FCC Part 90 & RSS-119

TEST REPORT

For

Repeater (Base Station)

Model Name: TR-800U(1)

Trade Name: HYT

FCC ID: R74TR-800U1, IC: 5465A-TR800U1

Report No.: SZAGC003080102E6

Date of Issue:Jan.25, 2007

Prepared For

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VERIFICATION OF COMPLIANCE

Applicant:	SHENZHEN HYT SCIENCE & TECHNOLOGY CO., LTD. HYT Tower, Shenzhen Hi-Tech Industrial Park North, Beihuan Rd., Nanshan District, Shenzhen, P.R.C.
Manufacturer:	SHENZHEN HYT SCIENCE & TECHNOLOGY CO., LTD. HYT Tower, Shenzhen Hi-Tech Industrial Park North, Beihuan Rd., Nanshan District, Shenzhen, P.R.C.
Product Description:	Repeater (Base Station)
Brand Name:	HYT
Model Number:	TR-800U(1)
Serial Number:	N/A
File Number:	SZAGC003080102E6
Date of Test:	Jan.01 2008 ~ Jan.25, 2008

We hereby certify that:

The above equipment was tested by Shenzhen Attestation of Global Compliance Science & Technology Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C 63.4:2003 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.

Prepared By: Tony Tian

Tony Tian Jan.25, 2007

Checked By: Randy He

Randy He Jan.25, 2007

Authorized By King Zhang

King Zhang Jan.25, 2007

CONTENTS

1. GENERAL INFORMATION

1.1 Product Description

The EUT is a single channel Repeater 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:

Communication Type	Voice / Tone only
Modulation	FM
Emission Type	16K0F3E (2M+2D, M=3, D=5.0, NB=16KHz for 12.5 KHz separation) 11K0F3E (2M+2D, M=3, D=2.5, NB=11KHz for 25.0 KHz separation)
Emission Bandwidth	10.50 KHz (Limit:11.25 KHz for 12.5 KHz channel separation)
	15.70 KHz (Limit: 20 KHz for 25 KHz channel Separation)
Peak Frequency Deviation	1.99 KHz for 12.5 KHz Channel Separation (Limit<±2.5 KHz)
	4.00 KHz for 25 KHz Channel Separation (Limit<±5 KHz)
Audio Frequency Response	2.8 KHz (Limit<3.125 KHz)
Maximum Transmitter Power	46.42 W for 12.5 KHz Channel Separation
	46.43 W for 25 KHz Channel Separation
Output power Modification	Fixed can’t be changed
Antenna Designation	Detachable
Power Supply	AC 120V / 60 Hz
Operation Frequency Range and Channel	Frequency Range: 400 MHz to 470 MHz Channel Separation: 12.5 KHz and 25.0 KHz
	Top Channel: 405.875 MHz
	Centre Channel: 440.875 MHz
	Bottom Channel: 469.875 MHz

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: R74TR-800U1** and **IC: 5465A-TR800U1** filing to comply with the FCC Part 90 requirements and RS-119 requirements.

1.3 Test Methodology

The radiated emission testing was performed according to the procedures of ANSI C63.4 : 2003;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 (Accurate Technology Co., Ltd.) used to collect the radio test data is located on the address of F1, Bldg.A, Changyuan New Material Port, Keyuan Rd., Science & Industry ParK, Nanshan District, Shenzhen 518057, China

The registration number is 253065. The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003.

The open area test site Industry Canada number: 5077

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	Series No.	Note
1	Repeater	TR-800U(1)	FCC ID: R74TR-800U1 IC:5465A-TC800U1	N/A	EUT
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3. SUMMARY OF TEST RESULTS

FCC Rules	RS-119	Description Of Test	Result
§15.207	RS-Gen	Conducted Emission	Compliant
§90.205	§5.4	Maximum Transmitter Power	Compliant
§90.207	§5.13	Modulation Characteristic	Compliant
§90.209	§5.5	Occupied Bandwidth	Compliant
§90.210	§5.8	Emission Mask	Compliant
§90.213	§5.3	Frequency Tolerance	Compliant
§90.214	§5.9	Transient Frequency Behavior	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under normal operating condition. Three channels (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.

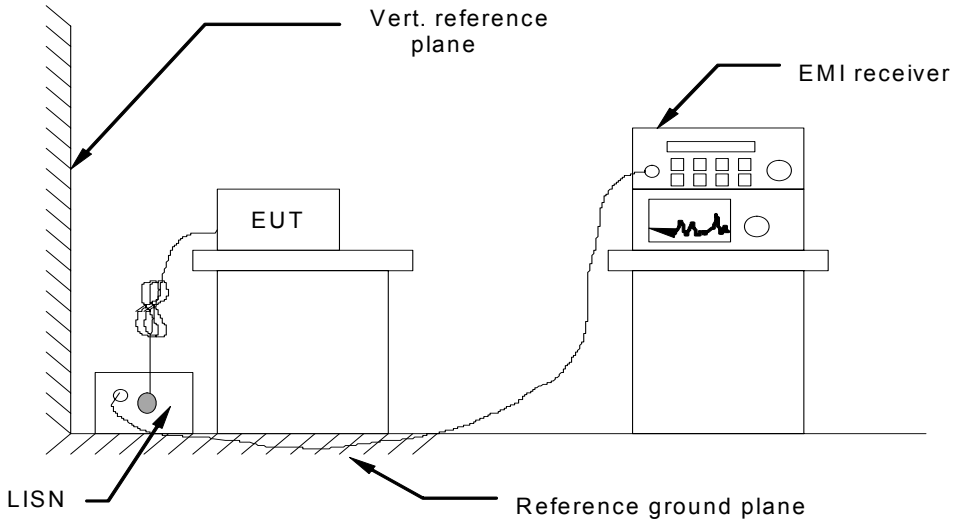
Frequency of Emission (MHz)	Conducted Limit(dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50

* 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 150 kHz 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**
EMI Test Receiver	R & S	ESPI3	100396	2007/07/13
LISN	R & S	ESH3-Z6	100132	2007/07/13

5.5 TEST RESULT

LINE CONDUCTED EMISSION TEST

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.876	37.17	---	---	56.00	46.00	-18.83	-8.83	L
2.327	36.33	---	---	56.00	46.00	-19.67	-9.67	L
4.172	41.65	---	---	56.00	46.00	-14.35	-4.35	L
8.088	42.33	---	---	60.00	50.00	-17.67	-7.67	L
12.618	41.17	---	---	60.00	50.00	-18.83	-8.83	L
0.895	36.87	---	---	56.00	46.00	-19.13	-9.13	N
2.377	37.73	---	---	56.00	46.00	-18.27	-8.27	N
4.217	41.29	---	---	56.00	46.00	-14.71	-4.71	N
8.486	43.24	---	---	60.00	50.00	-16.76	-6.76	N
12.501	43.19	---	---	60.00	50.00	-16.81	-6.81	N

**NOTE:

“---” denotes the peak emission level was or more than 2dB below the Average limit, so no re-check anymore.

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

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 +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 manufacture.

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 50℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

6.2.2 Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used. The EUT shall be powered by AC 120V/60Hz
2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz 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

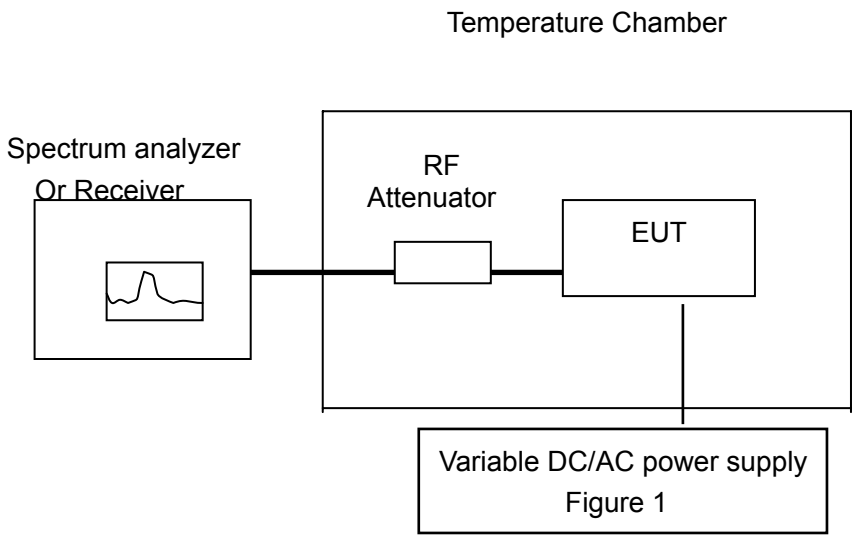


Figure 1

6.4 Test equipment used:

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
EMI TEST RECEIVER	R & S	ESCS 30	100307	2007.07.13
Climate Chamber	ESPEC	EL-10KA	05107008	2007.07.13

6.5 Test result

(1) Frequency stability versus input voltage

Measurement Result for Channel Separation of 12.5 KHz

Channel		Reference Frequency (MHz)	Tested Frequency (MHz)	Frequency Deviation (ppm)	Limit (ppm)
Bottom Channel	AC 138 V	405.875	405.874833	-0.41	2.5
	AC 120 V		405.874820	-0.44	
	AC 102 V		405.874807	-0.48	
Middle Channel	AC 138 V	440.875	440.874828	-0.39	2.5
	AC 120 V		440.874816	-0.42	
	AC 102 V		440.874806	-0.44	
Top Channel	AC 138 V	469.875	469.874827	-0.37	2.5
	AC 120 V		469.874813	-0.40	
	AC 102 V		469.874824	-0.42	

Measurement Result for Channel Separation of 25KHz

Channel		Reference Frequency (MHz)	Tested Frequency (MHz)	Frequency Deviation (ppm)	Limit (ppm)
Bottom Channel	AC 138 V	405.875	405.874825	-0.43	5.0
	AC 120 V		405.874813	-0.46	
	AC 102 V		405.874799	-0.50	
Top Channel	AC 138 V	440.875	440.874817	-0.42	5.0
	AC 120 V		440.874800	-0.45	
	AC 102 V		440.874789	-0.50	
Middle Channel	AC 138 V	469.875	469.874791	-0.44	5.0
	AC 120 V		469.874779	-0.47	
	AC 102 V		469.874761	-0.51	

(2)Frequency stability versus ambient temperature

Bottom Channel @ 12.5 KHz Channel Separations

Reference Frequency: 405.875 MHz		Limit: ±2.5PPM	
Environment Temperature (℃)	Power Supply (V)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	ppm
50	AC 120V	405.874711	-0.71
40	AC 120V	405.874747	-0.62
30	AC 120V	405.874782	-0.54
20	AC 120V	405.874820	-0.44
10	AC 120V	405.874861	-0.34
0	AC 120V	405.874905	-0.23
-10	AC 120V	405.874953	-0.12
-20	AC 120V	405.874986	-0.03
-30	AC 120V	405.874992	-0.02

Middle Channel @ 12.5 KHz Channel Separations

Reference Frequency: 440.875 MHz		Limit: ±2.5PPM	
Environment Temperature (℃)	Power Supply (V)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	ppm
50	AC 120V	440.874689	-0.71
40	AC 120V	440.874727	-0.62
30	AC 120V	440.874763	-0.54
20	AC 120V	440.874800	-0.45
10	AC 120V	440.874843	-0.36
0	AC 120V	440.874876	-0.28
-10	AC 120V	440.874908	-0.21
-20	AC 120V	440.874951	-0.11
-30	AC 120V	440.874987	-0.03

Top Channel @ 12.5KHz Channel Separation

Reference Frequency: 469.875 MHz		Limit: ±2.5PPM	
Environment Temperature (℃)	Power Supply (V)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	ppm
50	AC 120V	469.874651	-0.74
40	AC 120V	469.874686	-0.67
30	AC 120V	469.874733	-0.57
20	AC 120V	469.874779	-0.47
10	AC 120V	469.874817	-0.39
0	AC 120V	469.874858	-0.30
-10	AC 120V	469.874893	-0.23
-20	AC 120V	469.874938	-0.13
-30	AC 120V	469.874983	-0.04

Bottom Channel @ 25 KHz Channel Separation

Reference Frequency: 405.875 MHz			Limit: ±0.0005%
Environment Temperature (℃)	Power Supply (V)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	ppm
50	AC 120V	405.874669	-0.82
40	AC 120V	405.874723	-0.68
30	AC 120V	405.874774	-0.56
20	AC 120V	405.874820	-0.44
10	AC 120V	405.874876	-0.31
0	AC 120V	405.874928	-0.18
-10	AC 120V	405.874972	-0.07
-20	AC 120V	405.875021	0.05
-30	AC 120V	405.875061	0.15

