



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 7

Applicant: OCE Display Graphics Inc
FCC ID # U2P-3010105668
IC ID # 6947A-3010105668

Project Code CG-654

(Report CG-654-EM-1-2)
Supercedes CG-654-EM-1-1
Revision: 1

December 13, 2007

Prepared for: OCE Display Graphics Inc

Author: Spencer Watson

Approved by: Nick Kobrosly
Director of Operations

Confidentiality Statement: This report and the information contained herein represent the results of testing articles/products identified and selected by the client. The tests were performed to specifications and/or procedures approved by the client. National Technical Systems ("NTS") makes no representations expressed or implied that such testing fully demonstrates efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article or similar products for a particular purpose. This document shall not be reproduced except in full without written approval from National Technical Systems ("NTS") and the customer.

Report Summary

Test Facility	NTS Canada Product Integrity Laboratory 5151-47 th 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	Oce Display Graphics Systems 13231 Delf Place Building #501 Richmond, British Columbia V6V 2C3 Phone #: (604)232 2345 Direct Dial Fax #: (604)273 2775 Fax
Customer Representative	Name: Colin Souter Phone #: (604) 232-2345 Email Address: colin.souter@oce.com
Responsible Manager	Name: Phone #: Email Address:

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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 Issue 7 Section 2.7
B	Radiated H-Field Emissions 9 kHz – 30 MHz	No	No	No	PASS	FCC 15.209, 15.225, RSS 210 Issue 7 Section 2.7 and Appendix 2.6
C	Frequency Stability	No	No	No	PASS	FCC 15.225, RSS 210 Issue 7 Appendix 2.6
D	Occupied BW	No	No	No	3.407 kHz	RSS Gen Issue 2 Section 4.6.1

The compliance test cases and respective test standards, as defined by the customer, may not be inclusive of all testing required by the Base Standards or fulfill the applicable regulatory requirements in their entirety. They do not reflect the opinions or recommendations of NTS

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

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Test Log & Signatures:

APPENDIX	Test Case	Start	End	Tester
A	Radiated E-Field Emissions 30 MHz – 1 GHz	Sept 20, 2007	Sept 21, 2007	Spencer Watson EMC Technologist
B	Radiated H-Field Emissions 9 kHz – 30 MHz	Sept 21, 2007	Sept 21, 2007	Spencer Watson EMC Technologist
C	Frequency Stability	Dec 11, 2007	Dec 11, 2007	James MacKay EMC Technologist
D	Occupied BW	Dec 11, 2007	Dec 11, 2007	Spencer Watson EMC Technologist

Prepared By: _____
Spencer Watson
EMC Technologist

Reviewed By: _____
Glen Moore
EMC Manager

Checked By: _____
Robyn Zuelkhe
Quality Manager

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REGISTER OF REVISIONS

Revision	Date	Description of Revisions
0	December 11, 2007	First Draft
1	December 12, 2007	Revised for technical review notes
2	December 13, 2007	Corrected notes on H-Field plots

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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 OCE Display Graphic Model 3010105668 RFID transceiver to FCC Part 15 Subpart C section 15.225 for Intentional Radiator and the equivalent sections of Industry Canada's RSS 210 Issue 7.

The tests outlined may not be inclusive of all testing required by the Base Standards and may not fulfill the applicable regulatory requirements in their entirety.

1.2 ABBREVIATIONS AND DEFINITIONS

<u>Abbreviation</u>	<u>Explanation</u>
dB	Decibel
EMC	Electromagnetic Compatibility
Hz	Hertz
IEC	International Electrotechnical Commission
ITE	Information Technology Equipment
MHz	Megahertz
N/A	Not Applicable
NA	Not Available
µV	Microvolts
dBm	decibel relative to 1 mW
GHz	Giga Hertz
QA	Quality Assurance
EUT	Equipment Under Test
NDP	No Degradation in Performance
PI	Product Integrity
RF	Radio Frequency

Definitions:

Equipment Under Test (EUT): A representative ITE or functionally interactive group of ITE (that is a system), which includes one or more host units and is used for evaluation purposes.

Electromagnetic compatibility: EMC (abbreviation): The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

1.3 REFERENCES

International Standards

- CISPR 22 Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement, 2005

American National Standards Institute

- ANSI C63.4-2003 American National Standards for Methods of Measurements of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipments in the range of 9 kHz to 40 GHz, December 11, 2003

NTS Documentation

- NTS Radiated Emissions 30 MHz – 1 GHz Automated Test Method SOP CAG EMC 01
- NTS Radiated Emissions 9 kHz – 30 MHz Manual Test Method – Method 28.2 Rev 1.0

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2.0 EUT DESCRIPTION

Description of EUT

	Name	Model	Revision	Serial Number
EUT	OCE RFID	3010105668	5	EMC01
Classification	Tabletop			
Size (m)	0.37m x 0.10m x 0.09m			
Weight	1 kg			
Power	24 VDC			
Description	RFID transceiver			
Cables	Cable connections to support equipment detailed below			

2.1 MODE OF OPERATION

The EUT 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.

2.2 MODIFICATIONS REQUIRED FOR COMPLIANCE

None

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3.0 SUPPORT EQUIPMENT

3.1 CONFIGURATION

All support equipment information was supplied by the client and was verified by NTS.

Type	Position	Qty	Model #	P/N	Serial Number
PC	10m Support Room	1	Vento M9	71X350011301	90-PL982MC004-530
Monitor	10m Support Room	1	Viewsonic VS10040	VE510b	P1H045050016
Keyboard	10m Support Room	1	NEC KB-8963	229-00012	CHKB90842680
Mouse	10m Support Room	1	Microsoft 2.1A	90516	00620054
DC Power supply	10m Support Room	1	Cosel	ADA600F-24	6140530TR

3.2 CABLES

Support Cable List (These cables are not part of the EUT, but were required to exercise the EUT) and were located in the support shielded room underneath the turntable

Quantity	Routing		Description	Cable Length (m)
	From	To		
1	24 VDC Cosel Power Supply in support room	EUT in 10m chamber	2-conductor shielded ungrounded cable	~ 4m
1	PC in support room	EUT in 10m chamber	Ethernet Cat5	~ 4m

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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 RSS 210 Issue 7 Section 2.7
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 30 MHz – 1GHz Automated Test Method SOP CAG EMC 01

A.2. Specifications

Frequency	FCC Part 15 10-m Limit (Quasi-Peak)
MHz	dB μ V/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 – $20 * \log_{10}(10/3)$

§ 15.205 Restricted bands of operation.

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
¹ 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	N/A
13.36–13.41	N/A	N/A	N/A

At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions.

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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 and checked for worst case emissions configuration, with the worst case results being reported.

