Nemko Test Report:	3L0345RUS1REV2
Applicant:	Enfora Inc. 661 E/ 18th Street Plano, Texas 75074
Equipment Under Test: **(E.U.T.)**	Aspen – GSM/GPRS Wireless Modem GSM0107
In Accordance With:	**FCC Parts 24, Subpart E** Broadband PCS Subscriber Station
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, TX 75057-3136
Authorized By:	 Tom Tidwell, Frontline Manager
Date:	28Apr04
Total Number of Pages:	37

Table of Contents

Section 1. Summary of Test Results

Manufacturer: Enfora Inc.

Model No.: GSM0107

Serial No.: 28

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 24, Subpart E.

☒ New Submission ☐ Production Unit

☐ Class II Permissive Change ☒ Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See " Summary of Test Data".

TESTED BY: ____Eldon Berry_____ DATE: _26 Aug., 2003_

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	24.232	2W eirp	Complies
Occupied Bandwidth (TDMA)	24.238	Not Specified	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	Complies
Frequency Stability	24.235	+/- 0.05 ppm	Complies

Footnotes:

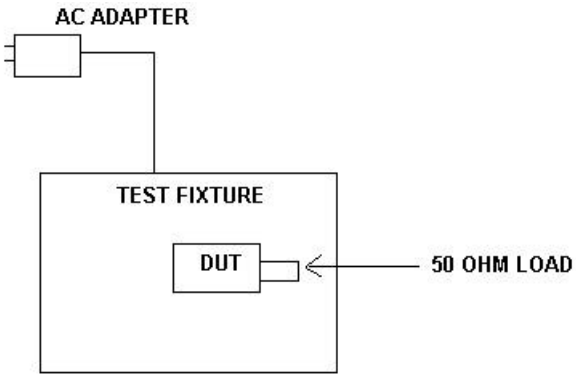
Section 2. General Equipment Specification

Supply Voltage Input:	3.3 - 5 Vdc
Frequency Bands:	☒ Block A 1850 – 1865 MHz ☒ Block D 1865 – 1870 MHz ☒ Block B 1870 – 1885 MHz ☒ Block E 1885 – 1890 MHz ☒ Block F : 1890 – 1895 MHz ☒ Block C 1895 – 1910 MHz
Type of Modulation and Designator:	**GPRS** **292K6G7W** ☒ **See page 9 for 20dB BW**
Output Impedance:	50 ohms
RF Output (Rated):	1 Watt

System Description

This device is a wireless GSM/GPRS wireless modem that operates in the PCS band.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 24.232(b)
TESTED BY: Eldon Berry	DATE: 22Aug03

Test Results: Complies.

Measurement Data:

RF Power Output (Conducted)

Job No.:	3L0345R	Date:	8/22/2003
Specification:	CFR 47, Part 24	Temperature(°C):	21
Tested By:	Eldon Berry	Humidity(%)	50
E.U.T.:	GSM0107		
Configuration:	EUT on test fixture.		
Detector:	Average		

Test Equipment Used:

Power Meter:	E4418B	Directional Coupler:	
Power Sensor:	E9304A	Cable #1:	1083
Load:		Cable #2:	
Spectrum Analyzer:	NA	Cable #3:	
Attenuator #1	1604	Cable #4:	
Attenuator #2:		Cable #5:	
Attenuator #3:		Cable #6:	
Attenuator #4:		Power Splitter:	

Measurement Uncertainty: +/- .7 dB

Frequency MHz	Channel	Modulation Type	Output Power (dBm)	Output Power (mW)
1850.2	512	GPRS	29.8	954.99
1880.2	662	GPRS	29.7	933.25
1909.8	810	GPRS	28.8	758.58

Power meter set for 12.5 % duty cycle.

Cable and attenuator verified with generator # 1053

Section 4. Occupied Bandwidth

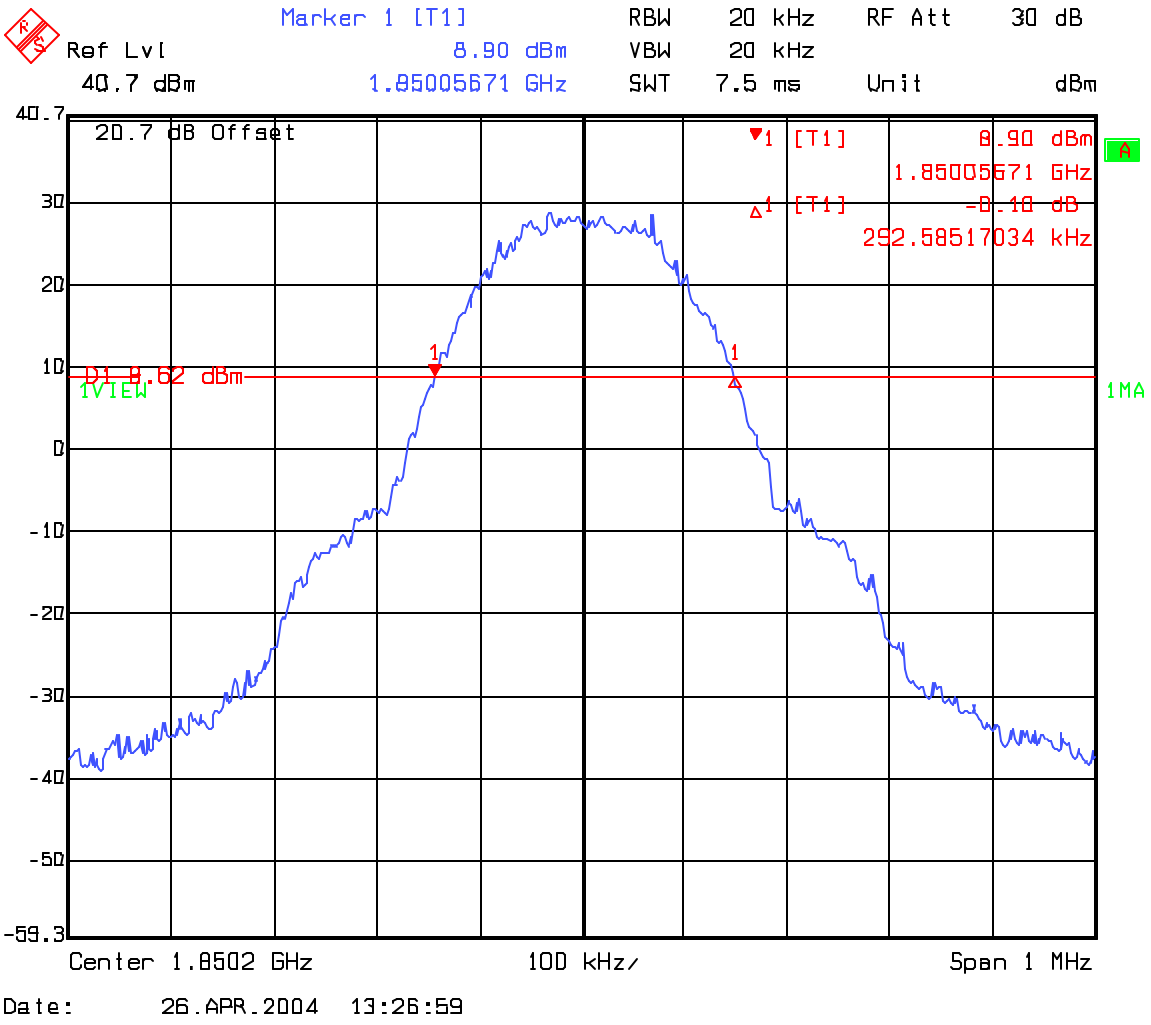
NAME OF TEST: Occupied Bandwidth	PARA. NO.: 24.238
TESTED BY: Dustin Oaks	DATE: April 26, 2004

Test Results: Complies.

