EMC Emissions Test Report

Hewlett-Packard DeskJet 995C
Model C8925A
Original Product Qualification

Test Report 1580 - E
24 May 2001

Electrical (EMC)

BSMI

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This Report Based upon Report Template Rev. A.1

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1 Executive Summary

Device Tested:	Hewlett-Packard DeskJet 995C
Model Number:	C8925A
Serial Number(s):	US13S3K00Q
HP Project Name:	Jeeni
Test Date(s):	26 April 2001 through 9 May 2001

The Device and Project names are only for reference, and may be changed without notice. The controlling product identifier is the product Model Number.

Applicable Standards: ANSI C63.4: 1992
CFR 47 Parts 0 - 19: 1998 (USA FCC Part 15)
CISPR 22: 1997
EN 55022: 1998
CNS 13438: approved 1994, revised 1997
AS/NZS 3548: 1995
ISO/IEC Guide 25: 1990
ETSI ETS 300-826

Results:	Radiated	Pass Class B Limits, 0.1 dB of Margin from the system 0.2 dB of Margin from the Test Sample
	Conducted	Pass Class B Limits, 8.2 dB of Margin (Avg. Limit)

This product was tested using a shielded USB (Universal Serial Bus) data cable.

2 Test Background

2.1 Scope

This report describes tests performed to support a worldwide shipment, including those needed for Declarations of Conformity. The report only covers tests of Radiated Emissions and Power Line Conducted Emissions. Other Quality, Environmental, or Electromagnetic Compatibility topics are not treated herein.

The data in this report apply only to the specific test sample and support equipment tested. The emission values for other samples of this product model may vary.

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2.2 Laboratory Accreditation and Relationship to Customer

The Radiated Emissions and Power Line Conducted Emissions testing described in this report were performed by the Hewlett-Packard Vancouver EMC Engineering Laboratory, in their facilities located at 18110 SE 34th Street, in the city of Vancouver, Washington, USA. At the time of testing, the following bodies accredited the Laboratory:

American Association for Laboratory Accreditation (A2LA), in the United States to perform radiated and conducted emissions tests under CFR 47 (FCC Part 15), ANSI C63.4, AS/NZS 3548, CISPR 22, and EN 55022, as shown in Section 1 of this EMC Test Report. The A2LA certificate number is 1003-01, valid until 31 May 2002.

Taiwan’s Bureau of Standards, Metrology and Inspection (BSMI) has accredited the Laboratory for testing under CNS 13438, as shown in Section 1. The certificate number SL2-IN-E-1021 is valid until 31 December 2001.

The Laboratory is registered to perform emissions tests with Japan’s Voluntary Control Council for Interference (VCCI). The registration numbers are R-560 for radiated emissions and C-573 for conducted emissions. This registration expires on 15 December 2002.

DATech in Germany accredits the Laboratory for conformance to EN55022 1987 and 1998. The registration number is TTI-P-G053/92-C0, and the accreditation is valid until 2 September 2001.

The laboratory is not presently accredited for testing under ETSI ETS 300-826.

The Laboratory is listed with the United States of America Federal Communications Commission (FCC).

The testing described herein was performed on behalf of the Hewlett-Packard Vancouver Inkjet Connectivity Platform Lab, a separate organization located at the same site as the EMC Engineering Laboratory.

2.3 Equipment Tested

The device tested was a color thermal inkjet printer. The printer uses two replaceable print head cartridges to image documents on various media, including plain paper, transparencies, or glossy pages. These media are drawn from a single tray at the base of the printer, and may be imaged on both sides using a mechanical duplexing attachment. The printer operates on AC power, delivered over a two-wire power cord from 100-240 Volt 50/60Hz mains. The printer includes an internal OEM power supply module which is procured from three different power supply vendors. These vendors are Yokogawa Electric Works (YEW), Astec and Lucent Technologies. All three power supply vendors were represented in these tests. The printer is capable of communicating with host devices over a Universal Serial Bus (USB), Fast Infrared (FIR), Slow Infrared (SIR) and Bluetooth Spread Spectrum radio frequency interface. The printer is provided with radio frequency interconnect capability by incorporation of a Bluetooth interface printed circuit assembly procured from two different vendors; Smart Technology and 3-Com. Both vendors were represented in these tests.

The test samples measured and reported in this document were selected from a set of six test samples. These samples were delivered from the production line with specific combinations of all the variations mentioned above. These combinations were chosen to represent the critical parameters of component vendors that will be used in final production. The emissions from each sample were measured in a preliminary test process to select a worst-case test sample and a worst-case test mode for radiated and conducted emissions. Those worst-case samples were then subjected to the full compliance test process for measuring the respective emissions. Their emissions are reported here to represent all configurations.

