HID CORPORATION TEST REPORT

FOR THE

ICLASS LONG RANGE READER, 6150A

FCC PART 15 SUBPART C SECTIONS 15.207, 15.209 & 15.225

COMPLIANCE

DATE OF ISSUE: JULY 20, 2005

PREPARED FOR:

HID Corporation
9292 Jeronimo Road
Irvine, CA 92718

P.O. No.: 10003694
W.O. No.: 83674

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Date of test: June 1 - July 19, 2005

Report No.: FC05-024

TABLE OF CONTENTS

ADMINISTRATIVE INFORMATION

DATE OF TEST:	June 1 - July 19, 2005
DATE OF RECEIPT:	June 1, 2005
MANUFACTURER:	HID Corporation 9292 Jeronimo Road Irvine, CA 92718
REPRESENTATIVE:	Frank de Vall
TEST LOCATION:	CKC Laboratories, Inc. 5046 Sierra Pines Drive Mariposa, CA 95338
TEST METHOD:	ANSI C63.4 (2003)
PURPOSE OF TEST:	To demonstrate the compliance of the iClass Long Range Reader, 6150A with the requirements for FCC Part 15 Subpart C Sections 15.207, 15.209 and 15.225 devices.

FCC TO CANADA STANDARD CORRELATION MATRIX

Canadian Standard	Canadian Section	FCC Standard	FCC Section	Test Description
RSS 210	5.5	47CFR	15.203	Antenna Connector Requirements
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	6.2.2(e)	47CFR	15.225(b)*	Out of band emissions
RSS 210	6.2.2(e)	47CFR	15.225(c)*	Carrier Stability
RSS 210	6.3	47CFR	15.205	Restricted Bands of Operation
RSS 210	6.4	47CFR	15.215(c)	Frequency Stability Recommendation
RSS 210	6.5	47CFR	15.35(c)	Pulsed Operation
RSS 210	6.6	47CFR	15.207	AC Mains Conducted Emissions Requirement
	IC 3082-D		784962	Site File No.

* Indicates that FCC Requirements are more stringent than the Canadian Equivalent.

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

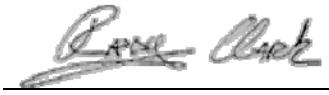
APPROVALS

Steve Behm, Director of Engineering Services

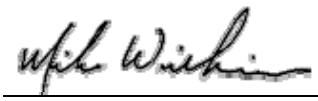
QUALITY ASSURANCE:

Joyce Walker, Quality Assurance Administrative Manager

TEST PERSONNEL:



Randy Clark, EMC Engineer



Mike Wilkinson, Lab Manager

FCC 15.33(a) Frequency Ranges Tested
15.207 Conducted Emissions: 150 kHz – 30 MHz
15.209/15.225 Radiated Emissions: 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	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.

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 customer declares the EUT tested by CKC Laboratories was representative of a production unit.

EQUIPMENT UNDER TEST

iClass Long Range Reader

Manuf: HID
Model: 6150A
Serial: 6150A-060105

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

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 dBµV	CORRECTION FACTORS Lisn dB	HPF dB	Cable dB	dB	CORRECTED READING dBµV	SPEC LIMIT dBµV	MARGIN dB	NOTES
13.170000	45.3	0.4	0.1	0.4		46.2	50.0	-3.8	W-1
13.562000	33.9	0.4	0.1	0.4		34.8	50.0	-15.2	WA-2
13.562000	33.8	0.5	0.1	0.4		34.8	50.0	-15.2	BA-2
19.700000	33.6	0.4	0.2	0.5		34.7	50.0	-15.3	W-2
27.122400	43.5	0.4	0.2	0.5		44.6	50.0	-5.4	B-1
27.129200	40.8	0.5	0.2	0.5		42.0	50.0	-8.0	W-1

Test Method: ANSI C63.4 (2003)
Spec Limit: FCC Part 15 Subpart C Section 15.207

NOTES:
B = Black Lead
W = White Lead
1 = 12VDC
2 = 24VDC

COMMENTS: EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Power Supply adjusted to +12 VDC. Power Supply adjusted to +24 VDC. Carrier frequency investigated with the antenna terminals terminated into a dummy load. All other measurements are performed with the integral antenna attached. Frequency Range Investigated: 150kHz to 30MHz. Temperature: 25ºC, Relative Humidity: 35%.

Table 2: FCC 15.209 Fundamental 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
13.561	80.5	9.6		0.8	-19.0	71.9	84.0	-12.1	H
13.561	75.6	9.6		0.8	-19.0	67.0	84.0	-17.0	V

Test Method: ANSI C63.4 (2003)
Spec Limit: FCC Part 15 Subpart C Section 15.225
Test Distance: 10 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization

COMMENTS: EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Test distance correction factor used in accordance with 15.31, 40dB per decade to correct test data for comparison with the limit at 30 meters. Frequency Range Investigated: Carrier. Temperature: 28ºC, Relative Humidity: 45%.

Table 3: FCC 15.209 Highest Radiated Emission Levels: 9kHz - 30 MHz

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	dB	Cable dB	Corr dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN DB	NOTES
27.123	36.4	6.6		1.1	-20.0	24.1	29.5	-5.4	VQ
27.123	35.6	6.6		1.1	-20.0	23.3	29.5	-6.2	HQ

Test Method: ANSI C63.4 (2003)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 10 Meters

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

COMMENTS: EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Test distance correction factor used in accordance with 15.31, 40dB per decade to correct test data for comparison with the limit at 30 and 300 meters as appropriate. Frequency Range Investigated: 9kHz - 30MHz. Temperature: 28ºC. Relative Humidity: 45%.