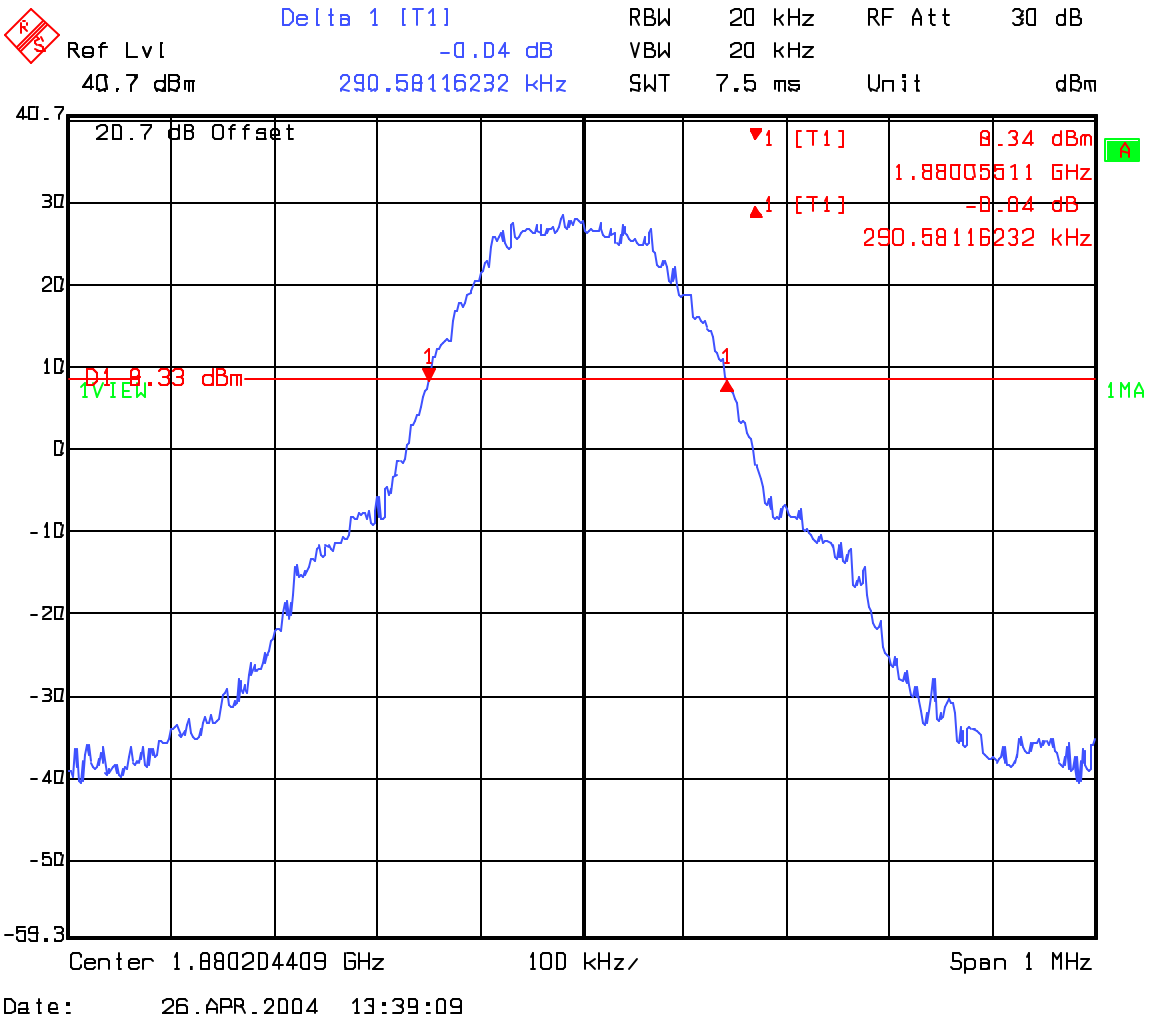
Test Data: See attached plots.

Test Equipment Used: 1036, 1973, 1604

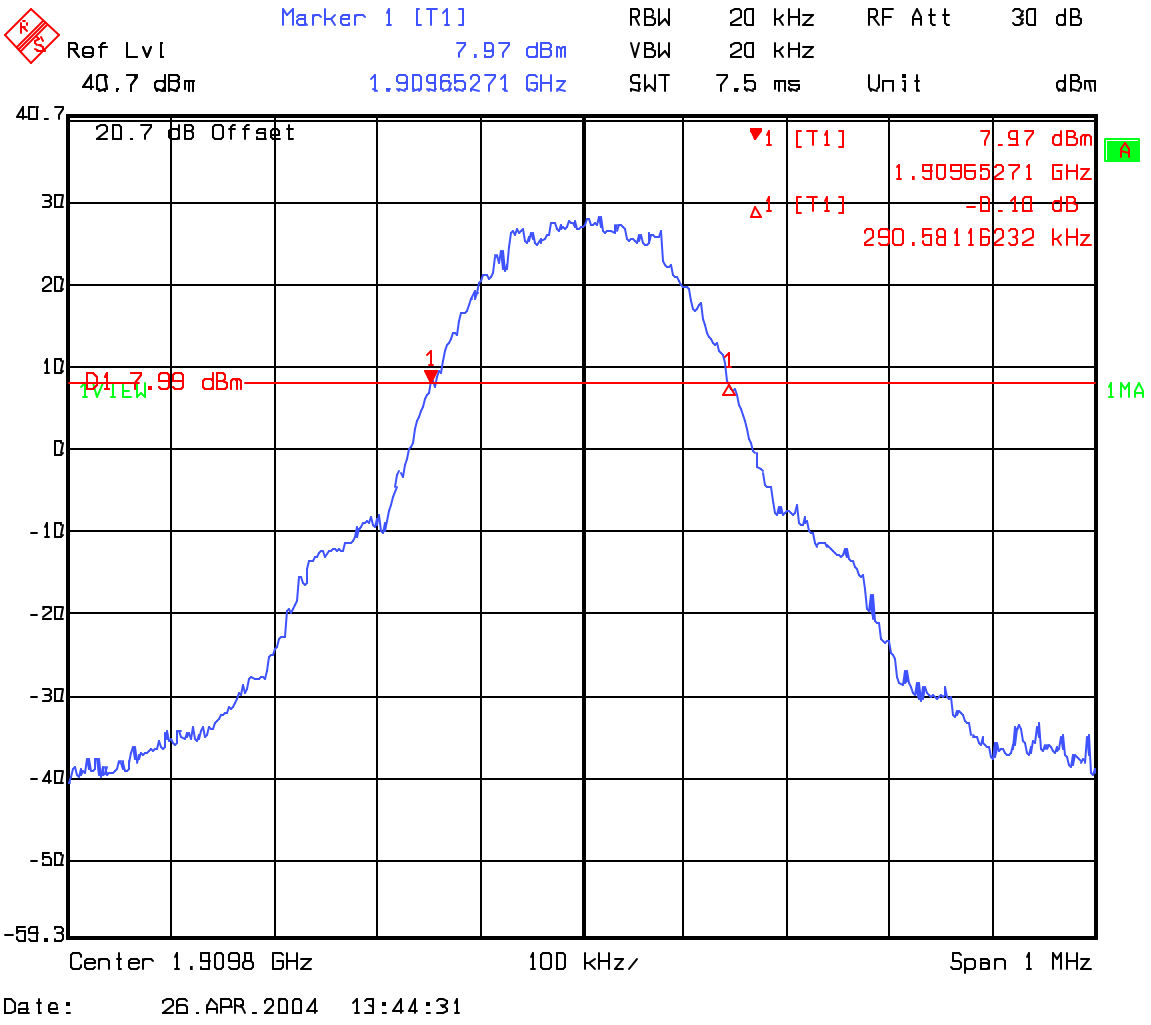
Test Plot – Occupied Bandwidth, Low Channel



Test Plot – Occupied Bandwidth, Middle Channel



Test Plot – Occupied Bandwidth, High Channel



Section 5. Spurious Emissions at Antenna Terminals

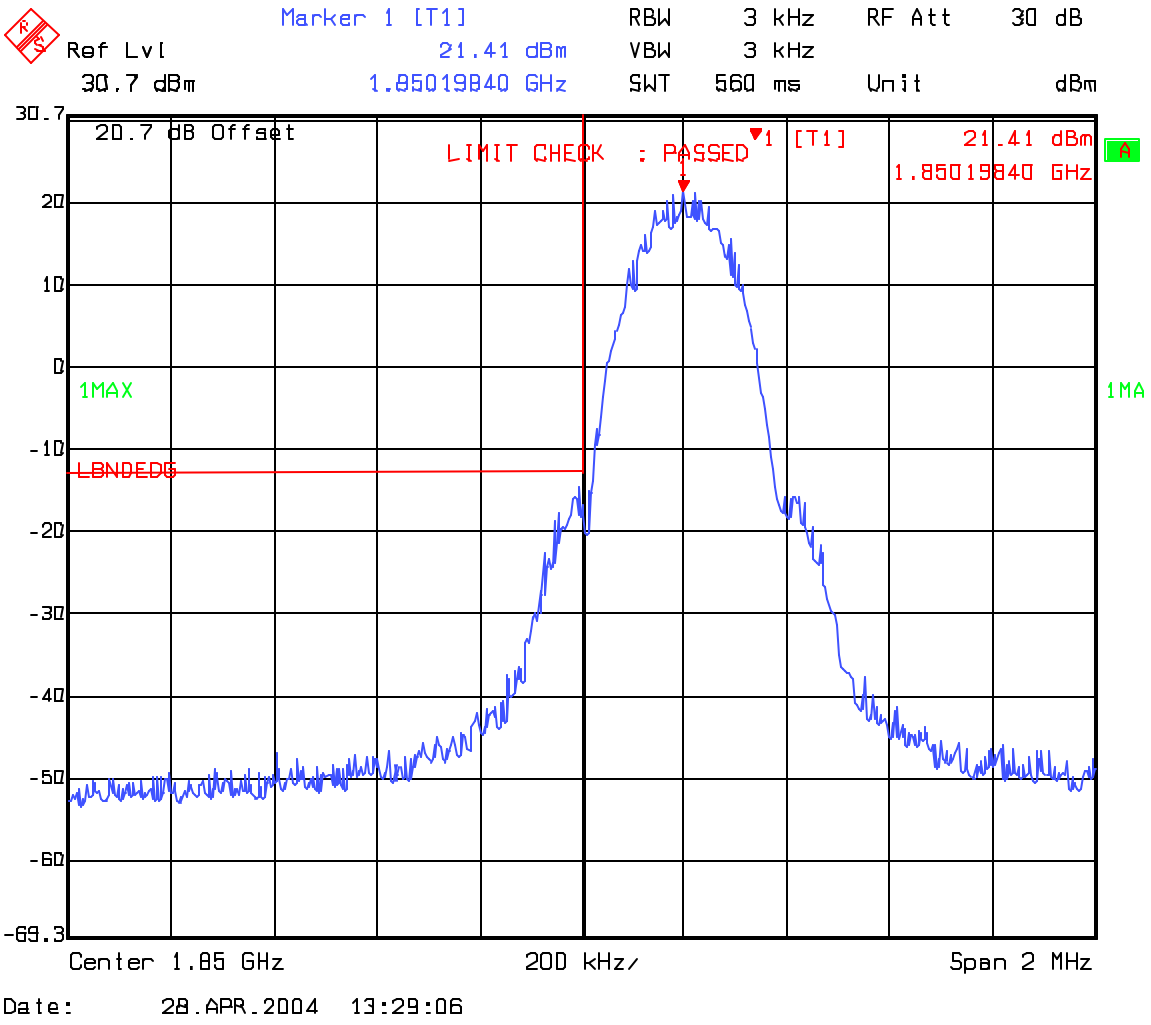
NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 24.238
TESTED BY: Dustin Oaks	DATE: April 26, 2004

