



NVLAP LAB CODE 200707-0

## FCC PART 24E



# MEASUREMENT AND TEST REPORT

For

## Bravo Tech (Shenzhen) Co., Ltd.

No.8 Building, The 3rd Zone, Tangtou Industrial Park, Shiyan, Baoan District,

Shenzhen, Guangdong, P .R. of China

**FCC ID: WBKMBSC081921-19**

<b>Report Type:</b> Class II Permissive Change	<b>Product Type:</b> Multi-Band, Multi-Standard, Multi-Carrier Coverage System
<b>Test Engineer:</b> Alvin Huang <i>Alvin Huang</i>	
<b>Report Number:</b> RSZ10062805-24E	
<b>Report Date:</b> 2010-08-20	
<b>Reviewed By:</b> EMC Engineer Merry Zhao <i>Merry Zhao</i>	
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**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP\*, NIST, or any agency of the Federal Government.

\* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "\*" (Rev.2)

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## GENERAL INFORMATION

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### Product Description for Equipment Under Test (EUT)

The *Bravo Tech (Shenzhen) Co., Ltd.*'s product, model number: *mBSC081921-12* ( *FCC ID: WBKMBSC081921-19*) or the "EUT" as referred to in this report is a *Multi-Band, Multi-Standard, Multi-Carrier Coverage System*, which measures approximately: 50 cm L x 25 cm W x 12 cm H, rated input voltage: AC 120V power source.

Frequency Range:

PCS Band: 1930-1990 MHz (Downlink)

Transmitter Output Power:

PCS Band: 46±1 dBm (Downlink)

*\* All measurement and test data in this report was gathered from production sample serial number: 1006083 (Assigned by BACL). The EUT was received on 2010-06-28.*

### Objective

This type approval report is prepared on behalf of *Bravo Tech (Shenzhen) Co., Ltd.* in accordance with Part 2, Subpart J and Part 24 Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability, band edge and radiated margin.

This is the C2PC application of the device. It is requesting for the additional PCS 1900 band without any hardware changes to the previously approved products, The new modulation is 1900 GSM & EDGE modulation (1930-1990 MHz), So the test about 1900 GSM & EDGE modulation were performed.

### Related Submittal(s)/Grant(s)

None.

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 24 Subpart E - Personal Communication Services

Applicable Standards: TIA/EIA 603-C, ANSI C63.4-2003.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp. 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 21, 2007. 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 EUT was configured for testing according to TIA/EIA-603-C.

The final qualification test was performed with the EUT operating at normal mode.

### Equipment Modifications

No modifications were made to the EUT.

### Local Support Equipment List and Details

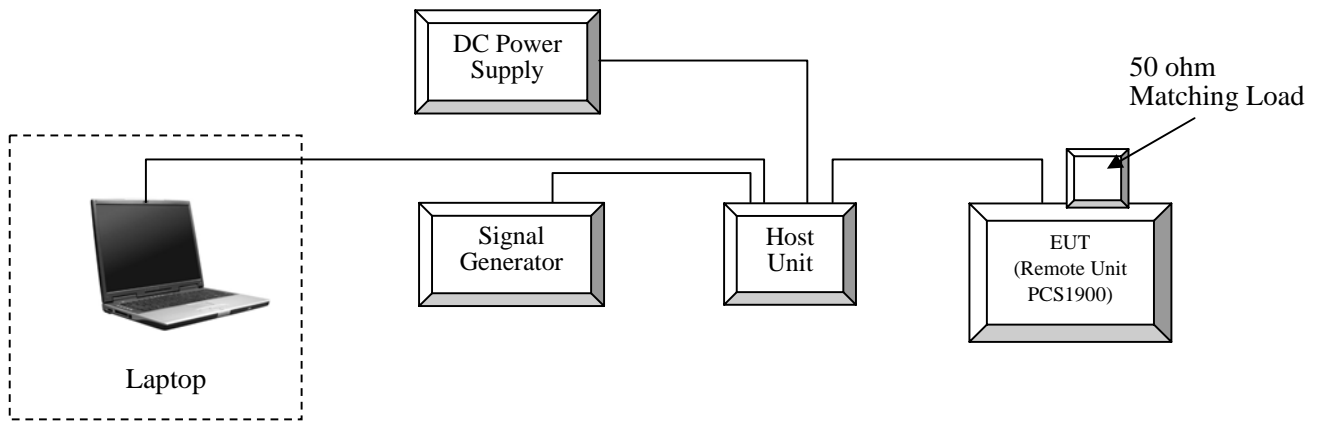
Manufacturer	Description	Model	Serial Number	FCC ID
AEROFLEX	Signal Generator	IFR3416	3410051025	N/A
ASTEC	DC Power Supply	JF101B-9000-0000	BY4748	N/A
IBM	Laptop	T400	GTVQC-2KWCD-VXM8V-KPRM9-KKVDB	DoC
Bravo	Multi-Band, Multi-Standard, Multi-Carrier Coverage System (Host Unit)	mBSC081921-12 (Host Unit)	N/A	N/A

### External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Detachable AC Cable	7.0	LISN/AC mains	EUT
Unshielded Detachable Fiber Cable	1.2	Host Unit/Fiber Port	Remote Unit (AWS 2100 Unit)
Shielded Detachable Blue RF Cable	1.5	Host Unit/SMA Port	Remote Unit
Shielded Detachable Yellow RF Cable	3.0	Signal Generator/SMA Port	Remote Unit
Unshielded Detachable DC Cable	1.3	DC Supply/DC Port	Host Unit
Unshielded Detachable Network Cable	10.0	Laptop/Network Port	Host Unit

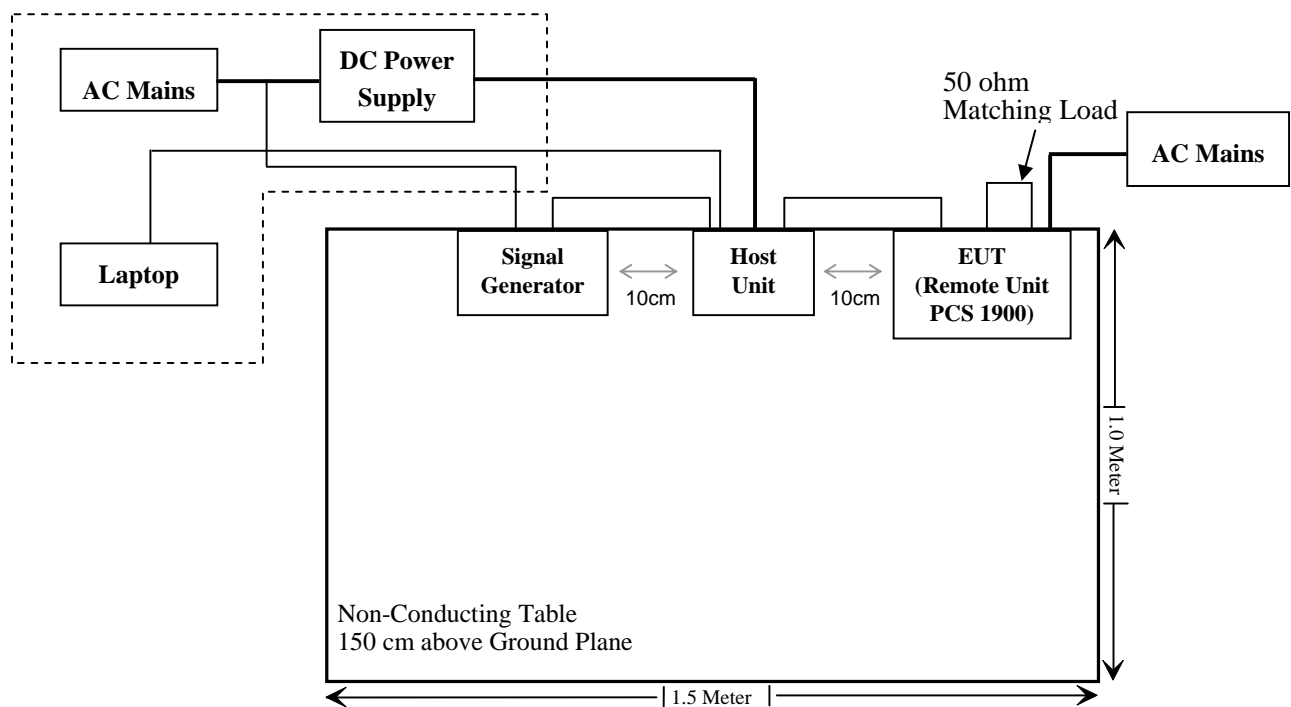
## Configuration of Test Setup

For Downlink mode-CDMA PCS band:



## Block Diagram of Test Setup

For Downlink mode- CDMA PCS band:



**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§1.1307 (b)(1), §2.1091	Maximum Permissible exposure (MPE)	Compliant
§2.1046; §24.232 (c)	RF Output Power	Compliant
§2.1047	Modulation Characteristics	N/A
§2.1049; §24.238	99% & -26 dB Occupied Bandwidth	Compliant
§2.1051, §24.238 (a)	Spurious Emissions at Antenna Terminal	Compliant
§2.1053; §24.238 (a)	Field Strength of Spurious Radiation	Compliant
§24.238 (a)	Out of band emission, Band Edge	Compliant
§2.1055; §24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Compliant



## **FCC §1.1307 (b)(1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

### **Standard Applicable**

According to subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

#### **Limits for Occupational/Controlled Exposures**

<b>Limits for Occupational/Controlled Exposures</b>				
<b>Frequency Range (MHz)</b>	<b>Electric Field Strength (V/m)</b>	<b>Magnetic Field Strength (A/m)</b>	<b>Power Density (mw/cm<sup>2</sup>)</b>	<b>Averaging Time (Minutes)</b>
0.3-3.0	614	1.63	*(100)	6
3.0-30.0	1824/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5.0	6

f = frequency in MHz

\* = Plane-wave equivalent power density

### **Test Data**

Predication of MPE limit at a given distance

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

Where:

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

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)

### **MPE Predication:**

Maximum peak output power at antenna input terminal: 45.76(dBm)

Maximum peak output power at antenna input terminal: 37670.38 (mW)

Prediction safety distance: >400 (cm)

Predication frequency: 1960 (MHz)

Antenna Gain (typical): 11(dBi)

Antenna Gain (typical): 12.59 (numeric)

Power density predication frequency at 400 cm: 0.23(mW/cm<sup>2</sup>)

MPE limit for general population exposure at prediction frequency: 5 (mW/cm<sup>2</sup>)

**Result:** Compliance.

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## **FCC §2.1047 - MODULATION CHARACTERISTIC**

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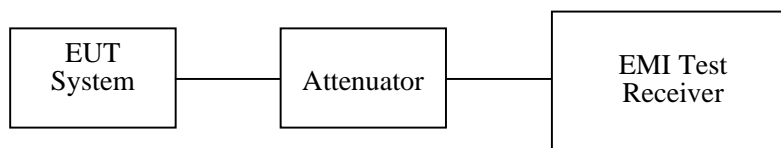
According to FCC § 2.1047(d), 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

**FCC § 2.1046 & § 24.232 (a) - RF OUTPUT POWER****Applicable Standard**

According to FCC §2.1046 and §24.232 (a).

**Test Procedure***Conducted method:*

The RF output of the EUT system was connected to the wireless test set and the EMI test receiver through sufficient attenuation.

*Radiated method:*

TIA 603-C section 2.2.17

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2009-11-24	2010-11-23

\* **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 Data****Environmental Conditions**

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

*The testing was performed by Alvin Huang from 2010-07-15 to 2010-08-18*

**GSM:**

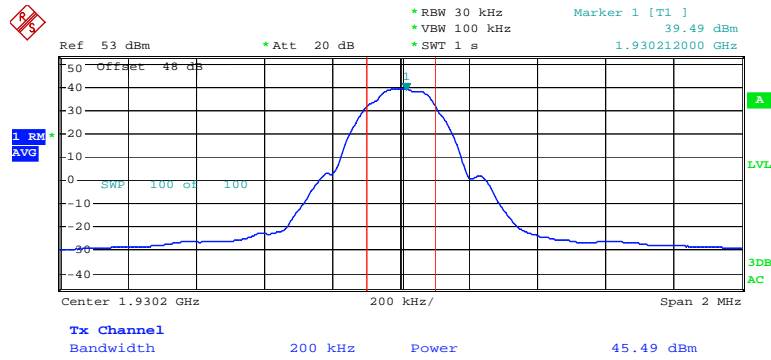
Mode	Channel	Frequency (MHz)	Output Power (dBm)	Result
Downlink	<b>One Carrier</b>			
	Low	1930.2	45.49	Compliance
	Mid	1960.0	45.37	Compliance
	High	1989.8	45.44	Compliance
	<b>Two Carriers</b>			
	Low	1930.5	45.46	Compliance
	Mid	1960.0	45.51	Compliance
	High	1989.5	45.62	Compliance
	<b>Three Carriers</b>			
	Low	1930.8	45.46	Compliance
	Mid	1960.0	45.76	Compliance
	High	1989.2	45.58	Compliance
	<b>Four Carriers</b>			
	Low	1931.1	45.60	Compliance
	Mid	1960.0	45.57	Compliance
	High	1988.9	45.53	Compliance

**EDGE:**

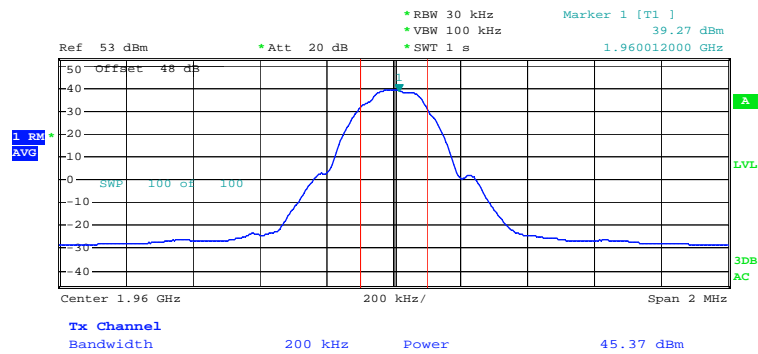
Mode	Channel	Frequency (MHz)	Output Power (dBm)	Result
Downlink	<b>One Carrier</b>			
	Low	1930.2	45.54	Compliant
	Mid	1960.0	45.33	Compliant
	High	1989.8	45.46	Compliant
	<b>Two Carriers</b>			
	Low	1930.5	45.48	Compliant
	Mid	1960.0	45.45	Compliant
	High	1989.5	45.48	Compliant
	<b>Three Carriers</b>			
	Low	1930.8	45.51	Compliant
	Mid	1960.0	45.63	Compliant
	High	1989.2	45.41	Compliant
	<b>Four Carriers</b>			
	Low	1931.1	45.38	Compliant
	Mid	1960.0	45.54	Compliant
	High	1988.9	45.45	Compliant

Note: The antenna gain for GSM 1900 is less than 11 dBi.

**Plots of Conducted Output Power**

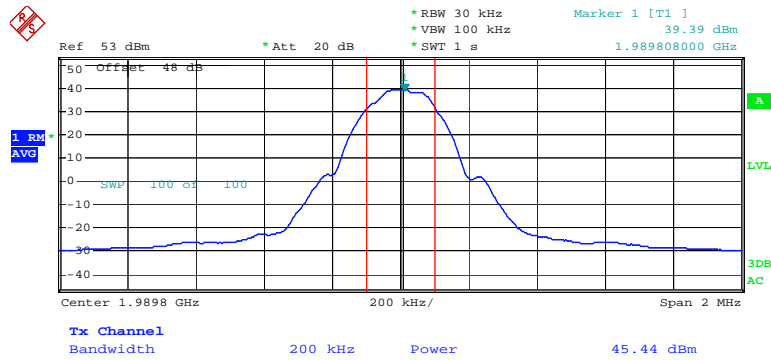
**GSM:****Downlink mode (One carrier):****Low Channel**

Date: 19.AUG.2010 02:32:36

**Middle Channel**

Date: 15.JUL.2010 23:06:14

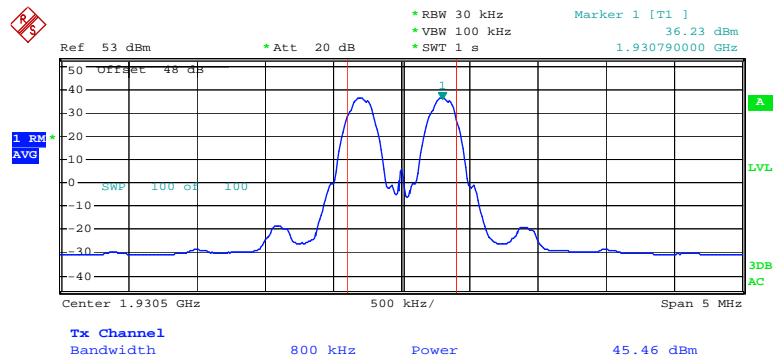
## High Channel



Date: 19.AUG.2010 02:43:22

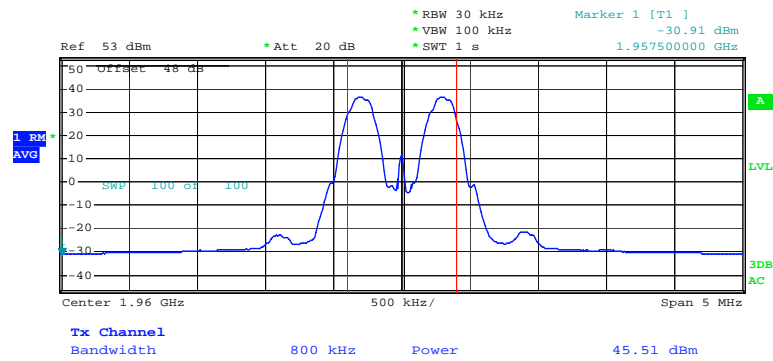
## Downlink mode (Two carriers):

