TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Panasonic Mobile Comms Dev of Europe Ltd
P906i

To: FCC Part 24: 2007 (Subpart E)

Test Report Serial No:
RFI/RPTE2/RP73067JD03A

Supersedes Test Report Serial No:
RFI/RPTE1/RP73067JD03A

This Test Report Is Issued Under The Authority Of Steve Flooks, Service Leader RPG:  **pp Brian Watson**	
Checked By: Brian Watson 	**Report Copy No: PDF01**
Issue Date: 27 March 2008	**Test Dates: 12 February 2008 to 26 February 2008**

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields.
This report may be copied in full. The results in this report apply only to the sample(s) tested.

RFI Global Services Ltd
Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire RG23 8BG
Telephone: +44 (0)1256 312000 Facsimile: +44 (0)1256 312001
Email: info@rfi-global.com Website: www.rfi-global.com

Registered in England and Wales. Company number:2117901

This page has been left intentionally blank.

Table of Contents

1. Client Information

Company Name:	Panasonic Mobile Communications Development of Europe Ltd
Address:	2 Gables Way Colthrop Thatcham Berkshire RG19 4ZB
Contact Name:	Mr M Hargreaves

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)

Description:	Mobile Headset
Brand Name:	DoCoMo
Model Name or Number:	P906i
Serial Number:	None stated
IMEI Number:	357015010018932
Hardware Version Number:	Rev C
Software Version Number:	B-WN905S.01.03.001 P7isCv05.01.02.00
FCC ID Number:	UCE208006A
Country of Manufacture:	Japan
Date of Receipt:	12 February 2008

Description:	Battery
Brand Name:	DoCoMo
Model Name or Number:	P16
Serial Number:	Not applicable
Hardware Version Number:	Not applicable
Software Version Number:	Not applicable
FCC ID Number:	Not applicable
Country of Manufacture:	Japan
Date of Receipt:	12 February 2008

2.2. Description of EUT

The equipment under test is a dual mode (W-CDMA/GSM) Cellular Mobile Telephone with Bluetooth.

2.3. Modifications Incorporated in EUT

During the course of testing the EUT was not modified.

2.4. Accessories

The following accessories were supplied with the EUT during testing:

Description:	AC Charger
Brand Name:	DoCoMo
Model Name or Number:	FOMA AC Charger 01 for Global use MAS-BH0008-A 002
Serial Number:	Not applicable
Cable Length and Type:	1.5 Mtr round twin core
Connected to Port:	Charge / Data Port

Description:	DC Charger
Brand Name:	DoCoMo
Model Name or Number:	FOMA DC Adapter 02
Serial Number:	Not applicable
Cable Length and Type:	2.0m approx / 2 core curl-cord
Connected to Port:	Charge / Data Port

Description:	Personal Hands Free (stereo)
Brand Name:	DoCoMo
Model Name or Number:	Flat-plug Stereo Earphone Set P01
Serial Number:	Not applicable
Cable Length and Type:	1.8m / Multi-core
Connected to Port:	AV Output

Description:	Micro-SD Memory Card
Brand Name:	None Stated
Model Name or Number:	Not applicable
Serial Number:	Not applicable
Cable Length and Type:	Not applicable
Connected to Port:	Dedicated micro-SD card port

Accessories - Continued

Description:	Charge / Data Cable
Brand Name:	None Stated
Model Name or Number:	FOMA USB Cable with Charge Function 01
Serial Number:	Not applicable
Cable Length and Type:	0.5m / Multi-core
Connected to Port:	Charge / Data Port

2.5. Additional Information Related to Testing

Power Supply Requirement:	Internal Battery Supply of 3.7V (nominal)		
Intended Operating Environment:	Within GSM coverage, UMTS coverage area		
Equipment Category:	Bluetooth GSM/GPRS Short Range Device UMTS FDD I		
Type of Unit:	Portable (standalone battery powered device) Transceiver		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	512	1850.2
	Middle	660	1879.8
	Top	810	1909.8
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)	27.8 dBm		

2.6. Port Identification

Port	Description	Type
1	Charge/Data	USB/Multipin
2	Audio PHF	Data /Multipin
3	USIM	Multipin
4	Micro-SD	Multipin

3. Test Specifications, Methods and Procedures

3.1. Test Specifications

Reference:	FCC Part 24 Subpart E: 2007 (Broadband PCS)
Title:	Code of Federal Regulations, Part 24 (47CFR24) Personal Communication Services.

Methods and Procedures

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003
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 (2003)
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.

3.2. 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

There were no deviations from the test specification.

5. Operation of the EUT during Testing

5.1. Operating Modes

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

- The EUT was tested on top, middle and bottom channels with the EUT communicating to a GSM tester transmitting at full power with the AC charger and PHF headset connected.
- The EUT was tested in both Idle Mode and Transceiver Mode.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration unless otherwise stated:

- With worst case accessory combination which comprised of the headset and charger combination.

6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Idle Mode AC Conducted Spurious Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2007 Section 15.107	AC Mains Input	Complied
Idle Mode Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2007 Section 15.109	Enclosure	Complied
Transmitter Effective Isotropic Radiated Power (EIRP)	C.F.R. 47 FCC Part 24: 2007 Section 24.232	Antenna	Complied
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 24: 2007 Section 24.235	Antenna	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 24: 2007 Section 24.235	Antenna	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 24: 2007 Section 24.238	Antenna	Complied
Transmitter Out of Band Radiated Emissions	C.F.R. 47 FCC Part 24: 2007 Section 2.1053/24.238	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 24: 2007 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
RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ

- FCC Site Registration Number: 90895

7. Measurements, Examinations and Derived Results

7.1. General Comments

This section contains test results only.

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.

7.2. Test Results

7.2.1. Idle Mode AC Conducted Spurious Emissions: Section 15.107

The EUT was configured as for AC conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emissions levels present on the ac mains line of the EUT.

