TEST REPORT

In support of the Application for Grant of Equipment Authorisation of the
BENQ W10 1900MHz Module
FCC ID: JVP56W10A

Report Number RO611122 Issue 3 January 2004

TÜV PRODUCT SERVICE

BABT

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Equipment:	Wireless LAN PC Card
FCC ID:	JVP56W10A
Report Number:	RO611122 Issue 3 Issue 3 has been produced to amend the FCC ID.
Specification:	47 CFR 2 & 47 CFR 24
Applicant:	BENQ Corporation 157 Shan-Ying Road Gueishan Taoyuan 333, Taiwan, ROC
Manufacturer:	As above
Manufacturer's Representative:	Mr James Soong
Approved by:	**M JENKINS** Wireless Group Leader
Dated:	5th January 2004
Start of Test:	1st July 2003
Completion of Test:	10th July 2003
Report Distribution:	BENQ Copy No. 1 BABT Copy No. 2 Copy No:

ENGINEERING STATEMENT

I ATTEST: the measurements shown in this report were made in accordance with the procedures indicated, and that the emissions from this equipment were found to be within the applicable limits. I assume full responsibility for the accuracy and completeness of these measurements. On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 2, Part 15 and Part 24 of the FCC Rules under normal use and maintenance.

Simon Bennett
Test Manager

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For copyright details see Page 93 of 93.

Introduction

The information contained within this report is intended to show verification of compliance of the BENQ 1900MHz WLAN PC Card to the requirements of 47 CFR 2 and 47 CFR 24.

The BENQ 1900MHz WLAN PC Card operates from a 5 V DC power supply and is Power Class 1, operating with a maximum output power of 1 watt.

Location Of Testing

All testing was conducted at the premises of BABT, Segensworth Road, Fareham, Hants, PO15 5RH. Testing at BABT was carried out by BABT Personnel, S Bennett and A Guy, Test Engineers. Radiated Emissions measurements were performed in a 3 metre semi-anechoic screened room. A complete room description is on file with the FCC Laboratory Division, Registration Number: 90987.

Test Equipment and Ancillaries Used For Test

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due
1	Thermohygrograph	1-1000	Rotronic	182615	2/10/03
2	Digital Multimeter	8050A	Fluke	494008	29/4/04
3	Power Supply	6253A	Hewlett Packard	2412A065579	T/U
4	Universal Radio Communications Analyser	CMU200	Rohde & Schwarz	833810/015	17/6/04
5	Spectrum Analyser	FSEM	Rohde & Schwarz	827285/006	
6	Attenuator	6810.17.B	Huber and Suhner	5929	10/7/03
7	Combiner	1506A	Weinschel	AC4911	T/U
8	Signal Generator	ESG4000A	Hewlett Packard	GB37040125	21/1/04
9	Signal Generator	8673B	Hewlett Packard	2823A01302	14/6/03
10	High Pass Filter	F-100-4000-5-R	RLC	0012	T/U
11	Climatic Chamber	VM 04/100	Heraeus Votsch	BLD8	T/U
12	Digital Thermometer	51	Fluke	73860035	24/2/04
13	Thermohygrograph	1-1000	Rotronic	1826 14	7/4/04
14	EMI Receiver	8542E	Hewlett Packard	3617A00165_00154	12/11/03
15	Bilog Antenna	CBL 6143	Chase	-	11/4/04
16	Turntable & Controller	HD 020	HD Gmbh	050/396	-
17	Antenna Mast	2070	EMCO	-	-
18	Antenna Mast Controller	2090	EMCO	-	-
19	Screened Room 5	EAC54300	Siemens	-	18/09/99
20	Low Noise Amplifier (1-8GHz)	AMF-3D-001080-18-13P	Miteq	UNK	-
21	Low Noise Amplifier (8-18GHz)	AMF-4E-080180-15-10P	Miteq	492562	-
22	Spectrum Analyser	ESIB40	Rhode & Schwarz	100142/240	4/2/04

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due
23	Horn	3115	EMCO	96964848	04/07/04
24	Horn	3115	EMCO	97015079	04/07/04
25	Signal Generator	8672A	Hewlett Packard	2016a01097	26/02/04
26	Amp 8-180 GHz	AWT18036	Avanteck	F13365 8452	26/6/04
27	Antenna	AM180HA-K-TU2	Link Microtek Ltd	2007	15/8/04
28	Test Equipment	CMU200	Rohde & Schwarz	833810/015	17/6/04
29	Amp (18-26GHz)	AMT 26177-33	Aventeck	-	-

Note(s)

1) All items are calibrated annually, except where labelled T/U (Tracebility Unscheduled). These items are calibrated within the test configurations using calibrated equipment.

2) Throughout the test report the test equipment used for each test is referenced using the number indicated in the table above.

Description of Equipment Under Test Configuration

The equipment under test is made up of the following component parts.

Module	Vendor	Kit Number	IMEI Number
GSM 1900	BENQ	W10	55453486575840/0

TABLE 1

List of Performed Measurements using the configuration in Table 1

i) Power Output
ii) Modulation Characteristics
iii) Occupied Bandwidth
iv) Band Edge Measurements
v) Frequency Stability – Temperature Variations
vi) Frequency Stability – Voltage Variations

Module	Vendor	Kit Number	IMEI Number
GSM 1900	BENQ	W10	55453486575840/1

TABLE 2

List of Performed Measurements using the configuration in Table 2

i) Radiated Emissions
vi) Conducted Emissions

Test Case	:	Radiated Emissions
Test Date	:	4th July 2003
Rule Parts	:	24.238

Measurement Method

A preliminary profile of the Radiated Electric Field Emissions was obtained by operating the Equipment Under Test (EUT) on a remotely controlled turntable within a semi-anechoic chamber; measurements were taken at a 3m distance. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, a search was made in the frequency range 30MHz to 20GHz. The list of worst case emissions was then confirmed or updated. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth. Emissions levels were then formally measured. The details of the worst case emissions were then recorded in the Job Log Book. Details of the worst case emissions are presented on page 7.

Radiated Electric Field Emissions measurements were made using a Hewlett Packard 8542E EMI Receiver in the frequency range 30MHz to 1000MHz and an Agilent E4407B Spectrum Analyser in the frequency range 1GHz to 20GHz. Measurements in the range 30MHz to 1000MHz were made using a Peak Detector in a 120kHz bandwidth and measurements above 1GHz were made using a Peak Detector in a 1MHz bandwidth.

Limit Calculation

In order to determine the Radiated Emission Limits, measurements of transmitter power (P) were first carried out on the top, middle and bottom channels as shown on page 10.

The limit for spurious emissions in accordance with FCC 47CFR 24.238(a) is 43 + 10Log(P) down on the carrier where P is the power in Watts.

Field Strength at 1850.2MHz = 120.9 dBµV/m
EIRP at 1850.2MHz = 0.269W

Therefore the limit is 120.9 – (43 + 10log(0.269)) = 120.9 – 37.3 = 83.6 dBµV/m

Field Strength at 1880.0MHz = 121.9dBµV/m
EIRP at 1880.0MHz = 0.324W

Therefore the limit is 121.9 – (43 + 10log(0.324)) = 121.9 – 38.1 = 83.8 dBµV/m

Field Strength at 1909.8MHz = 120.6 dBµV/m
EIRP at 1909.8MHz = 0.309W

Therefore the limit is 120.6 – (43 + 10log(0.309)) = 120.6 – 37.9 = 82.7 dBµV/m

Test Case : Radiated Emissions (continued)

Test Date : 4th July 2003

Rule Parts : 24.238

Alternative Open Area Site Results : The levels of the six highest emissions measured in accordance with the specification are presented below :-

Frequency	Pol	Hgt	Azm	Level at 3m	Cable Loss	Antenna Factor	F.S at 3m	Spec Limit
MHz	H/V	cm	deg	dBµV	dB	dB	dBµV/m	dBµV/m
9.549	V	137	074	58.0	-28.0	38.3	68.3	82.7
11.100	H	149	225	60.4	-28.2	38.7	70.9	83.6
11..279	V	155	240	57.9	-28.2	38.9	68.6	83.8
12.951	H	145	237	57.8	-28.2	40.6	70.2	83.6
13.159	V	140	279	59.5	-28.3	40.6	71.8	83.8
13.369	V	131	247	61.3	-28.6	40.5	73.2	82.7

The margin between the specification requirements and all other emissions was 15.2dB or more below the specification limit.

ABBREVIATIONS FOR ABOVE TABLE

ERP Effective Radiated Power
H Horizontal Polarisation V Vertical Polarisation

Procedure Test Performed in accordance with ANSI C63.4.

Test Equipment Used:
14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29
……

Test Case : RF Output Power (Conducted)

Test Date : 1st July 2003

Rule Parts : 2.1046, 24.232

Measurement Method

Using a spectrum analyser and attenuator(s), the output power of the EUT was measured at the antenna terminals. The EUT supports both GSM and GPRS. The device is a class 10 module. The carrier was modulated by it's normal GMSK modulation and measurements performed with TS3 active.

The spectrum analyser RBW and VBW were set to 1MHz and the path loss measured and entered as a reference level offset.

Results

Maximum Power - GSM

Frequency (MHz)	Output Power (dBm)	Path Loss (dB)	Result (dBm)	Result (W)
1850.2	8.51	21.0	29.51	0.893
1880.0	8.94	20.4	29.34	0.859
1909.8	8.84	20.7	29.54	0.899

Minimum Power- GSM

Frequency (MHz)	Output Power (dBm)	Path Loss (dB)	Result (dBm)	Result (mW)
1850.2	-20.0	21.0	1.00	1.259
1880.0	-19.57	20.4	0.83	1.211
1909.8	-19.88	20.7	0.82	1.208

Limit	<2W or <+33dBm

Remarks

EUT complies with CFR 47 2.1046 and 24.232(b). The EUT does not exceed 2W or +33dBm at the measured frequencies.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case : RF Output Power (Conducted) - continued

Test Date : 1st July 2003

Rule Parts : 2.1046, 24.232

Maximum Power - GPRS

Frequency (MHz)	Output Power (dBm)	Path Loss (dB)	Result (dBm)	Result (W)
1850.2	8.66	21.0	29.66	0.925
1880.0	9.01	20.4	29.41	0.873
1909.8	8.91	20.7	29.61	0.914

Minimum Power- GPRS

Frequency (MHz)	Output Power (dBm)	Path Loss (dB)	Result (dBm)	Result (mW)
1850.2	-20.22	21.0	0.78	1.197
1880.0	-19.82	20.4	0.58	1.143
1909.8	-20.48	20.7	0.22	1.052

Limit	<2W or <+33dBm

Remarks

EUT complies with CFR 47 2.1046 and 24.232(b). The EUT does not exceed 2W or +33dBm at the measured frequencies.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case : RF Output Power (Radiated)

Test Date : 4th July 2003

Rule Parts : 2.1046, 24.232

Measurement Method

Test Performed in accordance with ANSI C63.4.

The Spectrum Analyser was tuned to the test frequency. The device was put into Transmit mode then rotated through 360 degrees until the highest power level was observed in both horizontal and vertical polarisation. The device was then replaced with a substitution antenna, who's input signal the antenna was adjusted until the received level matched that of the previously detected emission.

Results

The EUT met the requirements of FCC CFR 47: Part 24, Section 24.232(b) for Effective Radiated Power.

Frequency (MHz)	Raw Result (dBm)	Substitution Level(dBm)	Substitution Antenna Gain (dB)	Cable Loss (dB)	Result EIRP (dBm)	Result EIRP (W)
1850.2	-17.5	+21.0	7.3	4.0	+24.3	0.269
1880.0	-16.7	+21.5	7.5	3.9	+25.1	0.324
1909.8	-17.8	+21.0	7.7	3.8	+24.9	0.309

Limit	<2W or <+33dBm

Test Equipment Used:
16, 17, 18, 19, 20, 22, 23, 24, 25, 28
……

Test Case: Modulation Characteristics

Test Date: 14th May 2003

Rule Parts: 2.1047(d)

Description Of Modulation Technique

The system is designed to meet the PCS requirements as defined in the 3GPP specifications: 3GPP TS 05:01, TS 05:02 and TS 05:04 are the most relevant. To summarise the system uses time division multiplexed access (TDMA) to separate eight users on a channel and frequency multiplexing for the up and down links.

There are 299 channels on a 200kHz raster. The frequency band 1930~1990MHz is allocated to the downlink and 1850~1910MHz to the uplink. The duplex frequency is 80MHz and the up and down link is offset in time by three TDMA slots.

The bit rate is 13MHz/48 (≈270.833kHz). There are 1250 bits in a frame that contains the eight slots; one of which is allocated to each user. Therefore each slot is 156.25 bits in length and lasts ≈577μs. To allow control information to be interleaved amongst the user data there is a larger data unit comprising 26 frames called a multiframe. The existence of the multiframe and the associated timing allows extra protection against data corruption by interleaving frames.

The modulation described by TS 05:04 is a differentially encoded scheme where the data are represented by phase shifts of ±π/2 over a bit period. The modulation scheme implemented is Gaussian filtered minimum shift keying (GMSK). Minimum shift keying is a special case of frequency shift keying (FSK) with a modulation index of h = 0.5. FSK is a binary modulation scheme with each of the two logical states represented by a different offset from the nominal carrier frequency.

From the well known equation

$$h = 2*Fp*Tb$$

where h is the modulation index, Fp is the peak frequency deviation and Tb is the bit period the peak frequency deviation is shown to be ≈±67.7kHz.

Minimum shift keying has a relatively wide frequency spectrum. To improve spectral efficiency Gaussian filtering is applied to modulation source resulting in a sinusoidal, rather than instantaneous, transition between the two offset frequencies determined by the modulation data and, therefore, a reduced signal bandwidth. The 3dB bandwidth of the Gaussian filter is 81.25kHz.

A complete description of the modulation and filtering is attached in the following annex.

Annex to Description of Modulation Characteristics

The differentially encoded modulating data values α_i ($\alpha_i \in \{-1,+1\}$) as represented by Dirac pulses excite a linear filter with impulse response at time t defined by:

$$g(t) = h(t) * rect\left(\frac{t}{T}\right)$$

where T is the bit period and the function *rect(x)* is defined by:

$$rect\left(\frac{t}{T}\right) = \frac{1}{T} \qquad for\ |t| < \frac{T}{2}$$

$$rect\left(\frac{t}{T}\right) = 0 \qquad otherwise$$

and * means convolution. *h(t)* is defined by:

$$h(t) = \frac{\exp\left(\frac{-t^2}{2\delta^2 T^2}\right)}{\sqrt{(2\pi)}\ .\ \delta T}$$

where $\delta = \frac{\sqrt{\ln(2)}}{2\pi BT} \qquad and\ BT = 0.3$

where B is the 3 dB bandwidth of the filter with impulse response *h(t)*.

The phase of the modulated signal is:

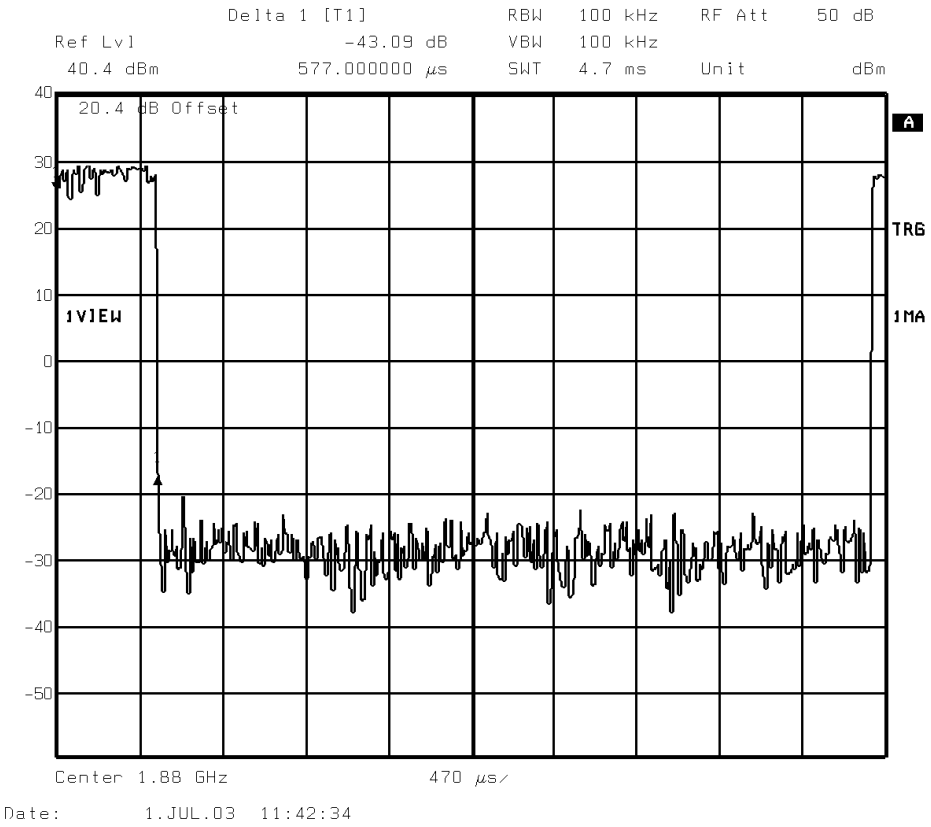
$$\varphi(t') = \sum_i \alpha_i \pi h \int_{-\infty}^{t'-iT} g(u)du$$

where the modulating index *h* is 1/2 (maximum phase change in radians is π/2 per data interval). The time reference *t' = 0* is the start of the slot.

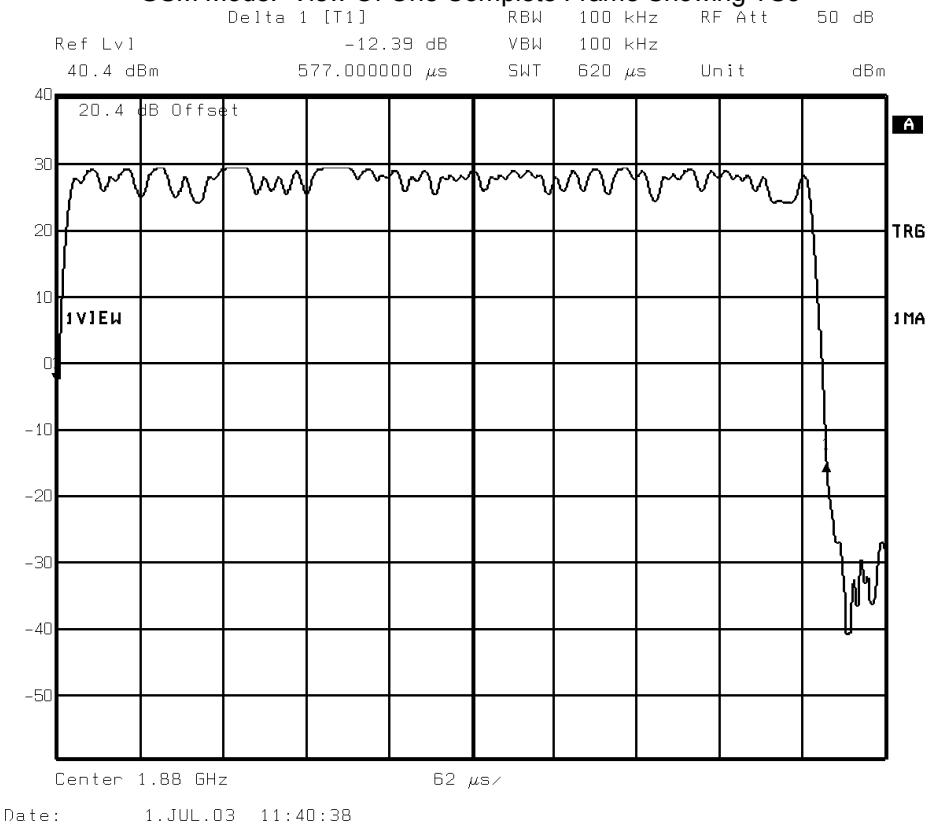
The modulated RF carrier is expressed as:

$$x(t') = \sqrt{\frac{2E_c}{T}}\ .\ \ \cos(2\pi f_0 t' + \varphi(t') + \varphi_0)$$

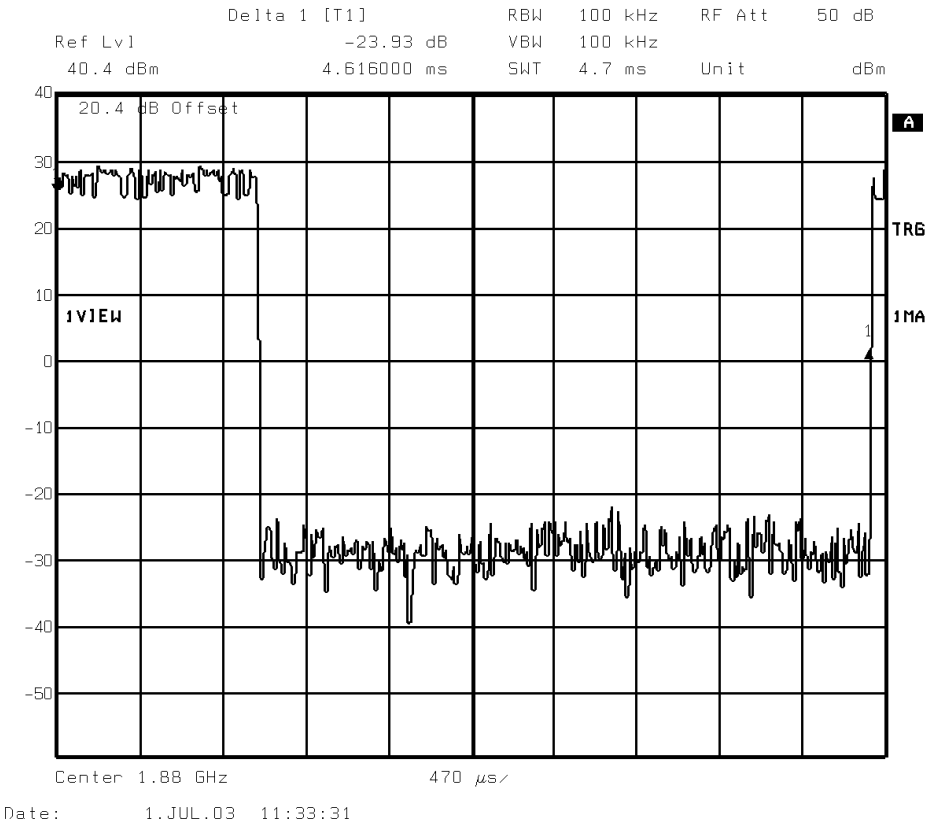
where E_c is the energy per modulating bit, f_0 is the centre frequency and φ_0 is a random phase and is constant during one burst



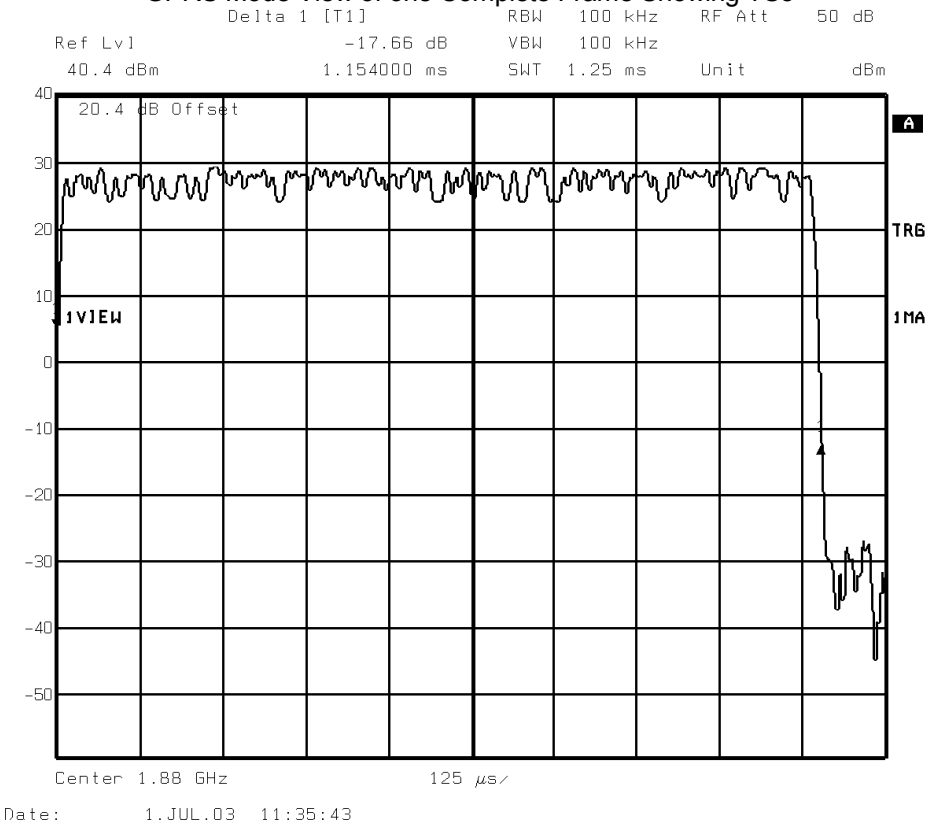
GSM Mode. View Of One Complete Frame Showing TS3



GSM Mode. View of TS3.



GPRS Mode View of one Complete Frame Showing TS3



GPRS Mode View of TS3

Test Case	:	Occupied Bandwidth
Test Date	:	1st July 2003
Rule Parts	:	2.1049, 24.238(b)

Measurement Method

GSM

The EUT was set to transmit on maximum power and measurements were made on Timeslot 3.

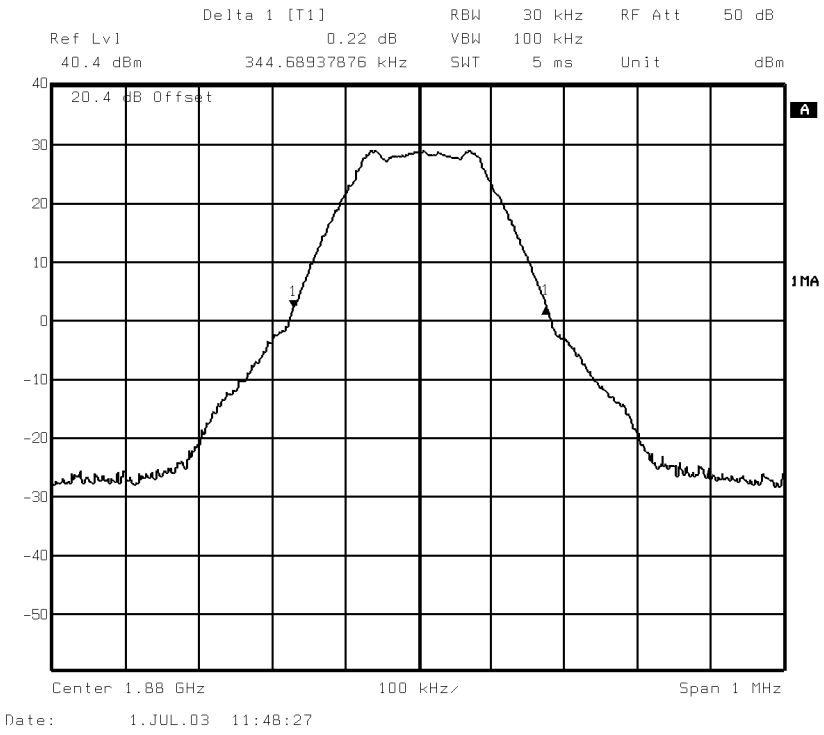
GPRS

The EUT was set to transmit on maximum power, (timeslots 3 and 4 active), and measurements were performed on Timeslot 3.

