REPORT ON

Limited FCC CFR 47: Parts 22 and 24
and Industry Canada RSS-132 and 133 Testing
of a Novatel Wireless Inc. PC Card Wireless Modem - U740

COMMERCIAL-IN-CONFIDENCE

FCC ID: NBZNRM-U740

Report No OR614781/01 Issue 2 **November 2005**

Product Service

Competence. Certainty. Quality

COMMERCIAL-IN-CONFIDENCE

TUV Product Service Ltd, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuvps.co.uk; www.babt.com

REPORT ON Limited FCC CFR 47: Parts 22 and 24
and Industry Canada RSS-132 and 133 Testing of a
Novatel Wireless Inc. PC Card Wireless Modem - U740

FCC ID: NBZNRM-U740

Report No OR614781/01 Issue 1

November 2005

PREPARED FOR Novatel Wireless Inc
Suite 200, 6715 – 8th Street N.E.
Calgary
Alberta T2E 7H7
Canada

.

PREPARED BY

J Plummer
Technical Author

APPROVED BY

K Adsetts
Authorised Signatory

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 22 and 24. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

P Harrison

UKAS TESTING 0141 Group

COMMERCIAL-IN-CONFIDENCE

Product Service

CONTENTS

Report OR614781-01 Issue 2 replaces Report OR614781-01 Issue 1 – The test report for the U730 was added as Annex A in the Issue 2 report.

Product Service

SECTION 1

REPORT SUMMARY

Limited FCC CFR 47: Parts 22 and 24
and Industry Canada RSS-132 and 133 Testing
of a Novatel Wireless Inc PC Card Wireless Modem - U740

1.1 STATUS

Equipment Under Test	U740
Objective	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
Name and Address of Client	Novatel Wireless Inc Suite 200, 6715 - 8th Street N.E. Calgary Alberta T2E 7H7 Canada
Manufacturing Description	PC Card Wireless Modem – U740
Type	Quad Band GPRS.Edge Band 1 UMTS/HSDPA
Part Number	1017582
Serial Numbers	None
Hardware Version	Rev 1
Software Version	Version 18
Declared Variants	None
Test Specification / Issue / Date	FCC CFR 47: Part 22, Subpart H, October 2004 FCC CFR 47: Part 24, Subpart D, October 2004 RSS-132: Issue 1: August 2002 RSS-133: Issue 3: June 2005
Number of Items Tested	One
Security Classification of EUT	Commercial-in-Confidence
Incoming Release **Date**	Declaration of Build Status 16th November 2005
Disposal **Reference Number** **Date**	Held pending disposal Not Applicable Not Applicable
Start of Test **Finish of Test**	24th November 2005 27th November 2005
Related Documents	ANSI C63.4 2001 RSS-212, Issue 1, February 1999 SRSP-503: 2003 SRSP-510: 2001

1.2 INTRODUCTION

The information contained within this report is intended to show verification of compliance of the Novatel Wireless Inc PC Card Wireless Modem - U740 to the requirements of FCC Specification Parts 22 and 24 and Industry Canada Radio Specifications RSS-132 and RSS-133.

The applicable GSM transmitter including operation; circuitry; frequency bands; hardware and software for US operation for the Novatel Wireless Merlin U740 are identical as for the Novatel Wireless Merlin U730.

Therefore, full compliance of the Novatel Wireless Merlin U740 to FCC Specification Parts 22 and 24 and Industry Canada Radio Specifications RSS-132 and RSS-133 has been tested for and met as detailed in test report for the U730, OR614714-01 Issue 2. This report is included as Annex A to this report.

This report also contains additional test results for UTRA FDD Bands II and V which are not applicable to the Merlin U740.

Testing has been performed under the following site accreditations

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC5208 Maplewood Test Laboratory

1.2 INTRODUCTION

1.2.1 Declaration of Build Status

MAIN EUT		
MANUFACTURING DESCRIPTION	PC Card Wireless Modem – U740	
MANUFACTURER	Novatel Wireless Technologies Inc	
TYPE	QUAD BAND GPRS/EDGE Band I UMTS/HSDPA	
PART NUMBER	01017582	
SERIAL NUMBER	None	
HARDWARE VERSION	Rev 1	
SOFTWARE VERSION	Version 18	
TRANSMITTER OPERATING RANGE	US – 824-849 1850-1910 MHz Europe - 920-980 MHz 880-915 1710-1785MHz	
RECEIVER OPERATING RANGE	US - 869-894 1930-1990MHz Europe - 925-960 1805-1880 2110-2170 MHz	
COUNTRY OF ORIGIN	Canada	
INTERMEDIATE FREQUENCIES	No IF	
ITU DESIGNATION OF EMISSION	GPRS 850: 316KGXW	GPRS 1900: 316KGXW
	EDGE 850: 311KG7W	EDGE 1900: 319KG7W
HIGHEST INTERNALLY GENERATED FREQUENCY	1989.8 MHz	
OUTPUT POWER (W or dBm)	GPRS.EDGE: +33dBm Max,	
FCC ID	NBZNRM-U740	
INDUSTRY CANADA ID	TBD	
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	PC card wireless modem used by laptop computers in order to establish a data connection through cellular networks.	
BATTERY/POWER SUPPLY		
MANUFACTURING DESCRIPTION	N/A	
MANUFACTURER	N/A	
VOLTAGE	N/A	

Signature

Date
D of B S Serial No OS614781

TUV Product Service formally certifies that the manufacturer's declaration as reproduced in this report, is a true and accurate record of the original received from the applicant.

1.3 BRIEF SUMMARY OF RESULTS

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

FCC CFR 47: Part 22, Subpart H and RSS-132

Test	Spec Clause		Test Description	Result	Comments
	FCC	Industry Canada			
2.1	Part 22 22.913 (a)	RSS-132, 6.4	Effective Radiated Power - Radiated	Pass	
	Part 2 2.1047(d)	Not Applicable	Modulation Characteristics		See Note
	Part 2 2.1049, Part 22 22.917 (b)	RSS-132, 6.2	Occupied Bandwidth		See Note
	Part 2 2.1051, Part 22 22.905 and 22.917	RSS-132, 6.5	Spurious Emissions at Antenna Terminals		See Note
2.2	Part 2.1053, Part 22.917	RSS-132, 6.5	Radiated Emissions	Pass	
2.7	Part 2 2.1051, Part 22 22.917(a)	Not Applicable	Conducted Spurious Emissions		See Note
2.8	Part 2 2.1055, Part 22 22.355	RSS-132, 6.3	Frequency Stability Under Temperature Variations		See Note
2.9	Part 2 2.1055, Part 22 22.355	Not Applicable	Frequency Stability Under Voltage Variations		See Note
2.10	Part 2 2.0146 Part 22 22.913 (a)	RSS-132, 4.4	Maximum Peak Output Power		See Note

NOTE: Results for model outlined in report OR614714-01 Issue 2 which is included in Annex A of this report

1.3 BRIEF SUMMARY OF RESULTS

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

Test	Spec Clause		Test Description	Result	Comments
	FCC	Industry Canada			
2.3	Part 2 2.1046 Part 24 24.232 (b)	RSS-133, 6.2	Maximum Peak Output Power – Radiated	Pass	
	Part 2 2.1046 Part 24 24.232	RSS-133, 6.2	Maximum Peak Output Power - Conducted		See Note
	Part 2 2.1047(d)	Not Applicable	Modulation Characteristics		See Note
	Part 2 2.1049, Part 24 24.238 (b)	Not Applicable	Occupied Bandwidth		See Note
	Part 2 2.1051, Part 24 24.229 and 24.238	RSS-133, 6.3	Spurious Emissions at Antenna Terminals		See Note
2.4	Part 2 2.1053, Part 24 24.238	RSS-133, 6.3	Radiated Spurious Emissions	Pass	
	Part 2 2.1051, Part 24 24.238 (a)	Not Applicable	Conducted Spurious Emissions		See Note
	Part 2 2.1055, Part 24 24.235	RSS-133, 7	Frequency Stability Under Temperature Variations		See Note
	Part 2 2.1055, Part 24 24.235	RSS-133, 7	Frequency Stability Under Voltage Variations		See Note

NOTE: Results for model outlined in report OR614714-01 Issue 2 which is included in Annex A of this report

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Novatel Wireless Technologies Inc PC Card Wireless Modem - U740.

1.4.2 Modes of Operation

Modes of operation of the EUT during testing were as given in section 1.4.3:

Applicable testing was carried out with the EUT transmitting at maximum power or receiving as detailed in section 1.4.3.

Maximum Output Powers and Classes were;

GSM (Class 4) GSM 850/EGSM900 = 32.0dBm
GSM (Class 1) DCS 1800 / PCS 1900 = 29.3dBm
GPRS (Class 10) Class B operation
EGPRS (Class E2) GSM 850/EGSM900 = 26.0dBm
DCS 1800/PCS 1900 = 25.0dBm

1.4.3 Test Configuration

Test Configuration – GPRS 850 Mode

850MHz transmitting on the following channels and frequencies;
Bottom Channel 128: 824.2MHz
Middle Channel 189: 836.4MHz
Top Channel 251: 848.8MHz
850MHz receiving on the following channels and frequencies;
Middle Channel 189: 836.40MHz

Test Configuration – EDGE 850 Mode

850MHz transmitting on the following channels and frequencies;
Bottom Channel 128: 824.2MHz
Middle Channel 189: 836.4MHz
Top Channel 251: 848.8MHz
850MHz receiving on the following channels and frequencies;
Middle Channel 189: 836.40MHz

1.4 PRODUCT INFORMATION

1.4.3 Test Configuration – continued

Test Configuration – GPRS 1900 Mode

1900MHz transmitting on the following channels and frequencies;
Bottom Channel 512: 1850.2MHz
Middle Channel 661: 1880.0MHz
Top Channel 810: 1909.8MHz
1900MHz receiving on the following channels and frequencies;
Middle Channel 661: 1880.0MHz

Test Configuration – EDGE 1900 Mode

1900MHz transmitting on the following channels and frequencies;
Bottom Channel 512: 1850.2MHz
Middle Channel 661: 1880.0MHz
Top Channel 810: 1909.8MHz
1900MHz receiving on the following channels and frequencies;
Middle Channel 661: 1880.0MHz

1.5 TEST CONDITIONS

The EUT was set-up simulating a typical user installation at the Test Laboratory, as listed in Section 1.2 and tested in accordance with the applicable specification.

For all tests, the PC Card Wireless Modem - U740 was powered via a laptop at 3.3V or by a 3.3V dc power supply.

Only GPRS and EDGE modes were tested.

1.6 DEVIATIONS FROM THE STANDARD

Not Applicable

1.7 MODIFICATION RECORD

Not Applicable

1.8 ALTERNATIVE TEST SITE

Under our group UKAS Accreditation, TUV Product Service Limited completed the test programme at our Maplewood, Basingstoke Test Laboratory

SECTION 2

TEST RESULTS

Limited FCC CFR 47: Parts 22 and 24
and Industry Canada RSS-132 and 133 Testing
of a Novatel Wireless Inc PC Card Wireless Modem - U740

The information contained within this report is intended to show verification of compliance of the NovatelWireless Inc PC Card Wireless Modem - U740 to the requirements of FCC Specification Parts 22 and 24 and Industry Canada Radio Specifications RSS-132 and RSS-133.

The applicable GSM transmitter including operation; circuitry; frequency bands; hardware and software for US operation for the Novatel Wireless Merlin U740 are identical as for the Novatel Wireless Merlin U730. Therefore, full compliance of the Novatel Wireless Merlin U740 to FCC Specification Parts 22 and 24 and Industry Canada Radio Specifications RSS-132 and RSS-133 has been tested for and met as detailed in test report for the U730, OR614714-01 Issue 2. This report is included as Annex A to this report.

This report also contains additional test results for UTRA FDD Bands II and V which are not applicable to the Merlin U740.

2.1 EFFECTIVE RADIATED POWER (RADIATED)

2.1.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 22.913 and Industry Canada RSS-132, 6.4 (4.4)

2.1.2 Equipment Under Test

PC Card Wireless Modem - U740

2.1.3 Date of Test

24th October 2005 and 25th October 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.

The EUT has an Integral Antenna, therefore the Maximum Peak Output Power (EIRP) was made using the Radiated method.

The Spectrum Analyser was tuned to the test frequency. The device Output Power setting was controlled as specified in the Product Information, Section 1.5 of this document. The device was 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, whose input signal the antenna was adjusted until the received level matched that of the previously detected emission.

The EUT was operated in GPRS and EDGE modes only.

2.1 EFFECTIVE RADIATED POWER (RADIATED)

2.1.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 22 Subpart H, Section 22.913 and Industry Canada RSS-132, 6.4 (4.4) for Effective Radiated Power.

Measurements were made with the EUT in GPRS 850 Mode.

Frequency MHz	Result ERP dBm	Result ERP mW	FCC Part 22.913 Limit ERP dBm	FCC Part 22.913 Limit ERP mW	RSS-132 Limit ERP dBm	RSS-132 Limit ERP mW
824.13	30.30	1071	38.45	7000	38.0	6300
836.44	30.14	1033	38.45	7000	38.0	6300
848.88	29.76	946	38.45	7000	38.0	6300

Measurements were made with the EUT in EDGE 850 Mode.

Frequency MHz	Result ERP dBm	Result ERP mW	FCC Part 22.913 Limit ERP dBm	FCC Part 22.913 Limit ERP mW	RSS-132 Limit ERP dBm	RSS-132 Limit ERP mW
824.40	29.92	981	38.45	7000	38.0	6300
836.47	29.82	959	38.45	7000	38.0	6300
848.82	30.15	1035	38.45	7000	38.0	6300

2.2 RADIATED EMISSIONS

2.2.1 Equipment Reference

FCC CFR 47: Part 22 Subpart H, Section 22.917 and Industry Canada RSS-132, 6.5

2.2.2 Equipment Under Test

PC Card Wireless Modem - U740

2.2.3 Date of Test

27th 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

Test Performed in accordance with ANSI C63.4.

In order to determine the Radiated Emission Limits, measurements of transmitter power (P) were first carried out on the top, middle 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 the 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 in the Anechoic Chamber (3 metres). 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 Peak detector.

Emissions identified within the range 1GHz – 10GHz were then formally measured using a Peak Detector.

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

The test limit is derived from the carrier power in accordance with the specification. (The power of any emission outside of the authorised operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 +10log(P) dB).

Only the channel that had the highest EPR was tested.

The EUT was operated in GPRS and EDGE modes only.

2.2 RADIATED EMISSIONS

2.2.6 Test Results

30MHz – 10GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 22, Subpart H, 22.917 and Industry Canada RSS-132, 6.5 for Radiated Emissions (30MHz – 10GHz).

Measurements were made with the EUT in GPRS 850 Mode.

EUT Transmitting on Bottom Channel (824.17MHz) highest power

No emissions were found that did not emanate from the laptop.

Measurements were made with the EUT in EDGE 850 Mode.

EUT Transmitting on Top Channel (848.83MHz) highest power

No emissions were found that did not emanate from the laptop.

2.3 MAXIMUM PEAK OUTPUT POWER (RADIATED)

2.3.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.232 and Industry Canada RSS-133, 6.2

2.3.2 Equipment Under Test

PC Card Wireless Modem - U740

2.3.3 Date of Test

24th October 2005 and 25th October 2005

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 has an Integral Antenna, therefore the Maximum Peak Output Power (EIRP) was made using the Radiated method.

The Spectrum Analyser was tuned to the test frequency. The device Output Power setting was controlled as specified in the Product Information, Section 1.5 of this document. The device was then rotated through 360 degrees, and the measuring antenna height searched (1m – 4m) until the highest power level was observed in both horizontal and vertical polarisation. The device was then replaced with a substitution antenna, whose input signal to the antenna was adjusted until the received level matched that of the previously detected emission.

The EUT was operated in GPRS and EDGE modes only.

2.3 MAXIMUM PEAK OUTPUT POWER (RADIATED)

2.3.6 Test Results

The EUT met the requirements of FCC Part 24, Section 24.232, and Industry Canada RSS-133, 6.2 Power and Antenna Height Limits.

Measurements were made with the EUT in GPRS 1900 Mode

Frequency MHz	Result EIRP dBm	EIRP Limit dBm	Result EIRP mW	EIRP Limit mW
1850.2	30.12	1028	515	1995
1880.0	29.82	959	514	1995
1909.8	32.22	1667	652	1995

Measurements were made with the EUT in EDGE 1900 Mode

Frequency MHz	Result EIRP dBm	EIRP Limit dBm	Result EIRP mW	EIRP Limit mW
1850.2	31.55	1429	515	1995
1880.0	29.38	867	560	1995
1909.8	31.99	1581	723	1995

2.4 RADIATED EMISSIONS

2.4.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.238 and Industry Canada RSS-133, 6.3

2.4.2 Equipment Under Test

PC Card Wireless Modem - U740

2.4.3 Date of Test

27th 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

Test Performed in accordance with ANSI C63.4.

In order to determine the Radiated Emission Limits, measurements of transmitter power (P) were first carried out on the top, middle 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 the 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 in the Anechoic Chamber (3 metres). 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 Peak detector.

Emissions identified within the range 1GHz – 10GHz were then formally measured using a Peak Detector.

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

The test limit is derived from the carrier power in accordance with the specification. (The power of any emission outside of the authorised operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 +10log(P) dB).

Only the channel that had the highest EPR was tested.

The EUT was operated in GPRS and EDGE modes only.

2.16 RADIATED EMISSIONS

2.16.6 **Test Results** - continued

30MHz – 10GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 and Industry Canada RSS-133, 6.3 for Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in GPRS 1900 Mode.

EUT Transmitting on Top Channel (1909.70MHz) highest power

No emissions were found that did not emanate from the laptop.

Measurements were made with the EUT in EDGE 1900 Mode

EUT Transmitting on Top Channel (1909.80MHz) highest power

No emissions were found that did not emanate from the laptop.

Product Service

SECTION 3

TEST EQUIPMENT

3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No	EMC Number	Calibration Due
Test Receiver	Rohde & Schwarz	ESI	27.039	18/03/2006
Cable	Rosenberger	-	CS0613	12/04/2006
Cable	Rosenberger	-	CS0615	12/06/2006
Bilog Antenna	Chase	CBL 6111B	27007	16/04/2006
Turntable	HD Gmbh	DS 420 S	-	TU
Antenna Mast	HD Gmbh	MA 250	-	TU
Antenna/TT Controller	HD Gmbh	HD 100	-	TU
Screened Room	ETS Lindgren	Site 6	-	TU
3dB Attenuator	Aeroflex	40A-3dB		TU
6dB Attenuator	Aeroflex	40A-6dB		TU
Horn	EMCO	3115	25.009	TU
Horn	EMCO	3115	25008	TU
Horn Antenna	Q-Par Angus	QSH 180K	3003	24/06/2006
3GHz Band Pass Filter	RLC Electronics	F-100-3000-5-R	3081	TU
1-8GHz Preamp	Phase 1	PS04-0085	3020	13/07/2006
8-18GHz Preamp	Phase 1	PS04-0086	3020	13/07/2006
18-40GHz Preamp	Phase 1	PS04-0087	3020	12/07/2006
Bilog Antenna	Chase	CBL 6141	27.008	TU

TU Traceability Unscheduled

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*

Worst case error for both Time and Frequency measurement 12 parts in 10^6.

* In accordance with CISPR 16-4

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

ANNEX A

U730 Test Report

REPORT ON

Limited FCC CFR 47: Parts 15, 22 and 24
and Industry Canada RSS-132 and 133 Testing
of a Novatel Wireless Inc U730
Quad-Band GPRS/EGPRS/UMTS/HSDPA Data Module

COMMERCIAL-IN-CONFIDENCE

FCC ID: NBZNRM-U730

Report No OR614714/01 Issue 2 **November 2005**

Competence. Certainty. Quality

TUV Product Service Ltd, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuvps.co.uk; www.babt.com

REPORT ON Limited FCC CFR 47: Parts 15, 22 and 24 and Industry Canada RSS-132 and 133 Testing of a Novatel Wireless Inc U730 Quad-Band GPRS/EGPRS/UMTS/HSDPA Data Module

FCC ID: NBZNRM-U730

Report No OR614714/01 Issue 2

November 2005

PREPARED FOR

Novatel Wireless Inc
Suite 200, 6715 – 8th Street N.E.
Calgary
Alberta T2E 7H7
Canada

.

PREPARED BY

J Plummer
Technical Author

APPROVED BY

K Adsetts
Authorised Signatory

M Jenkins
Authorised Signatory

DATED 14th 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, 22 and 24. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

P Harrison S Hartley A Hubbard R Small

UKAS TESTING 0141 Group

CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

Limited FCC CFR 47: Parts 15, 22 and 24
and Industry Canada RSS-132 and 133 Testing
of a Novatel Wireless Inc U730
Quad-Band GPRS/EGPRS/UMTS/HSDPA Data Module

Product Service

1.1 STATUS

Equipment Under Test	U730
Objective	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
Name and Address of Client	Novatel Wireless Inc Suite 200, 6715 - 8th Street N.E. Calgary Alberta T2E 7H7 Canada
Type	PC Card Wireless Modem
Part Number	649496 00672 3
Serial Numbers	See Test Result Pages
Hardware Version	Rev 1
Software Version	Version 18
Declared Variants	None
Test Specification / Issue / Date	FCC CFR 47: Part 15, Subparts B and C, October 2003 FCC CFR 47: Part 22, Subpart H, October 2004 FCC CFR 47: Part 24, Subpart D, October 2004 RSS-132: Issue 1: August 2002 RSS-133: Issue 3: June 2005
Number of Items Tested	One
Security Classification of EUT	Commercial-in-Confidence
Incoming Release **Date**	Declaration of Build Status 1st November 2005
Disposal **Reference Number** **Date**	Held pending disposal Not Applicable Not Applicable
Start of Test **Finish of Test**	3rd October 2005 27th October 2005
Related Documents	ANSI C63.4 2001 RSS-212, Issue 1, February 1999 SRSP-503 SRSP-510

1.2 INTRODUCTION

The information contained within this report is intended to show limited verification of compliance of the Novatel Wireless Inc U730 Quad-Band GPRS/EGPRS/UMTS/HSDPA Data Module to the requirements of FCC Specification Parts 15, 22 and 24 and Industry Canada Radio Specifications RSS-132 and RSS-133.

Testing has been performed under the following site accreditations

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC5208 Octagon House, Fareham Test Laboratory

1.2 INTRODUCTION

1.2.1 Declaration of Build Status

MAIN EUT		
MANUFACTURING DESCRIPTION	PC Card Wireless Modem	
MANUFACTURER	Novatel Wireless Technologies Inc	
TYPE	QUAD BAND GPRS/EDGE DUAL BAND UMTS/HSDPA	
PART NUMBER	649496 00672 3	
SERIAL NUMBER	See Test pages	
HARDWARE VERSION	Rev 1	
SOFTWARE VERSION	Version 18	
TRANSMITTER OPERATING RANGE	824-849MHz, 1850-1910MHz	
RECEIVER OPERATING RANGE	869-894MHz, 1805-1880MHz	
COUNTRY OF ORIGIN	Canada	
INTERMEDIATE FREQUENCIES	No IF	
ITU DESIGNATION OF EMISSION	GPRS 850: 316KGXW	GPRS 1900: 316KGXW
	EDGE 850: 311KG7W	EDGE 1900: 319KG7W
	UMTS 850: 4M66F9W	UMTS 1900: 4M66F9W
	HSDPA 850: 4M66F9W	HSDPA 1900: 4M66F9W
HIGHEST INTERNALLY GENERATED FREQUENCY	1989.8MHz	
OUTPUT POWER (W or dBm)	GPRS.EDGE: +33dBm Max, UMTS/HSDPA: +24dBm Max	
FCC ID	NBZNRM-U730	
INDUSTRY CANADA ID	TBD	
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	PC card wireless modem used by laptop computers in order to establish a data connection through cellular networks.	
BATTERY/POWER SUPPLY		
MANUFACTURING DESCRIPTION	N/A	
MANUFACTURER	N/A	
VOLTAGE	N/A	

TUV Product Service Limited formally certifies that the manufacturer's declaration as reproduced in this report is a true and accurate record of the original received from the applicant.

Signature Kevin Goodfellow

Date 1/11/2005
D of B S Serial No OS614714

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 22, Subpart H and RSS-132

Test	Spec Clause		Test Description	Result	Comments
	FCC	Industry Canada			
2.2	Part 22 22.913 (a)	RSS-132, 6.4	Effective Radiated Power - Radiated	Pass	
2.3	Part 2 2.21047(d)	Not Applicable	Modulation Characteristics	Pass	
2.4	Part 2 2.1049, Part 22 22.917 (b)	RSS-132, 6.2	Occupied Bandwidth	Pass	
2.5	Part 2 2.1051, Part 22 22.905 and 22.917	RSS-132, 6.5	Spurious Emissions at Antenna Terminals	Pass	
2.6	Part 2.1053, Part 22.917	RSS-132, 6.5	Radiated Emissions	Pass	
2.7	Part 2 2.1051, Part 22 22.917(a)	Not Applicable	Conducted Spurious Emissions	Pass	
2.8	Part 2 2.1055, Part 22 22.355	RSS-132, 6.3	Frequency Stability Under Temperature Variations	Pass	
2.9	Part 2 2.1055, Part 22 22.355	Not Applicable	Frequency Stability Under Voltage Variations	Pass	
2.10	Part 2 2.0146 Part 22 22.913 (a)	RSS-132, 4.4	Maximum Peak Output Power	Pass	

1.3 BRIEF SUMMARY OF RESULTS

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

Test	Spec Clause		Test Description	Result	Comments
	FCC	Industry Canada			
2.11	Part 2 2.1046 Part 24 24.232 (b)	RSS-133, 6.2	Maximum Peak Output Power – Radiated	Pass	
2.12	Part 2 2.1046 Part 24 24.232	RSS-133, 6.2	Maximum Peak Output Power - Conducted	Pass	
2.13	Part 2 2.1047(d)	Not Applicable	Modulation Characteristics	Pass	
2.14	Part 2 2.1049, Part 24 24.238 (b)	Not Applicable	Occupied Bandwidth	Pass	
2.15	Part 2 2.1051, Part 24 24.229 and 24.238	RSS-133, 6.3	Spurious Emissions at Antenna Terminals	Pass	
2.16	Part 2 2.1053, Part 24 24.238	RSS-133, 6.3	Radiated Spurious Emissions	Pass	
2.17	Part 2 2.1051, Part 24 24.238 (a)	Not Applicable	Conducted Spurious Emissions	Pass	
2.18	Part 2 2.1055, Part 24 24.235	RSS-133, 7	Frequency Stability Under Temperature Variations	Pass	
2.19	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 Equipment Under Test (EUT) was a Novatel Wireless Technologies Inc U730 Quad-Band GPRS/EGPRS/UMTS/HSDPA Data Module.

1.4.2 Modes of Operation

Modes of operation of the EUT during testing were as given in section 1.4.3:

Applicable testing was carried out with the EUT transmitting at maximum power or receiving as detailed in section 1.4.3.

Maximum Output Powers and Classes were;

GSM (Class 4) GSM 850/EGSM900 = 32.0dBm
GSM (Class 1) DCS 1800 / PCS 1900 = 29.3dBm
GPRS (Class 10) Class B operation
EGPRS (Class E2) GSM 850/EGSM900 = 26.0dBm
DCS 1800/PCS 1900 = 25.0dBm

1.4.3 Test Configuration

Test Configuration – GPRS 850 Mode

850MHz transmitting on the following channels and frequencies;
Bottom Channel 128: 824.2MHz
Middle Channel 189: 836.4MHz
Top Channel 251: 848.8MHz
850MHz receiving on the following channels and frequencies;
Middle Channel 189: 836.40MHz

Test Configuration – EDGE 850 Mode

850MHz transmitting on the following channels and frequencies;
Bottom Channel 128: 824.2MHz
Middle Channel 189: 836.4MHz
Top Channel 251: 848.8MHz
850MHz receiving on the following channels and frequencies;
Middle Channel 189: 836.40MHz

Test Configuration – UMTS 850 Mode

850MHz transmitting on the following channels and frequencies;
Bottom Channel 128: 826.00MHz
Middle Channel 189: 836.80MHz
Top Channel 251: 847.20MHz
850MHz receiving on the following channels and frequencies;
Middle Channel 189: 836.80MHz

1.4 PRODUCT INFORMATION

1.4.3 Test Configuration – continued

Test Configuration – HSDPA 850 Mode

850MHz transmitting on the following channels and frequencies;
Bottom Channel 128: 826.40MHz
Middle Channel 189: 836.60MHz
Top Channel 251: 846.60MHz
850MHz receiving on the following channels and frequencies;
Middle Channel 189: 836.60MHz

Test Configuration – GPRS 1900 Mode

1900MHz transmitting on the following channels and frequencies;
Bottom Channel 512: 1850.2MHz
Middle Channel 661: 1880.0MHz
Top Channel 810: 1909.8MHz
1900MHz receiving on the following channels and frequencies;
Middle Channel 661: 1880.0MHz

Test Configuration – EDGE 1900 Mode

1900MHz transmitting on the following channels and frequencies;
Bottom Channel 512: 1850.2MHz
Middle Channel 661: 1880.0MHz
Top Channel 810: 1909.8MHz
1900MHz receiving on the following channels and frequencies;
Middle Channel 661: 1880.0MHz

Test Configuration – UMTS 1900 Mode

1900MHz transmitting on the following channels and frequencies;
Bottom Channel 512: 1852.4MHz
Middle Channel 661: 1880.0MHz
Top Channel 810: 1907.6MHz
1900MHz receiving on the following channels and frequencies;
Middle Channel 661: 1880.0MHz

Test Configuration – HSDPA 1900 Mode

1900MHz transmitting on the following channels and frequencies;
Bottom Channel 512: 1852.4MHz
Middle Channel 661: 1880.0MHz
Top Channel 810: 1907.6MHz
1900MHz receiving on the following channels and frequencies;
Middle Channel 661: 1880.0MHz

1.5 TEST CONDITIONS

The EUT was set-up simulating a typical user installation at the Test Laboratory, as listed in Section 1.2 and tested in accordance with the applicable specification.

For all tests, the U730 Quad-Band GPRS/EGPRS/UMTS/HSDPA Data Module was powered via a laptop at 3.3V or a 3.3V dc power supply.

1.6 DEVIATIONS FROM THE STANDARD

Not Applicable

1.7 MODIFICATION RECORD

Not Applicable

1.8 ALTERNATIVE TEST SITE

Under our group UKAS Accreditation, TUV Product Service Limited completed the test programme at our Maplewood, Basingstoke Test Laboratory

Product Service

SECTION 2

TEST RESULTS

Limited FCC CFR 47: Parts 15, 22 and 24
and Industry Canada RSS-132 and 133 Testing
of a Novatel Wireless Inc U730
Quad-Band GPRS/EGPRS/UMTS/HSDPA Data Module

2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.109
Industry Canada RSS-132, 6.6 and RSS-133, 9

2.1.2 Equipment Under Test

U730

2.1.3 Date of Test

13th October 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 – 9GHz 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 15.109 and Industry Canada RSS-132, 6.6 and RSS-133, 9 for Spurious Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in GSM 850 Idle Mode.
Serial Number 001018-00-0006156-5.

EUT Rx

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz		cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
139.40	Vertical	100	305	36.6	67.7	43.5	100.0
147.48	Vertical	100	305	31.9	39.5	43.5	100.0
180.76	Horizontal	205	066	39.0	89.2	43.5	100.0
188.40	Horizontal	137	215	37.0	70.6	43.5	100.0
232.72	Horizontal	130	075	45.3	183.4	46.0	200.0
238.72	Horizontal	120	085	44.6	169.2	46.0	200.0

Measurements were made with the EUT in GSM 1900 Idle Mode.
Serial Number 001018-00-0006156-5.

EUT Rx

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

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz		cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
139.40	Vertical	100	305	36.6	69.9	43.5	100.0
147.48	Vertical	100	305	32.0	40.0	43.5	100.0
180.76	Horizontal	205	065	39.3	92.7	43.5	100.0
188.40	Horizontal	140	215	37.2	72.4	43.5	100.0
232.82	Horizontal	130	075	45.2	181.3	46.0	200.0
238.72	Horizontal	120	085	44.1	161.1	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 15.109 and Industry Canada RSS-132, 6.6 and RSS-133, 9 for Spurious Radiated Emissions (1GHz – 5GHz).

Measurements were made with the EUT in GSM 850 Mode.
Serial Number 001018-00-0006156-5.

EUT Rx

No emission tables are shown as no emissions were found.

Measurements were made with the EUT in GSM 1900 Mode.
Serial Number 001018-00-0006156-5.

EUT Rx

No emission tables are shown as no emissions were found.

2.2 EFFECTIVE RADIATED POWER (RADIATED)

2.2.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 22.913 and Industry Canada RSS-132, 6.4 (4.4)

2.2.2 Equipment Under Test

U730

2.2.3 Date of Test

8th and 11th 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

Test Performed in accordance with ANSI C63.4.

The EUT has an Integral Antenna, therefore the Maximum Peak Output Power (EIRP) was made using the Radiated method.

The Spectrum Analyser was tuned to the test frequency. The device Output Power setting was controlled as specified in the Product Information, Section 1.5 of this document. The device was 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, whose input signal the antenna was adjusted until the received level matched that of the previously detected emission.

2.2 EFFECTIVE RADIATED POWER (RADIATED)

2.2.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 22 Subpart H, Section 22.913 and Industry Canada RSS-132, 6.4 (4.4) for Effective Radiated Power.

Measurements were made with the EUT in GPRS 850 Mode.
Serial Number 001018-00-0006156-5.

Frequency MHz	Result ERP dBm	Result ERP mW	FCC Part 22.913 Limit ERP dBm	FCC Part 22.913 Limit ERP mW	RSS-132 Limit ERP dBm	RSS-132 Limit ERP mW
824.13	30.43	1104	38.45	7000	38.0	6300
836.44	30.80	1202	38.45	7000	38.0	6300
848.88	30.41	1099	38.45	7000	38.0	6300

Measurements were made with the EUT in EDGE 850 Mode.
Serial Number 001018-00-0006156-5.

Frequency MHz	Result ERP dBm	Result ERP mW	FCC Part 22.913 Limit ERP dBm	FCC Part 22.913 Limit ERP mW	RSS-132 Limit ERP dBm	RSS-132 Limit ERP mW
824.245	30.58	1143	38.45	7000	38.0	6300
836.295	30.72	1180	38.45	7000	38.0	6300
848.867	30.87	1222	38.45	7000	38.0	6300

Measurements were made with the EUT in UMTS 850 Mode.
Serial Number 001018-00-006341-3.

Frequency MHz	Result ERP dBm	Result ERP mW	FCC Part 22.913 Limit ERP dBm	FCC Part 22.913 Limit ERP mW	RSS-132 Limit ERP dBm	RSS-132 Limit ERP mW
827.170	17.23	52.84	38.45	7000	38.0	6300
835.869	17.26	53.21	38.45	7000	38.0	6300
848.848	17.04	50.58	38.45	7000	38.0	6300

2.2 EFFECTIVE RADIATED POWER (RADIATED)

2.2.6 **Test Results** - continued

Measurements were made with the EUT in HSDPA 850 Mode.
Serial Number 001018-00-006341-3.

The measurements were performed with the EUT lying down and the measuring antenna in a horizontal position, as this was found to be the worst case position.

Frequency MHz	Result ERP dBm	Result ERP mW	FCC Part 22.913 Limit ERP dBm	FCC Part 22.913 Limit ERP mW	RSS-132 Limit ERP dBm	RSS-132 Limit ERP mW
826.400	17.4	54.95	38.45	7000	38.0	6300
836.60	18.0	63.10	38.45	7000	38.0	6300
846.60	17.2	52.48	38.45	7000	38.0	6300

2.3 MODULATION CHARACTERISTICS

2.3.1 Specification Reference

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

2.3.2 Equipment Under Test

U730

2.3.3 Date of Test

14th October 2005 (GPRS)
17th October 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

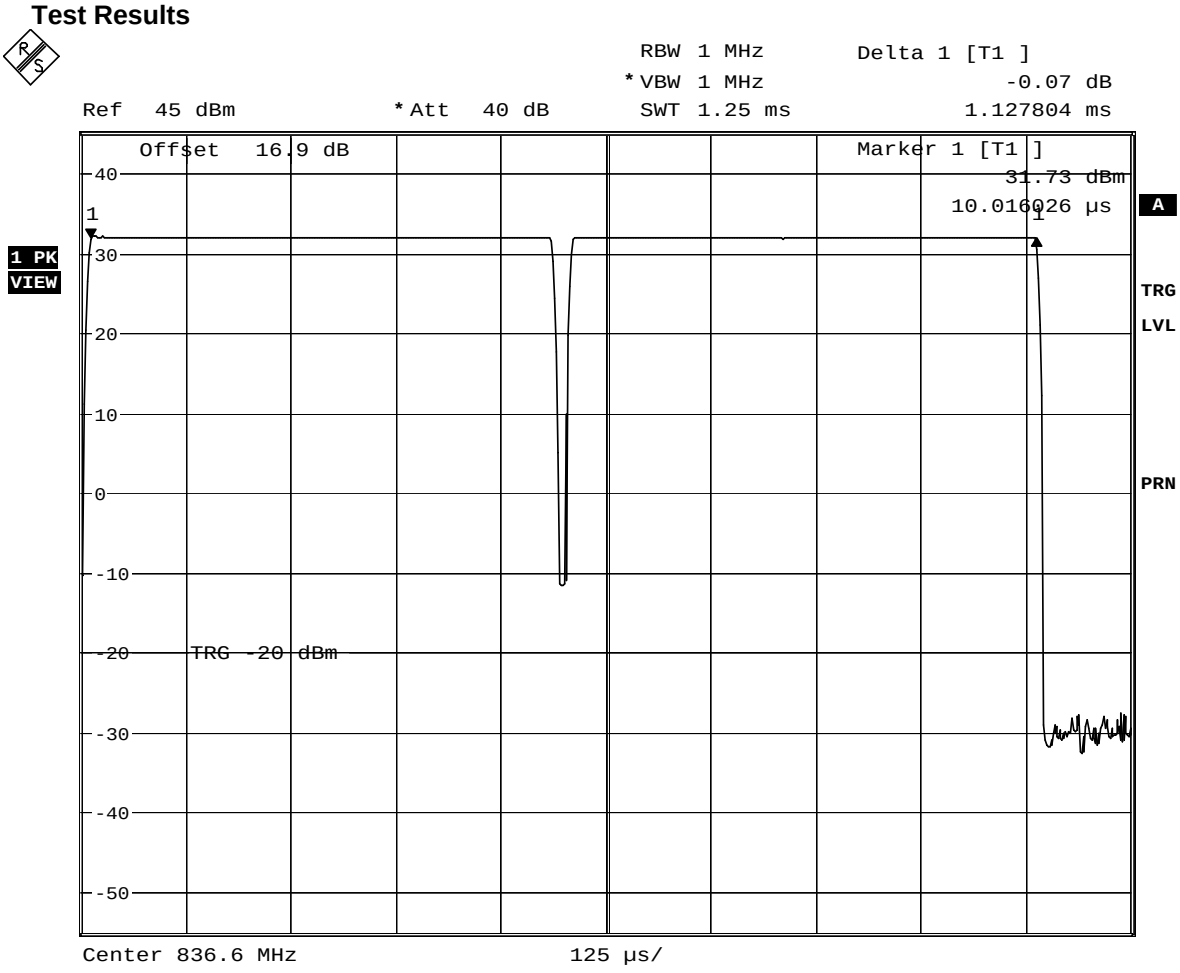
Two views are shown for GPRS and EDGE modes of operation. One view shows the two active slot(s) over a complete screen. The other view shows the active slot(s) over a complete frame.

2.3.6 Modulation Description

The GSM System uses the modulation system of 0.3 GMSK and 8PSK in a Time Division Duplex. The bandwidth is 200kHz. The Frame of the uplink and downlink if in a single slot is 4.6ms long. There are 8 slots per frame, thus a burst length is 577us, including transients.

2.3 MODULATION CHARACTERISTICS

2.3.7 Test Results



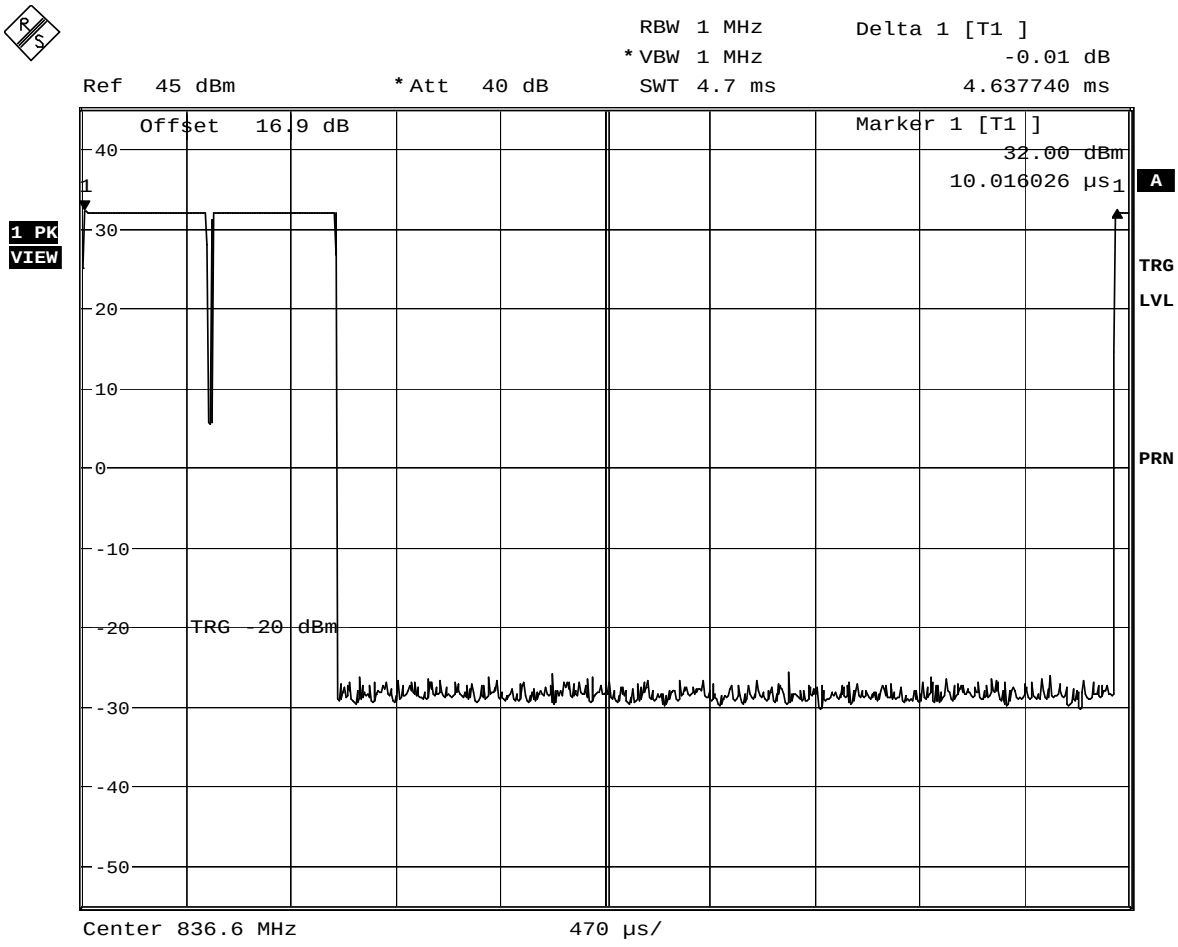
Date: 18.OCT.2005 14:17:34

Serial Number: 001018-00-006341-3

GPRS Mode –View of Two Timeslots Active

2.3 MODULATION CHARACTERISTICS

2.3.7 Test Results - continued

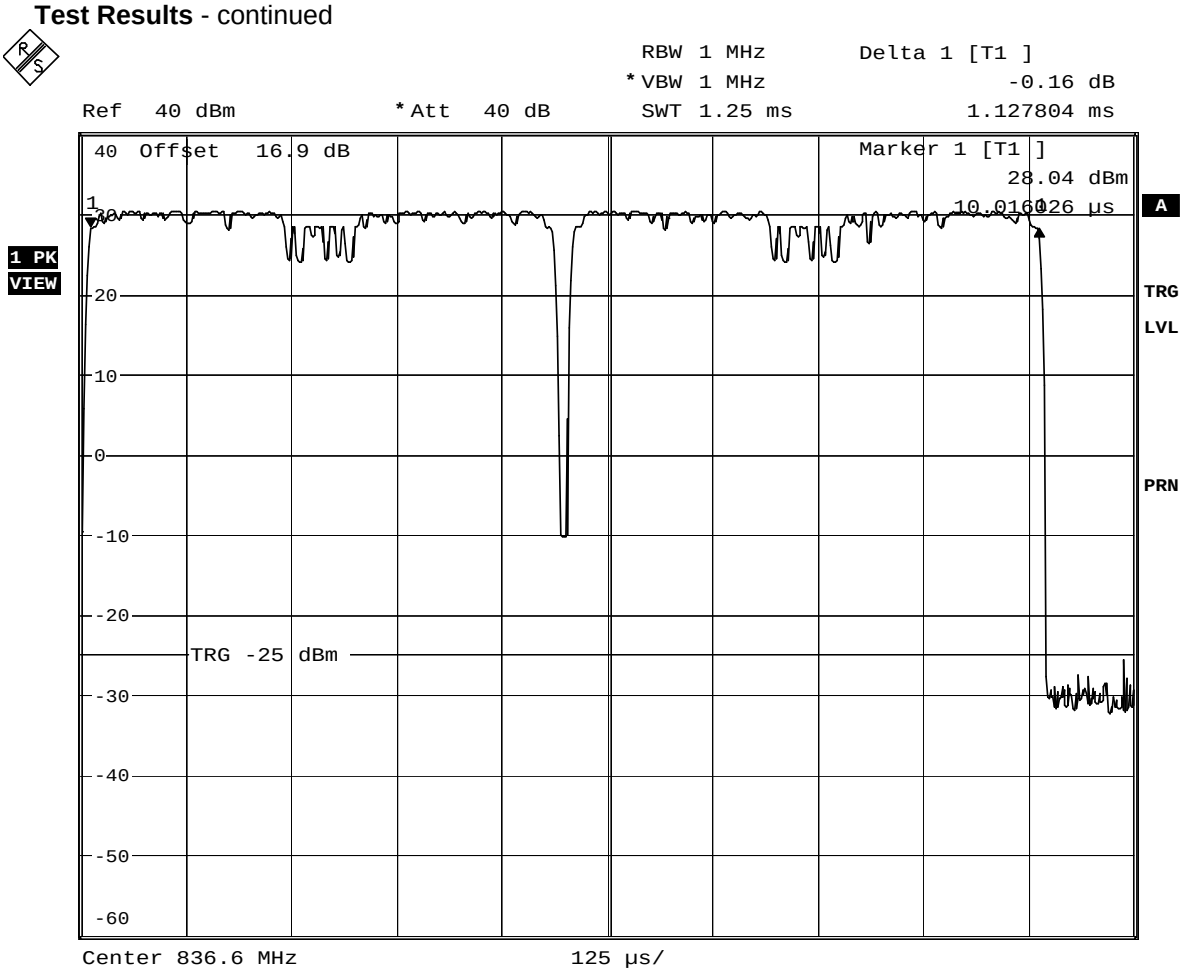


Date: 18.OCT.2005 14:18:59

Serial Number: 001018-00-006341-3
GPRS Mode – View of One Completed Frame

2.3 MODULATION CHARACTERISTICS

2.3.7 Test Results - continued



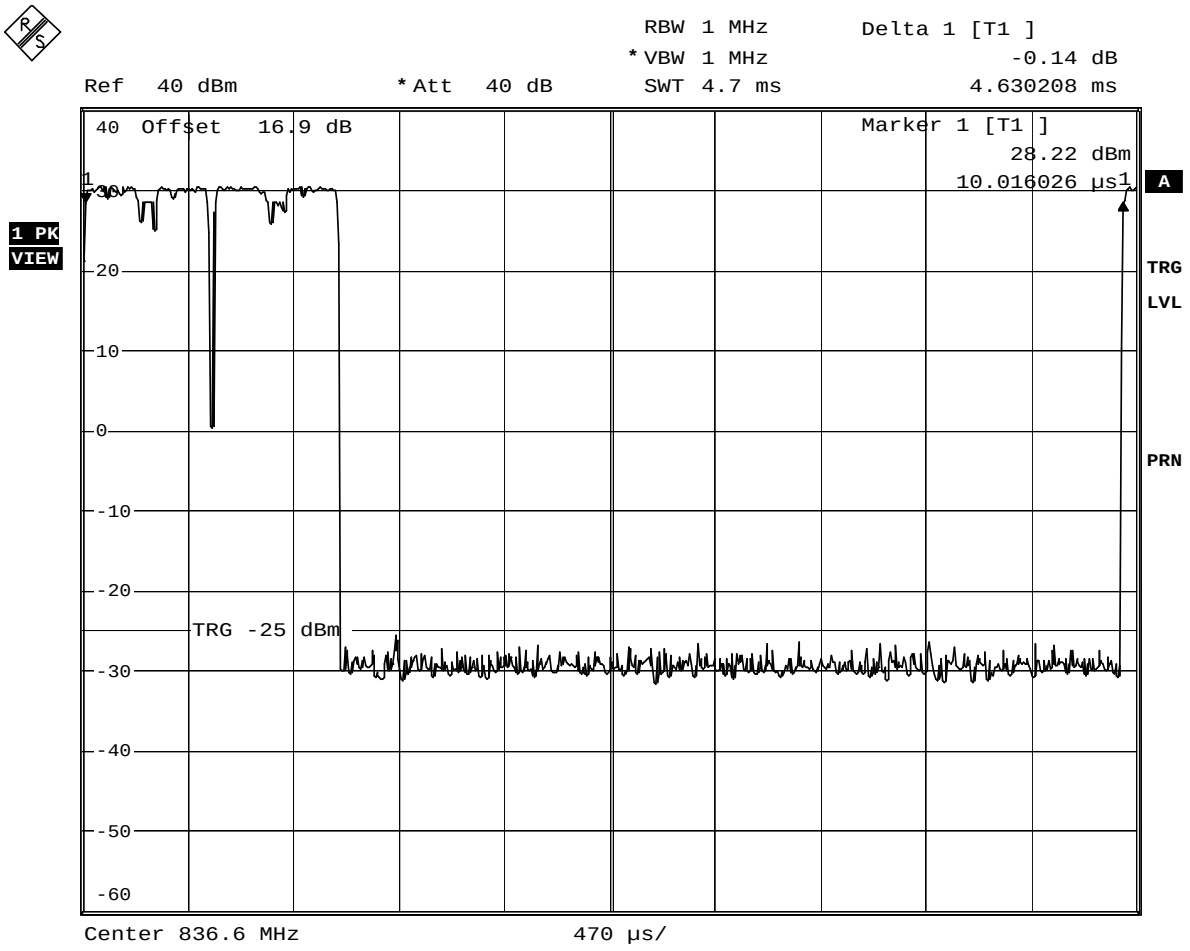
Date: 17.OCT.2005 16:16:17

Serial Number: 001018-00-006341-3

EDGE Mode – View of Two Timeslots Active

2.3 MODULATION CHARACTERISTICS

2.3.7 Test Results - continued



Date: 17.OCT.2005 16:17:41

Serial Number: 001018-00-006341-3

EDGE Mode –View of One Complete Frame

2.4 OCCUPIED BANDWIDTH

2.4.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 2.1049(h), 22.917(b) and Industry Canada RSS-132, 6.2

2.4.2 Equipment Under Test

U730

2.4.3 Date of Test

14th October 2005 (GPRS)
17th October 2005 (EDGE)
13th October 2005 (UMTS)
11th October 2005 (HSDPA)

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

GPRS and EDGE Modes
The EUT was transmitting at maximum power. In GPRS mode, TS2 and TS3 were active. In EDGE mode, TS2 and TS3 were active. Using a resolution bandwidth of 10 kHz and a video bandwidth of 30 kHz, the –26dBc points were established and the emission bandwidth determined.

