



INDALA CORPORATION TEST REPORT

FOR THE

PROXIMITY READER, EM READER VER. 1

FCC PART 15 SUBPART C SECTIONS 15.207 & 15.209 AND RSS 210

COMPLIANCE

DATE OF ISSUE: JUNE 19, 2003

PREPARED FOR:

Indala Corporation
6850 B Santa Teresa Blvd.
San Jose, CA 95119-1205

P.O. No.: 10001257
W.O. No.: 80707

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: June 2 - 9, 2003

Report No.: FC03-041

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ADMINISTRATIVE INFORMATION

DATE OF TEST: June 2 - 9, 2003

DATE OF RECEIPT: June 2, 2003

PURPOSE OF TEST: To demonstrate the compliance of the Proximity Reader, EM READER VER. 1 with the requirements for FCC Part 15 Subpart C Sections 15.207 & 15.209 and RSS 210 devices.

TEST METHOD: ANSI C63.4 (1992)

MANUFACTURER: Indala Corporation
6850 B Santa Teresa Blvd.
San Jose, CA 95119-1205

REPRESENTATIVE: Steve Rose

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

SUMMARY OF RESULTS

As received, the Indala Corporation Proximity Reader, EM READER VER. 1 was found to be fully compliant with the following standards and specifications:

<u>United States</u>	<u>Canada</u>
FCC PART 15.207/15.209	RSS 210
15.205	6.3
15.207	6.6
15.209	6.2.1
NA	5.9.1
ANSI C63.4 (1992) method	RSS 212 method
	Industry of Canada File No. IC 3082-A Industry of Canada File No. IC 3082-B

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

QUALITY ASSURANCE:



Steve Behm, Director of Engineering Services
and Quality Assurance



Joyce Walker, Quality Assurance Administrative
Manager



Mike Wilkinson, Lab Manager

TEST PERSONNEL:



Monika Brandle, EMC Test Engineer



Randy Clark, EMC Engineer

FCC 15.31(e) Voltage Variations

FREQUENCY kHz	CORRECTED READING dB μ V/m 85%	CORRECTED READING dB μ V/m 100%	CORRECTED READING dB μ V/m 115%	SPEC LIMIT dB μ V/m
129.085	1.4	1.5	1.5	25.4

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.31(e)
Test Distance: 10 meters

FCC 15.31(m) Number Of Channels

This device operates on a single channel.

FCC 15.33(a) Frequency Ranges Tested

15.207 Conducted: 150 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	150 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

FCC 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.

FCC 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.

FCC 15.215 Additional Provisions to the General Radiated Emission Limitations

The fundamental frequency was kept within the central 80% of the permitted band in order to minimize the possibility of out-of-band operation. Refer to Appendix B for the test equipment used.

Eut Operating Frequency

The EUT was operating at 130 kHz.

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 (EUT) DESCRIPTION

The EUT tested by CKC Laboratories was a production unit.

EQUIPMENT UNDER TEST**Proximity Reader**

Manuf: Indala Corporation
Model: EM READER VER. 1
Serial: EM-B 23316
FCC ID: E9UEMRDRV1 (pending)

PERIPHERAL DEVICES

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

DC Power Supply

Manuf: Topward Electric Instruments Co., Ltd.
Model: TPS-2000
Serial: 920035
FCC ID: NA

REPORT OF MEASUREMENTS

The following tables report the worst case emissions levels recorded during the tests performed on the EUT. 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: FCC 15.207 Six Highest Conducted Emission Levels

FREQUENCY MHz	METER READING dB μ V	CORRECTION FACTORS				CORRECTED READING dB μ V	SPEC LIMIT dB μ V	MARGIN dB	NOTES
		Lisn dB		Cable dB					
10.720760	42.2	0.4		0.2		42.8	50.0	-7.2	W
10.982410	43.5	0.4		0.2		44.1	50.0	-5.9	W
11.244060	44.7	0.4		0.2		45.3	50.0	-4.7	W
11.496690	45.0	0.4		0.2		45.6	50.0	-4.4	W
11.749320	44.1	0.4		0.2		44.7	50.0	-5.3	W
12.001950	43.1	0.4		0.2		43.7	50.0	-6.3	W

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

NOTES: W = White Lead

COMMENTS: EUT is a proximity card reader operating on a frequency of 130kHz. The EUT is powered by 12VDC through a DC power supply. The power supply is located near the ground plane. To simulate normal installation, the EUT is mounted on a wooden stand. Frequency Scanned: 150 kHz - 30MHz.

Table 2: FCC 15.209 Fundamental Emission Levels

FREQUENCY MHz	METER READING dB μ V	CORRECTION FACTORS				CORRECTED READING dB μ V/m	SPEC LIMIT dB μ V/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Corr. dB				
0.129	51.9	9.6			-60.0	1.5	25.4	-23.9	V
0.129	44.1	9.6			-60.0	-6.3	25.4	-31.7	H

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

NOTES: H = Horizontal Polarization
V = Vertical Polarization

COMMENTS: EUT is a proximity card reader operating on a frequency of 130kHz. The EUT is powered by 12VDC through a DC power supply. The power supply is located near the ground plane. To simulate normal installation, the EUT is mounted on a wooden stand. Data taken at a test distance of 10 meters, a correction factor of 40dB/Dec Fall off in accordance with FCC 15.31 was used to correct the data to 30 meters for comparison to the limit. Voltage variations performed in accordance with FCC 15.31(e) $\pm 15\%$ of nominal input voltage. Frequency Range Investigated: Carrier.

