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DATE: 23 August 2015

I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report

for

Magos Systems Ltd.

Equipment under test:

Outdoor Radar Based Perimeter Security Sensor

SR500

Tested by: _____
N. Levi

Approved by: _____
D. Shidlowsky

Measurement/Technical Report for Magos Systems Ltd.

Equipment under test:

Outdoor Radar Based Perimeter Security Sensor SR500

FCC ID: 2AFHU-SR500

This report concerns:	Original Grant:	X
	Class I change:	
	Class II change:	
Equipment type:	Digital Transmission System	
Limits used:	47CFR15 Section 15.249 (a, c, d, e)	

Measurement procedure used is ANSI C63.4-2003

Application for Certification prepared by:
R. Pinchuck
ITL (Product Testing) Ltd.
1 Bat Sheva Street
Lod
Israel
Tel: +972-8-918-6117
Fax: +972-8-915-3101
Email: Rpinchuck@itl.co.il

Applicant for this device: (different from "prepared by")
Amit Isserof
Mago Systems Ltd.
13 Gad Feinstein St.
Rehovot 76385171, Israel
Tel: +972-77-414-0155
Fax: +972-77-414-0165
Email: amit@magosys.com

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1. General Information

1.1 Administrative Information

Manufacturer:	Magos Systems Ltd.
Manufacturer's Address:	13 Gad Feinstein St., Rehovot, 7638517 Israel Tel: +972-77-414-0155 Fax: +972-77-414-0165
Manufacturer's Representative:	Amit Isserof
Equipment Under Test (E.U.T):	Outdoor Radar Based Perimeter Security Sensor
Equipment Model No.:	SR500
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	01.07.15
Start of Test:	01.07.15
End of Test:	07.07.15
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St., Lod ISRAEL 7120101
Test Specifications:	FCC Part 15, Subpart C, Section 15.249

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation Number US1004.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-3006, R-2729, T-1877, G-245.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025A-1.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

High Resolution Short-Range Ground Surveillance Radar
The SR-500 is the most cost effective perimeter protection solution for both rural and more saturated environments, without compromising detection performance.
By utilizing state of the art MIMO & Digital beam forming technology It covers an area of more than 250,000m2(>61acres) with a detection range of 400m for walker and 600m for vehicle/boat, and yet consumes extremely low power (<2.5W) and small form factor.
It boasts an ultra-high range resolution of 0.4m giving it excellent performance in cluttered environments. Its small size, low power consumption and low weight make it simple to install and renders it ideal as a deployable system.

List of ancillary and/or support equipment provided by the applicant

Description	Manufacturer	Model/Part Number	Serial Number
Laptop for running monitoring software	dell	Vostro 3700	7X9WZM1
DC power supply	LAMBDA	GEN1500W	------

Description of Interface Cables for Testing

Cable Type	Shield	Length [m]	Ferrite	Connection1	Connection2
Custom (supplied with product)	yes	15	None	12 pin service connector on the product	2 spades for DC power , RJ45 for Ethernet communication

1.4 Test Methodology

Unintentional Radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

Radiated emissions tests were performed at I.T.L.'s testing facility in Lod, Israel. I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and its FCC Designation Number is US1004.

1.6 Measurement Uncertainty

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.96 dB

2. System Test Configuration

2.1 Justification

The EUT was operating in CW continuous mode in the low (5740 MHz) mid (5800 MHz) and high (5860 MHz) frequencies.

2.2 EUT Exercise Software

No special exercise software was needed to achieve compliance.

2.3 Special Accessories

No special exercise Accessories was needed to achieve compliance

2.4 Equipment Modifications

No equipment modifications were needed to achieve compliance.

