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Amended Test Report

Report includes NCEE Labs Report R20120430-21A in full and its amendment

Client: **Coble Geophysical Services,**
P.O. Box 1637
Homer, Alaska 99603-1637

EUT: **IralukCeta 2012 Field Identification Tag Reader**

Test Report No.: **R20120430-21B**

FCC ID: **AYS-IRALUKCETA**

Approved By:

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Date: **29 November 2012**

Total Pages: **11**

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ACCREDITED
Test Laboratory Certificate 1953.01

Revision Page

Rev. No.	Date	Description
Original	5/16/2012	Original - NJohnson
A	10/8/2012	Data from 100kHz to 30MHz was measured again with additional preamplifier and vertical/horizontal axis loop antenna positions. Clarification was added regarding measurement distances and limit extrapolation. -NJohnson
B	11/29/2012	The notes on Tables 3 and 4 were corrected to reflect the correct extrapolation calculations, test distances and limits. Peak measurements were also included for radiated emissions tests from 100kHz to 30MHz. Clarification was added to how the fundamental values were calculated. Measurements from 100kHz to 30MHz were repeated because quasi-peak values were being recorded higher than the peak values. It appeared that the preamplifier was being saturated when the receiver attenuation was turned down. Measurements were repeated with 10dB of attenuation on the front end of the preamplifier. The measurement of the fundamental field strength was reported from the bandwidth calculations with a bandwidth correction factor added.

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1 Summary of Test Results

1.1 Emissions Test Results

The EUT was tested for compliance to The US Code of Federal Regulations, Title 47, Part 15 according to ANSI C63.4:2003 and ANSI C63.4:2009. Below is a summary of the test results. Complete results of testing can be found in Section 3.

Table 1 - Emissions Test Results

Emissions Tests	Test Method and Limits	Result
Radiated Emissions	FCC Part 15.109	Complies

2 EUT Description

The Equipment Under Test (EUT) was a Geophysical Instrument from Coble Geophysical services. The EUT tested was IralukCeta 2012 Field Identification Tag Reader.

2.1 Equipment under Test (EUT)

Table 2 - Equipment under Test (EUT)

Identification	AYS-IralukCeta
Manufacturer	Coble Geophysical Services
Model	IralukCeta
Serial Number	NCEE Test 1
EUT Received Date	5/16/2012
EUT Tested Date	5/16/2012 11/1/2012*

*Repeated testing from 100kHz to 30MHz with loop antenna in 3 axis. Peak and quasi-peak measurements were repeated with a preamplifier and 10dB of attenuation on the front end of the preamplifier.

2.2 Testing Location

All testing was performed at the NCEE Lincoln facility, which is an A2LA accredited EMC test laboratory accredited per scope 1953.01.

2.3 EUT Setup

The EUT was tested while a Pit Tag was hanging to the antenna housing to keep it transmitting. The EUT was powered by a 12VDC battery.

3 Test Results

3.1 Radiated Emissions

Test: FCC Part 15.209

Test Specifications: Class B

Test Result: Complies Date: 6/21/2012, 10/8/2012

3.1.1 Test Description

Radiated emissions measurements were made from 100kHz to 30mHz at a distance of 3 m inside a semi-anechoic chamber. The EUT was rotated 360^{o}, the antenna height varied from 1 – 4 meters in all 3 axis (X, Y, Z). The results were compared against the limits published in FCC Part 15.109. Measurements were made by first using a spectrum analyzer to acquire the signal spectrum; individual frequencies were then measured using a CISPR 16.1 compliant receiver with the following bandwidth setting:

100kHz – 30MHz, 9kHz IF bandwidth, 3kHz steps

Radiated emissions measurements were made from 30MHz to 1GHz at a distance of 3 m inside a semi-anechoic chamber. The EUT was rotated 360^{o}, the antenna height varied from 1 – 4 meters and both the vertical and horizontal antenna polarizations examined. The results were compared against the limits published in FCC Part 15.109. Measurements were made by first using a spectrum analyzer to acquire the signal spectrum; individual frequencies were then measured using a CISPR 16.1 compliant receiver with the following bandwidth setting:

30MHz – 1GHz: 120kHz IF bandwidth, 60kHz steps

3.1.2 Test Results

No radiated emissions measurements were found in excess of the limits. Test result data can be seen below.

