TEST REPORT
FROM
RADIO FREQUENCY
INVESTIGATION LTD.

Test Of: Microcell Ltd..
C62 Mobile Telephone Handset.

To: FCC Part 24

Test Report Serial No:
RFI/MPTB1/RP45006JD13A

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director: 	**Checked By:** 
Tested By:  **pp**	**Release Version No: PDF01**
Issue Date: 26 September 2003	**Test Dates: 27 August 2003 to 02 September 2003**

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This report may be copied in full. The results in this report apply only to the sample(s) tested.

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1. Client Information

Company Name:	Microcell Ltd.
Address:	Kaarnatie 38 Oulu FIN-90530 Finland
Contact Name:	Mr J Kortesalmi

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Brand Name:	Siemens
Model Name or Number:	C62
Unique Type Identification:	S30880-S6880-U100
IMEI Number:	00440000389205401
FCC ID Number:	RB9C62
Country of Manufacture:	Hungary
Date of Receipt:	27 August 2003

2.2. Description Of EUT

The equipment under test is a tri-band (900, 1800 & 1900) mobile handset. The 900/1800 bands are not available in the USA.

2.3. Modifications Incorporated In EUT

The EUT has not been modified from what is described by the Model Number and Unique Type Identification stated above.

2.4. Additional Information Related To Testing

Power Supply Requirement: (Internal, lithium ion battery)	3.8V		
Declared Battery End Point Voltage	3.5V		
Power Supply Requirement: (AC Battery Charger)	Nominal 115V, 60 Hz AC Mains supply		
Intended Operating Environment:	Within GSM network coverage		
Equipment Category:	Cellular phone		
Type of Unit:	Transceiver		
Weight:	75g		
Dimensions:	101mm x 44mm x 20mm		
Interface Ports:	All/Charger/Accessory Port		
Highest Fundamental Frequency	1989.8 MHz		
Transmit Frequency Range	1850.2 MHz to 1909.8 MHz		
Transmit Channels Tested	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	512	1850.2
	Middle	660	1879.8
	Top	810	1909.8
Receive Frequency Range	1850.2 MHz to 1909.8 MHz		
Receive Channels Tested	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	512	1930.2
	Middle	660	1959.8
	Top	810	1989.8
Maximum Power Output (EIRP)	32.9 dBm		

2.5. EUT Accessories

The following support equipment was used to exercise the EUT during testing:

Description:	Y Adapter USB
Brand Name:	Siemens
Model Name or Number:	DNET-D241
Serial Number:	V30146-A3089-D1
Cable Length And Type:	10cm
Connected to Port:	Charger/Accessory

Description:	AC Charger
Brand Name:	Siemens
Model Name or Number:	SNG-L37E1
Serial Number:	A5BHTN00108750
Cable Length And Type:	180cm
Connected to Port:	Charger/Accessory

Description:	Headset
Brand Name:	Siemens
Model Name or Number:	HHS-510
Serial Number:	S30880-S5601-A520
Cable Length And Type:	150cm
Connected to Port:	Charger/Accessory

Description:	Camera
Brand Name:	Siemens
Model Name or Number:	IQP-500
Serial Number:	S30880-S5701-A400
Cable Length And Type:	N/A
Connected to Port:	Charger/Accessory

3. Test Specification, Methods And Procedures

3.1. Test Specifications

Reference:	FCC Part 24 Subpart E: 2002 (Broadband PCS)
Title:	Code of Federal Regulations, Part 24 (47CFR24) Personal Communication Services.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

Reference:	FCC Part 15 Subpart B: 2001 (Section 15.107 and 15.109)
Title:	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices: Radio Frequency Devices.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

3.2. Methods And Procedures

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2002
Land Mobile Communications Equipment, Measurements and performance Standards.

ANSI C63.2 (1987)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2001)
Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)
Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)
Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)
Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

DA00-705 (2000)
Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.3. Definition Of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

4. Deviations From The Test Specification

None.

5. Operation Of The EUT During Testing

5.1. Operating Conditions

The EUT was tested in a normal laboratory environment.

During testing, the EUT was powered by a Nominal 3.8 Volt lithium Ion battery

5.2. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.

Preliminary radiated scans were performed on the EUT with the accessories stated in section 2.1 of this report connected and then disconnected. The combination that exhibited the worse case mode of operation was then used to perform final measurements.

Transmitter Modes:

For carrier output power, occupied bandwidth and final transmitter radiated measurements, testing was performed at full power on top, middle and bottom channels of the assigned frequency block.

For frequency stability testing, measurements were performed at full power on the top and bottom channels of the assigned frequency block at –30.0 ºC through to +50.0 ºC in 10º increments.

All transmitter radiated spurious pre-scan tests were performed at full power on the middle channel of the assigned frequency block. Final measurements were then performed on the top, middle and bottom channels if an emission was identified.

All transmitter conducted spurious pre-scan tests were performed at full power on the top, middle and bottom channels of the assigned frequency block. Final measurements were then performed on the top, middle and bottom channels if an emission was identified.

Idle Modes:

Testing was performed with the call terminated from the GSM Test Simulator and the phone left in its Idle mode.

5.3. Configuration And Peripherals

The EUT was tested in the following configuration:

Configured with Y adapter, camera, AC battery charger, and internal battery.

All tests were performed with the EUT connected via an air link or directly to a GSM test set.

The reason for choosing this configuration was that the client defined it as being likely to be the worst case with regards EMC.

6. Summary Of Test Results

Range Of Measurements	Specification Reference	Port Type	Compliancy Status
Idle AC Conducted Spurious Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2002 Section 15.107	AC Mains Input	Complied
Idle Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.109	Enclosure	Complied
Transmitter Effective Isotropic Radiated Power (EIRP)	C.F.R. 47 FCC Part 24: 2002 Section 24.232	Antenna	Complied
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 24: 2002 Section 24.235	Antenna	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 24: 2002 Section 24.235	Antenna	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 24: 2002 Section 24.238	Antenna	Complied
Transmitter Out of Band Emissions	C.F.R. 47 FCC Part 24: 2002 Section 2.1053/24.238	Antenna	Complied
Transmitter Band Edges Radiated Emissions	C.F.R. 47 FCC Part 2: 2002 Section 2.1053/24.238	Antenna	Complied

6.1. Location Of Tests

All the measurements described in this report were performed at the premises of Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

7. Measurements, Examinations And Derived Results

7.1. General Comments

7.1.1. This section contains test results only.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 8 for details of measurement uncertainties.

8. Test Results

8.1. Idle Mode AC Conducted Spurious Emissions: Section 15.107

8.1.1. The EUT was configured as for AC conducted emissions measurements as described in Section 9 of this report.

8.1.2. Tests were performed to identify the maximum emissions levels on the AC mains line of the EUT.

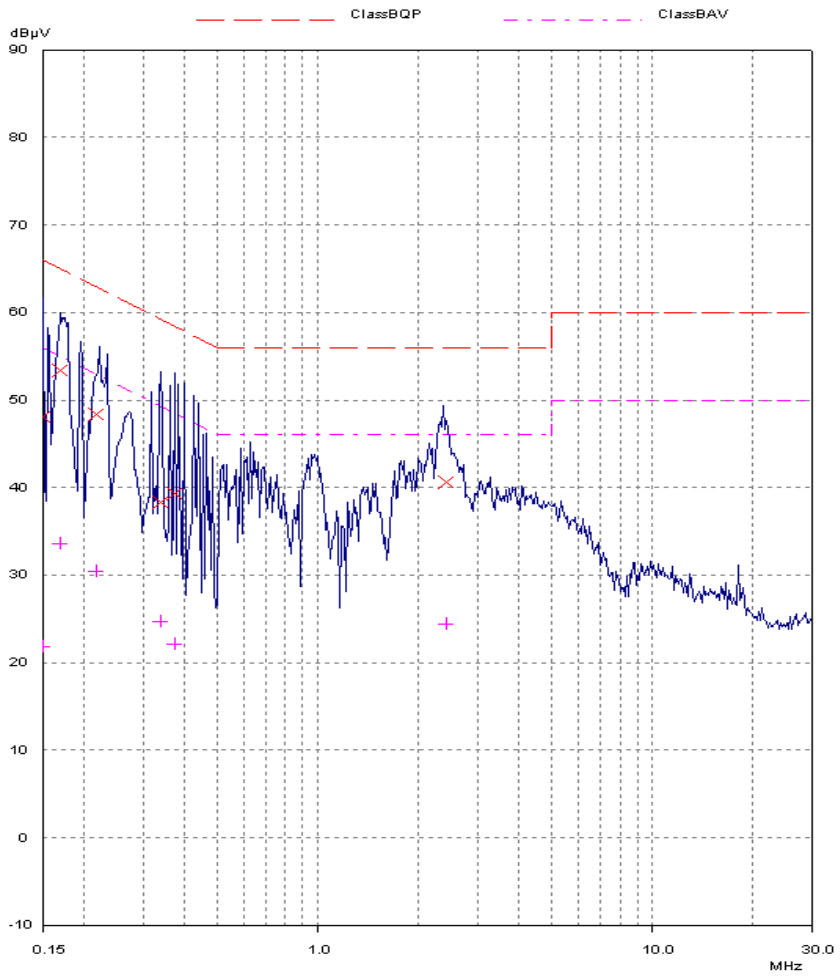
Results: Quasi-Peak Detector Measurements On Live And Neutral Lines

Frequency (MHz)	Line	Q-P Level (dBµV)	Q-P Limit (dBµV)	Margin (dB)	Result
0.15000	Live	48.03	66.00	17.97	Complied
0.16975	Live	53.44	64.97	11.53	Complied
0.21777	Live	48.34	62.90	14.56	Complied
0.33616	Neutral	38.28	59.30	21.02	Complied
0.37376	Neutral	39.37	58.42	19.05	Complied
2.42261	Live	40.64	56.00	15.36	Complied

