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Test Report: 111264-3TRFWL

Applicant: Amphitech Systems
3440 Francis-Hughes Suite 120
Laval, Quebec
H7L 5A9

Apparatus: STS-1400

In Accordance With: FCC Part 1.1310 Radio Frequency radiation
exposure limits

Tested By: Nemko Canada Inc.
303 River Road
Ottawa, Ontario
K1V 1H2

Authorized By:

A handwritten signature in blue ink, appearing to read "Sim Jagpal".

Sim Jagpal, Resource Manager

Date: October 9, 2008

Total Number of Pages: 12

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 1.1310 Radiofrequency radiation exposure limits.

The assessment summary is as follows:

Apparatus Assessed: STS-1400

Specification: FCC Part 1.1310

Compliance Status: Complies

Exclusions: None

Non-compliances: None

Report Release History: Original Release

Author: Jason Nixon, Wireless/Telecom Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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Section 1 : Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows:

STS-1400 Perimeter Surveillance Radar

1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Serial No.
1	STS-1400 radar (M/N: 921-0011-05-R0A)	SN08070001

The first samples were received on: August 25, 2008

1.3 Technical Specifications of the EUT

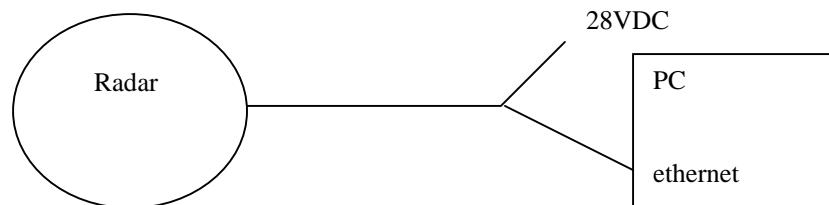
Transmit Frequency: 35GHz +/-250MHz

Modulation: Swept frequency

Output Power: 0.5Watts

Antenna Data: 32dBi bi-static antenna

1.4 Block Diagram of the EUT



Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 1.1310 Radiofrequency radiation exposure limits
IEEE C95.3 – 2002, Annex B.4

2.2 Test Procedures

Test procedure used is attached in Appendix C. The test plan in Appendix C explains the far/near field effects and reduction factors.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 °C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
Spectrum Analyzer	Rohde & Schwarz	FSP40	FA001920	April 14/09
WR28 20dB Attenuator	Dorado Company	FA-28-20	99001	COU
Isotropic Electric field probe	Narda	A8722D	13020	08/29/09
Electrmagnetic Survey Meter	Narda	8718B	2026	09/25/09

COU – Calibrate on Use

NCR – No Calibration Required

2.5 Measurement Uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95% and can be found in Nemko Canada document MU-003.

Section 3 : Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 1.1310 : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No : not applicable / not relevant.

Y Yes : Mandatory i.e. the apparatus shall conform to these tests.

N/T Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

4.1 FCC Part 15 Subpart C : Test Results

Rule Part	Test Description	Required	Result
1.1310(a)	Limits for Occupational/Controlled Exposure	N	
1.1310(b)	Limits for General Population/Uncontrolled Exposure	Y	PASS

Notes:

Appendix A : Test Results

Clause 1.1310(b) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Test Conditions:

Sample Number:	1	Temperature (°C):	26
Date:	September 3, 2008	Humidity (%):	39
Modification State:	0	Tester:	Jason Nixon
		Laboratory:	Shielded Room

Test Results: See Attached tabular data.

Additional Observations:

Measurements were performed with rotation stopped and the swept frequency modulation enabled.

Measurements were performed at the radome of the EUT and back up to 30cm from the radome.

The isotropic probe was rotated 360° and only the highest measurement was reported. The EUT was also investigated by tilting the transmit antenna up and down to maximize the power density.

Output power:

Before exposure measurements	26.25dBm
After exposure measurements	27.01dBm

Transmit power was measured before and after with the sweeping off. It was performed with a spectrum analyzer set to Peak-max hold and a 1MHz RBW/3MHz VBW.

