NORTEL NETWORKS™

Radio test report UMTS Compact Indoor iBTS according to FCC Part 24

Document number:	UMT/BTS/DJD/008795
Document issue:	V01.01 / EN
Document status:	Standard
Date:	17/Nov/2003

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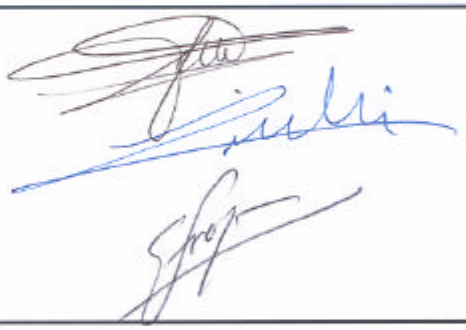


PUBLICATION HISTORY

17/Nov/2003 **S. BALE**

Document creation.

Issue V01.01 / EN

Standard

CONTENTS

1. INTRODUCTION

1.1. OBJECT

This document presents the measurement results of tests performed on Nortel Networks UMTS Compact Indoor iBTS according to FCC specifications.

1.2. SCOPE OF THIS DOCUMENT

This document applies to Nortel Networks FDD:

UMTS Compact Indoor iBTS

1.3. AUDIENCE FOR THIS DOCUMENT

This document is to be used by any person needing a view on Nortel UMTS Compact Indoor 1900 iBTS.

2. RELATED DOCUMENTS

2.1. APPLICABLE DOCUMENTS

[A1]	UMT/BTS/APP/0022	Methodology of UMTS BTS validation under 25.141 specifications V01.03
[A2]	UMT/BTS/DD/0017	e-mobility iBTS platform/UMTS/GSM product specification
[A3]	UMT/BTS/DPL/8382	Radio Test Plan for the qualification of the compact iBTS 1900

2.2. REFERENCE DOCUMENTS

[R1]	47CFR Part 24	PERSONAL COMMUNICATIONS SERVICES January 2001
[R2]	47CFR Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS October 2001

3. TEST RESULTS

3.1. INTRODUCTION

This document presents the RF tests performed for the qualification of the UMTS Compact Indoor 1900 iBTS with iModules.

UMTS Compact Indoor iBTS is feeded with -48V DC.

The following information is submitted to introduce a Certification of the UMTS Compact Indoor 1900 iBTS for Northern Telecom, Inc:

- According to 47CFR Part 24, Subpart E
- According to 47CFR Part 2, Subpart J

of the FCC Rules and Regulations. The measurement procedures were in accordance with the requirements of Part 2.947.

3.2. MEASUREMENT RESULTS

Table 1 is a summary of the measurement results performed in this report.

Description & Configuration code		Measurement Specification	Limit Specification	Test	Result
A	UMTS Compact Indoor iBTS 45W OTOR1	FCC 2.1046	24.232	Maximum Output Power	Complies
		FCC 2.1049	-	Occupied Bandwidth	Complies
B	UMTS Compact Indoor iBTS 30W OTOR1	FCC 2.1051	24.238	Spurious Emission at Antenna Terminals	Complies
C	UMTS Compact Indoor iBTS 45W STSR2	FCC 2.1051	24.238	Spurious Emission at Antenna Terminals	Complies
D	UMTS Compact Indoor iBTS 30W STSR2	FCC 2.1051	24.238	Spurious Emission at Antenna Terminals	Complies

Table 1. Measurement results performed for the qualification of the 1900 MHz

Test conditions in all the performed tests (temperature and nominal voltage) remain the same as the maximum output power test. For more details, please refer to the table 2.

3.3. MAXIMUM OUTPUT POWER

3.3.1 FCC REQUIREMENTS

(a) Base stations are limited to 1640 watts peak equivalent isotropically radiated power (e.i.r.p.) with an antenna height up to 300 meters HAAT. See 24.53 for HAAT calculation method. Base station antenna heights may exceed 300 meters with a corresponding reduction in power. In no case may the peak output power of a base station transmitter exceed 100 watts.

(b) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

3.3.2 TEST RESULTS

The table 2 summarizes the maximum output power performed according to the iBTS configuration code as described in the section above.

CONFIGURATION CODE	TEST CONDITIONS		Base Station Maximum Output Power (dBm)			Nominal Output Power (dBm)
			Channel B 1932.4 MHz	Channel M 1960 MHz	Channel T 1987.6 MHz	
			Sector 1	Sector 2	Sector 3	
A	T_{nom}(25°C)	V_{nom}(49.8V)	45.00	45.50	45.50	45.25 ±2.7dB

Table 2. Measurements result for Maximum output power

For equivalent isotropically radiated power requirement, the sum of the antenna gain and the feeder losses should not be higher than 17.05dB.

3.3.3 TEST PROCEDURE

The equipment was configured as shown in Figure 1. A power meter has been used to perform the maximum output power test.

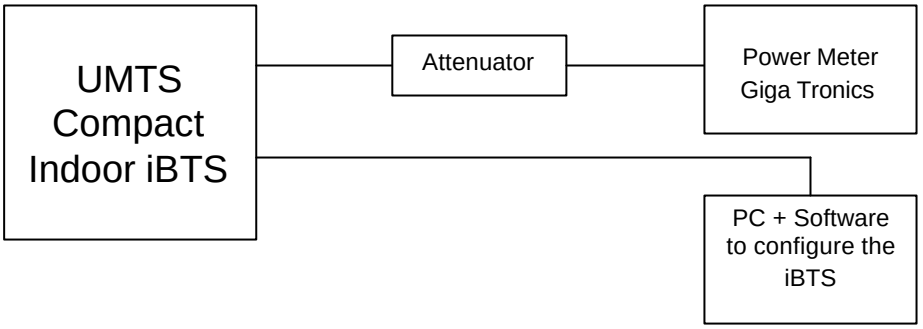


Figure 1. Test configuration to measure RF Output Power

The iBTS was configured to transmit at maximum power with 64 dedicated channels on the single carrier.

3.4. OCCUPIED BANDWIDTH

3.4.1 FCC REQUIREMENTS

The occupied 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 of at least 26 dB.

3.4.2 TEST RESULTS

The table 3 summarizes the occupied bandwidth test performed in 45W mode (Configuration code A).

OBSERVED CHANNEL	Occupied bandwidth (MHz)		
	Channel B 1932.4 MHz	Channel M 1960 MHz	Channel T 1987.6 MHz
	Sector 1	Sector 2	Sector 3
Occupied bandwidth	4.64	4.65	4.64

Table 3. Measurements result for Occupied Bandwidth

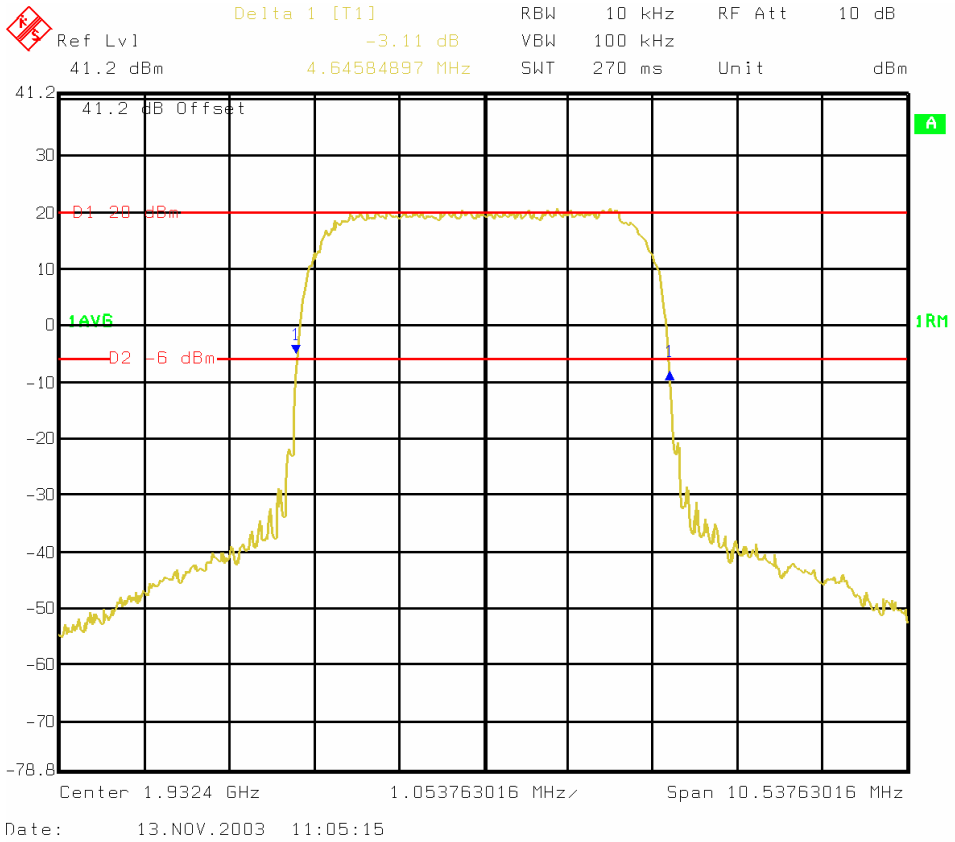


Figure 2. Sample plot for Occupied Bandwidth @ 1932.4 MHz

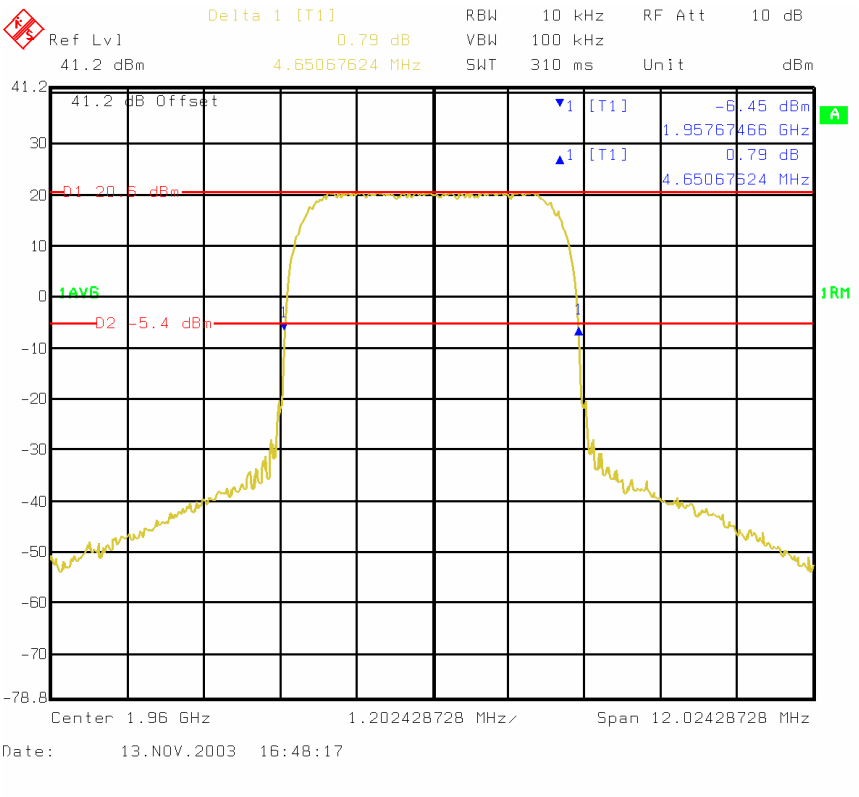


Figure 3. Sample plot for Occupied Bandwidth @ 1960 MHz

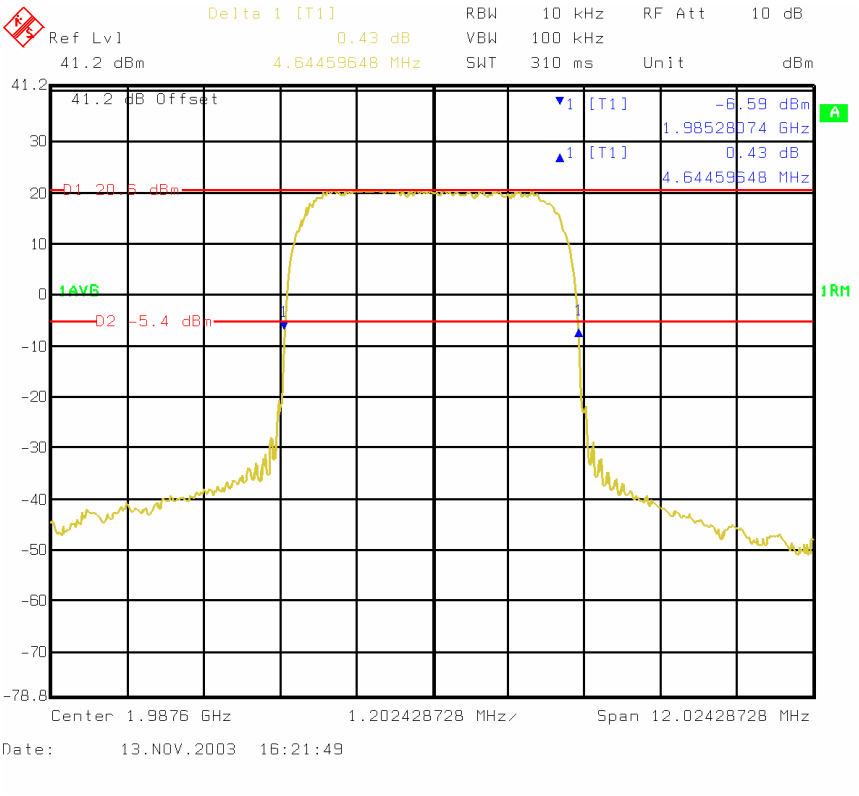


Figure 4. Sample plot for Occupied Bandwidth @ 1987.6 MHz

3.4.3 TEST PROCEDURE

The equipment was configured as shown in Figure 5.

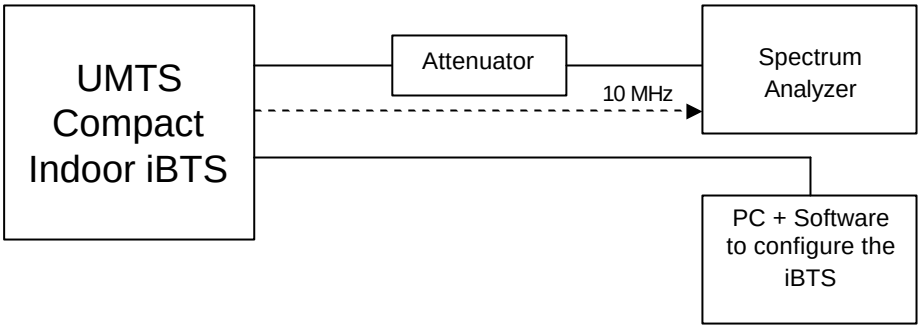


Figure 5. Test configuration for Occupied Bandwidth

The iBTS was configured to transmit at maximum power (45W). Measurements were performed at bottom, middle and top frequency of the transmit channel on each sector.

The spectrum analyzer had the following setting:

Resolution Bandwidth	10 kHz
Video Bandwidth	100 kHz
Span	10 MHz
Sweep time	250 ms
Reference Level Offset	Corrected to take into account cables and attenuator losses

3.5. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

3.5.1 FCC REQUIREMENTS

(a) At 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.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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 23 dB below the transmitter power.

(c) When measuring the emission limits, the nominal carrier frequency shallbe adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(d) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

3.5.2 TEST RESULTS

The reference level for spurious emissions at the antenna terminals is taken from the measured output power (45 dBm => 31.6 W).

Therefore the spurious emissions must be attenuated by at least:

43 + 10*Log(31.6) = 58 dB

The measured output power was 45 dBm, therefore the limit is -13 dBm.

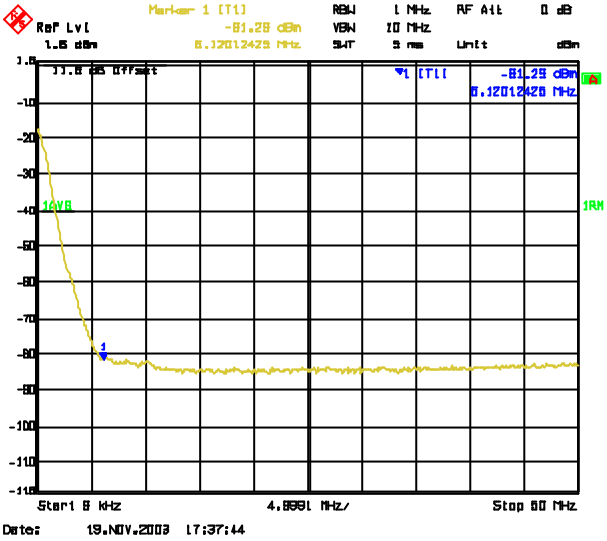
1. UMTS COMPACT INDOOR IBTS, OTOR1 30W MODE

Tables 4 to 6 show the results for Spurious Emissions at Antenna Terminals for the configuration B.

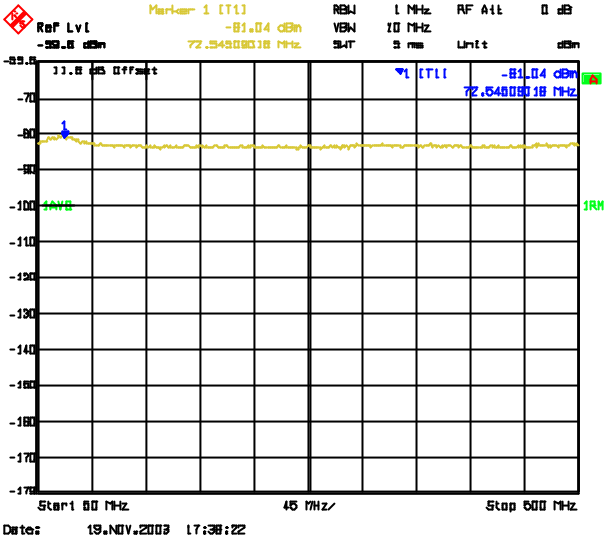
Frequency band	SPURIOUS EMISSION LEVEL (dBm) Channel B 1932.4 MHz Sector 1	Margin (dB)	Limit (dBm)
9 kHz to 50 MHz	-81.29	68.29	-13
50 MHz to 500 MHz	-81.04	68.04	
500 MHz to 1GHz	-79.09	66.09	
1GHz to 1.92 GHz	-42.58	29.58	
1920 MHz to 1927.025 MHz	-23.10	10.1	
1927.025 MHz to 1928.025 MHz	-23.38	10.38	
1928.025 MHzto 1929.025 MHz	-23.58	10.58	
1929.025 MHz to 1929.975 MHz	-17.18	4.18	
1935.025 MHz to 1935.975 MHz	-26.62	13.62	
1935.975 MHz to 1936.975 MHz	-23.37	10.37	
1936.975 MHz to 1937.975 MHz	-26.66	13.66	
1937.975 MHz to 2000 MHz	-19.79	6.79	
2 GHz to 3 GHz	-39.54	26.54	
3 GHz to 5 GHz	-54.04	41.04	
5 GHz to 7 GHz	-50.91	37.91	
7 GHz to 9 GHz	-51.67	38.67	
9 GHz to 12.75 GHz	-49.83	36.83	
12.75 GHz to 20 GHz	-50.40	37.4	

Table 4. Measurements result for Spurious Emission in B channel

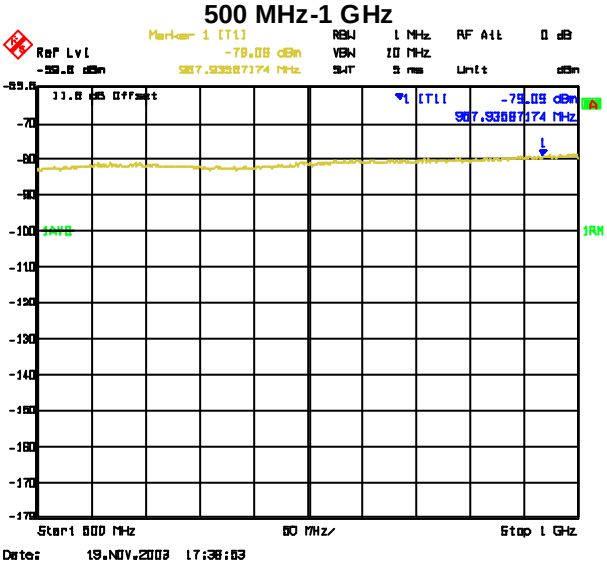
9 kHz-50 MHz[1]