2.5 Configuration of Tested System

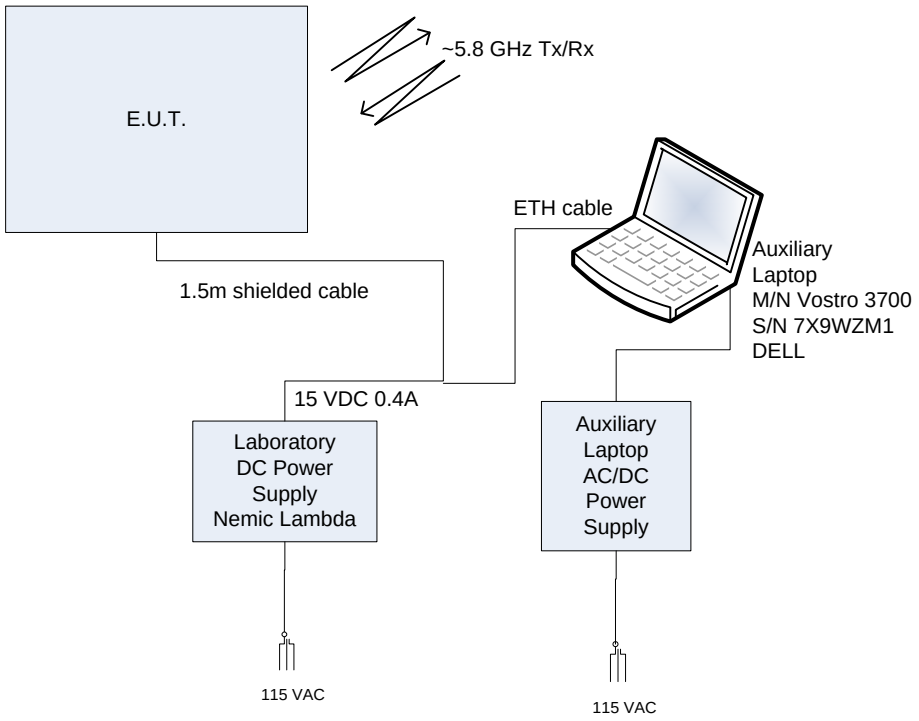

Figure 1. Configuration of Tested System

3. Conducted and Radiated Measurement Test Set-Up Photos

Figure 2. Conducted Emission From AC Mains Test

Figure 3. Spurious Radiated Emission Test

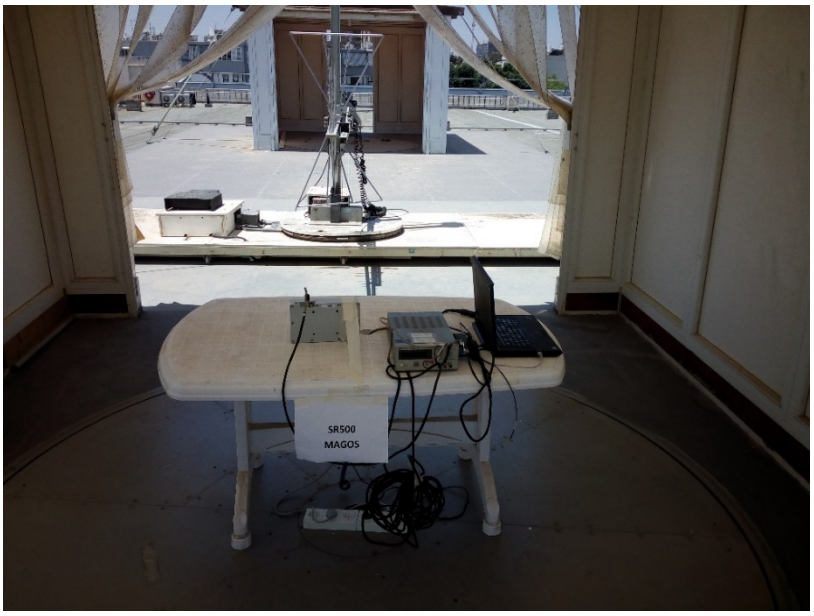

Figure 4. Spurious Radiated Emission Test

Figure 5. Spurious Radiated Emission Test

4. Conducted Emission from AC Mains

4.1 Test Specification

0.15 - 30 MHz, FCC Part 15, Subpart B, CLASS B

4.2 Test Procedure

The E.U.T operation mode and test setup are as described in Section 2.. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on a 0.8 meter high wooden table. In the case of a floor-standing E.U.T., it was placed on the horizontal ground plane.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 µHn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T.'s AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission. The configuration tested is shown in the photograph, *Figure 2. Conducted Emission From AC Mains Test*.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are
pre-loaded to the receiver and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 Test Results

The E.U.T met the requirements of the FCC Part 15, Subpart B, Class B specification.

The margin between the emission levels and the specification limit is, in the worst case, 15.53 dB for the phase line at 0.194 MHz and 16.36 dB at 0.194 MHz for the neutral line.

The details of the highest emissions are given in *Figure 6* to *Figure 9*.

