CRITERION TECHNOLOGY

NVLAP Accredited Since 1993

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EMC QUALIFICATION TEST REPORT

COGNITIVE CODE RANGER THERMAL PRINTER, RD232424-OH3

TESTED TO CONFORM WITH:

☒ **EMISSIONS STANDARDS** ☒ **IMMUNITY STANDARDS**

FOR

INFORMATION TECHNOLOGY EQUIPMENT (ITE)

Test Report Number: **020401-524**

Date of Issue: **MAY 30, 2002**

Date of Test Article Receipt: **MAY 5, 2002**

Manufacturer's Address: **691 CORPORATE CIRCLE**
GOLDEN, CO 80401

Phone: **303 273-1400**

Reviewed by: Approved by:

Compliance Engineer Laboratory Director

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12/CIS22a - IEC/CISPR22: 1993, Amendment 1:1995 & Amendment 2: 1996
12/CIS22b - CNS13438: 1997
12/F01 - FCC Method - 47 Part 15 - Digital Devices
12/F01a - Conducted Emissions, Power Lines, 450 kHz to 30 MHz
12/F01b - Radiated Emissions
12/T51 - AS/NZS 3548

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EMC QUALIFICATION TEST REPORT
CODE RANGER THERMAL PRINTER

1.0 EXECUTIVE SUMMARY

1.1 PURPOSE

The purpose of this report is to present EMC test data and demonstrate conformity to the requirements of the prescribed standards for Emissions and/or Immunity.

1.2 CONFORMITY

The test article was tested to the standards listed in Table I with the indicated conformity status. All test methods were performed in accordance to with the standards listed.

TABLE I. EMISSIONS CONFORMITY SUMMARY

TEST TYPE	COMPLIANCE STANDARD	TESTING TECHNIQUE	TEST DESCRIPTION	PRODUCT CLASSIFICATION	CONFORMITY STATUS
EMISSIONS	FCC Part 15	☒ IEC/EN 55022	Radiated Emissions	Class B	Pass
			Conducted Emissions 1		N/A
	61000-3-2	☐ 61000-3-2	Harmonic Current Emissions 2		N/A
	61000-3-3	☐ 61000-3-3	Voltage Fluctuation and Flicker 3		N/A

TABLE II. IMMUNITY CONFORMITY SUMMARY

TEST TYPE	COMPLIANCE STANDARD	TESTING TECHNIQUE	TEST DESCRIPTION	MINIMUM PERFORMANCE CRITERIA	CONFORMITY STATUS
IMMUNITY	EN 55024	☒ 61000-4-2	Electrostatic Discharge	B	Pass
		☒ 61000-4-3	Radiated, RF Electromagnetic Field Amplitude Modulated	A	Pass
		☒ ENV 50204	Radiated, RF Electromagnetic Field Pulse Modulated		Pass
		☐ 61000-4-4	Electrical Fast Transient/Burst	B	N/A
		☐ 61000-4-5	Surge	B	N/A
		☐ 61000-4-6	Conducted Disturbances, Induced by Radio-Frequency Fields	A	N/A
		☐ 61000-4-8	Power Frequency Magnetic Field 3	A	N/A
		☐ 61000-4-11	Voltage Dips, Short Interruptions and Voltage Variations	B/C	N/A

1.3 EQUIPMENT UNDER TEST (EUT)

EUT NAME: **CODE RANGER THERMAL PRINTER**
EUT MODEL/PART NUMBER(S): **RD232424-OH3**
EUT SERIAL NUMBER(S): **J021033807**
OTHER EUT CHARACTERISTICS:

1 Measurement of Conducted Emissions do not apply if the EUT is powered by an external DC power source.

2 Applicable to electrical and electronic equipment having an input current ≤16 amps per phase and intended to be connected to public low-voltage distribution systems of between 220 V and 250 V at 50 Hz line to neutral.

3 The requirements of EN 61000-4-8 may be waived if the EUT does not contain magnetically-sensitive devices.

2.0 EMISSIONS TEST STANDARDS

FCC Part 15, Subparts B and C	**Class B**
EN 55022 for IT Equipment	**Class B**

2.1 ☒ RADIATED EMISSIONS – 30 MHZ TO 1000 MHZ

Measurements for *Radiated Emissions* were performed over the frequency range of 30 MHz to 1000 MHz in the horizontal and vertical antenna polarities to the requirements of:

FCC Part 15 **Class B**

Testing Conditions

Date of Test: **April 8, 2002**
Temperature: **21°C**
Relative Humidity: **21%**
Test Voltage: **7.2 VCD**
Test Operator: **TM**

Test Location

Criterion Technology Open Area Test Site

Test Distance

Antenna Distance: **10 meter(s)** **Final Measurement(s)**

Test Equipment

☒ Hewlett-Packard Spectrum Analyzer, HP 8566B ☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A
☐ Hewlett-Packard Tracking Generator, HP 85645A
☐ Rohde and Schwarz Receiver, ESHS-30 ☒ Rohde and Schwarz Receiver, ESVS-30
☒ Mini Circuits Pre-Amp #2 ☐ Veratech Pre-Amp #3
☒ Chase BiLog Antenna, Model 1121 ☐ Antenna Research, Horn Antenna, Model DRG118/A
☐ EMCO BiConnical Antenna, Model 3108 ☐ EMCO Log Periodic Antenna, Model 3146

Test Accessories:

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: 30 MHz to 1000 MHz

Minimum Margin to Limit - FCC: **-8.01** dB at **290.0362** MHz

Minimum Margin to Limit – EN 55022: **-5.09** dB at **220.0296** MHz

Remarks

See: **APPENDIX A** for EUT Photographs **APPENDIX B** for Data Sheets
APPENDIX D for Test Equipment Calibration Status

2.2 ☒ RADIATED EMISSIONS 1 TO 18 GHZ

Measurements for *Radiated Emissions* were performed over the frequency range of **1**GHz to **18** in the horizontal and vertical antenna polarities to the requirements of:

FCC Class B Subparts B and C

Testing Conditions

Date of Test: **April 20, 2002**
Temperature: **20°C**
Relative Humidity: **32%**
Test Voltage: **7.2VDC**
Test Operator: **Ted Mullen**

Test Location

Criterion Technology Open Area Test Site

Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

☒ Hewlett-Packard Spectrum Analyzer, HP 8566B ☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A
☐ Hewlett-Packard Tracking Generator, HP 85645A
☐ Rohde and Schwarz Receiver, ESHS-30 ☐ Rohde and Schwarz Receiver, ESVS-30
☐ Mini Circuits Pre-Amp #2 ☒ Veratech Pre-Amp #3
☐ Chase BiLog Antenna, Model 1121 ☒ Antenna Research, Horn Antenna, Model DRG118/A
☐ EMCO BiConnical Antenna, Model 3108 ☐ EMCO Log Periodic Antenna, Model 3146
☒ HF Cable Set

Test Accessories:

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: **1** GHz to **18**GHz

Minimum Margin to Limit: **-0.15** dB at **7311** MHz

Remarks

See: **APPENDIX A** for EUT Photographs **APPENDIX B** for Data Sheets
APPENDIX D for Test Equipment Calibration Status
APPENDIX E EIRP CALCULATIONS
APPENDIX F ANTENNA PROPERTIES

2.3 ☒ RADIATED EMISSIONS 18 TO 26.5GHZ

Measurements for *Radiated Emissions* were performed over the frequency range of **18** GHz to **26.5** in the horizontal and vertical antenna polarities to the requirements of:

FCC CLASS B SUBPARTS B AND C

Testing Conditions

Date of Test: **April 20, 2002**
Temperature: **20°C**
Relative Humidity: **32%**
Test Voltage: **7.2VDc**
Test Operator: **Ted Mullen**

Test Location

Criterion Technology Open Area Test Site

Test Distance

Antenna Distance: **3 meter(s)** **Final Measurement(s)**

Test Equipment

☒ Hewlett-Packard Spectrum Analyzer, HP 8566B ☒ Hewlett-Packard Quasi-Peak Adapter, HP 85650A
☐ Hewlett-Packard Tracking Generator, HP 85645A
☐ Rohde and Schwarz Receiver, ESHS-30 ☐ Rohde and Schwarz Receiver, ESVS-30
☐ Mini Circuits Pre-Amp #2 ☐ Veratech Pre-Amp #3
☒ HP Pre-amp #4 ☒ HP IF Amp #5
☐ EMCO BiConnical Antenna, Model 3108 ☐ EMCO Log Periodic Antenna, Model 3146
☐ Chase BiLog Antenna, Model 1121 ☐Antenna Research, Horn Antenna, Model DRG118/A
☒ Micowave Instrument Technologies 12A-18 Horn ☒ HP 11970 Harmonic Mixer
☒ MMW Cable set

