Product Integrity Laboratory

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Certification Test Report

CFR 47 FCC Part 15, Subpart C Section 15.225
Industry Canada RSS 210, Issue 5

Wireless Dynamics Inc.
FCC ID # SHFSDID1010
IC ID # 5998A-SDID1010

Project Code CG-129

(Report CG-129-1)

Revision: 1

July 22, 2005

Prepared for:	Wireless Dynamics Inc.
Author:	Kuganesan Pararajasingam EMC Engineer
Approved by:	Nick Kobrosly Director of Operations

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Report Summary

NTS Canada

Product Integrity Laboratory
5151-47th Street, N.E. Calgary Alberta T3J 3R2

Accreditation Numbers: FCC 101386
IC 46405-3978 File # IC3978-2
Standards Council of Canada Accredited Laboratory No. 440

Performed For: Wireless Dynamics Inc.
220, 3636-23rd Street NE
Calgary, T2E8Z5
Canada

Customer Representative: Carlos Aguirre Charo
RF Engineer

EUT Description:

EUT Description	Manufacturer	Model	Revision	Serial Number
13.56 MHz SDID Card	Wireless Dynamics Inc.	SDID1010	A	01, 02

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Test Summary

Appendix	Test/Requirement Description	Deviations* from:			Pass / Fail	Applicable Rule Parts
		Base Standard	Test Basis	NTS Procedure		
A	Radiated E-Field Emissions 30 MHz – 1 GHz	No	No	No	PASS	FCC 15.209, RSS 210 6.2.2 e, 6.3
B	Conducted Voltage Emissions 150 kHz – 30 MHz AC Power Leads	No	No	No	PASS	15.207, RSS 210 Section 9, 6.6
C	Radiated H-Field Emissions 9 kHz – 30 MHz	No	No	No	PASS	FCC 15.209 , 15.225, RSS 210 Section 6.2.2 e, 6.3
D	Frequency Stability	No	No	No	PASS	FCC 15.225, RSS 210 Section 6.4

Test Result: The product presented for testing complied with test requirements as shown above.

Digitally signed by Kuganesan Pararajasingam
DN: CN = Kuganesan Pararajasingam, C = CA, O = NTS, OU = EMC
Date: 2005.07.25 17:02:24 -06'00'

Prepared By: _____
Kuganesan Pararajasingam
EMC Engineer

Checked By: _____
Glen Moore
EMC Manager

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REGISTER OF REVISIONS

Revision	Date	Description of Revisions
0	July 21, 2005	Draft release for review
1	July 22, 2005	

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Canada to demonstrate compliance of the SDID1010-3-2 from Wireless Dynamics Inc. to FCC Part 15 Subpart C section 15.225 for Intentional Radiator and the equivalent sections of Industry Canada's RSS 210 Issue 5

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

Description of EUT

	Name	Model	Revision	Serial Number
EUT	SDID Card	SDID1010		01, 02
Classification	Low Power Transmitter			
Size (m)	NA			
Weight	NA			
Power	3VDC			
Description	13.56 MHz RFID Reader			

2.2 MODE OF OPERATION

The SDID1010 was tested while in a Reader/Writer mode with worst case results reported. For Radiated emissions the EUT was checked in three orthogonal planes with worst case results reported. The EUT was also check at the three available data rates for worst case. For testing purposes the SDID card was plugged into an extender board to present a worst case emissions signature (no shielding from host system).

3.0 SUPPORT EQUIPMENT

3.1 CONFIGURATION

All support equipment information was supplied by the client and was not verified by NTS.

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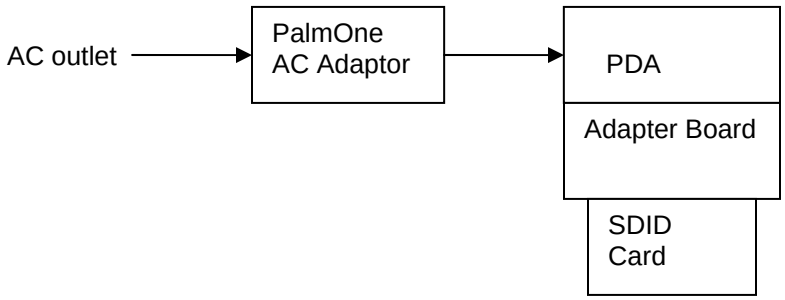

Note : To present the worst case test configuration an extender board (passive) was used to expose the SDID1010 card, so that the emission level would not be dependent on the shielding of this device.

PDA

Position	Qty	Model #	P/N	Serial Number
10m Support Room	1	Zire72 Palm1	NA	00V9A7C456RN

PalmOne AC Adaptor

Position	Qty	Description	P/N	Serial Number
10m Support Room	1	R3W005-500	163-5877B-US	NA

Adaptor Board

Position	Qty	Description	P/N	Serial Number
10m Support Room	1	SD Extend 300	NA	F100061RevA

3.2 CABLES

Support Cable List

Quantity	Model	Routing		Description	Cable Length (m)
		From	To		
1	Power	PalmOne AC Adaptor	PDA	Unshielded	0.9
1	Power	AC Mains	PalmOne AC Adaptor	Unshielded, Permanent connection to power supply	1.8

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APPENDICES

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APPENDIX A: RADIATED EMISSIONS 30 MHZ – 1 GHZ

A.1. Base Standard & Test Basis

Base Standard	CFR Title 47 – Telecommunications, Chapter I - FCC Part 15.209 – Radio Frequency Devices
Test Basis	ANSI C63.4 - 2003 Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Test Method	NTS Radiated Emissions Test Method E001R7

A.2. Specifications

Frequency	**FCC Part 15 10-m Limit (Quasi-Peak)**
MHz	**dBµV/m**
30 - 88	29.54
88 - 216	33.06
216 - 960	35.56
960 - 1000	43.52

Notes: Limit extrapolated from 3m using 10m Limit = 3m Limit – 20 * $\log_{10}(10/3)$

A.3. Measurement Uncertainty

Radiated Emissions 30 MHz – 1 GHz	**Measurement Uncertainty**	**Expanded Uncertainty (K=2)**
(dB)	+2.32/-2.36	+4.65/-4.72

A.4. Deviations

Deviation Number	**Time & Date**	**Description and Justification of Deviation**	**Deviation Reference**			**Approval**
			Base Standard	**Test Basis**	**NTS Procedure**	
none						

A.5. Test Method

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable. The emission levels were maximized by rotating the turntable through 360 degrees, a measurement antenna was positioned at a distance of 10meters as measured from the closest point of the EUT, and scanned from 1-4 meters.

A spectrum analyzer with peak detection was used to find the maximum field strength during the scans. The EUT was tested in 3 orthogonal planes, with the worst case results being reported.

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Test Results

Compliant. The worst case emission level at 10m was 27.02dBμV/m at 287.51MHz with a margin of 8.54dB.

A.6. Sample Calculation

Emission Level = Measured Level + Correction Factors
Margin = Limit – Emission Level

A.7. Test Data

Product Integrity Laboratory V2.5

Project Number:	CG-129	**Tester:**	Stephen Ching
Model:	SDID1010 Wireless Dynamic Inc.	**Test ID:**	RE02c-10m-05-129
Comments:	Conf08:Zire72, adaptor board, SDID1010-3-2,120VAC Power supply, PDA on back position		

Standard	FCC15_B	Measurement Distance	10	meters

Antenna	CL	Frequency	AF	CL+LNA	Total CF	Detector	Measured Value	Corrected Value	Limit	Margin	Mast Height	Turntable Angle
Horizontal		MHz	dB/m	dB	dB/m		dBuV	dBuV/m	dBuV/m	dB	cm	degrees
2701 RX BiCon Hpol	10M Total Link Factor	275.28	12.50	-23.22	-10.72	QP	35.98	25.26	35.56	**10.30**	267.8	193.9
2701 RX BiCon Hpol	10M Total Link Factor	287.51	13.19	-23.16	-9.97	QP	36.99	27.02	35.56	**8.54**	302.1	187.3
2701 RX BiCon Hpol	10M Total Link Factor	446.56	16.87	-23.52	-6.65	QP	29.75	23.10	35.56	**12.46**	159.0	173.6
Vertical												
2701 RX BiCon Vpol	10M Total Link Factor	54.01	6.80	-25.63	-18.83	QP	31.51	12.68	29.54	**16.87**	400.0	138.8
2701 RX BiCon Vpol	10M Total Link Factor	58.50	6.90	-25.58	-18.68	QP	29.88	11.20	29.54	**18.35**	187.3	323.8
2701 RX BiCon Vpol	10M Total Link Factor	287.51	13.60	-23.16	-9.56	QP	33.72	24.16	35.56	**11.40**	95.4	92.1

Positive Margin indicates a Pass

A.8. Tested By

This testing was conducted in accordance with the ISO 17025:1999 scope of accreditation, table 1; Quality Manual.
Name: Stephen Ching
Function: EMC Technician