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A.6. Test Results

 Product Integrity Laboratory V2.5	Project Number: CG-654 Model: OCE RFID Comments: Conf20: EUT powered on, running at max dutycycle, without mounting plate. HP Power supply. EUT Vertical orientation. 2 ferrites in control room on data line near PC	Tester: Spencer Watson Test ID: RE02c-10m-654								
Standard: FCC15.209	Measurement Distance: <1GHz >1GHz	10 meters 3 meters								
Antenna Polarization	Frequency (MHz)	Measured Level (dB μ V)	Measurement Detector	Correction Factors (dB/m)	Emission Level (dB μ V/m)	Limit Line	Limit (dB μ V/m)	Margin (dB)	Mast Height (cm)	Turntable Angle (degrees)
Horizontal	279.17	39.3	Q.Peak	-10.57	28.73	Q.Peak	35.56	6.83	282	317
Horizontal	284.74	41.16	Q.Peak	-10.41	30.75	Q.Peak	35.56	4.81	279	316
Horizontal	732.18	31.53	Q.Peak	-3.99	27.54	Q.Peak	35.56	8.02	94	357
Vertical	100.00	44.23	Q.Peak	-15.12	29.11	Q.Peak	33.06	3.95	110	319
Vertical	279.17	36.03	Q.Peak	-10.04	25.99	Q.Peak	35.56	9.57	100	162
Vertical	284.74	38.9	Q.Peak	-9.91	28.99	Q.Peak	35.56	6.57	100	155

Table 1: Radiated Emissions Data, 30 MHz – 1000 MHz

The highest emission measured was 30.75 dB μ V/m at 284.74 MHz, when antenna is Horizontally polarized. It has 4.81 dB margin to the FCC 15.209 limit.

The emission with the least margin to the limit measured was 29.11 dB μ V/m at 100.00 MHz, when antenna is Vertically polarized. It has 3.95 dB margin to the FCC 15.209 limit.

The EUT is in compliance with FCC Part 15 Subpart C 15.209, FCC Part 15 Subpart C 15.205 and Industry Canada RSS-210 Issue 7 Section 2.7 requirements.

A.7. Sample Calculation

Emission Level = Measured Level + Correction Factors

Margin = Limit – Emission Level

A.8. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Spencer Watson
Function: EMC Technologist

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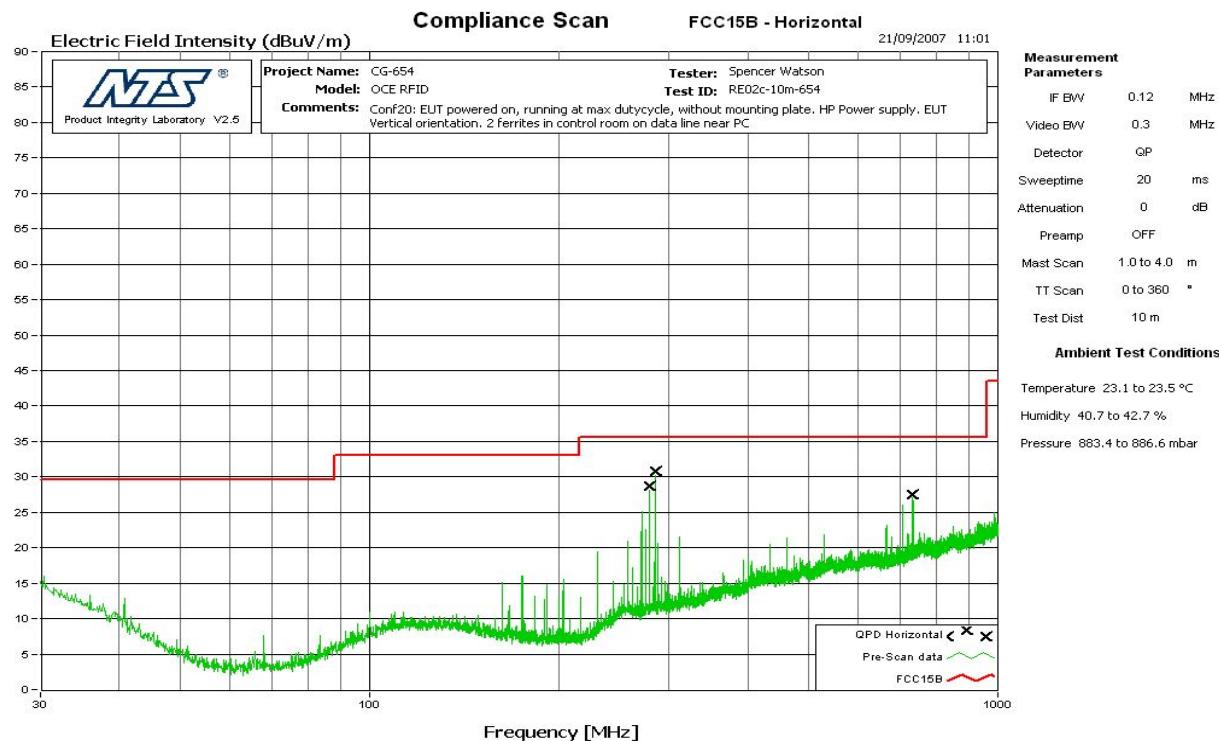


Figure 1 Radiated Emission – Horizontal, 30 MHz – 1 GHz

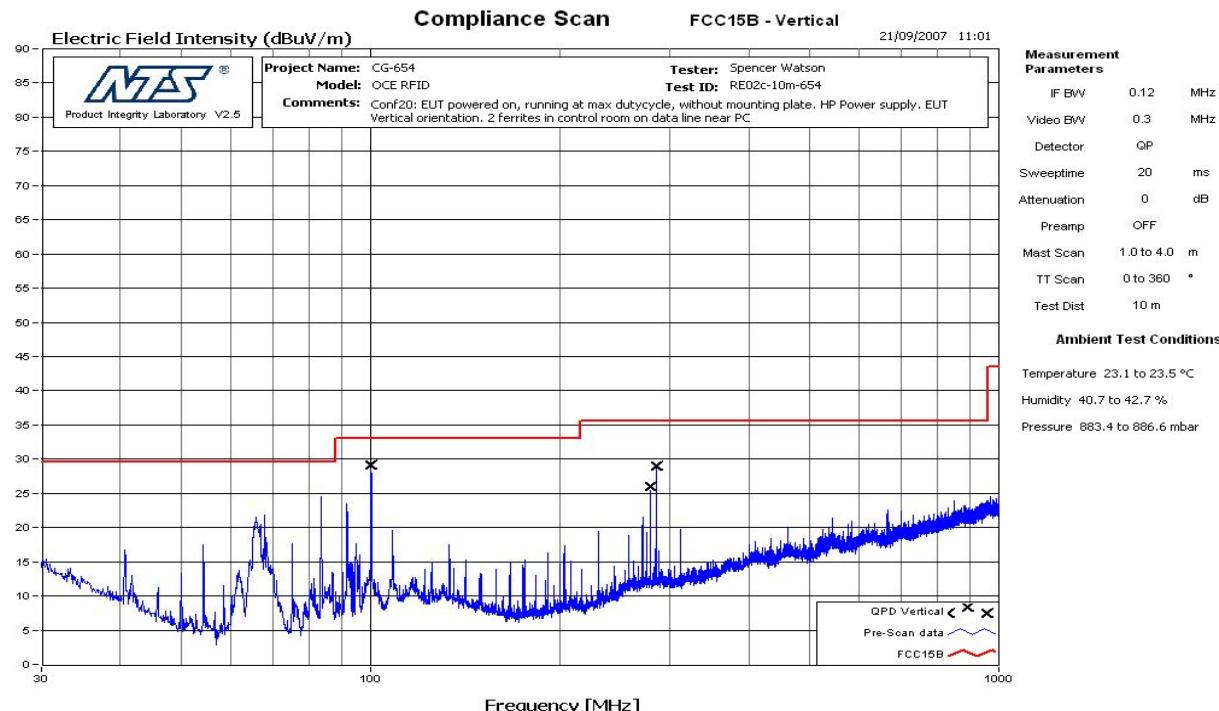


Figure 2 Radiated Emission – Vertical, 30 MHz – 1 GHz

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

B.1. Base Standard & Test Basis

Base Standard	<input checked="" type="checkbox"/>	CFR Title 47 – Telecommunications, Chapter I - FCC Part 15.209 and Part 15.225 – Radio Frequency Devices, RSS 210 Issue 7 Section 2.7 and Appendix 2.6
Test Basis	<input checked="" type="checkbox"/>	ANSI C63.4-2001 Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

B.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 decrease with the logarithm of the frequency.
2. Limit is extrapolated from 300m and 30 to 3m by adding 80dB and 40dB respectively as per 15.31(f)(2).

