Lab Code: 200707-0

FCC PART 15D

MEASUREMENT AND TEST REPORT

For

Shandong Bittel Electronics Co., Ltd.

No. 1 Rizhao N Rd, Rizhao,

Shandong, P. R. of China

FCC ID: WI6HWD

Report Type:	Product Type:
Original Report	Digital Wireless Phone

Test Engineer:	Jack Wang
Report Number:	RSZ08070805
Report Date:	2008-10-06
Reviewed By:	Merry Zhao EMC Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shandong Bittel Electronics Co., Ltd.* 's product, model: *HWD9888(48)TSD-NS, HWD9888(48)TSD-TN, HWD9888(48)TS, HWD9888(48)TSD (Base）(For all the models, （N=P，1，2，3，4，5，6，7，8，9，10）)*, or the "EUT" as referred to in this report is a *Cordless phone* which measures approximately 22.0 cm L x 17.0 cm W x 7.0 cm H, rated input voltage: DC 9 V adapter.

Adapter Information:
Manufacturer: HUAKE; Model: HKD090030U;
Input: 120V AC 60Hz; Output: 9V DC 300mA.

Note: The serial models HWD9888(48)TSD-NS, HWD9888(48)TSD-TN, HWD9888(48)TS, HWD9888(48)TSD (Base) Note: For all the models, N=P,1,2,3,4,5,6,7,8,9,10), the all models have same circuit diagram, PCB, only appearance have difference, which was explained in the attached Declaration Letter, so we selected the HWD9888(48)TSD to test.

* All measurement and test data in this report was gathered from production sample serial number: 0807024 (Assigned by BACL, Shenzhen). The EUT was received on 2008-07-08.

Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.17 – 2006, and ANSI C63.4-2003

The tests were performed in order to determine compliance with FCC Part 15, Subpart D, and section 15.203, 15.315, 15.317, 15.319 and 15.323 rules.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.17 - 1998, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).

NVLAP LAB CODE 200707-0

The current scope of accreditations can be found at
http://ts.nist.gov/Standards/scopes/2007070.htm

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

EUT Exercise Software

N/A.

Special Accessories

The special accessories were supplied by Bay Area Compliance Laboratories Corp. (Shenzhen).

Equipment Modifications

No modifications were made to the unit tested.

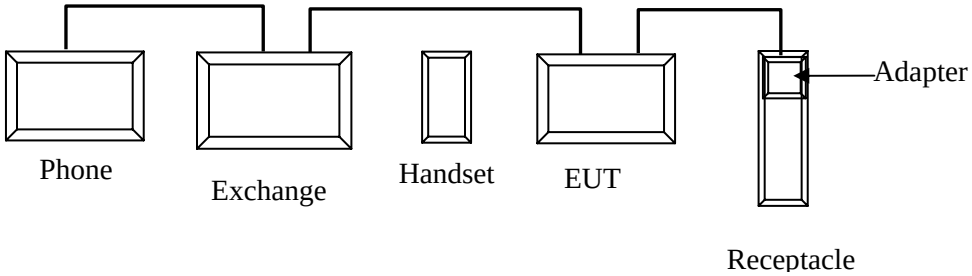
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
R&S	Digital Radio-Communication Tester	CMD60	8281461029	DoC
Kewang	Program-Control Telephone Exchange	TC-104L	N/A	DoC
Guo Wei	Phone	HCD1698(28) TDLB1	N/A	DoC

External I/O Cable

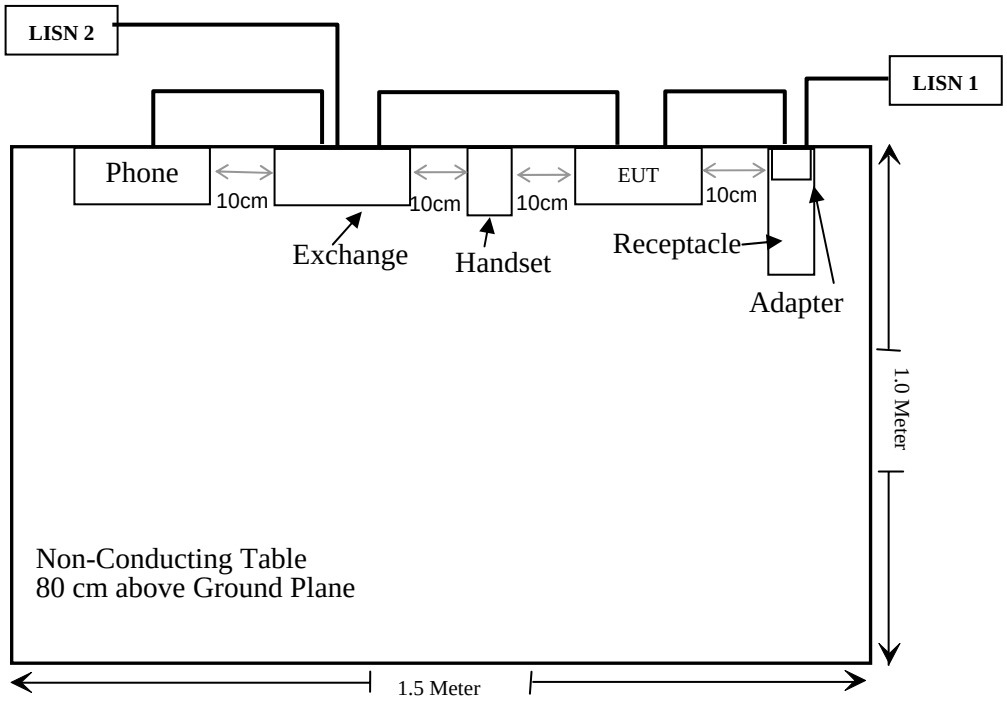
Cable Description	Length (m)	From/Port	To
Unshielded Undetectable DC Cable	1.80	Adapter	Connecter
Unshielded Undetectable RJ11 Cable	4.46	EUT	Connecter

Configuration of Test Setup



Block Diagram of Test Setup

Operating Mode:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§ 15.319 (i)	RF Radiation Exposure	Compliant
§ 15.317 § 15.203	Antenna Requirement	Compliant
§ 15.315 § 15.207	Conducted Emission	Compliant
§ 15.319 (g)	Radiated Emission	Compliant*
§ 15.323 (a)	Emission Bandwidth	Compliant
§ 15.319 (c)	Peak Transmit Power	Compliant
§ 15.319 (d)	Power Spectral Density	Compliant
§ 15.323 (d)	Emission Inside and Outside the sub-band	Compliant
§ 15.323 (f)	Frequency Stability Base	Compliant
§ 15.323 (c)(e) § 15.319 (f)	Verification of Access Protocols	Compliant

* Within measurement uncertainty.

§ 15.319 (i) - RF RADIATION EXPOSURE

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/cm2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	842/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

Test Data

Predication of MPE limit at a given distance
Equation from page 19 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Result: Pass

Maximum peak output power at antenna input terminal: 18.41 (dBm)
Maximum peak output power at antenna input terminal: 69.34 (mW)
Prediction distance: >20 (cm)
Predication frequency: 1921.536(MHz)
Antenna Gain (typical): 3 (dBi)
Antenna Gain (typical): 2 numeric
The worst case is power density at predication frequency at 20 cm: 0.028 (mW/cm^2)
MPE limit for general population exposure at prediction frequency: 1 (mW/cm^2)

0.028(mW/cm^2) < 1 (mW/cm^2)

§15.317&§15.203 - ANTENNA REQUIREMENT

Standard Applicable

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

This product has an integrated antenna arrangement, fulfill the requirement of this section.

Test Result: Pass

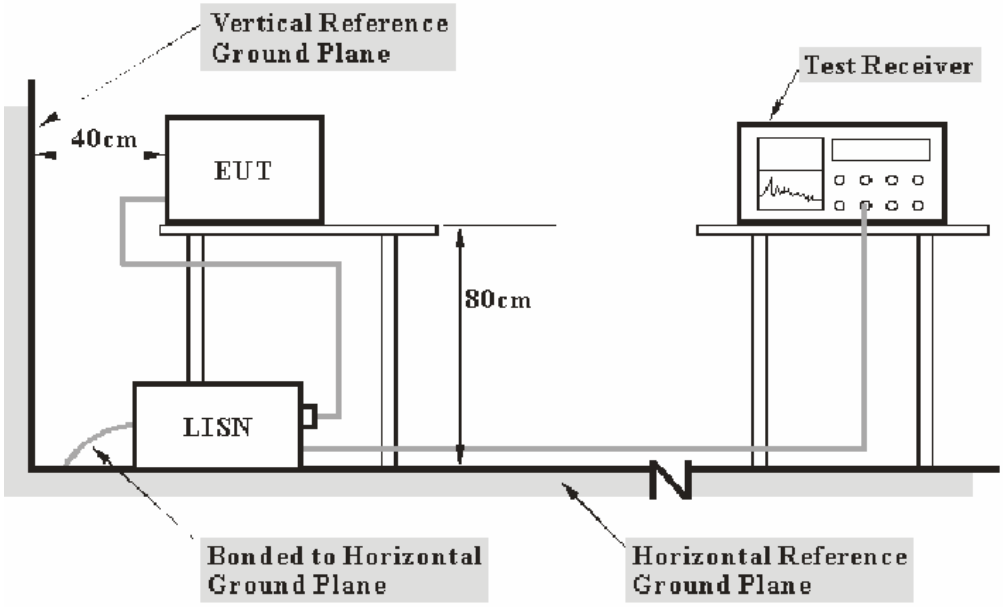
§15.315 & §15.207 - CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, 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 Bay Area Compliance Laboratories Corp. (Shenzhen) is ±2.4 dB.

