



ESCORT MEMORY SYSTEMS TEST REPORT

FOR THE

RFID READER/WRITER, LRP75/LRP76

FCC PART 15 SUBPART C SECTIONS 15.207, 15.209 & 15.225

COMPLIANCE

DATE OF ISSUE: SEPTEMBER 13, 2002

PREPARED FOR:

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Date of test: July 29 - August 13, 2002

Report No.: FC02-062

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A2LA (USA); BSMI (Taiwan); Nemko (Norway); and GOST (Russia).

CKC Laboratories, Inc has received test site Registration Acceptance from the following agencies:

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CKC Laboratories, Inc. has received Letters of Acceptance through an MRA for the following agencies:

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ADMINISTRATIVE INFORMATION

DATE OF TEST: July 29 - August 13, 2002

DATE OF RECEIPT: July 29, 2002

PURPOSE OF TEST: To demonstrate the compliance of the RFID Reader/Writer, LRP75/LRP76 with the requirements for FCC Part 15 Subpart C Sections 15.207, 15.209 and 15.225 devices.

TEST METHOD: ANSI C63.4 (1992)

MANUFACTURER: Escort Memory Systems
170 Technology Circle
Scotts Valley, CA 95066

REPRESENTATIVE: Scott Balzer

TEST LOCATION: CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

SUMMARY OF RESULTS

As received, the Escort Memory Systems RFID Reader/Writer, LRP75/LRP76 was found to be fully compliant with the following standards and specifications:

United States

- FCC Part 15 Subpart C Sections 15.207, 15.209 and 15.225
- ANSI C63.4 (1992) method

Canada

RSS-210 using:

- FCC Part 15 Subpart C Sections 15.207, 15.209 and 15.225

Industry of Canada File No. IC 3082-B

CONDITIONS FOR COMPLIANCE

LRP75: Ferrites attached at each end of the RS232 cable - the EUT end has 1 turn, the computer end has no turns. Ferrite cores with 1 wrap added to the ends of DC leads. Ferrites are installed on at the AC input to the transformer. Ferrite installed at the power entry point with one wrap. Copper shield installed between antenna and TX PCB. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189 Shield of the 13.56 MHz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed.

LRP76: Ferrites attached at each end of the RS232 cable - the EUT end has 1 turn, the computer end has no turns. Ferrite clamp installed at connector between antenna and antenna shield plate. EUT test bracket is earth referenced. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed.

APPROVALS

QUALITY ASSURANCE:

TEST PERSONNEL:

A handwritten signature in black ink, appearing to read "Steve Behm".

Steve Behm, Director of Engineering Services

A handwritten signature in black ink, appearing to read "Randy Clark".

Randy Clark, EMC Engineer

A handwritten signature in black ink, appearing to read "Joyce Walker".

Joyce Walker, Quality Assurance Administrative Manager

A handwritten signature in black ink, appearing to read "Chuck Kendall".

Chuck Kendall, EMC/Lab Manager

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The RFID Reader/Writer tested by CKC Laboratories was a production unit.

15.31(m) Number Of Channels

This device operates on a single channel.

15.33(a) Frequency Ranges Tested

15.207 Conducted: 450 kHz – 30 MHz

15.209 Radiated: 9 kHz – 1000 MHz

FCC SECTION 15.35: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	450 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz

15.203 Antenna Requirements

The antenna is an integral part of the EUT and is non-removable; therefore the EUT complies with Section 15.203 of the FCC rules.

15.205 Restricted Bands

The fundamental operating frequency lies outside the restricted bands and therefore complies with the requirements of Section 15.205 of the FCC rules. Any spurious emission coming from the EUT was investigated to determine if any portion lies inside the restricted band. If any portion of a spurious emissions signal was found to be within a restricted band, investigation was performed to ensure compliance with Section 15.209.

Eut Operating Frequency

The EUT was operating at 13.56 MHz.

Temperature And Humidity During Testing

The temperature during testing was within +15°C and + 35°C.

The relative humidity was between 20% and 75%.

EQUIPMENT UNDER TEST

RFID Reader/Writer

Manuf: Escort Memory Systems
Model: LRP75
Serial: 072902-001
FCC ID: pending

RFID Reader/Writer

Manuf: Escort Memory Systems
Model: LRP76
Serial: 080102-002
FCC ID: pending

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

EUT Power Supply

Manuf: International Power
Model: IPB500950
Serial: NA
FCC ID: NA

Host Computer

Manuf: Compaq
Model: 2870B
Serial: 3736HUR16020
FCC ID: CNT75MB36B

Power Supply for Computer

Manuf: Compaq
Model: 246960-001
Serial: CT:501BA14C1R687
FCC ID: NA

Computer Power Supply

Manuf: IBM
Model: AA21131
Serial: 1Z0ZA026211
FCC ID: NA

Computer

Manuf: IBM
Model: 2628-J1U
Serial: 78-MFV57
FCC ID: DoC

REPORT OF MEASUREMENTS

The following tables report the worst case emissions levels recorded during the tests performed on the RFID Reader/Writer, LRP75/LRP76. All readings taken were peak readings unless otherwise stated. The data sheets from which the emissions tables were compiled are contained in Appendix C.

Table 1: 15.225(a) Fundamental Emission Levels									
FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Ant dB	Corr dB	Cable dB	dB				
13.563	59.5	9.6	-20.0	0.7		49.8	80.0	-30.2	H-6
13.563	35.3	9.6	-20.0	0.7		25.6	80.0	-54.4	V-5
13.564	48.9	9.6	-20.0	0.7		39.2	80.0	-40.8	V-6
13.564	44.5	9.6	-20.0	0.7		34.8	80.0	-45.2	H-5

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.225
Test Distance: 10 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
5 = LRP75
6 = LRP76

COMMENTS: EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Test Distance correction factor used in accordance with 15.31 (40dB/Decade). Ferrites attached at each end of the RS232 cable - the EUT end has 1 turn, the computer end has no turns.

LRP75: Ferrite cores with 1 wrap added to the ends of DC leads. Ferrites are installed on at the AC input to the transformer. Ferrite installed at the power entry point with one wrap. Copper shield installed between antenna and TX PCB. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed.

LRP76: Ferrite clamp installed at connector between antenna and antenna shield plate. EUT test bracket is earth referenced. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed.

Table 2: 15.207 Six Highest Conducted Emission Levels

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV	SPEC LIMIT dBμV	MARGIN dB	NOTES
		Lisn dB		Cable dB					
3.150612	39.1	0.2		0.2		39.5	48.0	-8.5	W-6
3.262092	39.2	0.2		0.2		39.6	48.0	-8.4	W-6
3.317832	39.0	0.2		0.2		39.4	48.0	-8.6	W-6
3.367998	38.7	0.2		0.3		39.2	48.0	-8.8	W-6
13.571100	46.3	0.6		0.3		47.2	48.0	-0.8	WQ-5
13.571100	46.4	0.5		0.3		47.2	48.0	-0.8	BQ-5

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.207

NOTES:
Q = Quasi Peak Reading
B = Black Lead
W = White Lead
5 = LRP75
6 = LRP76

COMMENTS: EUT is located on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. Frequency Range Investigated: 450kHz - 30Mhz. EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable. The EUT end has 1 turn, the computer end has no turns.

LRP75: Ferrite cores with 1 wrap added to the ends of DC leads. EUT test enclosure tied to earth ground. Ferrites are installed on at the AC input to the transformer. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed.

LRP76: Ferrite clamp installed at connector between antenna and antenna shield plate. EUT test bracket is earth referenced. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground.

Table 3: 15.209/15.225(b) Highest Radiated Emission Levels: 9 kHz - 30 MHz

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
27.124	15.0	6.5	-20.0	1.0		2.5	29.5	-27.0	H-5
27.125	13.9	6.5	-20.0	1.0		1.4	29.5	-28.1	V-5
27.126	14.2	6.5	-20.0	1.0		1.7	29.5	-27.8	V-6
27.127	16.5	6.5	-20.0	1.0		4.0	29.5	-25.5	H-6

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209/15.225(b)
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
5 = LRP75
6 = LRP76

COMMENTS: LRP75 & LRP76: EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. EUT Configuration Notes: Ferrites attached at each end of the RS232 cable. The EUT end has 1 turn. The computer end has no turns. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. Test distance correction factor used in accordance with 15.31 (40dB/Decade). Frequency Range Investigated: 9kHz - 30MHz.

LRP75:

LRP76: EUT Configuration Notes: Ferrite clamp installed at connector between antenna and antenna shield plate. EUT test bracket is earth referenced. Board changes: 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed.

Table 4: 15.209/15.225(b) Six Highest Radiated Emission Levels: 30-1000 MHz

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
40.786	39.9	11.1	-26.8	1.2	10.0	35.4	40.0	-4.6	VQ-5
230.629	38.3	16.5	-26.2	3.1	10.0	41.7	46.0	-4.3	H-5
230.657	37.9	16.5	-26.2	3.1	10.0	41.3	46.0	-4.7	H-6
257.784	37.0	16.9	-26.1	3.3	10.0	41.1	46.0	-4.9	V-5
447.640	38.4	17.2	-27.2	4.6	10.0	43.0	46.0	-3.0	H-5
447.666	37.7	17.2	-27.2	4.6	10.0	42.3	46.0	-3.7	V-5

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209/15.225(b)
Test Distance: 10 Meters

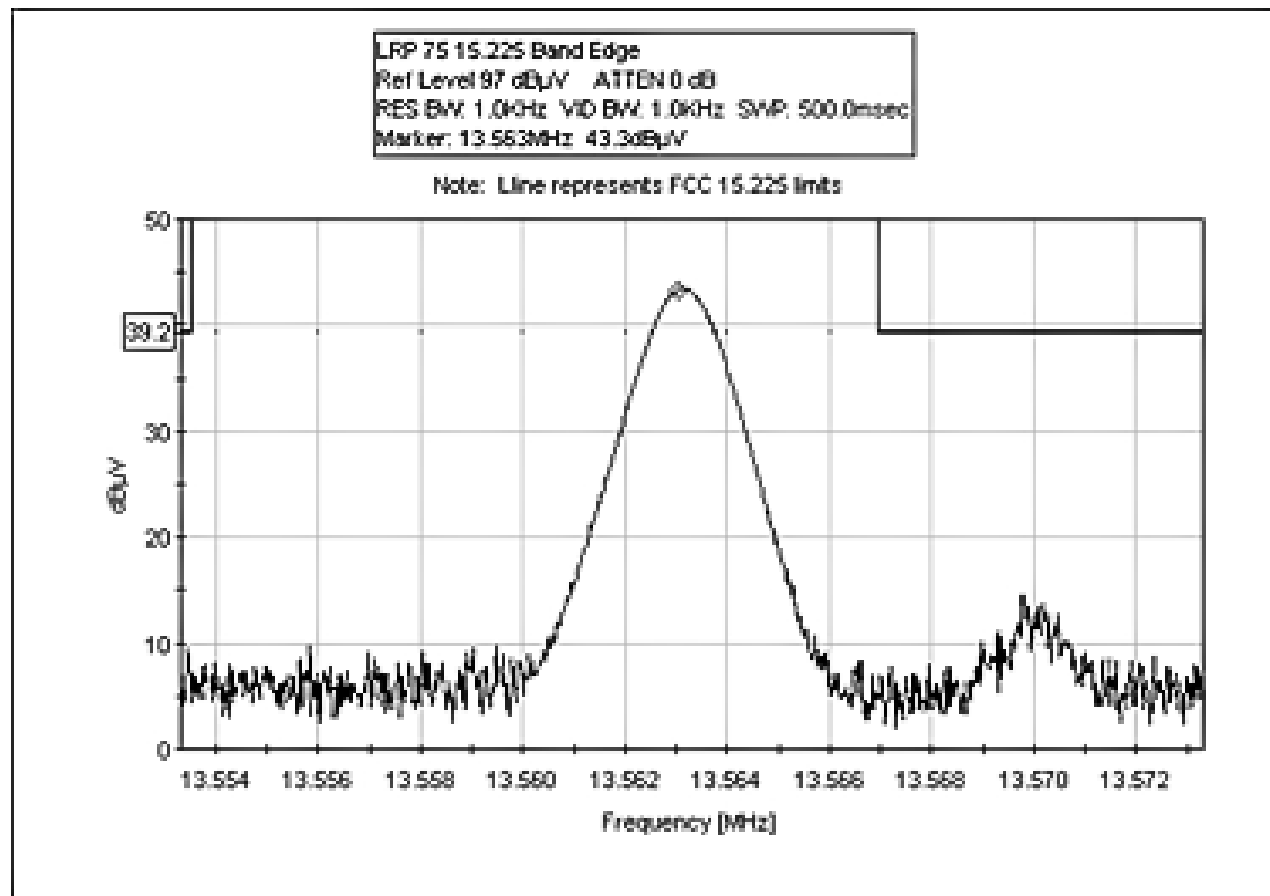
NOTES: H = Horizontal Polarization
V = Vertical Polarization
Q = Quasi Peak Reading
5 = LRP75
6 = LRP76

COMMENTS: EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable. The EUT end has 1 turn, the computer end has no turns. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. Frequency Range Investigated: 30-1000MHz.