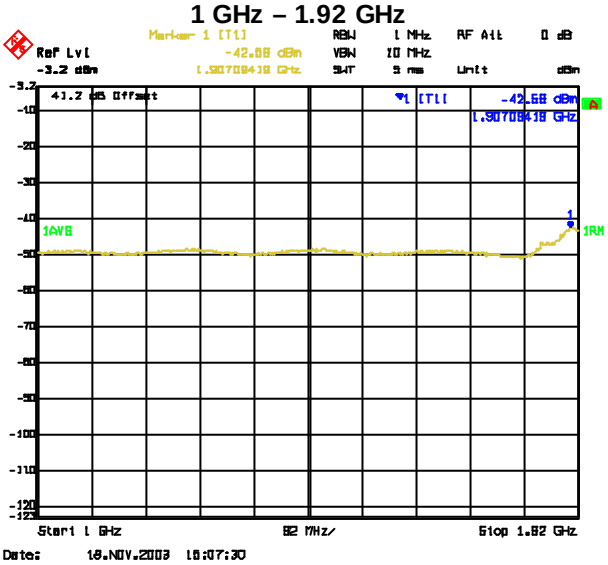
50 MHz- 500 MHz



500 MHz-1 GHz

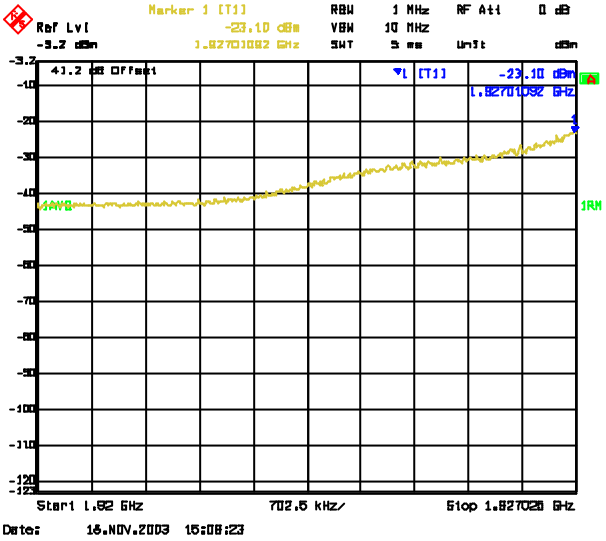


1 GHz – 1.92 GHz

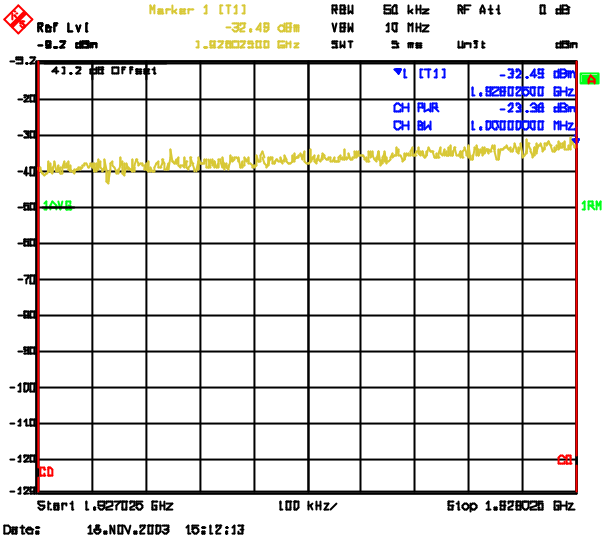


[1] Spectrum lines at 9 kHz are internal DC spectrum line of Analyzer

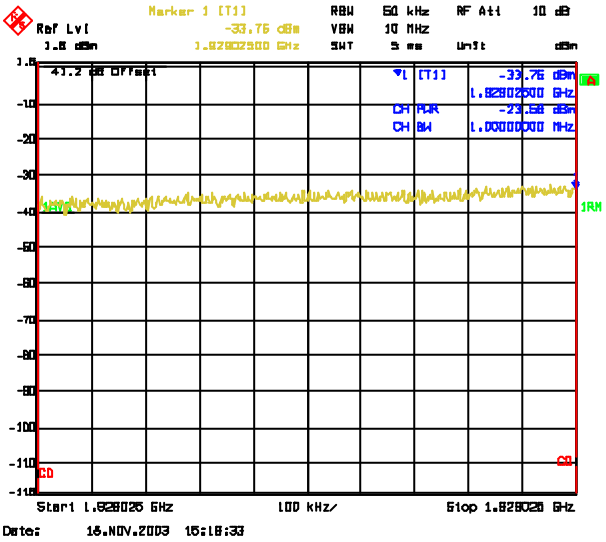
1920 MHz- 1927.025 MHz



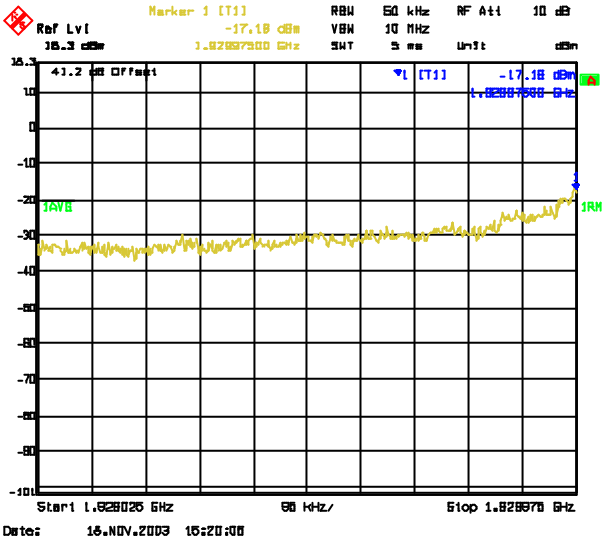
1927.025 MHz-1928.025 MHz



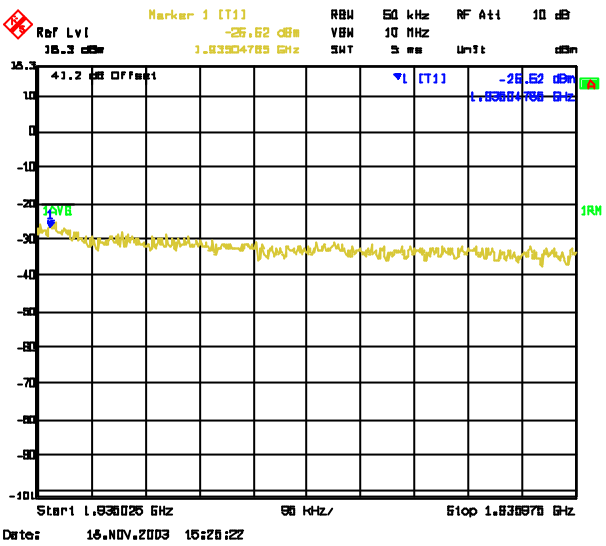
1928.025 MHz-1929.025 MHz



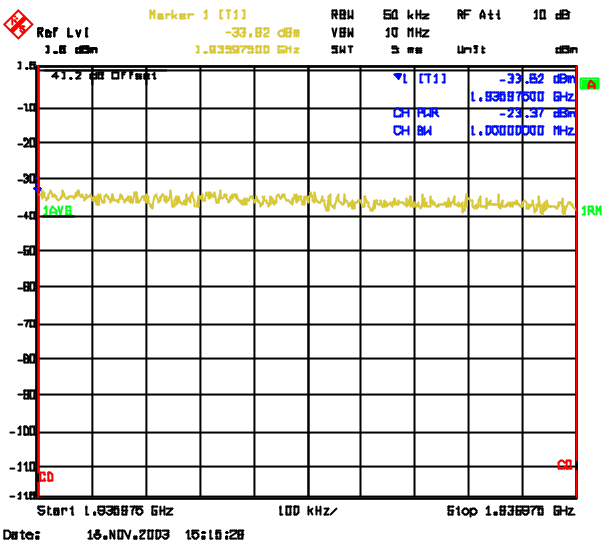
1929.025 MHz-1929.975 MHz



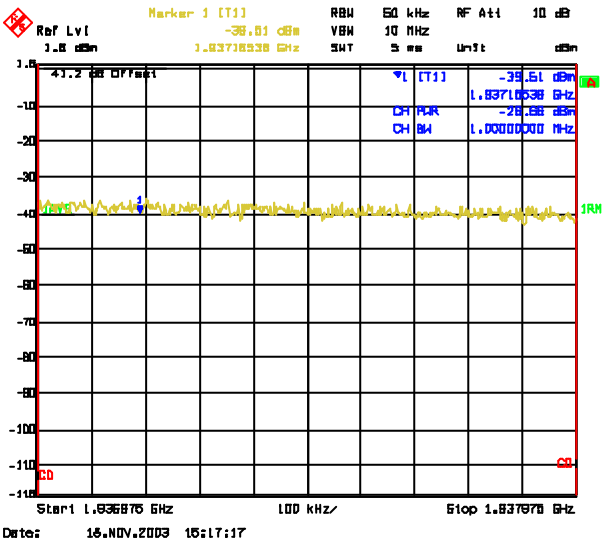
1935.025 MHz-1935.975 MHz



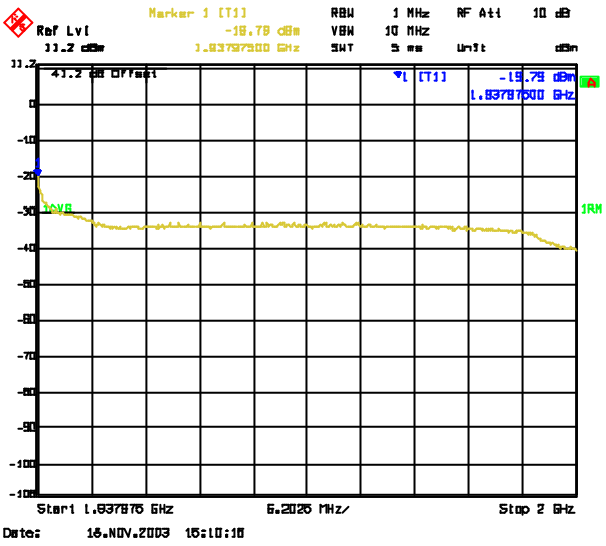
1935.975 MHz-1936.975 MHz



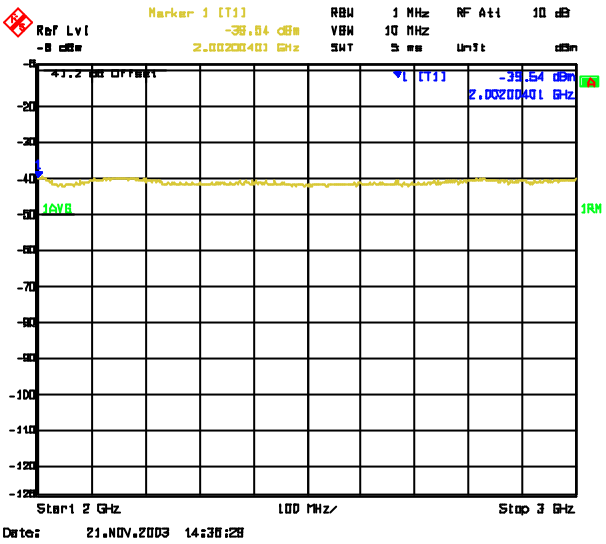
1936.975 MHz-1937.975 MHz



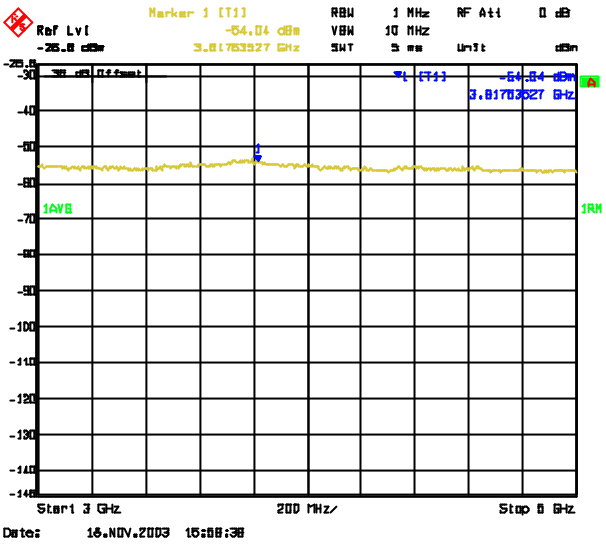
1937.975 MHz-2000 MHz



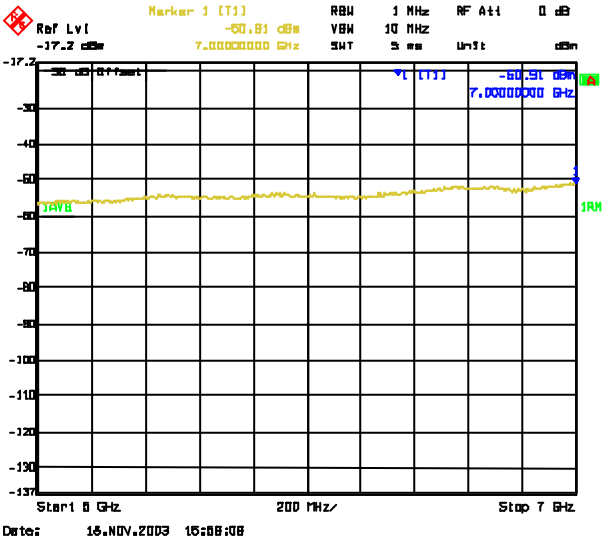
2 GHz-3 GHz



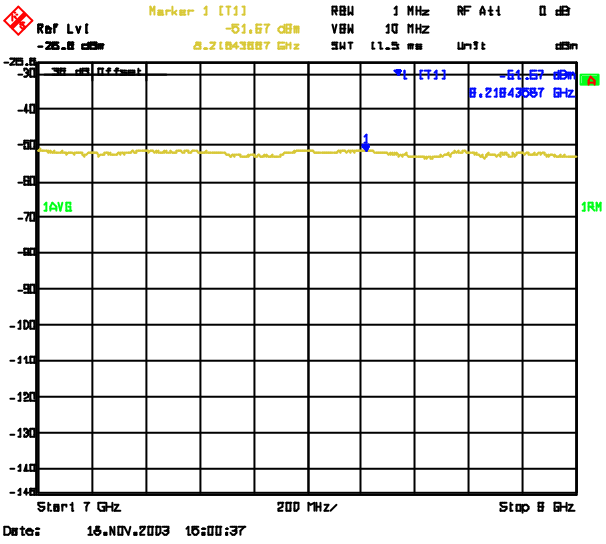
3 GHz-5 GHz



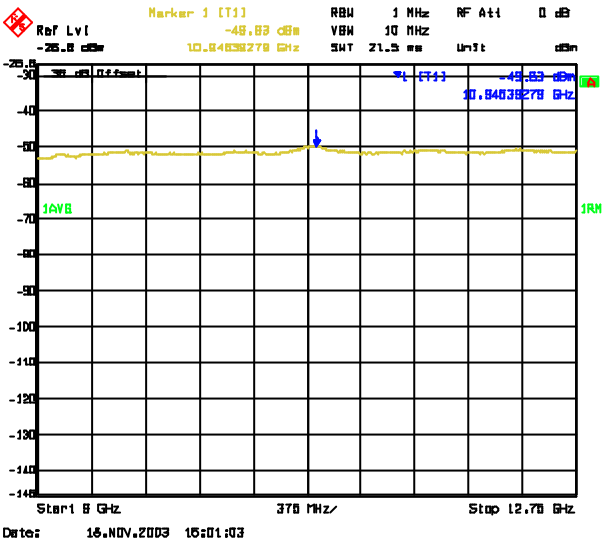
5 GHz-7 GHz



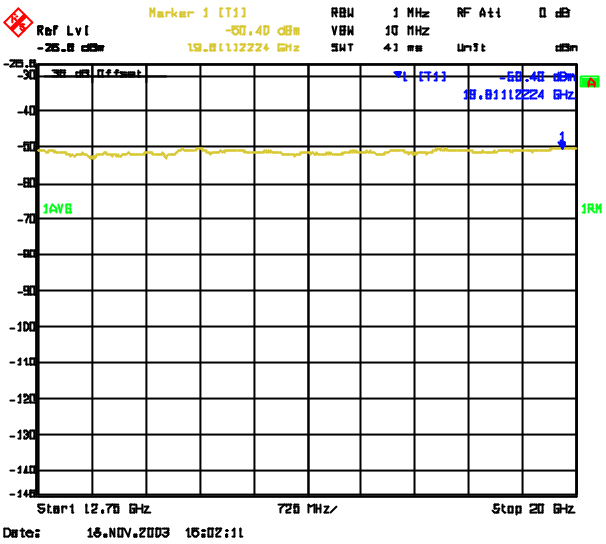
7 GHz-9 GHz



9 GHz- 12.75 GHz



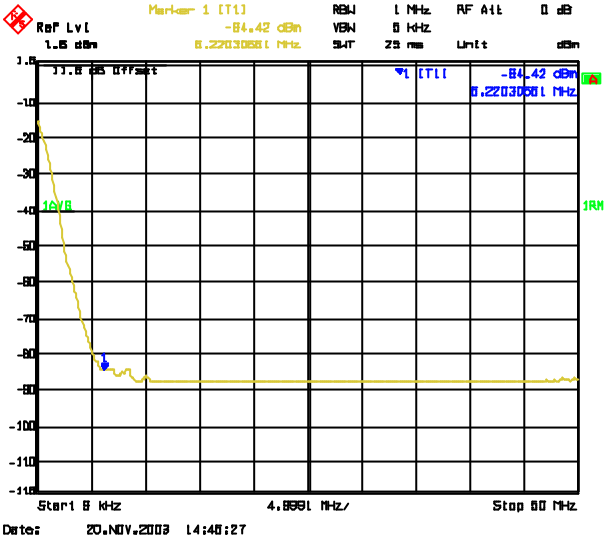
12.75 GHz-20 GHz



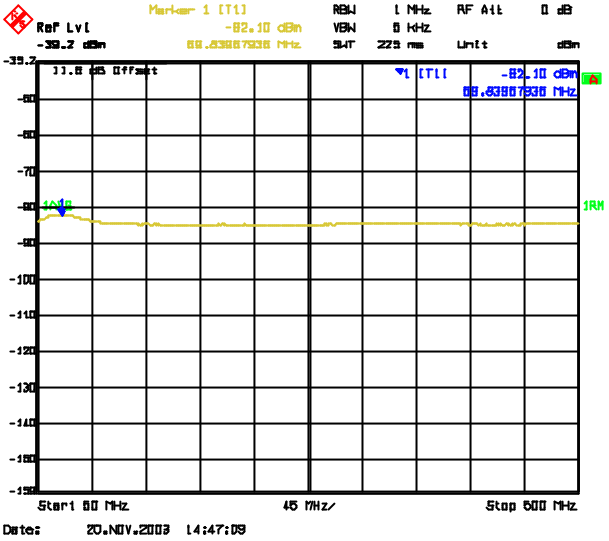
Frequency band	SPURIOUS EMISSION LEVEL (dBm) Channel M 1960 MHz Sector 1	Margin (dB)	Limit (dBm)
9 kHz to 50 MHz	-84.42	71.42	-13
50 MHz to 500 MHz	-82.10	69.1	
500 MHz to 1GHz	-80.35	67.35	
1GHz to 1.92 GHz	-44.09	31.09	
1920 MHz to 1954.525 MHz	-23.00	10	
1954.525 MHz to 1955.525 MHz	-22.42	9.42	
1955.525 MHzto 1956.525 MHz	-23.40	10.4	
1956.525 MHz to 1957.475 MHz	-23.30	10.3	
1962.525 MHz to 1963.475 MHz	-23.59	10.59	
1963.475 MHz to 1964.475 MHz	-22.47	9.47	
1964.475 MHz to 1965.475 MHz	-26.18	13.18	
1965.475 MHz to 2000 MHz	-17.19	4.19	
2 GHz to 3 GHz	-39.56	26.56	
3 GHz to 5 GHz	-54.13	41.13	
5 GHz to 7 GHz	-50.38	37.38	
7 GHz to 9 GHz	-51.41	38.41	
9 GHz to 12.75 GHz	-49.81	36.81	
12.75 GHz to 20 GHz	-50.47	37.47	

Table 5. Measurements result for Spurious Emission in M channel

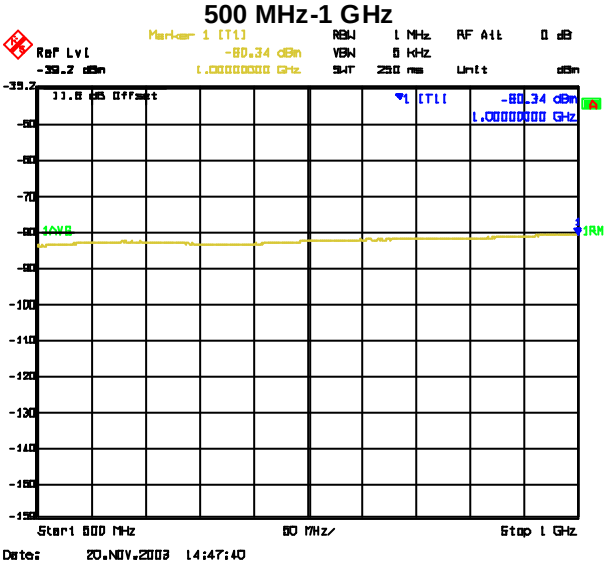
9 kHz-50 MHz[2]



