Lab Code: 200167-0

FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

CCT R&D LIMITED

18/F., CCT Telecom Building, 11 Wo Shing Street, Fo Tan, Shatin, N.T.

FCC ID: NC8CT5450
Model: CT5450

This Report Concerns:	**Product Type:**
☒ Original Report	5.8Ghz Cordless phone

Test Engineer:	Tom Chen
Report No.:	R0605262
Report Date:	2006-07-25
Reviewed By:	Lab Manager Samuil Lisinker
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *CCT R&D LIMITED,* FCC ID: *NC8CT5450* or the "EUT" as referred to in this report is a 5.8 GHz Cordless phone.

Features:
• 5.8 GHz Digital Spread Spectrum Technology
• Multi-Handset Phone System
• EZ Read Caller ID Backlit Display
• Bright Backlit Keypad
• Full Duplex Handset Speakerphone
• Call-Waiting Caller ID Compatible
• Voice Mail Indicator
• One-Touch Voice Mail Access
• 60 Name and Number Phone Book
• Do Not Disturb Ringer Option
• Ten Melodic Ring Tones
• Supports up to four handsets
• 3-Way Conference/Call Transfer
• Room Monitoring (requires at least two handsets)
• Headset Jack Option

Mechanical Description

The *CCT R&D LIMITED,* FCC ID: *NC8CT5450* or the "EUT" as referred to in this report is a 5.8 GHz Cordless phone. Approximately measures are Handset, 160mmL x 50mm W x 30mm H and Base, 150 mmL x 90 mmW x 70 mmH.

** The test data gathered are from a production sample, S/N: 5450A-USA GAI 233, provided by the manufacturer.*

EUT Photo

Handset (EUT)

Base (EUT)

Additional photos in Exhibit C

Objective

This type approval report is prepared on behalf of *CCT R&D LIMITED* in accordance with Part 2, Subpart J, Part 15, Subparts A, B, and C.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003.

Test Facility

The semi-anechoic chambers used by BACL to collect radiated and conducted emissions measurement data is located at it's facility in Sunnyvale, California, USA.

BACL's test sites have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and is listed under FCC registration number: 90464 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

Special Accessories

As shown in following test block diagram, all interface cables used for compliance testing are shielded.

Equipment Modifications

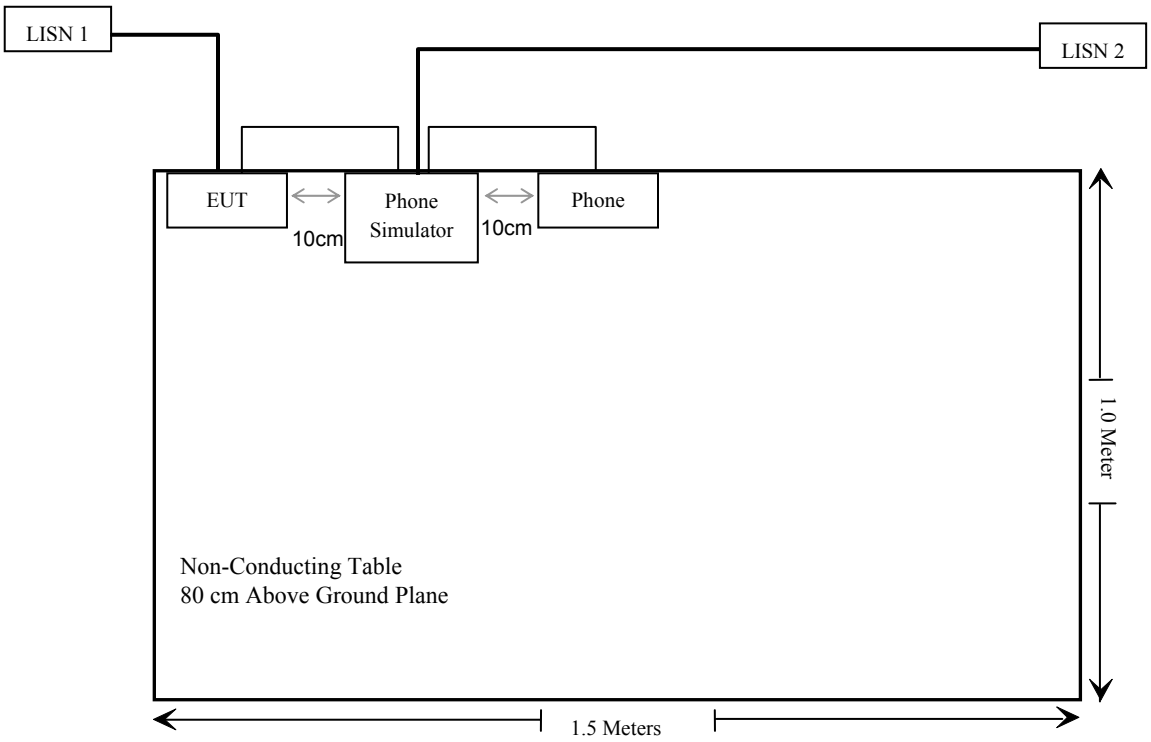
No modifications were made to the EUT.

Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
CCT	AC-DC Adaptor	N/A	N/A

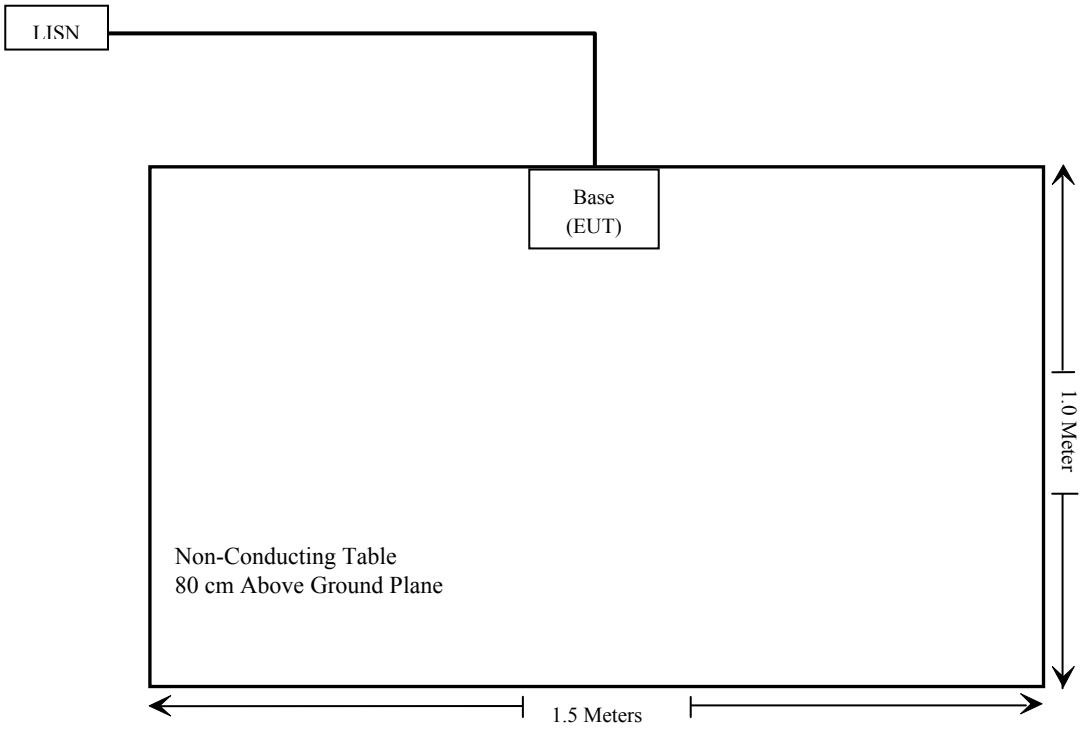
Test Setup Block Diagram

Conducted Emissions

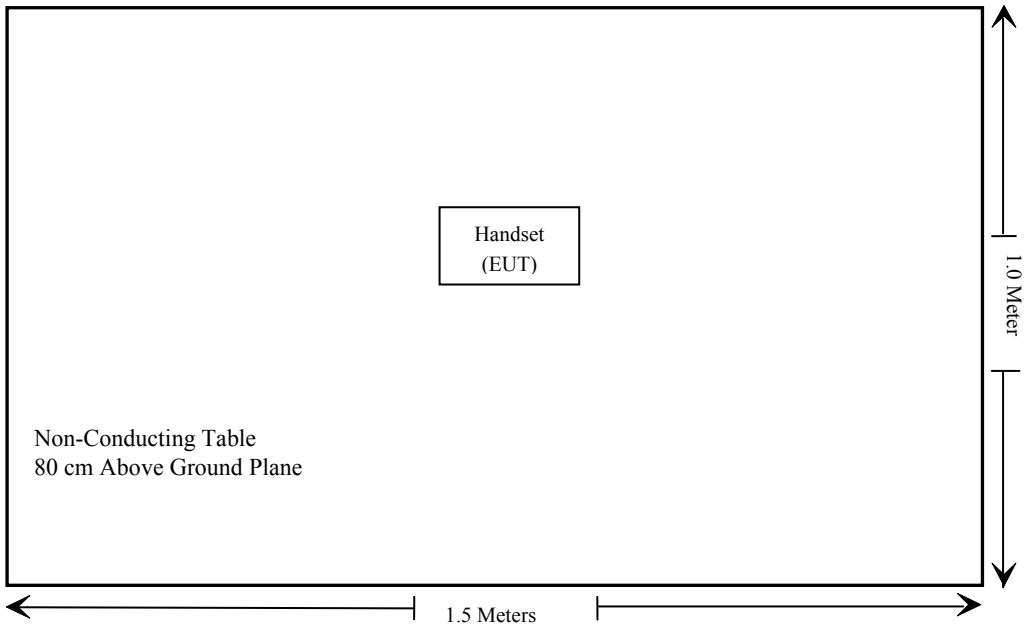


Radiated Emissions

Base (EUT)



Handset (EUT)


Handset
(EUT)
1.0 Meter
Non-Conducting Table
80 cm Above Ground Plane
1.5 Meters

SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247(e)(i) §2.1091	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§ 15.207 (a)	Conducted Emissions	Compliant
§2.1051 & §15.247(d)	Spurious Emissions at Antenna Port	Compliant
§15.205, §15.209 & §15.247(c)	Radiated Emissions	Compliant
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1)	Channel Bandwidth	Compliant
§15.247 (a) (1) (i)	Number of Hopping Frequencies Used	Compliant
§15.247 (a) (1) (i)	Dwell Time of Each Frequency	Compliant
§15.247 (b)(2)	Maximum Peak Output Power	Compliant
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant

§ 15.247 (e)(i) and § 2.1091 - RF EXPOSURE

According to §15.247(e)(i) and §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 General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	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

MPE Prediction

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

Handset:

Maximum peak output power at antenna input terminal: 16.33 (dBm)
Maximum peak output power at antenna input terminal: 42.95 (mW)
Prediction distance: 20 (cm)
Predication frequency: 5849.9 (MHz)
Antenna Gain (typical): 0 (dBi)
Maximum antenna gain: 1 (numeric)
Power density at predication frequency at 20 cm: 0.0085(mW/cm^2)
MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm^2)

Test Result

The predicted power density level at 20 cm is 0.0085 mW/cm^2. This is below the uncontrolled exposure limit of 1mW/cm^2 at 2400 MHz. The EUT is used at least 20cm away from user's body. It is determined as mobile equipment.

TCB Exclusions List for Portable Device

According to §1.1310 and §2.1093 RF exposure is calculated.

Exposure category	low threshold	high threshold
general population	$(60/f_{GHz})$ mW, $d < 2.5$ cm $(120/f_{GHz})$ mW, $d \geq 2.5$ cm	$(900/f_{GHz})$ mW, $d < 20$ cm
occupational	$(375/f_{GHz})$ mW, $d < 2.5$ cm $(900/f_{GHz})$ mW, $d \geq 2.5$ cm	$(2250/f_{GHz})$ mW, $d < 20$ cm

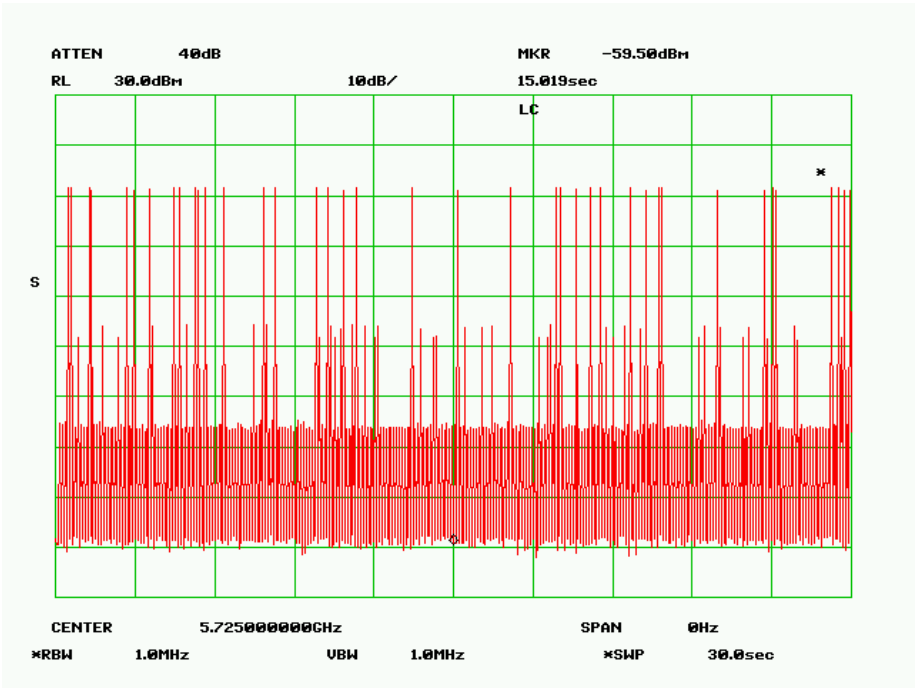
For 5.8GHz device, Low Threshold = 25 mw, High Threshold = 43mW

Duty cycle = On time / period

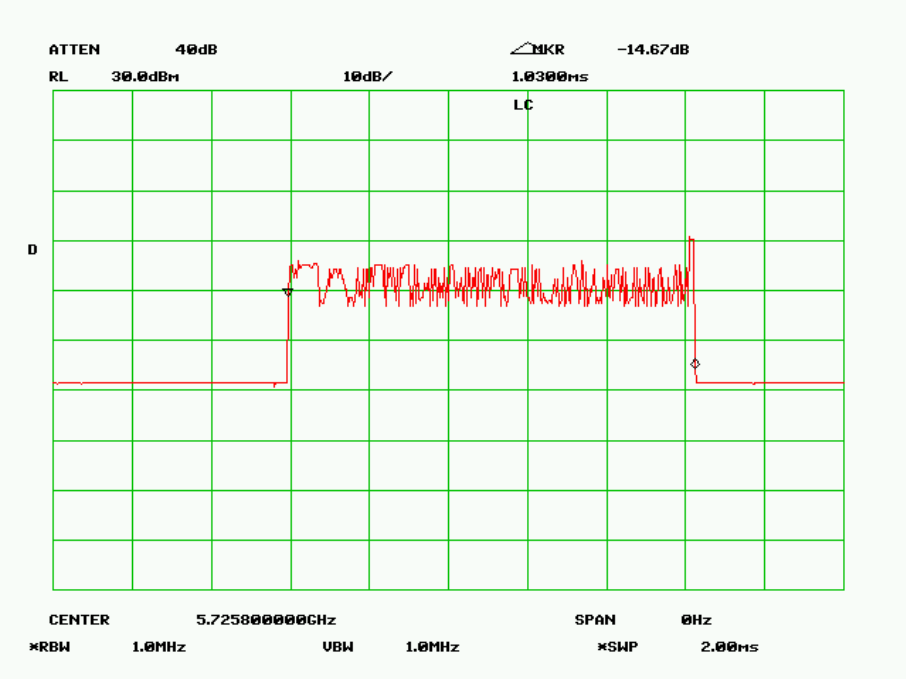
= 1.03 ms / 23.25 ms
= 0.044 sec

EUT Average output power = Peak power * Duty Cycle = 34 * 0.044 = 1.5 mw.

Therefore, EUT is not subject to any SAR evaluation.



Plot showing period between each On time



Plot showing On time duration

§ 15.203 ANTENNA REQUIREMENTS

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (b)(4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The antenna for the EUT is an integrated antenna with 0dBi gain.

§15.207 (a) - CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are receiver, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ±2.4 dB.

Test Setup

The measurement was performed at shield room, using the same setup per ANSI C63.4 – 2003 measurement procedure. The specification used was FCC Class B limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected with LISN-1.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Artificial-Mains Network	ESH2-Z5	871884/039	2005-11-14
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2006-03-13
Agilent	AC Power source generator	6812B	US38390366	N/A
Agilent	Spectrum analyzer	8565EC	3946A00131	2006-01-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emissions test, the power cord of the EUT was connected to the mains outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a "QP". Average readings are distinguished with an "Ave".

Environmental Conditions

Temperature:	24° C
Relative Humidity:	45%
ATM Pressure:	1021 mbar

**The testing was performed by Tom Chen on 2006-06-22.*

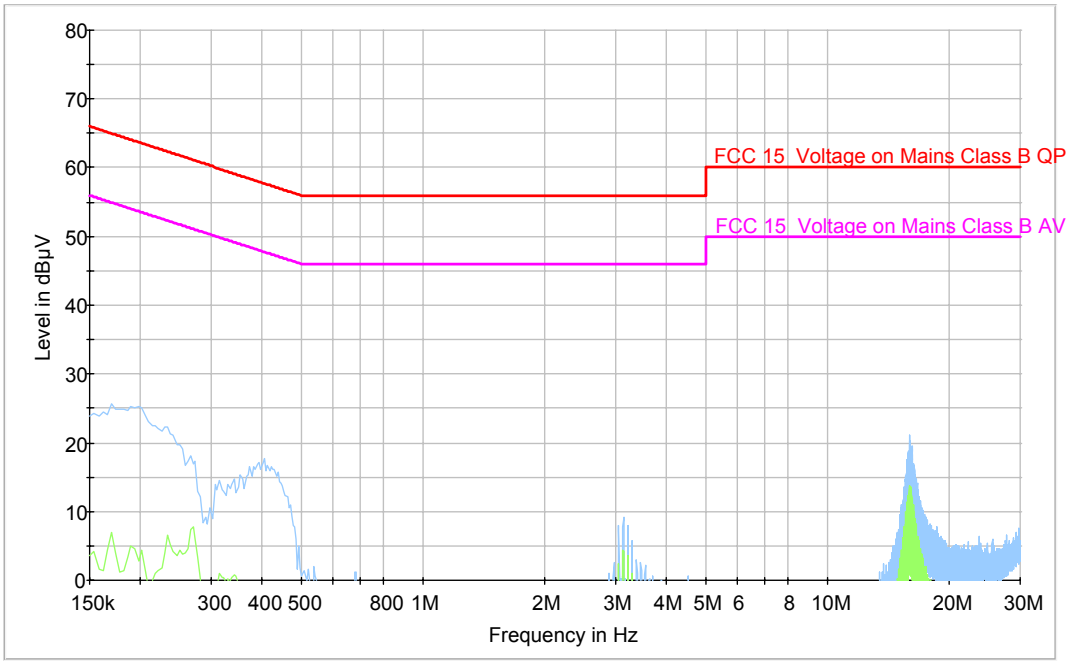
Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Conducted limits for a Class B device, with the *worst* margin reading of:

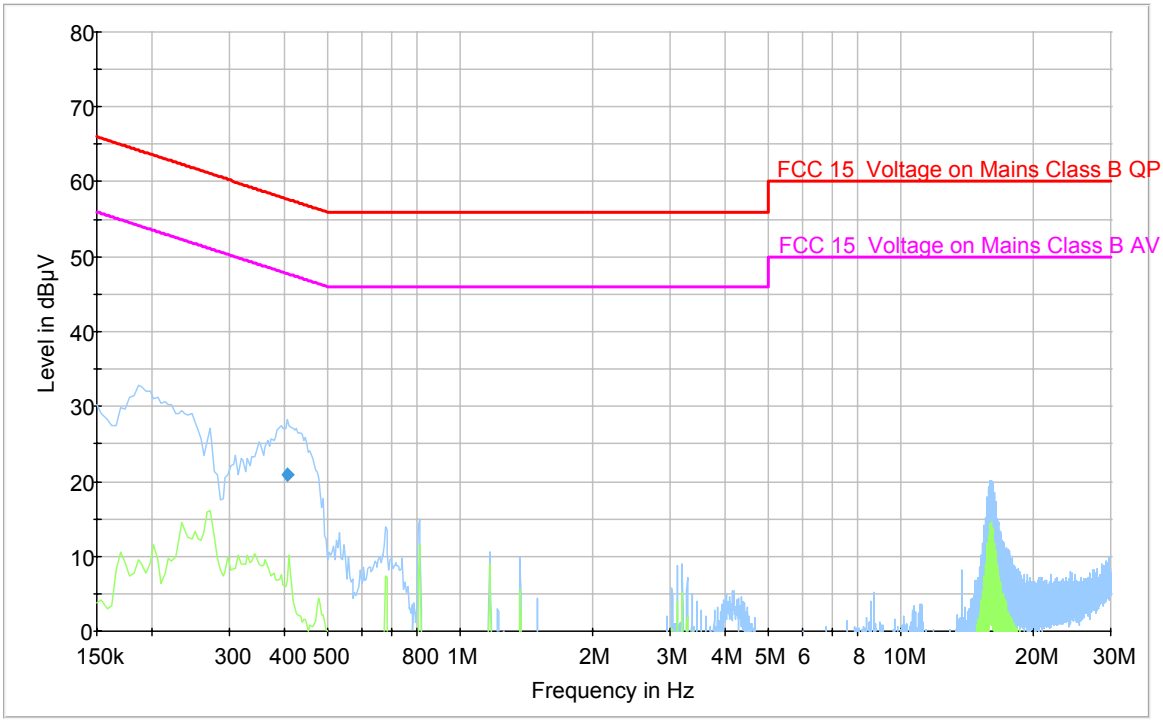
36.8 dB at **0.406000 MHz** in the **Neutral** conductor

Conducted Emissions Test Data

120V/60Hz - Line



120V/60Hz - Neutral



QP Measurements

Frequency (MHz)	Quasi-Peak (dBµV)	Line	Corr. (dB)	Limit (dBµV)	Margin (dB)
0.406000	20.9	N	0.0	57.7	36.8

§2.1051 & 15.247 (d) SPURIOUS EMISSIONS AT ANTENNA PORT

Applicable Standard

According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emissions limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emissions being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Position the EUT on a bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.

