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Report On

FCC Testing of the
IP Access Ltd
219C nano3G-4 Picocellular Base Station

COMMERCIAL-IN-CONFIDENCE

FCC ID: QGGIPA219C

Document 75907109 Report 02 Issue 1

September 2009



Product Service

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COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC Testing of the
IP Access Ltd
219C nano3G-4 Picocellular Base Station

Document 75907109 Report 02 Issue 1

September 2009

PREPARED FOR


IP Access Ltd
Building 2020
Cambourne Business Park
Cambourne
CB23 6DW

PREPARED BY


N Bennett
Senior Administrator

APPROVED BY


C Gould
Authorised Signatory


M Jenkins
Authorised Signatory


DATED


3rd September 2009

ENGINEERING STATEMENT

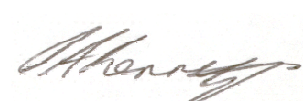
The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Parts 27. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);


A R Hubbard


A Guy


B Airs


S Bennett





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SECTION 1

REPORT SUMMARY

FCC Testing of the
IP Access Ltd
219C nano3G-4 Picocellular Base Station



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the IP Access Ltd, 219C nano3G-4 Picocellular Base Station to the requirements of FCC CFR 47 Part 27.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	IP Access Ltd
Model Number(s)	nano3G-4
Part Number	219C
Serial Number(s)	0947
Software Version	Main FS Version 400.0 FS Variant 220G
Hardware Version	XB
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 27: 2008
Incoming Release Date	Declaration of Build Status 20 August 2009
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	PO22514 13 July 2009
Start of Test	14 August 2009
Finish of Test	28 August 2009
Name of Engineer(s)	A R Hubbard A Guy B Airs S Bennett
Related Document(s)	FCC CFR 47 Part 27: 2009



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 27, is shown below.


Configuration 1 - Test Configuration 1					
Section	Spec Clause	Test Description	Mode	Mod State	Result
2.1	2.1053/ 27.53(h)	Emissions for Broadband PCS Equipment	Transmitting Bottom Channel	0	Pass
			Transmitting Middle Channel	0	Pass
			Transmitting Top Channel	0	Pass
2.2	2.1046/27.50(d)	EIRP Peak Power	Transmitting Bottom Channel	0	Pass
			Transmitting Middle Channel	0	Pass
			Transmitting Top Channel	0	Pass
2.3	2.1046/27.50(d)(2)(B)	Carrier Power	Transmitting Bottom Channel	0	Pass
			Transmitting Middle Channel	0	Pass
			Transmitting Top Channel	0	Pass
2.4	27.50(d)(5)	Carrier Power – CCDF	Transmitting Bottom Channel	0	Pass
			Transmitting Middle Channel	0	Pass
			Transmitting Top Channel	0	Pass
2.5	2.1049/27.53(h)(1)	26dB Bandwidth	Transmitting Bottom Channel	0	Pass
			Transmitting Middle Channel	0	Pass
			Transmitting Top Channel	0	Pass
2.6	27.54 / 2.1055(d)(1)	Frequency Stability Under Voltage Variations	Transmitting Bottom Channel	-	N/A
			Transmitting Middle Channel	0	Pass
			Transmitting Top Channel	-	N/A
2.7	27.54 / 2.1055	Frequency Stability Under Temperature Variations	Transmitting Bottom Channel	-	N/A
			Transmitting Middle Channel	0	Pass
			Transmitting Top Channel	-	N/A
2.8	2.1051/ 27.53(h)(1)	Conducted Emissions – Block Edge	Transmitting Bottom Channel	0	Pass
			Transmitting Middle Channel	-	N/A
			Transmitting Top Channel	0	Pass
2.9	2.1051/ 27.53/2.1053	Spurious Conducted Emissions	Transmitting Bottom Channel	0	Pass
			Transmitting Middle Channel	0	Pass
			Transmitting Top Channel	0	Pass

N/A – Not Applicable



Product Service

1.3 DECLARATION OF BUILD STATUS

Manufacturer	<u>IP Access Ltd</u>
Country of origin	<u>UK</u>
UK Agent	<u>N/A</u>
Technical Description	<u>3G Picocellular Base Station (Band 4, +13dBm)</u>
Model No	<u>nano3G-4</u>
Part No	<u>219C</u>
Serial No	<u>000295-0000009479</u>
Drawing Number	<u>219#005_PRT Individual Box Assembly 219#010_PRT nano3G-4 Assembly 219#015_PRT PCB Assembly</u>
Build Status	<u>219C015_XB</u>
Software Issue	<u>Main FS Version 400.0 FS Variant 220G</u>
Hardware Issue	<u>XB</u>
FCC ID	<u>QGGIPA219C</u>
Signature	<u></u>
Date	<u>20/08/2009</u>
D of B S Serial No	<u>75907109</u>

Note: This document has been prepared to enable manufacturers with no mechanism for producing their own Declaration of Build Status, to declare the build state of the equipment submitted for test.

No responsibility will be accepted by TÜV Product Service as to the accuracy of the information declared in this document by the manufacturer.



1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a IP-Access Ltd 219C nano3G-4 Picocellular Base Station as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.



Equipment Under Test



1.4.2 Test Configuration

Configuration 1: Test Configuration 1

The EUT was configured in accordance with FCC CFR 47 Part 27.

1.4.3 EUT Cable / Port Identification

Port	Max Cable Length specified	Usage	Type	Screened
AC Power	1.5m or <3m	Mains Lead	2 core	No
Signal	0.5m	Ethernet	Multicore	No

1.4.4 Modes of Operation

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

Mode 1 – Transmitting Bottom Channel

Mode 2 – Transmitting Middle Channel

Mode 3 – Transmitting Top Channel

Information on the specific test modes utilised are detailed in the test procedure for each individual test.



Product Service

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or an open test area as appropriate.

The EUT was powered from a 120V, 60Hz supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.



Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
IP Access Ltd
219C nano3G-4 Picocellular Base Station



Product Service

2.1 EMISSIONS FOR BROADBAND PCS EQUIPMENT

2.1.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.53(h)

2.1.2 Equipment Under Test

219C nano3G-4 Picocellular Base Station, S/N: 0947

2.1.3 Date of Test and Modification State

14 August 2009 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 27.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3

2.1.6 Environmental Conditions

14 August 2009

Ambient Temperature 19.3°C

Relative Humidity 47%

Atmospheric Pressure 1015mbar

2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 27 for Emissions for Broadband PCS Equipment.

The test results are shown below.

Configuration 1 - Mode 1

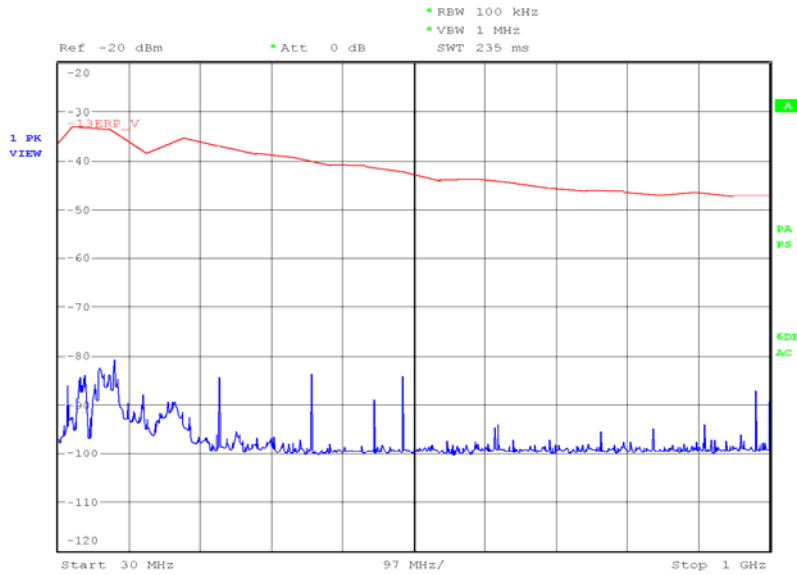
The highest emissions recorded are as below: -

Frequency GHz	Antenna Polarisation	Antenna Height cm	EUT Arc degrees	Result Peak dBm	EIRP Limit dBm	Margin dB	Result
6.457	Horizontal	100	67	-25.8	-13.0	-12.8	Pass
8.610	Horizontal	151	339	-34.5	-13.0	-21.5	Pass



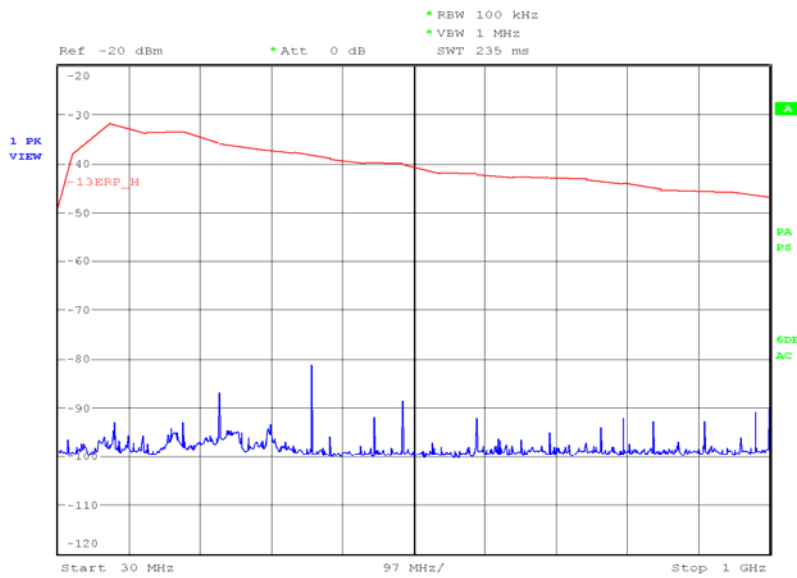
30MHz to 1GHz

Vertical



Date: 14.AUG.2009 11:12:40

Horizontal

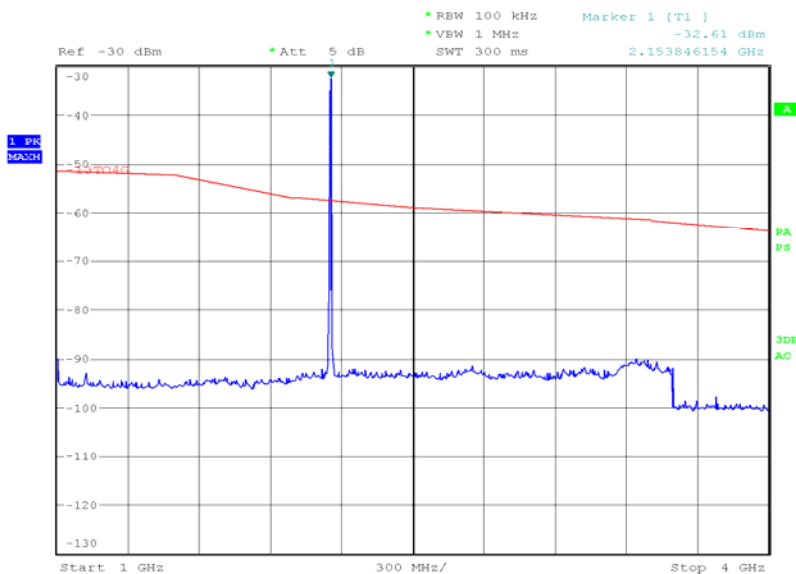


Date: 14.AUG.2009 11:16:56



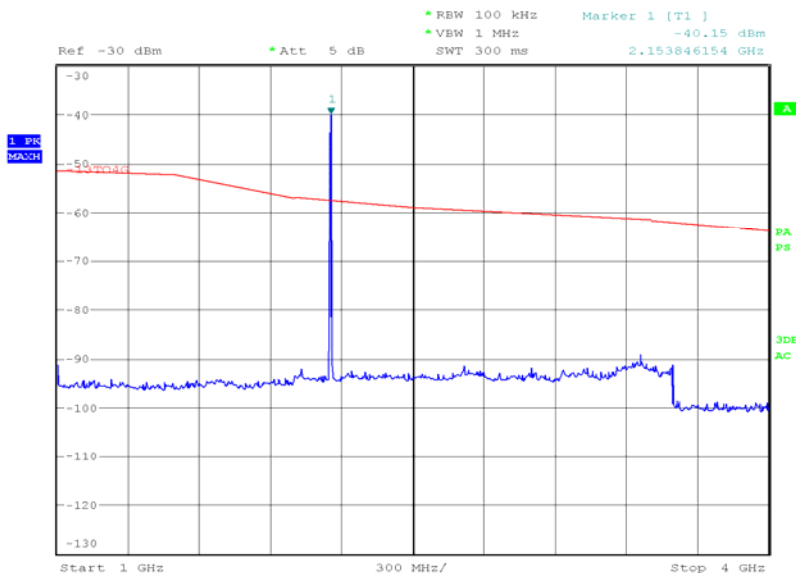
1GHz to 4GHz

Vertical



Date: 14.AUG.2009 22:58:19

Horizontal



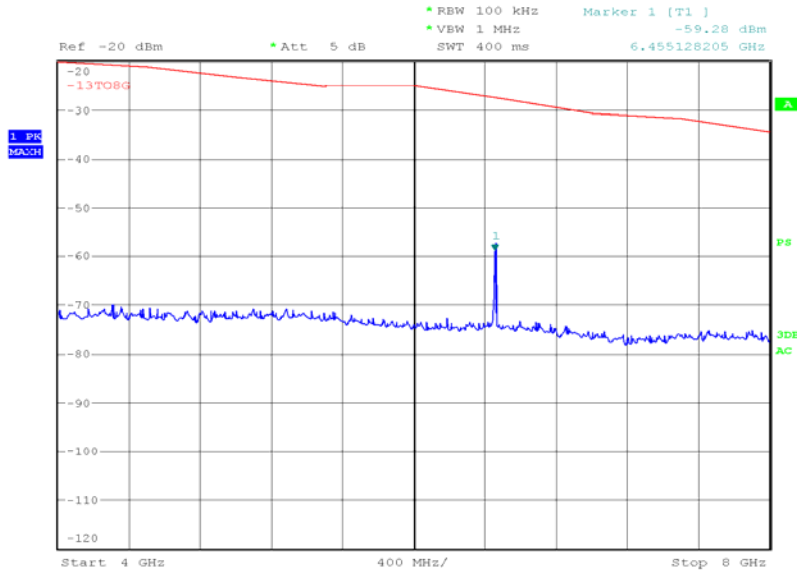
Date: 14.AUG.2009 22:53:13

Note: The emissions which are observed to exceed the limit on the plot above is an intentional transmission and therefore is excluded from testing.