Conducted Emission

E.U.T Description	Outdoor Radar Based Perimeter Security Sensor
Type	SR500
Serial Number:	Not designated

Specification: FCC Part 15, Subpart B, Class B
Lead: Phase
Detectors: Quasi-peak, Average

EDIT PEAK LIST (Final Measurement Results)

Trace1: CE22BQP
Trace2: CE22BAP
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	194 kHz	44.26	-19.60
2	Average	194 kHz	38.32	-15.53
1	Quasi Peak	290 kHz	29.54	-30.98
2	Average	290 kHz	23.98	-26.53
1	Quasi Peak	486 kHz	22.12	-34.11
2	Average	486 kHz	14.11	-32.12
1	Quasi Peak	766 kHz	17.53	-38.46
2	Average	770 kHz	14.22	-31.77
1	Quasi Peak	1.642 MHz	18.04	-37.95
2	Average	1.642 MHz	13.92	-32.07
1	Quasi Peak	2.866 MHz	11.52	-44.47
2	Average	2.994 MHz	6.42	-39.57
1	Quasi Peak	4.978 MHz	15.66	-40.33
2	Average	4.978 MHz	10.95	-35.04
2	Average	9.85 MHz	19.58	-30.41
1	Quasi Peak	10.242 MHz	23.48	-36.51
2	Average	15.646 MHz	21.89	-28.11
1	Quasi Peak	16.13 MHz	29.64	-30.35
1	Quasi Peak	22.126 MHz	32.06	-27.93
2	Average	22.126 MHz	28.63	-21.36

Date: 9.JUL.2015 14:28:37

Figure 6. Detectors: Quasi-peak, Average

Note: DELTA LIMIT refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description	Outdoor Radar Based Perimeter Security Sensor
Type	SR500
Serial Number:	Not designated

Specification: FCC Part 15, Subpart B, Class **B**
Lead: Phase
Detectors: Quasi-peak, Average

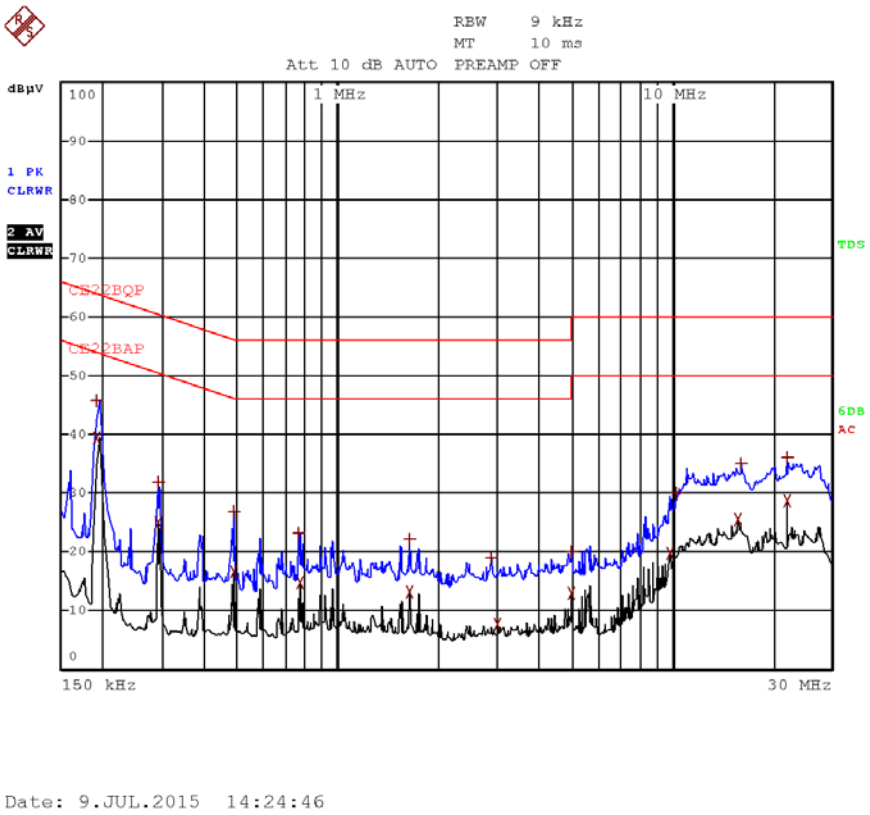

Figure 7 Detectors: Quasi-peak, Average

Conducted Emission

E.U.T Description	Outdoor Radar Based Perimeter Security Sensor
Type	SR500
Serial Number:	Not designated

