FCC Part 90
Test Report

For

Handheld two way radio

Model Name: TH-UVF1, TH-UVF2, TH-UVF3, TH-F5, TH-F8

Brand Name: TYT

FCC ID: X24-THUV

Report No.: AGC10600911QZ27E6

Date of Issue: Dec.17, 2009

Prepared For

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VERIFICATION OF COMPLIANCE

Applicant:	Quanzhou TYT Electronics Co., Ltd.
	Bldg.22, Daxiamei Industrial Area, Nan'an, Quanzhou, Fujian 362300, China
Manufacturer:	Quanzhou TYT Electronics Co., Ltd.
	Bldg.22, Daxiamei Industrial Area, Nan'an, Quanzhou, Fujian 362300, China
Product Description:	Handheld two way radio
Brand Name:	TYT
Model Number:	TH-UVF1, TH-UVF2, TH-UVF3, TH-F5, TH-F8
Model Difference:	Model names is different, the other are same.
File Number:	AGC10600911QZ27E6
Date of Test:	Dec.07 to Dec.17, 2009

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C 63.4:2009 and TIA/EIA 603. The sample tested as described in this report is in compliance with the FCC Rules Part 90

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

Checked By: Jekey Zhang

Jekey Zhang Dec.17, 2009

Authorized By King Zhang

King Zhang Dec.17, 2009

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

The EUT is a single channel Two-way Radio designed for voice communication. It is designed by way of utilizing the FM modulation achieves the system operating.

A major technical description of EUT is described as following:

<table>
<tr><td>Communication Type</td><td colspan="4">Voice / Tone only</td></tr>
<tr><td>Modulation</td><td colspan="4">FM</td></tr>
<tr><td>Emission Type</td><td colspan="4">16K0F3E/11K0F3E</td></tr>
<tr><td rowspan="2">Emission Bandwidth</td><td colspan="4">VHF: 10.34MHz/ 15.18MHz (Limite:11.25KHz/20KHz)</td></tr>
<tr><td colspan="4">UHF: 10.21MHz/15.76MHz (Limite:11.25KHz/20KHz)</td></tr>
<tr><td rowspan="2">Peak Frequency Deviation</td><td colspan="4">1.73 KHz for 12.5 KHz Channel Separation (Limit<±2.5 KHz)</td></tr>
<tr><td colspan="4">3.63 KHz for 25 KHz Channel Separation (Limit<±5 KHz)</td></tr>
<tr><td>Audio Frequency Response</td><td colspan="4">2.17 KHz (Limit<3.125 KHz)</td></tr>
<tr><td rowspan="2">Maximum Transmitter Power</td><td colspan="4">36.51 dBm for 12.5 KHz Channel Separation</td></tr>
<tr><td colspan="4">36.53 dBm for 25.0KHz Channel Separation</td></tr>
<tr><td>Output power Modification</td><td colspan="4">5W/1W
(It was fixed by the manufacturer, any individual can’t arbitrarily change it)</td></tr>
<tr><td>Antenna Designation</td><td colspan="4">Detachable</td></tr>
<tr><td>Power Supply</td><td colspan="4">DC 7.4V by battery</td></tr>
<tr><td>Battery Endpoint</td><td colspan="4">DC 7.4V</td></tr>
<tr><td rowspan="4">Operation Frequency Range and Channel</td><td colspan="4">Frequency Range:
VHF(136MHz to 174MHz), Channel Separation: 12.5KHz and 25KHz
UHF(400MHz to 470MHz), Channel Separation: 12.5KHz and 25KHz</td></tr>
<tr><td rowspan="3">VHF</td><td>Top Channel: 173.975MHz</td><td rowspan="3">UHF</td><td>Top Channel: 469.975MHz</td></tr>
<tr><td>Centre Channel:155.025MHz</td><td>Centre Channel:435.025MHz</td></tr>
<tr><td>Bottom Channel:136.025MHz</td><td>Bottom Channel:400.025MHz</td></tr>
<tr><td>Frequency Tolerance</td><td colspan="4">VHF:
1.70 ppm for 12.5 KHz Channel Separation
2.46 ppm for 25.0 KHz Channel Separation
UHF:
0.59 ppm for 12.5 KHz Channel Separation
0.80 ppm for 25.0 KHz Channel Separation</td></tr>
</table>

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: X24-THUV, filing to comply with the FCC Part 90.

1.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI C 63.4: 2009; 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

The test site used to collect the radiated data is located on the address of World Standardization Certification & Testing Co., Ltd. 1-2/F, Dachong Keji Building, No.28 of Tonggu Road, Nanshan District, Shenzhen, China. The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003.

FCC register No.: 276008 and IC register No.: 7700A-1.

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

(1). Section 15.207: Conducted Limits
(2). Section 90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area
(3). Section 90.207: Modulation Characteristic
(4). Section 90.209: Occupied Bandwidth
(5). Section 90.210: Emission Mask
(6). Section 90.213: Frequency Tolerance
(7). 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	Two-way Radio	TH-UVF1	FCC ID: X24-THUV	EUT
--	--	--	--	--
--	--	--	--	--

3. SUMMARY OF TEST RESULTS

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

4. DESCRIPTION OF TEST MODES

The EUT (Handheld two way radio) has been tested under normal operating condition. UHF (The top channel, the middle channel and the bottom channel) and VHF (The top channel, the middle channel and the bottom channel) are chosen for testing at each channel separation (12.5 KHz/ 25 KHz).

5. CONDUCTED LIMITS

5.1 PROVISIONS APPLICABLE

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the, the radio frequency voltage that is conducted back onto the AC power line on any frequencies within the band 150 KHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50uH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

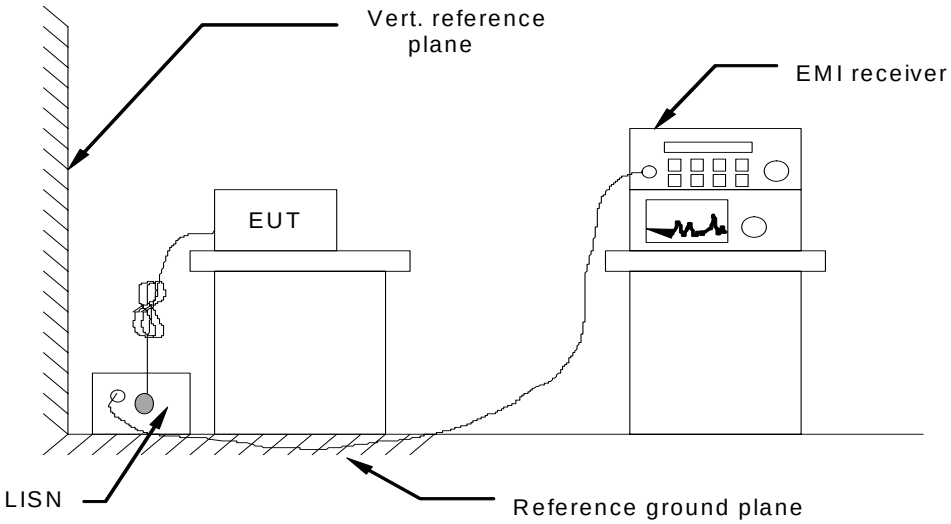
Frequency of Emission (MHz)	Conducted Limit(dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency.

5.2 MEASUREMENT PROCEDURE

(1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
(2) Support equipment, if needed, was placed as per ANSI C63.4.
(3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
(4) The EUT received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
(5) All support equipments received AC power from a second LISN, if any.
(6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
(7) Analyzer / Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
During the above scans, the emissions were maximized by cable manipulation.

5.3 TEST SETUP BLOCK DIAGRAM

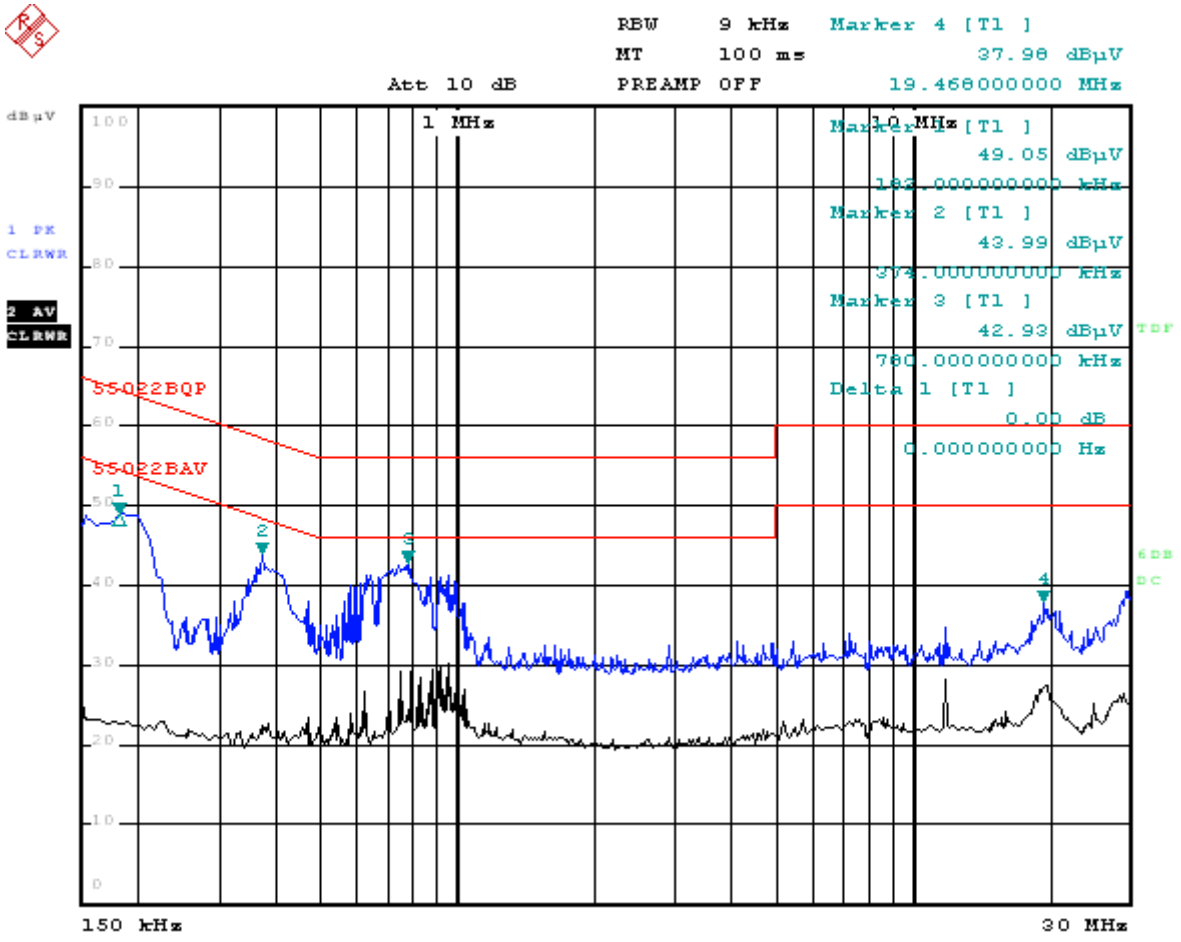


5.4 TEST EQUIPMENT USED

Conducted Emission Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Cal. Date**
TEST RECEIVER	R&S	FCKL1528	A0304230	2009.06
LISN	SCHWARZBECK	NSLK8127	A0304233	2009.06

5.5 TEST RESULT

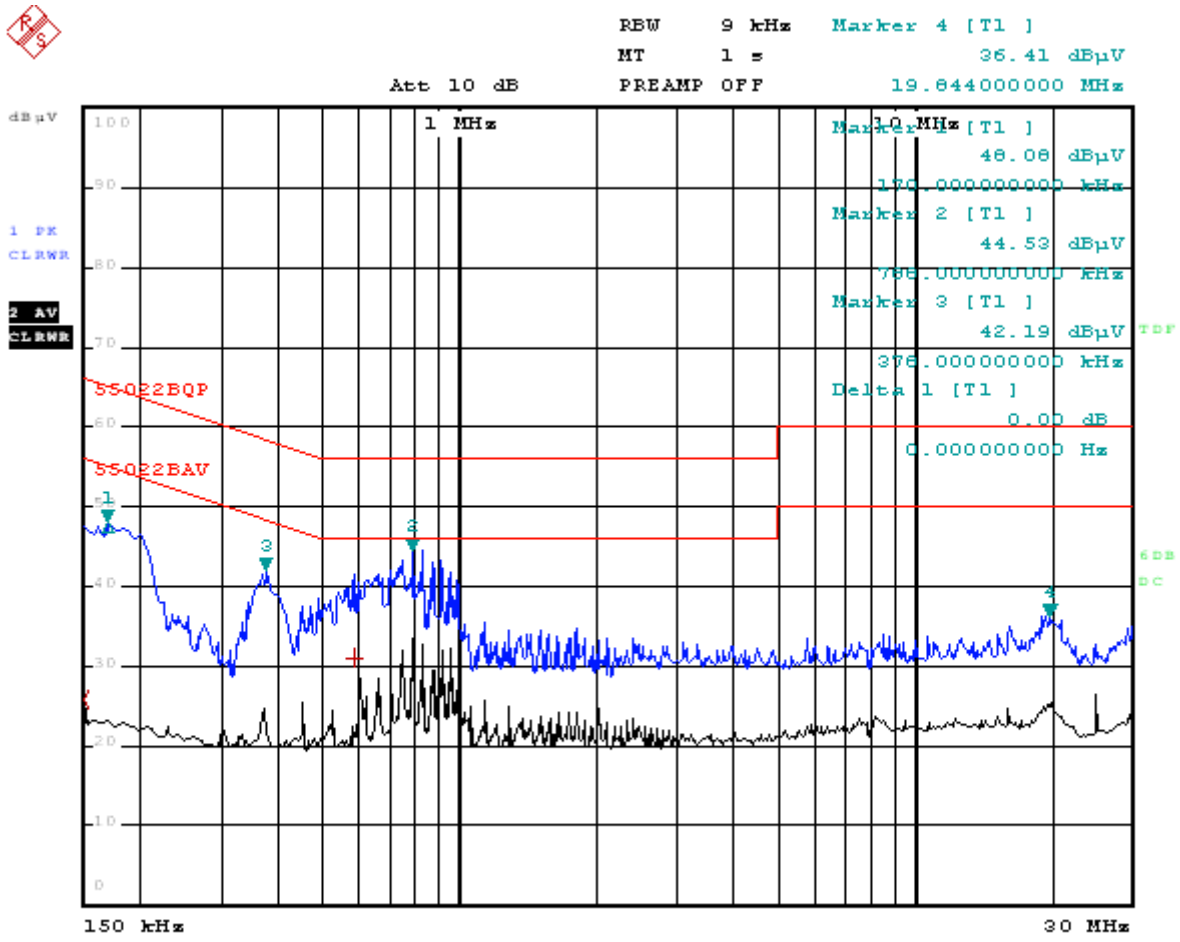
LINE CONDUCTED EMISSION TEST-L



TH-UVF1-L

Date: 09.Dec.2009 11:42:47

LINE CONDUCTED EMISSION TEST-N



TH-UVF1-N

Date: 09.Dec.2009 11:44:47

6. FREQUENCY TOLERANCE

6.1 PROVISIONS APPLICABLE

a). According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from –30℃ to +60℃ 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 12.5KHz channel separation and 0.0005% for 25KHz channel separation.

6.2 MEASUREMENT PROCEDURE

6.2.1 Frequency stability versus environmental temperature

1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.
2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz.Record this frequency as reference frequency.
3. Set the temperature of chamber to 60℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

6.2.2 Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used. The EUT shall be powered by DC 7.4 V
2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1KHz. Record this frequency as reference frequency.
3. Supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

6.3 TEST SETUP BLOCK DIAGRAM

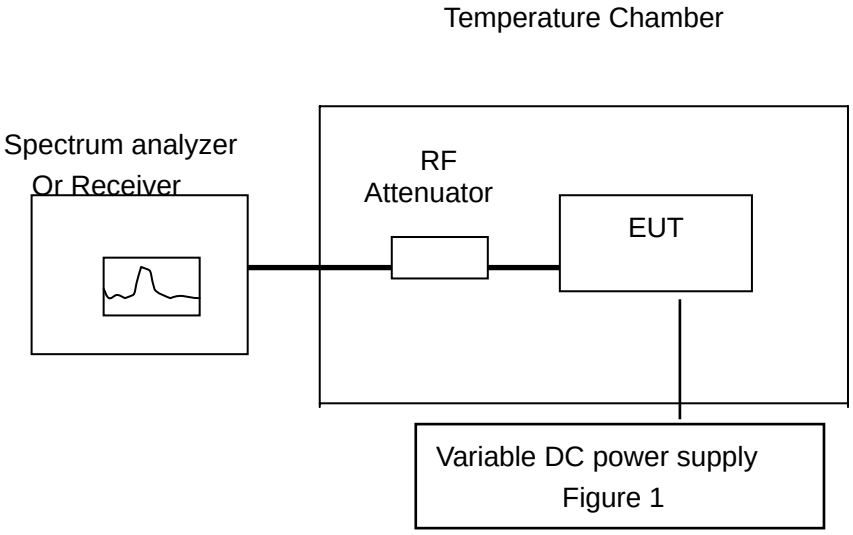


Figure 1

6.4 TEST EQUIPMENT USED:

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
Receiver	R&S	ESIB26	A0304218	2009.06
Climate Chamber	Albatross	--	--	2009.12

6.5 TEST RESULT

(1) Frequency stability versus input voltage (battery operation end point voltage is 7.4V)

VHF (136MHz-174MHz):

Measurement Result for Channel Separation of 12.5 KHz

Channel	Reference Frequency (MHz)	Frequency Measured at end point voltage	Frequency Deviation ppm	Limit ppm
Top	173.975	173.974919	-0.47	2.5
Middle	155.025	155.024958	-0.27	2.5
Bottom	136.025	136.024989	-0.08	2.5

Measurement Result for Channel Separation of 25KHz

Channel	Reference Frequency (MHz)	Frequency Measured at end point voltage	Frequency Deviation ppm	Limit ppm
Top	173.975	173.974924	-0.44	2.5
Middle	155.025	155.024956	-0.27	2.5
Bottom	136.025	136.024990	-0.08	2.5

UHF (400MHz-470MHz):

Measurement Result for Channel Separation of 12.5 KHz

Channel	Reference Frequency (MHz)	Frequency Measured at end point voltage	Frequency Deviation ppm	Limit ppm
Top	469.975	469.974919	-0.17	2.5
Middle	435.025	435.024958	-0.10	2.5
Bottom	400.025	400.024989	-0.03	2.5

Measurement Result for Channel Separation of 25KHz

Channel	Reference Frequency (MHz)	Frequency Measured at end point voltage	Frequency Deviation ppm	Limit ppm
Top	469.975	469.974910	-0.19	5.0
Middle	435.025	435.024889	0.03	5.0
Bottom	400.025	400.024901	0.02	5.0

(2)Frequency stability versus ambient temperature

VHF (136MHz-174MHZ):

Bottom Channel @ 12.5 KHz Channel Separation

Reference Frequency: 136.025 MHz			Limit: 2.5 ppm
Environment Temperature (°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	136.024976	-0.18
40	7.4	136.024978	-0.16
30	7.4	136.024987	-0.10
20	7.4	136.024989	-0.08
10	7.4	136.024997	-0.02
0	7.4	136.024999	-0.01
-10	7.4	136.025124	0.91
-20	7.4	136.025214	1.57
-30	7.4	136.025231	1.70

Middle Channel @ 12.5 KHz Channel Separation

Reference Frequency: 155.025MHz			Limit: 2.5 ppm
Environment Temperature (°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	155.024773	-1.46
40	7.4	155.024867	-0.86
30	7.4	155.024890	-0.71
20	7.4	155.024958	-0.27
10	7.4	155.024978	-0.14
0	7.4	155.024994	-0.04
-10	7.4	155.025021	0.14
-20	7.4	155.025187	1.21
-30	7.4	155.025201	1.30

Top Channel @ 12.5KHz Channel Separation

Reference Frequency: 173.975 MHz			Limit: 2.5 ppm
Environment Temperature(°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	173.974772	-1.31
40	7.4	173.974798	-1.16
30	7.4	173.974895	-0.60
20	7.4	173.974919	-0.47
10	7.4	173.974921	-0.45
0	7.4	173.974987	-0.07
-10	7.4	173.975055	0.32
-20	7.4	173.975198	1.14
-30	7.4	173.975278	1.60

Bottom Channel @ 25.0 KHz Channel Separation

Reference Frequency: 136.025MHz		Limit: 5.0 ppm	
Environment Temperature (°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	136.024965	-0.26
40	7.4	136.024960	-0.29
30	7.4	136.024977	-0.17
20	7.4	136.024989	-0.08
10	7.4	136.024997	-0.02
0	7.4	136.024999	-0.01
-10	7.4	136.025221	1.62
-20	7.4	136.025314	2.31
-30	7.4	136.025335	2.46

Middle Channel @ 25.0 KHz Channel Separation

Reference Frequency: 155.025 MHz		Limit: 5.0 ppm	
Environment Temperature (°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	155.024674	-2.10
40	7.4	155.024768	-1.50
30	7.4	155.024790	-1.35
20	7.4	155.024958	-0.27
10	7.4	155.024978	-0.14
0	7.4	155.024994	-0.04
-10	7.4	155.025125	0.81
-20	7.4	155.025287	1.85
-30	7.4	155.025301	1.94

Top Channel @ 25.0 KHz Channel Separation

Reference Frequency: 173.975 MHz		Limit: 5.0 ppm	
Environment Temperature(°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	173.974673	-1.88
40	7.4	173.974699	-1.73
30	7.4	173.974895	-0.60
20	7.4	173.974910	-0.52
10	7.4	173.974924	-0.44
0	7.4	173.974987	-0.07
-10	7.4	173.975155	0.89
-20	7.4	173.975298	1.71
-30	7.4	173.975375	2.16

UHF (400MHz-470MHZ):

Bottom Channel @ 12.5 KHz Channel Separation

Reference Frequency: 400.025 MHz		Limit: 2.5 ppm	
Environment Temperature (°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	400.024976	-0.06
40	7.4	400.024978	-0.05
30	7.4	400.024987	-0.03
20	7.4	400.024989	-0.03
10	7.4	400.024997	-0.01
0	7.4	400.024999	0.00
-10	7.4	400.025124	0.31
-20	7.4	400.025214	0.53
-30	7.4	400.025231	0.58

Middle Channel @ 12.5 KHz Channel Separation

Reference Frequency: 435.025MHz		Limit: 2.5 ppm	
Environment Temperature (°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	435.024773	-0.52
40	7.4	435.024867	-0.31
30	7.4	435.024890	-0.25
20	7.4	435.024958	-0.10
10	7.4	435.024978	-0.05
0	7.4	435.024994	-0.01
-10	7.4	435.025021	0.05
-20	7.4	435.025187	0.43
-30	7.4	435.025201	0.46

Top Channel @ 12.5KHz Channel Separation

Reference Frequency: 469.975 MHz		Limit: 2.5 ppm	
Environment Temperature(°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	469.974772	-0.49
40	7.4	469.974798	-0.43
30	7.4	469.974895	-0.22
20	7.4	469.974919	-0.17
10	7.4	469.974921	-0.17
0	7.4	469.974987	-0.03
-10	7.4	469.975055	0.12
-20	7.4	469.975198	0.42
-30	7.4	469.975278	0.59

Bottom Channel @ 25.0 KHz Channel Separation

Reference Frequency: 400.025MHz		Limit: 5.0 ppm	
Environment Temperature (°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	400.024962	-0.09
40	7.4	400.024963	-0.09
30	7.4	400.024972	-0.07
20	7.4	400.024980	-0.05
10	7.4	400.024995	-0.01
0	7.4	400.024999	0.00
-10	7.4	400.025222	0.55
-20	7.4	400.025317	0.79
-30	7.4	400.025339	0.85

Middle Channel @ 25.0 KHz Channel Separation

Reference Frequency: 435.025 MHz		Limit: 5.0 ppm	
Environment Temperature (°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	435.024673	-0.75
40	7.4	435.024762	-0.55
30	7.4	435.024790	-0.48
20	7.4	435.024959	-0.09
10	7.4	435.024978	-0.05
0	7.4	435.024995	-0.01
-10	7.4	435.025124	0.29
-20	7.4	435.025289	0.66
-30	7.4	435.025309	0.71

Top Channel @ 25.0 KHz Channel Separation

Reference Frequency: 469.975 MHz		Limit: 5.0 ppm	
Environment Temperature(°C)	Power Supply (V)	Frequency deviation	
		(MHz)	ppm
50	7.4	469.974673	-0.70
40	7.4	469.974699	-0.64
30	7.4	469.974895	-0.22
20	7.4	469.974910	-0.19
10	7.4	469.974924	-0.16
0	7.4	469.974987	-0.03
-10	7.4	469.975155	0.33
-20	7.4	469.975298	0.63
-30	7.4	469.975375	0.80

7. EMISSION BANDWIDTH

7.1 PROVISIONS APPLICABLE

According to FCC Part 90 Section 90.209: The authorized bandwidth shall be 11.25 KHz for 12.5 KHz and 20 KHz for 25 KHz

7.2 MEASUREMENT PROCEDURE

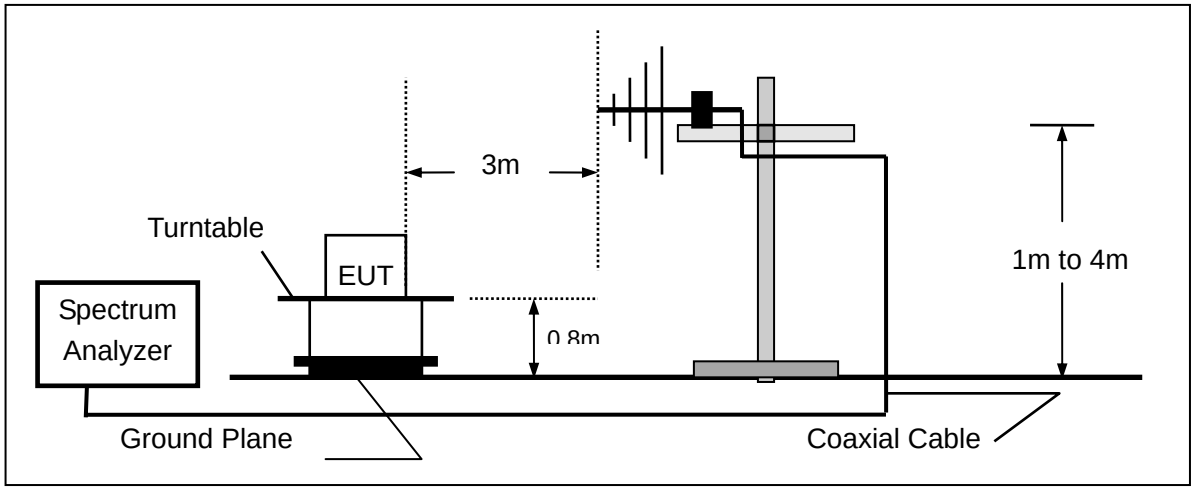
1). The EUT was placed on a turn table which is 0.8m above ground plane.