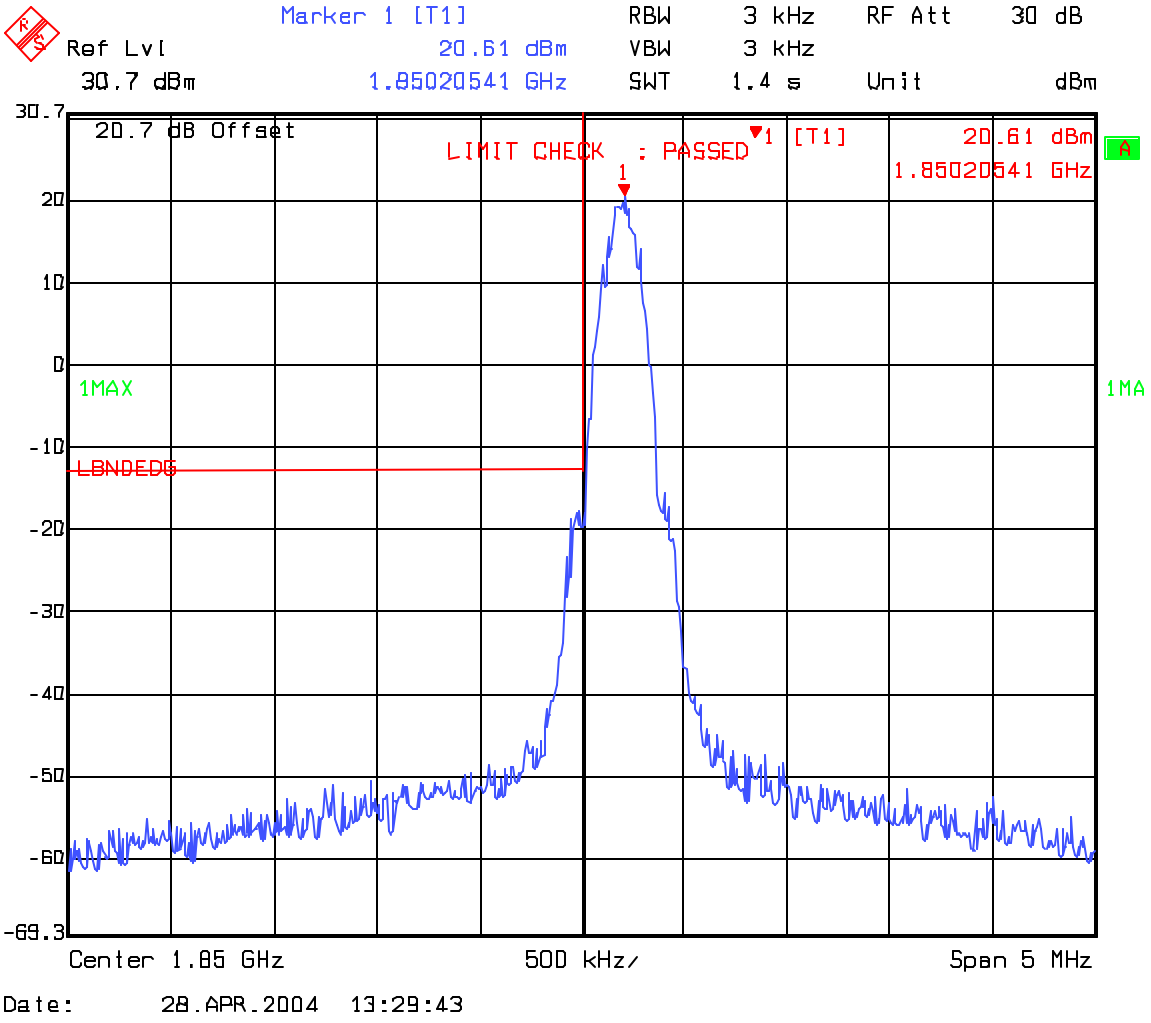
Test Results: Complies.

Test Data: See attached plots.