Test Accessories:

Test Results of Radiated Emissions

Test Status: **PASSED** Frequency Range: **18** GHz to **26.5**

Minimum Margin to Limit: **>8 db (noise floor)** dB at **18 to 26** GHz

Remarks No Harmonic or spurious emissions from the EUT were found

See: **APPENDIX A** for EUT Photographs **APPENDIX B** for Data Sheets
APPENDIX D for Test Equipment Calibration Status

3.0 IMMUNITY STANDARDS

3.1 IMMUNITY TEST STANDARDS.

TABLE III. IMMUNITY TESTS

BASIC STANDARDS	TESTED	ENVIRONMENTAL PHENOMENA	SPECIFICATIONS/UNITS	PERFORMANCE CRITERIA
EN 61000-4-2	☒	Electrostatic Discharge	±2,4,8 kV Air ±2,4 kV Contact	Performance Criterion B
EN 61000-4-3	☒	Radiated, RF Electromagnetic Field - Amplitude Modulated	3 V/m (unmodulated, RMS) 80%, 1 kHz AM 80 MHz - 1 GHz	Performance Criterion A
ENV 50204	☒	Radiated, RF Electromagnetic Field - Pulse Modulated	3 V/m (unmodulated, RMS) 50% duty cycle 200 Hz repetition frequency 900 ±5 MHz	
EN 61000-4-4	☐	Electrical Fast Transient/Burst	±__ CM (AC & DC) Direct ±__ CM (Signal) Capacitive Clamp	Performance Criterion B
EN 61000-4-5	☐	Surge	☐ ±_V CM, ±_V DM (AC) ☐ ±_V CM & DM (DC)	
EN 61000-4-6	☐	Conducted Disturbances, Induced by Radio-Frequency Fields	__ V_{RMS} (unmodulated, RMS) 80% 1 kHz AM 150 kHz - 80 MHz	Performance Criterion A
EN 61000-4-8	☐	Power Frequency Magnetic Field	50 Hz, 3.0 A_{RMS}/m	
EN 61000-4-11	☐	Voltage Dips, Short Interruptions and Voltage Variations	☐	Performance Criterion B
			☐	Performance Criterion C
			☐	Performance Criterion C

3.2 PERFORMANCE CRITERIA

3.2.1 Performance Criterion A

The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

3.2.2 Performance Criterion B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

3.2.3 Performance Criterion C

Temporary loss of function is allowed, provided the loss of function is self recoverable or can be restored by the operation of the controls.

3.3 ☒ ELECTROSTATIC DISCHARGE (ESD)

Measurements of immunity against *ESD* were performed to the requirements of EN 61000-4-2.

Testing Conditions

Date of Test:	**May 10, 2002**
Temperature:	**20°C**
Relative Humidity:	**30%**
Atmospheric Pressure:	**kPa**
Test Voltage:	**230 VAC 50 Hz**
Test Operator:	**WS**

Test Location

Criterion Technology Semi-Anechoic Chamber

Test Equipment

Haefely Trench PESD 1600

Test Accessories:

Test Setup

	Air	Contact
Discharge Type:	☒	☒
Discharge Voltages:	±**2,4,8 kV**	±**2,4 kV**
Discharge Polarity:	**Positive/Negative**	**Positive/Negative**
Discharge Factor:	**≥1 second**	**≥1 second**
Discharge Number:	**≥10**	**≥10**
Discharge Impedance:		**330 ohms/150 pF**
Discharge Locations:	☒ Human-Interface Accessible	
	☒ See Photographs	

Test Results of ESD

Test Status: **PASSED** Performance Criterion **A**

Remarks

See: **APPENDIX A** for EUT Photographs **APPENDIX B** for Data Sheets
APPENDIX D for Test Equipment Calibration Status

3.4 ☒ RADIATED RF ELECTROMAGNETIC (EM) FIELDS

Measurements of immunity against *Radiated RF EM Fields* were performed to the requirements of:

☒ EN 61000-4-3 ☒ ENV 50204

Testing Conditions

Date of Test: **May 10, 2002**
Temperature: **15°C**
Relative Humidity: **24%**
Test Voltage: **230 VAC 50 Hz**
Test Operator: **WS**

Test Location

Criterion Technology Semi-Anechoic Chamber

Test Equipment

☒ Amplifier Research Field-Strength Monitoring System, FM2000/FP2000
☒ Amplifier Research Power Amplifier, 100W1000M1
☐ Amplifier Research Power Amplifier, 150A100 ☐ Amplifier Research Power Amplifier, 10S1G4
☒ Amplifier Research Log Periodic Antenna, Model AT1080
☐ EMCO Log Periodic Antenna, Model 3146
☒ HP Signal Generator, HP8648D ☒ HP Spectrum Analyzer, HP8594E

Test Accessories:

Test Specifications

Frequency Range: ☒ **80 MHz to 1 GHz** ☒ **900 ±5 MHz**
Field Strength: ☒ **3 V/m** ☐ Other: **__ V/m**
Modulation: ☒ **AM - 1 kHz, 80% Sine Wave** ☐ **Pulse ON/OFF, 100%, 200 Hz**
☐ **None**
Step: **1%** **1.5 second(s) Dwell Time**

Antenna Distance: **3 meter(s)**
Antenna Polarization: ☒ **Horizontal** ☒ **Vertical**

EUT Position: ☒ Front ☒ Left ☐ Top
☒ Back ☒ Right ☐ Bottom

Test Results of Radiated RF EM Fields

Test Status: **PASSED** Performance Criterion **A**

Remarks

See: **APPENDIX A** for EUT Photographs **APPENDIX B** for Data Sheets
APPENDIX D for Test Equipment Calibration Status

