REPORT ON

In support of the Application for Grant of Equipment Authorization of the
Motorola Horizon*Macro* GSM 1900 Base Station

FCC ID: IHET6BV1 February 2002

TÜV PRODUCT SERVICE

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Equipment:	Horizon*Macro* GSM 1900 Base Station
FCC ID:	IHET6BV1
Specification:	47 CFR 2 & 47 CFR 24
Applicant:	Motorola GSM Systems Division 16 Euroway Blagrove Swindon SN5 8YQ
Manufacturer:	Motorola GSM Systems Division 16 Euroway Blagrove Swindon SN5 8YQ
Manufacturer's Representative:	Mr Andrew Pinnell-Hutchison
Approved by:	**M JENKINS** Wireless Group Leader
Dated:	21st February 2002
Start of Test:	15th October 2001
Completion of Test:	22nd October 2001
Report Distribution:	Motorola GSD Mr D Reid 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

0141
Group

CONTENTS:-

For copyright details see Page 98 of 98

Introduction

The information contained within this report is intended to show verification of compliance of the Motorola PCS Base Transmitter Station, Horizon*Macro* GSM 1900, to the requirements of 47 CFR 2 and 47 CFR 24.

Location Of Testing

All testing was conducted at the premises of Motorola GSM Systems Division, 16 Euroway, Blagrove, Swindon, Wiltshire, SN5 8TQ, with the exception of Radiated Emissions and AC Line Conducted Emissions. Testing at Motorola was carried out by BABT Personnel, Simon Bennett, Test Manager. Radiated Emissions and AC Line Conducted Emissions measurements were performed at BABT, Segensworth Road, Fareham, Hampshire, PO15 5RH. Radiated Emissions measurements were performed on a 3 metre open area test site (OATS). A complete site description is on file with the FCC Laboratory Division, Registration Number: 90987. See Annex A.

Test Equipment and Ancillaries Used For Test

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due
1	Spectrum Analyser	FSEM	Rohde & Schwarz	845112/006	7/9/02
2	Digital Radiocomms Tester	CMD57	Rohde & Schwarz	840676/010	9/8/02
3	Signal Generator	83623B	Agilent	3844A01104	-
4	Climatic Chamber	KJP-499-THCM2-10-10	Thermotron	31766	Note 3
5	Variac	Z 710R	Varatron	INV2221	T/U
6	DVM	70 III	Fluke	72320985	13/12/01
7	Notch	WRCT1920/2200-(5/40)-10EE	Wainwright Instruments	1	T/U
8	High Pass Filter	F-100-3000-5-R	RLC	0012	T/U
9	Attenuator	47-10-34	Weinschel	BC2506	23/8/02
10	Attenuator	AT9195	Weinschel	BH4996	23/8/02
11	Hygromer	A1	Rotronic	12814038	
12	EMI Receiver	8542E	Hewlett Packard	2286	04/12/01
13	Biconical Antenna	94455-1	Ailtech	422	05/12/02
14	Log Periodic Antenna	AT1000	Amplifier Research	829	05/04/02
15	LISN	MN2050	Chase	1269	09/08/02
16	Transient Limiter	11947A	Hewlett Packard	2271	T/U
17	Automatic Turntable & Controller	1060	EMCO	1322	T/U
18	Automatic Antenna Mast & Controller	1050	EMCO	1321	T/U
19	Low Noise Amplifier	AMF-3D-001080-18-13P	Miteq	2457	T/U
20	Low Noise Amplifier	AMF-4E-080180-15-10P	Miteq	2430	T/U
21	Spectrum Analyser	8562A	Hewlett Packard	2282	25/05/02

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due
22	Horn	3115	EMCO	2297	26/05/02
23	Horn	3115	EMCO	2397	26/05/02
24	Signal Generator	8672A	Hewlett Packard	411	14/12/01
25	Signal Generator	2031	Marconi	2198	21/06/02
26	10dB Attenuator	6534/3	Marconi	1494	T/U

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.

3) The temperature and humidity within the Climatic Chamber were verified by using item number 11.

Description of Equipment Under Test Configuration

The BTS was configured in what was considered to be its worst case operating condition. The RF blocks, (TDF's), between the radio and antenna connector represented the minimum path loss, thus giving the highest output power. The module list below shows the complete base station configuration with which the cabinet was populated. The Horizon*macro* Indoor was housed within a cabinet, and is classed as the Outdoor configuration. Again, this is considered the worst case configuration as the complete configuration is housed within the cabinet generating the most heat. The BTS was connected to an external PC which was used to set the unit into the relevant operating modes as described in each test case. Each test mode was selected to give the worst case operating condition for the applicable test.

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

Module	Vendor	Kit Number	Serial Number
Cabinet	Motorola	SV1001	X77FZH0QJH
Radios			
CTU 0	Motorola	SWRG5122#1	X77FIP0720
CTU 1	Motorola	SWRG5122#1	X77FIP072H
CTU 2	Motorola	SWRG5122#1	X77FIP08HX
CTU 3	Motorola	SWRG5122#1	X77FIP072D
CTU 4	Motorola	SWRG5122#1	X77FIP072K
CTU 5	Motorola	SWRG5122#1	X77FIP07Z8
48/60v DC Power Supplies	Motorola	SWPN1221A	ZN1EOU7167
	Motorola	SWPN1221A	ZYHE1B0156
	Motorola	SWPN1221A	ZNHEOT0103
SURF Module	Motorola	SWRG8125#1	X77FIR0EKB
TDF	Motorola	SWFG 8130	X77F1T03M8
	Motorola	SWFG 8130	X77F1T03MA
	Motorola	SWFG 8130	X77F1T03M9
Digital Boards			
Alarm Board	Motorola	SWLN5228#6	X77FZE1G60
NIU Board	Motorola	SWLN4403BB	X77FZA1QNB
NIU Board	Motorola	SWLN4403BB	X77FYRR3XE
BPSM Board	Motorola	0104819C01	X77FZE1G60

TABLE 1

List of Performed Measurements using the configuration in Table 1

i)	Power Output	47 CFR2.1046, 24.232
ii)	Modulation Characteristics	47 CFR2.1047(d)
iii)	Occupied Bandwidth	47 CFR2.1049(h), 24.238(b)
iv)	Band Edge Measurements	47 CFR24.238(b)
v)	Frequency Stability – Temperature Variations	47 CFR2.1055, 24.235
vi)	Frequency Stability – Voltage Variations	47 CFR2.1055(d)(1)

Module	Vendor	Kit Number	Serial Number
Cabinet	Motorola	SW1053	X77FYY1KFW
Transceivers			
CTU1900	Motorola	SWRG8122	X77F1P08HM
			X77F1P07ZG
			X77F1P0803
			X77F1P07ZB
			X77F1P07YX
			X77F1P0809
RF Blocks			
DDF Duplexing Combining Bandpass Filters		SWFG8129	X771Q0PKT
DCF Duplexing Combining Bandpass Filters		SWFG8128	X77F1R00PU
TDF Duplexing Combining Bandpass Filters		SWFC8130	X77F1T03M9
SURF Module	Motorola	SWRG8125	X77F1R0EKA
Power Supplies			
100 - 240V AC (115V AC to +27V DC)		SVPN1222A	ZZ3E1N0426
			ZZ3E1N0424
			ZZ3E1N0245
BPSM Power Supply Module		0104819C01	X75FYY1KCA
			BPSM660408
CCT Breaker Panel	Motorola	SWHN5519	YV1EYV0008
Digital Boards			
MCU-f Main Control Unit (Fiber)	Motorola	SWLN5227	X77FZH0342
NIU Network Interface Unit	Motorola	SWLN4403	X75FXH0S64
			X75FYRR329
			X75FYRR2BH
			X75FYRR3M4
T1 PCB	Motorola	SWZN4024	X560F0F07
Alarm PCB	Motorola	SWLN5228	X77FZE1FGY
Fan Assemblies			
Double Fan		SWHN5289A	Not Serialised
			Not Serialised
Quad Fan		SWHN5790	Not Serialised

TABLE 2

List of Performed Measurements using the configuration in Table 2

i)	Radiated Emissions	47 CFR2.1053, 24.238
vi)	Conducted Emissions	47 CFR2.1051, 24.238(a)

Test Case	:	Radiated Emissions
Test Date	:	17th October 2001
Rule Parts	:	24.238

Measurement Method

The CTU1900 Transceiver in the Horizonmacro Indoor Cabinet together with all associated cabling, was set-up simulating a typical user installation on the Open Field Test Site, then tested in accordance with the specification.

Radiated Emission testing was carried out with the GSM1900 transceivers transmitting on channels 512, 550, 635, 661, 735 and 810.

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.

The EUT was then transferred to the Open Field Site and placed on a remotely controlled turntable. Using the information from the preliminary profiling of the EUT, a search was made in the frequency range 30MHz to 18000MHz. The list of worst case emissions was then confirmed or updated under Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth. Emissions levels were then formally measured using a Quasi-Peak Detector which met the CISPR requirements. The details of the worst case emissions were then recorded in the Job Log Book. Details of the worst case emissions are presented in Table 1.

Radiated Electric Field Emissions measurements were made using a Hewlett Packard 8542E EMI Receiver in the frequency range 30MHz to 1000MHz and a Hewlett Packard 8562A Spectrum Analyser in the frequency range 1000MHz to 18000MHz. Measurements in the range 30MHz to 1000MHz were made using a Quasi-Peak Detector and measurements above 1GHz were made using a Peak Detector.

The EUT was connected to a 115V 60Hz supply.

Determination of Spurious Emissions Limit

As the EUT does not have an integral antenna it was not possible to directly measure the field strength of the carrier. A CW signal from a signal generator was radiated from a calibrated horn antenna at 1960MHz. The level of the signal into the horn was measured. The field strength at 3m was measured. Using the level into the horn and the gain over a dipole the equivalent power into a dipole was calculated, this was then compared to the manufacturers declared output. This difference was then added to the measured field strength to give the EUT field strength. The limit was then calculated in accordance with 24.238(a).

