INDALA TEST REPORT

FOR THE

MI100-BTCF MIFARE 100 SERIES READER

FCC PART 15 SUBPART C SECTIONS 15.207, 15.209 & 15.225 AND RSS-210

COMPLIANCE

DATE OF ISSUE: JUNE 30, 2004

PREPARED FOR:

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

P.O. No.: 10001838
W.O. No.: 81687

PREPARED BY:

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

Date of test: April 26, 2004

Report No.: FC04-049

This report contains a total of 29 pages and may be reproduced in full only. Partial reproduction may only be done with the written consent of CKC Laboratories, Inc. The results in this report apply only to the items tested, as identified herein.

TABLE OF CONTENTS

ADMINISTRATIVE INFORMATION

DATE OF TEST:	April 26, 2004
DATE OF RECEIPT:	April 26, 2004
PURPOSE OF TEST:	To demonstrate the compliance of the MI100-btcf Mifare 100 Series Reader with the requirements for FCC Part 15 Subpart C Sections 15.207, 15.209 & 15.225 and RSS-210 devices.
TEST METHOD:	ANSI C63.4 (2001) & RSS-212
MANUFACTURER:	Indala 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 MI100-btcf Mifare 100 Series Reader was found to be fully compliant with the following standards and specifications:

Canadian Standard	Canadian Section	FCC Standard	FCC Section	Test Description
RSS 210	6.2.1	47CFR	15.209	General Radiated Emissions Requirement
RSS 210	6.2.2(e)	47CFR	15.225(a)	Fundamental Requirements
RSS 210	6.2.2(e)	NA	NA	±150kHz to ±450kHz Emissions Requirement
RSS 210	6.6	47CFR	15.207	AC Mains Conducted Emissions Requirement
	IC 3082-D		784962	Site No.

CONDITIONS FOR COMPLIANCE
No modifications to the EUT were necessary to comply.

APPROVALS

Steve Behm, Director of Engineering Services

QUALITY ASSURANCE:

Joyce Walker, Quality Assurance Administrative Manager

TEST PERSONNEL:

Randy Clark, EMC Engineer

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

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 (EUT) DESCRIPTION
The EUT tested by CKC Laboratories was a production unit.

EQUIPMENT UNDER TEST

Mifare 100 Series Reader
Manuf: Indala
Model: MI100-btcf Mifare 100 Series Reader
Serial: 042604-01
FCC ID: 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

				MIFARE 100 SIERIES READER						
Base	Style	Type	Color	Output Protocol	Description					
MI100-	1	1	1	A	WAVE	SLIM	BLACK			
MI100-	1	1	4	A	WAVE	SLIM	BLUE			
MI100-	1	2	1	A	WAVE	WALL	BLACK			
MI100-	1	2	4	A	WAVE	WALL	BLUE			
MI100-	2	1	1	A	CURVE	SLIM	BLACK			
MI100-	2	1	4	A	CURVE	SLIM	BLUE			
MI100-	2	2	1	A	CURVE	WALL	BLACK			
MI100-	2	2	4	A	CURVE	WALL	BLUE			
MI100-	3	1	1	A	ARCH	SLIM	BLACK			
MI100-	3	1	5	A	ARCH	SLIM	GREY			
MI100-	3	1	6	A	ARCH	SLIM	WHITE			
MI100-	3	1	7	A	ARCH	SLIM	BEIGE			
MI100-	3	2	1	A	ARCH	WALL	BLACK			
MI100-	3	2	5	A	ARCH	WALL	GREY			
MI100-	3	2	6	A	ARCH	WALL	WHITE			
MI100-	3	2	7	A	ARCH	WALL	BEIGE			
MI100-	4	1	1	A	LINEAR	SLIM	BLACK			
MI100-	4	1	5	A	LINEAR	SLIM	GREY			
MI100-	4	1	6	A	LINEAR	SLIM	WHITE			
MI100-	4	1	7	A	LINEAR	SLIM	BEIGE			
MI100-	4	2	1	A	LINEAR	WALL	BLACK			
MI100-	4	2	5	A	LINEAR	WALL	GREY			
MI100-	4	2	6	A	LINEAR	WALL	WHITE			
MI100-	4	2	7	A	LINEAR	WALL	BEIGE			
MI100-	0	0	0	A	Core Electronics Module					
Family		MI100-	b	t	c	f				
		I	I	I	I	I				
		I	I	I	I	I				
		I	I	I	I	I -- --	-- -- -- --	OUTPUT FORMAT		
		I	I	I	I				A=Wiegand	
		I	I	I	I -- --	-- -- -- --	COLOR			
		I	I	I						
		I	I	I -- --	-- -- -- -- --	Type (Slim, Wallswitch)				
		I	I							
		I	I --	Bezel Style WAVE, CURVE, ARCH, LINEAR						
		I								
		I --	Base Model Number							

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 15.225(a) Fundamental

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
13.566	29.2	8.4		0.8	-19.0	19.4	84.0	-64.6	H
13.566	28.7	8.4		0.8	-19.0	18.9	84.0	-65.1	V

Test Method: ANSI C63.4 (2001)
Spec Limit: FCC Part 15 Subpart C Section 15.225(a)
Test Distance: 10 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization

COMMENTS: EUT is a Smart Card Reader with an operating frequency 13.56MHz. 12VDC power supplied via support DC power supply. EUT drain wire connected to power supply chassis. Frequency Range Investigated: Carrier. Test distance correction factor used in accordance with 15.31 of 40dB per decade for comparison to the limit.