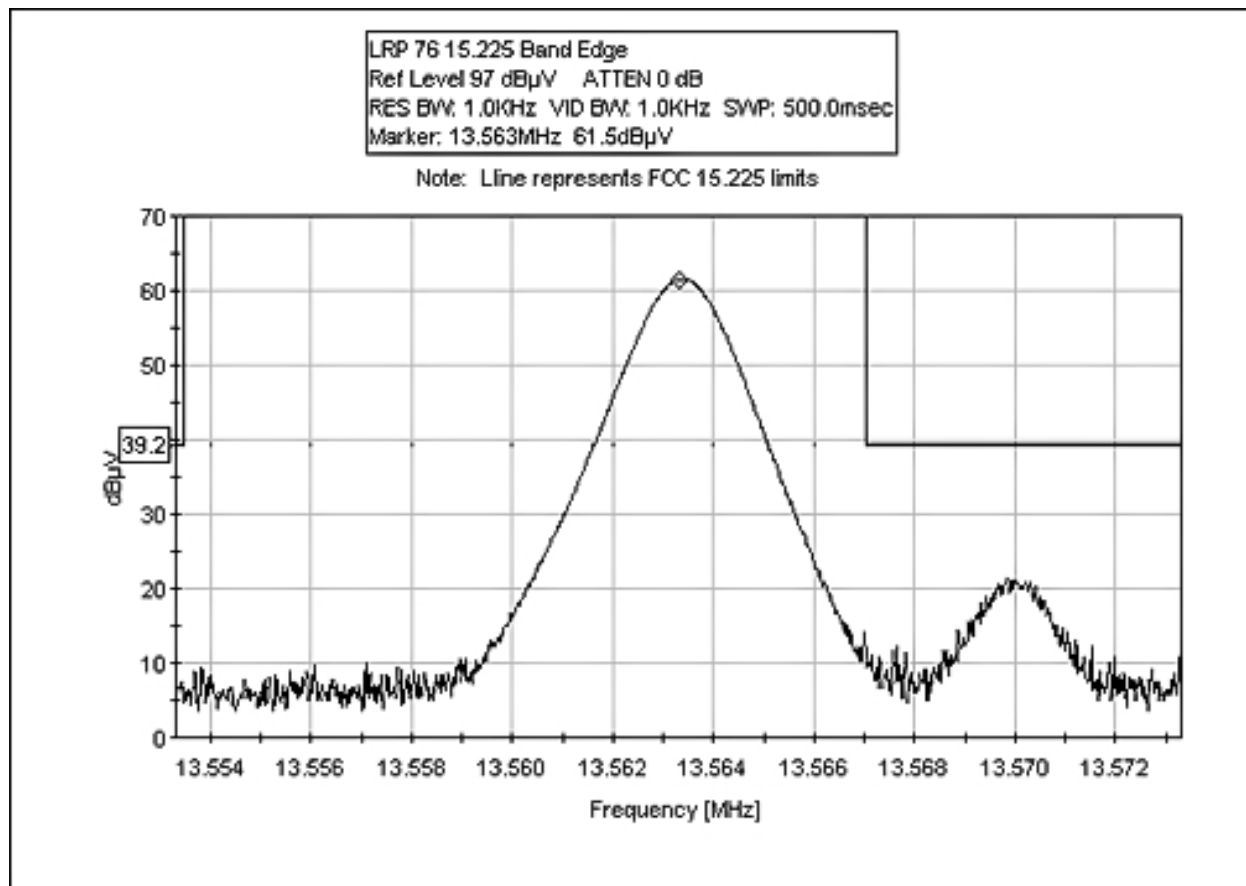
LRP75: EUT Configuration Notes: Ferrite cores with 1 wrap added to the ends of DC leads. Ferrites are installed on at the AC input to the transformer. Ferrite installed at the power entry point with one wrap. Copper shield installed between antenna and TX PCB. Board Changes: 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed.

LRP76: EUT Configuration Notes: Ferrite clamp installed at connector between antenna and antenna shield plate. EUT test bracket is earth referenced.

15.225(b) BANDEDGE PLOT – LRP75



15.225(b) BANDEDGE PLOT – LRP76





15.225(c) FREQUENCY TOLERANCE AND 15.31(e) VOLTAGE VARIATION

Device Model #: LRP 75
Operating Voltage: 24.0 VDC
Frequency Limit: 0.01 %

Temperature Variations

Channel Frequency:		Channel 1 (MHz)	Dev. (MHz)
		13.563	
Temp (C)	Voltage		
-30	24.0	13.563320	0.00032
-20	24.0	13.563330	0.00033
-10	24.0	13.563341	0.00034
0	24.0	13.563334	0.00033
10	24.0	13.563305	0.00030
20	24.0	13.563267	0.00027
30	24.0	13.563131	0.00013
40	24.0	13.563058	0.00006
50	24.0	13.563100	0.00010

Voltage Variations ($\pm 15\%$)

20	20.4	13.56305	0.00005
20	24.0	13.56311	0.00011
20	27.6	13.56312	0.00012

Max Deviation (MHz)	0.00034
Max Deviation (%)	0.00251
PASS	

Device Model #: LRP 76
 Operating Voltage: 24.0 VDC
 Frequency Limit: 0.01 %

Temperature Variations

Channel Frequency:		Channel 1 (MHz)	Dev. (MHz)
		13.563	
Temp (C)	Voltage		
-30	24.0	13.563367	0.00037
-20	24.0	13.563383	0.00038
-10	24.0	13.563415	0.00042
0	24.0	13.563437	0.00044
10	24.0	13.563439	0.00044
20	24.0	13.563428	0.00043
30	24.0	13.563403	0.00040
40	24.0	13.563370	0.00037
50	24.0	13.563348	0.00035

Voltage Variations ($\pm 15\%$)

20	20.4	13.563348	0.00035
20	24.0	13.563365	0.00036
20	27.6	13.563402	0.00040

Max Deviation (MHz)	0.00044
Max Deviation (%)	0.00324
PASS	

MEASUREMENT UNCERTAINTY

TEST	HIGHEST UNCERTAINTY
Radiated Emissions	+/- 2.94 dB
Conducted Emissions	+/- 1.56 dB

Note: Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

EUT SETUP

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables. The corrected data was then compared to the applicable emission limits to determine compliance.

The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available I/O ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. I/O cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected. The interval between different pieces of equipment was approximately 10 centimeters.

The radiated and conducted emissions data of the RFID Reader/Writer, LRP75/LRP76, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in Table A.

Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in $\text{dB}\mu\text{V}/\text{m}$, the spectrum analyzer reading in $\text{dB}\mu\text{V}$ was corrected by using the following formula in Table A. This reading was then compared to the applicable specification limit to determine compliance.

TABLE A: SAMPLE CALCULATIONS		
	Meter reading	($\text{dB}\mu\text{V}$)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	($\text{dB}\mu\text{V}/\text{m}$)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Appendix B were used to collect both the radiated and conducted emissions data. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. For radiated measurements below 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. Conducted emissions tests required the use of the FCC type LISNs.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dB μ V, and a vertical scale of 10 dB per division.

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the Tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

EUT TESTING

Mains Conducted Emissions

During conducted emissions testing, the EUT was located on a wooden table measuring approximately 80 cm high, 1 meter deep, and 1.5 meters in length. One wall of the room where the EUT was located has a minimum 2 meter by 2 meter conductive plane. The EUT was mounted on the wooden table 40 cm away from the conductive plane, and 80 cm from any other conductive surface.

The vertical metal plane used for conducted emissions was grounded to the earth. Power to the EUT was provided through a LISN. The LISN was grounded to the ground plane. All other objects were kept a minimum of 80 cm away from the EUT during the conducted test.

For conducted emissions testing, a 30 to 50 second sweep time was used for automated measurements in the frequency bands of 450 kHz to 1.705 MHz, 1.705 MHz to 3 MHz, and 3 MHz to 30 MHz. All readings within 20 dB of the limit were recorded. At frequencies where the recorded emissions were close to the limit, further investigation was performed manually at a slower sweep rate.

Radiated Emissions

The EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters.

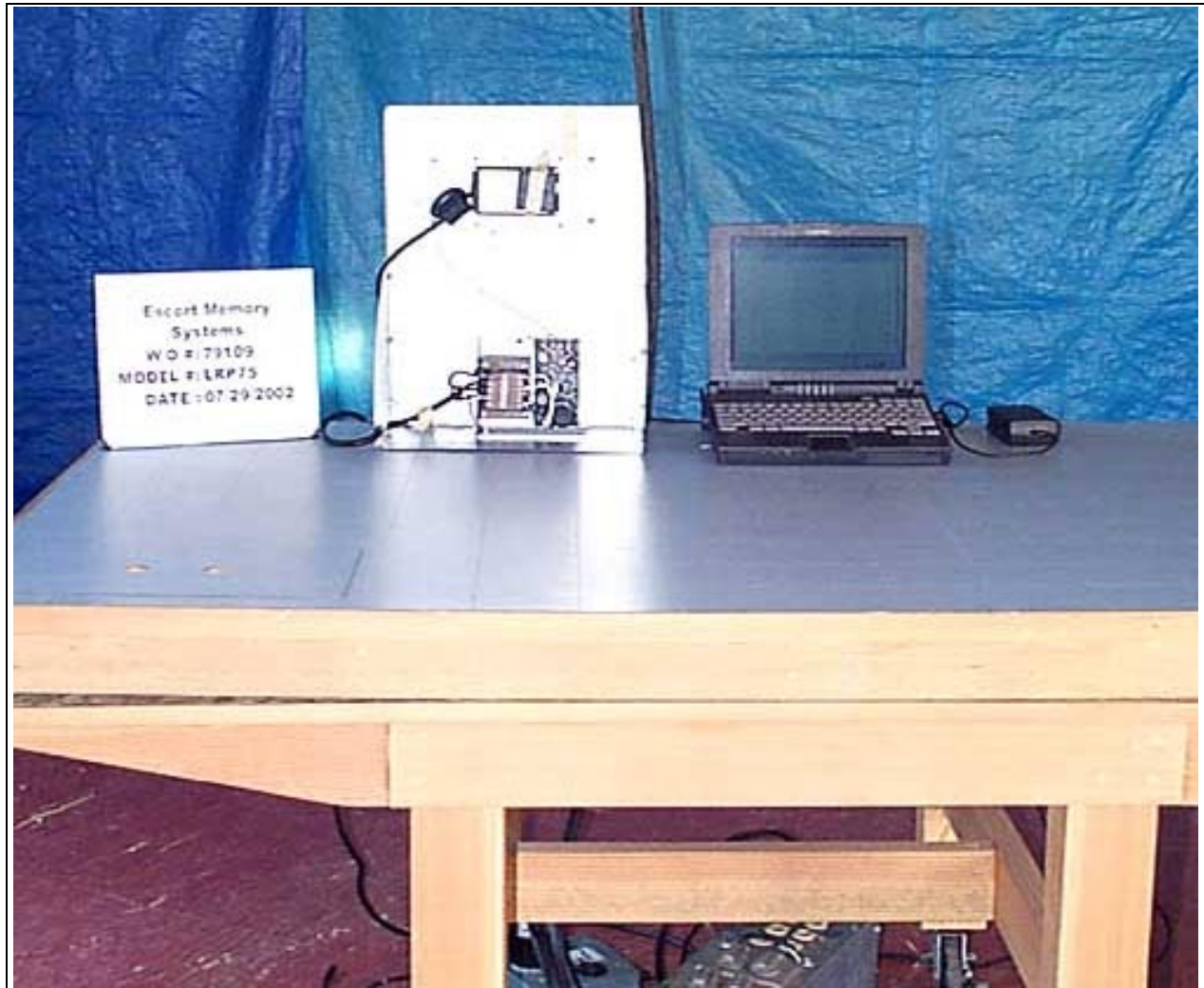
During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. The frequency range of 30 MHz to 88 MHz was scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. The frequency range of 100 to 300 MHz was then scanned in the same manner using the biconical antenna and the peaks recorded. Lastly, a scan of the FM band from 88 to 110 MHz was made, using a reduced resolution bandwidth and frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 to 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 to 1000 MHz was again scanned. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable as needed. The test engineer maximized the readings with respect to the table rotation, antenna height, and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor.

