(MOTOROLA) INDALA CORPORATION TEST REPORT

FOR THE
RFID READER, IR-12E

FCC PART 15 SUBPART C
PART 15.207 & 15.209

COMPLIANCE

DATE OF ISSUE: JULY 12, 2000

PREPARED FOR:

(Motorola) Indala Corporation
3041 Orchard Parkway
San Jose, CA 95134-2017

W.O. No: 74169

Report No: FC00-054

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Date of test: May 30-31, 2000

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ADMINISTRATIVE INFORMATION

DATE OF TEST:	May 30-31, 2000
PURPOSE OF TEST:	To demonstrate the compliance of the RFID Reader, IR-12E, with the requirements for FCC Part 15 Subpart C Part 15.207 & 15.209 devices.
MANUFACTURER:	(Motorola) Indala Corporation 3041 Orchard Parkway San Jose, CA 95134-2017
REPRESENTATIVE:	Gilbert Roque
TEST LOCATION:	CKC Laboratories, Inc. 5473A Clouds Rest Mariposa, CA 95338
TEST PERSONNEL:	Dustin Oaks
TEST METHOD:	ANSI C63.4 1992
FREQUENCY RANGE TESTED:	9 kHz - 1000 MHz
EQUIPMENT UNDER TEST:	**RFID Reader** Manuf: (Motorola) Indala Corporation Model: IR-12E Serial: N/A FCC ID: (pending)

SUMMARY OF RESULTS

The (Motorola) Indala Corporation RFID Reader, IR-12E, was tested in accordance with ANSI C63.4 1992 for compliance with FCC Part 15 Subpart C Part 15.207 & 15.209.

As received, the above equipment was found to be fully compliant with the limits of FCC Part 15 Subpart C Part 15.207 & 15.209. The results in this report apply only to the items tested, as identified herein.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The IR-12E is a single piece RFID proximity reader. The reader can be mounted on any surface, including metel.

MEASUREMENT UNCERTAINTY

Associated with data in this report is a ±4dB measurement uncertainty.

EUT OPERATING FREQUENCY

The EUT was operating at 0.125 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%.

PERIPHERAL DEVICES

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

Power Supply
Manuf: TopWard Electric Instrument
Model: 6303D
Serial: 677556
FCC ID: N/A

REPORT OF MEASUREMENTS

The following tables report the highest worst case levels recorded during the tests performed on the RFID Reader, IR-12E. All readings taken are peak readings unless otherwise noted by a "Q" or "A". The data sheets from which these tables were compiled are contained in Appendix B.

Table 1: Highest Radiated Emission Levels - Fundamental

FREQUENCY	METER READING	CORRECTION FACTORS				CORRECTED READING	SPEC LIMIT	MARGIN	NOTES
		Mag	FCC 15.31	Cable	Dist				
MHz	dBµV	dB	dB	dB	dB	dBµV/m	dBµV/m	dB	
0.125	56.6	10.6	-60.0	0.0		7.2	25.7	-18.5	N

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.209
Test Distance: 10 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: EUT is operating in a normal operating mode. EUT operating on 12VDC via DC power supply.

Table 2: Six Highest Radiated Emission Levels - 9kHz-30MHz

FREQUENCY	METER READING	CORRECTION FACTORS				CORRECTED READING	SPEC LIMIT	MARGIN	NOTES
		Mag	FCC 15.31	Cable	Dist				
MHz	dBµV	dB	dB	dB	dB	dBµV/m	dBµV/m	dB	
0.251	31.3	10.8	-60.0	0.0		-17.9	19.6	-37.5	N
0.375	36.2	11.0	-60.0	0.0		-12.8	16.1	-28.9	N
0.500	32.1	10.8	-20.0	0.0		22.9	33.6	-10.7	N
0.627	30.7	10.9	-20.0	0.0		21.6	31.7	-10.1	N
0.753	27.6	11.0	-20.0	0.0		18.6	30.0	-11.4	N
0.878	24.3	11.0	-20.0	0.0		15.3	28.7	-13.4	N

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.209
Test Distance: 10 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: EUT is operating in a normal operating mode. EUT operating on 12VDC via DC power supply.

Table 3: Six Highest Radiated Emission Levels - 30MHz-1000MHz									
	METER	CORRECTION FACTORS				CORRECTED	SPEC		
FREQUENCY MHz	READING dBµV	Ant dB	Amp dB	Cable dB	Dist dB	READING dBµV/m	LIMIT dBµV/m	MARGIN dB	NOTES
56.083	36.9	10.1	-24.9	1.0	10.0	33.1	40.0	-6.9	V
64.083	36.4	9.2	-24.9	1.0	10.0	31.7	40.0	-8.3	V
72.087	43.4	7.9	-25.0	1.0	10.0	37.3	40.0	-2.7	VQ
76.080	39.8	7.7	-25.0	1.1	10.0	33.6	40.0	-6.4	VQ
156.106	34.3	13.6	-24.9	2.0	10.0	35.0	43.5	-8.5	HQ
160.103	34.6	13.8	-24.9	2.0	10.0	35.5	43.5	-8.0	HQ

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.209
Test Distance: 10 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: EUT is operating in a normal operating mode. EUT operating on 12VDC via DC power supply.