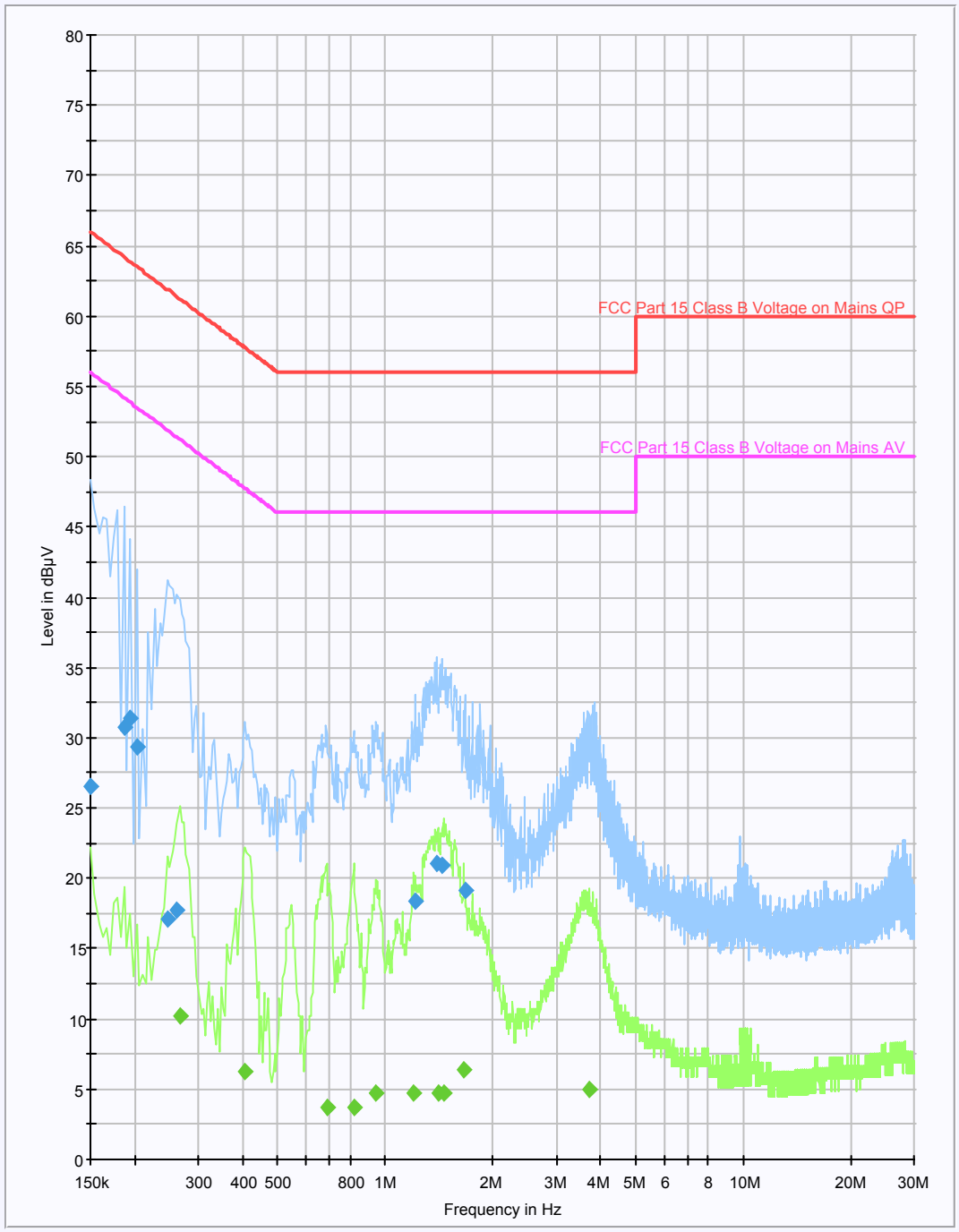
Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.150000	Neutral	26.5	66.0	39.5	Complied
0.186000	Neutral	30.8	64.2	33.4	Complied
0.194000	Neutral	31.4	63.9	32.5	Complied
0.202000	Neutral	29.4	63.5	34.1	Complied
0.246000	Live	17.0	61.9	44.9	Complied
0.262000	Neutral	17.7	61.4	43.7	Complied
1.210000	Neutral	18.3	56.0	37.7	Complied
1.390000	Live	21.0	56.0	35.0	Complied
1.438000	Live	20.9	56.0	35.1	Complied
1.666000	Live	19.1	56.0	36.9	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.266000	Neutral	10.2	51.2	41.0	Complied
0.406000	Neutral	6.2	47.7	41.5	Complied
0.686000	Neutral	3.7	46.0	42.3	Complied
0.818000	Neutral	3.7	46.0	42.3	Complied
0.942000	Neutral	4.7	46.0	41.3	Complied
1.202000	Live	4.7	46.0	41.3	Complied
1.402000	Live	4.7	46.0	41.3	Complied
1.462000	Live	4.8	46.0	41.2	Complied
1.654000	Live	6.4	46.0	39.6	Complied
3.698000	Live	4.9	46.0	41.1	Complied

Receiver AC Conducted Spurious Emissions: (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.2.2. Idle Mode Radiated Spurious Emissions: Section 15.109

The EUT was configured as for receiver radiated emission testing as described in section 9 of this report.

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

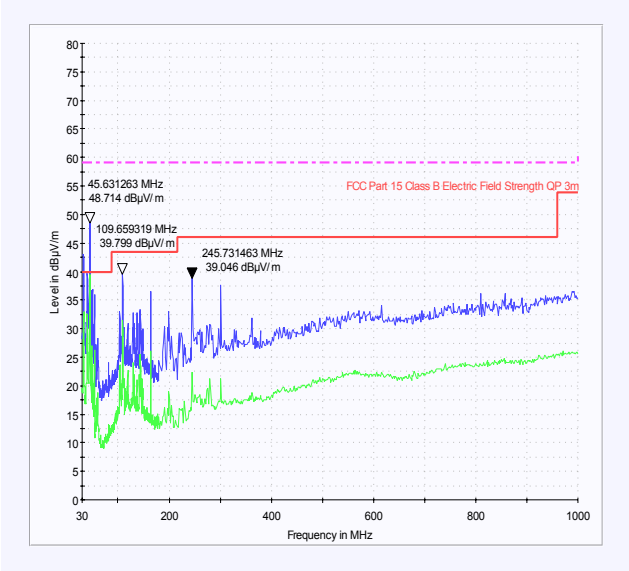
Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
45.6312	Vertical	11.8	40.0	28.2	Complied

Note(s):

1. *In the frequency range 30MHz to 1GHz all final emissions measurements were greater than 25dB below the limit and were close to the ambient level, therefore only the maximum level was recorded in the table above.*

Receiver Radiated Spurious Emissions: (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

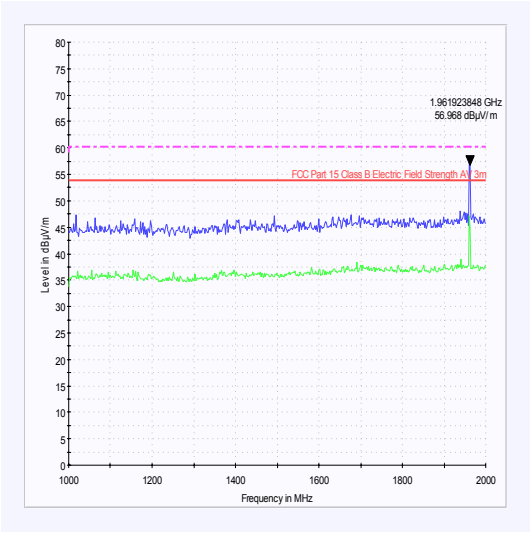
7.2.3. Idle Mode Radiated Emissions: Section 15.109: continued

Electric Field Strength Measurements (Frequency Range: 1 to 12.75 GHz)

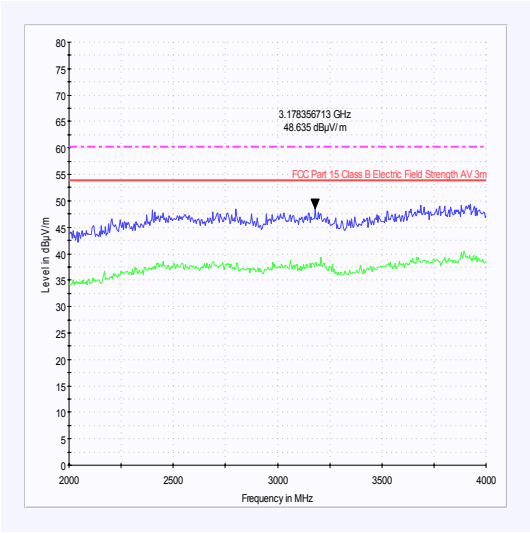
Highest Peak Level:

Frequency (GHz)	Antenna Polarity	Detector level (dBμV)	Transducer factor (dB)	Actual Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
3.1784	Vertical	56.6	-8.0	48.6	54.0	5.4	Complied
5.1503	Vertical	41.5	-2.8	38.7	54.0	15.3	Complied
7.8156	Vertical	42.8	-0.6	42.2	54.0	11.8	Complied
10.6854	Vertical	42.6	3.8	46.4	54.0	7.6	Complied

Idle Mode Radiated Spurious Emissions: (Continued)

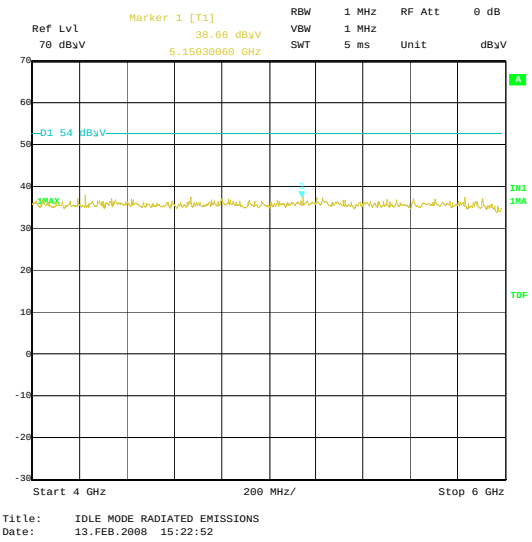


Receiver Mode: 1GHz to 2GHz

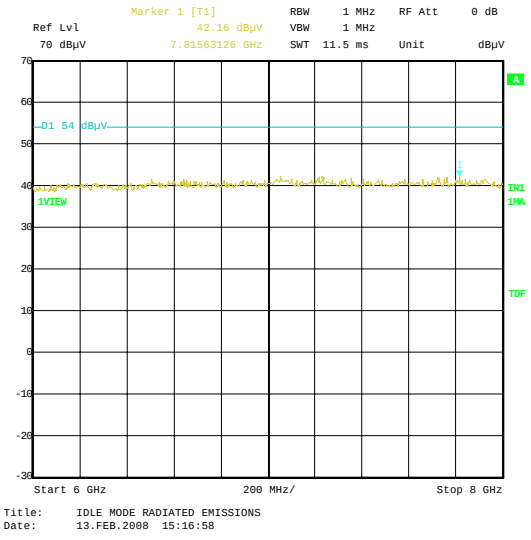


Receiver Mode: 2GHz to 4GHz

Note: The emission at 1.9619 GHz is the down link signal from the support equipment.



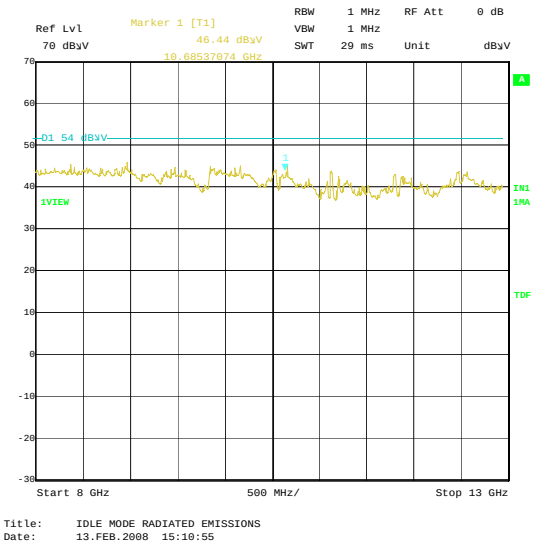
Receiver Mode: 4GHz to 6GHz



Receiver Mode: 6GHz to 8GHz

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

Radiated Spurious Emissions: (Continued)



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

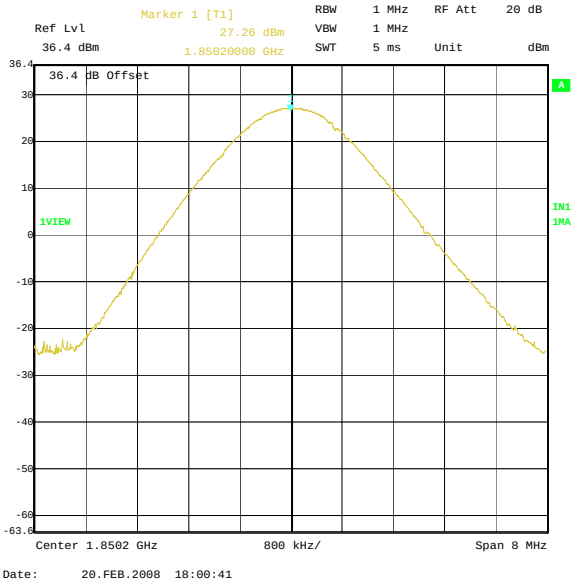
7.2.4. Transmitter Effective Isotropic Radiated Power (EIRP):

The EUT was configured as for effective isotropic radiated power as described in section 9 of this report.

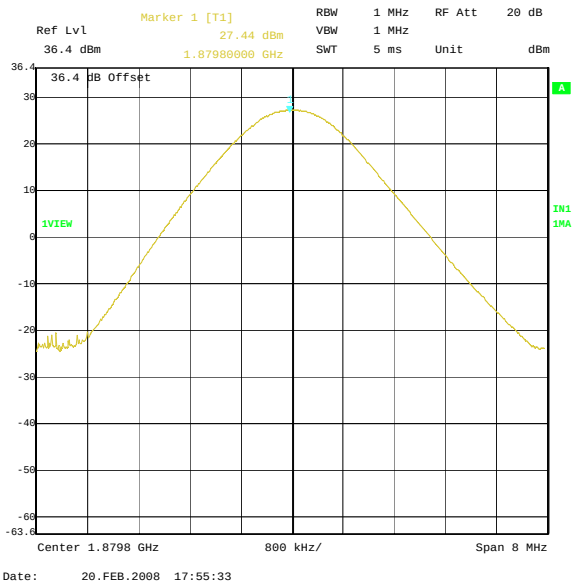
Tests were performed to identify the maximum effective isotropic radiated power (EIRP).