B.3. Measurement Uncertainty

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

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 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 at a worst case data rate and duty cycle (continuous tx) as reported by the applicant with the worst case results being reported.

B.6. Test Results

 Product Integrity Laboratory V2.5	Project Number: CG-654 Model: OCE RFID Comments: Conf22: EUT powered on, running at max dutycycle, no mounting plate. HP Power supply. EUT Side up orientation. 2 ferrites in control room on data line near PC	Tester: Spencer Test ID: RE01-10m-654						
Standard: FCC15.225 Measurement Distance: 3 meters								
Antenna Polarization	Frequency (MHz)	Measured Level (dB μ V)	Measurement Detector	Correction Factors (dB/m)	Emission Level (dB μ V/m)	Limit Line	Limit (dB μ V/m)	Margin (dB)
Parallel	0.0090	23.92	Peak	19.84	43.76	Q.P	128.52	84.76
Parallel	0.0961	31.51	Peak	19.61	51.12	Q.P	107.95	56.83
Parallel	13.561*	35.67	Peak	20.47	56.14	Q.P	124.00	67.86
Perpendicular	0.0092	27.81	Peak	19.81	47.62	Q.P	128.37	80.75
Perpendicular	0.0961	31.72	Peak	19.61	51.33	Q.P	107.95	56.62
Perpendicular	13.563*	24.59	Peak	20.47	45.06	Q.P	124.00	78.94

Table 2: Radiated Emissions Data – 9 kHz – 30 MHz

The highest emission measured was 56.14 dB μ V/m at 13.561 MHz, when antenna is Parallel polarized. It has 67.86 dB margin to the FCC 15.225 limit.

The EUT is in compliance with FCC Part 15 Subpart C 15.225, FCC Part 15 Subpart C 15.209, Industry Canada RSS-210 Issue 7 Section 2.7 and Industry Canada RSS-210 Issue 7 Appendix 2.6 requirements.

B.7. Sample Calculations

Corrected Value= Measured value + AF (antenna factor) + CL (Cable Losses)
Margin = Limit – Corrected value

B.8. Test Data

See plots on following pages

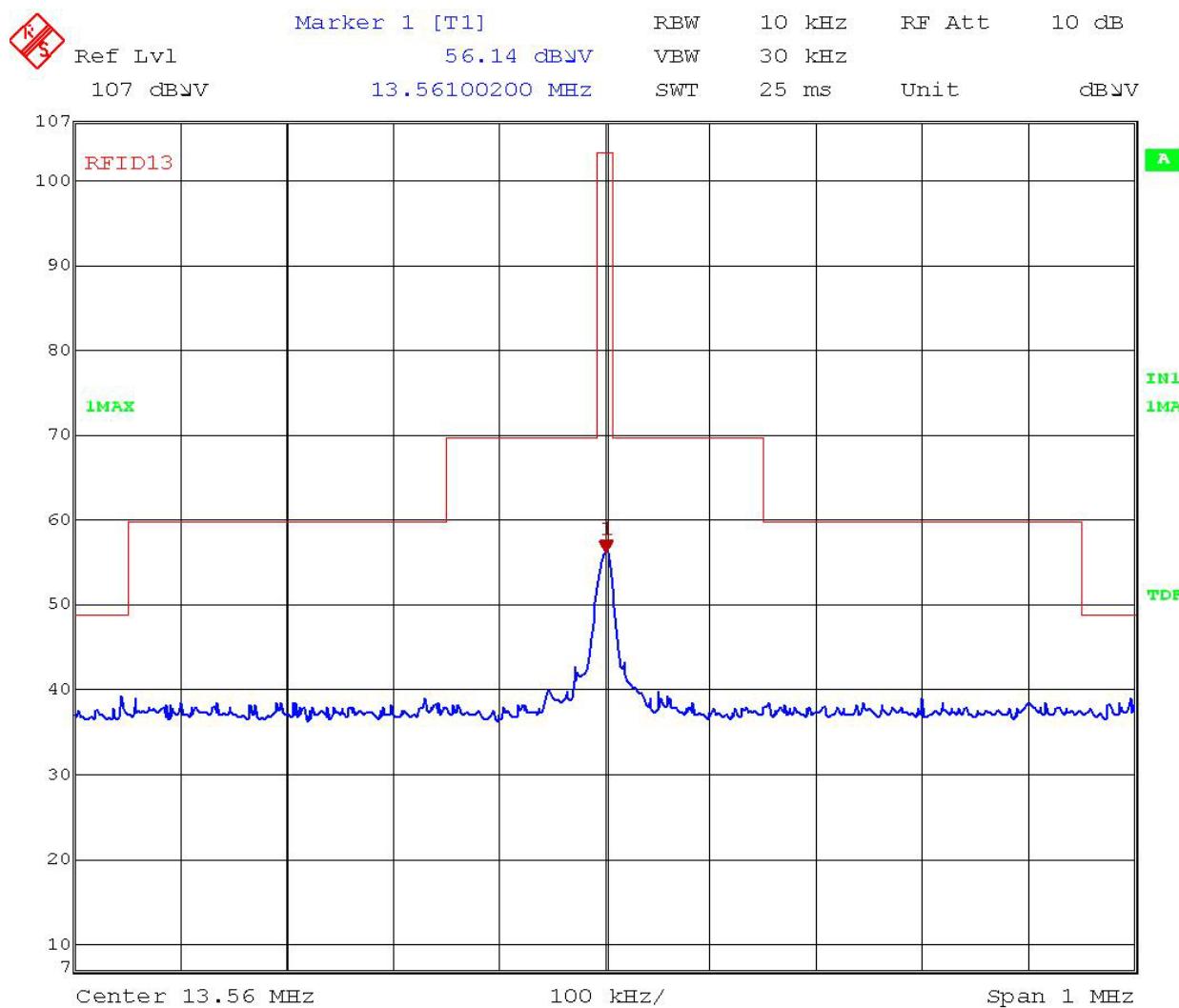
B.9. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Spencer Watson
Function: EMC Technologist

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Title: CG-654 OCE RFID Parallel 3m H-Field