2). The EUT was modulated by 2.5 KHz Sine wave audio signal, The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing) and 5 kHz (25 kHz channel spacing).

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

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

7.3 TEST SETUP BLOCK DIAGRAM



7.4 MEASUREMENT EQUIPMENT USED:

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
SPECTRUM ANALYZER	AGILENT	E4440A	US44300399	2009.06
MODULATION ANALYZER	HP	8901B	3104A03367	2009.06
BROADBAND ANT.	R&S	HL562	A0304224	2009.06

7.5 MEASUREMENT RESULT:

VHF (136MHz-174MHz):

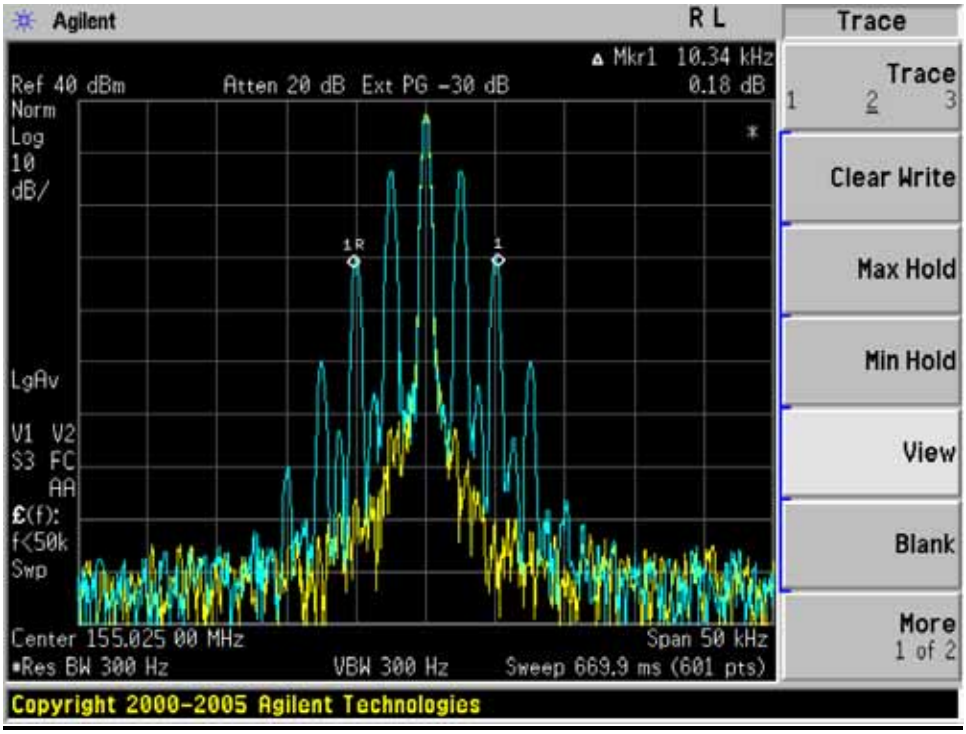
26 dB Bandwidth Measurement Result						
Operating Frequency	12.5 KHz Channel Separation			25 KHz Channel Separation		
	Test Data	Limits	Result	Test Data	Limits	Result
136.025MHz	10.17 KHz	11.25 KHz	Pass	15.18KHz	20.00 KHz	Pass
155.025MHz	10.34KHz	11.25 KHz	Pass	15.09 KHz	20.00 KHz	Pass
173.975MHz	10.28 KHz	11.25 KHz	Pass	15.08 KHz	20.00 KHz	Pass

UHF (400MHZ-470MHz)

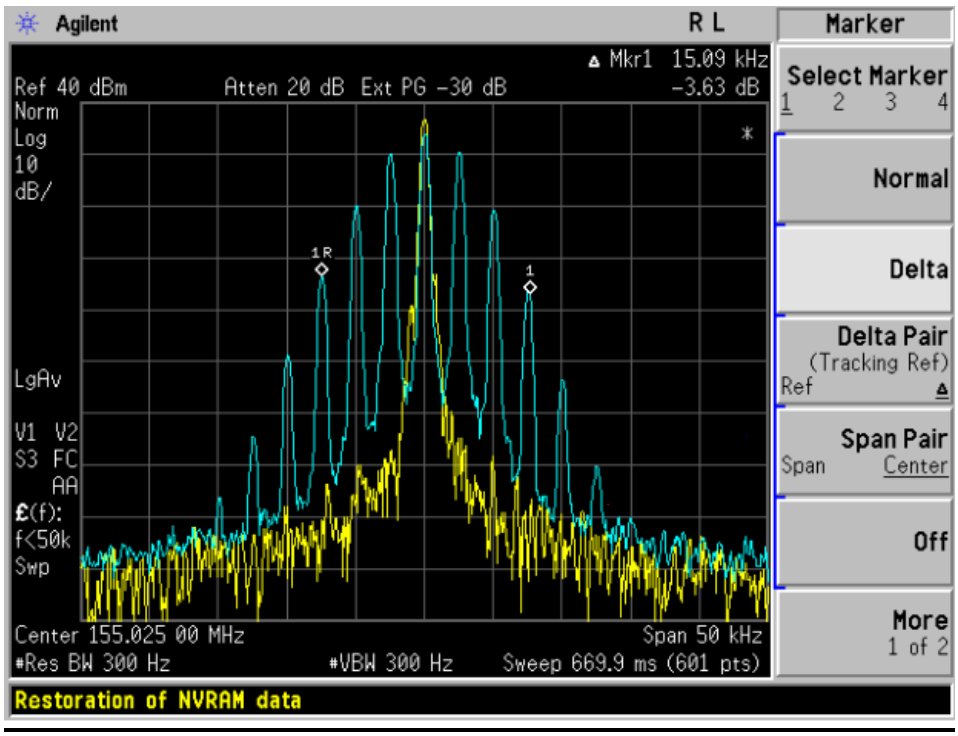
26 dB Bandwidth Measurement Result						
Operating Frequency	12.5 KHz Channel Separation			25 KHz Channel Separation		
	Test Data	Limits	Result	Test Data	Limits	Result
400.025MHz	10.21 KHz	11.25 KHz	Pass	15.36KHz	20.00 KHz	Pass
435.025MHz	10.09KHz	11.25 KHz	Pass	15.76 KHz	20.00 KHz	Pass
469.975MHz	10.16 KHz	11.25 KHz	Pass	15.57 KHz	20.00 KHz	Pass

VHF (136MHz-174MHz):

Occupied bandwidth of Middle Channel (Maximum) @ 12.5KHz Channel Separation

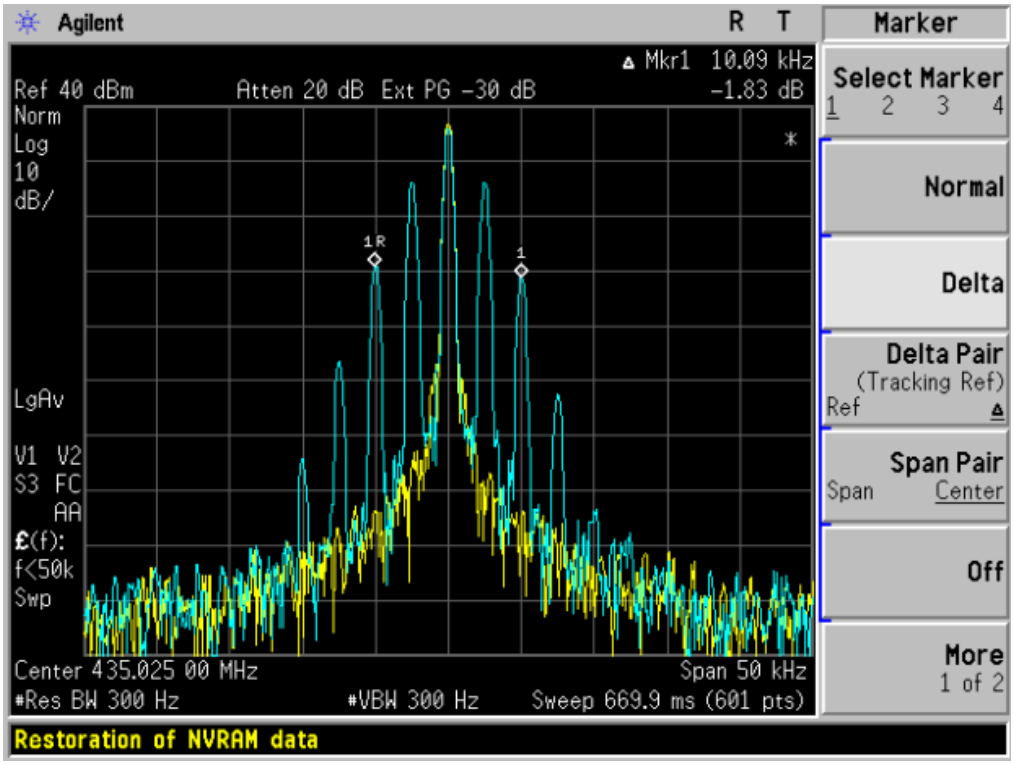


Occupied bandwidth of Middle Channel (Maximum) @ 25 KHz Channel Separation

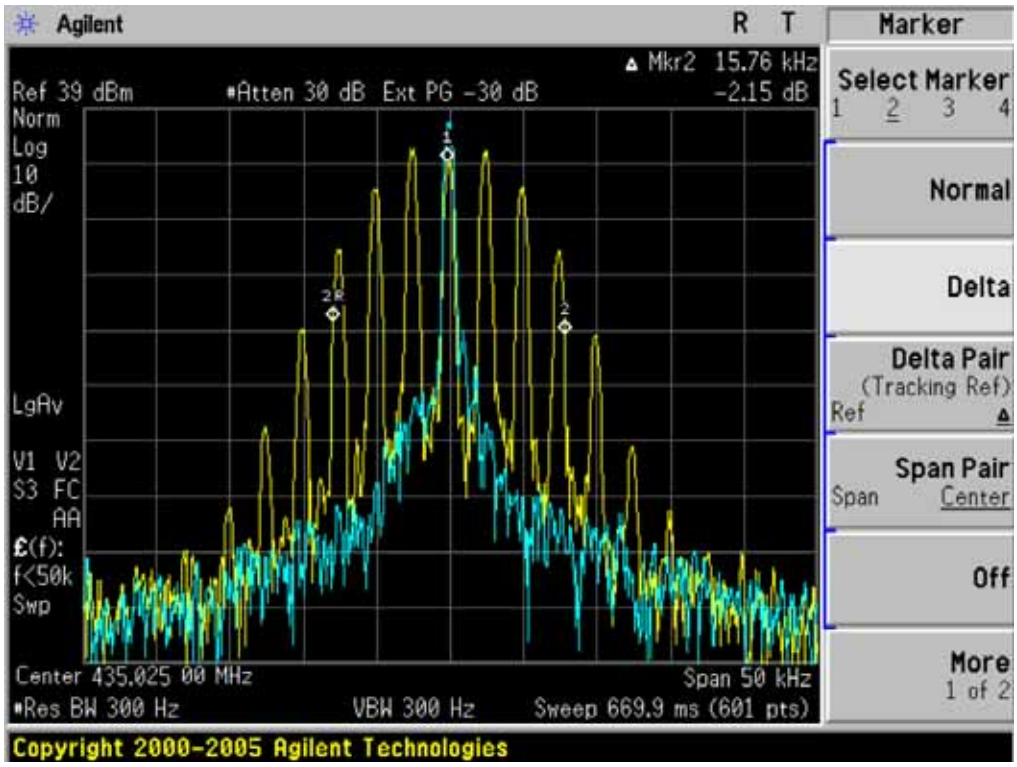


UHF (400MHz-470MHz):

Occupied bandwidth of Middle Channel (Maximum) @ 12.5KHz Channel Separation



Occupied bandwidth of Middle Channel (Maximum) @ 25KHz Channel Separation



8. UNWANTED RADIATION

8.1 PROVISIONS APPLICABLE

8.1.1 According to Section 90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

(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, which ever is lesser attenuation.

8.1.2 According to Section 90.210, Emission mask B. For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

(1), On any frequency removed from the assigned frequency by more than 50 percent, but no more than 100 percent of the authorized bandwidth: At least 25 dB.

(2), On any frequency removed from the assigned frequency by more than 100 percent, but no more than 250 percent of the authorized bandwidth: At least 35 dB.

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

8.2 MEASUREMENT PROCEDURE

(1)On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

(2)The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.

(3)The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

(4)The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

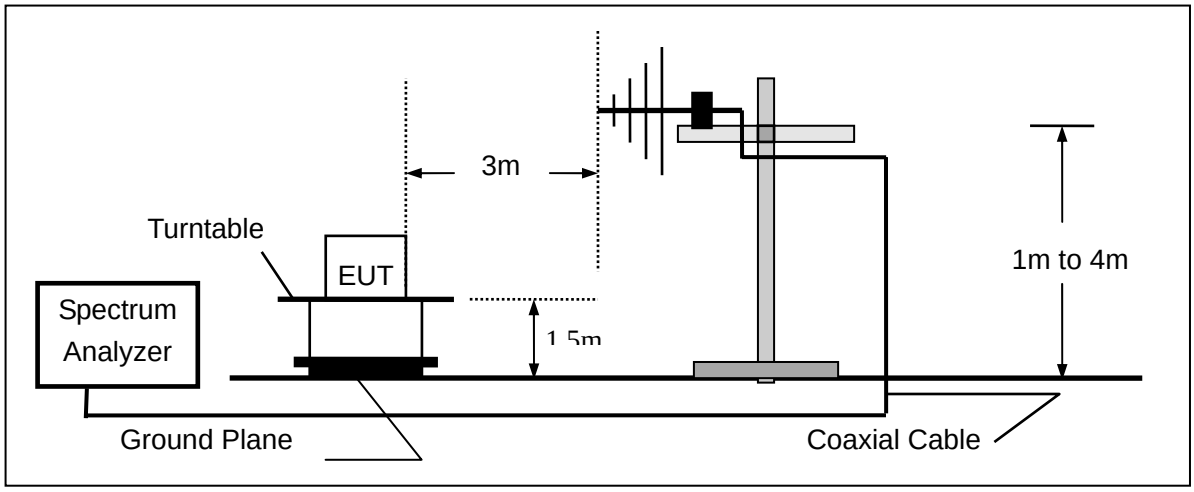
(5)The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.

(6)The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

(7)The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.

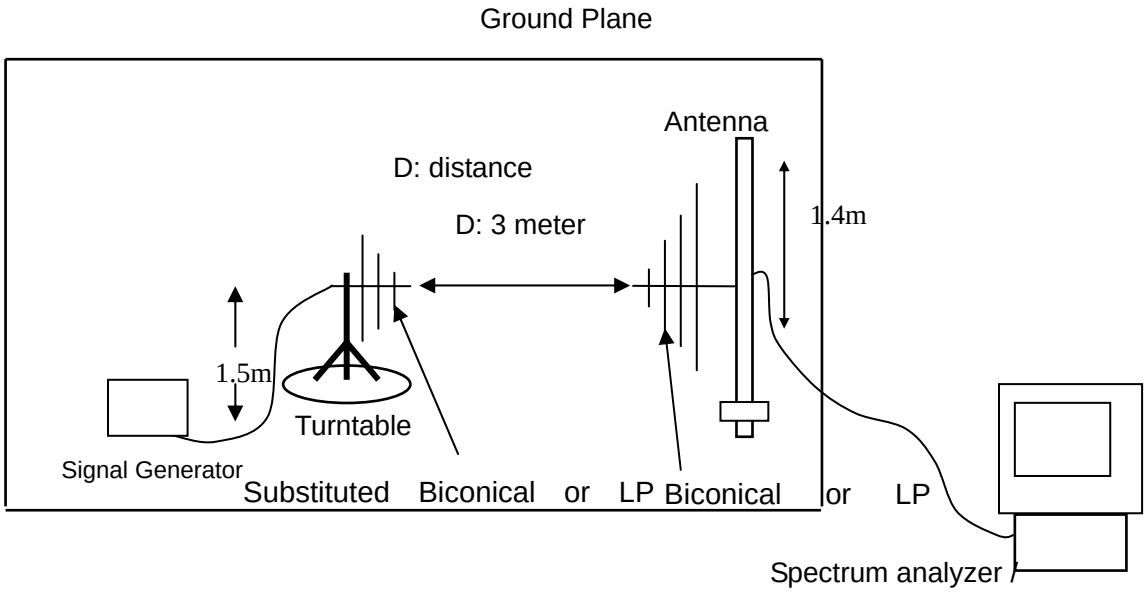
(8)The maximum signal level detected by the measuring receiver shall be noted.
(9)The measurement shall be repeated with the test antenna set to horizontal polarization.
(10) Replace the antenna with a proper Antenna (substitution antenna).
(11)The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
(12)The substitution antenna shall be connected to a calibrated signal generator.
(13)If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
(14)The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
(15)The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
(16)The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
(17)The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

8.3 TEST SETUP BLOCK DIAGRAM

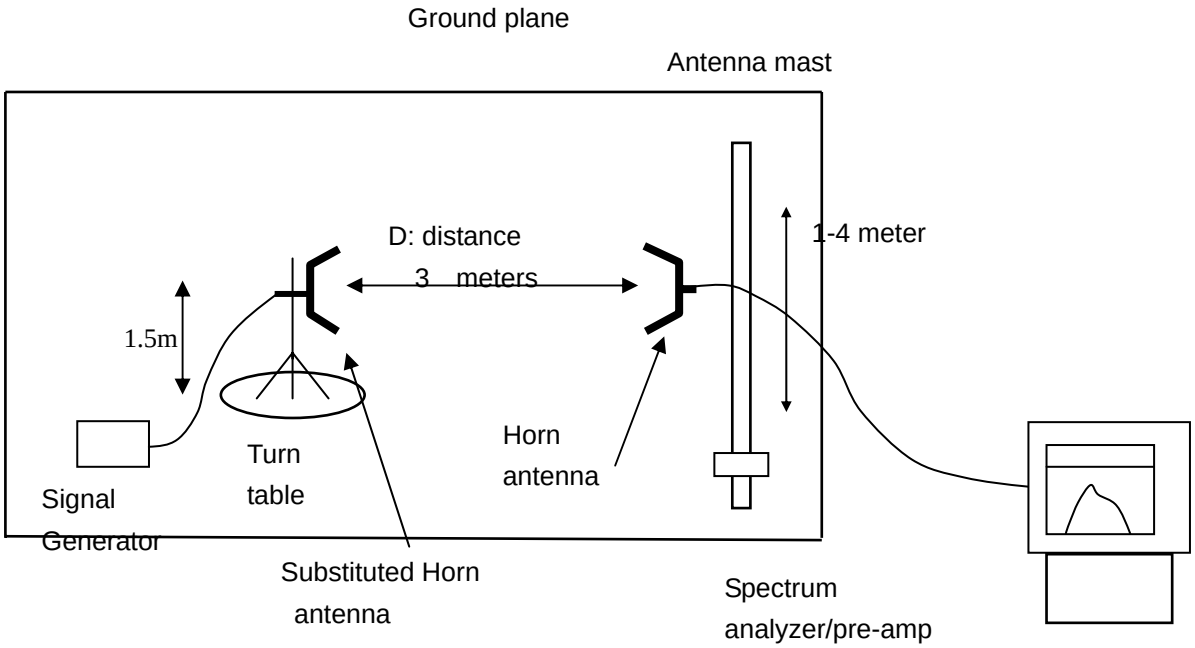


SUBSTITUTION METHOD: (Radiated Emissions)

Radiated Below 1GHz



Radiated Above 1 GHz



8.4 MEASUREMENT EQUIPMENT USED:

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
SPECTRUM ANALYZER	AGILENT	E4440A	US44300399	2009.06
TEST RECEIVER	R&S	ESIB26	A0304218	2009.06
LOOP ANTENNA	R&S	HFH2-Z2	A0304220	2009.06
HORN ANT.	R&S	HF906	100150	2009.06
BROADBAND ANT.	R&S	HL562	A0304224	2009.06

8.5 MEASUREMENT RESULTS:

Measurement Result for 12.5 KHz Channel Separation-5W

Calculation: Limit (dBm)= EL-50-10log10 (TP)

Notes:

EL is the emission level of the Output Power expressed in dBm,, in this application, the EL is 37.01 dBm.

Limit (dBm)=37.01-50-10log 10 (5) = -20

Measurement Result For 25 KHz Channel Separation-5W

Calculation: Limit (dBm)= EL-43-10log10 (TP)

Notes: EL is the emission level of the Output Power expressed in dBm,, in this application, the EL is 37.00 dBm.

Limit (dBm)=37 - 43-10log 10 (5) = -13 dBm

Measurement Result for 12.5 KHz Channel Separation-1W

Calculation: Limit (dBm)= EL-50-10log10 (TP)

Notes:

EL is the emission level of the Output Power expressed in dBm,, in this application, the EL is 30.01 dBm.

Limit (dBm)=30.01-50-10log 10 (1) = -20

Measurement Result For 25 KHz Channel Separation-1W

Calculation: Limit (dBm)= EL-43-10log10 (TP)

Notes: EL is the emission level of the Output Power expressed in dBm,, in this application, the EL is 30.00 dBm.