Results: Average Detector Measurements On Live And Neutral Lines

Frequency (MHz)	Line	Av. Level (dBµV)	Av. Limit (dBµV)	Margin (dB)	Result
0.15000	Live	21.75	56.00	34.25	Complied
0.16975	Live	33.58	54.97	21.39	Complied
0.21777	Live	30.36	52.90	22.54	Complied
0.33616	Live	24.75	49.30	24.55	Complied
0.37376	Live	22.13	48.42	26.29	Complied
2.42261	Live	24.39	46.00	21.61	Complied

Receive AC Conducted Spurious Emissions: Section 15.107 (Continued)



Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

8.2.Idle Mode Radiated Spurious Emission: Section 15.109

8.2.1. Electric Field Strength Measurements (Frequency Range 30 to 1000 MHz)

8.2.1.1. The EUT was configured as for receiver-radiated emissions testing as described in Section 9 of this report.

8.2.1.2. Tests were performed to identify the maximum receiver or standby radiated emissions levels.

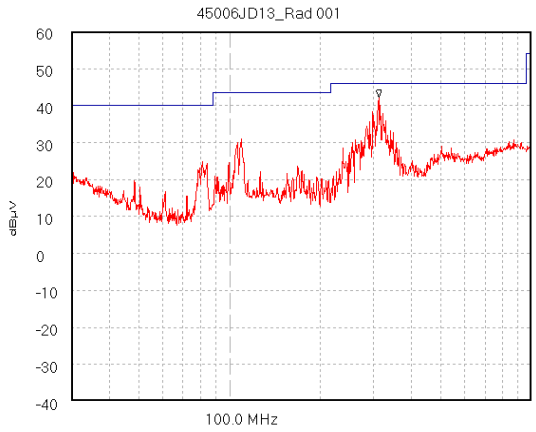
Result:

Frequency (MHz)	Antenna. Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
80.938	Vert.	32.9	40.0	7.1	Complied
108.72	Vert.	34.4	43.5	9.1	Complied
321.94	Horiz.	38.2	46.0	7.8	Complied

Note: Pre-scans were performed with several types of accessory combination to find the worst-case configuration. The plots are located below. It can be seen from the plots below that the worse case was with the Camera, Charger and Divider connected. All tests were performed in this mode.

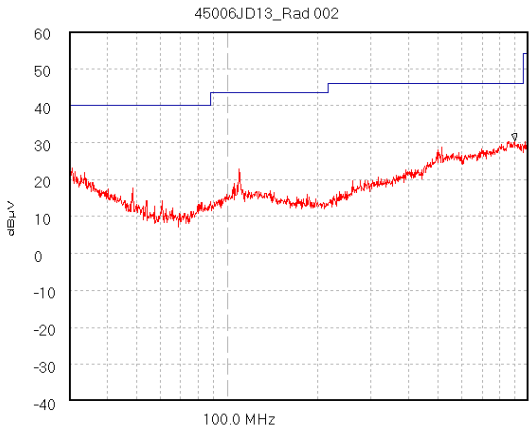
Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)

With Camera, Charger and Divider



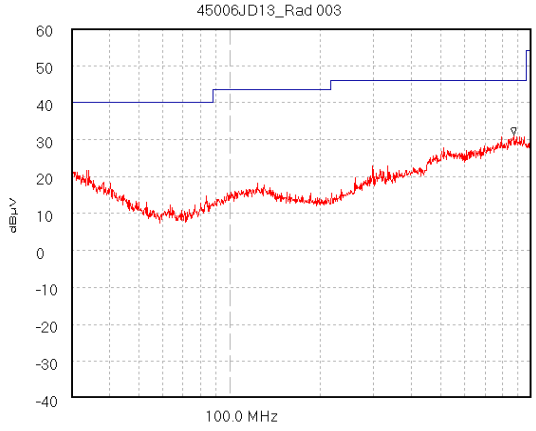
Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 380.0 mS
Peak 311.936 MHz, 42.2 dBµV
Limit/Mask: 15_109_Class_B; ; Limit Test Passed
Transducer Factors: A1037
8/27/2003 10:22:20 AM

With Charger and Divider



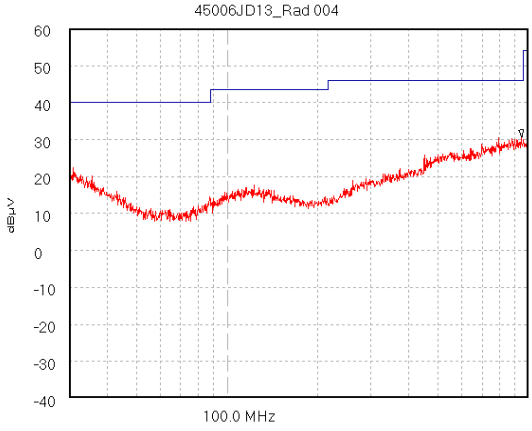
Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 80.0 mS
Peak 900.147 MHz, 30.52 dBµV
Limit/Mask: 15_109_Class_B; ; Limit Test Passed
Transducer Factors: A1037
8/27/2003 10:25:26 AM

With Camera and Divider



Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 380.0 mS
Peak 872.523 MHz, 31.18 dBµV
Limit/Mask: 15_109_Class_B; ; Limit Test Passed
Transducer Factors: A1037
8/27/2003 10:27:47 AM

With No Accessories



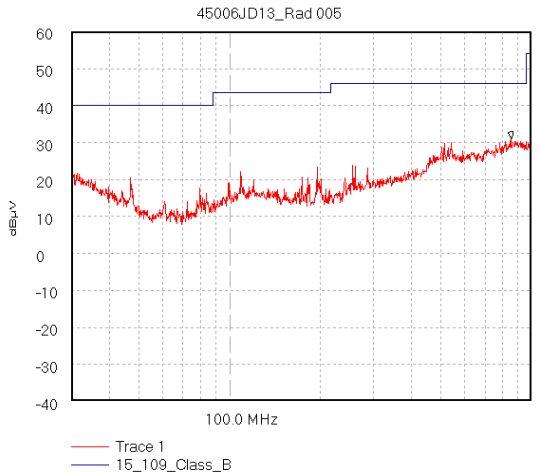
Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 380.0 mS
Peak 946.915 MHz, 30.65 dBµV
Limit/Mask: 15_109_Class_B; ; Limit Test Passed
Transducer Factors: A1037
8/27/2003 10:29:37 AM

Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Test Of: **Microcell Ltd..**
C62 Mobile Telephone Handset.
To: **FCC Part 24**

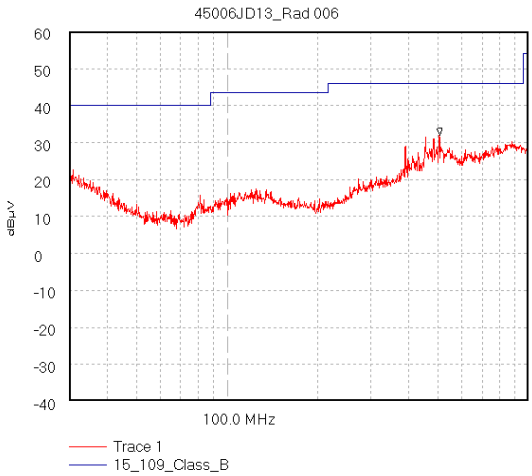
Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)

With Hands free, Divider and Charger



Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 80.0 mS
Peak 855.69 MHz, 30.95 dBµV
Limit/Mask: 15_109_Class_B; ; Limit Test Passed
Transducer Factors: A1037
8/27/2003 10:31:32 AM

With Divider



Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 80.0 mS
Peak 505.69 MHz, 32.0 dBµV
Limit/Mask: 15_109_Class_B; ; Limit Test Passed
Transducer Factors: A1037
8/27/2003 10:34:09 AM

Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)

8.2.2. Electric Field Strength Measurements (Frequency Range 1.0 to 20.0 GHz)

8.2.2.1. The EUT was configured as for receiver-radiated emissions testing as described in Section 9 of this report.

8.2.2.2. Tests were performed to identify the maximum receiver or standby radiated emissions levels.

Result:

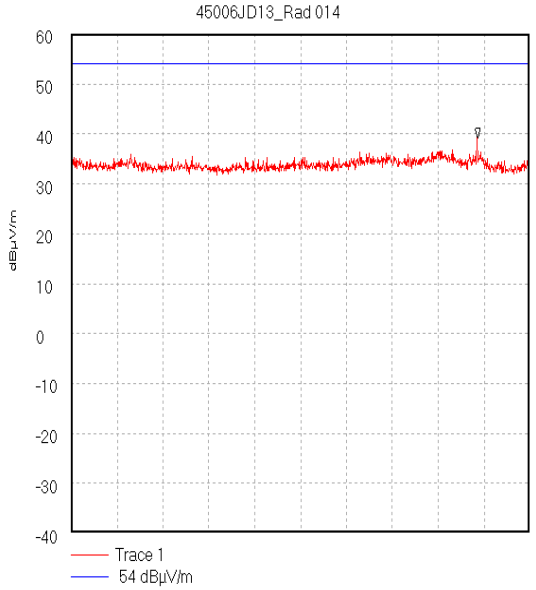
Highest Peak Level

Frequency (GHz)	Antenna. Polarity (H/V)	Peak Detector Level (dBµV)	Antenna Factor	Cable Loss	Actual Peak Level (dBµV/m)	Peak Level (dBµV/m)	Peak Margin (dB)	Result
1.86976	Horiz.	22.0	22.0	0.8	44.8	74.0	29.2	Complied