Table 4: Six Highest Conducted Emission Levels									
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS LISN dB	Cable dB	dB	dB	CORRECTED READING dBµV	SPEC LIMIT dBµV	MARGIN dB	NOTES
9.015710	35.7	5.4	0.2			41.3	48.0	-6.7	B
12.013300	40.2	0.5	0.2			40.9	48.0	-7.1	W
15.997330	41.8	0.3	0.3			42.4	48.0	-5.6	W
19.004880	39.0	0.2	0.3			39.5	48.0	-8.5	W
19.998340	45.4	0.2	0.3			45.9	48.0	-2.1	WQ
24.004430	39.6	0.3	0.4			40.3	48.0	-7.7	W

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.207

NOTES: Q = Quasi Peak Reading
A = Average Reading
B = Black Lead
W = White Lead

COMMENTS: EUT is operating in a normal operating mode. EUT operating on 12VDC via DC power supply.

TABLE A

LIST OF TEST EQUIPMENT

ID #	EQUIPMENT
439	Quasi-Peak Adapter, Hewlett Packard, Model No. 85650A, S/N 2811A01267. Calibration Date: July 7, 1999. Calibration due: July 7, 2000.
472	SA Display Section, Hewlett Packard, Model 8566B, S/N 2403A08241. Calibration date: July 7, 1999. Calibration due date: July 7, 2000.
502	Spectrum Analyzer, Hewlett Packard, Model No. 8566B, CKC 1, S/N 2403A08241 (Display Unit), S/N 2209A01404 (rf Unit). Calibration date: July 7, 1999. Calibration due date: July 7, 2000.
354	Mag Loop Antenna, EMCO, Model No. 6502, S/N 1074. Calibration date: June 16, 1999. Calibration due date: June 16, 2000.
327	LISN, Solar Electronics, S/N 8144793, 474. Calibration date: June 5, 2000. Calibration due date: June 5, 2001.
92	Biconical Antenna, A & H Systems, Model No. SAS-200/542, S/N 156. Calibration Date: May 8, 2000. Calibration Due: May 8, 2001.
341	Log Periodic Antenna, A & H Systems, Model No. SAS-200/512, S/N 154. Calibration Date: May 8, 2000. Calibration Due: May 8, 2001.
401	Preamp, Hewlett Packard, Model No. 8447D, S/N 1937A02604. Calibration Date: April 3, 2000. Calibration Due: April 3, 2001.

EUT SETUP

The equipment under test (EUT) and the peripheral(s) listed were set up in a manner that represented their normal use. Any special conditions required for the EUT to operate normally are identified in the comments that accompany Table 1 for fundamental radiated emissions, Table 2 & 3 for radiated emissions and Table 4 for conducted characteristics. Additionally, a complete description of the EUT is included on the information sheets contained in Appendix A.

During radiated emissions testing, 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. This configuration is typical for radiated emissions testing of wall mounted devices.

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 is 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. Conducted emissions tests required the use of the LISN's listed in Table A.

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Table A were used to collect both the radiated and conducted emissions data for the RFID Reader, IR-12E. For radiated measurements below 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. All antennas were located at a distance of 3 meters from the edge of the EUT. Conducted emissions tests required the use of the FCC type LISN's.

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.

TABLE B : 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

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in Tables 1 - 4 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 for the RFID Reader, IR-12E.

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

When the frequencies are below 30 MHz, 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.

TEST METHODS

The radiated and conducted emissions data of the RFID Reader, IR-12E, 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 the "Sample Calculations". The corrected data was then compared to the FCC Part 15, Subpart C emissions limits to determine compliance.

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

Radiated Emissions Testing

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC. Frequency ranges below 30 MHz were scanned using the magnetic loop antenna. The frequency range of 30 MHz - 88 MHz was then 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 which were at or near the limit were recorded. The frequency range of 100 - 300 MHz was scanned with the biconical antenna in the same manner, and the peaks recorded. Lastly, a scan of the FM band from 88 - 110 MHz was made, using a reduced resolution bandwidth and a reduced 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 - 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 - 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.

For the final radiated scan, a thorough scan of all frequencies was manually made using a small frequency span, rotating the turntable as needed. Comparison with the previously recorded measurements was then made.

Using the peak readings from both scans as a guide, the test engineer then maximized the readings with respect to the table rotation and antenna height. Photographs showing the final worst case configuration of the EUT are contained in Appendix A.

Conducted Emissions Testing

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.

SAMPLE CALCULATIONS

The basic spectrum analyzer reading was converted using correction factors as shown in the emissions readings in Tables 1 - 4. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula:

Meter reading (dBµV)
+ Antenna Factor (dB)
+ Cable Loss (dB)
- Distance Correction (dB)
- Pre-amplifier Gain (dB)

= Corrected Reading (dBµV/m)

This reading was then compared to the applicable specification limit to determine compliance.