Table 2: FCC 15.207 Six Highest Conducted Emission Levels									
	METER	CORRECTION FACTORS				CORRECTED	SPEC		
FREQUENCY MHz	READING dBµV	Lisn dB	HPF dB	Cable dB	dB	READING dBµV	LIMIT dBµV	MARGIN dB	NOTES
4.781254	25.9	0.4	0.1	0.3		26.7	46.0	-19.3	W
13.480340	33.3	0.5	0.1	0.4		34.3	50.0	-15.7	W
13.565500	48.0	0.4	0.0	0.4		48.8	50.0	-1.2	B
13.566190	48.6	0.5	0.1	0.4		49.6	50.0	-0.4	WA
13.579440	48.7	0.4	0.0	0.4		49.5	50.0	-0.5	B
13.642500	32.7	0.5	0.1	0.4		33.7	50.0	-16.3	W

Test Method: ANSI C63.4 (2001)
Spec Limit: FCC Part 15 Subpart C Section 15.207

NOTES: B = Black Lead
W = White Lead

COMMENTS: EUT is a Smart Card Reader with an operating frequency 13.56MHz. 12VDC power is provided via support DC power supply. EUT drain wire connected to power supply chassis. Frequency Range Investigated: 150 kHz to 30 MHz.

Table 3: FCC 15.209 Six Highest Radiated Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
447.628	41.9	16.4	-27.5	5.0	10.0	45.8	46.0	-0.2	HQ
447.629	40.6	16.4	-27.5	5.0	10.0	44.5	46.0	-1.5	VQ
461.191	39.1	16.7	-27.6	5.1	10.0	43.3	46.0	-2.7	HQ
461.191	38.1	16.7	-27.6	5.1	10.0	42.3	46.0	-3.7	VQ
474.753	39.4	16.9	-27.7	5.3	10.0	43.9	46.0	-2.1	VQ
501.874	37.1	17.4	-27.8	5.5	10.0	42.2	46.0	-3.8	HQ

Test Method: ANSI C63.4 (2001)
Spec Limit: FCC Part 15 Subpart C Sections 15.209
Test Distance: 10 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
Q = Quasi Peak Reading

COMMENTS: EUT is a Smart Card Reader with an operating frequency 13.56MHz. 12VDC power is provided via support DC power supply. EUT drain wire connected to power supply chassis. Frequency Range Investigated: 9 kHz to 1000 MHz. Test distance correction factor used in accordance with 15.31 of 20 dB per decade. **No emissions detected within 20dB of the limit for the 9 kHz - 30 MHz testing.**

FREQUENCY STABILITY AND VOLTAGE VARIATIONS

Test Conditions: EUT is a Smart Card reader operating on a frequency of 13.56 MHz. The EUT is located inside of a temperature chamber and is powered via external DC power supply.

Customer: Indala
WO#: 81687
Date: 30-Jun-04
Test Engineer:

Device Model #: MI100
Operating Voltage: 12 **VDC**
Frequency Limit: 0.01 **%**

Temperature Variations

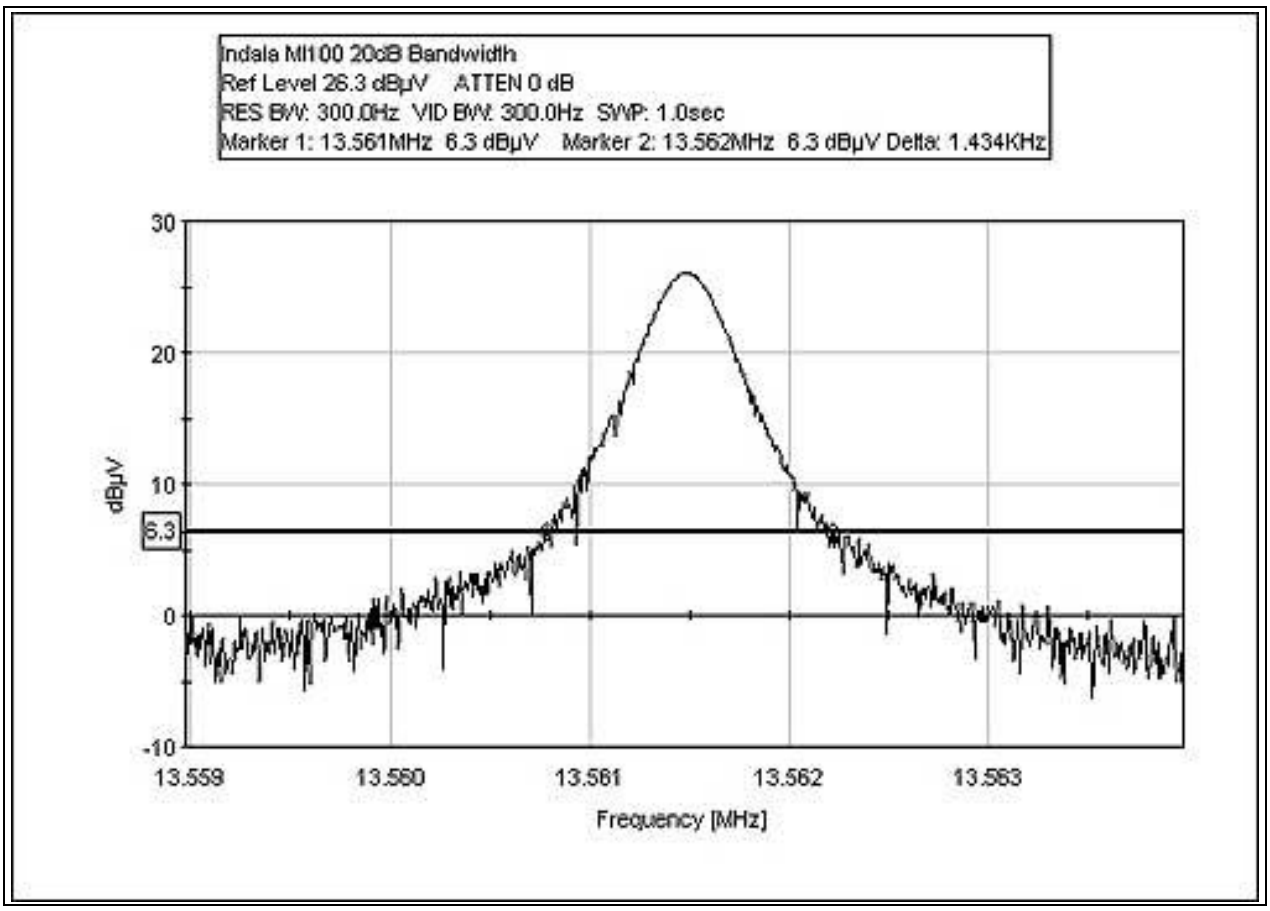
Channel Frequency:		**Channel 1 (MHz)** **13.561475**	**Dev. (MHz)**
Temp (C)	Voltage		
-30	12	13.56126	0.00021
-20	12	13.56134	0.00014
-10	12	13.56140	0.00007
0	12	13.56144	0.00004
10	12	13.56145	0.00002
20	12	13.56148	0.00000
30	12	13.56145	0.00002
40	12	13.56145	0.00002
50	12	13.56146	0.00001

Voltage Variations (±15%)

20	10.2	13.56148	0.00000
20	12	13.56148	0.00000
20	13.8	13.56146	0.00001

Max Deviation (MHz)	**0.00021**
Max Deviation (%)	**0.00157**
	PASS

RSS-210 OCCUPIED BANDWIDTH



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 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 dBµV/m, the spectrum analyzer reading in dBµV 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	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/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 µH-/+50 ohms. Above 150 kHz, a 0.15 µF 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.

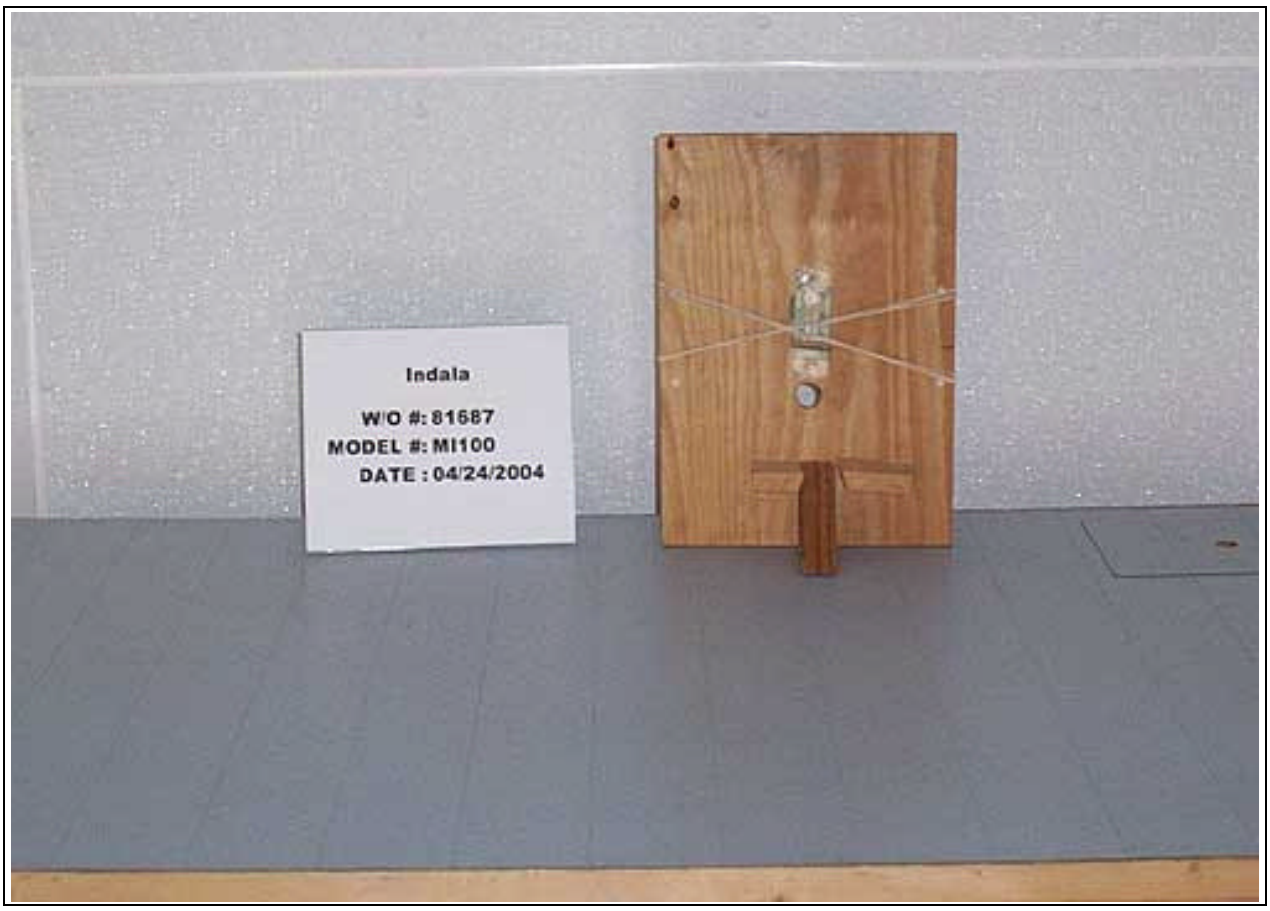
During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. The frequency range of 30 MHz to 1000 MHz was scanned with the biconilog antenna located about 1.5 meter above the 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 and raising and lowering the antenna from one to four meters 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

