



CONFIDENTIAL

1 (20)

VERTU RF
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11-08-03

Ver 0.3

Transmitter Conducted Measurements

Occupied Bandwidth and Band Edge Emissions

Product: Vertu NPM-7

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Approval:	M Pope
Status:	Draft
Document ID:	DTX07969-EN-0.3

Revision	Revision History		Comment
	Responsible	Date	
0.1	H McQuilliam	11/8/03	Measurements in support of further FCC requirements
0.2	H McQuilliam	11/8/03	Added doc. no.
0.3	H McQuilliam	11/8/03	Corrected Contents table



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1. PURPOSE

1.1 Document Purpose

This test is used to determine NPM-7's continued compliance to a variety of government emissions regulations for the United States. This retest is necessary after NPM-7 antenna mechanics were improved, removing the external antenna, and leaving only the internal antenna. This retest also takes account of recent FCC guidelines dividing the PCS1900 band into 6 blocks, compliance with band edge emissions regulations is now required to be shown at the band edges of all 6 blocks.

1.2 Test Overview

A conducted connection is made between the phone and the test equipment. The phone is placed in a call. Its occupied bandwidth is measured, then its band edge emissions are measured to determine if it is within guidelines

1.3 Test Rationale

This test is essential to determining a handset's compliance with federal regulations.

2. LIST OF ABBREVIATIONS, ACRONYMS AND TERMS

2.1 Abbreviations

dBm	dB (milliwatts)
MHz	Megahertz
Tx	Transmit

2.2 Acronyms

ARFCN	Absolute Radio Frequency Channel Number
BSE	Base Station Emulator
BW	Bandwidth
CFR	Code of Federal Regulations
DC	Direct Current
EUT	Equipment Under Test
FCC	Federal Communications Commission
GPS	Global Positioning System
GSM	Global System for Mobile communications
PCS	Personal Communications Systems
P	Power (Watts)
RBW	Resolution Bandwidth

2.3 Terms

This section intentionally left blank.

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3. STANDARDS BASIS

Note – The CFR is updated annually. The latest version should always apply.

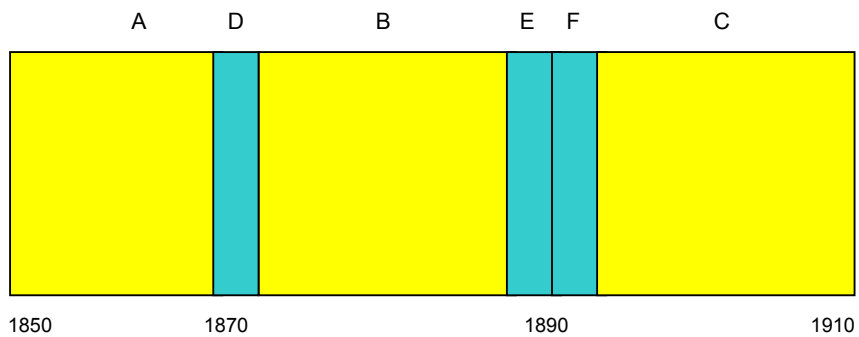
FCC. 47 CFR, Part 2.1049 (c): Occupied Bandwidth.

FCC. 47 CFR, Part 24.238 (b): Occupied Bandwidth.

FCC. 47 CFR, Part 24: Emissions at Band Edges

3.1 PCS Band Subdivision

Recent FCC correspondence indicated a requirement to show compliance at all band edges within the relevant Tx band. For PCS1900 this requires compliance to be shown at 12 band edges. The frequency blocks for PCS1900 Mobile Transmitters are shown below:



Block	Freq	Band	Channel range
BLOCK 1:	1850 – 1865 MHz	(A)	ARFCN 512 - 585
BLOCK 2:	1865 – 1870 MHz	(D)	ARFCN 587 - 610
BLOCK 3:	1870 – 1885 MHz	(B)	ARFCN 612 - 685
BLOCK 4:	1885 – 1890 MHz	(E)	ARFCN 687 - 710
BLOCK 5:	1890 – 1895 MHz	(F)	ARFCN 712 - 735
BLOCK 6:	1895 – 1910 MHz	(C)	ARFCN 737 - 810

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4. TEST EQUIPMENT, MATERIALS LIST AND SAMPLE REQUIREMENTS

4.1 Test Equipment and Materials

The relevant equipment used during the test is listed below.

DC Power Supply Agilent E3631A	Serial no. MY40009277 Calibrated 11 Jul, 2003	Due 11 Jul, 2004
Base Station Emulator Hewlett-Packard 8922	Serial no. 3933U04194 Serial no. 3842U03770 Calibrated 2 Aug, 2002	Due 20 Aug, 2004
Spectrum Analyser Agilent 8563E	Serial no. 3943A11206 Calibrated 26 Jun, 2003	Due 26 Jun, 2004

4.2 Phone Sample

NPM-7 Serial no. 390000957 Proto 7.0 build IMEI 004400/13/179493/3

Conducted RF connection to test system, powered via dummy battery connected to power supply set to nominal battery voltage. Manual control of traffic channel number and Tx power control level. Test conducted in NPM-7 project area laboratory.

5. LOCATION INFORMATION

All equipment needed to perform this test is available in the NPM-7 project area laboratory at the Nokia UK Southwood site.

6. PASS/FAIL CRITERIA

FCC Part 24.238 specifies a maximum allowable emission of $P - 43 + 10 \log (P)$ outside of the licensee's frequency block

This equates to $30 - 43 + 10 \log (1) = -13$ dBm for a PCS transmitter operating at top power level and transmitting 30 dBm (1W) as per the GSM recommendations.

For the band edge channels this is measured using a band width equal to 1% of the emission bandwidth.