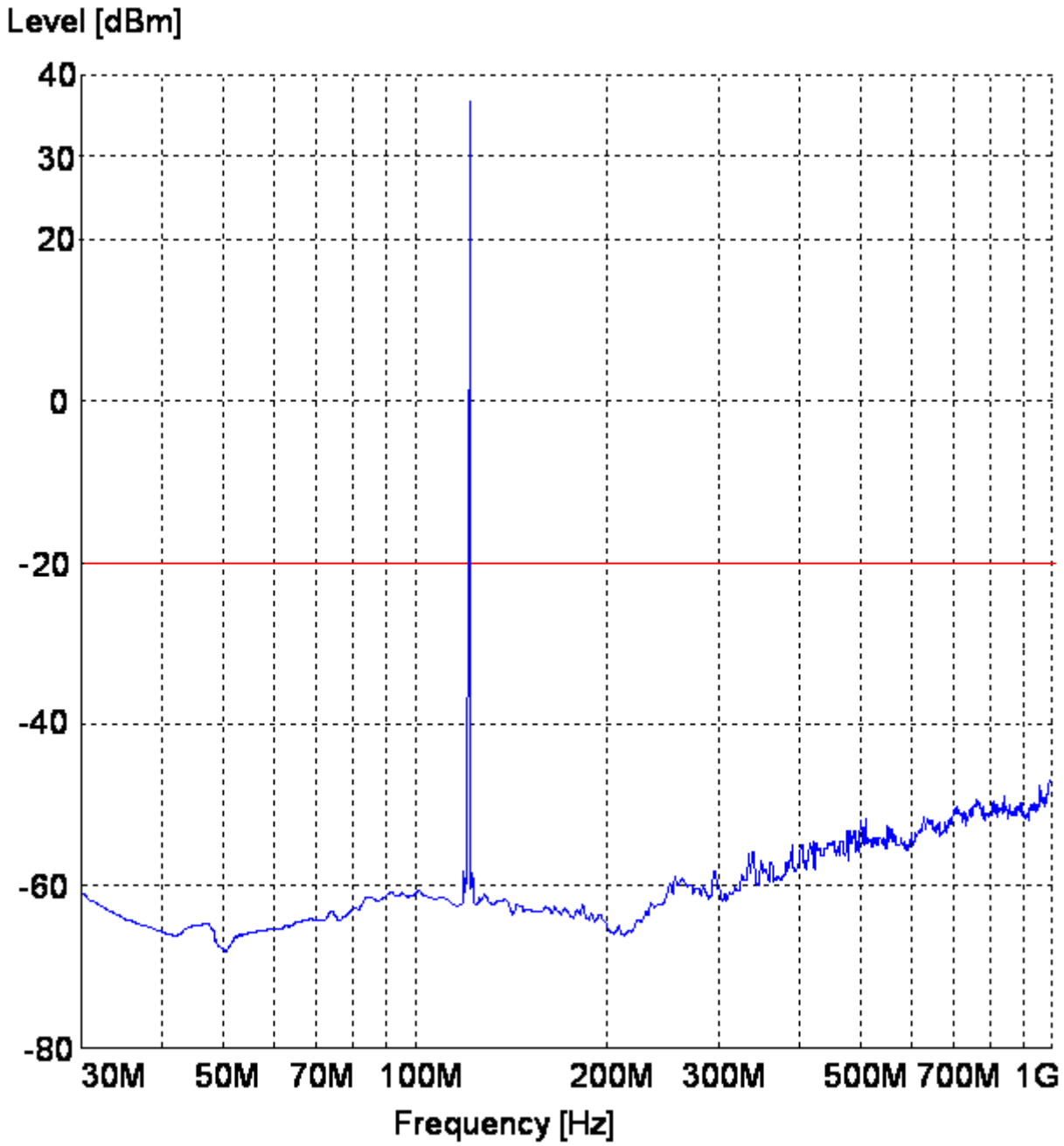
Limit (dBm)=30 - 43-10log 10 (1) = -13 dBm

VHF (136MHz-174MHz):

THE WORST RADIATED SPURIOUS EMISSION BELOW 1GHZ– HORIZONTAL

RBW=100KHz

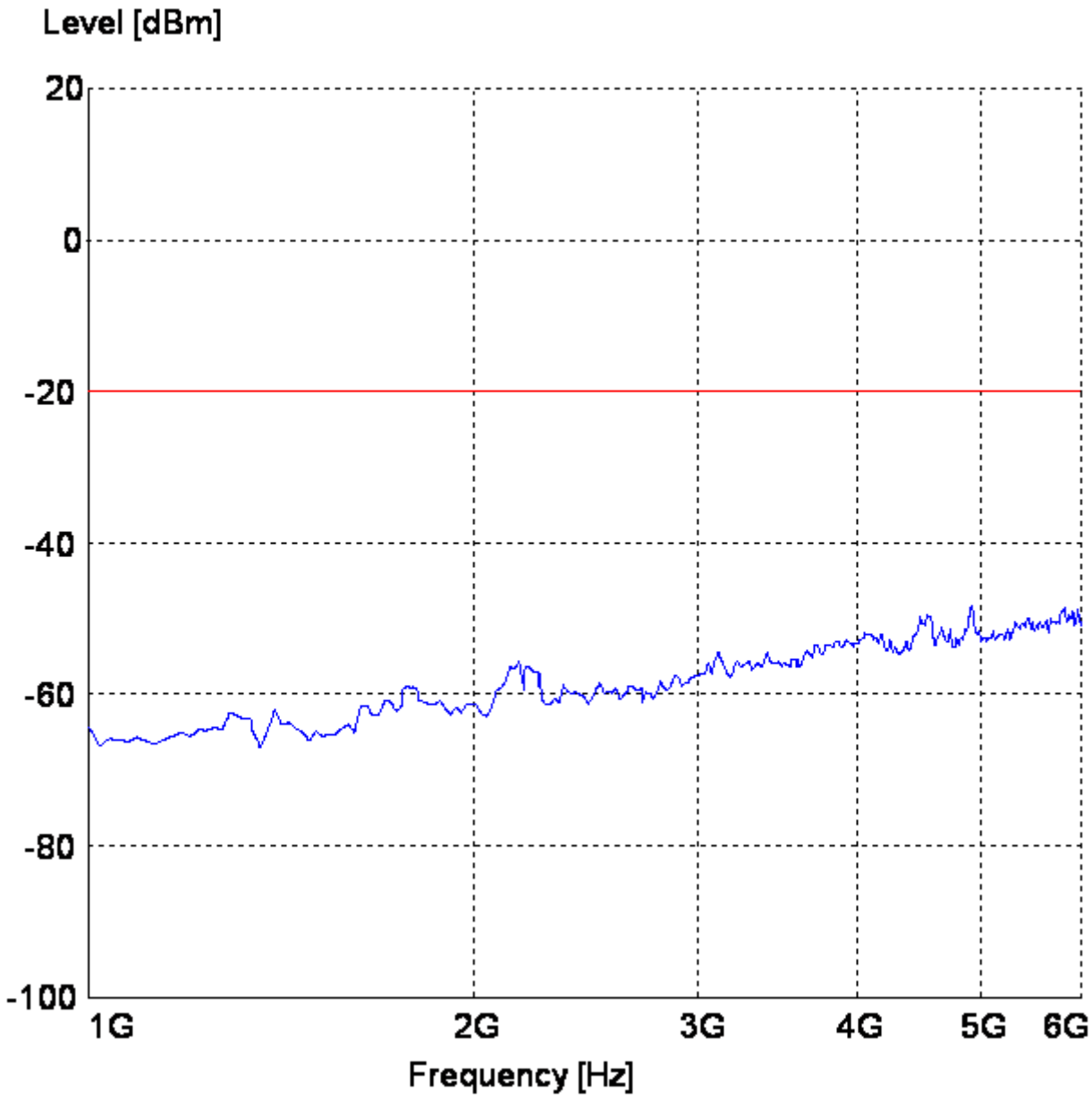
VBW=100KHz



THE WORST RADIATED SPURIOUS EMISSION ABOVE 1GHZ– HORIZONTAL

RBW=1MHz

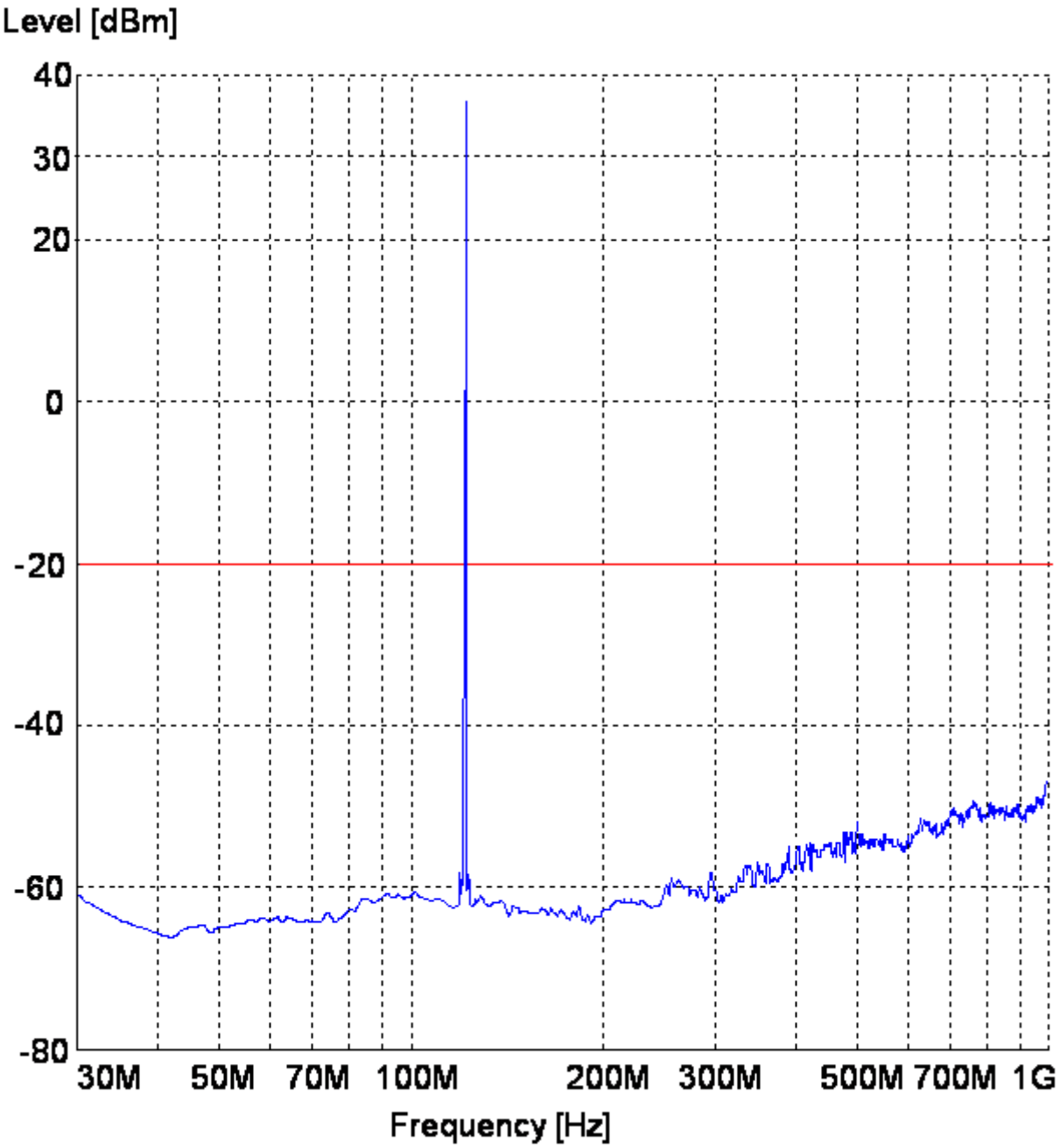
VBW=1MHz



THE WORST RADIATED SPURIOUS EMISSION BELOW 1GHZ–VERTICAL

RBW=100KHz

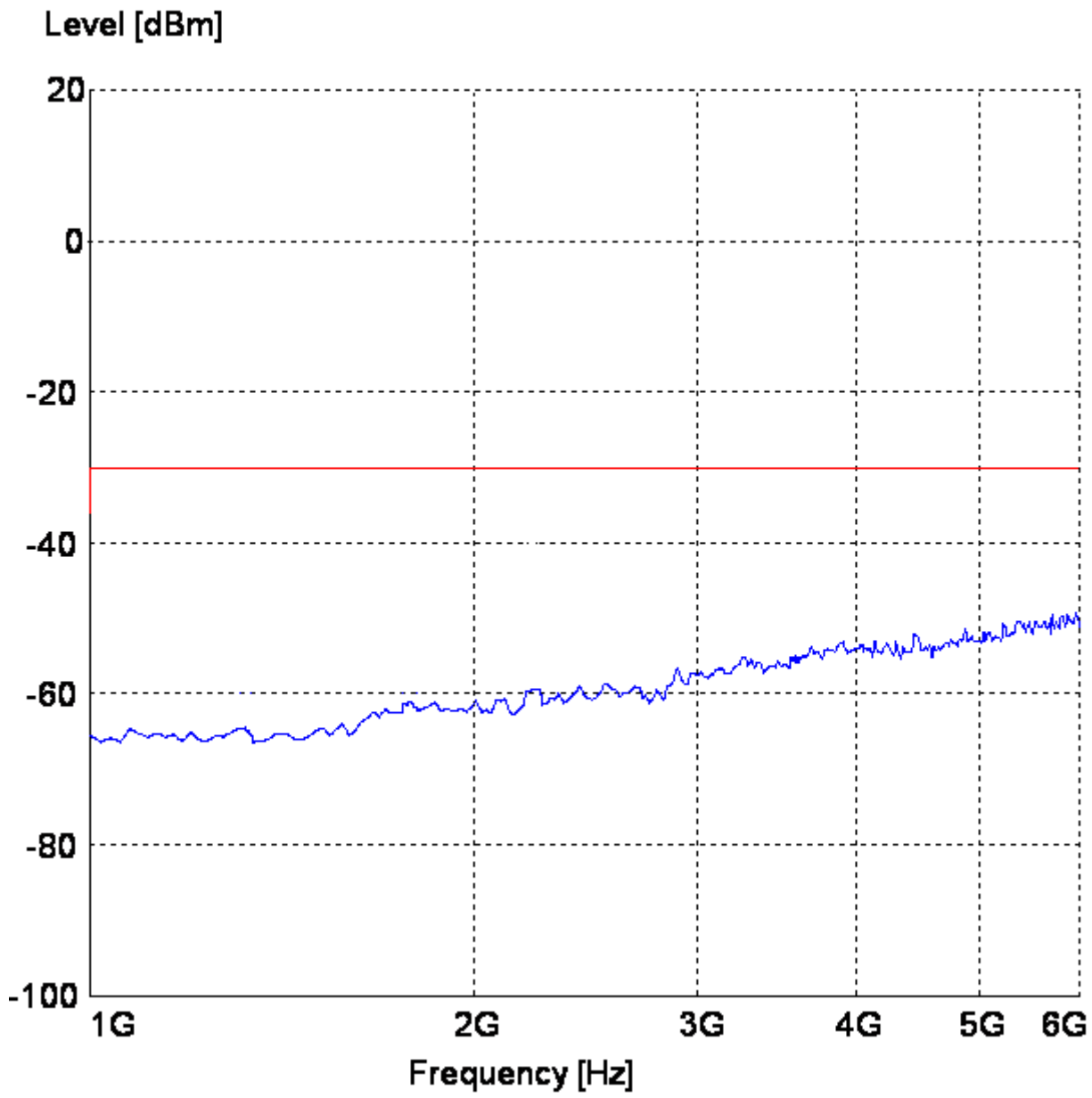
VBW=100KHz



THE WORST RADIATED SPURIOUS EMISSION ABOVE 1GHZ–VERTICAL

RBW=1MHz

VBW=1MHz

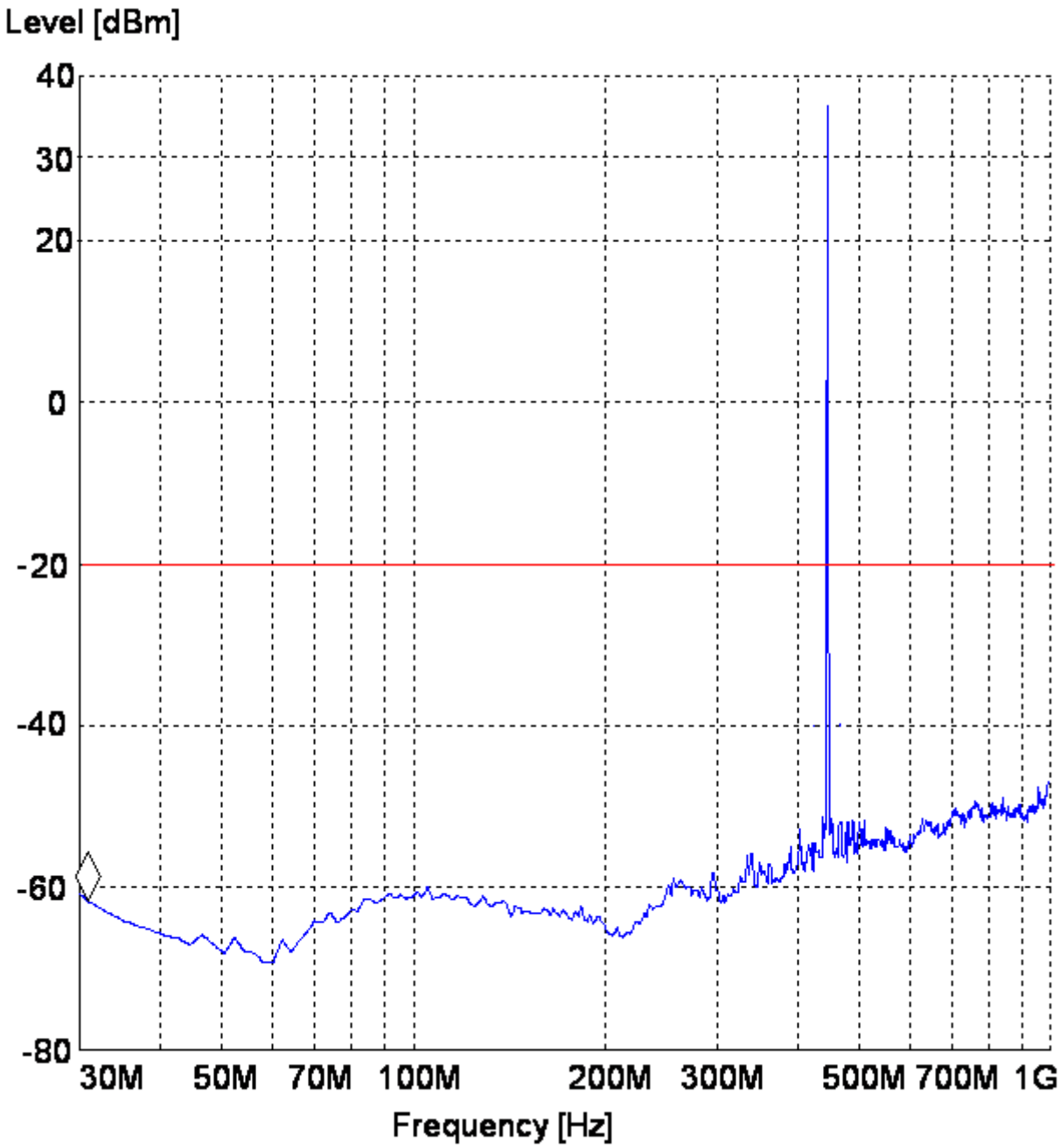


UHF (400MHz-470MHz):