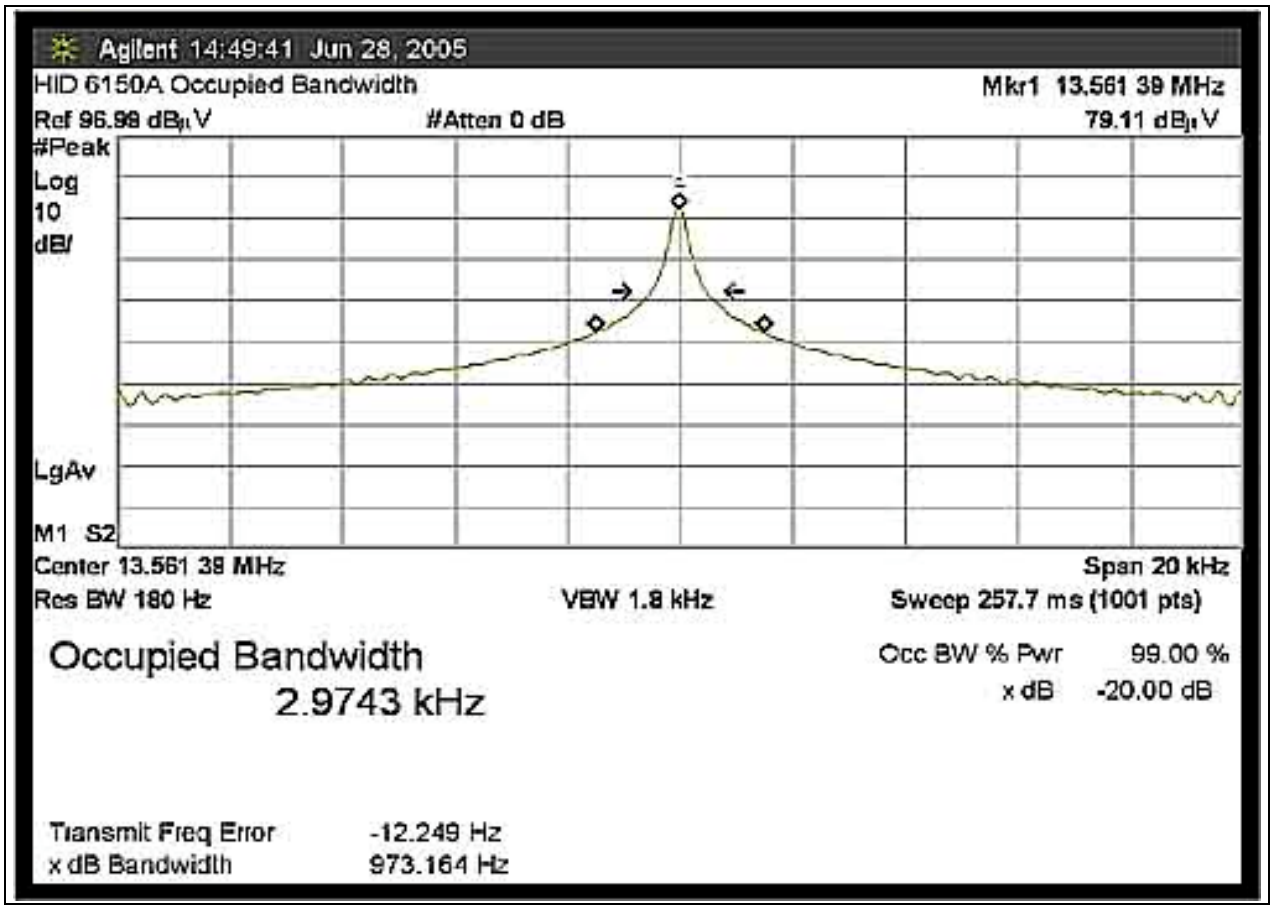
Table 4: FCC 15.209 Six Highest Radiated Emission Levels: 30-1000 MHz									
	METER	CORRECTION FACTORS				CORRECTED	SPEC		
FREQUENCY MHz	READING dBµV	Ant dB	Amp dB	Cable dB	Dist dB	READING dBµV/m	LIMIT dBµV/m	MARGIN DB	NOTES
40.689	43.2	12.0	-27.0	1.4	10.0	39.6	40.0	-0.4	VQ
54.245	43.0	7.3	-26.8	1.6	10.0	35.1	40.0	-4.9	V
81.369	42.7	6.9	-27.0	2.0	10.0	34.6	40.0	-5.4	V
108.489	45.4	10.1	-26.8	2.4	10.0	41.1	43.5	-2.4	VQ
122.057	42.2	11.0	-26.7	2.5	10.0	39.0	43.5	-4.5	V
189.866	44.5	8.3	-26.6	3.2	10.0	39.4	43.5	-4.1	HQ

Test Method: ANSI C63.4 (2003)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 10 Meters

