

FCC PART 24 TYPE APPROVAL EMI MEASUREMENT AND TEST REPORT


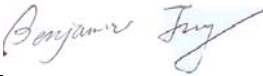
For

High Tech Computer, Corp.

23, Hsin-Hua Rd.,
Taoyuan, 330, Taiwan

FCC ID: NM8VOYAGER

2003-08-22

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: SmartPhone
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Report No.: R0307183	
Test Date: 2003-08-04	
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Note: This test report is specially limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *High Tech Computer, Corp.*'s product, model no.:SV10A/SV10B or the "EUT" as referred to this report is a bluetooth smartphone which is measured approximately 4.75"L x 1.9"W x 0.9"H. The difference between SV10A and SV10B is the material of the bezel. The bezel of SV10A contains metallic and the bezel of SV10B is plastic material.

** The test data gathered are from typical production samples provided by the manufacturer.*

1.2 Objective

This type approval report is prepared on behalf of *High Tech Computer, Corp.* in accordance with Part 2, Subpart J, Part 15, Subparts A and B, and Part 24 Subpart E, of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC Part 2, Part 15 and Part 24.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-1992 and TIA/EIA 603A, 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 by Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 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.

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 C63.4-1992.

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 scope of the accreditation covers the FCC Method – 47 CFR Part – Digital Devices, CISPER 22: 1997: Electromagnetic Interference – Limits and Methods of Measurement of Information Technology Equipment test methods.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2517A01610	2003-10-30
HP	Spectrum Analyzer	8593A	29190A00242	2004-05-01
HP	Amplifier	8447E	1937A01054	2004-05-01
HP	Quasi-Peak Adapter	85650A	2521A00718	2004-05-01
Com-Power	Biconical Antenna	AB-100	14012	2004-05-01
Com-Power	Log Periodic Antenna	AL-100	16091	2004-05-01
Com-Power	Log Periodic Antenna	AB-900	15049	2004-05-01
Agilent	Spectrum Analyzer (9KHz – 40GHz)	8564E	08303	2004-08-01
Agilent	Spectrum Analyzer (9KHz – 50GHz)	8565EC	06042	2004-05-03
HP	Amplifier (1-26.5GHz)	8449B	3147A00400	2004-03-14
A.H.System	Horn Antenna (700MHz-18GHz)	SAS-200/571	261	2004-05-31

* **Statement of Traceability: Bay Area Compliance Laboratory Corp.** certifies that all calibration has been performed using suitable standards traceable to the NIST.

1.7 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
DELL	Notebook PC	Latitude D600	37357573321	DOC
HP	Printer	2225C	N/A	DOC

1.8 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded Cable	1.0	EUT	Notebook PC
Shielded Printer	2.0	Parallel Port/Notebook PC	Printer

1.9 Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
DELTA	AC Adapter	ADP-10SB	SMW0322298719	DOC
PHIHONG	AC Adapter	PSC05R-050	EAF136V002987	DOC

1.10 Accessories Information

Manufacturer	Description	Model
HTC	USB Cradle	SV15
HTC	RS-232 Cradle	SV15
Eacotech	Earphone	TS168
HTC	USB Cable	N/A
HTC	RS-232 Cable	N/A
HTC	Pouch	N/A

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

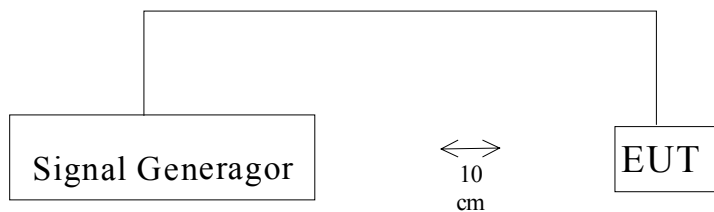
The EUT was configured for testing in a typical fashion (as normally used in a typical application).

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

2.2 Schematics/Block Diagram

Please refer to Exhibit D.

2.3 Test Setup Block Diagram



2.4 Equipment Modifications

No modifications were necessary for the EUT to comply with the applicable standard and limit.

3 - SUMMARY OF TEST RESULTS

FCC RULE	DESCRIPTION OF TEST	Measured	Result
§ 2.1049 § 24.238	Emission Bandwidth	Section 5	Compliant
2.1051 § 24.238(a)	Spurious emissions at antenna terminals	Section 6	Compliant
2.1053 § 24.238 (a)	Field strength of spurious radiation	Section 7	Compliant
§ 2.1055 (a) § 2.1055 (d) § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Section 9	Compliant
§ 2.1093 § 24.52	RF Exposure Requirement	SAR report	Compliant

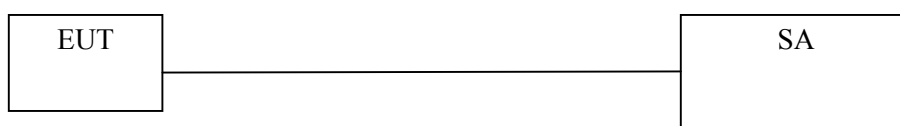
4 - CONDUCTED OUTPUT POWER MEASUREMENT

4.1 Standard Applicable

According to § 2.1046 (a) for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8).

4.2 Measurement Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Add a correction factor to the display.



Note: The antenna is integrated with the EUT. The conducted output power may not be measured exactly.

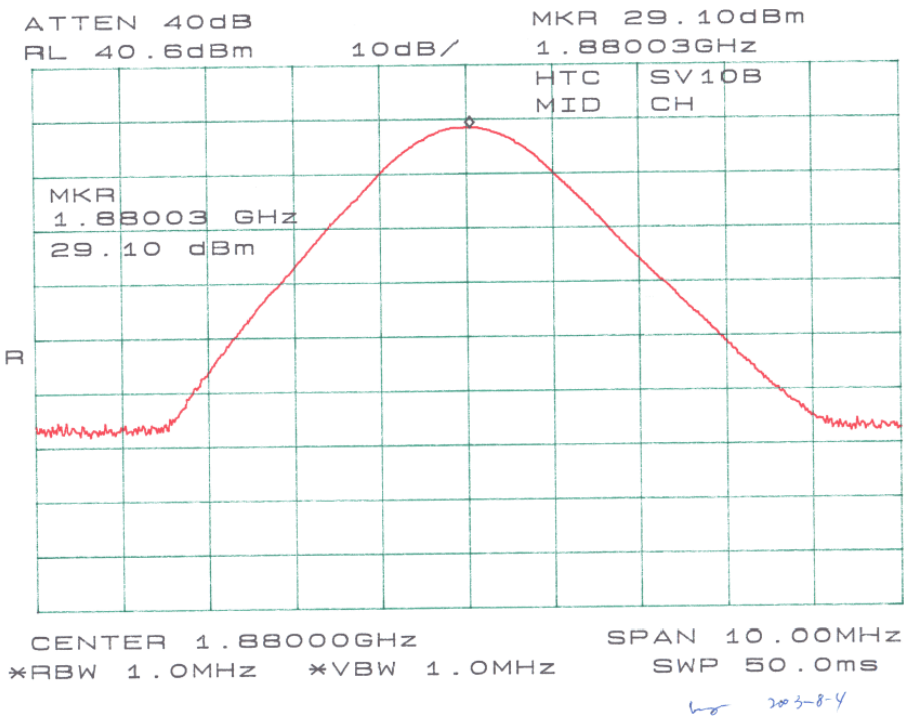
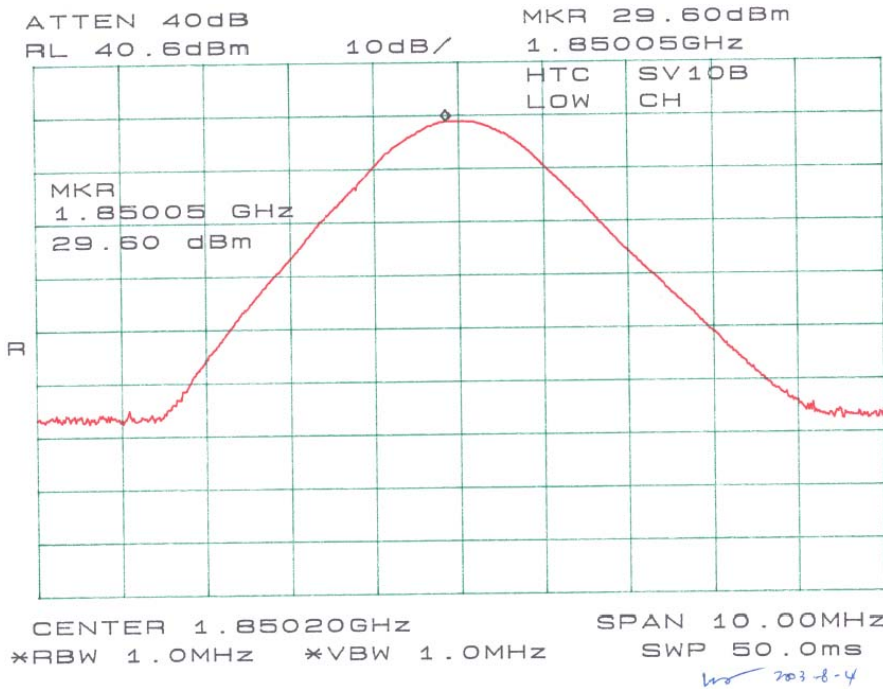
4.3 Measurement Result

