FCC PART 24 TYPE APPROVAL
EMI MEASUREMENT AND TEST REPORT

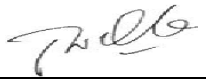
For

VCom Inc.

150 Cardinal Place
Saskatoon, SK Canada S7L 6H7

FCC ID: OPPBST1918-B1901

This Report Concerns:	**Equipment Type:**
☒ Original Report	1.9GHz Base Station Transceiver

Test Engineer:	Daniel Deng / 
Report No.:	R0509234
Report Date:	2005-10-12
Reviewed By:	Richard Lee / 
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *VCom Inc.* product, FCC ID: *OPPBST1918-B1901, Model: BST1918* or the "EUT" as referred to in this report is a 1.9GHz Base Station Transceiver. The EUT measures approximately 19"(L) x 14.8"(W) x 3.5"(H). The EUT operates at the frequency of 1950 – 1965 MHz, and emission designator 1M61G7D for 64QAM 1.5Msym/sec; and 1950 – 1965 MHz, maximum output power (ERIP) 32.2dBm (1.660W), and emission designator 5M45G7D for 64QAM 5.06Msym/sec.

** The test data gathered are from typical production sample, serial number: 661340, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *VCom Inc.* 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, spurious emission at antenna terminal, field strength of spurious radiation, frequency stability, band edge and radiated margin.

Related Submittal(s)/Grant(s)

No Related Submittals

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 - PCS

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, ANSI 63.4-2003, and TIA/EIA-603A.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Open Area Test site used by BACL to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA with registration number:90464.

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

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

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

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA 603A.

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

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

No modifications were made to the EUT.

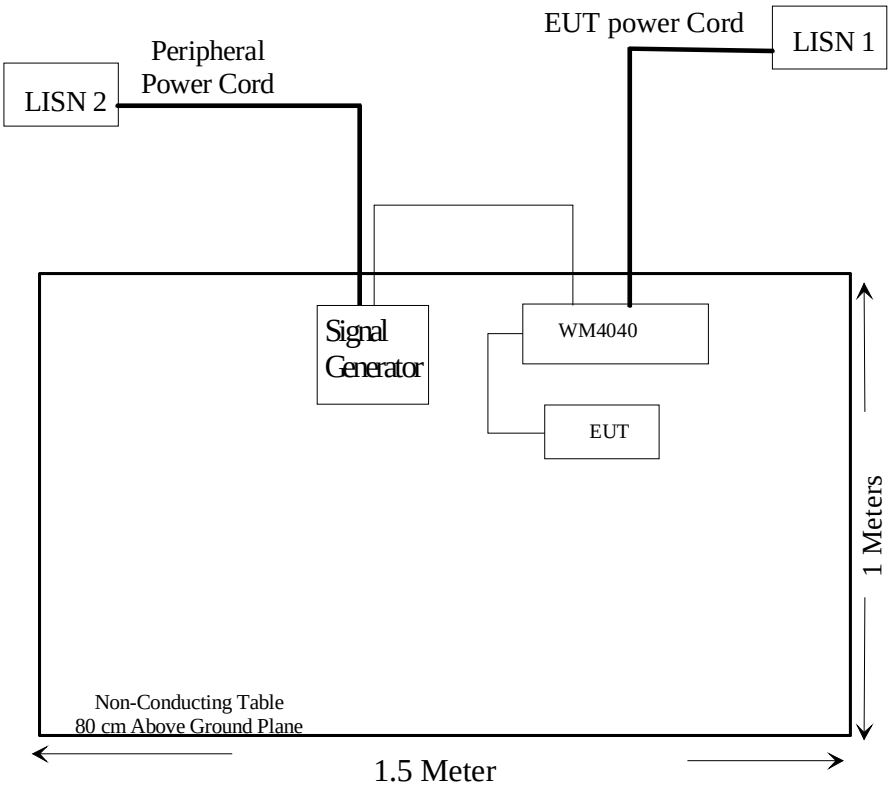
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Rohole & Schwarz	Signal Generator	SMIQ03	DE23746	N/A
Vcom	CMTS wireless interface	WM4040	389992	N/A

External Cables List and Details

Cable Description	Length (M)	From	To
RF Cable	2	SMIQ	WM4040 IF input port
RF cable	0.3	WM4040	EUT

Test Setup Block Diagram



SUMMARY OF TEST RESULTS

Results reported relate only to the product tested

FCC RULE	DESCRIPTION OF TEST	RESULT
§ 2.1047	Modulation Characteristics	Compliant
§ 2.1053	Field Strength of Spurious Radiation	Compliant
§ 15.107	Conducted Emissions	Compliant
§2.1091	RF Exposure	Compliant
§ 2.1046, § 24.232	Conducted RF Output Power	Compliant
§ 2.1049 § 24.238	Out of Band Emission, Occupied Bandwidth	Compliant
§ 2.1051, § 24.238(a)	Spurious Emissions at Antenna Terminals	Compliant
§ 2.1055 (a) § 2.1055 (d) § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Compliant
§24.238	Band Edge	Compliant

§2.1091 – RF EXPOSURE

According §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 Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-15000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

MPE Prediction

Predication of MPE limit at a given distance

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

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

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 31.3 (dBm)
Maximum peak output power at antenna input terminal: 1349 (mW)
Prediction distance: 150 (cm)
Predication frequency: 1957 (MHz)
Antenna Gain (typical): 19 (dBi)
antenna gain: 79.43 (numeric)
Power density at predication frequency at 150 cm: 0.38 (mW/cm^2)

MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm^2)

Test Result

The EUT is defined as a mobile device since the predicted power density level at 150 cm is 0.38 mW/cm^2. This is below the uncontrolled exposure limit of 1.0mW/cm^2 at 1950-1965 MHz.

§2.1047 - MODULATION CHARACTERISTIC

Applicable Standard

Requirement: FCC § 2.1047.

Test Procedure

UMTS digital mode is used by EUT.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-10-04
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

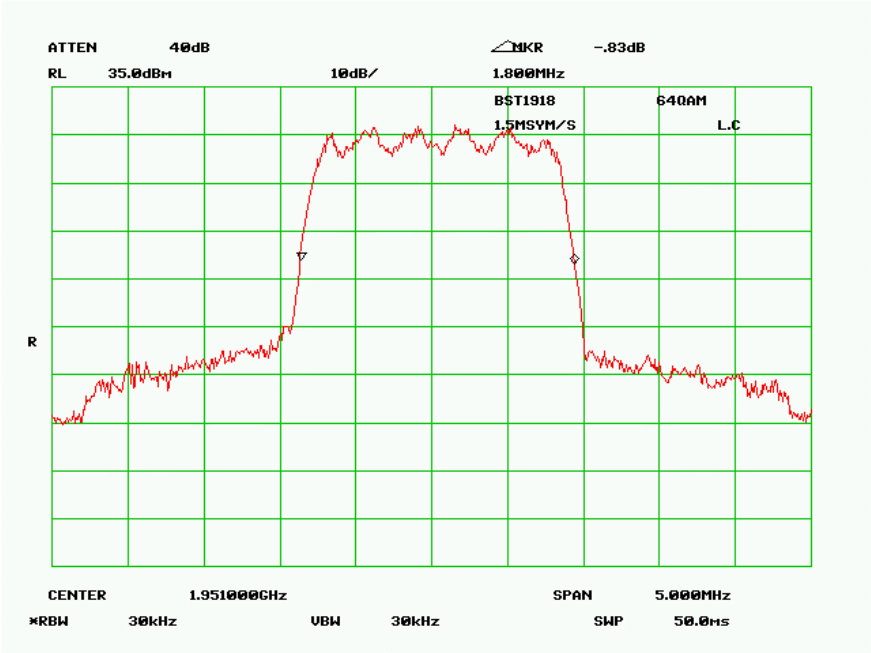
Temperature:	25° C
Relative Humidity:	46%
ATM Pressure:	1020 mbar

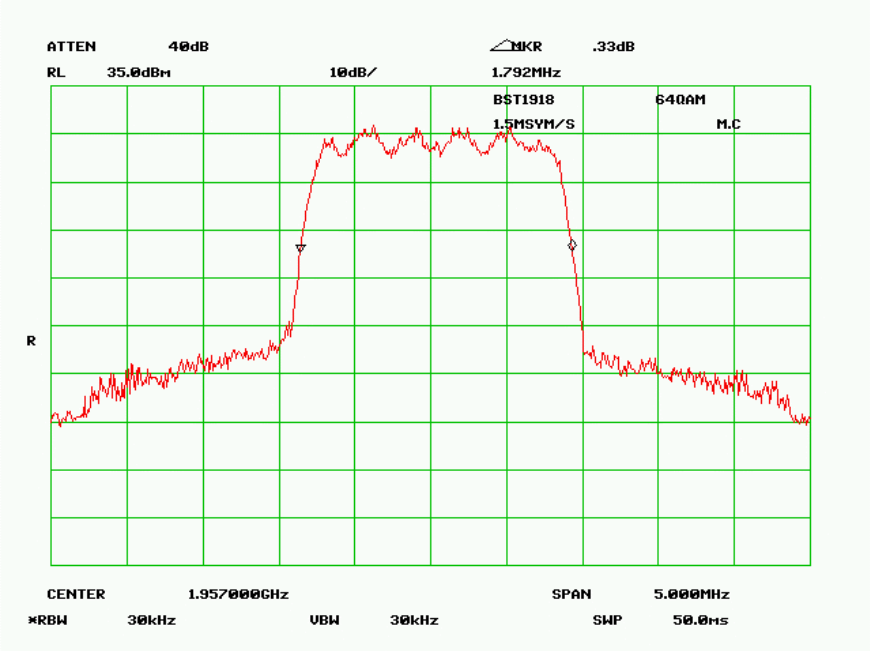
The testing was performed by Daniel Deng on 2005-09-28.