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4 - 2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter of the EUT was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	***IFBW***
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Com-Power	L.I.S.N.	LI-200	12005	N/A	N/A
Com-Power	L.I.S.N.	LI-200	12208	N/A	N/A
Rohde & Schwarz	EMI Test Receiver	ESCS30	DE25330	2008-03-25	2009-03-25
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2008-03-25	2009-03-25

***** Com-Power's LISN were used as the supporting equipment.
*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the adapter of the EUT was connected to the outlet of the first LISN, and the exchange was connected to the outlet of the second LISN.

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

All data was recorded in the Quasi-peak and average detection mode.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15 .207, with the worst margin reading of:

21.80 dB at **10.750 MHz** in the **Neutral** conductor mode.

Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Jack Wang on 2008-07-18.

Test Mode: Operating

Line Conducted Emissions				FCC Part 15.207	
Frequency (MHz)	**Amplitude (dBμV)**	**Detector (QP/AV)**	**Conductor (Line/Neutral)**	**Limit (dBμV)**	**Margin (dB)**
10.750	28.20	AV	Neutral	50.00	21.80
27.120	26.70	AV	Line	50.00	23.30
27.120	24.80	AV	Neutral	50.00	25.20
0.435	30.60	QP	Line	57.20	26.60
0.480	29.70	QP	Line	56.30	26.60
0.475	28.60	QP	Neutral	56.40	27.80
0.475	18.20	AV	Neutral	46.40	28.20
15.275	30.70	QP	Neutral	60.00	29.30
14.330	20.40	AV	Line	50.00	29.60
13.445	30.20	QP	Neutral	60.00	29.80
0.155	35.50	QP	Neutral	65.80	30.30
10.750	29.60	QP	Neutral	60.00	30.40
21.990	29.60	QP	Line	60.00	30.40
27.120	29.60	QP	Line	60.00	30.40
27.095	29.40	QP	Neutral	60.00	30.60
0.155	35.10	QP	Line	65.80	30.70
0.480	14.50	AV	Line	46.30	31.80
0.435	14.40	AV	Line	47.20	32.80
14.345	26.70	QP	Line	60.00	33.30
13.445	8.80	AV	Neutral	50.00	41.20
15.275	8.80	AV	Neutral	50.00	41.20
21.905	6.30	AV	Line	50.00	43.70
0.155	11.00	AV	Line	55.80	44.80
0.155	9.70	AV	Neutral	55.80	46.10

Plot(s) of Test Data

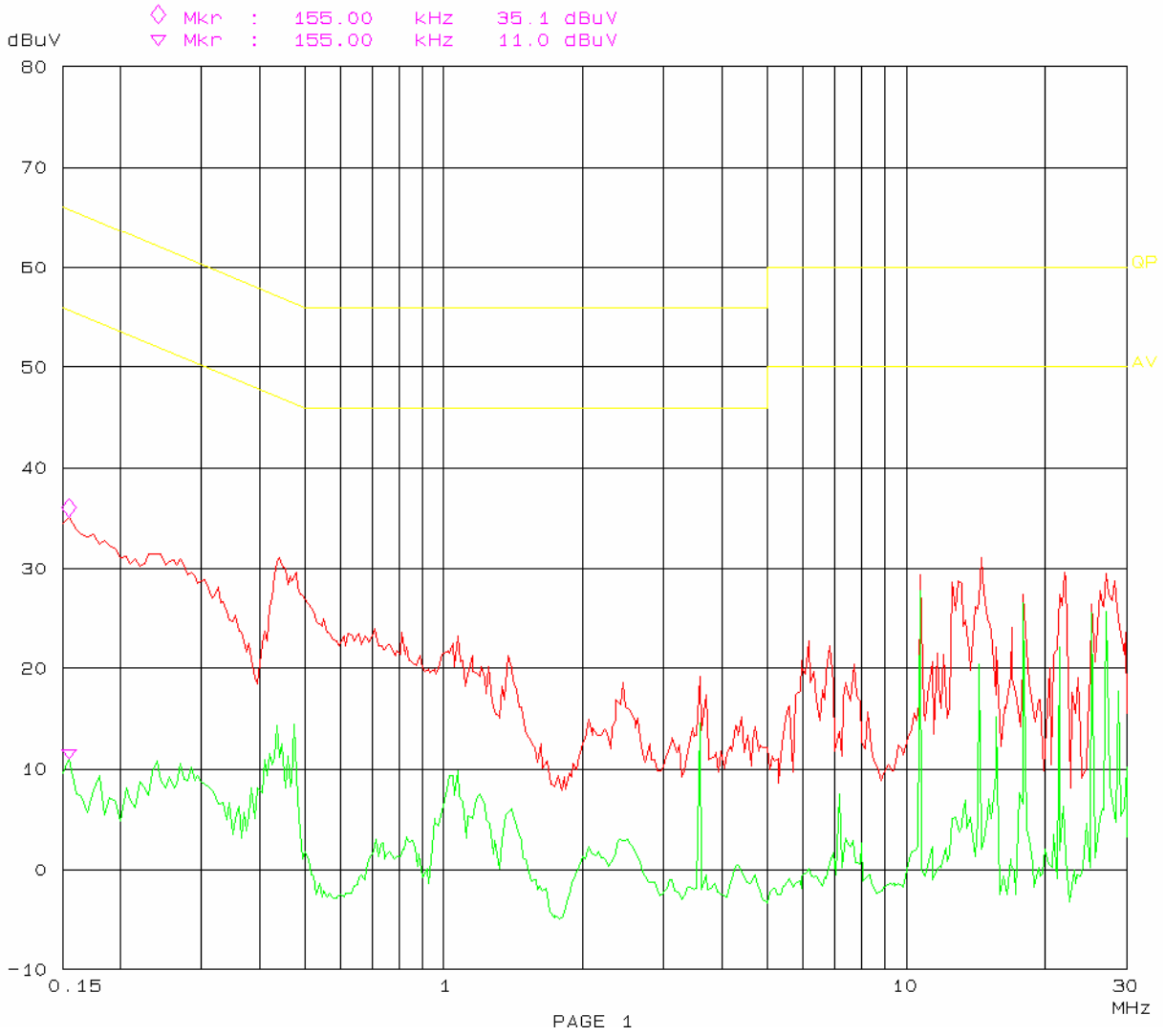
Plot(s) of Test Data is presented hereinafter as reference.

Conduction Emission

FCC Part 15

18. Jul 08 13:00

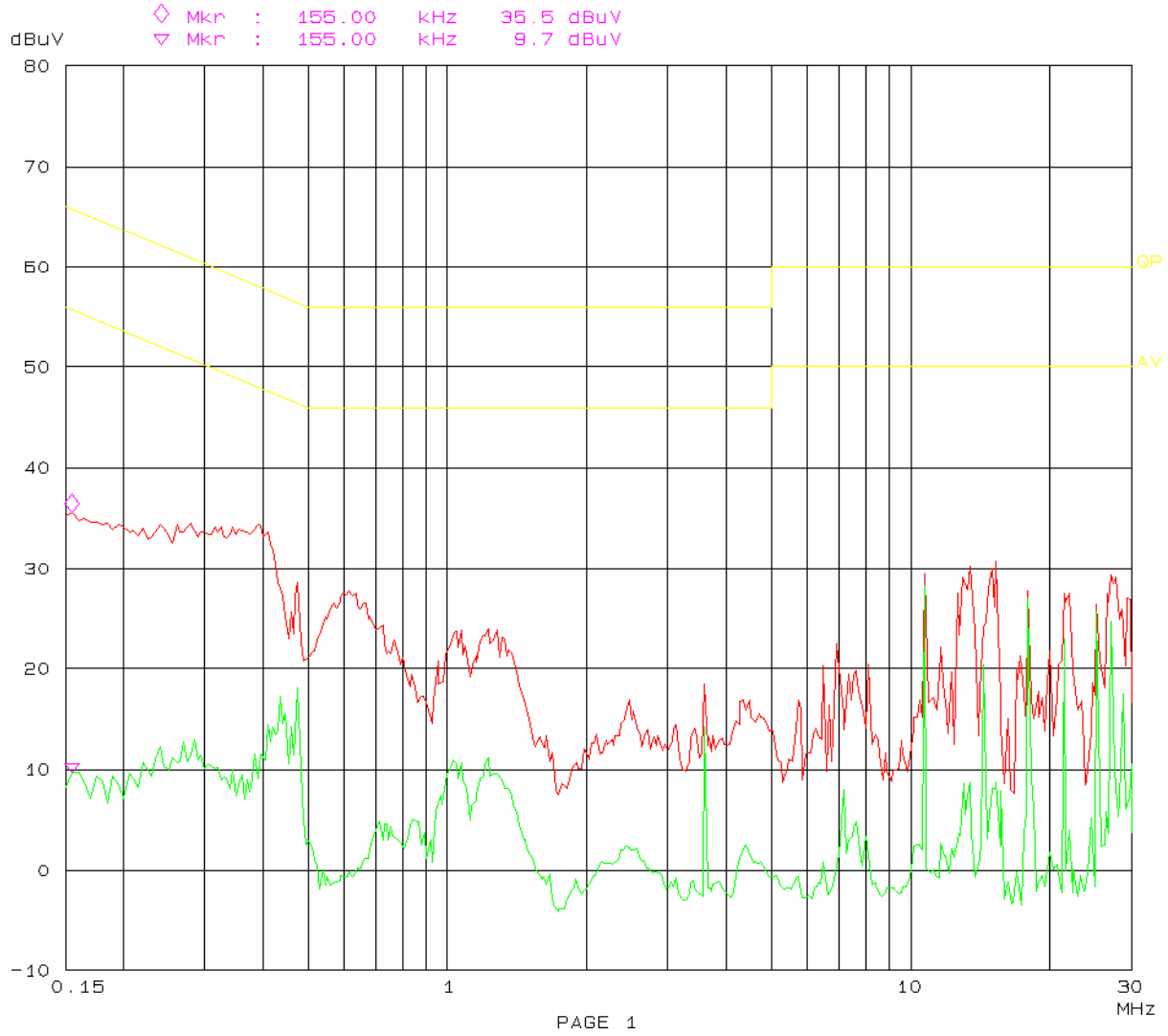
EUT: Cordless phone M/N: HDW9888(48)TSD
Manuf: Bittel
Op Cond: Operating
Operator: Jack
Test Spec: AC120V/60Hz line
Comment: Temp: 25 Hum: 56%