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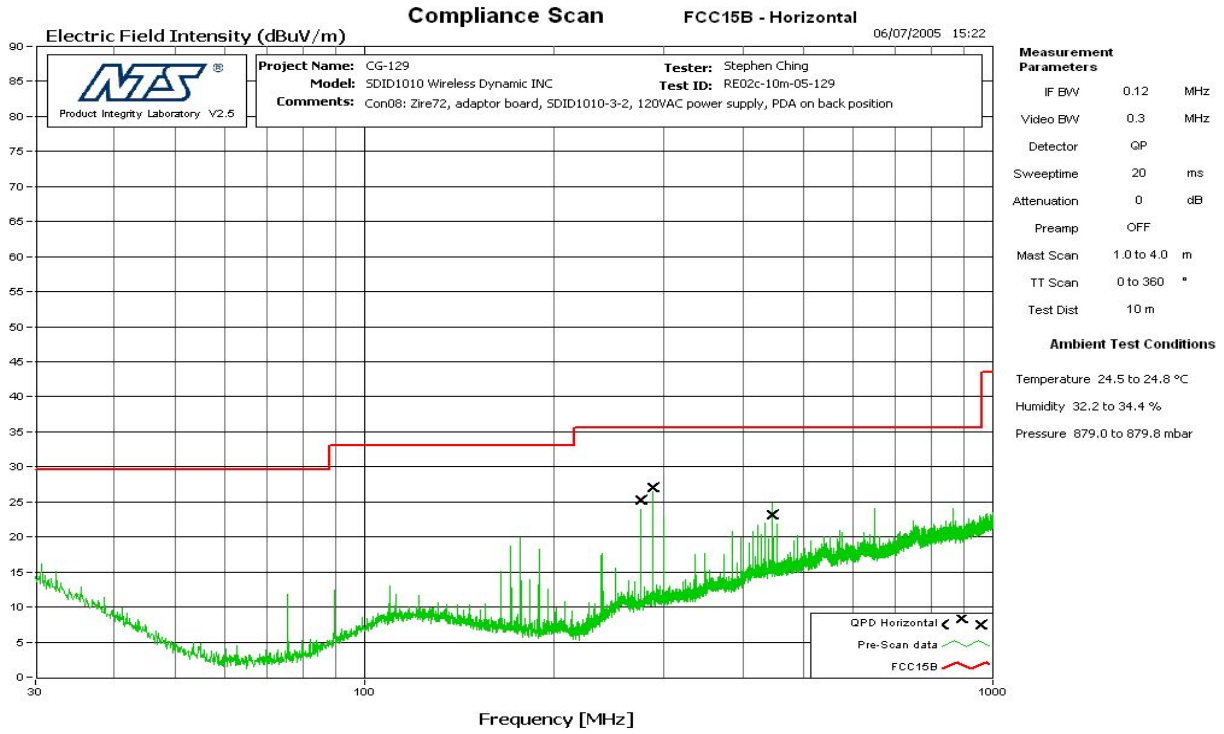

Figure 1 RE - Horizontal – 30 MHz – 1 GHz

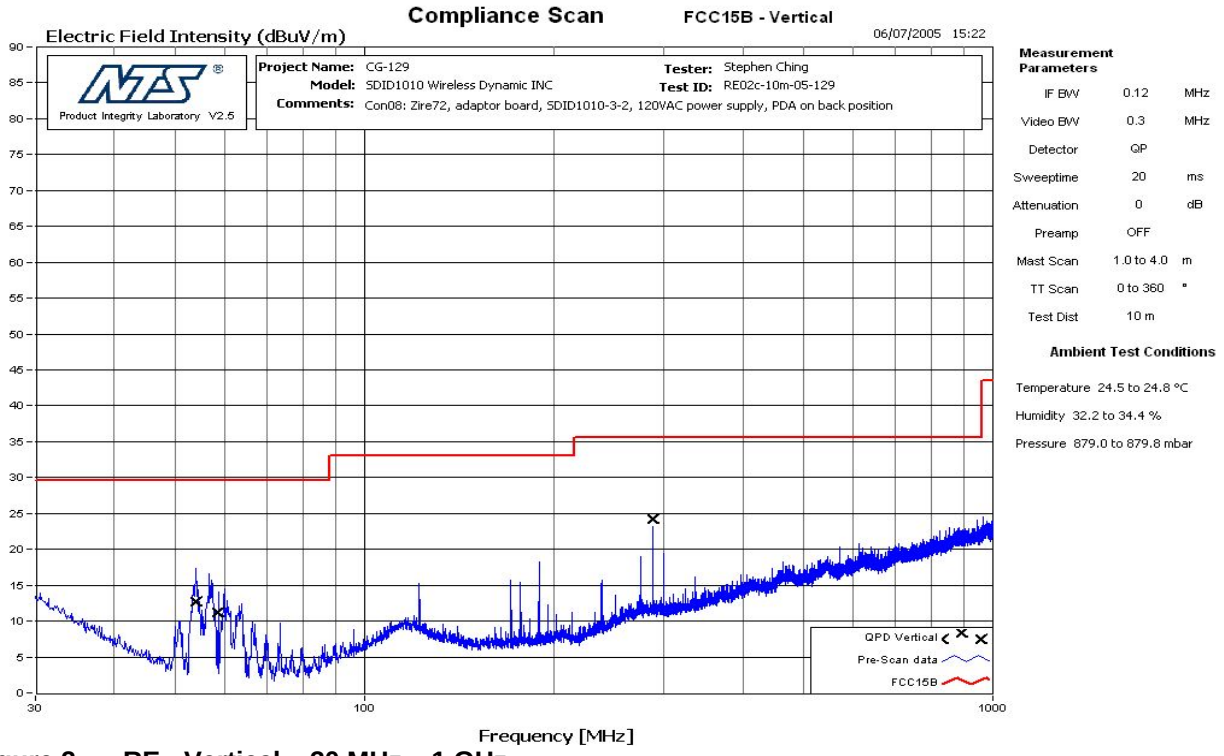

Figure 2 RE - Vertical – 30 MHz – 1 GHz

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APPENDIX B: CONDUCTED EMISSIONS 150 KHZ – 30 MHZ

B.1. Base Standard & Test Basis

Base Standard	CFR Title 47 – Telecommunications, Chapter I - FCC Part 15.207 – Radio Frequency Devices, RSS 210 Issue 5 Section 9
Test Basis	ANSI C63.4 - 2003 Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Test Method	NTS Conducted Emissions Test Method E011R1

B.2. Specifications

Frequency	**Limit**	
	Quasi-Peak	**Average**
MHz	**dBµV**	**dBµV**
0.150 – 0.500	66 to 56[1]	56 to 46[1]
0.500 – 5.00	56	46
5.00 – 30.00	60	50

Note 1: decrease with the logarithm of the frequency

B.3. Measurement Uncertainty

Conducted Current Emissions 150 kHz – 30 MHz	**Measurement Uncertainty**	**Expanded Uncertainty (K=2)**
(dB)	+1.21/-1.33	+2.41/-2.66

B.4. Deviations

Deviation Number	**Time & Date**	**Description and Justification of Deviation**	**Deviation Reference**			**Approval**
			Base Standard	**Test Basis**	**NTS Procedure**	
none						

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B.5. Test Results

Compliant. The worst case emission level was 25.07dBμV at 0.46MHz with a margin of 21.70dB.

B.6. Sample Calculation

Correction Factor = LISN Correction Factor + Cable Loss
Corrected Value = Measurement + Correction Factor
Margin = Limit – Corrected Emission Level

B.7. Test Data

Product Integrity Laboratory V2.5

Project Name: CG-129 **Tester:** Stephen Ching
Model: SDID1010-3-2 Wireless Dynamic Inc. **Test ID:** CE02c-10m-129
Comments: Conf10: Zire72, Adaptor board, SDID1010-3-2, 120VAC Power Supply, 106kbps, PDA on left side position

Standard: FCC15_B

Voltage/Line	LISN/Lead	Frequency	Measurement Detector	Measured Value	CF	Corrected Value	Limit Detector Type	Limit	Margin
		MHz		dBuV	dB	dBuV		dBuV	dB
Phase1	LISN A1	0.18	QP	29.81	11.45	41.26	QP	64.38	**23.12**
Phase1	LISN A1	0.24	QP	27.52	11.09	38.61	QP	62.17	**23.57**
Phase1	LISN A1	0.36	QP	25.06	10.76	35.82	QP	58.62	**22.80**
Phase1	LISN A1	0.46	QP	23.03	10.67	33.70	QP	56.77	**23.06**
Neutral	LISN A4	0.18	QP	29.73	11.42	41.15	QP	64.38	**23.23**
Neutral	LISN A4	0.24	QP	27.52	11.06	38.58	QP	62.18	**23.60**
Neutral	LISN A4	0.36	QP	25.13	10.74	35.87	QP	58.62	**22.75**
Neutral	LISN A4	0.46	QP	23.13	10.65	33.78	QP	56.77	**22.99**
Phase1	LISN A1	0.18	Avg	19.62	11.45	31.07	Avg	54.37	**23.30**
Phase1	LISN A1	0.27	Avg	17.34	10.95	28.29	Avg	51.01	**22.73**
Phase1	LISN A1	0.36	Avg	14.65	10.76	25.41	Avg	48.62	**23.21**
Phase1	LISN A1	0.46	Avg	14.37	10.67	25.04	Avg	46.77	**21.72**
Neutral	LISN A4	0.18	Avg	19.52	11.42	30.94	Avg	54.38	**23.44**
Neutral	LISN A4	0.27	Avg	17.44	10.92	28.36	Avg	51.01	**22.65**
Neutral	LISN A4	0.36	Avg	14.95	10.74	25.69	Avg	48.62	**22.93**
Neutral	LISN A4	0.46	Avg	14.42	10.65	25.07	Avg	46.77	**21.70**

Positive Margin indicates a Pass

B.8. Tested By

This testing was conducted in accordance with the ISO 17025:1999 scope of accreditation, table 1; Quality Manual.