Table 3: FCC 15.209 Six Highest Radiated Emission Levels: 9 kHz - 1000 MHz

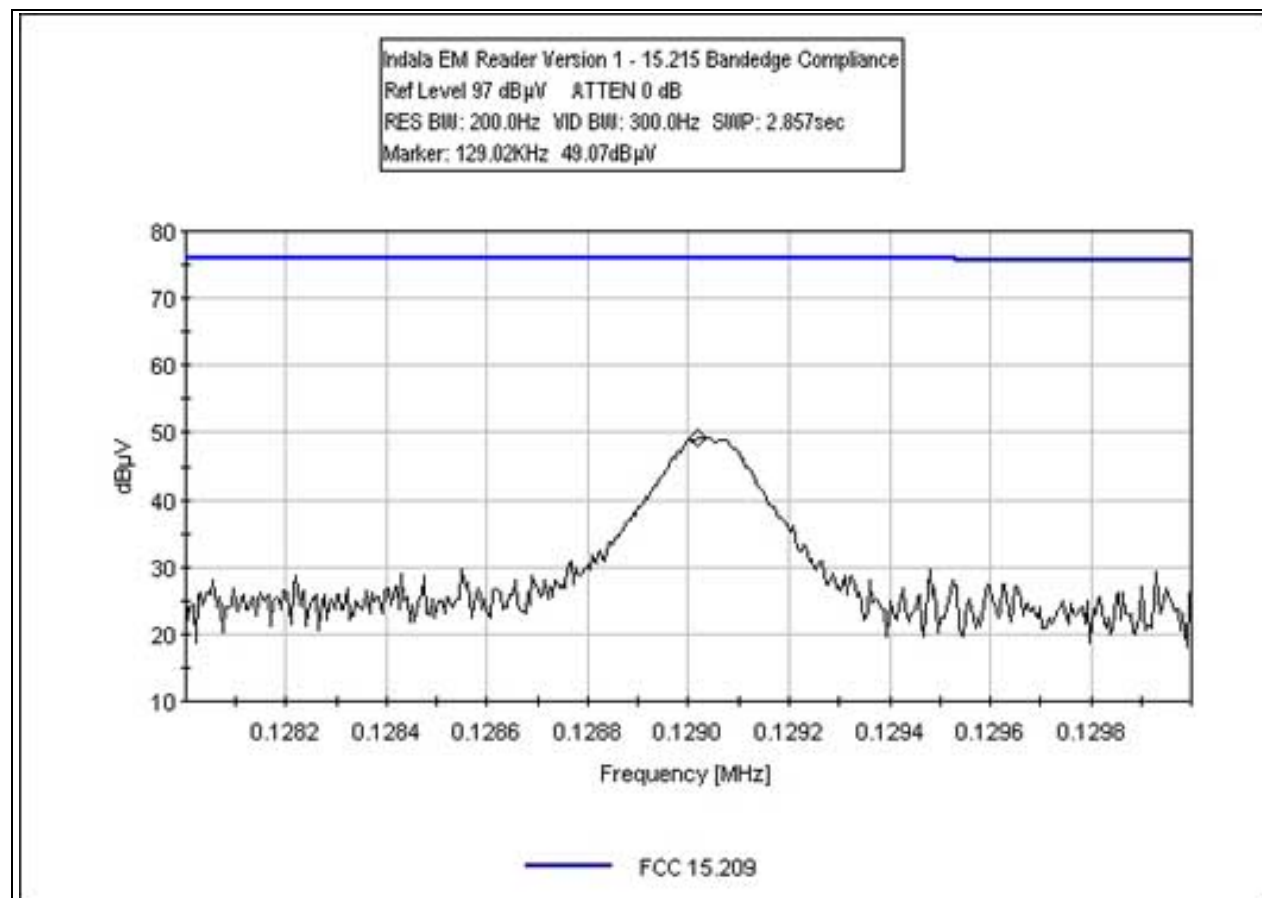
FREQUENCY MHz	METER READING dB μ V	CORRECTION FACTORS				CORRECTED READING dB μ V/m	SPEC LIMIT dB μ V/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB					
38.810	37.8	14.3	-27.3	0.9		25.7	40.0	-14.3	V
39.500	36.1	14.0	-27.3	0.9		23.7	40.0	-16.3	V
43.413	36.6	12.4	-27.3	0.9		22.6	40.0	-17.4	V
48.413	40.9	9.6	-27.3	1.0		24.2	40.0	-15.8	V
51.680	44.5	8.0	-27.3	1.0		26.2	40.0	-13.8	V
56.150	44.0	6.6	-27.3	1.1		24.4	40.0	-15.6	V