Middle Channel @ 25 KHz Channel Separations

Reference Frequency: 440.875 MHz			Limit: ±0.0005%
Environment Temperature (℃)	Power Supply (V)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	ppm
50	AC 120V	440.874651	-0.79
40	AC 120V	440.874706	-0.67
30	AC 120V	440.874756	-0.55
20	AC 120V	440.874800	-0.45
10	AC 120V	440.874847	-0.35
0	AC 120V	440.874902	-0.22
-10	AC 120V	440.874958	-0.10
-20	AC 120V	440.875002	0.00
-30	AC 120V	440.875051	0.12

Top Channel @ 25 KHz Channel Separation

Reference Frequency: 469.875 MHz		Limit: ±0.0005%	
Environment Temperature (℃)	Power Supply (V)	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	ppm
50	AC 120V	469.874653	-0.74
40	AC 120V	469.874711	-0.62
30	AC 120V	469.874765	-0.50
20	AC 120V	469.874813	-0.40
10	AC 120V	469.874864	-0.29
0	AC 120V	469.874912	-0.19
-10	AC 120V	469.874960	-0.09
-20	AC 120V	469.875013	0.03
-30	AC 120V	469.875061	0.13

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

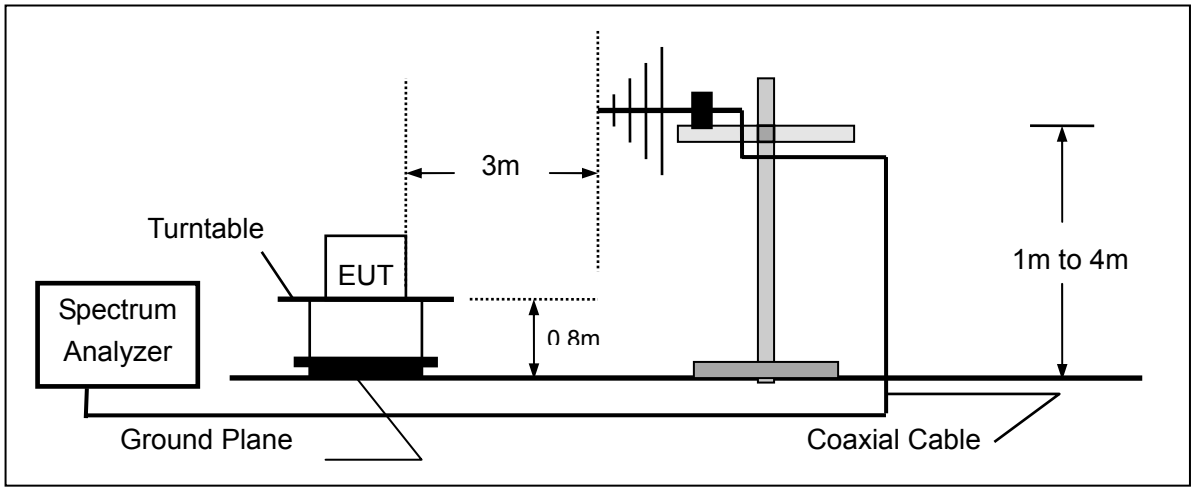
1). The EUT was placed on a turn table which is 0.8m above ground plane.

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



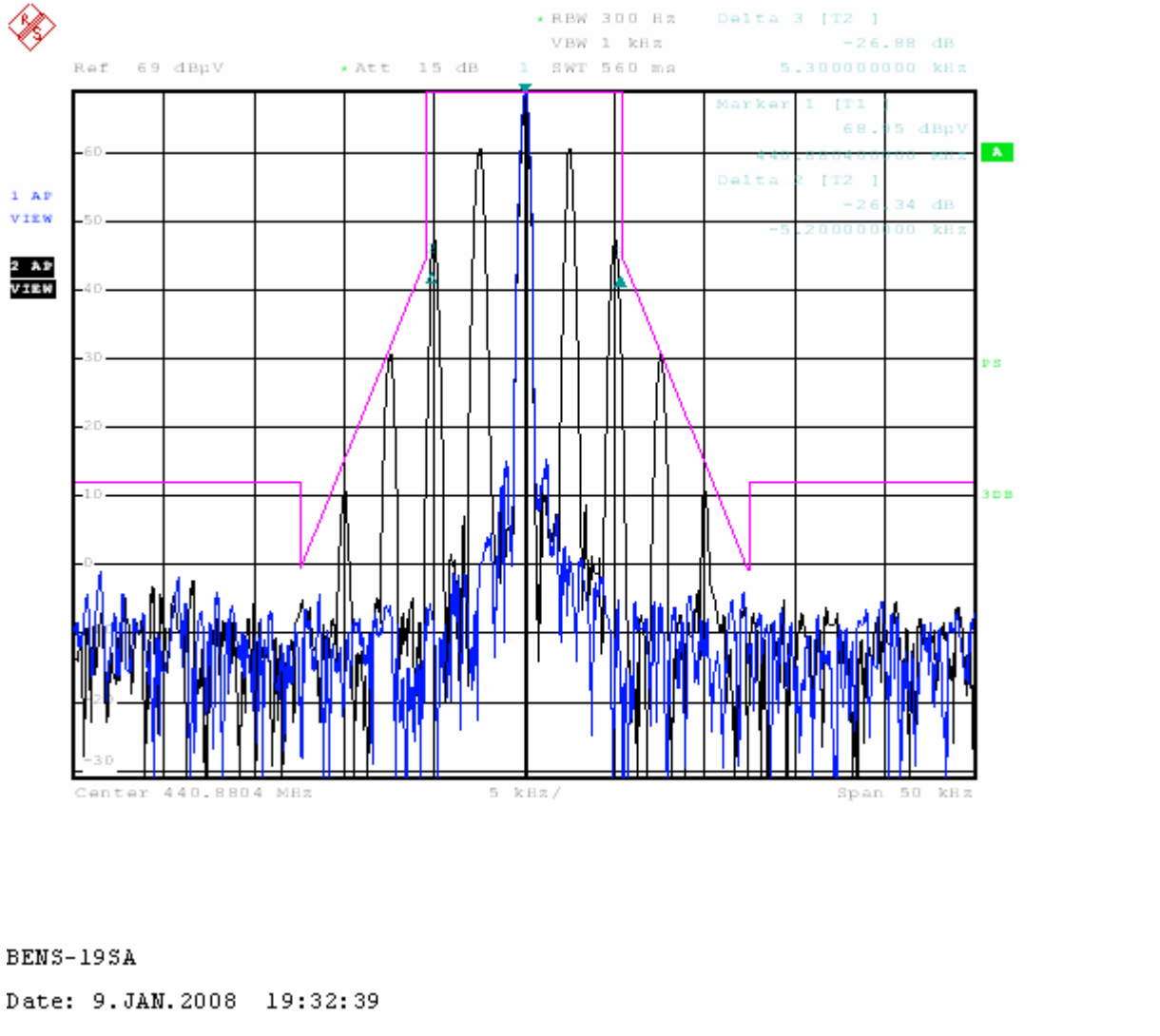
7.4 Measurement Equipment Used:

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
EMI Test Receiver	R&S	ESPI	100396	04/16/2007
ANTENNA	Schwarzbeck	VULB9163	9163-194	2007/07/13

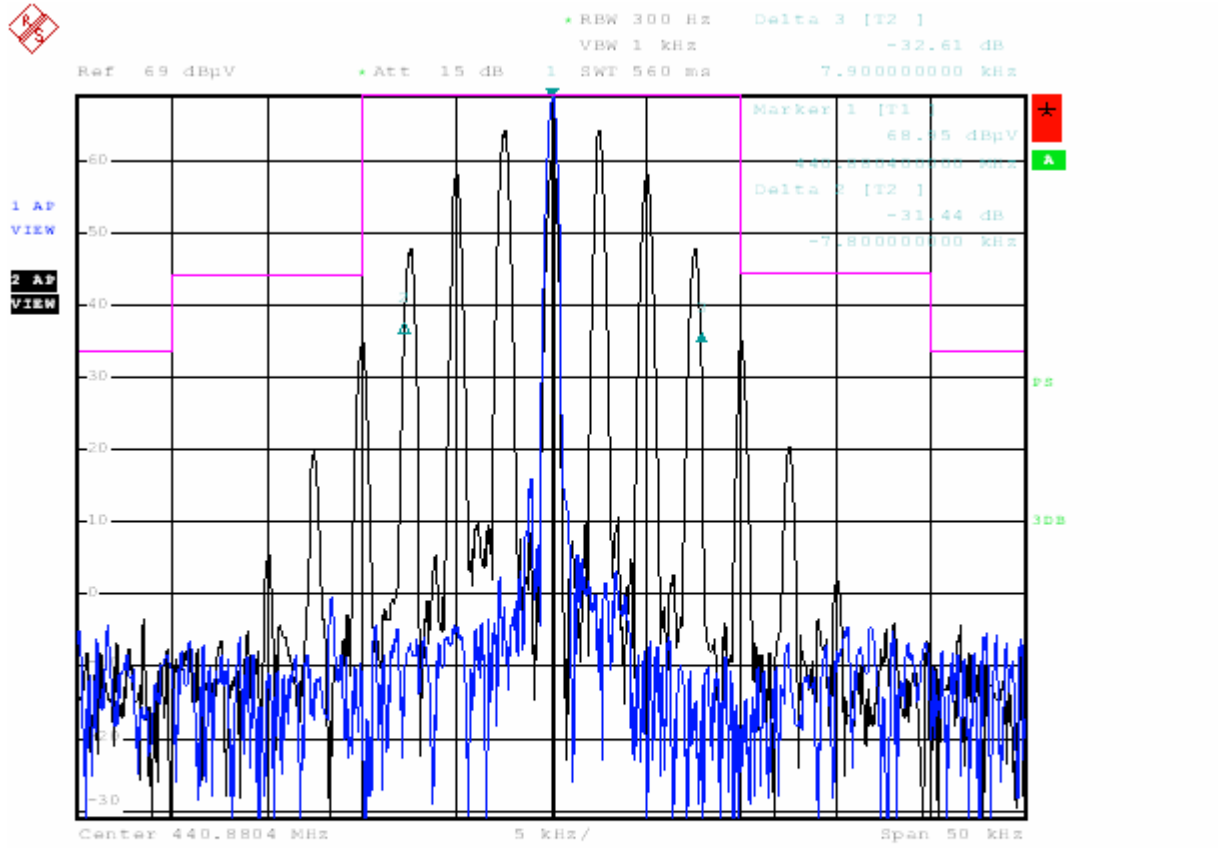
7.5 MEASUREMENT RESULT:

26 dB Bandwidth Measurement Result						
Operating Frequency	12.5 KHz Channel Separation			25 KHz Channel Separation		
	Test Data	Limits	Result	Test Data	Limits	Result
Bottom Channel	10.42KHz	11.25 KHz	Pass	15.61 KHz	20.00 KHz	Pass
Middle Channel	10.50 KHz	11.25 KHz	Pass	15.70 KHz	20.00 KHz	Pass
Top Channel	10.47 KHz	11.25 KHz	Pass	15.65 KHz	20.00 KHz	Pass

Occupied bandwidth of Middle Channel @ 12.5KHz Channel Separation



Occupied bandwidth of Middle Channel @ 25 KHz Channel Separation



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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 25KHz 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.

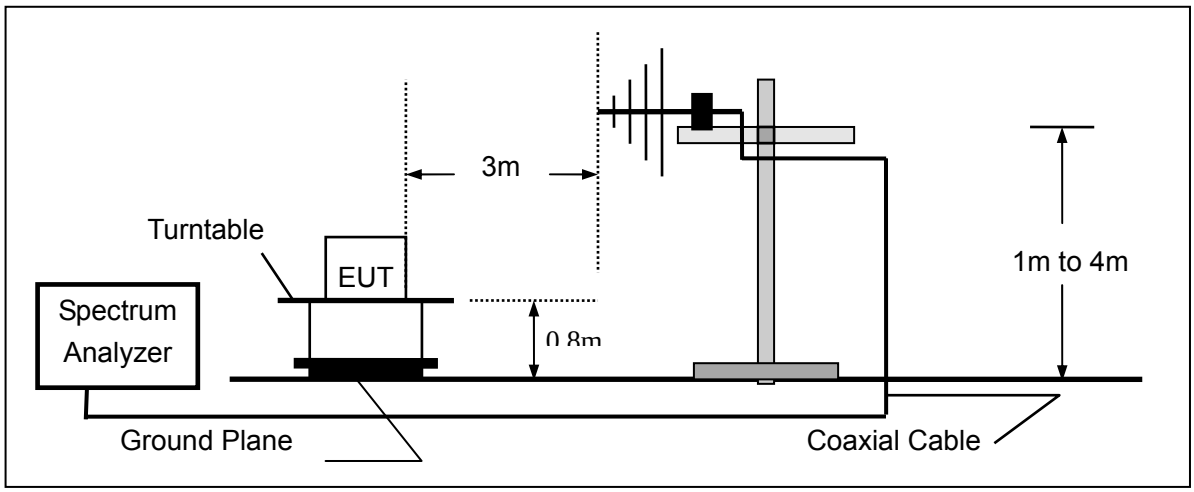
(7). The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.