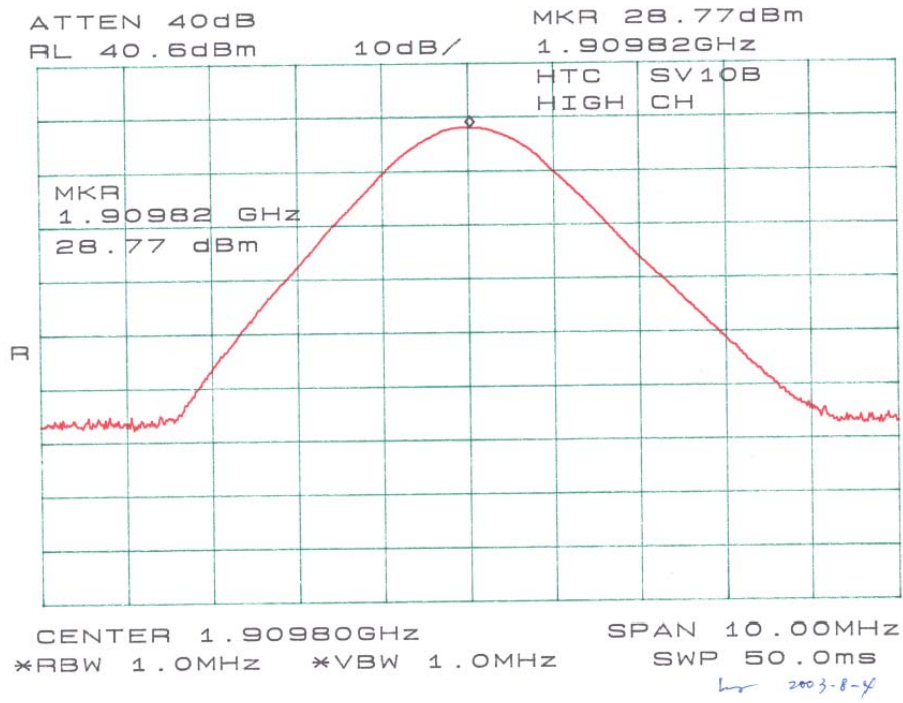
Please refer to the attached pictures for more information.

Frequency	Output Power (dBm)	Output Power (W)	Result
Low	29.60	0.912	Compliant
Middle	29.10	0.813	Compliant
High	28.77	0.753	Compliant

4.4 Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Due Date
HP	8568B	2610A02165	2003-12-06
HP	8593B	2919A0242	2003-12-06





5 - RF POWER OUTPUT

5.1 Applicable Standard

According to FCC §2.1046 and §24.232 (1), mobile/portable stations are limited to 2 watts EIRP.

5.2 Test Procedure

1. On a test site, the EUT shall be placed at 1.5m height on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the quasi-peak detector is used for the measurement.
4. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. The transmitter shall be replaced by a horn (substitution antenna).
10. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
11. The substitution antenna shall be connected to a calibrated signal generator.
12. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
14. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

17. The measure of the effective radiated power is the large of the two levels recorded, at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

5.3 Test Results

For Model SV10B:

FREQUENCY (MHZ)	SUBSTITUTION READING (dBm)	SUBSTITUTION ANTENNA GAIN	SUBSTITUTION CALBE LOSTS (dbm)	OUTPUT POWER (dBm)
1850.2	22.10	6.7	0.1	28.70
1880.0	21.67	6.7	0.1	28.27
1909.8	20.90	6.7	0.1	27.50

For Model SV10A:

FREQUENCY (MHZ)	SUBSTITUTION READING (dBm)	SUBSTITUTION ANTENNA GAIN	SUBSTITUTION CALBE LOSTS (dbm)	OUTPUT POWER (dBm)
1850.2	22.00	6.7	0.1	28.60
1880.0	21.45	6.7	0.1	28.05
1909.8	21.10	6.7	0.1	27.70

Sample calculation:

Absolute level = substitution reading + antenna gain - cable loss

For example:

$$22.1+6.7-0.1=28.7$$

6 - EMISSION BANDWIDTH

6.1 Applicable Standards

According to FCC §2.1049 and §24.238 (b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

6.2 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 3 KHz and the spectrum was recorded.

6.3 Test Equipment

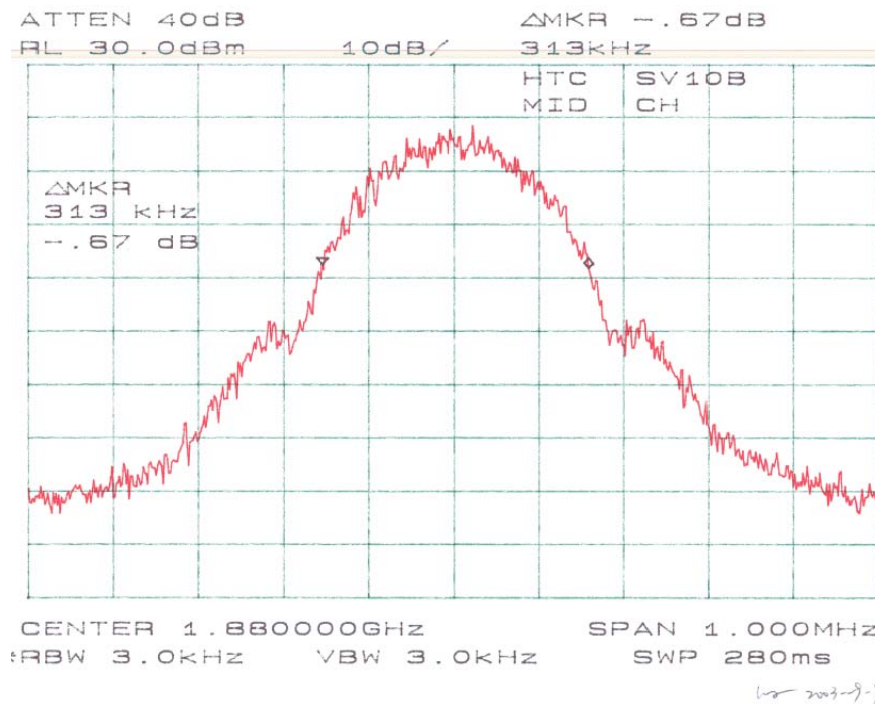
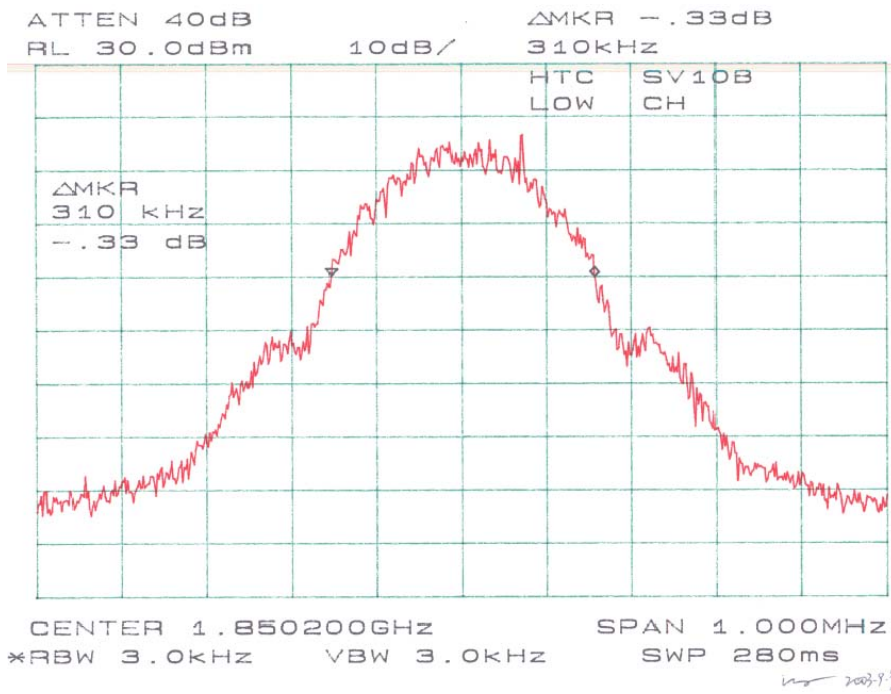
Agilent 8565EC Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Hewlett Packard 8449 Amplifier
A.H. Systems, Inc SAS-200/571 Horn Antenna

