
REPORT ON

Limited FCC CFR 47: Parts 15 and 24 Testing in support of an
Application for Grant of Equipment Authorisation
of an IP Access Ltd 165B (1900MHz nano Basestation)

FCC ID: QGGKU02ZZP

COMMERCIAL-IN-CONFIDENCE

Report No OR614552/01 Issue 1

November 2005



Product Service





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REPORT ON

Limited FCC CFR 47: Parts 15 and 24 Testing in support of an Application for Grant of Equipment Authorisation of an IP Access Ltd 165B (1900MHz nano Basestation) Tri-Band Terminal Equipment

FCC ID: QGGKU02ZZP


Report No OR614552/01 Issue 1

November 2005

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DATED

24th November 2005


ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Parts 15 and 24. The sample tested was found to comply with the requirements defined in the applied rules.


Test Engineers;



T Hubbard



S Hartley



A Guy



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SECTION 1

REPORT SUMMARY

Limited FCC CFR 47: Parts 15 and 24 Testing in support of an
Application for Grant of Equipment Authorisation
of an IP Access Ltd 165B (1900MHz nano Basestation)



Product Service

1.1 STATUS

Equipment Under Test	165B (1900MHz nano Basestation)
Objective	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
Name and Address of Client	IP Access Ltd Building 2020 Cambourne Business Park Cambourne Cambridge CB3 6DW
Type Number	165B (1900MHz nano Basestation)
Serial Number	000295FFFE0E 000295FFFE10 000295FFFE17 000295FFFE11
Software Version	V57d0
Test Specification / Issue / Date	FCC CFR 47: Part 15, Subparts B and C, August 2002, and Part 24, Subpart D, January 2001
Number of Items Tested	Four
Security Classification of EUT	Commercial-in-Confidence
Disposal	Held pending disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	PO08178
Date	27 th July 2005
Start of Test	13 th October 2005
Finish of Test	4 th November 2005
Related Documents	ANSI C63.4: 2001 FCC DA 00-705: 2000



Product Service

1.2 INTRODUCTION

The information contained within this report is intended to show limited verification of compliance of the IP Access Ltd 165B (1900MHz nano Basestation) to the requirements of FCC Specification Part 24.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of IP Access Ltd



1.3 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out is shown below.

FCC CFR 47: Part 15, Subpart B, RSS-210, RSS-132 and RSS-133

Test	Spec Clause		Test Description	Result	Comments
	FCC	Industry Canada			
2.1	15.109	RSS-132, 6.6 RSS-133, 9	Spurious Radiated Emissions	Pass	
	15.107	RSS-210, 6.6	Conducted Emissions	N/A	

FCC CFR 47: Part 24, Subpart E and RSS-133

Test	Spec Clause		Test Description	Result	Comments
	FCC	Industry Canada			
2.2	Part 2 2.1046 Part 24 24.232	RSS-133, 6.2	Maximum Peak Output Power - Conducted	Pass	
2.3	Part 2 22.1046 Part 24 24.232 (b)	RSS-133, 6.2	Maximum Peak Output Power – Radiated	Pass	
2.4	Part 2 2.1047(d)	Not Applicable	Modulation Characteristics	Pass	
2.5	Part 2 2.1049, Part 24 24.238 (b)	Not Applicable	Occupied Bandwidth	Pass	
2.6	Part 2 2.1051, Part 24 24.229 and 24.238	RSS-133, 6.3	Spurious Emissions at Antenna Terminals	Pass	
2.7	Part 2 22.1053, Part 24 24.238	RSS-133, 6.3	Radiated Spurious Emissions	Pass	
2.8	Part 2 2.1051, Part 24 24.238 (a)	Not Applicable	Conducted Spurious Emissions	Pass	
2.9	Part 2 2.1055, Part 24 24.235	RSS-133, 7	Frequency Stability Under Temperature Variations	Pass	
2.10	Part 2 2.1055, Part 24 24.235	RSS-133, 7	Frequency Stability Under Voltage Variations	Pass	



1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The IP Access Ltd 165B (1900MHz nano basestation) operates from a 48 volt dc power supply.

1.4.2 Modes of Operation

Modes of operation of the EUT during testing were as follows:

The 165B (1900MHz nano basestation) employs GSM, GPRS and EDGE technology. However, as the GSM and GPRS modes use the same modulation (GMSK) it was decided to operate the EUT in GSM mode only. The difference in GSM and GPRS Modes is the protocol, which will have no bearing on the RF Performance of the EUT.

All time slots were activated at once which provided a worst case scenario.

Applicable testing was carried out with the EUT transmitting at maximum power or receiving as detailed in Section 1.5.3.

Test Mode 1: GPRS 1900MHz Transmitting on the following channels and frequencies;

Bottom Channel 512	:	1930.2MHz
Middle Channel 661	:	1960.2MHz
Top Channel 810	:	1989.8MHz
Extra Channel 760	:	1980.0MHz

Test Mode 2: EDGE 1900MHz Transmitting on the following channels and frequencies;

Bottom Channel 512	:	1930.2MHz
Middle Channel 661	:	1960.2MHz
Top Channel 810	:	1989.8MHz
Extra Channel 760	:	1980.0MHz



Product Service

1.5 TEST CONDITIONS

The EUT was set-up simulating a typical user installation on the Alternative Open Field Test Site under Registration Number: 90987, and tested in accordance with the applicable specification.

For all tests, the IP Access Ltd 165B (1900MHz nano basestation) was powered by 48v dc power supply.

1.6 DEVIATIONS FROM THE STANDARD

No deviations to the standard were made.

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.8 ALTERNATIVE TEST SITE

Under our group UKAS Accreditation, TUV Product Service conducted the following tests at our Maplewood Facility, Basingstoke Test Laboratory

- 2.1 Part 15B Radiated Emissions
- 2.3 Part 24 Maximum Peak Output Power Radiated (GPRS mode)
- 2.7 Part 24 Radiated Emissions (GPRS mode)

SECTION 2

TEST DETAILS

Limited FCC CFR 47: Parts 15 and 24 Testing in support of an
Application for Grant of Equipment Authorisation
of an IP Access Ltd 165B (1900MHz nano basestation)



Product Service

2.1 SPURIOUS RADIATED EMISSIONS (Unintentional Radiator)

2.1.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.107

2.1.2 Equipment Under Test

165B (1900MHz nano basestation)

2.1.3 Date of Test

3rd November 2005

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

Test Performed in accordance with ANSI C63.4 and RSS-212.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. 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. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 10GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.



2.1 SPURIOUS RADIATED EMISSIONS

2.1.6 Test Results

Equipment Designation: Unintentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.107 and Industry Canada RSS-132, 6.6 and RSS-133, 9 for Spurious Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in GPRS 1900 Idle Mode.

EUT Receiving

Emission Frequency MHz	Polarisation	Height cm	Azimuth degree	Field Strength		Limit	
				dBµV/m	µV/m	dBµV/m	µV/m
38.90	Vertical	100	073	29.4	29.5	40.0	100.0
39.50	Vertical	100	073	29.4	29.5	40.0	100.0
312.00	Horizontal	100	261	43.8	159.0	46.0	200.0
520.00	Horizontal	176	299	41.8	123.0	46.0	200.0
624.00	Vertical	100	184	37.4	74.1	46.0	200.0
780.00	Vertical	100	205	41.5	118.9	46.0	200.0
780.00	Horizontal	100	126	39.1	90.2	46.0	200.0
910.00	Horizontal	100	151	39.8	97.7	46.0	200.0



2.1 SPURIOUS RADIATED EMISSIONS

2.1.6 Test Results - continued

Equipment Designation: Unintentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.107 and Industry Canada RSS-132, 6.6 and RSS-133, 9 for Spurious Radiated Emissions (1GHz- 20GHz).

Measurements were made with the EUT in GPRS 1900 Mode.

EUT Receiving

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Polarisation	Height	Azimuth				
GHz		cm	degree	dBµV/m	dBµV/m	dBµV/m	dBµV/m
1.000	Horizontal	140	057	44.5	74.0	34.6	54.0
1.400	Vertical	1300	000	45.2	74.0	37.6	54.0
1.450	Horizontal	100	316	47.7	74.0	38.5	54.0
1.500	Horizontal	100	320	48.7	74.0	38.1	54.0
1.800	Vertical	100	025	46.5	74.0	38.1	54.0



Product Service

2.2 MAXIMUM PEAK OUTPUT POWER (CONDUCTED)

2.2.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.232

2.2.2 Equipment Under Test

165B (1900MHz nano basestation)

2.2.3 Date of Test

13th October 2005

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

Using a spectrum analyser and attenuator(s), the output power of the EUT was measured at the antenna terminals. The EUT supports both GMSK and EDGE. The carrier was modulated by it's normal GMSK and EDGE modulation with all timeslots (0-7) active.

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

2.2.6 Test Results

Maximum Power - GMSK

Frequency (MHz)	Output Power (dBm)	Path Loss (dB)	Result (dBm)	Result (W)
1930.2	+12.51	10.66	24.04	0.254
1960.0	+13.59	10.66	24.08	0.256
1989.8	+13.28	10.67	24.35	0.272



2.2 MAXIMUM PEAK OUTPUT POWER (CONDUCTED)

2.2.6 Test Results - Continued

Maximum Power - EDGE

Frequency (MHz)	Output Power (dBm)	Path Loss (dB)	Result (dBm)	Result (mW)
1930.2	+7.1	10.7	16.62	45.92
1960.0	+6.98	10.7	16.47	44.36
1989.8	+7.16	10.7	16.71	46.88

Limit	<100W or <+50dBm
-------	------------------

Remarks

EUT complies with CFR 47 2.1046 and 24.232(b). The EUT does not exceed 100W or +55dBm at the measured frequencies.



Product Service

2.3 MAXIMUM PEAK OUTPUT POWER (RADIATED)

2.3.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.232

2.3.2 Equipment Under Test

165B (1900MHz nano basestation)

2.3.3 Date of Test

26th October 2005 (GPRS)
2nd November 2005 (EDGE)

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

The EUT contains an antenna port and therefore the Maximum Peak Output Power was made using the conducted method.

The EUT was connected to a Digital Storage Oscilloscope via an attenuator and Crystal Detector. The DC output from the Crystal Detector was measured on the Oscilloscope. The EUT was then substituted for a Signal Generator. The generators frequency was adjusted to that of the EUT and the amplitude increased to give the same DC level as measured from the EUT. The level was read from the Signal Generator which gave the maximum output power.

2.3.6 Test Results

Measurements were made with the EUT in GPRS 1900MHz Mode 1.

The EUT met the requirements of FCC Part 24, Section 24.232, Power and Antenna Height Limits.

Frequency (MHz)	Result ERP (dBm)	Result ERP (mW)
1930.2	21.42	139
1959.8	17.65	58
1979.9	23.66	232
Limit	33.00	2000



2.3 MAXIMUM PEAK OUTPUT POWER (RADIATED)

2.3.6 Test Results - Continued

Measurements were made with the EUT in EDGE 1900MHz Mode 1.

The EUT met the requirements of FCC Part 24, Section 24.232, Power and Antenna Height Limits.

Frequency (MHz)	Result ERP (dBm)	Result ERP (mW)
1930	20.6	115
1960	14.9	31
1990	13.9	25
Limit	33.0	2000



2.4 MODULATION CHARACTERISTICS

2.4.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 2.1047(d)

2.4.2 Equipment Under Test

165B (1900MHz nano basestation)

2.4.3 Date of Test

13th October 2005

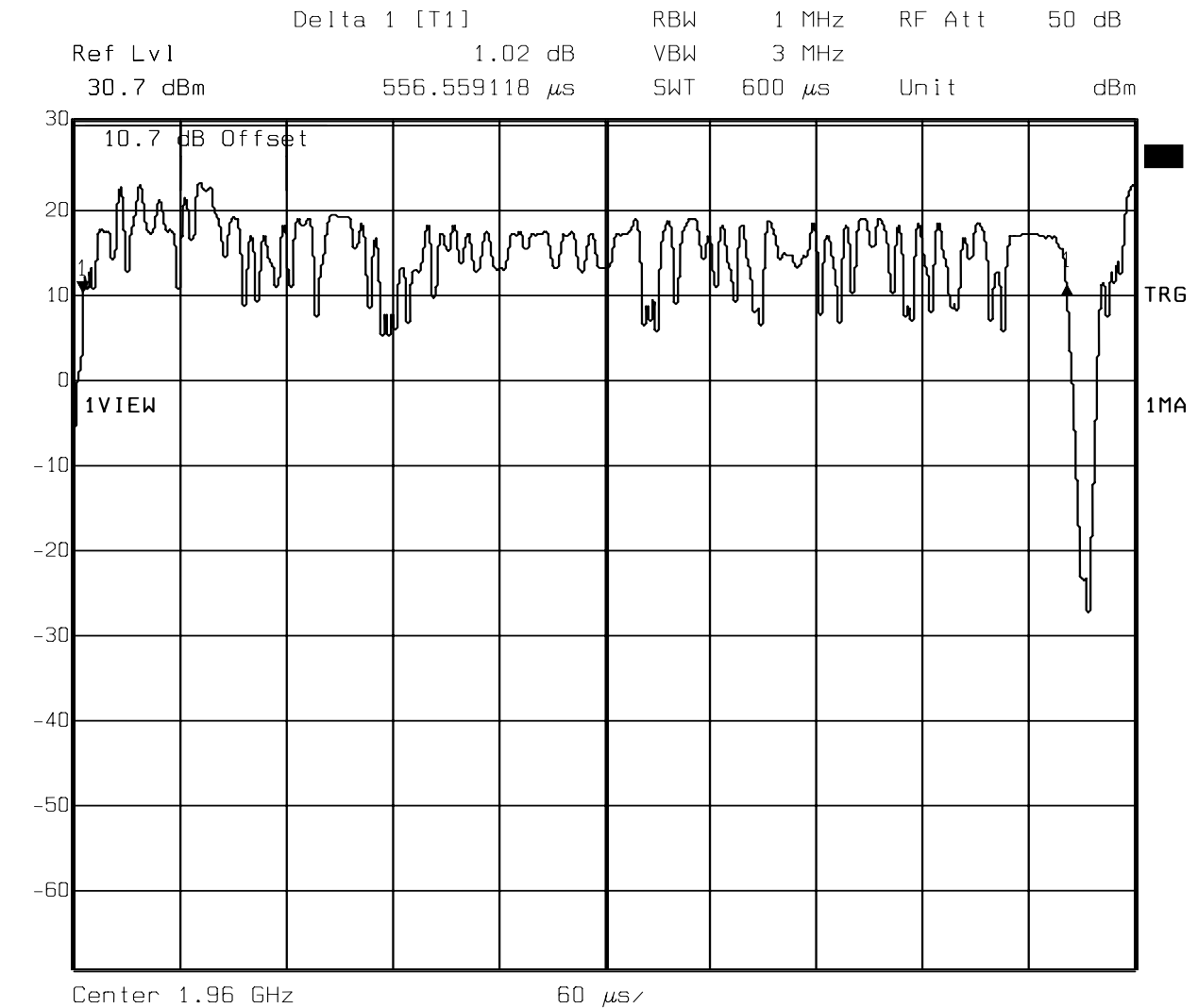
2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

Two views are shown for GSM and EDGE modes of operation. One view shows one active time slot over the complete screen. The other view shows the alternative time slots over a complete frame.