(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.

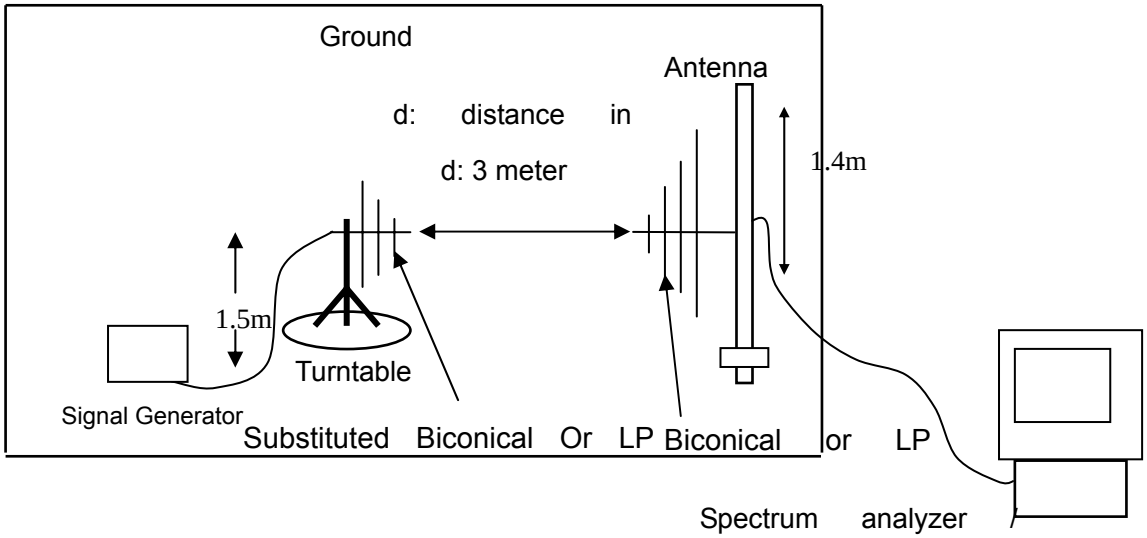
(10). Replace the antenna with a proper Antenna (substitution antenna).
(11). The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
(12). The substitution antenna 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

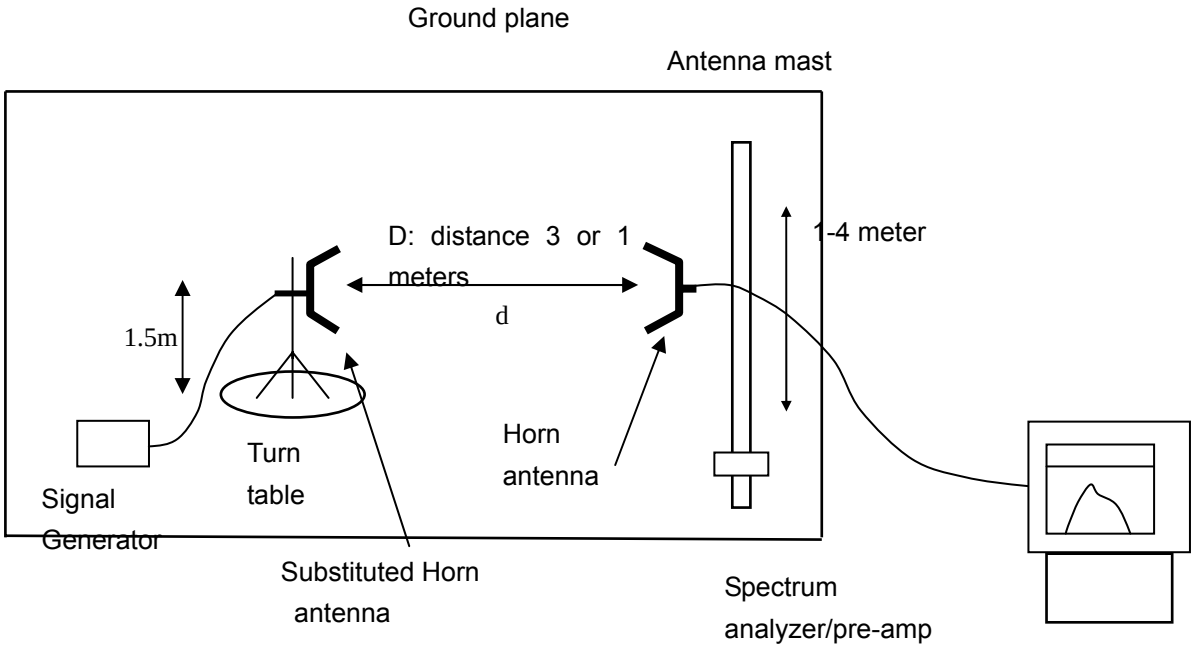


SUBSTITUTION METHOD: (Radiated Emissions)

Radiated Below 1GHz



Radiated Above 1 GHz



8.4 Measurement Equipment Used:

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
EMI Test Receiver	R&S	ESCS30	100343	2007/07/13
AMPLIFIER	HP	HP8447E	2945A02715	2007/07/13
ANTENNA	Schwarzbeck	VULB9163	9163-194	2007/07/13

8.5 MEASUREMENT RESULTS:

Measurement Result for 12.5 KHz Channel Separation

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 10*log10(P*1000) dBm.

Limit (dBm)= 10*log10(P*1000)-50-10log 10 (50) = -20 dBm

Bottom Channel

Frequency (MHz)	Reading level (dBuV)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Correction (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
30MHz – 1GHz	--	--	--	--	--	--	-20	--
1GHz – 6GHz	--	--	--	--	--	--	-20	--

Middle Channel

Frequency (MHz)	Reading level (dBuV)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Correction (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
30MHz – 1GHz	--	--	--	--	--	--	-20	--
1GHz – 6GHz	--	--	--	--	--	--	-20	--

Top Channel

Frequency (MHz)	Reading level (dBuV)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Correction (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
30MHz – 1GHz	--	--	--	--	--	--	-20	--
1GHz – 6GHz	--	--	--	--	--	--	-20	--

Notes:

"—" means that the emission level is too low to be measured or at least 20 dB down than the limit.

Measurement Result For 25 KHz Channel Separation

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 10log10(P) dBm.

Limit (dBm)=10log10(P) - 43-10log 10 (P) = -13 dBm

Bottom Channel

Frequency (MHz)	Reading level (dBuV)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Correction (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
30MHz – 1GHz	--	--	--	--	--	--	-13	--
1GHz – 6GHz	--	--	--	--	--	--	-13	--

Middle Channel

Frequency (MHz)	Reading level (dBuV)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Correction (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
30MHz – 1GHz	--	--	--	--	--	--	-13	--
1GHz – 6GHz	--	--	--	--	--	--	-13	--

Top Channel

Frequency (MHz)	Reading level (dBuV)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Correction (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
30MHz – 1GHz	--	--	--	--	--	--	-13	--
1GHz – 6GHz	--	--	--	--	--	--	-13	--

Notes:

"—" means that the emission level is too low to be measured or at least 20 dB down than the limit.

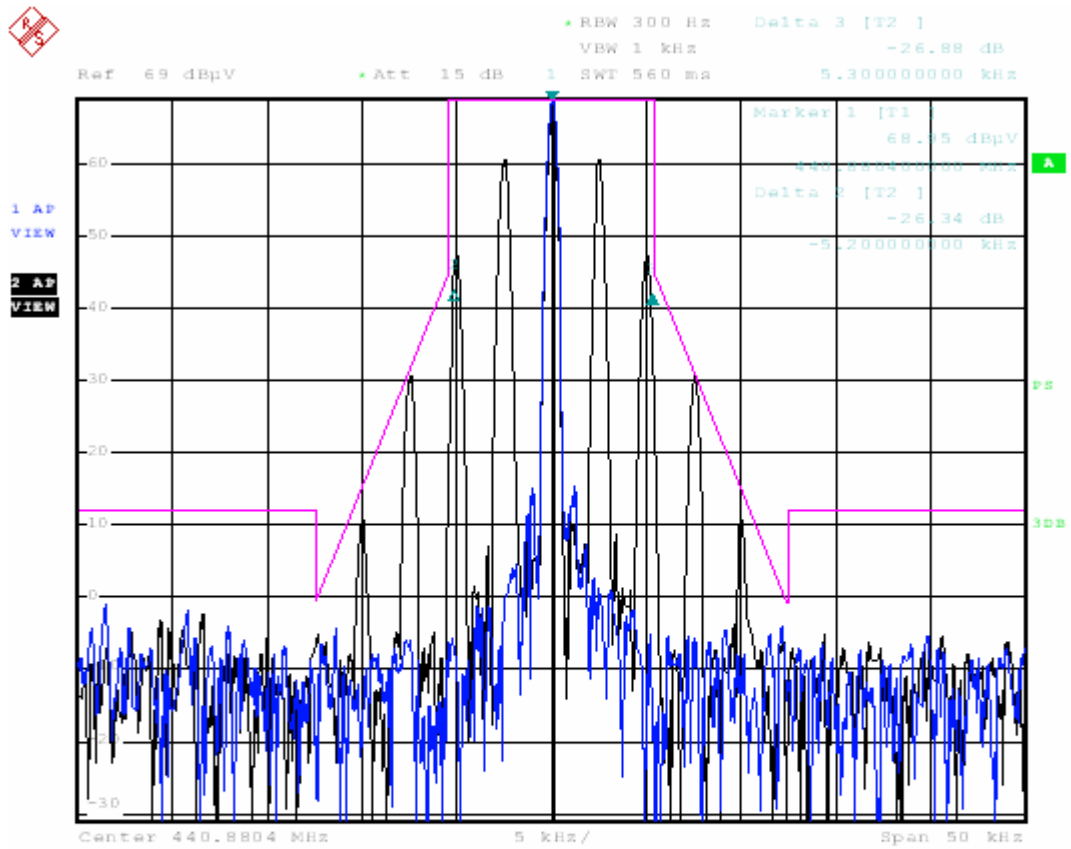
8.6 Emission Mask Plot

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)

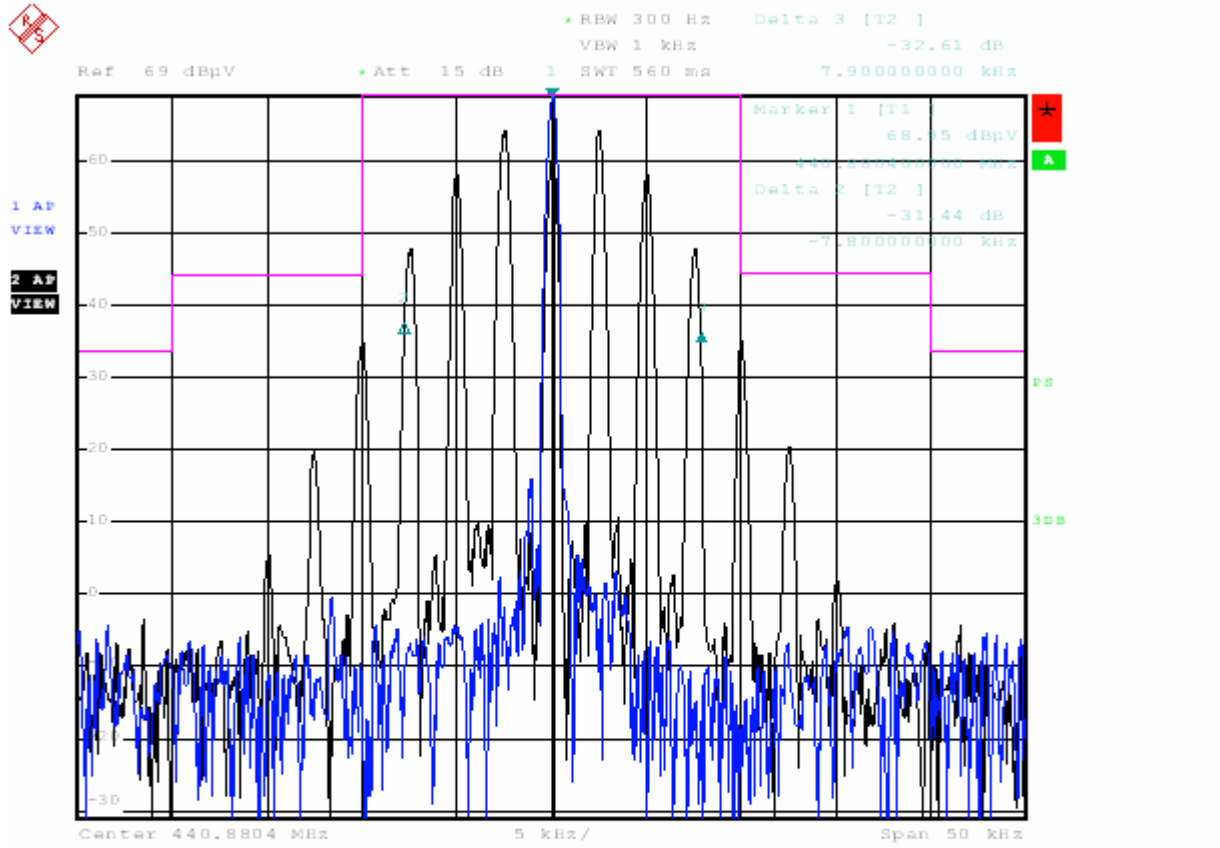
The Worst Emission Mask for 12.5 KHz channel Separation



BENS-19SA

Date: 9.JAN.2008 19:32:39

The Worst Emission Mask for 25 KHz channel Separation



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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 1KHz reference).