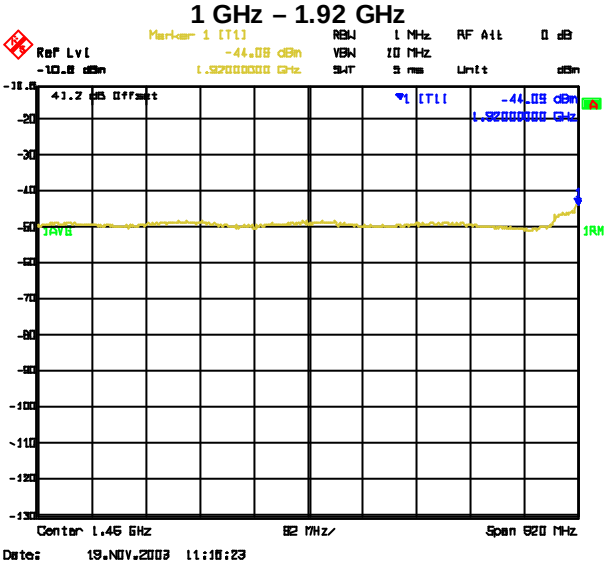
50 MHz- 500 MHz



500 MHz-1 GHz

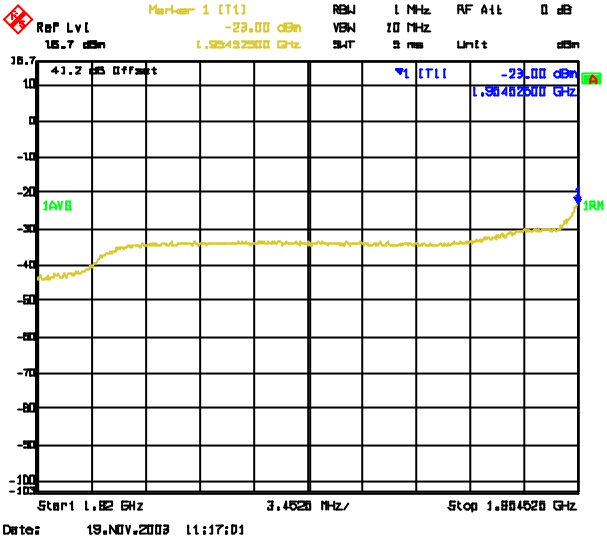


1 GHz – 1.92 GHz

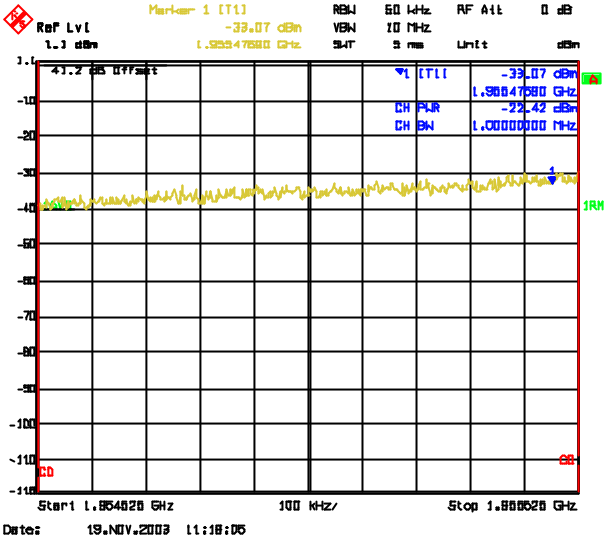


[2] Spectrum lines at 9 kHz are internal DC spectrum line of Analyzer

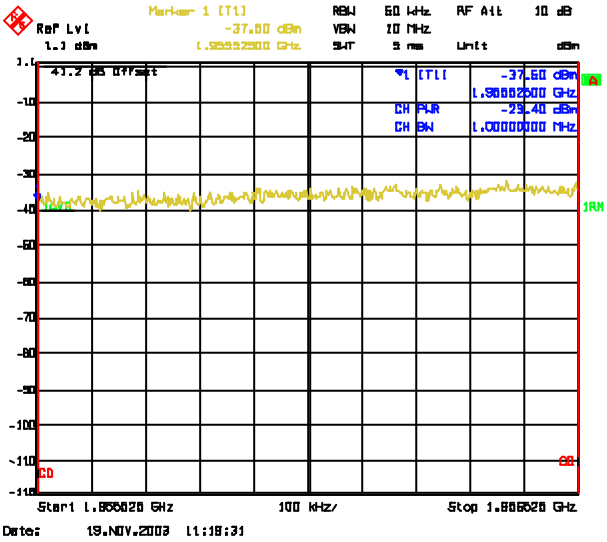
1920 MHz- 1954.525 MHz



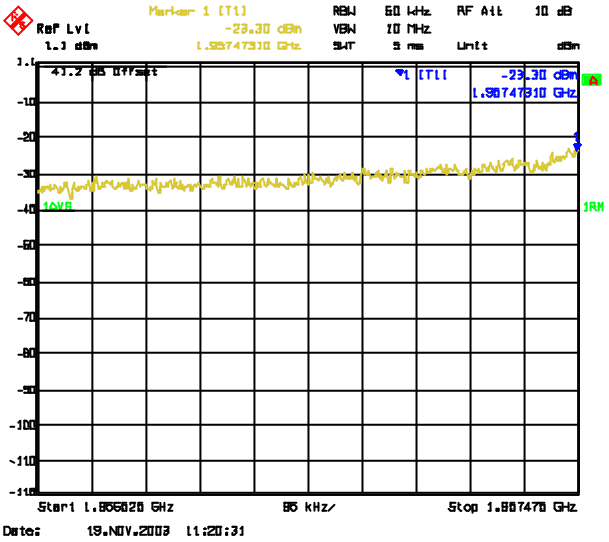
1954.525 MHz-1955.525 MHz



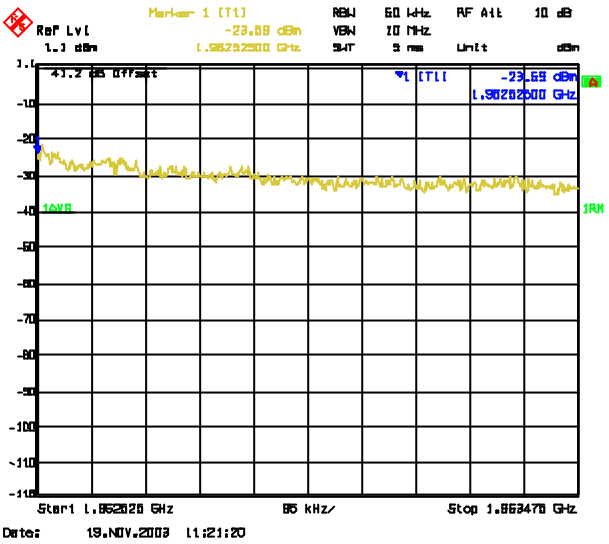
1955.525 MHz-1956.525 MHz



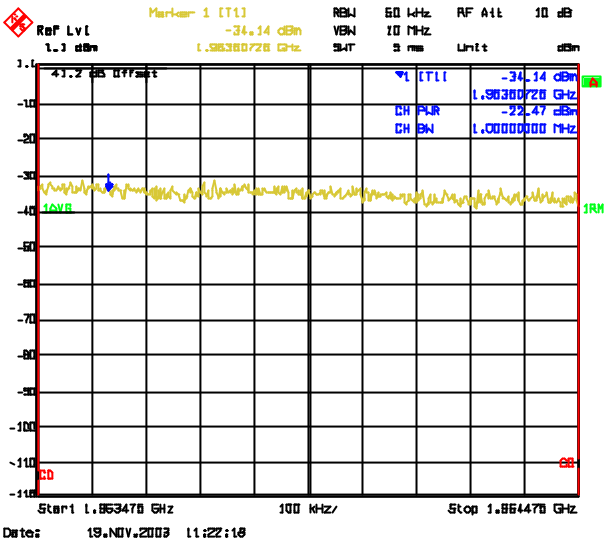
1956.525 MHz-1957.475 MHz



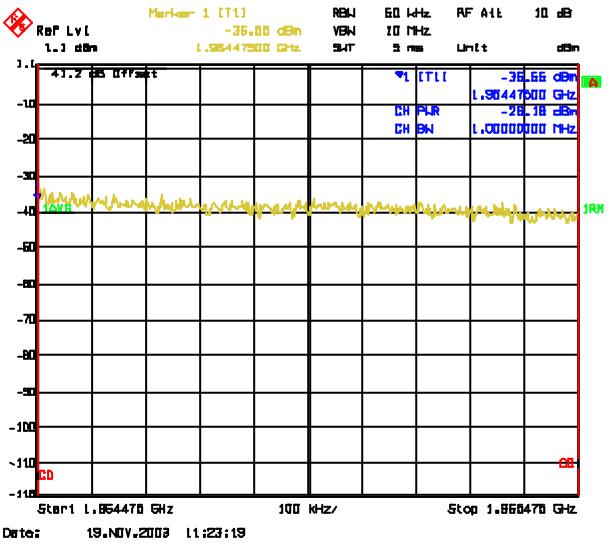
1962.525 MHz-1963.475 MHz



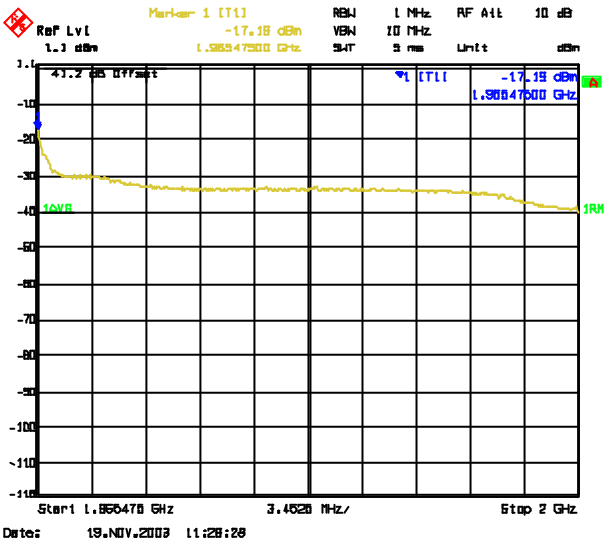
1963.475 MHz-1964.475 MHz



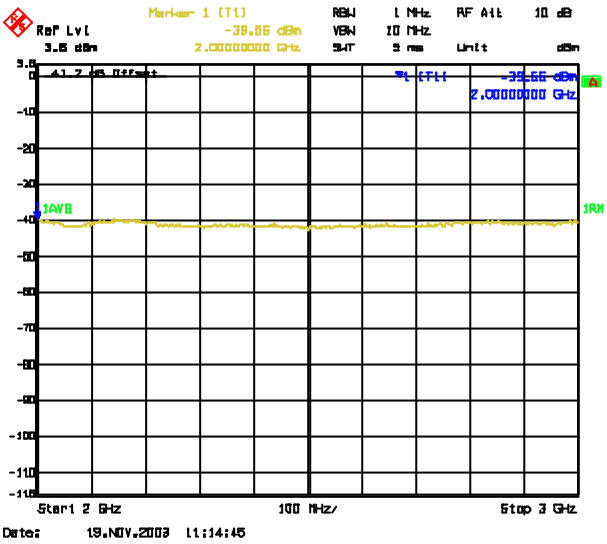
1964.475 MHz-1965.475 MHz



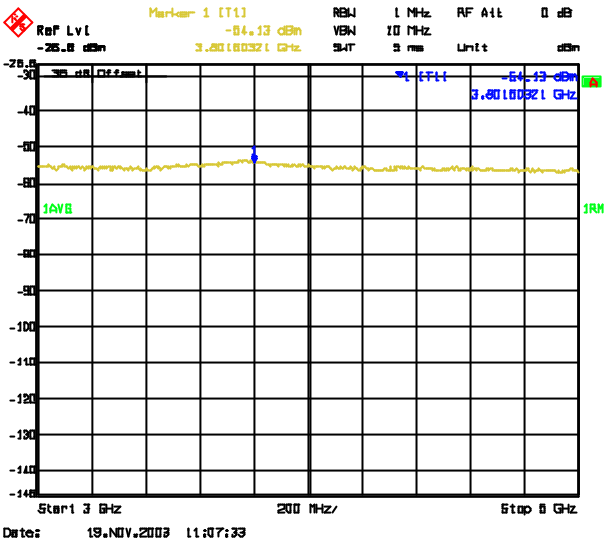
1965.475 MHz-2000 MHz



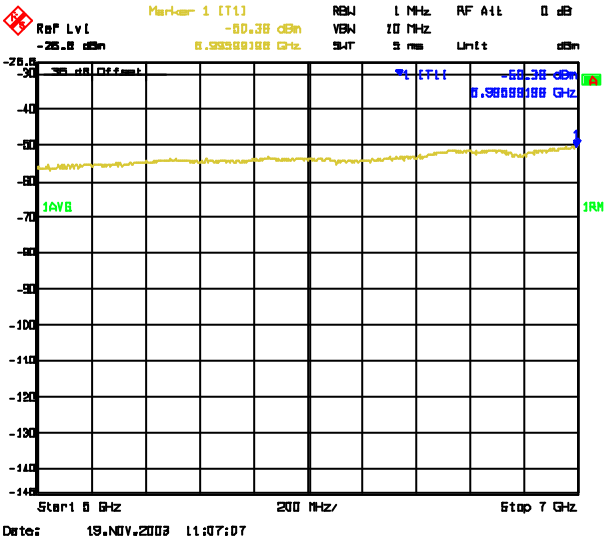
2 GHz-3 GHz



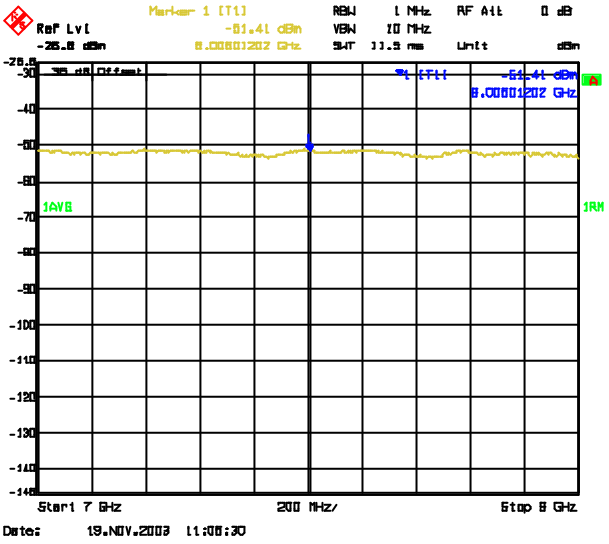
3 GHz-5 GHz



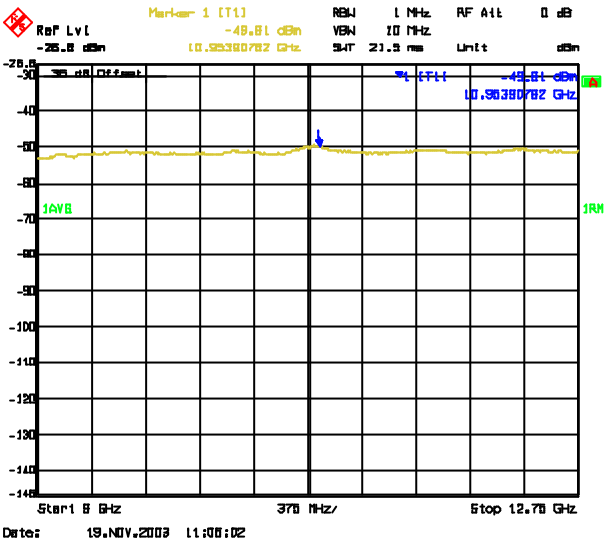
5 GHz-7 GHz



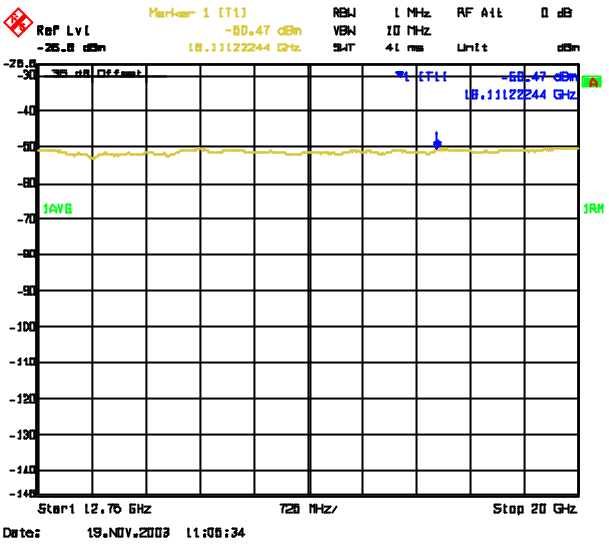
7 GHz-9 GHz



9 GHz- 12.75 GHz



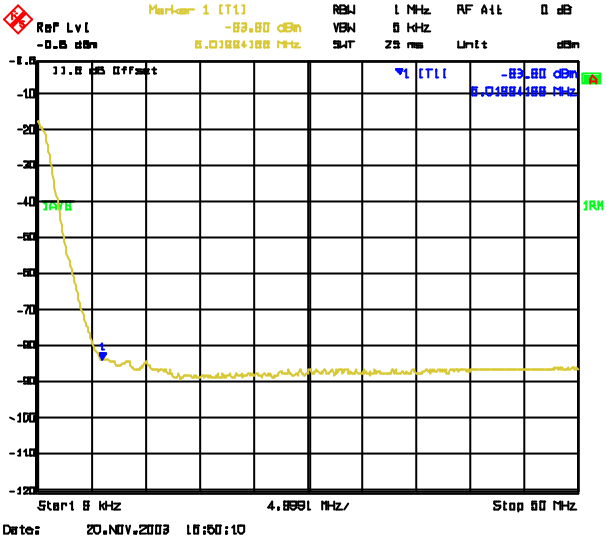
12.75 GHz-20 GHz



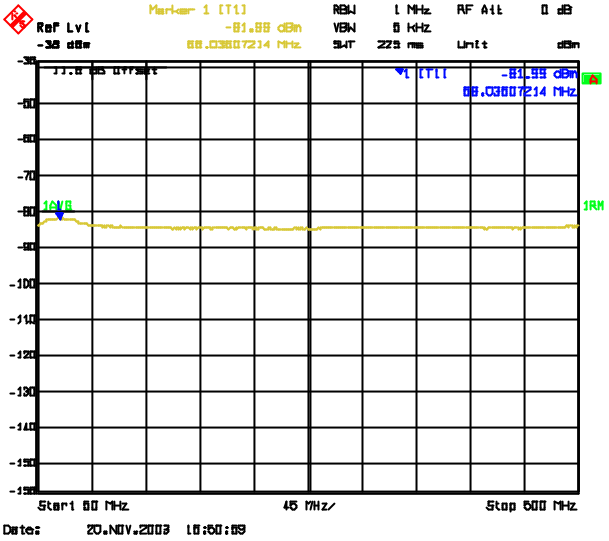
Frequency band	SPURIOUS EMISSION LEVEL (dBm) Channel T 1987.6 MHz Sector 1	Margin (dB)	Limit (dBm)
9 kHz to 50 MHz	-83.80	70.8	-13
50 MHz to 500 MHz	-81.99	68.99	
500 MHz to 1GHz	-80.40	67.4	
1GHz to 1927.6 MHz	-35.16	22.16	
1927.6 MHz to 1982.025 MHz	-24.83	11.83	
1982.025 MHz to 1983.025 MHz	-23.41	10.41	
1983.025 MHzto 1984.025 MHz	-23.73	10.73	
1984.025 MHz to 1984.975 MHz	-26.32	13.32	
1990.025 MHz to 1990.975 MHz	-18.52	5.52	
1990.975 MHz to 1991.975 MHz	-23.95	10.95	
1991.975 MHz to 1992.975 MHz	-27.57	14.57	
1992.975 MHz to 2000 MHz	-17.40	4.4	
2 GHz to 3 GHz	-38.65	25.65	
3 GHz to 5 GHz	-53.79	40.79	
5 GHz to 7 GHz	-50.15	37.15	
7 GHz to 9 GHz	-51.22	38.22	
9 GHz to 12.75 GHz	-49.81	36.81	
12.75 GHz to 20 GHz	-50.43	37.43	

Table 6. Measurements result for Spurious Emission in T channel

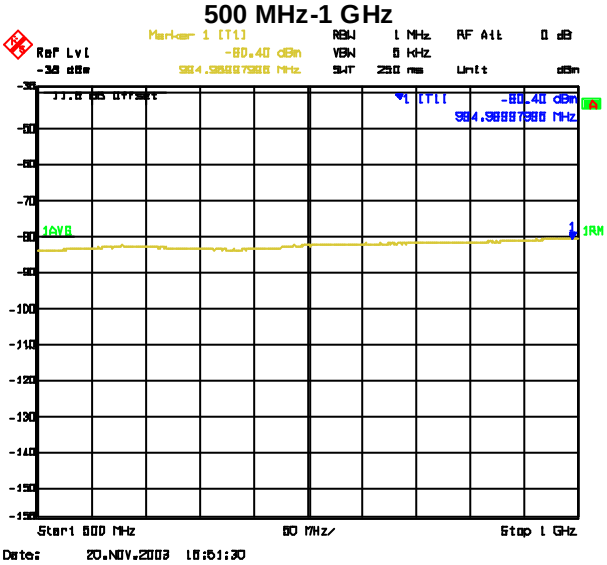
9 kHz-50 MHz[3]



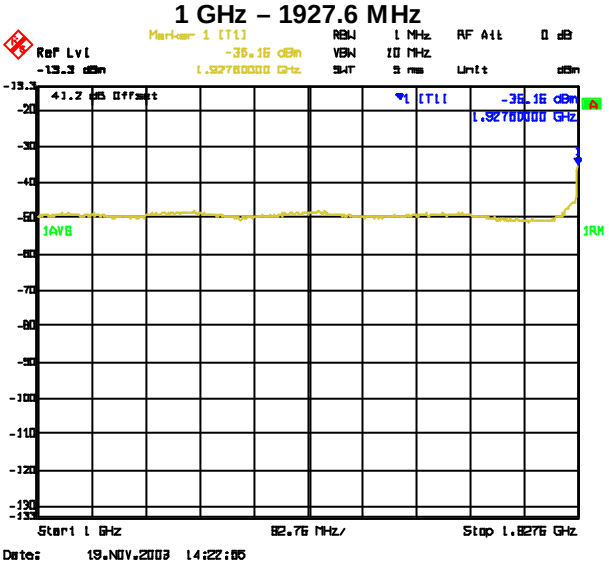
50 MHz- 500 MHz



500 MHz-1 GHz

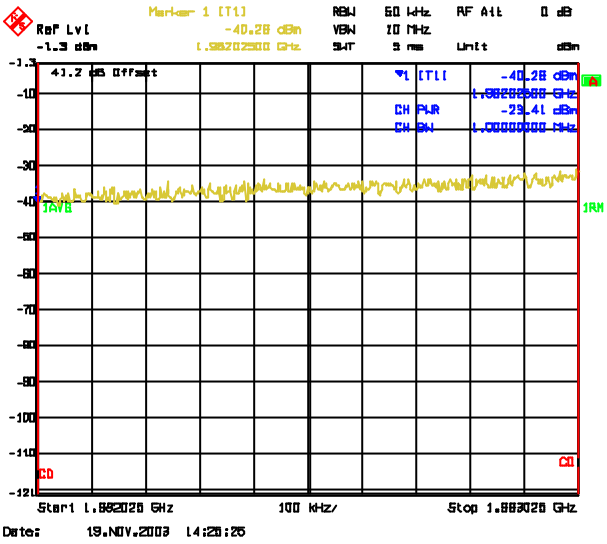


1 GHz – 1927.6 MHz

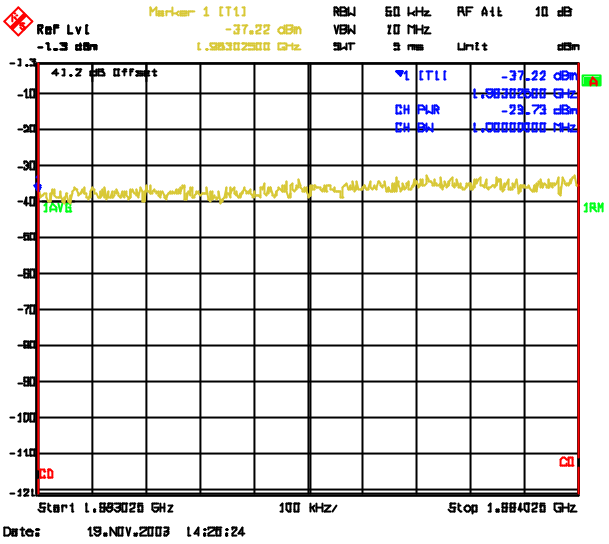


[3] Spectrum lines at 9 kHz are internal DC spectrum line of Analyzer

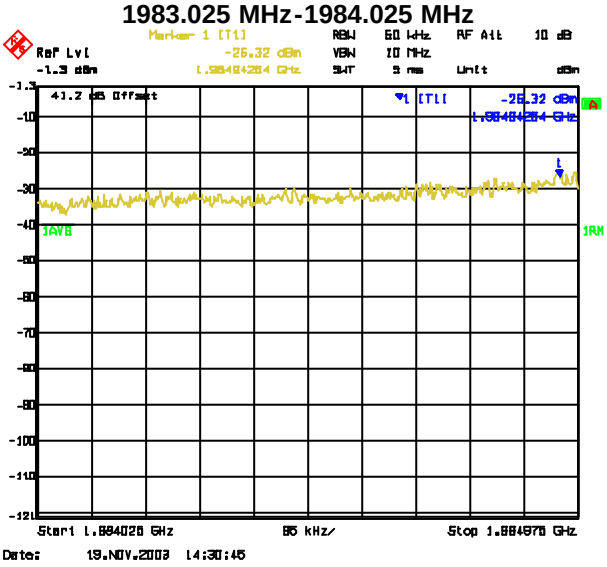
1927.6 MHz- 1982.025 MHz



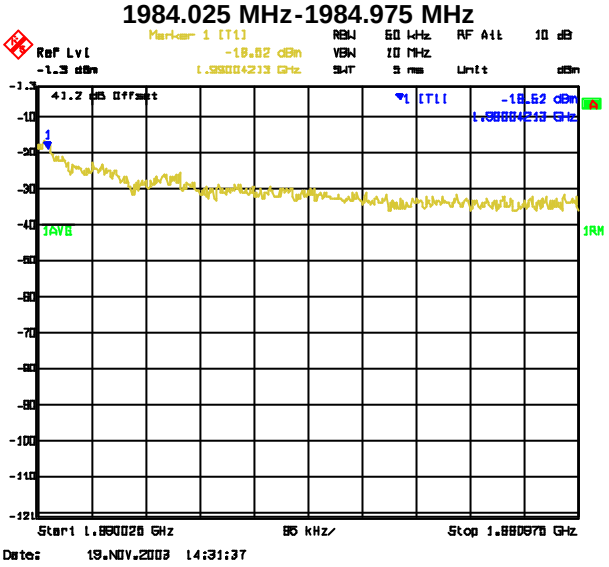
1982.025 MHz-1983.025 MHz



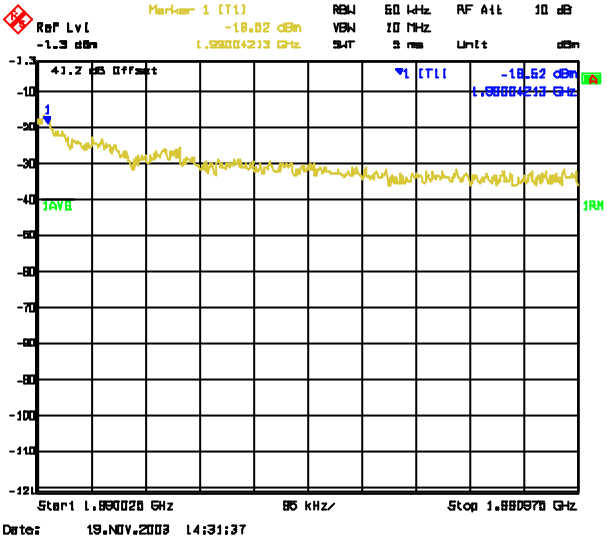
1983.025 MHz-1984.025 MHz



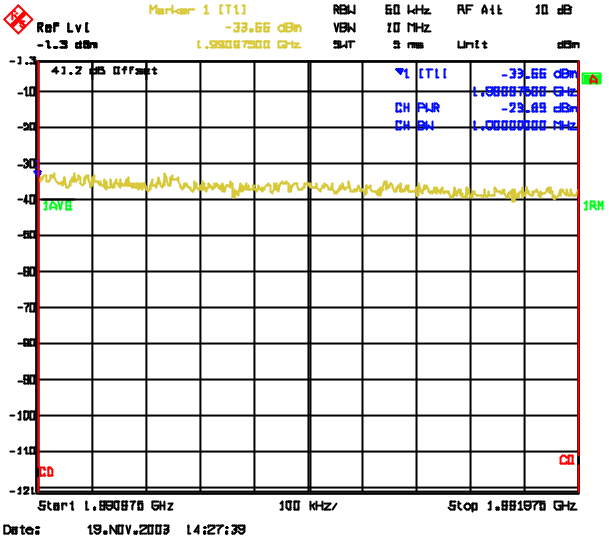
1984.025 MHz-1984.975 MHz



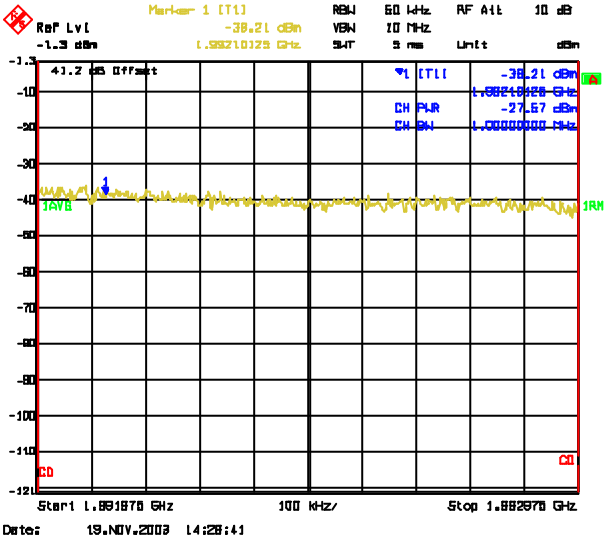
1990.025 MHz-1990.975 MHz



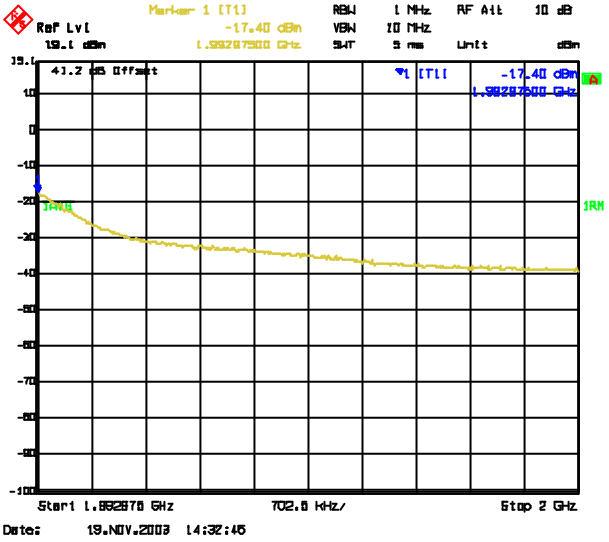
1990.975 MHz-1991.975 MHz



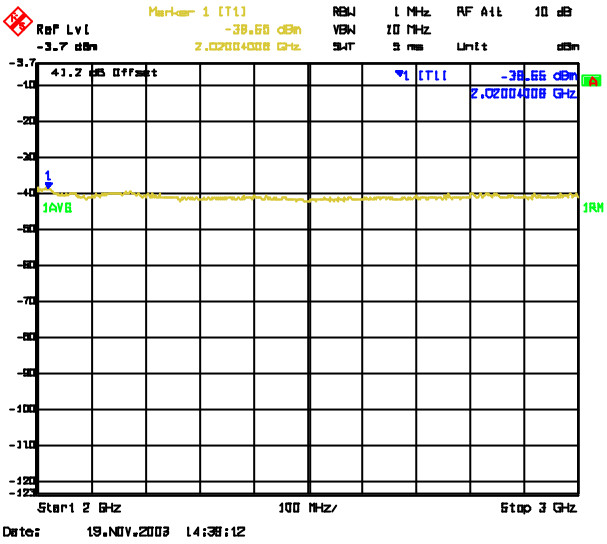
1991.975 MHz-1992.975 MHz



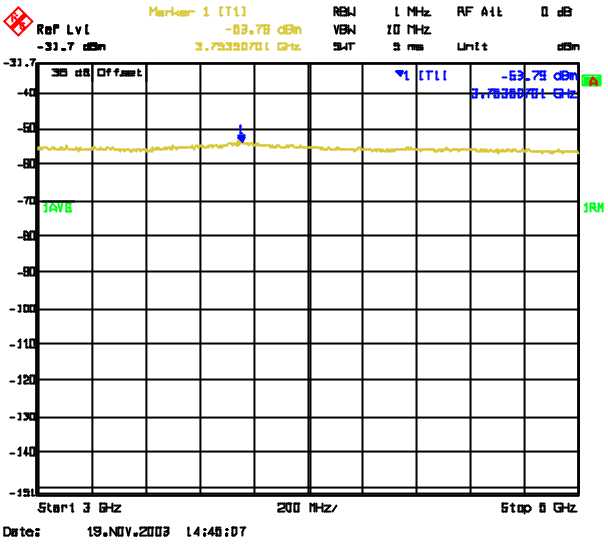
1992.975 MHz-2000 MHz



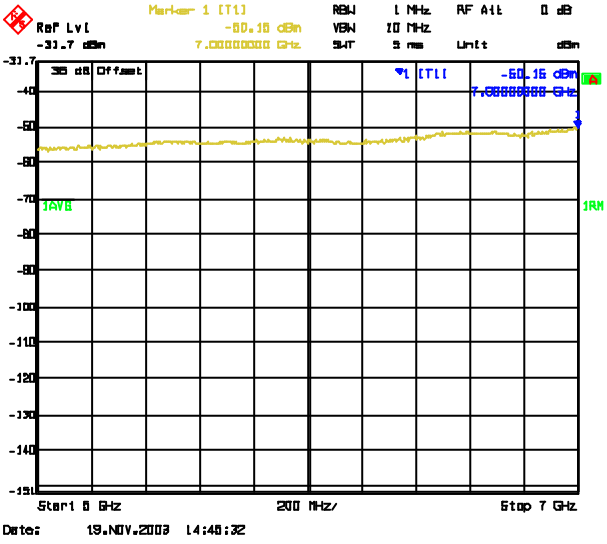
2 GHz-3 GHz



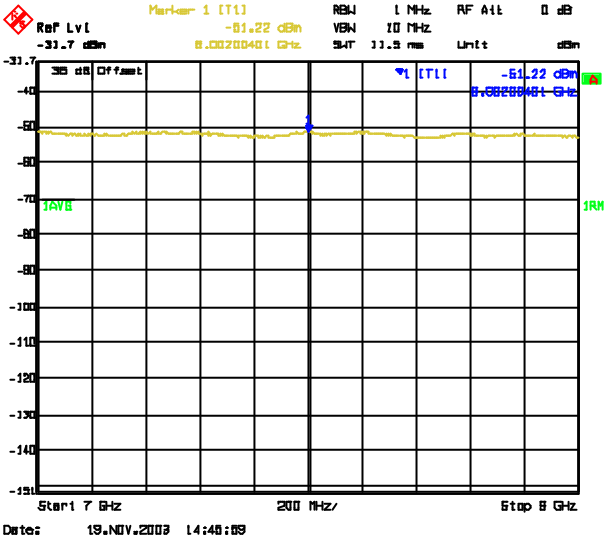
3 GHz-5 GHz



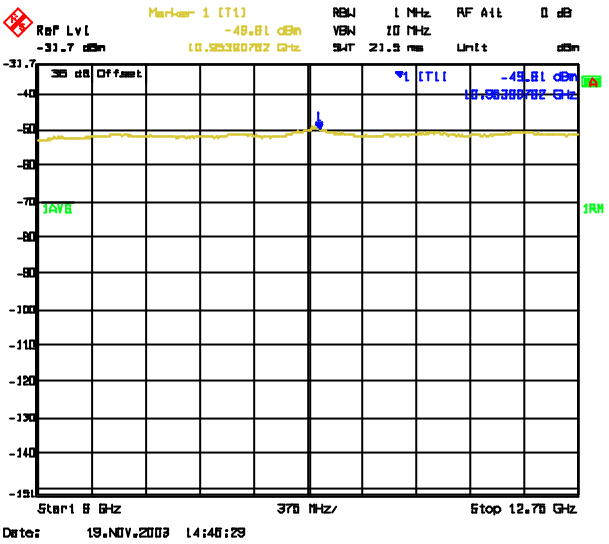
5 GHz-7 GHz



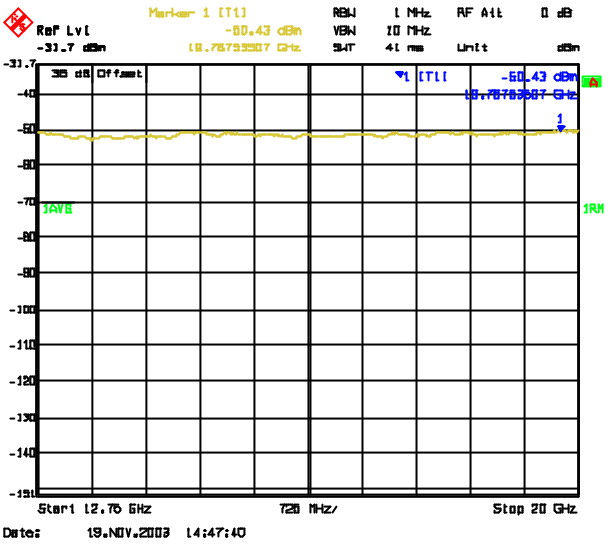
7 GHz-9 GHz



9 GHz- 12.75 GHz



12.75 GHz-20 GHz



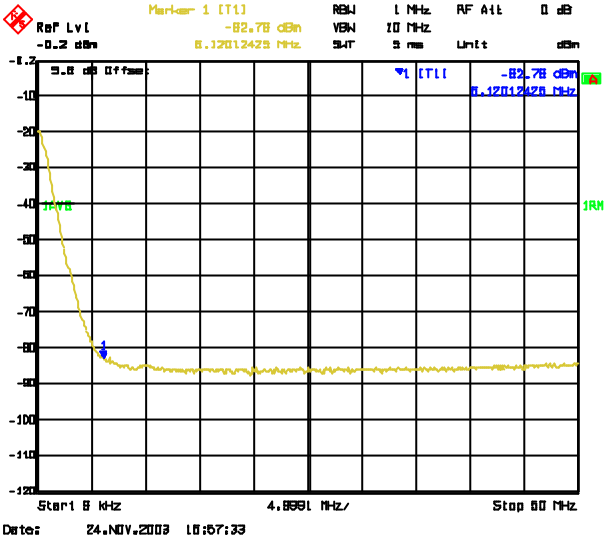
2. UMTS COMPACT INDOOR IBTS, STSR2 45W MODE

Tables 7 to 9 show the results for Spurious Emissions at Antenna Terminals for the configuration C.