4.0 APPENDIX A: EUT PHOTOGRAPHS

4.1 RADIATED EMISSIONS – FRONT VIEW

4.2 RADIATED EMISSIONS – SIDE VIEW

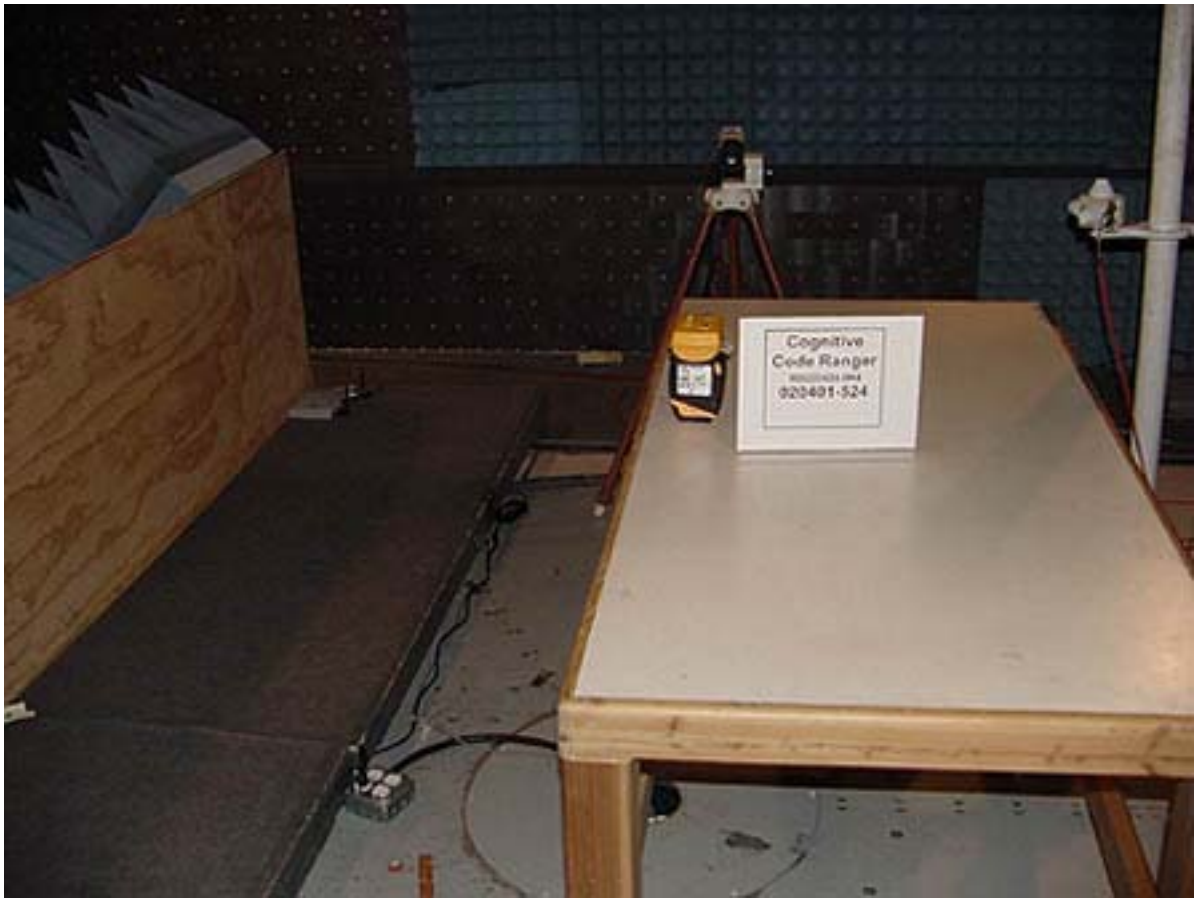
4.3 RADIATED EMISSIONS – REAR VIEW

4.4 ELECTROSTATIC DISCHARGE

4.5 ELECTROSTATIC DISCHARGE – EUT INTERIOR

4.6 RADIATED RF ELECTROMAGNETIC FIELDS – FRONT VIEW

4.7 RADIATED RF ELECTROMAGNETIC FIELDS – SIDE VIEW

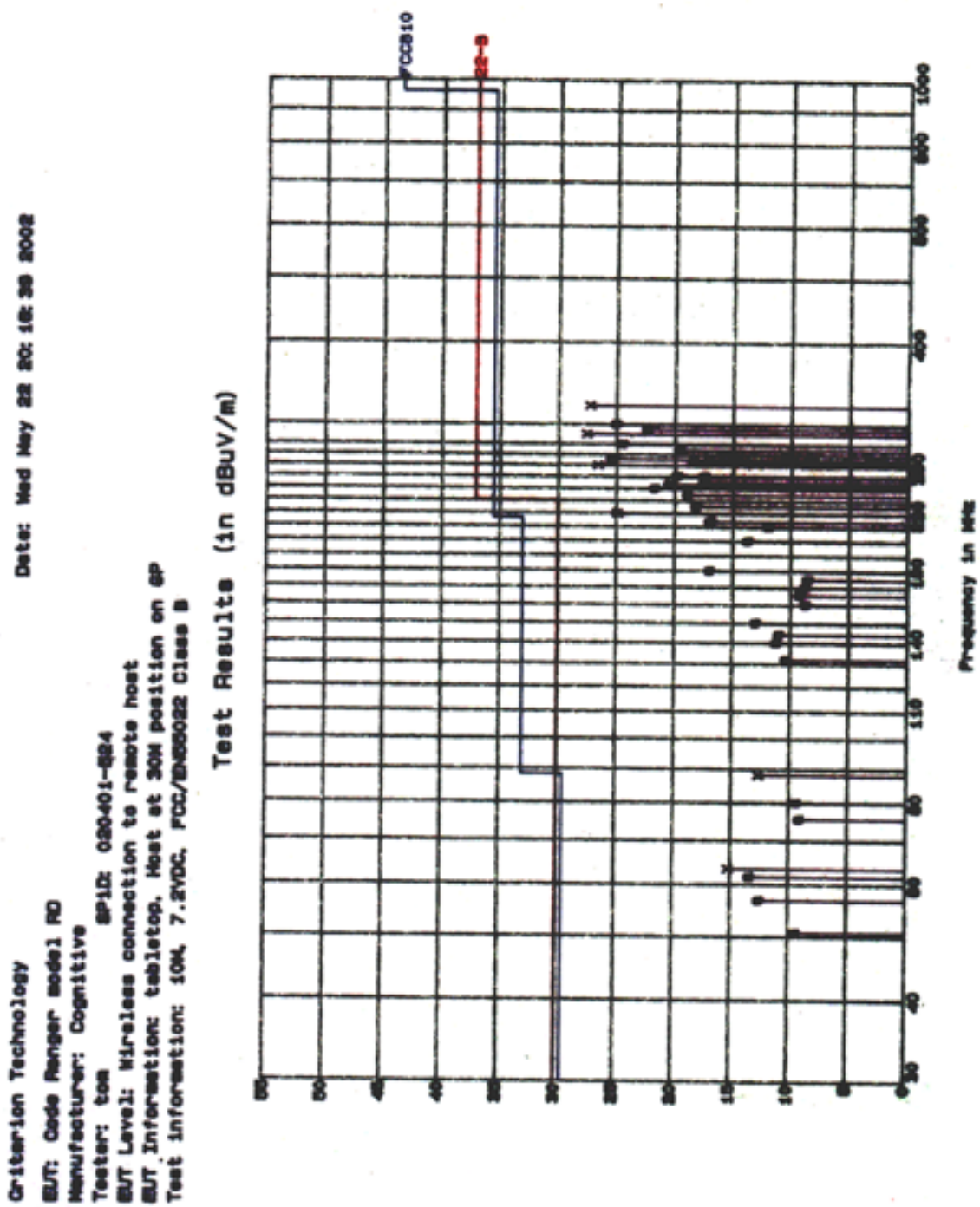


4.8 INTENTIONAL RADIATOR – ANTENNA (SEE NOTE)

Note: This antenna is internal to the unit, and is shown with the connector modified to SMA for antenna measurements

5.0 APPENDIX B: DATA SHEETS

5.1 RADIATED EMISSIONS PLOT – 30 MHZ TO 1 GHZ



5.2 RADIATED EMISSIONS TABLE – 30 MHZ TO 1 GHZ

Notes:
The third column below contains alpha characters which pertain to the type of measurements made. The following are the definitions for those characters: q = Quasi Peak, m = Maximized (cable, rotation and antenna height), s = scanned but no data taken, and a = average. For the first character in column four, a '-' indicates that value is below the limit while an '*' indicates that value is above the limit
If the list is sorted using "I-sort", then quasi-peak and average levels are weighted higher than peak levels and are moved to the front of the scan list.
The following keys help to better understand the data:
TT: Turntable position in degrees
Hght: Height of antenna in centimeters
Az: Azimuth, V = Vertical, H= Horizontal

Criterion Technology **Wed May 22 20:17:20 2002**

EUT: Code Ranger model RD

Manufacturer: Cognitive

Tester: TM **Special ID: 020401-524**

EUT Level: Wireless connection to remote host

EUT Information: tabletop, Host at 10M position on GP

Test information: 10M, 7.2VDC, FCC/EN55022 Class B

Table 1: Scan List, sorted by margin to limit FCCB10, -30.0dB filter

FREQ, MHZ	VALUE	STS	FCCB10	TT	HGHT	AZ	COMMENT
290.0362	27.55	m	-8.01	173	98	V	bb
320.0398	27.26	m	-8.30	183	99	V	nb
260.0316	26.57	m	-8.99	185	101	V	nb
265.4240	25.49	q	-10.07	183	99	V	pulsing nb in bb
300.0360	25.08	q	-10.48	0	100	V	nb amb?
220.0296	24.91	m	-10.65	249	104	V	nb
280.0324	24.56	q	-11.00	183	99	V	nb
294.8836	22.41	q	-13.15	0	100	V	pulsing nb
240.0302	21.77	q	-13.79	249	104	V	nb
63.3661	15.17	m	-14.37	90	401	H	bb Power Line Noise
243.2952	20.54	q	-15.02	0	100	V	pulsing nb
250.6707	19.81	q	-15.75	183	99	V	pulsing bb
274.6417	19.65	q	-15.91	180	100	V	bb
213.8110	17.01	q	-16.05	183	99	V	pulsing nb
180.0261	17.00	q	-16.06	270	100	V	nb
61.5581	13.39	q	-16.15	90	401	H	bb
234.7044	18.95	q	-16.61	173	98	V	bb
87.9946	12.62	m	-16.92	90	401	H	nb and Line Noise
56.7233	12.54	q	-17.00	90	401	H	bb
262.9584	18.50	q	-17.06	180	100	V	pulsing bb
225.3257	18.19	q	-17.37	249	104	V	bb
225.4197	18.18	q	-17.38	249	104	V	bb
250.0410	17.53	q	-18.03	90	162	V	bb
245.3095	17.50	q	-18.06	0	100	V	bb
200.0250	13.76	q	-19.30	249	104	V	nb
150.0224	13.04	q	-20.02	270	162	V	bb
50.5898	9.43	q	-20.11	90	401	H	nb
80.0114	9.40	q	-20.14	0	401	H	nb
75.4214	9.15	q	-20.39	0	401	H	nb
210.0260	11.92	q	-21.14	183	99	V	bb