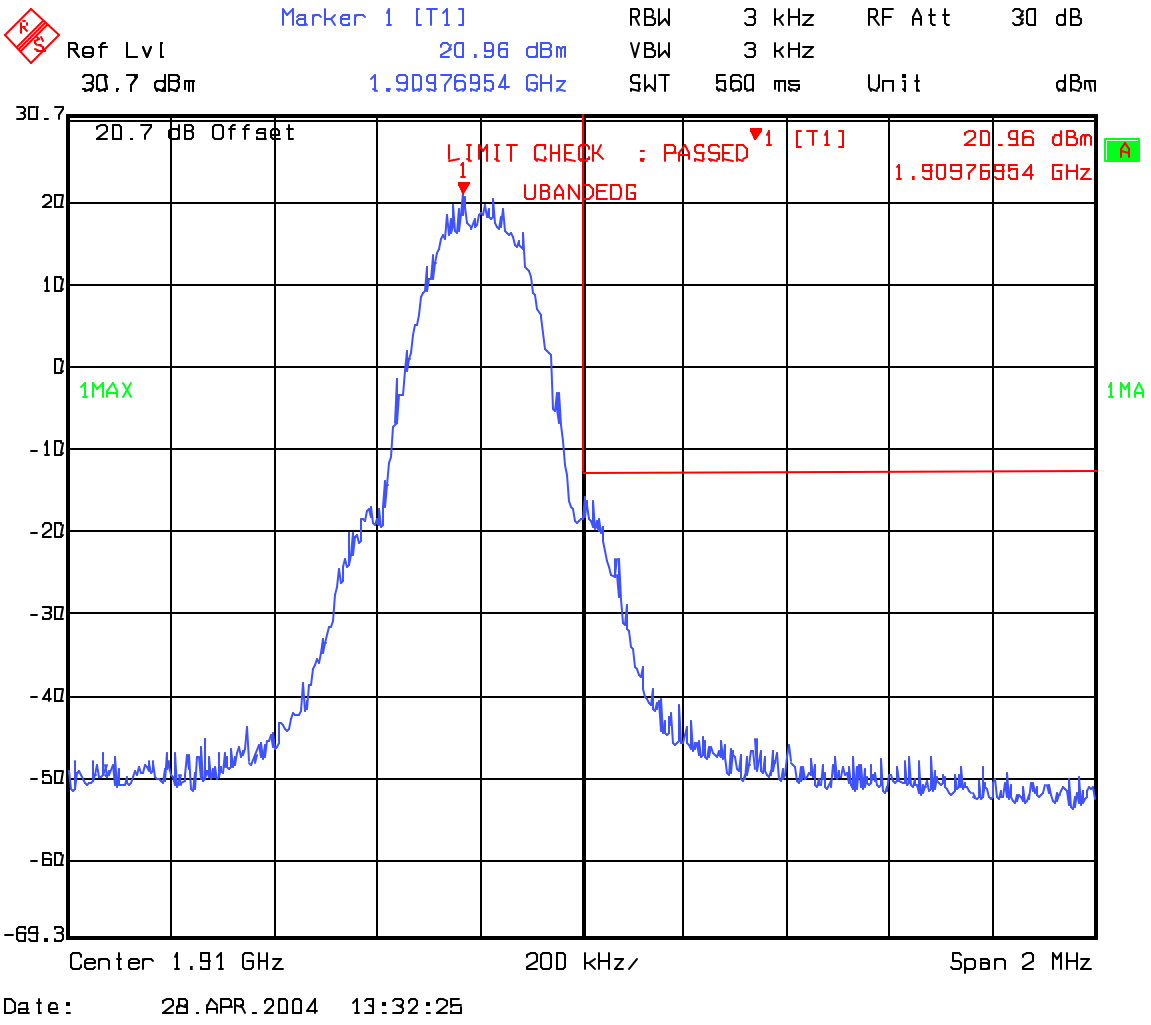
Test Equipment Used: 1036, 1973, 1604

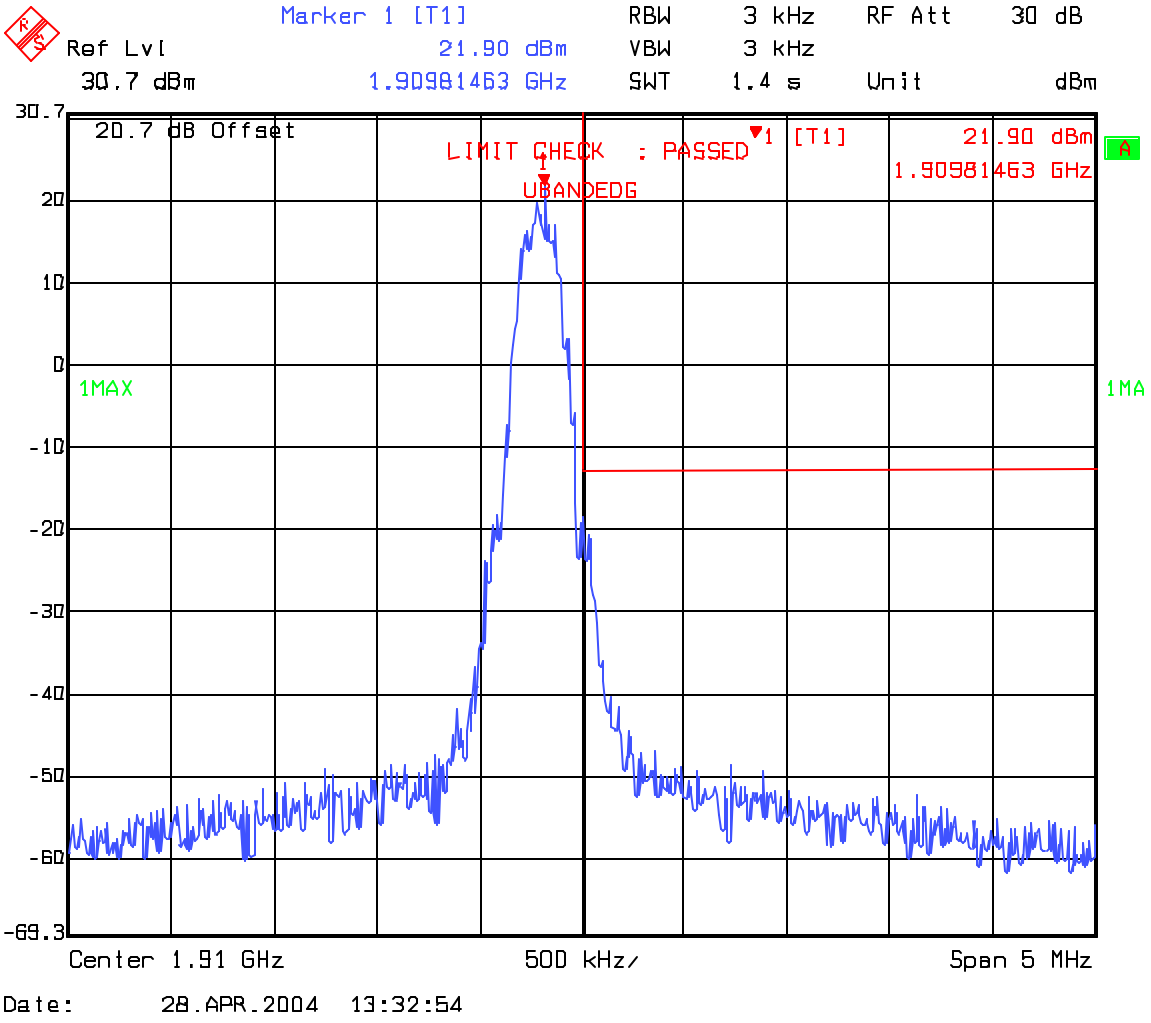
Test Plots – Lower Band Edge



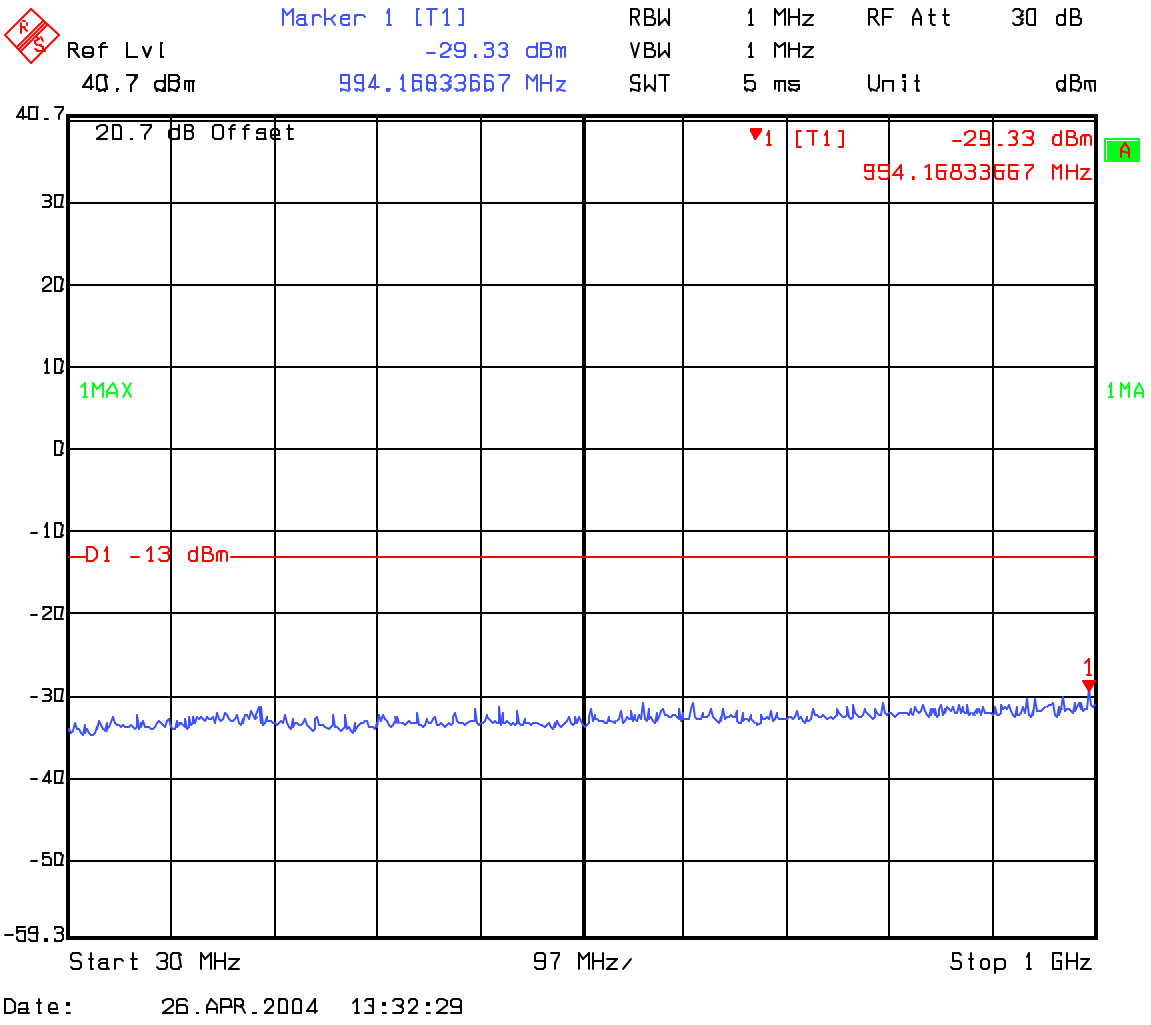

Marker 1 [T1]
Ref Lvl
30.7 dBm
20.61 dBm
1.85020541 GHz
RBW 3 kHz
VBW 3 kHz
SWT 1.4 s
RF Att 30 dB
Unit dBm
20.7 dB Offset
LIMIT CHECK : PASSED
1 [T1]
20.61 dBm
1.85020541 GHz
1MAX
LBNDEDG
1MA
30.7
20
10
0
-10
-20
-30
-40
-50
-60
-69.3
Center 1.85 GHz
500 kHz/
Span 5 MHz
Date: 28.APR.2004 13:29:43