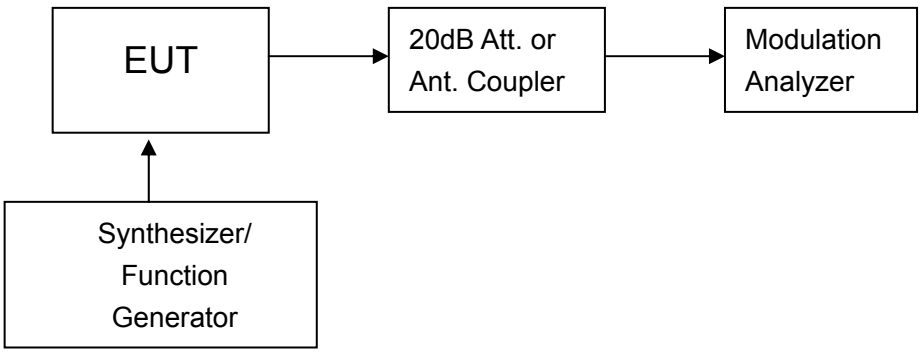


Figure 1: Modulation characteristic measurement configuration

9.3 Measurement Instruments

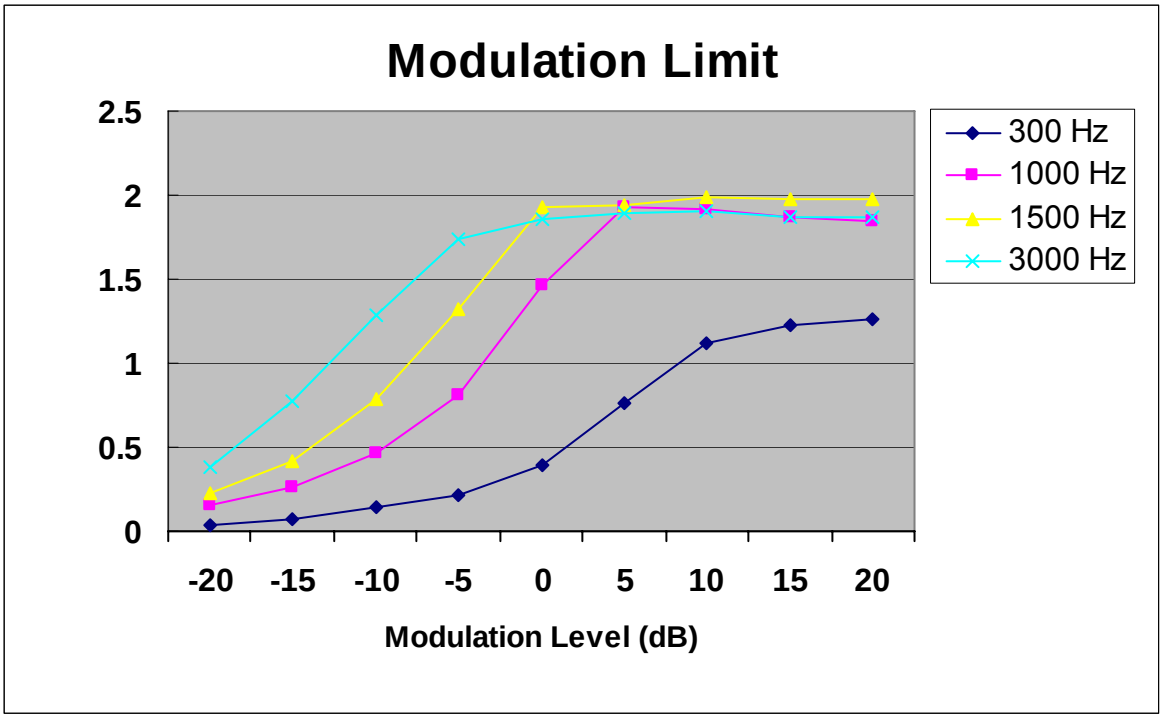
NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
RF COMMUNICATIONS TEST SET	HP	8920B	US35010161	2007-12-12

9.4 Measurement Result

(a). Modulation Limit:

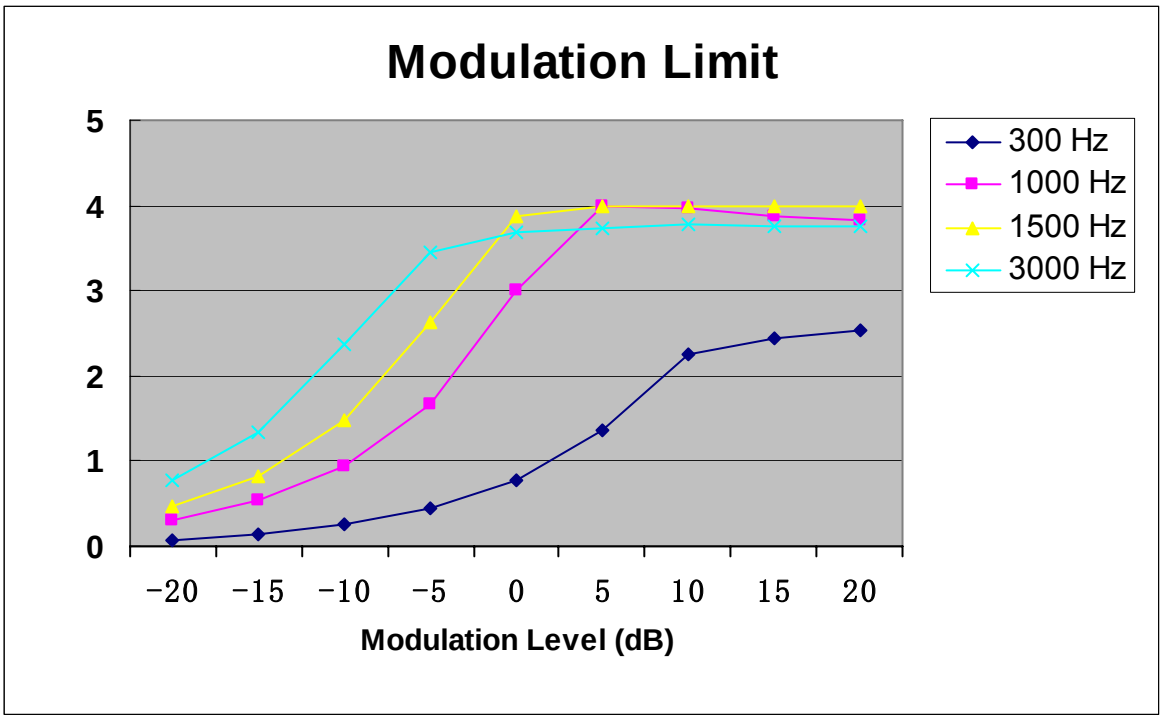
Middle Channel @ 12.5 KHz Channel Separations

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	0.04	0.15	0.23	0.38
-15	0.07	0.26	0.42	0.77
-10	0.14	0.46	0.79	1.29
-5	0.22	0.81	1.32	1.74
0	0.39	1.46	1.93	1.86
+5	0.76	1.93	1.94	1.89
+10	1.12	1.92	1.99	1.90
+15	1.23	1.87	1.98	1.87
+20	1.26	1.84	1.98	1.87



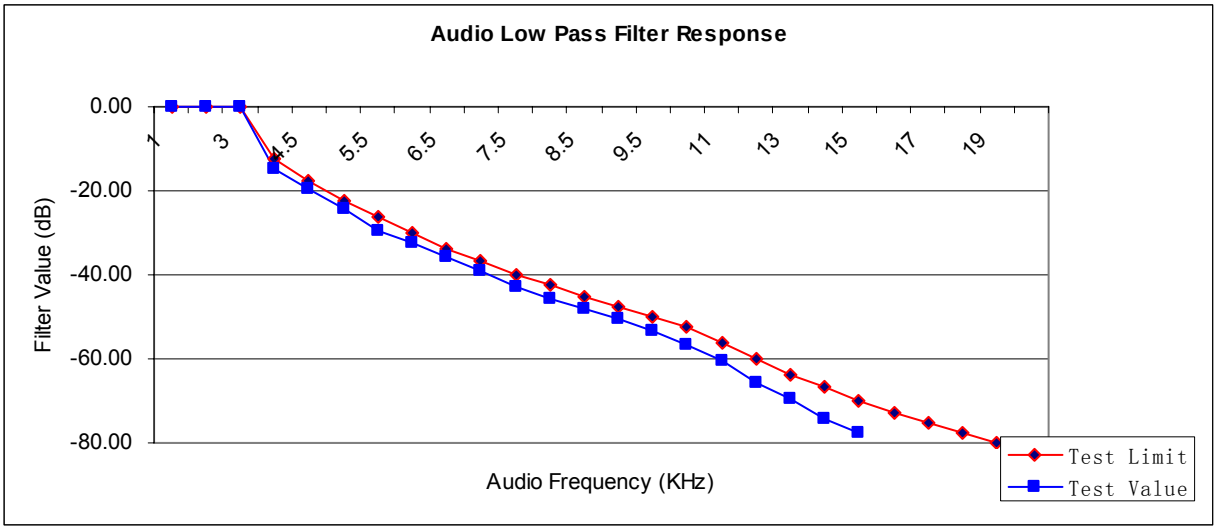
Middle Channel @ 25KHz Channel Separation

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	0.07	0.30	0.47	0.77
-15	0.15	0.53	0.83	1.34
-10	0.25	0.94	1.48	2.38
-5	0.44	1.67	2.64	3.45
0	0.78	3.00	3.87	3.68
+5	1.35	3.99	3.98	3.73
+10	2.25	3.97	4.00	3.78
+15	2.45	3.88	3.99	3.75
+20	2.53	3.83	3.99	3.76

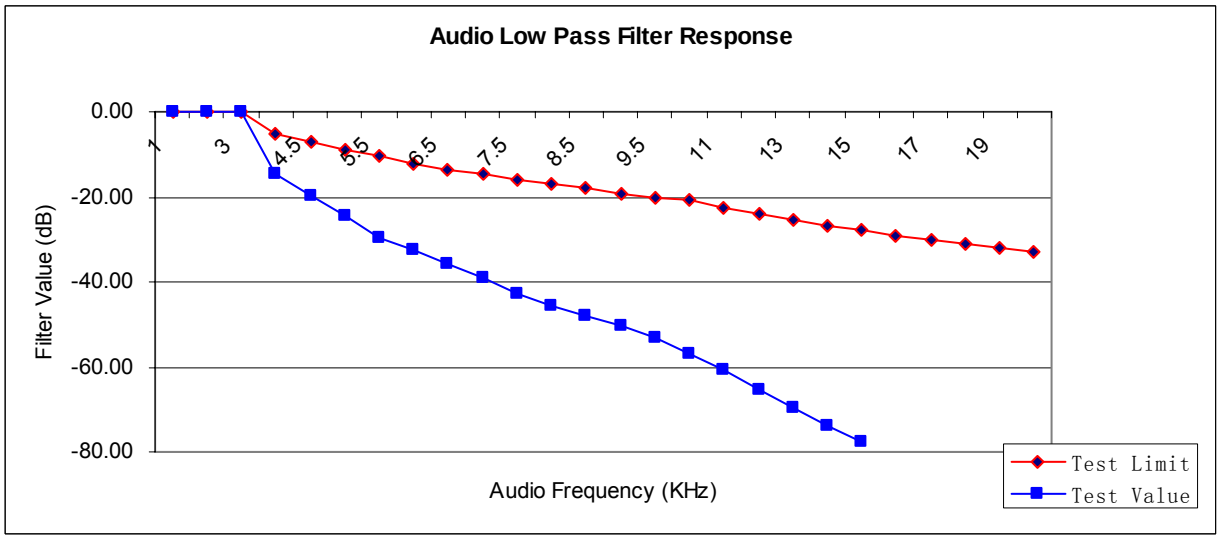


(b) Audio Low Pass Filter Response Test Plot:

Middle Channel @ 12.5 KHz Channel Separations



Middle Channel @ 25.0 KHz Channel Separations

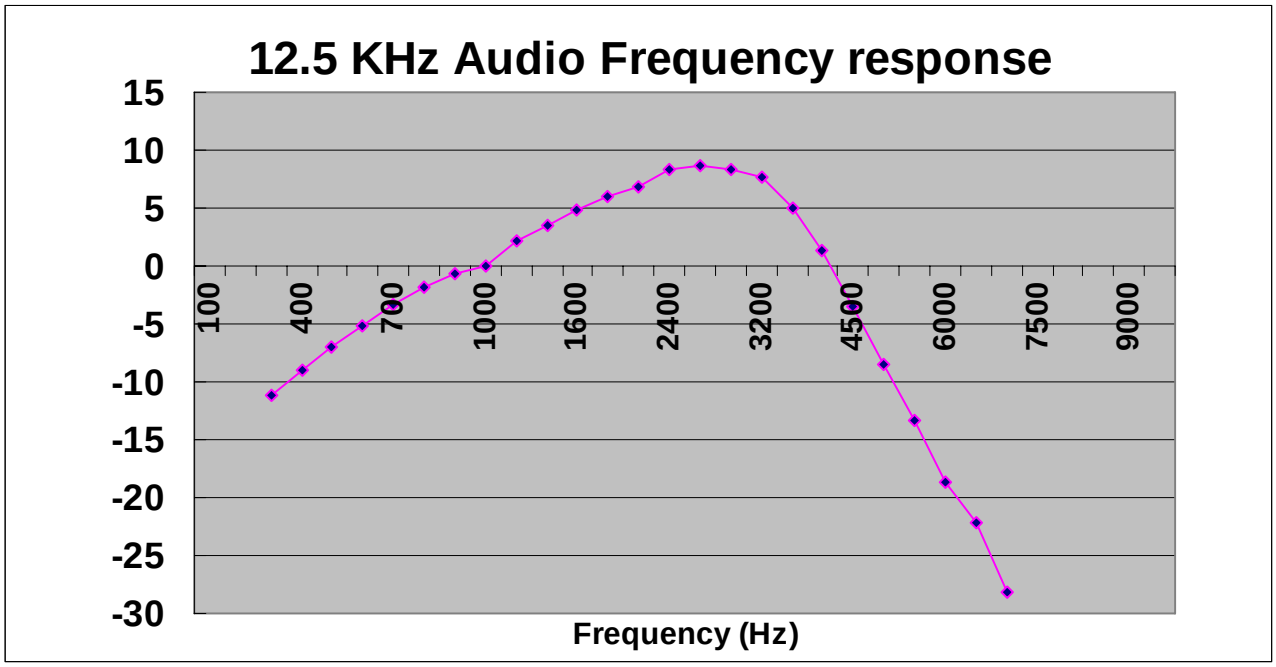


(b). Audio Frequency Response:

12.5 KHz Channel Separations

Frequency (Hz)	Deviation (KHz)
100	--
200	--
300	0.14
400	0.18
500	0.23
600	0.28
700	0.35
800	0.41
900	0.47
1000	0.51
1200	0.66
1400	0.77
1600	0.89
1800	1.01
2000	1.13
2400	1.32
2800	1.39
3000	1.34
3200	1.23
3600	0.91
4000	0.59
4500	0.34
5000	0.19
5500	0.11
6000	0.06
6500	0.04
7000	--
7500	--
8000	--
8500	--
9000	--
9500	--
10000	--

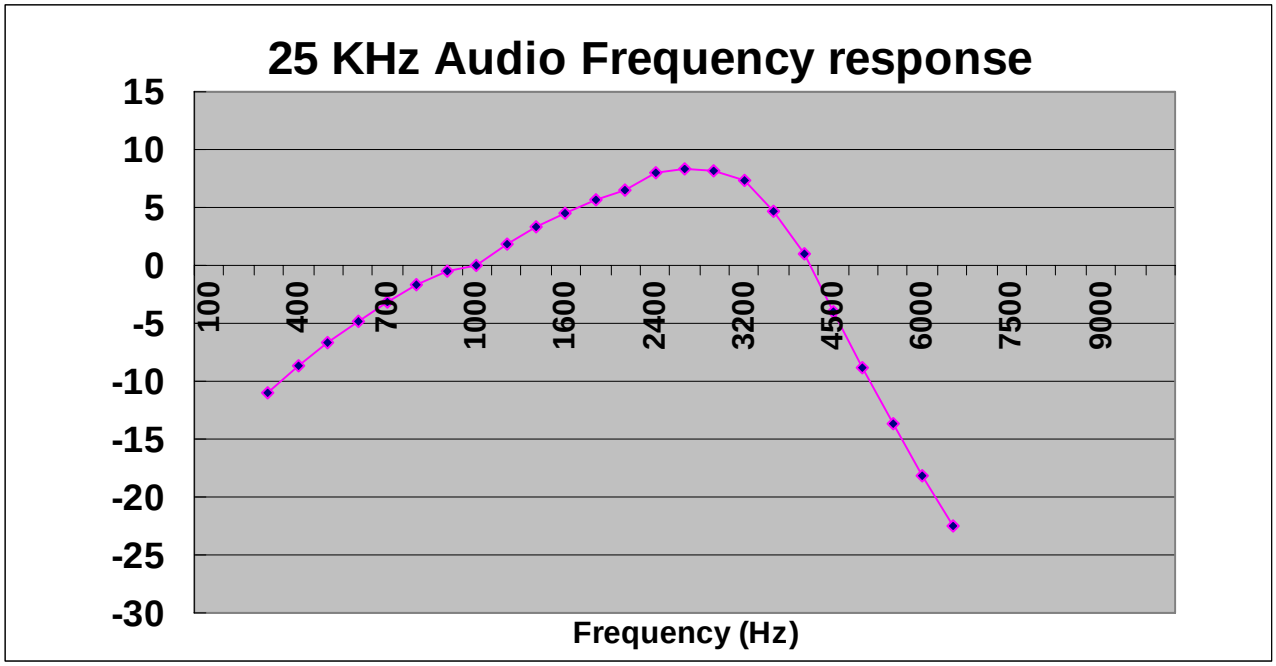
Frequency Response of Middle Channel



25 KHz Channel Separation

Frequency (Hz)	Deviation (KHz)
100	--
200	--
300	0.28
400	0.37
500	0.46
600	0.57
700	0.70
800	0.82
900	0.94
1000	1.06
1200	1.31
1400	1.55
1600	1.79
1800	2.03
2000	2.26
2400	2.64
2800	2.78
3000	2.69
3200	2.47
3600	1.82
4000	1.19
4500	0.67
5000	0.38
5500	0.22
6000	0.13
6500	0.08
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 transceiver 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	E4443A	MY45304669	04/16/2007
SPECTURM ANALYZER	AILENT	8593E	3523A01272	2007/07/13

10.4Test Result

The maximum Conducted Power (CP) is

43.85 W for 12.5 KHz Channel Separation

43.95 W 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

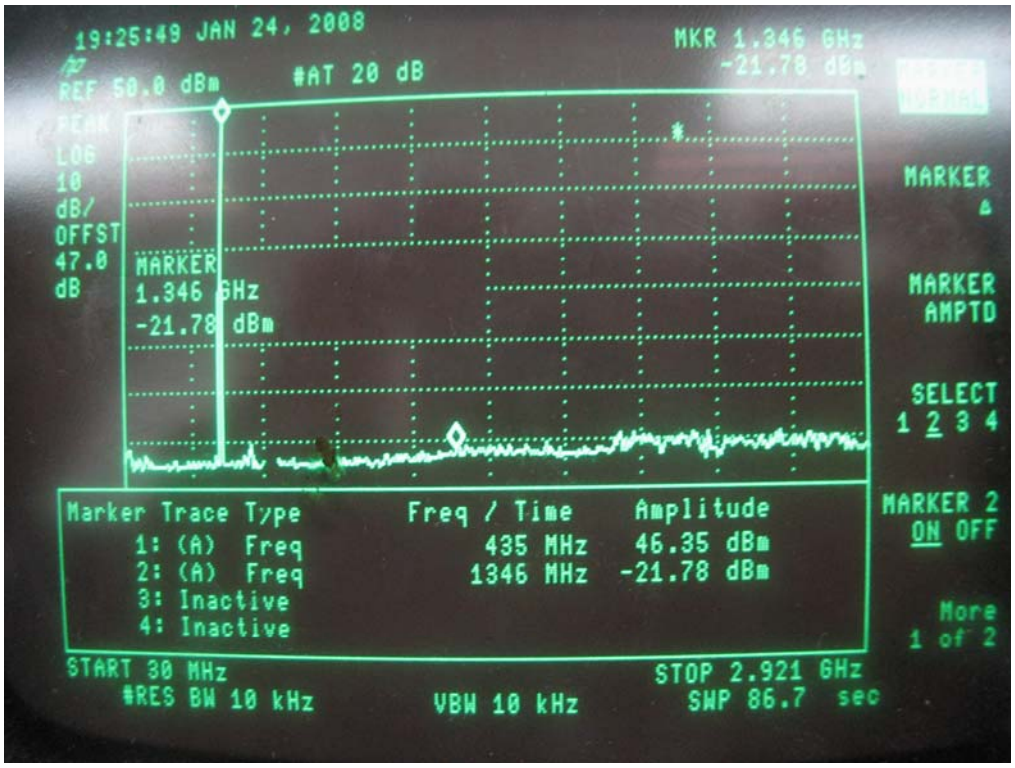
A : The attenuation value of the used attenuator

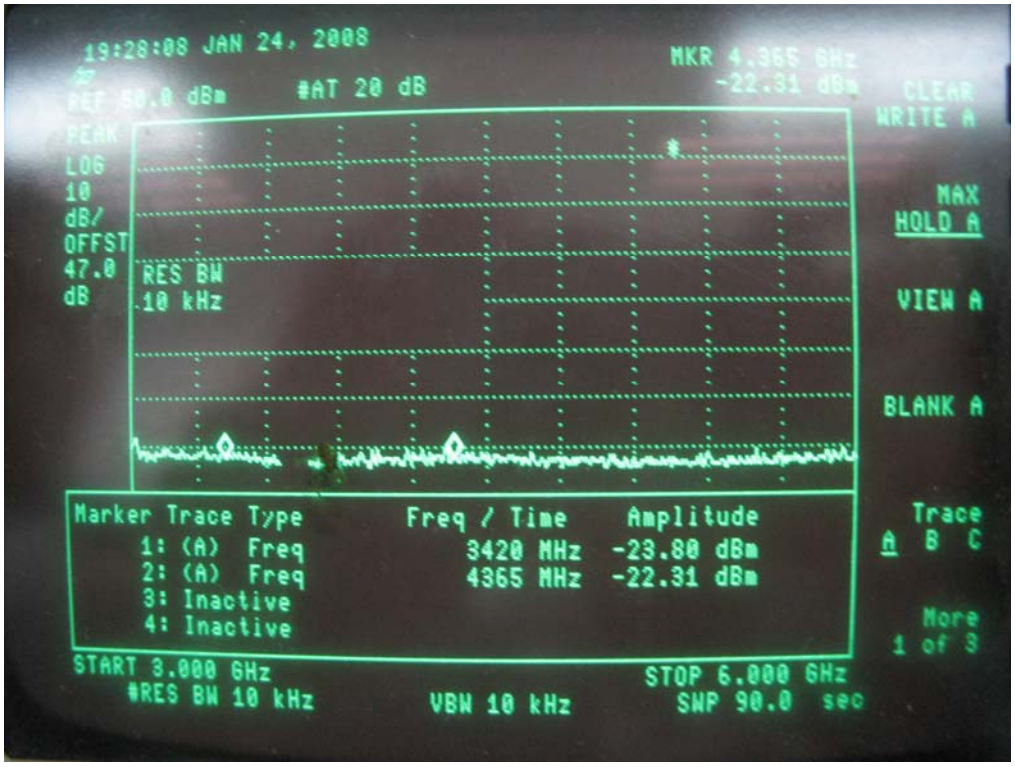
L : The loss of all connection cables

Conducted Power Measurement Results		
Channel Separation	**Channel**	**Measurement Result**
12.5 KHz	Bottom	46.40 dBm
	Middle	46.42 dBm
	Top	46.41 dBm
25 KHz	Bottom	46.41 dBm
	Middle	46.43 dBm
	Top	46.42 dBm

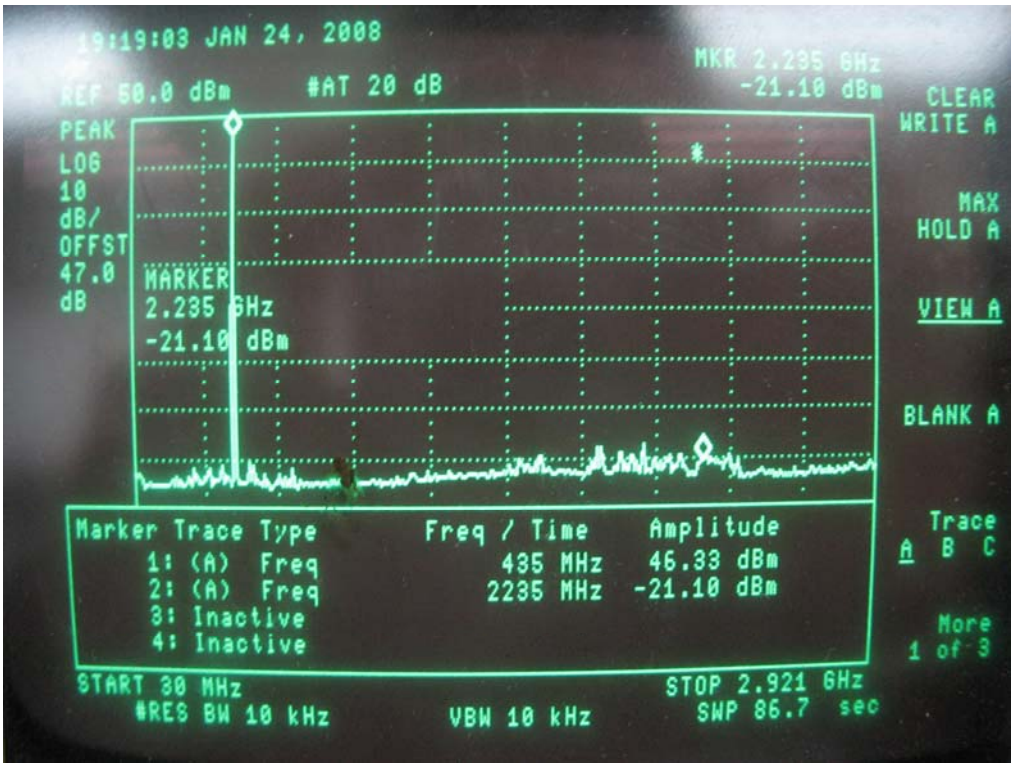
10.5 Conduct spurious plot

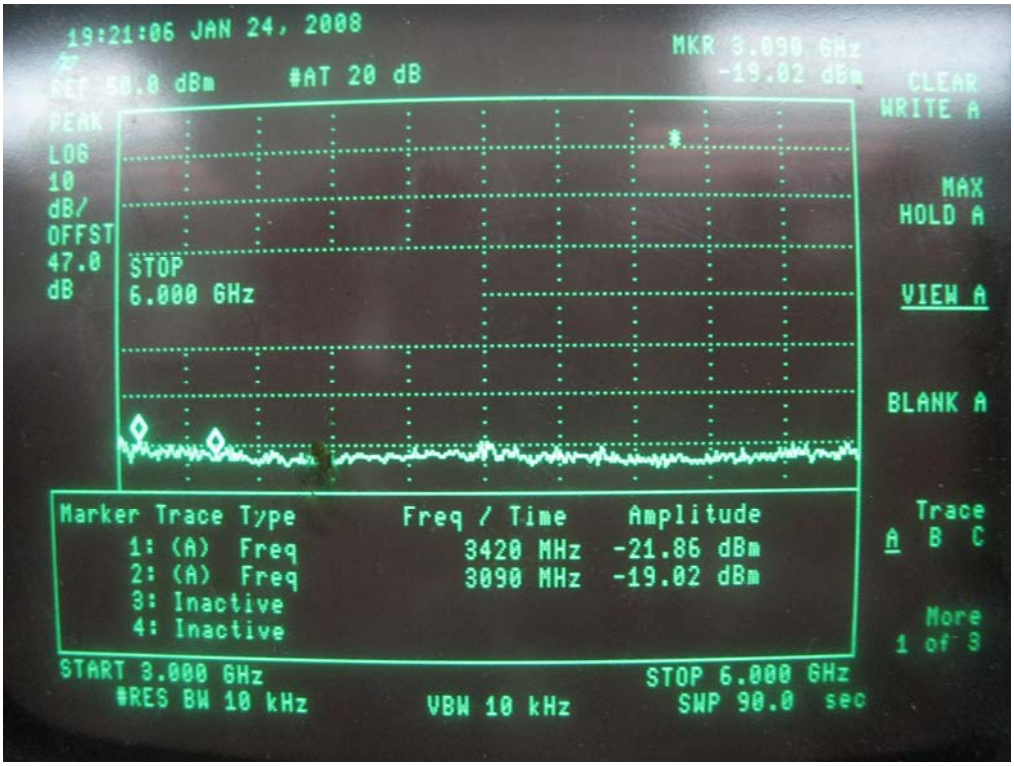
The Worst Case of The Three Channels for Conduct Spurious Emission @ 12.5KHz





The Worst Case of The Three Channels for Conduct Spurious Emission @ 25KHz





11 RANSMITTER FREQUENCY BEHAVIOR

11.1Provisions Applicable

Section 90.214

11.2 Test Method

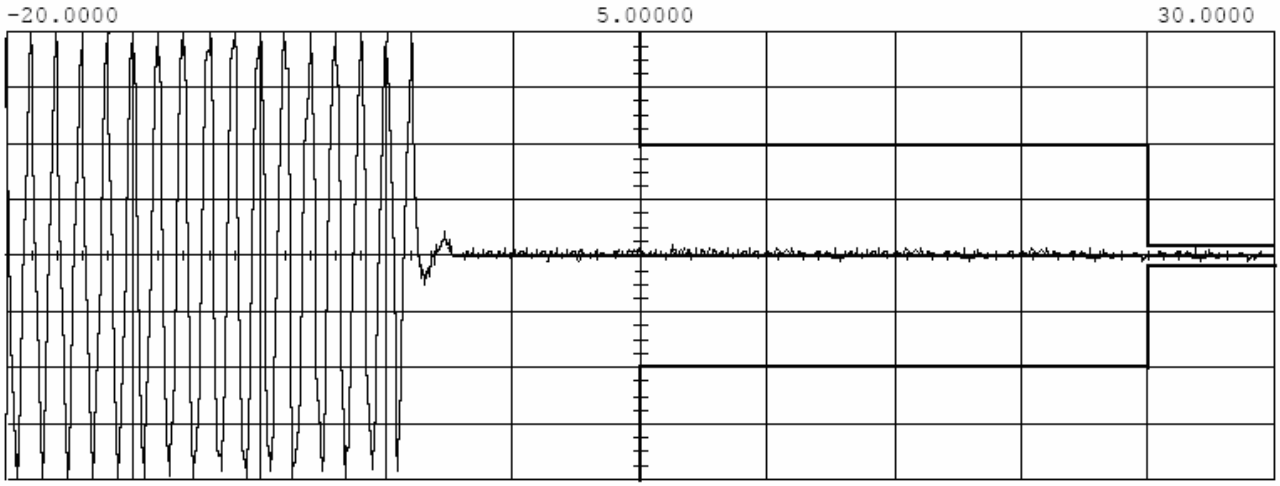
TIA/EIA-603 2.2.19

11.3Test Instruments

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DATE
OSILLICOPE	TEKTRONIX	TDS3012B	B042290	2007/03/07
RF SIGNAL GENERATOR	R & S	SML01	101161	2007/07/13

11.4Measure Result

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

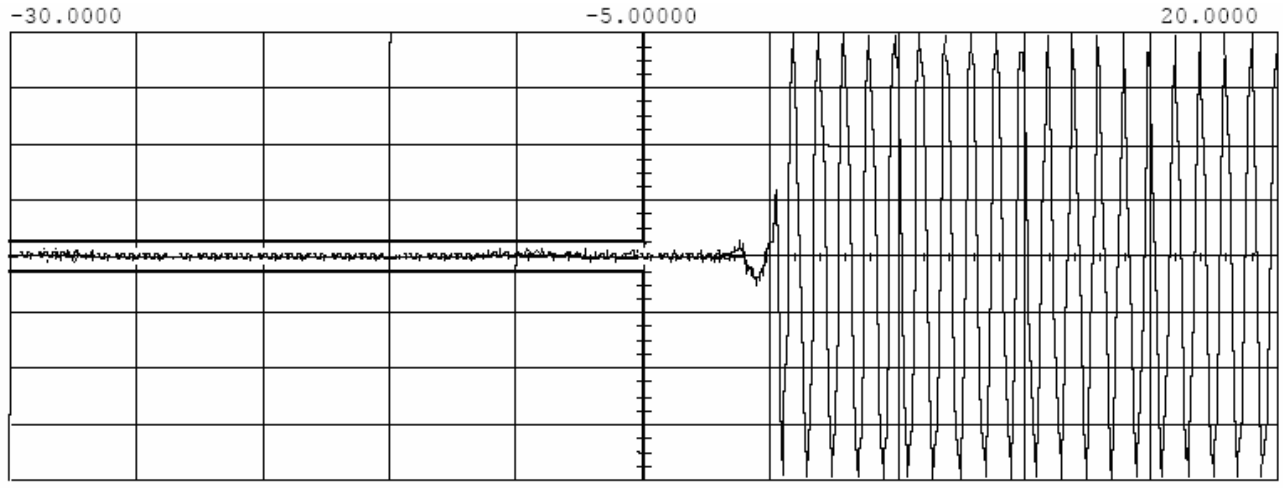


	Timebase	Delay/Pos	
Main	5.00 ms/div	-20.0000 ms	Left
	Sensitivity	Offset	Probe
Channel 1	122 mV/div	0.00000 V	1.000 :1

Measurements
V p-p (c1) = 30.911 mV
frequency (c1) = 1.00000 kHz

Trigger mode :
On Negative Edge Of
Trigger
Chan2 = -970.000 mV (noise
Holdoff =-40.000

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

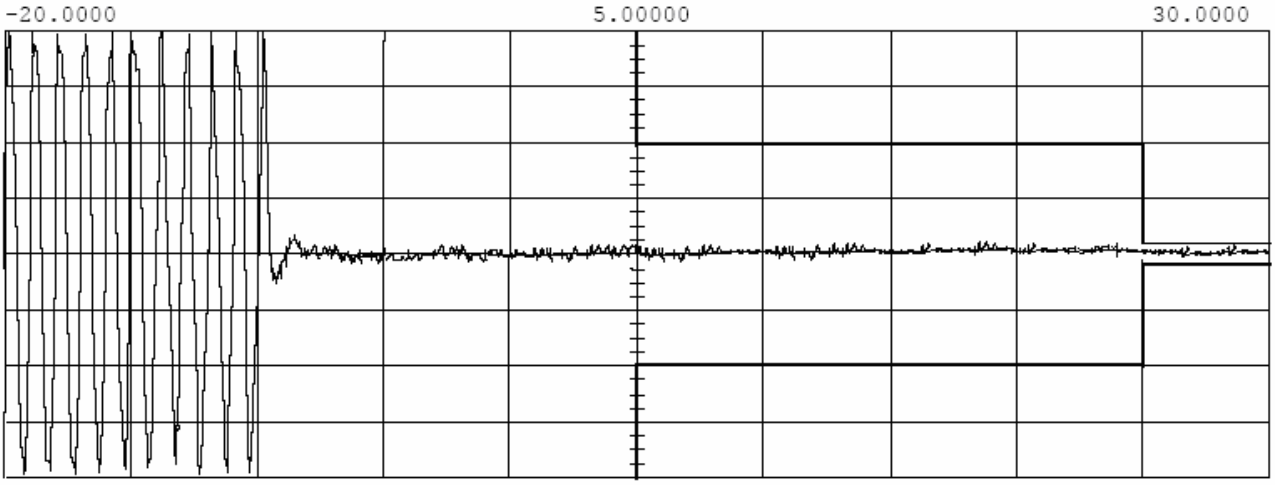


	Timebase	Delay/Pos	
Main	5.00 ms/div	20.0000 ms	Right
	Sensitivity	Offset	Probe
Channel 1	122 mV/div	0.00000 V	1.000 :1

Measurements
V p-p (c1) = 30.711 mV
frequency (c1) = 1.00000 kHz

Trigger mode :
On Positive Edge Of
Trigger
Chan2 = -100.000 mV (noise
Holdoff =-40.000

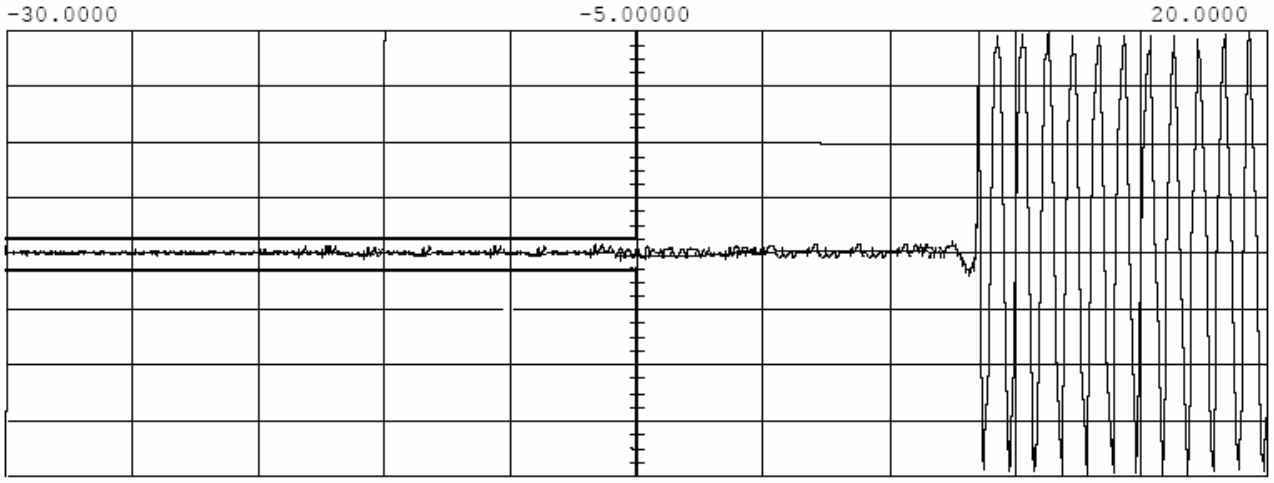
Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation--Off to On



	Timebase	Delay/Pos		Measurements
Main	5.00 ms/div	-20.0000 ms	Left	V p-p (c1) = 39.210 mV
				frequency (c1) = 1.00000 kHz
	Sensitivity	Offset	Probe	
Channel 1	66.0 mV/div	0.00000 V	1.000 :1	

Trigger mode :
On Negative Edge Of
Trigger
Chan2 = -440.000 mV (noise
Holdoff =-40.000

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



	Timebase	Delay/Pos		Measurements
Main	5.00 ms/div	20.0000 ms	Right	V p-p (c1) = 39.992 mV
				frequency (c1) = 1.00000 kHz
	Sensitivity	Offset	Probe	
Channel 1	66.0 mV/div	0.00000 V	1.000 :1	

Trigger mode :
On Positive Edge Of
Trigger
Chan2 = -100.000 mV (noise
Holdoff =-40.000

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
EMI Test Receiver	R&S	ESCS30	100343	2007/07/13
AMPLIFIER	HP	HP8447E	2945A02715	2007/07/13
ANTENNA	Schwarzbeck	VULB9163	9163-194	2007/07/13

12.4 Measure Result (Measured at 3m using FCC Part15 B Limits)

Radiated Emission Test Result									
Frequency	**eading Level (dBuv**		**Factor**	**mission Level (dBuV/r**		**Limit**	**Margin**	**Result**	**Remarks**
(MHz)	**Peak**	**Q.P.**	**dB**	**Peak**	**Q.P.**	**Q.P.**	**QP(dB)**	**(P/F)**	**(H/V)**
167.44	34.57		-4.25	30.32		43.50	-13.18	P	H
177.17	37.99		-4.75	33.24		43.50	-10.26	P	H
361.72	43.41		-2.85	40.56		46.00	-5.44	P	H
367.33	39.87		-2.82	37.05		46.00	-8.95	P	H
725.05	30.04		3.62	33.66		46.00	-12.34	P	H
734.87	31.97		3.53	35.50		46.00	-10.50	P	H
75.45	35.72		-2.54	33.18		43.50	-10.32	P	V
177.17	32.91		-4.75	28.16		46.00	-17.84	P	V
353.30	33.88		-5.49	28.39		46.00	-17.61	P	V
361.72	42.09		-5.38	36.71		46.00	-9.29	P	V
367.33	35.63		-5.12	30.51		46.00	-15.49	P	V
725.01	30.52		4.17	34.69		46.00	-11.31	P	V

13. RF EXPOSURE EVALUATION

Limit

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (Minute)
Limits for Occupational / Controlled Exposure				
0.3 – 3.0	614	1.63	(100)*	6
3.0 – 30	1842/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100 000	/	/	5	6

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (Minute)
Limits for General population / Uncontrolled Exposure				
0.3 – 3.0	614	1.63	(100)*	30
3.0 – 30	842/f	2.19/f	(180/f)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100 000	/	/	1.0	30

F = Frequency in MHz

* = Plane-wave equivalent power density

Test Data

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where:

S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

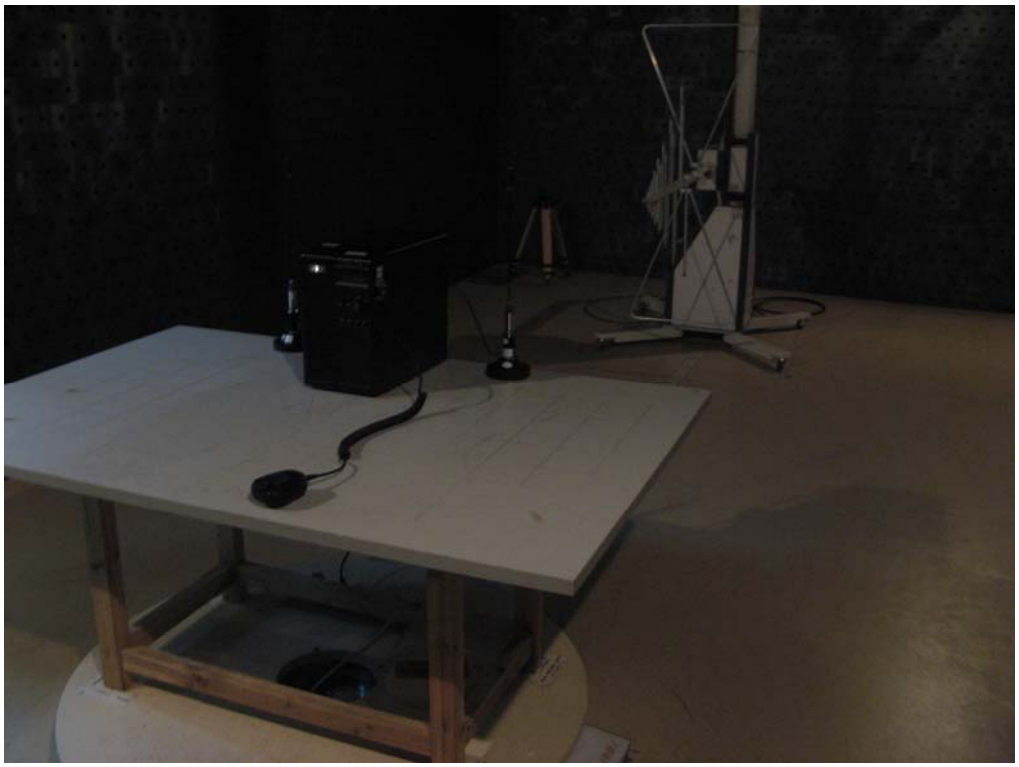
R=distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: **46.43(dBm)**
Maximum peak output power at antenna input terminal: **43.95(W)**
Prediction distance: **150 (cm)**
Predication frequency: **440.875(MHz)**
Antenna Gain (typical): **5.5 (dBi)**

Power density at predication frequency at **150** cm: **0.28 (mW/cm²)**
MPE limit for controlled exposure at prediction frequency: **1.47 (mW/cm²)**
MPE limit for uncontrolled exposure at prediction frequency: **0.29 (mW/cm²)**
Test Result: Pass

APPENDIX I PHOTOGRAPHS OF SETUP

RADIATED EMISSION TEST SETUP



CONDUCTED EMISSION TEST SETUP

APPENDIX II EXTERNAL VIEW OF EUT

FRONT VIEW OF SAMPLE

BACK VIEW OF SAMPLE

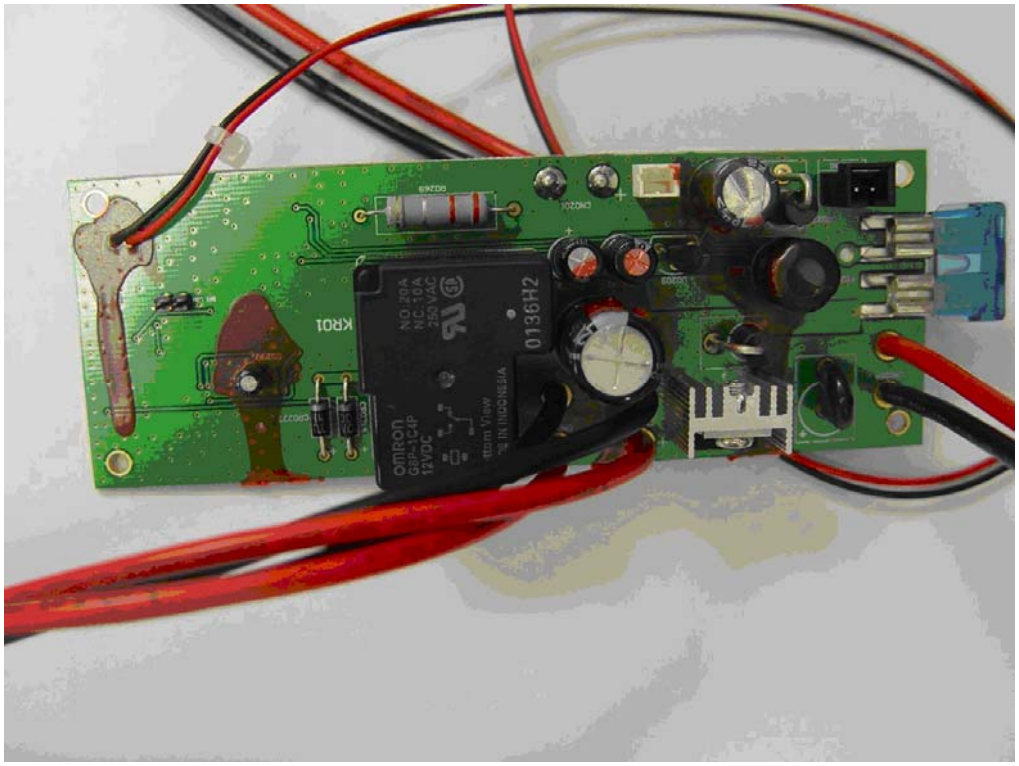
LEFT VIEW OF SAMPLE

RIGHT VIEW OF SAMPLE

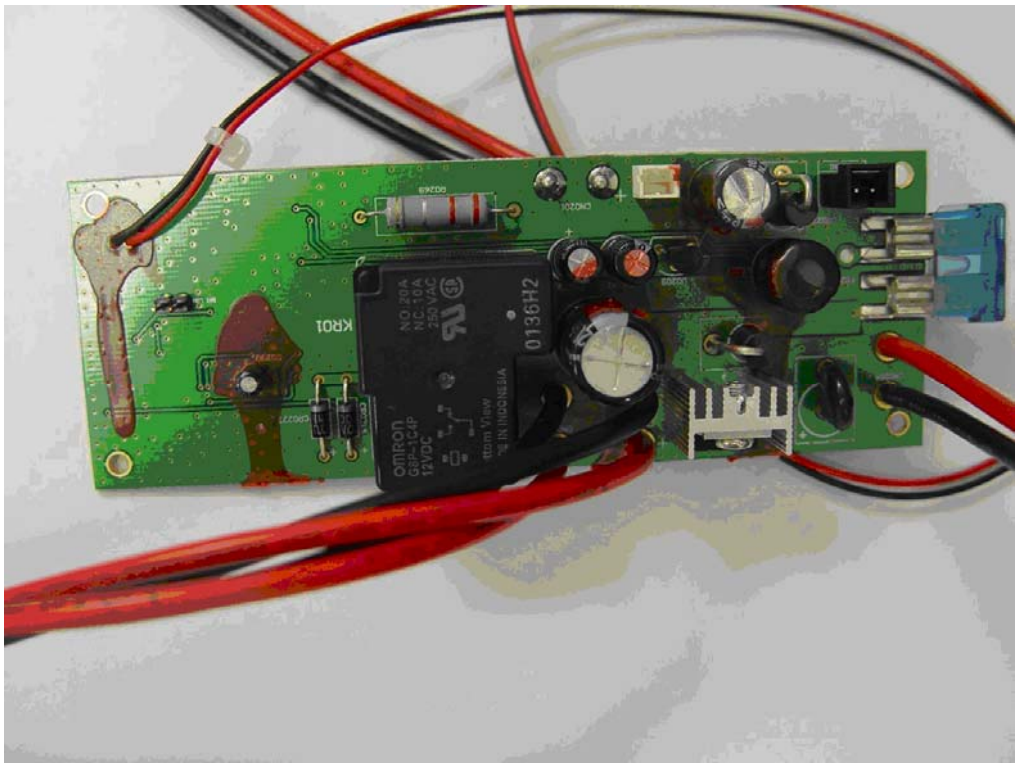
TOP VIEW OF SAMPLE

BOTTOM VIEW OF SAMPLE

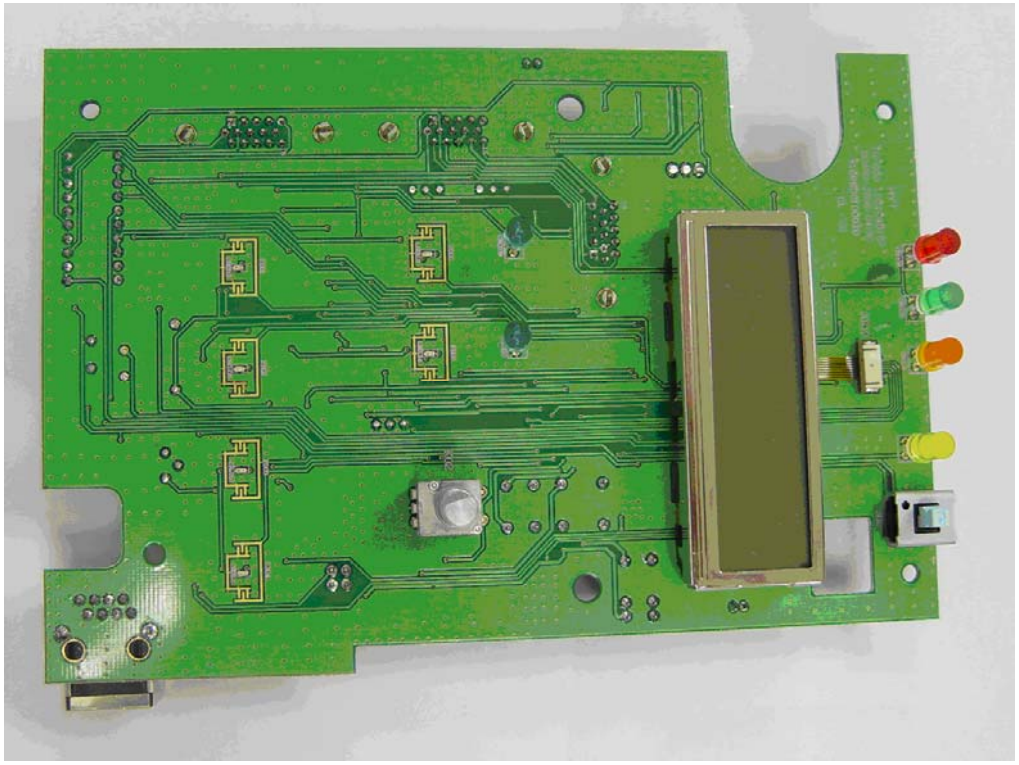
INTERNAL VIEW OF SAMPLE – 1



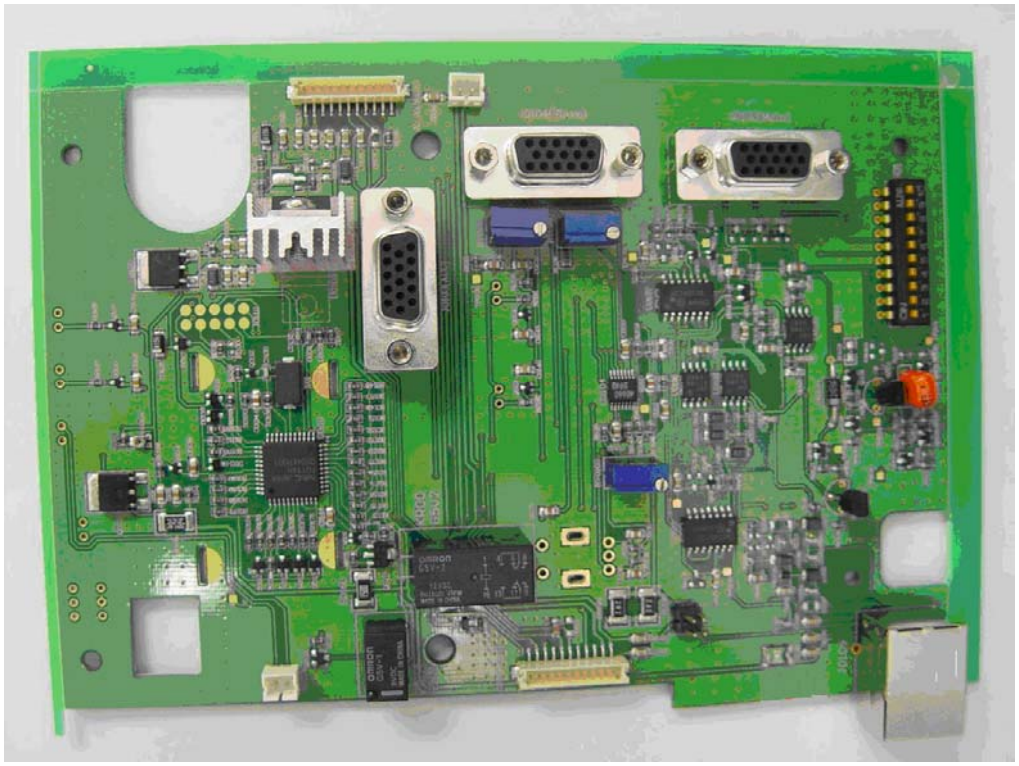
INTERNAL VIEW OF SAMPLE – 2



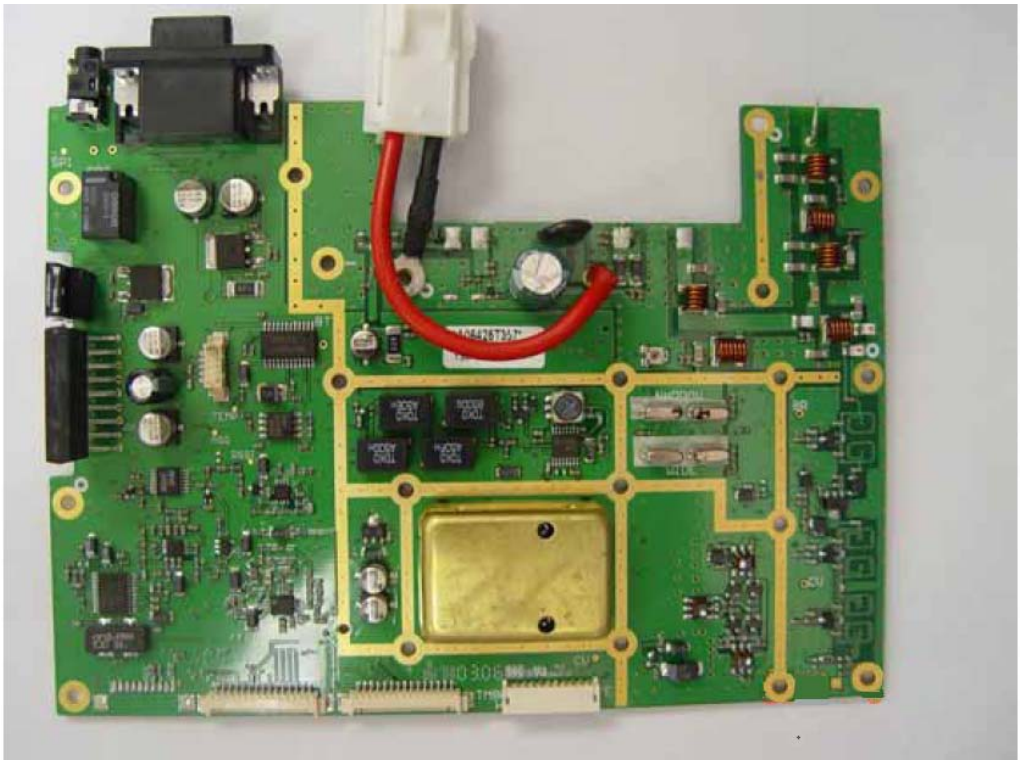
INTERNAL VIEW OF SAMPLE – 3



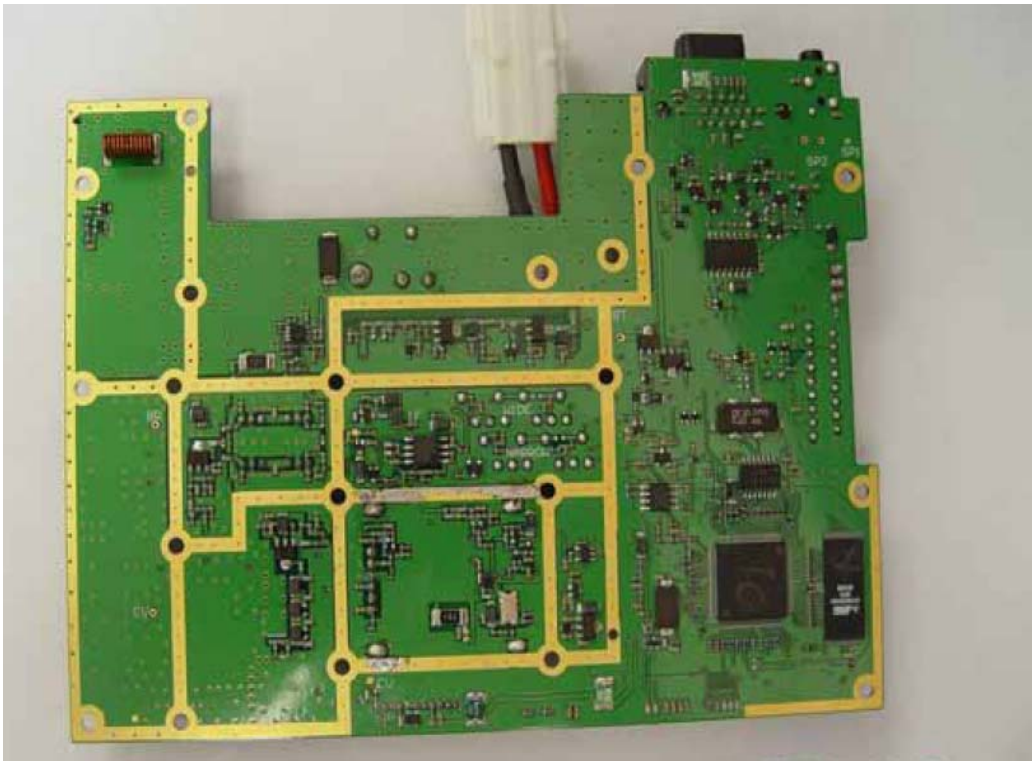
INTERNAL VIEW OF SAMPLE – 4



INTERNAL VIEW OF SAMPLE – 5



INTERNAL VIEW OF SAMPLE – 6



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