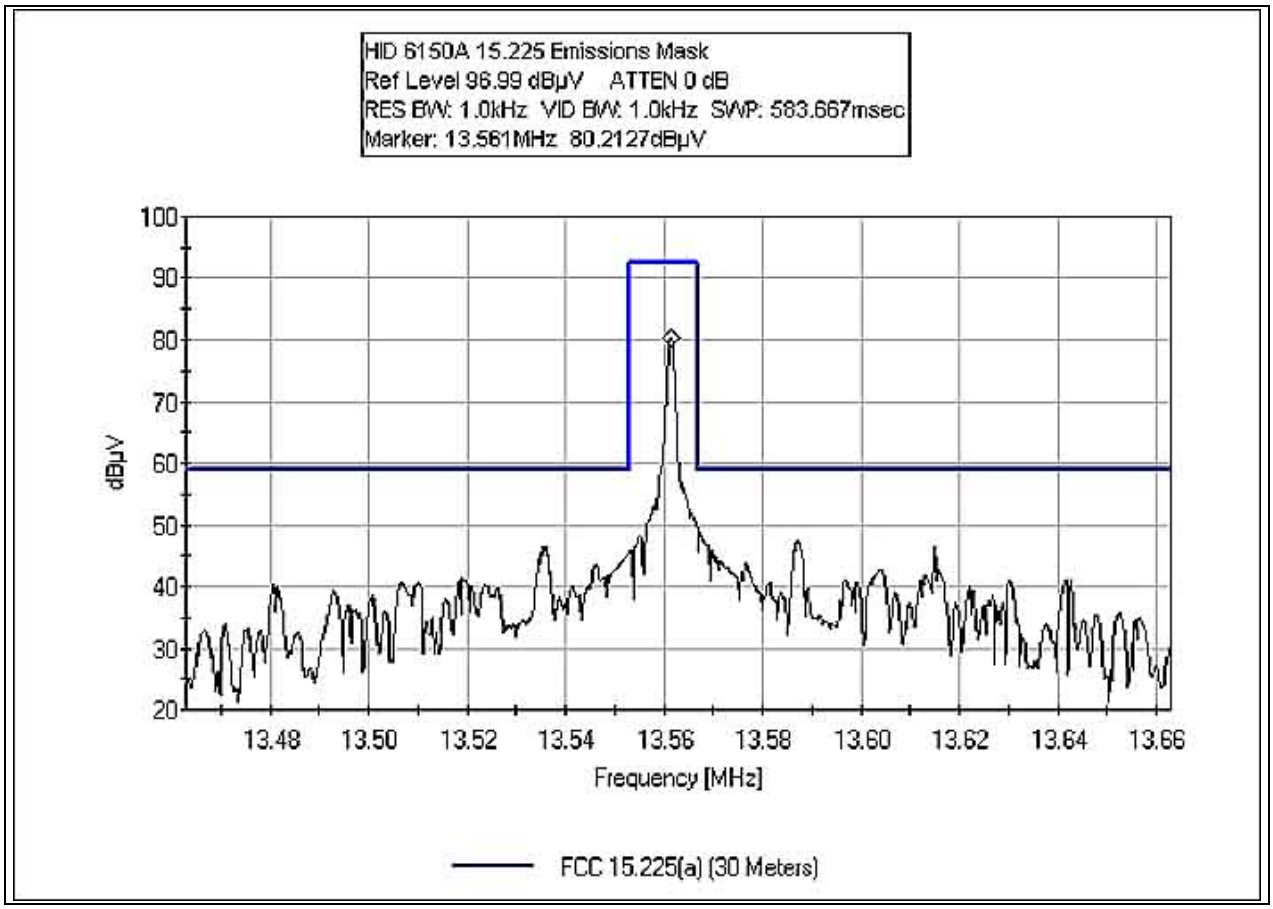
NOTES: H = Horizontal Polarization
V = Vertical Polarization
Q = Quasi Peak Reading

COMMENTS: EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Test distance correction factor used in accordance with 15.31, 20dB per decade to correct test data for comparison with the limit at 3 meters. Frequency Range Investigated: 30-1000MHz. Temperature: 28ºC, Relative Humidity: 45%.

OCCUPIED BANDWIDTH



FCC 15.225 EMISSIONS MASK



FREQUENCY STABILITY AND VOLTAGE VARIATIONS

Test Conditions: EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. EUT was placed into the Temp Chamber and performance and input was monitored by the equipment listed.

Customer:	HID
WO#:	83674
Test Engineer:	Mike Wilkinson

Device Model #:	6150A	
Operating Voltage:	24	**VDC**
Frequency Limit:	0.01	**%**

Temperature Variations

		Channel 1 (MHz	Dev. (MHz)
Channel Frequency:		**13.5614**	
Temp (C)	Voltage		
-20	24	13.56145	0.00005
-10	24	13.56143	0.00003
0	24	13.56142	0.00002
10	24	13.56140	0.00000
20	24	13.56139	0.00001
30	24	13.56137	0.00003
40	24	13.56135	0.00005
50	24	13.56133	0.00007

Voltage Variations (±15%)

20	20.4	13.56139	0.00001
20	24	13.56139	0.00001
20	27.6	13.56139	0.00001

Max Deviation (MHz)	**0.00007**
Max Deviation (%)	**0.00052**
	PASS

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. The horn antenna was used for frequencies above 1000 MHz. 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 MAINS CONDUCTED EMISSIONS

Mains Conducted Emissions - With Dummy Load

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View

PHOTOGRAPH SHOWING TEMPERATURE TESTING

Temperature Testing

APPENDIX B

TEST EQUIPMENT LIST

15.207

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/12/2005	01/12/2007	02660
150kHz HP Filter TTE	G7754	04/20/2004	04/20/2006	02608
LISN, 8028-50-TS-24-BNC	8379276, 280	06/03/2005	06/03/2007	1248 & 1249

15.225 Carrier and 9 kHz – 30 MHz

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/12/2005	01/12/2007	02660
Antenna, Loop EMCO 6502	1074	05/13/2005	05/13/2007	226

15.225 30-1000 MHz

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/12/2005	01/12/2007	02660
Chase CBL6111C Bilog	2456	06/07/2005	06/07/2007	01991
HP 8447D Preamp	1937A02604	03/11/2005	03/11/2007	00099

Frequency Stability

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/12/2005	01/12/2007	02660
Antenna, Loop EMCO 6502	1074	05/13/2005	05/13/2007	226
Temp Chamber Thermotron S-1.2 MiniMax	11899	01/24/2005	01/24/2007	1879
Thermometer Omega HH-26K	T-202884	08/15/2003	08/14/2005	2242
Multimeter Fluke 8520A	2905006	04/25/2005	04/25/2007	2369

APPENDIX C:

MEASUREMENT DATA SHEETS

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

Customer: **HID**
Specification: **FCC 15.207 - AVE**
Work Order #: **83674** Date: 07/19/2005
Test Type: **Conducted Emissions** Time: 16:34:59
Equipment: **iClass Long Range Reader** Sequence#: 71
Manufacturer: HID Tested By: Mike Wilkinson
Model: 6150A 120V 60Hz
S/N: 6150A-060105

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

Function	Manufacturer	Model #	S/N
iClass Long Range Reader*	HID	6150A	6150A-060105

Support Devices:

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

Test Conditions / Notes:

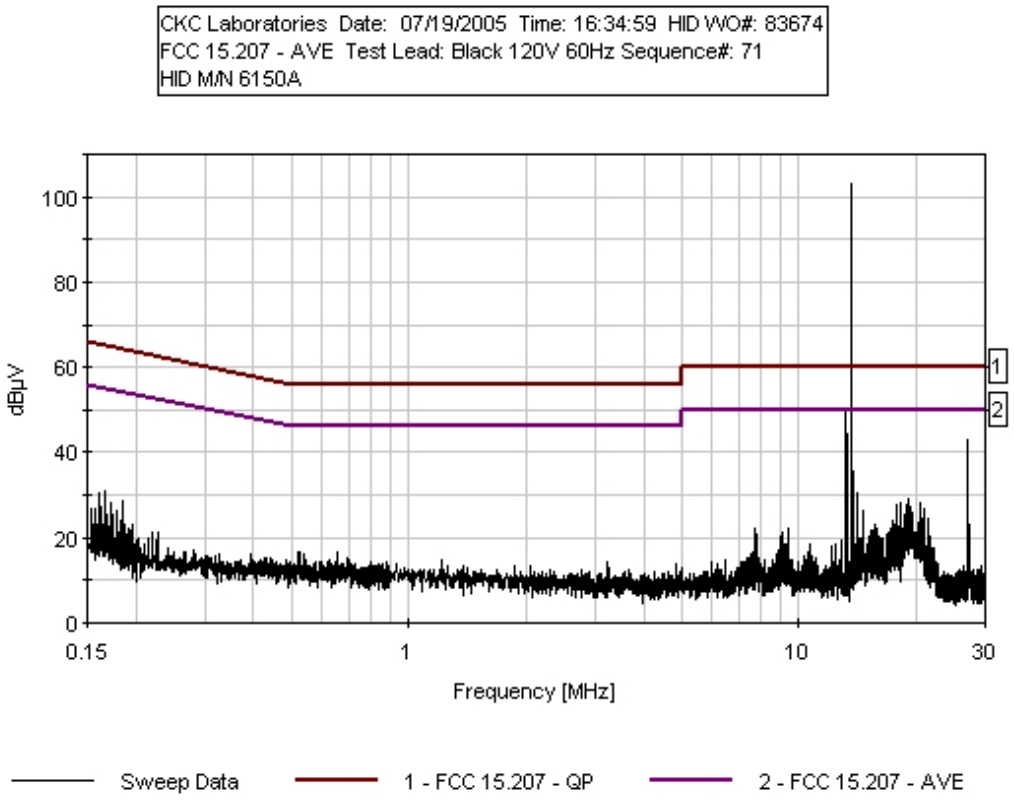
EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Power Supply adjusted to +12 VDC. Carrier frequency investigated with the antenna terminals terminated into a dummy load. All other measurements are performed with the integral antenna attached. Frequency Range Investigated: 150kHz to 30MHz. Temperature: 25ºC, Relative Humidity: 35%.

Transducer Legend:

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

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	27.122M	43.5	+0.2	+0.4	+0.5		+0.0	44.6	50.0	-5.4	Black
2	13.561M Ave	28.4	+0.1	+0.5	+0.4		+0.0	29.4	50.0	-20.6	Black
									Carrier with dummy load attached		
^	13.561M	102.0	+0.1	+0.5	+0.4		+0.0	103.0	50.0	+53.0	Black
									Carrier with integral antenna attached.		
^	13.562M	55.0	+0.1	+0.5	+0.4		+0.0	56.0	50.0	+6.0	Black
									Carrier with dummy load attached		
5	160.300k	31.6	+1.8	+0.4	+0.1		+0.0	33.9	55.4	-21.5	Black
6	9.974M	22.4	+0.1	+0.5	+0.3		+0.0	23.3	50.0	-26.7	Black
7	9.924M	20.2	+0.1	+0.5	+0.3		+0.0	21.1	50.0	-28.9	Black
8	10.025M	19.0	+0.1	+0.5	+0.3		+0.0	19.9	50.0	-30.1	Black


CKC Laboratories Date: 07/19/2005 Time: 16:34:59 HID WO#: 83674
FCC 15.207 - AVE Test Lead: Black 120V 60Hz Sequence#: 71
HID M/N 6150A
100
80
60
40
20
0
dBµV
0.15
1
10
30
Frequency [MHz]
1
2
Sweep Data
1 - FCC 15.207 - QP
2 - FCC 15.207 - AVE

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

Customer: **HID**
Specification: **FCC 15.207 - AVE**
Work Order #: **83674** Date: 07/19/2005
Test Type: **Conducted Emissions** Time: 16:31:01
Equipment: **iClass Long Range Reader** Sequence#: 72
Manufacturer: HID Tested By: Mike Wilkinson
Model: 6150A 120V 60Hz
S/N: 6150A-060105

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

Function	Manufacturer	Model #	S/N
iClass Long Range Reader*	HID	6150A	6150A-060105

Support Devices:

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

Test Conditions / Notes:

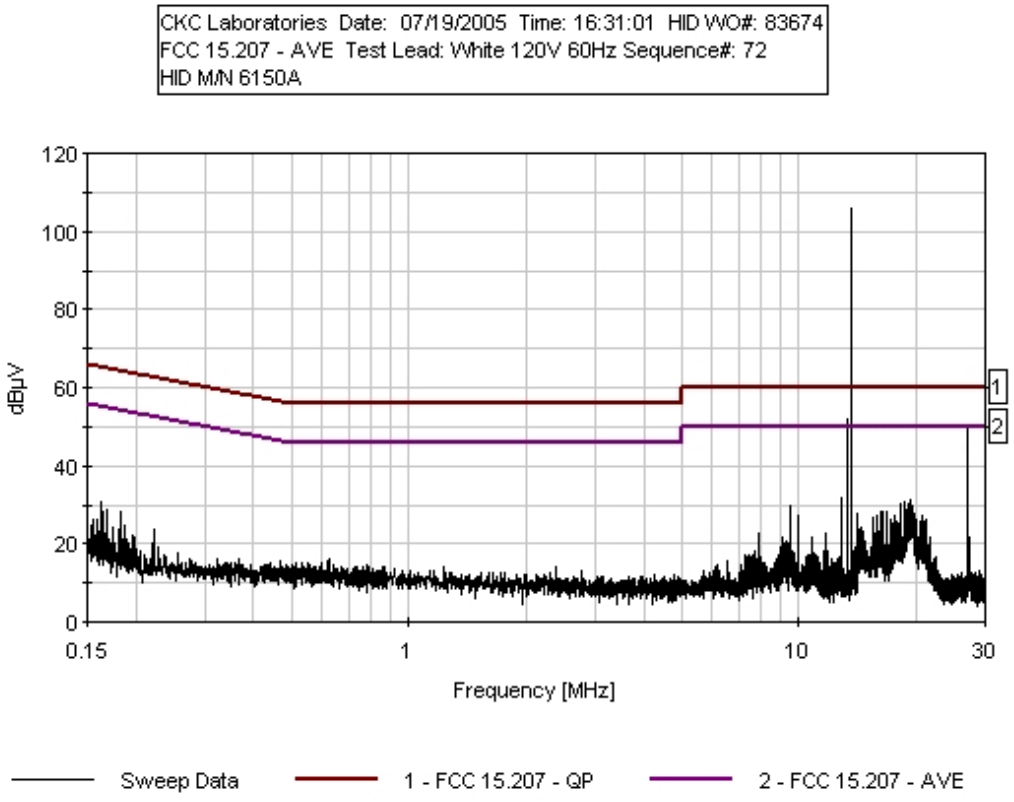
EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Power Supply adjusted to +12 VDC. Carrier frequency investigated with the antenna terminals terminated into a dummy load. All other measurements are performed with the integral antenna attached. Frequency Range Investigated: 150kHz to 30MHz. Temperature: 25ºC, Relative Humidity: 35%.