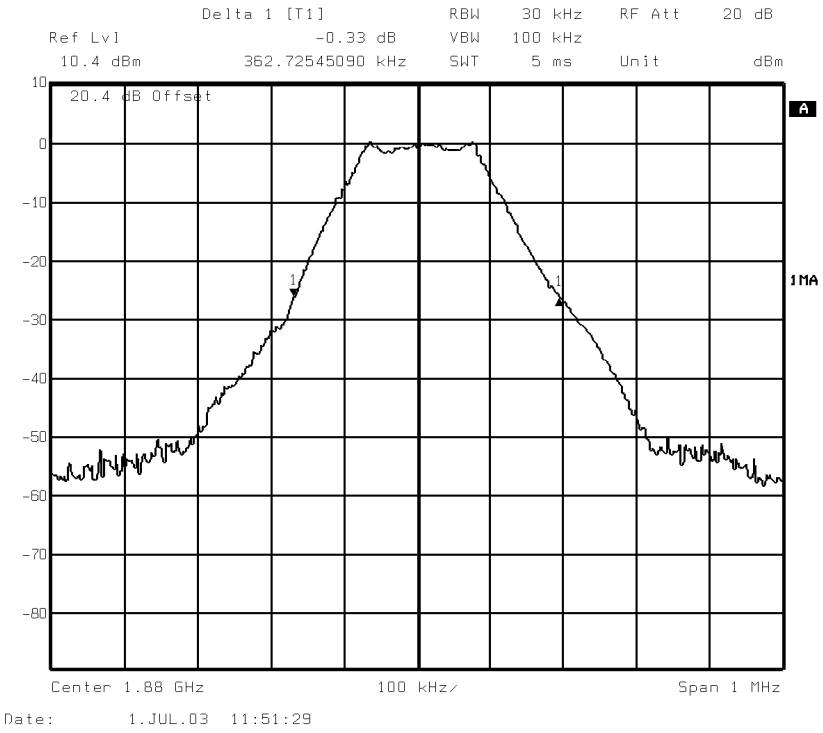
Using a resolution bandwidth of 30kHz and a video bandwidth of 100kHz, the –26dBc points were established and the emission bandwidth determined.

The plots below show the resultant display from the Spectrum Analyser.

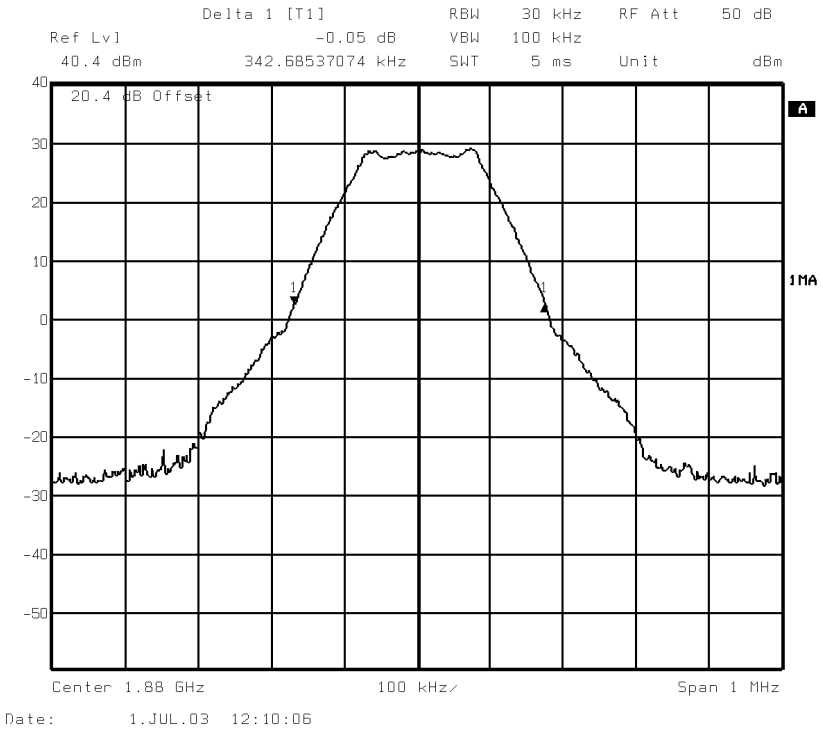
Occupied Bandwidth As Defined By The - 26dBc Points



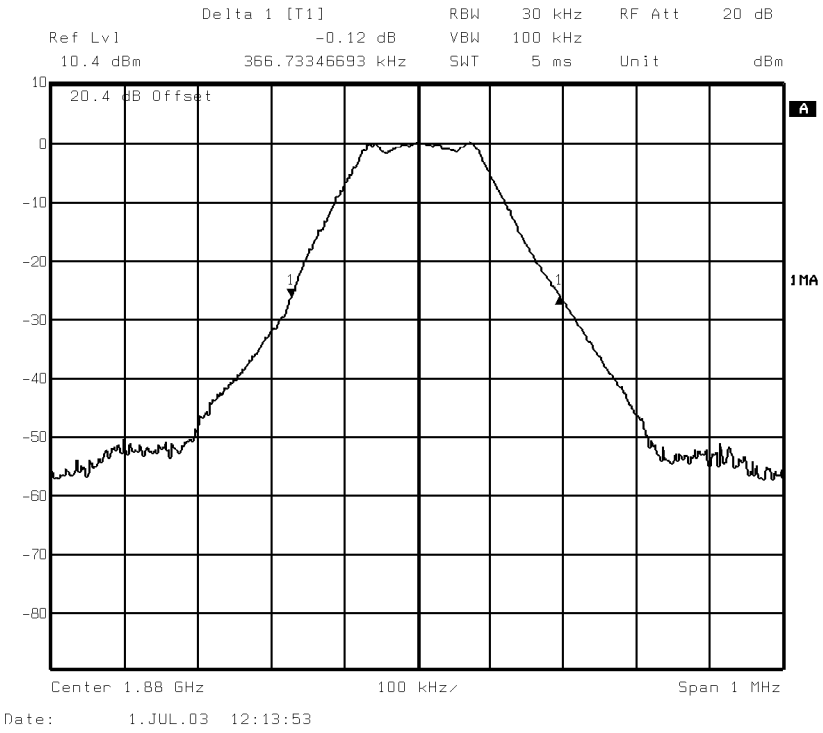
Maximum Power – Circuit Switched (GSM)



Minimum Power – Circuit Switched (GSM)



Maximum Power – Packet Data, (GPRS)



Minimum Power – Packet Data, (GPRS)

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case: Spurious Emissions At Antenna Terminals (+/-1MHz)

Test Date : 1st July 2003

Rule Parts : 2.1049, 24.238(b)

Measurement Method

In accordance with Part 24.238, at least 1% of the 26dB bandwidth was used for the resolution and video bandwidths up to 1MHz away from the Block Edge. At greater than 1MHz, the resolution and video bandwidths were increased to 1MHz.

The reference power and path losses of all channels used for testing in each frequency block were measured. It was found that there was <0.6dB variation in all channels, thus the worst case reference level offset was used throughout. Having entered the reference level offset, the limit line was displayed, showing the –13dBm, (43+10logP), limit.

The EUT was tested in GSM and GPRS modes of operation.

Below are the Frequency Blocks the EUT was tested against along with the tested channels.

Frequency Block (MHz)	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A	Channel : 513 Frequency : 1850.4 MHz	Channel : 584 Frequency : 1864.6 MHz
B	Channel : 613 Frequency : 1870.4 MHz	Channel : 684 Frequency : 1884.6 MHz
C	Channel : 738 Frequency : 1895.4 MHz	Channel : 809 Frequency : 1909.6 MHz
D	Channel : 588 Frequency : 1865.4 MHz	Channel : 609 Frequency : 1869.6 MHz
E	Channel : 688 Frequency : 1885.4 MHz	Channel : 709 Frequency : 1889.6 MHz
F	Channel : 713 Frequency : 1890.4 MHz	Channel : 734 Frequency : 1894.6 MHz

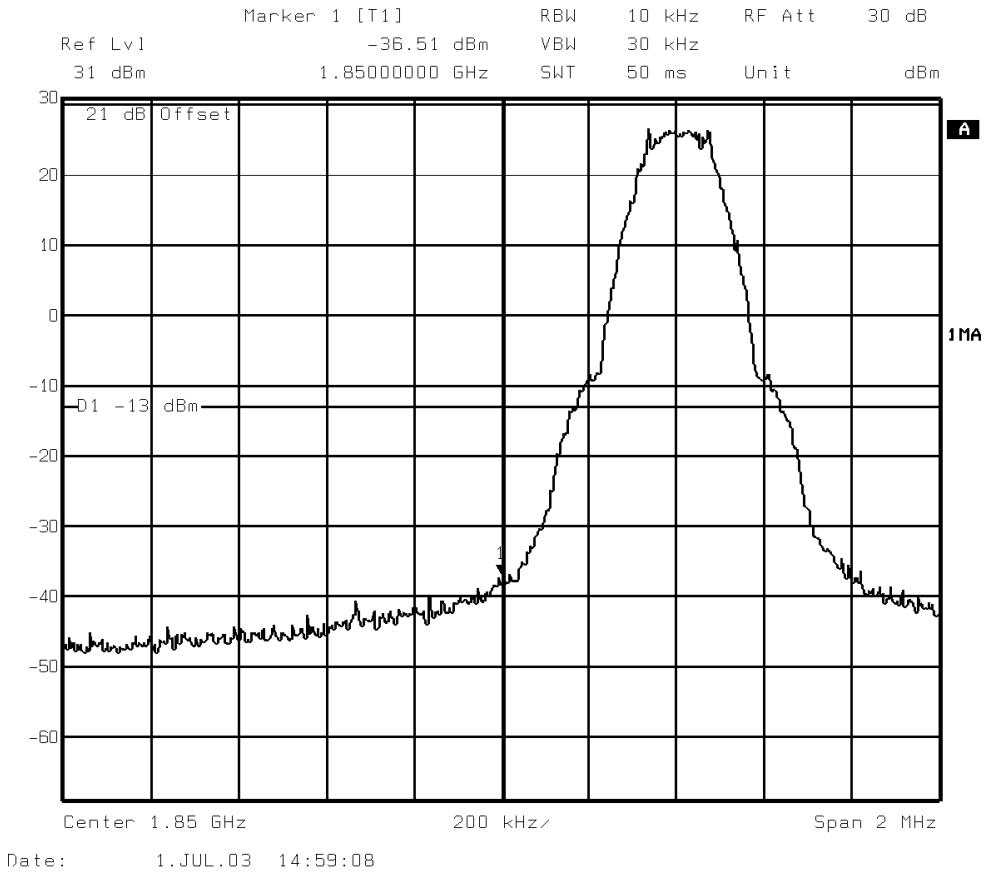
Remarks

The measurement plots are shown on the following pages.

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 513, (1850.4MHz)

Block A



GSM – Circuit Switched

Remarks

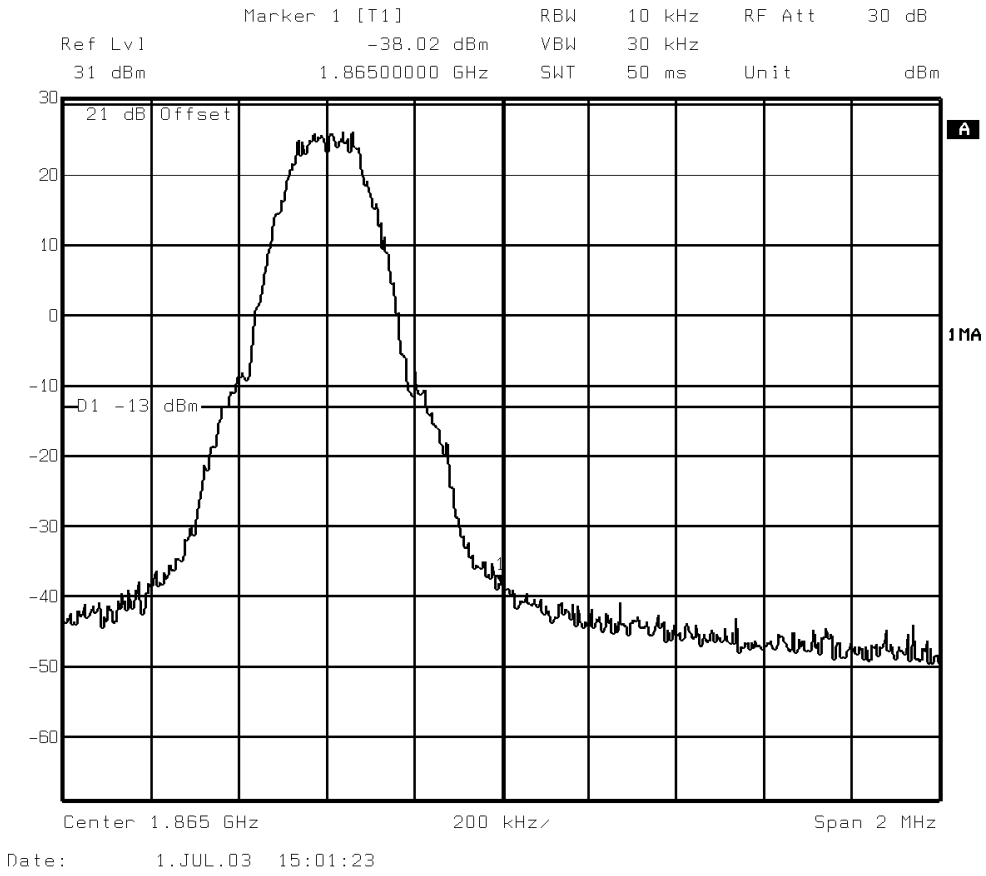
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……...

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 584, (1864.6MHz)

Block A



GSM – Circuit Switched

Remarks

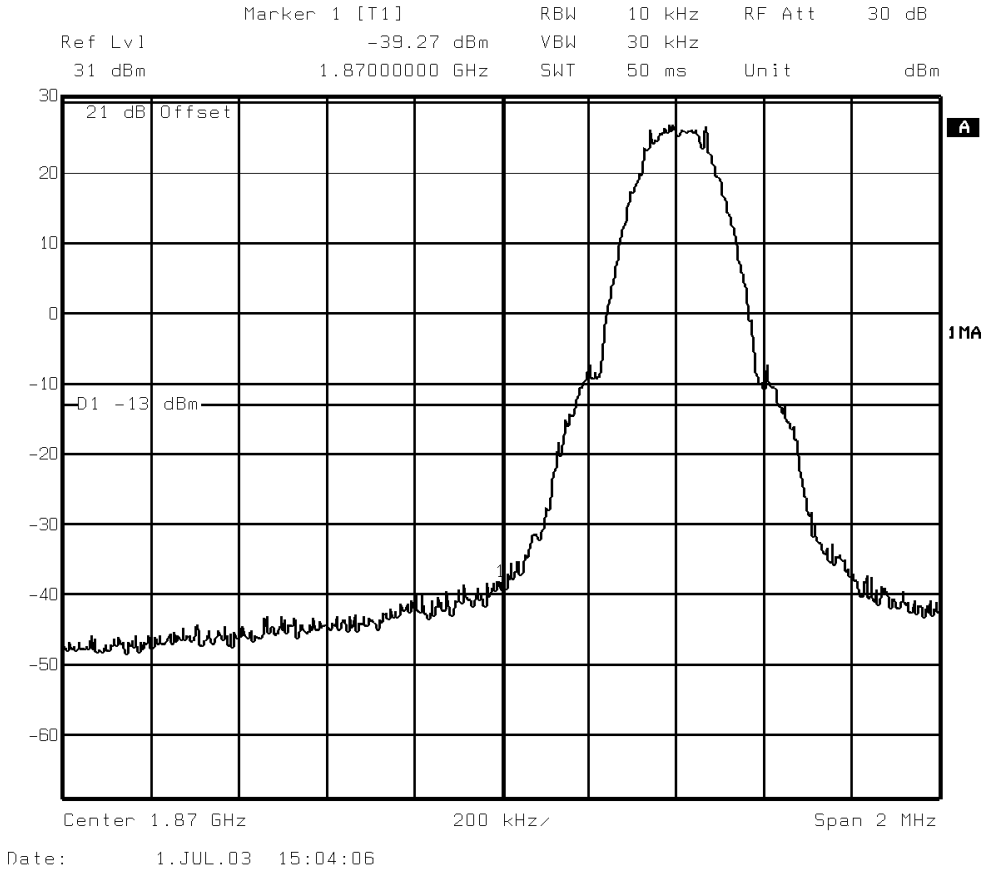
All emissions are below -13 dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 613, (1870.4MHz)

Block B



GSM – Circuit Switched

Remarks

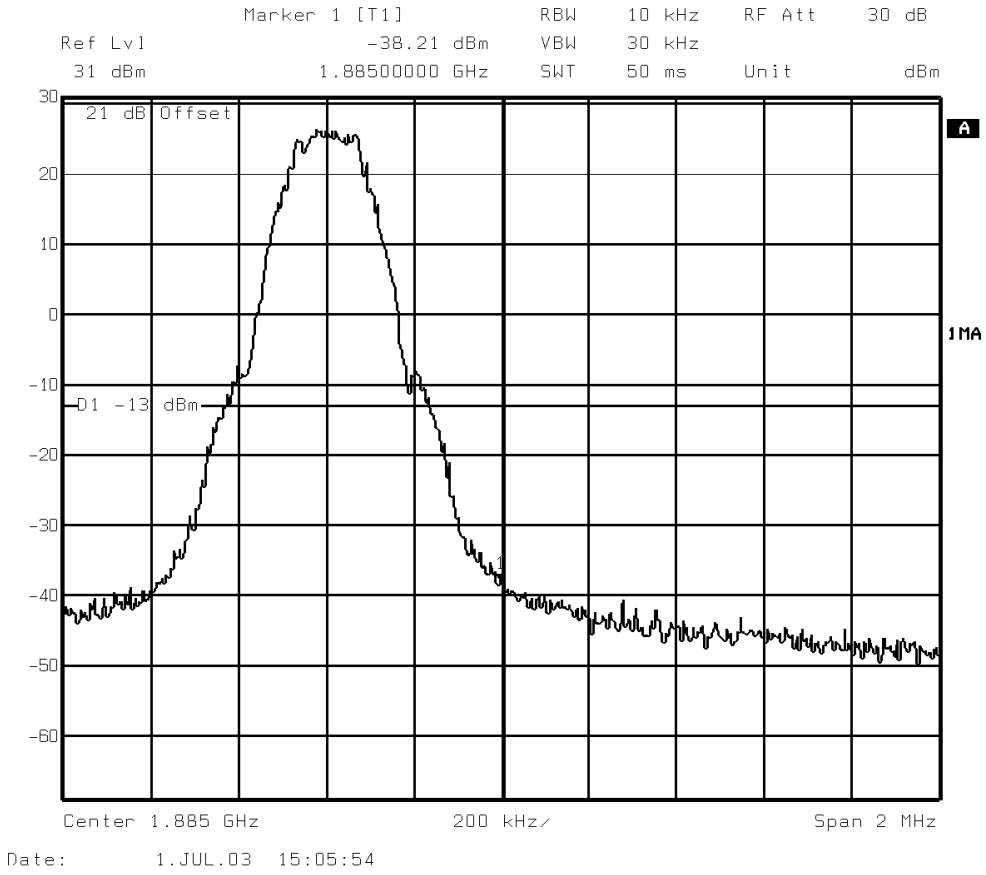
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 684, (1884.6MHz)

Block B



GSM – Circuit Switched

Remarks

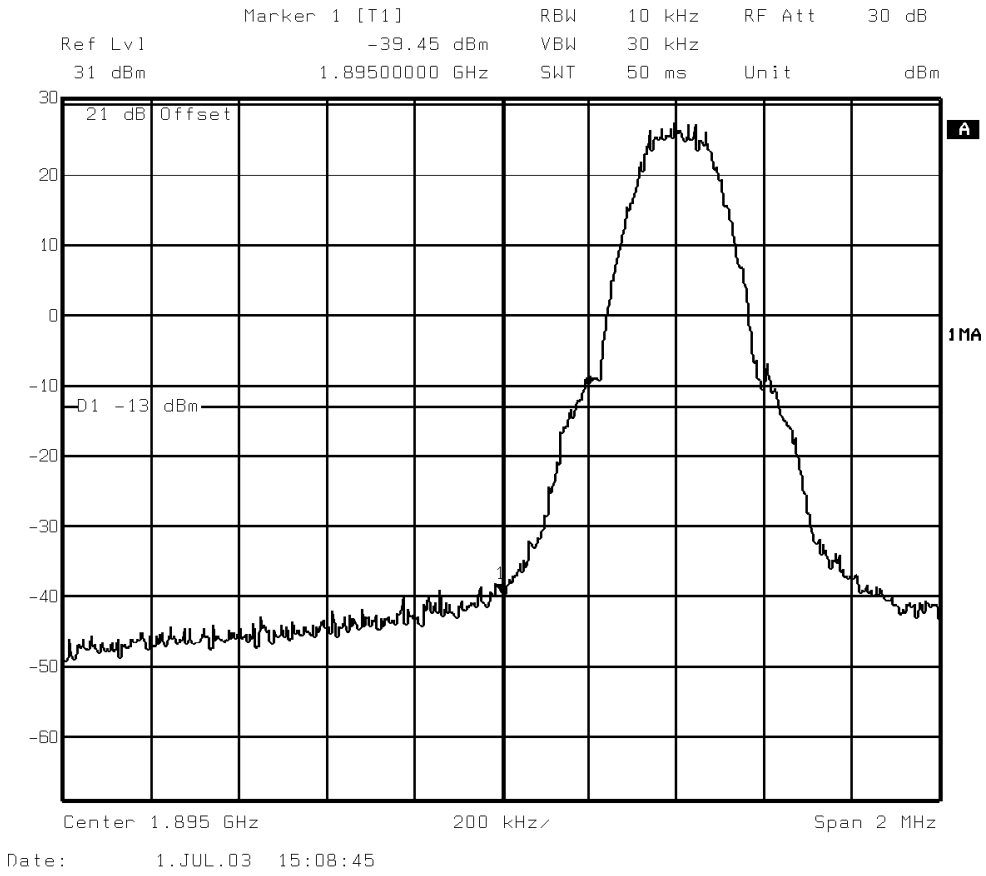
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 738, (1895.4MHz)

Block C



GSM – Circuit Switched

Remarks

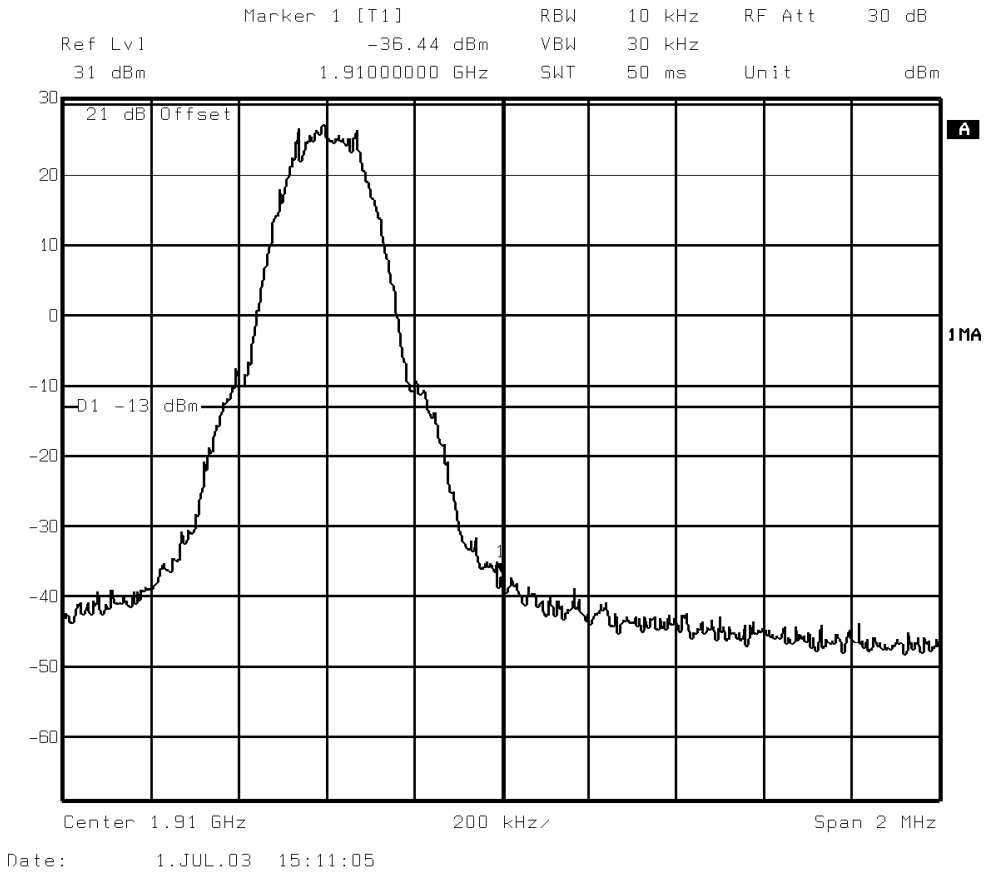
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 809, (1909.6MHz)

Block C



GSM – Circuit Switched

Remarks

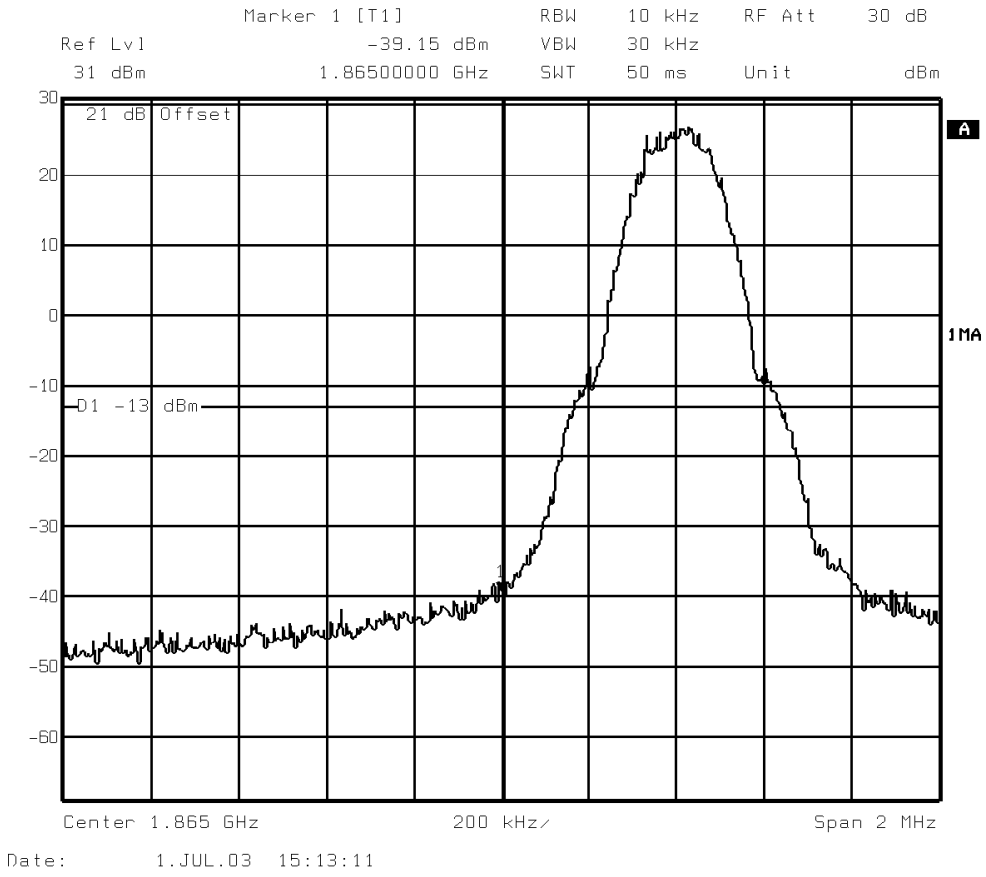
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	15th January 2002
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 588, (1865.4MHz)

Block D



GSM – Circuit Switched

Remarks

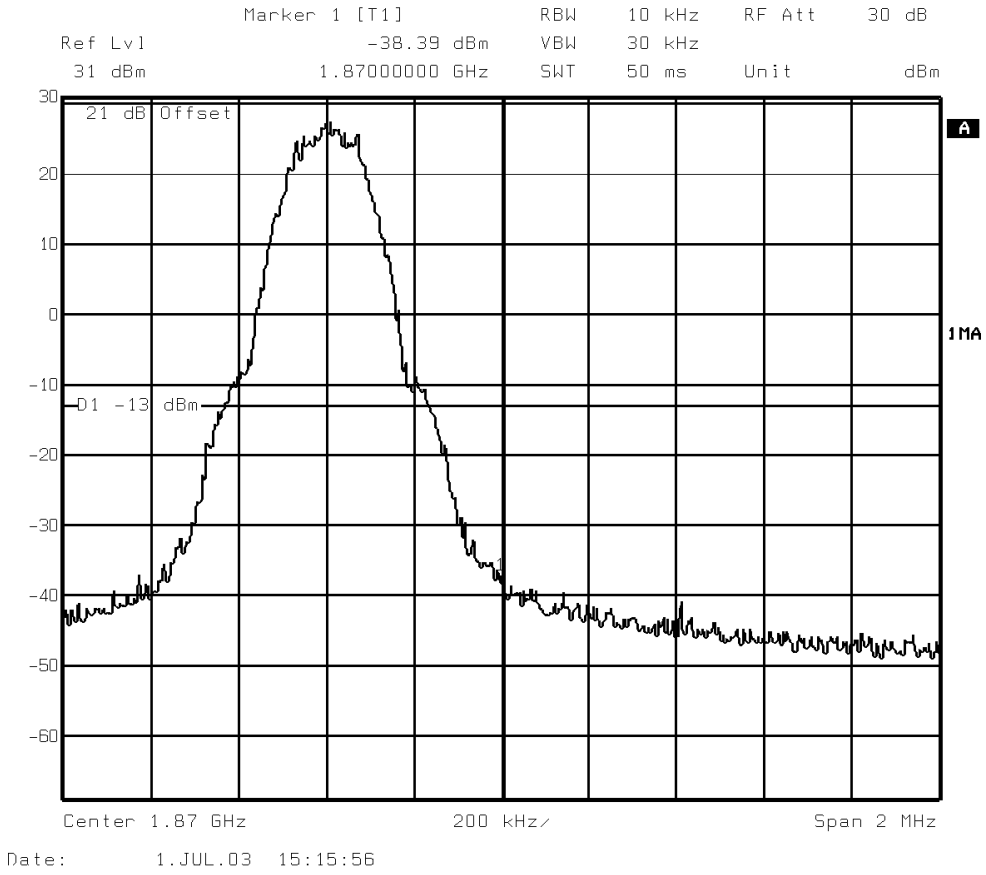
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
…….