Power into antenna = -37.0dBm
Gain over dipole = 6.02dB
Equivalent power into dipole = -37.0 + 6.02 = -30.98dBm
Declared output from EUT = 32W = 45.05dBm
Difference = 76.03dB
Level on analyser = 67.33dBµV
Antenna Factor = 27.73dB
Cable loss = -28.67dB
Field strength = 66.39dBµV/m
Equivalent EUT field strength = 142.42dBµV/m

Limit = 142.42-(43+10log32(W)) = 84.37dBµV/m

Test Case : Radiated Emissions (continued)

Test Date : 17th October 2001

Rule Parts : 24.238

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

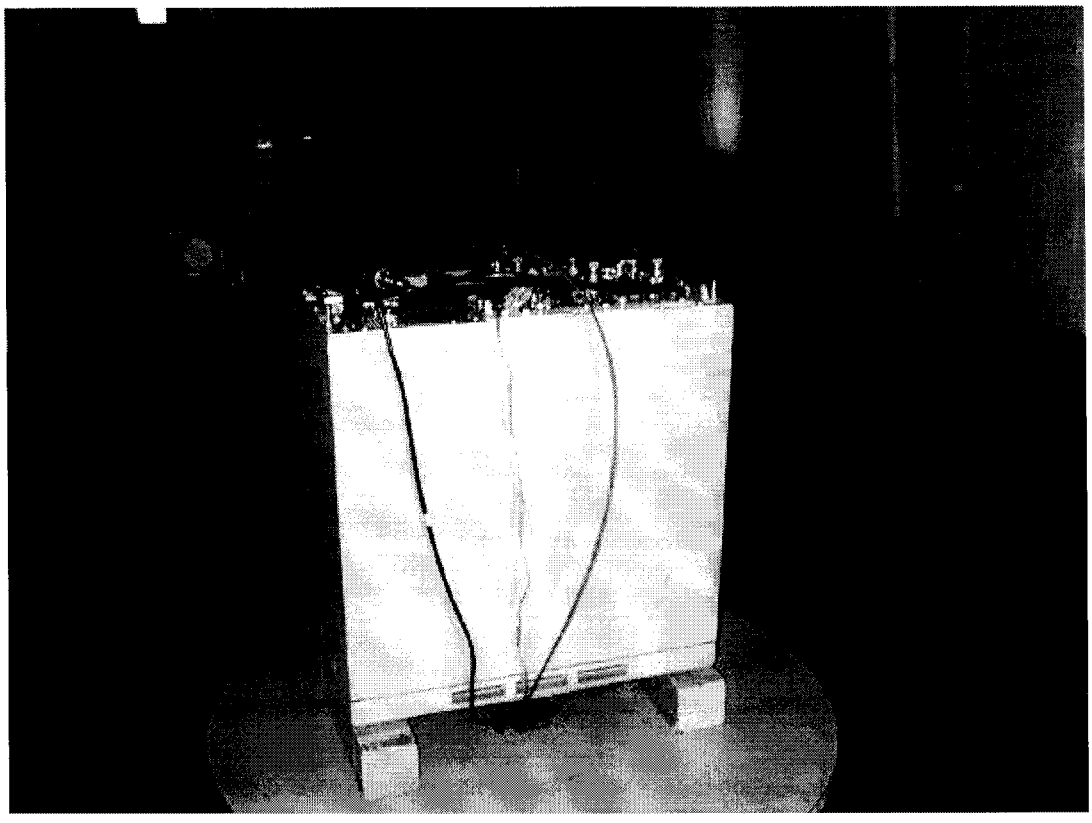
Frequency	Pol	Hgt	Azm	Level at 3m	Cable Loss	Antenna Factor	F.S at 3m	Spec Limit
MHz	H/V	cm	deg	dBµV	dB	dB	dBµV/m	dBµV/m
3909.79	V	145	10	55.50	-30.00	33.23	58.73	84.37
3919.92	V	155	360	57.67	-30.17	33.24	60.74	84.37
5228.56	V	116	347	55.50	-30.17	34.74	60.07	84.37
6763.21	V	108	332	54.00	-29.33	36.10	60.77	84.37
6831.31	V	167	360	52.50	-29.50	36.25	59.25	84.37
6911.31	V	116	10	49.83	-29.00	36.60	57.43	84.37

The margin between the specification requirements and all other emissions was 26dB 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.



Photograph No 1 – Radiated Emissions

Test Case : RF Output Power

Test Date : 18th October 2001

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 carrier was modulated by it's normal GMSK modulation with all time slots 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

Frequency (MHz)	Output Power (dBm)	Path Loss (dB)	Result (dBm)	Result (W)
1930.2	17.33	28.7	46.03	40.09
1960.0	17.42	29.0	46.42	43.85
1989.8	16.92	28.7	45.62	36.47

Minimum Power

Frequency (MHz)	Output Power (dBm)	Path Loss (dB)	Result (dBm)	Result (W)
1930.2	5.44	28.7	34.14	2.59
1960.0	5.94	29.0	34.94	3.12
1989.8	5.22	28.7	33.92	2.47

Limit	<100W or <+50dBm

Remarks

EUT complies with CFR 47 2.1046 and 24.232(a). The EUT does not exceed 100W or +50dBm at the measured frequencies.

Test Equipment Used:
1, 2, 5, 6, 9, 10

.....

Test Case	:	Modulation Characteristics
Test Date	:	12th October 2001
Rule Parts	:	2.1047(d)

Description Of Modulation Technique

In essence, the system uses TDMA and frequency multiplexes the signals. The signals are transmitted using a Gaussian Minimum Shift Keying (GMSK) scheme.

GMSK is a form of binary signalling schemes which represent digital states as a shift between discrete sinusoidal frequencies called Frequency Shift Keying (FSK). Minimum Shift Keying (MSK) is continuous phase FSK with the smallest possible modulation index h. Modulation index is defined as:

$$h = 2FTb$$

where F = Peak frequency deviation in Hz and Tb = Bit period in seconds

Two discrete frequencies, representing two distinct digital states, with equal phases at switch time t = 0 requires a minimum value of h = 0.5. The Gaussian part of GMSK describes the fact that the digital pulses are filtered in the time domain. This results in bits, which are sinusoidal rather than square. The effective spectrum is then compressed with the average carrier frequency in the centre of the passband. This is a great advantage because of the significantly reduced bandwidth. GMSK is utilized because of these bandwidth conservation properties.

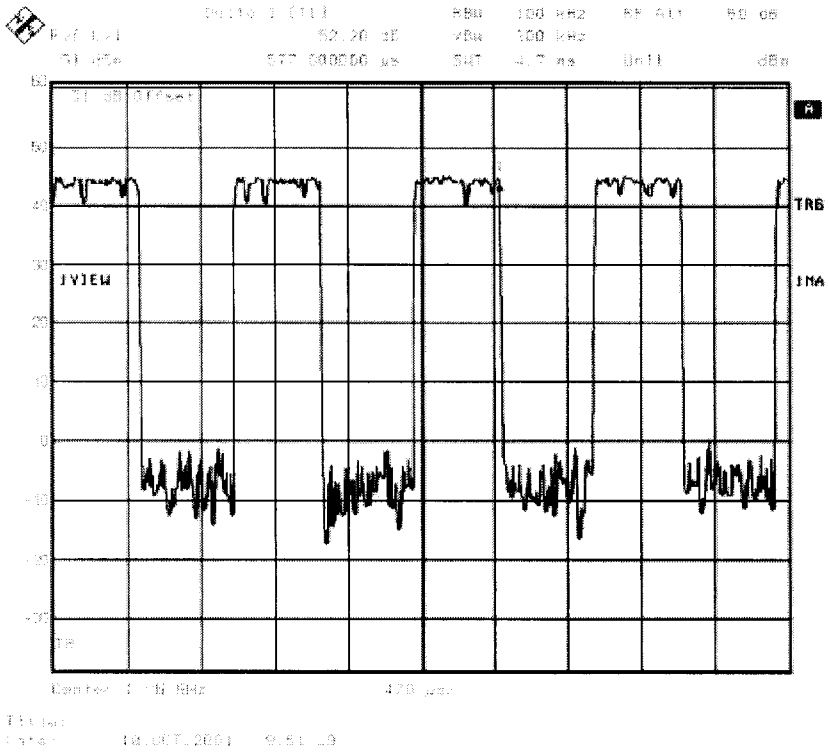
The bandwidth for GSM is a 25 MHz up-link at 890-915 MHz and down-link at 935-960 MHz. The 25 MHz is divided into 125 channels, each of which is 200 kHz wide. Slight spectral spillage is allowed into neighbouring channels (which is minimized by GMSK). This separated transmit/receive frequencies scheme under GSM enables easier duplex filtering.

Within the bandwidth, individual channels are subdivided into multiframes (made of 26 frames), frames (made of 8 time slots), and time slots (made of 8 fields). The time slots are 0.57 ms long allowing 156.25 bits of information including overhead. Each user is active during two time slots; one for transmit and one for receive. The other six time slots in the frame are used by the mobile for signal strength measurements.