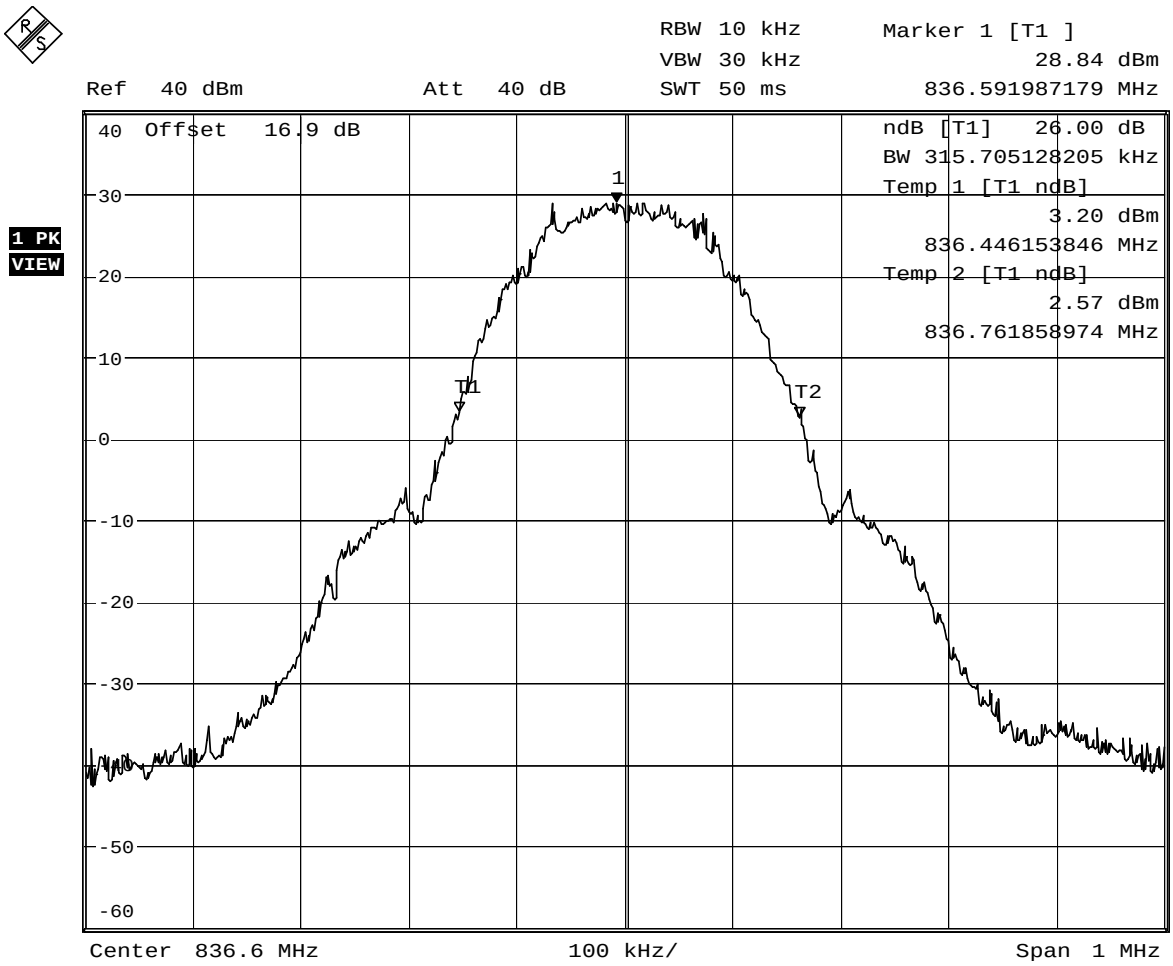
UMTS Mode
The EUT was transmitting at maximum power with QPSK modulation using a resolution bandwidth of 100 kHz and a video bandwidth of 100 kHz, the –26dBc points were established and the emission bandwidth determined.

HSDPA Mode
The EUT was transmitting at maximum power with HSDPA (16QAM) modulation, TS2 and TS3 were active. Using a resolution bandwidth of 100 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.

2.4 OCCUPIED BANDWIDTH

2.4.6 Test Results

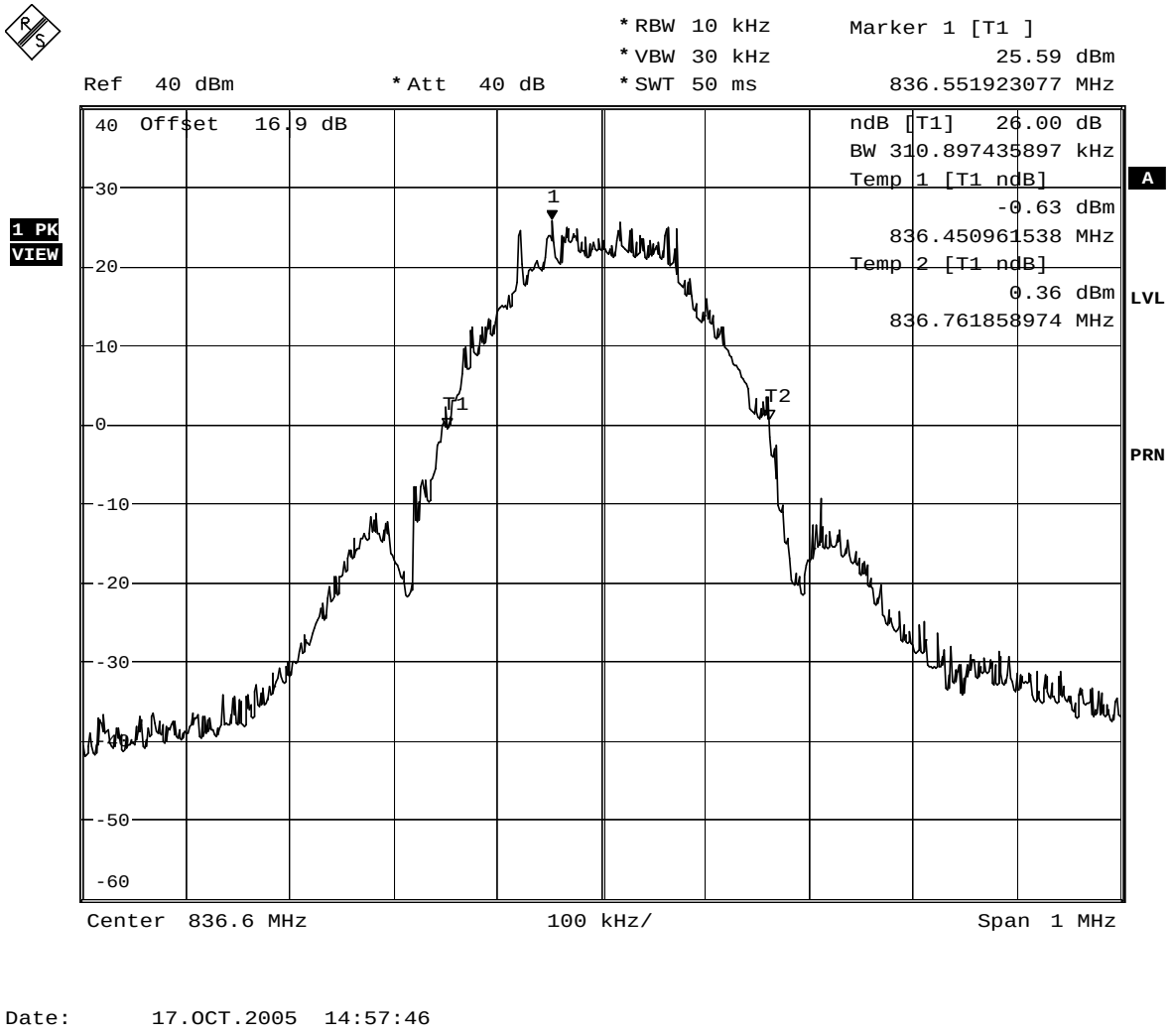


Date: 14.OCT.2005 10:06:59

Serial Number: 001018-00-006341-3
Occupied Bandwidth As Defined By The –26dBc Points
Maximum Power – GPRS 850

2.4 OCCUPIED BANDWIDTH

2.4.6 **Test Results** - continued

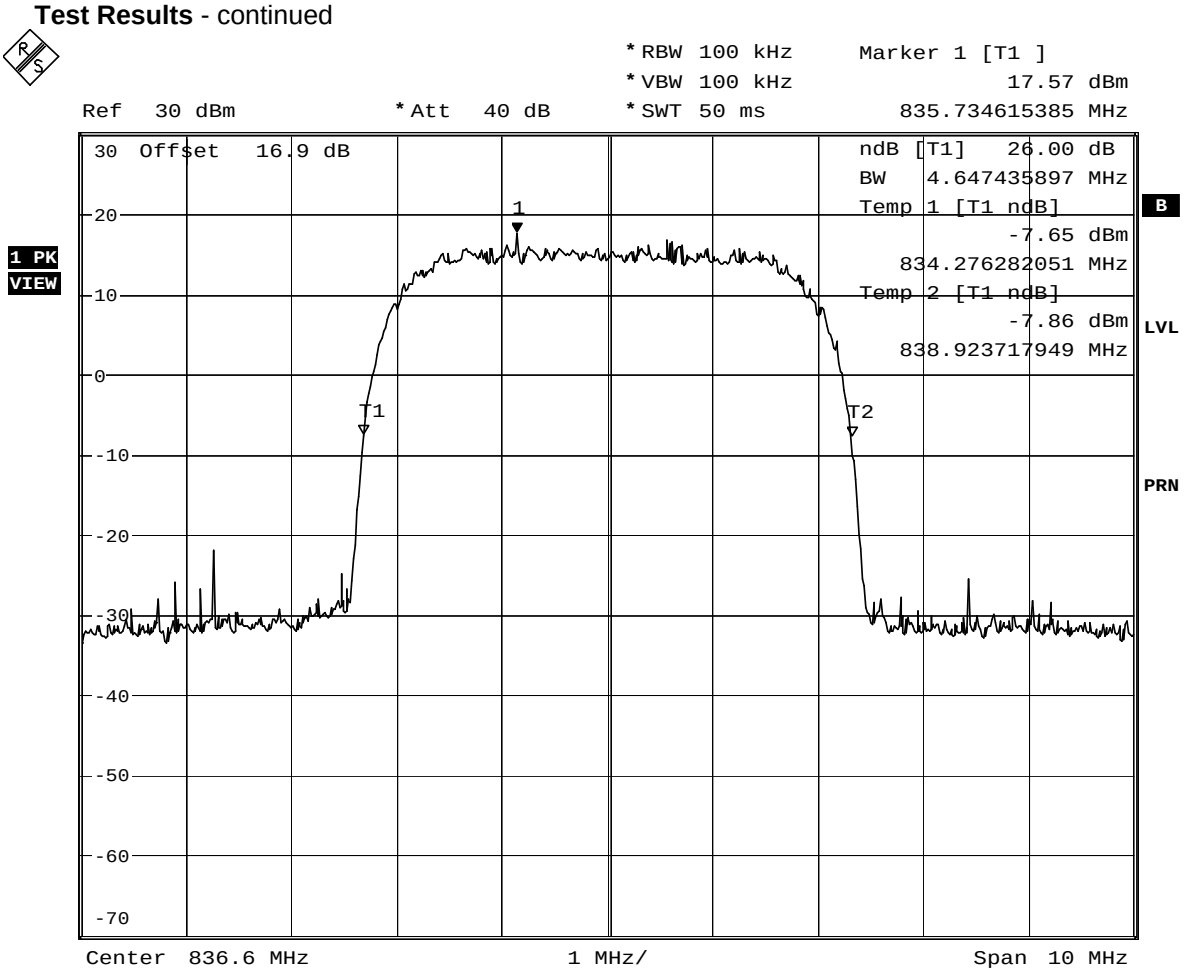


Date: 17.OCT.2005 14:57:46

Serial Number: 001018-00-006341-3
Occupied Bandwidth As Defined By The –26dBc Points
Maximum Power – EDGE 850

2.4 OCCUPIED BANDWIDTH

2.4.6 **Test Results** - continued

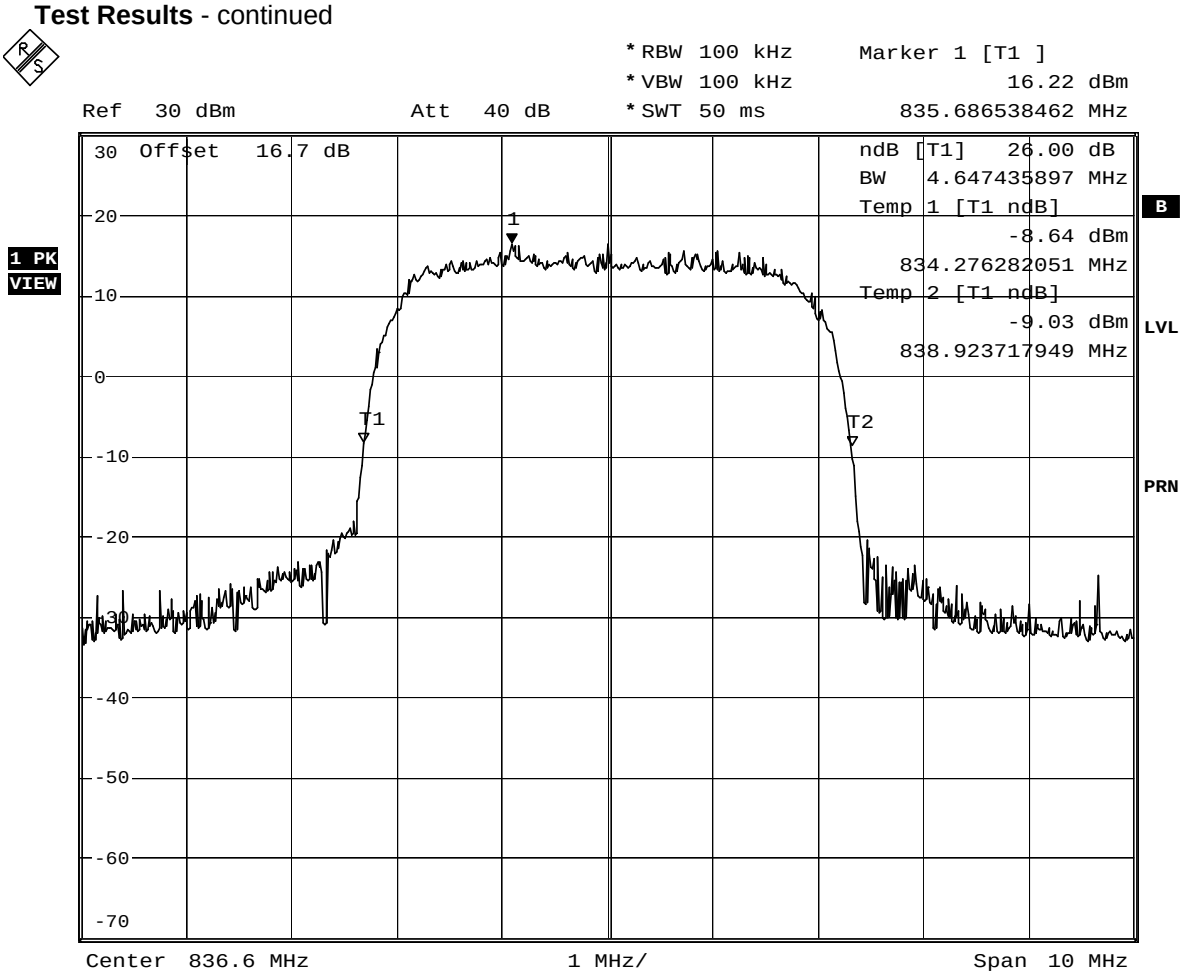


Date: 13.OCT.2005 12:03:17

Serial Number: 001018-00-006341-3
Occupied Bandwidth As Defined By The –26dBc Points
Maximum Power – UMTS 850

2.4 OCCUPIED BANDWIDTH

2.4.6 **Test Results** - continued



Serial Number: 001018-00-006341-3
Occupied Bandwidth As Defined By The –26dBc Points
Maximum Power – HSDPA 850

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

2.5.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 2.1051, 22.905, 22.917 and
Industry Canada RSS-132, 6.5

2.5.2 Equipment Under Test

U730

2.5.3 Date of Test

14th October 2005 (GPRS)
17th October 2005 (EDGE)
13th October 2005 (UMTS)
11th October 2005 (HSDPA)

2.5.4 Test Equipment Used

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

2.5.5 Test Procedure

In accordance with 22.917(b) and 22.905, 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 + 10 log (P) limit. The measurements were performed using a peak detector with the trace display set to max hold. A resolution bandwidth of at least 1% of the measured 26dB bandwidth was used, in this case 10 kHz resolution bandwidth and 30 kHz video bandwidth. The measured path loss was entered as a reference level offset into the Spectrum Analyser.

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

2.5.6 Test Results

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

Measurements were made with the EUT in GPRS 850 Mode.
Serial Number: 001018-00-006341-3

Communication Channel Pair Blocks

Frequency Block MHz	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A 824.0 – 835.0	Channel : 129 Frequency : 824.4MHz	-
B 824.0 – 849.0	-	Channel : 250 Frequency : 848.6MHz

Measurements were made with the EUT in EDGE 850 Mode.
Serial Number: 001018-00-006341-3

Communication Channel Pair Blocks

Frequency Block MHz	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A 824.0 – 835.0	Channel : 129 Frequency : 824.4MHz	-
B 846.5 – 849.0	-	Channel : 250 Frequency : 848.6MHz

Measurements were made with the EUT in UMTS 850 Mode.
Serial Number: 001018-00-006341-3

Communication Channel Pair Blocks

Frequency Block MHz	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A 824.0 – 835.0	Channel : 4132 Frequency : 826.4MHz	-
B 846.5 – 849.0	-	Channel : 4233 Frequency : 846.6MHz

Measurements were made with the EUT in HSDPA 850 Mode.
Serial Number: 001018-00-006341-3

Communication Channel Pair Blocks

Frequency Block MHz	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A 824.0 – 835.0	Channel : 4132 Frequency : 826.4MHz	-
B 846.5 – 849.0	-	Channel : 4233 Frequency : 846.6MHz

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

2.5.6 Test Results

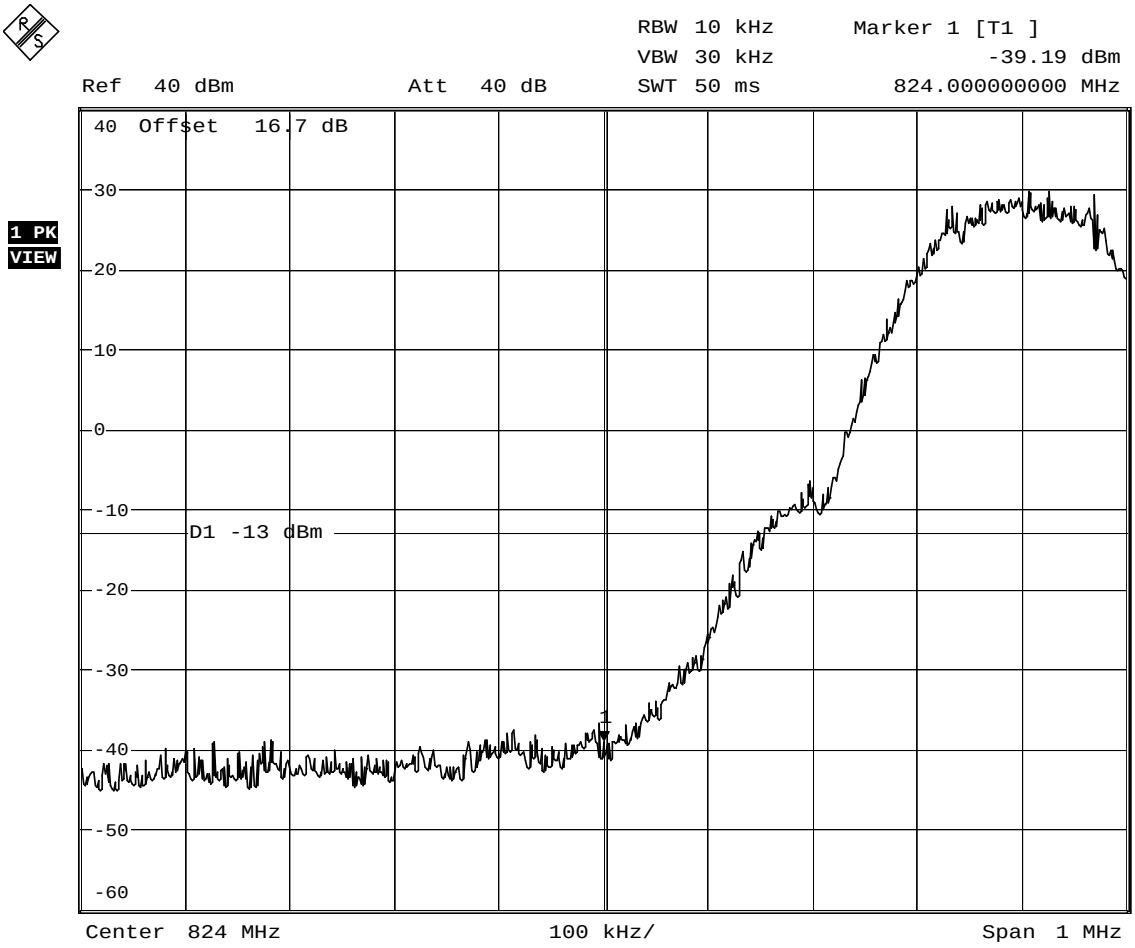
The channels shown in the table above are the minimum and maximum channels that can be used in each block to maintain compliance. Channels used outside of those stated in the table exceed the specification limits, thus they cannot be used.

The channels outside of those shown in the table above were not tested at lower power levels to determine a level at which compliance would be achieved. Therefore, to maintain compliance, only the channels shown in the table above shall be used.

The measurement plots are shown on the following pages.

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

2.5.6 Test Results - continued



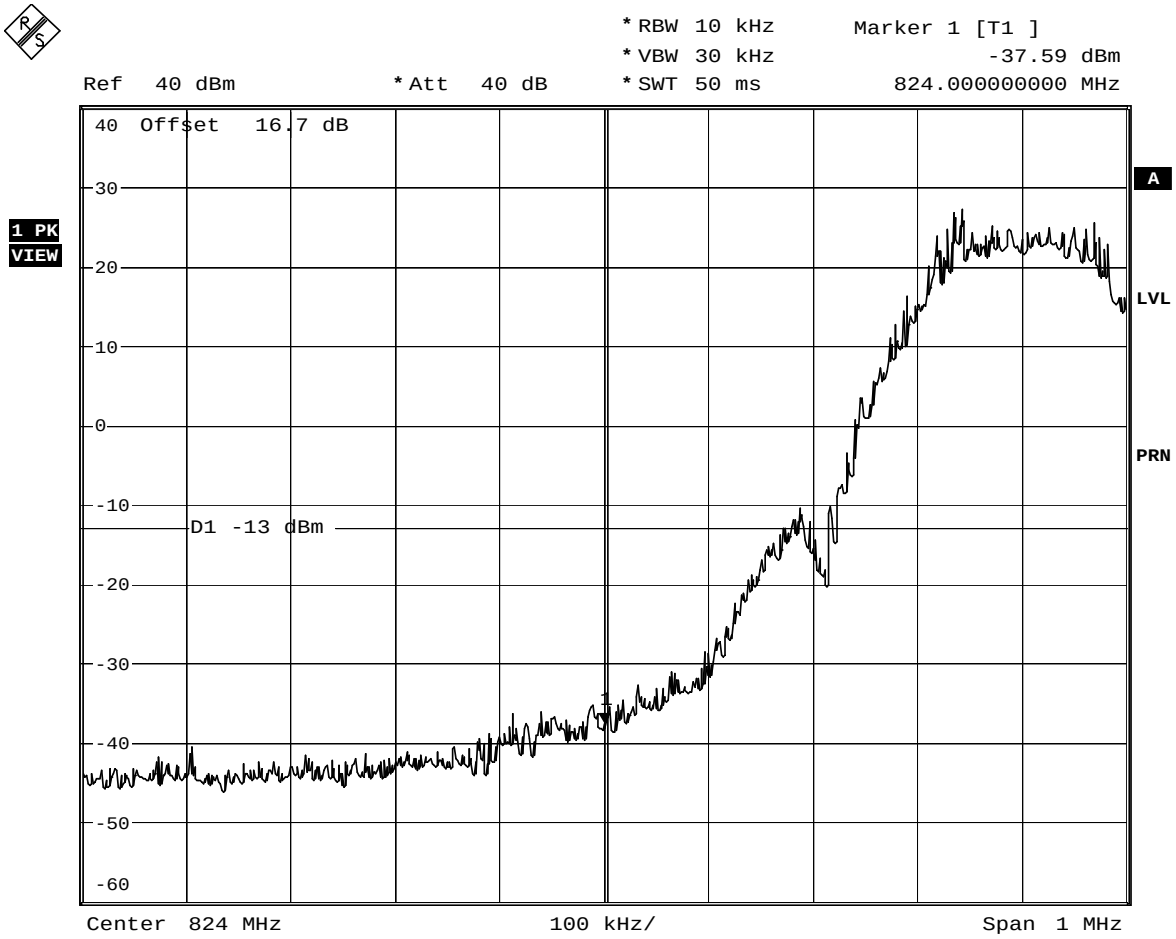
Date: 14.OCT.2005 10:17:01

Block Edge Measurement with EUT Transmitting on Full Power On
Channel 129, (824.40MHz) GPRS Modulation

Block A
824.0 – 835.0MHz

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

2.5.6 **Test Results** - continued



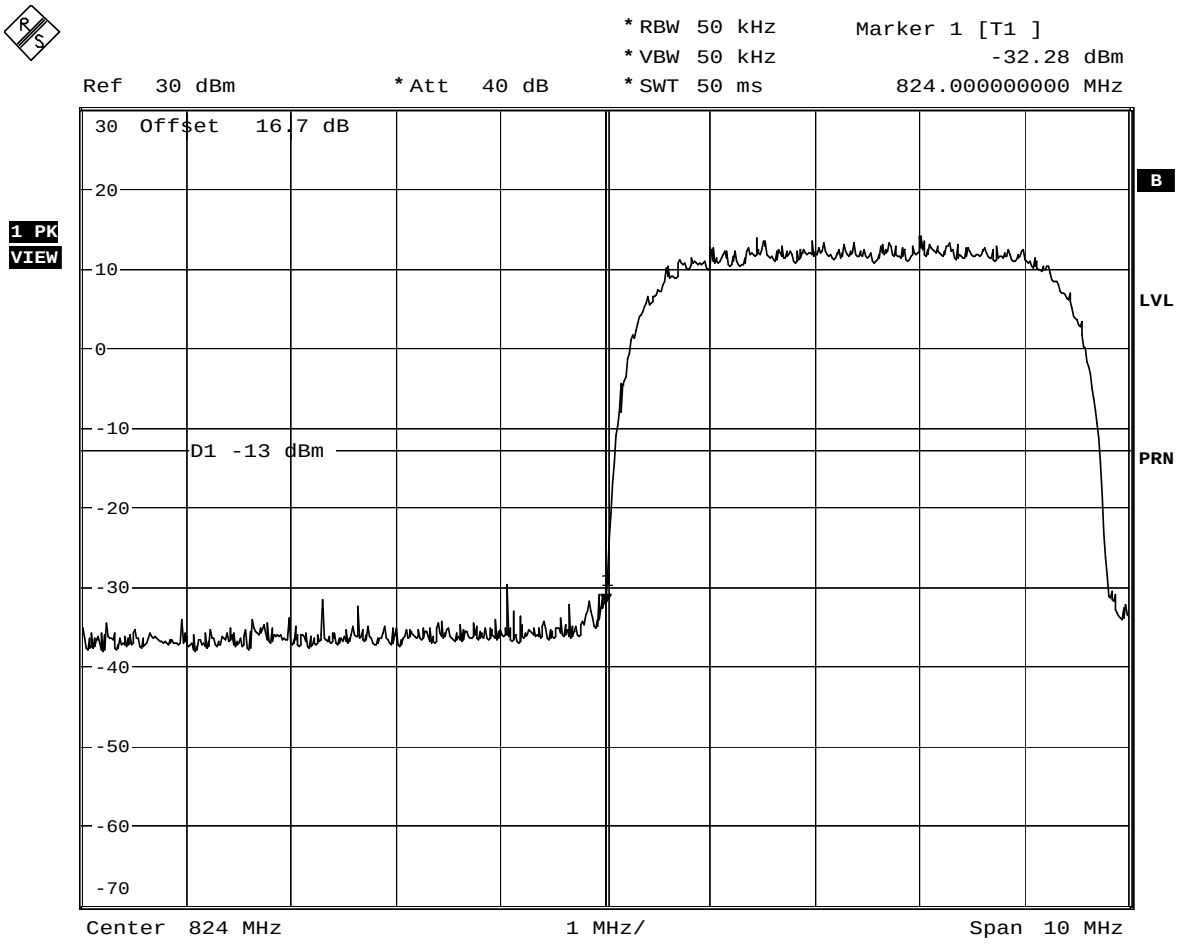
Date: 17.OCT.2005 15:04:27

Block Edge Measurement With EUT Transmitting on Full Power On
Channel 129, (824.40MHz) EDGE Modulation

Block A
824.0 – 835.0MHz

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

2.5.6 **Test Results** - continued

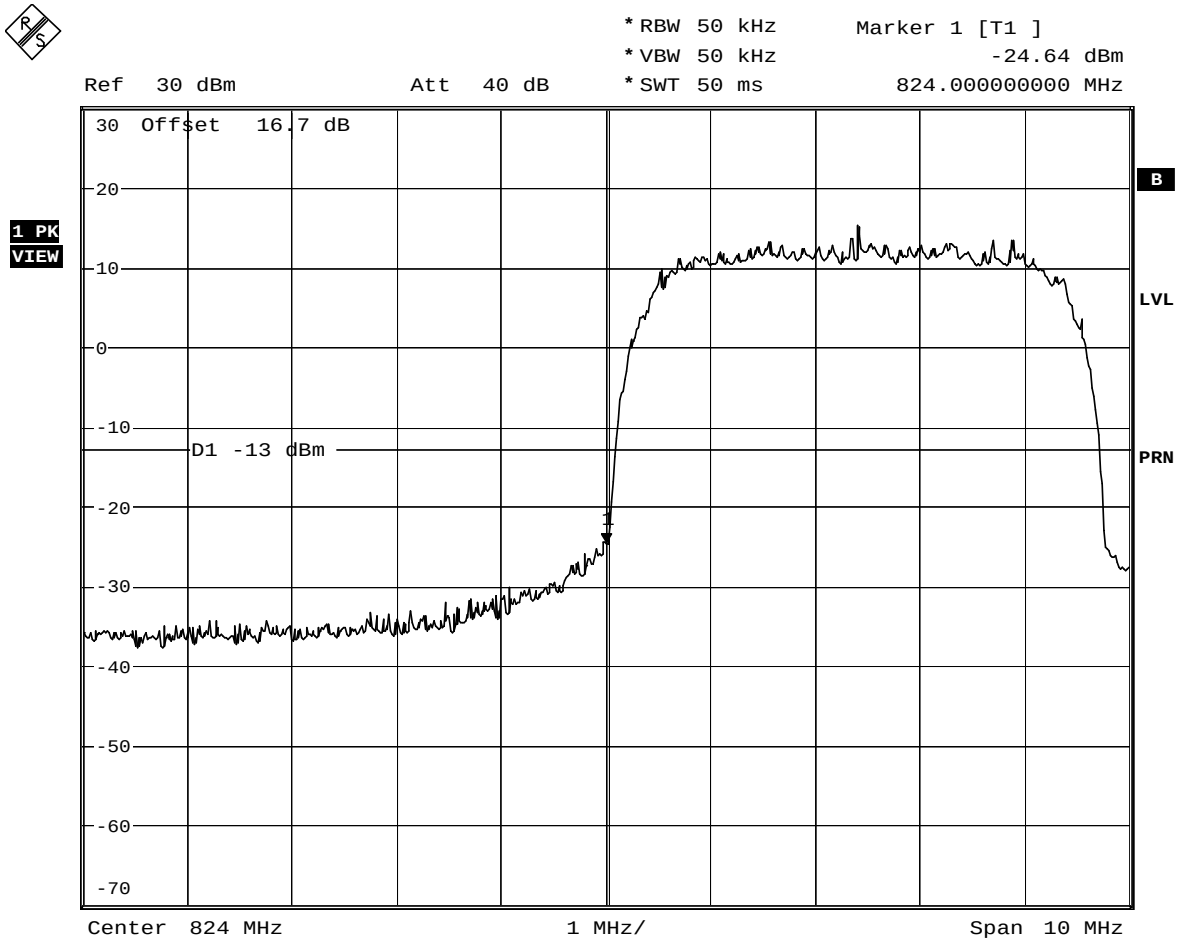


Block Edge Measurement With EUT Transmitting on Full Power On
Channel 4132, (826.4MHz) UMTS Modulation

Block A
824.0 – 835.0MHz

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

2.5.6 **Test Results** - continued



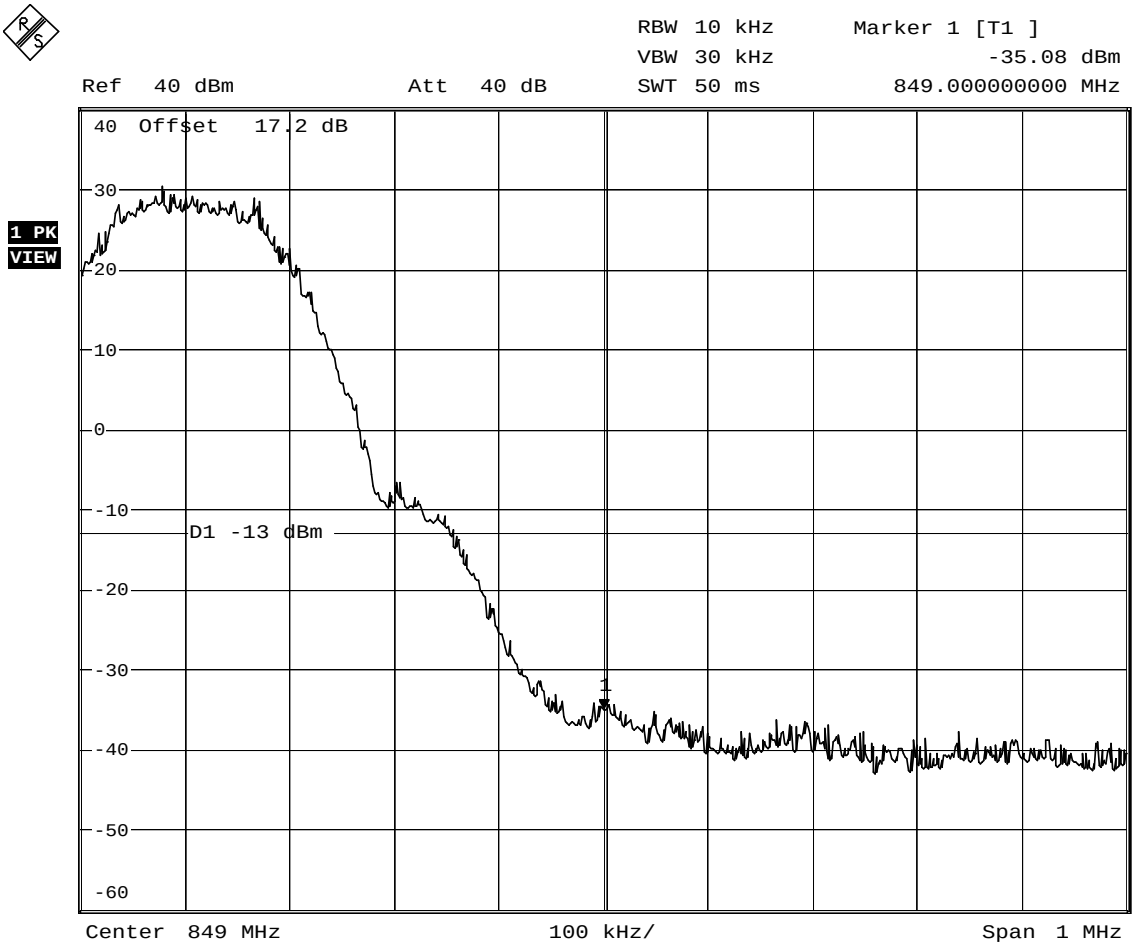
Date: 11.OCT.2005 11:51:12

Block Edge Measurement With EUT Transmitting on Full Power On
Channel 4132, (826.4MHz) UMTS Modulation

Block A
824.0 – 835.0MHz

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

2.5.6 **Test Results** - continued



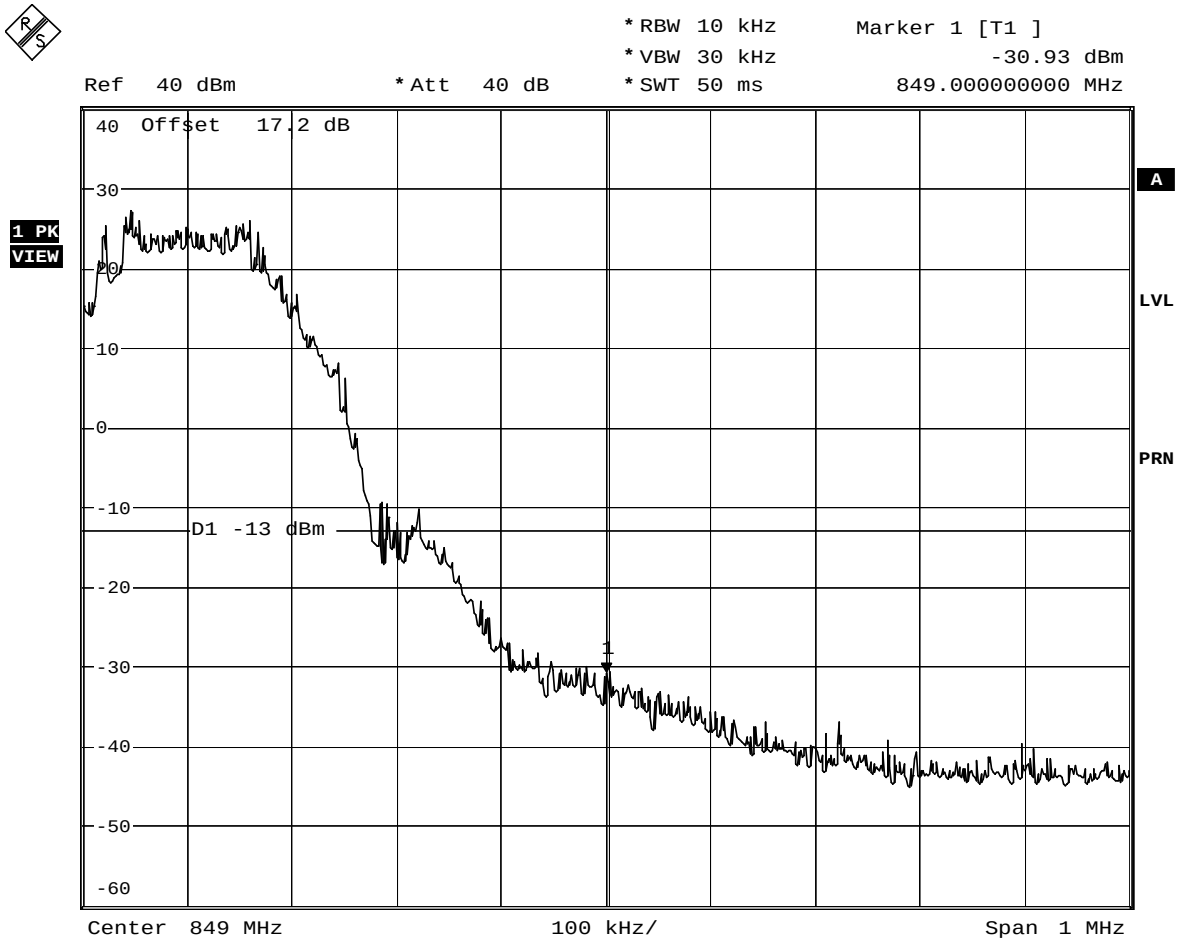
Date: 14.OCT.2005 10:18:39

Block Edge Measurement With EUT Transmitting on Full Power On Channel 250, (848.6MHz) GPRS Modulation

Block B
846.5 – 849.0MHz

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

2.5.6 **Test Results** - continued



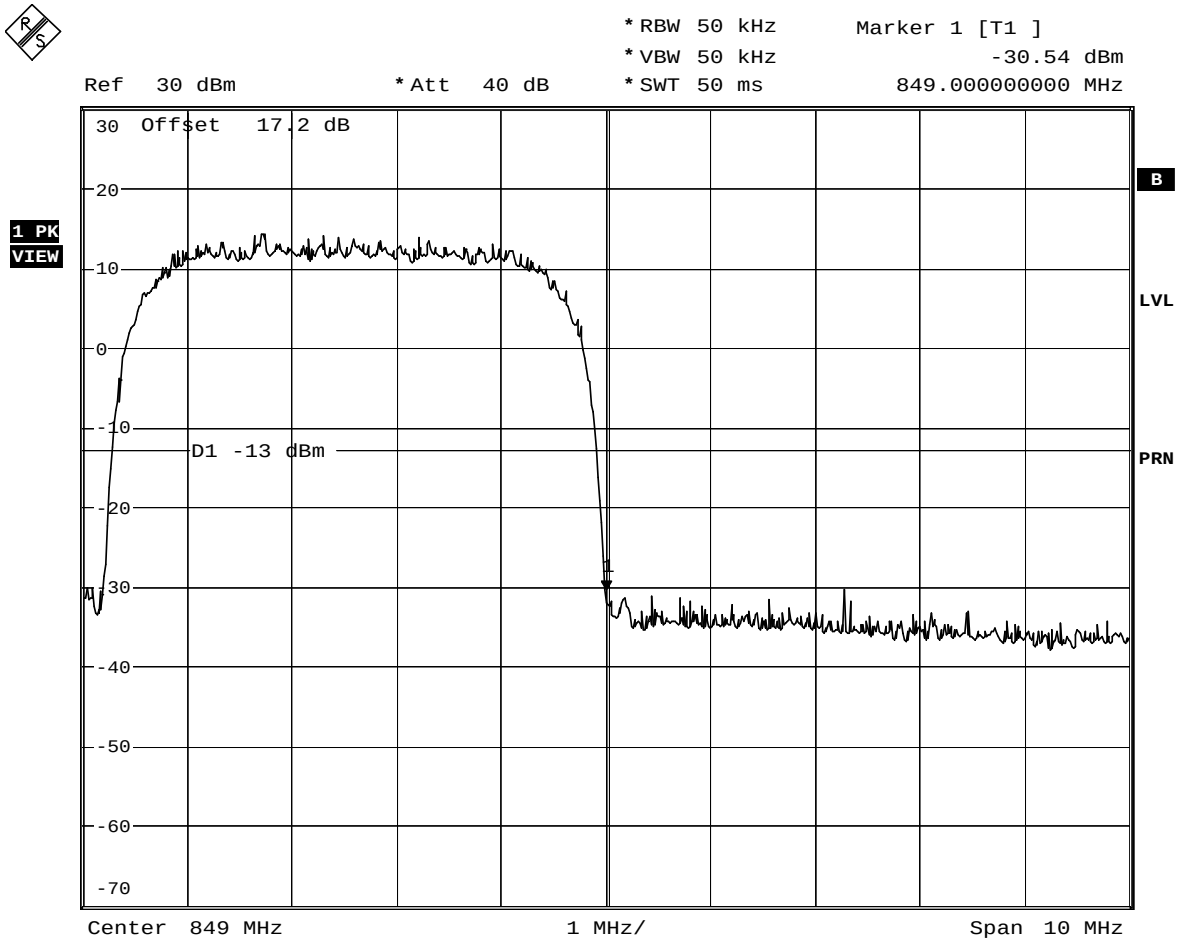
Date: 17.OCT.2005 15:07:52

Block Edge Measurement With EUT Transmitting on Full Power On
Channel 250, (848.6MHz) EDGE Modulation

Block B
846.5 – 849.0MHz

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

2.5.6 **Test Results** - continued



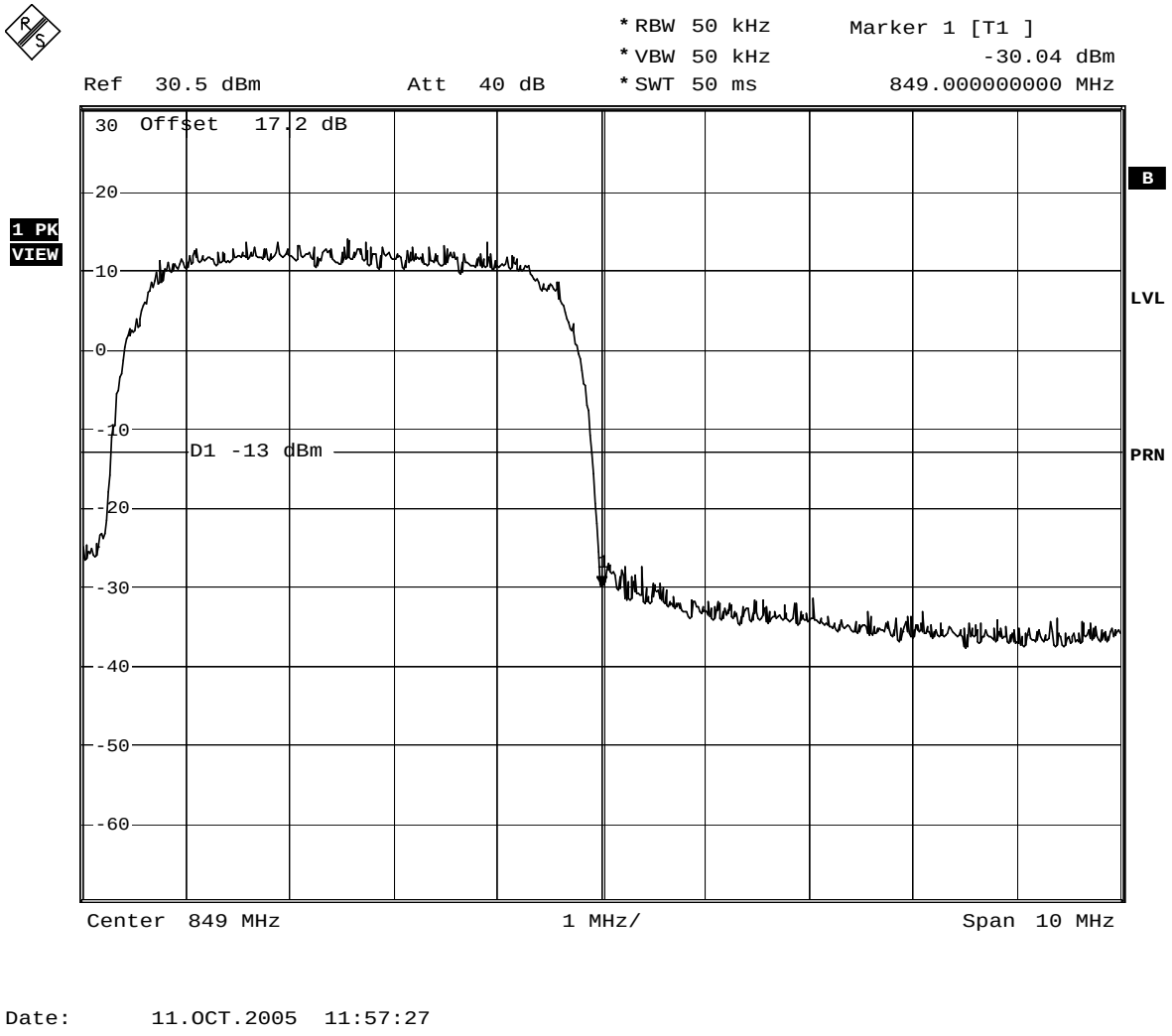
Date: 13.OCT.2005 12:28:13

Block Edge Measurement With EUT Transmitting on Full Power On
Channel 4132, (826.4MHz) UMTS Modulation

Block B
846.5 – 849.0MHz

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

2.5.6 **Test Results** - continued



Block Edge Measurement With EUT Transmitting on Full Power On
Channel 4233, (846.6MHz) HSDPA Modulation

Block B
846.5 – 849.0MHz

2.6 RADIATED EMISSIONS

2.6.1 Equipment Reference

FCC CFR 47: Part 22 Subpart H, Section 22.917 and Industry Canada RSS-132, 6.5

2.6.2 Equipment Under Test

U730

2.6.3 Date of Test

10th October 2005 (EDGE, UMTS and HSDPA)
11th October 2005 and 4th November 2005 (GPRS)

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

Test Performed in accordance with ANSI C63.4.

In order to determine the Radiated Emission Limits, measurements of transmitter power (P) were first carried out on the top, middle 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 the 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 in the Anechoic Chamber (3 metres). 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 Peak detector.

Emissions identified within the range 1GHz – 9GHz were then formally measured using a Peak Detector.

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

The test limit is derived from the carrier power in accordance with the specification. (The power of any emission outside of the authorised operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 +10log(P) dB).

2.6 RADIATED EMISSIONS

2.6.6 Test Results

30MHz – 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 22, Subpart H, 22.917 and Industry Canada RSS-132, 6.5 for Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in GPRS 850 Mode.
Serial Number 001018-00-006341-3.

EUT Transmitting on Bottom Channel (824.13MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
180.76	Horizontal	100	090	45.4	90.1
239.12	Horizontal	100	090	50.4	90.1

EUT Transmitting on Middle Channel (836.44MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
182.44	Horizontal	100	090	46.5	89.5
239.122	Horizontal	100	090	53.2	89.5

EUT Transmitting on Top Channel (848.88MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
180.20	Horizontal	100	090	46.7	90.3
239.67	Horizontal	100	090	53.6	90.3

2.6 RADIATED EMISSIONS

2.6.6 Test Results - continued

30MHz – 1GHz Frequency Range

Measurements were made with the EUT in EDGE 850 Mode.
Serial Number 001018-00-006341-3.

EUT Transmitting on Bottom Channel (824.245MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
187.67	Vertical	100	270	47.0	90.1
240.30	Vertical	194	034	50.0	90.1

EUT Transmitting on Middle Channel (836.295MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
180.68	Vertical	100	270	48.2	90.5
240.30	Vertical	181	035	49.6	90.5

EUT Transmitting on Top Channel (848.867MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
187.11	Vertical	100	272	47.1	90.3
240.85	Vertical	193	035	49.8	90.3

2.6 RADIATED EMISSIONS

2.6.6 Test Results - continued

30MHz – 1GHz Frequency Range

Measurements were made with the EUT in UMTS 850 Mode.
Serial Number: 001018-00-006341-3

EUT Transmitting on Bottom Channel (826.00MHz)

No emissions were detected within 35dB of the limit. Therefore, no formal measurements were made.

EUT Transmitting on Middle Channel (836.80MHz)

No emissions were detected within 35dB of the limit. Therefore, no formal measurements were made.

EUT Transmitting on Top Channel (847.20MHz)

No emissions were detected within 35dB of the limit. Therefore, no formal measurements were made.

2.6 RADIATED EMISSIONS

2.6.6 Test Results - continued

30MHz – 1GHz Frequency Range

Measurements were made with the EUT in HSDPA 850 Mode.
Serial Number/; 001018-00-006341-3

EUT Transmitting on Bottom Channel (826.40MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Middle Channel (836.60MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Top Channel (846.60MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

2.6 RADIATED EMISSIONS

2.6.6 Test Results - continued

1GHz – 9GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 22, Subpart H, 22.917 and Industry Canada RSS-132, 6.5 for Radiated Emissions (1GHz – 9GHz).

Measurements were made with the EUT in GPRS 850 Mode
Serial Number: 001018-00-006341-3

EUT Transmitting on Bottom Channel (824.13MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Middle Channel (836.44MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Top Channel (848.88MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

Measurements were made with the EUT in EDGE 850 Mode.
Serial Number: 001018-00-006341-3

EUT Transmitting on Bottom Channel (824.245MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Middle Channel (836.295MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Top Channel (848.867MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

2.6 RADIATED EMISSIONS

2.6.6 Test Results - continued

1GHz – 9GHz Frequency Range

Measurements were made with the EUT in UMTS 850 Mode.
Serial Number 001018-00-006341-3.

EUT Transmitting on Bottom Channel (826.00MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
GHz		cm	degree	dBm	dBm
1.005	Vertical	100	000	-54.4	-13.0
1.500	Vertical	100	000	-46.4	-13.0
1.995	Vertical	100	000	-40.3	-13.0

EUT Transmitting on Middle Channel (836.80MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Top Channel (847.20MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
GHz		cm	degree	dBm	dBm
2.537	Vertical	100	056	-42.6	-13.0
5.000	Vertical	100	000	-55.1	-13.0
7.995	Vertical	100	000	-53.5	-13.0
8.005	Vertical	100	000	-52.7	-13.0
8.995	Vertical	100	000	-54.5	-13.0

2.6 RADIATED EMISSIONS

2.6.6 **Test Results** - continued

1GHz – 9GHz Frequency Range

Measurements were made with the EUT in HSDPA 850 Mode
Serial Number: 001018-00-006341-3

EUT Transmitting on Bottom Channel (826.4MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
GHz		cm	degree	dBm	dBm
1.655	Horizontal	100	266	-28.2	-13.0
2.482	Horizontal	100	109	-49.8	-13.0

EUT Transmitting on Middle Channel (836.6MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
GHz		cm	degree	dBm	dBm
1.671	Horizontal	100	263	-28.7	-13.0
2.509	Vertical	100	287	-42.7	-13.0

EUT Transmitting on Top Channel (846.6MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
GHz		cm	degree	dBm	dBm
1.691	Horizontal	100	266	-27.3	-13.0
2.537	Horizontal	100	087	-48.2	-13.0

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 2.1051, 22.917 (a)

2.7.2 Equipment Under Test

U730

2.7.3 Date of Test

14th October 2005 (GPRS)
17th October 2005 (EDGE)
13th October 2005 (UMTS)
12th October 2005 (HSDPA)

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

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 9GHz. The EUT was set to transmit on full power on timeslots 2 and 3 for GPRS and EDGE. The EUT was set to full power for UMTS (QPSK) and HSDPA (16QAM). The EUT was tested on Bottom, Middle and Top channels on maximum power. The resolution and video bandwidths were set to 1MHz thus meeting the requirements of Part 22.917(b). The spectrum analyser detector was set to Max Hold.

From 9kHz to 1.5GHz, an attenuator was used. For measuring the range 1.5GHz to 9GHz, an attenuator and high pass filter were used. This was to reduce saturation effects in the spectrum analyser.

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

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 Test Results

See test plots.