Conduction Emission
FCC Part 15

18. Jul 08 12:43

EUT: Cordless phone M/N: HDW9888(48) TSD
Manuf: Bittel
Op Cond: Operating
Operator: Jack
Test Spec: AC120V/60Hz NEUTRAL
Comment: Temp: 25 Hum: 56%



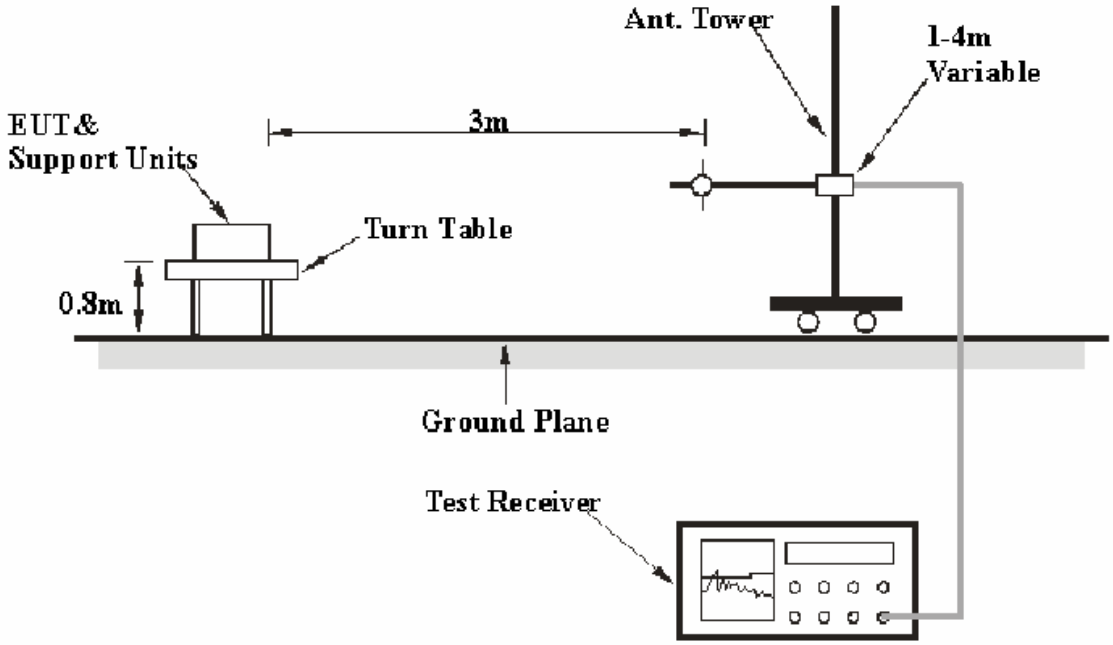
§15.319 (g) - RADIATED EMISSIONS

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 emission measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is±4.0 dB.

EUT Setup



The radiated emission tests were performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.17 - 2006. The specification used was the FCC 15 § 15.319(g).

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter of the EUT was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 5 GHz.

During the radiated emission test, the test receiver was set with the following configurations:

Frequency Range	***RBW***	***VBW***
30 – 1000 MHz	100 kHz	300 kHz
1000 MHz –5 GHz	1 MHz	3 MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2007-11-15	2008-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2008-03-11	2009-03-11
HP	Amplifier	8449B	3008A00277	2007-09-29	2008-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2007-09-25	2008-09-25
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

For the radiated emissions test, the adapter was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Peak and Average detection mode.

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -5.8dB means the emission is 5.8dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.319 (g), with the worst margin reading of:

30MHz-1GHz:

9.2 dB at**36.433950 MHz** in the **Vertical** polarization.

Above 1GHz:

High Channel: 5.41 dB at **3856.896 MHz** in the **Vertical** polarization.
Low Channel: 4.77 dB at **3843.072 MHz** in the **Vertical** polarization.

Test Data

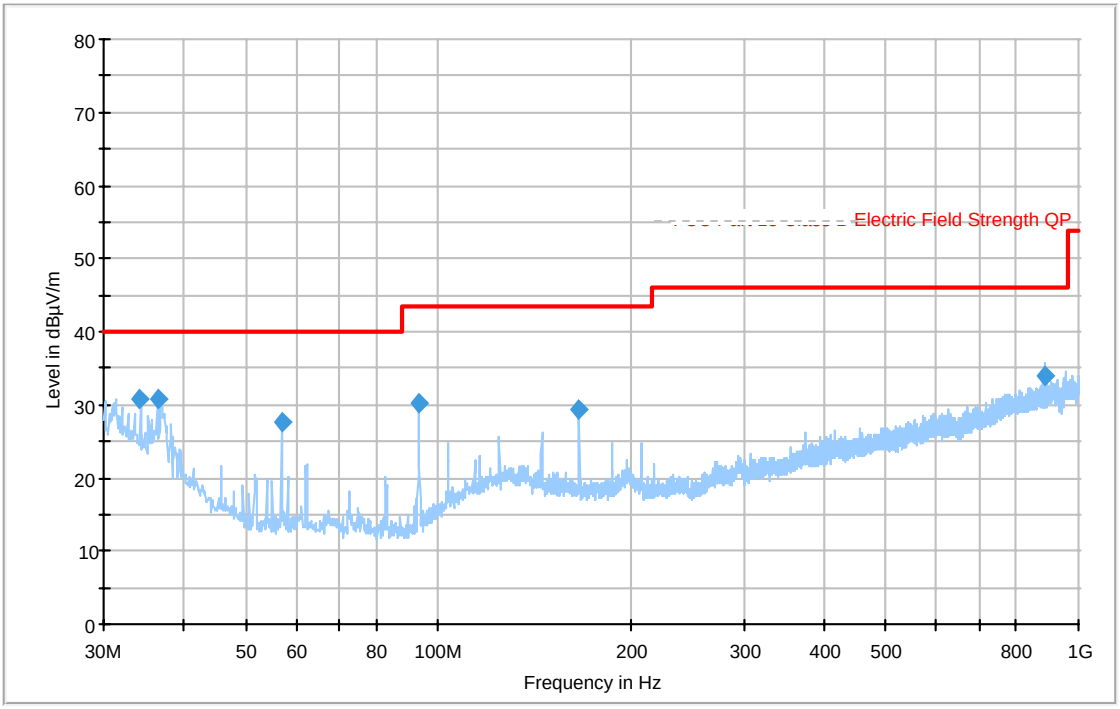
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Jack Wang on 2008-07-18.

Test Mode: Transmitting

30MHz-1GHz



Frequency (MHz)	Corrected Amp. (dBµV/m)	Antenna Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
36.433950	30.8	183.0	V	142.0	-13.1	40.0	9.2
34.223125	30.7	301.0	H	259.0	-11.8	40.0	9.3
885.469550	33.9	159.0	V	0.0	-0.5	46.0	12.1
56.917500	27.5	194.0	H	281.0	-22.7	40.0	12.5
93.313800	30.1	255.0	H	57.0	-22.3	43.5	13.4
165.868225	29.4	164.0	H	294.0	-17.1	43.5	14.1