7. SYSTEM VALIDATION INSTRUCTIONS

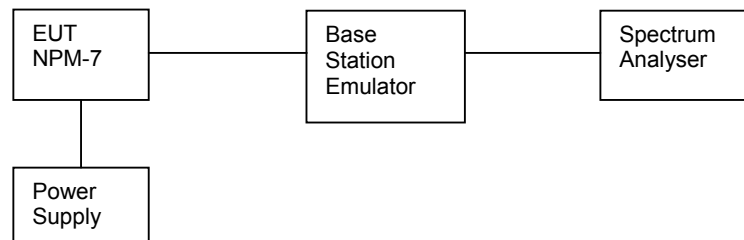
The following was verified before proceeding:

- All calibrated equipment is marked with a calibration sticker and is still within its calibration interval.
- The ambient temperature and humidity of the lab is within the normal operating limits of all test equipment.
- The BSE should power on and pass any internal self checks.

8. TEST PROCEDURE

The testing described below is designed to cover all the requirements listed in Section 3.

The measurement equipment is set up as shown below.



- 1) The EUT is connected via a conducted connection and placed in a call with random (worst case) modulation against the base station emulator, PCS mid channel 661, Tx Power Control level 0 (max power).
- 2) The spectrum analyser is connected via the coupled RF port on the base station emulator.
- 3) The maximum power in 1 MHz RBW is measured.
- 4) The Occupied Bandwidth is measured via the 99% Power BW function on the spectrum analyser.
- 5) The channel is changed to low channel 512.
- 6) The band edge emissions limit is checked in 1% RBW for compliance.
- 7) The channel is changed to the next band edge channel.
- 8) The band edge emissions limit is checked in 1% RBW for compliance.
- 9) Repeat 7) & 8) up to the last band edge channel 810.
- 10) The results are attached in the following pages.

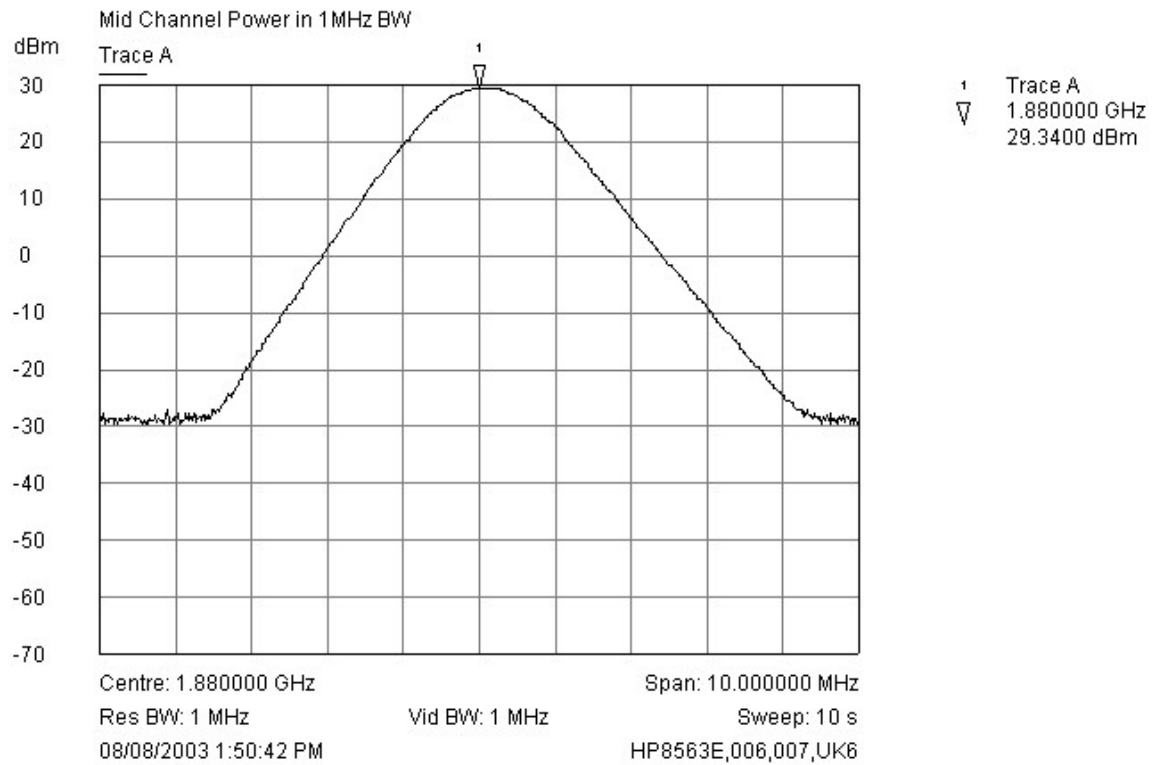
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9. RESULTS