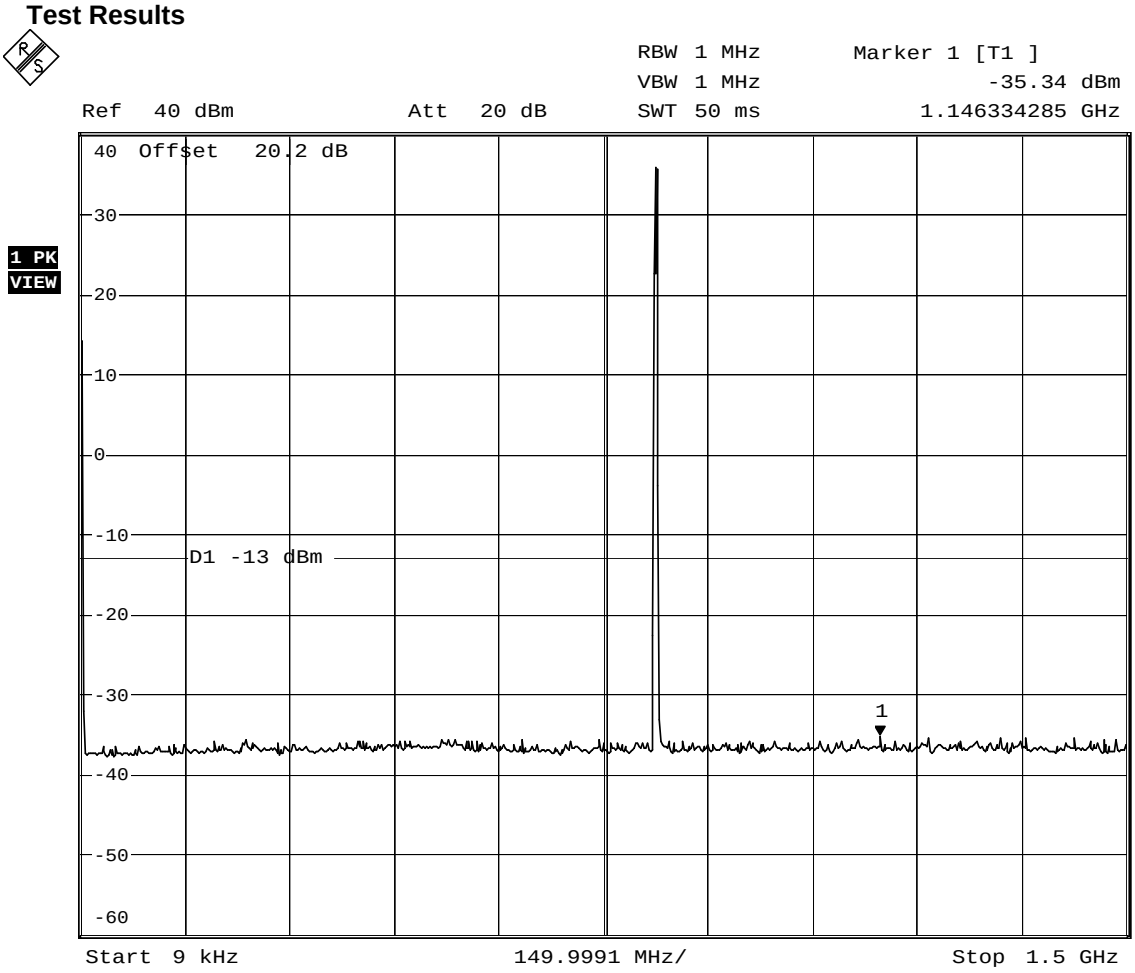
Remarks

The EUT passed the requirements laid out in 22.917(a).

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

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 Test Results

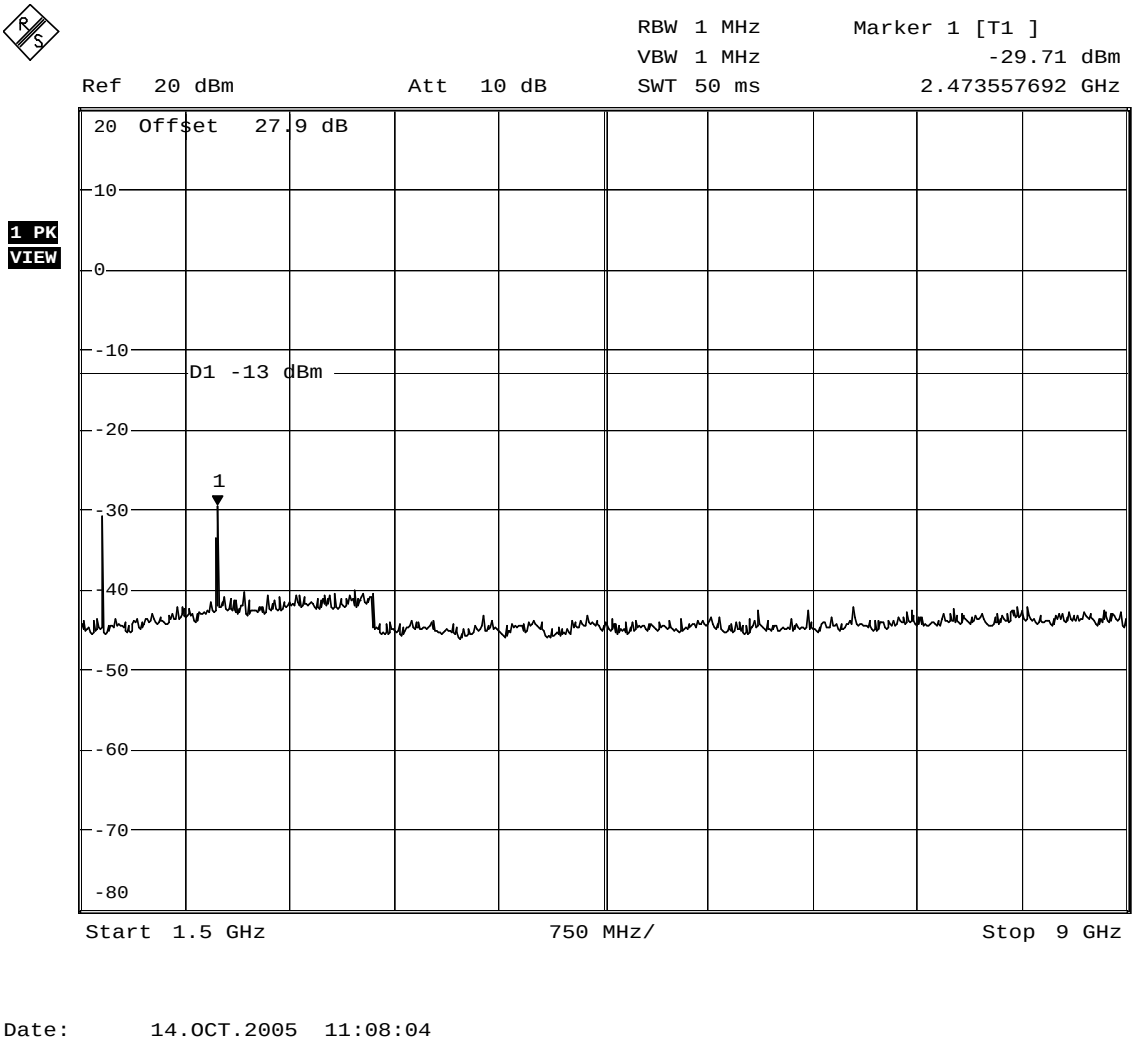


Date: 14.OCT.2005 10:54:49

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 4.0GHz)
Channel 128, (824.2MHz) – Maximum Power – GPRS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

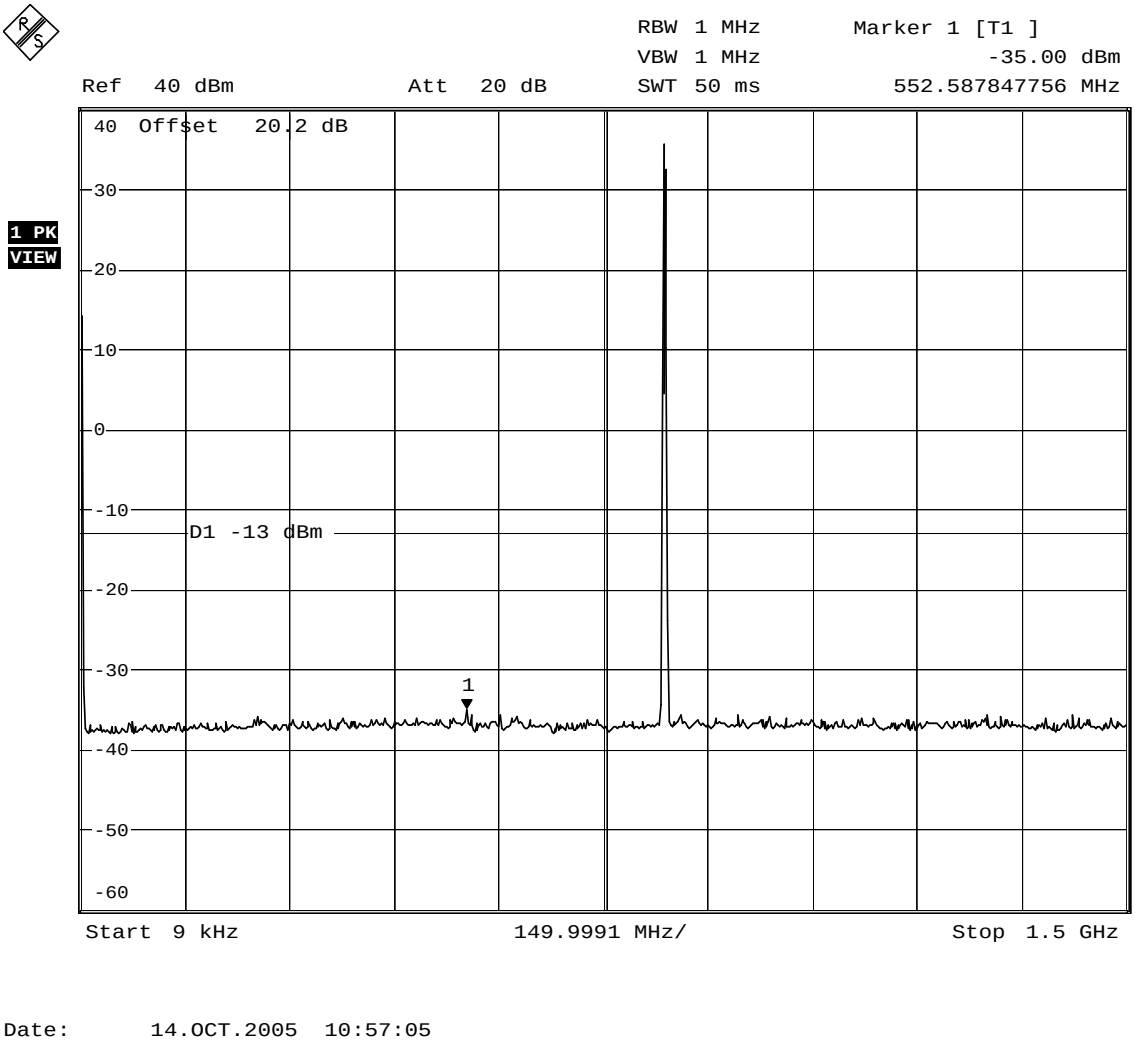
2.7.6 **Test Results** - continued



Serial Number: 001018-00-006341-3
Spurious Emissions (1.5GHz – 9GHz)
Channel 128 (824.2MHz) - Maximum Power – GPRS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

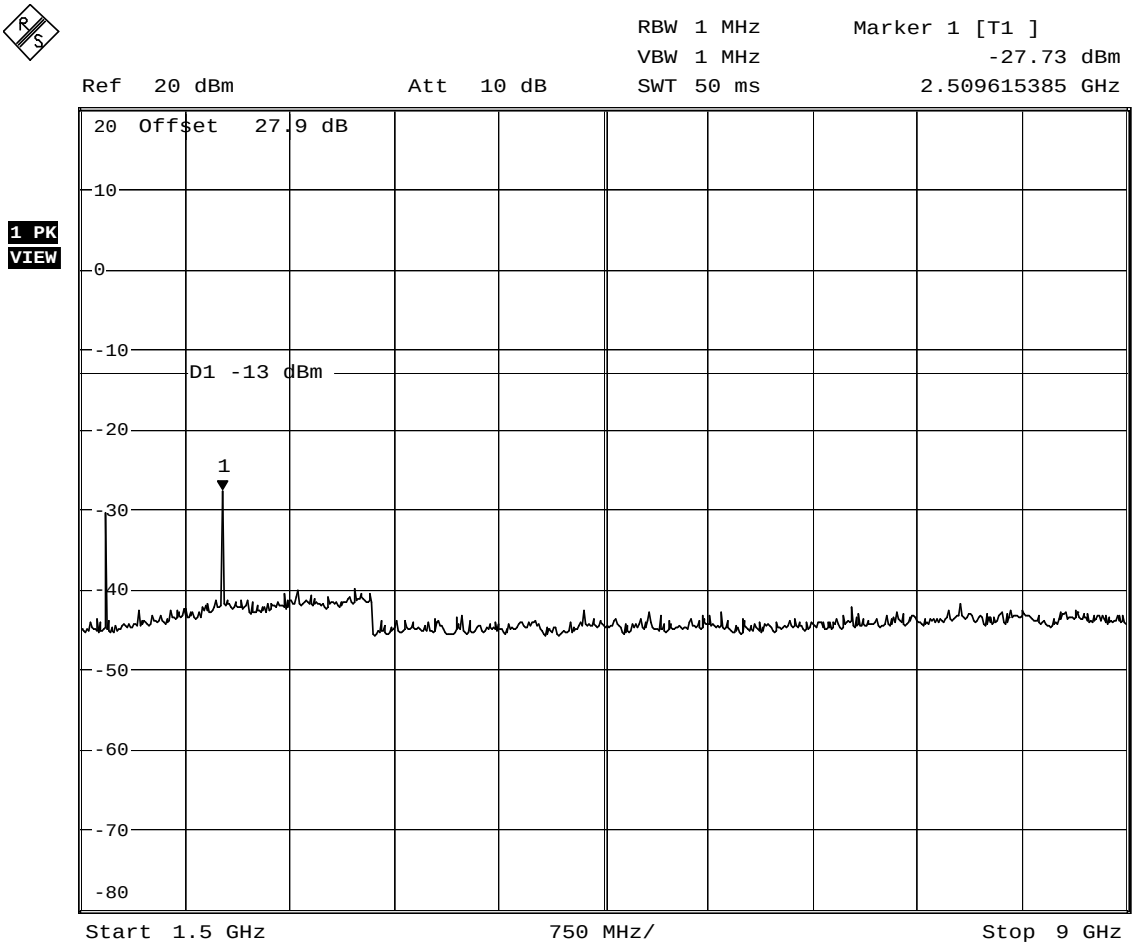


Date: 14.OCT.2005 10:57:05

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 190 (836.6MHz) - Maximum Power - GPRS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

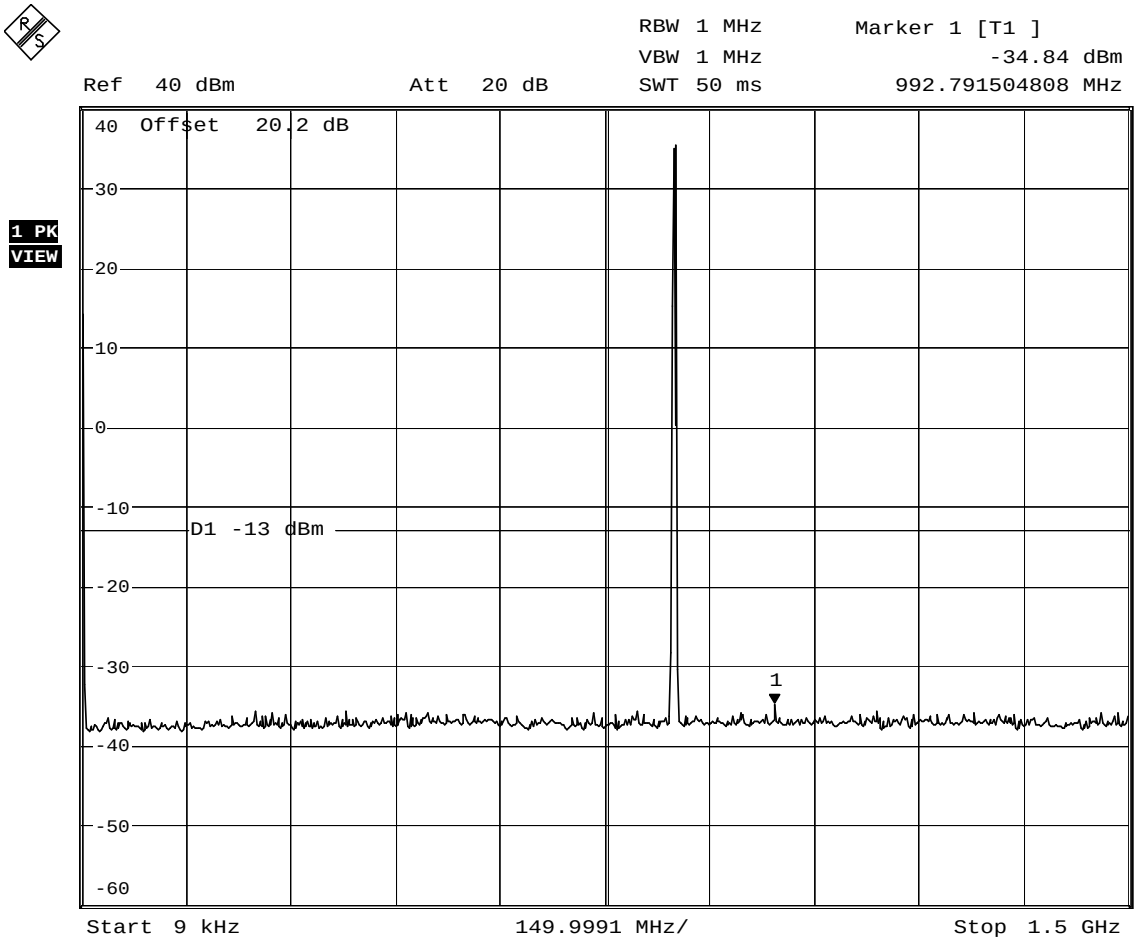


Date: 14.OCT.2005 11:07:04

Serial Number: 001018-00-006341-3
Spurious Emissions (1.5GHz - 9GHz)
Channel 190 (836.6MHz) - Maximum Power - GPRS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

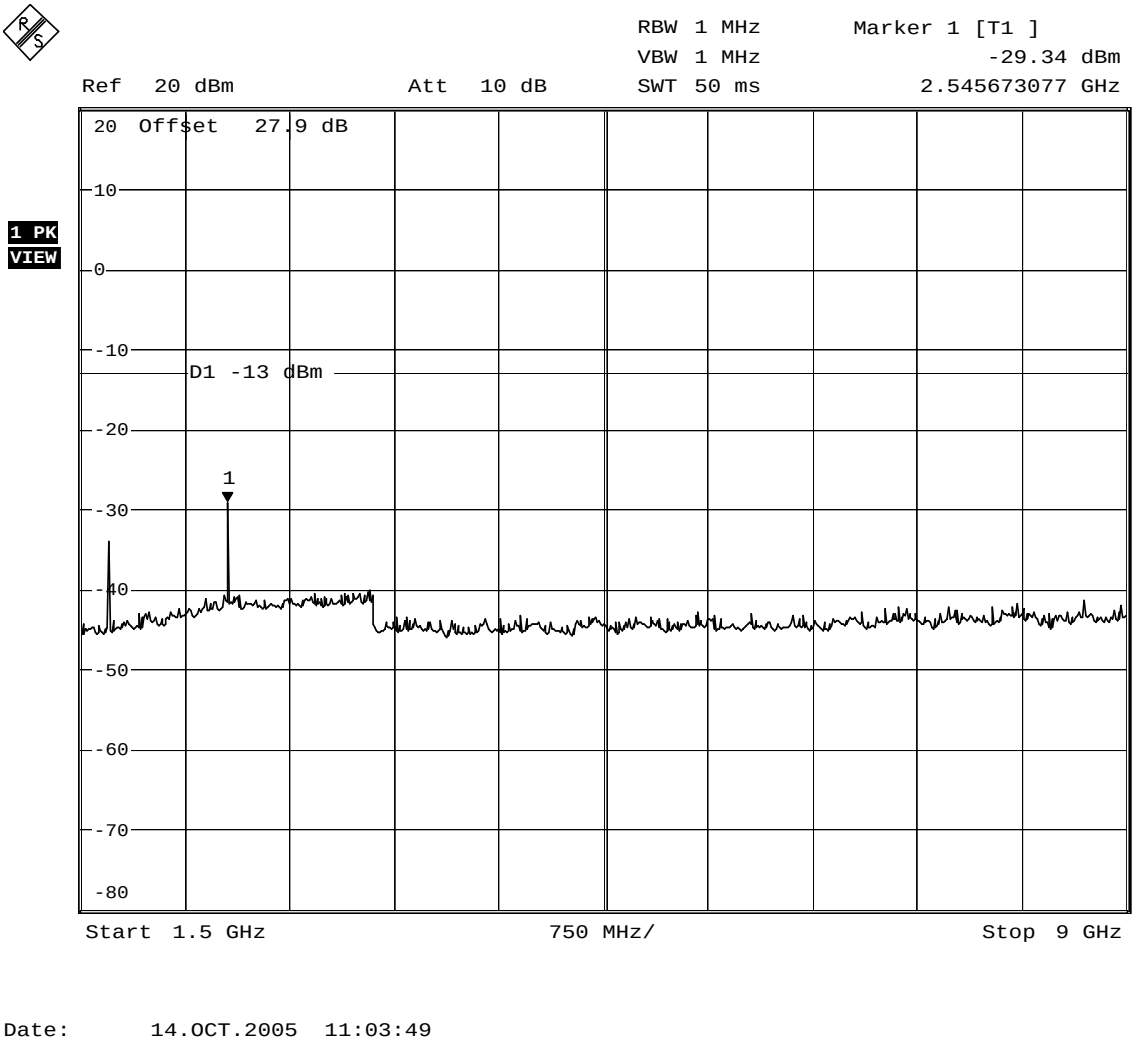


Date: 14.OCT.2005 10:58:56

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 251 (848.8MHz) - Maximum Power - GPRS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

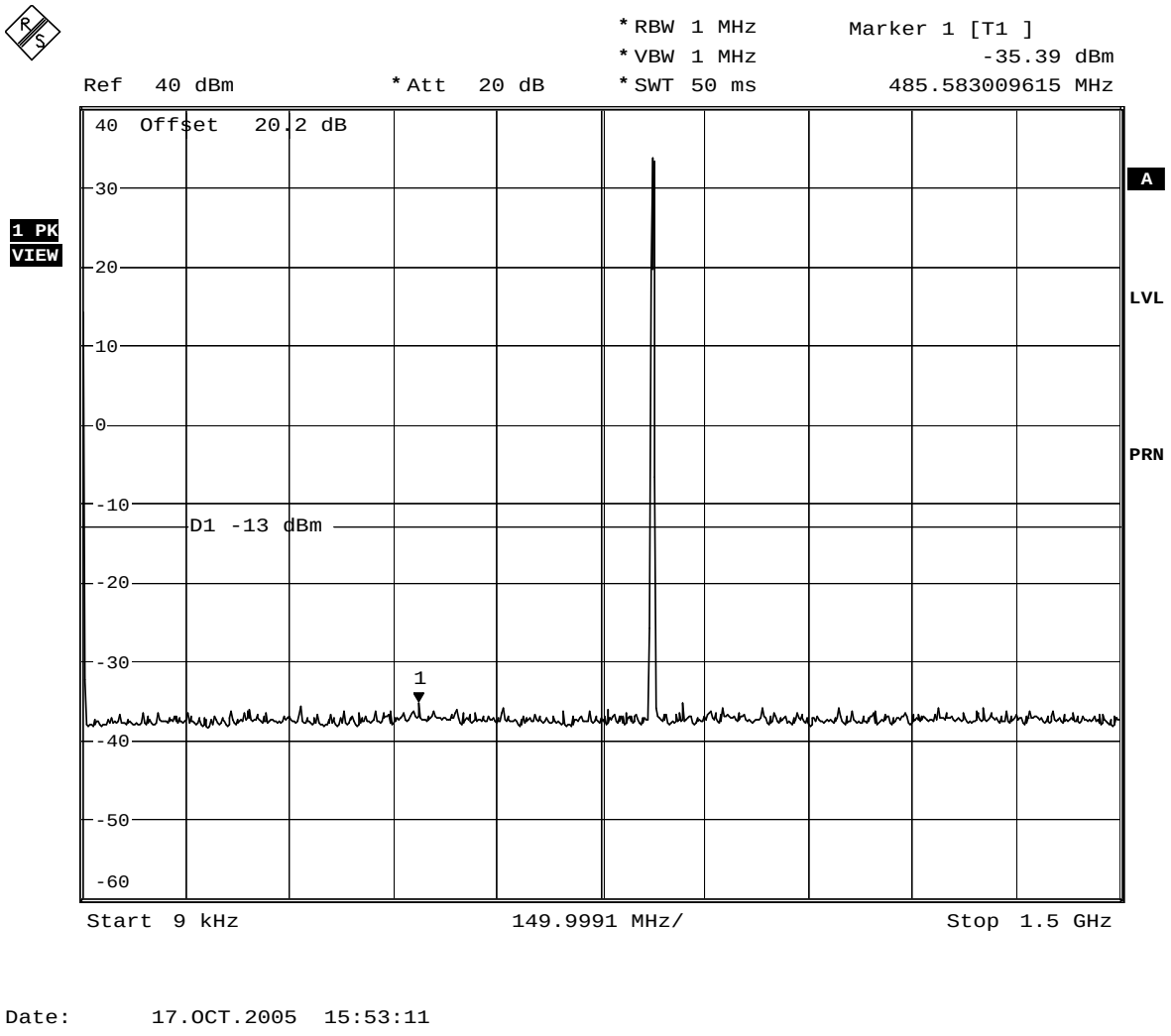
2.7.6 **Test Results** - continued



Serial Number: 001018-00-006341-3
Spurious Emissions (1.5GHz – 9GHz)
Channel 251 (848.8MHz) - Maximum Power - GPRS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

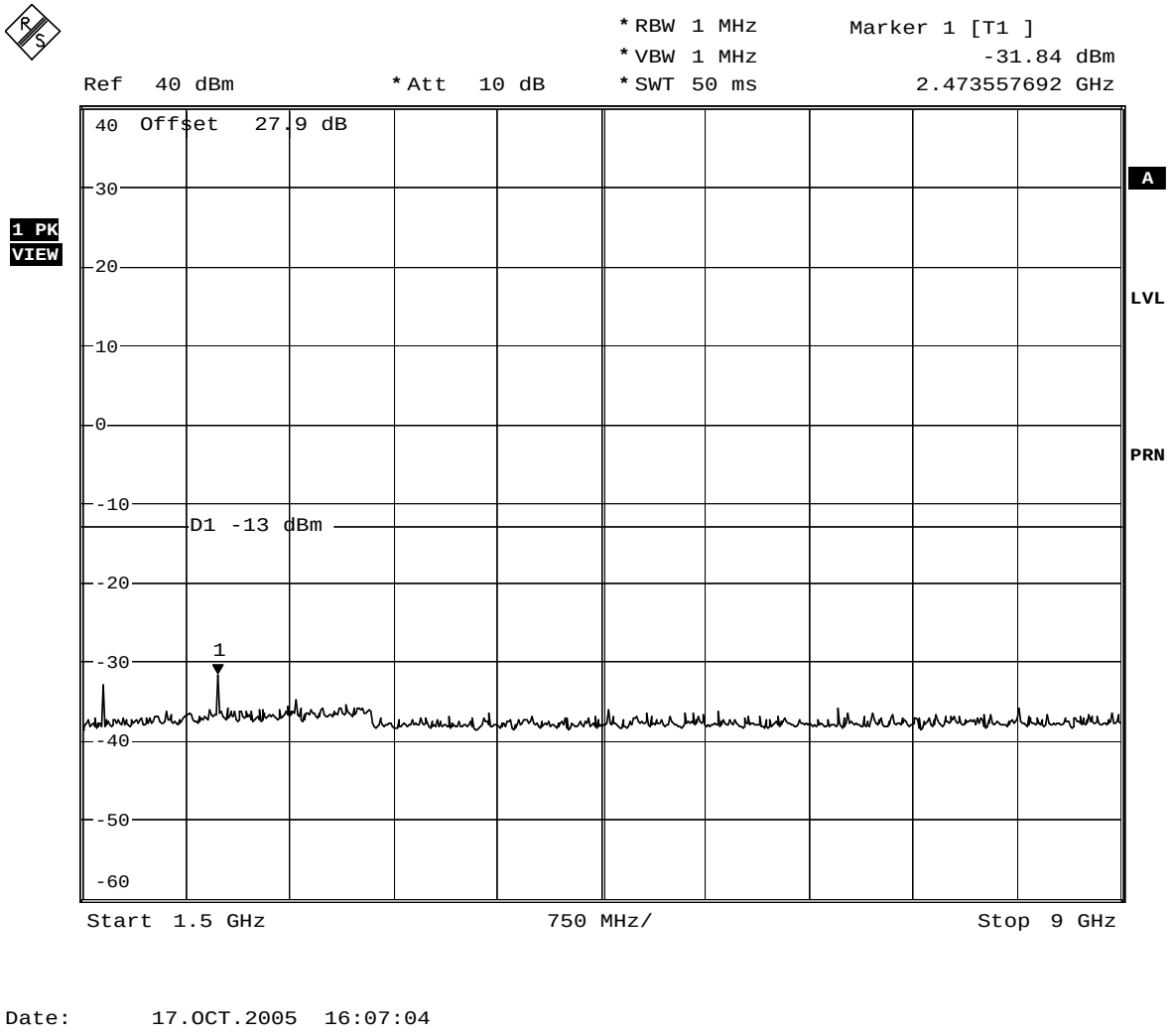


Date: 17.OCT.2005 15:53:11

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 128 (824.2MHz) - Maximum Power - EDGE 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

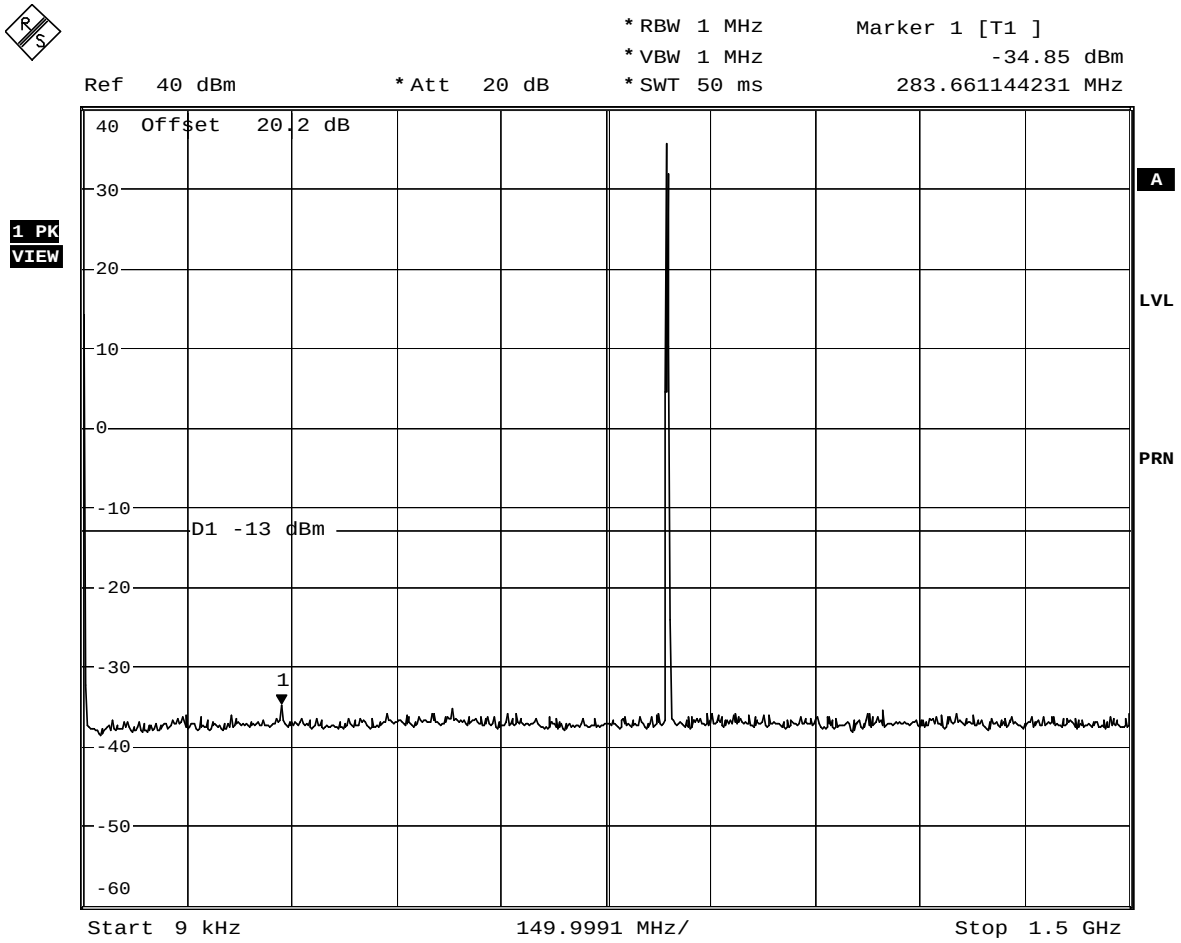
2.7.6 **Test Results** - continued



Serial Number: 001018-00-006341-3
Spurious Emissions (1.5GHz – 9GHz)
Channel 128 (824.2MHz) - Maximum Power - EDGE 850 Mode
3.9 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

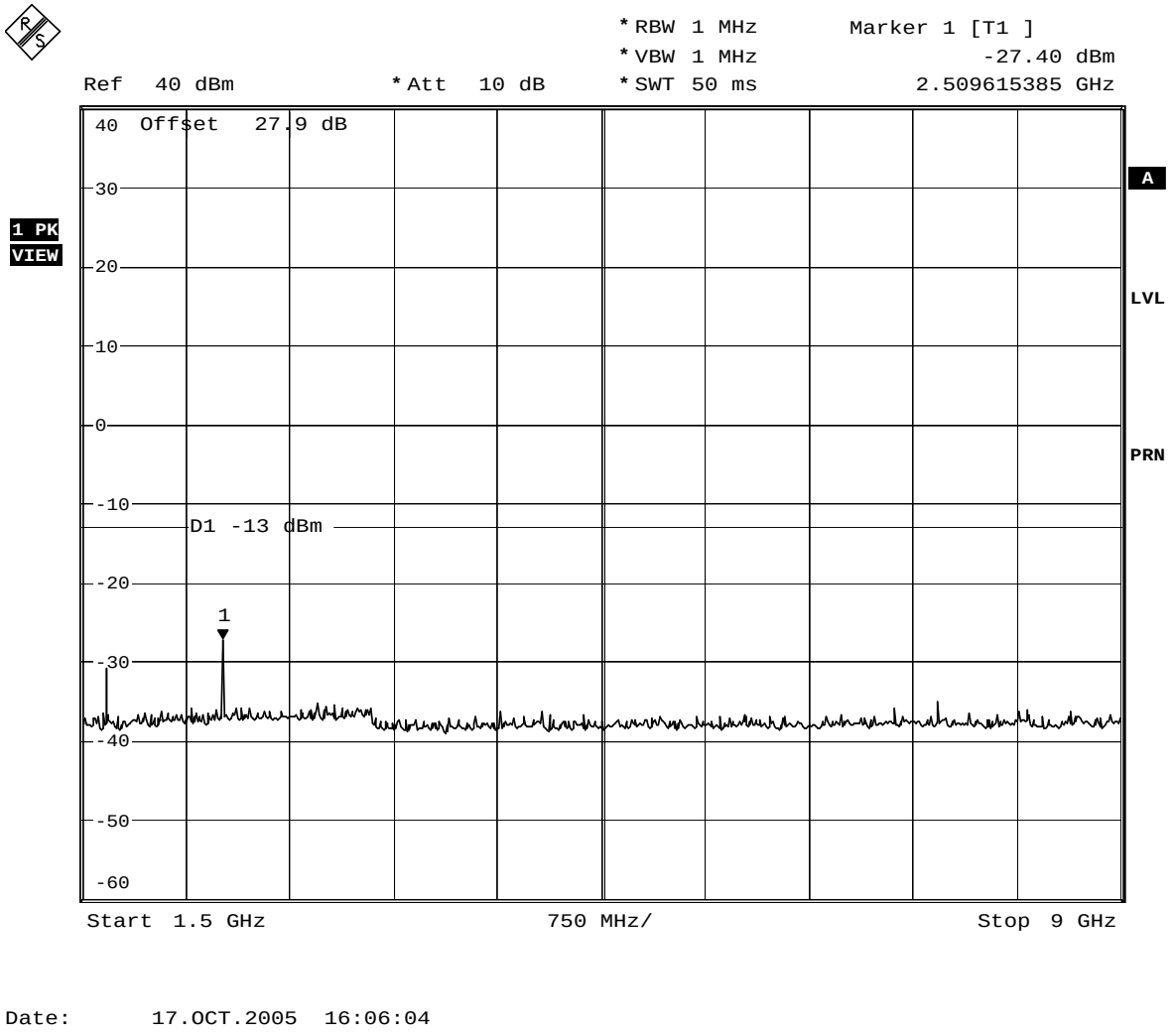


Date: 17.OCT.2005 15:55:20

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 189 (836.4MHz) - Maximum Power - EDGE 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

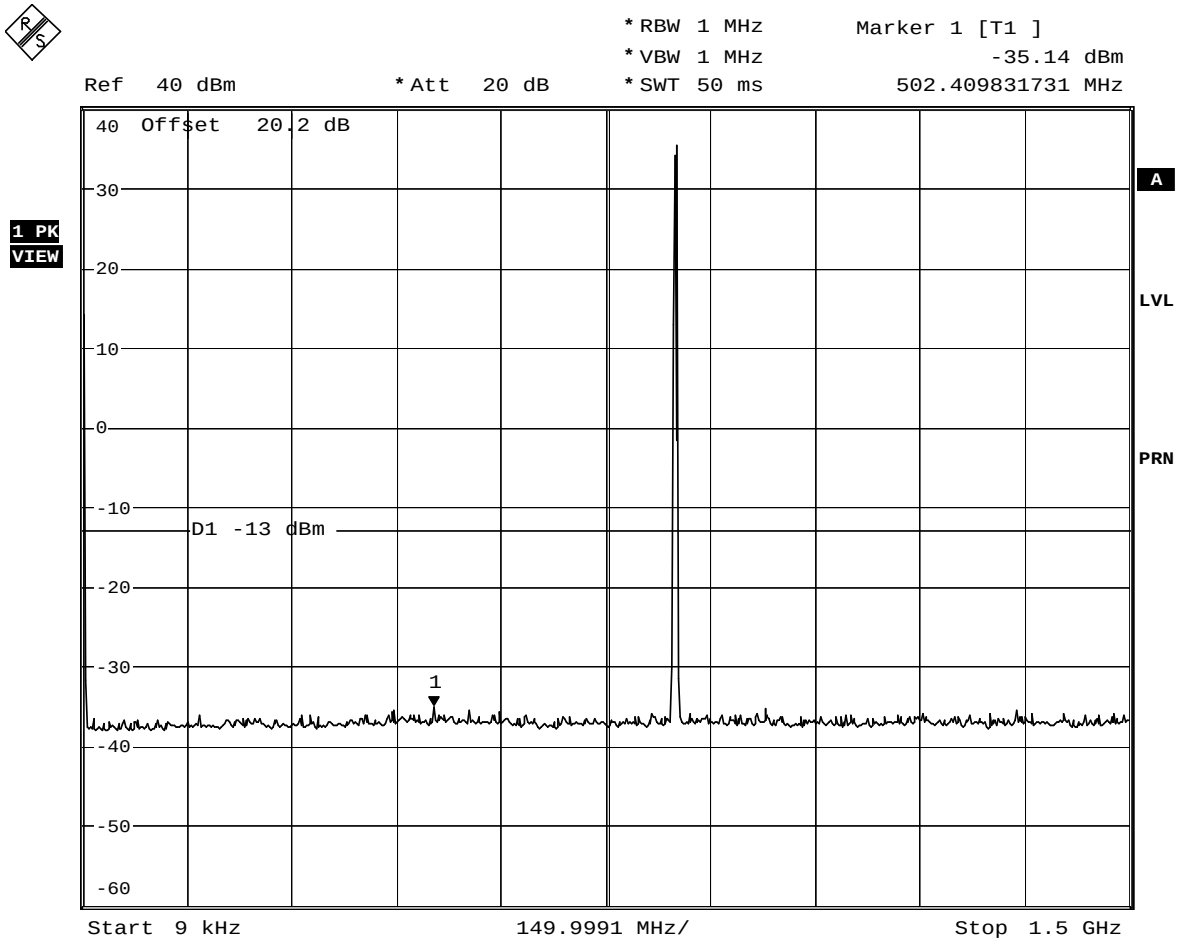
2.7.6 **Test Results** - continued



Serial Number:001018-00-006341-3
Spurious Emissions (1.5GHz – 9GHz)
Channel 189 (836.4MHz) - Maximum Power - EDGE 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

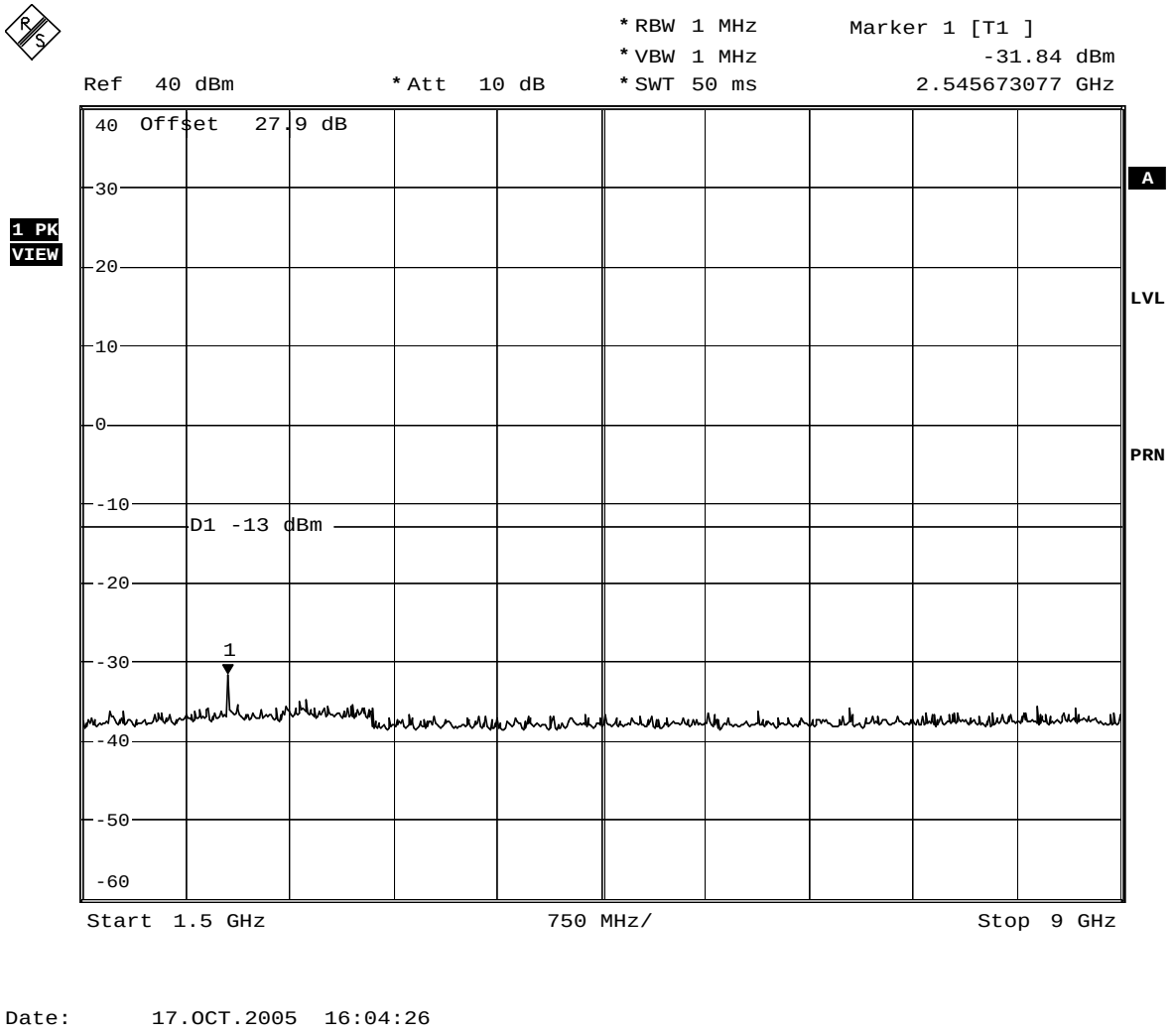


Date: 17.OCT.2005 15:58:34

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 251 (848.8MHz) - Maximum Power - EDGE 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

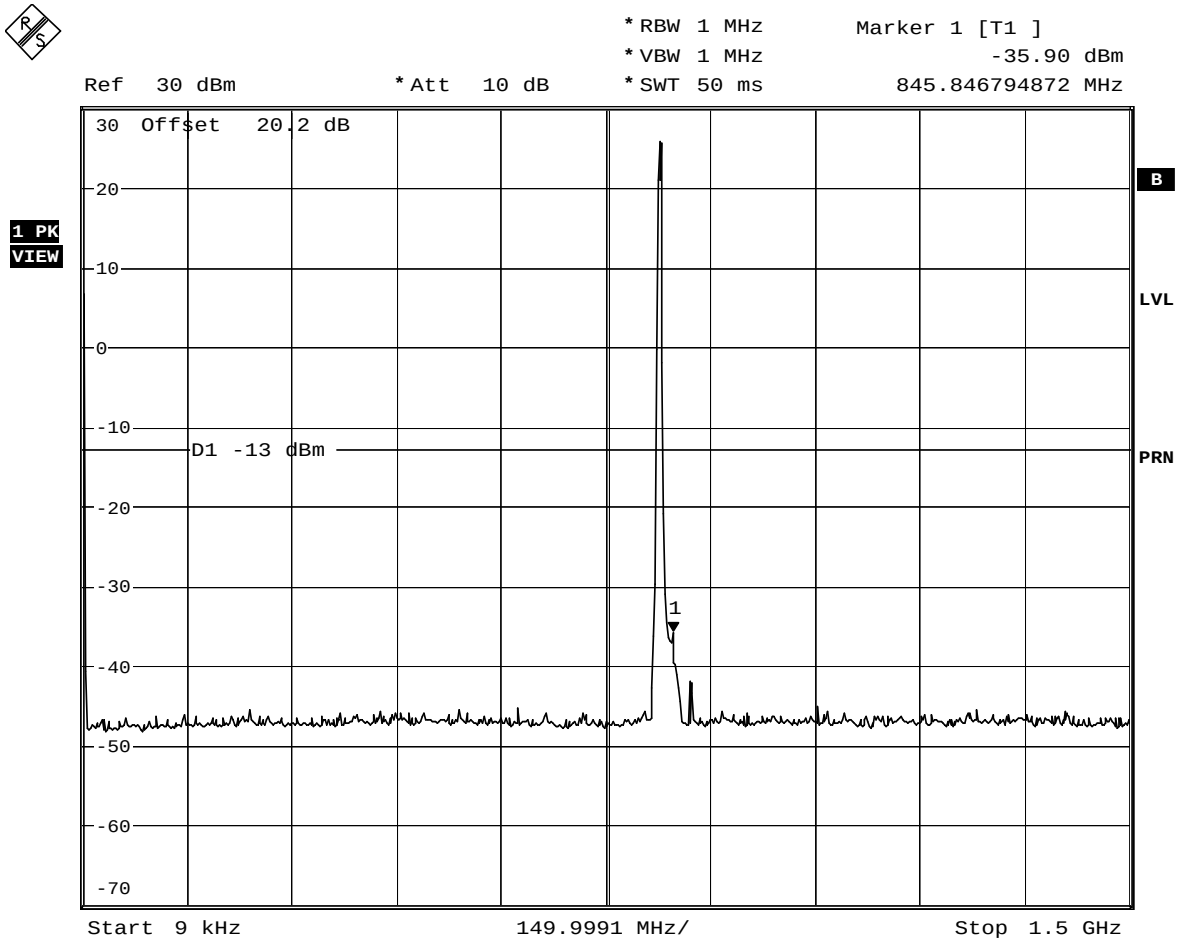
2.7.6 **Test Results** - continued



Serial Number: 001018-00-006341-3
Spurious Emissions (1.5GHz – 9GHz)
Channel 251 (848.8MHz) - Maximum Power - EDGE 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

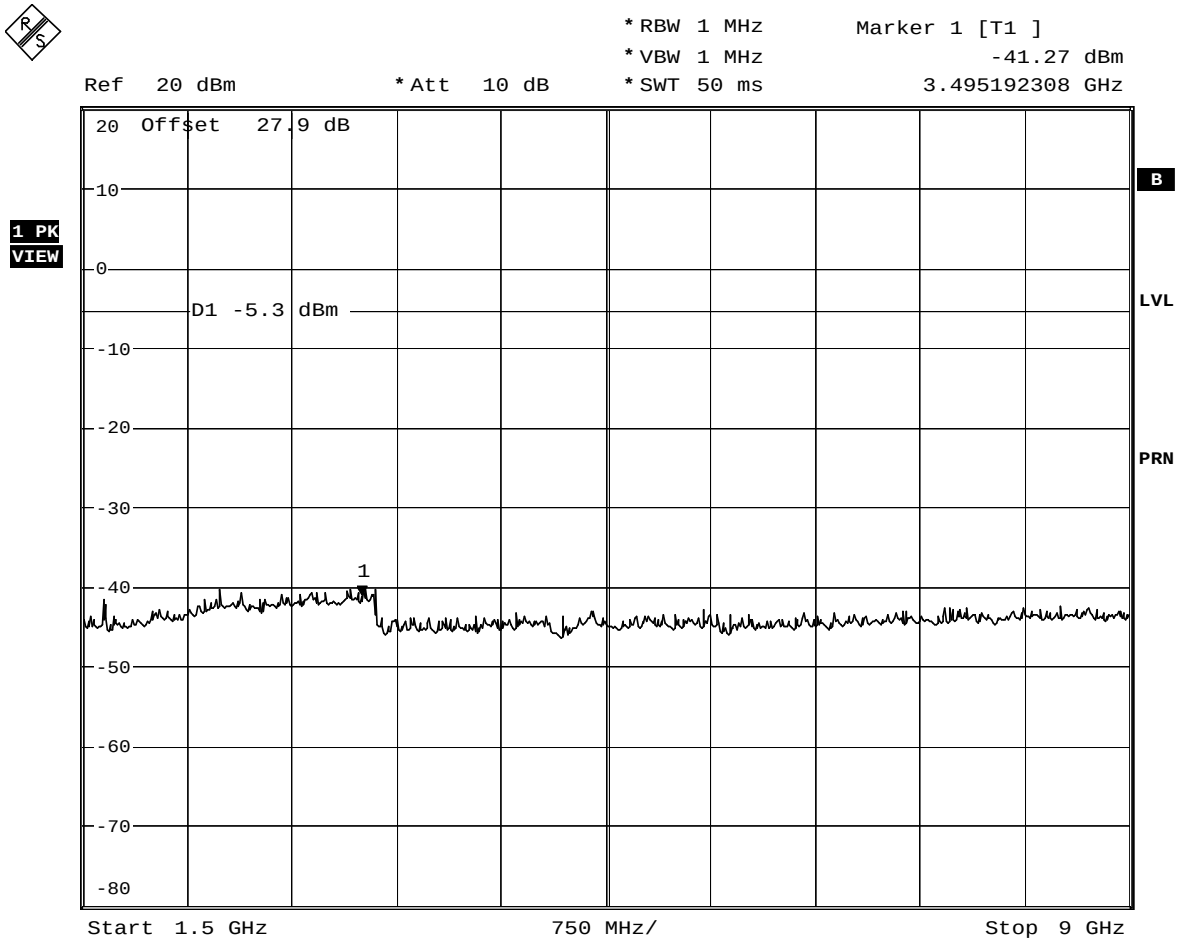


Date: 13.OCT.2005 13:25:17

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 4132 (826.4MHz) - Maximum Power - UMTS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

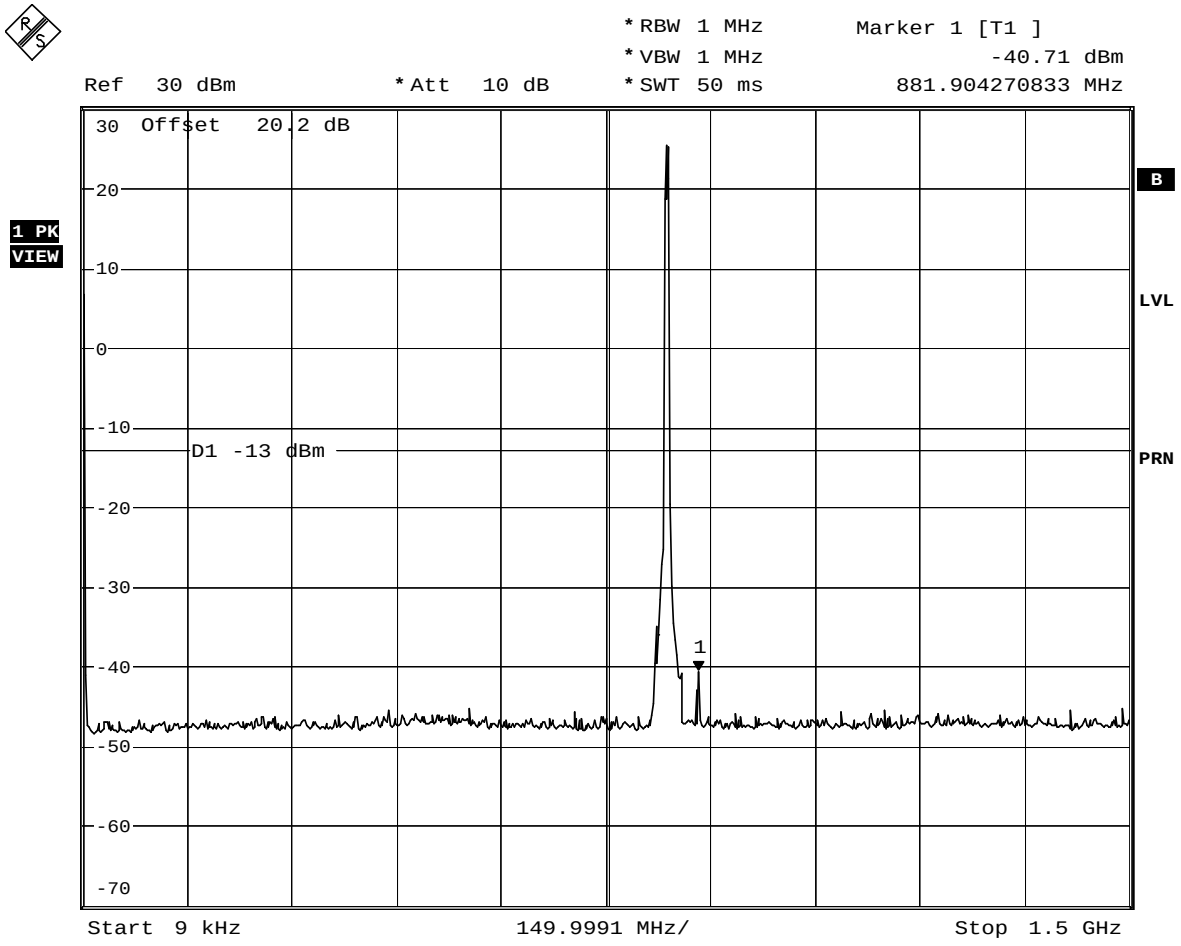


Date: 13.OCT.2005 13:40:13

Serial Number: 001018-00-006341-3
Spurious Emissions (1.5GHz – 9GHz)
Channel 4132 (826.4MHz) - Maximum Power - UMTS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