APPENDIX A

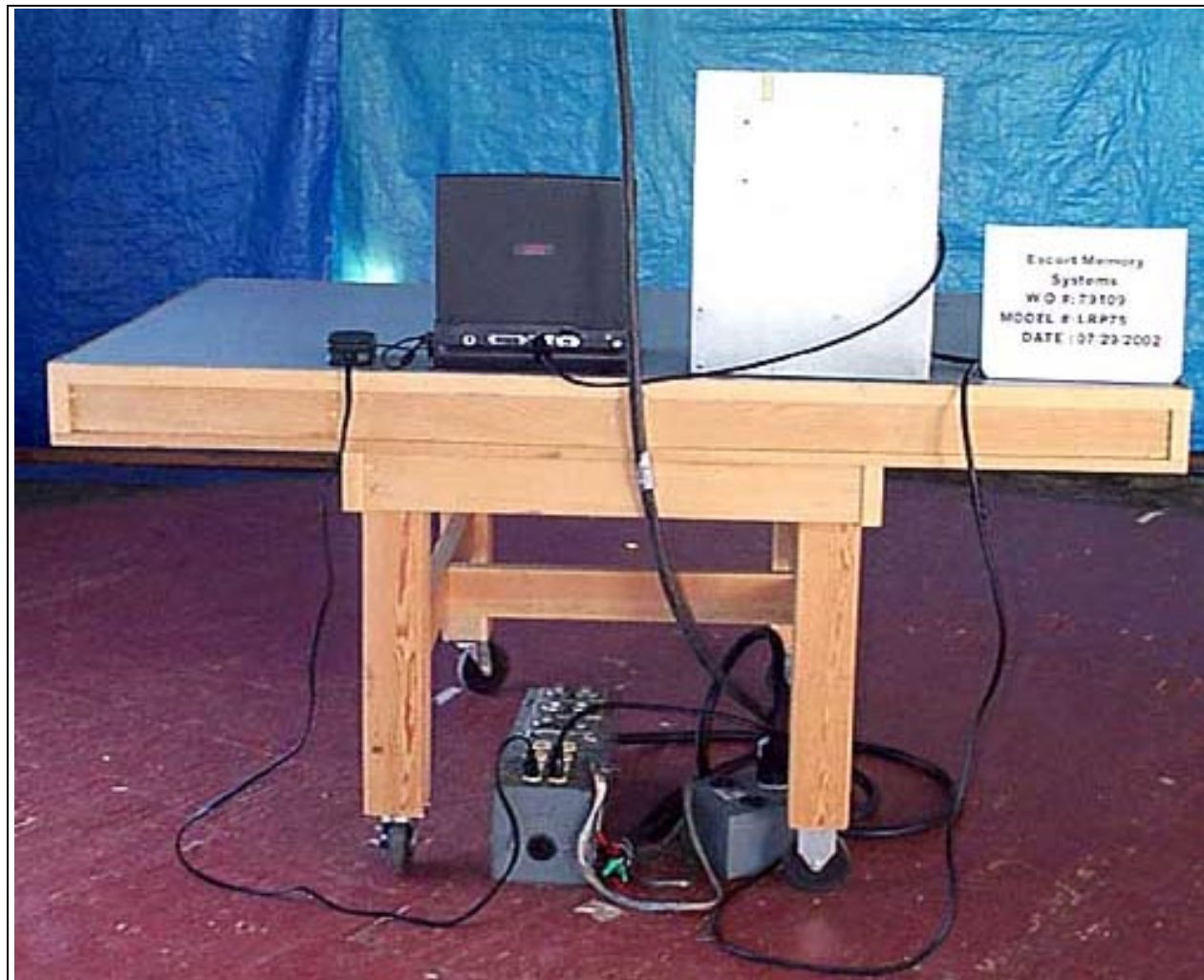
TEST SETUP DIAGRAM AND PHOTOGRAPHS

PHOTOGRAPH SHOWING RADIATED EMISSIONS



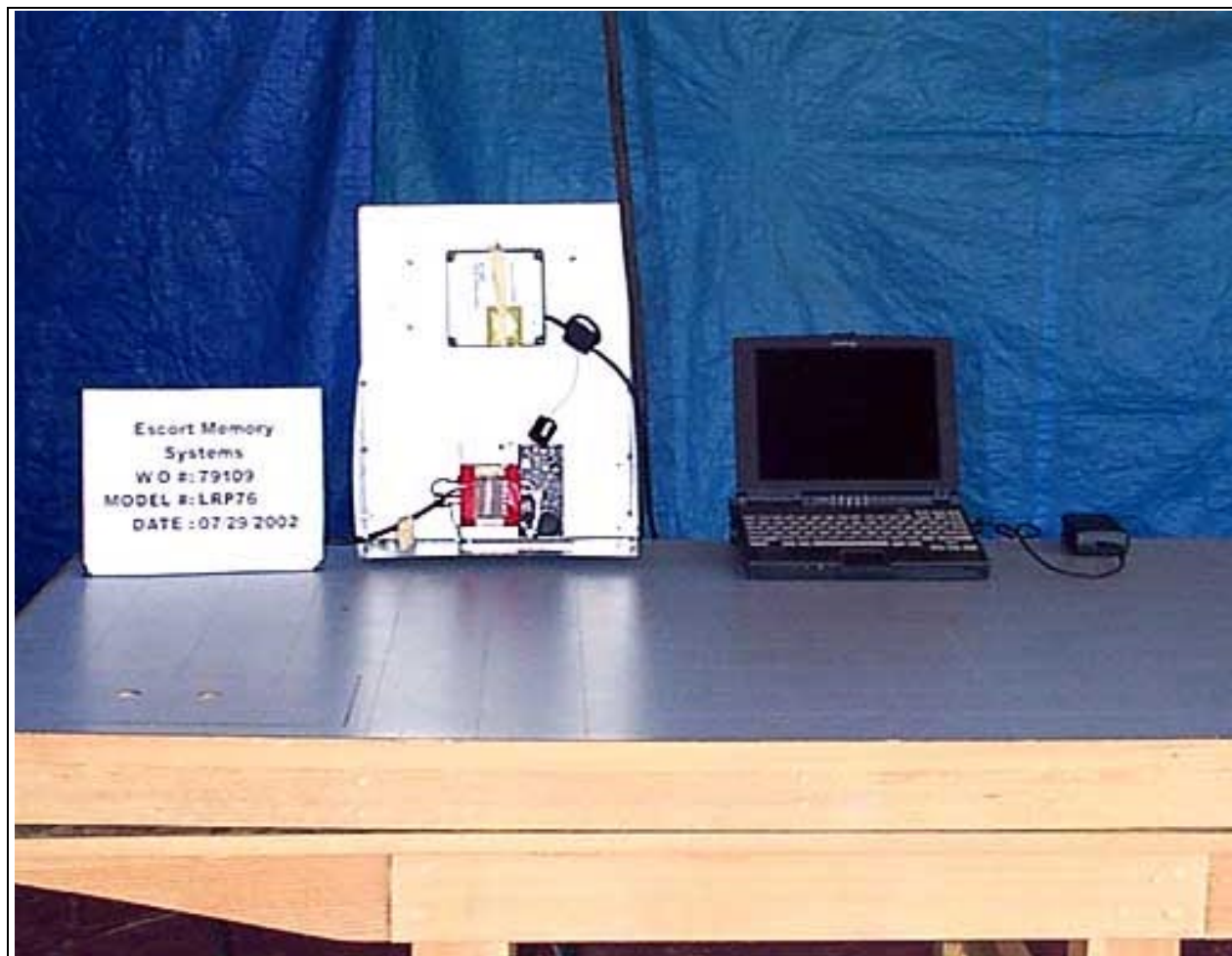
Radiated Emissions - Front View - LRP75

PHOTOGRAPH SHOWING RADIATED EMISSIONS



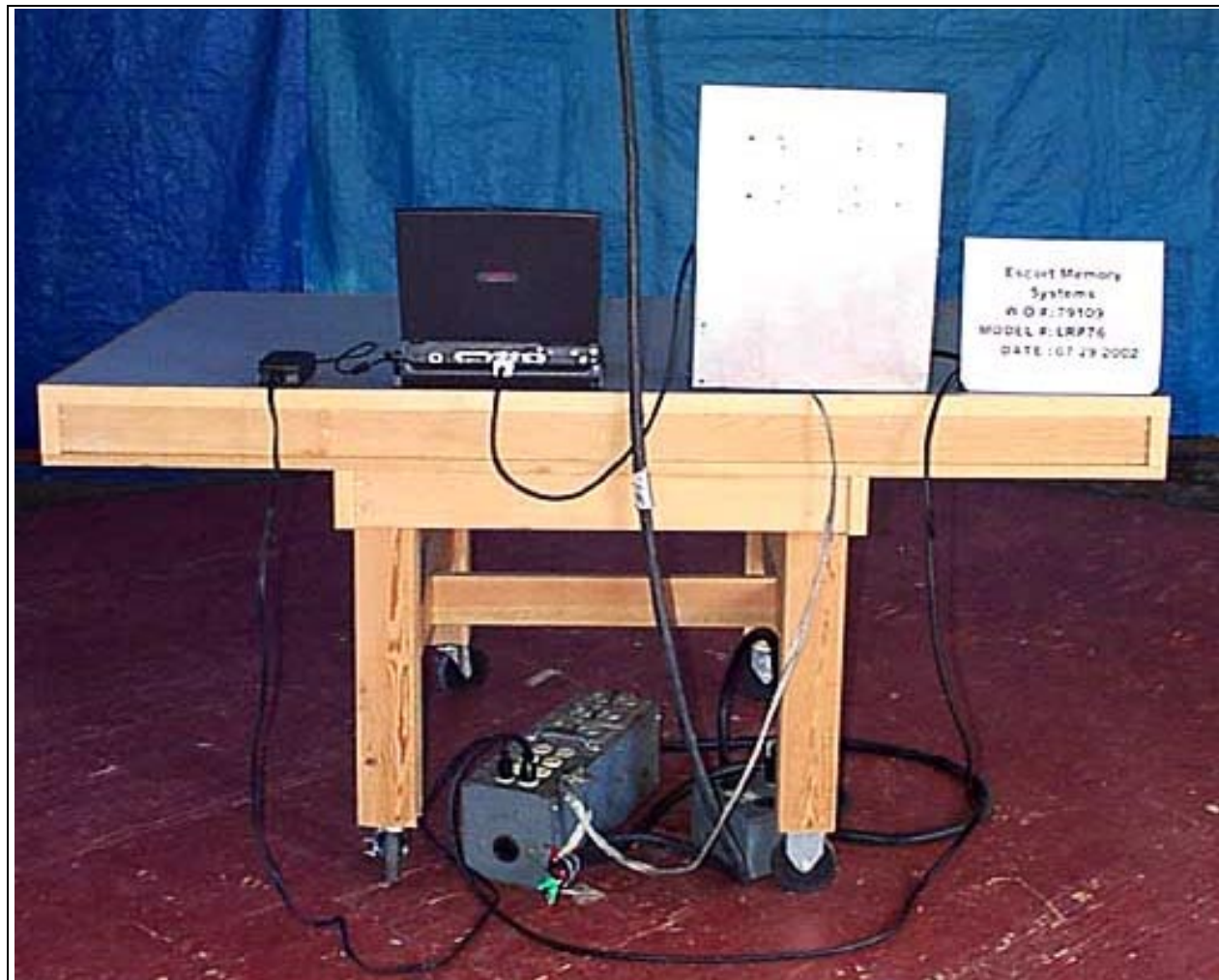
Radiated Emissions - Back View - LRP75

PHOTOGRAPH SHOWING RADIATED EMISSIONS



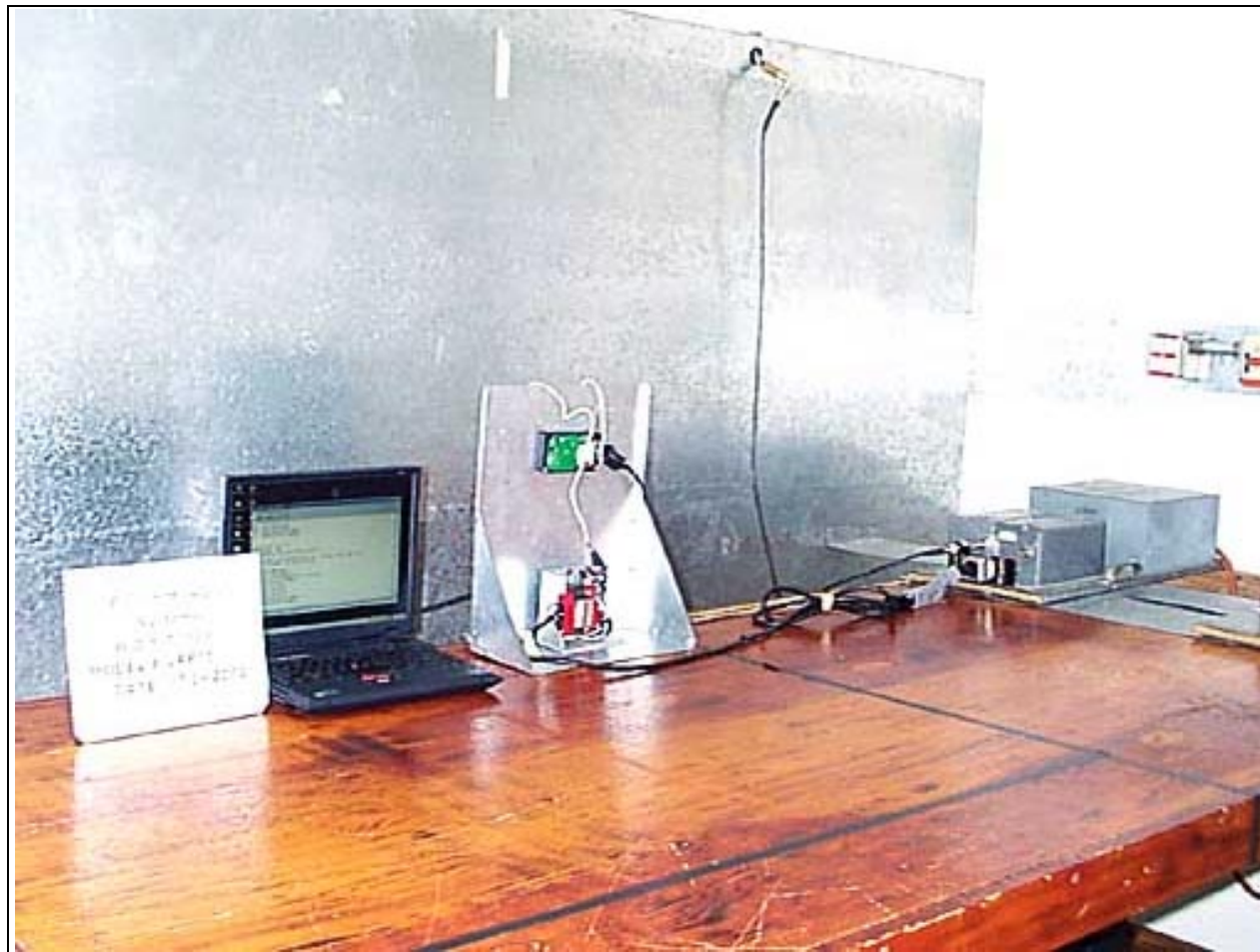
Radiated Emissions - Front View - LRP76

PHOTOGRAPH SHOWING RADIATED EMISSIONS



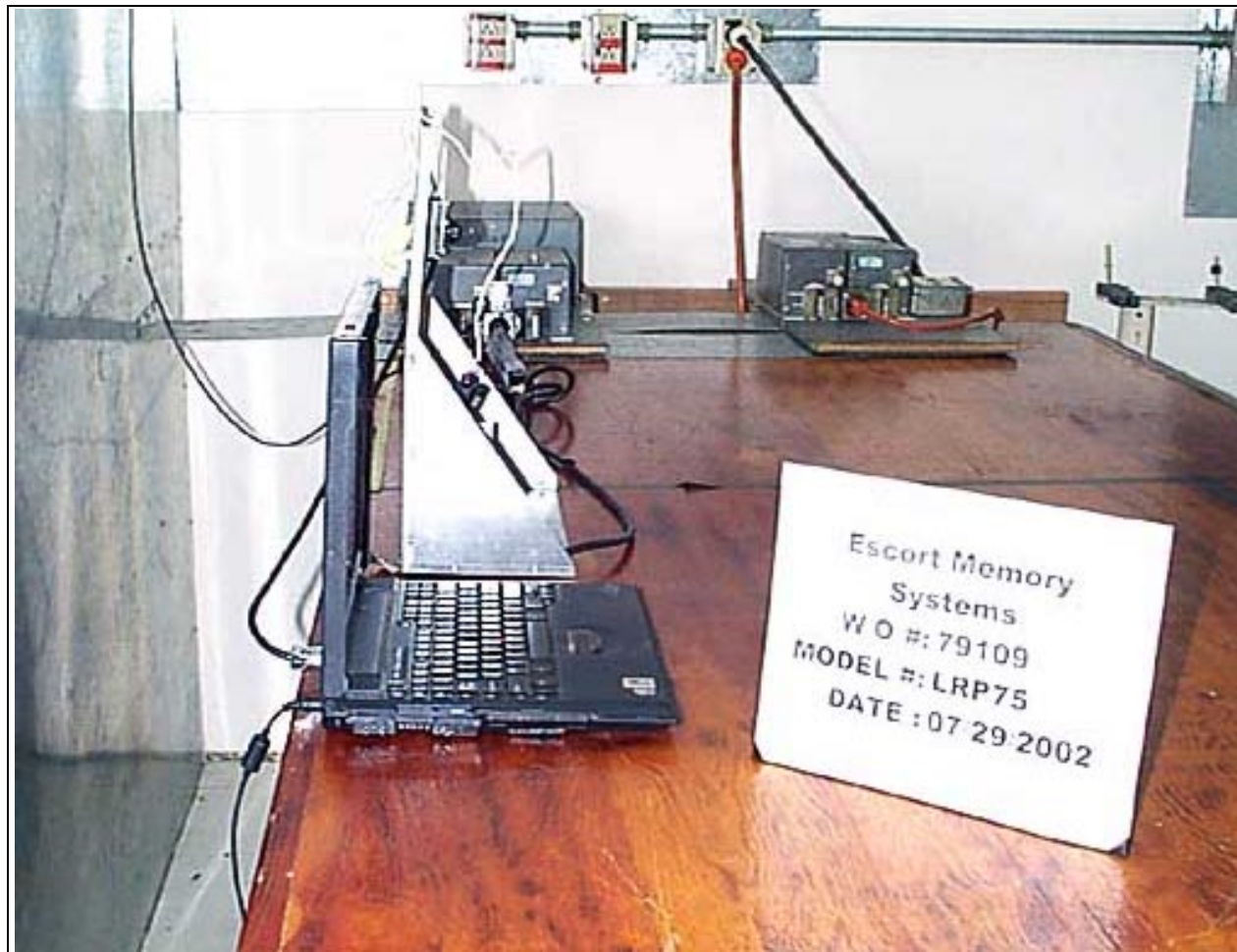
Radiated Emissions - Back View - LRP76

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



Mains Conducted Emissions - Front View - LRP75

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



Mains Conducted Emissions - Side View - LRP75

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



Mains Conducted Emissions - Side View - LRP76

PHOTOGRAPH SHOWING TEMPERATURE TESTING



Temperature Testing - LRP75

PHOTOGRAPH SHOWING TEMPERATURE TESTING



Temperature Testing - LRP76

APPENDIX B

TEST EQUIPMENT LIST

15.209/15.225 (b) Radiated Emissions

<i>Description</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Asset #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Antenna, Bicon	A&H	SAS-200/542	156	00225	12/06/01	12/6/2002
Antenna, Log Periodic	A&H	SAS-200/510	154	01330	6/19/02	6/19/2003
Preamplifier	HP	8447D	1937A02604	00099	3/21/02	3/21/2003
QP Adapter	HP	85650A	2811A01267	00478	1/30/02	1/30/2003
S/A Display	HP	8566B	2403A08241	00489	1/30/02	1/30/2003
Spectrum Analyzer	HP	8566B	2209A01404	00490	1/30/02	1/30/2003
Antenna, Loop	EMCO	6502	1074	00226	6/5/02	6/5/2003

15.225 Fundamental and Bandedge

<i>Description</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Asset #</i>	<i>Cal Date</i>	<i>Cal Due</i>
QP Adapter	HP	85650A	2811A01267	00478	1/30/02	1/30/2003
S/A Display	HP	8566B	2403A08241	00489	1/30/02	1/30/2003
Spectrum Analyzer	HP	8566B	2209A01404	00490	1/30/02	1/30/2003
Antenna, Loop	EMCO	6502	1074	00226	6/5/02	6/5/2003

15.207 Conducted Emissions.

<i>Description</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Asset #</i>	<i>Cal Date</i>	<i>Cal Due</i>