## Low Channel



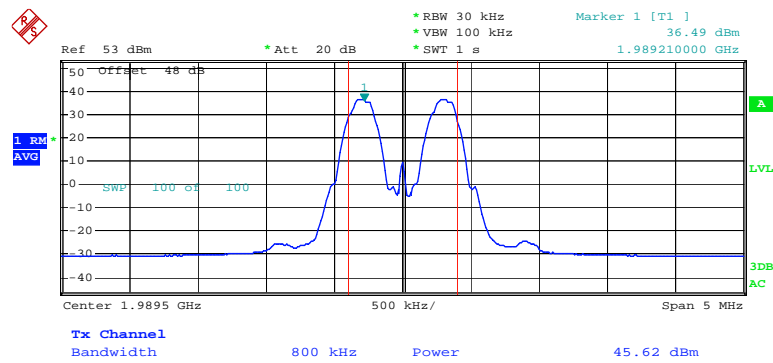
Date: 19.AUG.2010 03:03:20

## Middle Channel

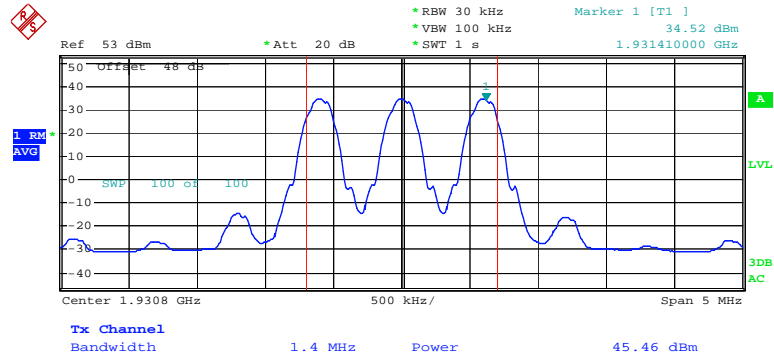


Date: 15.JUL.2010 22:29:40

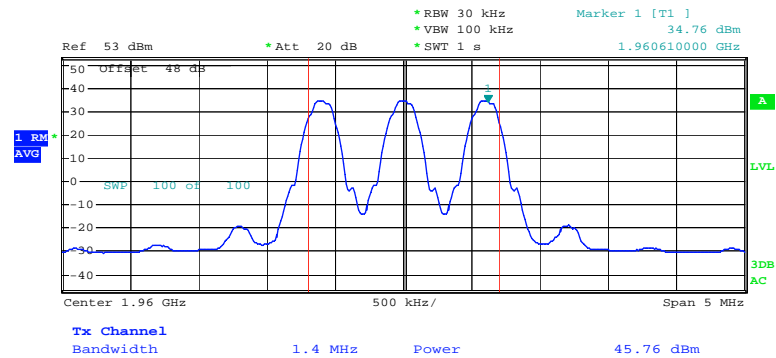
## High Channel



Date: 19.AUG.2010 02:46:53

**Downlink mode (Three carriers):****Low Channel**

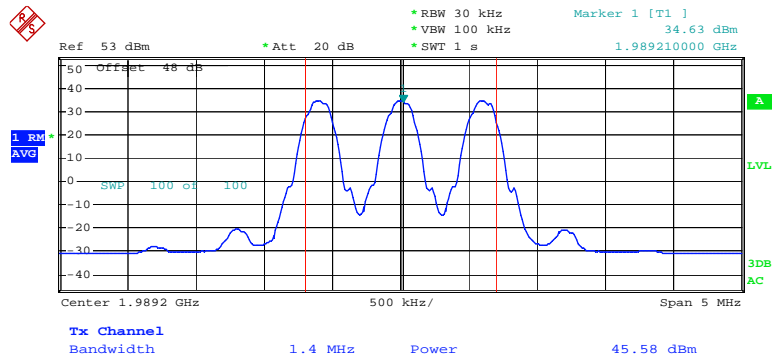
Date: 19.AUG.2010 03:06:15

**Middle Channel**

Date: 15.JUL.2010 21:49:57



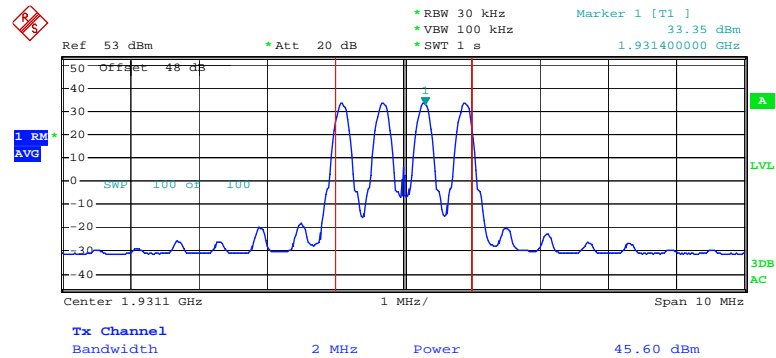
## High Channel



Date: 19.AUG.2010 03:20:35

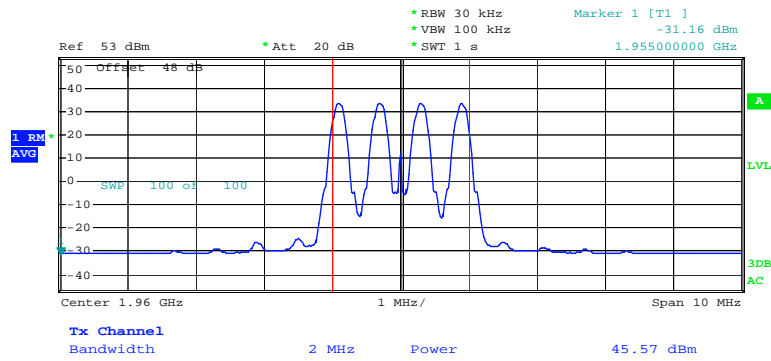
## Downlink mode (Four carriers):

## Low Channel



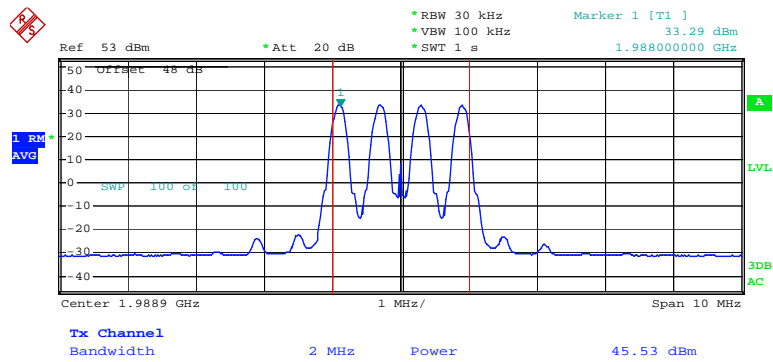
Date: 19.AUG.2010 03:37:25

## Middle Channel

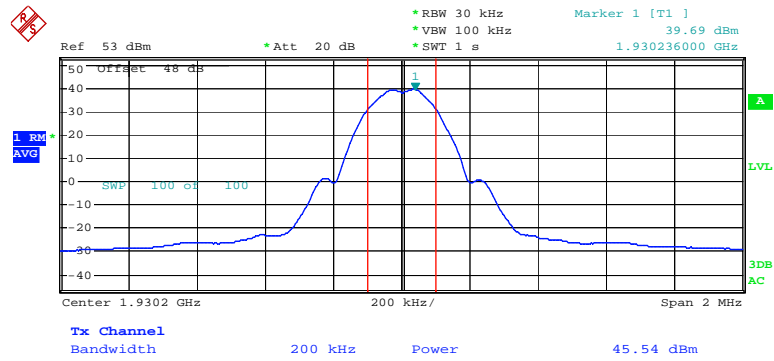


Date: 14.JUL.2010 21:58:10

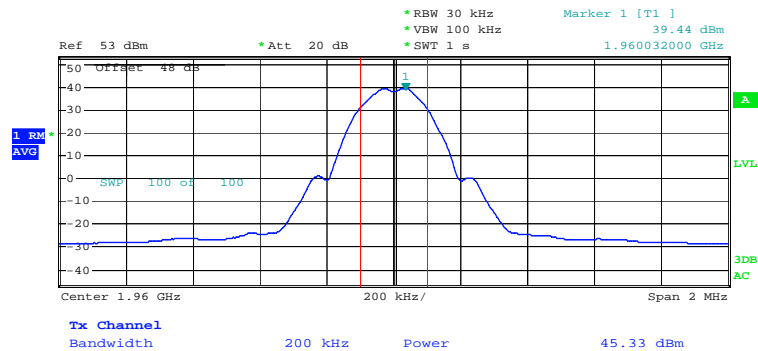
## High Channel



Date: 19.AUG.2010 03:23:59

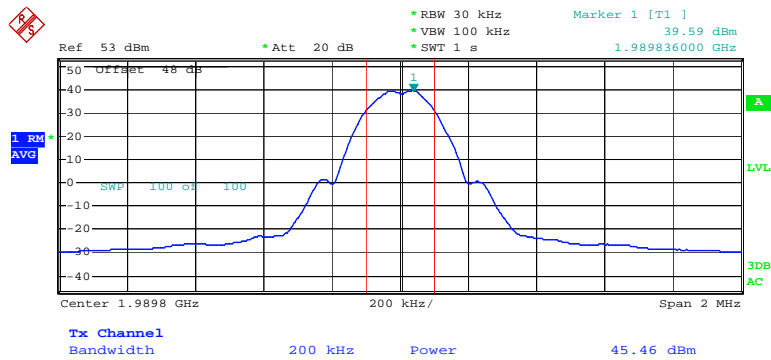
**EDGE:****Downlink mode (One carrier):****Low Channel**

Date: 19.AUG.2010 02:36:16

**Middle Channel**

Date: 15.JUL.2010 23:14:20

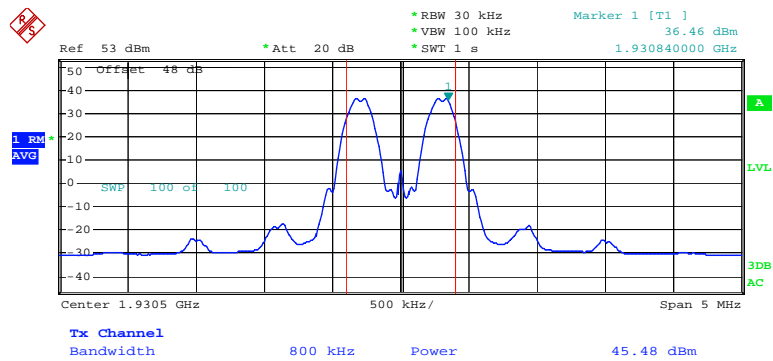
## High Channel



Date: 19.AUG.2010 02:39:47

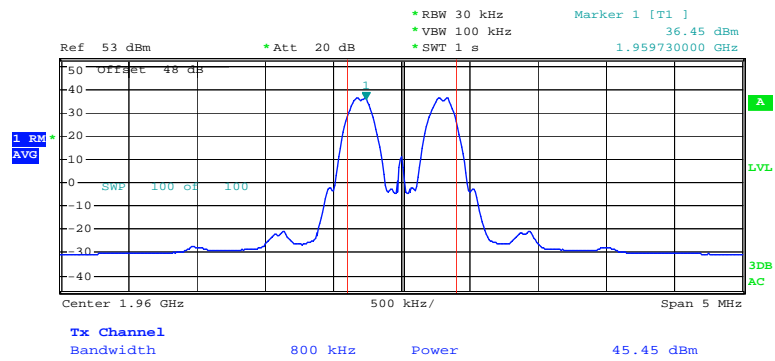
## Downlink mode (Two carriers):

## Low Channel



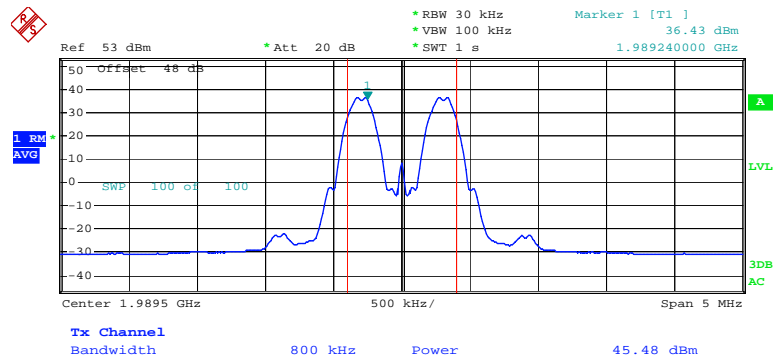
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## Middle Channel

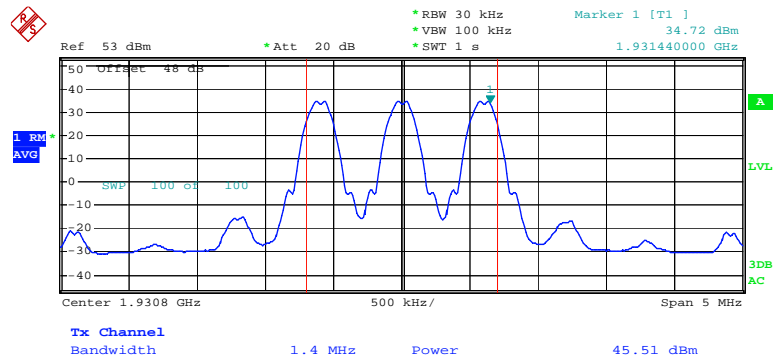


Date: 15.JUL.2010 22:36:44

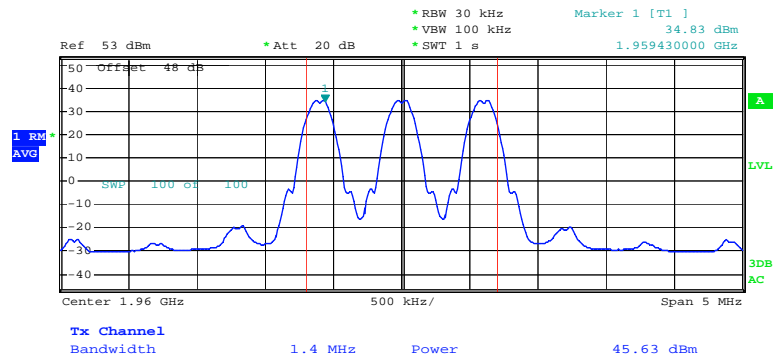
## High Channel



Date: 19.AUG.2010 02:52:45

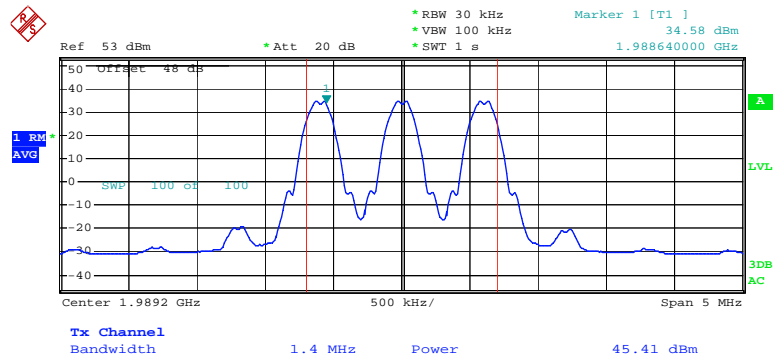
**Downlink mode (Three carriers):****Low Channel**

Date: 19.AUG.2010 03:12:09

**Middle Channel**

Date: 15.JUL.2010 21:46:32

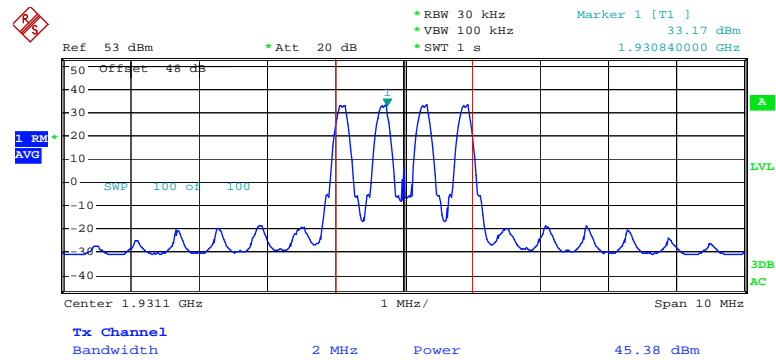
## High Channel



Date: 19.AUG.2010 03:15:40

## Downlink mode (Four carriers):

## Low Channel



Date: 19.AUG.2010 03:32:33

Ref 53 dBm \*Att 20 dB \*RBW 30 kHz \*VBW 100 kHz \*SWT 1 s Marker 1 [T1] 33.33 dBm 1.960940000 GHz

Offset 48 dB

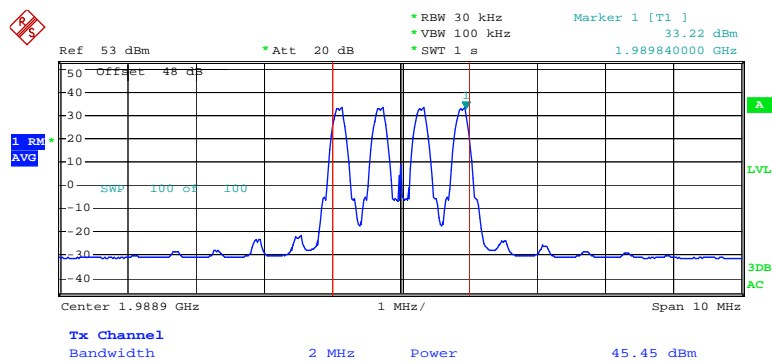
1.96 AVG

SWP 100 GHz

Center 1.96 GHz 1 MHz/ Span 10 MHz

Tx Channel Bandwidth 2 MHz Power 45.54 dBm

High Channel



FCC Part 24E Test Report



## FCC §2.1049 & §24.238 - OCCUPIED BANDWIDTH

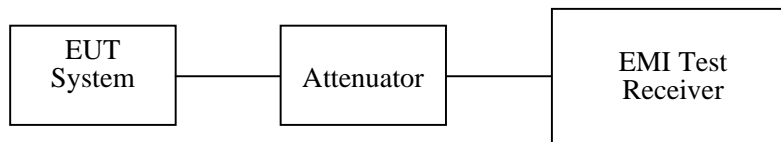
### Applicable Standards

FCC §2.1049 and §24.238.

### Test Procedure

The RF output of the EUT system was connected to the simulator and the EMI test receiver through sufficient attenuation.

The resolution bandwidth of the EMI test receiver was set at 30 kHz (PCS) and the 26 dB & 99% bandwidth was recorded.



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2009-11-24	2010-11-23

\* **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 Data

#### Environmental Conditions

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

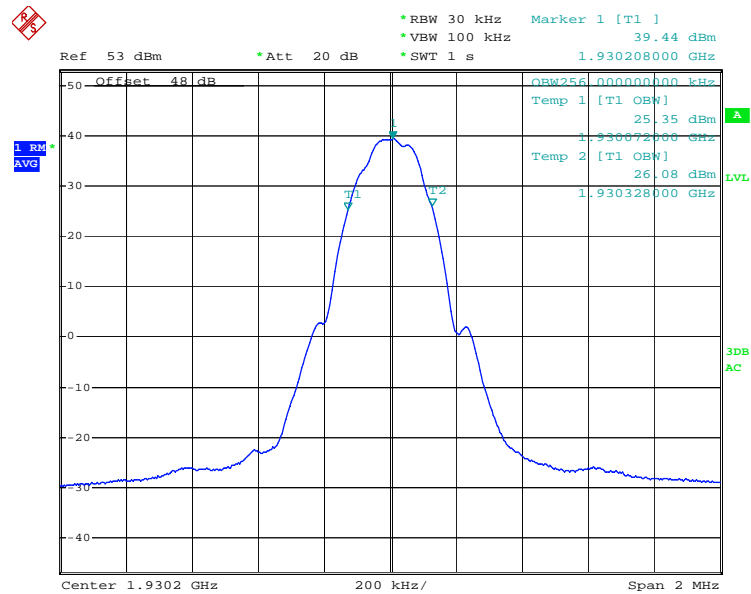
*The testing was performed by Alvin Huang from 2010-07-15 to 2010-08-19*

**GSM:**

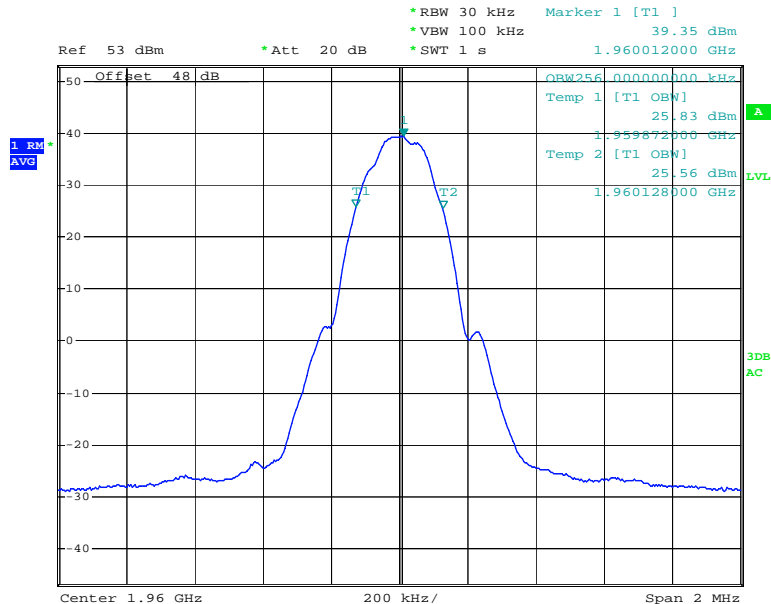
Mode	Channel	Frequency (MHz)	26 dB Occupied Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
Downlink	One Carrier			
	Low	1930.2	336	256
	Mid	1960.0	336	256
	High	1989.8	336	256
	Two Carriers			
	Low	1930.5	940	840
	Mid	1960.0	940	840
	High	1989.5	940	840
	Three Carriers			
	Low	1930.8	1540	1420
	Mid	1960.0	1540	1420
	High	1989.2	1540	1420
	Four Carriers			
	Low	1931.1	2140	2000
	Mid	1960.0	2140	2000
	High	1988.9	2140	2000