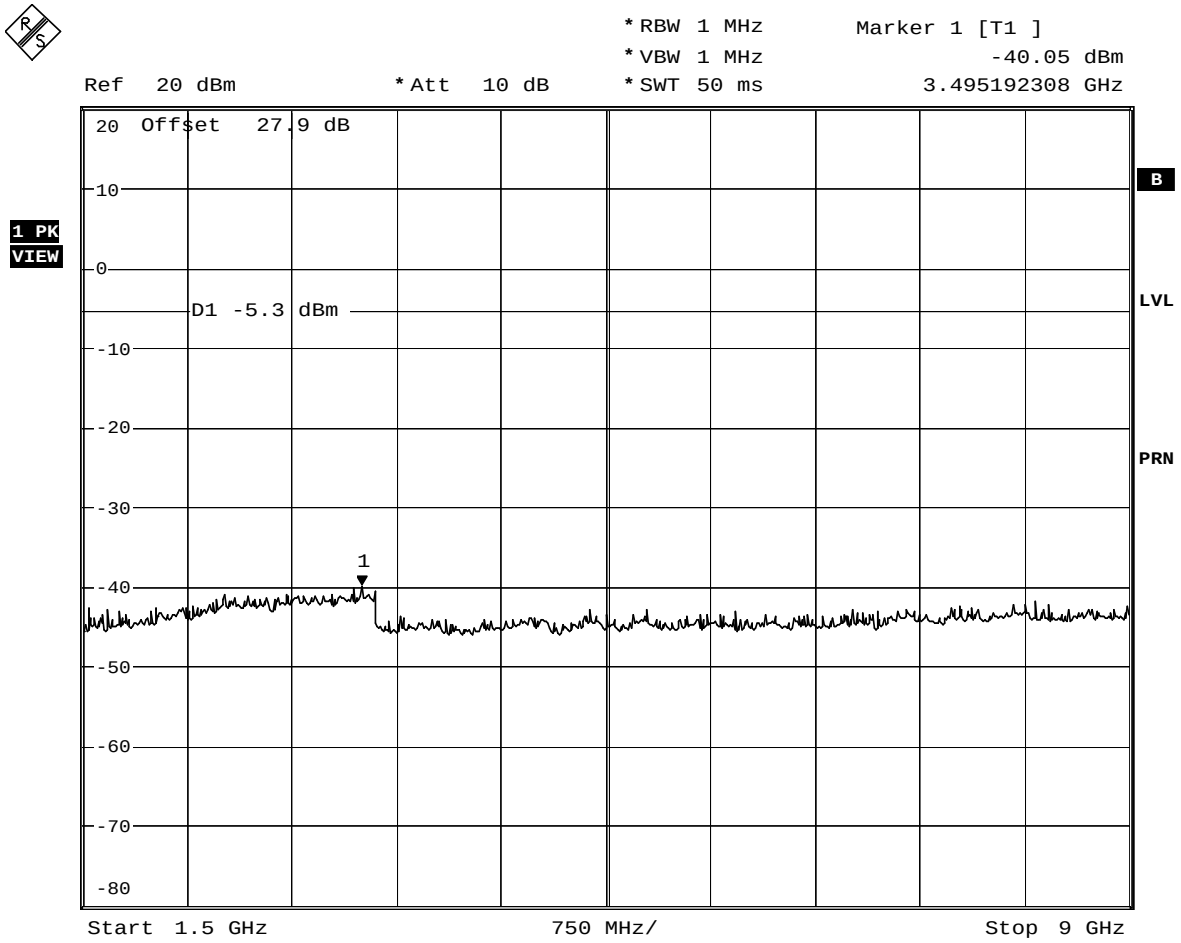


Date: 13.OCT.2005 13:26:59

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 4183 (836.6MHz) - Maximum Power - UMTS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

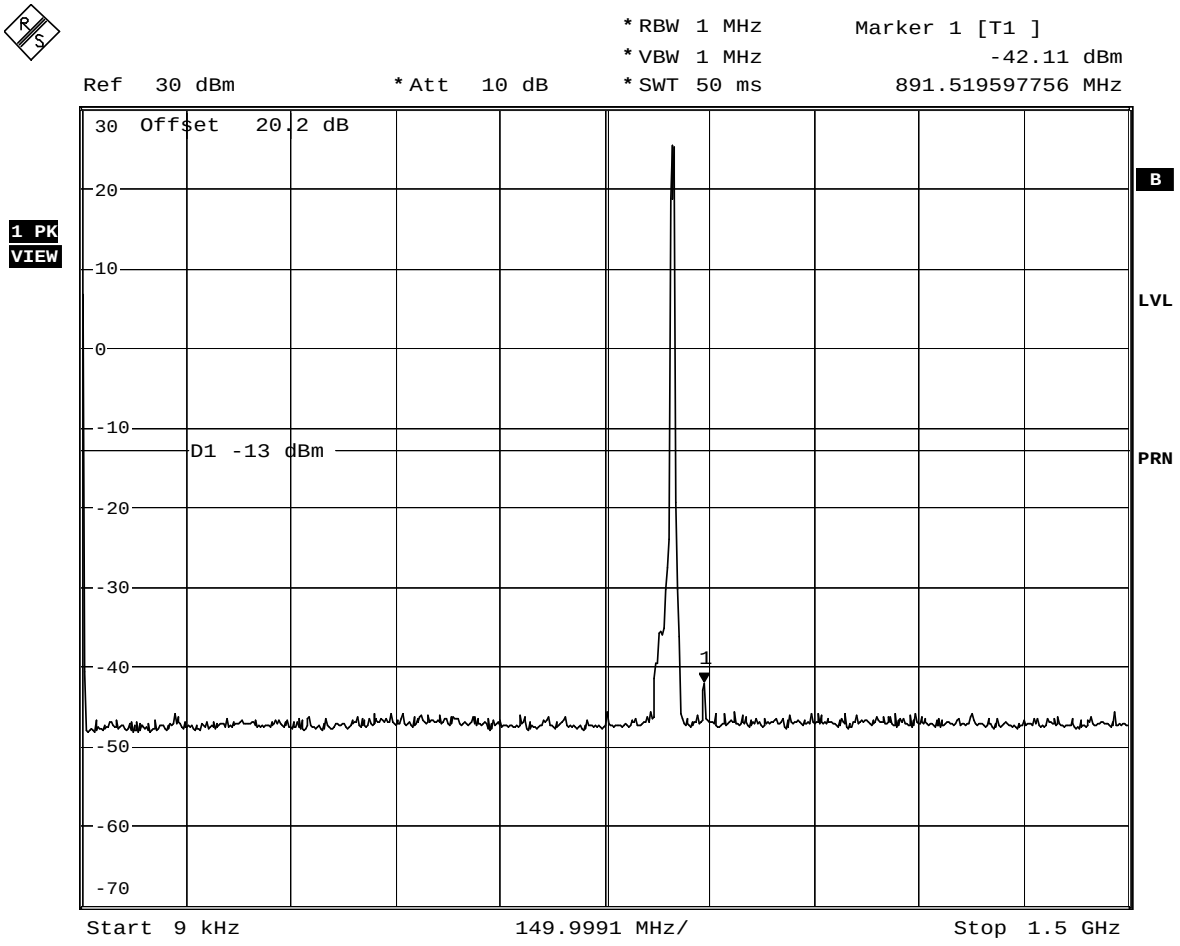


Date: 13.OCT.2005 13:39:23

Serial Number: 001018-00-006341-3
Spurious Emissions (1.5GHz - 9GHz)
Channel 4183 (836.6MHz) - Maximum Power - UMTS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

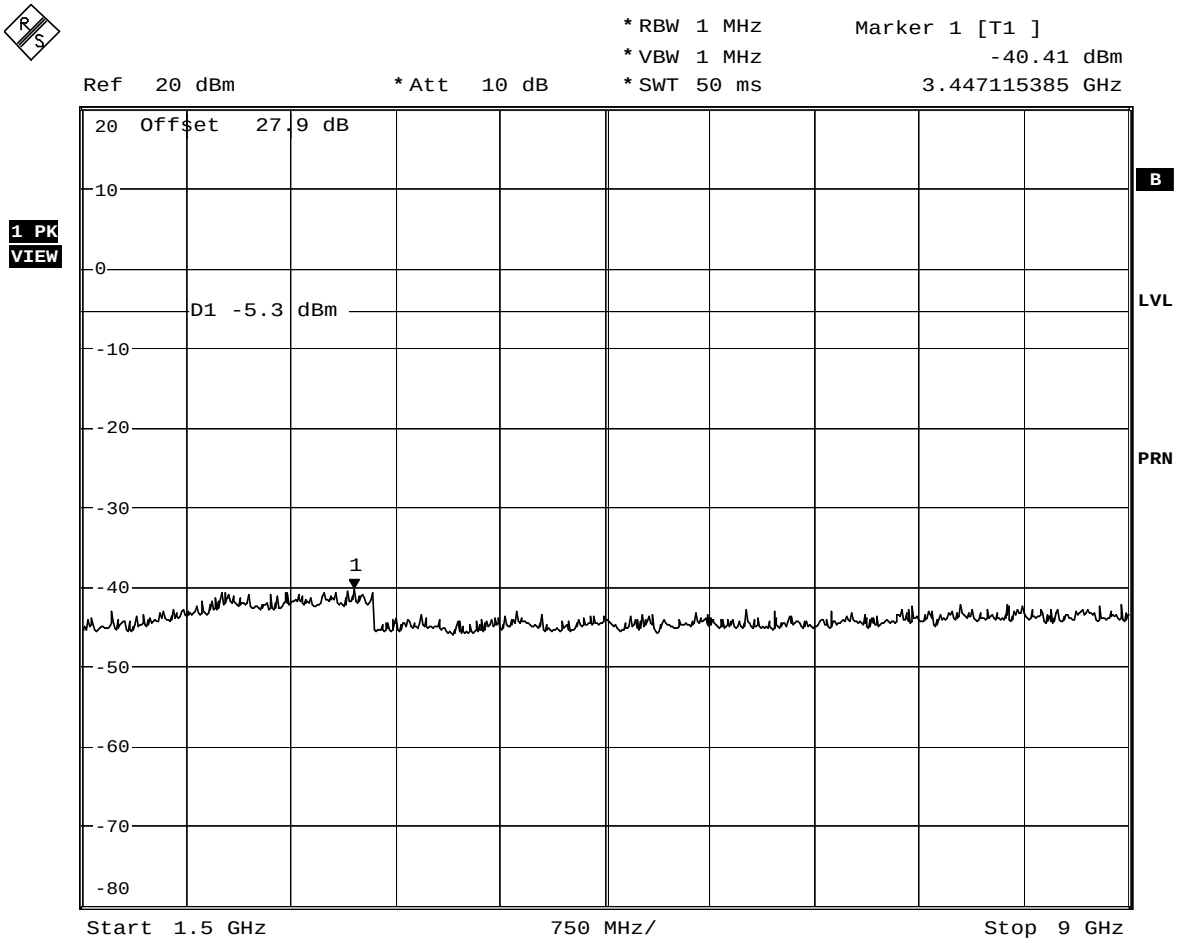


Date: 13.OCT.2005 13:30:29

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 4233 (846.6MHz) - Maximum Power - UMTS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

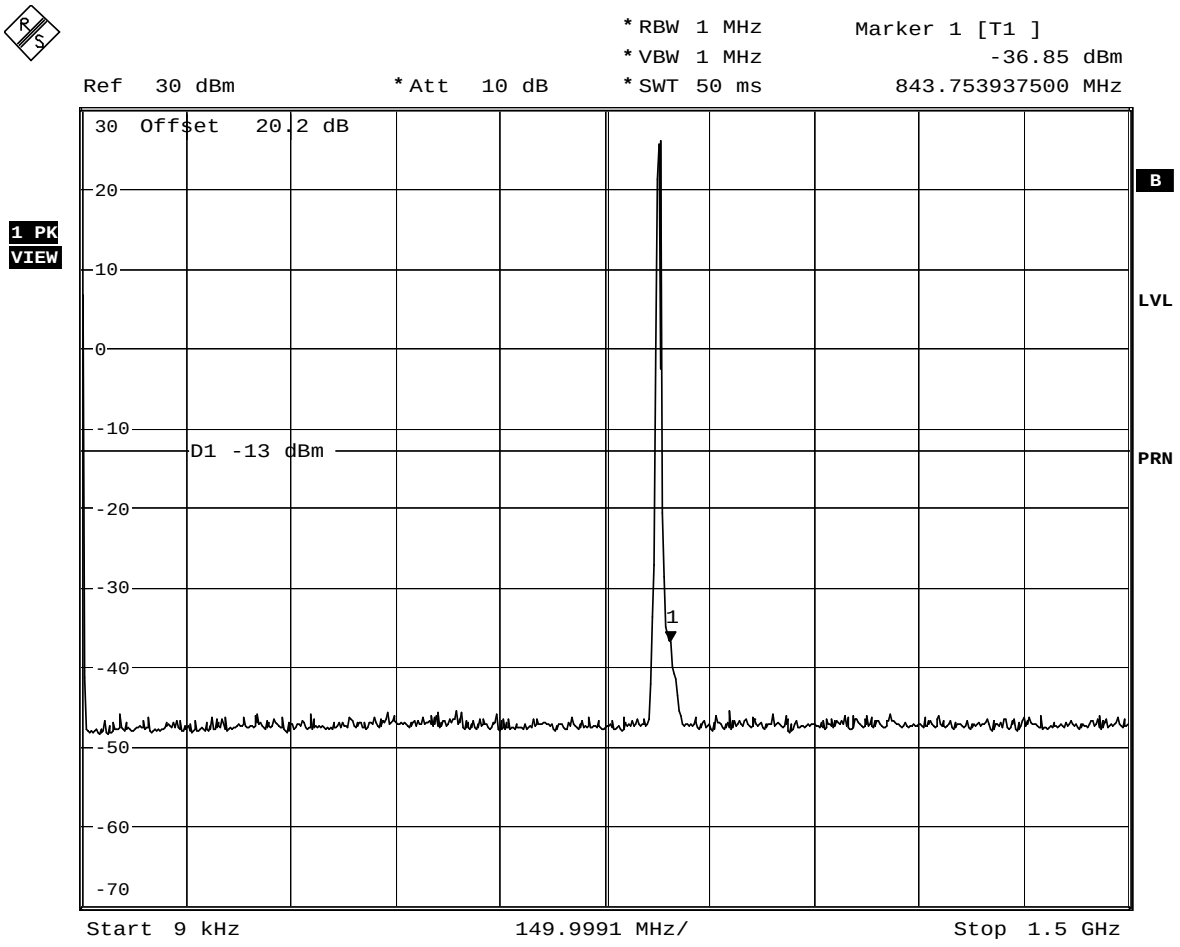


Date: 13.OCT.2005 13:38:32

Serial Number: 001018-00-006341-3
Spurious Emissions (1.5GHz – 9GHz)
Channel 4233 (846.6MHz) - Maximum Power - UMTS 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

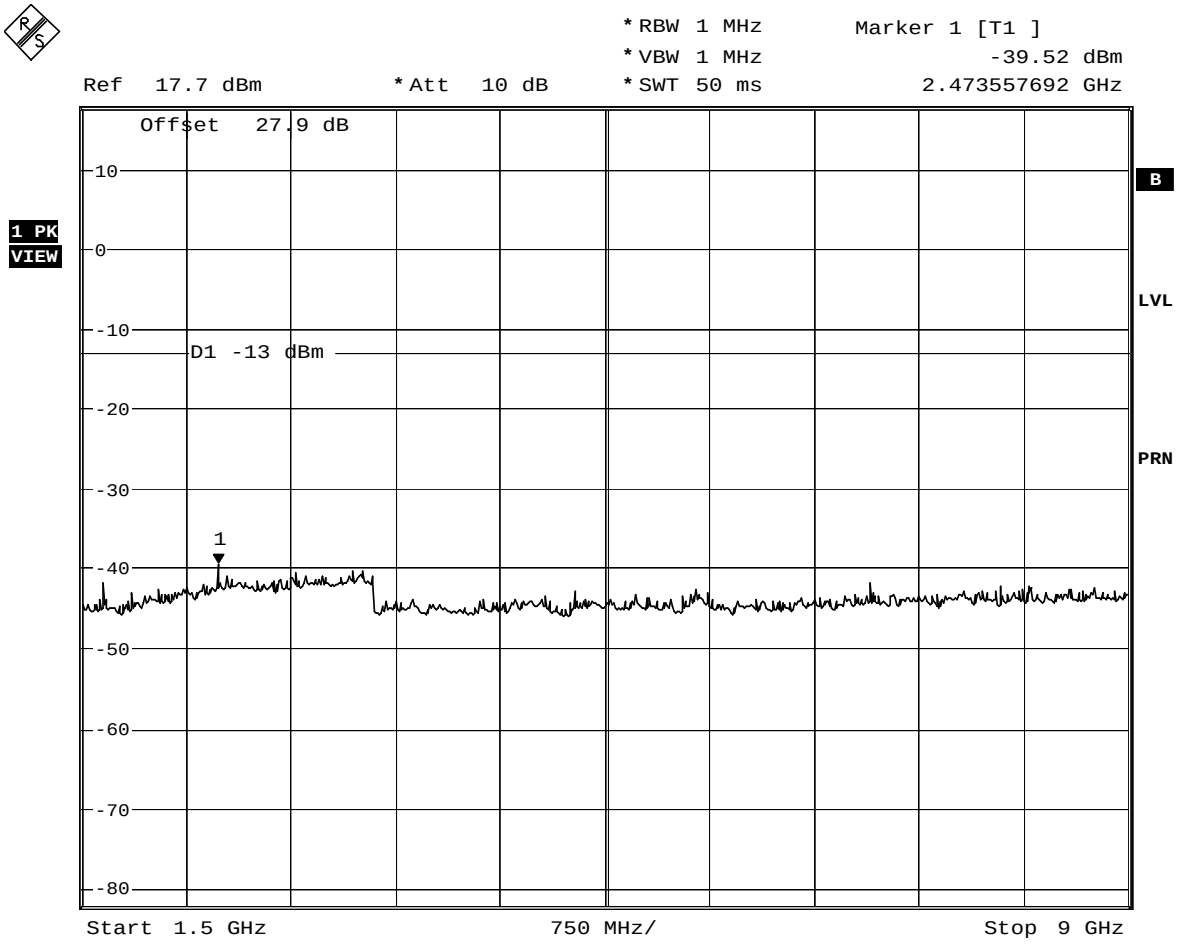


Date: 12.OCT.2005 12:00:17

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 4132 (826.4MHz) - Maximum Power - HSDPA 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

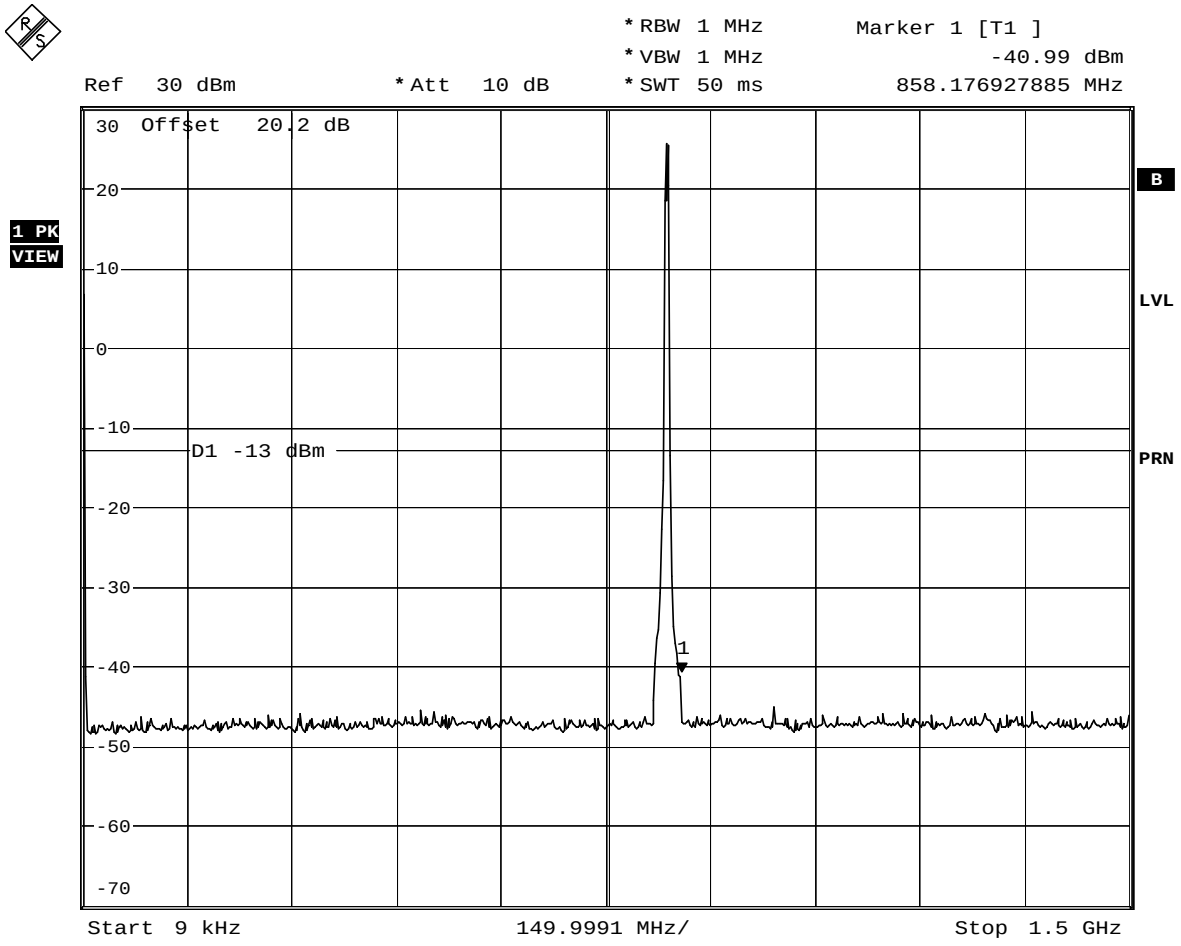


Date: 12.OCT.2005 11:48:57

Serial Number; 001018-00-006341-3
Spurious Emissions (1.5GHz – 9GHz)
Channel 4132 (826.4MHz) - Maximum Power - HSDPA 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

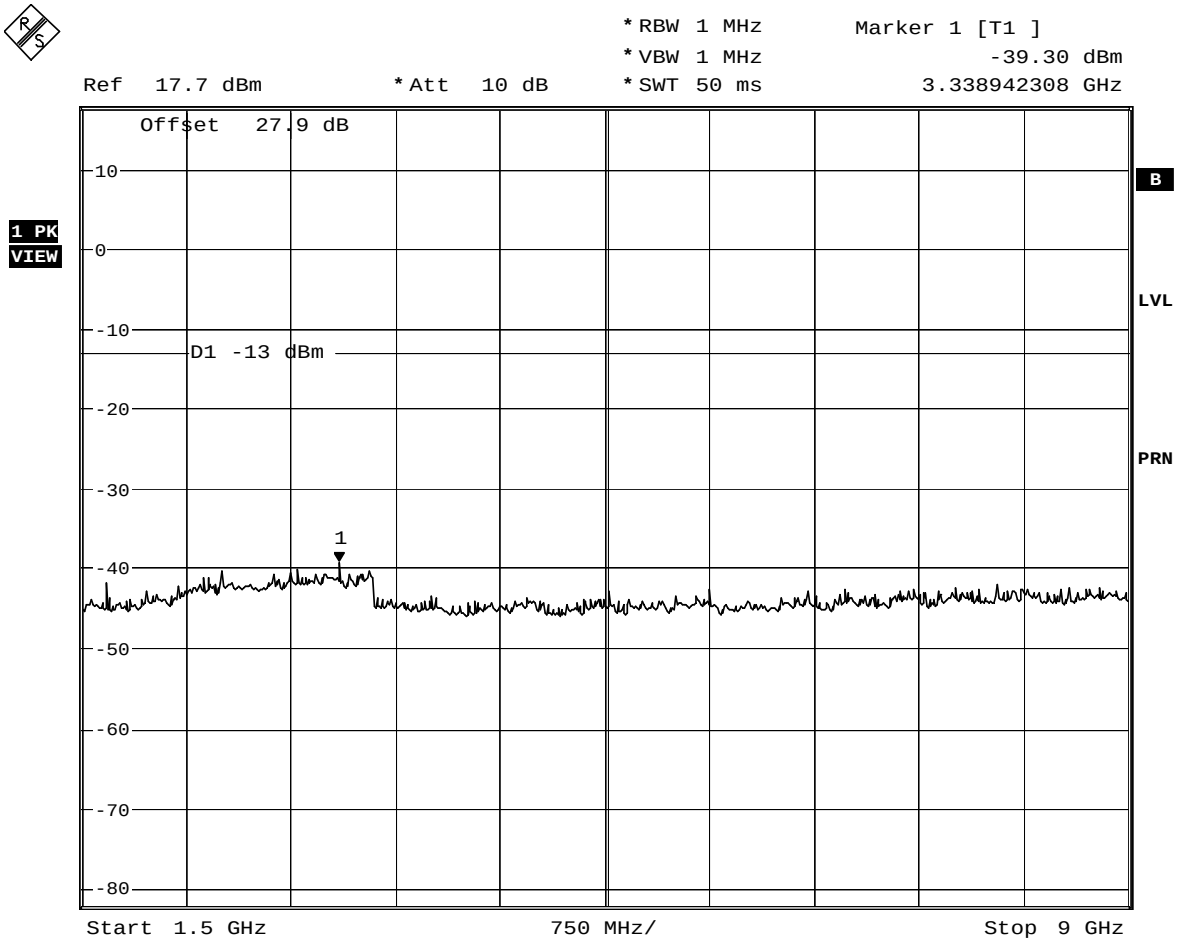


Date: 12.OCT.2005 11:58:47

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 4183 (836.6MHz) - Maximum Power - HSDPA 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

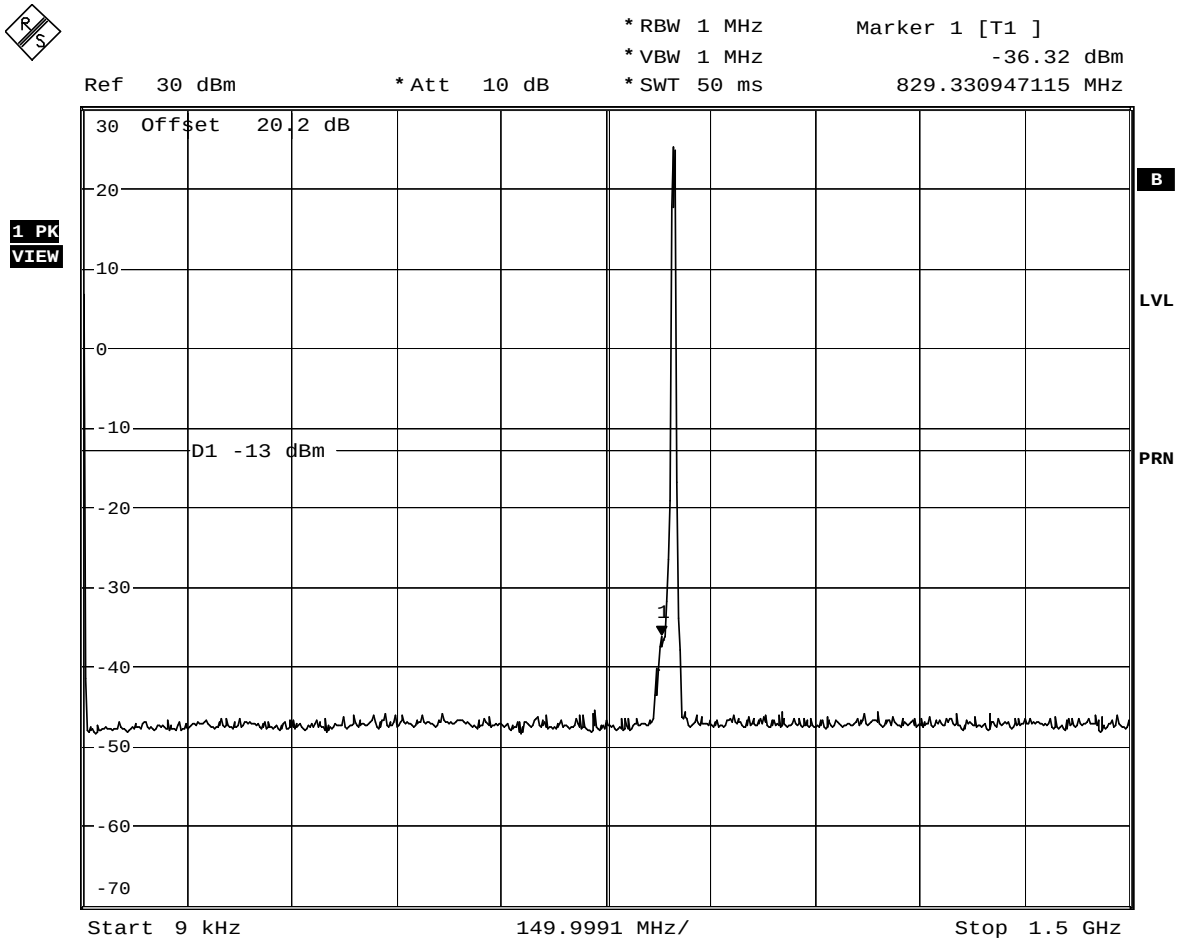


Date: 12.OCT.2005 11:51:27

Serial Number: 001018-00-006341-3
Spurious Emissions (1.5GHz - 9GHz)
Channel 4183 (836.6MHz) - Maximum Power - HSDPA 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued

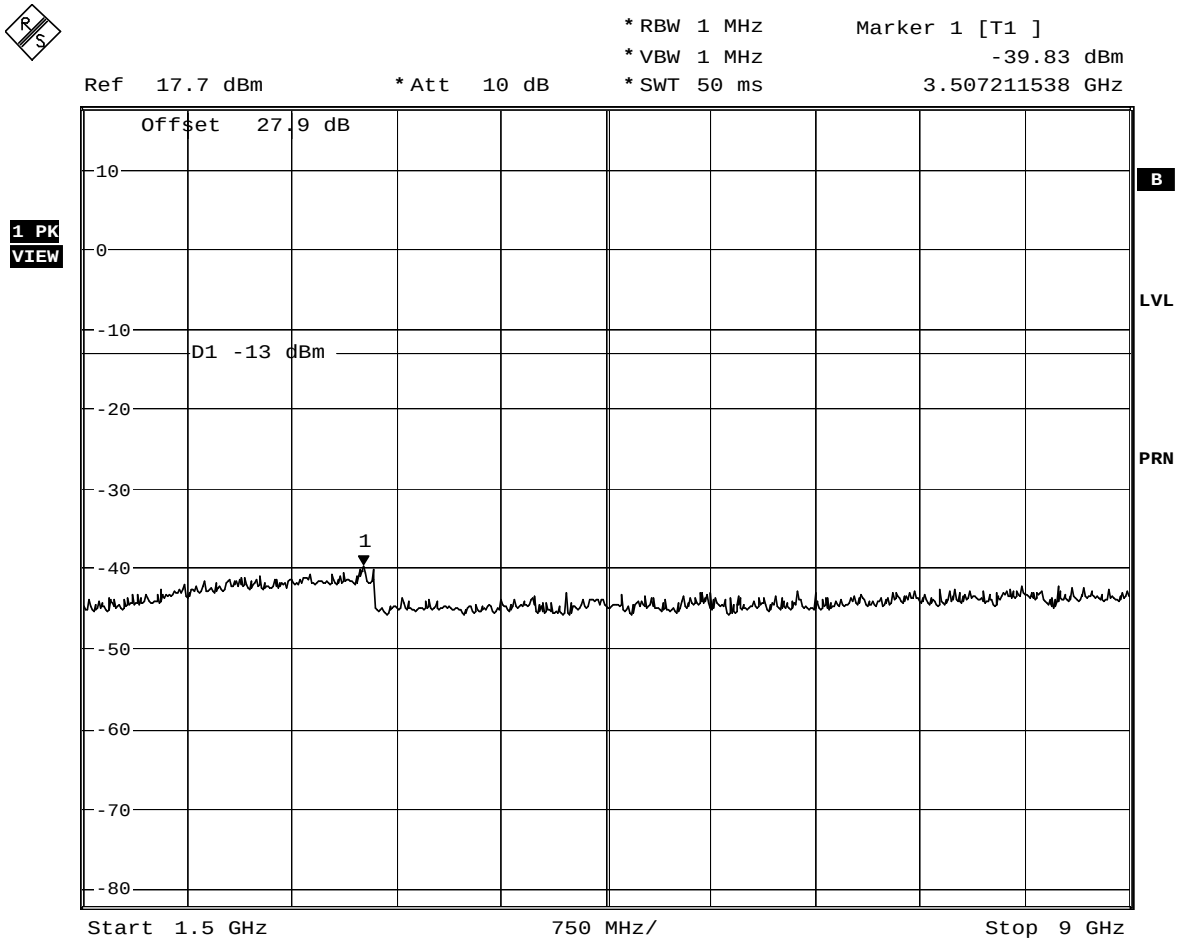


Date: 12.OCT.2005 11:57:33

Serial Number: 001018-00-006341-3
Spurious Emissions (9kHz – 1.5GHz)
Channel 4233 (846.6MHz) - Maximum Power - HSDPA 850 Mode
3.3 V SUPPLY

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.6 **Test Results** - continued



Date: 12.OCT.2005 11:53:17

Serial Number: 001018-00-006341-3
Spurious Emissions (1.5GHz – 9GHz)
Channel 4233 (846.6MHz) - Maximum Power - HSDPA 850 Mode
3.3 V SUPPLY

2.8 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.8.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 2.1055, 22.355 and Industry Canada RSS-132, 6.3

2.8.2 Equipment Under Test

U730

2.8.3 Date of Test

19th October 2005 (GPRS, EDGE, UMTS and HSDPA)

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

The EUT was set to transmit on maximum power with timeslots 2 and 3 active. A Digital Communication Analyser, (CMU200), was used to measure the frequency error. The maximum result was taken over 200 bursts. The temperature was adjusted between –30ºC and +50ºC in 10º steps as per 2.1055.

Measurements were conducted with the EUT in GPRS, EDGE, UMTS and HSDPA modes of operation.

2.8 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.8.6 Test Results

Temperature Interval ºC	Test Frequency MHz	Deviation Hz	Limit kHz
-30	836.6	-29	±2.5ppm or ±2.091
-20	836.6	+20	±2.5ppm or ±2.091
-10	836.6	+18	±2.5ppm or ±2.091
0	836.6	+14	±2.5ppm or ±2.091
+10	836.6	+15	±2.5ppm or ±2.091
+20	836.6	-8	±2.5ppm or ±2.091
+30	836.6	+22	±2.5ppm or ±2.091
+40	836.6	+23	±2.5ppm or ±2.091
+50	836.6	-18	±2.5ppm or ±2.091

Serial Number: 001018-00-0363441
3.3V SUPPLY – GPRS 850 Mode

Temperature Interval ºC	Test Frequency MHz	Deviation Hz	Limit kHz
-30	836.6	-45	±2.5ppm or ±2.091
-20	836.6	-23	±2.5ppm or ±2.091
-10	836.6	+28	±2.5ppm or ±2.091
0	836.6	+37	±2.5ppm or ±2.091
+10	836.6	+38	±2.5ppm or ±2.091
+20	836.6	+16	±2.5ppm or ±2.091
+30	836.6	+33	±2.5ppm or ±2.091
+40	836.6	+40	±2.5ppm or ±2.091
+50	836.6	-36	±2.5ppm or ±2.091

Serial Number: 001018-00-0363441
3.3V SUPPLY – EDGE 850 Mode

Temperature Interval ºC	Test Frequency MHz	Deviation Hz	Limit kHz
-30	836.6	+28	±2.5ppm or ±2.091
-20	836.6	-16	±2.5ppm or ±2.091
-10	836.6	-18	±2.5ppm or ±2.091
0	836.6	-23	±2.5ppm or ±2.091
+10	836.6	+33	±2.5ppm or ±2.091
+20	836.6	-17	±2.5ppm or ±2.091
+30	836.6	-18	±2.5ppm or ±2.091
+40	836.6	-18	±2.5ppm or ±2.091
+50	836.6	-17	±2.5ppm or ±2.091

Serial Number: 001018-00-0363441
3.3V SUPPLY – UMTS 850 Mode

2.8 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.8.6 **Test Results** - continued

Temperature Interval ºC	Test Frequency MHz	Deviation Hz	Limit kHz
-30	836.6	-35	±2.5ppm or ±2.091
-20	836.6	-24	±2.5ppm or ±2.091
-10	836.6	-19	±2.5ppm or ±2.091
0	836.6	-22	±2.5ppm or ±2.091
+10	836.6	-23	±2.5ppm or ±2.091
+20	836.6	-23	±2.5ppm or ±2.091
+30	836.6	-19	±2.5ppm or ±2.091
+40	836.6	-19	±2.5ppm or ±2.091
+50	836.6	-18	±2.5ppm or ±2.091

Serial Number: 001018-00-0363441
3.3V SUPPLY – HSDPA 850 Mode

Remarks

EUT complies with CFR 47 Part 22.355 and Industry Canada RSS-132, 6.3. The frequency stability of the EUT is sufficient to keep it within the authorised frequency blocks at any temperature interval across the measured range.

2.9 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.9.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 2.1055, 22.355

2.9.2 Equipment Under Test

U730

2.9.3 Date of Test

17th October 2005 (GPRS, EDGE, UMTS and HSDPA)

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

GPRS
The EUT was set to transmit on maximum power. A Digital Communication Analyser, (CMU200), was used to measure the frequency error. The maximum result was taken over 200 bursts. Measurements were conducted with the EUT in GPRS mode of operation.
The voltage to the EUT was varied as shown in the table of results.

EDGE
The EUT was set to transmit on maximum power. A Digital Communication Analyser, (CMU200), was used to measure the frequency error. The maximum result was taken over 200 bursts. Measurements were conducted with the EUT in EDGE mode of operation.
The voltage to the EUT was varied as shown in the table of results.

UMTS
The EUT was set to transmit on maximum power. A Digital Communication Analyser, (CMU200), was used to measure the frequency error. The maximum result was taken over 200 bursts. Measurements were conducted with the EUT in QPSK mode of operation.
The voltage to the EUT was varied as shown in the table of results at a temperature of 18ºC.

HSDPA
The EUT was set to transmit on maximum power. A Digital Communication Analyser, (CMU200), was used to measure the frequency error. The maximum result was taken over 200 bursts. Measurements were conducted with the EUT in HSDPA mode of operation.
The voltage to the EUT was varied as shown in the table of results.

2.9 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.9.6 Test Results

DC Voltage V	Test Frequency MHz	Deviation Hz	Deviation Limit kHz
3.795	836.4	+27	±2.5ppm or ±2.091
3.300	836.4	-9	±2.5ppm or ±2.091
2.805	836.4	-9	±2.5ppm or ±2.091

Serial Number: 001018-00-006341-3
3.3V SUPPLY - GPRS 850 Mode

DC Voltage V	Test Frequency MHz	Deviation Hz	Deviation Limit kHz
3.795	836.6	-40	±2.5ppm or ±2.091
3.300	836.6	-44	±2.5ppm or ±2.091
2.805	836.6	-36	±2.5ppm or ±2.091

Serial Number: 001018-00-006341-3
3.3V SUPPLY - EDGE 850 Mode

DC Voltage V	Test Frequency MHz	Deviation Hz	Deviation Limit kHz
3.795	836.6	-56	±2.5ppm or ±2.091
3.300	836.6	-40	±2.5ppm or ±2.091
2.805	836.6	-43	±2.5ppm or ±2.091

Serial Number: 001018-00-006341-3
3.3V SUPPLY - UMTS 850 Mode

DC Voltage V	Test Frequency MHz	Deviation Hz	Deviation Limit kHz
3.795	836.6	-22	±2.5ppm or ±2.091
3.300	836.6	-23	±2.5ppm or ±2.091
2.805	836.6	-20	±2.5ppm or ±2.091

Serial Number: 001018-00-006341-3
3.3V SUPPLY - HSDPA 850 Mode

Remarks

EUT complies with CFR 47 Part 22.355. The EUT does not exceed ±2.092kHz at the measured frequency either at nominal or voltage variation.

2.10 MAXIMUM PEAK OUTPUT POWER

2.10.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 22.913 (a), 2.1046 and Industry Canada RSS-132, 4.4

2.10.2 Equipment Under Test

U730

2.10.3 Date of Test

21st 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

Using a spectrum analyser and attenuator(s), the output power of the EUT was measured at the antenna terminals.

The EUT was set to transmit on maximum power with timeslots 2 and 3 active for GPRS, EDGE., UMTS and HSDPA.

The spectrum analyser RBW and VBW were set to 1MHz for GRPS and EDGE modes and 3MHz for UMTS and HSDPA Modes. The path loss was measured and entered as a reference level offset.

2.10 MAXIMUM PEAK OUTPUT POWER (CONDUCTED)

2.10.6 Test Results

Maximum Power -GPRS
Serial Number: 001018-00-036344-1

Frequency MHz	Result dBm	Result mW
824.2	31.90	1549
836.6	31.72	1486
848.8	31.76	1499

Maximum Power - EDGE
Serial Number: 001018-00-036344-1

Frequency MHz	Result dBm	Result mW
824.2	30.17	1175
836.6	30.00	1000
848.8	29.99	998

Maximum Power - UMTS
Serial Number: 001018-00-036344-1

Frequency MHz	Result dBm	Result mW
824.2	22.38	173
836.6	22.15	164
848.8	22.37	173

Maximum Power - HSDPA
Serial Number: 001018-00-036344-1

Frequency MHz	Result dBm	Result mW
824.2	22.51	178
836.6	22.54	179
848.8	22.36	172

Limit	<7W or <+38.45dBm

Remarks

EUT complies with CFR 47 2.1046 and 24.132(b) and Industry Canada RSS-133, 6.2. The EUT does not exceed 2W or +33dBm at the measured frequencies.

2.11 MAXIMUM PEAK OUTPUT POWER (RADIATED)

2.11.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.232 and Industry Canada RSS-133, 6.2

2.11.2 Equipment Under Test

U730

2.11.3 Date of Test

8th October 2005 (HSDPA)
12th October 2005 (GPRS, EDGE)
25th October 2005 (UMTS)

2.11.4 Test Equipment Used

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

2.11.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

The EUT has an Integral Antenna, therefore the Maximum Peak Output Power (EIRP) was made using the Radiated method.

The Spectrum Analyser was tuned to the test frequency. The device Output Power setting was controlled as specified in the Product Information, Section 1.5 of this document. The device was then rotated through 360 degrees, and the measuring antenna height searched (1m – 4m) until the highest power level was observed in both horizontal and vertical polarisation. The device was then replaced with a substitution antenna, whose input signal to the antenna was adjusted until the received level matched that of the previously detected emission.

2.11 MAXIMUM PEAK OUTPUT POWER (RADIATED)

2.11.6 Test Results

The EUT met the requirements of FCC Part 24, Section 24.232, and Industry Canada RSS-133, 6.2 Power and Antenna Height Limits.

Measurements were made with the EUT in PCS 1900 Mode
Serial Number: 001018-00-0006156-5

Frequency MHz	Result EIRP dBm	EIRP Limit dBm	Result EIRP mW	EIRP Limit mW
1850.2	27.12	33.0	515	1995
1880.0	27.11	33.0	514	1995
1909.8	28.14	33.0	652	1995

Measurements were made with the EUT in EDGE 1900 Mode
Serial Number: 001018-00-0006156-5

Frequency MHz	Result EIRP dBm	EIRP Limit dBm	Result EIRP mW	EIRP Limit mW
1850.2	27.12	33.0	515	1995
1880.0	27.48	33.0	560	1995
1909.7	28.59	33.0	723	1995

Measurements were made with the EUT in UMTS 1900 Mode
Serial Number: 001018-00-0006156-5

Frequency MHz	Result EIRP dBm	EIRP Limit dBm	Result EIRP mW	EIRP Limit mW
1853.17	20.43	33.0	110	1995
1880.70	20.32	33.0	108	1995
1906.52	22.70	33.0	186	1995

Measurements were made with the EUT in HSDPA 1900 Mode
Serial Number: 001018-00-006341-3

Frequency MHz	Result EIRP dBm	EIRP Limit dBm	Result EIRP mW	EIRP Limit mW
1852.5	22.8	33.0	191	1995
1880.0	22.6	33.0	182	1995
1909.7	24.2	33.0	263	1995

2.12 MAXIMUM PEAK OUTPUT POWER (CONDUCTED)

2.12.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.232, 2.1046 and Industry Canada RSS-133, 6.2

2.12.2 Equipment Under Test

U730

2.12.3 Date of Test

21st October 2005

2.12.4 Test Equipment Used

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

2.12.5 Test Procedure

Using a spectrum analyser and attenuator(s), the output power of the EUT was measured at the antenna terminals.

The EUT was set to transmit on maximum power with timeslots 2 and 3 active for GPRS, EDGE., UMTS and HSDPA.

The spectrum analyser RBW and VBW were set to 1MHz for GRPS and EDGE modes and 3MHz for UMTS and HSDPA Modes. The path loss was measured and entered as a reference level offset.

2.12 MAXIMUM PEAK OUTPUT POWER (CONDUCTED)

2.12.6 Test Results

Maximum Power -GPRS
Serial Number: 001018-00-036344-1

Frequency MHz	Result dBm	Result mW
1850.2	28.73	746
1880.0	28.99	792
1909.8	28.99	792

Maximum Power - EDGE
Serial Number: 001018-00-036344-1

Frequency MHz	Result dBm	Result mW
1850.2	28.88	773
1880.0	29.17	826
1909.8	29.14	820

Maximum Power - UMTS
Serial Number: 001018-00-036344-1

Frequency MHz	Result dBm	Result mW
1824.4	22.79	190
1880.0	22.90	195
1907.6	22.50	178

Maximum Power - HSDPA
Serial Number: 001018-00-036344-1

Frequency MHz	Result dBm	Result mW
1824.4	22.92	196
1880.0	22.87	194
1907.6	23.12	205

Limit	<7W or <+38.45dBm

Remarks

EUT complies with CFR 47 2.1046 and 24.132(b) and Industry Canada RSS-133, 6.2. The EUT does not exceed 2W or +33dBm at the measured frequencies.

2.13 MODULATION CHARACTERISTICS

2.13.1 Specification Reference

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

2.13.2 Equipment Under Test

U730

2.11.3 Date of Test

14th October 2005 (GPRS)
17th October 2005 (EDGE)

2.13.4 Test Equipment Used

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

2.13.5 Test Procedure

Two views are shown for GPRS and EDGE modes of operation. One view shows the active slot(s) over a complete screen. The other view shows the active slot(s) over a complete frame.

2.13 MODULATION CHARACTERISTICS

2.13.5 Modulation Description

Modulation format for GMSK

Modulating symbol rate
The modulating symbol rate is 1/T = 1 625/6 ksymb/s (i.e. approximately 270.833 ksymb/s), which corresponds to 1 625/6 kbit/s (i.e. 270.833 kbit/s). T is the symbol period.

Start and stop of the burst
Before the first bit of the bursts as defined in 3GPP TS 45.002 [3] enters the modulator, the modulator has an internal state as if a modulating bit stream consisting of consecutive ones (di = 1) had entered the differential encoder. Also after the last bit of the time slot, the modulator has an internal state as if a modulating bit stream consisting of consecutive ones (di = 1) had continued to enter the differential encoder. These bits are called dummy bits and define the start and the stop of the active and the useful part of the burst as illustrated in figure 1. Nothing is specified about the actual phase of the modulator output signal outside the useful part of the burst.

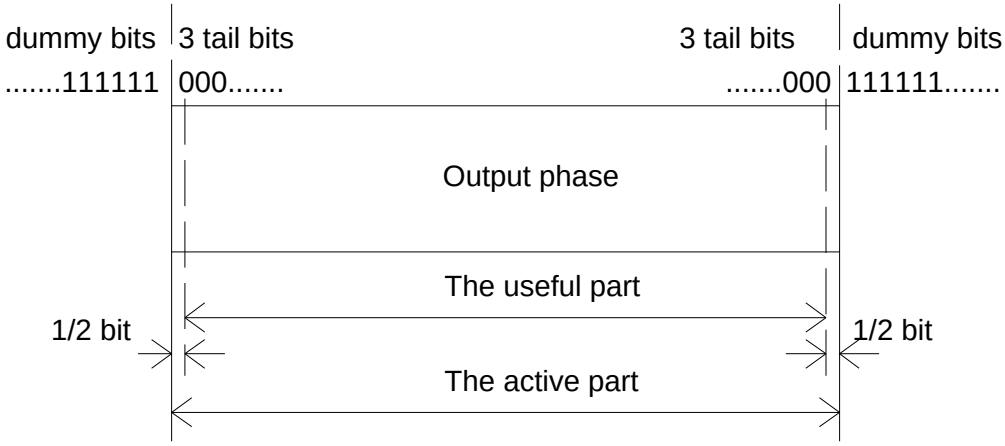


Figure 1: Relation between active part of burst, tail bits and dummy bits. For the normal burst the useful part lasts for 147 modulating bits

Differential encoding

Each data value $d_i = [0,1]$ is differentially encoded. The output of the differential encoder is:

$$\hat{d}_i = d_i \oplus d_{i-1} \qquad (d_i \in \{0,1\})$$

where $\oplus$ denotes modulo 2 addition.
The modulating data value α_i input to the modulator is:

$$\alpha_i = 1 - 2\hat{d}_i \qquad (\alpha_i \in \{-1,+1\})$$

2.13 MODULATION CHARACTERISTICS

2.13.5 Modulation Description - continued

Filtering

The modulating data values α_i as represented by Dirac pulses excite a linear filter with impulse response defined by:

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

where 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)*. This theoretical filter is associated with tolerances defined in 3GPP TS 45.005 [4].

Output phase

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 active part of the burst as shown in figure 1. This is also the start of the bit period of bit number 0 (the first tail bit) as defined in 3GPP TS 45.002 [2].

Modulation

The modulated RF carrier, except for start and stop of the TDMA burst may therefore be 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.

2.13 MODULATION CHARACTERISTICS

2.13.5 **Modulation Description** - continued

Modulation format for 8PSK

Modulating symbol rate

The modulating symbol rate is 1/T = 1 625/6 ksymb/s (i.e. approximately 270.833 ksymb/s), which corresponds to 3*1 625/6 kbit/s (i.e. 812.5 kbit/s). T is the symbol period.

Symbol mapping

The modulating bits are Gray mapped in groups of three to 8PSK symbols by the rule

$$s_i = e^{j2\pi l/8}$$

where *l* is given by table 1.

Table 1: Mapping between modulating bits and the 8PSK symbol parameter *l*.

Modulating bits d_{3i},, d_{3i+1}, d_{3i+2}	Symbol parameter *l*
(1,1,1)	0
(0,1,1)	1
(0,1,0)	2
(0,0,0)	3
(0,0,1)	4
(1,0,1)	5
(1,0,0)	6
(1,1,0)	7

This is illustrated in figure 2.

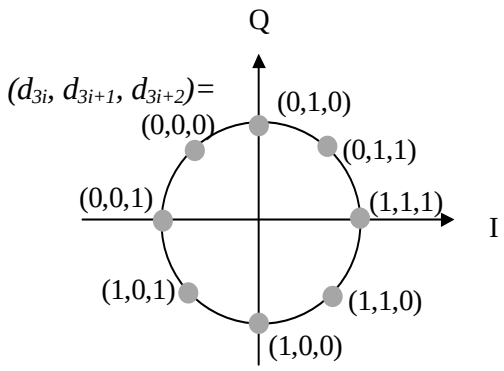


Figure 2: Symbol mapping of modulating bits into 8PSK symbols.

2.13 MODULATION CHARACTERISTICS

2.13.5 Modulation Description - continued

Start and stop of the burst

Before the first bit of the bursts as defined in 3GPP TS 45.002 [3] enters the modulator, the state of the modulator is undefined. Also after the last bit of the burst, the state of the modulator is undefined. The tail bits (see 3GPP TS 45.002) define the start and the stop of the active and the useful part of the burst as illustrated in figure 3. Nothing is specified about the actual phase of the modulator output signal outside the useful part of the burst.