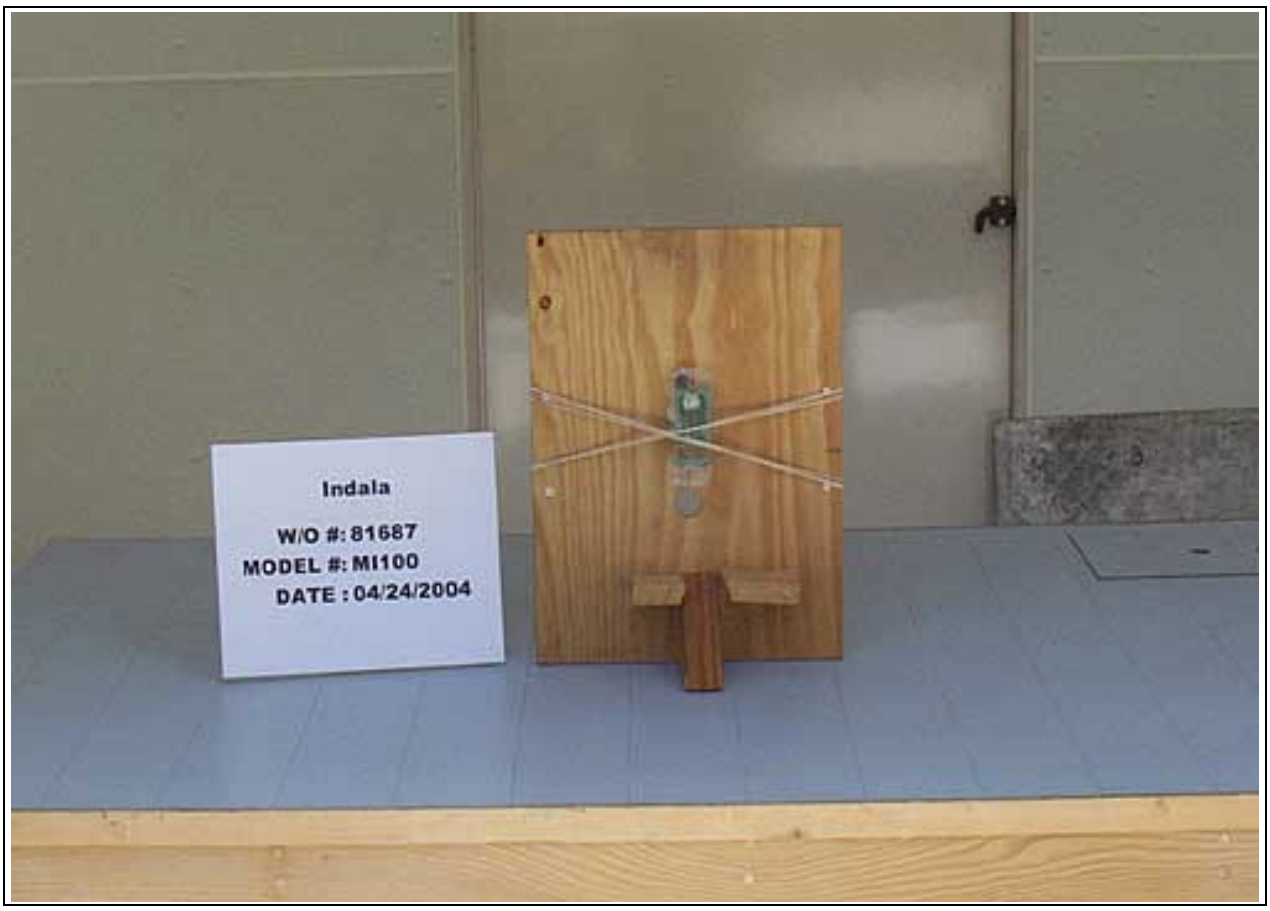
TEST SETUP PHOTOGRAPHS

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



Mains Conducted Emissions

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View

PHOTOGRAPH SHOWING TEMPERATURE TESTING

APPENDIX B

TEST EQUIPMENT LIST

15.225(a) & 15.209 9 kHz to 30 MHz

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8566B SA	2209A01404	02/26/2003	02/26/2005	00490
HP 8566B SA Display	2403A08241	02/26/2003	02/26/2005	00489
HP 85650A QPA	2811A01267	02/26/2003	02/26/2005	00478
EMCO Loop Antenna	1074	05/21/2003	05/21/2005	00226

15.207

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8566B SA	2209A01404	02/26/2003	02/26/2005	00490
HP 8566B SA Display	2403A08241	02/26/2003	02/26/2005	00489
HP 85650A QPA	2811A01267	02/26/2003	02/26/2005	00478
LISN Model 8028-50-TS-24-BNC	8379276 & 8379280	06/05/2003	06/05/2005	00330
150kHz HP Filter TTE	G7754	04/20/2004	04/20/2006	02608

15.209 30-1000 MHz

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8566B SA	2209A01404	02/26/2003	02/26/2005	00490
HP 8566B SA Display	2403A08241	02/26/2003	02/26/2005	00489
HP 85650A QPA	2811A01267	02/26/2003	02/26/2005	00478
HP 8447D Preamp	1937A02604	03/07/2003	03/07/2005	00099
Chase CBL6111C Bilog	2456	12/13/2002	12/13/2004	01991

APPENDIX C:

MEASUREMENT DATA SHEETS

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

Customer: **Indala**
Specification: **FCC 15.225(a) (30 Meters)**
Work Order #: **81687** Date: 04/26/2004
Test Type: **Maximized Emissions** Time: 16:02:39
Equipment: **Smart Card Reader** Sequence#: 29
Manufacturer: Indala Tested By: Randal Clark
