

# ***Test Plan and Test Results***

**BS-240XLU II BTS Base Station**

**FCC ID: NE3PCS011**

## ***Name of Applicant***

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**1 Equipment under test (EUT)**

The equipment under test (EUT) comprises the modules listed in the table below.

Module Name	Siemens Part No.	Serial No.	Test No.
FCUPV1	S30861-U2408-X-05/01	UEB/SD216729	1, 2, 3, 4, 7
FDUAMCOPV2 (in 2:2 mode)	S30861-U2412-X-02/01	RMX/S3300004	1, 2, 3, 4, 7
FCUPV1	S30861-U2408-X-05/01	UEB/SD216724	5
FCUPV1	S30861-U2408-X-05/01	UEB/SD216875	5
FDUAMCOPV2 (in 4:2 mode)	S30861-U2412-X-03/01	RMX/S3300009	5
FCUPV1	S30861-U2408-X-05/01	UEB/SD216724	6
FCUPV1	S30861-U2408-X-05/01	UEB/SD216875	6
FDUAMCOPV2 (in 4:2 mode)	S30861-U2412-X-03/01	RMX/S3300009	6

For a functional description of the modules, please refer to the appropriate related parts and exhibit sections of this certification application.

The tests were conducted with the modules installed in a BS-240XLU II. Worst-case measurement data is reported.

**To comply with the FCC rules (§2.1051, §24.238), the maximum transmit power at the antenna port of channel numbers 512 (1930.2 MHz) and 810 (1989.8 MHz) is decreased according to the following table.**

Type of FCU	Carrier Frequency [MHz]	Channel No.	Maximum RF power output GMSK	Maximum RF power output 8PSK
FCUPV1	1930.2 MHz	512	38.4 dBm = 6.9 W	41.7 dBm = 14.8 W
FCUPV1	1989.8 MHz	810	38.5 dBm = 7.1 W	41.7 dBm = 14.8 W

A complete description of the transceiver’s calibration/tuning procedure is included in the Parts List and TuneUp exhibit section of this application.

## 2 Measurements

### 2.1 General description

#### 2.1.1 EUT configuration and operating conditions

If not stated otherwise, the following standard setup procedure for the EUT under test was used:

A BSC simulator is used to control the EUT and is connected to the EUT via the A<sub>bis</sub> Link. For detailed test system equipment configuration please refer to Fig.1 on page 6.

The transmitter modules were tuned up according to the procedure described in the TuneUp exhibit section of this application.

During the measurements, one carrier channel was tested at a time. The carrier was set to the maximum power level with all timeslots activated to ensure the maximum emission amplitudes during all measurements.

A pseudo random bit pattern was applied to the digital modulator. This ensures that the measurements of the emission characteristics of the transmitter are pursuant to § 2.1049.

#### 2.1.2 Selected carrier test frequencies

The measurements were performed at 3 selected carrier test frequencies, according to the following table:

Carrier Test Frequency [MHz]	Remark
1930.2	lowest possible carrier frequency
1960.0	frequency at the middle of the band
1989.8	highest possible carrier frequency

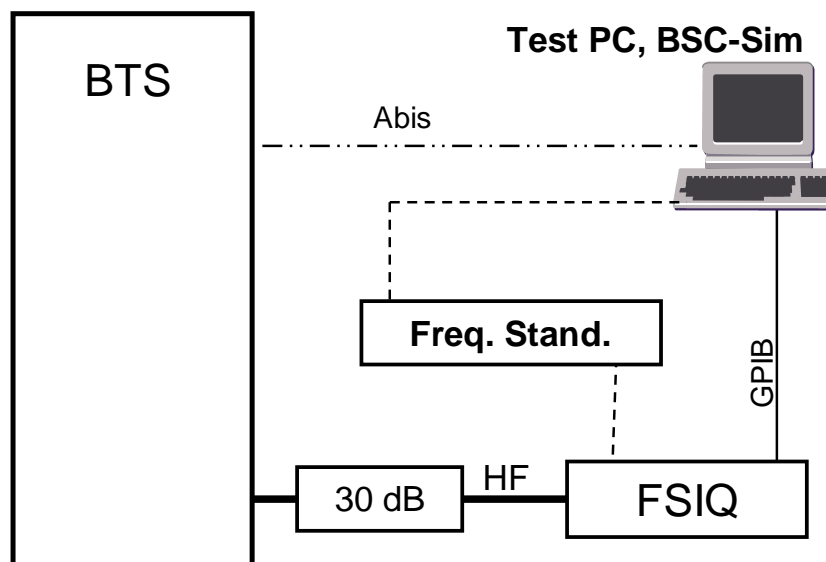
#### 2.1.3 Modulation characteristics

The EUT supports two types of modulation: GMSK and 8PSK. The modulation characteristic of the GMSK and the 8PSK modulation is defined in standard 3GPP TS 05.04.

During all measurements described below, a pseudo random sequence was applied to the digital modulator to ensure that the emission characteristics of the transmitter are pursuant to § 2.1049.

### 2.1.4 Measurement test configuration

If not stated otherwise, the following measurement configuration was used to perform all measurements (see figure below):



**Fig. 1 – Measurement Test Configuration**

The EUT is controlled by a BSC simulator via the serial  $A_{bis}$  Link. The RF output signal is connected to a spectrum analyzer (FSIQ26, Rohde&Schwarz) via a high power 30 dB attenuator. The attenuator is used to protect the input of the spectrum analyzer from high RF power levels. A description of the analyzer settings is given in each of the sections describing the measurements. A complete list of the measurement equipment is included on page 22 of this measurement report.

The measurements were performed at Siemens AG, Center for Quality Engineering, Hofmannstr. 50, 81359 Munich, Germany.

### 2.1.5 Calibration of the measurement equipment

The spectrum analyzer has a built-in self-calibration procedure. This calibration procedure was activated prior to the measurements so that the analyzer is deemed accurate. High quality cables were used to connect the measurement equipment to the EUT. The actual loss of the attenuator and the cables was measured with a high precision network analyzer and taken into account for all measurements.

## 2.2 Summary of the measurements

The measurements described in the following sections were conducted pursuant to 47 CFR § 2.947. All applicable paragraphs of the 47 CFR parts 2 and 24 of the most current version of the rules were considered.

The following tests were performed according to the FCC rules in order to verify the compliance of the EUT with the FCC requirements:

Test No.	Measurement	FCC Rule	Page Number of this Report	Results
1	RF power output	§ 2.1046	8	compliant
2	Modulation characteristics	§ 2.1047, § 2.201	9	compliant
3	Occupied bandwidth	§ 2.1049	10	compliant
4	Spurious emissions at antenna terminals	§ 2.1051, § 2.1057, § 24.238	11	compliant
5	Field strength of spurious radiation	(§ 2.1053, § 2.1057, § 24.238)	15	compliant
6	Frequency stability	(§ 2.1055, § 24.235)	18	compliant
7	Slow frequency hopping	N/A	20	compliant

In accordance with the FCC Rule §15.3 (z) the equipment was tested with the limits that are valid for an *unintentional radiator*.

## 2.3 Test No. 1: RF power output (§ 2.1046)

### 2.3.1 Purpose

The RF power output measurements were performed pursuant to § 2.1046 in order to determine the peak rated RF output power of the EUT.

### 2.3.2 EUT operation condition

The standard setup procedure as described in section 2.1.1 of this report was used. The maximum transmit power of channel number 512 (1930.2 MHz) and 810 (1989.8 MHz) was set according to section 1.

### 2.3.3 Test configuration

The test configuration used is described in the block diagram in section 2.1.4 (page 6, Fig. 1).

### 2.3.4 Measurement procedure and results

Using a spectrum analyzer the RF power is measured with a frequency sweep across the carrier (see screenshots). The carrier power is the maximum indicated power level. The base station maximum output power is the sum of the measured carrier power and the external attenuation (cable loss of the test set up).

The following table shows the measured output powers at the RF output terminal. Spectral plots are included on pages 23 – 28 of this report.

#### Note:

The offset value indicated on the spectral plots represents the external attenuation value that includes the fixed attenuator plus the cable loss.

#### GMSK modulation

Carrier Test Frequency [MHz]	Indicated Power Level [dBm]	External Attenuation [dB]	RF Power	Results
1930.2	2.1	-34.8	36.9 dBm = 4.9 W	compliant
1930.4	10.0	-34.8	44.8 dBm = 30.2 W	compliant
1960.0	10.5	-34.8	45.3 dBm = 33.9 W	compliant
1989.6	10.0	-34.8	44.8 dBm = 30.2 W	compliant
1989.8	2.2	-34.8	37.0 dBm = 5.0 W	compliant

#### 8PSK modulation

Carrier Test Frequency [MHz]	Indicated Power Level [dBm]	External Attenuation [dB]	RF Power	Results
1930.2	5.4	-34.8	40.2 dBm = 10.5 W	compliant
1930.4	10.1	-34.8	44.9 dBm = 30.9 W	compliant
1960.0	10.5	-34.8	45.3 dBm = 33.9 W	compliant
1989.6	10.0	-34.8	44.8 dBm = 30.2 W	compliant
1989.8	5.4	-34.8	40.2 dBm = 10.5 W	compliant

The measured power levels were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.



**2.4 Test No. 2: Modulation characteristics (§ 2.1047, § 2.201)**

The occupied bandwidth was measured to be 253kHz, which represents the 99% power bandwidth (refer to the spectral plots included on pages 30 – 34 and the following section). Five carrier test frequencies were investigated. Including all measurement uncertainties the modulation characteristic of the base stations transceiver is **258KGXW**.

No further testing is required under this section of the FCC rules. No measurements other than the occupied bandwidth are required.

**The modulation characteristics were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.**

## 2.5 Test No. 3: Occupied bandwidth (§ 2.1049)

### 2.5.1 Purpose

The measurements are performed to determine the occupied bandwidth of the EUT pursuant to § 2.1049.

### 2.5.2 EUT operation condition

The EUT was set up according to section 2.1.1 of this test report. A pseudo random bit pattern was applied to the modulator. First the test transceiver was modulated using GMSK modulation. Afterwards the measurements were repeated with 8PSK modulation. For a specific modulation technique description, please see section XII of the “Certification Application Overview”, located in the cover letter section of this application. For circuit diagrams of the modulator, please refer to the Schematics exhibit section of this application. The maximum transmit power of channel number 512 (1930.2 MHz) and 810 (1989.8 MHz) was set according to section 1.

### 2.5.3 Test configuration

The test configuration used is described in the block diagram in section 2.1.4 (page 6, Fig. 1).

### 2.5.4 Measurement procedure and results

The occupied bandwidth was determined for each of the test frequencies listed in the table below. See the spectral plots included on pages 30 – 34 for details. The 99% power bandwidth was determined with the spectrum analyzer. The following table summarizes the measurement results:

#### GMSK modulation:

Carrier Test Frequency [MHz]	Occupied Bandwidth [kHz]	Results
1930.2	248.5	compliant
1930.4	248.5	compliant
1960.0	248.5	compliant
1989.6	252.5	compliant
1989.8	248.5	compliant

#### 8PSK modulation:

Carrier Test Frequency [MHz]	Occupied Bandwidth [kHz]	Results
1930.2	248.5	compliant
1930.4	252.5	compliant
1960.0	244.5	compliant
1989.6	248.5	compliant
1989.8	244.5	compliant

**The occupied bandwidth was found to be compliant with the manufacturer’s specifications and with all requirements of the FCC rules.**

## 2.6 Test No. 4: Spurious emissions at antenna terminals (§ 2.1051, § 2.1057, § 24.238)

### 2.6.1 Purpose

The measurements of the spurious emissions at the equipment output terminals were performed pursuant to § 2.1051 in order to verify that any emissions are below the limits given by § 24.238.

### 2.6.2 Limits

Compliance with § 24.238 requires that any emission be attenuated below the transmitter power by at least  $43 + 10 \log_{10} P$  ( $P$  = transmitter power in Watts).

The compliance limit was calculated as per the following table:

#### GMSK modulation:

Maximum transmitter output power	47.86 W (= 46.8 dBm)
Required attenuation	$43 + 10 \log_{10} 47.86 = 59.8$ dB
Maximum transmitter output power – required attenuation = compliance limit	46.8 dBm – 59.8 dB = –13 dBm

#### 8PSK modulation:

Maximum transmitter output power	47.86 W (= 46.8 dBm)
Required attenuation	$43 + 10 \log_{10} 47.86 = 59.8$ dB
Maximum transmitter output power – required attenuation = compliance limit	46.8 dBm – 59.8 dB = –13 dBm

### 2.6.3 EUT operation condition

The standard setup procedure as described in section 2.1.1 of this report was used. The maximum transmit power of channel number 512 (1930.2 MHz) and 810 (1989.8 MHz) was set according to section 1.

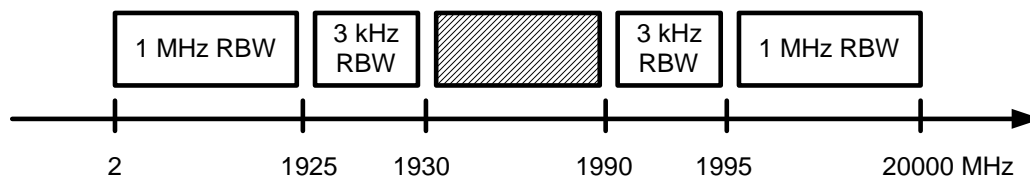
### 2.6.4 Test configuration

The test configuration used is described in the block diagram in section 2.1.4 (page 6, Fig. 1).

### 2.6.5 Measurement procedure and results

In accordance with § 24.238, a 1 MHz resolution bandwidth was used for the measurements. However, in the 1 MHz frequency bands immediately outside and adjacent to the frequency block a resolution bandwidth of approximately one percent of the emission bandwidth of the fundamental emission of the transmitter was employed. The emission bandwidth is 253 kHz (refer to the spectral plot on page 57). Thus, the measurements were conducted using a 3 kHz resolution bandwidth.

Due to the imperfect resolution filter in the spectrum analyzer<sup>1</sup>, the FCC allows continuing the use of the 3 kHz RBW in the 5 MHz frequency bands immediately outside and adjacent to the frequency block with an increased attenuation specification. This is depicted in the following diagram:



Pursuant to the FCC, the (effective) attenuation specification has to be increased by the same ratio of required RBW setting to actual RBW setting<sup>2</sup>. In this case, use of 3 kHz beyond the original 1 MHz region would result in a 25.2 dB increase in the attenuation specification. As a result the compliance limit is  $-13 \text{ dBm} - 25.2 \text{ dB} = -38.2 \text{ dBm}$  in the frequency ranges 1925-1929 MHz and 1991-1995 MHz.

According to § 2.1057, all emission including the fundamental frequency of the transceiver and all frequencies up to the 10th harmonic were investigated.

The measurements were performed at all 3 selected carrier test frequencies. Refer to section 2.3 of this test report.

The following table summarizes the worst case detected emission levels (see screenshots on pages 36 – 56 for details). The external attenuation (cable loss of the set up) is already added in the results. It can be seen separately as the “Offset” value in the screenshots.

<sup>1</sup> A spectral plot showing the frequency response of the 1 MHz resolution filter of the spectrum analyzer is included on page of this report.

<sup>2</sup> E-Mail Frank Coperich, FCC to Mike Nicolay, CTJC 02/25/2000

**Note:**

The offset value indicated on the spectral plots represents the external attenuation value that includes the fixed attenuator plus the cable loss.

**GMSK modulation:**

Frequency Marker Indication [MHz]	Indicated Power Level [dBm]	External Attn. [dB]	Worst Case Emission Level [dBm]	Compliance Limit [dBm]	Spectral Plot on Page:	Results
<b>Carrier Test Frequency 1930.2 MHz</b>						
1077.18	-73.2	-34.8	-38.4	-13.0	36	compliant
1928.98	-96.3	-34.8	-61.5	-38.2	37	compliant
1929.98	-52.1	-34.8	-17.3	-13.0	38	compliant
1991.00	-99.0	-34.8	-64.2	-13.0	39	compliant
1993.90	-98.3	-34.8	-63.5	-38.2	40	compliant
2410.52	-72.0	-34.8	-37.2	-13.0	41	compliant
6833.67	-69.1	-34.8	-34.3	-13.0	42	compliant
<b>Carrier Test Frequency 1960.0 MHz</b>						
1790.12	-73.8	-34.8	-39.0	-13.0	43	compliant
1927.97	-98.3	-34.8	-63.5	-38.2	44	compliant
1929.75	-97.6	-34.8	-62.8	-13.0	45	compliant
1990.66	-96.9	-34.8	-62.1	-13.0	46	compliant
1991.10	-97.5	-34.8	-62.7	-38.2	47	compliant
2398.48	-72.7	-34.8	-37.9	-13.0	48	compliant
12545.09	-68.6	-34.8	-33.8	-13.0	49	compliant
<b>Carrier Test Frequency 1989.8 MHz</b>						
1019.38	-73.7	-34.8	-38.9	-13.0	50	compliant
1926.76	-99.3	-34.8	-64.5	-38.2	51	compliant
1929.96	-98.3	-34.8	-63.5	-13.0	52	compliant
1990.02	-51.5	-34.8	-16.7	-13.0	53	compliant
1991.05	-96.8	-34.8	-62.0	-38.2	54	compliant
2392.45	-72.3	-34.8	-37.5	-13.0	55	compliant
6923.85	-68.2	-34.8	-33.4	-13.0	56	compliant

**Note:**

The offset value indicated on the spectral plots represents the external attenuation value that includes the fixed attenuator plus the cable loss.

**8PSK modulation:**

Frequency Marker Indication [MHz]	Indicated Power Level [dBm]	External Attn. [dB]	Worst Case Emission Level [dBm]	Compliance Limit [dBm]	Spectral Plot on Page:	Results
Carrier Test Frequency 1930.2 MHz						
996.26	-73.0	-34.8	-38.2	-13.0	36	compliant
1928.72	-97.2	-34.8	-62.4	-38.2	37	compliant
1929.98	-49.6	-34.8	-14.8	-13.0	38	compliant
1990.47	-98.1	-34.8	-63.3	-13.0	39	compliant
1992.41	-98.7	-34.8	-63.9	-38.2	40	compliant
2416.54	-72.4	-34.8	-37.6	-13.0	41	compliant
18046.09	-68.9	-34.8	-34.1	-13.0	42	compliant
Carrier Test Frequency 1960.0 MHz						
1046.35	-73.5	-34.8	-38.7	-13.0	43	compliant
1927.40	-98.5	-34.8	-63.7	-38.2	44	compliant
1929.09	-98.4	-34.8	-63.6	-13.0	45	compliant
1990.62	-97.2	-34.8	-62.4	-13.0	46	compliant
1991.18	-98.0	-34.8	-63.2	-38.2	47	compliant
3091.01	-72.7	-34.8	-37.9	-13.0	48	compliant
17985.97	-68.7	-34.8	-33.9	-13.0	49	compliant
Carrier Test Frequency 1989.8 MHz						
1169.67	-73.2	-34.8	-38.4	-13.0	50	compliant
1928.94	-99.1	-34.8	-64.3	-38.2	51	compliant
1929.22	-99.0	-34.8	-64.2	-13.0	52	compliant
1990.03	-56.0	-34.8	-21.2	-13.0	53	compliant
1991.02	-95.3	-34.8	-60.5	-38.2	54	compliant
2374.39	-73.2	-34.8	-38.4	-13.0	55	compliant
14499.00	-69.1	-34.8	-34.3	-13.0	56	compliant

The measured conducted emission levels were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

## 2.7 Test No. 5: Field strength of spurious radiation (§ 2.1053, § 2.1057, § 24.238)

### 2.7.1 Purpose

The measurement of spurious radiated emissions was performed pursuant to § 2.1053 and § 2.1057 to verify that the field strength of any spurious emissions radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements are attenuated below the transmitter power P by at least  $43 + 10 \log_{10} (P \text{ in Watts})$  dB as is required by § 24.238 (Emission limits).

### 2.7.2 Limits

Compliance with § 24.238 requires that all spurious emissions be attenuated below the transmitter power by at least  $43 + 10 \log_{10} P$  (P = rated maximum transmitter output power in Watts).

The compliance limit was calculated as per the following table:

#### GMSK modulation:

Rated maximum transmitter output power	47.86 W (= 46.8 dBm)
Required attenuation	$43 + 10 \log_{10} 47.86 = 59.8$ dB

#### 8PSK modulation:

Rated maximum transmitter output power	47.86 W (= 46.8 dBm)
Required attenuation	$43 + 10 \log_{10} 47.86 = 59.8$ dB

According to § 2.1057, all emissions to the 10th harmonic were investigated.

### 2.7.3 EUT operation condition

The EUT was configured and operating with its maximum number of TRX. All carriers were set to the maximum power level to ensure the maximum emission amplitudes during all measurements. The radiated spurious emissions were determined for three selected carrier test frequencies, according to section 2.1.2. During all testing, the EUT's RF output power was terminated into a non-radiating 50  $\Omega$  dummy load.

### 2.7.4 Test configuration

The measurements (scans) were conducted for BS-240XLU II. The measurements were performed in the anechoic chamber at the Siemens AG EMC Center, Hofmannstraße 51, 81359 Munich, Germany. The radiated test site complies with the site attenuation requirements listed in ANSI C63.4 1992 and is listed with the FCC.

The test antenna was positioned at a distance of 3 m from the EUT. Photographs of the EUT in the anechoic chamber are shown on page 59 of this measurement report.

### 2.7.5 Measurement procedure

For maximizing the radiated spurious emission measured levels the EUT was rotated 360°. The antenna height was adjusted between 1 m and 4 m. Both, horizontal and vertical polarizations were investigated.

To verify that all spurious emissions are compliant to the limits specified in § 24.238, the substitution method described in the ANSI/TIA/EIA-603-1992 document was used. Initially the EUT's spurious emission frequencies and field-strength values were measured and recorded. The measured, maximized field strength values were then used as the references levels for dipole substitution measurements.

For substitution measurements the EUT was removed and replaced with a signal generator and a transmitting antenna. TIA/EIA-603 requires that all substitution measurement transmissions have be done using a "dipole" antenna, as the reference antenna. As per TIA/EIA-603, corrections were done to equate the results to a dipole antenna. Using the same measurement techniques listed above (for maximizing), the signal generators output power was adjusted until the initial spurious emission reference levels were matched. The signal generator's indicated output power level was then recorded and corrected to an equivalent level at the transmitting antenna's input connector.

To determine compliance with the FCC Rules, the corrected dipole substitution powers were then set into relation to the EUT's (transmitter) power, measured at the antenna connector.

### 2.7.6 Measurement results & limits

Worst case detected emission levels are reported in the following table (refer to spectral plots included on pages 60 – 62 for details). The antenna factor and cable loss is according to the manufacturer's specification.

#### GMSK modulation:

Spurious Emission Frequency	Spurious Emission Reference Field Strength	Signal Generator Output	Power at dipole antenna <sup>3</sup>	Maximum Transmitter Output Power at the Antenna Port	Spurious Emissions in reference to Output Power of EUT <sup>4</sup>	Limit	Results
[MHz]	[dBμV/m]	[dBm]	[dBm]	[dBm]	[dBc]	[dB]	
4765.0	55.80	-53.0	-58.50	46.8	105.3	59.8	compliant
11778.5	56.70	-53.0	-57.65	46.8	104.5	59.8	compliant
13311.0	64.40	-43.0	-43.25	46.8	90.1	59.8	compliant
17978.5	65.80	-42.0	-42.45	46.8	89.3	59.8	compliant

<sup>3</sup> Power at Dipole Antenna = Signal Generator Output – cable loss + correction factor antenna gain

<sup>4</sup> [dBc] = Maximum Transmitter Output Power [dBm] - Power at dipole antenna [dBm]



## 8PSK modulation:

Spurious Emission Frequency	Spurious Emission Reference Field Strength	Signal Generator Output	Power at dipole antenna <sup>5</sup>	Maximum Transmitter Output Power at the Antenna Port	Spurious Emissions in reference to Output Power of EUT <sup>6</sup>	Limit	Results
[MHz]	[dB $\mu$ V/m]	[dBm]	[dBm]	[dBm]	[dBc]	[dB]	
4765.0	55.80	-53.0	-58.50	46.8	105.3	59.8	compliant
11778.5	56.70	-53.0	-57.65	46.8	104.5	59.8	compliant
13311.0	64.40	-43.0	-43.25	46.8	90.1	59.8	compliant
17978.5	65.80	-42.0	-42.45	46.8	89.3	59.8	compliant

The measured emission levels were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

<sup>5</sup> Power at Dipole Antenna = Signal Generator Output – cable loss + correction factor antenna gain

<sup>6</sup> [dBc] = Maximum Transmitter Output Power [dBm] - Power at dipole antenna [dBm]

## 2.8 Test No. 6: Frequency stability (§ 2.1055, § 24.235)

### 2.8.1 Purpose

Frequency stability measurements were performed to verify that the frequency deviation of the emission stays within the licensee's frequency block under extreme temperature conditions (-5°C to +50°C) according to § 2.1055.

### 2.8.2 Limits

According to § 24.235, the frequency of the fundamental emission is required to stay within the authorized frequency block.

### 2.8.3 EUT operation condition

The EUT was configured and powered up with its maximum number of TRX. All carriers were set to the maximum power level to ensure the maximum emission amplitudes during all measurements.

The supply voltage of -48 V DC was kept constant.

The supply voltage is measured at the power supply terminals of the EUT.

### 2.8.4 Test configuration

The measurements were conducted with a BS-240XLU II.

The EUT was controlled by a BSC simulator via the serial Abis Link and connected to a mobile communication tester (CMU300, Rohde&Schwarz) via a high power 20 dB attenuator. The attenuator was used to protect the input of the measurement equipment from high RF power levels.

The EUT was operated and tested in a climatic chamber.

The measurements were performed at Siemens AG, Center for Quality Engineering, Hofmannstr. 50, 81359 Munich, Germany.

A complete list of the measurement equipment is included on page 22 of this measurement report.