Above 1GHz

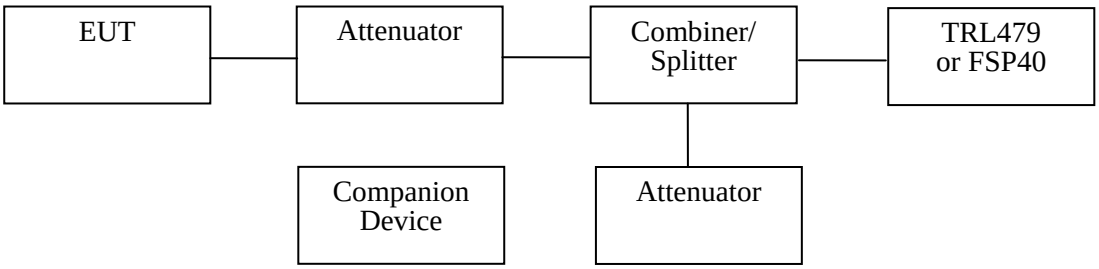
Freq. (MHz)	Meter Reading (dBuV)	Detector PK/QP/AV	Direction Degree	Antenna		Antenna Loss (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBuV/m)	FCC Part 15.319(g)/209		
				Height (m)	Polar (H/V)					Limit (dBuV/m)	Margin (dB)	Remarks
High Channel												
1928.448	95.36	PK	45	1.0	H	27.4	3.09	34.0	91.85			Fund.
1928.448	46.32	AV	180	1.2	H	27.4	3.09	34.0	42.81			Fund.
1928.448	99.89	PK	45	1.0	V	27.4	3.09	34.0	96.38			Fund.
1928.448	54.63	AV	60	1.2	V	27.4	3.09	34.0	51.12			Fund.
3856.896	66.10	PK	270	1.0	V	31.2	3.79	32.5	68.59	74	5.41	Harmonic
3856.896	38.52	AV	180	1.2	V	31.2	3.79	32.5	41.01	54	12.99	Harmonic
3856.896	56.66	PK	45	1.2	H	31.2	3.79	32.5	59.15	74	14.85	Harmonic
3856.896	36.13	AV	60	1.0	H	31.2	3.79	32.5	38.62	54	15.38	Harmonic
5785.344	55.12	PK	45	1.0	H	32.4	4.70	34.4	57.82	74	16.18	Harmonic
5785.344	34.23	AV	45	1.2	H	32.4	4.70	34.4	36.93	54	17.07	Harmonic
5785.344	54.18	PK	85	1.2	V	32.4	4.70	34.4	56.88	74	17.12	Harmonic
5785.344	33.08	AV	150	1.0	V	32.4	4.70	34.4	35.78	54	18.22	Harmonic
Low Channel												
1921.536	94.64	PK	45	1.0	H	27.4	3.09	34.0	91.13			Fund.
1921.536	45.68	AV	180	1.2	H	27.4	3.09	34.0	42.17			Fund.
1921.536	99.88	PK	45	1.0	V	27.4	3.09	34.0	96.37			Fund.
1921.536	46.28	AV	60	1.2	V	27.4	3.09	34.0	42.77			Fund.
3843.072	66.74	PK	270	1.0	V	31.2	3.79	32.5	69.23	74	4.77	Harmonic
3843.072	38.66	AV	45	1.2	V	31.2	3.79	32.5	41.15	54	12.85	Harmonic
5764.608	55.63	PK	45	1.0	H	32.4	4.70	34.4	58.33	74	15.67	Harmonic
5764.608	55.13	PK	45	1.2	V	32.4	4.70	34.4	57.83	74	16.17	Harmonic
3843.072	35.02	AV	60	1.0	H	31.2	3.79	32.5	37.51	54	16.49	Harmonic
3843.072	54.42	PK	45	1.0	H	31.2	3.79	32.5	56.91	74	17.09	Harmonic
5764.608	33.51	AV	180	1.2	H	32.4	4.70	34.4	36.21	54	17.79	Harmonic
5764.608	33.41	AV	90	1.2	V	32.4	4.70	34.4	36.11	54	17.89	Harmonic

§15.323 (a) - EMISSION BANDWIDTH

Standard Applicable

Operation shall be contained within the 1920–1930 MHz band. The emission bandwidth shall be less then 2.5 MHz and greater than 50 kHz.

The emission bandwidth is measured in accordance with ANSI C63.17 sub-clause 6.1.3 using the setup below:



The width, in Hz, of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that is 26 dB down relative to the maximum level of the modulated carrier. It is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1% of the emission band-width of the device under measurement. [Extraction from 47 VFR 15, subpart D, 15.303 (C)].

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2007-08-25	2008-08-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.8 kPa

The testing was performed by Jack Wang on 2008-08-15.

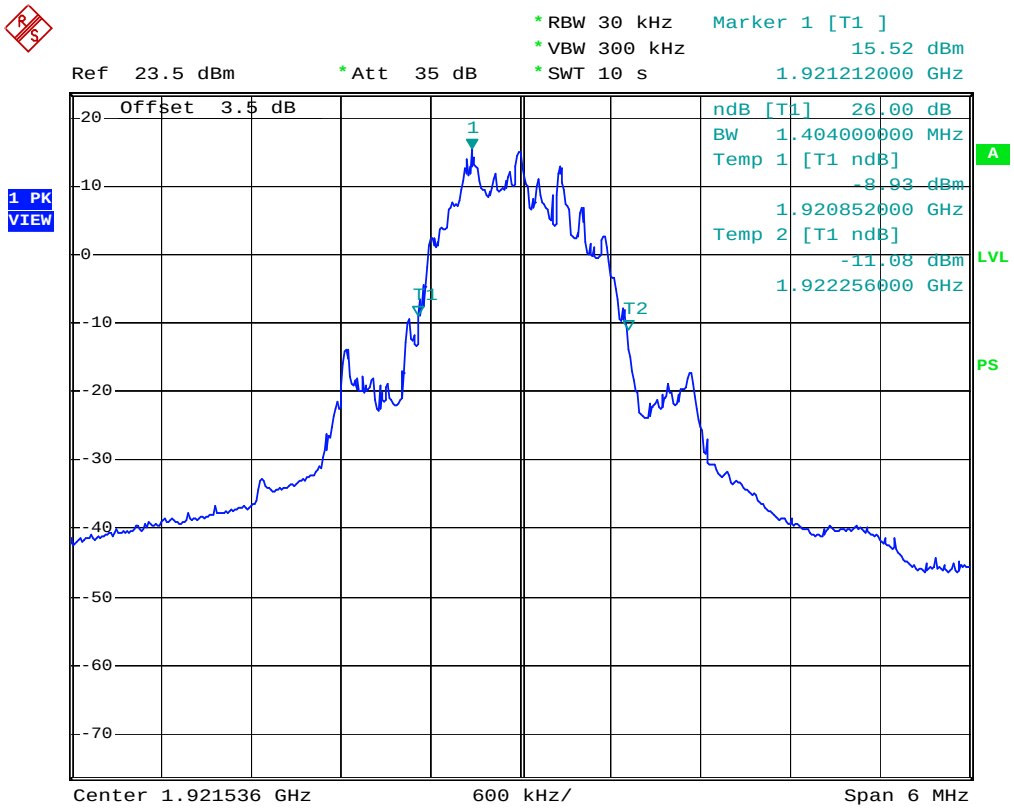
Test Mode: Operating

Channel	Center Frequency (MHz)	26dB Bandwidth (MHz)	Limit
Low	1921.536	1.404	50kHz < OBW <2.5MHz
Middle	1924.992	1.404	50kHz < OBW <2.5MHz
High	1928.448	1.404	50kHz < OBW <2.5MHz

Test Result: Pass

Refer to the attached plots.

Low Channel



26dB bandwidth low channel

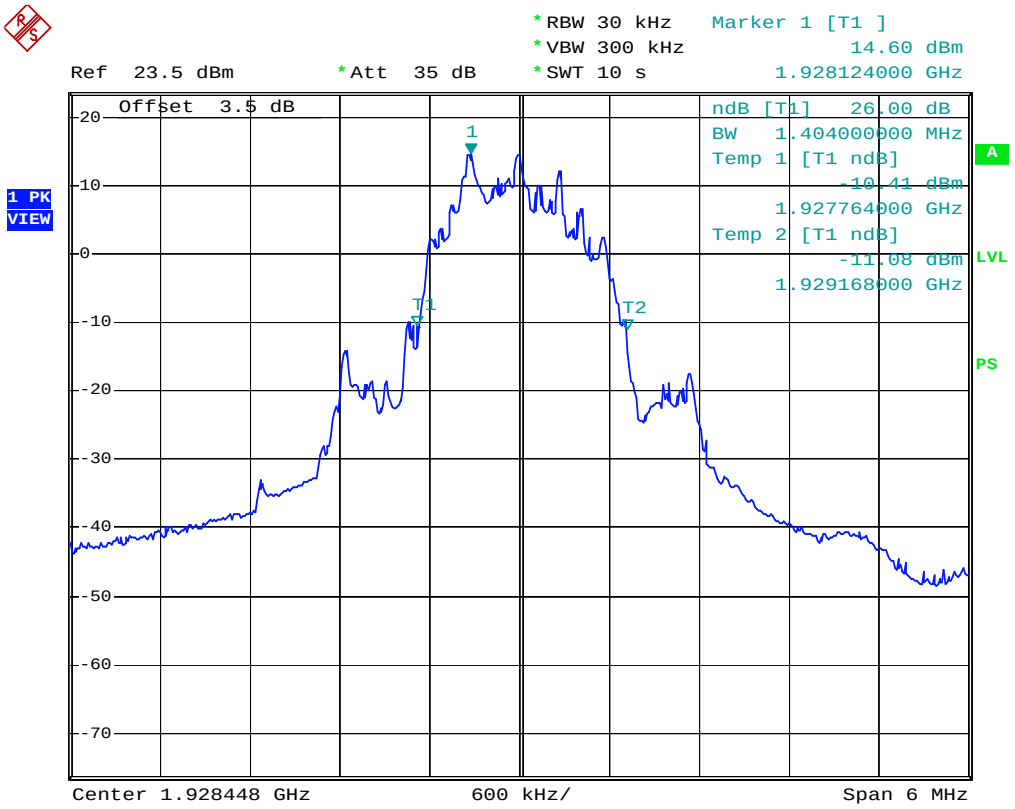
Date: 15.AUG.2008 14:18:15

Middle Channel

26dB bandwidth middle channel

Date: 15.AUG.2008 14:14:31

High Channel



26dB bandwidth high channel

Date: 15.AUG.2008 14:20:56

§15.319 (c) - PEAK TRANSMIT POWER

Standard Applicable

Per FCC Part15.319 (a), Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in hertz.

Per FCC Part15.319 (e), The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Calculation of Peak Transmit Power Limit (P_{max}):

$P_{max} = 100\mu w \times (EBW)^{1/2}$
EBW is the transmit emission bandwidth in Hz determined in the other test item:
EBW = 1404000Hz
$P_{max} = 100\ \mu\ W \times (1404000)^{1/2}$, i.e. P_{max} = 20.74 dBm

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2007-08-25	2008-08-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.8 kPa

The testing was performed by Jack Wang on 2008-08-15.