4. Set the SA on View mode and then plot the result on SA screen.

5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	8565EC	3946A00131	2006-01-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	24° C
Relative Humidity:	45%
ATM Pressure:	1021mbar

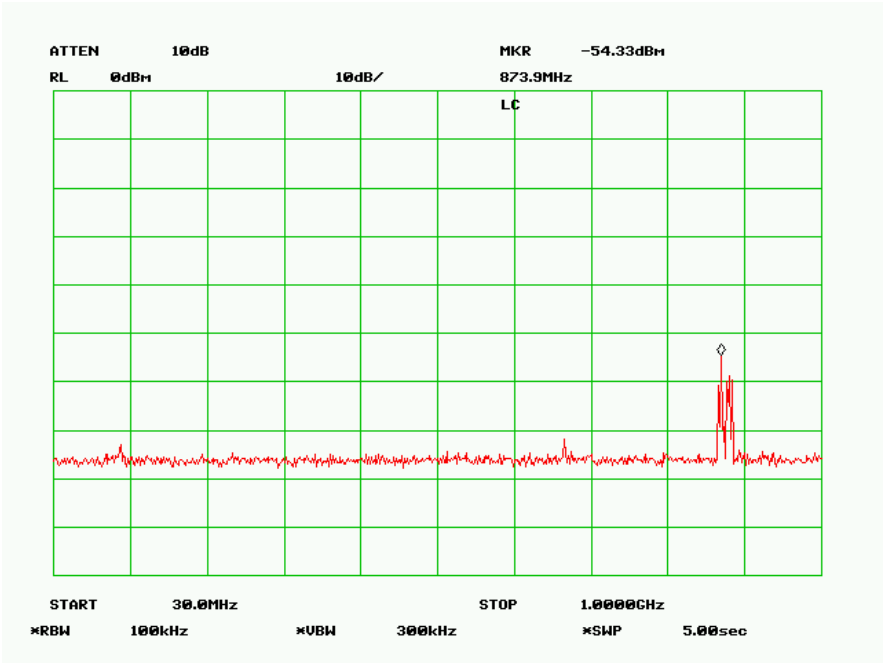
**The testing was performed by Tom Chen on 2006-06-22.*

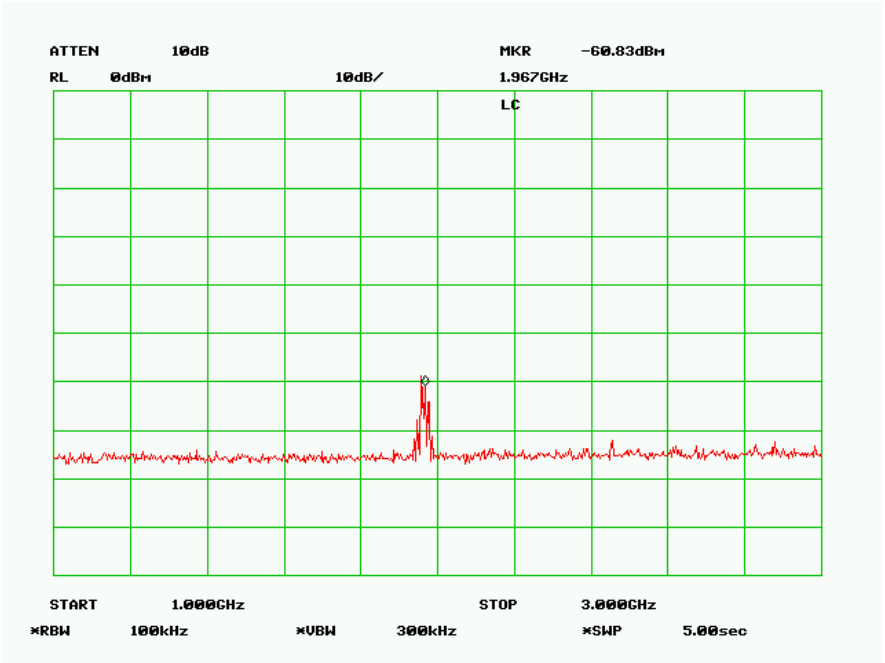
Measurement Results

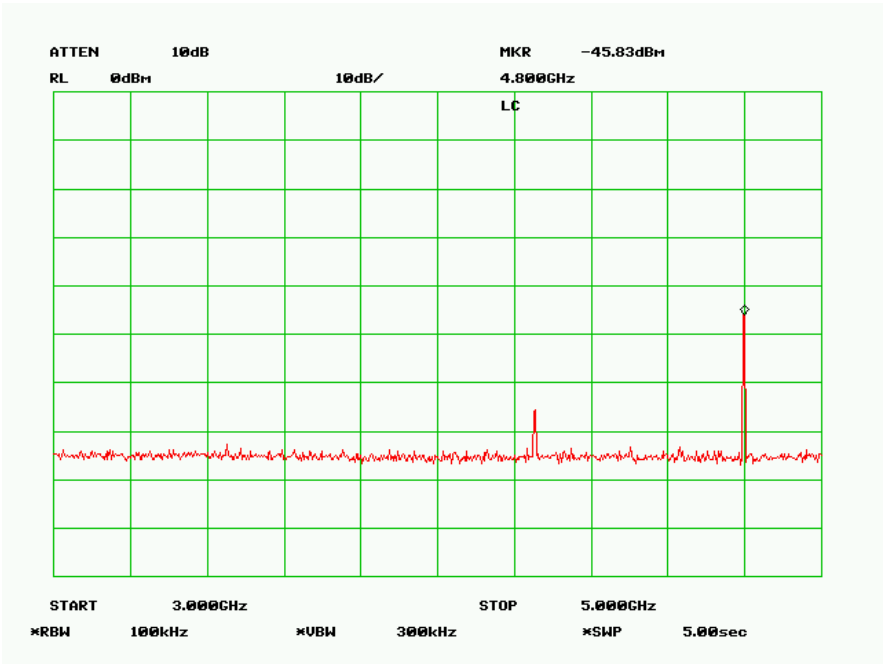
Please refer to the following plots.

For Handset (EUT)

Low Channel



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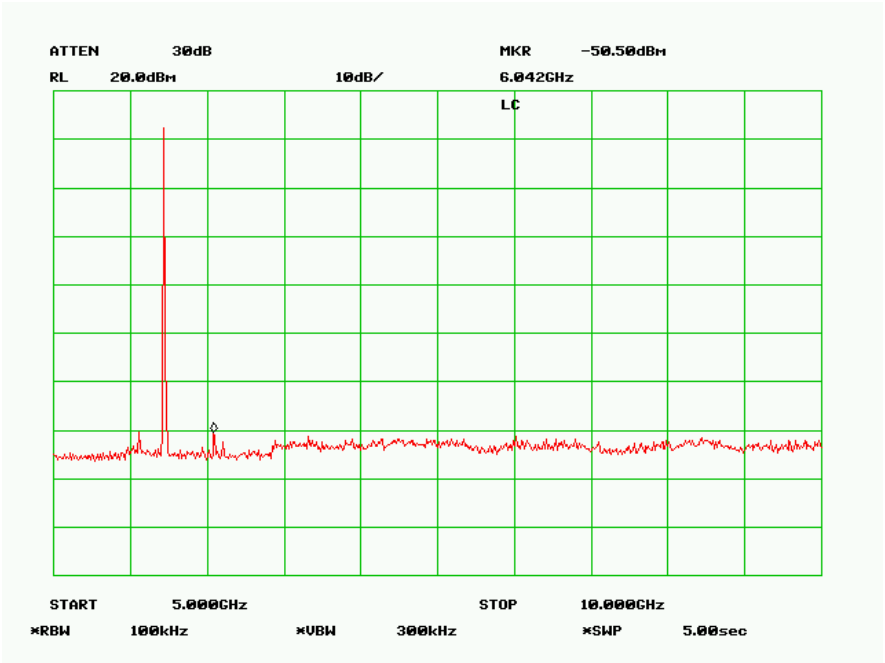
MKR -45.83dBm
RL 0dBm
10dB/
4.800GHz
LC
START 3.000GHz
STOP 5.000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 5.00sec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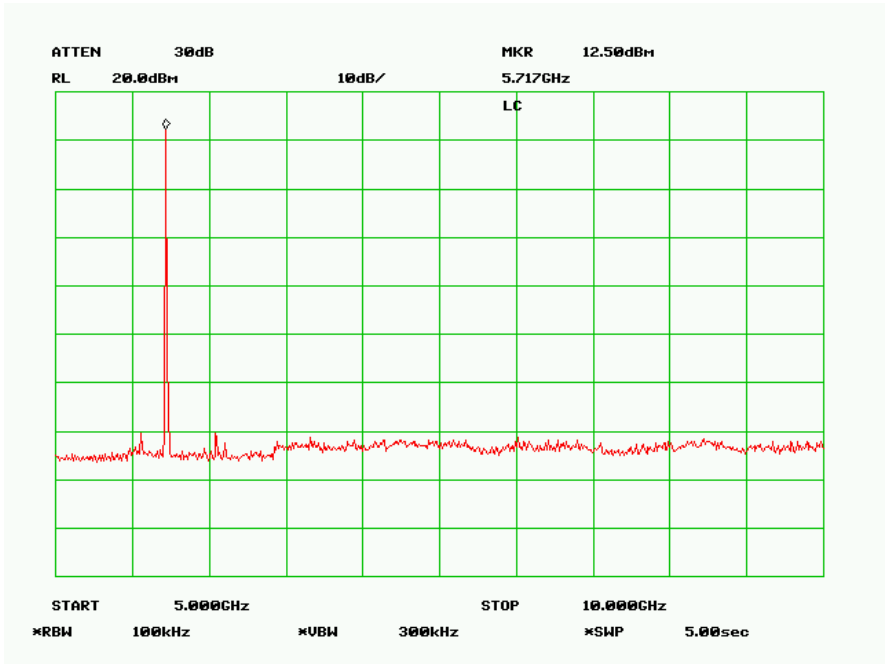
MKR -50.50dBm
RL 20.0dBm
10dB/
6.042GHz
LC
START 5.000GHz
STOP 10.000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 5.00sec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MKR 12.50dBm
RL 20.0dBm
10dB/
5.717GHz
LC
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STOP 10.000GHz
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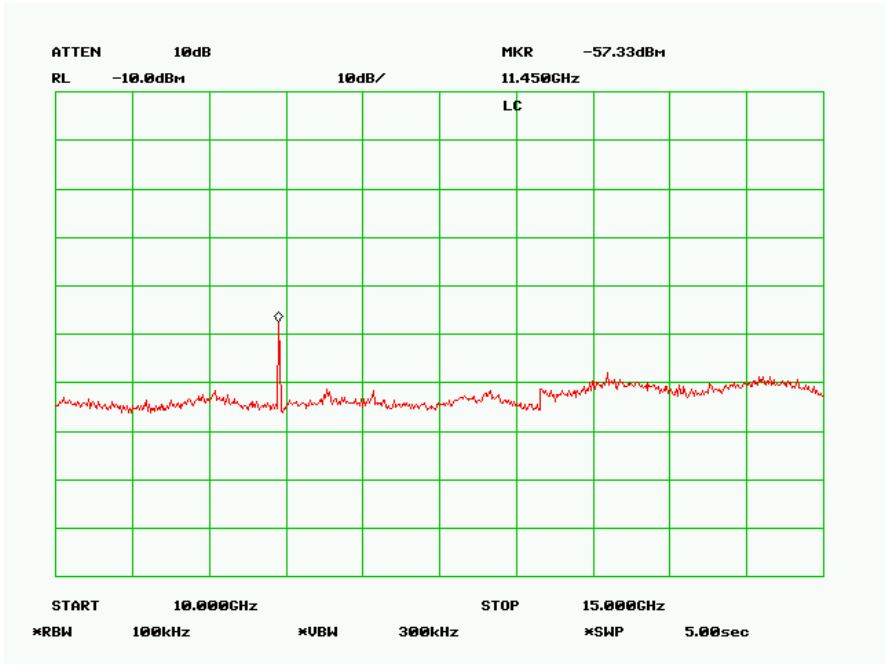
*VBW 300kHz
*SWP 5.00sec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RL -10.0dBm
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STOP 15.000GHz
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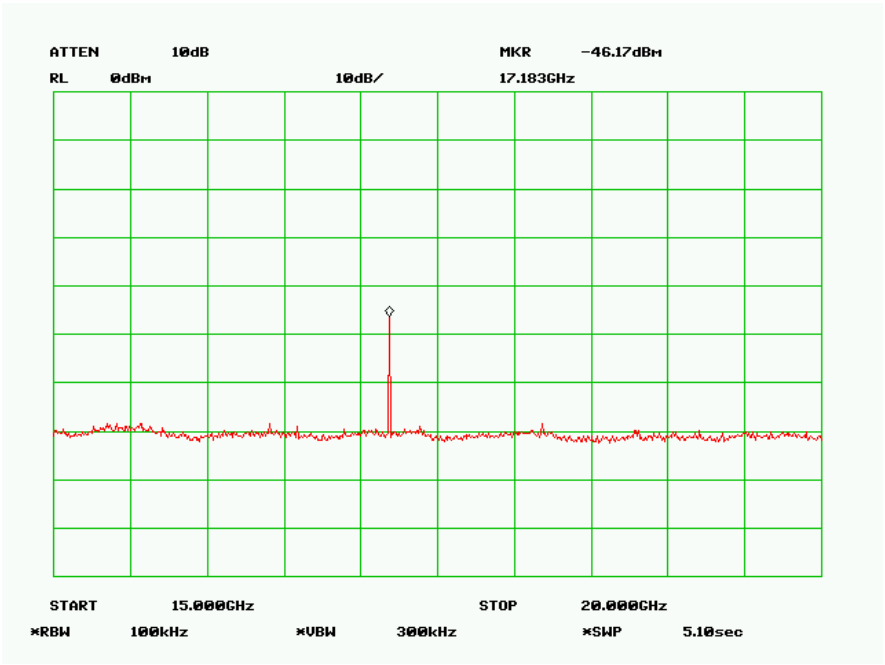
*VBW 300kHz
*SWP 5.00sec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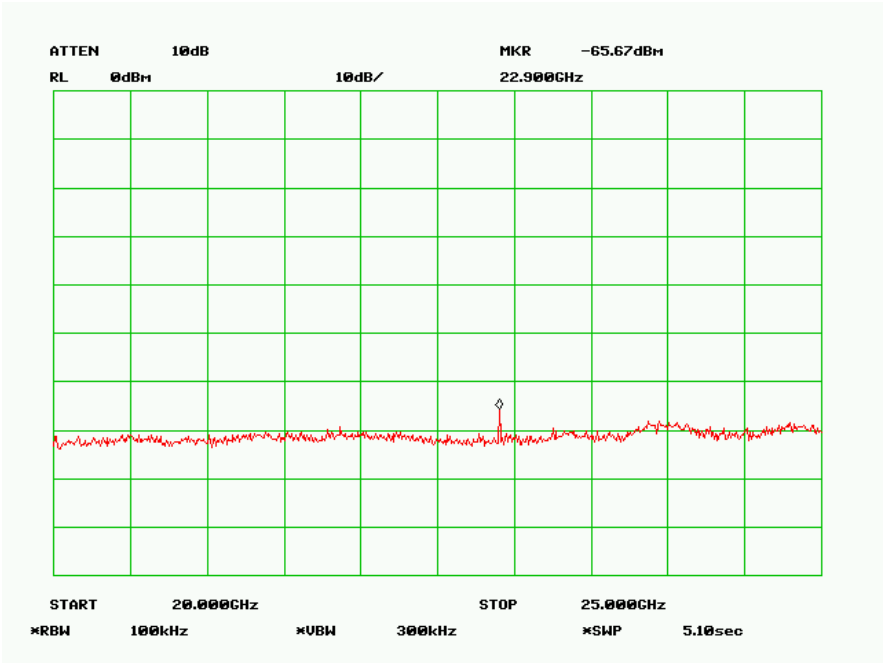
STOP 20.000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 5.10sec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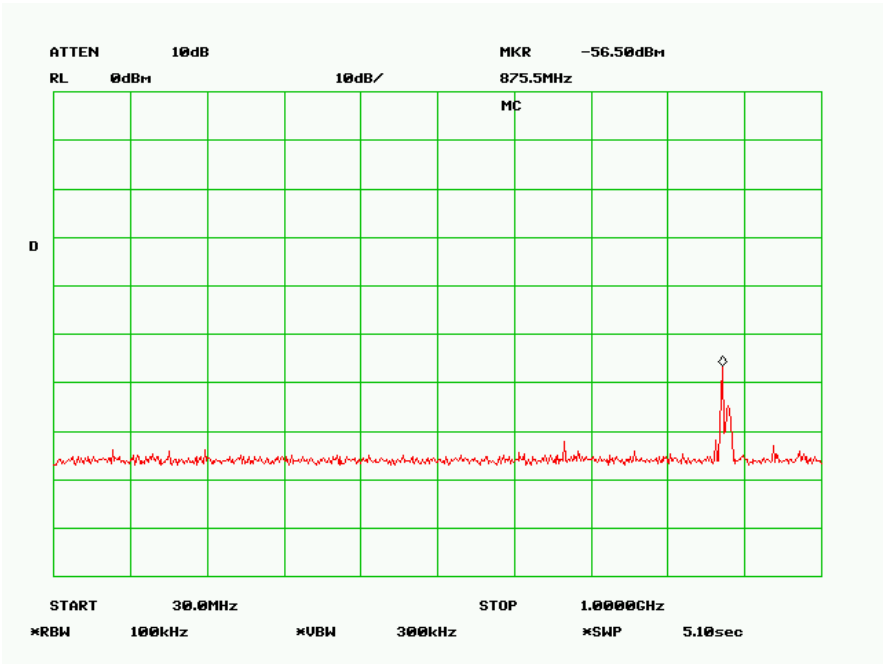
RL 0dBm
10dB/
22.900GHz
START 20.000GHz
STOP 25.000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 5.10sec