**EDGE:**

Mode	Channel	Frequency (MHz)	26 dB Occupied Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
Downlink	One Carrier			
	Low	1930.2	324	240
	Mid	1960.0	324	244
	High	1989.8	324	240
	Two Carriers			
	Low	1930.5	930	820
	Mid	1960.0	930	820
	High	1989.5	930	820
	Three Carriers			
	Low	1930.8	1530	1420
	Mid	1960.0	1530	1410
	High	1989.2	1530	1420
	Four Carriers			
	Low	1931.1	2140	2000
	Mid	1960.0	2140	2000
	High	1988.9	2140	2000

**GSM:****Downlink mode (One carrier):****99% Occupied Bandwidth****Low Channel**

Date: 19.AUG.2010 02:33:25

**Middle Channel**

Date: 15.JUL.2010 23:06:39

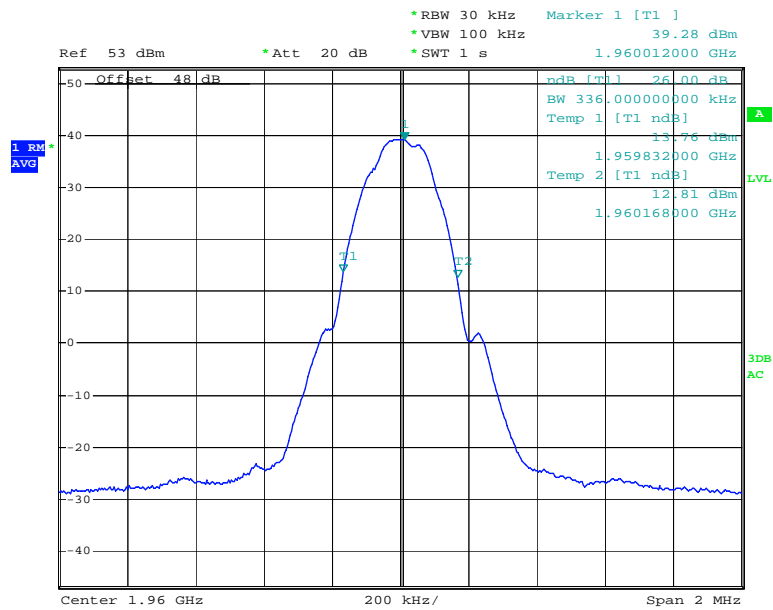
The screenshot displays a spectrum analyzer interface. At the top left, there is a red diamond icon with a white 'R' inside. The main display area shows a blue trace of a signal centered at 1.9898 GHz. The frequency axis ranges from approximately 1.9896 GHz to 1.9899 GHz, with major grid lines every 10 kHz. The power axis ranges from -40 dBm to -50 dBm, with major grid lines every 10 dB. A vertical black line marks the center frequency. Two green arrows labeled 'T1' and 'T2' point to the rising and falling edges of the signal peak. On the right side, a panel shows various parameters: 'Ref 53 dBm', '\*Att 20 dB', '\*RBW 30 kHz', '\*VBW 100 kHz', '\*SWT 1 s', and 'Marker 1 [T1 ]'. Below these, it shows 'OBW256 000000000 kHz', 'Temp 1 [T1 OBW] 26.73 dBm', '1.989672000 GHz', 'Temp 2 [T1 OBW] 27.41 dBm', and '1.989928000 GHz'. At the bottom, it indicates 'Center 1.9898 GHz', '200 kHz /', and 'Span 2 MHz'. There are also some status indicators like 'LVL' and 'AC' on the right.

## 26 dB Bandwidth

[illegible]

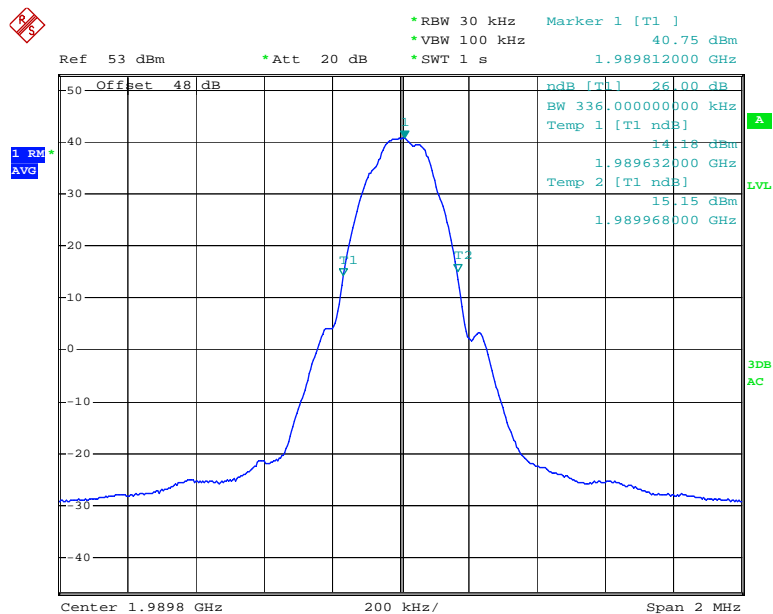
FCC Part 24E Test Report

## Middle Channel

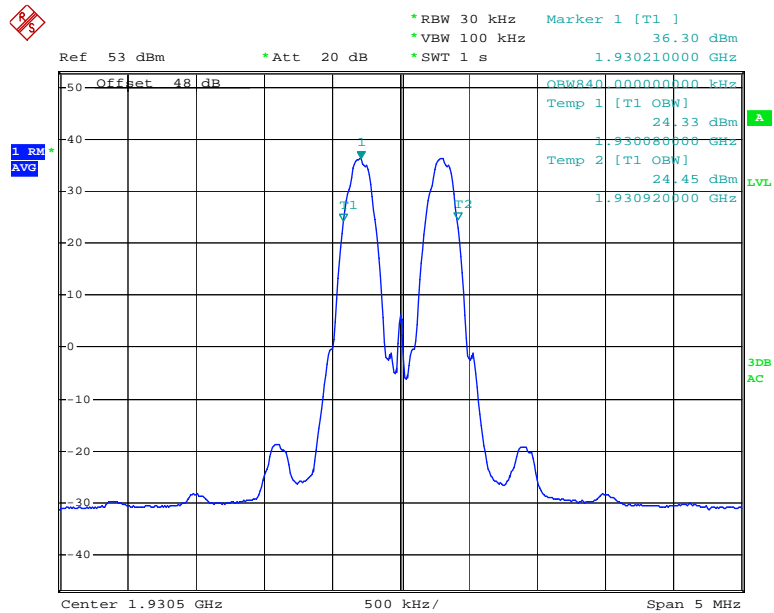


Date: 15.JUL.2010 23:06:51

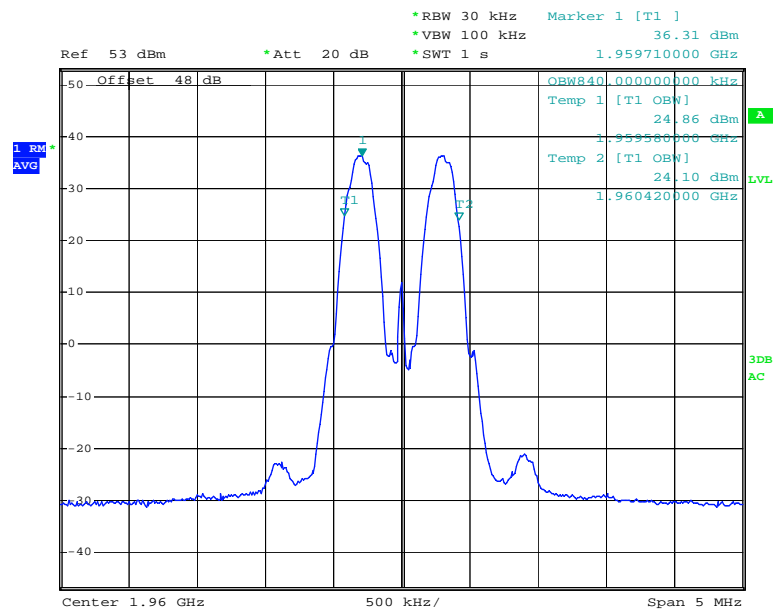
## High Channel



Date: 19.AUG.2010 02:44:07

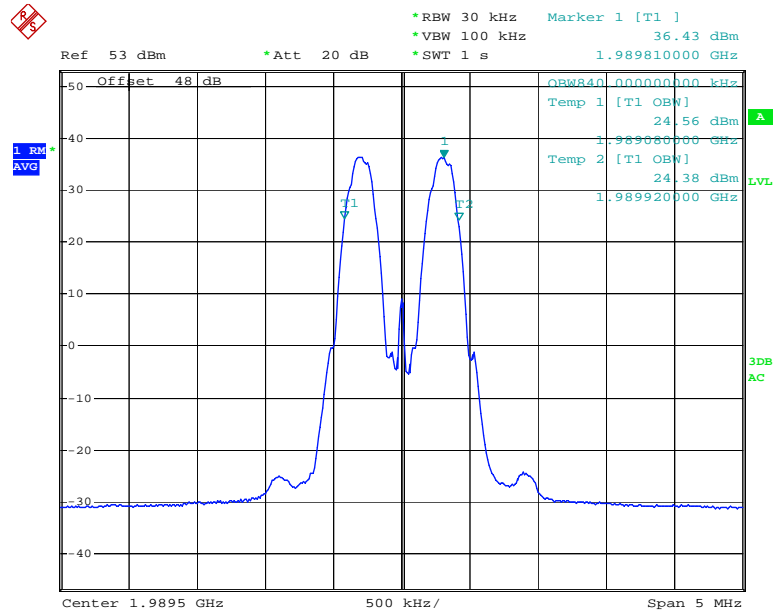
**Downlink mode (Two carriers):****99% Occupied Bandwidth****Low Channel**

Date: 19.AUG.2010 03:01:12

**Middle Channel**

Date: 15.JUL.2010 22:29:59

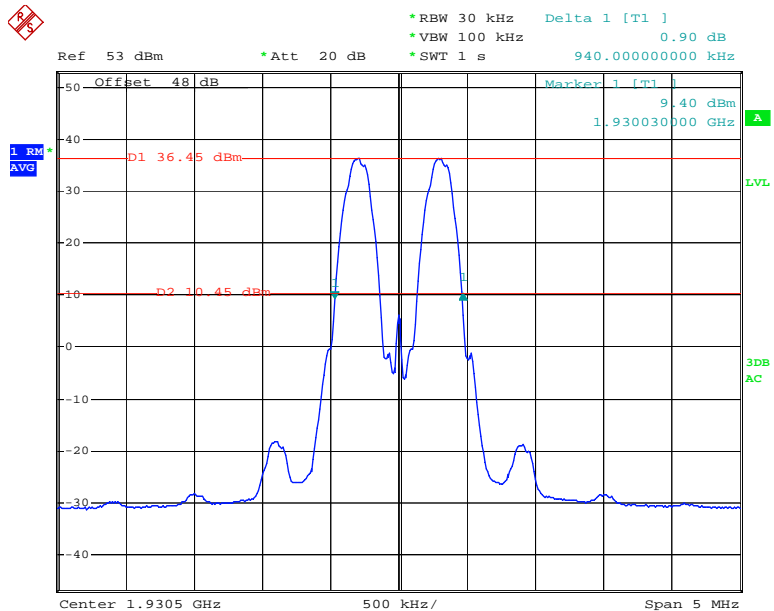
## High Channel



Date: 19.AUG.2010 02:47:18

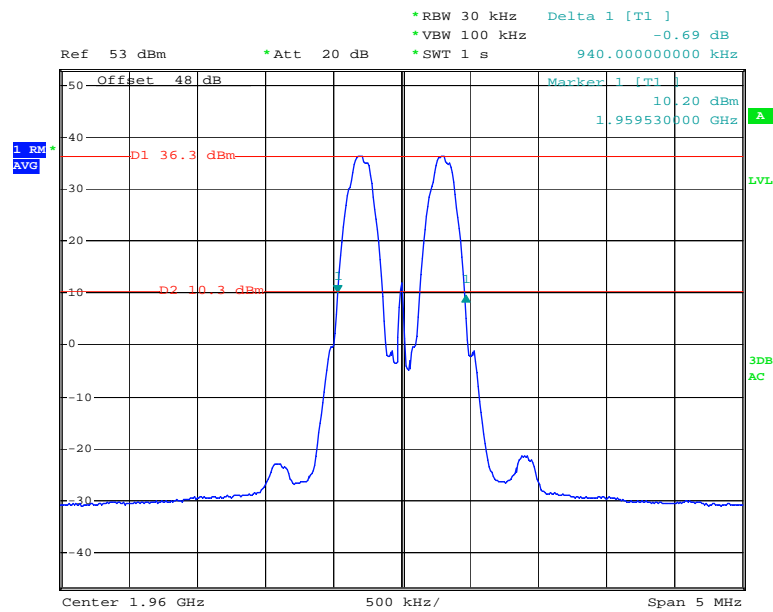
## 26 dB Bandwidth

## Low Channel



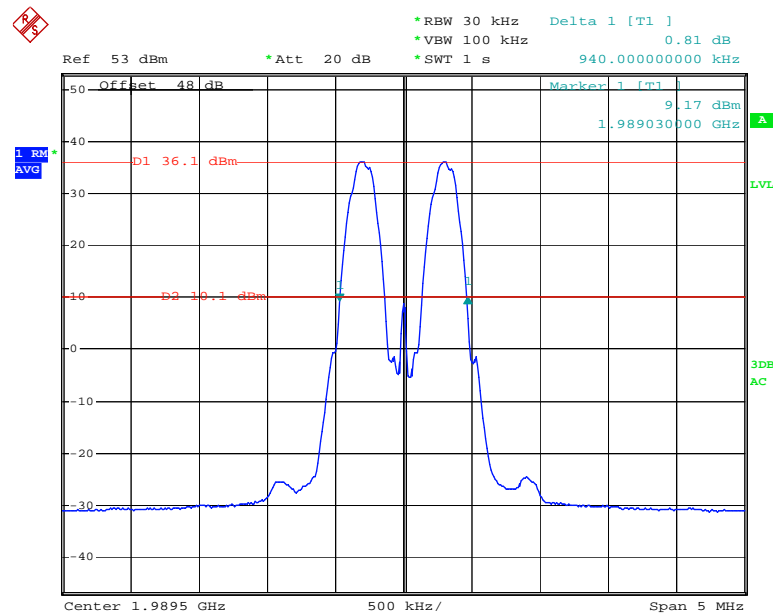
Date: 19.AUG.2010 03:00:40

## Middle Channel



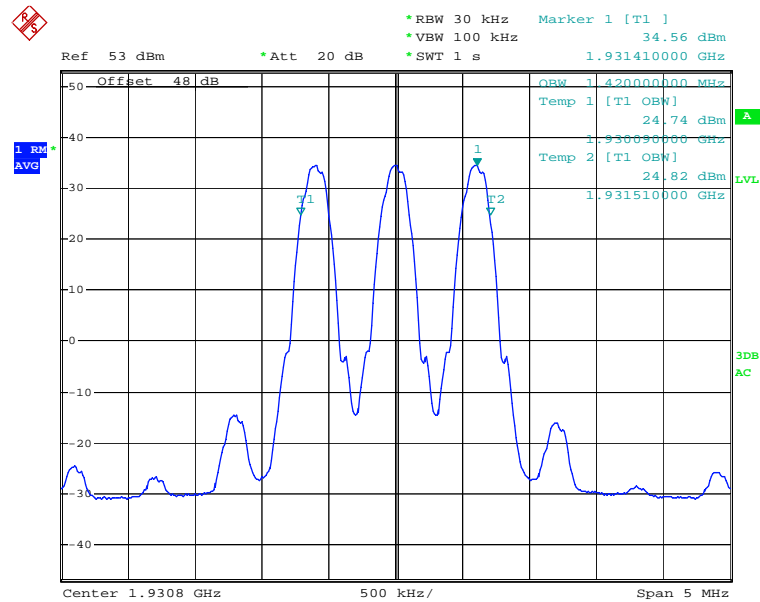
Date: 15.JUL.2010 22:30:41

## High Channel

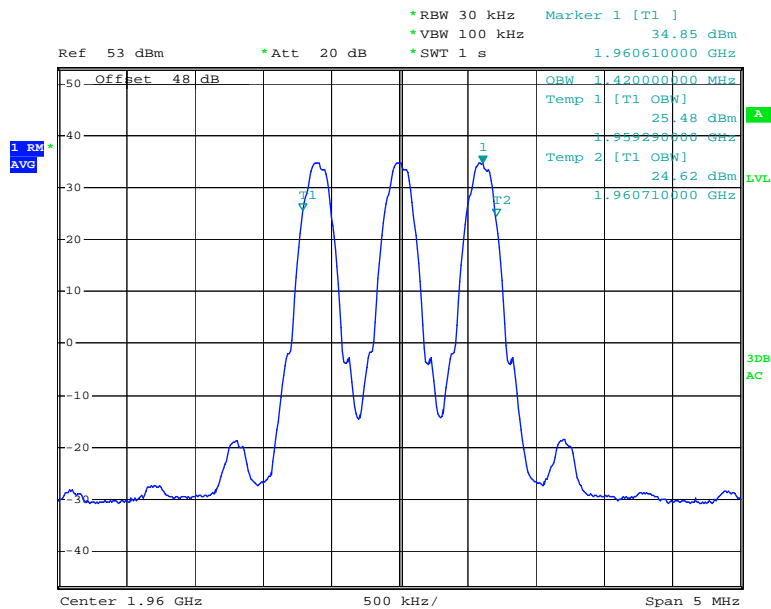


Date: 19.AUG.2010 02:48:12



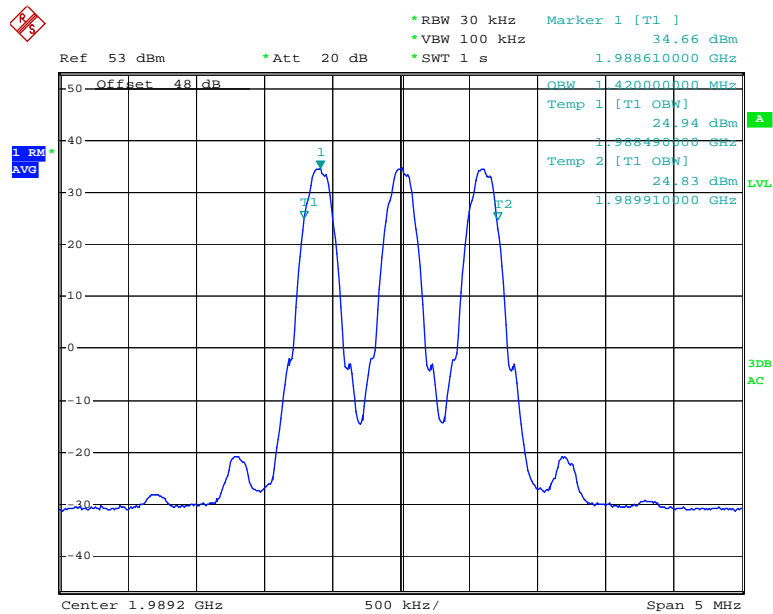
**Downlink mode (Three carriers):****99% Occupied Bandwidth****Low Channel**