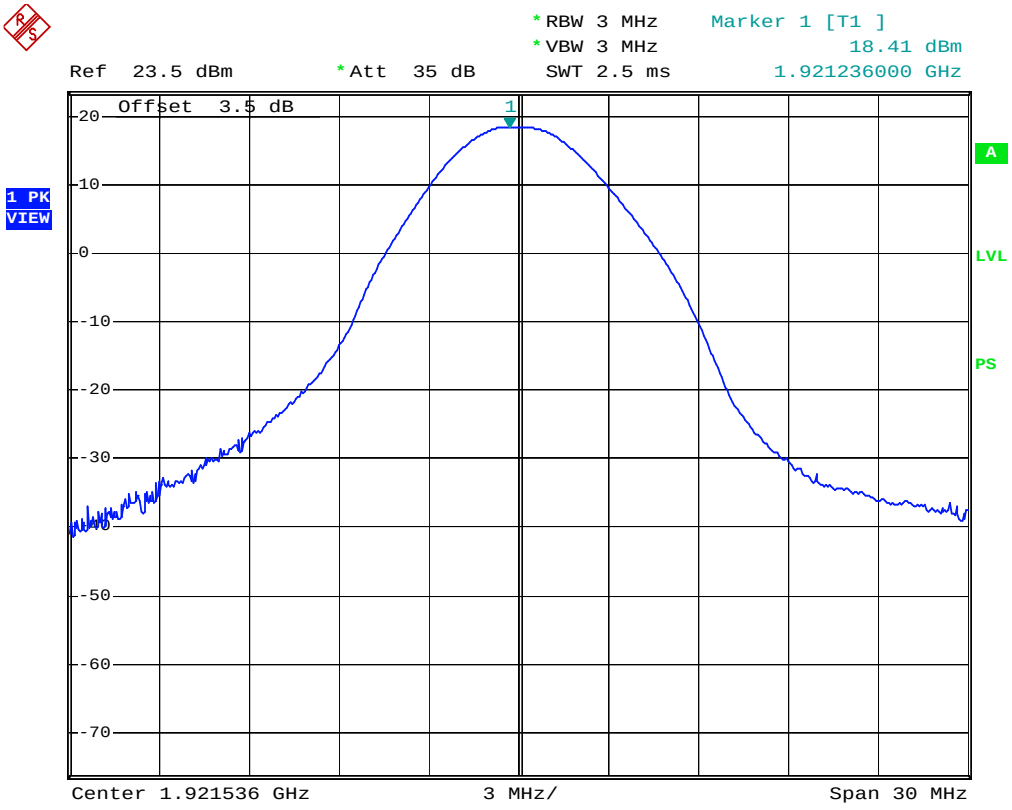
Test Mode: Operating

Test Result: Pass

Refer to the attached plots.

Frequency (MHz)	Peak Transmit Power (dBm)	Limit (dBm)
1921.536	18.41	20.74
1924.992	17.88	20.74
1928.448	17.68	20.74

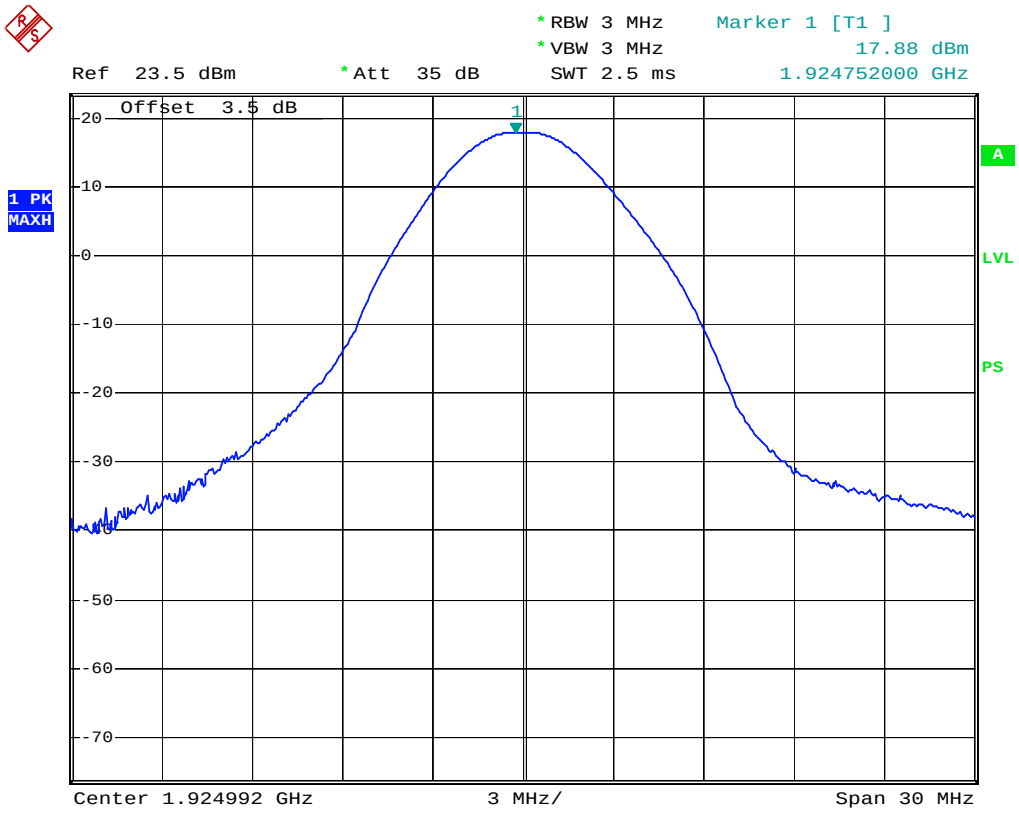
Low Channel



peak transmit power low channel

Date: 15.AUG.2008 13:40:20

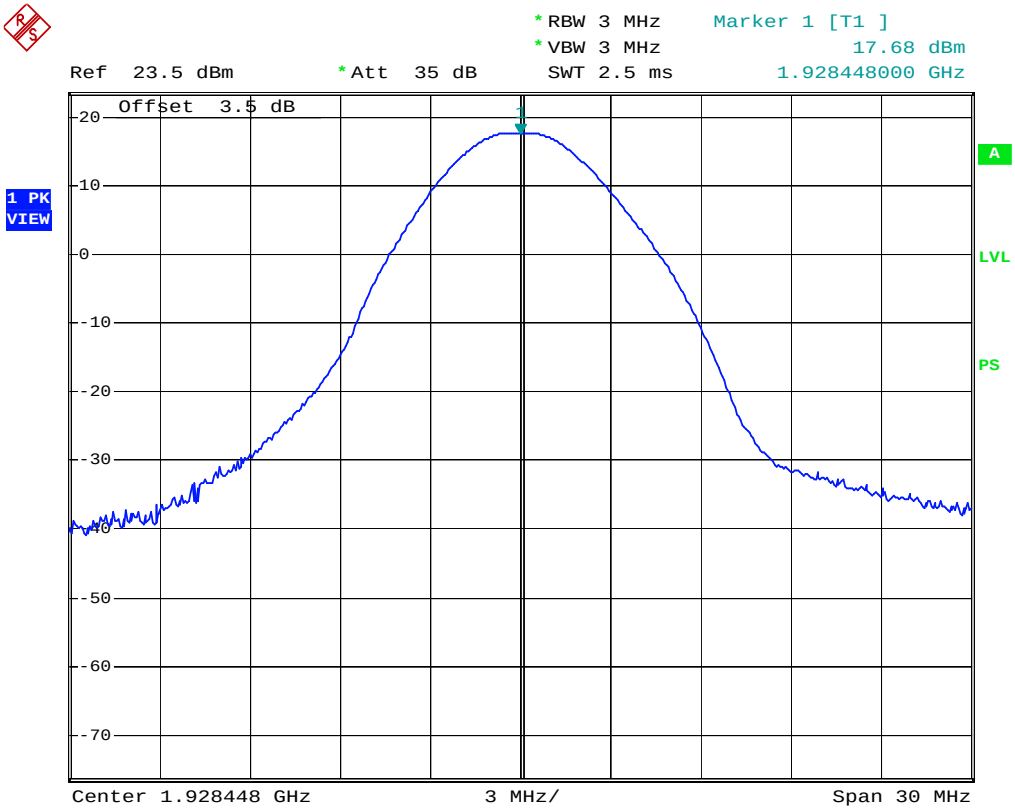
Middle Channel



peak transmit power middle channel

Date: 15.AUG.2008 13:47:05

High Channel



peak transmit power high channel

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§15.319 (d) - POWER SPECTRAL DENSITY

Standard Applicable

The average pulse energy in a 3 kHz bandwidth divided by the pulse duration.

The power spectral density shall not exceed 3mW in any 3 kHz bandwidth as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2007-08-25	2008-08-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.8 kPa

The testing was performed by Jack Wang on 2008-08-15.