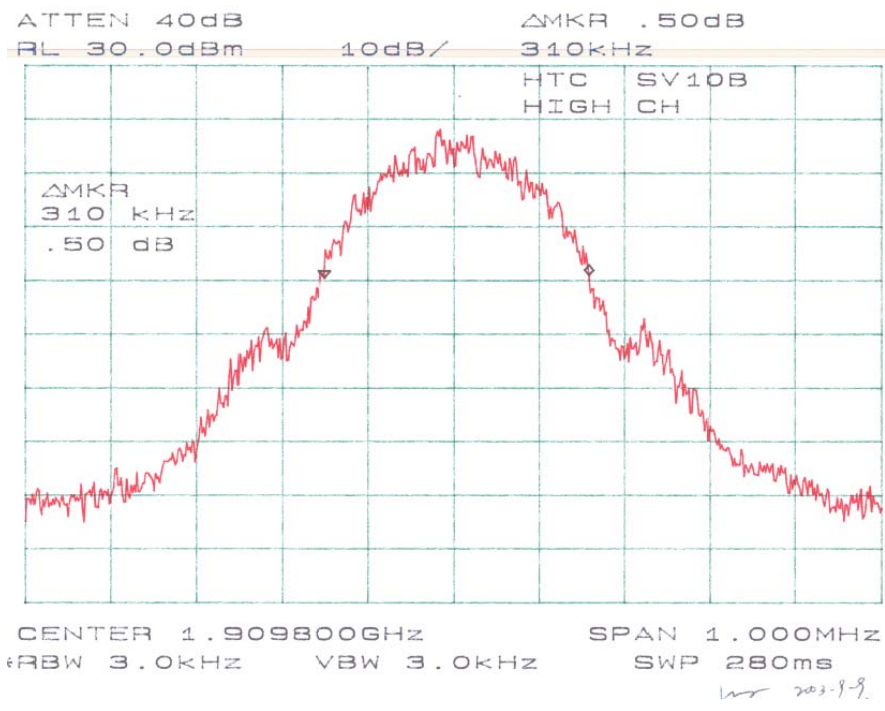
6.4 Plots of Occupied Bandwidth

Please refer to plots hereinafter.

Test Data Summary

Channel	Emission Bandwidth in kHz
Low	310
Mid	313
High	310





7 - OUT OF BAND EMISSIONS AT ANTENNA TERMINALS

7.1 Applicable Standards

According to FCC §2.1049 and §24.238, on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB.

7.2 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 1 MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

7.3 Test Equipment

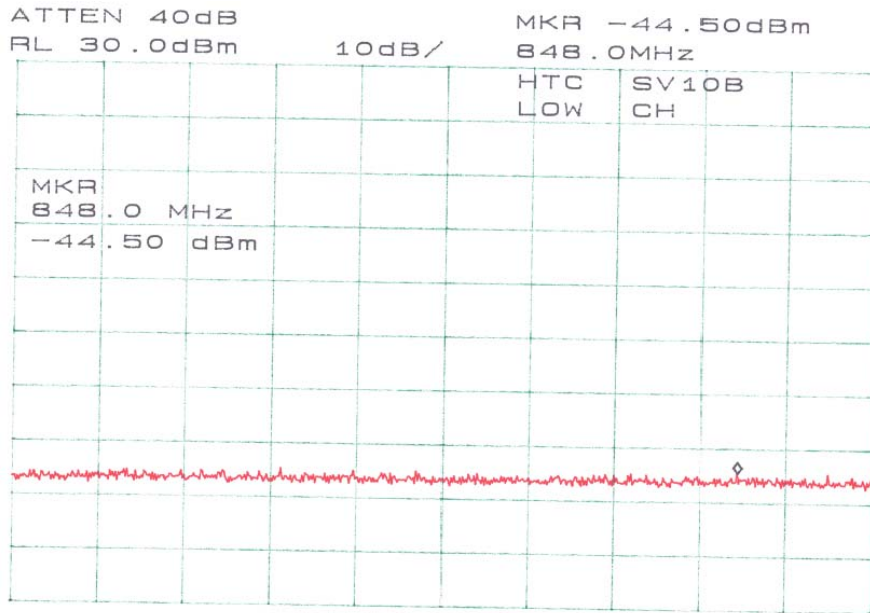
Agilent 8565EC Spectrum Analyzer
HP 7470A Plotter
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Hewlett Packard 8449 Amplifier
A.H. Systems, Inc SAS-200/571 Horn Antenna

7.4 Test Results

Channel	Measured
Low	< -13dBm
Mid	< -13dBm
High	< -13dBm

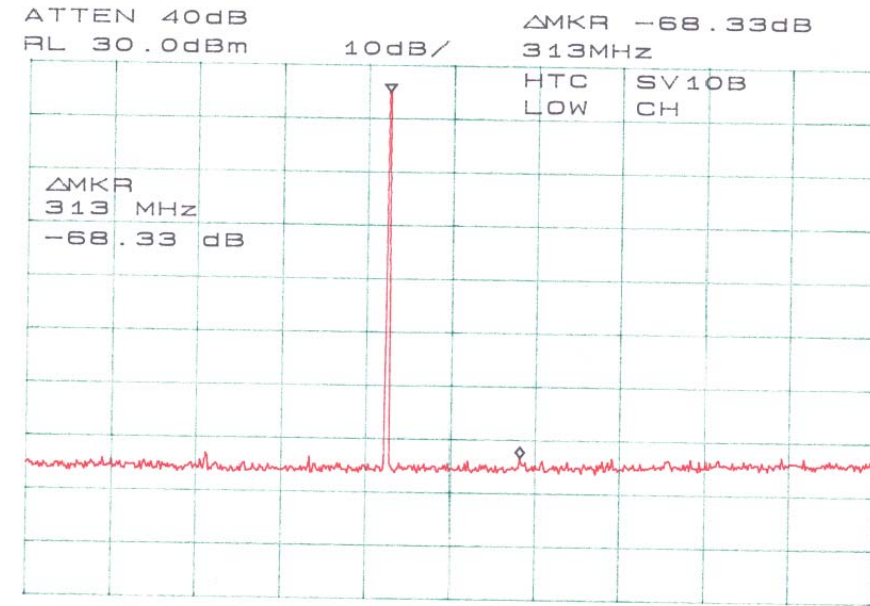
6.5 Plots of Out-of-Band Emissions at Antenna Terminal

Please refer to plots hereinafter.



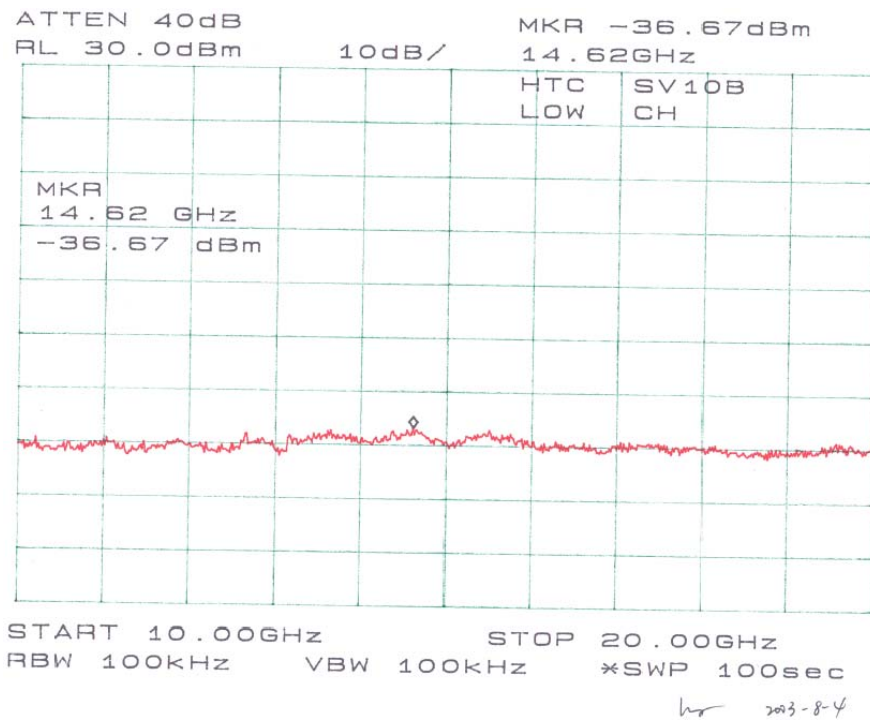
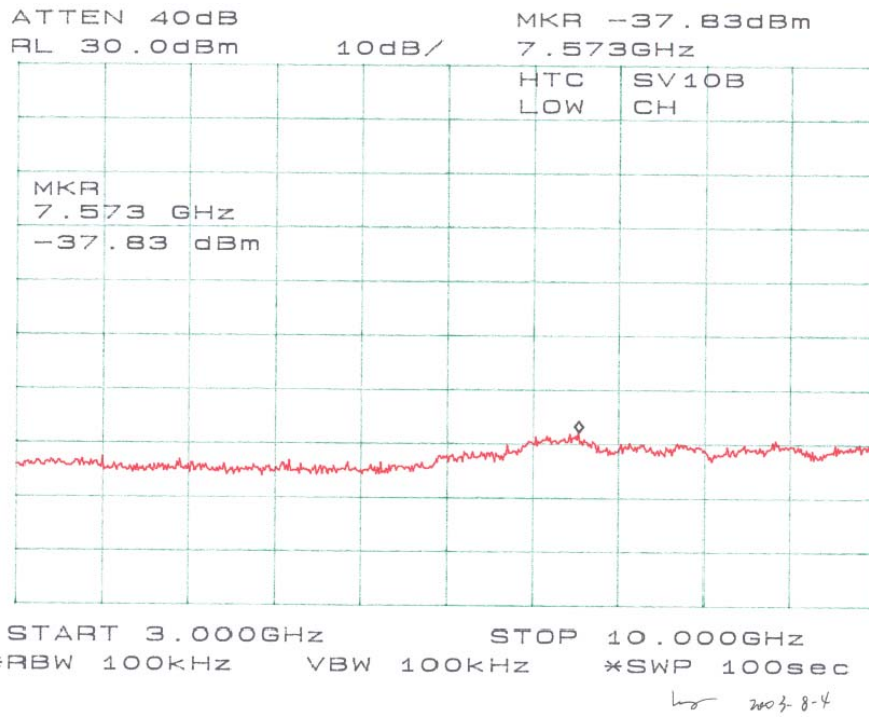
START 30.0MHz STOP 1.0000GHz
RBW 100kHz VBW 100kHz *SWP 50.0sec

