TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Panasonic Mobile Comms. Dev. of Europe Ltd.
VS7a Mobile Handset

To: FCC Part 24: 2006 (Subpart E)

Test Report Serial No:
RFI/RPTE2/RP72749JD03A

Supersedes Test Report Serial No:
RFI/RPTE1/RP72749JD03A

This Test Report Is Issued Under The Authority Of Michael Derby, Radio Performance Service Leader:  **pp**	
Checked By: Brian Watson  **pp**	**Report Copy No: PDF01**
Issue Date: 24 October 2007	**Test Dates: 29 August 2007 to 07 September 2007**

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Registered in England and Wales. Company number:2117901

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1. Client Information

Company Name:	Panasonic Mobile Comms. Dev. 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 Handset
Brand Name:	Panasonic
Model Name or Number:	VS7a (Sample C13)
Serial Number:	None stated
IMEI Number:	004401220316554
Hardware Version Number:	Rev B
Software Version Number:	820PVAII
FCC ID Number:	UCE207003A
Country of Manufacture:	Japan
Date of Receipt:	29 August 2007

2.2. Accessories

The following accessories were supplied with the EUT:

Description:	Personal Hands free (Stereo)
Brand Name:	Panasonic
Model Name or Number:	None stated
Serial Number:	None stated
Cable Length and Type:	1.8m, Multicore
Connected to Port:	Audio Port

Description:	Micro SD Memory Card
Brand Name:	Panasonic
Model Name or Number:	Micro SD
Serial Number:	None stated
Cable Length and Type:	Not applicable
Connected to Port:	Dedicated Micro SD

Accessories (Continued)

Description:	AC Charger
Brand Name:	JET KYUSHU Mitsumi
Model Name or Number:	ZTDAA1
Serial Number:	None stated
Cable Length and Type:	2m, Charger Cable
Connected to Port:	Charger port on EUT

2.3. Description of EUT

The equipment under test is a mobile telephone handset.

2.4. Modifications Incorporated in EUT

During the course of testing the EUT was not modified.

2.5. Additional Information Related to Testing

Power Supply Requirement:	Internal battery Supply of 3.7V		
Intended Operating Environment:	Within GSM and *Bluetooth* Coverage		
Equipment Category:	GSM/GPRS/*Bluetooth*		
Type of Unit:	Portable (Standalone Battery Powered Device)		
Transmit Frequency Range:	1850 MH to 1910 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:	1930 MH to 1990 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)	30.4 dBm		

2.6. Port Identification

Port	Description
1	Charger / Data
2	Audio PHF
3	Micro SD

3. Test Results

Reference:	FCC Part 24 Subpart E: 2006 (Broadband PCS)
Title:	Code of Federal Regulations, Part 24 (47CFR24) Personal Communication Services.

3.1. 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 stated otherwise:

- Call allocated
- Receive

5.2. Configuration and Peripherals

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

Connected to the AC Charger during final measurements. A wireless link to a communications analyser was established.

6. Summary of Test Results

Devices with an External Antenna Connector

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Idle Mode AC Conducted Spurious Emissions (150 kHz to 30 MHz)	Section 15.107	AC Mains Input	Complied
Idle Mode Radiated Spurious Emissions	Section 15.109	Enclosure	Complied
Transmitter Effective Isotropic Radiated Power (EIRP)	Section 24.232	Antenna	Complied
Transmitter Frequency Stability (Temperature Variation)	Section 24.235	*Antenna Terminals	Complied
Transmitter Frequency Stability (Voltage Variation)	Section 24.235	* Antenna Terminals	Complied
Transmitter Occupied Bandwidth	Section 24.238	* Antenna Terminals	Complied
Transmitter Out of Band Radiated Emissions	Section 2.1053/24.238	Antenna	Complied
Transmitter Band Edge Radiated Emissions	Section 2.1053/24.238	Antenna	Complied

Note(s):

** This is an access point on the EUT provided by the manufacturer for the purpose of this test.*

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

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

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.

Results:

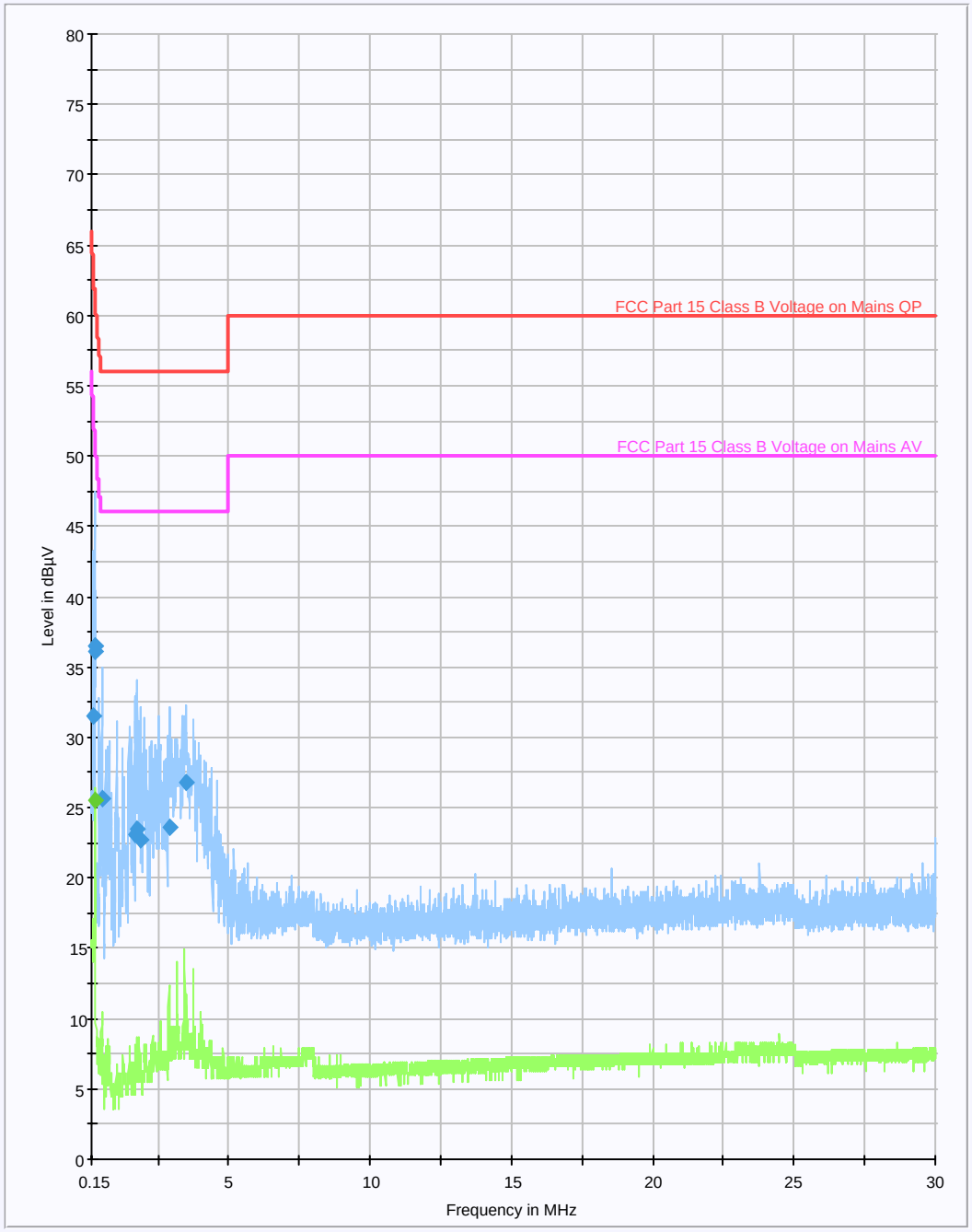
Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.214000	Live	31.5	63.0	31.5	Complied
0.254000	Live	36.5	61.6	25.1	Complied
0.258000	Live	36.5	61.5	25.0	Complied
0.290000	Live	36.1	60.5	24.4	Complied
0.514000	Live	25.7	56.0	30.3	Complied
1.686000	Live	23.1	56.0	32.9	Complied
1.786000	Live	23.5	56.0	32.5	Complied
1.882000	Live	22.7	56.0	33.3	Complied
2.930000	Live	23.6	56.0	32.4	Complied
3.474000	Live	26.8	56.0	29.2	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.290000	L1	25.5	50.5	25.0	Complied

Idle Mode 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

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

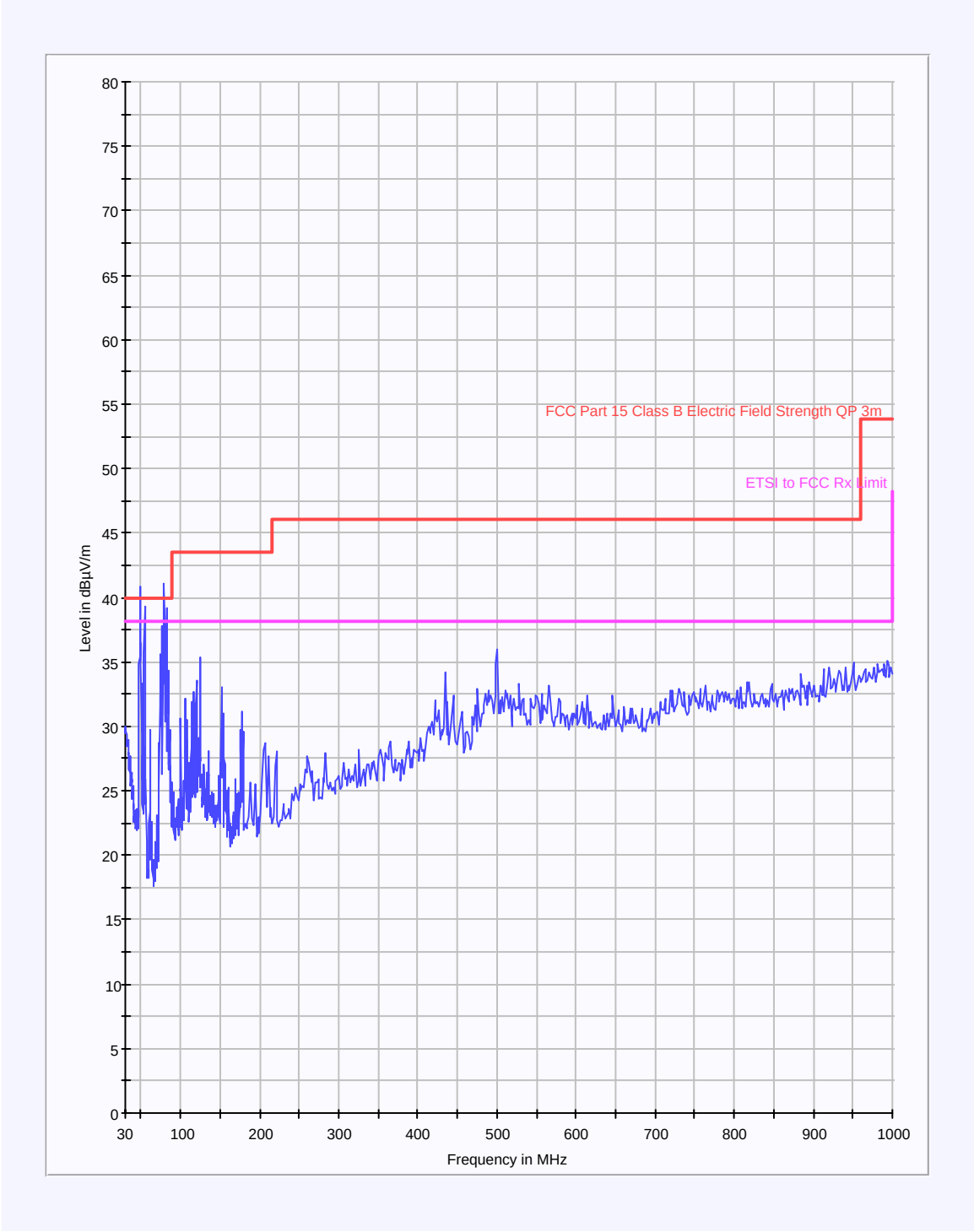
Tests were performed to identify the maximum radiated emission levels in receive (or standby) mode.

Results:

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

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
49.082	Vertical	24.8	40.0	15.2	Complied
54.280	Vertical	27.2	40.0	12.8	Complied
79.326	Vertical	16.5	40.0	23.5	Complied
82.841	Vertical	23.4	40.0	16.6	Complied
125.081	Vertical	19.6	43.5	23.9	Complied
151.318	Vertical	17.3	43.5	26.2	Complied
177.447	Vertical	18.0	43.5	25.5	Complied
500.027	Vertical	23.7	46.0	22.3	Complied
49.082	Vertical	24.8	40.0	15.2	Complied
54.280	Vertical	27.2	40.0	12.8	Complied
79.326	Vertical	16.5	40.0	23.5	Complied
82.841	Vertical	23.4	40.0	16.6	Complied
125.081	Vertical	19.6	43.5	23.9	Complied
151.318	Vertical	17.3	43.5	26.2	Complied
177.447	Vertical	18.0	43.5	25.5	Complied
500.027	Vertical	23.7	46.0	22.3	Complied
49.082	Vertical	24.8	40.0	15.2	Complied

Idle Mode 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 Spurious Emissions

Results:

Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz)

Peak Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
9.6913827	Vertical	39.0	3.1	42.1	74.0	31.9	Complied

Average Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
9.6913827	Vertical	39.0	3.1	42.1	54.0	11.9	Complied

Note(s):

1. As no emissions were detected, the highest noise floor level was recorded.

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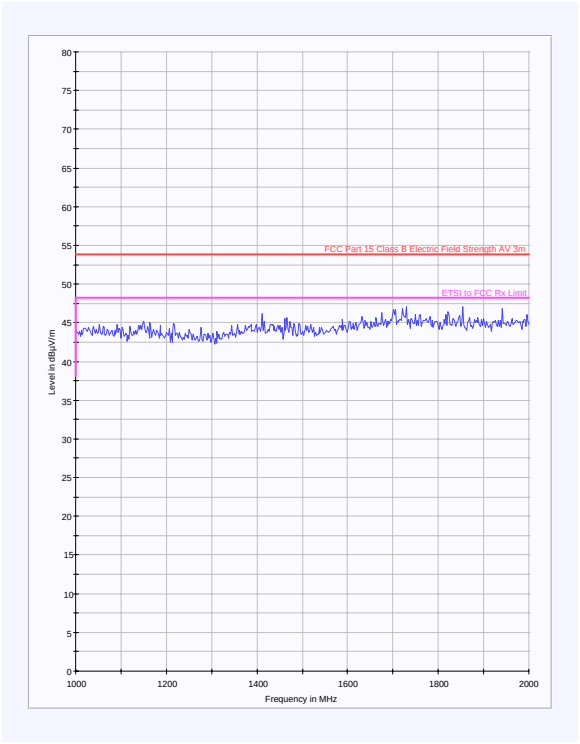
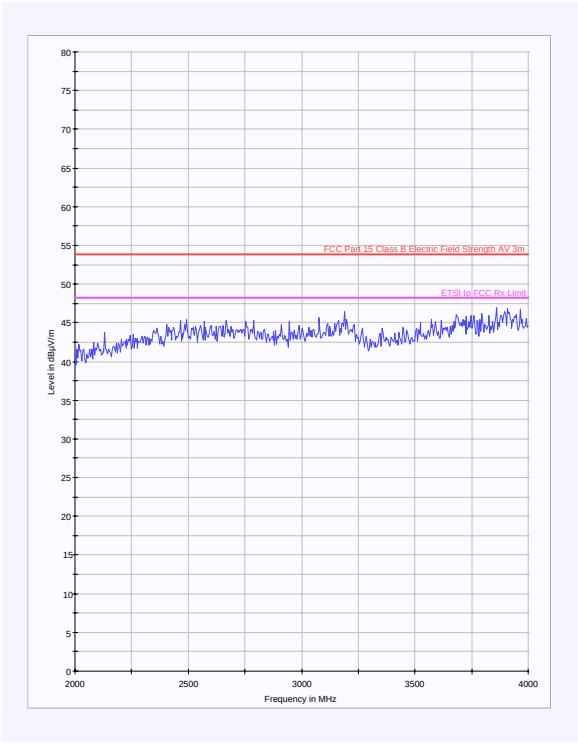
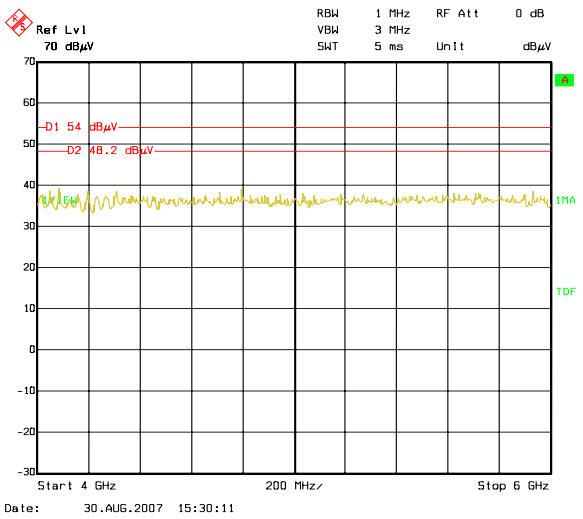
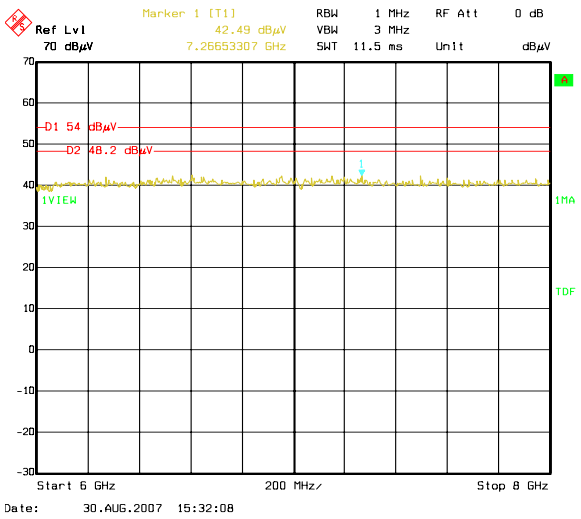
Idle Mode Radiated Spurious Emissions (Continued)



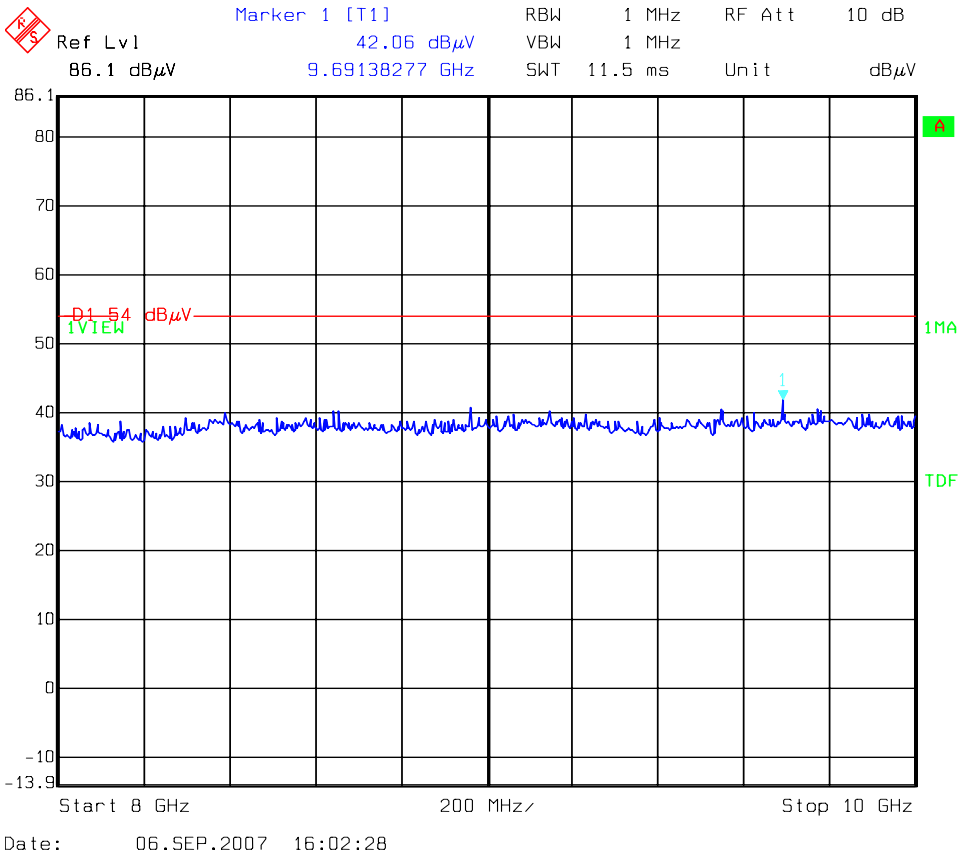






Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Idle Mode Radiated Spurious Emissions (Continued)



Note: This plot is a pre-scan 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).

Results:

Channel	Measured Frequency (MHz)	Antenna Polarity	Maximum Transmitter EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	1850.2	Horizontal	29.7	33.0	3.3	Complied
Middle	1879.8	Horizontal	30.4	33.0	2.6	Complied
Top	1909.8	Horizontal	30.1	33.0	2.9	Complied

7.2.5. Transmitter Frequency Stability (Temperature Variation)

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.

Results:

Bottom Channel (1850.2 MHz)

Temperature (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	6015	1850.206015	1850.0	0.206015	Complied
-20	5010	1850.205010	1850.0	0.205010	Complied
-10	5510	1850.205510	1850.0	0.205510	Complied
0	5510	1850.205510	1850.0	0.205510	Complied
10	5510	1850.205510	1850.0	0.205510	Complied
20	6510	1850.206510	1850.0	0.206510	Complied
30	5510	1850.205510	1850.0	0.205510	Complied
40	7015	1850.207015	1850.0	0.207015	Complied
50	5010	1850.205010	1850.0	0.205010	Complied

Transmitter Frequency Stability (Temperature Variation) (Continued)

Results:

Top Channel (1910.8 MHz)

Temperature (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	5110	1909.80511	1910.0	0.19489	Complied
-20	5510	1909.80551	1910.0	0.19449	Complied
-10	6010	1909.80601	1910.0	0.19399	Complied
0	6010	1909.80601	1910.0	0.19399	Complied
10	6010	1909.80601	1910.0	0.19399	Complied
20	5010	1909.80501	1910.0	0.19499	Complied
30	5510	1909.80551	1910.0	0.19449	Complied
40	6010	1909.80601	1910.0	0.19399	Complied
50	5515	1909.805515	1910.0	0.194485	Complied

7.2.6. Transmitter Frequency Stability (Voltage Variation)

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.

Results:

Bottom Channel (1850.2 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.7	4910	1850.204910	1850	0.204910	Complied
3.4	5410	1850.205410	1850	0.205410	Complied

Top Channel (1909.8 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.7	4605	1909.804605	1910	0.195395	Complied
3.4	5910	1909.805910	1910	0.194090	Complied

7.2.7. Transmitter Occupied Bandwidth

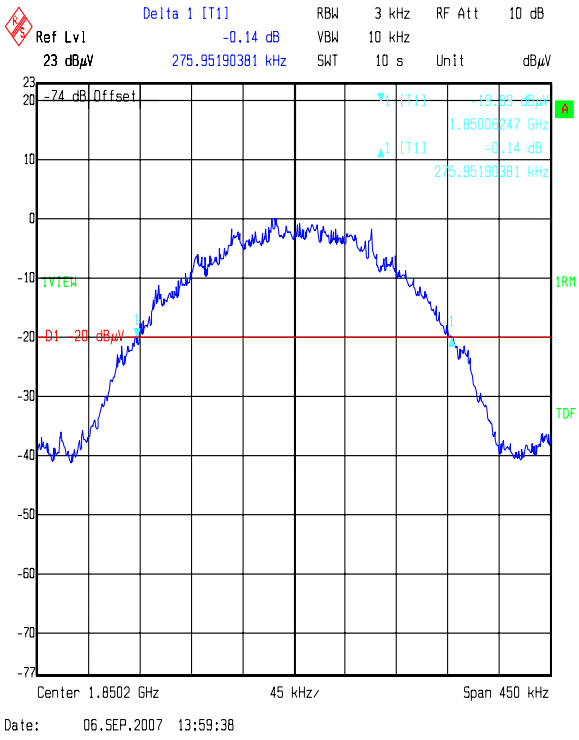
The EUT was configured as for occupied bandwidth measurements as described in Section 9 of this report.

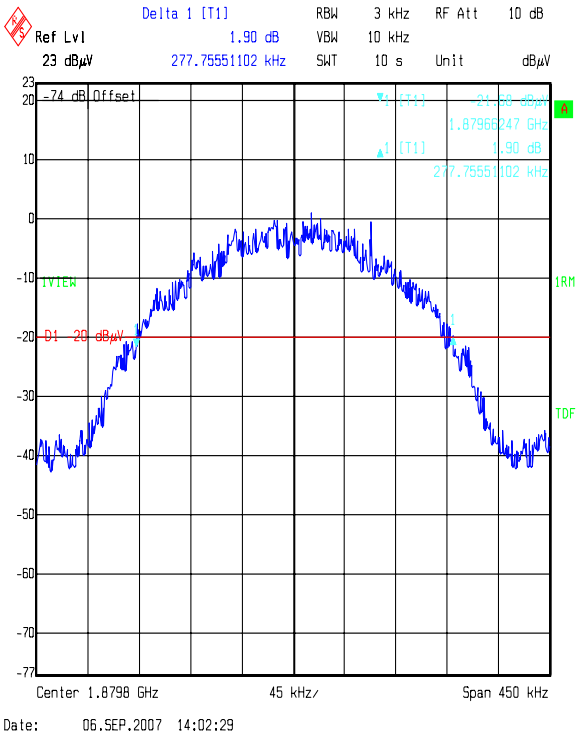
Tests were performed to identify the maximum bandwidth occupied by the fundamental frequency of the EUT.

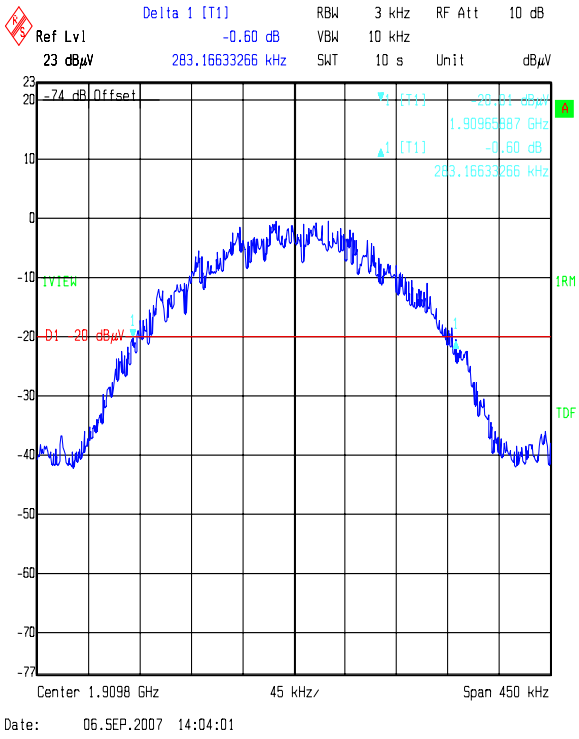
Results:

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	3.0	10.0	275.951903
Middle	1879.8	3.0	10.0	277.755511
Top	1909.8	3.0	10.0	283.166332

Transmitter Occupied Bandwidth (Continued)







7.2.8. Transmitter Out of Band Radiated Emissions

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.

Results:

Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
11101.6633	-49.7	-13.0	36.7	Complied

Middle Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
11279.1680	-43.9	-13.0	30.9	Complied

Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
11458.6420	-37.8	-13.0	24.8	Complied

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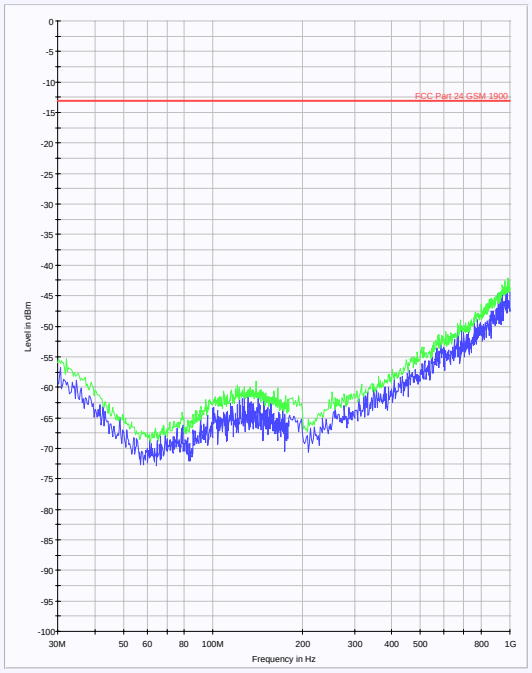
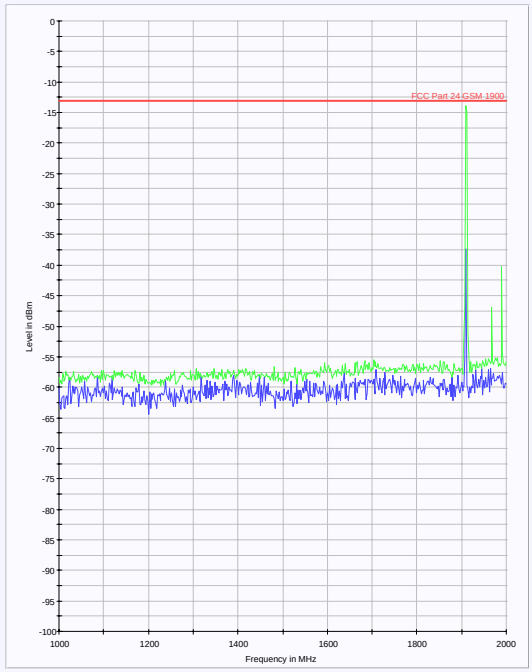
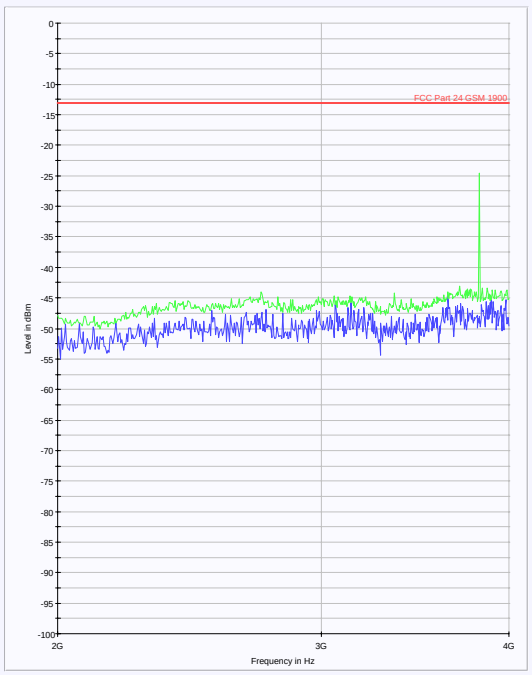
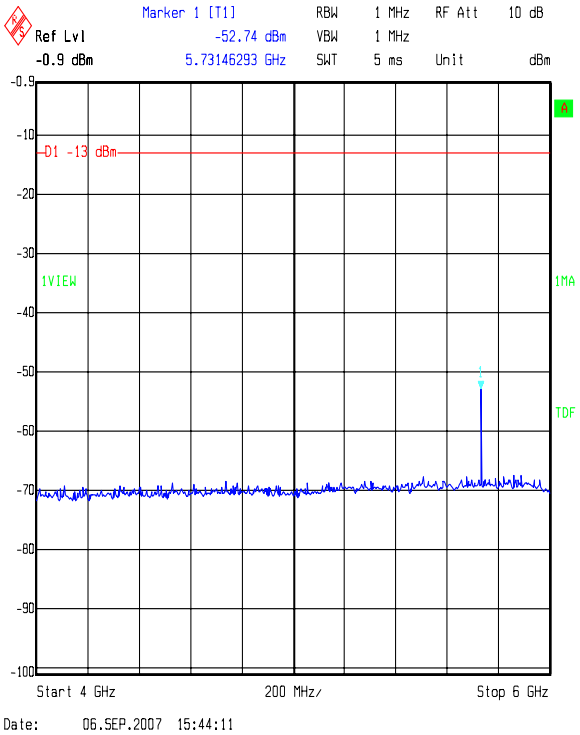
Transmitter Out of Band Radiated Emissions (Continued)









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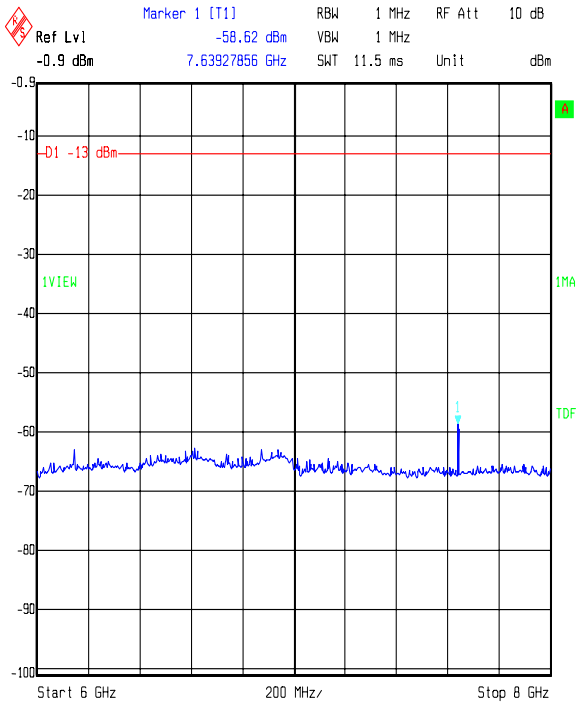
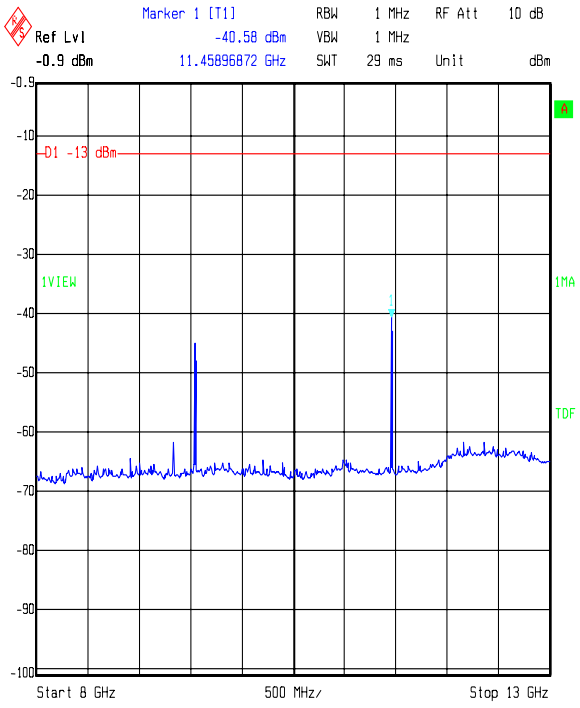
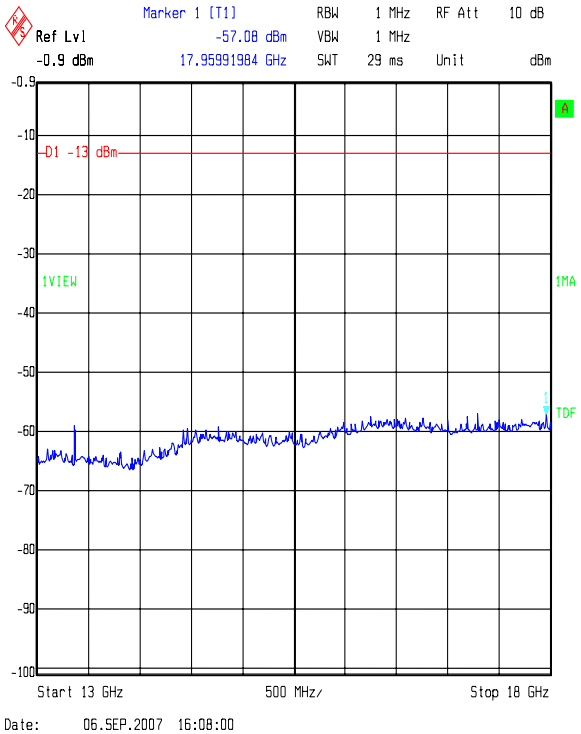
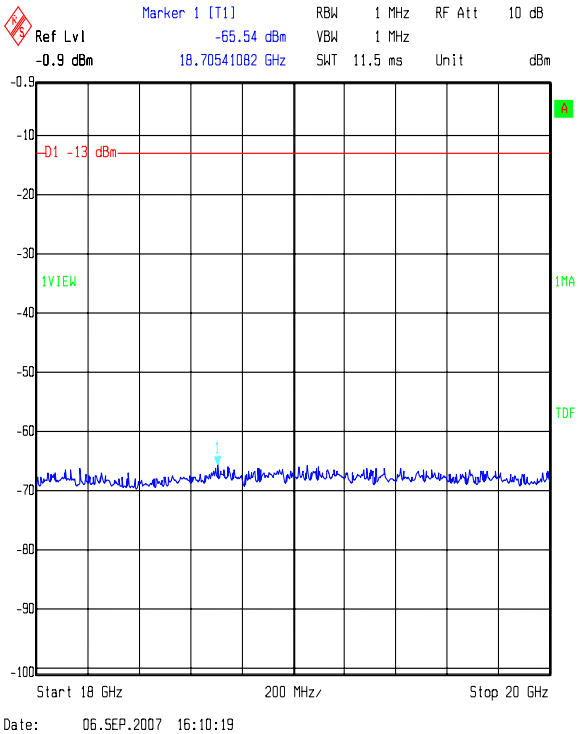
Transmitter Out of Band Radiated Emissions (Continued)









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

Transmitter Out of Band Radiated Emissions (Continued)

Integrated Power Over 1 MHz Strip Band: 1911 to 1912 MHz

1st 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	302	6	151
2	229	7	145
3	209	8	115
4	170	9	117
5	162	10	100
Total Peak Power:	1700 nW/MHz		

Integrated Power Over 1 MHz Strip Band: 1912 to 1913 MHz

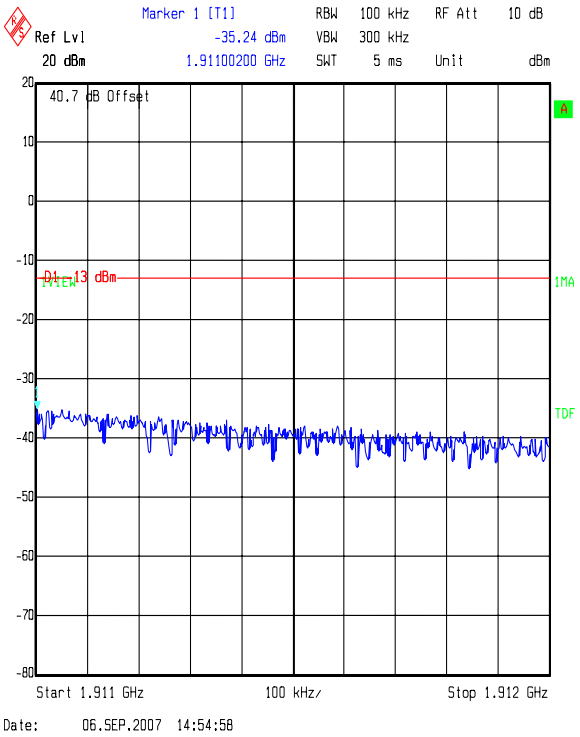
2nd 1 MHz block immediately outside adjacent frequency block

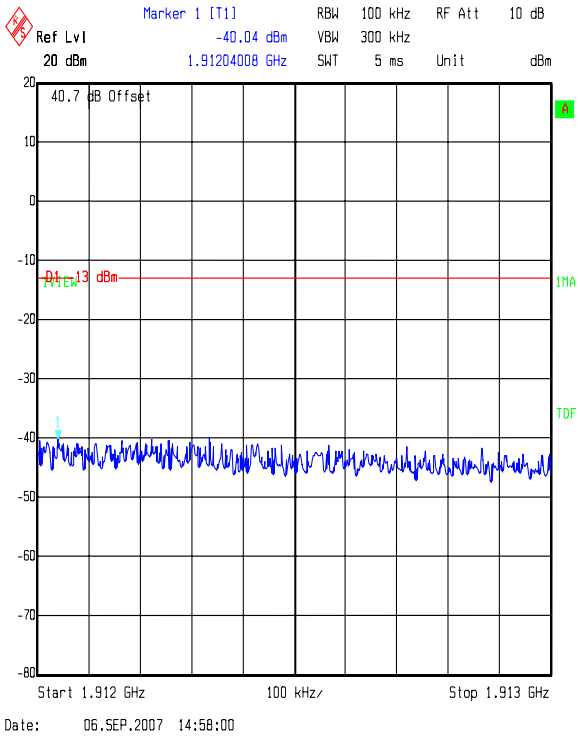
100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	100	6	70
2	90	7	60
3	90	8	70
4	100	9	60
5	100	10	50
Total Peak Power:	790 nW/MHz		

Results:

Band (MHz)	Peak Power (nW/MHz)	Peak Power (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Result
1911 to 1912	1700	-27.7	-13.0	14.7	Complied
1912 to 1913	790	-31.0	-13.0	18.0	Complied

Transmitter Out of Band Radiated Emissions (Continued)





7.2.9. Transmitter Radiated Emissions at Band Edges

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.

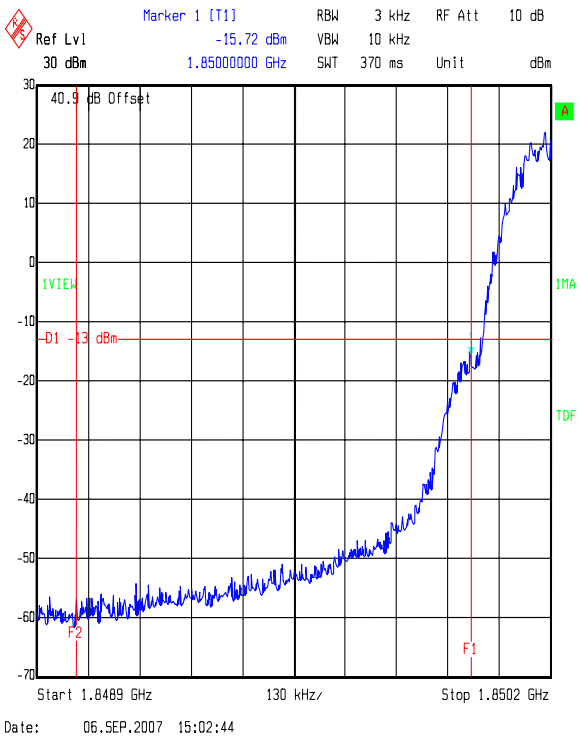
Results:

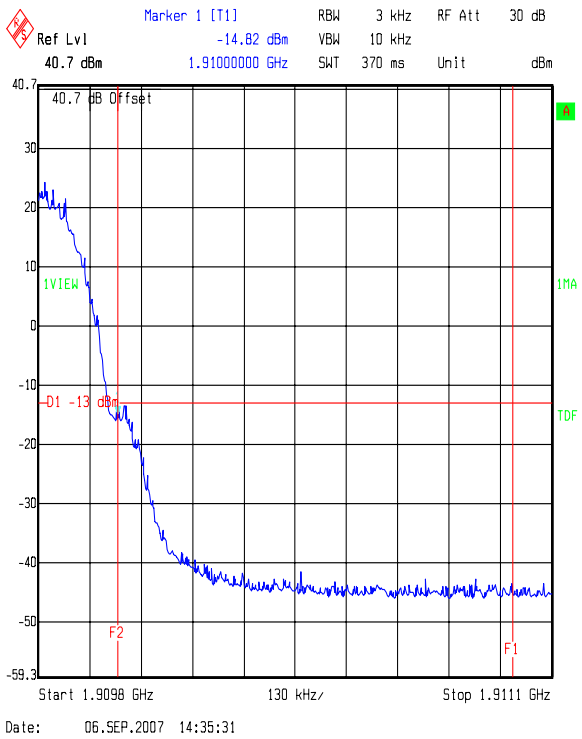
Bottom Band Edge

Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-15.7	-13.0	2.7	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1910	-14.8	-13.0	1.8	Complied





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%	±3.72 dB
Conducted Emissions Antenna Port	30 MHz to 40 GHz	95%	±0.28 dB
Effective Isotropic Radiated Power (EIRP)	Not applicable	95%	±2.54 dB
Frequency Stability	Not applicable	95%	±11.4 ppm
Minimum Bandwidth	Not applicable	95%	±11.4 ppm
Occupied Bandwidth	824 to 849 MHz	95%	±11.4 ppm
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±4.64 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. 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

9.2. 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.

9.3. 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.

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.

9.4. 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

9.5. 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.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A028	Horn Antenna	Eaton	91888-2	304	08 Jun 2006	36
A031	Horn Antenna	Eaton	91889-2	557	08 Jun 2006	36
A1037	Bilog Antenna	Chase EMC Ltd	CBL6112B	2413	20 Sep 2006	12
A1067	Radial HAC Probe	CCL	R-100	0074	Calibrated before use	-
A1534	Preamplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	08 Jan 2007	12
A253	Horn Antenna	Flann Microwave	12240-20	128	17 Nov 2006	36
A254	Horn Antenna	Flann Microwave	14240-20	139	17 Nov 2006	36
A255	Horn Antenna	Flann Microwave	16240-20	519	17 Nov 2006	36
A256	Horn Antenna	Flann Microwave	18240-20	400	17 Nov 2006	36
A259	Bilog Antenna	Chase	CBL6111	1513	13 Mar 2007	12
A436	Horn Antenna	Flann	20240-20	330	24 Apr 2006	36
A553	Bi-log Antenna	Chase	CBL6111A	1593	01 Nov 2006	12
C1025	Cable	Rosenberger	FA210A-1-020m	FA00B 7564	05 Jun 2007	12
C1029	Cable	Rosenberger	FA210B-1-010M-30X30	FA00C 7589	31 May 2007	12
C1165	Cable	Rosenberger Micro-Coax	FA210A1020 007070	43189-1	05 Jun 2007	12
C1167	Cable	Rosenberger Micro-Coax	FA210A1030 007070	43190-01	05 Jun 2007	12
C1192	Cable	Rosenburg	FA210A1015 M3030	27141-07	31 May 2007	12
C160	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Calibrated before use	-
C348	Cable	Rosenberger	UFA210A-1-1181-70x70	2993	Calibrated before use	-
C363	Cable	Rosenberger	RG142	None	Calibrated before use	-
E013	Environmental Chamber	Sanyo	ATMOS chamber	None	Calibration not required	-

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
M1242	Spectrum Analyser	Rohde & Schwarz, Inc.	FSEM30	845986/022	08 Sep 2006	12
M1263	EMI Test Receiver	Rohde & Schwarz	ESIB7	100265	25 Jan 2007	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	15 Aug 2007	12
M166	Temperature, Humidity and Pressure Meter	EuroCom	None	None	19 Apr 2007	12
S201	Open Area Test Site	RFI	1	None	25 May 2007	12
S202	Open Area Test Site	RFI	2	S202-15011990	17 Nov 2006	12
S207	Bench Site	RFI	7	None	Calibration not required	-
S209	Screened Room	RFI	9	None	Calibrated before use	-
S212	Screened Room	RFI	12	None	Calibrated before use	-

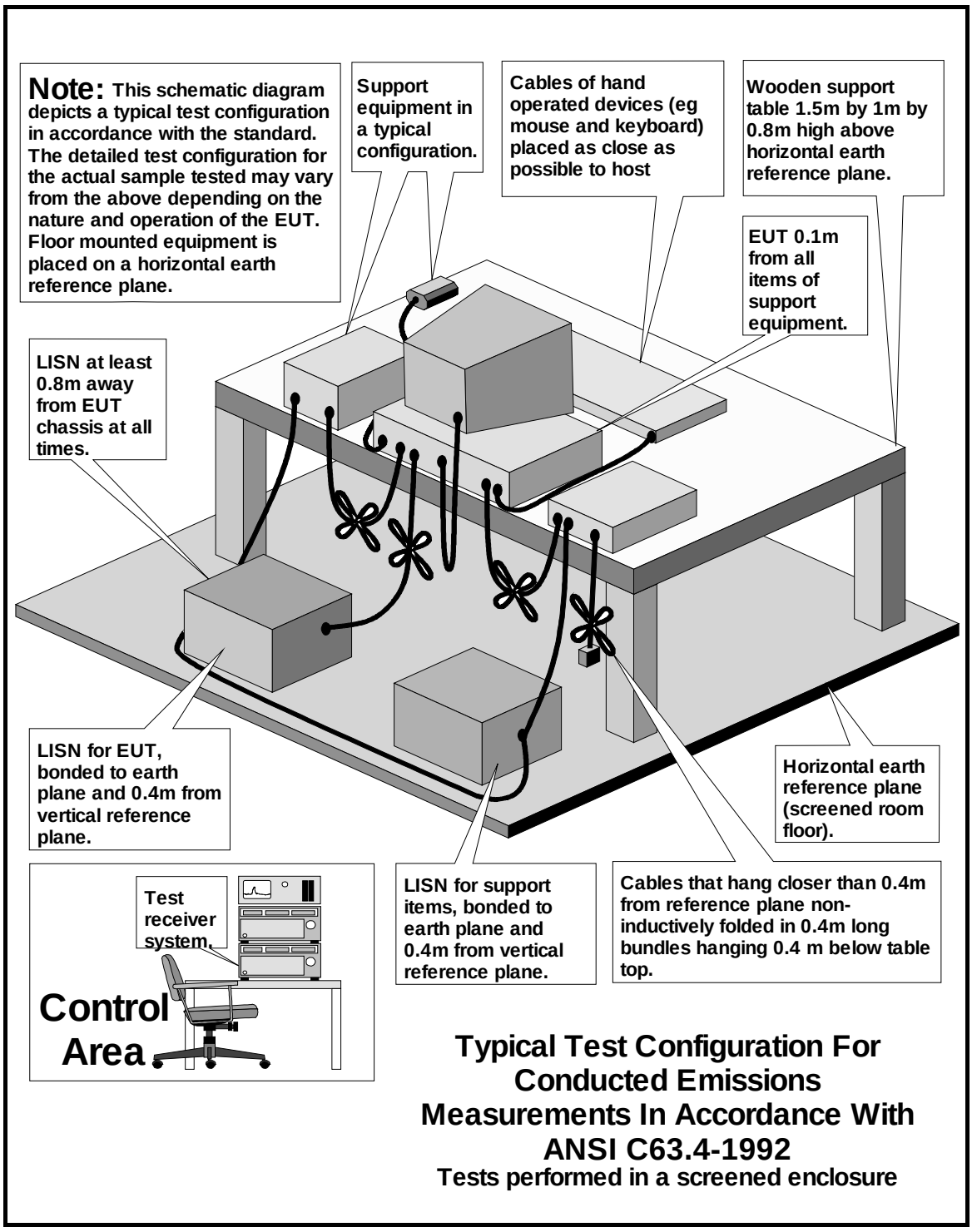
NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Test Configuration Drawings

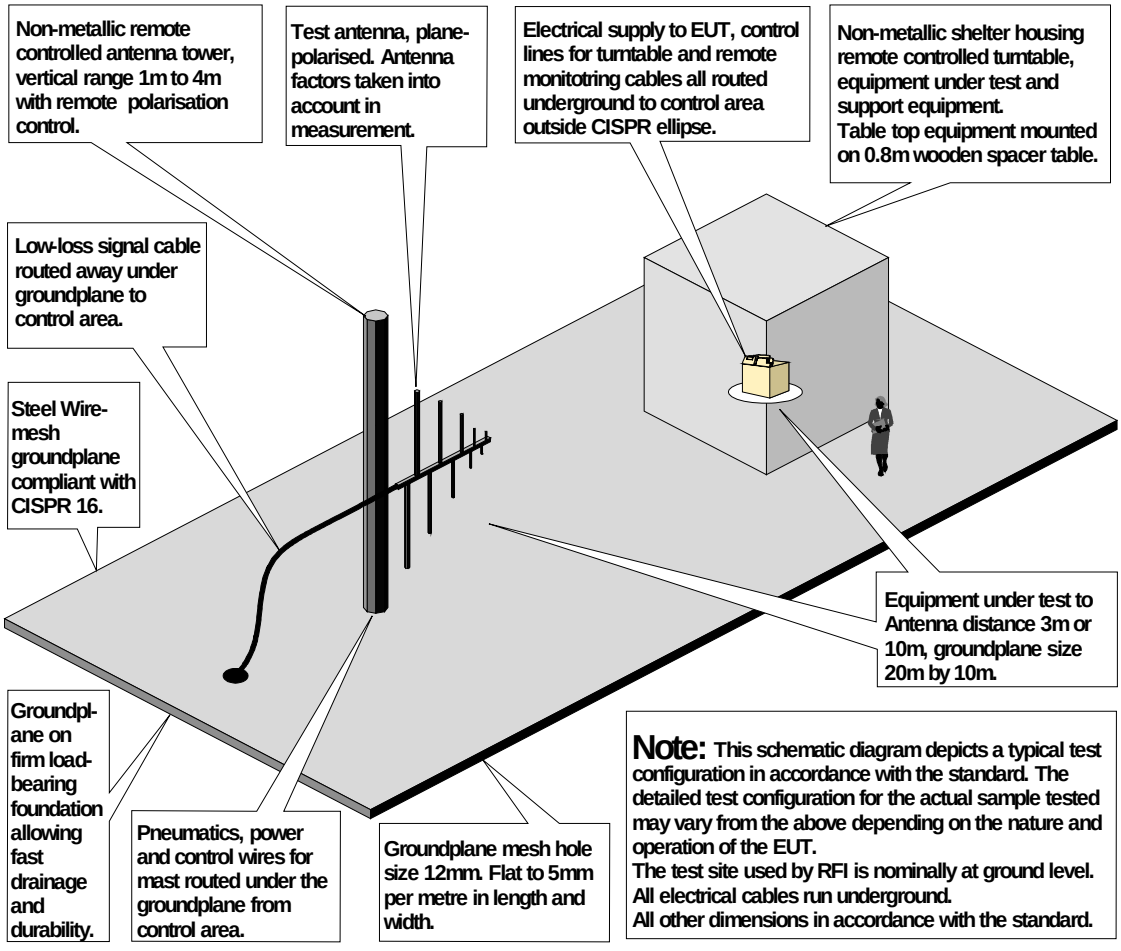
This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\72749JD03\EMICON	Test configuration for measurement of conducted emissions.
DRG\72749JD03\EMIRAD	Test configuration for measurement of radiated emissions.

DRG\72749JD03\EMICON



DRG\72749JD03\EMIRAD



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