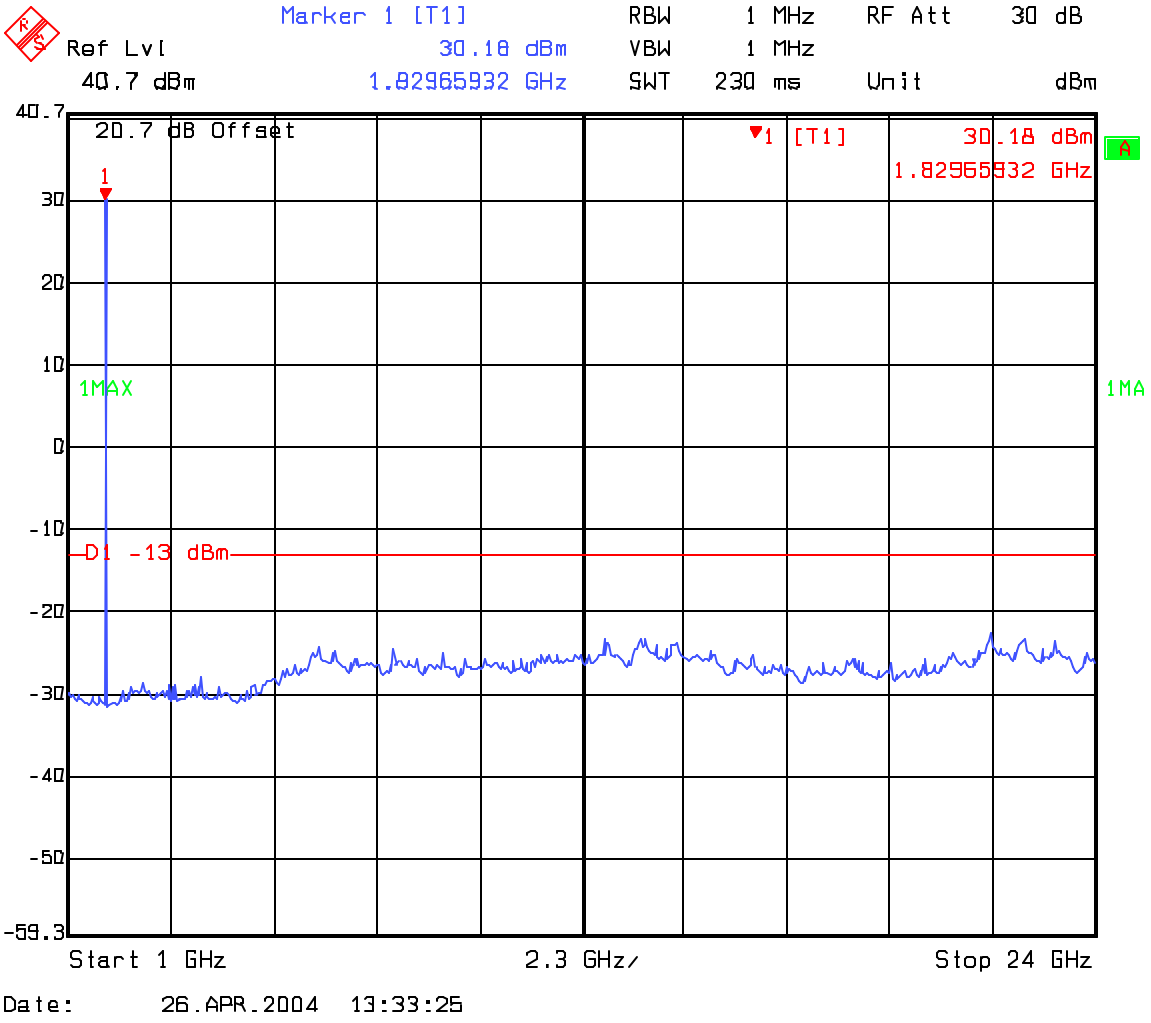
Test Plots – Upper Band Edge



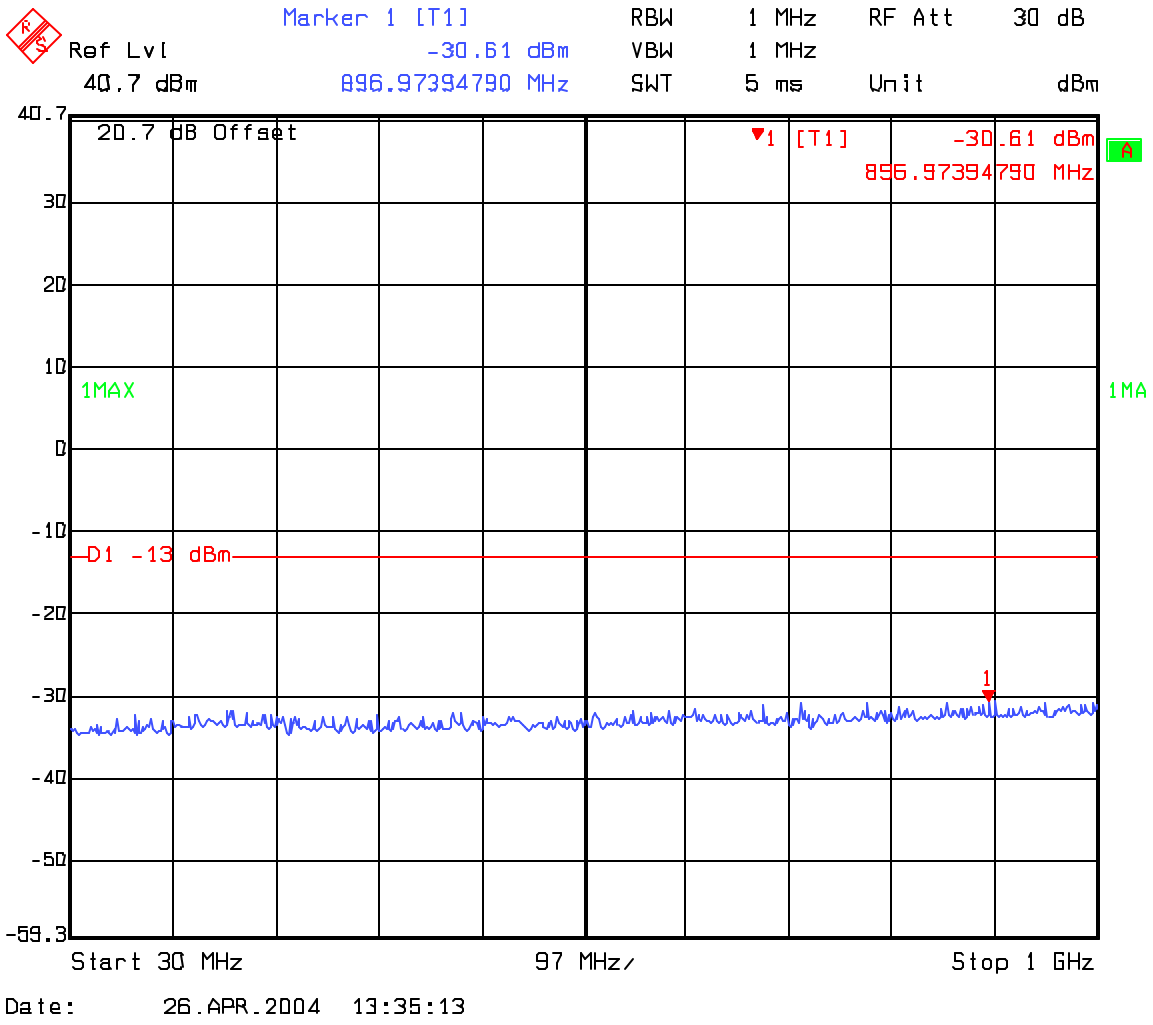

Marker 1 [T1]
Ref Lvl
30.7 dBm
21.90 dBm
1.90981463 GHz
RBW 3 kHz
VBW 3 kHz
SWT 1.4 s
RF Att 30 dB
Unit dBm
20.7 dB Offset
LIMIT CHECK : PASSED
UBANDEDG
1 [T1]
21.90 dBm
1.90981463 GHz
1MAX
1MA
A
30.7
20
10
0
-10
-20
-30
-40
-50
-60
-69.3
Center 1.91 GHz
500 kHz/
Span 5 MHz
Date: 28.APR.2004 13:32:54

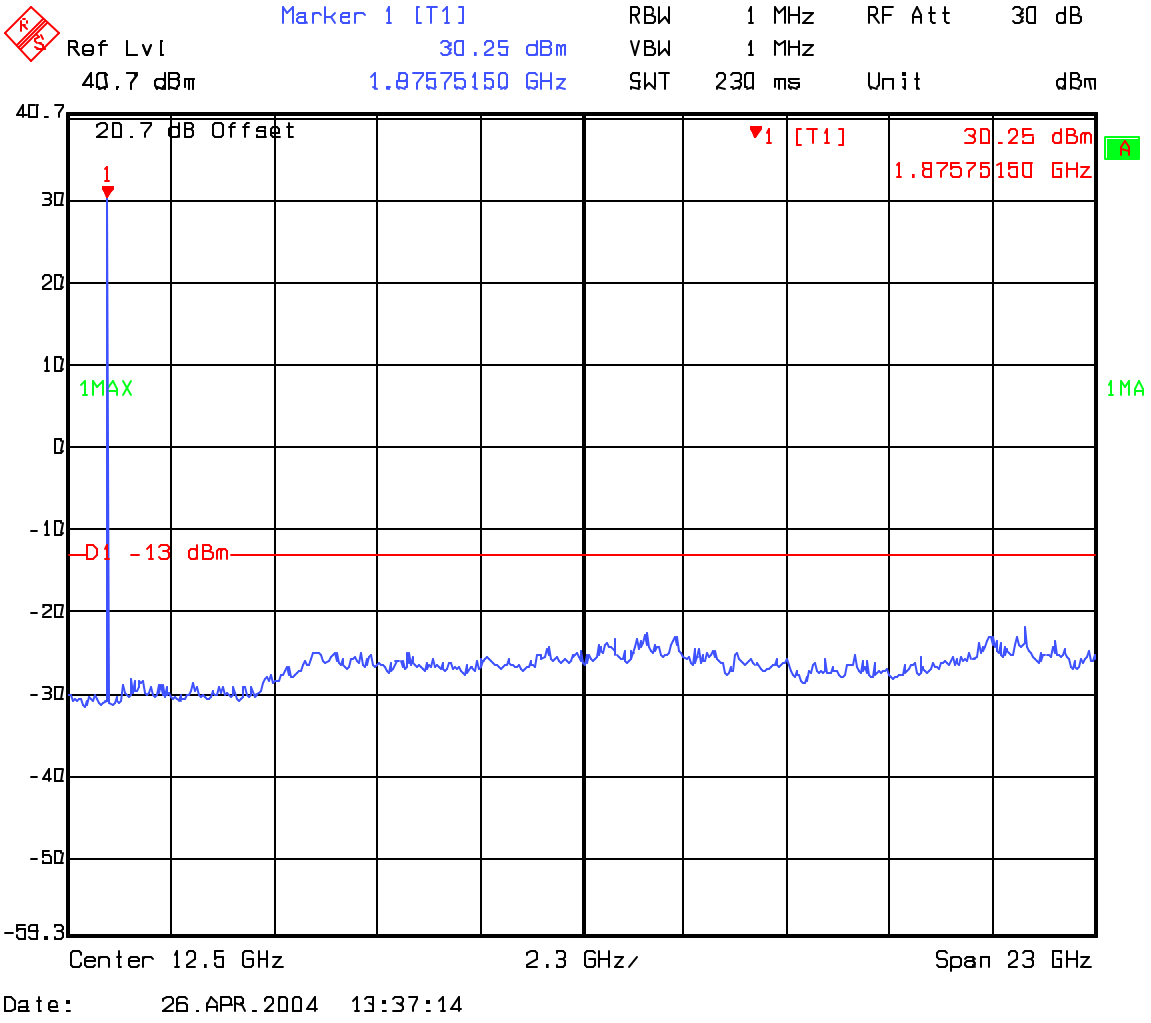
Test Plots – Spurious Emissions at Antenna Terminals - Low Channel