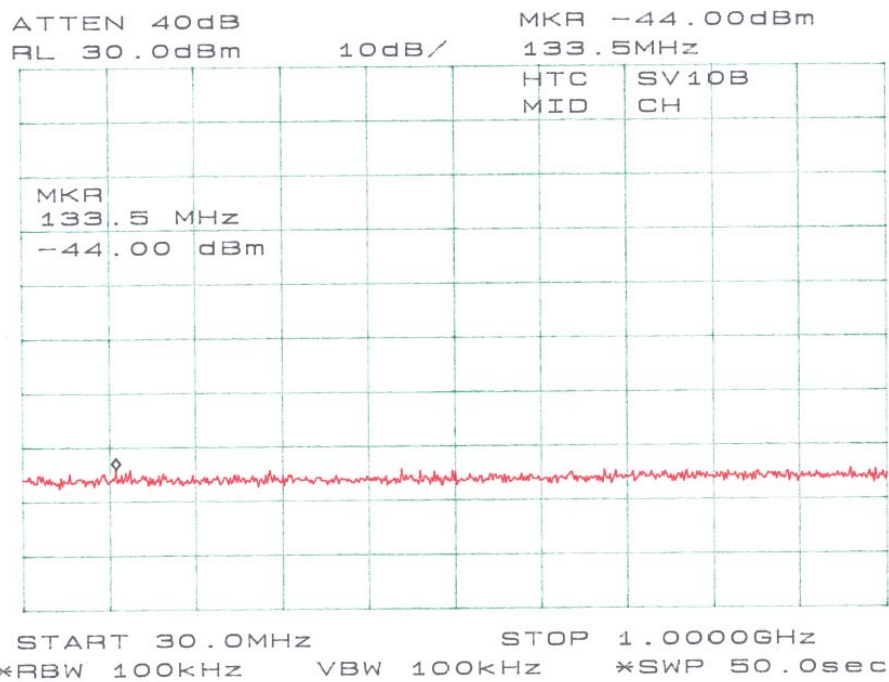
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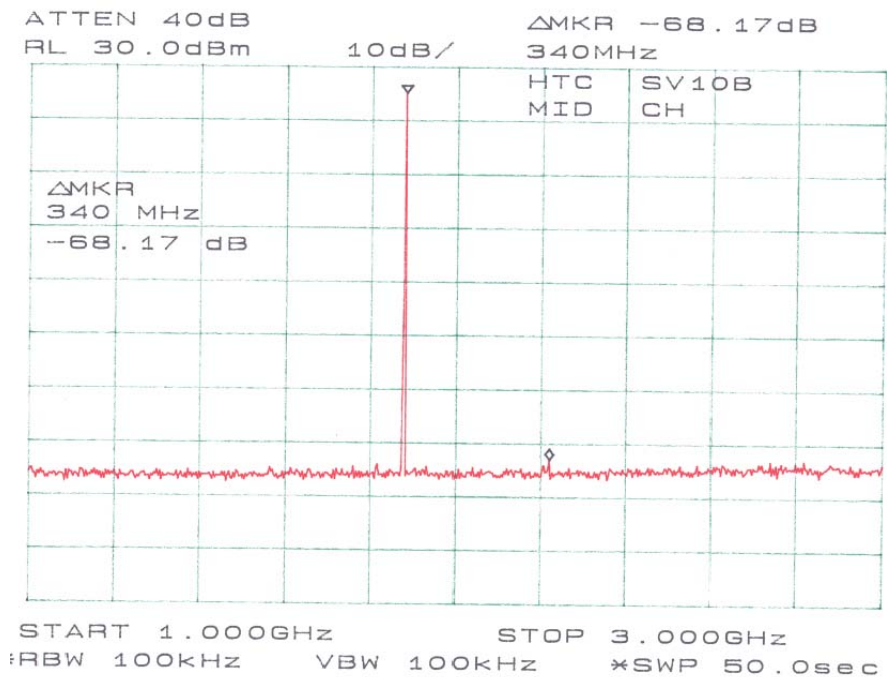
START 1.000GHz STOP 3.000GHz
RBW 100kHz VBW 100kHz *SWP 50.0sec

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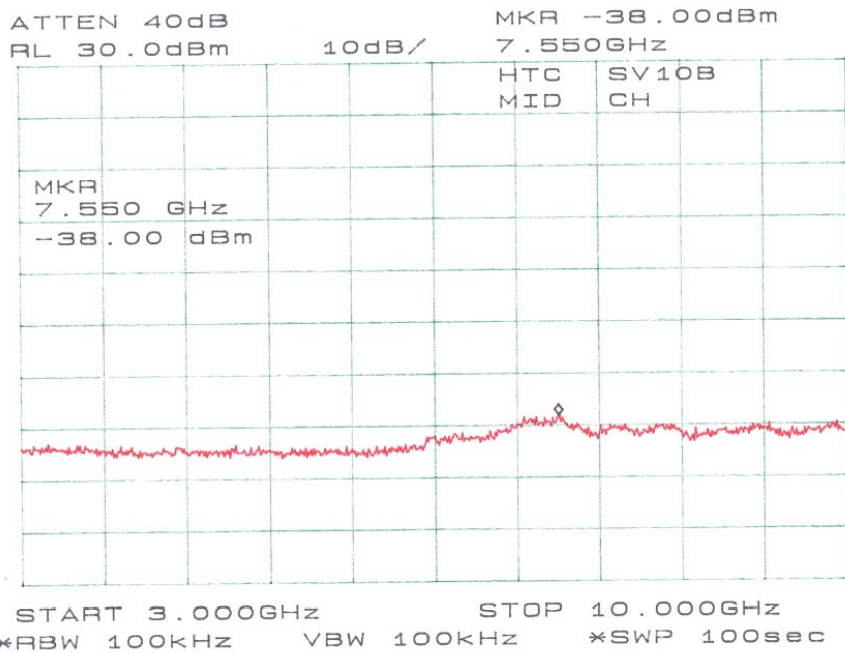