The test samples were modified by rerouting the two wire cable leading from the main logic PCB to the "Bluetooth Enabled" LED away from the nearby Bluetooth RF module and securing it to the side of the printer top case. This routing reduced the coupling from the RF module to the LED cabling and greatly improved the radiated emission margins. The test samples with Astec power supplies were initially configured with pre-production prototype supplies (Rev. B – 02197203). After a radiated emission defect was discovered, they were modified by changing the to a production version of the power supplies (Rev. B –02197203B). All test samples were initially built with Smart Technology radio modules. Prior to the start of testing, the radio modules were changed to 3-Com in half of the test samples to match the test plan.

Product Designer's Statement

"I hereby attest that the modifications made to the samples tested and detailed in this test report are representative of the future production of the model #C8925A Printer."

Dave Patton 5-25-01

Dave Patton Date
HP Design Engineer for model #C8925A printer

Upon receipt, the test samples were in good working order, with the exception of the issues previously described, appeared to be properly assembled.

2.4 Support Hardware

The sample was tested as part of a system. Other components of the system are noted below. These comprise the standard test support equipment used in the HP Vancouver EMC Test Lab. Where possible, common Hewlett-Packard retail products have been used. Details of the equipment configuration appear in Appendix A.

Devices

Radiated Emissions equipment

Device	Name	Model	Serial Number
Computer	HP Vectra LCII	D5970	US81602088
Video Monitor	HP	D2842A	KR00314707
Serial Calculator	HP 48G+	F1015A	ID93805363
Keyboard, coiled cord	HP	C1405B	3419M61100
Mouse	HP	C3751B	LZA64900824

Conducted Emissions Equipment

Description	Name	Model	Serial Number
Computer	HP Vectra LCII	D5970A	US81602088
Video Monitor	HP	D2832A	MY84162417
Serial Calculator	HP 48G+	F1630A	ID93805363
Keyboard, coiled cord	HP	C1405B	3423M54623
Mouse	HP	C1413B	3417M10432

Bluetooth RF Support Equipment for Radiated and Conducted Emission

Description	Name	Model	Serial Number
HP Bluetooth Test Module	HP	N/A	N/A
Serial M to F Gender Changer	N/A	N/A	N/A
Computer #2	HP Vectra LCII	LC II / D5969	US0220971
Video Monitor #2	HP	D2842A	KR9656633
Keyboard, coiled cord #2	HP	C375805109	E03633WLUS-C
Mouse#2	HP	HP C3751B	LZB62011438
Astec DC Power Converter	HP	C6436-60002	N/A

Interconnect Cables and Cords

Cable Description	Length	From	To	EMC Treatment
Power Cord	1.8m	AC Mains	EUT Power Port	None
Power Cord HP 8120-8330	2.0m	AC Mains	CPU Power Port	None
Power Cord HP 8120-8330	2.0m	AC Mains	Video Monitor	None
Power Cord HP 8120-8330	2.0m	AC Mains	CPU Power Port#2	None
Power Cord HP 8120-8330	2.0m	AC Mains	Video Monitor #2	None
DC Power Cable	1.9m	Power Converter HP C6436-60002	HP Bluetooth Test Module	None
USB Cable HP C6518A	2.0m	CPU	EUT	Braid
HP48 Serial Data Cable F1897A	2.8m	CPU	Serial Calculator G48+	Braid
Video Cable	1.2m	CPU	Video Monitor	Braid/Ferrite
M/M Serial Data Cable CMT-01-06	2.0m	CPU	HP Bluetooth Test Module	Braid

Pens, Ink Supplies, or Special Print Media

Description	Part Number
Black	HP 51645A
Color	HP C6578 series

3 General Test Processes

3.1 Test Standards

This testing was performed using the methods of ANSI C63.4, according to Part 15 of the FCC Rules, using the Class B limits and 10 m test distance of CISPR 22. Testing was also performed in compliance with CISPR 22 as amended, and other applicable standards listed in Section 1 of this report.

3.2 Special Conditions

During Radiated Emission measurements, the cables connecting the AC Mains to the system components were bundled to control excess cable length, in order to improve test repeatability. With the excess length bundled in 30-40 cm serpentine loops, the cable was draped over the back of the table, and routed to the floor-mounted power receptacle.

This is the standard configuration for this test facility, and is permitted under ANSI C63.4. (See Section 6.1.4 Paragraph 3, Section 10.1.9, and Section 11 Paragraph 2.)