Name: Stephen Ching
Function: EMC Technician

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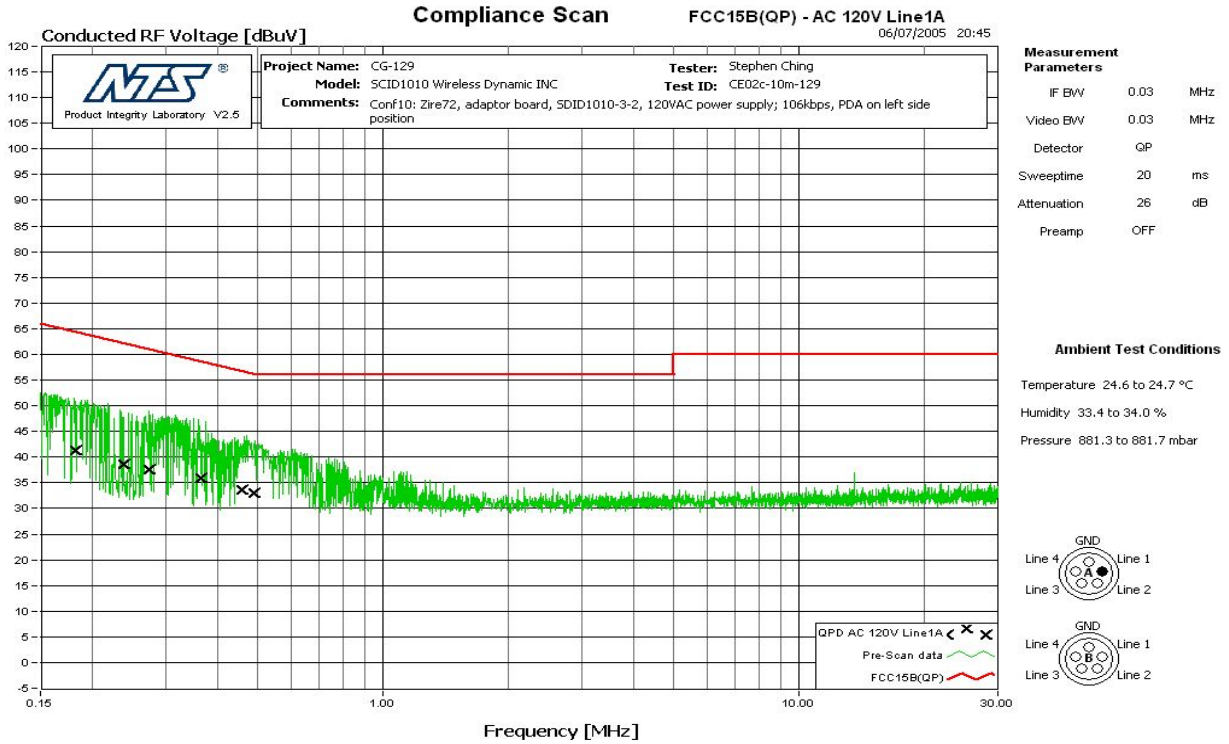

Figure 3 CE –Line A1 – 150 kHz – 30 MHz (QP Detector)

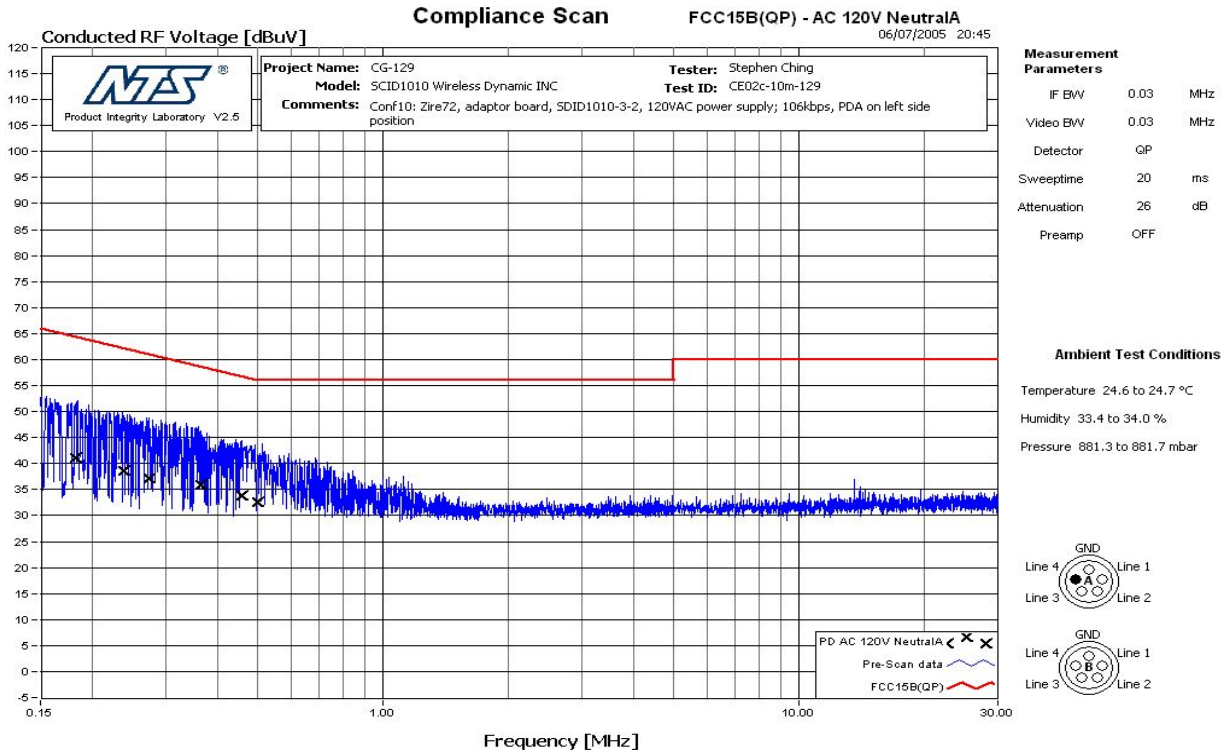

Figure 4 CE –Return A2 – 150 kHz – 30 MHz (QP Detector)

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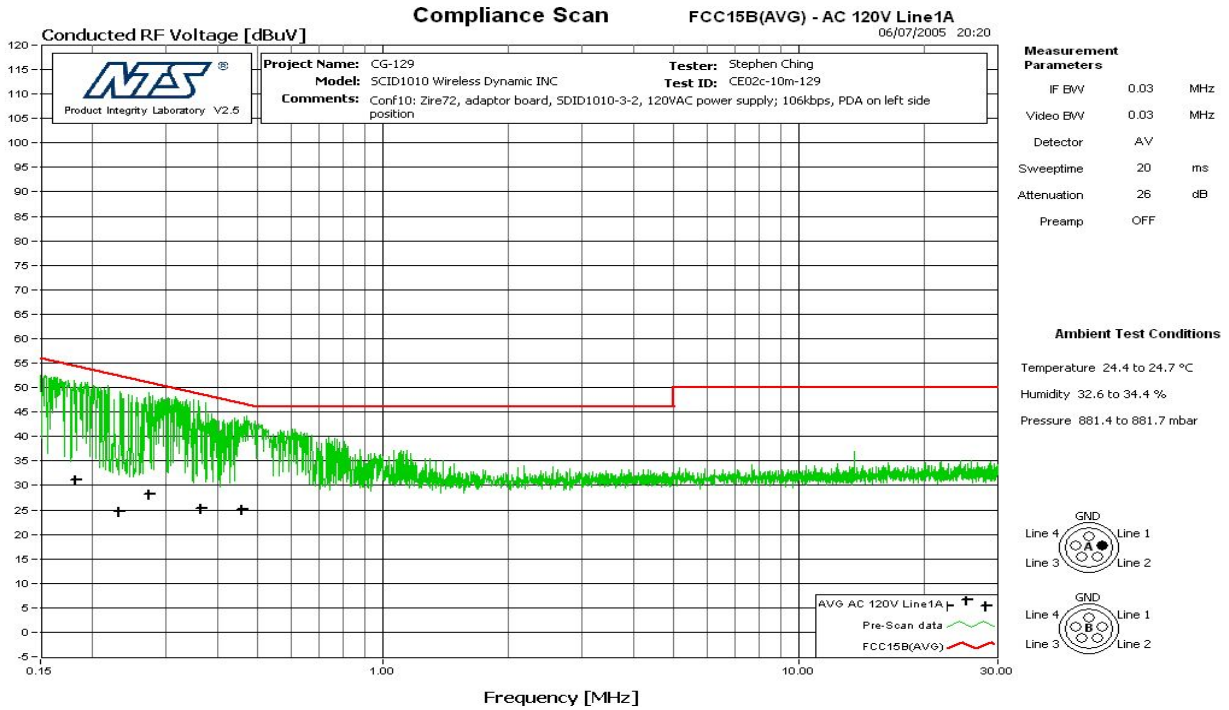