THE WORST RADIATED SPURIOUS EMISSION BELOW 1GHZ– HORIZONTAL

RBW=100KHz

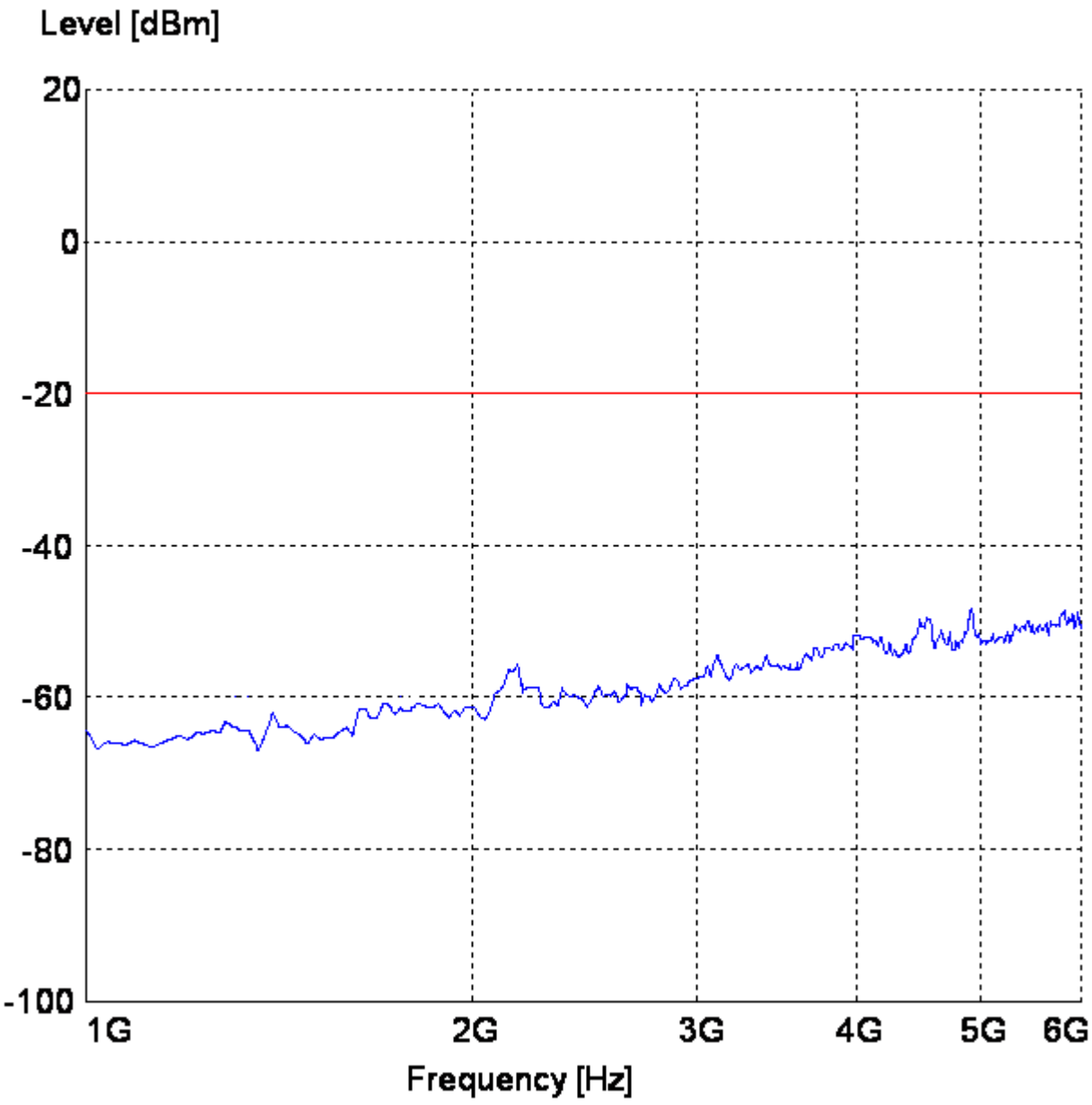
VBW=100KHz



THE WORST RADIATED SPURIOUS EMISSION ABOVE 1GHZ– HORIZONTAL

RBW=1MHz

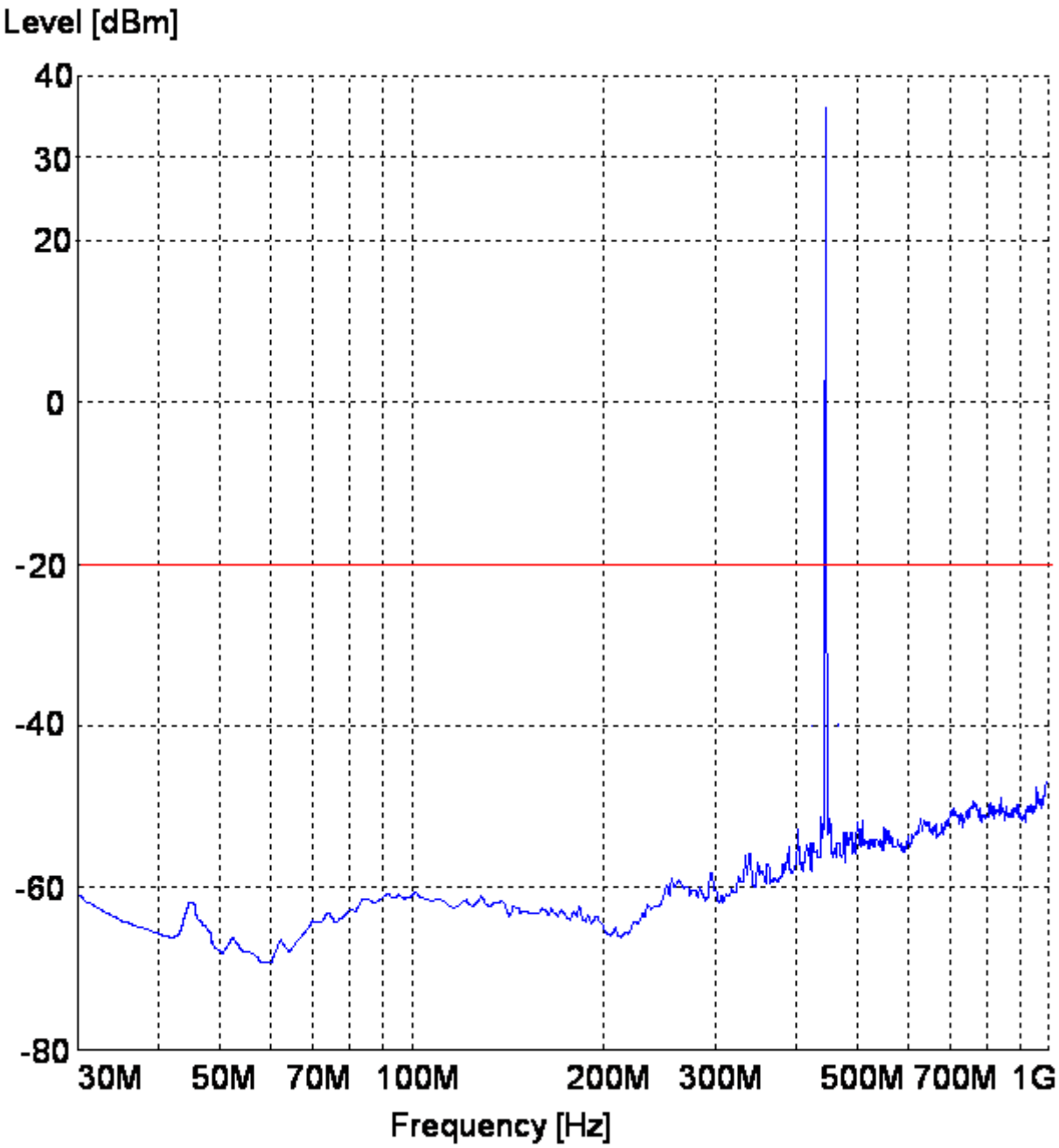
VBW=1MHz



THE WORST RADIATED SPURIOUS EMISSION BELOW 1GHZ–VERTICAL

RBW=100KHz

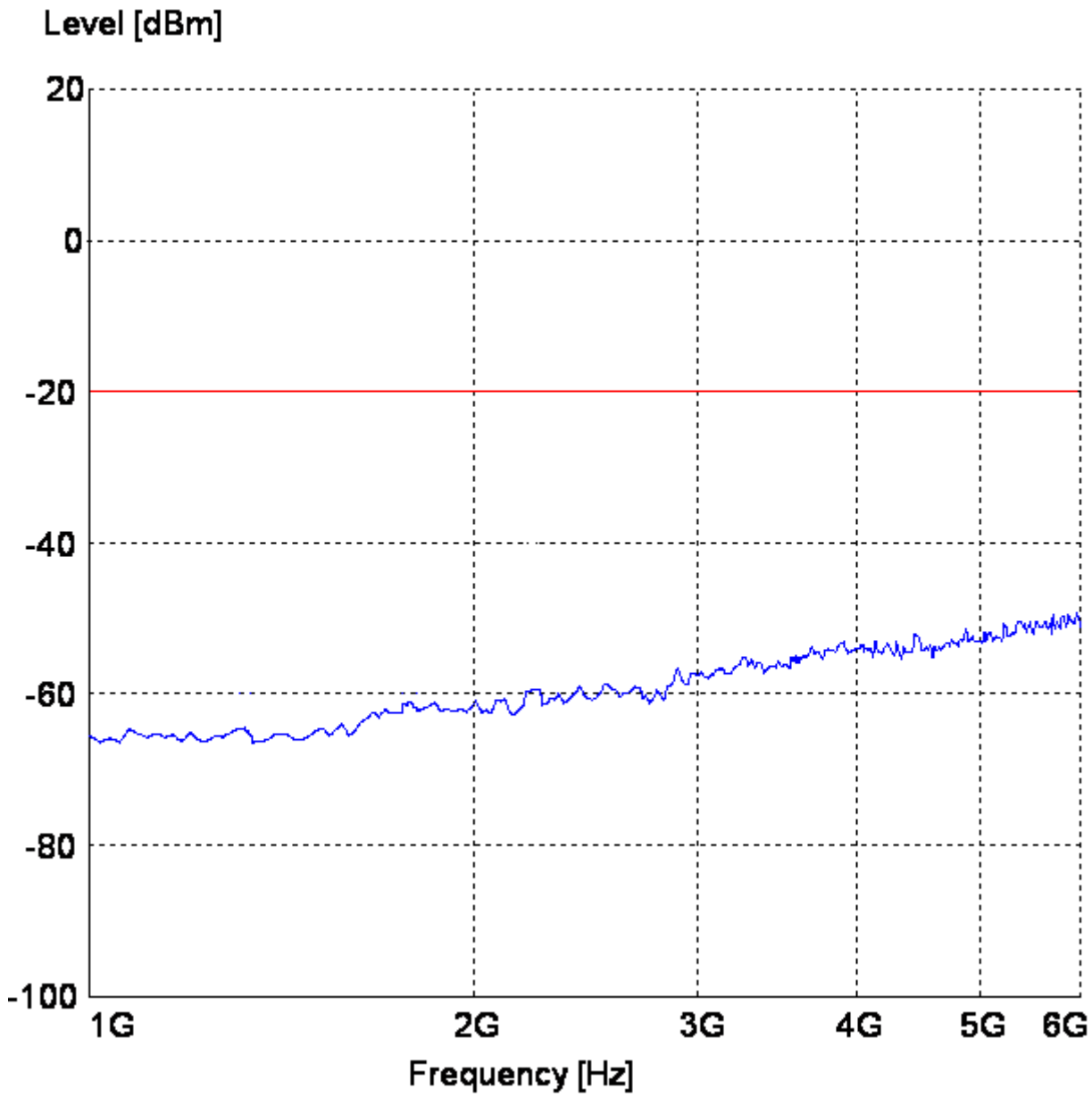
VBW=100KHz



THE WORST RADIATED SPURIOUS EMISSION ABOVE 1GHZ–VERTICAL

RBW=1MHz

VBW=1MHz



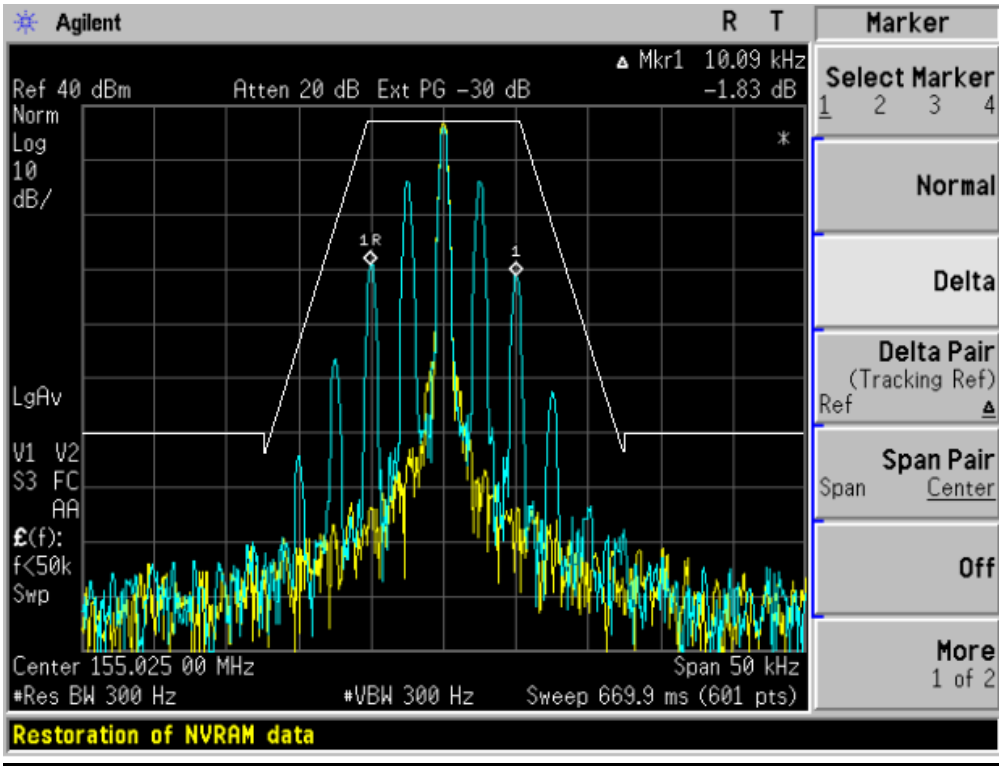
8.6 EMISSION MASK PLOT

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

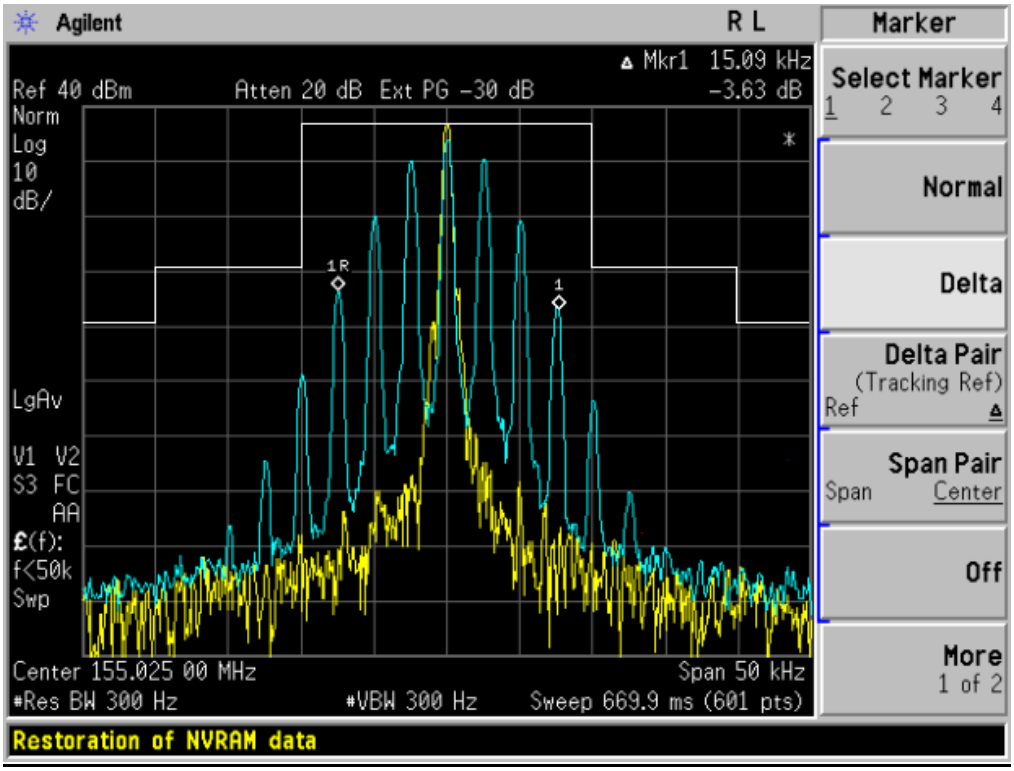
- The transmitter shall be modulated by a 2.5 kHz audio signal,
- The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing) and 5 kHz (25 kHz channel spacing)

VHF (136MHz-174MHz):

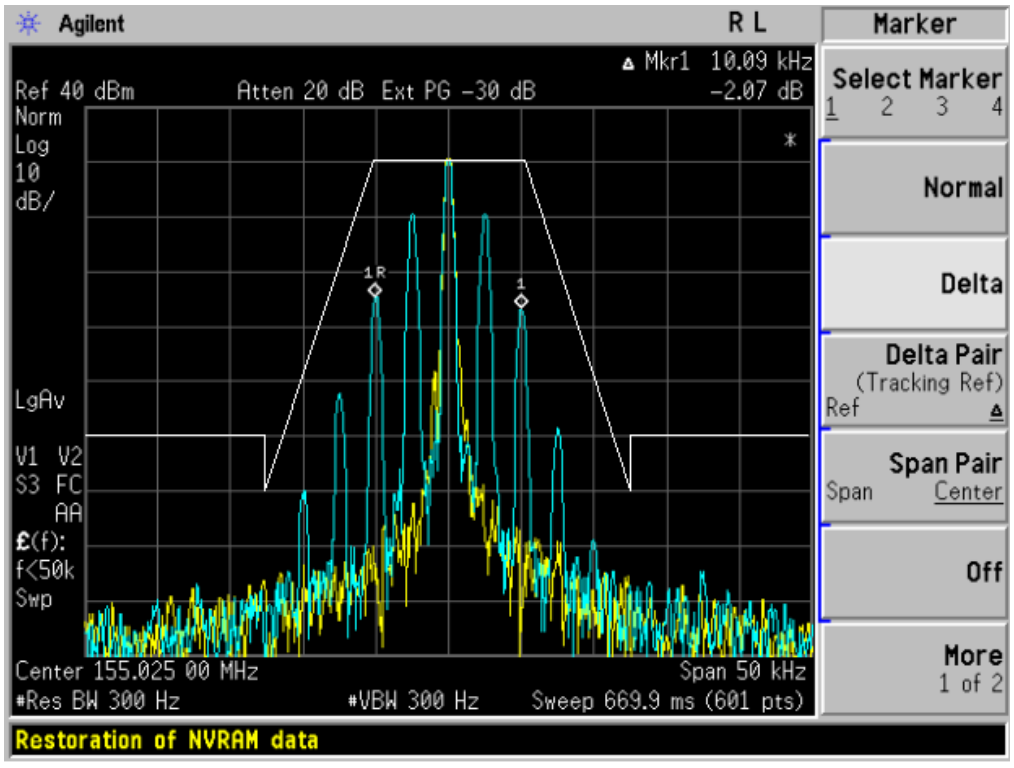
The Worst Emission Mask for 12.5 KHz channel Separation (5w)



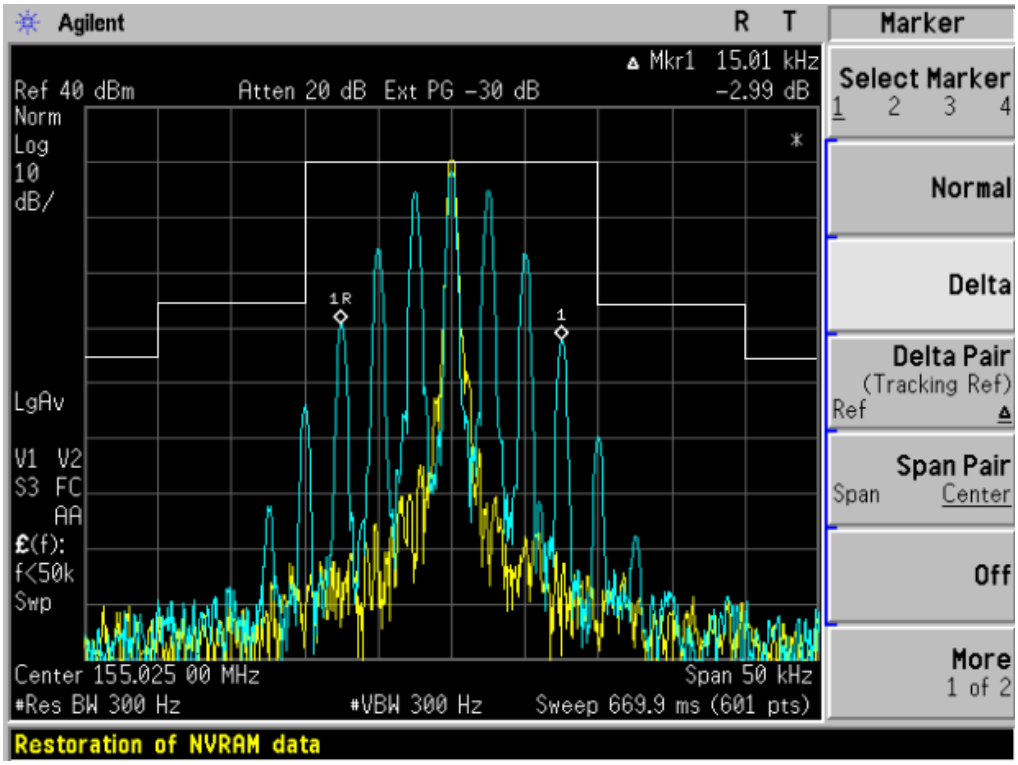
The Worst Emission Mask for 25 KHz channel Separation (5W)



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

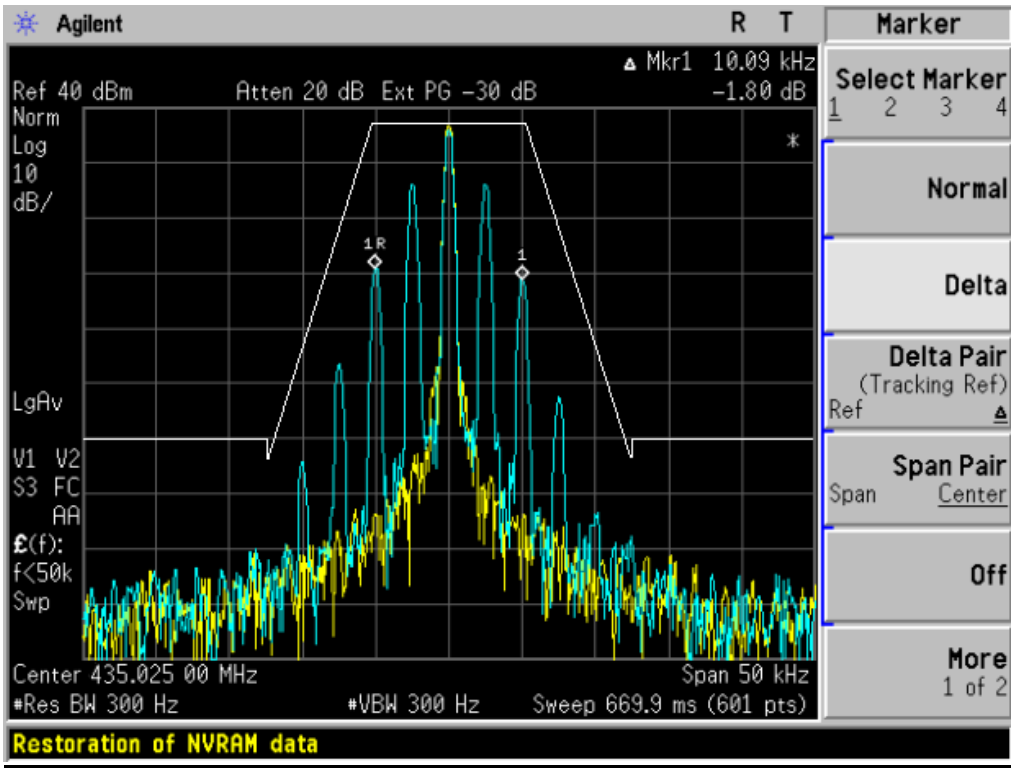


The Worst Emission Mask for 25 KHz channel Separation (1w)

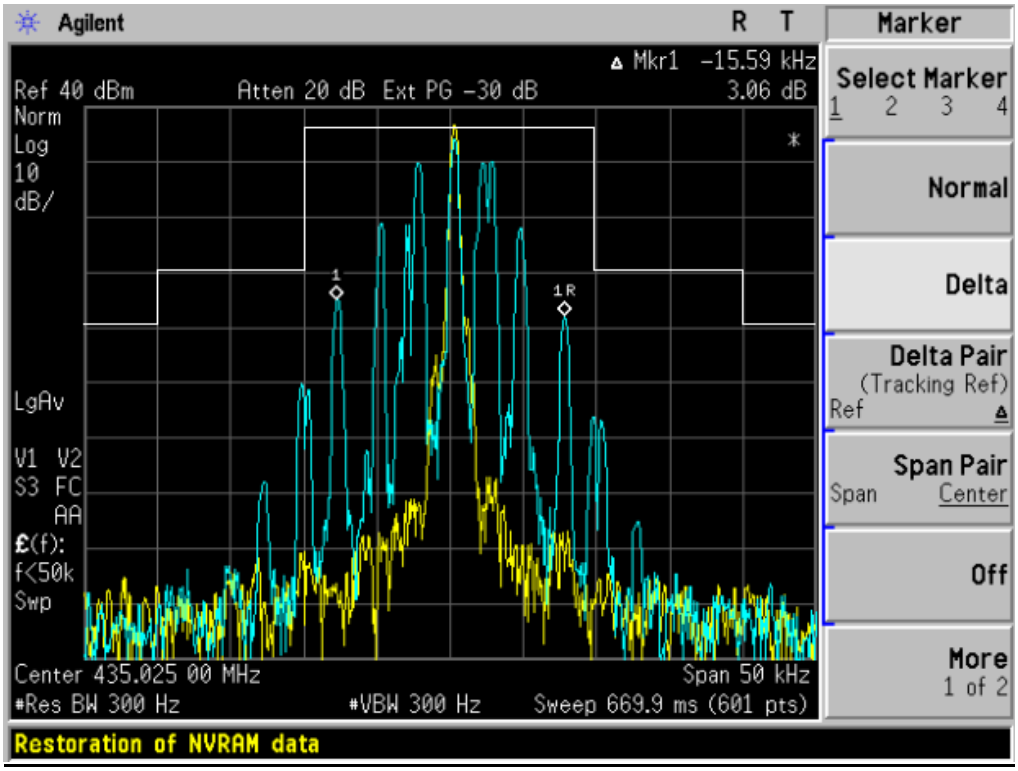


UHF (400MHz-470MHz):

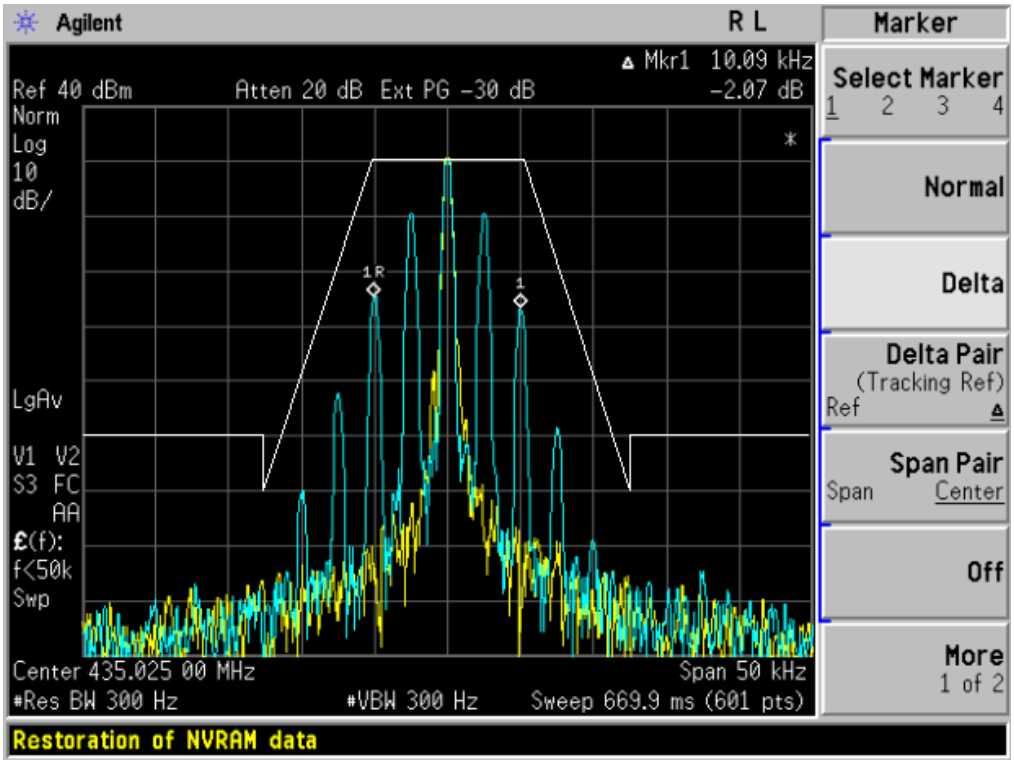
The Worst Emission Mask for 12.5 KHz channel Separation (5w)