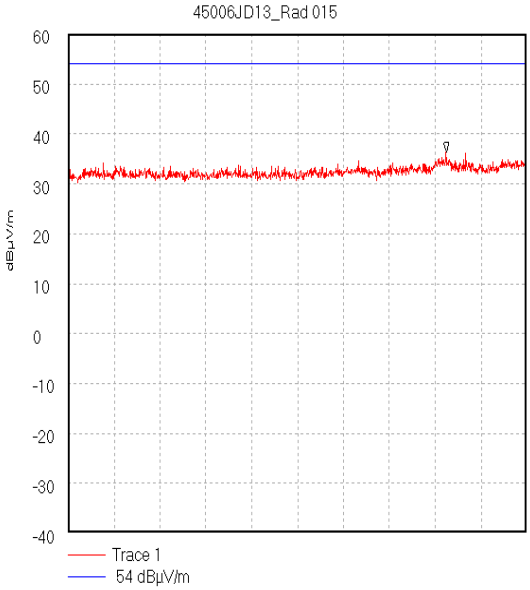
Highest Average Level:

Frequency (GHz)	Antenna. Polarity (H/V)	Average Detector Level (dBµV)	Antenna Factor	Cable Loss	Actual Average Level (dBµV/m)	Average Level (dBµV/m)	Average Margin (dB)	Result
1.86976	Horiz.	8.7	22.0	0.8	31.5	54.0	22.5	Complied

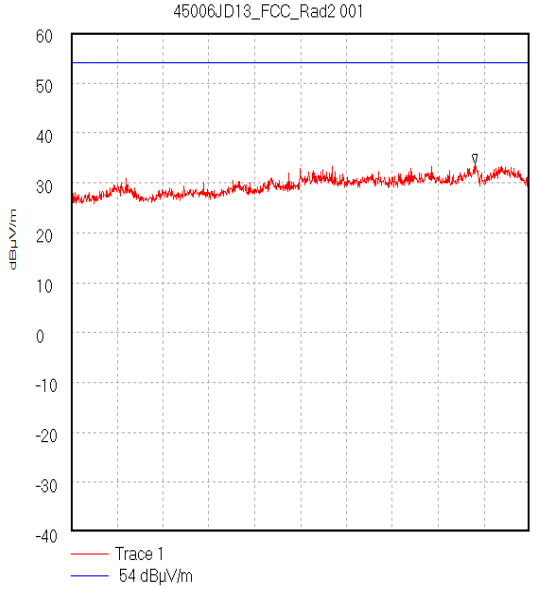
Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)



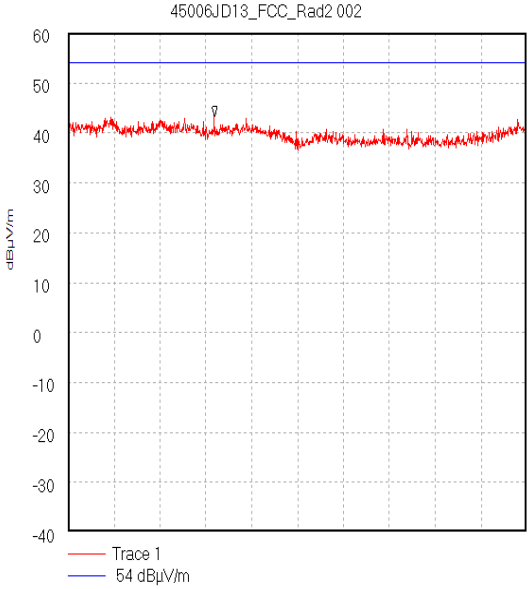
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBµV/m; Ref Offset 5.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.886 GHz, 39.13 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Failed
8/27/2003 12:11:25 PM



Start 2.0 GHz; Stop 4.0 GHz
Ref 60 dBµV/m; Ref Offset 5.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 3.649 GHz, 36.31 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Passed
8/27/2003 12:17:14 PM

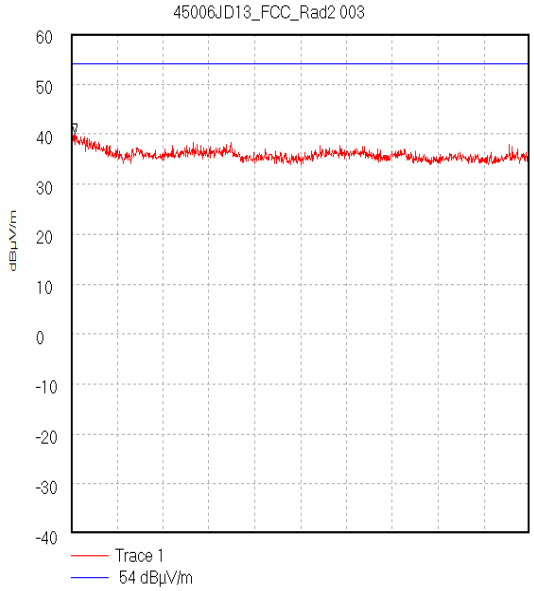


Start 4.0 GHz; Stop 6.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 5.762 GHz, 33.82 dBµV/m
Display Line: 54 dBµV/m;
28/08/2003 10:47:38

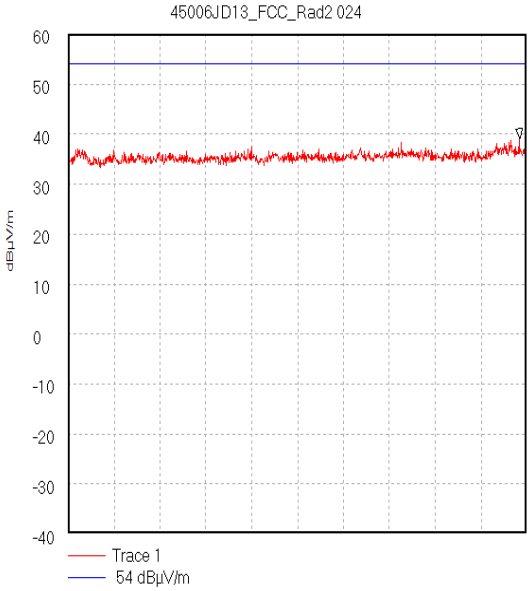


Start 6.0 GHz; Stop 8.0 GHz
Ref 60 dBµV/m; Ref Offset 2.3 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 6.638 GHz, 43.27 dBµV/m
Display Line: 54 dBµV/m;
28/08/2003 10:57:22

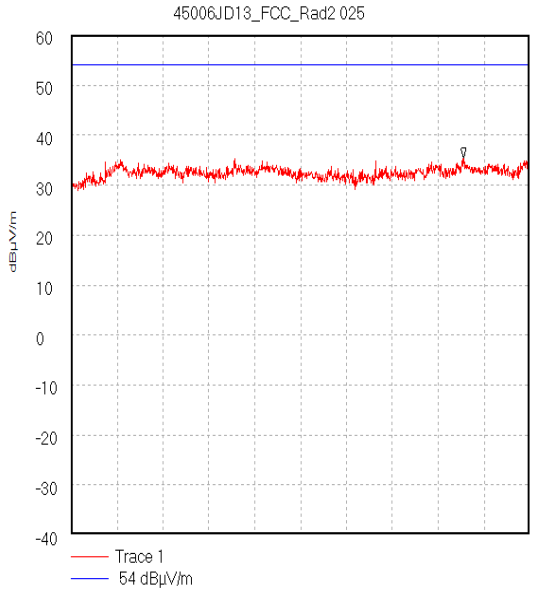
Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)



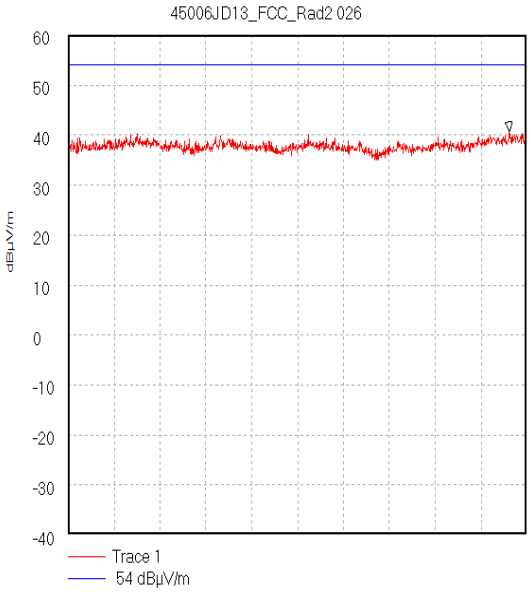
Start 8.0 GHz; Stop 10.0 GHz
Ref 60 dBµV/m; Ref Offset 2.9 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Marker 8.018 GHz, 40.1 dBµV/m
Display Line: 54 dBµV/m;
28/08/2003 11:04:17



Start 10.0 GHz; Stop 12.5 GHz
Ref 60 dBµV/m; Ref Offset 2.9 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 12.461 GHz, 39.11 dBµV/m
Display Line: 54 dBµV/m;
23/08/2003 15:18:35



Start 12.5 GHz; Stop 18.0 GHz
Ref 60 dBµV/m; Ref Offset 3.6 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 17.206 GHz, 35.37 dBµV/m
Display Line: 54 dBµV/m;
23/08/2003 15:21:22



Start 18.0 GHz; Stop 20.0 GHz
Ref 60 dBµV/m; Ref Offset 5.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 19.924 GHz, 40.81 dBµV/m
Display Line: 54 dBµV/m;
23/08/2003 15:23:09

8.3. Transmitter Effective Isotropic Radiated Power (EIRP): Section 24.232

8.3.1. The EUT was configured as for Effective Isotropic Radiated Power as described in Section 9 of this report.

8.3.2. Tests were performed to identify the maximum Effective Isotropic Radiated Power (EIRP).

Results:

Channel	Measured Frequency (MHz)	Antenna Polarity	Maximum Transmitter EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	1850.2	Vert.	32.9	33.0	0.1	Complied
Middle	1879.8	Vert.	31.0	33.0	2.0	Complied
Top	1909.8	Vert.	28.8	33.0	4.2	Complied

8.4. Transmitter Frequency Stability (Temperature Variation): Section 24.235

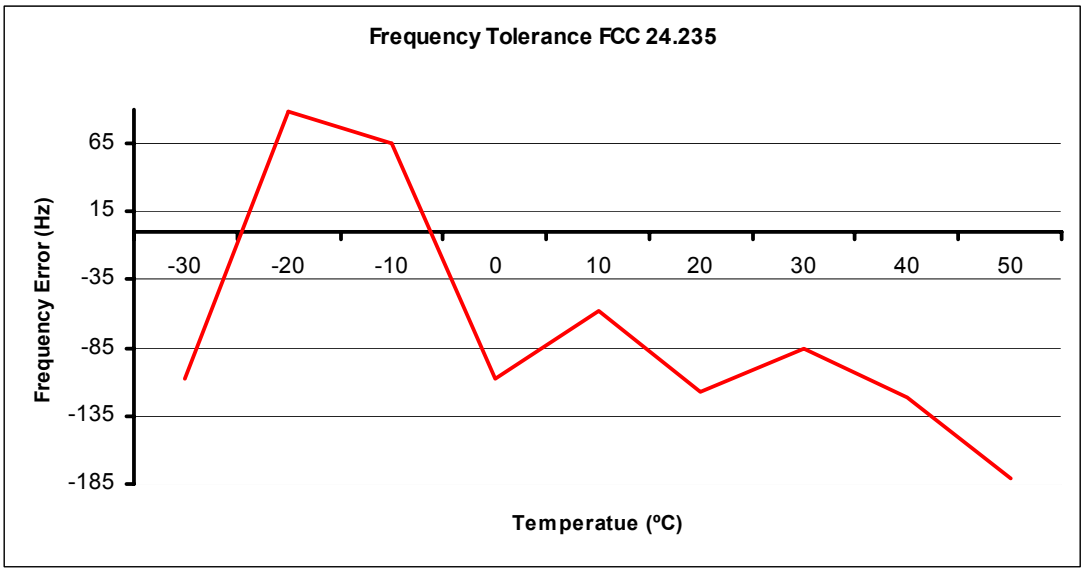
8.4.1. The EUT was configured as for frequency stability measurements as described in Section 9 of this report.

8.4.2. Tests were performed to identify the maximum frequency error of the EUT with variations in ambient temperature.

Results Bottom Channel (1850.2 MHz)

Temp (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	-108	1850.199892	1850.0	0.199892	Complied
-20	88	1850.200088	1850.0	0.200088	Complied
-10	65	1850.200065	1850.0	0.200065	Complied
0	-108	1950.199892	1850.0	0.199892	Complied
10	-58	1850.199942	1850.0	0.19942	Complied
20	-117	1850.199883	1850.0	0.199883	Complied
30	-86	1850.199914	1850.0	0.199914	Complied
40	-122	1850.199878	1850.0	0.199878	Complied
50	-181	1850.199819	1850.0	0.199819	Complied

Frequency Variation From 1850.2MHz

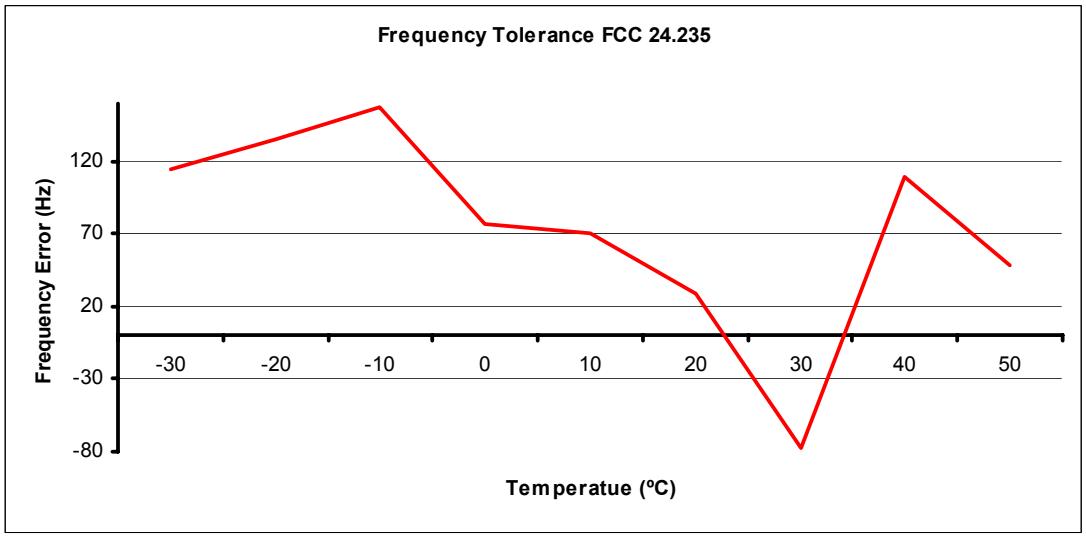


Transmitter Frequency Stability (Temperature Variation): Section 24.235 (continued)

Results Top Channel (1909.8 MHz)

Temp (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	114	1909.800114	1910.0	0.199886	Complied
-20	135	1909.800135	1910.0	0.199865	Complied
-10	158	1909.800158	1910.0	0.199842	Complied
0	77	1909.800077	1910.0	0.199923	Complied
10	71	1909.800071	1910.0	0.199929	Complied
20	29	1909.800029	1910.0	0.199971	Complied
30	-77	1909.799923	1910.0	0.200077	Complied
40	109	1909.800109	1910.0	0.199891	Complied
50	49	1909.800049	1910.0	0.199951	Complied

Frequency Variation From 1909.8MHz



8.5. Transmitter Frequency Stability (Voltage Variation): Section 24.235

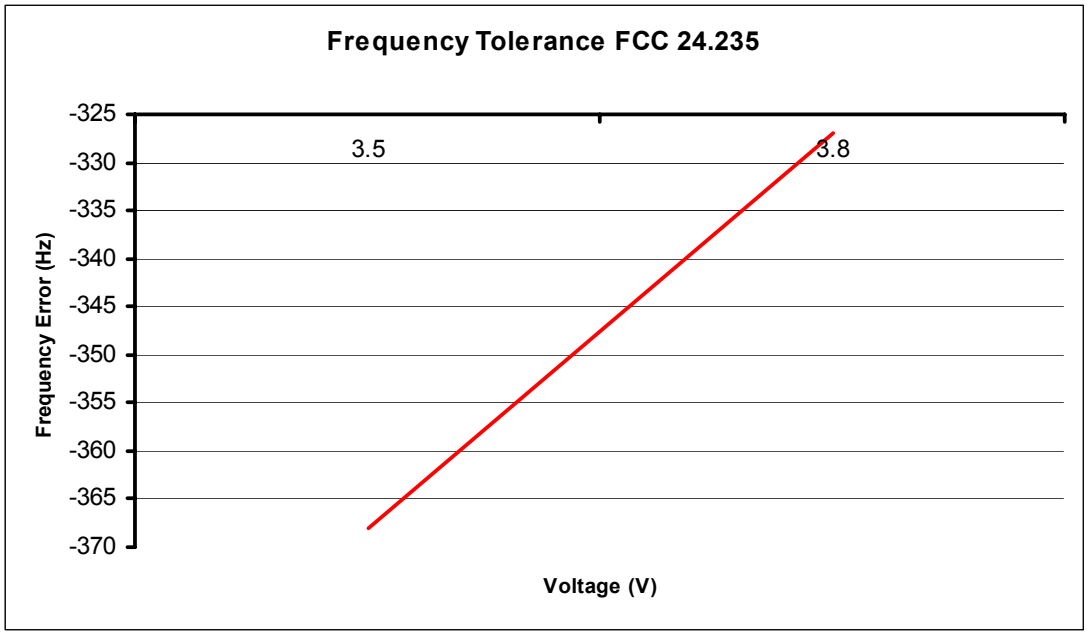
8.5.1. The EUT was configured as for frequency stability measurements as described in Section 9 of this report.

8.5.2. Tests were performed to identify the maximum frequency error of the EUT with variations in nominal operating voltage.