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

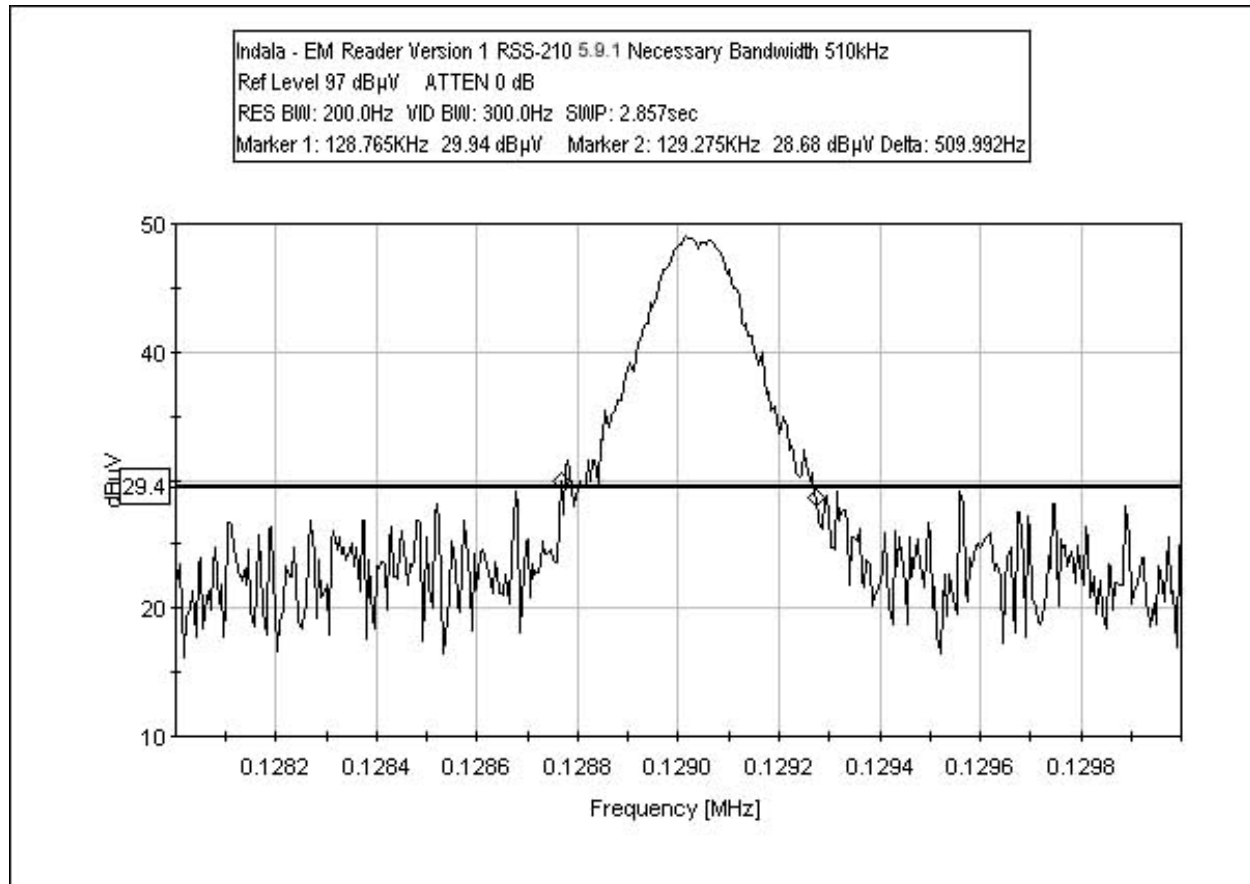
NOTES: V = Vertical Polarization

COMMENTS: EUT is a proximity card reader operating on a frequency of 130kHz. The EUT is powered by 12VDC through a DC power supply. The power supply is located near the ground plane. To simulate normal installation, the EUT is mounted on a wooden stand. Frequency Scanned: 9 kHz - 1000 MHz.

FCC 15.215 BAND EDGE PLOT



RSS 210 5.9.1 EMISSIONS MASK



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. Statements of compliance are based on the nominal values only.

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. The radiated and conducted emissions data of the EUT 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 dB μ V/m, the spectrum analyzer reading in dB μ 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	(dB μ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB μ V/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 frequencies from 30 to 1000 MHz, the biconilog 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 dBμV, 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.

The LISNs used were 50 μ H/+50 ohms. Above 150 kHz, a 0.15 μ F series capacitor was added in-line prior to connecting the analyzer to restore the proper impedance for the range. A 30 to 50 second sweep time was used for automated measurements in the frequency bands of 150 kHz to 500 kHz, and 500 kHz to 30 MHz. All readings within 20 dB of the limit were recorded, and those within 6 dB of the limit were examined with additional measurements using a slower sweep time.

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 1000 MHz was scanned with the biconilog antenna located about 1.5 meter above the ground plane in the vertical polarity. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. A scan of the FM band from 88 to 110 MHz was then made using a reduced resolution bandwidth and frequency span. The biconilog antenna was changed to the horizontal polarity and the above steps were repeated. 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