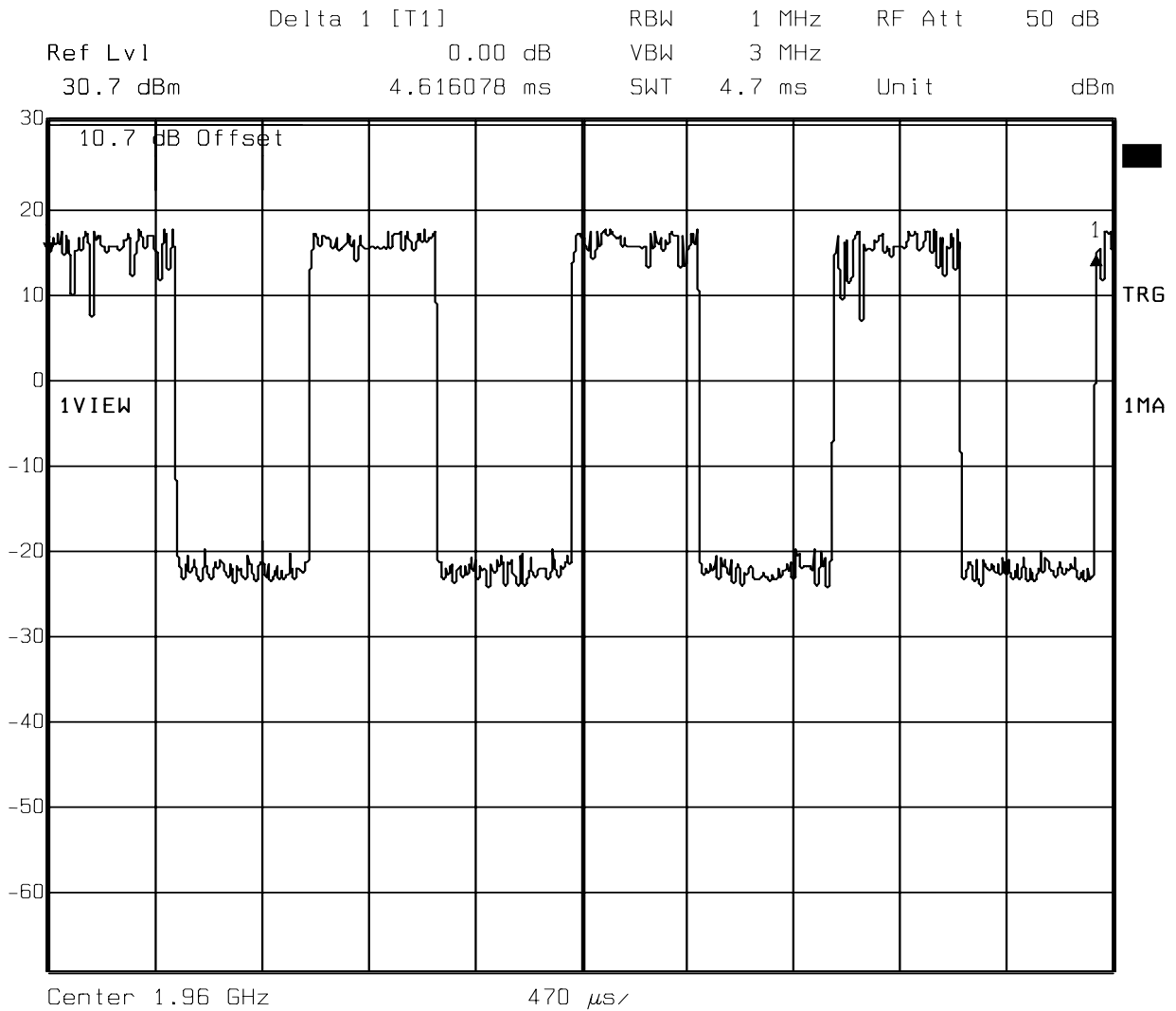
2.4 MODULATION CHARACTERISTICS



Date: 13.OCT.05 10:31:46

GSM Mode. Single Shot View

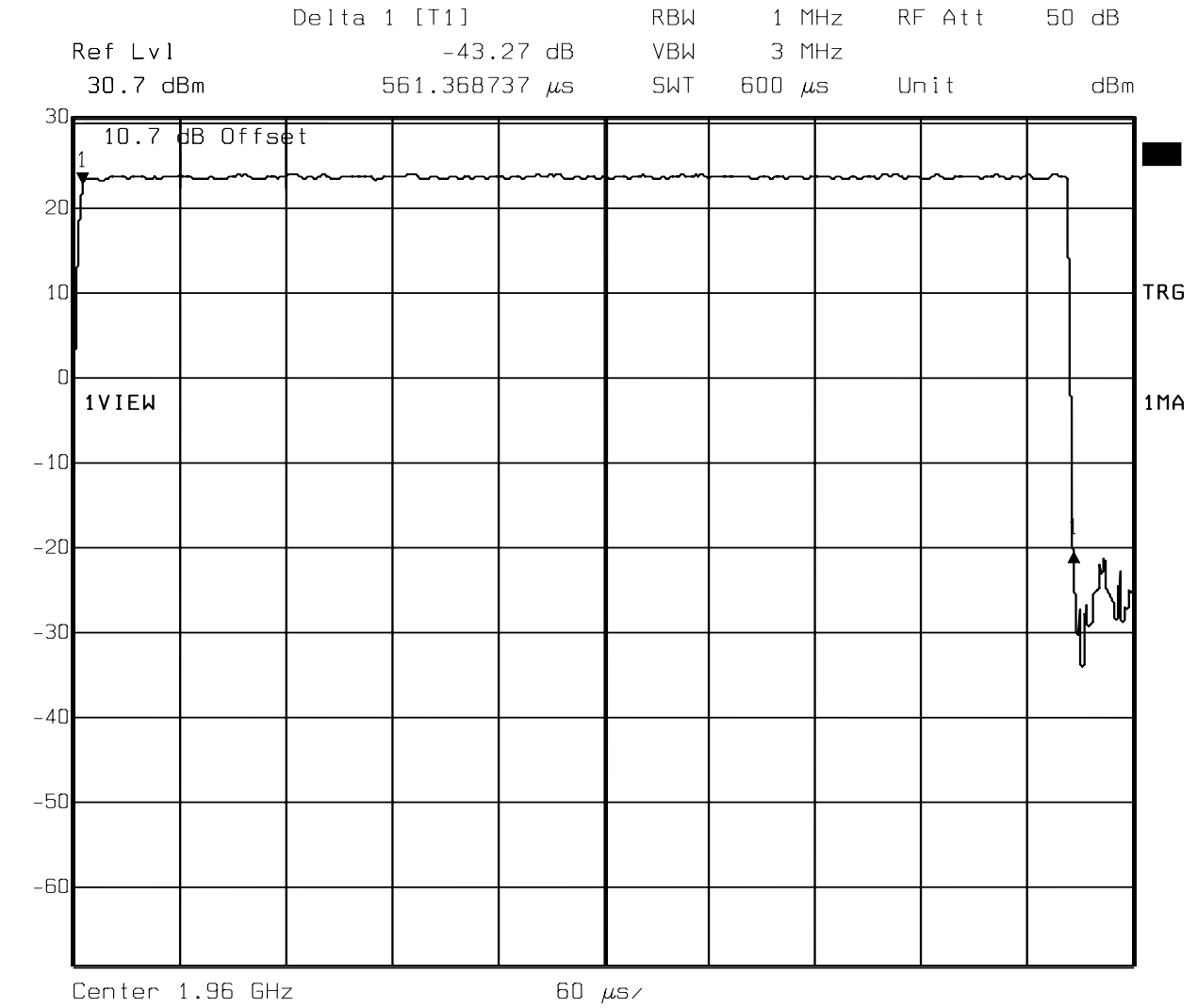
2.4 MODULATION CHARACTERISTICS



Date: 13.OCT.05 10:35:10

GSM Mode. Alternative Slot View

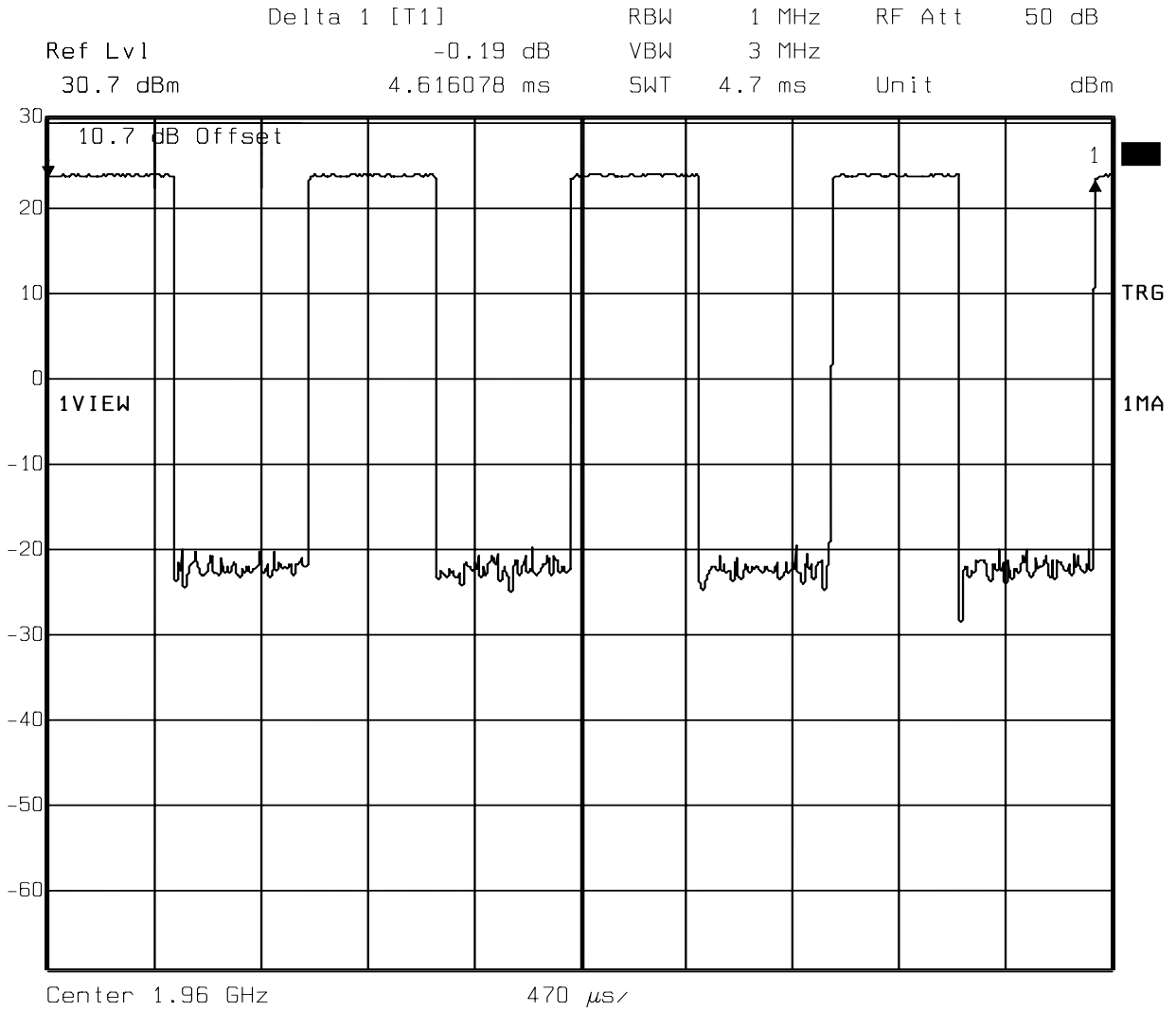
2.4 MODULATION CHARACTERISTICS



Date: 13.OCT.05 10:42:20

EDGE Mode. Single Shot View

2.4 MODULATION CHARACTERISTICS



Date: 13.OCT.05 10:40:10

EDGE Mode. Alternative Slot View



Product Service

2.5 OCCUPIED BANDWIDTH

2.5.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.238(b)

2.5.2 Equipment Under Test

165B (1900MHz nano basestation)

2.5.3 Date of Test

13th October 2005

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

The EUT was set to transmit on maximum power and measurements were made on all Timeslots (0-7) for both GMSK and EDGE modes.

