FCC Part 90 Rules
Test Report

Report No.: AGC01039170302FE10

FCC ID	:	POD-DMR1
PRODUCT DESIGNATION	:	DMR Digital Transceiver
BRAND NAME	:	TYT
MODEL NAME	:	MD-280, MD-580, MD-680, MD-750
CLIENT	:	TYT ELECTRONICS CO., LTD
DATE OF ISSUE	:	Jun,29, 2017
STANDARD(S)	:	FCC Part 90 Rules FCC Part 22 Rules
REPORT VERSION	:	V 1.0

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

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jun,29, 2017	Valid	Original Report

VERIFICATION OF COMPLIANCE

Applicant:	TYT ELECTRONICS CO., LTD
	Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China
Manufacturer:	TYT ELECTRONICS CO., LTD
	Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China
Product Designation:	DMR Digital Transceiver
Brand Name:	TYT
Test Model	MD-280
Series Model	MD-580, MD-680, MD-750
Difference description	All the same except for the model name and appearance shape.
Date of Test:	Mar.25, 2017 to Apr.01, 2017

WE HEREBY CERTIFY THAT:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA 603. The sample tested as described in this report is in compliance with the FCC Rules Part 90 and FCC Rules Part 22 requirements

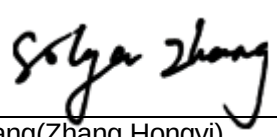
The test results of this report relate only to the tested sample identified in this report.

Tested by 

Steven Zhou(Zhou Pengyun) Jun,29, 2017

Reviewed by 

Bart Xie(Xie Xiaobin) Jun,29, 2017

Approved by 

Solger Zhang(Zhang Hongyi)
Authorized Officer Jun,29, 2017

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

The EUT is a **DIGITAL/ANALOG 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	V2.2
Software Version	MD280-d12.32
Modulation	FM/4FSK
Emission Type	11K0F3E, 7K60FXD, 7K60FXW
Emission Bandwidth	Analog:7.930 KHz(5W),7.946 KHz(1W) Digital: 9.963 KHz(5W),9.229 KHz(1W)
Peak Frequency Deviation	1.75KHz
Audio Frequency Response	10.93dB
Maximum Transmitter Power	Analog:36.86dBm(5W), 29.95dBm (1W) Digital: 36.92dBm(5W), 29.91dBm (1W)
Output power Modification	1W/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	1.2 dBi
Antenna Length	9.5 cm
Power Supply	DC 7.4V, 2000mAh (by battery)
Adapter Parameter	INPUT： 100V-240V , 50HZ , 0.2A OUTPUT：12V , 0.5A
Limiting Voltage	DC 6.0V-8.51V
Operation Frequency Range and Channel	Frequency Range: 400MHz to 480MHz (UHF) Channel Separation: 12.5KHz (Analog), 12.5KHz(Digital)
	Bottom Channel: 400.025MHz Middle Channel: 453.225MHz Middle Channel: 454.025MHz Top Channel: 479.975MHz
Frequency Tolerance	1.106ppm

Frequency Range (MHz)	Rated Transmit Power(W)(Conducted)	Transmit Mode/Emission Designator
400-480	1W/5W	11K0F3E(Analog Vioce;NB)
400-480	1W/5W	11K0FXW(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	454.025
4		
5	5-6	479.975
6		

FCC Rules and Regulations Part 2.202: Necessary Bandwidth and Emission Bandwidth
Voice –FM Analog (12.5KHz)
Calculation:
Max modulation (M) in kHz : 3.0
Max deviation(D) in kHz:2.5
Constant factor (K): 1(assumed)
Bn= 2XM +2XDK=11.0 KHz
Emission designator: 11K0F3E

9600 Digital Vioce/date (12.5KHz)
Calculation:
Data rate in bps(R)=9600
Deviation Peak deviation of carrier(D)=2359.585
Constant factor (K): 1 (default)
Bn= 3.86D+1.27RK= 3.86(2359.585)+0.27(9600)(1)=11.7KHz
Emission designator: 11K0FXD

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: POD-DMR1, filing to comply with the FCC Part 90 requirements.

1.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of TIA/EIA 603 and FCC CFR 47 Rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057.

1.4 TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location	Building D, Baoding Technology Park,Guangming Road2, Dongcheng District, Dongguan, Guangdong, China.
Description	The test site is constructed and calibrated to meet the FCC requirements in documents TIA/EIA 603
FCC Registration No.	371540

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-280	FCC ID: POD-DMR1	EUT

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 :

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NO.	Cal. Date	Cal. Due
CLIMATE CHAMBER	EXPERY	TN-400	TN2007SR038	2016.07.02	2017.07.01
ATTENUATOR	WEINSCHEL CORP	58-30-33	ML030	2016.07.02	2017.07.01
DC POWER SUPPLY	ZHAOXIN	RXN-605D	N/A	2016.07.02	2017.07.01
MODULATION ANALYZER	HP	8920B	3104A03367	2016.07.02	2017.07.01
SIGNAL GENERATOR	AGILENT	E4421B	122501288	2016.07.03	2017.07.02
SIGNAL GENERATOR	R&S	SMT03	A0304261	2016.07.03	2017.07.02
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	2016.07.03	2017.07.02
Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3355	2016.07.03	2017.07.02
Substitution Antenna	SCHWARZBECK	VULB9160	9168-494	2016.07.03	2017.07.02
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	2016.07.03	2017.07.02
RF Cable	SCHWARZBECK	AK9515E	96221	2016.07.03	2017.07.02
3m Anechoic Chamber	CHENGYU	966	PTS-001	2016.06.03	2017.06.02
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	2016.06.03	2017.06.02
Spectrum analyzer	Agilent	E4407B	MY46185649	2016.06.03	2017.06.02
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	2016.06.03	2017.06.02
Substitution ANTENNA	EM	EM-AH-10180	67	2016.06.03	2017.06.02
Modulation Domain Analyzer	HP	53310A	3121A02467	2016.06.03	2017.06.02
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	2016.06.03	2017.06.02
RF Cable	SCHWARZBECK	AK9515E	96222	2016.06.03	2017.06.02
Shielded Room	CHENGYU	843	PTS-002	2016.06.03	2017.06.02

NOTE: 8920B can generate audio modulation frequency.

4. DESCRIPTION OF TEST MODES

RF TEST MODES

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

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 7.4V.
2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1KHz. Record this frequency as reference frequency.
3. Supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

5.3 TEST SETUP BLOCK DIAGRAM

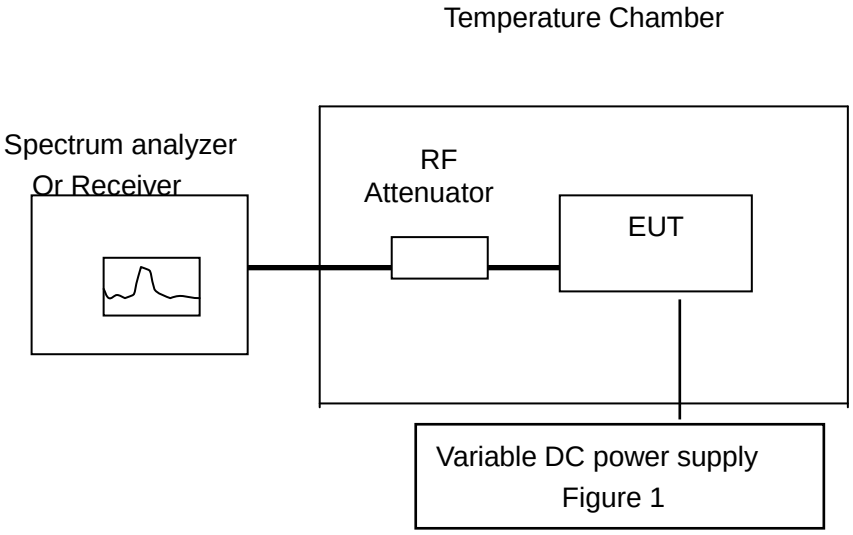


Figure 1

5.4 TEST RESULT

Analog:

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

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 7.40	0.652	0.692	0.406	5
40	DC 7.40	0.762	0.538	0.523	
30	DC 7.40	0.902	0.527	0.817	
20	DC 7.40	0.255	0.693	0.590	
10	DC 7.40	0.237	0.538	0.523	
0	DC 7.40	0.895	0.867	0.488	
-10	DC 7.40	0.547	0.639	0.558	
-20	DC 7.40	0.892	0.317	0.365	
-30	DC 7.40	0.537	0.624	0.350	
Result	Pass				

(2) Frequency stability versus input voltage (Battery limiting voltage is 6.29V) **-5W**

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 6.29	0.635	0.395	0.540	5
40	DC 6.29	0.632	0.681	0.448	
30	DC 6.29	0.657	0.905	0.283	
20	DC 6.29	0.905	0.692	0.052	
10	DC 6.29	0.540	0.681	0.779	
0	DC 6.29	0.662	0.637	0.248	
-10	DC 6.29	0.457	0.592	0.933	
-20	DC 6.29	0.587	0.684	0.317	
-30	DC 6.29	0.905	0.729	0.450	
Result	Pass				

(3) Frequency stability versus input voltage (Battery Fully Charged voltage is 8.51V) **-5W**

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 8.51	0.647	0.921	0.306	5
40	DC 8.51	0.235	0.635	0.413	
30	DC 8.51	0.207	0.539	0.548	
20	DC 8.51	0.730	0.581	0.544	
10	DC 8.51	0.212	0.634	0.179	
0	DC 8.51	0.782	0.591	0.760	
-10	DC 8.51	0.215	0.925	0.550	
-20	DC 8.51	0.417	0.526	0.450	
-30	DC 8.51	0.545	0.637	0.246	
Result	Pass				

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

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 6.00	0.395	0.593	0.544	5
40	DC 6.00	0.740	0.681	0.469	
30	DC 6.00	0.835	0.593	0.408	
20	DC 6.00	0.682	0.492	0.031	
10	DC 6.00	0.877	0.539	0.731	
0	DC 6.00	0.390	0.492	0.306	
-10	DC 6.00	0.330	0.506	0.965	
-20	DC 6.00	0.962	0.483	0.317	
-30	DC 6.00	0.877	0.397	0.594	
Result	Pass				

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

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 7.40	0.562	0.962	0.454	5
40	DC 7.40	0.790	0.528	0.769	
30	DC 7.40	0.262	0.637	0.385	
20	DC 7.40	0.617	0.592	0.706	
10	DC 7.40	0.590	0.835	0.448	
0	DC 7.40	0.672	0.627	0.471	
-10	DC 7.40	0.287	0.964	0.365	
-20	DC 7.40	0.347	0.537	0.471	
-30	DC 7.40	0.570	0.692	0.658	
Result	Pass				

(2) Frequency stability versus input voltage (Battery limiting voltage is 6.29V) **-1W**

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 6.29	0.672	0.691	0.733	5
40	DC 6.29	0.382	0.631	0.492	
30	DC 6.29	0.405	0.905	0.406	
20	DC 6.29	0.722	0.891	0.263	
10	DC 6.29	0.337	0.832	0.475	
0	DC 6.29	0.517	0.792	0.469	
-10	DC 6.29	0.490	0.652	0.367	
-20	DC 6.29	0.537	0.681	0.260	
-30	DC 6.29	0.840	0.643	0.452	
Result	Pass				

(3) Frequency stability versus input voltage (Battery Fully Charged voltage is 8.51V) **-1W**

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 8.51	0.787	0.923	0.473	5
40	DC 8.51	0.522	0.482	0.650	
30	DC 8.51	0.792	0.961	0.471	
20	DC 8.51	0.480	0.853	0.494	
10	DC 8.51	0.590	0.647	0.331	
0	DC 8.51	0.437	0.629	0.535	
-10	DC 8.51	0.597	0.714	0.558	
-20	DC 8.51	0.542	0.814	0.388	
-30	DC 8.51	0.395	0.593	0.558	
Result	Pass				

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

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 6.00	0.647	0.492	0.329	5
40	DC 6.00	0.565	0.438	0.423	
30	DC 6.00	0.795	0.762	0.467	
20	DC 6.00	0.632	0.926	0.388	
10	DC 6.00	0.817	0.862	0.494	
0	DC 6.00	0.392	0.916	0.413	
-10	DC 6.00	0.765	0.952	0.627	
-20	DC 6.00	0.907	0.634	0.683	
-30	DC 6.00	0.560	0.872	0.619	
Result	Pass				

Digital:

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

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 7.40	0.392	0.591	0.475	5
40	DC 7.40	0.520	0.637	0.281	
30	DC 7.40	0.657	0.962	0.782	
20	DC 7.40	0.770	0.528	0.685	
10	DC 7.40	0.417	0.627	0.075	
0	DC 7.40	0.580	0.652	0.327	
-10	DC 7.40	0.907	0.629	0.144	
-20	DC 7.40	1.015	0.527	0.108	
-30	DC 7.40	0.542	0.962	0.548	
Result	Pass				

(2) Frequency stability versus input voltage (Battery limiting voltage is 6.29V) **-5W**

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 6.29	0.545	0.395	0.635	5
40	DC 6.29	0.490	0.526	0.560	
30	DC 6.29	0.595	0.522	0.371	
20	DC 6.29	0.565	0.834	0.263	
10	DC 6.29	0.142	0.529	0.654	
0	DC 6.29	0.407	0.961	0.381	
-10	DC 6.29	0.595	0.534	0.469	
-20	DC 6.29	0.440	0.953	0.408	
-30	DC 6.29	0.640	0.773	0.283	
Result	Pass				

(3) Frequency stability versus input voltage (Battery Fully Charged voltage is 8.51V) **-5W**

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 8.51	0.645	0.634	0.340	5
40	DC 8.51	0.382	0.853	0.469	
30	DC 8.51	0.407	0.961	0.802	
20	DC 8.51	0.815	0.664	0.283	
10	DC 8.51	0.812	0.842	0.656	
0	DC 8.51	0.540	0.965	0.802	
-10	DC 8.51	0.490	0.523	0.754	
-20	DC 8.51	0.345	0.526	1.106	
-30	DC 8.51	0.467	0.384	0.327	
Result	Pass				

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

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 6.00	0.562	0.638	0.683	5
40	DC 6.00	0.422	0.641	0.452	
30	DC 6.00	0.402	0.596	0.283	
20	DC 6.00	0.590	0.806	0.327	
10	DC 6.00	0.380	0.524	0.535	
0	DC 6.00	0.490	0.638	0.388	
-10	DC 6.00	0.287	0.629	0.617	
-20	DC 6.00	0.670	0.537	0.269	
-30	DC 6.00	0.467	0.619	0.267	
Result	Pass				

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

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 7.40	0.645	0.862	0.594	5
40	DC 7.40	0.657	0.629	0.283	
30	DC 7.40	0.892	0.524	0.592	
20	DC 7.40	0.880	0.853	0.340	
10	DC 7.40	0.547	0.519	0.408	
0	DC 7.40	0.462	0.567	0.283	
-10	DC 7.40	0.797	0.529	0.469	
-20	DC 7.40	0.770	0.649	0.496	
-30	DC 7.40	0.490	0.394	0.523	
Result	Pass				

(2) Frequency stability versus input voltage (Battery limiting voltage is 6.29V) **-1W**

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 6.29	0.630	0.537	0.475	5
40	DC 6.29	0.672	0.634	0.352	
30	DC 6.29	0.120	0.294	0.469	
20	DC 6.29	0.407	0.903	0.548	
10	DC 6.29	0.142	0.846	0.660	
0	DC 6.29	0.570	0.529	0.331	
-10	DC 6.29	0.657	0.564	0.471	
-20	DC 6.29	0.770	0.492	0.804	
-30	DC 6.29	0.570	0.598	0.283	
Result	Pass				

(3) Frequency stability versus input voltage (Battery Fully Charged voltage is 8.51V) **-1W**

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 8.51	0.820	0.769	0.427	5
40	DC 8.51	0.540	0.851	0.548	
30	DC 8.51	0.505	0.631	0.535	
20	DC 8.51	0.565	0.952	0.548	
10	DC 8.51	0.517	0.849	0.679	
0	DC 8.51	0.657	0.652	0.452	
-10	DC 8.51	0.437	0.395	0.590	
-20	DC 8.51	0.517	0.529	0.635	
-30	DC 8.51	0.580	0.568	0.477	
Result	Pass				

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

Environment	Power	Reference Frequency			Limit:
Temperature(℃)	(V)	400.025MHz	454.025MHz	479.975MHz	ppm
50	DC 6.00	0.597	0.493	0.475	5
40	DC 6.00	0.462	0.583	0.492	
30	DC 6.00	0.297	0.726	0.240	
20	DC 6.00	0.590	0.538	0.283	
10	DC 6.00	0.462	0.648	0.535	
0	DC 6.00	0.292	0.523	0.590	
-10	DC 6.00	0.340	0.962	0.467	
-20	DC 6.00	0.570	0.843	0.679	
-30	DC 6.00	0.840	0.851	0.746	
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.

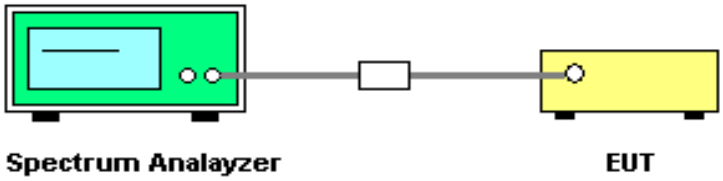
6.2 MEASUREMENT PROCEDURE

1). The EUT was 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).

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

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

6.3 TEST SETUP BLOCK DIAGRAM

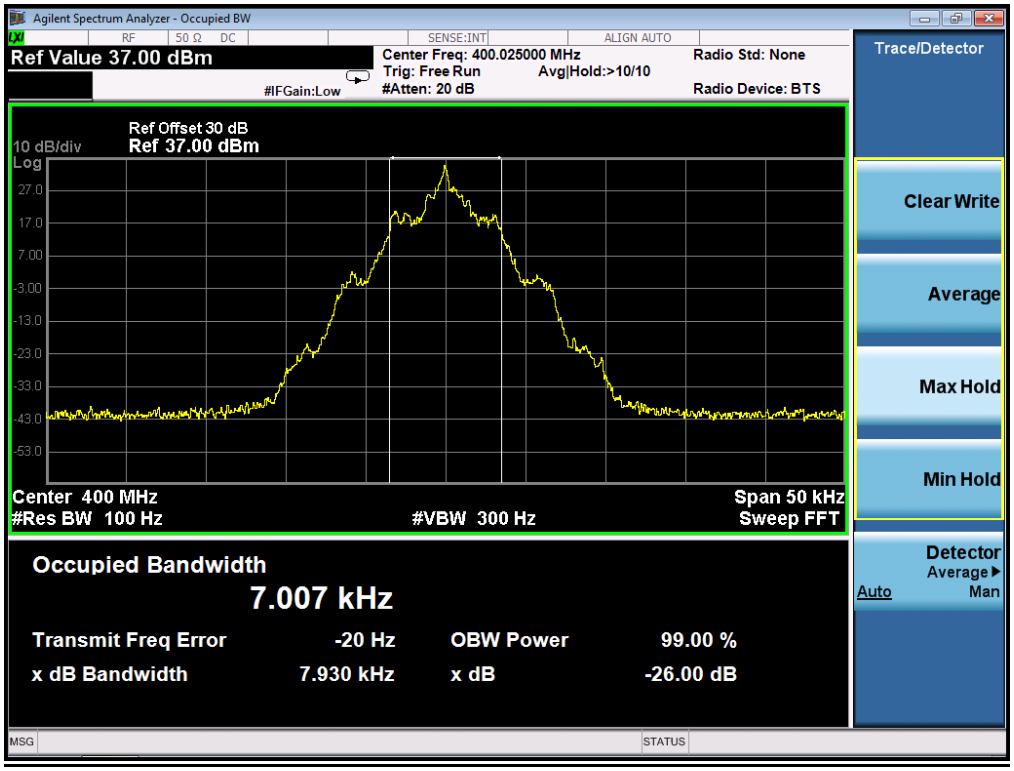


6.4 MEASUREMENT RESULT

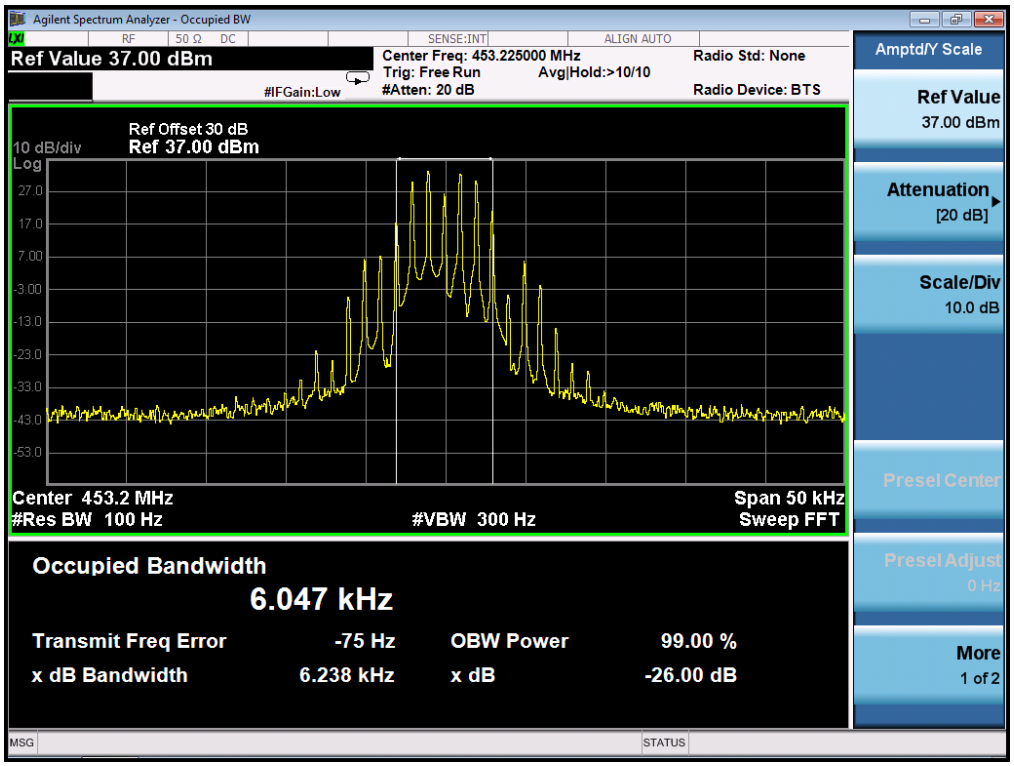
Analog:

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	7.930KHz	11.25 KHz	Pass
453.225MHz	6.238KHz	11.25 KHz	Pass
454.025MHz	7.172KHz	11.25 KHz	Pass
479.975MHz	7.259KHz	11.25 KHz	Pass