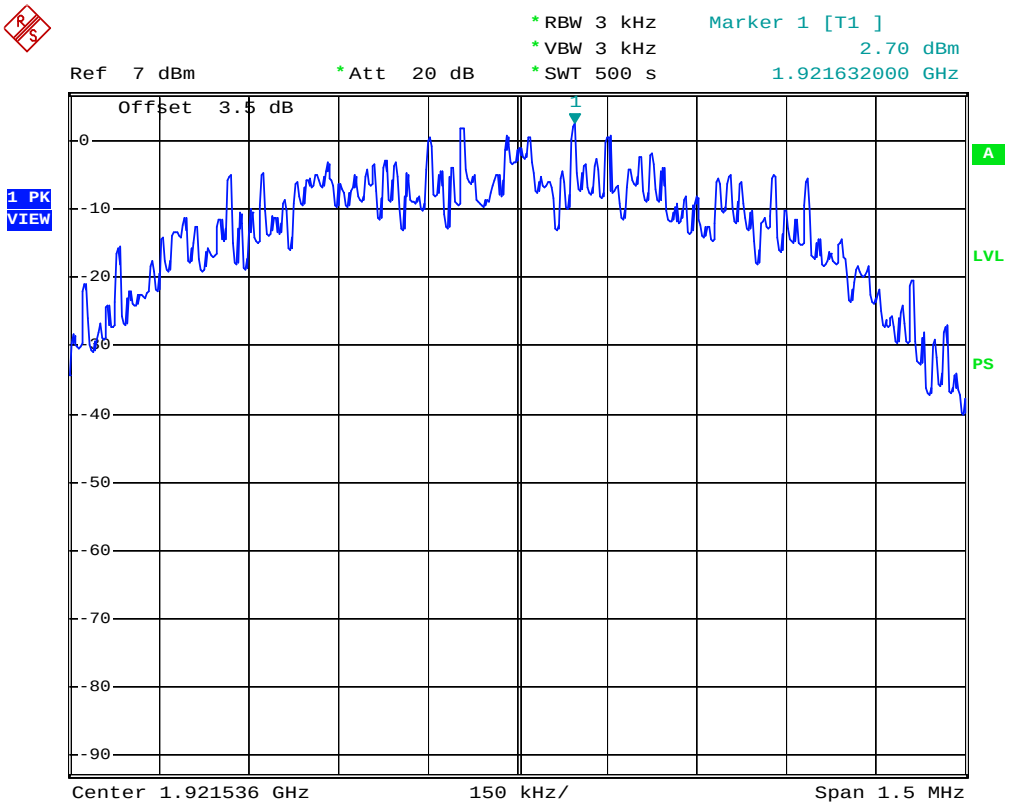
Test Mode: Operating

Test Result: Pass

Refer to the attached plots.

Frequency (MHz)	Power Spectral Density		Limit (mW/3kHz)	Result
	(dBm/3kHz)	(mW/3kHz)		
1921.536	2.70	1.86	3	Pass
1924.992	2.74	1.88	3	Pass
1928.448	1.96	1.57	3	Pass

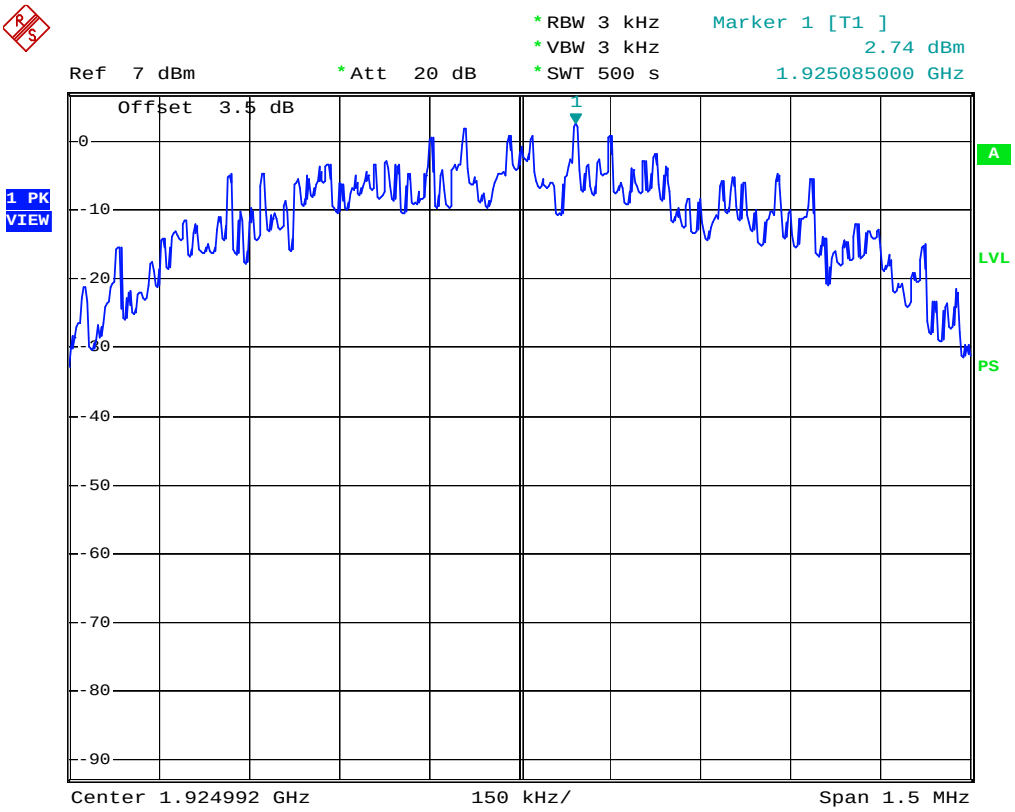
Low Channel



power spectral density low channel

Date: 15.AUG.2008 21:03:20

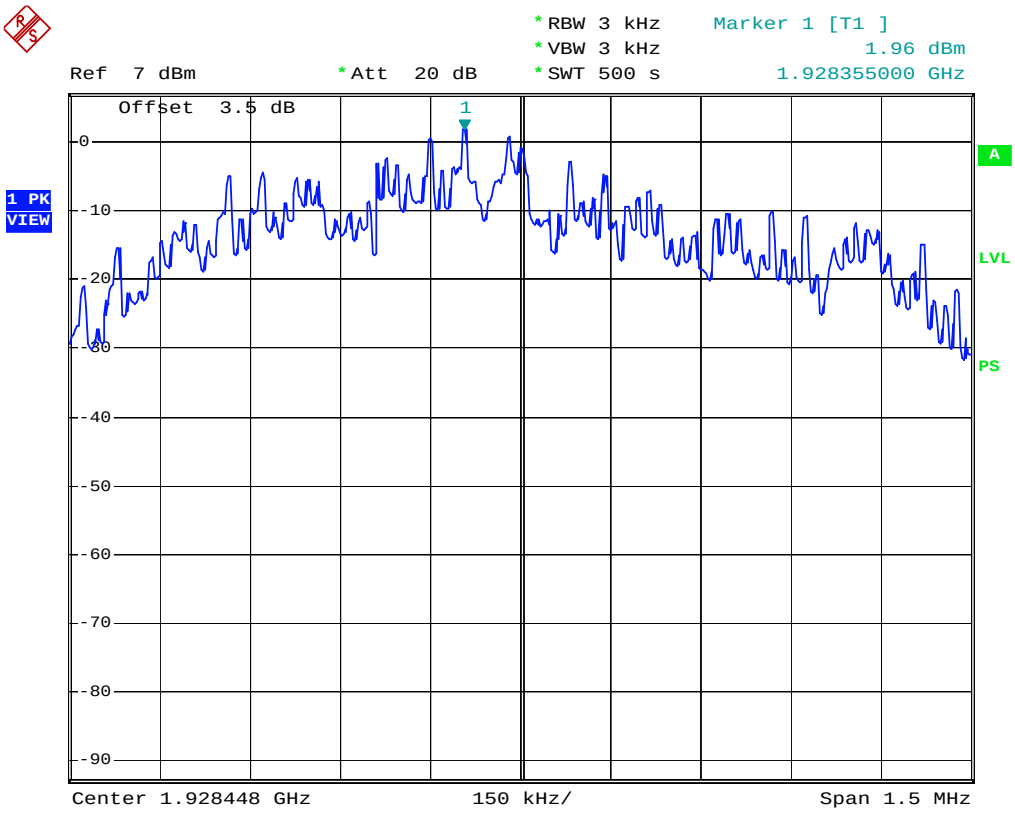
Middle Channel



power spectral density middle channel

Date: 15.AUG.2008 20:54:07

High Channel



power spectral density high channel

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§15.323 (d) - EMISSION INSIDE AND OUTSIDE THE SUB-BAND

Standard Applicable

Emissions inside the sub-band must comply with the following emission mask:

1. In the bands between 1B and 2B measured from the center of the emission bandwidth the total power emitted by the device shall be at least 30 dB below the transmit power permitted for that device;
2. in the bands between 2B and 3B measured from the center of the emission bandwidth the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator;
3. in the bands between 3B and the sub-band edge the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator.

   Where B = emission bandwidth

Emission Outside the sub-band shall be attenuated below a reference power of 112 mw (20.5 dBm) as follows:

1. 30 dB between the sub-band and 1.25 MHz above or below the sub-band;
2. 50 dB between 1.25 and 2.5 MHz above or below the sub-band;
3. 60 dB at 2.5 MHz or greater above or below the sub-band.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2007-08-25	2008-08-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Data