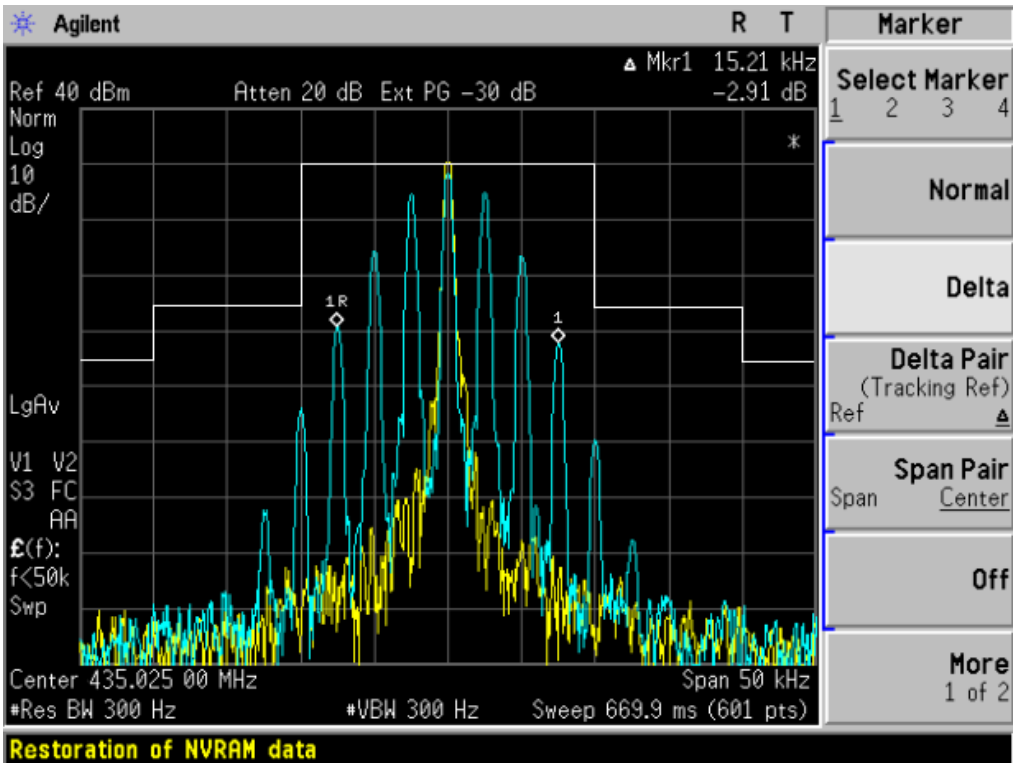
The Worst Emission Mask for 25 KHz channel Separation (5W)



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



The Worst Emission Mask for 25 KHz channel Separation (1w)



9. MODULATION CHARACTERISTICS

9.1 PROVISIONS APPLICABLE

According to CFR 47 section 2.1047(a), for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

9.2 MEASUREMENT METHOD

9.2.1 Modulation Limit

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

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

9.2.2 Audio Frequency Response

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

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

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

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

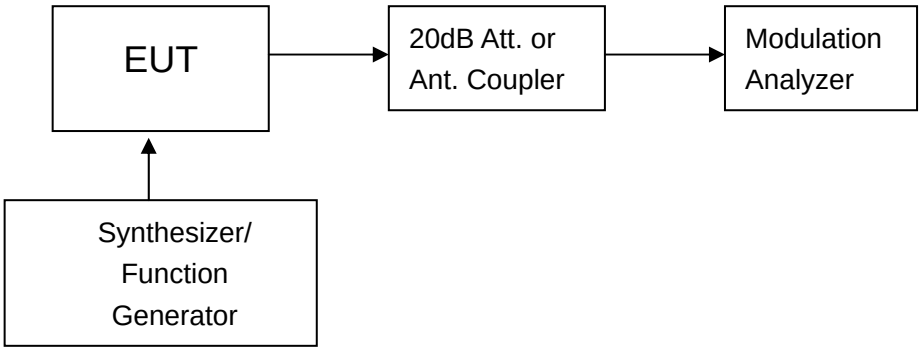


Figure 1: Modulation characteristic measurement configuration

9.3 MEASUREMENT INSTRUMENTS

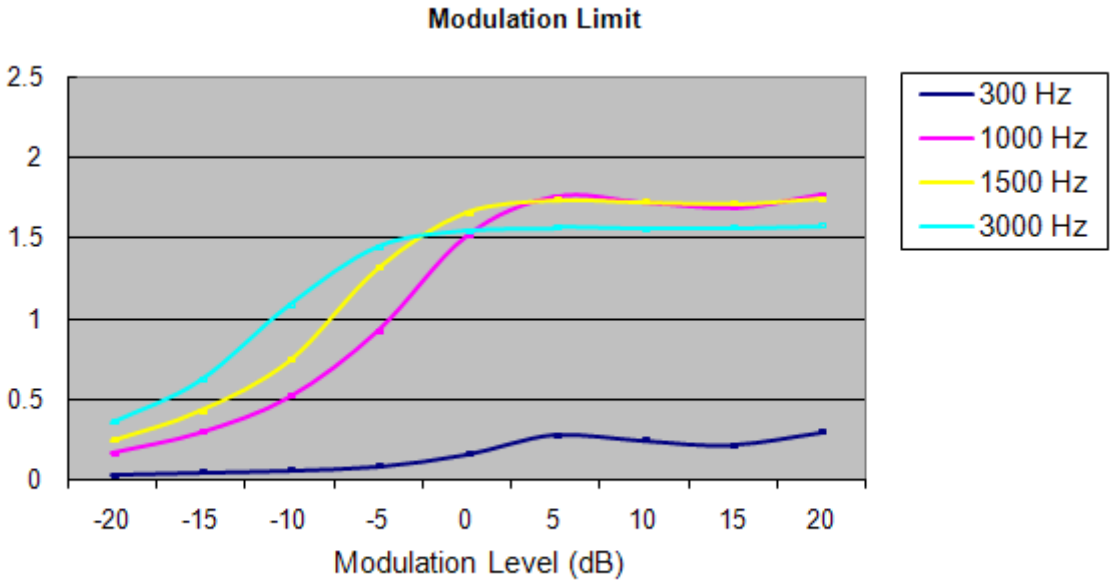
NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
Modulation Analyzer	HP	8901B	3104A03367	2009.06

9.4 MEASUREMENT RESULT

(a). Modulation Limit:

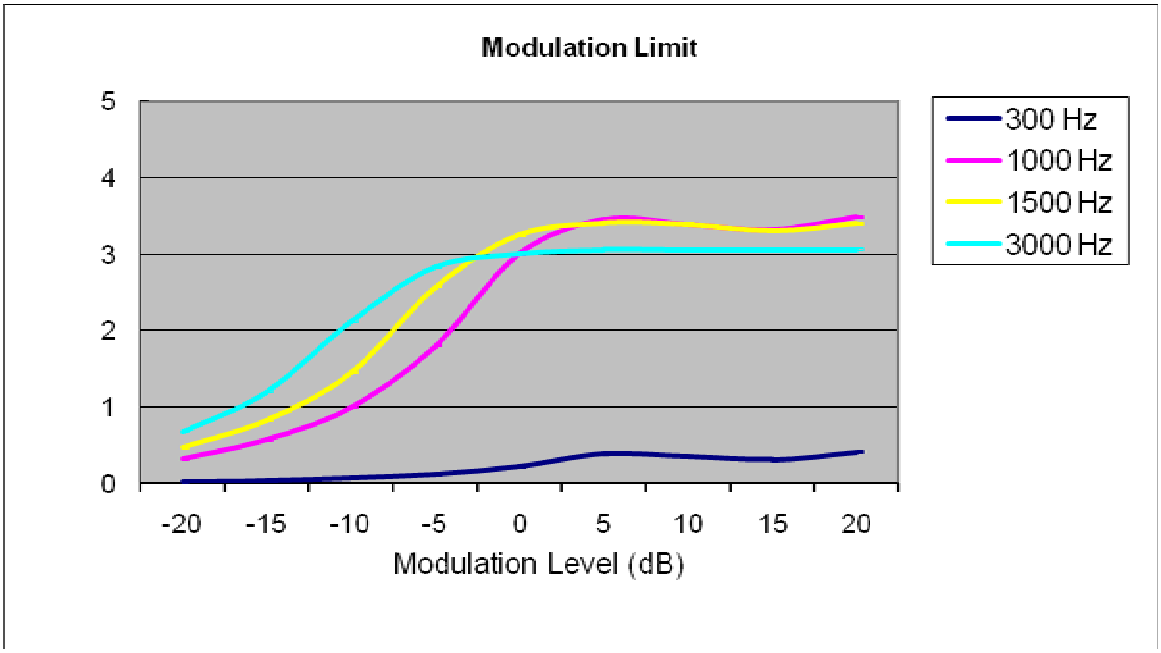
Middle Channel @ 12.5 KHz Channel Separations

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	0.02	0.16	0.24	0.35
-15	0.04	0.29	0.42	0.61
-10	0.05	0.51	0.74	1.08
-5	0.08	0.92	1.31	1.44
0	0.15	1.51	1.65	1.54
+5	0.27	1.75	1.73	1.56
+10	0.24	1.72	1.72	1.55
+15	0.21	1.68	1.71	1.56
+20	0.29	1.76	1.74	1.57



Middle Channel @ 25KHz Channel Separation

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	0.02	0.32	0.47	0.68
-15	0.03	0.57	0.83	1.20
-10	0.07	1.00	1.45	2.12
-5	0.12	1.80	2.57	2.83
0	0.22	3.00	3.25	3.01
+5	0.39	3.45	3.41	3.06
+10	0.35	3.39	3.39	3.05
+15	0.31	3.32	3.31	3.05
+20	0.41	3.48	3.40	3.06

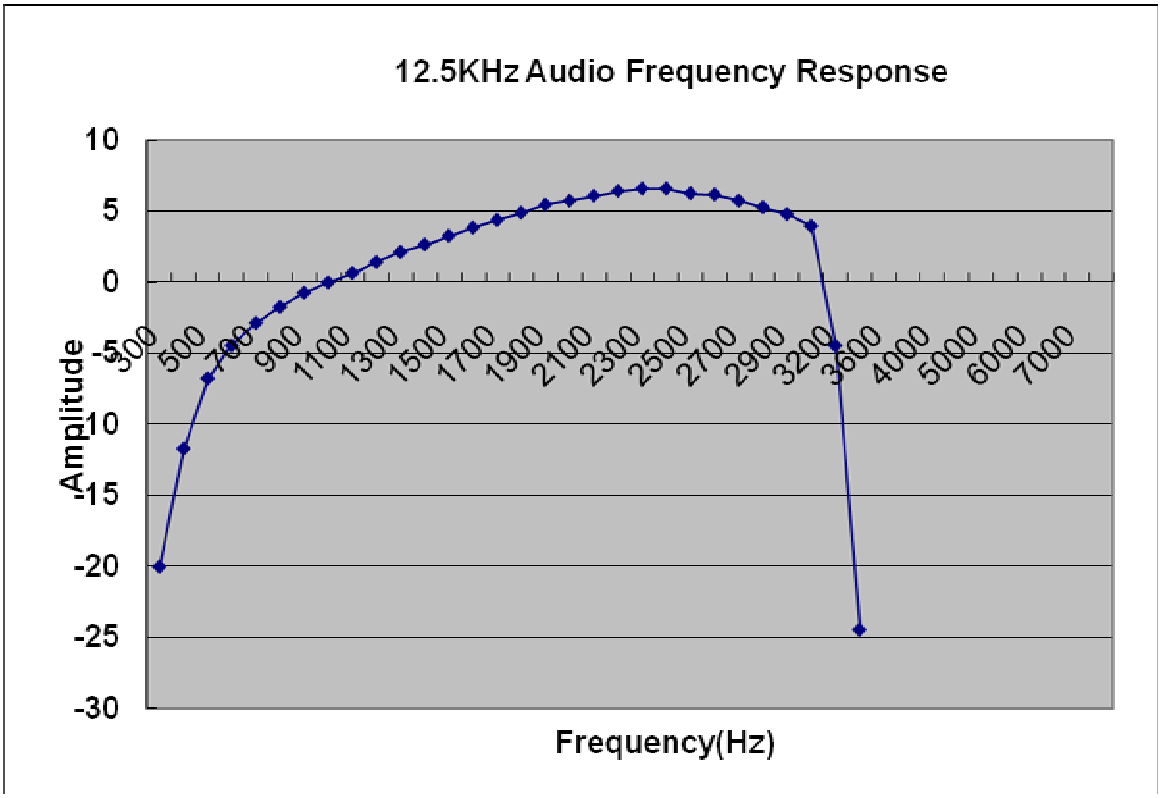


(b). Audio Frequency Response:

12.5 KHz Channel Separation

Frequency (Hz)	Deviation (KHz)
100	--
200	--
300	0.05
400	0.13
500	0.23
600	0.30
700	0.36
800	0.41
900	0.46
1000	0.50
1100	0.54
1200	0.59
1300	0.64
1400	0.68
1500	0.73
1600	0.78
1700	0.83
1800	0.88
1900	0.94
2000	0.97
2100	1.01
2200	1.05
2300	1.07
2400	1.07
2500	1.03
2600	1.02
2700	0.97
2800	0.92
2900	0.87
3000	0.79
3200	0.30
3400	0.03
3600	--
3800	--
4000	--
4500	--
5000	--
5500	--
6000	--
6500	--
7000	--
7500	--
8000	--
8500	--
9000	--
9500	--

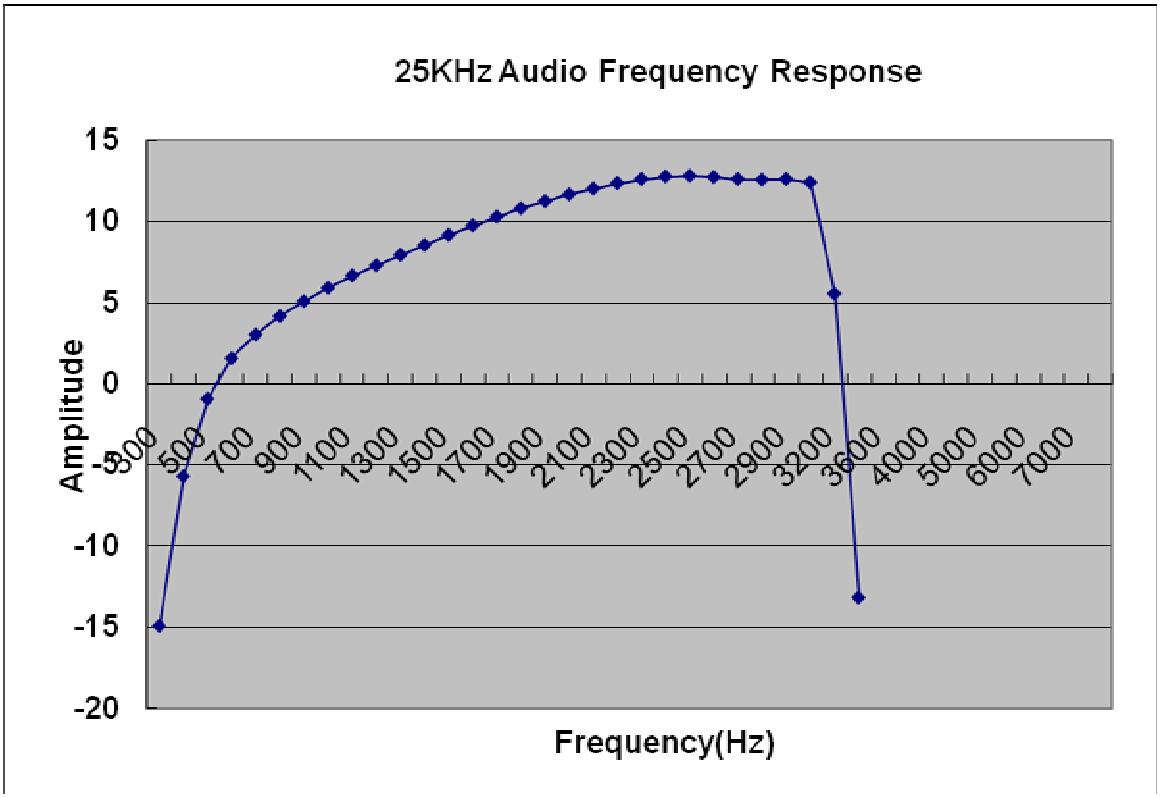
Frequency Response of Middle Channel



25 KHz Channel Separation

Frequency (Hz)	Deviation (KHz)
100	--
200	--
300	0.09
400	0.26
500	0.45
600	0.60
700	0.71
800	0.81
900	0.90
1000	0.99
1100	1.08
1200	1.16
1300	1.25
1400	1.34
1500	1.44
1600	1.54
1700	1.64
1800	1.74
1900	1.83
2000	1.92
2100	2.00
2200	2.08
2300	2.14
2400	2.18
2500	2.19
2600	2.17
2700	2.14
2800	2.13
2900	2.14
3000	2.09
3200	0.95
3400	0.11
3600	--
3800	--
4000	--
4500	--
5000	--
5500	--
6000	--
6500	--
7000	--
7500	--
8000	--
8500	--
9000	--
9500	--
10000	--

Frequency Response of Middle Channel



10. MAXIMUMN TRANSMITTER POWER (CONDUCTED OUTPUT POWER)

10.1 PROVISIONS APPLICABLE

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

10.2 TEST PROCEDURE

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

10.3 TEST INSTRUMENTS

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
SPECTRUM ANALYZER	AGILENT	E4440A	US44300399	2008.06

10.4 TEST RESULT

The maximum Conducted Power (CP) is

5 W /1W for 12.5 KHz Channel Separation

5 W /1W for 25.0 KHz Channel Separation

Calculation Formula: CP = R + A + L

***** Note:

CP: The final Conducted Power

R : The reading value from spectrum analyzer

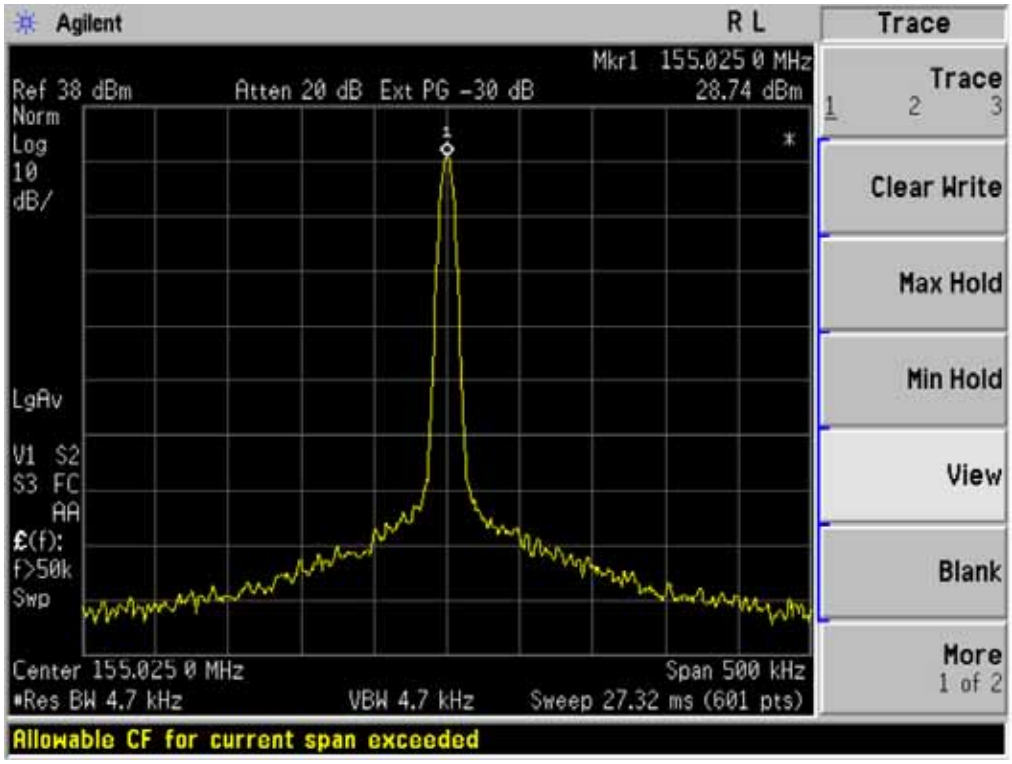
A : The attenuation value of the used attenuator

L : The loss of all connection cables

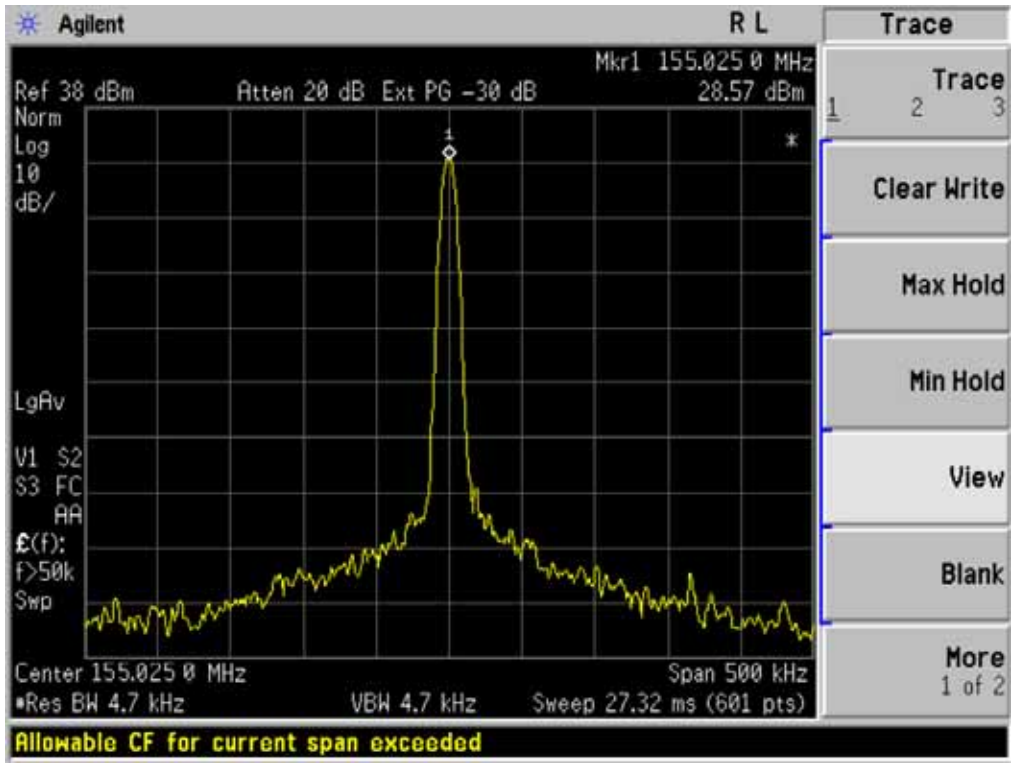
Conducted Power Measurement Results			
Channel Separation	Channel	Measurement Result (dBm)	
		For 5W	For 1 W
12.5 KHz	Bottom(136.025MHz)	36.34	28.88
	Middle(155.025MHz)	36.29	28.74
	Top (173.975MHz)	35.89	28.69
25 KHz	Bottom(136.025MHz)	36.51	28.91
	Middle(155.025MHz)	36.47	28.72
	Top (173.975MHz)	36.23	29.21