Mid Channel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RL 0dBm
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STOP 1.0000GHz
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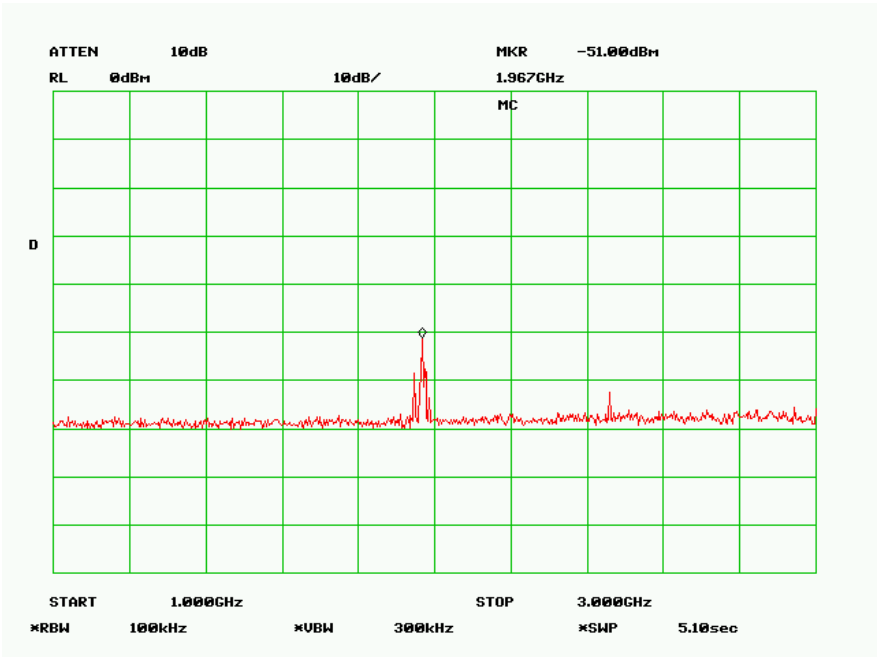
*VBW 300kHz
*SWP 5.10sec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*VBW 300kHz
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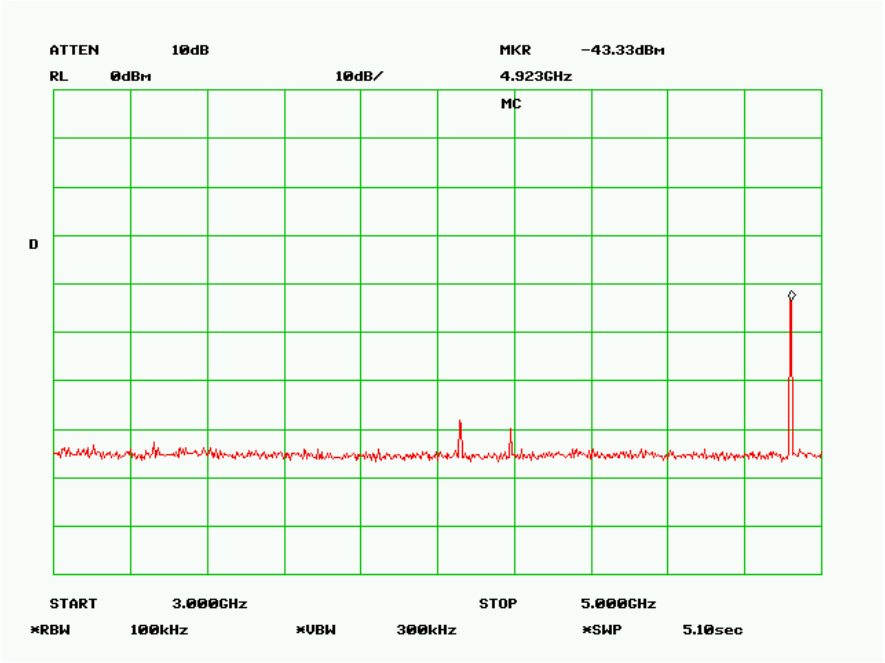
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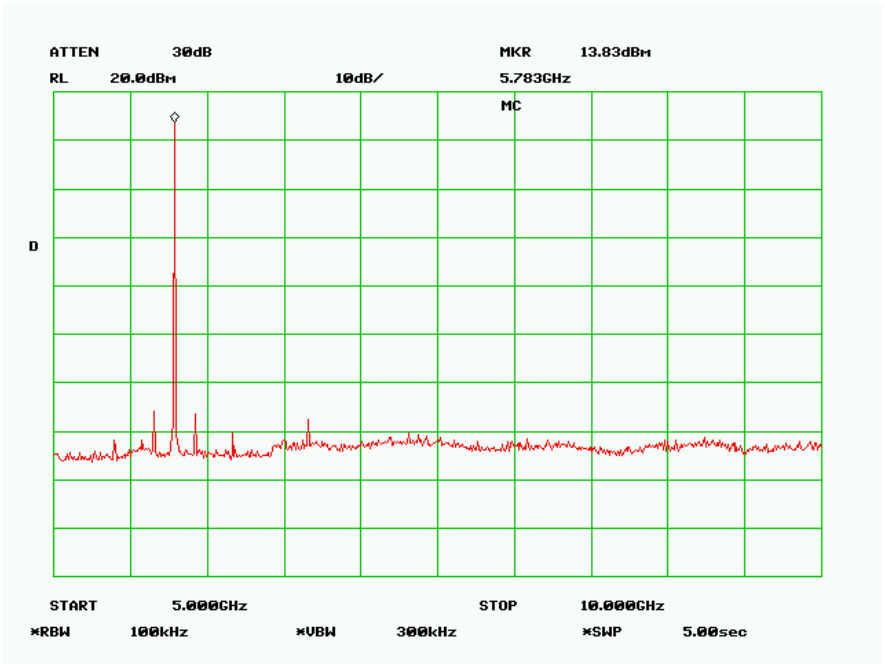
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RL 20.0dBm
10dB/
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MC
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STOP 10.000GHz
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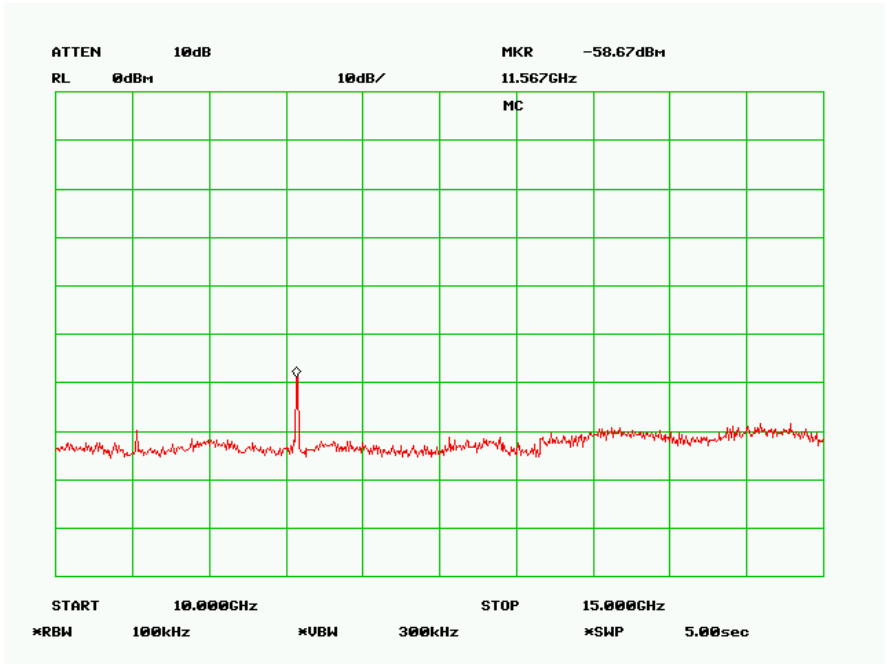
*VBW 300kHz
*SWP 5.00sec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RL 0dBm
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STOP 15.000GHz
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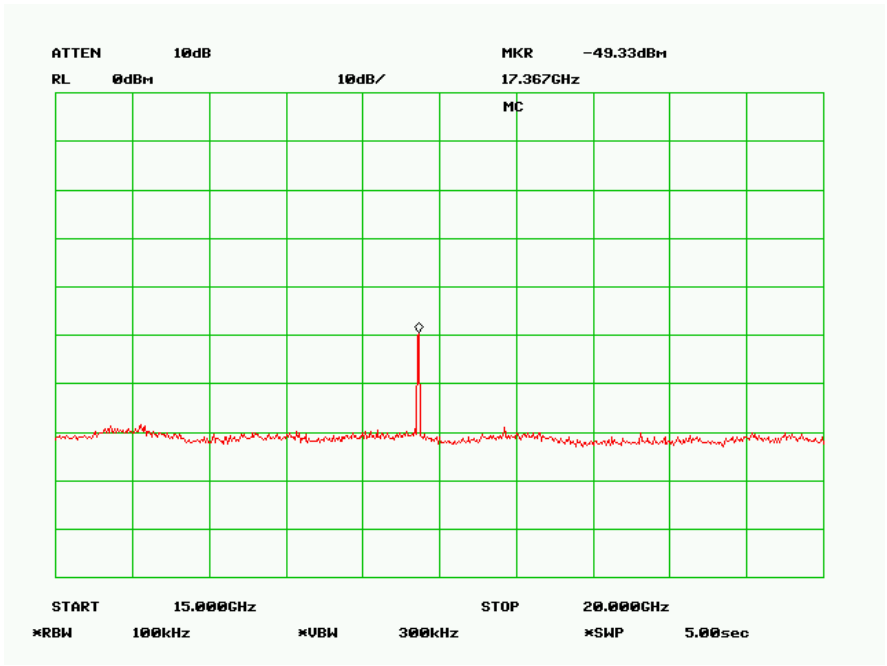
*VBW 300kHz
*SWP 5.00sec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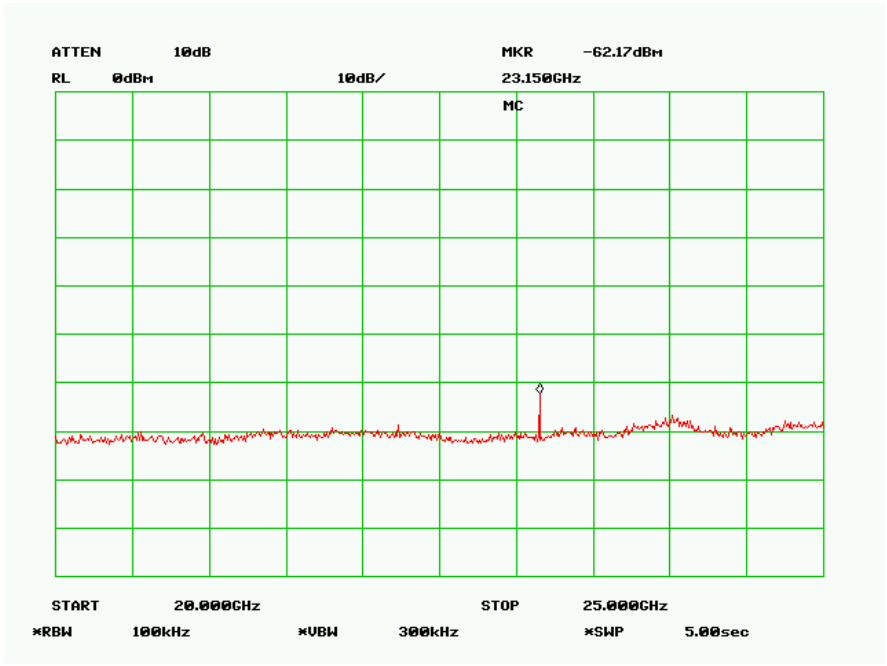
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RL 0dBm
10dB/
23.150GHz
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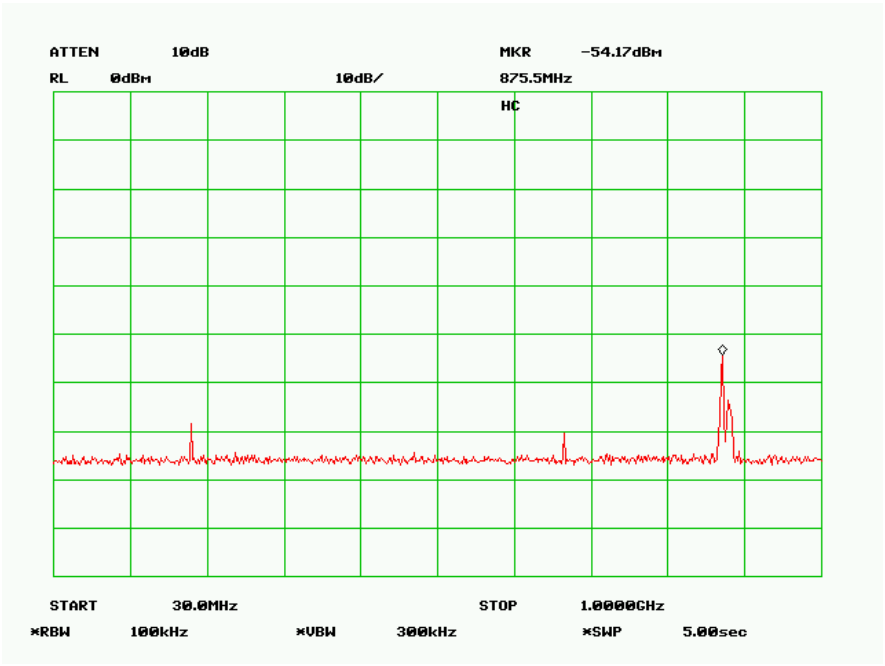
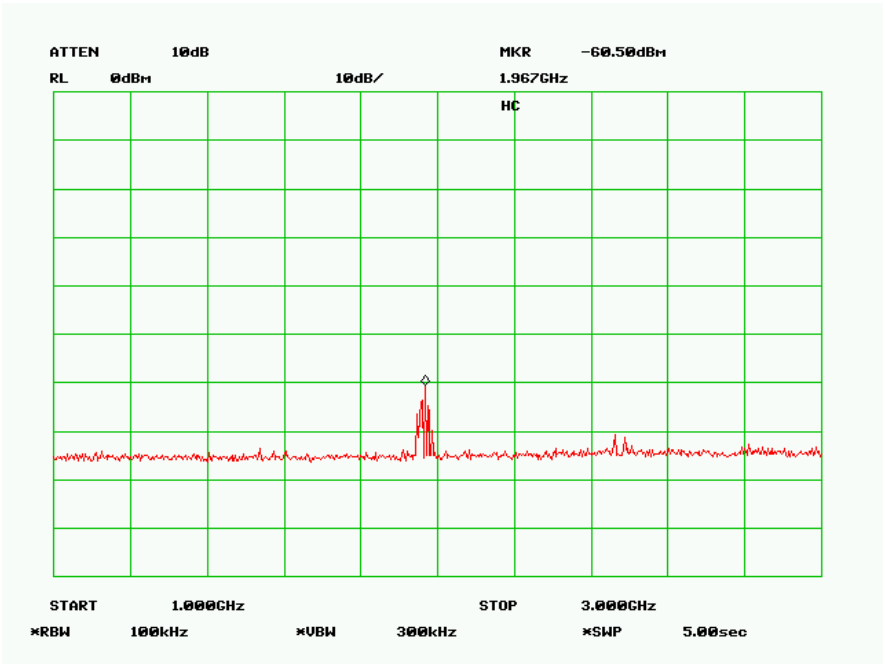
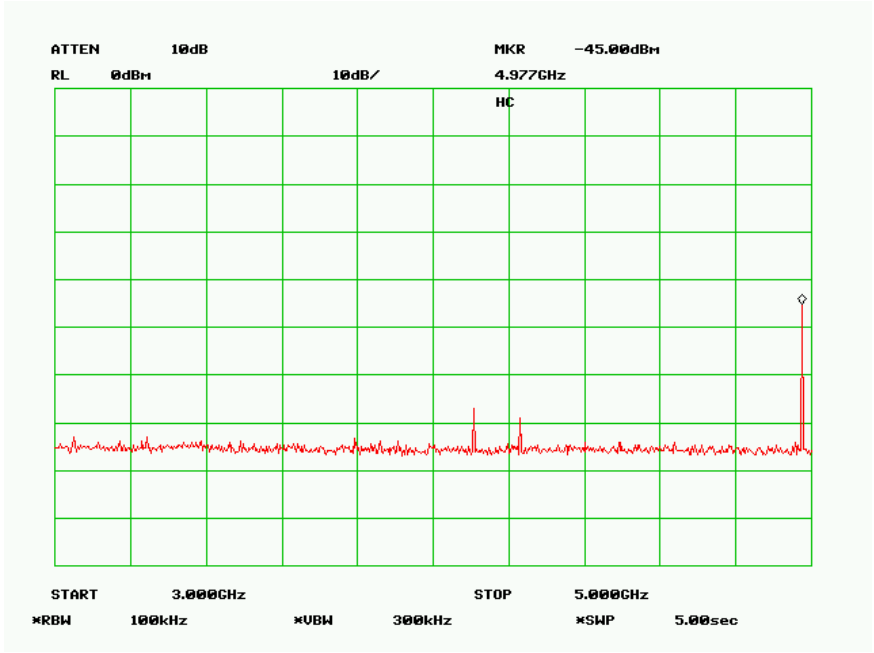
*VBW 300kHz
*SWP 5.00sec

High Channel



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HC
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STOP 5.000GHz
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*VBW 300kHz
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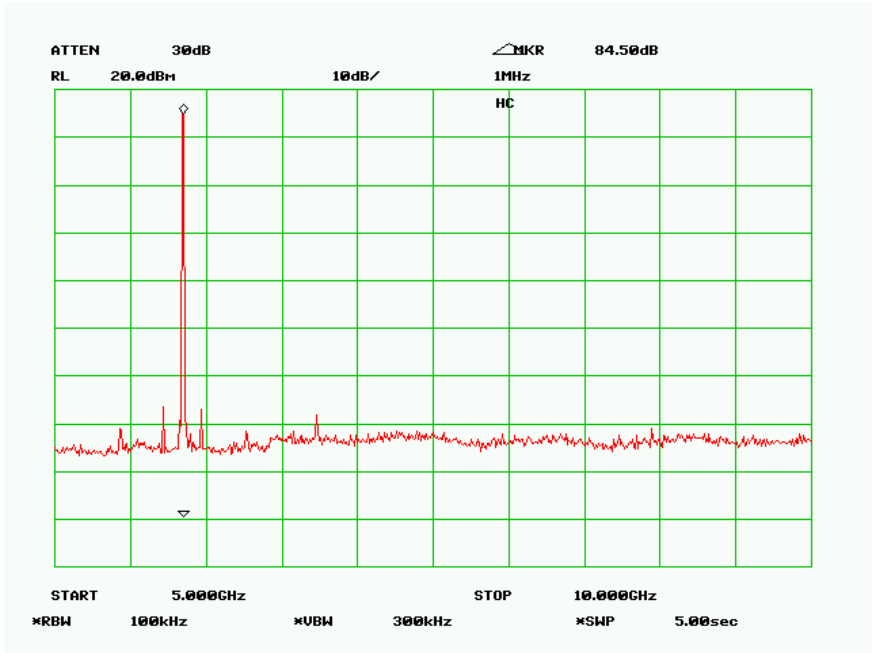
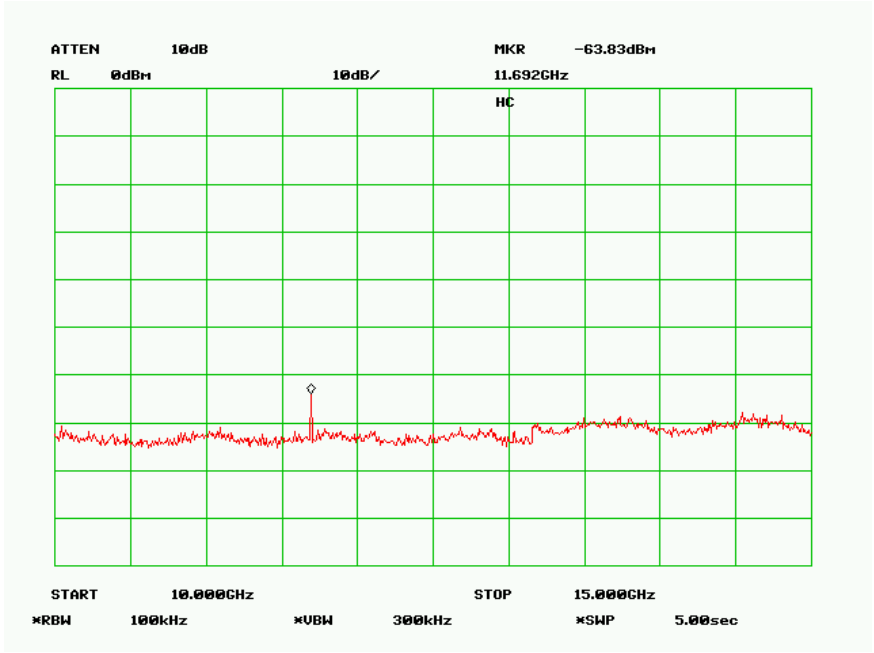
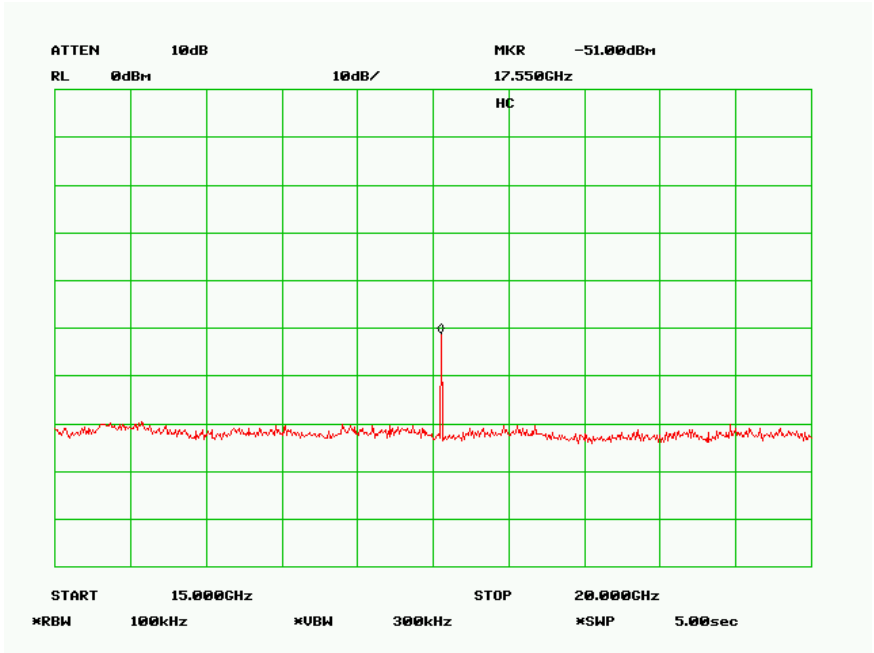
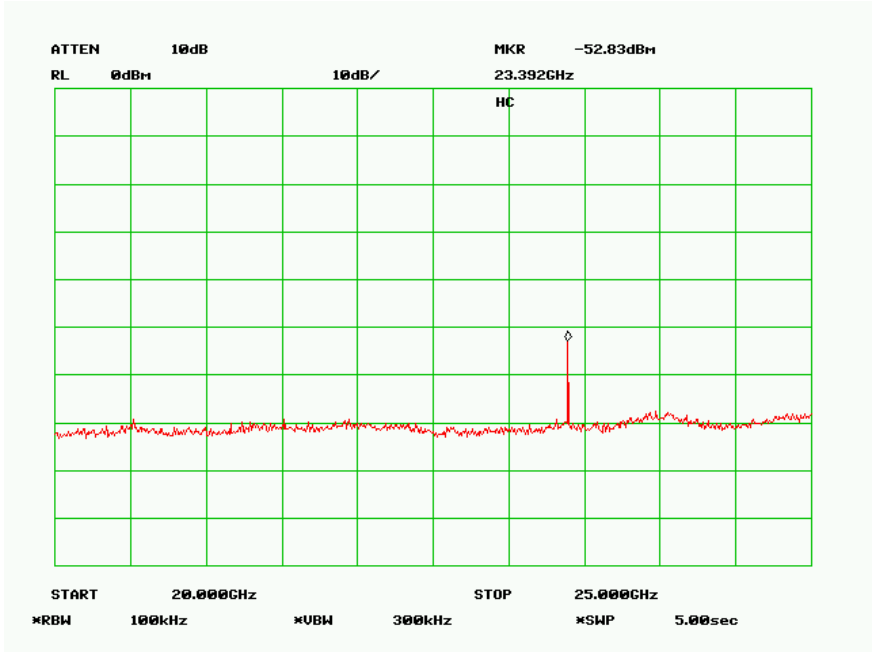

ATTEN 30dB
MKR 84.50dB
RL 20.0dBm
10dB/
1MHz
HC
START 5.000GHz
STOP 10.000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 5.00sec

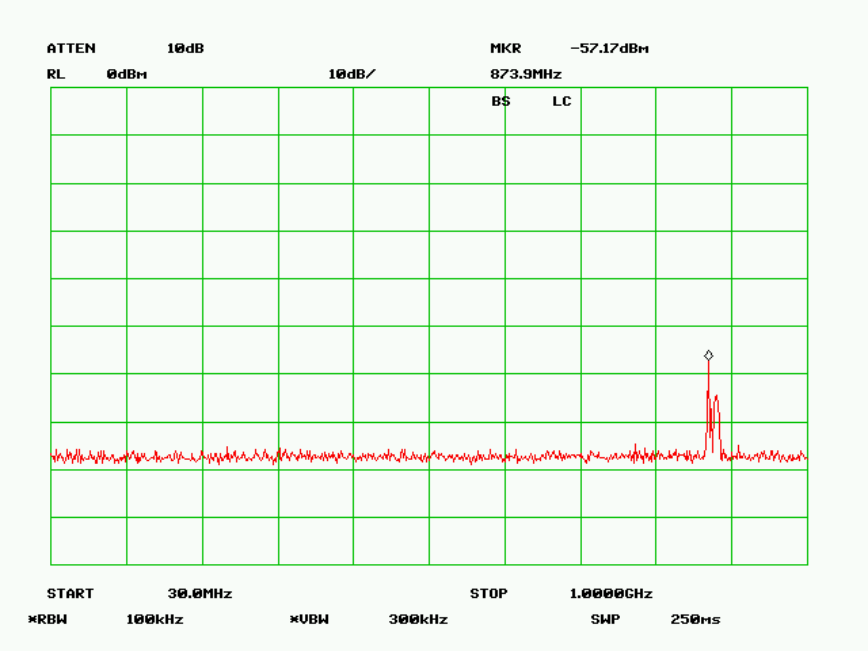

ATTEN 10dB
MKR -63.83dBm
RL 0dBm
10dB/
11.692GHz
HC
START 10.000GHz
STOP 15.000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 5.00sec