Environmental Conditions

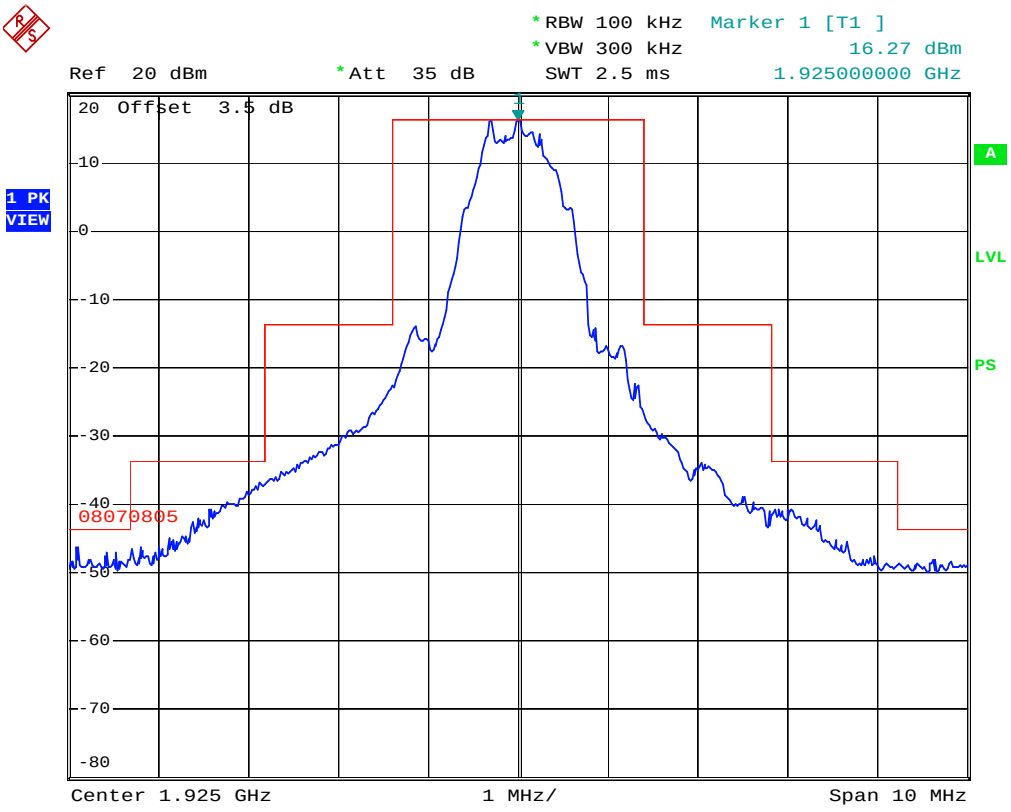
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.8 kPa

The testing was performed by Jack Wang on 2008-08-15.

Test Mode: Operating

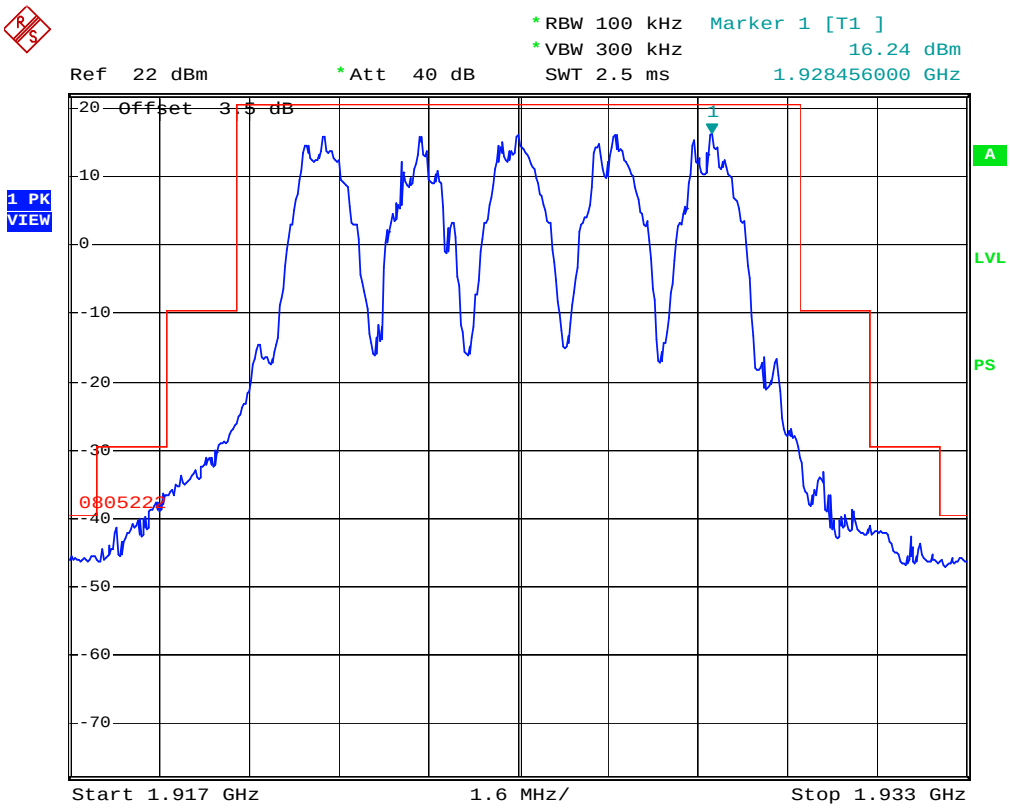
Test Result: Pass

Refer to the attached plots.



Emission mask inside the sub-band

Date: 15.AUG.2008 15:41:19



Emission outside the sub-band

Date: 18.AUG.2008 12:54:17

§15.323 (f) - FREQUENCY STABILITY BASE

Standard Applicable

This procedure should be carried out for each of the following test cases:

Temperature	Supply Voltage
20℃	85-115% or new batteries
-20℃[a]	Normal
+50℃	Normal

[a] Use the lowest temperature at which the EUT is specified to operate if it is above -20 ℃.

Using the mean carrier frequency at 20℃ and at nominal supply voltage as the reference, the mean carrier frequency shall be maintained within ±10 ppm at the two extreme temperatures (or as declared by the manufacturer) and at normal temperature (typically 20℃) at the two extreme supply voltages.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
WUHUAN	Temperature & Humidity Chamber	HTP205	20021115	N/A	N/A
R&S	Digital Radio-Communication Tester	CMD60	8281461029	2008-9-26	2009-9-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.8 kPa

The testing was performed by Jack Wang on 2008-09-26

Test Mode: Operating

Test Result: Pass

Temperature (^{O}C)	Voltage (Vac)	Channel Frequency (MHz)	Measured Frequency Offset (kHz)	Measured Frequency Offset (ppm)	Limit (ppm)
+20	102	1924.992	0.325	0.169	±10
	120	1924.992	0.327	0.170	±10
	138	1924.992	0.327	0.170	±10
-20	102	1924.992	-3.388	-1.76	±10
	120	1924.992	-3.369	-1.75	±10
	138	1924.992	-3.272	-1.70	±10
+50	102	1924.992	3.080	1.60	±10
	120	1924.992	3.157	1.64	±10
	138	1924.992	3.176	1.65	±10

§15.323 (c) (e) & §15.319(f) – SPECIFIC REQUIREMENTS FOR UPCS DEVICE

Automatic Discontinuation of Transmission, FCC Part 15.319(f)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. The provisions in this section are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Test Procedure:

The following tests simulate the reaction of EUT in case of either absence of information to transmit or operational failure after a connection of its companion device is established.

Test Result:

Part	Transmits Control and Signaling Information	Equipment Under Test
Base	X	/

Item	Test Description	Reaction of EUT	Results
1	Power removed from EUT	C	Pass
2	EUT powered down	C	Pass
3	Battery charger connected to PCB	N/A	N/A
4	Power/Signal cable removed counter part	N/A	N/A
5	On Hook on EUT Side	C	Pass
6	On Hook on counterpart side	B	Pass

A – Connection breakdown, Cease of all transmissions.
B – Connection breakdown, EUT transmits control and signaling information.
C – Connection breakdown, Counterpart transmits control and signaling information.
N/A– Not Applicable

Lower Monitoring Threshold Part15.323 (c) (2) ;(c) (5); (c) (9)

According FCC Part15.323(c) (2), the monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth used by the device.

According FCC Part15.323(c) (5), If access to spectrum is not available as determined by the (c)(2), and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed.

According to FCC Part15.323 (c) (9), Devices that have a power output lower than the maximum permitted under this subpart may increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

Calculation of monitoring threshold limits for isochroous devices:

Low threshold: $T_L = -174+10Log_{10}B + M_u + P_{MAX}-P_{EUT}$ (dBm)

Upper threshold: $T_U = -174+10Log_{10}B + M_u + P_{MAX}-P_{EUT}$ (dBm)

Where: B=Emission bandwidth (Hz)
M_u =dBs the threshold may exceed thermal noise (30 for T_L & 50 for T_U)
P_{MAX} =$5Log_{10}B-10$(dBm)
P_{EUT} =Transmitted Power (dBm)

For Base:

Monitor Threshold	B (MHz)	M_u (dB)	P_{MAX} (dBm)	P_{EUT} (dBm)	Threshold (dBm)
T_L	1.404	30	20.74	18.41	-80.20
T_U	1.404	50	20.74	18.41	-60.20

Limits:

The EUT must not transmit until the interference level is less than or equal to:

Measured Threshold Level $\leqslant T_U$

Where: T_U =Upper threshold level

Test Results

Monitor Threshold (dBm)	Measured Threshold Level (dBm)	Limit (dBm)
Lower Threshold	N/A	-80.20
Upper Threshold	-63.8	-60.20

Note: The upper threshold is applicable as the EUT utilizes more than 40 duplex system channels

Maximum Transmit Period FCC Part15.323 (c) (3)

If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

EUT established a communication channel with its companion device, the centre frequency of spectrum analyzer was set to the carrier frequency and SPAN was set to ZERO, the spectrum analyzer was used for monitoring the time and spectrum of the communication channel.