LISN Set	Solar	8028-50-TS-24-BNC	814493, 474	02056	6/5/02	6/5/2003
QP Adapter	HP	85650A	2811A01267	00478	1/30/02	1/30/2003
S/A Display	HP	8566B	2403A08241	00489	1/30/02	1/30/2003
Spectrum Analyzer	HP	8566B	2209A01404	00490	1/30/02	1/30/2003

15.225(c) Temperature and 15.31(e) Voltage Variation

<i>Description</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Asset #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Power Supply, DC (Programmable)	Leader	LPS-2801	6030090	P01889	6/5/02	6/5/2003
QP Adapter	HP	85650A	2811A01267	00478	1/30/02	1/30/2003
S/A Display	HP	8566B	2403A08241	00489	1/30/02	1/30/2003
Spectrum Analyzer	HP	8566B	2209A01404	00490	1/30/02	1/30/2003
Temp Chamber	Thermotron	S-1.2 MiniMax	11899	01879	2/7/02	2/7/2003
Thermometer	Omega	HH-26K	T-202884	02242	8/30/02	8/30/2003

APPENDIX C: MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa CA 95338 • 1-800-500-4EMC (4362)

Customer: **Escort Memory Systems**

Specification: **FCC 15.225(a)**

Work Order #: **79109**

Date: 08/05/2002

Test Type: **Maximized Emissions**

Time: 11:18:06

Equipment: **RFID Reader/Writer**

Sequence#: 3

Manufacturer: Escort Memory Systems

Tested By: Randal Clark

Model: LRP75

S/N: 072902-001

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader/Writer*	Escort Memory Systems	LRP75	072902-001

Support Devices:

Function	Manufacturer	Model #	S/N
EUT Power Supply	International Power	IPB500950	N/A
Power Supply for Computer	Compaq	246960-001	CT:501BA14C1R687
Host Computer	Compaq	2870B	3736HUR16020

Test Conditions / Notes:

EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. Test Distance correction factor used in accordance with 15.31 (40dB/Decade). EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable. The EUT end has 1 turn, the computer end has no turns. Ferrite cores with 1 wrap added to the ends of DC leads. Ferrites are installed on at the AC input to the transformer. Ferrite installed at the power entry point with one wrap. Copper shield installed between antenna and TX PCB. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed

Transducer Legend:

T1=Loop 1074	T2=Cable - 10 Meter
T3=15.31 10m 40dB/Dec Correction	

Measurement Data:

Reading listed by margin.

Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB		Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	13.564M	44.5	+9.6	+0.7	-20.0		+0.0	34.8	80.0	-45.2	Horiz
2	13.563M	35.3	+9.6	+0.7	-20.0		+0.0	25.6	80.0	-54.4	Vert

Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa CA 95338 • 1-800-500-4EMC (4362)

Customer: **Escort Memory Systems**

Specification: **FCC 15.225(a)**

Work Order #: **79109**

Date: 08/02/2002

Test Type: **Radiated Scan**

Time: 17:55:48

Equipment: **RFID Reader/Writer**

Sequence#: 23

Manufacturer: Escort Memory Systems

Tested By: Randal Clark

Model: LRP76

S/N: 080102-002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader/Writer*	Escort Memory Systems	LRP76	080102-002

Support Devices:

Function	Manufacturer	Model #	S/N
EUT Power Supply	International Power	IPB500950	N/A
Power Supply for Computer	Compaq	246960-001	CT:501BA14C1R687
Host Computer	Compaq	2870B	3736HUR16020

Test Conditions / Notes:

EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable; the EUT end has 1 turn, the computer end has no turns. Ferrite clamp installed at connector between antenna and antenna shield plate. EUT test bracket is earth referenced. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed.

Transducer Legend:

T1=Loop 1074	T2=Cable - 10 Meter
T3=15.31 10m 40dB/Dec Correction	

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB		Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	13.563M	59.5	+9.6	+0.7	-20.0		+0.0	49.8	80.0	-30.2	Horiz
2	13.564M	48.9	+9.6	+0.7	-20.0		+0.0	39.2	80.0	-40.8	Vert

Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa CA 95338 • 1-800-500-4EMC (4362)

Customer: **Escort Memory Systems**
 Specification: **FCC 15.207**
 Work Order #: **79109**
 Test Type: **Conducted Emissions**
 Equipment: **RFID Reader/Writer**
 Manufacturer: Escort Memory Systems
 Model: LRP75
 S/N: 072902-001

Date: 08/03/2002
 Time: 12:45:00
 Sequence#: 22
 Tested By: Randal Clark
 120V 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader/Writer*	Escort Memory Systems	LRP75	072902-001

Support Devices:

Function	Manufacturer	Model #	S/N
Computer Power Supply	IBM	AA21131	1Z0ZA026211
Computer	IBM	2628-J1U	78-MFV57
EUT Power Supply	International Power	IPB500950	N/A

Test Conditions / Notes:

EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. Frequency Range Investigated: 450kHz - 30Mhz EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable - the EUT end has 1 turn, the computer end has no turns. Ferrite cores with 1 wrap added to the ends of DC leads EUT test enclosure tied to earth ground. Ferrites are installed on at the AC input to the transformer. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed.

Transducer Legend:

T1=Cable & Cap (Bench)	T2=LISN Insertion Loss s/n474
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Measurement Data:

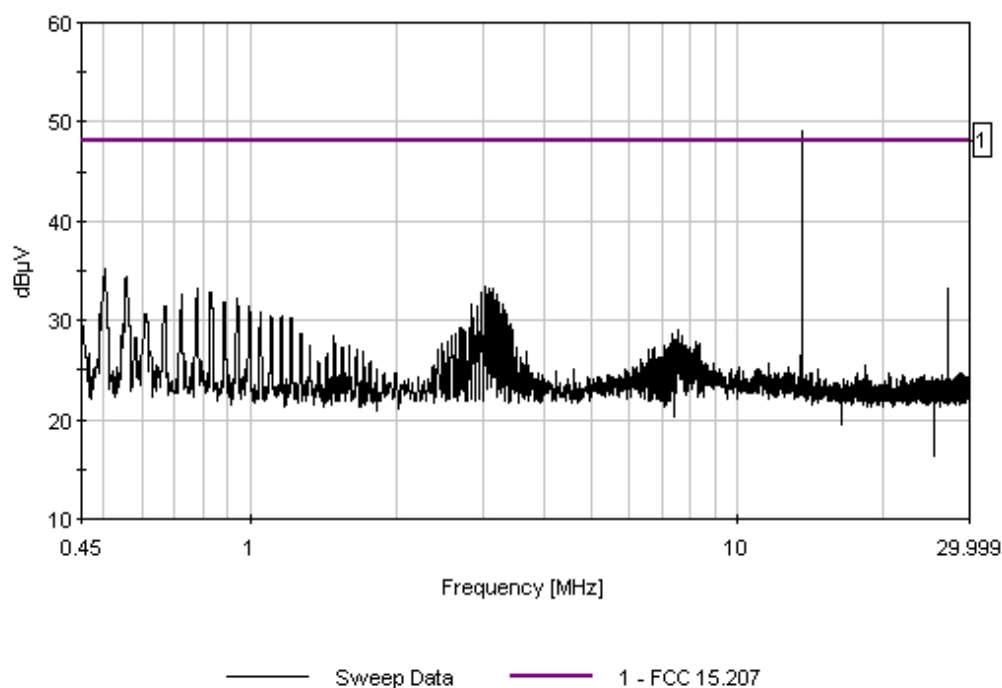
Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	13.560M	46.4	+0.3	+0.5			+0.0	47.2	48.0	-0.8	Black
QP											
^	13.560M	48.2	+0.3	+0.5			+0.0	49.0	48.0	+1.0	Black
3	504.960k	35.0	+0.1	+0.0			+0.0	35.1	48.0	-12.9	Black
4	555.798k	34.2	+0.1	+0.1			+0.0	34.4	48.0	-13.6	Black
5	3.039M	33.1	+0.2	+0.1			+0.0	33.4	48.0	-14.6	Black
6	3.139M	33.0	+0.2	+0.1			+0.0	33.3	48.0	-14.7	Black

7	27.131M	32.7	+0.4	+0.2	+0.0	33.3	48.0	-14.7	Black
8	778.386k	33.1	+0.0	+0.1	+0.0	33.2	48.0	-14.8	Black
9	3.084M	32.9	+0.2	+0.1	+0.0	33.2	48.0	-14.8	Black
10	827.850k	32.7	+0.0	+0.1	+0.0	32.8	48.0	-15.2	Black
11	2.972M	32.5	+0.2	+0.1	+0.0	32.8	48.0	-15.2	Black
12	723.426k	32.5	+0.0	+0.1	+0.0	32.6	48.0	-15.4	Black
13	3.195M	32.3	+0.2	+0.1	+0.0	32.6	48.0	-15.4	Black
14	941.892k	32.0	+0.1	+0.1	+0.0	32.2	48.0	-15.8	Black
15	3.245M	31.6	+0.2	+0.1	+0.0	31.9	48.0	-16.1	Black
16	882.810k	31.7	+0.0	+0.1	+0.0	31.8	48.0	-16.2	Black
17	3.301M	31.4	+0.2	+0.1	+0.0	31.7	48.0	-16.3	Black
18	2.850M	31.3	+0.2	+0.1	+0.0	31.6	48.0	-16.4	Black
19	668.466k	31.3	+0.1	+0.1	+0.0	31.5	48.0	-16.5	Black
20	995.478k	31.3	+0.1	+0.1	+0.0	31.5	48.0	-16.5	Black
21	450.001k	29.8	+0.1	+0.0	+0.0	29.9	48.0	-18.1	Black

Escort Memory Systems W/O#: 79109 Date: 08/03/2002 Time: 12:45:00 Test Lab: CKC Laboratories
FCC 15.207 Test Lead: Black 120V 60Hz Sequence#: 22



Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa CA 95338 • 1-800-500-4EMC (4362)

Customer: **Escort Memory Systems**
 Specification: **FCC 15.207**
 Work Order #: **79109**
 Test Type: **Conducted Emissions**
 Equipment: **RFID Reader/Writer**
 Manufacturer: Escort Memory Systems
 Model: LRP75
 S/N: 072902-001

Date: 08/03/2002
 Time: 12:56:32
 Sequence#: 20
 Tested By: Randal Clark
 120V 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader/Writer*	Escort Memory Systems	LRP75	072902-001

Support Devices:

Function	Manufacturer	Model #	S/N
Computer Power Supply	IBM	AA21131	1Z0ZA026211
Computer	IBM	2628-J1U	78-MFV57
EUT Power Supply	International Power	IPB500950	N/A

Test Conditions / Notes:

EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. Frequency Range Investigated: 450kHz - 30Mhz EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable - the EUT end has 1 turn, the computer end has no turns. Ferrite cores with 1 wrap added to the ends of DC leads EUT test enclosure tied to earth ground. Ferrites are installed on at the AC input to the transformer. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed.

Transducer Legend:

T1=Cable & Cap (Bench)	T2=LISN Insertion Loss s/n493
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Measurement Data:

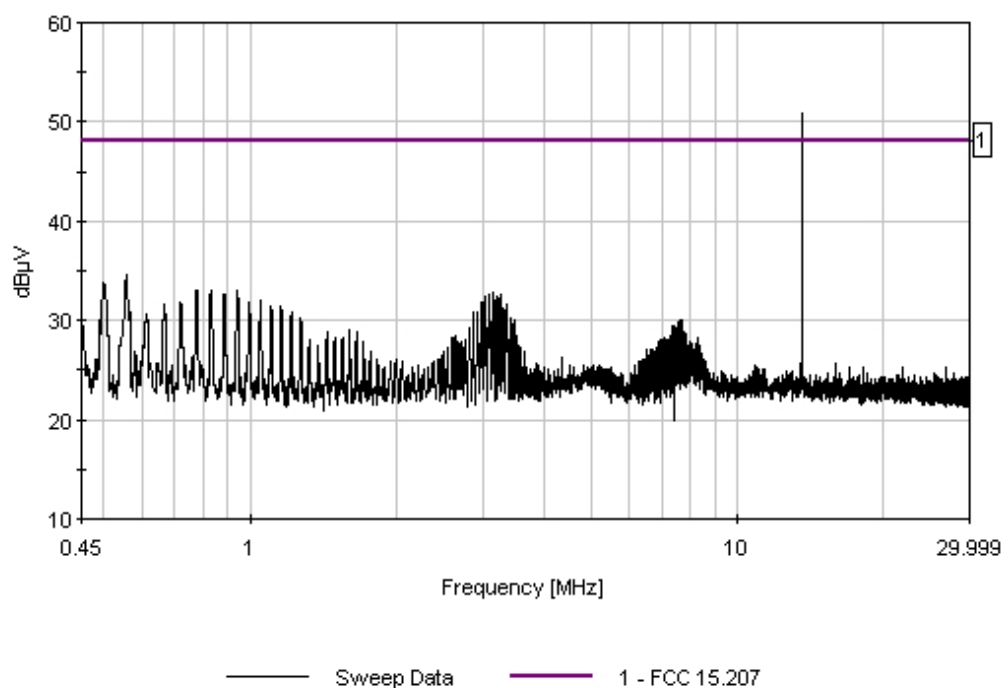
Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	13.560M	46.3	+0.3	+0.6			+0.0	47.2	48.0	-0.8	White
QP											
Λ	13.560M	50.0	+0.3	+0.6			+0.0	50.9	48.0	+2.9	White
3	557.172k	34.3	+0.1	+0.2			+0.0	34.6	48.0	-13.4	White
4	498.090k	33.6	+0.1	+0.2			+0.0	33.9	48.0	-14.1	White
5	775.638k	32.9	+0.0	+0.2			+0.0	33.1	48.0	-14.9	White
6	940.518k	32.8	+0.1	+0.2			+0.0	33.1	48.0	-14.9	White

7	830.598k	32.8	+0.0	+0.2	+0.0	33.0	48.0	-15.0	White
8	3.151M	32.4	+0.2	+0.2	+0.0	32.8	48.0	-15.2	White
9	3.089M	32.3	+0.2	+0.2	+0.0	32.7	48.0	-15.3	White
10	882.810k	32.4	+0.0	+0.2	+0.0	32.6	48.0	-15.4	White
11	3.262M	32.2	+0.2	+0.2	+0.0	32.6	48.0	-15.4	White
12	3.039M	32.1	+0.2	+0.2	+0.0	32.5	48.0	-15.5	White
13	3.201M	32.0	+0.2	+0.2	+0.0	32.4	48.0	-15.6	White
14	1.049M	31.9	+0.1	+0.1	+0.0	32.1	48.0	-15.9	White
15	717.930k	31.7	+0.0	+0.2	+0.0	31.9	48.0	-16.1	White
16	2.983M	31.5	+0.2	+0.2	+0.0	31.9	48.0	-16.1	White
17	994.104k	31.6	+0.1	+0.1	+0.0	31.8	48.0	-16.2	White
18	665.718k	31.3	+0.1	+0.2	+0.0	31.6	48.0	-16.4	White
19	3.374M	31.1	+0.3	+0.2	+0.0	31.6	48.0	-16.4	White
20	1.104M	31.2	+0.1	+0.1	+0.0	31.4	48.0	-16.6	White
21	1.156M	31.2	+0.1	+0.1	+0.0	31.4	48.0	-16.6	White

Escort Memory Systems WO#: 79109 Date: 08/03/2002 Time: 12:56:32 Test Lab: CKC Laboratories
FCC 15.207 Test Lead: White 120V 60Hz Sequence#: 20



Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa CA 95338 • 1-800-500-4EMC (4362)

Customer: **Escort Memory Systems**
 Specification: **FCC 15.207**
 Work Order #: **79109**
 Test Type: **Conducted Emissions**
 Equipment: **RFID Reader/Writer**
 Manufacturer: Escort Memory Systems
 Model: LRP76
 S/N: 080102-002

Date: 08/03/2002
 Time: 11:33:20 AM
 Sequence#: 15
 Tested By: Randal Clark
 120V 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader/Writer*	Escort Memory Systems	LRP76	080102-002

Support Devices:

Function	Manufacturer	Model #	S/N
EUT Power Supply	International Power	IPB500950	N/A
Computer Power Supply	IBM	AA21131	1Z0ZA026211
Computer	IBM	2628-J1U	78-MFV57

Test Conditions / Notes:

EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. Frequency Range Investigated: 450kHz - 30Mhz EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable; the EUT end has 1 turn, the computer end has no turns. Ferrite clamp installed at connector between antenna and antenna shield plate. EUT test bracket is earth referenced. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short R7 replaced with 51 Ohms L4 replaced with 51 Ohms EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground.