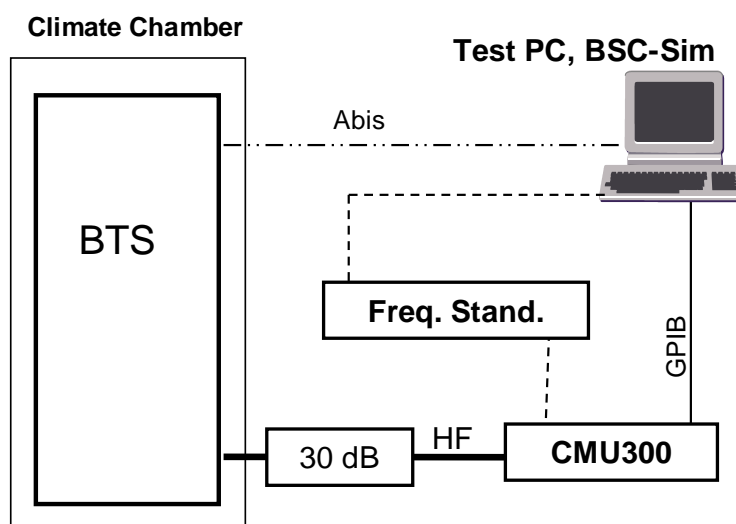


Fig. 2 – Measurement Test Configuration

### 2.8.5 Measurement procedure

The center frequency deviation of the highest and lowest test frequency was measured at ambient temperature levels from -5°C to +50°C in intervals of not more than 10°C.

At each temperature level, the frequency was measured over a certain time period, taking ten measurement values. Worst-case measurement data is reported.

### 2.8.6 Measurement results

The following table includes the worst case detected frequency deviations. For complete measurement data see plots on pages 64 – 65. The BS-240XLU II is designed for indoor locations. Therefore the EUT does not work below a temperature of -5°C, no RF signals were measured at the antenna port.

#### GMSK modulation:

Ambient Temp. [°C]	Frequency Deviation @ -48V [ppm]	Manufacturer's Specification [ppm]	Results
-5	0.008	0.05	compliant
0	0.008	0.05	compliant
+10	0.007	0.05	compliant
+20	0.008	0.05	compliant
+30	0.006	0.05	compliant
+40	0.006	0.05	compliant
+50	0.008	0.05	compliant

#### 8PSK modulation:

Ambient Temp. [°C]	Frequency Deviation @ -48V [ppm]	Manufacturer's Specification [ppm]	Results
-5	0.008	0.05	compliant
0	0.007	0.05	compliant
+10	0.009	0.05	compliant
+20	0.007	0.05	compliant
+30	0.008	0.05	compliant
+40	0.007	0.05	compliant
+50	0.007	0.05	compliant

A pseudo random bit sequence was applied to the modulator during all testing. No variation of the frequency deviation due to keying was observed. Also, no variation of the frequency deviation due to the EUT's heater element was observed at any temperature level (refer to measurement data above).

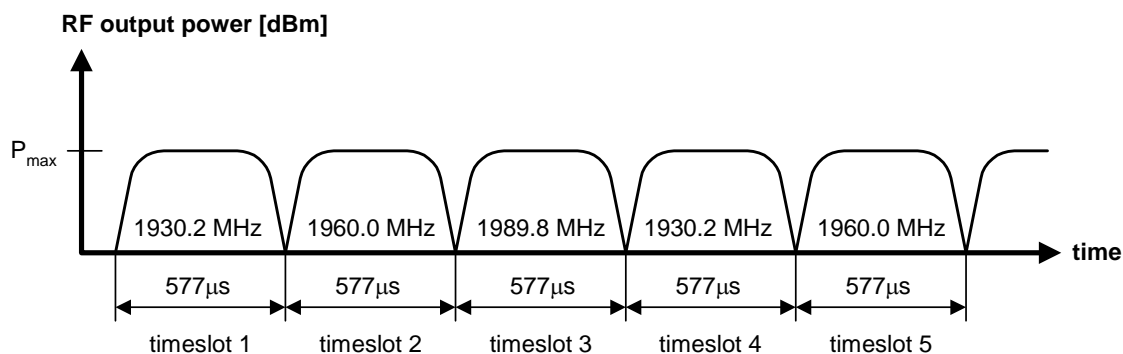
In all cases, the fundamental emission stayed within the authorized frequency block.

**The measured frequency stability was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.**

## 2.9 Test No. 7: Slow frequency hopping

### 2.9.1 Introduction

Slow frequency hopping (SFH) is a feature of GSM transceiver systems used to improve the signal quality under fading conditions. When SFH is activated, the carrier frequency is shifted to a different value on a timeslot per timeslot basis. This is depicted in the figure below (carrier test frequencies 1930.2 MHz, 1960.0 MHz, and 1989.8 MHz).



**Fig. 3 – Slow frequency hopping (SFH) comprising 3 carrier test frequencies (1930.2 MHz, 1960.0 MHz, and 1989.8 MHz).**

SFH allows only one carrier per transmitter being activated at a time. This ensures that no intermodulation products are produced.

### 2.9.2 Purpose

These measurements were performed to verify that under SFH operating conditions, spurious emissions due to intermodulation products and periodically shifting the carrier frequency were not produced above the compliance level required under § 2.1051 of the FCC rules.

### 2.9.3 EUT operation condition

The standard setup procedure as described in section 2.1.1 of this report was used and the EUT was configured with two TRX. The SFH operating mode was switched on throughout the measurements. Three hopping test frequencies were measured in accordance with section 2.1.2. Please refer to Fig. 3 for the hopping scheme.

### 2.9.4 Test configuration

The test configuration used is described in the block diagram in section 2.1.4 (page 6, Fig. 1).

### 2.9.5 Measurement procedure

A spectrum analyzer (FSIQ26, Rohde&Schwarz) was used to verify that all emissions are below the permissible limit.

### 2.9.6 Measurement results

SFH did not cause any detectable emissions above the compliance limits required by the FCC rules. The following table summarizes the worst case detected emission levels:

**Note:**

The offset value indicated on the spectral plots represents the external attenuation value that includes the fixed attenuator plus the cable loss.

**GMSK modulation:**

Frequency [MHz]	Indicated Power Level [dBm]	External Attenuation [dB]	Measured Power Level [dBm]	Compliance Limit [dBm]	Results
1903.29	-61.7	-34.8	-26.9	-13.0	compliant
1952.99	-64.5	-34.8	-29.7	-13.0	compliant
1968.62	-86.3	-34.8	-51.5	-13.0	compliant

**8PSK modulation:**

Frequency [MHz]	Indicated Power Level [dBm]	External Attenuation [dB]	Measured Power Level [dBm]	Compliance Limit [dBm]	Results
1968.62	-60.8	-34.8	-26.0	-13.0	compliant
1969.82	-66.0	-34.8	-31.2	-13.0	compliant
1945.37	-85.8	-34.8	-51.0	-13.0	compliant

The above listed emission levels were taken from measurements conducted using three different RBW (resolution bandwidth) settings (1 MHz, 300 kHz, and 3 kHz). Copies of the spectral plots can be found on pages 67 – 69.

**It was verified through measurements that SFH does not cause any adverse effects on other parameters of the transmitter (RF power output, modulation characteristics, occupied bandwidth, spurious emissions, and frequency stability).**

**The measurement values were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.**

### 3 Measurement data and spectral plots

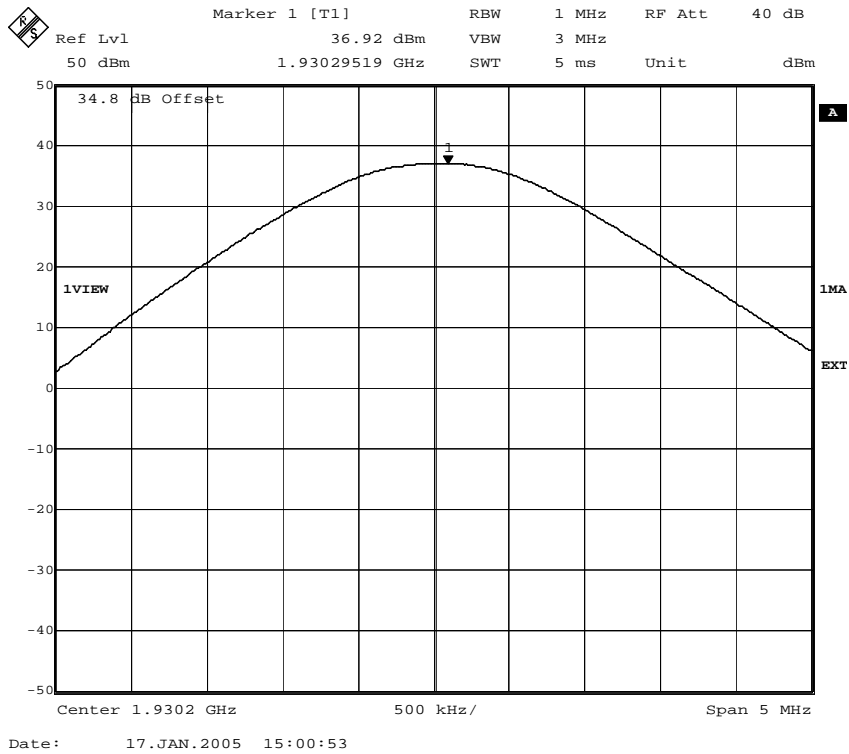
#### 3.1 Part list of the RF measurement test equipment

No.	Item	Model	Serial Number	Test No.
1	Personal computer	Fujitsu Siemens SCENIC W600	YBES213379	1 ,2 ,3 ,4 , 7
2	Spectrum analyzer	Rohde & Schwarz FSIQ 26	825556/007	1 ,2 ,3 ,4 , 7
3	Atomic clock reference	Datum GmbH RubiSource 2000	187	1 ,2 ,3 ,4 , 7
4	Personal computer	Alternate	3E9999 7P**01 2762PC	5
5	Radio Communication Tester	Rohde & Schwarz	100059	5
6	Radio Communication Tester	Rohde & Schwarz	100060	5
7	Personal Computer	FSC	YBPJ014171	5
8	Personal Computer	FSC	YBPJ015303	5
9	Frequency Standard	Datum GmbH	150	5
10	test chamber	Siemens	-	5
11	antenna	Singer	0273	5
12	amplifier	miteq	909363	5
13	ESMI display section	R&S	849182/009	5
14	ESMI RF section	R&S	849937/003	5
15	controller	Deisel	100/503	5
16	antenna	SCIEN	100	5
17	antenna	Ailtech	2622	5
18	mast	Deisel	240/445	5
19	power supply	Siemens	-	5
20	antenna	Chase	1566	5
21	antenna	Emco	8906-3173	5
22	signal generator	R&S	832033/0006	5
23	Personal computer	Scenic 860	YBHE067914	6
24	Radio Communication Tester	CMU 300	100060	6
25	Radio Communication Tester	CMU 300	100175	6
26	Personal Computer	Laptop Lifebook E- 7010	YBDC007725	6
27	Personal Computer	Laptop Lifebook E- 7010	YBDC007722	6
28	Frequency Standard	MRT Telekom Rub. Freq. Normal	4202 / 001	6
29	DC Power Supply	1150-064	3002	6
30	DC Power Supply	1150-064	3102	6
31	Digital-AC/DC- Multimeter	HIO - K3284	647605	6

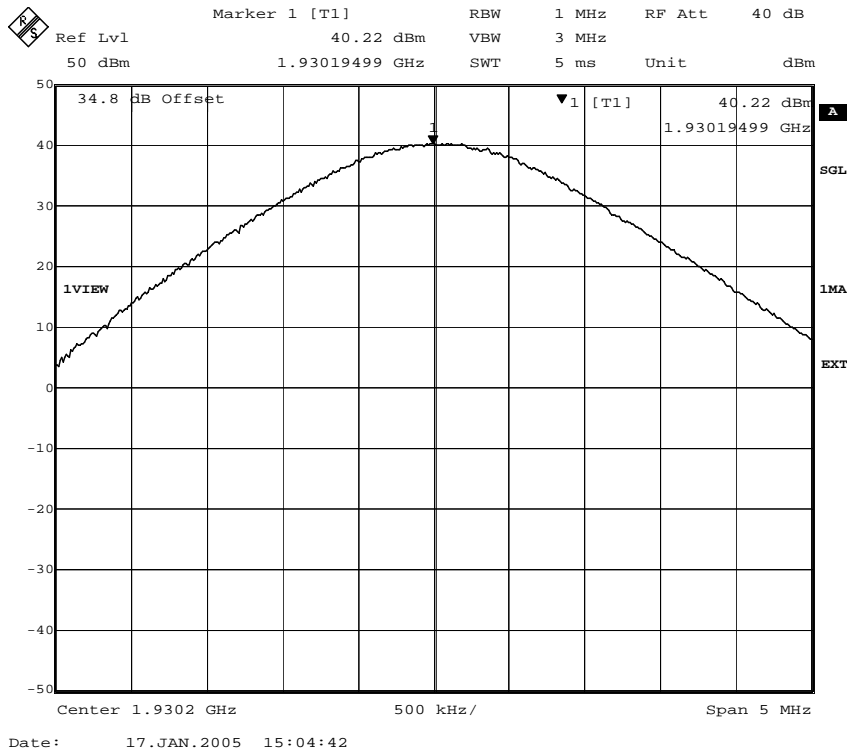
### **3.2 *Spectral plots***

#### **3.2.1 Test No. 1: RF Power Output**

**Test No. 1: RF Power Output (Carrier Test Frequency = 1930.2 MHz)**



**Fig. 4 – RF power at the antenna connector (GMSK modulation).**



**Fig. 5 – RF power at the antenna connector (8PSK modulation).**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.



Test No. 1: RF Power Output (Carrier Test Frequency = 1930.4 MHz)

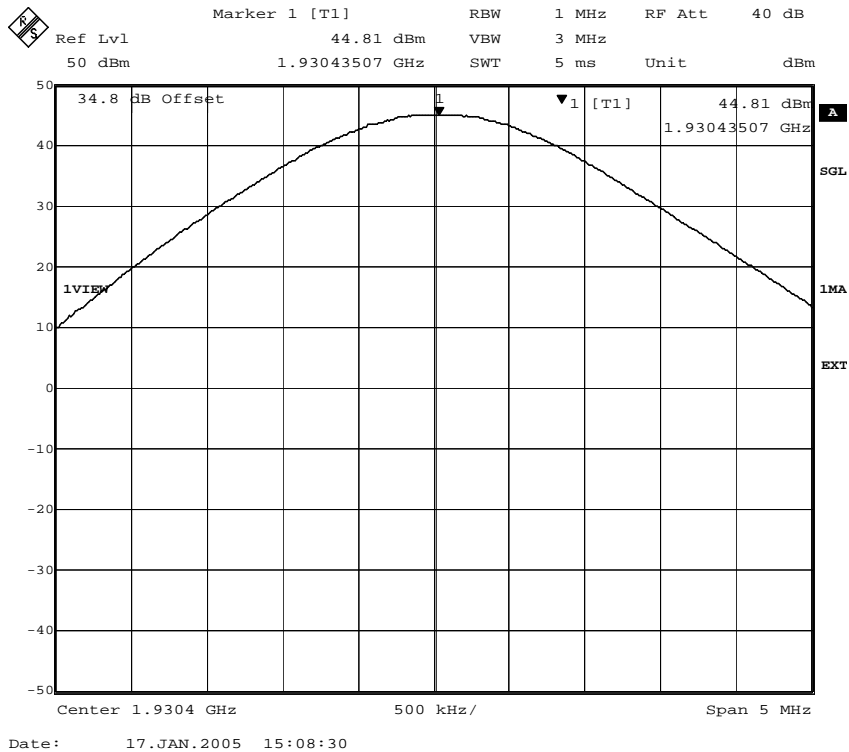


Fig. 6 – RF power at the antenna connector (GMSK modulation).

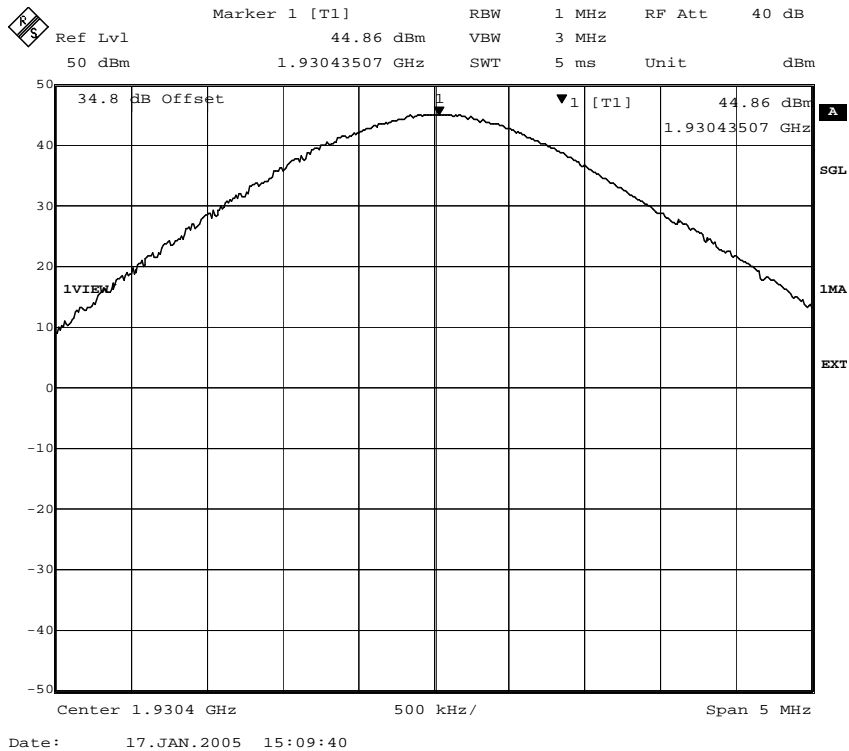


Fig. 7 – RF power at the antenna connector (8PSK modulation).

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

Test No. 1: RF Power Output (Carrier Test Frequency = 1960.0 MHz)

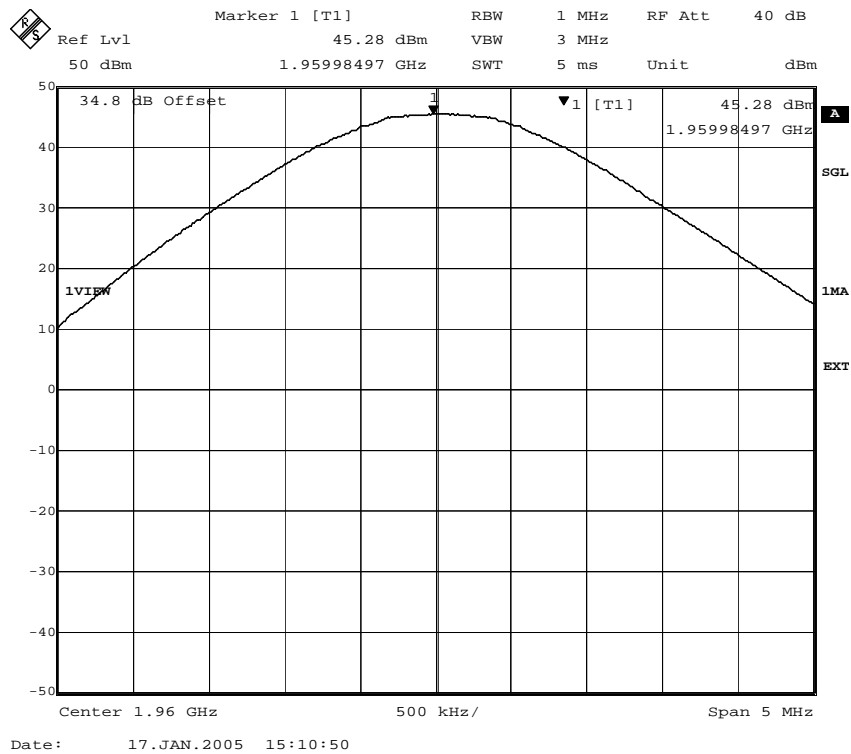


Fig. 8 – RF power at the antenna connector (GMSK modulation).

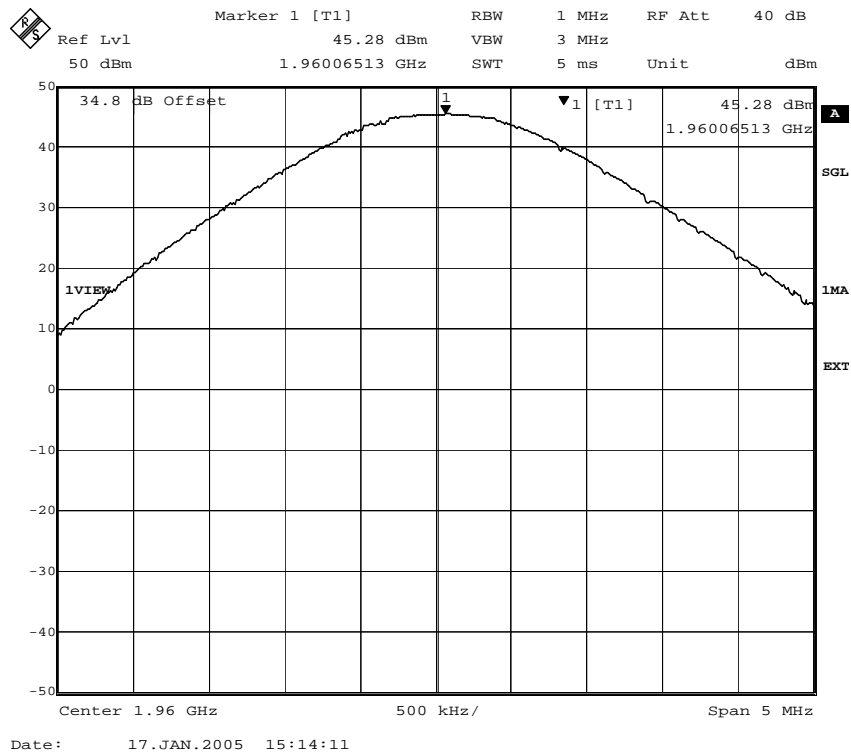


Fig. 9 – RF power at the antenna connector (8PSK modulation).

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

Test No. 1: RF Power Output (Carrier Test Frequency = 1989.6 MHz)

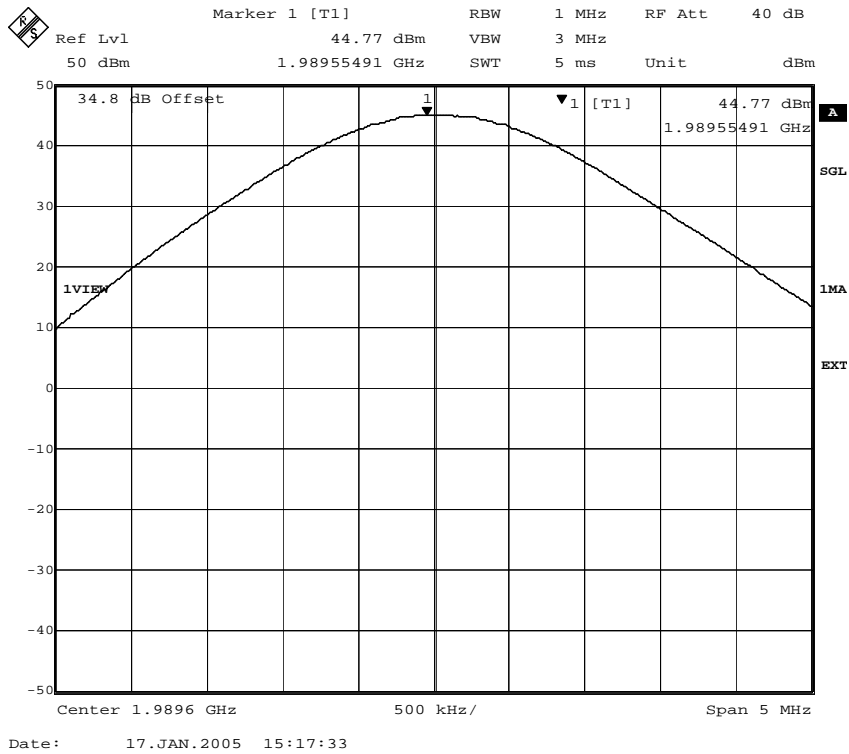


Fig. 10 – RF power at the antenna connector (GMSK modulation).