Model: MI100
S/N: 042604-01

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Smart Card Reader*	Indala	MI100	042604-01

Support Devices:

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

Test Conditions / Notes:

EUT is a Smart Card Reader with an operating frequency 13.56MHz. 12VDC power supplied via support DC power supply. EUT drain wire connected to power supply chassis. Frequency Range Investigated: Carrier Test distance correction factor used in accordance with 15.31 of 40dB per decade for comparison to the limit.

Transducer Legend:

T1=Mag Loop - Site B - AN 00226 - 9kHz-30M	T2=Cable - 10 Meter

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	13.566M	29.2	+8.4	+0.8			-19.0	19.4	84.0	-64.6	Horiz 100
2	13.566M	28.7	+8.4	+0.8			-19.0	18.9	84.0	-65.1	Vert 100

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

Customer: **Indala**
Specification: **FCC 15.207 - AVE**
Work Order #: **81687** Date: 04/26/2004
Test Type: **Conducted Emissions** Time: 14:14:50
Equipment: **Smart Card Reader** Sequence#: 24
Manufacturer: Indala Tested By: Randal Clark
Model: MI100 120V 60Hz
S/N: 042604-01

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Smart Card Reader*	Indala	MI100	042604-01

Support Devices:

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

Test Conditions / Notes:

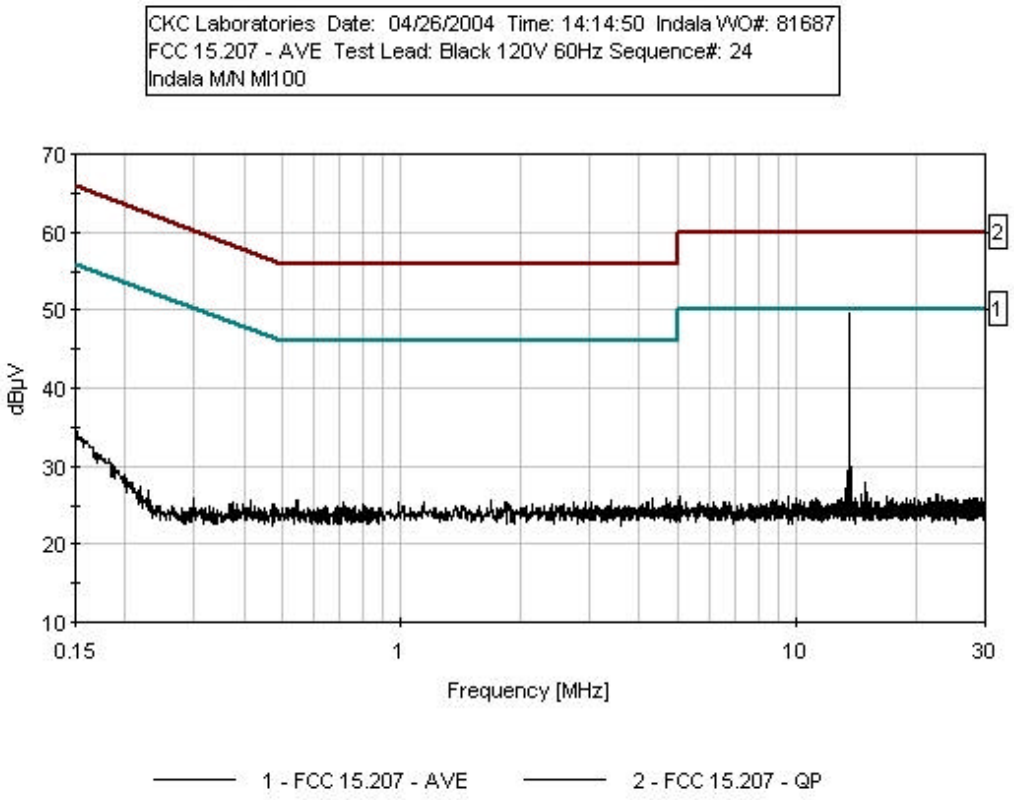
EUT is a Smart Card Reader with an operating frequency 13.56MHz. 12VDC power is provided via support DC power supply. EUT drain wire connected to power supply chassis. Frequency Range Investigated: 150 kHz to 30 MHz.