FREQ, MHZ	VALUE	STS	FCCB10	TT	HGHT	AZ	COMMENT
140.0184	11.23	q	-21.83	249	104	V	nb
144.0124	11.02	q	-22.04	0	401	H	nb
131.9988	10.41	q	-22.65	0	401	H	nb
165.4034	9.25	q	-23.81	270	100	V	bb
170.0424	8.78	q	-24.28	270	100	V	bb
160.0154	8.74	q	-24.32	90	100	V	nb
174.7102	8.56	q	-24.50	249	104	V	bb

Table 2: Scan List, sorted by margin to limit 22-B, -30.0dB filter

FREQ, MHZ	VALUE	STS	22-B	TT	HGHT	AZ	COMMENT
220.0296	24.91	m	-5.09	249	104	V	nb
290.0362	27.55	m	-9.45	173	98	V	bb
320.0398	27.26	m	-9.74	183	99	V	nb
260.0316	26.57	m	-10.43	185	101	V	nb
265.4240	25.49	q	-11.51	183	99	V	pulsing nb in bb
225.3257	18.19	q	-11.81	249	104	V	bb
225.4197	18.18	q	-11.82	249	104	V	bb
300.0360	25.08	q	-11.92	0	100	V	nb amb?
280.0324	24.56	q	-12.44	183	99	V	nb
213.8110	17.01	q	-12.99	183	99	V	pulsing nb
180.0261	17.00	q	-13.00	270	100	V	nb
294.8836	22.41	q	-14.59	0	100	V	pulsing nb
63.3661	15.17	m	-14.83	90	401	H	bb Power Line Noise
240.0302	21.77	q	-15.23	249	104	V	nb
200.0250	13.76	q	-16.24	249	104	V	nb
243.2952	20.54	q	-16.46	0	100	V	pulsing nb
61.5581	13.39	q	-16.61	90	401	H	bb
150.0224	13.04	q	-16.96	270	162	V	bb
250.6707	19.81	q	-17.19	183	99	V	pulsing bb
274.6417	19.65	q	-17.35	180	100	V	bb
87.9946	12.62	m	-17.38	90	401	H	nb and Line Noise
56.7233	12.54	q	-17.46	90	401	H	bb
234.7044	18.95	q	-18.05	173	98	V	bb
210.0260	11.92	q	-18.08	183	99	V	bb
262.9584	18.50	q	-18.50	180	100	V	pulsing bb
140.0184	11.23	q	-18.77	249	104	V	nb
144.0124	11.02	q	-18.98	0	401	H	nb
250.0410	17.53	q	-19.47	90	162	V	bb
245.3095	17.50	q	-19.50	0	100	V	bb
131.9988	10.41	q	-19.59	0	401	H	nb
50.5898	9.43	q	-20.57	90	401	H	nb
80.0114	9.40	q	-20.60	0	401	H	nb
165.4034	9.25	q	-20.75	270	100	V	bb
75.4214	9.15	q	-20.85	0	401	H	nb
170.0424	8.78	q	-21.22	270	100	V	bb
160.0154	8.74	q	-21.26	90	100	V	nb
174.7102	8.56	q	-21.44	249	104	V	bb

Table 3: Scan List for FCCB10, sorted by Frequency, -30.0dB filter

FREQ, MHZ	VALUE	STS	FCCB10	TT	HGHT	AZ	COMMENT
50.5898	9.43	q	-20.11	90	401	H	nb
56.7233	12.54	q	-17.00	90	401	H	bb
61.5581	13.39	q	-16.15	90	401	H	bb
63.3661	15.17	m	-14.37	90	401	H	bb Power Line Noise
75.4214	9.15	q	-20.39	0	401	H	nb
80.0114	9.40	q	-20.14	0	401	H	nb
87.9946	12.62	m	-16.92	90	401	H	nb and Line Noise
131.9988	10.41	q	-22.65	0	401	H	nb
140.0184	11.23	q	-21.83	249	104	V	nb
144.0124	11.02	q	-22.04	0	401	H	nb
150.0224	13.04	q	-20.02	270	162	V	bb
160.0154	8.74	q	-24.32	90	100	V	nb
165.4034	9.25	q	-23.81	270	100	V	bb
170.0424	8.78	q	-24.28	270	100	V	bb
174.7102	8.56	q	-24.50	249	104	V	bb
180.0261	17.00	q	-16.06	270	100	V	nb
200.0250	13.76	q	-19.30	249	104	V	nb
210.0260	11.92	q	-21.14	183	99	V	bb
213.8110	17.01	q	-16.05	183	99	V	pulsing nb
220.0296	24.91	m	-10.65	249	104	V	nb
225.3257	18.19	q	-17.37	249	104	V	bb
225.4197	18.18	q	-17.38	249	104	V	bb
234.7044	18.95	q	-16.61	173	98	V	bb
240.0302	21.77	q	-13.79	249	104	V	nb
243.2952	20.54	q	-15.02	0	100	V	pulsing nb
245.3095	17.50	q	-18.06	0	100	V	bb
250.0410	17.53	q	-18.03	90	162	V	bb
250.6707	19.81	q	-15.75	183	99	V	pulsing bb
260.0316	26.57	m	-8.99	185	101	V	nb
262.9584	18.50	q	-17.06	180	100	V	pulsing bb
265.4240	25.49	q	-10.07	183	99	V	pulsing nb in bb
274.6417	19.65	q	-15.91	180	100	V	bb
280.0324	24.56	q	-11.00	183	99	V	nb
290.0362	27.55	m	-8.01	173	98	V	bb
294.8836	22.41	q	-13.15	0	100	V	pulsing nb
300.0360	25.08	q	-10.48	0	100	V	nb amb?
320.0398	27.26	m	-8.30	183	99	V	nb

Table 4: Scan List for 22-B, sorted by Frequency, -30.0dB filter

FREQ, MHZ	VALUE	STS	22-B	TT	HGHT	AZ	COMMENT
50.5898	9.43	q	-20.57	90	401	H	nb
56.7233	12.54	q	-17.46	90	401	H	bb
61.5581	13.39	q	-16.61	90	401	H	bb
63.3661	15.17	m	-14.83	90	401	H	bb Power Line Noise
75.4214	9.15	q	-20.85	0	401	H	nb
80.0114	9.40	q	-20.60	0	401	H	nb
87.9946	12.62	m	-17.38	90	401	H	nb and Line Noise
131.9988	10.41	q	-19.59	0	401	H	nb
140.0184	11.23	q	-18.77	249	104	V	nb
144.0124	11.02	q	-18.98	0	401	H	nb
150.0224	13.04	q	-16.96	270	162	V	bb
160.0154	8.74	q	-21.26	90	100	V	nb
165.4034	9.25	q	-20.75	270	100	V	bb
170.0424	8.78	q	-21.22	270	100	V	bb
174.7102	8.56	q	-21.44	249	104	V	bb
180.0261	17.00	q	-13.00	270	100	V	nb
200.0250	13.76	q	-16.24	249	104	V	nb
210.0260	11.92	q	-18.08	183	99	V	bb
213.8110	17.01	q	-12.99	183	99	V	pulsing nb
220.0296	24.91	m	-5.09	249	104	V	nb
225.3257	18.19	q	-11.81	249	104	V	bb
225.4197	18.18	q	-11.82	249	104	V	bb
234.7044	18.95	q	-18.05	173	98	V	bb
240.0302	21.77	q	-15.23	249	104	V	nb
243.2952	20.54	q	-16.46	0	100	V	pulsing nb
245.3095	17.50	q	-19.50	0	100	V	bb
250.0410	17.53	q	-19.47	90	162	V	bb
250.6707	19.81	q	-17.19	183	99	V	pulsing bb
260.0316	26.57	m	-10.43	185	101	V	nb
262.9584	18.50	q	-18.50	180	100	V	pulsing bb
265.4240	25.49	q	-11.51	183	99	V	pulsing nb in bb
274.6417	19.65	q	-17.35	180	100	V	bb
280.0324	24.56	q	-12.44	183	99	V	nb
290.0362	27.55	m	-9.45	173	98	V	bb
294.8836	22.41	q	-14.59	0	100	V	pulsing nb
300.0360	25.08	q	-11.92	0	100	V	nb amb?
320.0398	27.26	m	-9.74	183	99	V	nb