Results Bottom Channel (1850.2 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.5	-368	1850.199632	1850.0	0.199632	Complied
3.8	-327	1850.199673	1850.0	0.199673	Complied

Frequency Variation From 1850.2MHz

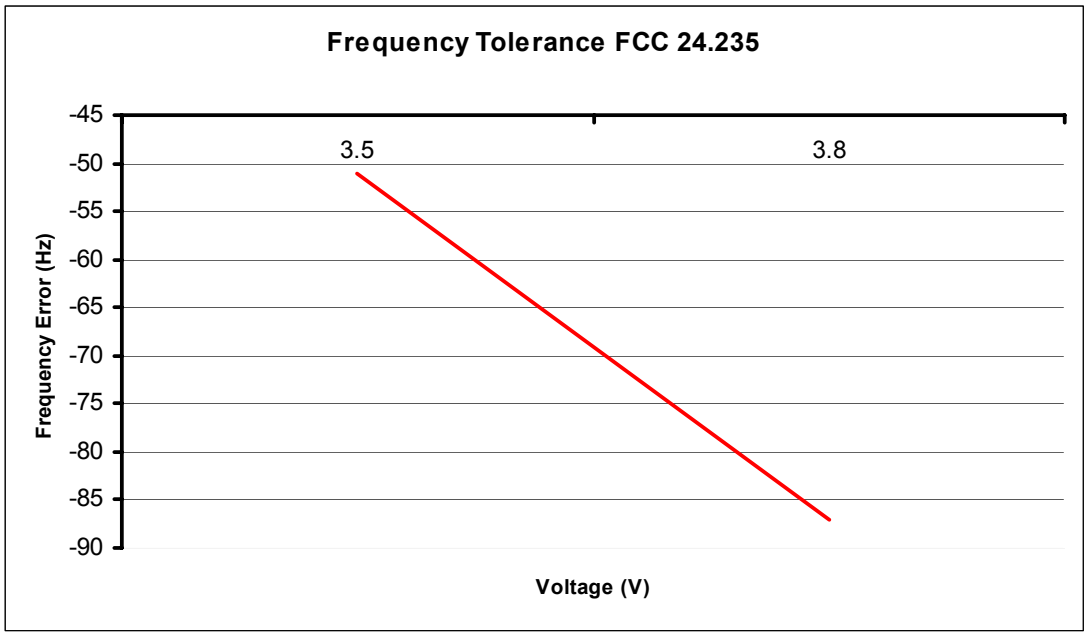


Transmitter Frequency Stability (Voltage Variation): Section 24.235 (Continued)

Results Top Channel (1909.8 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.5	-51	1909.799949	1910.0	0.200051	Complied
3.8	-87	1909.799913	1910.0	0.200087	Complied

Frequency Variation From 1909.8MHz



8.6. Transmitter Occupied Bandwidth: Section 24.238

8.6.1. The EUT was configured as for Occupied Bandwidth measurements as described in Section 9 of this report.

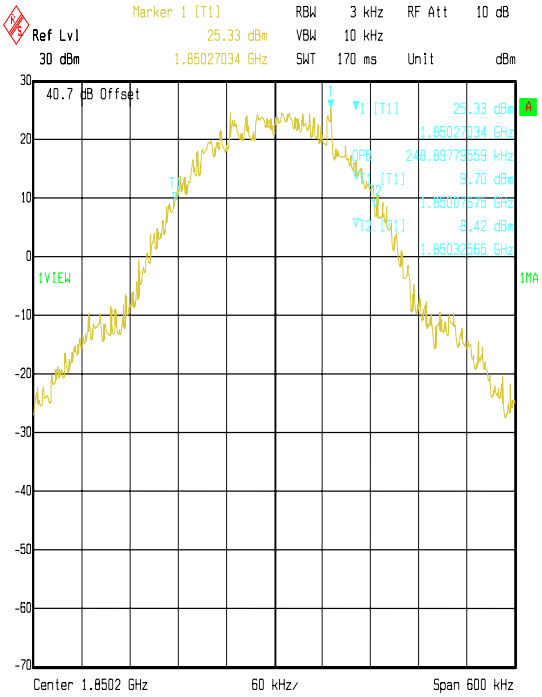
8.6.2. Tests were performed to identify the maximum bandwidth occupied by the fundamental frequency of the EUT.

Results:

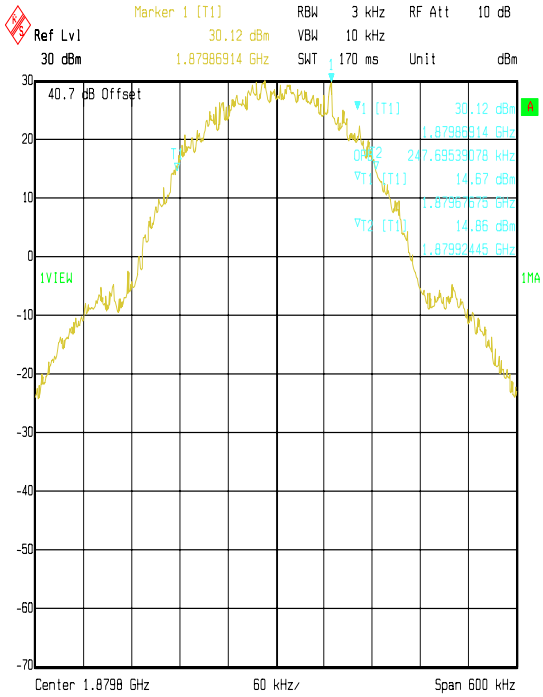
Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	3.0	10.0	248.897
Middle	1879.8	3.0	10.0	247.695
Top	1909.8	3.0	10.0	247.695

Test Of: **Microcell Ltd..**
C62 Mobile Telephone Handset.
To: **FCC Part 24**

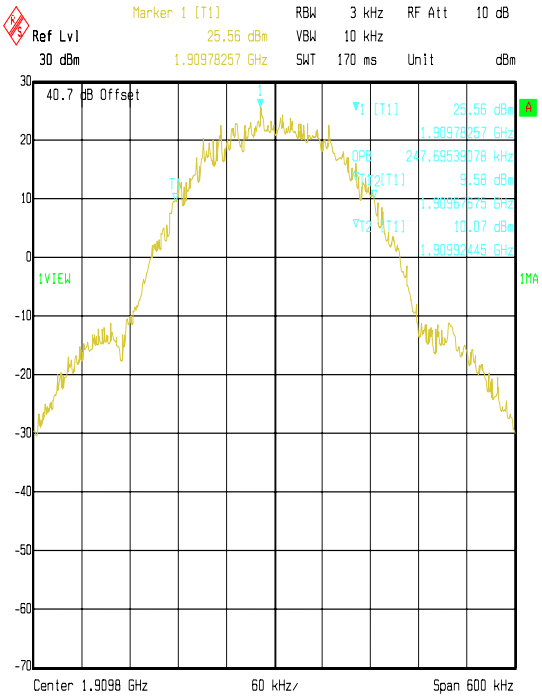
Transmitter Occupied Bandwidth: Section 24.238 (Continued)



Title: Microcell EUT: HD0503 00440000389205401 Occupied Bandwidth.
Comment A: 45006JD13_FCC_P24_OCBW_TX_Bottom_Channel_001
Date: 29.AUG.2003 9:20:23



Title: Microcell EUT: HD0503 00440000389205401 Occupied Bandwidth.
Comment A: 45006JD13_FCC_P24_OCBW_TX_Middle_Channel_002
Date: 29.AUG.2003 9:23:14



Title: Microcell EUT: HD0503 00440000389205401 Occupied Bandwidth.
Comment A: 45006JD13_FCC_P24_OCBW_TX_Top_Channel_003
Date: 29.AUG.2003 9:24:48

8.7. Transmitter Out of Band Emissions: Section 2.1053/24.238

8.7.1. The EUT was configured as for transmitter-radiated emissions testing as described in Section 9 of this report.

8.7.2. Tests were performed to identify the maximum transmitter radiated emission levels.

Result: Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3700.472	-20.4	-13.0	7.4	Complied

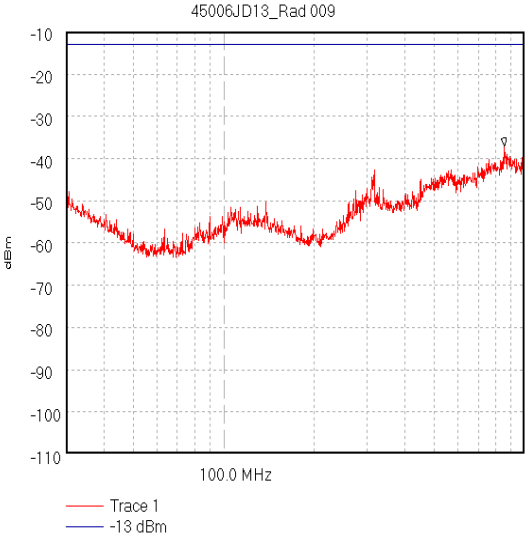
Result: Middle Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3759.483	-24.0	-13.0	11.0	Complied

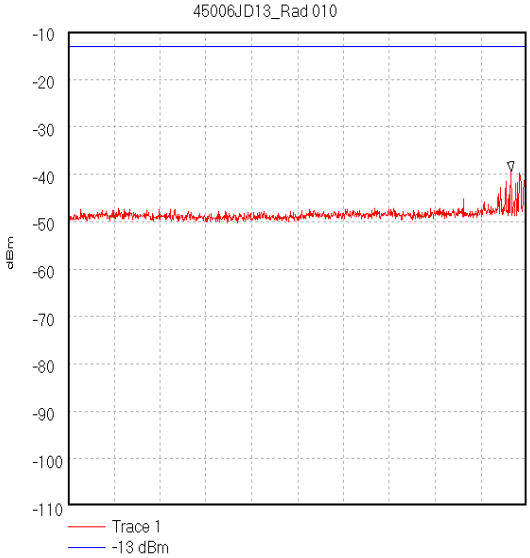
Result: Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3819.844	-18.6	-13.0	5.6	Complied

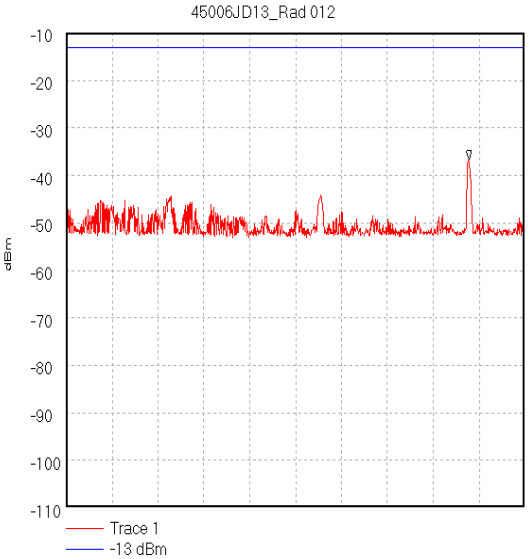
Transmitter Out of Band Emissions: Section 2.1053/24.238 (Continued)