Transducer Legend:

T1=Cable & Cap (Bench)	T2=LISN Insertion Loss s/n474
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Measurement Data:

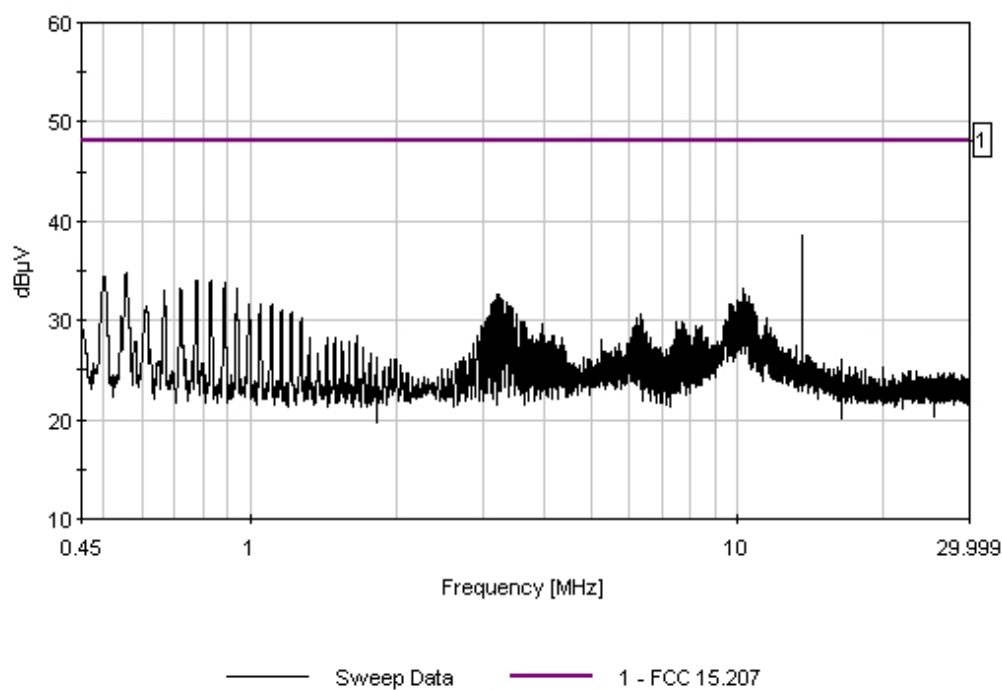
Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	13.551M	37.7	+0.3	+0.5			+0.0	38.5	48.0	-9.5	Black
2	555.798k	34.7	+0.1	+0.1			+0.0	34.9	48.0	-13.1	Black
3	498.090k	34.4	+0.1	+0.0			+0.0	34.5	48.0	-13.5	Black
4	775.638k	34.0	+0.0	+0.1			+0.0	34.1	48.0	-13.9	Black
5	829.224k	33.9	+0.0	+0.1			+0.0	34.0	48.0	-14.0	Black
6	884.184k	33.8	+0.0	+0.1			+0.0	33.9	48.0	-14.1	Black
7	717.930k	33.2	+0.0	+0.1			+0.0	33.3	48.0	-14.7	Black
8	940.518k	33.1	+0.1	+0.1			+0.0	33.3	48.0	-14.7	Black

9	10.272M	32.1	+0.2	+0.9	+0.0	33.2	48.0	-14.8	Black
10	665.718k	32.8	+0.1	+0.1	+0.0	33.0	48.0	-15.0	Black
11	3.245M	32.4	+0.2	+0.1	+0.0	32.7	48.0	-15.3	Black
12	3.195M	32.3	+0.2	+0.1	+0.0	32.6	48.0	-15.4	Black
13	10.551M	31.5	+0.2	+0.8	+0.0	32.5	48.0	-15.5	Black
14	3.301M	31.8	+0.2	+0.1	+0.0	32.1	48.0	-15.9	Black
15	10.002M	30.9	+0.2	+0.9	+0.0	32.0	48.0	-16.0	Black
16	10.056M	30.8	+0.2	+0.9	+0.0	31.9	48.0	-16.1	Black
17	10.497M	30.9	+0.2	+0.8	+0.0	31.9	48.0	-16.1	Black
18	3.139M	31.5	+0.2	+0.1	+0.0	31.8	48.0	-16.2	Black
19	3.357M	31.4	+0.3	+0.1	+0.0	31.8	48.0	-16.2	Black
20	10.776M	30.7	+0.2	+0.8	+0.0	31.7	48.0	-16.3	Black

Escort Memory Systems WO#: 79109 Date: 08/03/2002 Time: 11:33:20 AM Test Lab: CKC Laboratories
FCC 15.207 Test Lead: Black 120V 60Hz Sequence#: 15



Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa CA 95338 • 1-800-500-4EMC (4362)

Customer: **Escort Memory Systems**
 Specification: **FCC 15.207**
 Work Order #: **79109**
 Test Type: **Conducted Emissions**
 Equipment: **RFID Reader/Writer**
 Manufacturer: Escort Memory Systems
 Model: LRP76
 S/N: 080102-002

Date: 08/03/2002
 Time: 11:41:50 AM
 Sequence#: 16
 Tested By: Randal Clark
 120V 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader/Writer*	Escort Memory Systems	LRP76	080102-002

Support Devices:

Function	Manufacturer	Model #	S/N
EUT Power Supply	International Power	IPB500950	N/A
Computer Power Supply	IBM	AA21131	1Z0ZA026211
Computer	IBM	2628-J1U	78-MFV57

Test Conditions / Notes:

EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. Frequency Range Investigated: 450kHz - 30Mhz EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable; the EUT end has 1 turn, the computer end has no turns. Ferrite clamp installed at connector between antenna and antenna shield plate. EUT test bracket is earth referenced. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short R7 replaced with 51 Ohms L4 replaced with 51 Ohms EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground.

Transducer Legend:

T1=Cable & Cap (Bench)	T2=LISN Insertion Loss s/n493
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Measurement Data:

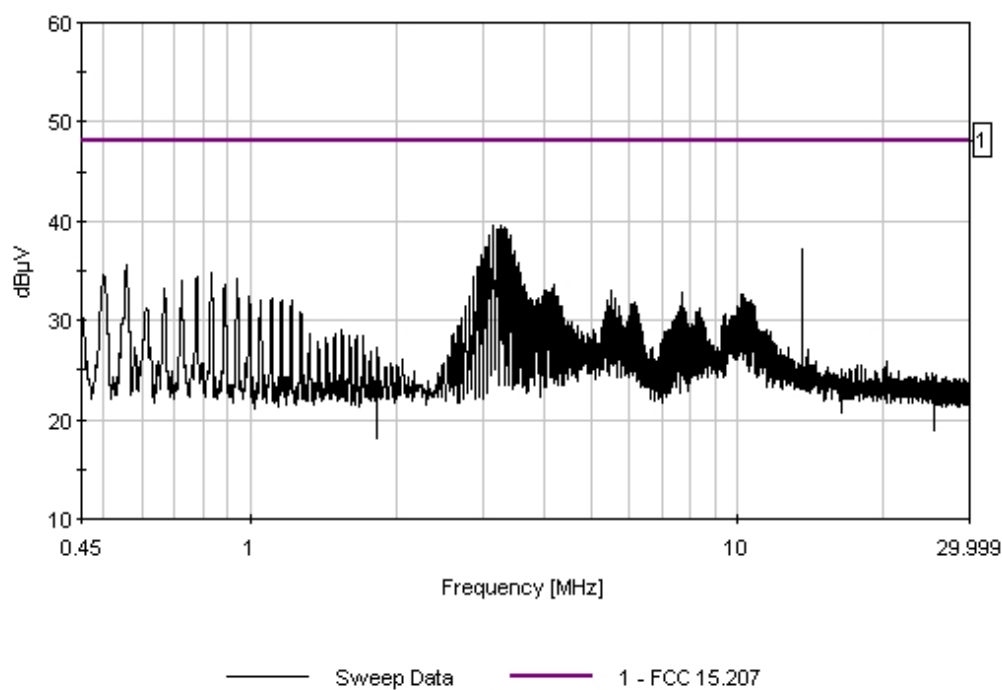
Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	dB	dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	3.262M	39.2	+0.2	+0.2			+0.0	39.6	48.0	-8.4	White
2	3.151M	39.1	+0.2	+0.2			+0.0	39.5	48.0	-8.5	White
3	3.318M	39.0	+0.2	+0.2			+0.0	39.4	48.0	-8.6	White
4	3.368M	38.7	+0.3	+0.2			+0.0	39.2	48.0	-8.8	White
5	3.212M	38.7	+0.2	+0.2			+0.0	39.1	48.0	-8.9	White
6	3.089M	38.2	+0.2	+0.2			+0.0	38.6	48.0	-9.4	White
7	3.429M	38.0	+0.3	+0.2			+0.0	38.5	48.0	-9.5	White
8	3.045M	37.0	+0.2	+0.2			+0.0	37.4	48.0	-10.6	White

9	13.569M	36.3	+0.3	+0.6	+0.0	37.2	48.0	-10.8	White
10	3.479M	36.3	+0.3	+0.3	+0.0	36.9	48.0	-11.1	White
11	2.983M	36.1	+0.2	+0.2	+0.0	36.5	48.0	-11.5	White
12	3.006M	35.7	+0.2	+0.2	+0.0	36.1	48.0	-11.9	White
13	3.541M	35.1	+0.3	+0.3	+0.0	35.7	48.0	-12.3	White
14	557.172k	35.2	+0.1	+0.2	+0.0	35.5	48.0	-12.5	White
15	2.933M	35.0	+0.2	+0.2	+0.0	35.4	48.0	-12.6	White
16	833.346k	34.6	+0.0	+0.2	+0.0	34.8	48.0	-13.2	White
17	3.591M	34.2	+0.3	+0.3	+0.0	34.8	48.0	-13.2	White
18	498.090k	34.4	+0.1	+0.2	+0.0	34.7	48.0	-13.3	White
19	2.872M	34.1	+0.2	+0.2	+0.0	34.5	48.0	-13.5	White
20	777.012k	34.2	+0.0	+0.2	+0.0	34.4	48.0	-13.6	White

Escort Memory Systems WO#: 79109 Date: 08/03/2002 Time: 11:41:50 AM Test Lab: CKC Laboratories
FCC 15.207 Test Lead: White 120V 60Hz Sequence#: 16



Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa CA 95338 • 1-800-500-4EMC (4362)

Customer: **Escort Memory Systems**

Specification: **FCC 15.209/15.225(b)**

Work Order #: **79109**

Date: 07/31/2002

Test Type: **Maximized Emissions**

Time: 10:51:40

Equipment: **RFID Reader/Writer**

Sequence#: 4

Manufacturer: Escort Memory Systems

Tested By: Randal Clark

Model: LRP75

S/N: 072902-001

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader/Writer*	Escort Memory Systems	LRP75	072902-001

Support Devices:

Function	Manufacturer	Model #	S/N
EUT Power Supply	International Power	IPB500950	N/A
Power Supply for Computer	Compaq	246960-001	CT:501BA14C1R687
Host Computer	Compaq	2870B	3736HUR16020

Test Conditions / Notes:

EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. Test distance correction factor used in accordance with 15.31 (40dB/Decade). Frequency Range Investigated: 9kHz - 30MHz. EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable - the EUT end has 1 turn, the computer end has no turns. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short R7 replaced with 51 Ohms L4 replaced with 51 Ohms EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. Frequency range tested: 9 kHz – 30 MHz.