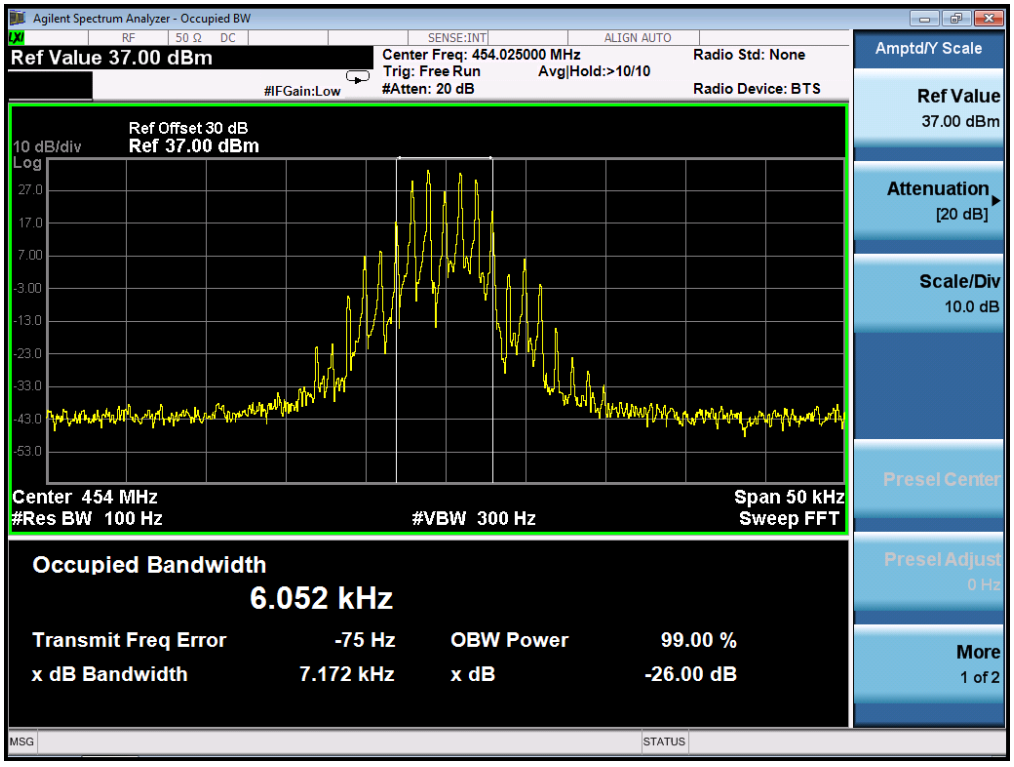
Occupied bandwidth of Bottom Channel (Maximum)-5W



Occupied bandwidth of Middle Channel (Maximum)-5W

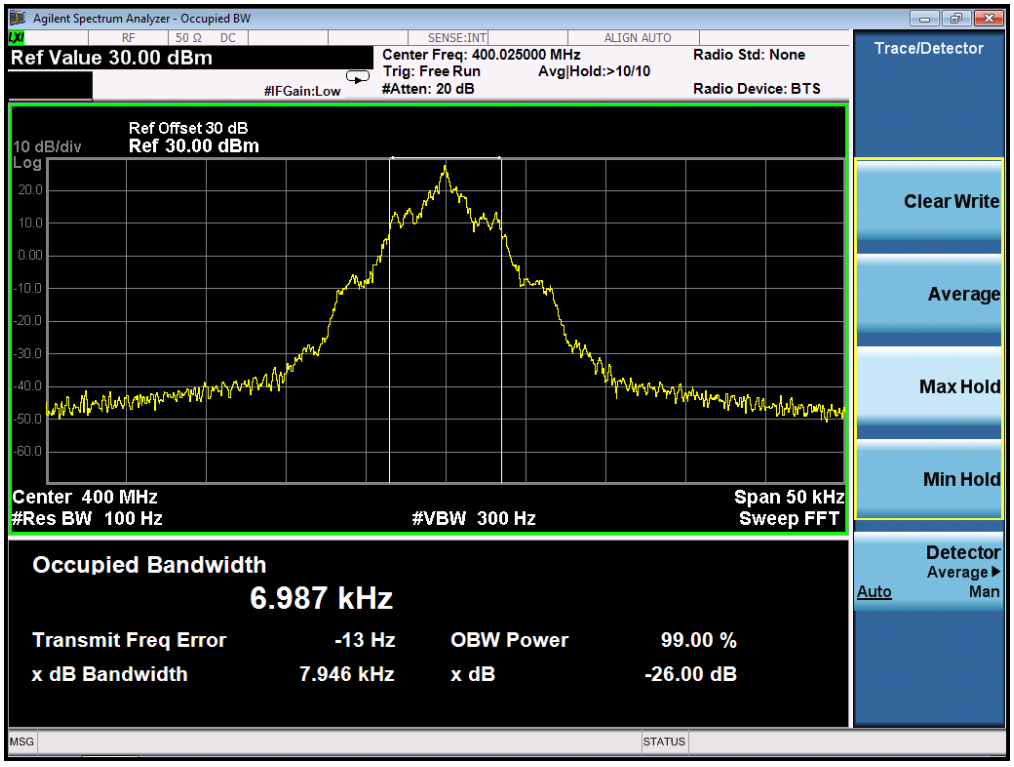


Occupied bandwidth of Middle Channel (Maximum)-5W

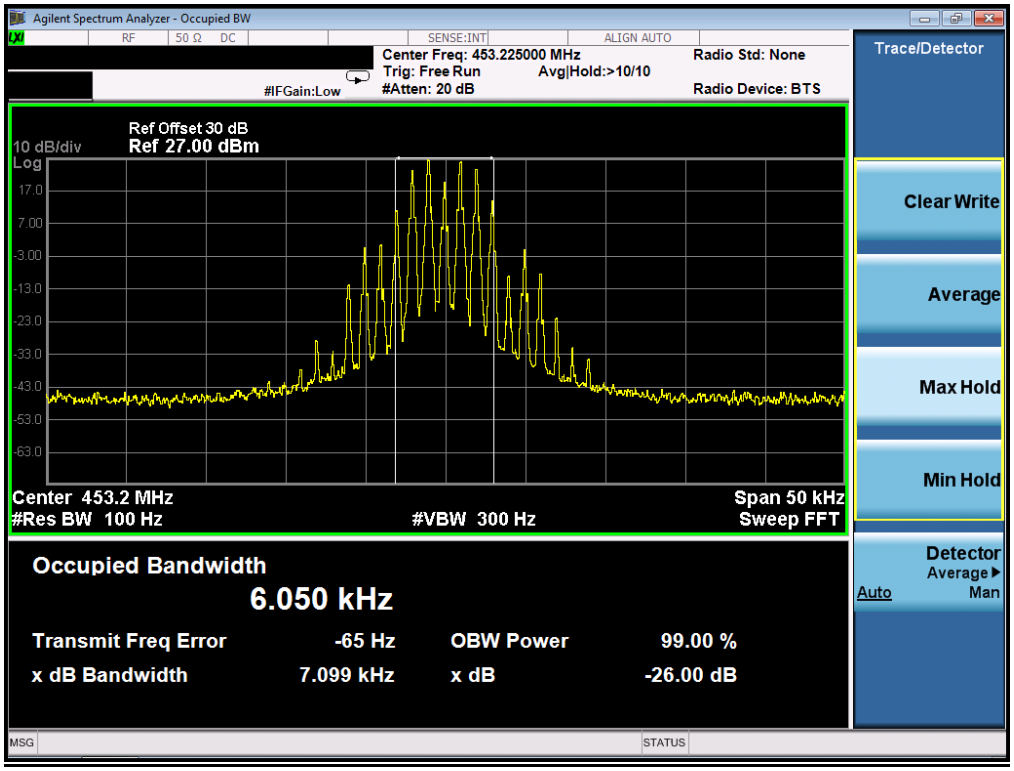


26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	7.946 KHz	11.25 KHz	Pass
453.225MHz	7.099 KHz	11.25 KHz	Pass
454.025MHz	7.227 KHz	11.25 KHz	Pass
479.975MHz	7.253 KHz	11.25 KHz	Pass

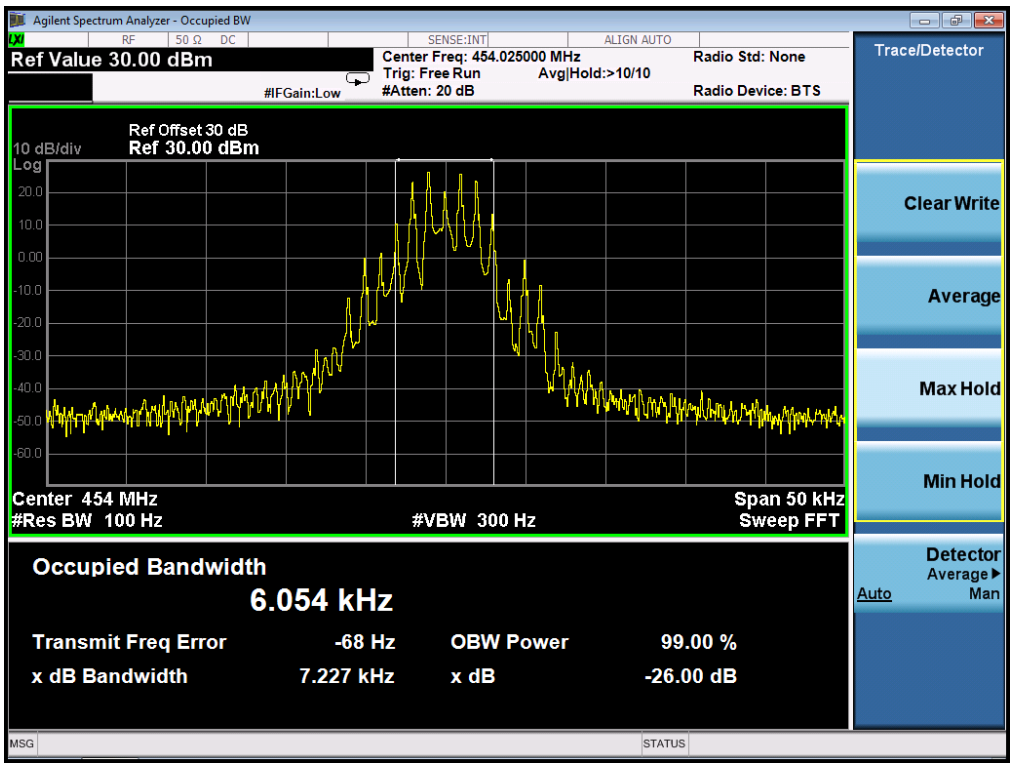
Occupied bandwidth of Bottom Channel (Maximum)-1W



Occupied bandwidth of Middle Channel (Maximum)-1W



Occupied bandwidth of Middle Channel (Maximum)-1W

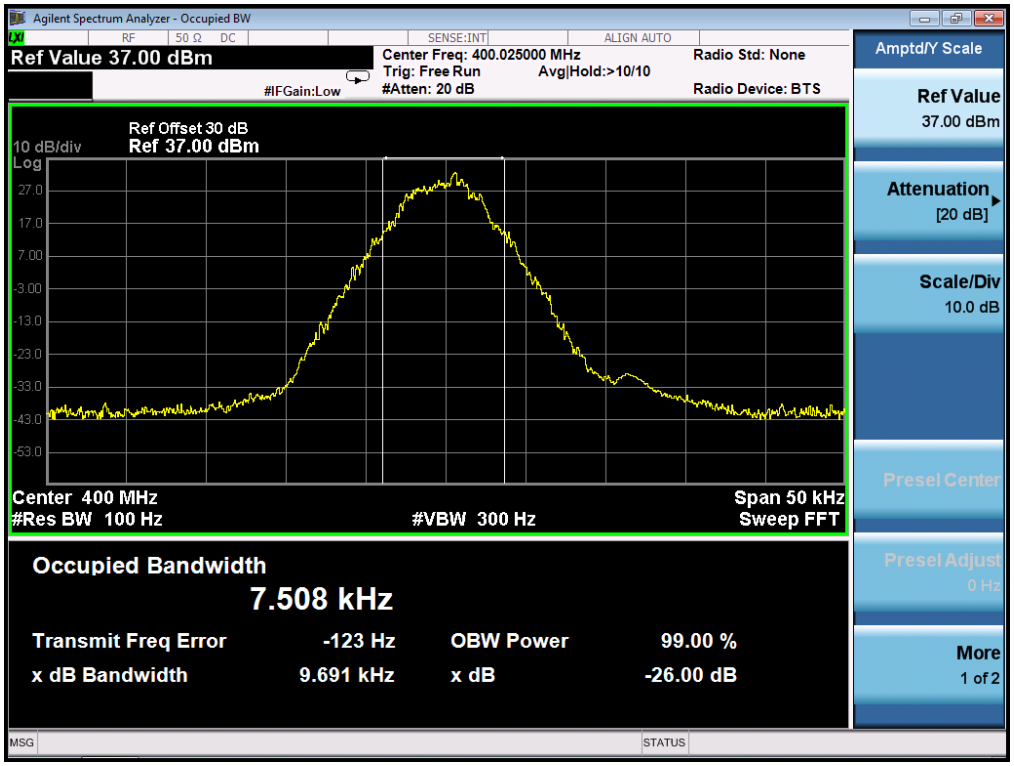


Digital:

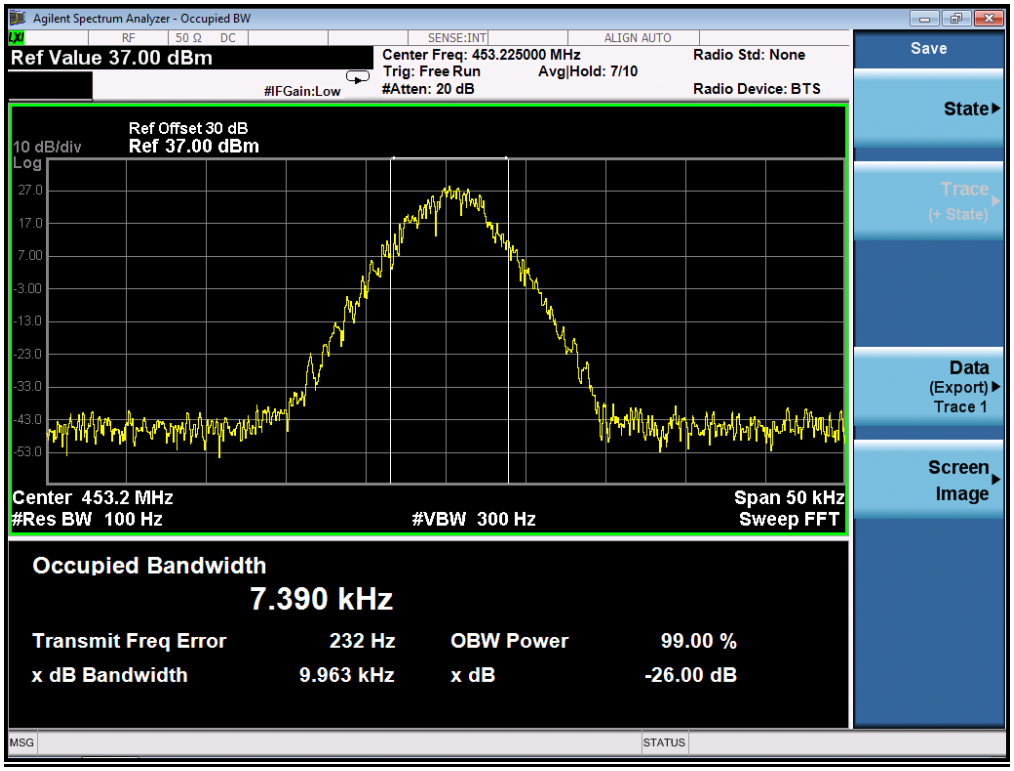
TEST RESULTS

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	9.691 KHz	11.25 KHz	Pass
453.225MHz	9.963 KHz	11.25 KHz	Pass
454.025MHz	8.617 KHz	11.25 KHz	Pass
479.975MHz	9.659 KHz	11.25 KHz	Pass

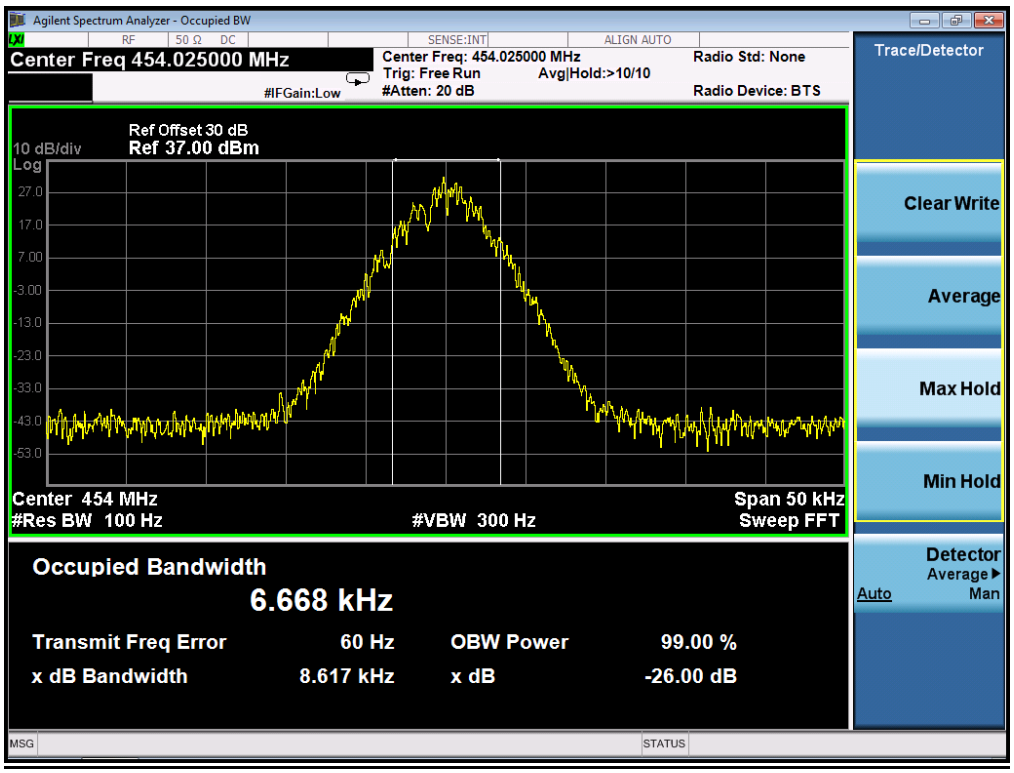
Occupied bandwidth of Bottom Channel (Maximum) -5W



Occupied bandwidth of Middle Channel (Maximum)-5W



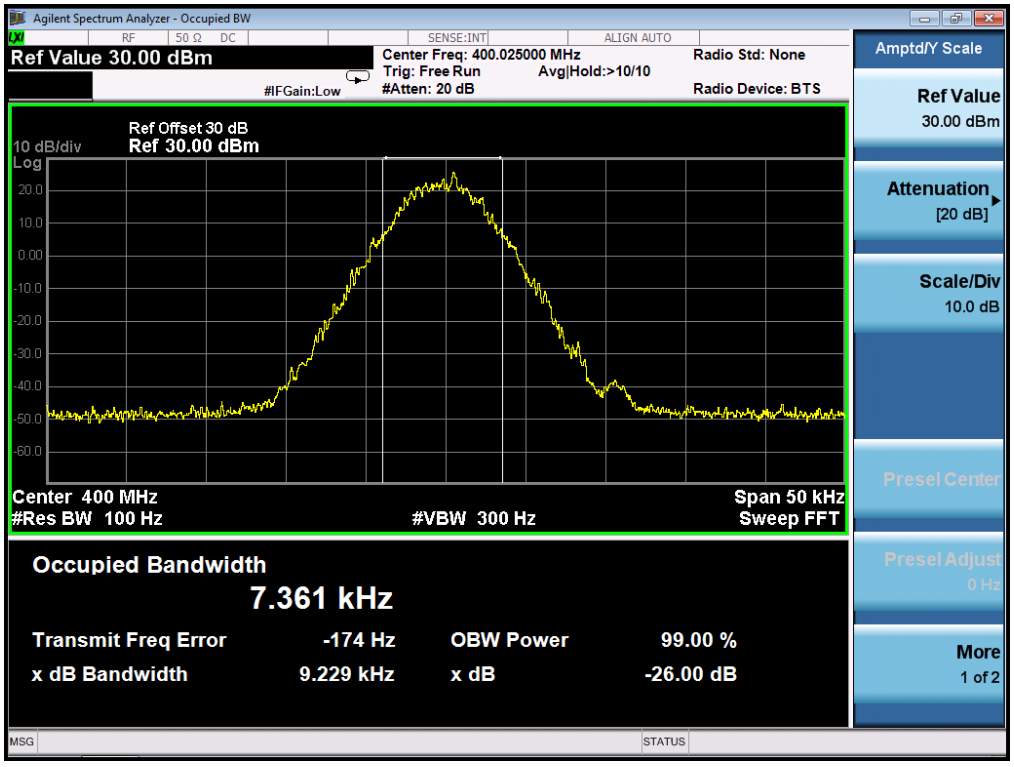
Occupied bandwidth of Middle Channel (Maximum)-5W



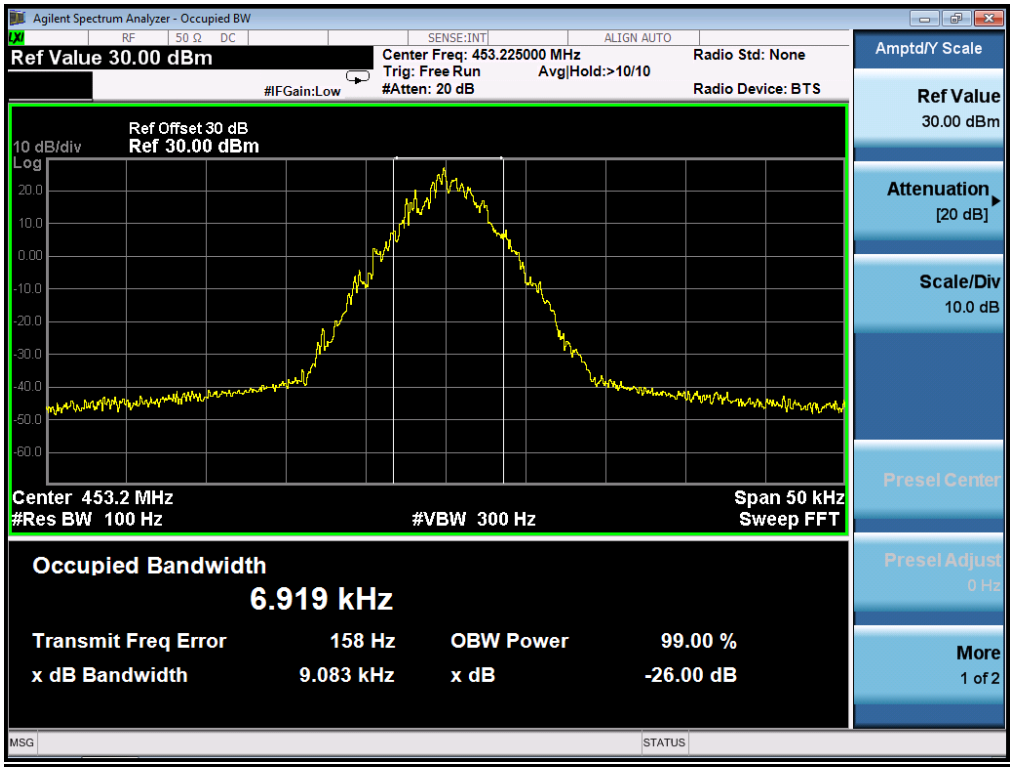
TEST RESULTS

26 DB BANDWIDTH MEASUREMENT RESULT			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
400.025MHz	9.229KHz	11.25 KHz	Pass
453.225MHz	9.083KHz	11.25 KHz	Pass
454.025MHz	8.998KHz	11.25 KHz	Pass
479.975MHz	9.162KHz	11.25 KHz	Pass

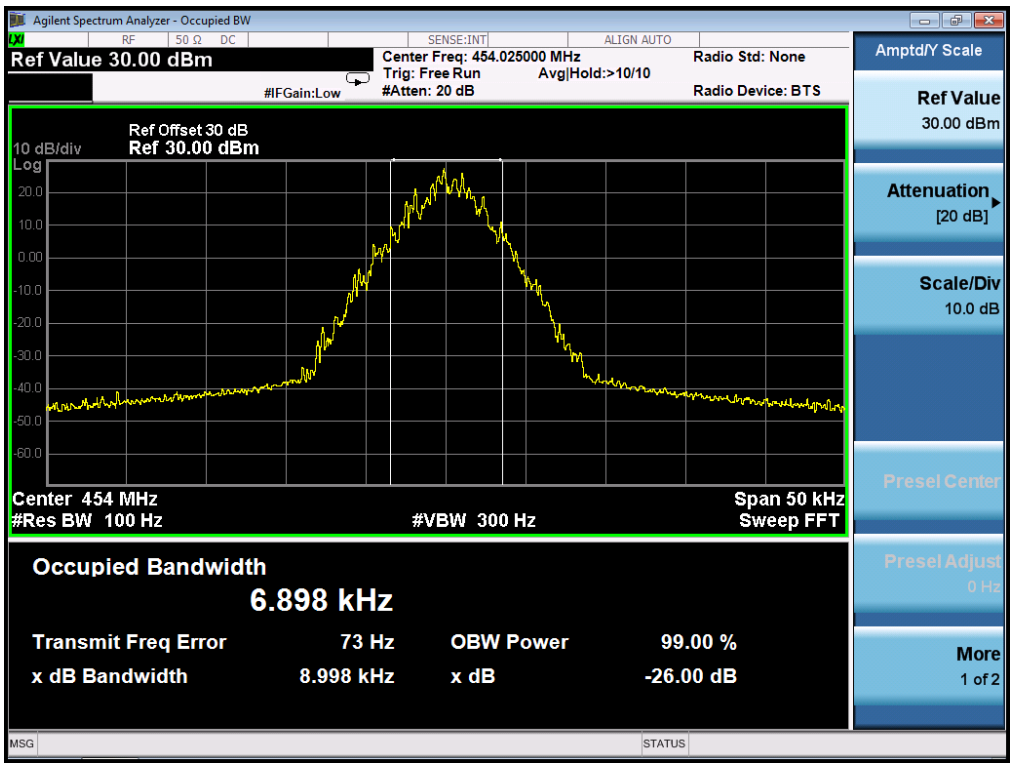
Occupied bandwidth of Bottom Channel (Maximum) -1W



Occupied bandwidth of Middle Channel (Maximum)-1W



Occupied bandwidth of Middle Channel (Maximum)-1W



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.