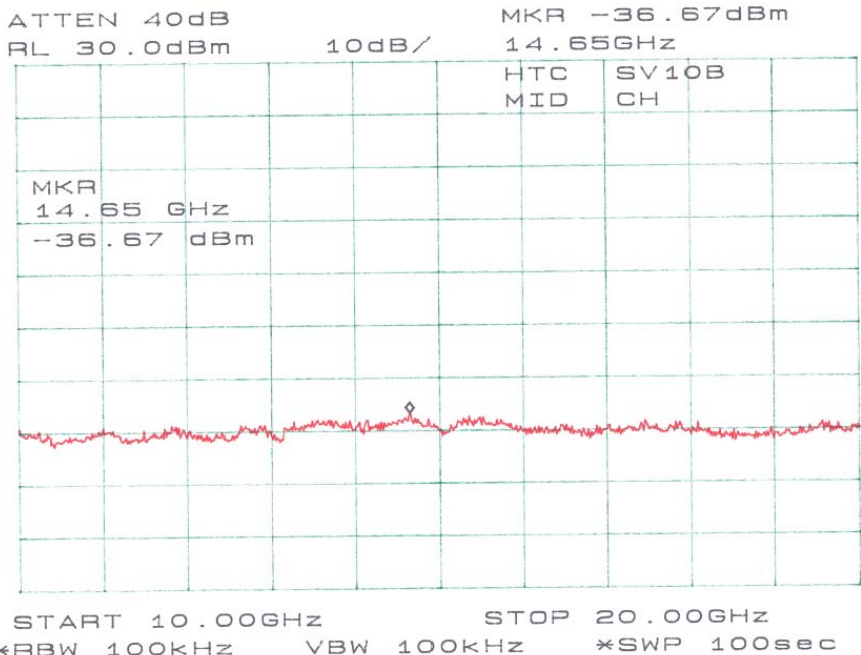
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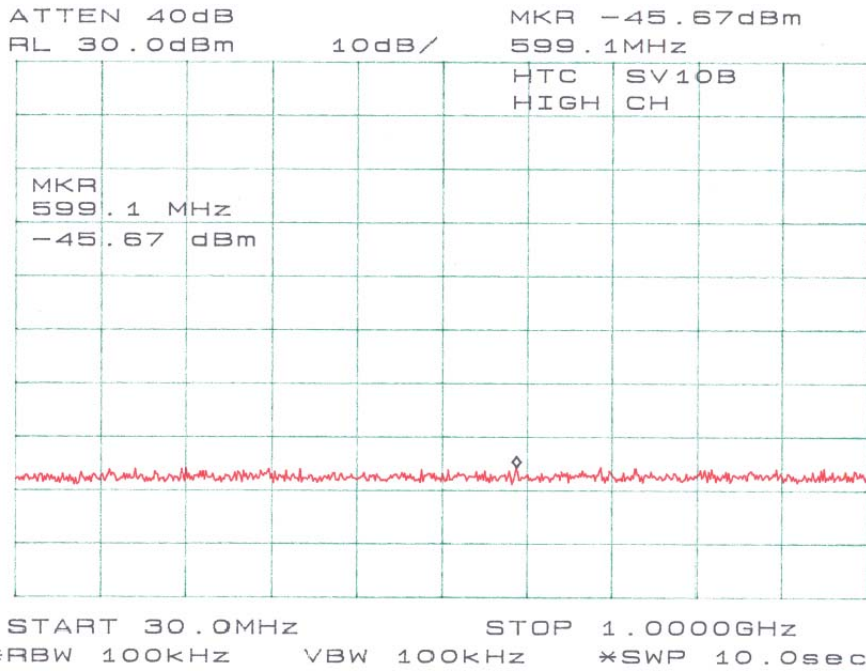
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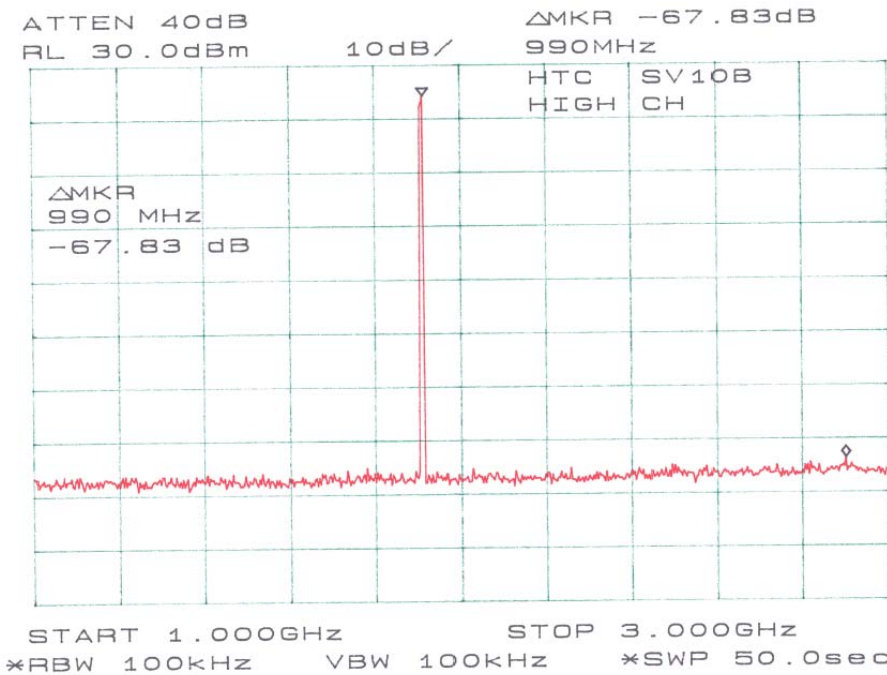
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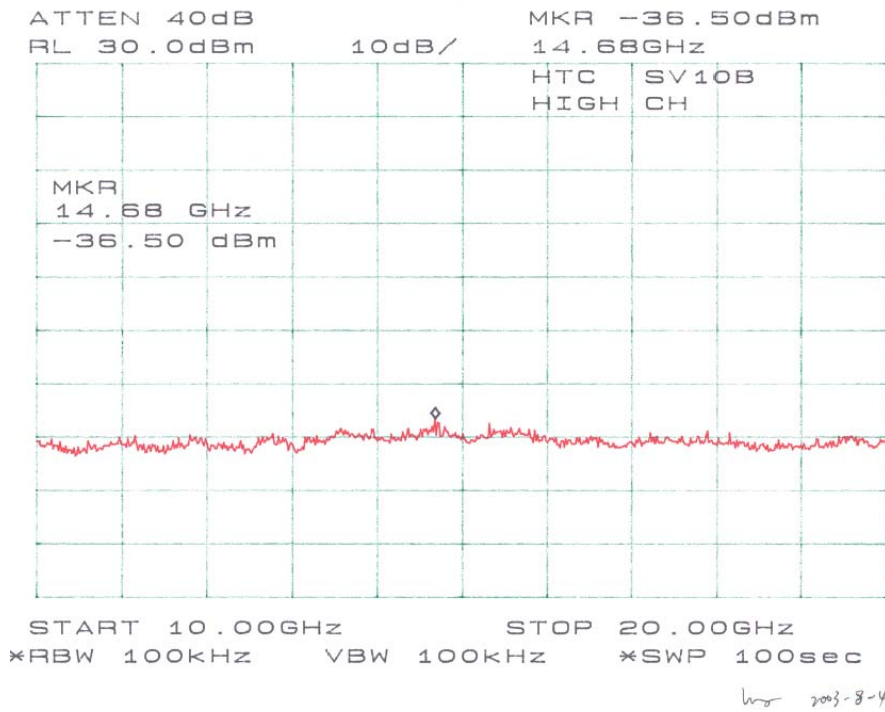
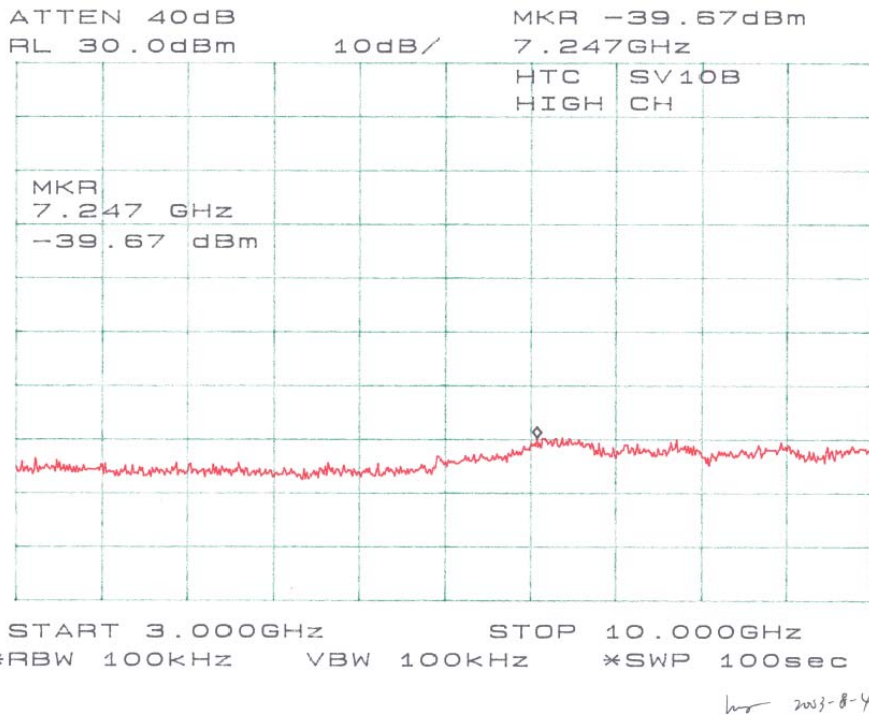
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2003-8-4



8 - FIELD STRENGTH OF SPURIOUS RADIATION

8.1 Test Procedure

Requirements: CFR 47, § 2.1053, § 22.917 and § 24.238 (a).