Specification:	FCC Part 15, Subpart B, Class **B**
Lead:	Neutral
Detectors:	Quasi-peak, Average

EDIT PEAK LIST (Final Measurement Results)

Trace1: CE22BQP
Trace2: CE22BAP
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	194 kHz	43.25	-20.60
2	Average	194 kHz	37.50	-16.36
1	Quasi Peak	290 kHz	27.91	-32.61
2	Average	290 kHz	22.59	-27.93
1	Quasi Peak	486 kHz	18.27	-37.96
2	Average	486 kHz	11.60	-34.62
1	Quasi Peak	770 kHz	19.15	-36.84
2	Average	770 kHz	13.81	-32.18
2	Average	1.642 MHz	13.03	-32.96
1	Quasi Peak	1.742 MHz	12.76	-43.23
1	Quasi Peak	3.05 MHz	11.96	-44.03
2	Average	3.054 MHz	7.71	-38.28
1	Quasi Peak	4.882 MHz	14.29	-41.70
2	Average	5.486 MHz	12.79	-37.20
1	Quasi Peak	10.334 MHz	25.07	-34.92
2	Average	10.334 MHz	18.10	-31.90
2	Average	15.062 MHz	21.76	-28.23
1	Quasi Peak	15.742 MHz	29.01	-30.98
2	Average	22.126 MHz	28.09	-21.90
1	Quasi Peak	22.986 MHz	29.66	-30.33

Date: 9.JUL.2015 14:42:01

Figure 8. Detectors: Quasi-peak, Average

Note: DELTA LIMIT refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description	Outdoor Radar Based Perimeter Security Sensor
Type	SR500
Serial Number:	Not designated

Specification: FCC Part 15, Subpart B, Class B
Lead: Neutral
Detectors: Quasi-peak, Average

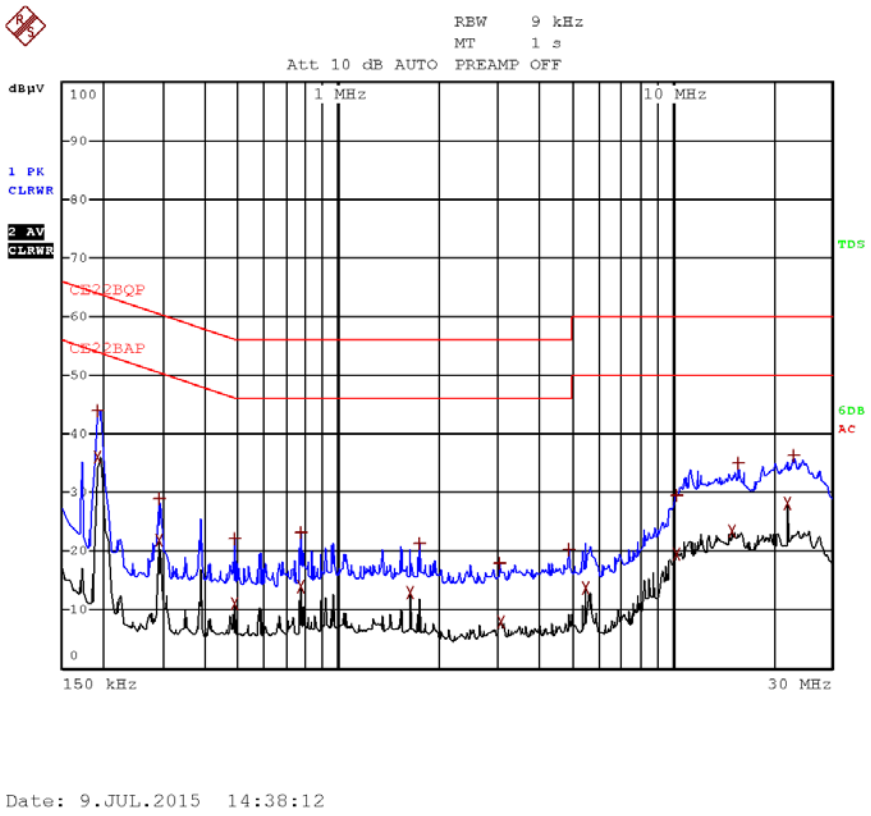

Figure 9 Detectors: Quasi-peak, Average

4.4 Test Instrumentation Used; Conducted Emission from AC Mains

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
LISN	Fischer	FCC-LISN-2A	127	March 16, 2015	1 year
Transient Limiter	HP	11947A	3107A03041	May 13, 2015	1 year
EMI Receiver	R&S	ESCI7	100724	January 4, 2015	1 year