Conducted Power Measurement Results			
Channel Separation	Channel	Measurement Result (dBm)	
		For 5W	For 1 W
12.5 KHz	Bottom(400.025MHz)	36.33	28.79
	Middle(435.025MHz)	36.14	28.79
	Top (469.975MHz)	35.97	28.91
25 KHz	Bottom(400.025MHz)	36.41	29.12
	Middle(435.025MHz)	36.30	29.31
	Top (469.975MHz)	36.53	29.10

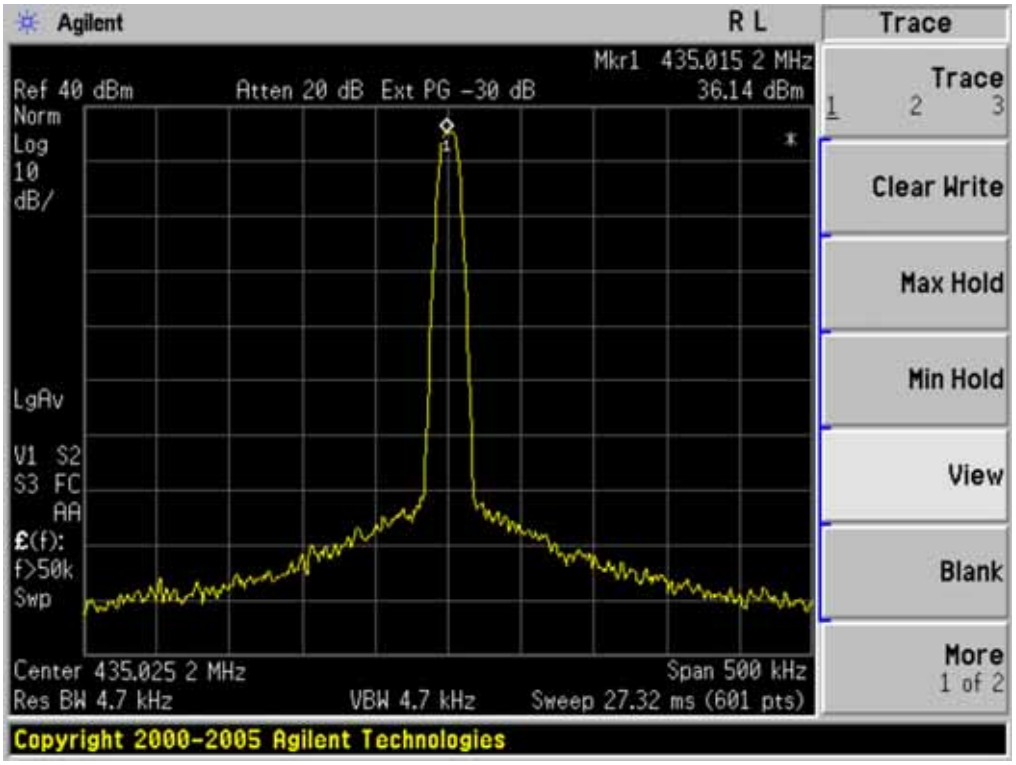
OUTPUT POWER (MAXIMUM) FOR 1W (155.025M)-12.5KHZ



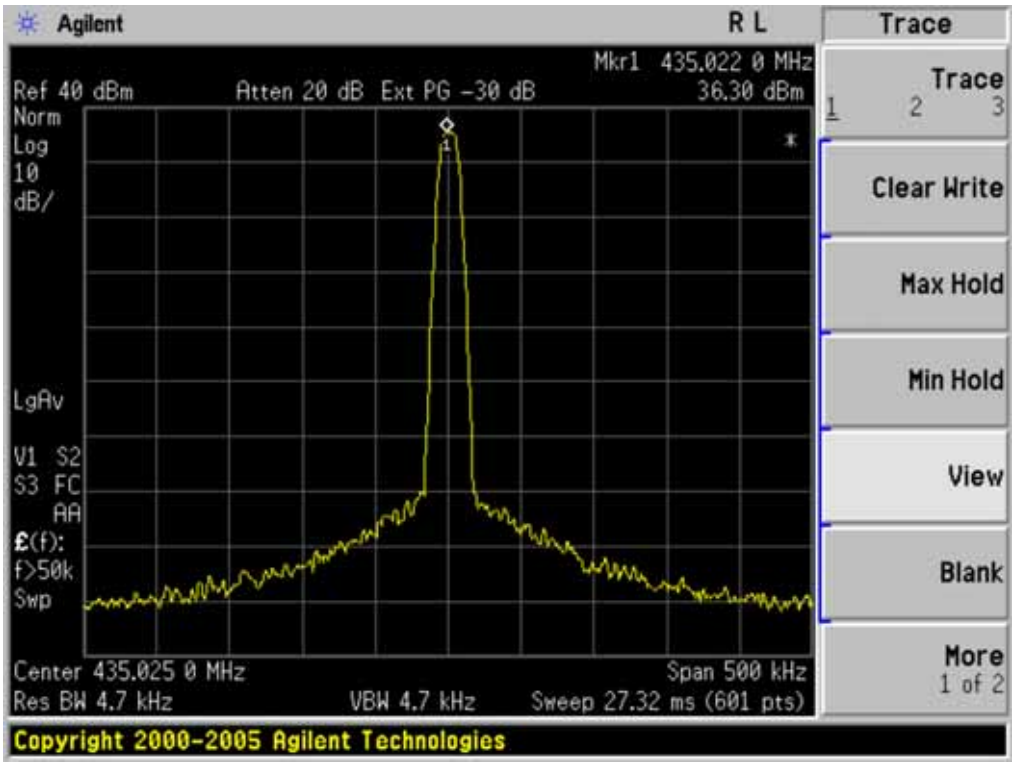
OUTPUT POWER (MAXIMUM) FOR 1W (155.025M)-25KHZ



OUTPUT POWER (MAXIMUM) FOR 5W (435.025M)-12.5KHZ



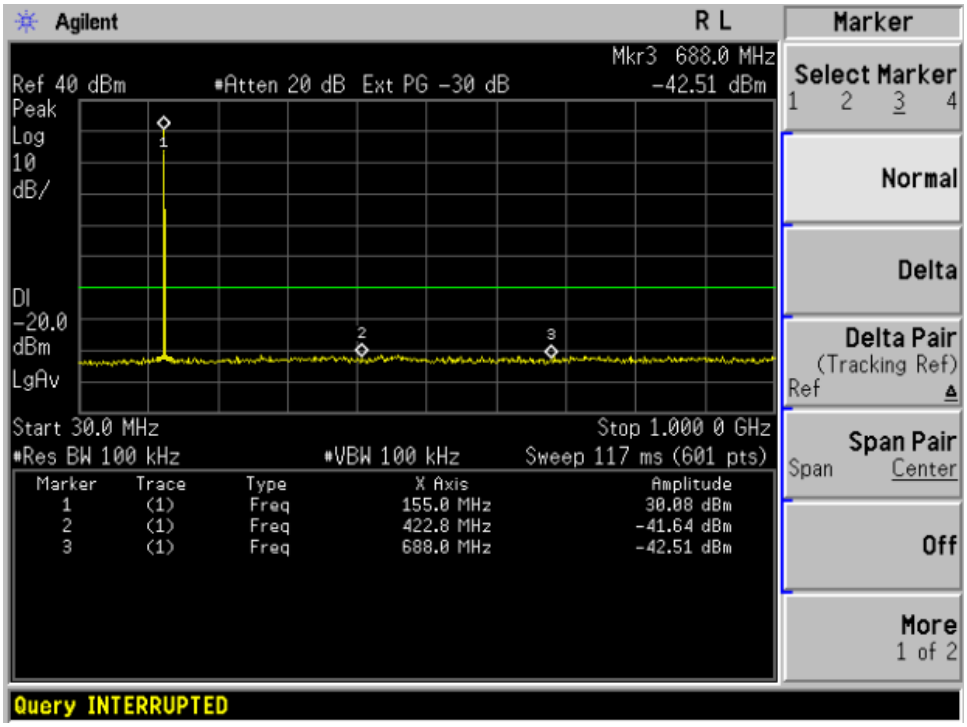
OUTPUT POWER (MAXIMUM) FOR 5W (435.025M)-25KHZ

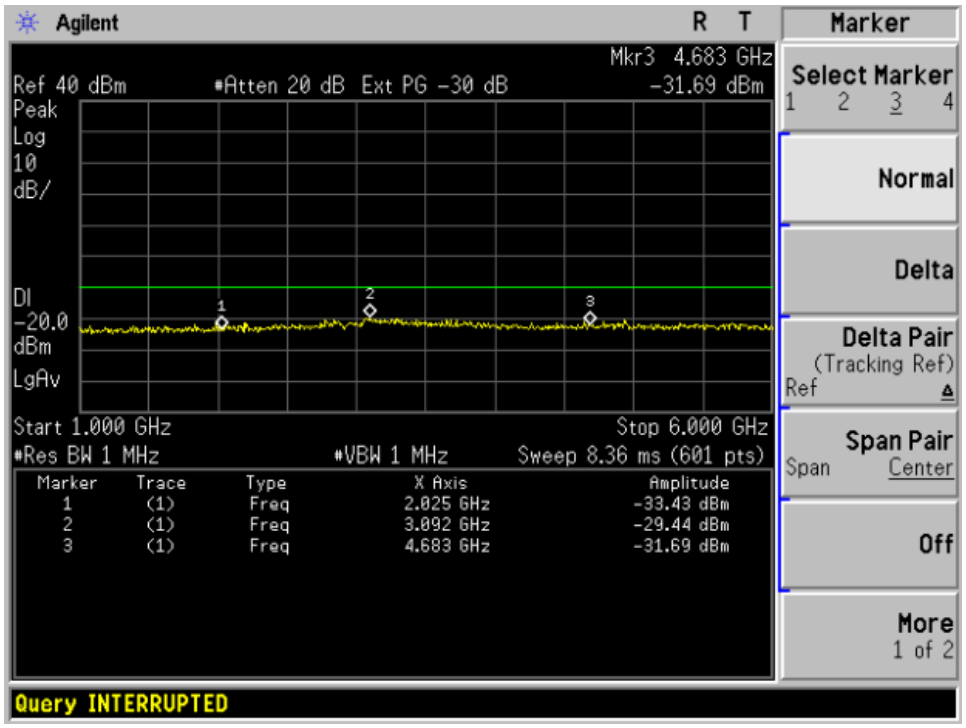


10.4 CONDUCT SPURIOUS PLOT

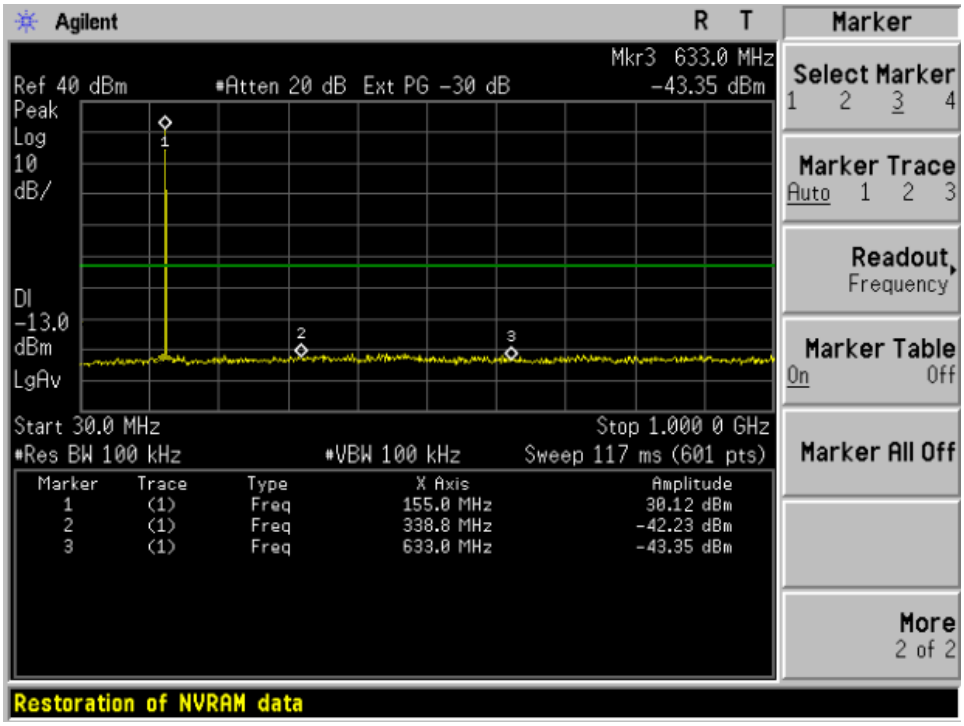
VHF (137MHZ-174MHZ)

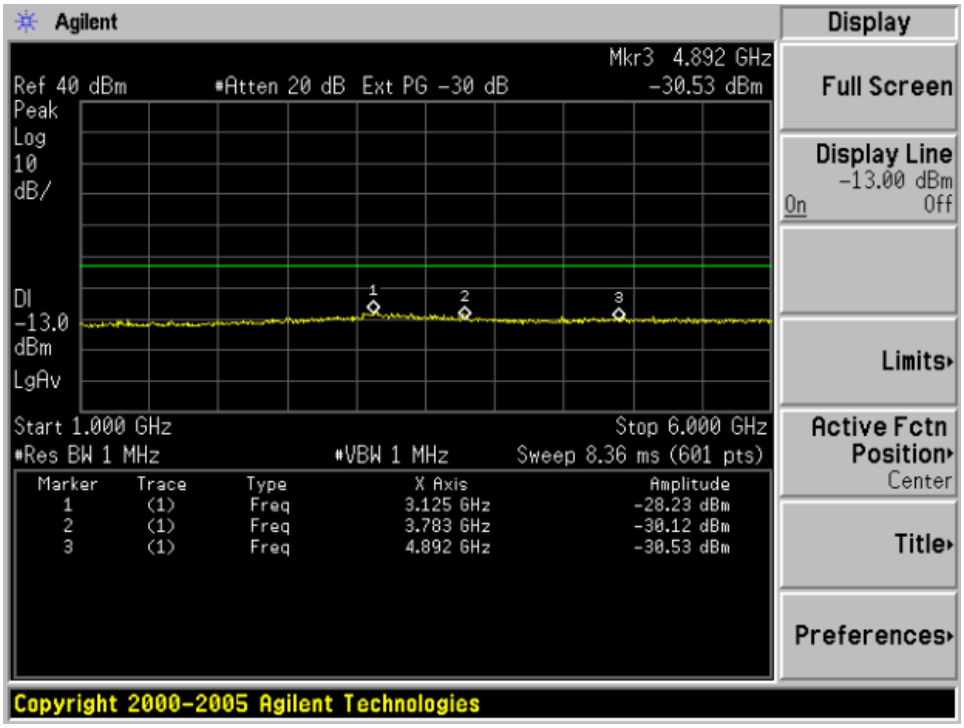
The Worst Case (1 W) of The Three Channels for Conduct Spurious Emission @ 12.5KHz



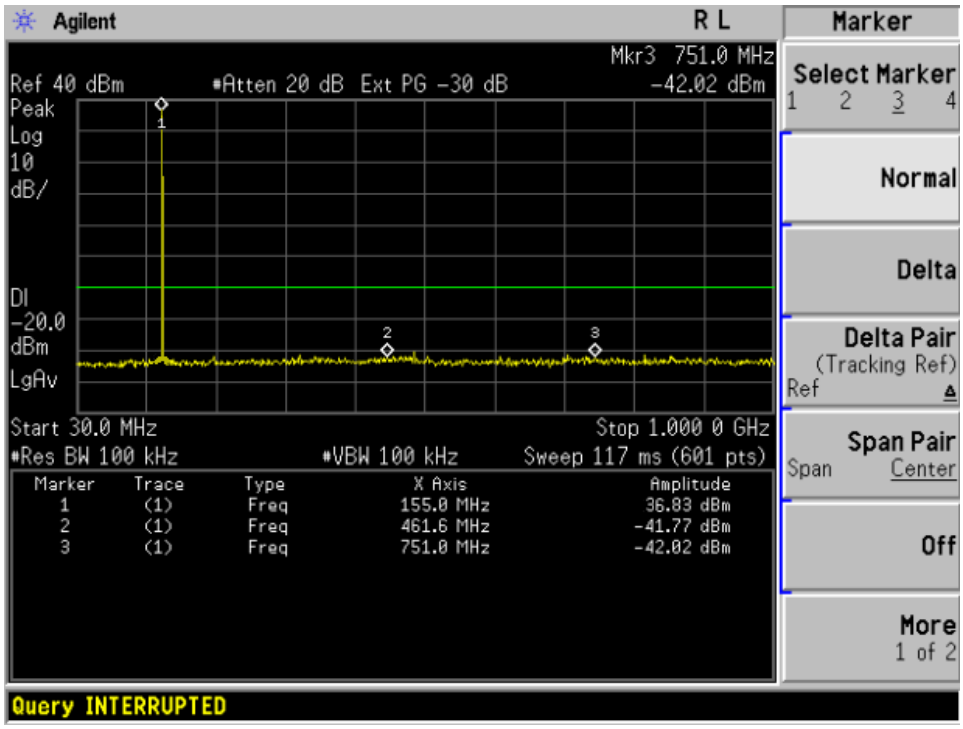


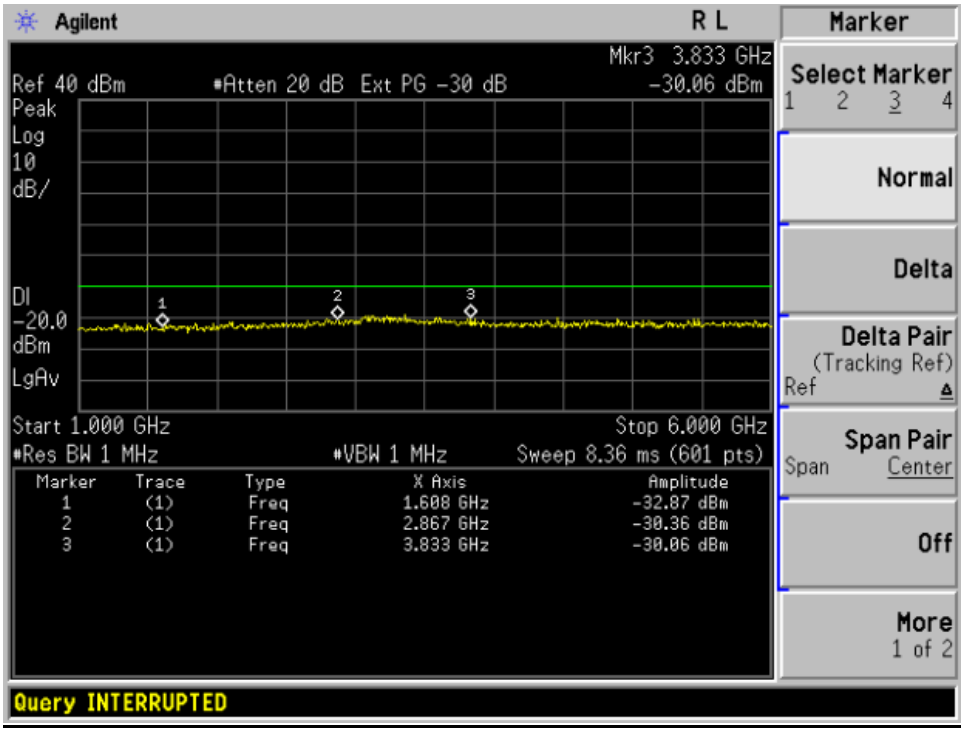
The Worst Case (1w) of The Three Channels for Conduct Spurious Emission @ 25KHz



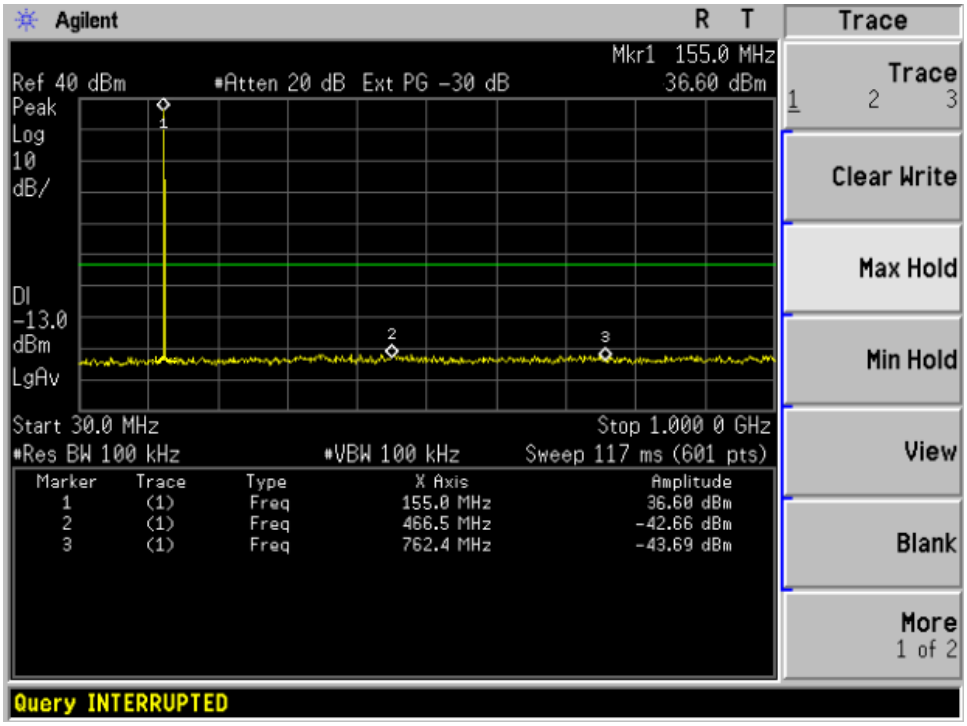


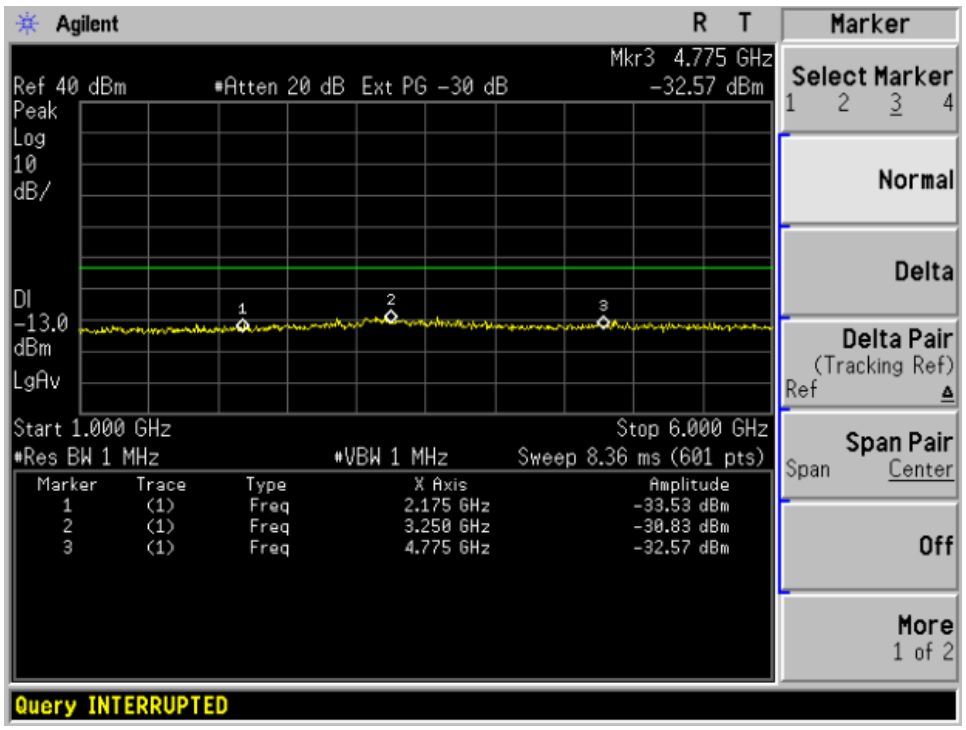
The Worst Case (5W) of The Three Channels for Conduct Spurious Emission @ 12.5KHz