Using a resolution bandwidth of 10kHz and a video bandwidth of 30kHz, the -26dBc points were established and the emission bandwidth determined.

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

26dB Bandwidth GMSK Mode

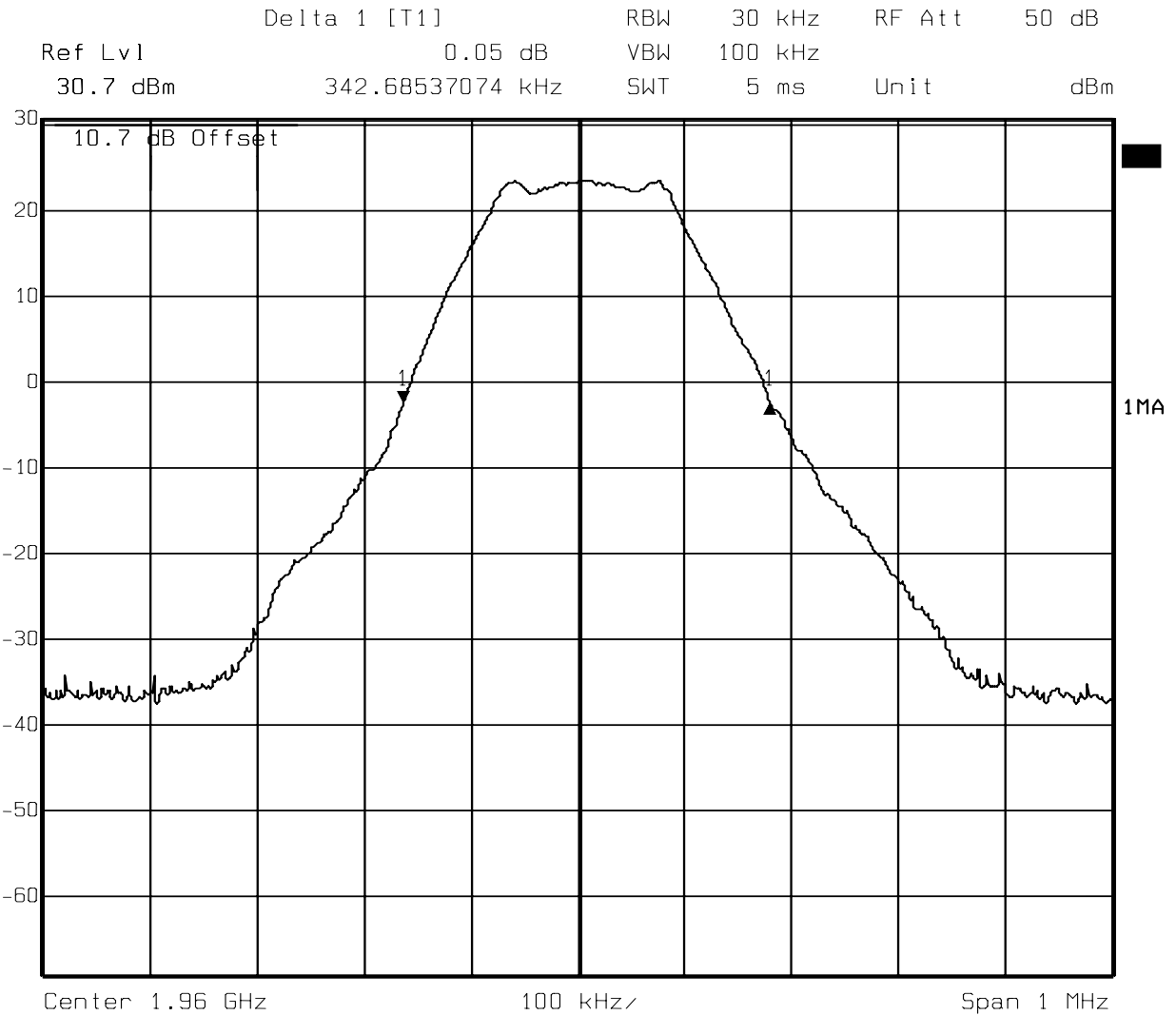
Frequency (MHz)	26dB Bandwidth (kHz)
1960.0	342.685370

26dB Bandwidth EDGE Mode

Frequency (MHz)	26dB Bandwidth (kHz)
1960.0	330.661322

2.5 OCCUPIED BANDWIDTH

2.5.5 Test Results

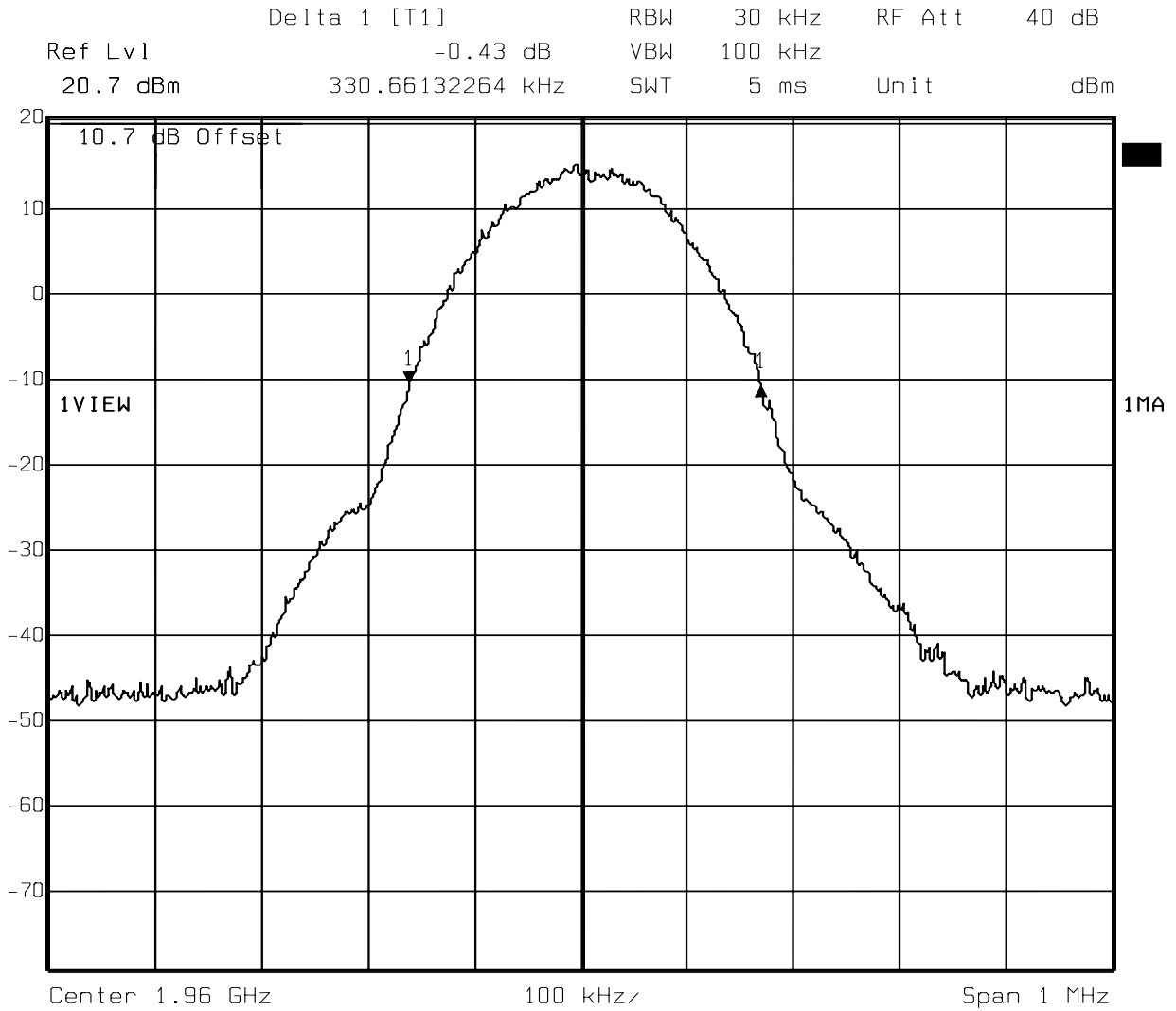


Date: 13.OCT.05 14:39:19

GMSK Mode - Occupied Bandwidth As Defined By The - 26dBc Points

2.5 OCCUPIED BANDWIDTH

2.5.5 Test Results



Date: 13.OCT.05 14:43:23

EDGE Mode - Occupied Bandwidth As Defined By The -26dBc Points



Product Service

2.6 SPURIOUS EMISSIONS AT ANTENNA TERMINALS (+/-1MHz)

2.6.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.229

2.6.2 Equipment Under Test

165B (1900MHz nano basestation)

2.6.3 Date of Test

13th October 2005

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Procedure

In accordance with Part 24.238(b) and 24.229, using a spectrum analyser and attenuators, the emissions were measured between the block edge frequency up to 1MHz away to ensure compliance with the 43 +10Log P limit. Measurements were performed using a peak detector with the trace display set to Max Hold. A resolution bandwidth at least 1% of the 26dB bandwidth was used, in this case 5kHz resolution bandwidth and 20kHz video bandwidth. The measured path loss was entered as a reference level offset into the Spectrum Analyser.

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

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

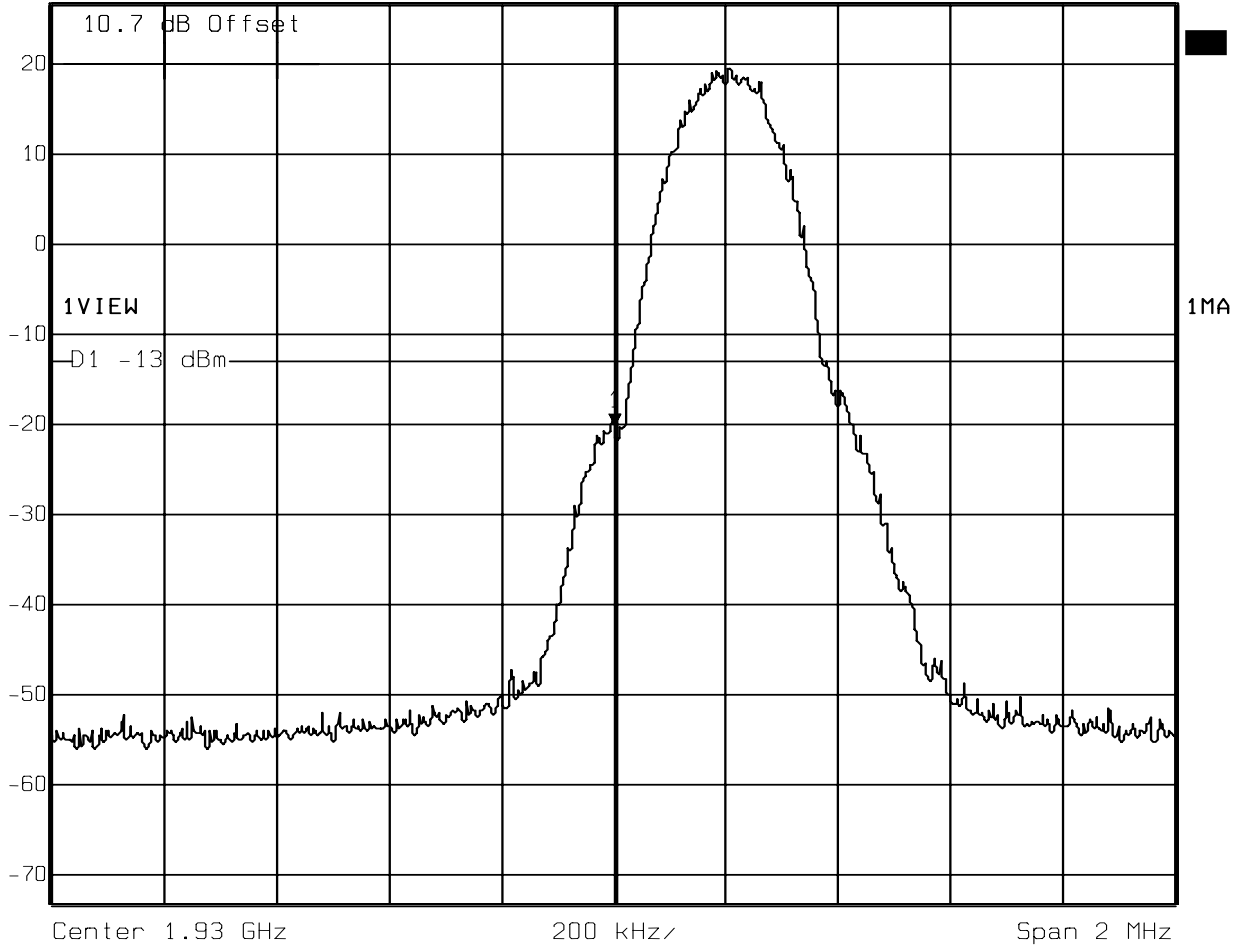
Frequency Block (MHz)	Lower Block Edge Test Channels/Frequencies
A	Channel: 512 Frequency: 1930.2 MHz
C	Channel: 810 Frequency: 1989.8 MHz

2.6.6 Test Results

The measurement plots are shown on the following pages.