9.1 Mid Channel, Power in 1MHz

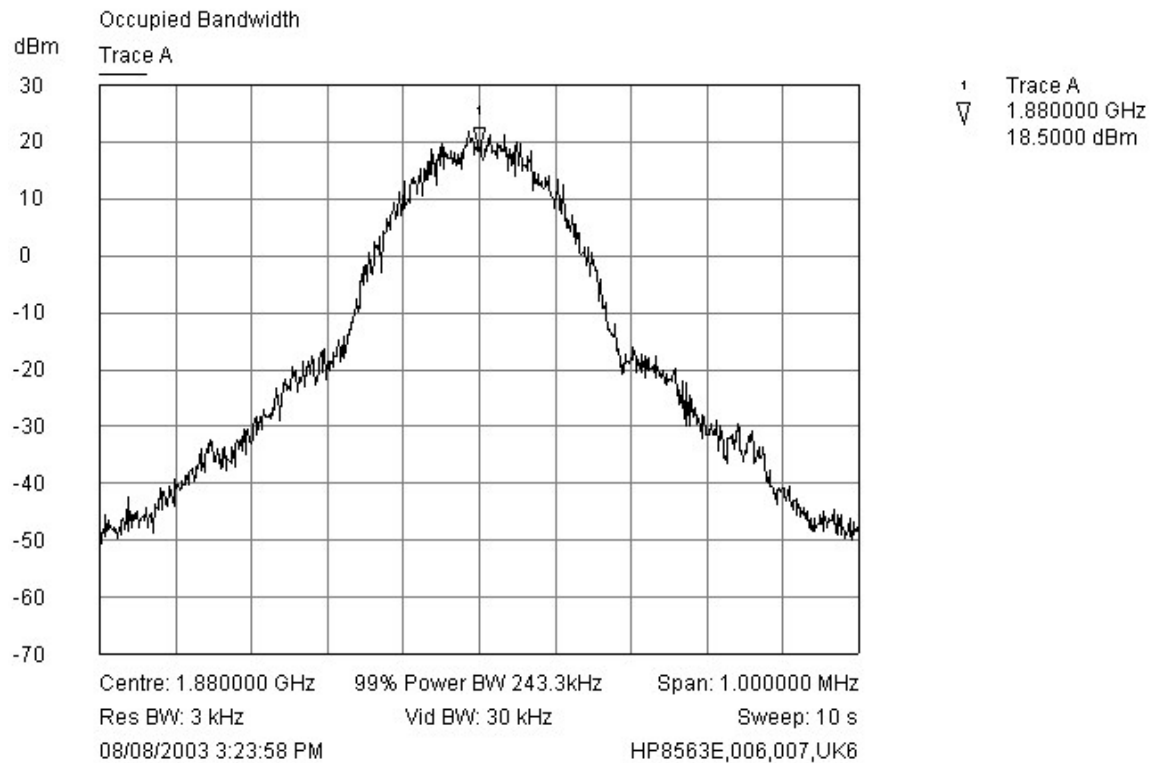


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9.2 Mid Channel, Occupied Bandwidth



Power: Tx level 0 (highest)

Modulation: Random GMSK

Channel: Mid ARFCN 661

Occupied Bandwidth = 243.3 kHz

1% Bandwidth = 2.433 kHz

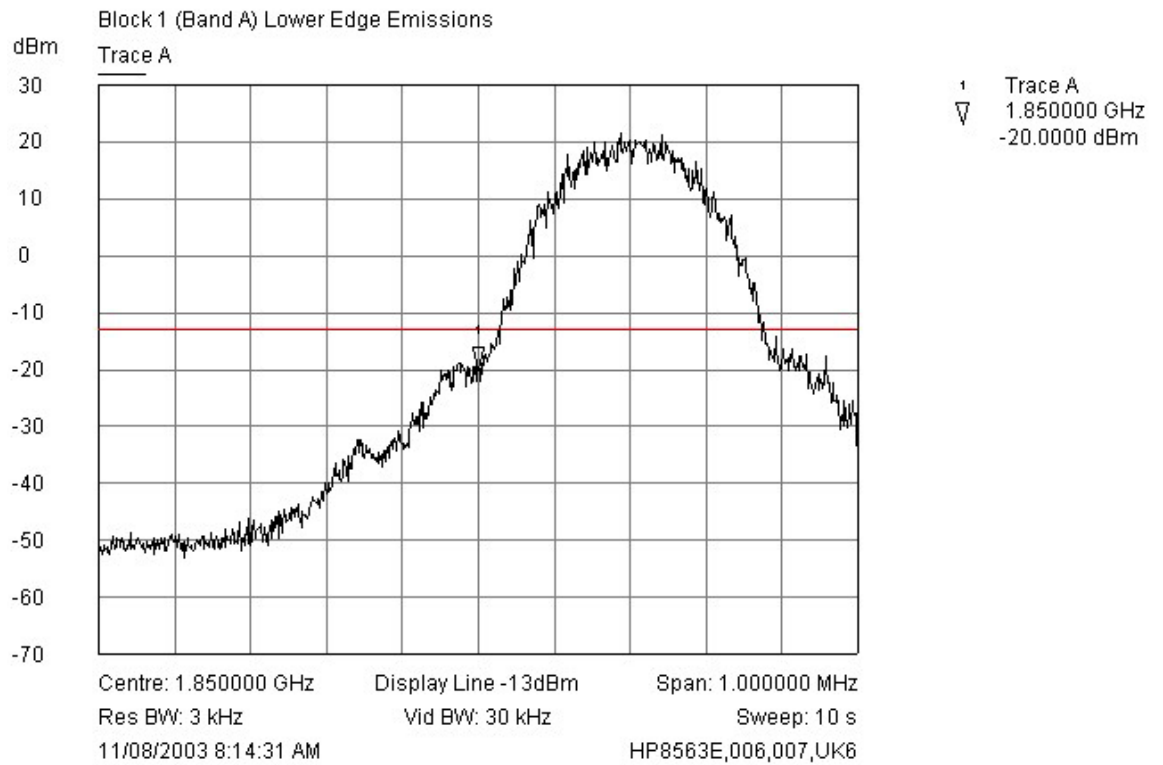
3kHz = next largest bandwidth on spectrum analyser

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9.3 Block 1 (Band A) Lower Edge Emissions