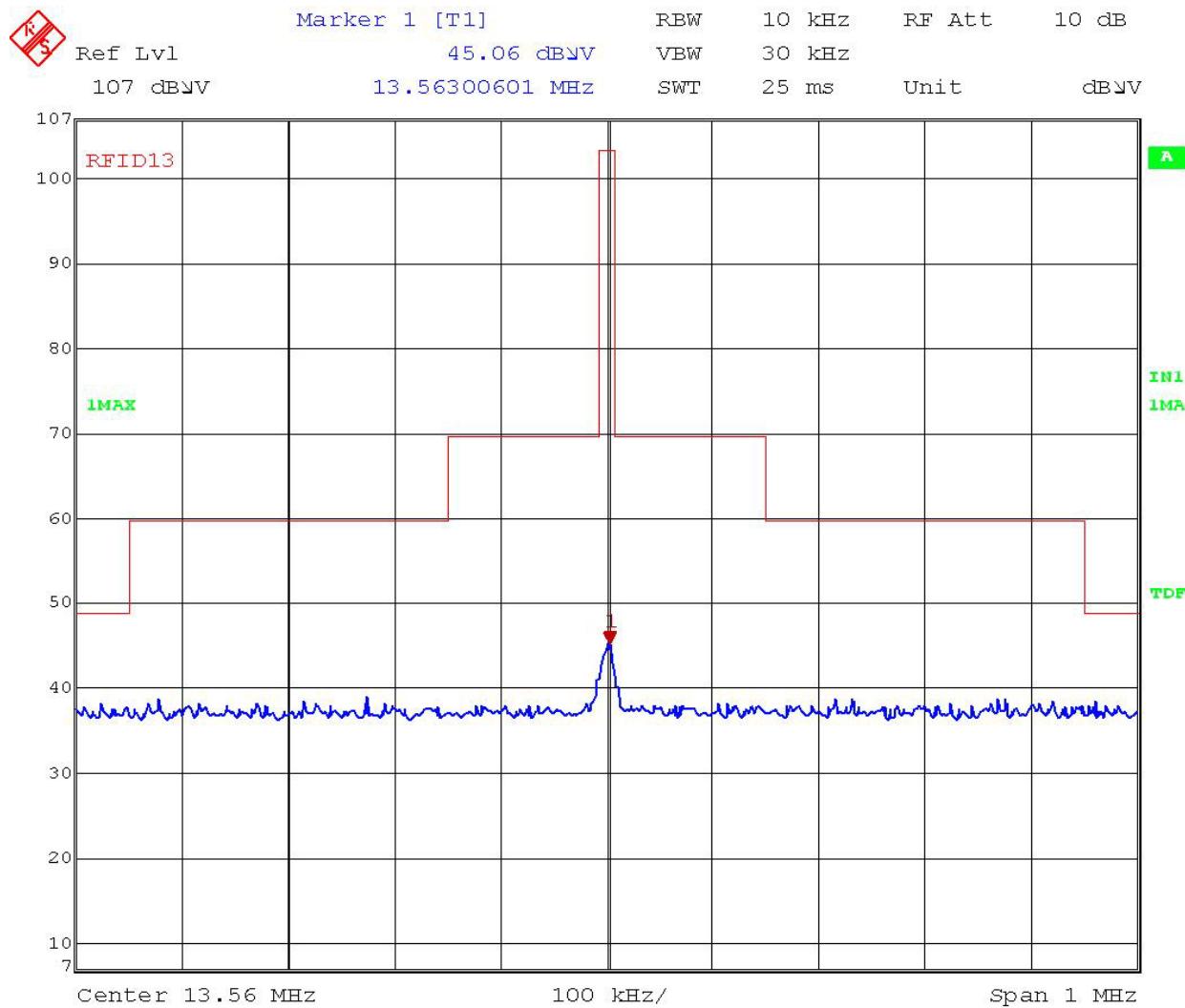
Comment A: Conf22:Max duty cycle, Side Up orientation, no mounting plate, 2 ferrites in support room

Date: 21.SEP.2007 16:28:14

Figure 3 RE - Parallel – 13.06 MHz – 14.06 MHz

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Title: CG-654 OCE RFID Perpendicular 3m H-Field
Comment A: Conf22:Max duty cycle, Side Up orientation, no mounting plate, 2 ferrites in support room
Date: 21.SEP.2007 16:37:57

Figure 4 RE - Perpendicular – 13.06 MHz – 14.06 MHz

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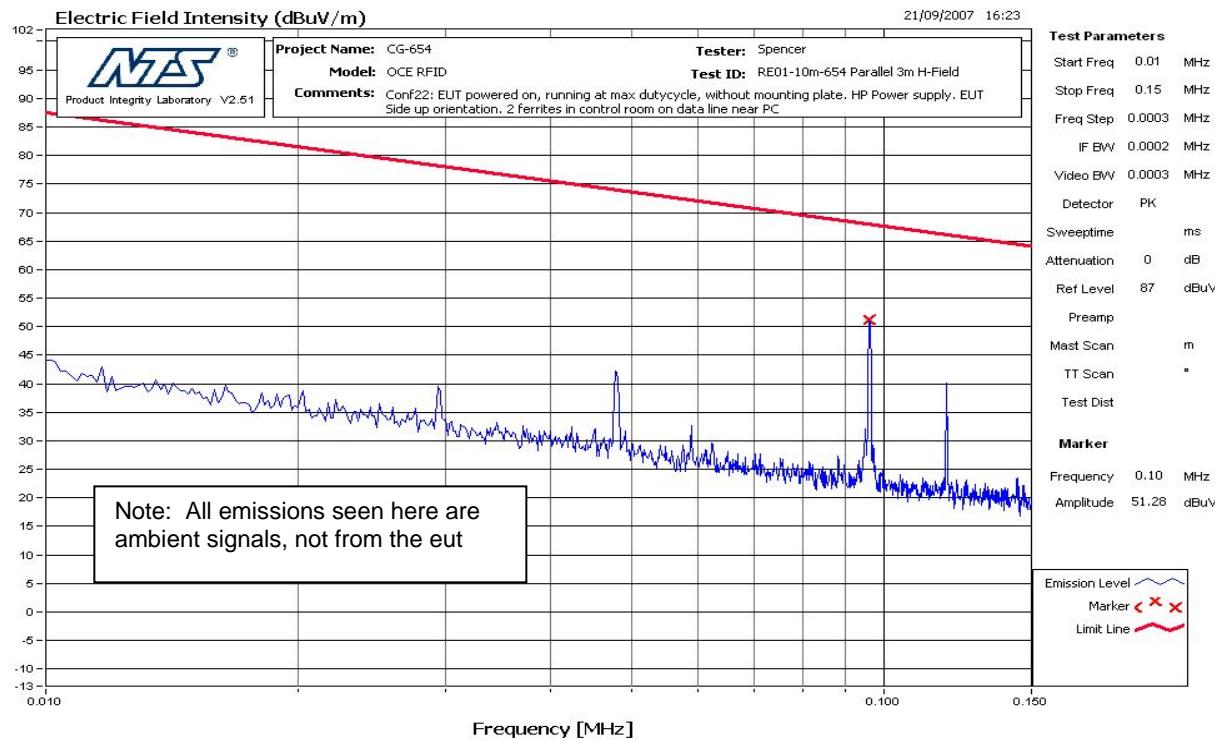