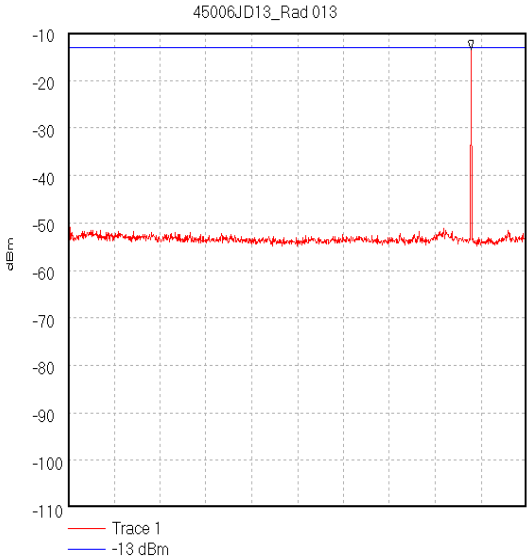
Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref -10 dBm; Ref Offset 10.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 10 dB; Swp 20.0 mS
Peak 855.69 MHz, -36.94 dBm
Display Line: -13 dBm; ; Limit Test Passed
Transducer Factors: A1037
8/27/2003 11:22:05 AM



Start 1.0 GHz; Stop 1.85 GHz
Ref -10 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Marker 1.821 GHz, -39.43 dBm
Display Line: -13 dBm; ; Limit Test Passed
8/27/2003 11:38:45 AM



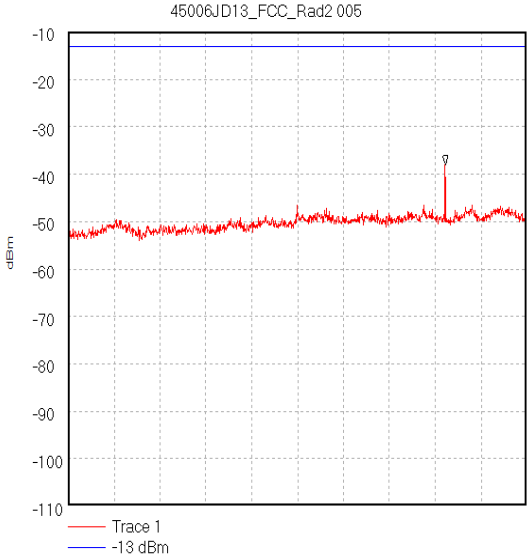
Start 1.91 GHz; Stop 2.0 GHz
Ref -10 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.989 GHz, -36.63 dBm
Display Line: -13 dBm; ; Limit Test Passed
8/27/2003 12:00:37 PM



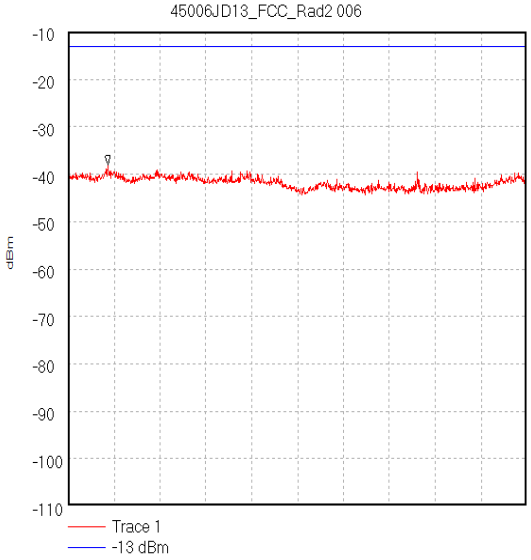
Start 2.0 GHz; Stop 4.0 GHz
Ref -10 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 3.758 GHz, -13.55 dBm
Display Line: -13 dBm; ; Limit Test Passed
8/27/2003 12:03:32 PM

Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

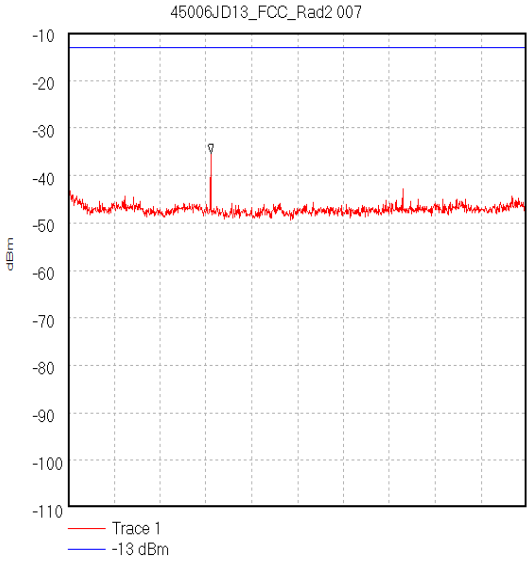
Transmitter Out of Band Emissions: Section 2.1053/24.238 (Continued)



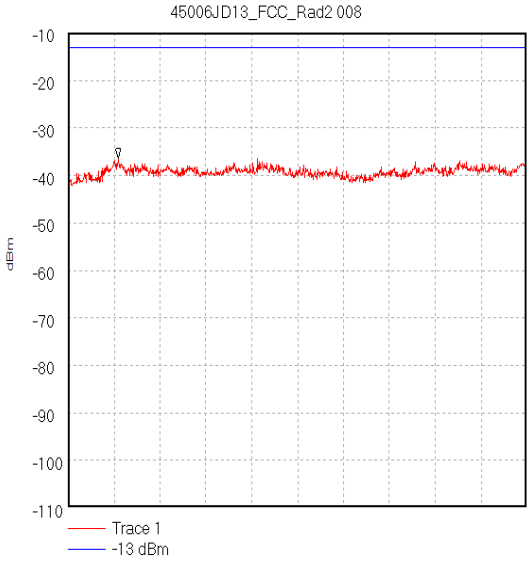
Start 4.0 GHz; Stop 6.0 GHz
Ref -10 dBm; Ref Offset 30.8 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 5.644 GHz, -38.0 dBm
Display Line: -13 dBm;
28/08/2003 11:17:35



Start 6.0 GHz; Stop 8.0 GHz
Ref -10 dBm; Ref Offset 33.4 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 6.173 GHz, -38.03 dBm
Display Line: -13 dBm;
28/08/2003 11:20:39



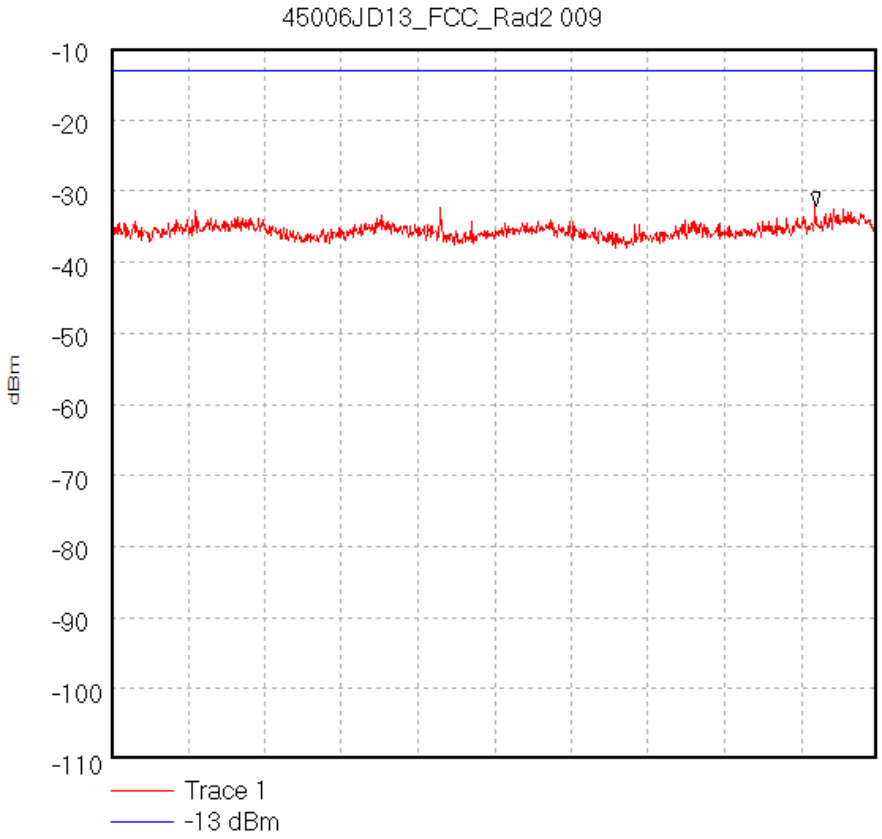
Start 8.0 GHz; Stop 12.5 GHz
Ref -10 dBm; Ref Offset 38.1 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 9.4 GHz, -35.41 dBm
Display Line: -13 dBm;
28/08/2003 11:23:16



Start 12.5 GHz; Stop 18.0 GHz
Ref -10 dBm; Ref Offset 41.9 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS
Peak 13.105 GHz, -36.38 dBm
Display Line: -13 dBm;
28/08/2003 11:26:14

Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Out of Band Emissions: Section 2.1053/24.238 (Continued)



Start 18.0 GHz; Stop 20.0 GHz
Ref -10 dBm; Ref Offset 45.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 19.838 GHz, -32.19 dBm
Display Line: -13 dBm;
28/08/2003 11:30:42

Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

8.8. Transmitter Radiated Emissions At Band Edges: Section 2.1053/24.238

8.8.1. The EUT was configured as for transmitter-radiated emissions testing described in Section 9 of this report.

8.8.2. Tests were performed to identify the maximum emissions level at the band edges of the frequency block that the EUT will operate over.