Date: 19.AUG.2010 03:06:46

**Middle Channel**

Date: 15.JUL.2010 21:50:15

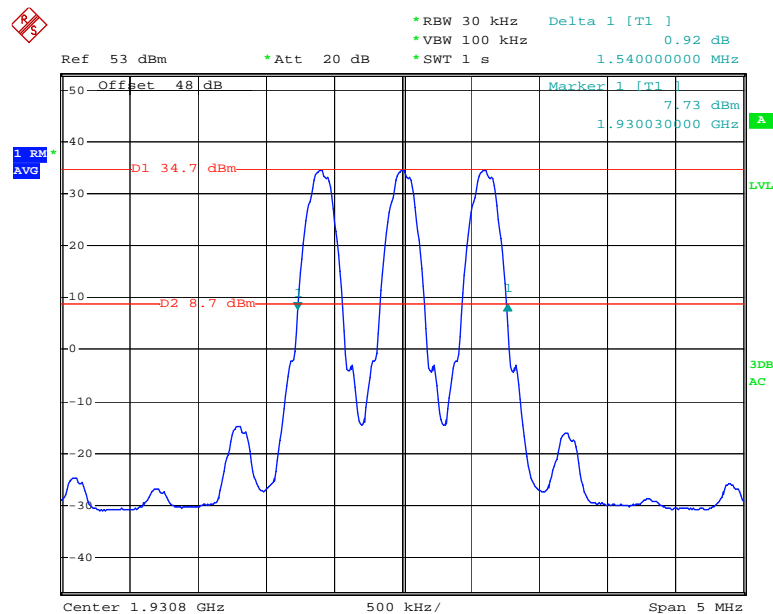
## High Channel



Date: 19.AUG.2010 03:18:32

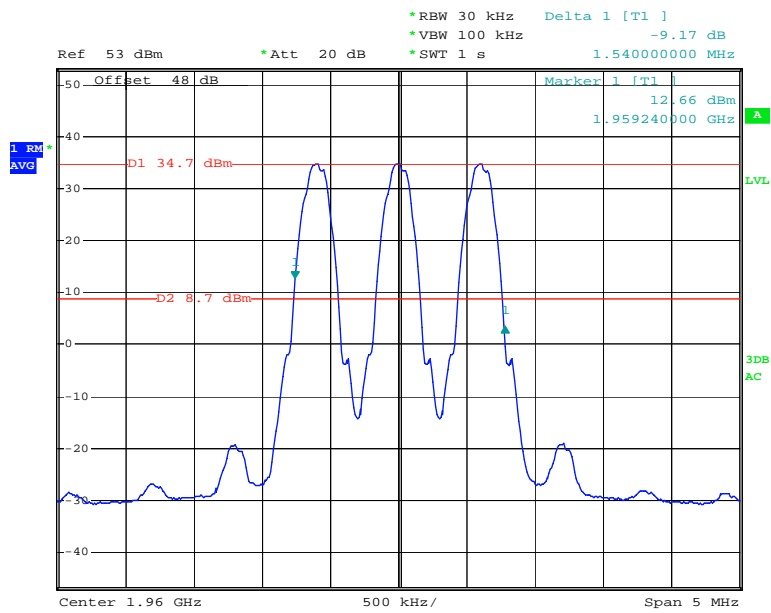
## 26 dB Bandwidth

## Low Channel



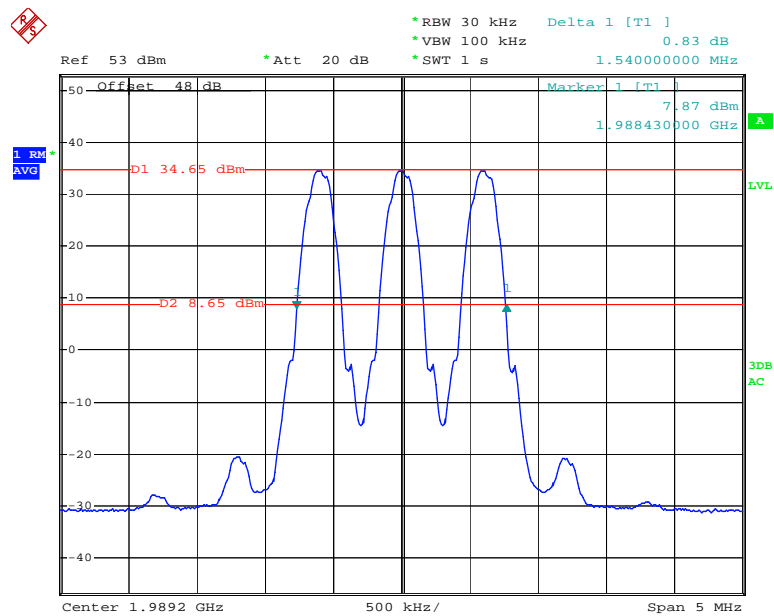
Date: 19.AUG.2010 03:07:31

## Middle Channel

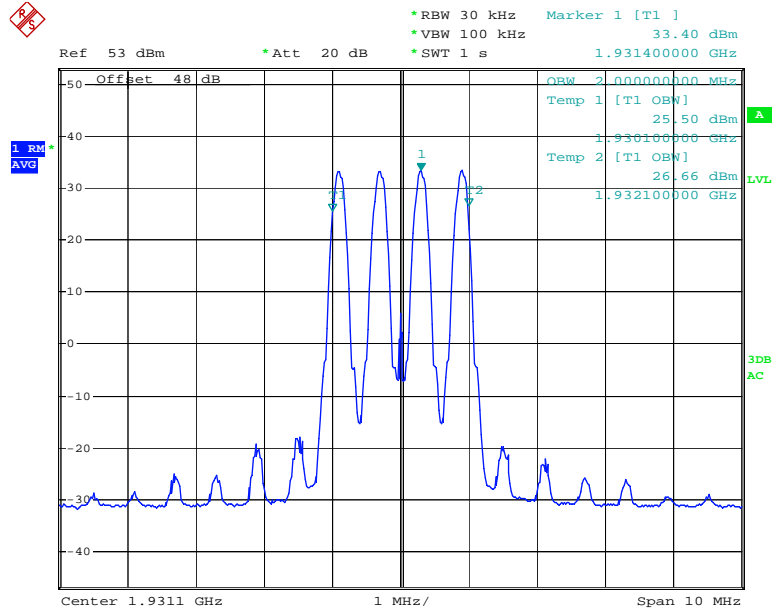


Date: 15.JUL.2010 21:43:08

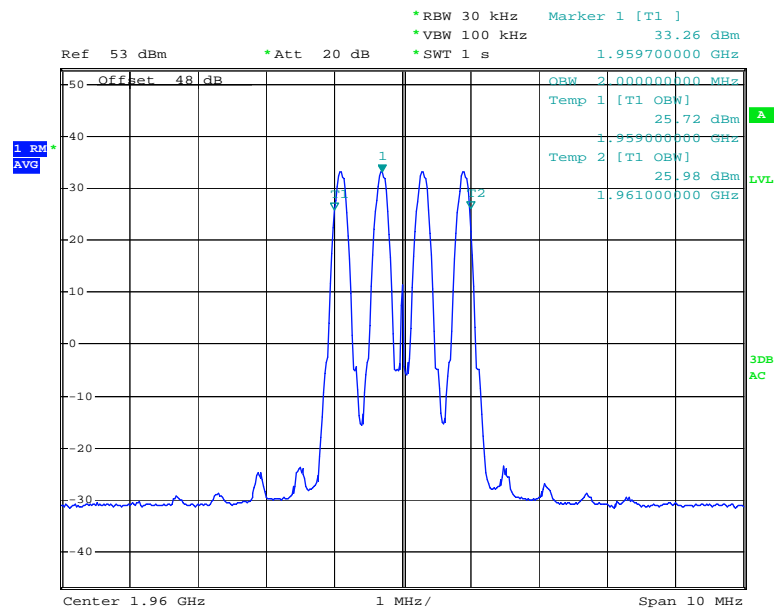
## High Channel



Date: 19.AUG.2010 03:18:11

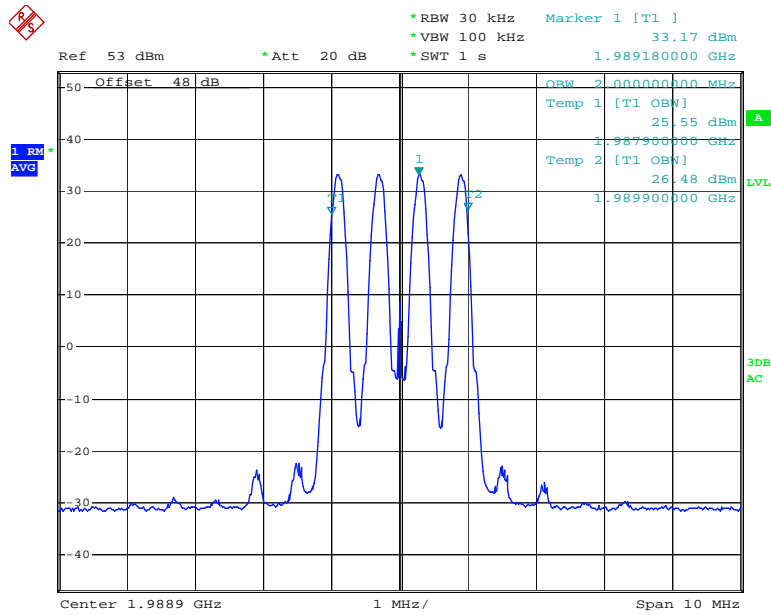
**Downlink mode (Four carriers):****99% Occupied Bandwidth****Low Channel**

Date: 19.AUG.2010 03:35:09

**Middle Channel**

Date: 14.JUL.2010 22:05:12

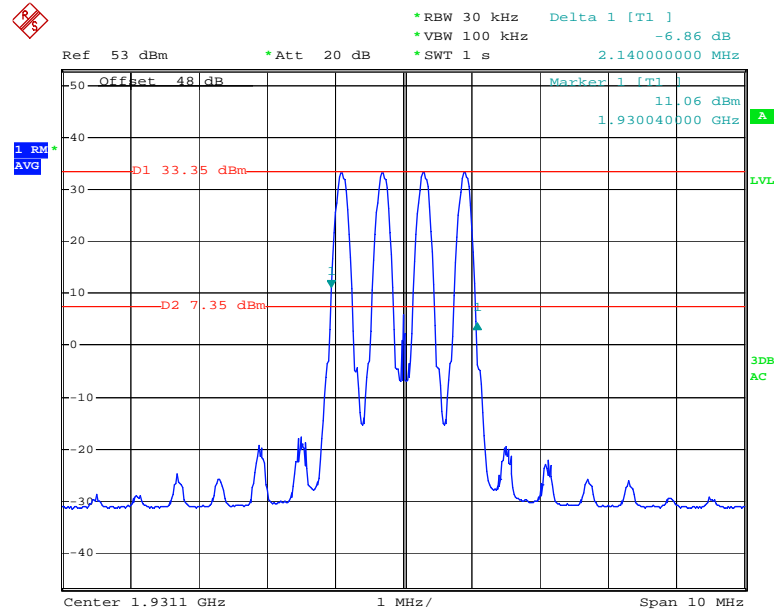
## High Channel



Date: 19.AUG.2010 03:24:17

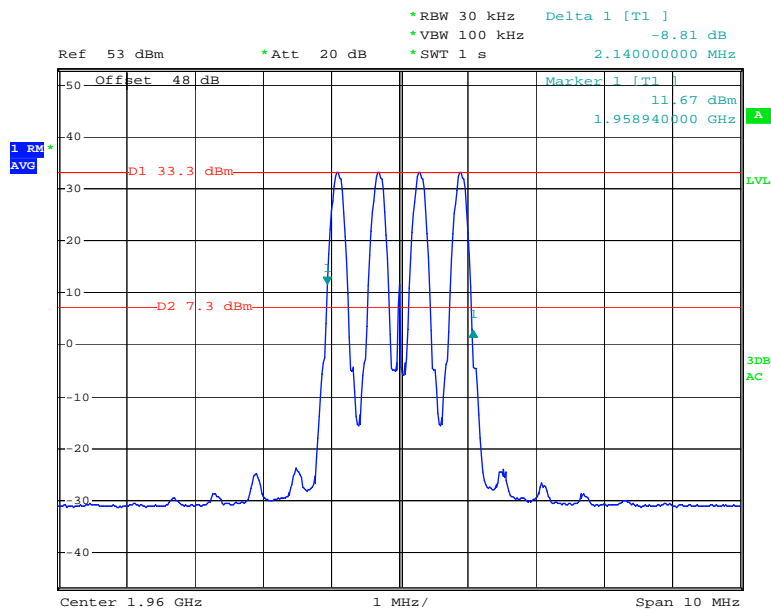
## 26 dB Bandwidth

## Low Channel



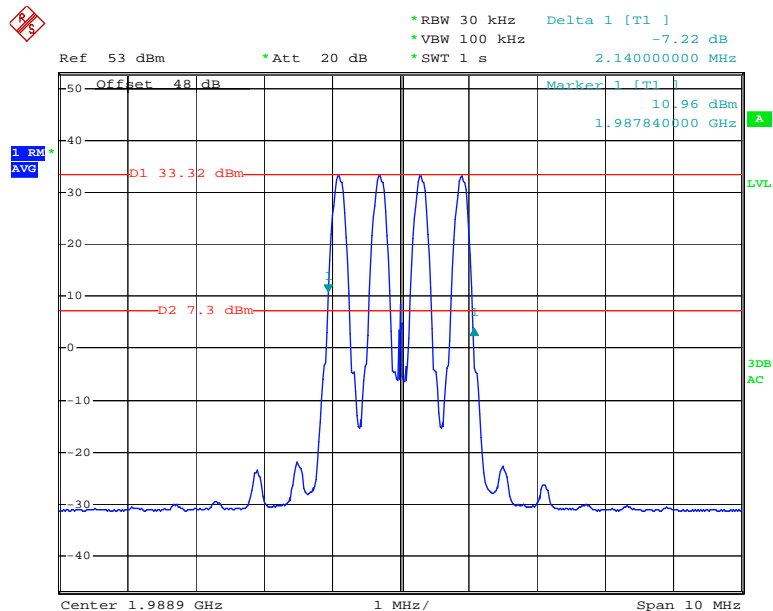
Date: 19.AUG.2010 03:34:46

## Middle Channel

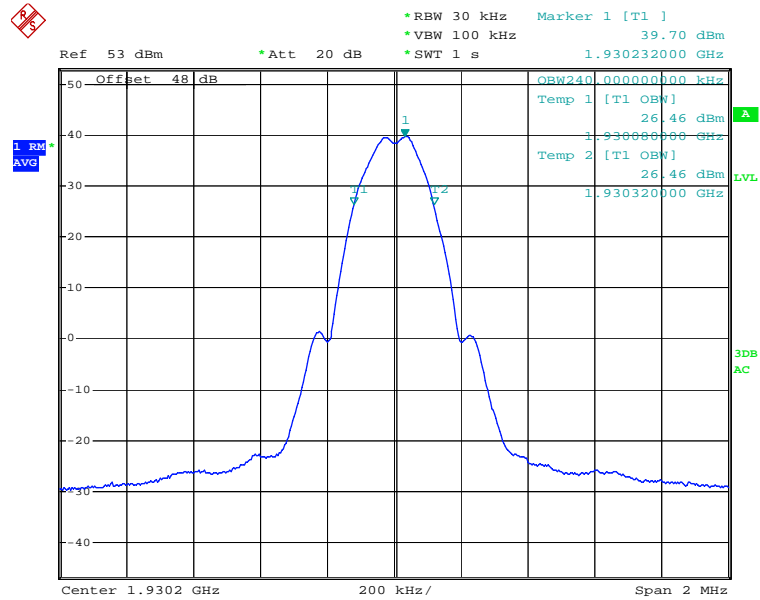


Date: 14.JUL.2010 22:04:50

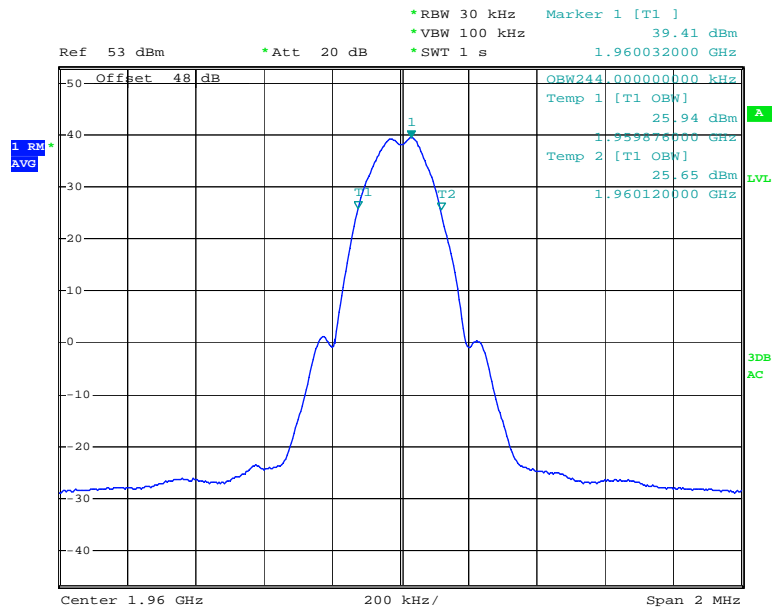
## High Channel



Date: 19.AUG.2010 03:25:01

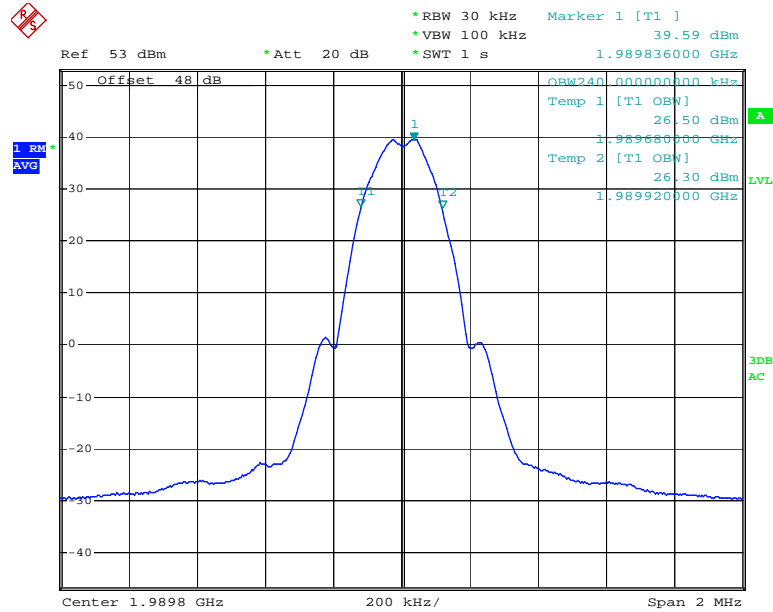
**EDGE:****Downlink mode (One carrier):****99% Occupied Bandwidth****Low Channel**