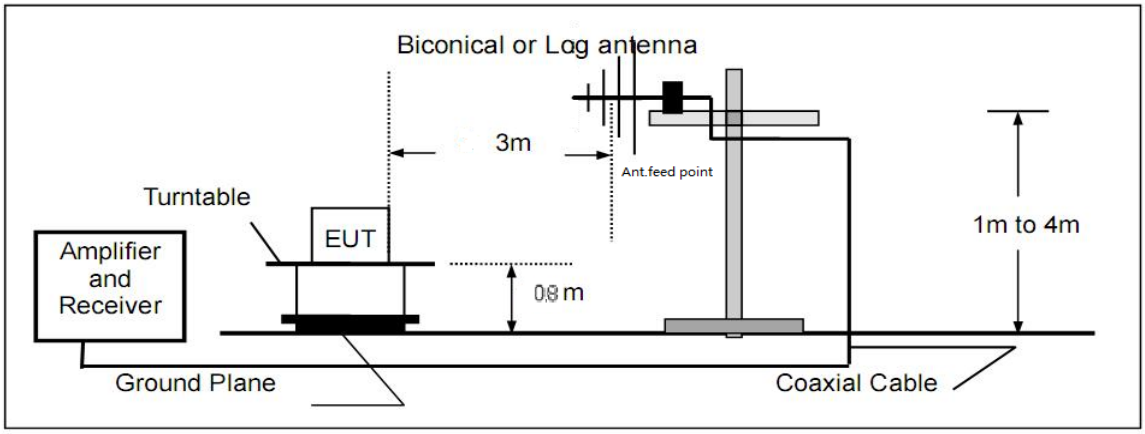
(16)The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

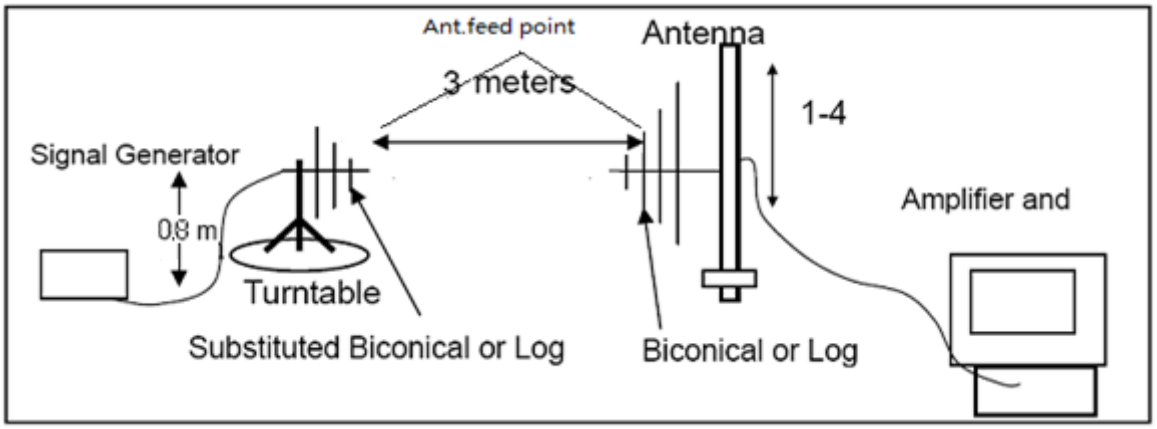
(17)The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

7.3 TEST SETUP BLOCK DIAGRAM

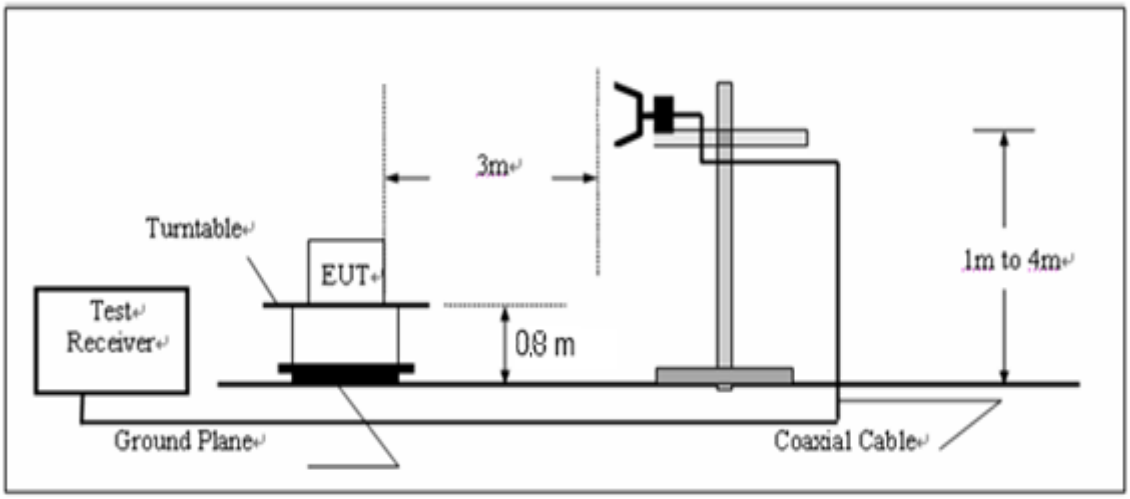
SUBSTITUTION METHOD: (Radiated Emissions)

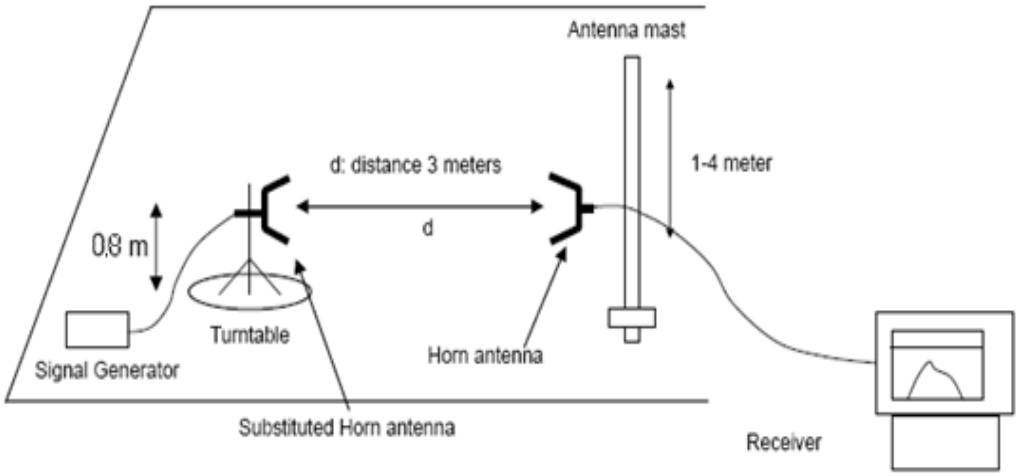
Radiated Below1GHz





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.

Limit: At least 50+10 log (P) =50+10log (5) =57 (dB)—5W

At least 50+10 log (P) =50+10log (1) =50 (dB)—1W

Analog:

TEST RESULTS--5W

Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
400.025	H	0		pass
800.050	H	72.95	57	pass
1200.075	H	73.82	57	pass
1600.100	H	75.61	57	pass
2000.125	H	76.85	57	pass
2400.150	H	76.18	57	pass
2800.175	H	79.62	57	pass
3200.200	H	80.25	57	pass
3600.225	H	79.25	57	pass
4000.250	H	81.63	57	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
400.025	V	0		pass
800.050	V	72.51	57	pass
1200.075	V	72.36	57	pass
1600.100	V	73.51	57	pass
2000.125	V	74.69	57	pass
2400.150	V	75.25	57	pass
2800.175	V	75.26	57	pass
3200.200	V	81.26	57	pass
3600.225	V	82.15	57	pass
4000.250	V	80.36	57	pass

Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
454.025	H	0		pass
908.050	H	69.63	57	pass
1362.075	H	70.28	57	pass
1816.100	H	72.31	57	pass
2270.125	H	74.59	57	pass
2724.150	H	74.71	57	pass
3178.175	H	77.38	57	pass
3632.200	H	78.75	57	pass
4086.225	H	80.28	57	pass
4540.250	H	81.51	57	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
454.025	V	0		pass
908.050	V	71.21	57	pass
1362.075	V	70.36	57	pass
1816.100	V	73.51	57	pass
2270.125	V	74.38	57	pass
2724.150	V	76.49	57	pass
3178.175	V	75.36	57	pass
3632.200	V	78.59	57	pass
4086.225	V	78.26	57	pass
4540.250	V	80.42	57	pass

Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
479.975	H	0		pass
959.950	H	70.52	57	pass
1439.925	H	69.83	57	pass
1919.900	H	71.69	57	pass
2399.875	H	72.63	57	pass
2879.850	H	74.66	57	pass
3359.825	H	75.81	57	pass
3839.800	H	77.63	57	pass
4319.775	H	79.51	57	pass
4799.750	H	80.25	57	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
479.975	V	0		pass
959.950	V	67.85	57	pass
1439.925	V	69.32	57	pass
1919.900	V	70.51	57	pass
2399.875	V	75.96	57	pass
2879.850	V	76.18	57	pass
3359.825	V	78.62	57	pass
3839.800	V	79.68	57	pass
4319.775	V	80.15	57	pass
4799.750	V	81.56	57	pass

TEST RESULTS--1W

Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
400.025	H	0		pass
800.050	H	71.63	50	pass
1200.075	H	72.63	50	pass
1600.100	H	73.65	50	pass
2000.125	H	75.81	50	pass
2400.150	H	76.92	50	pass
2800.175	H	77.26	50	pass
3200.200	H	81.56	50	pass
3600.225	H	82.57	50	pass
4000.250	H	81.93	50	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
400.025	V	0		pass
800.050	V	70.69	50	pass
1200.075	V	72.68	50	pass
1600.100	V	74.51	50	pass
2000.125	V	76.82	50	pass
2400.150	V	74.69	50	pass
2800.175	V	75.81	50	pass
3200.200	V	79.62	50	pass
3600.225	V	80.25	50	pass
4000.250	V	81.56	50	pass

Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
454.025	H	0		pass
908.050	H	69.16	50	pass
1362.075	H	70.25	50	pass
1816.100	H	73.63	50	pass
2270.125	H	74.74	50	pass
2724.150	H	75.29	50	pass
3178.175	H	75.63	50	pass
3632.200	H	76.81	50	pass
4086.225	H	78.86	50	pass
4540.250	H	80.68	50	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
454.025	V	0		pass
908.050	V	69.26	50	pass
1362.075	V	69.31	50	pass
1816.100	V	70.81	50	pass
2270.125	V	72.53	50	pass
2724.150	V	76.75	50	pass
3178.175	V	78.68	50	pass
3632.200	V	78.38	50	pass
4086.225	V	79.49	50	pass
4540.250	V	80.51	50	pass

Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
479.975	H	0		pass
959.950	H	72.69	50	pass
1439.925	H	75.96	50	pass
1919.900	H	73.69	50	pass
2399.875	H	76.52	50	pass
2879.850	H	77.69	50	pass
3359.825	H	79.51	50	pass
3839.800	H	80.62	50	pass
4319.775	H	81.56	50	pass
4799.750	H	83.62	50	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
479.975	V	0		pass
959.950	V	70.36	50	pass
1439.925	V	68.59	50	pass
1919.900	V	81.18	50	pass
2399.875	V	80.63	50	pass
2879.850	V	79.69	50	pass
3359.825	V	81.36	50	pass
3839.800	V	82.63	50	pass
4319.775	V	81.69	50	pass
4799.750	V	83.25	50	pass

Digital:

TEST RESULTS-5W

Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
400.025	H	0		pass
800.050	H	68.92	57	pass
1200.075	H	69.36	57	pass
1600.100	H	70.32	57	pass
2000.125	H	72.69	57	pass
2400.150	H	81.35	57	pass
2800.175	H	82.51	57	pass
3200.200	H	81.62	57	pass
3600.225	H	80.52	57	pass
4000.250	H	81.67	57	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
400.025	V	0		pass
800.050	V	71.58	57	pass
1200.075	V	69.65	57	pass
1600.100	V	67.52	57	pass
2000.125	V	68.35	57	pass
2400.150	V	74.57	57	pass
2800.175	V	73.64	57	pass
3200.200	V	75.91	57	pass
3600.225	V	81.69	57	pass
4000.250	V	82.63	57	pass

Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
454.025	H	0		pass
908.050	H	71.49	57	pass
1362.075	H	70.62	57	pass
1816.100	H	73.36	57	pass
2270.125	H	74.15	57	pass
2724.150	H	75.42	57	pass
3178.175	H	77.62	57	pass
3632.200	H	79.49	57	pass
4086.225	H	80.52	57	pass
4540.250	H	81.37	57	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
454.025	V	0		pass
908.050	V	70.49	57	pass
1362.075	V	71.62	57	pass
1816.100	V	72.75	57	pass
2270.125	V	73.62	57	pass
2724.150	V	74.85	57	pass
3178.175	V	74.64	57	pass
3632.200	V	76.26	57	pass
4086.225	V	77.42	57	pass
4540.250	V	79.36	57	pass

Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
479.975	H	0		pass
959.950	H	67.91	57	pass
1439.925	H	68.82	57	pass
1919.900	H	70.54	57	pass
2399.875	H	72.63	57	pass
2879.850	H	73.85	57	pass
3359.825	H	76.24	57	pass
3839.800	H	78.86	57	pass
4319.775	H	80.62	57	pass
4799.750	H	81.85	57	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
479.975	V	0		pass
959.950	V	70.69	57	pass
1439.925	V	69.26	57	pass
1919.900	V	72.62	57	pass
2399.875	V	74.96	57	pass
2879.850	V	76.91	57	pass
3359.825	V	81.63	57	pass
3839.800	V	81.63	57	pass
4319.775	V	83.66	57	pass
4799.750	V	82.69	57	pass

TEST RESULTS-1W

Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
400.025	H	0		pass
800.050	H	69.52	50	pass
1200.075	H	71.68	50	pass
1600.100	H	73.58	50	pass
2000.125	H	74.63	50	pass
2400.150	H	75.92	50	pass
2800.175	H	77.69	50	pass
3200.200	H	78.21	50	pass
3600.225	H	79.63	50	pass
4000.250	H	81.92	50	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
400.025	V	0		pass
800.050	V	70.52	50	pass
1200.075	V	71.82	50	pass
1600.100	V	72.85	50	pass
2000.125	V	73.65	50	pass
2400.150	V	73.58	50	pass
2800.175	V	75.81	50	pass
3200.200	V	77.58	50	pass
3600.225	V	78.19	50	pass
4000.250	V	79.58	50	pass

Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
454.025	H	0		pass
908.050	H	71.49	50	pass
1362.075	H	73.63	50	pass
1816.100	H	73.75	50	pass
2270.125	H	75.18	50	pass
2724.150	H	74.62	50	pass
3178.175	H	76.61	50	pass
3632.200	H	78.82	50	pass
4086.225	H	80.28	50	pass
4540.250	H	81.43	50	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
454.025	V	0		pass
908.050	V	69.26	50	pass
1362.075	V	70.39	50	pass
1816.100	V	70.51	50	pass
2270.125	V	71.75	50	pass
2724.150	V	74.49	50	pass
3178.175	V	75.82	50	pass
3632.200	V	76.63	50	pass
4086.225	V	78.84	50	pass
4540.250	V	80.51	50	pass

Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
479.975	H	0		pass
959.950	H	71.58	50	pass
1439.925	H	70.18	50	pass
1919.900	H	73.61	50	pass
2399.875	H	74.91	50	pass
2879.850	H	76.35	50	pass
3359.825	H	78.69	50	pass
3839.800	H	79.18	50	pass
4319.775	H	81.06	50	pass
4799.750	H	80.64	50	pass

Emission Frequency (MHz)	Ant. Polarity(H/V)	Measurement Result Below carrier(dBc)	Limit below carrier(dBc)	Result(P/F)
479.975	V	0		pass
959.950	V	69.58	50	pass
1439.925	V	68.62	50	pass
1919.900	V	70.92	50	pass
2399.875	V	71.69	50	pass
2879.850	V	74.96	50	pass
3359.825	V	76.81	50	pass
3839.800	V	77.95	50	pass
4319.775	V	78.18	50	pass
4799.750	V	79.28	50	pass

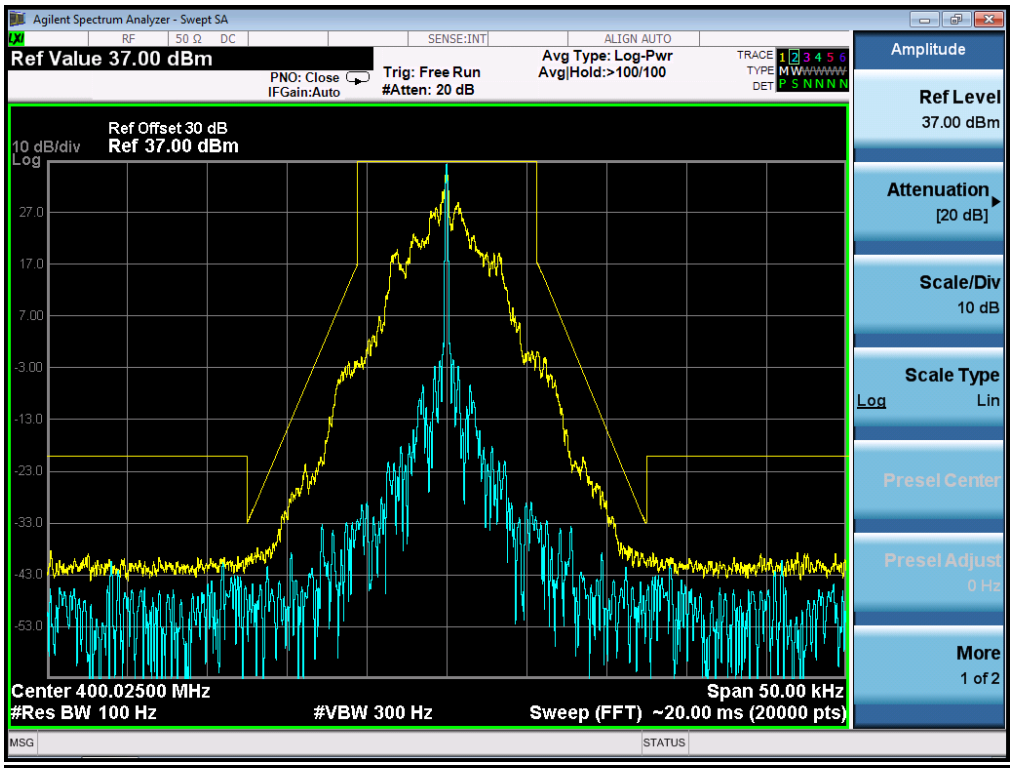
7.5 EMISSION MASK PLOT

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

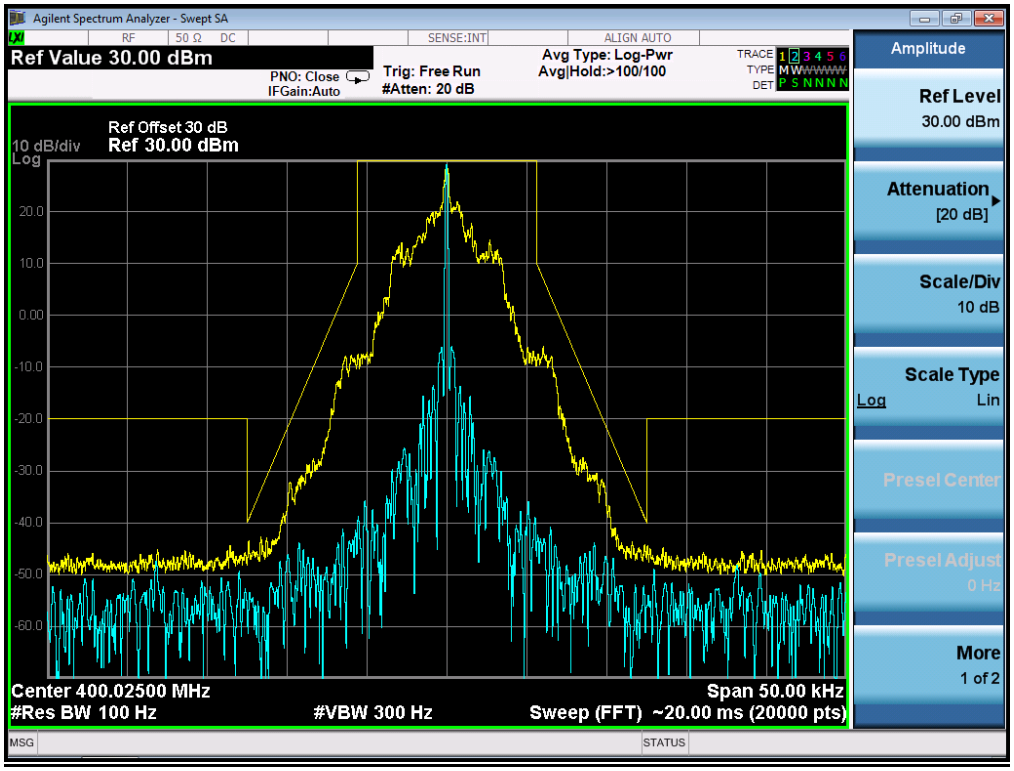
- The transmitter shall be modulated by a 2.5 kHz audio signal,
- The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz.