8.2 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 = $10 \lg(\text{TXpwr in Watts}/0.001)$ – the absolute level

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

8.3 Test Equipment

CDI B100/200/300 Biconical Antennas
EMCO Bi-logcon Antenna
EMCO 3115 Horn Antenna
HP 8566B Spectrum Analyzer
Preamplifiers
HP8640 Generator
Non-radiating Load

8.4 Test Result

For Model: SV10B

Low Channel: -14.73 dBm at 3700.4 MHz
Middle Channel: -16.33 dBm at 3760 MHz
High Channel: -12.5 dBm at 3819.6 MHz

For Model: SV10A

Low Channel: -10.83 dBm at 3700.4 MHz
Middle Channel: -12.3 dBm at 3760 MHz
High Channel: -9.7 dBm at 3819.6 MHz

8.4.1 Test Data for Model: SV10B

EUT					Generator							Standard	
Indicated		Table	Test Antenna		Substitution			Antenna	Cable	Absolute	FCC	FCC	
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Polar H/V	Gain Corrected	Loss dBm	Level dB	Limit dBm	Margin DBm	
Low Channel													
1850.2	120.3	250	2.2	V	1850.2	22.1	V	6.7	0.1	28.7			
1850.2	114	90	1.8	H	1850.2	16.05	H	6.7	0.1	22.65			
3700.4	50.17	150	2.5	V	3700.4	-36.2	V	8.8	0.3	-27.73	-13	-14.73	
3700.4	48.33	90	1.5	H	3700.4	-38.3	H	8.8	0.3	-29.83	-13	-16.83	
5550.6	42.67	30	2	V	5550.6	-42.2	V	9.1	0.5	-33.57	-13	-20.57	
5550.6	42.17	60	1.8	H	5550.6	-43.7	H	9.1	0.5	-35.07	-13	-22.07	
Middle Channel													
1880	119.5	0	2.2	V	1880	21.67	V	6.7	0.1	28.27			
1880	113.8	150	2	H	1880	15.8	H	6.7	0.1	22.4			
3760	49.5	270	2	V	3760	-37.8	V	8.8	0.3	-29.33	-13	-16.33	
3760	46.33	150	2	H	3760	-40.7	H	8.8	0.3	-32.17	-13	-19.17	
5640	44.33	30	1.5	V	5640	-42	V	9.1	0.5	-33.4	-13	-20.4	
5640	43	45	1.7	H	5640	-43.3	H	9.1	0.5	-34.7	-13	-21.7	
High Channel													
1909.8	118.7	300	2	V	1909.8	20.9	V	6.7	0.1	27.5			
1909.8	112.7	300	1.8	H	1909.8	15.25	H	6.7	0.1	21.85			
3819.6	52.67	270	1.8	V	3819.6	-34	V	8.8	0.3	-25.5	-13	-12.5	
3819.6	50.5	300	2.2	H	3819.6	-36.2	H	8.8	0.3	-27.7	-13	-14.7	
5729.4	44.5	0	2.2	V	5729.4	-41.8	V	9.1	0.5	-33.23	-13	-20.23	
5729.4	43.33	200	1.7	H	5729.4	-42.7	H	9.1	0.5	-34.07	-13	-21.07	

Sample calculation:

Absolute level = substitution level + antenna gain – cable loss

For example:

$$22.1+6.7-0.1 = 28.7$$

$$21.67+6.7-0.1 = 28.27$$

$$20.9+6.7-0.1 = 27.5$$

8.4.2 Test Data for Model: SV10A

EUT					Generator						Standard	
Indicated		Table	Test Antenna		Substitution			Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Polar H/V	Gain Corrected	Loss dBm	Level dB	Limit dBm	Margin DBm
Low Channel												
1850.2	120	300	2	V	1850.2	22	V	6.7	0.1	28.6		
1850.2	113.1	30	1.8	H	1850.2	15.1	H	6.7	0.1	21.7		
3700.4	53.33	180	1.8	H	3700.4	-32.3	H	8.8	0.3	-23.83	-13	-10.83
3700.4	53.67	90	2.2	V	3700.4	-32.7	V	8.8	0.3	-24.17	-13	-11.17
5550.6	47.33	60	2	V	5550.6	-38.5	V	9.1	0.5	-29.9	-13	-16.9
5550.6	43.83	270	1.9	H	5550.6	-44	H	9.1	0.5	-35.4	-13	-22.4
Middle Channel												
1880	119.3	0	2	V	1880	21.45	V	6.7	0.1	28.05		
1880	113.3	90	1.8	H	1880	15.3	H	6.7	0.1	21.9		
3760	52.5	90	2.3	V	3760	-33.8	V	8.8	0.3	-25.3	-13	-12.3
3760	50.17	150	2	H	3760	-35.1	H	8.8	0.3	-26.6	-13	-13.6
5640	49.33	150	2	V	5640	-37.5	V	9.1	0.5	-28.9	-13	-15.9
5640	44.17	60	2.2	H	5640	-42.3	H	9.1	0.5	-33.7	-13	-20.7
High Channel												
1909.8	118.9	0	2.2	V	1909.8	21.1	V	6.7	0.1	27.7		
1909.8	112.7	270	2	H	1909.8	14.75	H	6.7	0.1	21.35		
3819.6	54.7	0	2.3	V	3819.6	-31.2	V	8.8	0.3	-22.7	-13	-9.7
3819.6	53.67	300	2.2	H	3819.6	-32.4	H	8.8	0.3	-23.9	-13	-10.9
5729.4	47.83	330	2.5	V	5729.4	-40.8	V	9.1	0.5	-32.23	-13	-19.23
5729.4	45.17	0	1.8	H	5729.4	-43.3	H	9.1	0.5	-34.7	-13	-21.7

Sample calculation:

Absolute level = substitution level + antenna gain – cable loss

For example:

$$22+6.7-0.1 = 28.6$$

$$21.45+6.7-0.1 = 28.05$$

$$21.1+6.7-0.1 = 27.7$$

9 – BAND EDGE TEST

9.1 Applicable Standards

According to FCC §2.1049 and §24.238, when measuring the emission limits, carrier frequency shall be adjusted as close to the frequency block edges, both upper and lower.

9.2 Test Procedure

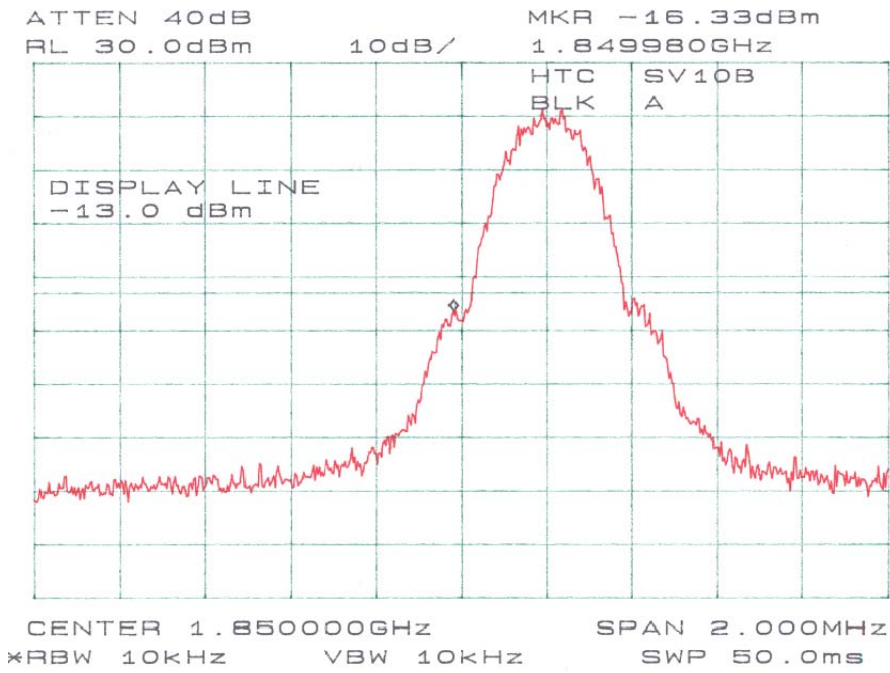
The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. Adjust the carrier frequency as close to the frequency block edges both upper and lower. Sufficient scans were taken to show any out of band-edge emission.