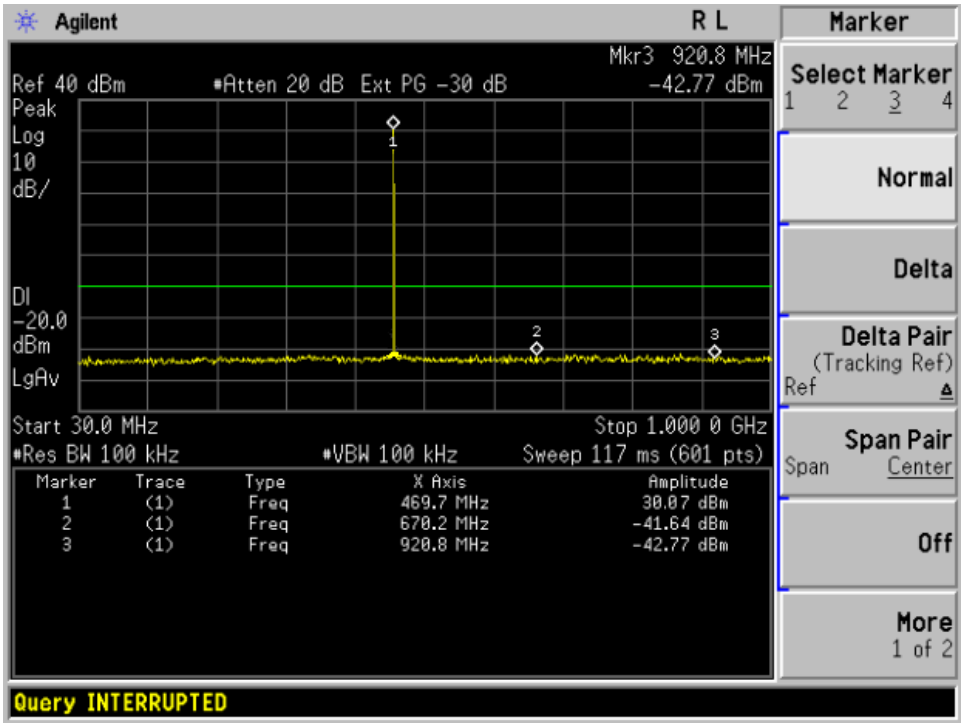
The Worst Case (5W)of The Three Channels for Conduct Spurious Emission @ 25.0 KHz

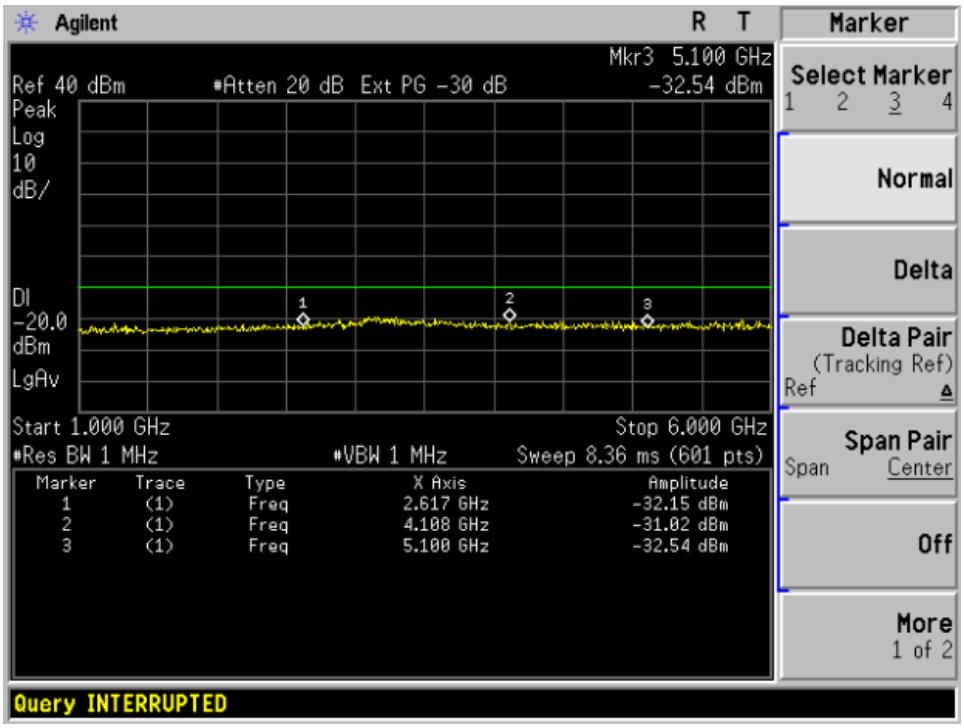




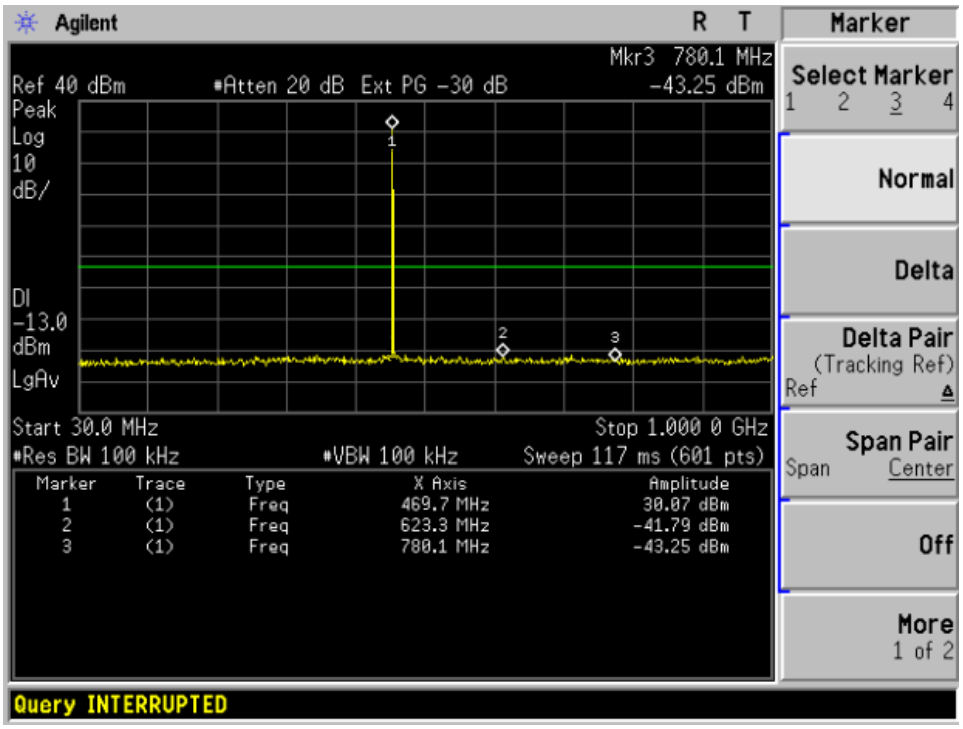
UHF (400MHZ-470MHZ)

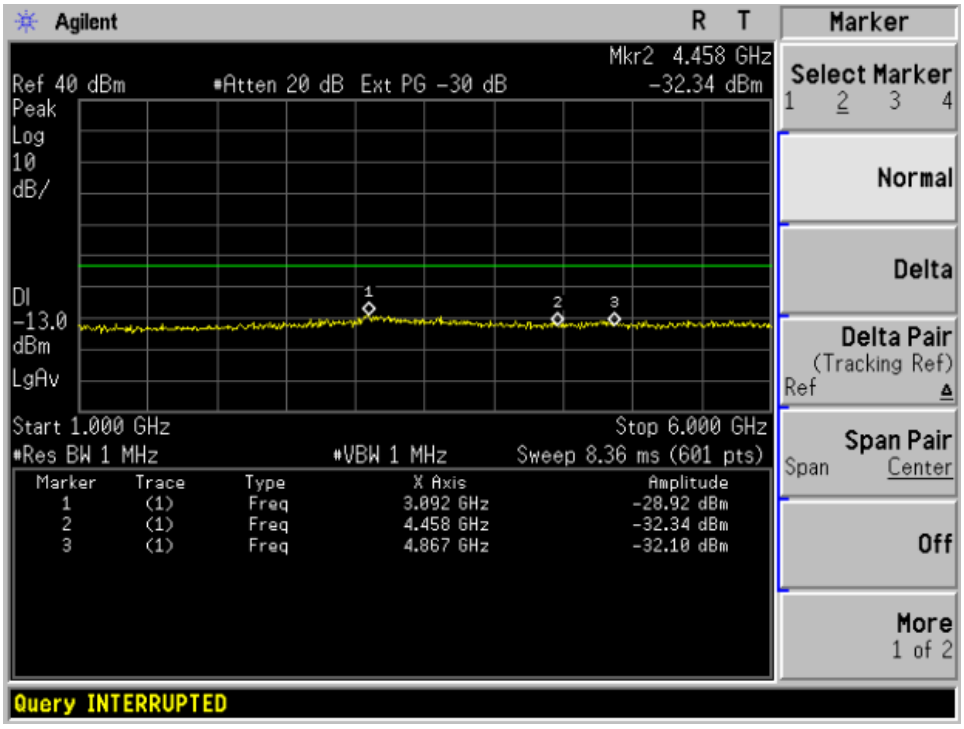
The Worst Case (1 W) of The Three Channels for Conduct Spurious Emission @ 12.5KHz



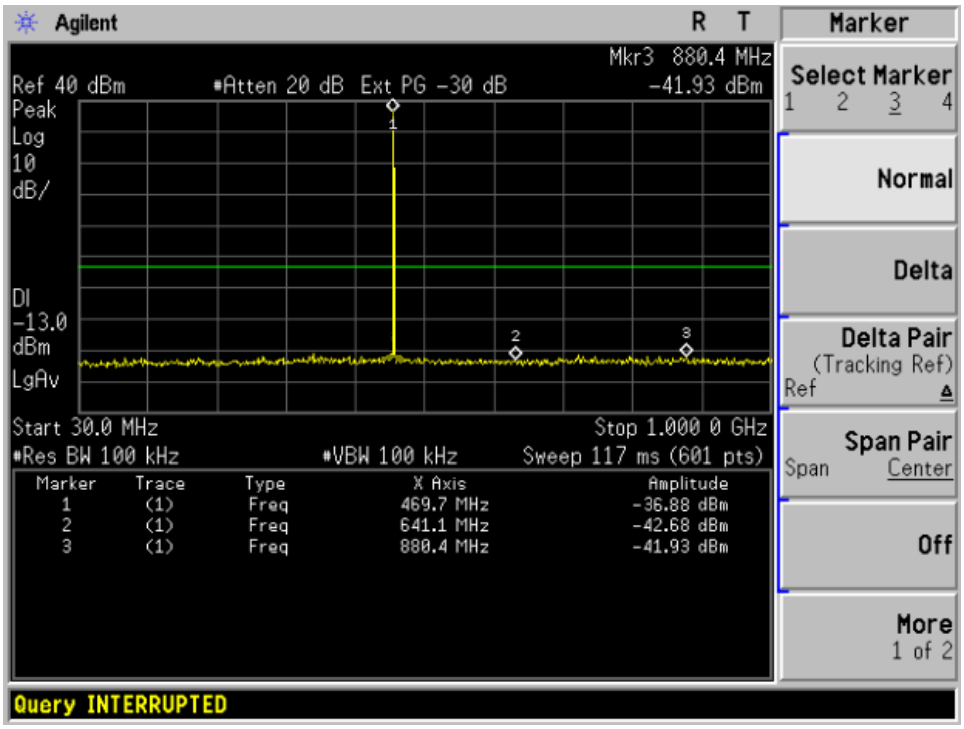


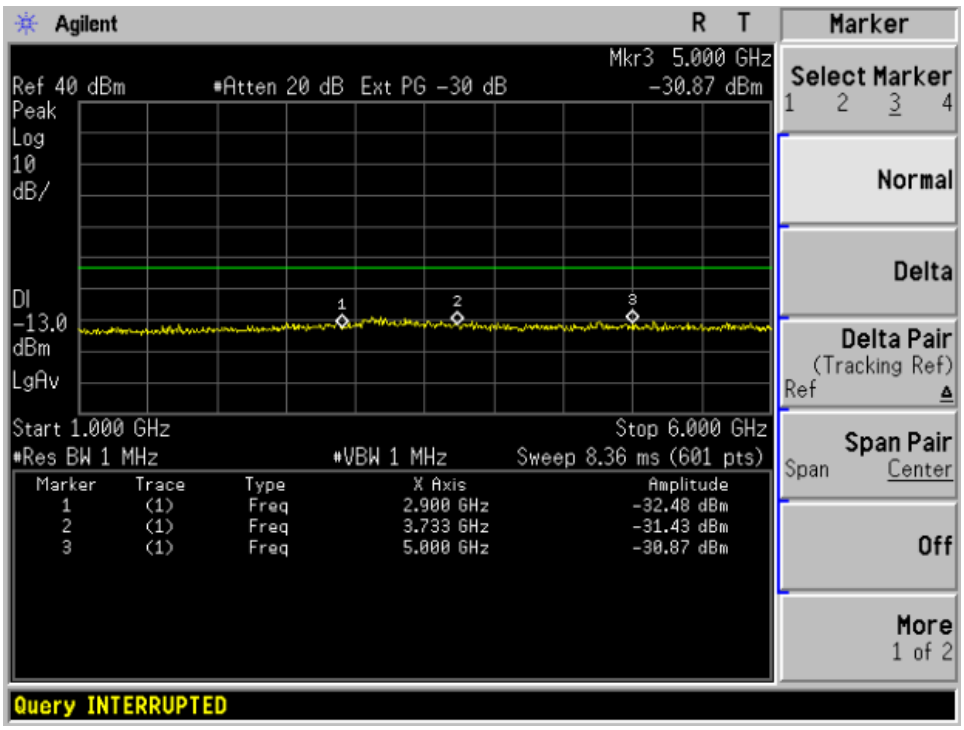
The Worst Case (1w) of The Three Channels for Conduct Spurious Emission @ 25KHz



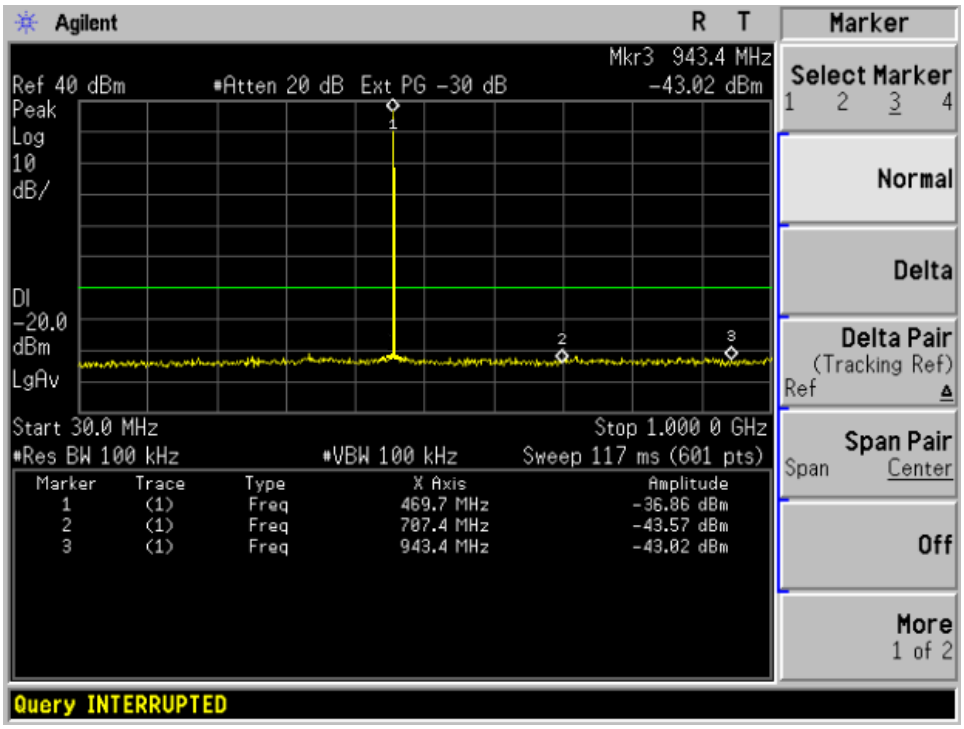


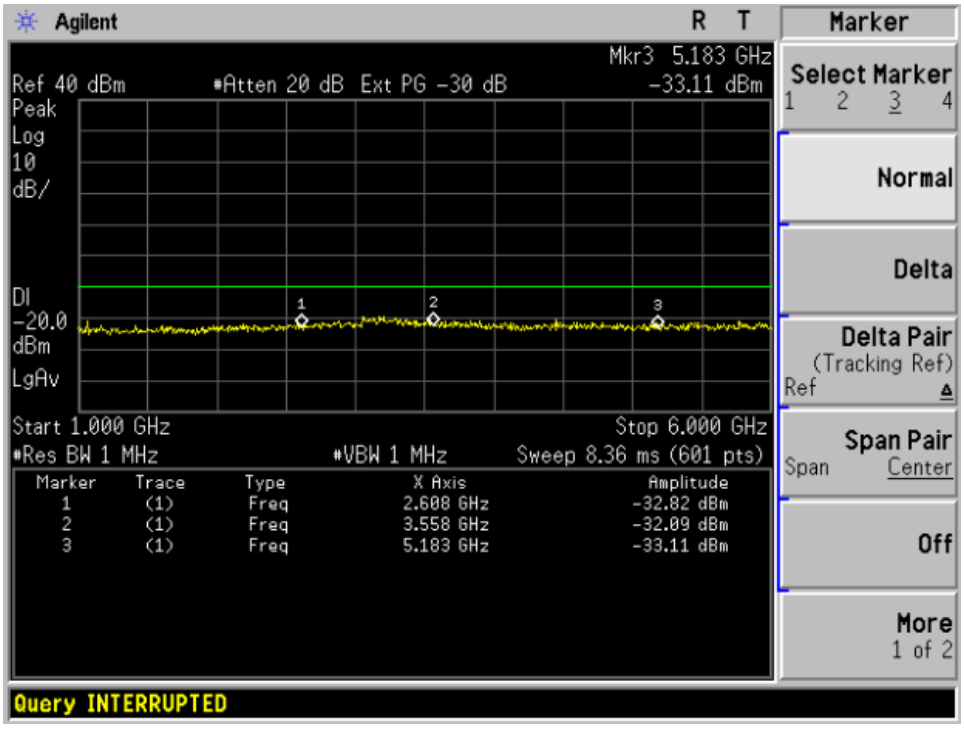
The Worst Case (5W) of The Three Channels for Conduct Spurious Emission @ 12.5KHz





The Worst Case (5W)of The Three Channels for Conduct Spurious Emission @ 25.0 KHz





11. RANSMITTER FREQUENCY BEHAVIOR

11.1 PROVISIONS APPLICABLE

Section 90.214

11.2 TEST METHOD

TIA/EIA-603 2.2.19

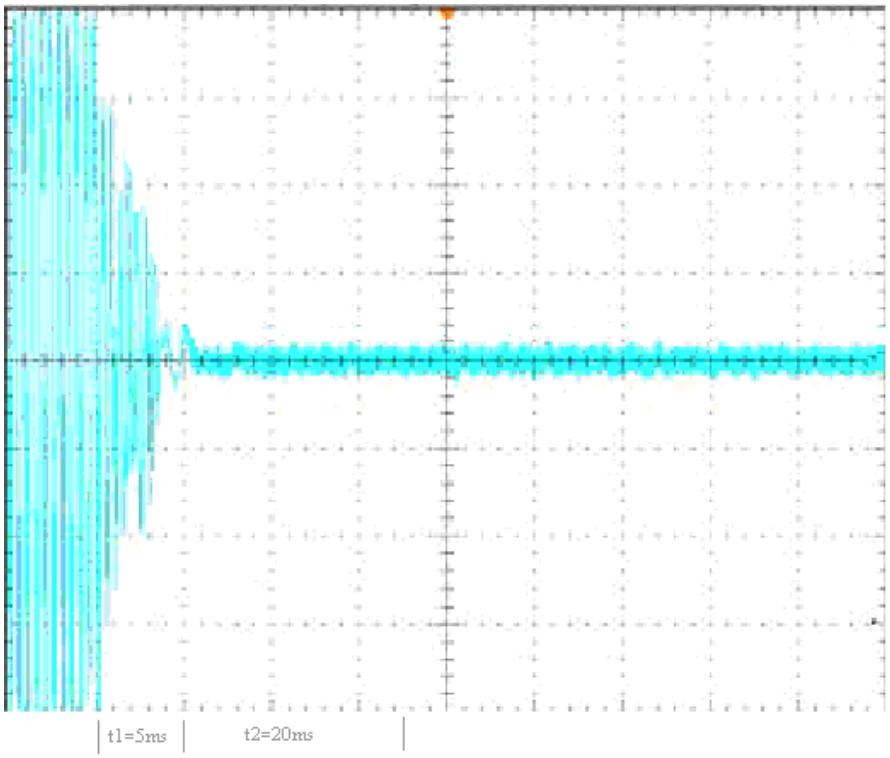
11.3 TEST INSTRUMENTS

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
Signal Generator	R&S	SMT02	A0304261	2009.06
Storage Oscilloscope	Tektronix	TDS3052	B017447	2009.08

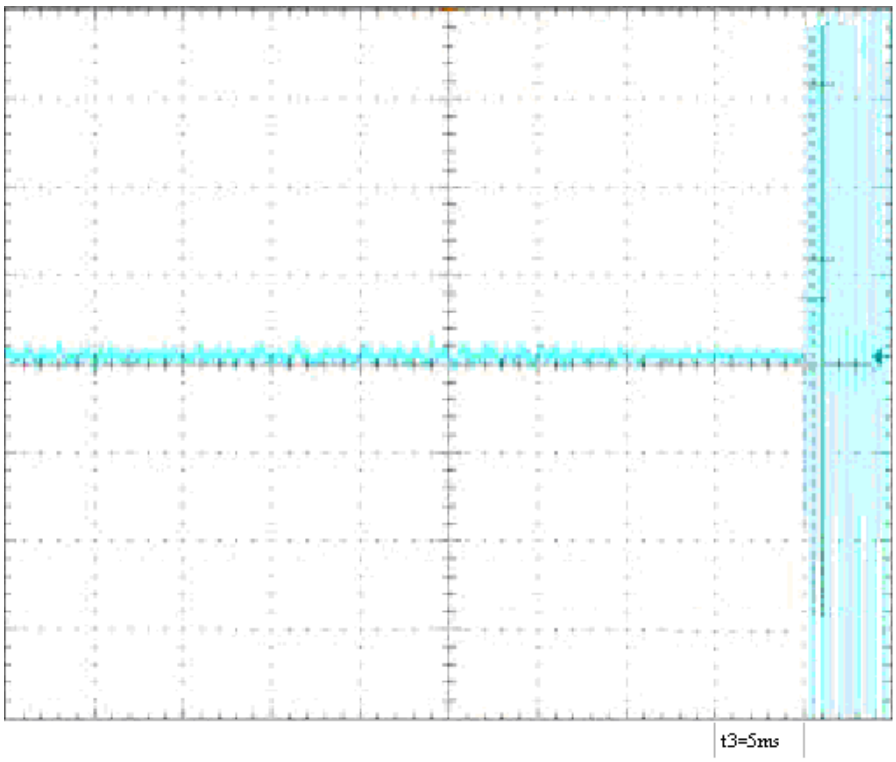
11.4 MEASURE RESULT

VHF (136MHZ-174MHZ):