Figure 5 RE - Parallel - 9kHz - 150kHz - Limit shown is not the limit applied

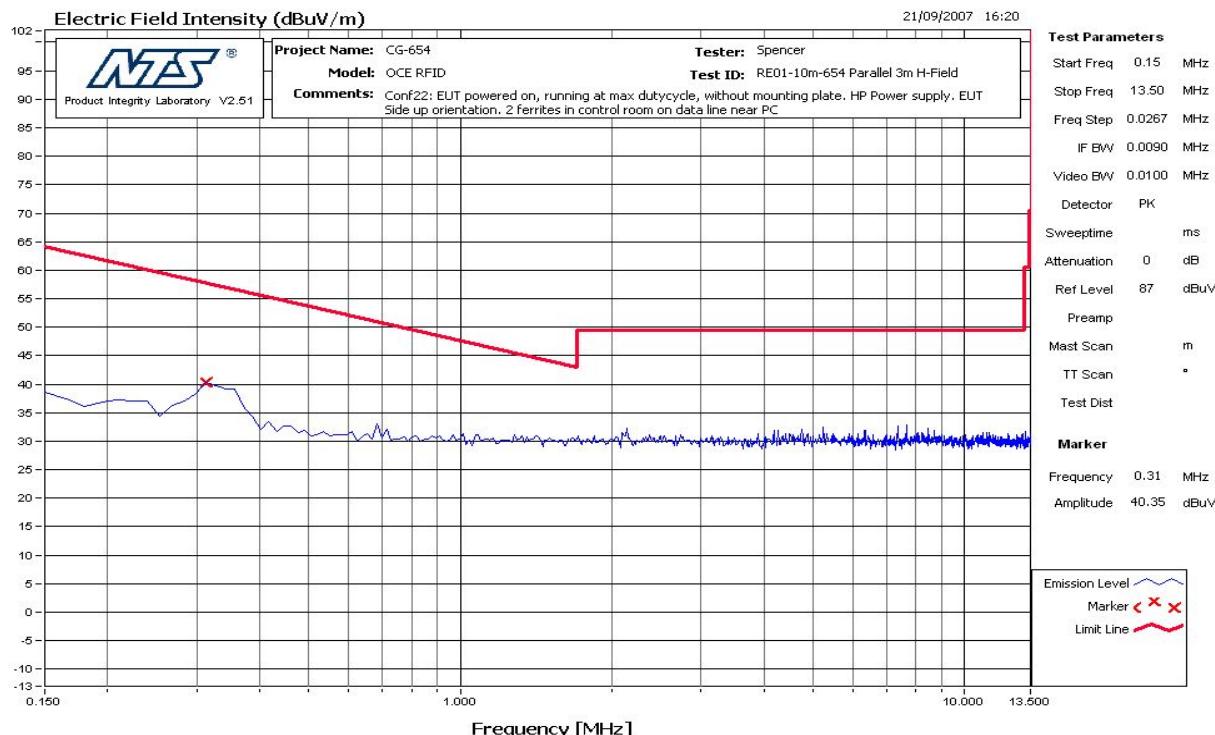


Figure 6 RE - Parallel - 150kHz - 13.5MHz - Limit shown is not the limit applied

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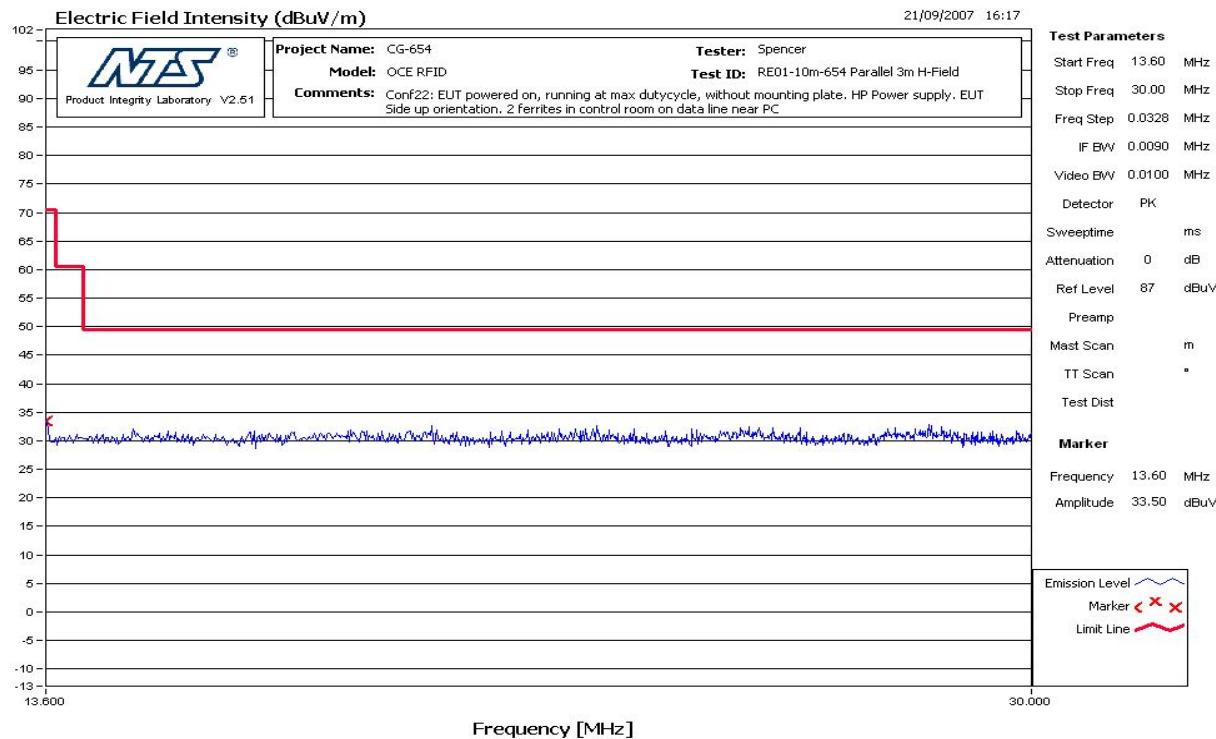


Figure 7 RE - Parallel – 13.60 MHz – 30.0 MHz – Limit shown is not the limit applied

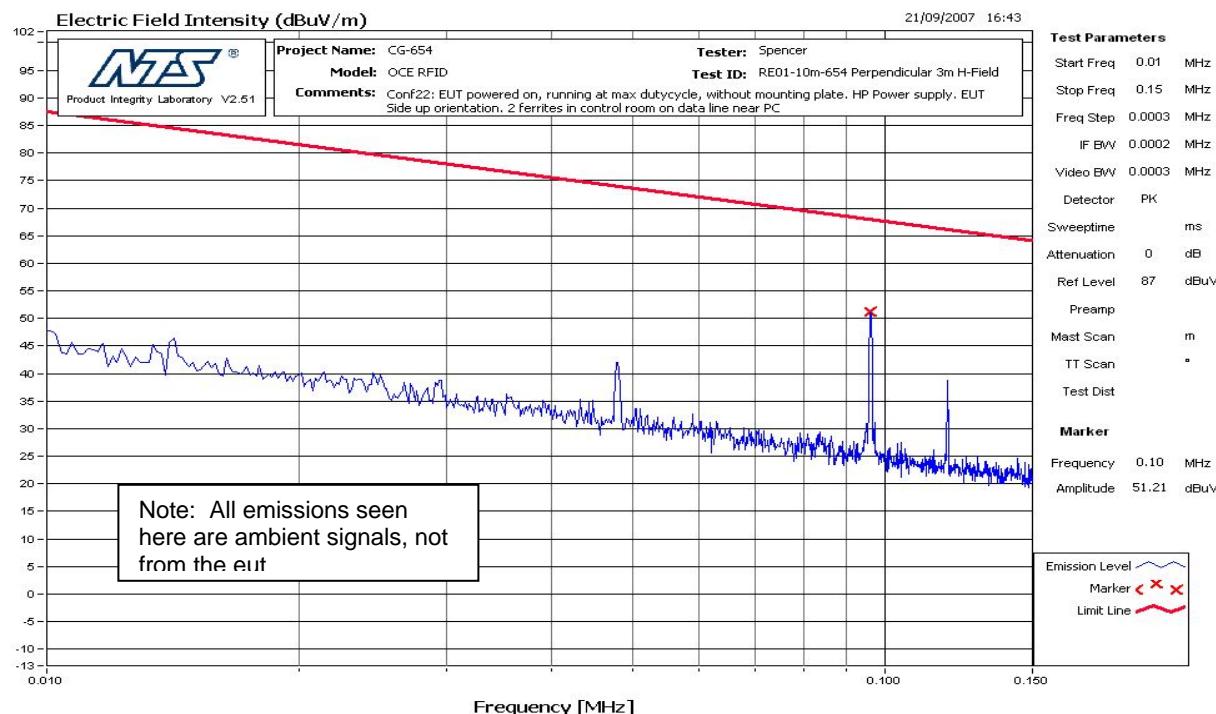


Figure 8 RE – Perpendicular – 9kHz – 150kHz – Limit shown is not the limit applied