Analog:

The Worst Emission Mask for 12.5 KHz channel Separation (5W)

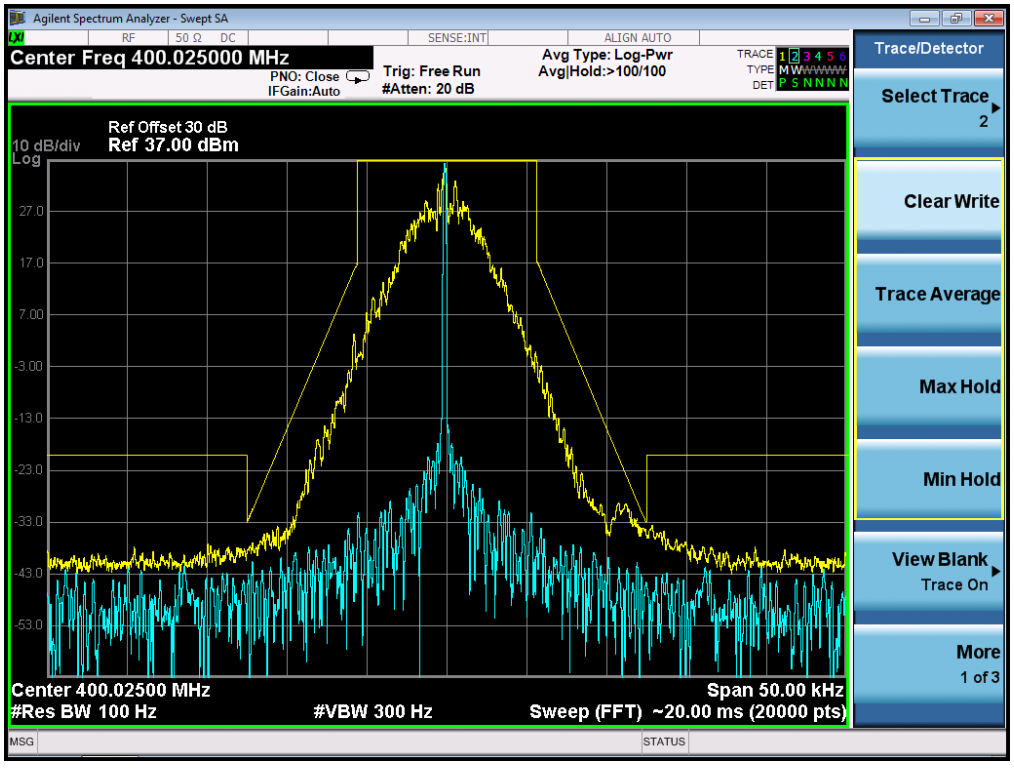


The Worst Emission Mask for 12.5 KHz channel Separation (1W)

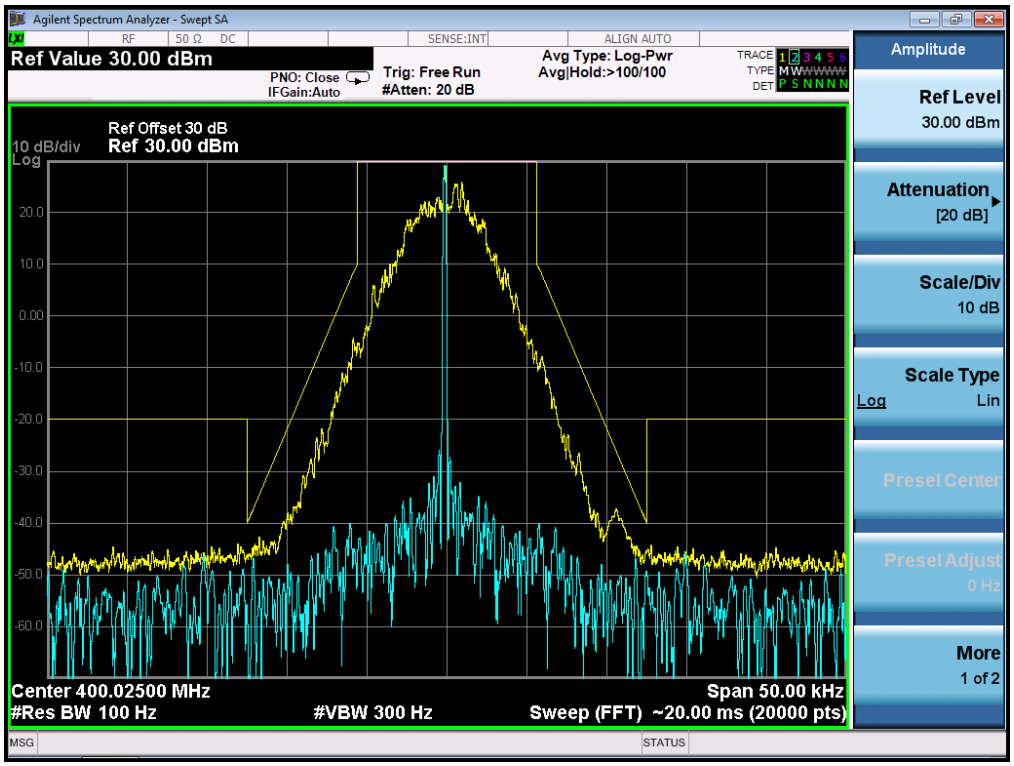


Digital：

The Worst Emission Mask for 12.5 KHz channel Separation (5W)



The Worst Emission Mask for 12.5 KHz channel Separation (1W)



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).

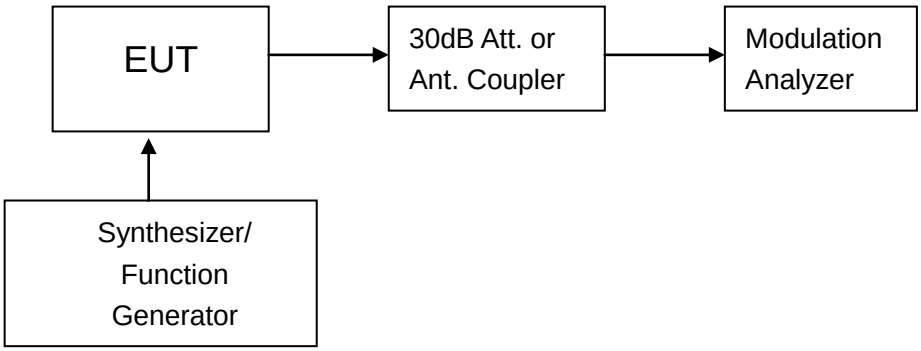


Figure 1: Modulation characteristic measurement configuration

8.3 MEASUREMENT RESULT

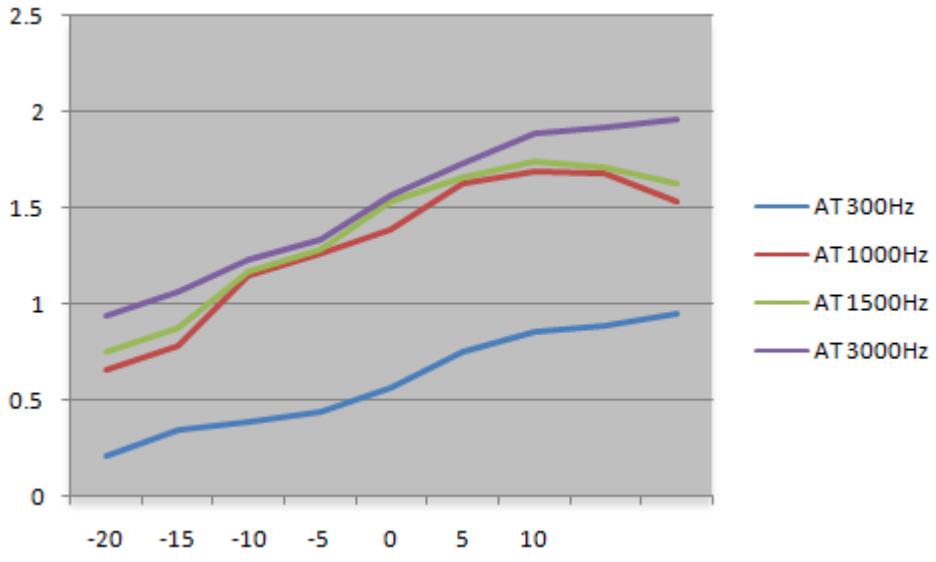
Analog:

TEST RESULTS FOR H POWER

(A). MODULATION LIMIT:

Low 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	0.21	0.66	0.75	0.94
-15	0.35	0.78	0.88	1.06
-10	0.39	1.15	1.17	1.23
-5	0.44	1.26	1.28	1.34
0	0.56	1.39	1.53	1.56
+5	0.75	1.63	1.66	1.73
+10	0.86	1.69	1.74	1.89
+15	0.89	1.68	1.71	1.92
+20	0.95	1.53	1.63	1.96



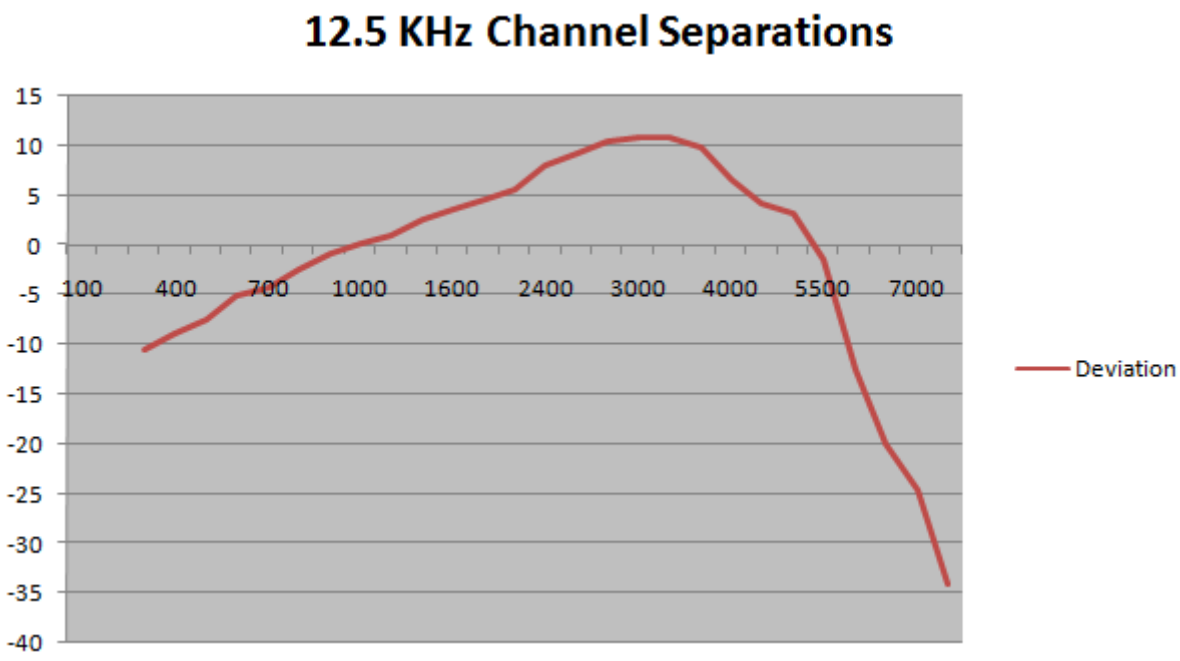
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

Middle Channel @ 12.5 KHz Channel Separations

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.15	-11.06
400	0.18	-9.37
500	0.21	-6.74
600	0.28	-5.35
700	0.31	-4.73
800	0.38	-2.85
900	0.46	-1.51
1000	0.51	0.00
1200	0.56	0.83
1400	0.68	2.28
1600	0.76	3.52
1800	0.85	4.71
2000	0.96	5.48
2400	1.26	7.75
2500	1.43	9.19
2800	1.68	10.42
3000	1.74	10.88
3200	1.72	10.68
3600	1.55	9.88
4000	1.06	6.44
4500	0.82	4.51
5000	0.72	3.52
5500	0.42	-0.72
6000	0.12	-11.06
6500	0.05	-18.42
7000	0.03	-21.94
7500	0.01	-27.96
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of Middle Channel



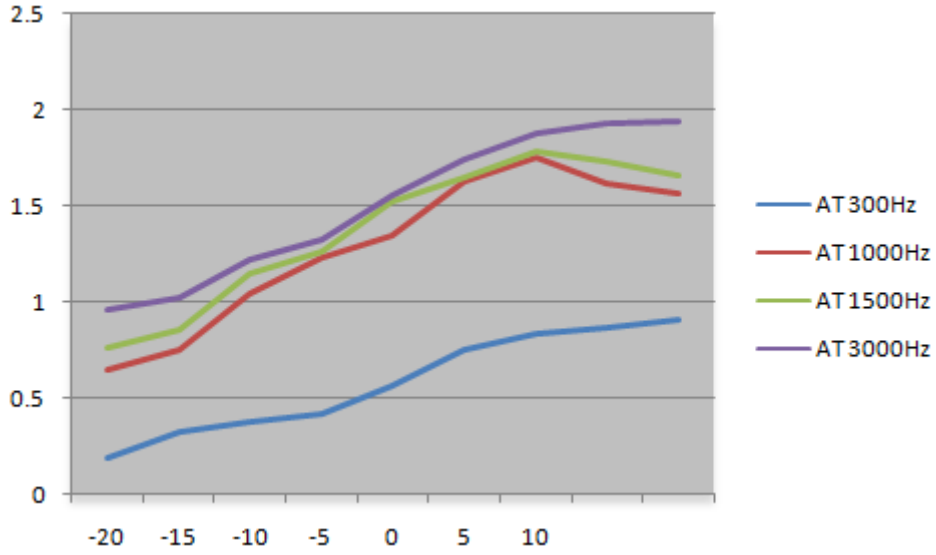
Note: All the modes had been tested, but only the worst data recorded in the report.

TEST RESULTS FOR L POWER

(A). MODULATION LIMIT:

Bottom Channel @ 12.5 KHz Channel Separations

Modulation Level (dB)	Peak Freq. Deviation At 300 Hz	Peak Freq. Deviation At 1000 Hz	Peak Freq. Deviation At 1500 Hz	Peak Freq. Deviation At 3000 Hz
-20	0.19	0.65	0.76	0.96
-15	0.33	0.75	0.85	1.02
-10	0.38	1.04	1.15	1.22
-5	0.42	1.23	1.26	1.33
0	0.57	1.35	1.52	1.55
+5	0.75	1.63	1.64	1.74
+10	0.84	1.75	1.78	1.88
+15	0.87	1.61	1.73	1.93
+20	0.91	1.56	1.66	1.94



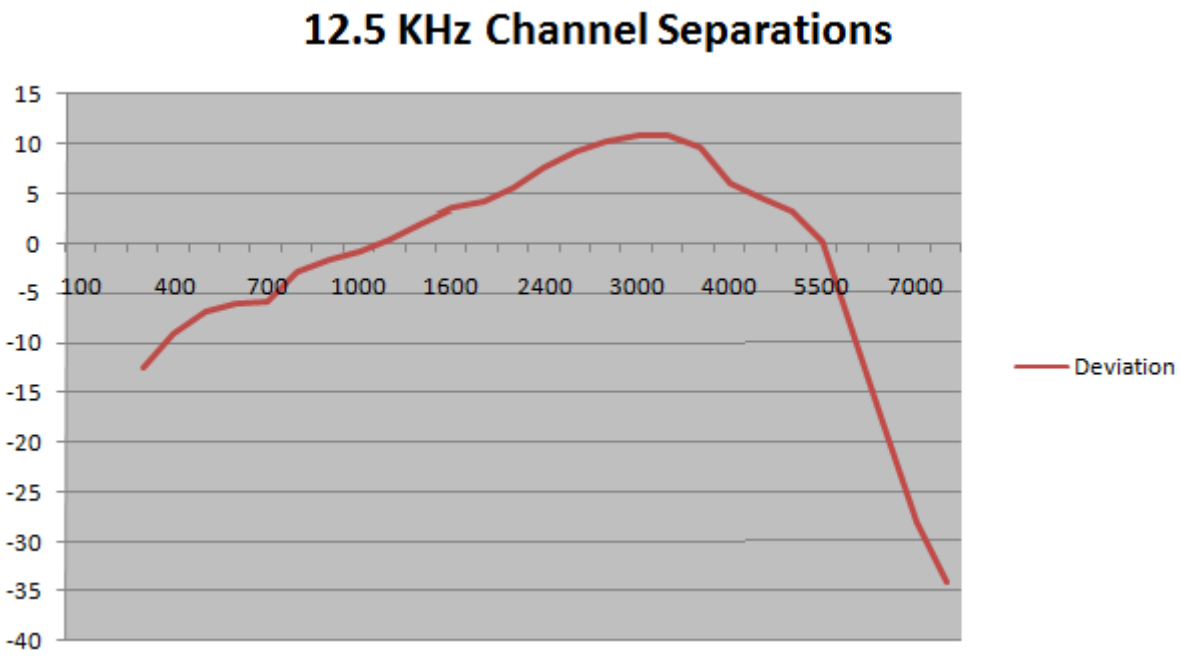
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

Bottom Channel @ 12.5 KHz Channel Separations

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.12	-12.40
400	0.18	-8.87
500	0.23	-6.74
600	0.25	-6.02
700	0.26	-5.68
800	0.37	-2.62
900	0.42	-1.51
1000	0.46	-0.72
1200	0.53	0.51
1400	0.64	2.14
1600	0.75	3.52
1800	0.82	4.30
2000	0.96	5.67
2400	1.21	7.68
2500	1.43	9.13
2800	1.62	10.21
3000	1.74	10.83
3200	1.73	10.78
3600	1.51	9.60
4000	1.01	6.11
4500	0.84	4.51
5000	0.72	3.17
5500	0.51	0.17
6000	0.17	-9.37
6500	0.06	-18.42
7000	0.02	-27.96
7500	0.01	-33.98
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of Bottom Channel



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

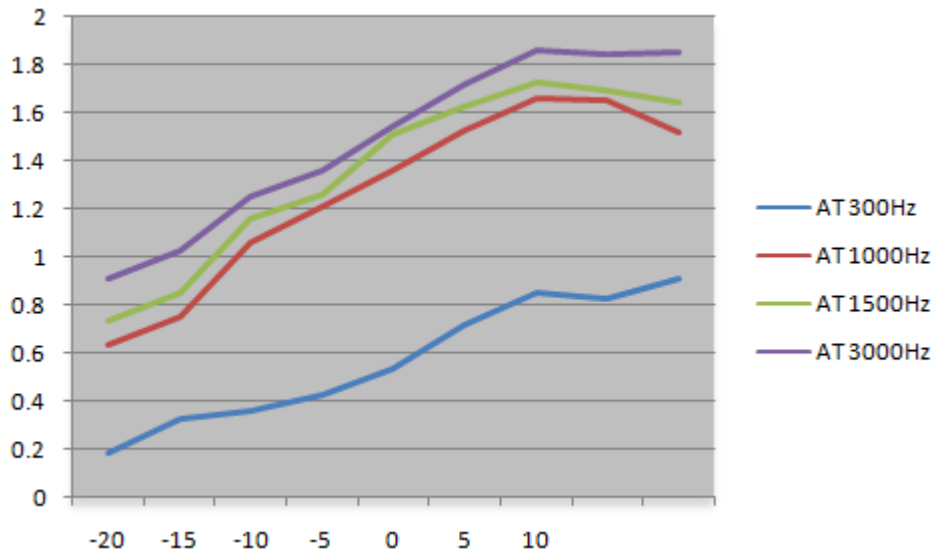
Digital:

TEST RESULT TS FOR H POWER 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	0.18	0.63	0.73	0.91
-15	0.32	0.75	0.85	1.03
-10	0.36	1.06	1.16	1.25
-5	0.42	1.21	1.26	1.36
0	0.53	1.36	1.51	1.54
+5	0.72	1.53	1.63	1.72
+10	0.85	1.66	1.73	1.86
+15	0.83	1.65	1.7	1.84
+20	0.91	1.52	1.65	1.85



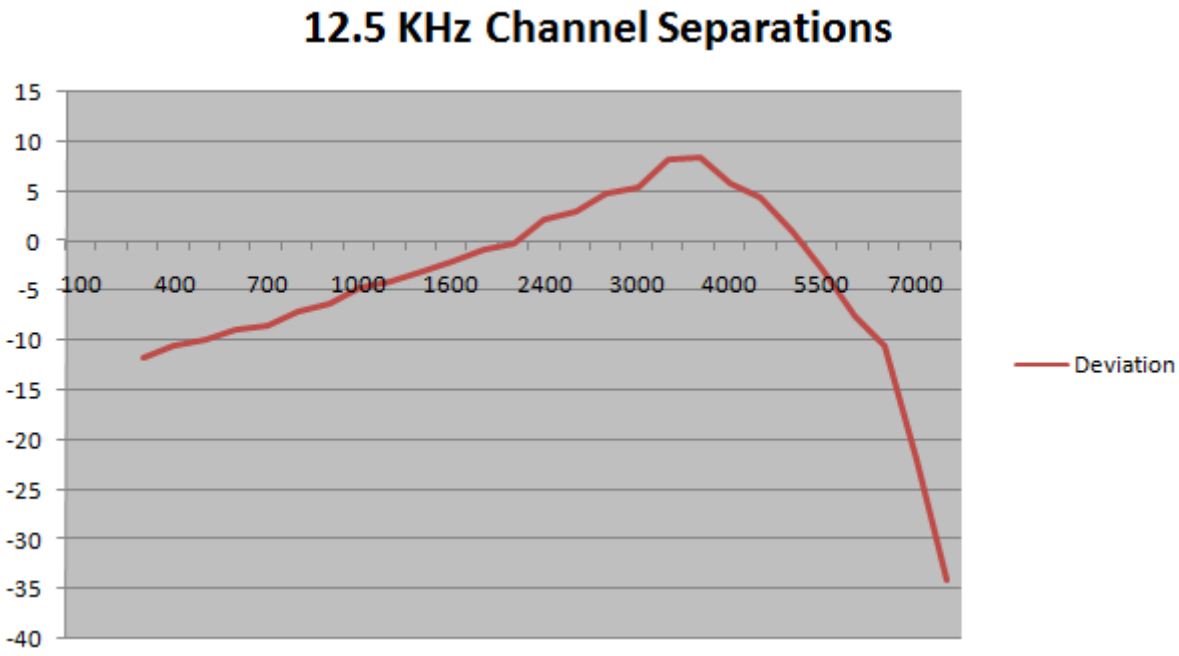
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

High Channel @ 12.5 KHz Channel Separations

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.13	-20.00
400	0.15	-15.92
500	0.16	-12.40
600	0.18	-11.70
700	0.19	-10.46
800	0.22	-8.40
900	0.24	-7.54
1000	0.29	-6.02
1200	0.31	-5.04
1400	0.35	-3.88
1600	0.39	-2.38
1800	0.45	-1.31
2000	0.49	-0.54
2400	0.64	1.73
2500	0.71	3.17
2800	0.86	4.40
3000	0.95	4.91
3200	1.35	4.71
3600	1.48	3.86
4000	0.96	0.51
4500	0.83	-1.51
5000	0.56	-2.38
5500	0.36	-6.74
6000	0.21	-17.08
6500	0.15	-24.44
7000	0.04	-27.96
7500	0.01	-33.98
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of High Channel

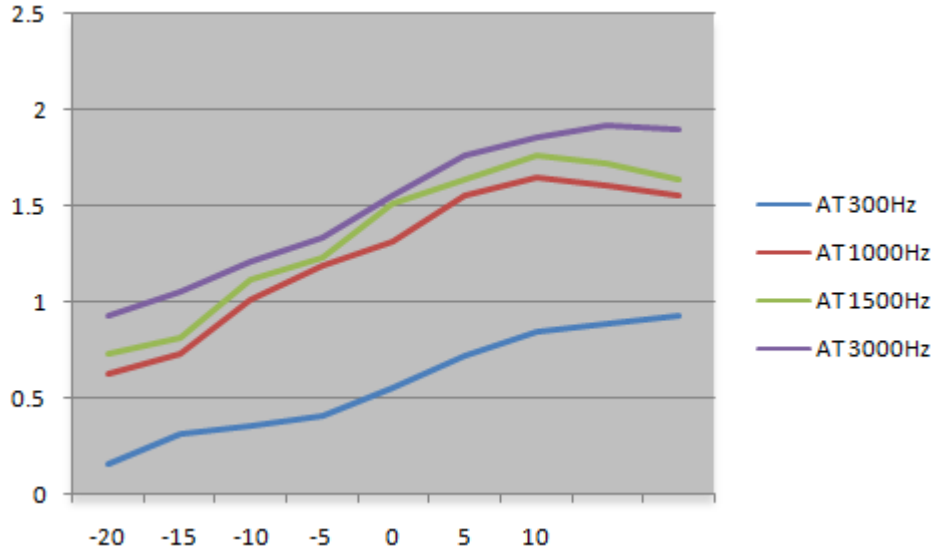


Note: All the modes had been tested, but only the worst data recorded in the report.