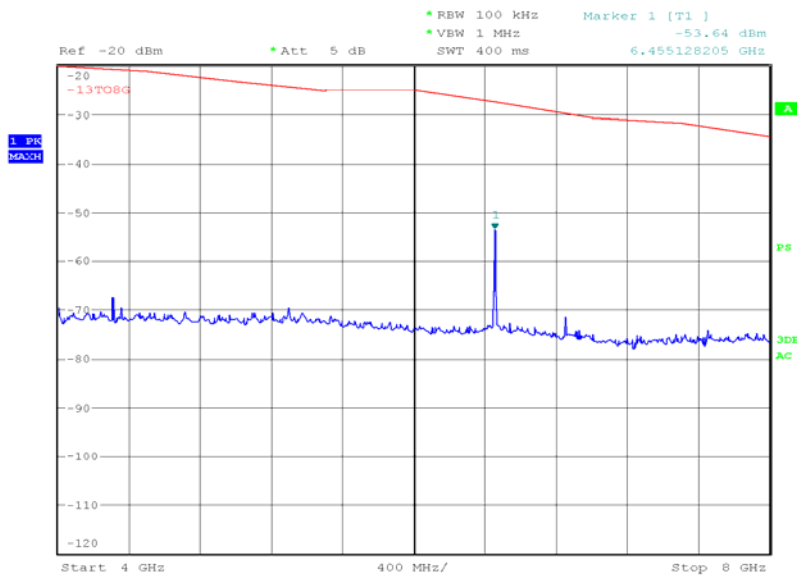
4GHz to 8GHz

Vertical



Date: 15.AUG.2009 02:31:40

Horizontal

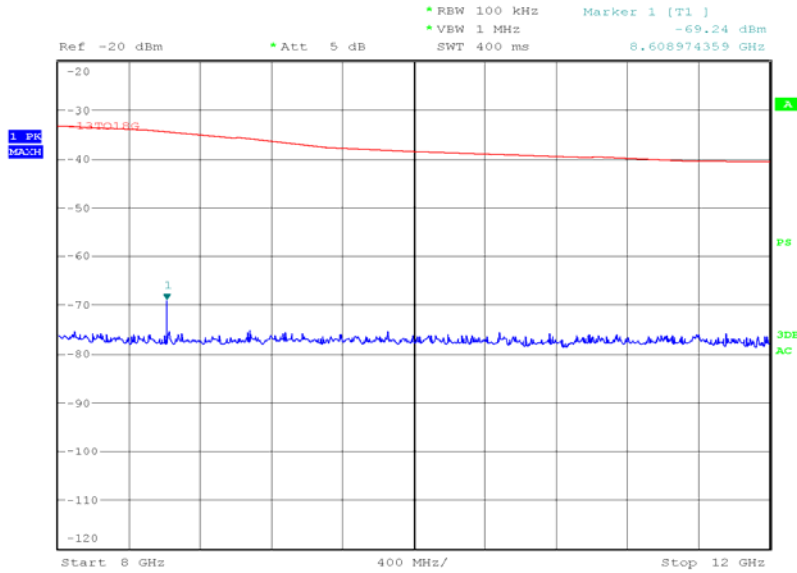


Date: 15.AUG.2009 02:28:27



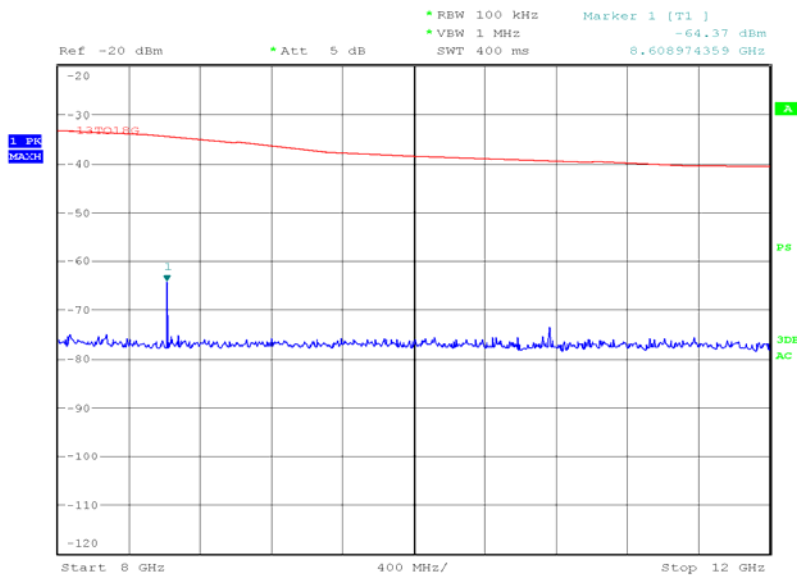
8GHz to 12GHz

Vertical



Date: 15.AUG.2009 03:36:53

Horizontal

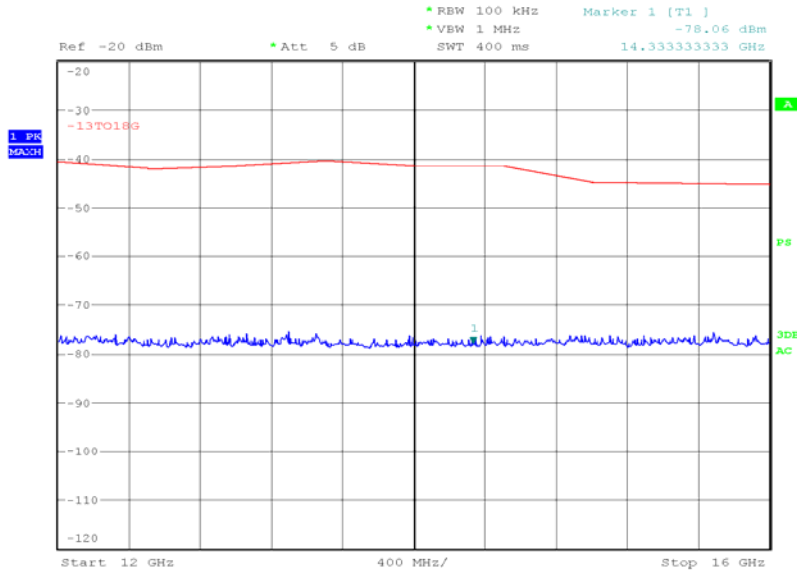


Date: 15.AUG.2009 03:13:58



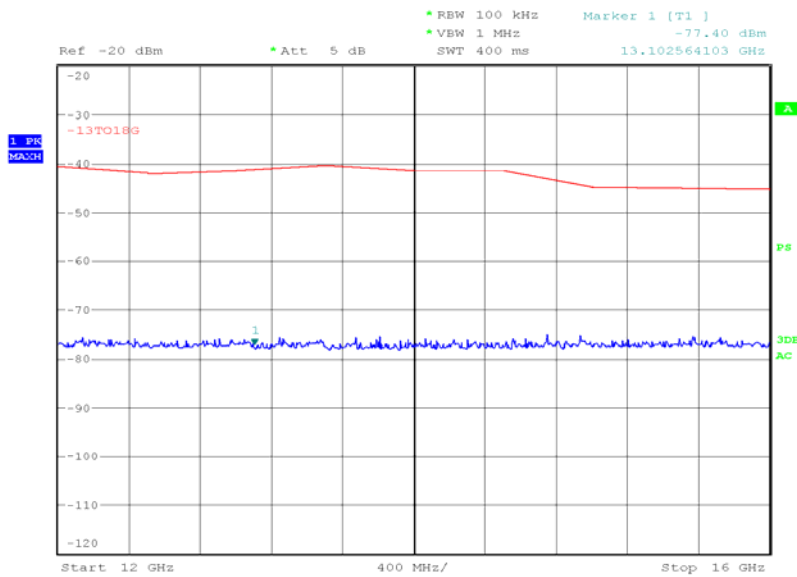
12GHz to 16GHz

Vertical



Date: 15.AUG.2009 03:34:39

Horizontal

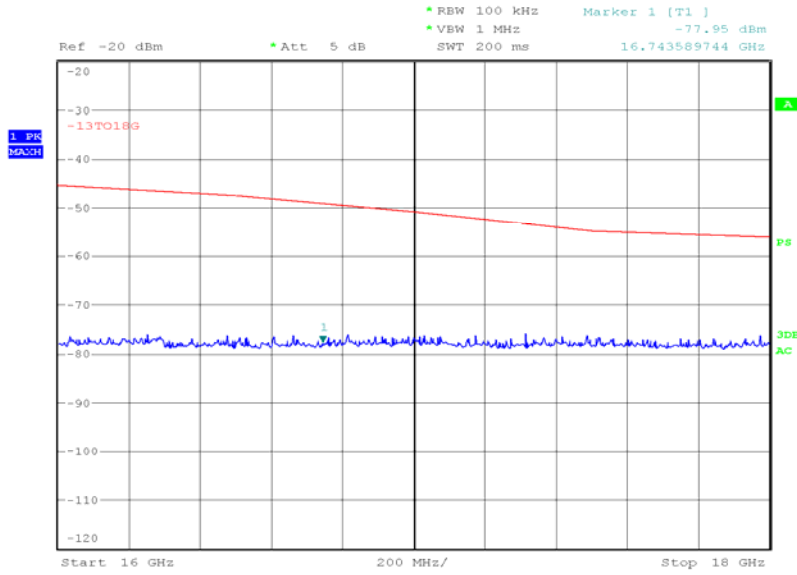


Date: 15.AUG.2009 03:25:26



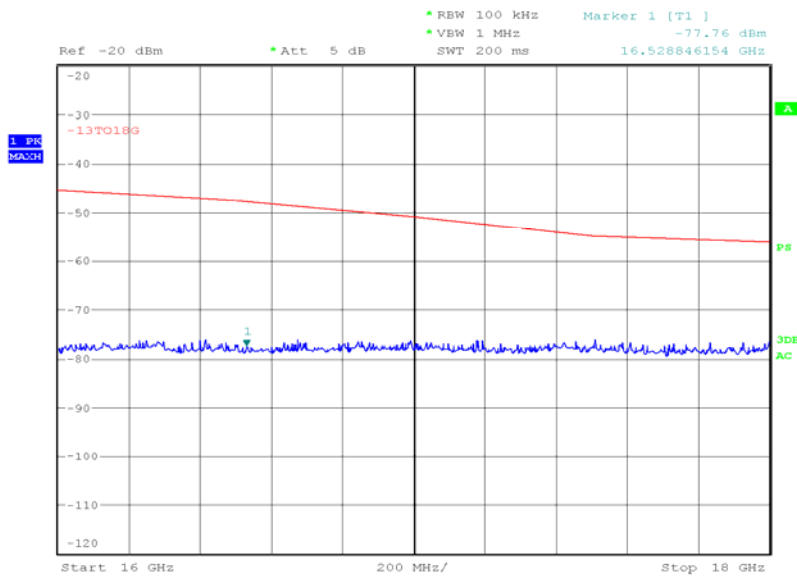
16GHz to 18GHz

Vertical



Date: 15.AUG.2009 03:31:19

Horizontal

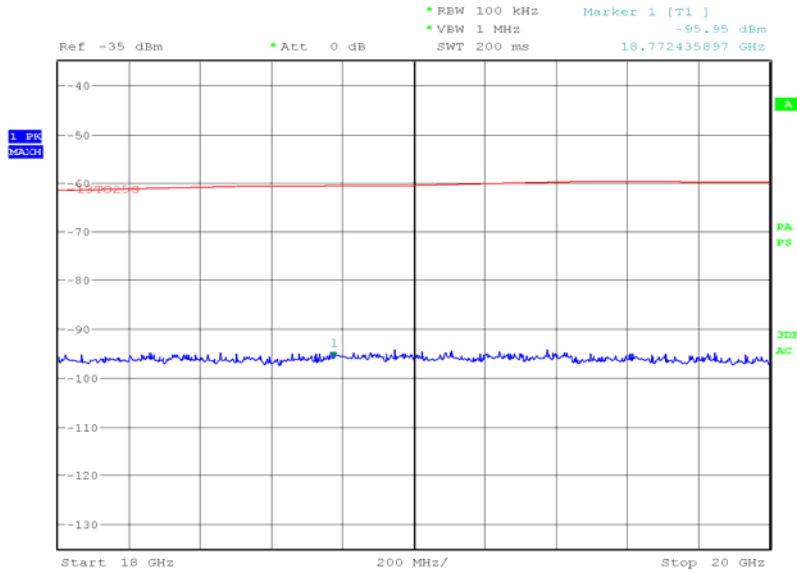


Date: 15.AUG.2009 03:28:05



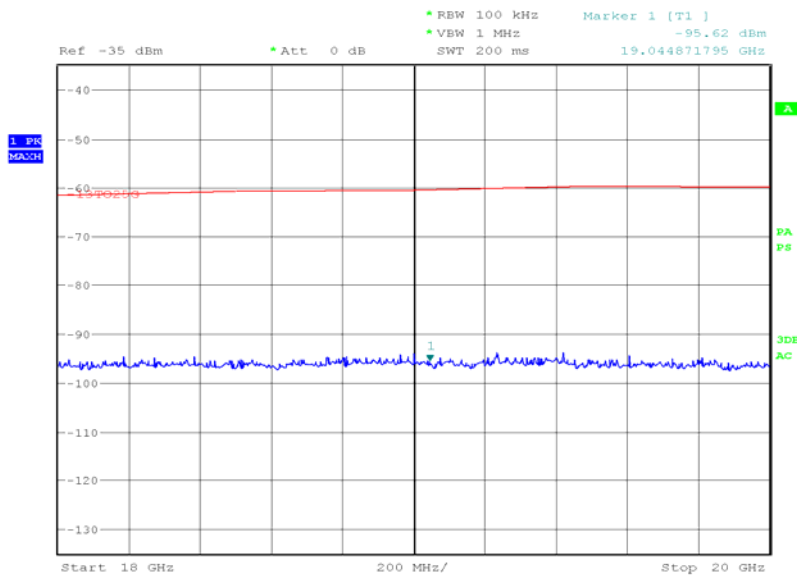
18GHz to 20GHz

Vertical



Date: 15.AUG.2009 05:04:25

Horizontal



Date: 15.AUG.2009 05:00:53



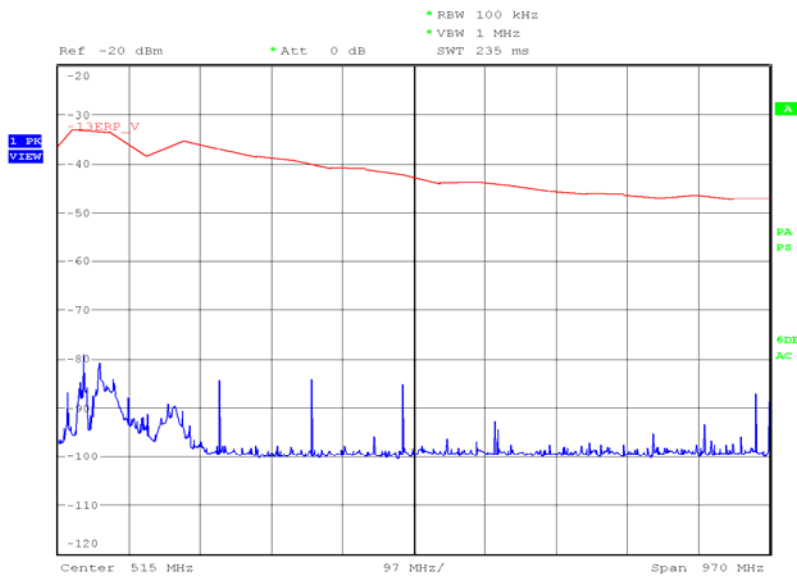
Configuration 1 - Mode 2

The highest emissions recorded are as below: -

Frequency GHz	Antenna Polarisation	Antenna Height cm	EUT Arc degrees	Result Peak dBm	EIRP Limit dBm	Margin dB	Result
6.397	Horizontal	100	133	-25.6	-13.0	-12.6	Pass
8.530	Horizontal	148	346	-35.4	-13.0	-22.4	Pass