A typical data sheet will display the following in column format:

#	Freq MHz	Rdng dBuV	Cable	Amp	Bicon	Mag	Log	Dist	Corr dBuV/m	Spec	Margin	Polar
	FCC 15.31	LISN										

means reading number
Freq MHz is the frequency in MHz of the obtained reading.
Rdng dBuV is the reading obtained on the spectrum analyzer in dBµV.
Amp is short for the preamplifier factor or gain in dB.
Bicon is the biconical antenna factor in dB.
Log is the log periodic antenna factor in dB.
Mag is the magnetic loop antenna factor in dB.
Cable is the cable loss in dB of the coaxial cable on the OATS.
Dist is the distance factor (in dB). It is used when testing at a different test distance than the one stated in the spec.
Corr dBµV/m is the corrected reading which is in dBµV/m (field strength).
Spec is the specification limit (dB) stated in the regulations.
Margin is the closeness to the specified limit in dB; + is over and - is under the limit.
Polar is the Polarity of the antenna with respect to earth.
LISN is the line impedance stabilization network factor in dB.
FCC 15.31 is the average correction called in FCC Part 15.31.

APPENDIX A

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

INFORMATION ABOUT THE EQUIPMENT UNDER TEST	
Test Software/Firmware:	-
CRT was displaying:	-
Power Supply Manufacturer:	**Power One**
Power Supply Part Number:	**HA15-0.9-A**
AC Line Filter Manufacturer:	**N/A**
AC Line Filter Part Number:	**N/A**
Line voltage used during testing:	**12 Volts DC**

I/O PORTS	
Type	#
RS-232 full duplex serial port	1

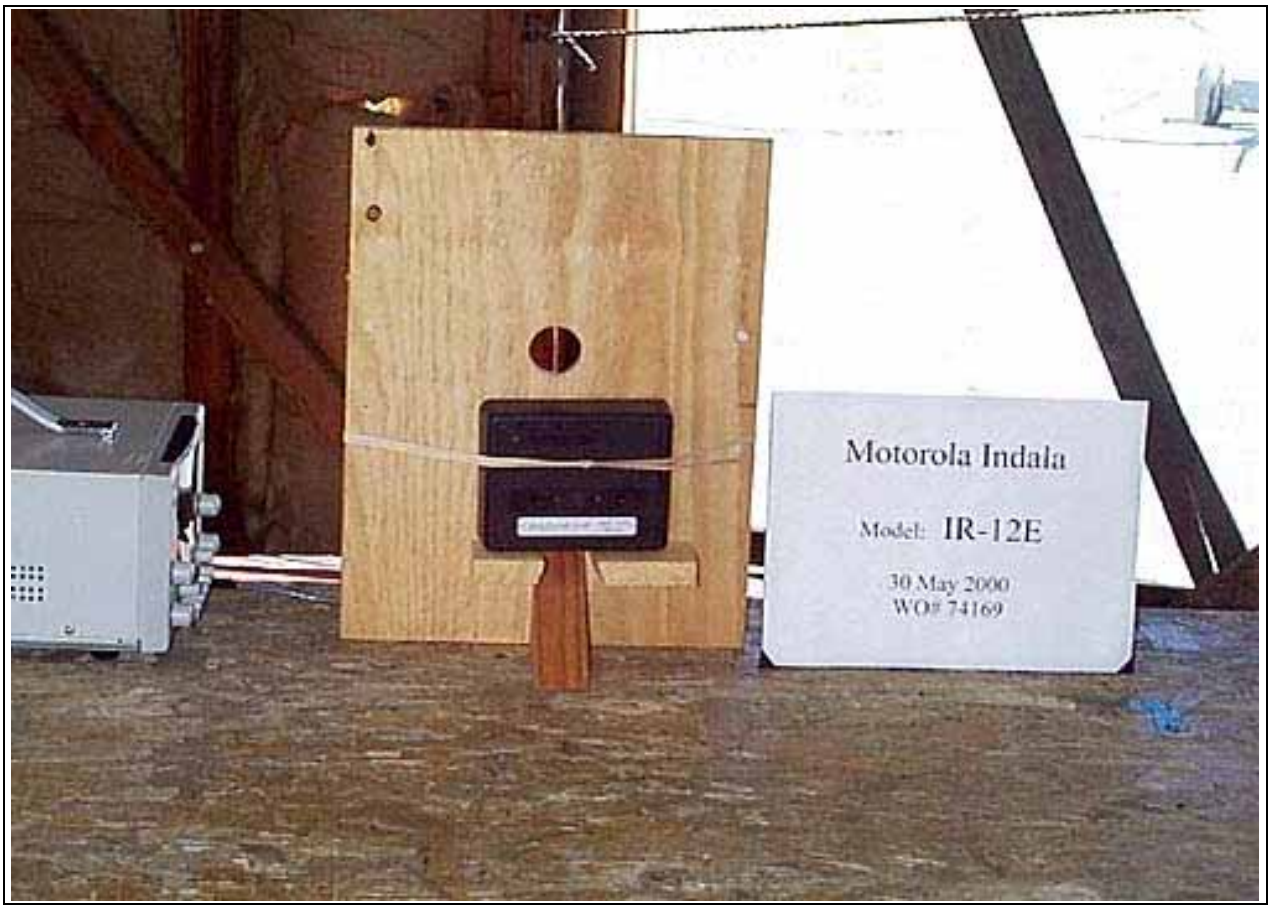
CRYSTAL OSCILLATORS	
Type	Freq In MHz
Low Profile OSC – Y1	20