2.6 SPURIOUS EMISSIONS AT ANTENNA TERMINALS (+/-1MHz)

	Marker 1 [T1]	RBW	5 kHz	RF Att	40 dB
Ref Lvl	-20.11 dBm	VBW	20 kHz		
26.7 dBm	1.93000000 GHz	SWT	200 ms	Unit	dBm



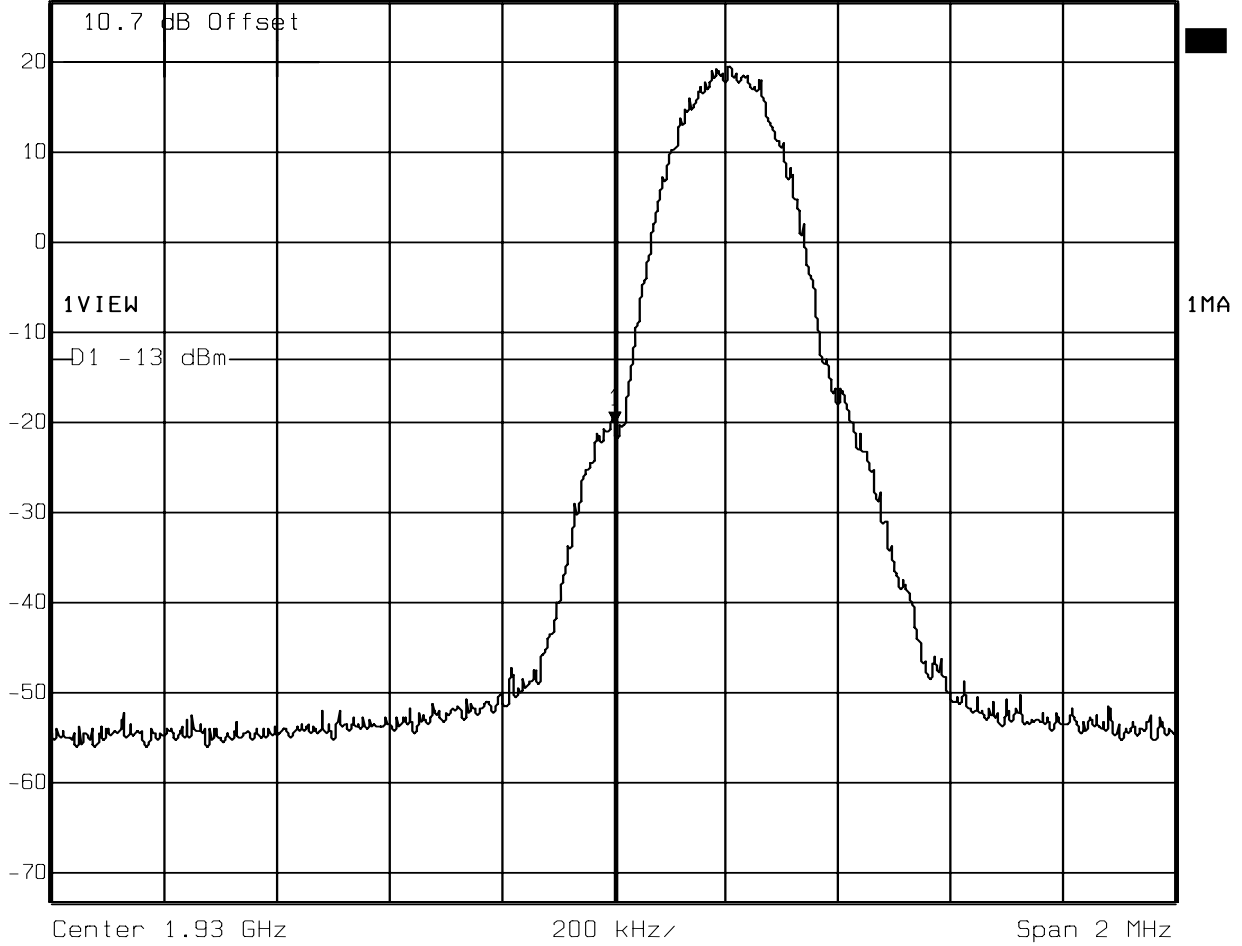
Date: 13.OCT.05 15:15:57

GMSK Mode

Block Edge Measurement with EUT Transmitting on full power
on Channel 512, (1930.2MHz)

2.6 SPURIOUS EMISSIONS AT ANTENNA TERMINALS (+/-1MHz)

	Marker 1 [T1]	RBW	5 kHz	RF Att	40 dB
Ref Lvl	-20.11 dBm	VBW	20 kHz		
26.7 dBm	1.93000000 GHz	SWT	200 ms	Unit	dBm



Date: 13.OCT.05 15:15:57

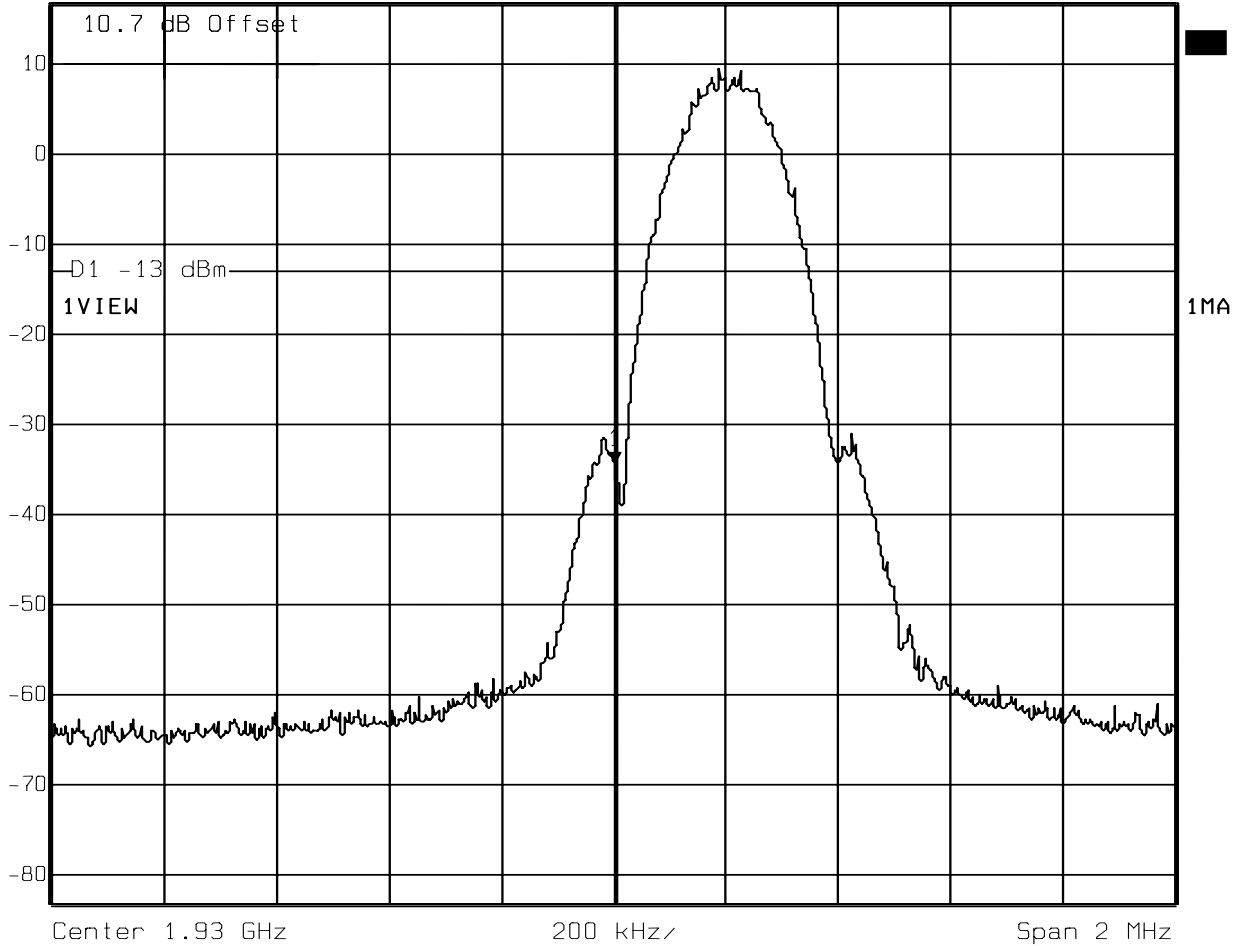
GMSK Mode

Block Edge Measurement with EUT Transmitting on full power

Channel 810, (1989.8MHz)

2.6 SPURIOUS EMISSIONS AT ANTENNA TERMINALS (+/-1MHz)

Marker 1 [T1] RBW 5 kHz RF Att 30 dB
Ref Lvl -34.36 dBm VBW 20 kHz
16.7 dBm 1.93000000 GHz SWT 200 ms Unit dBm



Date: 13.OCT.05 15:20:12

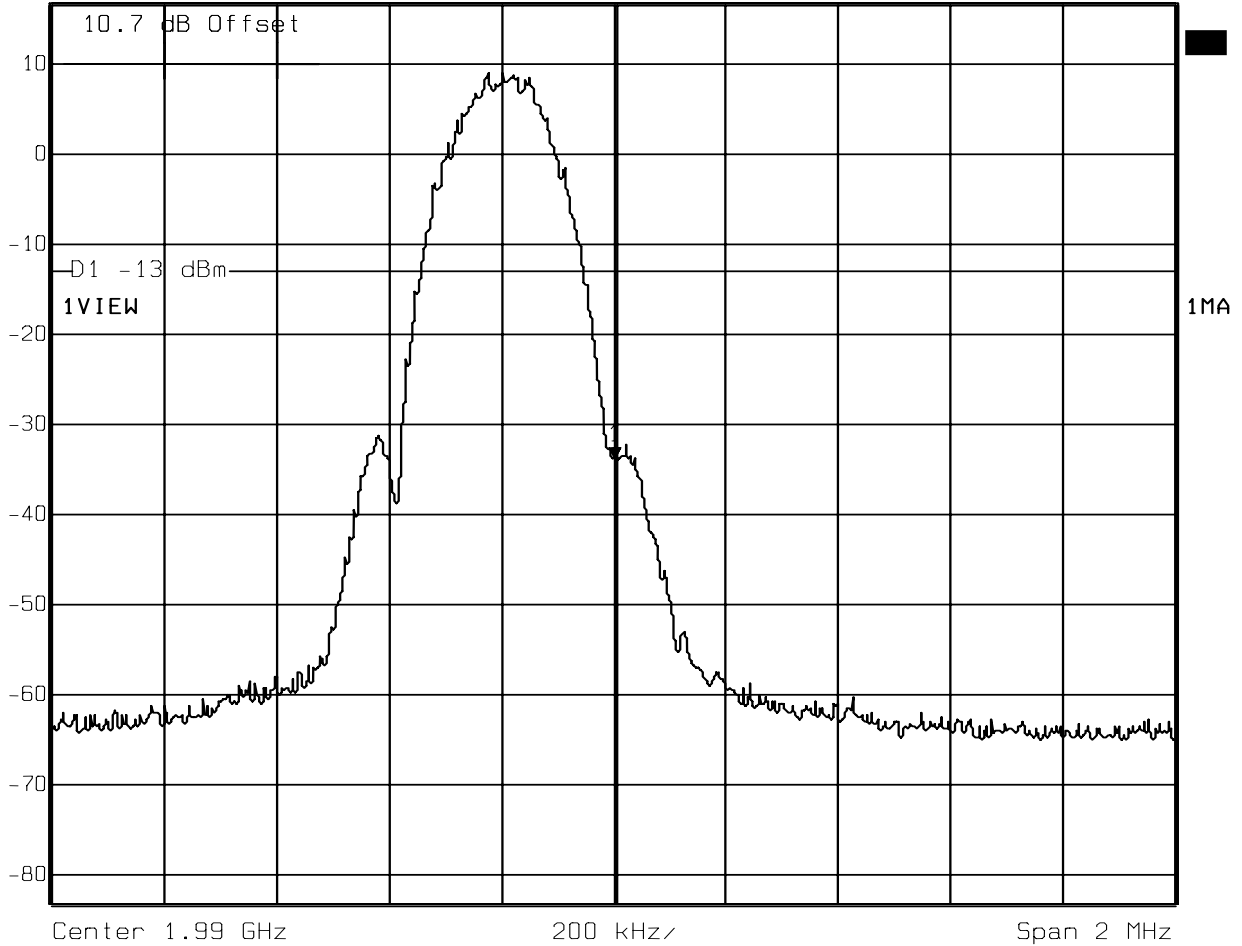
EDGE Mode

Block Edge Measurement with EUT Transmitting on full power

Channel 512, (1930.2MHz)

2.6 SPURIOUS EMISSIONS AT ANTENNA TERMINALS (+/-1MHz)

	Marker 1 [T1]	RBW	5 kHz	RF Att	30 dB
Ref Lvl	-33.89 dBm	VBW	20 kHz		
16.7 dBm	1.99000000 GHz	SWT	200 ms	Unit	dBm



Date: 13.OCT.05 15:22:44

EDGE Mode

Block Edge Measurement with EUT Transmitting on full power
Channel 810, (1989.8MHz)

2.5.5 Test Results

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

2.7 RADIATED EMISSIONS

2.7.1 FCC CFR 47: Part 24 Subpart E, Section 24.238

2.7.2 Equipment Under Test

165B (1900MHz nano basestation)

2.7.3 Date of Test

1st November 2005 (GPRS 30MHz – 1GHz)
3rd November 2005 (EDGE 30MHz – 1GHz)
26th October 2005 and 27th October 2005 (GPRS 1GHz – 20GHz)
1st November 2005 (EDGE 1GHz – 20GHz)

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

In order to determine the Radiated Emission Limits, measurements of Transmitting power (P) were first carried out on the top and bottom channels using a peak detector, and the results are shown in the following table.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. 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. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 20GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.