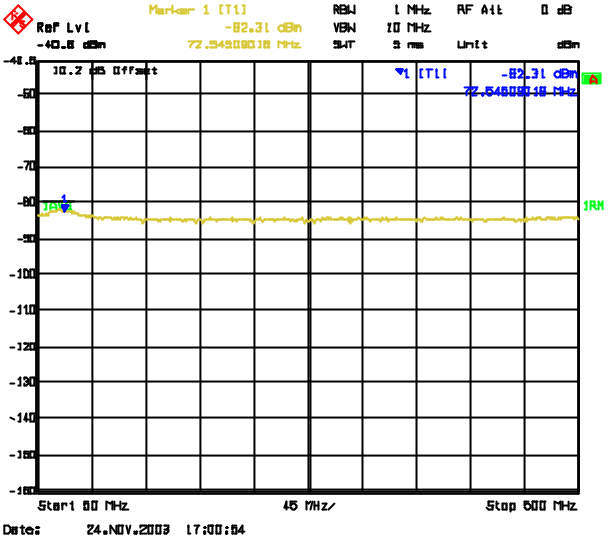
Frequency band	SPURIOUS EMISSION LEVEL (dBm) Channel B 1932.4 MHz Sector 1	Margin (dB)	Limit (dBm)
9 kHz to 50 MHz	-82.78	69.78	-13
50 MHz to 500 MHz	-82.31	69.31	
500 MHz to 1GHz	-80.70	67.7	
1GHz to 1.92 GHz	-38.44	25.44	
1920 MHz to 1927.025 MHz	-22.54	9.54	
1927.025 MHz to 1928.025 MHz	-24.48	11.48	
1928.025 MHzto 1929.025 MHz	-22.57	9.57	
1929.025 MHz to 1929.975 MHz	-18.63	5.63	
1940.025 MHz to 1940.975 MHz	-25.64	12.64	
1940.975 MHz to 1941.975 MHz	-21.77	8.77	
1941.975 MHz to 1942.975 MHz	-23.16	10.16	
1942.975 MHz to 2000 MHz	-19.33	6.33	
2 GHz to 3 GHz	-39.97	26.97	
3 GHz to 5 GHz	-54.39	41.39	
5 GHz to 7 GHz	-50.71	37.71	
7 GHz to 9 GHz	-51.37	38.37	
9 GHz to 12.75 GHz	-49.45	36.45	
12.75 GHz to 20 GHz	-50.43	37.43	

Table 7. Measurements result for Spurious Emission in B channel

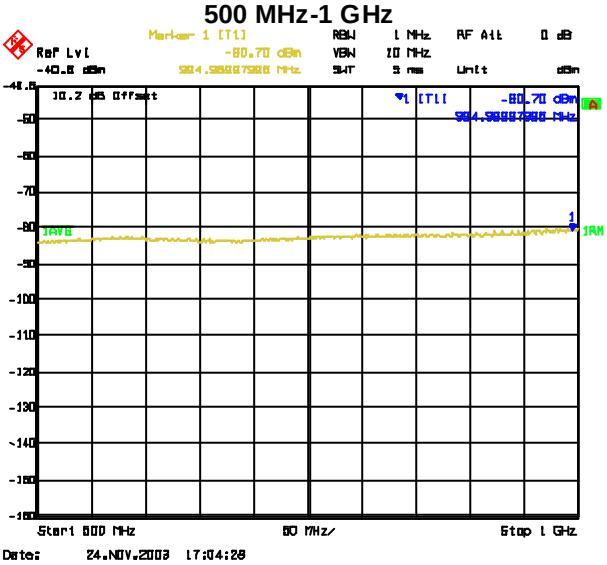
9 kHz-50 MHz[4]



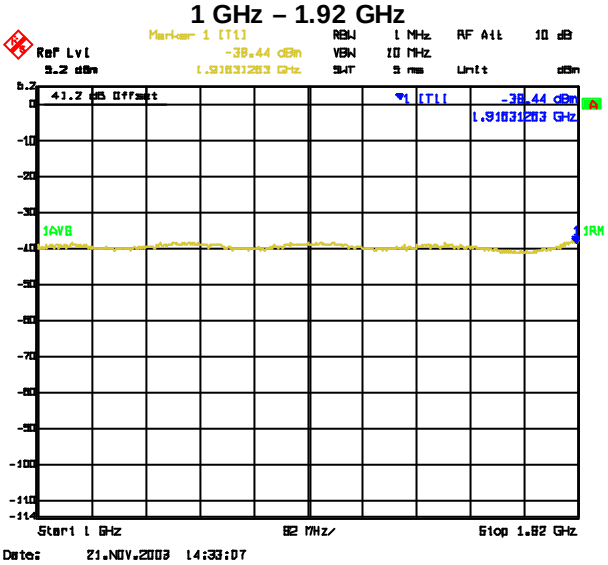
50 MHz- 500 MHz



500 MHz-1 GHz

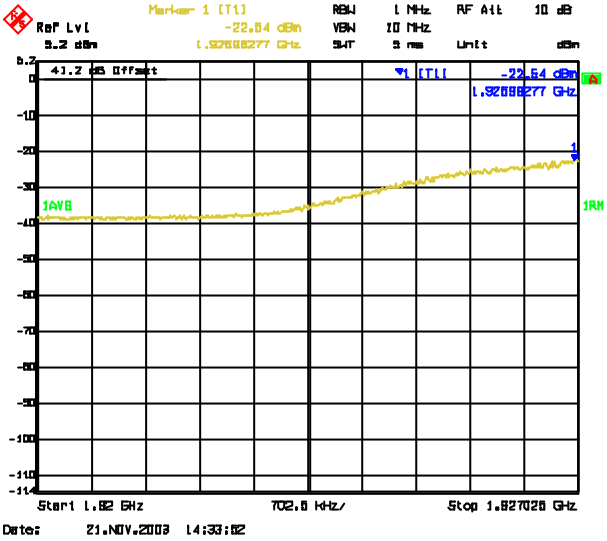


1 GHz – 1.92 GHz

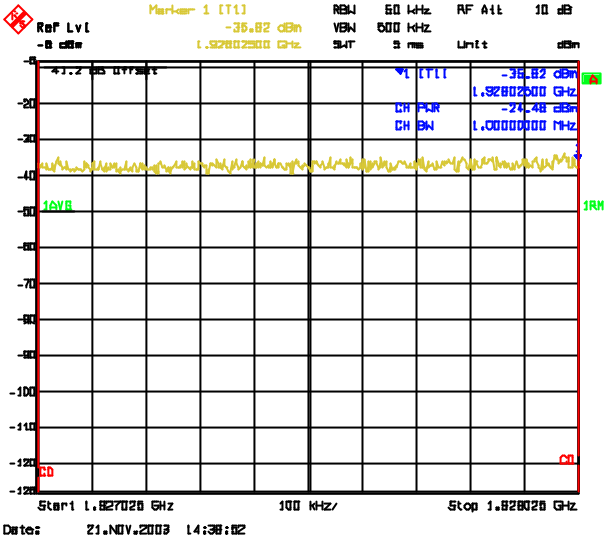


[4] Spectrum lines at 9 kHz are internal DC spectrum line of Analyzer

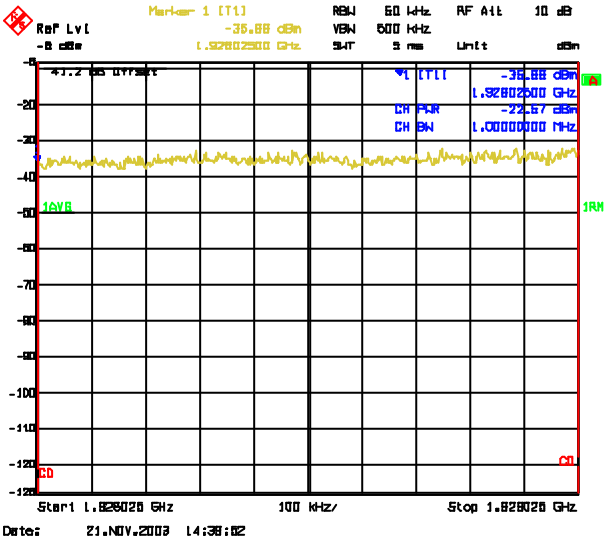
1920 MHz- 1927.025 MHz



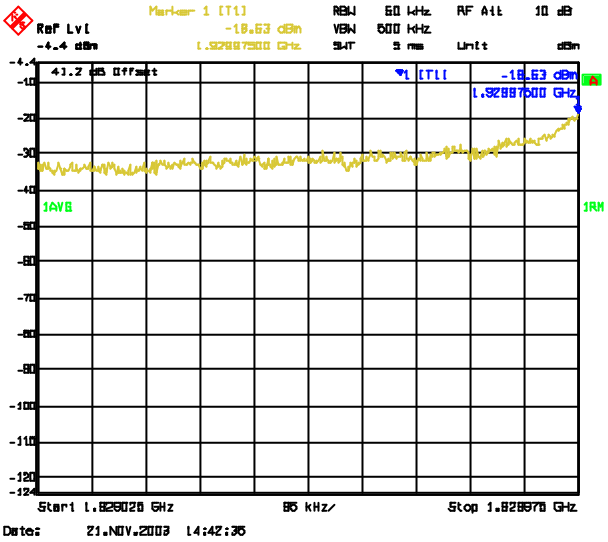
1927.025 MHz-1928.025 MHz



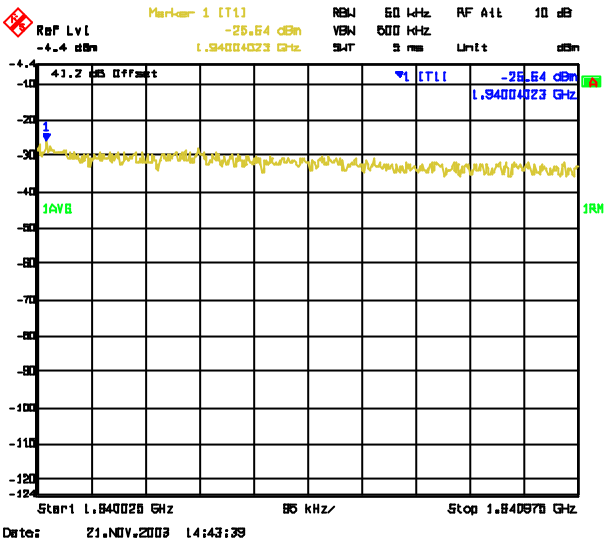
1928.025 MHz-1929.025 MHz



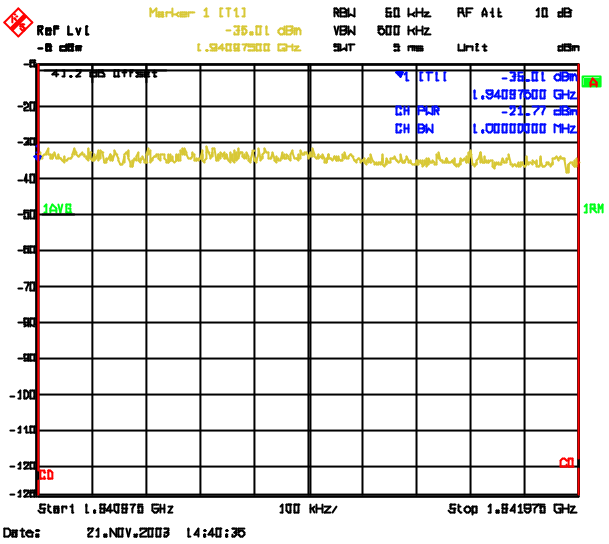
1929.025 MHz-1929.975 MHz



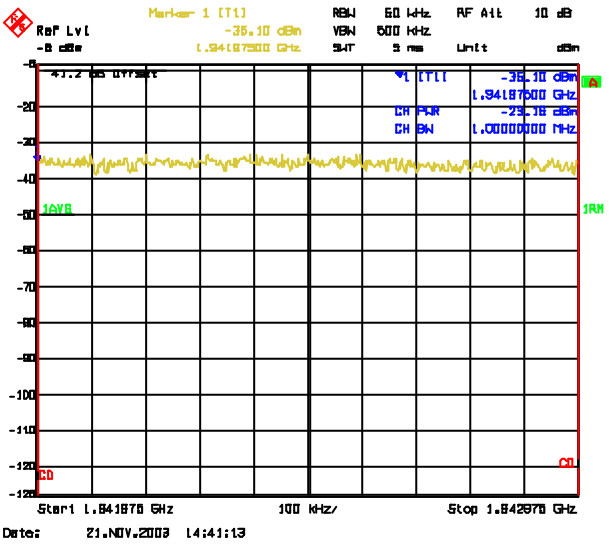
1940.025 MHz-1940.975 MHz



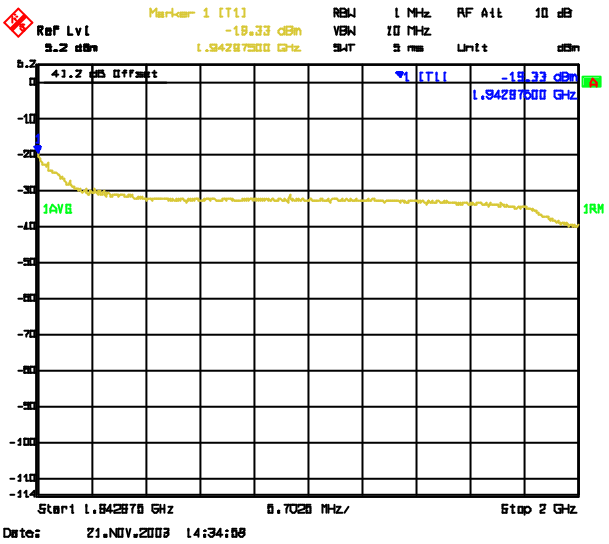
1940.975 MHz-1941.975 MHz



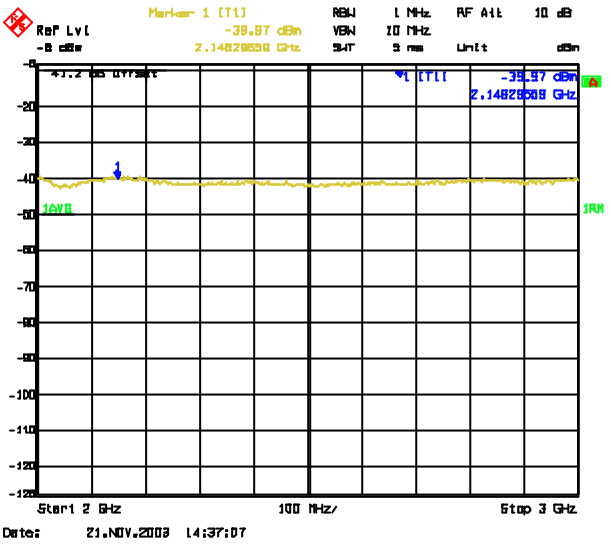
1941.975 MHz-1942.975 MHz



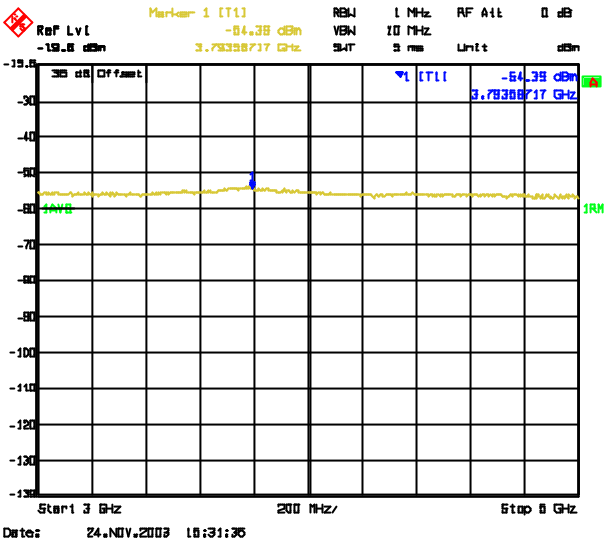
1942.975 MHz-2000 MHz



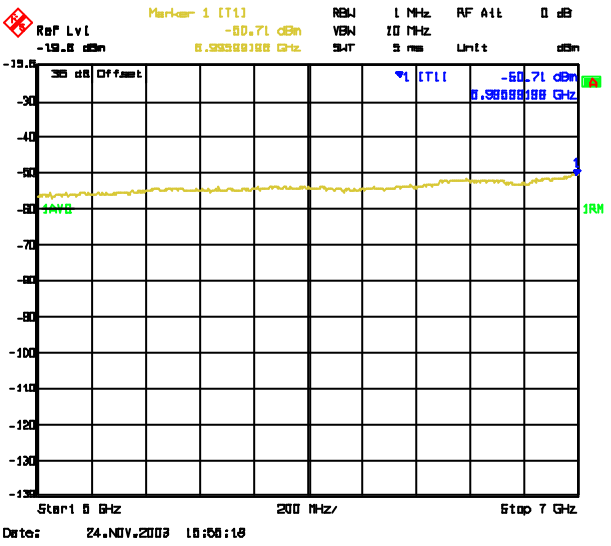
2 GHz-3 GHz



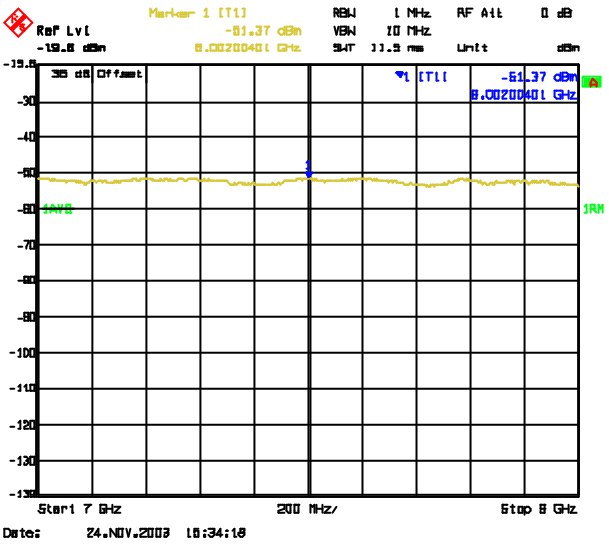
3 GHz-5 GHz



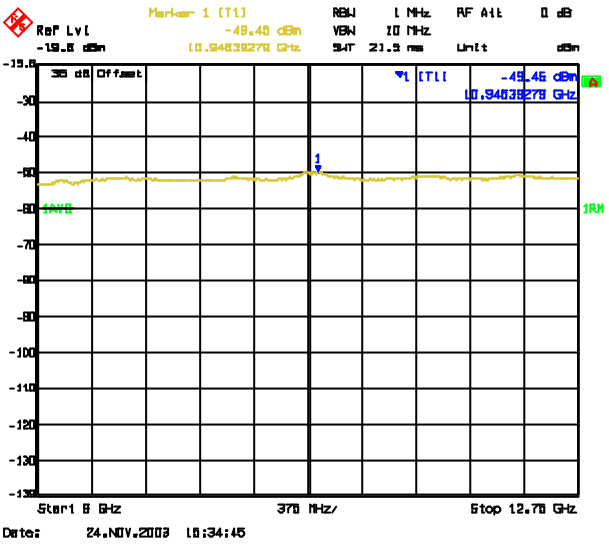
5 GHz-7 GHz



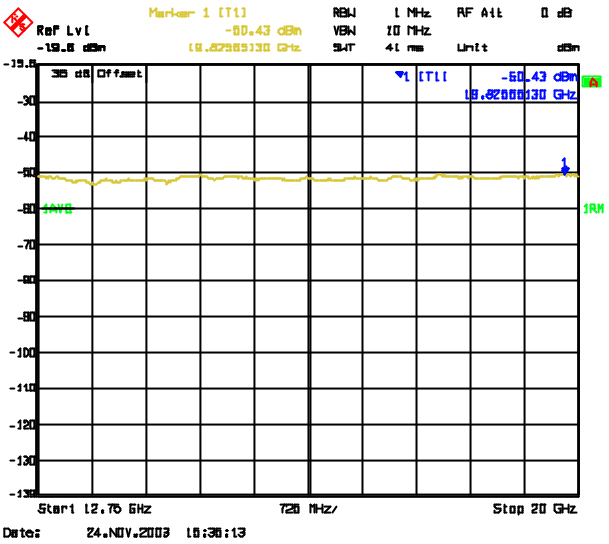
7 GHz-9 GHz



9 GHz- 12.75 GHz



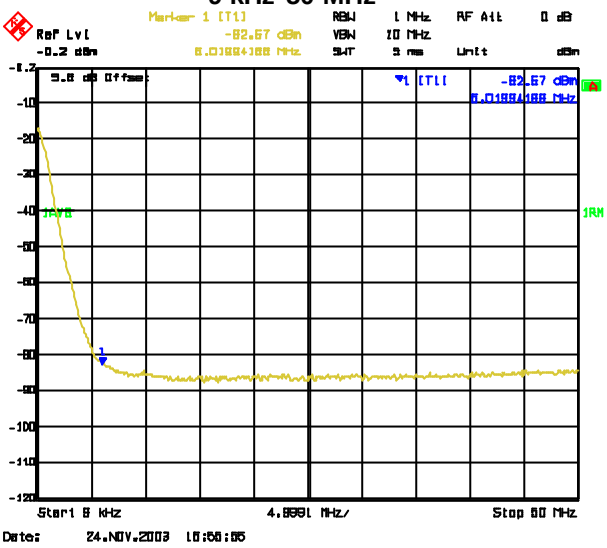
12.75 GHz-20 GHz



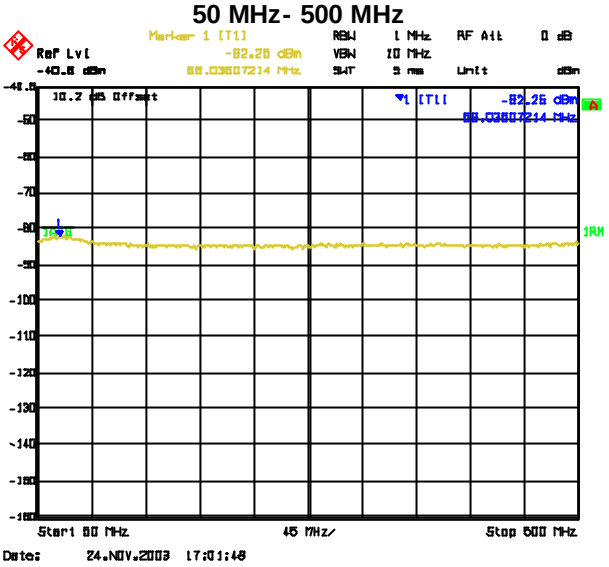
Frequency band	SPURIOUS EMISSION LEVEL (dBm) Channel M 1960 MHz Sector 2	Margin (dB)	Limit (dBm)
9 kHz to 50 MHz	-82.67	69.67	-13
50 MHz to 500 MHz	-82.25	69.25	
500 MHz to 1GHz	-80.87	67.87	
1GHz to 1.92 GHz	-38.74	25.74	
1920 MHz to 1952.025 MHz	-23.38	10.38	
1952.025 MHz to 1953.025 MHz	-24.78	11.78	
1953.025 MHzto 1954.025 MHz	-23.25	10.25	
1954.025 MHz to 1954.975 MHz	-25.77	12.77	
1965.025 MHz to 1965.975 MHz	-24.57	11.57	
1965.975 MHz to 1966.975 MHz	-22.69	9.69	
1966.975 MHz to 1967.975 MHz	-24.46	11.46	
1967.975 MHz to 2000 MHz	-18.35	5.35	
2 GHz to 3 GHz	-38.93	25.93	
3 GHz to 5 GHz	-54.48	41.48	
5 GHz to 7 GHz	-50.93	37.93	
7 GHz to 9 GHz	-51.94	38.94	
9 GHz to 12.75 GHz	-49.85	36.85	
12.75 GHz to 20 GHz	-50.61	37.61	

Table 8. Measurements result for Spurious Emission in M channel

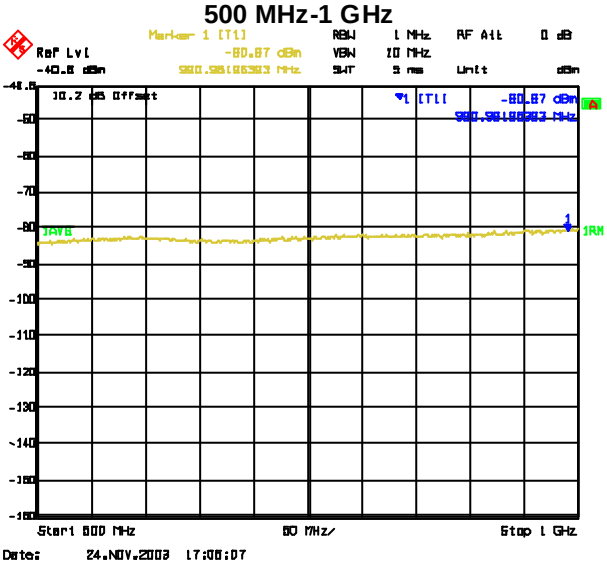
9 kHz-50 MHz[5]