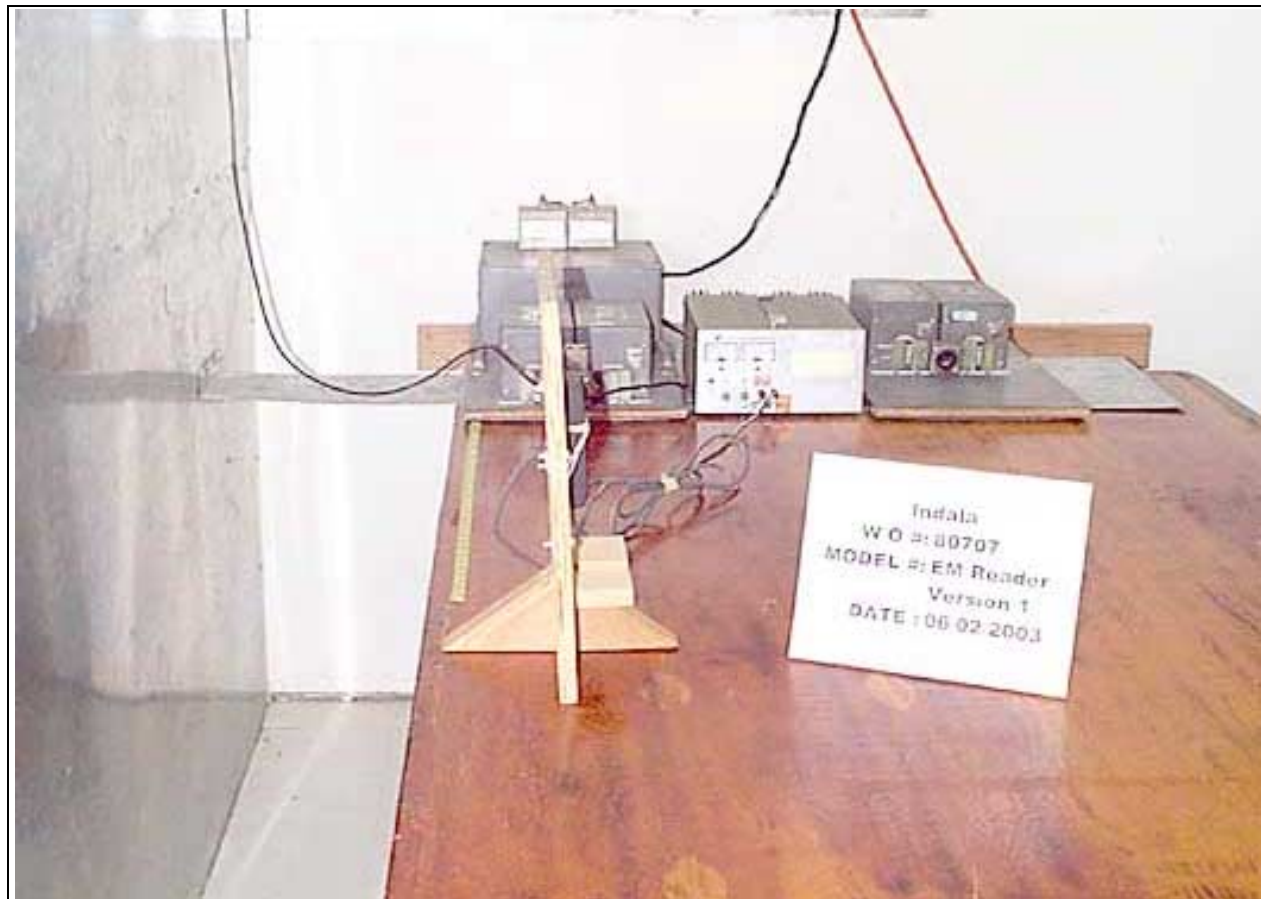
TEST SETUP PHOTOGRAPHS

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



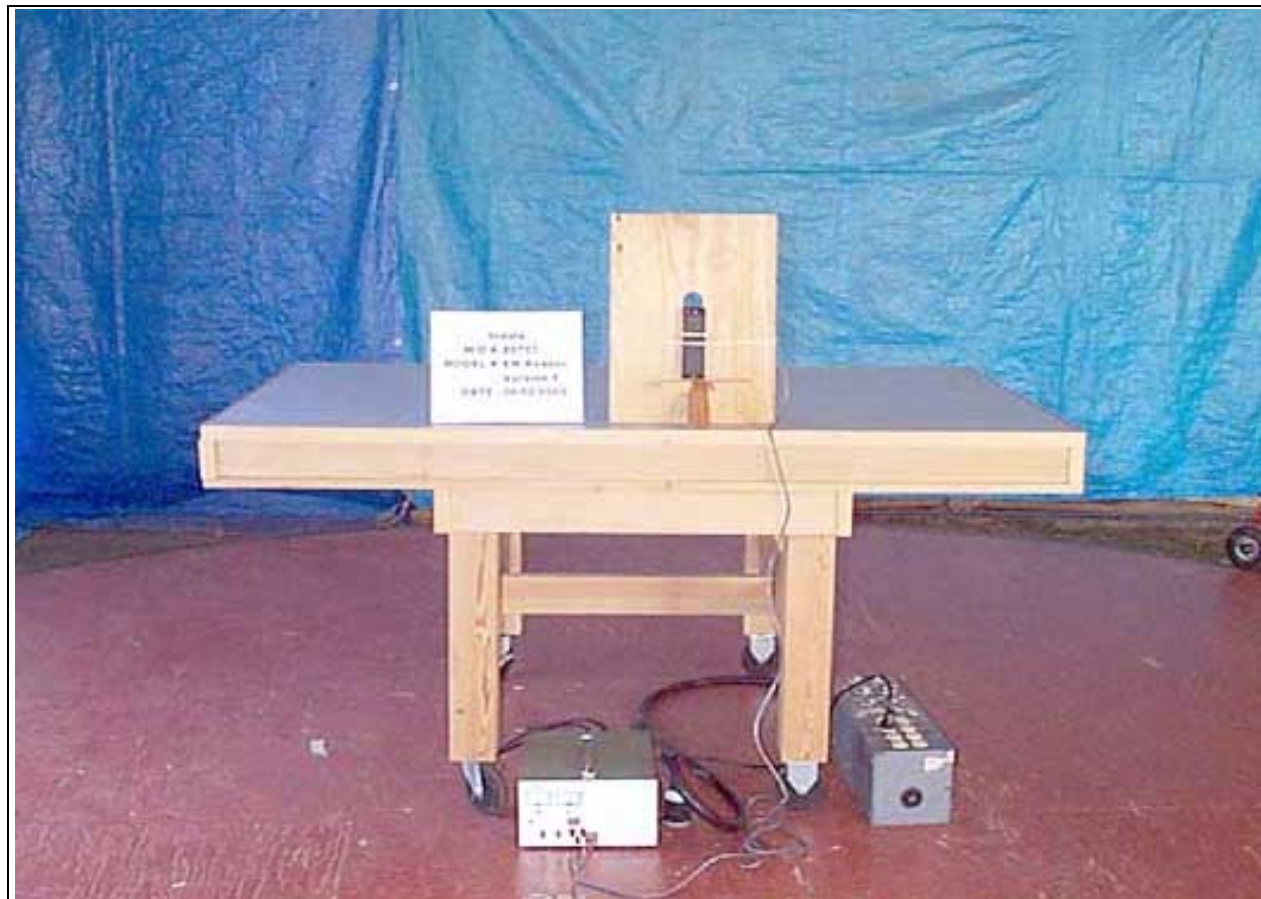
Mains Conducted Emissions - Front View

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



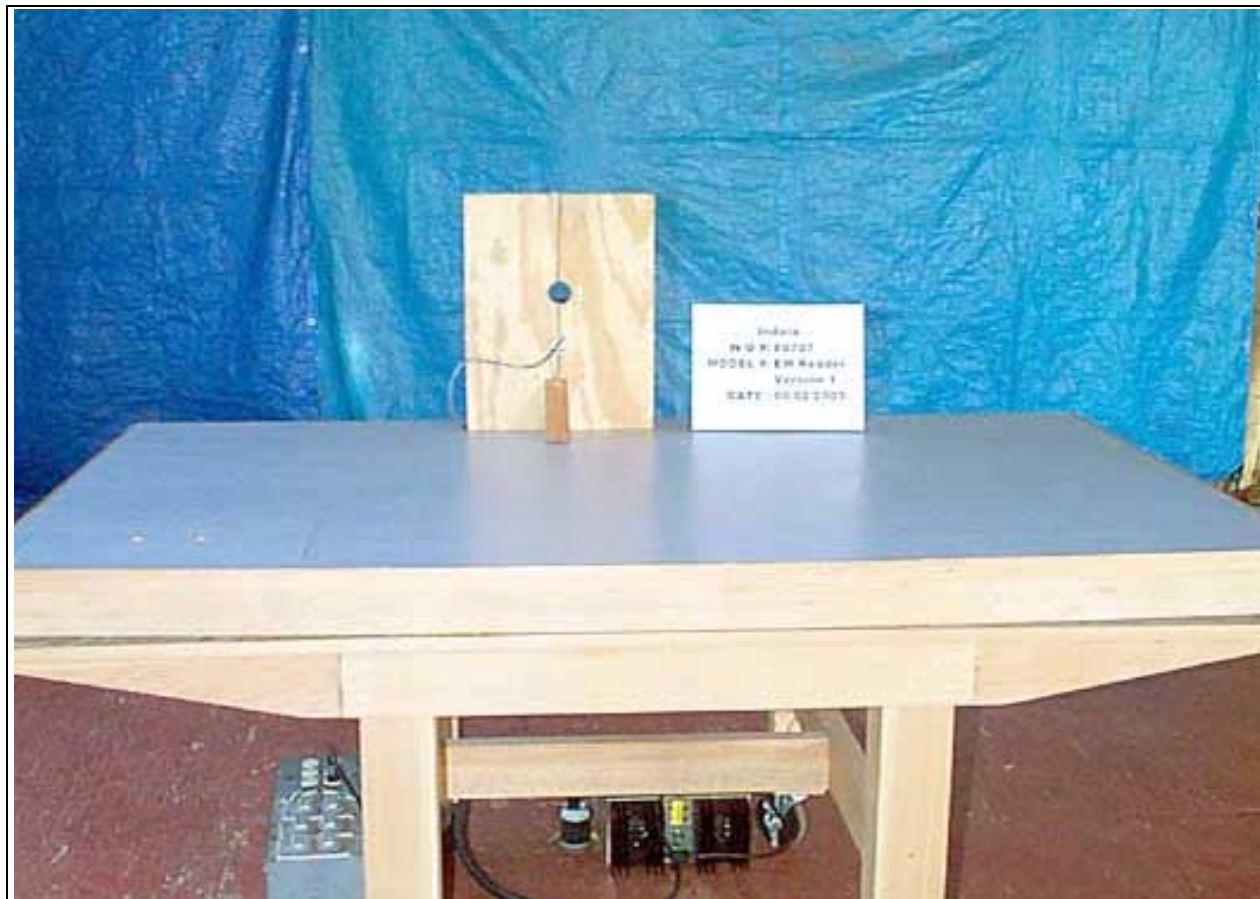
Mains Conducted Emissions - Side View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View

APPENDIX B

TEST EQUIPMENT LIST

15.207

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8593EM Spectrum Analyzer	3624A00159	05/12/2003	05/12/2005	2111
LISN Single Phase	8379276, ...280	06/05/2003	06/05/2005	330

15.209 (30-1000 MHz)