Channel	Measured Frequency (MHz)	Antenna Polarity	Maximum Transmitter EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	1850.2	Horizontal	27.3	30.0	2.7	Complied
Middle	1879.8	Horizontal	27.4	30.0	2.6	Complied
Top	1909.8	Horizontal	27.8	30.0	2.2	Complied

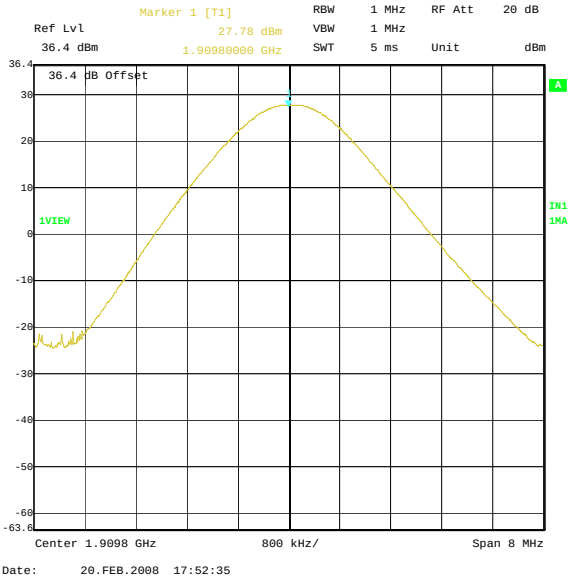
Transmitter Effective Isotropic Radiated Power (EIRP): Continued



Bottom Channel



Middle Channel



Top Channel

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

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

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

Bottom Channel (1850.2 MHz)

Temp (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	-8	1850.199992	1850.0	0.199992	Complied
-20	32	1850.200032	1850.0	0.200032	Complied
-10	3	1850.200003	1850.0	0.200003	Complied
0	22	1850.200022	1850.0	0.200022	Complied
10	25	1850.200025	1850.0	0.200025	Complied
20	60	1850.200060	1850.0	0.200060	Complied
30	30	1850.200030	1850.0	0.200030	Complied
40	47	1850.200047	1850.0	0.200047	Complied
50	11	1850.200011	1850.0	0.200011	Complied

Top Channel (1909.8 MHz)

Temp (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	-14	1909.799986	1910.0	0.200014	Complied
-20	26	1909.800026	1910.0	0.199974	Complied
-10	-5	1909.799995	1910.0	0.200005	Complied
0	-3	1909.799997	1910.0	0.200003	Complied
10	53	1909.800053	1910.0	0.199947	Complied
20	36	1909.800036	1910.0	0.199964	Complied
30	50	1909.800050	1910.0	0.199950	Complied
40	54	1909.800054	1910.0	0.199946	Complied
50	-2	1909.799998	1910.0	0.200002	Complied

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

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

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

Bottom Channel (1850.2 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.4	20	1850.200020	1850	0.200020	Complied
4.2	23	1850.200023	1850	0.200023	Complied

Top Channel (1909.8 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.4	16	1909.800016	1910	0.199984	Complied
4.2	25	1909.800025	1910	0.199975	Complied

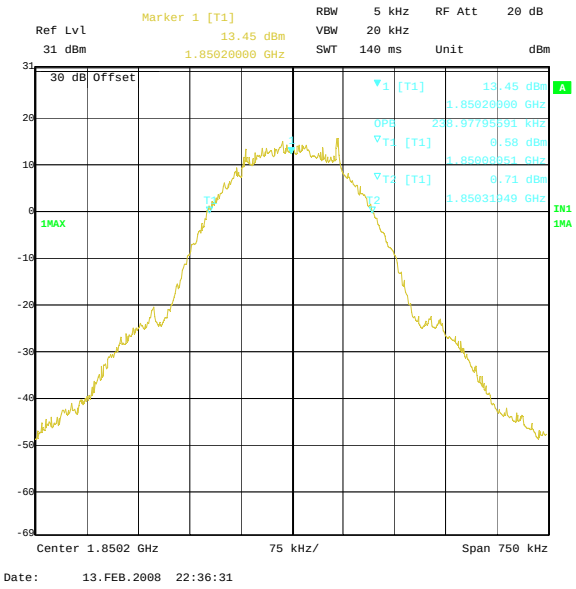
7.2.7. Transmitter Occupied Bandwidth: Section 24.238

The EUT was configured as for occupied bandwidth measurements as described in section 9 of this report.

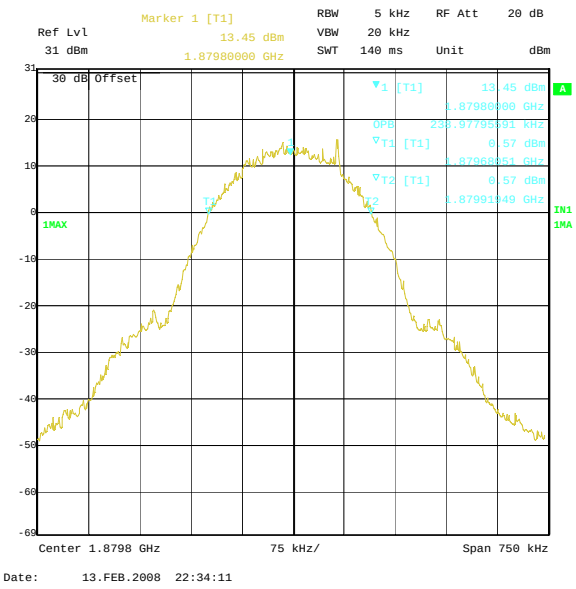
Tests were performed to identify the maximum bandwidth occupied by the fundamental frequency of the EUT.

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	3.0	10.0	238.98
Middle	1879.8	3.0	10.0	238.98
Top	1909.8	3.0	10.0	240.48

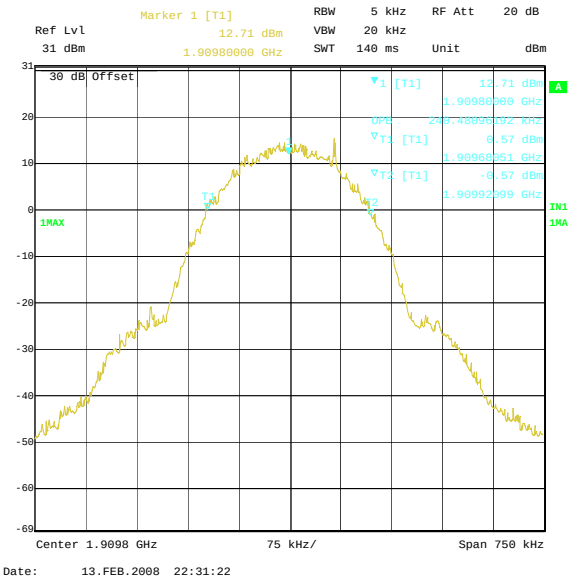
Transmitter Occupied Bandwidth: (Continued)



Bottom Channel



Middle Channel



Top Channel

7.2.8. Transmitter Out of Band Radiated Emissions: Section 2.1053/24.238

The EUT was configured as for transmitter radiated emission testing as described in section 9 of this report.