Figure 5 CE –Line A1 – 150 kHz – 30 MHz (Average Detector)

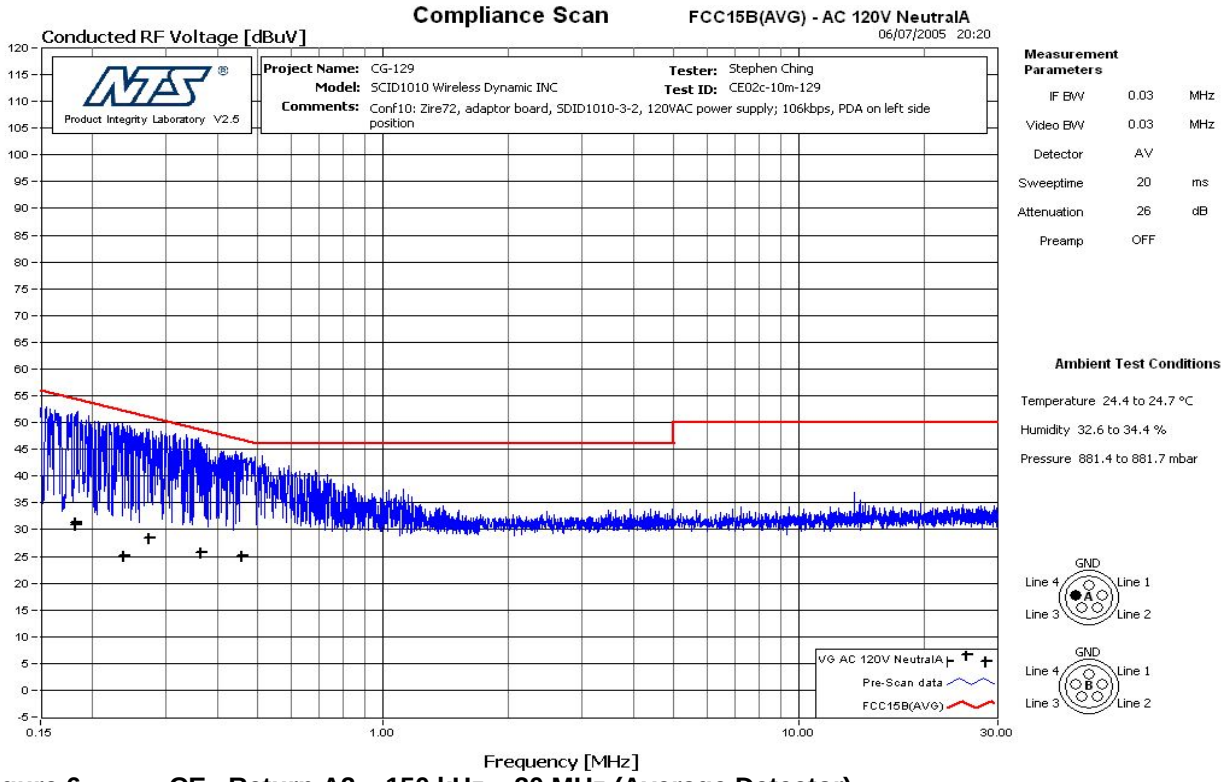

Figure 6 CE –Return A2 – 150 kHz – 30 MHz (Average Detector)

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APPENDIX C: RADIATED H-FIELD EMISSIONS 9 KHZ - 30 MHZ

C.1. Base Standard & Test Basis

Base Standard	CFR Title 47 – Telecommunications, Chapter I - FCC Part 15.209 and Part 15.225 – Radio Frequency Devices, RSS 210 Issue 5, 6.2.2 e, 6.3
Test Basis	ANSI C63.4 - 2003 Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Test Method	NTS Radiated H-Field Emissions Test Method 28.2, Rev 1.0

C.2. Specifications

Frequency (F)	Limit		Limit at 3m
	Field Strength	Distance	
MHz	µV/m	m	dBµV/m
0.009 – 0.49	2400/ F(kHz)	300	128.5 to 93.8[1]
0.49 – 1.705	24000/ F(kHz)	30	73.8 to 63.0[1]
1.705 – 13.11	30	30	69.5
13.11 – 13.41	106	30	80.5
13.41 – 13.553	334	30	90.5
13.553 – 13.567	15848	30	124.0
13.567 – 13.71	334	30	90.5
13.71 – 14.01	106	30	80.5
14.01 – 30	30	30	69.5

Notes:

1. [1] decrease with the logarithm of the frequency.
2. Limit is extrapolated from 300m and 30 to 3m by adding 80dB and 40dB respectively.

C.3. Measurement Uncertainty

Radiated H-Field Emissions 9kHz – 30MHz	Measurement Uncertainty	Expanded Uncertainty (K=2)
(DB)	+2.15/-2.19	+4.30/-4.38

C.4. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

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C.5. Test Method

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable. The fundamental field strength was maximized by rotating the turntable through 360 degrees. The receive Loop antenna was positioned at a distance of 3 meters as measured from the closest point of the EUT and 1 meter above the ground plane. A spectrum analyzer with peak detection was used to find the maximum field strength during the scans. The EUT was tested in 3 orthogonal planes and with 3 data rates (106kbps, 212kbps and 424kbps), with the worst case results being reported.

C.6. Test Results

Compliant. The worst case fundamental field strength is 59.68dBμV/m

C.7. Sample Calculation

Margin = Limit – Emission Level

C.8. Test Data

Product Integrity Laboratory V2.5

Project Number:	CG-129	**Tester:**	Kuga
Model:	SDID1010-3-2 Wireless Dynamic Inc.	**Test ID:**	RE01-10m-129
Comments:	Conf10: Zire72, Adapter board, 106kbps, 120VAC Power supply, PDA on left-side position		

Standard :	FCC Part 15	Measurement Distance :	3 meters	Measurement Type :	H-Field

Antenna	Frequency	AF	CL	Total CF	Detector	Measured Value	Corrected Value	Limit	Margin
Horizontal	MHz	dB/m	dB	dB/m		dBuV	dBuV/m	dBuV/m	dB
R&S HFH2-Z2 Loop	13.3530	20.30	0.58	20.89	Peak	23.52	44.41	80.51	**36.10**
R&S HFH2-Z2 Loop	13.5600	20.34	0.60	20.94	Peak	38.74	59.68	124.00	**64.32**
R&S HFH2-Z2 Loop	13.5680	20.34	0.59	20.93	Peak	36.13	57.06	90.47	**33.41**
Vertical									
R&S HFH2-Z2 Loop	13.3530	20.30	0.58	20.89	Peak	16.23	37.12	80.51	**43.39**
R&S HFH2-Z2 Loop	13.5600	20.34	0.60	20.94	Peak	31.33	52.27	124.00	**71.73**
R&S HFH2-Z2 Loop	13.5680	20.34	0.59	20.93	Peak	28.69	49.62	90.47	**40.85**

Positive Margin indicates a Pass

C.9. Tested By

This testing was conducted in accordance with the ISO 17025:1999 scope of accreditation, table 1; Quality Manual.
Name: Stephen Ching
Function: EMC Technician