PRINTED CIRCUIT BOARDS				
Function	Model & Rev	Clocks, MHz	Layers	Location
I/O, RS-232	23112-001 rev. B	N/A	2	Bottom Left
Receiver	23165-001 rev. A	62.5 KHZ	4	Right
Plumb	23209-001 rev. D	62.5 KHZ	4	Center
Antenna	08119-002 rev. B	N/A	2	Front

CABLE INFORMATION

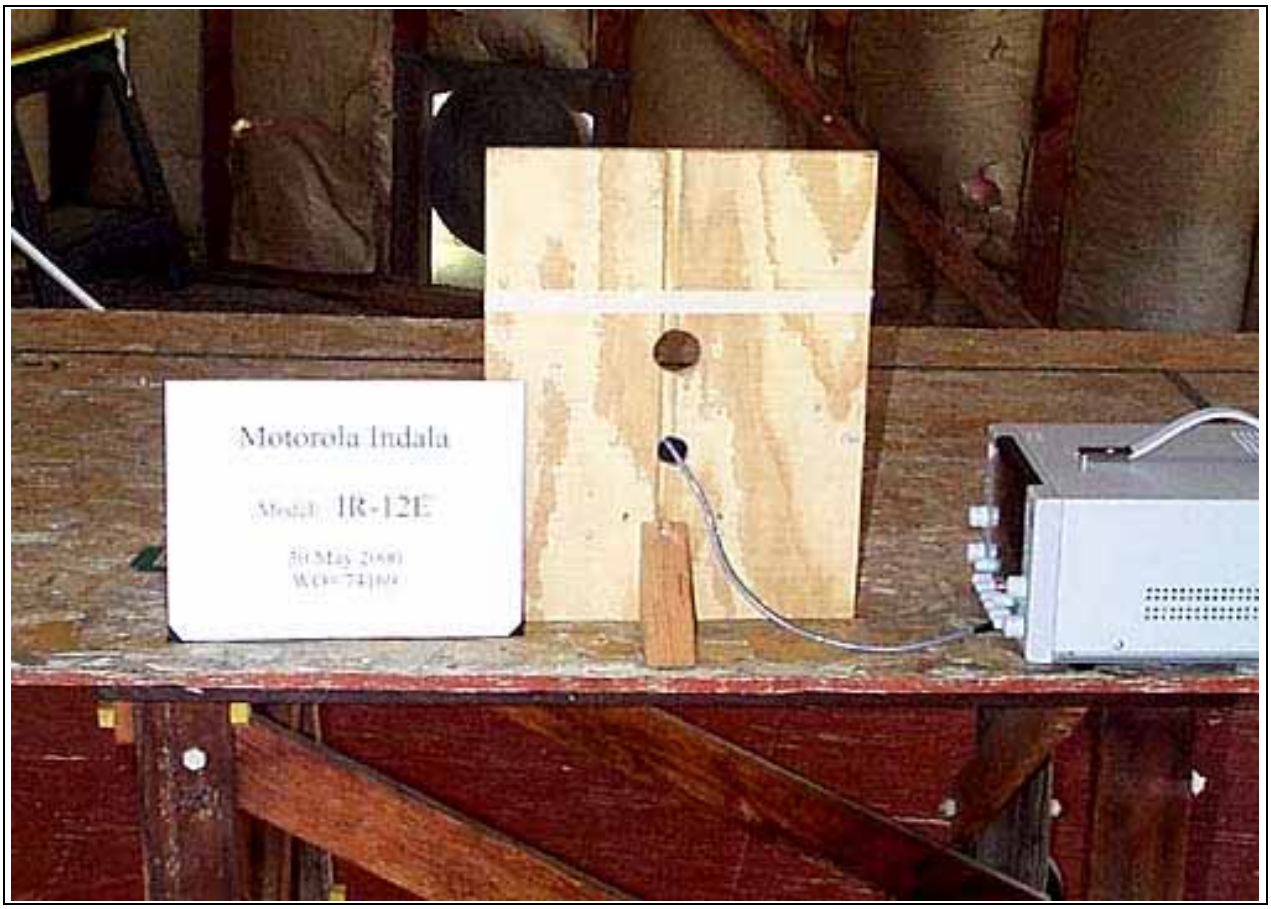
Cable #: 1		Cable(s) of this type: 1	
Cable Type:	Serial I/O	Shield Type:	foil
Construction:	8 conductor with shield	Length In Meters:	1.5
Connected To End (1):	PC Laptop	Connected To End (2):	PCB I/O Points
Connector At End (1):	none	Connector At End (2):	none
Shield Grounded At (1):	yes	Shield Grounded At (2):	yes
Part Number:	20003-005	Number of Conductors:	8 +shield
Notes:			