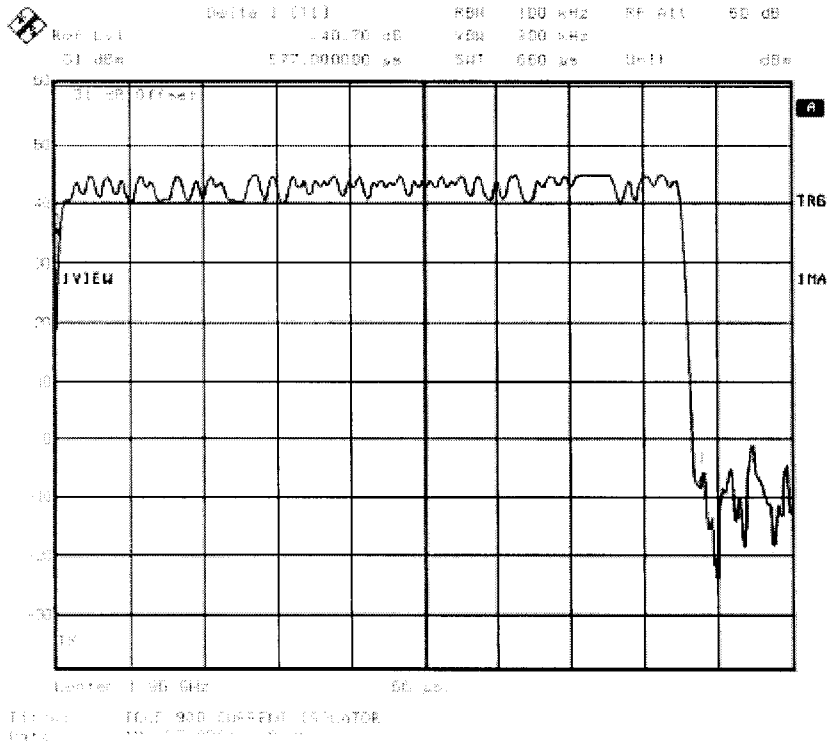
Two plots are shown on the following pages showing the EUT transmitting with the display in the time domain:

1) EUT transmitting with alternate time slots over one complete frame.

2) EUT transmitting with alternate time slots over one time slot.



Plot (1)



Plot (2)

Test Equipment Used:
1, 3, 9, 10

.....

Test Case	:	Occupied Bandwidth
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

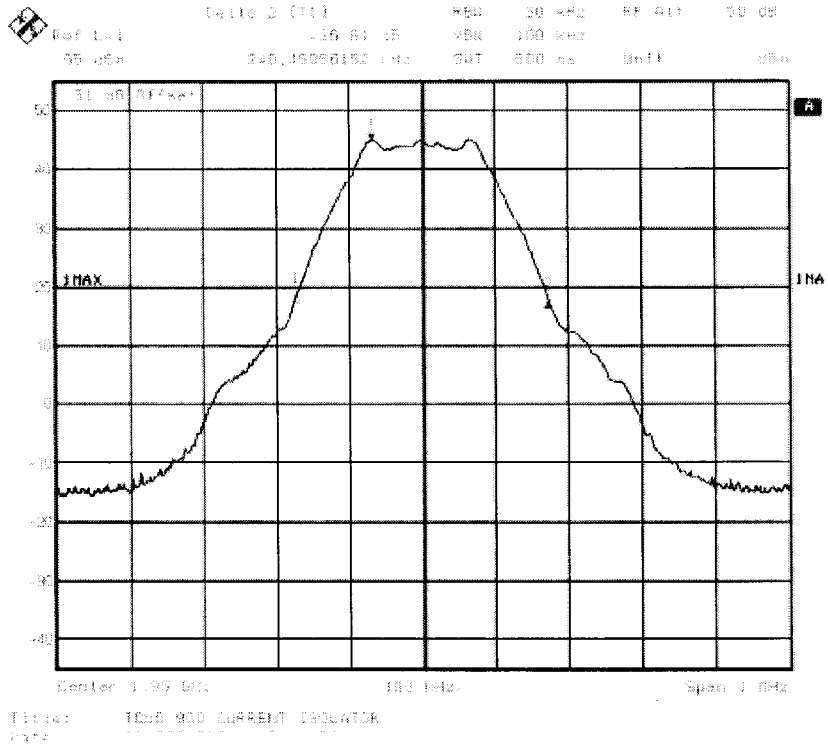
Measurement Method

The EUT was transmitted at maximum power, modulated with all timeslots active. Using a resolution bandwidth of 30 kHz and a video bandwidth of 100 kHz, the –26dBc points were established and the emission bandwidth determined.

The plot below, shows the resultant display from the Spectrum Analyser.

Occupied Bandwidth As Defined By The –26dBc Points

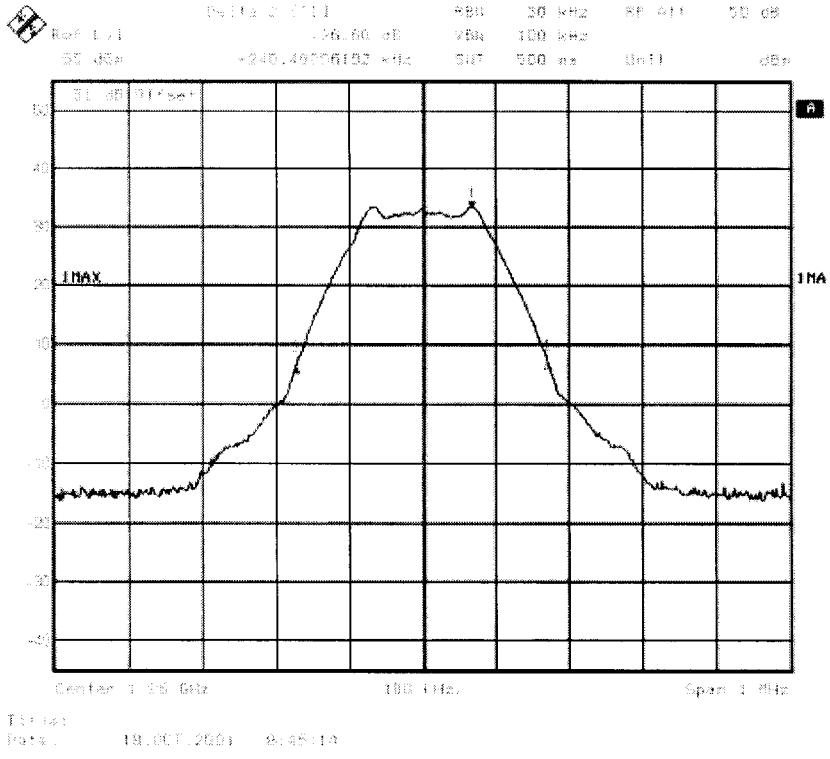
Maximum Power



Test Equipment Used:
1, 3, 9, 10

.....

Minimum Power



Test Equipment Used:
1, 2, 5, 6, 9, 10

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
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 away from block edge, 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 <0.3dB 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.

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 (1930 – 1945)	Channel : 514 Frequency : 1930.4MHz	Channel : 583 Frequency : 1944.8MHz
B (1950 – 1965)	Channel : 614 Frequency : 1950.4MHz	Channel : 683 Frequency : 1964.6MHz
C (1975 – 1990)	Channel : 739 Frequency : 1975.4MHz	Channel : 808 Frequency : 1989.6MHz
D (1945 – 1950)	Channel : 589 Frequency : 1945.4MHz	Channel : 608 Frequency : 1949.6MHz
E (1965 – 1970)	Channel : 689 Frequency : 1965.4MHz	Channel : 708 Frequency : 1969.6MHz
F (1970 – 1975)	Channel : 713 Frequency : 1970.4MHz	Channel : 733 Frequency : 1974.8MHz

Remarks

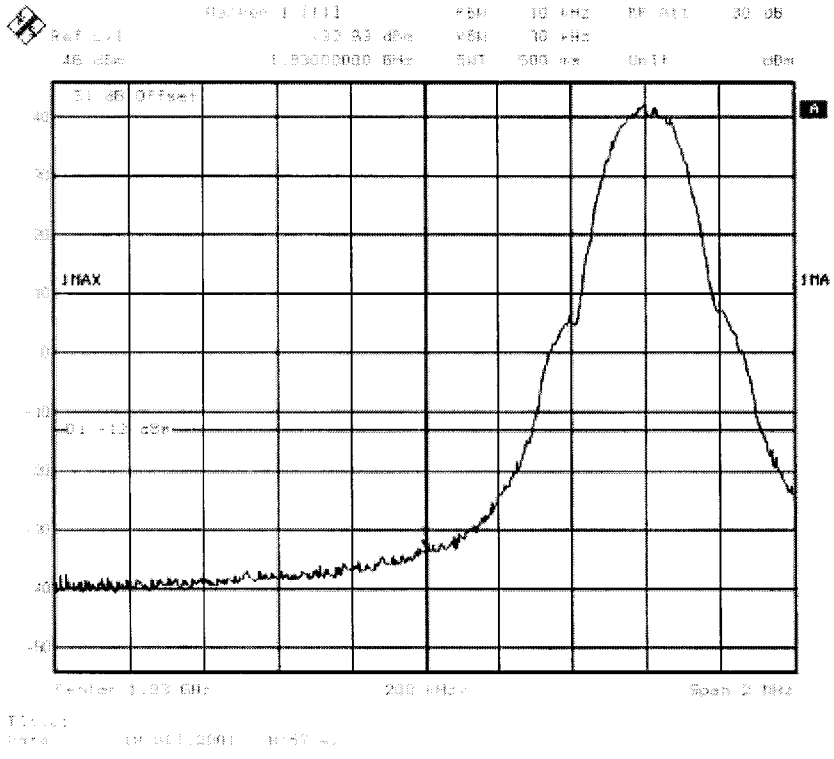
The EUT was tested at two channels in from the edge of the Frequency Blocks. With the EUT transmitting on full power one channel from the block edge, the limit is exceeded. It would therefore be recommended that the unit should not be used on full power one channel from the block edge.

The measurement plots are shown on the following pages.