30MHz to 1GHz

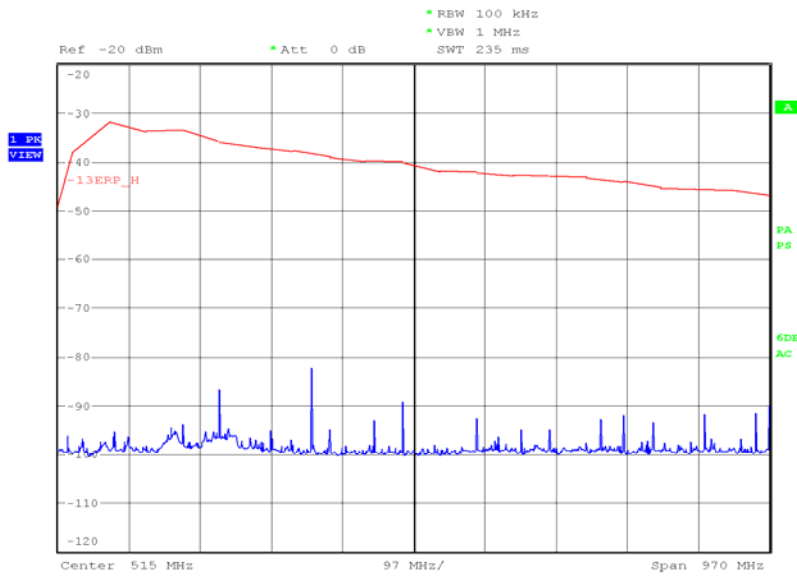
Vertical



Date: 14.AUG.2009 11:34:33



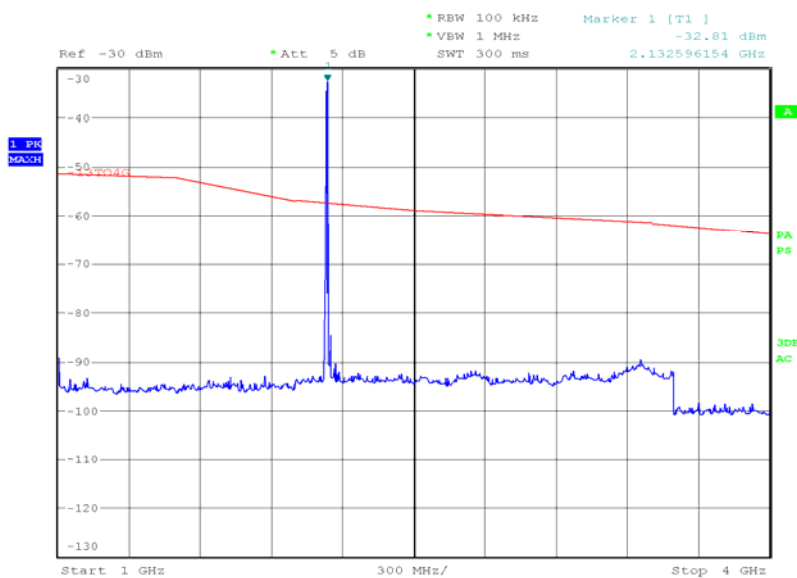
Horizontal



Date: 14.AUG.2009 11:31:54

1GHz to 4GHz

Vertical

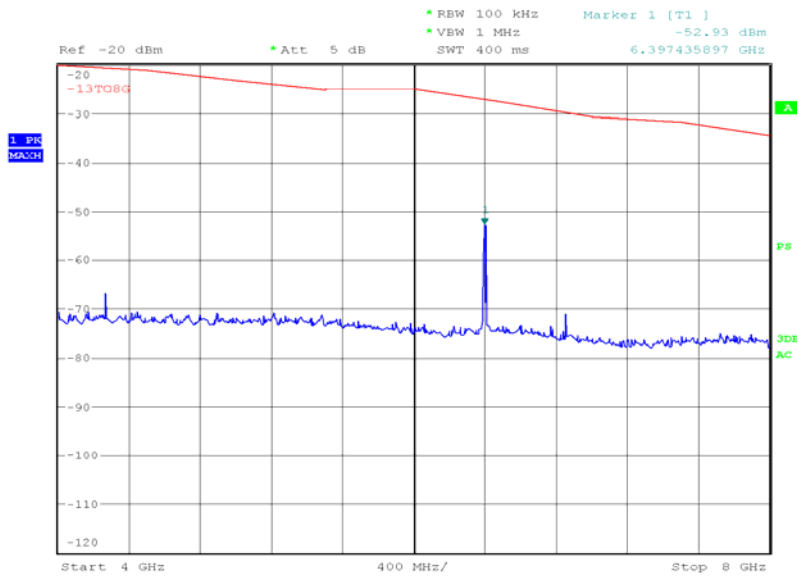


Date: 14.AUG.2009 22:45:33

Note: The emissions which are observed to exceed the limit on the plot above is an intentional transmission and therefore is excluded from testing.