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

Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3823.645	-20.0	-13	7.0	Complied
5551.102	-37.0	-13	24.0	Complied
7402.805	-37.0	-13	24.0	Complied
9250.501	-24.0	-13	11.0	Complied

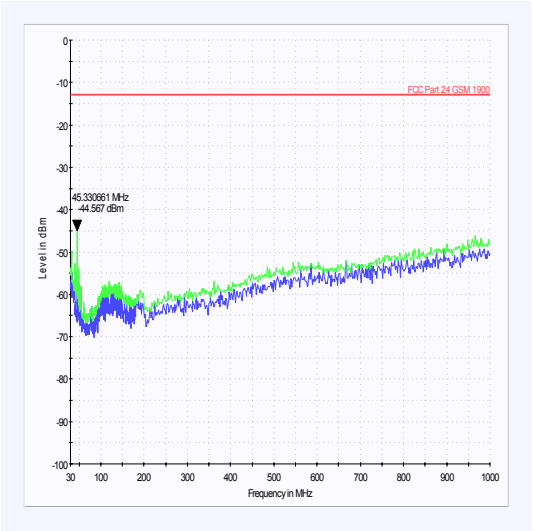
Middle Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3823.645	-18.2	-13	5.2	Complied
5643.287	-29.0	-13	16.0	Complied
7519.038	-39.0	-13	26.0	Complied
9394.790	-29.0	-13	16.0	Complied

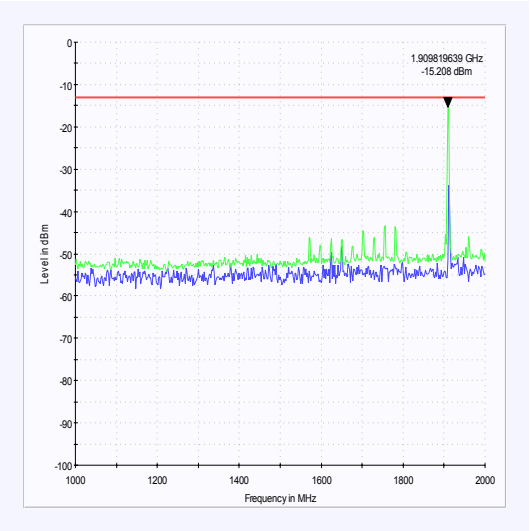
Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3823.645	-25.2	-13	12.2	Complied
5731.462	-42.2	-13	29.2	Complied
7639.279	-45.8	-13	32.8	Complied
9547.094	-38.0	-13	25.0	Complied

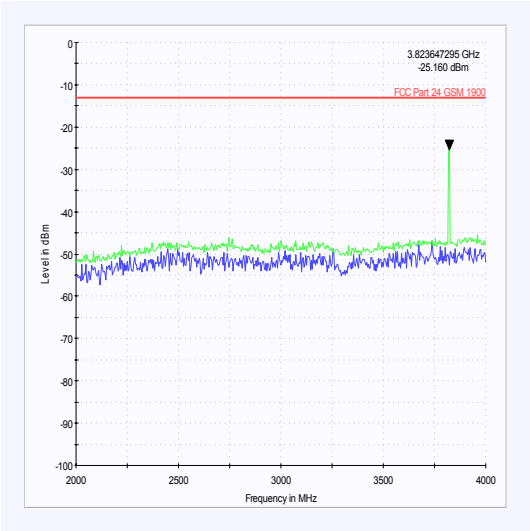
Transmitter Out of Band Radiated Emissions: (Continued)



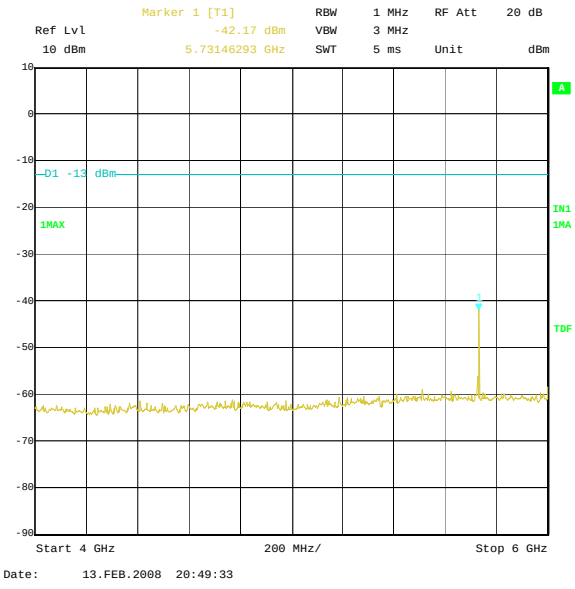
Tx 30MHz to 1GHz



TX 1GHz to 2GHz



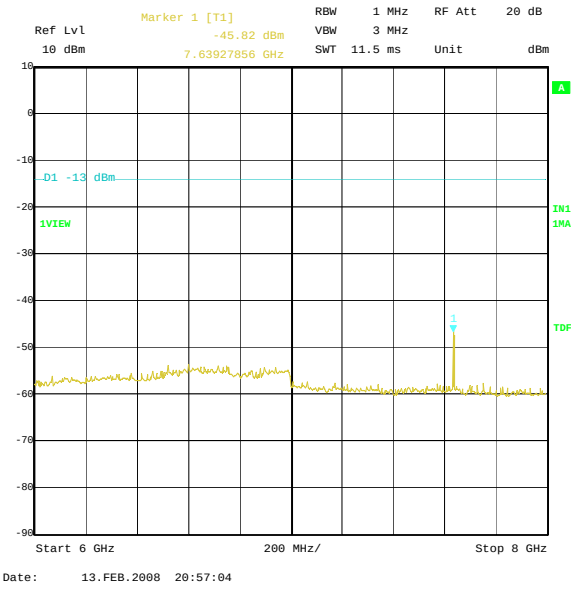
TX 2GHz to 4GHz



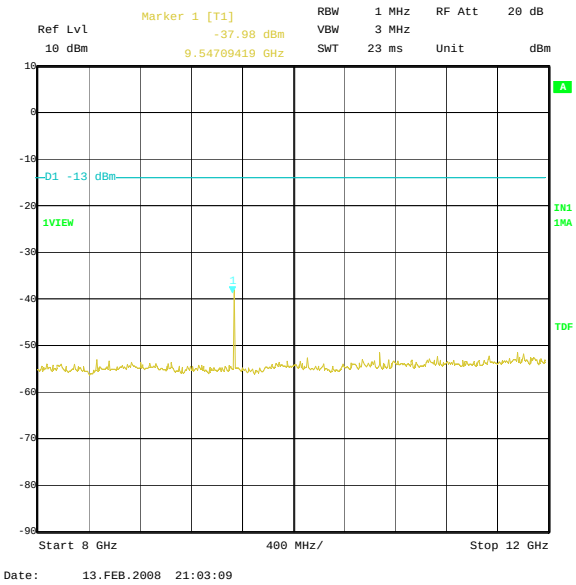
TX 4GHz to 6GHz

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

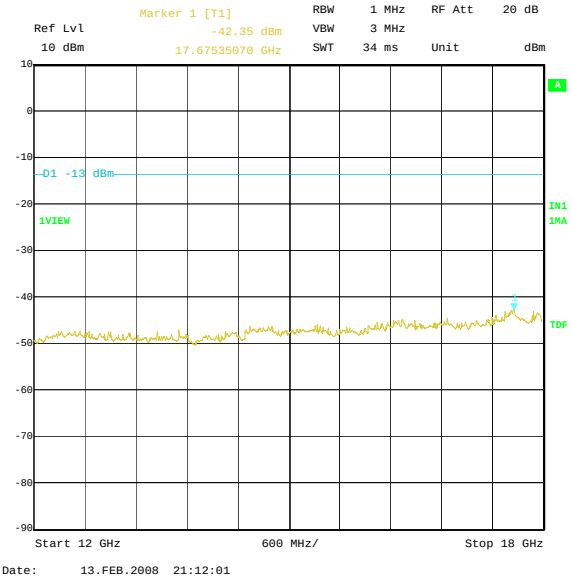
Transmitter Out of Band Radiated Emissions: (Continued)