Table 5: Complete Scan List Sorted by Frequency

FREQ, MHZ	I-VAL	FINAL	STS	TT	HGHT	AZ	TIME	COMMENT
50.5898	23.87	9.43	q	90	401	H	Wed May 22 19:37:20 2002	nb
56.7233	28.34	12.54	q	90	401	H	Wed May 22 19:37:24 2002	bb
61.5581	29.60	13.39	q	90	401	H	Wed May 22 19:37:26 2002	bb
63.3661	31.51	15.17	m	90	401	H	Wed May 22 19:37:28 2002	bb Power Line Noise
75.4214	24.98	9.15	q	0	401	H	Wed May 22 19:35:19 2002	nb
80.0114	24.66	9.40	q	0	401	H	Wed May 22 19:35:22 2002	nb
87.9946	26.45	12.62	m	90	401	H	Wed May 22 19:37:35 2002	nb and Line Noise
131.9988	20.45	10.41	q	0	401	H	Wed May 22 19:35:27 2002	nb
140.0184	21.39	11.23	q	249	104	V	Wed May 22 19:24:21 2002	nb
144.0124	21.15	11.02	q	0	401	H	Wed May 22 19:35:32 2002	nb
150.0224	23.72	13.04	q	270	162	V	Wed May 22 19:43:41 2002	bb
160.0154	19.91	8.74	q	90	100	V	Wed May 22 19:03:56 2002	nb
165.4034	20.68	9.25	q	270	100	V	Wed May 22 19:08:00 2002	bb
170.0424	20.22	8.78	q	270	100	V	Wed May 22 19:08:02 2002	bb
174.7102	20.65	8.56	q	249	104	V	Wed May 22 19:24:35 2002	bb
180.0261	29.37	17.00	q	270	100	V	Wed May 22 19:08:07 2002	nb
200.0250	25.65	13.76	q	249	104	V	Wed May 22 19:24:40 2002	nb
210.0260	23.27	11.92	q	183	99	V	Wed May 22 20:08:00 2002	bb
213.8110	28.46	17.01	q	183	99	V	Wed May 22 20:08:04 2002	pulsing nb
220.0296	35.82	24.91	m	249	104	V	Wed May 22 19:14:34 2002	nb
225.3257	28.51	18.19	q	249	104	V	Wed May 22 19:24:55 2002	bb
225.4197	28.49	18.18	q	249	104	V	Wed May 22 19:24:57 2002	bb
234.7044	28.74	18.95	q	173	98	V	Wed May 22 19:59:26 2002	bb
240.0302	30.99	21.77	q	249	104	V	Wed May 22 19:25:02 2002	nb
243.2952	29.47	20.54	q	0	100	V	Wed May 22 19:02:07 2002	pulsing nb
245.3095	26.22	17.50	q	0	100	V	Wed May 22 19:02:09 2002	bb
250.0410	25.82	17.53	q	90	162	V	Wed May 22 19:48:18 2002	bb
250.6707	28.02	19.81	q	183	99	V	Wed May 22 20:08:24 2002	pulsing bb
260.0316	35.09	26.57	m	185	101	V	Wed May 22 20:12:21 2002	nb
262.9584	26.99	18.50	q	180	100	V	Wed May 22 19:06:35 2002	pulsing bb
265.4240	33.94	25.49	q	183	99	V	Wed May 22 20:08:32 2002	pulsing nb in bb
274.6417	27.79	19.65	q	180	100	V	Wed May 22 19:06:40 2002	bb
280.0324	32.69	24.56	q	183	99	V	Wed May 22 20:08:37 2002	nb
290.0362	35.17	27.55	m	173	98	V	Wed May 22 19:58:10 2002	bb
294.8836	29.84	22.41	q	0	100	V	Wed May 22 19:02:32 2002	pulsing nb
300.0360	32.53	25.08	q	0	100	V	Wed May 22 19:02:34 2002	nb amb?
320.0398	34.47	27.26	m	183	99	V	Wed May 22 20:07:06 2002	nb

5.3 RADIATED EMISSIONS TABLE – 1 TO 18GHZ

The EUT was tested in 2 orthoganl positions at a distance of 3 Meters.

TEST NUMBER 020401-524
COGNITIVE CODE RANGER SN J020227178

Freq. (MHz)	TRN (dB/m)	I Val(pk) (dBuV)	F Val(pk) (dBuV/m)	Fval(avg) (dBuV/m)	Azimuth (deg)	Ant. Ht. (m)	POL	comment	Limit (dBuV/m)	Margin (- Fails)
CHANNEL 1 DATA										
2412	-6.45	113.57	107.12	87.12	305	136	V	F0 @ 3m		N/A
4824	0.1	62.77	62.87	42.87	305	1.35	V	2fo	54	11.13
7236	6.31	66.51	72.82	52.82	107	1.34	V	3fo	54	1.18
12060	16.38	34.23	50.61	30.61	111	1.35	v	noise flr	54	23.39
14472	17.41	37.21	54.62	34.62	334	1.01	V	noise flr	54	19.38
CHANNEL 2 DATA										
2437	-6.4	115.43	109.03	89.03	115	1.35	V	F0 @ 3m		N/A
4874	0.39	65.06	65.45	45.45	114	1.34	V	2fo	54	8.55
7311	6.44	67.41	73.85	53.85	115	1.36	V	3fo	54	0.15
12185	17.14	34.76	51.9	31.9	114	1.35	v	noise flr	54	22.1
14622	17.16	37.4	54.56	34.56	0	1.35	V	noise flr	85.66	51.1
CHANNEL 3 DATA										
2462	-6.33	114.06	107.73	87.73	275	1.4	h	F0 @ 3m		N/A
4924	0.49	63.05	63.54	43.54	277	1.36	h	2fo	54	10.46
7382	6.49	64.68	71.17	51.17	297	1.42	h	3fo	54	2.83
12310	17.77	33.6	51.37	31.37	239	1.18	v	noise flr	54	22.63
14772	19.52	37.5	57.02	37.02	0	1.18	v	noise flr	85.66	48.64

TEST NUMBER 020401-524
COGNITIVE CODE RANGER SN J020227178

Freq. (MHz)	TRN (dB/m)	I Val(pk) (dBuV)	F Val(pk) (dBuV/m)	Fval(avg) (dBuV/m)	Azimuth (deg)	Ant. Ht. (m)	POL	comment	Spec Limit (dBuV/m)	Margin (- Fails)
Channel 1 data										
2412	-6.45	112.1	105.65	85.65	260	1.2	H	F0 @ 3m		N/A
4824	0.1	57.38	57.48	37.48	258	1.2	H	2fo	54	16.52
7236	6.31	60.48	66.79	46.79	259	1.2	H	3fo	54	7.21
12060	16.38	33.6	49.98	29.98	184	1.2	H	noise flr	54	24.02
14472	17.41	37.2	54.61	34.61	242	1.2	H	noise flr	54	19.39
Channel 2 data										
2437	-6.4	113.63	107.23	87.23	238	1.5	H	F0 @ 3m		N/A
4874	0.39	63.71	64.1	44.1	240	1.52	H	2fo	54	9.9
7310.86	6.44	67.3	73.74	53.74	317	1.54	H	3fo	54	0.26
12185	17.14	33.6	50.74	30.74	362	1.5	v	noise flr	54	23.26
14622	17.16	37.4	54.56	34.56	360	1.54	H	noise flr	67.23	32.67
Channel 3 Data										
2462	-6.33	113.2	106.87	86.87	318	1.54	H	F0 @ 3m		N/A
4924	0.49	63.06	63.55	43.55	318	1.5	H	2fo	54	10.45
7382	6.49	66.82	73.31	53.31	318	1.55	H	3fo	54	0.69
12310	17.77	33.6	51.37	31.37	0	1.5	H	noise flr	54	22.63
14772	19.52	37.4	56.92	36.92	0	1.54	V	noise flr	66.87	29.95

Remarks All Measurments were performed with RBW and VBW set to 1MHz

5.4 ELECTROSTATIC DISCHARGE (EN61000-4-2, IEC1000-4-2, IEC 801-2)

Test Number: 020401-524

Test Article: Wireless Thermal Printer Model Number: RD-222424 EUT

Serial #: J020227178

Temperature: 20°C Humidity: 30% Atmospheric Pressure: 73.99kPa

Test Results: Complies [X] Does Not Comply [ ]