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 609, (1869.6MHz)

Block D



GSM – Circuit Switched

Remarks

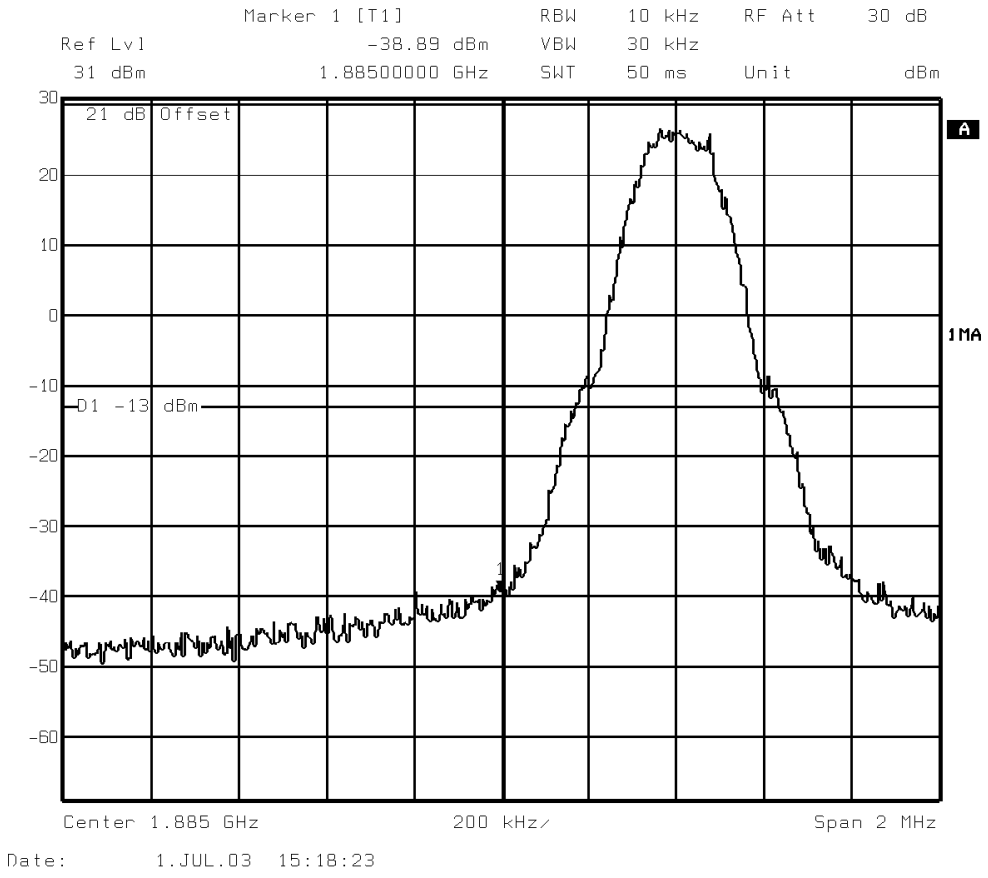
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 688, (1885.4MHz)

Block E



GSM – Circuit Switched

Remarks

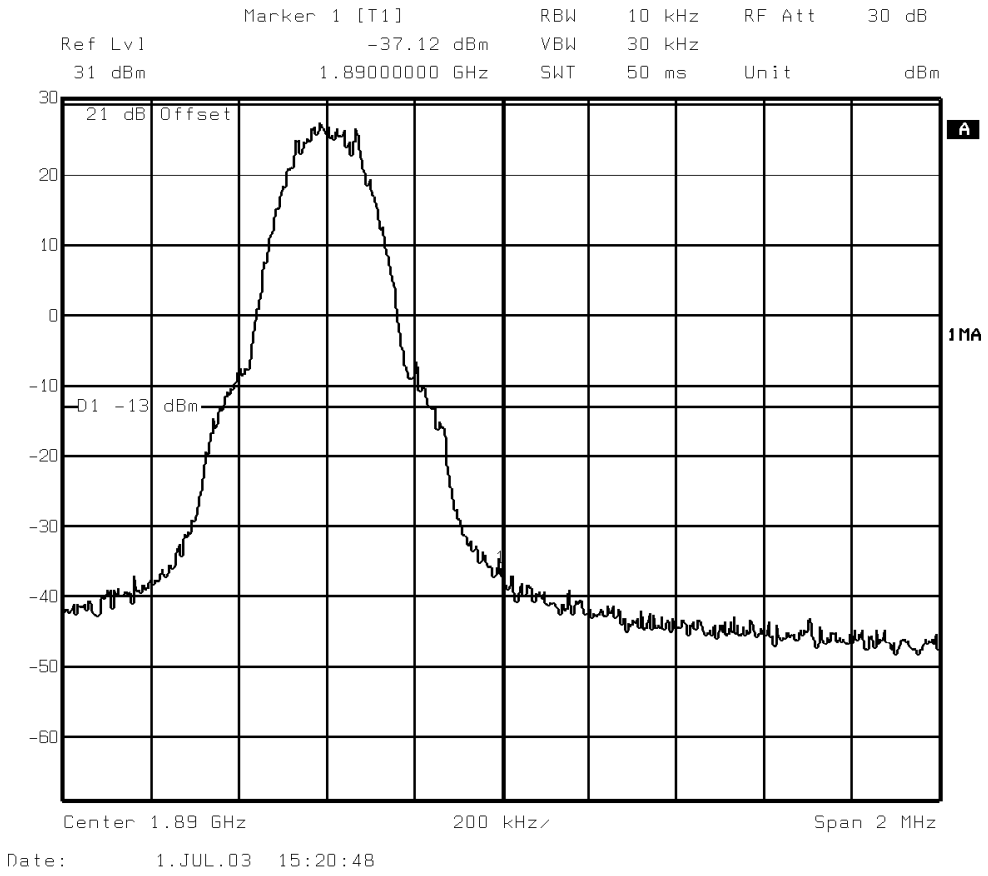
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 710 (1889.8MHz)

Block E



GSM – Circuit Switched

Remarks

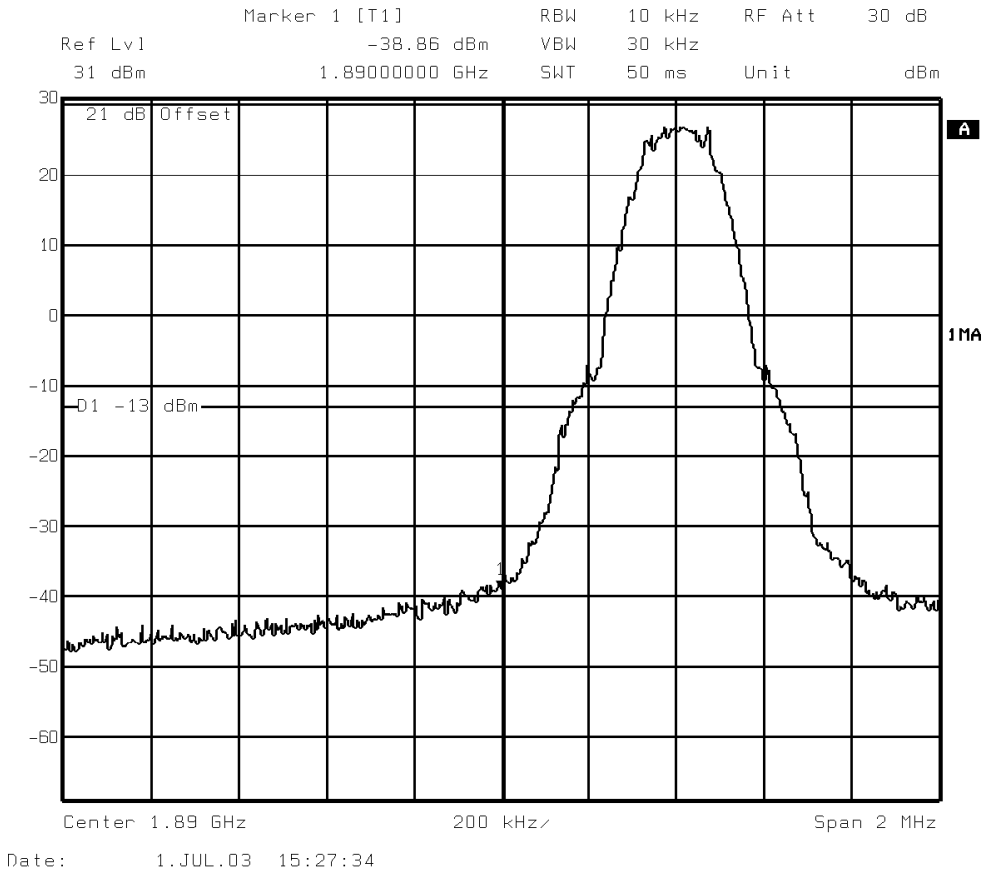
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 713, (1890.4MHz)

Block F



GSM – Circuit Switched

Remarks

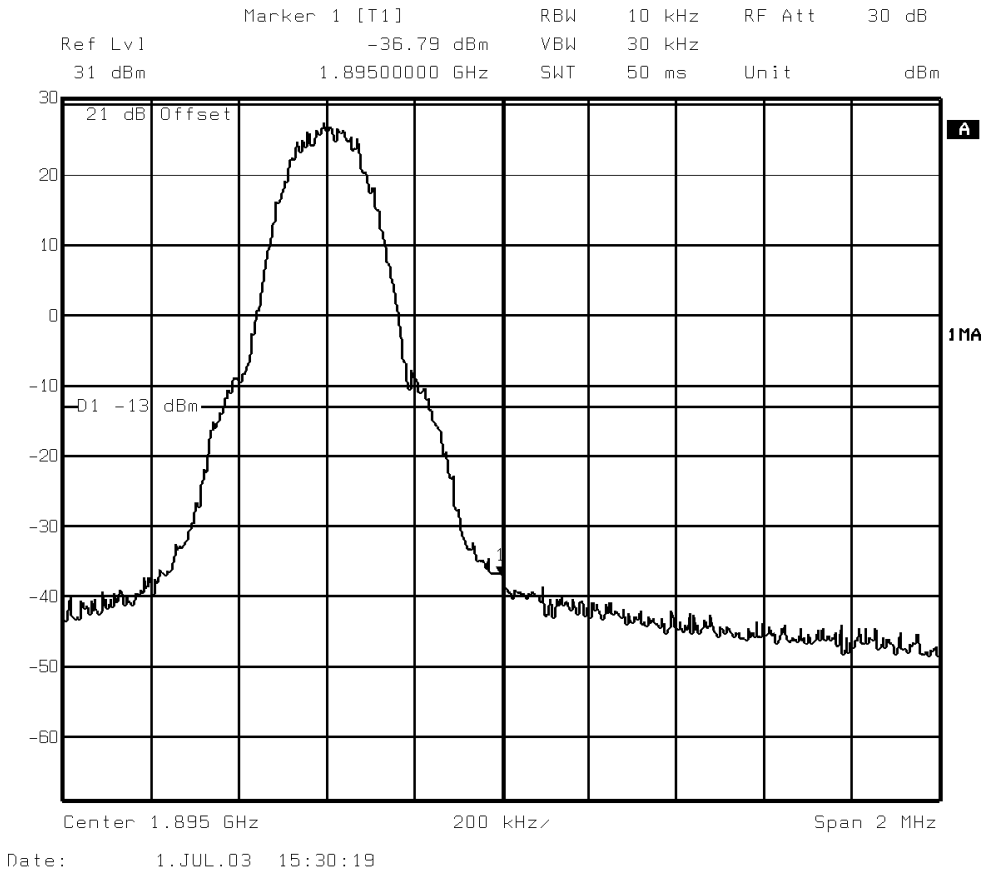
All emissions are below –13dBm up to 1MHz away from the block edge

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 734, (1894.6MHz)

Block F



GSM – Circuit Switched

Remarks

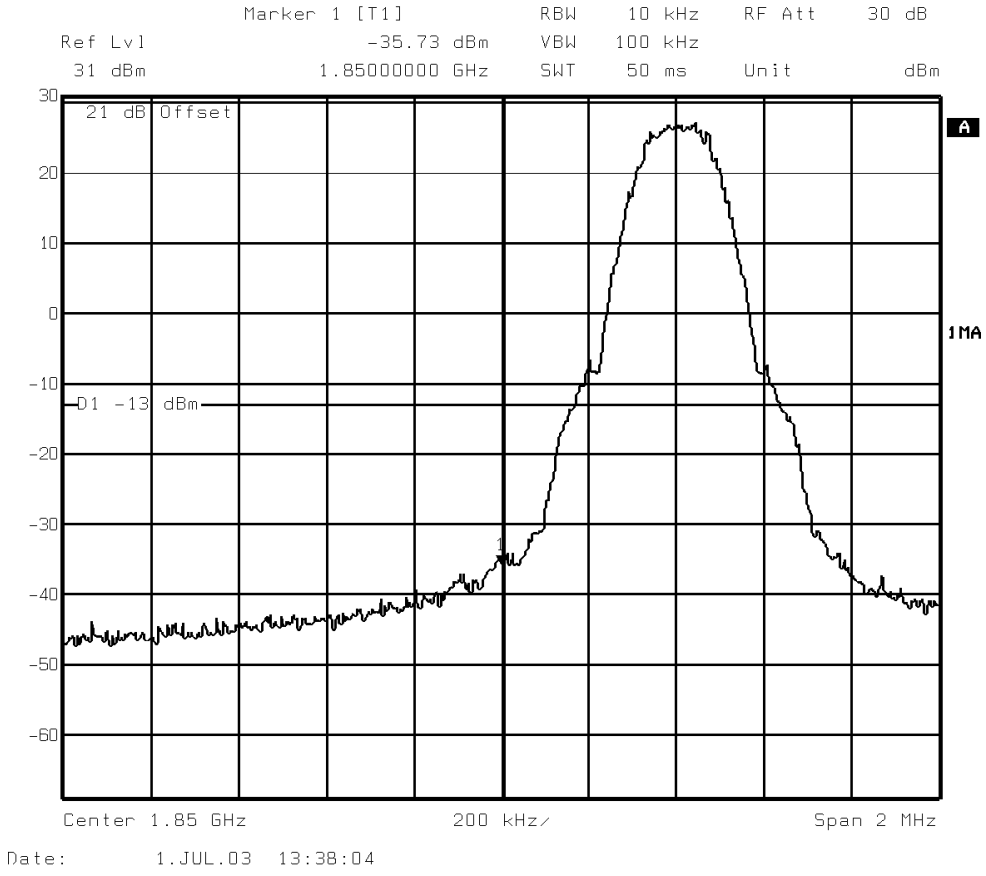
All emissions are below –13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
…….

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 513, (1850.4MHz)

Block A



GPRS – Packet Data

Remarks

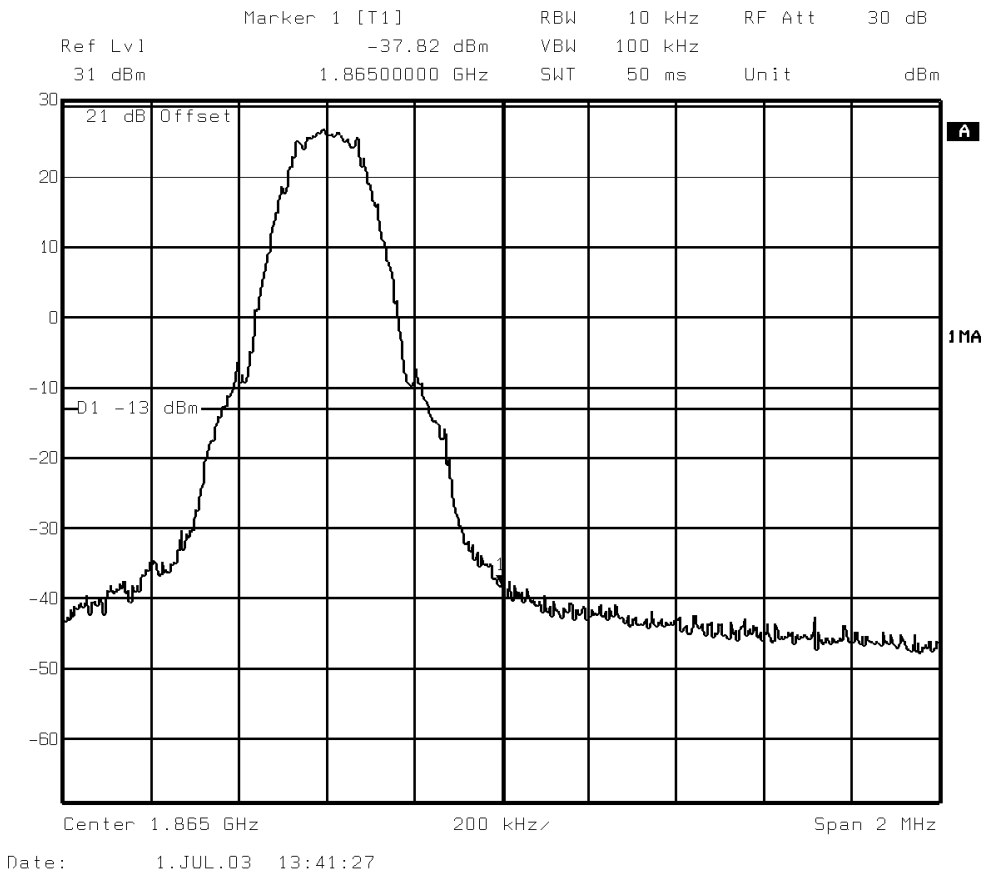
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……...

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 584, (1864.6MHz)

Block A



GPRS – Packet Data

Remarks

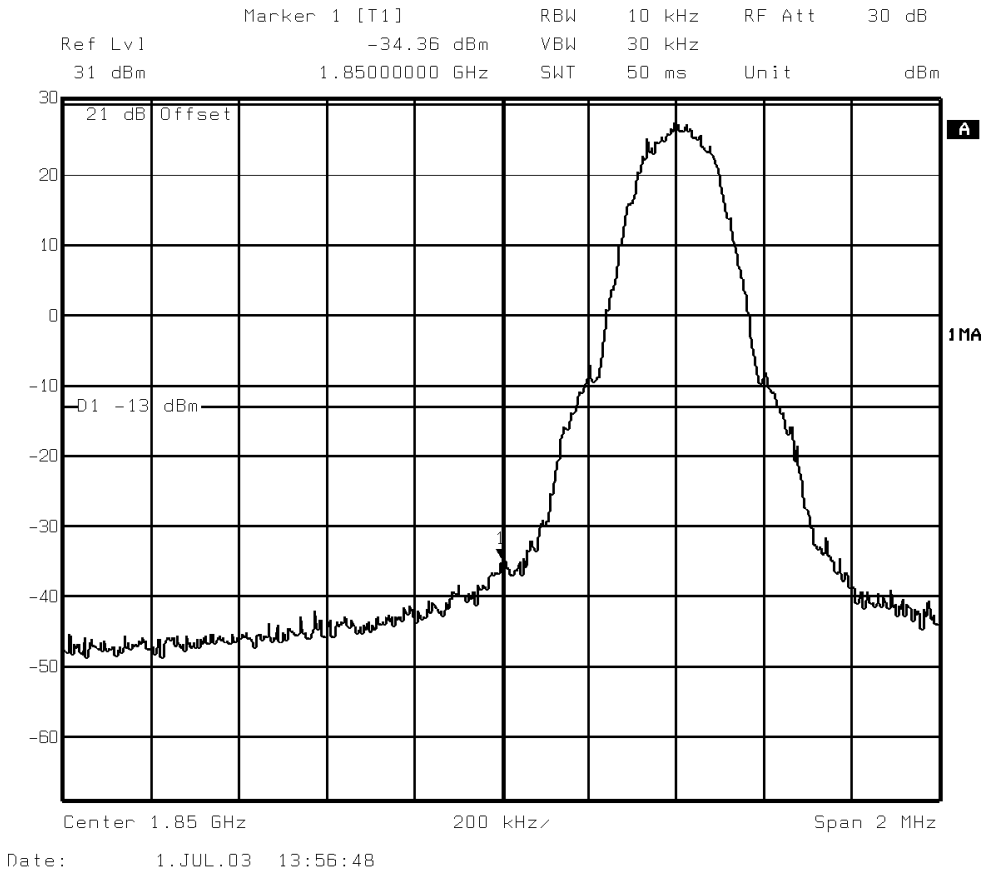
All emissions are below -13 dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 613, (1870.4MHz)

Block B



GPRS – Packet Data

Remarks

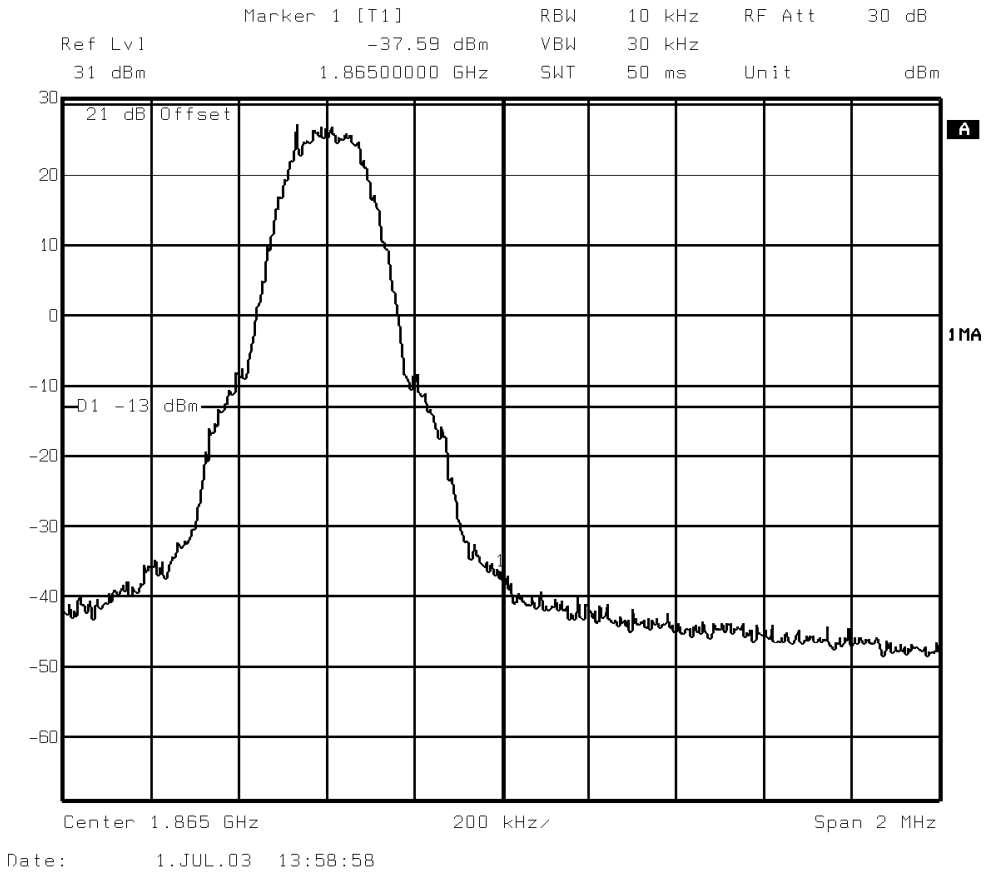
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 684, (1884.6MHz)

Block B



GPRS – Packet Data

Remarks

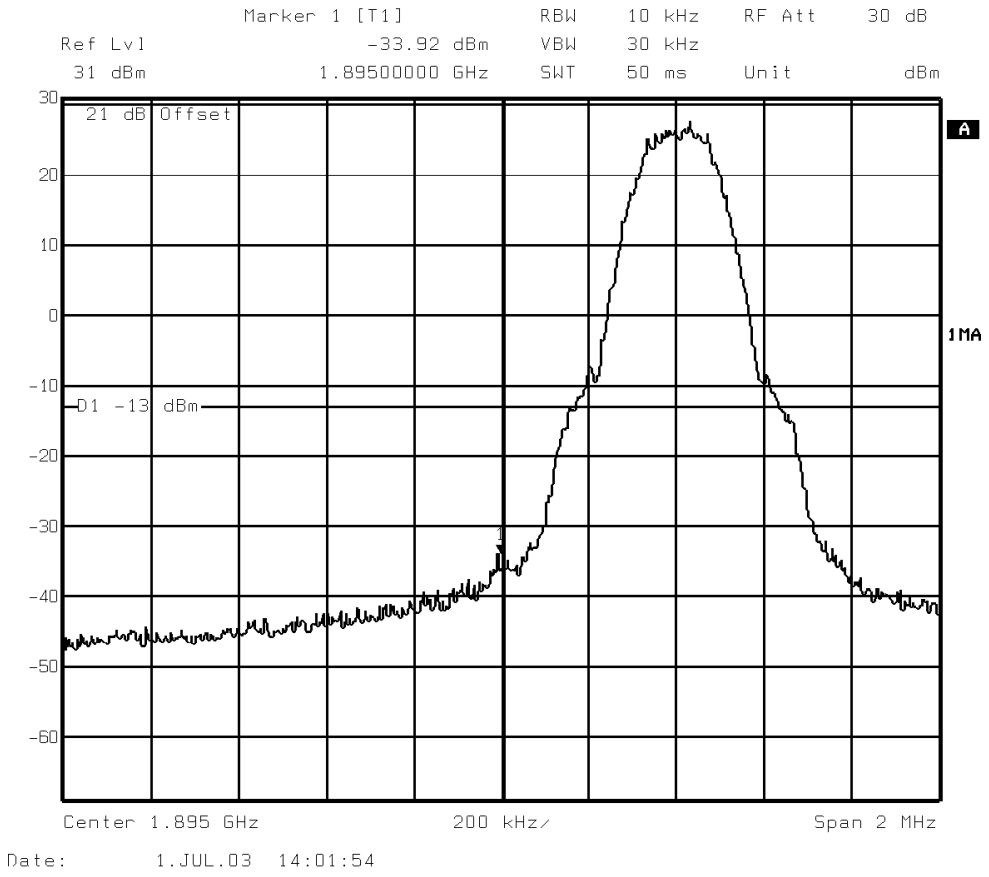
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 738, (1895.4MHz)