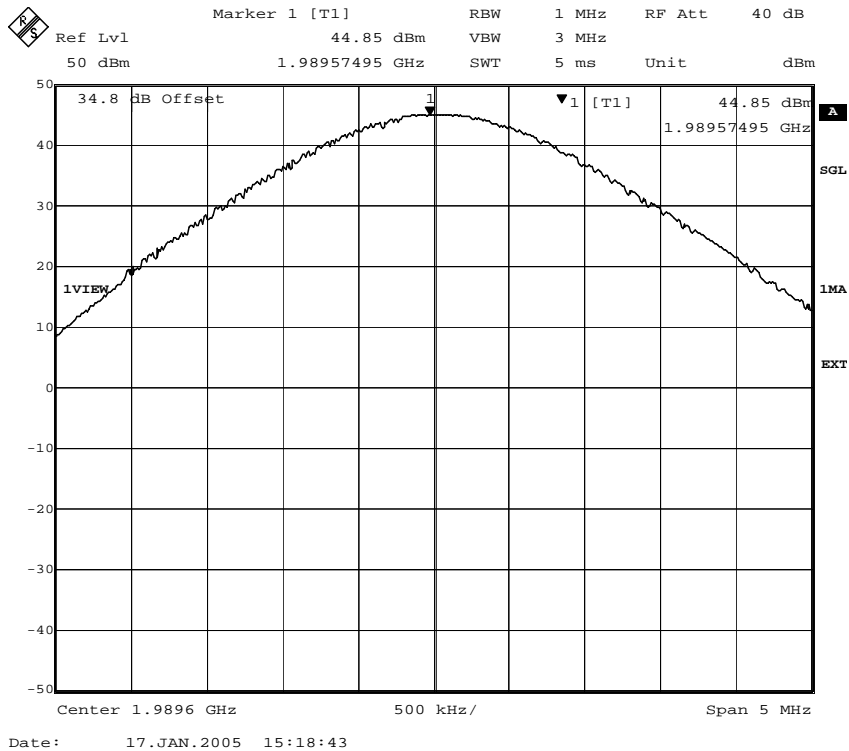
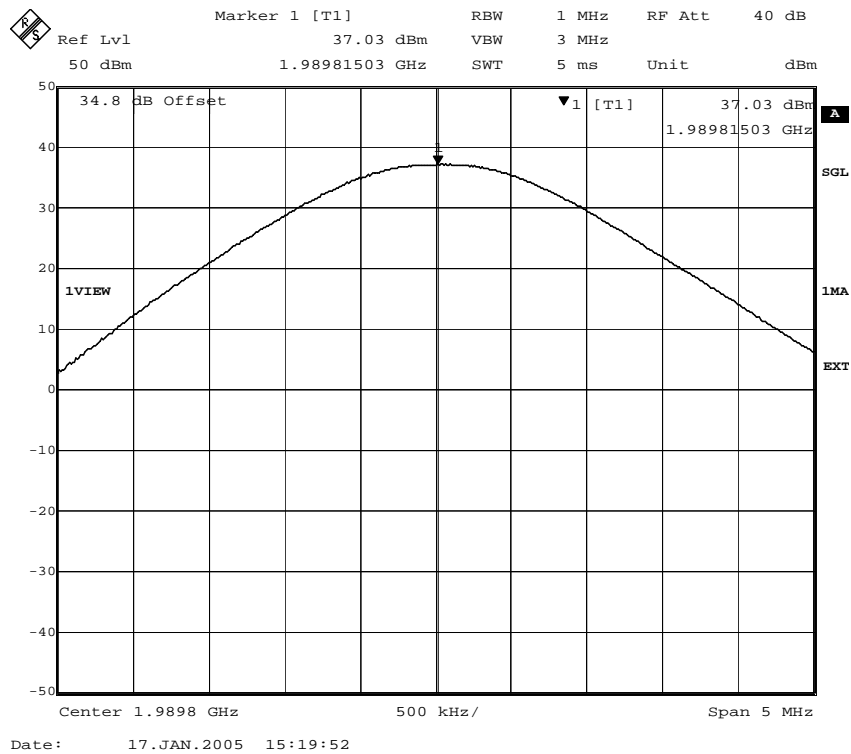


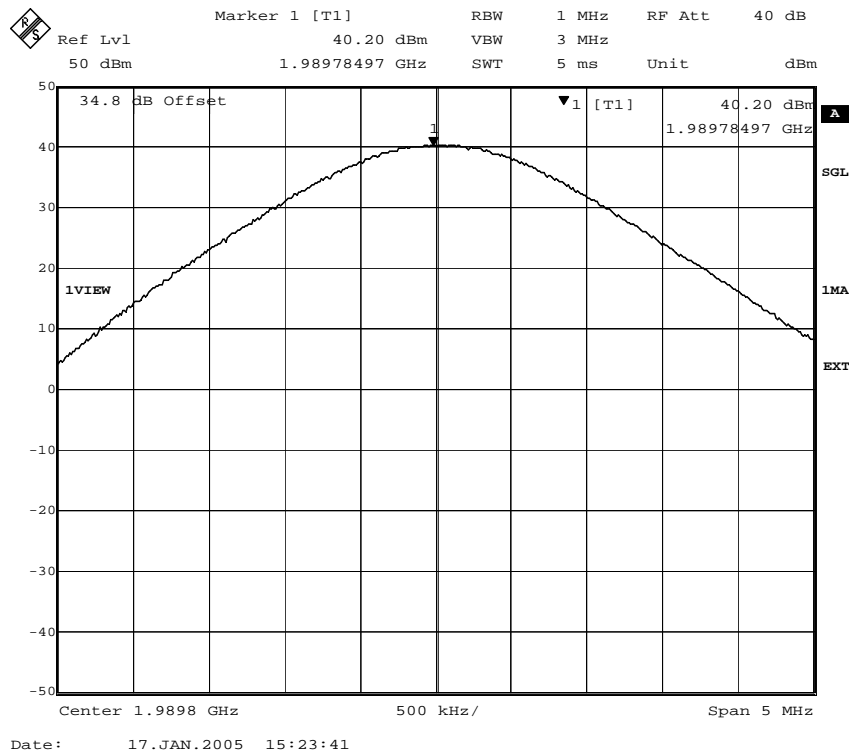
Fig. 11 – RF power at the antenna connector (8PSK modulation).

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 1: RF Power Output (Carrier Test Frequency = 1989.8 MHz)**



**Fig. 12 – RF power at the antenna connector (GMSK modulation).**



**Fig. 13 – RF power at the antenna connector (8PSK modulation).**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**3.2.2 Test No. 2: Modulation Characteristics*****Test No. 2: Modulation Characteristics***

No additional measurements are required for the modulation characteristics. Please refer to test no. 3, occupied bandwidth on pages 30 - 34.

**3.2.3 Test No. 3: Occupied Bandwidth**

Test No. 3: Occupied Bandwidth (Carrier Test Frequency = 1930.2 MHz)

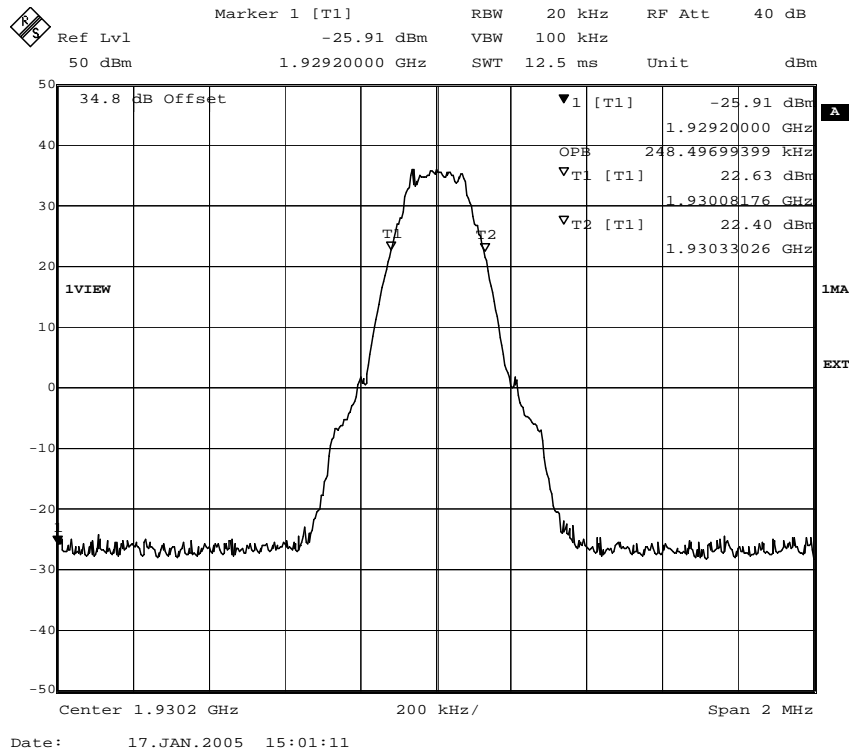


Fig. 14 – Occupied bandwidth (GMSK modulation).

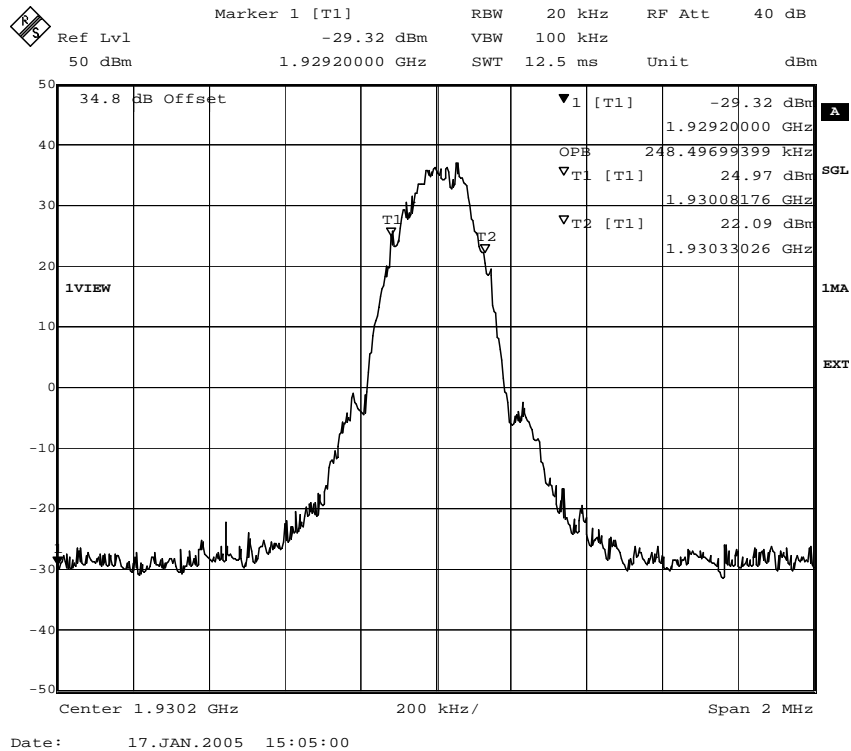


Fig. 15 – Occupied bandwidth (8PSK modulation).

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

Test No. 3: Occupied Bandwidth (Carrier Test Frequency = 1930.4 MHz)

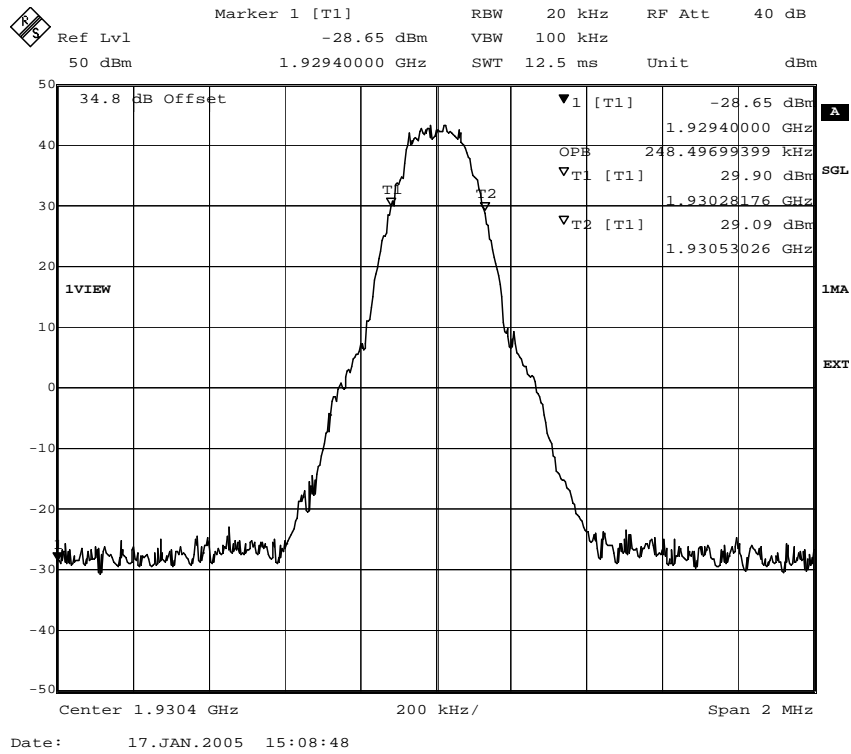


Fig. 16 – Occupied bandwidth (GMSK modulation).

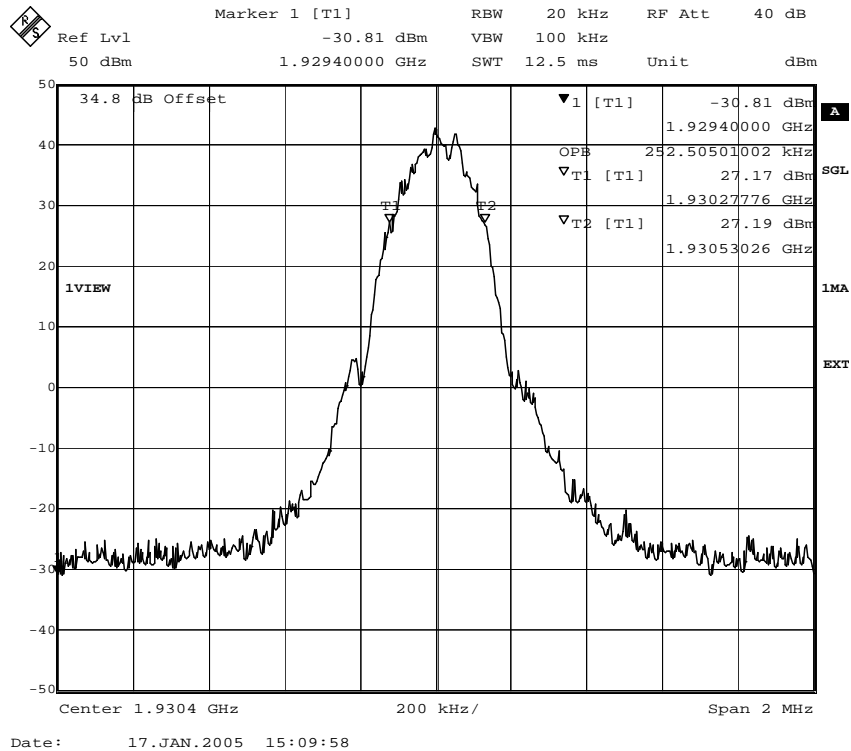


Fig. 17 – Occupied bandwidth (8PSK modulation).

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

Test No. 3: Occupied Bandwidth (Carrier Test Frequency = 1960.0 MHz)

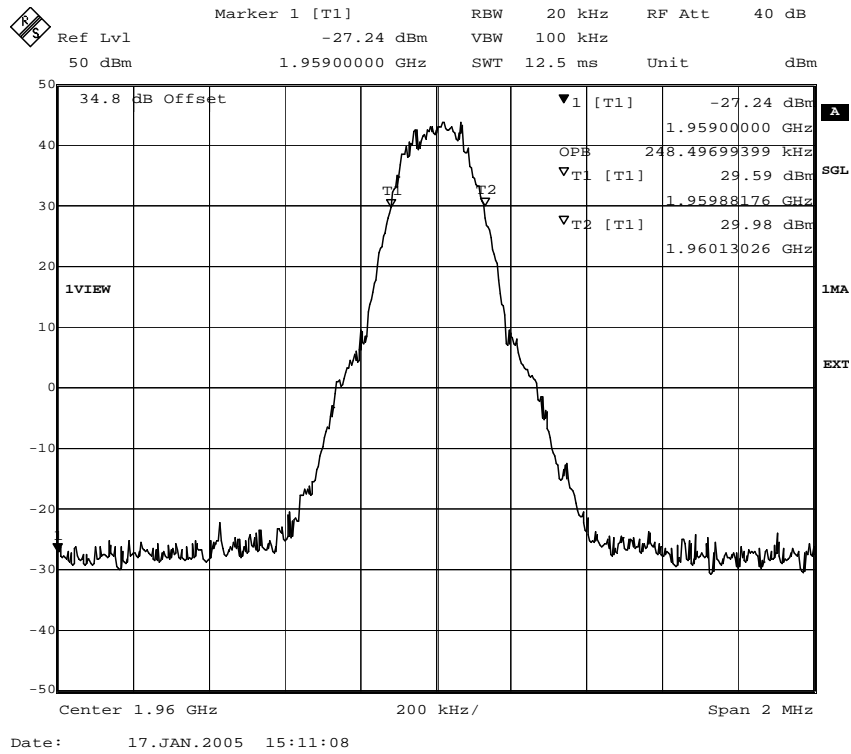


Fig. 18 – Occupied bandwidth (GMSK modulation).

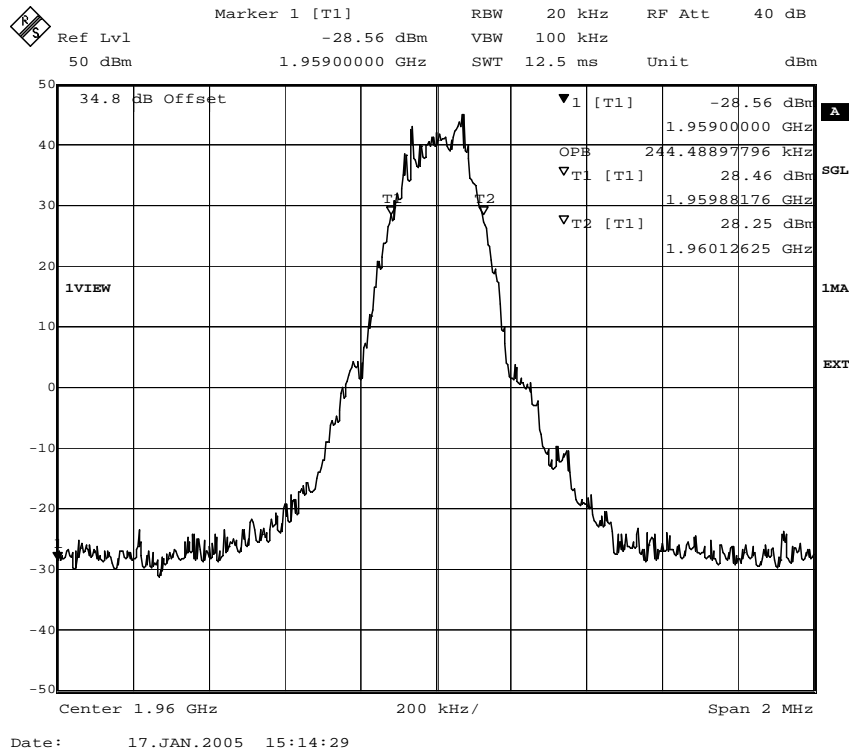


Fig. 19 – Occupied bandwidth (8PSK modulation).

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.



Test No. 3: Occupied Bandwidth (Carrier Test Frequency = 1989.6 MHz)

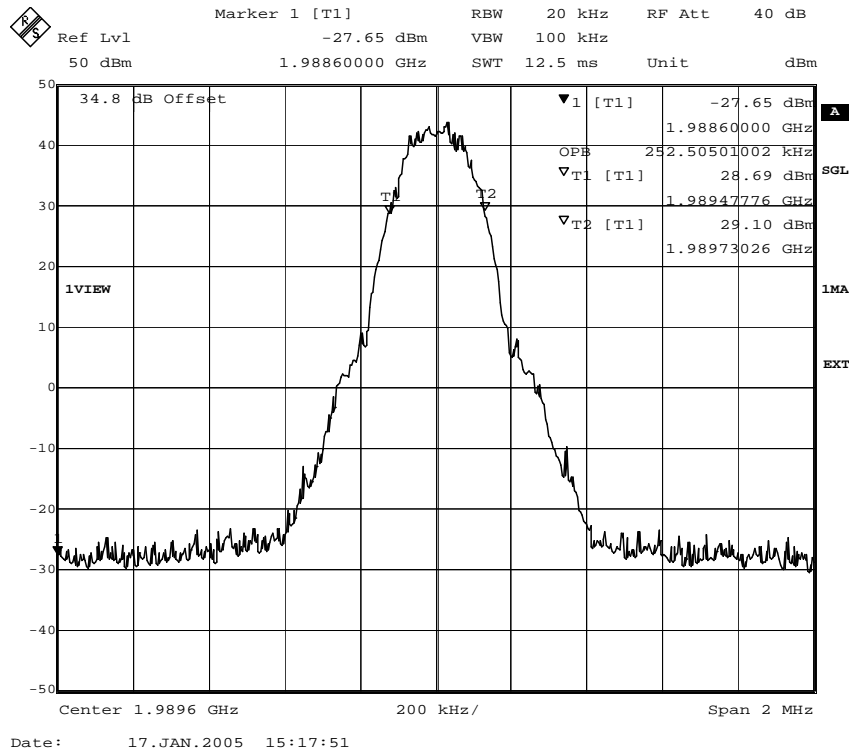


Fig. 20 – Occupied bandwidth (GMSK modulation).

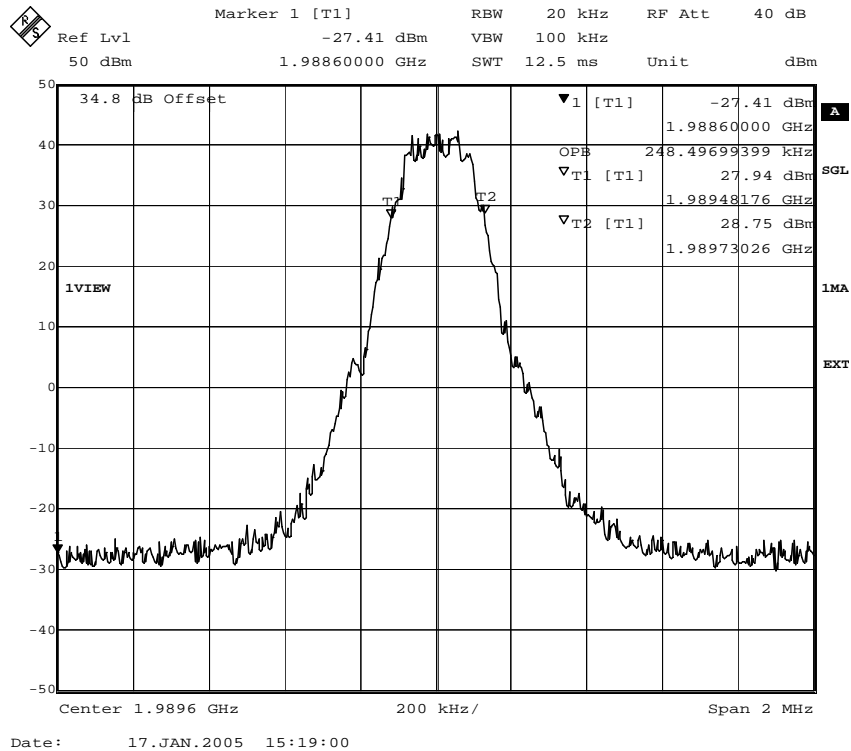


Fig. 21 – Occupied bandwidth (8PSK modulation).

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

Test No. 3: Occupied Bandwidth (Carrier Test Frequency = 1989.8 MHz)

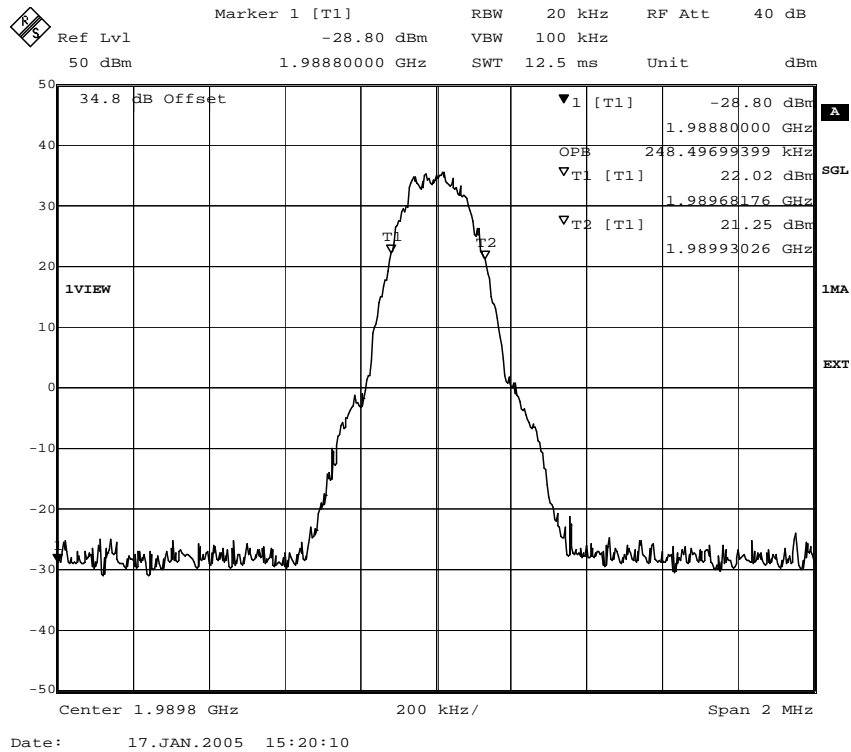


Fig. 22 – Occupied bandwidth (GMSK modulation).

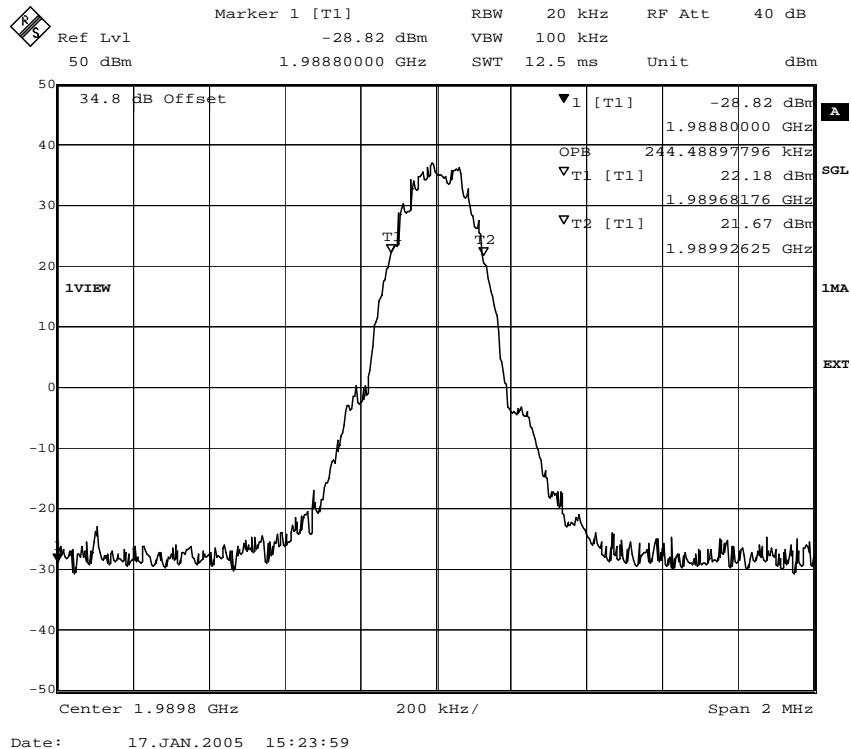
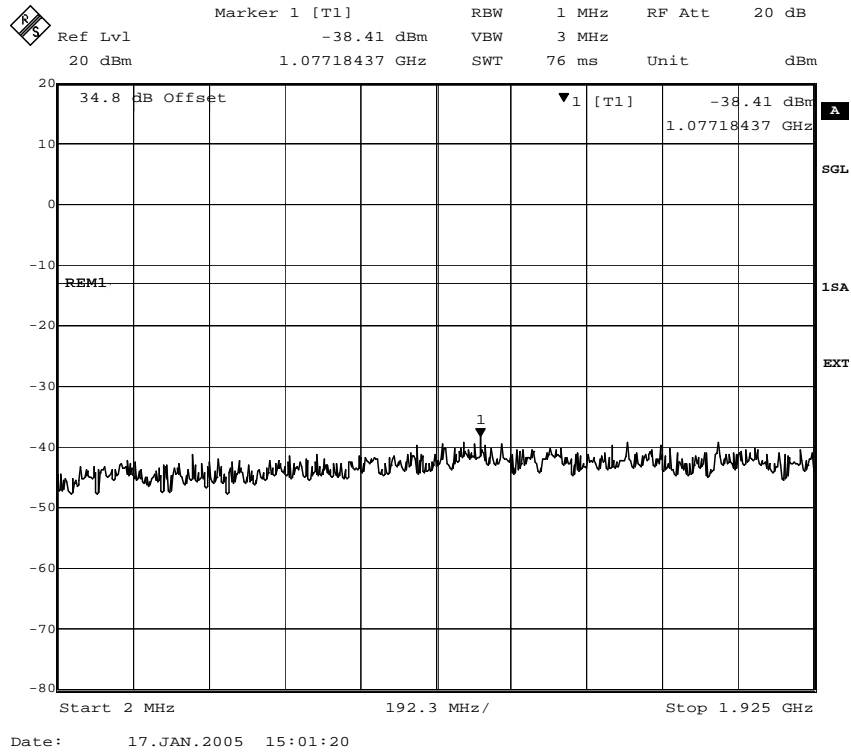


Fig. 23 – Occupied bandwidth (8PSK modulation).