Date: 19.AUG.2010 02:36:36

**Middle Channel**

Date: 15.JUL.2010 23:14:52

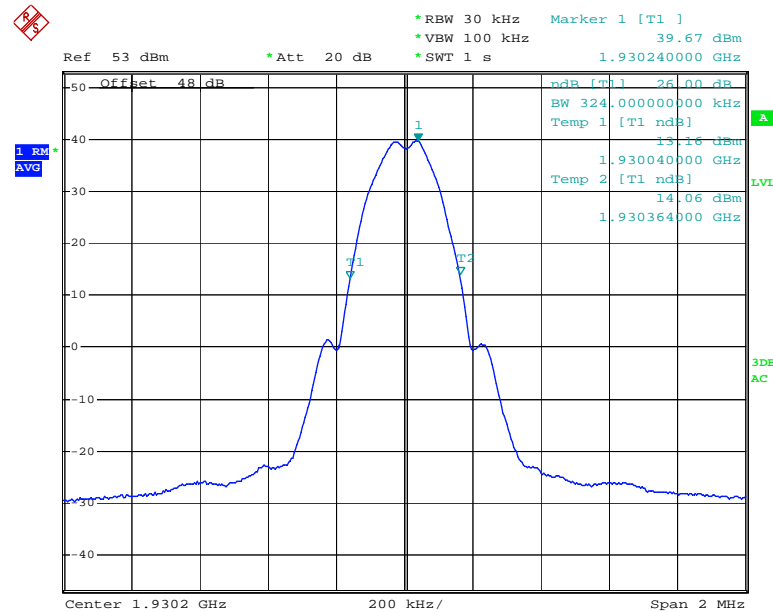
## High Channel



Date: 19.AUG.2010 02:40:30

## 26 dB Bandwidth

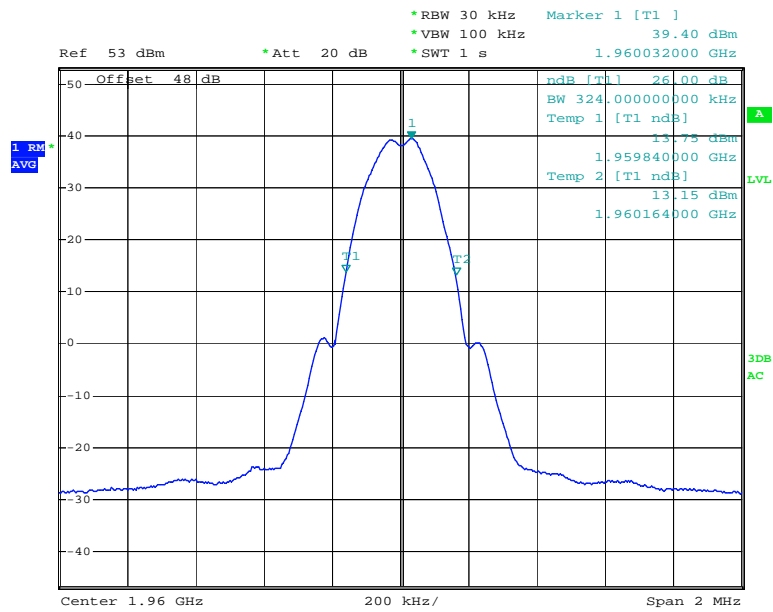
## Low Channel



Date: 19.AUG.2010 02:36:54

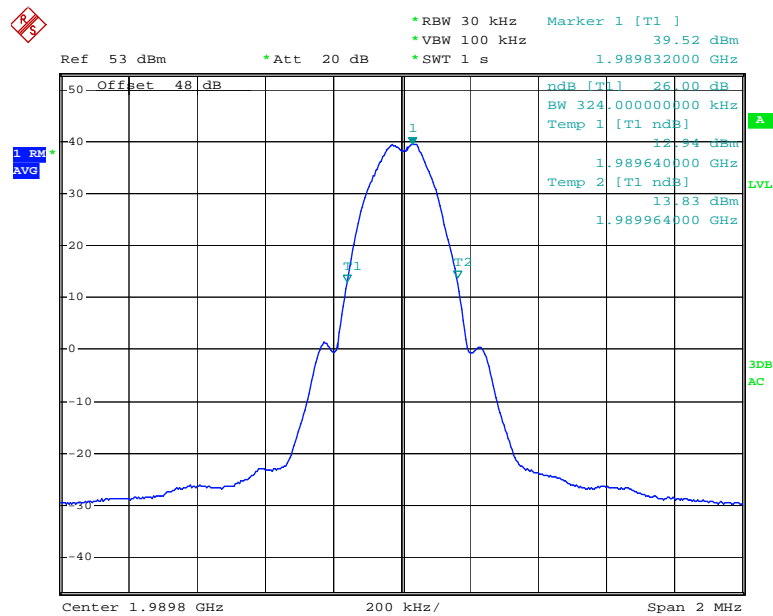


## Middle Channel

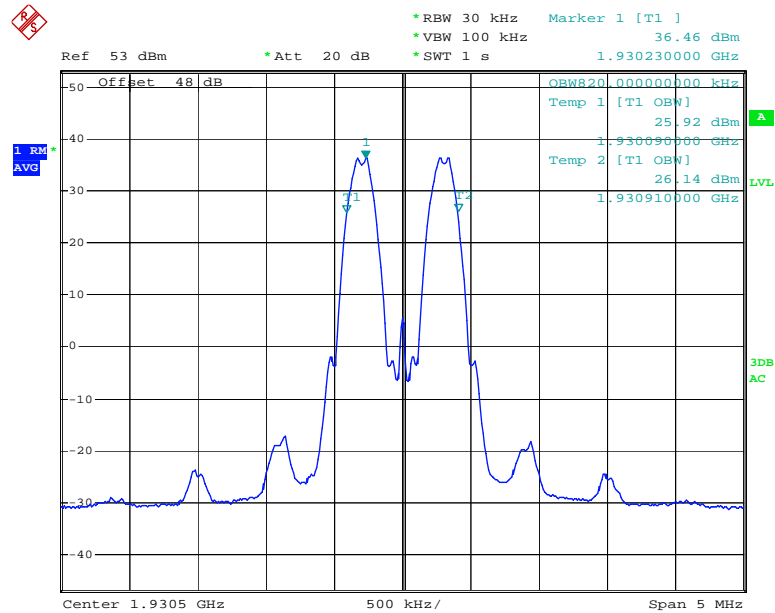


Date: 15.JUL.2010 23:15:11

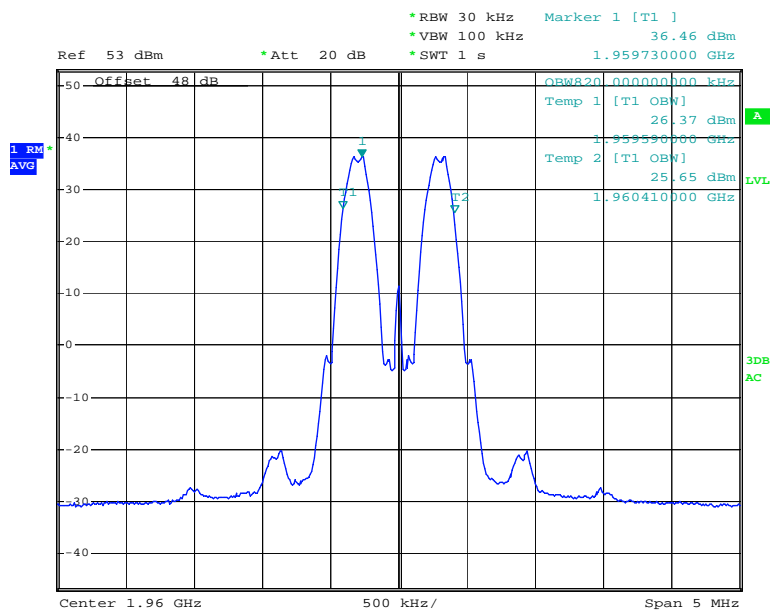
## High Channel



Date: 19.AUG.2010 02:40:58

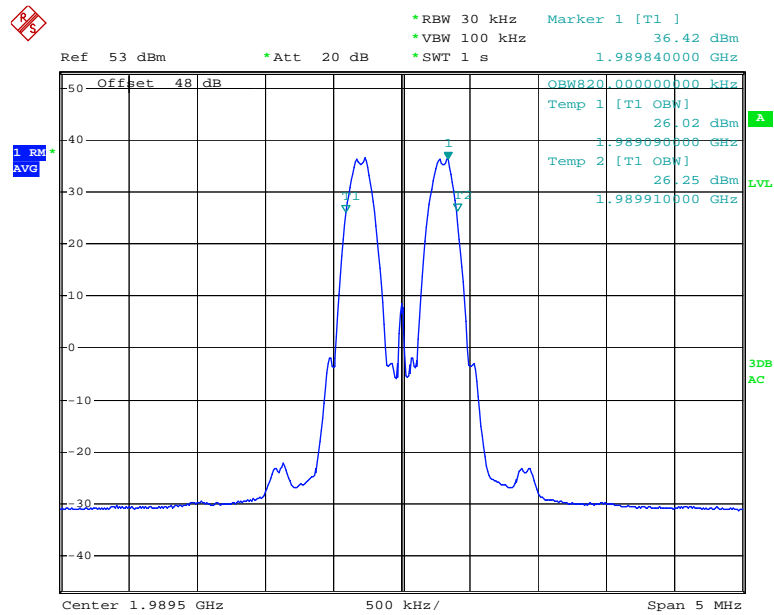
**Downlink mode (Two carriers):****99% Occupied Bandwidth****Low Channel**

Date: 19.AUG.2010 02:58:38

**Middle Channel**

Date: 15.JUL.2010 22:37:05

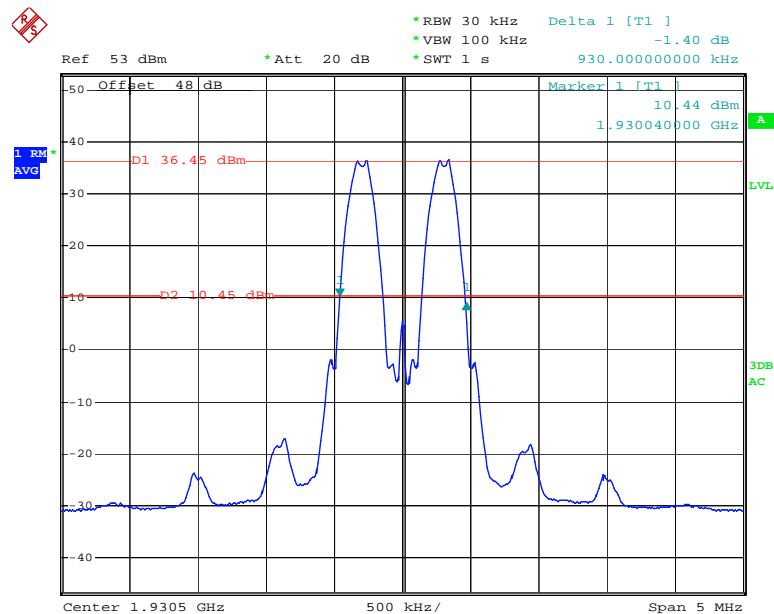
## High Channel



Date: 19.AUG.2010 02:50:13

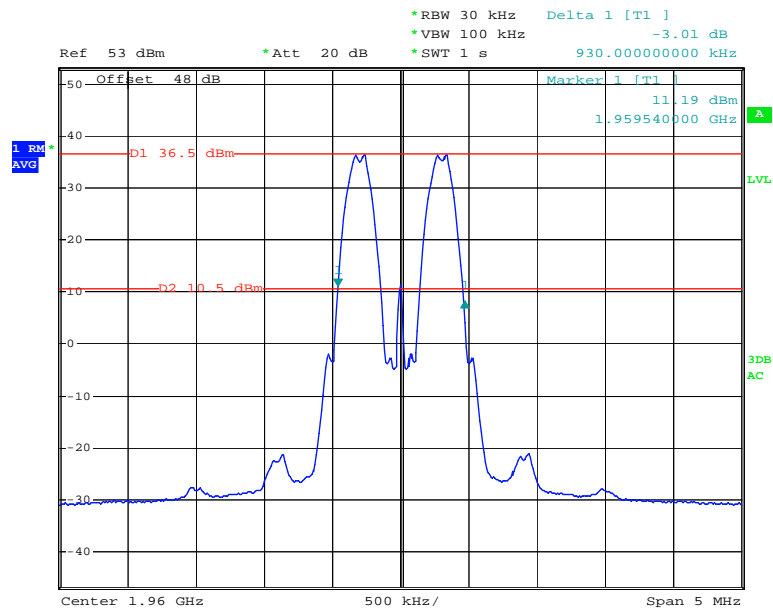
## 26 dB Bandwidth

## Low Channel



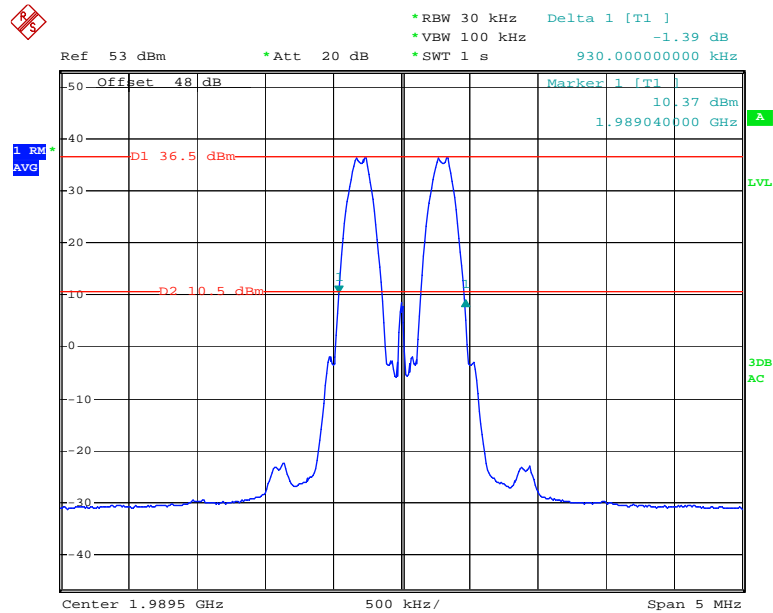
Date: 19.AUG.2010 02:59:23

## Middle Channel

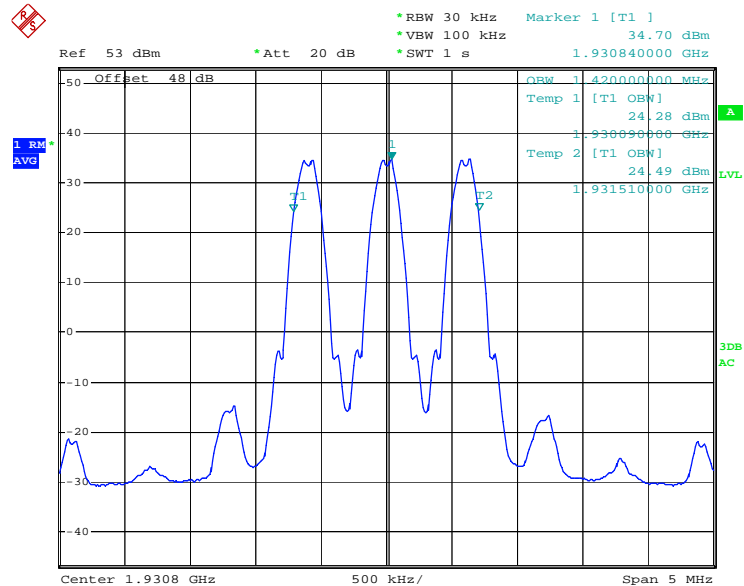


Date: 15.JUL.2010 22:37:41

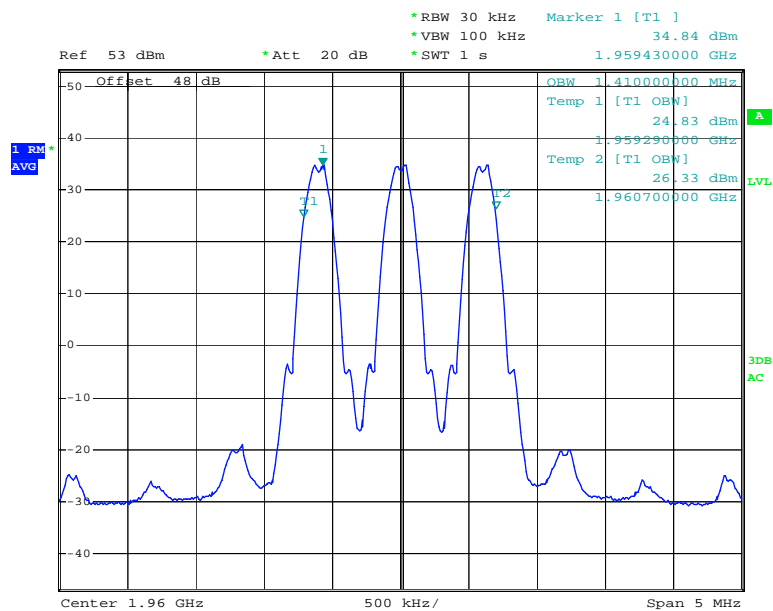
## High Channel



Date: 19.AUG.2010 02:49:22

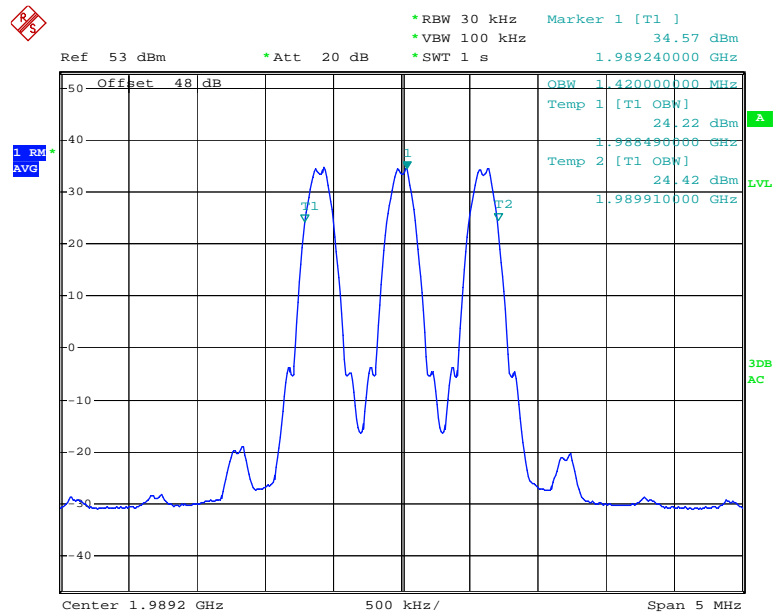
**Downlink mode (Three carriers):****99% Occupied Bandwidth****Low Channel**