3.1.3 Test Environment

Testing was performed at the NCEE Labs Lincoln facility in the 10m semi-anechoic chamber. Laboratory environmental conditions varied slightly throughout the test:

Relative humidity of 33 ± 5%

Temperature of 22 ±2^{o} C

3.1.4 Test Setup

See Section 2.3 for further details.

3.1.5 Test Equipment Used

Serial No.	Manufacturer	Model	Description	Last Cal.
1654	EMCO	3142B	Bicon Antenna	6 Jan 2012
100037	Rhode & Schwarz	ES126	EMI Test Receiver	27 Sep 2011
2575	Rohde & Schwarz	ES-K1	Software v.1.60	N/A
00024936	EMCO	6512	Standard loop	5 January 2012
920203	EMCO	7405-907B	100kHz to 3GHz PA	16 May 2012*

*Internally characterized

3.1.6 Test Pictures and/or Figures

Figure 1 - Radiated Emissions Test Setup

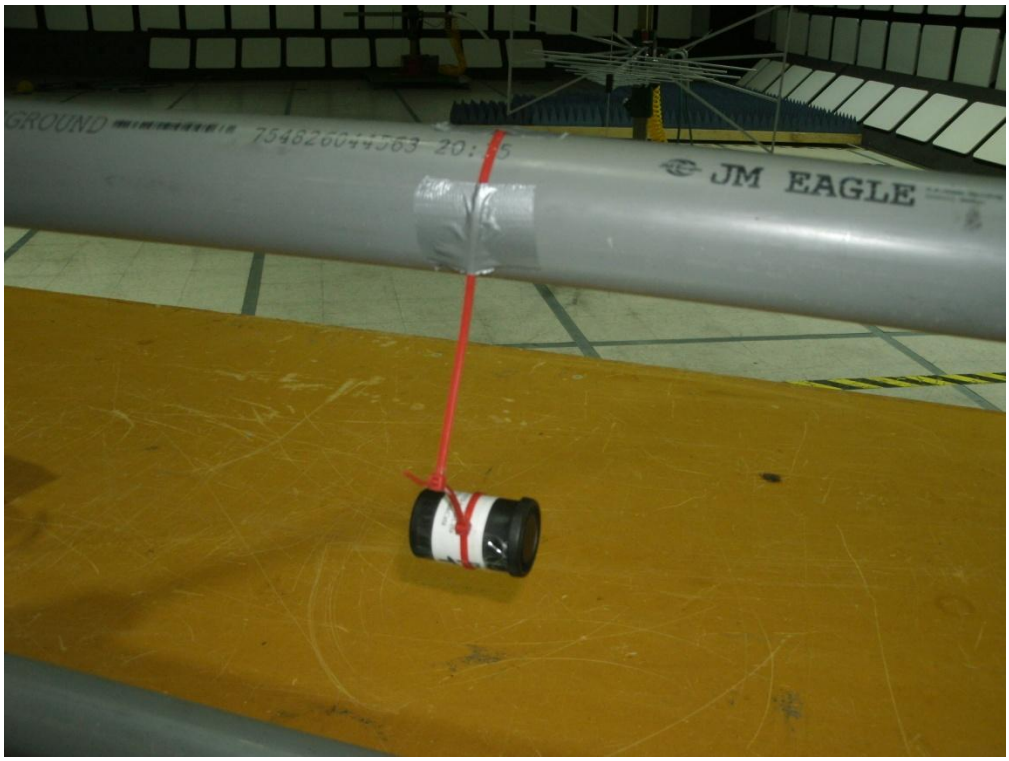

Figure 2 - Radiated Emissions Test Setup

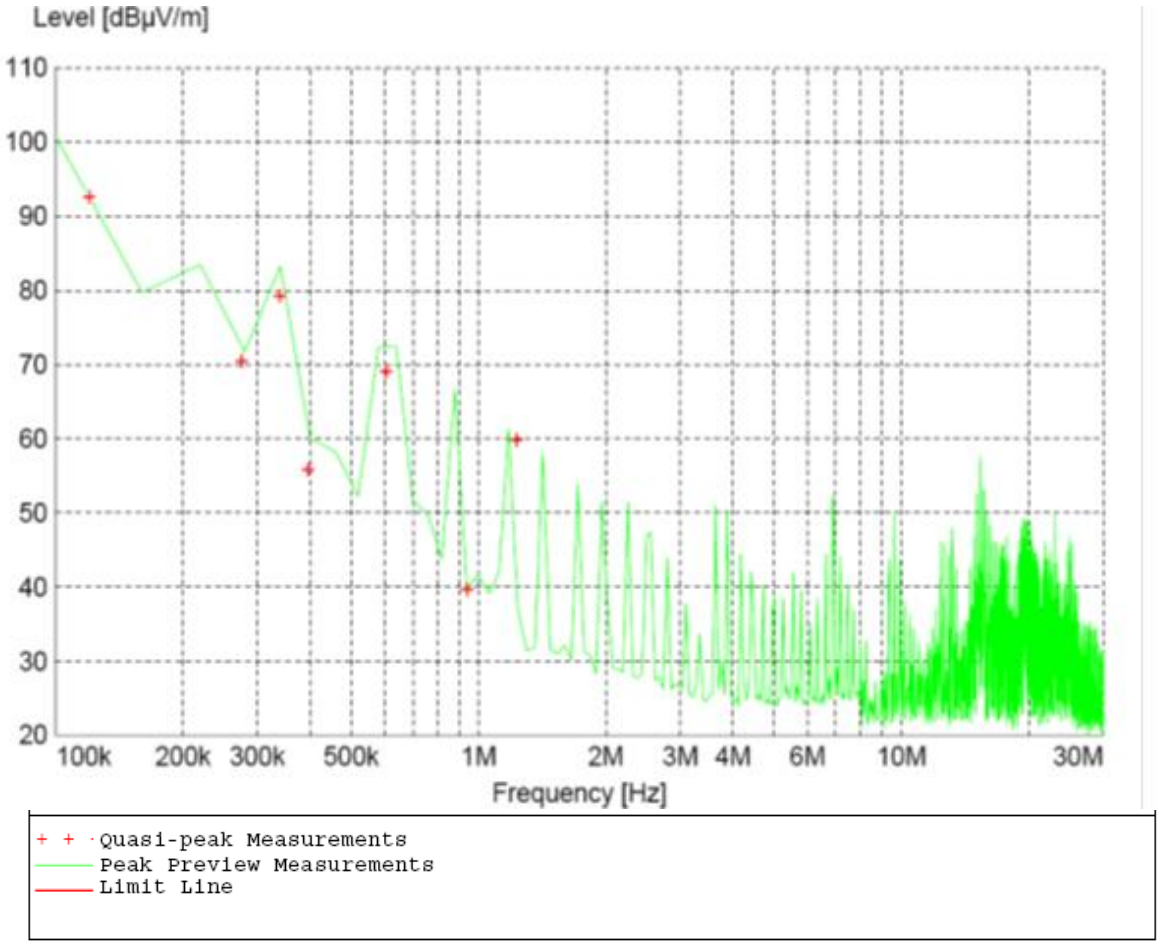

Figure 3 - Radiated Emissions Data Plot

Plot shows worse case axis at each frequency (composite maximum of all three sweeps)