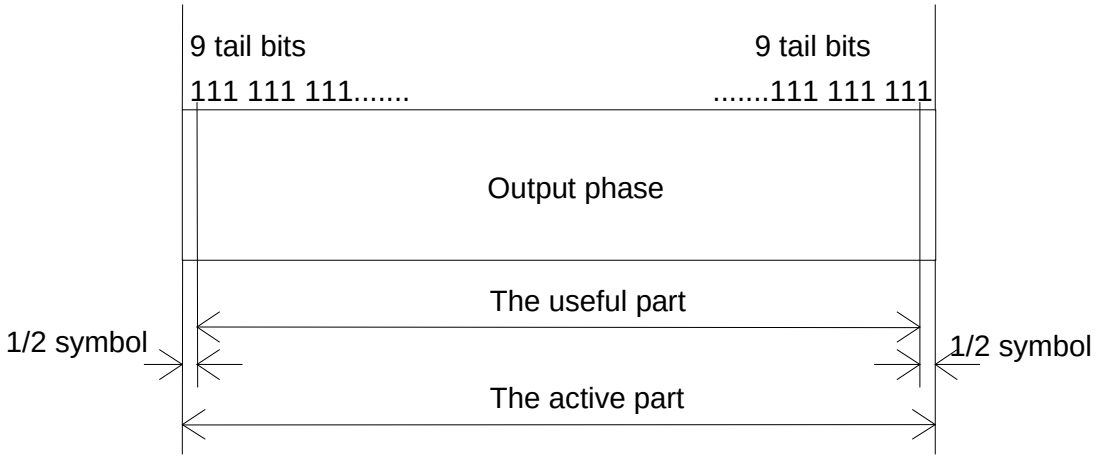


Figure 3: Relation between active part of burst and tail bits. For the normal burst the useful part lasts for 147 modulating symbols

Symbol rotation

The 8PSK symbols are continuously rotated with 3 /8 radians per symbol before pulse shaping. The rotated symbols are defined as

$$\hat{s}_i = s_i \cdot e^{ji3\pi/8}$$

2.13 MODULATION CHARACTERISTICS

2.13.5 Modulation Description - continued

Pulse shaping

The modulating 8PSK symbols $\hat{s}_i$ as represented by Dirac pulses excite a linear pulse shaping filter. This filter is a linearised GMSK pulse, i.e. the main component in a Laurant decomposition of the GMSK modulation. The impulse response is defined by:

$$c_0(t) = \begin{cases} \prod_{i=0}^{3} S(t+iT), \ for\ 0 \le t \le 5T \\ 0, \ else \end{cases}$$

where

$$S(t) = \begin{cases} \sin(\pi \int_0^t g(t')dt'), \ for\ 0 \le t \le 4T \\ \sin(\frac{\pi}{2} - \pi \int_0^{t-4T} g(t')dt'), \ for\ 4T < t \le 8T \\ 0, \ else \end{cases}$$

$$g(t) = \frac{1}{2T}\left(Q(2\pi \cdot 0.3 \frac{t-5T/2}{T\sqrt{\log_e(2)}}) - Q(2\pi \cdot 0.3 \frac{t-3T/2}{T\sqrt{\log_e(2)}}) \right)$$

and

$$Q(t) = \frac{1}{\sqrt{2\pi}} \int_t^{\infty} e^{-\frac{\tau^2}{2}} d\tau \, .$$

The base band signal is

$$y(t') = \sum_i \hat{s}_i \cdot c_0(t' - iT + 2T)$$

The time reference *t' = 0* is the start of the active part of the burst as shown in figure 3. This is also the start of the symbol period of symbol number 0 (containing the first tail bit) as defined in 3GPP TS 45.002 [2].

Modulation

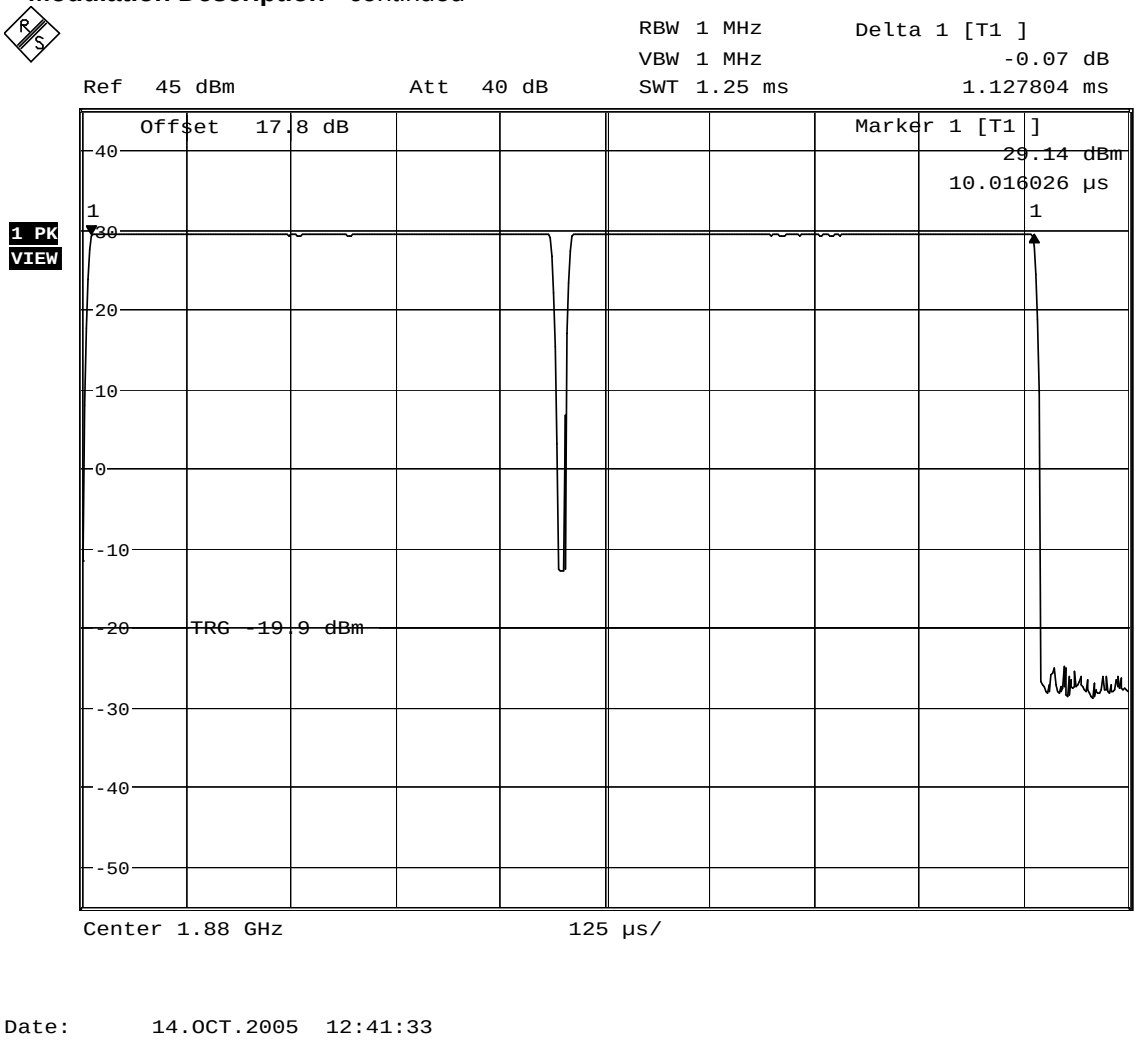
The modulated RF carrier during the useful part of the burst is therefore:

$$x(t') = \sqrt{\frac{2E_s}{T}} \, \mathrm{Re}\left[y(t') \cdot e^{j(2\pi f_0 t' + \varphi_0)} \right]$$

where E_S is the energy per modulating symbol, f_0 is the centre frequency and φ_0 is a random phase and is constant during one burst.

2.13 MODULATION CHARACTERISTICS

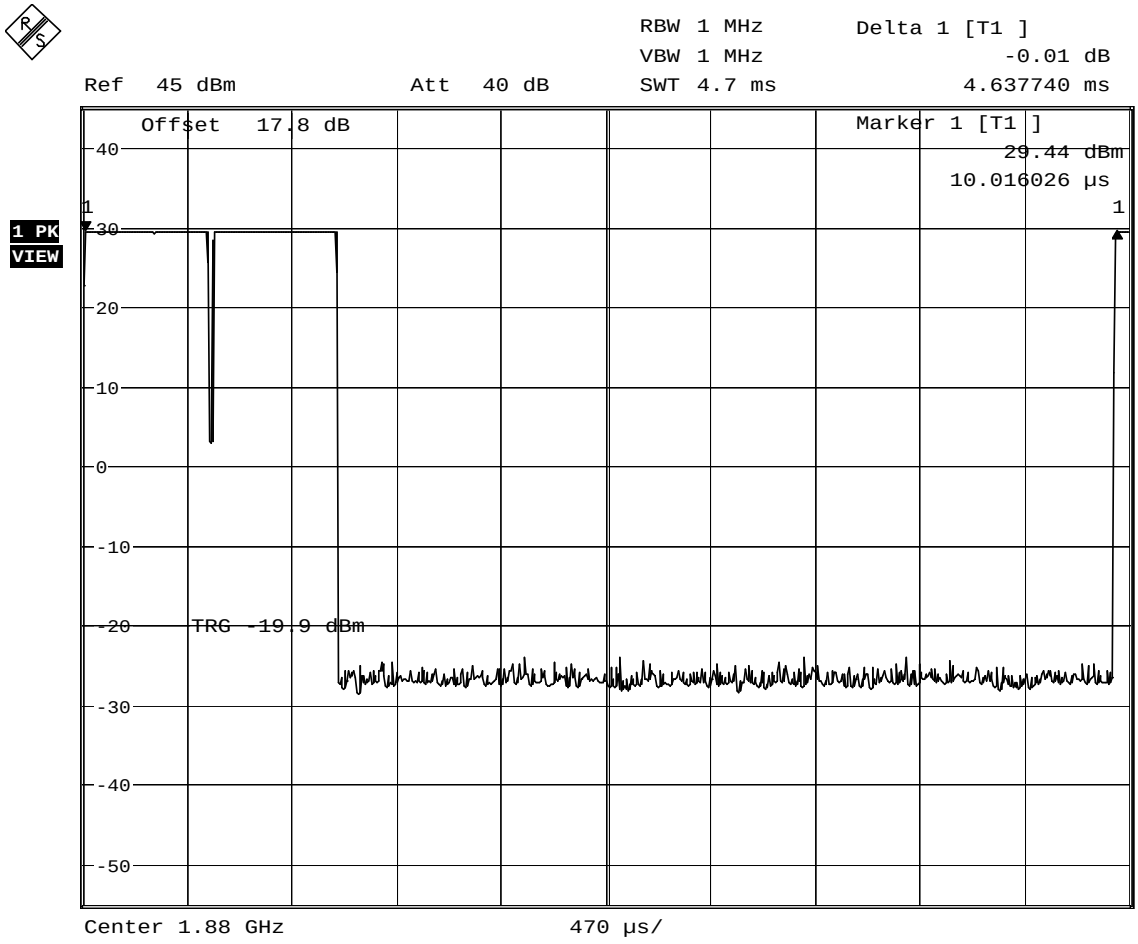
2.13.5 Modulation Description - continued



Serial Number: 00108-00-006341-3
GPRS Mode – View of Two Timeslots Active

2.13 MODULATION CHARACTERISTICS

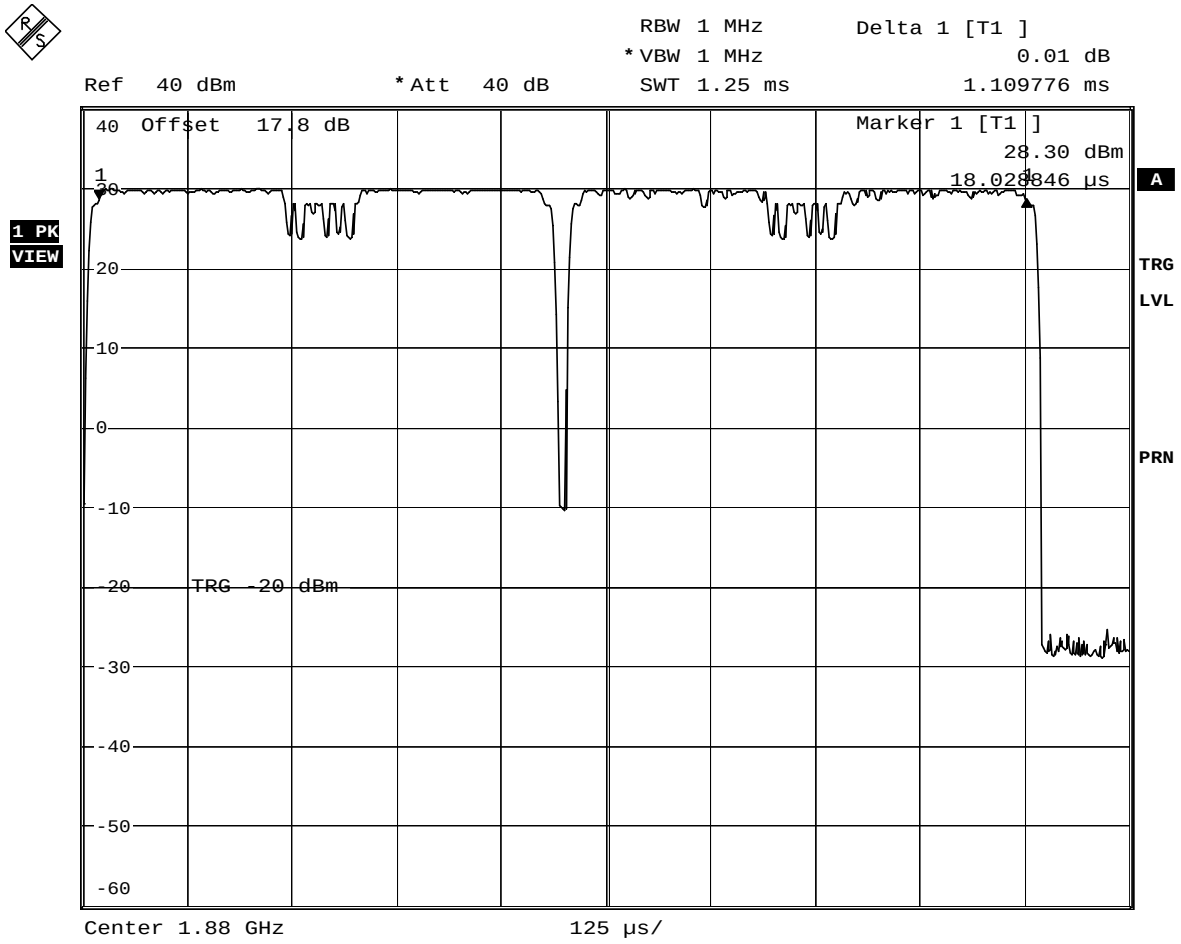
2.13.5 **Modulation Description** - continued



Serial Number: 00108-00-006341-3
GPRS Mode – View of One Complete Frame

2.13 MODULATION CHARACTERISTICS

2.13.5 Modulation Description - continued

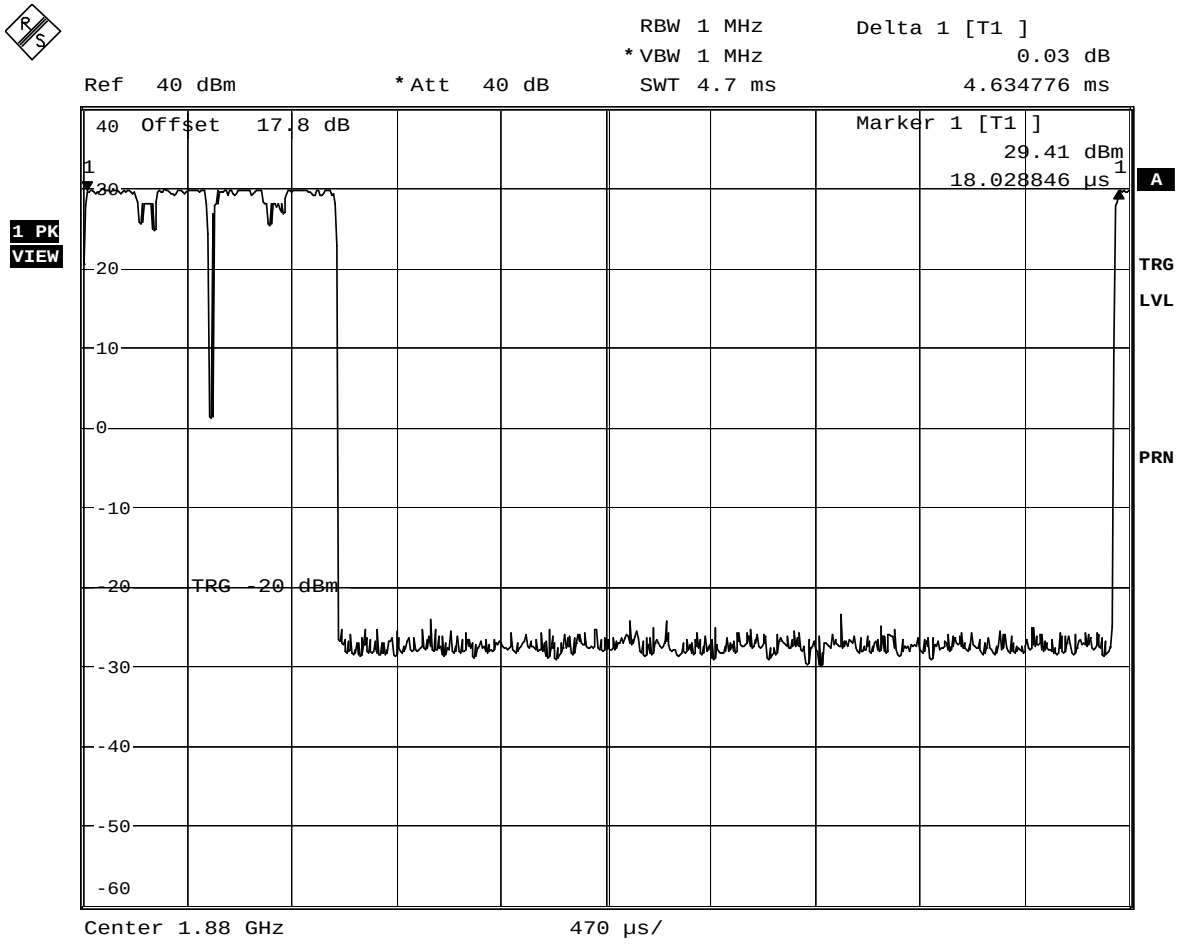


Date: 17.OCT.2005 17:16:53

Serial Number: 00108-00-006341-3
EDGE Mode – View of Two Timeslots Active

2.13 MODULATION CHARACTERISTICS

2.13.5 Modulation Description - continued



Serial Number: 00108-00-006341-3
EDGE Mode – View of One Complete Frame

2.14 OCCUPIED BANDWIDTH

2.14.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.238(b), 2.1049

2.14.2 Equipment Under Test

U730

2.14.3 Date of Test

11th October 2005 (HSDPA)
13th October 2005 (UMTS)
14th October 2005 (GPRS)
17th October 2005 (EDGE)

2.14.4 Test Equipment Used

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

2.14.5 Test Procedure

For GRPS and EDGE modes of operation a resolution bandwidth of 10kHz and a video bandwidth of 30kHz were used. The -26dBc points were established and the emission bandwidth recorded.

For UTMS and HSDPA modes of operation, a resolution and video bandwidth of 100kHz was used. The -26dBc points were established and the emission bandwidth recorded.

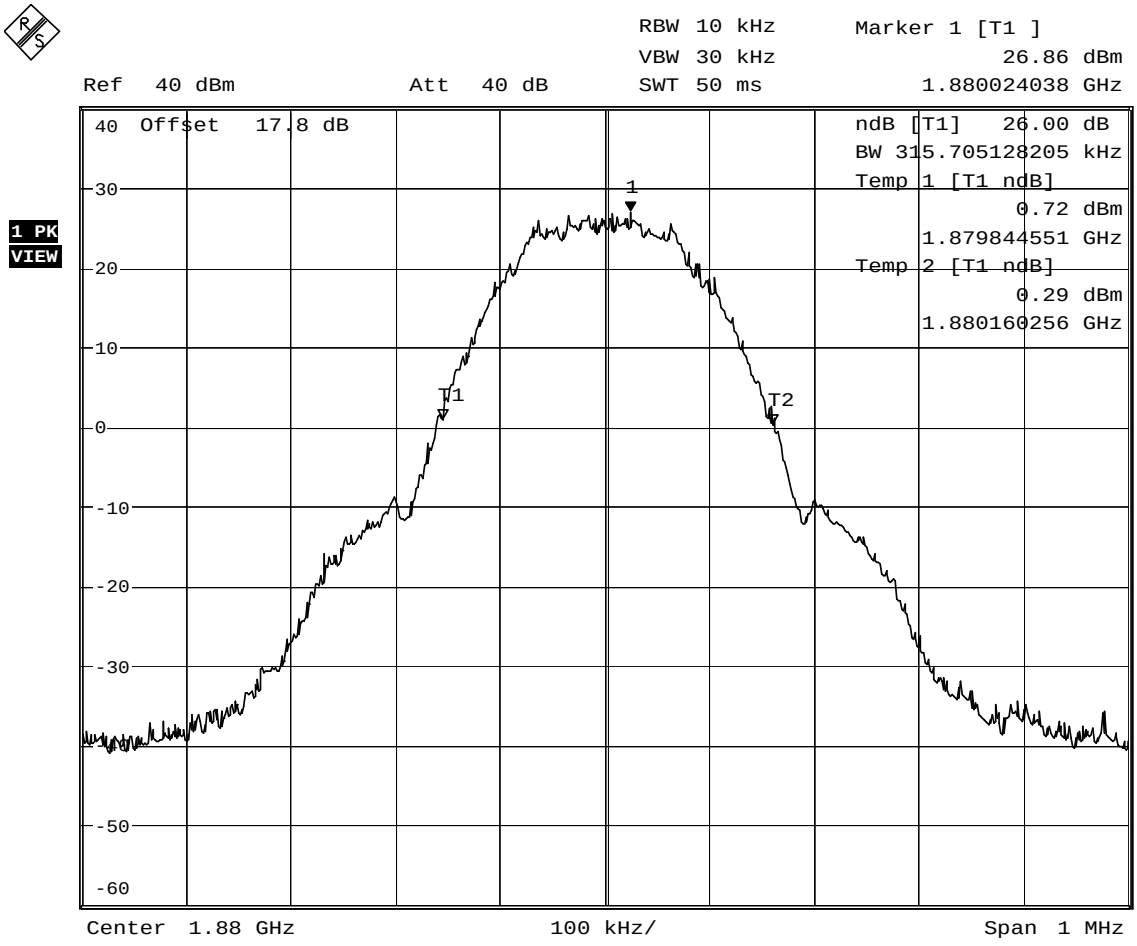
The resultant plots are shown overleaf with a summary table of results below.

Frequency (MHz)	Modulation	26dB Bandwidth (kHz)
836.6	GPRS	315.705
836.6	EDGE	318.910
1880.0	UMTS	4663.461
1880.0	HSDPA	4647.435

2.14 OCCUPIED BANDWIDTH

2.14.6 Test Results

Occupied Bandwidth As Defined By The – 26dBc Points



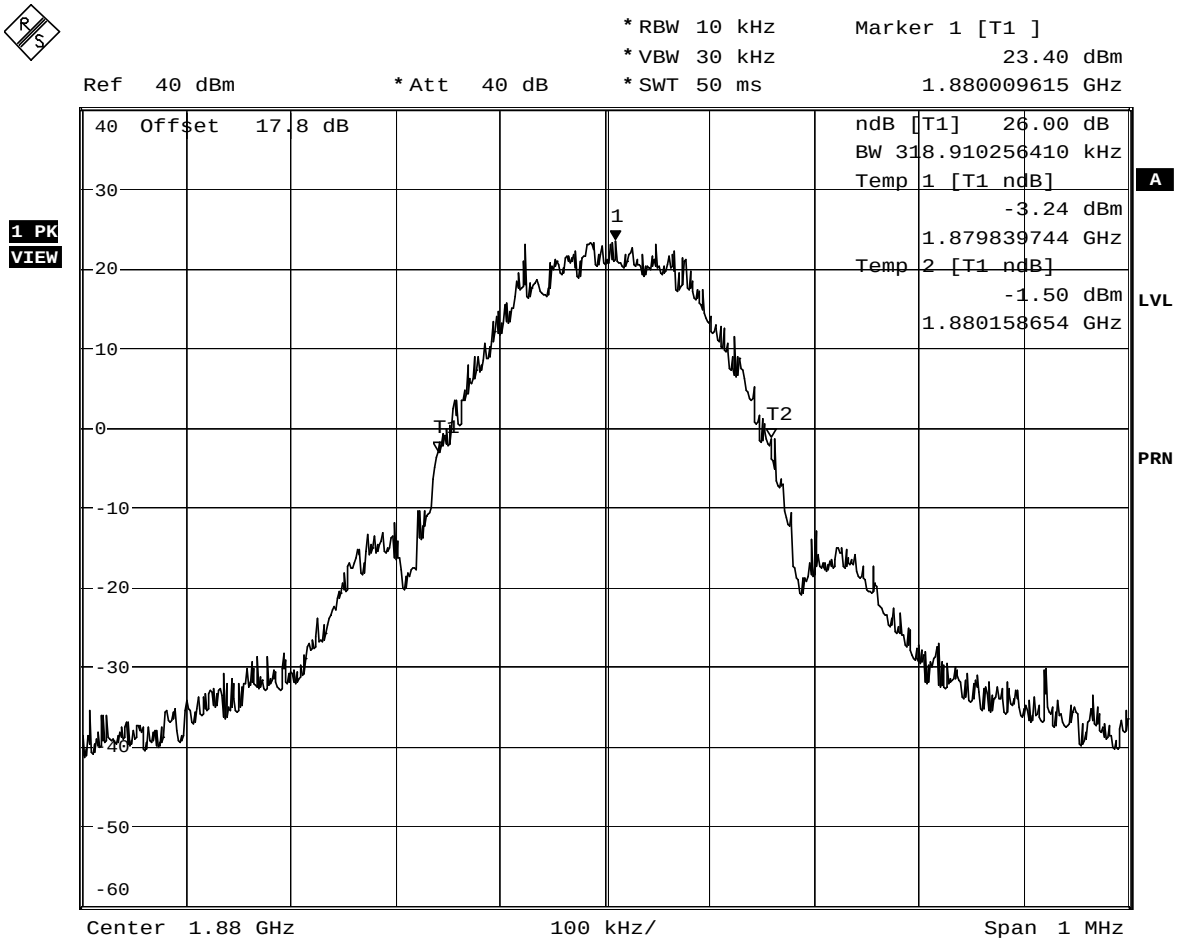
Date: 14.OCT.2005 12:52:27

Serial Number: 00108-00-006341-3
Maximum Power – GPRS Mode

2.14 OCCUPIED BANDWIDTH

2.14.6 **Test Results** - continued

Occupied Bandwidth As Defined By The - 26dBc Points



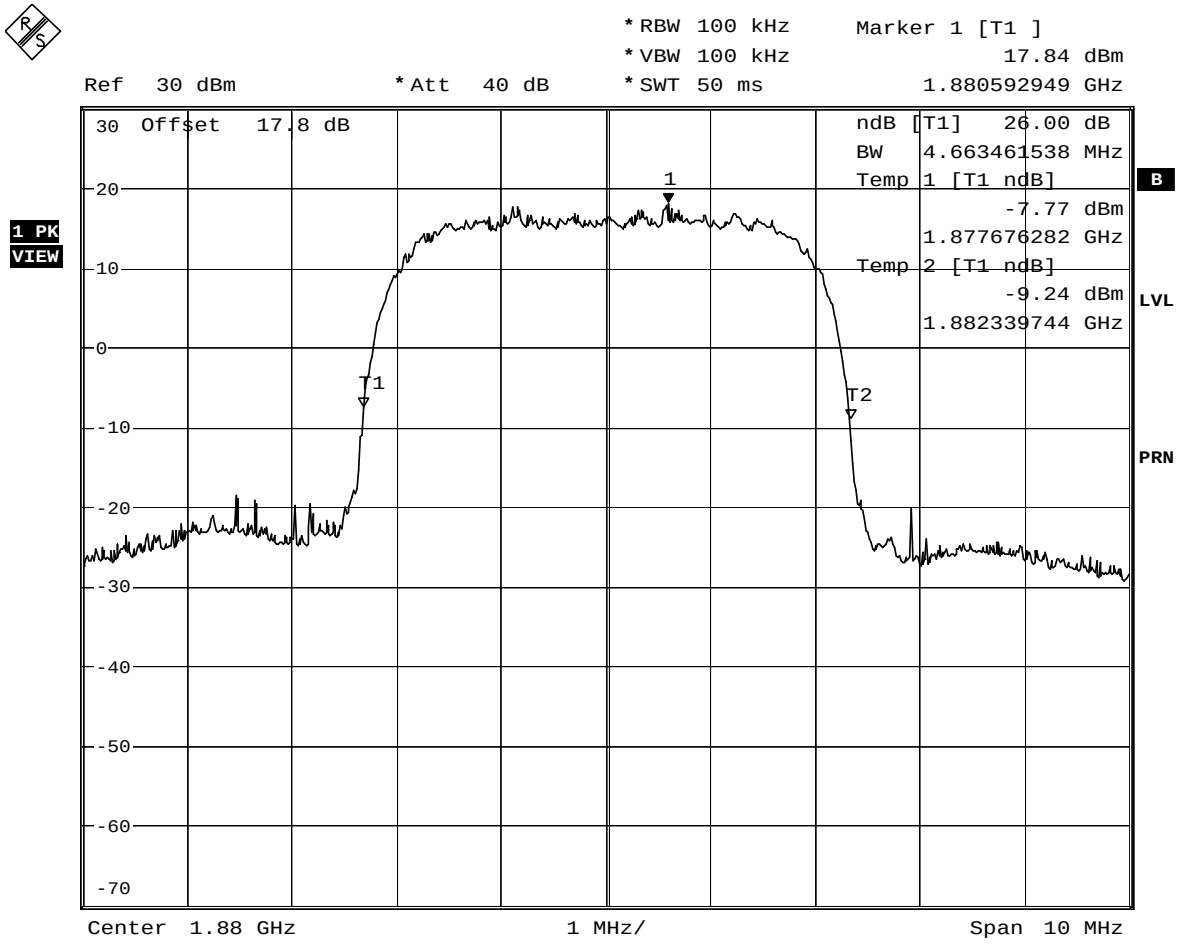
Date: 17.OCT.2005 16:58:52

Serial Number: 00108-00-006341-3
Maximum Power – EDGE

2.14 OCCUPIED BANDWIDTH

2.14.6 **Test Results** - continued

Occupied Bandwidth As Defined By The - 26dBc Points



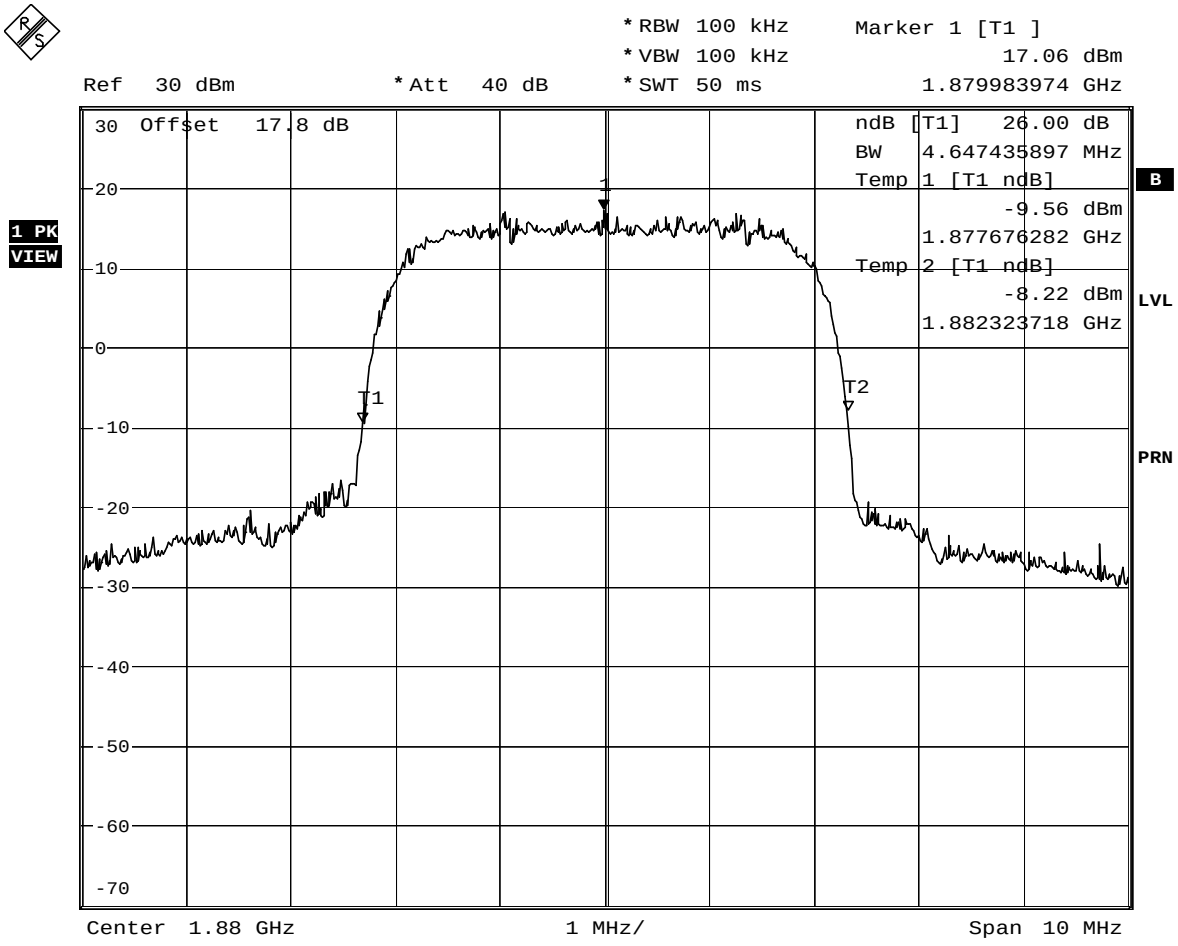
Date: 13.OCT.2005 11:07:13

Serial Number: 00108-00-006341-3
Maximum Power – UMTS

2.14 OCCUPIED BANDWIDTH

2.14.6 **Test Results** - continued

Occupied Bandwidth As Defined By The - 26dBc Points



Date: 11.OCT.2005 13:57:17

Serial Number: 00108-00-006341-3
Maximum Power – HSDPA

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

2.15.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.229, 24.238, 2.1051 and
Industry Canada RSS-133, 6.3

2.15.2 Equipment Under Test

U730

2.15.3 Date of Test

11th October 2005 (HSDPA)
13th October 2005 (UMTS)
14th October 2005 (GPRS)
17th October 2005 (EDGE)

2.15.4 Test Equipment Used

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

2.15.5 Test Procedure

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 at it's maximum power level and in GPRS, EDGE, UMTS and HSDPA modes of operation.

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

2.15.6 Test Results

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

Measurements were made with the EUT in GPRS 1900 Mode

Frequency Block MHz	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A	Channel : 513 Frequency : 1850.4 MHz	-
C	-	Channel : 809 Frequency : 1909.6 MHz

Measurements were made with the EUT in EDGE 1900 Mode

Frequency Block MHz	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A	Channel : 512 Frequency : 1850.2 MHz	-
C	-	Channel : 809 Frequency : 1909.6 MHz

Measurements were made with the EUT in UMTS 1900 Mode

Frequency Block MHz	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A	Channel : 9262 Frequency : 1852.4 MHz	-
C	-	Channel : 9538 Frequency : 1907.6 MHz

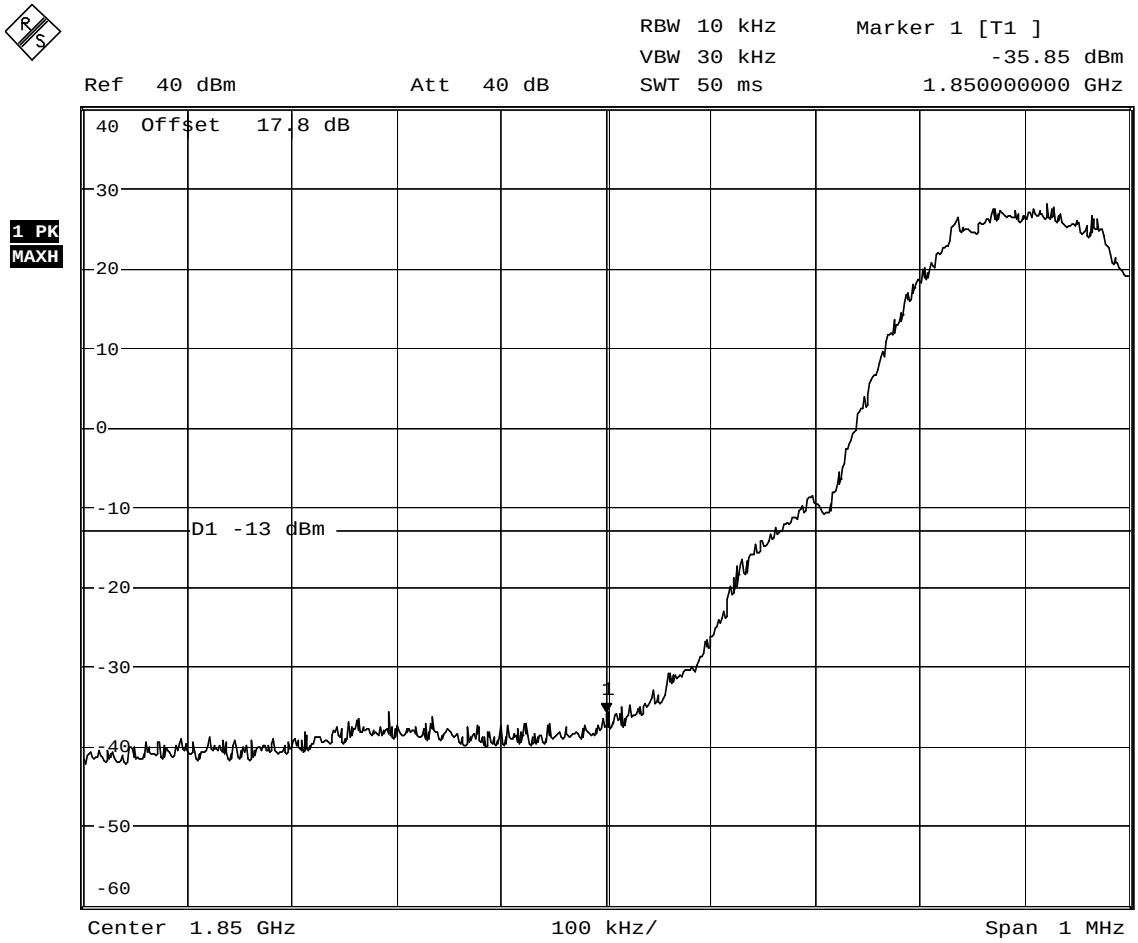
Measurements were made with the EUT in HSDPA 1900 Mode

Frequency Block MHz	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A	Channel : 9262 Frequency : 1852.4 MHz	-
C	-	Channel : 9538 Frequency : 1907.6 MHz

The measurement plots are shown on the following pages.

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

2.15.6 Test Results - continued



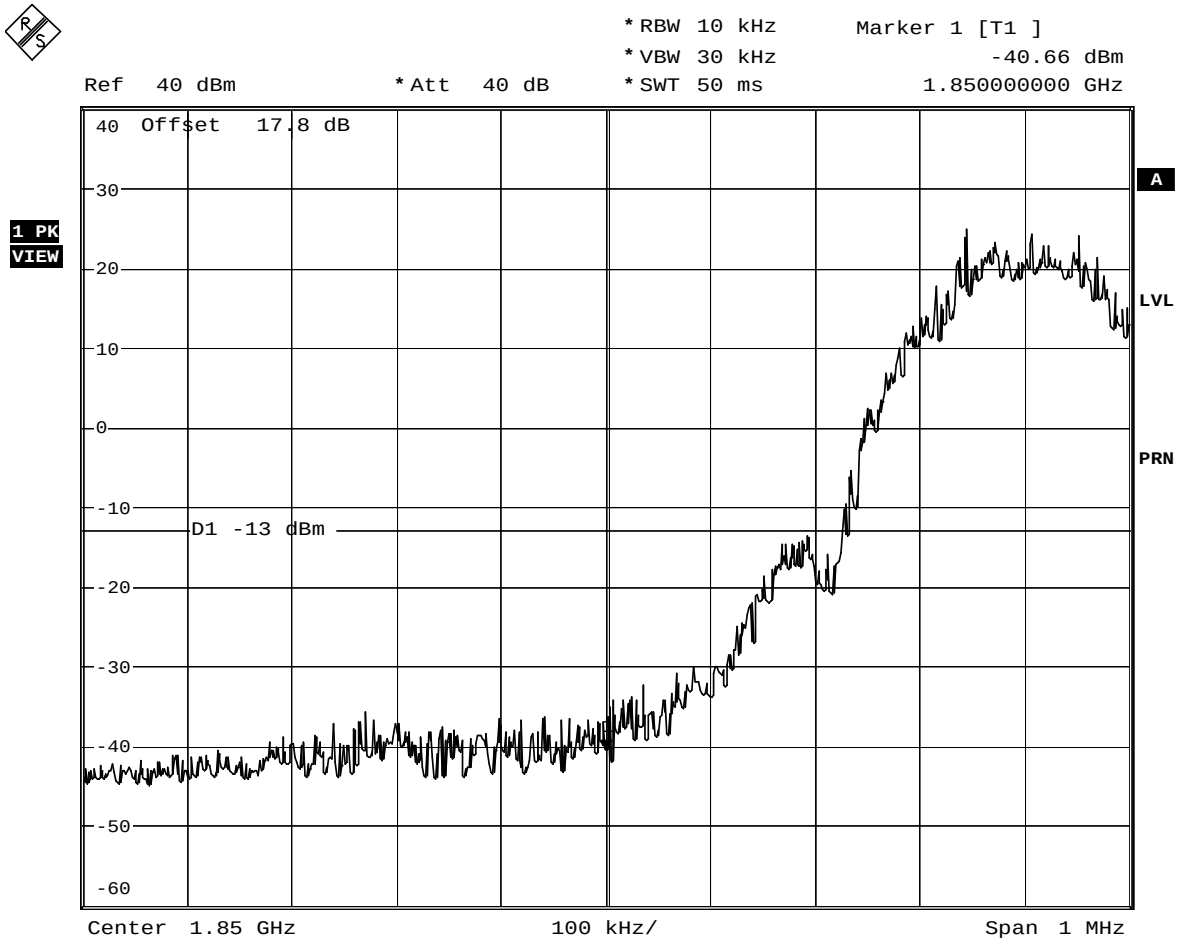
Date: 14.OCT.2005 13:02:52

Serial Number: 00108-00-006341-3
GPRS - Block Edge Measurement with EUT Transmitting on full power on Channel 513, (1850.4MHz)

Block A

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

2.15.6 Test Results - continued



Date: 17.OCT.2005 17:05:13

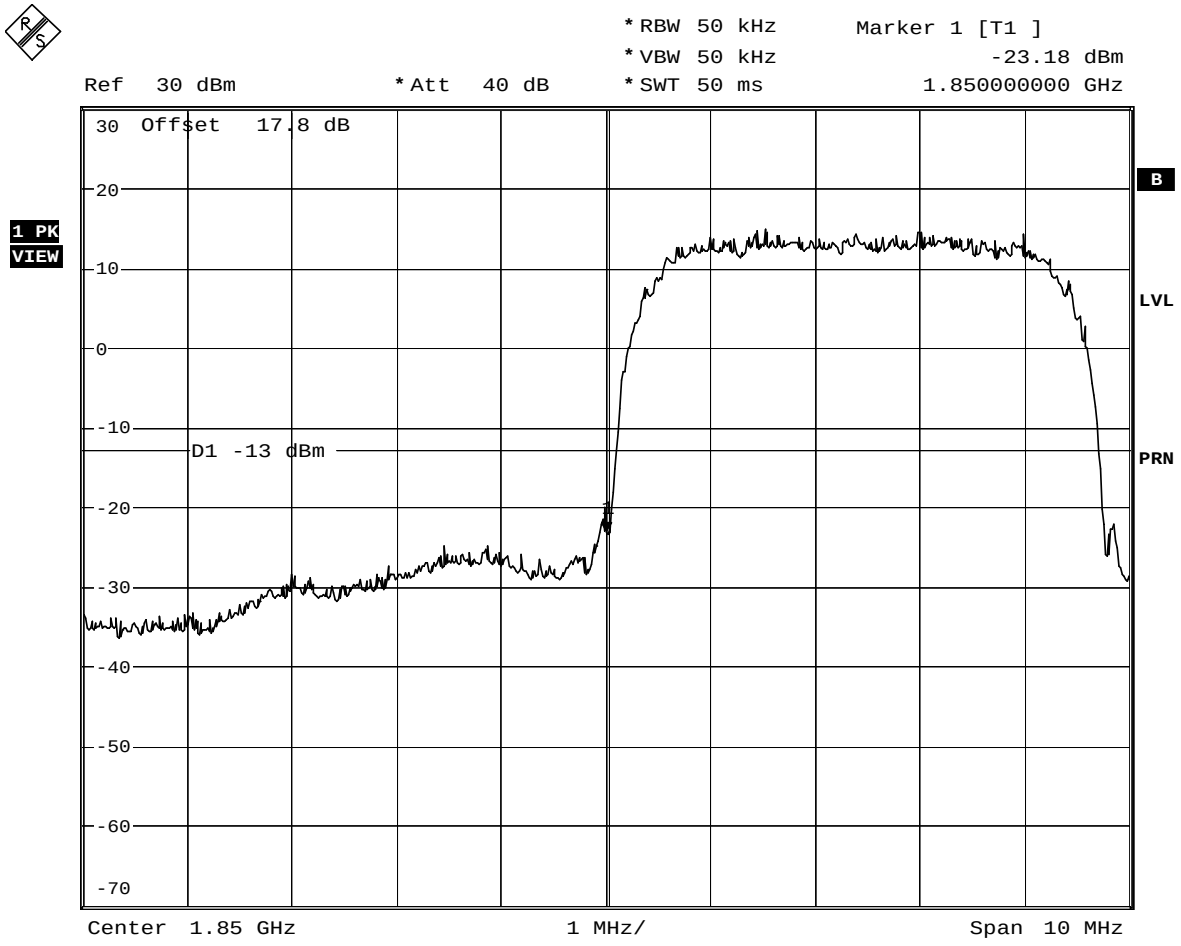
Serial Number: 00108-00-006341-3

EDGE - Block Edge Measurement with EUT Transmitting on full power on Channel 512 (1850.2MHz)

Block A

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

2.15.6 Test Results - continued



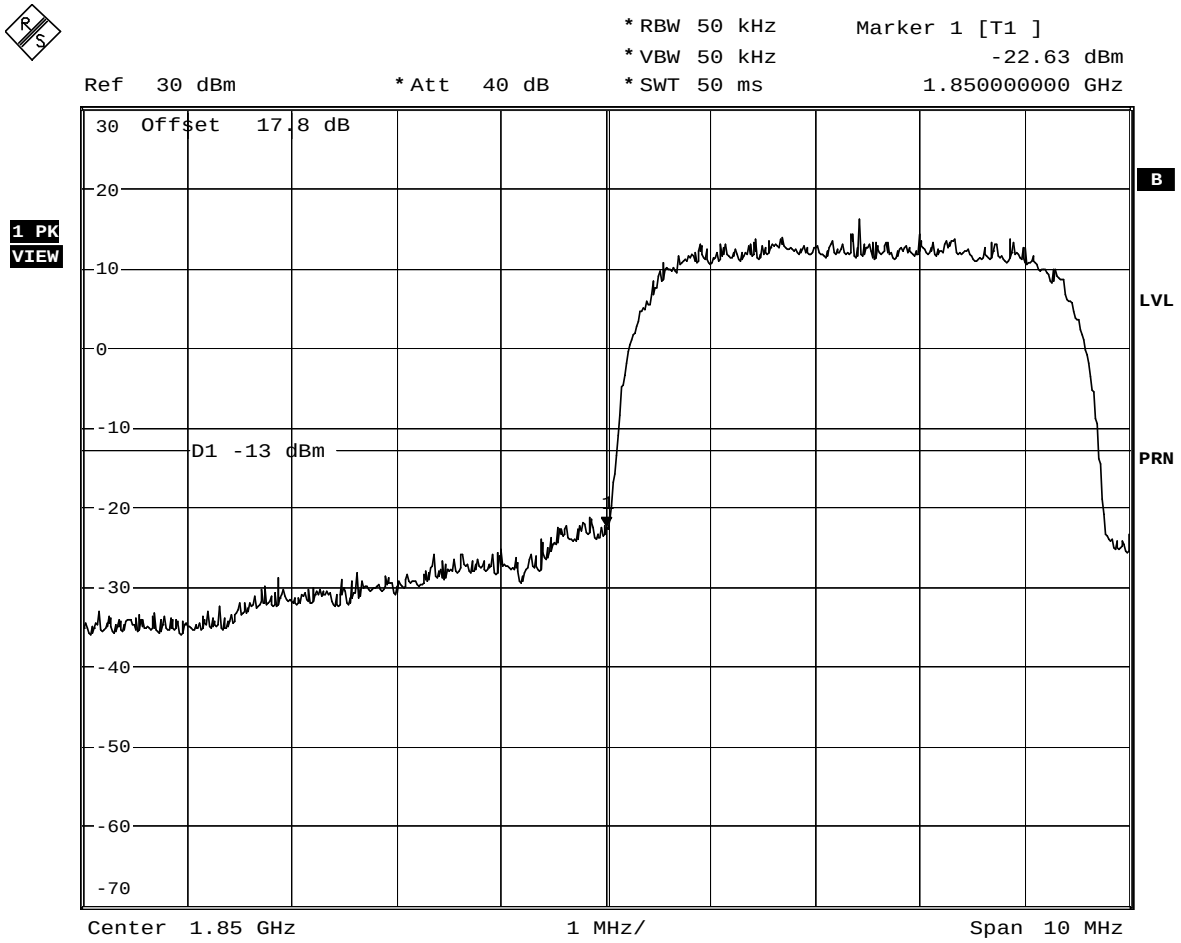
Serial Number: 00108-00-006341-3

UMTS - Block Edge Measurement with EUT Transmitting on full power on Channel 9262, (1852.4MHz)

Block A

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

2.15.6 Test Results - continued



Date: 11.OCT.2005 14:29:21

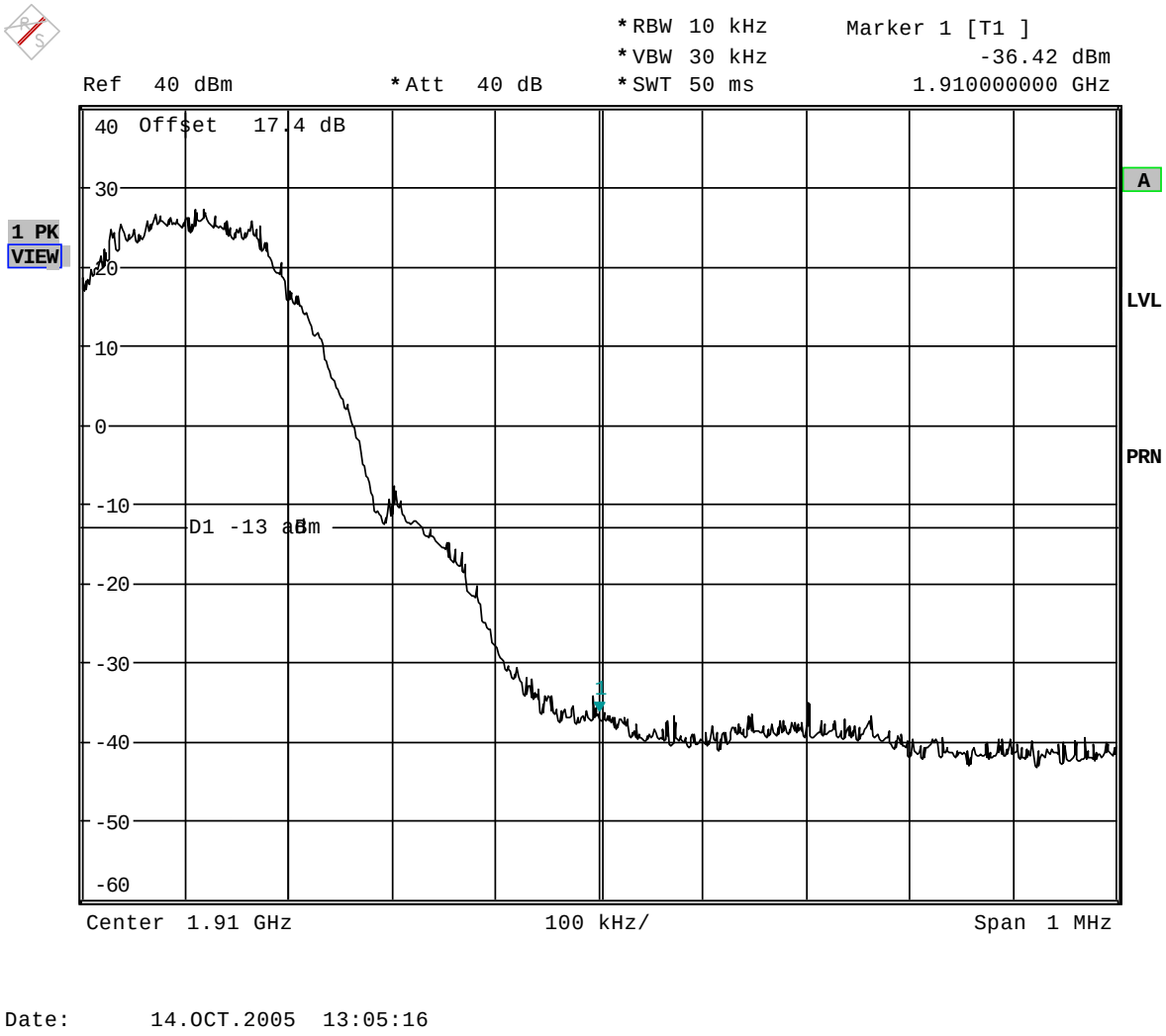
Serial Number: 00108-00-006341-3

HSDPA - Block Edge Measurement with EUT Transmitting on full power on Channel 9262, (1852.4MHz)