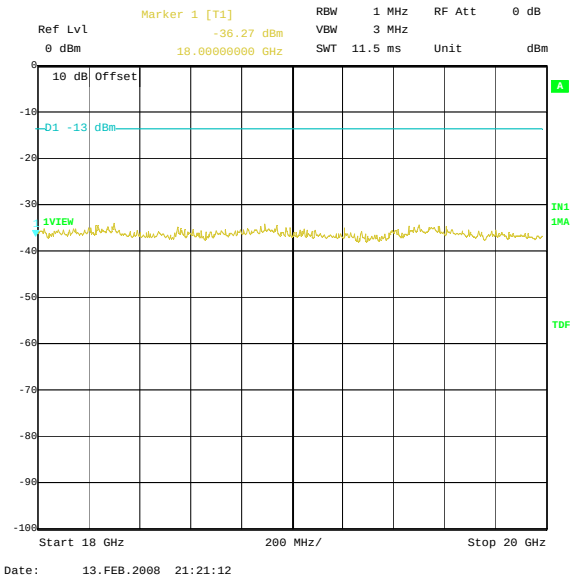
TX 6GHz to 8GHz



TX 8GHz to 12GHz



TX 12GHz to 18GHz



TX 18GHz to 20GHz

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

7.2.9. Transmitter Radiated Emissions at Band Edges: Section 2.1053/24.238

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

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

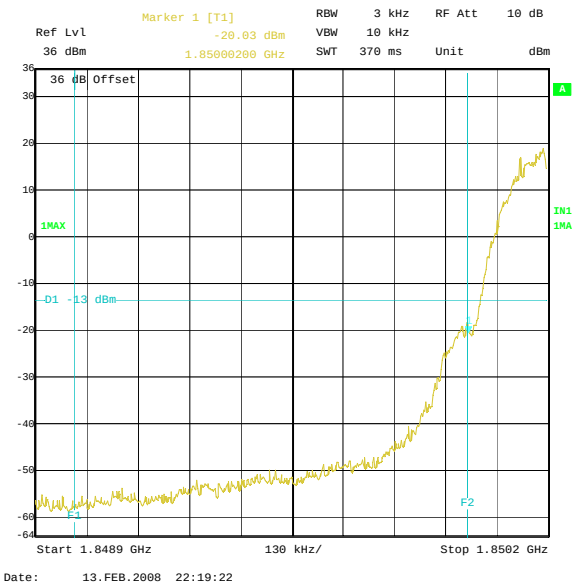
Bottom Band Edge

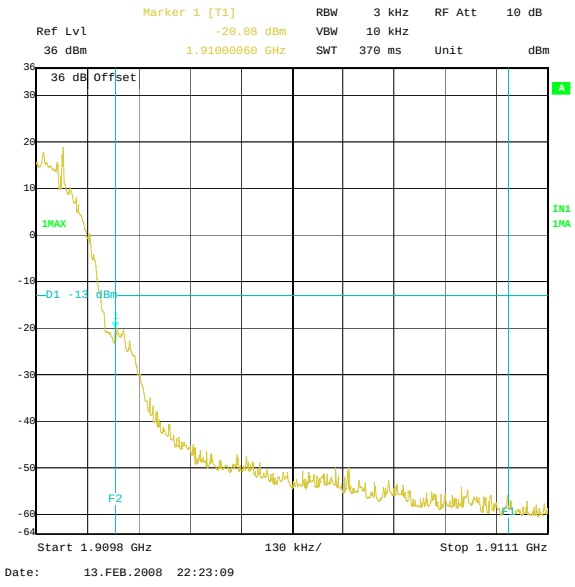
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-20.0	-13.0	7.0	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1910	-20.1	-13.0	6.9	Complied

Transmitter Radiated Emissions at Band Edges: (Continued)





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

8. Measurement Uncertainty

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.

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

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

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 MHz	95%	+/- 3.25 dB
Effective Isotropic Radiated Power (EIRP)	Not applicable	95%	+/- 2.94 dB
Frequency Stability	Not applicable	95%	+/- 24.3 Hz
Minimum Bandwidth	Not applicable	95%	+/- 0.12 %
Occupied Bandwidth	1850 to 1910 MHz	95%	+/- 0.12 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 2.94 dB
Radiated Spurious Emissions	1 GHz to 26 GHz	95%	+/- 2.94 dB

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.

9. Measurement Methods

9.1. Conducted Output Power

The EUT was connected to a spectrum analyser and to a GSM test set via suitable cables, RF attenuators and combiners.

The connection was made to the EUT either via an antenna port or by antenna terminals made available by the client.

The total loss of the cables, attenuators and combiner were measured and entered as a reference level offset into the measuring receiver to correct for the losses.

The EUT was set to the required channel and the transmitter set to operate at full power.

A marker was set to the maximum indicated peak and the conducted power was recorded.

This test was performed on the bottom, middle and top channels.

The test equipment settings for conducted antenna port measurements were as follows:

Receiver Function	Setting
Detector Type:	Peak
Mode:	Max Hold
Bandwidth:	1 MHz
Amplitude Range:	100 dB
Step Size:	Continuous sweep
Sweep Time:	Coupled

9.2. 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 – 2003 Clause 5.4. The transmitter was fitted with an integral antenna; therefore all radiated tests were performed with the unit operating into the integral antenna.

The level of the EIRP was measured using a spectrum analyser.

The test antenna was positioned in the horizontal plane. The EUT was oriented in the X plane. 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. This 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 then repeated with the test antenna set in the vertical polarity.

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 6 dB or greater attenuator. 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

All measurements were performed using broadband Horn antennas.

Effective Isotropic Radiated Power (EIRP) (Continued)

Circumstances where the signal generator could not produce the desired power 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.

The test equipment settings for EIRP measurements were as follows:

Receiver Function	Setting
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	1 MHz
Amplitude Range:	100 dB
Sweep Time:	Coupled

9.3. Frequency Stability

The EUT was situated within an environmental test chamber and connected directly to the GSM test set via an access port.

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

Measurements were also performed at voltage extremes between the declared nominal supply voltage and at the declared endpoint voltage (for hand carried battery operated equipment) or by varying the primary supply voltage from 85% to 115% of the nominal value for all other equipment types.

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.

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 non-compliance. There is also a frequency graph presented offering the frequency variation around nominal frequency.

9.4. 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.

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 the EUT is a PCS phone, no modulation input port was available. A call was thus set up 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 or ESIB 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 spectrum analyser user manual for this measurement, i.e., RBW $\geq$ 1% of occupied bandwidth. A value of 3 kHz was used.

9.5. Transmitter Conducted Emissions Measurements

The test was performed in a laboratory environment.

Spurious emission measurements at the antenna port were performed from the lowest declared frequency to 10 times the highest EUT fundamental frequency.