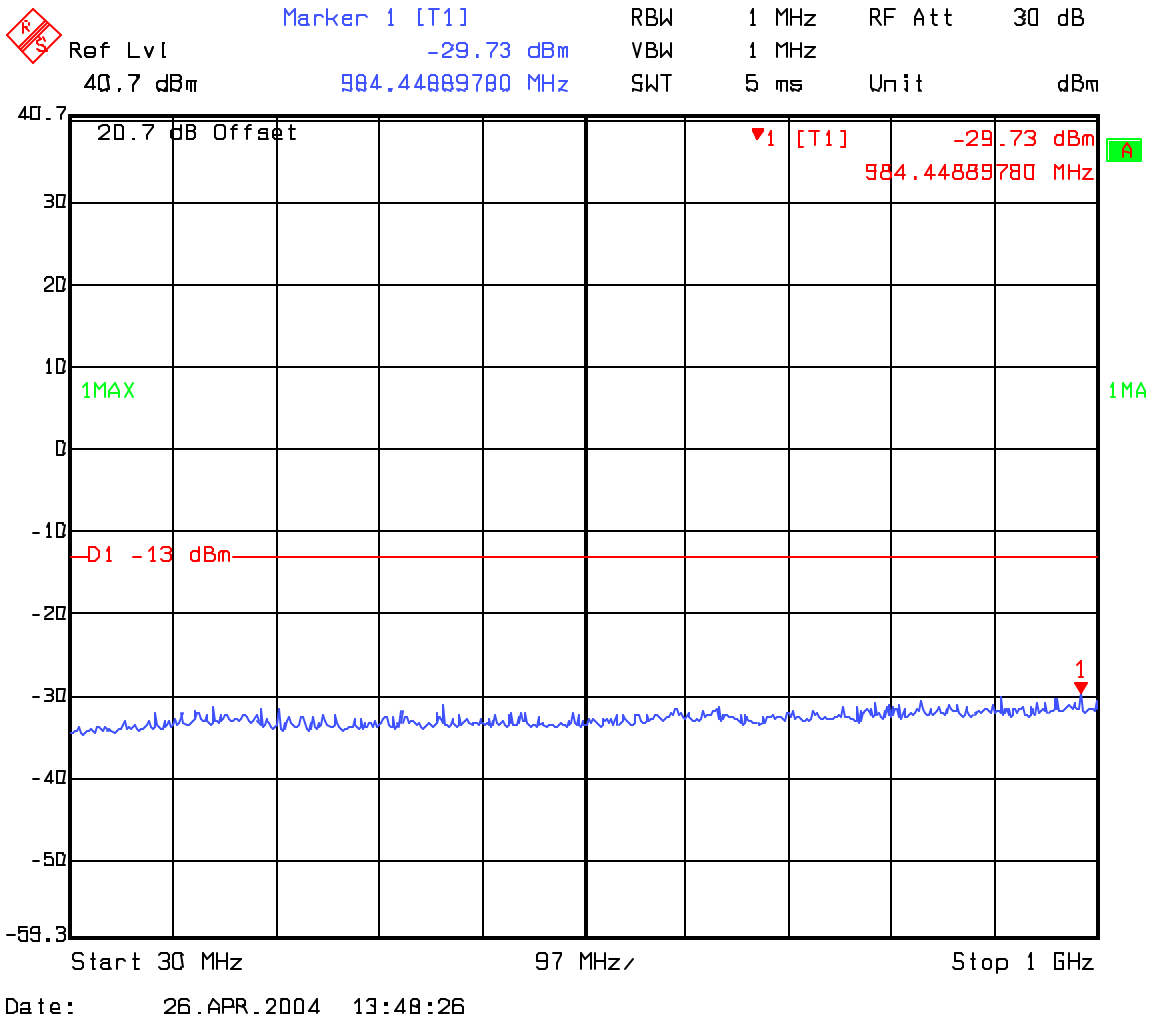

Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
30.18 dBm
VBW 1 MHz
40.7 dBm
1.82965932 GHz
SWT 230 ms
Unit dBm
40.7
20.7 dB Offset
1
1 [T1]
30.18 dBm
1.82965932 GHz
A
30
20
10
1MAX
1MA
0
-10
D1 -13 dBm
-20
-30
-40
-50
-59.3
Start 1 GHz
2.3 GHz/
Stop 24 GHz
Date: 26.APR.2004 13:33:25

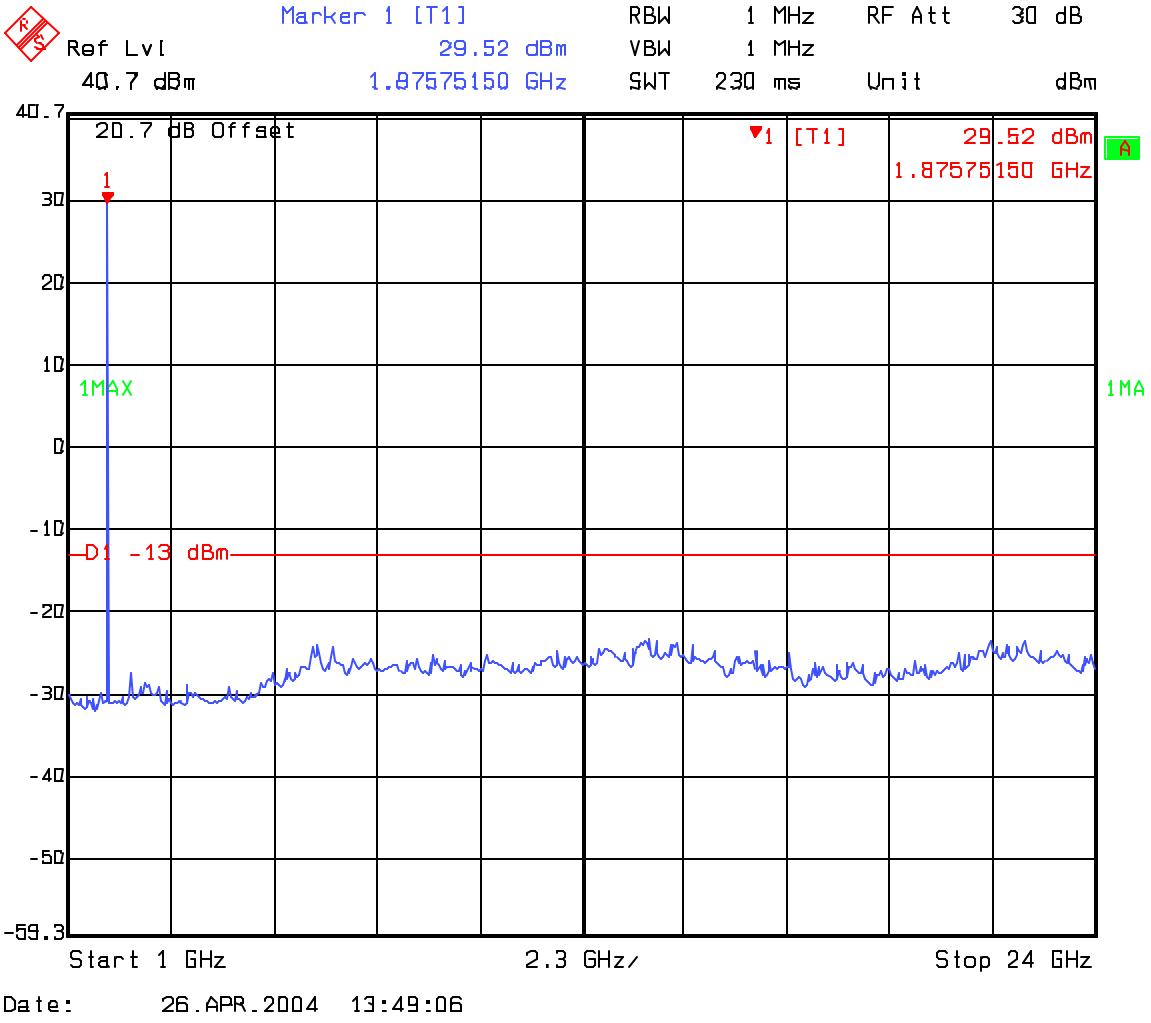
Test Plots – Spurious Emissions at Antenna Terminals - Middle Channel




Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
30.25 dBm
VBW 1 MHz
40.7 dBm
1.87575150 GHz
SWT 230 ms
Unit dBm
40.7
20.7 dB Offset
1
1 [T1]
30.25 dBm
1.87575150 GHz
A
30
20
10
1MAX
1MA
0
-10
D1 -13 dBm
-20
-30
-40
-50
-59.3
Center 12.5 GHz
2.3 GHz/
Span 23 GHz
Date: 26.APR.2004 13:37:14

Test Plots – Spurious Emissions at Antenna Terminals - Upper Channel




Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
29.52 dBm
VBW 1 MHz
40.7 dBm
1.87575150 GHz
SWT 230 ms
Unit dBm
40.7
20.7 dB Offset
1
1 [T1]
29.52 dBm
1.87575150 GHz
A
30
20
10
1MAX
1MA
0
-10
D1 -13 dBm
-20
-30
-40
-50
-59.3
Start 1 GHz
2.3 GHz/
Stop 24 GHz
Date: 26.APR.2004 13:49:06

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 24.238
TESTED BY: Eldon Berry	DATE: 22Aug03

Test Results: Complies.