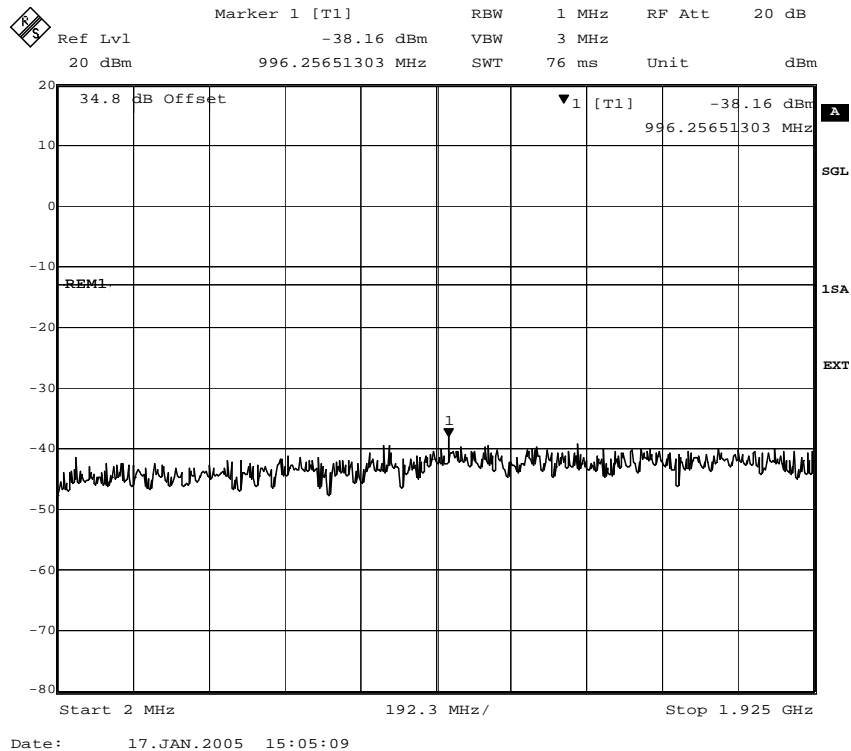
**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**3.2.4 Test No. 4: Spurious Emissions at the Antenna Terminals**

**Test No. 4: Spurious Emissions at the Antenna Terminals**  
**(Carrier Test Frequency = 1930.2 MHz)**



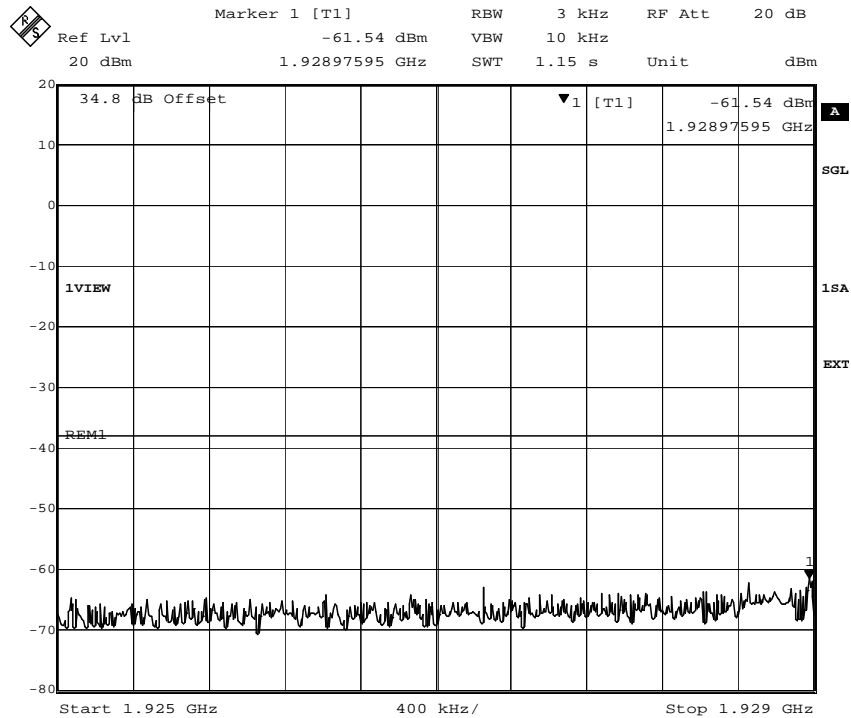
**Fig. 24 – Spurious emissions in the frequency range 2 MHz – 1925 MHz (GMSK modulation).**



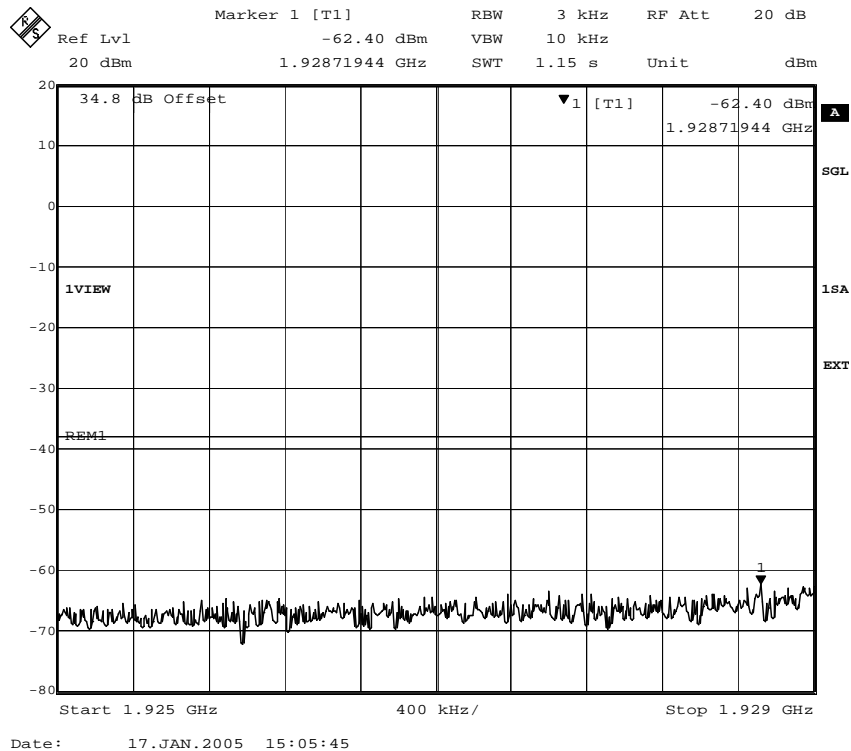
**Fig. 25 – Spurious emissions in the frequency range 2 MHz – 1925 MHz (8PSK modulation).**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals**  
**(Carrier Test Frequency = 1930.2 MHz)**



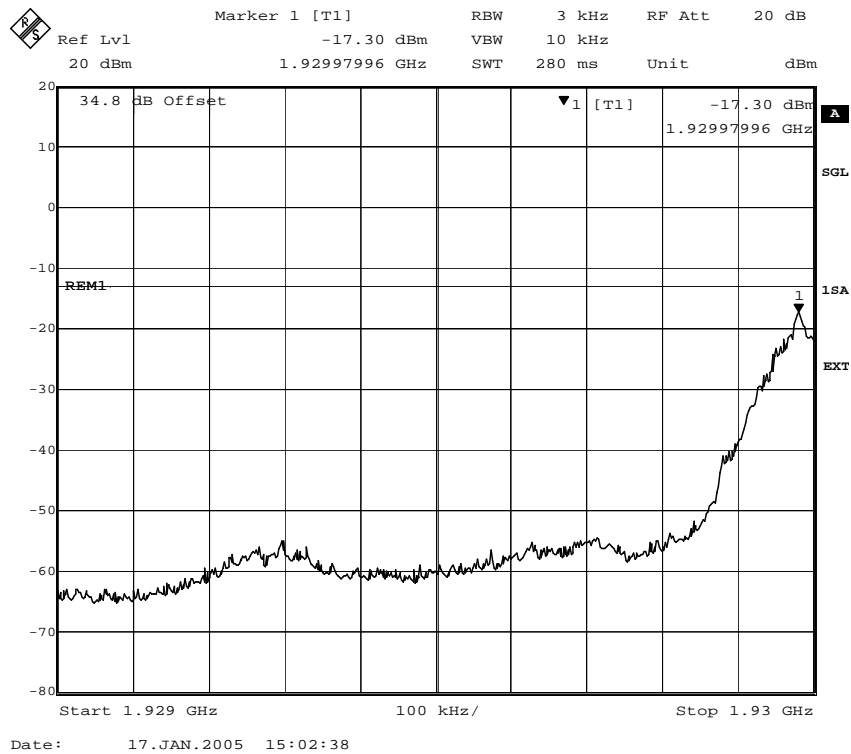
**Fig. 26 – Spurious emissions in the frequency range 1925 MHz–1929 MHz (GMSK modulation).  
Limit: -13dBm–25.2dB–38.2dBm**



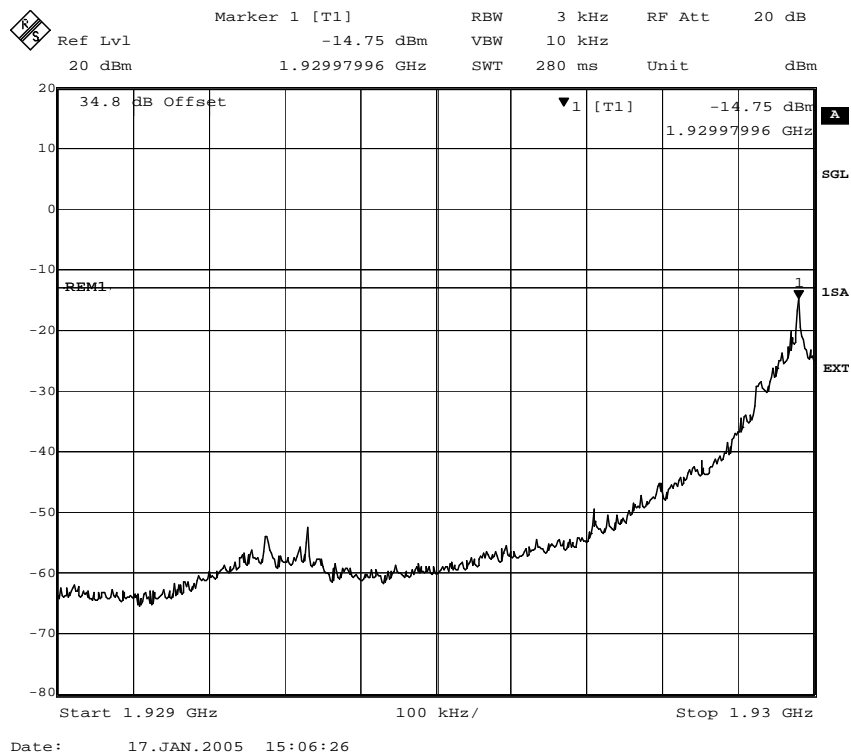
**Fig. 27 – Spurious emissions in the frequency range 1925 MHz–1929 MHz (8PSK modulation).  
Limit: -13dBm–25.2dB–38.2dBm**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1930.2 MHz)**



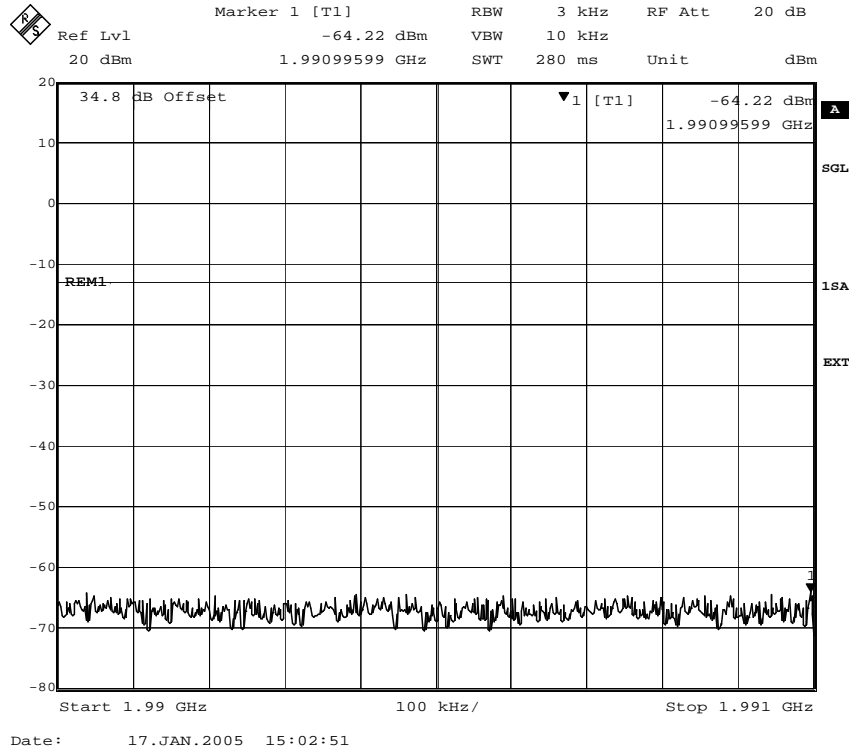
**Fig. 28 – Spurious emissions in the frequency range 1929 MHz – 1930 MHz (GMSK modulation).**



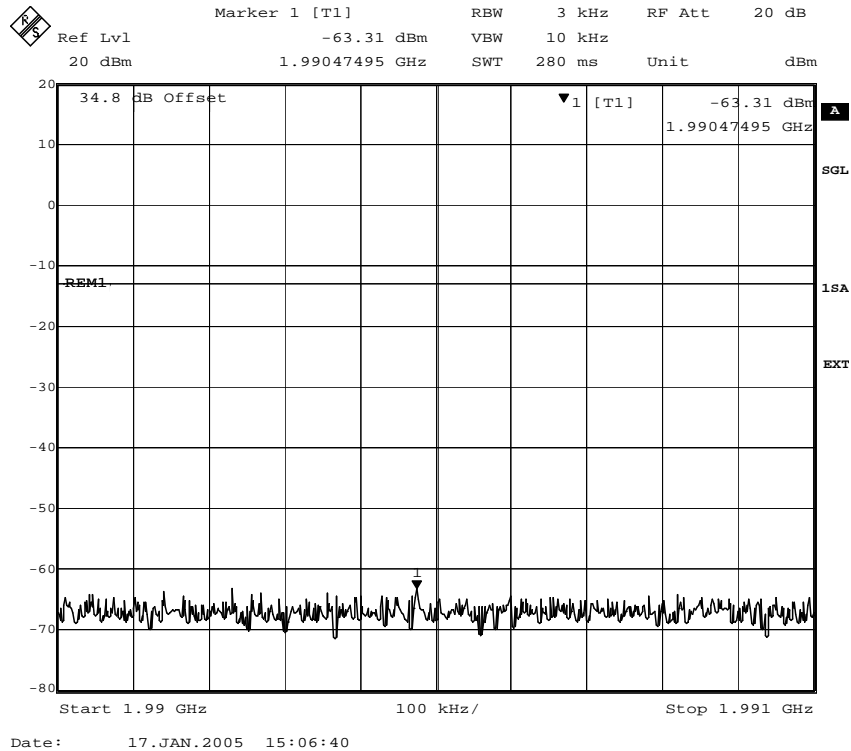
**Fig. 29 – Spurious emissions in the frequency range 1929 MHz – 1930 MHz (8PSK modulation).**

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1930.2 MHz)**



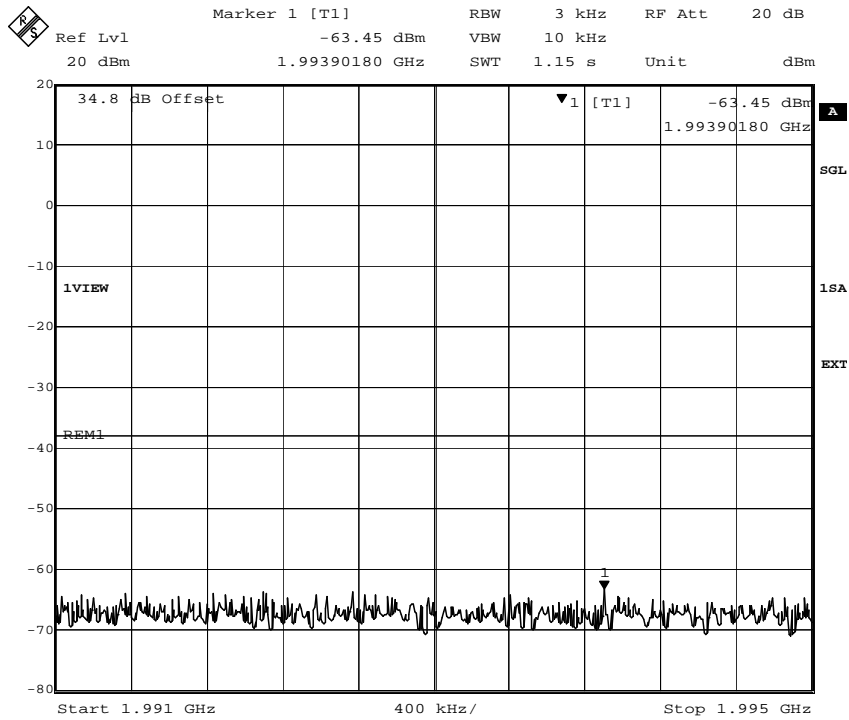
**Fig. 30 – Spurious emissions in the frequency range 1990 MHz – 1991 MHz (GMSK modulation).**



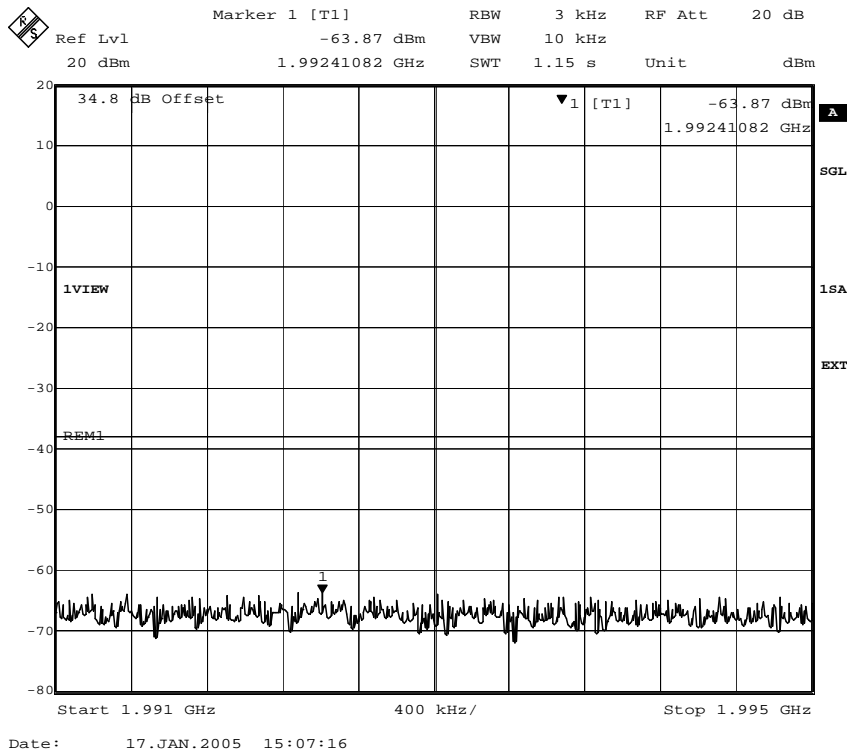
**Fig. 31 – Spurious emissions in the frequency range 1990 MHz – 1991 MHz (8PSK modulation).**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals**  
**(Carrier Test Frequency = 1930.2 MHz)**



**Fig. 32 – Spurious emissions in the frequency range 1991 MHz – 1995 MHz (GMSK modulation).  
Limit: -13dBm-25.2dB=-38.2dBm**

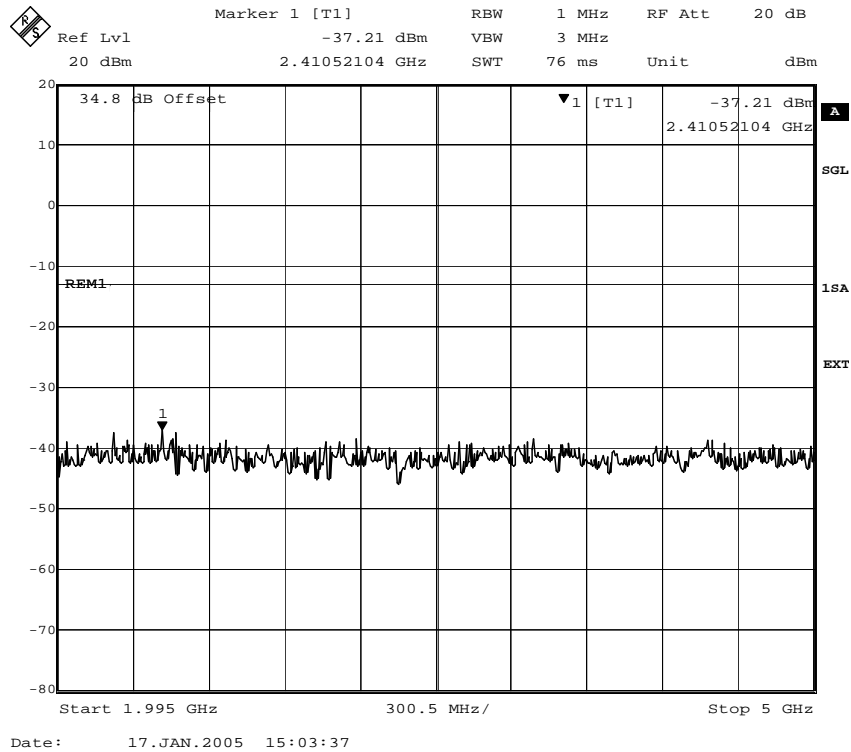


**Fig. 33 – Spurious emissions in the frequency range 1991 MHz – 1995 MHz (8PSK modulation).  
Limit: -13dBm-25.2dB=-38.2dBm**

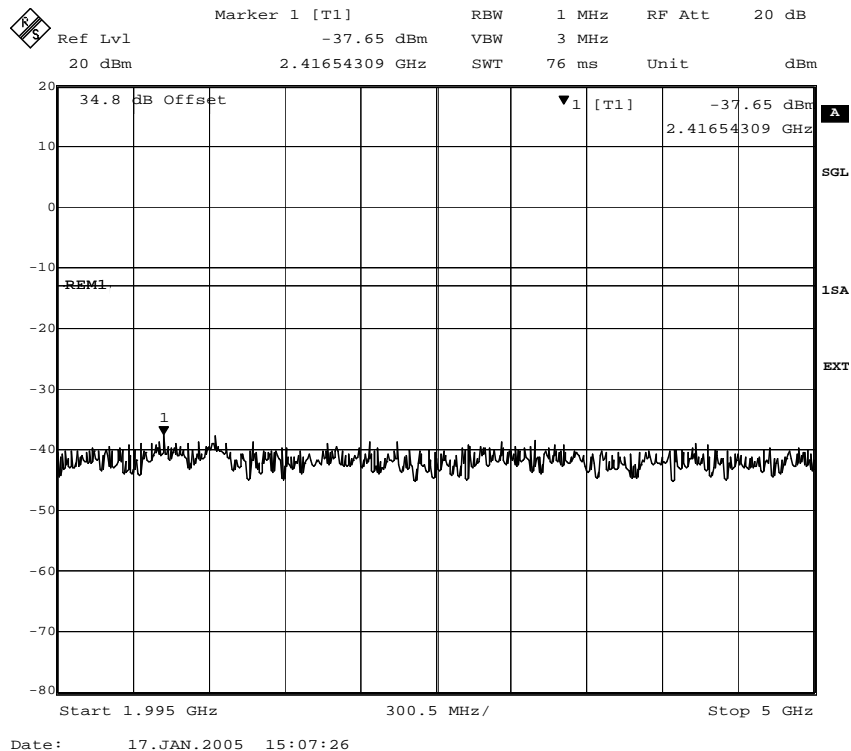
Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.