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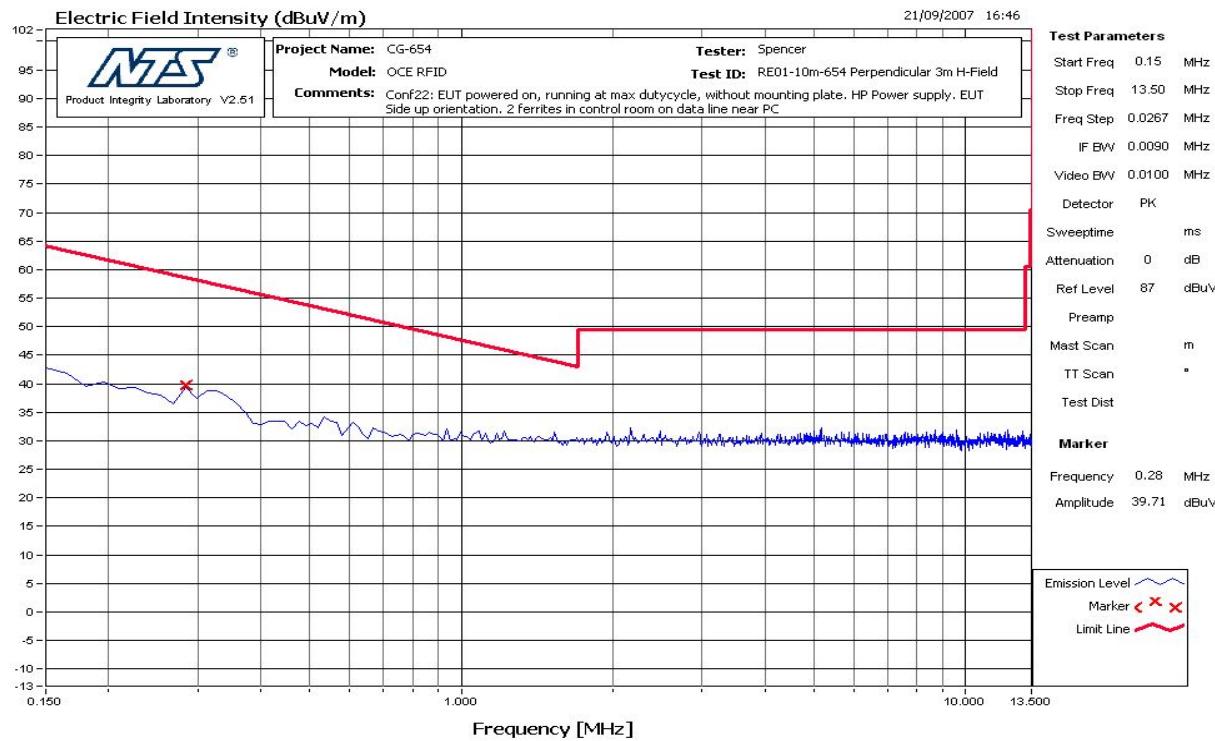


Figure 9 RE - Perpendicular – 150kHz – 13.5MHz – Limit shown is not the limit applied

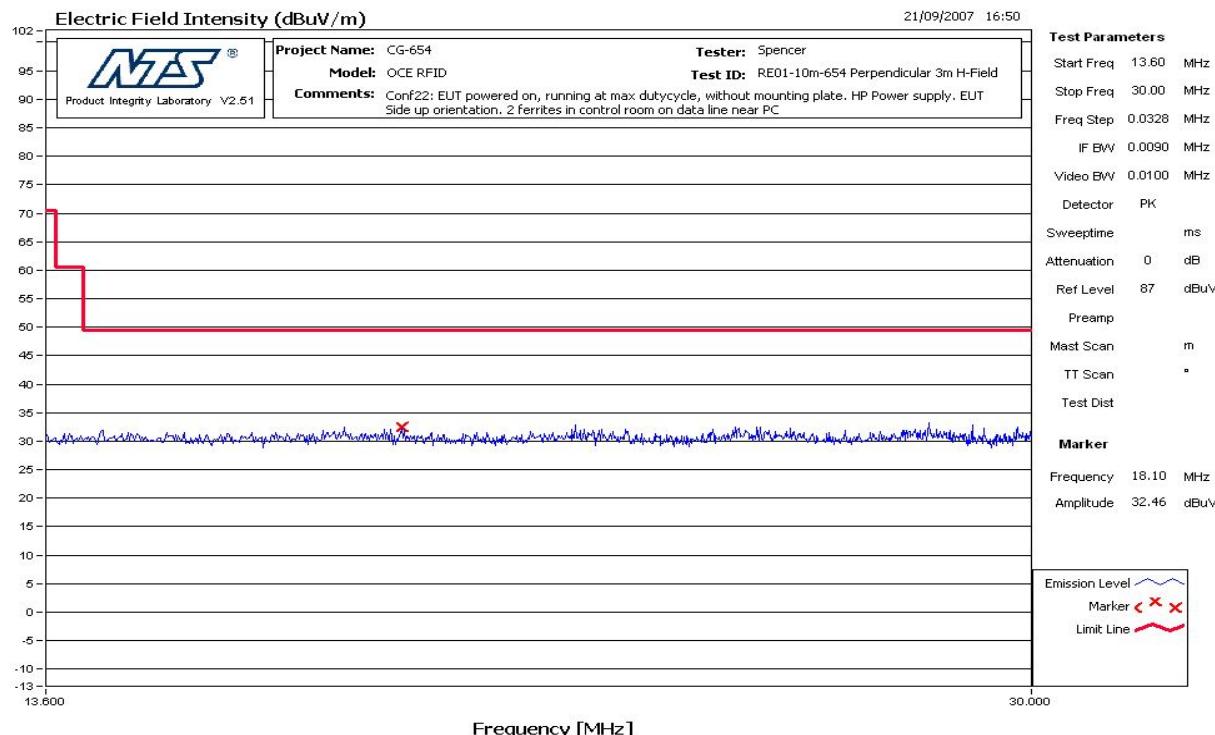


Figure 10 RE - Perpendicular – 13.60 MHz – 30.0 MHz – Limit shown is not the limit applied

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APPENDIX C: FREQUENCY STABILITY

C.1. Base Standard & Test Basis

Base Standard	CFR Title 47 – Telecommunications, Chapter I - FCC Part 15.225 – Radio Frequency Devices, RSS 210 Issue 2 Appendix 2.6
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 Stability Measurements

C.2. Specifications

Supply Voltage	Temperature	Maximum Tolerance
VDC	°C	kHz
24.0	20	1.356
27.6 (115%)	20	1.356
20.4 (85%)	20	1.356
24.0	-20	1.356
24.0	-10	1.356
24.0	0	1.356
24.0	10	1.356
24.0	30	1.356
24.0	40	1.356
24.0	50	1.356

FCC Part 15.225 limit = 0.01% of fundamental frequency

RSS 210 Appendix 2.6 limit = 100 ppm = 0.01% of fundamental frequency

13.56 MHz * 0.0001 = 1.356 kHz

C.3. Deviations

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

C.4. Test Procedure for Temperature Variation

The EUT was allowed to stabilize at each temperature for a period of 20 minutes. The transmitter was keyed on and frequency readings were taken via radiated signal to a loop antenna on one minute intervals for ten minutes. The frequency was recorded and the frequency drift calculated from these measurements.