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8566B SA	2209A01404	02/26/2003	02/26/2004	490
HP 85650A QPA	2811A01267	02/26/2003	02/26/2004	478
HP 8447D Preamp	1937A02604	03/07/2003	03/07/2004	99
Chase CBL6111C Bilog	2456	12/13/2002	12/13/2004	1991

15.209 (9 kHz – 30 MHz)

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8447D Preamp	1937A02604	03/07/2003	03/07/2004	99
Chase CBL6111C Bilog	2456	12/13/2002	12/13/2004	1991
HP 8593EM Spectrum Analyzer	3624A00159	05/12/2003	05/12/2005	2111
EMCO Loop Antenna	2078	08/23/2002	08/23/2003	432

APPENDIX C:
MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa, Ca 95338 • (209) 966-5240

Customer: **Indala**
 Specification: **FCC 15.207 - AVE**
 Work Order #: **80707**
 Test Type: **Conducted Emissions**
 Equipment: **Proximity Reader**
 Manufacturer: Indala
 Model: EM Reader Version 1
 S/N: EM-B 23316

Date: 06/09/2003
 Time: 3:08:11 PM
 Sequence#: 9
 Tested By: Randal Clark
 120V 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Proximity Reader*	Indala	EM Reader Version 1	EM-B 23316

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Topward Electric Instruments Co., Ltd.	TPS-2000	920035

Test Conditions / Notes:

EUT is a proximity card reader operating on a frequency of 130kHz. The EUT is powered by 12VDC through a DC power supply. The power supply is located near the ground plane. To simulate normal installation, the EUT is mounted on a wooden stand. Frequency Scanned: 150 kHz - 30MHz.

Transducer Legend:

T1=Cable & Cap (Bench)	T2=LISN Insertion Loss s/n276
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Measurement Data:

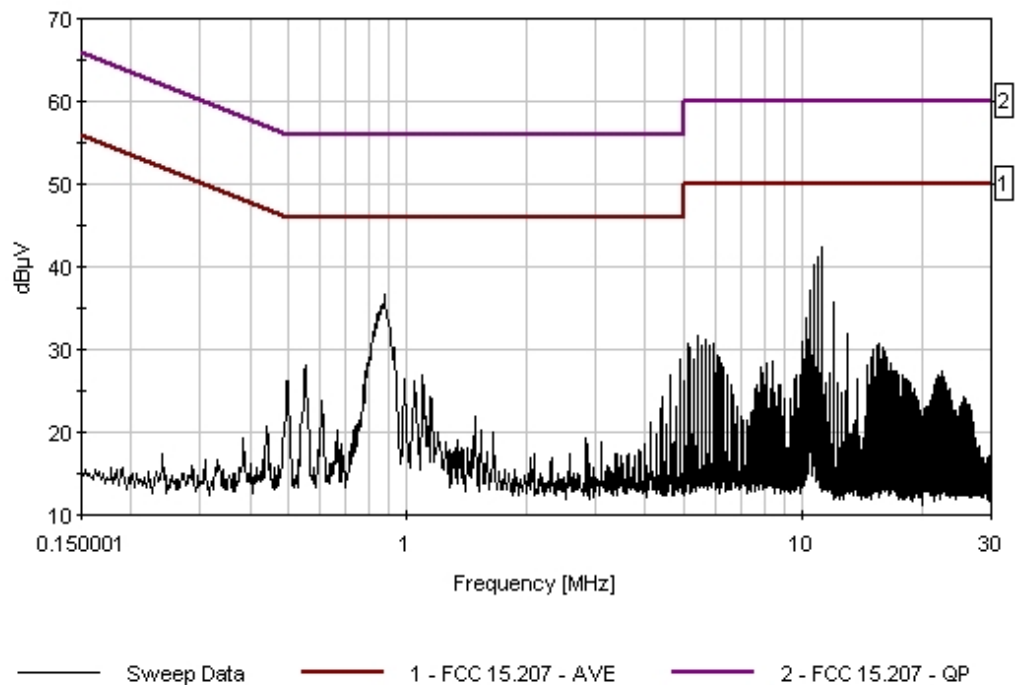
Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	Reading noted by Margin		Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	11.244M	41.6	+0.2	+0.5			+0.0	42.3	50.0	-7.7	Black
2	10.982M	40.6	+0.2	+0.5			+0.0	41.3	50.0	-8.7	Black
3	875.387k	36.3	+0.0	+0.3			+0.0	36.6	46.0	-9.4	Black
4	10.721M	39.5	+0.2	+0.5			+0.0	40.2	50.0	-9.8	Black
5	877.205k	35.5	+0.0	+0.3			+0.0	35.8	46.0	-10.2	Black
6	10.459M	36.4	+0.2	+0.5			+0.0	37.1	50.0	-12.9	Black
7	12.002M	35.1	+0.2	+0.5			+0.0	35.8	50.0	-14.2	Black
8	10.197M	33.1	+0.2	+0.5			+0.0	33.8	50.0	-16.2	Black
9	4.901M	28.4	+0.1	+0.4			+0.0	28.9	46.0	-17.1	Black
10	551.781k	27.7	+0.1	+0.3			+0.0	28.1	46.0	-17.9	Black
11	13.040M	31.2	+0.2	+0.5			+0.0	31.9	50.0	-18.1	Black