(A). MODULATION LIMIT:

Bottom Channel @ 12.5 KHz Channel Separations---L 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	0.16	0.62	0.73	0.93
-15	0.32	0.72	0.81	1.05
-10	0.36	1.01	1.12	1.21
-5	0.41	1.19	1.23	1.34
0	0.56	1.31	1.51	1.56
+5	0.72	1.56	1.63	1.76
+10	0.85	1.65	1.76	1.86
+15	0.89	1.61	1.72	1.92
+20	0.93	1.56	1.63	1.9



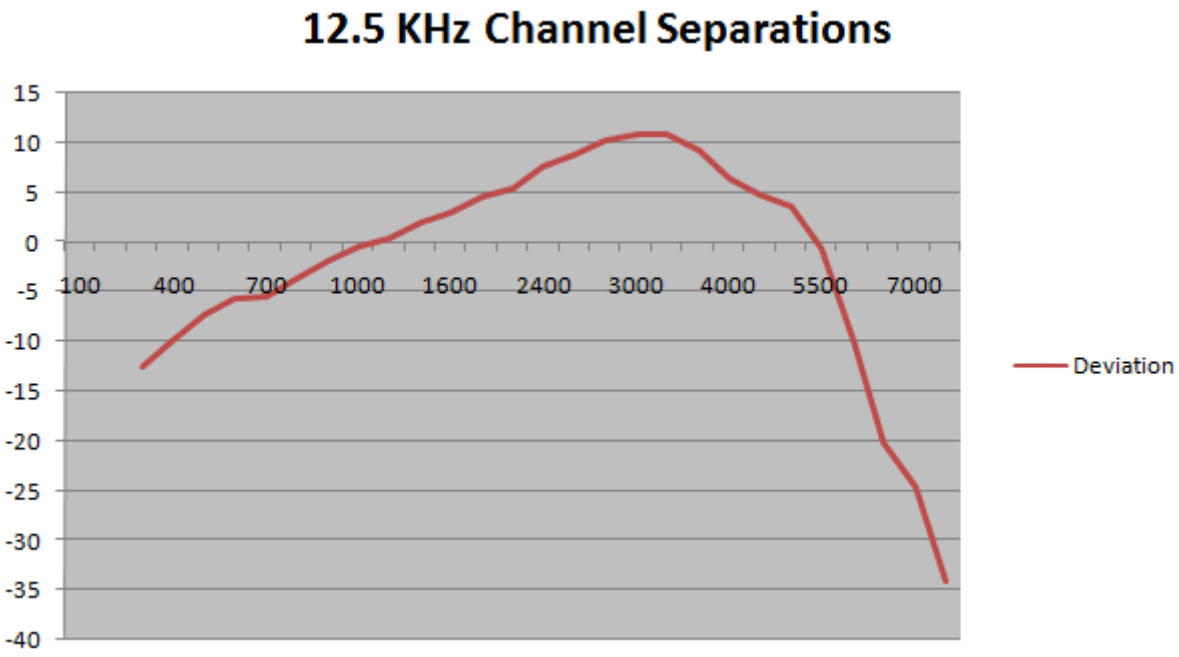
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

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

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.12	-14.89
400	0.16	-11.70
500	0.22	-7.54
600	0.26	-5.35
700	0.27	-4.73
800	0.33	-3.10
900	0.41	-1.31
1000	0.48	-0.54
1200	0.52	0.67
1400	0.63	1.73
1600	0.71	3.29
1800	0.85	4.30
2000	0.94	5.48
2400	1.21	7.82
2500	1.38	8.88
2800	1.64	10.16
3000	1.73	10.63
3200	1.75	10.93
3600	1.47	9.48
4000	1.06	6.28
4500	0.87	4.19
5000	0.76	3.17
5500	0.47	-0.18
6000	0.16	-8.87
6500	0.05	-21.94
7000	0.03	-27.96
7500	0.01	-33.98
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of Bottom Channel



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

9. MAXIMUMN TRANSMITTER POWER (CONDUCTED OUTPUT POWER)

9.1 PROVISIONS APPLICABLE

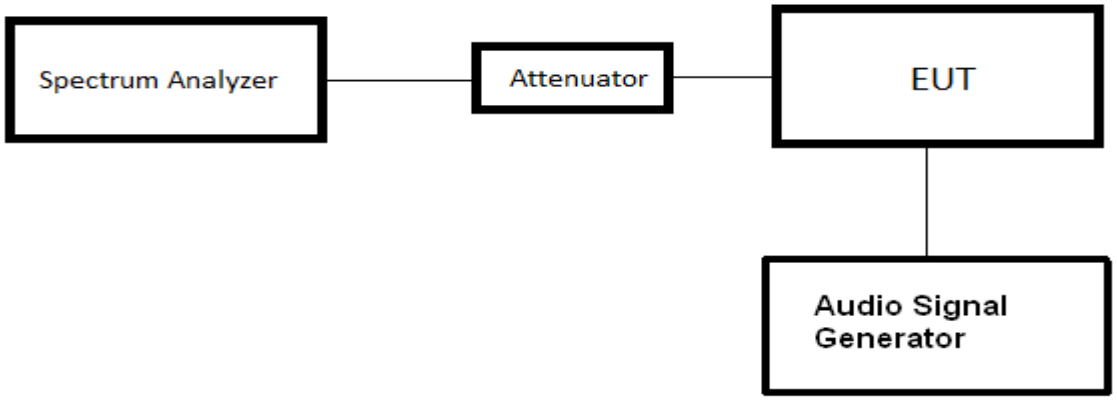
Per FCC §2.1046 § 22.565 and §90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

9.2 TEST PROCEDURE

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

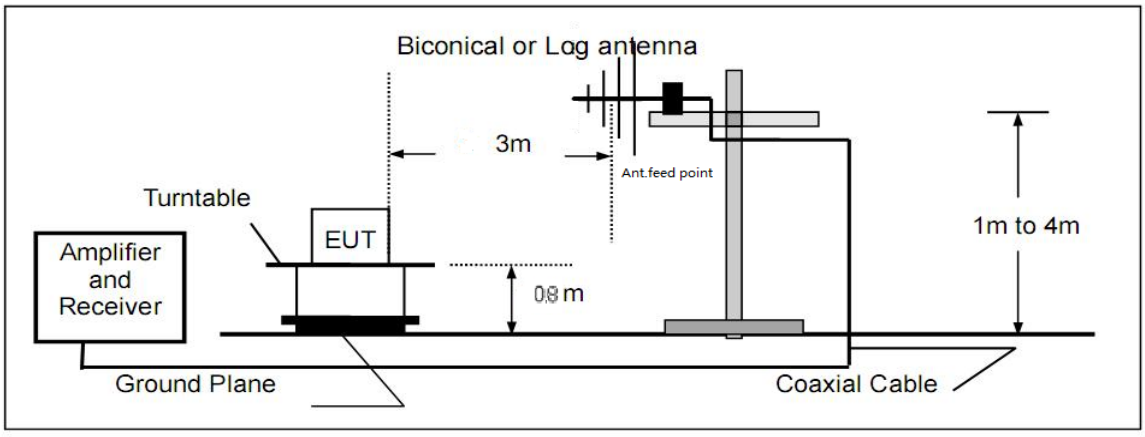
9.3 TEST CONFIGURATION

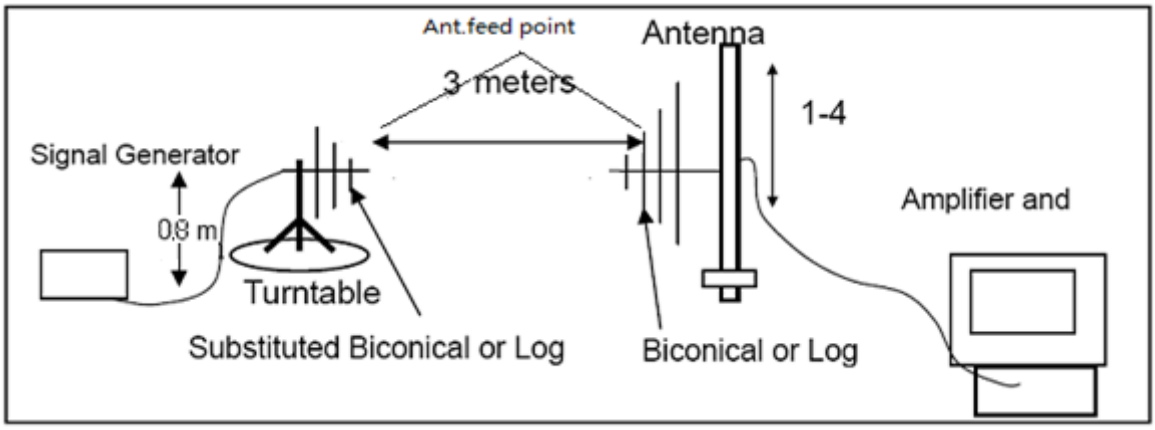
Conducted Output Power:



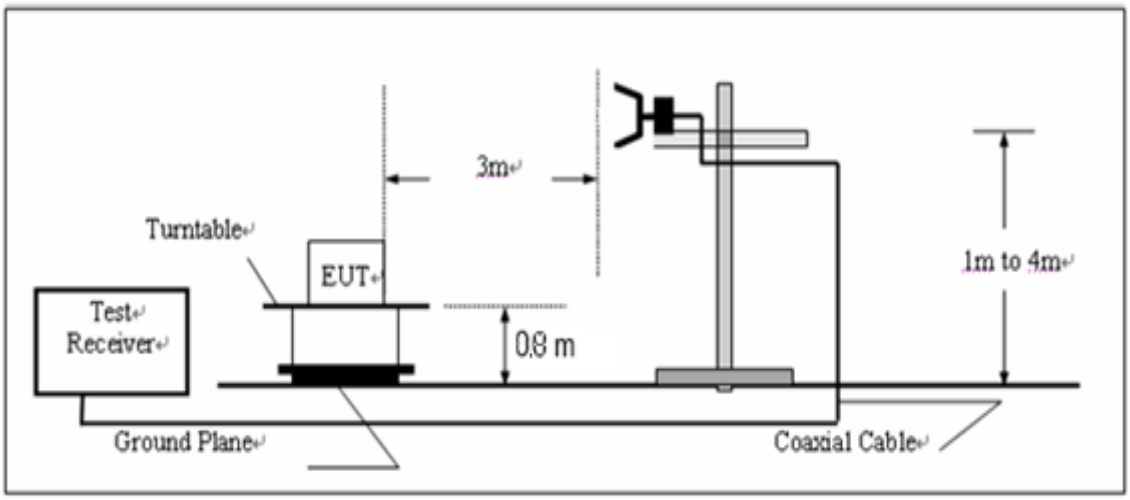
Effective Radiated Power

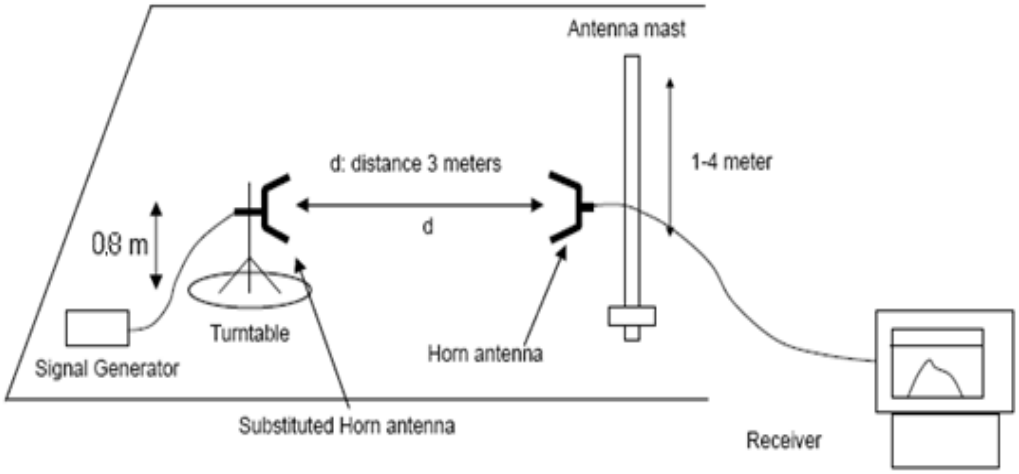
Radiated Below1GHz





Radiated Above 1 GHz





9.4 TEST RESULT

The maximum Conducted Power (CP) is

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

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

Calculation Formula: CP = R + A + L

***** Note:

CP: The final Conducted Power

R : The reading value from spectrum analyzer

A : The attenuation value of the used attenuator

L : The loss of all connection cables

Analog:

Conducted Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.86
	Middle(453.225MHz)	36.79
	Middle(454.025MHz)	36.72
	Top (479.975MHz)	36.69

Radiated Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.84
	Middle(453.225MHz)	36.91
	Middle(454.025MHz)	36.89
	Top (479.975MHz)	36.76

Conducted Power Measurement Results-1W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.95
	Middle(453.225MHz)	29.83
	Middle(454.025MHz)	29.87
	Top (479.975MHz)	29.92

Radiated Power Measurement Results-1W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.90
	Middle(453.225MHz)	29.85
	Middle(454.025MHz)	29.83
	Top (479.975MHz)	29.91

Digital:

Date + voice:

Conducted Power Measurement Results		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.82
	Middle(453.225MHz)	36.78
	Middle(454.025MHz)	36.76
	Top (479.975MHz)	36.73

Radiated Power Measurement Results		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.92
	Middle(453.225MHz)	36.86
	Middle(454.025MHz)	36.88
	Top (479.975MHz)	36.73

Date transmission mode:

Conducted Power Measurement Results		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.71
	Middle(453.225MHz)	36.72
	Middle(454.025MHz)	36.69
	Top (479.975MHz)	36.68

Radiated Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	36.82
	Middle(453.225MHz)	36.83
	Middle(454.025MHz)	36.82
	Top (479.975MHz)	36.82

Date + voice:

Conducted Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.89
	Middle(453.225MHz)	29.85
	Middle(454.025MHz)	29.85
	Top (479.975MHz)	29.91

Radiated Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.82
	Middle(453.225MHz)	29.83
	Middle(454.025MHz)	29.79
	Top (479.975MHz)	29.63

Date transmission mode:

Conducted Power Measurement Results		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.84
	Middle(453.225MHz)	29.82
	Middle(454.025MHz)	29.80
	Top (479.975MHz)	29.80

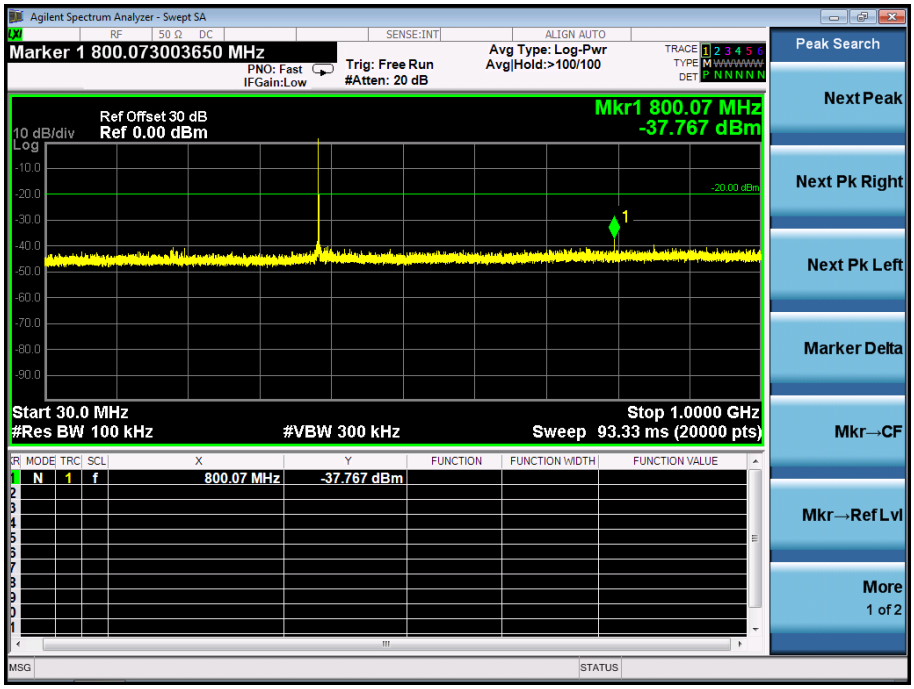
Radiated Power Measurement Results		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.81
	Middle(453.225MHz)	29.77
	Middle(454.025MHz)	29.78
	Top (479.975MHz)	29.63

9.5 CONDUCT SPURIOUS PLOT

Analog:

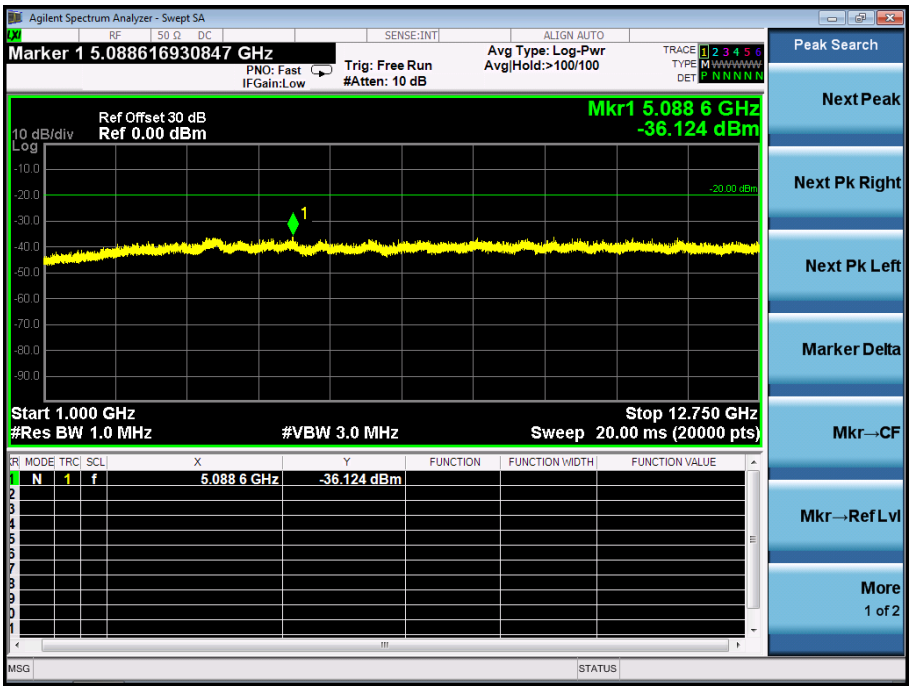
Conducted Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



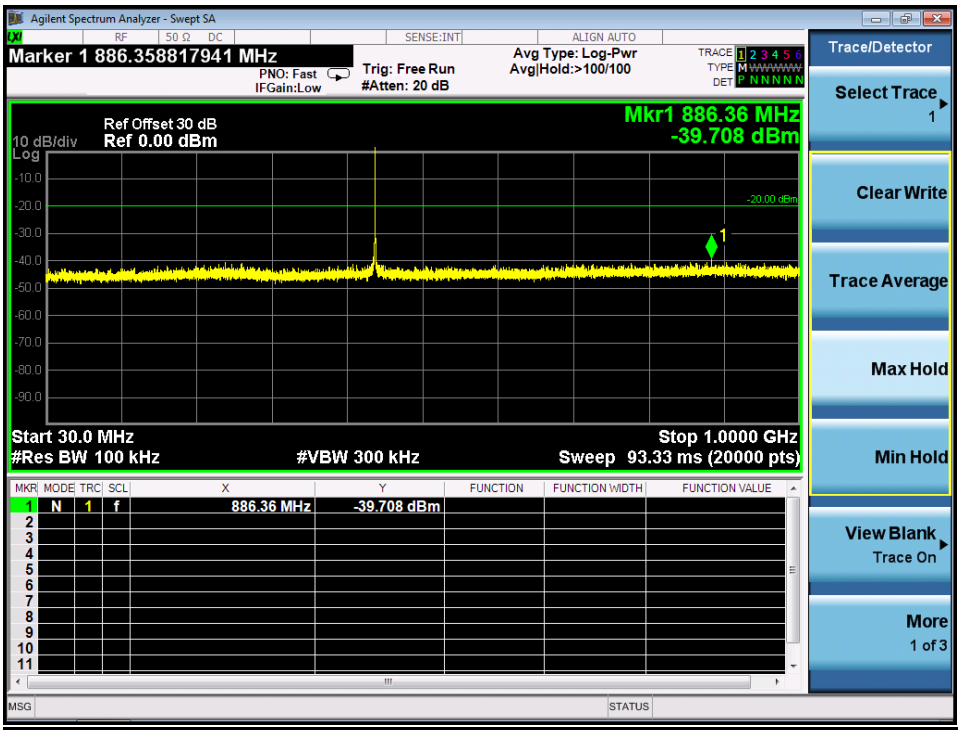
Conduct Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



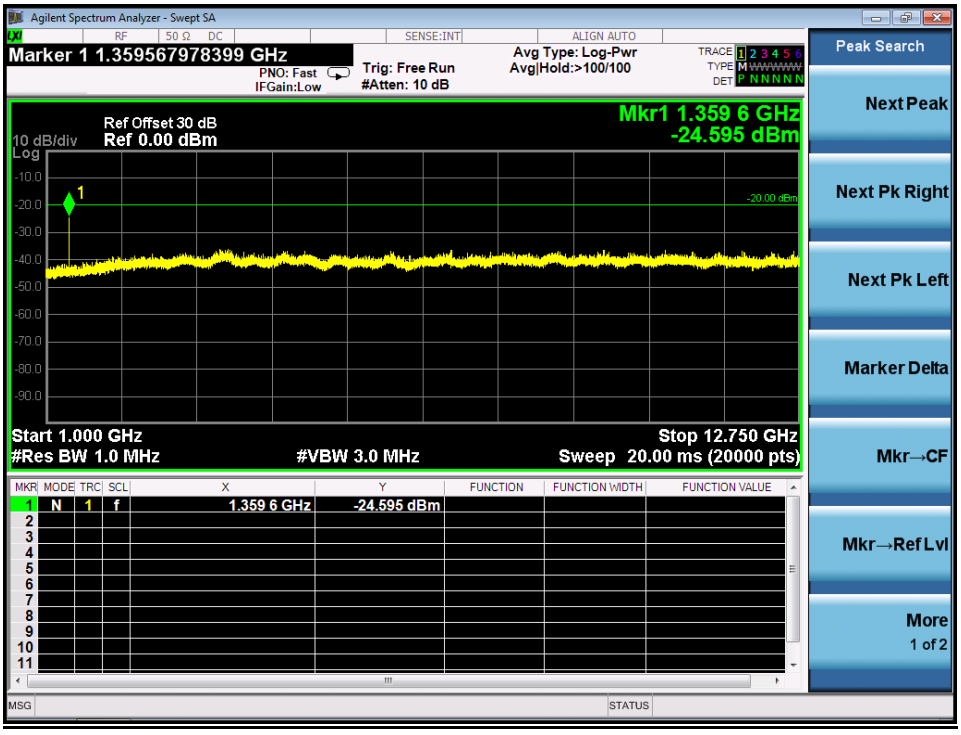
Conducted Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