This equipment is intended for use indoors in an office environment. All tests were performed in an indoor office environment, which complies with the temperature and humidity requirements of ANSI C63.4 section 6.1.9. The nominal temperature and humidity in the 10-meter chamber used for radiated emissions testing were 67.9 degrees Fahrenheit and 30.5% respectively. The nominal temperature and humidity in the conducted emissions facility were 68.9 degrees Fahrenheit and 41.3% respectively.

The mains power in this facility is provided through a special set of flush-mounted Line Impedance Stabilization Networks designed to present a nominal 50-Ohm impedance over the frequency range 30 to 500 MHz. These LISNs are used to achieve better test repeatability, and require attachment of a special connector to the end of each power cord. These connectors were installed on the power cords in such a manner as to have minimal impact on cord length.

3.3 Test Sample Configuration

The arrangement of the equipment is shown in Appendix A.

The computer ran special software that caused the test sample to print a repeated H pattern on paper drawn from the paper tray. All other devices in the system were fully exercised: an H pattern was sent to the serial calculator; the computer accessed its memory and disk drives; and a scrolling H pattern was displayed on the video monitor. Preliminary testing indicated that strength of the emission spectrum was reduced when the infrared link of the test sample was active, due to the lower data rates achieved during infrared printing. During the tests reported here, the infrared transmitter of the printer was inactive and the infrared receiver was active but idle.

4 Radiated Emissions

4.1 Test Process

Ed Blankenship, Dan Dreier and Mike Raupp measured Radiated Emissions from the test sample in a semi-anechoic shielded room on 6 May 2001 through 9 May 2001. Photographs of the final test configuration appear in Appendix A. Emissions between 30 MHz and 2000 MHz were measured using an automated test system. When the device under test has intentional signals with base frequencies higher than 108 MHz (independent of other devices in the system), the device is also tested at frequencies above 1000 MHz.

The CPU used to operate the Bluetooth RF test module was located in the 10 meter control room. A serial cable connected to the CPU ran down beneath the 10 meter chamber and up thought conduits into the 10 meter chamber. The Bluetooth RF test module was located at the base of the turntable in the 10 meter chamber.

During the test, the equipment was arranged on the turntable as shown in Appendix A. The technicians measured emissions from a list of suspect frequencies developed during previous testing, along with other emissions noted by observing the radio spectrum. This is a system test, and so the frequency list includes emissions from sources other than the test sample. A preliminary scan of this list, in both horizontal and vertical antenna orientations and at eight or more turntable radials, indicated the strongest emissions and their spatial polarization. The strongest emissions were re-measured with a full azimuth and height search. The cables were manipulated while observing the receiver display to determine the final cable orientation. Final emission measurements were made in this configuration using either the Pre-Calibrated Measurement process or the Measurement by Substitution process, described in Appendix B.

4.2 Test Results – 30 MHz to 1000 MHz

Testing showed that all emissions met the regulatory standards. A sample data page is provided in Appendix B. Testing was performed while the system-under-test was powered from 230V/50Hz power mains, and from 110V/60Hz power mains.

The emissions closest to the limit during the 230V test were found in printing mode with USB connected and actively linked, and the Bluetooth RF link being exercised. The Serial Infrared link was inactive.

Emission Frequency (MHz)	Antenna Polarity	Turntable Azimuth (degrees)	Antenna Height (cm)	Emission Level (dBµV/m)	CISPR Limit (dBµV/m)	Margin (dB)	Source
98.292	Vertical	190	114	29.9	30.0	0.1	System
600.028	Vertical	88	248	36.8	37.0	0.2	EUT/ System
99.0871	Vertical	197	124	29.5	30.0	0.5	System
98.760	Vertical	150	105	29.2	30.0	0.8	System
98.215	Vertical	189	119	29.1	30.0	0.9	System
99.310	Vertical	189	144	28.2	30.0	1.8	System
576.049	Vertical	115	275	33.3	37.0	3.7	EUT
192.011	Vertical	83	104	26.0	30.0	4.0	EUT
214.843	Vertical	108	109	23.9	30.0	6.1	EUT
209.728.	Vertical	108	124	22.8	30.0	7.2	EUT

Result: Pass

Performance Margin: 0.1 dB from the system and 0.2 dB from the EUT.

The emissions closest to the limit during the 110V test were found in printing mode with the USB I/O being exercised. The Bluetooth RF and Serial Infrared links were inactive.