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 514, (1930.4MHz)

Block A
1930 – 1945MHz



Remarks

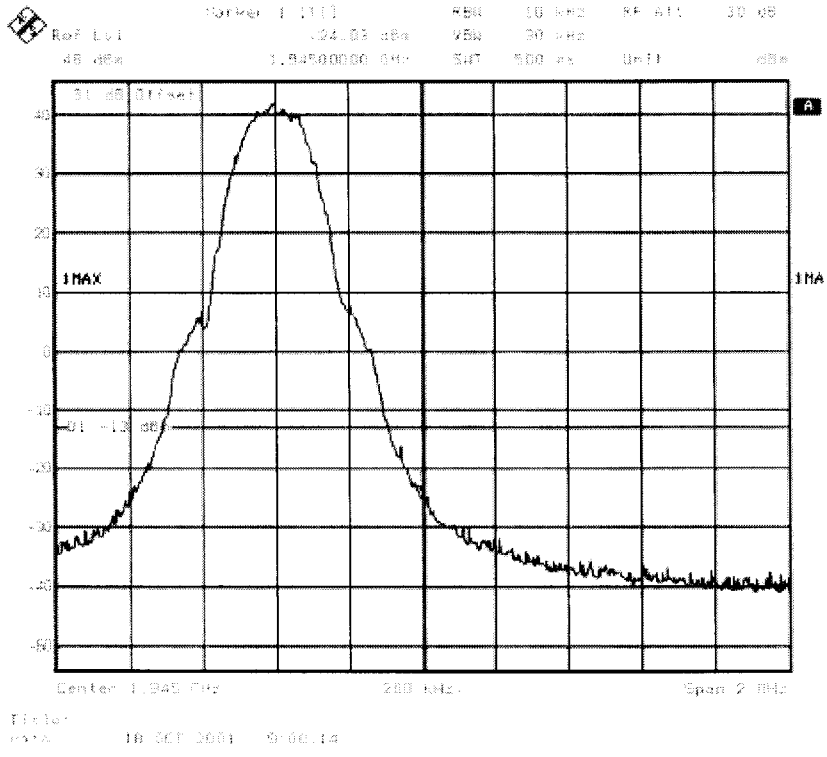
All emissions are below –13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 3, 9, 10
.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 583, (1944.6.4MHz)

Block A
1930 – 1945MHz



Remarks

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

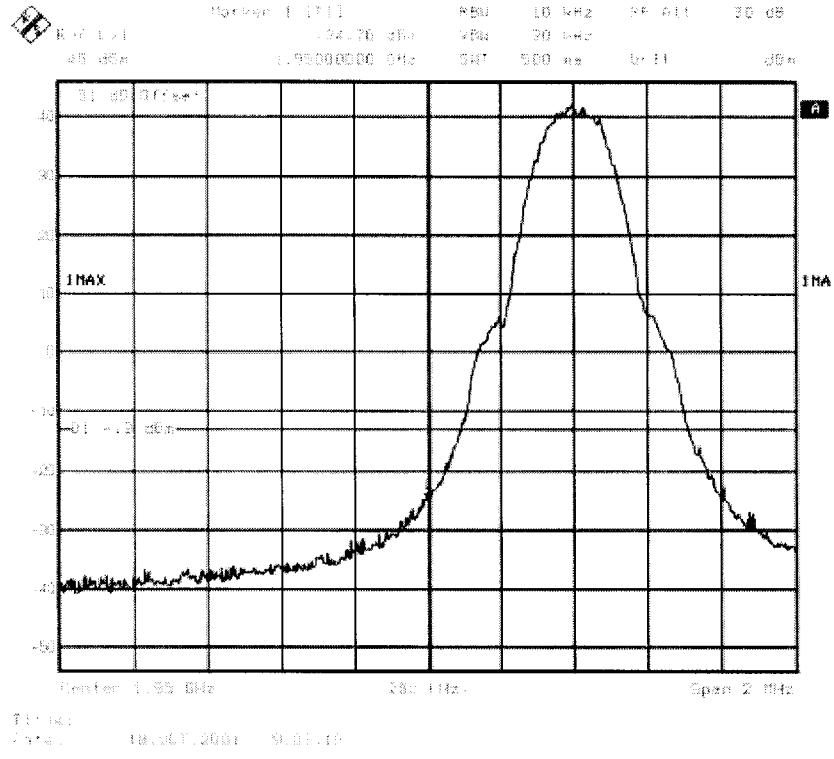
Test Equipment Used:
1, 3, 9, 10

.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 614, (1950.4MHz)

Block B
1950 – 1965MHz



Remarks

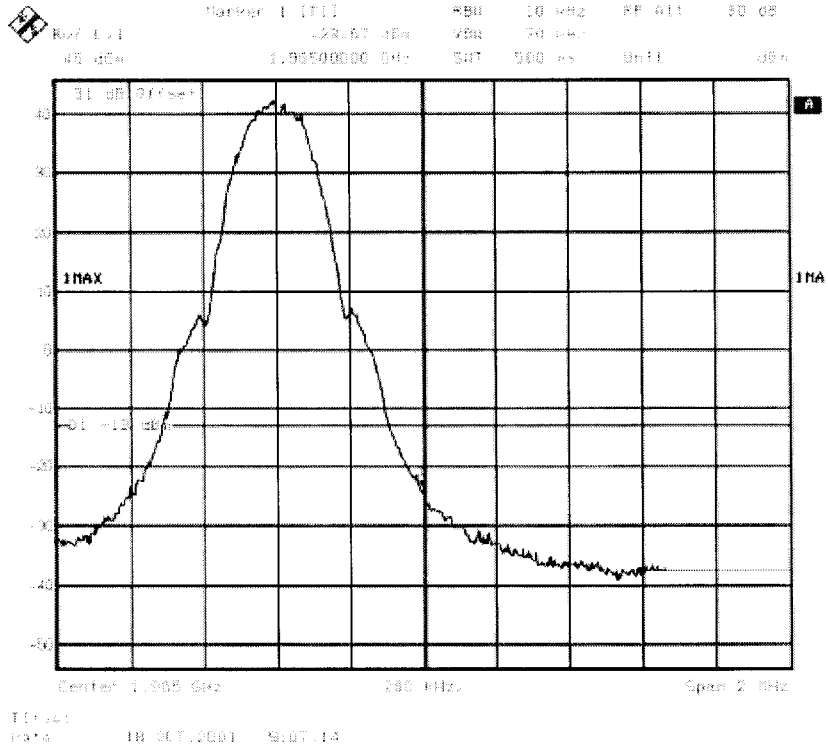
All emissions are below –13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 3, 9, 10
.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 683, (1964.6MHz)

Block B
1950 – 1965MHz



Remarks

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

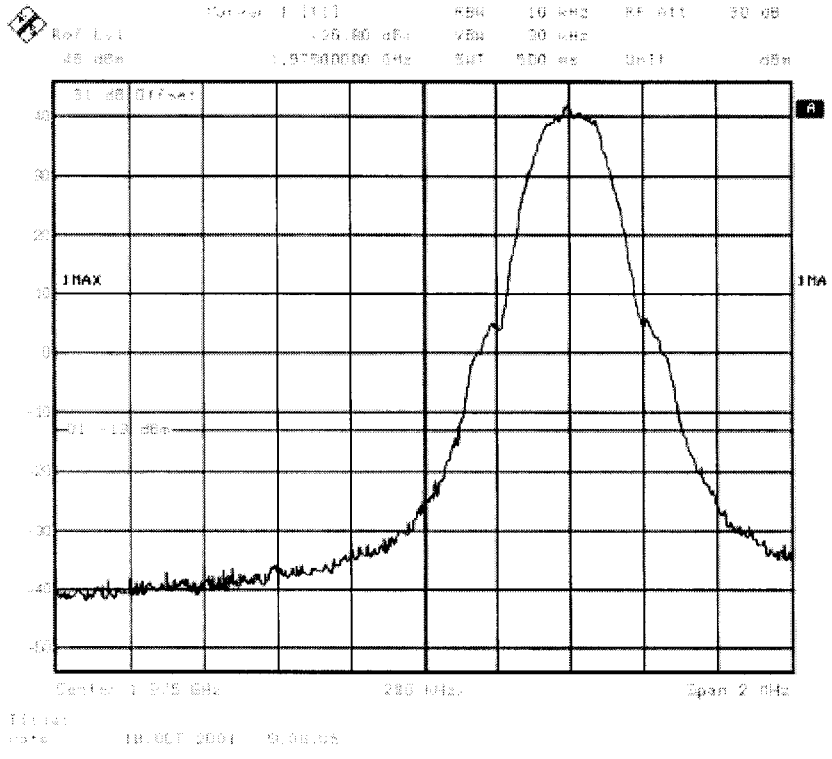
Test Equipment Used:
1, 3, 9, 10

.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 739, (1975.4MHz)

Block C
1975 – 1990MHz



Remarks

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

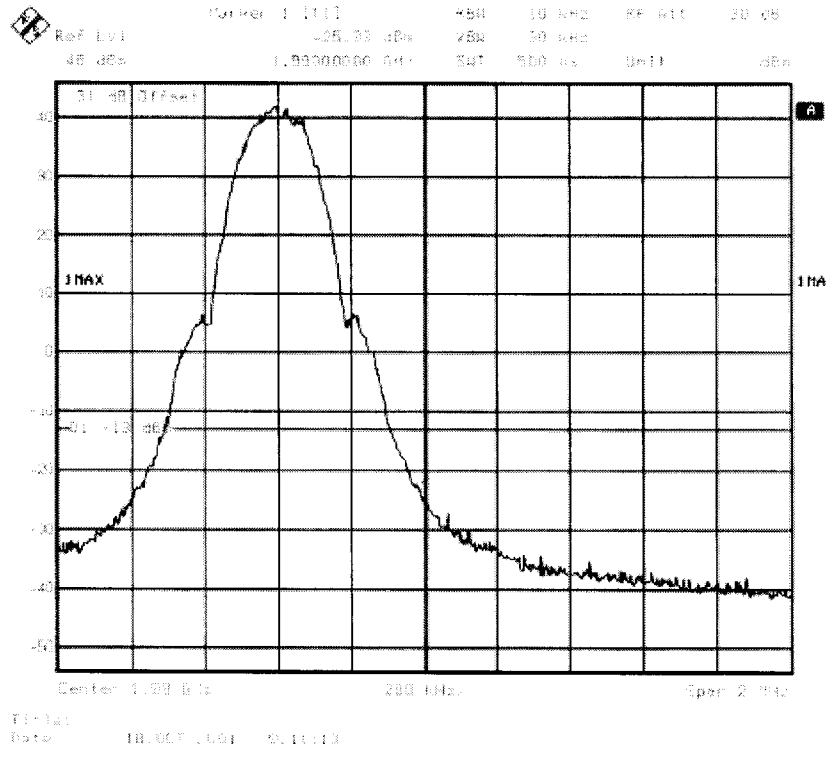
Test Equipment Used:
1, 3, 9, 10

.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 808, (1989.6MHz)