Test Data: See attached table.

Test Data - Radiated Emissions

EIRP Substitution Method

Page 1 of 1 Complete X

Job No.: 3L0345R Date: 8/22/03 Preliminary

Specification: PT 24 Temperature(°C): 22

Tested By: Eldon Berry Relative Humidity(%) 50

E.U.T.: GSM0107

Configuration: EUT on test fixture.

Sample No: 1

Location: AC 3 RBW: 1 MHz Measurement

Detector Type: Peak VBW: 1 MHz Distance: 3 m

Test Equipment Used

Antenna: 1304 Directional Coupler:

Pre-Amp: 1016 Cable #1: 1484

Filter: 1482 Cable #2: 1485

Receiver: 1464 Cable #3:

Attenuator #1 Cable #4:

Attenuator #2: Mixer:

Additional equipment used:

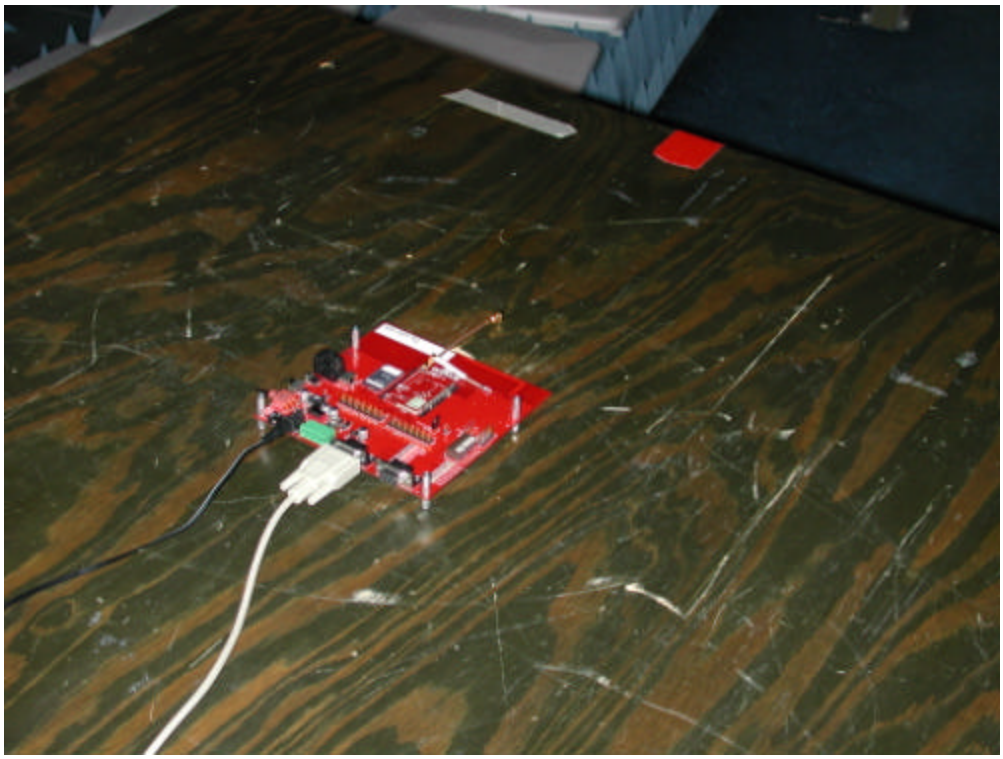
Measurement Uncertainty: +/-1.7 dB

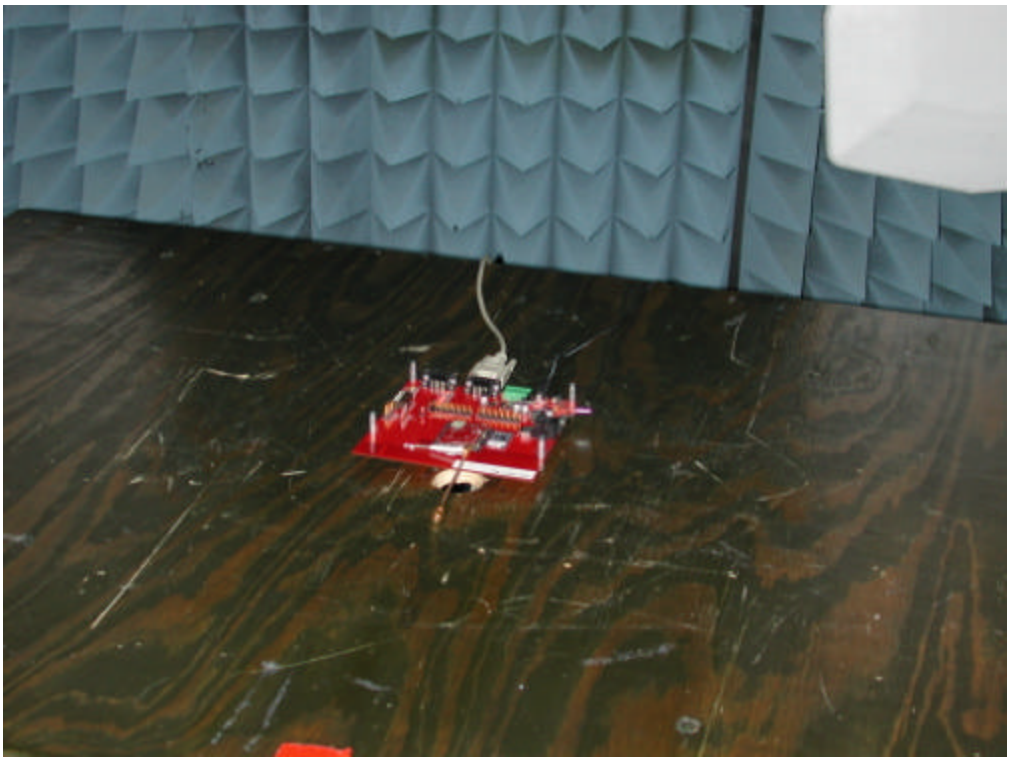
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBi)		EIRP (dBm)	EIRP (mW)	Polarity	Comments
3760.4	-71.3	43.3		0	10.7		-17.3	0.0188	V	Channel 662
5640.6	-61.0	39.8		28.5	11.4		-38.3	0.0001	V	
7520.8	-62.5	41.8		34.1	11.3		-43.5	0.0000	V	
9401	-54.5	41.3		33.4	11.7		-34.9	0.0003	V	
11281.2	-43.2	43.7		34.6	12.5		-21.6	0.0069	V	
13161.4	-60.0	45.8		34.5	11.9		-36.8	0.0002	V	
15041.6	-63.0	45.2		32	12.8		-37.0	0.0002	V	
16921.8	-63.0	46.0		33.3	14.5		-35.8	0.0003	V	
3760.4	-75.0	35.5		0	10.7		-28.8	0.0013	H	
5640.6	-63.8	37.8		28.5	11.4		-43.1	0.0000	H	
7520.8	-62.7	41.5		34.1	11.3		-44.0	0.0000	H	
9401	-57.7	42.3		33.4	11.7		-37.1	0.0002	H	
13161.4	-63.0	47.8		30.3	11.9		-33.6	0.0004	H	

Notes: Searched spectrum to the 10th harmonic of carrier

NOTE: The correction factor in the above table references the pre-calibrated path loss at that frequency and is the difference between the received signal level and the input to the substitution antenna. The same antennas, cables and test range are used for calibration and for measurement.

Photographs of Test Setup





Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 24.235
TESTED BY: David Light	DATE: 24Aug03

Test Results: Complies.