Power density:

Distance from Radome	Measured Power density	Rotation Correction factor	Average power density	Limit
0cm	1.885mW/cm ²	0.283	0.533mW/cm ²	1mW/cm ²
5cm	1.687mW/cm ²	0.226	0.381mW/cm ²	1mW/cm ²
10cm	1.525mW/cm ²	0.189	0.288mW/cm ²	1mW/cm ²
20cm	1.123mW/cm ²	0.141	0.158mW/cm ²	1mW/cm ²
30cm	0.843mW/cm ²	0.113	0.095mW/cm ²	1mW/cm ²

Rotation Correction Factor:

$$(a/(2\pi d))(360/\theta)$$

where a = length of antenna = 0.3556m

d = distance from antenna = 0.2m at the edge of the Radome

θ = scan angle = 360° for full turn

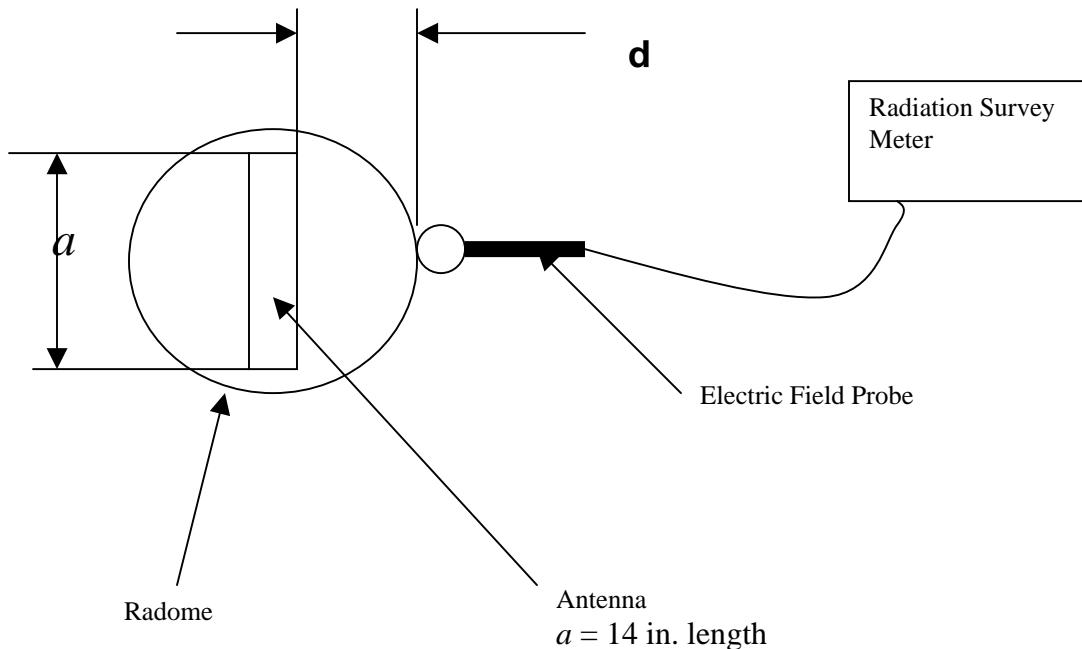
Appendix B : Test Plan

Scanning Antenna RF Exposure Test Plan

Test Equipment: RF Exposure Meter and Field Probe.

Equipment Under Test: 35 GHz PSR-1400 Perimeter Surveillance Radar

Test Setup Diagram



The equipment under test is perimeter surveillance radar that rotates continuously for 360 degrees in one direction at the rate of 1.08 seconds per turn.

Antenna dimension is 14 inches in length by 3 inches in height. This is $0.3556 \text{ m} \times 0.0762 \text{ m}$

Wavelength at 35 GHz is $\lambda = 300 / 35000 = 0.00857 \text{ m}$

Antenna length to wave length ratio is $0.3556 / 0.00857 = 41.5$

Therefore the antenna is electrically large at this frequency and the far field can be assumed to begin at $2a^2/\lambda$ or more realistically at $0.5a^2/\lambda = 0.5 \times 0.3556^2 / 0.00857 = 7.37 \text{ m}$
All measurements are in the near field $< 7.37 \text{ m}$ from the antenna.

The maximum power flux density is measured along the main axis of the antenna with the rotation stopped and is reduced by the near field rotational reduction factor of annex B.4 IEEE Std C95.3 – 2002 equation 41.

For example at 20 cm distance the near field rotational factor is $(a/(2\pi d))(360/\theta)$

$a = 0.3556 \text{ m}$, $d = 0.2 \text{ m}$, $\theta = 360^\circ$ scan angle

$$((0.3556 / (2 \times \pi \times 0.2)) \times (360/360)) = 0.283$$

Appendix C : Extrapolation Demonstration

The following plot is a demonstration of the extrapolation factors when the measurement results are plotted against inverse linear and square law.

This plot is for demonstrational purposes only.