9.3 Test Equipment

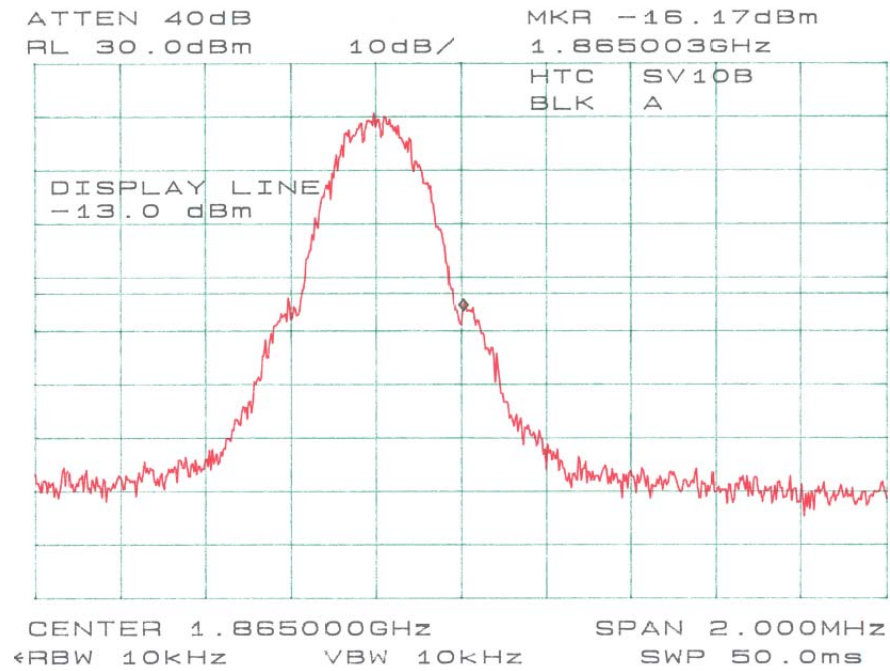
Agilent 8565EC Spectrum Analyzer
HP 7470A Plotter
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Rohde & Schwarz SMIQ03B Signal Generator
Rohde & Schwarz AMIQ I/Q Modulation Generator
Hewlett Packard 8449 Amplifier
A.H. Systems, Inc SAS-200/571 Horn Antenna

9.4 Plots of Out-of-Band-Edge Emissions at Antenna Terminal

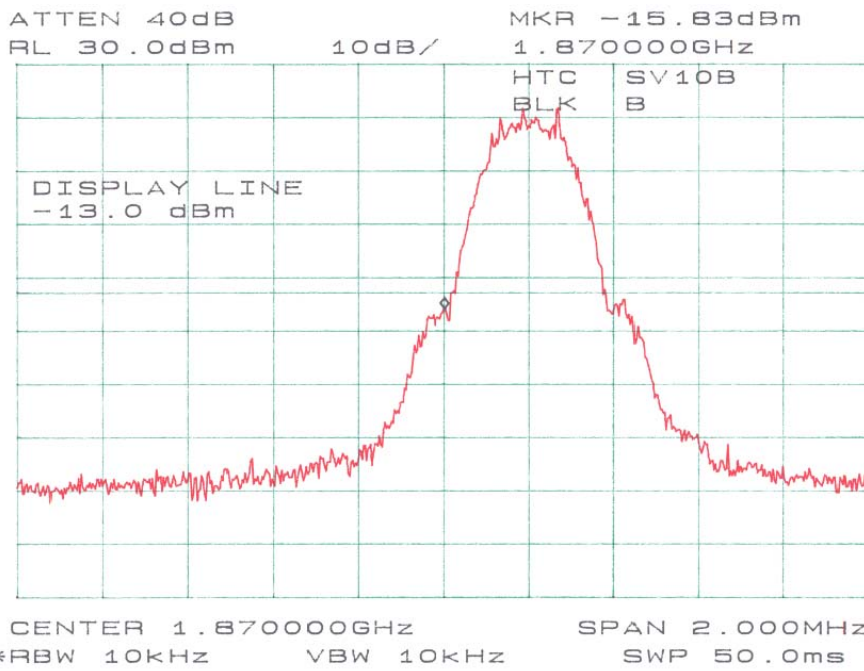
Please refer to plots hereinafter.



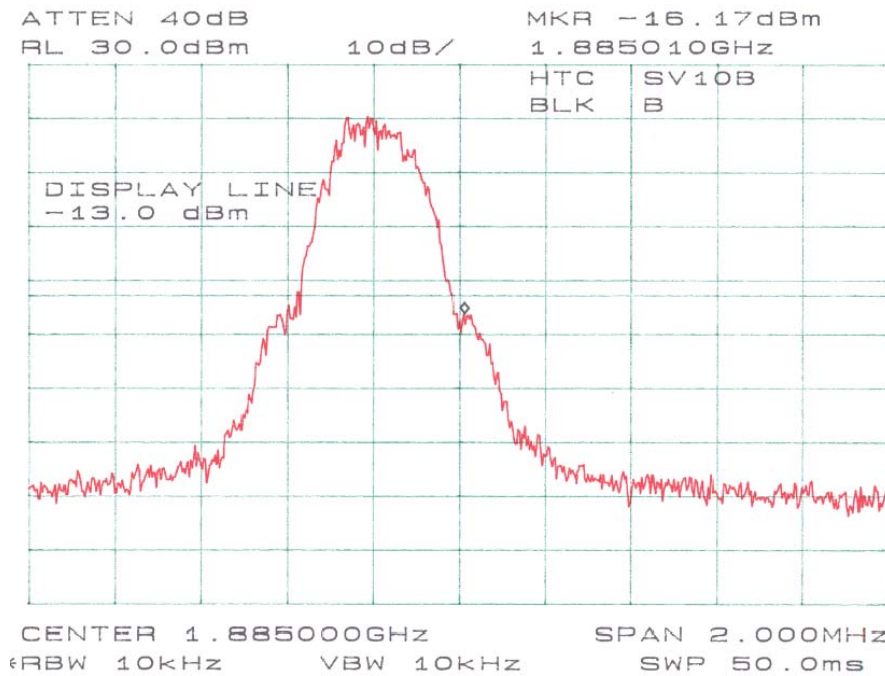
203-8-4



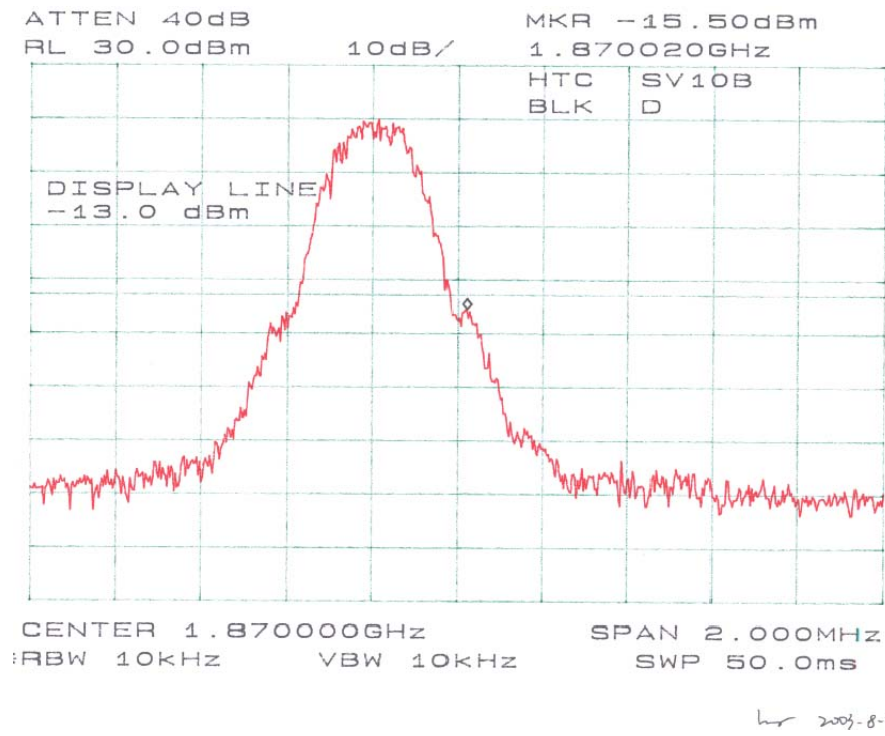
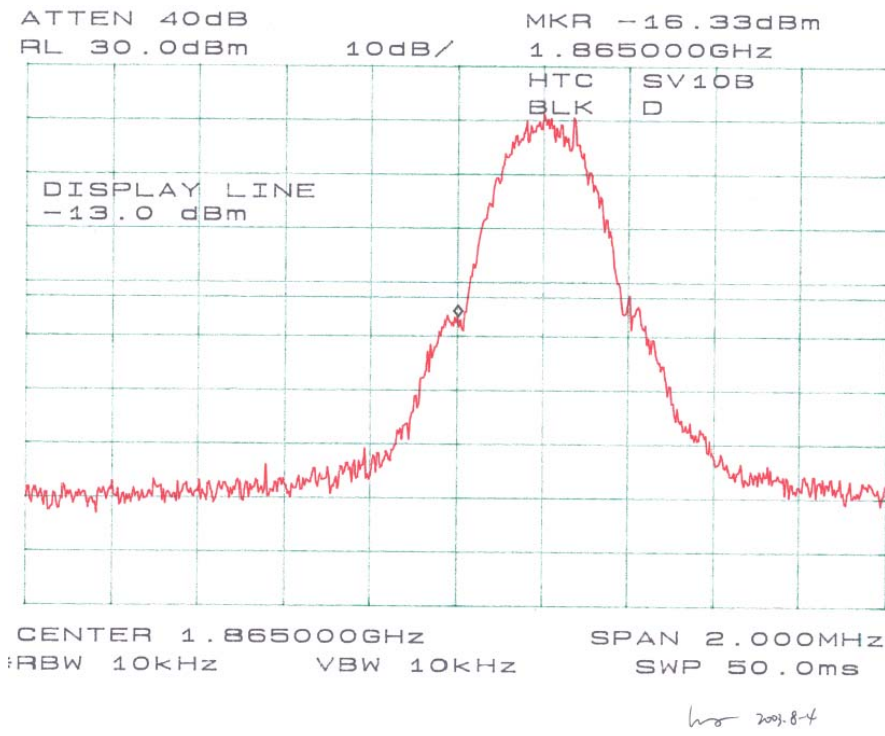
203-8-4