Figure 10 Test Equipment Used

5. Field Strength of Fundamental

5.1 Test Specification

F.C.C., Part 15, Subpart C, Section 15.249(a)

5.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 2. The E.U.T. was placed on a non-conductive table, 0.8 meters above the chamber floor.
The EMI receiver was set to the E.U.T. Fundamental Frequencies: low (5740 MHz) mid (5800 MHz) and high (5860 MHz) using a Peak Detector. The turntable and antenna were adjusted for maximum level reading on the EMI receiver. The measurement was performed for vertical and horizontal polarizations of the test antenna.

5.3 Test Results

JUDGEMENT: Passed by 15.7 dB

The EUT met the FCC Part 15, Subpart C, Section 15.249(a) specification requirements.

The details of the highest emissions are given in *Figure 11*.

Field Strength of Fundamental

E.U.T Description	Outdoor Radar Based Perimeter Security Sensor
Model Number	SR500
Serial Number:	Not designated

Specification: F.C.C., Part 15, Subpart C 15.249(a)

Antenna Polarization: Horizontal/Vertical

Test Distance: 3 meters Detector: Peak, Average

Freq.	Pol.	PEAK Reading	PEAK Specification	Margin	AVG Result	AVG Specification	Margin
(MHz)	V/H	(dBµV/m)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
5740	H	72.3	114.0	-41.7	61.4	94.0	-32.6
5740	V	80.7	114.0	-33.3	61.2	94.0	-32.8
5800	H	72.3	114.0	-41.7	70.4	94.0	-23.6
5800	V	79.3	114.0	-34.7	78.3	94.0	-15.7
5860	H	71.0	114.0	-43.0	68.6	94.0	-25.4
5860	V	74.3	114.0	-39.7	72.6	94.0	-21.4

Figure 11. Field Strength of Fundamental. Antenna Polarization: HORIZONTAL/VERTICAL. Detector: Peak, Average

Note: Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

* "Peak Amp." includes "Correction Factors.

"Correction Factors" = Antenna Correction Factor + Cable Loss.

Field Strength of Fundamental

E.U.T Description	Outdoor Radar Based Perimeter Security Sensor
Model Number	SR500
Serial Number:	Not designated

Specification: F.C.C., Part 15, Subpart C 15.249(a)

Antenna Polarization: Horizontal/Vertical
Operation Frequency: Low/Mid/High
Test Distance: 3 meters
Detector: Peak, Average