Transducer Legend:

T1=Cable - Internal + cab	T2=LISN Insertion Loss s/n280

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	13.579M	48.7	+0.4	+0.4			+0.0	49.5	50.0	-0.5	Black
2	13.566M	48.0	+0.4	+0.4			+0.0	48.8	50.0	-1.2	Black
3	13.706M	29.0	+0.4	+0.4			+0.0	29.8	50.0	-20.2	Black
4	13.670M	28.7	+0.4	+0.4			+0.0	29.5	50.0	-20.5	Black
5	13.372M	28.5	+0.4	+0.4			+0.0	29.3	50.0	-20.7	Black
6	150.727k	34.1	+0.1	+0.3			+0.0	34.5	56.0	-21.5	Black
7	14.850M	27.1	+0.4	+0.4			+0.0	27.9	50.0	-22.1	Black
8	5.096M	25.5	+0.3	+0.3			+0.0	26.1	50.0	-23.9	Black
9	23.195M	25.2	+0.5	+0.4			+0.0	26.1	50.0	-23.9	Black


CKC Laboratories Date: 04/26/2004 Time: 14:14:50 Indala WO#: 81687
FCC 15.207 - AVE Test Lead: Black 120V 60Hz Sequence#: 24
Indala M/N MI100
70
60
50
40
30
20
10
dBµV
0.15
1
10
30
Frequency [MHz]
2
1
1 - FCC 15.207 - AVE
2 - FCC 15.207 - QP

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

Customer: **Indala**
Specification: **FCC 15.207 - AVE**
Work Order #: **81687** Date: 04/26/2004
Test Type: **Conducted Emissions** Time: 14:28:48
Equipment: **Smart Card Reader** Sequence#: 26
Manufacturer: Indala Tested By: Randal Clark
Model: MI100 120V 60Hz
S/N: 042604-01

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Smart Card Reader*	Indala	MI100	042604-01

Support Devices:

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

Test Conditions / Notes:

EUT is a Smart Card Reader with an operating frequency 13.56MHz. 12VDC power is provided via support DC power supply. EUT drain wire connected to power supply chassis. Frequency Range Investigated: 150 kHz to 30 MHz.

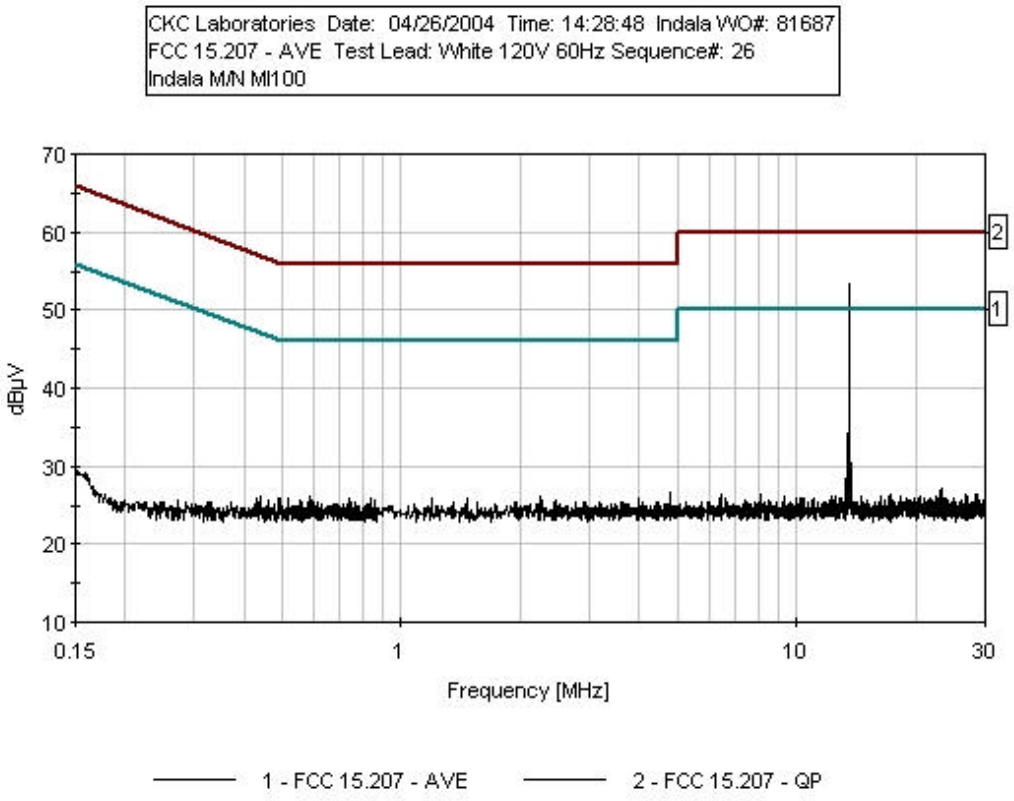
Transducer Legend:

T1=Cable - Internal + cab T2=LISN Insertion Loss s/n276
T3=HP Filter AN02608

Measurement Data: Reading listed by margin. Test Lead: White

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	13.566M Ave	48.6	+0.4	+0.5	+0.1		+0.0	49.6	50.0	-0.4	White
^	13.565M	50.8	+0.4	+0.5	+0.1		+0.0	51.8	50.0	+1.8	White
3	13.480M	33.3	+0.4	+0.5	+0.1		+0.0	34.3	50.0	-15.7	White
4	13.643M	32.7	+0.4	+0.5	+0.1		+0.0	33.7	50.0	-16.3	White
5	4.781M	25.9	+0.3	+0.4	+0.1		+0.0	26.7	46.0	-19.3	White
6	13.706M	29.5	+0.4	+0.5	+0.1		+0.0	30.5	50.0	-19.5	White
7	13.778M	29.3	+0.4	+0.5	+0.1		+0.0	30.3	50.0	-19.7	White
8	13.426M	28.2	+0.4	+0.5	+0.1		+0.0	29.2	50.0	-20.8	White
9	13.345M	27.3	+0.4	+0.5	+0.1		+0.0	28.3	50.0	-21.7	White

10	23.216M	26.1	+0.5	+0.4	+0.2	+0.0	27.2	50.0	-22.8	White
11	17.210M	25.5	+0.4	+0.4	+0.1	+0.0	26.4	50.0	-23.6	White
12	158.726k	26.8	+0.1	+0.4	+1.9	+0.0	29.2	55.5	-26.3	White



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

Customer: **Indala**
Specification: **FCC 15.209**
Work Order #: **81687** Date: 04/26/2004
Test Type: **Maximized Emissions** Time: 12:06:37
Equipment: **Smart Card Reader** Sequence#: 22
Manufacturer: Indala Tested By: Randal Clark
Model: MI100
S/N: 042604-01

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Smart Card Reader*	Indala	MI100	042604-01

Support Devices:

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

Test Conditions / Notes:

EUT is a Smart Card Reader with an operating frequency 13.56MHz. 12VDC power is provided via support DC power supply. EUT drain wire connected to power supply chassis. Frequency Range Investigated: 9 kHz to 1000 MHz. Test distance correction factor used in accordance with 15.31 of 20 dB per decade.

Transducer Legend:

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

Measurement Data: Reading listed by margin. Test Distance: 10 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	447.628M QP	41.9	-27.5	+16.4	+5.0		+10.0 314	45.8	46.0	-0.2	Horiz 140
^	447.617M	43.5	-27.5	+16.4	+5.0		+10.0 314	47.4	46.0	+1.4	Horiz 140
3	447.629M QP	40.6	-27.5	+16.4	+5.0		+10.0 76	44.5	46.0	-1.5	Vert 107
4	474.753M QP	39.4	-27.7	+16.9	+5.3		+10.0 341	43.9	46.0	-2.1	Vert 107
^	474.738M	41.8	-27.7	+16.9	+5.3		+10.0 341	46.3	46.0	+0.3	Vert 107
6	461.191M QP	39.1	-27.6	+16.7	+5.1		+10.0 314	43.3	46.0	-2.7	Horiz 140
^	461.184M	43.6	-27.6	+16.7	+5.1		+10.0 314	47.8	46.0	+1.8	Horiz 140
8	461.191M QP	38.1	-27.6	+16.7	+5.1		+10.0 361	42.3	46.0	-3.7	Vert 107
^	461.198M	41.9	-27.6	+16.7	+5.1		+10.0 361	46.1	46.0	+0.1	Vert 107

