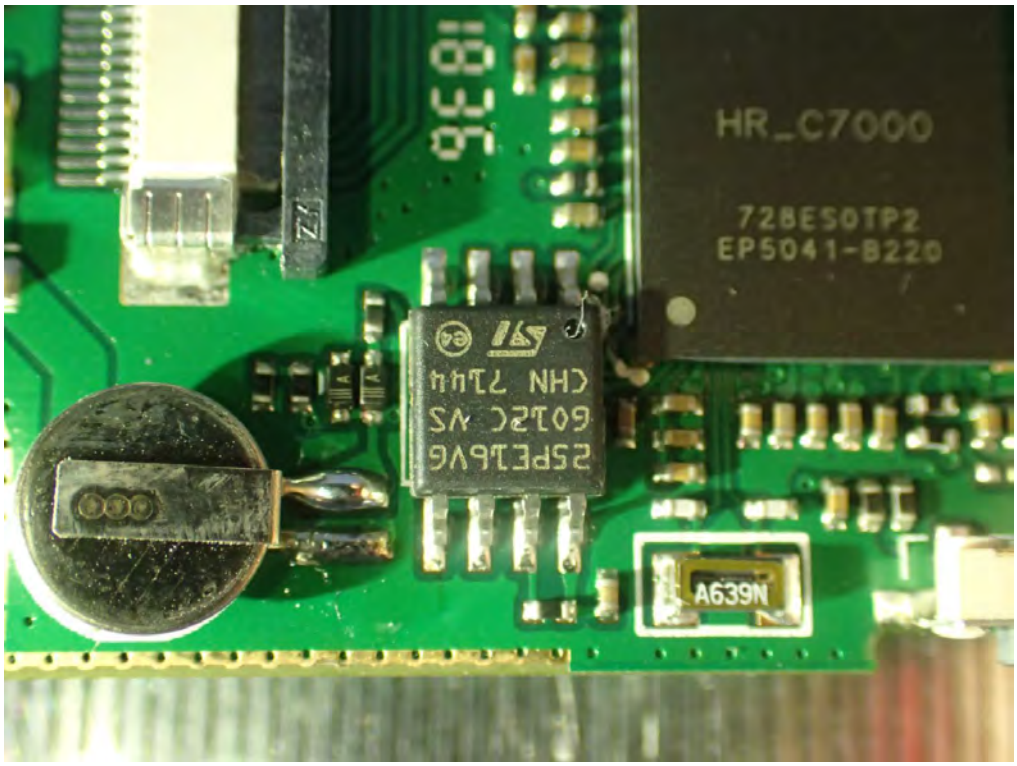
INTERNAL VIEW-7 OF EUT



INTERNAL VIEW-8 OF EUT



INTERNAL VIEW-9 OF EUT



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