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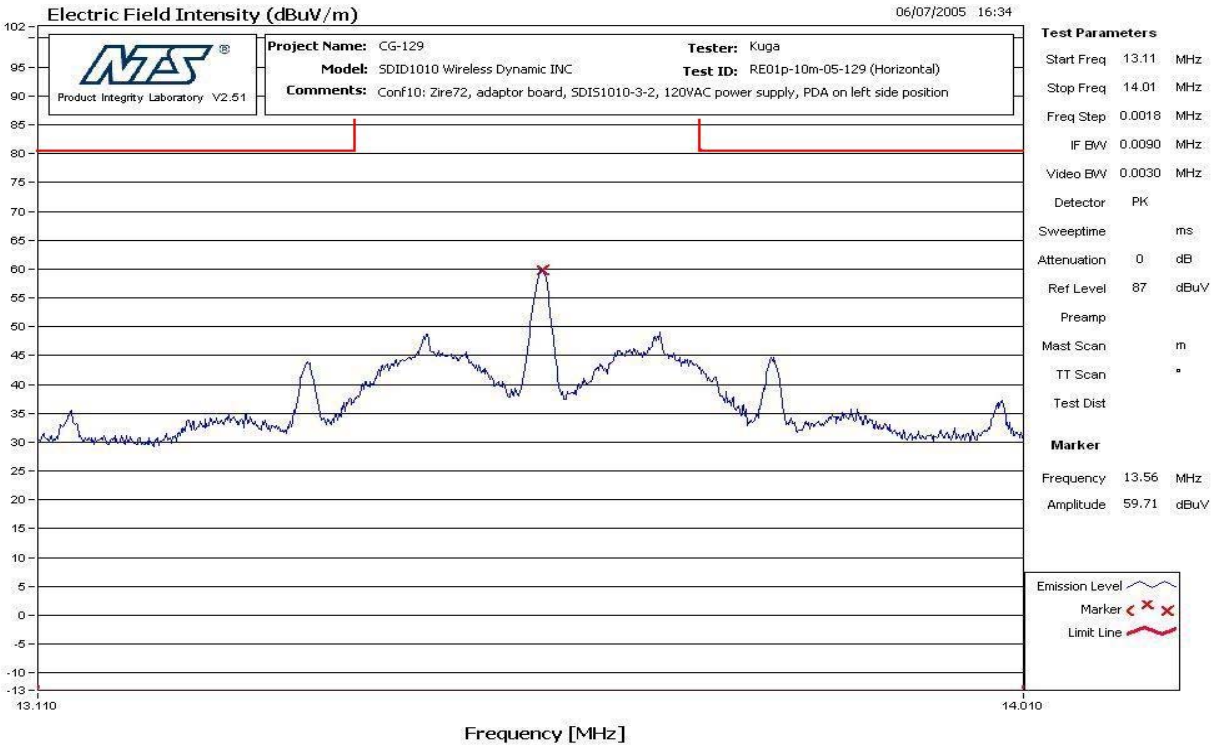

Figure 7 RE - Horizontal – 13.11MHz – 14.01MHz (Data-rate: 106kbps)

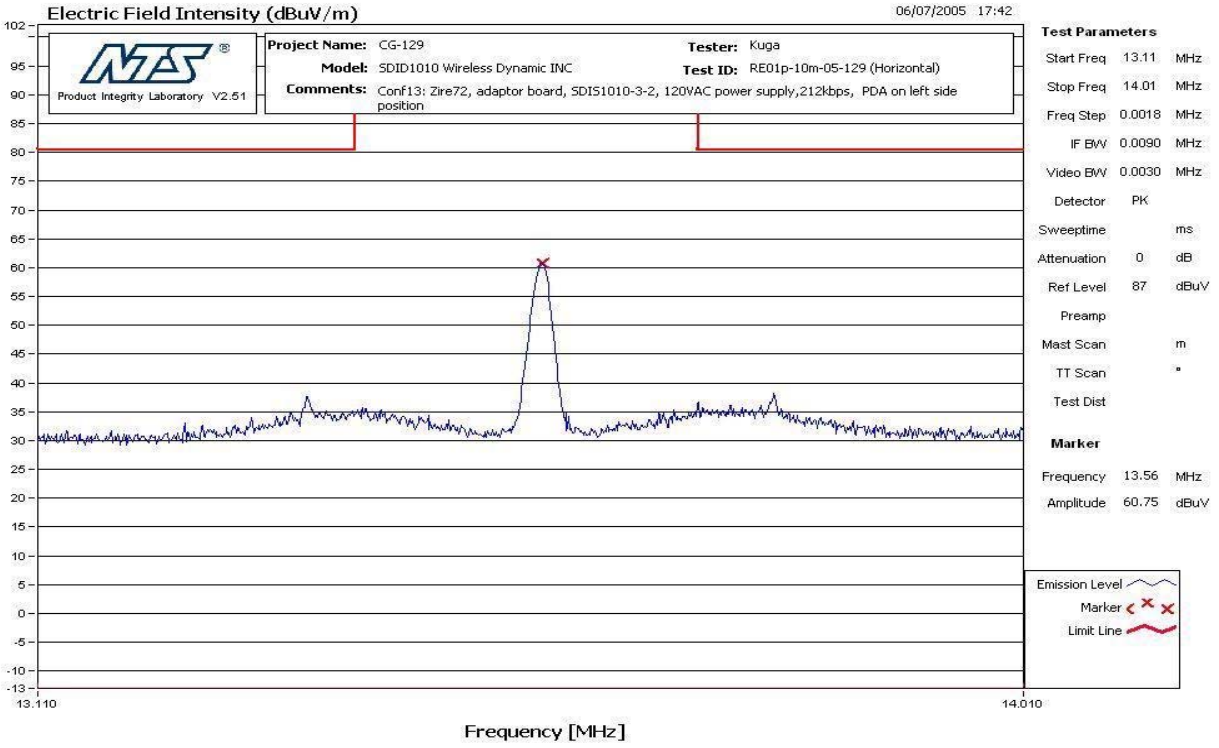

Figure 8 RE - Horizontal – 13.11MHz – 14.01MHz (Data-rate: 212kbps)

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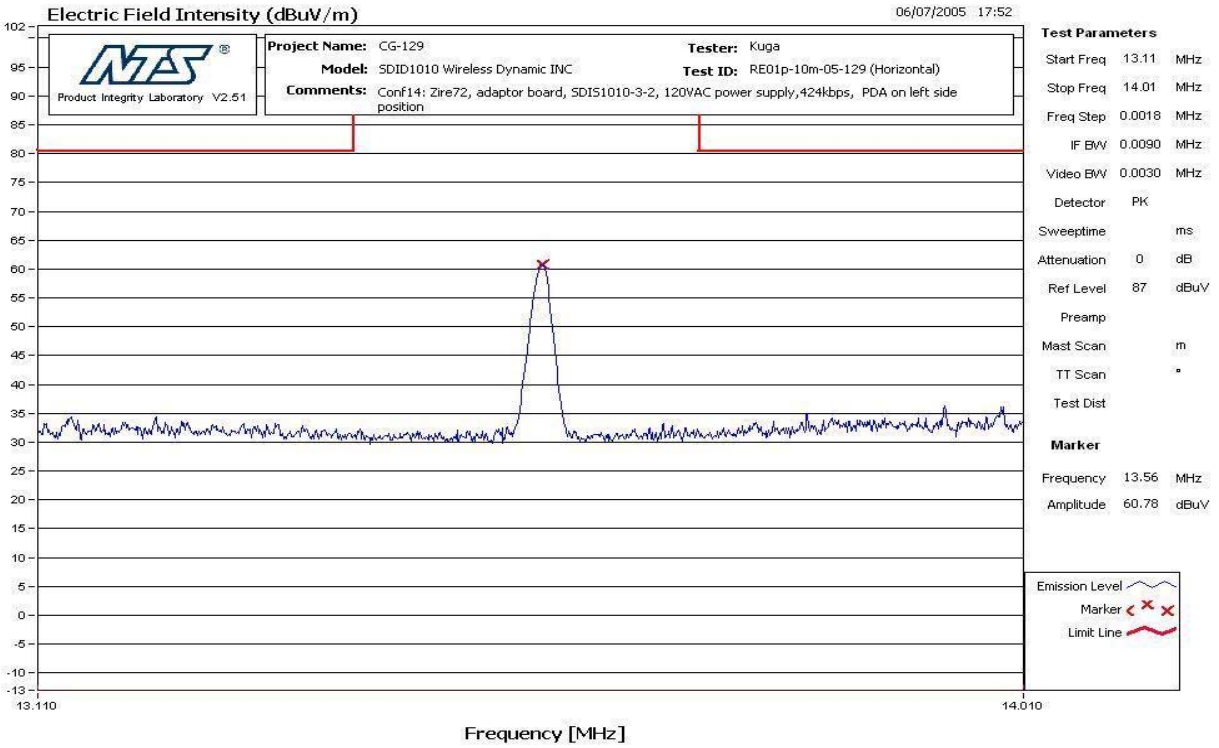

Figure 9 RE - Horizontal – 13.11MHz – 14.01MHz (Data-rate: 424kbps)