A measuring receiver was connected to the antenna port of the EUT via a suitable cable and RF Attenuator. The total loss of both the cable and the attenuator were measured and entered as a reference level offset into the measuring receiver to correct for the losses.

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 -13 dBm therefore, the limit line presented on the accompanying plots is set to -13 dBm.

The frequency band described above was investigated with the transmitter operating at full power on the top, bottom and middle channels. Any spurious observed were then recorded and compared to the -13 dBm limit. The requirement is for the emission to be less than -13 dBm. The margin between emission and limit is recorded and should always be positive to indicate compliance.

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

The measurements in the 2nd and 3rd 1 MHz blocks away from the adjacent 1 MHz block from 1911 MHz to 1912 MHz and 1912 MHz to 1913 MHz were carried out using an analyser span of 1 MHz and a 100 kHz receiver resolution bandwidth (RBW). 10 linear readings were taken for each 100 kHz strip across the 1 MHz band. These readings were integrated to give the emission level in an equivalent 1 MHz bandwidth.

The test equipment settings for conducted antenna port measurements were as follows:

Receiver Function	Settings
Detector Type:	Peak
Mode:	Max Hold
Bandwidth:	1 MHz >1 GHz
Bandwidth:	10 kHz <1 GHz
Amplitude Range:	100 dB
Step Size:	Continuous sweep
Sweep Time:	Coupled

The resolution bandwidth used for measurements in the 1 MHz blocks either side of the declared operating frequency block were set as described in the procedure above.

9.6. AC Mains Conducted Emissions

AC mains conducted emission 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. The EUT was powered with 115V 60 Hz AC mains supplied via a line impedance stabilisation network (LISN).

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.

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

9.7. Transmitter Radiated Emissions

Radiated emission 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. 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 20 dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20 dB 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 6 dB or greater attenuator. 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

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 -13 dBm therefore, the limit line presented on the accompanying plots is set to -13 dBm.

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

All measurements were performed using broadband horn antennas.

Transmitter Radiated Emissions (Continued)

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 by calculating 1% of the bandwidth measured in the transmitter occupied bandwidth section of this report. The next largest available bandwidth above this calculated figure was, therefore, used i.e. 3 kHz.

The measurements in the 2nd and 3rd 1 MHz blocks away from the adjacent 1 MHz block from 1911 MHz to 1912 MHz and 1912 MHz to 1913 MHz were carried out using an analyser span of 1 MHz and a 100 kHz receiver resolution bandwidth (RBW). 10 linear readings were taken for each 100 kHz strip across the 1 MHz band. These readings were integrated to give the emission level in an equivalent 1 MHz bandwidth.

9.8. Receiver / Idle 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 the upper frequency detailed in Section 15.33(b) 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 – 2003 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.

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

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

Receiver Function	Initial Scan	Final Measurements <1GHz	Final Measurements ≥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

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A004	Line Impedance Stabilization Network	Rohde & Schwarz	ESH3-Z5	890 604/027	23 Apr 2007	12
A028	Antenna	Eaton	91888-2	304	08 Jun 2006	36
A031	Antenna	Eaton	91889-2	557	08 Jun 2006	36
A1037	Antenna	Chase EMC Ltd	CBL6112B	2413	13 Feb 2008	12
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	16 Jan 2008	12
A253	Antenna	Flann Microwave	12240-20	128	17 Nov 2006	36
A254	Antenna	Flann Microwave	14240-20	139	17 Nov 2006	36
A255	Antenna	Flann Microwave	16240-20	519	17 Nov 2006	36
A256	Antenna	Flann Microwave	18240-20	400	17 Nov 2006	36
A259	Antenna	Chase	CBL6111	1513	13 Mar 2007	12
A436	Antenna	Flann	20240-20	330	24 Apr 2006	36
A512	Antenna	EMCO	3115	3993	17 Sep 2004	36
C1025	Cable	Rosenberger	FA210A-1-020m	FA00B 7564	Calibrated before use	-
C1065	Cable	Rosenberger	UFA210-1-7872	0985	Calibrated before use	-
C1072	Cable	Rosenberger	FA210a1030 M5050	Not Stated	Calibrated before use	-
C1164	Cable	Rosenberger Micro-Coax	FA210A1015 007070	43188-1	Calibrated before use	-
C1167	Cable	Rosenberger Micro-Coax	FA210A1030 007070	43190-01	Calibrated before use	-
C1268	Cable	Rosenberger	FA210A0075 008080	49356-1	Calibrated before use	-
C151	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Calibrated before use	-
C160	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Calibrated before use	-

Test Equipment Used – Continued

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
C172	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Calibrated before use	-
C341	Cable	Andrews	None	None	Calibrated before use	-
C348	Cable	Rosenberger	UFA210A-1-1181-70x70	2993	Calibrated before use	-
C363	Cable	Rosenberger	RG142	None	Calibrated before use	-
C468	Cable	Rosenberger	UFA210A-1-3937-504504	98L0440	Calibrated before use	-
E0511	VTM 7004	Votsch Industrietechnik	VTM 7004	5856608770 0010	Calibrated before use	-
G088	Power Supply Unit	Thurlby Thandar	CPX200	100700	Calibrated before use	-
M023	Test Receiver	Rohde & Schwarz	ESVP	872 991/027	24 Apr 2007	12
M024	Spectrum Monitor	Rohde & Schwarz	EZM	873 952/006	Calibrated before use	-
M1093	Communications Test Set	Will tek	4202S	0513018	29 August 2003 (Communicatio n purpose only)	-
M1229	Digital Multimeter	Fluke	179	87640015	20 Apr 2007	12
M1242	Spectrum Analyser	Rohde & Schwarz, Inc.	FSEM30	845986/022	29 Nov 2007	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	06 Feb 2008	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	15 Aug 2007	12
M1379	Test Receiver	Rohde and Schwarz	ESIB7	100330	02 Aug 2007	12
M1447	CBT	Rohde and Schwarz	1153.9000.35	100329	24 Jan 2008	12
S201	Open Area Test Site	RFI	1	None	25 May 2007	12
S202	Site 2	RFI	2	S202-15011990	28 Jan 2008	12
S503	Antenna Mast	EMCO	1051-25	9205 1670	Calibration not required	-