PHOTOGRAPH SHOWING RADIATED EMISSIONS



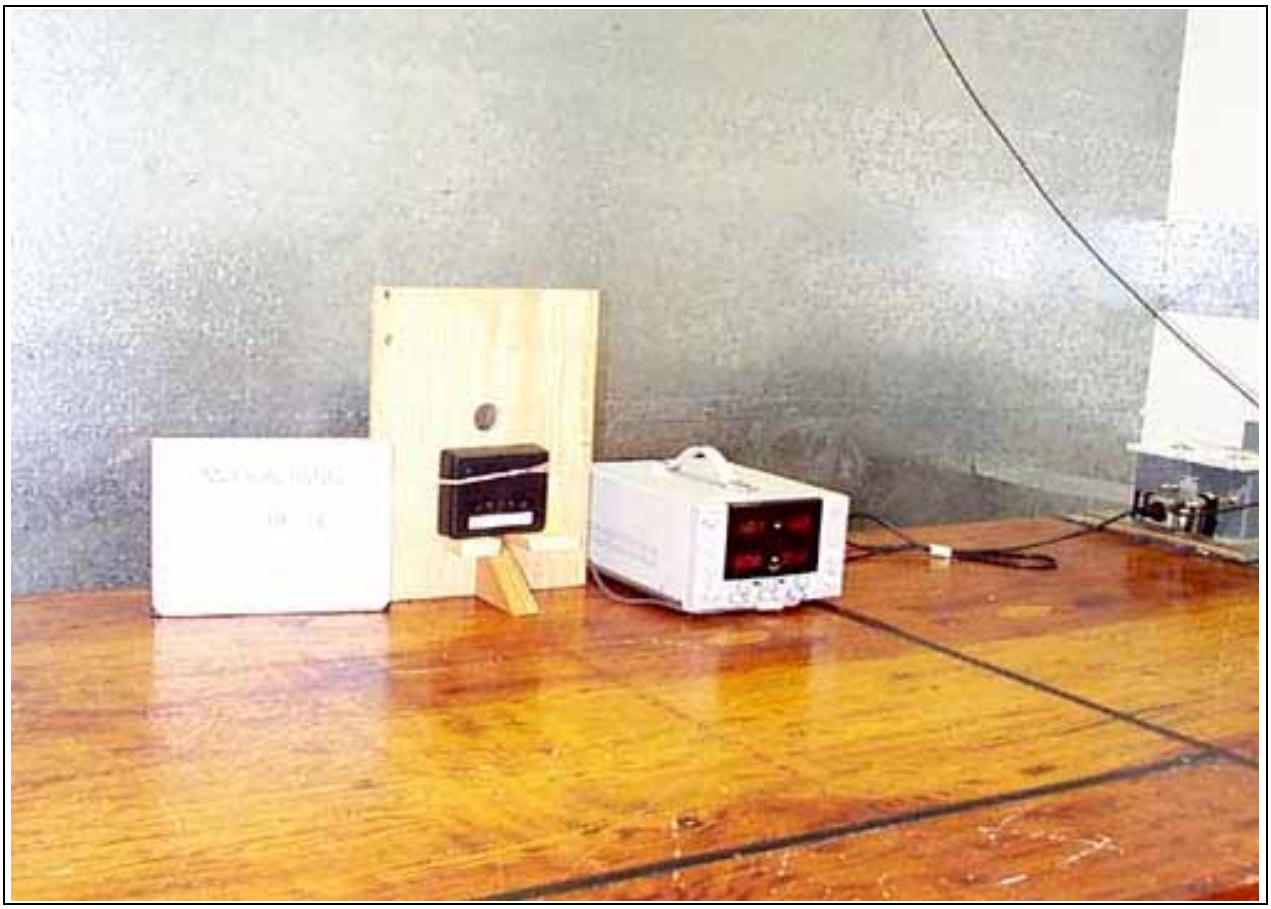
Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View

PHOTOGRAPH SHOWING CONDUCTED EMISSIONS



Conducted Emissions - Front View

APPENDIX B

MEASUREMENT DATA SHEETS

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

Customer: **Motorola Indala**
Specification: **FCC 15 C PARA 15.209**
Work Order #: **74169** Date: 05/30/2000
Test Type: **Radiated Scan** Time: 10:08:33
Equipment: **RFID Reader** Sequence#: 1
Manufacturer: Motorola Indala Tested By: Dustin Oaks
Model: IR-12E
S/N: N/A

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

Function	Manufacturer	Model #	S/N
RFID Reader*	Motorola Indala	IR-12E	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	TopWard Electric Instrument	6303D	677556

Test Conditions / Notes:

EUT is operating in a normal operating mode. EUT operating on 12VDC via DC power supply.

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

#	Freq MHz	Rdng dBµV	Mag dB	Cable dB	FCC 15.31 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	124.917k	56.6	+10.6	+0.0	-60.0		+0.0	7.2	25.7	-18.5	None

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

Customer: **Motorola Indala**
Specification: **FCC 15 C PARA 15.209**
Work Order #: **74169** Date: 05/30/2000
Test Type: **Radiated Scan** Time: 10:38:11
Equipment: Sequence#: 4
Manufacturer: Tested By: Dustin Oaks
Model:
S/N:

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

Function	Manufacturer	Model #	S/N
RFID Reader*	Motorola Indala	IR-12E	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	TopWard Electric Instrument	6303D	677556

Test Conditions / Notes:

EUT is operating in a normal operating mode. EUT operating on 12VDC via DC power supply.