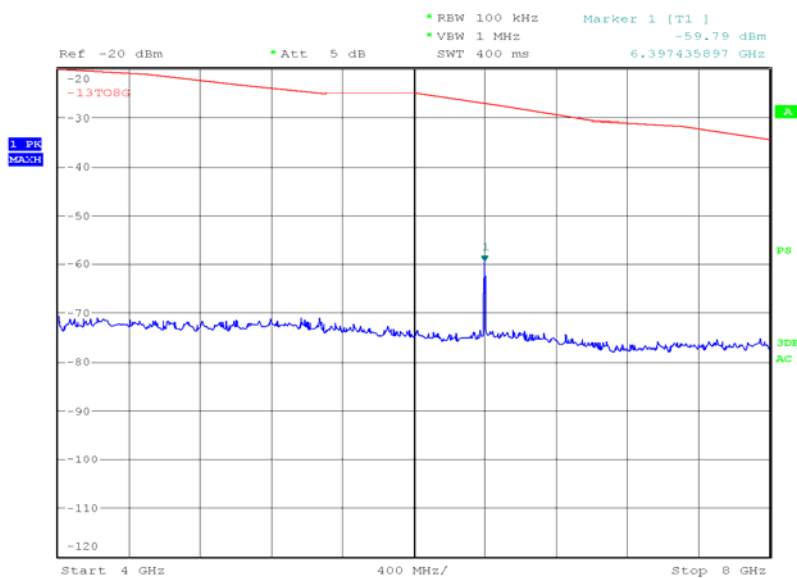
Horizontal



Date: 15.AUG.2009 02:18:40

4GHz to 8GHz

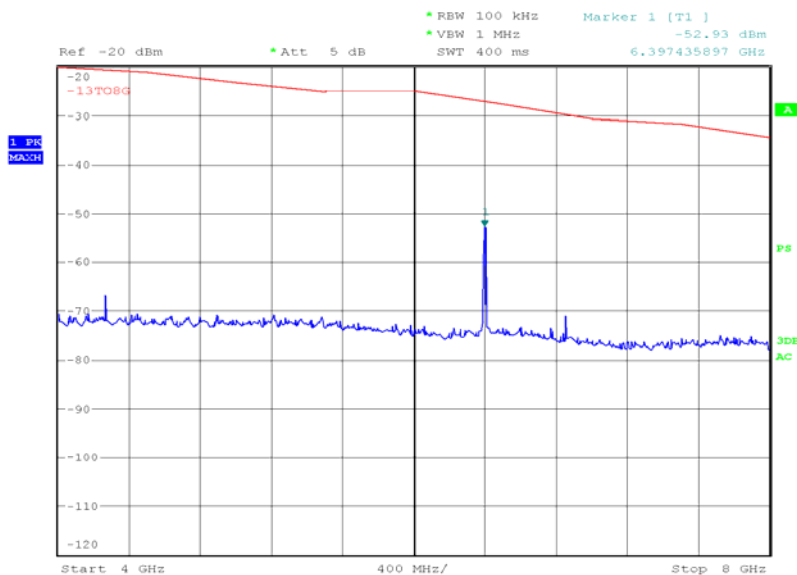
Vertical



Date: 15.AUG.2009 02:15:00



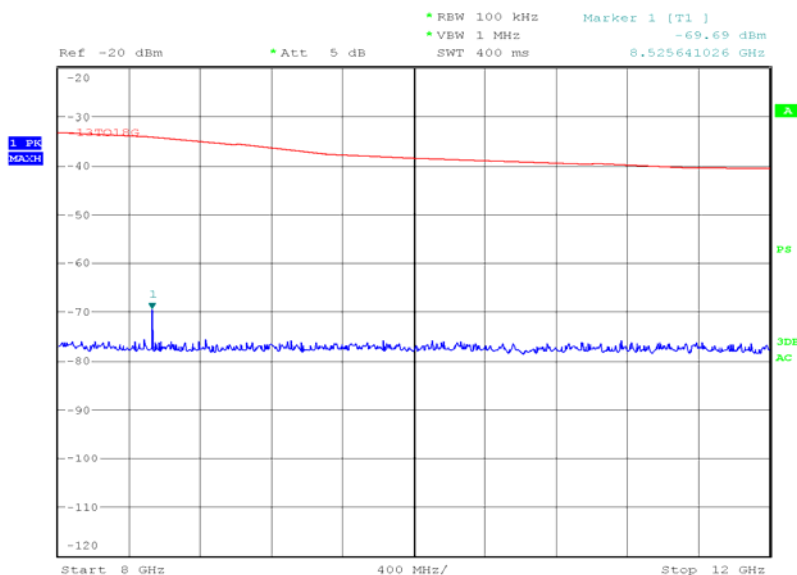
Horizontal



Date: 15.AUG.2009 02:18:40

8GHz to 12GHz

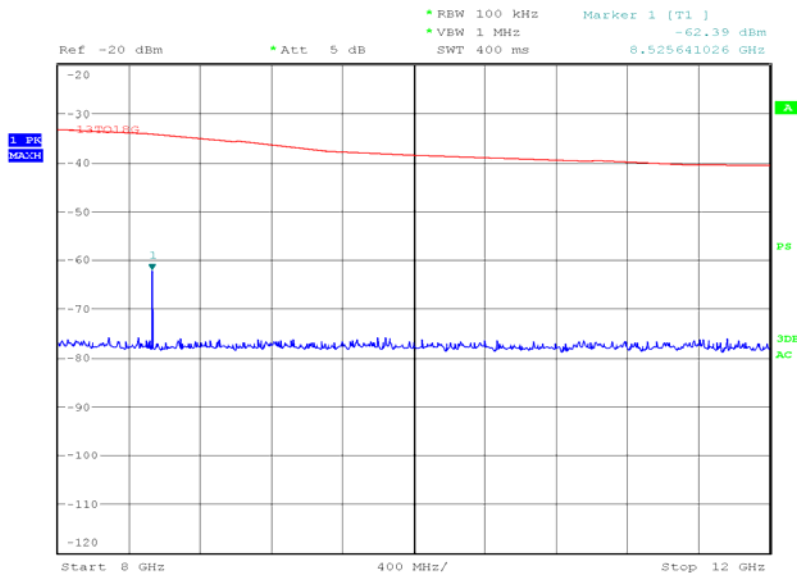
Vertical



Date: 15.AUG.2009 04:04:43



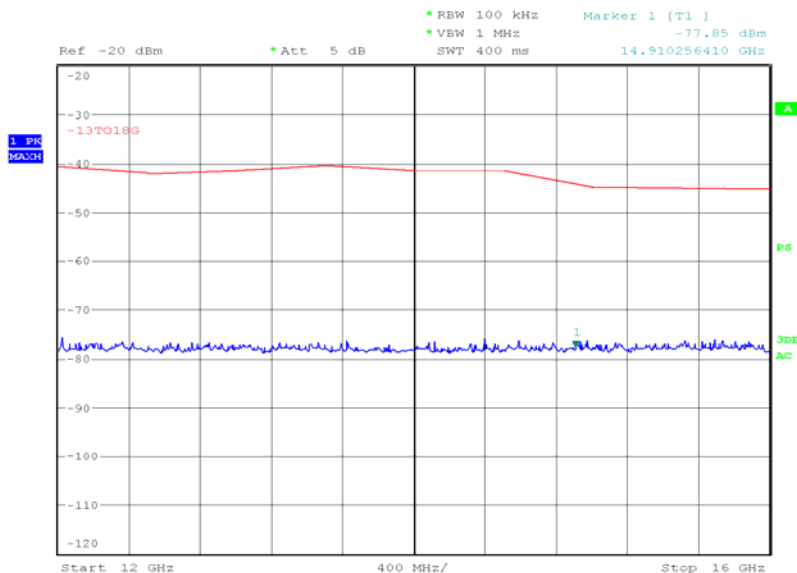
Horizontal



Date: 15.AUG.2009 03:51:50

12GHz to 16GHz

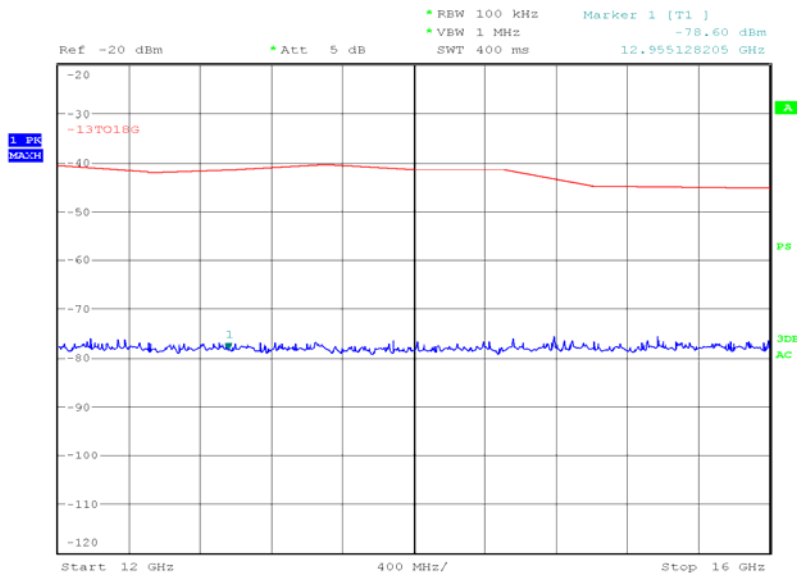
Vertical



Date: 15.AUG.2009 04:01:53



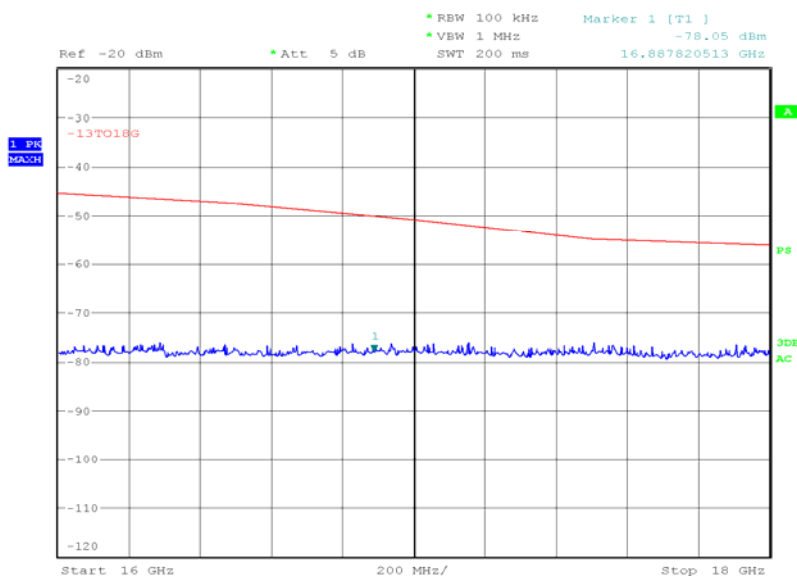
Horizontal



Date: 15.AUG.2009 03:54:01

16GHz to 18GHz

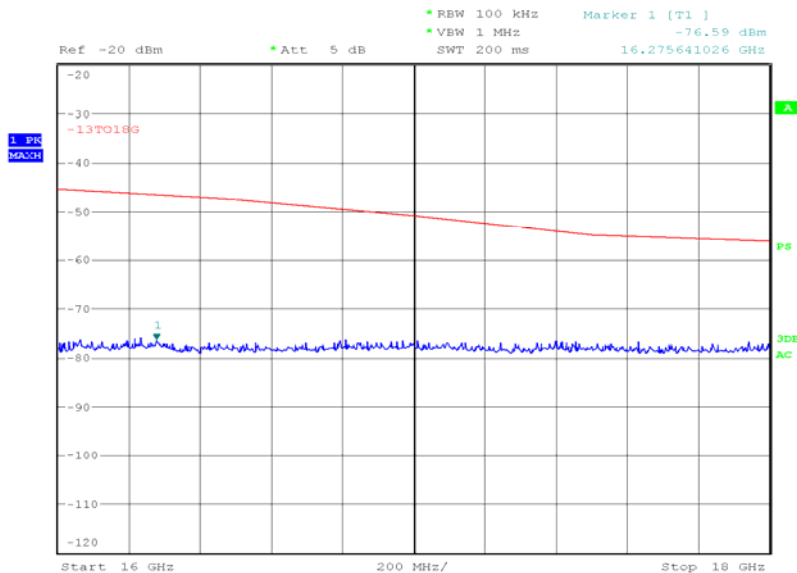
Vertical



Date: 15.AUG.2009 03:59:05



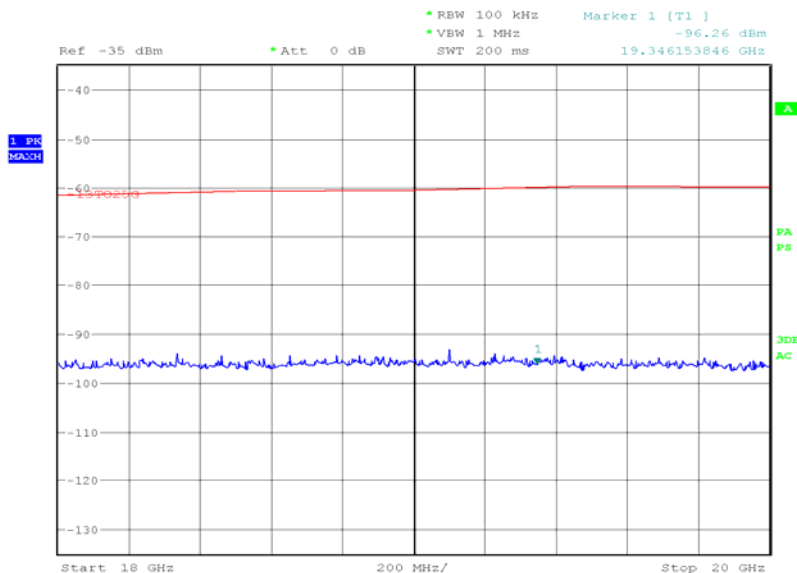
Horizontal



Date: 15.AUG.2009 03:56:20

18GHz to 20GHz

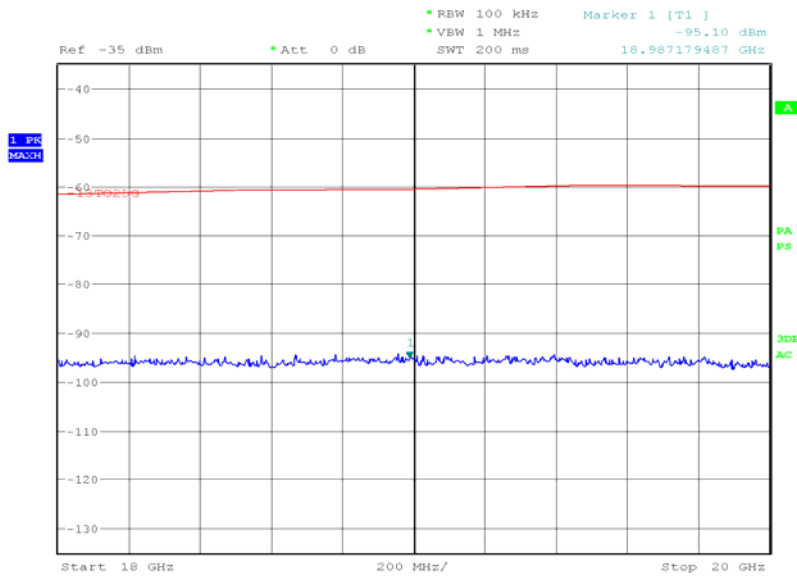
Vertical



Date: 15.AUG.2009 05:10:55



Horizontal



Date: 15.AUG.2009 05:08:30

Configuration 1 - Mode 3

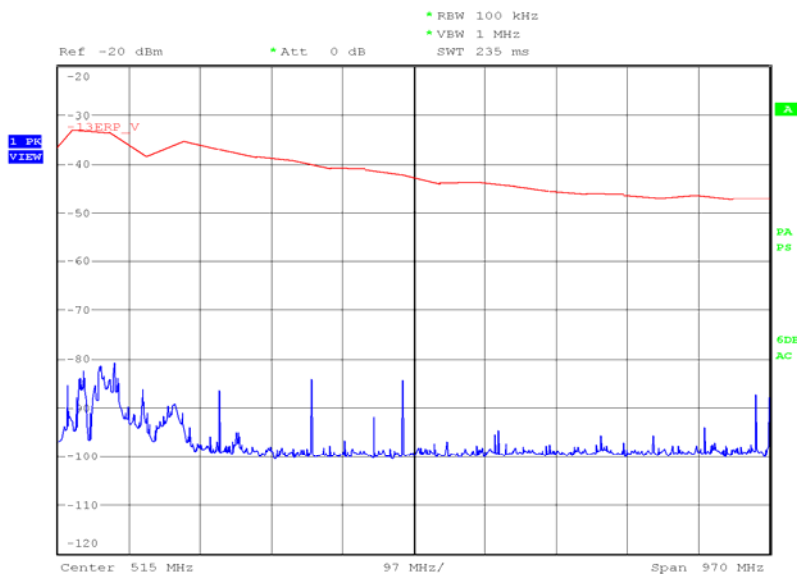
The highest emissions recorded are as below: -

Frequency GHz	Antenna Polarisation	Antenna Height cm	EUT Arc degrees	Result Peak dBm	EIRP Limit dBm	Margin dB	Result
6.337	Horizontal	100	146	-23.6	-13.0	-10.6	Pass
8.450	Horizontal	100	347	-40.2	-13.0	-27.2	Pass



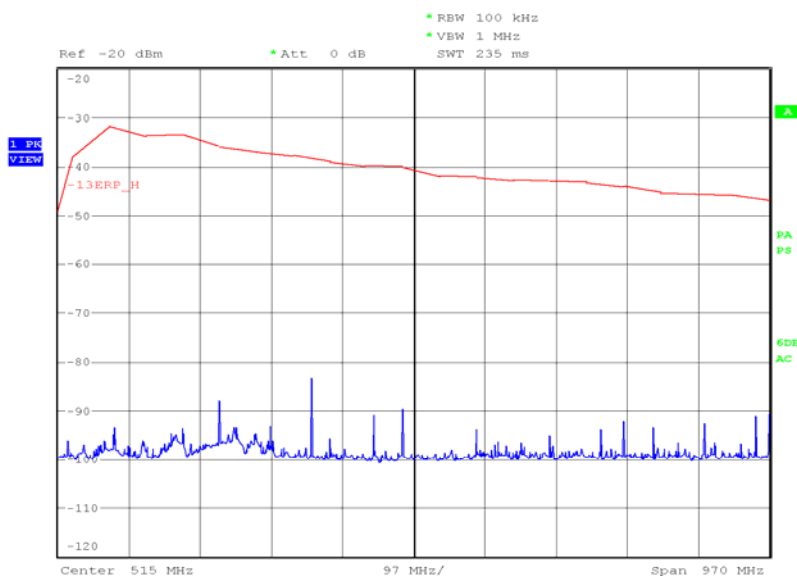
30MHz to 1GHz

Vertical



Date: 14.AUG.2009 11:46:32

Horizontal

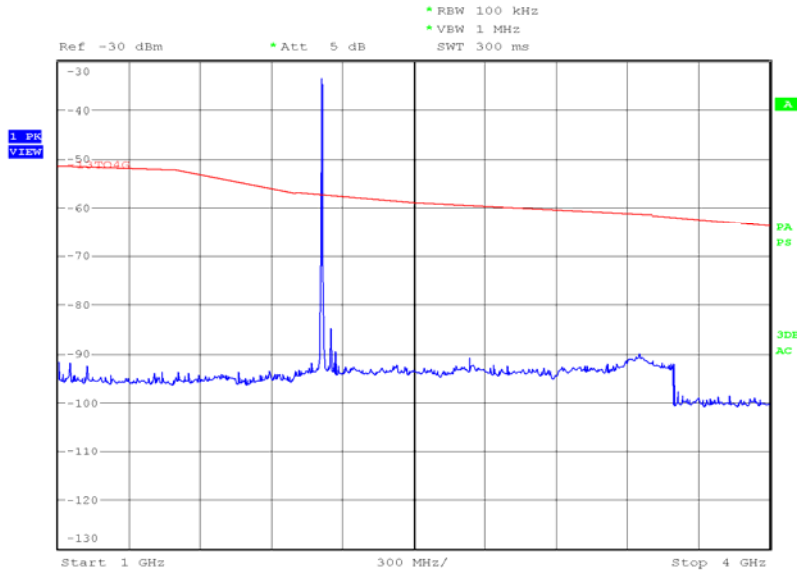


Date: 14.AUG.2009 11:49:15



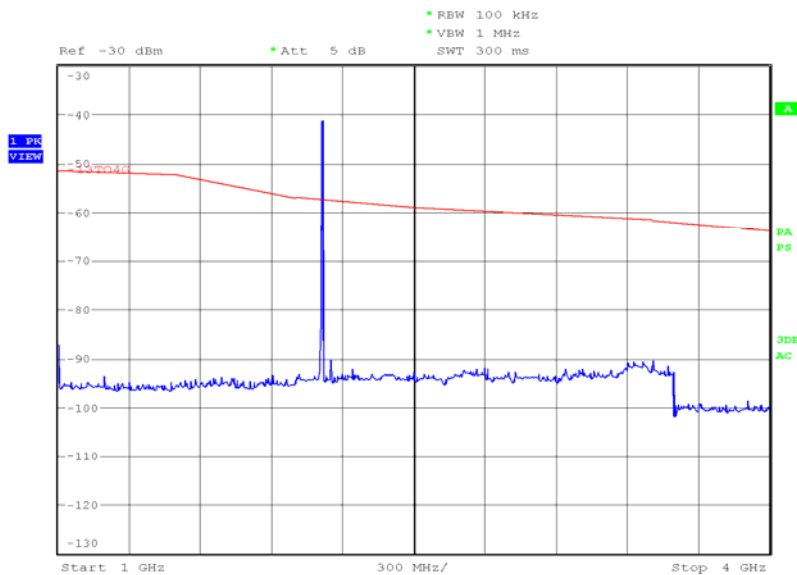
1GHz to 4GHz

Vertical



Date: 14.AUG.2009 15:49:50

Horizontal



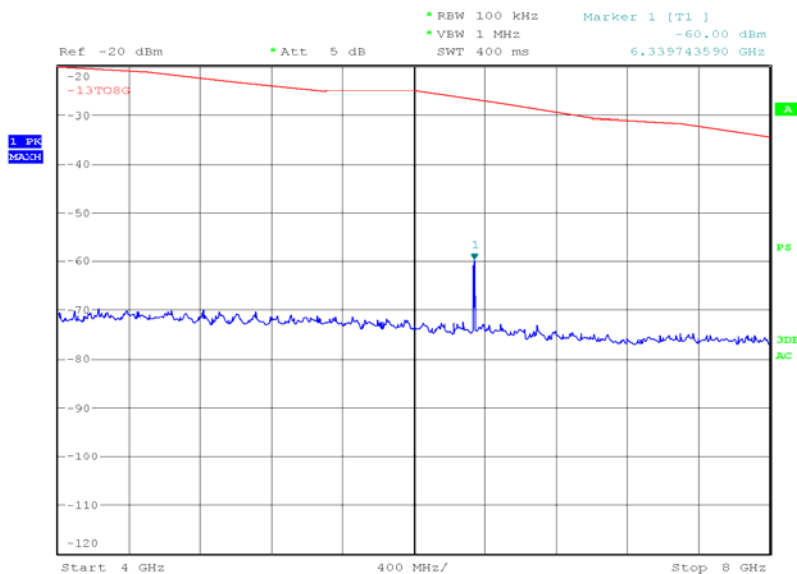
Date: 14.AUG.2009 15:52:31

Note: The emissions which are observed to exceed the limit on the plot above is an intentional transmission and therefore is excluded from testing.