Emission Frequency (MHz)	Antenna Polarity	Turntable Azimuth (degrees)	Antenna Height (cm)	Emission Level (dBµV/m)	CISPR Limit (dBµV/m)	Margin (dB)	Source
97.110	Vertical	76	100	29.5	30.0	0.5	System
98.292	Vertical	135	119	28.8	30.0	1.2	System
95.998	Vertical	76	100	28.6	30.0	1.4	System
576.049	Vertical	71	269	34.1	37.0	2.9	EUT
96.582	Vertical	224	100	26.8	30.0	3.2	System
100.002	Vertical	107	128	26.4	30.0	3.6	System
192.011	Vertical	76	124	25.5	30.0	4.5	EUT
227.368	Vertical	89	100	23.2	30.0	6.8	EUT
229.080	Vertical	89	100	23.1	30.0	6.9	EUT
226.543	Vertical	90	100	23.0	30.0	7.0	EUT
227.556	Vertical	89	100	22.9	30.0	7.1	EUT

Result: Pass

Performance Margin: 0.5 dB from the system and 2.9 dB from the EUT.

4.3 Test Results above 1000 MHz

Testing showed that all emissions met the regulatory standards. A sample data page is provided in Appendix B. Testing was performed at 10m distance, while the system-under-test was powered from 110V/60Hz power mains. This requirement is specific to US Law.

The emissions closest to the limit during this test were found in printing mode with USB connected and actively linked, and the Bluetooth RF link being exercised. The Serial Infrared link was inactive.

Emission Frequency (MHz)	Antenna Polarity	Table Azimuth (degrees)	Antenna Height (cm)	Emission Level (dBμV/m)	FCC Limit (dBμV/m)	Margin (dB)	Detector Function	Source
1212.450	Horizontal	56	248	62.6	63.5	0.9	Peak	EUT
1214.550	Horizontal	222	393	61.2	63.5	2.3	Peak	EUT
1000.030	Horizontal	76	257	59.1	63.5	4.4	Peak	EUT
1270.700	Vertical	78	99	58.9	63.5	4.6	Peak	EUT
1297.350	Vertical	78	99	56.5	63.5	7.0	Peak	EUT
1224.380	Vertical	353	121	54.9	63.5	8.6	Peak	EUT
1224.380	Vertical	191	122	25.7	43.5	17.8	Average	EUT
2000.000	Horizontal	204	115	31.9	43.5	11.6	Average	Noise Floor

Result: Pass
Performance Margin: 0.9 dB Peak Detector Limit, 11.6 dB or better Average Detector Limit

4.4 Test Equipment Used to Measure Radiated Emissions

10M Absorber Lined Chamber / South Position

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	LAST CAL.	CAL. DUE
Spectrum Analyzer	Hewlett-Packard	HP-8566B			
		Display	3552A22012	1/11/01	1/11/02
		RF Section	3638A08558	1/11/01	1/11/02
Quasi-peak Adapter	Hewlett-Packard	HP-85650A	3303A01824	1/11/01	1/11/02
Signal Generator	Hewlett-Packard	E4420A	US37230331	1/12/01	1/12/03
Bilog Antenna 30-2GHz	Chase	CBL6112A	2203	7/17/00	7/17/01
Turntable (3m diameter)	EMCO	2081-3.03	9510-1842	N/A	N/A
Antenna Mast (South)	EMCO	2070-2	9606-1983	N/A	N/A
Mast/Turntable Controller	EMCO	2090	9510-1085	N/A	N/A
Mast/Turntable Controller	EMCO	2090	9504-1030	N/A	N/A
Low Noise Pre-Amplifier	Miteq	AM-3A-000110	89	N/A	N/A
Digital Thermohygrometer	Omega	RH411	HO103189	3/30/01	3/30/02

5 Conducted Emissions

5.1 Test Process

Kent Sheets measured Power Line Conducted Emissions in a shielded enclosure on 8 May 2001. Photographs of the final test configuration appear in Appendix A. Emissions were tested in the frequency range from 150 kHz to 30 MHz using an automated test system.

The Bluetooth RF test module and the computer that controlled it were located inside the shielded room but several meters away from the test table, and were powered from the building mains.

5.2 Test Results

Testing showed that all emissions met the regulatory standards. A sample data page is provided in Appendix C. Testing was performed while the system-under-test was powered from 230V/50Hz power mains, and from 110V/60Hz power mains.

The emissions closest to the limit during the 230V test were found in idle mode with USB connected and actively linked. The Serial Infrared and Bluetooth RF links were inactive.