Transducer Legend:

T1=HP Filter AN02608	T2=LISN Insertion Loss s/n280
T3=Cable - Internal + cab	

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	13.170M	45.3	+0.1	+0.4	+0.4		+0.0	46.2	50.0	-3.8	White
2	27.129M	40.8	+0.2	+0.5	+0.5		+0.0	42.0	50.0	-8.0	White
3	19.750M	32.0	+0.2	+0.4	+0.5		+0.0	33.1	50.0	-16.9	White
4	13.561M Ave	28.5	+0.1	+0.4	+0.4		+0.0	29.4	50.0 Carrier with dummy load attached	-20.6	White
^	13.561M	105.0	+0.1	+0.4	+0.4		+0.0	105.9	50.0 Carrier with integral antenna attached.	+55.9	White
^	13.561M	54.7	+0.1	+0.4	+0.4		+0.0	55.6	50.0 Carrier with dummy load attached	+5.6	White
7	9.975M	25.8	+0.1	+0.4	+0.3		+0.0	26.6	50.0	-23.4	White
8	166.000k	29.9	+1.3	+0.3	+0.1		+0.0	31.6	55.2	-23.6	White


CKC Laboratories Date: 07/19/2005 Time: 16:31:01 HID WO#: 83674
FCC 15.207 - AVE Test Lead: White 120V 60Hz Sequence#: 72
HID M/N 6150A
120
100
80
60
40
20
0
dBµV
0.15
1
10
30
Frequency [MHz]
1
2
Sweep Data
1 - FCC 15.207 - QP
2 - FCC 15.207 - AVE

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

Customer: **HID**
Specification: **FCC 15.207 - AVE**
Work Order #: **83674** Date: 07/19/2005
Test Type: **Conducted Emissions** Time: 16:18:29
Equipment: **iClass Long Range Reader** Sequence#: 74
Manufacturer: HID Tested By: Mike Wilkinson
Model: 6150A 120V 60Hz
S/N: 6150A-060105

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

Function	Manufacturer	Model #	S/N
iClass Long Range Reader*	HID	6150A	6150A-060105

Support Devices:

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

Test Conditions / Notes:

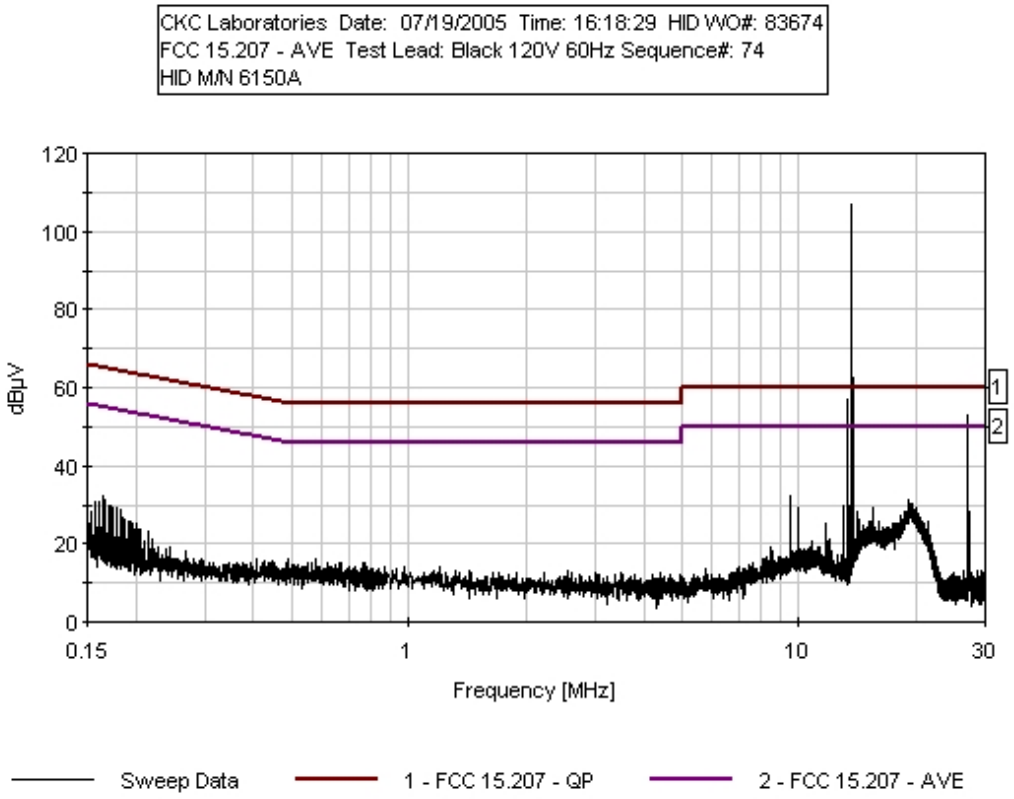
EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Power Supply adjusted to +24 VDC. Carrier frequency investigated with the antenna terminals terminated into a dummy load. All other measurements are performed with the integral antenna attached. Frequency Range Investigated: 150kHz to 30MHz. Temperature: 25ºC, Relative Humidity: 35%.