**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1930.2 MHz)**



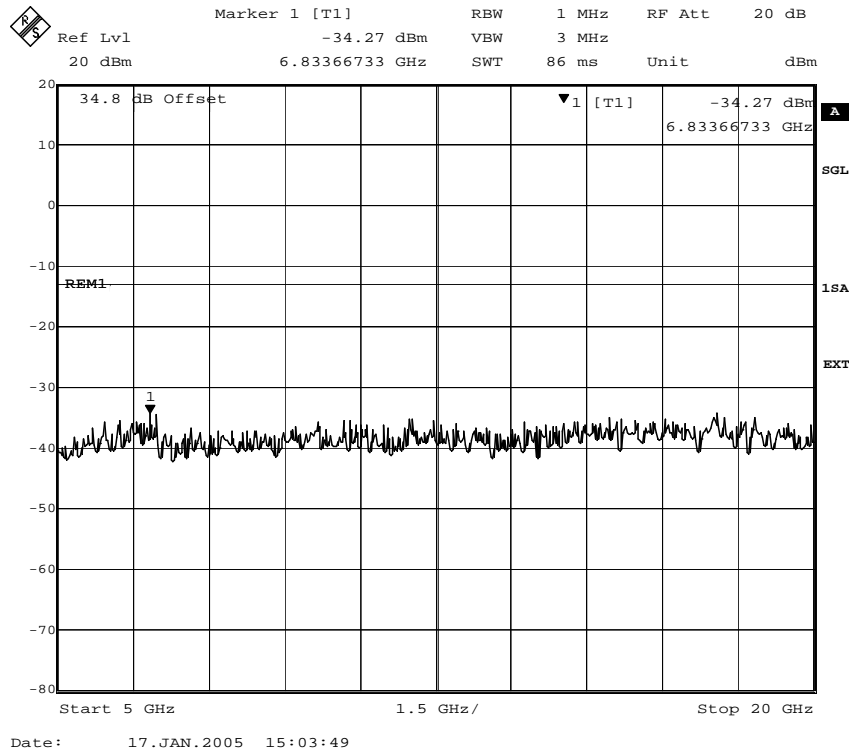
**Fig. 34 – Spurious emissions in the frequency range 1995 MHz – 5000 MHz (GMSK modulation).**



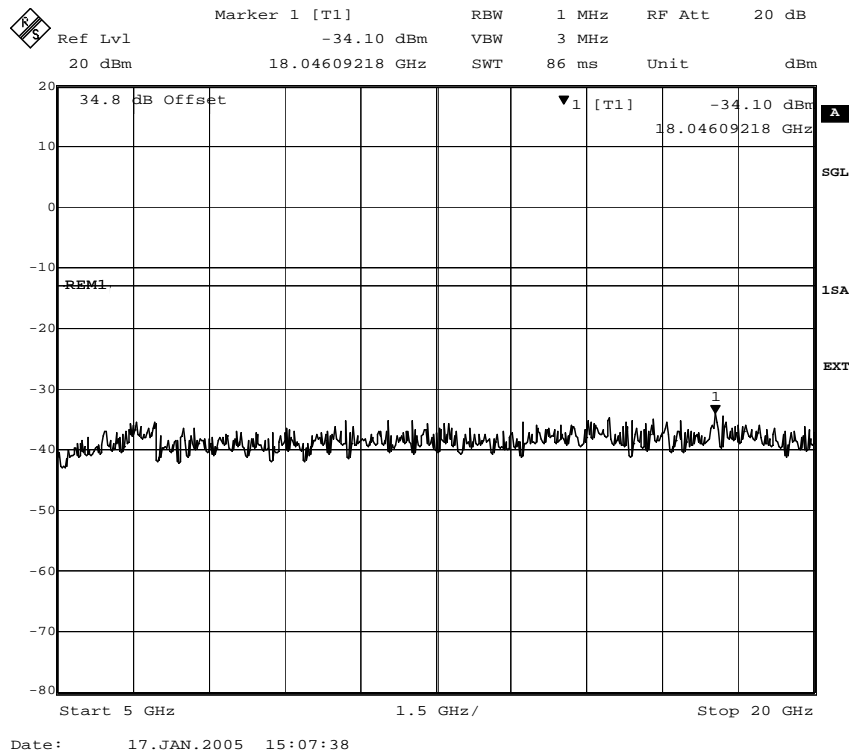
**Fig. 35 – Spurious emissions in the frequency range 1995 MHz – 5000 MHz (8PSK modulation).**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1930.2 MHz)**



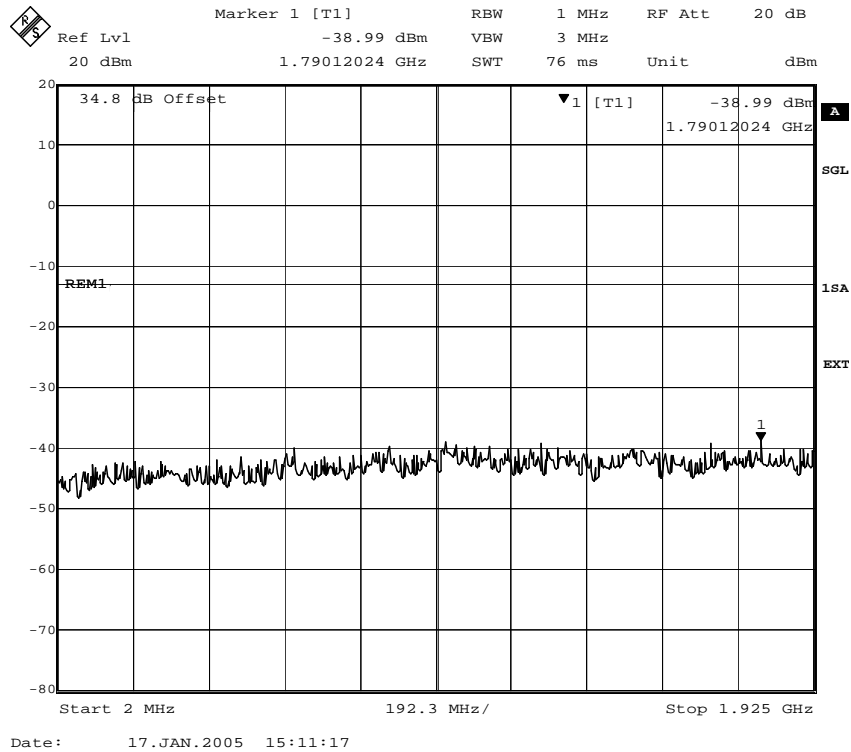
**Fig. 36 – Spurious emissions in the frequency range 5000 MHz–20000 MHz (GMSK modulation).**



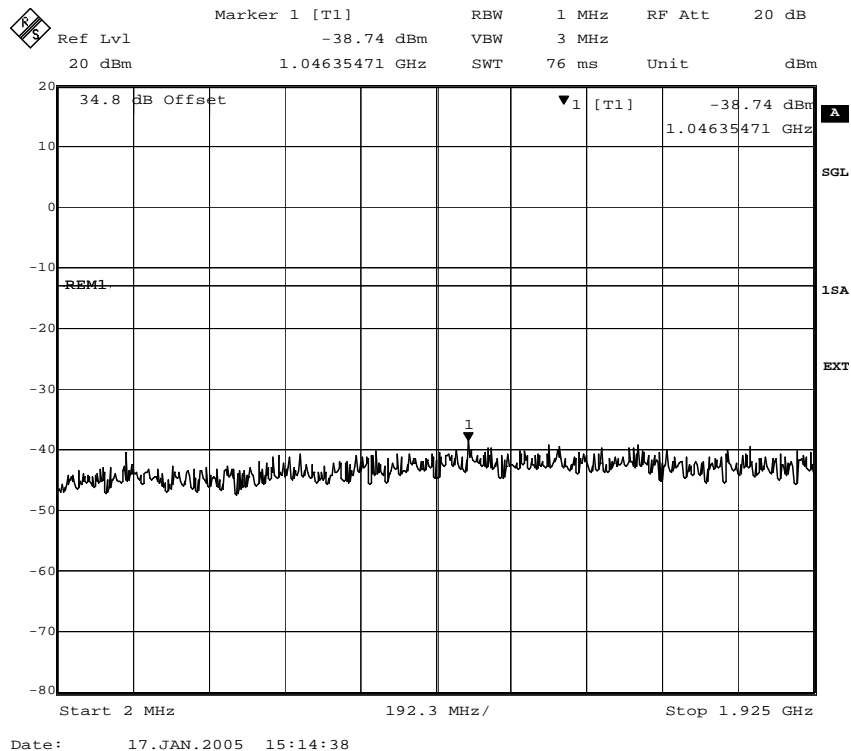
**Fig. 37 – Spurious emissions in the frequency range 5000 MHz–20000 MHz (8PSK modulation).**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1960.0 MHz)**



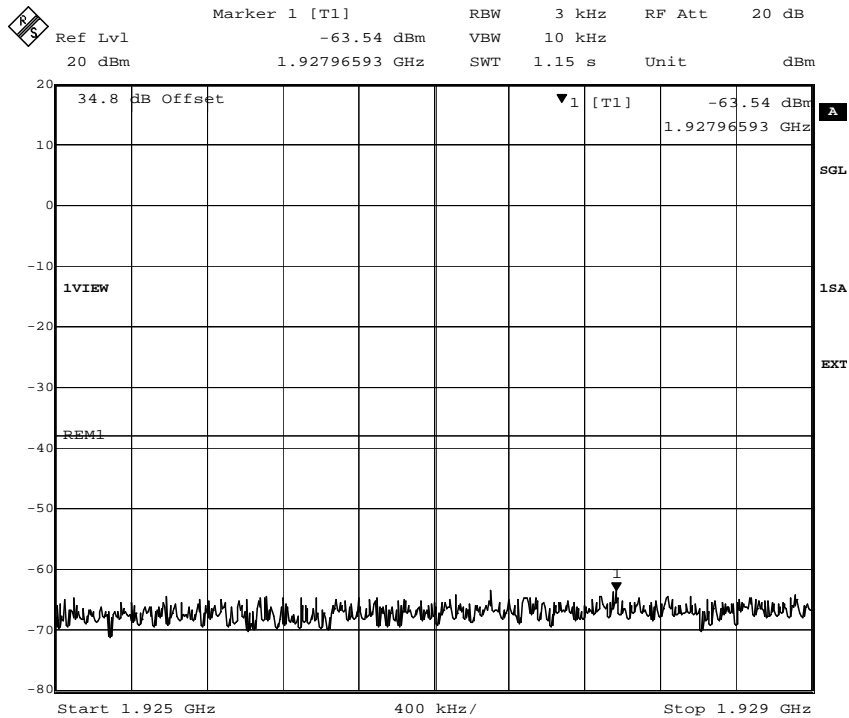
**Fig. 38 – Spurious emissions in the frequency range 2 MHz – 1925 MHz (GMSK modulation).**



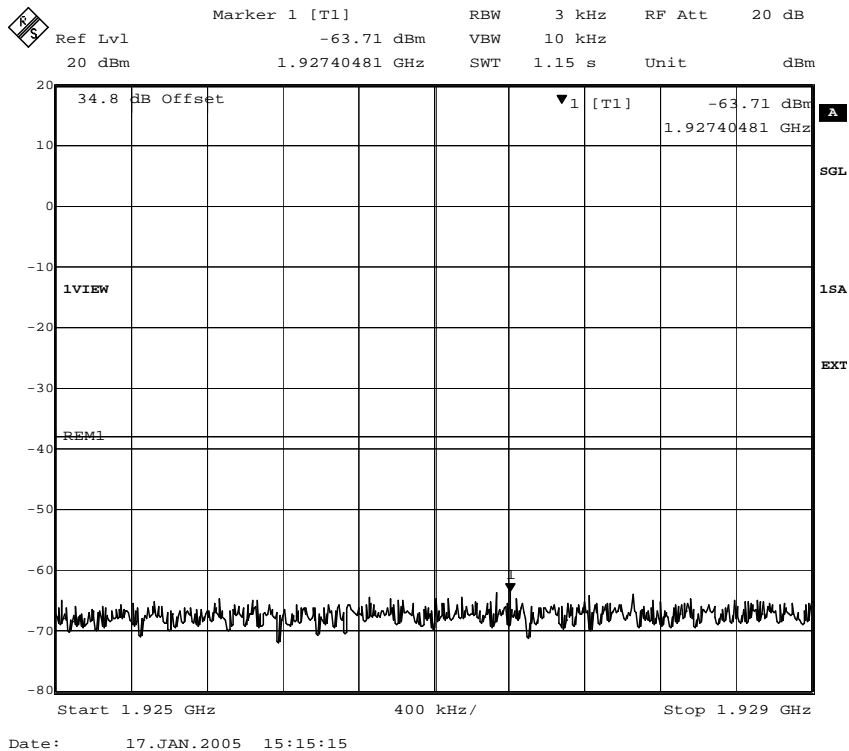
**Fig. 39 – Spurious emissions in the frequency range 2 MHz – 1925 MHz (8PSK modulation).**

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1960.0 MHz)**



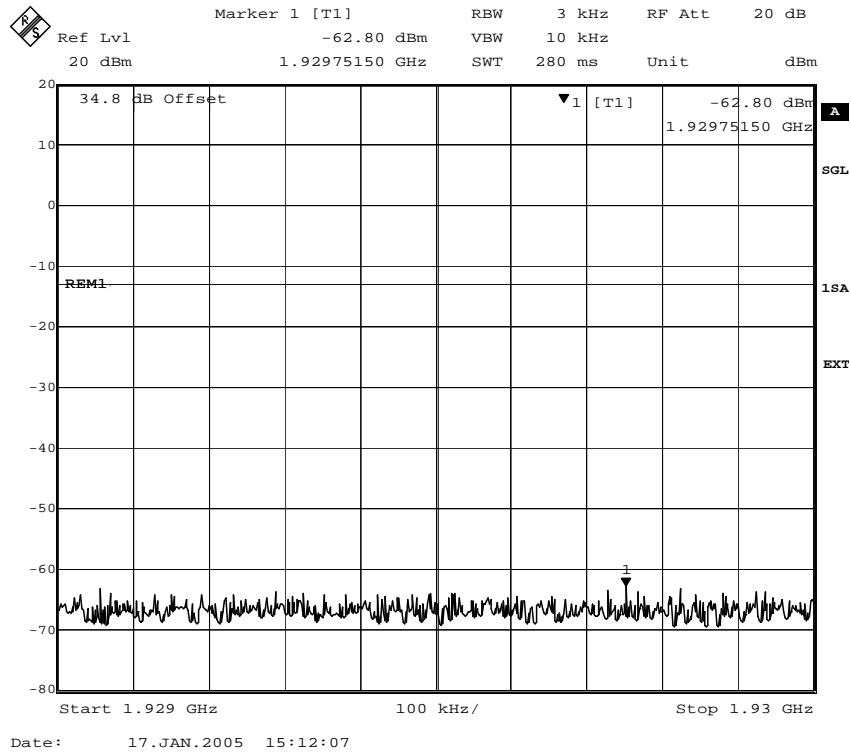
**Fig. 40 – Spurious emissions in the frequency range 1925 MHz–1929 MHz (GMSK modulation).  
Limit: -13dBm–25.2dB–38.2dBm**



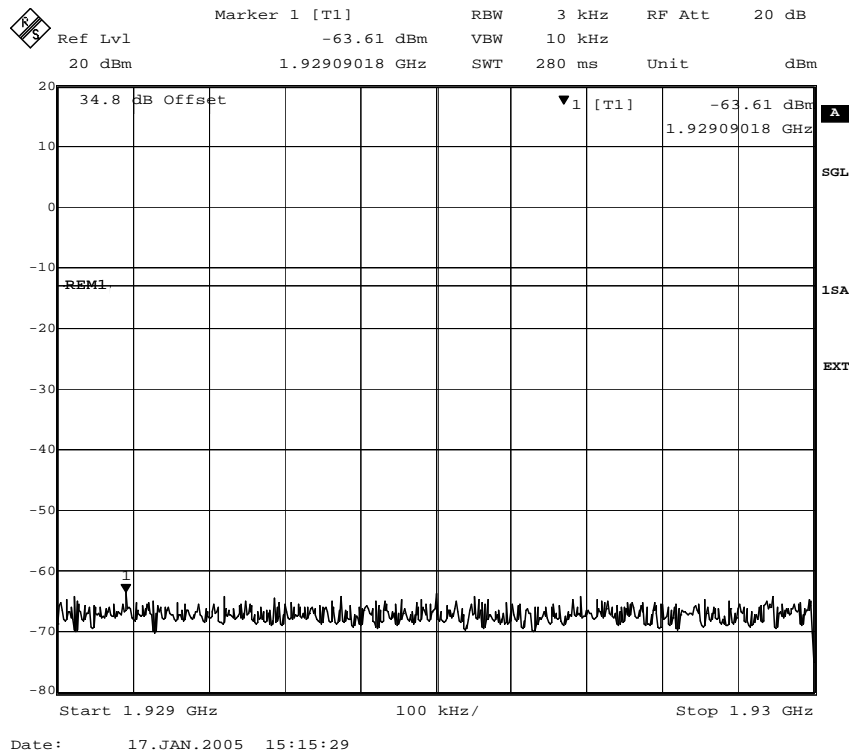
**Fig. 41 – Spurious emissions in the frequency range 1925 MHz–1929 MHz (8PSK modulation).  
Limit: -13dBm–25.2dB–38.2dBm**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1960.0 MHz)**



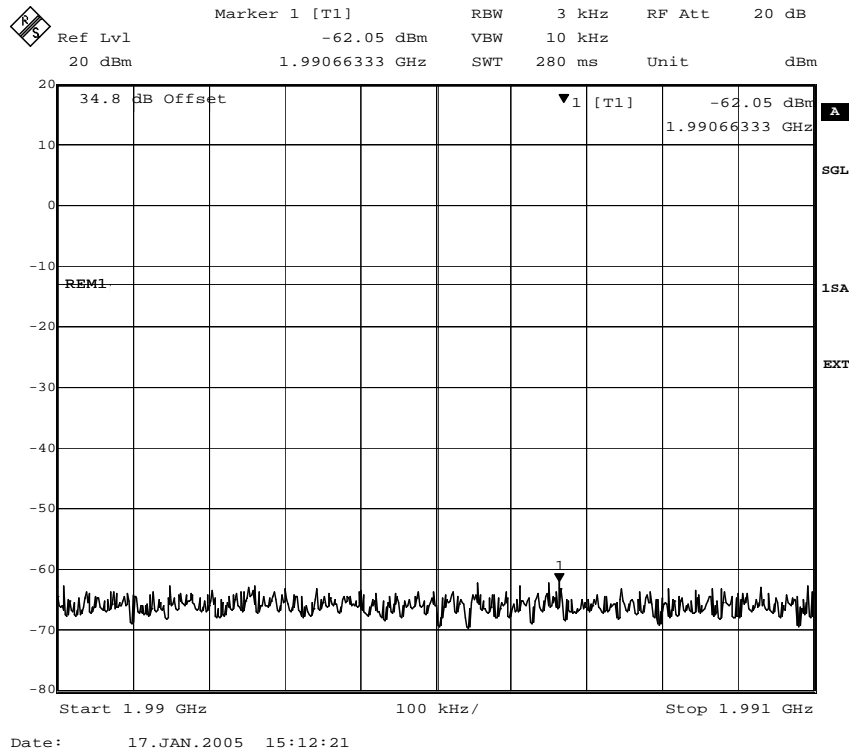
**Fig. 42 – Spurious emissions in the frequency range 1929 MHz – 1930 MHz (GMSK modulation).**



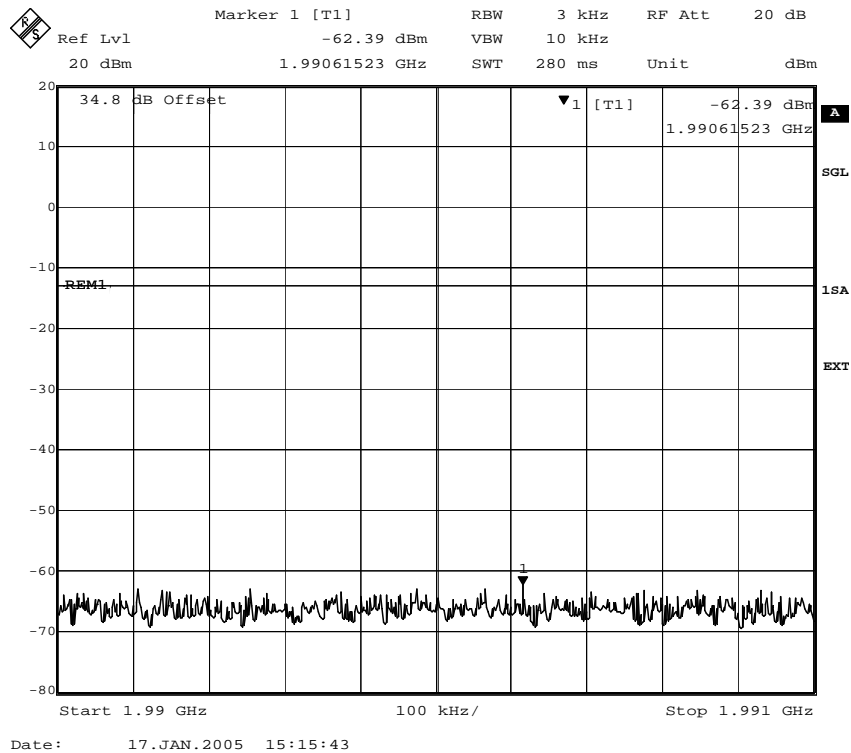
**Fig. 43 – Spurious emissions in the frequency range 1929 MHz – 1930 MHz (8PSK modulation).**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1960.0 MHz)**



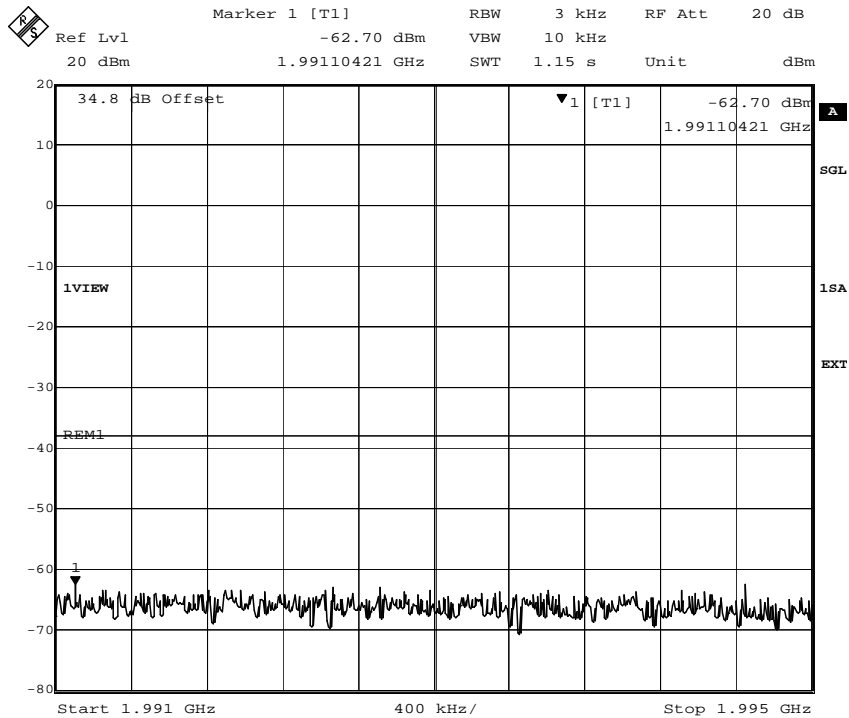
**Fig. 44 – Spurious emissions in the frequency range 1990 MHz – 1991 MHz (GMSK modulation).**



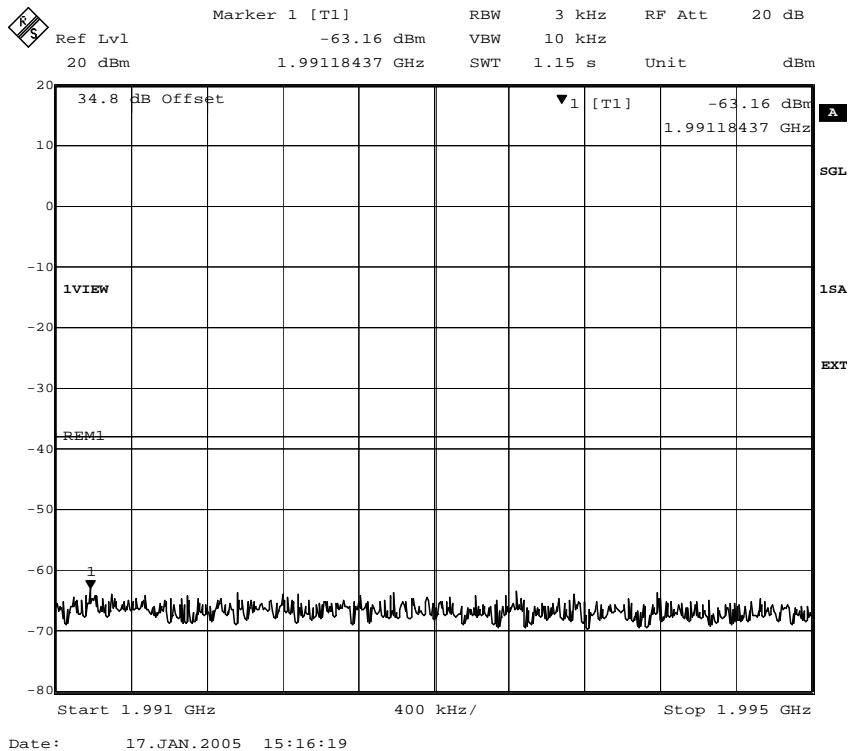
**Fig. 45 – Spurious emissions in the frequency range 1990 MHz – 1991 MHz (8PSK modulation).**

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1960.0 MHz)**



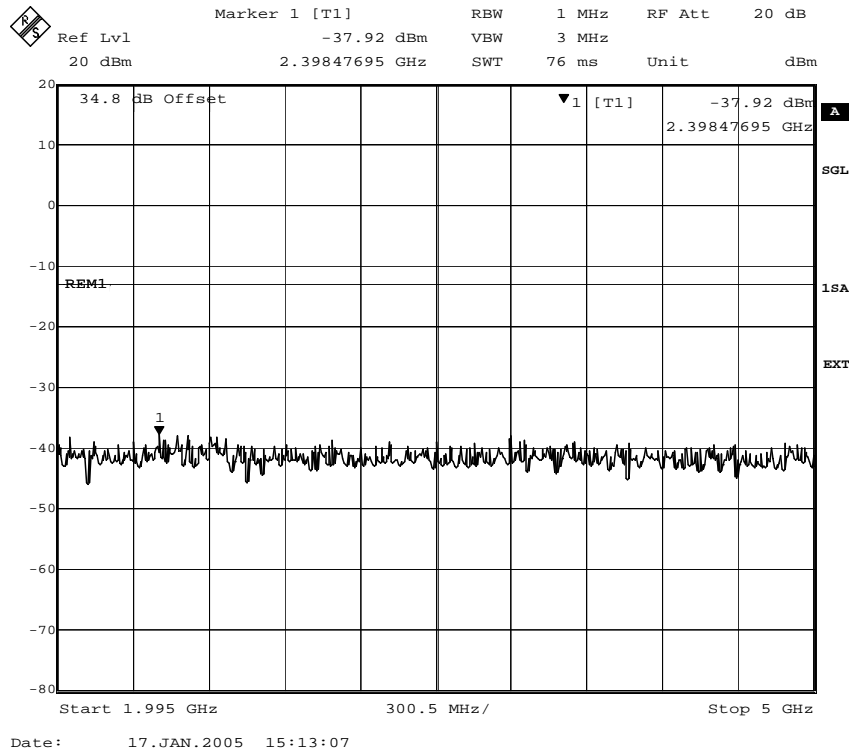
**Fig. 46 – Spurious emissions in the frequency range 1991 MHz – 1995 MHz (GMSK modulation).  
Limit: -13dBm–25.2dB–38.2dBm**