Date: 19.AUG.2010 03:09:19

**Middle Channel**

Date: 15.JUL.2010 21:44:21

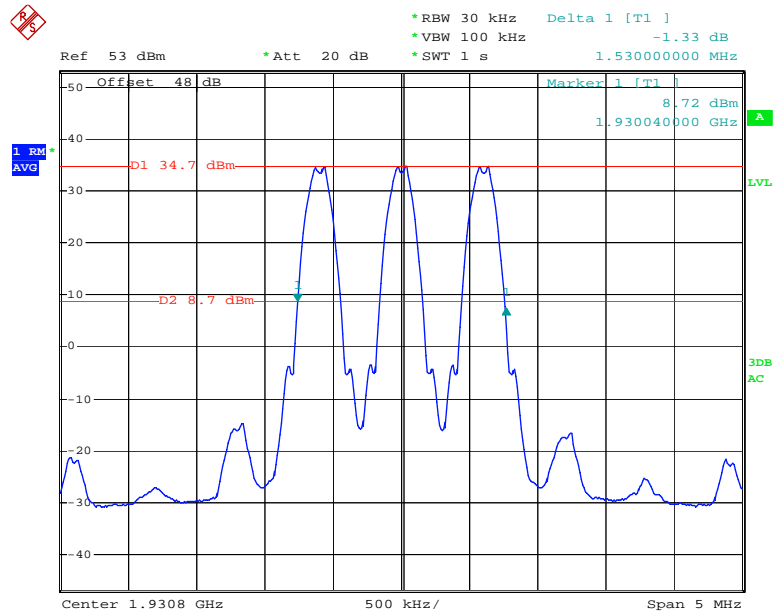
## High Channel



Date: 19.AUG.2010 03:16:17

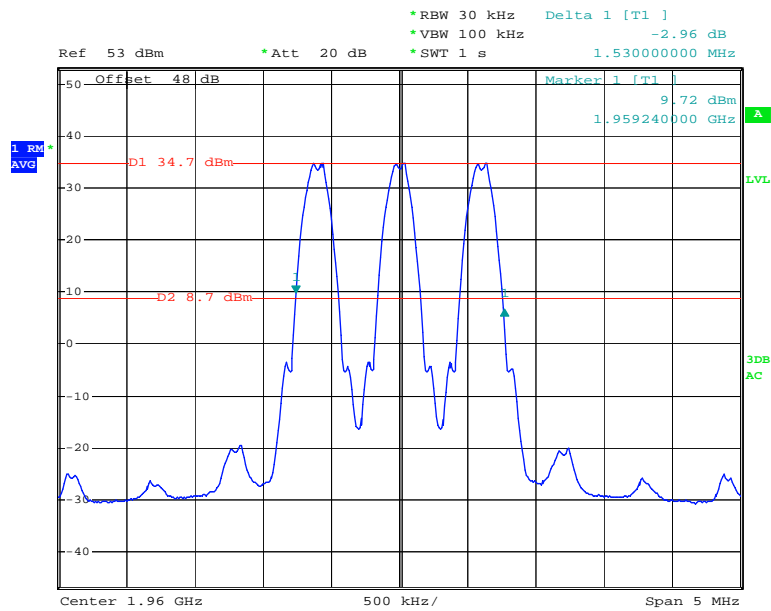
## 26 dB Bandwidth

## Low Channel



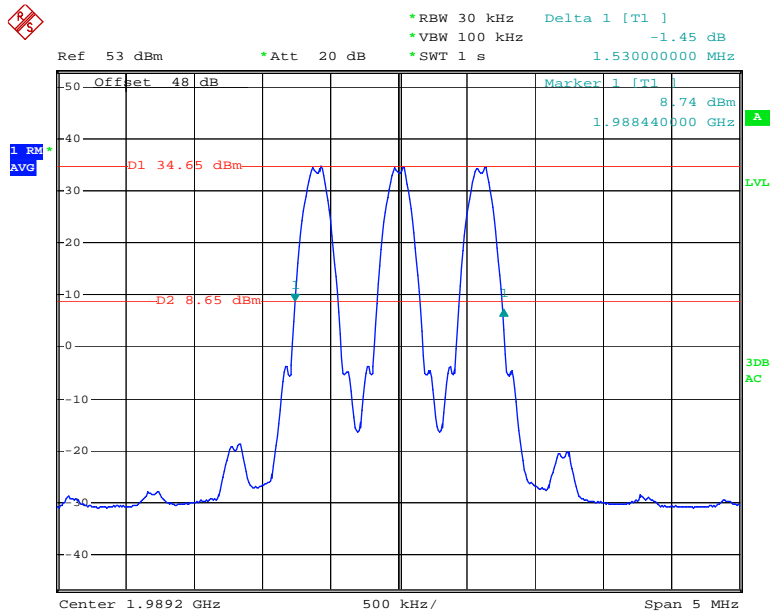
Date: 19.AUG.2010 03:09:48

## Middle Channel

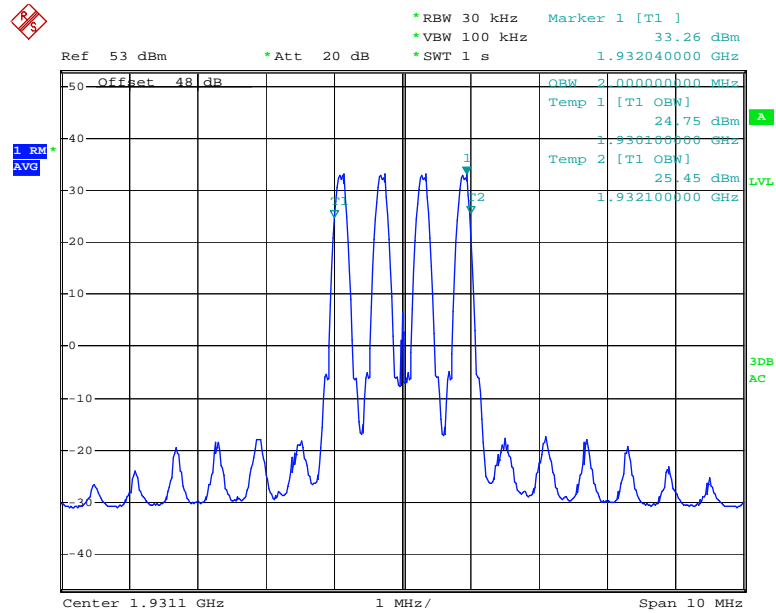


Date: 15.JUL.2010 21:44:00

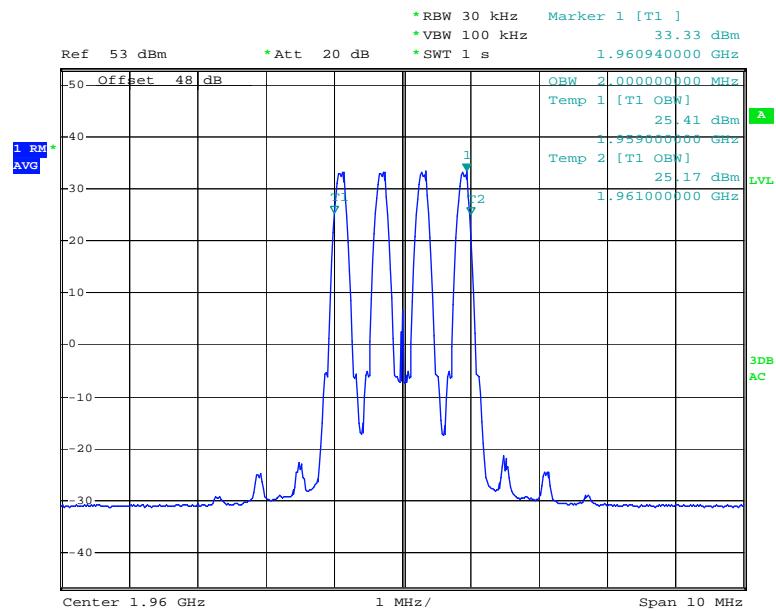
## High Channel



Date: 19.AUG.2010 03:17:05

**Downlink mode (Four carriers):****99% Occupied Bandwidth****Low Channel**

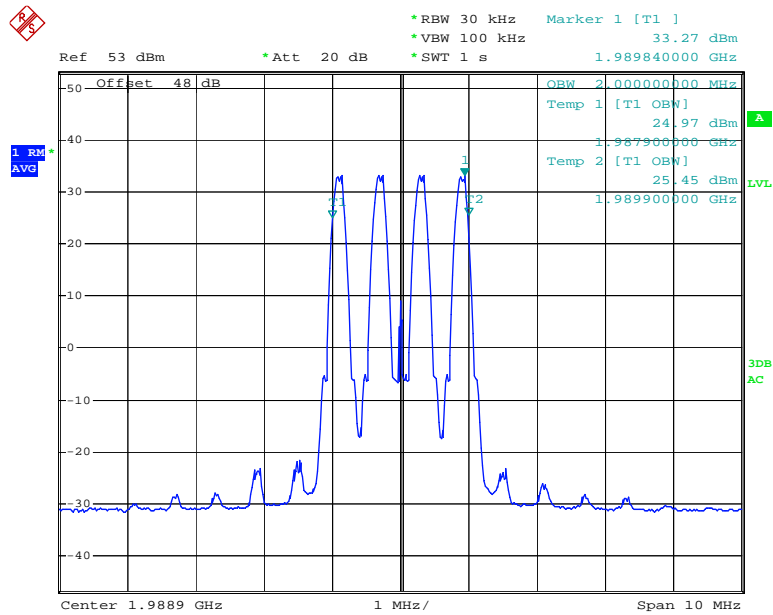
Date: 19.AUG.2010 03:33:02

**Middle Channel**

Date: 16.JUL.2010 20:09:03



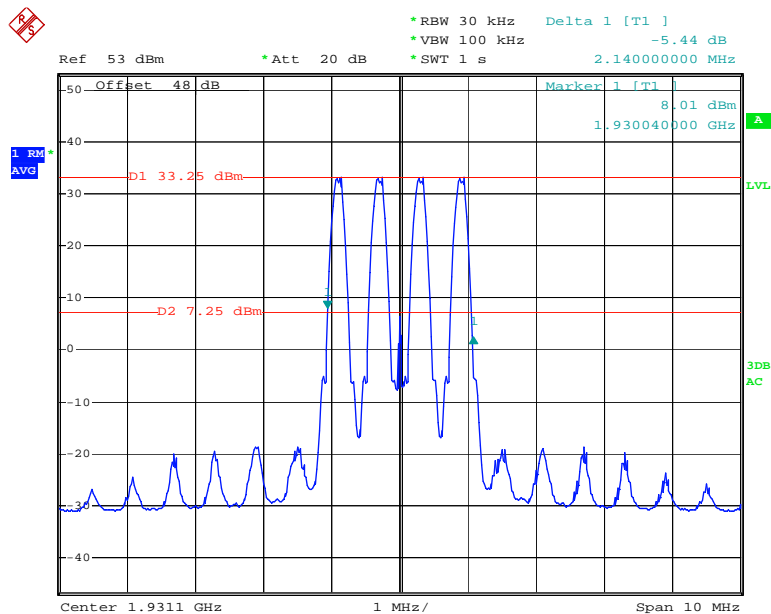
## High Channel



Date: 19.AUG.2010 03:26:42

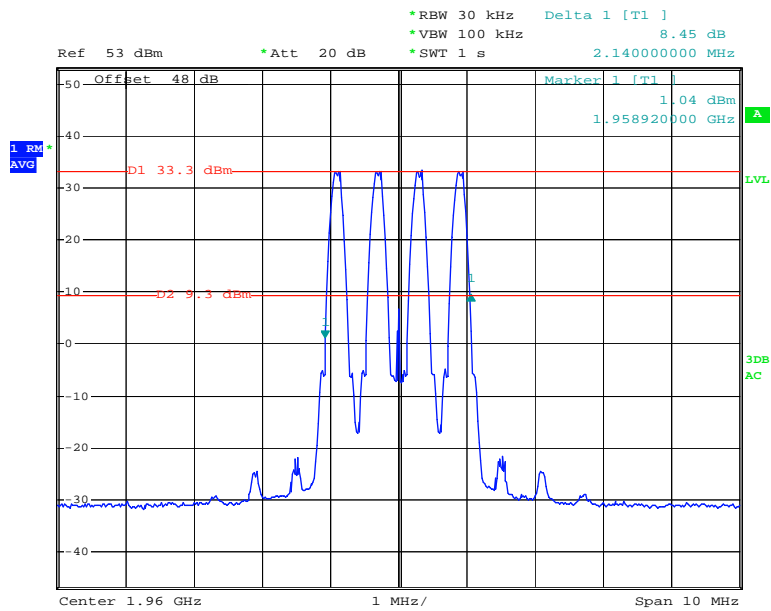
## 26 dB Bandwidth

## Low Channel



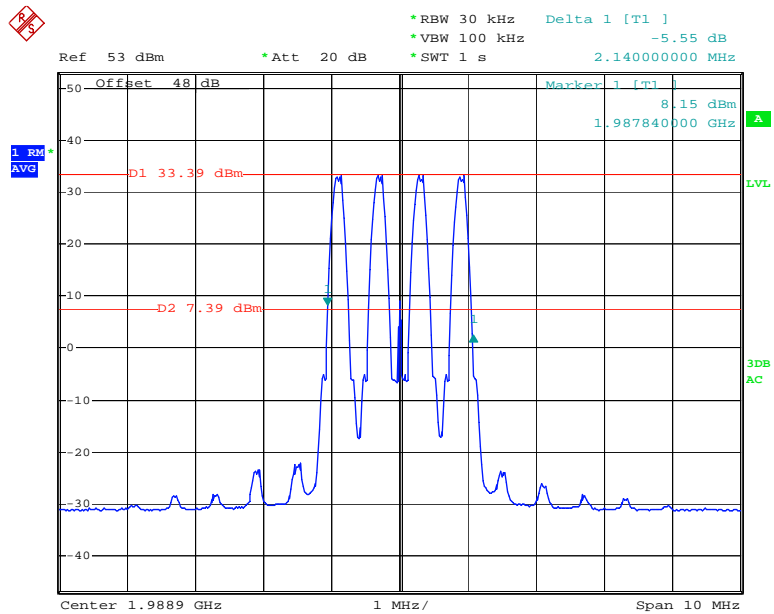
Date: 19.AUG.2010 03:33:47

## Middle Channel



Date: 16.JUL.2010 20:13:49

## High Channel



Date: 19.AUG.2010 03:27:18

## FCC §2.1051 & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

### Applicable Standards

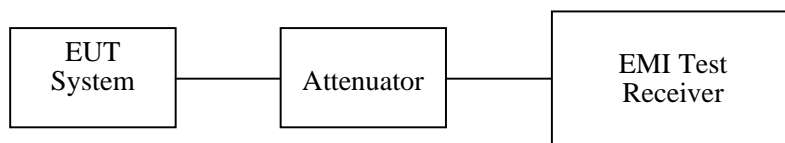
FCC §2.1051 and §24.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

### Test Procedure

The RF output of the EUT system was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set as following table. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

Frequency	RBW	VBW
9kHz ~ 150kHz	1kHz	3kHz
150kHz ~ 30MHz	10kHz	30kHz
30MHz ~ 1GHz	100kHz	300kHz
Above 1GHz	1MHz	3MHz



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-07
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2009-11-24	2010-11-23

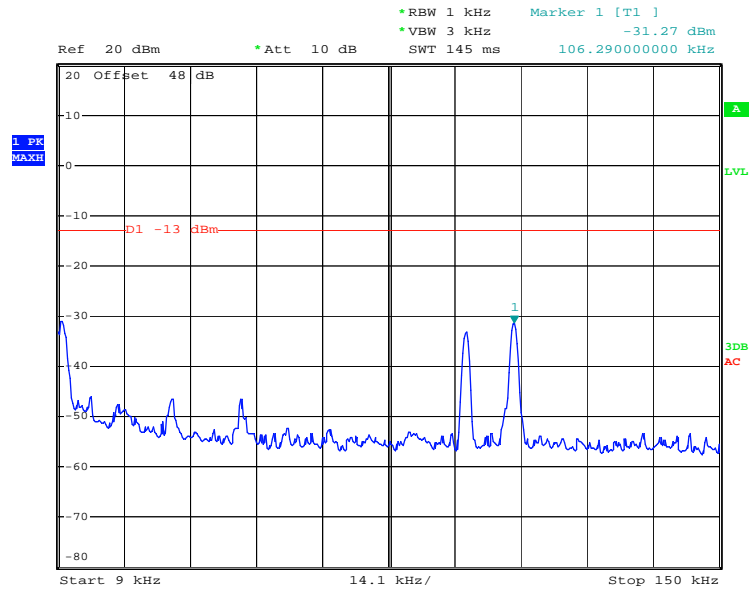
\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Data

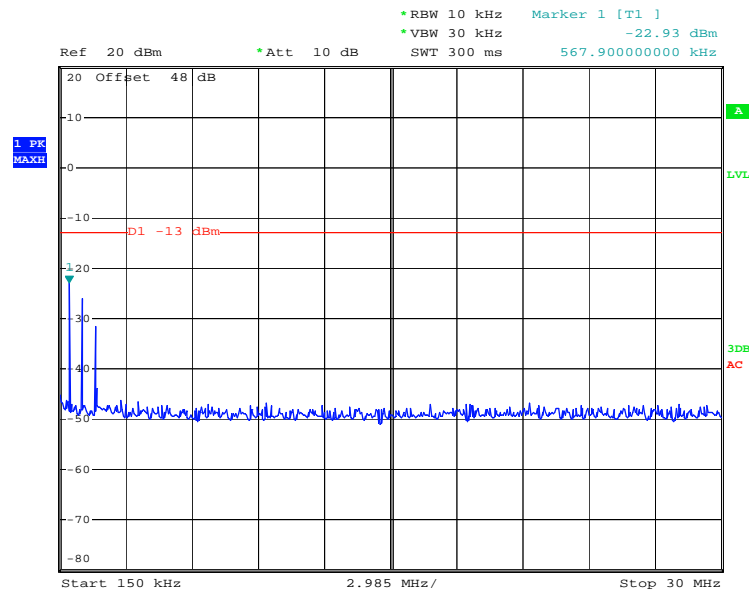
#### Environmental Conditions

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

The testing was performed by Alvin Huang on 2010-07-16 to 2010-07-24.

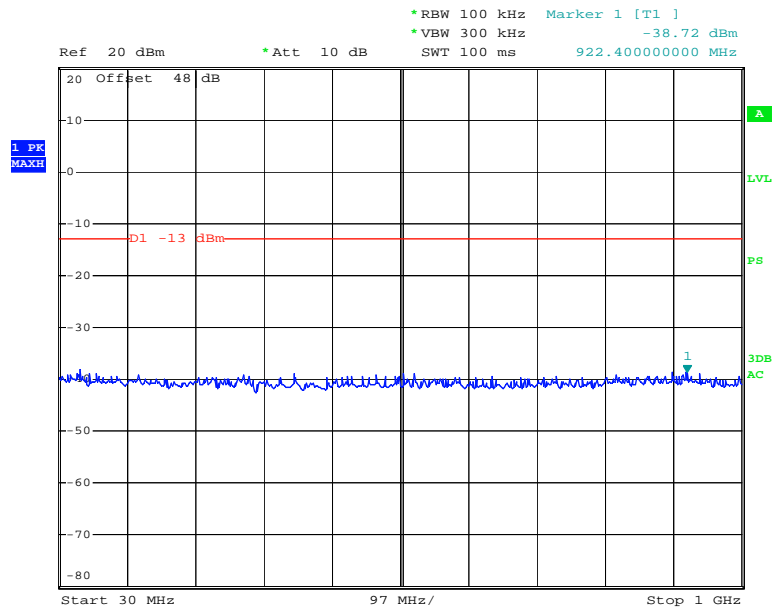
**GSM:****Downlink mode (Worse Case):****9 kHz – 150 kHz - Middle Channel**