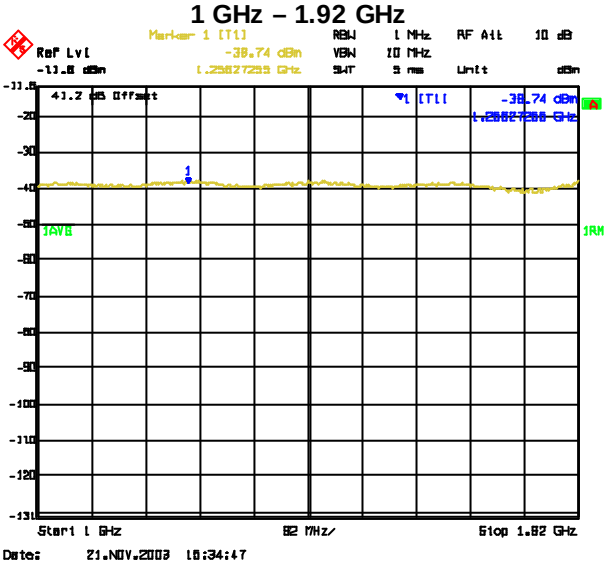
50 MHz- 500 MHz



500 MHz-1 GHz

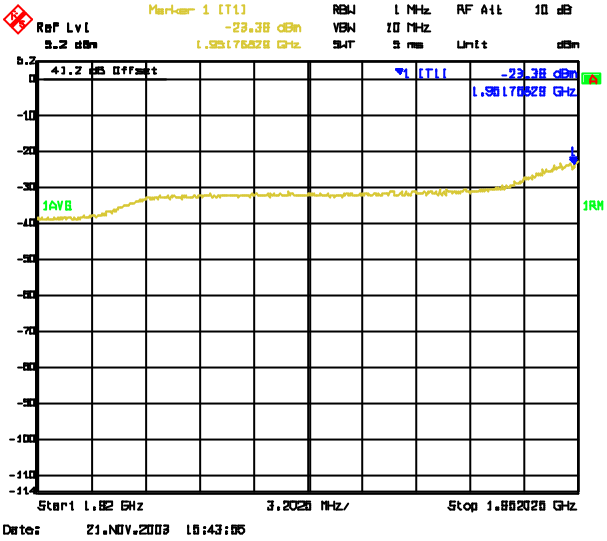


1 GHz – 1.92 GHz

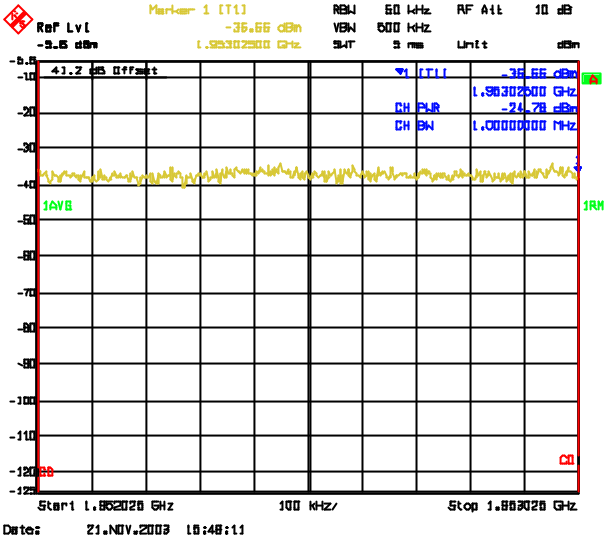


[5] Spectrum lines at 9 kHz are internal DC spectrum line of Analyzer

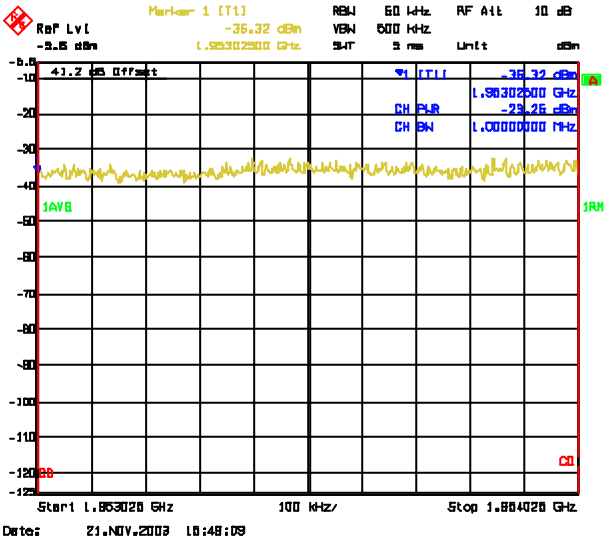
1920 MHz- 1952.025 MHz



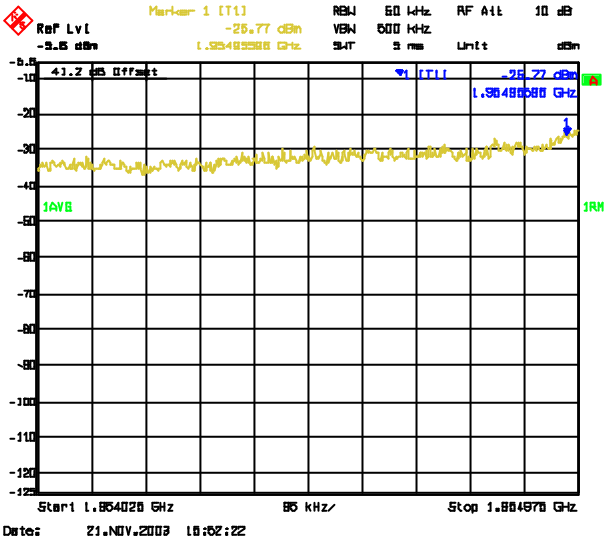
1952.025 MHz-1953.025 MHz



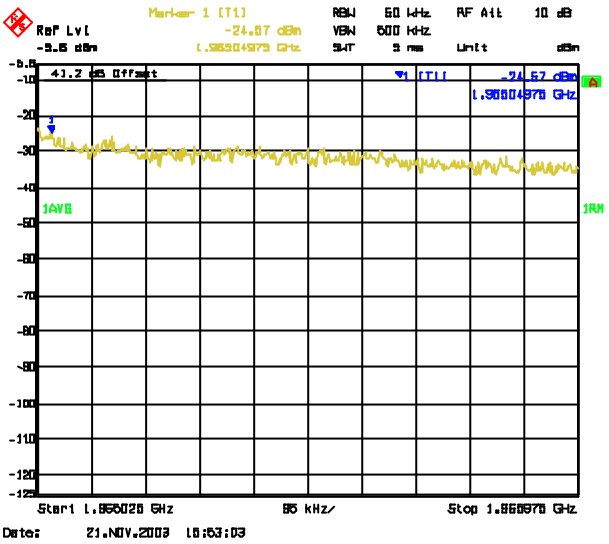
1953.025 MHz-1954.025 MHz



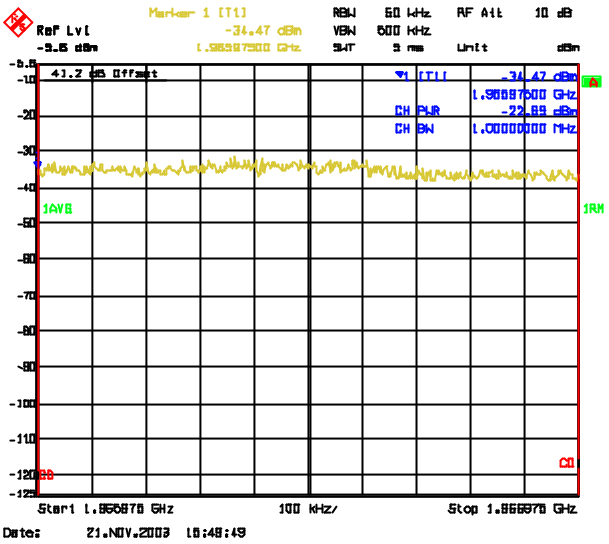
1954.025 MHz-1954.975 MHz



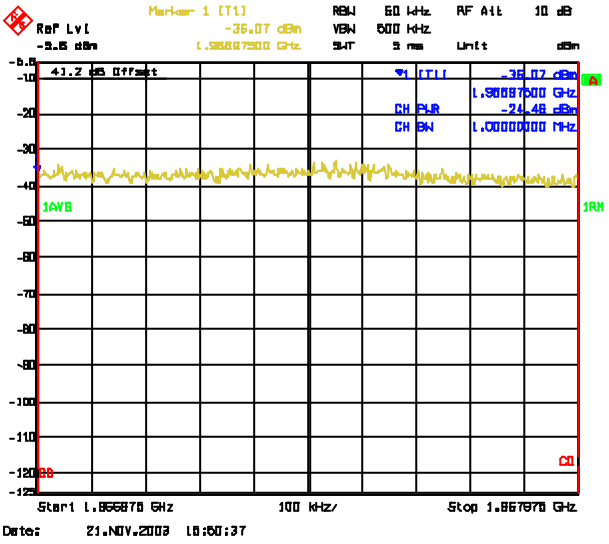
1965.025 MHz-1965.975 MHz



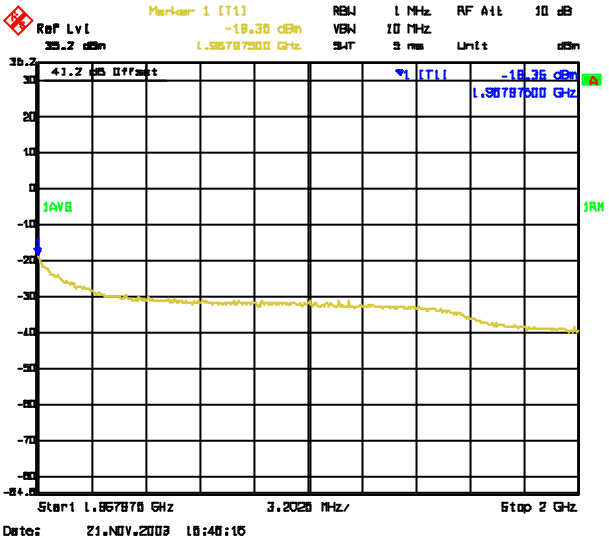
1965.975 MHz-1966.975 MHz



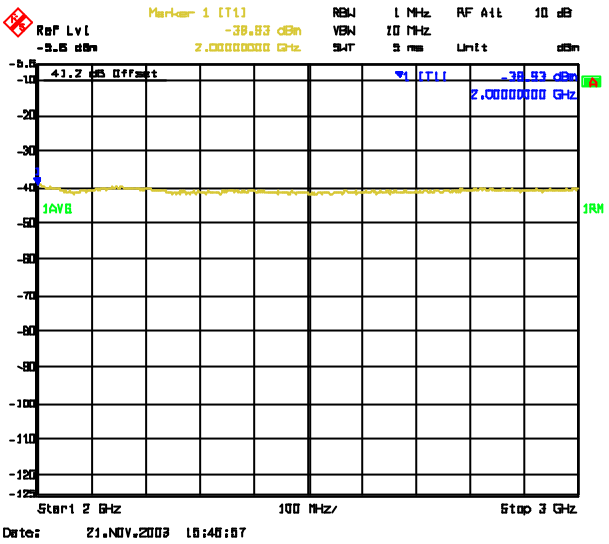
1966.975 MHz-1967.975 MHz



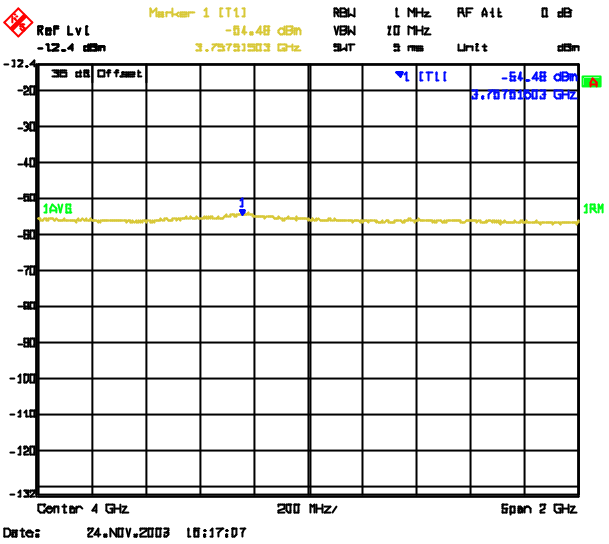
1967.975 MHz-2000 MHz



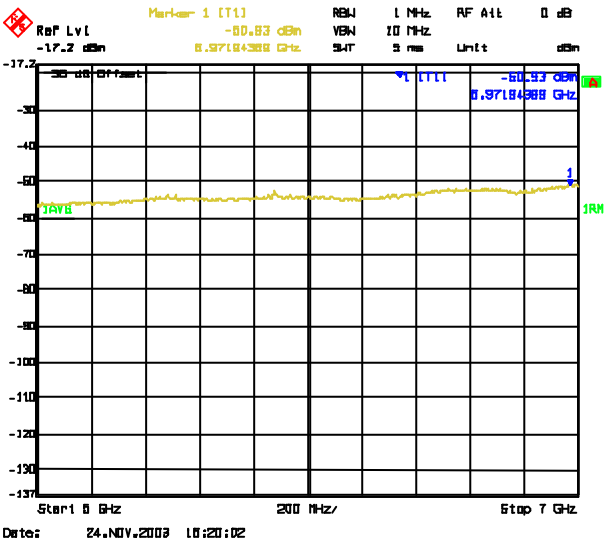
2 GHz-3 GHz



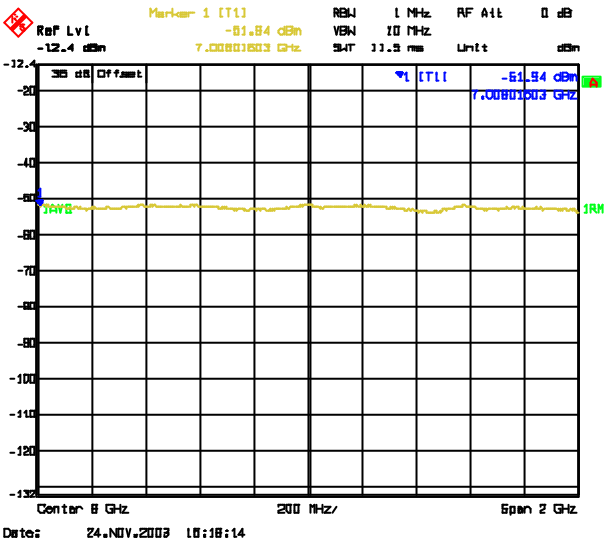
3 GHz-5 GHz



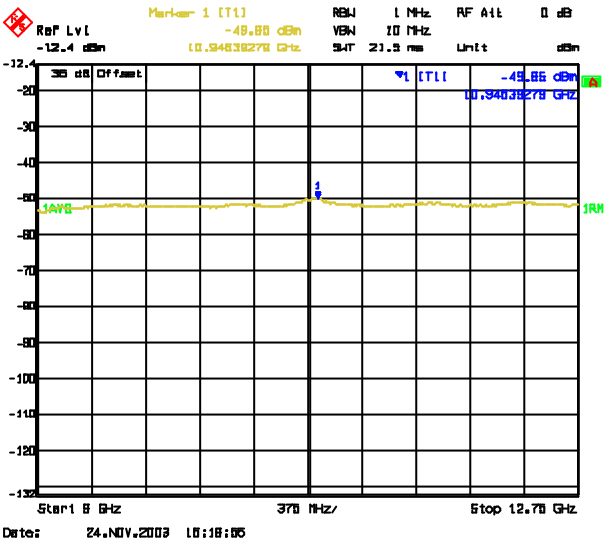
5 GHz-7 GHz



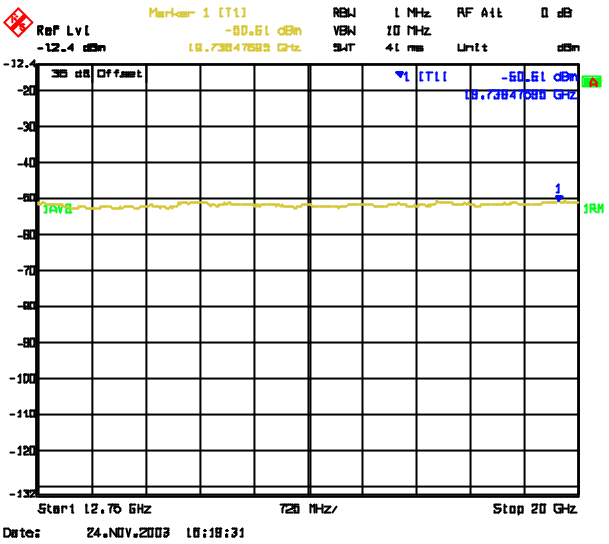
7 GHz-9 GHz



9 GHz- 12.75 GHz



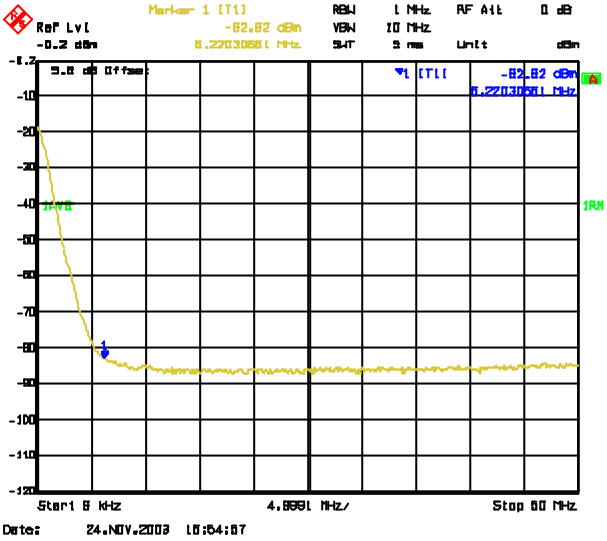
12.75 GHz-20 GHz



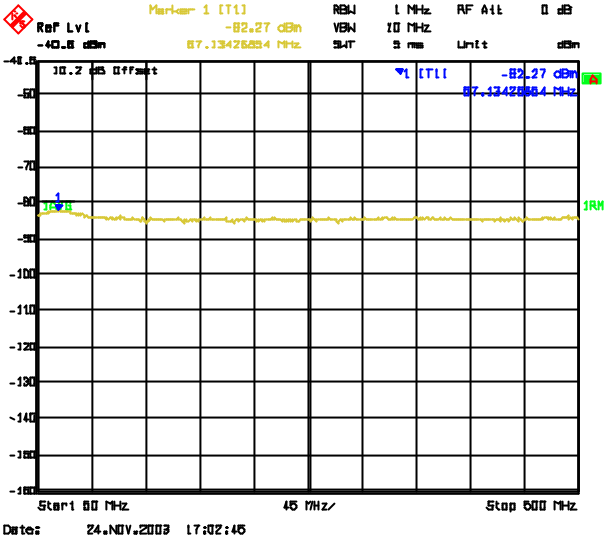
Frequency band	SPURIOUS EMISSION LEVEL (dBm) Channel T 1987.6 MHz Sector 3	Margin (dB)	Limit (dBm)
9 kHz to 50 MHz	-82.82	69.82	-13
50 MHz to 500 MHz	-82.27	69.27	
500 MHz to 1GHz	-80.57	67.57	
1GHz to 1927.6 MHz	-33.55	20.55	
1927.6 MHz to 1977.025 MHz	-21.07	8.07	
1977.025 MHz to 1978.025 MHz	-21.50	8.5	
1978.025 MHzto 1979.025 MHz	-20.85	7.85	
1979.025 MHz to 1979.975 MHz	-27.52	14.52	
1990.025 MHz to 1990.975 MHz	-19.04	6.04	
1990.975 MHz to 1991.975 MHz	-22.43	9.43	
1991.975 MHz to 1992.975 MHz	-24.36	11.36	
1992.975 MHz to 2000 MHz	-19.04	6.04	
2 GHz to 3 GHz	-38.01	25.01	
3 GHz to 5 GHz	-54.13	41.13	
5 GHz to 7 GHz	-50.93	37.93	
7 GHz to 9 GHz	-51.78	38.78	
9 GHz to 12.75 GHz	-49.64	36.64	
12.75 GHz to 20 GHz	-50.53	37.53	

Table 9. Measurements result for Spurious Emission in T channel

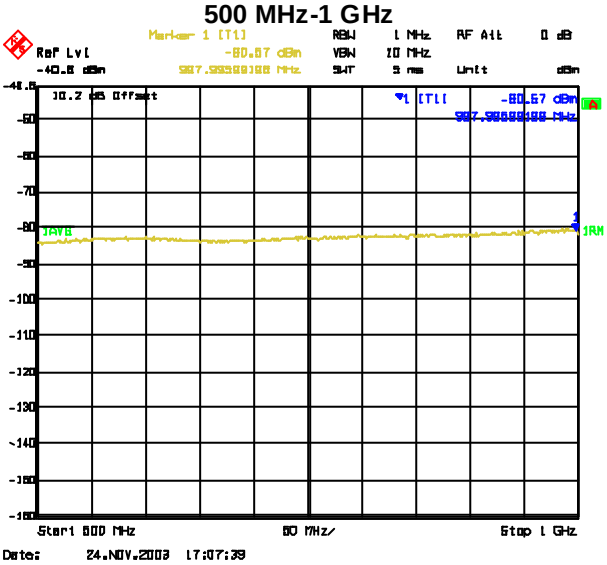
9 kHz-50 MHz[6]