Product Service

2.7 RADIATED EMISSIONS

2.7.6 Test Results - continued

30MHz – 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 for Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in GPRS 1900MHz Mode 1.

EUT transmitting on four channels

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Limit
MHz		cm	degree	dBµV/m	dBµV/m
65.00	Vertical	100	000	-54.37	-13.0

Measurements were made with the EUT in EDGE 1900MHz Mode 2.

EUT transmitting on four channels

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
MHz		cm	degree	dBµV/m	dBµV/m
88.0	Vertical	100	254	-53.1	-13.0
131.7	Horizontal	100	287	-52.7	-13.0



Product Service

2.7 RADIATED EMISSIONS

2.7.6 Test Results - continued

1GHz – 20GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 for Radiated Emissions (1GHz- 20GHz).

Measurements were made with the EUT in GPRS 1900MHz Mode 1.

EUT transmitting on four channels

No emissions that were above the noise floor were detected. All emissions were 20dB or more below the specification limit.

Measurements were made with the EUT in EDGE 1900MHz Mode 1.

EUT transmitting on four channels

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Peak Limit
GHz		cm	degree	dBµV/m	dBµV/m
5.039	Horizontal	113	349	-40.7	-13.0
5.128	Horizontal	115	169	-39.8	-13.0
5.217	Horizontal	123	099	-40.5	-13.0
6.718	Vertical	131	146	-37.5	-13.0
6.837	Vertical	100	056	-40.4	-13.0
10.435	Horizontal	144	055	-34.6	-13.0



Product Service

2.8 CONDUCTED SPURIOUS EMISSIONS

2.8.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.238(a)

2.8.2 Equipment Under Test

165B (1900MHz nano basestation)

2.8.3 Date of Test

13th October 2005

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.5 Test Procedure

In accordance with Part 2.1051, the spurious emissions from the antenna terminal were measured. The Transmitting 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 (0-7) timeslot active. The EUT was tested on Bottom, Middle and Top channels. 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 4GHz high pass filter were used.

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

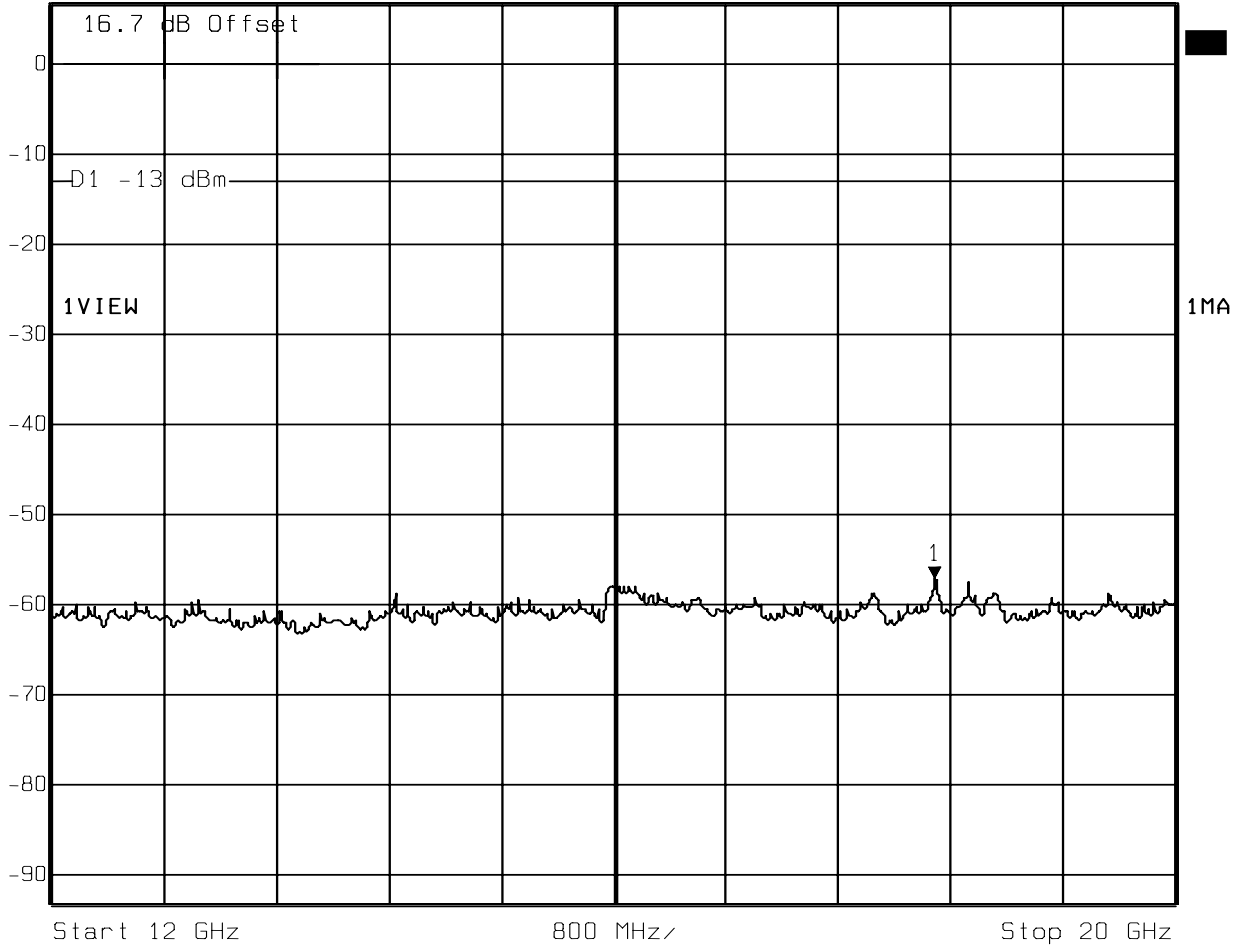
Both GPRS and EGDE Modes were tested.

2.8.6 Test Results

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.

2.8 CONDUCTED SPURIOUS EMISSIONS

	Marker 1 [T1]	RBW	1 MHz	RF Att	0 dB
Ref Lvl	-57.11 dBm	VBW	1 MHz		
6.7 dBm	18.28456914 GHz	SWT	46 ms	Unit	dBm

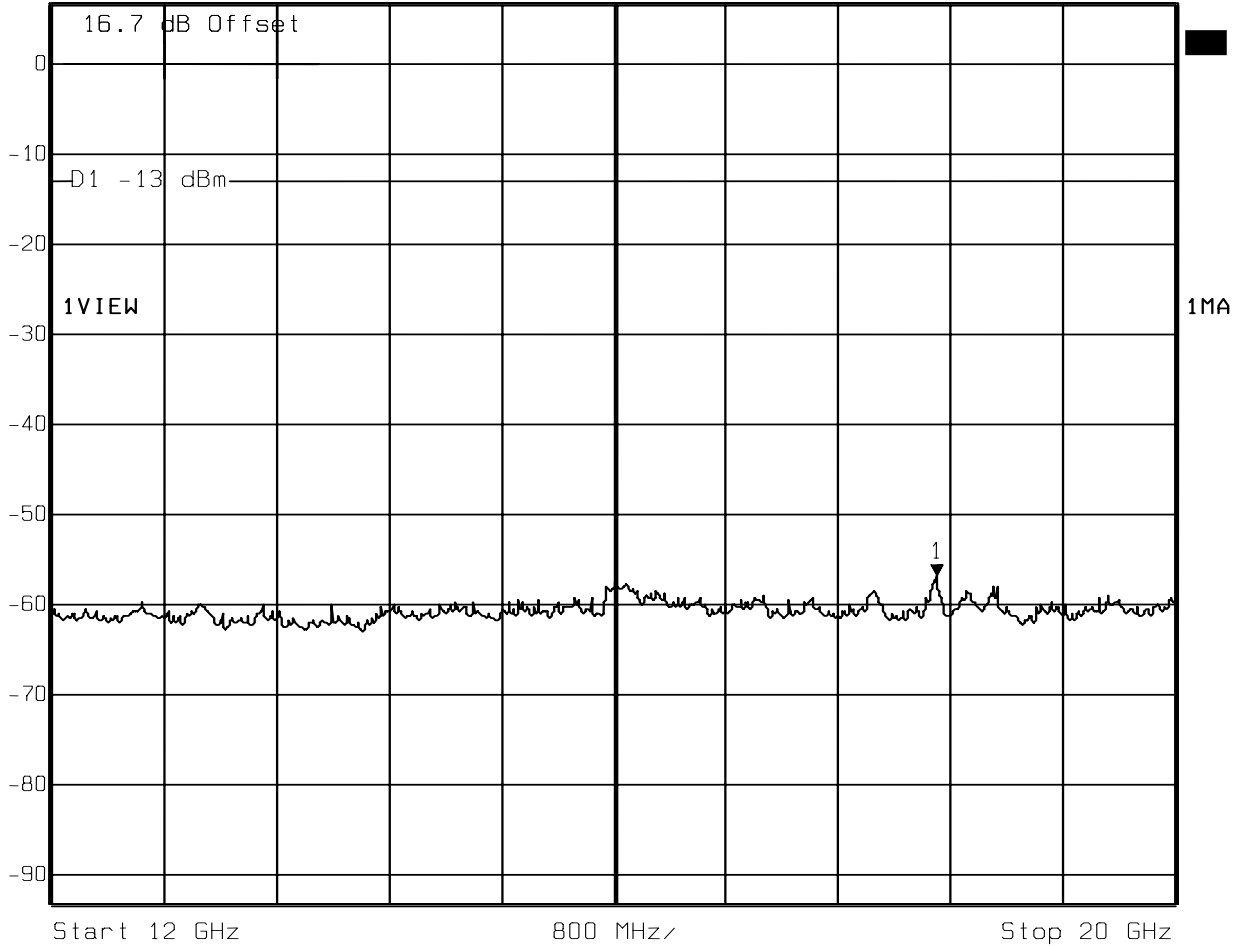


Date: 13.OCT.05 16:34:10

Spurious Emissions (12GHz – 20GHz)
GMSK Mode Channel 512 (1930.2MHz) - Maximum Power

2.8 CONDUCTED SPURIOUS EMISSIONS

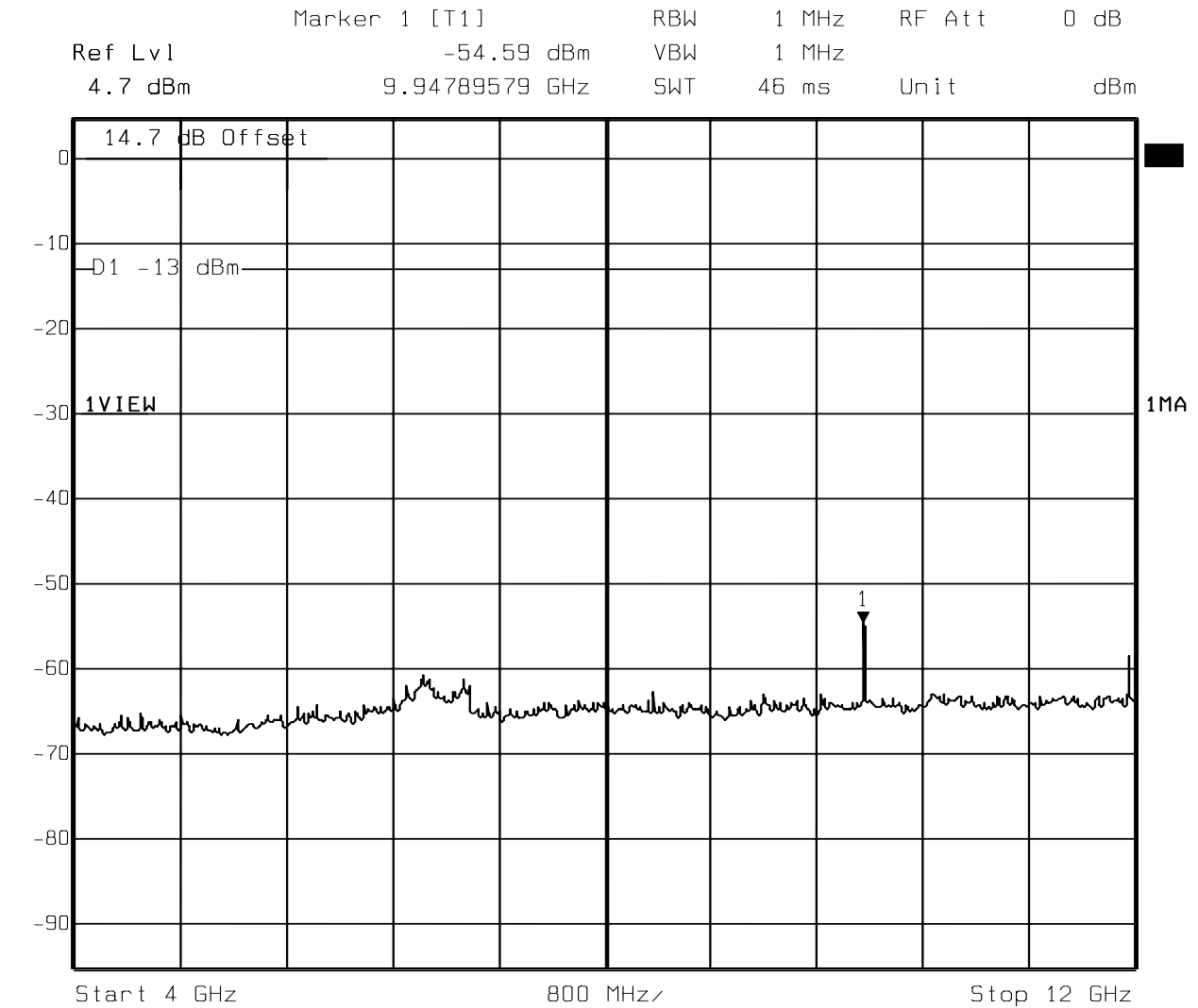
Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -56.98 dBm VBW 1 MHz
6.7 dBm 18.30060120 GHz SWT 46 ms Unit dBm