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

#	Freq MHz	Rdng dBµV	Mag dB	Cable dB	FCC 15.31 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	626.620k	30.7	+10.9	+0.0	-20.0		+0.0	21.6	31.7	-10.1	None
2	500.410k	32.1	+10.8	+0.0	-20.0		+0.0	22.9	33.6	-10.7	None
3	753.020k	27.6	+11.0	+0.0	-20.0		+0.0	18.6	30.0	-11.4	None
4	878.020k	24.3	+11.0	+0.0	-20.0		+0.0	15.3	28.7	-13.4	None
5	375.410k	36.2	+11.0	+0.0	-60.0		+0.0	-12.8	16.1	-28.9	None
6	250.570k	31.3	+10.8	+0.0	-60.0		+0.0	-17.9	19.6	-37.5	None

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

Customer: **Motorola Indala**
Specification: **FCC 15.209**
Work Order #: **74169** Date: 05/31/2000
Test Type: **Radiated Scan** Time: 10:44:22
Equipment: **RFID Reader** Sequence#: 8
Manufacturer: Motorola Indala Tested By: Dustin Oaks
Model: IR-12E
S/N: N/A

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

Function	Manufacturer	Model #	S/N
RFID Reader*	Motorola Indala	IR-12E	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	TopWard Electric Instrument	6303D	677556

Test Conditions / Notes:

EUT is operating in a normal operating mode. EUT operating on 12VDC via DC power supply.

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

#	Freq	Rdng	Pream	Bicon	Log	Cable	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	72.087M	43.4	-25.0	+7.9	+0.0	+1.0	+10.0	37.3	40.0	-2.7	Vert
	QP										
^	72.079M	45.1	-25.0	+7.9	+0.0	+1.0	+10.0	39.0	40.0	-1.0	Vert
3	76.080M	39.8	-25.0	+7.7	+0.0	+1.1	+10.0	33.6	40.0	-6.4	Vert
	QP										
^	76.087M	42.1	-25.0	+7.7	+0.0	+1.1	+10.0	35.9	40.0	-4.1	Vert
5	56.083M	36.9	-24.9	+10.1	+0.0	+1.0	+10.0	33.1	40.0	-6.9	Vert
6	72.093M	38.9	-25.0	+7.9	+0.0	+1.0	+10.0	32.8	40.0	-7.2	Horiz
	QP										
^	72.079M	41.4	-25.0	+7.9	+0.0	+1.0	+10.0	35.3	40.0	-4.7	Horiz
8	160.103M	34.6	-24.9	+13.8	+0.0	+2.0	+10.0	35.5	43.5	-8.0	Horiz
	QP										
^	160.083M	36.3	-24.9	+13.8	+0.0	+2.0	+10.0	37.2	43.5	-6.3	Horiz
10	64.083M	36.4	-24.9	+9.2	+0.0	+1.0	+10.0	31.7	40.0	-8.3	Vert
11	156.106M	34.3	-24.9	+13.6	+0.0	+2.0	+10.0	35.0	43.5	-8.5	Horiz
	QP										
^	156.087M	36.2	-24.9	+13.6	+0.0	+2.0	+10.0	36.9	43.5	-6.6	Horiz

13	40.075M	33.4	-25.0	+12.0	+0.0	+0.7	+10.0	31.1	40.0	-8.9	Horiz
14	132.081M	32.9	-25.0	+14.4	+0.0	+1.8	+10.0	34.1	43.5	-9.4	Horiz
15	120.058M	33.2	-25.0	+14.2	+0.0	+1.6	+10.0	34.0	43.5	-9.5	Vert
16	68.079M	36.0	-25.0	+8.4	+0.0	+1.0	+10.0	30.4	40.0	-9.6	Horiz
17	76.046M	36.3	-25.0	+7.7	+0.0	+1.1	+10.0	30.1	40.0	-9.9	Horiz
18	40.050M	32.1	-25.0	+12.0	+0.0	+0.7	+10.0	29.8	40.0	-10.2	Vert
19	56.089M	33.5	-24.9	+10.1	+0.0	+1.0	+10.0	29.7	40.0	-10.3	Horiz
20	148.093M	32.9	-24.9	+13.3	+0.0	+1.9	+10.0	33.2	43.5	-10.3	Horiz
21	160.069M	31.9	-24.9	+13.8	+0.0	+2.0	+10.0	32.8	43.5	-10.7	Vert
22	64.072M	33.1	-24.9	+9.2	+0.0	+1.0	+10.0	28.4	40.0	-11.6	Horiz
23	136.093M	30.7	-25.0	+14.2	+0.0	+1.8	+10.0	31.7	43.5	-11.8	Horiz
24	144.087M	30.8	-24.9	+13.7	+0.0	+1.9	+10.0	31.5	43.5	-12.0	Horiz
25	116.070M	28.8	-25.0	+13.9	+0.0	+1.6	+10.0	29.3	43.5	-14.2	Vert

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

Customer: **Motorola Indala**
Specification: **FCC 15.207**
Work Order #: **74169** Date: 05/31/2000
Test Type: **Conducted Emissions** Time: 11:02:24
Equipment: **RFID Reader** Sequence#: 9
Manufacturer: Motorola Indala Tested By: Dustin Oaks
Model: IR-12E
S/N: N/A