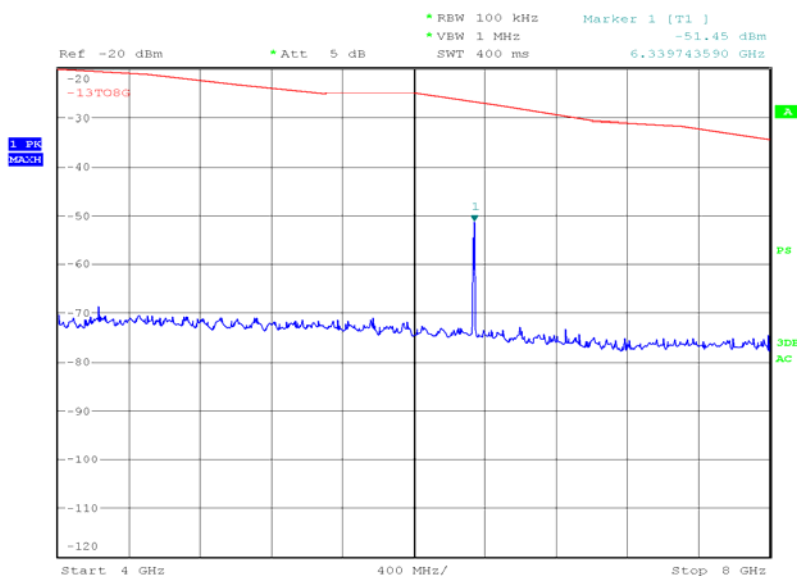
4GHz to 8GHz

Vertical



Date: 15.AUG.2009 00:57:08

Horizontal

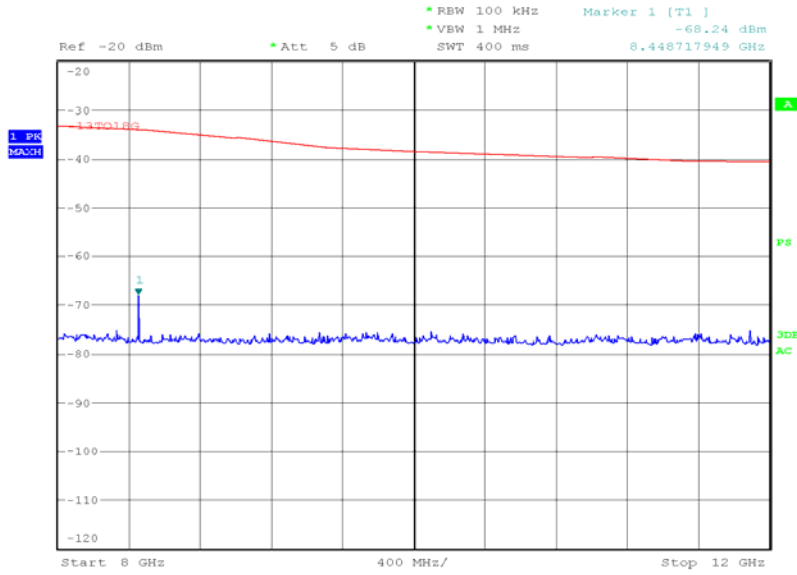


Date: 15.AUG.2009 01:00:48



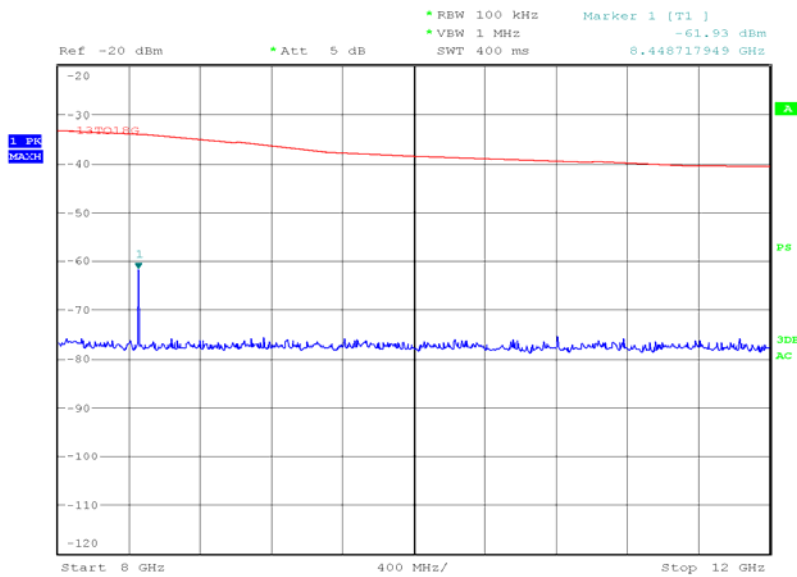
8GHz to 12GHz

Vertical



Date: 15.AUG.2009 04:11:28

Horizontal

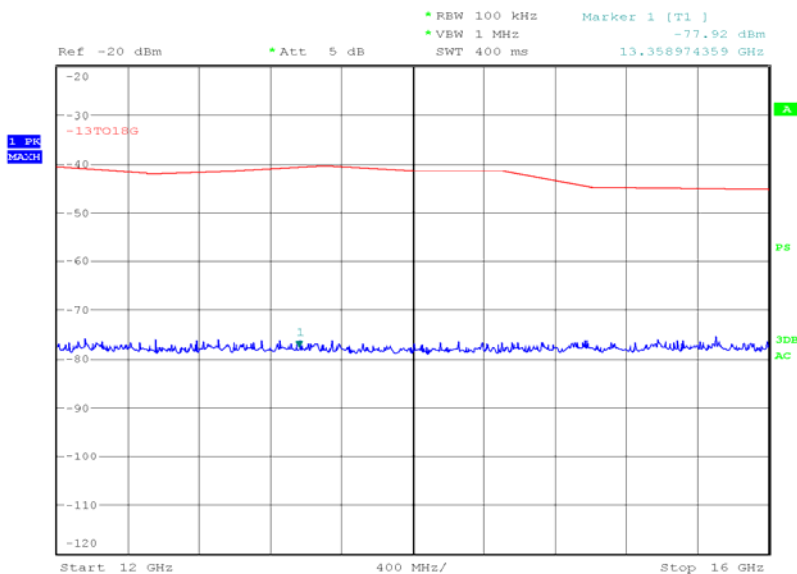


Date: 15.AUG.2009 04:30:48



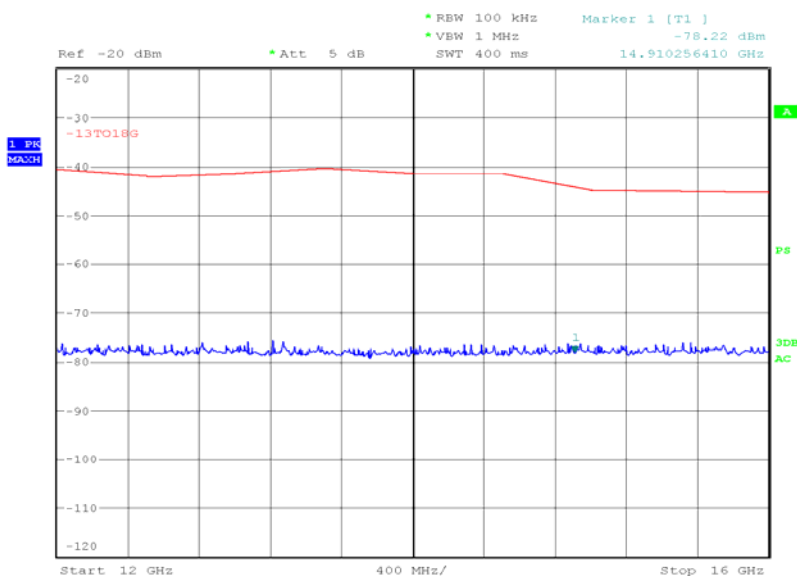
12GHz to 16GHz

Vertical



Date: 15.AUG.2009 04:13:58

Horizontal

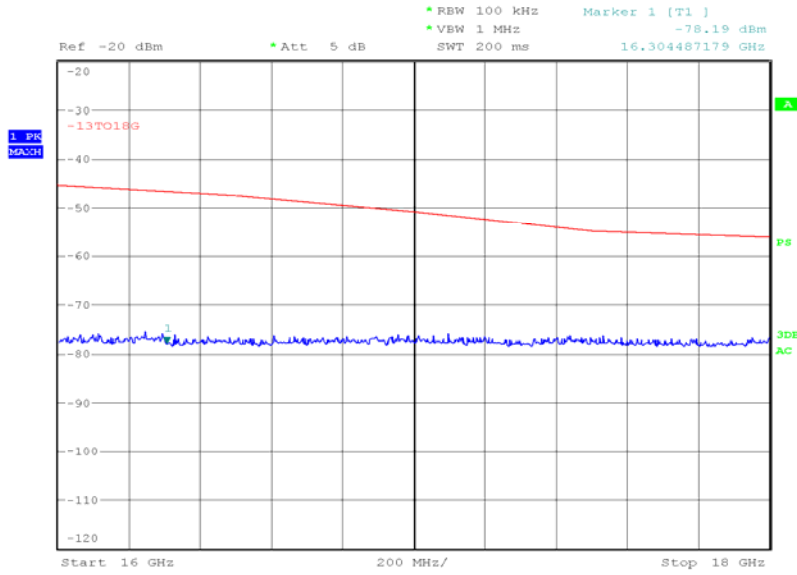


Date: 15.AUG.2009 04:28:24



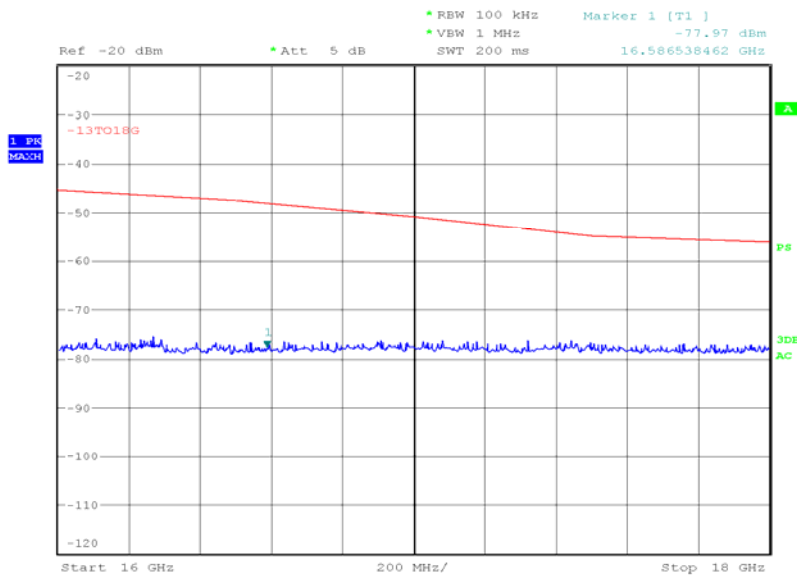
16GHz to 18GHz

Vertical



Date: 15.AUG.2009 04:22:36

Horizontal

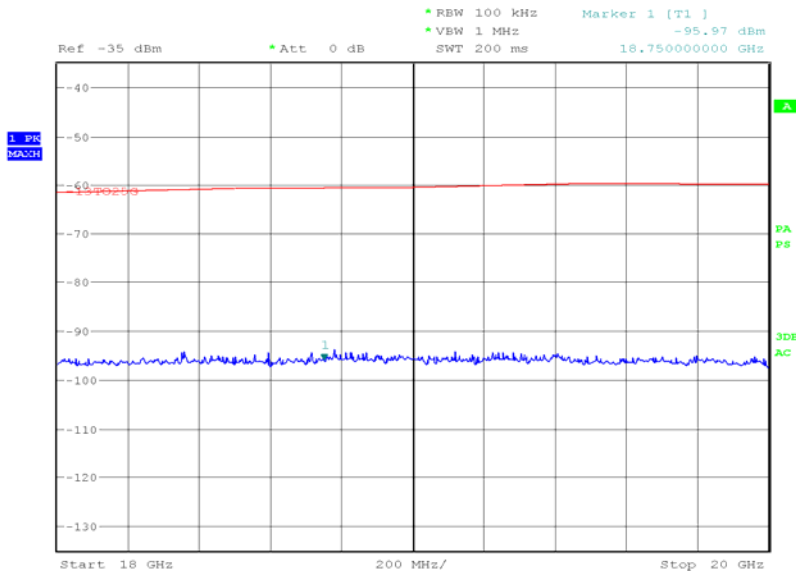


Date: 15.AUG.2009 04:26:03



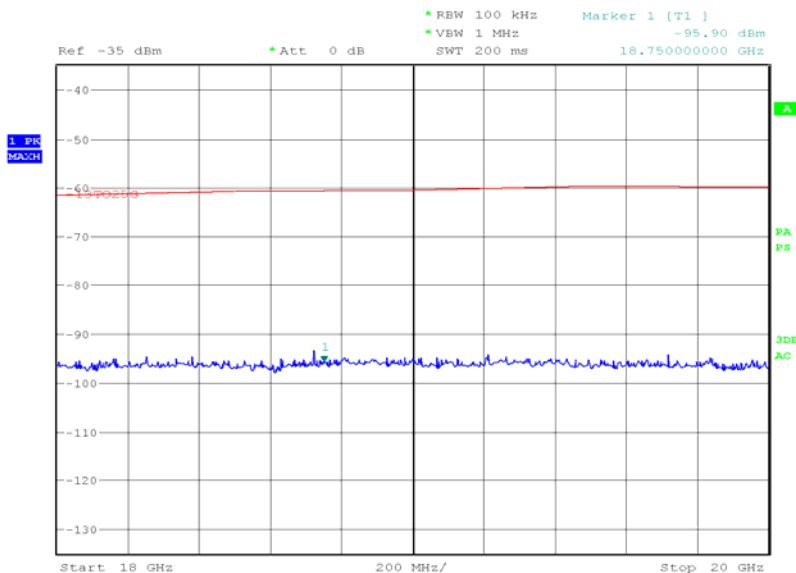
18GHz to 20GHz

Vertical



Date: 15.AUG.2009 04:51:53

Horizontal



Date: 15.AUG.2009 04:55:03



Product Service

2.2 EIRP PEAK POWER

2.2.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.50(d)

2.2.2 Equipment Under Test

219C nano3G-4 Picocellular Base Station, S/N: 0947

2.2.3 Date of Test and Modification State

14 August 2009 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 27.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
- Mode 2
- Mode 3

2.2.6 Environmental Conditions

	14 August 2009
Ambient Temperature	18.7 - 19.3°C
Relative Humidity	46 - 47%
Atmospheric Pressure	1015mbar



Product Service

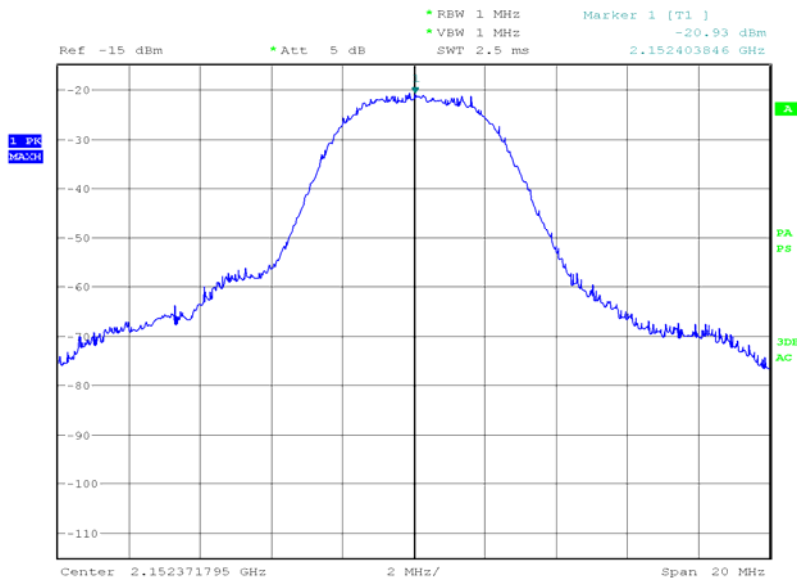
2.2.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 27 for EIRP Peak Power.