Block C
1975 – 1990MHz



Remarks

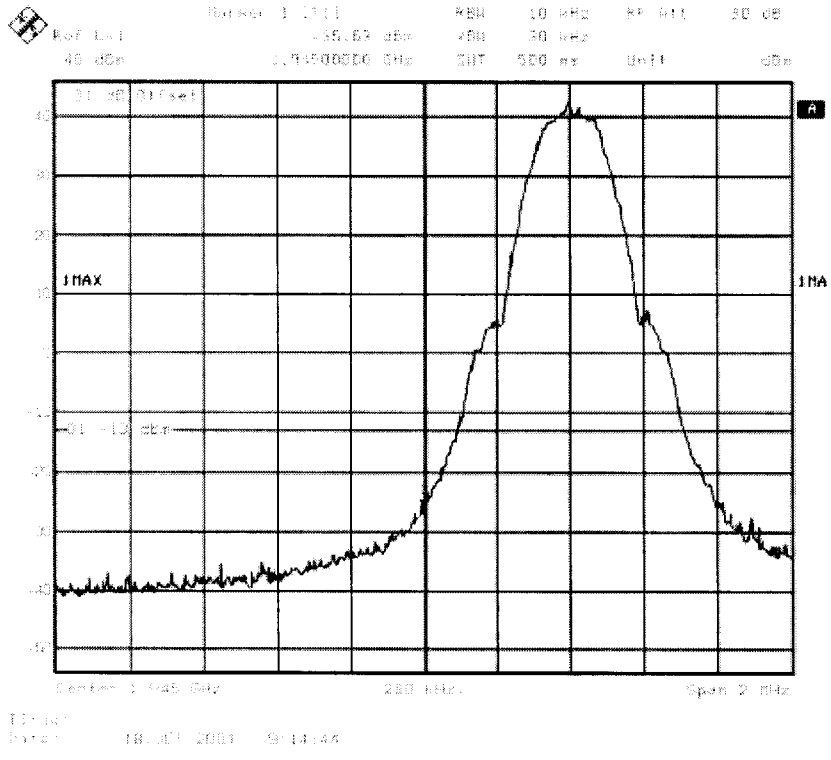
All emissions are below –13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 3, 9, 10
.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 589, (1945.4MHz)

Block D
1945 – 1950MHz



Remarks

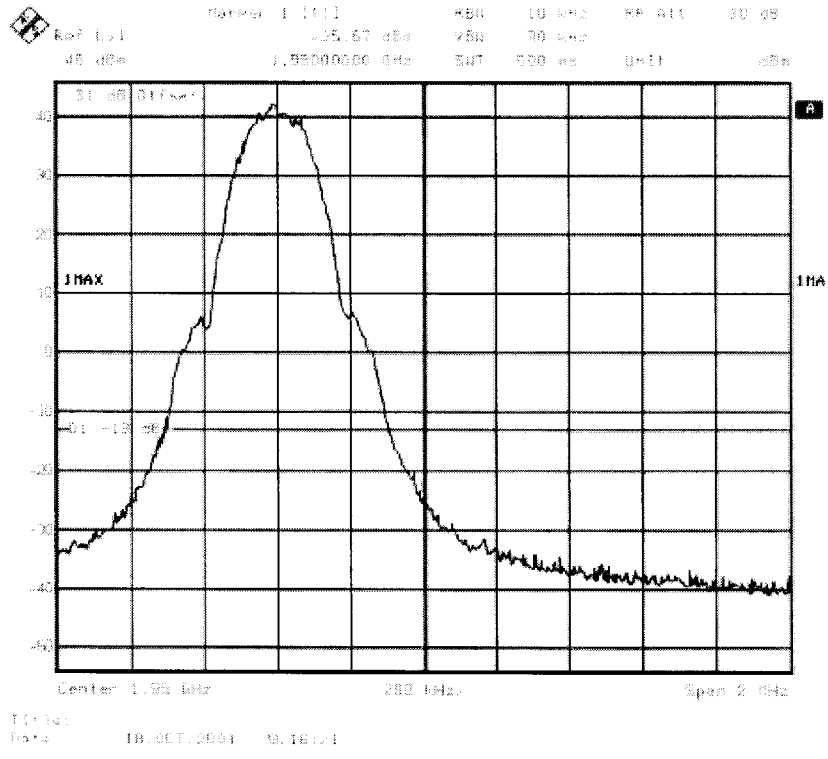
All emissions are below –13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 3, 9, 10
.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 608, (1949.6MHz)

Block D
1945 – 1950MHz



Remarks

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

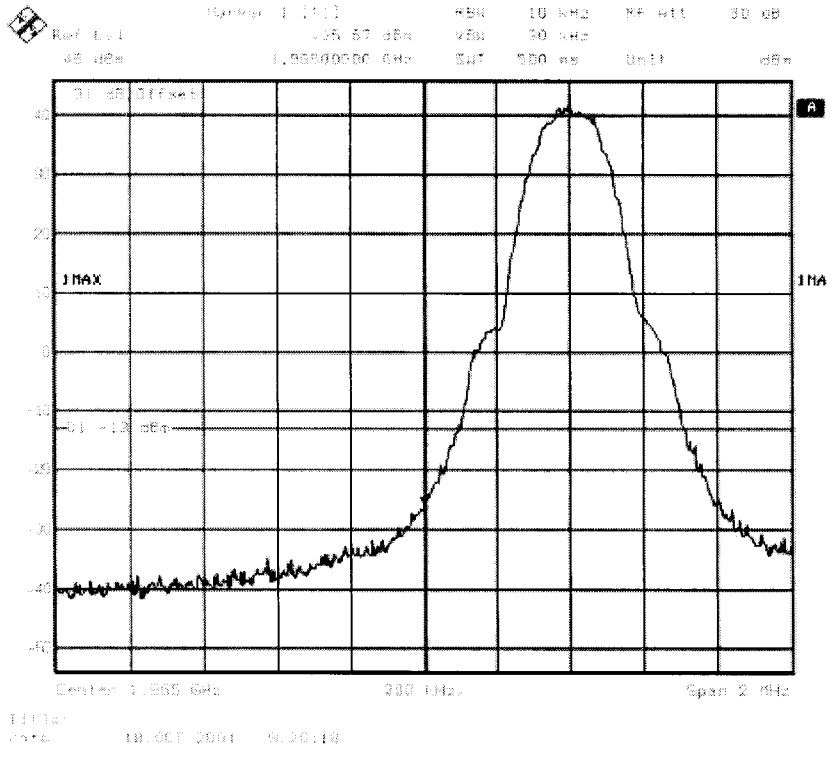
Test Equipment Used:
1, 3, 9, 10

.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 689, (1965.4MHz)

Block E
1965 – 1970MHz



Remarks

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

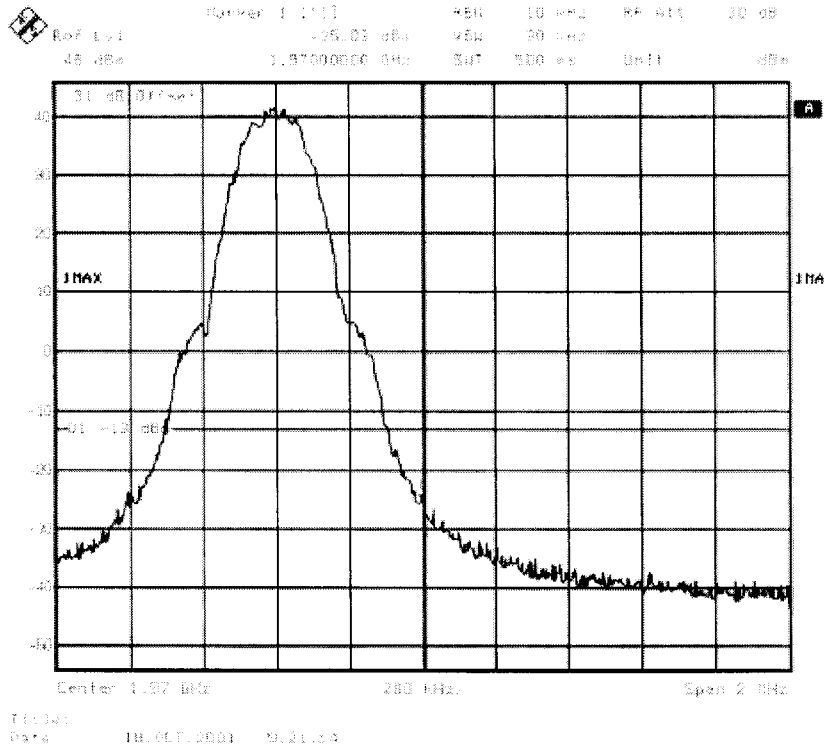
Test Equipment Used:
1, 3, 9, 10

.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 708, (1969.6MHz)

Block E
1965 – 1970MHz



Remarks

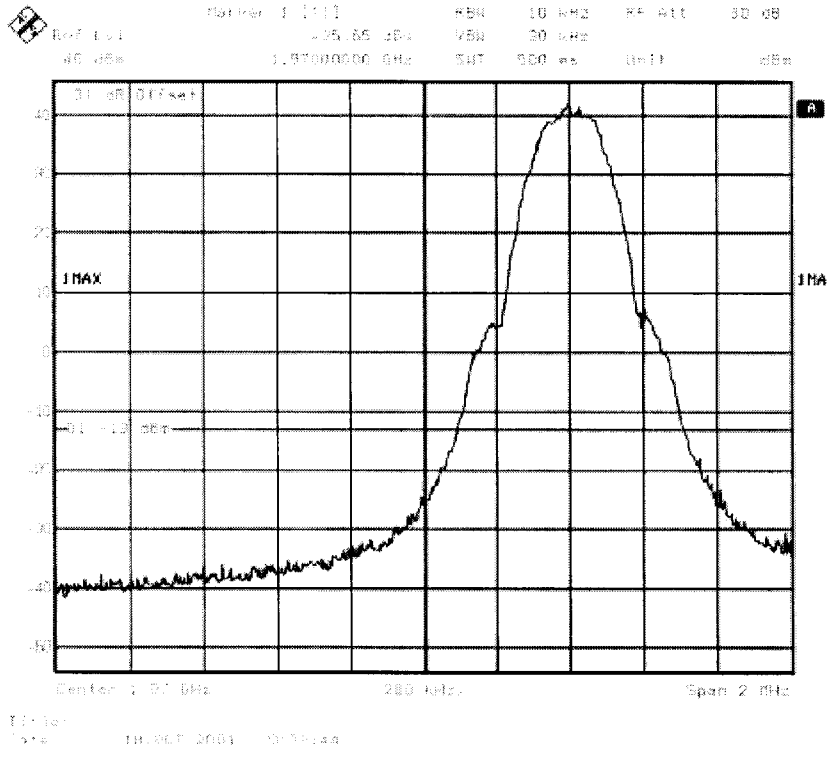
All emissions are below –13dBm up to 1MHz away from the block edge.

Test Equipment Used:
1, 3, 9, 10
.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 714, (1970.4MHz)

Block F
1970 – 1975MHz



Remarks

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

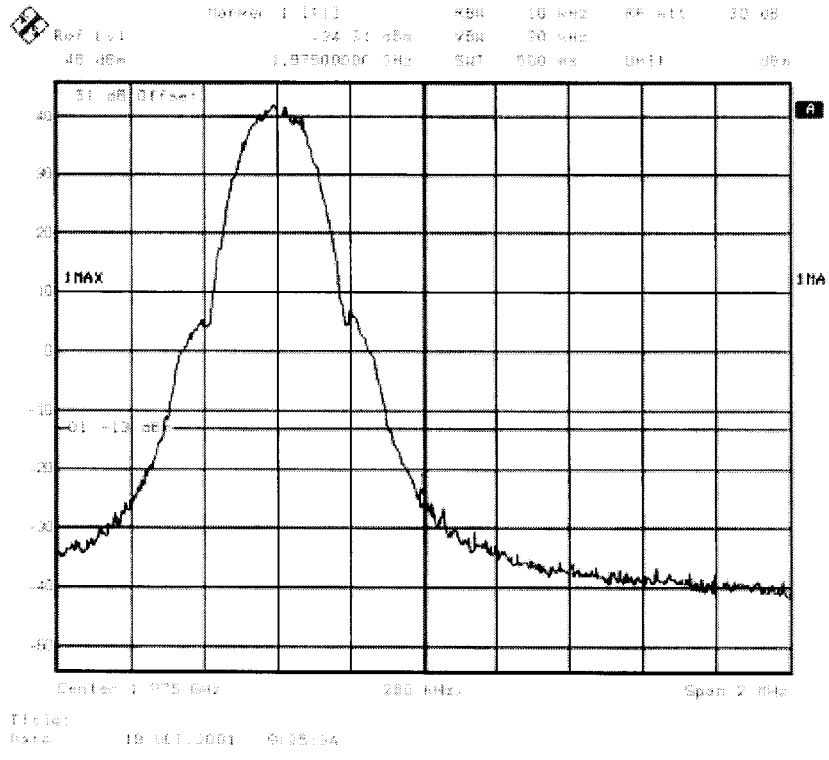
Test Equipment Used:
1, 3, 9, 10

.....

Test Case	:	Spurious Emissions At Antenna Terminals (+/-1MHz)
Test Date	:	18th October 2001
Rule Parts	:	2.1049, 24.238(b)

Block Edge Measurement With EUT Transmitting on Full Power On Channel 733, (1974.6MHz)

Block F
1970 – 1975MHz



Remarks

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

Test Equipment Used:
1, 3, 9, 10
.....

Test Case : Spurious Emissions

Test Date : 18th October 2001

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 notch filter was used in conjunction with an attenuator. This was to reduce saturation effects in the spectrum analyser. 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

Emissions within 20dB of the limit – 9kHz to 20GHz

Channel	Frequency (MHz)	Raw Result (dBm)	Path Loss (dBm)	Corrected Result (dBm)	Limit (dBm)
512	3863.73	-47.71	23.1	-24.61	-13
661	3927.856	-46.00	23.1	-22.90	-13
810	3983.968	-51.19	23.1	-28.09	-13

Remarks

The EUT passed the requirements laid out in 24.238.

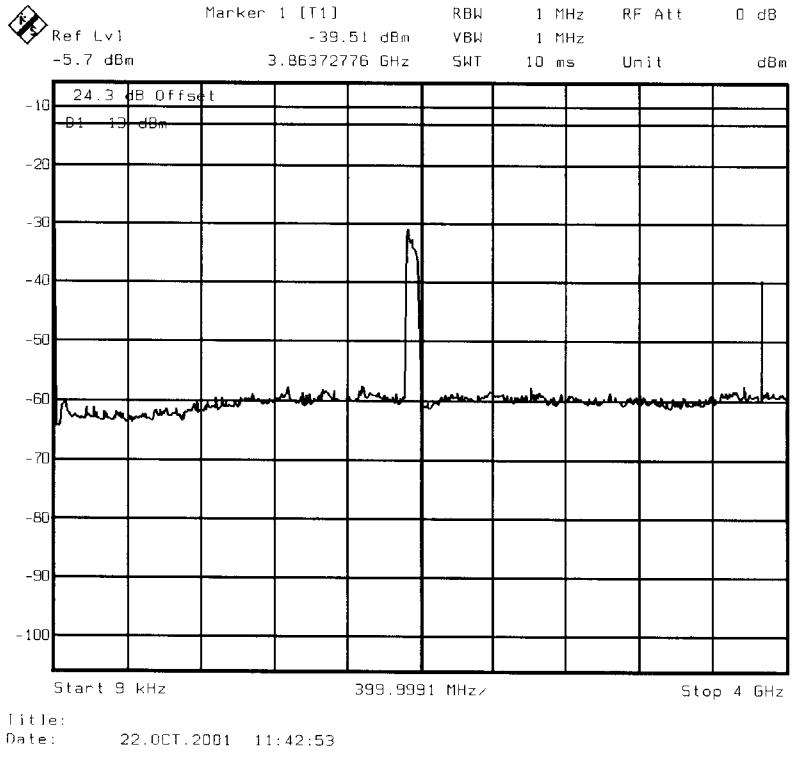
The plots on the following pages show the frequency spectrum from 9kHz to 20GHz of the EUT.

Test Equipment Used:
1, 3, 5, 6, 7, 8, 9, 10
.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)

Channel 512, (1930.2MHz) – Maximum Power



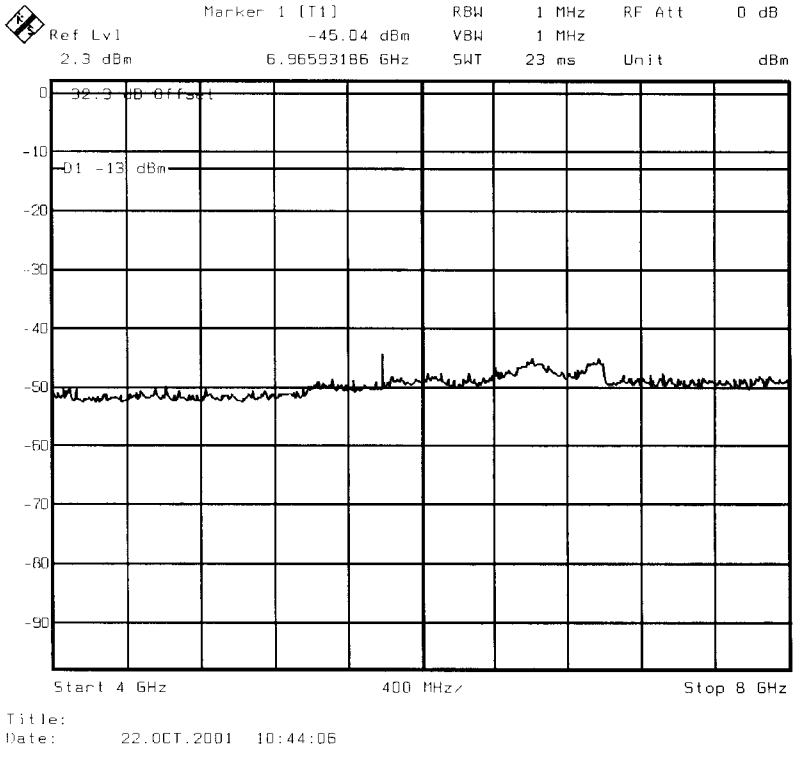
Test Equipment Used:
1, 3, 5, 6, 7, 11

.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (4GHz – 8GHz)

Channel 512, (1930.2MHz) – Maximum Power



Test Equipment Used:

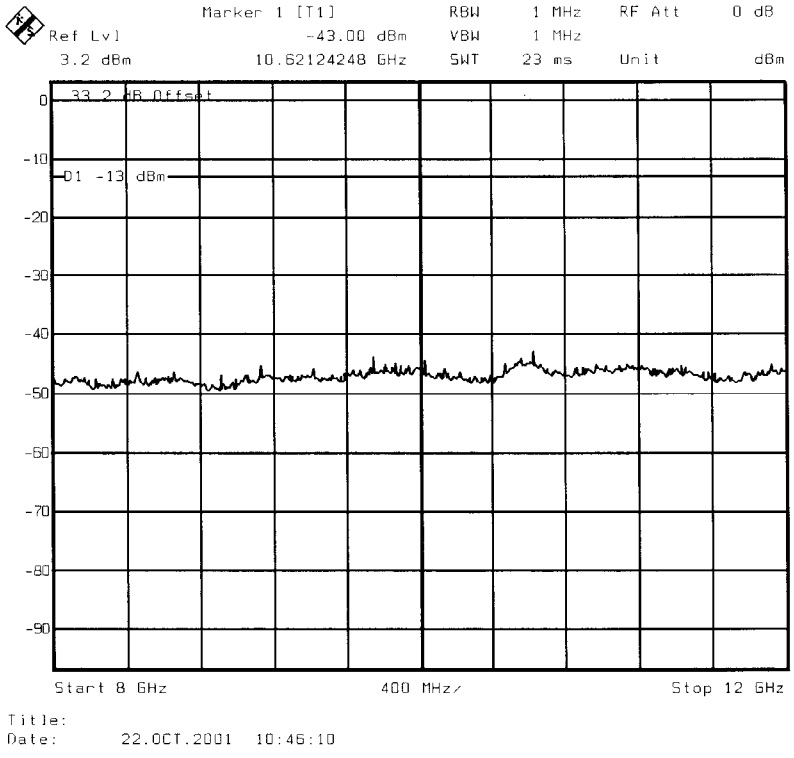
1, 3, 5, 6, 8, 9, 10

.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (8GHz – 12GHz)

Channel 512, (1930.2MHz) – Maximum Power



Test Equipment Used:

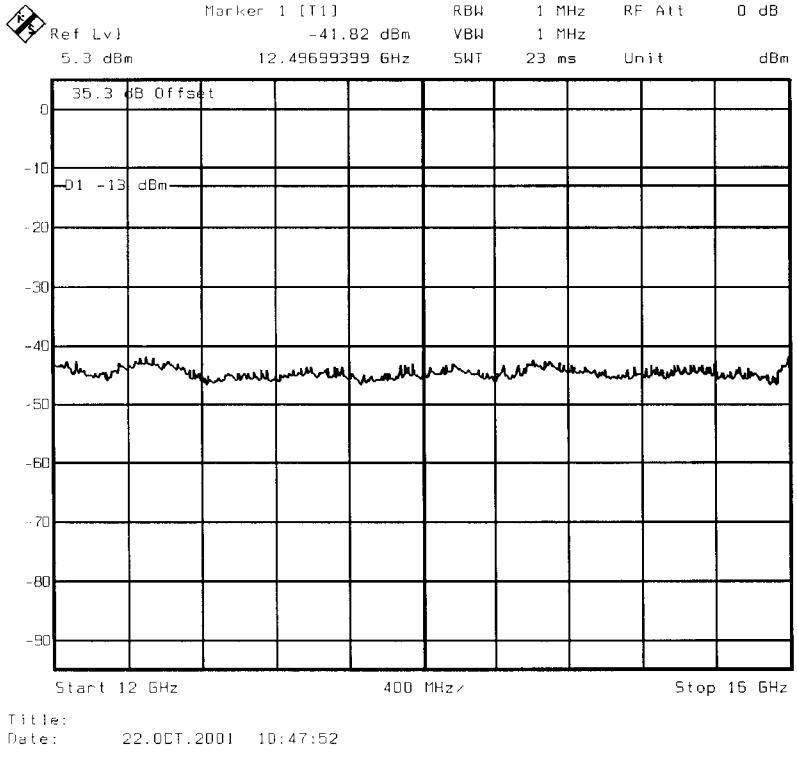
1, 3, 5, 6, 8, 9, 10

.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (12GHz – 16GHz)

Channel 512, (1930.2MHz) – Maximum Power



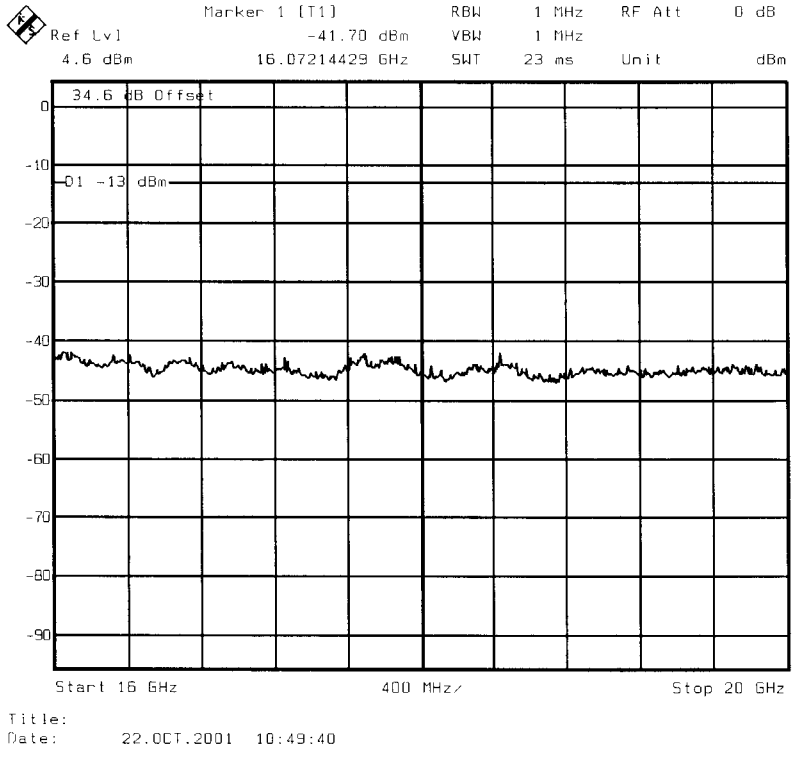
Test Equipment Used:
1, 3, 5, 6, 8, 9, 10

.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (16GHz – 20GHz)

Channel 512, (1930.2MHz) – Maximum Power



Test Equipment Used:

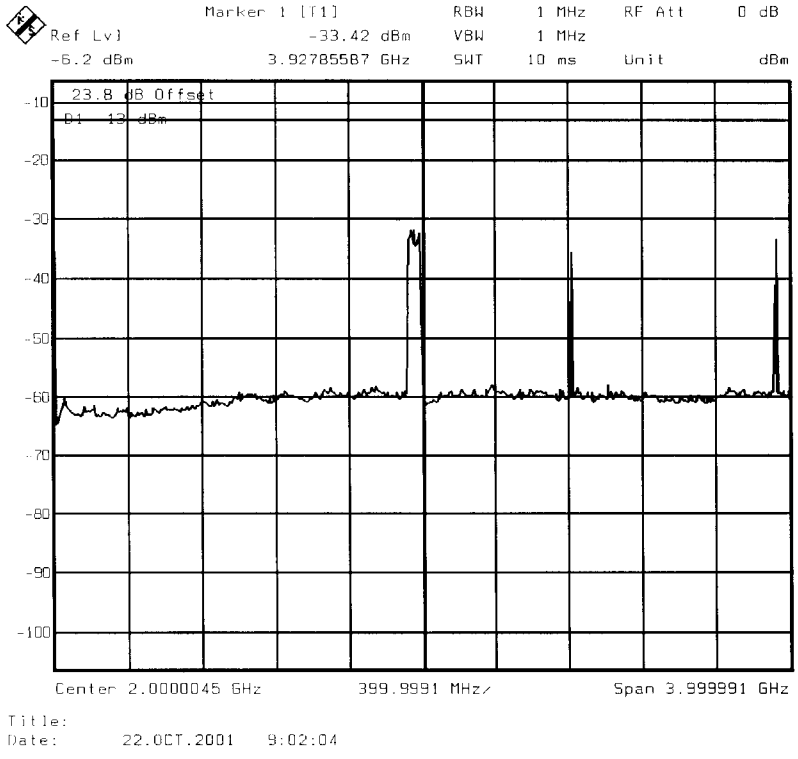
1, 3, 5, 6, 8, 9, 10

.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)

Channel 661, (1960.0MHz) – Maximum Power



Test Equipment Used:

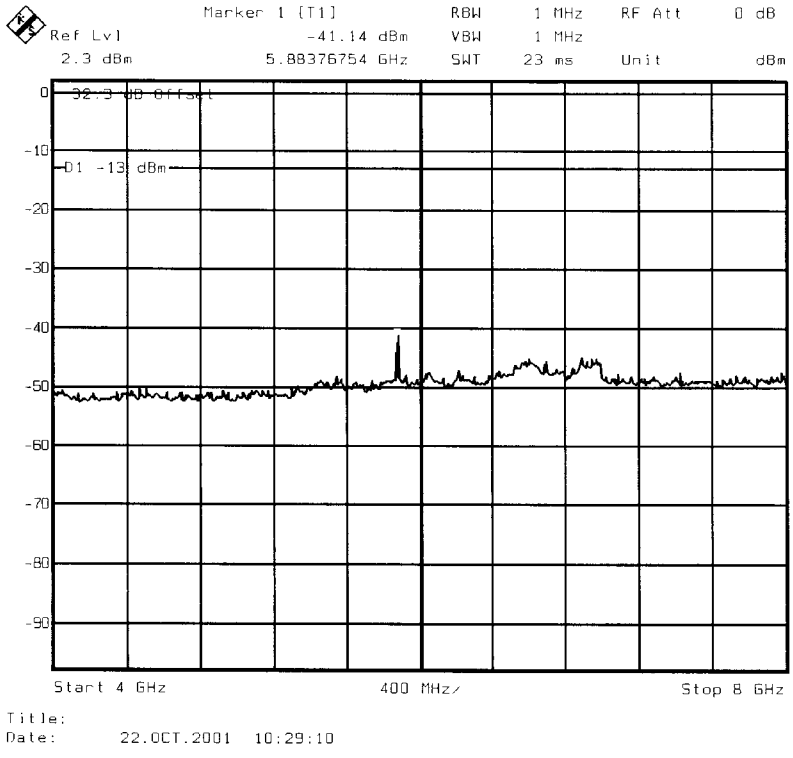
1, 3, 5, 6, 7, 11

.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (4GHz – 8GHz)

Channel 661, (1960.0MHz) – Maximum Power



Test Equipment Used:

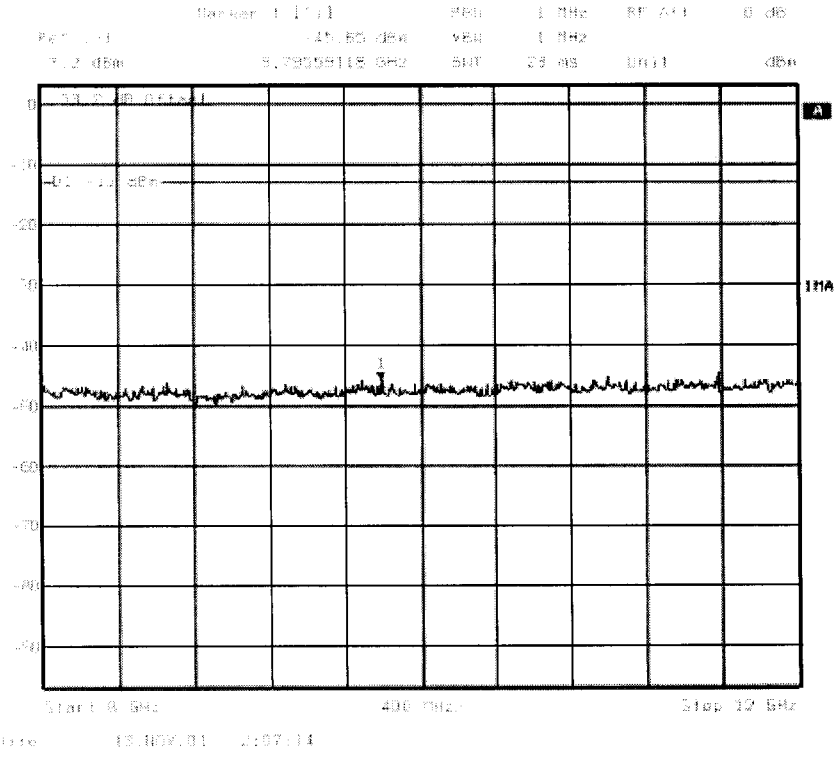
1, 3, 5, 6, 8, 9, 10

.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (8GHz – 12GHz)

Channel 661, (1960.0MHz) – Maximum Power



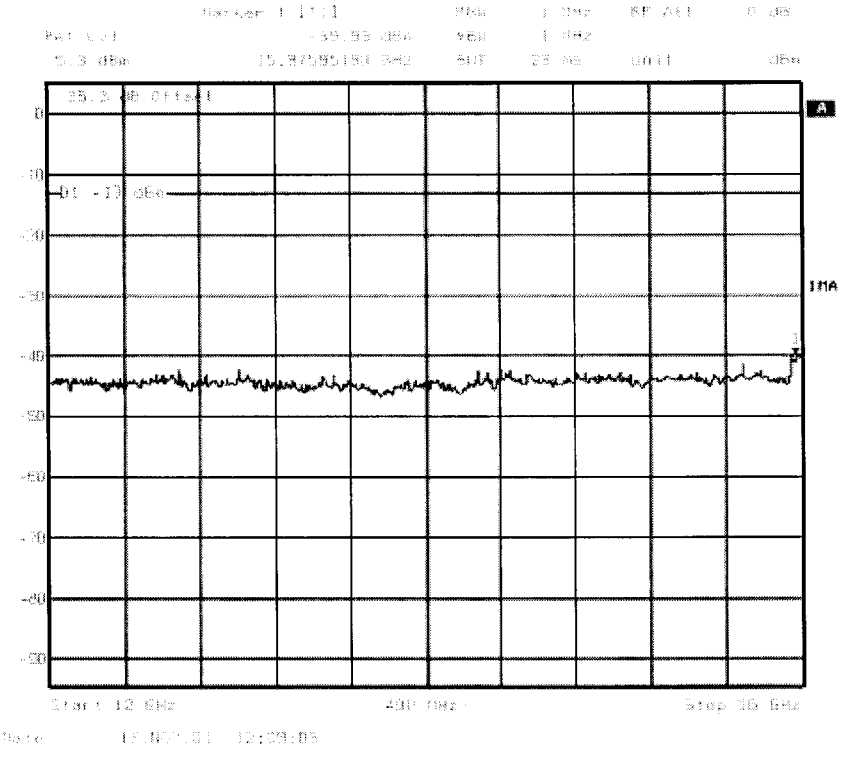
Test Equipment Used:
1, 3, 5, 6, 8, 9, 10

.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (12GHz – 16GHz)

Channel 661, (1960.0MHz) – Maximum Power



Test Equipment Used:

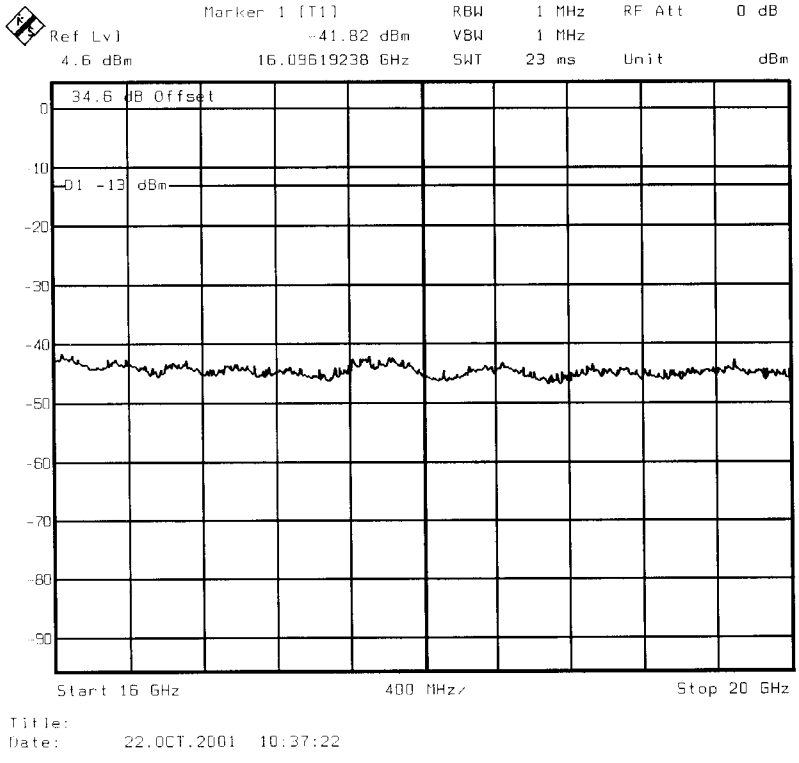
1, 3, 5, 6, 8, 9, 10

.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (16GHz – 20GHz)

Channel 661, (1960.0MHz) – Maximum Power



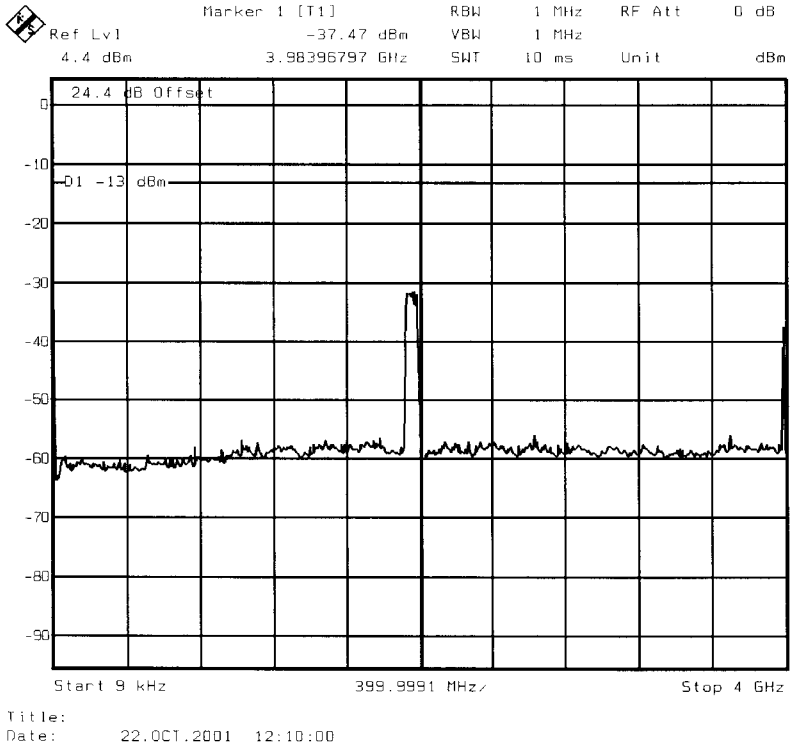
Test Equipment Used:
1, 3, 5, 6, 8, 9, 10

.....

Test Case	:	Spurious Emissions
Test Date	:	22nd October 2001
Rule Parts	:	2.1051, 24.238(a)

Spurious Emissions (9kHz – 4GHz)

Channel 810, (1989.8MHz) – Maximum Power



Test Equipment Used:

1, 3, 5, 6, 7, 11

.....