12	5.416M	31.2	+0.1	+0.4	+0.0	31.7	50.0	-18.3	Black
13	5.677M	30.7	+0.1	+0.4	+0.0	31.2	50.0	-18.8	Black
14	10.333M	30.5	+0.2	+0.5	+0.0	31.2	50.0	-18.8	Black
15	1.094M	26.7	+0.0	+0.3	+0.0	27.0	46.0	-19.0	Black
16	9.945M	30.2	+0.2	+0.5	+0.0	30.9	50.0	-19.1	Black
17	4.640M	26.3	+0.1	+0.4	+0.0	26.8	46.0	-19.2	Black
18	15.620M	30.2	+0.2	+0.4	+0.0	30.8	50.0	-19.2	Black
19	5.939M	30.2	+0.1	+0.4	+0.0	30.7	50.0	-19.3	Black
20	5.154M	30.1	+0.1	+0.4	+0.0	30.6	50.0	-19.4	Black

CKC Laboratories Date: 06/09/2003 Time: 3:08:11 PM Indala VVO#: 80707
FCC 15.207 - AVE Test Lead: Black 120V 60Hz Sequence#: 9



Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa, Ca 95338 • (209) 966-5240

Customer: **Indala**
 Specification: **FCC 15.207 - AVE**
 Work Order #: **80707**
 Test Type: **Conducted Emissions**
 Equipment: **Proximity Reader**
 Manufacturer: Indala
 Model: EM Reader Version 1
 S/N: EM-B 23316

Date: 06/09/2003
 Time: 15:22:13
 Sequence#: 10
 Tested By: Randal Clark
 120V 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Proximity Reader*	Indala	EM Reader Version 1	EM-B 23316

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Topward Electric Instruments Co., Ltd.	TPS-2000	920035

Test Conditions / Notes:

EUT is a proximity card reader operating on a frequency of 130kHz. The EUT is powered by 12VDC through a DC power supply. The power supply is located near the ground plane. To simulate normal installation, the EUT is mounted on a wooden stand. Frequency Scanned: 150 kHz - 30MHz.

Transducer Legend:

T1=Cable & Cap (Bench)	T2=LISN Insertion Loss s/n280
------------------------	-------------------------------

Measurement Data:

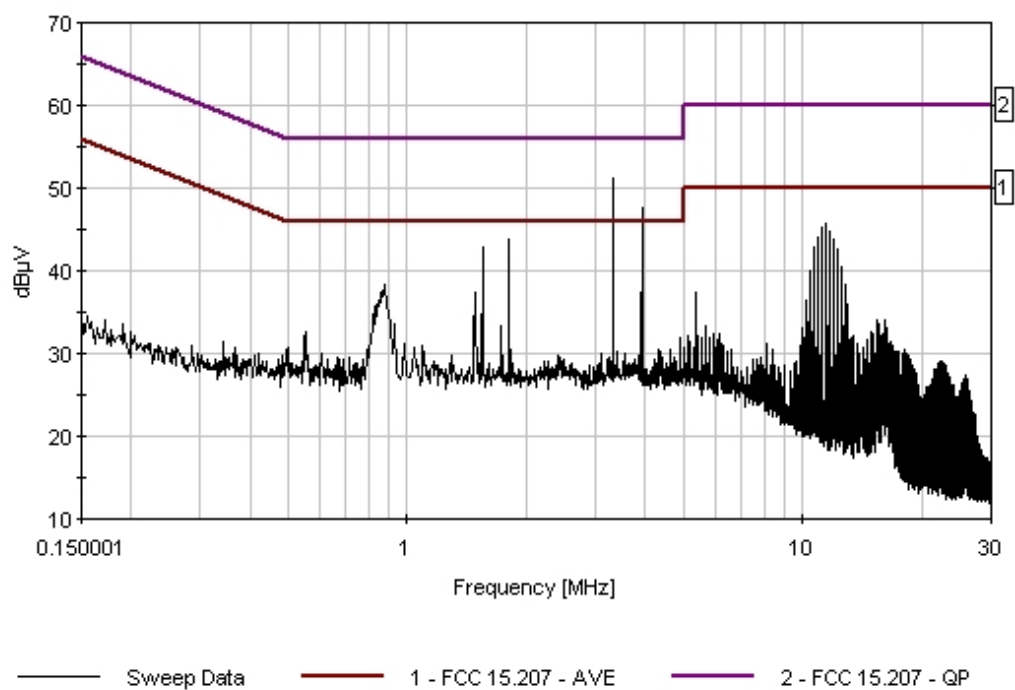
Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	Dist dB	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	11.497M	45.0	+0.2	+0.4	+0.0	45.6	50.0	-4.4	White
2	11.244M	44.7	+0.2	+0.4	+0.0	45.3	50.0	-4.7	White
3	11.749M	44.1	+0.2	+0.4	+0.0	44.7	50.0	-5.3	White
4	10.982M	43.5	+0.2	+0.4	+0.0	44.1	50.0	-5.9	White
5	12.002M	43.1	+0.2	+0.4	+0.0	43.7	50.0	-6.3	White
6	10.721M	42.2	+0.2	+0.4	+0.0	42.8	50.0	-7.2	White
7	12.264M	42.0	+0.2	+0.4	+0.0	42.6	50.0	-7.4	White
8	877.205k	38.1	+0.0	+0.2	+0.0	38.3	46.0	-7.7	White
9	873.570k	38.0	+0.0	+0.2	+0.0	38.2	46.0	-7.8	White
10	1.482M	37.1	+0.0	+0.3	+0.0	37.4	46.0	-8.6	White
11	12.525M	39.8	+0.2	+0.4	+0.0	40.4	50.0	-9.6	White