C.5. Test Procedure for Voltage Variation

The EUT was kept at 20 degrees Celsius for all voltage variation measurements. DC supply voltage was varied by 15% both above and below the rated input level of 24 VDC. The transmitter was keyed on and frequency readings were taken via radiated signal to a loop antenna. The frequency was recorded and the frequency drift calculated from these measurements.

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C.6. Temperature Drift Test Data

Temperature (° C)	Time	Frequency Reading (MHz)	Delta (kHz)	Percent
30.2 °	Initial	13.55885972	-1.1403	-0.00841
30.1 °	1 minute	13.55887132	-1.1287	-0.00832
30.1 °	2 minutes	13.55886853	-1.1315	-0.00834
30.2 °	3 minutes	13.55887976	-1.1202	-0.00826
30.1 °	4 minutes	13.55875952	-1.2405	-0.00915
30.2 °	5 minutes	13.55883968	-1.1603	-0.00856
30.2 °	6 minutes	13.55889980	-1.1002	-0.00811
30 °	7 minutes	13.55887976	-1.1202	-0.00826
30.2 °	8 minutes	13.55879960	-1.2004	-0.00885
30.2 °	9 minutes	13.55883968	-1.1603	-0.00856
30.2 °	10 minutes	13.55879960	-1.2004	-0.00885
40.2 °	Initial	13.55879960	-1.2004	-0.00885
40.4 °	1 minute	13.55879960	-1.2004	-0.00885
40.3 °	2 minutes	13.55879960	-1.2004	-0.00885
40.1 °	3 minutes	13.55902004	-0.9800	-0.00723
40.2 °	4 minutes	13.55881964	-1.1804	-0.00870
40.2 °	5 minutes	13.55883968	-1.1603	-0.00856
40.2 °	6 minutes	13.55883968	-1.1603	-0.00856
40.1 °	7 minutes	13.55879960	-1.2004	-0.00885
40.1 °	8 minutes	13.55883968	-1.1603	-0.00856
40.3 °	9 minutes	13.55883968	-1.1603	-0.00856
40.2 °	10 minutes	13.55879960	-1.2004	-0.00885
50.2 °	Initial	13.55871944	-1.2806	-0.00944
50.1 °	1 minute	13.55871944	-1.2806	-0.00944
50.3 °	2 minutes	13.55871944	-1.2806	-0.00944
50.2 °	3 minutes	13.55873948	-1.2605	-0.00930
50.1 °	4 minutes	13.55873948	-1.2605	-0.00930
50.2 °	5 minutes	13.55873948	-1.2605	-0.00930
50.3 °	6 minutes	13.55873948	-1.2605	-0.00930
50.1 °	7 minutes	13.55873948	-1.2605	-0.00930
50.3 °	8 minutes	13.55887976	-1.1202	-0.00826
50.2 °	9 minutes	13.55877956	-1.2204	-0.00900
50.4 °	10 minutes	13.55873948	-1.2605	-0.00930
-20.3	Initial	13.55885972	-1.1403	-0.00841
-20.4	1 minute	13.55889980	-1.1002	-0.00811
-20.1	2 minutes	13.55885972	-1.1403	-0.00841
-20.2	3 minutes	13.55885972	-1.1403	-0.00841
-20.3	4 minutes	13.55889980	-1.1002	-0.00811
-20.2	5 minutes	13.55885972	-1.1403	-0.00841
-20.4	6 minutes	13.55897996	-1.0200	-0.00752
-20.2	7 minutes	13.55889980	-1.1002	-0.00811
-20.3	8 minutes	13.55886971	-1.1303	-0.00834
-20.1	9 minutes	13.55885972	-1.1403	-0.00841
-20	10 minutes	13.55889980	-1.1002	-0.00811

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Temperature (° C)	Time	Frequency Reading (MHz)	Delta (kHz)	Percent
-10.1	Initial	13.55893988	-1.0601	-0.00782
-10.2	1 minute	13.55893988	-1.0601	-0.00782
-10	2 minutes	13.55889980	-1.1002	-0.00811
-10.3	3 minutes	13.55893988	-1.0601	-0.00782
-10.1	4 minutes	13.55893988	-1.0601	-0.00782
-10.1	5 minutes	13.55889980	-1.1002	-0.00811
-10.2	6 minutes	13.55893988	-1.0601	-0.00782
-10.2	7 minutes	13.55889980	-1.1002	-0.00811
-10.1	8 minutes	13.55893988	-1.0601	-0.00782
-10.3	9 minutes	13.55889980	-1.1002	-0.00811
-10.1	10 minutes	13.55893988	-1.0601	-0.00782
-0.4	Initial	13.55893988	-1.0601	-0.00782
-0.3	1 minute	13.55881964	-1.1804	-0.00870
-0.2	2 minutes	13.55891984	-1.0802	-0.00797
-0.3	3 minutes	13.55891984	-1.0802	-0.00797
-0.4	4 minutes	13.55891984	-1.0802	-0.00797
-0.3	5 minutes	13.55891984	-1.0802	-0.00797
-0.3	6 minutes	13.55891984	-1.0802	-0.00797
-0.5	7 minutes	13.55890206	-1.0979	-0.00810
-0.4	8 minutes	13.55891984	-1.0802	-0.00797
-0.5	9 minutes	13.55892017	-1.0798	-0.00796
-0.6	10 minutes	13.55895992	-1.0401	-0.00767
10.2 °	Initial	13.55891984	-1.0802	-0.00797
10.1 °	1 minute	13.55895992	-1.0401	-0.00767
10.1 °	2 minutes	13.55889980	-1.1002	-0.00811
10.2 °	3 minutes	13.55885972	-1.1403	-0.00841
10.3 °	4 minutes	13.55889980	-1.1002	-0.00811
10.2 °	5 minutes	13.55887976	-1.1202	-0.00826
10.2 °	6 minutes	13.55914028	-0.8597	-0.00634
10.2 °	7 minutes	13.55889980	-1.1002	-0.00811
10.2 °	8 minutes	13.55893988	-1.0601	-0.00782
10.2 °	9 minutes	13.55893546	-1.0645	-0.00785
10.2 °	10 minutes	13.55889980	-1.1002	-0.00811
20.2 °	Initial	13.55893988	-1.0601	-0.00782
20.1 °	1 minute	13.55889980	-1.1002	-0.00811
20.1 °	2 minutes	13.55893988	-1.0601	-0.00782
20.2 °	3 minutes	13.55897996	-1.0200	-0.00752
20.2 °	4 minutes	13.55889980	-1.1002	-0.00811
20.2 °	5 minutes	13.55885972	-1.1403	-0.00841
20.1 °	6 minutes	13.55885972	-1.1403	-0.00841
20.2 °	7 minutes	13.55889980	-1.1002	-0.00811
20 °	8 minutes	13.55885972	-1.1403	-0.00841
20.2 °	9 minutes	13.55889980	-1.1002	-0.00811
20 °	10 minutes	13.55885972	-1.1403	-0.00841

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C.7. Voltage Drift Test Data

Voltage Variations	Frequency Reading (MHz)	Delta (kHz)	Percent
85 % of 24 VDC = 20.4 VDC	13.5588998	-1.1002	-0.008114
115 % of VDC = 27.6 VDC	13.55906012	-0.93988	-0.006931

C.8. Test Results

The maximum frequency drift from both temperature and voltage variation was found to be 1281 Hz at 50 degrees C (-0.009444% of fundamental frequency, 94.44 ppm).