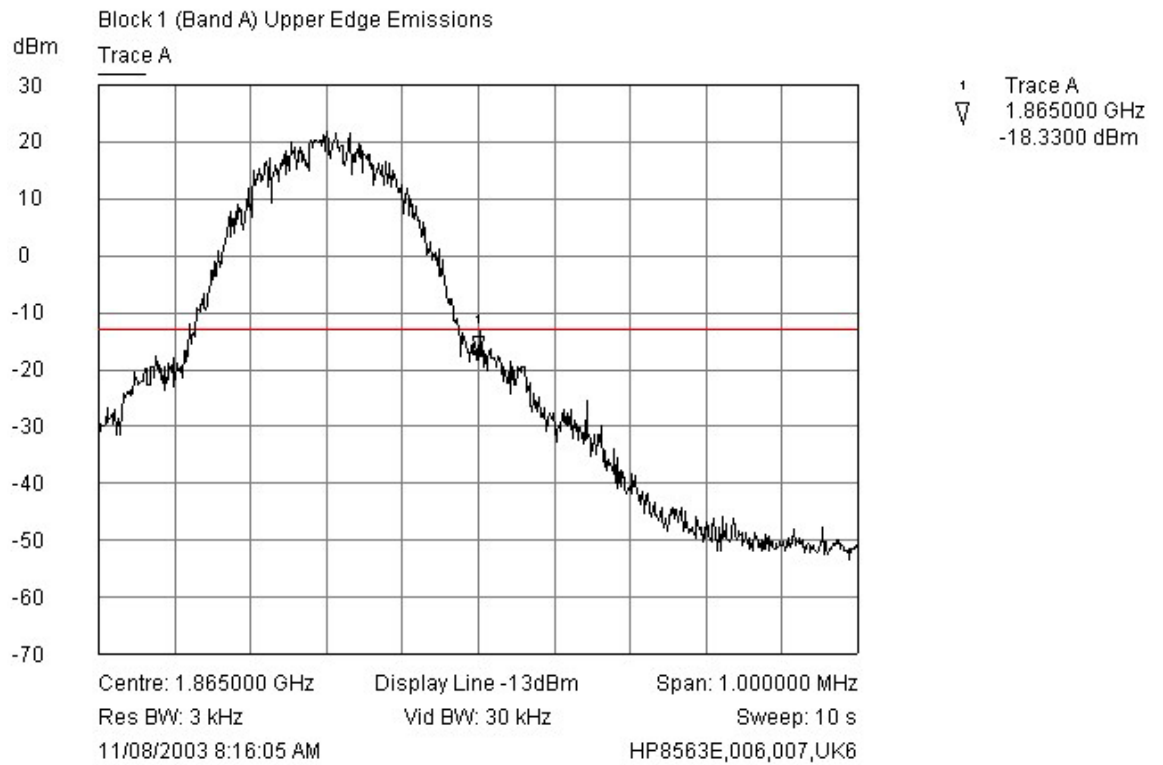


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9.4 Block 1 (Band A) Upper Edge Emissions

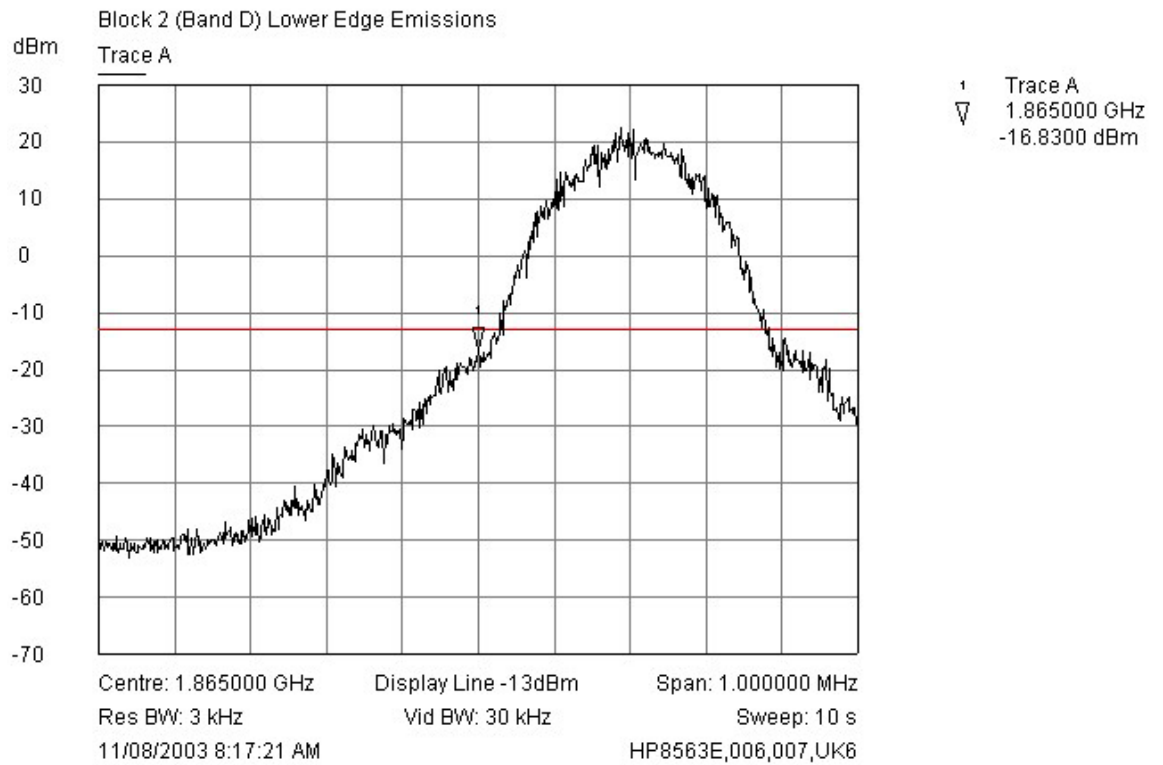


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9.5 Block 2 (Band D) Lower Edge Emissions