Transducer Legend:

T1=Loop 1074	T2=Cable - 10 Meter
T3=15.31 10m 40dB/Dec Correction	

Measurement Data:

Reading listed by margin.

Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB		Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	27.124M	15.0	+6.5	+1.0	-20.0		+0.0	2.5	29.5	-27.0	Horiz
2	27.125M	13.9	+6.5	+1.0	-20.0		+0.0	1.4	29.5	-28.1	Vert

Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa CA 95338 • 1-800-500-4EMC (4362)

Customer: **Escort Memory Systems**
 Specification: **FCC 15.209/15.225(b)**
 Work Order #: **79109**
 Test Type: **Radiated Scan**
 Equipment: **RFID Reader/Writer**
 Manufacturer: Escort Memory Systems
 Model: LRP76
 S/N: 080102-002

Date: 08/02/2002
 Time: 17:55:48
 Sequence#: 14
 Tested By: Randal Clark

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader/Writer*	Escort Memory Systems	LRP76	080102-002

Support Devices:

Function	Manufacturer	Model #	S/N
EUT Power Supply	International Power	IPB500950	N/A
Power Supply for Computer	Compaq	246960-001	CT:501BA14C1R687
Host Computer	Compaq	2870B	3736HUR16020

Test Conditions / Notes:

EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable; the EUT end has 1 turn, the computer end has no turns. Ferrite clamp installed at connector between antenna and antenna shield plate. EUT test bracket is earth referenced. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short. R7 replaced with 51 Ohms. L4 replaced with 51 Ohms. EMS Fab 14-1189; shield of the 13.56 Hz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed. Frequency range tested: 9 kHz – 30 MHz.

Transducer Legend:

T1=Loop 1074	T2=Cable - 10 Meter
T3=15.31 10m 40dB/Dec Correction	

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB		Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	27.127M	16.5	+6.5	+1.0	-20.0		+0.0	4.0	29.5	-25.5	Horiz
2	27.126M	14.2	+6.5	+1.0	-20.0		+0.0	1.7	29.5	-27.8	Vert

Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa CA 95338 • 1-800-500-4EMC (4362)

Customer: **Escort Memory Systems**

Specification: **FCC 15.209**

Work Order #: **79109**

Date: 08/05/2002

Test Type: **Maximized Emissions**

Time: 10:53:36

Equipment: **RFID Reader/Writer**

Sequence#: 7

Manufacturer: Escort Memory Systems

Tested By: Randal Clark

Model: LRP75

S/N: 072902-001

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader/Writer*	Escort Memory Systems	LRP75	072902-001

Support Devices:

Function	Manufacturer	Model #	S/N
EUT Power Supply	International Power	IPB500950	N/A
Power Supply for Computer	Compaq	246960-001	CT:501BA14C1R687
Host Computer	Compaq	2870B	3736HUR16020

Test Conditions / Notes:

EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable - the EUT end has 1 turn, the computer end has no turns. Ferrite cores with 1 wrap added to the ends of DC leads Ferrites are installed on at the AC input to the transformer. Ferrite installed at the power entry point with one wrap. Copper shield installed between antenna and TX PCB. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short, R7 replaced with 51 Ohms, L4 replaced with 51 Ohms, EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. 1 ea 470 pF, 1 ea 1uF tantalum and 2ea 1500pF ceramic capacitors added to +24 and DC common. 1 ea 1uF capacitor added to C6. 1 ea 1uF tantalum capacitor added to C5. Capacitors in C3 and C13 removed. Frequency range tested: 30-1000 MHz.

Transducer Legend:

T1=Amp - S/N 604	T2=Bicon 156
T3=Log s/n 154	T4=Cable - 10 Meter

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	447.640M	38.4	-27.2	+0.0	+17.2	+4.6	+10.0	43.0	46.0	-3.0	Horiz
2	447.666M	37.7	-27.2	+0.0	+17.2	+4.6	+10.0	42.3	46.0	-3.7	Vert
3	230.629M	38.3	-26.2	+16.5	+0.0	+3.1	+10.0	41.7	46.0	-4.3	Horiz
4	40.786M	39.9	-26.8	+11.1	+0.0	+1.2	+10.0	35.4	40.0	-4.6	Vert
QP											
^	40.756M	41.3	-26.8	+11.1	+0.0	+1.2	+10.0	36.8	40.0	-3.2	Vert
6	257.784M	37.0	-26.1	+16.9	+0.0	+3.3	+10.0	41.1	46.0	-4.9	Vert

7	366.277M	35.3	-26.5	+0.0	+18.1	+4.1	+10.0	41.0	46.0	-5.0	Vert
8	339.169M	33.8	-26.4	+0.0	+19.7	+3.9	+10.0	41.0	46.0	-5.0	Horiz
9	244.206M	37.9	-26.1	+15.9	+0.0	+3.2	+10.0	40.9	46.0	-5.1	Horiz
10	284.882M	32.4	-26.1	+20.9	+0.0	+3.6	+10.0	40.8	46.0	-5.2	Vert
11	67.898M	41.5	-26.8	+8.4	+0.0	+1.6	+10.0	34.7	40.0	-5.3	Vert
12	868.143M QP	28.4	-27.2	+0.0	+22.6	+6.9	+10.0	40.7	46.0	-5.3	Horiz
^	868.129M	31.7	-27.2	+0.0	+22.6	+6.9	+10.0	44.0	46.0	-2.0	Horiz
14	230.657M QP	37.2	-26.2	+16.5	+0.0	+3.1	+10.0	40.6	46.0	-5.4	Vert
^	230.641M	39.3	-26.2	+16.5	+0.0	+3.1	+10.0	42.7	46.0	-3.3	Vert
16	244.215M	37.5	-26.1	+15.9	+0.0	+3.2	+10.0	40.5	46.0	-5.5	Vert
17	203.545M QP	33.3	-26.3	+17.8	+0.0	+2.9	+10.0	37.7	43.5	-5.8	Vert
^	203.503M	36.2	-26.3	+17.8	+0.0	+2.9	+10.0	40.6	43.5	-2.9	Vert
19	922.403M QP	26.4	-27.0	+0.0	+23.3	+7.0	+10.0	39.7	46.0	-6.3	Vert
^	922.363M	30.7	-27.0	+0.0	+23.2	+7.0	+10.0	43.9	46.0	-2.1	Vert
21	895.277M QP	26.2	-27.1	+0.0	+22.9	+6.9	+10.0	38.9	46.0	-7.1	Vert
^	895.229M	31.6	-27.1	+0.0	+22.9	+6.9	+10.0	44.3	46.0	-1.7	Vert
23	474.807M QP	33.3	-27.3	+0.0	+17.7	+4.9	+10.0	38.6	46.0	-7.4	Horiz
^	474.810M	37.3	-27.3	+0.0	+17.7	+4.9	+10.0	42.6	46.0	-3.4	Horiz
^	474.775M	32.1	-27.3	+0.0	+17.7	+4.9	+10.0	37.4	46.0	-8.6	Horiz
26	366.302M	32.9	-26.5	+0.0	+18.1	+4.1	+10.0	38.6	46.0	-7.4	Horiz
27	583.272M	31.3	-27.5	+0.0	+18.9	+5.3	+10.0	38.0	46.0	-8.0	Horiz
28	176.418M QP	33.1	-26.4	+16.2	+0.0	+2.6	+10.0	35.5	43.5	-8.0	Vert
^	176.418M	36.6	-26.4	+16.2	+0.0	+2.6	+10.0	39.0	43.5	-4.5	Vert
^	176.388M	32.4	-26.4	+16.2	+0.0	+2.6	+10.0	34.8	43.5	-8.7	Vert

31	488.374M QP	32.4	-27.3	+0.0	+17.9	+5.0	+10.0	38.0	46.0	-8.0	Horiz
^	488.363M	35.8	-27.3	+0.0	+17.9	+5.0	+10.0	41.4	46.0	-4.6	Horiz
33	81.335M	39.6	-26.8	+7.2	+0.0	+1.8	+10.0	31.8	40.0	-8.2	Horiz
34	203.541M QP	30.7	-26.3	+17.8	+0.0	+2.9	+10.0	35.1	43.5	-8.5	Horiz
^	203.521M	34.2	-26.3	+17.8	+0.0	+2.9	+10.0	38.6	43.5	-4.9	Horiz
36	420.532M	33.4	-27.0	+0.0	+16.7	+4.4	+10.0	37.5	46.0	-8.5	Horiz
37	149.288M QP	35.9	-26.5	+13.0	+0.0	+2.4	+10.0	34.8	43.5	-8.7	Vert
^	149.279M	38.6	-26.5	+13.0	+0.0	+2.4	+10.0	37.5	43.5	-6.0	Vert
39	217.103M QP	33.2	-26.2	+17.2	+0.0	+3.0	+10.0	37.2	46.0	-8.8	Vert
^	217.088M	36.8	-26.2	+17.2	+0.0	+3.0	+10.0	40.8	46.0	-5.2	Vert
41	501.895M QP	31.2	-27.3	+0.0	+18.1	+5.1	+10.0	37.1	46.0	-8.9	Horiz
^	501.887M	35.4	-27.3	+0.0	+18.1	+5.1	+10.0	41.3	46.0	-4.7	Horiz
^	501.926M	34.1	-27.3	+0.0	+18.1	+5.1	+10.0	40.0	46.0	-6.0	Horiz
44	583.314M	30.4	-27.5	+0.0	+18.9	+5.3	+10.0	37.1	46.0	-8.9	Vert
45	122.122M	34.6	-26.6	+14.3	+0.0	+2.2	+10.0	34.5	43.5	-9.0	Horiz
46	515.492M	30.8	-27.4	+0.0	+18.3	+5.1	+10.0	36.8	46.0	-9.2	Horiz
47	149.297M	35.3	-26.5	+13.0	+0.0	+2.4	+10.0	34.2	43.5	-9.3	Horiz
48	135.671M	34.6	-26.6	+13.5	+0.0	+2.3	+10.0	33.8	43.5	-9.7	Vert
49	610.442M QP	29.1	-27.5	+0.0	+19.2	+5.5	+10.0	36.3	46.0	-9.7	Horiz
^	610.427M	32.8	-27.5	+0.0	+19.2	+5.5	+10.0	40.0	46.0	-6.0	Horiz
^	610.400M	28.4	-27.5	+0.0	+19.2	+5.5	+10.0	35.6	46.0	-10.4	Horiz
52	786.794M QP	25.5	-27.4	+0.0	+21.8	+6.2	+10.0	36.1	46.0	-9.9	Horiz
^	786.756M	30.6	-27.4	+0.0	+21.8	+6.2	+10.0	41.2	46.0	-4.8	Horiz
54	176.416M QP	31.0	-26.4	+16.2	+0.0	+2.6	+10.0	33.4	43.5	-10.1	Horiz
^	176.376M	34.7	-26.4	+16.2	+0.0	+2.6	+10.0	37.1	43.5	-6.4	Horiz