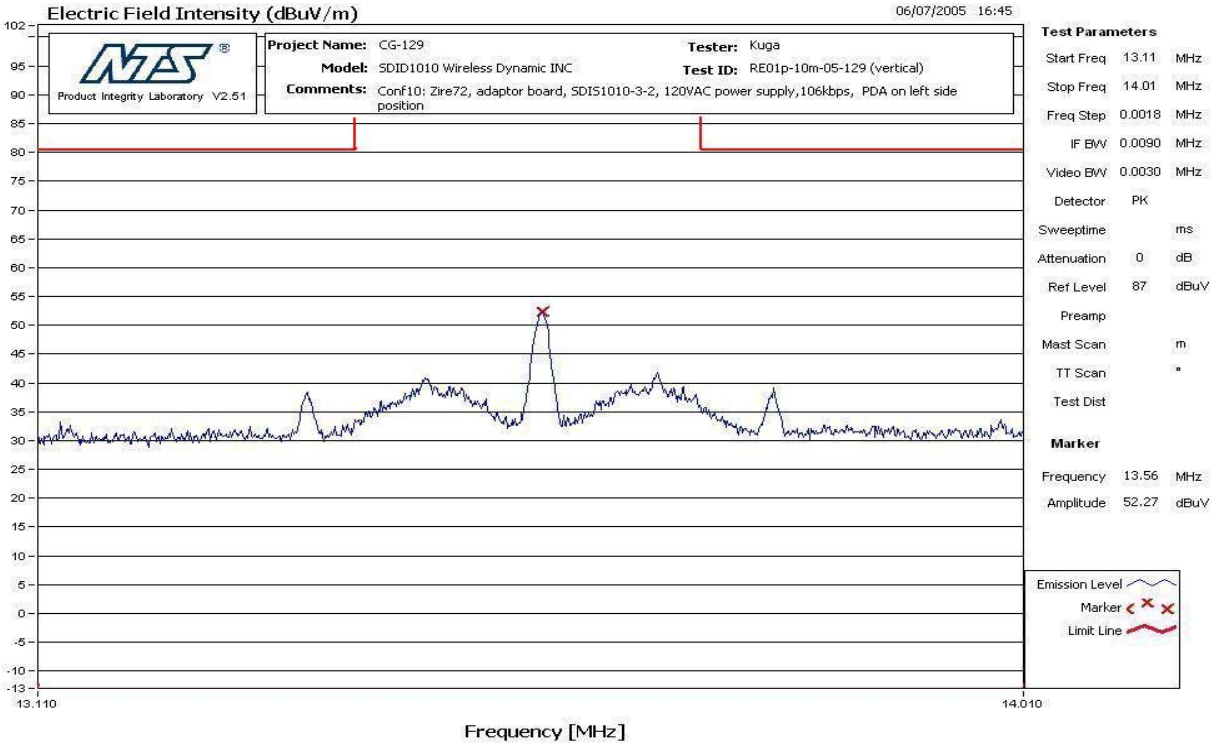

Figure 10 RE - Vertical – 13.11MHz – 14.01MHz

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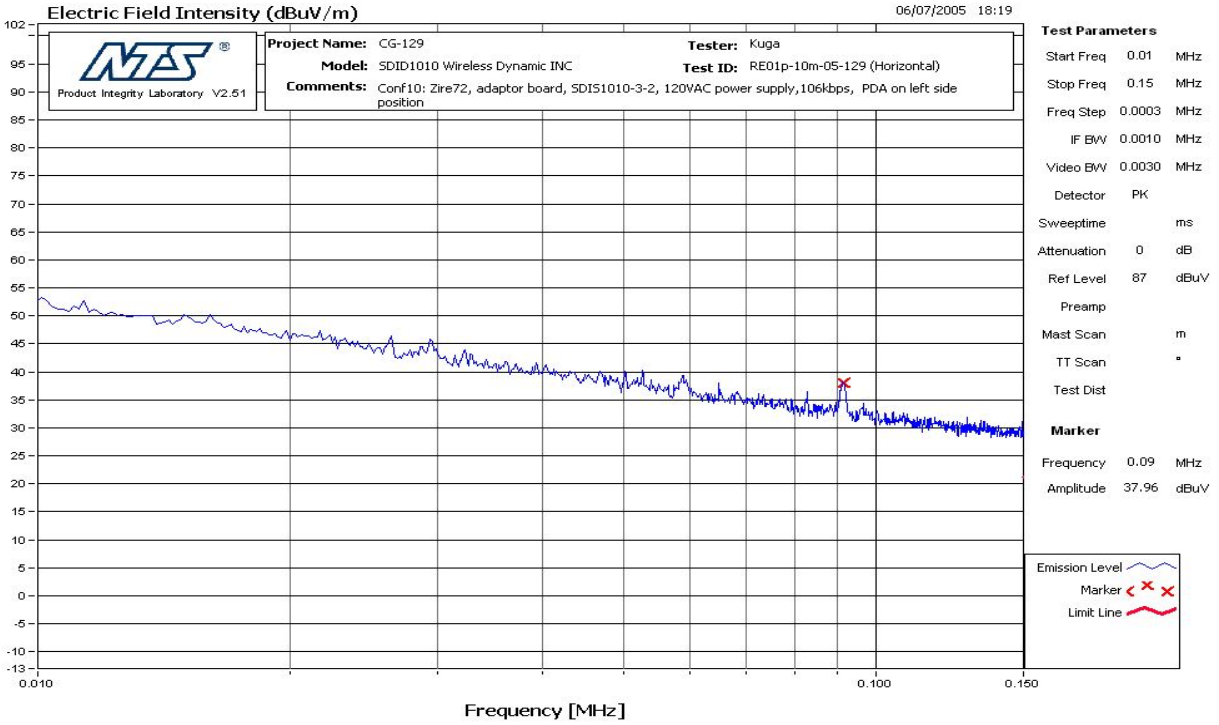