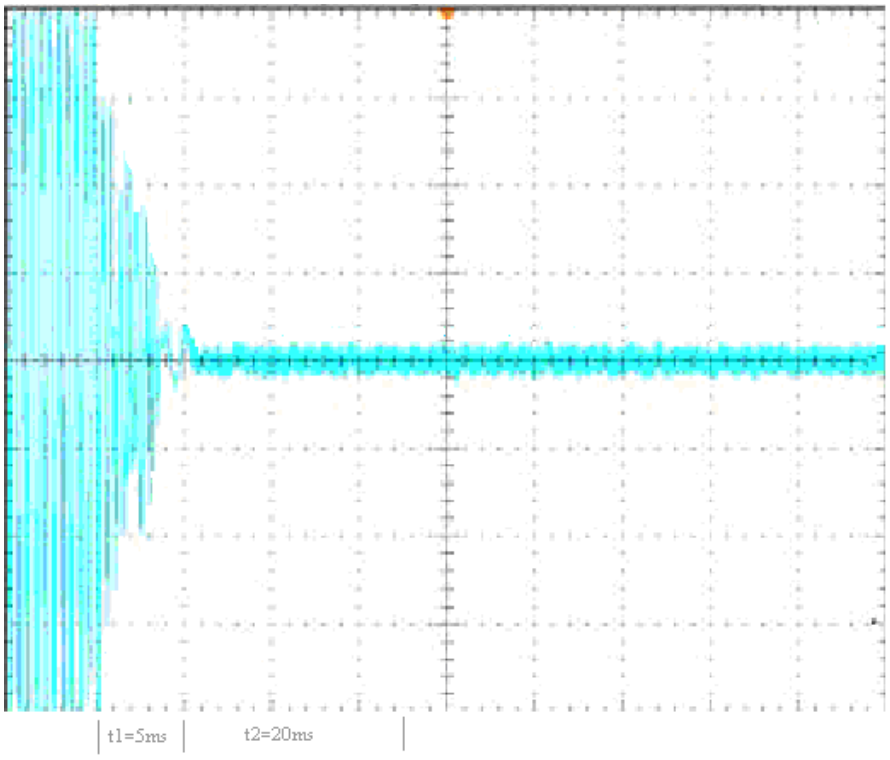
Transmitter Frequency Behavior @ 25 KHz Channel Separation--Off to On



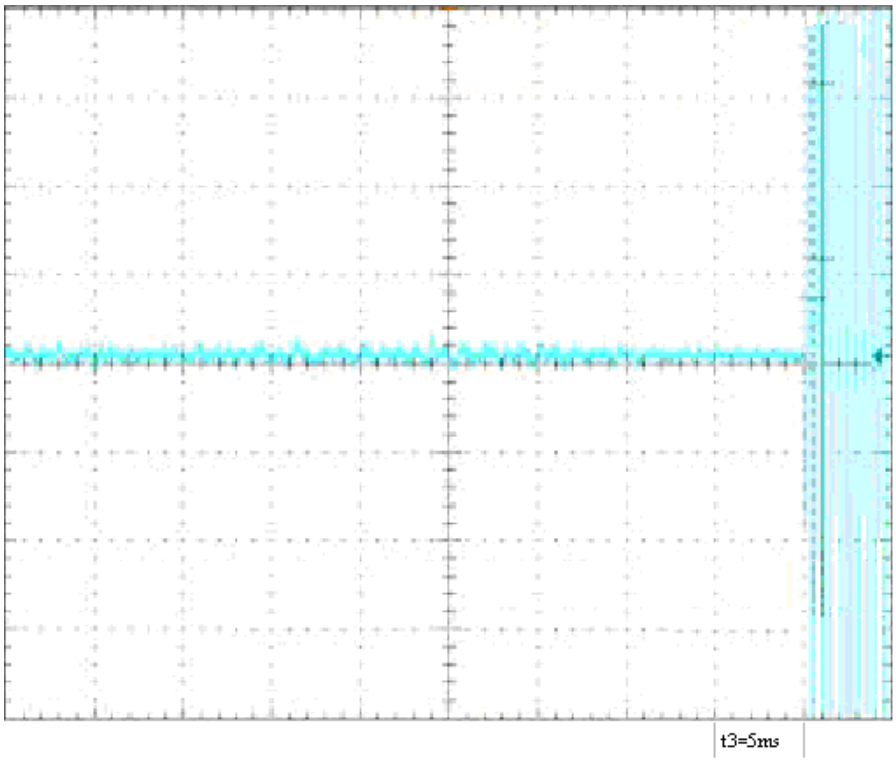
Transmitter Frequency Behaviour @ 25 KHz Channel Separation--On to Off



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

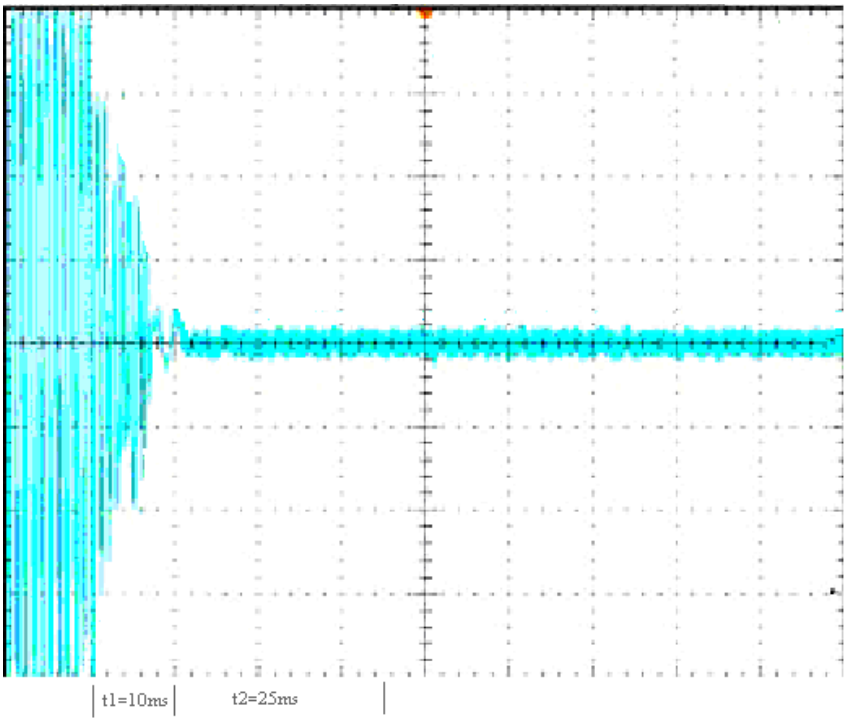


Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation--On to Off

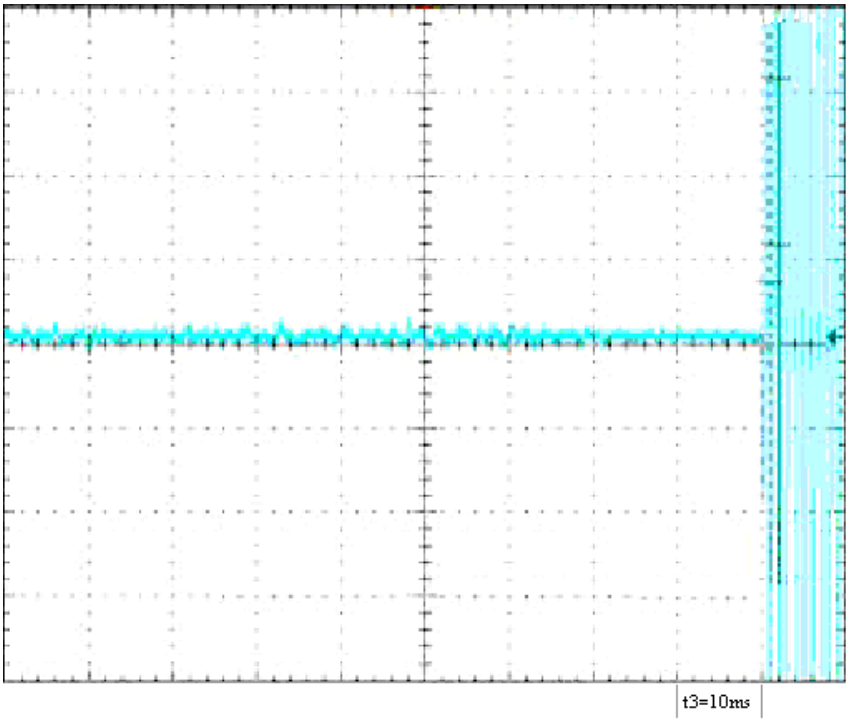


UHF (400MHZ-470MHZ)

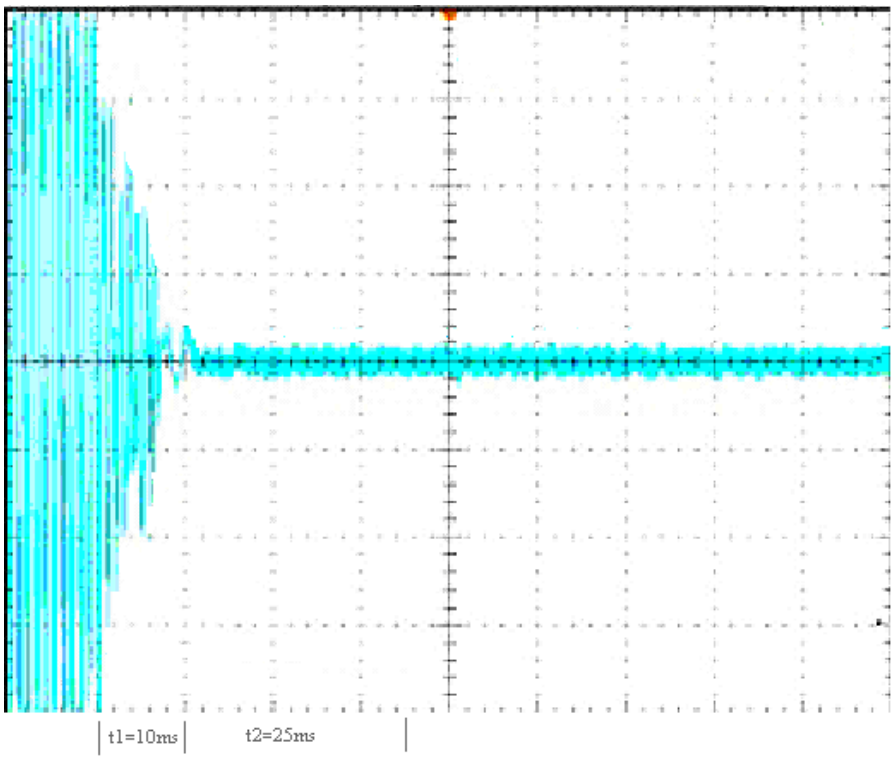
Transmitter Frequency Behavior @ 25 KHz Channel Separation--Off to On



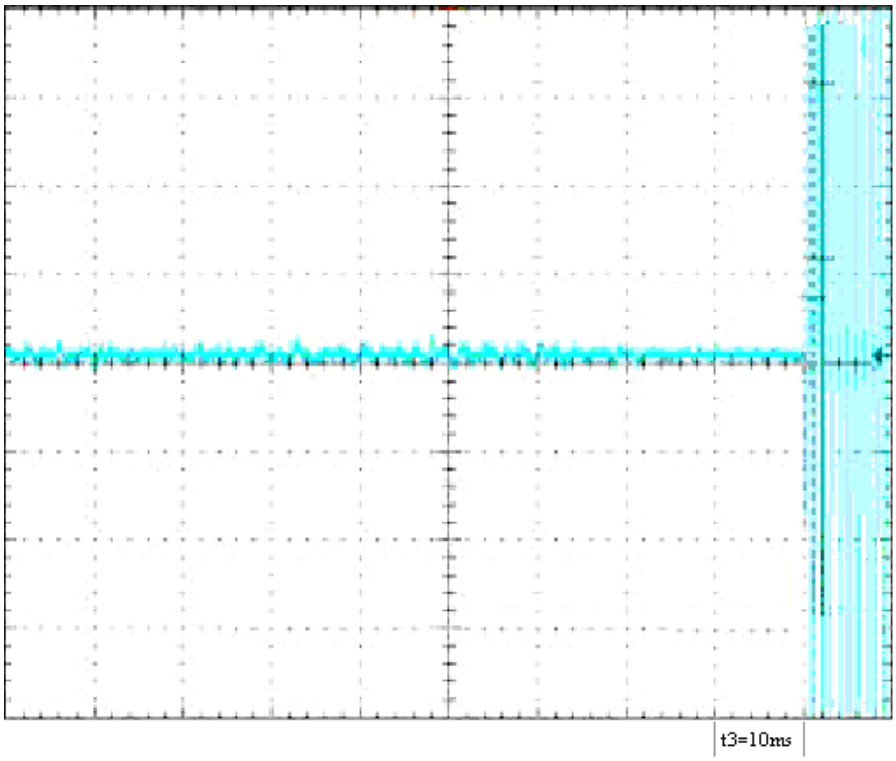
Transmitter Frequency Behaviour @ 25 KHz Channel Separation--On to Off



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



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



12. Radiated Emission on Receiving Mode

12.1 PROVISIONS APPLICABLE

FCC Part 15 Subpart B Section 15.109

12.2 TEST METHOD

ANSI C 63.4: 2003

12.3 TEST INSTRUMENTS

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
SPECTRUM ANALYZER	AGILENT	E4440A	US44300399	2008.06
TEST RECEIVER	R&S	ESIB26	A0304218	2008.06
LOOP ANTENNA	R&S	HFH2-Z2	A0304220	2008.06
HORN ANT.	R&S	HF906	100150	2008.06
BROADBAND ANT.	R&S	HL562	A0304224	2008.06

12.4 MEASURE RESULT (MEASURED AT 3M USING FCC PART15 B LIMITS)

RADIATED EMISSION TEST RESULTS – HORIZONTAL

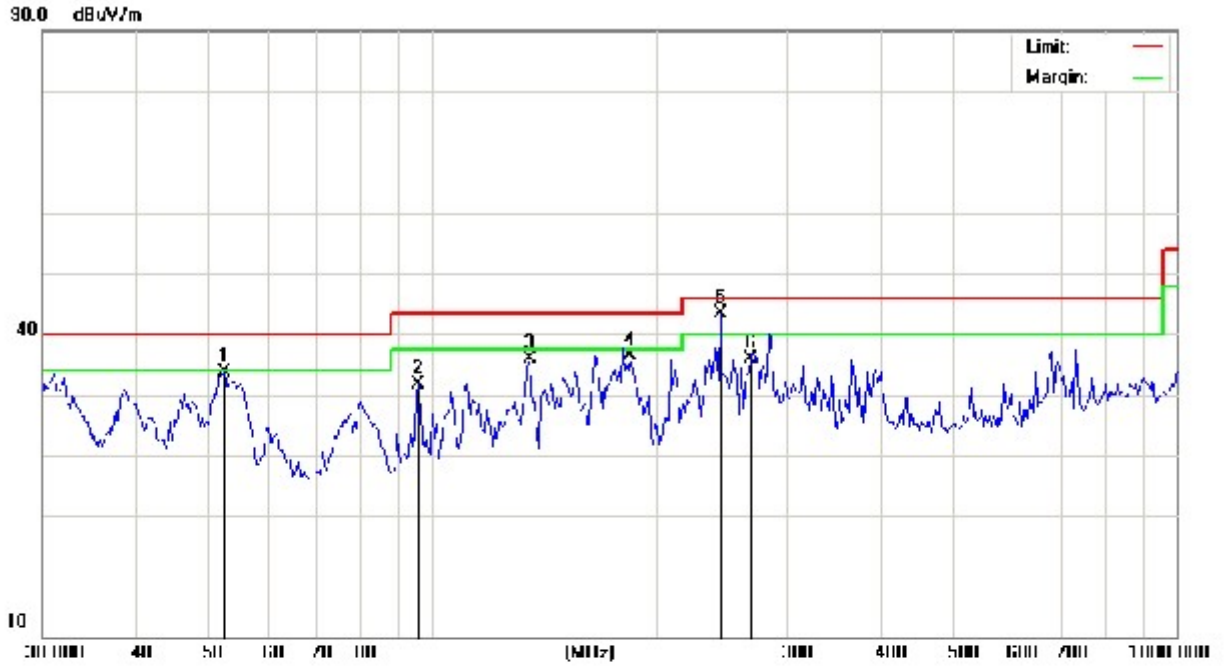
Site 966 Chamber #1
Limit: FCC Part15 RE-Class B_30-1000MHz
EUT:
M/N:
Mode:
Note:

Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		123.6316	38.86	-4.73	34.13	43.50	-9.37	peak			
2	*	133.7510	40.15	-6.01	34.14	43.50	-9.36	peak			
3		203.8616	34.81	-6.47	28.34	43.50	-15.16	peak			
4		367.7807	35.71	-2.66	33.05	46.00	-12.95	peak			
5		529.9346	30.51	1.73	32.24	46.00	-13.76	peak			
6		637.9095	29.64	3.68	33.32	46.00	-12.68	peak			

RADIATED EMISSION TEST RESULTS – VERTICAL



Site 966 Chamber #1
Limit: FCC Part15 RE-Class B_30-1000MHz
EUT:
M/N:
Mode:
Note:

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

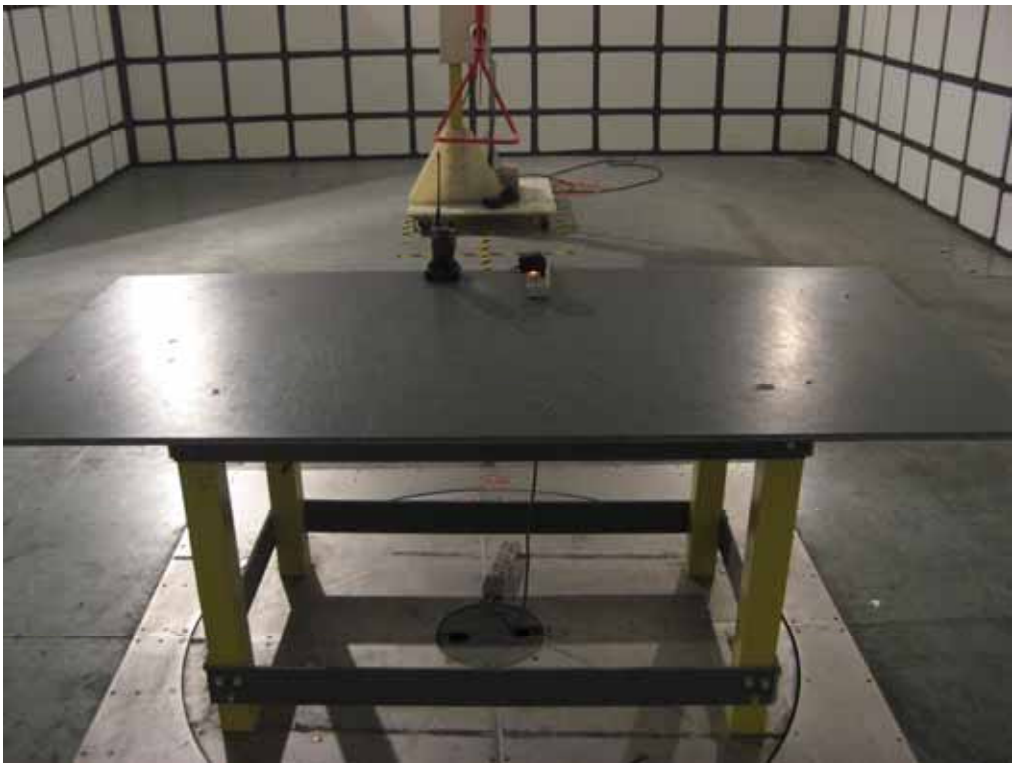
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		52.6226	45.29	-11.63	33.66	40.00	-6.34	peak			
2		96.0079	44.88	-13.13	31.75	43.50	-11.75	peak			
3		135.2627	41.26	-5.48	35.78	43.50	-7.72	peak			
4		184.2495	43.80	-7.41	36.39	43.50	-7.11	peak			
5	*	244.0236	49.58	-6.30	43.28	46.00	-2.72	peak			
6		268.4853	38.30	-2.32	35.98	46.00	-10.02	peak			

APPENDIX I

PHOTOGRAPHS OF SETUP

CONDUCTED EMISSION TEST SETUP

RADIATED TEST SETUP



EIRP TEST SETUP

APPENDIX II
EXTERNAL VIEW OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

LEFT VIEW OF EUT

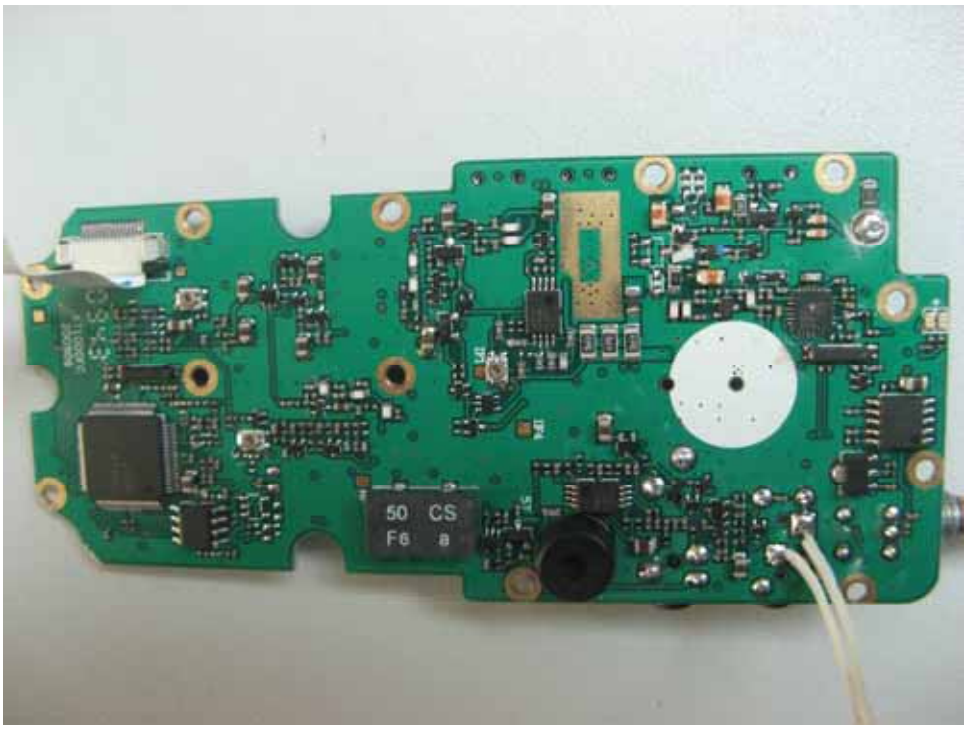
RIGHT VIEW OF EUT

FRONT VIEW OF EUT

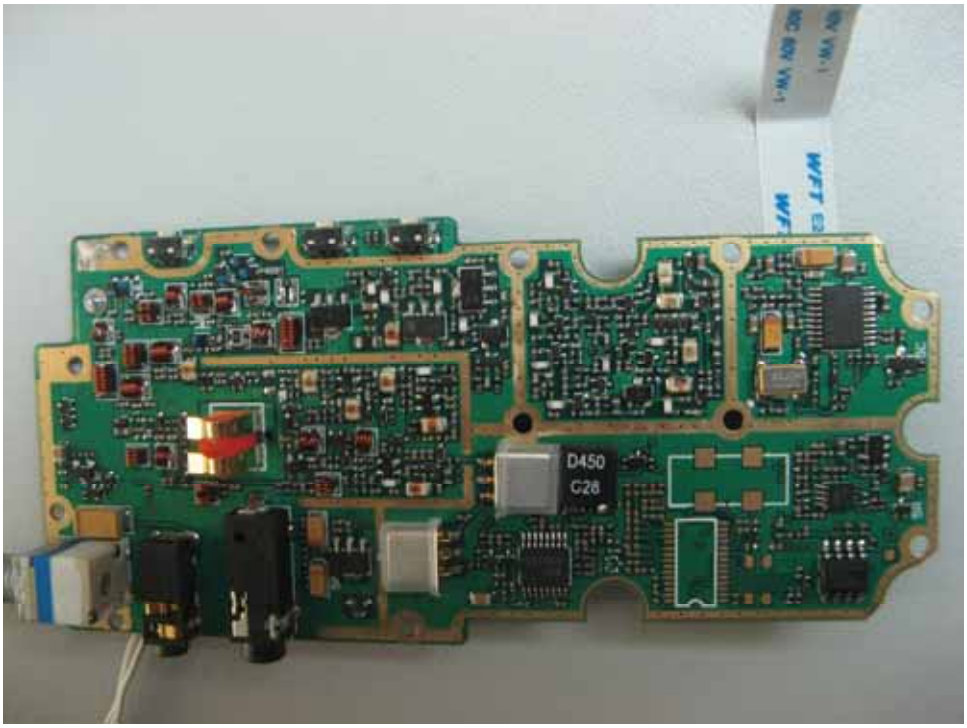
BACK VIEW OF EUT

ALL VIEW

INTERNAL VIEW OF EUT - 1



INTERNAL VIEW OF EUT - 2



INTERNAL VIEWOF EUT-3

INTERNAL VIEW OF EUT-4

----END OF REPORT----