Emission Frequency (MHz)	Conductor Under Test	Detector	Emission Level (dBμV)	Average Limit (dBμV)	Q-Peak Limit (dBμV)	Margin (dB)
0.9925	Neutral	Average	37.8	46.0	56.0	8.2
0.9925	Line	Average	37.8	46.0	56.0	8.2
1.035	Line	Average	37.8	48.3	58.3	10.5
2.922	Line	Average	35.3	46.0	56.0	10.7
3.016	Line	Average	35.2	46.0	56.0	10.8
2.969	Neutral	Average	35.2	46.0	56.0	10.8
3.065	Neutral	Average	35.2	46.0	56.0	10.8
0.9925	Neutral	Peak	41.1	46.0	56.0	14.9

Result: Pass

Performance Margin: 8.2 dB Average Detector Limit, 14.9 dB Quasi-Peak Limit

The emissions closest to the limit during the 110V test were found in printing mode with USB connected and actively linked, and RF being exercised. The Serial Infrared link was inactive.

Emission Frequency (MHz)	Conductor Under Test	Detector	Emission Level (dBμV)	Average Limit (dBμV)	Q-Peak Limit (dBμV)	Margin (dB)
0.9023	Line	Average	35.3	46.0	56.0	10.7
0.9463	Line	Average	34.8	46.0	56.0	11.2
4.857	Line	Average	33.5	46.0	56.0	12.5
0.1815	Line	Average	41.8	54.4	64.4	12.6
0.8558	Line	Average	32.7	46.0	56.0	13.3
4.909	Line	Average	32.7	46.0	56.0	13.3
0.1825	Line	Peak	50.7	54.3	64.3	13.6

Result: Pass

Performance Margin: 10.7dB Average Detector Limit, 13.6 dB Quasi-Peak Limit

5.3 Test Equipment Used to Measure Conducted Emissions

Conducted Emissions Facility

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	LAST CAL.	CAL. DUE
Spectrum Analyzer	Hewlett-Packard	HP-8566B			
		Display	3552A22006	5/17/00	5/17/01
		RF Section	3407A08563	5/17/00	5/17/01
Quasi-peak Adapter	Hewlett-Packard	HP-85650A	3303A01823	8/14/00	5/17/01
Artificial Mains (LISN)	Fischer Custom Communication	FCC-LISN-2A	115	7/23/00	7/23/01
Artificial Mains (LISN)	Fischer Custom Communication	FCC-LISN-2A	116	7/23/00	7/23/01
Transient Limiter/ High Pass Filter	Hewlett-Packard	11947A	3107A01193	2/23/01	2/23/02
Digital Thermohygrometer	Omega	RH411	H0104832	6/27/00	6/27/01

6 Approvals

Radiated Emission Tests Performed By:

Ed Blankenship — Date
EMC Test Technician

Dan Dreier — Date
EMC Test Technician

Mike Raupp — Date
EMC Test Technician

Conducted Emission Tests Performed By:

Kent Sheets — Date
EMC Test Technician

Test Engineer:

Dave Arnett — Date
EMC Project Engineer

Report Prepared By:

Lynda Poe — Date
EMC Engineering Support Technician

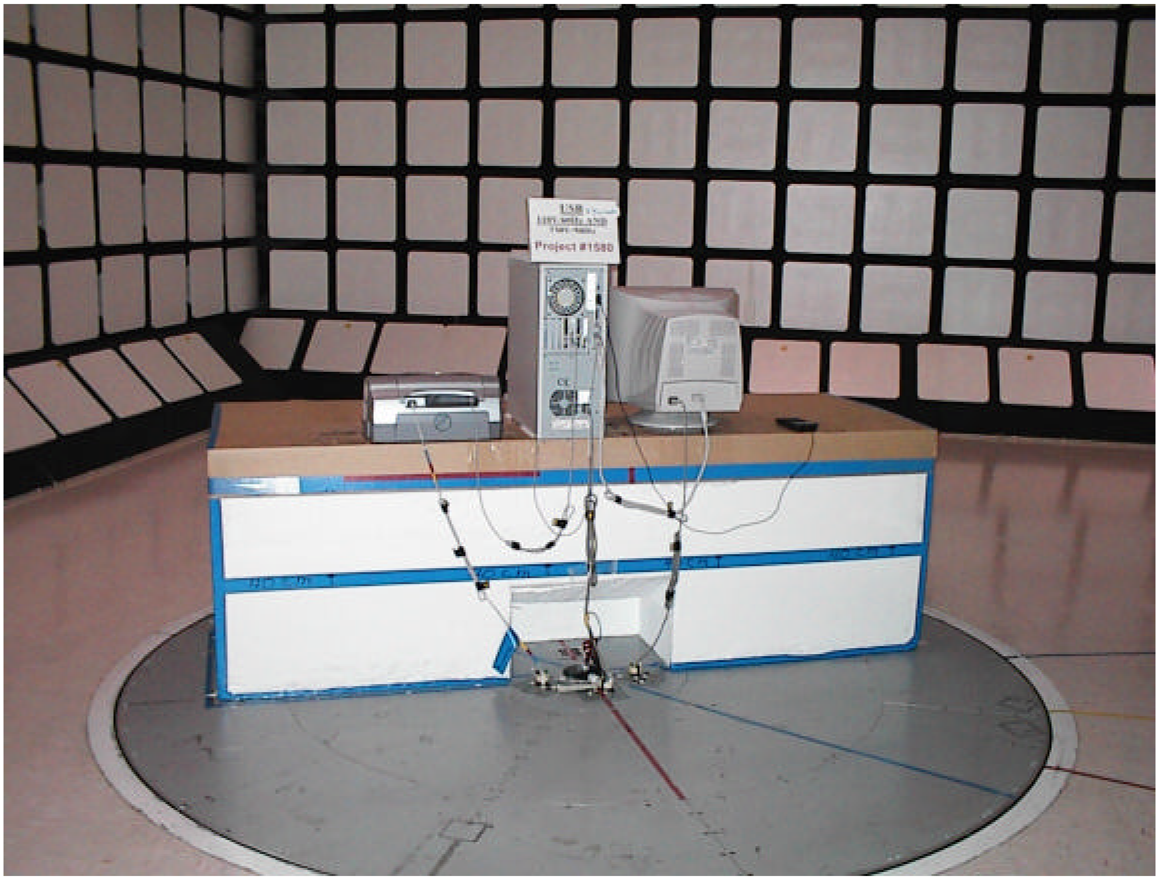
Report Reviewed and Approved By:

Robert Dockey — Date
EMC Engineering Manager
Official Representing
Hewlett-Packard Company

Appendix A: Equipment Configuration

Photographs of the Radiated Emissions Configuration

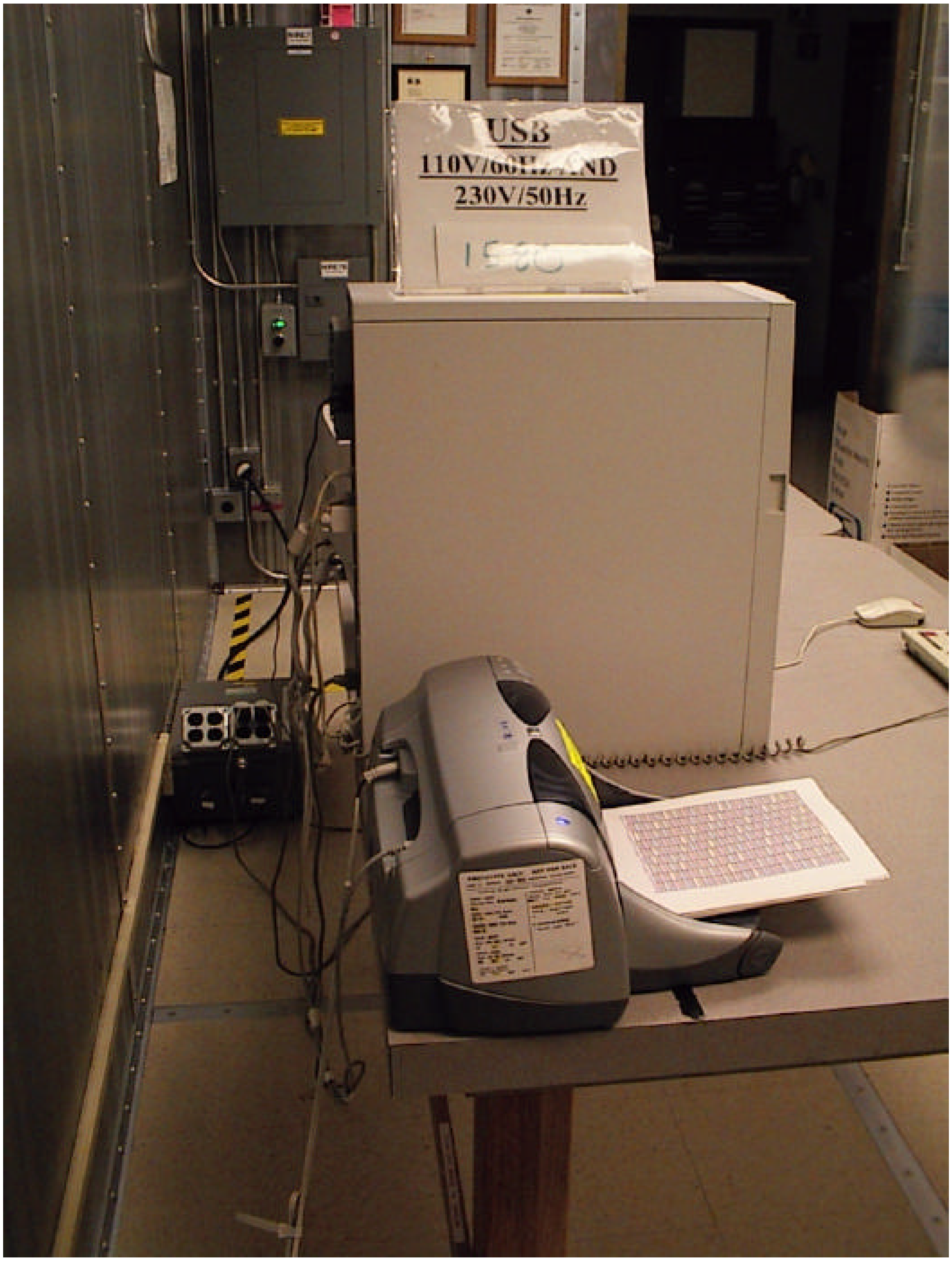
This test setup represents both 110V and 230V operation, with or without the RF link.