Figure 11 RE - Horizontal – 9kHz – 150kHz

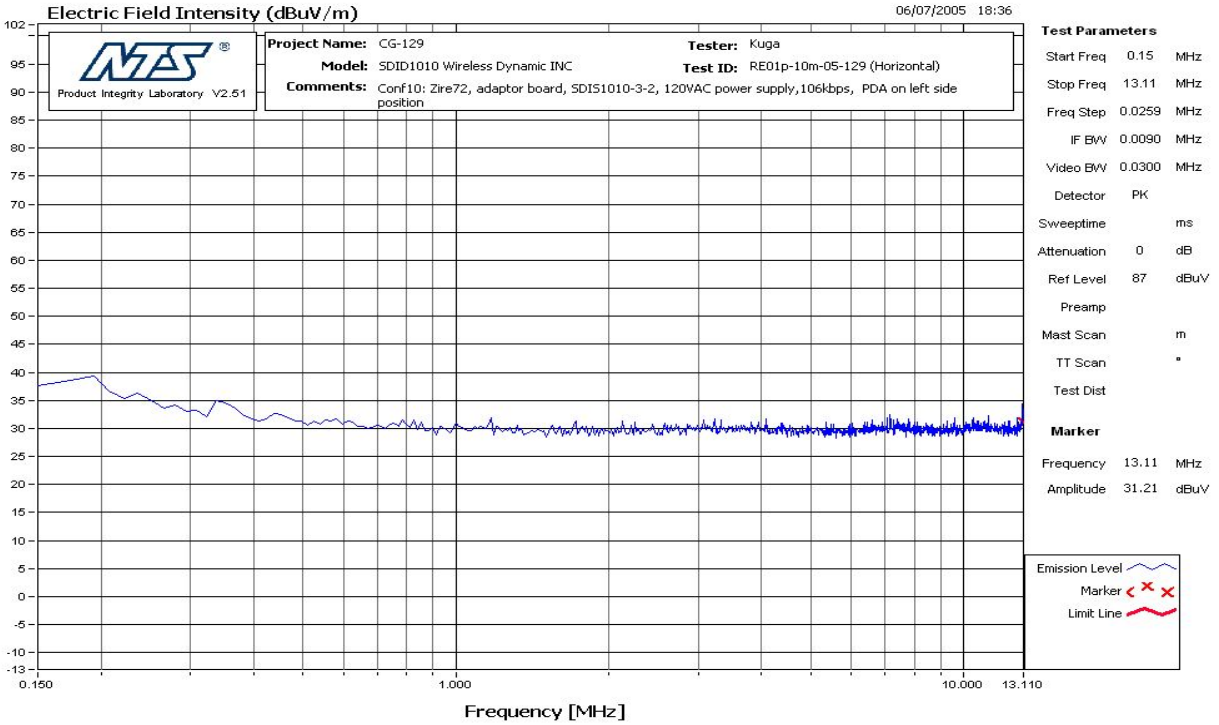

Figure 12 RE - Horizontal – 150kHz – 13.11MHz

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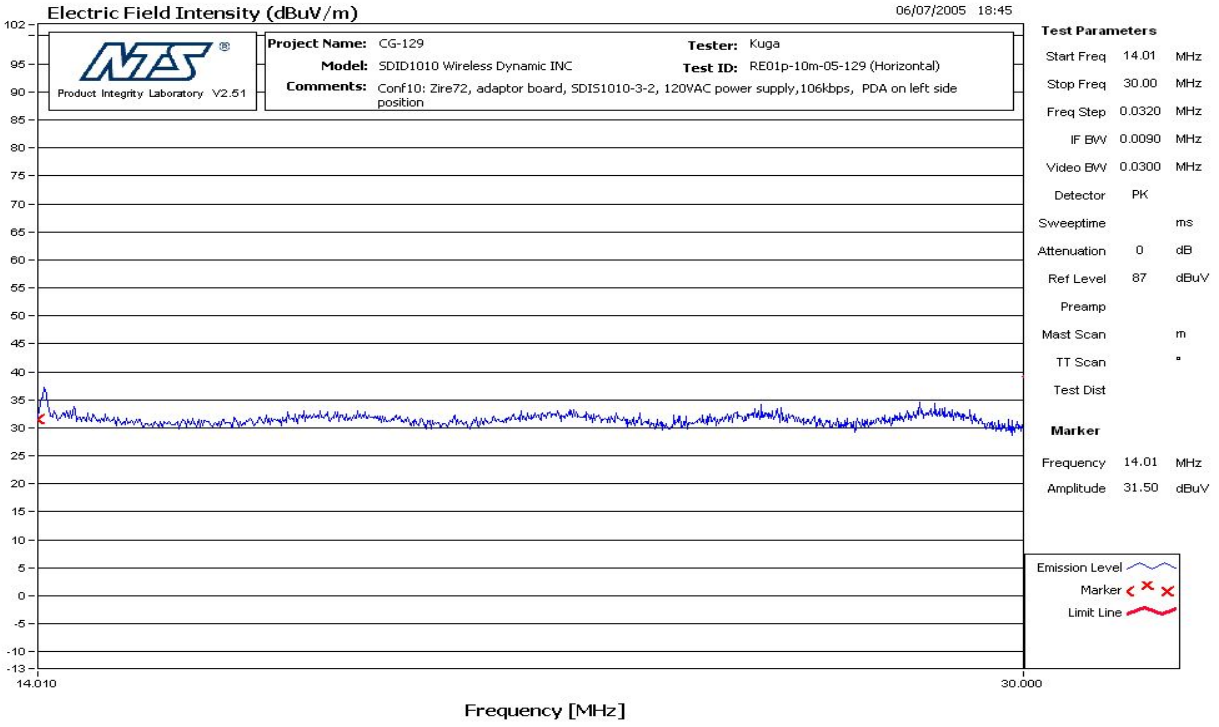

Figure 13 RE - Horizontal – 14.01MHz – 30.0MHz

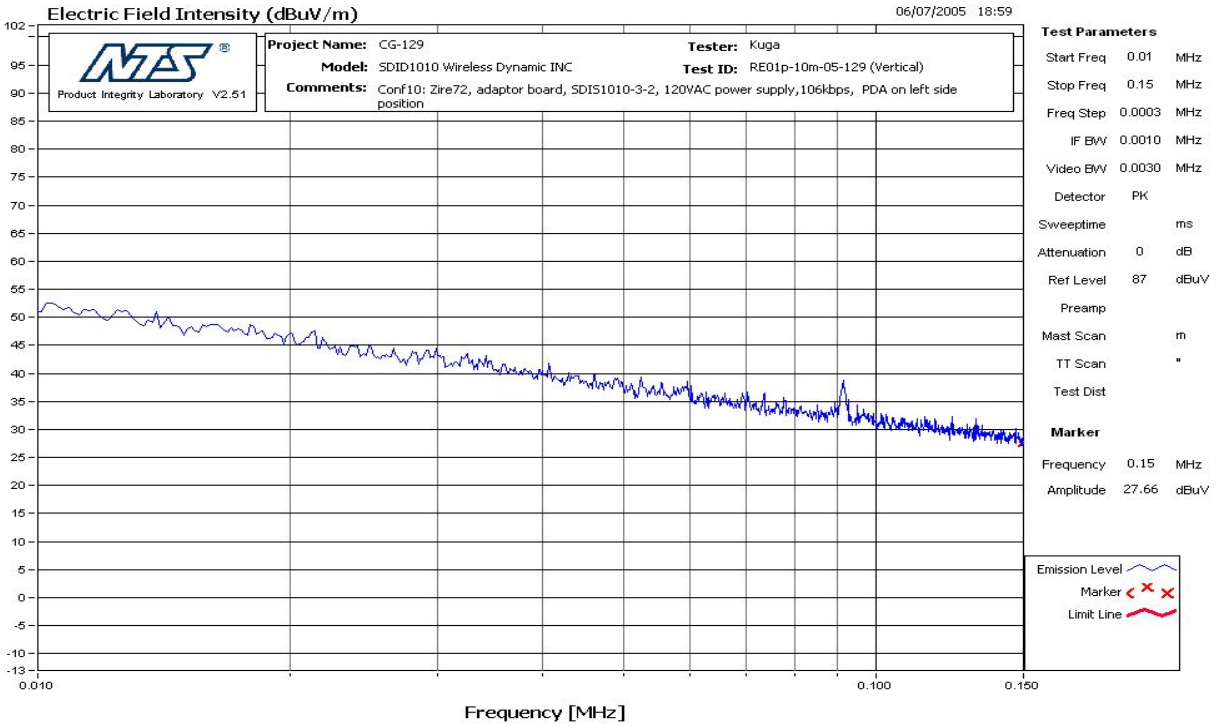

Figure 14 RE - Vertical – 9kHz – 150kHz

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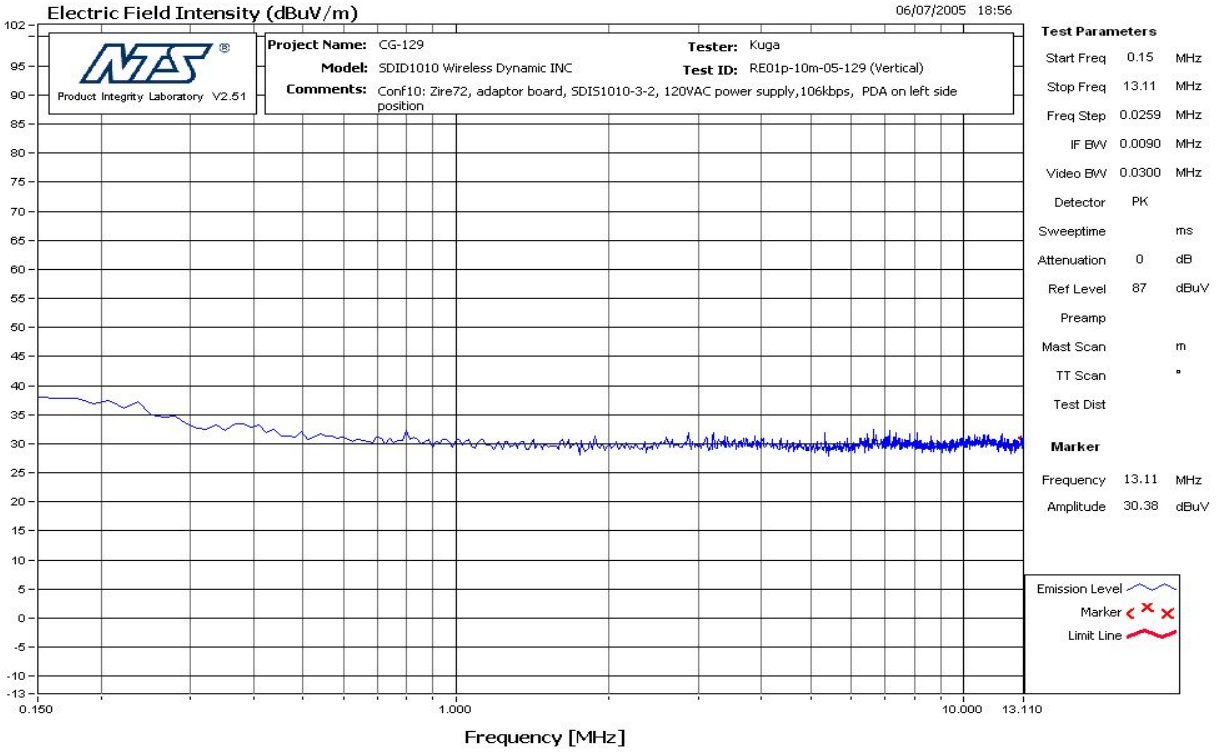