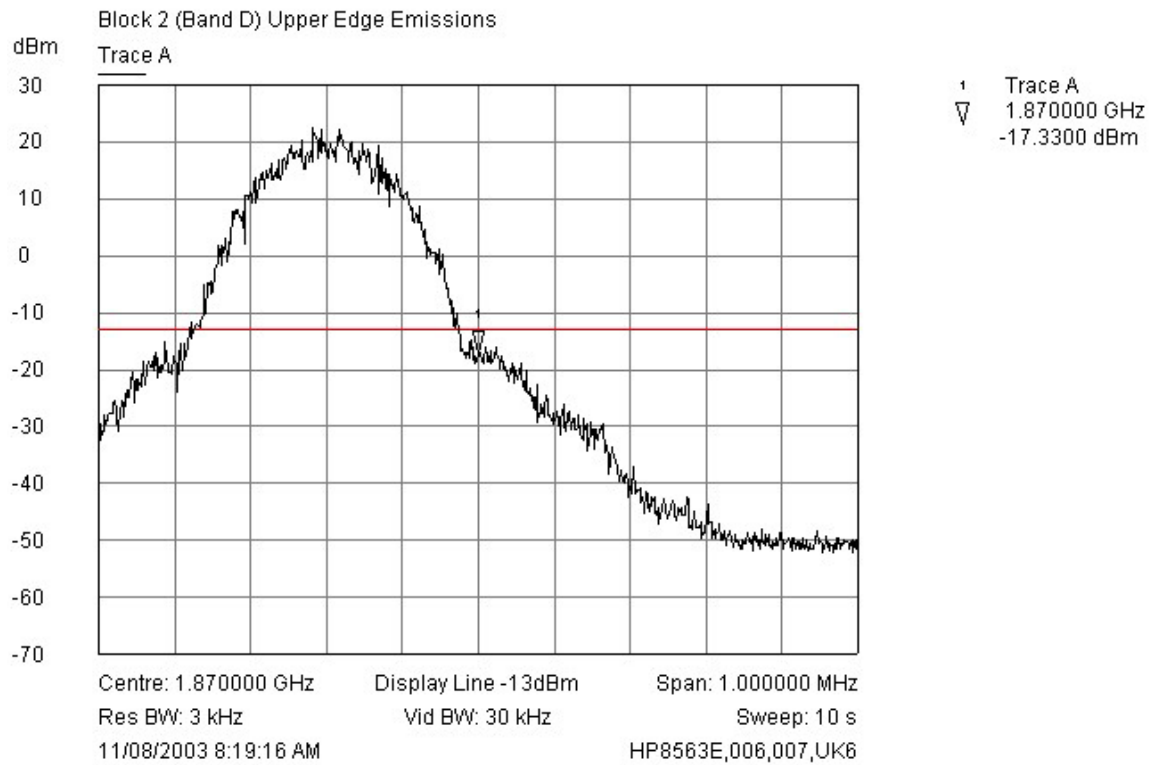


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9.6 Block 2 (Band D) Upper Edge Emissions

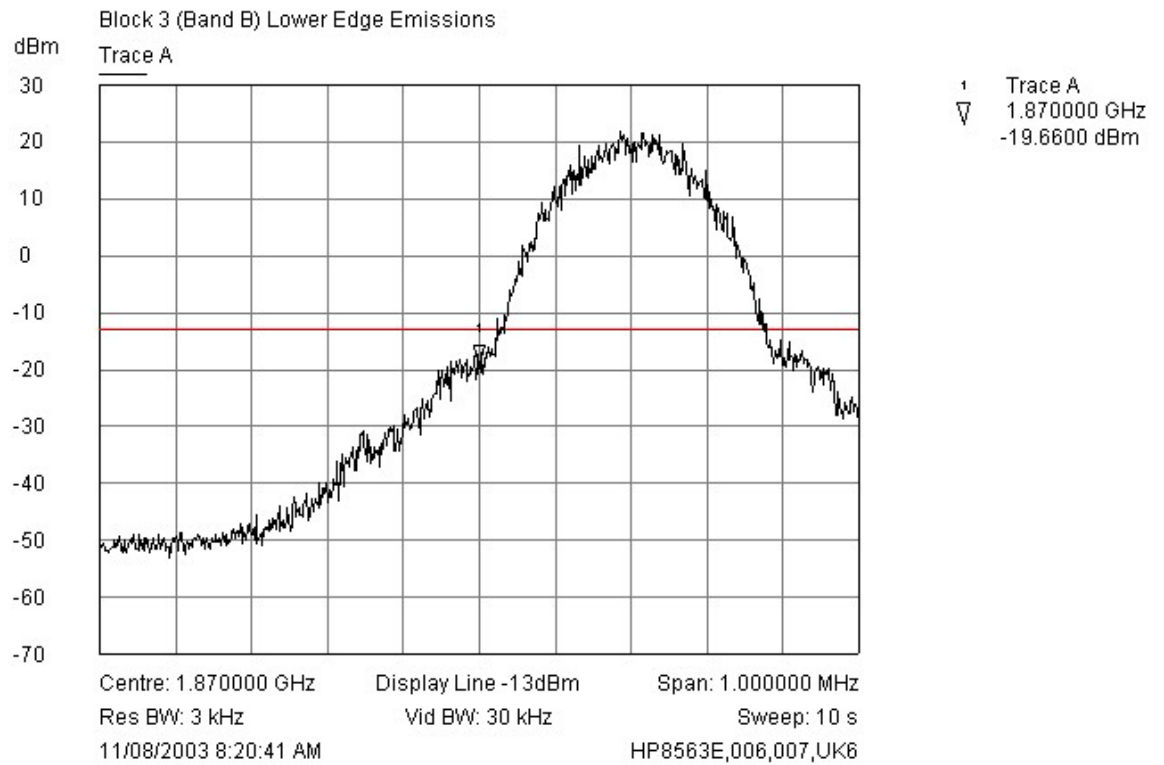


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9.7 Block 3 (Band B) Lower Edge Emissions