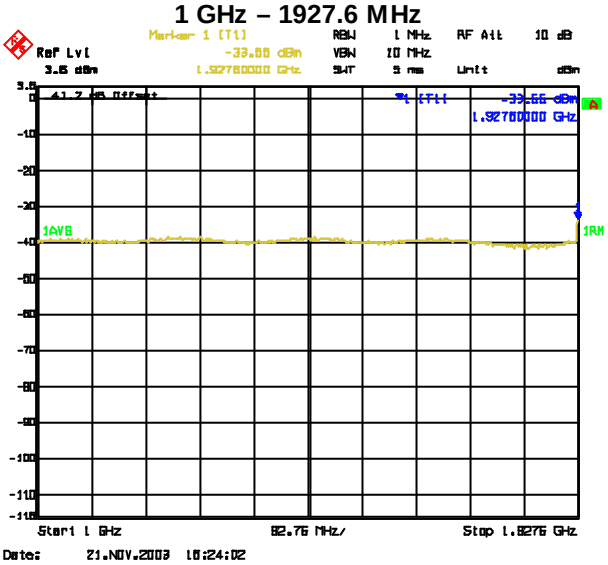
50 MHz- 500 MHz



500 MHz-1 GHz

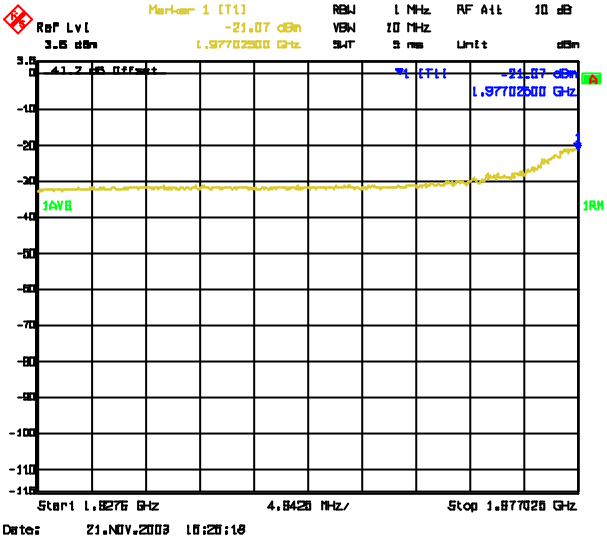


1 GHz – 1927.6 MHz

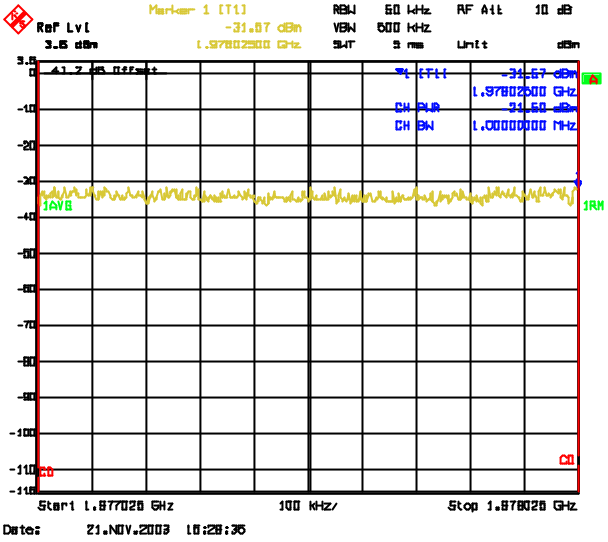


[6] Spectrum lines at 9 kHz are internal DC spectrum line of Analyzer

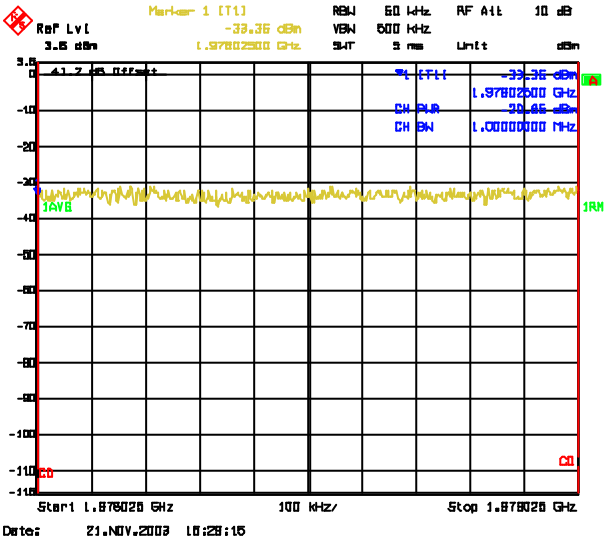
1927.6 MHz- 1977.025 MHz



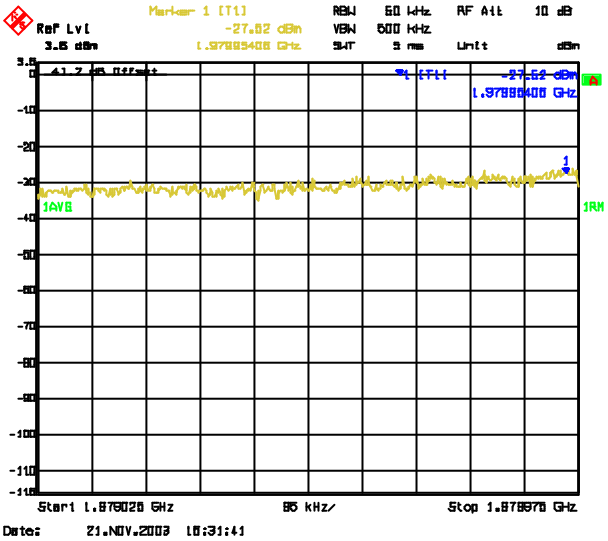
1977.025 MHz-1978.025 MHz



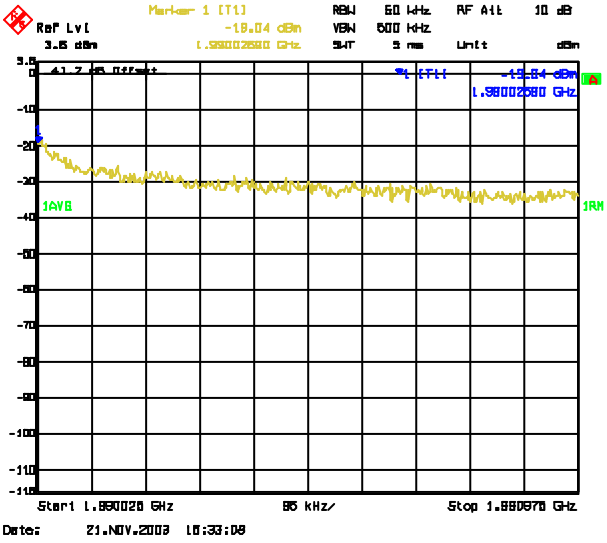
1978.025 MHz-1979.025 MHz



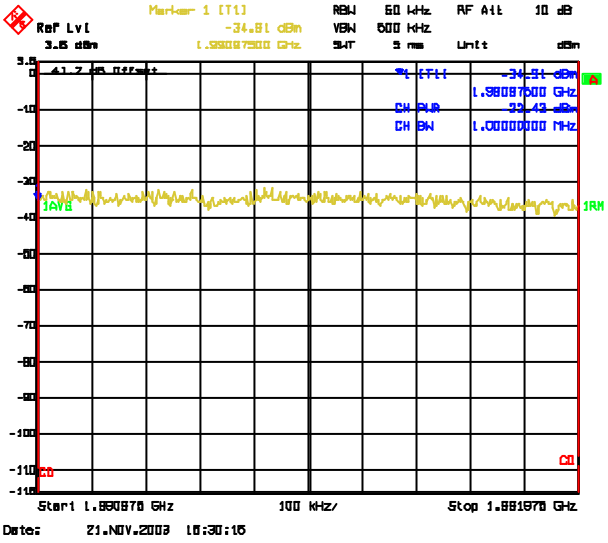
1979.025 MHz-1979.975 MHz



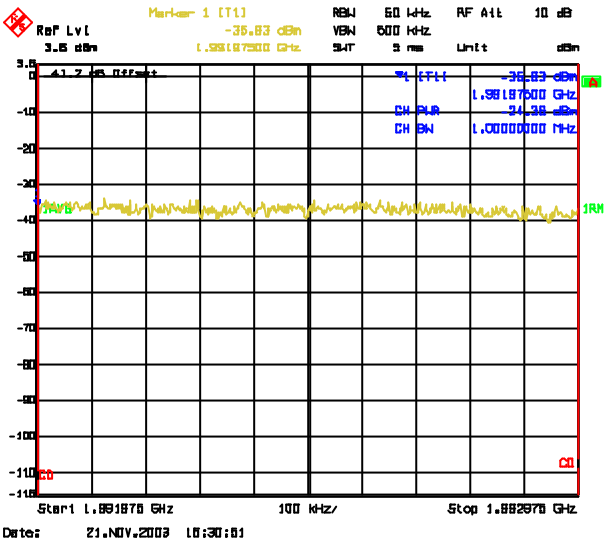
1990.025 MHz-1990.975 MHz



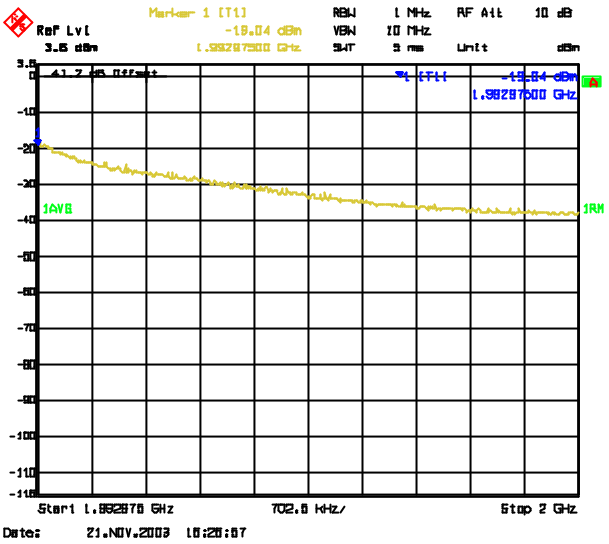
1990.975 MHz-1991.975 MHz



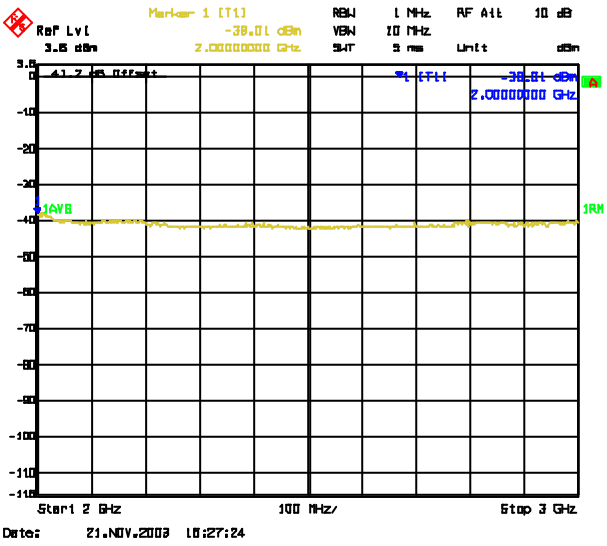
1991.975 MHz-1992.975 MHz



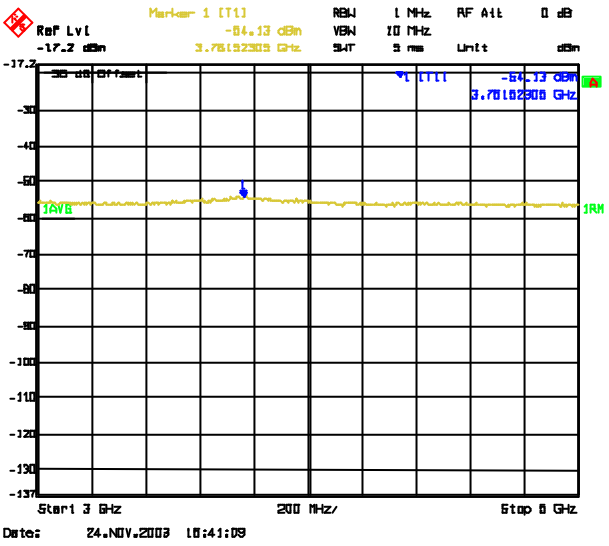
1992.975 MHz-2000 MHz



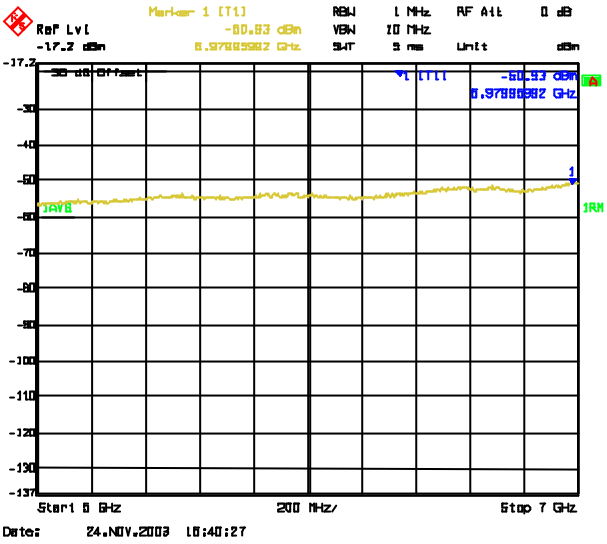
2 GHz-3 GHz



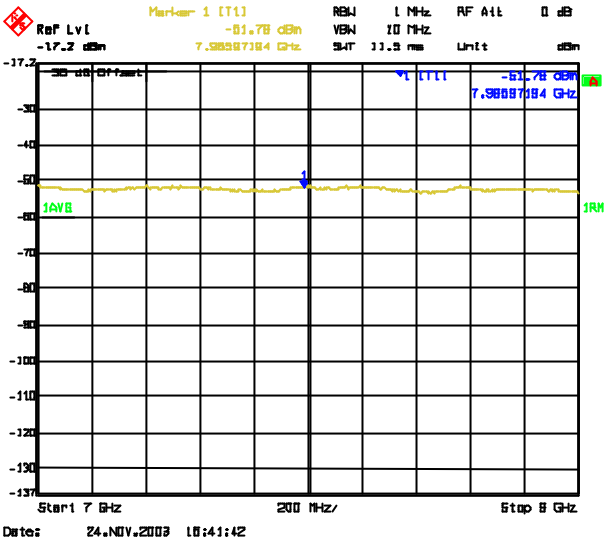
3 GHz-5 GHz



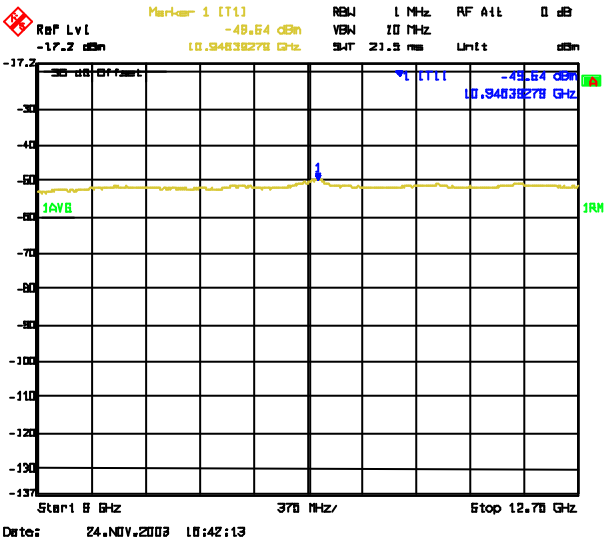
5 GHz-7 GHz



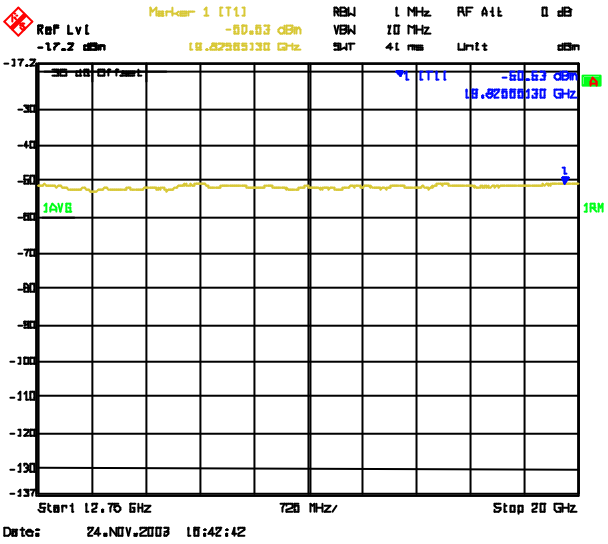
7 GHz-9 GHz



9 GHz- 12.75 GHz



12.75 GHz-20 GHz



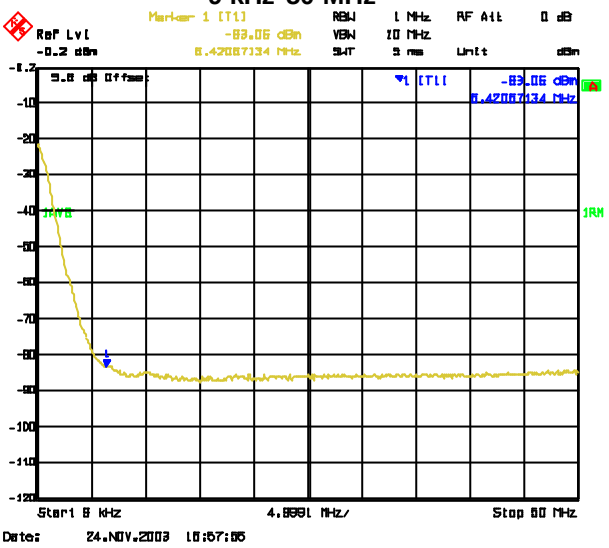
3. UMTS COMPACT INDOOR IBTS, STSR2 30W MODE

Tables 10 to 12 show the results for Spurious Emissions at Antenna Terminals for the configuration D.

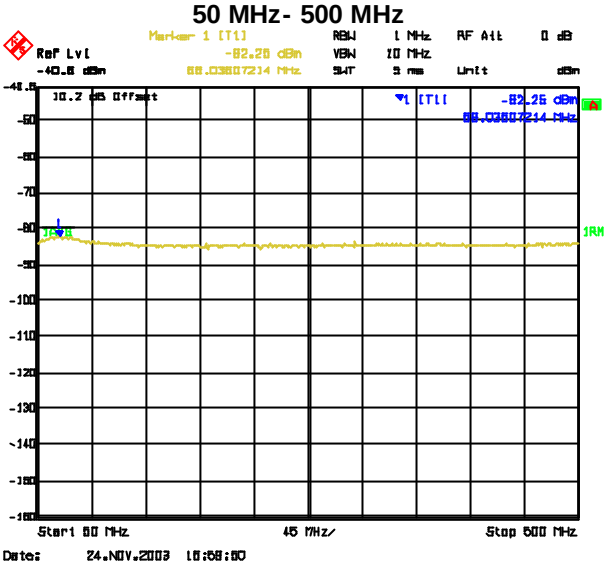
Frequency band	SPURIOUS EMISSION LEVEL (dBm) Channel B 1932.4 MHz Sector 1	Margin (dB)	Limit (dBm)
9 kHz to 50 MHz	-83.06	70.06	-13
50 MHz to 500 MHz	-82.25	69.25	
500 MHz to 1GHz	-80.89	67.89	
1GHz to 1.92 GHz	-42.73	29.73	
1920 MHz to 1927.025 MHz	-23.70	10.7	
1927.025 MHz to 1928.025 MHz	-25.44	12.44	
1928.025 MHzto 1929.025 MHz	-23.87	10.87	
1929.025 MHz to 1929.975 MHz	-20.34	7.34	
1940.025 MHz to 1940.975 MHz	-29.04	16.04	
1940.975 MHz to 1941.975 MHz	-23.25	10.25	
1941.975 MHz to 1942.975 MHz	-23.88	10.88	
1942.975 MHz to 2000 MHz	-20.82	7.82	
2 GHz to 3 GHz	-40.27	27.27	
3 GHz to 5 GHz	-54.24	41.24	
5 GHz to 7 GHz	-51.19	38.19	
7 GHz to 9 GHz	-51.82	38.82	
9 GHz to 12.75 GHz	-49.47	36.47	
12.75 GHz to 20 GHz	-50.36	37.36	

Table 10. Measurements result for Spurious Emission in B channel

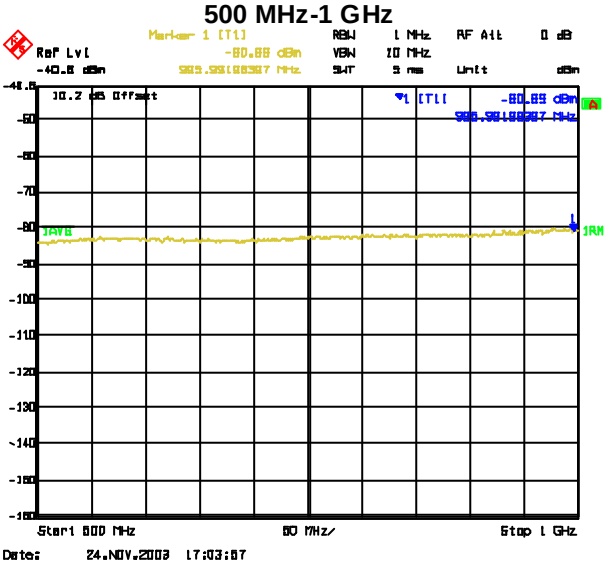
9 kHz-50 MHz[7]