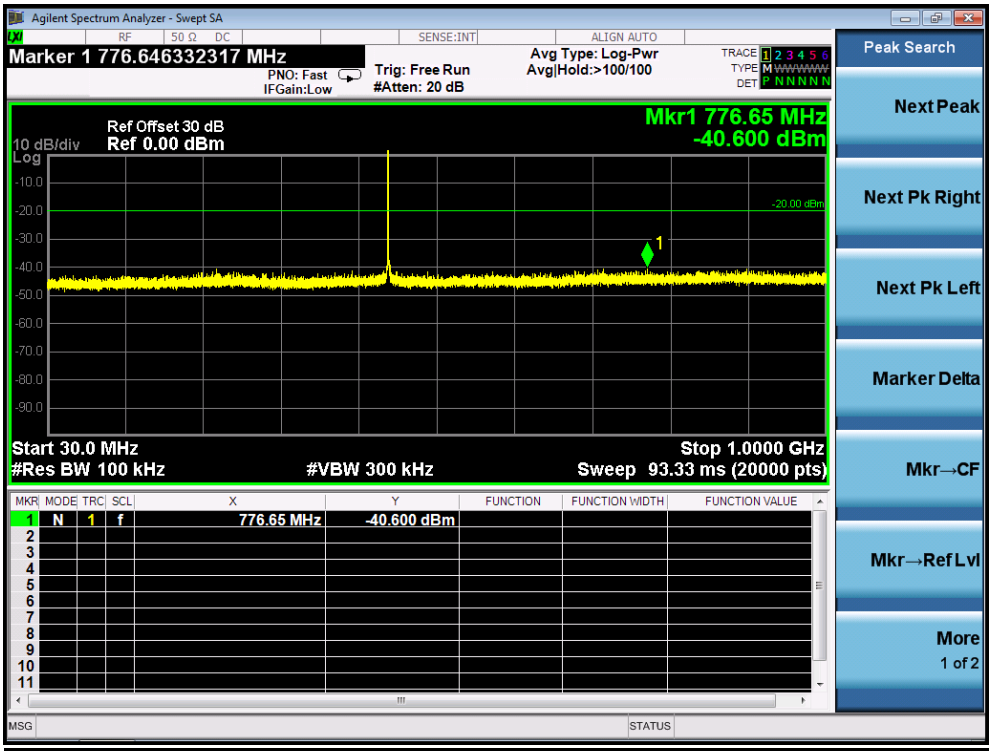
Conduct Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



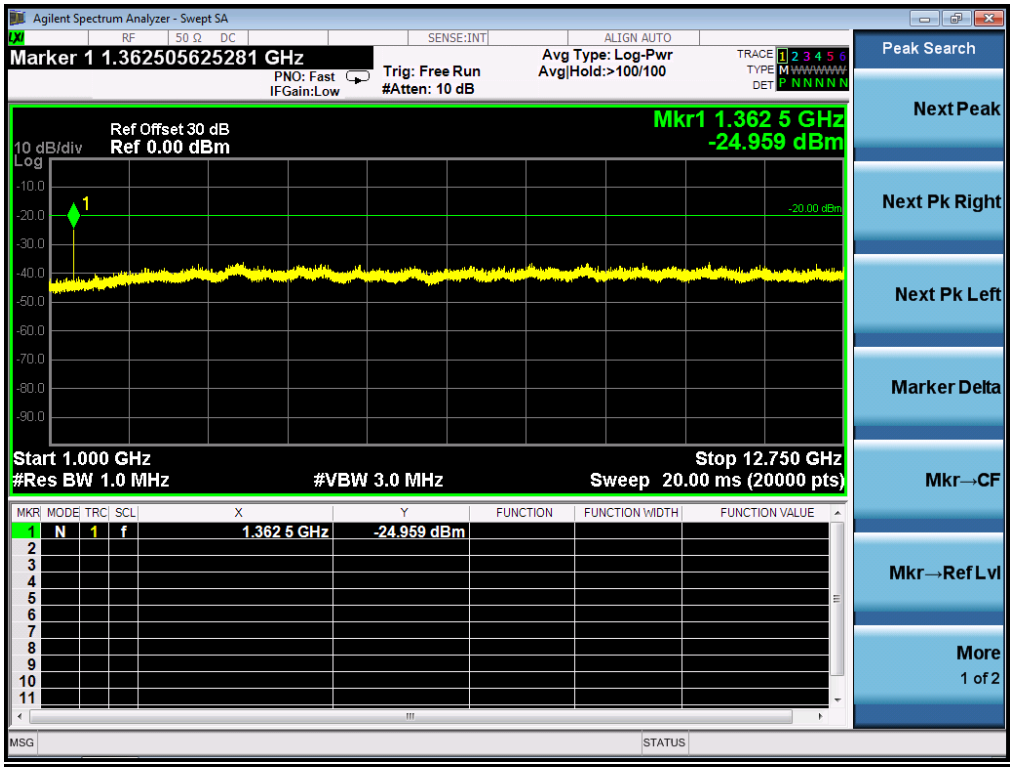
Conducted Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



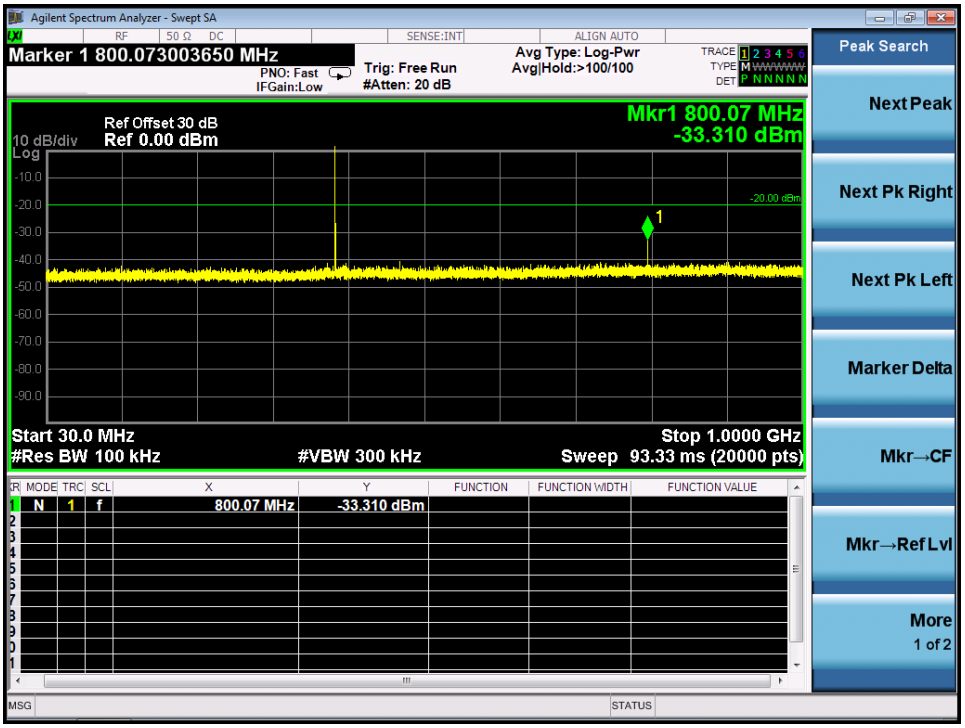
Conduct Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



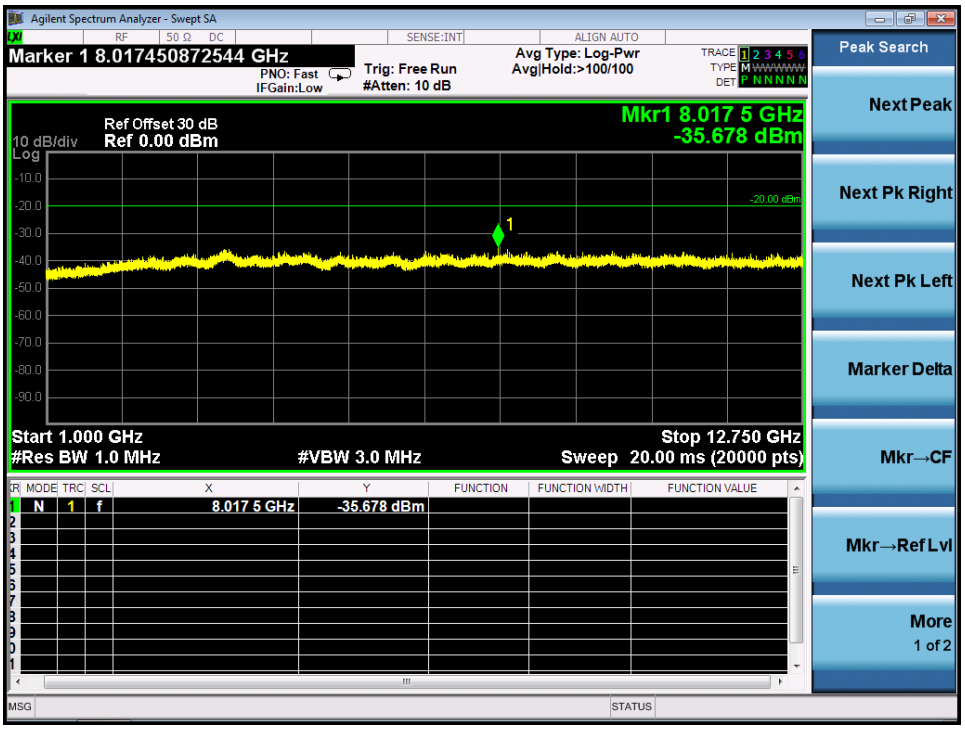
Conducted Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



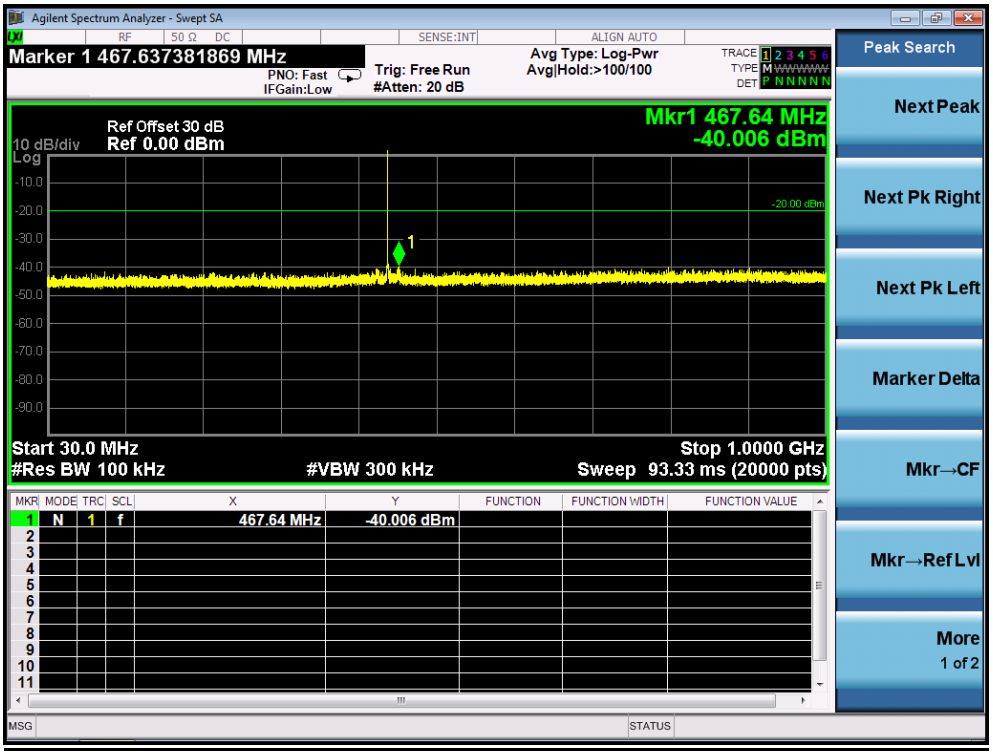
Conduct Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



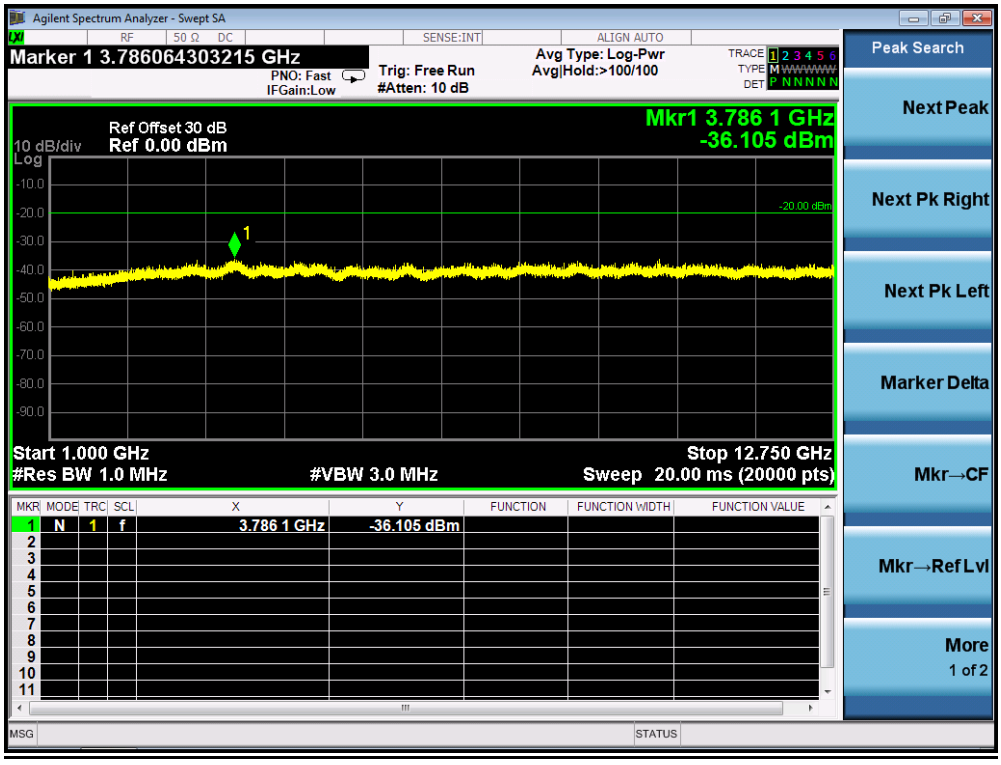
Conducted Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



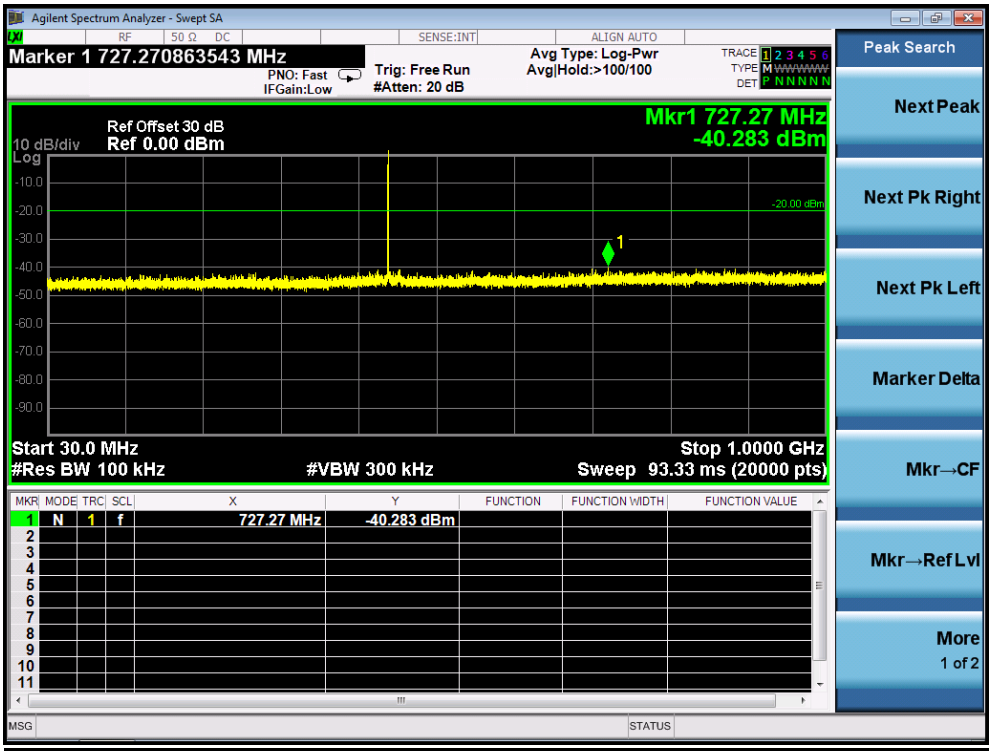
Conduct Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



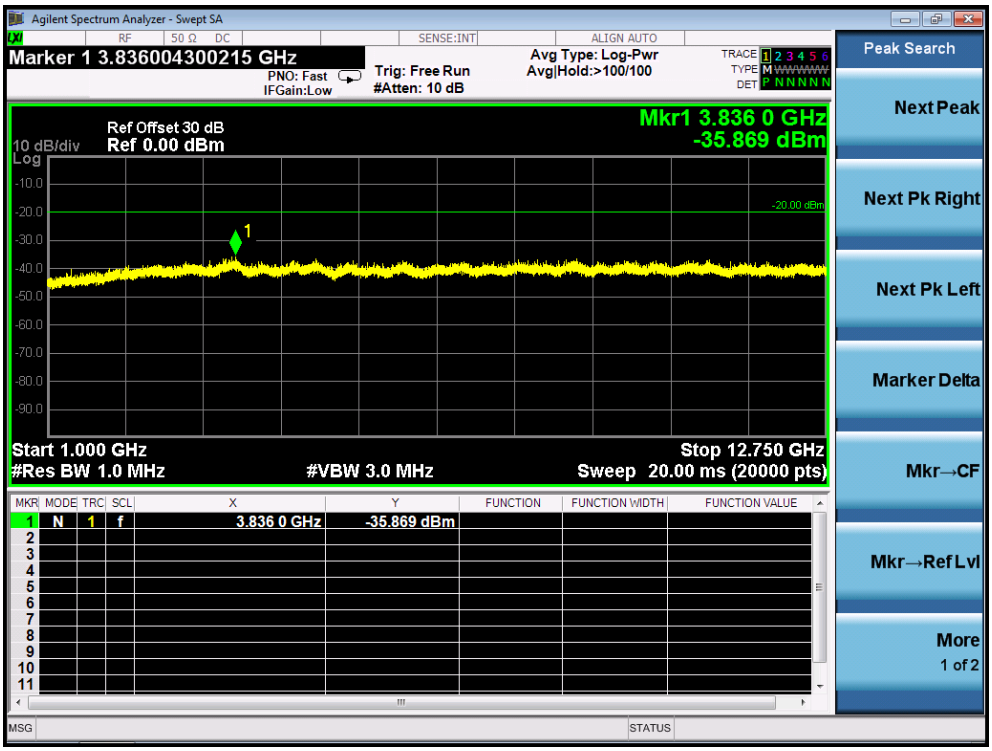
Conducted Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



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

1GHz-12.75GHz

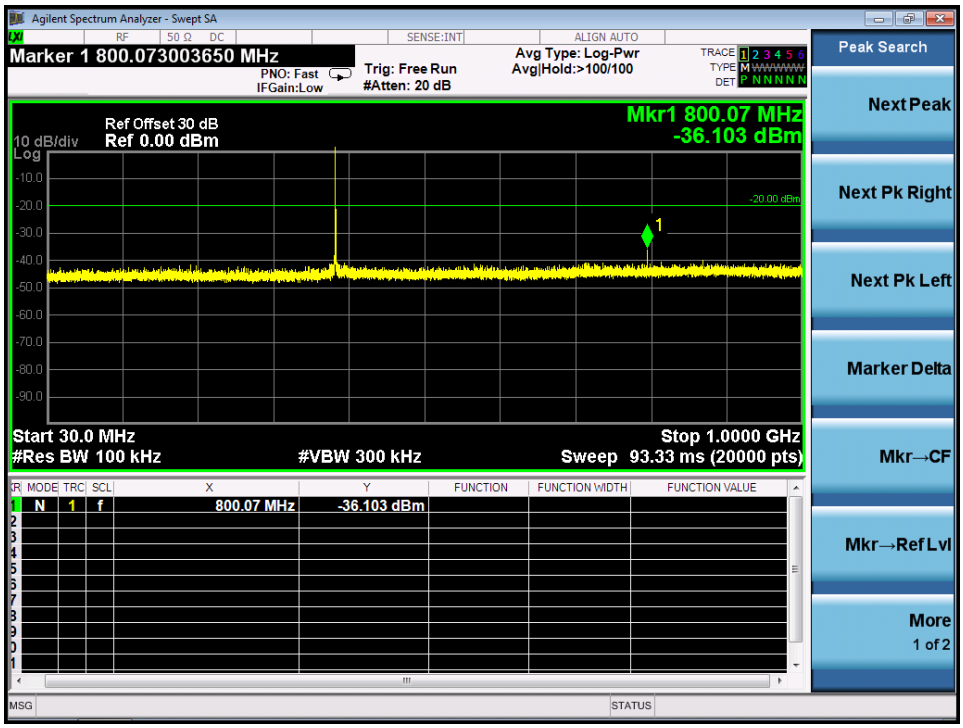


Note: All the test frequencies was tested, but only the worst data be recorded in this part.

Digital:

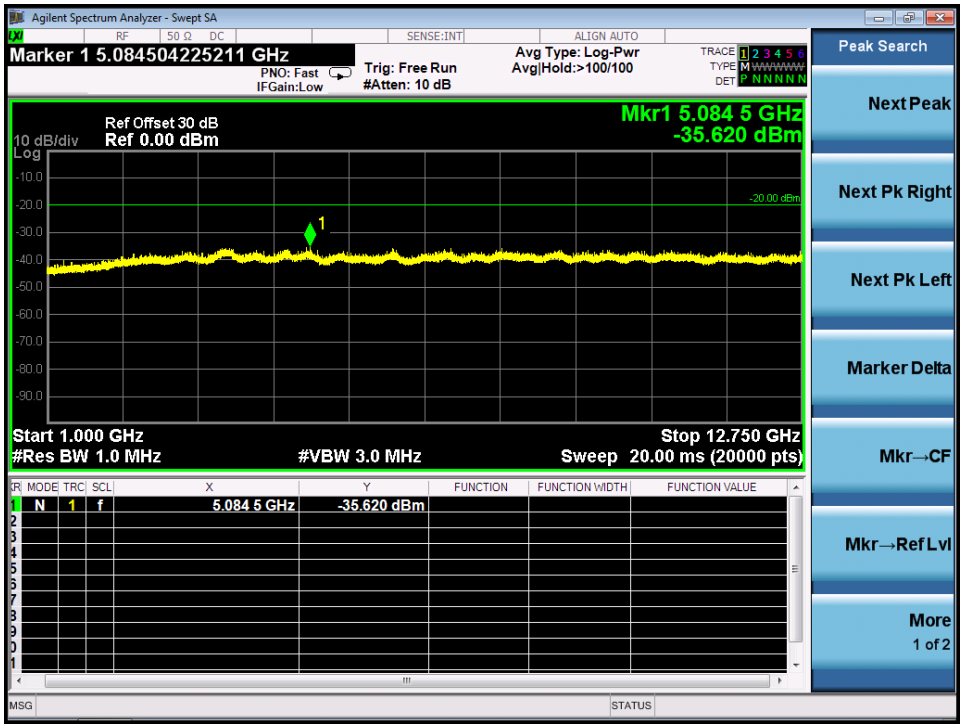
Conducted Spurious Emission (worst) @479.975MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



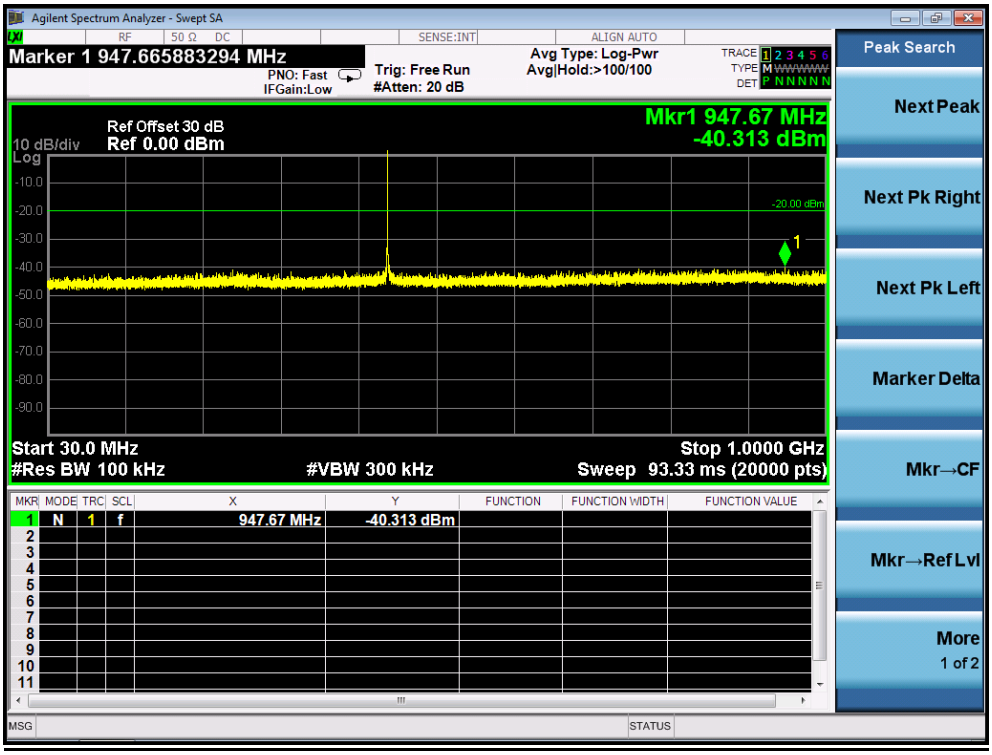
Conduct Spurious Emission (worst) @ 479.975MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