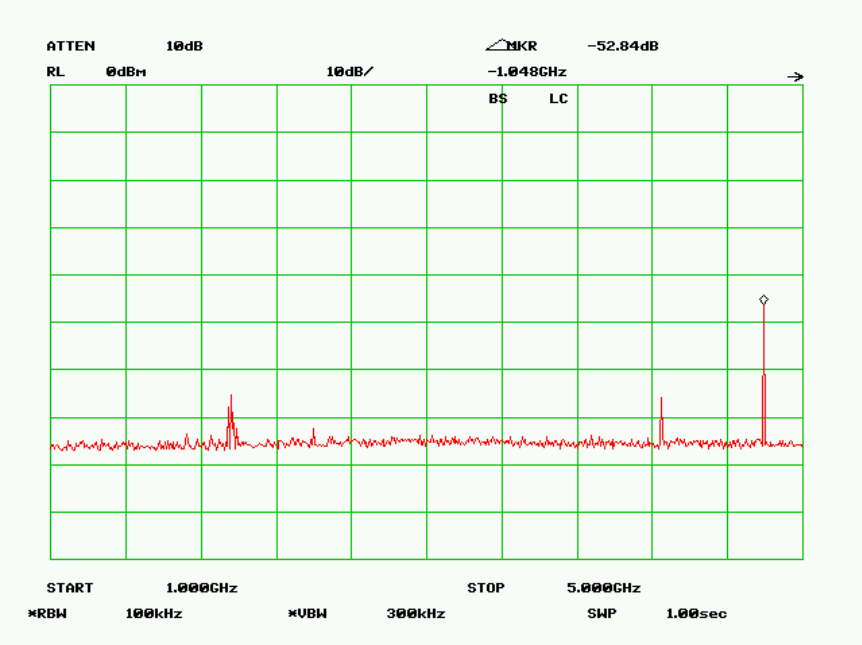

ATTEN 10dB
MKR -51.00dBm
RL 0dBm
10dB/
17.550GHz
HC
START 15.000GHz
STOP 20.000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 5.00sec

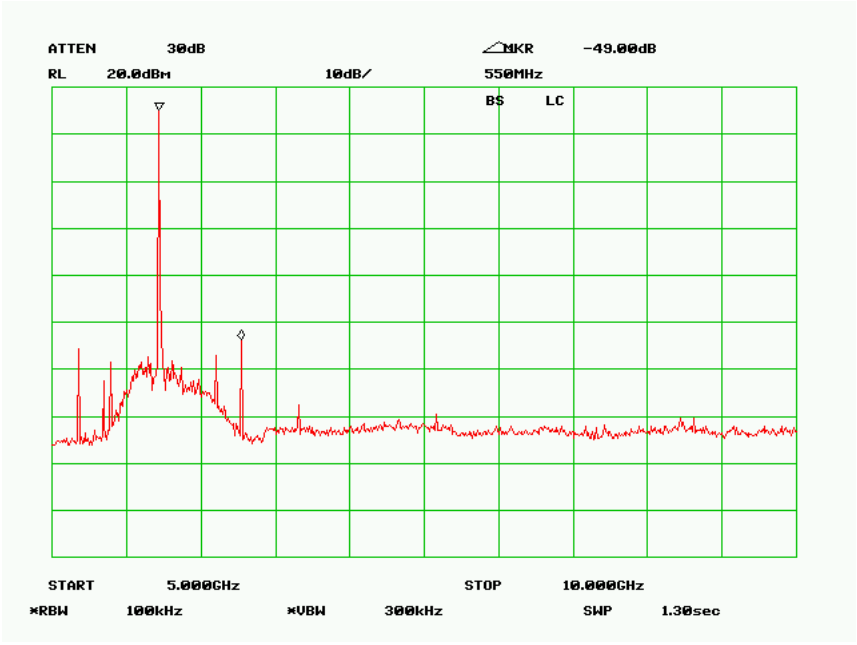

ATTEN 10dB
MKR -52.83dBm
RL 0dBm
10dB/
23.392GHz
HC
START 20.000GHz
STOP 25.000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 5.00sec

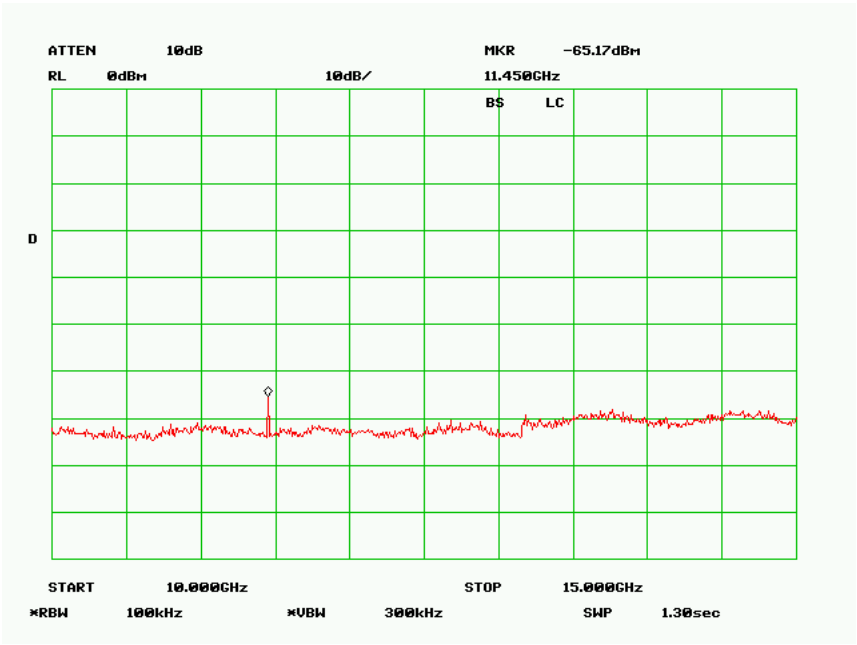
For Base (EUT)

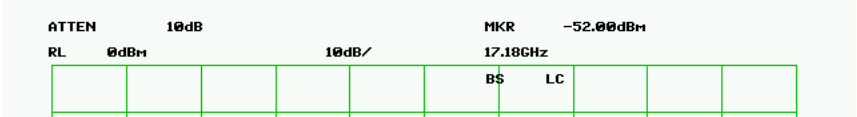
Low Channel



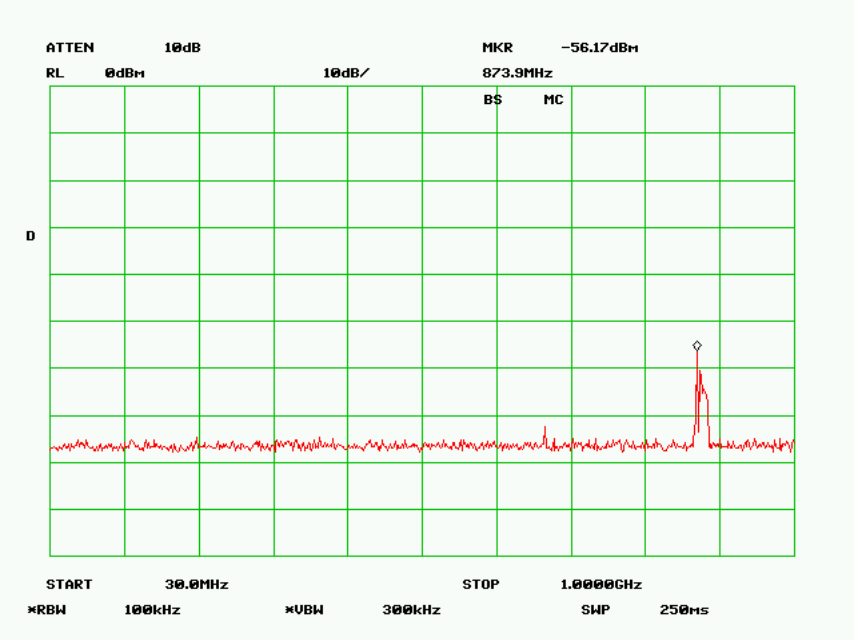


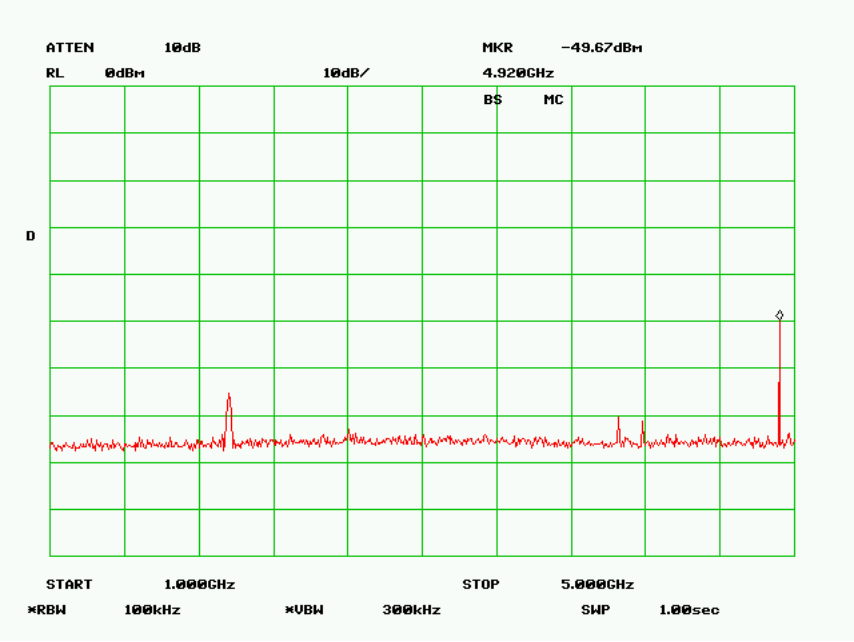

ATTEN 30dB
MKR -49.00dB
RL 20.0dBm
10dB/
550MHz
BS LC
START 5.000GHz
STOP 10.000GHz
*RBW 100kHz
*VBW 300kHz
SWP 1.30sec

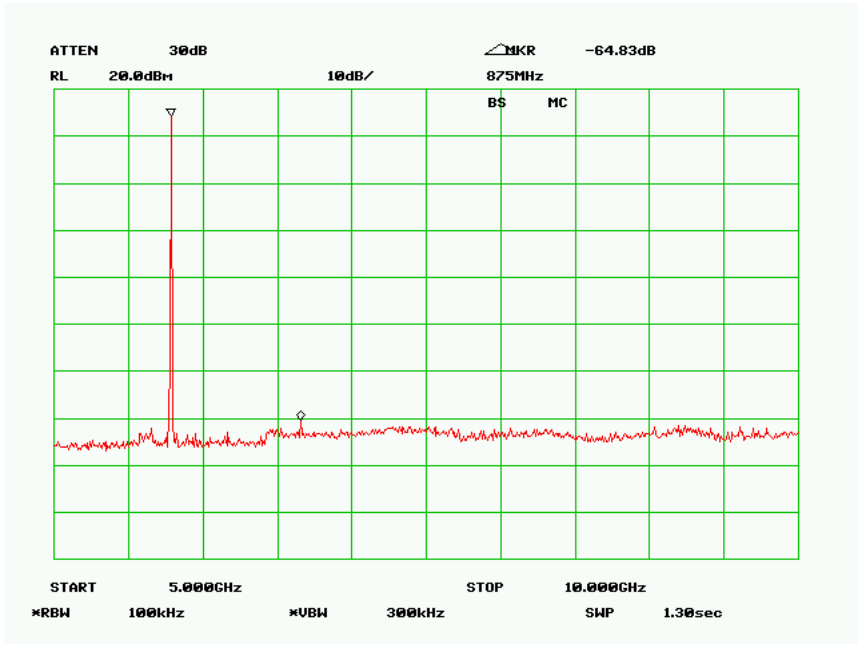

ATTEN 10dB
MKR -65.17dBm
RL 0dBm
10dB/
11.450GHz
BS LC
D
START 10.000GHz
STOP 15.000GHz
*RBW 100kHz
*VBW 300kHz
SWP 1.30sec

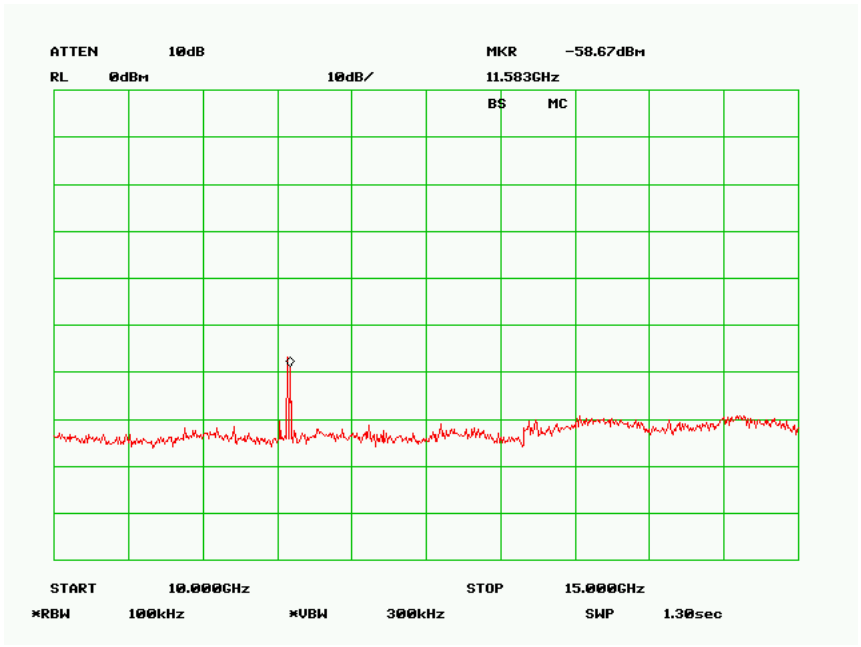

ATTEN 10dB
MKR -52.00dBm
RL 0dBm
10dB/
17.18GHz
BS LC

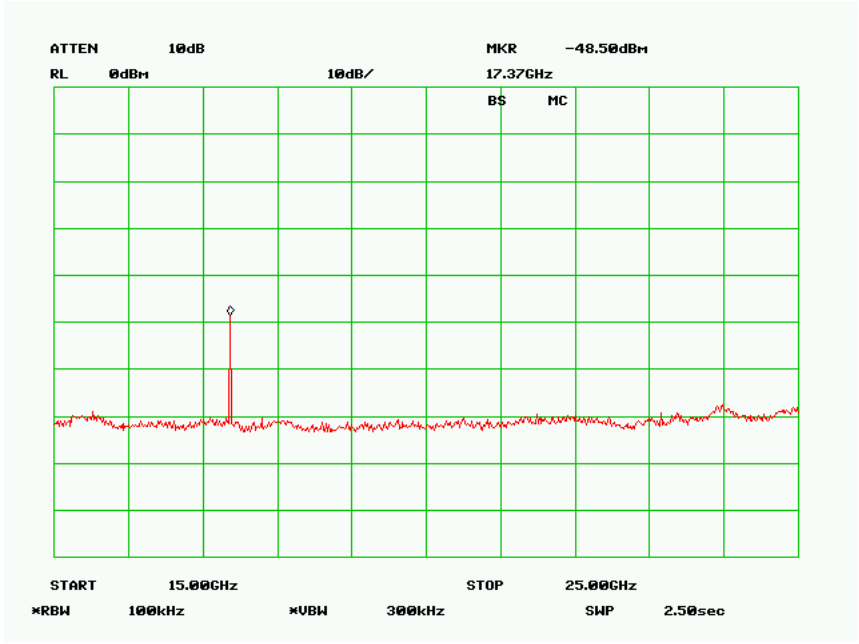
Mid Channel


ATTEN 10dB
MKR -56.17dBm
RL 0dBm
10dB/
873.9MHz
B$ MC
D
START 30.0MHz
STOP 1.0000GHz
*RBW 100kHz
*VBW 300kHz
SWP 250ms

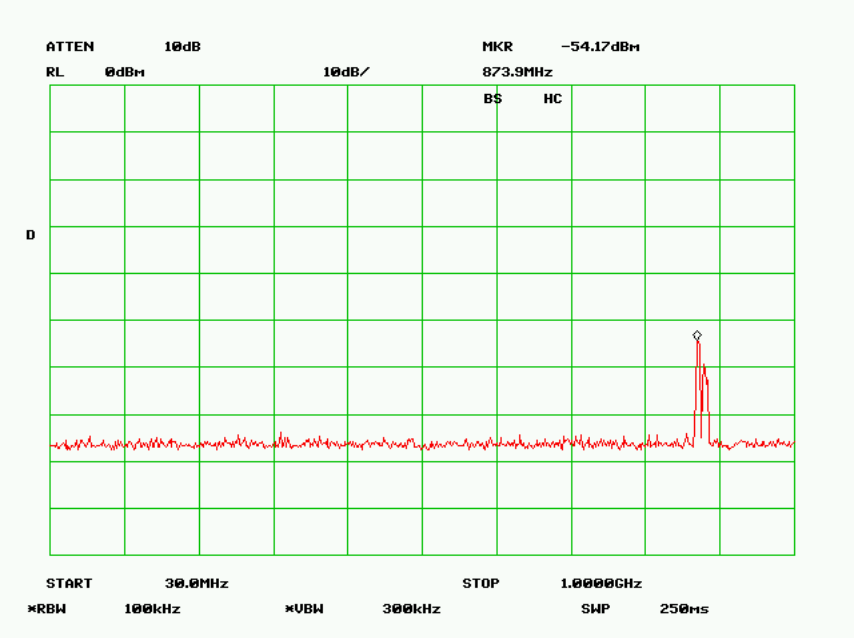

ATTEN 10dB
MKR -49.67dBm
RL 0dBm
10dB/
4.920GHz
B$ MC
D
START 1.000GHz
STOP 5.000GHz
*RBW 100kHz
*VBW 300kHz
SWP 1.00sec

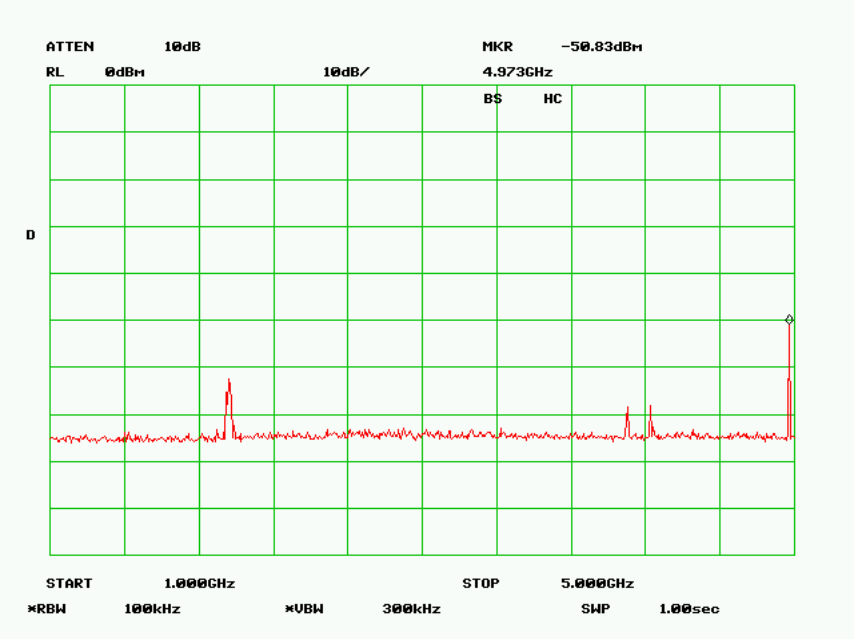

ATTEN 30dB
MKR -64.83dB
RL 20.0dBm
10dB/
875MHz
BS MC
START 5.000GHz
STOP 10.000GHz
*RBW 100kHz
*VBW 300kHz
SWP 1.30sec

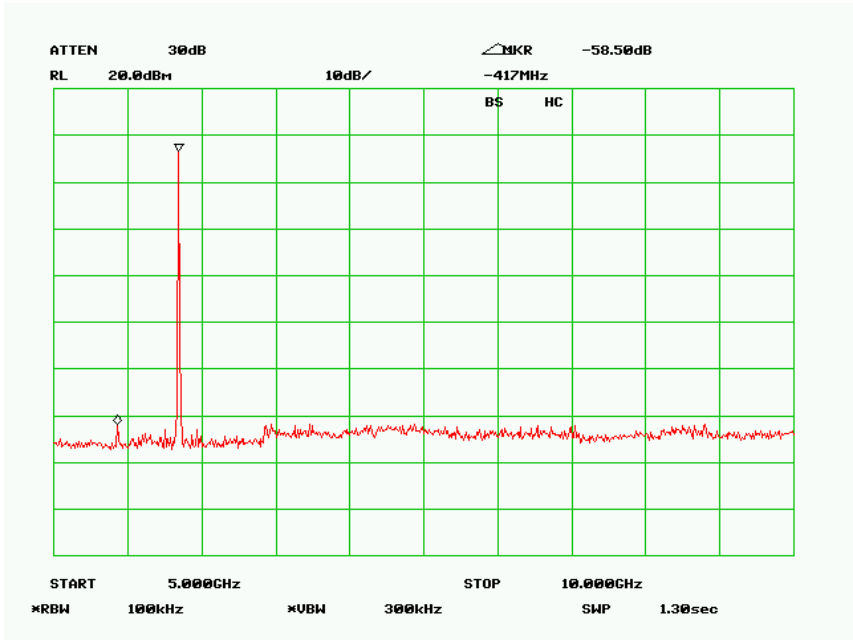

ATTEN 10dB
MKR -58.67dBm
RL 0dBm
10dB/
11.583GHz
BS MC
START 10.000GHz
STOP 15.000GHz
*RBW 100kHz
*VBW 300kHz
SWP 1.30sec