Date: 14.JUL.2010 22:33:17

**150 kHz - 30 MHz - Middle Channel**

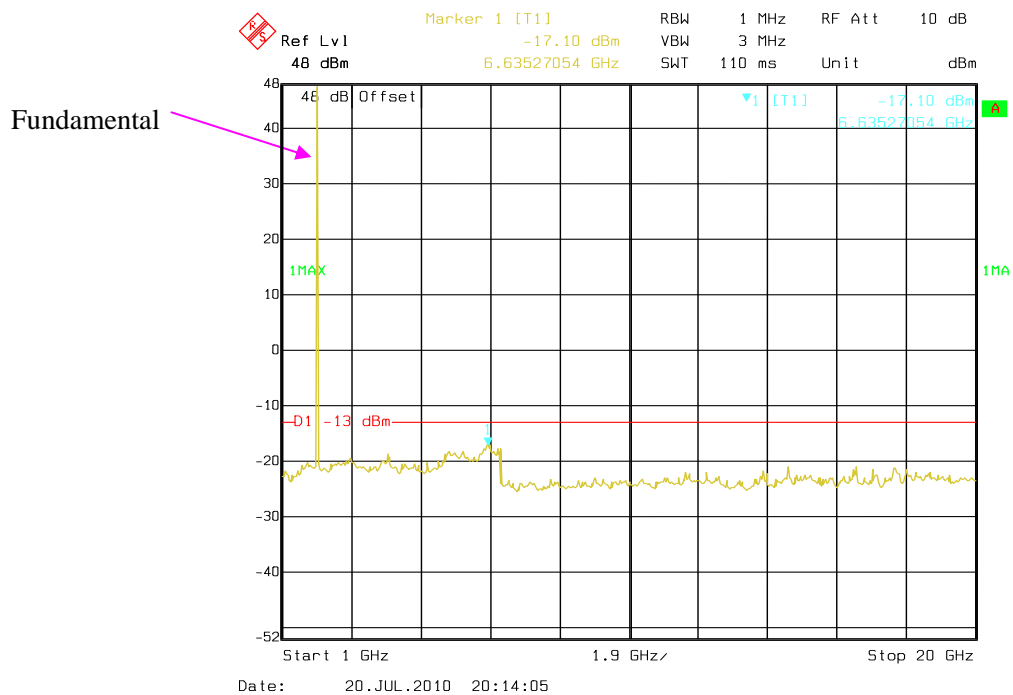
Date: 14.JUL.2010 22:35:34

## 30 - 1000 MHz - Middle Channel

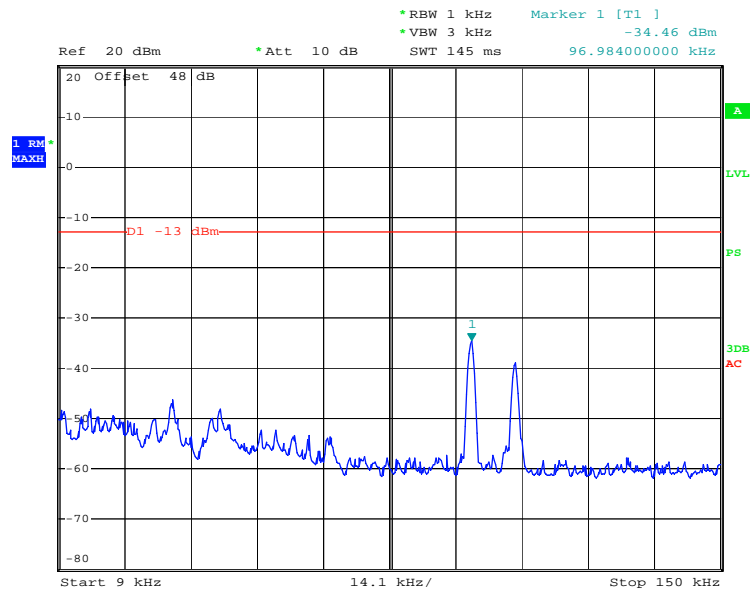


Date: 16.JUL.2010 21:20:29

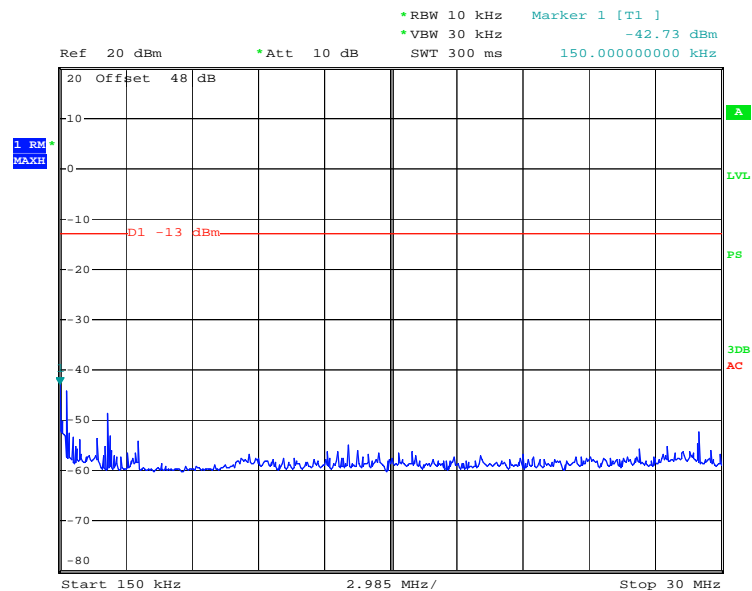
## 1 - 20 GHz - Middle Channel



Date: 20.JUL.2010 20:14:05

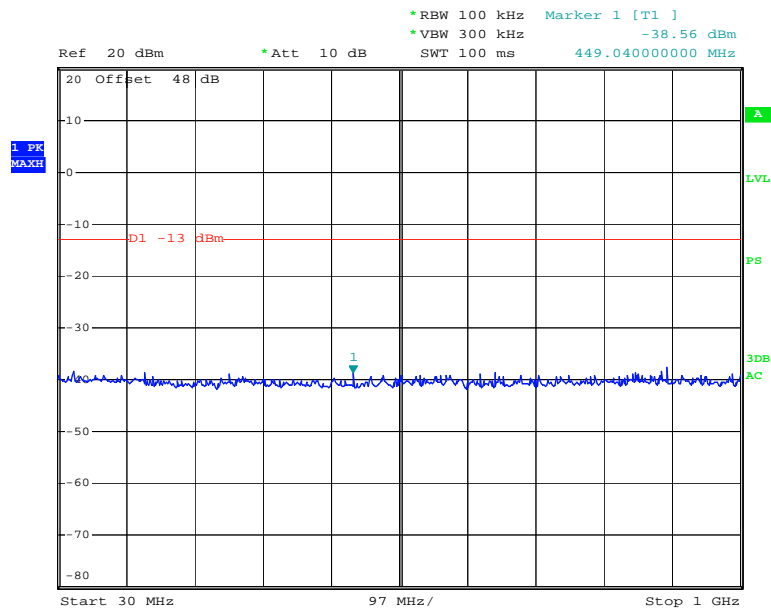
**EDGE:****Downlink mode (Worse Case):****9 kHz – 150 kHz - Middle Channel**

Date: 16.JUL.2010 20:59:50

**150 kHz - 30 MHz - Middle Channel**

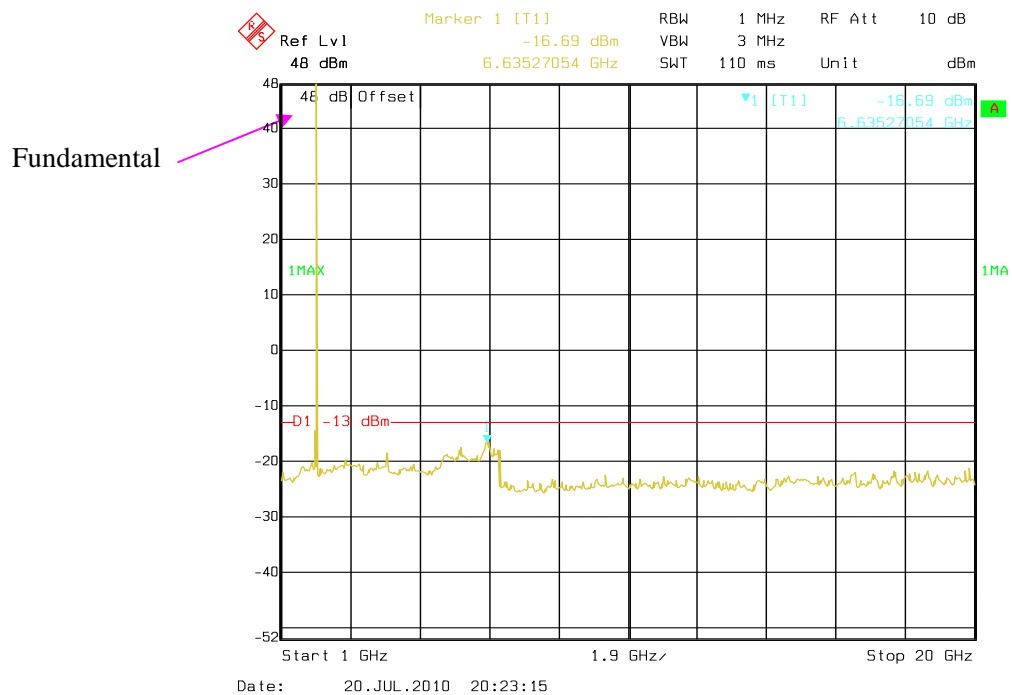
Date: 16.JUL.2010 21:02:31

## 30 - 1000 MHz - Middle Channel



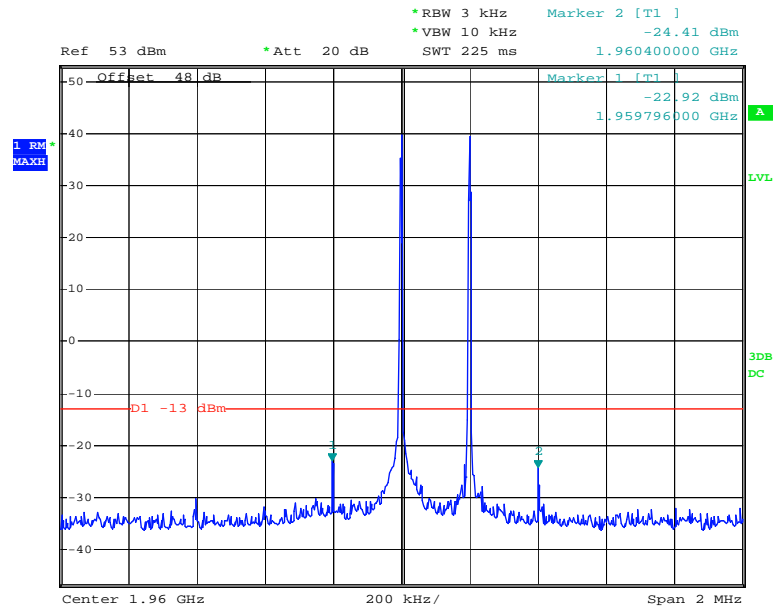
Date: 16.JUL.2010 21:19:49

## 1 - 20 GHz - Middle Channel



Date: 20.JUL.2010 20:23:15

## Two tone Inter-modulation:



Date: 24.JUL.2010 20:21:19



## FCC §2.1053 & §24.238 - SPURIOUS RADIATED EMISSIONS

### Applicable Standards

FCC§ 2.1053 and § 24.238.

### Test Procedure

The EUT system was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \lg (\text{TXpwr in Watts}/0.001)$  – the absolute level

Spurious attenuation limit in dB =  $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052604	2010-05-05	2011-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-07
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-07
HP	Preamplifier	8449B	3008A00277	2009-09-12	2010-09-11
HP	Signal Generator	HP8657A	2849U00982	2009-10-28	2010-10-27
HP	Amplifier	HP8447D	2944A09795	2009-08-02	2010-08-02
HP	Synthesized Sweeper	8341B	2624A00116	2009-11-07	2010-11-06
COM POWER	Dipole Antenna	AD-100	041000	2009-09-25	2010-09-25
A.H. System	Horn Antenna	SAS-200/571	135	2010-05-17	2011-05-17

\* **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 Data****Environmental Conditions**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.0kPa

The testing was performed by Alvin Huang on 2010-07-20.

Test mode: Transmitting

**GSM:**

Indicated		Table Angle Degree	Test Antenna		Substituted				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Reading (dBμV)		Height (m)	Polar (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain (dBi)	Cable Loss (dB)			
30 MHz-20GHz Middle Channel											
59.16	65.15	215	1.8	V	59.16	-32.5	0	0.2	-32.7	-13	19.7
105.81	60.94	240	1.9	H	105.81	-36.1	0	0.3	-36.4	-13	23.4
3920	40.70	15	1.6	H	3920	-55.0	6.7	1.5	-49.8	-13	36.8
3920	37.86	136	2.1	V	3920	-57.2	6.7	1.5	-52	-13	39.0

**EDGE:**

Indicated		Table Angle Degree	Test Antenna		Substituted				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Reading (dBμV)		Height (m)	Polar (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain (dBi)	Cable Loss (dB)			
30 MHz-20GHz Middle Channel											
59.25	64.02	36	1.6	V	59.25	-33.0	0	0.2	-33.2	-13	20.2
37.77	61.25	260	1.9	H	37.77	-36.7	0	0.2	-36.9	-13	23.9
3920	40.56	178	1.7	H	3920	-54.5	6.7	1.5	-49.3	-13	36.3
3920	36.42	137	1.8	V	3920	-58.8	6.7	1.5	-53.6	-13	40.6

## FCC §24.238(a) - BAND EDGES

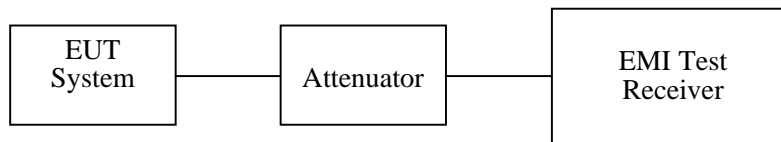
### Applicable Standards

According to FCC §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

### Test Procedure

The RF output of the EUT system was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency, RBW set to 10 kHz.



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2009-11-24	2010-11-23

\* **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 Data

#### Environmental Conditions

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

*The testing was performed by Alvin Huang on 2010-07-14 to 2010-08-19*

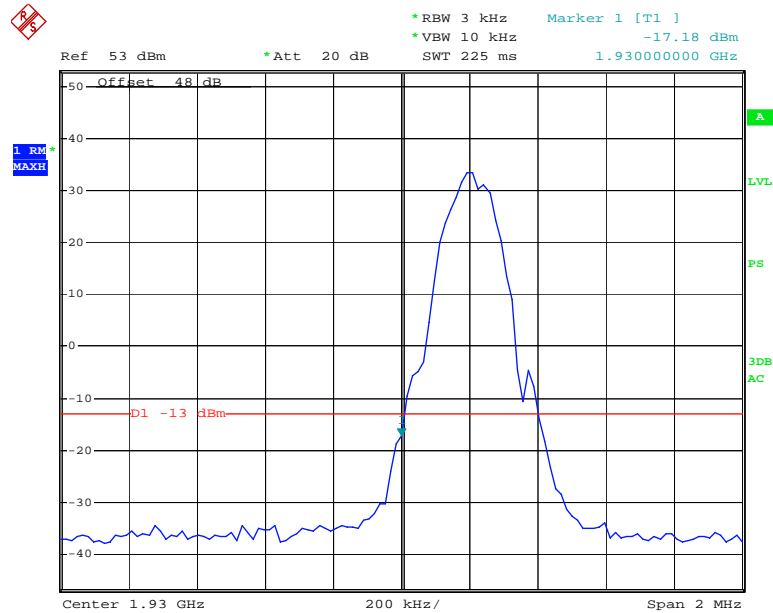
Please refer to the following tables and plots.

**GSM:**

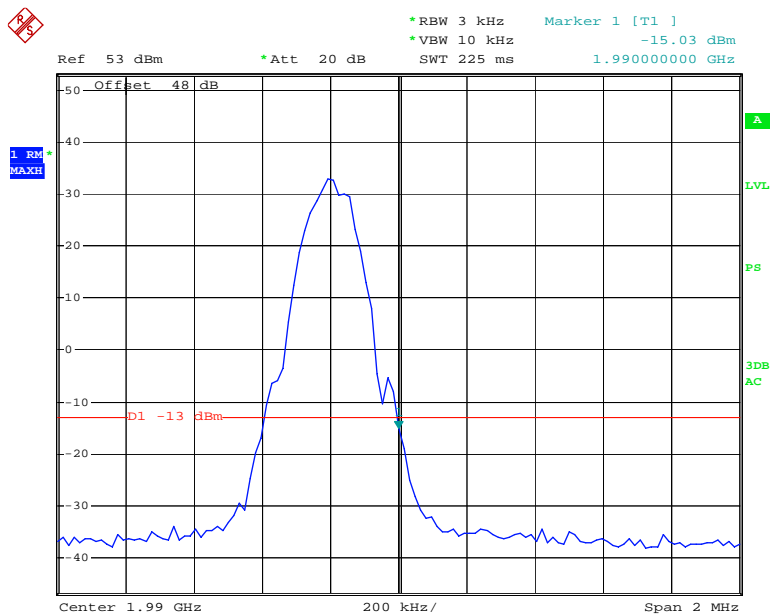
Mode	Channel	Frequency (MHz)	Emission (dBm)	Limit (dBm)
Downlink	One Carrier			
	Lowest	1930	-17.18	-13
	Highest	1990	-15.03	-13
	Two Carriers			
	Lowest	1930	-14.35	-13
	Highest	1990	-16.05	-13
	Three Carriers			
	Lowest	1930	-15.95	-13
	Highest	1990	-16.96	-13
	Four Carriers			
	Lowest	1930	-17.53	-13
	Highest	1990	-19.05	-13

**EDGE:**

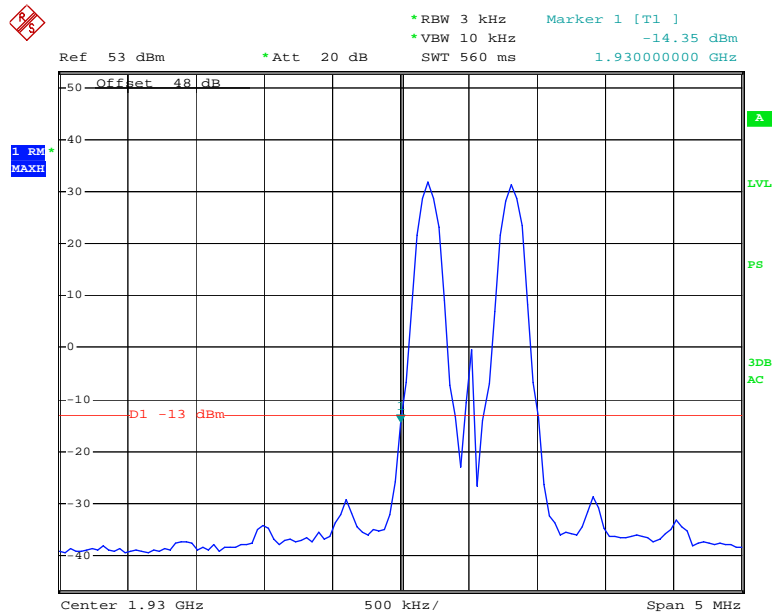
Mode	Channel	Frequency (MHz)	Emission (dBm)	Limit (dBm)
Downlink	One Carrier			
	Lowest	1930	-14.00	-13
	Highest	1990	-15.70	-13
	Two Carriers			
	Lowest	1930	-17.12	-13
	Highest	1990	-17.97	-13
	Three Carriers			
	Lowest	1930	-18.45	-13
	Highest	1990	-20.05	-13
	Four Carriers			
	Lowest	1930	-20.76	-13
	Highest	1990	-20.40	-13

**GSM:****Downlink mode (One carrier), Lowest Channel**

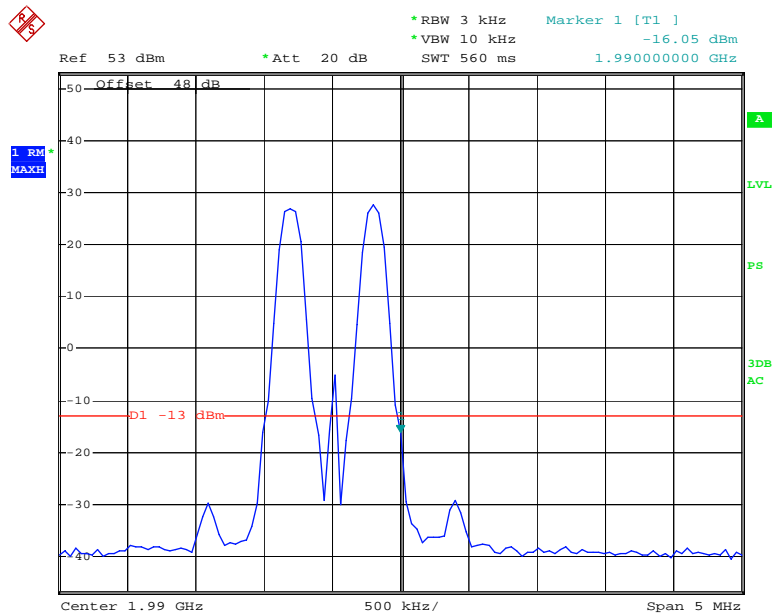
Date: 20.AUG.2010 02:05:15

**Downlink mode (One carrier), Highest Channel**

Date: 20.AUG.2010 02:25:59

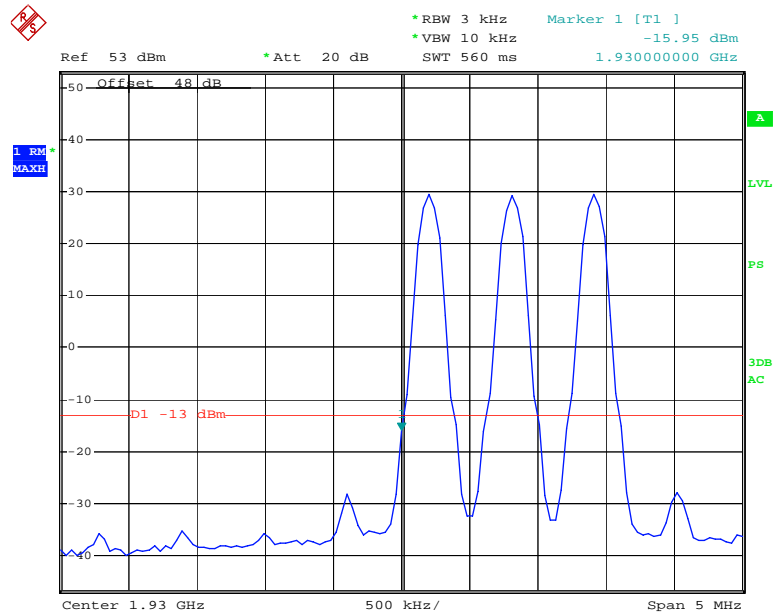
**Downlink mode (Two carriers), Lowest Channel**

Date: 20.AUG.2010 02:08:02

**Downlink mode (Two carriers), Highest Channel**

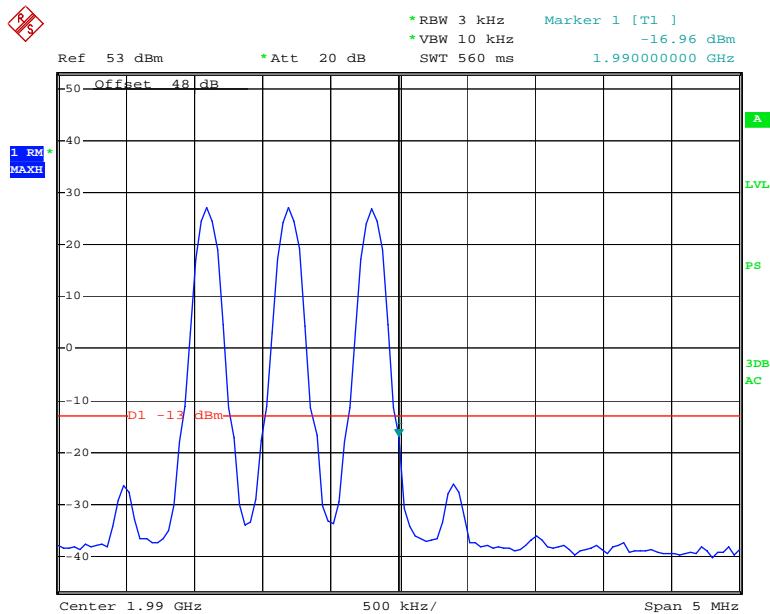
Date: 20.AUG.2010 02:23:03

## Downlink mode (Three carriers), Lowest Channel

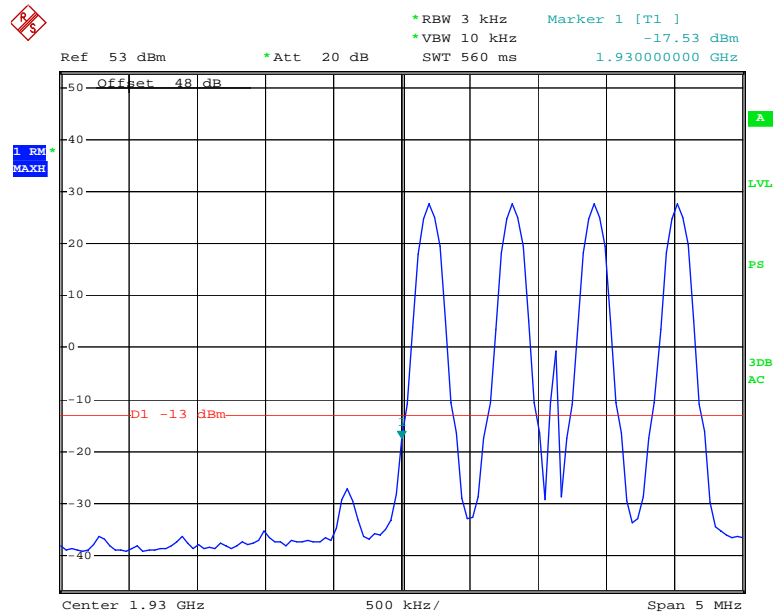


Date: 20.AUG.2010 02:11:29

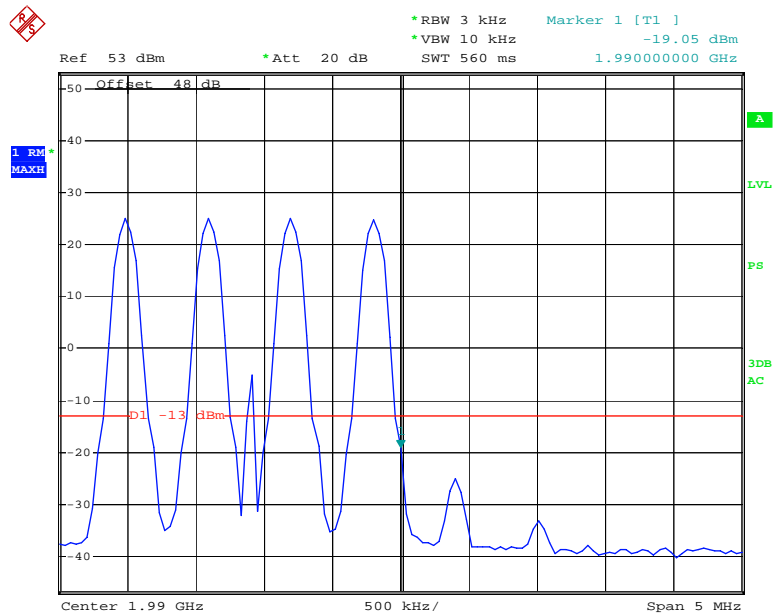
## Downlink mode (Three carriers), Highest Channel



Date: 20.AUG.2010 02:20:42

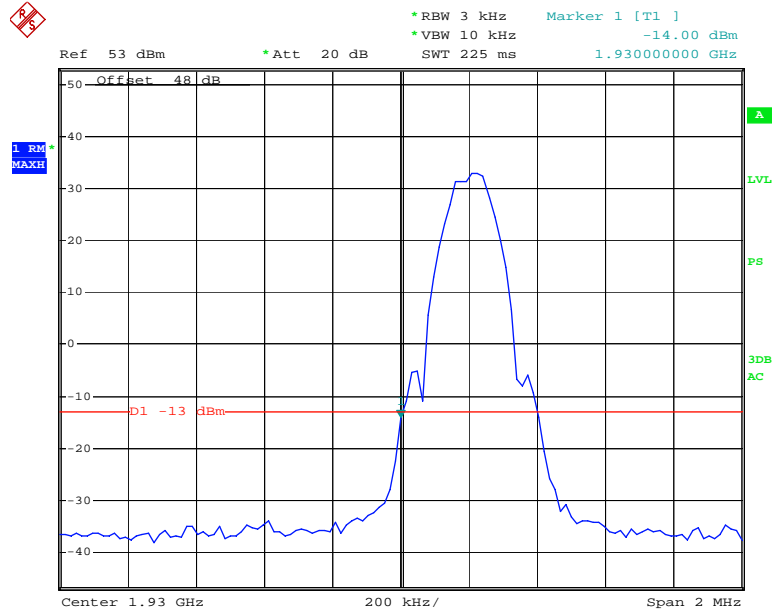
**Downlink mode (Four carriers), Lowest Channel**

Date: 20.AUG.2010 02:15:00

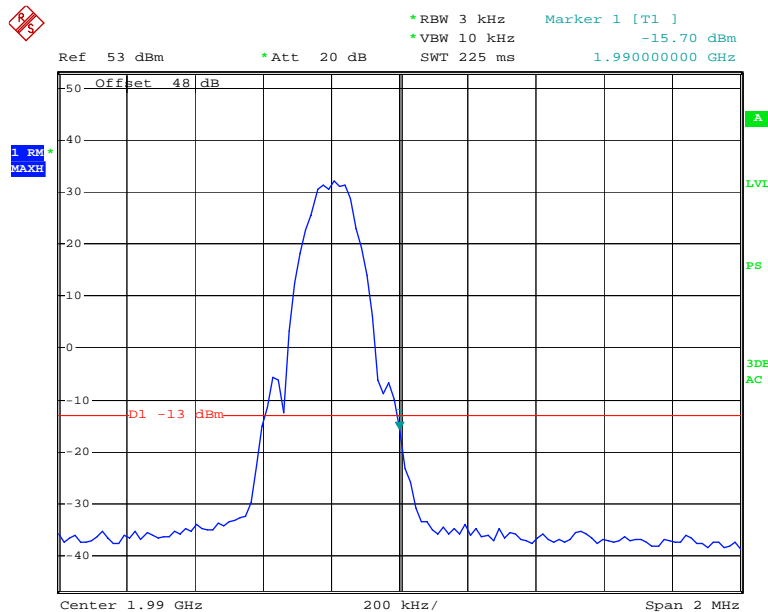
**Downlink mode (Four carriers), Highest Channel**

Date: 20.AUG.2010 02:16:46

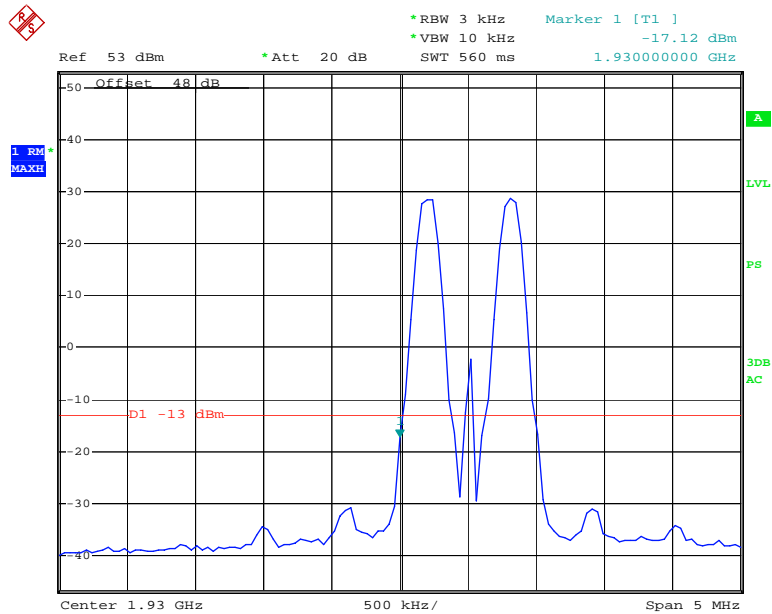


**EDGE:****Downlink mode (One carrier), Lowest Channel**

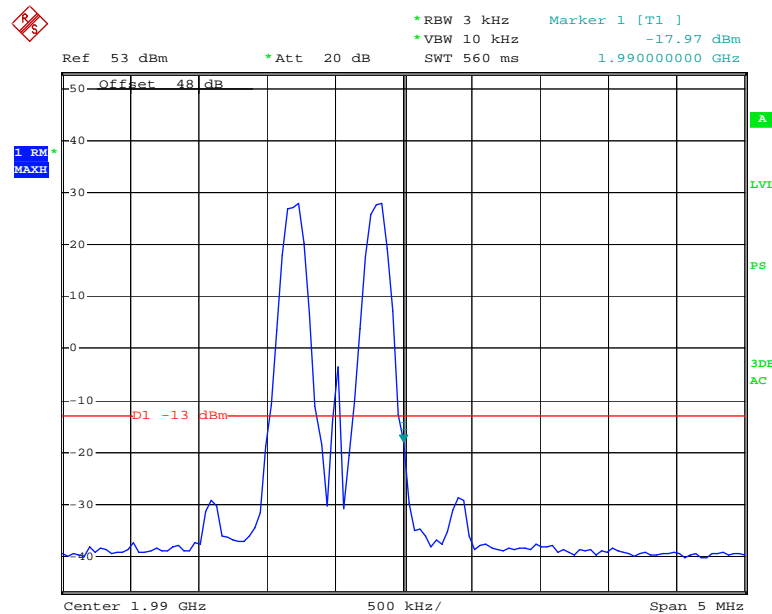
Date: 20.AUG.2010 02:03:23

**Downlink mode (One carrier), Highest Channel**

Date: 20.AUG.2010 02:26:40

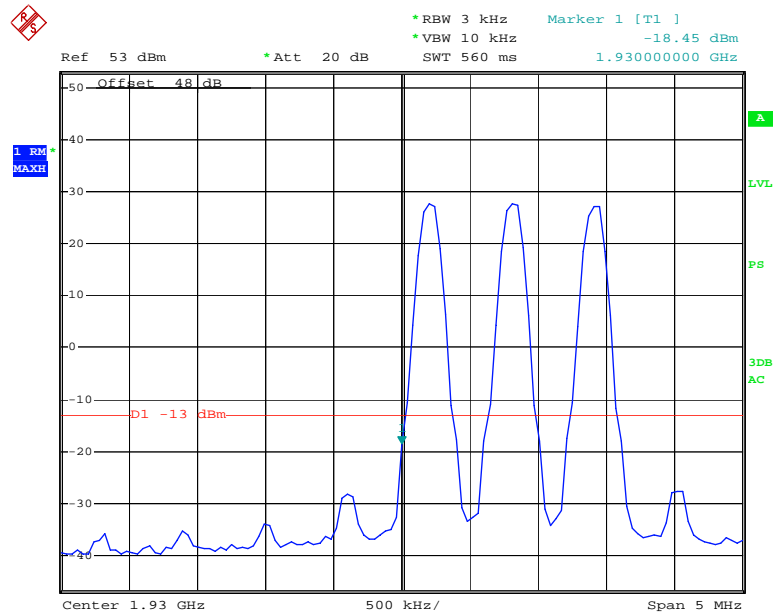
**Downlink mode (Two carriers), Lowest Channel**

Date: 20.AUG.2010 02:07:08

**Downlink mode (Two carriers), Highest Channel**

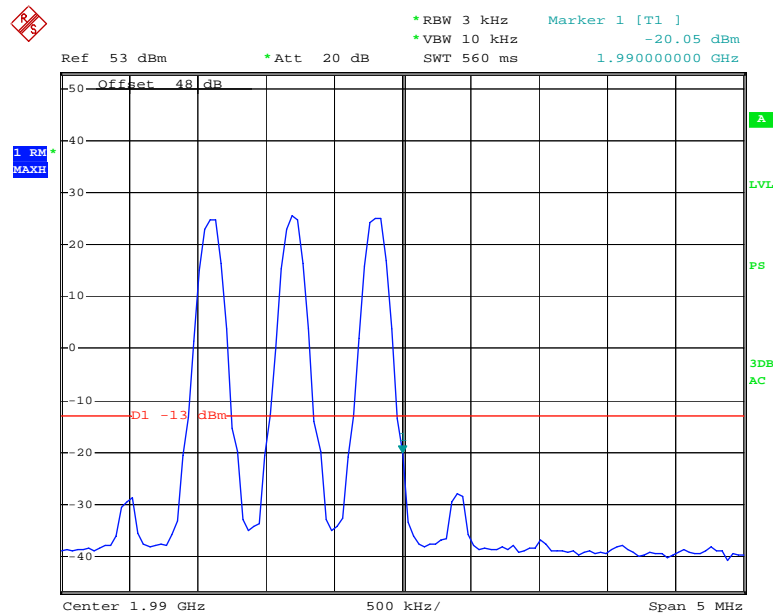
Date: 20.AUG.2010 02:23:49

## Downlink mode (Three carriers), Lowest Channel

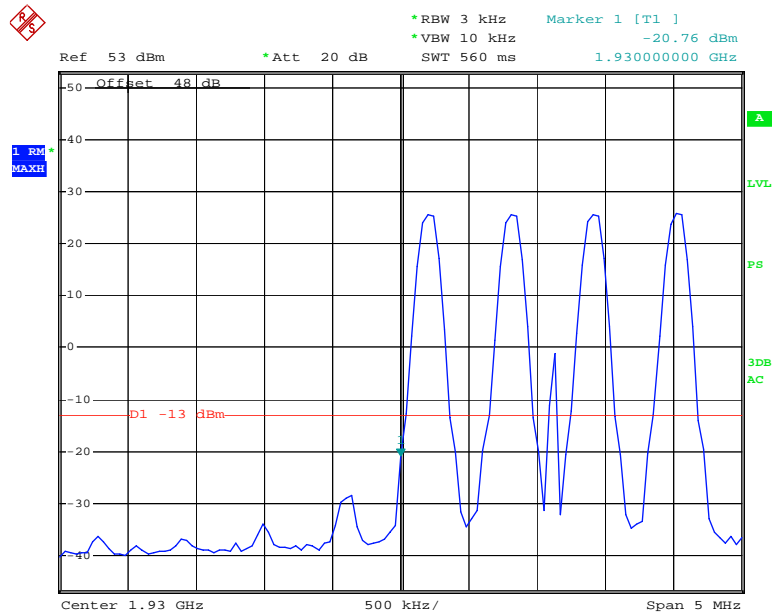


Date: 20.AUG.2010 02:10:50

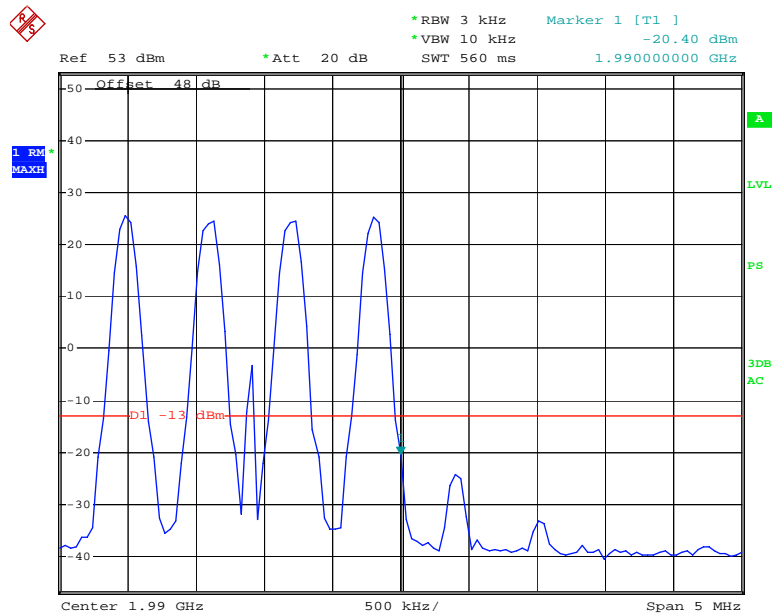
## Downlink mode (Three carriers), Highest Channel



Date: 20.AUG.2010 02:21:20

**Downlink mode (Four carriers), Lowest Channel**

Date: 20.AUG.2010 02:13:13

**Downlink mode (Four carriers), Highest Channel**

Date: 20.AUG.2010 02:18:51

## FCC §2.1055 & §24.235 - FREQUENCY STABILITY

### Applicable Standard

FCC §2.1055 (a), §2.1055 (d), §24.235

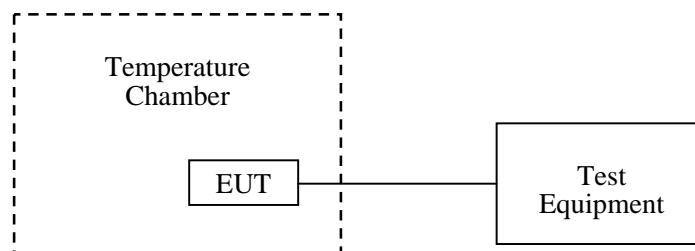
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### Test Procedure

**Frequency Stability vs. Temperature:** The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

**Frequency Stability vs. Voltage:** An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
WUHUAN	Temperature & Humidity Chamber	HTP205	20021115	2010-06-04	2010-06-03
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2009-11-24	2010-11-23

\* **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 Data****Environmental Conditions**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.0kPa

The testing was performed by Alvin Huang on 2010-07-22.

Middle Channel: fo =1960 MHz				
Temperature (°C)	Power Supplied (Vac)	Frequency Error (Hz)	Frequency Error (ppm)	Result
	RU Unit			
-30	102	7	0.003571	Compliant
	120	6	0.003061	Compliant
	138	8	0.004082	Compliant
-20	102	7	0.003571	Compliant
	120	6	0.003061	Compliant
	138	5	0.002551	Compliant
-10	102	3	0.001531	Compliant
	120	7	0.003571	Compliant
	138	5	0.002551	Compliant
0	102	6	0.003061	Compliant
	120	3	0.001531	Compliant
	138	2	0.00102	Compliant
+10	102	5	0.002551	Compliant
	120	4	0.002041	Compliant
	138	3	0.001531	Compliant
+20	102	4	0.002041	Compliant
	120	4	0.002041	Compliant
	138	4	0.002041	Compliant
+30	102	3	0.001531	Compliant
	120	5	0.002551	Compliant
	138	2	0.00102	Compliant
+40	102	4	0.002041	Compliant
	120	6	0.003061	Compliant
	138	3	0.001531	Compliant
+50	102	5	0.002551	Compliant
	120	7	0.003571	Compliant
	138	5	0.002551	Compliant

\*\*\*\*\* END OF REPORT \*\*\*\*\*