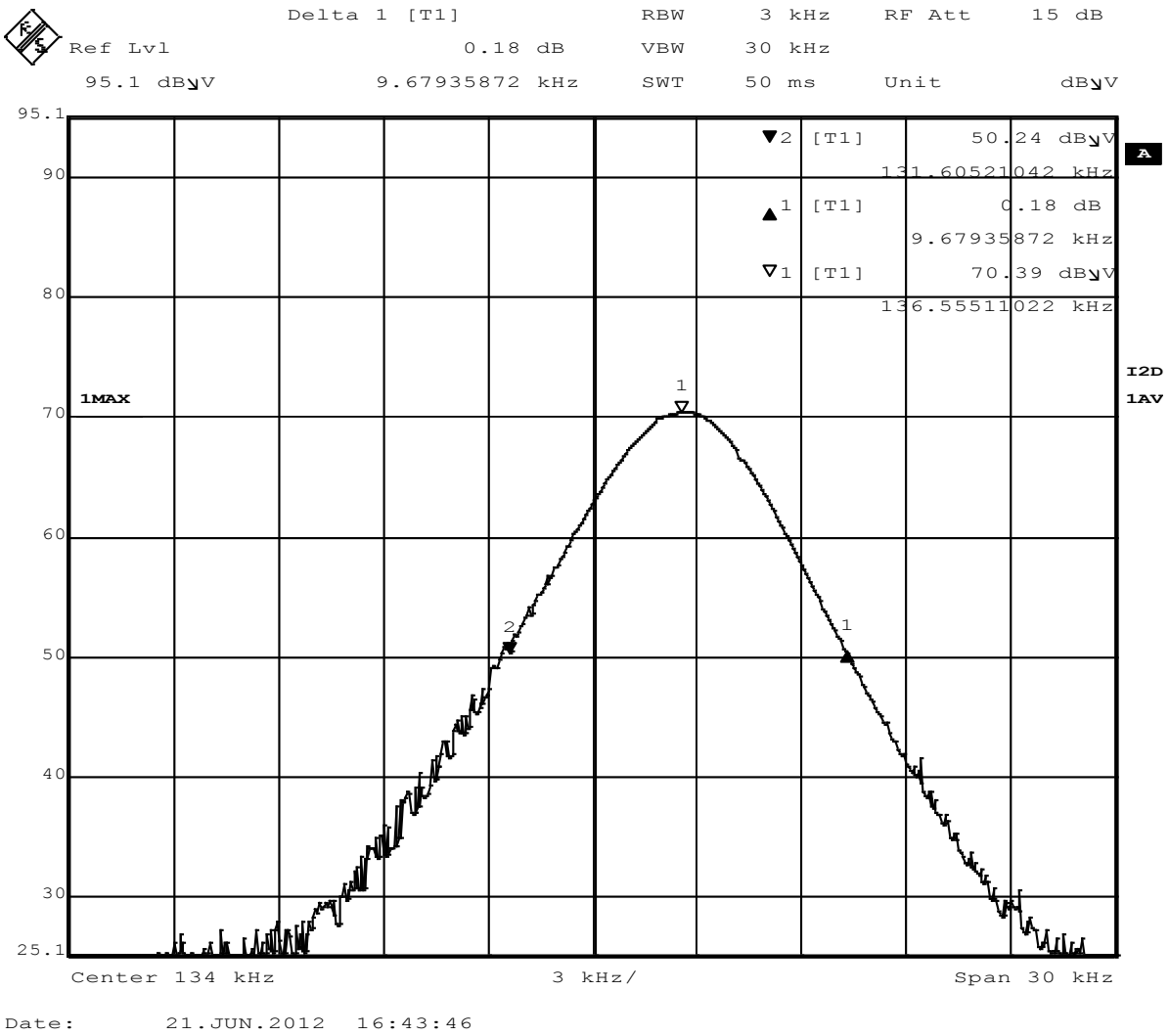

Figure 4 - 20dB Bandwidth, 9.68kHz
Plot shows uncorrected values

Antenna factor at 135kHz for loop antenna at 3m = 12.35 dB
Bandwidth correction factor from 3kHz to 9kHz = 9.54
Corrected value = 92.28 dBµV/m
No preamp was used for measurement of the fundamental

Table 3- Radiated Emissions Worst-Case Quasi-Peak Data
3m Test Distance, Limits extrapolated from 300m limits in FCC Part 15.209
Limit at 3m = (Limit at 300m) + 40Log(3/300)
3m Test Distance

Frequency	Level	Limit	Margin	Height	Angle	Axis
MHz	dBµV/m	dBµV/m	dB	cm	deg	
0.135000	92.28*	105.00	12.72	100	364	X
0.275000	70.42	98.82	28.40	100	127	Y
0.339000	79.23	97.00	17.77	100	123	X
0.395000	55.79	95.67	39.88	100	55	X
0.605000	69.06	71.97	2.91	100	23	X
0.940000	39.62	68.14	28.52	100	300	X

X=loop plane perpendicular to EUT Y=loop plane in line with EUT Z=loop plane facing up

*Note: Measurement was taken from Figure 5 above. The measurement is presented as a peak value and is below the quasi-peak limits. It was performed on 6/21/2012. All other measurements were performed on 10/8/2012.

All quasi-peak measurements were repeated on 10/8/2012 with a preamplifier and 20dB of attenuation on the front end.