The test results are shown below.

Configuration 1 - Mode 1

Frequency	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
2.152	26.4	62.15	0.436	1640

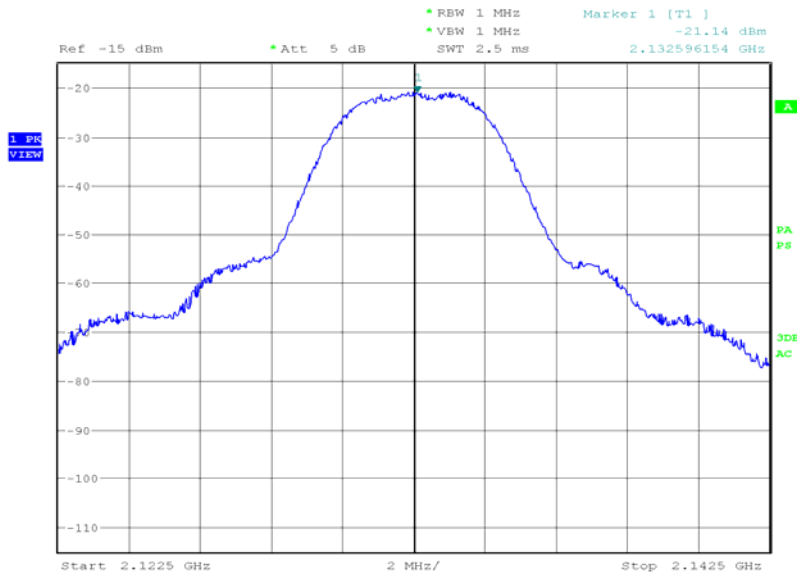


Date: 14.AUG.2009 23:15:12



Configuration 1 - Mode 2

Frequency	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
2.1325	26.43	62.15	0.439	1640

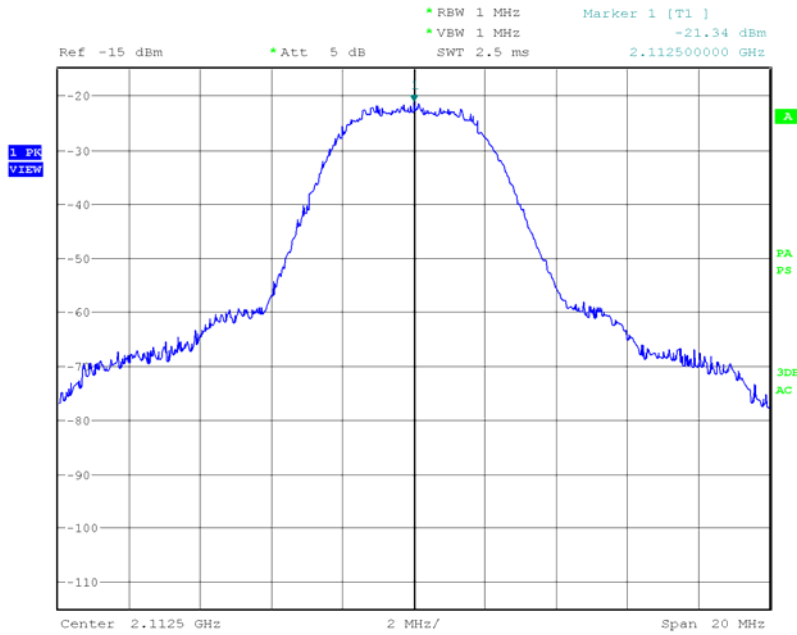


Date: 14.AUG.2009 22:41:22



Configuration 1 - Mode 3

Frequency	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
2.112	25.2	62.15	0.331	1640



Date: 14.AUG.2009 23:22:15



Product Service

2.3 CARRIER POWER

2.3.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.50(d)(2)(B)

2.3.2 Equipment Under Test

219C nano3G-4 Picocellular Base Station, S/N: 000000947

2.3.3 Date of Test and Modification State

18 August 2009 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 27.

The EUT was connected to a spectrum analyser via a 10dB attenuator. The path loss between the EUT and the spectrum analyser was measured and entered as a reference level offset. The detector was set to rms and the trace set to the max hold. The carrier power was then measured in two ways, on bottom, middle and top channels at maximum power:

- Power in a 1MHz bandwidth using a spectrum analyser.
- Wideband power using a peak power analyser.

Both average and peak reading were recorded in a 1MHz bandwidth and wideband power measurement.

The test was performed with the EUT in the following configurations and modes of operation:

- Configuration 1 - Mode 1
- Mode 2
- Mode 3

2.3.6 Environmental Conditions

	18 August 2009
Ambient Temperature	23°C
Relative Humidity	44%



Product Service

2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 27 for Carrier Power.

The test results are shown below.

Configuration 1 – Modes 1, 2 and 3

Channel Number / Frequency (MHz)	1 MHz RBW, 10MHz VBW				Wideband Power			
	Average		Peak		Average		Peak	
	dBm	mW	dBm	mW	dBm	mW	dBm	mW
1887 / 2112.5 MHz	10.93	12.39	19.02	79.80	16.06	40.36	35.53	225.42
1987 / 2132.5 MHz	10.94	12.42	19.38	86.70	16.22	41.88	23.68	233.34
2087 / 2152.5 MHz	11.60	14.45	19.72	93.76	16.80	47.86	23.43	220.29

Limit

≤ 1640W/MHz



Product Service

2.4 CARRIER POWER - CCDF

2.4.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.50(d)(5)

2.4.2 Equipment Under Test

219C nano3G-4 Picocellular Base Station, S/N: 0947

2.4.3 Date of Test and Modification State

18 August 2009 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 27.

To demonstrate compliance with the PAR (Peak to Average Ratio) of 13dB defined in 27.50(d)(5) the CCDF function of the spectrum analyser was used. The following plots show the CCDF statistics and compliance with the 13dB PAR.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3

2.4.6 Environmental Conditions

	18 August 2009
Ambient Temperature	23°C
Relative Humidity	44%



Product Service

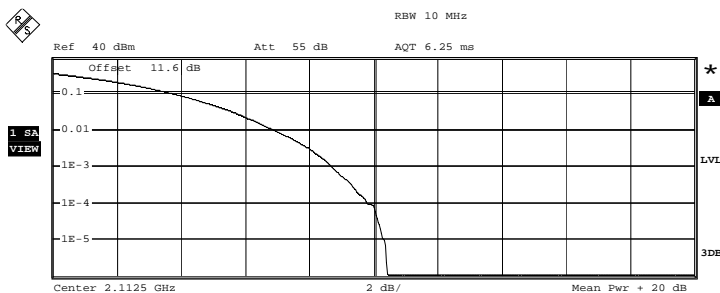
2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 27 for Carrier Power - CCDF.

The test results are shown below.

Configuration 1 – Modes 1, 2 and 3

2112.5MHz



Complementary Cumulative Distribution Function
 NOP samples: 100000, Usable BW: 11.2MHz

Trace 1
 Mean 15.73 dBm
 Peak 26.15 dBm
 Crest 10.42 dB

10 %	3.78 dB
1 %	6.89 dB
.1 %	8.69 dB
.01 %	9.84 dB

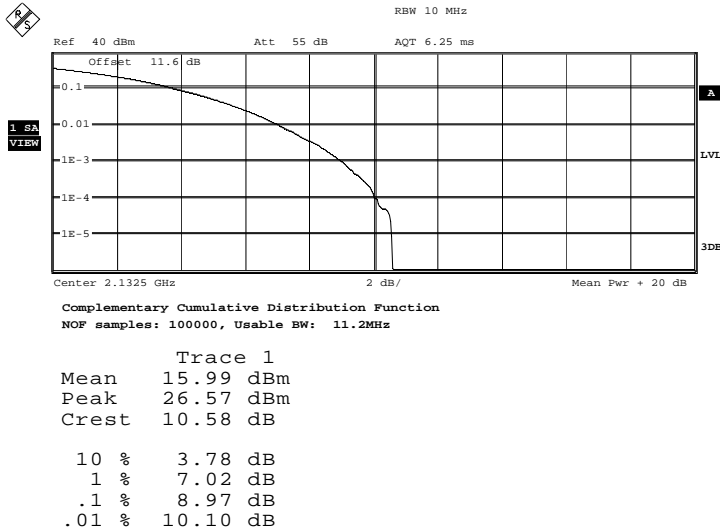
Date: 18.AUG.2009 10:49:14

Peak to Average Ratio: 10.42dB



Product Service

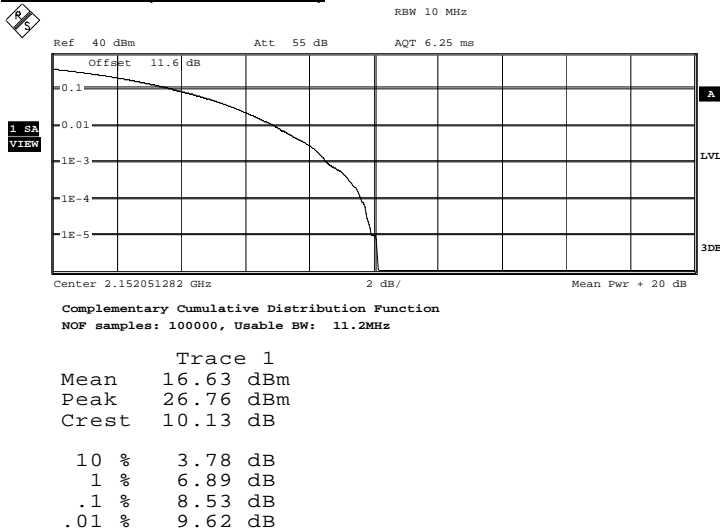
2132.5MHz



Date: 18.AUG.2009 10:48:07

Peak to Average Ratio: 10.58dB

2152.5MHz (PAR 10.13dB)



Date: 18.AUG.2009 10:43:49

Peak to Average Ratio: 10.13dB

Limit

≤ 13dB



Product Service

2.5 26dB BANDWIDTH

2.5.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.53(h)(1)

2.5.2 Equipment Under Test

219C nano3G-4 Picocellular Base Station, S/N: 0947

2.5.3 Date of Test and Modification State

18 August 2009 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 27.

The EUT was connected to a spectrum analyser via an attenuator and cable. The EUT was configured to transmit Test Model 1 on bottom, middle and top channels. The trace was set to max hold and using the markers, the 26dB bandwidth was established. The plots are shown on the following pages.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
- Mode 2
- Mode 3

2.5.6 Environmental Conditions

	18 August 2009
Ambient Temperature	23°C
Relative Humidity	44%



Product Service

2.5.7 Test Results

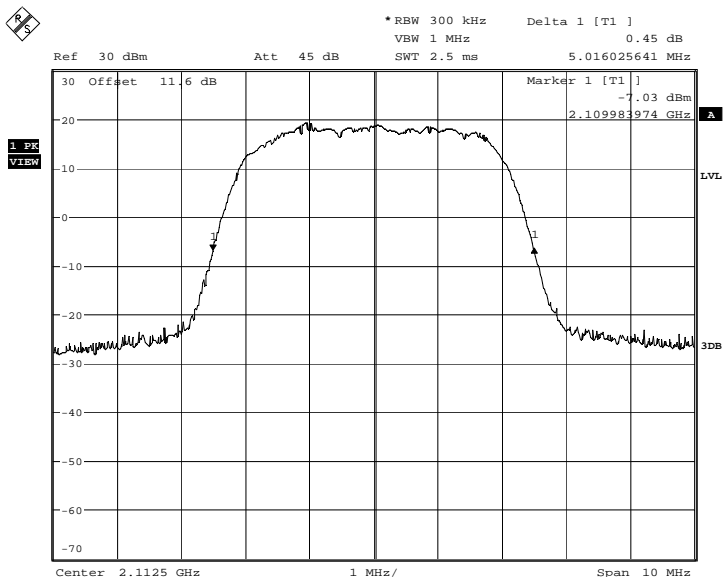
For the period of test the EUT met the requirements of FCC CFR 47 Part 27 for 26dB Bandwidth.

The test results are shown below.

Configuration 1 – Modes 1, 2 and 3

	Channel 1887 2112.5MHz	Channel 1987 2132.5MHz	Channel 2087 2152.5MHz
26dB Bandwidth	5.016	5.032	5.032

Channel 1887 - 2112.5MHz

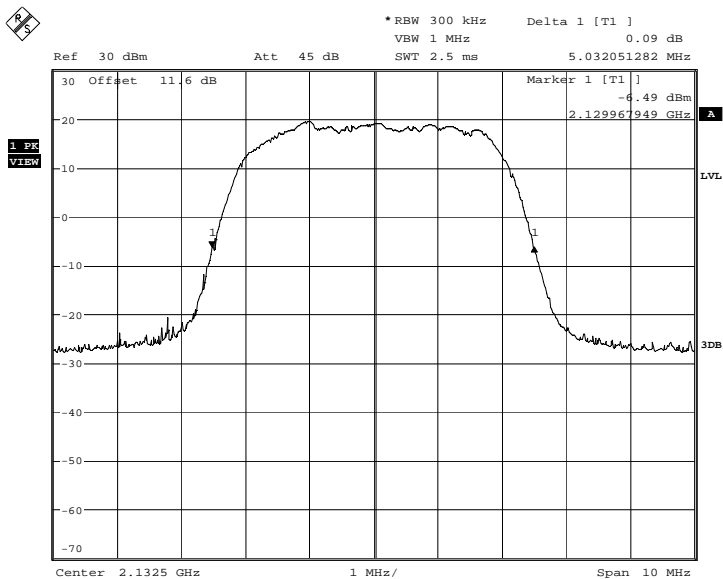


Date: 18.AUG.2009 11:13:21



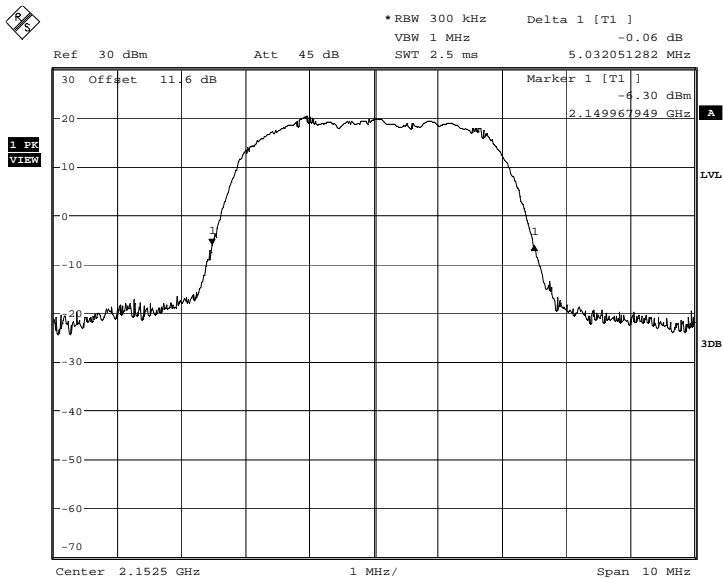
Product Service

Channel 1987 - 2132.5MHz



Date: 18.AUG.2009 12:18:44

Channel 2087 - 2152.5MHz



Date: 18.AUG.2009 12:25:00



Product Service

2.6 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.6.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.54 / 2.1055(d)(1)

2.6.2 Equipment Under Test

219C nano3G-4 Picocellular Base Station, S/N: 0947

2.6.3 Date of Test and Modification State

19 August 2009 - Modification State 0

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

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 27.