12	10.459M	39.5	+0.2	+0.4	+0.0	40.1	50.0	-9.9	White
13	12.778M	37.7	+0.2	+0.4	+0.0	38.3	50.0	-11.7	White
14	3.324M	33.2	+0.1	+0.3	+0.0	33.6	46.0	-12.4	White
Ave									
^	3.324M	52.0	+0.1	+0.3	+0.0	52.4	46.0	+6.4	White
16	1.734M	33.0	+0.0	+0.3	+0.0	33.3	46.0	-12.7	White
17	5.379M	36.9	+0.1	+0.3	+0.0	37.3	50.0	-12.7	White
18	553.599k	32.3	+0.1	+0.2	+0.0	32.6	46.0	-13.4	White
19	1.817M	28.5	+0.0	+0.3	+0.0	28.8	46.0	-17.2	White
Ave									
^	1.817M	51.6	+0.0	+0.3	+0.0	51.9	46.0	+5.9	White
21	1.558M	27.1	+0.0	+0.3	+0.0	27.4	46.0	-18.6	White
Ave									
^	1.558M	42.2	+0.0	+0.3	+0.0	42.5	46.0	-3.5	White
23	3.928M	26.8	+0.1	+0.4	+0.0	27.3	46.0	-18.7	White
Ave									
^	3.928M	52.5	+0.1	+0.4	+0.0	53.0	46.0	+7.0	White

CKC Laboratories Date: 06/09/2003 Time: 15:22:13 Indala WVO#: 80707
 FCC 15.207 - AVE Test Lead: White 120V 60Hz Sequence#: 10



Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa, Ca 95338 • (209) 966-5240

Customer: **Indala**
 Specification: **FCC 15.209**
 Work Order #: **80707**
 Test Type: **Maximized Emissions**
 Equipment: **Proximity Reader**
 Manufacturer: Indala
 Model: EM Reader Version 1
 S/N: EM-B 23316

Date: 06/09/2003
 Time: 11:38:46
 Sequence#: 2
 Tested By: Monika Brandle

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Proximity Reader*	Indala	EM Reader Version 1	EM-B 23316

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Topward Electric Instruments Co., Ltd.	TPS-2000	920035

Test Conditions / Notes:

EUT is a proximity card reader operating on a frequency of 130kHz. The EUT is powered by 12VDC through a DC power supply. The power supply is located near the ground plane. To simulate normal installation, the EUT is mounted on a wooden stand. Data taken at a test distance of 10 meters, a correction factor of 40dB/Dec fall off in accordance with FCC 15.31 was used to correct the data to 30 meters for comparison to the limit. Voltage variations performed in accordance with FCC 15.31(e) $\pm 15\%$ of nominal input voltage. Frequency Range Investigated: Carrier.

Transducer Legend:

T1=Mag Loop - Site B - AN 00226 - 9kHz-30M	T2=15.31 10m 40dB/Dec Correction
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Measurement Data:

Reading listed by margin.

Test Distance: 10 Meters

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	dB	dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	129.085k	51.9	+9.6	-60.0			+0.0	1.5	25.4 +15% of nominal input voltage	-23.9	Vert
2	129.085k	51.9	+9.6	-60.0			+0.0	1.5	25.4	-23.9	Vert
3	129.085k	51.8	+9.6	-60.0			+0.0	1.4	25.4 -15% of nominal input voltage	-24.0	Vert
4	129.180k	44.1	+9.6	-60.0			+0.0	-6.3	25.4	-31.7	Horiz

Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa, Ca 95338 • (209) 966-5240

Customer: **Indala**
 Specification: **FCC 15.209**
 Work Order #: **80707**
 Test Type: **Maximized Emissions**
 Equipment: **Proximity Reader**
 Manufacturer: Indala
 Model: EM Reader Version 1
 S/N: EM-B 23316

Date: 06/02/2003
 Time: 16:50:48
 Sequence#: 6
 Tested By: Monika Brandle

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Proximity Reader*	Indala	EM Reader Version 1	EM-B 23316

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Topward Electric Instruments Co., Ltd.	TPS-2000	920035

Test Conditions / Notes:

EUT is a proximity card reader operating on a frequency of 130kHz. The EUT is powered by 12VDC through a DC power supply. The power supply is located near the ground plane. To simulate normal installation, the EUT is mounted on a wooden stand. Frequency Scanned: 9 kHz - 1000 MHz.

Transducer Legend:

T1=Cable - 10 Meter	T2=Amp - S/N 604
T3=Bilog B	

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	51.680M	44.5	+1.0	-27.3	+8.0		+0.0	26.2	40.0	-13.8	Vert
2	38.810M	37.8	+0.9	-27.3	+14.3		+0.0	25.7	40.0	-14.3	Vert
3	56.150M	44.0	+1.1	-27.3	+6.6		+0.0	24.4	40.0	-15.6	Vert
4	48.413M	40.9	+1.0	-27.3	+9.6		+0.0	24.2	40.0	-15.8	Vert
5	39.500M	36.1	+0.9	-27.3	+14.0		+0.0	23.7	40.0	-16.4	Vert
6	43.413M	36.6	+0.9	-27.3	+12.4		+0.0	22.6	40.0	-17.4	Vert
7	60.930M	42.9	+1.1	-27.3	+5.5		+0.0	22.2	40.0	-17.8	Vert
8	51.630M	32.4	+1.0	-27.3	+8.0		+0.0	14.1	40.0	-25.9	Horiz