Block A

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

2.15.6 Test Results - continued

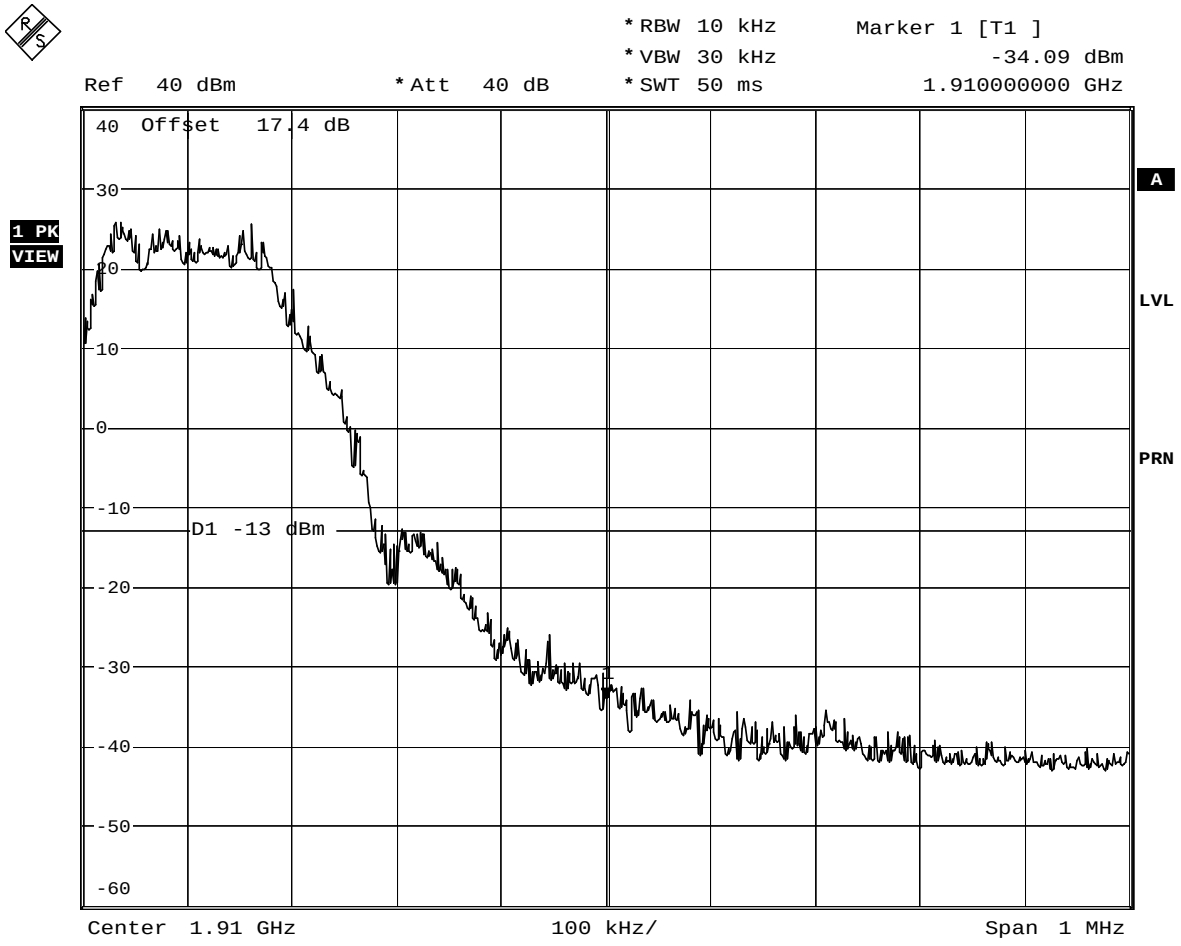


Serial Number: 00108-00-006341-3
GPRS - Block Edge Measurement with EUT Transmitting on full power on Channel 809, (1909.6MHz)

Block C

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

2.15.6 Test Results - continued



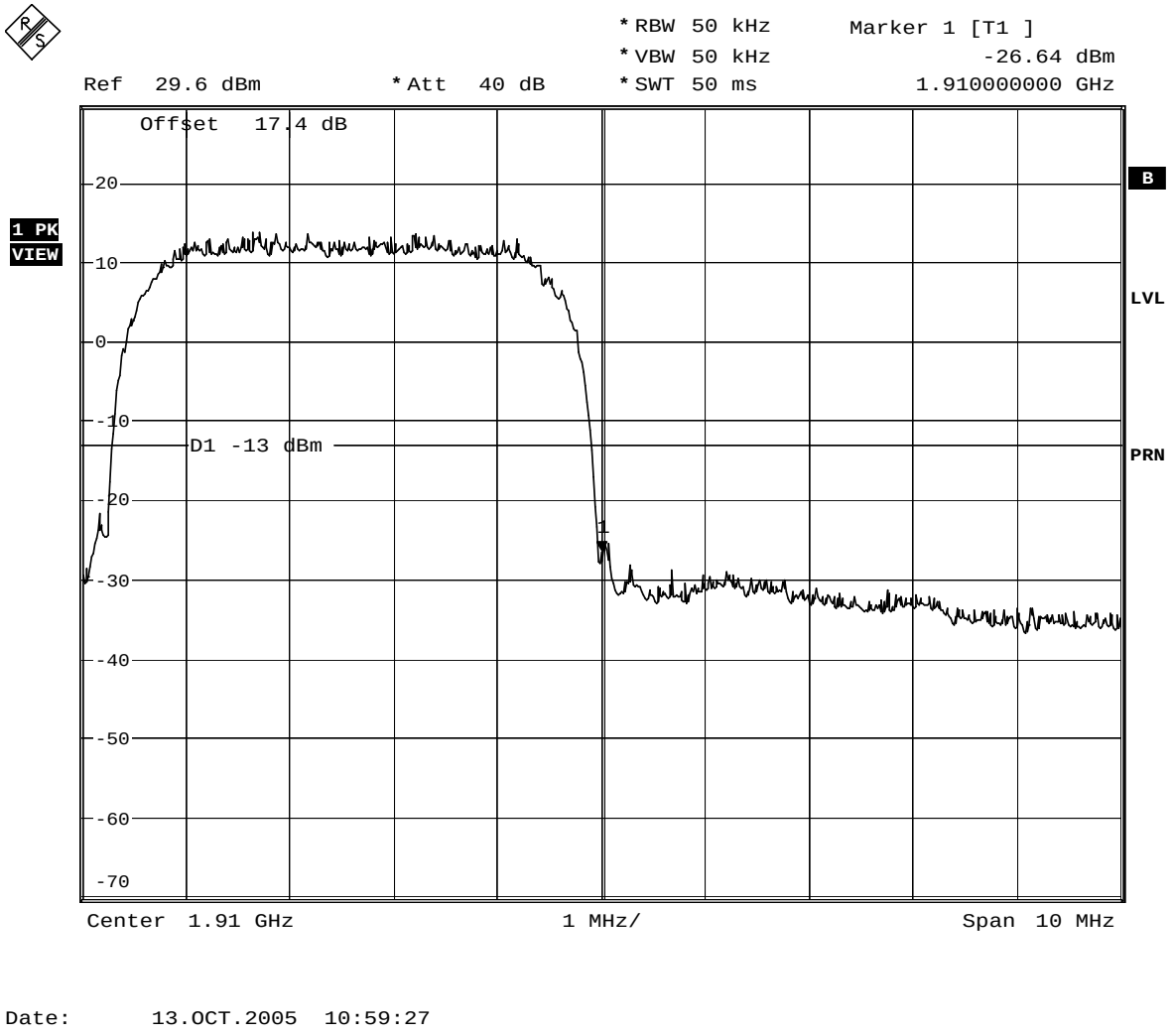
Serial Number: 00108-00-006341-3

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

Block C

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

2.15.6 Test Results - continued

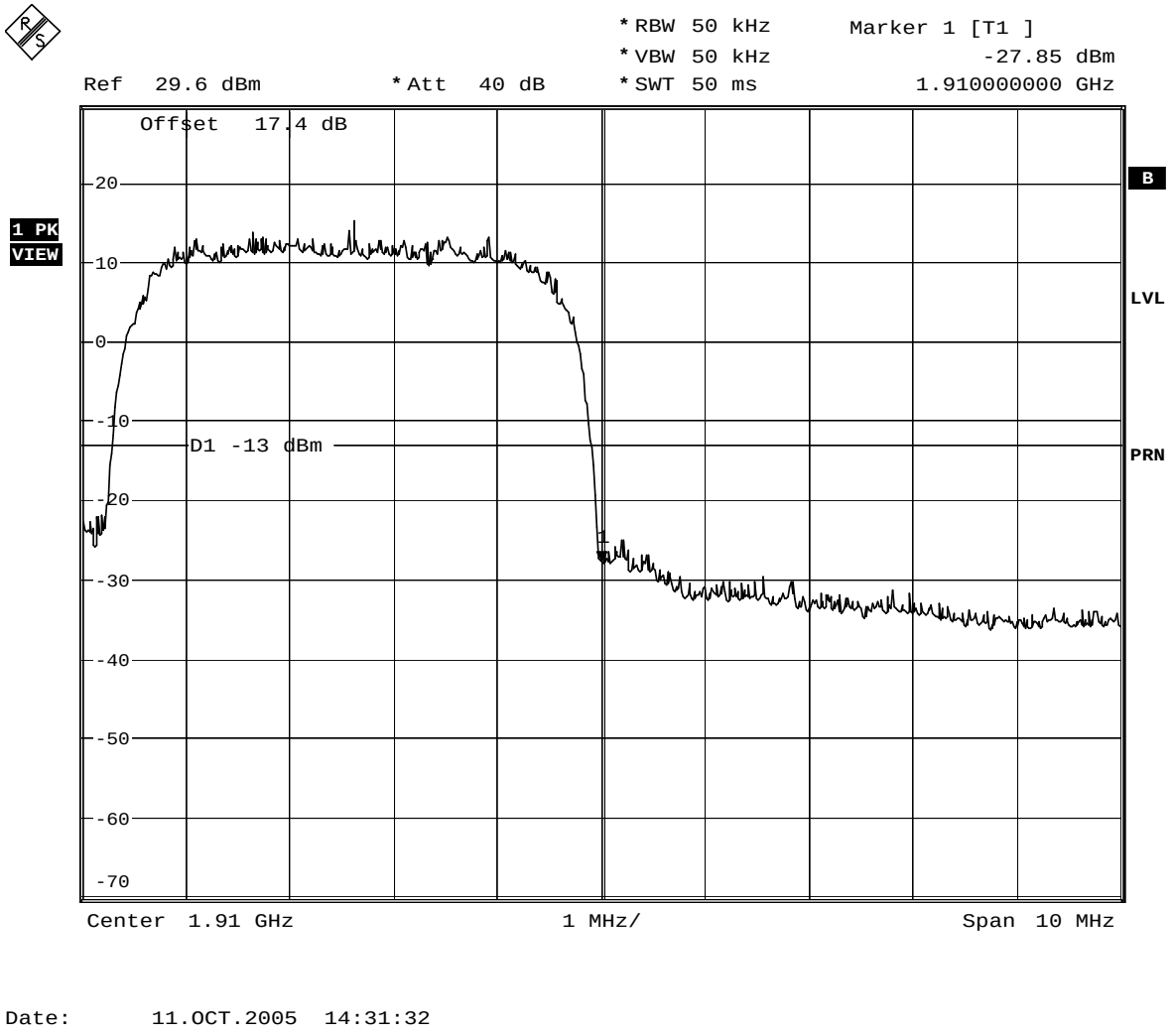


Serial Number: 00108-00-006341-3
UMTS - Block Edge Measurement with EUT Transmitting on full power on Channel 9538, (1907.6MHz)

Block C

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

2.15.6 Test Results - continued



Serial Number: 00108-00-006341-3
HSDPA - Block Edge Measurement with EUT Transmitting on full power on Channel 9538, (1907.6MHz)

Block CB

2.16 RADIATED EMISSIONS

2.16.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.238 and Industry Canada RSS-133, 6.3

2.16.2 Equipment Under Test

U730

2.16.3 Date of Test

9th October 2005 (HSDPA)
12th October 2005 (GPRS)
10th October 2005 (EDGE)
11th and 12th October 2005 (UMTS)

2.16.4 Test Equipment Used

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

2.16.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

In order to determine the Radiated Emission Limits, measurements of transmitter power (P) were first carried out on the top, middle 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 the 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 in the Anechoic Chamber (3 metres). 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 Peak detector.

Emissions identified within the range 1GHz – 9GHz were then formally measured using a Peak Detector.

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

The test limit is derived from the carrier power in accordance with the specification. (The power of any emission outside of the authorised operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 +10log(P) dB).

2.16 RADIATED EMISSIONS

2.16.6 **Test Results** - continued

30MHz – 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 and Industry Canada RSS-133, 6.3 for Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in GPRS 1900 Mode.
Serial Number: 00108-00-0006156-5

EUT Transmitting on Bottom Channel (824.13MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
181.57	Horizontal	100	087	46.0	83.3
238.87	Horizontal	100	090	52.0	83.3

EUT Transmitting on Middle Channel (836.44MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
181.76	Horizontal	100	090	45.9	83.1
232.52	Horizontal	100	090	51.3	83.1

EUT Transmitting on Top Channel (848.88MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
180.60	Horizontal	100	090	45.5	82.4
239.44	Horizontal	100	090	51.8	82.4

2.16 RADIATED EMISSIONS

2.16.6 **Test Results** - continued

Measurements were made with the EUT in EDGE 1900 Mode
Serial Number: 00108-00-0006156-5

EUT Transmitting on Bottom Channel (824.245MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
187.67	Vertical	100	270	47.0	83.3
232.67	Vertical	160	000	49.6	83.3

EUT Transmitting on Middle Channel (836.295MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
187.67	Vertical	100	270	46.5	83.3
240.30	Vertical	200	035	48.6	83.3

EUT Transmitting on Top Channel (848.867MHz)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Result	Peak Limit
MHz		cm	degree	dBµV/m	dBµV/m
173.68	Vertical	100	273	47.1	82.4
240.30	Vertical	164	030	48.3	82.4

2.16 RADIATED EMISSIONS

2.16.6 **Test Results** - continued

Measurements were made with the EUT in UMTS 1900 Mode
Serial Number: 00108-00-006156-05

EUT Transmitting on Bottom Channel (1852.4)

No emissions were detected within 35dB of the limit. Therefore, no formal measurements were made.

EUT Transmitting on Middle Channel (1880.0MHz)

No emissions were detected within 35dB of the limit. Therefore, no formal measurements were made.

EUT Transmitting on Top Channel (1907.6)

No emissions were detected within 35dB of the limit. Therefore, no formal measurements were made.

2.16 RADIATED EMISSIONS

2.16.6 **Test Results** - continued

30MHz – 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 and Industry Canada RSS-133, 6.3 for Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in HSDPA 1900 Mode
Serial Number: 00108-00-006341-3

EUT Transmitting on Bottom Channel (1852.5MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Middle Channel (1880.0MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Top Channel (1907.6MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

2.16 RADIATED EMISSIONS

2.16.6 **Test Results** - continued

1GHz – 20GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 and Industry Canada RSS-133, 6.3 for Radiated Emissions (1GHz - 20GHz).

Measurements were made with the EUT in GPRS 1900 Mode
Serial Number: 00108-00-0006156-5

EUT Transmitting on Bottom Channel (1850.2MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Middle Channel (1880.0MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Top Channel (1909.8MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

2.16 RADIATED EMISSIONS

2.16.6 **Test Results** - continued

1GHz – 20GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 and Industry Canada RSS-133, 6.3 for Radiated Emissions (1GHz - 20GHz).

Measurements were made with the EUT in EDGE 1900 Mode
Serial Number: 00108-00-0006156-5

EUT Transmitting on Bottom Channel (1850.2MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Middle Channel (1880.0MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Top Channel (1909.7MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

2.16 RADIATED EMISSIONS

2.16.6 **Test Results** - continued

1GHz – 20GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 and Industry Canada RSS-133, 6.3 for Radiated Emissions (1GHz - 20GHz).

Measurements were made with the EUT in UMTS 1900 Mode
Serial Number: 00108-00-006341-3

EUT Transmitting on Bottom Channel (1852.0MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Middle Channel (1880.0MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Top Channel (1907.0MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

2.16 RADIATED EMISSIONS

2.16.6 **Test Results** - continued

1GHz – 20GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 and Industry Canada RSS-133, 6.3 for Radiated Emissions (1GHz - 20GHz).

Measurements were made with the EUT in HSDPA 1900 Mode
Serial Number: 00108-00-006341-3

EUT Transmitting on Bottom Channel (1852.0MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Middle Channel (1880.0MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

EUT Transmitting on Top Channel (1907.6MHz)

No emissions emanating from the EUT were observed. Therefore, no table of results is presented.

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.238(a), 2.1051

2.17.2 Equipment Under Test

U730

2.17.3 Date of Test

11th October 2005 (HSDPA)
13th October 2005 (UMTS)
17th October 2005 (GPRS)
18th October 2005 (EDGE)

2.17.4 Test Equipment Used

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

2.17.5 Test Procedure

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 timeslots 2 and 3 active in GPRS and EDGE modes. The EUT was transmitting on full power for UMTS and HSDPA Modes. 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 peak and the trace 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.

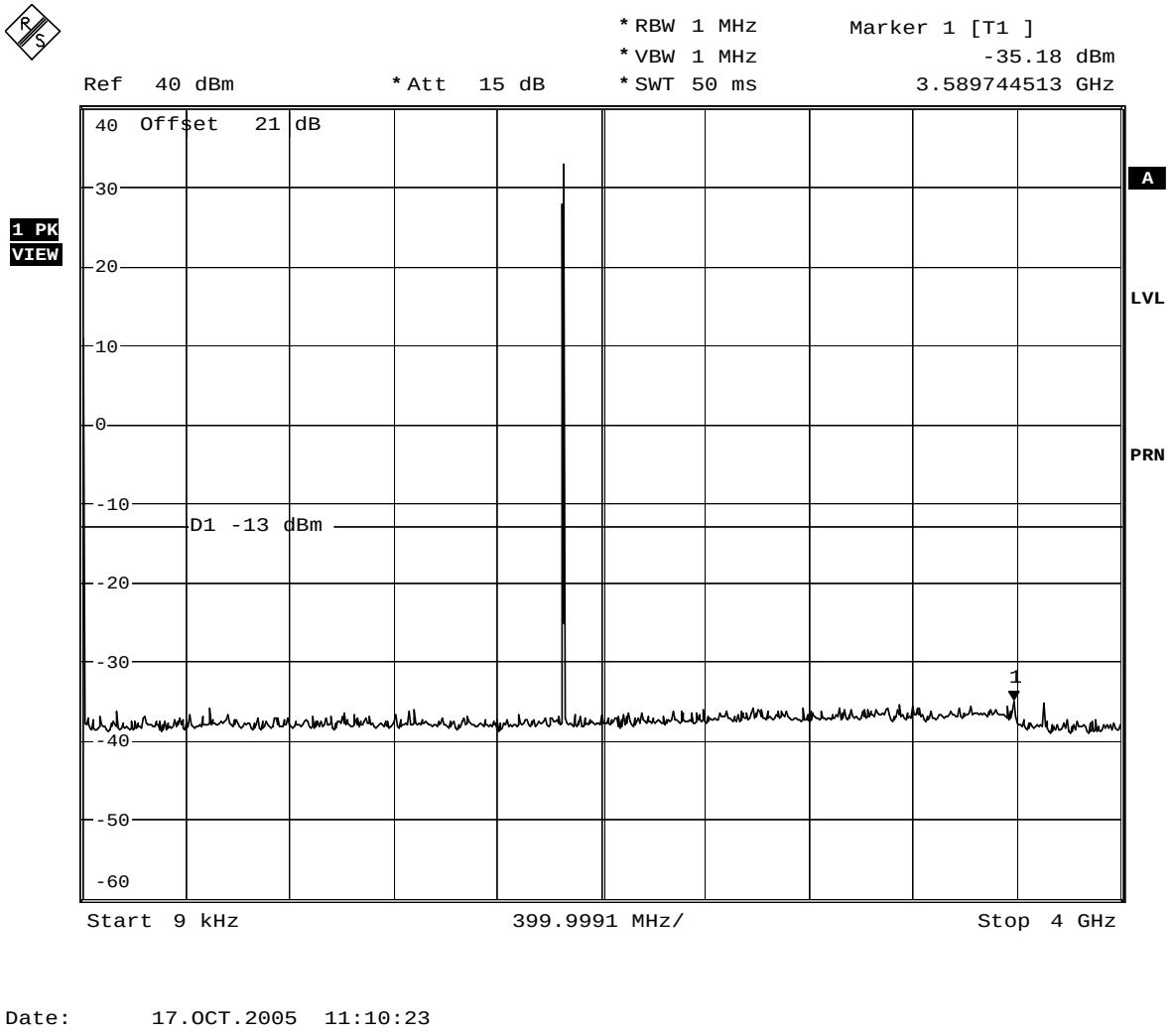
The maximum path loss across the measurement band was used as the reference level offset to ensure worst case

2.17.6 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.

2.17 CONDUCTED SPURIOUS EMISSIONS

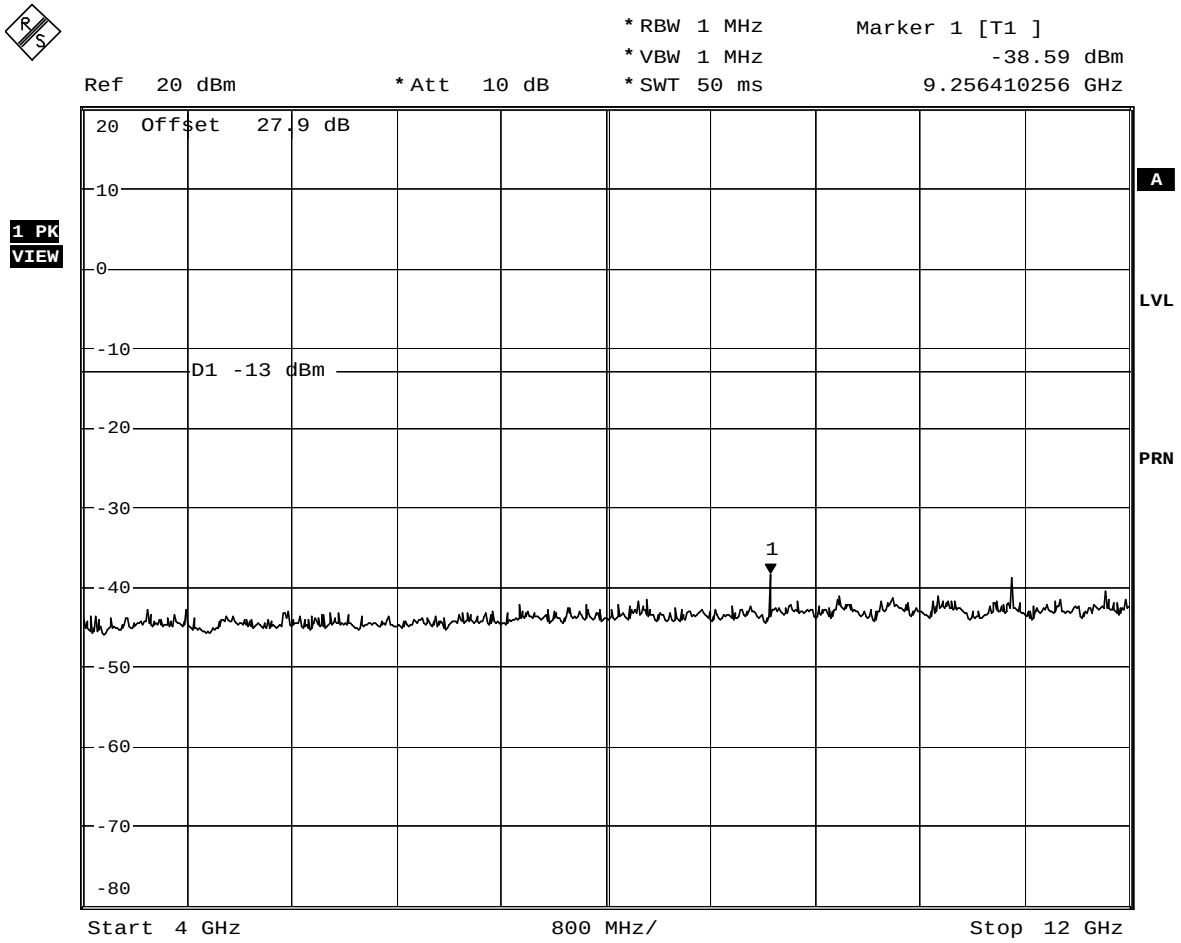
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
GPRS - Spurious Emissions (9kHz – 4GHz)
Channel 512 (1850.2MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

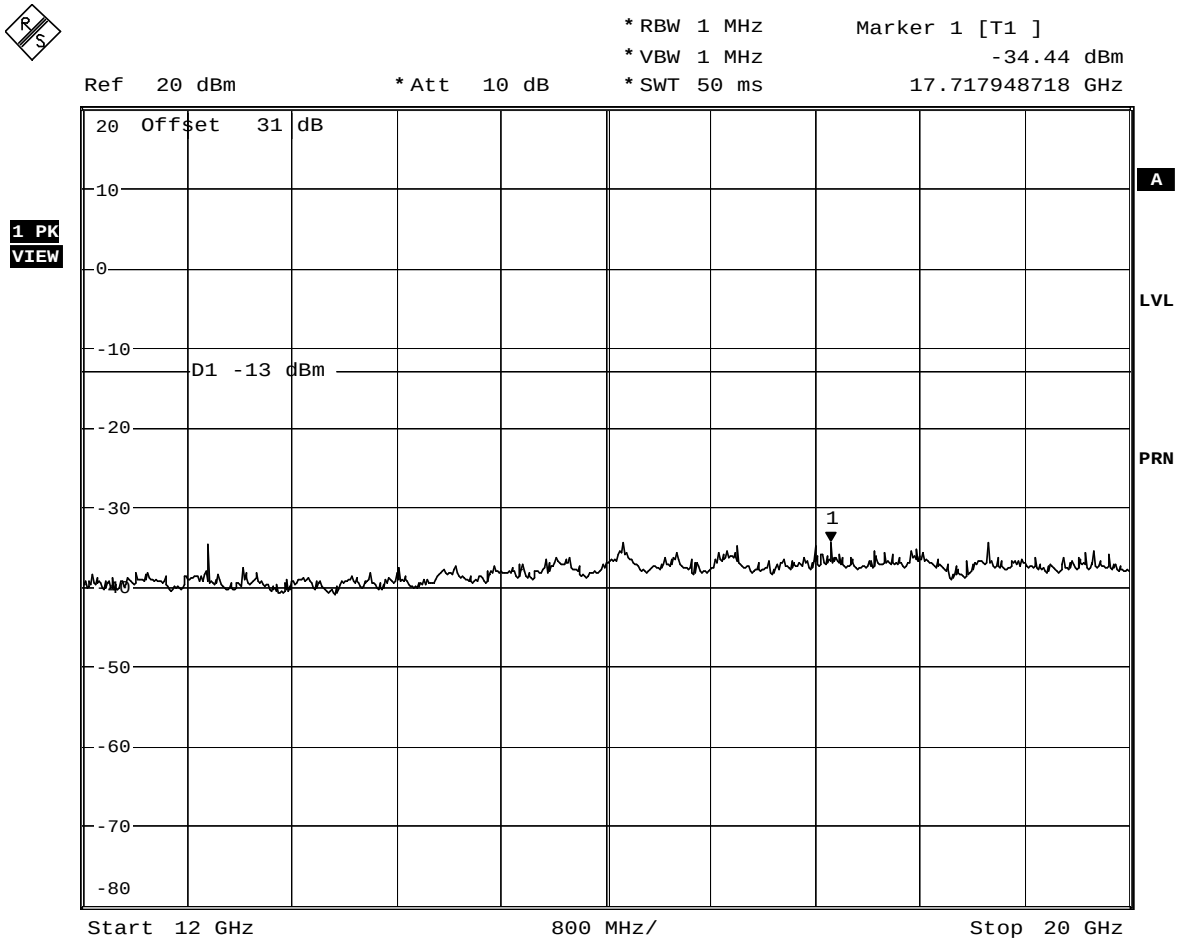
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
GPRS - Spurious Emissions (4GHz – 12GHz)
Channel 512 (1850.2MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

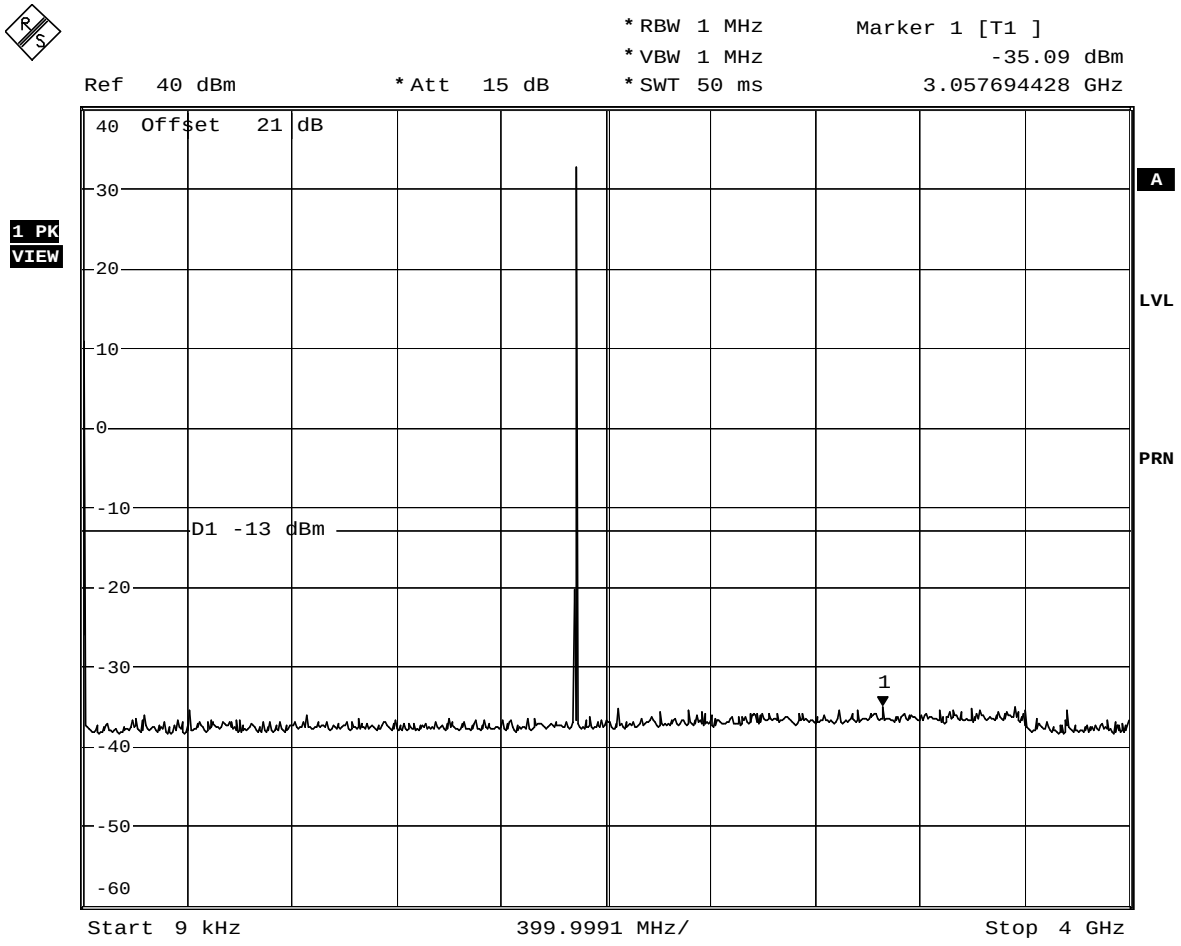


Date: 17.OCT.2005 11:25:35

Serial Number: 00108-00-006341-3
GPRS - Spurious Emissions (12GHz – 20GHz)
Channel 512 (1850.2MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

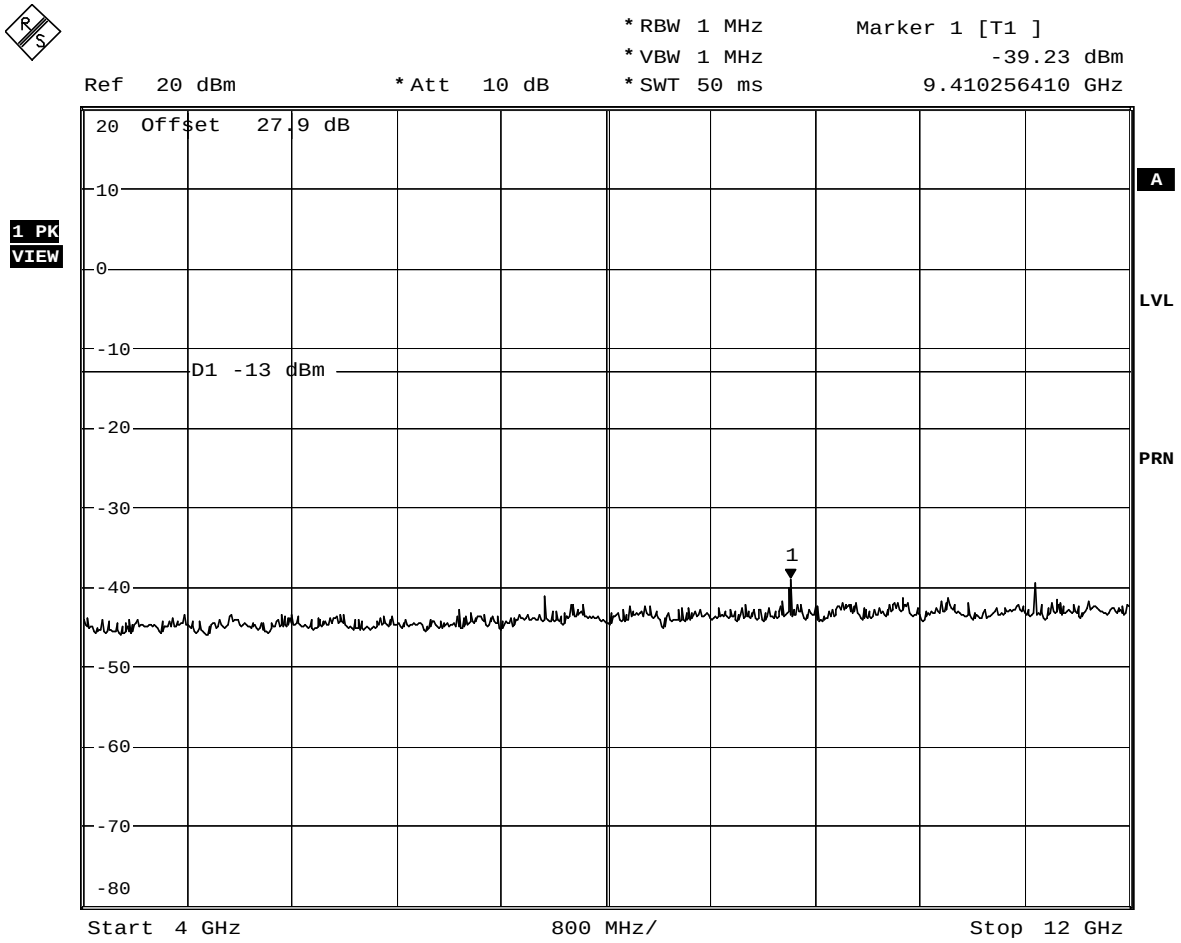
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
GPRS - Spurious Emissions (9kHz – 4GHz)
Channel 661 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

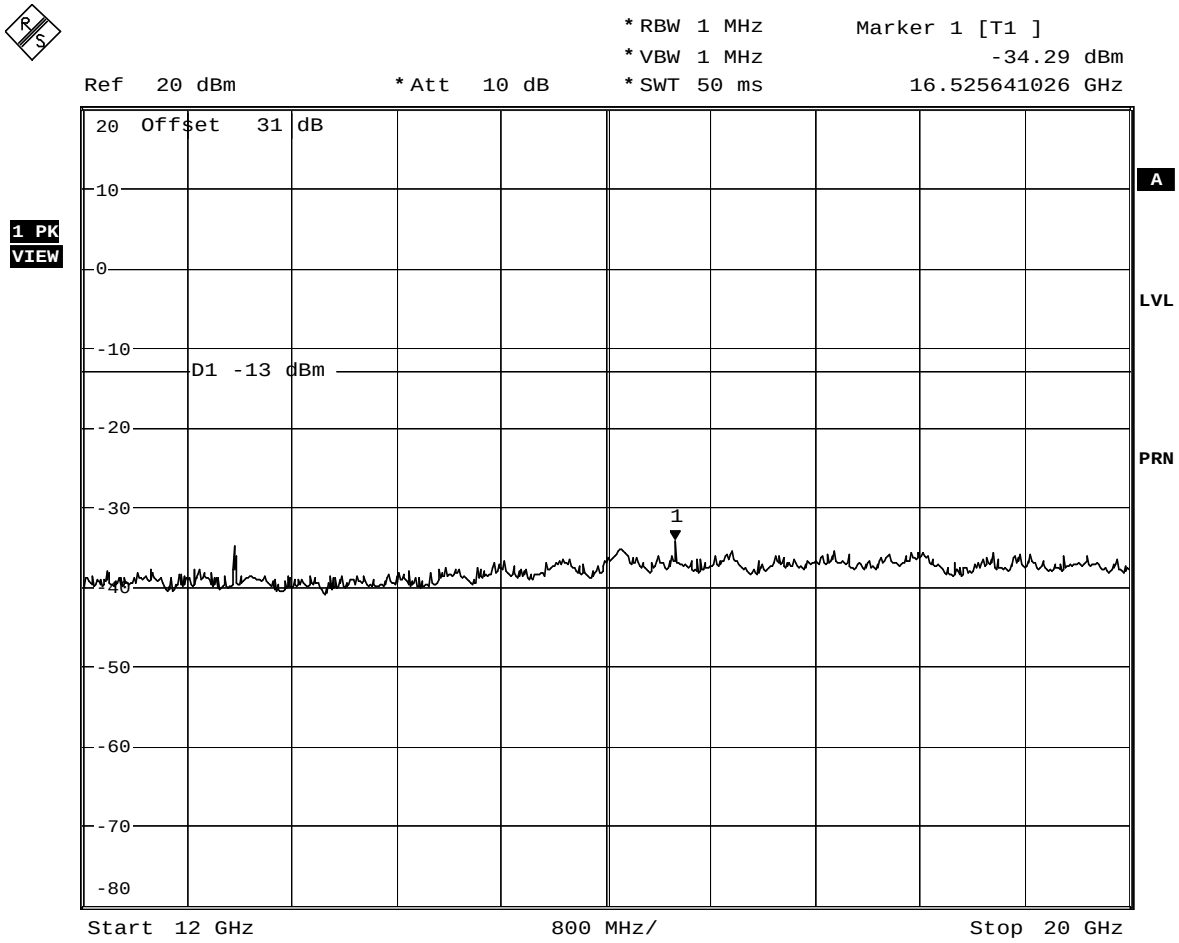
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
GPRS - Spurious Emissions (4GHz – 12GHz)
Channel 661 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

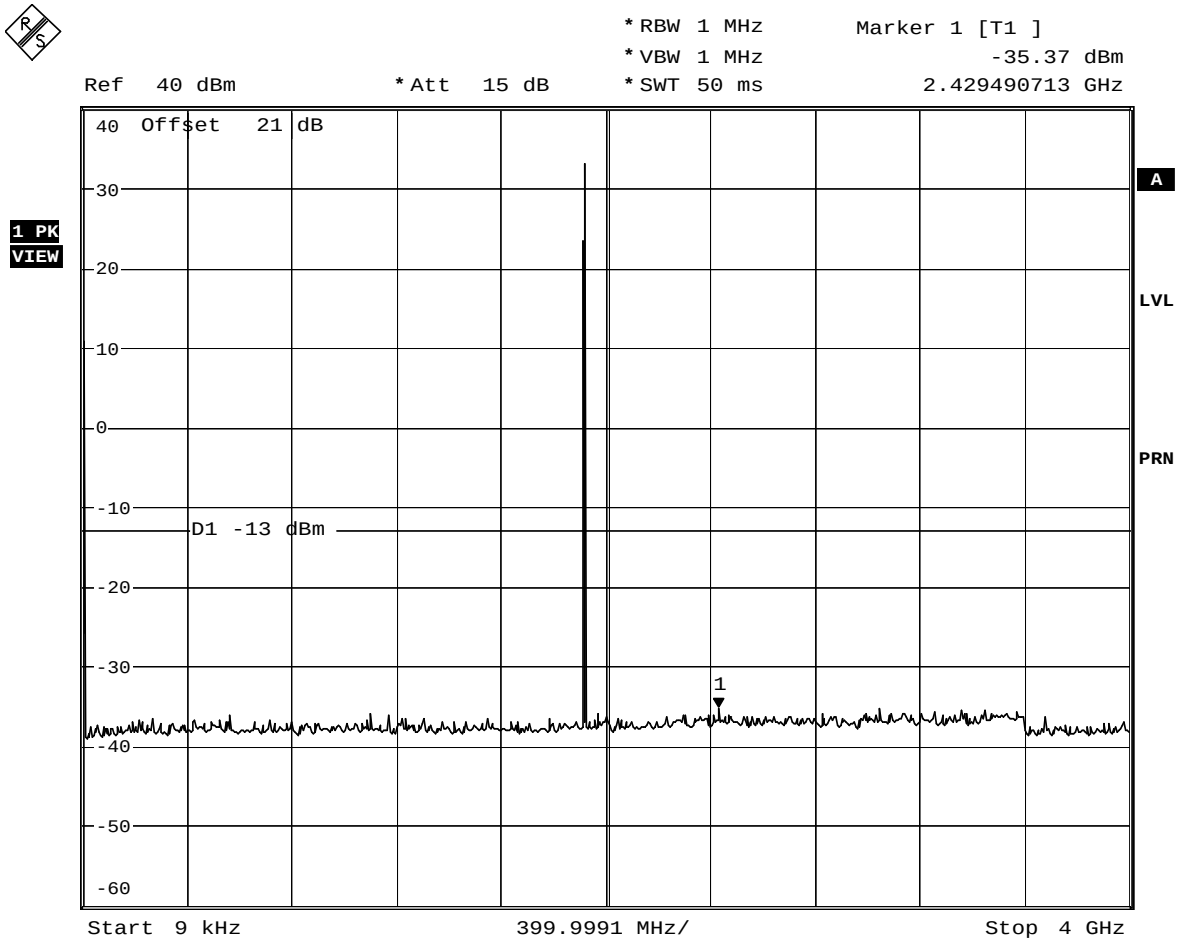


Date: 17.OCT.2005 11:33:16

Serial Number: 00108-00-006341-3
GPRS - Spurious Emissions (12GHz – 20GHz)
Channel 661 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

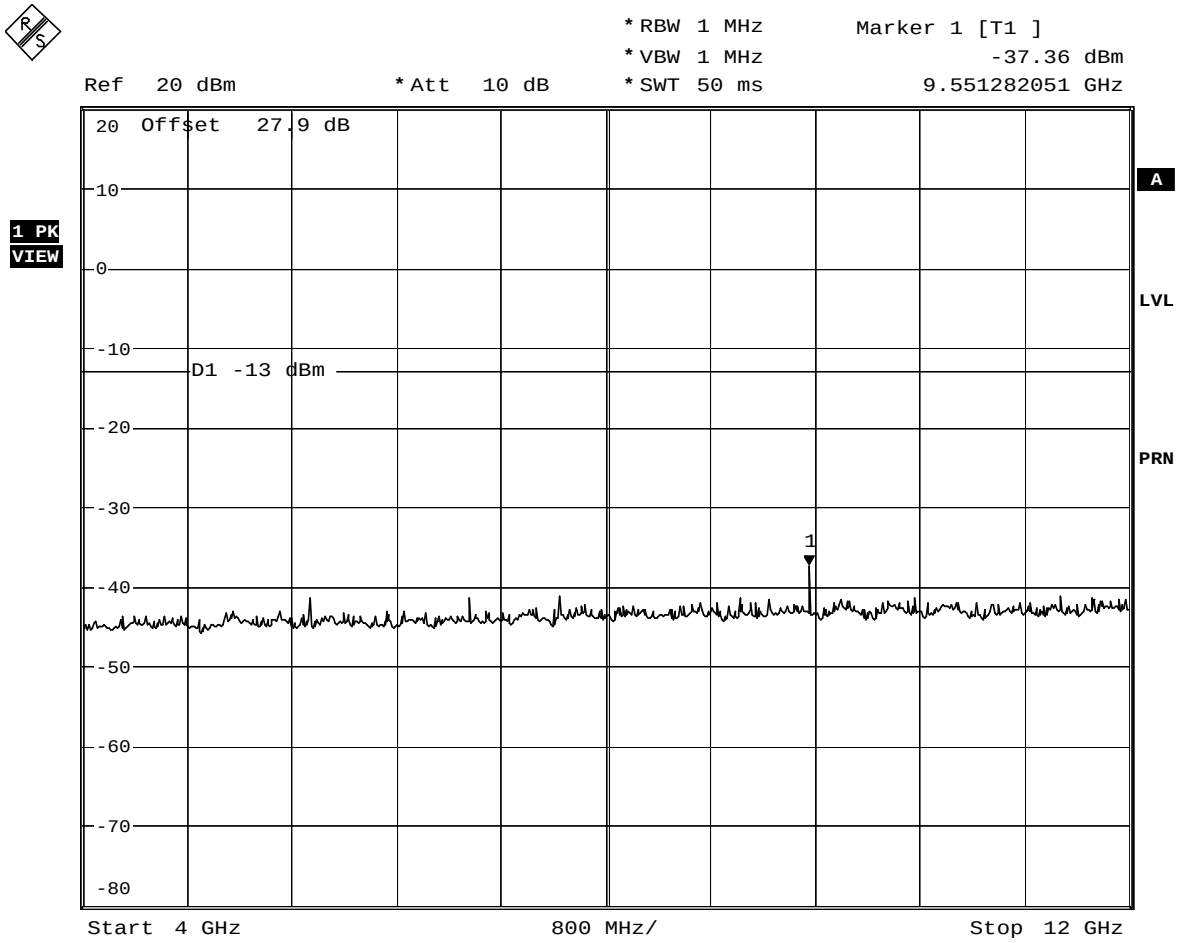
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
GPRS - Spurious Emissions (9kHz – 4GHz)
Channel 810 (1909.8MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

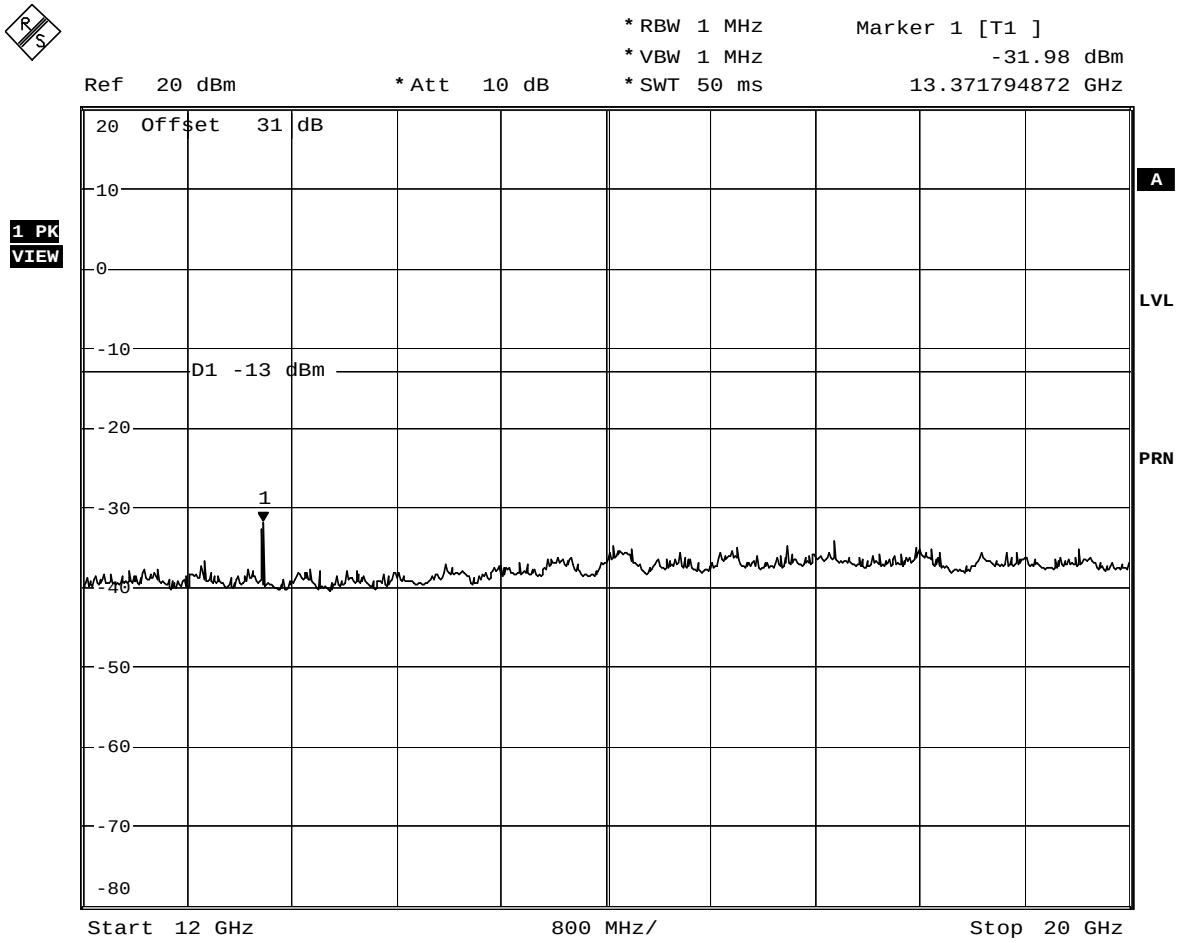
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
GPRS - Spurious Emissions (4GHz – 12GHz)
Channel 810 (1909.8MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

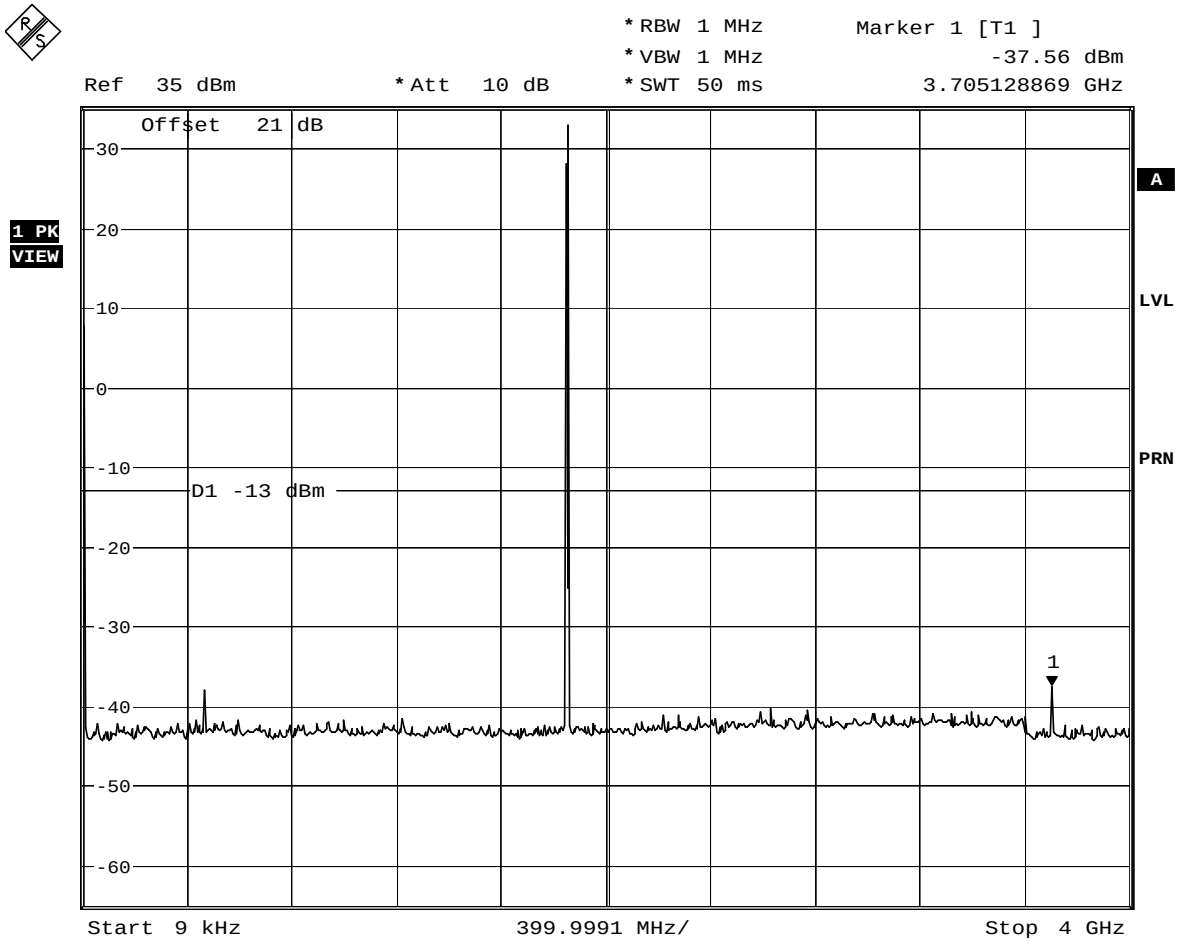


Date: 17.OCT.2005 11:34:19

Serial Number: 00108-00-006341-3
GPRS - Spurious Emissions (12GHz – 20GHz)
Channel 810 (1909.8MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