10	501.874M QP	37.1	-27.8	+17.4	+5.5	+10.0 40	42.2	46.0	-3.8	Horiz 138
^	501.846M	38.2	-27.8	+17.4	+5.5	+10.0 40	43.3	46.0	-2.7	Horiz 138
12	637.468M	34.1	-28.0	+19.6	+6.3	+10.0 261	42.0	46.0	-4.0	Horiz 119
13	434.063M QP	38.1	-27.4	+16.1	+5.0	+10.0 303	41.8	46.0	-4.2	Horiz 140
^	434.075M	43.7	-27.4	+16.1	+5.0	+10.0 303	47.4	46.0	+1.4	Horiz 140
15	393.383M QP	38.2	-27.2	+15.2	+5.0	+10.0 311	41.2	46.0	-4.8	Horiz 260
^	393.384M	40.7	-27.2	+15.2	+5.0	+10.0 311	43.7	46.0	-2.3	Horiz 260
17	434.037M	37.1	-27.4	+16.1	+5.0	+10.0 201	40.8	46.0	-5.2	Vert 107
18	556.095M	33.6	-27.8	+18.4	+6.0	+10.0 37	40.2	46.0	-5.8	Horiz 119
19	420.507M QP	36.4	-27.3	+15.8	+5.1	+10.0 225	40.0	46.0	-6.0	Horiz 190
^	420.479M	40.3	-27.3	+15.8	+5.1	+10.0 225	43.9	46.0	-2.1	Horiz 190
21	528.967M	34.0	-27.8	+17.9	+5.8	+10.0 39	39.9	46.0	-6.1	Horiz 138
22	447.628M QP	35.9	-27.5	+16.4	+5.0	+10.0 153	39.8	46.0	-6.2	Vert 107
^	447.628M	42.6	-27.5	+16.4	+5.0	+10.0 76	46.5	46.0	+0.5	Vert 107
^	447.609M	39.5	-27.5	+16.4	+5.0	+10.0 153	43.4	46.0	-2.6	Vert 107
^	447.609M	39.5	-27.5	+16.4	+5.0	+10.0 153	43.4	46.0	-2.6	Vert 107
26	664.588M	31.2	-27.9	+19.9	+6.5	+10.0 79	39.7	46.0	-6.3	Horiz 145
27	610.339M	32.2	-27.8	+19.2	+6.0	+10.0 118	39.6	46.0	-6.4	Horiz 119
28	501.869M	34.0	-27.8	+17.4	+5.5	+10.0 233	39.1	46.0	-6.9	Vert 107
29	583.219M	31.8	-27.8	+18.8	+5.9	+10.0 118	38.7	46.0	-7.3	Horiz 119
30	556.097M	32.1	-27.8	+18.4	+6.0	+10.0	38.7	46.0	-7.3	Vert 100
31	528.962M	32.2	-27.8	+17.9	+5.8	+10.0	38.1	46.0	-7.9	Vert 107
32	271.313M	36.4	-26.5	+12.4	+3.8	+10.0 203	36.1	46.0	-9.9	Vert 118
33	325.555M	33.4	-26.7	+13.5	+4.3	+10.0 208	34.5	46.0	-11.5	Vert 107
34	379.817M	31.5	-27.0	+14.9	+4.9	+10.0 284	34.3	46.0	-11.7	Horiz 142

35	339.112M	32.7	-26.7	+13.9	+4.4	+10.0 193	34.3	46.0	-11.7	Vert 107
36	352.691M	32.2	-26.8	+14.3	+4.5	+10.0 61	34.2	46.0	-11.8	Horiz 153
37	257.745M	34.3	-26.5	+12.1	+3.7	+10.0 201	33.6	46.0	-12.4	Vert 107
38	366.237M	31.0	-26.9	+14.6	+4.7	+10.0 106	33.4	46.0	-12.6	Vert 107
39	311.998M	32.3	-26.6	+13.2	+4.2	+10.0 183	33.1	46.0	-12.9	Vert 107
40	284.854M	33.1	-26.5	+12.6	+3.9	+10.0 238	33.1	46.0	-12.9	Vert 107
41	339.131M	31.0	-26.7	+13.9	+4.4	+10.0 246	32.6	46.0	-13.4	Horiz 163
42	271.320M	32.7	-26.5	+12.4	+3.8	+10.0 37	32.4	46.0	-13.6	Horiz 163
43	244.191M	33.7	-26.5	+11.6	+3.6	+10.0 219	32.4	46.0	-13.6	Vert 107
44	108.572M	34.3	-27.2	+10.1	+2.4	+10.0 119	29.6	43.5	-13.9	Vert 107
45	176.374M	34.7	-26.8	+8.4	+3.0	+10.0 150	29.3	43.5	-14.2	Vert 107
46	352.672M	29.3	-26.8	+14.3	+4.5	+10.0 359	31.3	46.0	-14.7	Vert 107
47	298.422M	30.7	-26.5	+12.8	+4.1	+10.0 181	31.1	46.0	-14.9	Vert 107
48	230.626M	33.2	-26.5	+10.7	+3.4	+10.0 204	30.8	46.0	-15.2	Vert 107
49	203.490M	31.6	-26.7	+8.6	+3.3	+10.0 37	26.8	43.5	-16.7	Horiz 181
50	257.758M	29.4	-26.5	+12.1	+3.7	+10.0 37	28.7	46.0	-17.3	Horiz 163
51	203.521M	30.9	-26.7	+8.6	+3.3	+10.0 42	26.1	43.5	-17.4	Vert 107
52	217.066M	31.0	-26.6	+9.7	+3.4	+10.0 281	27.5	46.0	-18.5	Vert 107