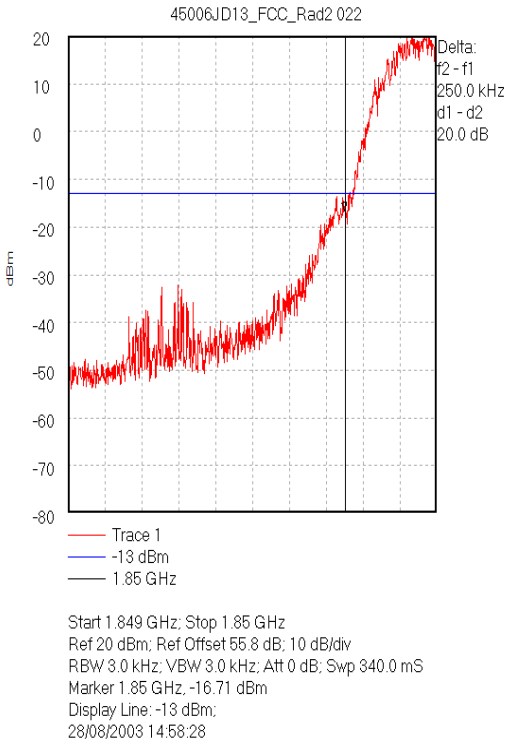
Results:

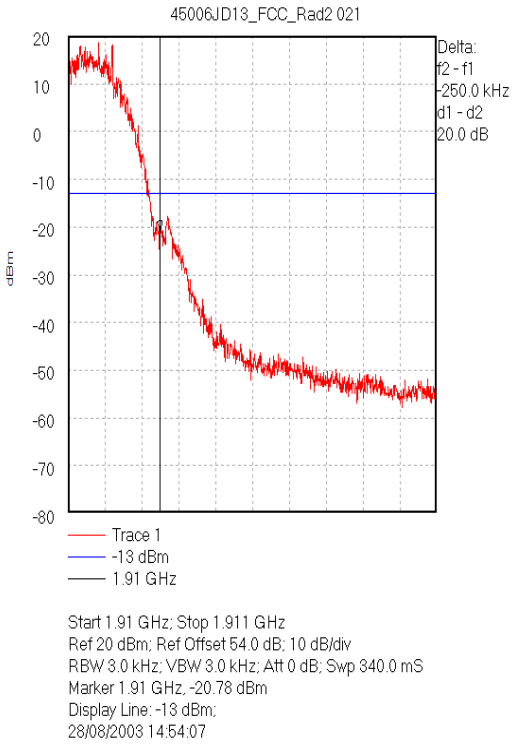
Bottom Band Edge

Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
1850.0	-16.7	-13.0	3.7	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1910.0	-20.8	-13.0	7.8	Complied





9. Measurement Methods

9.1. Effective Isotropic Radiated Power (EIRP)

EIRP measurements were performed in accordance with the standard, against appropriate limits.

The EIRP was measured with the EUT arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4 as requested by EIA/TIA 603.

The EIRP was measured with a spectrum analyser.

The test antenna was positioned in the horizontal plane.

The EUT was oriented in the X plane and the test antenna was then raised and lowered until a maximum peak was observed.

The turntable was then rotated through 360 degrees and the maximum peak reading obtained.

The height search was then repeated to take into consideration the new angular position of the turntable.

The maximum reading observed was then recorded.

The above procedure was then repeated with the EUT oriented in the Y and Z planes.

The highest reading taken in all 3 planes was recorded.

The entire procedure was repeated with the test antenna set in the Vertical polarity.

Once a final maximum amplitude had been obtained, the EUT was substituted with a isotropic horn antenna.

The centre of the substitution antenna was set to approximately the same centre location as the EUT.

The substitution antenna was set to the horizontal polarity.

The substitution antenna was matched into a signal generator using a 6dB or greater PAD.

The signal generator was tuned to the EUT frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser.

The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed.

The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised.

Effective Isotropic Radiated Power (EIRP) (Continued)

The EIRP was calculated as:-

EIRP = Signal Generator Level - Cable Loss + Antenna Gain

Circumstances where the signal generator could not produce the desired power level, substitution was performed with the signal generator set to 0 dBm. The radiated signal was maximised as previously described. The level indicated on the measuring receiver was noted. The delta between this level and the maximum level for the EUT was calculated and also noted. The EIRP of the signal generator was calculated using the above formulae. The recorded delta was added to the calculated EIRP to obtain the substituted EUT EIRP.

Delta (dB) = EUT – SG

Where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual EIRP is calculated as:

EIRP SG= Signal Generator Level - Cable Loss + Antenna Gain

The EUT EIRP is calculated as:

EIRP EUT = EIRP SG + Delta.

9.2. Frequency Stability

The EUT was situated within an environmental test chamber and connected directly to the GSM test set via an air link radiated from the antenna.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range –30 to 50 Deg C.

Measurements were also performed at voltage extremes between the declared nominal supply voltage and at the declared endpoint voltage.

The requirement was to determine the frequency stability of the device under specified environmental operating conditions and ensure they remained within specified operating parameters.

Measurements were made on the top, and bottom channels using the GSM test set described in Appendix 1.

The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

Once the environmental chamber had reached thermal equilibrium, the nominal frequency of the EUT was measured and recorded. The recorded frequency was compared to the applicants declared operating frequency band edges.

In order to show compliance, the measured frequency must remain within the declared frequency band.

The reported data shows the nominal frequency drift and its margin from the band edge. If this margin is positive, the result is compliant. If it goes negative, the result is a none compliance. There is also a frequency graph presented offering the frequency variation around nominal frequency.

9.3. Occupied Bandwidth

The EUT was connected to a spectrum analyser enabled with an occupied bandwidth function and a GSM test set via a bi-directional coupler to its antenna port. If the EUT was not fitted with an antenna port as standard, the client made a temporary antenna port available.

Measurements were performed to determine the Occupied Bandwidth in accordance with FCC Part 2.1049. The Occupied Bandwidth was measured from the fundamental emission at the bottom middle and top channels.

As EUT is a PCS phone, no modulation input port was available. A call was thus setup using the PCS/GSM simulator and using normal modulation. The Occupied Bandwidth was measured in this configuration.

The Occupied Bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser settings were set as per those outlined in the FSEB user manual for this measurement, i.e., RBW <= 1/20 of occupied bandwidth. A value of 3kHz was used.

9.4. AC Mains Conducted Emissions

AC mains conducted emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane.

Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

During the swept measurements (and also during subsequent final measurements on single frequencies) any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

The test equipment settings for conducted emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements
Detector Type:	Peak	Quasi-Peak (CISPR)/Average
Mode:	Max Hold	Not applicable
Bandwidth:	10 kHz*	9 kHz*
Amplitude Range:	60 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

9.5. Transmitter Radiated Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 10 times the highest fundamental frequency stated in section 2.5 of this report. The scans were performed within a screened chamber in order to identify frequencies on which the EUT was generating spurious. This procedure identified the frequencies from the EUT which required further examination. Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit by characterising the screen room using a known signal source set at exactly the same location as the EUT. The signal source was derived from either a horn antenna or a dipole dependant on the frequency band under investigation. Any levels within 20dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a Peak detector was used for final measurements at each frequency recorded in the screen room.

The levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the vertical polarisation. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT. The procedure was repeated for the horizontal polarisation.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For EIRP measurements a Horn antenna whose gain was based on an isotropic antenna was used, ERP measurements were done using a dipole. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6dB or greater PAD. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The EIRP was calculated as:-

EIRP = Signal Generator Level - Cable Loss + Antenna Gain

Transmitter Radiated Emissions (Continued)

The limit in the standard states that emissions shall be attenuated by at least 43+10 Log(P) dB below the transmitter power (P), where (P) is the maximum measured fundamental power for the channel under test. This limit always reduces to –13dBm as such, the limit line presented on the accompanying plots is set to –13dBm.

Any spurious measured were then compared to the –13dBm limit. The requirement is for the emission to be less than –13dBm. The margin between emission and limit is recorded and should always be positive to indicate compliance.

All measurements were performed using broadband Horn antennas.

It should be noted that FCC Part 24.238 states that the 1st MHz band immediately adjacent to the applicants declared frequency block may be measured using a resolution bandwidth of at least 1% of the emission bandwidth. This bandwidth was found to be 3 kHz

9.6. Idle Mode Radiated Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 5 times the highest clock frequency stated in section 2.5 of this report were performed within a screened chamber in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT which required further examination. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit. Levels within 20dB of this limit were measured where possible, on occasion, the receiver noise floor came within the 20dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a Quasi-Peak detector was used for measurements below 1000 MHz, for measurements above 1000 MHz average and peak detectors were used.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT. The procedure was repeated for the vertical polarisation.

Idle Mode Radiated Emissions (Continued)

The final field strength was determined as the indicated level in dBuV plus cable loss and antenna factor.

The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements Below 1GHz	Final Measurements Above 1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	(120 kHz < 1GHz) (1MHz > 1GHz)	120 kHz	1 MHz (If Applicable)
Amplitude Range:	60 dB	20 dB	20 dB (typical)
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

10. Measurement Uncertainty

10.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

10.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

10.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

10.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30.0 MHz	95%	+/- 3.25 dB
Effective Isotropic Radiated Power (EIRP)	Not applicable	95%	+/- 1.78 dB
Frequency Stability	Not applicable	95%	+/- 20 Hz
Occupied Bandwidth	1850 to 1910 MHz	95%	+/- 0.12 %
Radiated Spurious Emissions	30.0 MHz to 1000.0 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1.0 GHz to 26.0 GHz	95%	+/- 1.78 dB

10.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A003	ESH3-Z2 Pulse Limiter	Rohde & Schwarz	ESH3-Z2	357 881/052
A027	Horn Antenna	Eaton	9188-2	301
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002
A1037	Chase Bilog Antenna	Chase EMC Ltd	CBL6112B	2413
A197	Site 2 Controller SC144	Unknown	SC144	150720
A248	60 dB Variable Attenuator	Narda	743-60	01411
A253	WG 12 Microwave Horn	Flann Microwave	12240-20	128
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139
A255	WG 16 Microwave Horn	Flann Microwave	16240-20	519
A256	WG 18 Microwave Horn	Flann Microwave	18240-20	400
A259	Bilog Antenna	Chase	CBL6111	1513
A276	OATS Positioning Controller	Rohde & Schwarz	HCC	
A392	3 dB attenuator (9)	Suhner	6803.17.B	None
A427	WG 14 horn	Flann	14240-20	150
A428	WG 12 horn	Flann	12240-20	134
A429	WG 16 horn	Flann	16240-20	561
A430	WG 18 horn	Flann	18240-20	425
A436	WG 20 horn	Flann	20240-20	330
C1079	Rosenberger 1m Cable	Rosenberger	FA210A1010 M5050	28462-1
C1080	Rosenberger Cable 3m	Rosenberger	FA210A1030 M5050	28464-1
C1081	Rosenberger Cable 2m	Rosenberger	FA210A1020 M5050	28463-2
C1082	Rosenberger Cable 2m	Rosenberger	FA210A1020 M5050	28463-1
C160	Cables	Rosenberger	UFA210A-1-1181-70x70	None
C202	Rosenberger cable	Rosenberger	UFA 210A-1-1180-70X70	1543
C453	Cable	Rosenberger	RG142XX-001-RFIB	C453-10081998
C457	Cable	Rosenberger	RG142XX-002-RFIB	C457-10081998

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
C461	Cable	Rosenberger	UFA210A-1-1182-704704	98H0305
C468	N-Type Coaxial Cable	Rosenberger	UFA210A-1-3937-504504	98L0440
E013	PCN Environmental Chamber	Sanyo	ATMOS chamber	None
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M072	FSM Spectrum Analyser	Rohde & Schwarz	FSM	862 967/010 (RF) & 863 912/048 (Display)
M088	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:835862/018 RU:835387/006
M1093	Will tek	Will tek	4202S	0513018
M114	Temperature/Humidity Meter	RS Components	212-146	None
M173	Turntable Controller	R.H.Electrical Services	RH351	3510020
S009	D.C. PSU	Farnell	PDD3502A	174

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

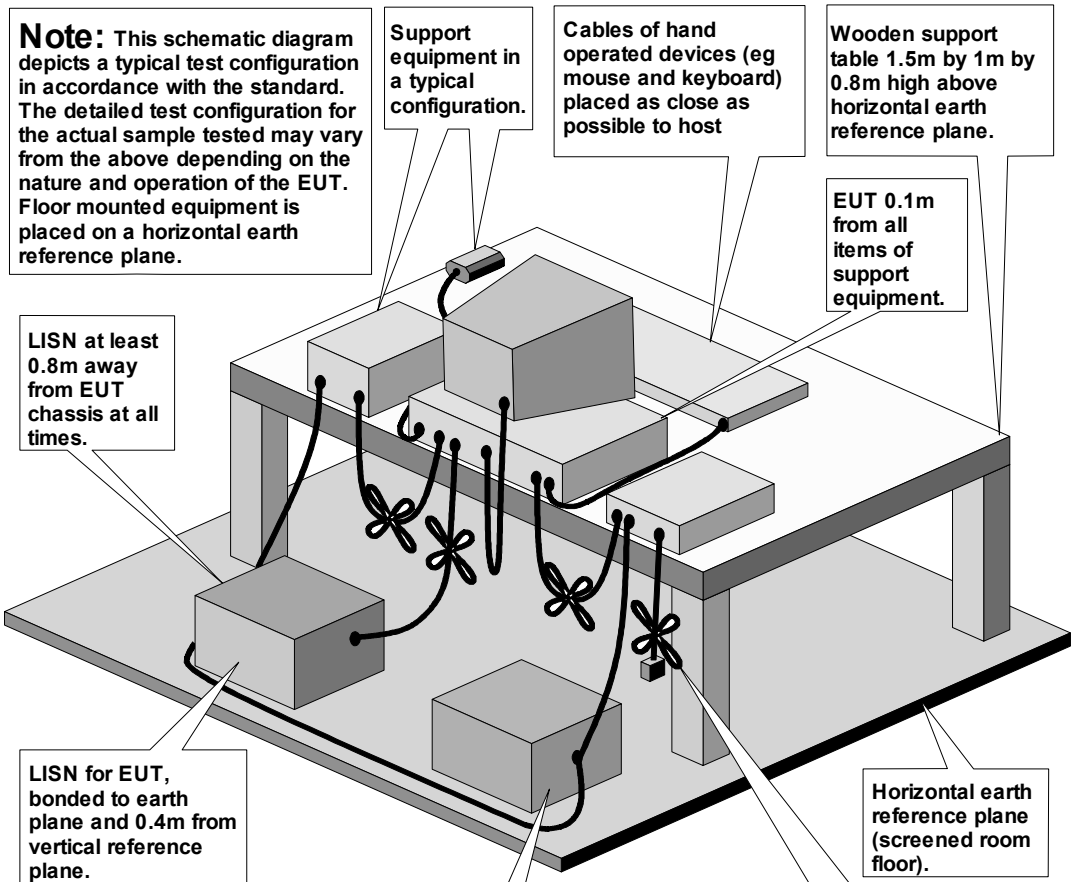
Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\45006JD13\EMICON	Test configuration for measurement of conducted emissions
DRG\45006JD13\EMIRAD	Test configuration for measurement of radiated emissions

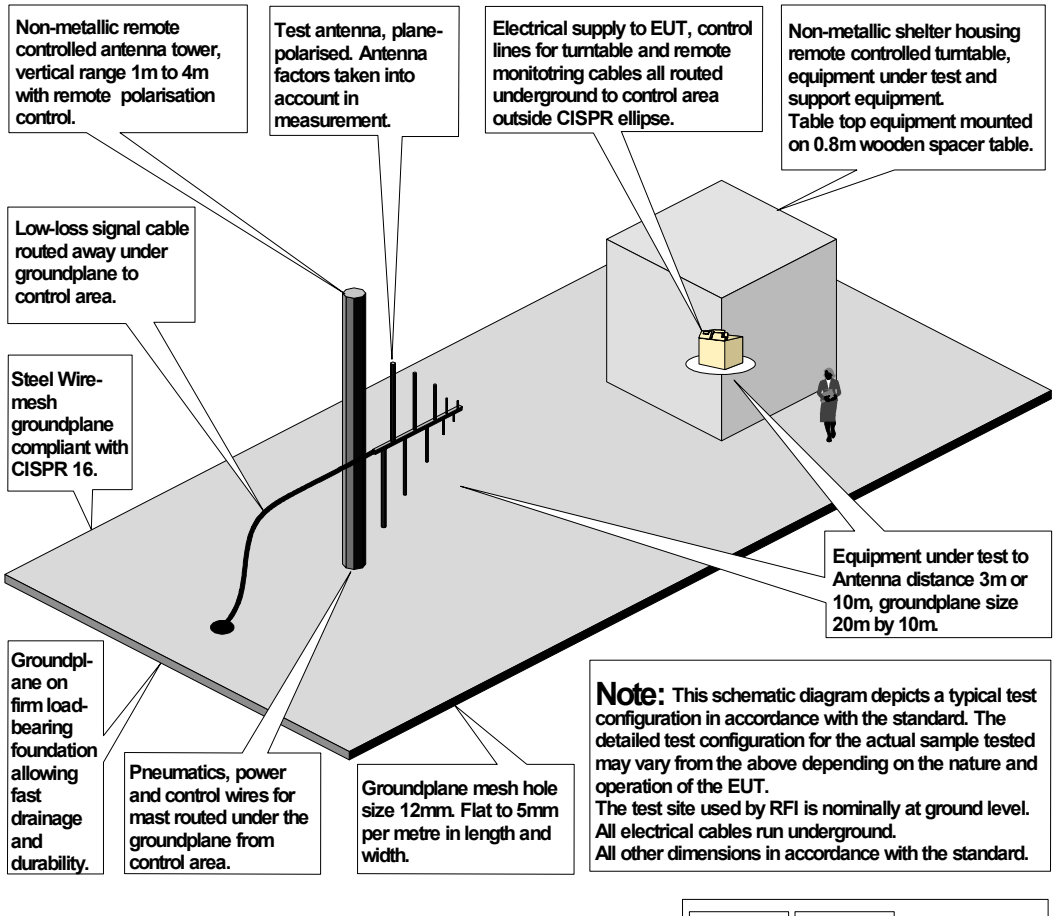
Test Of: Microcell Ltd..
C62 Mobile Telephone Handset.
To: FCC Part 24

DRG\45006JD13\EMICON



Typical Test Configuration For Conducted Emissions Measurements In Accordance With ANSI C63.4-1992
Tests performed in a screened enclosure

DRG\45006JD13\EMIRAD



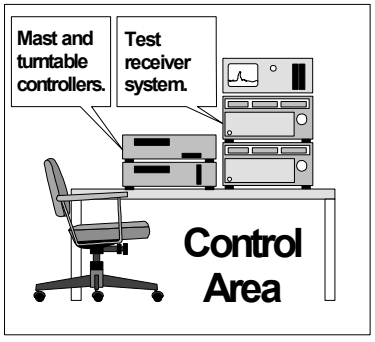
Note: This schematic diagram depicts a typical test configuration in accordance with the standard. The detailed test configuration for the actual sample tested may vary from the above depending on the nature and operation of the EUT.
The test site used by RFI is nominally at ground level.
All electrical cables run underground.
All other dimensions in accordance with the standard.

Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m (CISPR ellipse)

Groundplane Earthed

Control room outside CISPR ellipse



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