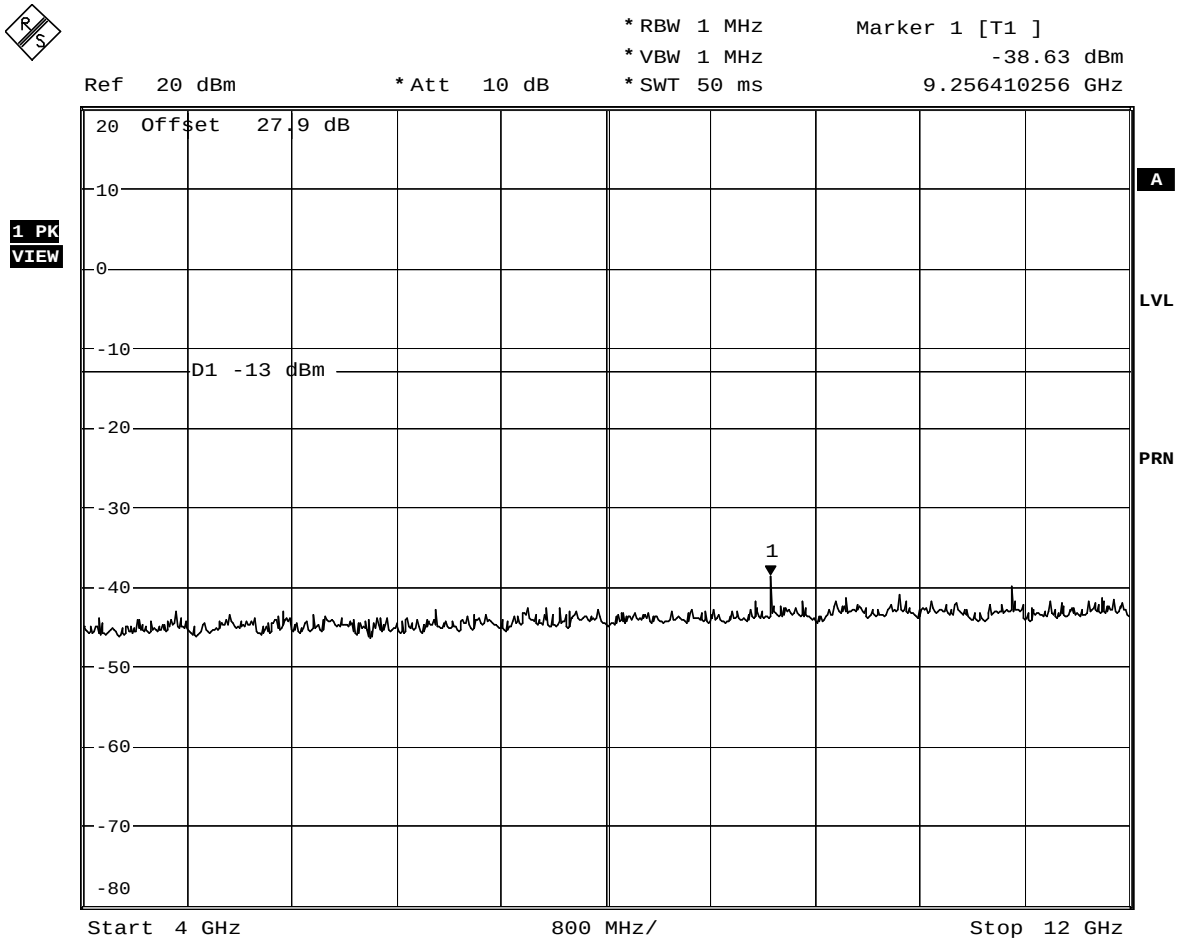


Date: 18.OCT.2005 11:52:08

Serial Number: 00108-00-006341-3
EDGE - Spurious Emissions (9kHz – 4GHz)
Channel 512 (1850.2MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

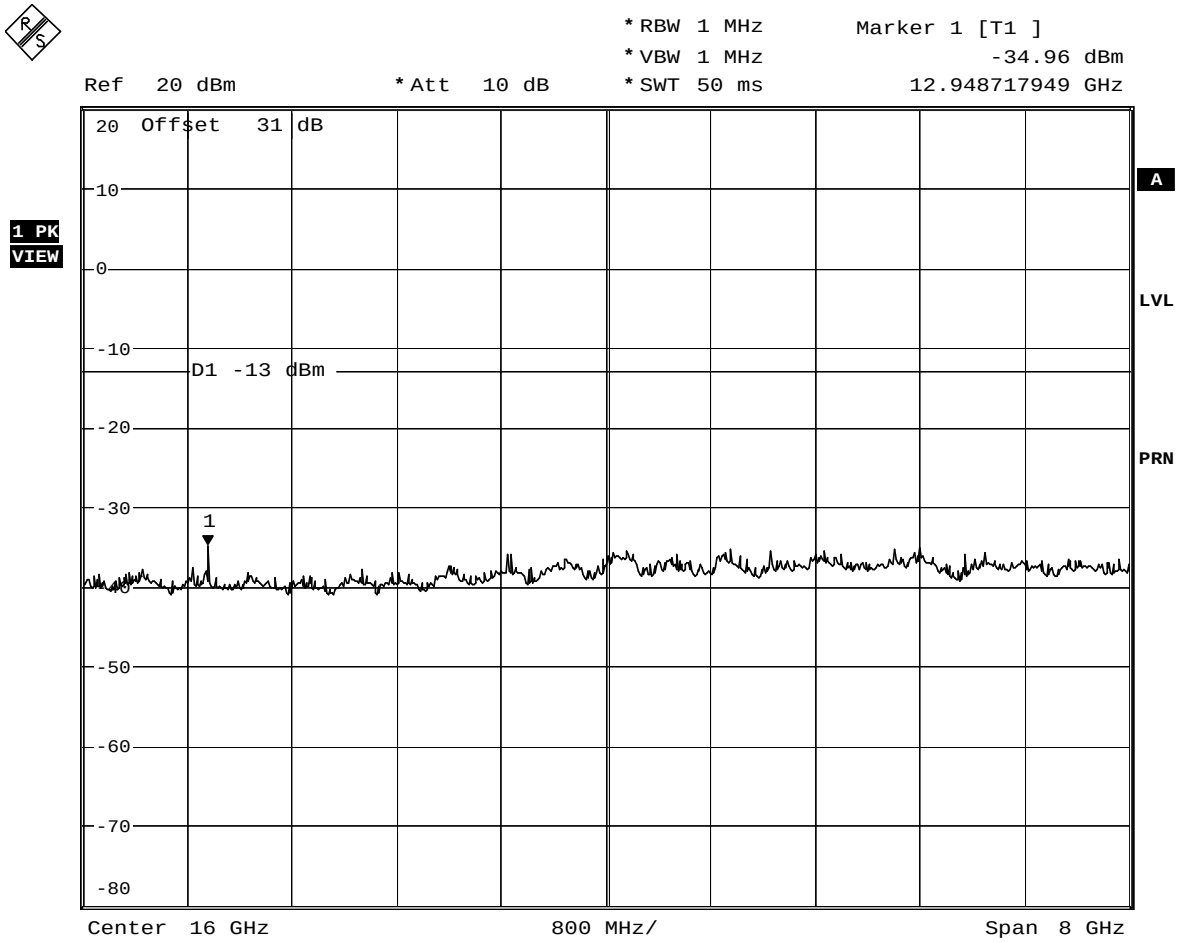
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
EDGE - Spurious Emissions (4GHz – 12GHz)
Channel 512 (1850.2MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

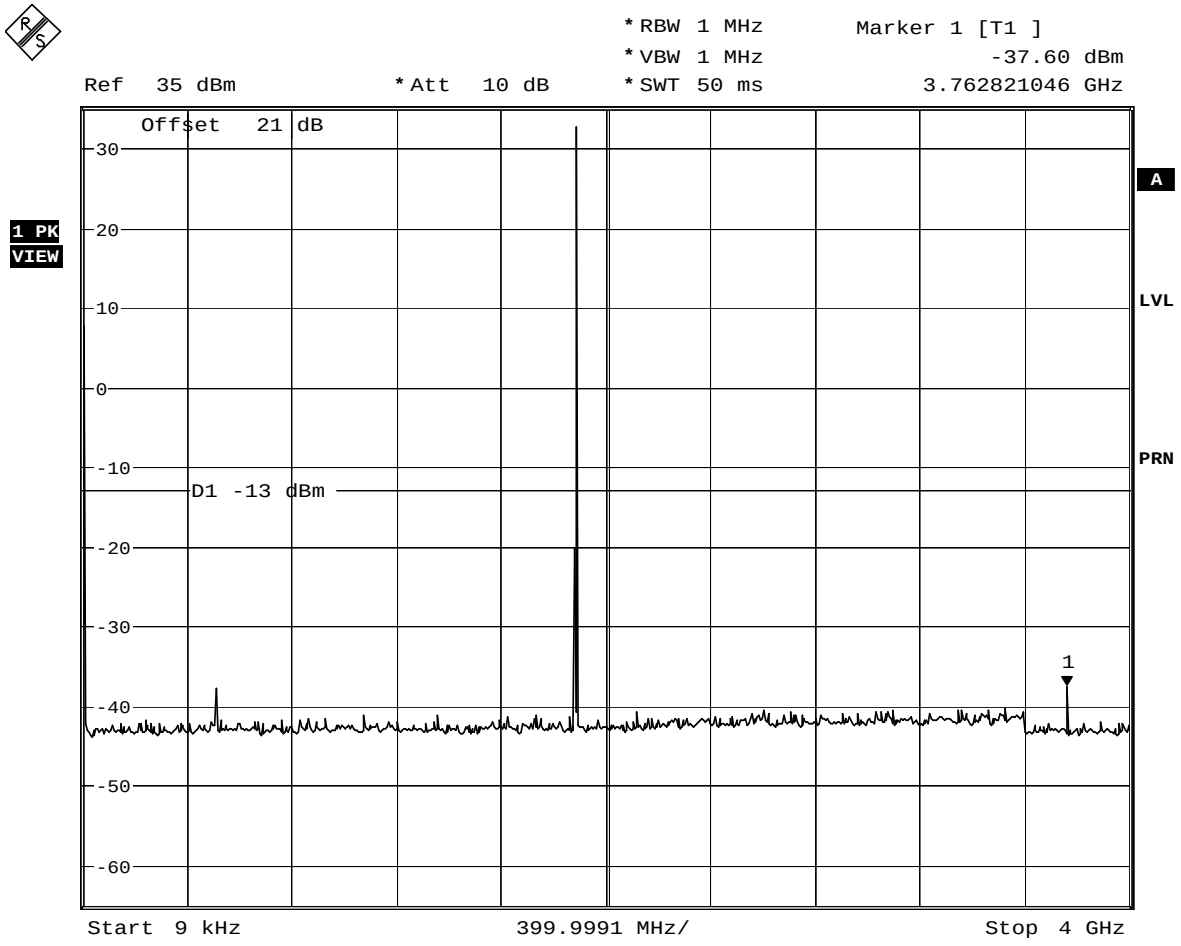
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
EDGE - Spurious Emissions (12GHz – 20GHz)
Channel 512 (1850.2MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

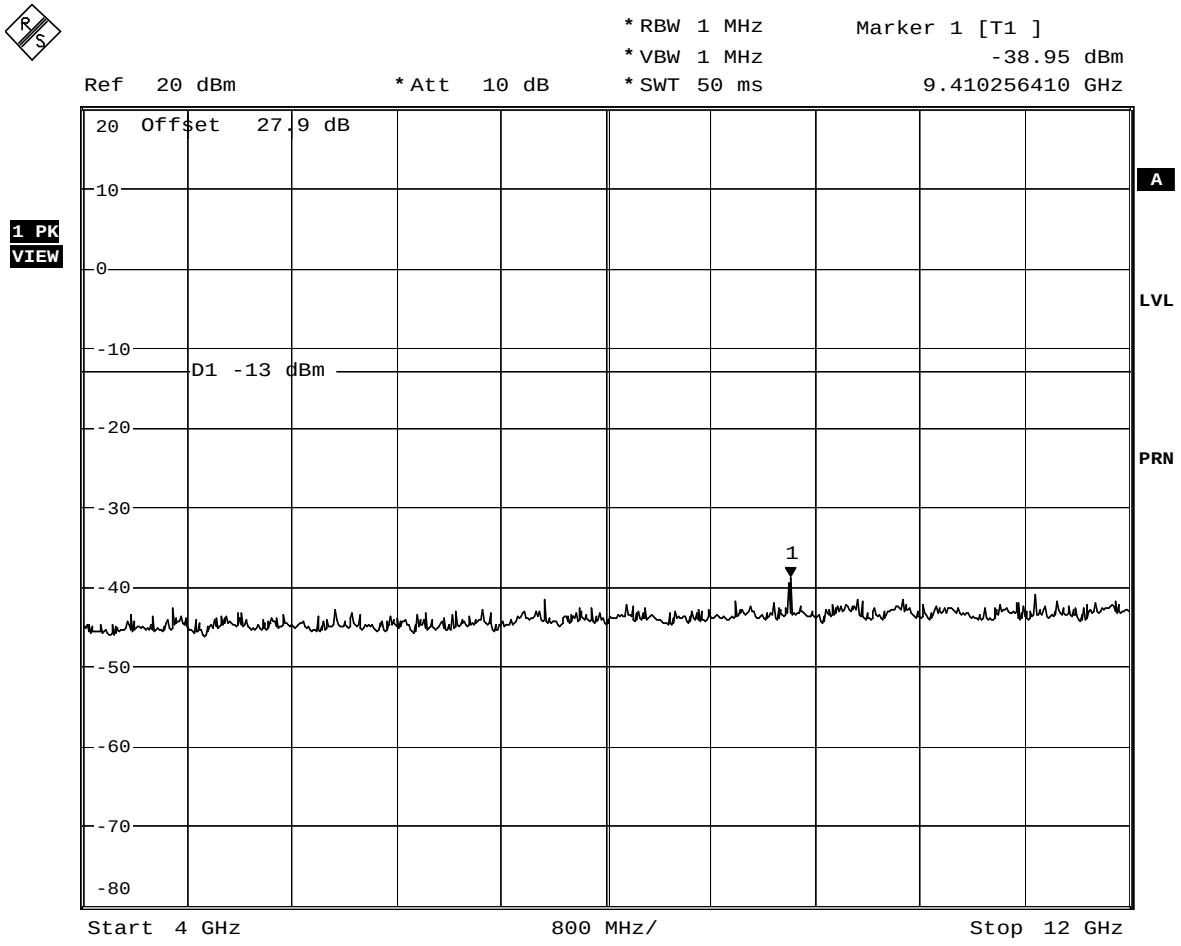


Date: 18.OCT.2005 11:53:34

Serial Number: 00108-00-006341-3
EDGE - Spurious Emissions (9kHz – 4GHz)
Channel 661 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

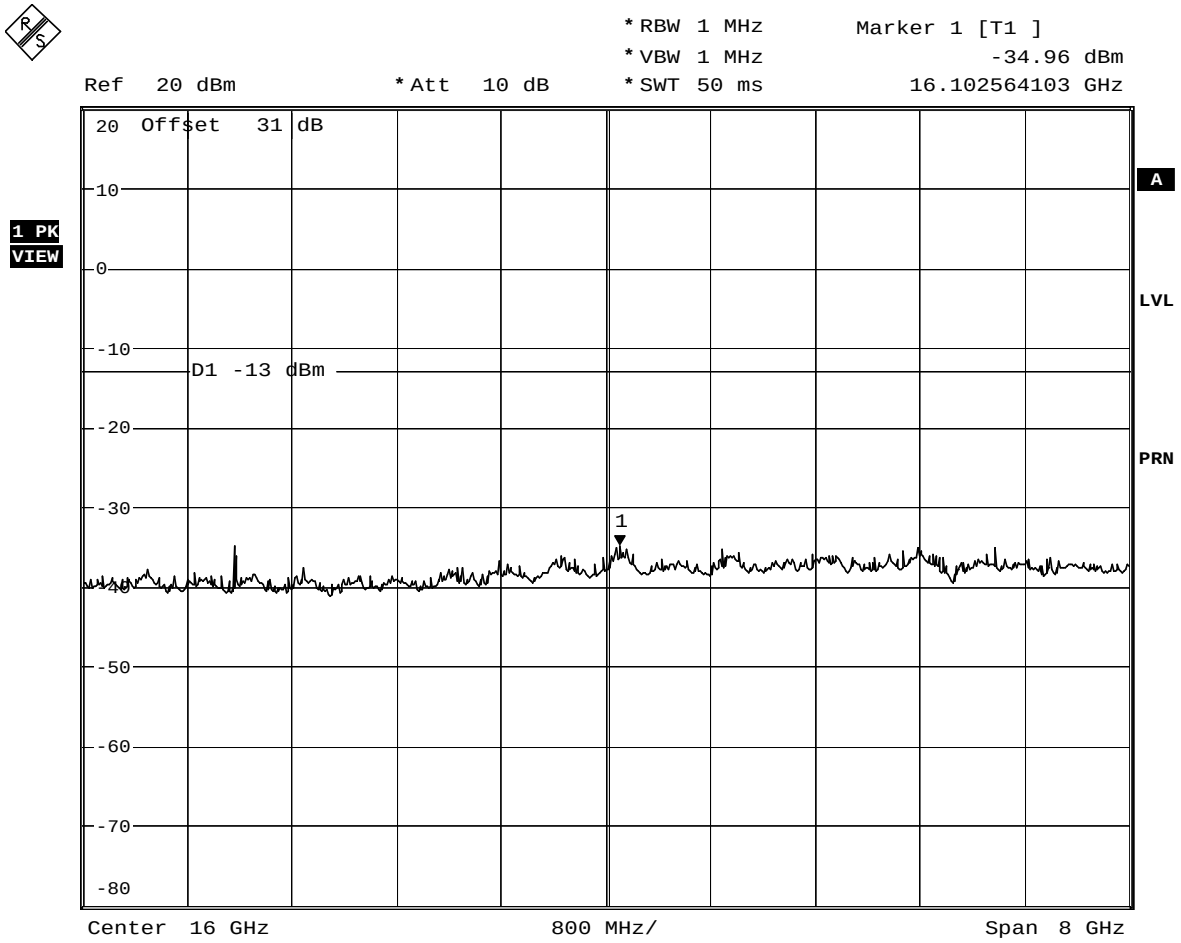
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
EDGE - Spurious Emissions (4GHz – 12GHz)
Channel 661 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

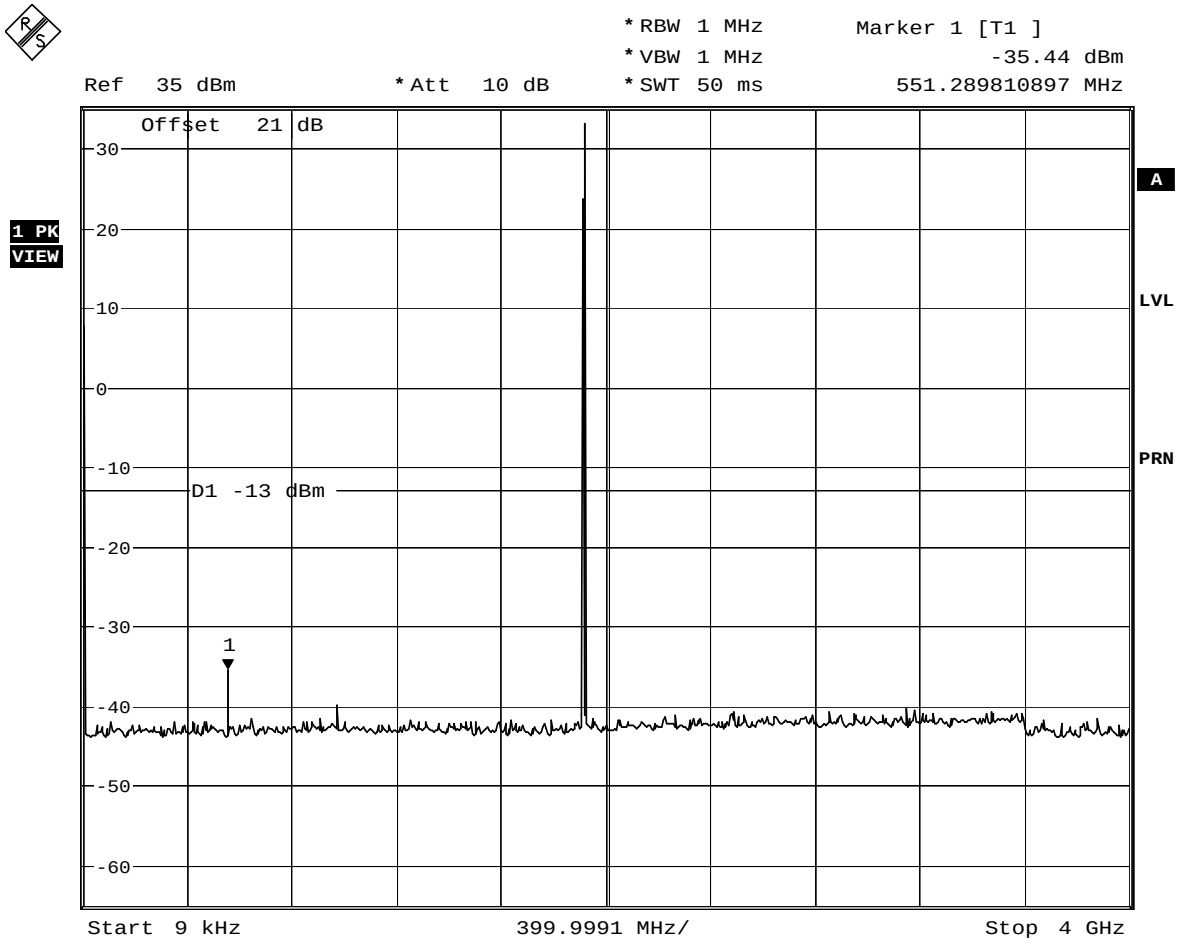


Date: 18.OCT.2005 12:11:01

Serial Number: 00108-00-006341-3
EDGE - Spurious Emissions (12GHz – 20GHz)
Channel 661 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

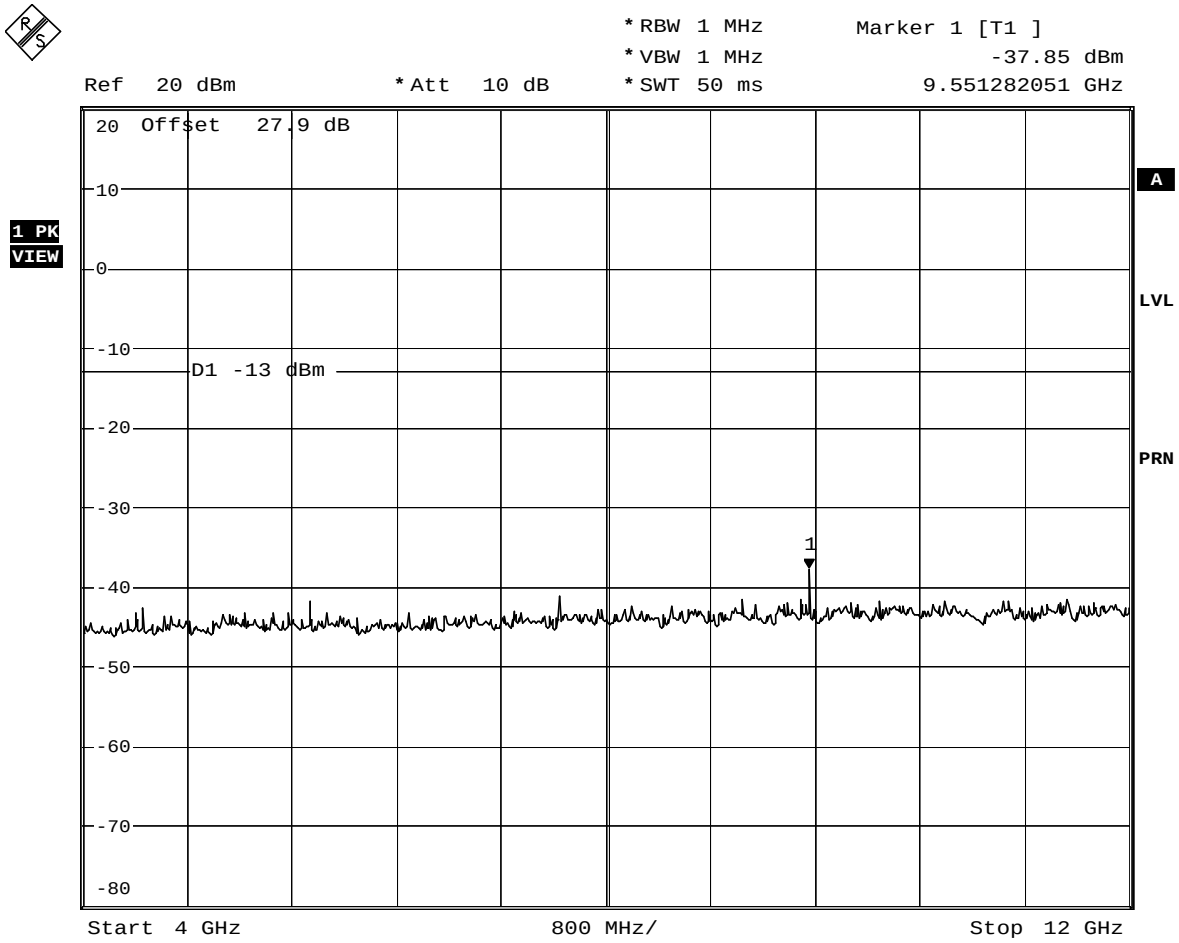
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
EDGE - Spurious Emissions (9kHz – 4GHz)
Channel 810 (1909.8MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

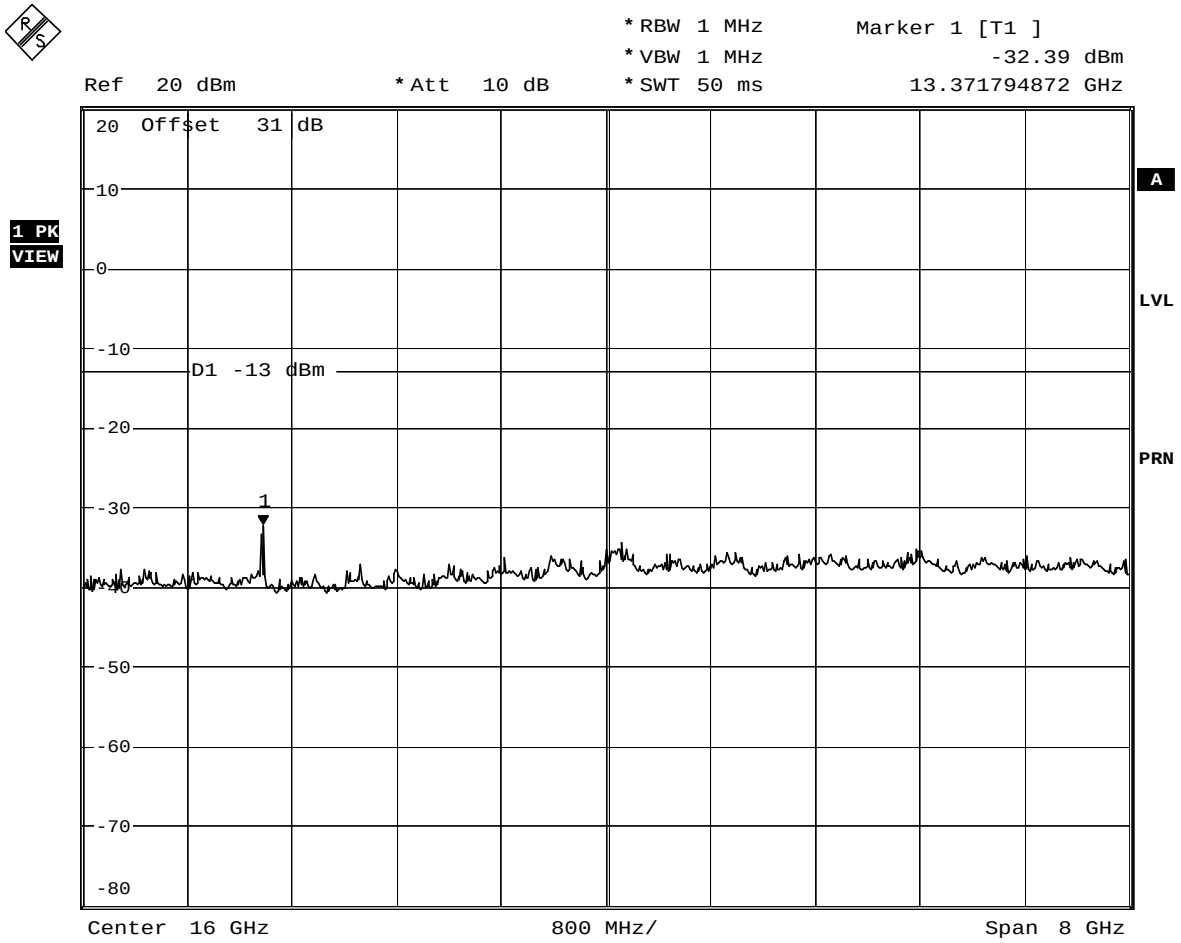


Date: 18.OCT.2005 12:05:31

Serial Number: 00108-00-006341-3
EDGE - Spurious Emissions (4GHz – 12GHz)
Channel 810 (1909.8MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

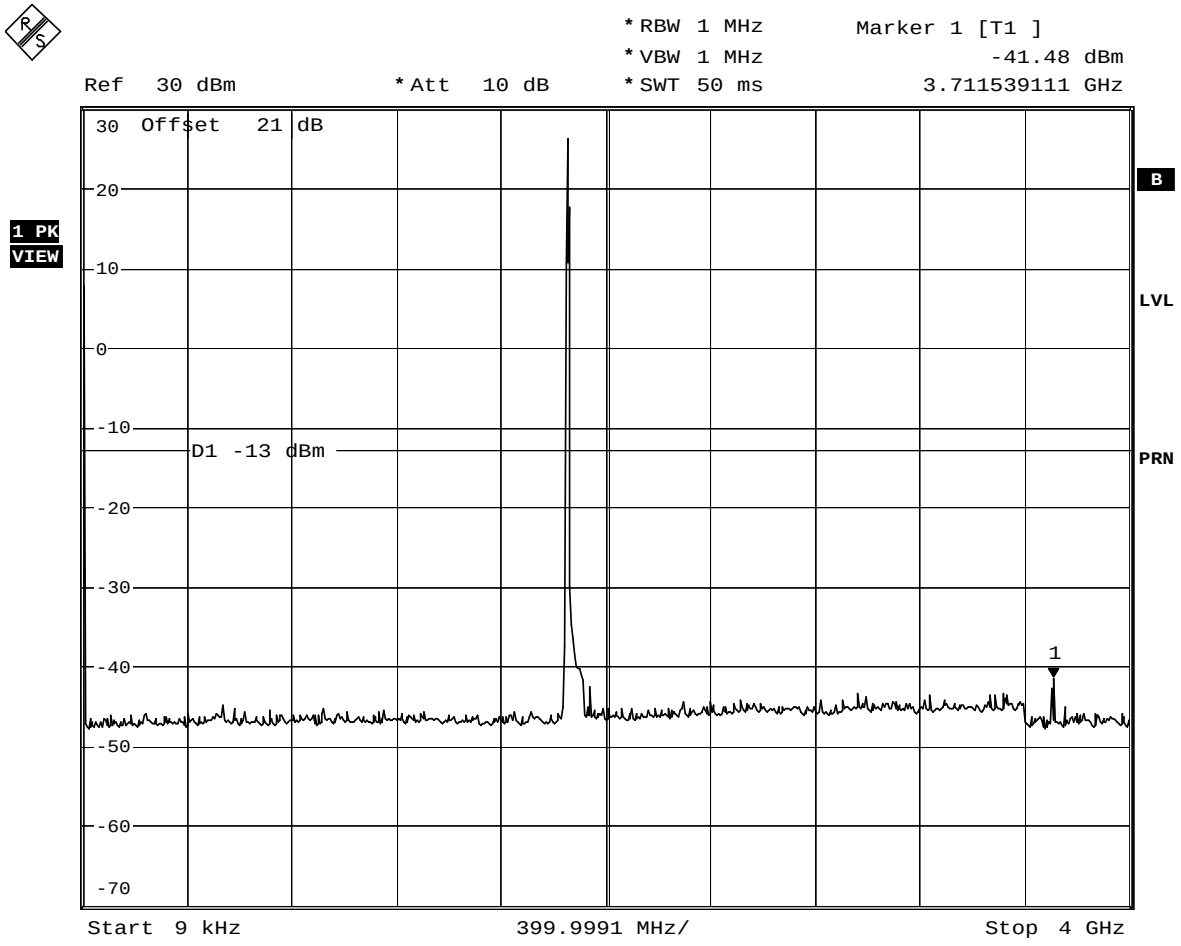


Date: 18.OCT.2005 12:11:53

Serial Number: 00108-00-006341-3
EDGE - Spurious Emissions (12GHz – 20GHz)
Channel 810 (1909.8MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

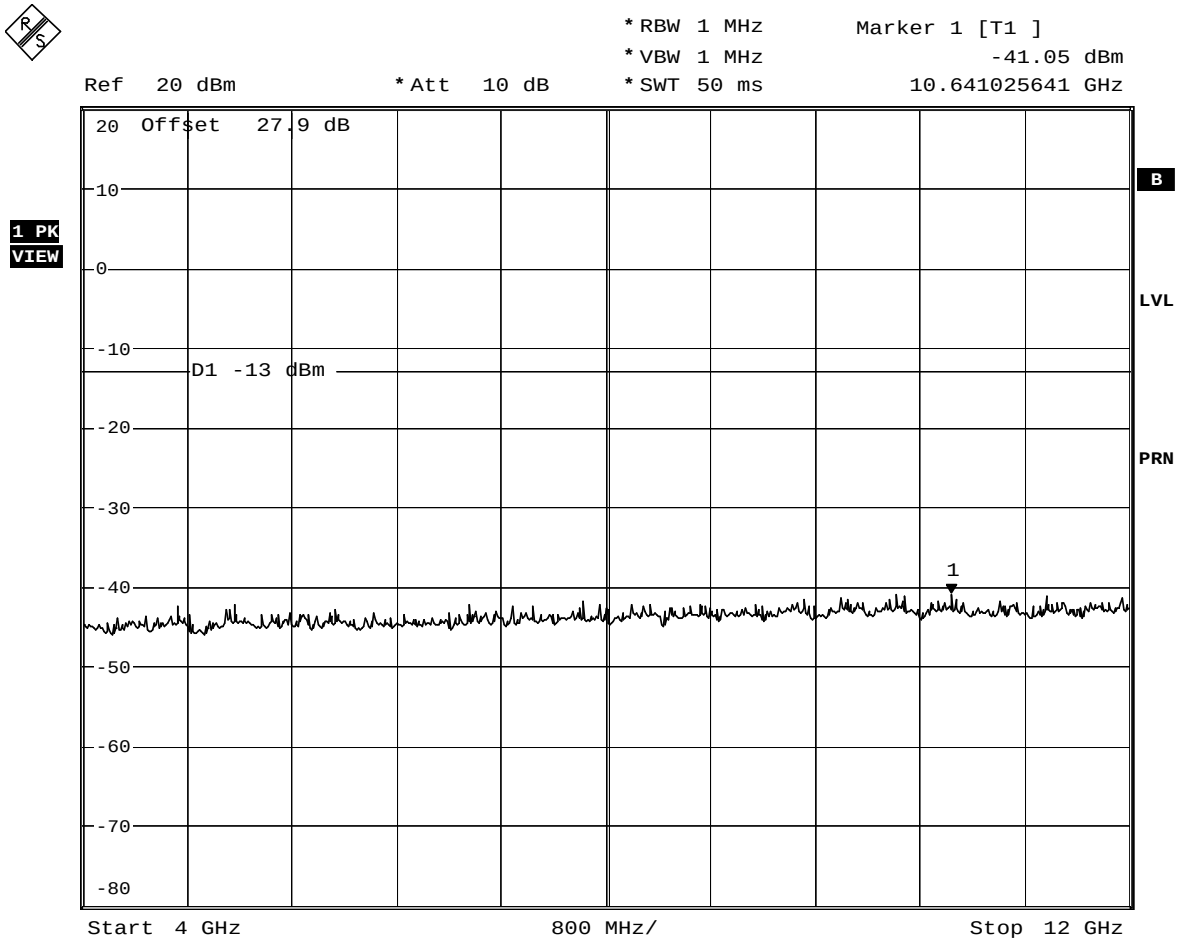


Date: 13.OCT.2005 14:26:54

Serial Number: 00108-00-006341-3
UMTS - Spurious Emissions (9kHz – 4GHz)
Channel 9262 (1852.4MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

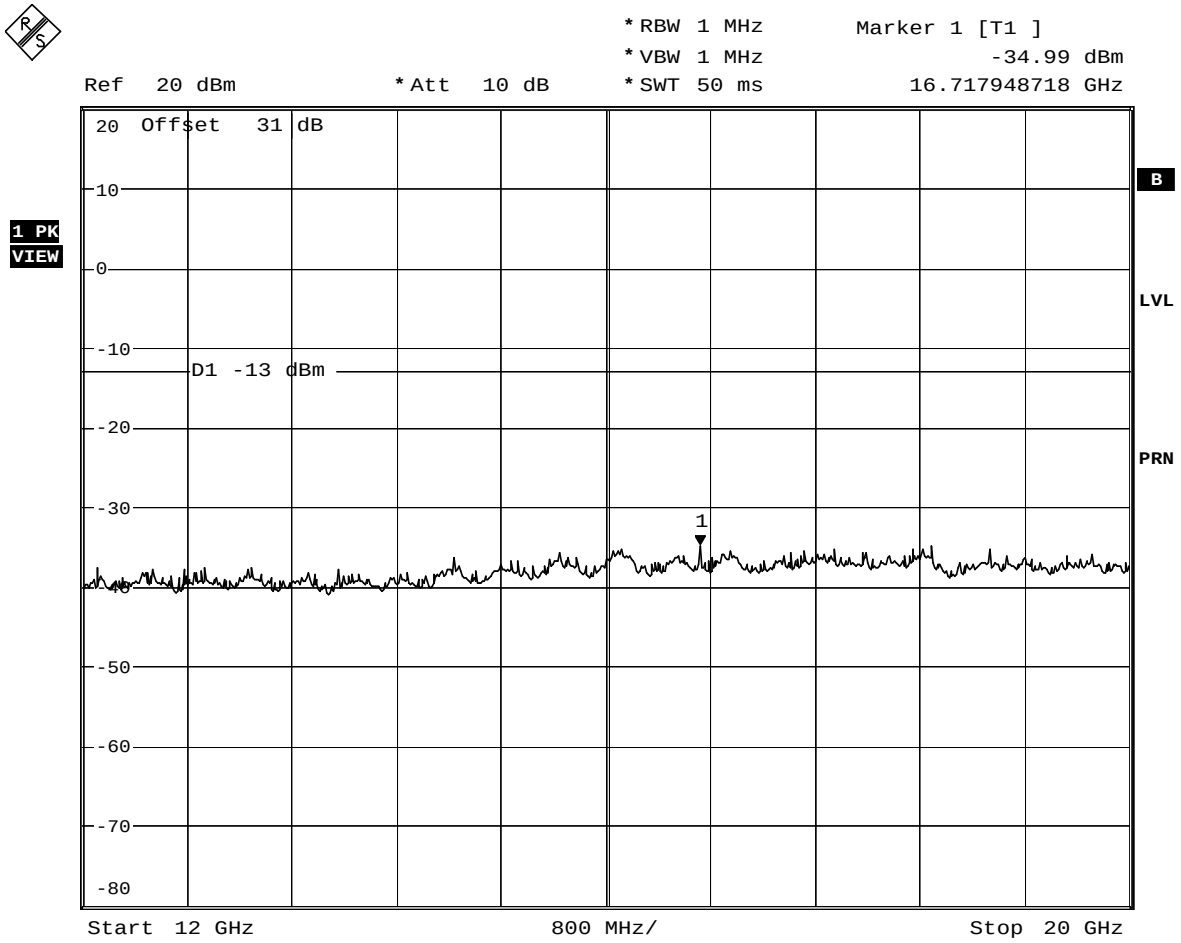
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
UMTS - Spurious Emissions (4GHz – 12GHz)
Channel 9262 (1852.4MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

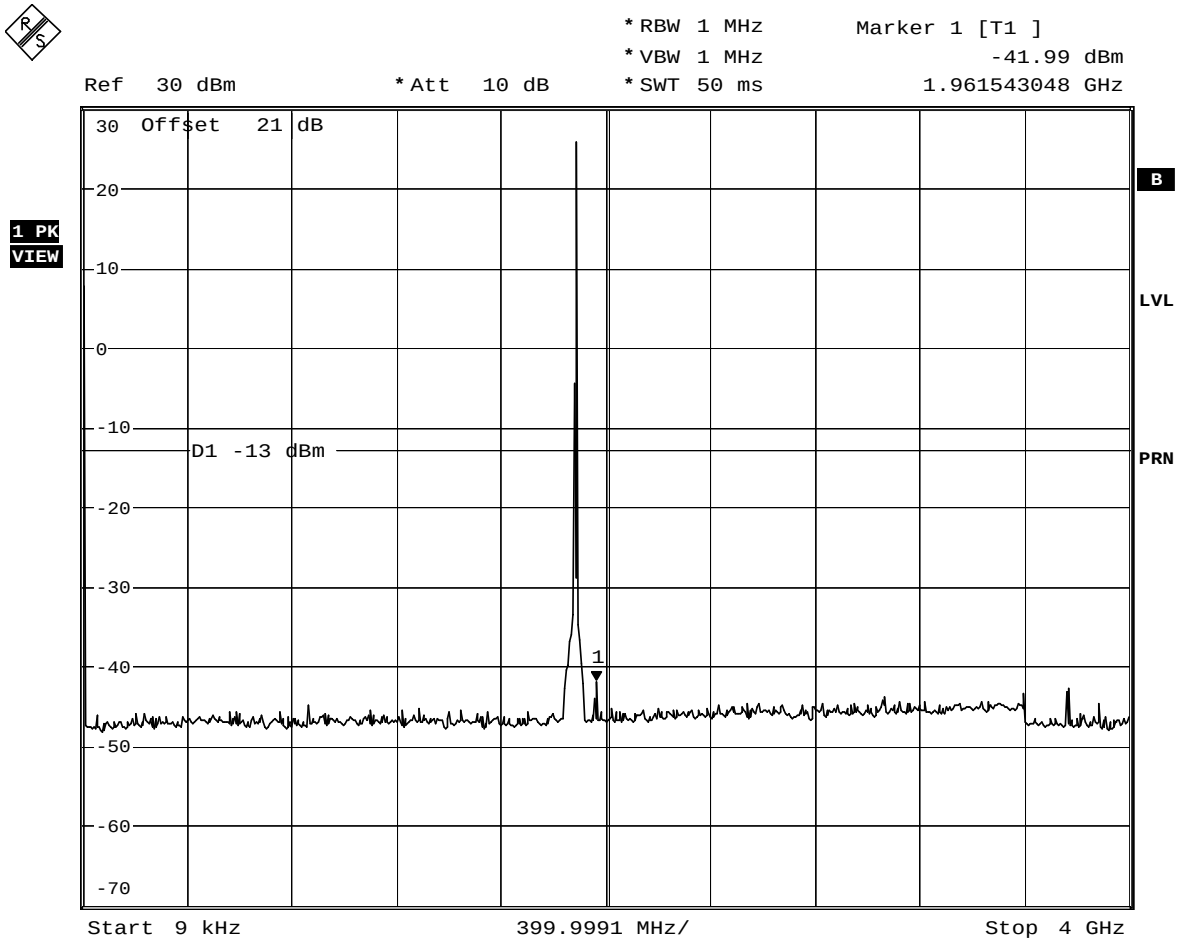


Date: 13.OCT.2005 14:22:43

Serial Number: 00108-00-006341-3
UMTS - Spurious Emissions (12GHz – 20GHz)
Channel 9262 (1852.4MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

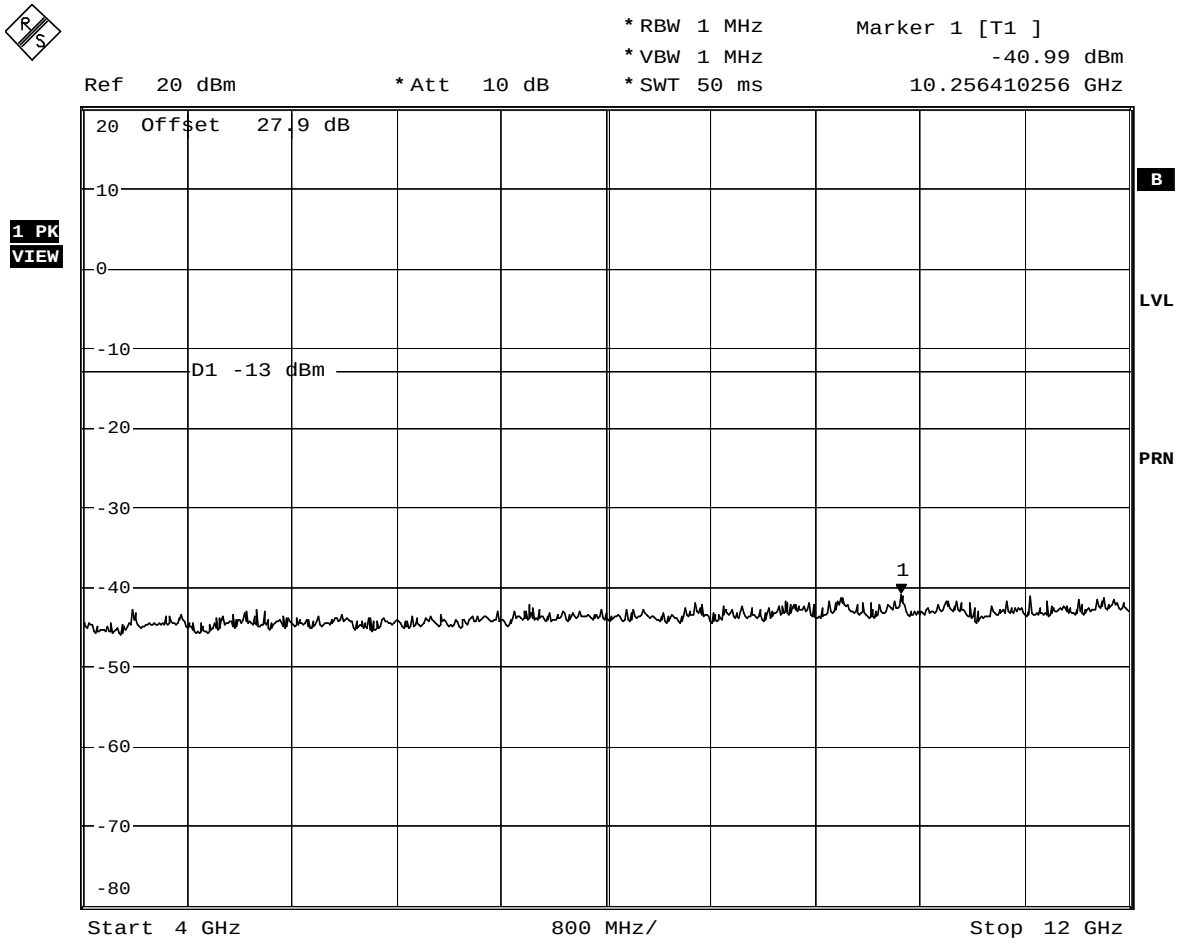


Date: 13.OCT.2005 14:28:05

Serial Number: 00108-00-006341-3
UMTS - Spurious Emissions (9kHz – 4GHz)
Channel 9400 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

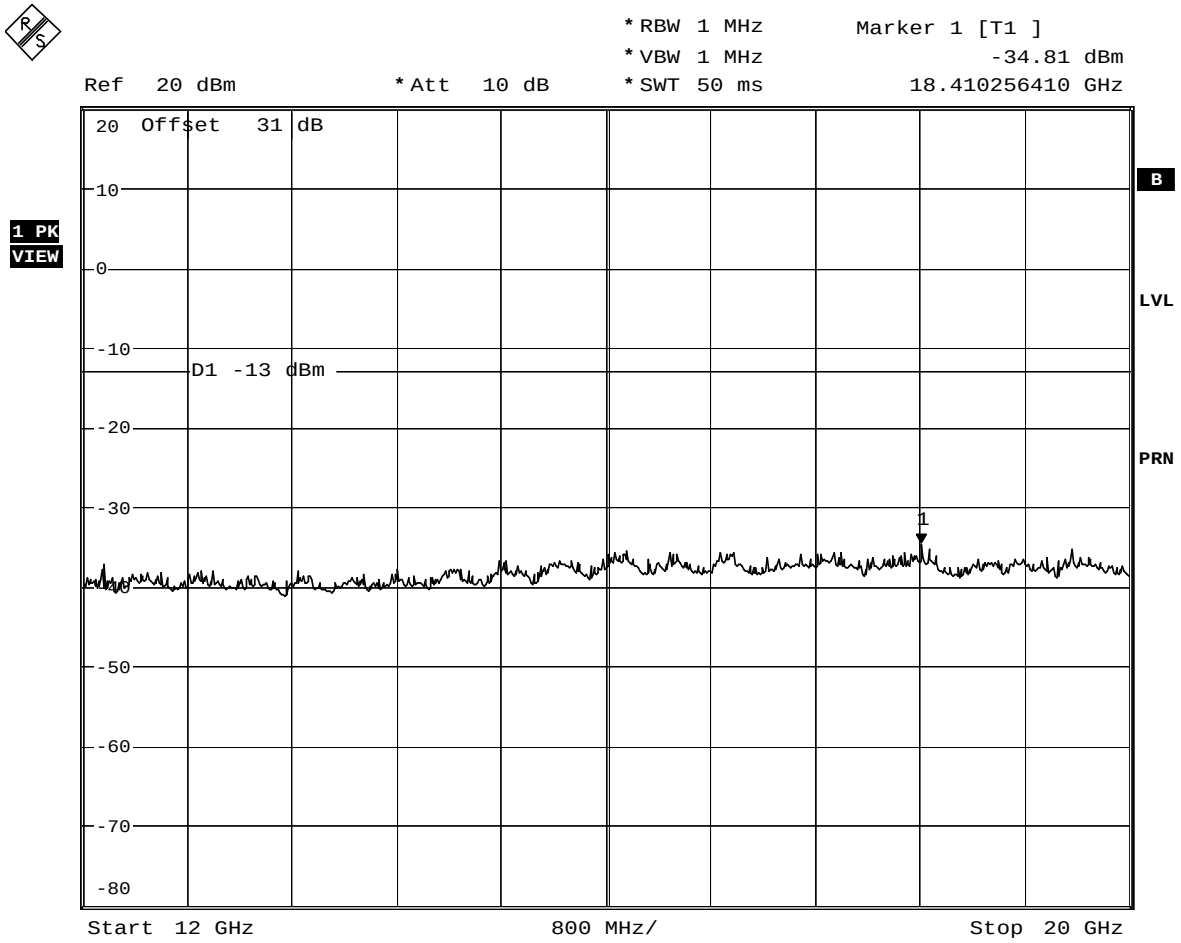


Date: 13.OCT.2005 14:15:09

Serial Number: 00108-00-006341-3
UMTS - Spurious Emissions (4GHz – 12GHz)
Channel 9400 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

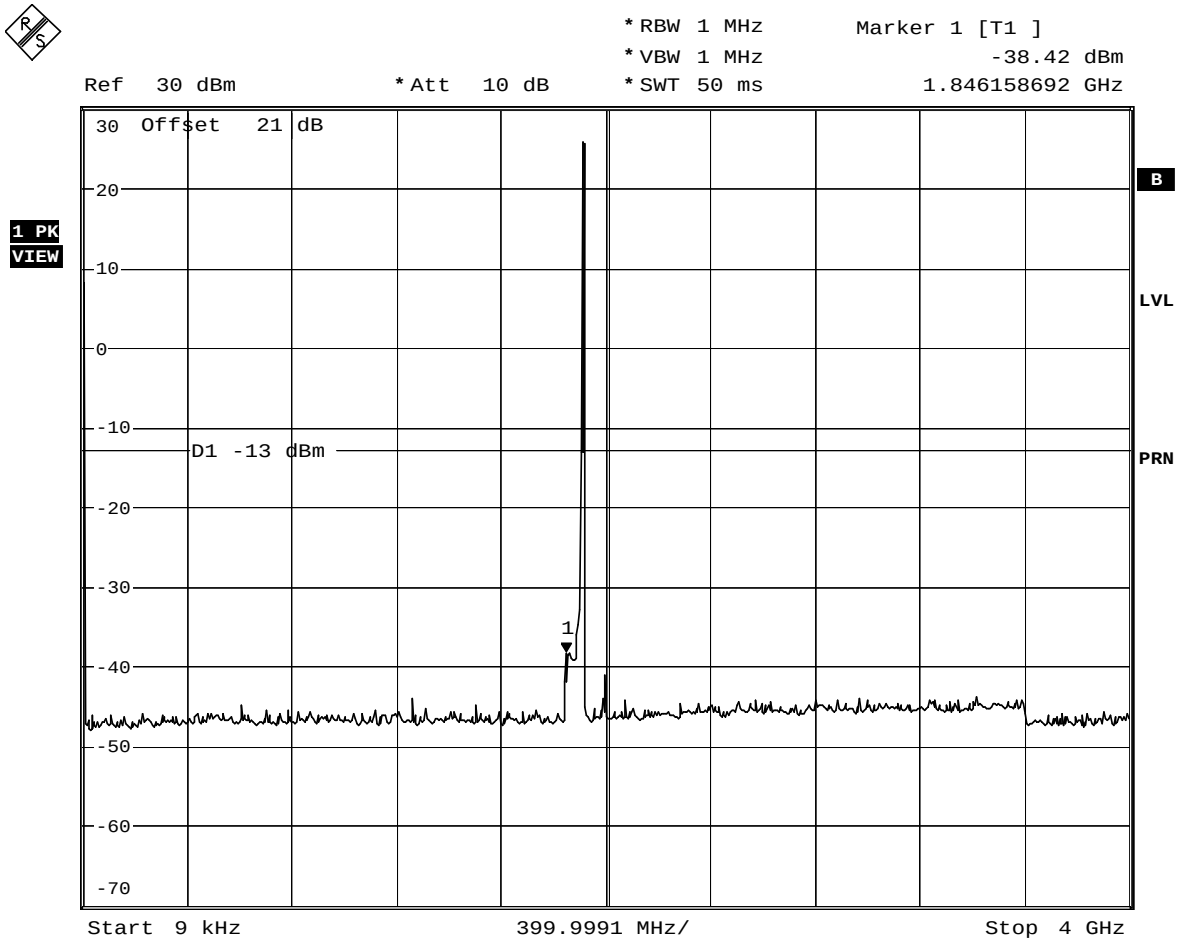


Date: 13.OCT.2005 14:21:52

Serial Number: 00108-00-006341-3
UMTS - Spurious Emissions (12GHz – 20GHz)
Channel 9400 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