Table 4 – Radiated Emissions Worst-Case Peak Data
3m Test Distance, Limits extrapolated from 300m limits in FCC Part 15.209
Limit at 3m = (Limit at 300m) + 40Log(3/300)
3m Test Distance, table shows 10 points with the least margin

Frequency	Level	Limit	Margin	Angle	Height	Axis
MHz	dBµV/m			deg	cm	
0.100000	100.75	107.60	6.854225	160	100	X
15.079960	52.6	64.03	11.43622	0	100	X
15.379559	57.63	63.87	6.235347	348	100	X
15.619238	53.18	63.73	10.55103	9	100	X
15.679158	53.17	63.68	10.52777	9	100	X
19.454108	49.17	61.82	12.654	0	100	X
19.633868	48.88	61.74	12.86411	0	100	X
19.753707	49.00	61.69	12.69125	160	100	X
23.049299	49.98	60.35	10.37107	119	100	X
24.966733	46.85	59.66	12.80699	0	100	X

Quasi-peak measurements were compared to the peak limit.

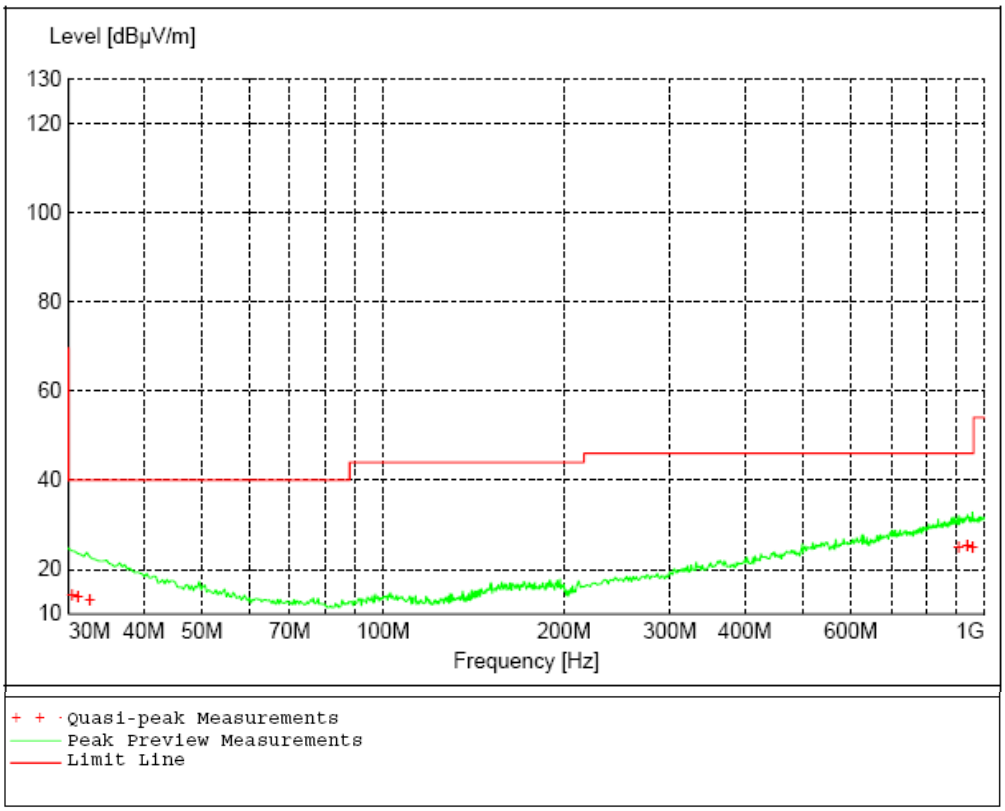

Figure 5 - Radiated Emissions Data Plot

Table 5- Radiated Emissions Quai-Peak Data
3m Limits and test distance

Frequency	Level	Limit	Margin	Height	Angle	Polarity
MHz	dBµV/m	dBµV/m	dB	cm	deg	
30.420000	14.26	40.00	25.70	100	101	VERT
31.080000	13.89	40.00	26.10	200	159	VERT
32.520000	13.19	40.00	26.80	325	45	HORI
907.080000	24.78	46.00	21.20	294	50	HORI
937.500000	25.14	46.00	20.90	400	217	HORI
1000.000000	33.19	49.50	16.30	211	305	VERT