The EUT was set to transmit on maximum power with test model 1. In accordance with 2.1055 (d)(1) the primary supply voltage was varied by $\pm 15\%$ and the frequency error recorded. The results were then reviewed and the block edge measurements examined to ensure that the fundamental remained within the authorised bands of operation.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.6.6 Environmental Conditions

	19 August 2009
Ambient Temperature	23°C
Relative Humidity	53%



Product Service

2.6.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 27 for Frequency Stability Under Voltage Variations.

The test results are shown below.

Configuration 1 – Mode 1

Channel: 1987 - 2132.5MHz

AC Voltage	Deviation (Hz)
93.5 V AC / 60Hz	-50.41
110 V AC / 60Hz	-50.30
126.5V AC / 60Hz	-49.34

Limit:

The fundamental must remain within the authorised frequency block.
--



Product Service

2.7 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.7.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.540/2.1055

2.7.2 Equipment Under Test

219C nano3G-4 Picocellular Base Station, S/N: 0947

2.7.3 Date of Test and Modification State

27 August 2009 - Modification State 0

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

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 27.

The EUT was set to transmit on maximum power with test model 1 in accordance with 2.1055. The temperature was varied from -30°C to +50° in 10° steps. Middle channel only 2132.5MHz, Channel 1987.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.7.6 Environmental Conditions

	27 August 2009
Ambient Temperature	24°C
Relative Humidity	51%



Product Service

2.7.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 27 for Frequency Stability Under Temperature Variations.

The test results are shown below.

Configuration 1 – Mode 1

Channel: 1987 - 2132.5MHz

Temperature Interval °C	Frequency Error (Hz)
-30	-45.33
-20	-45.63
-10	-45.55
0	-46.13
+10	-45.45
+20	-45.82
+30	-45.68
+40	-43.41
+50	-40.99

Limit:

The fundamental must remain within the authorised frequency block.
--



Product Service

2.8 CONDUCTED EMISSIONS – BLOCK EDGE

2.8.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.53(h)(1)

2.8.2 Equipment Under Test

219C nano3G-4 Picocellular Base Station, S/N: 0947

2.8.3 Date of Test and Modification State

18 August 2009 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 27.

Using a spectrum analyser and attenuator the emissions were made between the block edge frequency up to 1MHz away to ensure compliance with the 43 +10 log P limit.

Measurements were performed using a peak detector with the trace display set to max hold. An RBW of at least 1% of the measurement 26dB bandwidth was used, in this case 100kHz RBW and 300kHz VBW. The measured path loss was entered as a reference level offset to the spectrum analyser.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 3

2.8.6 Environmental Conditions

18 August 2009

Ambient Temperature 23°C

Relative Humidity 44%



Product Service

2.8.7 Test Results

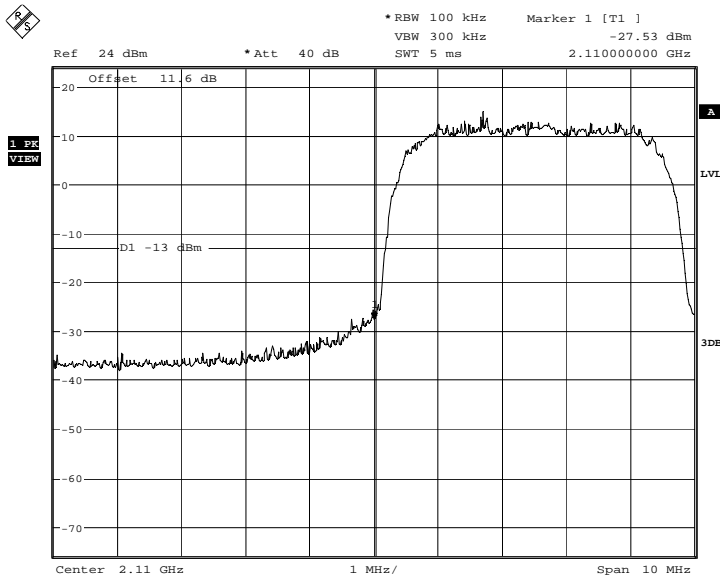
For the period of test the EUT met the requirements of FCC CFR 47 Part 27 for Conducted Emissions – Block Edge.

The test results are shown below.

Configuration 1 – Mode 1 and 3

Frequency Block	Block Edge Test Channel/Frequency
A – 2100 to 2120MHz	Channel 1887 – 2112.5MHz
F – 2145 to 2155MHz	Channel 2087 – 2152.5MHz

Block A

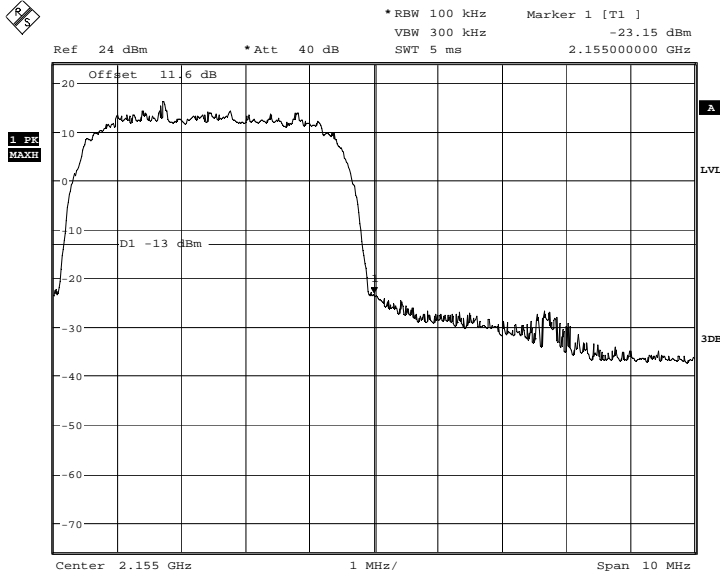


Date: 18.AUG.2009 14:51:43



Product Service

Block F



Date: 18.AUG.2009 14:49:48

Limit:

At block A and F (2110MHz and 2155MHz)	≤ -13dBm
--	----------



Product Service

2.9 SPURIOUS CONDUCTED EMISSIONS

2.9.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.53/2.1053

2.9.2 Equipment Under Test

219C nano3G-4 Picocellular Base Station, S/N: 0947

2.9.3 Date of Test and Modification State

18 August 2009 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 27.

The EUT was set up to transmit on max power with test model 1 in accordance with 2.1051. Emissions were searched for from 9kHz to 4GHz via a 20dB attenuator, from 4GHz to 18GHz via a 4GHz high pass filter and 18GHz to 22GHz waveguide. Plots were taken on bottom, middle and top channels. Path losses of each set up were offset in the analyser.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
- Mode 2
- Mode 3

2.9.6 Environmental Conditions

	18 August 2009
Ambient Temperature	23°C
Relative Humidity	44%



Product Service

2.9.7 Test Results

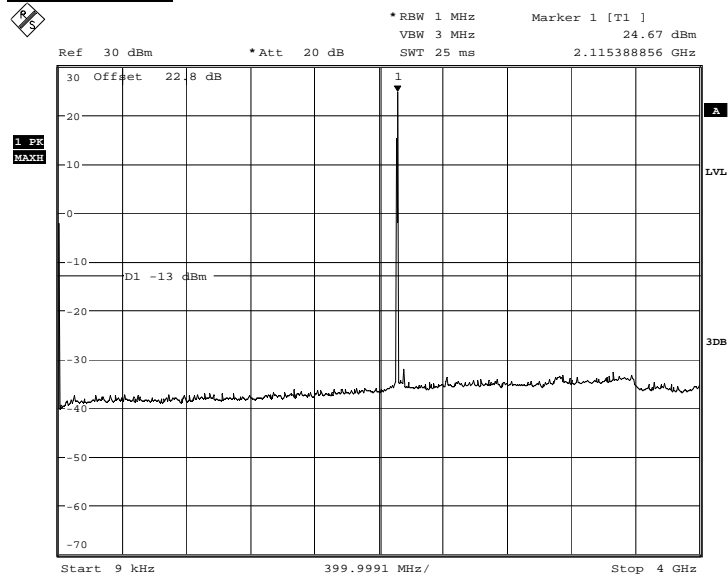
For the period of test the EUT met the requirements of FCC CFR 47 Part 27 for Spurious Conducted Emissions.

The test results are shown below.