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

Function	Manufacturer	Model #	S/N
RFID Reader*	Motorola Indala	IR-12E	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	TopWard Electric Instrument	6303D	677556

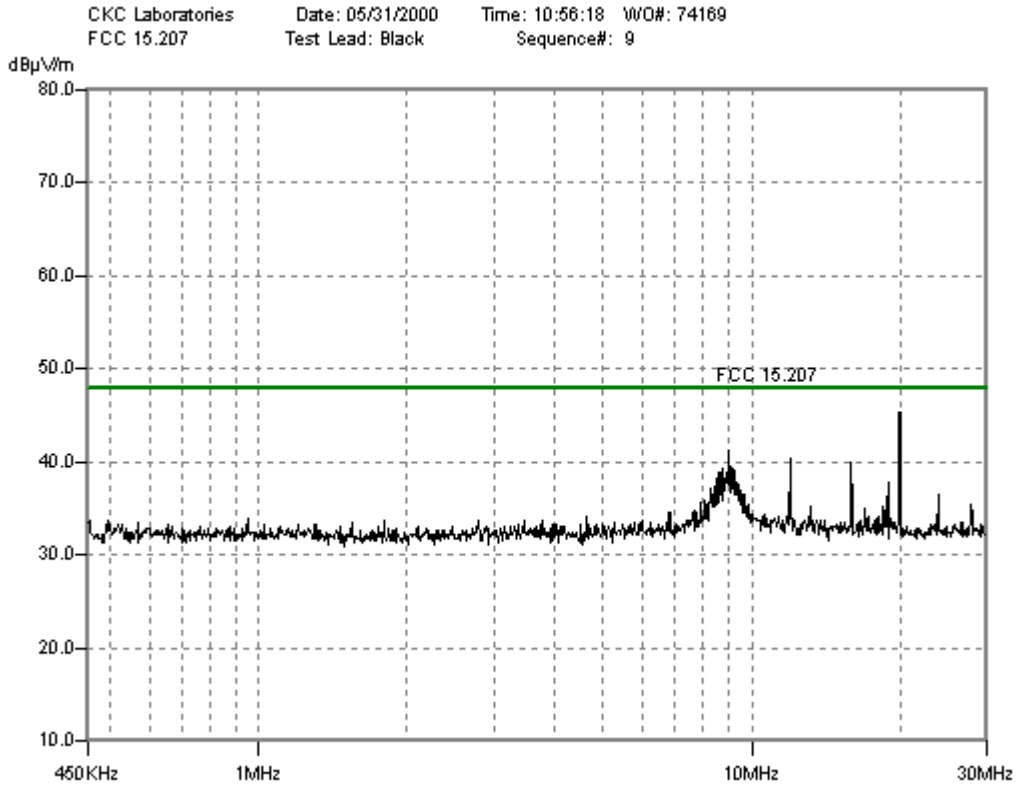
Test Conditions / Notes:

EUT is operating in a normal operating mode. EUT operating on 12VDC via DC power supply.

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

#	Freq MHz	Rdng dBµV	Cable dB	LISN dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1 QP	19.998M	42.9	+0.3	+0.3			+0.0	43.5	48.0	-4.5	Black
^	19.997M	44.9	+0.3	+0.3			+0.0	45.5	48.0	-2.5	Black
3	9.016M	35.7	+0.2	+5.4			+0.0	41.3	48.0	-6.7	Black
4	12.013M	38.8	+0.2	+1.3			+0.0	40.3	48.0	-7.7	Black
5	15.997M	39.0	+0.3	+0.7			+0.0	40.0	48.0	-8.0	Black
6	9.139M	34.1	+0.2	+4.9			+0.0	39.2	48.0	-8.8	Black
7	8.770M	34.4	+0.2	+4.6			+0.0	39.2	48.0	-8.8	Black
8	9.262M	34.4	+0.2	+4.4			+0.0	39.0	48.0	-9.0	Black
9	8.893M	33.6	+0.2	+5.1			+0.0	38.9	48.0	-9.1	Black
10	8.633M	34.5	+0.2	+4.1			+0.0	38.8	48.0	-9.2	Black
11	8.524M	34.4	+0.2	+3.7			+0.0	38.3	48.0	-9.7	Black
12	9.385M	33.7	+0.2	+4.0			+0.0	37.9	48.0	-10.1	Black

13	19.005M	37.0	+0.3	+0.4	+0.0	37.7	48.0	-10.3	Black
14	8.387M	34.0	+0.2	+3.2	+0.0	37.4	48.0	-10.6	Black
15	8.264M	34.2	+0.2	+2.7	+0.0	37.1	48.0	-10.9	Black
16	9.521M	33.3	+0.2	+3.4	+0.0	36.9	48.0	-11.1	Black


CKC Laboratories
Date: 05/31/2000
Time: 10:56:18
WO#: 74169
FCC 15.207
Test Lead: Black
Sequence#: 9
dBµV/m
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
FCC 15.207
450KHz
1MHz
10MHz
30MHz