This test setup represents both 110V and 230V operation, with or without the RF link.

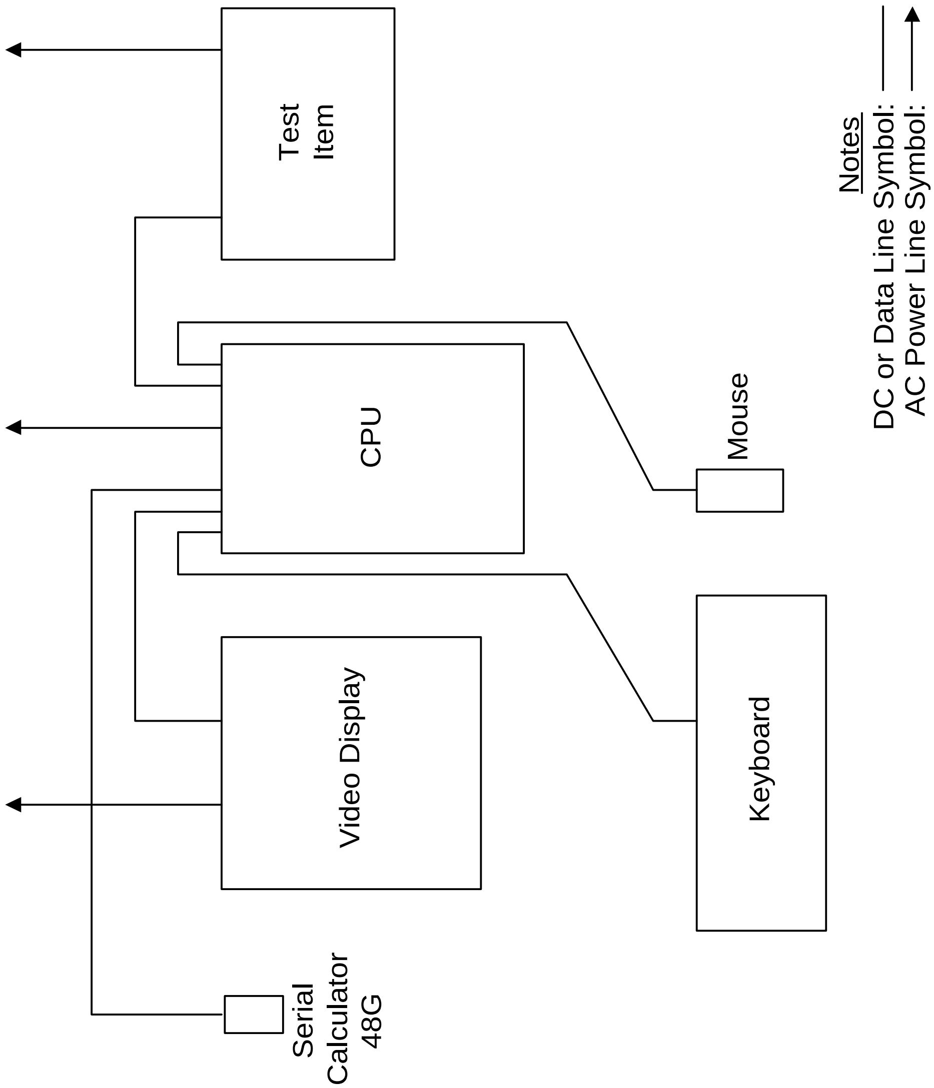
Photographs of the Conducted Emissions Configuration

This test setup represents both 110V and 230V operation, with or without the RF link.