The EUT is in compliance with FCC Part 15 Subpart C 15.225 and Industry Canada RSS 210 Issue 7 Appendix 2.6 requirements.

C.9. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: James MacKay
Function: EMC Technologist

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APPENDIX D: OCCUPIED BANDWIDTH

D.1. Base Standard & Test Basis

Base Standard	RSS Gen Issue 2 June 2007
Test Basis	RSS Gen Issue 2 section 4.6.1
Test Method	RSS Gen Issue 2 section 4.6.1

D.2. Specifications

The 99% occupied BW is measured and used to determine the emission designator

D.3. Deviations

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

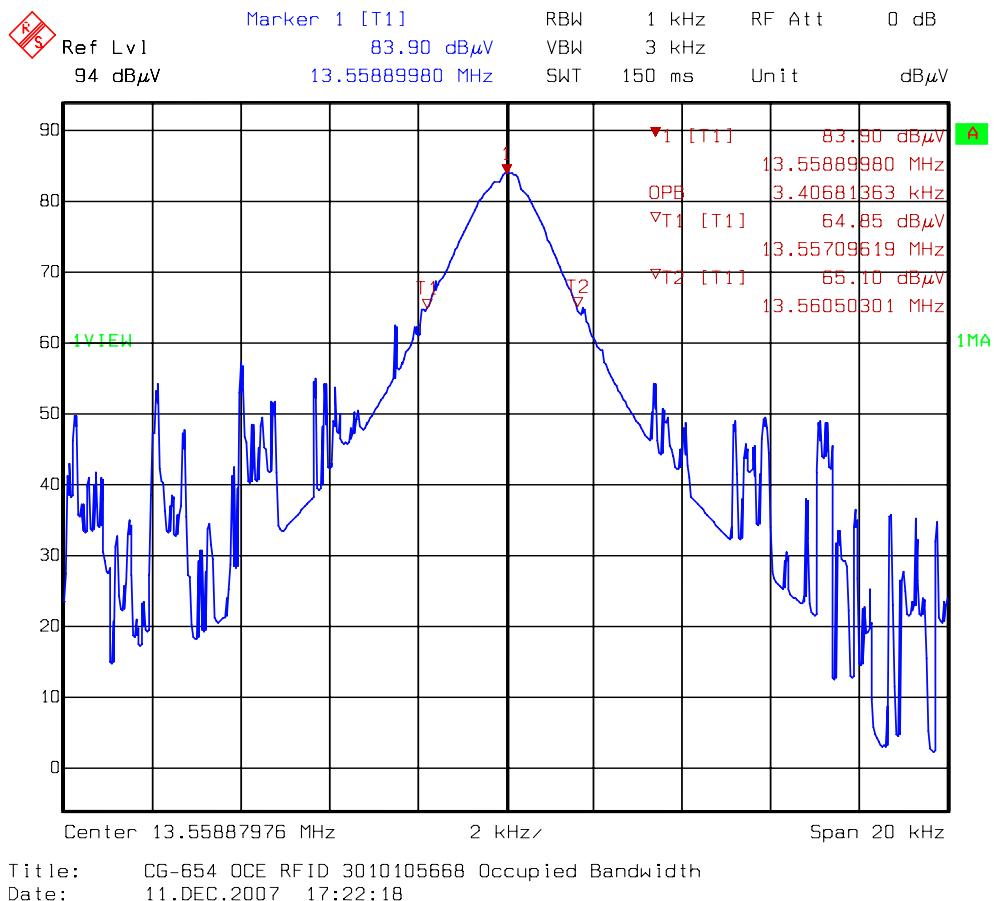
D.4. Test Results

Compliant. The 99% occupied bandwidth is 3.407 KHz

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D.5. Test Data



D.6. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Spencer Watson
Function: EMC Technologist

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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	<input checked="" type="checkbox"/> Chase	CBL 6112B	CG0314	24SEP07	24AUG06
RF Cable	Suhner Sucoflex	Ferrite bead loaded cable	CG0398	13APR08	13APR06
Digital Barometer / Thermometer	Cole-Parmer	1870	CG0728	19JUN08	19JUN07
CONTROL ROOM					
Test Receiver	Rohde & Schwarz	ESMI	CG0433/CG0434	27FEB08	27FEB07
Mast Controller	EMCO	2090	CG0179	N/A	N/A
Multi Device Controller TT1 (Turntable)	EMCO	2090	CG0178	N/A	N/A
RF 10m East site Link				13APR08	13APR06
- Cable 1	Suhner Sucoflex	NA	CG0690		
- Cable 2	Suhner Sucoflex	NA	CG0634		
- Cable 3	Suhner Sucoflex	NA	CG0660		
- Cable 4	Suhner Sucoflex	NA	CG0661		
- Amplifier	Hewlett Packard	8447F	CG0177		

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E.2. Radiated H-Field Emissions 10kHz – 30MHz Measurement Equipment

Descriptions	Manufacturer	Type/Model	Asset #	Cal Due	Cal Date
10m ANECHOIC CHAMBER					
Loop Antenna (Rx) 10 KHz – 30 MHz	Rohde & Schwarz	HFH2-Z2	CG0701	02JUL08	02JUL07
E-field link Cable 10 KHz – 35 MHz	Sucoflex	N/A	CG0667	8JAN08	8JAN06
Digital Barometer / Thermometer	Cole-Parmer	1870	CG0728	19JUN08	19JUN07
CONTROL ROOM					
Test Receiver	Rohde & Schwarz	ESMI	CG0433/ CG0434	27FEB08	27FEB07
Cable to Receiver	NA	NA	CG0685	18JAN08	18JAN06

E.3. Frequency Stability Measurement Equipment

Descriptions	Manufacturer	Type/Model	Asset #	Cal Due	Cal Date
Temperature Chamber	Thermotron Industries	S-16C	CG0001	NA	NA
Data Acquisition/ Switch unit	Hewlett Packard	34970A	CG0016	27NOV07	27NOV06
Test receiver Spectrum Analyzer 9k-40GHz	Rohde & Schwarz	FSEK-20	CG0118	19JUN08	19JUN07
DC Power Supply	Harrison	6206B	S/N:6E6028	NA	NA
RMS Multimeter	Fluke	87	CG0383	29JAN08	29JAN07
EMI Passive Loop Antenna 1 kHz to 30 MHz	EMCO	6509	CG0095	NA	NA

E.4. Occupied Bandwidth Measurement Equipment

Descriptions	Manufacturer	Type/Model	Asset #	Cal Due	Cal Date
Test receiver Spectrum Analyzer 9k-40GHz	Rohde & Schwarz	FSEK-20	CG0118	19JUN08	19JUN07
EMI Passive Loop Antenna 1 kHz to 30 MHz	EMCO	6509	CG0095	NA	NA

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