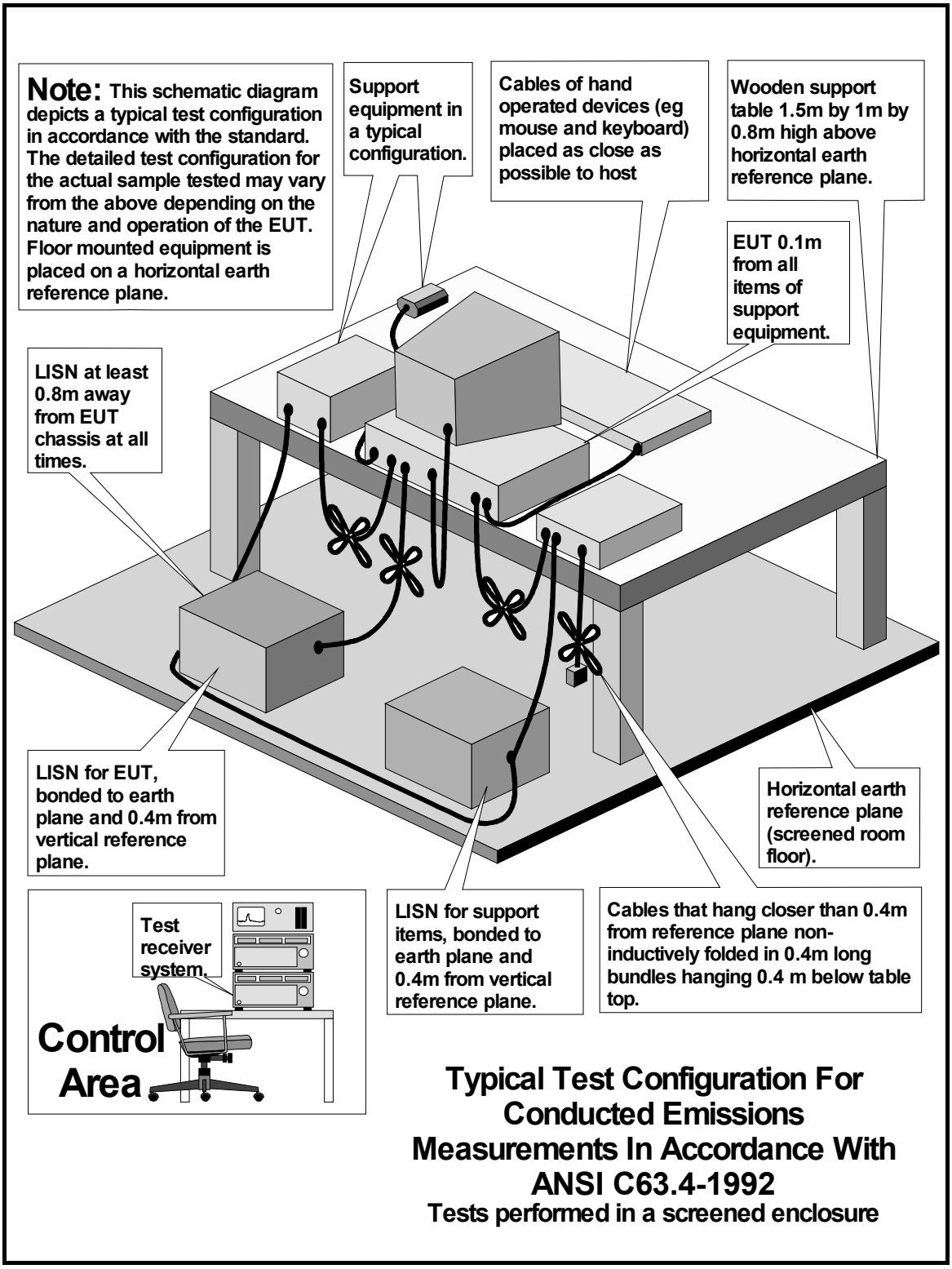
NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Test Configuration Drawings

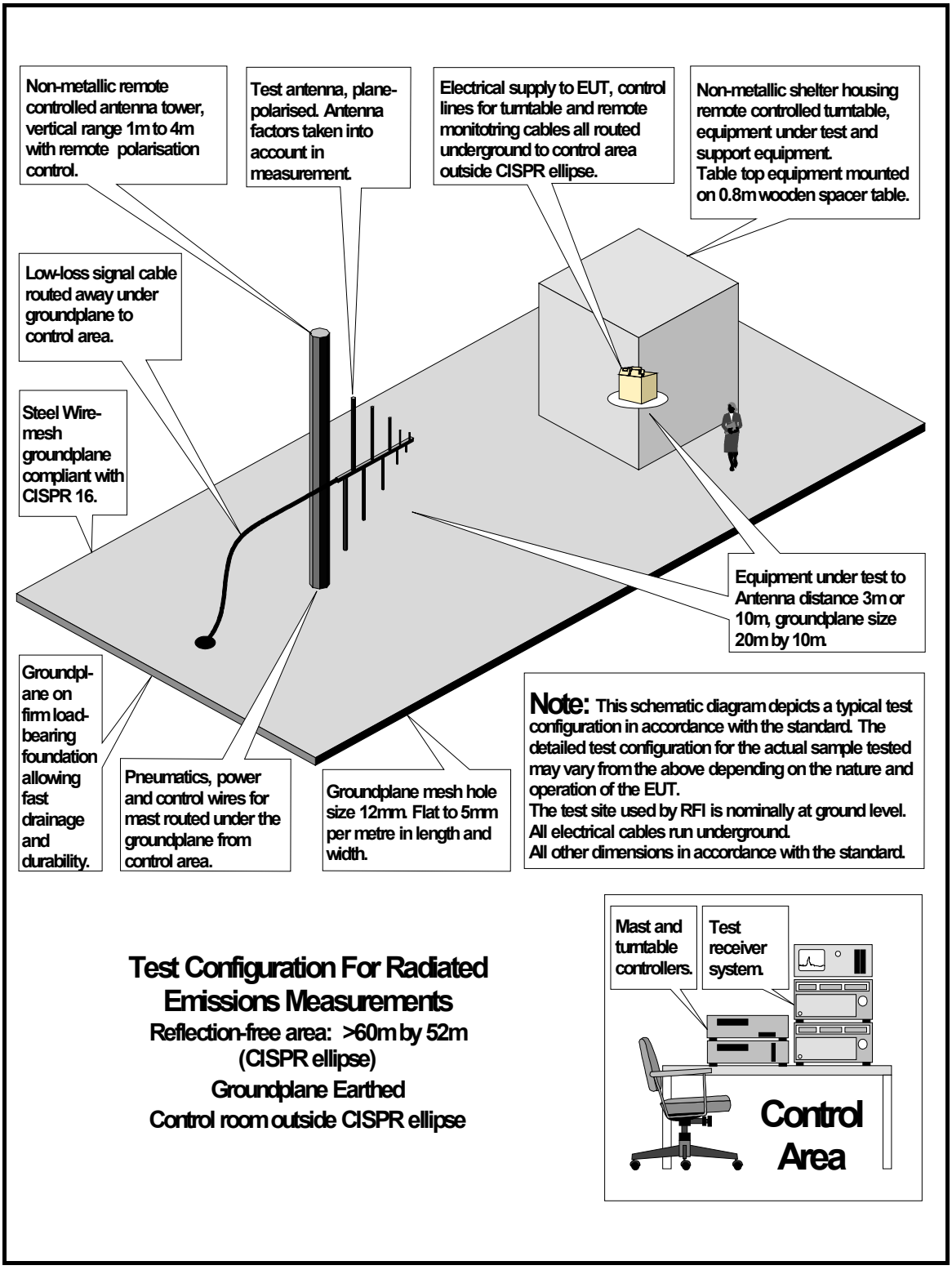
This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\73067JD03\EMICON	Test configuration for measurement of conducted emissions.
DRG\73067JD03\EMIRAD	Test configuration for measurement of radiated emissions.

DRG\73067JD03\EMICON



DRG\73067JD03\EMIRAD



Test Configuration For Radiated Emissions Measurements
Reflection-free area: >60m by 52m (CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse