TEST REPORT
FROM
RADIO FREQUENCY
INVESTIGATION LTD.

Test of: Datascope Corp.
Panorama Instrument - 608

To: FCC Part 95 Subpart H: 2002

Test Report Serial No: RFI/MPTB2/RP44457JD06A

Supersedes Test Report Serial No: RFI/MPTB1/RP44457JD06A

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director: 	**Checked By:** 
Tested By: 	**Release Version No:** **PDF01**
Issue Date: 06 February 2004	**Test Dates19 November 2003 to 26 November 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:	Datascope Corp.
Address:	Patient Monitoring Division 800 MacArthur Blvd. Mahwah NJ 07430-0619 USA
Contact Name:	Mr J Fidacaro

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:	Panorama Instrument – 608
Model Name or Number:	0670-00-0743
Serial Number:	03-00001-34*
FCC ID	DXXRA0743-00000
Country of Manufacture:	USA
Date of Receipt:	13 October 2003

** Sample of EUT set to transmit on the bottom channel (608.03125 MHz)*

Brand Name:	Panorama Instrument – 608
Model Name or Number:	0670-00-0743
Serial Number:	03-00001-34**
FCC ID	DXXRA0743-00000
Country of Manufacture:	USA
Date of Receipt:	13 October 2003

*** Sample of EUT set to transmit on the top channel (613.96875 MHz)*

2.2. Description Of EUT

The equipment under test is a transmitter intended to be used in the Wireless Medical Telemetry Service.

2.3. Modifications Incorporated In EUT

None.

2.4. Additional Information Related To Testing

Power Supply Requirement:	5 V DC regulated supply, supplied by 100 V, 60 Hz AC mains powered support equipment		
Intended Operating Environment:	Hospitals		
Equipment Category:	Fixed		
Type of Unit:	Transmitter		
Interface Ports:	Power/Serial		
Transmitter Frequency Range	608 MHz to 614 MHz		
Transmitter Channels Tested	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	1	608.03125
	Top	191	613.96875
Occupied Bandwidth:	12.0 kHz		
Highest Fundamental Frequency:	613.96875 MHz		
Maximum Fundamental Field Strength	99.8 dBµV/m @ 3 metres		

2.5. Support Equipment

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

Description:	Bedside monitor (in screened enclosure)
Brand Name:	Passport 2
Model Name or Number:	0998-00-0170-0038F
Serial Number:	TM01168-G2
Cable Length and Type:	3 m 5 Core
Connected to Port:	EUT's power/serial interface connector

3. Test Specification, Methods And Procedures

Reference:	FCC Part 95 Subpart E: 2002 (Technical Regulations)
Title:	Code of Federal Regulations, Part 95 (47CFR95) Personal Radio 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 95 Subpart H: 2002 (Wireless Medical Telemetry Service)
Title:	Code of Federal Regulations, Part 95 (47CFR95) Personal Radio Services.

Reference:	FCC Part 2 Subpart J: 2002 (Sections 2.1049, 2.1051, 2.1053 and 2.1055)
Title:	Code of Federal Regulations, Part 2 (47CFR2) Subpart J - Equipment Authorization Procedures

The methods and procedures used were as detailed in:

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.

3.1. 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 110 V, 60 Hz AC mains powered Passport 2 bedside monitor (which supplied a 5 V DC regulated supply to the EUT)

5.2. Operating Modes

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

Fully operational, continuously transmitting ECG data supplied by the Passport 2 bedside monitor.

Preliminary radiated and conducted spurious pre-scan tests were performed on the highest operating frequency of the EUT (top channel). Final measurements were then performed on the top channel and the bottom channel if an emission was identified. All other tests were performed on the top and bottom channels.

5.3. Configuration And Peripherals

The EUT was tested in the following configuration:

Connected to the Passport 2 bedside monitor.

6. Summary Of Test Results

Range Of Measurements	Specification Reference	Port Type	Compliancy Status
Transmitter Carrier Output Power	C.F.R. 47 FCC Part 2: 2002 Section 2.1046(a)	Antenna Terminals	Complied
Transmitter Fundamental Fieldstrength	C.F.R. 47 FCC Part 95 H: 2002 Section 95.1115(a)	Antenna	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 95 H: 2002 Section 95.1115(d)/2.1049	Antenna Terminals	Complied
Transmitter Out of Band Conducted Emissions (30.0 MHz to 6.5 GHz)	C.F.R. 47 FCC Part 2: 2002 Section 2.1051	Antenna Terminals	Complied
Transmitter Band Edge Conducted Emissions	C.F.R. 47 FCC Part 2: 2002 Section 2.1051	Antenna Terminals	Complied
Transmitter Out of Band Radiated Emissions (30.0 MHz to 6.5 GHz)	C.F.R. 47 FCC Part 95: 2002 Section 95.1115(b)/2.1053	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2002 Section 95.1115(b)/2.1053	Antenna	Complied
Transmitter Frequency Stability (Temperature & Voltage Variation)	C.F.R. 47 FCC Part 95: 2002 Section 95.1115(e)/2.1055	Antenna Terminals	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. Details of the test methods and procedures can be found in Section 9 of this report.

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 10 for details of measurement uncertainties.

8. Test Results

8.1. Transmitter Carrier Output Power (and ERP Limitations): Section 2.1046(a)

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

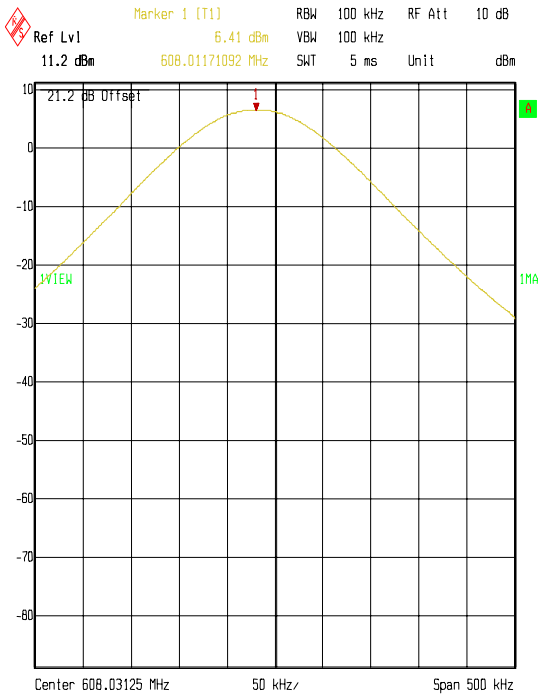
8.1.2. Tests were performed to identify the EUT's maximum conducted transmit power

8.1.3. The effective radiated power (ERP) was calculated by adding the manufacturer's declared antenna gain to the figure measured for conducted RF output power.

Results:

Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Stated Antenna Gain (dB)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	608.03125	6.4	0.0	6.4	10.8	4.4	Complied
Top	613.96875	6.3	0.0	6.3	10.8	4.5	Complied

Note: *According to Part 95.1115(a) the radiated field strength limit is 200 mV/m (106 dBμV/m) at 3 metres. To convert from fieldstrength to an equivalent conducted power in dBm, subtract 95.2 dB. (106.0 –95.2 = 10.8). The figure of 95.2 dB is arrived at using the formula P = (V/m x d)^2 /30.*



Comment A: CONDUCTED CARRIER OUTPUT POWER BOTTOM CHANNEL
GPH/44457JD06/CP01
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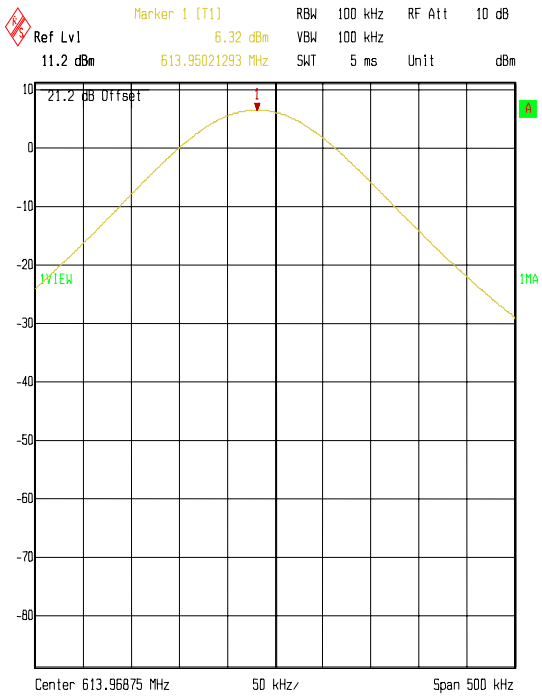


Comment A: CONDUCTED CARRIER OUTPUT POWER TOP CHANNEL
GPH/44457JD06/CP02
Date: 21.NOV.2003 11:55:44

8.2. Transmitter Fundamental Fieldstrength Section 95.1115(a)

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

8.2.2. Tests were performed to identify the maximum field strength at 3 metres of the fundamental frequency.

Results:

Channel	Frequency (MHz)	Ant. Pol.	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
Bottom	608.03125	Vert.	99.2	106.0	6.8	Complied
Top	613.96875	Vert.	99.8	106.0	6.2	Complied

8.3. Transmitter Occupied Bandwidth: Sections 95.1115(d)/2.1049

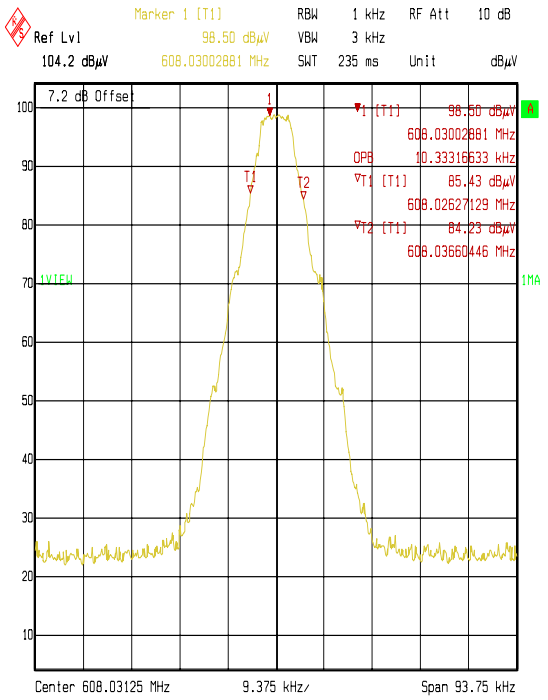
8.3.1. The EUT was configured as for Occupied Bandwidth measurements as described in Section 9 of this report.

8.3.2. Tests were performed to identify the 20 dB bandwidth occupied by the fundamental frequency of the EUT.

Results:

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom	608.03125	1.0	3.0	10.333
Top	613.96875	1.0	3.0	10.333

Note: *According to Part 95.1115(c) any emission type appropriate for communications in the Wireless Medical Telemetry Service may be transmitted with the except for video and voice. It can be seen from the Occupied Bandwidth plots shown below that the Modulation Characteristic of the EUT meets the modulation requirements of Part 95.1115 (c).*



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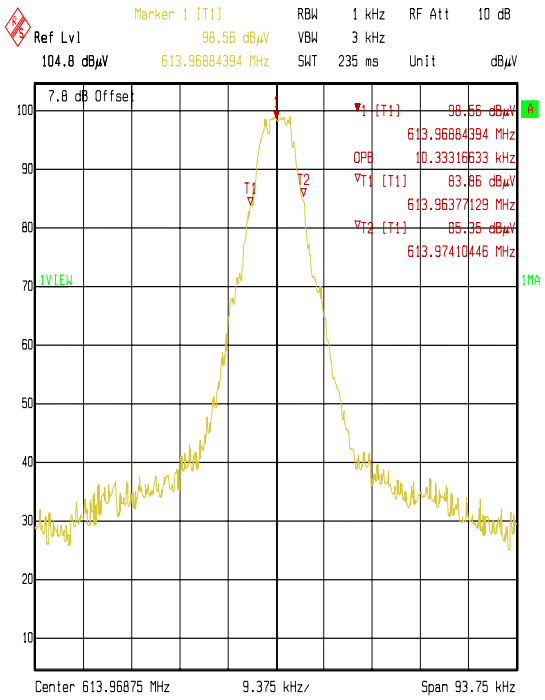


Comment A: OCCUPIED BANDWIDTH TOP CHANNEL
GPH/44457JD06/OB02
Date: 21.NOV.2003 11:42:21

Note: The occupied bandwidth is measured using the internal OBW function of the measurement analyser. The analyser automatically configures the measurement bandwidths to make an accurate measurement. The vital data is reported in the upper right portion of the graph. See attached graphs.

8.4. Transmitter Out of Band Conducted Emissions: Section 2.1051

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

8.4.2. Tests were performed to identify the maximum transmitter conducted emission levels.

8.4.3. The limit lines shown in the plots below are set to a level 20 dB below the measured fundamental peak power.

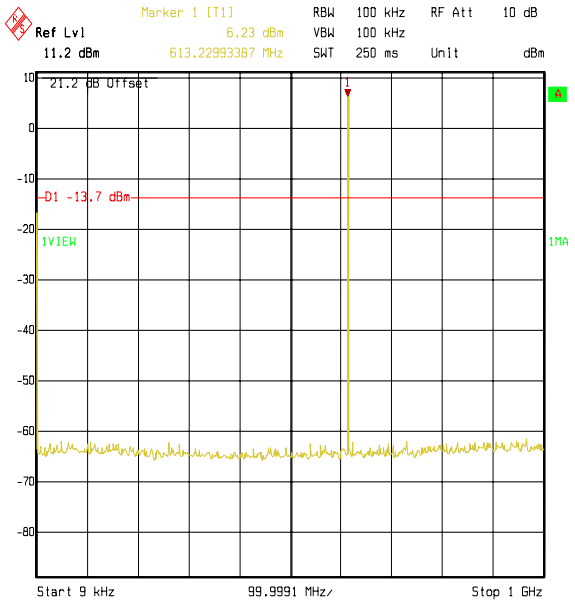
Result: Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
1216.070	-58.7	-65.1	-20.0	45.1	Complied
4256.227	-62.7	-69.1	-20.0	49.1	Complied

Result: Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
1227.950	-58.9	-65.2	-20.0	45.2	Complied
4297.817	-61.5	-61.5	-20.0	47.3	Complied

Transmitter Out of Band Conducted Emissions: Section 2.1051 (Continued)



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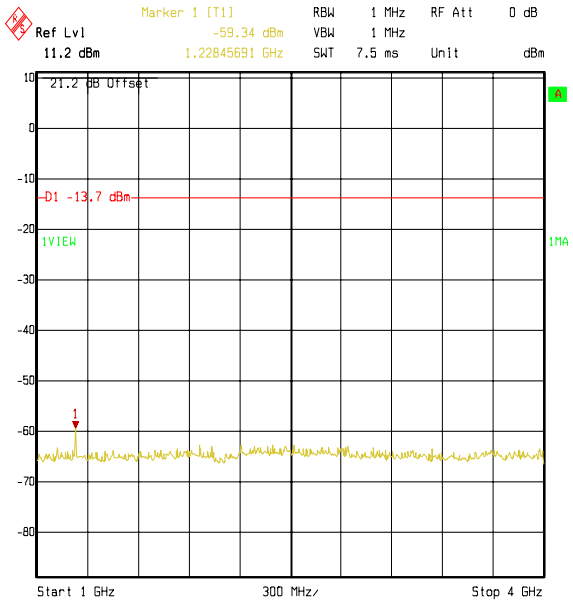

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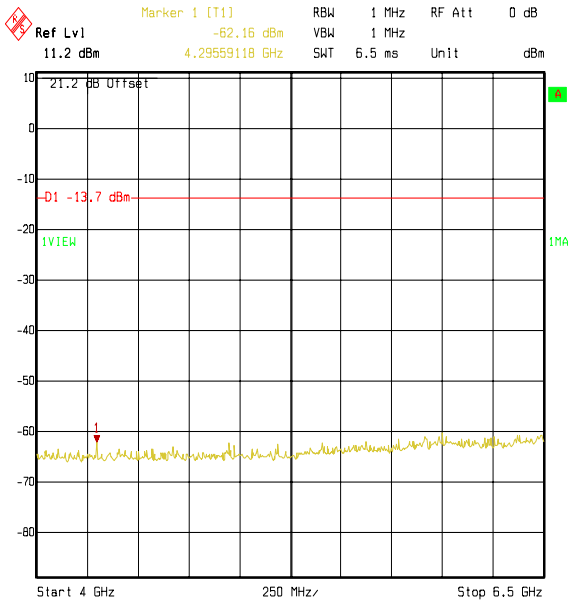

Comment A: CONDUCTED EMISSIONS TOP CHANNEL
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Date: 21.NOV.2003 12:26:09

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

8.5. Transmitter Conducted Emissions At Band Edges: Section 2.1051

8.5.1. The EUT was configured as for transmitter conducted emissions testing described in Section 9 of this report.

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

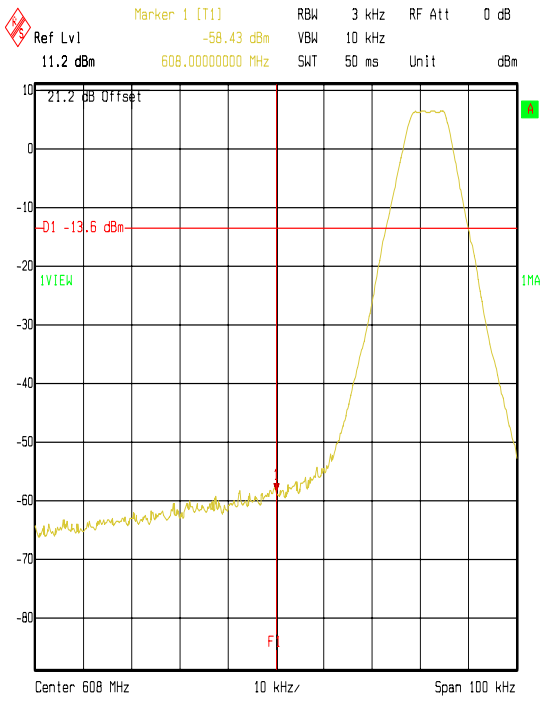
Results:

Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
608.000	-58.4	-64.8	-20.0	44.8	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
614.000	-50.8	-57.1	-20.0	37.1	Complied



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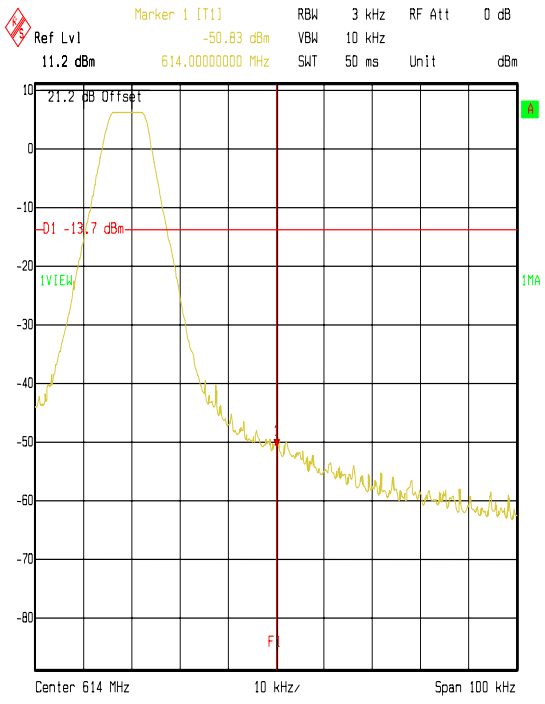


Comment A: CONDUCTED BAND EDGE TOP CHANNEL
GPH/44457JD06/CBE02
Date: 21.NOV.2003 13:24:14

8.6. Transmitter Out of Band Radiated Emissions: Sections 95.1115(b)/2.1053

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

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

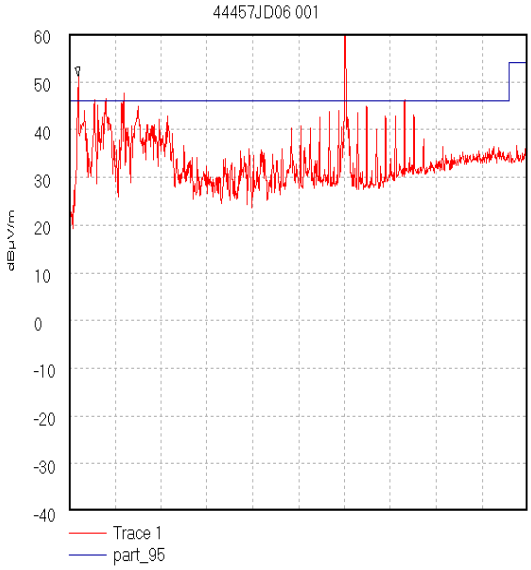
8.6.1.2. Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
50.000	Vert.	42.3	46.0	3.7	Complied
83.649	Vert.	23.4	46.0	22.6	Complied
108.446	Vert.	21.3	46.0	24.7	Complied
145.220	Vert.	19.4	46.0	26.6	Complied
174.006	Horiz.	27.4	46.0	18.6	Complied
500.000	Horiz.	23.3	46.0	22.7	Complied
520.000	Horiz.	31.9	46.0	14.1	Complied
540.000	Horiz.	33.2	46.0	12.8	Complied
560.000	Horiz.	31.4	46.0	14.6	Complied
580.000	Horiz.	33.5	46.0	12.5	Complied
600.000	Horiz.	34.4	46.0	11.6	Complied
640.000	Horiz.	33.9	46.0	12.1	Complied
660.000	Horiz.	36.5	46.0	9.5	Complied
680.000	Horiz.	34.3	46.0	11.7	Complied
700.000	Vert.	32.5	46.0	13.5	Complied
720.000	Horiz.	30.5	46.0	15.5	Complied
740.000	Vert.	34.6	46.0	11.4	Complied
760.000	Horiz.	33.8	46.0	12.2	Complied

Note: The preliminary scans showed similar emission levels for both the bottom channel and top channel below 1 GHz, therefore final radiated emissions measurements were performed with the EUT set to the top channel only.

Transmitter Out of Band Radiated Emissions: Sections 95.1115(b)/2.1053 (Continued)



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

Transmitter Out of Band Radiated Emissions: Sections 95.1115(b)/2.1053 (Continued)

8.6.2. Electric Field Strength Measurements: 1.0 to 6.5 GHz

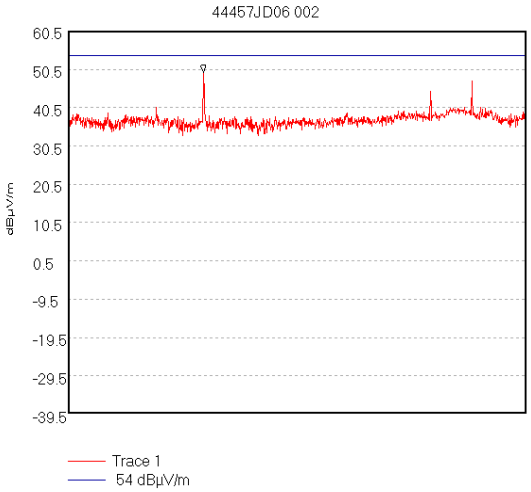
Results: Bottom Channel

Frequency (GHz)	Antenna Polarity	Average Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBμV/m)	Average Limit (dBμV/m)	Average Margin (dB)	Result
1.216117	Horiz.	21.0	21.6	0.9	43.5	54.0	11.5	Complied
1.729711	Horiz.	20.1	21.9	1.1	43.1	54.0	11.9	Complied
1.824148	Horiz.	24.1	21.9	1.1	47.1	54.0	6.9	Complied
2.432191	Horiz.	15.5	20.6	1.3	37.4	54.0	16.6	Complied
3.040222	Vert.	23.3	20.8	1.4	45.5	54.0	8.5	Complied
3.648242	Horiz.	21.0	20.9	1.5	43.4	54.0	10.6	Complied
4.256302	Vert.	13.5	24.1	1.7	39.3	54.0	14.7	Complied
4.864336	Horiz.	15.8	24.2	1.8	41.8	54.0	12.2	Complied
5.190066	Vert.	9.7	24.3	1.8	35.8	54.0	18.2	Complied

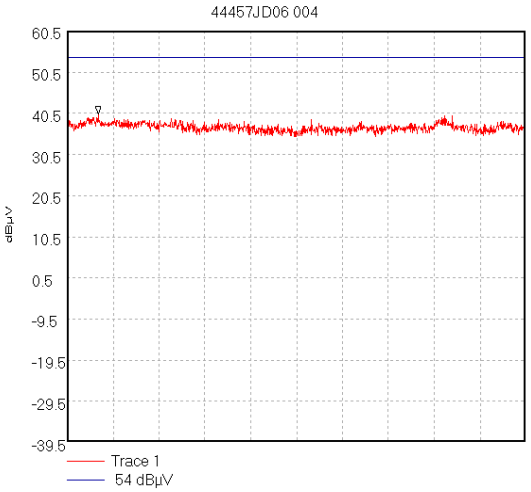
Results: Top Channel

Frequency (GHz)	Antenna Polarity	Average Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBμV/m)	Average Limit (dBμV/m)	Average Margin (dB)	Result
1.227986	Horiz.	24.6	21.6	0.9	47.1	54.0	6.9	Complied
1.729747	Horiz.	18.8	21.9	1.1	41.8	54.0	12.2	Complied
1.841964	Horiz.	25.9	21.9	1.1	48.9	54.0	5.1	Complied
2.455916	Horiz.	16.8	20.6	1.3	38.7	54.0	15.3	Complied
3.069890	Vert.	18.2	20.8	1.4	40.4	54.0	13.6	Complied
3.683853	Horiz.	22.5	20.9	1.5	44.9	54.0	9.1	Complied
4.297847	Vert.	13.0	24.1	1.7	38.8	54.0	15.2	Complied
4.911816	Vert.	18.8	24.2	1.8	44.8	54.0	9.2	Complied
5.190066	Vert.	12.1	24.3	1.8	38.2	54.0	15.8	Complied

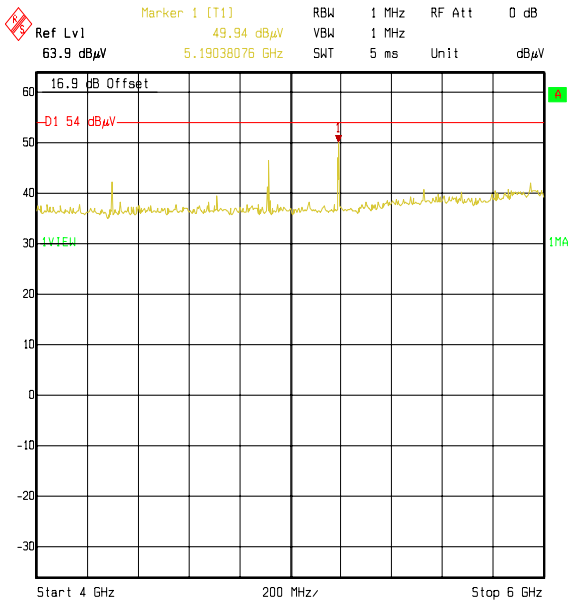
Transmitter Out of Band Radiated Emissions: Sections 95.1115(b)/2.1053 (Continued)



Start 1.0 GHz; Stop 2.0 GHz - Log Scale
Ref 60.5 dBµV/m; Ref Offset -9.5 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.227 GHz, 49.69 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Passed
Transducer Factors: A490
11/19/2003 10:39:43 AM



Start 2.0 GHz; Stop 4.0 GHz
Ref 60.5 dBµV; Ref Offset -9.5 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.136 GHz, 40.22 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
Transducer Factors: A490
11/19/2003 11:13:11 AM



Comment A: Radiated Emissions FCC Part 95 Subpart H Top Channel
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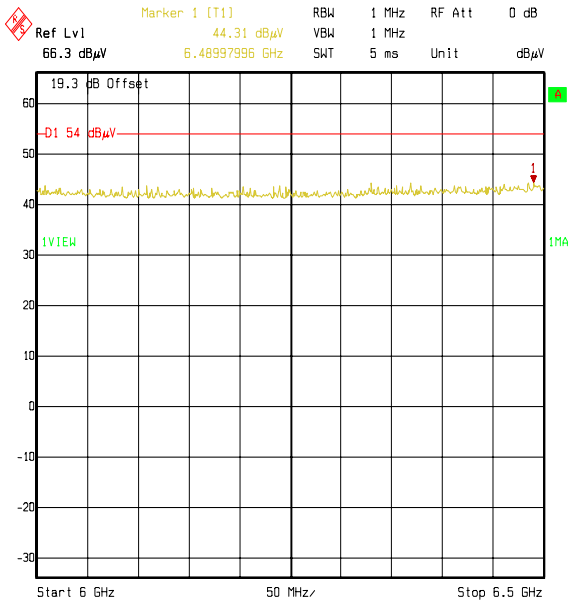

Comment A: Radiated Emissions FCC Part 95 Subpart H Top Channel
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Date: 20.NOV.2003 12:00:09

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

8.7. Transmitter Radiated Emissions At Band Edges: Section 95.1115(b)/2.1053

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

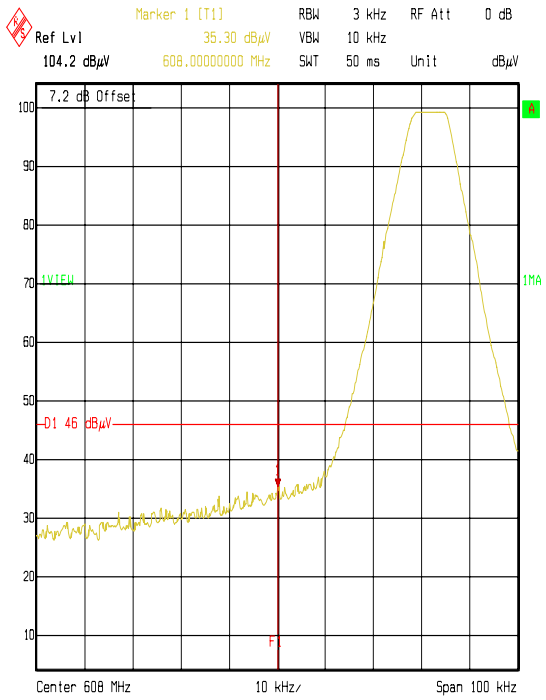
8.7.2. Tests were performed to identify the maximum emissions level at the band edges of the frequency band that the EUT will operate over and modulation sidebands related to the fundamental emission of the EUT.

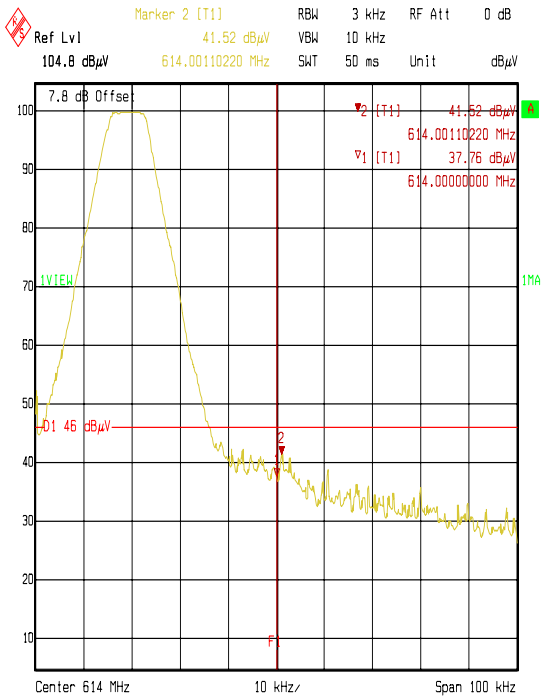
Results: Bottom Band Edge

Frequency (MHz)	Q-P Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
608.000	35.5	46.0	8.7	Complied

Results: Top Band Edge

Frequency (MHz)	Q-P Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
608.000	37.8	46.0	8.2	Complied
614.001	41.5	46.0	4.5	Complied





8.8. Transmitter Frequency Stability: Sections 95.1115(e)/2.1055

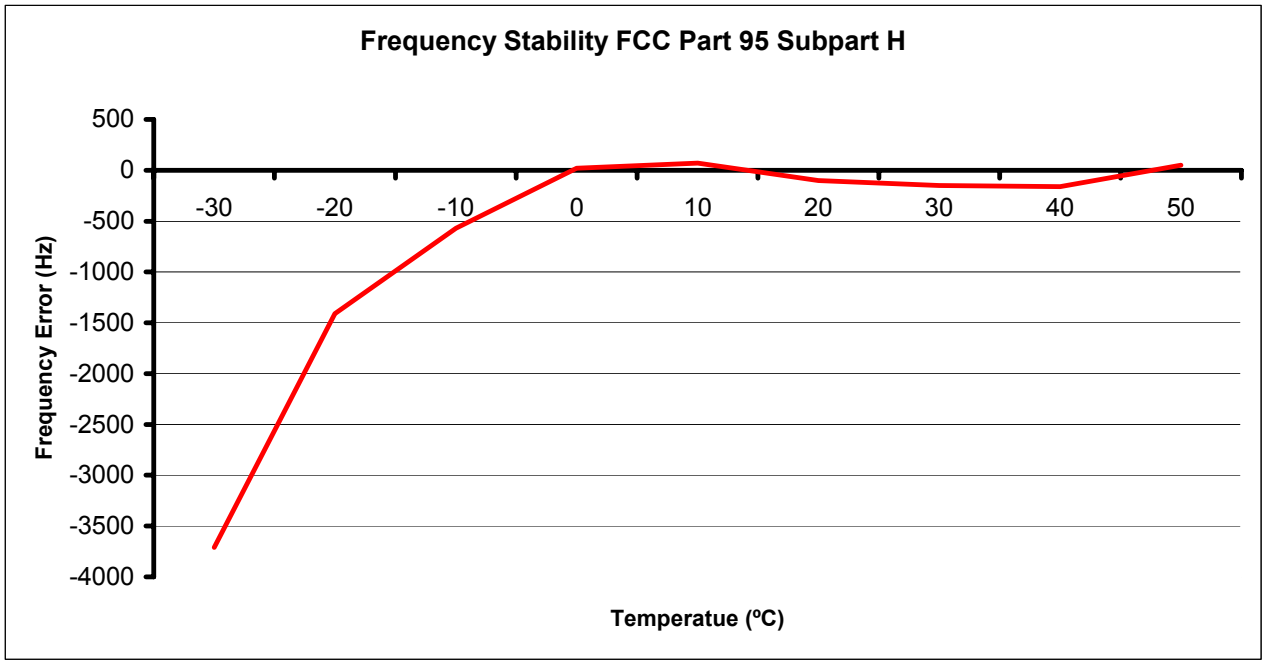
8.8.1. The EUT was configured as for frequency stability measurements as described in Section 9 of this report.

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

Results Bottom Channel (608.03125 MHz)

Temp (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	-3710	608.027540	608.0	0.027540	Complied
-20	-1410	608.029840	608.0	0.029840	Complied
-10	-570	608.030680	608.0	0.030680	Complied
0	20	608.031270	608.0	0.031270	Complied
10	70	608.031320	608.0	0.031320	Complied
20	-100	608.031150	608.0	0.031150	Complied
30	-150	608.031100	608.0	0.031100	Complied
40	-160	608.031090	608.0	0.031090	Complied
50	50	608.031300	608.0	0.031300	Complied

Frequency Variation From 608.03125 MHz

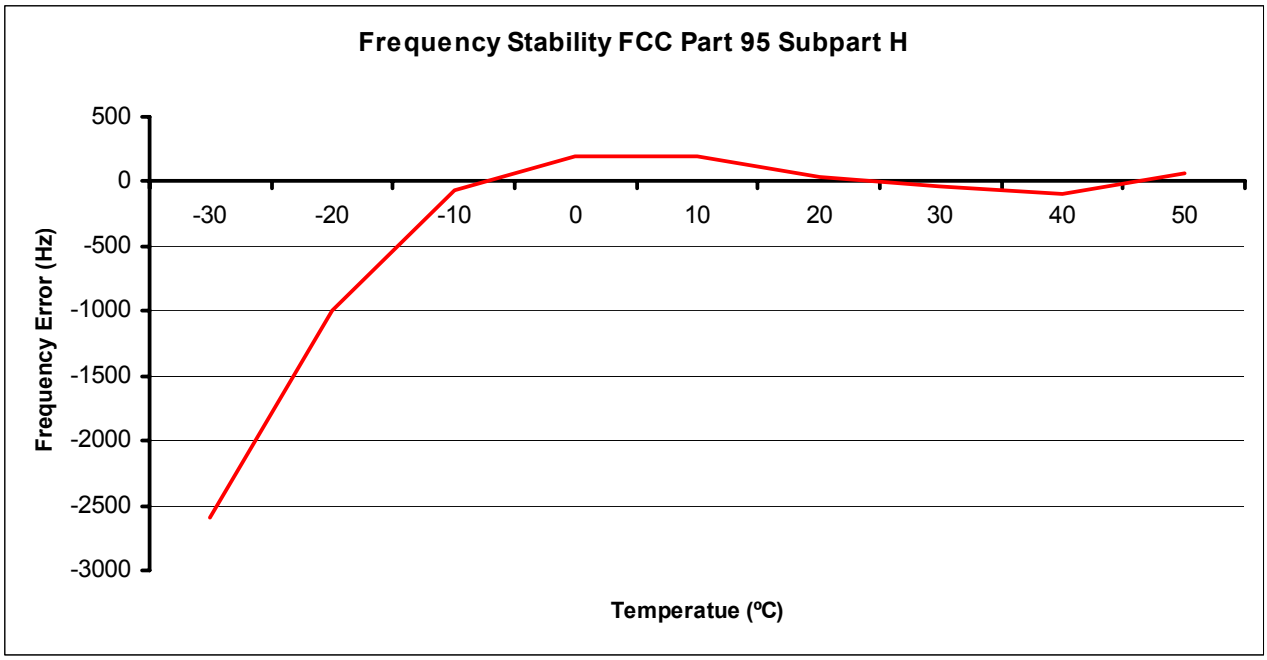


Transmitter Frequency Stability (Temperature Variation): Sections 95.1115(e)/2.1055 (continued)

Results Top Channel (613.96875 MHz)

Temp (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	-2590	613.966160	614.0	0.033840	Complied
-20	-1000	613.967750	614.0	0.032250	Complied
-10	-60	613.968690	614.0	0.031310	Complied
0	200	613.968950	614.0	0.031050	Complied
10	200	613.968950	614.0	0.031050	Complied
20	40	613.968790	614.0	0.031210	Complied
30	-40	613.968710	614.0	0.031290	Complied
40	-100	613.968650	614.0	0.031350	Complied
50	70	613.968820	614.0	0.031180	Complied

Frequency Variation From 613.96875 MHz



8.9. Transmitter Frequency Stability (Voltage Variation): Sections 95.1115(e)/2.1055

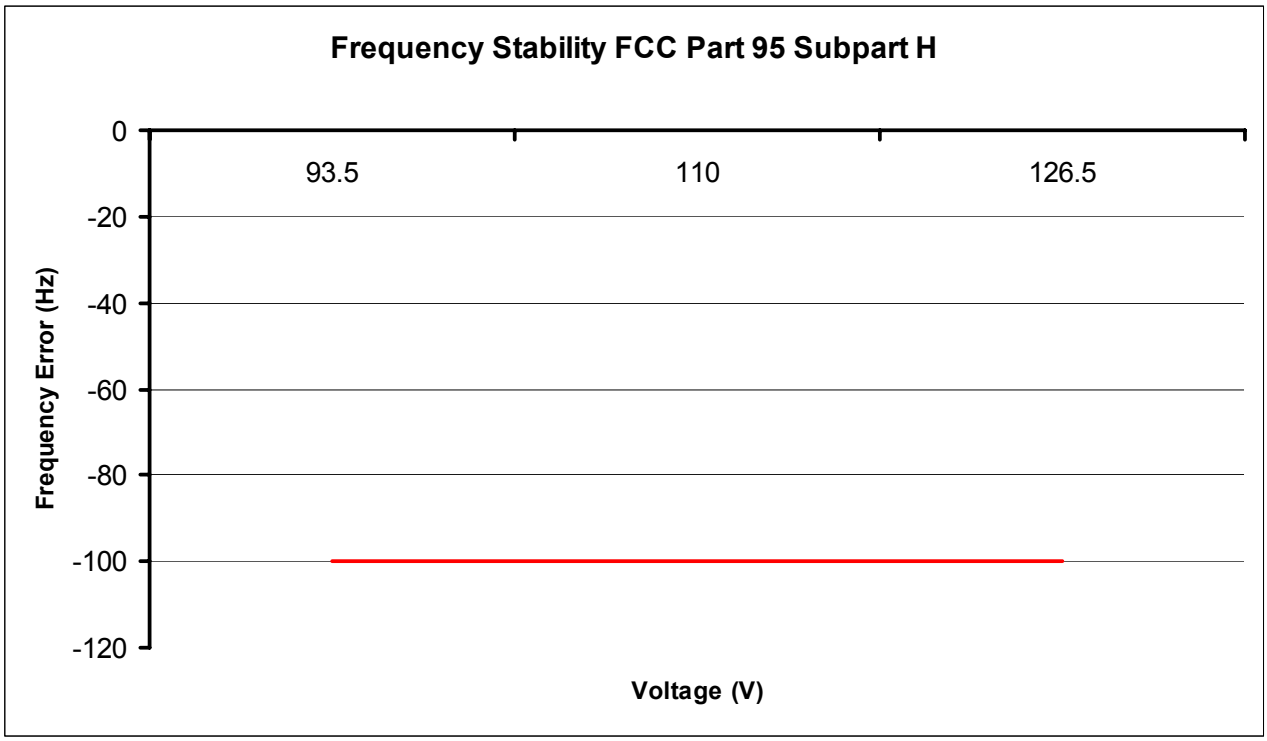
8.9.1. The EUT was configured as for frequency stability measurements as described in Section 9 of this report.