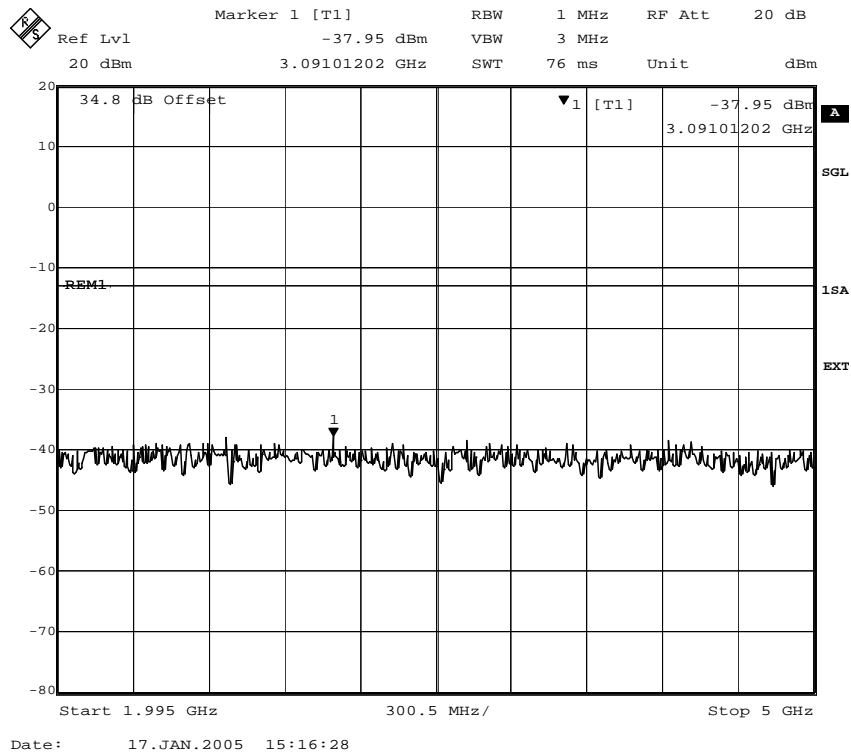
**Fig. 47 – Spurious emissions in the frequency range 1991 MHz – 1995 MHz (8PSK modulation).  
Limit: -13dBm–25.2dB–38.2dBm**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1960.0 MHz)**



**Fig. 48 – Spurious emissions in the frequency range 1995 MHz – 5000 MHz (GMSK modulation).**

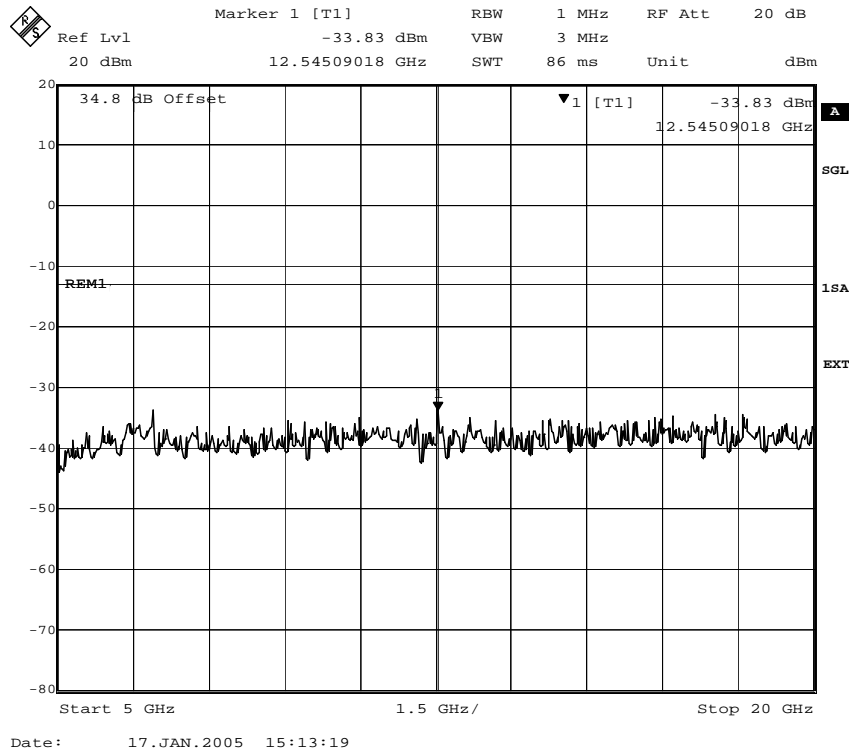


**Fig. 49 – Spurious emissions in the frequency range 1995 MHz – 5000 MHz (8PSK modulation).**

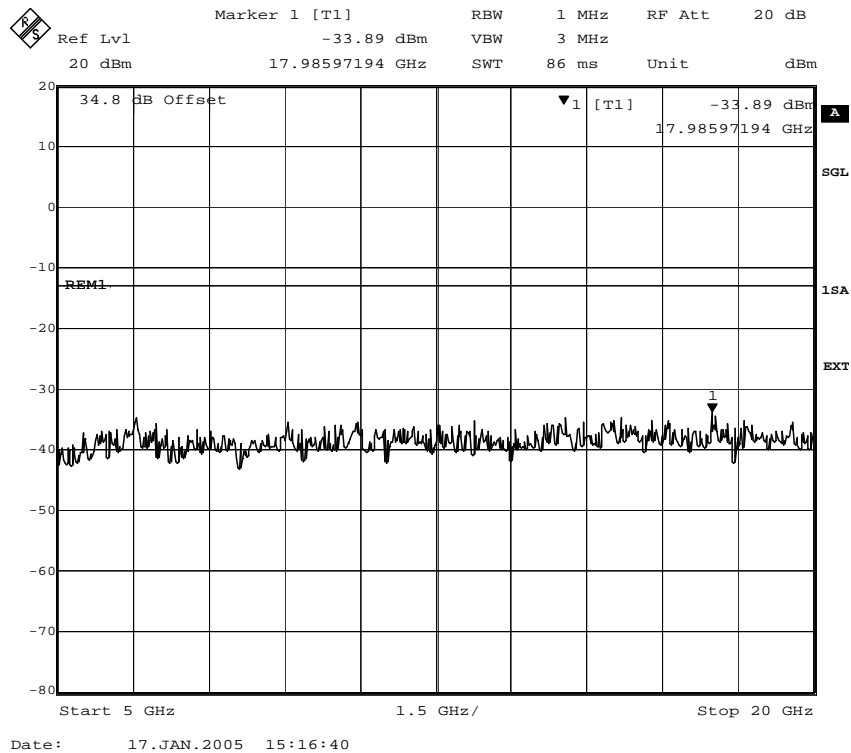
**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.



**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1960.0 MHz)**



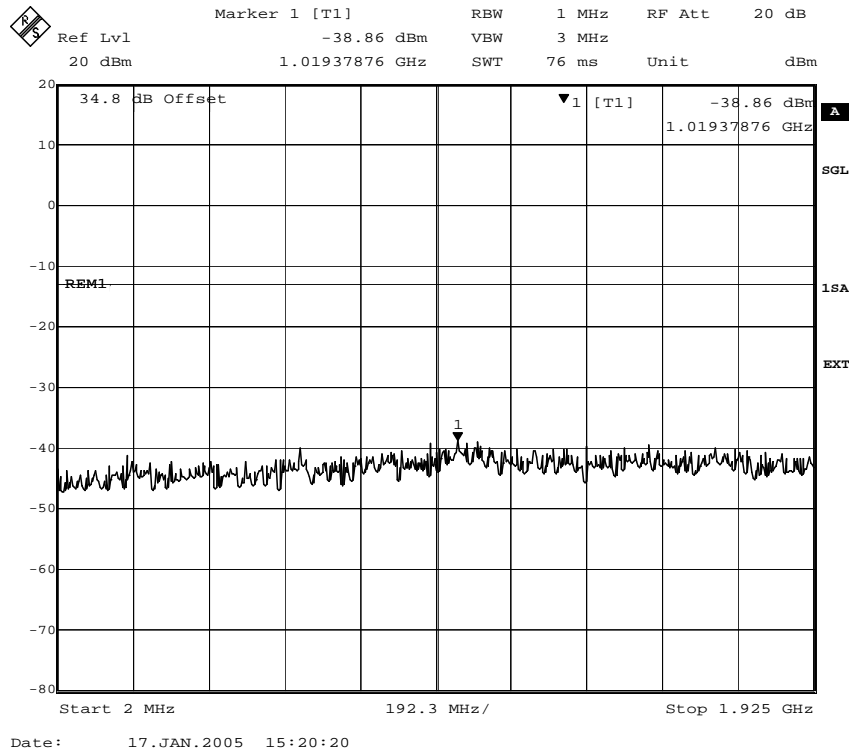
**Fig. 50 – Spurious emissions in the frequency range 5000 MHz–20000 MHz (GMSK modulation).**



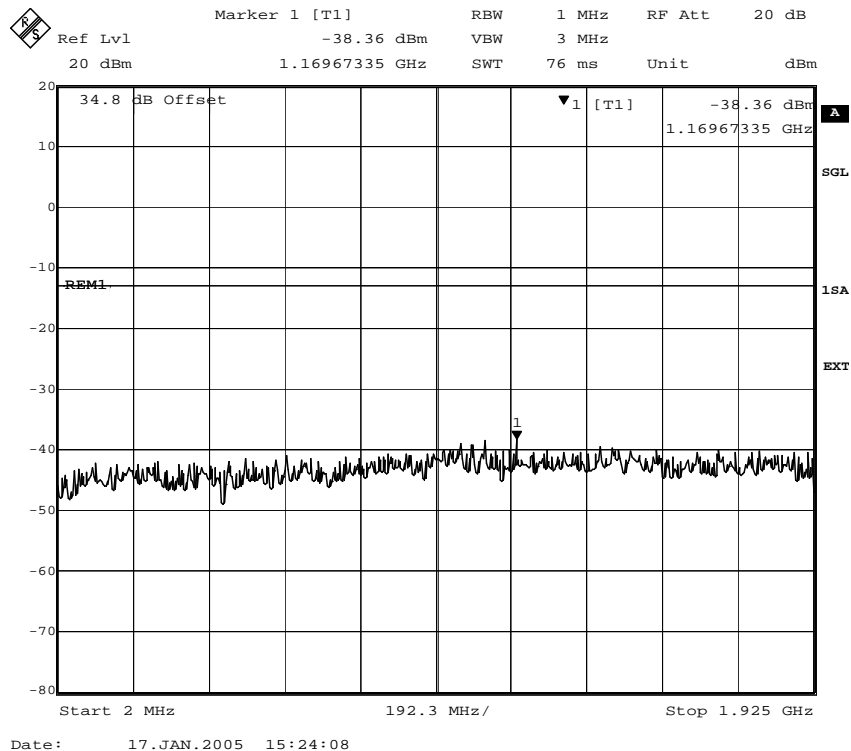
**Fig. 51 – Spurious emissions in the frequency range 5000 MHz–20000 MHz (8PSK modulation).**

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1989.8 MHz)**



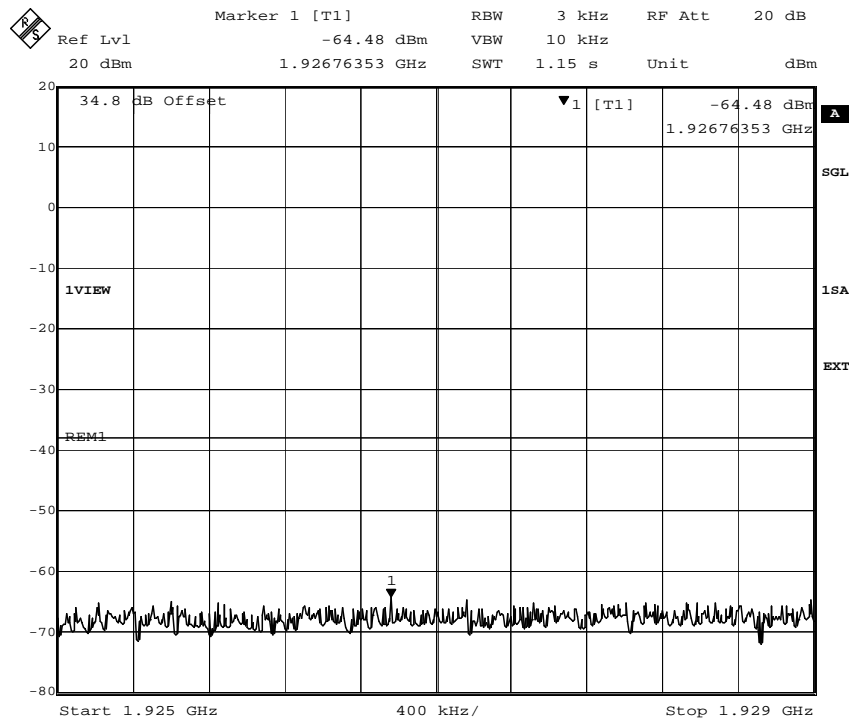
**Fig. 52 – Spurious emissions in the frequency range 2 MHz – 1925 MHz (GMSK modulation).**



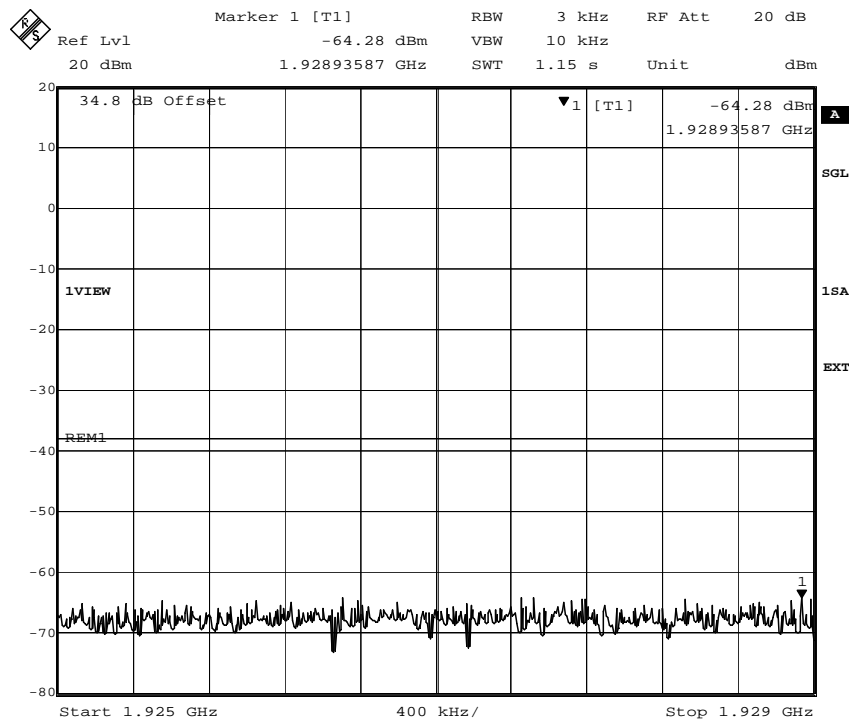
**Fig. 53 – Spurious emissions in the frequency range 2 MHz – 1925 MHz (8PSK modulation).**

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1989.8 MHz)**



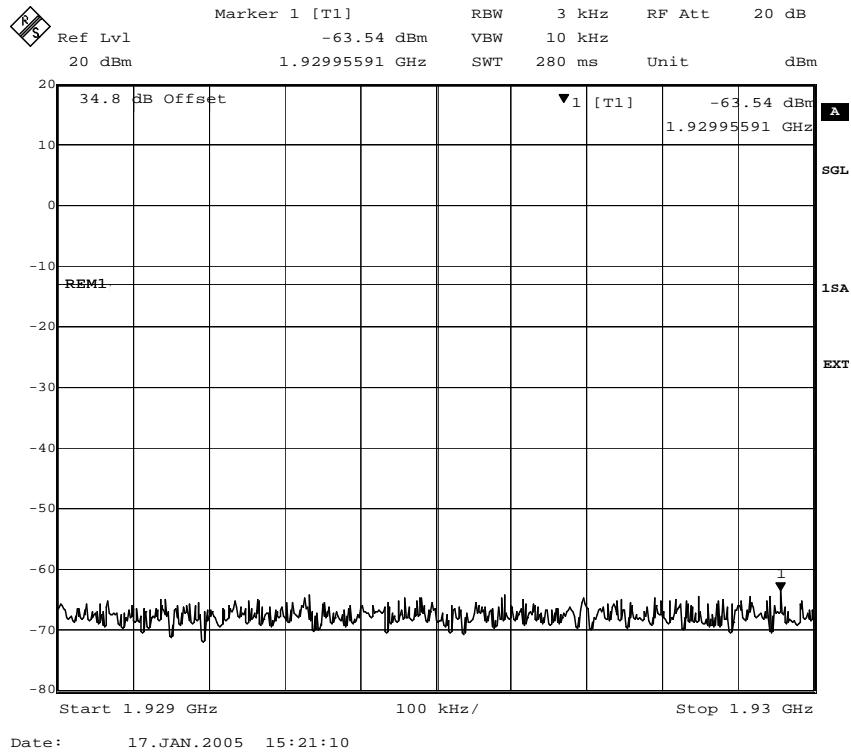
**Fig. 54 – Spurious emissions in the frequency range 1925 MHz – 1929 MHz (GMSK modulation).  
Limit: -13dBm–25.2dB–38.2dBm**



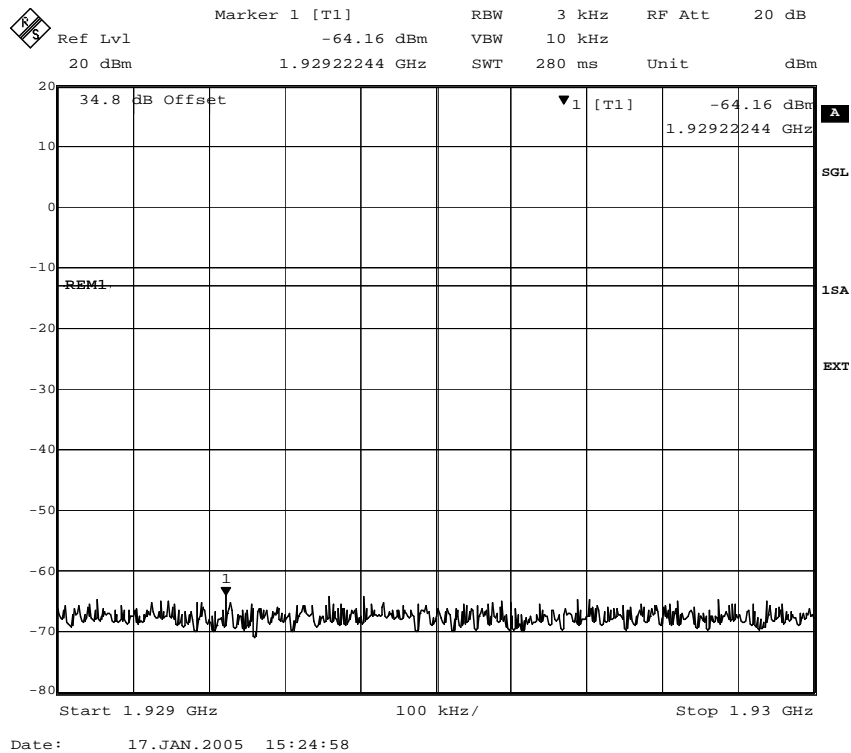
**Fig. 55 – Spurious emissions in the frequency range 1925 MHz – 1929 MHz (8PSK modulation).  
Limit: -13dBm–25.2dB–38.2dBm**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1989.8 MHz)**



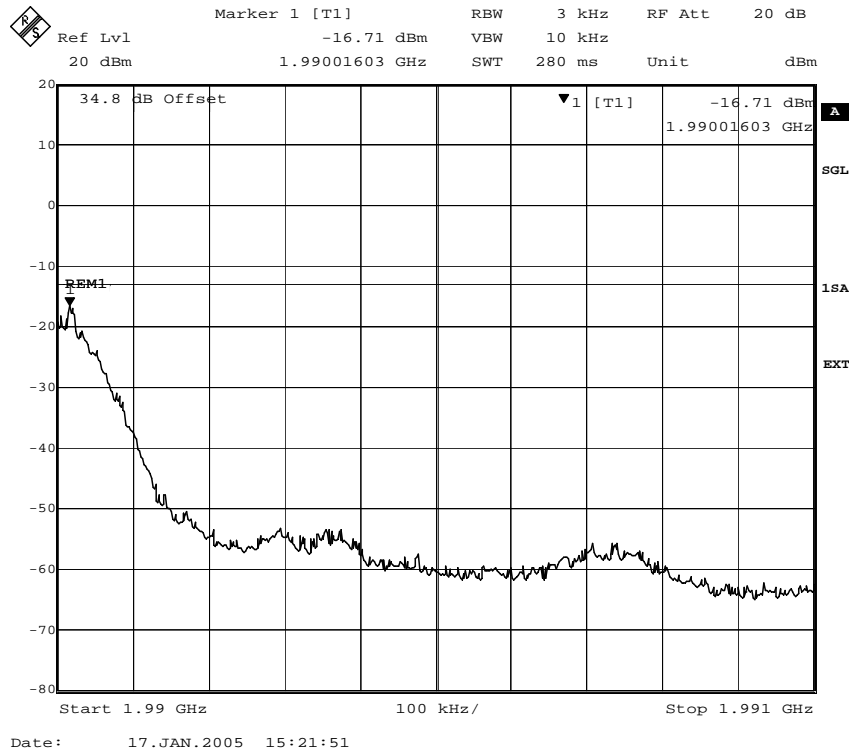
**Fig. 56 – Spurious emissions in the frequency range 1929 MHz – 1930 MHz (GMSK modulation).**



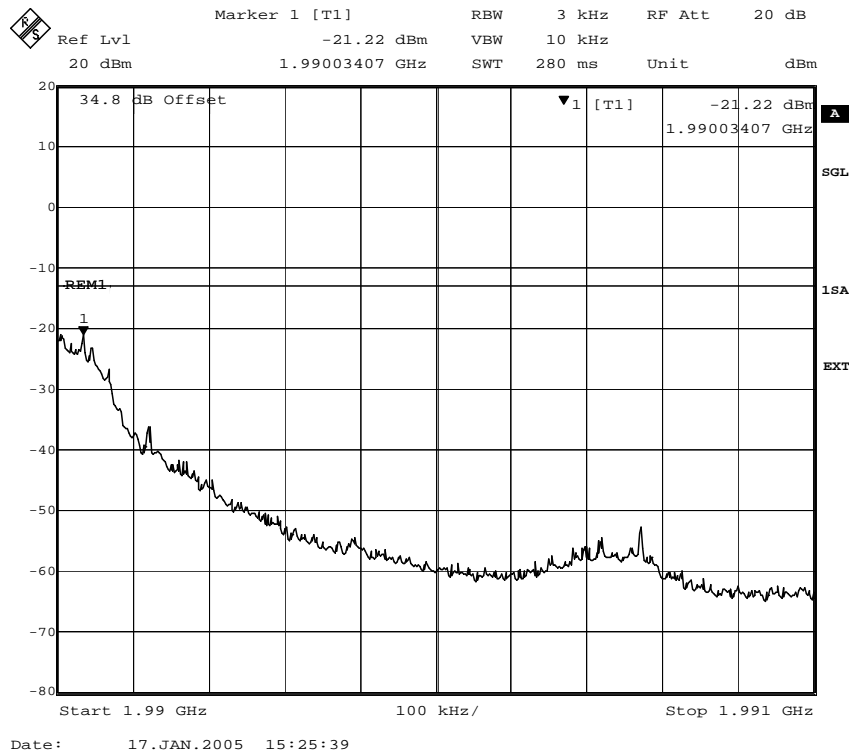
**Fig. 57 – Spurious emissions in the frequency range 1929 MHz – 1930 MHz (8PSK modulation).**

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1989.8 MHz)**



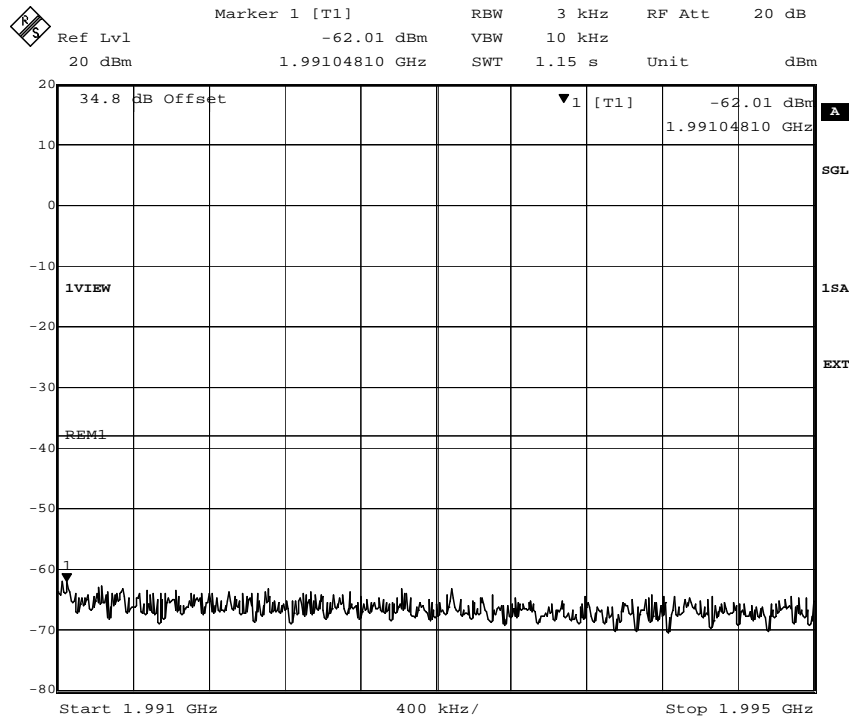
**Fig. 58 – Spurious emissions in the frequency range 1990 MHz – 1991 MHz (GMSK modulation).**



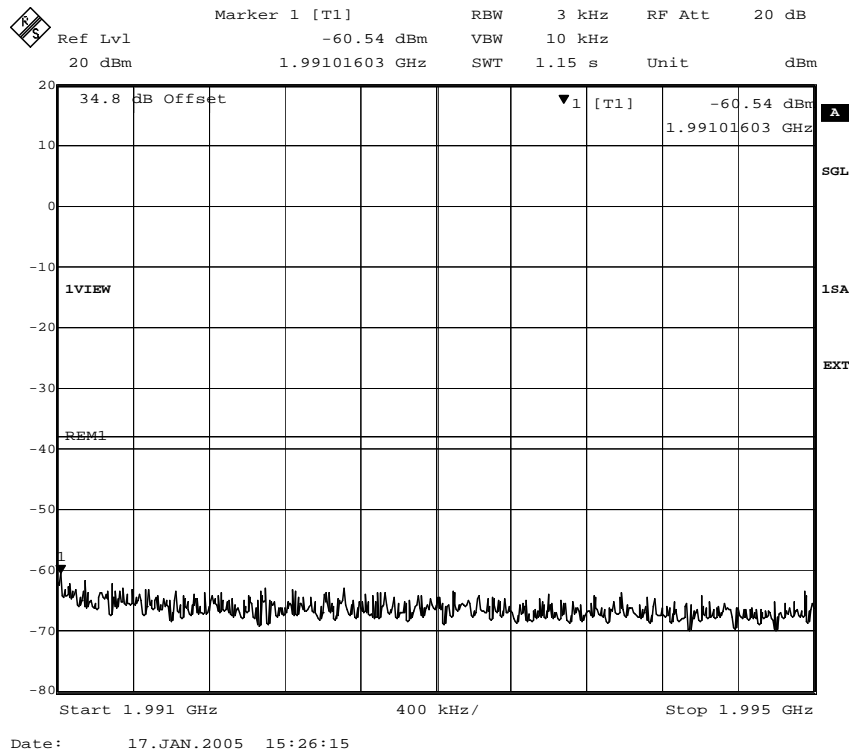
**Fig. 59 – Spurious emissions in the frequency range 1990 MHz – 1991 MHz (8PSK modulation).**

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1989.8 MHz)**



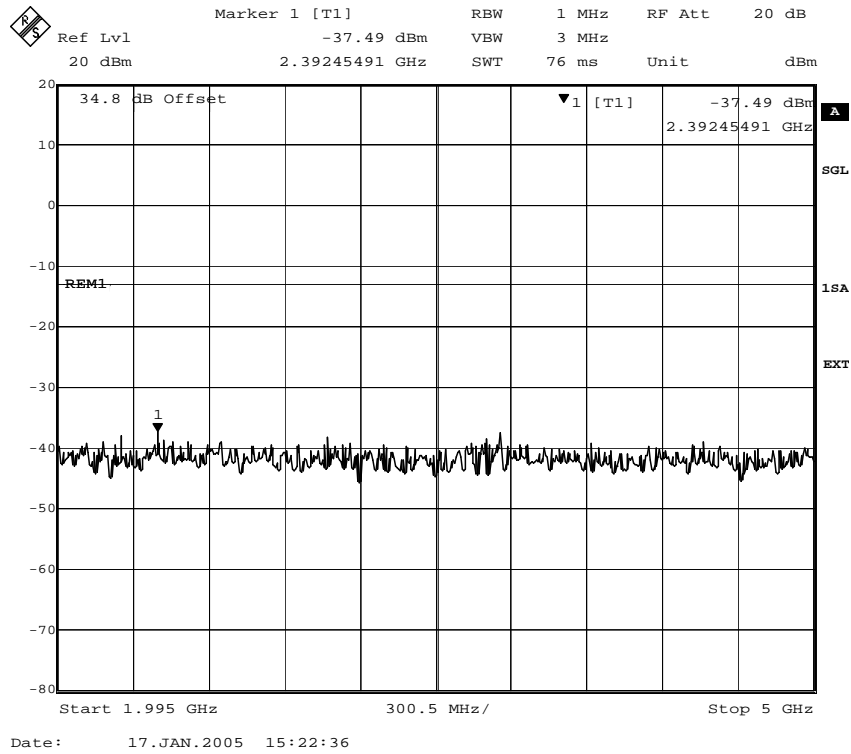
**Fig. 60 – Spurious emissions in the frequency range 1991 MHz – 1995 MHz (GMSK modulation).  
Limit: -13dBm-25.2dB=-38.2dBm**



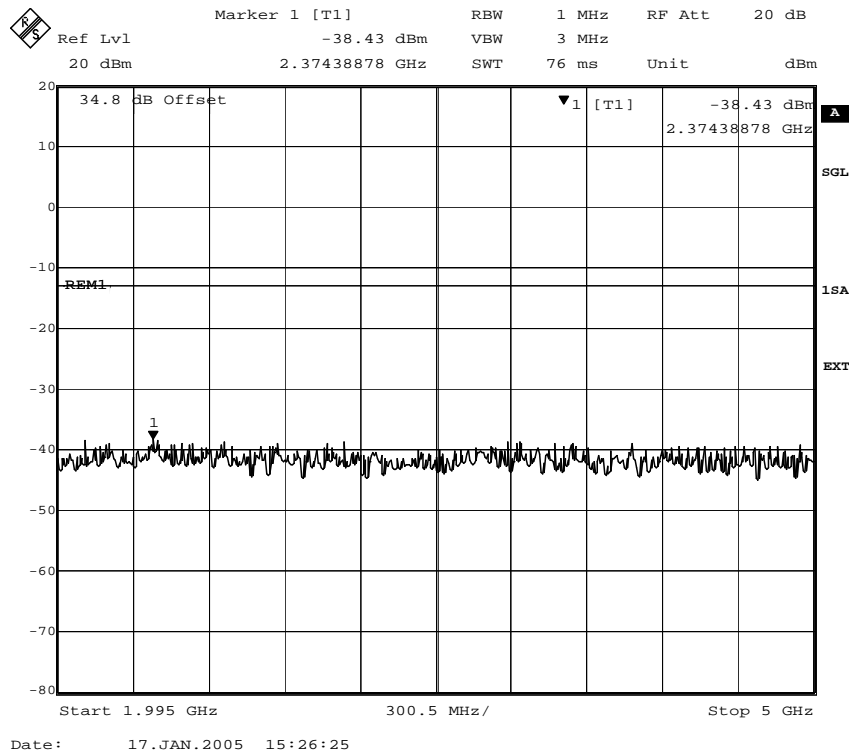
**Fig. 61 – Spurious emissions in the frequency range 1991 MHz – 1995 MHz (8PSK modulation).  
Limit: -13dBm-25.2dB=-38.2dBm**

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1989.8 MHz)**



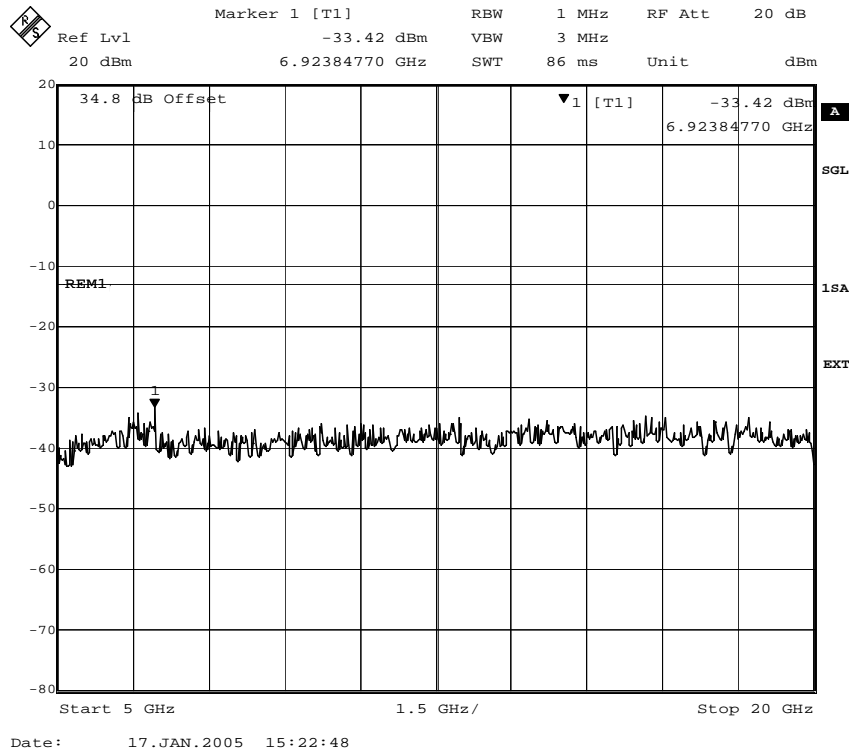
**Fig. 62 – Spurious emissions in the frequency range 1995 MHz – 5000 MHz (GMSK modulation).**



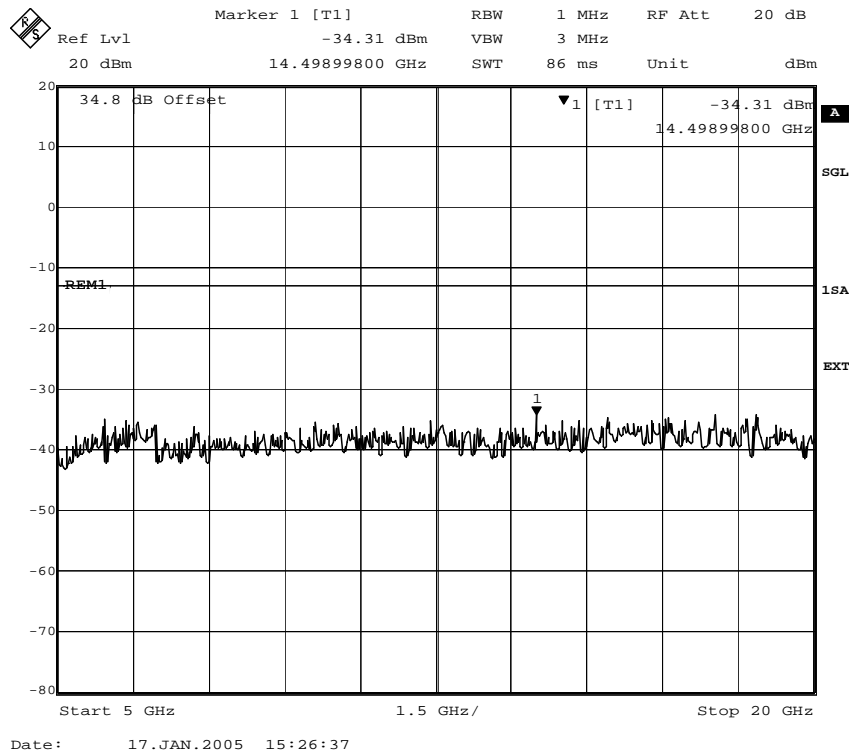
**Fig. 63 – Spurious emissions in the frequency range 1995 MHz – 5000 MHz (8PSK modulation).**

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

**Test No. 4: Spurious Emissions at the Antenna Terminals  
(Carrier Test Frequency = 1989.8 MHz)**



**Fig. 64 – Spurious emissions in the frequency range 5000 MHz–20000 MHz (GMSK modulation).**

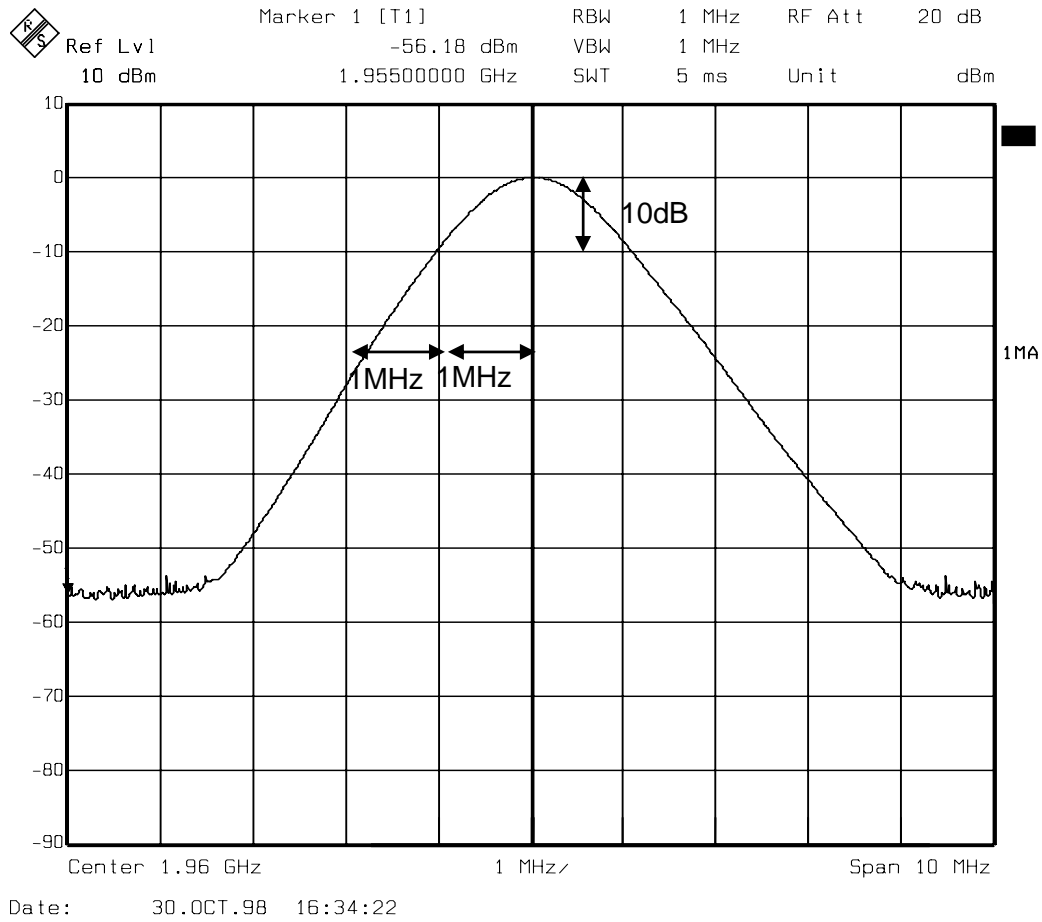


**Fig. 65 – Spurious emissions in the frequency range 5000 MHz–20000 MHz (8PSK modulation).**

**Note:** The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

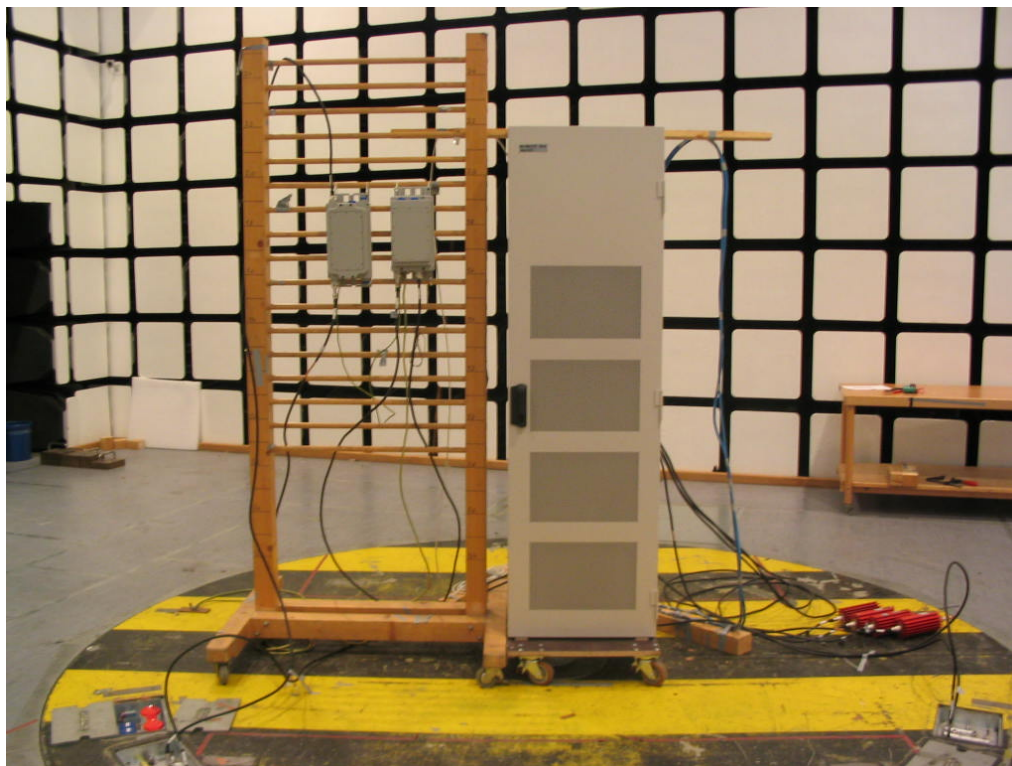


**Test No. 4: Spurious Emissions at the Antenna Terminals:  
Filter Characteristic of the FSIQ26 Spectrum Analyzer's Resolution Filter**



**Fig. 66 – Filter characteristic of the 1 MHz resolution filter.**

**3.2.5 Test No. 5: Field Strength of Spurious Radiation**

**Test No. 5: Field Strength of Spurious Radiation**

**Fig. 67 – Photograph of the anechoic chamber with the EUT.**



**Fig. 68 – Photograph of the anechoic chamber with the test configuration for substitution method.**

Test No. 5: Field strength of spurious radiation

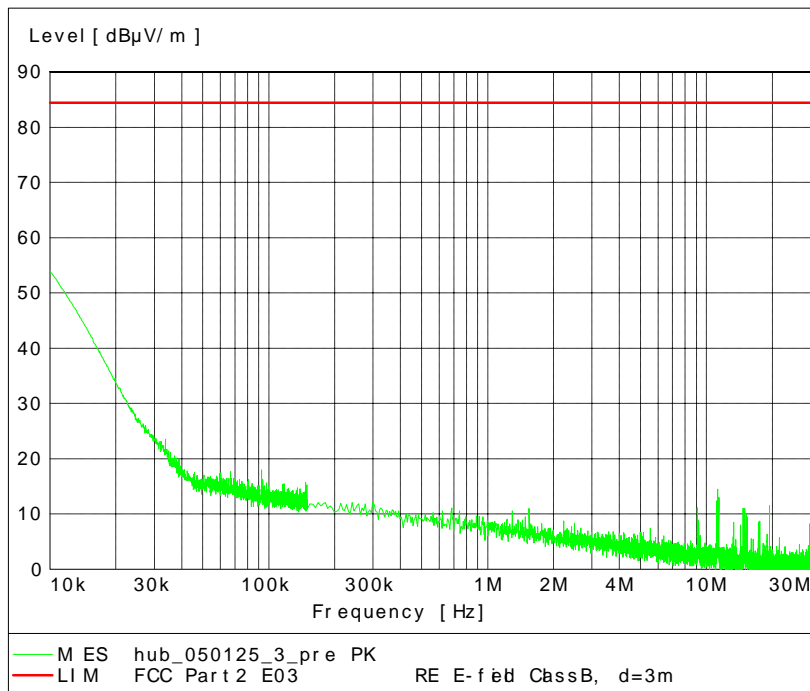


Fig. 69 – Radiated Emission 10 kHz – 30 MHz, GMSK modulation.

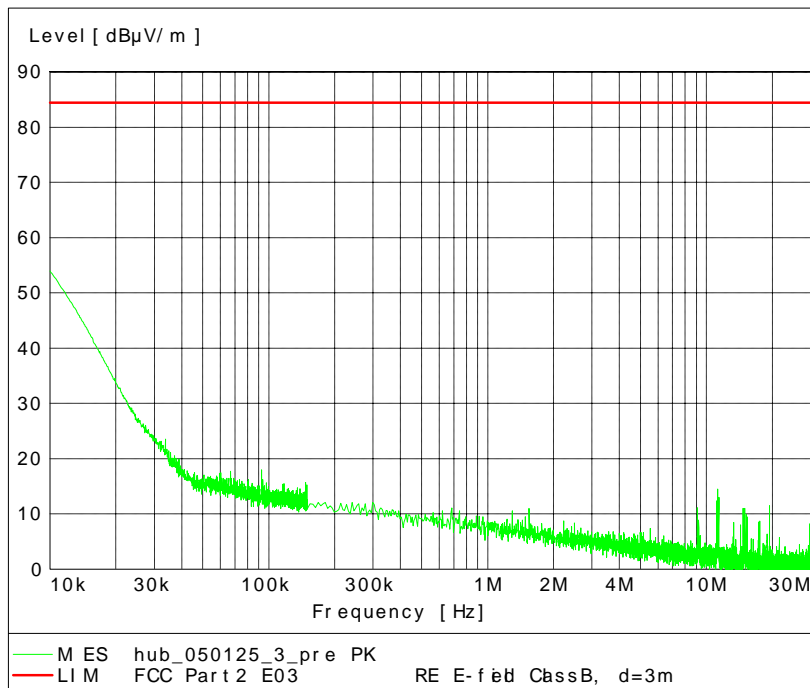
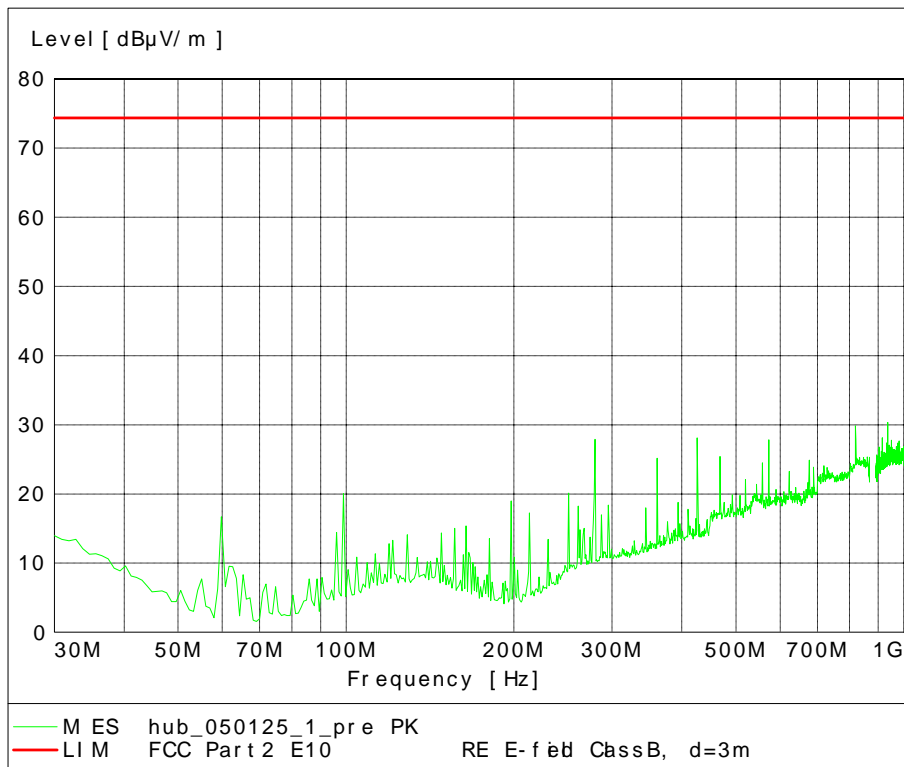


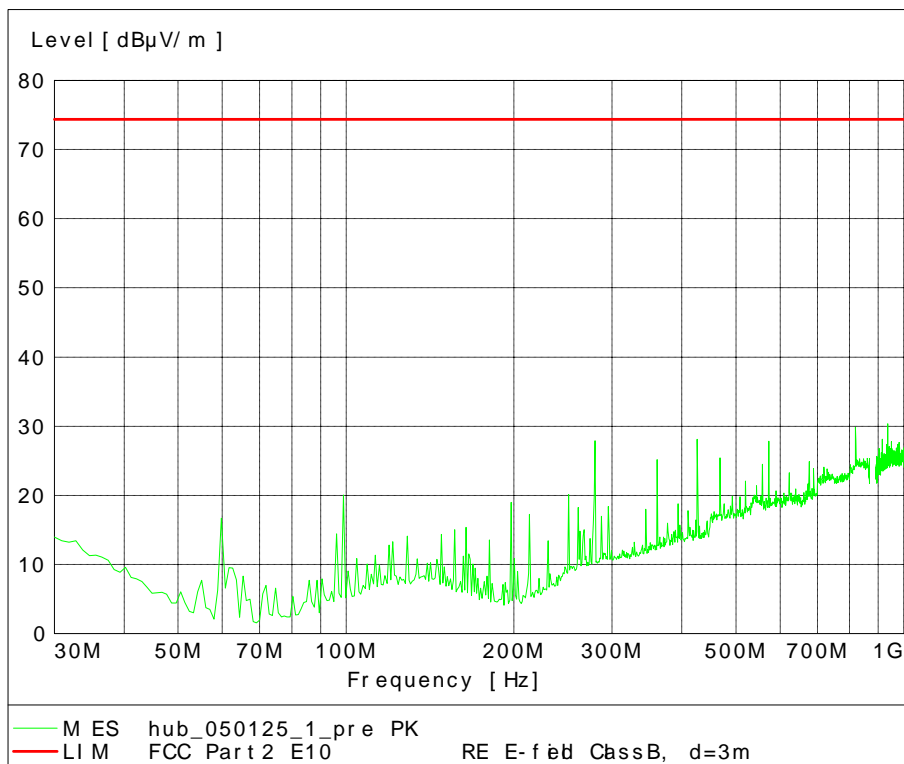
Fig. 70 – Radiated Emission 10 kHz – 30 MHz, 8PSK modulation.

Note: The frequencies shown on the plot were used for the spurious emission measurements using the "dipole substitution method".