Transducer Legend:

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

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	13.562M Ave	33.8	+0.1	+0.5	+0.4		+0.0	34.8	50.0 Carrier with dummy load attached	-15.2	Black
^	13.561M	105.7	+0.1	+0.5	+0.4		+0.0	106.7	50.0 Carrier with integral antenna attached.	+56.7	Black
^	13.562M	53.1	+0.1	+0.5	+0.4		+0.0	54.1	50.0 Carrier with dummy load attached	+4.1	Black
4	9.977M	30.7	+0.1	+0.5	+0.3		+0.0	31.6	50.0	-18.4	Black
5	18.883M	27.4	+0.2	+0.4	+0.5		+0.0	28.5	50.0	-21.5	Black
6	155.700k	30.6	+2.2	+0.4	+0.1		+0.0	33.3	55.7	-22.4	Black
7	27.121M Ave	2.9	+0.2	+0.4	+0.5		+0.0	4.0	50.0	-46.0	Black
^	27.121M	51.6	+0.2	+0.4	+0.5		+0.0	52.7	50.0	+2.7	Black


CKC Laboratories Date: 07/19/2005 Time: 16:18:29 HID WO#: 83674
FCC 15.207 - AVE Test Lead: Black 120V 60Hz Sequence#: 74
HID M/N 6150A
120
100
80
60
40
20
0
dBµV
0.15
1
10
30
Frequency [MHz]
1
2
Sweep Data
1 - FCC 15.207 - QP
2 - FCC 15.207 - AVE

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

Customer: **HID**
Specification: **FCC 15.207 - AVE**
Work Order #: **83674** Date: 07/19/2005
Test Type: **Conducted Emissions** Time: 16:25:05
Equipment: **iClass Long Range Reader** Sequence#: 73
Manufacturer: HID Tested By: Mike Wilkinson
Model: 6150A 120V 60Hz
S/N: 6150A-060105

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

Function	Manufacturer	Model #	S/N
iClass Long Range Reader*	HID	6150A	6150A-060105

Support Devices:

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

Test Conditions / Notes:

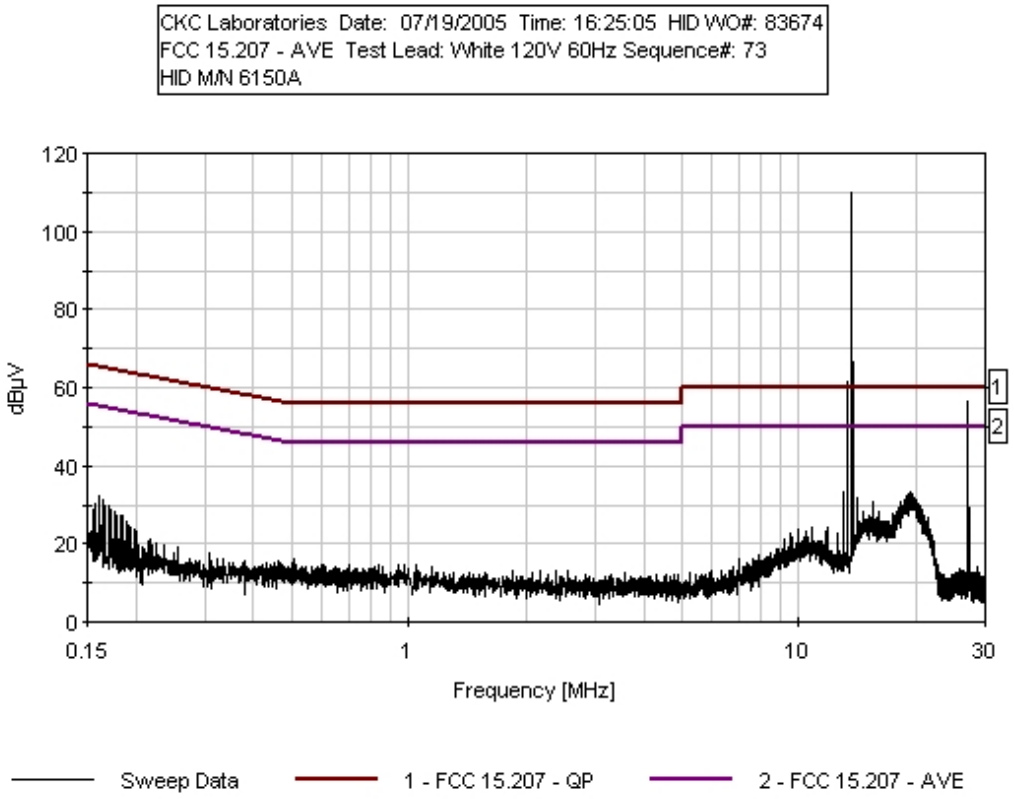
EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Power Supply adjusted to +24 VDC. Carrier frequency investigated with the antenna terminals terminated into a dummy load. All other measurements are performed with the integral antenna attached. Frequency Range Investigated: 150kHz to 30MHz. Temperature: 25ºC, Relative Humidity: 35%.

Transducer Legend:

T1=HP Filter AN02608	T2=LISN Insertion Loss s/n280
T3=Cable - Internal + cab	

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	13.562M Ave	33.9	+0.1	+0.4	+0.4		+0.0	34.8	50.0 Carrier with dummy load attached	-15.2	White
^	13.561M	108.9	+0.1	+0.4	+0.4		+0.0	109.8	50.0 Carrier with integral antenna attached.	+59.8	White
^	13.561M	53.6	+0.1	+0.4	+0.4		+0.0	54.5	50.0 Carrier with dummy load attached	+4.5	White
4	19.700M	33.6	+0.2	+0.4	+0.5		+0.0	34.7	50.0	-15.3	White
5	155.600k	31.1	+2.2	+0.3	+0.1		+0.0	33.7	55.7	-22.0	White
6	27.121M Ave	11.8	+0.2	+0.5	+0.5		+0.0	13.0	50.0	-37.0	White
^	27.121M	54.2	+0.2	+0.5	+0.5		+0.0	55.4	50.0	+5.4	White


CKC Laboratories Date: 07/19/2005 Time: 16:25:05 HID WO#: 83674
FCC 15.207 - AVE Test Lead: White 120V 60Hz Sequence#: 73
HID M/N 6150A
120
100
80
60
40
20
0
dBµV
0.15
1
10
30
Frequency [MHz]
1
2
Sweep Data
1 - FCC 15.207 - QP
2 - FCC 15.207 - AVE

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

Customer: **HID**
Specification: **FCC 15.225(a) (30 Meters)**
Work Order #: **83674** Date: 06/28/2005
Test Type: **Maximized Emissions** Time: 14:35:03
Equipment: **iClass Long Range Reader** Sequence#: 58
Manufacturer: HID Tested By: Randal Clark
Model: 6150A
S/N: 6150A-060105

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

Function	Manufacturer	Model #	S/N
iClass Long Range Reader*	HID	6150A	6150A-060105

Support Devices:

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

Test Conditions / Notes:

EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Test distance correction factor used in accordance with 15.31, 40dB per decade to correct test data for comparison with the limit at 30 meters. Frequency Range Investigated: Carrier. Temperature: 28ºC, Relative Humidity: 45%.

Transducer Legend:

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

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	13.561M	80.5	+0.8	+9.6			-19.0	71.9	84.0	-12.1	Horiz 100
2	13.561M	75.6	+0.8	+9.6			-19.0	67.0	84.0	-17.0	Verti 100

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

Customer: **HID**
Specification: **FCC 15.209**
Work Order #: **83674** Date: 06/28/2005
Test Type: **Maximized Emissions** Time: 14:12:28
Equipment: **iClass Long Range Reader** Sequence#: 57
Manufacturer: HID Tested By: Randal Clark
Model: 6150A
S/N: 6150A-060105

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

Function	Manufacturer	Model #	S/N
iClass Long Range Reader*	HID	6150A	6150A-060105

Support Devices:

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

Test Conditions / Notes:

EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Test distance correction factor used in accordance with 15.31, 40dB per decade to correct test data for comparison with the limit at 30 and 300 meters as appropriate. Frequency Range Investigated: 9kHz - 30MHz. Temperature: 28ºC, Relative Humidity: 45%.

Transducer Legend:

T1=Cable - 10 Meter	T2=Mag Loop - AN 00226 - 9kHz-30M
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	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	27.123M QP	36.4	+1.1	+6.6	-20.0		+0.0	24.1	29.5	-5.4	Verti 100
^	27.123M	40.1	+1.1	+6.6	-20.0		+0.0	27.8	29.5	-1.7	Verti 100
3	27.123M QP	35.6	+1.1	+6.6	-20.0		+0.0	23.3	29.5	-6.2	Horiz 100
^	27.123M	39.2	+1.1	+6.6	-20.0		+0.0	26.9	29.5	-2.6	Horiz 100
^	27.123M	28.5	+1.1	+6.6	-20.0		+0.0	16.2	29.5	-13.3	Horiz 100

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

Customer: **HID**
Specification: **FCC 15.209**
Work Order #: **83674** Date: 06/28/2005
Test Type: **Maximized Emissions** Time: 12:06:21
Equipment: **iClass Long Range Reader** Sequence#: 54
Manufacturer: HID Tested By: Randal Clark
Model: 6150A
S/N: 6150A-060105

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/12/2005	01/12/2007	02660
150kHz HP Filter	G7754	04/20/2004	04/20/2006	02608
TTE LISN, 8028-50-TS-24-BNC	8379276, 280	06/03/2005	06/03/2007	1248 & 1249

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

Function	Manufacturer	Model #	S/N
iClass Long Range Reader*	HID	6150A	6150A-060105

Support Devices:

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

Test Conditions / Notes:

EUT is an iClass Long Range Reader operating on a frequency of 13.56MHz. Power supply is bonded to ground plane. EUT drain wire disconnected. Test distance correction factor used in accordance with 15.31, 20dB per decade to correct test data for comparison with the limit at 3 meters. Frequency Range Investigated: 30-1000MHz. Temperature: 28ºC, Relative Humidity: 45%.

Transducer Legend:

T1=Amp - S/N 604	T2=Bilog Site D
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	40.689M QP	43.2	-27.0	+12.0	+1.4		+10.0	39.6	40.0	-0.4	Verti 124
^	40.693M	49.1	-27.0	+12.0	+1.4		+10.0	45.5	40.0	+5.5	Verti 124
3	108.489M QP	45.4	-26.8	+10.1	+2.4		+10.0	41.1	43.5	-2.4	Verti 124
^	108.495M	47.4	-26.8	+10.1	+2.4		+10.0	43.1	43.5	-0.4	Verti 124
5	189.866M QP	44.5	-26.6	+8.3	+3.2		+10.0	39.4	43.5	-4.1	Horiz 347
^	189.866M	46.7	-26.6	+8.3	+3.2		+10.0	41.6	43.5	-1.9	Horiz 347

7	122.057M	42.2	-26.7	+11.0	+2.5	+10.0	39.0	43.5	-4.5	Verti 123
8	54.245M	43.0	-26.8	+7.3	+1.6	+10.0	35.1	40.0	-4.9	Verti 124
9	81.369M	42.7	-27.0	+6.9	+2.0	+10.0	34.6	40.0	-5.4	Verti 100
10	352.598M	37.7	-26.5	+14.3	+4.5	+10.0	40.0	46.0	-6.0	Horiz 218
11	325.478M	38.4	-26.4	+13.5	+4.3	+10.0	39.8	46.0	-6.2	Horiz 235
12	339.038M	37.3	-26.4	+13.9	+4.4	+10.0	39.2	46.0	-6.8	Horiz 218
13	352.600M	36.5	-26.5	+14.3	+4.5	+10.0	38.8	46.0	-7.2	Verti 100
14	691.608M	29.2	-27.7	+20.2	+6.7	+10.0	38.4	46.0	-7.6	Horiz 218
15	366.158M	35.4	-26.6	+14.6	+4.7	+10.0	38.1	46.0	-7.9	Horiz 218
16	433.972M	33.4	-27.1	+16.1	+5.0	+10.0	37.4	46.0	-8.6	Horiz 218
17	311.924M	36.3	-26.3	+13.2	+4.2	+10.0	37.4	46.0	-8.6	Horiz 235
18	271.232M	37.1	-26.0	+12.4	+3.8	+10.0	37.3	46.0	-8.7	Horiz 235
19	406.837M	32.9	-26.9	+15.6	+5.1	+10.0	36.7	46.0	-9.3	Horiz 218
20	298.353M	35.9	-26.2	+12.8	+4.1	+10.0	36.6	46.0	-9.4	Horiz 235
21	556.019M	29.7	-27.5	+18.4	+6.0	+10.0	36.6	46.0	-9.4	Horiz 218
22	379.722M	33.4	-26.7	+14.9	+4.9	+10.0	36.5	46.0	-9.5	Horiz 218
23	203.426M	37.8	-26.5	+8.6	+3.3	+10.0	33.2	43.5	-10.3	Horiz 347
24	488.240M	30.0	-27.3	+17.2	+5.4	+10.0	35.3	46.0	-10.7	Horiz 218
25	420.397M	31.1	-27.0	+15.8	+5.1	+10.0	35.0	46.0	-11.0	Horiz 218
26	203.415M	37.1	-26.5	+8.6	+3.3	+10.0	32.5	43.5	-11.0	Verti 100
27	474.646M	30.0	-27.3	+16.9	+5.3	+10.0	34.9	46.0	-11.1	Verti 105
28	149.170M	35.6	-26.7	+10.4	+2.8	+10.0	32.1	43.5	-11.4	Verti 100
29	67.808M	37.4	-26.8	+5.8	+1.9	+10.0	28.3	40.0	-11.7	Verti 135
30	678.027M	25.2	-27.6	+20.1	+6.6	+10.0	34.3	46.0	-11.7	Verti 123
31	135.613M	34.7	-26.7	+11.0	+2.6	+10.0	31.6	43.5	-11.9	Verti 123
32	176.295M	36.6	-26.7	+8.4	+3.0	+10.0	31.3	43.5	-12.2	Verti 100

33	569.549M	26.6	-27.6	+18.6	+6.0	+10.0	33.6	46.0	-12.4	Verti 123
34	325.472M	32.1	-26.4	+13.5	+4.3	+10.0	33.5	46.0	-12.5	Verti 140
35	257.652M	33.6	-26.0	+12.1	+3.7	+10.0	33.4	46.0	-12.6	Verti 155
36	339.039M	31.5	-26.4	+13.9	+4.4	+10.0	33.4	46.0	-12.6	Verti 140
37	40.709M	30.8	-27.0	+12.0	+1.4	+10.0	27.2	40.0	-12.8	Horiz 256
38	366.158M	30.4	-26.6	+14.6	+4.7	+10.0	33.1	46.0	-12.9	Verti 156
39	352.598M	30.7	-26.5	+14.3	+4.5	+10.0	33.0	46.0	-13.0	Verti 156
40	501.765M	27.4	-27.3	+17.4	+5.5	+10.0	33.0	46.0	-13.0	Verti 105
41	528.869M	26.6	-27.4	+17.9	+5.8	+10.0	32.9	46.0	-13.1	Verti 105
42	515.312M	26.9	-27.4	+17.7	+5.7	+10.0	32.9	46.0	-13.1	Verti 105
43	393.278M	29.4	-26.8	+15.2	+5.0	+10.0	32.8	46.0	-13.2	Horiz 218
44	488.201M	27.4	-27.3	+17.2	+5.4	+10.0	32.7	46.0	-13.3	Verti 105
45	311.920M	31.4	-26.3	+13.2	+4.2	+10.0	32.5	46.0	-13.5	Verti 140
46	461.055M	27.8	-27.3	+16.7	+5.1	+10.0	32.3	46.0	-13.7	Horiz 218
47	583.107M	25.0	-27.6	+18.8	+5.9	+10.0	32.1	46.0	-13.9	Verti 123
48	542.425M	25.4	-27.5	+18.2	+5.9	+10.0	32.0	46.0	-14.0	Horiz 218
49	257.672M	32.2	-26.0	+12.1	+3.7	+10.0	32.0	46.0	-14.0	Horiz 313
50	379.715M	28.7	-26.7	+14.9	+4.9	+10.0	31.8	46.0	-14.2	Verti 156
51	230.542M	33.8	-26.2	+10.7	+3.4	+10.0	31.7	46.0	-14.3	Verti 100
52	433.954M	27.2	-27.1	+16.1	+5.0	+10.0	31.2	46.0	-14.8	Verti 105
53	244.092M	31.9	-26.0	+11.6	+3.6	+10.0	31.1	46.0	-14.9	Verti 100
54	216.975M	34.3	-26.3	+9.7	+3.4	+10.0	31.1	46.0	-14.9	Verti 100
55	420.394M	27.0	-27.0	+15.8	+5.1	+10.0	30.9	46.0	-15.1	Verti 105
56	67.806M	33.6	-26.8	+5.8	+1.9	+10.0	24.5	40.0	-15.5	Verti 124
57	406.826M	26.4	-26.9	+15.6	+5.1	+10.0	30.2	46.0	-15.8	Verti 105
58	54.267M	31.8	-26.8	+7.3	+1.6	+10.0	23.9	40.0	-16.1	Horiz 256

59	122.057M	30.6	-26.7	+11.0	+2.5	+10.0	27.4	43.5	-16.1	Horiz 278
60	298.360M	29.1	-26.2	+12.8	+4.1	+10.0	29.8	46.0	-16.2	Verti 140
61	461.086M	24.4	-27.3	+16.7	+5.1	+10.0	28.9	46.0	-17.1	Verti 105
62	216.987M	31.8	-26.3	+9.7	+3.4	+10.0	28.6	46.0	-17.4	Horiz 347
63	271.227M	28.1	-26.0	+12.4	+3.8	+10.0	28.3	46.0	-17.7	Verti 155
64	162.735M	29.5	-26.7	+9.8	+2.9	+10.0	25.5	43.5	-18.0	Verti 100
65	135.617M	28.5	-26.7	+11.0	+2.6	+10.0	25.4	43.5	-18.1	Horiz 278
66	149.177M	28.1	-26.7	+10.4	+2.8	+10.0	24.6	43.5	-18.9	Horiz 278
67	230.547M	26.0	-26.2	+10.7	+3.4	+10.0	23.9	46.0	-22.1	Horiz 347