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

Results Bottom Channel (608.03125 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
93.5	-100	608.031150	608.0	0.031150	Complied
110.0	-100	608.031150	608.0	0.031150	Complied
126.5	-100	608.031150	608.0	0.031150	Complied

Frequency Variation From 608.03125 MHz

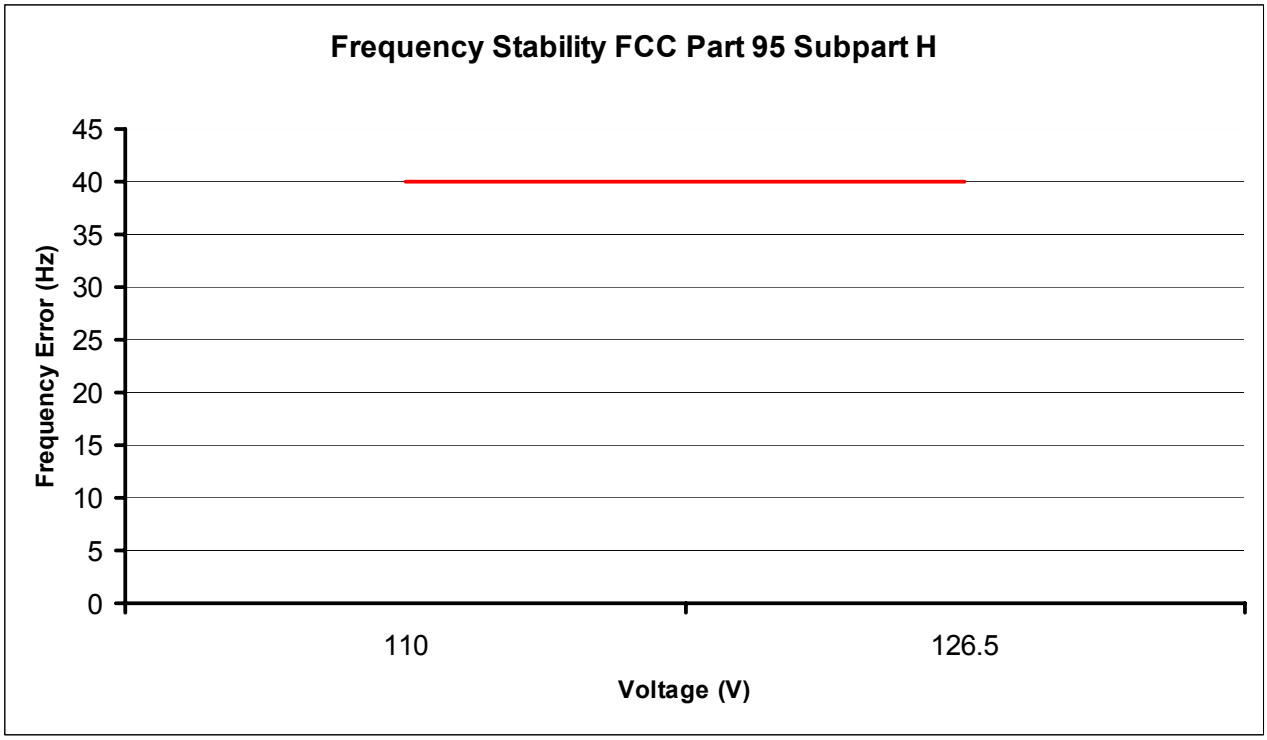


8.10. Transmitter Frequency Stability (Voltage Variation): Sections 95.1115(e)/2.1055 (continued)

Results Top Channel (613.96875 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
93.5	40	613.968790	614.0	0.031210	Complied
110.0	40	613.968790	614.0	0.031210	Complied
126.5	40	613.968790	614.0	0.031210	Complied

Frequency Variation From 613.96875 MHz



9. Measurement Methods

9.1. Transmitter Conducted Emissions

Conducted Emissions measurements were performed in accordance with Part 2.1051 against the appropriate limits.

A spectrum analyser was connected to the antenna port of the EUT via a suitable cable and RF attenuation. Prior to testing being performed the RF attenuation and cable were calibrated for the required frequency range. For each measurement range the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

A limit line was set to 20 dB below the peak of the fundamental emission.

Initial measurements covering the entire frequency band in the form of swept scans were performed in order to identify frequencies on which the EUT was generating spurious emissions. This determined the frequencies on which final measurements were necessary. To make the final measurements a peak detector was used in conjunction with the appropriate detector IF measuring bandwidth.

Repetitive scans were performed to allow for emissions with low repetition rates.

Scans were performed to the upper frequency limit as stated in Section 2.1057(a)(1) i.e. as the equipment operates below 10 GHz, to the 10^{th} harmonic of the highest fundamental frequency.

Standard FCC practice states that the 1^{st} 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 was the method used to measure conducted emissions at the band edges. This bandwidth was found by calculating 1% of the bandwidth measured in the transmitter occupied bandwidth section of this report. A bandwidth of 3 kHz (> 1% of the emission bandwidth) was, therefore, used.

9.2. Transmitter Radiated Emissions

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

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. Any emission within 20 dB of the limit were then measured on the open area test site, except in cases where the noise floor was within 20 dB of the limit, in these cases the highest point of the noise floor was measured.

In either case the measurement was made at the appropriate distance using a measuring receiver with a Quasi-Peak detector for measurements below 960 MHz and an Average detector for measurements above 960 MHz.

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.

All measurements on the open area test site were performed using broadband antennas.