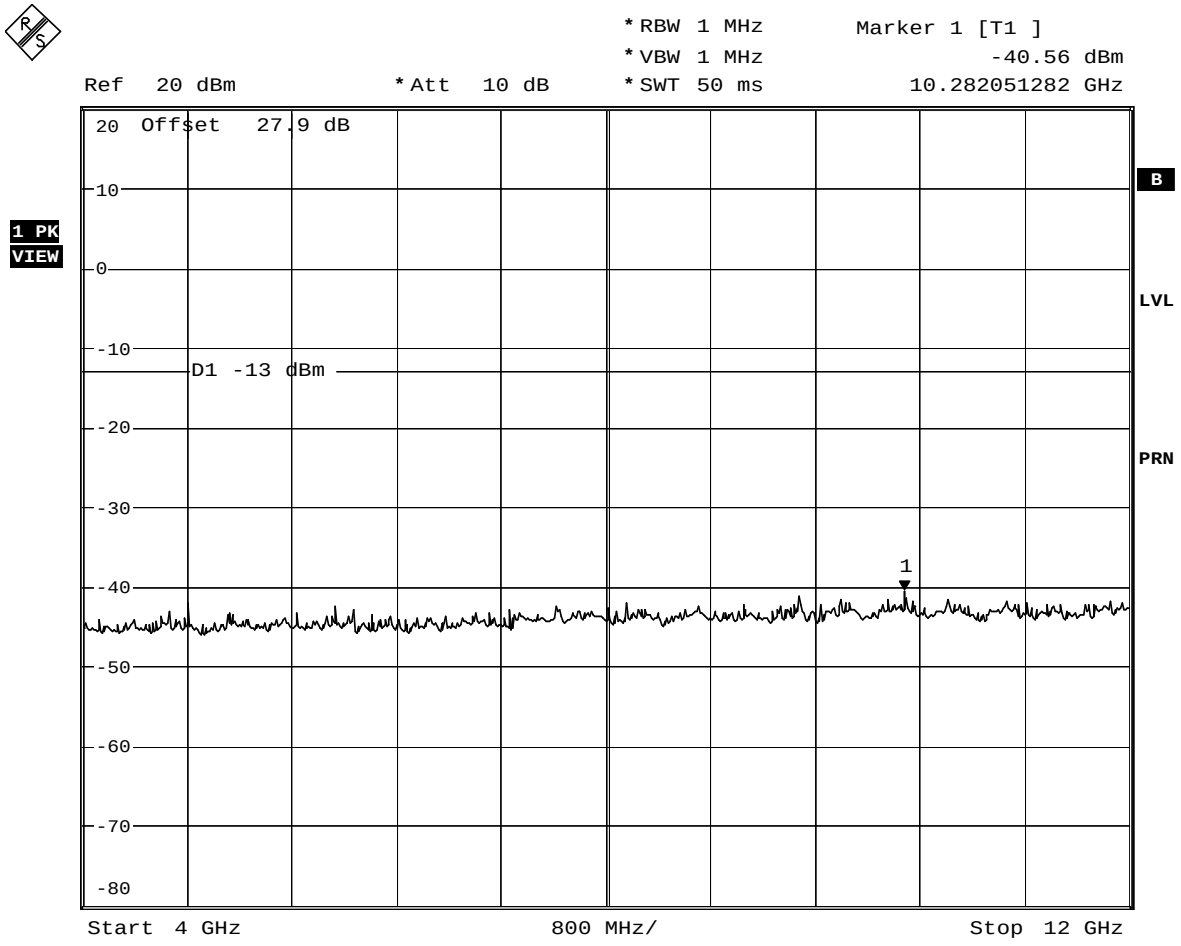


Date: 13.OCT.2005 14:29:44

Serial Number: 00108-00-006341-3
UMTS - Spurious Emissions (9kHz – 4GHz)
Channel 9538 (1907.6MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

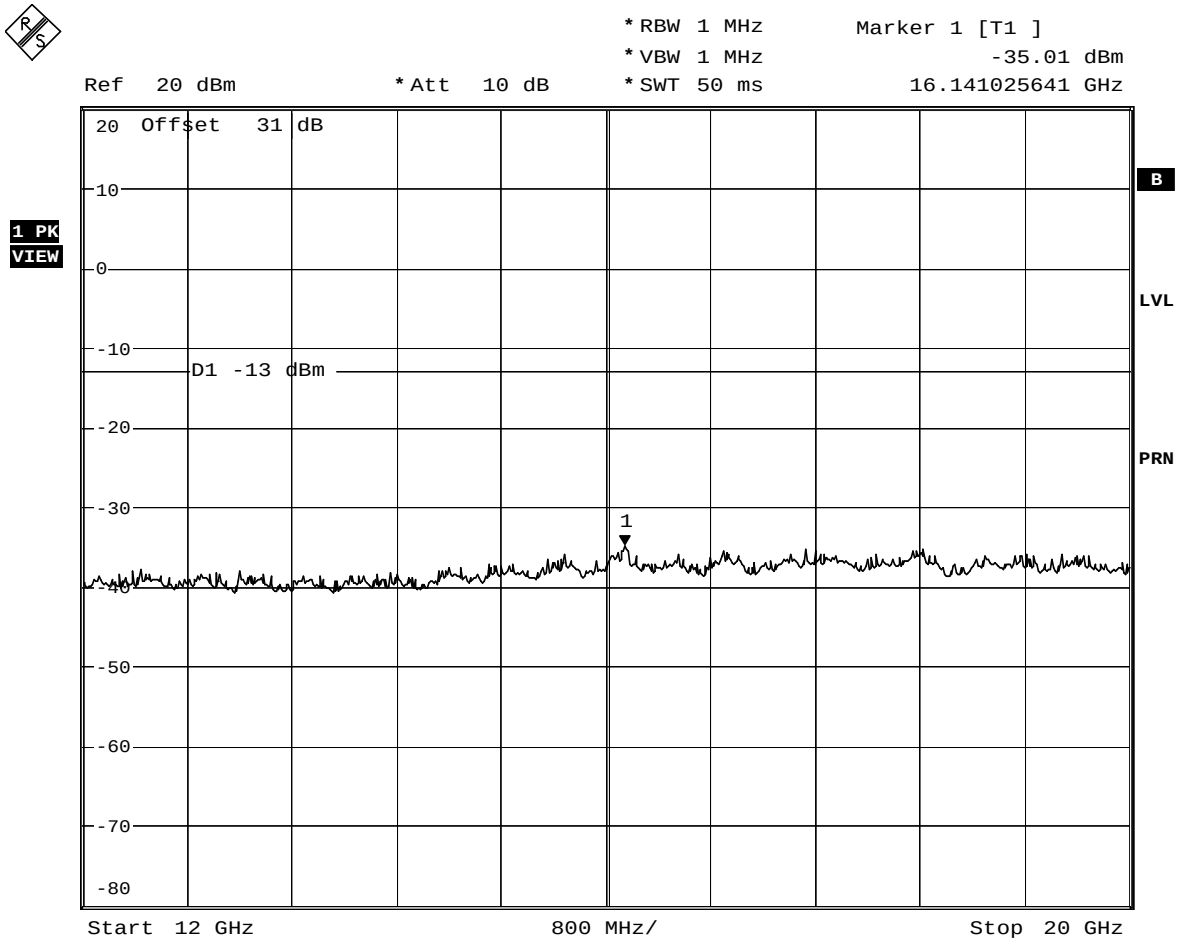


Date: 13.OCT.2005 14:15:59

Serial Number: 00108-00-006341-3
UMTS - Spurious Emissions (4GHz – 12GHz)
Channel 9538 (1907.6MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

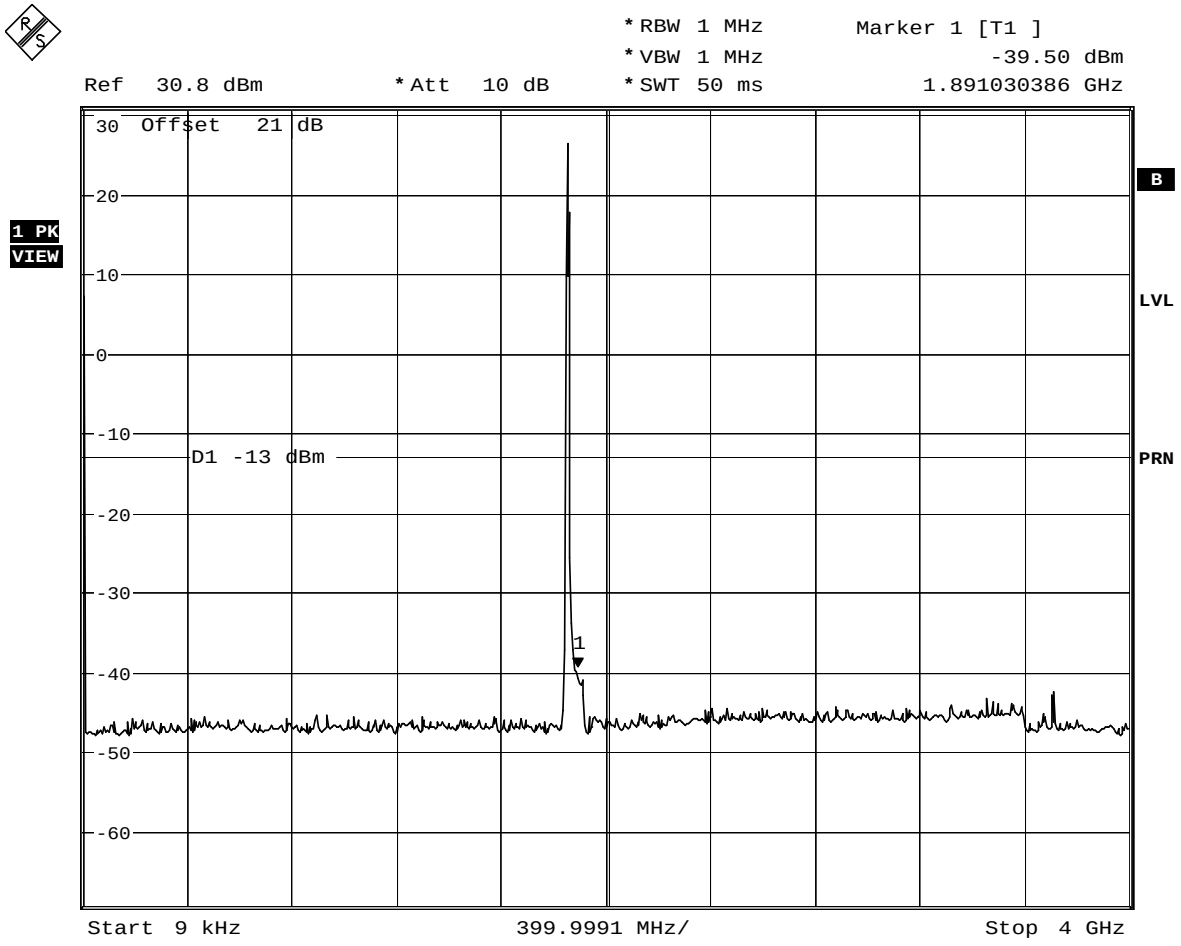


Date: 13.OCT.2005 14:20:59

Serial Number: 00108-00-006341-3
UMTS - Spurious Emissions (12GHz – 20GHz)
Channel 9538 (1907.6MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

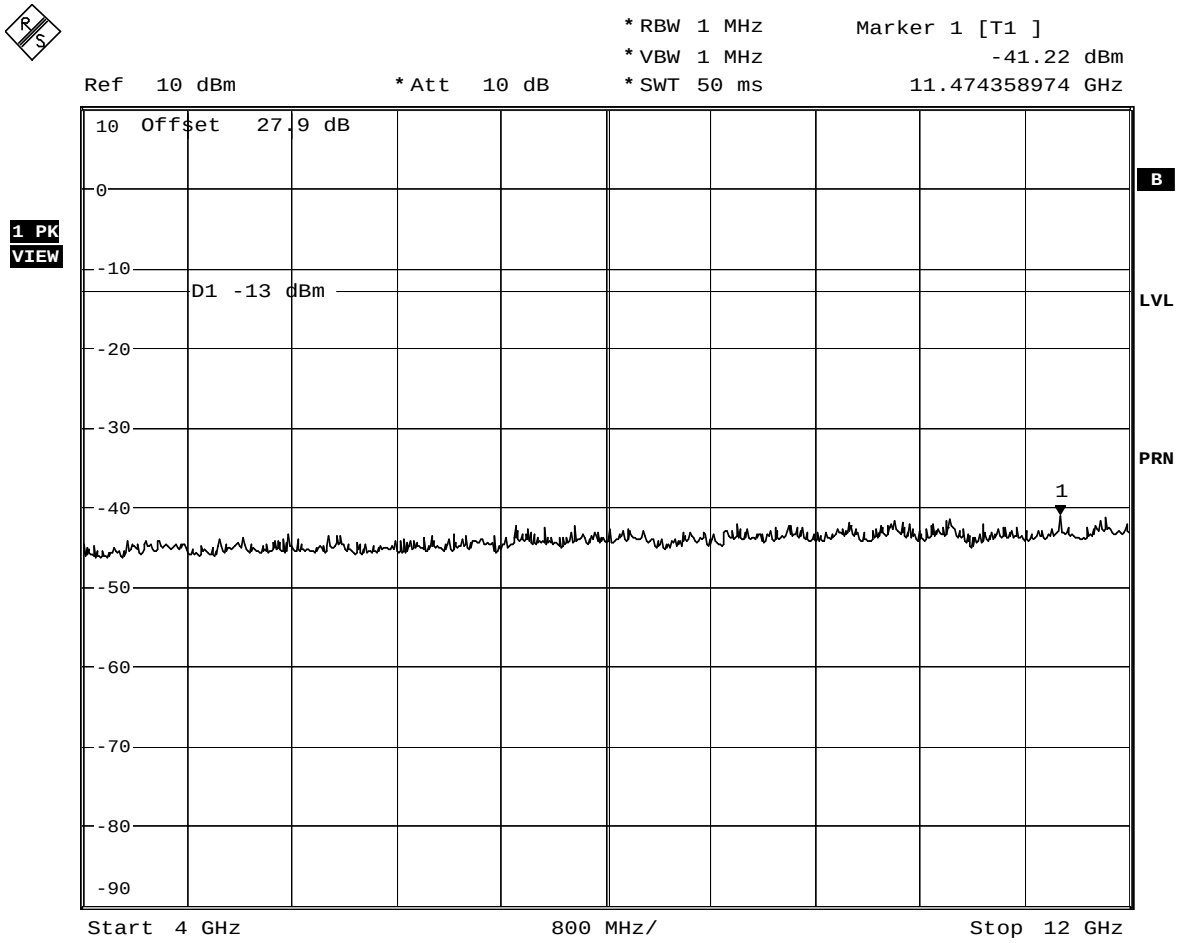
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
HSDPA - Spurious Emissions (9kHz – 4GHz)
Channel 9262 (1852.4MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

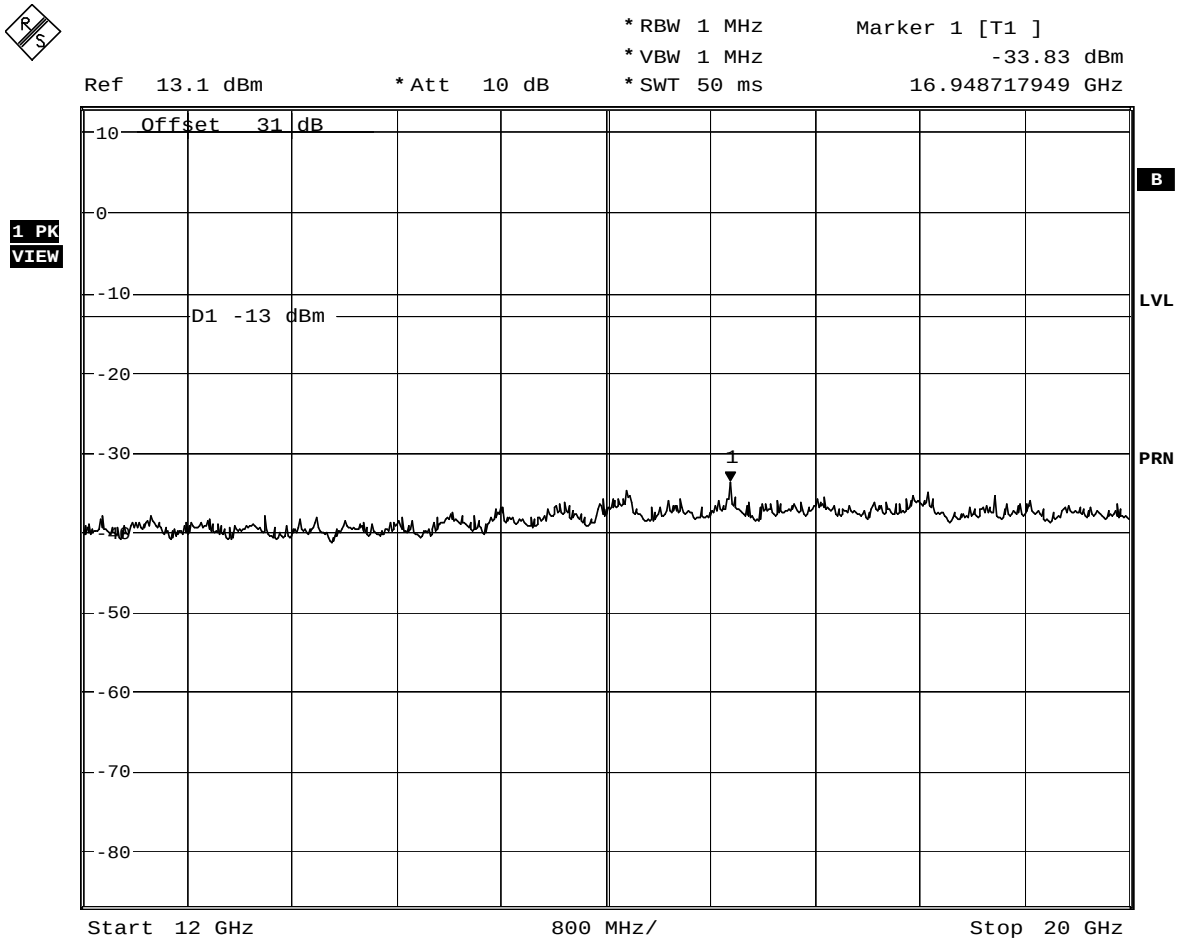


Date: 12.OCT.2005 12:22:13

Serial Number: 00108-00-006341-3
HSDPA - Spurious Emissions (4GHz – 12GHz)
Channel 9262 (1852.4MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

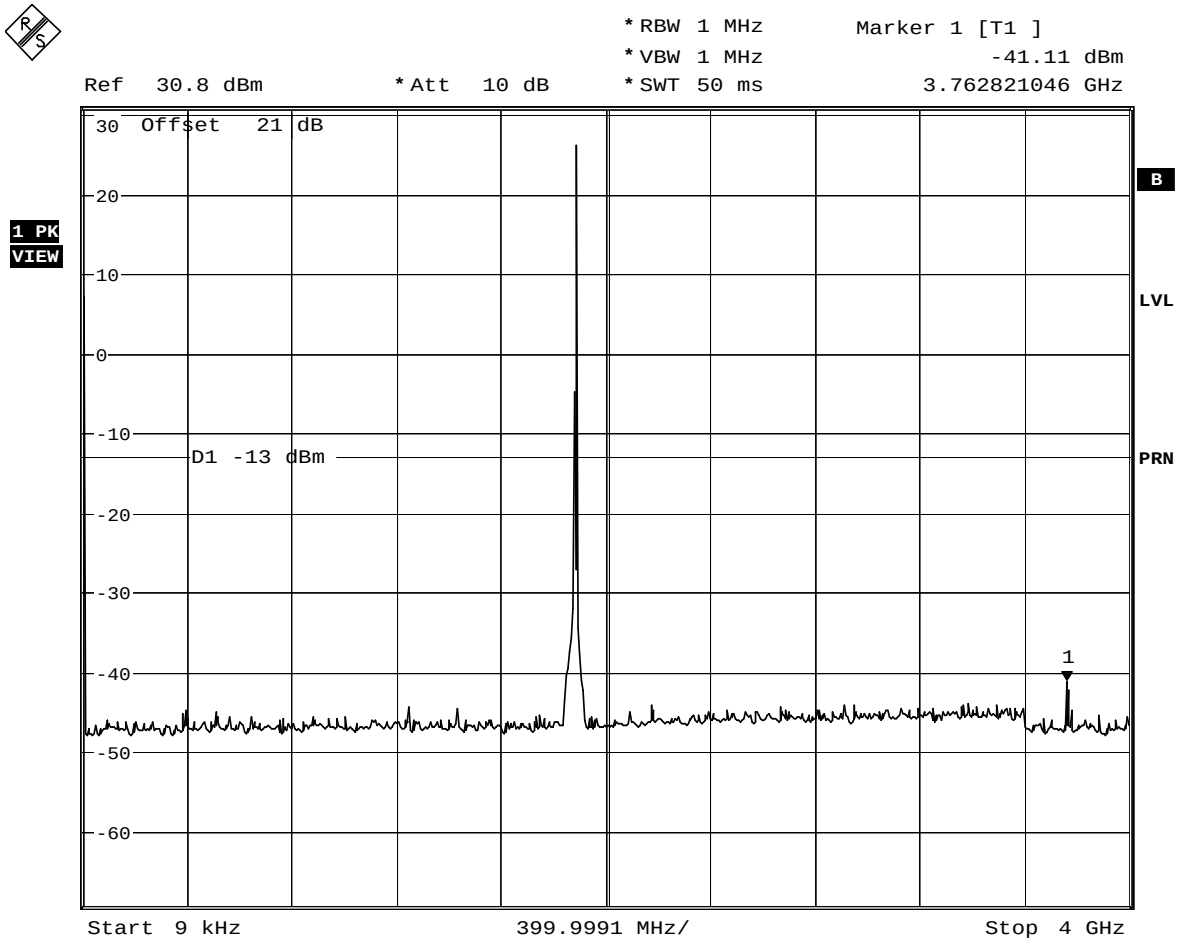


Date: 12.OCT.2005 12:25:18

Serial Number: 00108-00-006341-3
HSDPA - Spurious Emissions (12GHz – 20GHz)
Channel 9262 (1852.4MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

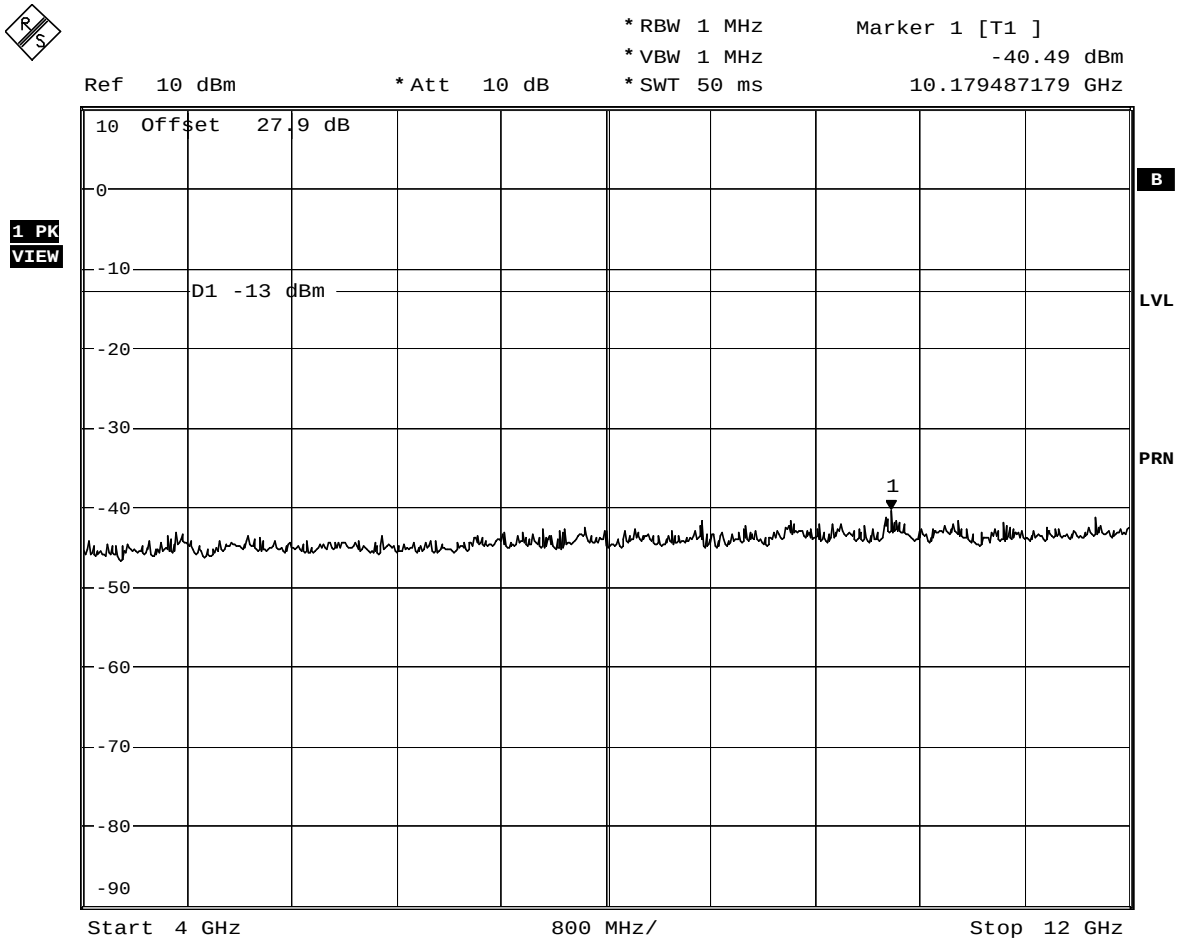


Date: 12.OCT.2005 12:15:35

Serial Number: 00108-00-006341-3
HSDPA - Spurious Emissions (9kHz – 4GHz)
Channel 9400 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

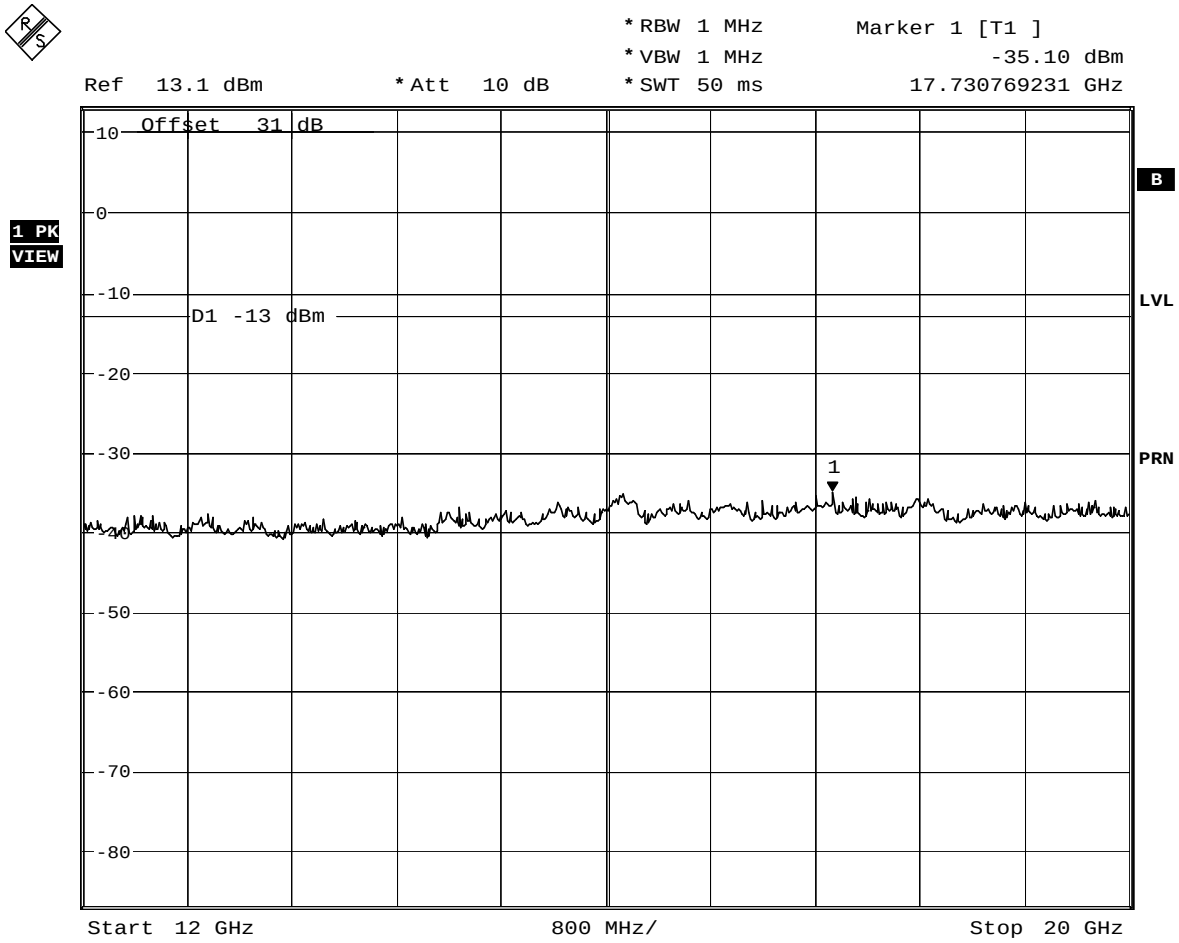


Date: 12.OCT.2005 12:21:11

Serial Number: 00108-00-006341-3
HSDPA - Spurious Emissions (4GHz – 12GHz)
Channel 9400 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

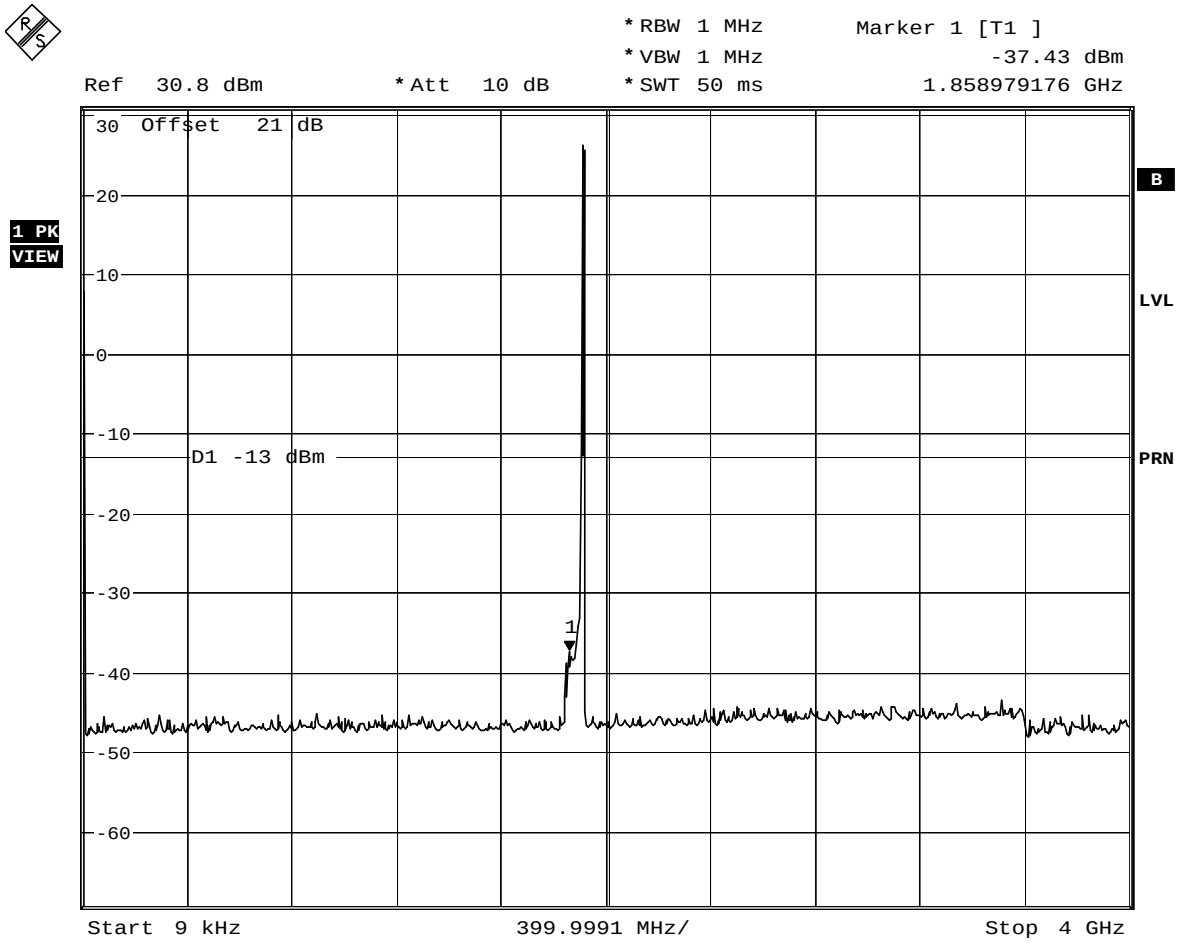


Date: 12.OCT.2005 12:26:35

Serial Number: 00108-00-006341-3
HSDPA - Spurious Emissions (12GHz – 20GHz)
Channel 9400 (1880.0MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

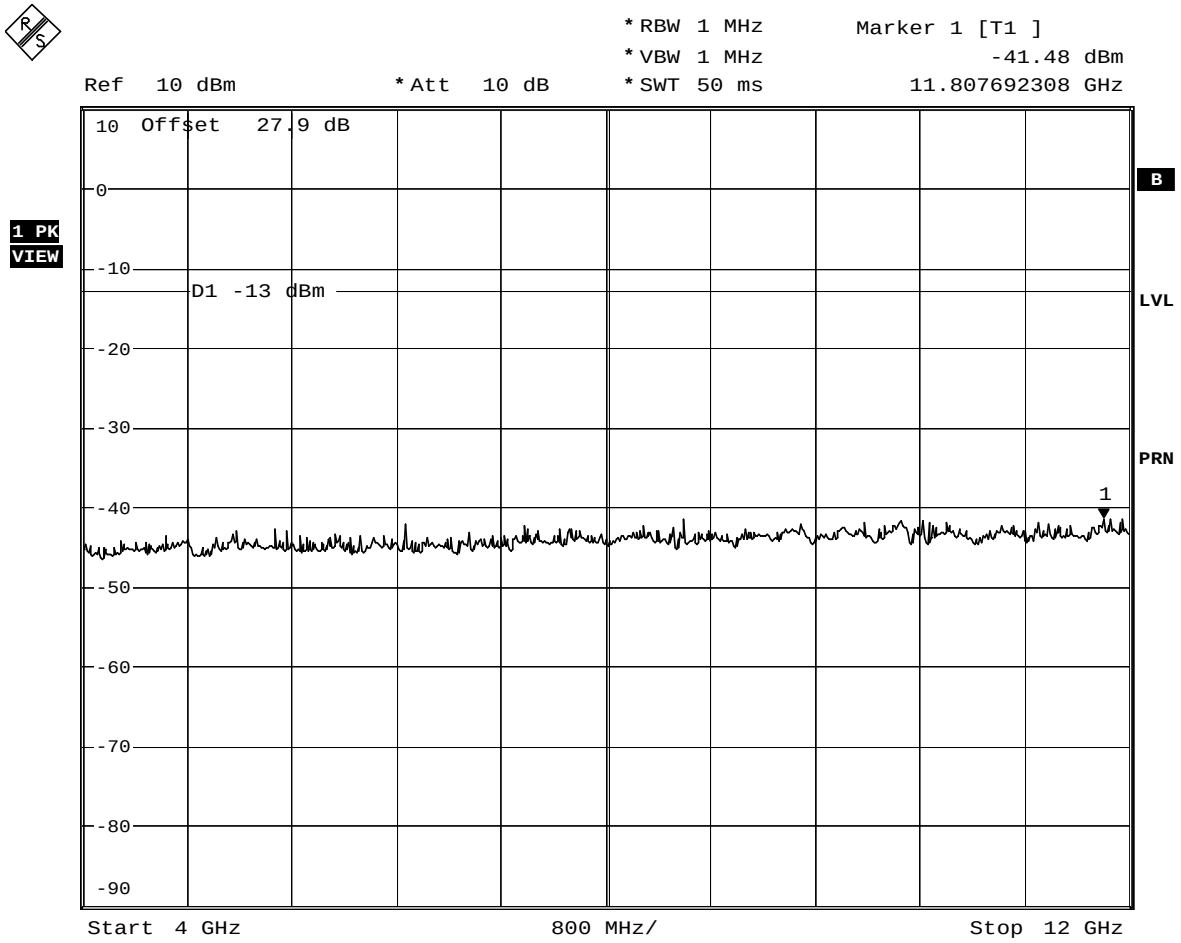
2.17.6 **Test Results** - continued



Serial Number: 00108-00-006341-3
HSDPA - Spurious Emissions (9kHz – 4GHz)
Channel 9538 (1907.6MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued

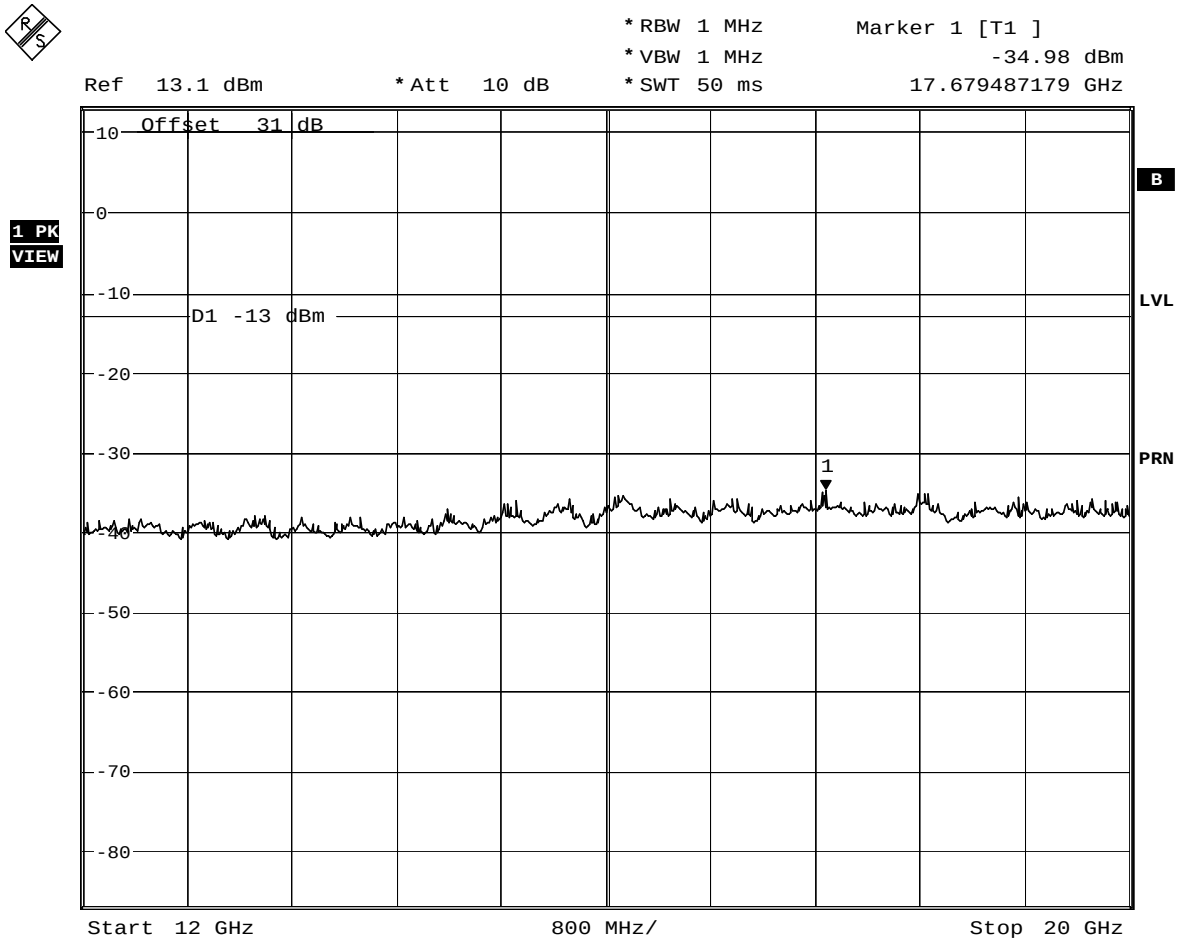


Date: 12.OCT.2005 12:20:08

Serial Number: 00108-00-006341-3
HSDPA - Spurious Emissions (4GHz – 12GHz)
Channel 9538 (1907.6MHz) - Maximum Power

2.17 CONDUCTED SPURIOUS EMISSIONS

2.17.6 **Test Results** - continued



Date: 12.OCT.2005 12:27:28

Serial Number: 00108-00-006341-3
HSDPA - Spurious Emissions (12GHz – 20GHz)
Channel 9538 (1907.6MHz) - Maximum Power

2.18 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.18.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.235, 2.1055 and RSS-133, 7

2.18.2 Equipment Under Test

U730

2.18.3 Date of Test

19th October 2005 (GPRS, EDGE, UMTS and HSDPA)

2.18.4 Test Equipment Used

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

2.18.5 Test Procedure

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

The temperature was adjusted between -30ºC and +50ºC in 10º steps as per 2.1055. Measurements were conducted with the EUT in GPRS, EDGE, UMTS and HSDPA modes of operation.

2.18 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.18.6 Test Results

Temperature Interval ºC	Test Frequency GHz	Deviation Hz	Limit kHz
- 30	1.880	-18	See Below
- 20	1.880	+34	See Below
- 10	1.880	+30	See Below
0	1.880	+50	See Below
+ 10	1.880	+40	See Below
+ 20	1.880	+24	See Below
+ 30	1.880	+30	See Below
+ 40	1.880	+15	See Below
+ 50	1.880	-51	See Below

Serial Number: 00108-00-0363441
3.3V SUPPLY – PCS1900 Mode GPRS Modulation

Temperature Interval ºC	Test Frequency GHz	Deviation Hz	Limit kHz
- 30	1.880	-42	See Below
- 20	1.880	+45	See Below
- 10	1.880	+44	See Below
0	1.880	+48	See Below
+ 10	1.880	+49	See Below
+ 20	1.880	+38	See Below
+ 30	1.880	+44	See Below
+ 40	1.880	-20	See Below
+ 50	1.880	-26	See Below

Serial Number: 00108-00-0363441
3.3V SUPPLY – PCS1900 Mode EDGE Modulation

Temperature Interval ºC	Test Frequency GHz	Deviation Hz	Limit kHz
- 30	1.880	-15	See Below
- 20	1.880	-34	See Below
- 10	1.880	-27	See Below
0	1.880	-30	See Below
+ 10	1.880	-35	See Below
+ 20	1.880	-31	See Below
+ 30	1.880	-33	See Below
+ 40	1.880	-29	See Below
+ 50	1.880	-38	See Below

Serial Number: 00108-00-0363441
3.3V SUPPLY – UMTS Band II QPSK Modulation

2.18 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.18.6 Test Results

Temperature Interval ºC	Test Frequency GHz	Deviation Hz	Limit kHz
- 30	1.880	-26	See Below
- 20	1.880	-28	See Below
- 10	1.880	-27	See Below
0	1.880	-28	See Below
+ 10	1.880	-36	See Below
+ 20	1.880	-31	See Below
+ 30	1.880	-28	See Below
+ 40	1.880	-35	See Below
+ 50	1.880	-36	See Below

Serial Number: 00108-00-0363441
3.3V SUPPLY – UMTS Band II HSDPA Modulation

Limit	0.0001% or 1ppm

Remarks

EUT complies with CFR 47 Part 24.135(a) and Industry Canada RSS-133,7. The EUT remains within the authorized frequency block over the entire temperature range.

2.19 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.19.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.135(a), 2.1055 and Industry Canada RSS-133, 7

2.19.2 Equipment Under Test

U730

2.19.3 Date of Test

13th October 2005 (UMTS and HSDPA)
17th October 2005 (GPRS)
18th October 2005 (EDGE)

2.19.4 Test Equipment Used

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

2.19.5 Test Procedure

GPRS
The EUT was set to transmit on maximum power. A Digital Communications Analyser, (CMU200), was used to measure the Frequency Error. The maximum result of measurements made over 200 bursts was recorded. The voltage was varied as described in the results table.

EDGE
The EUT was set to transmit on maximum. A Digital Communications Analyser, (CMU200), was used to measure the Frequency Error. The maximum result of measurements made over 200 bursts was recorded. The voltage was varied as described in the results table.

UMTS
The EUT was set to transmit on maximum power. A Digital Communications Analyser, (CMU200), was used to measure the Frequency Error. The maximum result of measurements made over 200 bursts was recorded. The voltage was varied as described in the results table.

HSDPA
The EUT was set to transmit on maximum power. A Digital Communications Analyser, (CMU200), was used to measure the Frequency Error. The maximum result of measurements made over 200 bursts was recorded. The voltage was varied as described in the results table.

2.19 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.19.6 **Test Results** - continued

DC Voltage V	Test Frequency GHz	Deviation Hz	Deviation Limit kHz
3.795	1.880	+34	* see limit below
3.300	1.880	+25	* see limit below
2.805	1.880	+43	* see limit below

3.3V SUPPLY – PCS 1900 Mode GPRS Modulation

DC Voltage V	Test Frequency GHz	Deviation Hz	Deviation Limit kHz
3.795	1.880	+28	* see limit below
3.300	1.880	+32	* see limit below
2.805	1.880	+34	* see limit below

3.3V SUPPLY PCS 1900 Mode EDGE Modulation

DC Voltage V	Test Frequency GHz	Deviation Hz	Deviation Limit kHz
2.795	1.880	+90	* see limit below
3.300	1.880	-86	* see limit below
2.805	1.880	-90	* see limit below

3.3V SUPPLY – UMTS Band II Mode QPSK Modulation

DC Voltage V	Test Frequency GHz	Deviation Hz	Deviation Limit kHz
3.795	1.880	-32	* see limit below
3.300	1.880	-31	* see limit below
2.805	1.880	-33	* see limit below

3.3V SUPPLY – UMTS Band II Mode HSDPA Modulation

Limit	0.0001% or 1ppm

Remarks

EUT complies with CFR 47 Part 24.135(a). The EUT remains within the authorised frequency block over the test voltage range.

SECTION 3

TEST EQUIPMENT

3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No	TE Number	Calibration Due
EMC Maximum Output Power				
Emi Receiver	Rohde & Schwarz	ESIB 40	2941	11/08/2006
Peak Power Ana	Hewlett Packard	8990A	107	12/10/2006
Turntable/Mast Controller	EMCO	2090	1607	TU
Mast Controller	Unknown	CO 1000	1606	TU
Screened Room 5	Rainford	Rainford	1545	01/03/2008
Emco 3115 Drg Ant	EMCO	3115	235	01/07/2006
Emco Drg Horn Ant	EMCO	3115	234	01/07/2006
Wideband Generator	Rohde & Schwarz	SWM 02	62	15/01/2006
EMC Radiated Emissions				
Emi Receiver	Rohde & Schwarz	ESIB 40	2941	11/08/2006
Bilog Antenna	Schaffner	CBL6143	287	12/11/2005
Hi Pass Filter	Sematron	RLC-F100-1500-S-R	2843	16/05/2006
Dual PSU	Thurlby	PL320	288	TU
Low Noise Amplifier	Miteq Corp	AMF-3d-001080-18-13P	231	TU
Spectrum Analyser	Hewlett Packard	8542E	18	08/01/2006
Wideband Generator	Rohde & Schwarz	SWM 02	62	15/01/2006
Double Ridge Guide Antenna	EMCO	3115	235	01/07/2006
Mast Controller	Unknown	CO 1000	1606	TU
Screened Room 5	Rainford	Rainford	1545	01/03/2008
Turntable/Mast Controller	EMCO	2090	1607	TU
Double Ridge Guide Antenna	EMCO	3115	234	01/07/2006
Mast Controller	Unknown	CO 1000	1606	TU
Turntable/Mast Controller	EMCO	2090	1607	TU
Screened Room 5	Rainford	Rainford	1545	01/03/2008
High Pass Filter	RLC Electronics	F-100-3000-5-R	563	TU
Bilog Antenna	Schaffner	CBL6143	287	12/11/2005
Radio Communication Tester	Rohde & Schwarz	CMU 200	39	07/07/2006
Spectrum Analyser	Hewlett Packard	8542E	18	08/01/2006
Radio - Spurious Emissions				
Signal Gen	Rohde & Schwarz	SMY01	49	08/06/2006
Attenuatod 10dB	Texscan	HFP-50N	468	11/07/2006
Power Splitter	Weinschel	1506A	605	06/08/2006
Signal Generator	Rohde & Schwarz	SMR 40	1002	25/10/2005
Hi Pass Filter	RLC Electronics	F-100-4000-5-R	2199	16/05/2006
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	16/12/2005
Filter	Daden Anthony Ass	MH-1500-7SS	2778	15/10/2005 *

* - This equipment was used only for UMTS/HSDPA testing.

3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Radio (Transmitting) - Frequency Characteristics				
DC Power Supply Unit	Hewlett Packard	6253A	441	TU
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	16/12/2005
Signal Generator	Rohde & Schwarz	SMR 40	1002	25/10/2005
Attenuator 10dB	Texscan	HFP-50N	468	11/07/2006
Signal Gen	Rohde & Schwarz	SMY01	49	08/06/2006
Power Splitter	Weinschel	1506A	605	06/08/2006
Radio (Transmitting) - Occupied Bandwidth				
Attenuator 10dB	Texscan	HFP-50N	468	11/07/2006
Power Splitter	Weinschel	1506A	605	06/08/2006
Signal Generator	Rohde & Schwarz	SMR 40	1002	25/10/2005
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	16/12/2005
Signal Gen	Rohde & Schwarz	SMY01	49	08/06/2006
Radio (Transmitting) - Power Characteristics				
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	16/12/2005
Signal Gen	Rohde & Schwarz	SMY01	49	08/06/2006
Attenuator 10dB	Texscan	HFP-50N	468	11/07/2006
Signal Generator	Rohde & Schwarz	SMR 40	1002	25/10/2005
Power Splitter	Weinschel	1506A	605	06/08/2006

3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No	TE Number	Calibration Due
EMC Maximum Output Power				
Attenuator 10dB	Marconi	6534/3	1048	TU
Bilog Antenna	Schaffner	CBL6143	287	12/11/2005
Bilog Antenna	Schaffner	CBL 6143	316	TU
Screened Room 5	Rainford	Rainford	1545	01/03/2008
Mast Controller	Unknown	CO 1000	1606	TU
Turntable/Mast Controller	EMCO	2090	1607	TU
Test Receiver	Rohde & Schwarz	ESIB26	2085	26/09/2006
Wideband Generator	Rohde & Schwarz	SWM 02	62	15/01/2006
EMC Radiated Emissions				
Double Ridge Guide Antenna	EMCO	3115	235	01/07/2006
Mast Controller	Unknown	CO 1000	1606	TU
Turntable/Mast Controller	EMCO	2090	1607	TU
Test Receiver	Rohde & Schwarz	ESIB26	2085	26/09/2006
Bilog Antenna	Schaffner	CBL6143	287	12/11/2005
Turntable/Mast Controller	EMCO	2090	1607	TU
Mast Controller	Unknown	CO 1000	1606	TU
Screened Room 5	Rainford	Rainford	1545	01/03/2008
Double Ridge Guide Antenna	EMCO	3115	234	01/07/2006
Test Receiver	Rohde & Schwarz	ESIB26	2085	26/09/2006
Low Noise Amplifier	Miteq Corp	AMF-3d-001080-18-13P	231	TU
Wideband Generator	Rohde & Schwarz	SWM 02	62	15/01/2006
Hi Pass Filter	Sematron	RLC-F100-1500-S-R	2843	16/05/2006
Double Ridge Guide Antenna	EMCO	3115	235	01/07/2006
Mast Controller	Unknown	CO 1000	1606	TU
Turntable/Mast Controller	EMCO	2090	1607	TU
Screened Room 5	Rainford	Rainford	1545	01/03/2008

TU Traceability Unscheduled

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*

Worst case error for both Time and Frequency measurement 12 parts in 10^6.

* In accordance with CISPR 16-4
† In accordance with UKAS Lab 34

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).