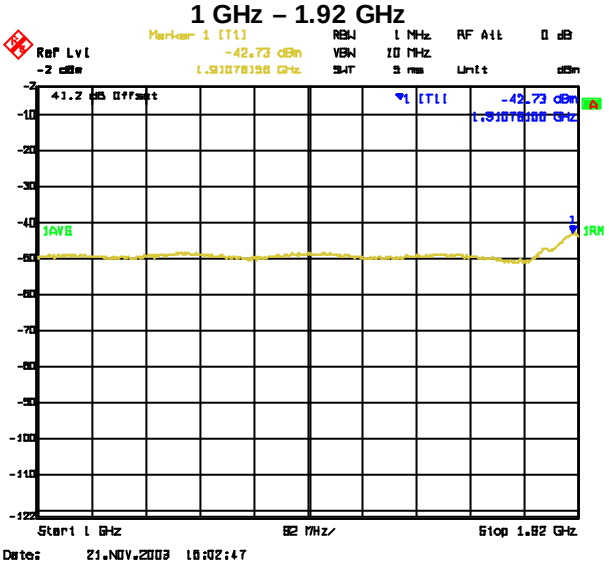
50 MHz- 500 MHz



500 MHz-1 GHz

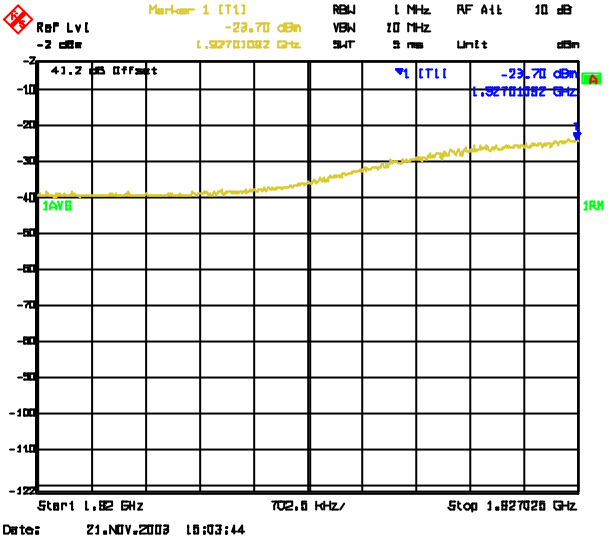


1 GHz – 1.92 GHz

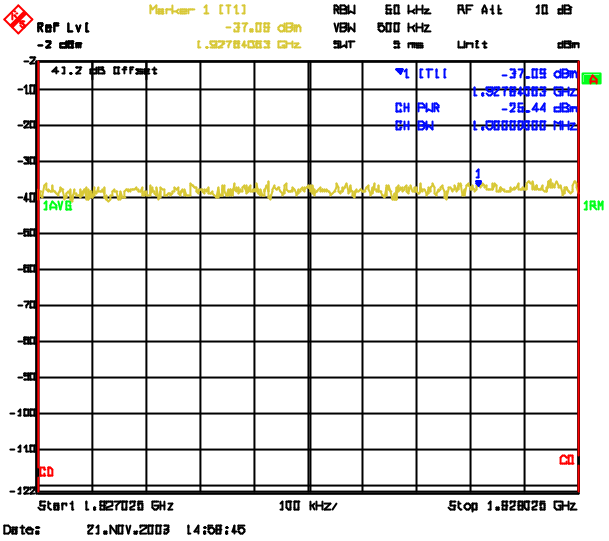


[7] Spectrum lines at 9 kHz are internal DC spectrum line of Analyzer

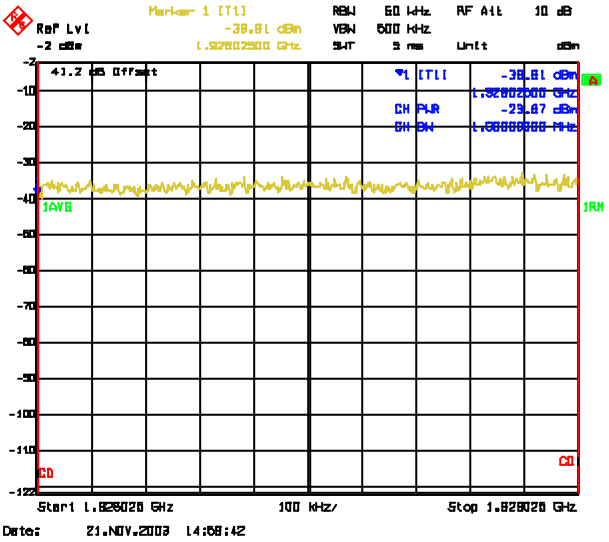
1920 MHz- 1927.025 MHz



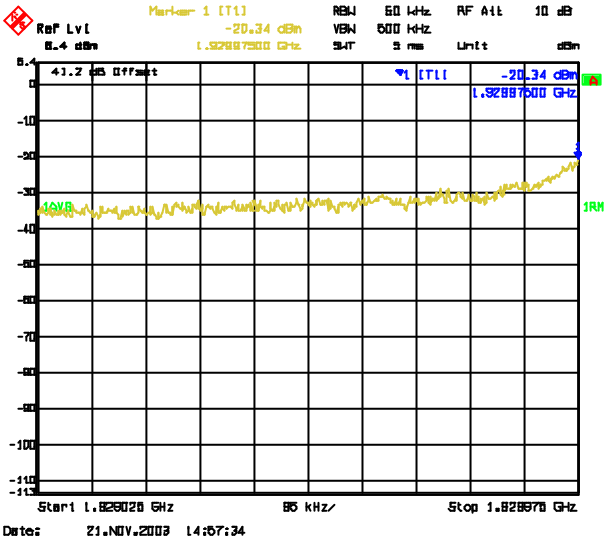
1927.025 MHz-1928.025 MHz



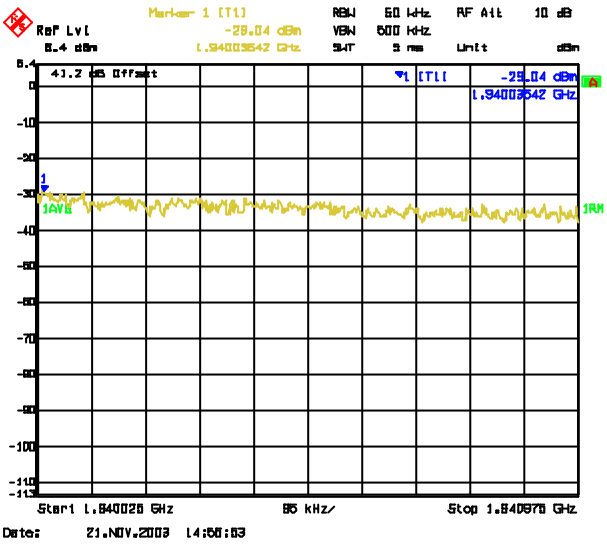
1928.025 MHz-1929.025 MHz



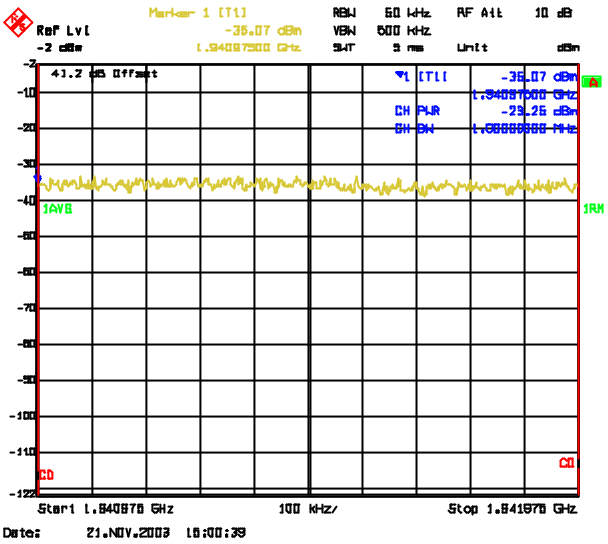
1929.025 MHz-1929.975 MHz



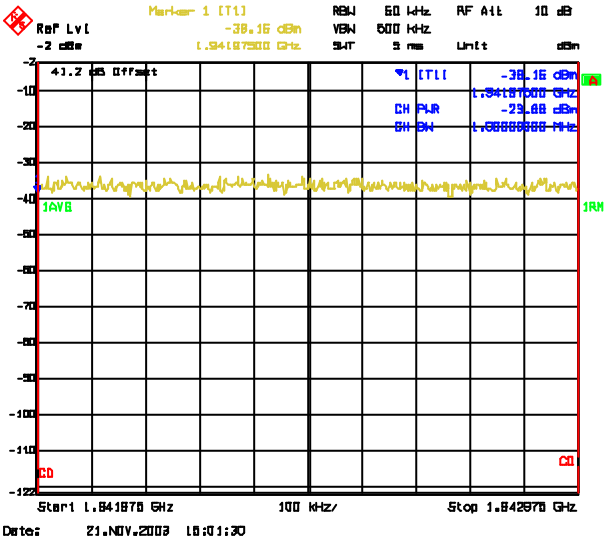
1940.025 MHz-1940.975 MHz



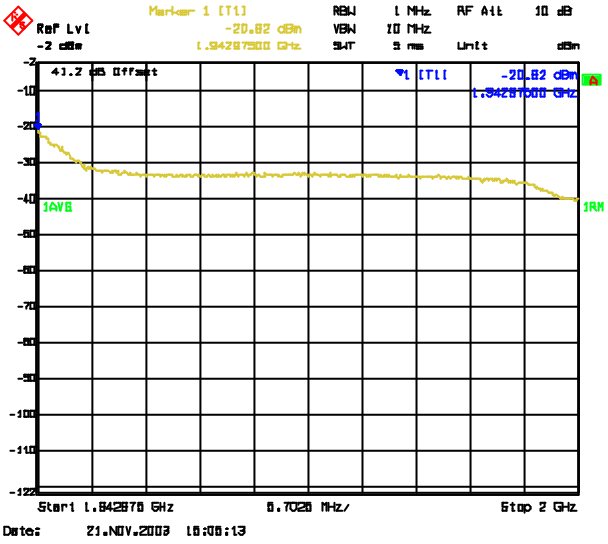
1940.975 MHz-1941.975 MHz



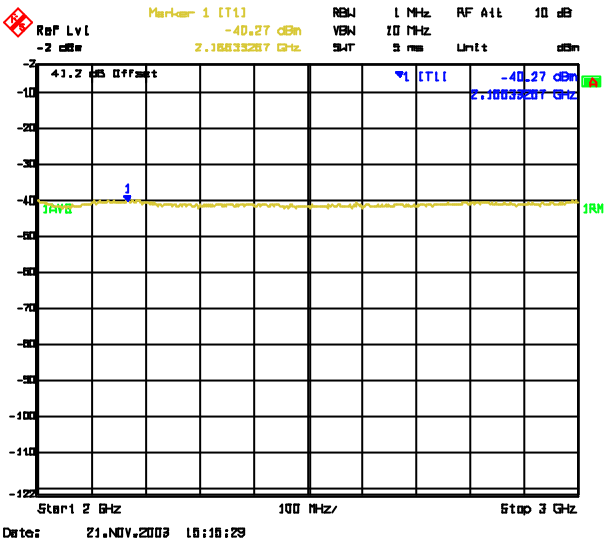
1941.975 MHz-1942.975 MHz



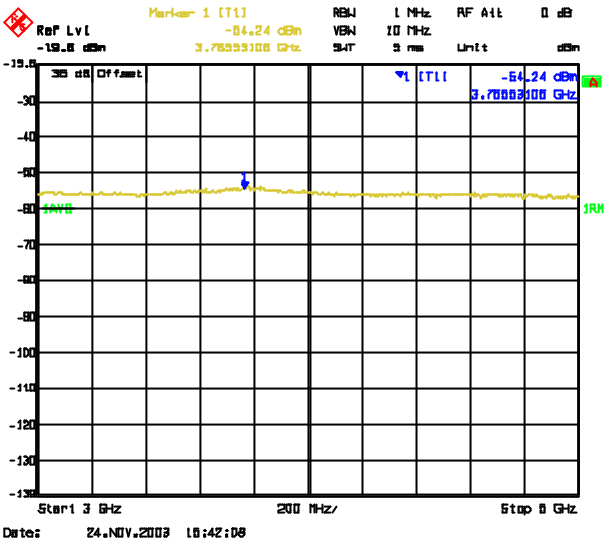
1942.975 MHz-2000 MHz



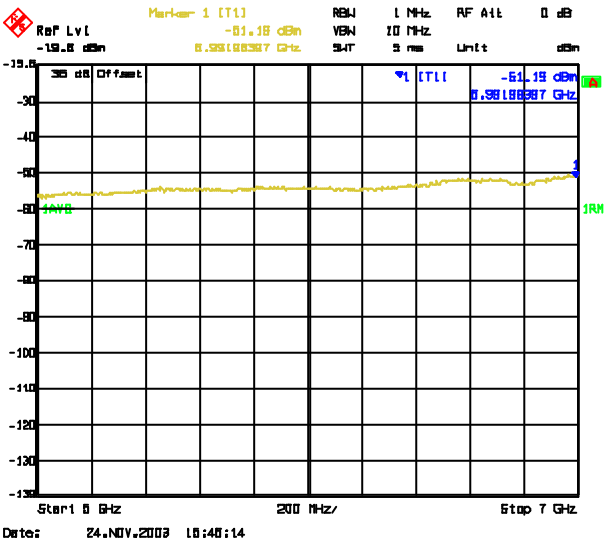
2 GHz-3 GHz



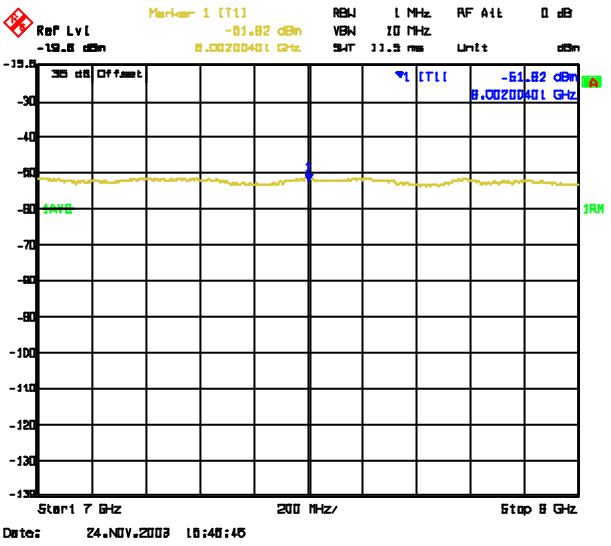
3 GHz-5 GHz



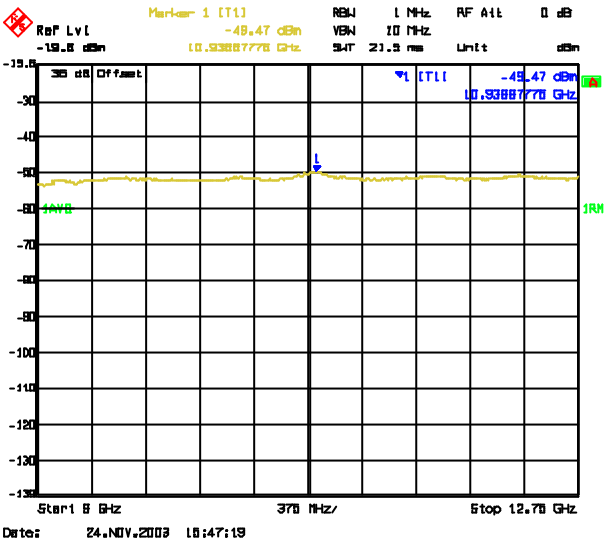
5 GHz-7 GHz



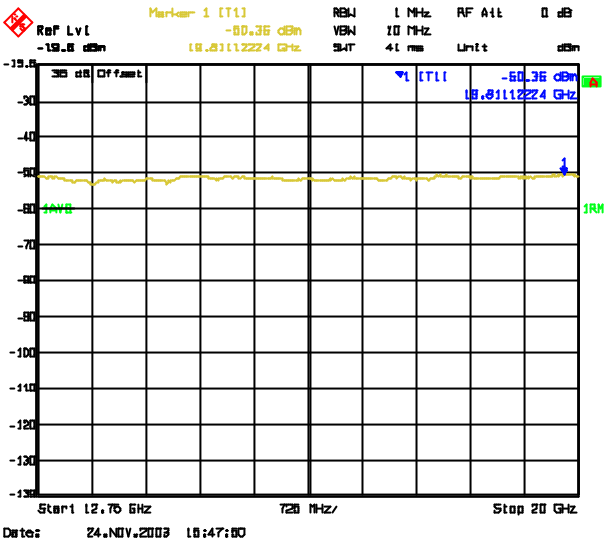
7 GHz-9 GHz



9 GHz- 12.75 GHz



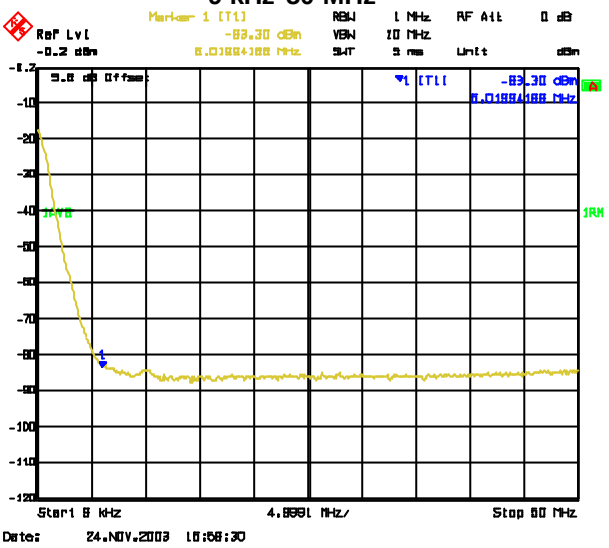
12.75 GHz-20 GHz



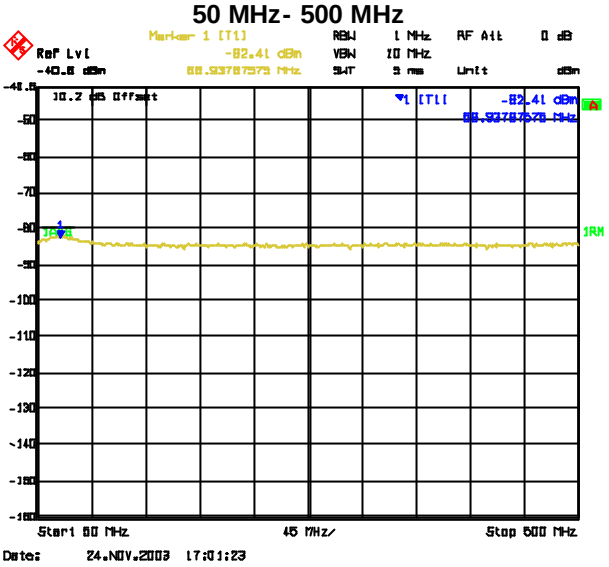
Frequency band	SPURIOUS EMISSION LEVEL (dBm) Channel M 1960 MHz Sector 2	Margin (dB)	Limit (dBm)
9 kHz to 50 MHz	-83.30	70.3	-13
50 MHz to 500 MHz	-82.41	69.41	
500 MHz to 1GHz	-80.45	67.45	
1GHz to 1.92 GHz	-44.36	31.36	
1920 MHz to 1952.025 MHz	-24.68	11.68	
1952.025 MHz to 1953.025 MHz	-26.73	13.73	
1953.025 MHzto 1954.025 MHz	-24.75	11.75	
1954.025 MHz to 1954.975 MHz	-26.46	13.46	
1965.025 MHz to 1965.975 MHz	-27.75	14.75	
1965.975 MHz to 1966.975 MHz	-25.13	12.13	
1966.975 MHz to 1967.975 MHz	-27.01	14.01	
1967.975 MHz to 2000 MHz	-21.17	8.17	
2 GHz to 3 GHz	-39.79	26.79	
3 GHz to 5 GHz	-54.27	41.27	
5 GHz to 7 GHz	-50.97	37.97	
7 GHz to 9 GHz	-51.48	38.48	
9 GHz to 12.75 GHz	-49.81	36.81	
12.75 GHz to 20 GHz	-50.55	37.55	

Table 11. Measurements result for Spurious Emission in M channel

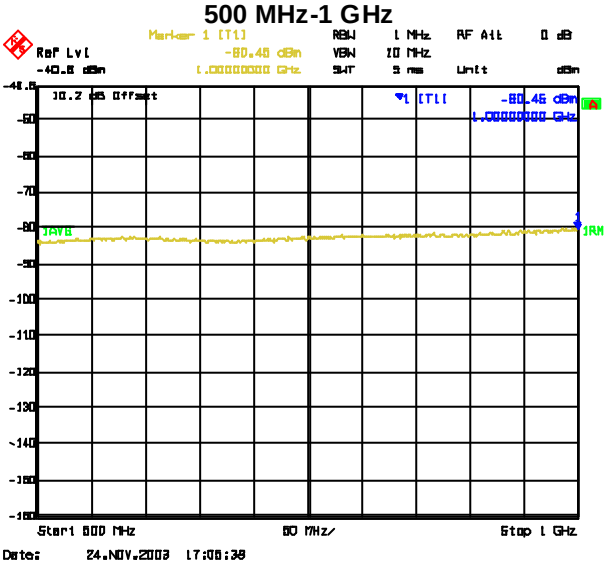
9 kHz-50 MHz[8]



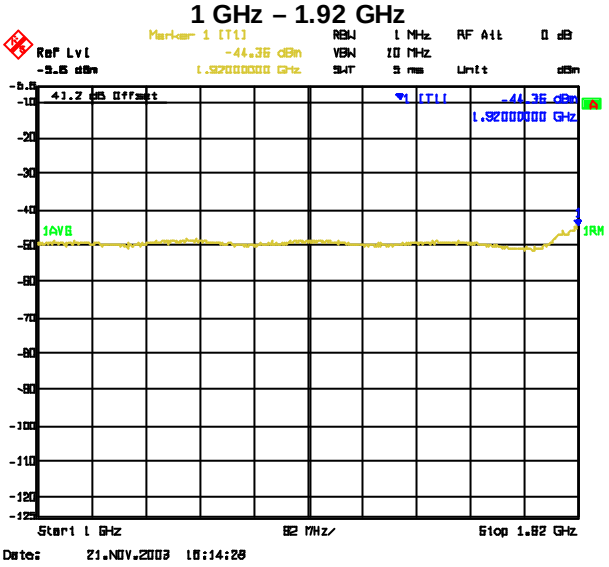
50 MHz- 500 MHz



500 MHz-1 GHz

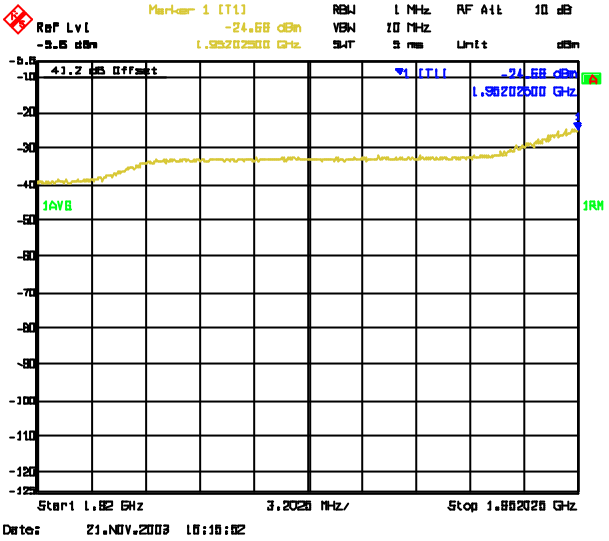


1 GHz – 1.92 GHz

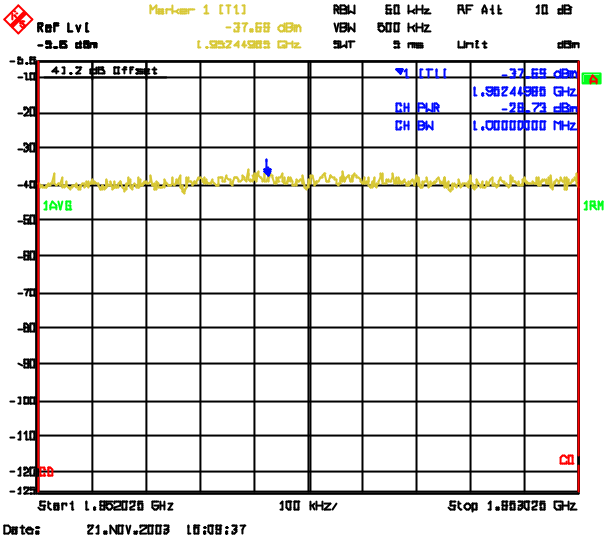


[8] Spectrum lines at 9 kHz are internal DC spectrum line of Analyzer

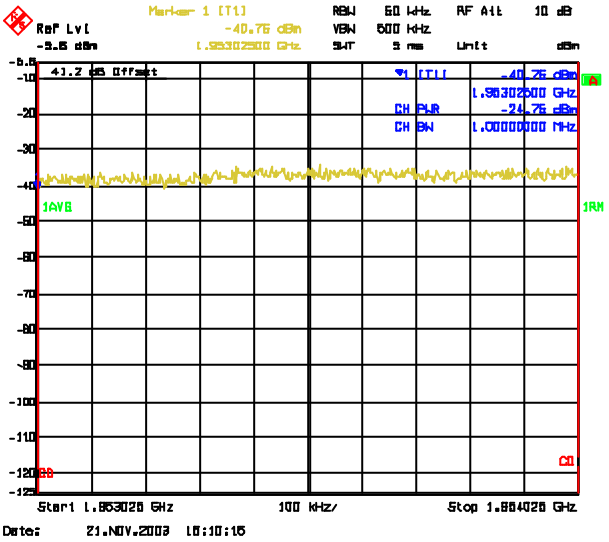
1920 MHz- 1952.025 MHz



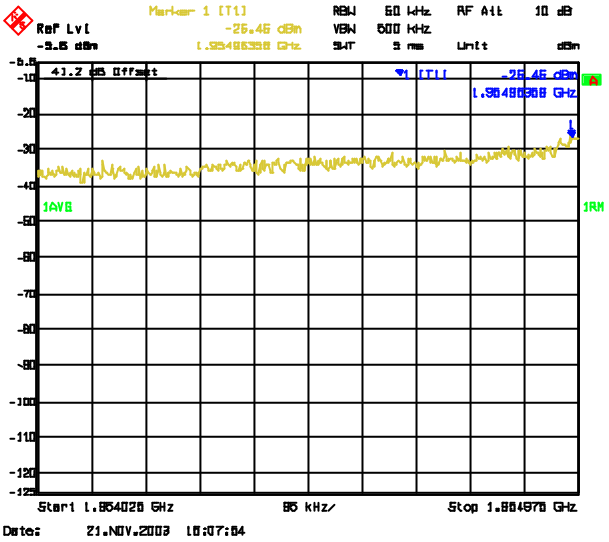
1952.025 MHz-1953.025 MHz



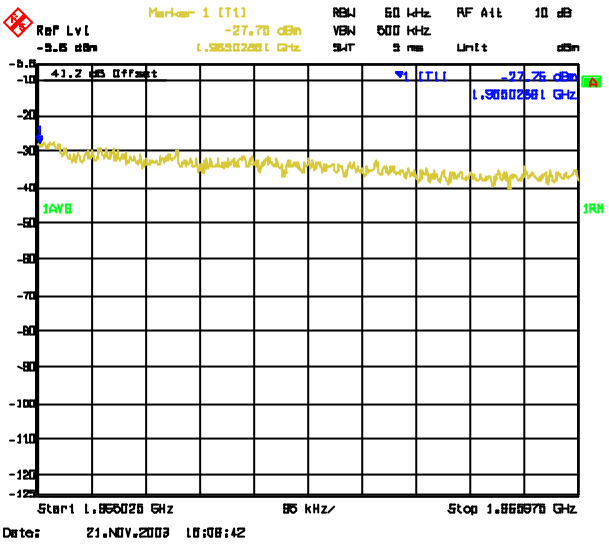
1953.025 MHz-1954.025 MHz



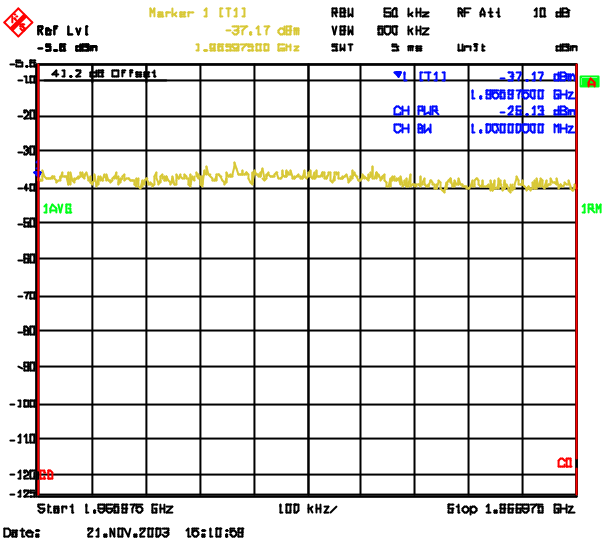
1954.025 MHz-1954.975 MHz



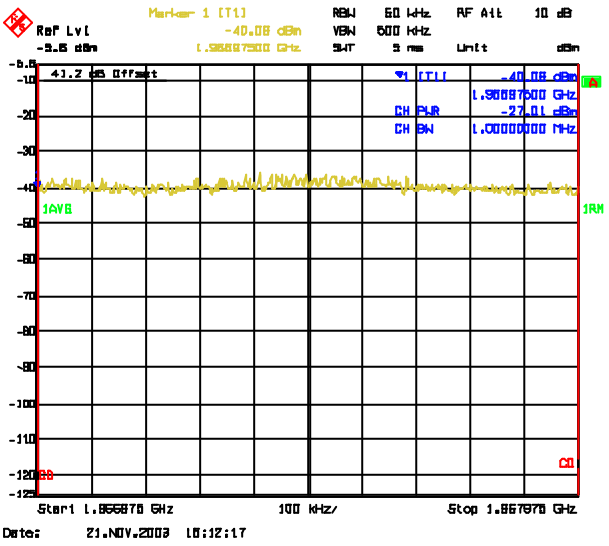
1965.025 MHz-1965.975 MHz



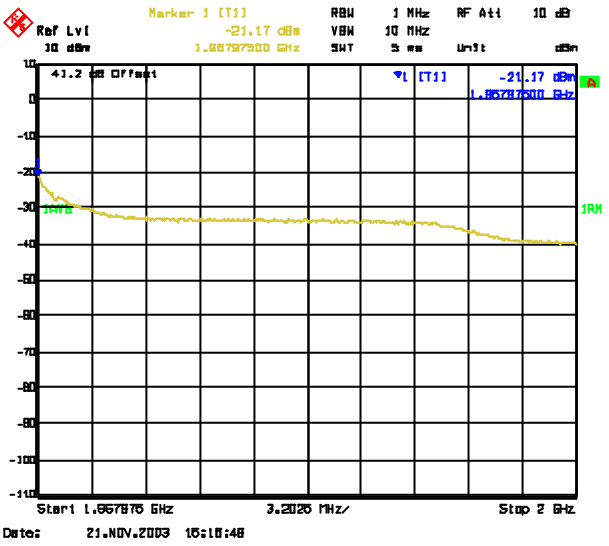
1965.975 MHz-1966.975 MHz



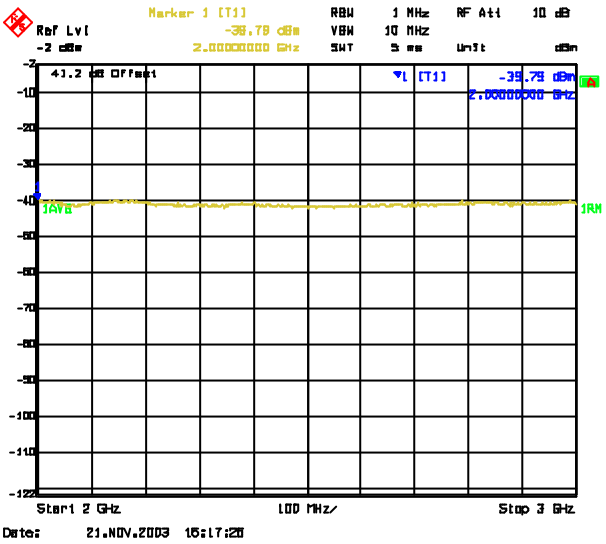
1966.975 MHz-1967.975 MHz



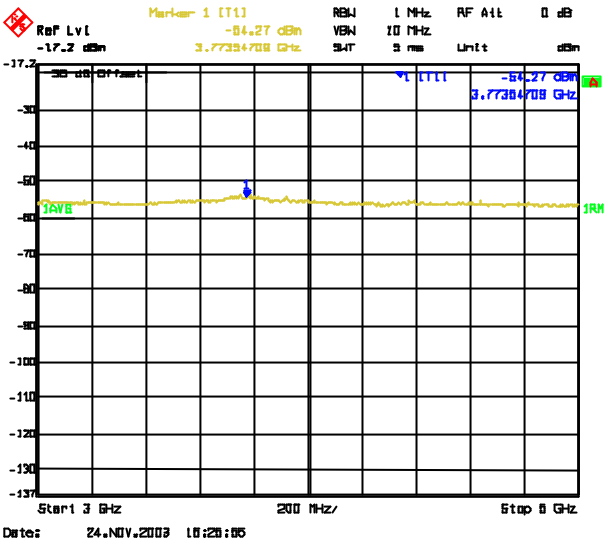
1967.975 MHz-2000 MHz



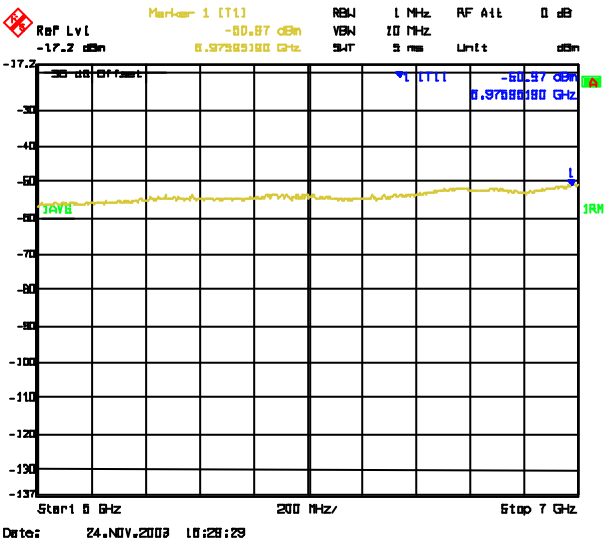
2 GHz-3 GHz



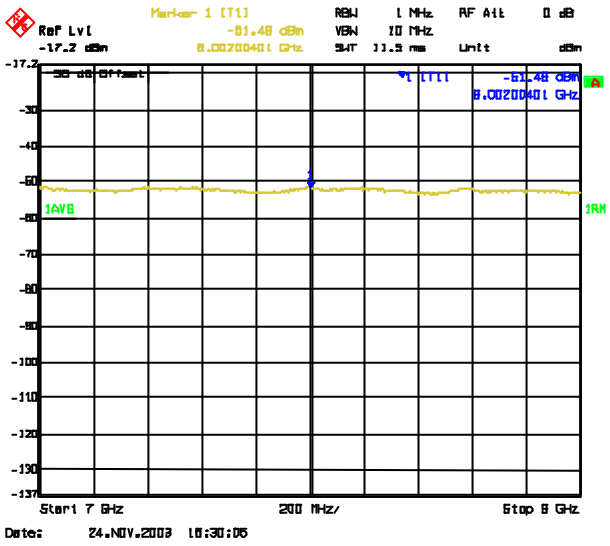
3 GHz-5 GHz



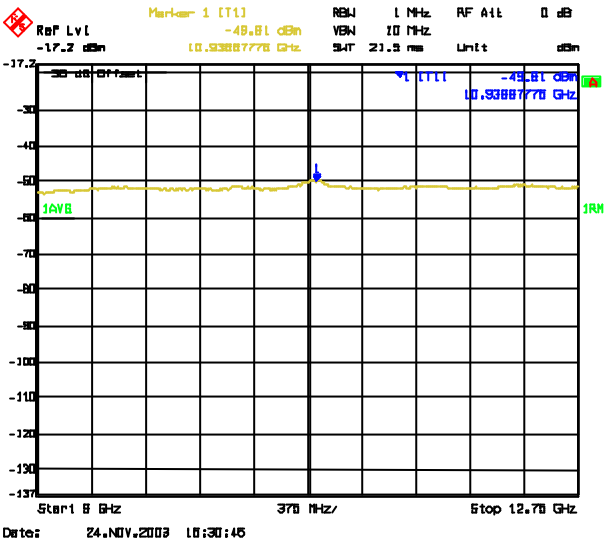
5 GHz-7 GHz



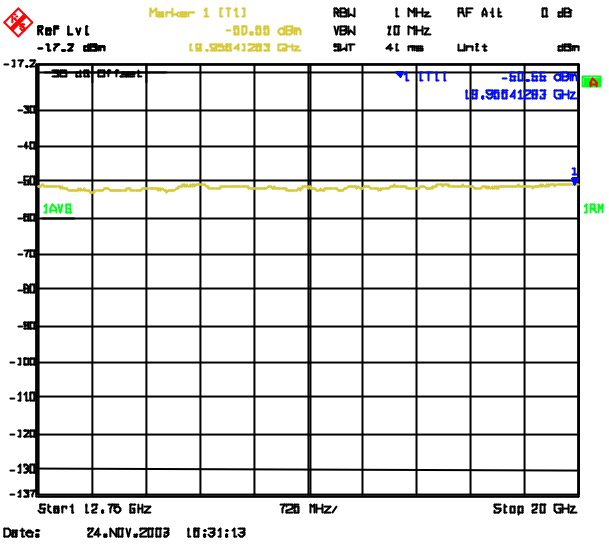
7 GHz-9 GHz



9 GHz- 12.75 GHz



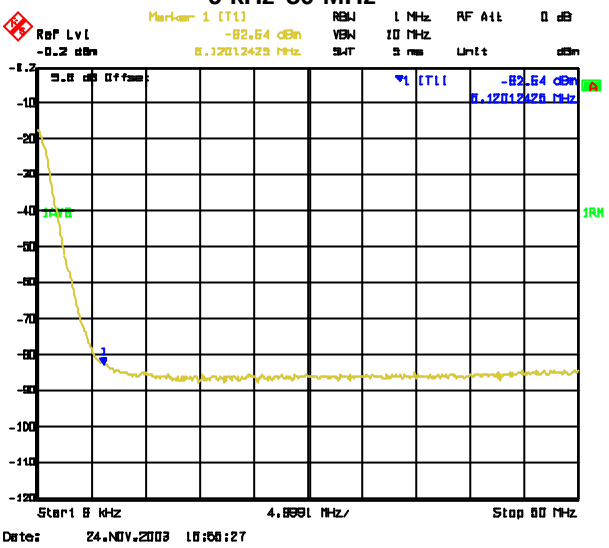
12.75 GHz-20 GHz



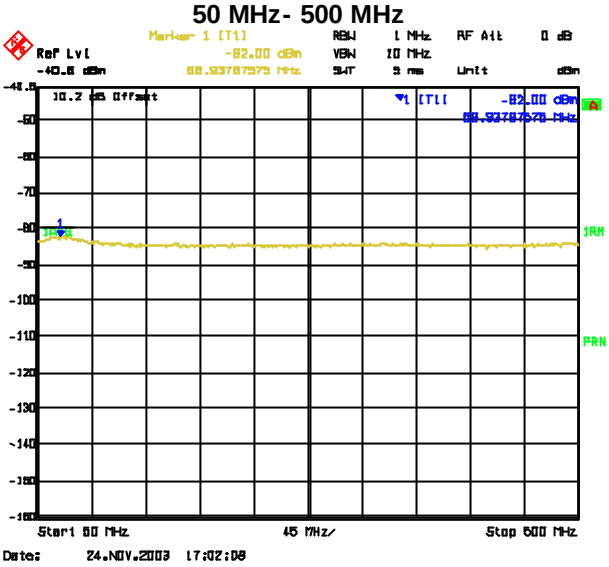
Frequency band	SPURIOUS EMISSION LEVEL (dBm) Channel T 1987.6 MHz Sector 3	Margin (dB)	Limit (dBm)
9 kHz to 50 MHz	-82.64	69.64	-13
50 MHz to 500 MHz	-82.00	69	
500 MHz to 1GHz	-80.53	67.53	
1GHz to 1927.6 MHz	-33.99	20.99	
1927.6 MHz to 1977.025 MHz	-21.15	8.15	
1977.025 MHz to 1978.025 MHz	-22.63	9.63	
1978.025 MHzto 1979.025 MHz	-21.78	8.78	
1979.025 MHz to 1979.975 MHz	-28.25	15.25	
1990.025 MHz to 1990.975 MHz	-21.50	8.5	
1990.975 MHz to 1991.975 MHz	-24.65	11.65	
1991.975 MHz to 1992.975 MHz	-26.41	13.41	
1992.975 MHz to 2000 MHz	-20.19	7.19	
2 GHz to 3 GHz	-39.13	26.13	
3 GHz to 5 GHz	-53.94	40.94	
5 GHz to 7 GHz	-51.01	38.01	
7 GHz to 9 GHz	-51.59	38.59	
9 GHz to 12.75 GHz	-49.89	36.89	
12.75 GHz to 20 GHz	-50.71	37.71	