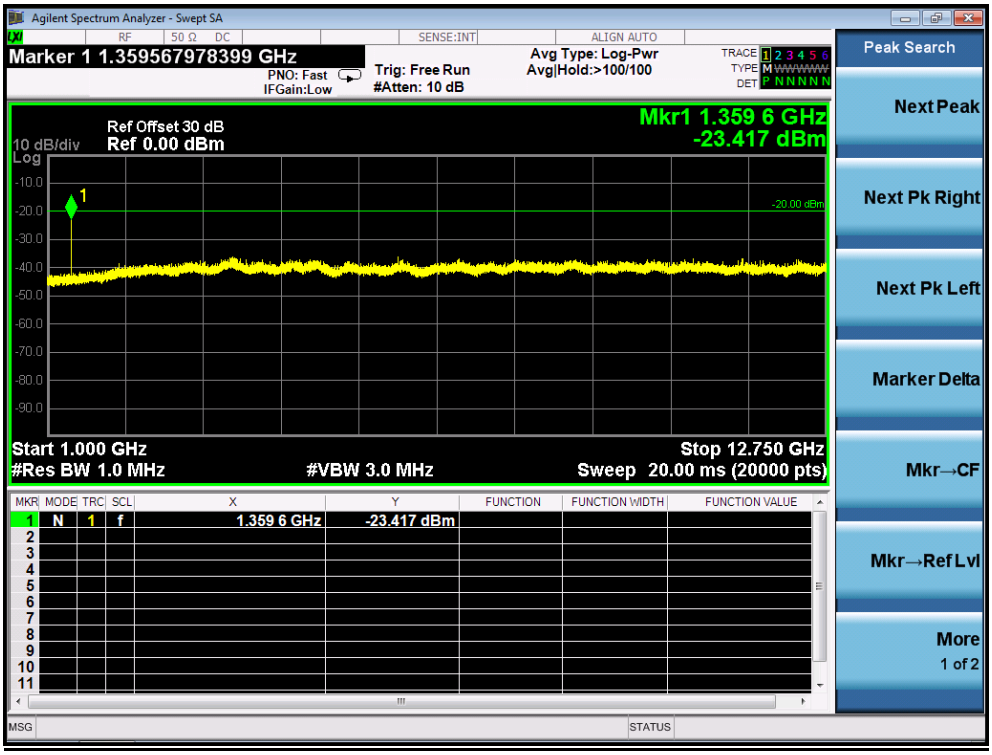
Conducted Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



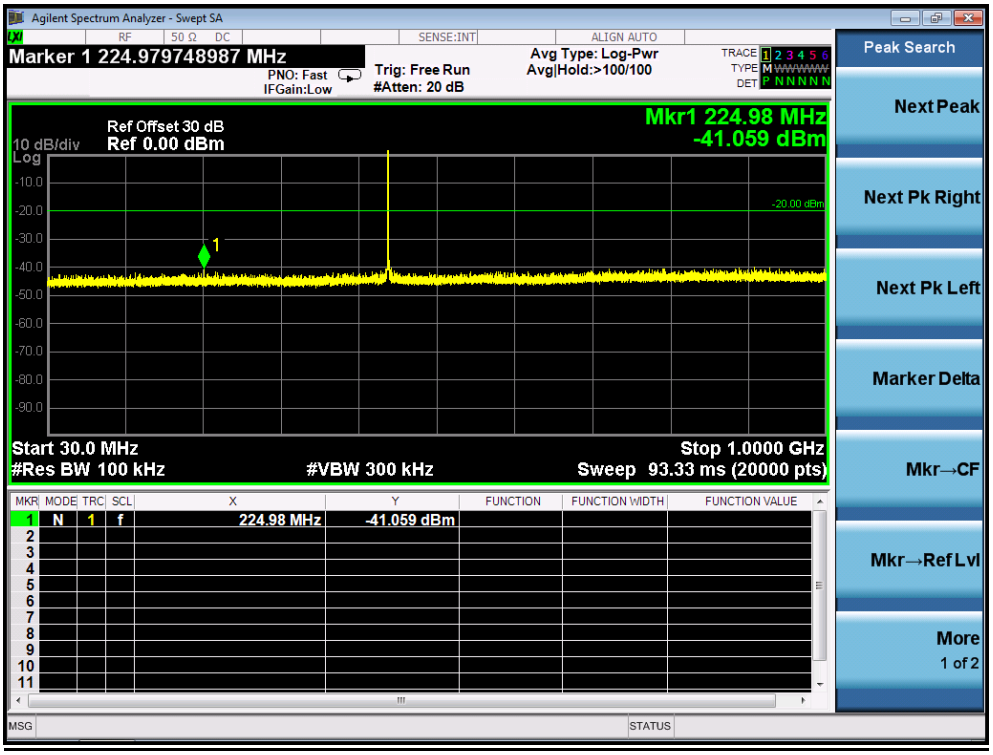
Conduct Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



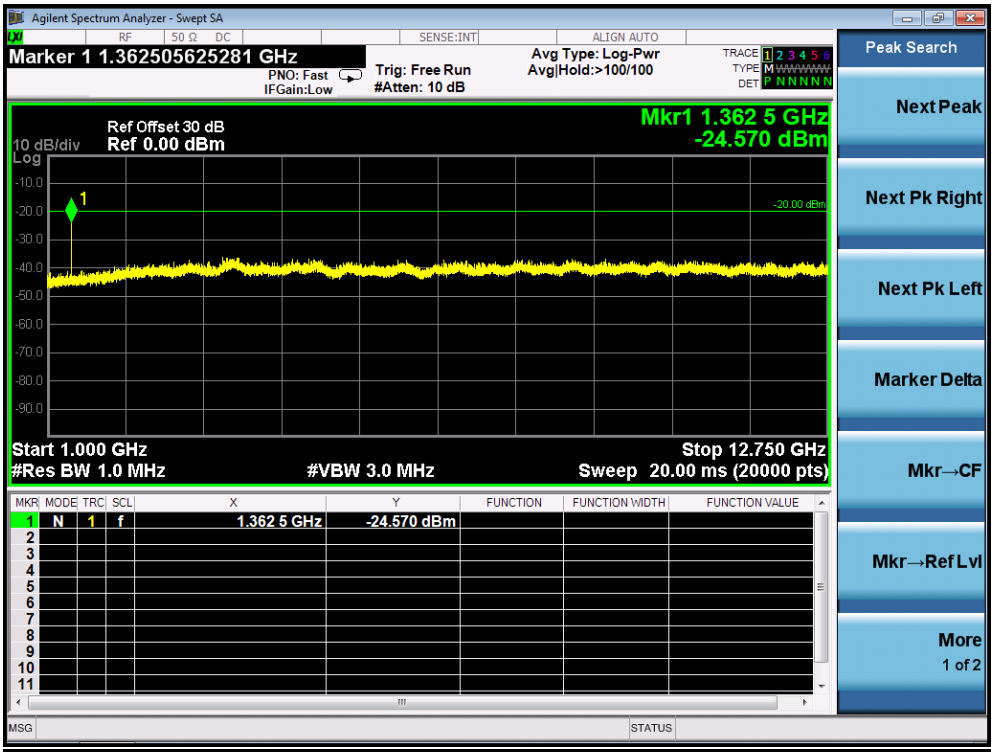
Conducted Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



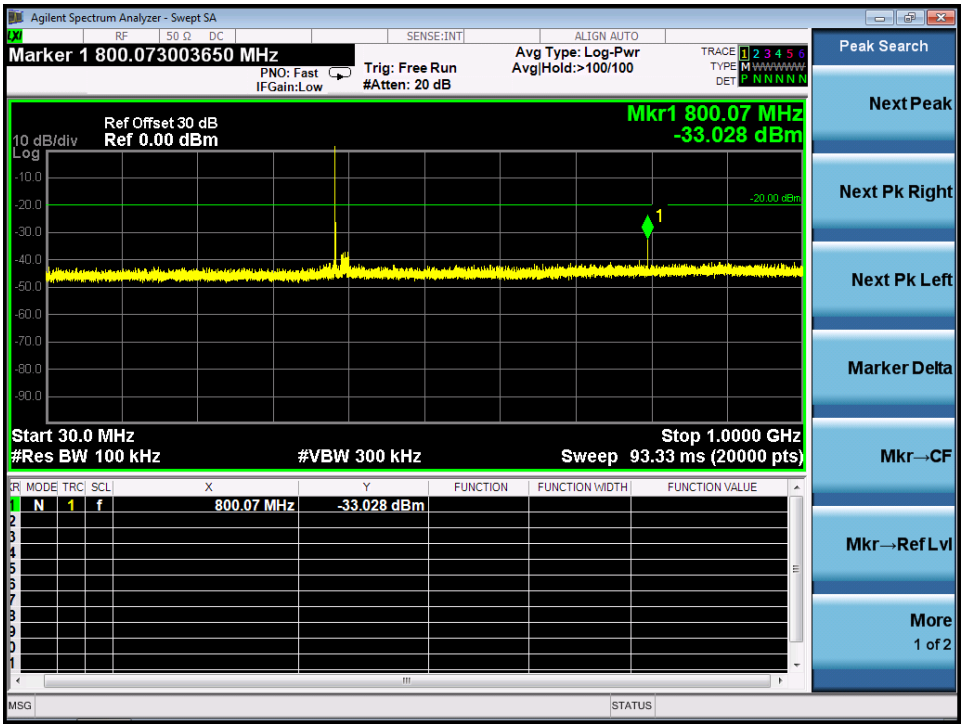
Conduct Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



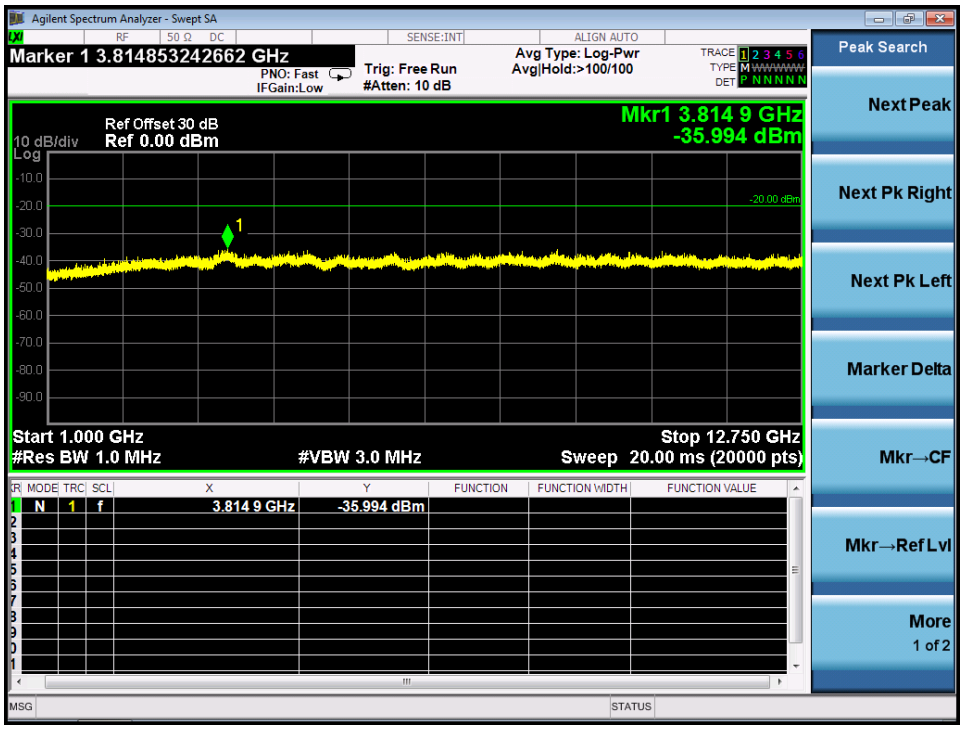
Conducted Spurious Emission (worst) @ 440.025MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



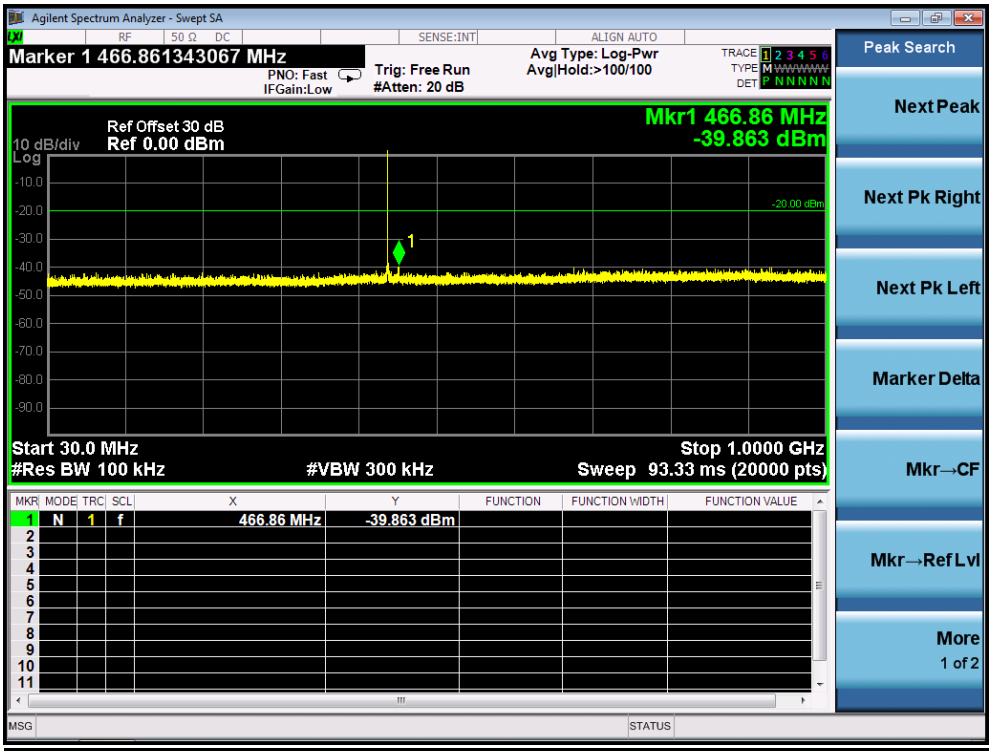
Conduct Spurious Emission (worst) @ 440.025MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



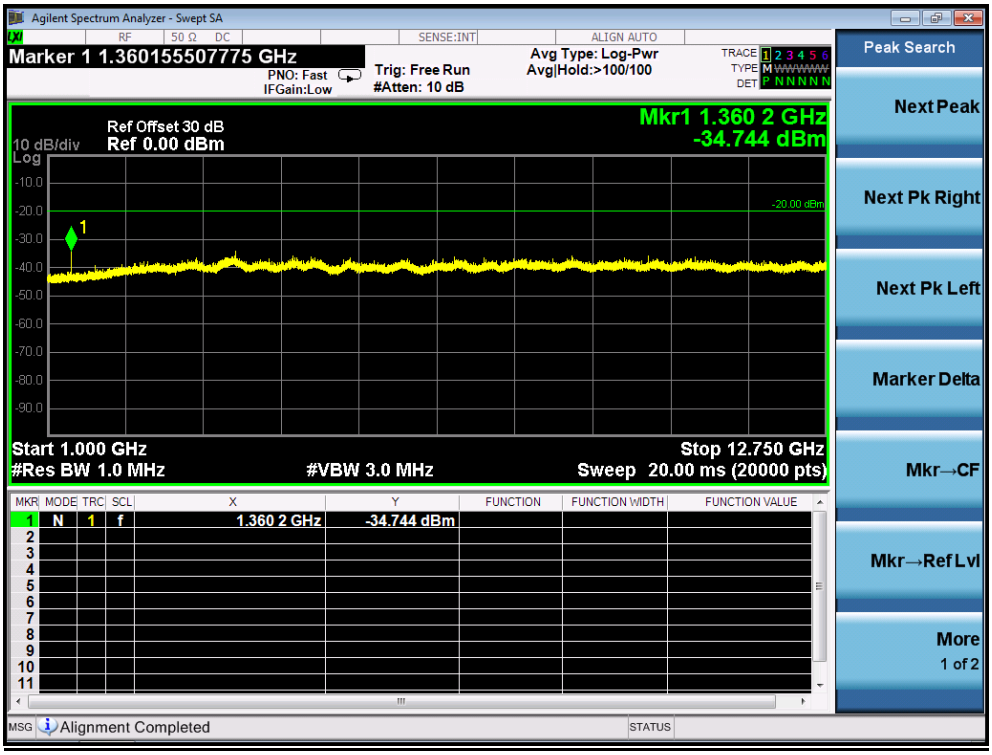
Conducted Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



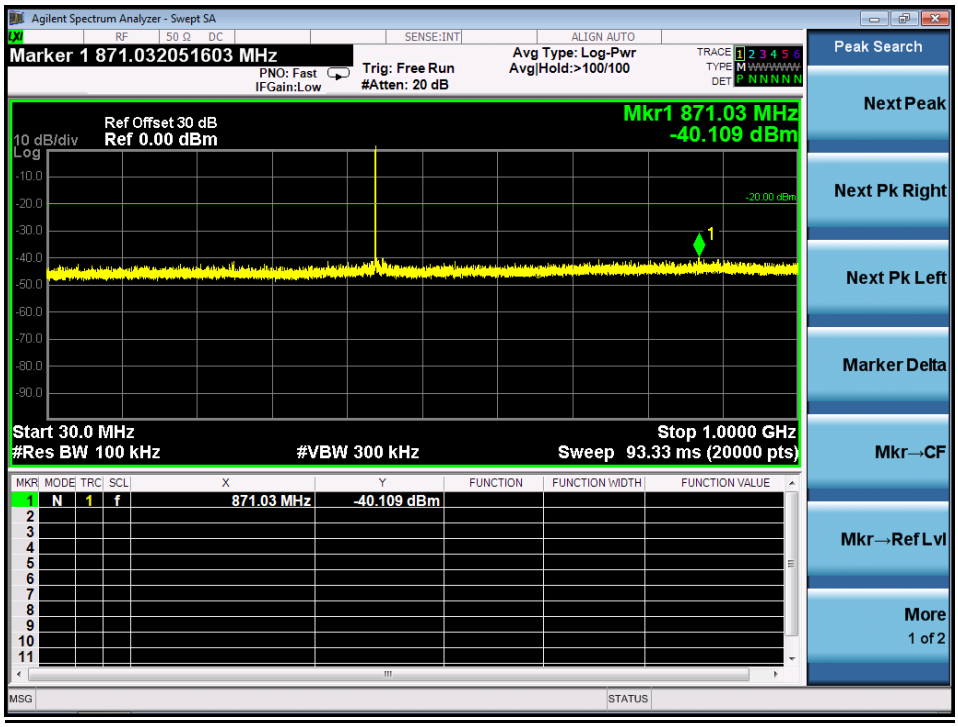
Conduct Spurious Emission (worst) @ 453.225MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



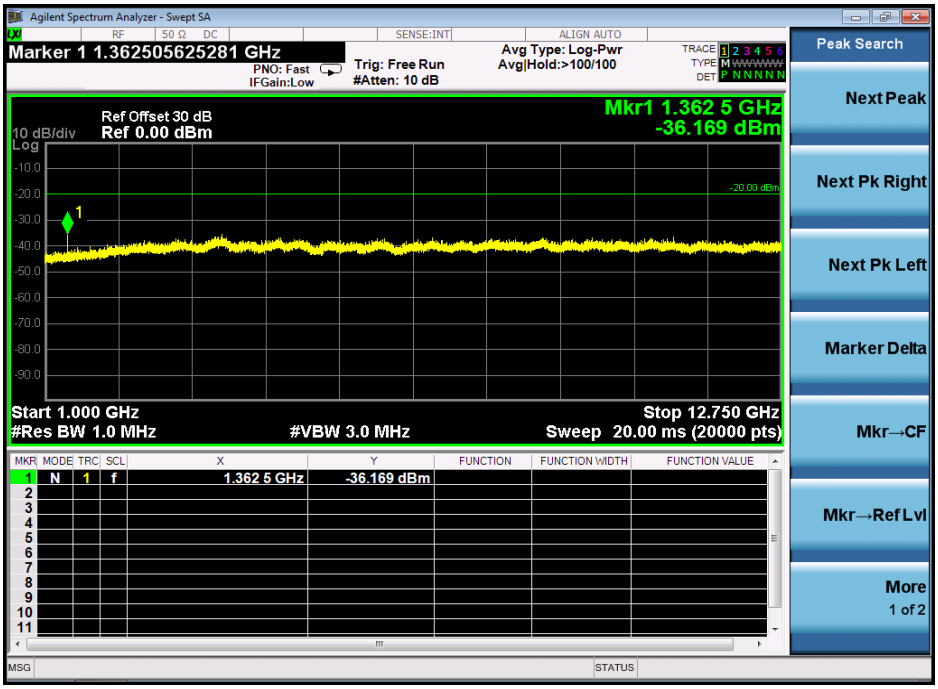
Conducted Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



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

1GHz-12.75GHz



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

10. RANSMITTER FREQUENCY BEHAVIOR

10.1PROVISIONS APPLICABLE

Section 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

10.3 DESCRIBE LIMIT LINE OF RANSMITTER FREQUENCY BEHAVIOR

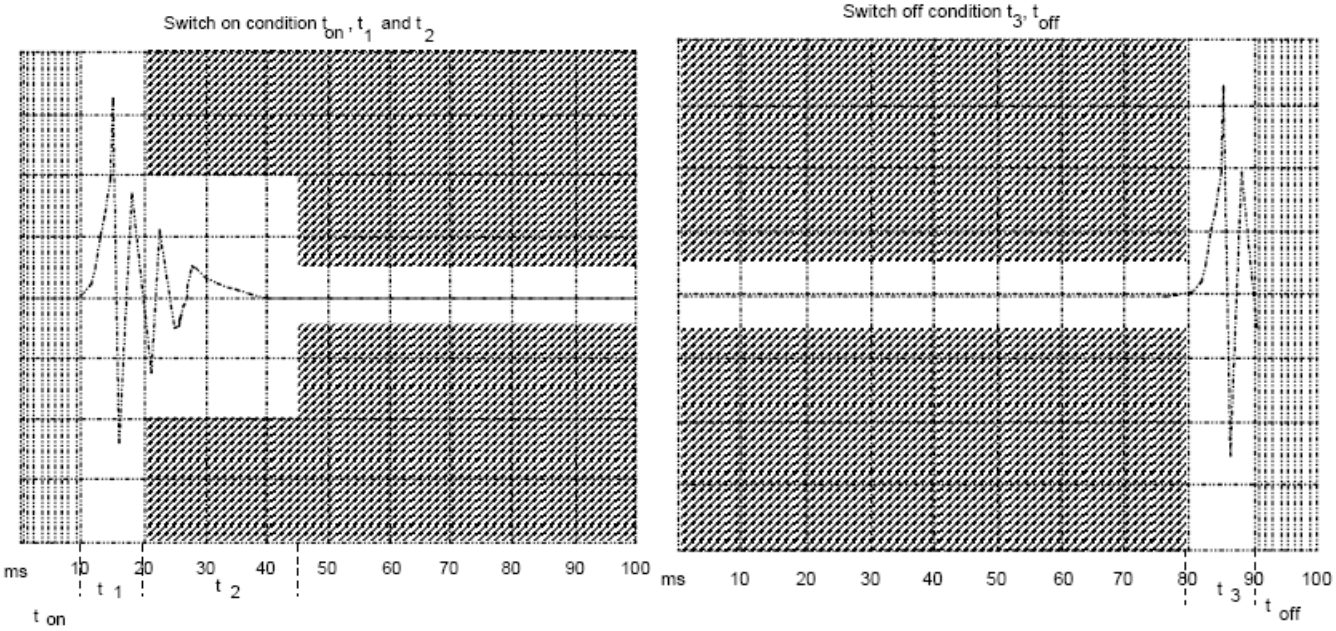
ton: The switch-on instant ton of a transmitter is defined by the condition when the output power, measured at the antenna terminal, exceeds 0,1 % of the full output power (-30 dBc).