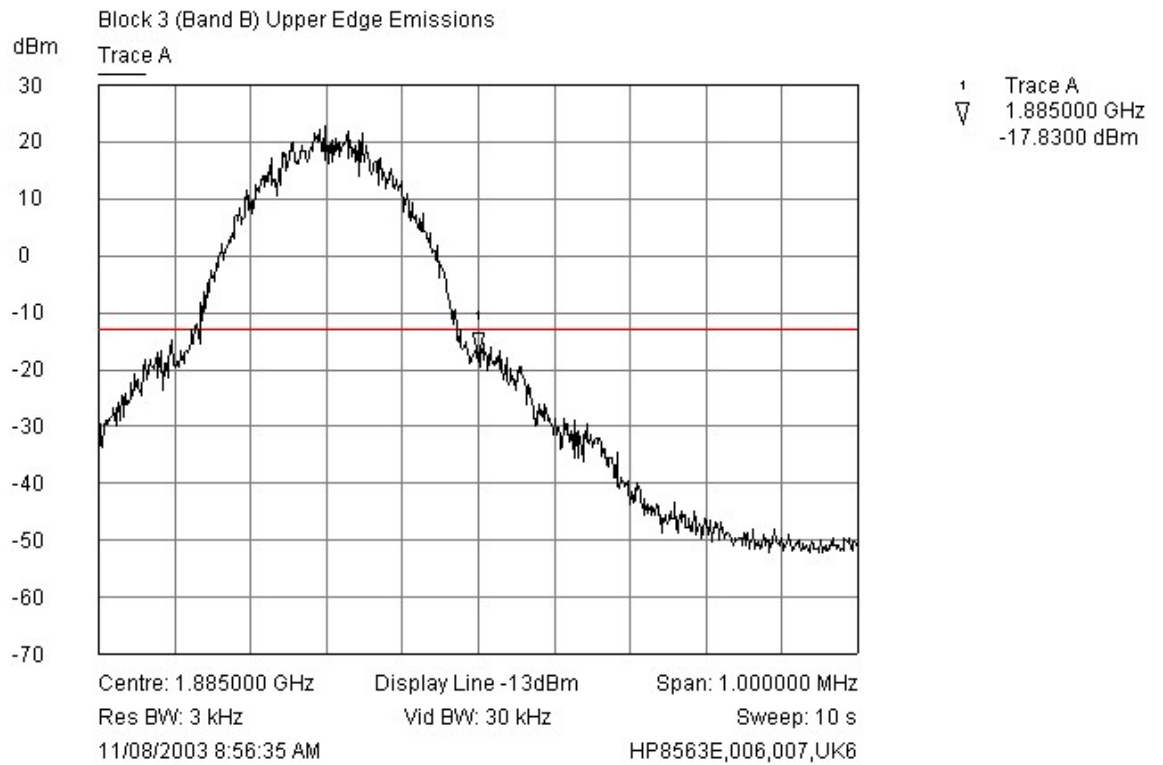


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9.8 Block 3 (Band B) Upper Edge Emissions

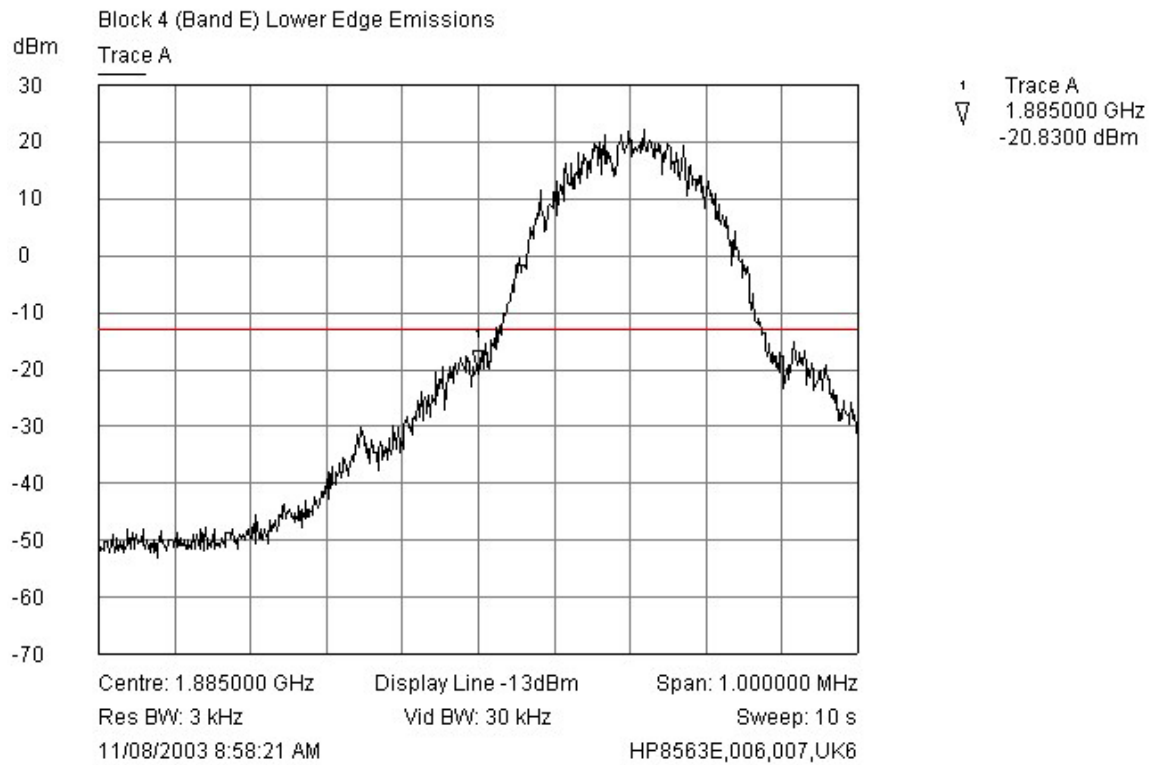


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9.9 Block 4 (Band E) Lower Edge Emissions

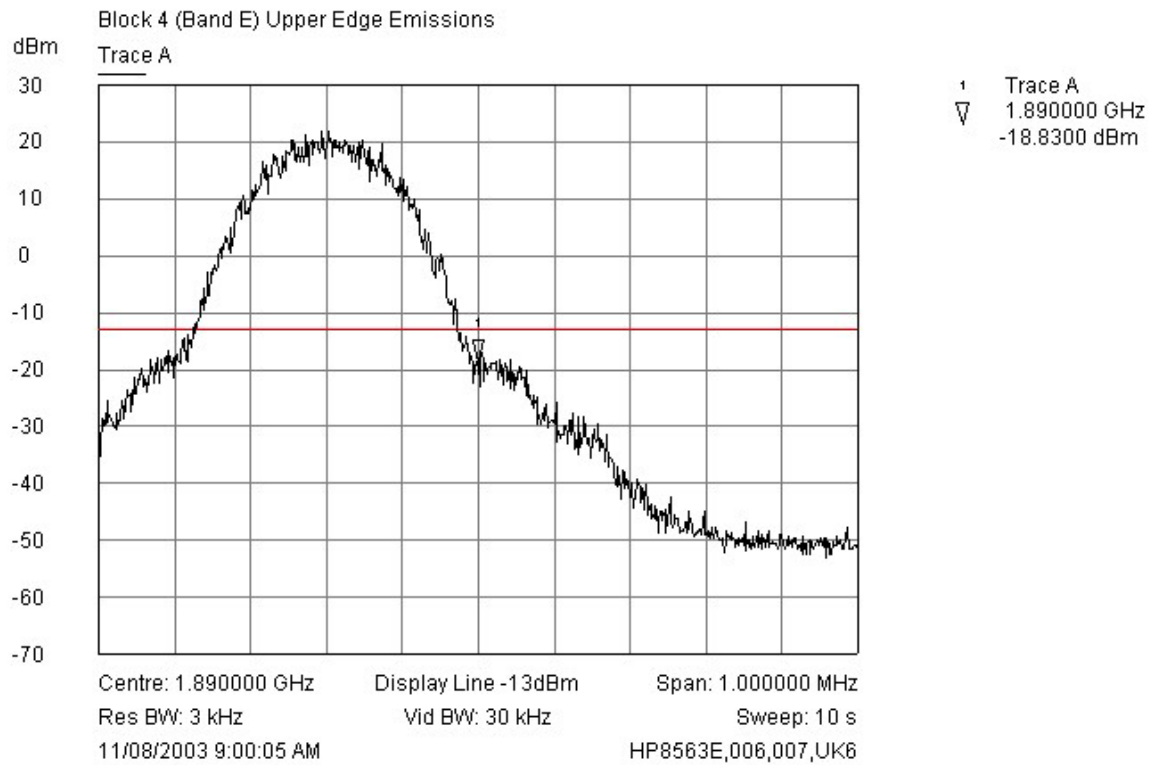


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9.10 Block 4 (Band E) Upper Edge Emissions

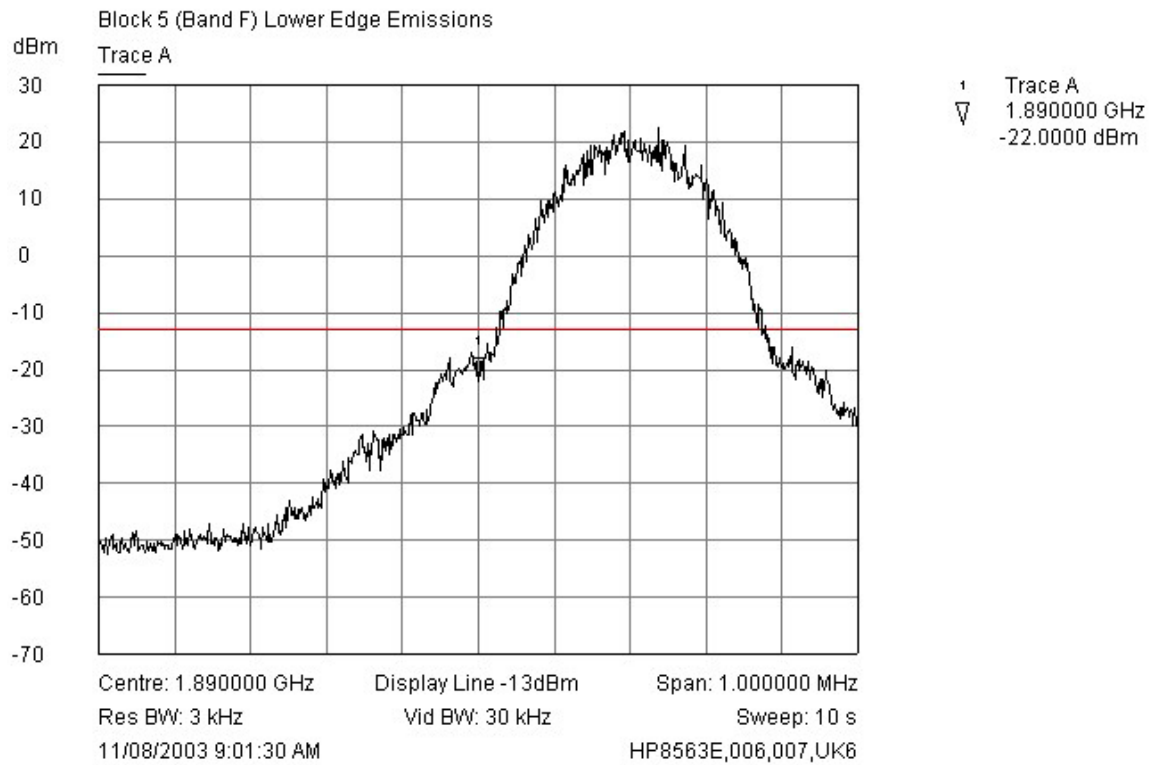


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9.11 Block 5 (Band F) Lower Edge Emissions