**Test No. 5: Field strength of spurious radiation**



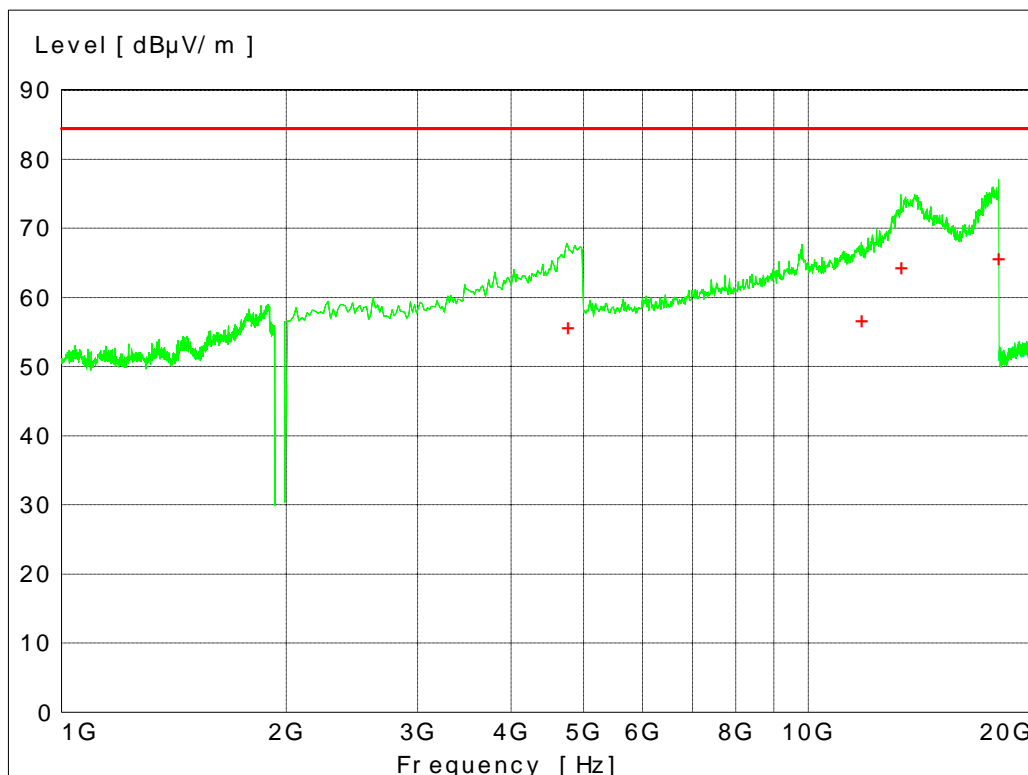
**Fig. 71 – Radiated Emission 30 MHz – 1 GHz, GMSK modulation.**



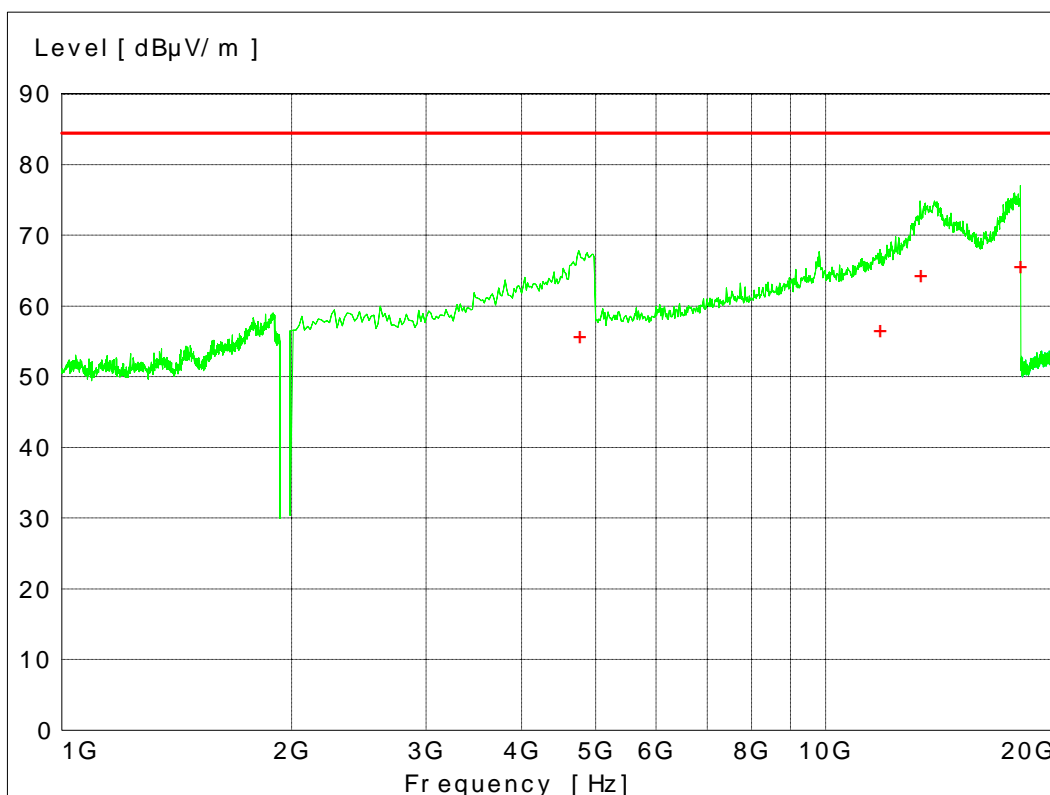
**Fig. 72 – Radiated Emission 30 MHz – 1 GHz, 8PSK modulation.**

Note: The frequencies shown on the plot were used for the spurious emission measurements using the "dipole substitution method".

**Test No. 5: Field strength of spurious radiation**



**Fig. 73 – Radiated Emission 1 GHz – 20 GHz, GMSK modulation.**

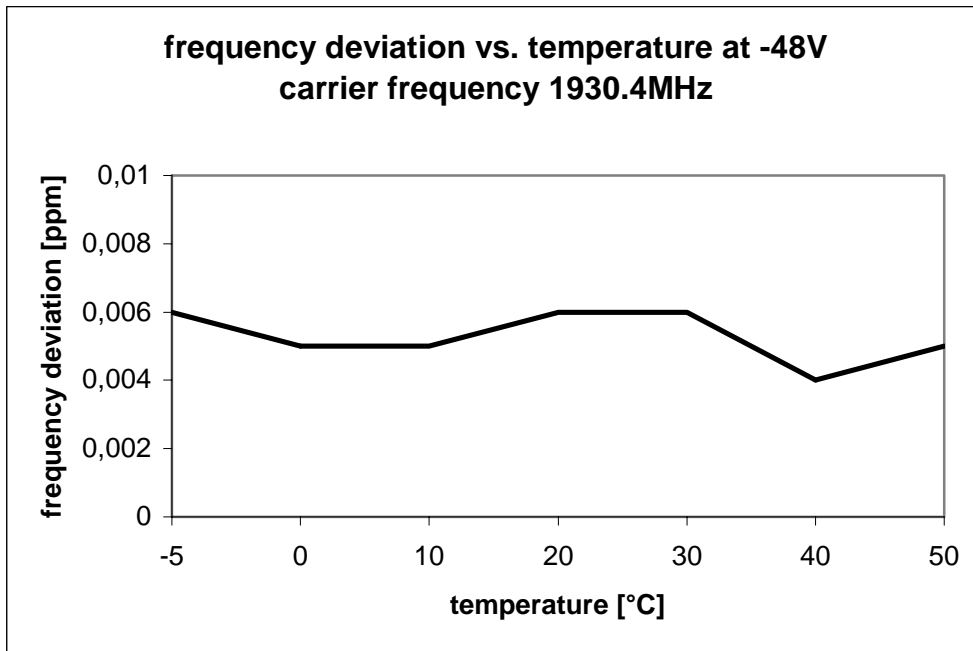


**Fig. 74 – Radiated Emission 1 GHz – 20 GHz, 8PSK modulation.**

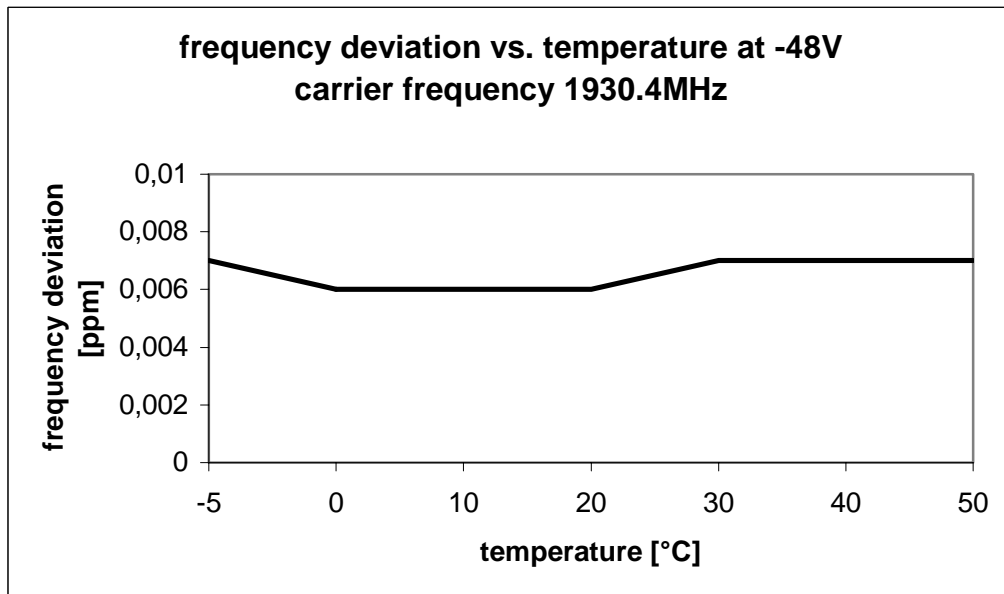
Note: The frequencies shown on the plot were used for the spurious emission measurements using the "dipole substitution method".

**3.2.6 Test No. 6: Frequency Stability**

**Test No. 6: Frequency Stability**



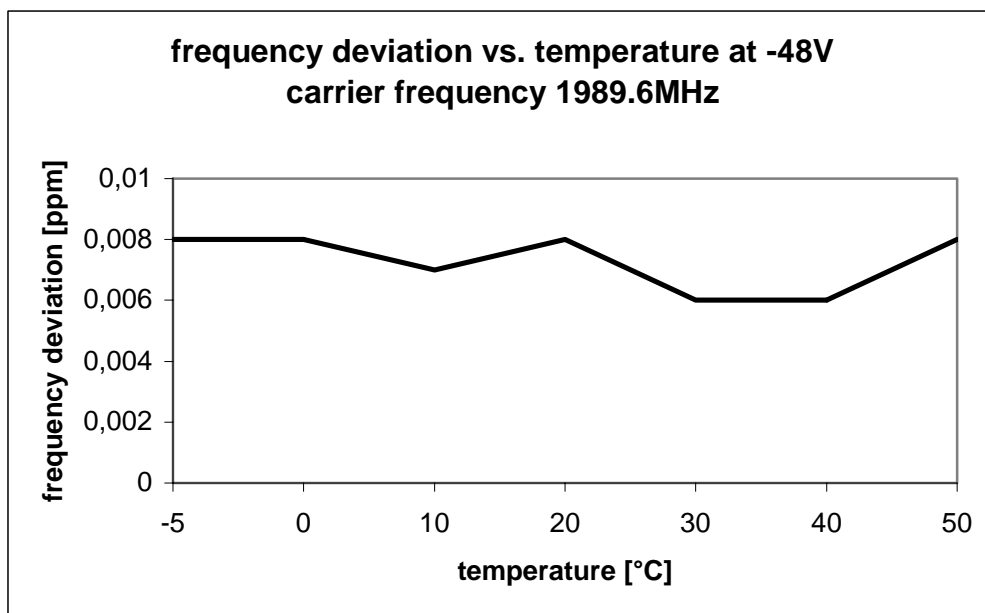
**Fig. 75 – Frequency deviation vs. temperature (48V, 1930.4 MHz, GMSK modulation)**



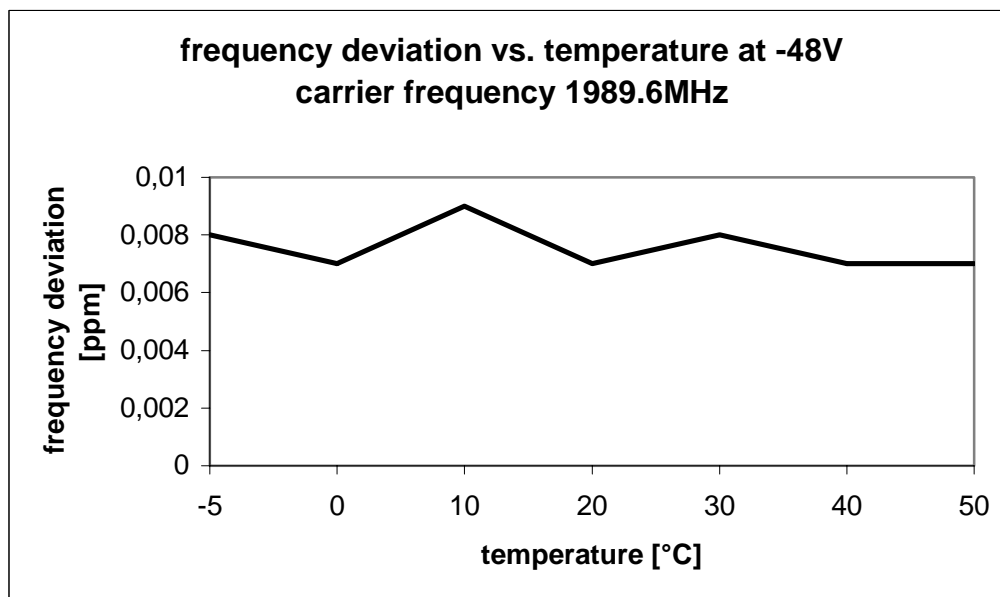
**Fig. 76 – Frequency deviation vs. temperature (48V, 1930.4 MHz, 8PSK modulation)**



**Test No. 6: Frequency Stability**



**Fig. 77 – Frequency deviation vs. temperature (48V, 1989.6 MHz, GMSK modulation)**



**Fig. 78 – Frequency deviation vs. temperature (48V, 1989.6 MHz, 8PSK modulation)**

**3.2.7 Test No. 7: Slow Frequency Hopping**

Test No. 7: Slow Frequency Hopping

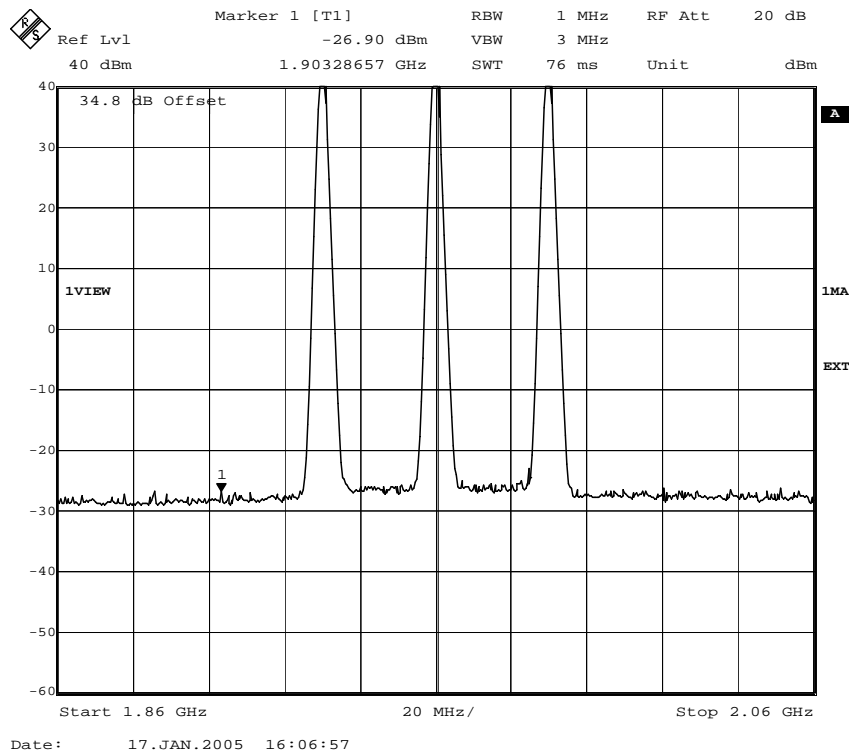


Fig. 79 – Slow frequency hopping – RBW = 1 MHz (GMSK modulation)

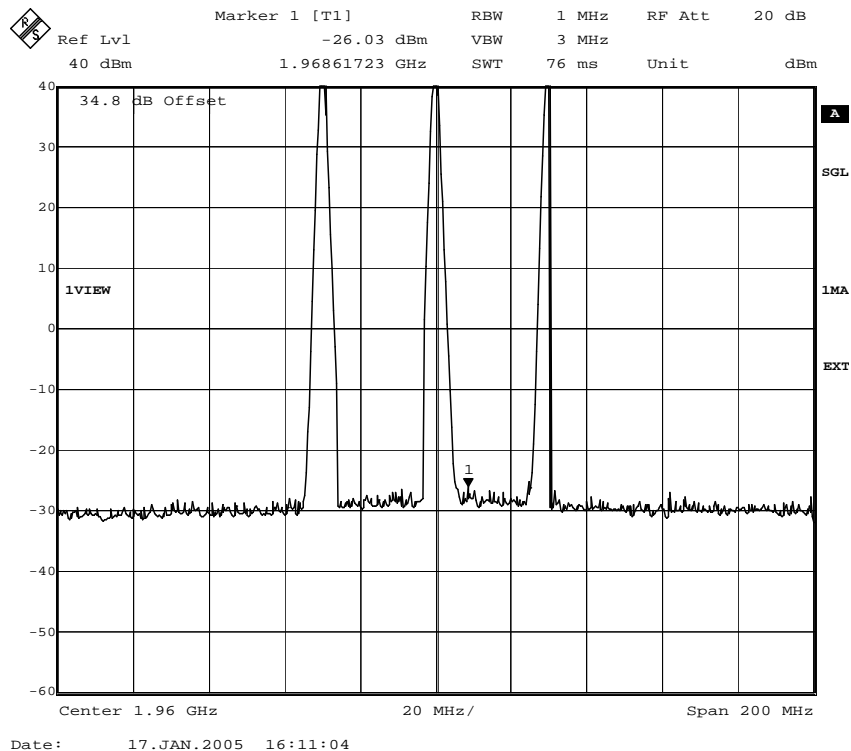


Fig. 80 – Slow frequency hopping – RBW = 1 MHz (8PSK modulation)

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

Test No. 7: Slow Frequency Hopping

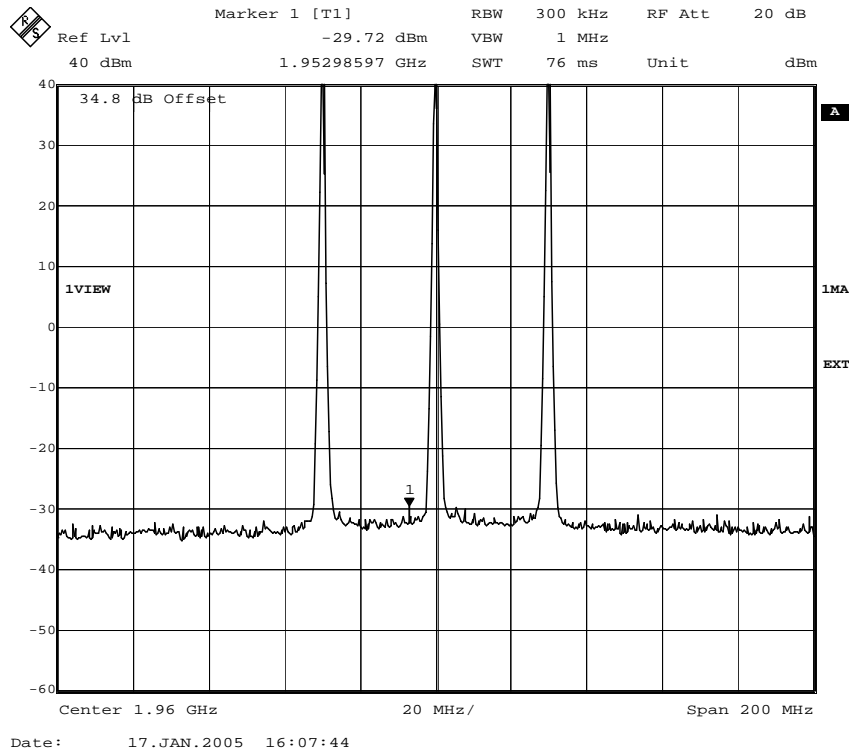


Fig. 81 – Slow frequency hopping – RBW = 300 kHz (GMSK modulation)

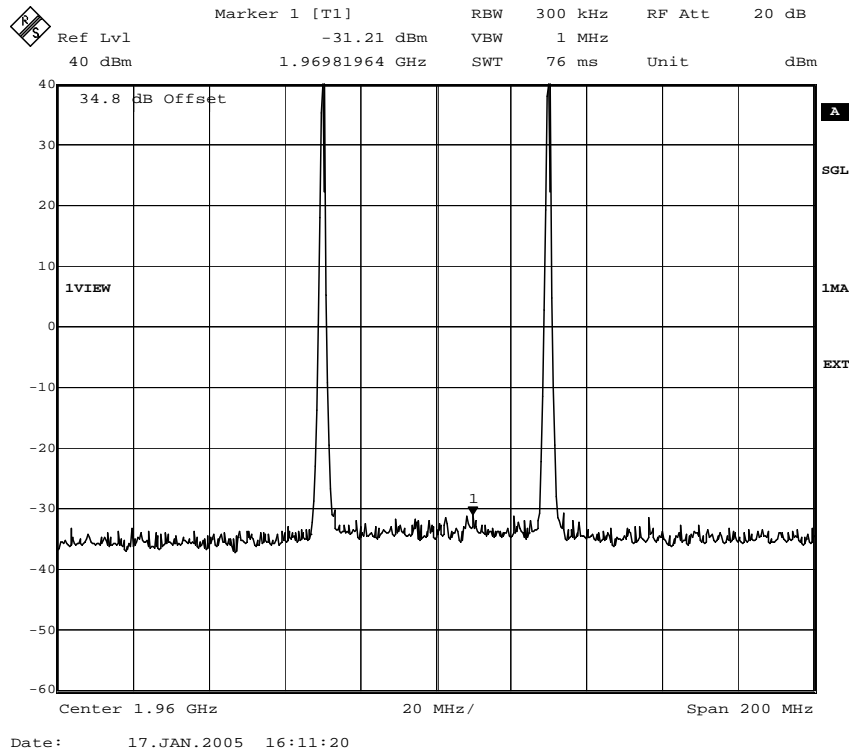


Fig. 82 – Slow frequency hopping – RBW = 300 kHz (8PSK modulation)

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.

Test No. 7: Slow Frequency Hopping

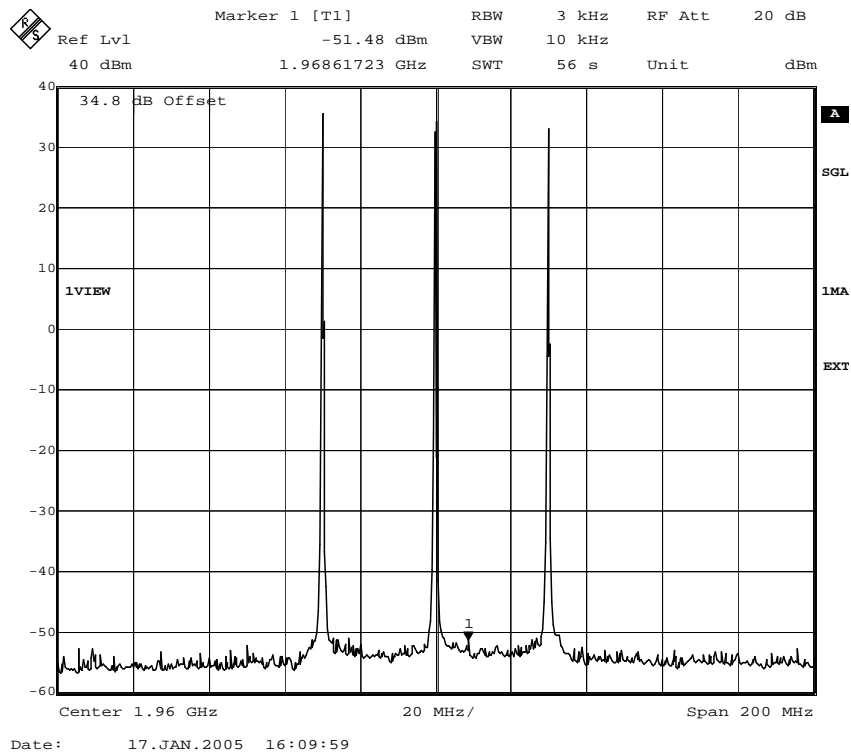


Fig. 83 – Slow frequency hopping – RBW = 3 kHz (GMSK modulation)

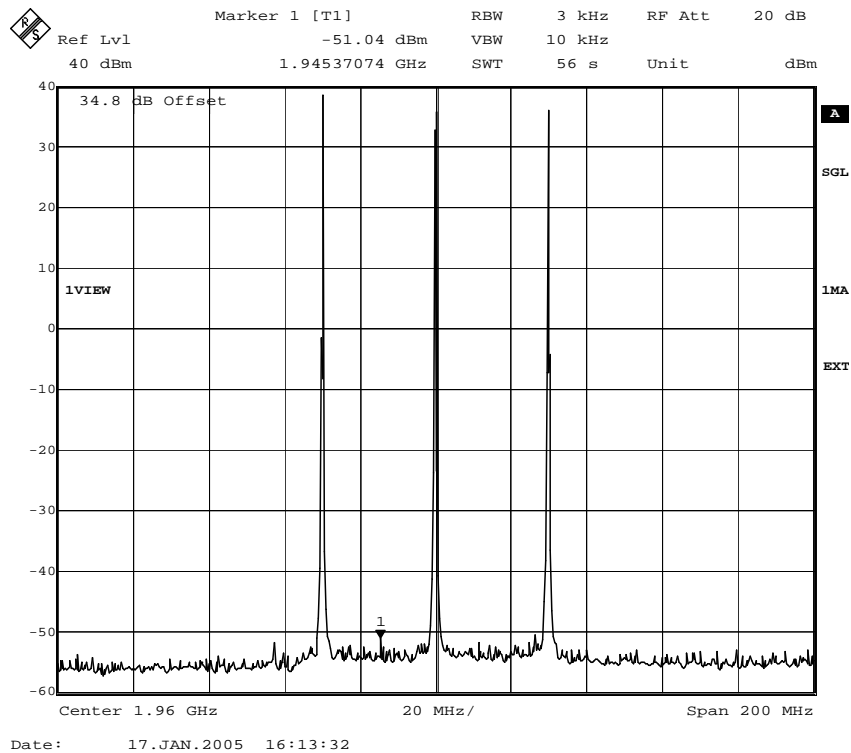


Fig. 84 – Slow frequency hopping – RBW = 3 kHz (8PSK modulation)

Note: The external attenuation of 34.8 dB is included in the spectral plot. This accounts for the external attenuation and the cable loss during the testing.