56	746.078M QP	25.7	-27.5	+0.0	+21.5	+6.1	+10.0	35.8	46.0	-10.2	Horiz
^	746.047M	30.4	-27.5	+0.0	+21.5	+6.1	+10.0	40.5	46.0	-5.5	Horiz
58	501.931M QP	29.7	-27.3	+0.0	+18.1	+5.1	+10.0	35.6	46.0	-10.5	Horiz
59	664.694M QP	26.7	-27.6	+0.0	+20.4	+6.0	+10.0	35.5	46.0	-10.6	Horiz
^	664.689M	33.9	-27.6	+0.0	+20.4	+6.0	+10.0	42.7	46.0	-3.3	Horiz
^	664.673M	31.9	-27.6	+0.0	+20.4	+6.0	+10.0	40.7	46.0	-5.3	Horiz
62	759.668M QP	25.1	-27.5	+0.0	+21.6	+6.1	+10.0	35.3	46.0	-10.8	Horiz
^	759.666M	30.5	-27.5	+0.0	+21.6	+6.1	+10.0	40.7	46.0	-5.3	Horiz
64	40.758M	33.7	-26.8	+11.1	+0.0	+1.2	+10.0	29.2	40.0	-10.8	Horiz
65	529.077M QP	29.0	-27.4	+0.0	+18.4	+5.2	+10.0	35.2	46.0	-10.8	Horiz
^	529.035M	33.0	-27.4	+0.0	+18.4	+5.2	+10.0	39.2	46.0	-6.8	Horiz
^	529.027M	32.9	-27.4	+0.0	+18.4	+5.2	+10.0	39.1	46.0	-6.9	Horiz
68	691.838M QP	25.6	-27.5	+0.0	+20.9	+6.0	+10.0	35.0	46.0	-11.0	Horiz
^	691.812M	32.9	-27.5	+0.0	+20.9	+6.0	+10.0	42.3	46.0	-3.7	Horiz
^	691.789M	30.2	-27.5	+0.0	+20.9	+6.0	+10.0	39.6	46.0	-6.4	Horiz
71	217.100M QP	30.9	-26.2	+17.2	+0.0	+3.0	+10.0	34.9	46.0	-11.1	Horiz
^	217.083M	34.1	-26.2	+17.2	+0.0	+3.0	+10.0	38.1	46.0	-7.9	Horiz
73	67.887M	35.0	-26.8	+8.4	+0.0	+1.6	+10.0	28.2	40.0	-11.8	Horiz
74	108.568M	33.0	-26.7	+13.3	+0.0	+2.1	+10.0	31.7	43.5	-11.8	Vert
75	162.761M	31.4	-26.4	+13.8	+0.0	+2.5	+10.0	31.3	43.5	-12.2	Vert
76	108.569M	32.2	-26.7	+13.3	+0.0	+2.1	+10.0	30.9	43.5	-12.6	Vert
77	81.570M	34.7	-26.8	+7.2	+0.0	+1.8	+10.0	26.9	40.0	-13.1	Vert

Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa CA 95338 • 1-800-500-4EMC (4362)

Customer: **Escort Memory Systems**

Specification: **FCC 15.209**

Work Order #: **79109**

Date: 08/03/2002

Test Type: **Radiated Scan**

Time: 11:04:37

Equipment: **RFID Reader/Writer**

Sequence#: 9

Manufacturer: Escort Memory Systems

Tested By: Randal Clark

Model: LRP76

S/N: 080102-002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RFID Reader/Writer*	Escort Memory Systems	LRP76	080102-002

Support Devices:

Function	Manufacturer	Model #	S/N
EUT Power Supply	International Power	IPB500950	N/A
Power Supply for Computer	Compaq	246960-001	CT:501BA14C1R687
Host Computer	Compaq	2870B	3736HUR16020

Test Conditions / Notes:

EUT is located in on an 80cm table in a test enclosure setup similar to normal installation. Host computer is for controlling and monitoring EUT. RFID tag is located 7mm in front of the EUT for continuous feedback. EUT is powered with 24VDC via AC transformer. Frequency Range Investigated: 30-1000MHz. EUT Configuration Notes: DC common, chassis ground and logic ground all tied together at cable entry. Nearest enclosure bolt used for ground point. Ferrites attached at each end of the RS232 cable; the EUT end has 1 turn, the computer end has no turns. Ferrite clamp installed at connector between antenna and antenna shield plate. EUT test bracket is earth referenced. Board changes: EMS Fab 14-1188, removed L5 and replaced with a short R7 replaced with 51 Ohms L4 replaced with 51 Ohms EMS Fab 14-1189; shield of the 13.56 MHz local oscillator (Y1) tied to ground. Frequency range tested: 30-1000 MHz.

Transducer Legend:

T1=Amp - S/N 604	T2=Bicon 156
T3=Log s/n 154	T4=Cable - 10 Meter

Measurement Data:

Reading listed by margin.

Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	230.657M	37.9	-26.2	+16.5	+0.0	+3.1	+10.0	41.3	46.0	-4.7	Horiz
2	54.330M	39.4	-26.8	+10.9	+0.0	+1.4	+10.0	34.9	40.0	-5.1	Vert
3	122.108M	38.5	-26.6	+14.3	+0.0	+2.2	+10.0	38.4	43.5	-5.1	Vert
4	67.902M	41.6	-26.8	+8.4	+0.0	+1.6	+10.0	34.8	40.0	-5.2	Vert
QP											
^	67.894M	44.5	-26.8	+8.4	+0.0	+1.6	+10.0	37.7	40.0	-2.3	Vert
6	176.408M	35.2	-26.4	+16.2	+0.0	+2.6	+10.0	37.6	43.5	-5.9	Vert
QP											
^	176.393M	37.3	-26.4	+16.2	+0.0	+2.6	+10.0	39.7	43.5	-3.8	Vert

8	176.412M	34.1	-26.4	+16.2	+0.0	+2.6	+10.0	36.5	43.5	-7.0	Horiz
9	149.241M	37.3	-26.5	+13.0	+0.0	+2.4	+10.0	36.2	43.5	-7.3	Horiz
10	40.774M QP	37.0	-26.8	+11.1	+0.0	+1.2	+10.0	32.5	40.0	-7.5	Vert
^	40.766M	44.3	-26.8	+11.1	+0.0	+1.2	+10.0	39.8	40.0	-0.2	Vert
12	312.050M	29.4	-26.3	+0.0	+21.4	+3.8	+10.0	38.3	46.0 Antenna 2 m off the ground.	-7.7	Horiz
13	244.245M	35.2	-26.1	+15.9	+0.0	+3.2	+10.0	38.2	46.0	-7.8	Horiz
14	203.538M	30.9	-26.3	+17.8	+0.0	+2.9	+10.0	35.3	43.5	-8.2	Vert
15	135.682M	35.8	-26.6	+13.5	+0.0	+2.3	+10.0	35.0	43.5	-8.5	Vert
16	596.863M QP	30.6	-27.5	+0.0	+19.0	+5.4	+10.0	37.5	46.0	-8.5	Horiz
^	596.861M	35.8	-27.5	+0.0	+19.0	+5.4	+10.0	42.7	46.0	-3.3	Horiz
18	122.152M	35.0	-26.6	+14.3	+0.0	+2.2	+10.0	34.9	43.5	-8.6	Horiz
19	149.299M	35.9	-26.5	+13.0	+0.0	+2.4	+10.0	34.8	43.5	-8.7	Vert
20	81.460M	39.1	-26.8	+7.2	+0.0	+1.8	+10.0	31.3	40.0	-8.7	Vert
21	447.670M	32.5	-27.2	+0.0	+17.2	+4.6	+10.0	37.1	46.0 Antenna 2 m off the ground.	-8.9	Horiz
22	393.407M	32.9	-26.8	+0.0	+16.6	+4.3	+10.0	37.0	46.0	-9.0	Vert
23	135.681M	35.0	-26.6	+13.5	+0.0	+2.3	+10.0	34.2	43.5	-9.3	Horiz
24	515.489M QP	30.7	-27.4	+0.0	+18.3	+5.1	+10.0	36.7	46.0 Antenna 2 m off the ground.	-9.3	Horiz
^	515.470M	35.0	-27.4	+0.0	+18.3	+5.1	+10.0	41.0	46.0 Antenna 2 m off the ground.	-5.0	Horiz
26	230.611M	33.2	-26.2	+16.5	+0.0	+3.1	+10.0	36.6	46.0	-9.4	Vert
27	420.512M	32.5	-27.0	+0.0	+16.7	+4.4	+10.0	36.6	46.0	-9.4	Vert
28	203.534M QP	29.6	-26.3	+17.8	+0.0	+2.9	+10.0	34.0	43.5	-9.5	Horiz
^	203.617M	33.0	-26.3	+17.8	+0.0	+2.9	+10.0	37.4	43.5	-6.1	Horiz
30	420.538M	32.3	-27.0	+0.0	+16.7	+4.4	+10.0	36.4	46.0 Antenna 2 m off the ground.	-9.6	Horiz

31	447.650M	31.8	-27.2	+0.0	+17.2	+4.6	+10.0	36.4	46.0 Antenna 2 m off the ground.	-9.6	Horiz
32	501.917M QP	30.4	-27.3	+0.0	+18.1	+5.1	+10.0	36.3	46.0	-9.7	Vert
^	501.899M	34.6	-27.3	+0.0	+18.1	+5.1	+10.0	40.5	46.0	-5.5	Vert
^	501.851M	32.6	-27.3	+0.0	+18.1	+5.1	+10.0	38.5	46.0	-7.5	Vert
35	596.851M QP	29.0	-27.5	+0.0	+19.0	+5.4	+10.0	35.9	46.0	-10.1	Vert
^	596.843M	33.7	-27.5	+0.0	+19.0	+5.4	+10.0	40.6	46.0	-5.4	Vert
37	501.915M QP	29.7	-27.3	+0.0	+18.1	+5.1	+10.0	35.6	46.0 Antenna 2 m off the ground.	-10.4	Horiz
^	501.936M	33.9	-27.3	+0.0	+18.1	+5.1	+10.0	39.8	46.0 Antenna 2 m off the ground.	-6.2	Horiz
39	217.097M QP	31.4	-26.2	+17.2	+0.0	+3.0	+10.0	35.4	46.0	-10.6	Horiz
^	217.059M	34.4	-26.2	+17.2	+0.0	+3.0	+10.0	38.4	46.0	-7.6	Horiz
41	393.392M	31.2	-26.8	+0.0	+16.6	+4.3	+10.0	35.3	46.0 Antenna 2 m off the ground.	-10.7	Horiz
42	217.059M	31.0	-26.2	+17.2	+0.0	+3.0	+10.0	35.0	46.0	-11.0	Vert
43	501.916M QP	29.1	-27.3	+0.0	+18.1	+5.1	+10.0	35.0	46.0	-11.0	Vert
44	257.781M	30.5	-26.1	+16.9	+0.0	+3.3	+10.0	34.6	46.0	-11.4	Horiz
45	67.905M	35.3	-26.8	+8.4	+0.0	+1.6	+10.0	28.5	40.0	-11.5	Horiz
46	529.044M QP	28.1	-27.4	+0.0	+18.4	+5.2	+10.0	34.3	46.0	-11.7	Horiz
^	529.014M	32.2	-27.4	+0.0	+18.4	+5.2	+10.0	38.4	46.0	-7.6	Horiz
48	406.966M	30.0	-26.9	+0.0	+16.4	+4.3	+10.0	33.8	46.0 Antenna 2 m off the ground.	-12.2	Horiz
49	623.985M QP	26.0	-27.5	+0.0	+19.5	+5.7	+10.0	33.7	46.0	-12.3	Horiz
^	623.932M	32.0	-27.5	+0.0	+19.5	+5.7	+10.0	39.7	46.0	-6.3	Horiz
51	542.609M QP	27.3	-27.5	+0.0	+18.5	+5.2	+10.0	33.5	46.0	-12.5	Horiz
^	542.601M	32.2	-27.5	+0.0	+18.5	+5.2	+10.0	38.4	46.0	-7.6	Horiz

53	569.739M	26.7	-27.5	+0.0	+18.7	+5.3	+10.0	33.2	46.0	-12.8	Vert
	QP										
^	569.686M	31.9	-27.5	+0.0	+18.7	+5.3	+10.0	38.4	46.0	-7.6	Vert
55	556.171M	26.4	-27.5	+0.0	+18.6	+5.2	+10.0	32.7	46.0	-13.3	Horiz
	QP										
^	556.111M	32.1	-27.5	+0.0	+18.6	+5.2	+10.0	38.4	46.0	-7.6	Horiz
57	108.585M	31.2	-26.7	+13.3	+0.0	+2.1	+10.0	29.9	43.5	-13.6	Horiz
58	108.572M	31.2	-26.7	+13.3	+0.0	+2.1	+10.0	29.9	43.5	-13.6	Vert