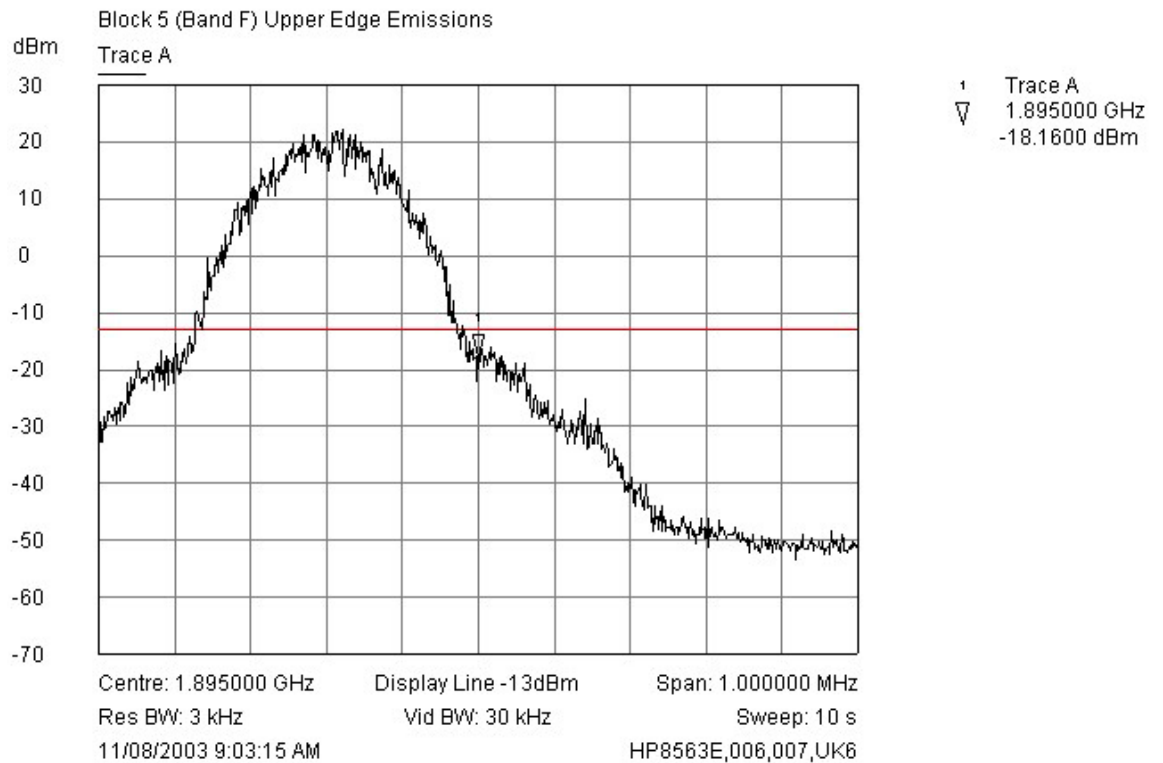


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9.12 Block 5 (Band F) Upper Edge Emissions

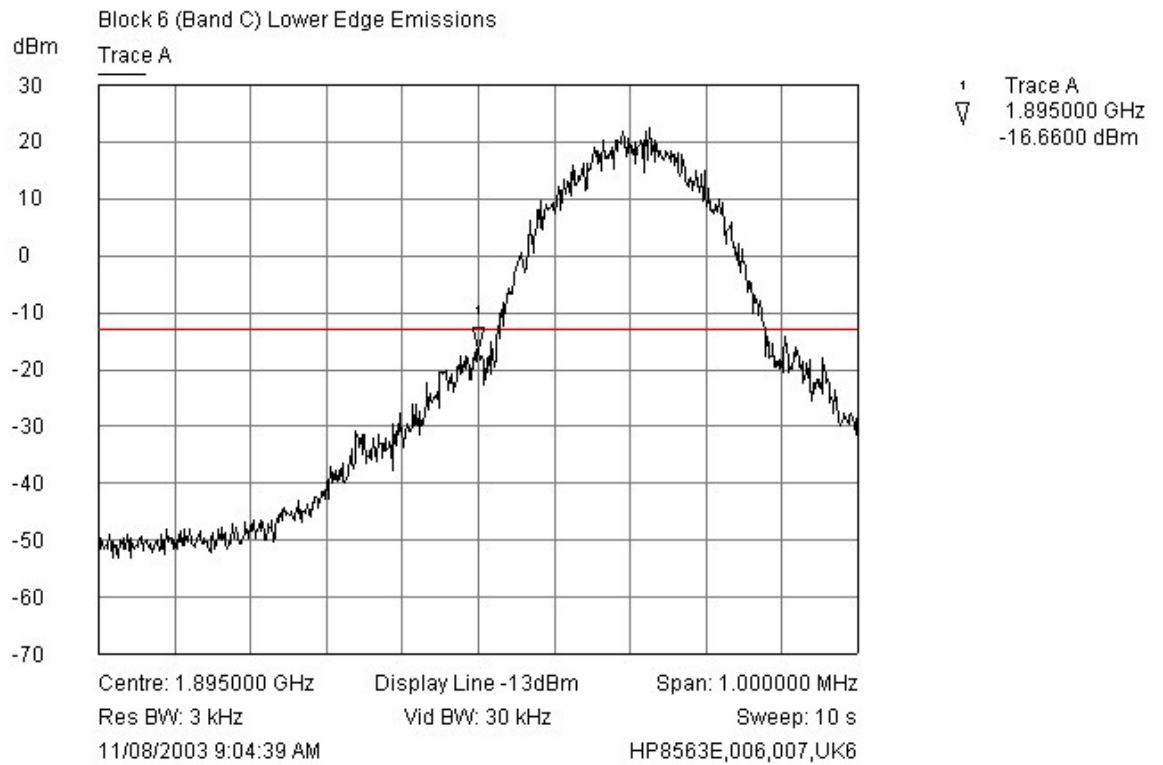


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9.13 Block 6 (Band C) Lower Edge Emissions



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9.14 Block 6 (Band C) Upper Edge Emissions