This test setup represents both 110V and 230V operation, with or without the RF link.

System Interconnect Drawing



Appendix B: Sample Calculations - Radiated Emissions

There are two methods for making Radiated Emission measurements: Pre-calibrated Measurements, and Measurement by Substitution. The pre-calibrated measurement method is a faster process, and is the method used at most test facilities around the world. The substitution technique permits more accurate measurement of signals near the receiver noise floor, but involves more processing steps. Both methods are described here.

The data presented in the following examples are generic values at 100 MHz, and are not taken from the actual measurements described in this report.

Pre-calibrated Measurements

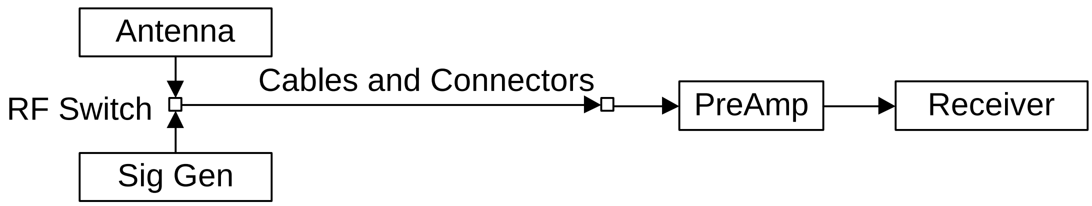
In a pre-calibrated measurement, the primary data point is the receiver reading, in dBμV, evaluated in conjunction with the system loss and antenna factor values. The system loss is a set of measured values. It includes the losses in cables and connectors, and the gain of the wide band preamplifier, as a function of frequency. The antenna factor is also a function of frequency, as reported by an outside antenna calibration laboratory.

The electric field is calculated based upon the system loss and the antenna factor at the frequency of measurement, as follows:

	Receiver Reading	42.0 dBμV
+	System Loss	-33.2 dB (Gain)
+	Antenna Factor	10.2 dB(1/m)
	================	===========
=	Electric Field Strength	19.0 dBμV/m

Measurements by Substitution

In the measurement by substitution technique, a pre-calibrated measurement is performed first. The antenna is then disconnected from the coaxial feed line, and a calibrated signal generator replaces the antenna. This signal substitution is performed by means of an RF coaxial switch and a matched pair of lead-in cables. The output amplitude of the signal generator is adjusted until the receiver reading is the same as when the antenna drove the line. Since the output of the signal generator produces the same receiver reading as did the antenna, the voltage produced by the antenna during measurement can be determined directly from the calibrated signal generator.



In this method, the system loss is not a factor in determining field strength. Field strength is calculated as follows:

	Sig. Gen. Level	12.0 dBµV
+	Antenna Factor	10.2 dB(1/m)
	================	===========
=	Electric Field Strength	22.2 dBµV/m

Appendix C: Sample Calculations - Conducted Emissions

The conducted emission levels are determined by reading the voltage levels reported by the receiver, and accounting for insertion losses of the cables, relays, and LISN. An additional source of loss is a protective signal limiter – a 10 dB attenuator placed at the receiver input – which is accounted separately in the calculation of the final measurement.

The data presented in the following example is generic at 20 MHz, and is not taken from the actual measurements described in this report.

	Receiver Level	30.0 dBμV
+	Attenuator	10.0 dB
+	Insertion Loss	0.5 dB
	================	==========
=	Final Level	40.5 dBμV

Appendix D: Sample US Regulatory Statements

These regulatory statements are defined in CFR47 Part 2.1077(a) and (c), as well as Part 15.21, Part 15.27(c), and Part 15.105. The following is a sample of an appropriate statement for a US Declaration of Conformity. This statement, or an equivalent statement, must be included with the product if the product is marketed under a Declaration of Conformity within the United States of America.

Hewlett-Packard Company Model C8925A

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Pursuant to Part 15.21 of the FCC Rules, any changes or modifications to this equipment not expressly approved by Hewlett-Packard Company may cause harmful interference, and void your authority to operate this equipment. Use of a shielded data cable is required to comply with the Class B limits of Part 15 of the FCC Rules.

For further information, contact:

Hewlett-Packard Company
Manager of Corporate Product Regulations
3000 Hanover Street
Palo Alto, CA 94304
415/857-1501

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, can cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and the receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.