Date: 13.OCT.05 16:31:29

Spurious Emissions (12GHz – 20GHz)
GMSK Mode Channel 661 (1960.0MHz) - Maximum Power

2.8 CONDUCTED SPURIOUS EMISSIONS



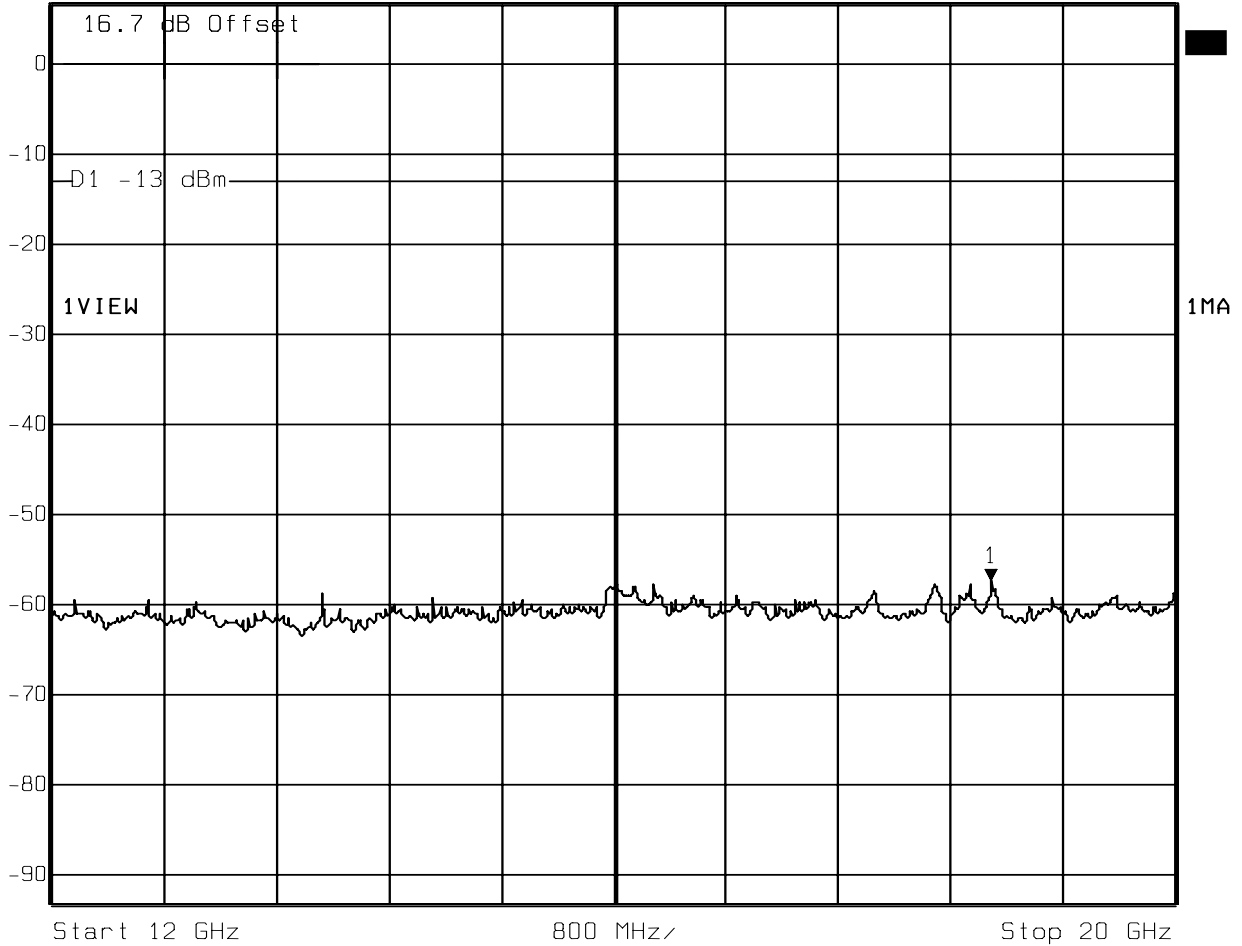
Date: 13.OCT.05 16:27:18

Spurious Emissions (4GHz – 12GHz)
GMSK Mode Channel 810 (1989.8MHz) - Maximum Power



2.8 CONDUCTED SPURIOUS EMISSIONS

Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -57.45 dBm VBW 1 MHz
6.7 dBm 18.68537074 GHz SWT 46 ms Unit dBm

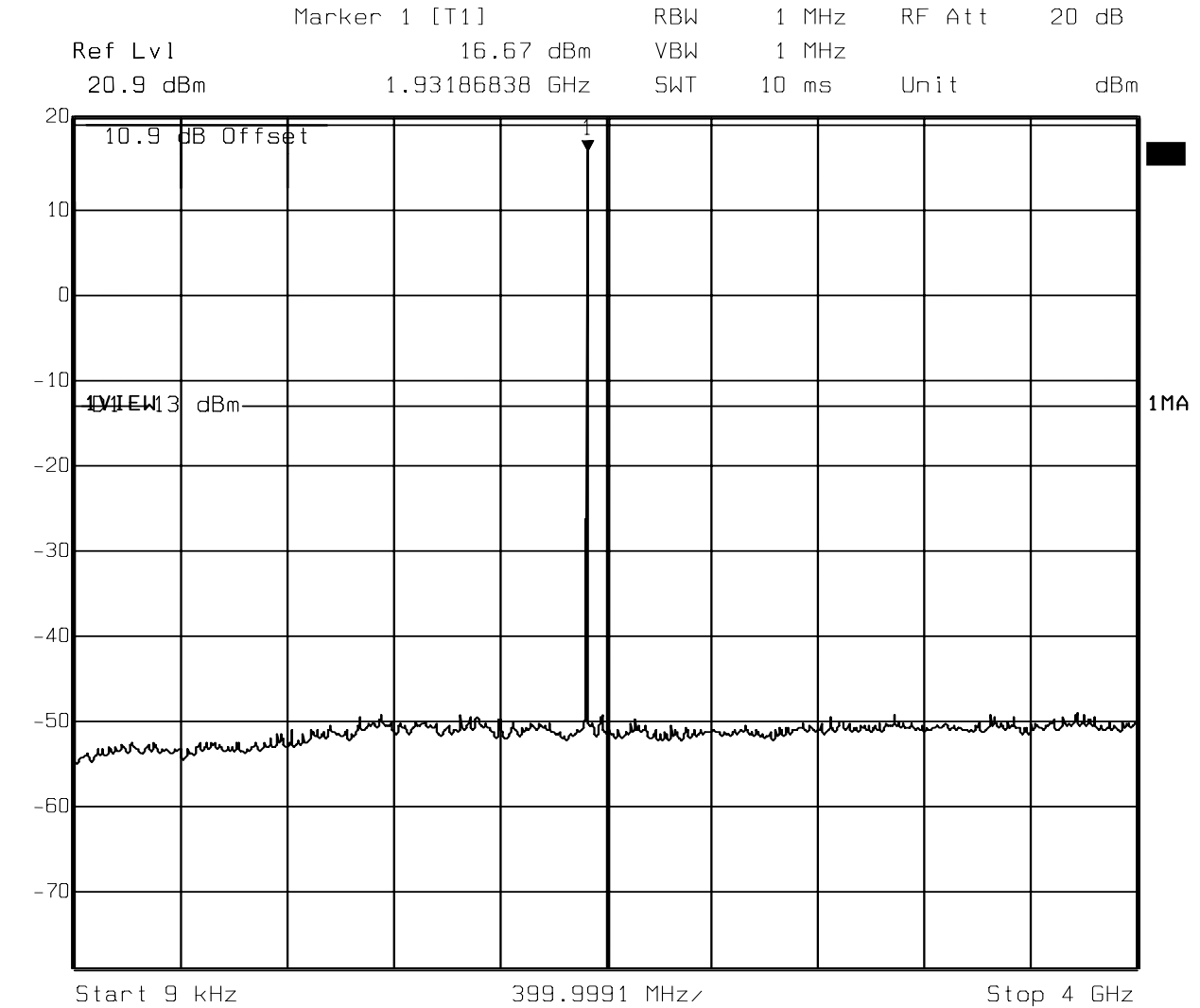


Date: 13.OCT.05 16:29:33

Spurious Emissions (12GHz – 20GHz)
GMSK Mode Channel 810 (1989.8MHz) - Maximum Power



2.8 CONDUCTED SPURIOUS EMISSIONS

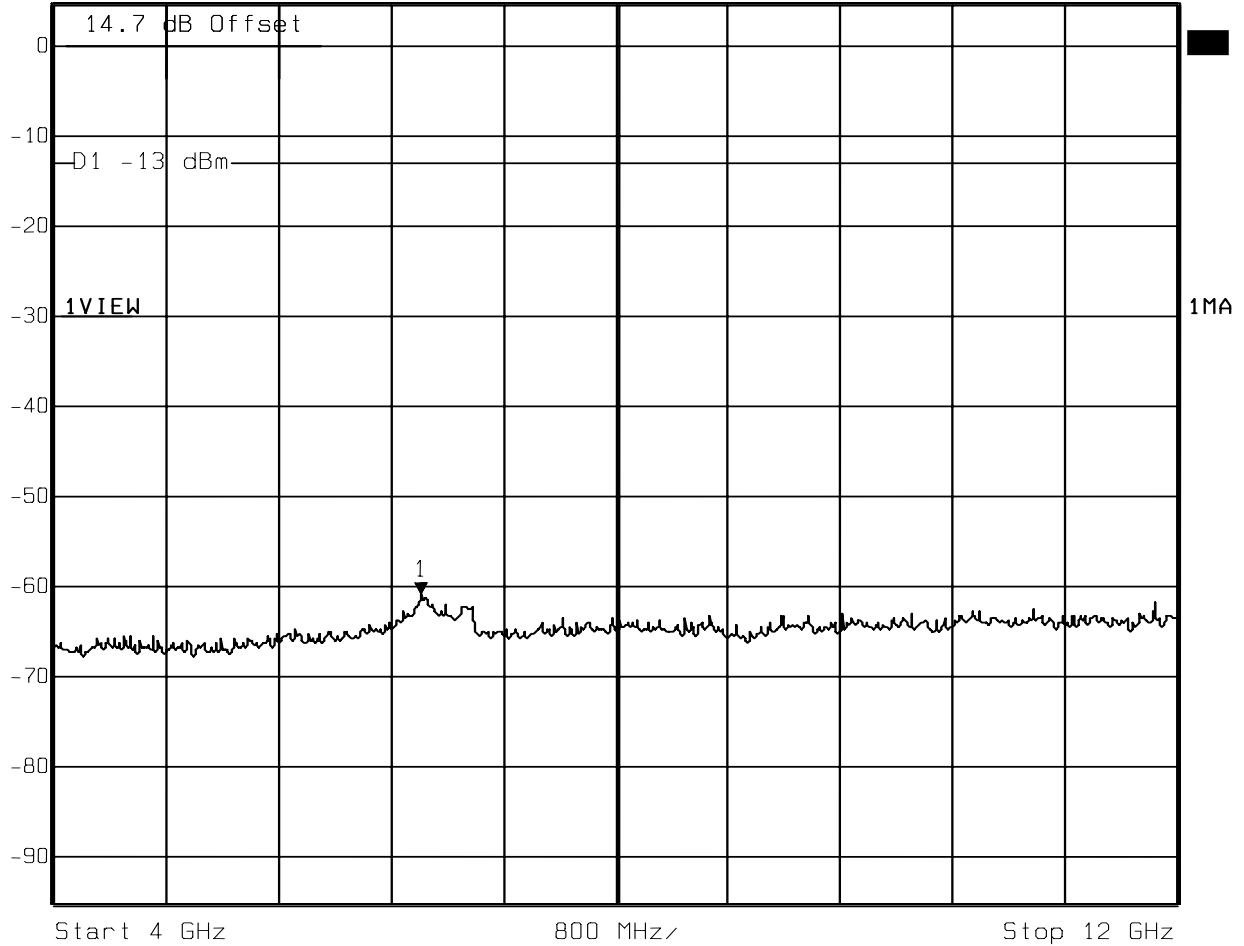


Date: 13.OCT.05 15:51:54

Spurious Emissions (9kHz – 4GHz)
EDGE Mode Channel 512 (1930.2MHz) - Maximum Power

2.8 CONDUCTED SPURIOUS EMISSIONS

Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -60.82 dBm VBW 1 MHz
4.7 dBm 6.61322645 GHz SWT 46 ms Unit dBm



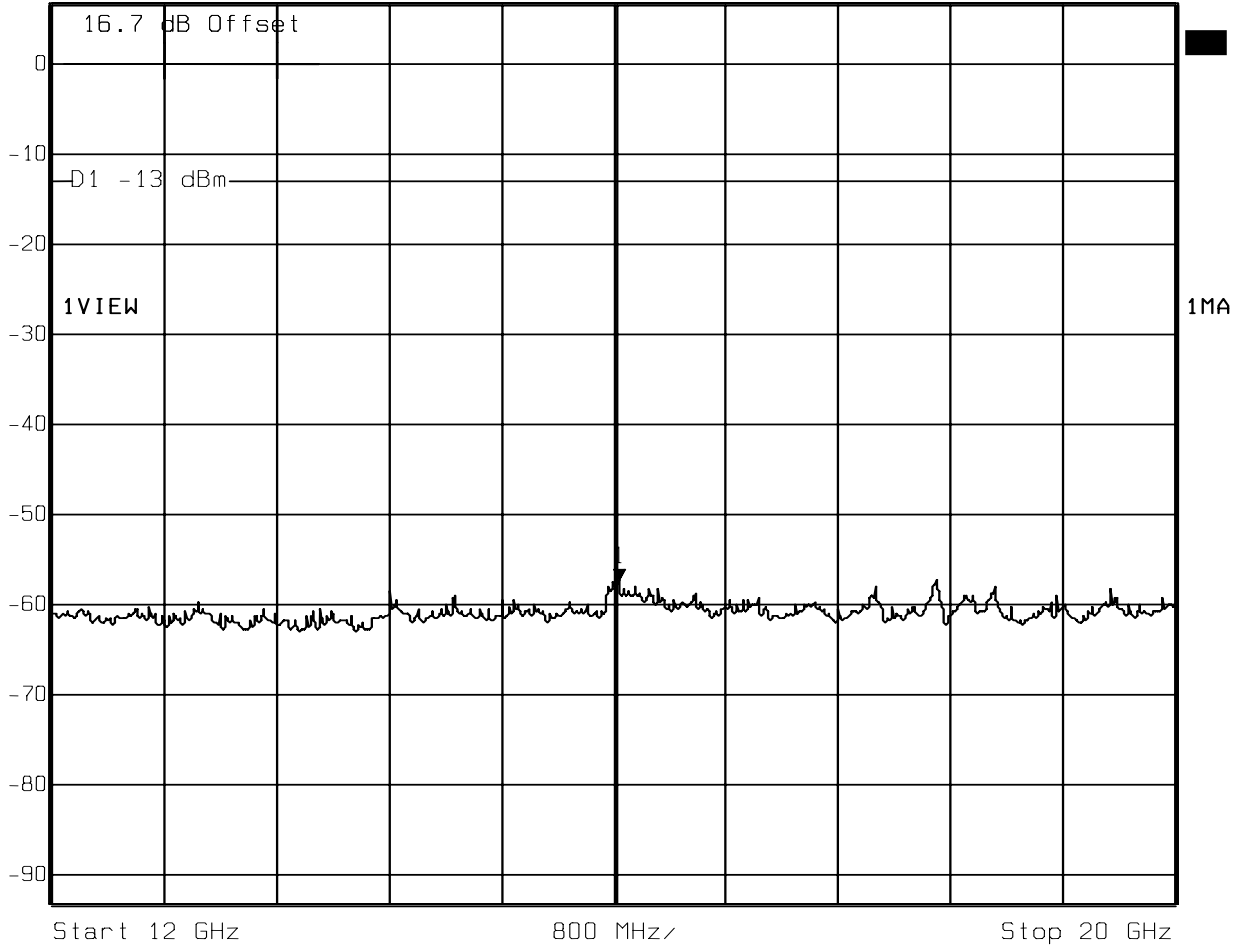
Date: 13.OCT.05 16:01:23

Spurious Emissions (4GHz – 12GHz)
EDGE Mode Channel 512 (1930.2MHz) - Maximum Power



2.8 CONDUCTED SPURIOUS EMISSIONS

Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -57.40 dBm VBW 1 MHz
6.7 dBm 16.04008016 GHz SWT 46 ms Unit dBm

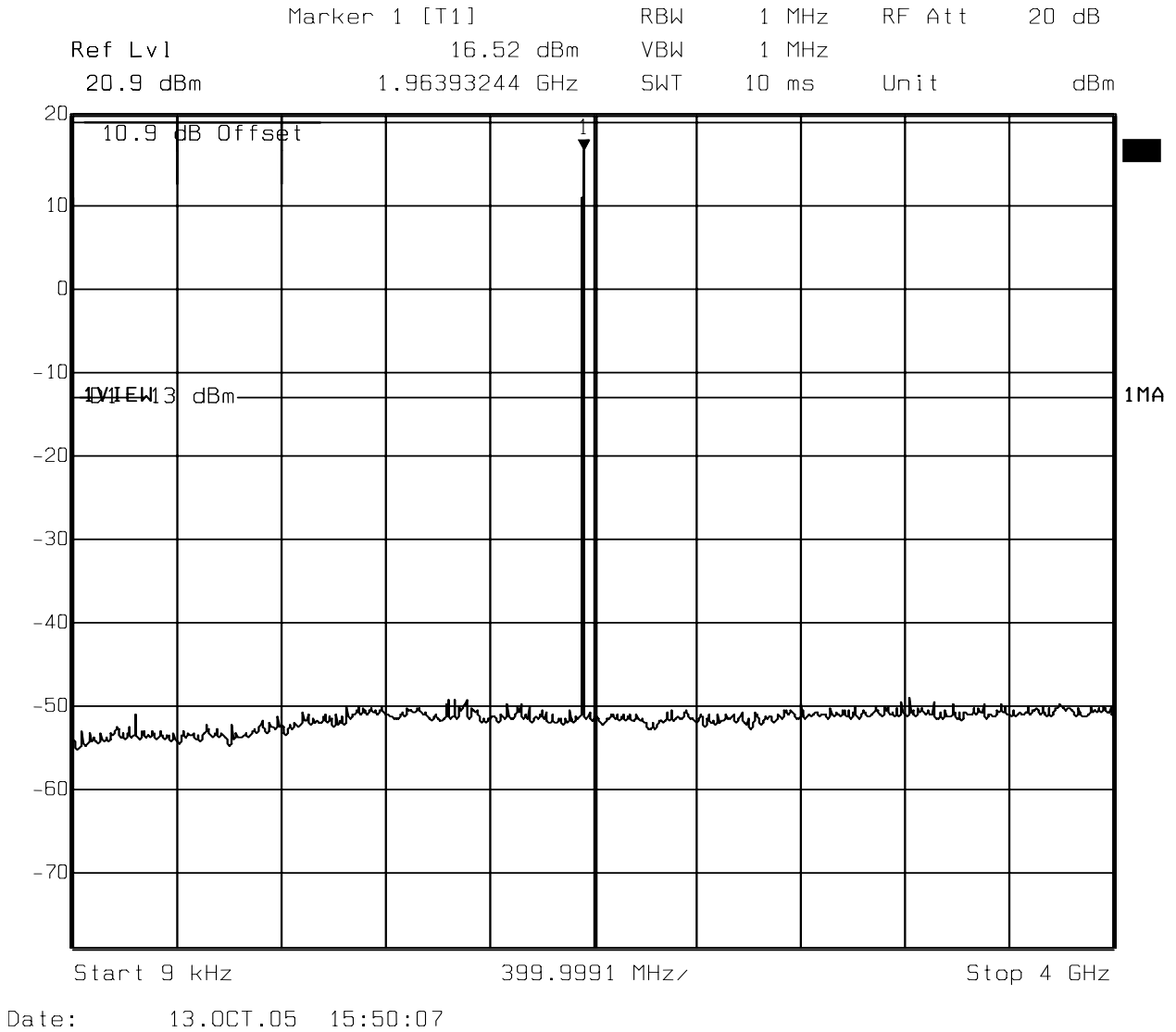


Date: 13.OCT.05 16:20:31

Spurious Emissions (12GHz – 20GHz)
edge Mode Channel 512 (1930.2MHz) - Maximum Power



2.8 CONDUCTED SPURIOUS EMISSIONS



Spurious Emissions (9kHz – 4GHz)
EDGE Mode Channel 661 (1960.0MHz) - Maximum Power



2.8 CONDUCTED SPURIOUS EMISSIONS

Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -60.87 dBm VBW 1 MHz
4.7 dBm 6.61322645 GHz SWT 46 ms Unit dBm

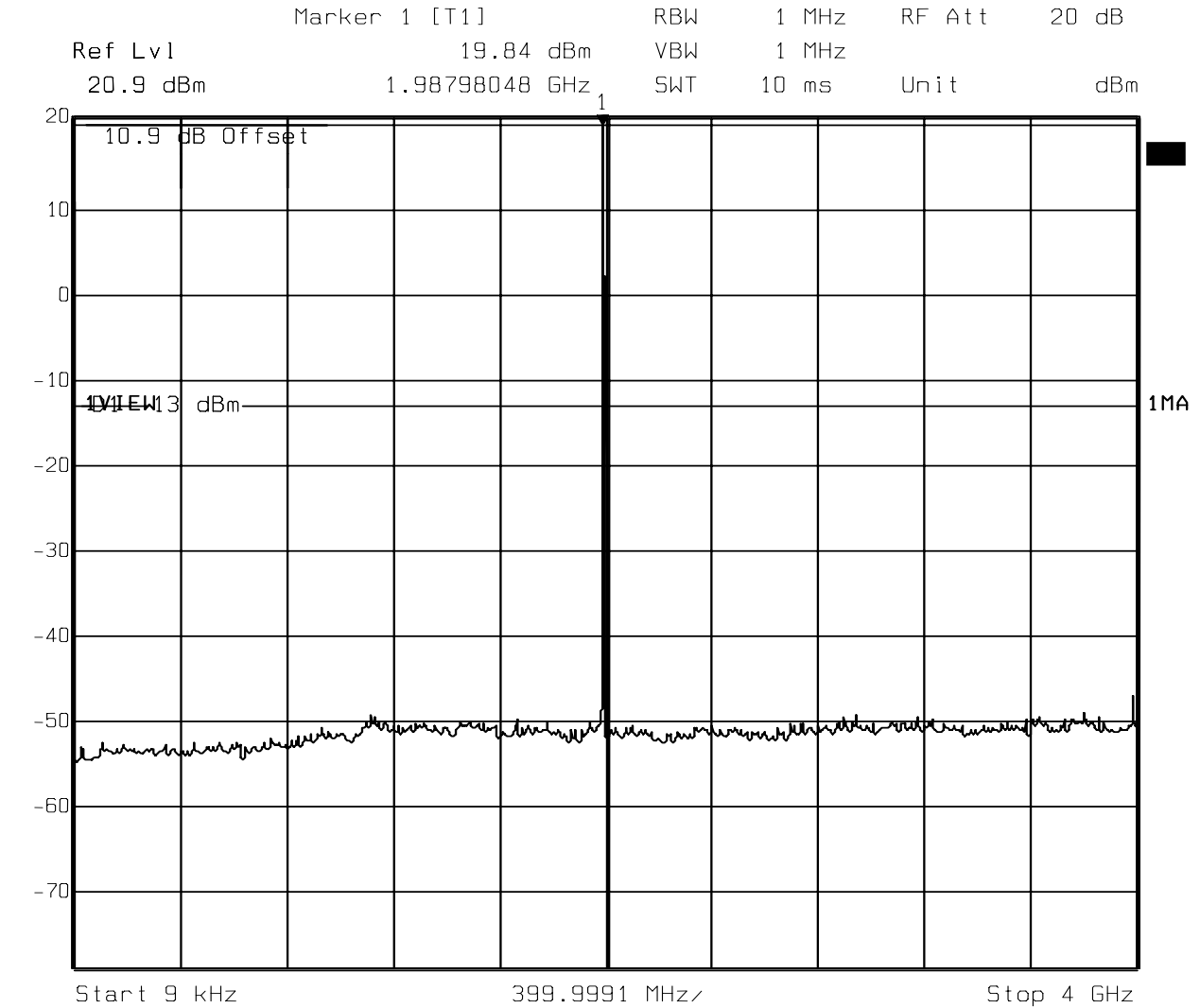


Date: 13.OCT.05 16:03:03

Spurious Emissions (4GHz - 12GHz)
EDGE Mode Channel 661 (1960.0MHz) - Maximum Power



2.8 CONDUCTED SPURIOUS EMISSIONS

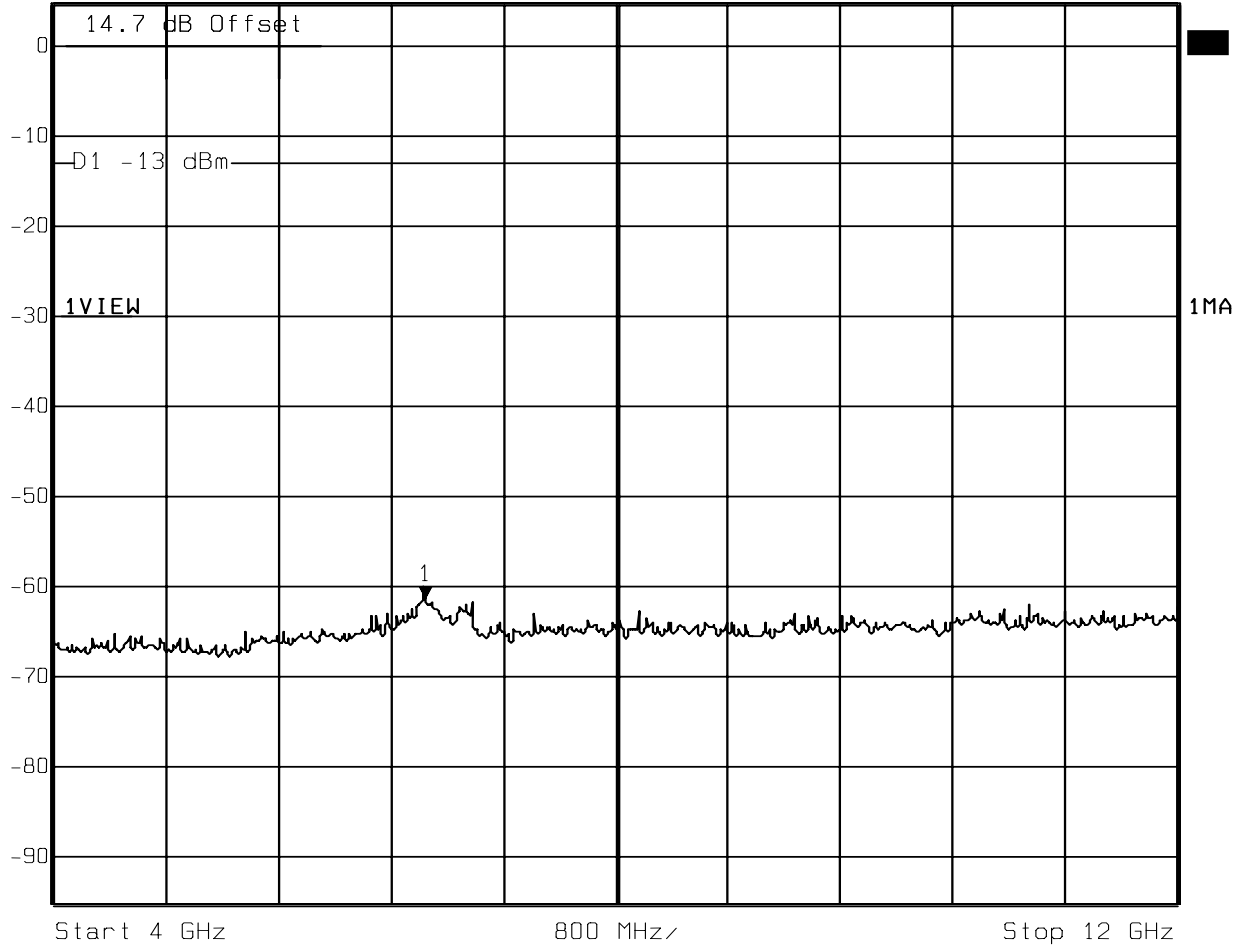


Date: 13.OCT.05 15:48:29

Spurious Emissions (9kHz – 4GHz)
EDGE Mode Channel 810 (1989.8MHz) - Maximum Power

2.8 CONDUCTED SPURIOUS EMISSIONS

Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -61.40 dBm VBW 1 MHz
4.7 dBm 6.64529058 GHz SWT 46 ms Unit dBm



Date: 13.OCT.05 16:10:28

Spurious Emissions (4GHz – 12GHz)
EDGE Mode Channel 810 (1989.8MHz) - Maximum Power



Product Service

2.9 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.9.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.135(a)

2.9.2 Equipment Under Test

165B (1900MHz nano basestation)

2.9.3 Date of Test

14th October 2005

2.9.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.5 Test Procedure

GSM

The EUT was set to transmit on power control level 0 and measurements were made on Timeslot 0. A Digital Communications Analyser, (CMU200), was used to measure the Frequency Error. The maximum result of measurements made over 100 bursts was recorded. The temperature was adjusted between -30°C and +50°C in 10° steps as per 2.1055.

EDGE

The EUT was set to transmit on power control level 5 and measurements were made on Timeslot 0. A Digital Communications Analyser, (CMU200), was used to measure the Frequency Error. The maximum result of measurements made over 100 bursts was recorded. The temperature was adjusted between -30°C and +50°C in 10° steps as per 2.1055.

2.9.6 Test Results

GSMK – PCS1900 Mode

Temperature Interval(°C)	Test Frequency (GHz)	Deviation (Hz)
-30	1960.0	-34
-20	1960.0	-39
-10	1960.0	-39
0	1960.0	-37
+10	1960.0	-43
+20	1960.0	-24
+30	1960.0	-27
+40	1960.0	-27
+50	1960.0	-30

2.9 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

EDGE – PCS1900 Mode

Temperature Interval(°C)	Test Frequency (GHz)	Deviation (Hz)
-30	1960.0	-36
-20	1960.0	-37
-10	1960.0	-37
0	1960.0	-39
+10	1960.0	-39
+20	1960.0	-21
+30	1960.0	-24
+40	1960.0	-27
+50	1960.0	-28

Limit	Fundamental must remain within the authorised frequency block.
-------	--

Remarks

EUT complies with CFR 47 Part 24.135(a). The frequency drift of the EUT does not take the fundamental outside of the authorised frequency block at any temperature interval across the measured range.

2.10 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.10.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.135(a)

2.10.2 Equipment Under Test

165B (1900MHz nano basestation)

2.10.3 Date of Test

14th October 2005

2.10.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.10.5 Test Procedure

GSM

The EUT was set to transmit on power control level 0 and measurements were made on Timeslot 0. A Digital Communications Analyser, (CMU200), was used to measure the Frequency Error. The maximum result of measurements made over 100 bursts was recorded. The temperature was adjusted between -30°C and +50°C in 10° steps as per 2.1055.

EDGE

The EUT was set to transmit on power control level 5 and measurements were made on Timeslot 0. A Digital Communications Analyser, (CMU200), was used to measure the Frequency Error. The maximum result of measurements made over 100 bursts was recorded. The temperature was adjusted between -30°C and +50°C in 10° steps as per 2.1055.

2.10.6 Test Results

GSMK – PCS1900 Mode

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)
55.2	1960.0	-23
48.0	1960.0	-24
40.8	1960.0	-22

2.10 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.10.6 Test Results

EDGE – PCS1900 Mode

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)
55.2	1960.0	-21
48.0	1960.0	-21
40.8	1960.0	-23

Limit	Fundamental must remain within the authorised frequency block.
-------	--

Remarks

EUT complies with CFR 47 Part 24.135(a). The frequency drift of the EUT does not take the fundamental outside of the authorised frequency block at any temperature interval across the measured range.



SECTION 3

TEST EQUIPMENT

3.1 TEST EQUIPMENT

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Sections 2.1, 2.3 and 2.7 EMC Radiated Emissions (Bearley)				
Amplifier	Miteq Corp	AMF-3d-001080-18-13P	231	TU
Double Ridge Guide Antenna (1GHz-18GHz)	EMCO	3115	234	01/07/2006
LNA 18-40 GHz	Narda	NARDA DB02-0447	237	02/06/2006
LNA18-40 GHz	Narda	NARDA DB02-0447	240	02/06/2006
4m 40GHz Microwave Cable	Rosenberger	FB142A2040002020	485	24/10/2006
7m 40GHz Microwave Cable	Rosenberger	FB142A2070002020	486	24/10/2006
High Pass Filter (4GHz)	Sematron	F-100-4000-5-R	564	TU
Attenuator (10dB, 10W)	Marconi	6534/3	1048	TU
Signal Gen	Hewlett Packard	8673B	1351	09/09/2006
Hygromer	Rotronic	A1	1430	18/04/2006
Receiver	Rohde & Schwarz	ESVP	1658	26/06/2006
Test Receiver	Rohde & Schwarz	ESVP	1669	07/09/2006
Screened Room	Rayproof	1993	1675	TU
Biconical Antenna	EMCO	3104	1692	TU
Log Periodic Antenna	EMCO	3146	1694	TU
Signal Generator	Rohde & Schwarz	SMT03	1702	21/10/2006
Antenna Mast	EMCO	1050	1707	TU
Turntable Controller	Various	RH253	1708	TU
Spectrum Analyser	Rohde & Schwarz	EZM	1823	TU
Open Area Site 2	TUV	OATS2	1850	28/11/2005
Floppy Disc Station	Rohde & Schwarz	ROHDE	1854	TU
Turntable Interface	Various	RH-253.6	1855	TU
Antenna Tower 6m	EMCO	1050	1859	TU
Bilog Antenna	York Electronics	CBL6111B	1868	01/10/2006
Power Supply Unit	Farnell	LT30-2	2045	TU
Amplifier (8GHz-18GHz)	Avantec	AWT-18036	2821	TU
Emi Receiver	Rohde & Schwarz	ESIB 40	2941	11/08/2006

3.2 TEST EQUIPMENT - Continued

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Sections 2.3 and 2.7 Radio - Spurious Emissions				
Spectrum Analyser	Rohde & Schwarz	FSEM	37	13/01/2006
Hygrometer	Rotronic	A1	465	20/09/2006
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	11/07/2006
SMA-SMA Cable (2m)	Reynolds	262-0248-2000	2399	21/07/2006
SMA-SMA Cable (1m)	Reynolds	262-0248-1000	2407	21/07/2006
1m sma(m) - sma(m) Cable	Reynolds	262-0248-1000	2408	21/07/2006
Multimeter	Isotech	Iso Tech IDM101	2424	26/07/2006
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	16/05/2006
Sections 2.9 and 2.10 Radio (Tx) - Frequency Characteristics				
Hygrometer	Rotronic	A1	465	20/09/2006
Chamber	Montford	2F3,BLD 8	467	TU
Digital Temperature Indicator	Fluke	51	1385	03/08/2006
SMA-SMA Cable (2m)	Reynolds	262-0248-2000	2400	21/07/2006
Multimeter	Isotech	Iso Tech IDM101	2424	26/07/2006
GSM Test Set	Rohde & Schwarz	CMU 200	2809	03/12/2005
Section 2.4 Radio (Tx) - Modulation Characteristics				
Spectrum Analyser	Rohde & Schwarz	FSEM	37	13/01/2006
Hygrometer	Rotronic	A1	465	20/09/2006
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	11/07/2006
1m sma(m) - sma(m) Cable	Reynolds	262-0248-1000	2408	21/07/2006
Multimeter	Isotech	Iso Tech IDM101	2424	26/07/2006
Section 2.5 Radio (Tx) - Occupied Bandwidth				
Spectrum Analyser	Rohde & Schwarz	FSEM	37	13/01/2006
Hygrometer	Rotronic	A1	465	20/09/2006
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	11/07/2006
1m sma(m) - sma(m) Cable	Reynolds	262-0248-1000	2408	21/07/2006
Multimeter	Isotech	Iso Tech IDM101	2424	26/07/2006



Product Service

3.3 TEST EQUIPMENT - Continued

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.2 Radio (Tx) - Power Characteristics				
Spectrum Analyser	Rohde & Schwarz	FSEM	37	13/01/2006
Hygrometer	Rotronic	A1	465	20/09/2006
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	11/07/2006
1m sma(m) - sma(m) Cable	Reynolds	262-0248-1000	2408	21/07/2006
Multimeter	Isotech	Iso Tech IDM101	2424	26/07/2006

TU Traceability Unscheduled

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

IN THE FREQUENCY RANGE 30MHz TO 1000MHz		
TEST	FREQUENCY	AMPLITUDE
For 6dB Bandwidth	$\pm 210.894\text{kHz}$	$\pm 0.5\text{dB}$
For Maximum Output Power	Not Applicable	$\pm 0.5\text{dB}$
For Radiated Emissions, Quasi-Peak Measurements using the ESVP Test Receiver and Bilog Antenna	$\pm 5\text{ppm} + 500\text{Hz}$	$\pm 4.1\text{dB}$
For Radiated Emissions, Quasi-Peak Measurements taken in Zero Span using the Hewlett Packard EMI Receiver and Bilog Antenna	$\pm 2 \times 10^{-7} \times \text{Centre Frequency}$	5.15dB calculated in accordance with CISPR 16-4
For Spurious Conducted Emissions	Not Applicable	$\pm 3.0\text{dB}$
IN THE FREQUENCY RANGE 1GHz TO 20GHz		
TEST	FREQUENCY	AMPLITUDE
For Spurious Radiated Emissions measurements	$\pm 2 \times 10^{-7} \times \text{Centre Frequency}$	$\pm 3.4\text{dB}$
For Peak Power Spectral Density	Not Applicable	$\pm 1.8\text{dB}$
For Effective Radiated Power (ERP) measurements	Not Applicable	$\pm 1.45\text{dBm}$



SECTION 4

PHOTOGRAPHS

4.1 PHOTOGRAPH OF EQUIPMENT UNDER TEST (EUT)



Radiated Emissions Test Set up



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

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