Figure 15 RE - Vertical – 150kHz – 13.11MHz

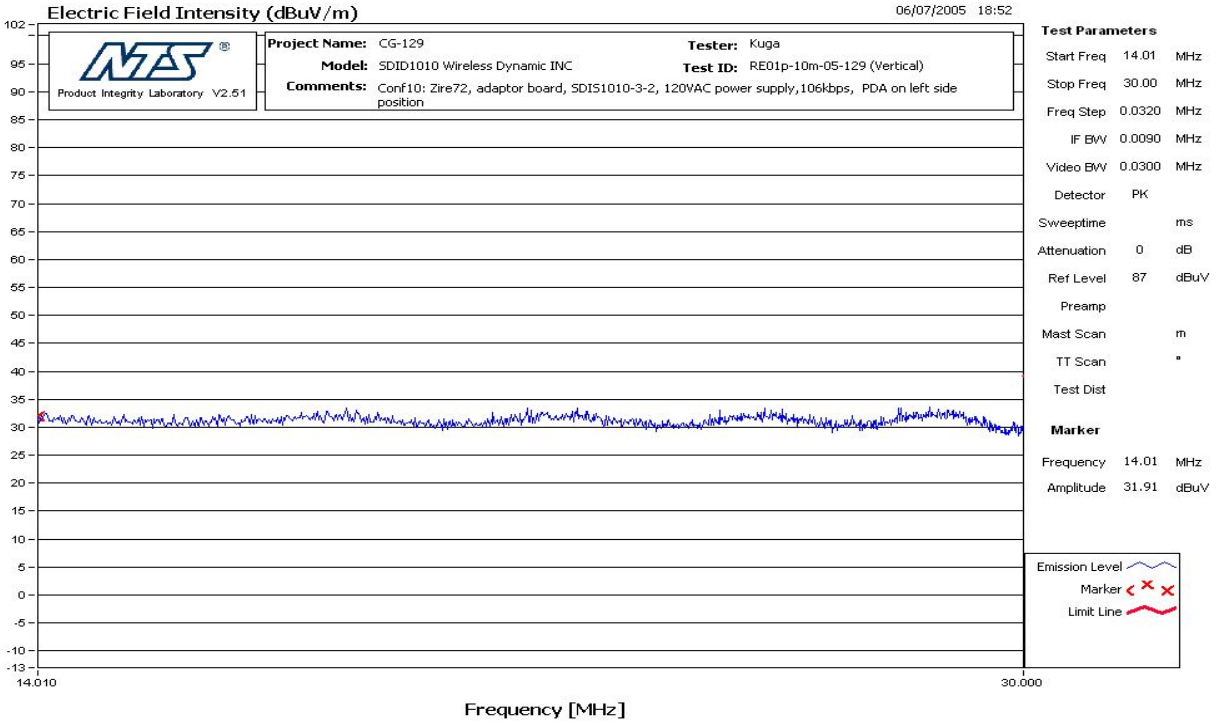

Figure 16 RE - Vertical – 14.01MHz – 30.0MHz

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APPENDIX D: FREQUENCY STABILITY

D.1. Base Standard & Test Basis

Base Standard	CFR Title 47 – Telecommunications, Chapter I - FCC Part 15.225 – Radio Frequency Devices, RSS 210 Issue 5, Section 6.4
Test Basis	ANSI C63.4 - 2003 Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Test Method	ANSI C63.4 - 2003 , 13.1.6 - Frequency Measurements

D.2. Specifications

Supply Voltage	Temperature	Maximum Tolerance
VAC	^{0}C	kHz
120	20	1.356
138 (115%)	20	1.356
102 (85%)	20	1.356
120	-20	1.356
120	50	1.356

D.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

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D.4. Test Results

Compliant. The maximum frequency tolerance was found to be 320.6Hz.

D.5. Sample Calculation

None

D.6. Test Data

Product Integrity Laboratory **V2.5**

Project Name:	CG-129	**Tester:**	Kuganesan Pararajasingam
Model:	SDID1010-3-2 Wireless Dynamics Inc.	**Test ID:**	Frequency Tolerance
Comments:	SDID Card, 3VDC Power Supply.		

Standard: FCC CFR47 Part 15.225

Voltage/Line	Temperature	Frequency
VDC	^{0}C	MHz
3	20	13.5598998
3.45	20	13.5598998
2.55	20	13.5598998
3	-20	13.5596994
3	50	13.5600200

D.7. Tested By

This testing was conducted in accordance with the ISO 17025:1999 scope of accreditation, table 1; Quality Manual.

Name: Kuganesan Pararajasingam
Function: EMC Engineer

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APPENDIX E: TEST EQUIPMENTS

E.1. Radiated Emissions 30 MHz – 1 GHz Measurement Equipment

Description	Manufacturer	Type/Model	Asset #	Cal Due	Cal Date
10m ANECHOIC CHAMBER					
Bilog Antenna	☐ Chase	CBL 6111B	260398	09JULY05	09JULY04
	☒ Chase	CBL 6112B	260301		
RF Cable	Suhner Succoflex	Ferrite bead loaded cable	260388	07JAN06	07JAN04
CONTROL ROOM					
Test Receiver	☒ Rohde & Schwarz	ESAI	260110 / 260111	2FEB06	2FEB05
Mast Controller	EMCO	2090	260165	N/A	N/A
Multi Device Controller TT1 (Turntable)	07JAN06	07JAN04		N/A	N/A
RF 10m East site Link				Suhner Succoflex	NA
- Cable 1	Suhner Succoflex	NA	263135		
- Cable 2	Suhner Succoflex	NA	263161		
- Cable 3	Suhner Succoflex	NA	263162		
- Cable 4	TDL	SMC-002	260162		
- Amplifier	Hewlett Packard	8447F	260164		

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E.2. Conducted Emissions 10 kHz – 30 MHz Measurement Equipment

Description		Manufacturer	Type/Model	Serial #	Cal Due	Cal Date
10m ANECHOIC CHAMBER						
A LISN Link					07JAN06	07JAN04
-LISN A Switch	☒ A	NA	NA	263177		
-Cable Switch to Limiter	☒ A	NA	NA	263164		
- Cable LISN to Switch	☒ A1	Succoflex	NA	263168	07JAN06	07JAN04
	☐ A2	Succoflex	NA	263169	07JAN06	07JAN04
	☐ A3	Succoflex	NA	263170	07JAN06	07JAN04
	☒ A4	Succoflex	NA	263171	07JAN06	07JAN04
- Table Top LISN	☒ TT	EMCO	3825	260354	08JAN06	08JAN04
B LISN Link					07JAN06	07JAN04
-LISN B Switch	☐ B	NA	NA	263176		
-Cable Switch to Limiter	☐ B	NA	NA	263165		
- Cable LISN to Switch	☐ B1	Succoflex	NA	263172	07JAN06	07JAN04
	☐ B2	Succoflex	NA	263173	07JAN06	07JAN04
	☐ B3	Succoflex	NA	263174	07JAN06	07JAN04
	☐ B4	Succoflex	NA	263175	07JAN06	07JAN04
CONTROL ROOM						
		Rohde & Schwarz	ESAI	260110 / 260111		
Mast Controller		EMCO	2090	260166	N/A	N/A
Switch Matrix		TDL	SMC-002	260162	07JAN06	07JAN04
Cable Switch Matrix to Receiver		NA	NA	263166	07JAN06	07JAN04
A LISN Link					07JAN06	07JAN04
-LISN A Limiter	☒ A	NA	NA	263178		
-Cable Switch to Limiter	☒ A	NA	NA	263164		
B LISN Link					07JAN06	07JAN04
-LISN B Limiter	☐ B	NA	NA	263179		
-Cable Switch to Limiter	☐ B	NA	NA	263194		

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E.3. Radiated H-Field Emissions 10kHz – 30MHz Measurement Equipment

Description		Manufacturer	Type/Model	Serial #	Cal Due	Cal Date
10m ANECHOIC CHAMBER						
Loop Antenna		R&S	HFH2-Z2	DE12245	09NOV05	09NOV04
Loop Antenna Power Supply		NA	NA	263257	N/A	N/A
Cable	☒ 3m center site bulkhead to antenna	Succoflex	NA	263136	08JAN06	08JAN04
	☐ H-Field site bulkhead to antenna	Succoflex	NA	263387	08JAN06	08JAN04
CONTROL ROOM						
Mast Controller		EMCO	2090	260166	N/A	N/A
Multi Device Controller TT1 (Turntable)		EMCO	2090	260165	N/A	N/A
Test Receiver		Rohde & Schwarz	ESAI	260110 / 260111	02FEB06	02FEB05
☒ RF 3m Center site Link					08JAN06	08JAN04
- Cable 1		Succoflex	NA	263188		
- Cable 2		Succoflex	NA	263134		
☐ RF 10m H-Field site Link					08JAN06	08JAN04
- Cable 1		Succoflex	NA	263184		
- Cable 2		Succoflex	NA	263189		
- Cable 3		Succoflex	NA	263167		
- Switch Matrix Controller		TDL	SMC-002	260162		

E.4. Frequency Stability Measurement Equipment

Description	Manufacturer	Type/Model	Serial #	Cal Due	Cal Date
Temperature Chamber	Thermotron Industries	SM-8C	17013-S	NA	NA
Data Acquisition/ Switch unit	Hewlett Packard	34970A	US37003408	24SEP05	24SEP04
Spectrum Analyzer 9k-40GHz	Rohde & Schwarz	FSEK	260104	05APR06	05ARP05
DC Power Supply	Hewlett Packard	6632B	US36351938	NA	NA
RMS Multimeter	Fluke	87	69460888	10Jan06	10Jan05

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END OF DOCUMENT

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