Test Result:

Repetition of Access Criteria	Measured Maximum Transmission Time (Seconds)	Limit (Seconds)	Results
First	< 14,400	28,800	Pass
Second	< 14,400	28,800	Pass

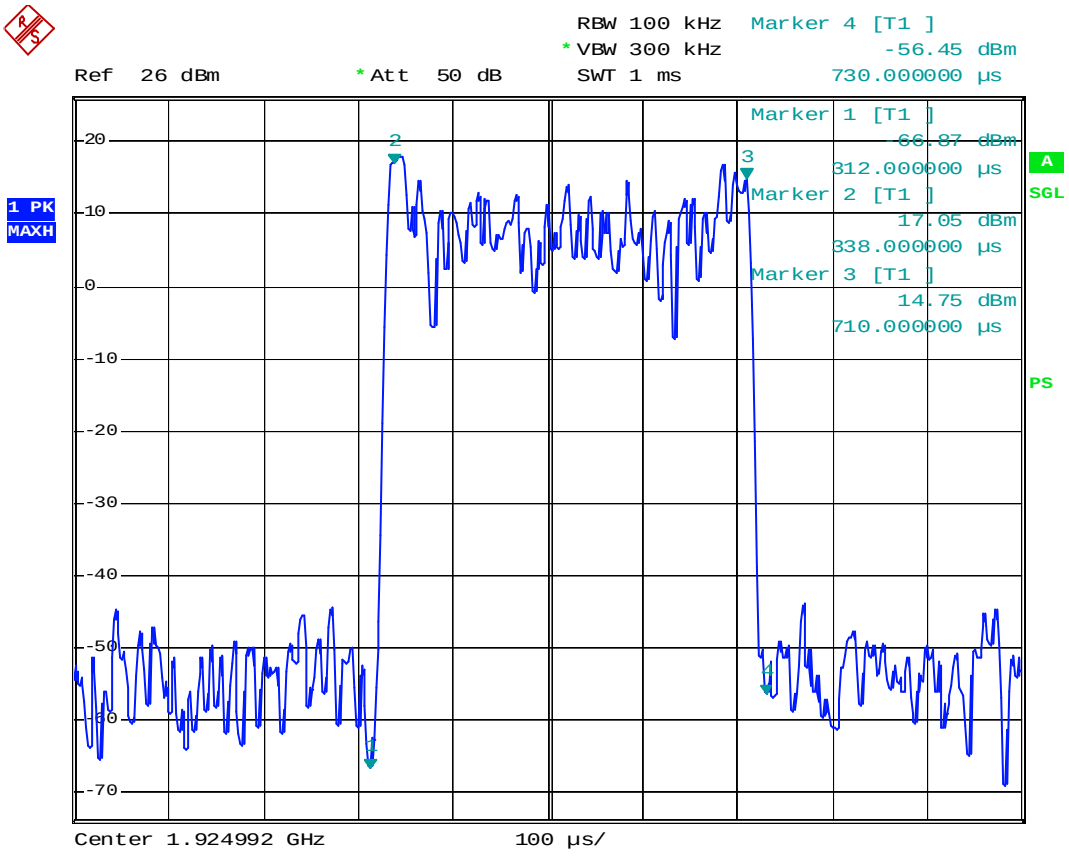
System Acknowledgment, FCC Part15.323 (c) (4)

Once access to specific combined time and spectrum windows is obtained an acknowledgment from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgments must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgment, at which time the access criteria must be repeated.

Measurement are made in accordance with ANSI C63.17 sub-clause 8.1.1 and 8.2.1

Test Result:

Test	Time Taken (second)	Limit (Second)	Results
Initiating transmitter time	0.000025	1	Pass
Channel used for control and signaling information	0.000088	30	Pass
Transmission cease time	0.000035	30	Pass



Least Interfered Channel (LIC) Selection, FCC Part15.323 (c) (5)

If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed.

Least interfered Channel

As this system has less than 40 channels the least interfered channel relating to the lower monitoring threshold shall be assessed. This test was carried out in accordance with ANSI C63.17 sub-clause 7.3.3 using test setup 2. The EUT was frequency administered to operating on two frequencies only, f1 and f2.

f1 = 1924.992 MHz
f2 = 1923.264 MHz

Test a)
Interference on f1 was set at TL + 7dB and at TL on f2. Initiate communication. The EUT should transmit on f2. Repeat 5 times. If the EUT transmits on f1, the test is failed.

Test b)
Interference on f1 was set at TL and at TL + 7dB on f2. Initiate communication. The EUT should transmit on f1. Repeat 5 times. If the EUT transmits on f2, the test is failed.

Test c)
Interference on f1 was set at TL + 1dB and at TL - 6dB on f2. Initiate communication. The EUT should transmit on f2. Repeat 5 times. If the EUT transmits on f1, the test is failed.

Test d)
Interference on f1 was set at TL - 6dB and at TL + 7dB on f2. Initiate communication. The EUT should transmit on f1. Repeat 5 times. If the EUT transmits on f2, the test is failed.

Test Result:

Test	Transmit on f1	Transmit on f2	Wanted Transmit Channel	Results
a	No	Yes	f2	Pass
b	Yes	No	f1	Pass
c	No	Yes	f2	Pass
d	Yes	No	f1	Pass

Note: all tests were repeated 5 times.

Least Interfered Channel (LIC) Confirmation, FCC Part15.323 (c) (5)

A device utilizing the provisions of FCC Part15.323 (c) (5) must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 milliseconds frame period) immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value.

This test was carried out in accordance with ANSI C63.17 sub-clause 7.3.4 using test setup 2(page 12).

The test is to ensure the EUT monitors the time/spectrum window immediately prior to transmission. The EUT was frequency administered to operating on two frequencies only, f1 and f2.

f1 = 1924.992 MHz
f2 = 1923.264 MHz

Test a)
Interference is applied on f1 at a level of T_U , verifies a connection is established on f2. The connection is terminated.

Test b)
Interference is applied on f2 at a level of T_U and immediately removed from f1 and the EUT is immediately caused to attempt transmission. In this case the EUT should transmit on f1

Test Result:

Test	Transmit on f1	Transmit on f2	Wanted Transmit Channel	Results
a	No	Yes	f2	Pass
b	Yes	No	f1	Pass

Power Accuracy

The power measurement resolution for the previous comparison must be accurate to within 6dB. The monitoring threshold test covered in Part 15.323 (c) (2) automatically proves that this requirement is met.

Monitoring Bandwidth, FCC Part 15.323 (c) (7)

The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission and have a maximum reaction time less than 50xSQRT (1.25/emission bandwidth in MHz) microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds.

Test Result:

Test Equation (μs)	Bandwidth B (MHz)	Pulse Width (μs)	Results
50 (1.25/B)1/2	1.404	50	Pass
35 (1.25/B)1/2	1.404	35	Pass

Monitoring Antenna, FCC Part15.323 (c) (8)

The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

Test Result:

The antenna of the EUT base and handset used for transmission are the same interior antenna that used for monitoring.

Duplex Connections, FCC Part15.323 (c) (10)

An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

The tests laid out in this section verify that the access criteria are met by two devices communicating over a duplex connection. The EUT is the initiating device and the companion is the responding device.

These tests are carried out in accordance with ANSI C63.17 sub-clause 8.3.1 using test setup 2.
Before all tests are carried out any connection is terminated.

Test a)
The system is restricted to operation on one frequency (1924.992 MHz) using administration. Verify that a connection between the EUT and its companion device can be made.

Test b) & c)
Apply interference at a level TL to all transmit time slots and to all but one receive time slots.
The EUT should not establish a connection.

Test d) & e)
Apply interference at a level TL to all receive time slots and to all but one transmit time slots.
The EUT should not establish a connection.

Test Result:

Test	Connection Made	Correct Time Slot	Required Slot	Result
a	Yes	N/A	Any	Pass
b & c	No	N/A	N/A	Pass
d & e	No	N/A	N/A	Pass

Alternative monitoring interval for co-located devices, FCC Part 15.323 (c) (11)

An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within 1.25 MHz of the center frequency of channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

This test is carried out in accordance with ANSI C63.17 sub-clause 8.4.

Test Result:

N/A. The manufacturer declares that this provision is not utilized by the EUT.

Fair Access, FCC Part 15.323 (c) (12)

The provisions of FCC Part15.323(c)(10) or (c)(11) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

Test Result:

The manufacturer declares that this device does not use any mechanisms as provided by Part15.323 (c) (10) or (c) (11) to extend the range of spectrum occupied over space or time for the purpose of denying fail access to spectrum to other device.

Frame Repetition Stability, Part15 .323 (e)

The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in these sub-bands shall be 20 milliseconds or 10 milliseconds/X where X is a positive whole number.

Measurements are made in accordance with ANSI C63.17 sub-clause 6.2.2 and 6.2.3

Test Result:

Frame Repetition Stability:

Frame Repetition Stability (ppm)	Limit (ppm)	Result
-1.76	10	pass

Frame Period and Jitter:

Max. Positive jitter (us)	Max. Negative jitter (us)	Frame Period (µs)	Limit	
			Frame Period (ms)	Jitter (µs)
0.00	-0.01	10.00001	2 or 10/X	25

Directional Gain of the Antenna, FCC Part 15.319(e)

The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Test Result:

Maximum Antenna Gain	Result
3dBi	Pass

DECLARATION LETTER

Bittel
Shandong Bittel Electronics Co., Ltd.
No.1 Rizhao North Road, Rizhao, China Tel:+86-633-2212149 Fax: +86-633-2212118

To: Bay Area Compliance Laboratories Corp.

Declaration of Similarity

Date: 2008-9-5

To whom it may concern,

We, Shandong Bittel Electronics Co. Ltd.
Address: No.1 Rizhao North Road, Rizhao, Shandong, China
Hereby declare that:

-1. All the bellowed models are exact the same:
HWD9888(48)TSD, HWD9888(48)TSD-NS (N=P, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10), HWD9888(48)TSD-TN (N=P, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
The different names are just for different countries' label mark purpose.
-2. HWD9888 (48) TS are exact the same as HWD9888(48)TSD in PCB, circuit, structure, etc., the only difference is HWD9888(48)TSD has SPKR button, while HWD9888(48)TS doesn't have SPKR button.

Jianwen Tian

Authorized Signature