Block C



GPRS – Packet Data

Remarks

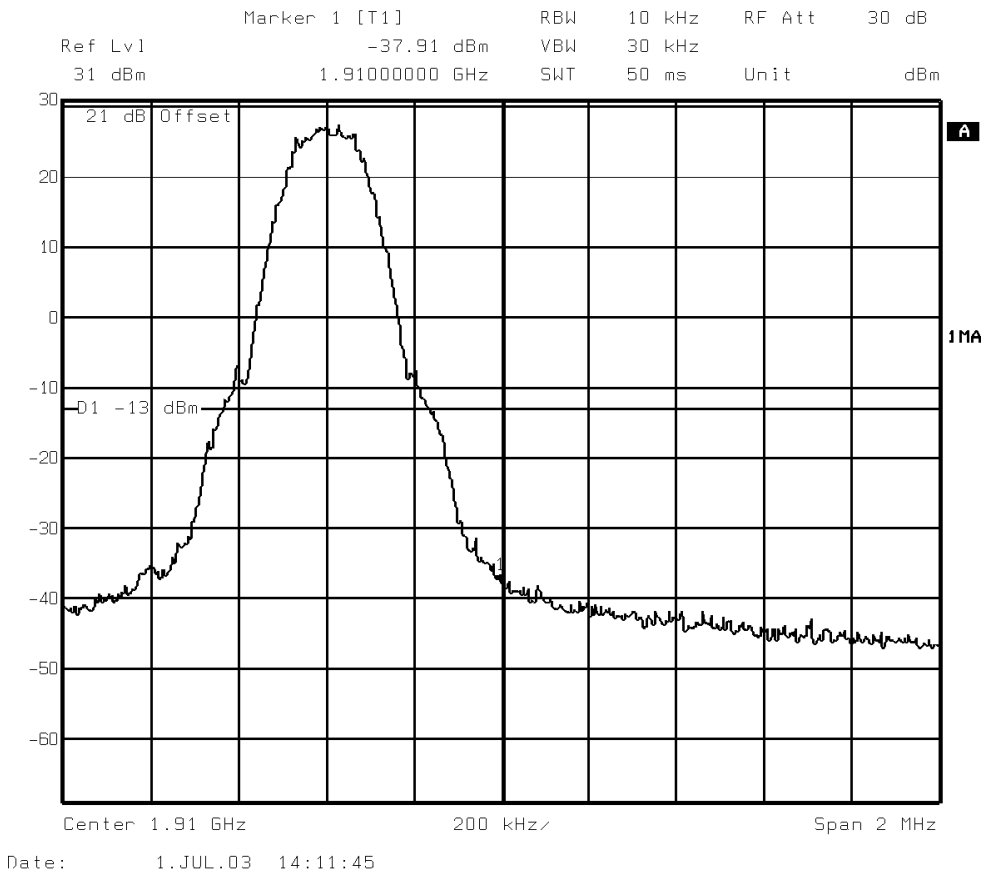
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 809, (1909.6MHz)

Block C



GPRS – Packet Data

Remarks

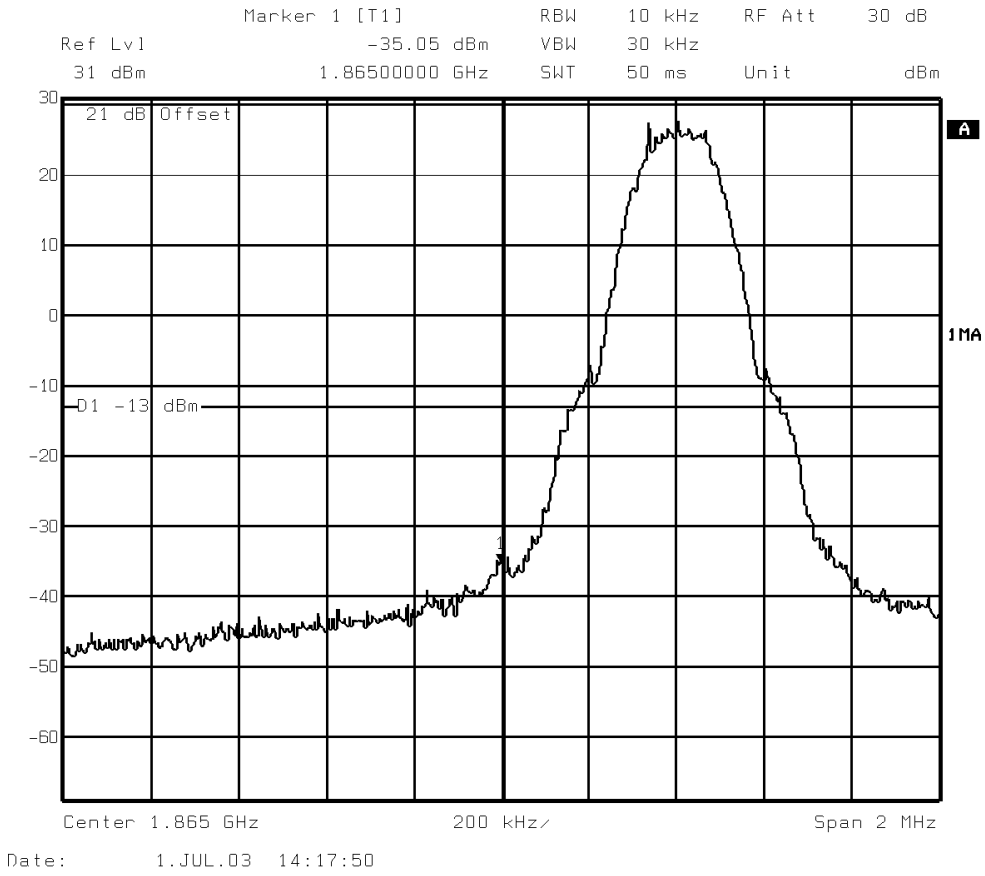
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 588, (1865.4MHz)

Block D



GPRS – Packet Data

Remarks

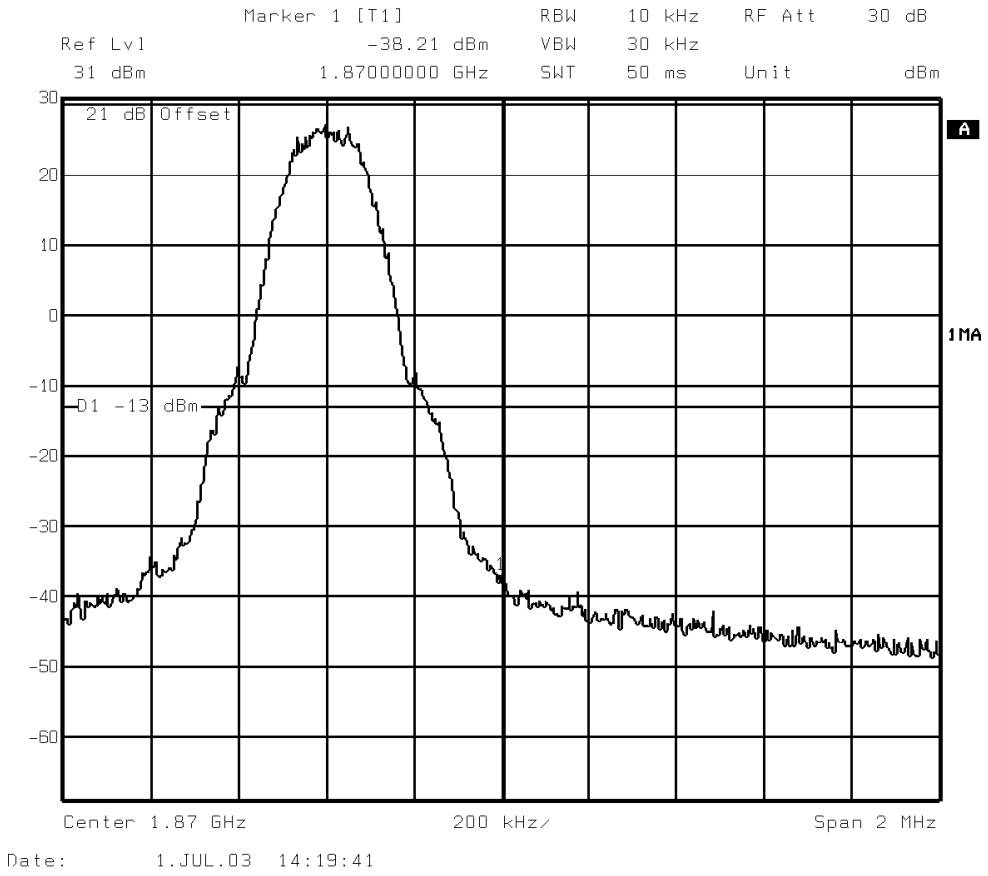
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 609, (1869.6MHz)

Block D



GPRS – Packet Data

Remarks

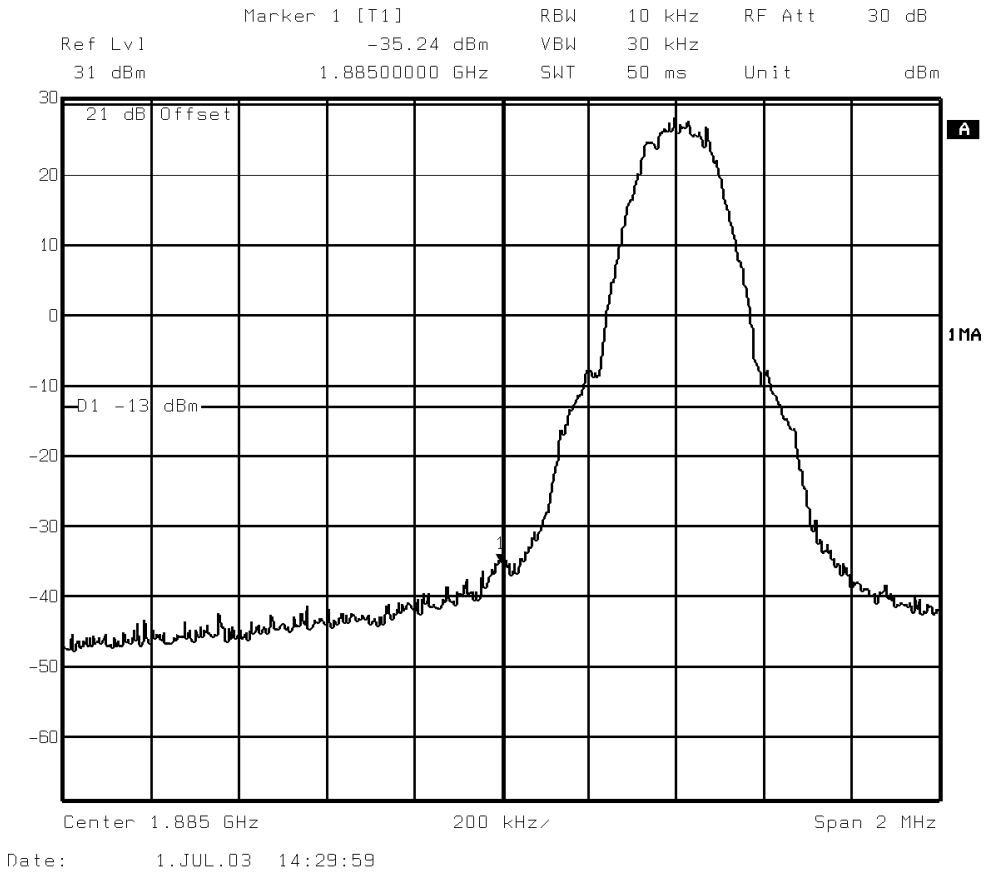
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 688, (1885.4MHz)

Block E



GPRS – Packet Data

Remarks

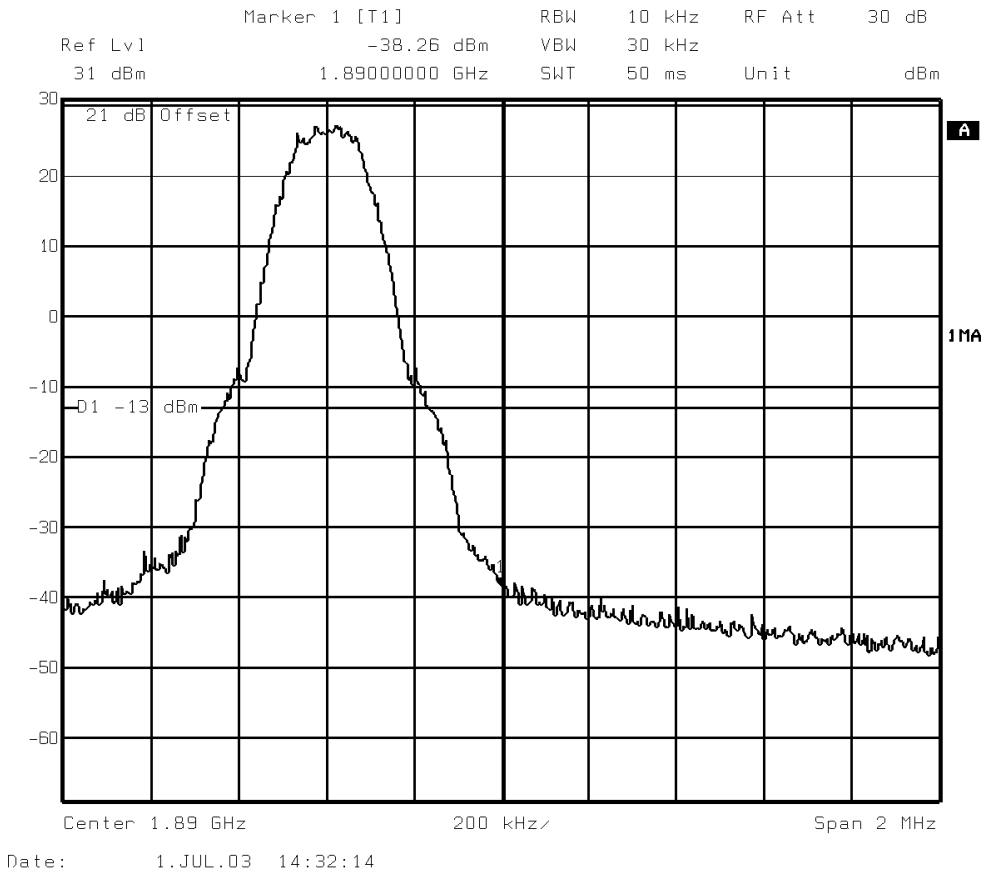
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 710 (1889.8MHz)

Block E



GPRS – Packet Data

Remarks

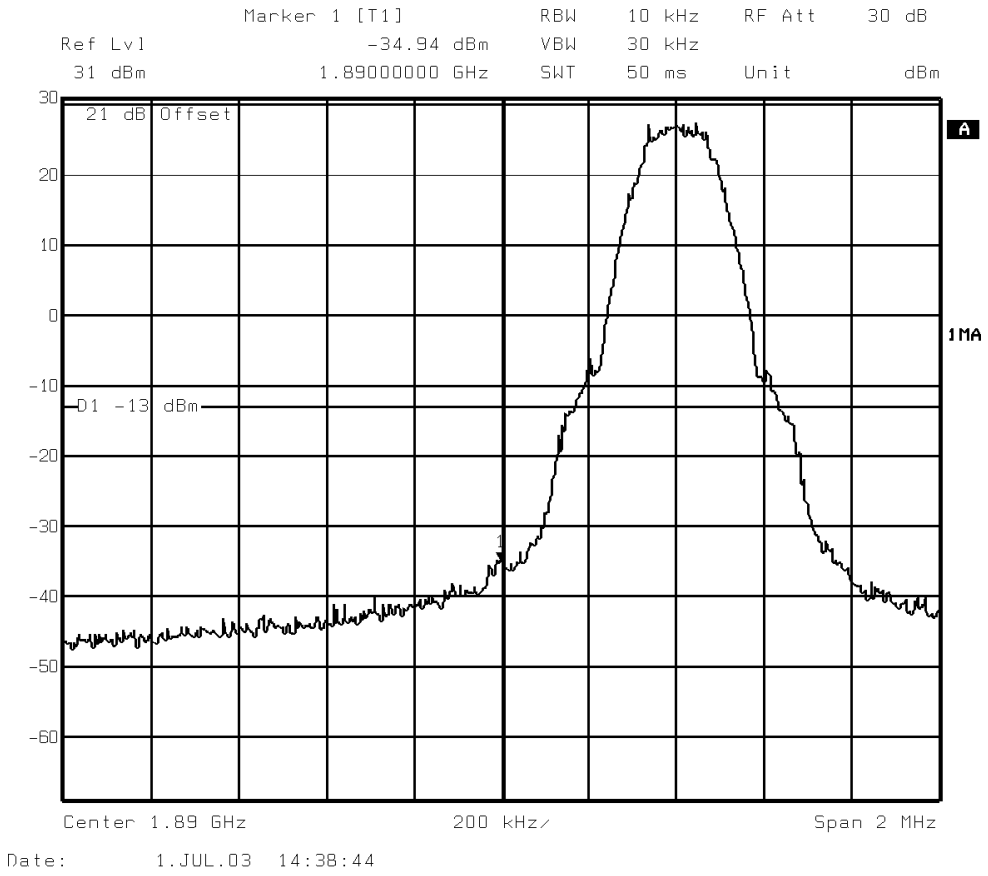
All emissions are below -13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 713, (1890.4MHz)

Block F



GPRS – Packet Data

Remarks

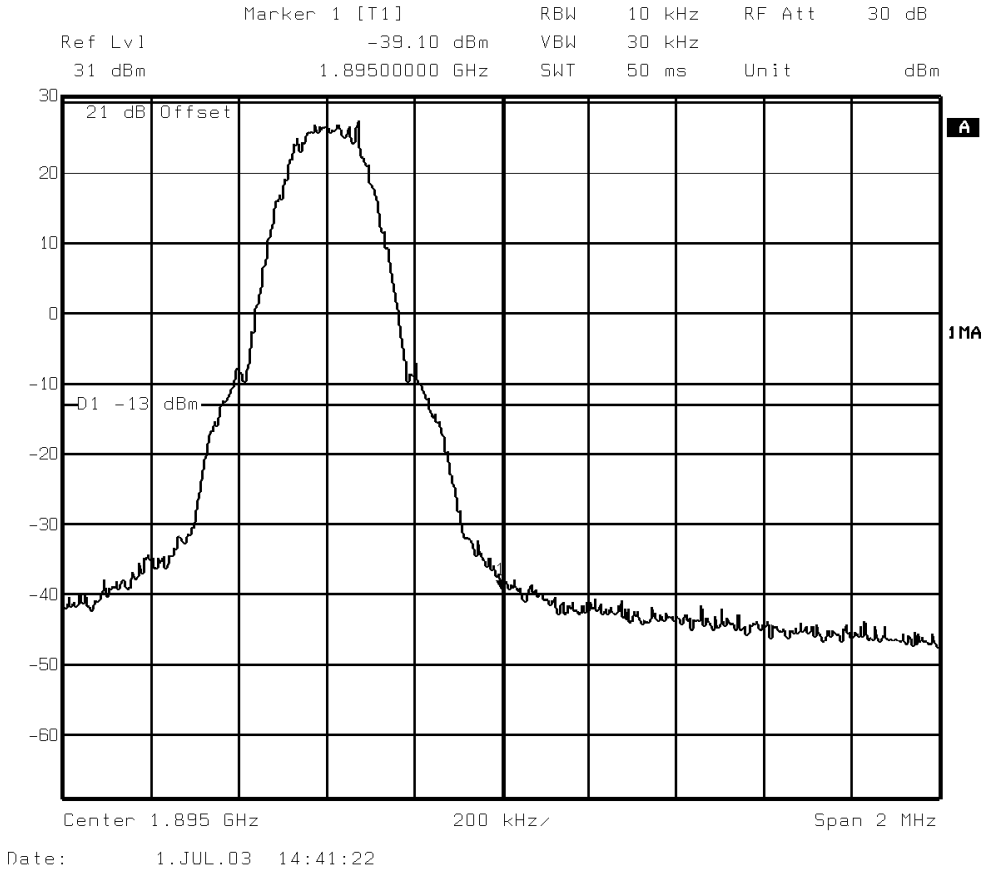
All emissions are below –13dBm up to 1MHz away from the block edge

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7
……

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	1st July 2003
Rule Parts	:	2.1049a, 24.238(b)

Block Edge Measurement with EUT Transmitting on full power on Channel 734, (1894.6MHz)

Block F



GPRS – Packet Data

Remarks

All emissions are below –13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
…….

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Measurement Method

In accordance with Part 2.1051, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 9kHz to 20 GHz. The EUT was set to transmit on full power with all timeslots active and minimum power with all timeslots active. The EUT was tested on Bottom, Middle and Top channels for both power levels. The resolution and video bandwidths were set to 1MHz in accordance with Part 24.238. The spectrum analyser detector was set to Max Hold.

For measuring the range 9kHz to 4GHz, on maximum power, a 10dB attenuator was used. From 4 to 20GHz, attenuators and a high pass filter were used.

The maximum path loss across the measurement band was used as the reference level offset to ensure worst case

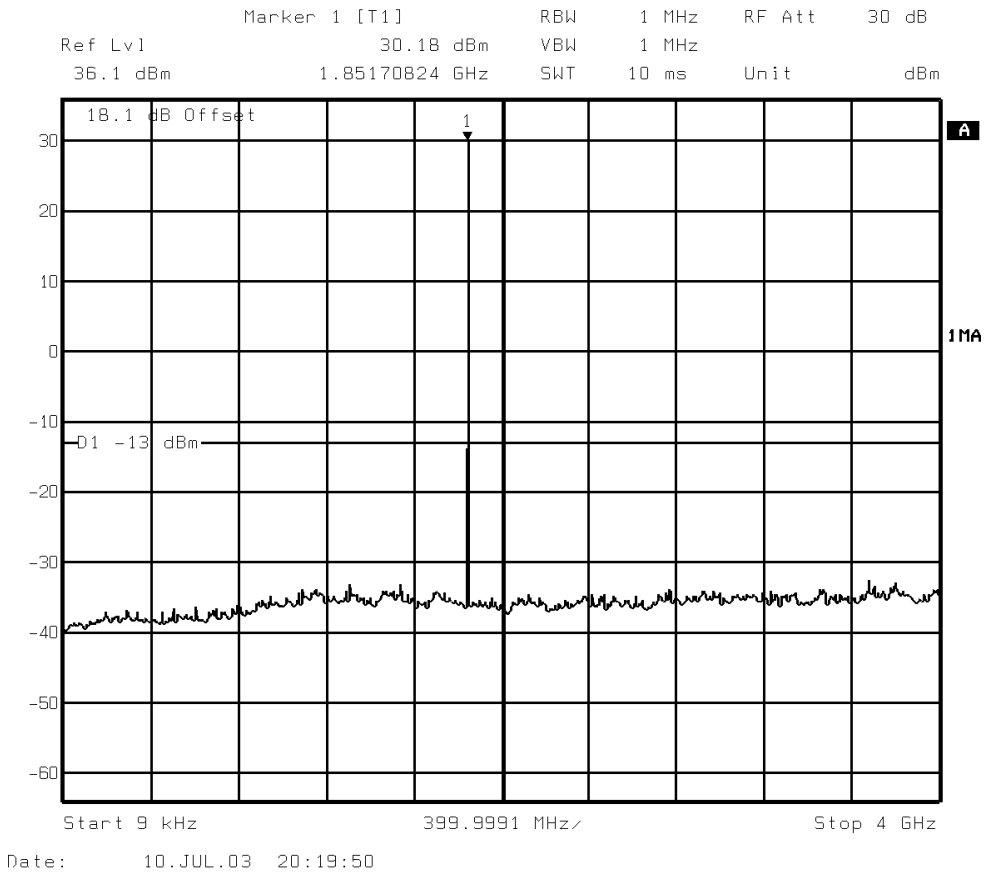
In addition, measurements were made up to the 10th harmonic of the fundamental.

Summary Of Results

No emissions, other than the harmonics shown on pages 57 to 60, were within 20dB of the limit. The EUT passed the requirements laid out in 24.238. The plots on the following pages show the frequency spectrum from 9kHz to 20GHz of the EUT.

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 512 (1850.2MHz) - Maximum Power

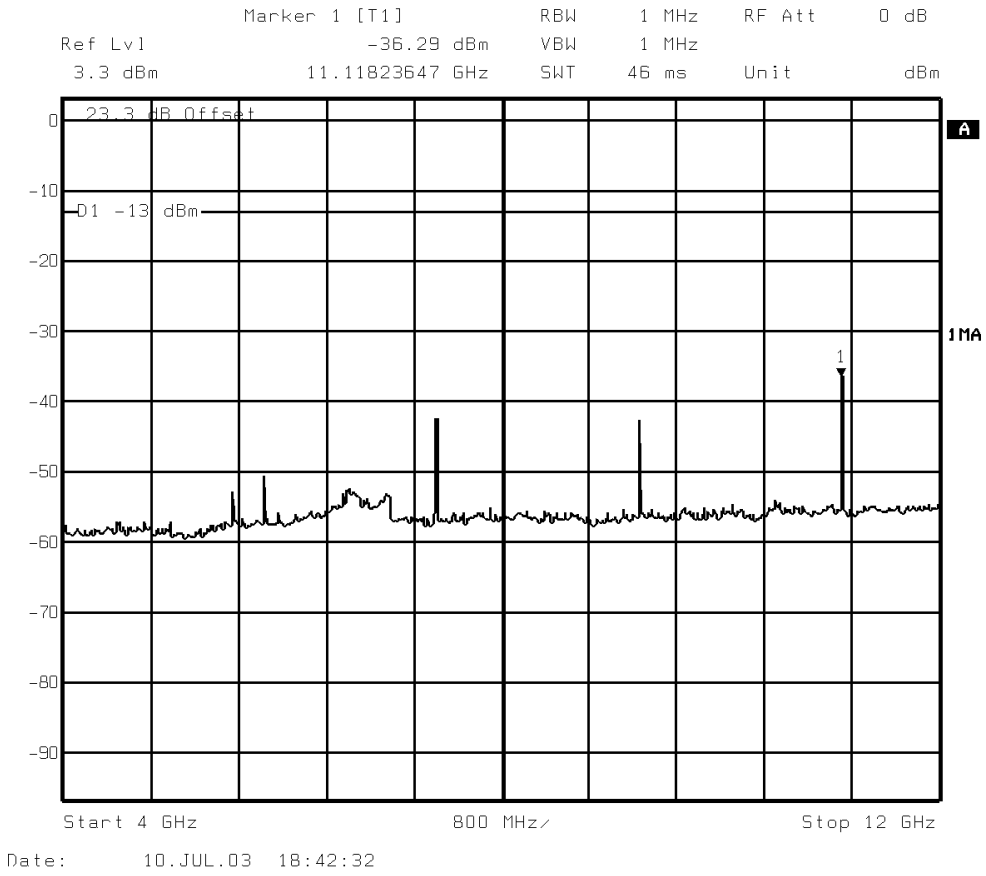


GSM – Circuit Switched

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (4GHz – 12GHz)
Channel 512 (1850.2MHz) – Maximum Power

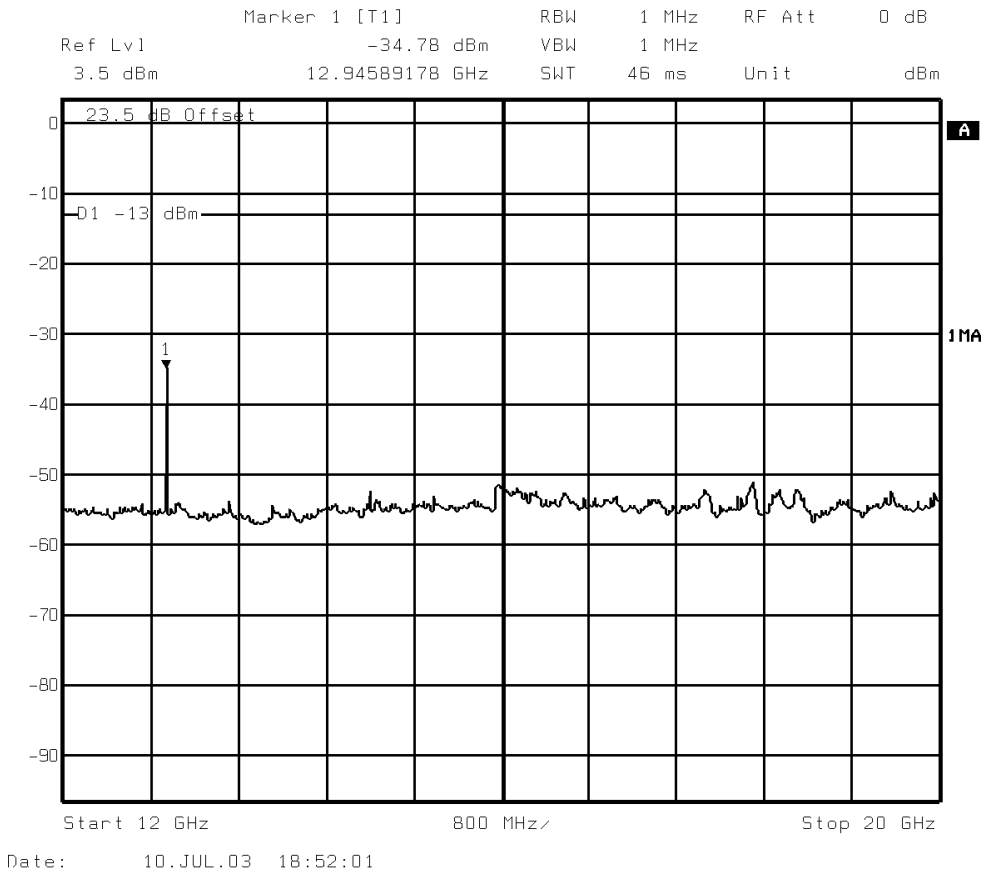


GSM – Circuit Switched

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (12GHz – 20GHz)
Channel 512 (1850.2MHz) – Maximum Power

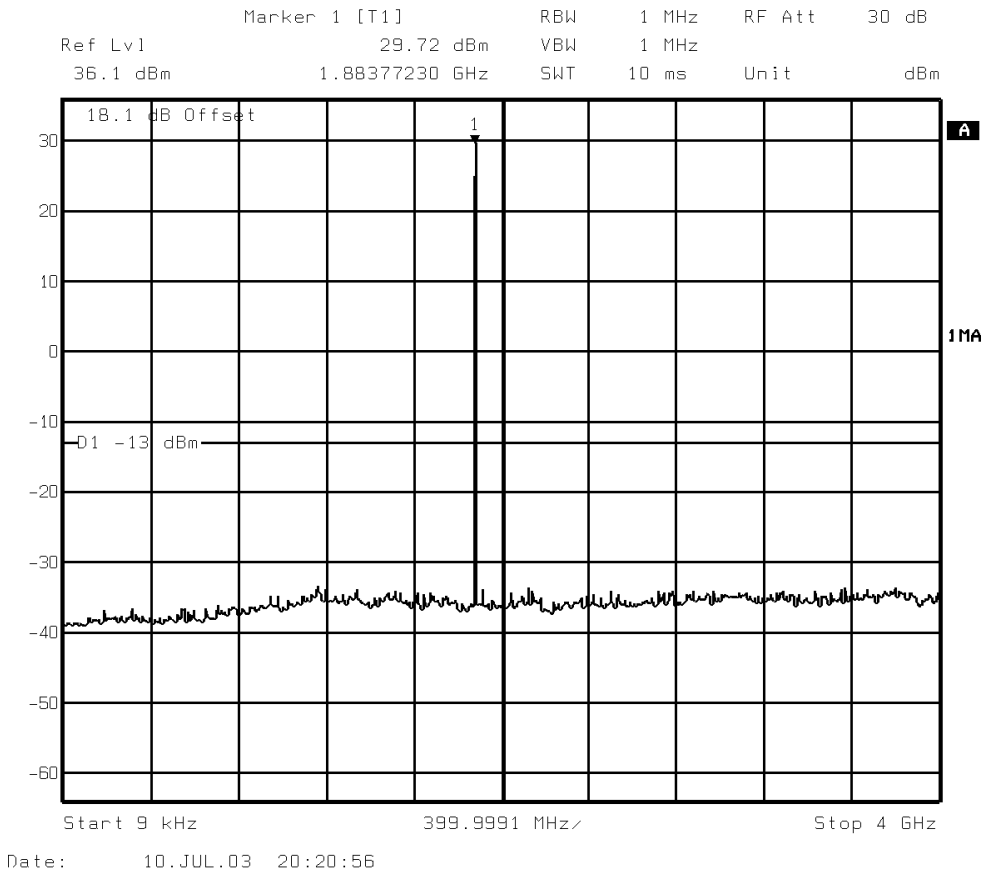


GSM – Circuit Switched

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
…….

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 661 (1880.0MHz) – Maximum Power

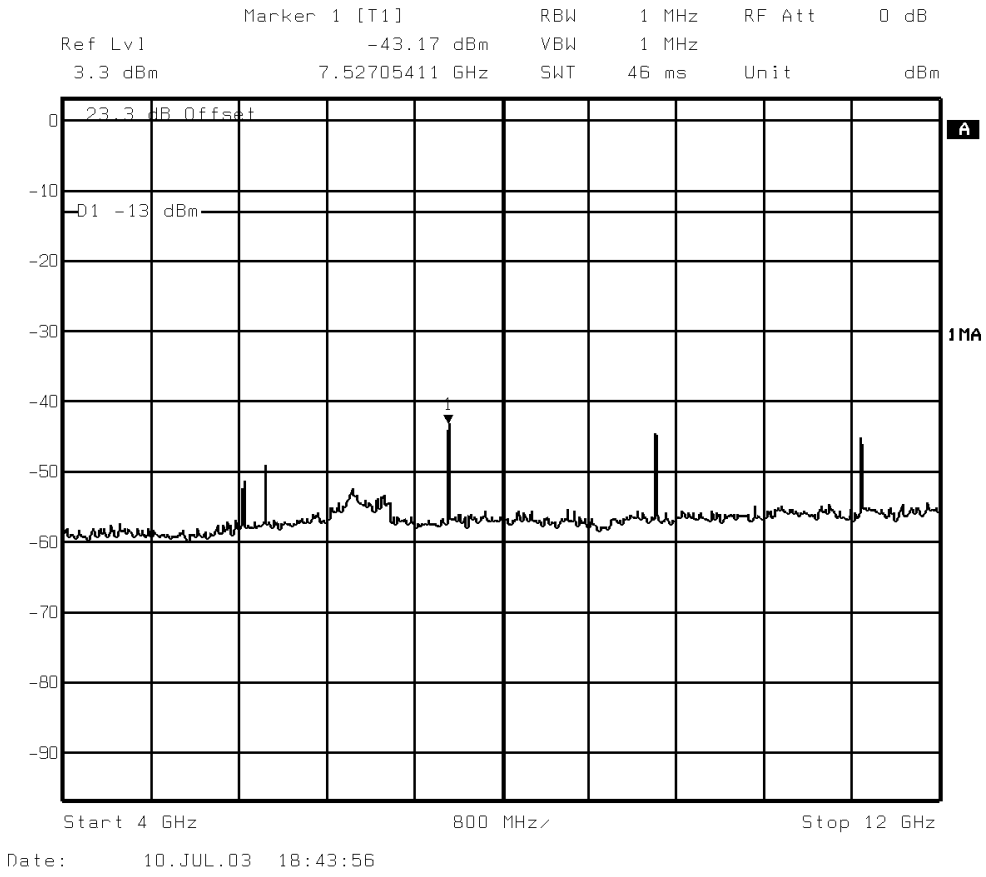


GSM – Circuit Switched

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (4GHz - 12GHz)
Channel 661 (1880.0MHz) – Maximum Power

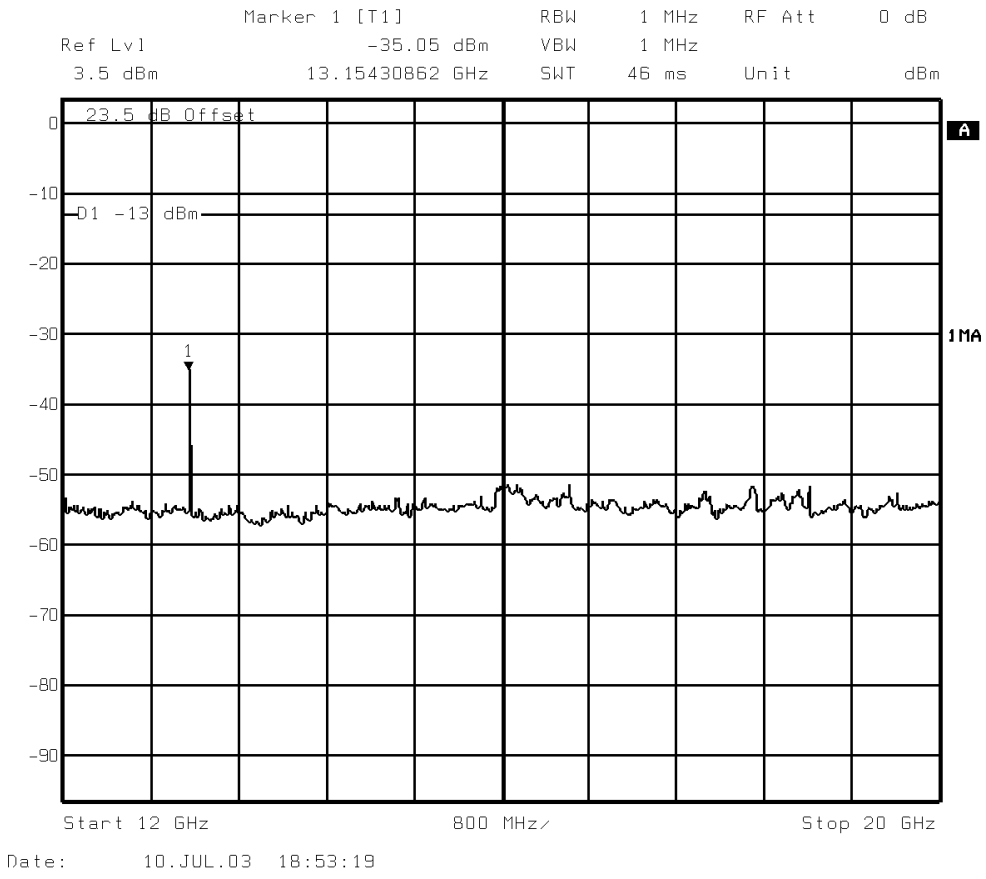


GSM – Circuit Switched

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (12GHz – 20GHz)
Channel 661 (1880.0MHz) – Maximum Power



GSM – Circuit Switched

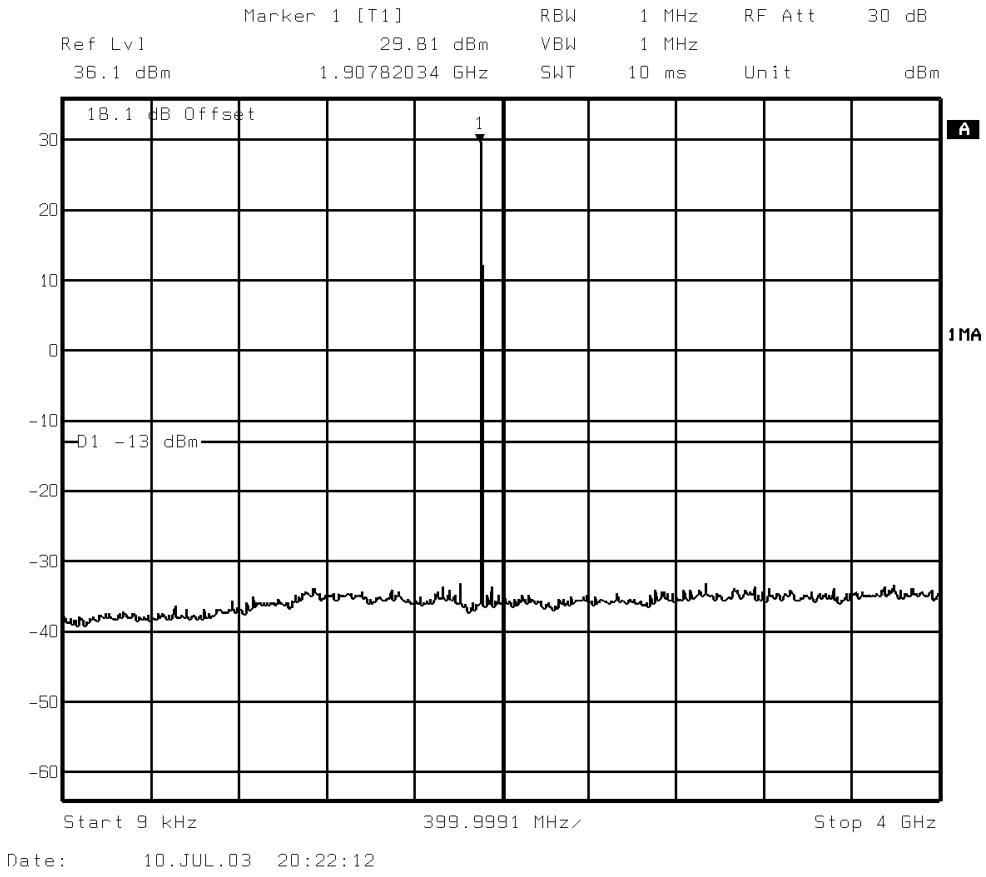
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 810 (1909.8MHz) – Maximum Power



GSM – Circuit Switched

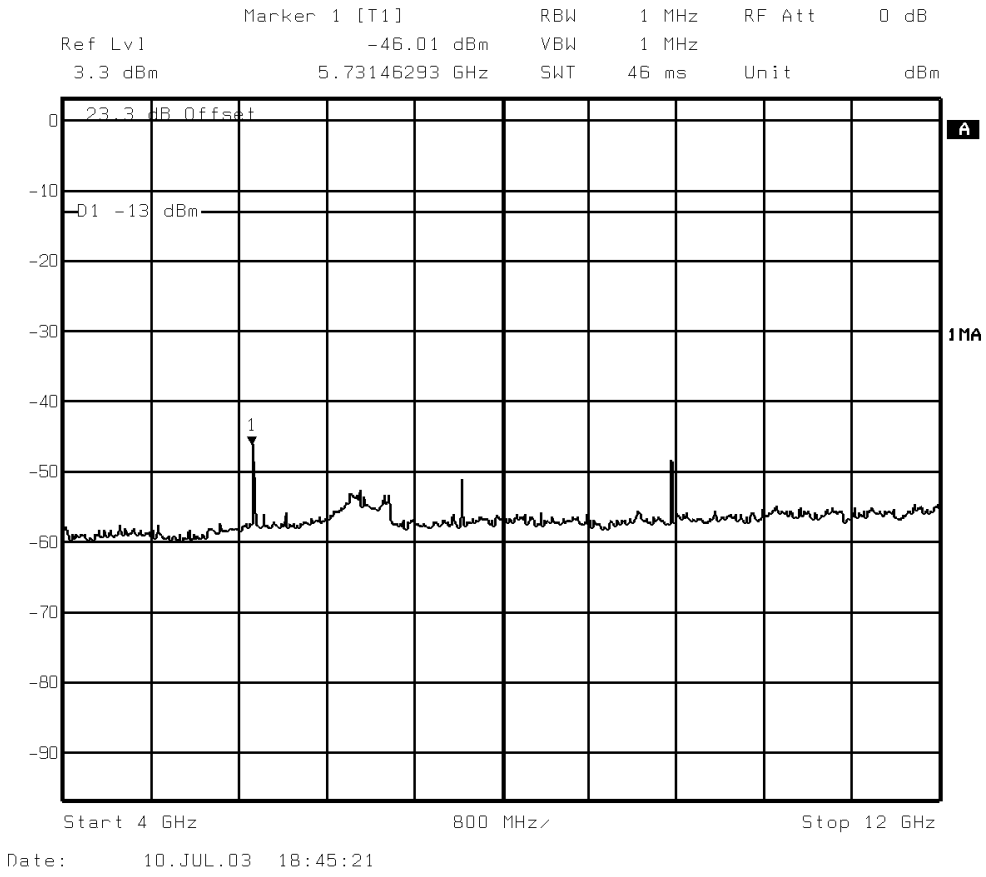
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (4GHz – 12GHz)
Channel 810 (1909.8MHz) – Maximum Power



GSM – Circuit Switched

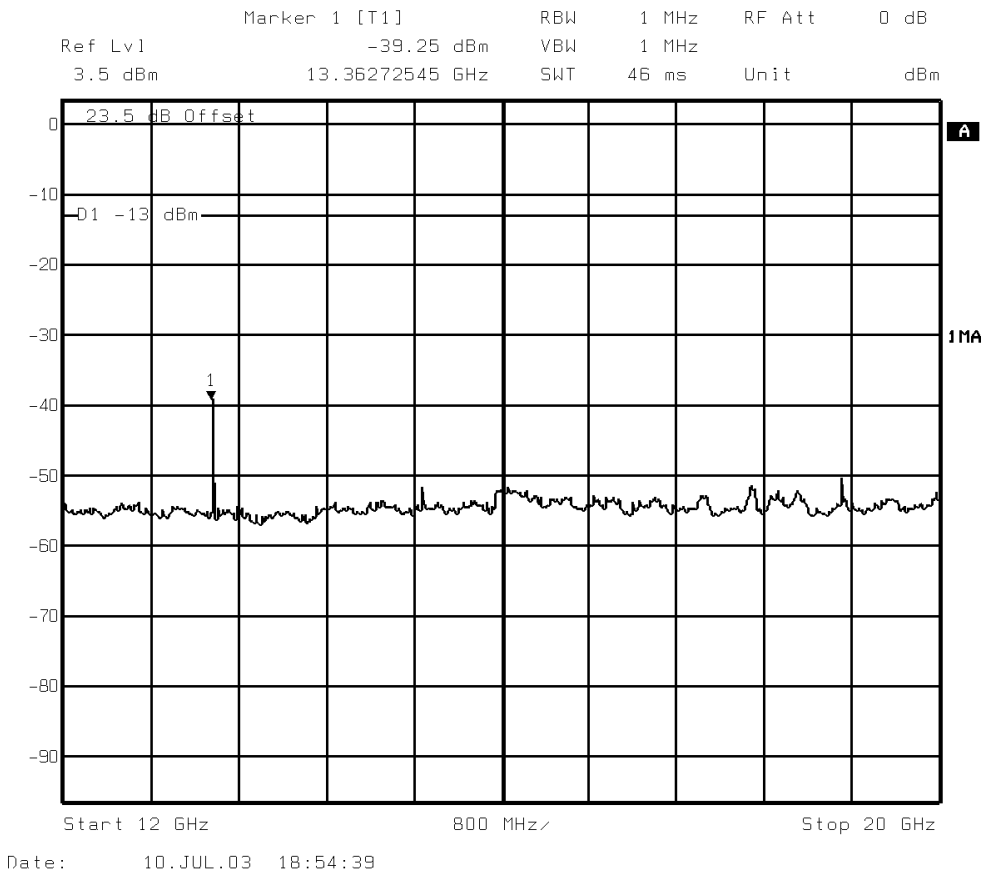
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (12GHz – 20GHz)
Channel 810 (1909.8MHz) – Maximum Power

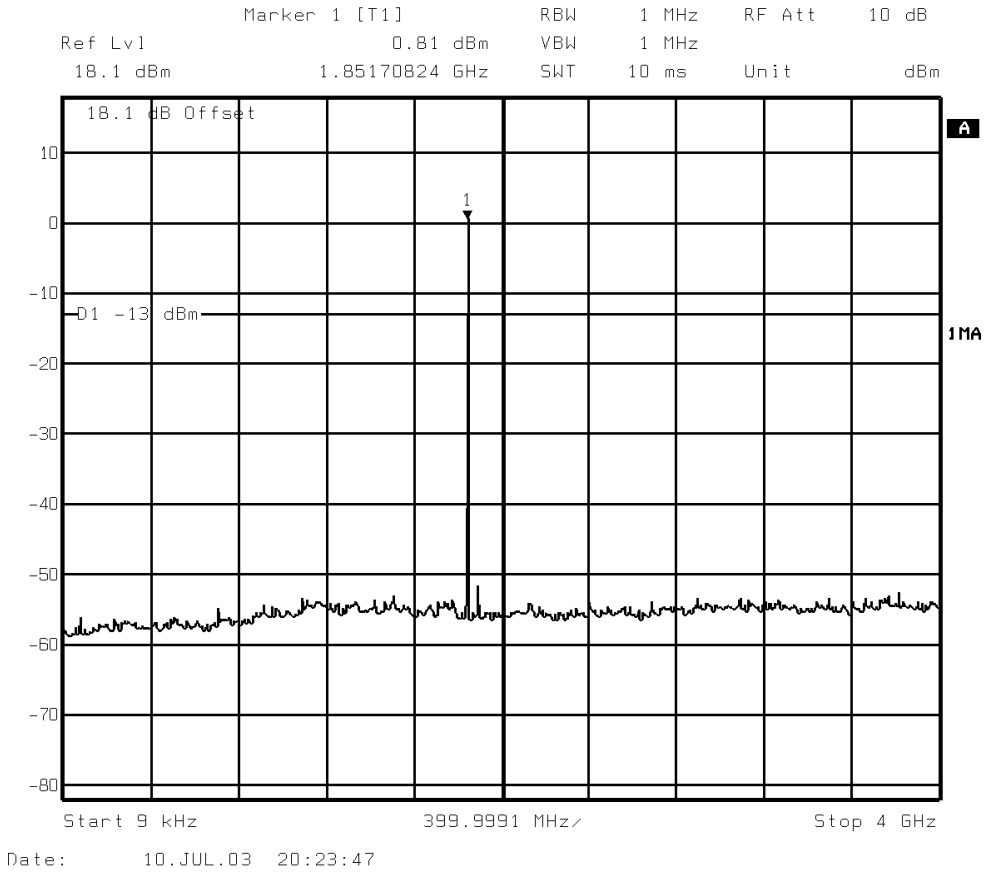


GSM – Circuit Switched

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 512 (1850.2MHz) – Minimum Power



GSM – Circuit Switched

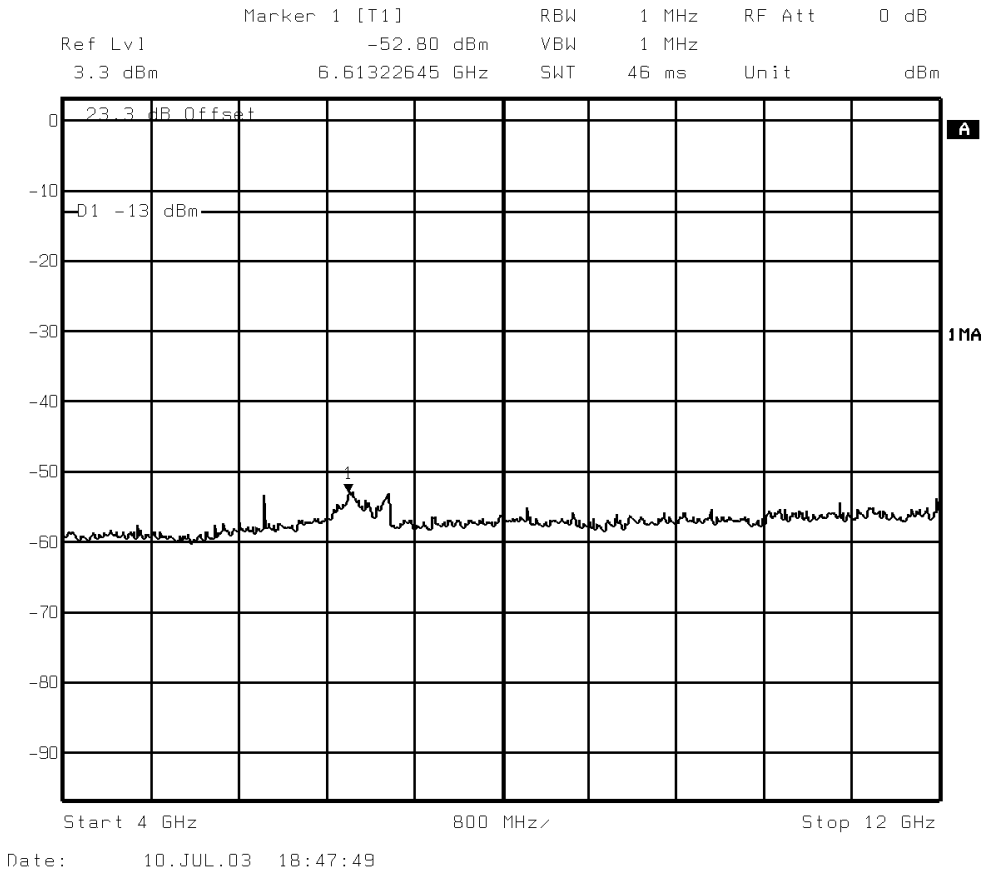
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (4GHz – 12GHz)
Channel 512 (1850.2MHz) – Minimum Power



GSM – Circuit Switched

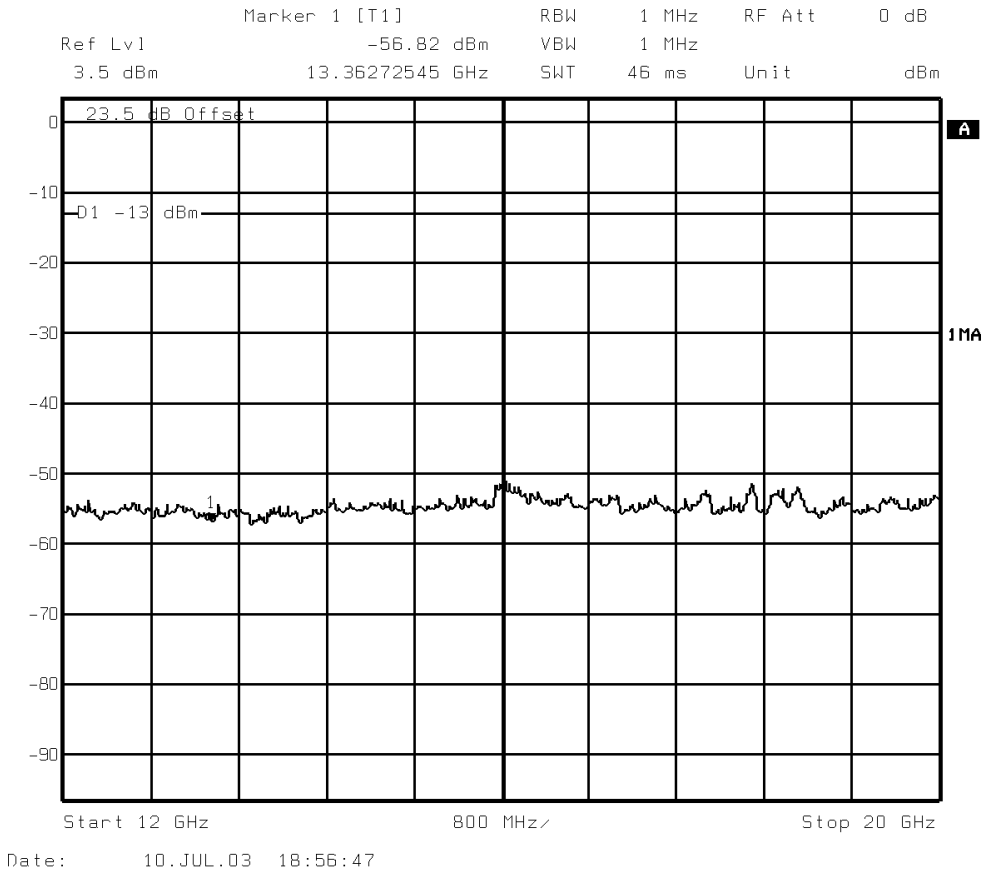
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……..

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (12GHz-20GHz)
Channel 512 (1850.2MHz) – Minimum Power

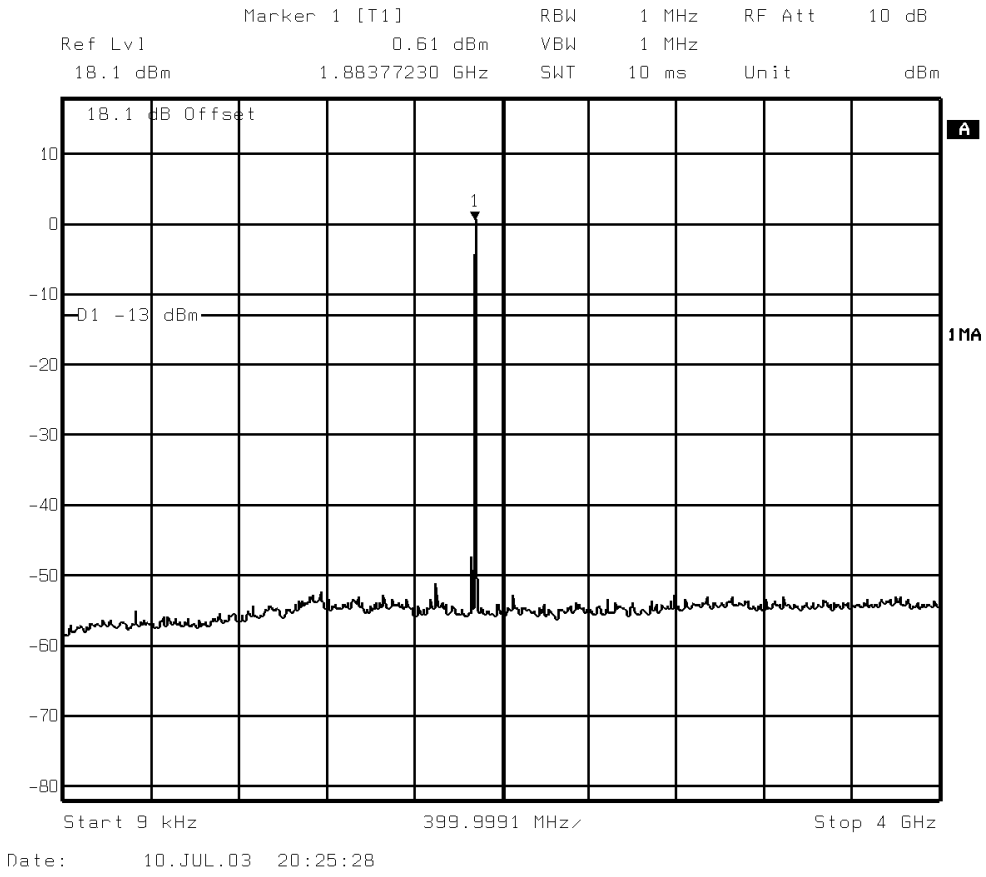


GSM – Circuit Switched

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 661 (1880.0MHz) – Minimum Power



GSM – Circuit Switched

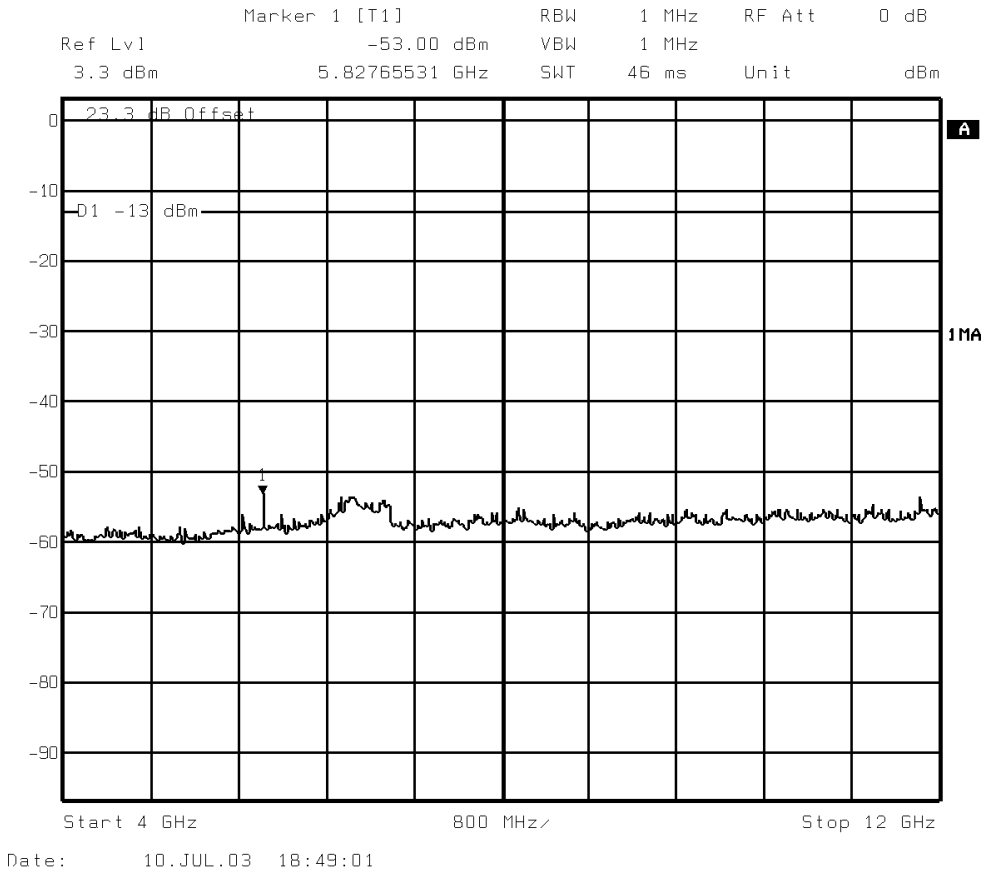
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (4GHz – 12GHz)
Channel 661 (1880.0MHz) – Minimum Power



GSM – Circuit Switched

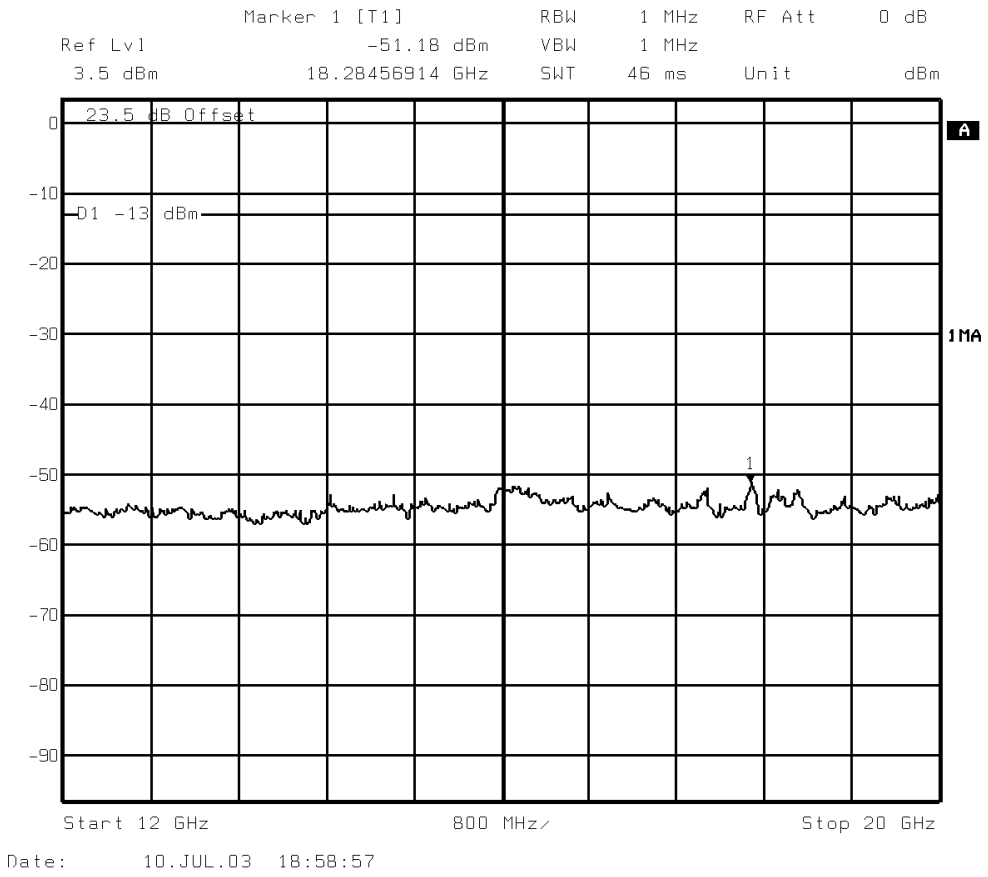
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……..

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (12GHz – 20GHz)
Channel 661 (1880.0MHz) – Minimum Power



GSM – Circuit Switched

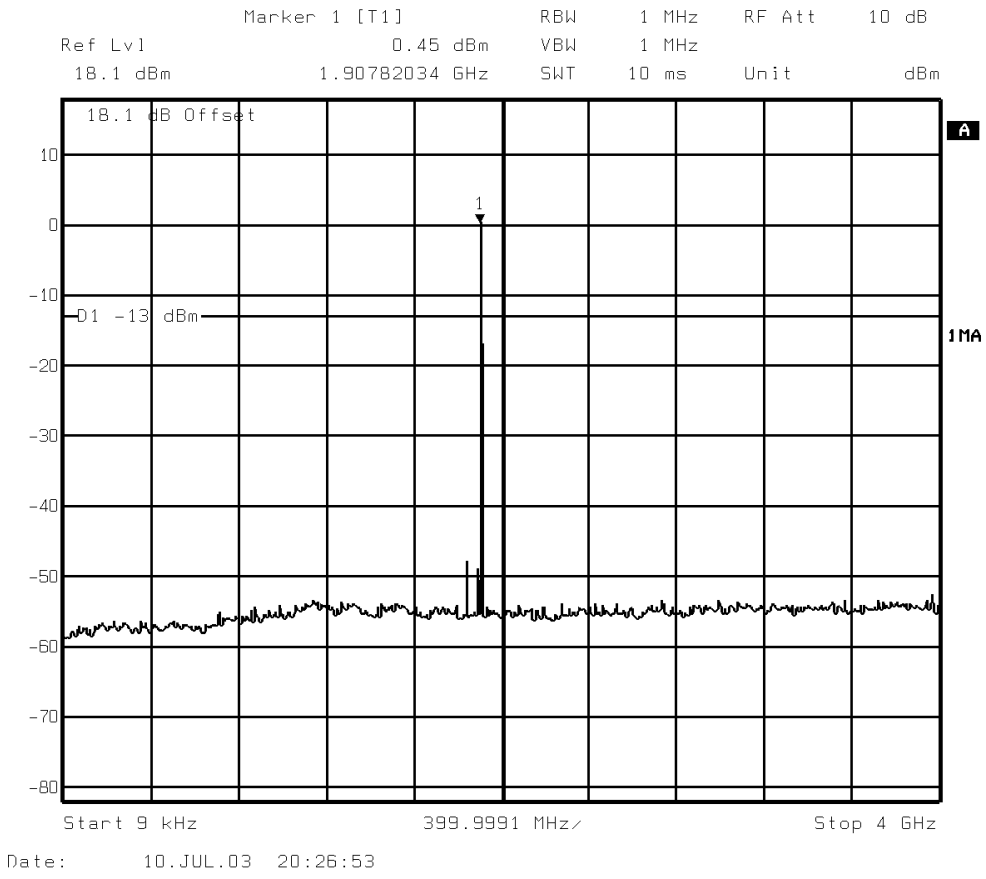
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 810 (1909.8MHz) – Minimum Power



GSM – Circuit Switched

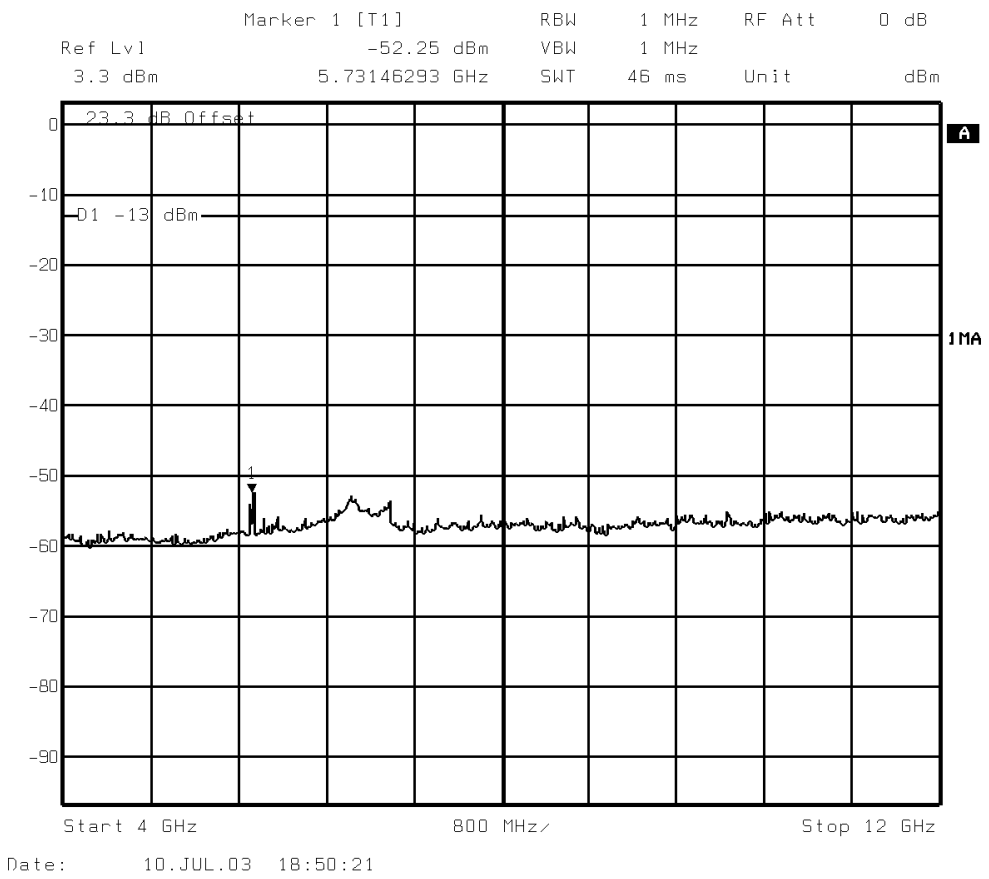
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (4GHz – 12GHz)
Channel 810 (1909.8MHz) – Minimum Power



GSM – Circuit Switched

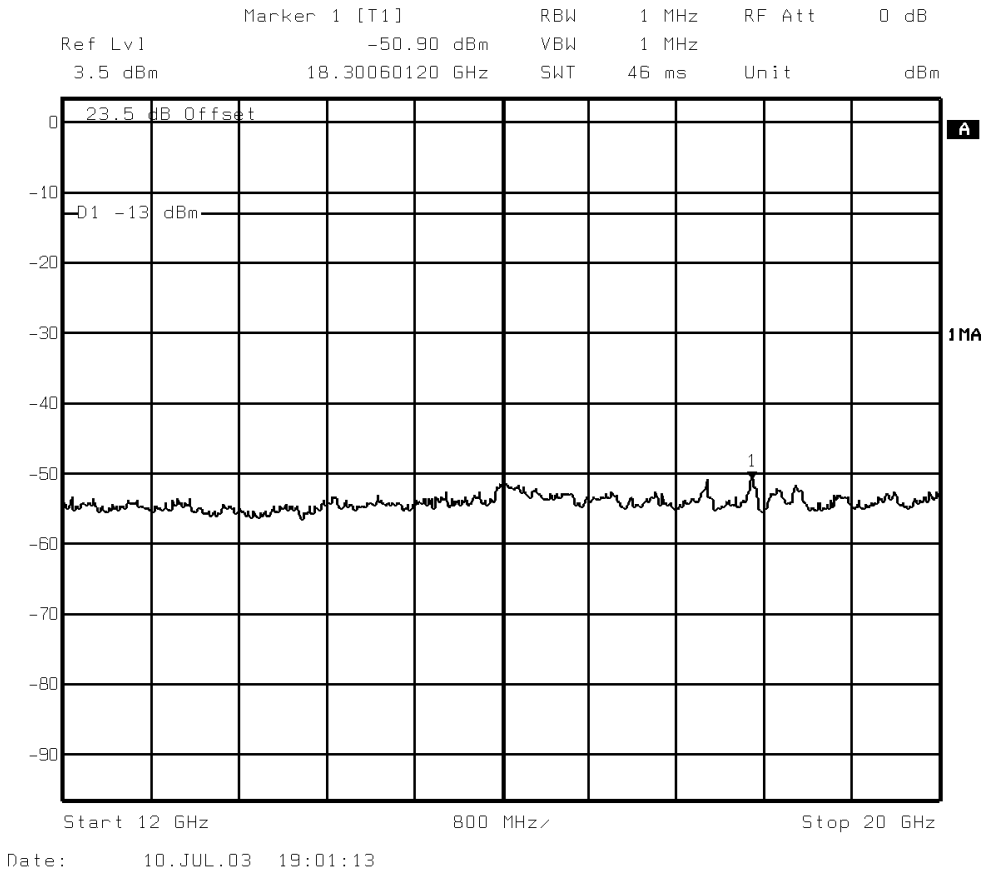
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (12GHz – 20GHz)
Channel 810 (1909.8MHz) – Minimum Power

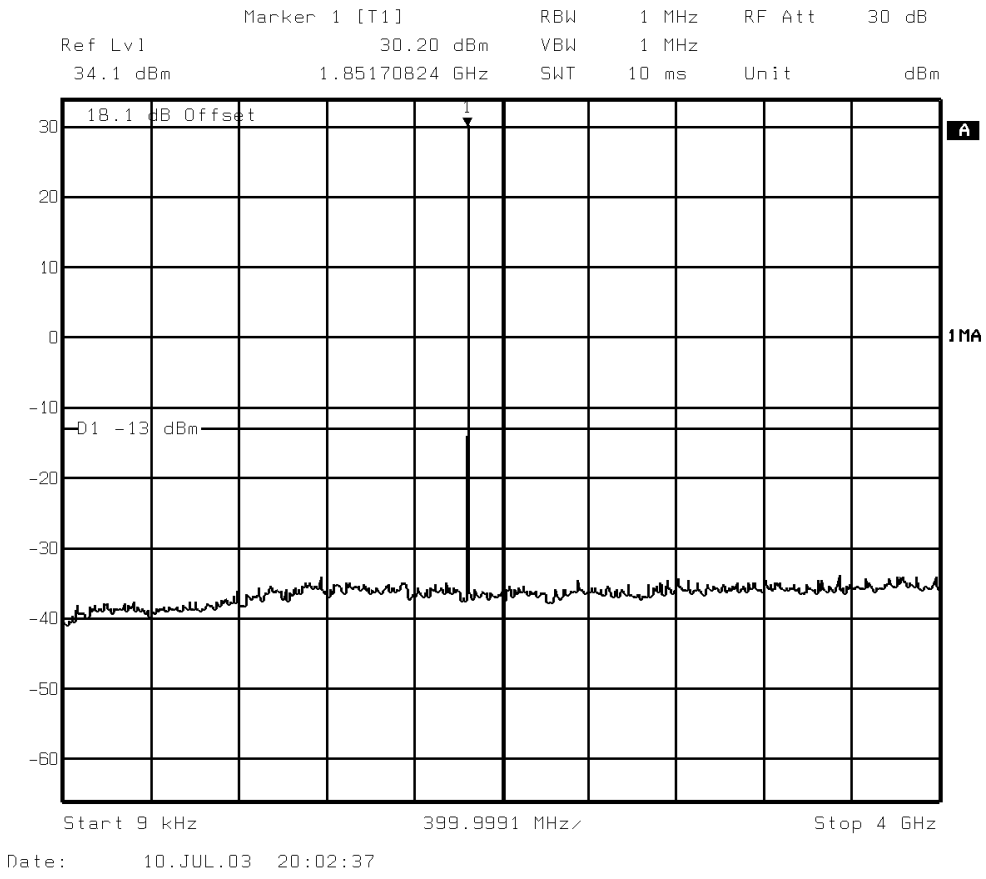


GSM – Circuit Switched

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 512 (1850.2MHz) - Maximum Power

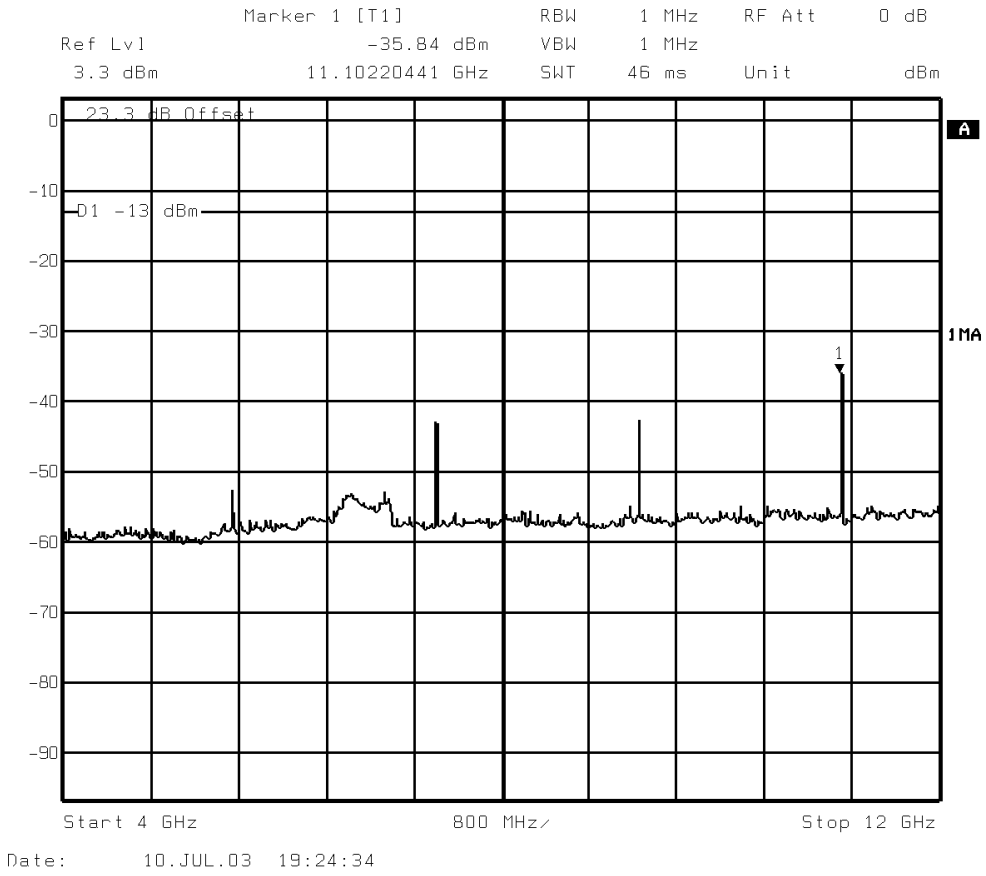


GPRS – Packet Data

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (4GHz – 12GHz)
Channel 512 (1850.2MHz) – Maximum Power

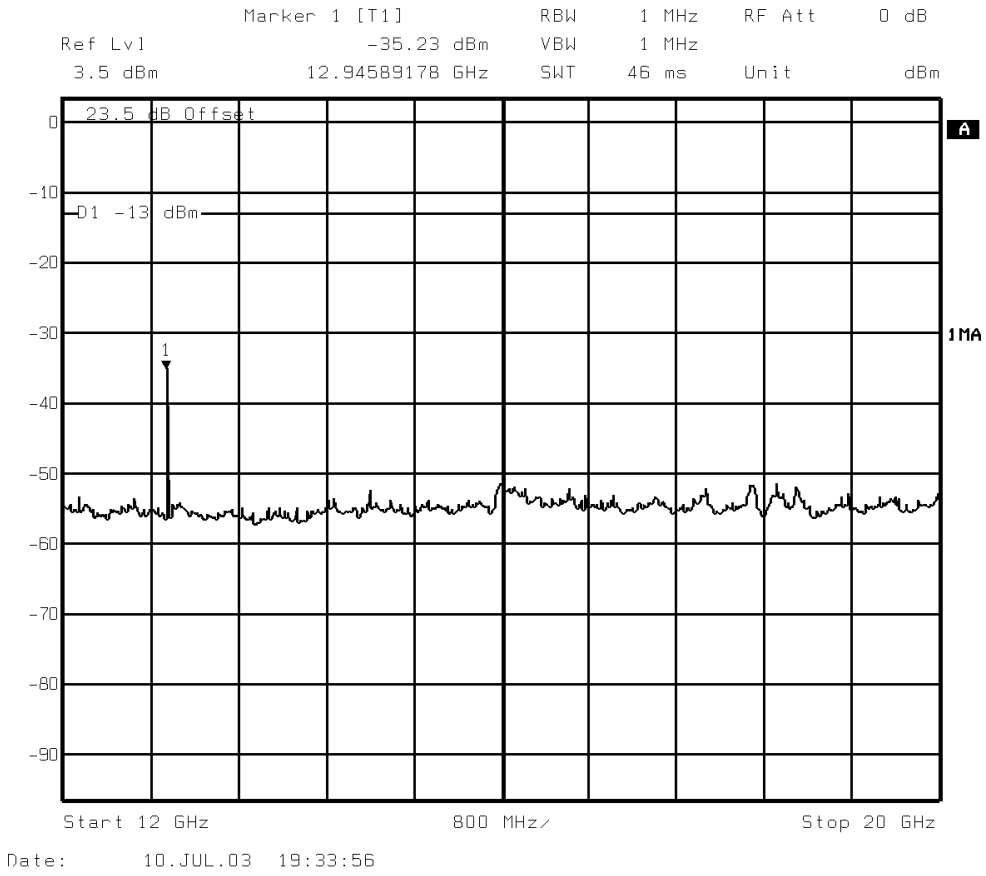


GPRS – Packet Data

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (12GHz – 20GHz)
Channel 512 (1850.2MHz) – Maximum Power

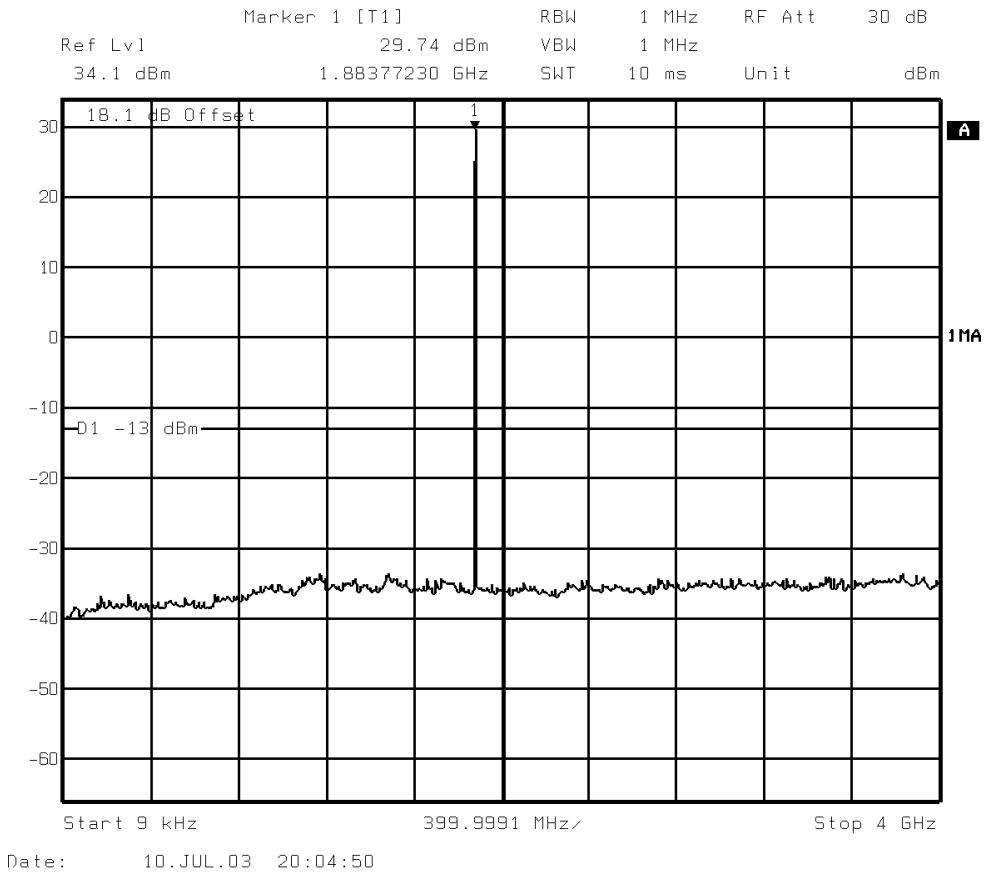


GPRS – Packet Data

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
…….

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 661 (1880.0MHz) – Maximum Power

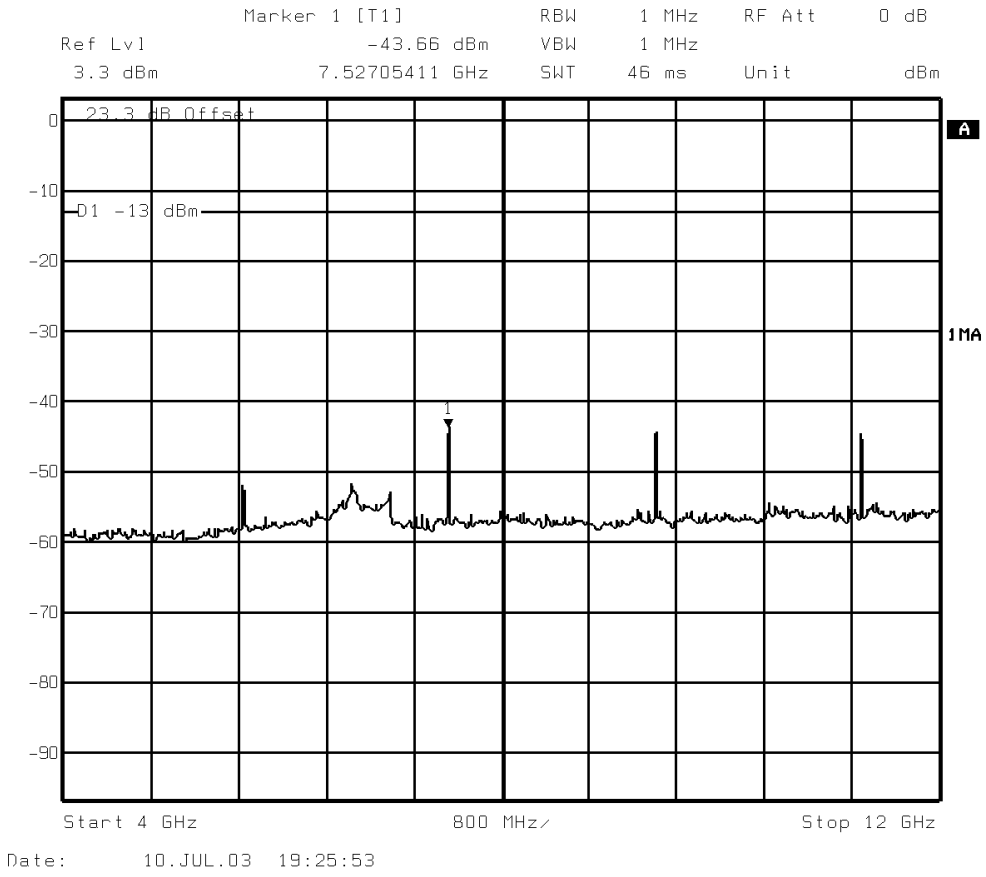


GPRS – Packet Data

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (4GHz - 12GHz)
Channel 661 (1880.0MHz) – Maximum Power

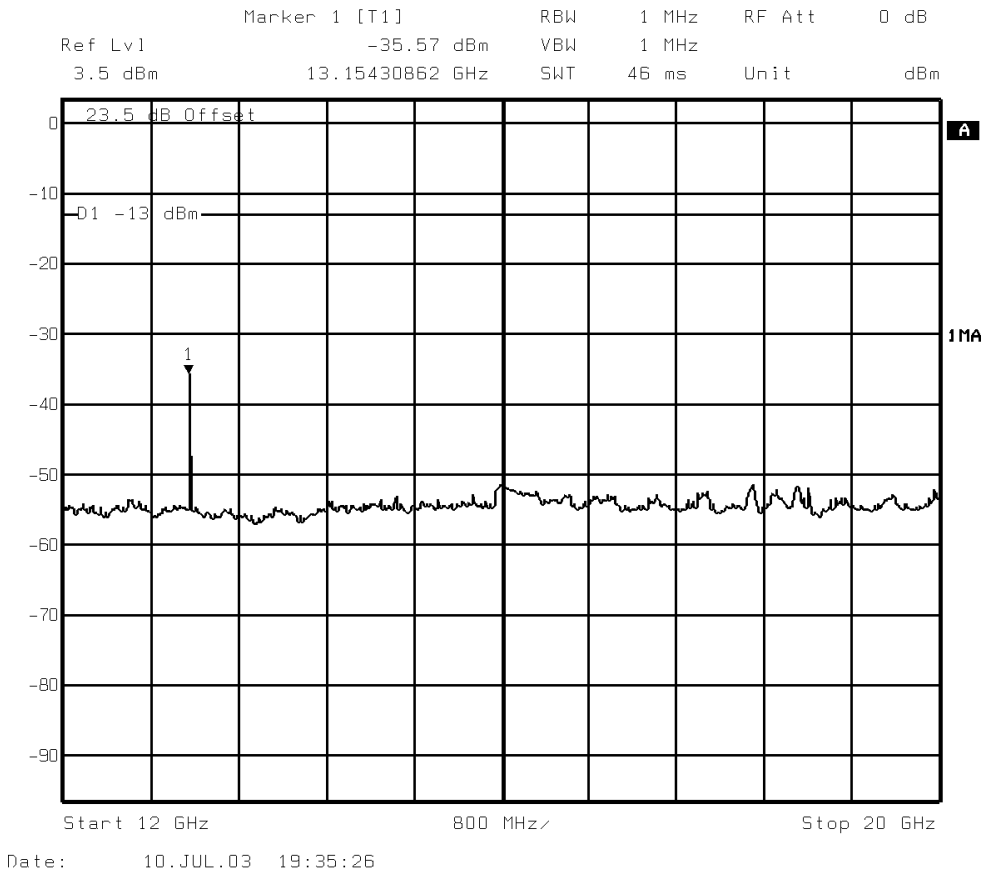


GPRS – Packet Data

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (12GHz – 20GHz)
Channel 661 (1880.0MHz) – Maximum Power



GPRS – Packet Data

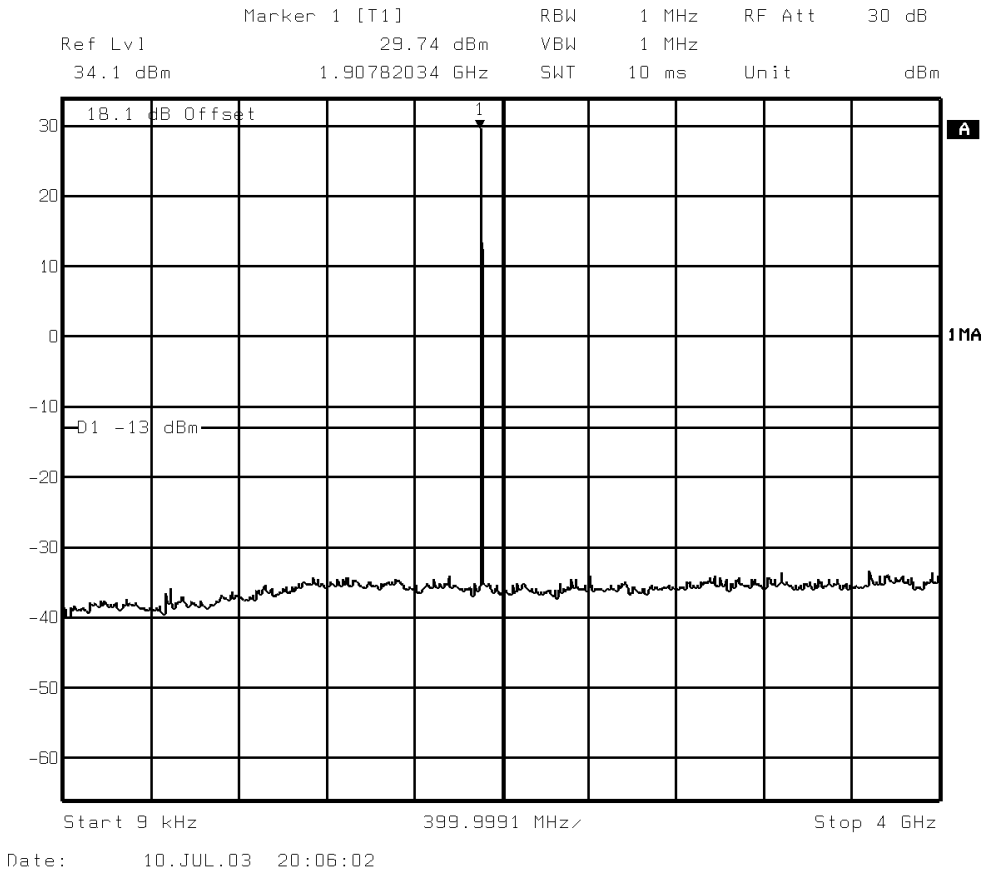
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 810 (1909.8MHz) – Maximum Power

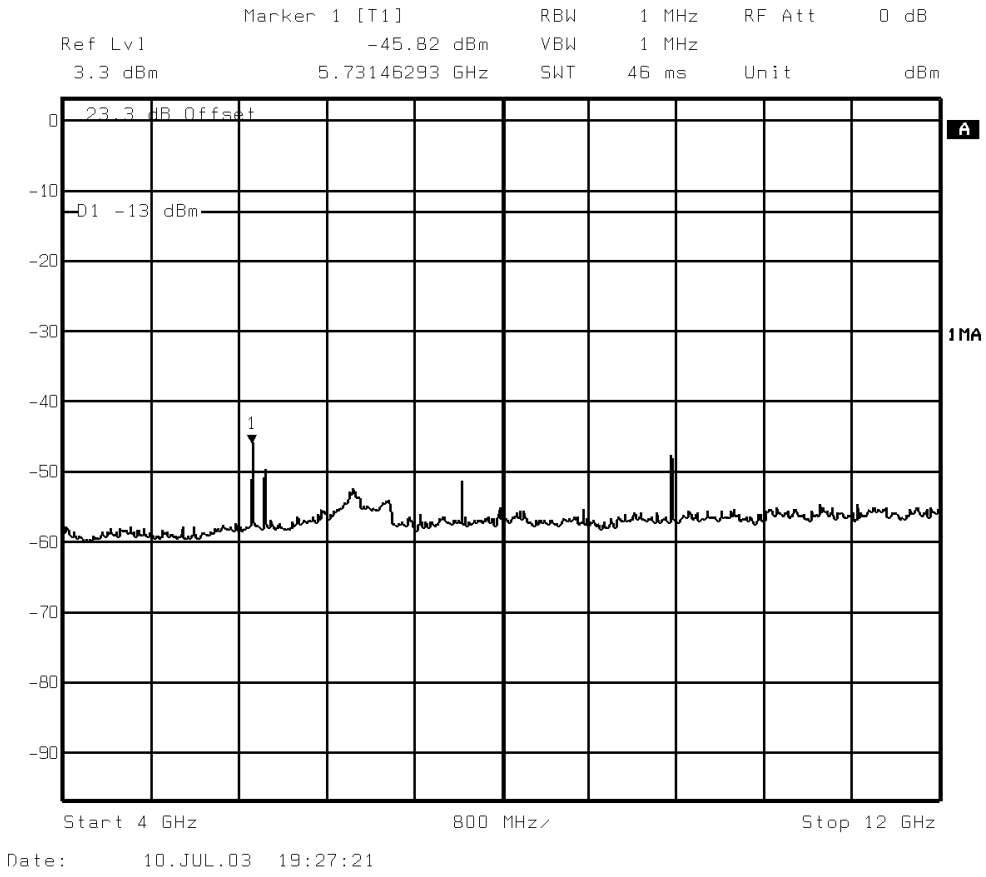


GPRS – Packet Data

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case	:	Spurious Emissions
Test Date	:	10th July 2003
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (4GHz – 12GHz)
Channel 810 (1909.8MHz) – Maximum Power



GPRS – Packet Data

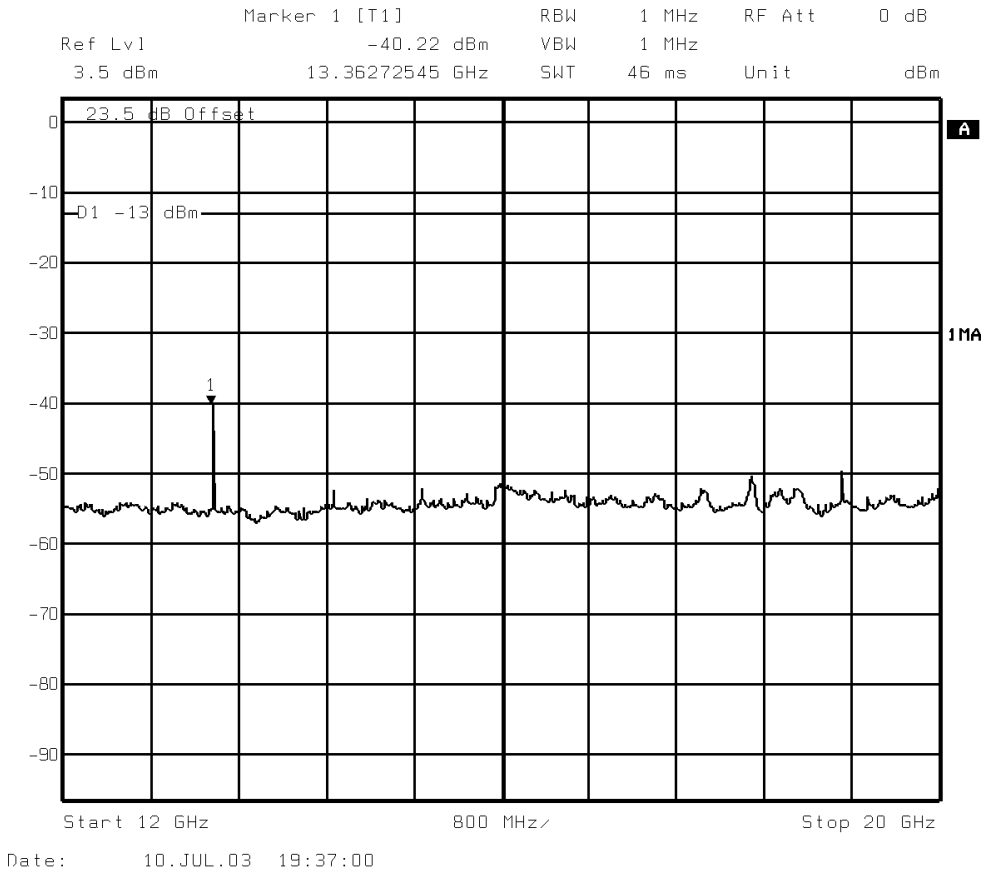
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (12GHz – 20GHz)
Channel 810 (1909.8MHz) – Maximum Power



GPRS – Packet Data

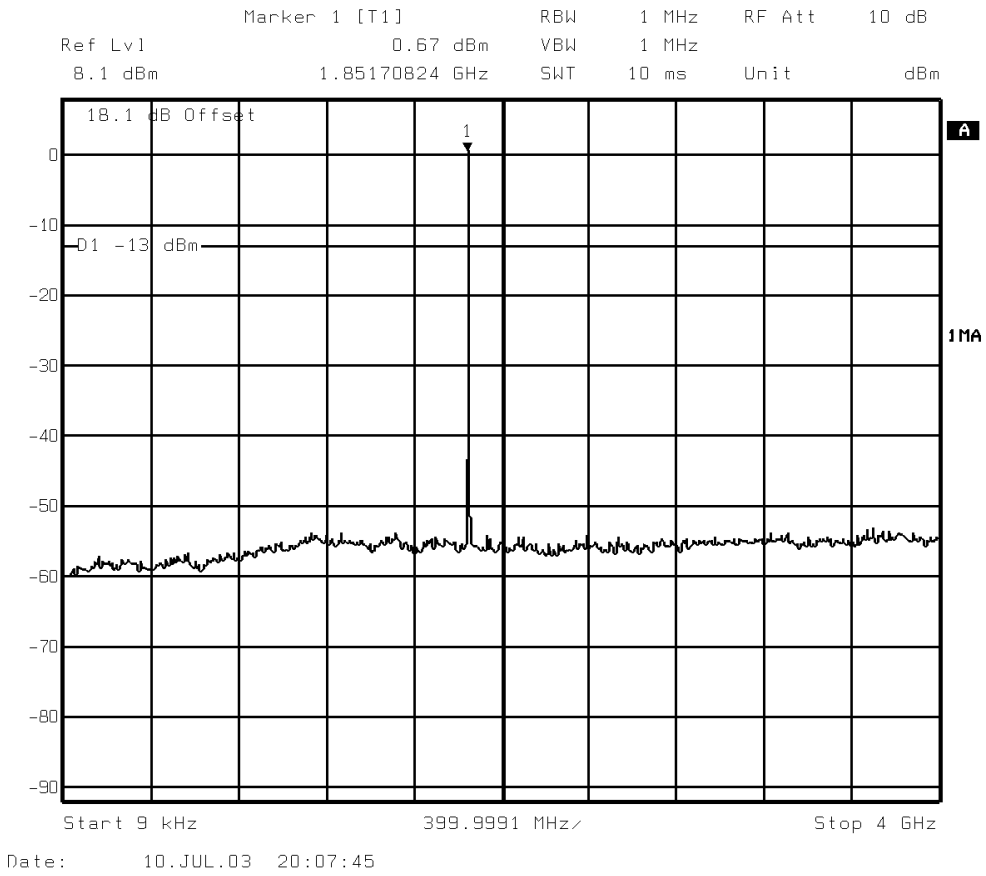
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 512 (1850.2MHz) – Minimum Power



GPRS – Packet Data

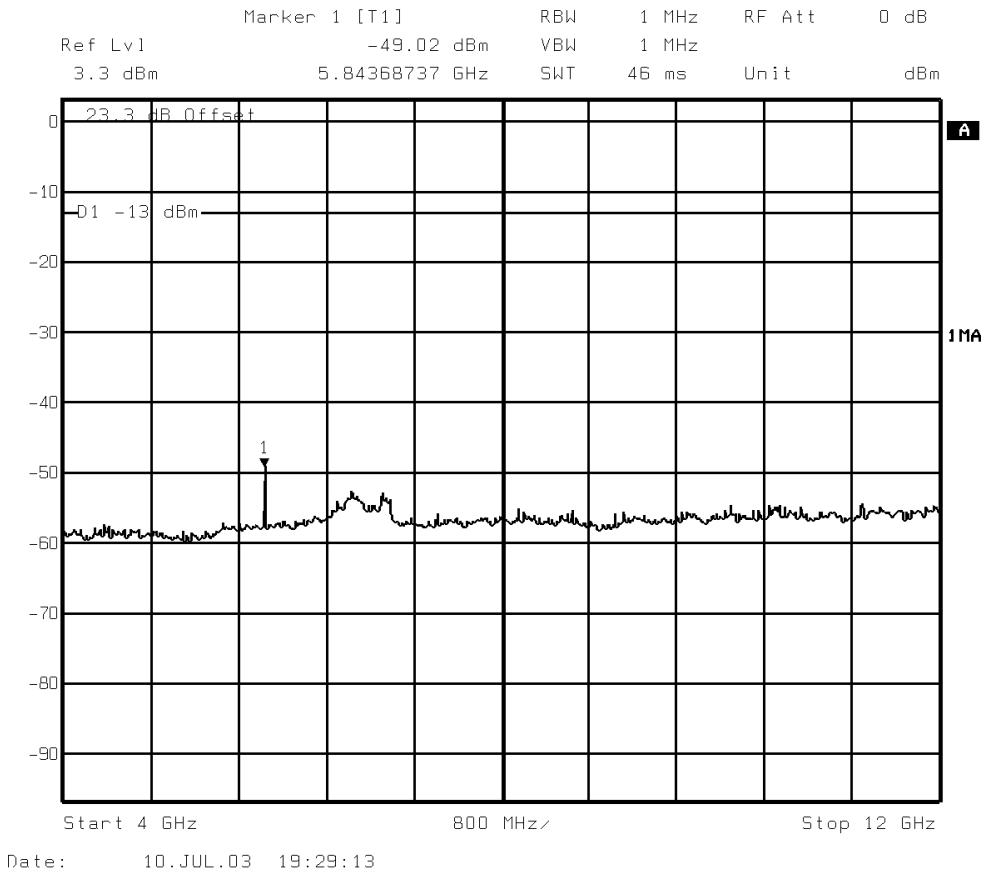
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (4GHz – 12GHz)
Channel 512 (1850.2MHz) – Minimum Power



GPRS – Packet Data

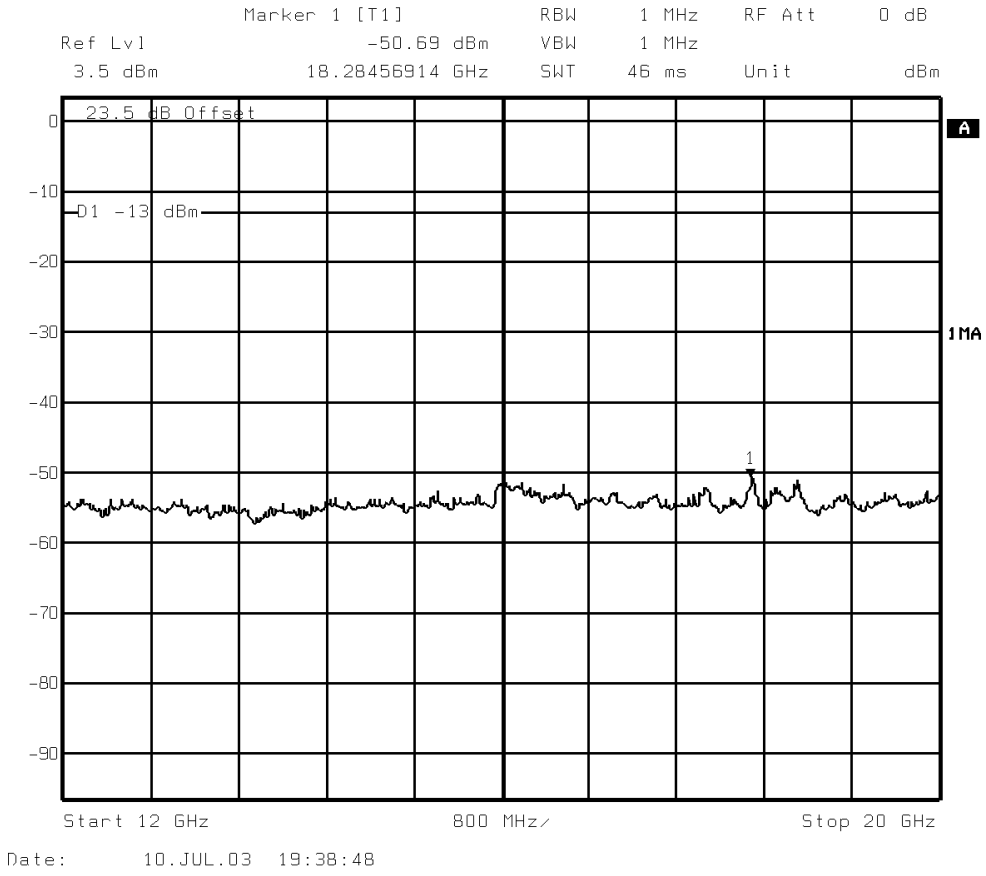
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……..

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (12GHz-20GHz)
Channel 512 (1850.2MHz) – Minimum Power



GPRS – Packet Data

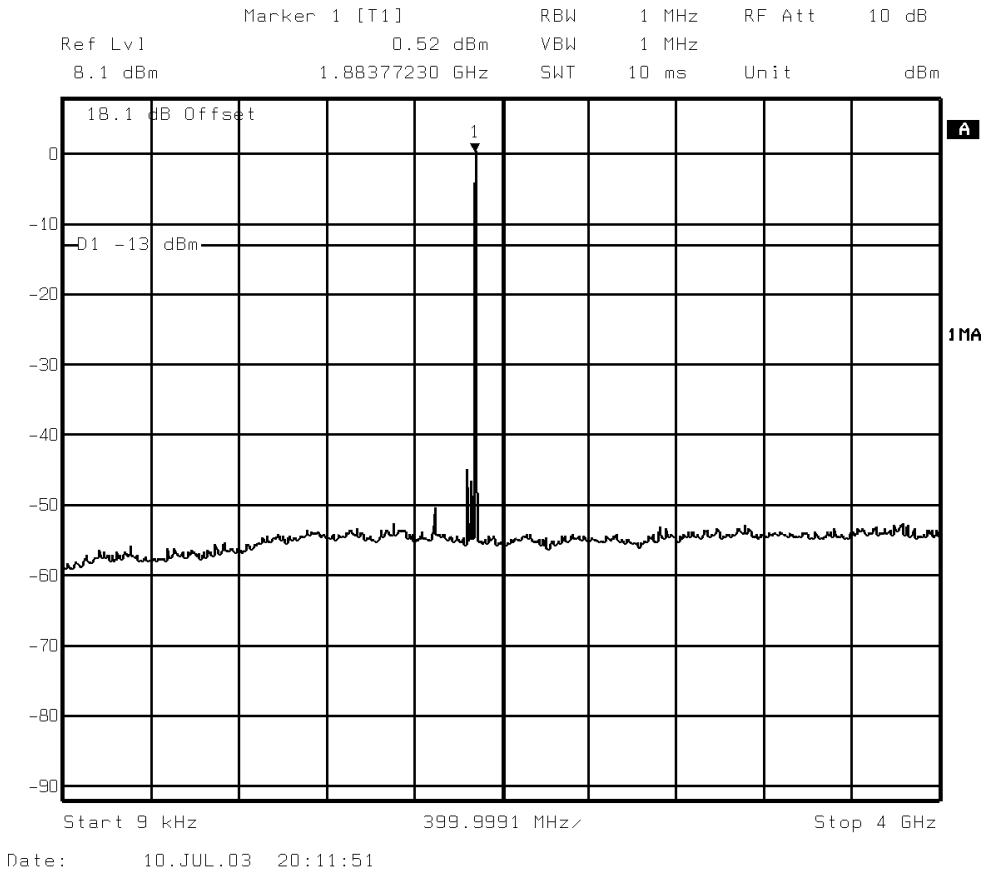
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 661 (1880.0MHz) – Minimum Power



GPRS – Packet Data

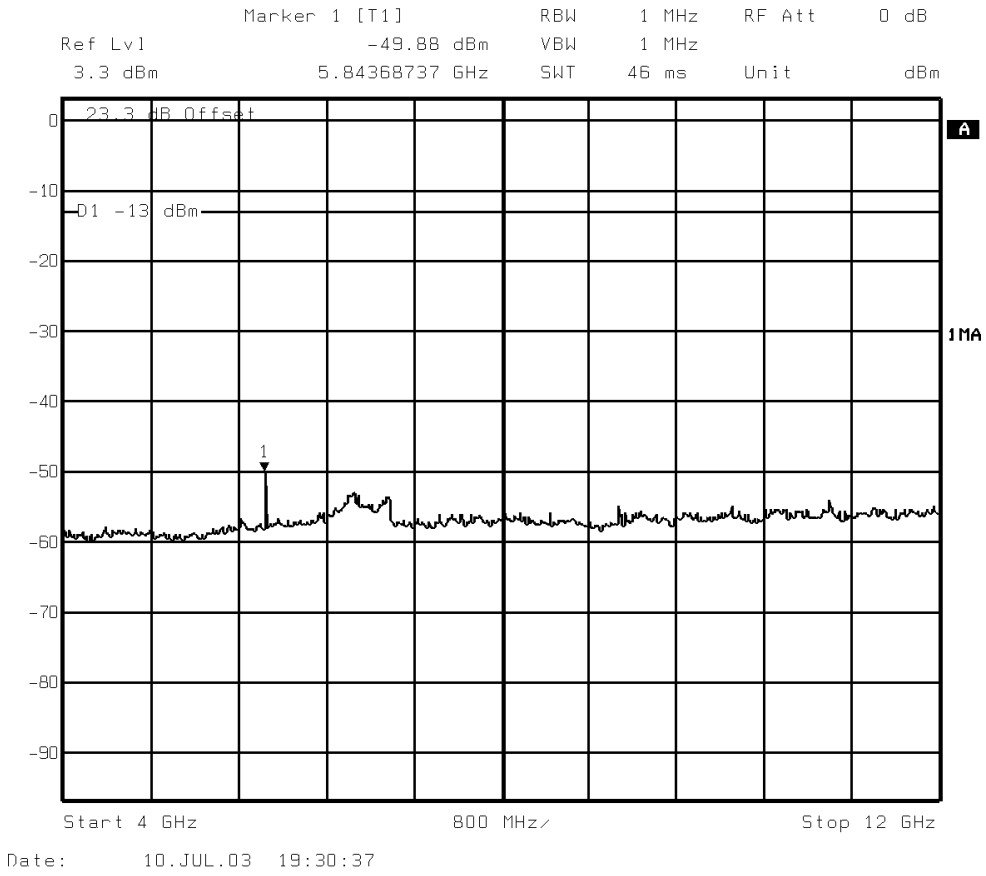
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
……..

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (4GHz – 12GHz)
Channel 661 (1880.0MHz) – Minimum Power



GPRS – Packet Data

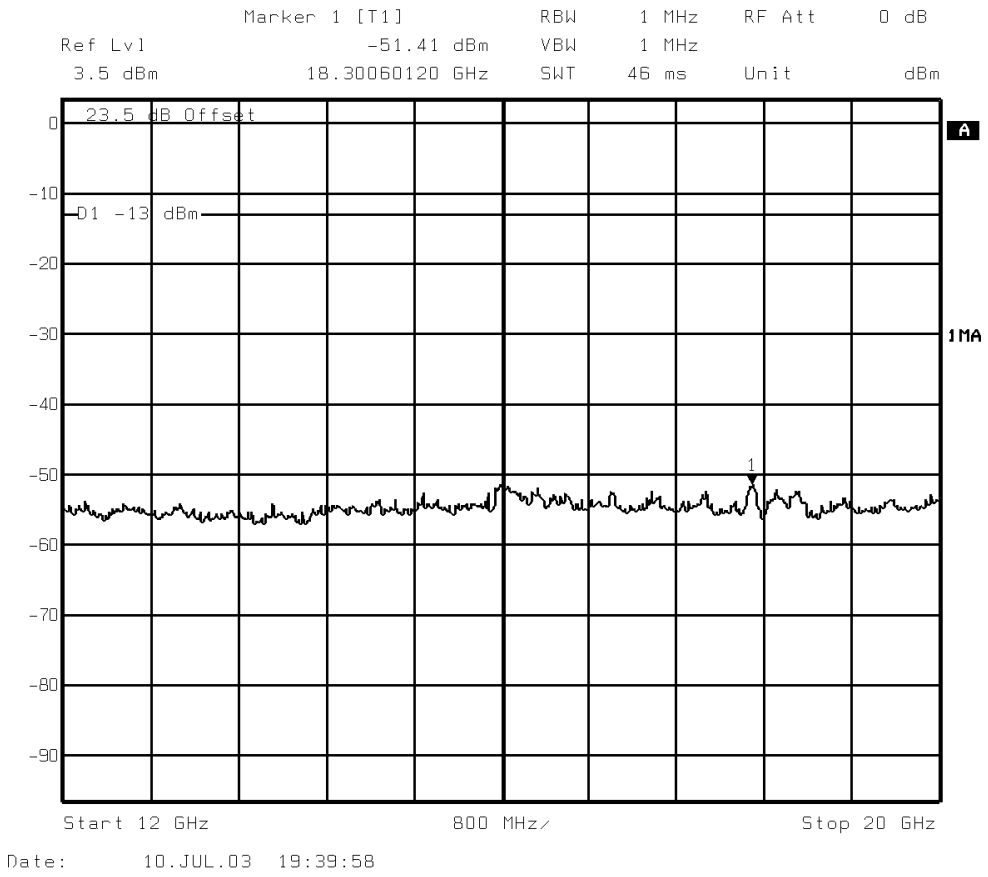
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……..

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (12GHz – 20GHz)
Channel 661 (1880.0MHz) – Minimum Power



GPRS – Packet Data

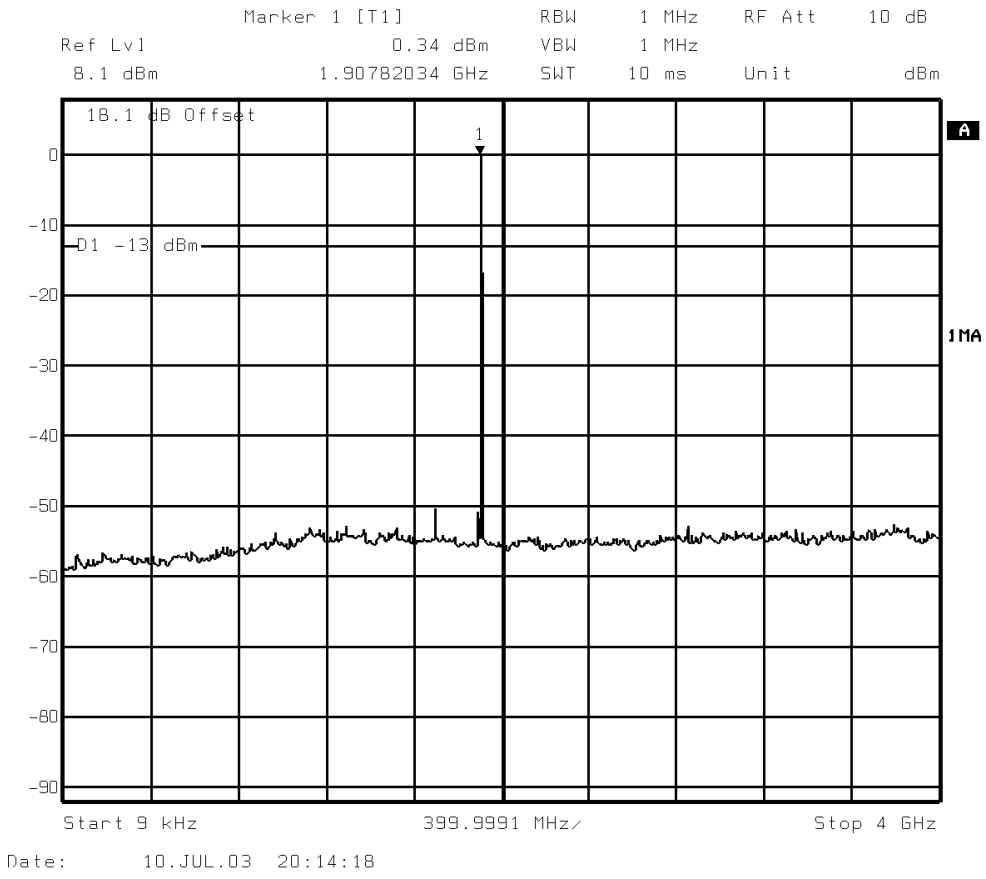
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)
Channel 810 (1909.8MHz) – Minimum Power



GPRS – Packet Data

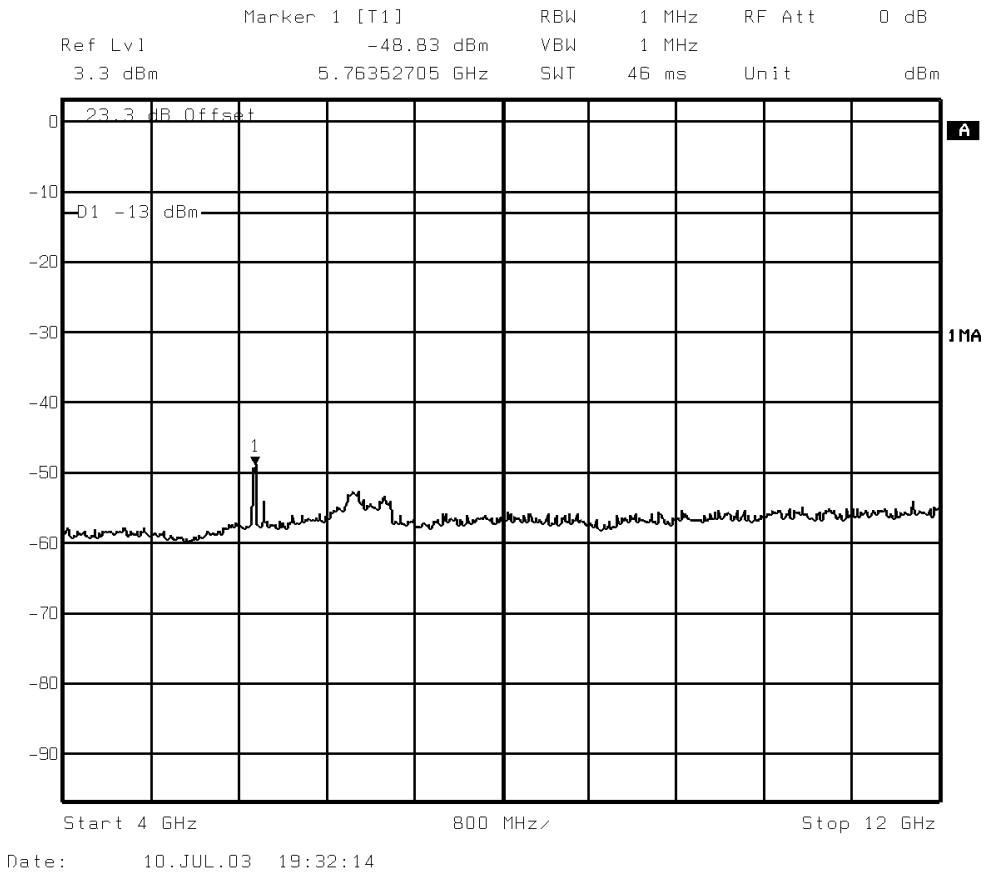
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8
…….

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (4GHz – 12GHz)
Channel 810 (1909.8MHz) – Minimum Power



GPRS – Packet Data

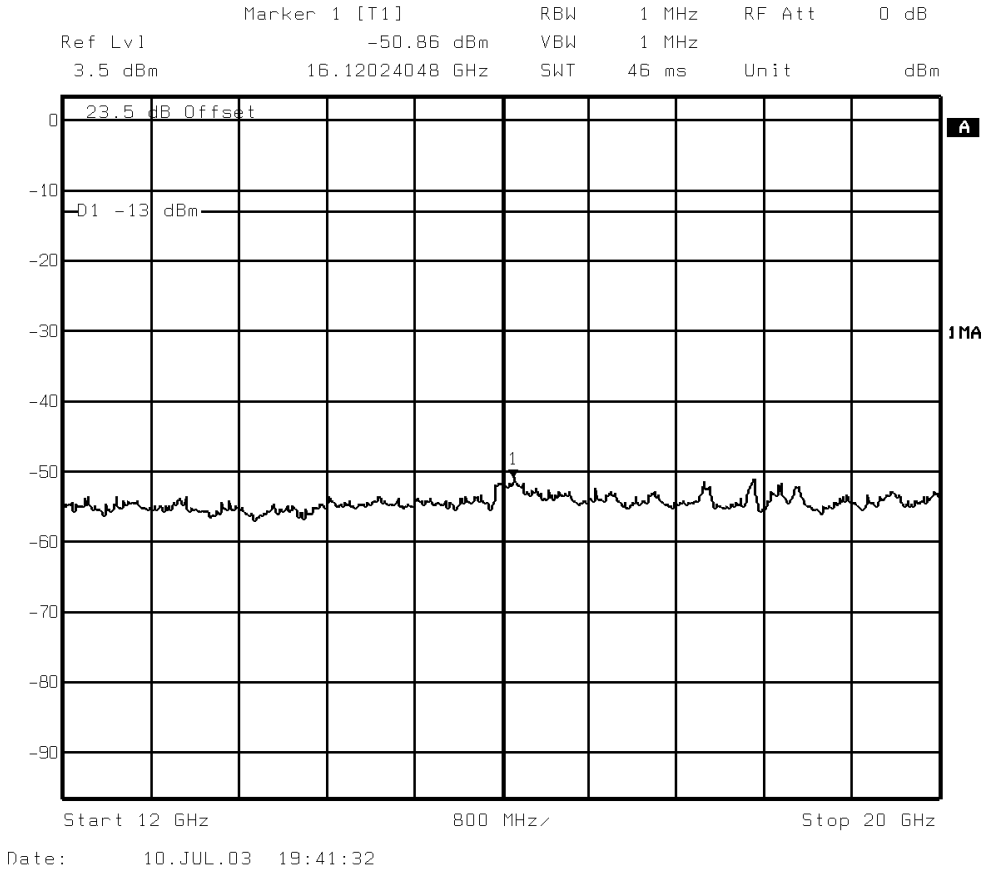
Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Spurious Emissions (12GHz – 20GHz)
Channel 810 (1909.8MHz) – Minimum Power



GPRS – Packet Data

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Harmonic Emissions — Channel 512 (1850.2MHz) – Maximum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.7004	-61.0	19.9	-41.1	-13
5.5506	-77.2	20.3	-56.9	-13
7.4008	-68.5	20.0	-48.5	-13
9.2510	-61.9	21.0	-40.9	-13
11.1012	-59.2	21.3	-37.9	-13
12.9514	-59.6	21.9	-37.7	-13
14.8016	-75.0	21.6	-53.4	-13
16.6068	-77.4*	22.5	-54.9	-13
18.4120	-77.4*	22.3	-55.1	-13

*Instrumentation Noise Floor

Harmonic Emissions — Channel 661 (1880.0MHz)– Maximum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.760	-59.4	19.9	-40.5	- 13
5.640	-71.4	20.3	-51.1	- 13
7.520	-63.3	20.0	-43.3	- 13
9.400	-62.3	21.0	-41.4	- 13
11.280	-60.3	21.3	-38.9	- 13
13.160	-55.6	21.9	-34.3	- 13
15.040	-69.0	21.6	-47.2	- 13
16.920	-77.2*	22.5	-54.6	- 13
18.800	-77.2*	22.3	-54.6	- 13

*Instrumentation Noise Floor

Test Case : Spurious Emissions (continued)

Test Date : 10th July 2003

Harmonic Emissions Channel 810 (1909.8MHz) – Maximum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.8196	-61.5	19.9	-42.5	-13
5.7294	-68.4	20.3	-48.1	-13
7.6392	-67.3	20.0	-47.3	-13
9.5490	-64.7	21.0	-44.0	-13
11.4588	-72.5	21.3	-50.9	-13
13.3686	-58.1	21.9	-36.5	-13
15.2784	-66.5	21.6	-45.2	-13
17.1882	-77.4*	22.5	-55.3	-13
19.0980	-77.4*	22.3	-54.5	-13

* Instrumentation Noise Floor

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10
……

Test Case : Spurious Emissions

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Harmonic Emissions — Channel 512 (1850.2MHz) – Minimum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.7004	-79.5*	19.9	-59.6	-13
5.5506	-79.5*	20.3	-59.2	-13
7.4008	-74.7*	20.0	-54.7	-13
9.2510	-74.1*	21.0	-53.1	-13
11.1012	-73.1*	21.3	-51.8	-13
12.9514	-70.5*	21.9	-48.6	-13
14.8016	-69.0*	21.6	-47.4	-13
16.6068	-70.4*	22.5	-47.9	-13
18.4120	-69.5*	22.3	-47.2	-13

*Instrumentation Noise Floor

Harmonic Emissions — Channel 661 (1880.0MHz) – Minimum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.760	-80.2*	19.9	-61.3	- 13
5.640	-82.8*	20.3	-62.5	- 13
7.520	-73.6*	20.0	-53.6	- 13
9.400	-73.9*	21.0	-53.0	- 13
11.280	-74.4*	21.3	-53.0	- 13
13.160	-70.5*	21.9	-49.2	- 13
15.040	-69.1*	21.6	-47.3	- 13
16.920	-69.9*	22.5	-47.3	- 13
18.800	-68.8*	22.3	-46.2	- 13

*Instrumentation Noise Floor

Test Case : Spurious Emissions (continued)

Test Date : 10th July 2003

Harmonic Emissions Channel 810 (1909.8MHz) – Minimum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.8196	-80.1*	19.9	-61.1	- 13
5.7294	-79.7	20.3	-59.4	- 13
7.6392	-73.8*	20.0	-53.8	- 13
9.5490	-74.8*	21.0	-54.1	- 13
11.4588	-75.0*	21.3	-53.4	- 13
13.3686	-69.5*	21.9	-47.9	- 13
15.2784	-69.4*	21.6	-48.1	- 13
17.1882	-70.1*	22.5	-48.0	- 13
19.0980	-65.9*	22.3	-43.0	- 13

* Instrumentation Noise Floor

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10
……

Test Case : Spurious Emissions - GPRS

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Harmonic Emissions — Channel 512 (1850.2MHz) – Maximum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.7004	-59.3	19.9	-39.4	-13
5.5506	-82.7	20.3	-62.4	-13
7.4008	-64.5	20.0	-44.5	-13
9.2510	-61.0	21.0	-40.0	-13
11.1012	-54.8	21.3	-33.5	-13
12.9514	-56.9	21.9	-35.0	-13
14.8016	-71.1	21.6	-49.5	-13
16.6068	-75.1*	22.5	-52.6	-13
18.4120	-75.1*	22.3	-52.8	-13

*Instrumentation Noise Floor

Harmonic Emissions — Channel 661 (1880.0MHz)– Maximum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.760	-61.3	19.9	-42.4	- 13
5.640	-74.7	20.3	-54.4	- 13
7.520	-62.7	20.0	-42.7	- 13
9.400	-61.0	21.0	-40.1	- 13
11.280	-60.5	21.3	-398.1	- 13
13.160	-52.6	21.9	-31.3	- 13
15.040	-66.5	21.6	-44.7	- 13
16.920	-69.9*	22.5	-47.3	- 13
18.800	-65.5*	22.3	-42.9	- 13

*Instrumentation Noise Floor

Test Case : Spurious Emissions - GPRS (continued)

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Harmonic Emissions — Channel 810 (1909.8MHz) – Maximum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.8196	-61.3	19.9	-42.3	-13
5.7294	-68.5	20.3	-48.2	-13
7.6392	-66.3	20.0	-46.3	-13
9.5490	-64.3	21.0	-43.6	-13
11.4588	-70.7	21.3	-49.1	-13
13.3686	-56.2	21.9	-34.6	-13
15.2784	-67.1	21.6	-45.8	-13
17.1882	-70.5	22.5	-48.4	-13
19.0980	-65.4	22.3	-42.5	-13

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10
……

Test Case : Spurious Emissions - GPRS

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Harmonic Emissions — Channel 512 (1850.2MHz) – Minimum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.7004	-79.6*	19.9	-59.7	-13
5.5506	-79.6*	20.3	-59.3	-13
7.4008	-74.6*	20.0	-54.6	-13
9.2510	-73.7*	21.0	-52.7	-13
11.1012	-74.3*	21.3	-53.0	-13
12.9514	-70.4*	21.9	-48.5	-13
14.8016	-69.3*	21.6	-47.7	-13
16.6068	-70.7*	22.5	-48.2	-13
18.4120	-70.1*	22.3	-47.8	-13

*Instrumentation Noise Floor

Harmonic Emissions — Channel 661 (1880.0MHz) – Minimum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.760	-79.7*	19.9	-60.8	- 13
5.640	-79.6*	20.3	-59.3	- 13
7.520	-74.1*	20.0	-54.1	- 13
9.400	-73.4*	21.0	-52.5	- 13
11.280	-73.9*	21.3	-52.5	- 13
13.160	-70.2*	21.9	-48.9	- 13
15.040	-68.6*	21.6	-46.8	- 13
16.920	-70.2*	22.5	-47.6	- 13
18.800	-65.6*	22.3	-43.0	- 13

*Instrumentation Noise Floor

Test Case : Spurious Emissions (continued)

Test Date : 10th July 2003

Rule Parts : 2.1051, 24.238(a)

Harmonic Emissions Channel 810 (1909.8MHz) – Minimum Power

Frequency (GHz)	Raw Result (dBm)	Path Loss (dB)	Corrected Result (dBm)	Limit (dBm)
3.8196	-80.1*	19.9	-61.1	- 13
5.7294	-74.3*	20.3	-54.0	- 13
7.6392	-75.0*	20.0	-55.0	- 13
9.5490	-73.6*	21.0	-52.9	- 13
11.4588	-74.4*	21.3	-52.8	- 13
13.3686	-69.2*	21.9	-47.6	- 13
15.2784	-69.7*	21.6	-48.4	- 13
17.1882	-70.4*	22.5	-48.3	- 13
19.0980	-65.2*	22.3	-42.3	- 13

* Instrumentation Noise Floor

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10
……

Test Case : Frequency Stability Under Temperature Variations

Test Date : 2nd July 2003

Rule Parts : 2.1055, 24.135(a)

Measurement Method

GSM

The EUT was set to transmit on maximum power and measurements were made on Timeslot 3. A Digital Communications Analyser, (CMU200), was used to measure the Frequency Error. The maximum result of measurements made over 200 bursts was recorded.

GPRS

The EUT was set to transmit on maximum power, (timeslots 3 and 4 active), and measurements performed on Timeslot 3. . A Digital Communications Analyser, (CMU200), was used to measure the Frequency Error. The maximum result of measurements made over 200 bursts was recorded.

Results

GSM – Circuit Switched

Temperature Interval(ºC)	Test Frequency (GHz)	Deviation (Hz)	Limit (kHz)
- 30	1.88	+40	± 1.88
- 20	1.88	+58	± 1.88
- 10	1.88	+25	± 1.88
0	1.88	-26	± 1.88
+ 10	1.88	+28	± 1.88
+ 20	1.88	-25	± 1.88
+ 30	1.88	-33	± 1.88
+ 40	1.88	+26	± 1.88
+ 50	1.88	+26	± 1.88

Test Case : Frequency Stability Under Temperature Variations – (continued)

Test Date : 2nd July 2003

Rule Parts : 2.1055, 24.135(a)

GPRS – Packet Data

Temperature Interval(ºC)	Test Frequency (GHz)	Deviation (Hz)	Limit (kHz)
- 30	1.88	-30	± 1.88
- 20	1.88	+60	± 1.88
- 10	1.88	-42	± 1.88
0	1.88	-38	± 1.88
+ 10	1.88	-32	± 1.88
+ 20	1.88	-26	± 1.88
+ 30	1.88	+31	± 1.88
+ 40	1.88	-35	± 1.88
+ 50	1.88	-25	± 1.88

Limit	±0.0001% or 1ppm

Remarks

EUT complies with CFR 47 Part 24.135(a). The EUT does not exceed ±1.88kHz at the measured frequency at any temperature interval across the measured range.

Test Equipment Used:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10
……

Test Case : Frequency Stability Under Voltage Variations

Test Date : 16th July 2003

Rule Parts : 24.135(a)

Measurement Method

Results

GSM

DC Voltage (V)	Test Frequency (GHz)	Deviation (Hz)	Deviation Limit (kHz)
4.25	1.88	-23	± 1.88
5.00	1.88	28	± 1.88
5.75	1.88	-25	± 1.88

GPRS

DC Voltage (V)	Test Frequency (GHz)	Deviation (Hz)	Deviation Limit (kHz)
4.25	1.88	-41	± 1.88
5.00	1.88	-44	± 1.88
5.75	1.88	-42	± 1.88

Limit	±0.0001% or 1ppm

Remarks

EUT complies with CFR 47 Part 24.135(a). The EUT does not exceed ±1.88kHz at the measured frequency either at nominal or voltage variation.

Test Equipment Used:
1, 2, 3, 4, 6, 7, 8
…….

TEST SAMPLE PHOTOGRAPHS

Figure One : Front View of the BENQ 56W10 Sample.

2.6 **TEST SAMPLE PHOTOGRAPHS** Continued

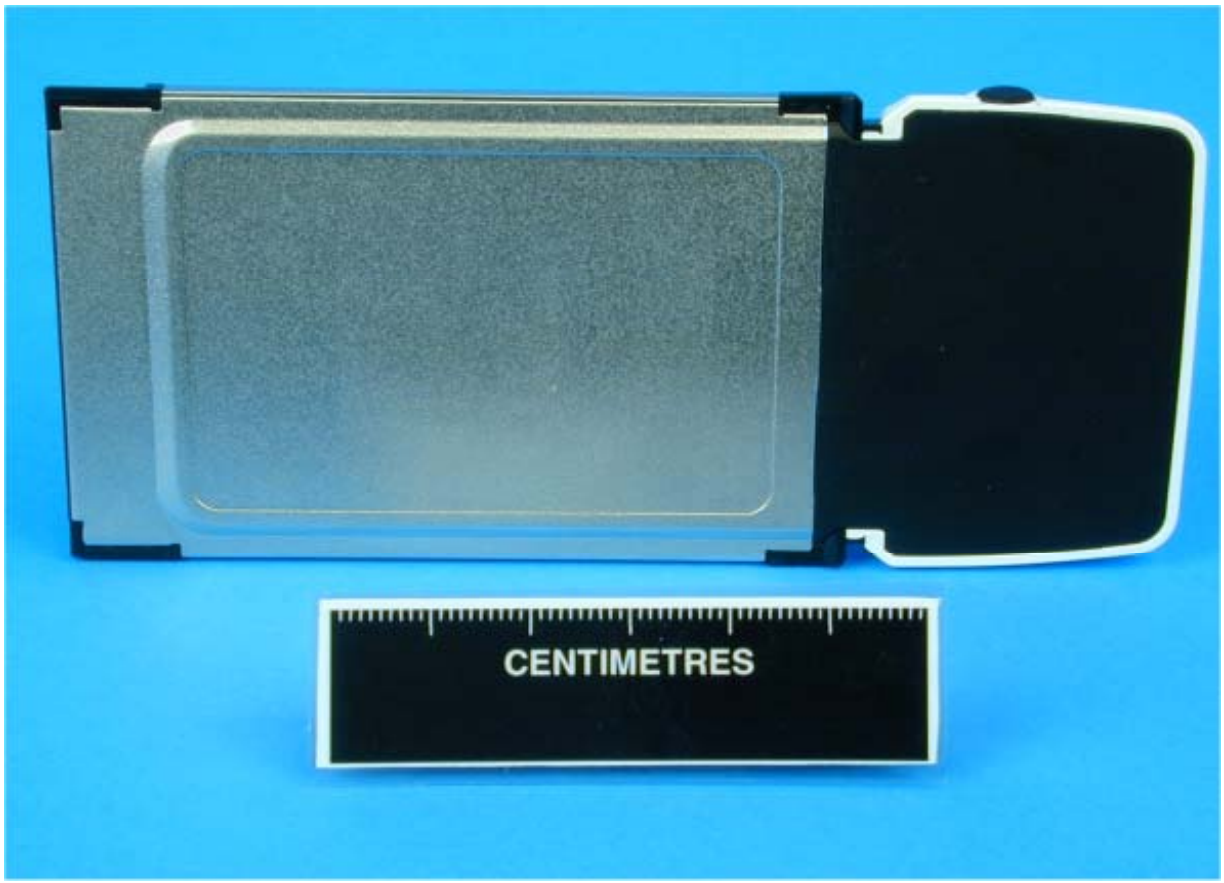


Figure Two : Rear View of the BENQ 56W10 Sample.

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Group

UKAS Accreditations do not cover opinions and interpretations and any expressed herein are outside the scope of any UKAS Accreditation.

Results of tests not yet included in our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

Annex A

FCC Measurement Facility Compliance Letter

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

October 18, 2002

Registration Number: 90987

TUV Product Service Ltd
Segensworth Road
Titchfield
Fareham, Hampshire, PO15 5RH
United Kingdom
Attention: Kevan Adsetts

Re: Measurement facility located at Titchfield
Anechoic chamber (3 meters) and 3 & 10 meter OATS
Date of Listing: October 18, 2002

Gentlemen:

Your request for registration of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC rules. The information has, therefore, been placed on file and the name of your organization added to the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Thomas W. Phillips

Thomas W Phillips
Electronics Engineer