Table 12. Measurements result for Spurious Emission in T channel

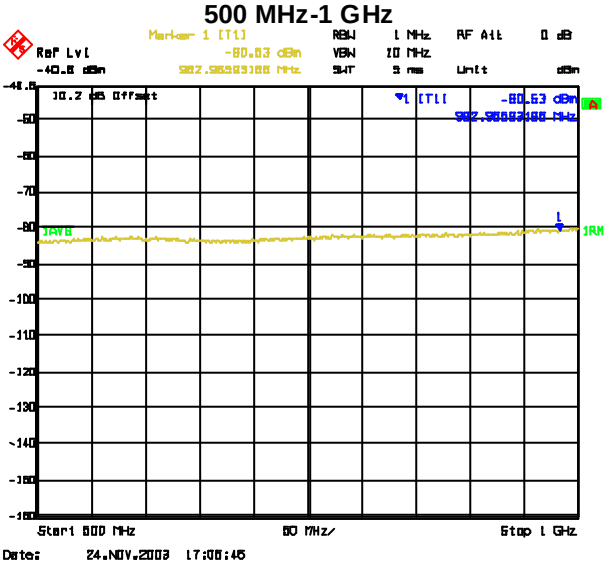
9 kHz-50 MHz[9]



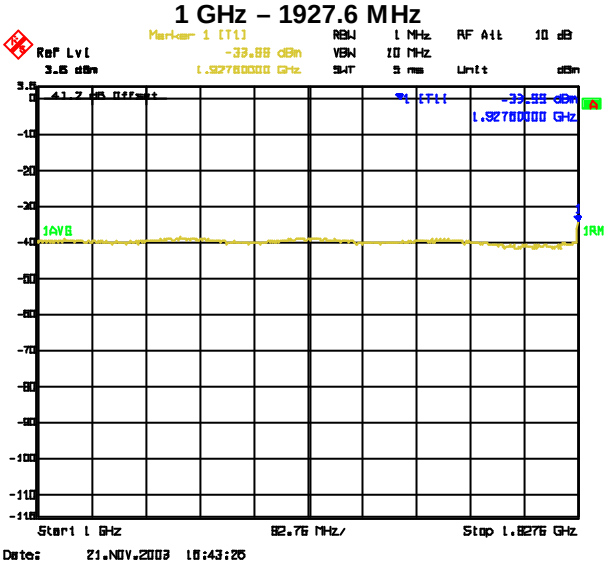
50 MHz- 500 MHz



500 MHz-1 GHz

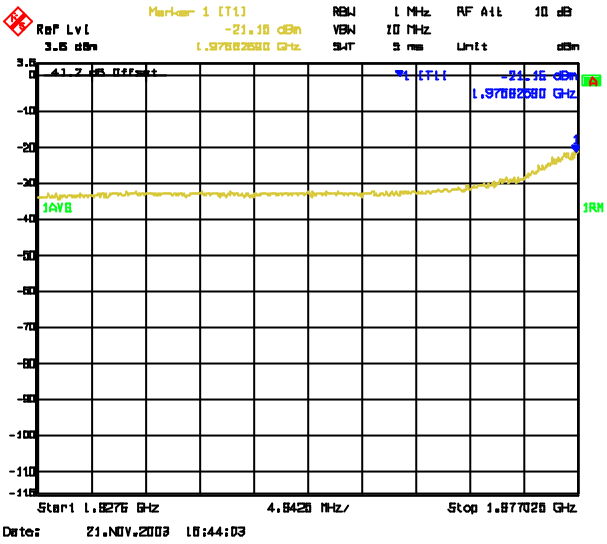


1 GHz – 1927.6 MHz

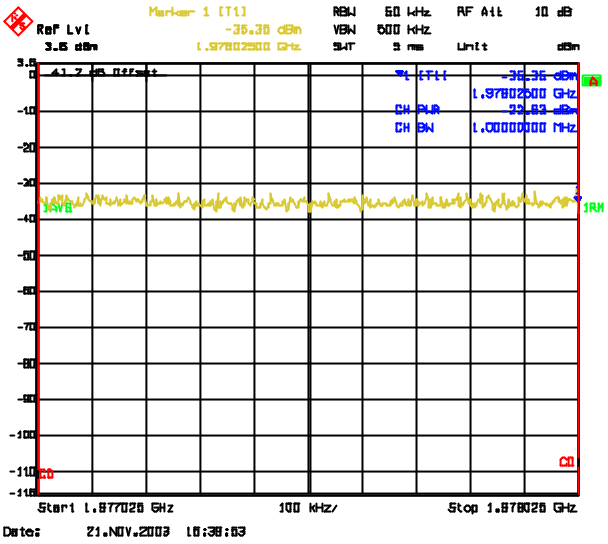


[9] Spectrum lines at 9 kHz are internal DC spectrum line of Analyzer

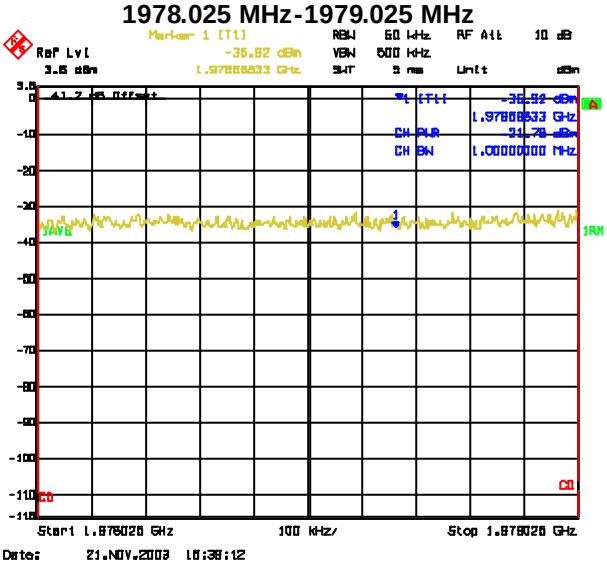
1927.6 MHz- 1977.025 MHz



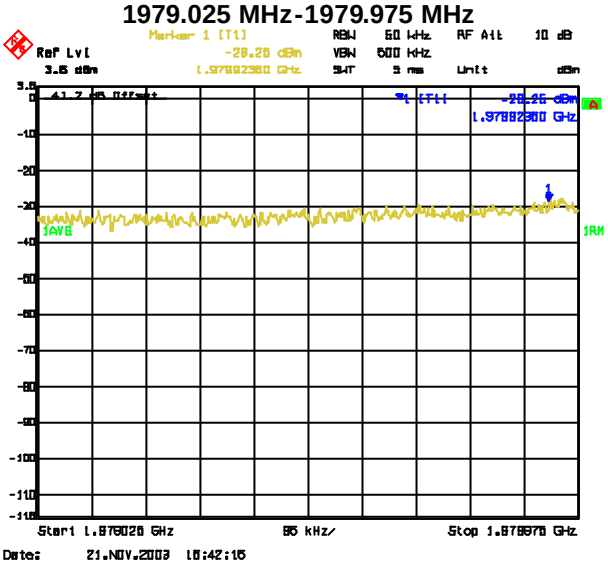
1977.025 MHz-1978.025 MHz



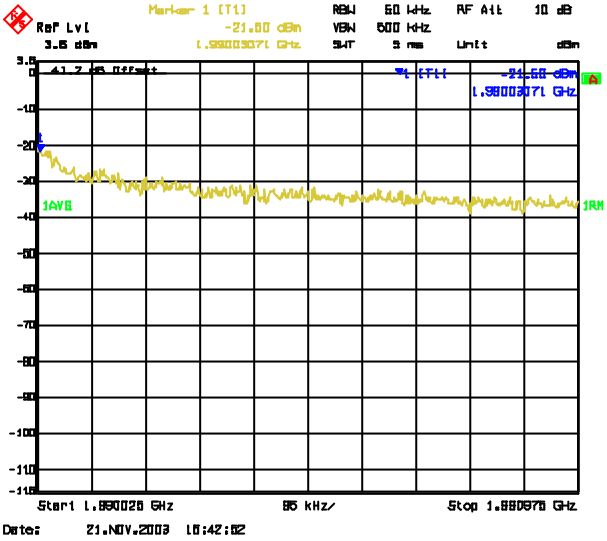
1978.025 MHz-1979.025 MHz



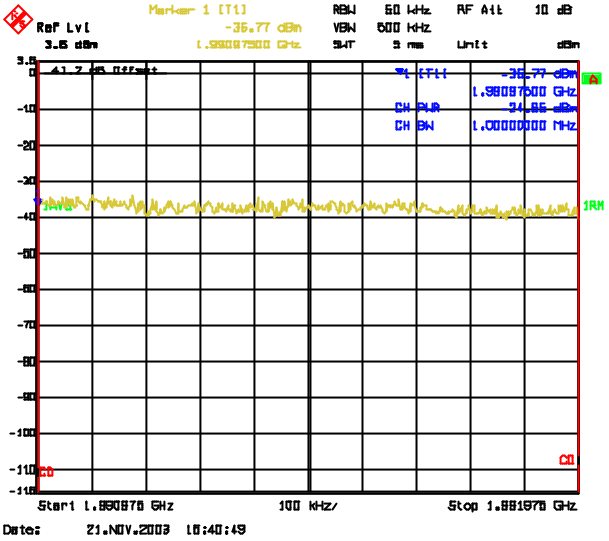
1979.025 MHz-1979.975 MHz



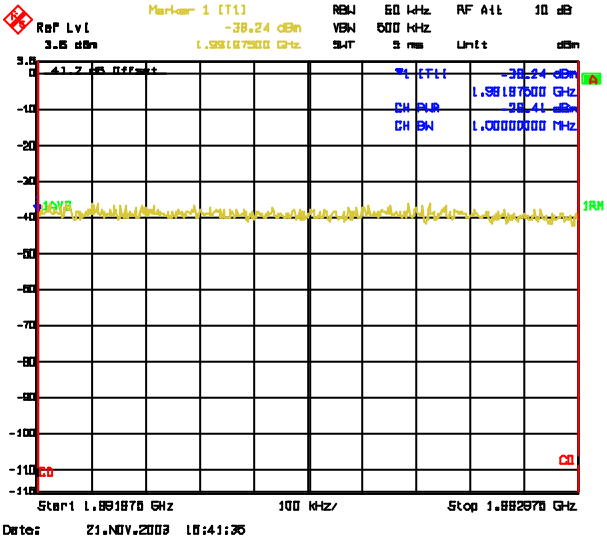
1990.025 MHz-1990.975 MHz



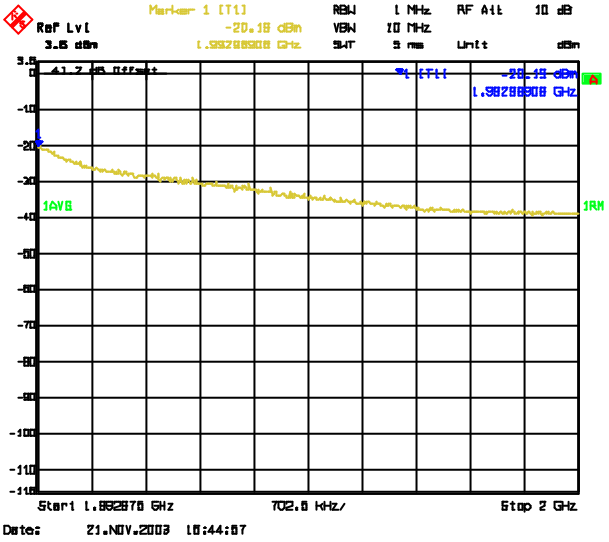
1990.975 MHz-1991.975 MHz



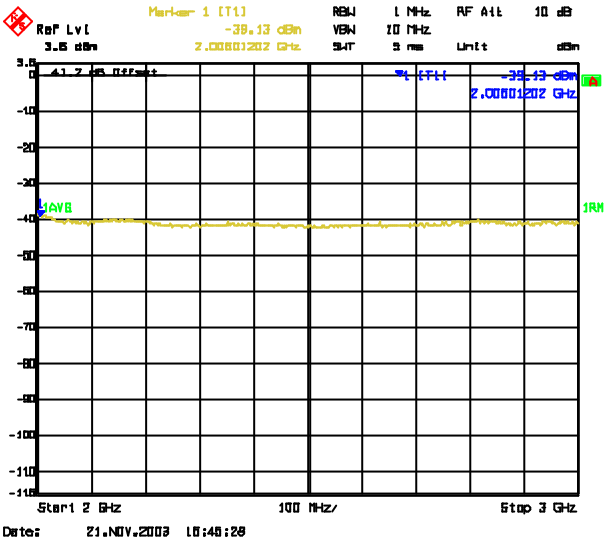
1991.975 MHz-1992.975 MHz



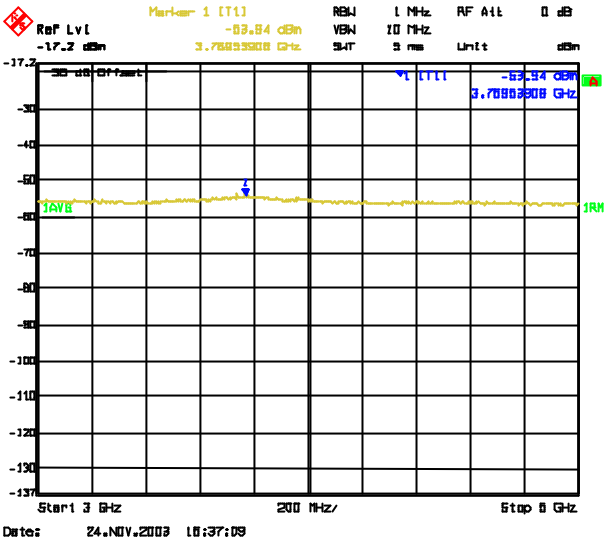
1992.975 MHz-2000 MHz



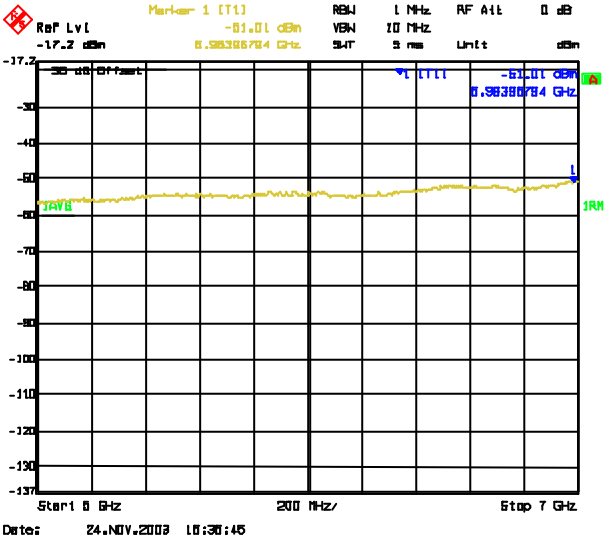
2 GHz-3 GHz



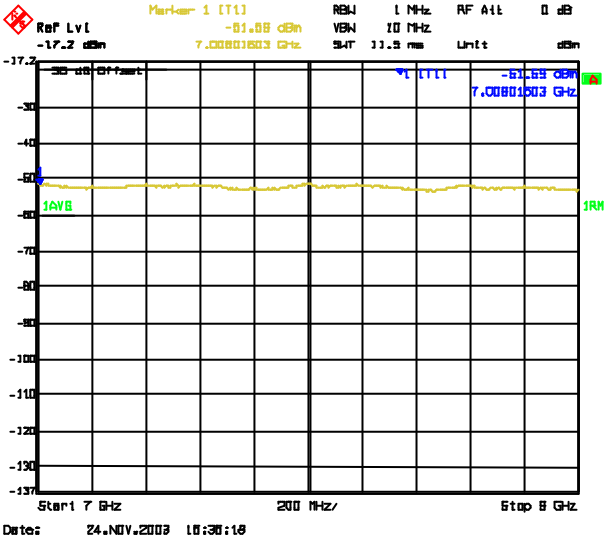
3 GHz-5 GHz



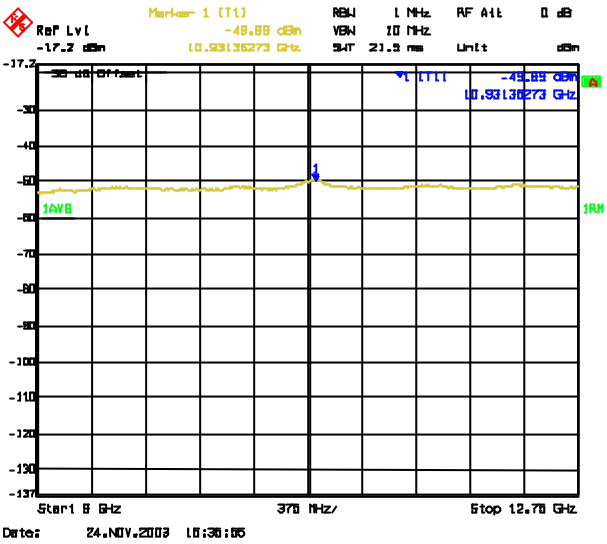
5 GHz-7 GHz



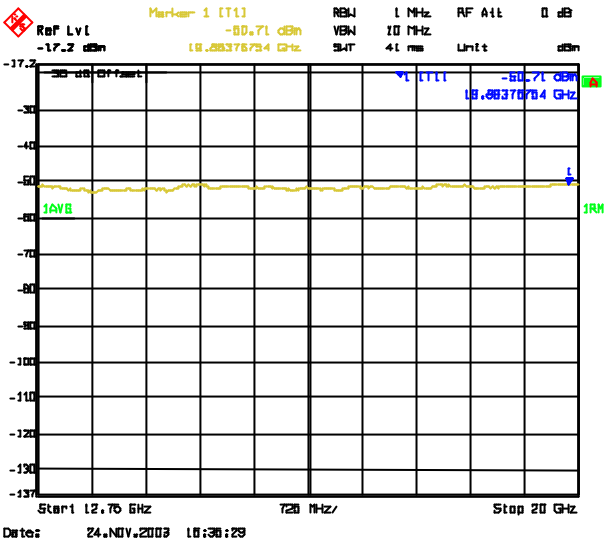
7 GHz-9 GHz



9 GHz- 12.75 GHz



12.75 GHz-20 GHz



3.5.3 TEST PROCEDURE

The equipment was configured as shown in Figure 6.

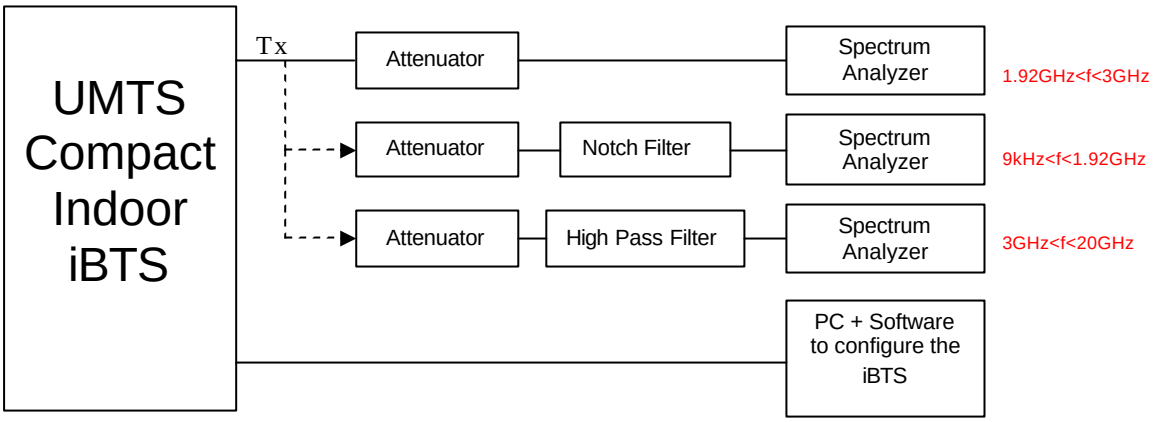


Figure 6. Test configuration for Spurious Emission

For these measurements, three benches have been used.

The bench 1 is used to measure spurious near the Tx band.

The bench 2 and 3 use respectively a stop band filter and a high pass filter in order to filter out the TX band of the iBTS and only measure the spurious created inside the iBTS.

The spectrum analyzer has the following setting in the 1 MHz bands immediately outside and adjacent to the frequency block:

Resolution Bandwidth	50 kHz
Video Bandwidth	5 / 500 kHz
Reference Level Offset	Corrected to take into account cables and attenuator losses

As regards to the other bands, the following setting is applied:

Resolution Bandwidth	1 MHz (see Note)
Video Bandwidth	10 MHz
Reference Level Offset	Corrected to take into account cables and attenuator losses

Note:

Just beside the 1 MHz bands immediately adjacent to the frequency block, the measure has been performed with 50kHz resolution bandwidth instead of 1 MHz. With this resolution bandwidth, **integrated over 1 MHz,** a better estimation of spurious power has been achieved (in the case of RBW 1MHz influence from the carrier power on the measurement has been observed)

3.6. CONCLUSION

FCC part 24 tests have been performed on the UMTS Compact Indoor 1900 iBTS. Test results comply with all the requirements.

3.7. MEASUREMENT EQUIPMENT LIST

Table 19 is a list of the measurement equipments used in these tests.

Equipment Description	Manufacturer	Model	Serial Number	Calibration	Next calibration
Spectrum Analyzer	Rohde & Schwarz	FSEM	525495	25/07/02	25/07/04
Vector Signal Analyzer	Agilent	E4406A	525148	19/05/03	19/05/05
Power Meter	Gigatronics	8542C	511322	03/10/03	03/10/05
Power sensor	Gigatronics	80401A	515344	20/06/03	20/06/05
Power Supply	Hewlett Packard	E3630A	508878	04/08/03	04/08/05
Network Analyzer	Hewlett Packard	8719D	521768	03/12/03	03/12/05
Network Analyzer	Rohde & Schwarz	ZVRE	500701	12/09/03	12/09/05
High Pass Filter	Trilithic	4HC2800/13 G-3-KK 9745041	23042	N/A	N/A
Notch Filter	TEMEX	CRL 21304006A	-	N/A	N/A
40dB attenuator	BIRD	50-A-MFN-40	-	N/A	N/A
10dB attenuator	Radiall	R417010128	-	N/A	N/A
30dB attenuator HF	Hewlett Packard	8498A	519473	N/A	N/A
Catapult	SUN Microsystems	ULTRA 10	530797	N/A	N/A

Table 13. Measurement equipment list

4. TECHNICAL STATUS OF THE MODULES CONSTITUTING THE TESTED EQUIPMENT

Conf. #	Designation	Hardware code / ***Software version***	Release	Manufacturer	Serial number
A B C D	Compact Indoor iBTS cabinet	NTA505AA / ***v03.D5.0***	0D	Celestica	0D/2
	CICU	NTA535AA	0D	Celestica	-
	MCA	NTA536EA	0D	Celestica	-
	Interconnect	NTA525AA	01	SANMINA	SNMN7500C5X6
	Digital shelf	NTA535EA	0D	SANMINA	-
	DC PANEL	NTA506AA	0D	Celestica	-
	iTRM (digital shelf slot 2)	NTUM17BA / ***V03D5.0_E13.0***	01	Nortel Networks	NNTM7503W5CS
	iCCM Board (digital shelf slot 4)	NTUM25BA/ ***V03D5.0_E30.0***	D3	Nortel Networks	SLR200315001
	iCCM Shelf	NTUM26AA	D1	Nortel Networks	CDN200315018
	iCEM (digital shelf slot 6)	NTUM00DA / ***V03D5.0_E30.1***	D2	Nortel Networks	CDN200316018
	iCEM (digital shelf slot 7)	NTUM00DA / ***V03D5.0_E30.1***	D2	Nortel Networks	CDN200316013
	cGPSAM (digital shelf slot 10)	NTA520AA	D1	Nortel Networks	NNTM7503LXHH
	DDM (slot 1)	NTUM42AA	D1	Forem	FORM01429946
	DDM (slot 2)	NTUM42AA	D1	Forem	FORM01429956
	DDM (slot 3)	NTUM42AA	D1	Forem	FORM01411850
	MCPA UMTS (slot 1)	NTUM30PA / **V1.17**	D2	Powerwave	PWWT03D9DJTN
	MCPA UMTS (slot 2)	NTUM30PA / **V1.17**	D2	Powerwave	PWWT03D9DJV6
	MCPA UMTS (slot 3)	NTUM30PA / **V1.17**	D2	Powerwave	PWWT03D97J86

5. ABBREVIATIONS AND DEFINITIONS

5.1. ABBREVIATIONS

ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity
ARFCN	Absolute Radio Frequency Channel Number
BER	Bit Error Ratio
BLER	Block Error Ratio
BTS	Base Transceiving Station
CDMA	Code Division Multiple Access
CW	Carrier Wave
DCH	Dedicated Channel
DPCH	Dedicated Physical Channel
EUT	Equipment Under Test
EVM	Error Vector Magnitude
FDD	Frequency Division Duplex
N/A	Not Applicable
OTSR	Omni Transmit, Sectored Receive
PHS	Portable Handset System
SA	Spectrum Analyzer
sanf	Spectrum analyzer noise floor
SG	Signal Generator
SSDT	Site Selection Diversity Transmission
STSR	Sectored Transmit, Sectored Receive
SUT	System Under Test
UARFCN	UTRA ARFCN
UMTS	Universal Mobile Telecommunication System
VSA	Vector Signal Analyzer
WCDMA	Wide-band CDMA

5.2. DEFINITIONS

Frequency Channel

	B	M	T
Tx (MHz)	1932.4	1960	1987.6
Rx (MHz)	1852.4	1880	1907.6

END OF DOCUMENT