Configuration 1 – Mode 1

Channel 1887 – Frequency 2112.5MHz

9kHz to 4GHz

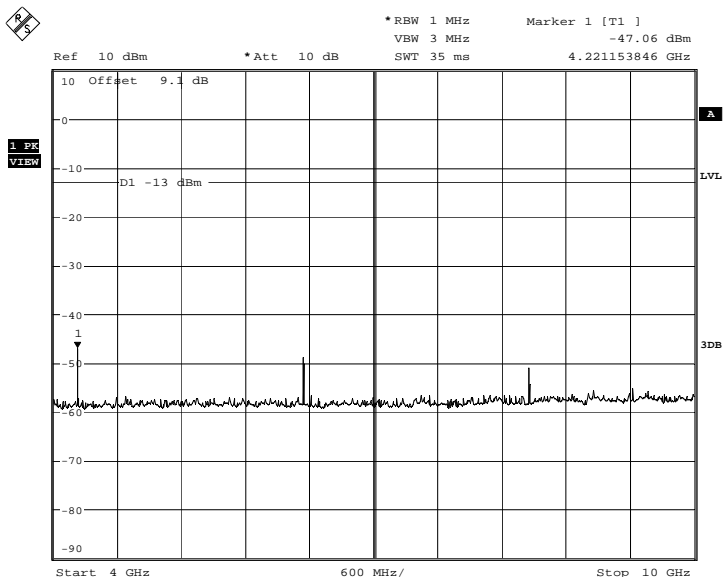


Date: 28.AUG.2009 11:12:45



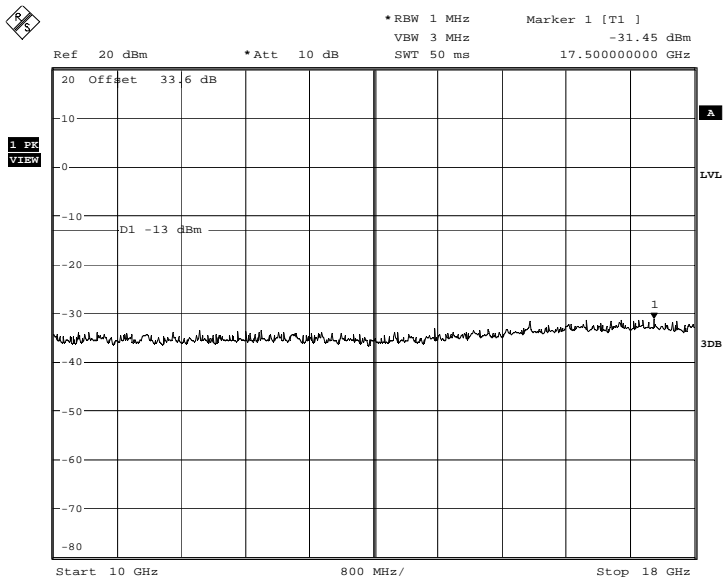
Product Service

4GHz to 10GHz



Date: 28.AUG.2009 11:36:30

10GHz to 18GHz

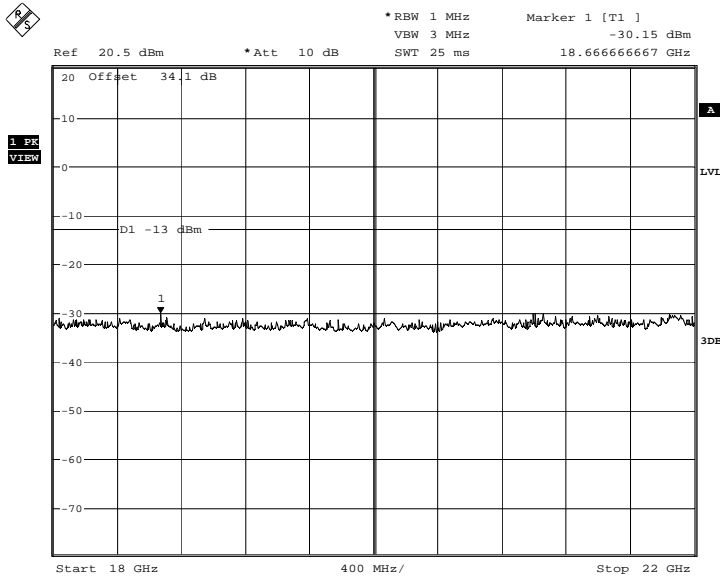


Date: 28.AUG.2009 11:40:08



Product Service

18GHz to 22GHz

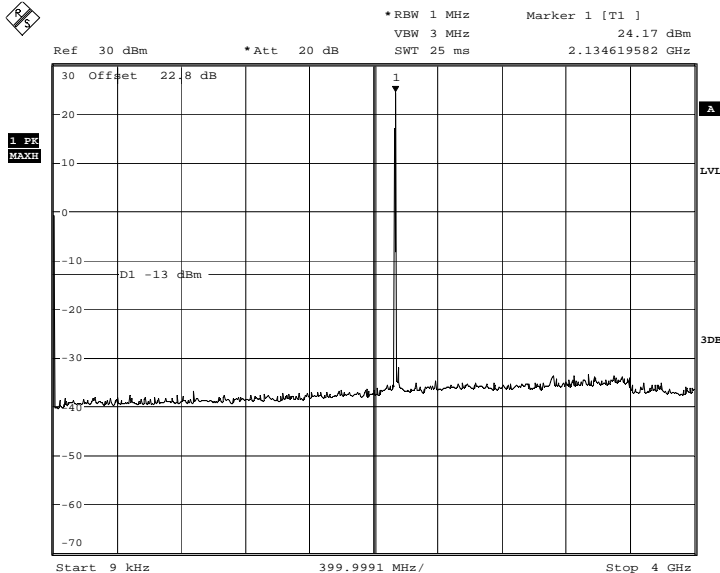


Date: 28.AUG.2009 12:00:50

Configuration 1 – Mode 2

Channel 1987 – Frequency 2132.5MHz

9kHz to 4GHz

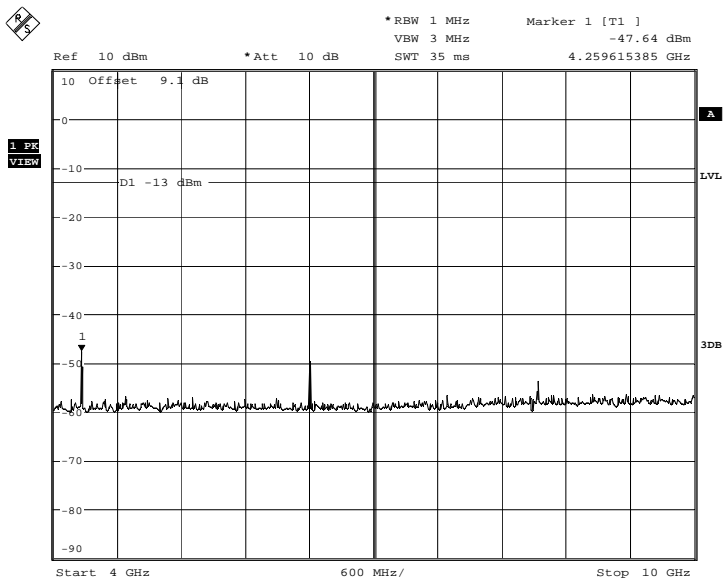


Date: 28.AUG.2009 11:18:59



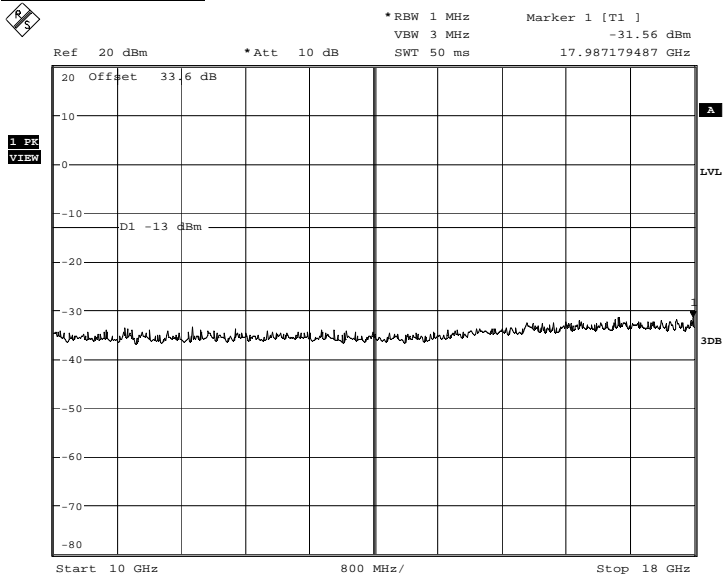
Product Service

4GHz to 10GHz



Date: 28.AUG.2009 11:29:40

10GHz to 18GHz

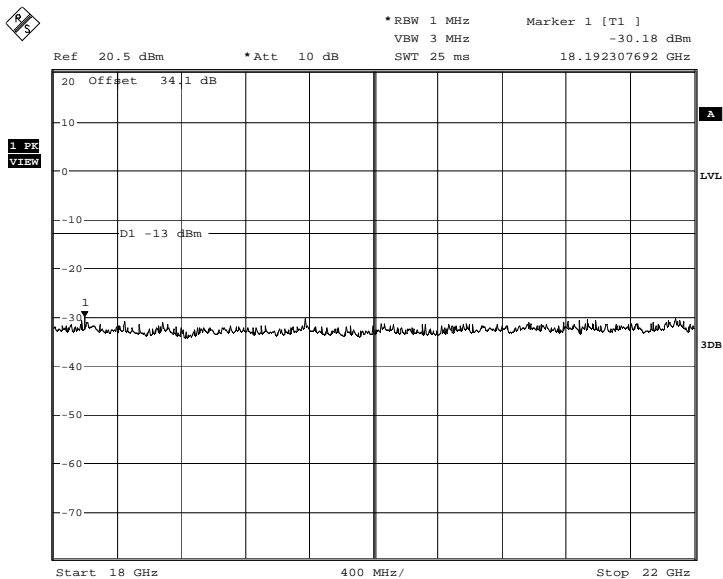


Date: 28.AUG.2009 11:45:56



Product Service

18GHz to 22GHz

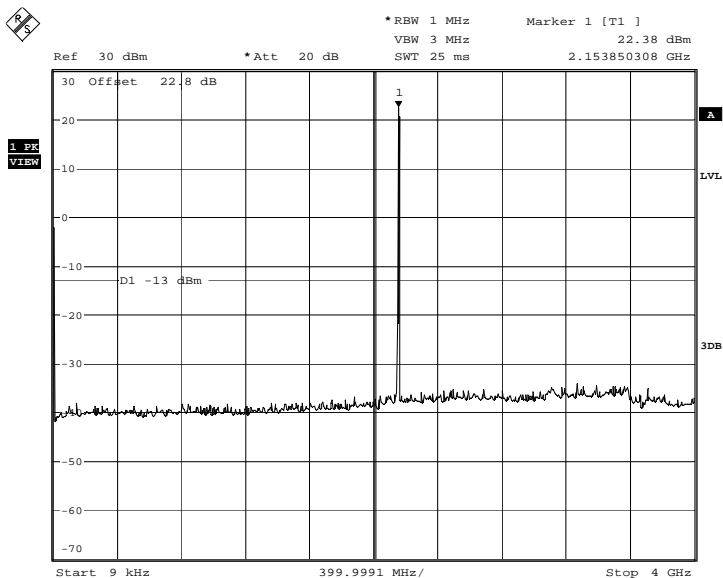


Date: 28.AUG.2009 11:55:42

Configuration 1 – Mode 3

Channel 2087 – Frequency 2152.5MHz

9kHz to 4GHz

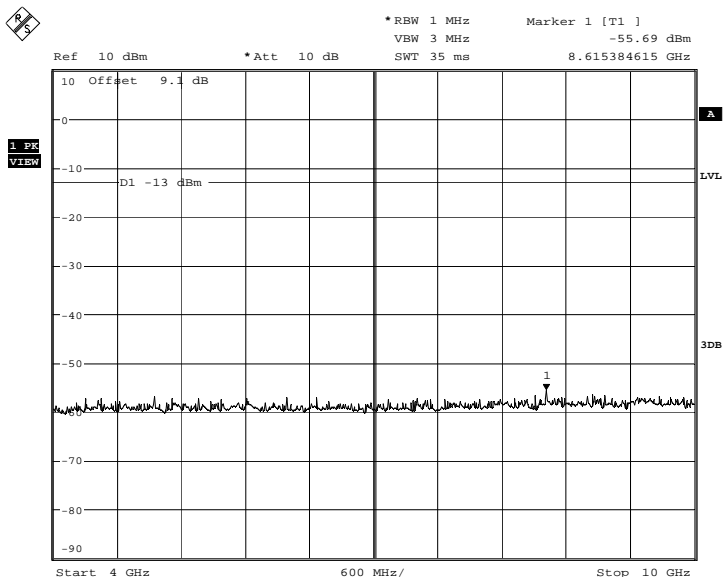


Date: 28.AUG.2009 11:21:22



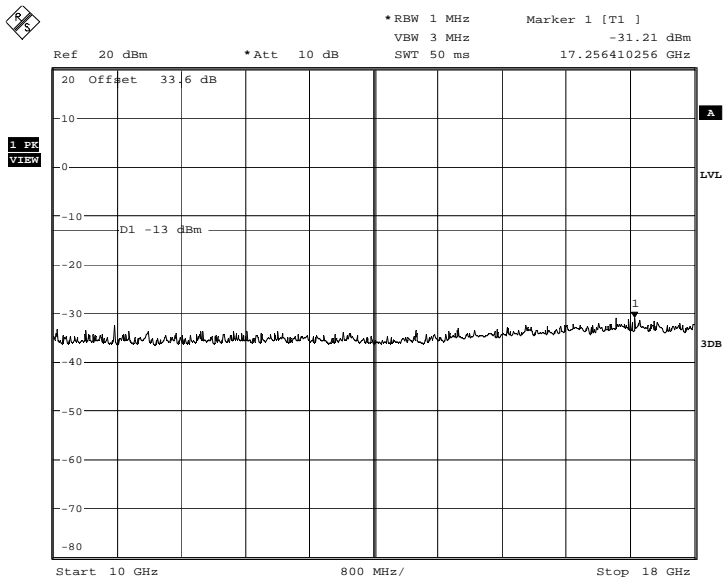
Product Service

4GHz to 10GHz



Date: 28.AUG.2009 11:26:51

10GHz to 18GHz

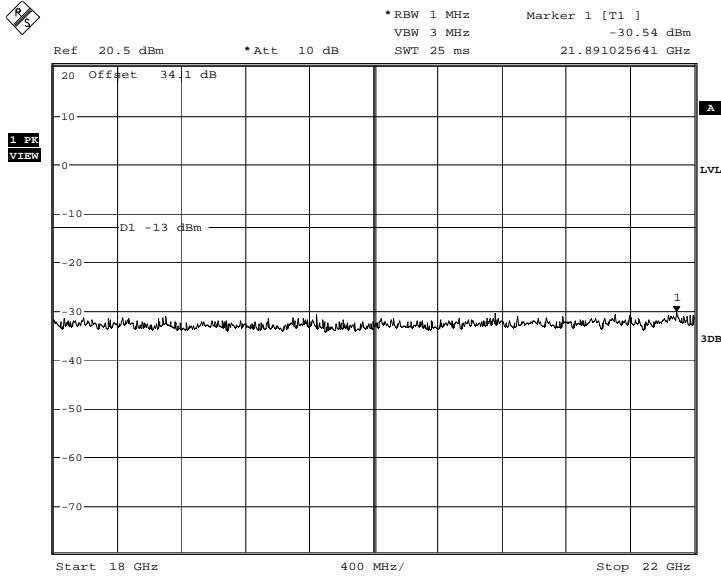


Date: 28.AUG.2009 11:48:08



Product Service

18GHz to 22GHz



Date: 28.AUG.2009 11:57:18



Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 EMC - Radiated Emissions					
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	-	TU
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	6-Sep-2009
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	11-Sep-2009
Amplifier (Low Noise, 18GHz-40GHz)	Narda	NARDA DB02-0447	240	12	26-Jun-2010
Pre-Amplifier	Phase One	PS04-0085	1532	12	15-Sep-2009
Pre-Amplifier	Phase One	PS04-0086	1533	12	15-Sep-2009
Screened Room (5)	Rainford	Rainford	1545	36	11-Feb-2011
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Turntable/Mast Controller	EMCO	2090	1610	-	TU
4GHz HPF	Sematron	F-100-4000-5-R	2245	-	TU
High Pass Filter (7GHz)	Lorch	9HP7-7000-SR	2246	12	5-Sep-2009
Antenna (Bilog)	Chase	CBL6143	2904	24	28-Nov-2009
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	4-Aug-2010
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	20-Aug-2009
Section 2.2 EMC - Maximum Output Power					
Peak Power Analyser	Hewlett Packard	8990A	107	12	2-Feb-2010
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	6-Sep-2009
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	11-Sep-2009
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Turntable/Mast Controller	EMCO	2090	1610	-	TU
Power Sensor	Hewlett Packard	84812A	2743	-	TU
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	4-Aug-2010
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	20-Aug-2009
Section 2.3 and 2.4 Radio (Tx) - Power Characteristics					
Peak Power Analyser	Hewlett Packard	8990A	107	12	2-Feb-2010
Multimeter	White Gold	WG022	190	12	11-Sep-2009
Attenuator 10dB 25W	Weinschel	46-10-43	400	12	5-May-2010
Programmable Power Supply	California Inst	2001RP	1898	-	TU
Power Sensor	Hewlett Packard	84812A	2743	-	TU
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3351	12	22-Apr-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-May-2010
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Feb-2010



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.5 Radio (Tx) - Channel Bandwidth					
Multimeter	White Gold	WG022	190	12	11-Sep-2009
Attenuator 10dB 25W	Weinschel	46-10-43	400	12	5-May-2010
Programmable Power Supply	California Inst	2001RP	1898	-	TU
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3351	12	22-Apr-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-May-2010
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Feb-2010
Section 2.6 Radio (Tx) - Frequency Tolerance under Voltage Variations					
Multimeter	White Gold	WG022	190	12	11-Sep-2009
Attenuator 10dB 25W	Weinschel	46-10-43	400	12	5-May-2010
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	3-Sep-2009
Programmable Power Supply	California Inst	2001RP	1898	-	TU
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3351	12	22-Apr-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-May-2010
Section 2.7 Radio (Tx) - Frequency Tolerance under Temperature Variations					
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Digital Voltmeter	White Gold	WG022	190	12	11-Sep-09
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
Digital Temperature Indicator	Fluke	51	2267	12	23-Jun-2010
Attenuator (20dB, 50W)	Aeroflex / Weinschel	47-20-34	3165	12	9-Jun-2010
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	4-Jun-2010
Hygrometer	Rotronic	I-1000	3220	12	17-Apr-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-May-2010
Section 2.8 Radio (Tx) - Block Edge					
Multimeter	White Gold	WG022	190	12	11-Sep-2009
Attenuator 10dB 25W	Weinschel	46-10-43	400	12	5-May-2010
Programmable Power Supply	California Inst	2001RP	1898	-	TU
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3351	12	22-Apr-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-May-2010
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Feb-2010
Section 2.9 Radio (Tx) - Conducted Spurious Emissions					
True RMS Multimeter	Fluke	79 Series III	411	12	24-Jul-2010
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	12	5-Sep-2009
Attenuator (20dB, 50W)	Aeroflex / Weinschel	47-20-34	3165	12	9-Jun-2010
Hygrometer	Rotronic	I-1000	3220	12	17-Apr-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-May-2010
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Feb-2010
Waveguide	FMI	200935	-	-	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*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Conducted Emissions, ISN	150kHz to 30MHz Amplitude	2.1dB
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
Discontinuous Interference	150kHz to 30MHz Amplitude	3.0dB*
Interference Power	30MHz to 300MHz Amplitude	3.0dB*
Radiated E-Field Susceptibility	26MHz to 2.5GHz Test Amplitude	1.4dB†
Conducted Susceptibility	100kHz to 250MHz Amplitude	1.8dB†
DC Input Ripple Immunity	Current Voltage	0.45% 0.91%
Power Frequency Magnetic Field	50Hz/60Hz Amplitude	0.45%
Magnetic Emissions	9kHz to 30MHz Amplitude	3.4dB*
Magnetic Field/Flux iaw EN 50366	10Hz to 400kHz	2.64%
Harmonics and Flicker	The test was applied using proprietary equipment that meets the requirements of EN 61000-3-2 and EN 61000-3-3	—
Mains Voltage Variations and Interrupts	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11	—
Fast Transient Burst	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4	—
Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2	—
Surge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5	—
Vehicle Transients	The test was applied using proprietary equipment that meets the requirements of ISO 7637-1 and 2	—
Compass Safe Distance	Azimuth Accuracy	0.10°
26dB Bandwidth	Frequency Amplitude	± 210.89kHz ± 0.5dB
Conducted Spurious	9kHz – 25GHz Amplitude	±3.45dB
Frequency Stability	2.1325GHz	±1.78Hz
Carrier Power	2GHz	±0.45dB

Worst case error for both Time and Frequency measurement 12 parts in 10⁶.

* In accordance with CISPR 16-4

† In accordance with UKAS Lab 34



Product Service

SECTION 4

PHOTOGRAPHS



4.1 TEST SET UP PHOTOGRAPHS



Emissions for Broadband PCS Equipment



EIRP Peak Power



Product Service

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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5.1 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.

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