Test Personnel: ws Date: 10 May 2002

Discharge Method: Air (A), Contact (C) __ EUT Operating Voltage: 7.2VDC

TEST POINT DESCRIPTION	DISCHARGE VOLTAGE	PASS/FAIL CRITERIA	DISCHARGE NOTE	OBSERVED RESPONSE OF THE EUT
battery contacts on printer (3)	A +/-2,4,8kV	pass A	1	no discharge
battery contacts (2)	A +/-2,4,8kV	pass A	1	no discharge
slot by battery contacts	A +/-2,4,8kV	pass A	1	no discharge
door hinge on bottom	A +/-2,4,8kV	pass A	1	no discharge
door hinge on front	A +/-2,4,8kV	pass A	1	no discharge
paper cutter	A +/-2,4,8kV	pass A	1	no discharge
feed button	A +/-2,4,8kV	pass A	1	no discharge
power switch	A +/-2,4,8kV	pass A	1	no discharge
LED	A +/-2,4,8kV	pass A	1	no discharge
left door seam	A +/-2,4,8kV	pass A	1	no discharge
left top case seam	A +/-2,4,8kV	pass A	1	no discharge
left bottom case seam	A +/-2,4,8kV	pass A	1	no discharge
right door seam	A +/-2,4,8kV	pass A	1	no discharge
right top case seam	A +/-2,4,8kV	pass A	1	no discharge
right bottom case seam	A +/-2,4,8kV	pass A	1	no discharge
charger port	A +/-2,4,8kV	pass A	1	no discharge
RS232 port	A +/-2,4,8kV	pass A	1	no discharge
battery case seam, rear	A +/-2,4,8kV	pass A	1	no discharge
Horizontal Coupling Plane				
rear	C +/-2,4kV	pass A	2	none
left	C +/-2,4kV	pass A	2	none
front	C +/-2,4kV	pass A	2	none
right	C +/-2kV	pass A	2	none
right	C +4kV	pass A	2	none
right	C -4kV	pass B	3	lost comm. with host, recovered with out operator intervention
Vertical Coupling Plane				
rear	C +4kV	pass A	2	none
right	C +4kV	pass A	2	none
front	C +4kV	pass A	2	none
left	C +4kV	pass A	2	none

Discharge Notes:

1. No perceived discharge, and no observed response in the EUT.
2. Discharge observed, but no observed response in the EUT.

3. Discharge observed, and the EUT was effected.

Note: Refer to Setup Photos to see the test points.

5.5 RADIATED SUSCEPTIBILITY (EN 61000-4-3, IEC 1000-4-3, IEC 801-3)

Test Number: 020401-524

Test Article: Wireless Thermal Printer

Model Number: RD-333424-0H4 **Serial Number: J020227178**

Temperature: 15°C **Humidity: 24%** **Atmospheric Pressure: 18.63 kPa**

Test Results: Complies [X] **Does Not Comply [ ]**

Test Personnel: ws **Date: 10 May 2002**

EUT Operating Voltage: 7.2VDC **Dwell: 5 seconds**

TEST FREQUENCY (MHz)	FIELD STRENGTH (V/M)	MODULATION FREQ. %	FIELD POLARITY	TESTED SIDE OF EUT	PASS/FAIL CRITERIA	OBSERVED RESPONSE OF THE EUT
80MHz to 1GHz	3	1kHz 80% AM	horizontal	back	pass A	none
80MHz to 1GHz	3	1kHz 80% AM	vertical	back	pass A	none
900MHz	3	200Hz pulse	vertical	back	pass A	none
900MHz	3	200Hz pulse	horizontal	back	pass A	none
900MHz	3	200Hz pulse	horizontal	right	pass A	none
900MHz	3	200Hz pulse	vertical	right	pass A	none
80MHz to 1GHz	3	1kHz 80% AM	vertical	right	pass A	none
80MHz to 1GHz	3	1kHz 80% AM	horizontal	right	pass A	none
80MHz to 1GHz	3	1kHz 80% AM	horizontal	front	pass A	none
80MHz to 1GHz	3	1kHz 80% AM	vertical	front	pass A	none
900MHz	3	200Hz pulse	vertical	front	pass A	none
900MHz	3	200Hz pulse	horizontal	front	pass A	none
900MHz	3	200Hz pulse	horizontal	left	pass A	none
900MHz	3	200Hz pulse	vertical	left	pass A	none
80MHz to 1GHz	3	1kHz 80% AM	vertical	left	pass A	none
80MHz to 1GHz	3	1kHz 80% AM	horizontal	left	pass A	none

6.0 APPENDIX C: CRITERION TECHNOLOGY PRODUCT INFORMATION FORM

General Information

Date_03/03/02_____

Company Name: Cognitive_____
Company Address: 720 Corporate Circle, Unit E, Golden, Colorado 80401_____
_____
_____

Contacts:

Compliance Engineer: Tim Holzschuh, 303-273-1400-343, Tim.Holzschuh@Cognitive.com
Design Engineer: Roger Shepherd, 303-273-1400-331, Roger.Shepherd@Cognitive.com

Test Description

De-Bug_____Formal (Initial) XX_____Formal (Re-Verification)_____

Market Information (Check all that Apply)

USA X_ Canada X_ Euro. Union X_ Taiwan____ Japan___ New Zealand___ Australia___
Other_____

Product Information

Name Code Ranger RF_____Model Number RD232424-0H3 & RD222424-0H4

Product Dimensions: 190x119x102 mm and 160x119x89 mm__ Weight: 0.8 and 0.7 kg

Product Power Source:

Battery
Type NiMH

AC Supply
Input Voltage Range(s) 120VAC to 9VDC
Phases_____ Delta_____ Wye____
Current 100mA
Frequency 60Hz
Manufacturer CUI Stack
Model Number 101-125-01

Topology
Linear X Switching Mode_____ Switching Frequency_____

Support Equipment (if used):

CPU:
Manufacturer NCR
Model No. System 3333 Model 5502
Serial No. 15-25963970

Monitor:
Manufacturer ViewSonic
Model No. E655-1M
Serial No. E364600155

Keyboard:
Manufacturer Premio
Model No. KPQEA4ZA
Serial No. 50*KPQEA4ZA796G7529*7745

Mouse:
Manufacturer Microsoft
Model No. 93633
Serial No. 00548921

I/O Cables – Manufacturer, P/N, Length :

Serial Port Cognitive, 101-155-02, 1meter
Parallel Port_____
SCSI Port_____
Other_____

Operation Software:
Name SerialTester.exe Version Number 1.0

Operating Modes: (Please Include Cycle Time)
Sleep, Idle, Print labels

Operation Pass/Fail Criteria:
First level: no affect on printer or PC operation
Second level: printer operation affected, but no permanent damage
Third level: PC operation affected, but no permanent damage

Test Type – Emissions (Please check all that apply):

Information Technology Equipment
Class A_____
Class B X
Oscillator/Clock Frequencies (MHz) 14.7456 and 12.0

Industrial, Scientific, Medical Equipment
Class A_____
Class B_____
Oscillator/Clock Frequencies (MHz)_____

Unintentional Radiator
Class A_____
Class B X
Oscillator/Clock Frequencies (MHz) 14.7456 and 12.0

Receiver
Type (Regen., Superhet., Direct Conv., Homodyne 802.11
Local Oscillator Frequencies_____
Frequency Range 2.40 to 2.50 GHz

Intentional Radiator
Fundamental Frequency Range 2.40 to 2.50 GHz
Local Oscillator Frequencies_____
Power Output (to antenna)_____
Integral Antenna (Yes/No)_____
Modulation Type (AM, CM, Pulse, Spread Spectrum)_____
Control Circuits (Microprocessor/Micro-controller)_____
Oscillator/Clock Frequencies (MHz)_____

_____**IEC 61000-3-2**, Harmonics
Max. Steady State Power Consumed by Product: _____Watts

_____**IEC 61000-3-3,** Flicker Meter

IMMUNITY TESTING

Test Type (Please check all that apply): not sure

_____**EN 50082-1 –**Electromagnetic Compatibility-Generic Immunity Standard, Part 1. Residential, Commercial and Light Industry

_____**EN 50082-2** –Electromagnetic Compatibility-Generic Immunity Standard, Part 2.Industrial Environment

_____**EN 55024** –Information Technology Equipment – Immunity Characteristics - Limits and Methods of Measurement Requirements

_____**EN 60601-1-2** –Medical Electrical Equipment, Collateral Standard: EMC Requirements and Test

_____**EN 61326** -Electrical Equipment for Measurement, Control and Laboratory Use –EMC Requirements

EN 61000-4-2 (ESD)

Number of Metallic test points touchable by equipment operator: _____
Number of Non-Metallic test points touchable by equipment operator: _____
Is the product enclosure completely plastic? _no_____
Is the product enclosure partly plastic? _yes_____
Are there any additional ESD voltages required for testing? If so, list herein:
_no___

EN 61000-4-4 (Electrical Fast Transients)

How many interfacing cables are greater than 3 meter long? _none
List each cable by name? _____

EN 61000-4-3 & ENV 50204 (Radiated Susceptibility Testing, 80 - 1000 MHz)

What is the maximum time necessary for the product to respond? _none
During normal operations, what parameter will be monitored to determine susceptibility of the product? _printing labels

EN 61000-4-5 (Surge Testing on Power Lines)

Optional: Are there any long interfacing cables to be tested? _no
If so, how many? _____
Note: Cables must be tested at a length of 20 meters.