On the open area test site, at each frequency where a signal was to be measured, the trace was maximised by rotating a turntable through 360°. The angle at which the maximum signal was observed was locked out. For frequencies below 1000 MHz the test antenna was varied in height between 1 m and 4 m in order to further maximise the target emission.

For frequencies above 1000 MHz where a horn antenna was used, height searching was performed to locate the optimal height of the horn with respect to the EUT. At this point the horn was locked off and the turntable was again rotated through 360° to maximise the target signal. It should be noted that the received signal from the EUT would diminish very quickly after it exits the beam width of the horn antenna, for this reason it may not be necessary to fully height search with the horns.

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.

Scans were performed to the upper frequency limit as stated in Section 2.1057(a)(1) i.e. as the equipment operates below 10 GHz, to the 10^{th} harmonic of the highest fundamental frequency.

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

Radiated Emissions (continued)

Standard FCC practice 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 was the method used to measure radiated emissions at the band edges. This bandwidth was found by calculating 1% of the bandwidth measured in the transmitter occupied bandwidth section of this report. A bandwidth of 3 kHz (> 1% of the emission bandwidth) was, therefore, used.

9.3. Occupied (20 dB) Bandwidth

The EUT was connected to a spectrum analyser enabled with an occupied bandwidth function via a direct connection.

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 and top channels. The Occupied Bandwidth was measured in line with the requirements of 2.1049 i.e. with the EUT modulated with a signal representing the maximum rated conditions under which it will operate (worst case).

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.

9.4. Frequency Stability

The EUT was situated within an environmental test chamber and monitored on the test equipment via a direct connection.

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

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

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 appropriate operating frequency band edge.

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

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**
Conducted Carrier Output Power	9 kHz to 26 GHz	95%	+/- 1.2 dB
Fundamental Fieldstrength	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Frequency Stability	Not applicable	95%	+/- 20 Hz
Occupied Bandwidth	Not applicable	95%	+/- 0.12 %
Conducted Emissions Antenna Port	9 kHz to 26 GHz	95%	+/- 1.2 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1 GHz to 18 GHz	95%	+/- 4.18 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

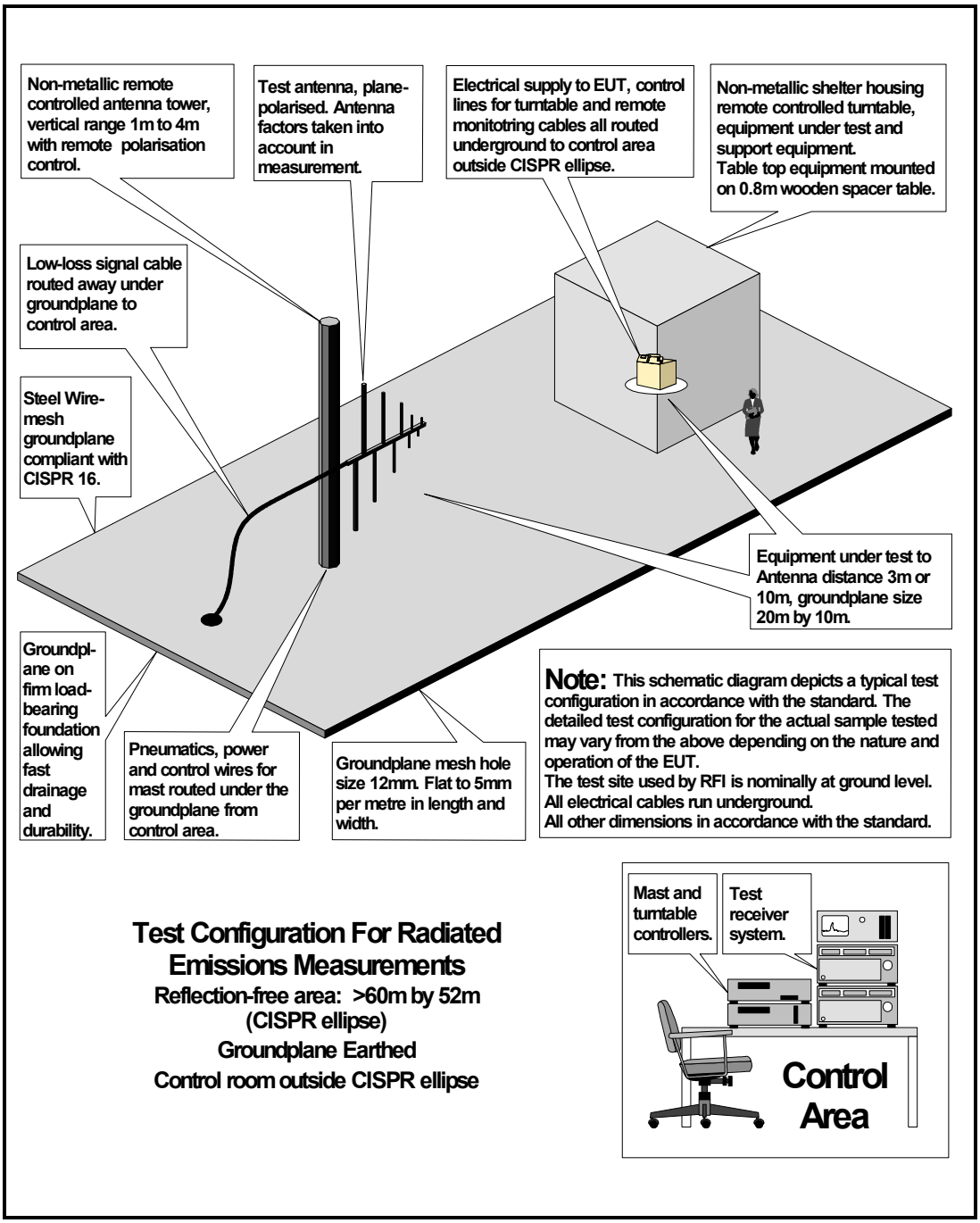
RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A027	Horn Antenna	Eaton	9188-2	301
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A244	20 dB Attenuator	Schaffner	6820-17-B	None
A247	10 dB Attenuator	Narda	769-10	03712
A253	WG 12 Microwave Horn	Flann Microwave	12240-20	128
A258	Zenith Variable Power Supply	Zenith Electric	SVA 10	None
A259	Bilog Antenna	Chase	CBL6111	1513
A490	Bilog Antenna	Chase	CBL6111A	1590
E013	PCN Environmental Chamber	Sanyo	ATMOS chamber	None
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M027	CMTA Radio Comms Analyser	Rohde & Schwarz	CMTA	883 574/004
M088	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:835862/018 RU:835387/006
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016
M128	Fluke 76 DVM	Fluke	76	65340273
S201	Site 1	RFI	1	
S202	Site 2	RFI	2	S202-15011990
S212	Site 12	RFI	12	

Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\44457JD06\EMIRAD	Test configuration for measurement of radiated emissions

DRG\44457JD06\EMIRAD



Test Configuration For Radiated Emissions Measurements

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

Groundplane Earthed

Control room outside CISPR ellipse