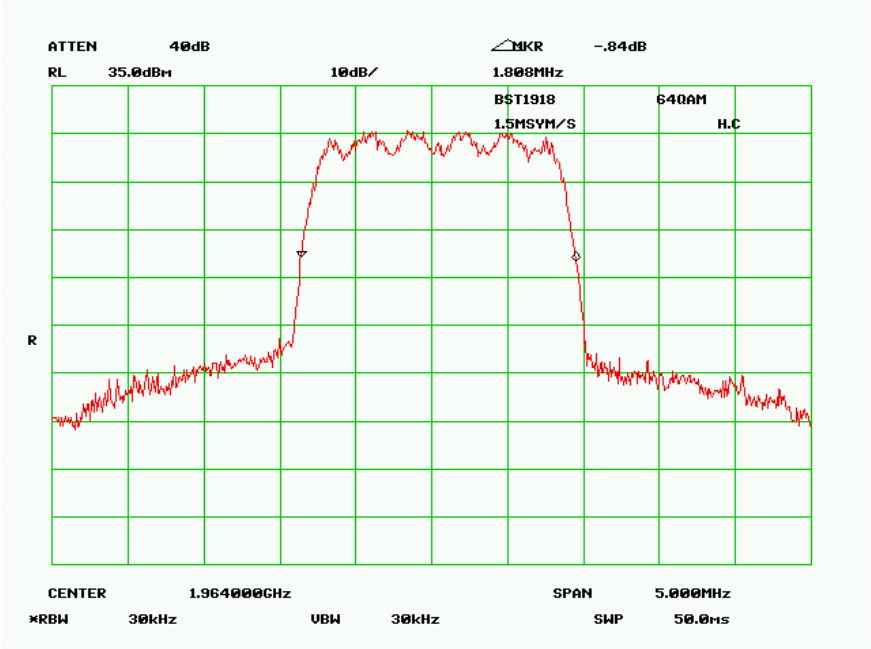
Test Results

Please refer to the hereinafter plots.

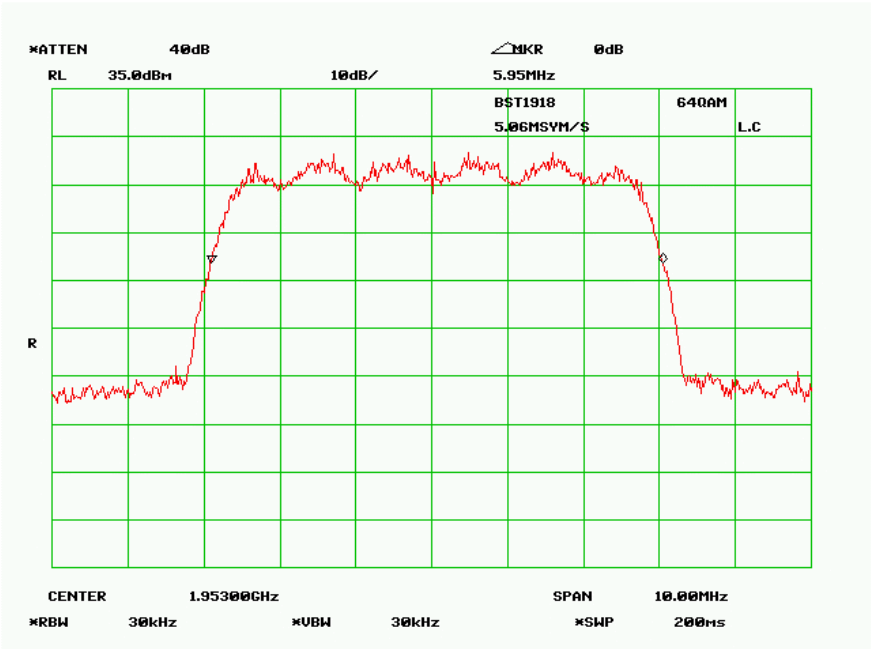
64QAM 1.5Msym/s

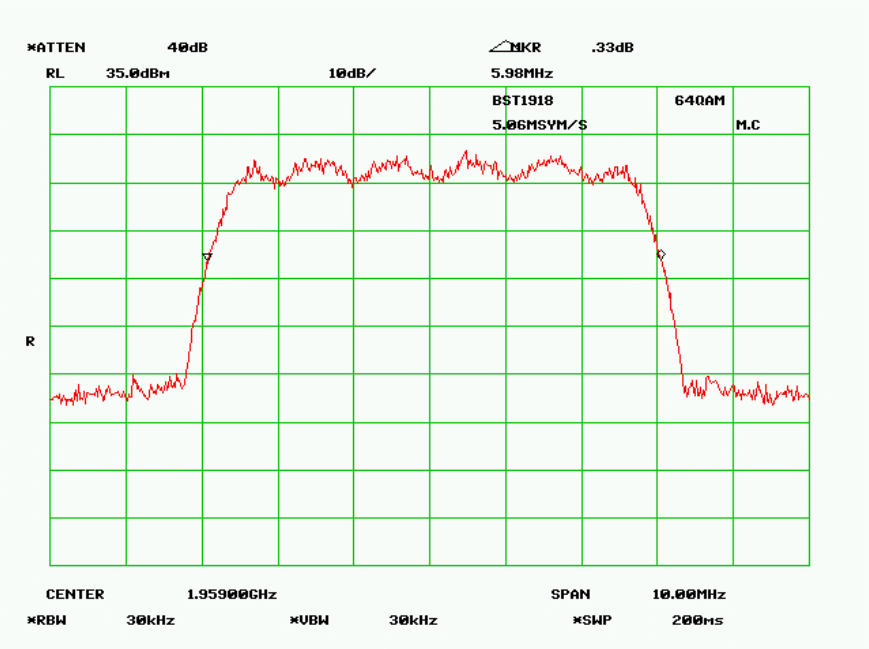


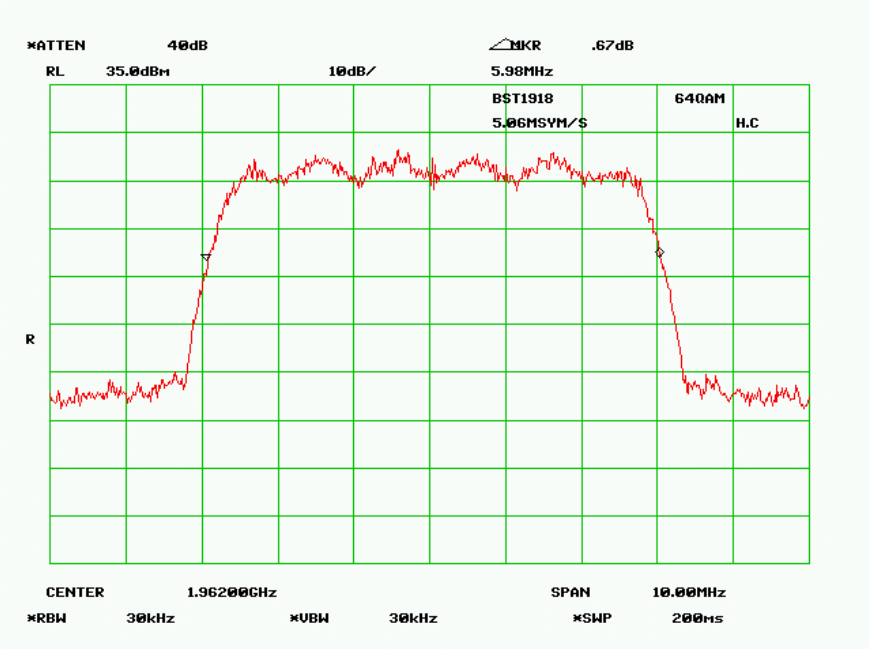




64QAM 5.06Msym/s




*ATTEN 40dB
MKR .33dB
RL 35.0dBm
10dB/
5.98MHz
BST1918
640AM
5.06MSYM/S
M.C
R
CENTER 1.95900GHz
SPAN 10.00MHz
*RBW 30kHz
*VBW 30kHz
*SWP 200ms


*ATTEN 40dB
MKR .67dB
RL 35.0dBm
10dB/
5.98MHz
BST1918
640AM
5.06MSYM/S
H.C
R
CENTER 1.96200GHz
SPAN 10.00MHz
*RBW 30kHz
*VBW 30kHz
*SWP 200ms

§2.1053 – SPURIOUS RADIATED EMISSIONS

Applicable Standard

Requirements: CFR 47, § 2.1053.

Test Procedure

The transmitter 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 (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	8564E	3943A01781	10/4/2004
HP	Amplifier, Pre	8447D	2944A10198	8/17/2005
HP	Amplifier, Pre, Microwave	8449B	3147A00400	8/10/2005
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	5/2/2005
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	4/20/2005
HP	Generator, Signal	83650B	3614A00276	5/10/2005
A.R.A.	Antenna, Horn	DRG-118/A	1132	8/17/2005
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100044	9/29/2004
Sunol Sciences	Antenna	JB1	A013105-3	2/11/2005

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	45%
ATM Pressure:	1016 mbar

The testing was performed by Daniel Deng on 2005-09-29.

Test Result

Transmitter:
64QAM 1.5Msym/sec: -18.6 dB at 3914 MHz
64QAM 5.06Msym/sec: -24.2 dB at 3918 MHz

Receiver: -4.2 dB at 43.5 MHz

TX: Final scan 30 MHZ -20 GHZ (TX) 64QAM 1.5Msym/sec

Mid Channel: 1957MHz

Indicated		Table Angle	Test Antenna		Substituted		Antenna Gain Correction	Cable Loss	Absolute Level	Limit	Margin
Frequency	Ampl.		Height	Polar	Frequency	Level					
MHz	dBuV/m	Degree	Meter	H/V	MHz	dBm		dB	dBm	dBm	dB
3914	56.7	180	1.7	v	3914	-40	10.67	2.3	-31.6	-13	-18.6
3914	55.5	180	1.7	h	3914	-43	10.55	2.3	-34.8	-13	-21.8

Note : 1) EUT connected to 50 ohm terminator
2) Other spurious emission are under noise level.

TX: Final scan 30 MHZ -20 GHZ (TX), 64QAM 5.06Msym/sec

Mid Channel: 1959MHz

Indicated		Table Angle	Test Antenna		Substituted		Antenna Gain Correction	Cable Loss	Absolute Level	Limit	Margin
Frequency	Ampl.		Height	Polar	Frequency	Level					
MHz	dBuV/m	Degree	Meter	H/V	MHz	dBm		dB	dBm	dBm	dB
3918	51.5	180	1.7	v	3918	-45.6	10.67	2.3	-37.2	-13	-24.2
3918	49.5	300	1.7	h	3918	-48.5	10.55	2.3	-40.3	-13	-27.3

Note : 1) EUT connected to 50 ohm terminator
2) Other spurious emission are under noise level.

RX: 30 - 1000MHz

Frequency	Reading	Direction	Height	Polar	Antenna Factor	Cable loss	Amplifer	Correction Factor	FCC 15B	FCC 15B
MHz	dBuV	Degree	Meter	H / V	dB/m	dB	dB	dBuV/m	Limit	Margin
43.5	49.1	270	1.3	V	13.9	1.4	28.6	35.8	40	-4.2
871.9	37.6	0	1.5	V	22.4	7	27.7	39.3	46	-6.7
43.5	45.35	270	1.6	H	13.9	1.4	28.6	32.05	40	-8.0
895.2	35.2	270	1.5	V	22.3	7	27.6	36.9	46	-9.1
93.5	52.5	0	1.1	V	8.0	2	28.3	34.2	43.5	-9.3
871.9	33.6	0	1.2	H	22.4	7	27.7	35.3	46	-10.7
825.4	34.2	30	1.2	V	21.9	6.5	27.7	34.9	46	-11.1
93.5	48.9	180	1.3	H	8.0	2	28.3	30.6	43.5	-12.9
672.1	35.2	0	1.1	H	19.4	5.7	28.5	31.8	46	-14.2

§15.107 - 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 BACL is ±2.4 dB.

EUT Setup

The measurement was performed in the shielded room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC 15 Class B limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

The EUT was connected to 120VAC/60Hz power source.

Spectrum Analyzer Setup

The spectrum analyzer was set to investigate the spectrum from 150 kHz to 30MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Artificial LISN	ESH2-Z5	871884/039	2004-08-16
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-09-15
Fluke	Calibrated Voltmeter	189	18485-38	2005-07-18

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

Test Procedure

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

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

All data was recorded in the peak detection mode, quasi-peak and average. Average readings are distinguished with an “Ave”.

Test Results Summary

According to the recorded data, the EUT complies with the FCC Conducted limits for a Class B device, with the worst margin reading of:

-0.7 dB at **3.24 MHz** in the **Neutral** conductor mode.
(test data is within the measurement uncertainty ±2.4dB)

Conducted Emissions Test Data

Environmental Conditions

Temperature:	25° C
Relative Humidity:	46%
ATM Pressure:	1020 mbar

The testing was performed by Daniel Deng on 2005-09-28.

LINE CONDUCTED EMISSIONS				FCC15 CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
3.24	45.3	Ave	Neutral	46.0	-0.7
0.465	45.8	Ave	Neutral	46.6	-0.8
0.465	45.3	Ave	Line	46.6	-1.3
0.185	51.2	Ave	Line	54.3	-3.1
0.15	58.8	QP	Line	66.0	-7.2
0.185	55	QP	Line	64.3	-9.3
0.165	55.1	QP	Neutral	65.2	-10.1
3.24	45.9	QP	Neutral	56.0	-10.1
0.465	46	QP	Line	56.6	-10.6
0.465	45.4	QP	Neutral	56.6	-11.2
0.15	29.2	Ave	Line	56.0	-26.8
0.165	26.1	Ave	Neutral	55.2	-29.1

Plots of Conducted Emission

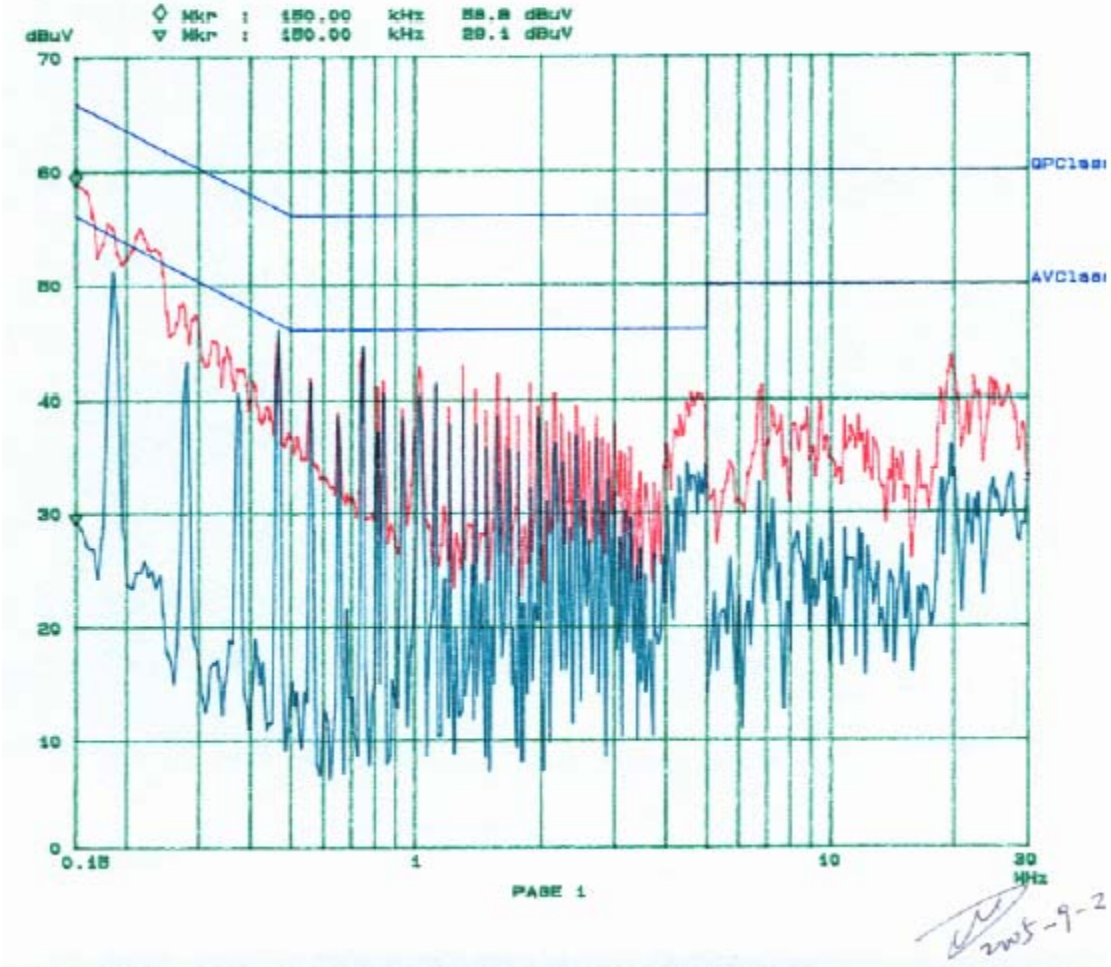
The plots of conducted emission are presented hereinafter as reference.

>Bay Area Compliance LABoratory Corp 24. Sep 05 11:14
Class B

EUT: BBT1918
Manuf: Vcom
Op Cond: Normal
Operator: Daniel
Comment: Line

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	10dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	10dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	10dBLN	OFF

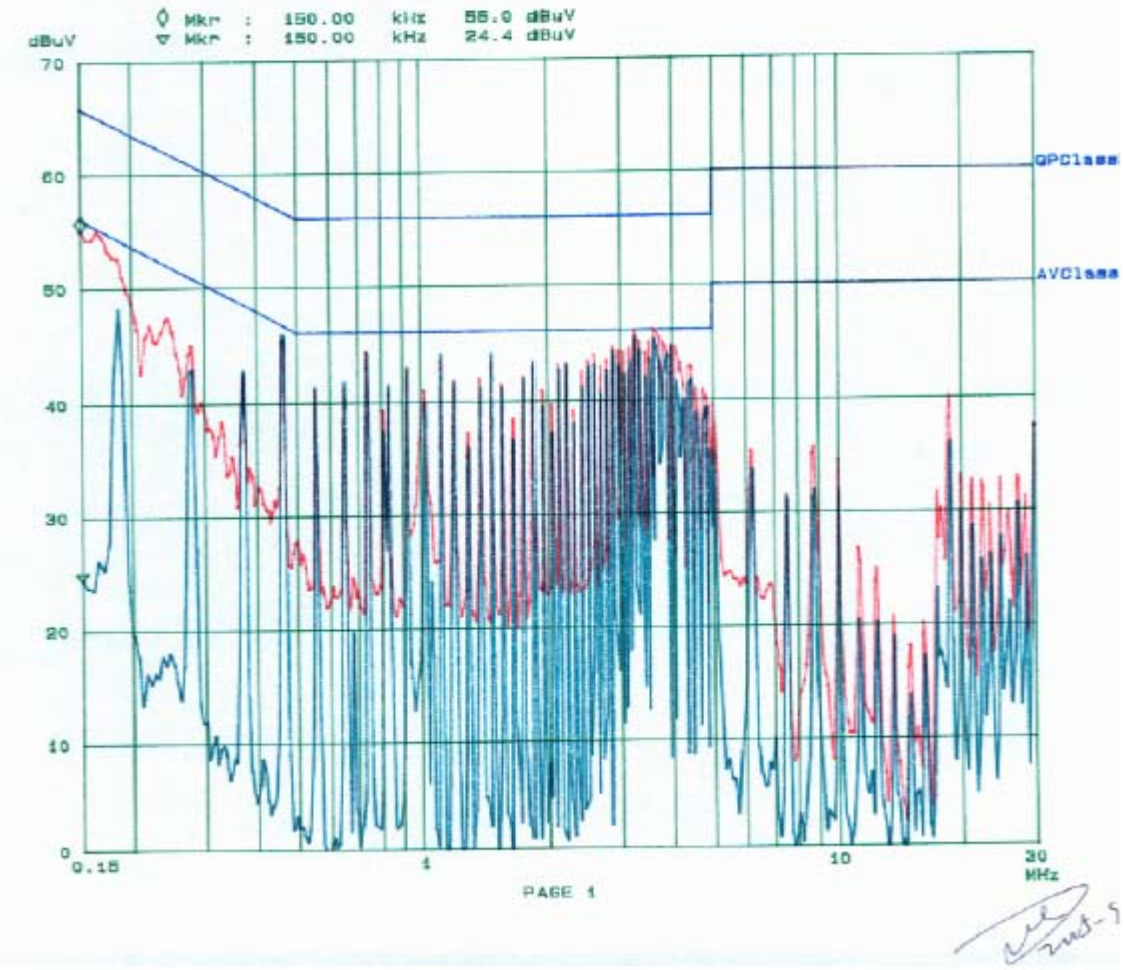


>Bay Area Compliance LABoratory Corp 24. Sep 05 11:41
Class B

EUT: BST1918
Manuf: Vcom
Op Cond: Normal
Operator: Daniel
Comment: Neutral

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	10dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	10dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	10dBLN	OFF



§2.1046, & §24.232 – CONDUCTED RF POWER OUTPUT

Applicable Standard

FCC §2.1046 and §24.232

Test Procedure

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	8564E	3943A01781	10/4/2004
Agilent	Sensor, Power	E4412A	US38488542	9/8/2005
Agilent	Meter, Power	E4419B	MY4121511	8/31/2005
Tenney	Oven, Temperature	VersaTenn	12.222-193	6/27/2005

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

Environmental Conditions

Temperature:	25° C
Relative Humidity:	46%
ATM Pressure:	1020 mbar

The testing was performed by Daniel Deng on 2005-09-28.

Test Results

1) 64QAM 1.5Msym/sec :

Channel	Frequency (MHZ)	Conducted Power at antenna port (dBm)
Low	1951	31.2
Mid	1957	31.3
High	1964	31.3

2) 64QAM 5.06Msym/sec :

Channel	Frequency (MHZ)	Conducted Power at antenna port (dBm)
Low	1953	31.2
Mid	1959	31.2
High	1962	31.1

§2.1049, & §24.238 - OCCUPIED BANDWIDTH

Applicable Standard

Requirements: CFR 47, Section 2.1049, and Section 24.238.

Test Procedure

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

The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the 26 dB bandwidth was recorded.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-10-04
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

Temperature:	25° C
Relative Humidity:	46%
ATM Pressure:	1020 mbar

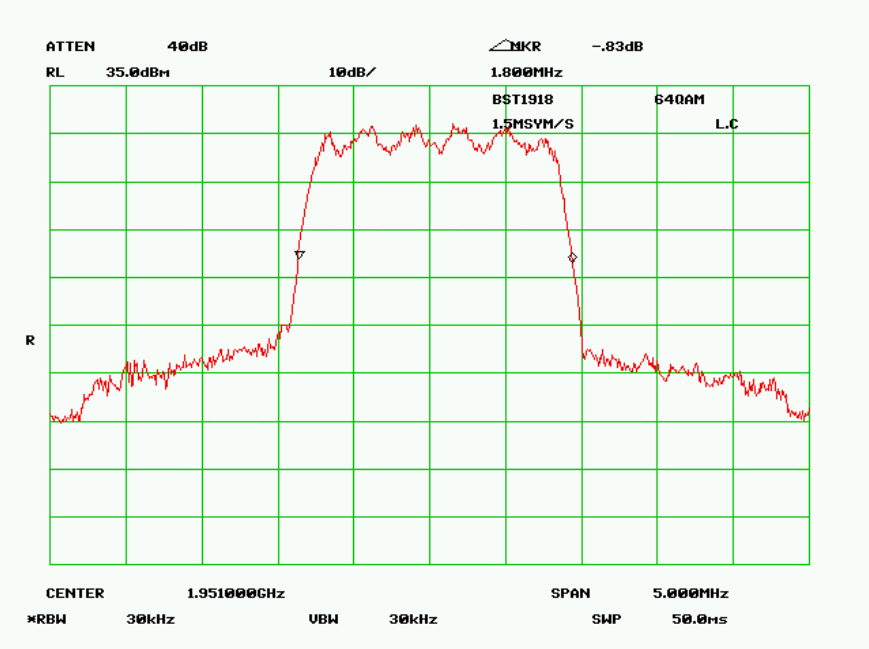
The testing was performed by Daniel Deng on 2005-09-28.

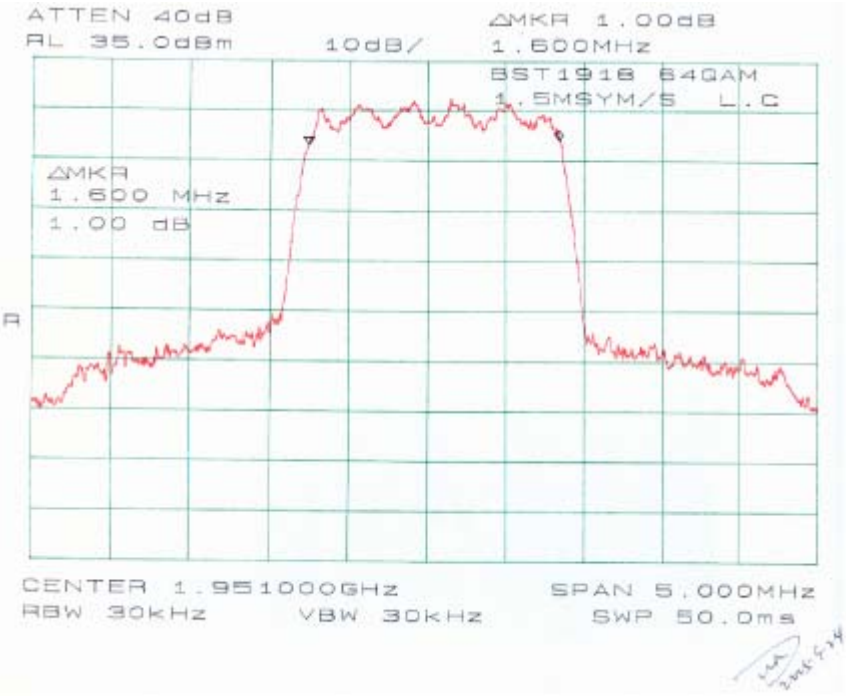
Test Results

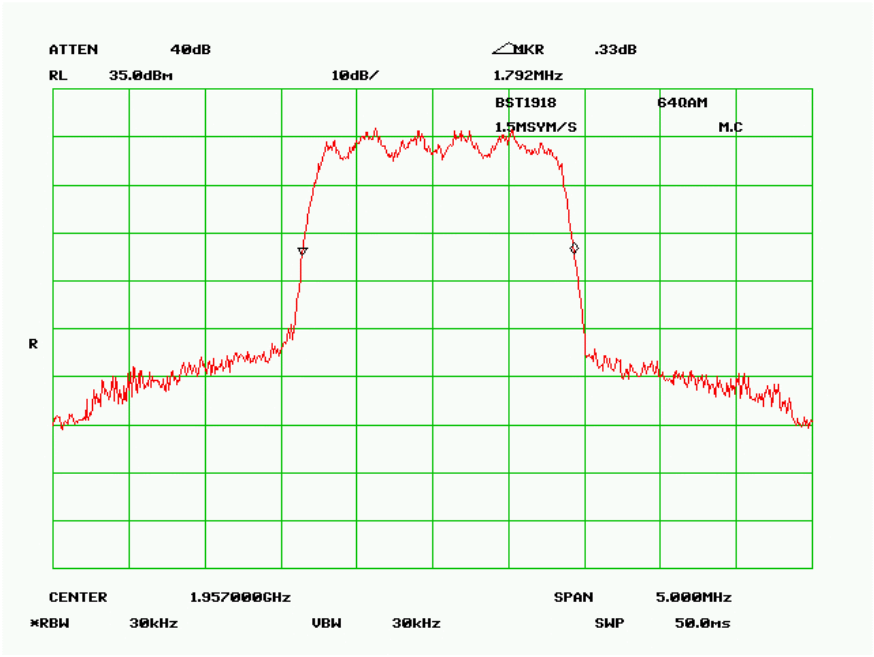
Mode	Channel	Frequency (Mhz)	Type	Measurement (KHz)	Result
64QAM 1.5Msym/s	Low	1951.00	Occupied Bandwidth	1600	Compliant
			26dB Bandwidth	1800	Compliant
	Middle	1957.00	Occupied Bandwidth	1608	Compliant
			26dB Bandwidth	1792	Compliant
	High	1964.00	Occupied Bandwidth	1608	Compliant
			26dB Bandwidth	1808	Compliant
64QAM 5.06Msym/s	Low	1953.00	Occupied Bandwidth	5430	Compliant
			26dB Bandwidth	5950	Compliant
	Middle	1959.00	Occupied Bandwidth	5450	Compliant
			26dB Bandwidth	5980	Compliant
	High	1962.00	Occupied Bandwidth	5450	Compliant
			26dB Bandwidth	5980	Compliant

Please refer to the hereinafter plots.

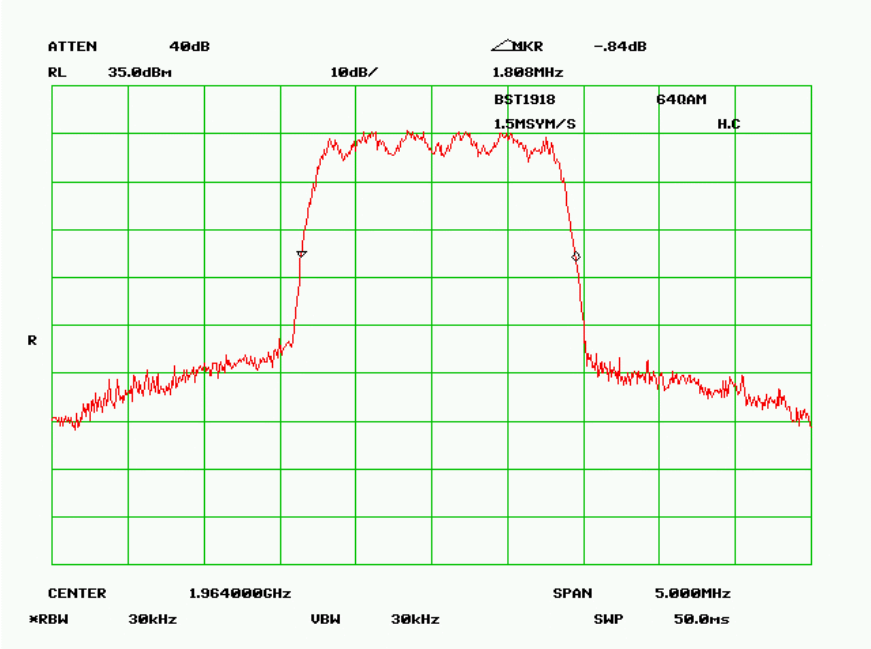
64QAM 1.5Msym/s

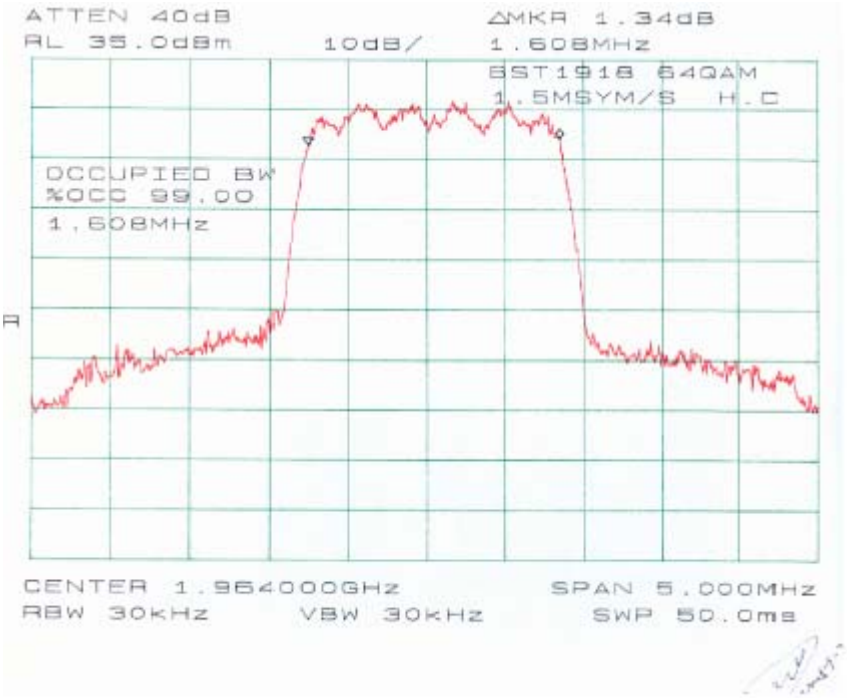




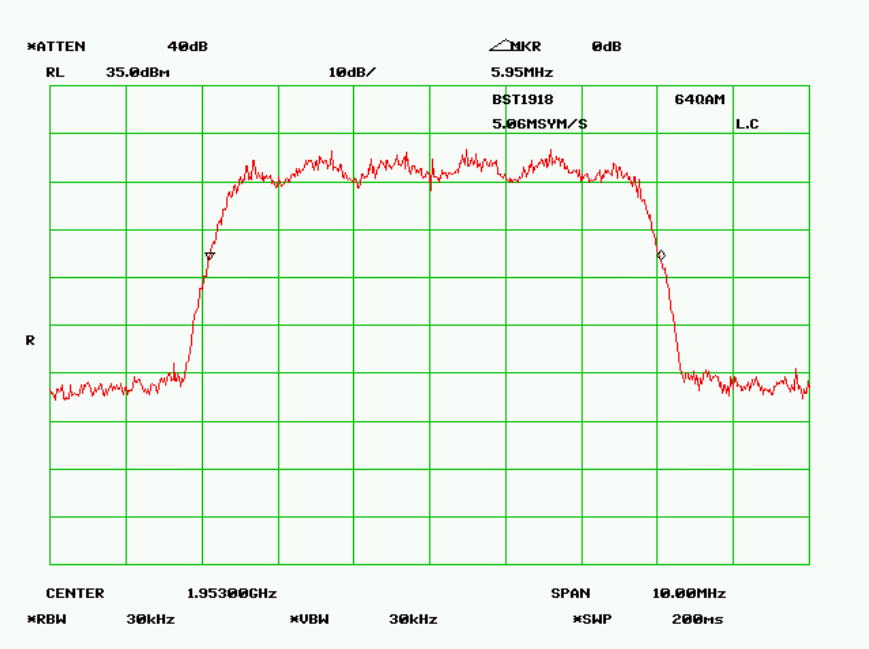

ATTEN 40dB
RL 35.0dBm
10dB/
MKR .33dB
1.792MHz
BST1918
1.5MSYM/S
640AM
M.C
R
CENTER 1.957000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

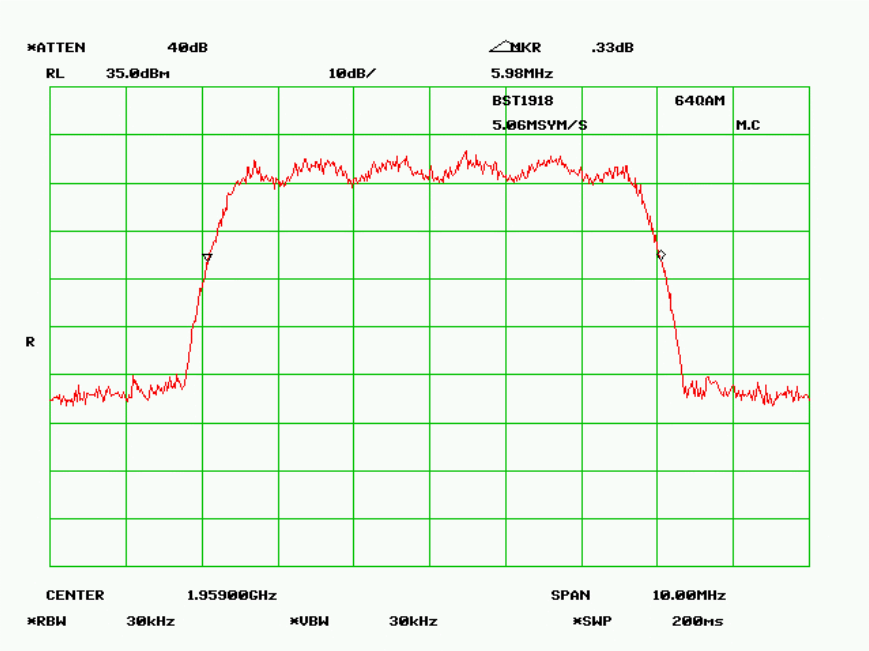

ATTEN 40dB
RL 35.0dBm
10dB/
ΔMKR .50dB
1.608MHz
BST1918 640AM
1.5MSYM/S M.C
OCCUPIED BW
%OCC 99.00
1.608MHz
R
CENTER 1.957000GHz
SPAN 5.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 40dB
RL 35.0dBm
10dB/
ΔMKR -.84dB
1.808MHz
BST1918 64QAM
1.5MSYM/S H.C
R
CENTER 1.964000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

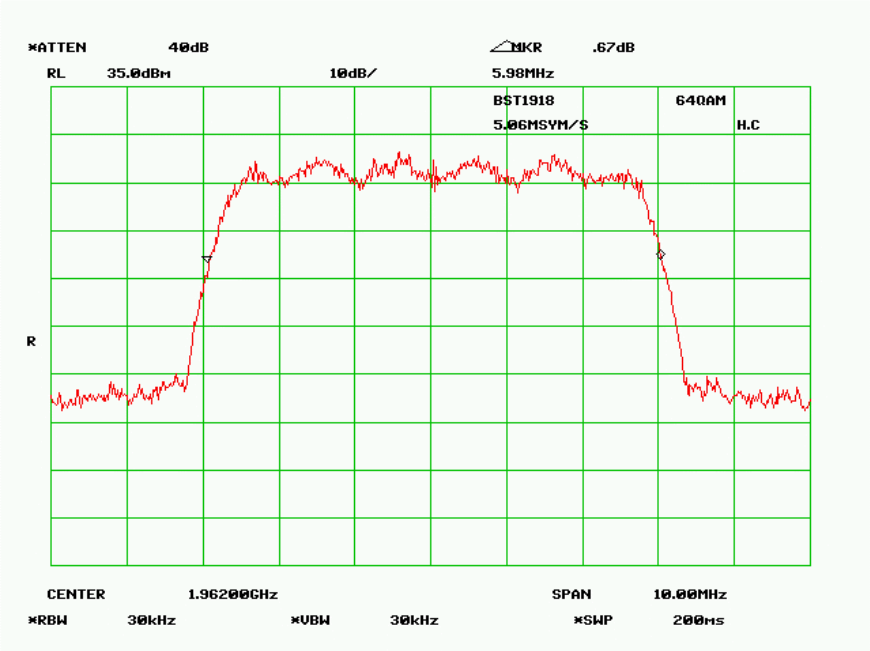

ATTEN 40dB
RL 35.0dBm
10dB/
ΔMKR 1.34dB
1.608MHz
BST1918 64QAM
1.5MSYM/S H.C
OCCUPIED BW
%OCC 99.00
1.608MHz
R
CENTER 1.964000GHz
SPAN 5.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms

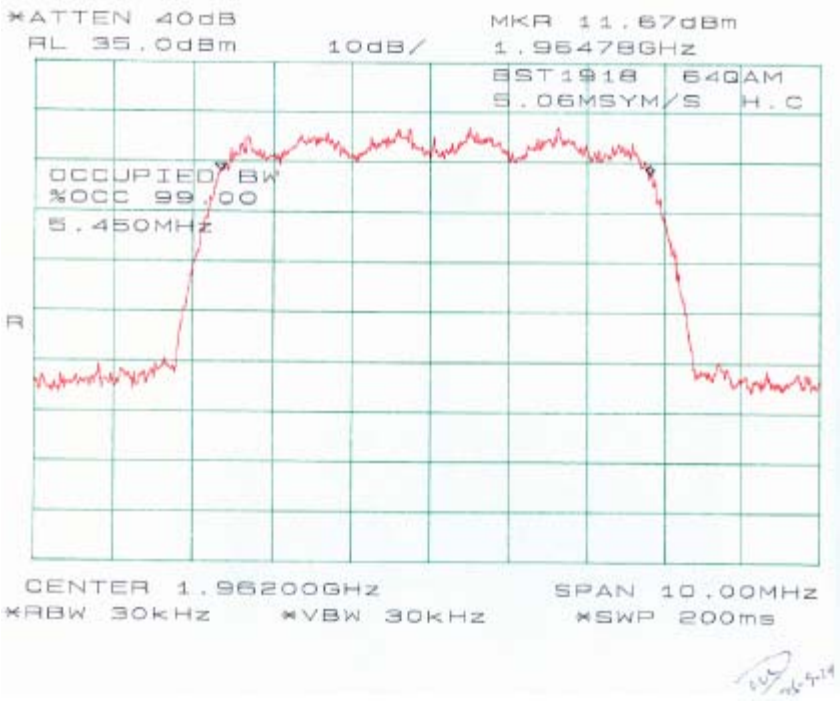
64QAM 5.06Msym/s




*ATTEN 40dB
RL 35.0dBm
10dB/
MKR .33dB
5.98MHz
BST1918
5.06MSYM/S
640AM
M.C
R
CENTER 1.95900GHz
SPAN 10.00MHz
*RBW 30kHz
*VBW 30kHz
*SWP 200ms


*ATTEN 40dB
RL 35.0dBm
10dB/
MKR 22.33dBm
1.960620GHz
BST1918
5.06MSYM/S
640AM
M.C
OCCUPIED BW
%OCC 99.00
5.450MHz
R
CENTER 1.95900GHz
SPAN 10.00MHz
*RBW 30kHz
*VBW 30kHz
*SWP 200ms


*ATTEN 40dB
RL 35.0dBm
10dB/
MKR .67dB
5.98MHz
BST1918
5.06MSYM/S
640AM
H.C
R
CENTER 1.96200GHz
SPAN 10.00MHz
*RBW 30kHz
*VBW 30kHz
*SWP 200ms


*ATTEN 40dB
RL 35.0dBm
10dB/
MKR 11.67dBm
1.96478GHz
BST1918
5.06MSYM/S
640AM
H.C
OCCUPIED BW
%OCC 99.00
5.450MHz
R
CENTER 1.96200GHz
SPAN 10.00MHz
*RBW 30kHz
*VBW 30kHz
*SWP 200ms

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

Applicable Standard

Requirements: CFR 47, § 2.1051 & §24.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10^{th} harmonic.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-10-04
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

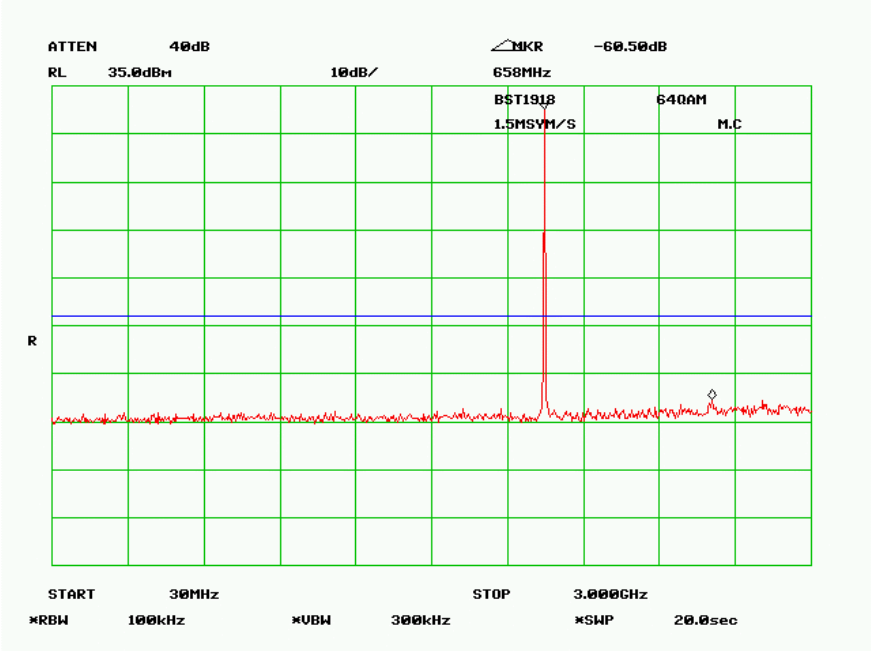
Temperature:	25° C
Relative Humidity:	46%
ATM Pressure:	1020 mbar

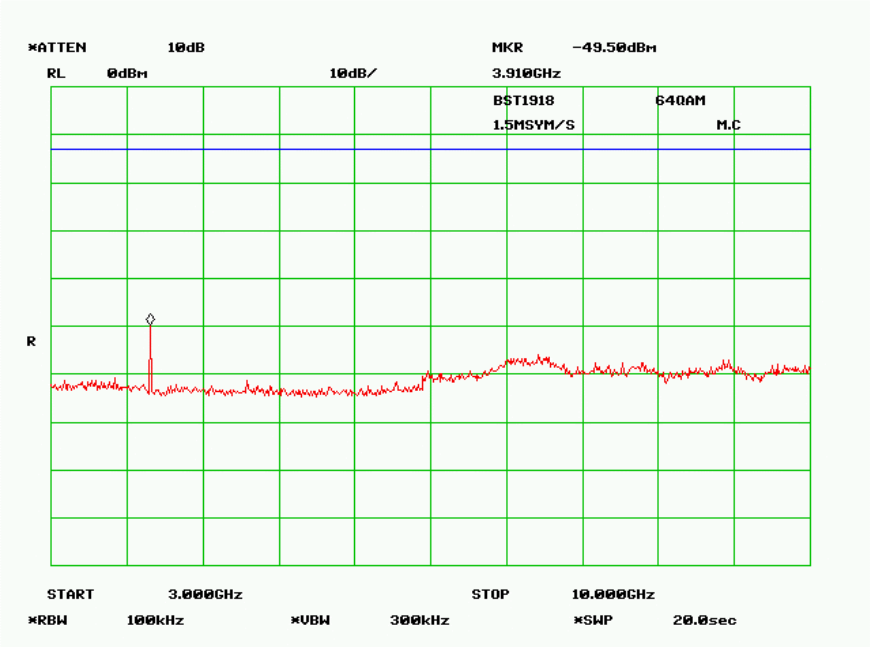
The testing was performed by Daniel Deng on 2005-09-28.

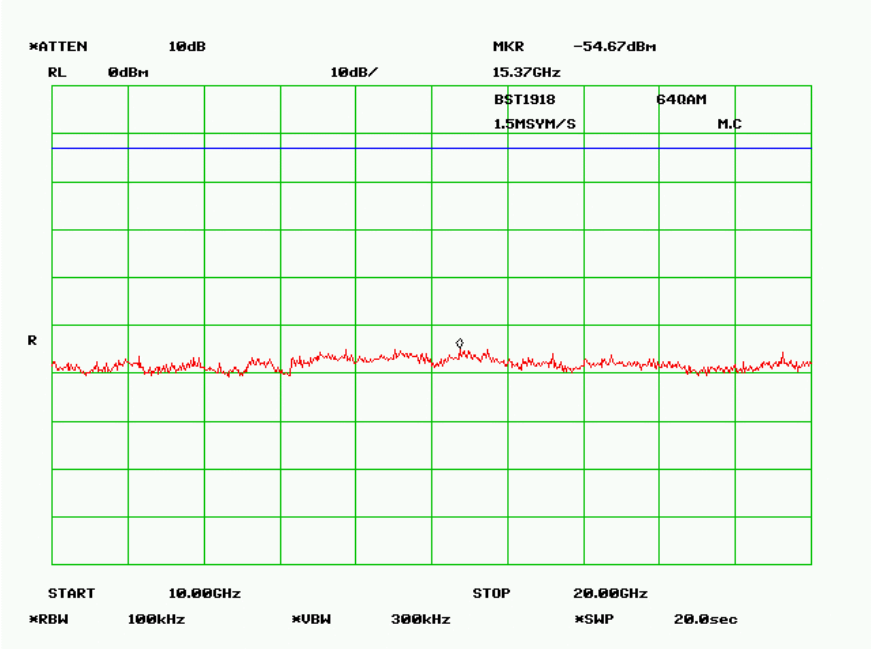
Test Results

Please refer to the hereinafter plots.

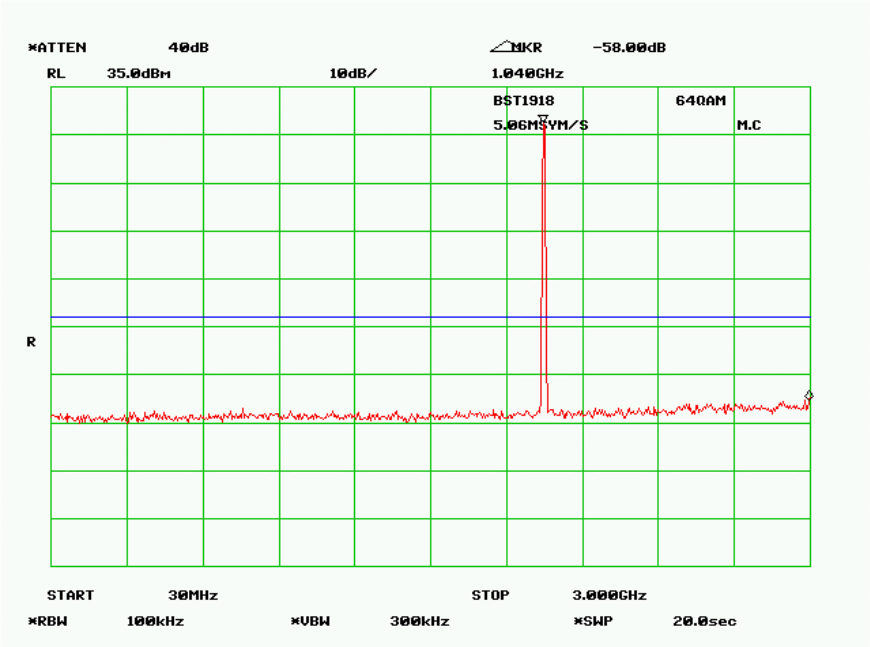
64QAM 1.5Msym/s

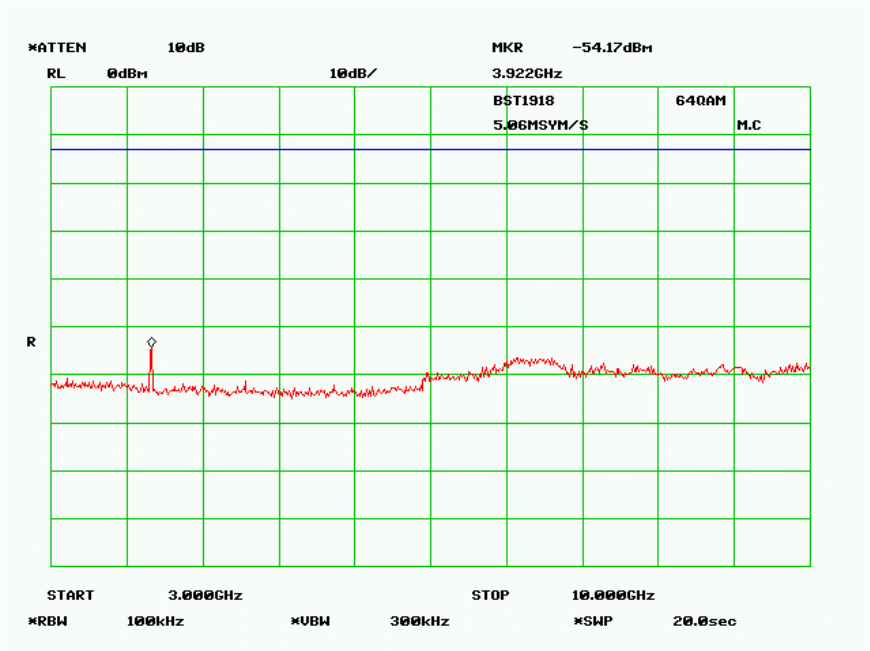


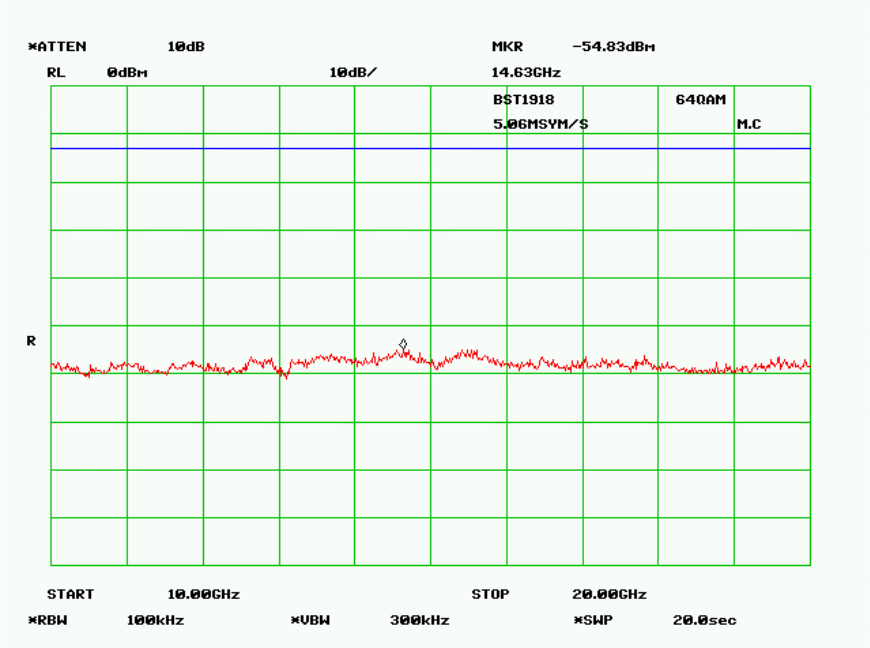




64QAM 5.06Msym/s




*ATTEN 10dB
MKR -54.17dBm
RL 0dBm
10dB/
3.922GHz
BST1918
640AM
5.06MSYM/$
M.C
R
START 3.000GHz
STOP 10.000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 20.0sec


*ATTEN 10dB
MKR -54.83dBm
RL 0dBm
10dB/
14.63GHz
BST1918
640AM
5.06MSYM/$
M.C
R
START 10.00GHz
STOP 20.00GHz
*RBW 100kHz
*VBW 300kHz
*SWP 20.0sec

§2.1055 (a), §2.1055 (d), & §24.235 - FREQUENCY STABILITY

Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d) & following:

According to §24.235, The frequency stability shall be sufficient to ensure that the fundamental emission 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 a frequency counter 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 counter.

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	Cal. Date
Agilent	Analyzer, Spectrum	8564E	3943A01781	10/4/2004
Tenney	Oven, Temperature	VersaTenn	12.222-193	6/27/2005

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

Environmental Conditions

Temperature:	25° C
Relative Humidity:	46%
ATM Pressure:	1020 mbar

The testing was performed by Daniel Deng on 2005-09-28.

Test Results

Frequency Stability Versus Temperature

Reference Frequency : 1957 MHz			
		Frequency Measure with Time Elapsed	
Temperature C	Power supplied Vac	MCF (MHz)	Error ppm
50	120	1957.002825	1.4
40	120	1957.002706	1.4
30	120	1957.002715	1.4
20	120	1957.002683	1.4
10	120	1957.002576	1.3
0	120	1957.002565	1.3
-10	120	1957.002501	1.3
-20	120	1957.002538	1.3
-30	120	1957.002625	1.3

Frequency Stability Versus Voltage

Reference Frequency : 1957 MHz			
Power supplied Vac	Environment Temperature (° C)	Frequency Measure with Time Elapsed (MHz)	Error ppm
102	20	1957.002665	1.3
138	20	1957.002670	1.3

§24.238 – BAND EDGE

Applicable Standard

According to §24.238, the power of any emission 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 transmitter 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 30KHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-10-04
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

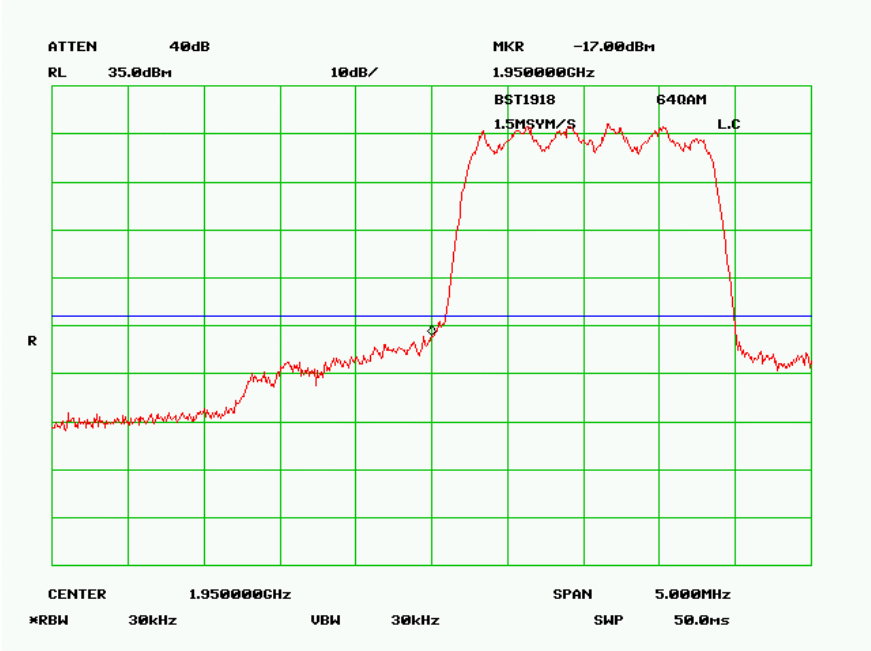
Temperature:	25° C
Relative Humidity:	46%
ATM Pressure:	1020 mbar

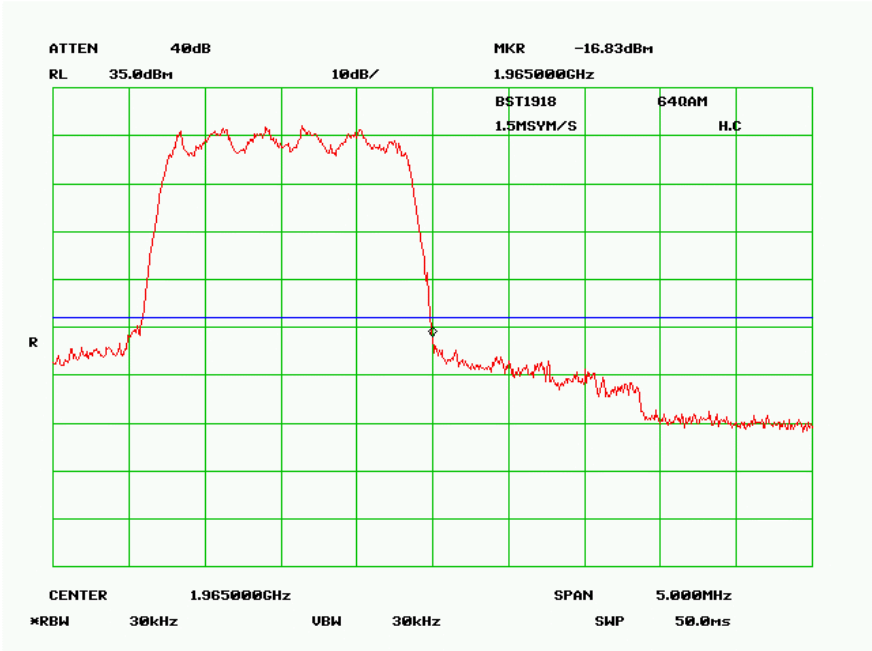
The testing was performed by Daniel Deng on 2005-09-28.

Test Results

Please refer to the following plots.

64QAM 1.5Msym/s





64QAM 5.06Msym/s