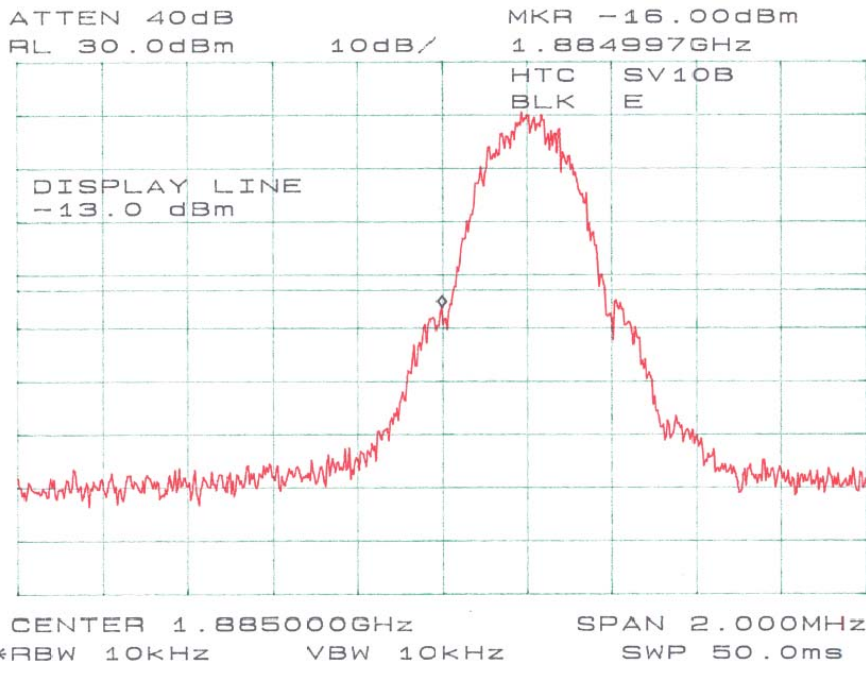


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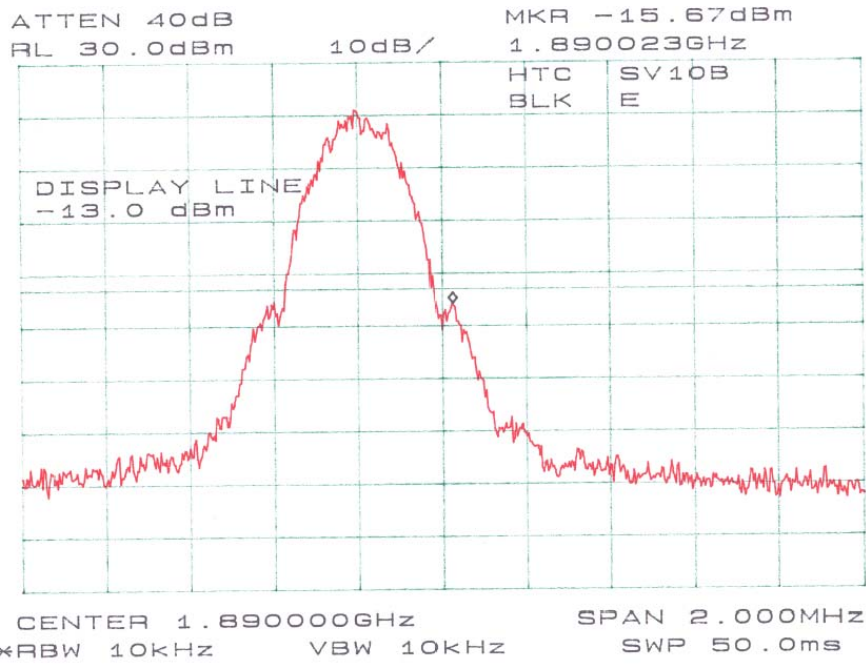


hr 2003-8-4

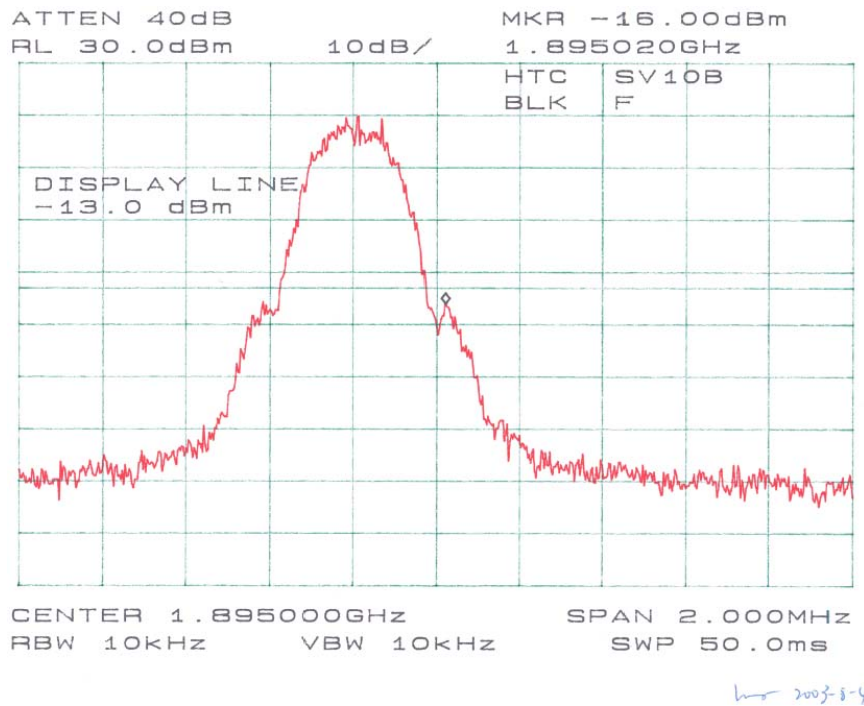
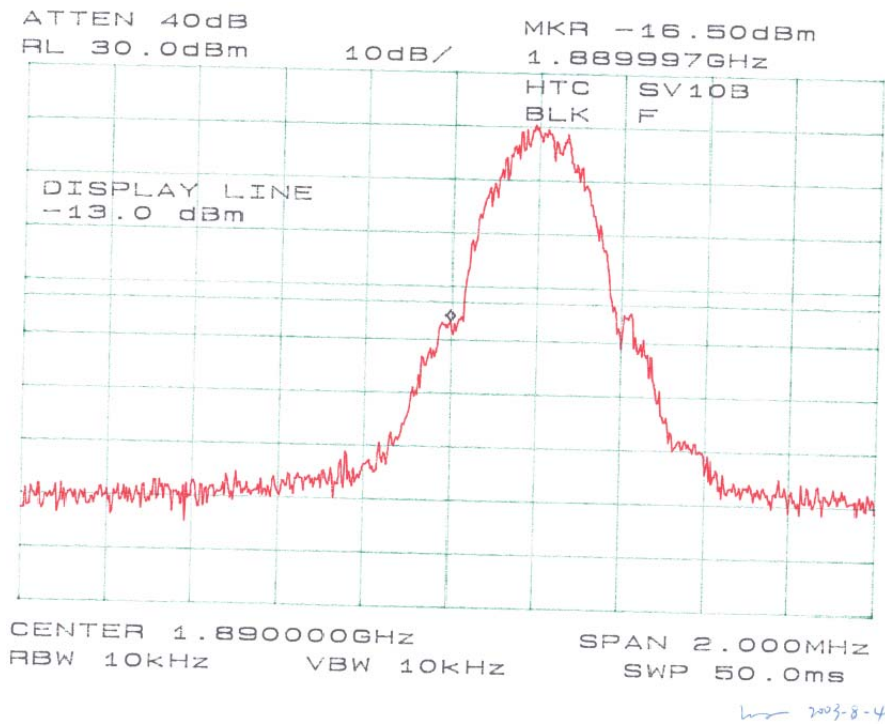




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10 - FREQUENCY STABILITY

Frequency Stability vs Temperature

Reference Frequency: 1880 MHz		
Temperature (°C)	MHz	%
50	1880.004	0.00021%
40	1880.002	0.00011%
30	1880.002	0.00011%
20	1880.00	0.00000%
10	1879.999	-0.00005%
0	1880.001	0.00005%
-10	1879.997	-0.00016%
-20	1879.997	-0.00016%

Frequency Stability vs Battery Voltage

Reference Frequency: 1880 MHz		
Power Supplied (Vdc)	MHz	%
3.6	1880.001	0.00005%
4.2	1880.002	0.00011%