Equipment Used: Wavetek 3600D, Voltmeter # 1558, Thermometer # 619
Environmental Chamber # 283

Temperature: 23 ?C

Relative Humidity: 36 %

Measurement Data:

Band of Operation	PCS
Mode	GPRS
Channel	662
Standard Test Frequency:	1880.264638 MHz
Standard Test Voltage:	3.8 Vdc

Test Equipment: 283-1464-425-1031

Temperature	Voltage (Vdc)	Frequency (MHz)	Change (Hz)	Change (PPM)
50	3.8	1880.260830	3808	2.0
40	3.8	1880.262604	2034	1.1
30	3.8	1880.267339	-2701	-1.4
20	3.8	1880.264638	0	0.0
10	3.8	1880.267320	-2682	-1.4
0	3.8	1880.267628	-2990	-1.6
-10	3.8	1880.267898	-3260	-1.7
-20	3.8	1880.267010	-2372	-1.3
-30	3.8	1880.267143	-2505	-1.3
20	4.8	1880.264630	8	0.0
20	3. 3	1880.264748	-110	-0.1

Section 8. Test Equipment List

Nemko	Descriptio	Manufacturer Model	Serial	Calibratio Date	Calibratio Du
1083	Cable 2m	Astrolab 32027-2-29094-72TC	N/A	CBU	N/A
	Power meter	E4418B	GB39401848	12/11/02	12/11/04
	Power sensor	E9304A	MY41494308	9/9/02	9/9/03
1604	ATTENUATOR	NARDA 776B-20	NONE	N/A	N/A
1036	SPECTRUM ANALYZER	ROHDE & FSEK30	830844/006	12/18/01	12/19/03
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01	07/31/03
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	07/24/03	07/24/04
1482	Band Pass	K & L 11SH10-4000/T12000-0/0	2	Cal B4	N/A
1464	Spectrum	Hewlett 8563E	3551A04428	02/11/03	02/11/05
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/24/03	07/23/04
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/24/03	07/23/04
283	Environmental Chamber with controller #	ENVIROTRONIC SH27 & 2030-22844	129010083	04/22/03	04/21/04
425	DIGITAL MULTIMETER	FLUKE 45-01	5930073	10/03/02	10/03/03
1031	D C power	Hewlett 6002A	2930A-12218	Not	N/A

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01	12/19/03
1973	CABLE, 1m	KTL 0	N/A	04/14/03	04/30/04
1604	ATTENUATOR	NARDA 776B-20	NONE	N/A	N/A

ANNEX A - TEST METHODOLOGIES

NAME OF TEST: RF Power Output **PARA. NO.: 2.1046**

Minimum Standard: Para. No.24.232. Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

Method Of Measurement: CDMA Per ANSI/J-STD-008
TDMA Per ANSI/J-STD-010
PCS 1900 Per ANSI/J-STD-007

Detachable Antenna:
The peak power at antenna terminals is measured using an in-line peak power meter or a spectrum analyzer.

Integral Antenna:

Test Method: TIA/EIA-603-1992, Section 2.2.12

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

NAME OF TEST: Occupied Bandwidth **PARA. NO.: 2.1049**

Minimum Standard: Para. No. 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 26 dB.

Method Of Measurement:

CDMA Per ANSI/J-STD-008

Spectrum analyzer settings:
RBW: 30 kHz
VBW: ? RBW
Span: 5 MHz
Sweep: Auto

GSM Per ANSI/J-STD-007

RBW: 3 kHz
VBW: ? RBW
Span: 2 MHz
Sweep: Auto

NADC Per IS-136

RBW: 1 kHz
VBW: ? RBW
Span: 1 MHz
Sweep: Auto

NAME OF TEST: Spurious Emission at Antenna Terminals **PARA. NO.: 2.1053**

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (P) dB.

Method Of Measurement:

Spectrum analyzer settings:

CDMA Per ANSI/J-STD-008

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 20 kHz (< 1MHz from Band Edge)
VBW: ? RBW
Sweep: Auto
Video Avg: 6 Sweeps

GSM Per ANSI/J-STD-007

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
VBW: ? RBW
Sweep: Auto
Video Avg: Disabled

NADC Per IS-136

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 1 kHz (< 1 MHz from Band Edge)
VBW: ? RBW
Sweep: Auto
Video Avg: Disabled

To demonstrate compliance at band edges the frequency of the input signal is set to the lowest and highest assigned channel and the center frequency of the spectrum analyzer is set to the upper and lower edges of the appropriate frequency block.

NAME OF TEST: Field Strength of Spurious Radiation PARA. NO.: 2.1053

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (P) dB.

Calculation Of Field Strength Limit

Test Method: TIA/EIA-603-1992, Section 2.2.12

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

NAME OF TEST: Frequency Stability **PARA. NO.: 2.1055**

Minimum Standard: Para. No. 24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Method Of Measurement: CDMA Per ANSI/J-STD-008
TDMA Per ANSI/J-STD-007
NADC Per IS-136

Frequency Stability With Voltage Variation

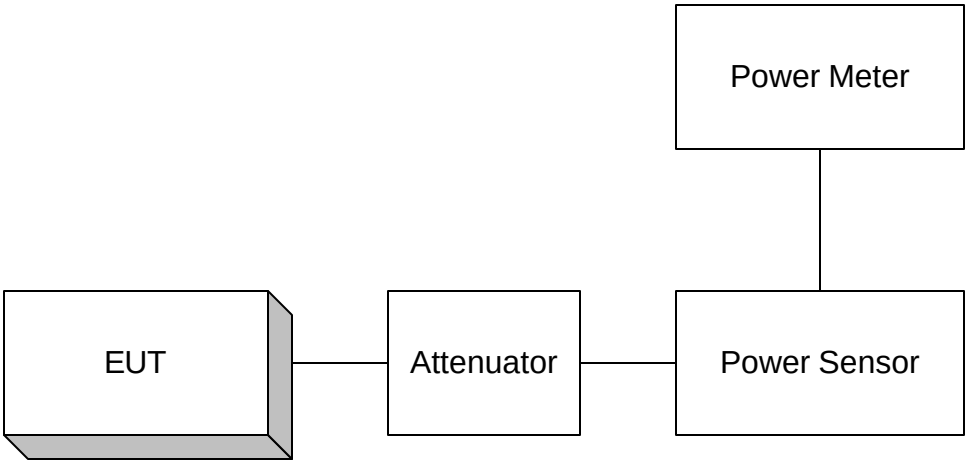
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

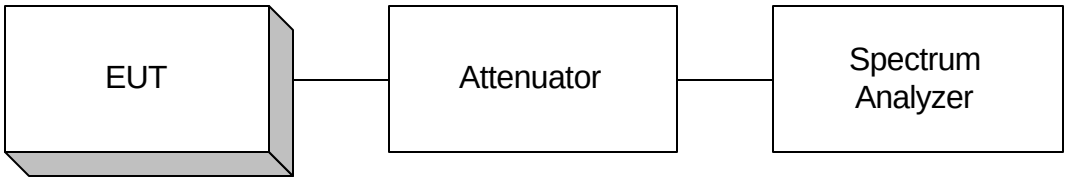
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

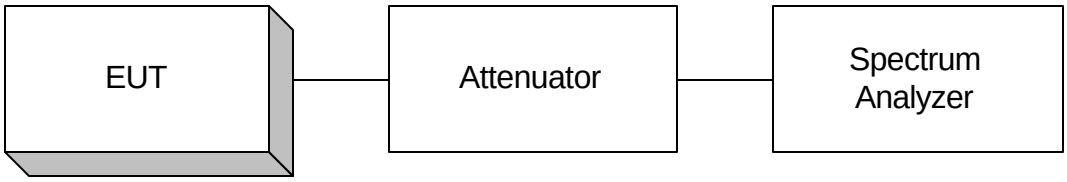
Para. No. 2.1046 - R.F. Power Output



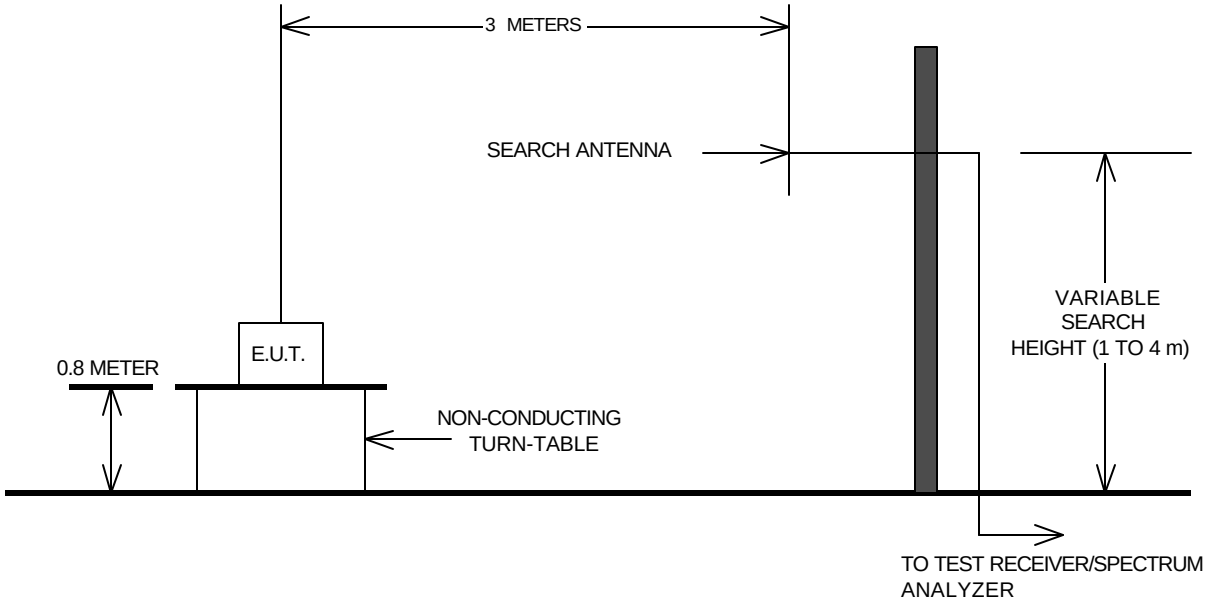
Para. No. 2.1049 - Occupied Bandwidth



Para. No. 2.1053 Spurious Emissions at Antenna Terminals



Para. No. 2.1053- Field Strength of Spurious Radiation



Para. No. 2.1055 - Frequency Stability