EN 61000-4-6 (Conducted Disturbance Testing)

How many interfacing cables are greater than 3 meter long? _none
List each cable by name? _____

EN 61000-4-8 (Magnetic Field Susceptibility Testing)

Test is applicable to Hall Elements, Electrodynamic Microphones, Magnetic Field Sensors and CRT Monitors. _Do any of these apply?_no

EN 61000-4-11 (Voltage Sag and Interruptions)

Comments:_____

7.0 APPENDIX D: TEST EQUIPMENT AND CALIBRATION STATUS

TABLE IV. LAB CALIBRATION LIST AS OF APRIL 29, 2002

Manufacturer	Name/Description	Model Number	Serial Number	Cal. Due Date
Amplifier Research	Directional Coupler	DC2600	302981	4/11/03
Amplifier Research	E-Field Probe	FP2000	19682	03/19/03
Amplifier Research	E-Field Probe	FP2080	20236	03/20/03
Amplifier Research	Power Amplifier	150A100A	20183	04/02/03
Amplifier Research	Power Amplifier	100W1000M1	20214	04/02/03
Amplifier Research	Power Amplifier	10S1G4	20155	04/11/03
Amplifier Research	Coupler	DC6080	19529	04/11/03
Andrews Heliax Cable	F2-50 Low Loss Coax	F2-50	N/A	04/26/03
Antenna Research Associates	1-18 GHz Horn	DRG118/A	1056	03/24/03
Antenna Research Associates	1-18 GHz Horn	DRG118/A	1057	04/22/03
Chase	Bilog 30 - 1000 MHz	CB6111	1121	05/03/03
Dickson	Temperature/ RH Recorder	THDX	5300245	03/15/03
EMCO	Active Loop	6502	2626	10/26/02
EMCO	BiConnical 30-200 MHz	3108	2343	05/03/03
EMCO	BiConnical 30-200 MHz	3108	2441	05/03/03
EMCO	Log Periodic 200 - 1000 MHz	3146	2763	05/03/03
EMCO	Log Periodic 200 - 1000 MHz	3146	3096	05/03/03
EMCO	Horn	3115	4003	Verif. for Use
EMCO	Dipole	3121C	722	Verify
FCC	CDN	FCC-801-M3-25	9714	11/27/02
FCC	EM Clamp	F2031	309	11/29/02
FCC	Current Probe	F-33-2	67	12/20/02
FCC	Current Probe	F-33-1	154	12/20/02
Fluke	Digital Multimeter	87	60800598	2/18/03
Fluke	Digital Multimeter	87	66320753	2/18/03
Fluke	Digital Multimeter	87	68630334	2/18/03
Gigatronics	Power Meter	8541C	1830945	11/9/02
Gigatronics	Power Sensor	80301A-410	1831996	11/9/02
Haefely Trench	Coupling Network	IP6.2	083 957-02	09/26/02
Haefely Trench	De-coupling Network	DEC1A	080057-09	09/26/02
Haefely Trench	EFT Coupling Clamp	IP4A	080-011-06	09/26/02
Haefely Trench	EFT Tester	PEFT Junior	583-333-51	09/26/02
Haefely Trench	Impulse Module	PHV 30.2	083991-06	09/26/02

Manufacturer	Name/Description	Model Number	Serial Number	Cal. Due Date
Haefely Trench	Surge Generator	PSURGE 6.1	083 906-07	09/26/02
Haefely Trench	Surge Network	FP-SURGE 32.1	083925-05	09/26/02
Haefely Trench	ESD Gun	PESD 1600	H605100	09/10/02
Haefely Trench	Dip Generator	PLINE1610	083 970-07	09/26/02
Haefely Trench	Power Supply	PHF555	080-419-05	09/26/02
Heise	Barometer	710A	S7-15256	02/06/03
Hewlett Packard	Tracking Generator	HP85645A	3210A00124	06/14/02
Hewlett Packard	Quasi Peak Adapter	HP 85650A	2521A00733	06/14/02
Hewlett Packard	Pulse Generator	HP 8116A	2901G09493	10/21/02
Hewlett Packard	Spectrum Analyzer	HP 8594E	3412A01039	11/5/02
Hewlett Packard	Spectrum Analyzer	HP 8591A	2919A00220	03/25/03
Hewlett Packard	Preselector	HP 8445B	1704A02674	Verify
Hewlett Packard	Signal Generator	HP 8648D	3642000145	03/15/03
Hewlett Packard	Spectrum Analyzer	HP 8566B	2403A07322	07/02/02
Hewlett Packard	Spectrum Analyzer	HP 8566B	2421A00527	07/02/02
Hewlett Packard	Directional Coupler	HP 779D	1144-C4725	4/26/03
Hewlett Packard	Power Splitter	11667A	13688	04/04/03
Le Croy	Digital Storage Oscilloscope	9450	2141	03/20/03
Lehman Chambers	Semi Anechoic Chamber	N/A	N/A	09/25/02
Microwave Instrumentation Technologies	18-26.5 GHz Horn	12A-18	115300	1/14/03
Microwave Instrumentation Technologies	26.5 - 40 GHz Horn	12A-26	20493KE	03/25/03
Mini Circuits (in HP case)	Preamp (AMP5)	ZFL-1000LN	N/A	04/29/03
NSAs	Open Area Test Site	N/A	N/A	07/09/02
Rohde/Schwarz	LISN	ESH2-Z5	828739-001	07/23/02
Rohde/Schwarz	HF Receiver	ESHS-30	82600/011	08/01/02
Rohde/Schwarz	VHF/UHF Receiver	ESVS-30	8634221014	04/01/03
Solar Electronics Co.	LISN	8610-50-TS-100-N	967622	04/02/03
Tegam	Current Probe	925236-1	12588	12/7/02
Tektronix	Oscilloscope	2467B	B051203	2/18/03
Tektronix	Oscilloscope	2465A	B021016	2/18/03
Veratech	Preamp (AMP2)			04/03/03

8.0 APPENDIX E: TEST DIRECTIVES, STANDARDS AND METHODS

8.1 EUROPEAN DIRECTIVES, STANDARDS AND METHODS

8.1.1 89/336/EEC: *Council Directive of 03 May 1989 on the Approximation of the Laws of the Member States Relating to Electromagnetic Compatibility*, *OJEC* No. L 139/19-26, 23 May 1989.

8.1.2 EN 50081-1 (CENELEC): *EMC - Generic Emission Standard, Part 1: Residential, Commercial and Light Industry*, 1992.

8.1.3 EN 50081-2 (CENELEC): *EMC - Generic Emission Standard, Part 2: Industrial Environment*, 1993.

8.1.4 EN 50082-1 (CENELEC): *Electromagnetic Compatibility - Generic Immunity Standard, Part 1: Residential, Commercial and Light Industry*, 1998.

8.1.5 EN 50082-2 (CENELEC): *Electromagnetic Compatibility - Generic Immunity Standard, Part 2: Industrial Environment*, 1995.

8.1.6 ENV 50204 (CENELEC): *Testing and Measurement Techniques; Radiated Electromagnetic Field from Digital Radio Telephones - Immunity Test*, 1996.

8.1.7 EN 55011 (CENELEC): *ISM Radio-Frequency Equipment Radio Disturbance Characteristics - Limits and Methods of Measurement*, 1999.