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

Customer: **Motorola Indala**
Specification: **FCC 15.207**
Work Order #: **74169** Date: 05/31/2000
Test Type: **Conducted Emissions** Time: 11:17:58
Equipment: **RFID Reader** Sequence#: 10
Manufacturer: Motorola Indala Tested By: Dustin Oaks
Model: IR-12E
S/N: N/A

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

Function	Manufacturer	Model #	S/N
RFID Reader*	Motorola Indala	IR-12E	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	TopWard Electric Instrument	6303D	677556

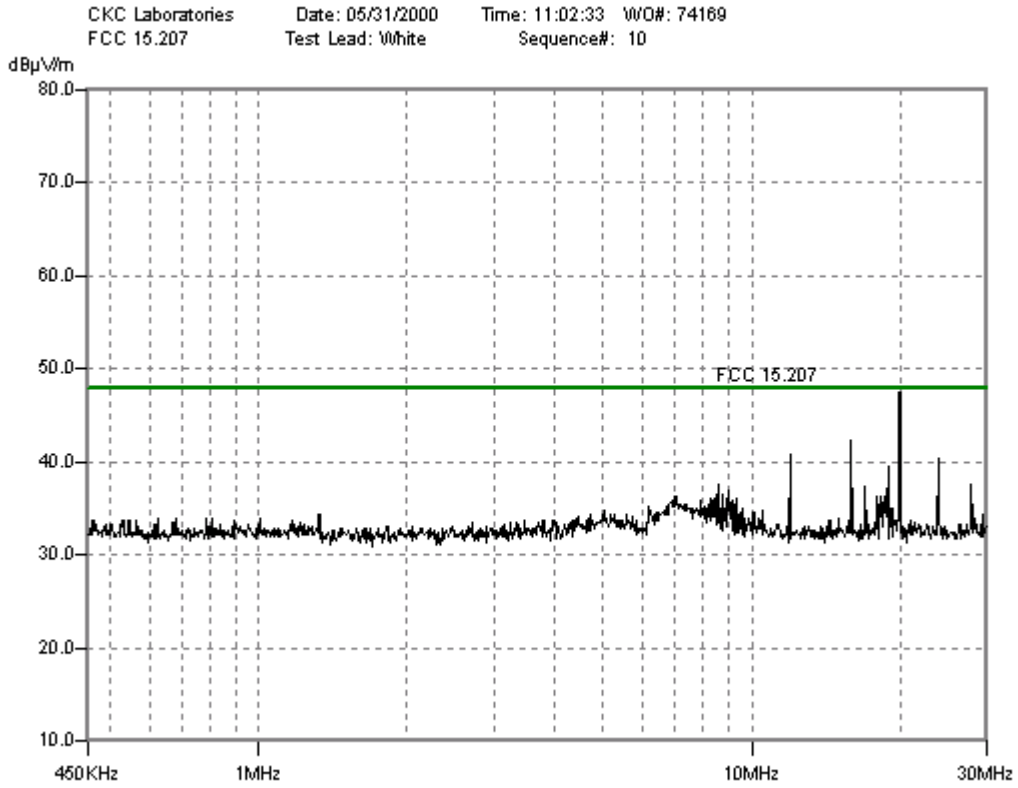
Test Conditions / Notes:

EUT is operating in a normal operating mode. EUT operating on 12VDC via DC power supply.

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

#	Freq	Rdng	Cable		LISN		Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1 QP	19.998M	45.4	+0.3		+0.2		+0.0	45.9	48.0	-2.1	White
^	19.998M	46.8	+0.3		+0.2		+0.0	47.3	48.0	-0.7	White
3	15.997M	41.8	+0.3		+0.3		+0.0	42.4	48.0	-5.6	White
4	12.013M	40.2	+0.2		+0.5		+0.0	40.9	48.0	-7.1	White
5	24.004M	39.6	+0.4		+0.3		+0.0	40.3	48.0	-7.7	White
6	19.005M	39.0	+0.3		+0.2		+0.0	39.5	48.0	-8.5	White
7	27.988M	36.8	+0.4		+0.4		+0.0	37.6	48.0	-10.4	White
8	8.633M	35.9	+0.2		+1.4		+0.0	37.5	48.0	-10.5	White
9	17.013M	36.8	+0.3		+0.3		+0.0	37.4	48.0	-10.6	White
10	9.002M	35.8	+0.2		+0.9		+0.0	36.9	48.0	-11.1	White
11	8.756M	35.2	+0.2		+1.2		+0.0	36.6	48.0	-11.4	White
12	8.510M	34.7	+0.2		+1.6		+0.0	36.5	48.0	-11.5	White

13	9.385M	35.1	+0.2	+0.8	+0.0	36.1	48.0	-11.9	White
14	8.879M	34.7	+0.2	+1.1	+0.0	36.0	48.0	-12.0	White
15	9.125M	34.8	+0.2	+0.9	+0.0	35.9	48.0	-12.1	White
16	9.262M	34.4	+0.2	+0.8	+0.0	35.4	48.0	-12.6	White


CKC Laboratories
Date: 05/31/2000
Time: 11:02:33
WO#: 74169
FCC 15.207
Test Lead: White
Sequence#: 10
dBµV/m
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
FCC 15.207
450KHz
1MHz
10MHz
30MHz