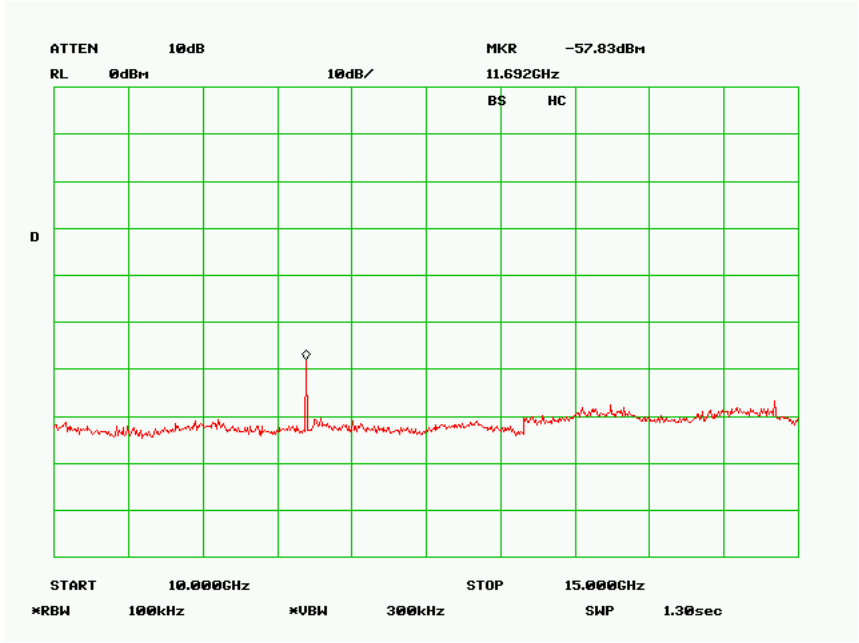

ATTEN 10dB
MKR -48.50dBm
RL 0dBm
10dB/
17.37GHz
BS MC
START 15.00GHz
STOP 25.00GHz
*RBW 100kHz
*VBW 300kHz
SWP 2.50sec

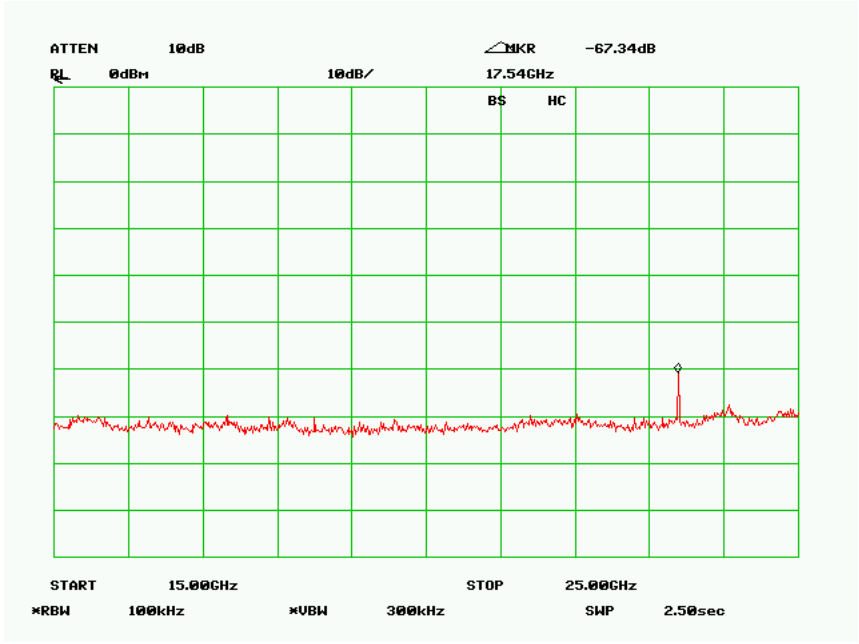
High Channel






ATTEN 30dB
MKR -58.50dB
RL 20.0dBm
10dB/
-417MHz
BS HC
START 5.000GHz
STOP 10.000GHz
*RBW 100kHz
*VBW 300kHz
SWP 1.30sec


ATTEN 10dB
MKR -57.83dBm
RL 0dBm
10dB/
11.692GHz
BS HC
D
START 10.000GHz
STOP 15.000GHz
*RBW 100kHz
*VBW 300kHz
SWP 1.30sec


ATTEN 10dB
MKR -67.34dB
RL 0dBm
10dB/
17.54GHz
BS HC
START 15.00GHz
STOP 25.00GHz
*RBW 100kHz
*VBW 300kHz
SWP 2.50sec

§15.205, §15.209 & §15.247(c) - RADIATED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is $\pm$4.0 dB.

Test Setup

The radiated emissions tests were performed in the shield room, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Sonoma Instruments	Pre amplifier	317	260406	2006-02-03
Agilent	Pre amplifier	8449B	3008A01978	2005-08-10
Sunol Science Corp	Combination Antenna	JB3 Antenna	A013105	2006-02-11
DRG	Horn Antenna	SAS-200/571	261	2006-04-20
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.595 0K03	100044	2005-12-14
Agilent	Spectrum analyzer	8565EC	3946A00131	2006-01-11
Rohde & Schwarz	Artificial-Mains Network	ESH2-Z5	871884/039	2005-11-14

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	24° C
Relative Humidity:	45%
ATM Pressure:	1020 mbar

**The testing was performed by Tom Chen 2006-06-22.*

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data were recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**QP**" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emissions are 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Class B Limit

Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247, and had the worst margin of:

For 30-1000MHZ (TX Spurious Emissions)

-38.1dB at **31.2325 MHz** in the **Vertical** polarization, **Handset (EUT)**

-35.1 dB at **943.72 MHz** in the **Horizontal** polarization, **Base (EUT)**

Radiated spurious emissions above 1GHz (Handset)

-0.5 dB at**17176.7000 MHz** in the **Vertical** polarization, **Low Channel**

-1.1 dB at **14768.1000 MHz** in the **Horizontal** polarization, **Middle Channel**

-1.0 dB at **17546.0000 MHz** in the **Vertical** polarization, **High Channel**

Radiated spurious emissions above 1GHz (Base)

-1.3 dB at **17178.8000 MHz** in the **Horizontal** polarization, **Low Channel**

-5.8 dB at **17361.9000 MHz** in the **Horizontal** polarization, **Middle Channel**

-0.5 dB at **17546.0000 MHz** in the **Horizontal** polarization, **High Channel**

Radiated Emissions Test Data @ 3 meter

TX mode spurious emissions test result (30-1000MHz)

Handset (EUT)

Frequency MHz	Corrected Reading dBuV	Height m	Polar H / V	Azimuth Degrees	Corr. dBuV/m	FCC15 Limit (dBuV/m)	FCC15 Margin
31.2325	18.6	1.02	V	37	1.9	40	-38.1
39.3975	17.8	1.14	V	177	-2.2	40	-42.2
52.65375	25.8	3	V	324	-2.8	40	-42.8
982.96375	18.6	2.51	V	175	11.1	54	-42.9
74.76125	19.6	1.3	V	45	-8.9	40	-48.9
100.87	12	3.95	V	54	-14.5	43.5	-58.0

Base (EUT)

Frequency MHz	Corrected Reading dBuV	Height m	Polar H / V	Azimuth Degrees	Corr. dBuV/m	FCC15 Limit (dBuV/m)	FCC15 Margin
943.72	18.4	3.21	H	135	10.9	46	-35.1
30	14.5	1.72	H	180	-2.2	40	-42.2
47.15625	22.8	2.64	V	311	-3.7	40	-43.7
147.47125	18.9	3.88	H	254	-3.9	43.5	-47.4
103.255	12.1	3.94	V	0	-14.4	43.5	-57.9
101.355	11.3	3.45	V	226	-15.2	43.5	-58.7

Radiated spurious emissions above 1GHZ – 25GHz (Handset)

Low Channel:

Frequency MHz	Reading dBuV	Azimuth Degrees	Height m	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Corrected Reading dBuV/m	FCC15 Limit (dBuV/m)	FCC15 Margin	Comments
17176.7000	36.5	293	1.1	V	43.6	4.4	31.0	53.5	54	-0.5	Ave
17176.7000	35.2	299	1.1	H	43.6	4.4	31.0	52.2	54	-1.8	Ave
11451.1000	35.2	213	1.0	V	39.3	4.3	33.0	45.8	54	-8.2	Ave
17176.7000	48.0	293	1.1	V	43.6	4.4	31.0	65.0	74	-9.0	Peak
17176.7000	46.3	299	1.1	H	43.6	4.4	31.0	63.4	74	-10.6	Peak
4799.6000	41.8	186	1.3	H	32.5	1.9	34.8	41.4	54	-12.6	Ave
11451.1000	28.9	322	1.1	H	39.3	4.3	33.0	39.5	54	-14.5	Ave
4799.6000	37.4	174	1.0	V	32.5	1.9	34.8	37.0	54	-17.0	Ave
11451.1000	45.5	213	1.0	V	39.3	4.3	33.0	56.1	74	-17.9	Peak
11451.1000	40.5	322	1.1	H	39.3	4.3	33.0	51.1	74	-22.9	Peak
4799.6000	47.0	186	1.3	H	32.5	1.9	34.8	46.6	74	-27.4	Peak
4799.6000	43.8	174	1.0	V	32.5	1.9	34.8	43.4	74	-30.6	Peak

Middle Channel:

Frequency MHz	Reading dBuV	Azimuth Degrees	Height m	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Corrected Reading dBuV/m	FCC15 Limit (dBuV/m)	FCC15 Margin	Comments
14768.1000	37.7	228	1.6	H	42.5	2.9	30.2	52.9	54	-1.1	Ave
14768.1000	36.3	208	1.0	V	42.5	2.9	30.2	51.5	54	-2.5	Ave
11574.6000	34.7	181	1.4	H	39.5	5.0	32.2	47.1	54	-6.9	Ave
11574.6000	32.1	183	1.0	V	39.5	5.0	32.2	44.5	54	-9.5	Ave
14768.1000	48.7	228	1.6	H	42.5	2.9	30.2	63.9	74	-10.1	Peak
14768.1000	46.8	208	1.0	V	42.5	2.9	30.2	62.0	74	-12.0	Peak
4922.7000	37.6	226	1.3	V	32.5	1.9	34.8	37.2	54	-16.8	Ave
4922.7000	36.3	291	1.1	H	32.5	1.9	34.8	35.9	54	-18.1	Ave
11574.6000	43.5	181	1.4	H	39.5	5.0	32.2	55.9	74	-18.1	Peak
11574.6000	42.5	183	1.0	V	39.5	5.0	32.2	54.9	74	-19.1	Peak
4922.7000	45.3	291	1.1	H	32.5	1.9	34.8	44.9	74	-29.1	Peak
4922.7000	44.0	226	1.3	V	32.5	1.9	34.8	43.6	74	-30.4	Peak

High Channel:

Frequency MHz	Reading dBuV	Azimuth Degrees	Height m	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Corrected Reading dBuV/m	FCC15 Limit (dBuV/m)	FCC15 Margin	Comments
17546.0000	37.4	191	1.0	V	43.4	2.8	30.7	53.0	54	-1.0	Ave
19912.0000	35.2	178	1.2	H	43.4	3.8	30.7	51.8	54	-2.2	Ave
17546.0000	34.2	179	1.3	H	43.4	2.8	30.7	49.8	54	-4.2	Ave
17546.0000	52.3	179	1.3	H	43.4	2.8	30.7	67.9	74	-6.1	Peak
19912.0000	28.7	136	1.3	V	43.4	3.8	30.7	45.3	54	-8.7	Ave
11697.8000	32.5	165	1.1	H	39.5	5.0	32.2	44.9	54	-9.1	Ave
17546.0000	48.0	191	1.0	V	43.4	2.8	30.7	63.6	74	-10.4	Peak
4978.0000	42.1	171	1.0	H	32.5	1.9	34.8	41.7	54	-12.3	Ave
4978.0000	41.5	196	1.0	V	32.5	1.9	34.8	41.1	54	-12.9	Ave
11697.8000	28.4	213	1.0	V	39.5	5.0	32.2	40.8	54	-13.2	Ave
19912.0000	44.2	178	1.2	H	43.4	3.8	30.7	60.7	74	-13.3	Peak
19912.0000	39.2	136	1.3	V	43.4	3.8	30.7	55.7	74	-18.3	Peak
11697.8000	41.5	165	1.1	H	39.5	5.0	32.2	53.9	74	-20.1	Peak
11697.8000	39.7	213	1.0	V	39.5	5.0	32.2	52.0	74	-22.0	Peak
4978.0000	50.7	171	1.0	H	32.5	1.9	34.8	50.3	74	-23.7	Peak
4978.0000	46.5	196	1.0	V	32.5	1.9	34.8	46.1	74	-27.9	Peak

Radiated spurious emissions above 1GHZ – 25GHz (Base)

Low Channel:

Frequency MHz	Reading dBuV	Azimuth Degrees	Height m	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Corrected Reading dBuV/m	FCC15 Limit (dBuV/m)	FCC15 Margin	Comments
17178.8000	35.7	85	1.3	H	43.6	4.4	31.0	52.7	54	-1.3	Ave
17178.8000	26.8	212	1.4	V	43.6	4.4	31.0	43.8	54	-10.2	Ave
17178.8000	46.5	85	1.3	H	43.6	4.4	31.0	63.5	74	-10.5	Peak
11451.9000	32.8	48	1.3	V	39.3	4.3	33.0	43.4	54	-10.6	Ave
11451.9000	32.8	131	1.9	H	39.3	4.3	33.0	43.4	54	-10.6	Ave
17178.8000	41.8	212	1.4	V	43.6	4.4	31.0	58.9	74	-15.1	Peak
11451.9000	44.3	48	1.3	V	39.3	4.3	33.0	54.9	74	-19.1	Peak
11451.9000	44.0	131	1.9	H	39.3	4.3	33.0	54.6	74	-19.4	Peak

Middle Channel:

Frequency MHz	Reading dBuV	Azimuth Degrees	Height m	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Corrected Reading dBuV/m	FCC15 Limit (dBuV/m)	FCC15 Margin	Comments
17361.9000	31.2	192	2.0	H	43.6	4.4	31.0	48.2	54	-5.8	Ave
17361.9000	31.0	156	2.0	V	43.6	4.4	31.0	48.0	54	-6.0	Ave
11574.2000	33.8	188	1.6	V	39.5	5.0	32.2	46.2	54	-7.8	Ave
11575.0000	33.6	191	1.6	V	39.5	5.0	32.2	46.0	54	-8.0	Ave
11575.0000	31.2	196	2.1	H	39.5	5.0	32.2	43.6	54	-10.4	Ave
17361.9000	45.8	192	2.0	H	43.6	4.4	31.0	62.9	74	-11.1	Peak
17361.9000	45.0	156	2.0	V	43.6	4.4	31.0	62.0	74	-12.0	Peak
11574.2000	28.9	270	1.6	H	39.5	5.0	32.2	41.3	54	-12.7	Ave
11574.2000	47.3	188	1.6	V	39.5	5.0	32.2	59.7	74	-14.3	Peak
11575.0000	47.0	191	1.6	V	39.5	5.0	32.2	59.4	74	-14.6	Peak
11575.0000	45.8	196	2.1	H	39.5	5.0	32.2	58.2	74	-15.8	Peak
11574.2000	42.3	270	1.6	H	39.5	5.0	32.2	54.7	74	-19.3	Peak

High Channel:

Frequency MHz	Reading dBuV	Azimuth Degrees	Height m	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Corrected Reading dBuV/m	FCC15 Limit (dBuV/m)	FCC15 Margin	Comments
17546.0000	37.9	231	1.3	H	43.4	2.8	30.7	53.5	54	-0.5	Ave
17546.4000	37.2	225	1.2	H	43.4	2.8	30.7	52.8	54	-1.2	Ave
17546.0000	33.7	149	1.5	V	43.4	2.8	30.7	49.3	54	-4.7	Ave
17546.0000	50.3	231	1.3	H	43.4	2.8	30.7	65.9	74	-8.1	Peak
17546.4000	28.8	153	1.4	V	43.4	2.8	30.7	44.4	54	-9.6	Ave
17546.4000	48.4	225	1.2	H	43.4	2.8	30.7	64.0	74	-10.0	Peak
17546.0000	46.7	149	1.5	V	43.4	2.8	30.7	62.2	74	-11.8	Peak
11697.8000	28.9	212	1.0	V	39.5	5.0	32.2	41.3	54	-12.7	Ave
11697.8000	26.1	138	1.6	H	39.5	5.0	32.2	38.5	54	-15.5	Ave
17546.4000	42.3	153	1.4	V	43.4	2.8	30.7	57.9	74	-16.1	Peak
11697.8000	44.2	212	1.0	V	39.5	5.0	32.2	56.5	74	-17.5	Peak
11697.8000	41.5	138	1.6	H	39.5	5.0	32.2	53.9	74	-20.1	Peak

§15.247 (a) (1) - HOPPING CHANNEL SEPARATION

Applicable Standard

According to §15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	8565EC	3946A00131	2006-01-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	24° C
Relative Humidity:	45%
ATM Pressure:	1021 mbar

**The testing was performed by Tom Chen on 2006-06-22.*

Measurement Results

Handset

Channel	Frequency MHz	Channel Separation (KHz)	Limit > KHz
Low	5725.8	181.7	>500
Mid	5787.3	190	>500
High	5848.9	187.5	>500

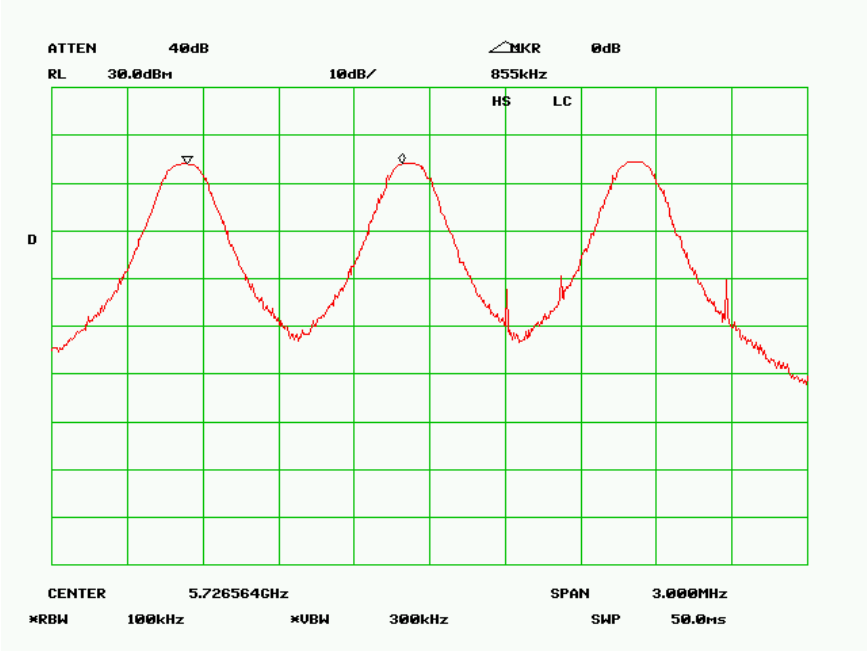
Base

Channel	Frequency MHz	Channel Separation (KHz)	Limit > KHz
Low	5725.8	917	>500
Mid	5787.3	990	>500
High	5848.9	1030	>500

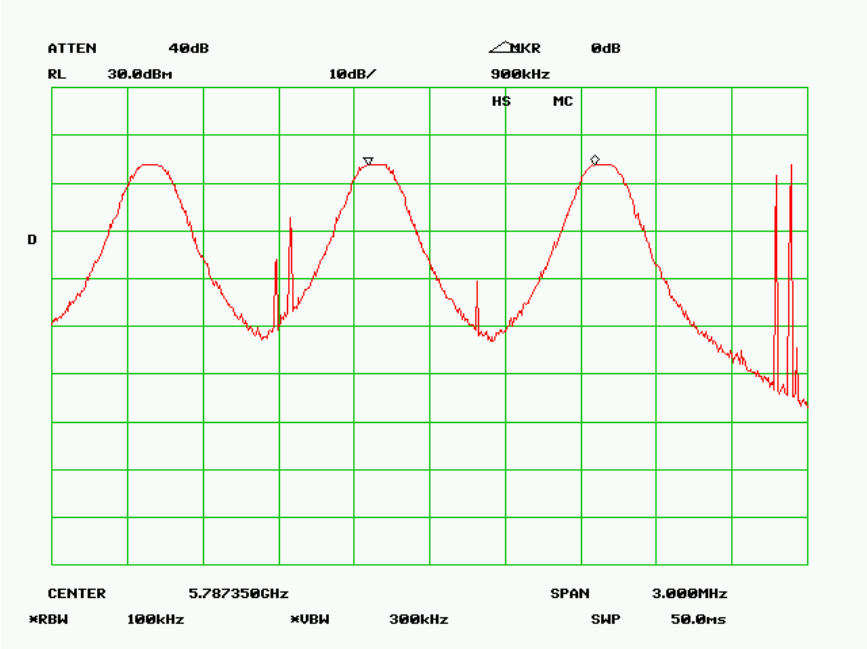
Please refer to the following plots.

For Handset (EUT)

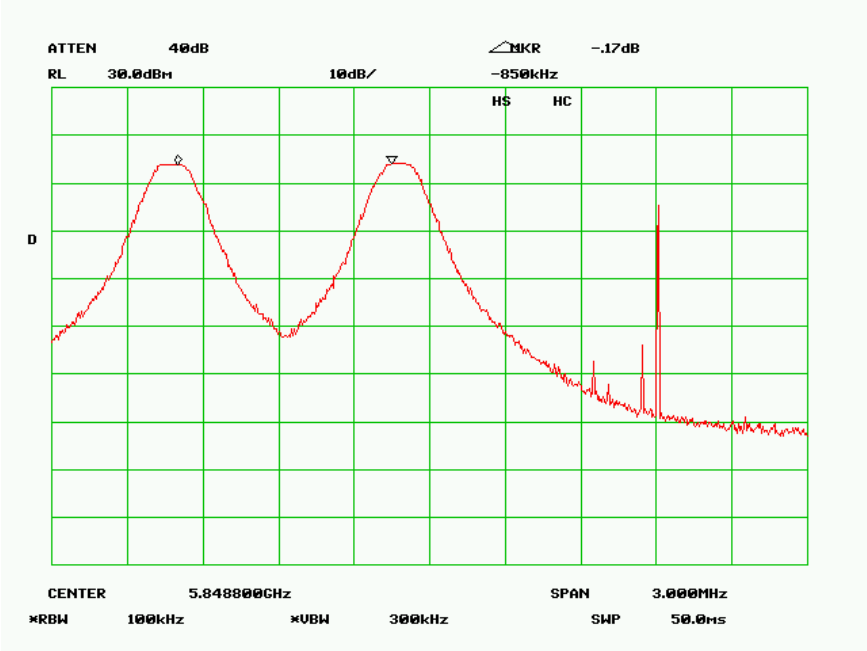
Low Channel



Middle Channel

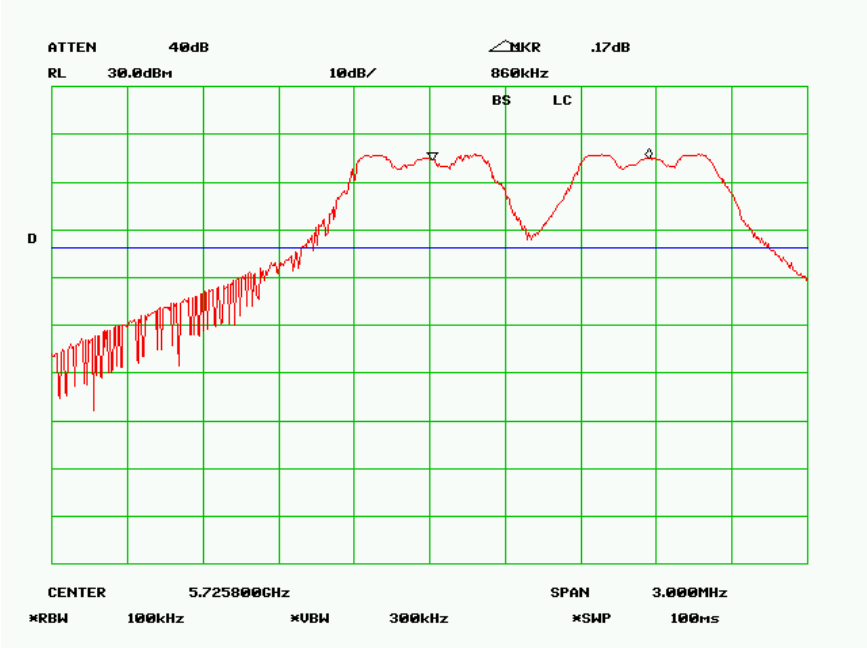


High Channel

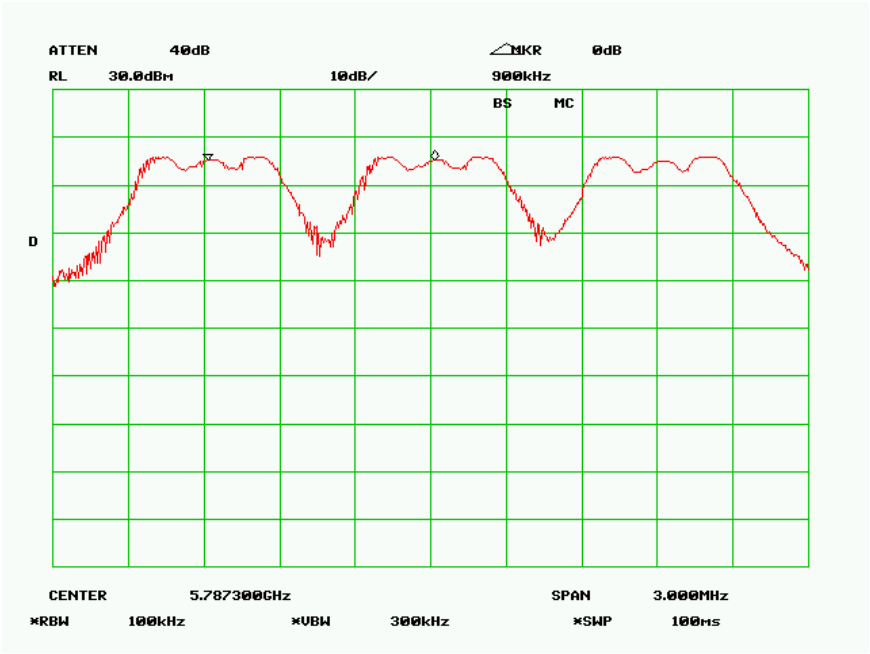


For Base (EUT)

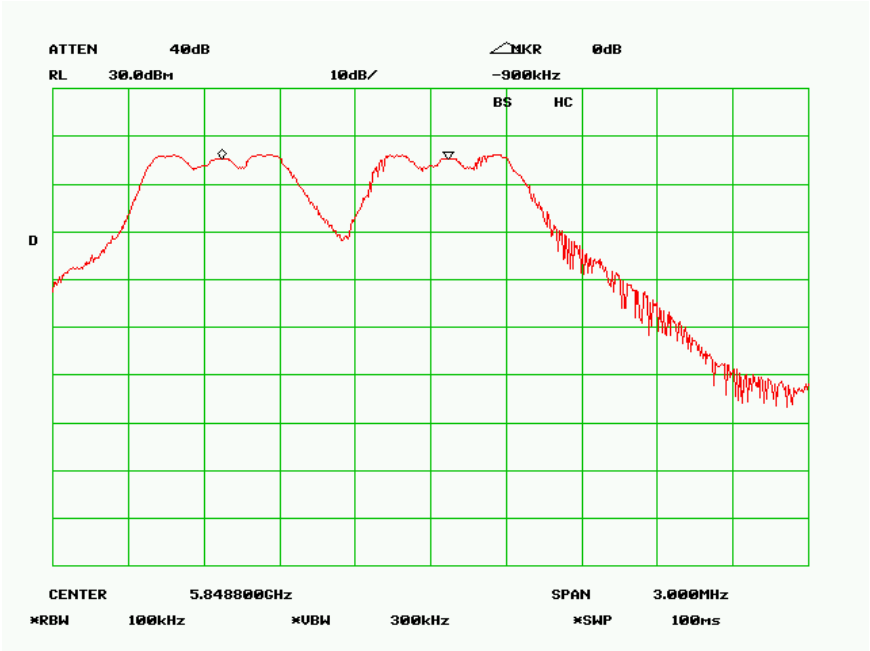
Low Channel



Middle Channel



High Channel



§15.247 (a) (1) - CHANNEL BANDWIDTH

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emissions bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	8565EC	3946A00131	2006-01-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	24° C
Relative Humidity:	45%
ATM Pressure:	1021 mbar

**The testing was performed by Tom Chen on 2006-06-22.*

Measurement Result

Please see the following plots

Handset

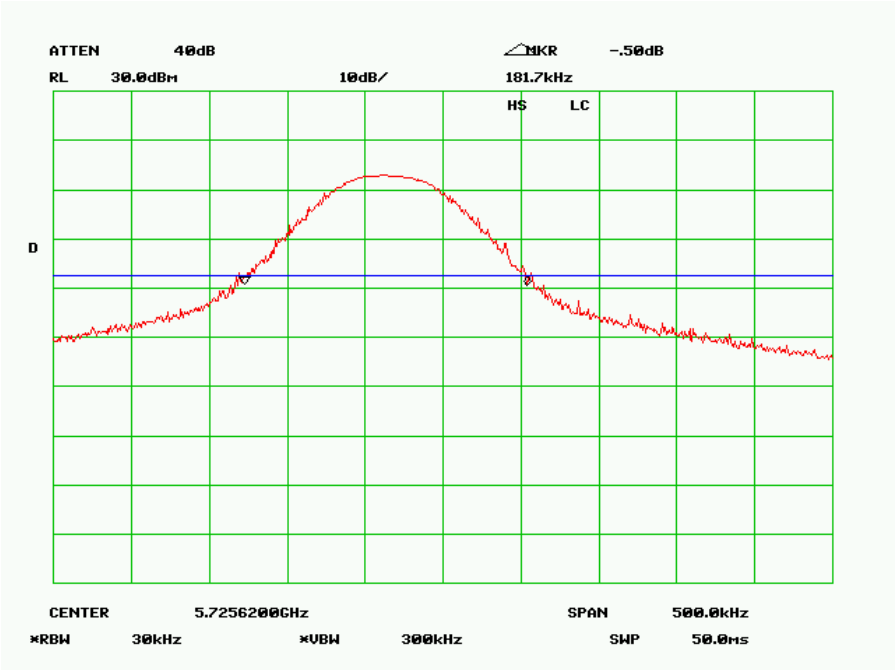
Channel	Frequency MHz	Channel Bandwidth (KHz)
Low	5725.8	181.7
Mid	5787.3	190
High	5848.9	187.5

Base

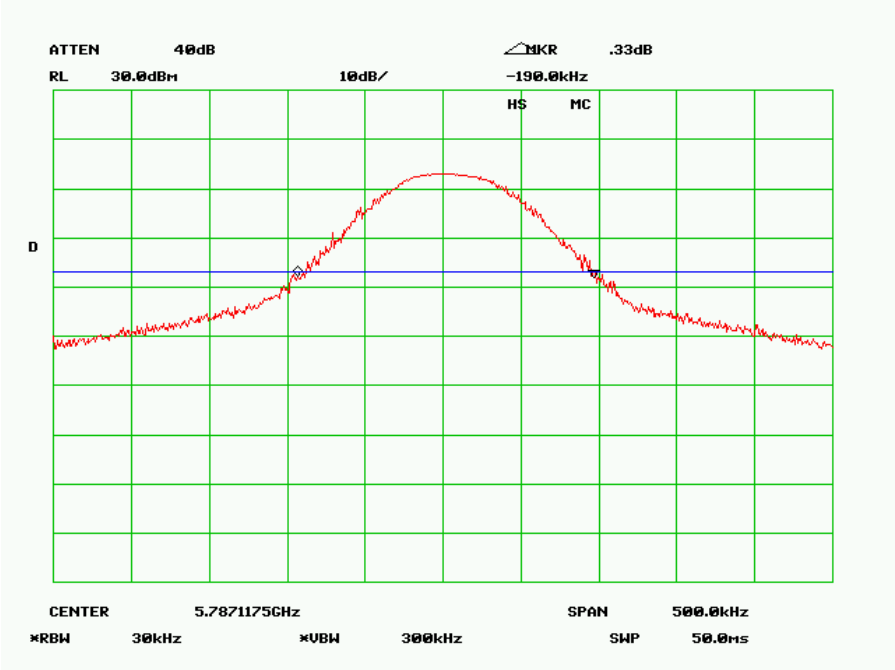
Channel	Frequency MHz	Channel Bandwidth (KHz)
Low	5725.8	917
Mid	5787.3	990
High	5848.9	1030

For Handset (EUT)

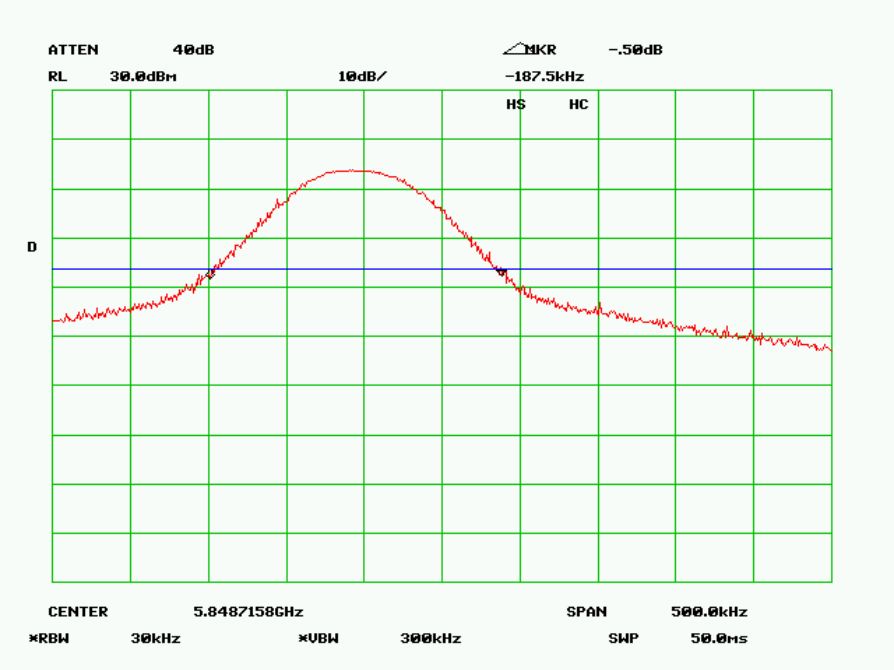
Low Channel



Middle Channel

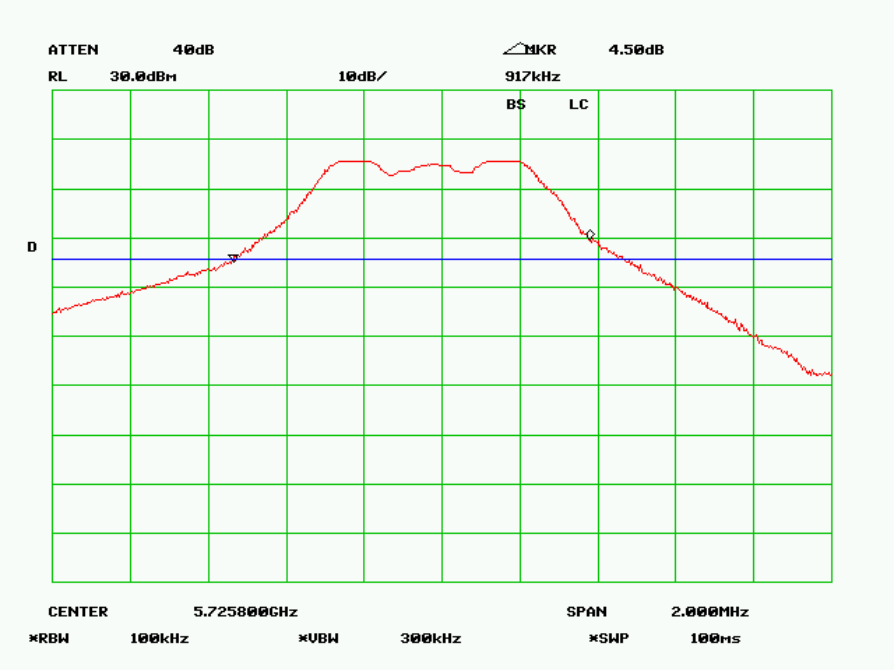


High Channel

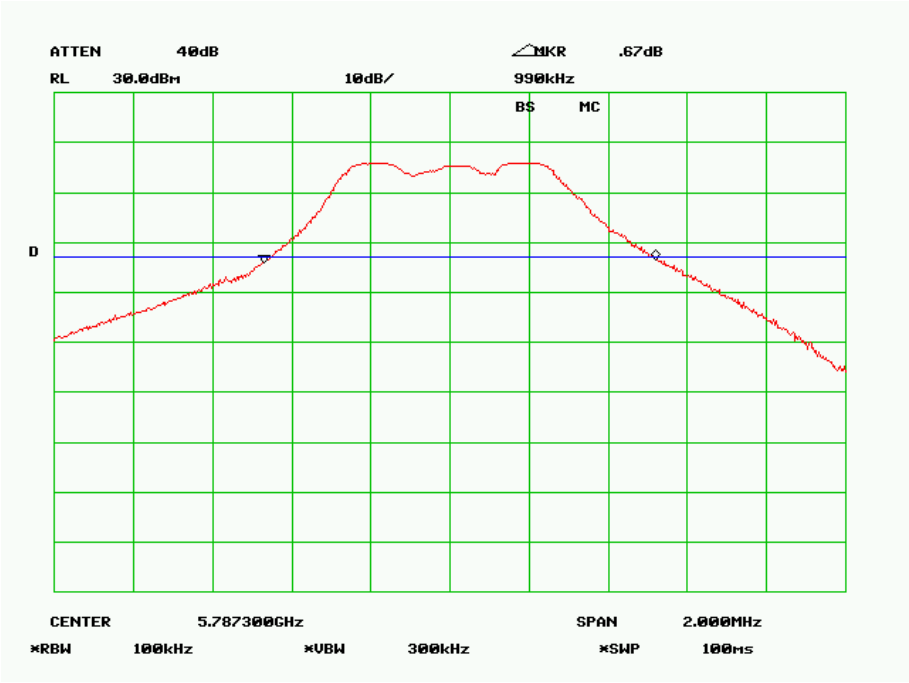


For Base (EUT)

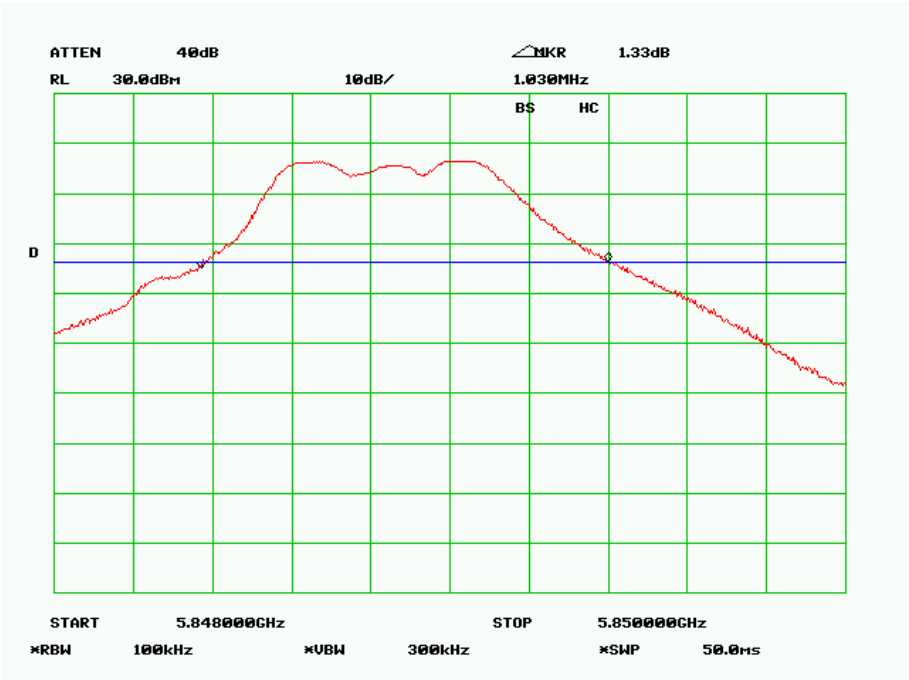
Low Channel



Middle Channel



High Channel



§15.247 (a) (1) (i) - NUMBER OF HOPPING FREQUENCIES USED

Applicable Standard

According to §15.247(a)(1)(iii), for Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	8565EC	3946A00131	2006-01-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

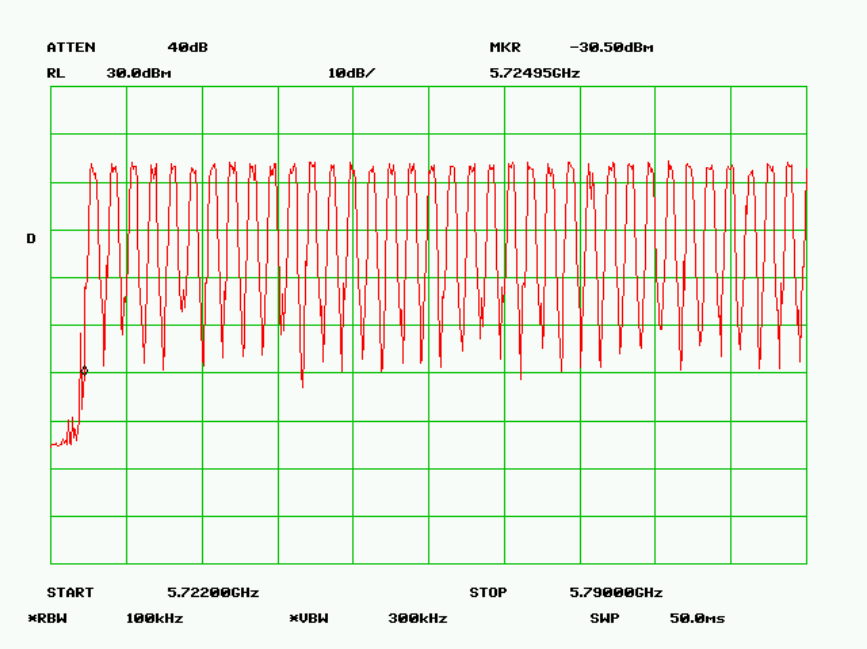
Temperature:	24° C
Relative Humidity:	45%
ATM Pressure:	1021 mbar

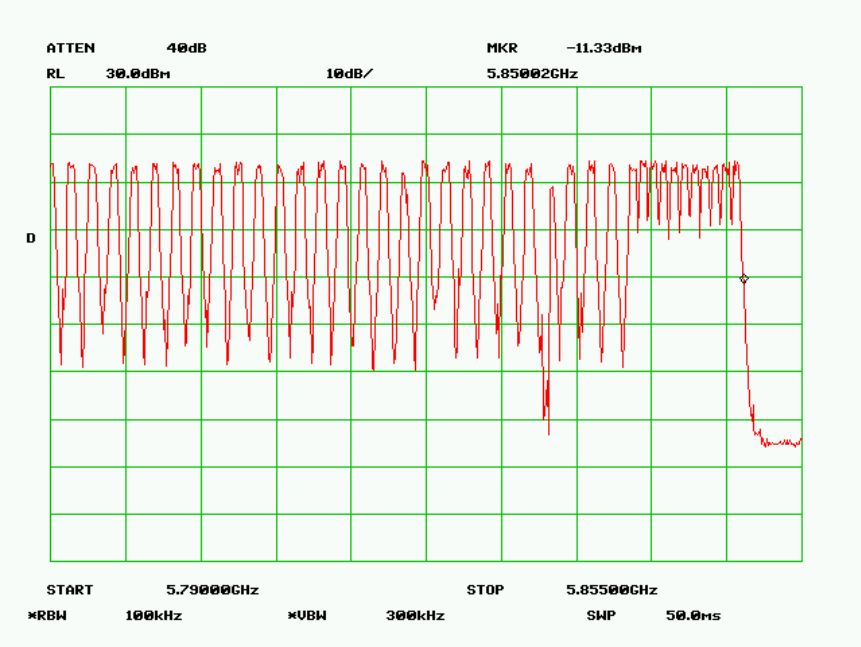
**The testing was performed by Tom Chen on 2006-06-22.*

Measurement Results: 76 Channels

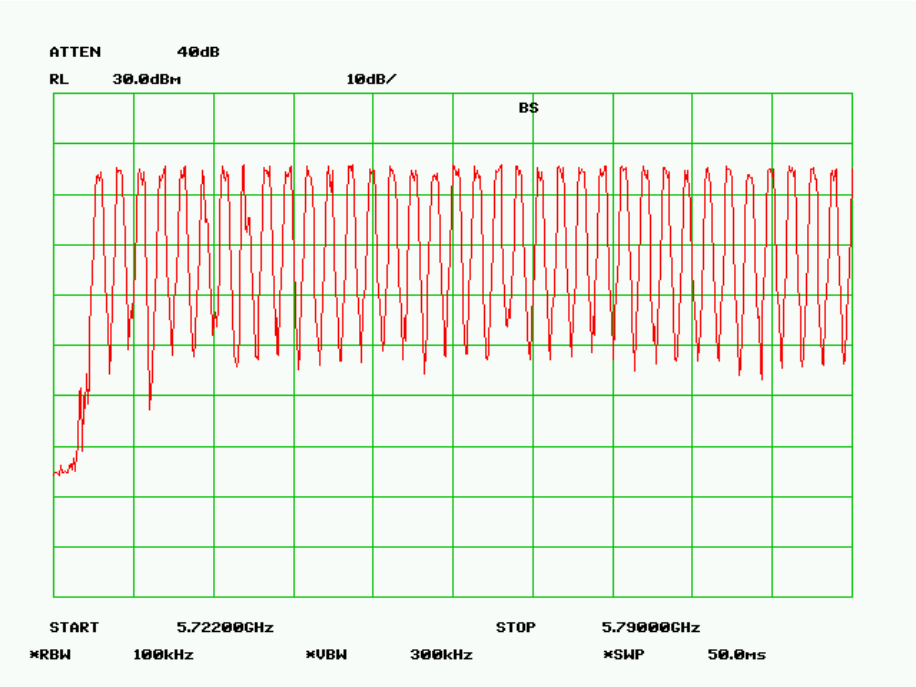
Please refer to the attached plots.

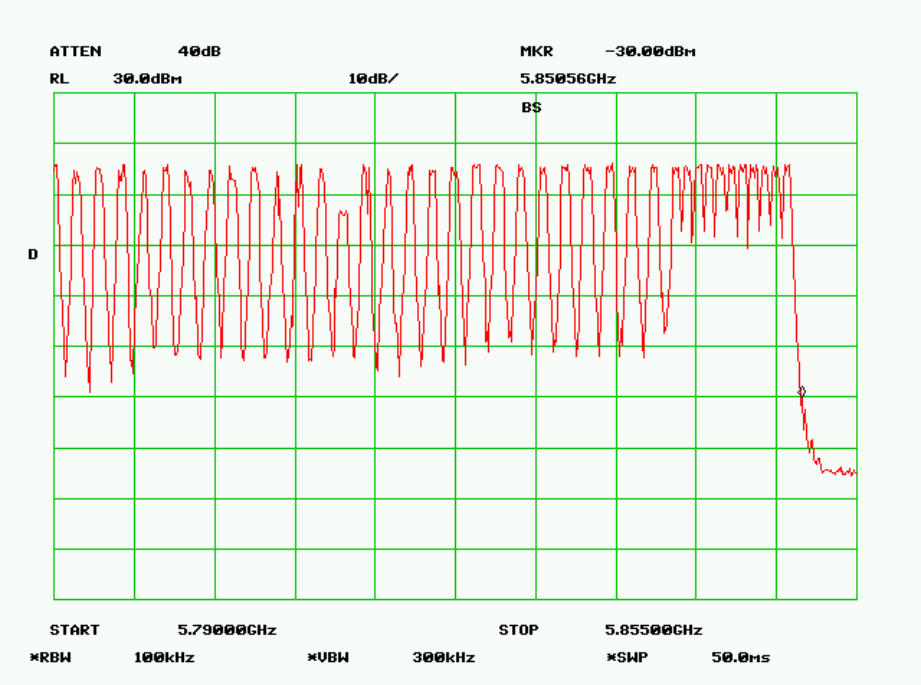
For Handset (EUT)





For Base (EUT)


ATTEN 40dB
RL 30.0dBm
10dB/
BS
START 5.72200GHz
STOP 5.79000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 50.0ms


ATTEN 40dB
MKR -30.00dBm
RL 30.0dBm
10dB/
5.850560GHz
BS
D
START 5.79000GHz
STOP 5.85500GHz
*RBW 100kHz
*VBW 300kHz
*SWP 50.0ms

§15.247(a)(1)(iii) - DWELL TIME

Applicable Standard

According to §15.247(a)(1)(iii), for Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	8565EC	3946A00131	2006-01-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	24° C
Relative Humidity:	45%
ATM Pressure:	1021mbar

**The testing was performed by Tom Chen on 2006-06-22.*

Measurement Results:

For Handset (EUT)

Channel	Frequency MHz	Pulse Wide msec	Occupied time	Dwell Time Sec	Limit Sec
Low	5725.8	1.03	43	0.044	0.4
Mid	5787.3	1.0367	104	0.108	0.4
High	5848.9	1.0333	80	0.083	0.4

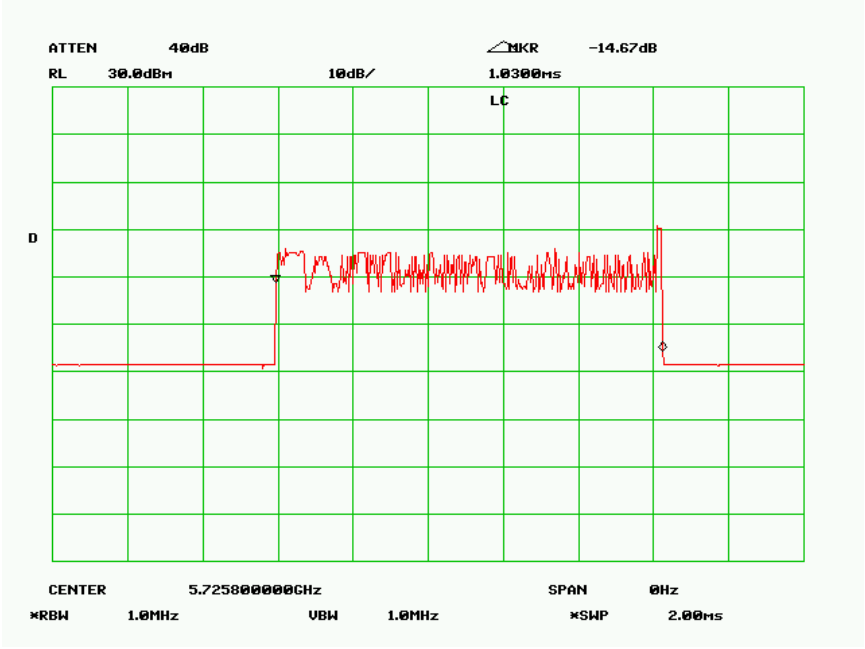
For Base (EUT)

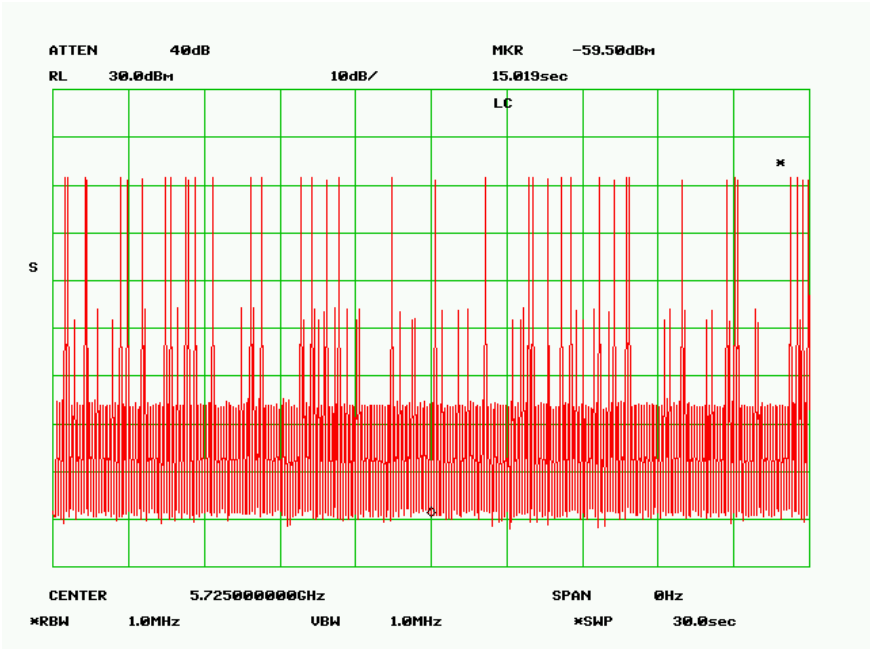
Channel	Frequency MHz	Pulse Wide msec	Occupied time	Dwell Time Sec	Limit Sec
Low	5725.8	1.0333	71	0.073	0.4
Mid	5787.3	1.0367	121	0.125	0.4
High	5848.9	1.0367	124	0.129	0.4

Please refer the following plots.

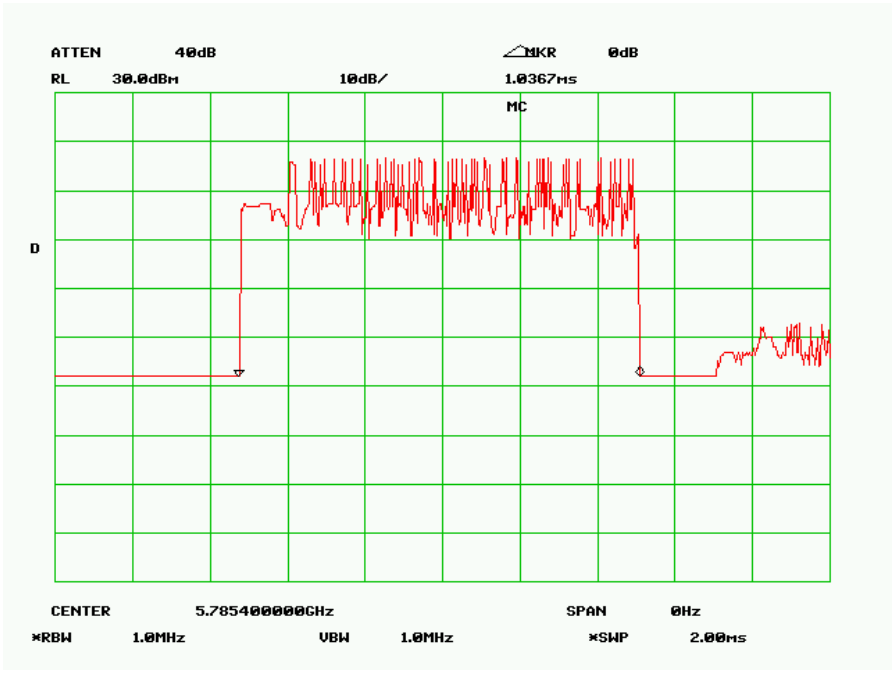
For Handset (EUT)

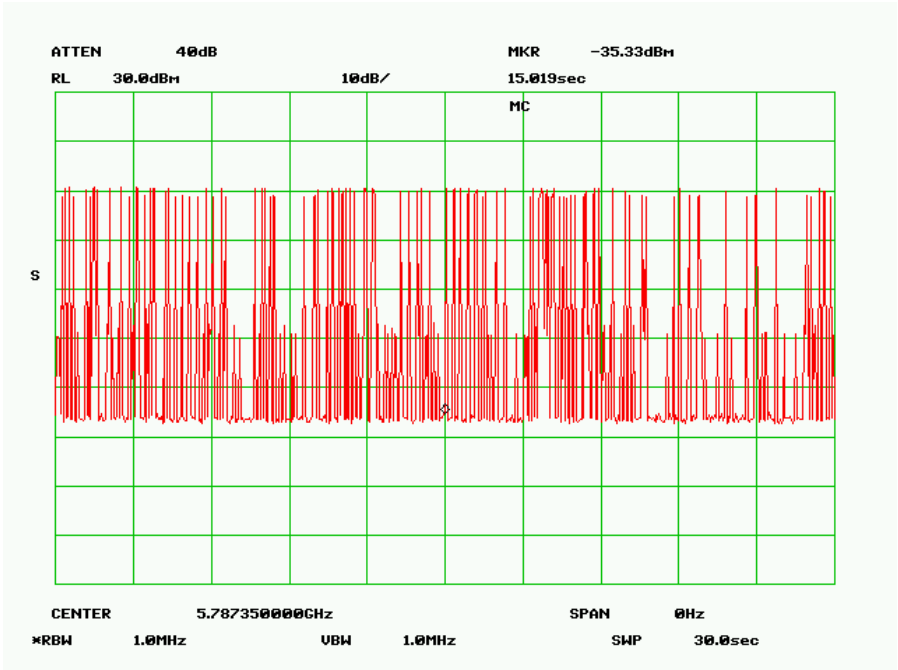
Low Channel:



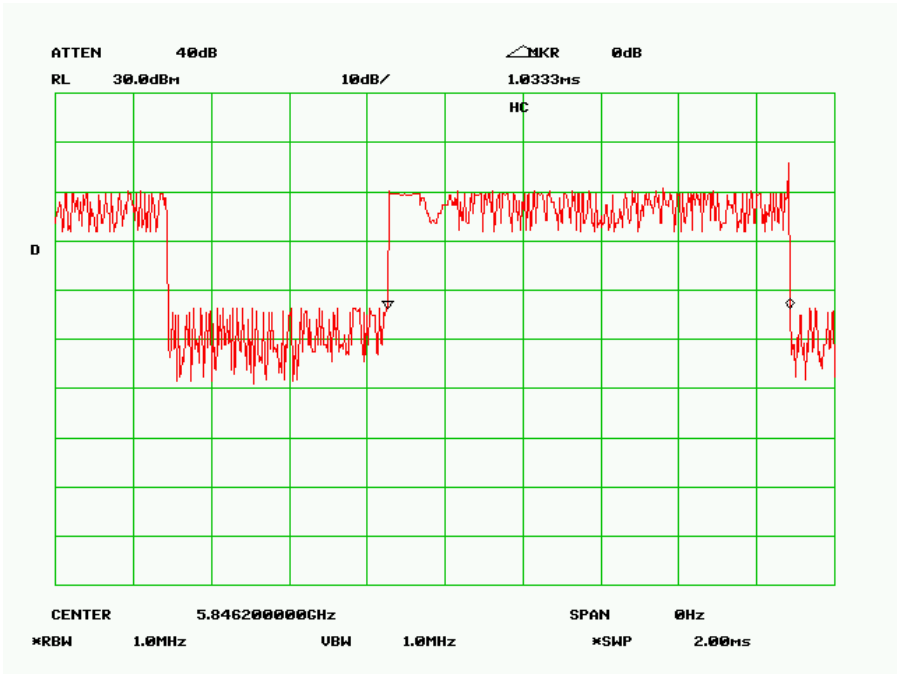


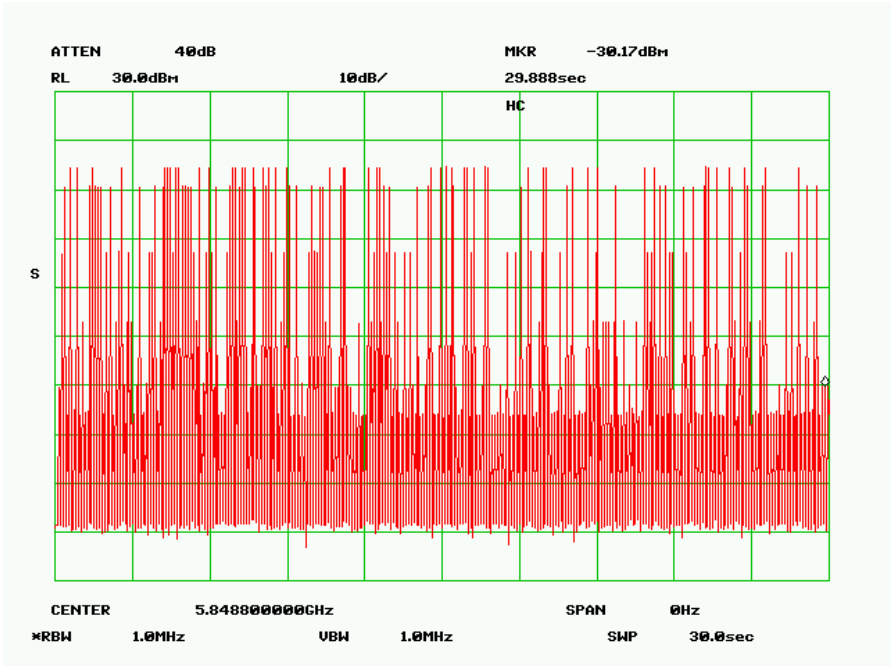
Middle Channel:





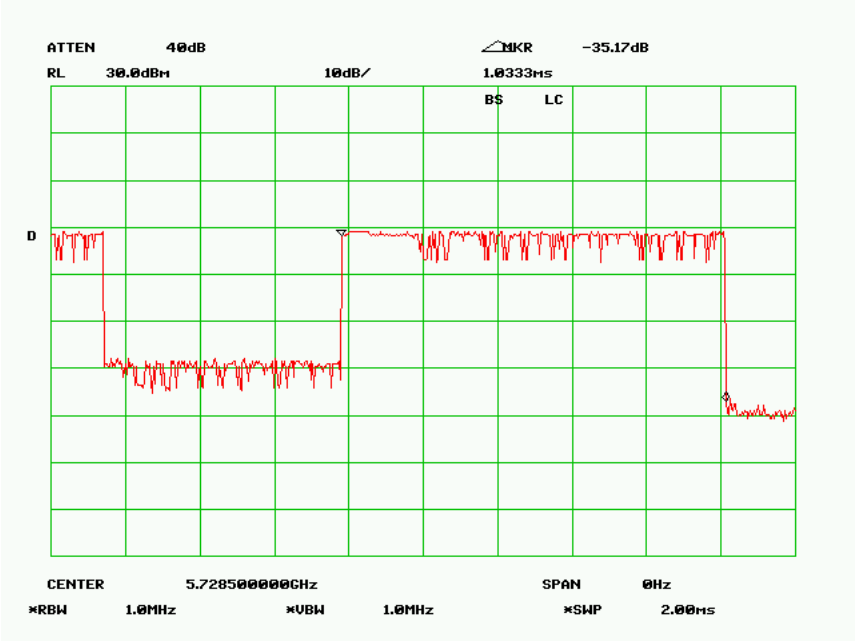
High Channel:

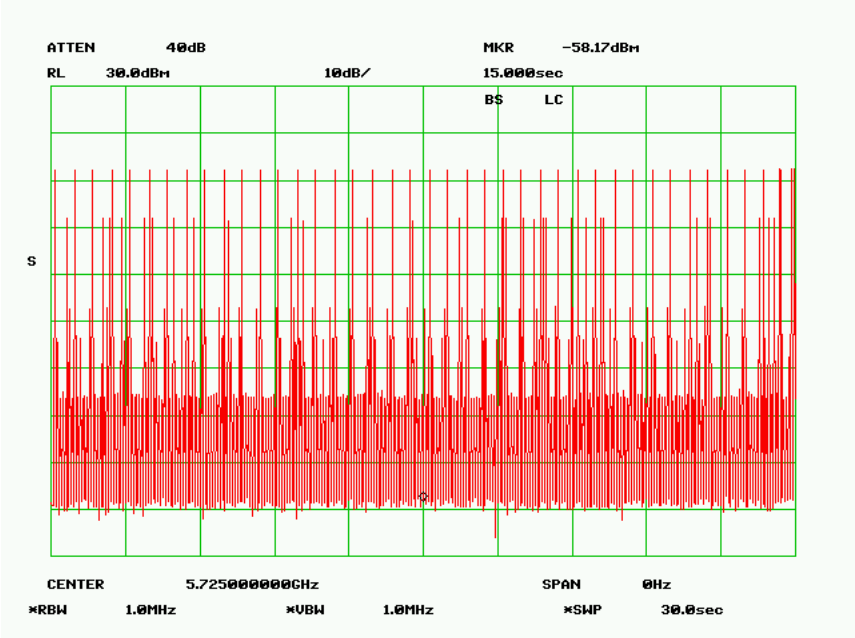




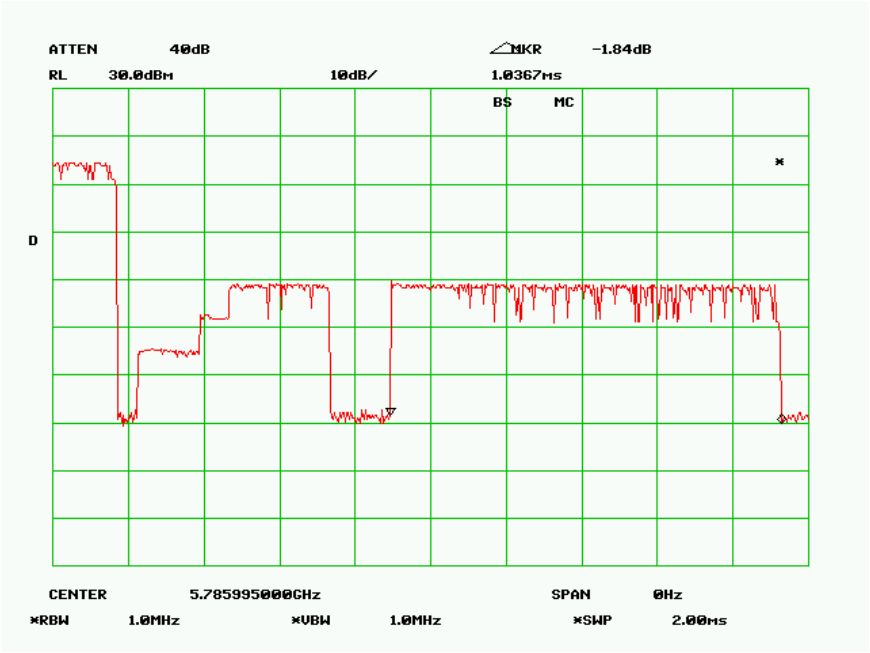
For Base (EUT)

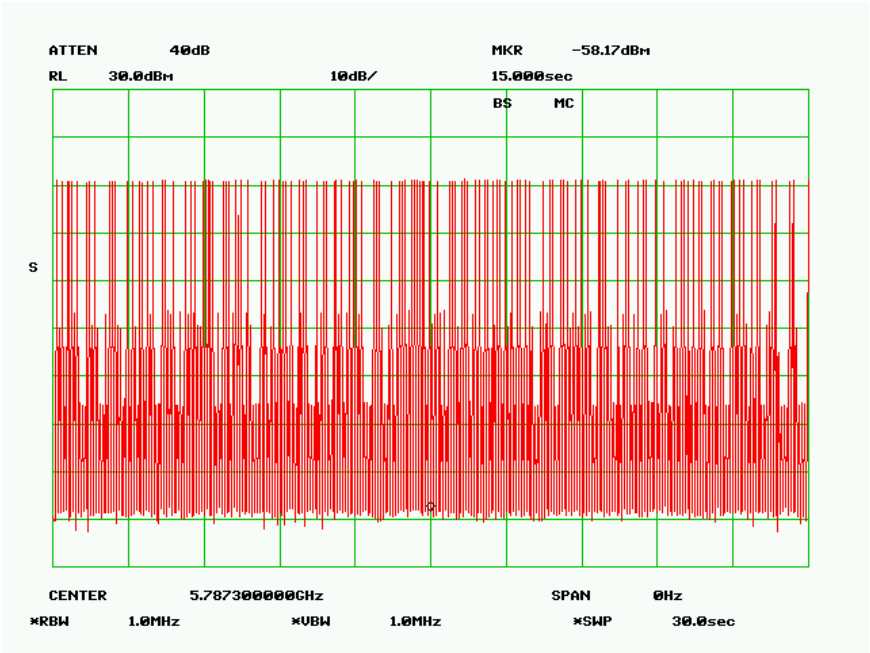
Low Channel



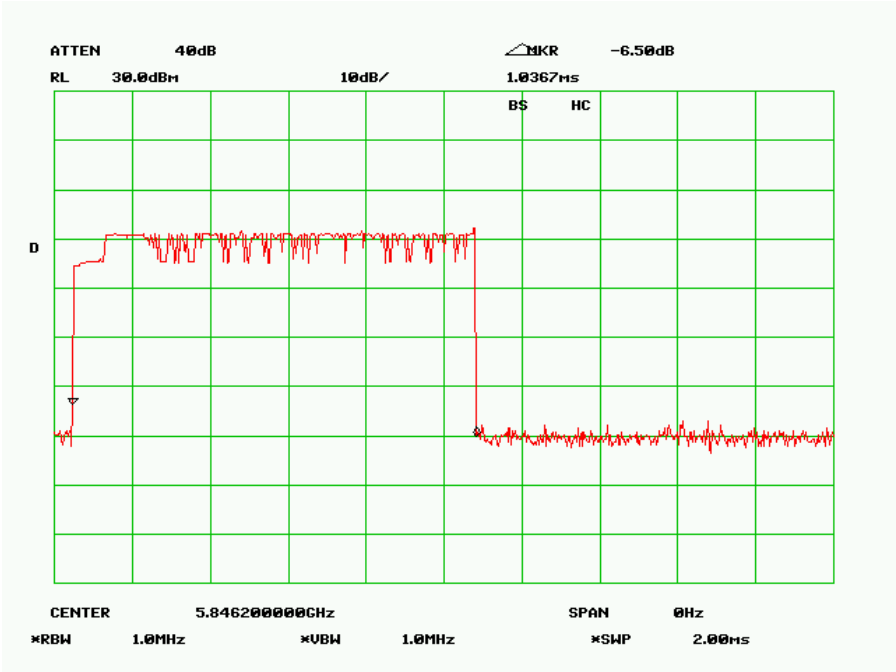


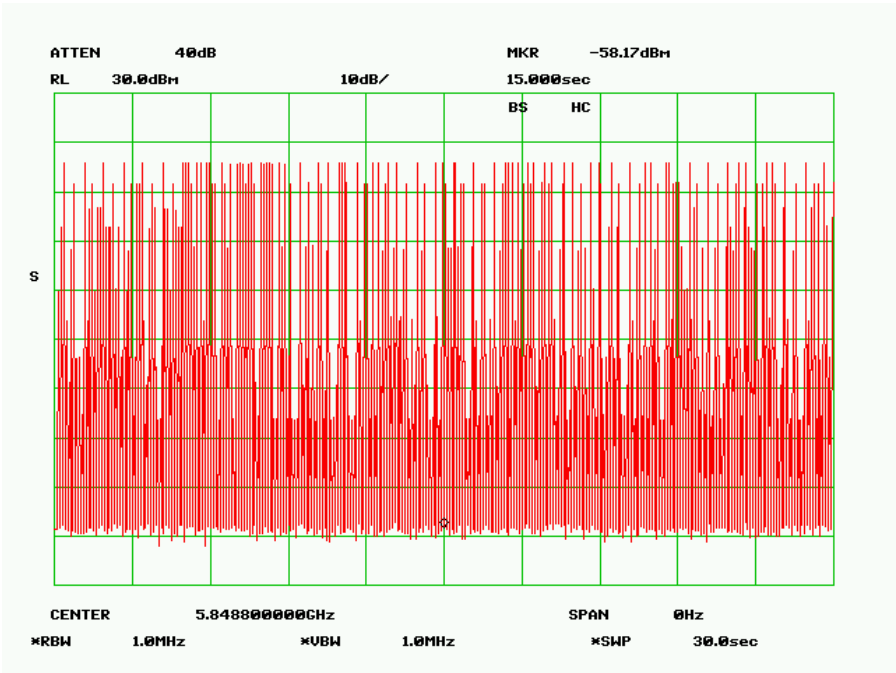
Middle Channel





High Channel





§15.247(b)(2) - MAXIMUM PEAK OUTPUT POWER

Applicable Standard

According to §15.247(b) (2), For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

Measurement Procedure

1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	8565EC	3946A00131	2006-01-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	24° C
Relative Humidity:	45%
ATM Pressure:	1021 mbar

**The testing was performed by Tom Chen on 2006-06-22.*

Measurement Result

For Handset (EUT)

Channel	Frequency MHz	Max Peak Output Power (dBm)	(mW)	Limit (mW)	Result
Low	5725.8	14.00	25.12	1000	pass
Mid	5787.3	14.00	25.12	1000	pass
High	5848.9	14.33	27.10	1000	pass

For Base (EUT)

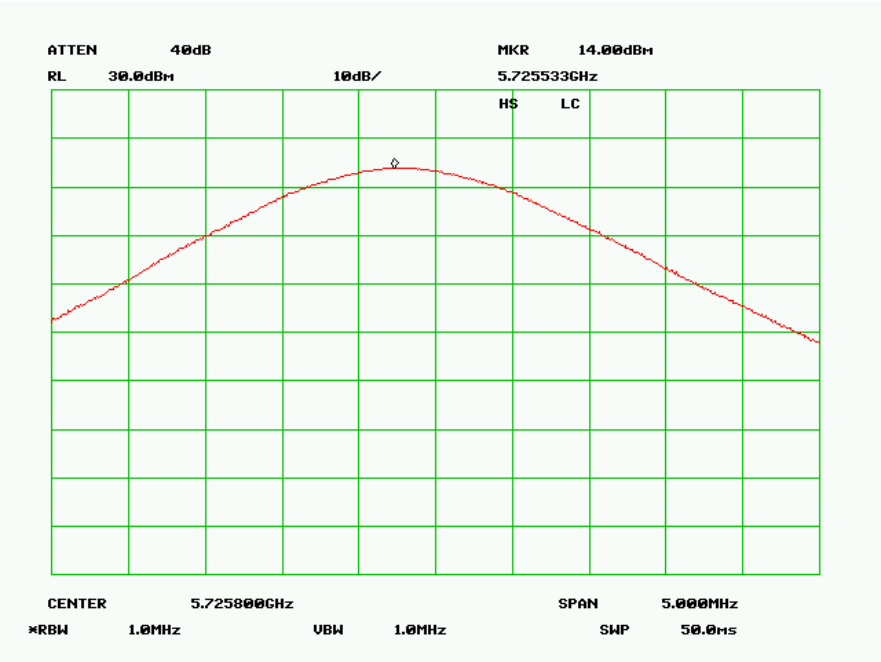
Channel	Frequency MHz	Max Peak Output Power (dBm)	(mW)	Limit (mW)	Result
Low	5725.8	16.00	39.81	1000	pass
Mid	5787.3	16.00	39.81	1000	pass
High	5848.9	16.33	42.95	1000	pass

Plots of Maximum Peak Output Power

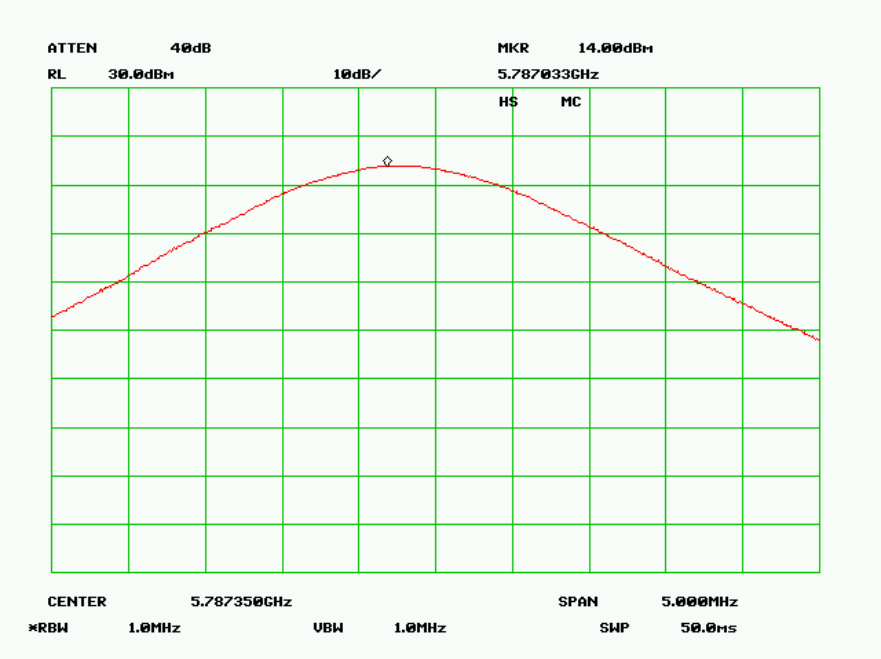
Please see the following plots

For Headset (EUT)

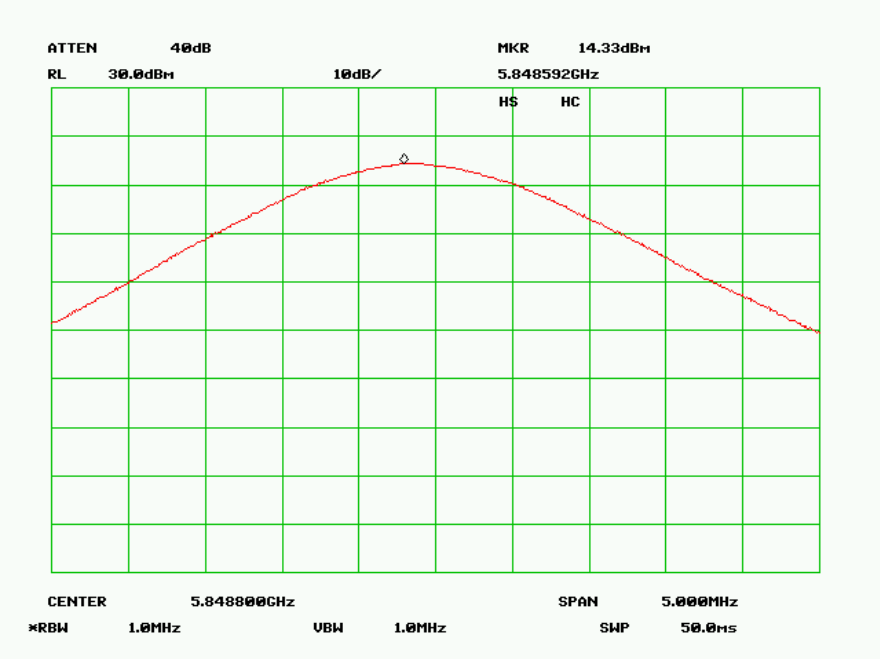
Low Channel



Middle Channel

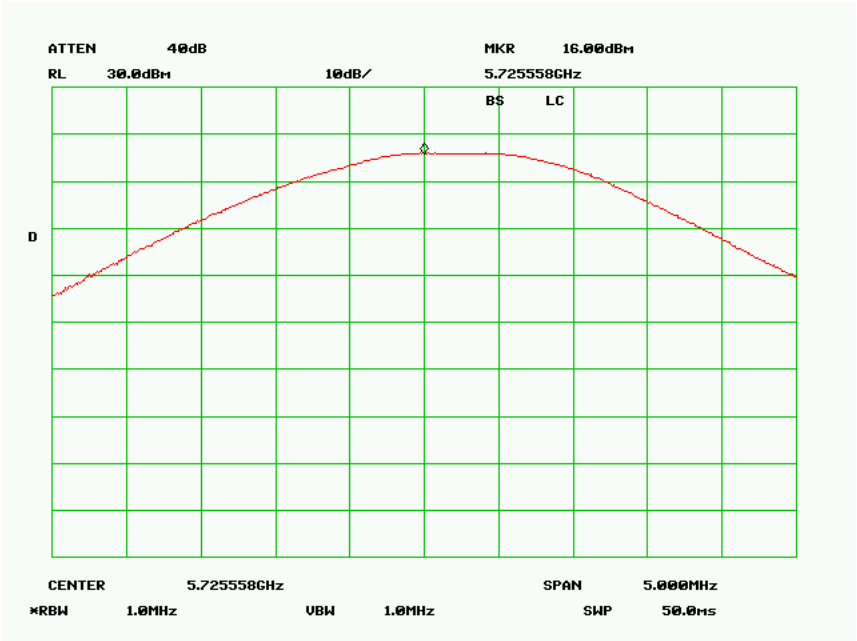


High Channel

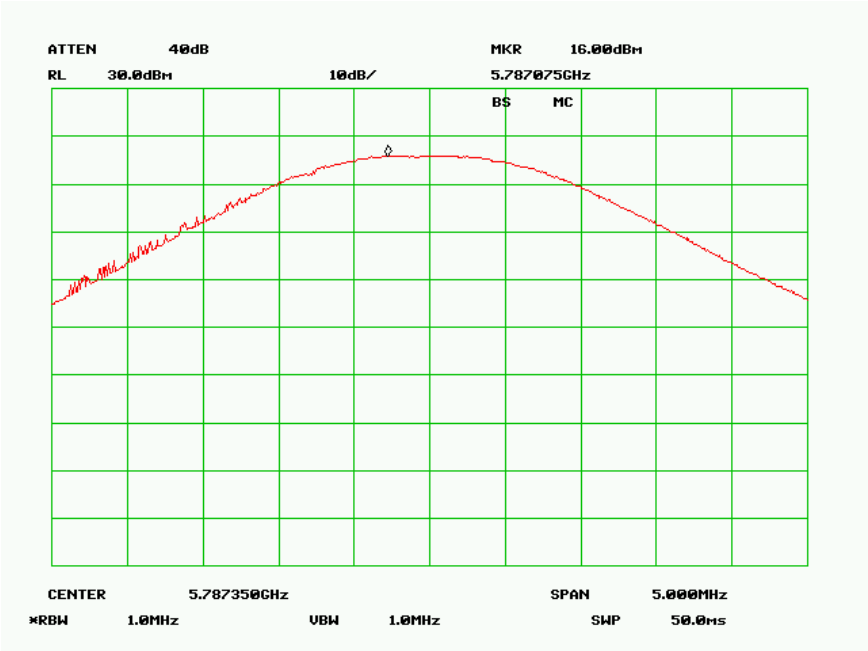


For Base (EUT)

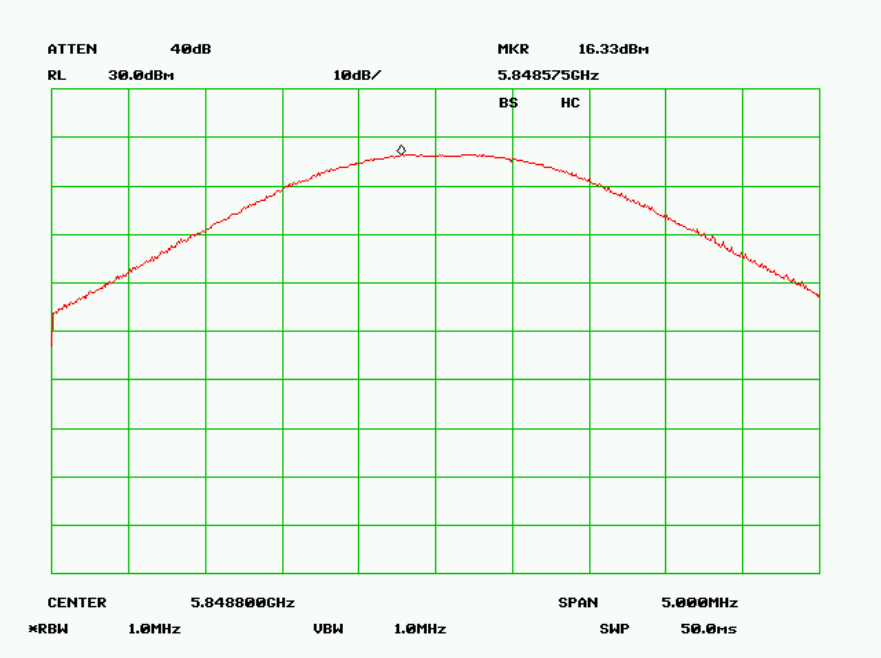
Low Channel



Middle Channel



High Channel



§15.247 (c) - 100 KHz BANDWIDTH OF BAND EDGES

Applicable Standard

According to §15.247(c), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	8565EC	3946A00131	2006-01-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	24° C
Relative Humidity:	45%
ATM Pressure:	1021 mbar

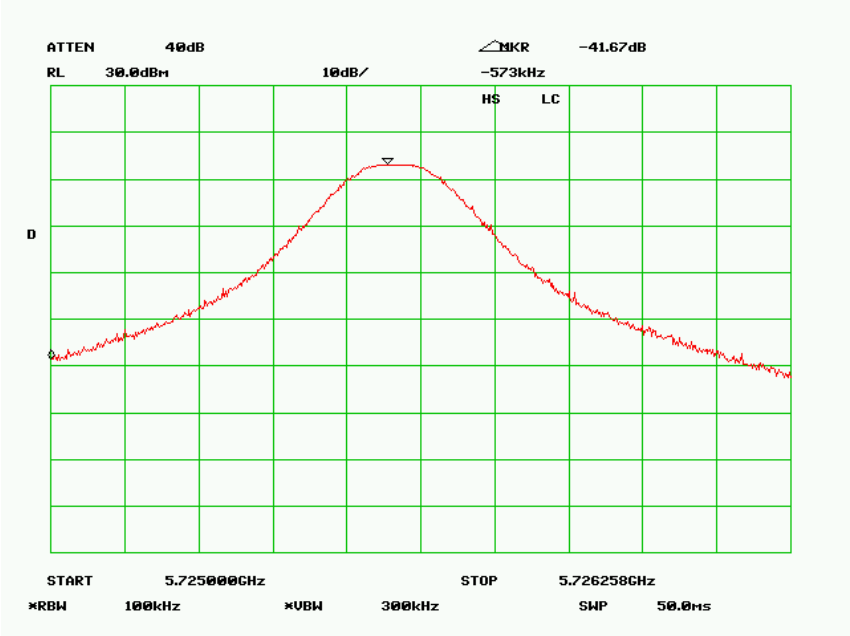
**The testing was performed by Tom Chen on 2006-06-22.*

Plots of 100kHz Bandwidth of Band Edge

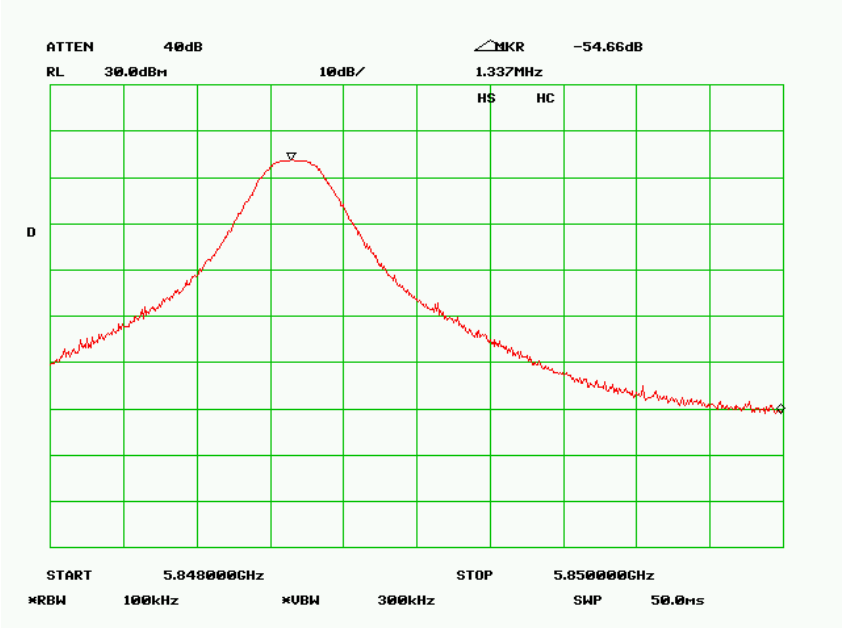
Please refer the following plots.

For Handset (UET)

Low Channel

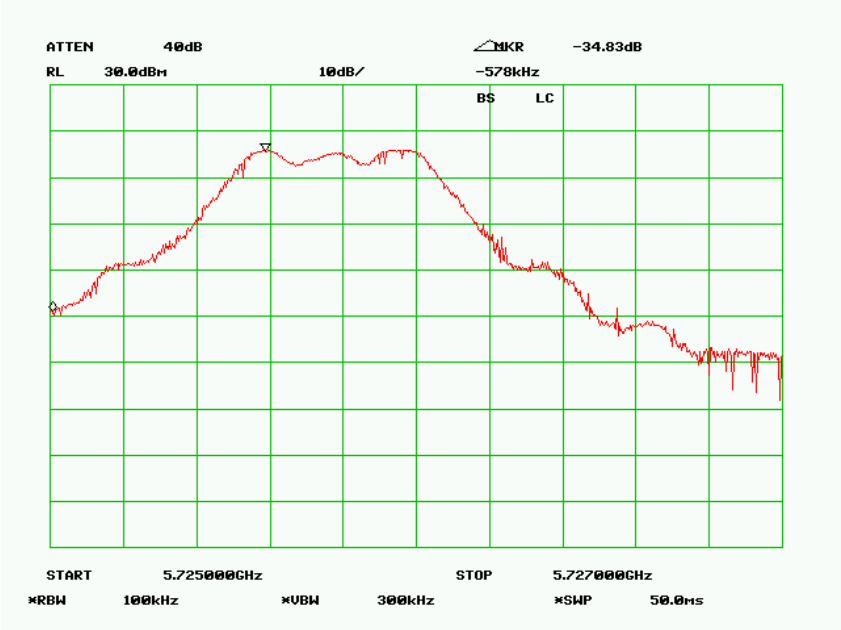


High Channel



For Base (EUT)

Low Channel



High Channel