8.1.8 EN 55014-1 (CENELEC): Part 1. *Electromagnetic Compatibility Requirements for Household Appliances, Electric Tools and Similar Apparatus - Part 1. Emission - Product Family Standard*, 2001.

8.1.9 EN 55022 (CENELEC): *ITE - Radio-Frequency Equipment Radio Disturbance Characteristics - Limits and Methods of Measurement*, 1998.

8.1.10 EN 55024 (CENELEC): *ITE - Immunity Characteristics - Limits and Methods of Measurement*, 1998.

8.1.11 EN 60601-1-2 (CENELEC): *Medical Electrical Equipment. Part 1. General Requirements for Safety - Section 1.2. Collateral Standard: Electromagnetic Compatibility - Requirements and Tests, 1993.*

8.1.12 EN 61000-3-2 (CENELEC): EMC - Part 2. *Limits for Harmonic Current Emissions (Equipment Input Current ≤16 A per phase),* 2000.

8.1.13 EN 61000-3-3 (CENELEC): EMC - Part 3. *Limitation of Voltage Fluctuation and Flicker in Low-Voltage Supply Systems for Equipment with Rated Current ≤16 A*, 1998.

8.1.14 EN 61000-4-2 (CENELEC): EMC - Part 4. *Testing and Measurement Techniques; Section 2. Electrostatic Discharge Immunity Test*, 1995.

8.1.15 EN 61000-4-3 (CENELEC): EMC - Part 4. *Testing and Measurement Techniques; Section 3. Radiated, Radio-Frequency, Electromagnetic Field Immunity*, 1996.

8.1.16 EN 61000-4-4 (CENELEC): EMC - Part 4. *Testing and Measurement Techniques; Section 4. Electrical Fast Transient/Burst Immunity Test*, 1999.

8.1.17 EN 61000-4-5 (CENELEC): EMC - Part 4. *Testing and Measurement Techniques; Section 5. Surge Immunity Test*, 1996.

8.1.18 EN 61000-4-6 (CENELEC): EMC - Part 4. *Testing and Measurement Techniques; Section 6. Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields*, 1997.

8.1.19 EN 61000-4-8 (CENELEC): EMC - Part 4. *Testing and Measurement Techniques; Section 8. Power Frequency Magnetic Field Immunity Test*, 1993.

8.1.20 EN 61000-4-11 (CENELEC): EMC - Part 4. Testing and Measurement Techniques; Section 11. Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests, 1994

8.1.21 EN 61326 (CENELEC): *ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE - EMC REQUIREMENTS*, 1998.

8.2 FCC PART 15

8.2.1 Subpart A.

8.2.2 Subpart B.

8.2.3 Subpart C.

8.2.4 Subpart D.

8.3 FCC PART 22

8.4 FCC PART 24

8.5 JAPAN

VCCI V-3

8.6 CANADA

8.6.1 ICES-001: *Interference-Causing Equipment Standard - ISM RF Generators*, 1998.

8.6.2 ICES-003: *Interference-Causing Equipment Standard - Digital Apparatus*, 1997.

8.7 AUSTRALIA/NEW ZEALAND

SAA AS/NZ 3548: *Limits and Methods of Measurement of Radio Disturbance Characteristics of ITE*, 1997.

8.8 CHINA

CNS13438, 1997.

9.0 APPENDIX F: ANTENNA MEASUREMENTS AND EIRP CALCULATIONS

TABLE V a. ANTENNA PROPAGATION MEASUREMENTS A

	ARA DG-118A horn (#1056) (RCV) 3 Meter Ht ARA DG-118A horn (#1057) (XMIT) 1.5 Meter Ht	COGNITIVE DIPOLE (RCV) 3 Meter Ht ARA DG-118A horn (#1057) (XMIT) 1.5 Meter Ht
Frequency	dBuV	dBuV
2412 MHz	75.45 dBuV	66.85 dBuV
2437 MHz	75.2 dBuV	67.45 dBuV
2462 MHz	74.9 dBuV	66.2 dBuV

TABLE V b . ANTENNA PROPAGATION MEASUREMENTS B

	DG-118A horn (#1057) (RCV) 3 Meter Ht DG-118A horn (#1056) (XMIT) 1.5 Meter Ht	COGNITIVE DIPOLE (RCV) 3 Meter Ht DG-118A horn (#1057) (XMIT) 1.5 Meter Ht
Frequency	dBuV	dBuV
2412 MHz	75.2 dBuV	66.85 dBuV
2437 MHz	75.55 dBuV	67.45 dBuV
2462 MHz	74.55 dBuV	66.2 dBuV

TABLE V c . ANTENNA PROPAGATION MEASUREMENTS C

	ARA DG-118A horn (#1056) (RCV) 3 Meter Ht ARA DG-118A horn (#1057) (XMIT) 1.5 Meter Ht	COGNITIVE DIPOLE (RCV) 3 Meter Ht ARA DG-118A horn (#1056) (XMIT) 1.5 Meter Ht
Frequency	dBuV	dBuV
2412 MHz	75.45 dBuV	66.25 dBuV
2437 MHz	75.2 dBuV	67.3 dBuV
2462 MHz	74.9 dBuV	65.55 dBuV

Note: Antenna gain measurements were made in the horizontal polarity

TABLE VI a. ANTENNA GAIN CALCULATIONS FOR TABLE V a

	2412 MHz	2437 MHz	2462 MHz
HORN TO HORN SIGNAL – TABLE Va	75.45 dBuV	75.2 dBuV	74.9 dBuV
HORN TO COGNITIVE DIPOLE SIGNAL – TABLE IVa	66.85 dBuV	67.45 dBuV	66.2 dBuV
DIFFERENCE IN SIGNAL STRENGTH (db)	8.6 db	7.75 db	8.7 db
#1056 HORN GAIN	7.45 db	7.50 db	7.55 db
RESULTING COGNITIVE ANTENNA/ COAX ASSEMBLY GAIN	-1.15 db	-0.25 db	-1.15 db

TABLE VI b. ANTENNA GAIN CALCULATIONS FOR TABLE V b

	2412 MHz	75.55 dBuV	2462 MHz
HORN TO HORN SIGNAL – TABLE Va	75.2 dBuV	75.55 dBuV	74.55 dBuV
HORN TO COGNITIVE DIPOLE SIGNAL – TABLE IVa	66.85 dBuV	67.45 dBuV	66.2 dBuV
DIFFERENCE IN SIGNAL STRENGTH (db)	8.35 db	8.1 db	8.35 db
#1056 HORN GAIN	7.45 db	7.50 db	7.55 db
RESULTING COGNITIVE ANTENNA/ COAX ASSEMBLY GAIN	-0.9 db	-0.6 db	-0.8 db

TABLE VI c. ANTENNA GAIN CALCULATIONS FOR TABLE V c

	2412 MHz	2437 MHz	2462 MHz
HORN TO HORN SIGNAL – TABLE Va	75.45 dBuV	75.2 dBuV	74.9 dBuV
HORN TO COGNITIVE DIPOLE SIGNAL – TABLE IVa	66.25 dBuV	67.3 dBuV	65.55 dBuV
DIFFERENCE IN SIGNAL STRENGTH (db)	9.2 db	7.9 db	9.35 db
#1057 HORN GAIN	7.65 db	7.72 db	7.8 db
RESULTING COGNITIVE ANTENNA/ COAX ASSEMBLY GAIN	-1.55 db	-0.18 db	-1.55 db

TABLE VII. EIRP CALCULATIONS

	2412 MHz	2437 MHz	2462 MHz
COGNITIVE DIPOLE/COAX GAIN FROM TABLE VI a	-1.15 db	-0.25 db	-1.15 db
COGNITIVE DIPOLE/COAX GAIN FROM TABLE VI b	-0.9 db	-0.6 db	-0.8 db
COGNITIVE DIPOLE/COAX GAIN FROM TABLE VI c	-1.55 db	-0.18 db	-1.55 db
MINIMUM COGNITIVE ANTENNA/COAX GAIN	-1.55 db	-0.6 db	-1.55 db
MAXIMUM COGNITIVE ANTENNA/COAX GAIN	--0.9 db	-0.18 db	-0.8 db
POWER AVAILABLE FROM SYMBOL CARD (as measured by Compliance Certification Services in report # 02U1292-1)	13 dbm	12.75 dbm	11.8 dbm
MAXIMUM EIRP (dbm)	12.1 dbm	12.57 dbm	11.0 dbm
MAXIMUM EIRP (milliwatts)	16.2	18.1	12.6