

TEST REPORT

Report Number: 3137283MPK-002

Project Number: 3137283

September 16, 2008

Testing performed on the
Eye Laser System with RF ID
Model Number: Corona System
FCC ID: UDB65600

to

FCC Part 15.225

For

Iridex Corp.

Test Performed by:

Intertek Testing Services
1365 Adams Court
Menlo Park, CA 94025

Test Authorized by:

Iridex Corp.
1212 Terra Bella Ave.
Mountain View, CA 94043

Prepared by:



Krishna Vemuri

Date: 9/16/2008

Reviewed by:



Suresh Kondapalli

Date: 9/16/2008

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1.0 Summary of Tests

MODEL: Corona System
DESCRIPTION: Eye Laser System with RF ID
FCC ID: UDB65600

TEST	REFERENCE	RESULTS
Radiated Emissions in the band	15.225(a)	Complies
Occupied Bandwidth	15.215(c)	Complies
Radiated Emissions out of the band	15.225(d)	Complies
AC Line Conducted Emissions	15.207	Complies
Frequency Tolerance	15.225(e)	Complies
Antenna Requirement	15.203	Complies



Krishna Vemuri, Test Engineer

Date: 9/16/2008



Suresh Kondapalli, EMC Team Leader

Date: 9/16/2008

2.0 General Description

2.1 Product Description

Overview of the EUT

Applicant	Iridex Corp. 1212 Terra Bella Ave Mountain View, CA 94043
Trade Name & Model No.	Iridex Corp. / Corona System
FCC Identifier	UDB65600
Use of product	RFID Tag reader
Transmitter activation	Transmitter activated automatically when RFID tag is placed in the port
Frequency Range (MHz)	13.56 MHz
Antenna Requirement	The EUT uses a permanently connected antenna. The antenna is a loop trace on PCB tuned for 13.56MHz.

A production version of the EUT was received on August 20, 2008 in good operating condition

Test Start Date: August 20, 2008

Test End Date: August 21, 2008

2.2 Related Submittal(s) Grants

This report is for use with an application for certification of a low power transmitter. One transmitter is included in the application.

2.3 Test Methodology

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4. Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Data Sheet**" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

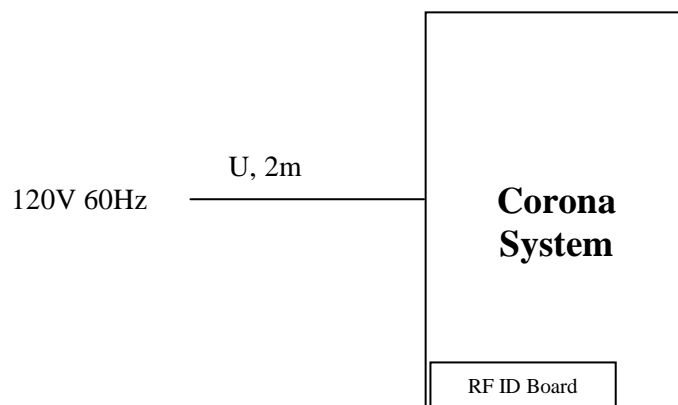
The 10 meter Semi Anechoic test site was used for Radiated and conducted measurements. This test facility and site measurement data have been fully placed on file with the FCC and A2LA accredited.

3.0 System Test Configuration

3.1 Support Equipment and description

None.

3.2 Block Diagram of Test Setup



S = Shielded U = Unshielded	F = With Ferrite M = Length in Meters
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3.3 Justification

For emission testing, the test procedures, as described in American National Standards Institute C63.4, were employed. The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it).

During testing, all cables were manipulated to produce worst case emissions.

If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power.

3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. For emissions testing, the unit was setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

3.5 Mode of Operation During Test

RF ID continuously transmitting.

3.6 Modifications Required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance (Please note that this does not include changes made specifically by Iridex prior to compliance testing).

3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusions from the standard were made.

4.0 Measurement Results

4.1 Section 15.225(a)(b)(c) Radiated Emissions

Limits

The field strength of any emissions shall not exceed

In the band:

13.553–13.567 MHz	84.0 dBuV/m	at 30 meters
13.410–13.553 MHz	50.4 dBuV/m	at 30 meters
13.567–13.710 MHz	50.4 dBuV/m	at 30 meters
13.110–13.410 MHz	40.5 dBuV/m	at 30 meters
13.710–14.010 MHz	40.5 dBuV/m	at 30 meters

All emissions outside side the band:

<13.110–14.010> MHz	< Limits specified in section 15.209
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Procedure for below 30 MHz

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003. The test was performed at 10 meter distance and its result was converted into the one at specified 30 meter distance according to 15.31(f). The turntable was rotated and the center point of the loop antenna was fixed at 1 meter above ground level to investigate the maximum radiated emission.

Procedure for above 30 MHz

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003. The test was performed at 3 meter distance. During the test the EUT is rotated and the antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Analyzer resolution

10 kHz for frequencies below 30 MHz
120 kHz for frequencies between 30 MHz and 1000 MHz
1 MHz for frequencies above 1000 MHz

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follows:

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength in dB (μ V/m)

RA = Receiver Amplitude (including preamplifier) in dB (μ V)

CF = Cable Attenuation Factor in dB

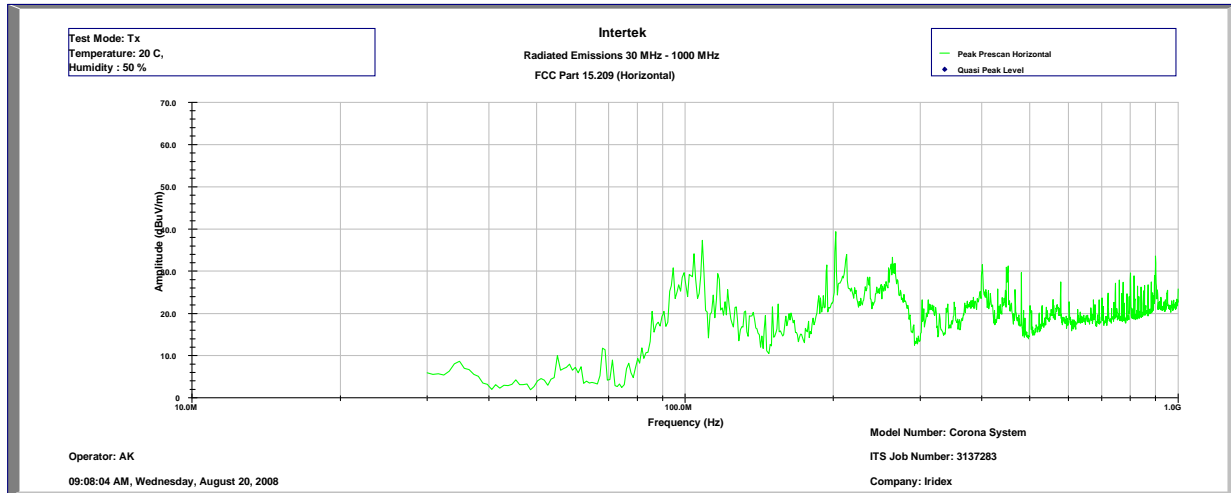
AF = Antenna Factor in dB(1/m)

AG = Amplifier Gain in dB

Radiated Emissions Below 30 MHz

Freq MHz	SA Reading dBuV	Ant Factor+ Preamp Gain dB	Distance Factor dB	Cable Loss dB	Field strength dBuV/m	Limit dBuV/m @ 30m	Margin dB	Measure Distance
13.56	55.2	23.6	-20	1.0	59.8	84.0	-24.2	@10m
27.12	16.4	22.7	-20	1.0	20.1	29.5	-9.4	@10m

Radiated Emissions 30 MHz to 1GHz



Intertek

Radiated Emissions 30 MHz - 1000 MHz

FCC part 15.209 (QP-Horizontal)

Operator: AK

August 20, 2008

Model Number: Corona System

ITS Job Number: 3137283

Company: Iridex

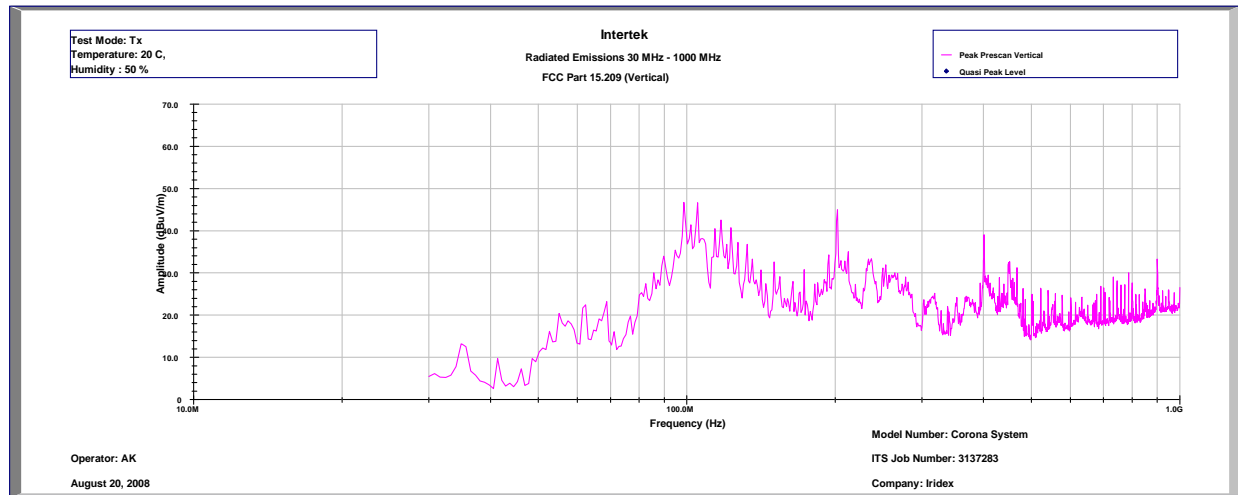
Frequency	Quasi Pk FS	Limit@3m	Margin	RA	CF	AG	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB(1/m)
1.09E+08	26.6	43.5	-16.9	51.8	1.1	32	5.7
2.00E+08	37.6	43.5	-5.9	58.5	1.5	32	9.6

Test Mode: Tx

Temperature: 20 C,

Humidity : 50 %

Radiated Emissions 30 MHz to 1GHz



Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC part 15.209 (QP-Vertical)
Operator: AK

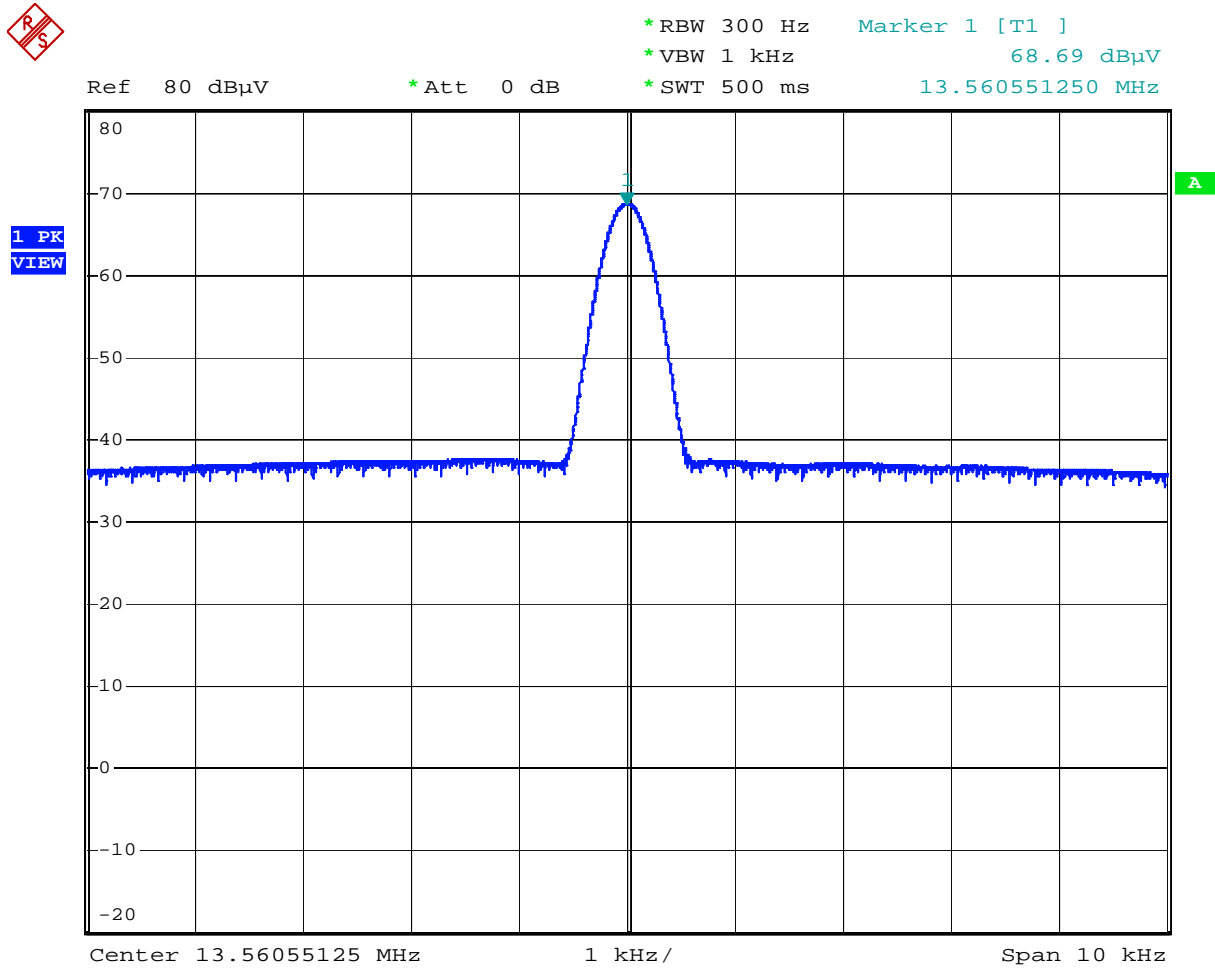
August 20, 2008

Model Number: Corona System
ITS Job Number: 3137283
Company: Iridex

Frequency	Quasi Pk FS	Limit@3m	Margin	RA	CF	AG	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB(1/m)
9.72E+07	39.6	43.5	-3.9	64.5	1	32	6.1
1.01E+08	39.1	43.5	-4.4	64.1	1	32	6
1.04E+08	33.5	43.5	-10.0	58.7	1	32	5.8
1.07E+08	32.0	43.5	-11.5	57.2	1.1	32	5.7
1.13E+08	35.9	43.5	-7.6	61.2	1.1	32	5.6
1.16E+08	33.3	43.5	-10.2	58.6	1.1	32	5.6
1.19E+08	43.1	43.5	-0.4	68.3	1.1	32	5.7
1.21E+08	41.0	43.5	-2.5	66.0	1.1	32	5.9
2.00E+08	43.0	43.5	-0.5	63.3	1.5	32	10.2

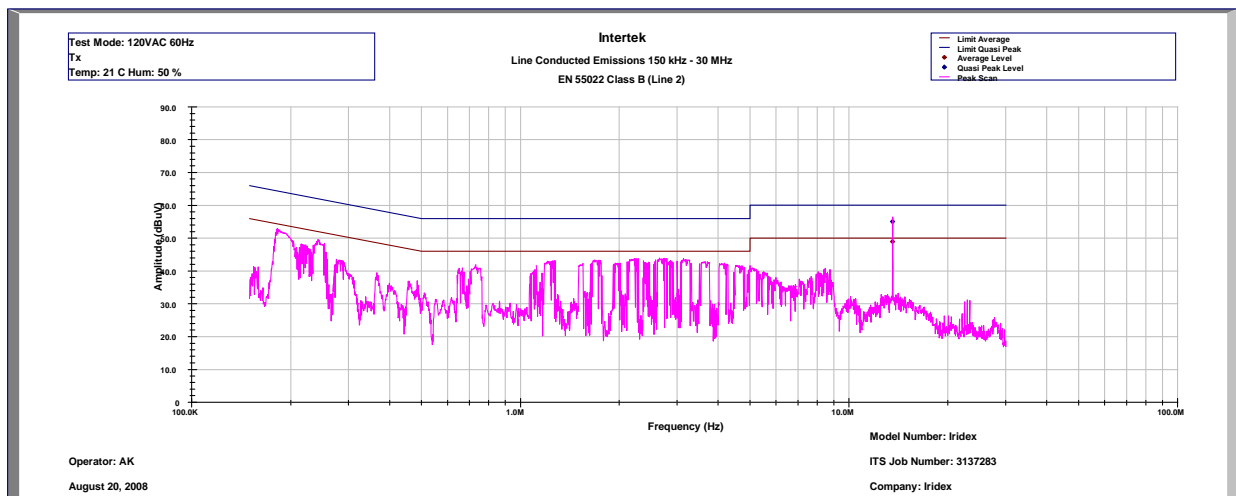
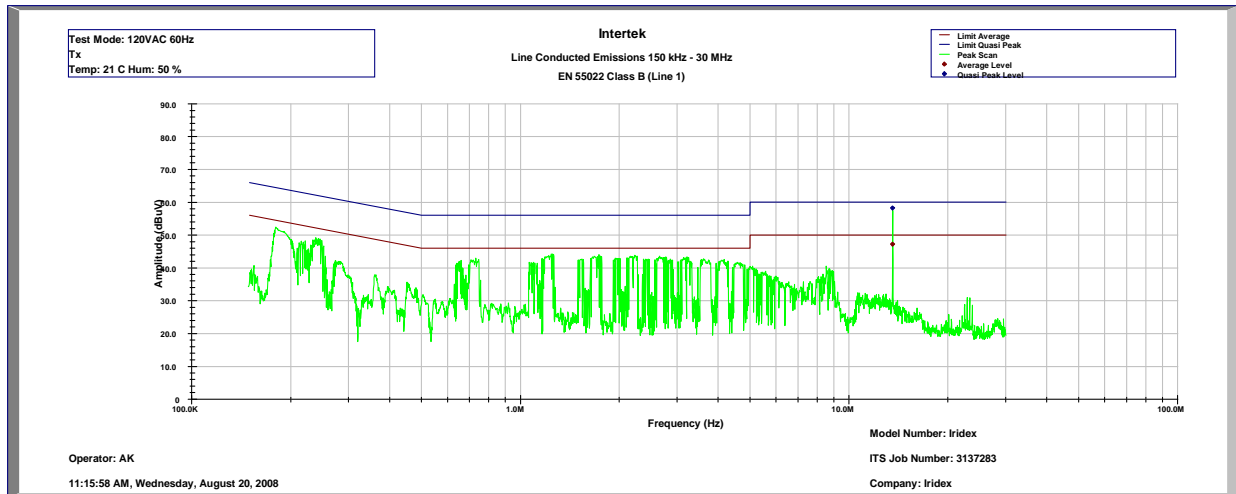
Test Mode: Tx
Temperature: 20 C,
Humidity : 50 %

4.2 Section 15.215(c) 20dB Bandwidth



4.3 Section 15.207 AC Line Conducted Emission

AC line conducted emission test was performed according the ANSI C63.4 standard.
A complete scan from 0.15 - 30 MHz was made.



Complies by 1.5 dB at 27.12 MHz

4.4 Section 15.225 (e) Frequency Tolerance

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Nominal Voltage: 120V

Nominal Frequency: 13.56

Temperature Deg C	Measured frequency MHz	Deviation %
-20	13.560664	0.0049
-10	13.560515	0.0038
0	13.560542	0.0040
10	13.560474	0.0035
20	13.560583	0.0043
30	13.560501	0.0037
40	13.560528	0.0039
50	13.560569	0.0042

Voltage	Measured frequency MHz	Deviation %
102V	13.560610	0.0045
138V	13.560488	0.0036



5.0 Antenna Requirement

The transmitter uses a permanently connected antenna. The EUT complies with FCC rule part 15.203.



6.0 List of Test Equipment

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	10/02/08
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	10/02/08
BI-Log Antenna	EMCO	3143	9509-1160	12	9/05/08
Pre-Amplifier	Sonoma	310N	185634	12	9/26/08
LISN	FCC	FCC-LISN-50-50-M-H	2011	12	9/05/08
Loop Antenna	EMCO	6512	1029	12	6/04/09

7.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 3137283	KK	September 16, 2008	Original document