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

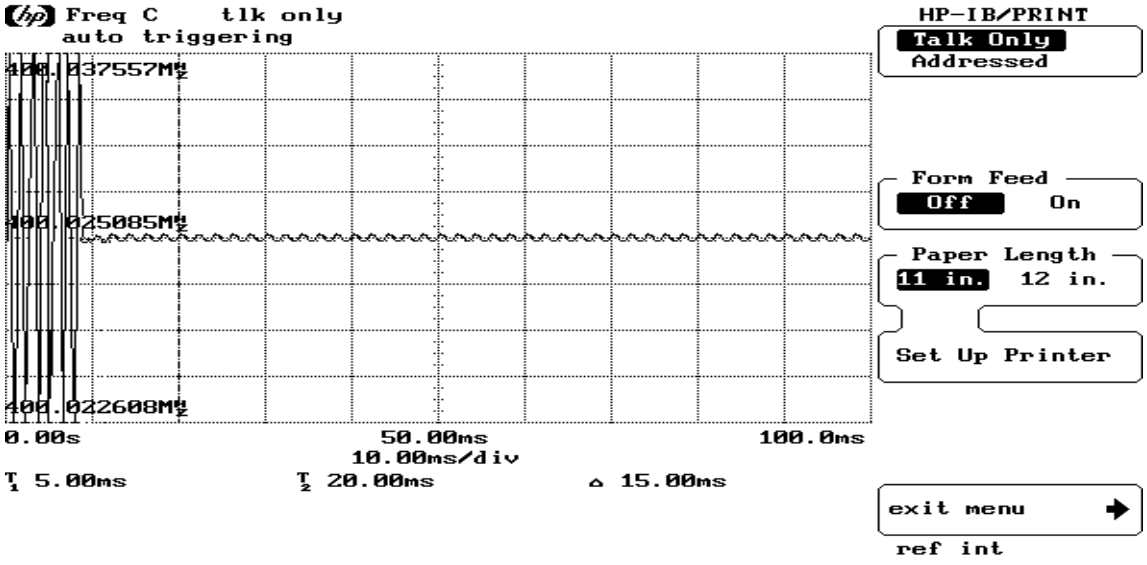
toff: switch-off instant defined by the condition when the output power falls below 0,1 % of the full output power (-30 dBc).

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

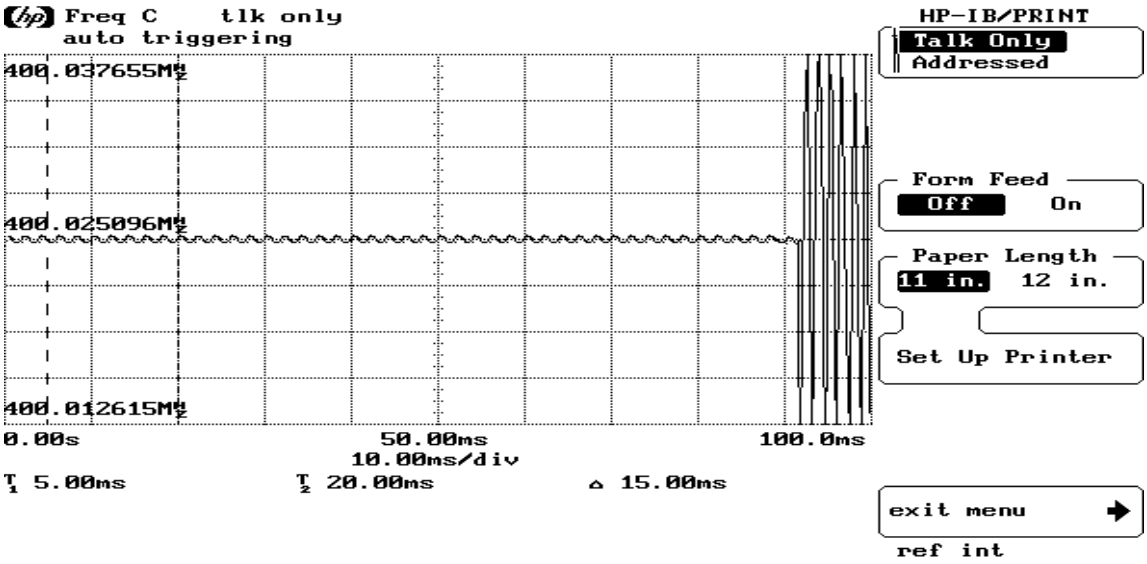


10.4 MEASURE RESULT

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 LIMITS

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

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

11.2. METHOD OF MEASUREMENTS

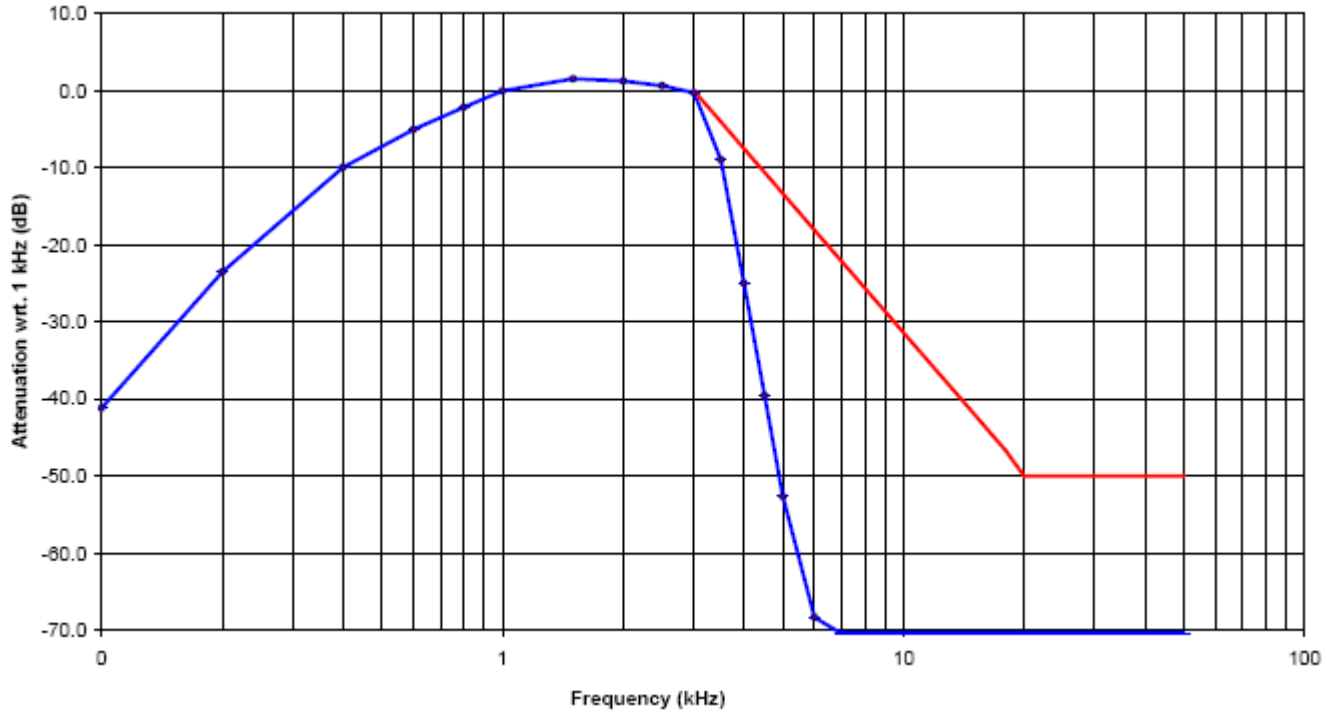
The rated audio input signal was applied to the input of the audio low-pass filter (or of all modulation stages) using an audio oscillator, this input signal level and its corresponding output signal were then measured and recorded using the FFT Digital Spectrum Analyzer. Tests were repeated at different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

11.3 TEST DATA

12.5 KHZ CHANNEL SPACING, F3E, FREQUENCY OF ALL MODULATION STATES (TEST RESULT FOR UHF)-5W

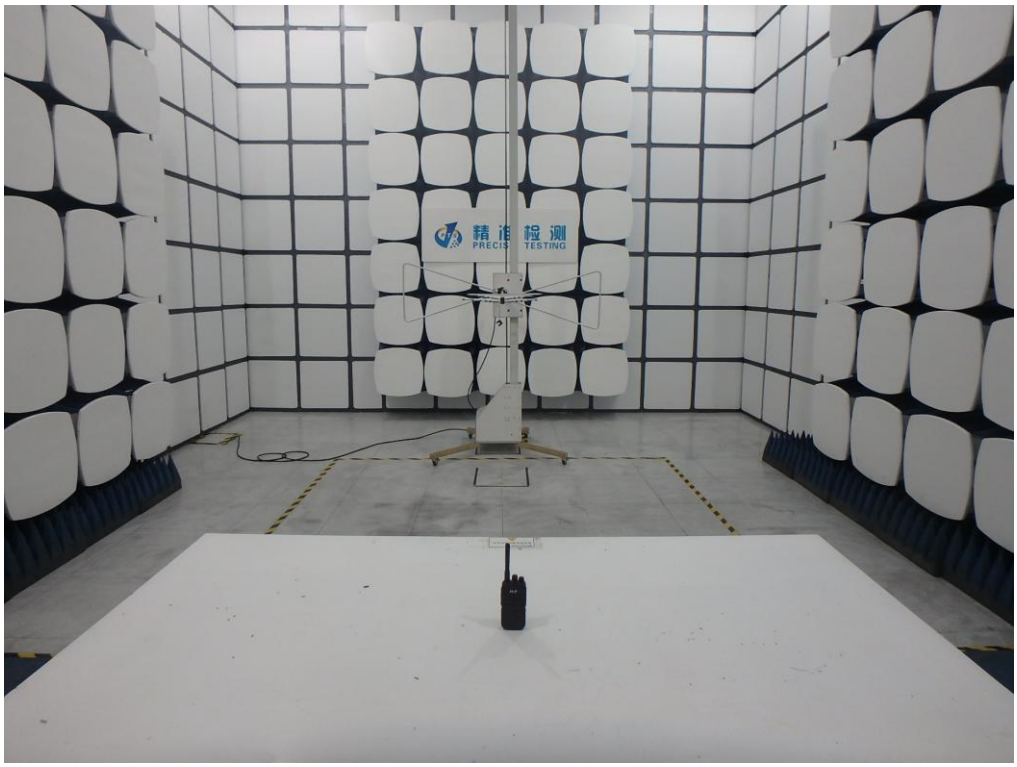
Frequency	Audio In	Audio out	Attenuation	Attenuation	Recommended Attenuation
(KHz)	(dBV)	(dBV)	(Out_In)	Rel.to 3 KHz	(dB)
			dB	（dB)	
0.1	-76.18	-31.28	46.3	-36.56	
0.2	-76.18	-17.39	58.23	-25.68	
0.4	-76.18	-6.27	71.62	-12.82	
0.6	-76.18	0.43	74.24	-6.41	
0.8	-76.18	4.15	78.97	-2.91	
1.0	-76.18	7.16	83.66	-0.02	
1.5	-76.18	8.29	84.84	2.14	
2.0	-76.18	8.95	85.32	1.59	
2.5	-76.18	7.53	83.86	0.68	
3.0	-76.18	6.24	82.57	-1.86	0
3.5	-76.18	2.66	78.43	-4.91	-5
4.0	-76.18	-2.36	74.64	-9.47	-6
4.5	-76.18	-9.25	68.22	-16.55	-11
5.0	-76.18	-15.18	60.63	-21.76	-13
6.0	-76.18	-21.26	54.16	-28.65	-17
7.0	-76.18	-31.65	46.26	-36.47	-22
8.0	-76.18	-39.28	37.94	-47.66	-25
9.0	-76.18	-61.94	15.14	-66.41	-28
10.0	-76.18	-61.94	15.14	-66.41	-31
12.0	-76.18	-61.94	15.14	-66.41	-37
14.0	-76.18	-61.94	15.14	-66.41	-46
16.0	-76.18	-61.94	15.14	-66.41	-43
18.0	-76.18	-61.94	15.14	-66.41	-48
20.0	-76.18	-61.94	15.14	-66.41	-48
25.0	-76.18	-61.94	15.14	-66.41	-48
30.0	-76.18	-61.94	15.14	-66.41	-48
35.0	-76.18	-61.94	15.14	-66.41	-48
40.0	-76.18	-61.94	15.14	-66.41	-48
45.0	-76.18	-61.94	15.14	-66.41	-48
50.0	-76.18	-61.94	15.14	-66.41	-48

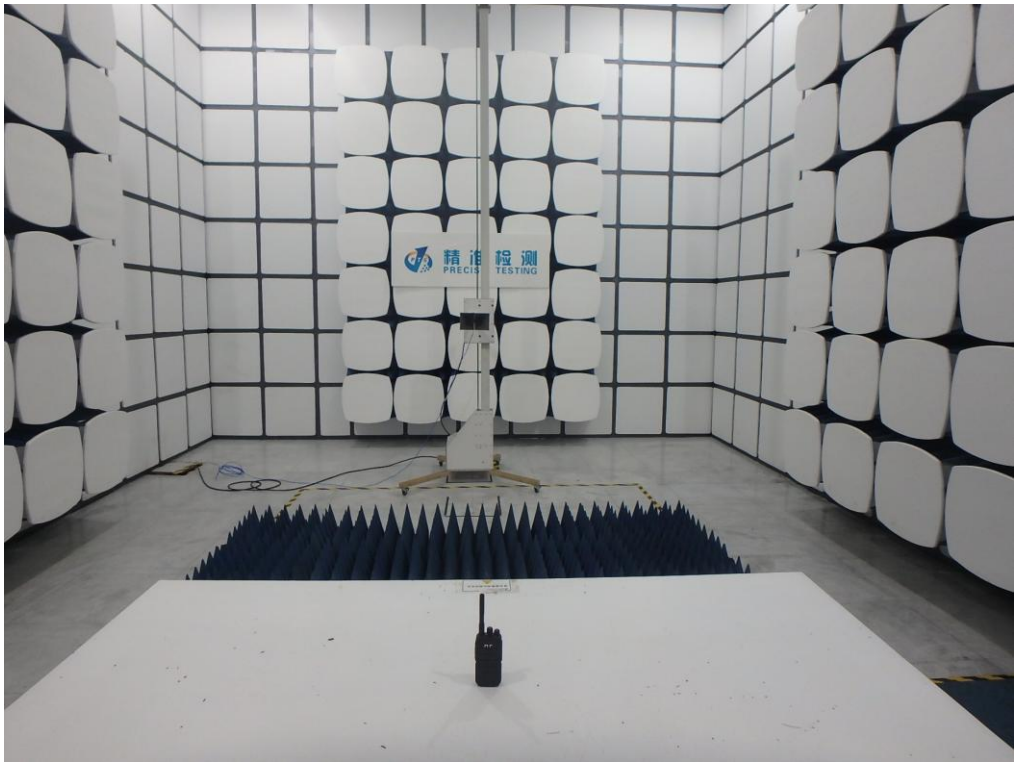
***Note**: Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 KHz in comparison with the recommended audio filter attenuation.*



APPENDIX I: PHOTOGRAPHS OF SETUP

RADIATED EMISSION TEST SETUP





APPENDIX II: EXTERNAL VIEW OF EUT

TOTAL VIEW OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

FRONT VIEW OF EUT

BACK VIEW OF EUT

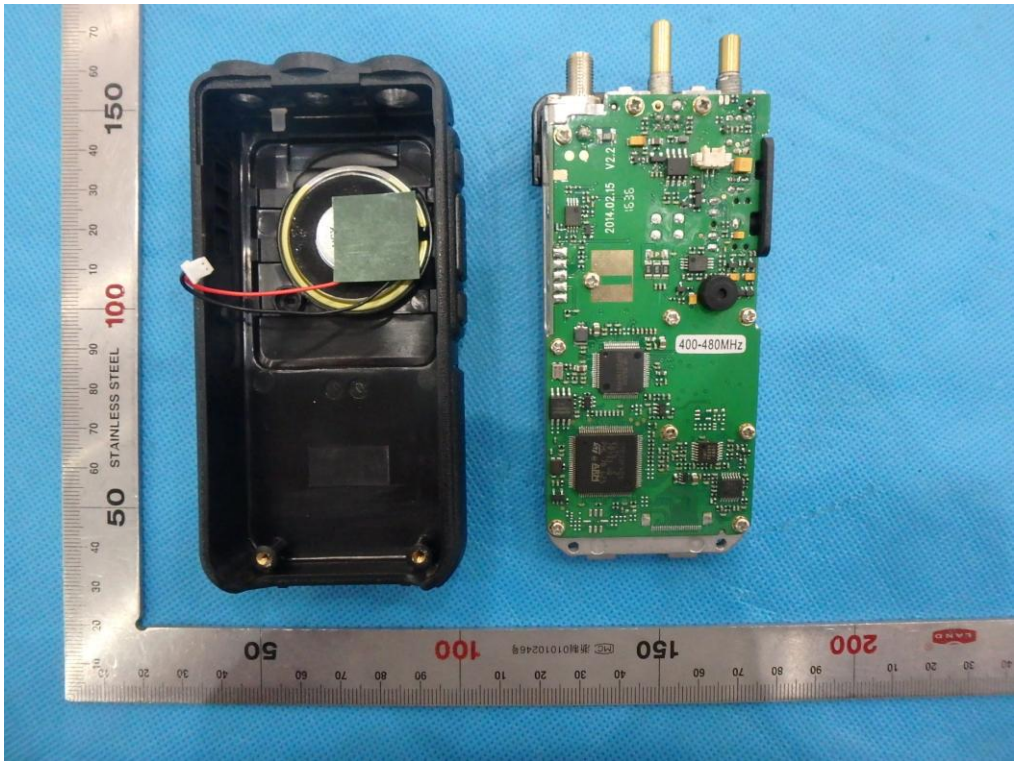
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

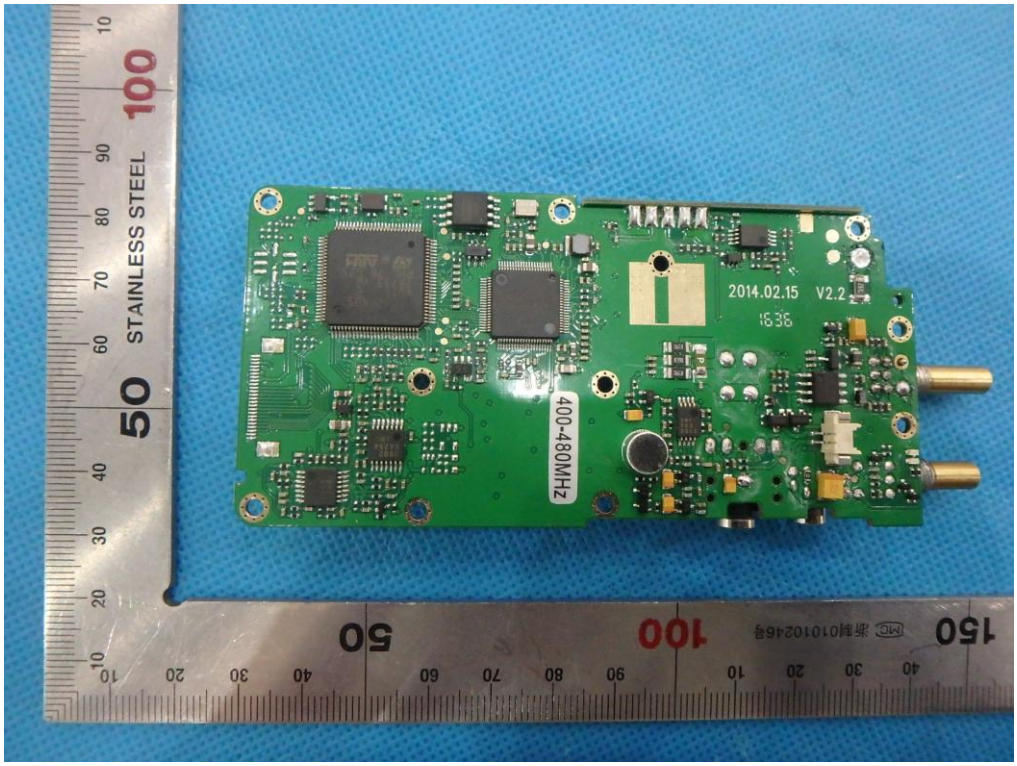
THE LABLE OF POWER ADAPTER MARKETED

OPEN VIEW-1 OF EUT

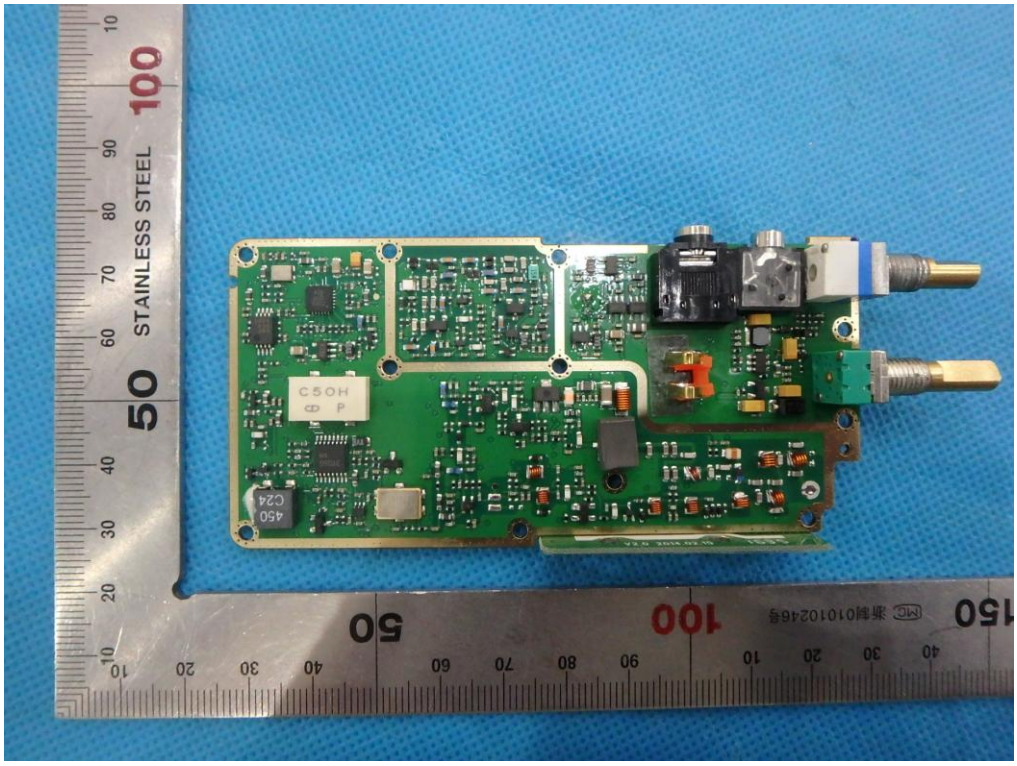
OPEN VIEW-2 OF EUT



INTERNAL VIEW-1 OF EUT



INTERNAL VIEW-2 OF EUT



----END OF REPORT----