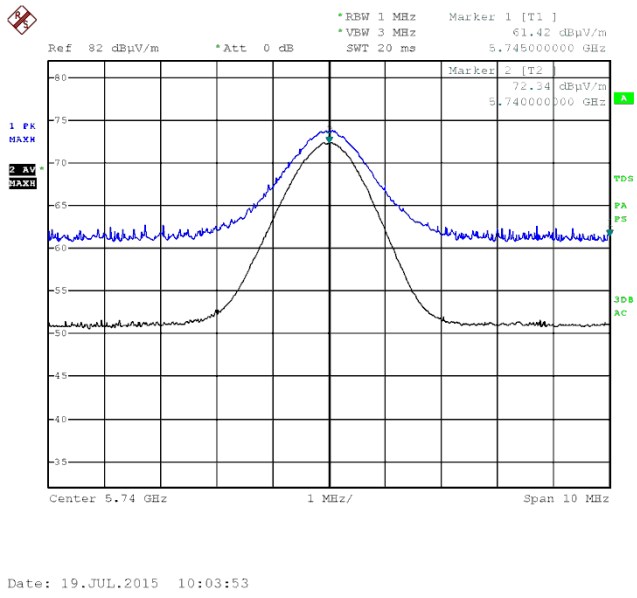

Figure 12. Field Strength of Fundamental. HORIZONTAL – Low

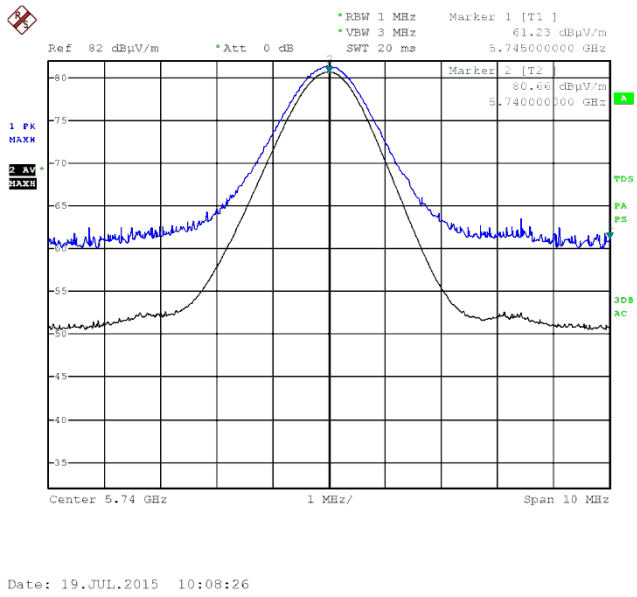

Figure 13. Field Strength of Fundamental. VERTICAL - Low

Field Strength of Fundamental

E.U.T Description	Outdoor Radar Based Perimeter Security Sensor
Model Number	SR500
Serial Number:	Not designated

Specification: F.C.C., Part 15, Subpart C 15.249(a)

Antenna Polarization: Horizontal/Vertical
Operation Frequency: Low/Mid/High
Test Distance: 3 meters
Detector: Peak, Average

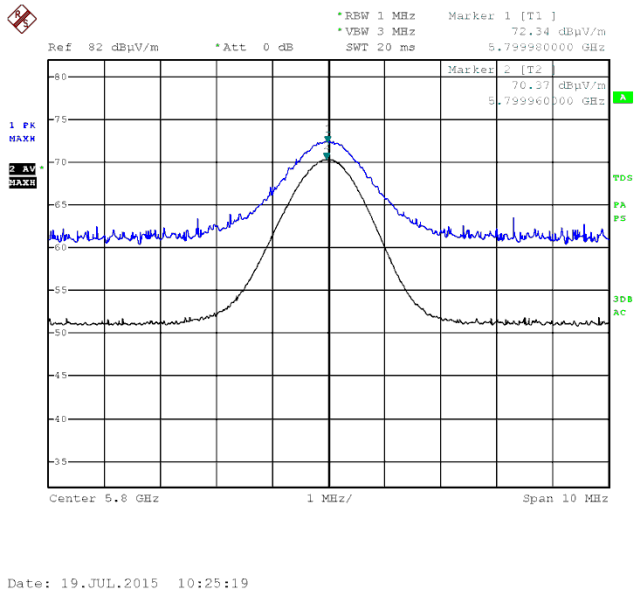

Figure 14. Field Strength of Fundamental. HORIZONTAL - Mid

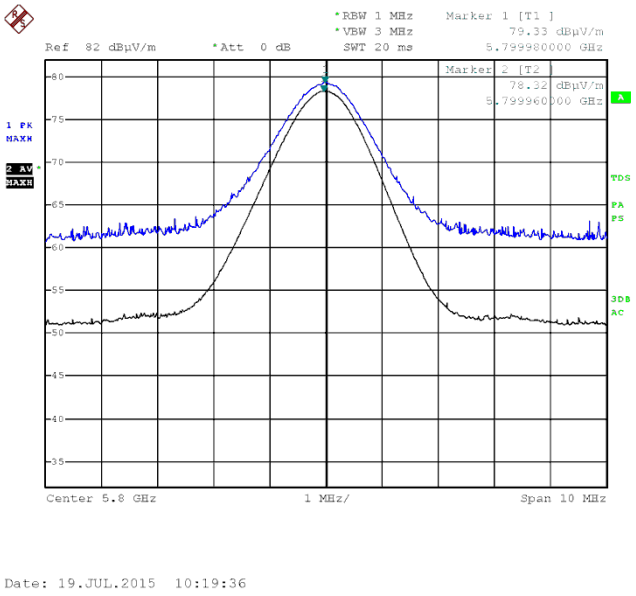

Figure 15. Field Strength of Fundamental. VERTICAL - Mid

Field Strength of Fundamental

E.U.T Description	Outdoor Radar Based Perimeter Security Sensor
Model Number	SR500
Serial Number:	Not designated

Specification: F.C.C., Part 15, Subpart C 15.249(a)

Antenna Polarization: Horizontal/Vertical
Operation Frequency: Low/Mid/High
Test Distance: 3 meters
Detector: Peak, Average

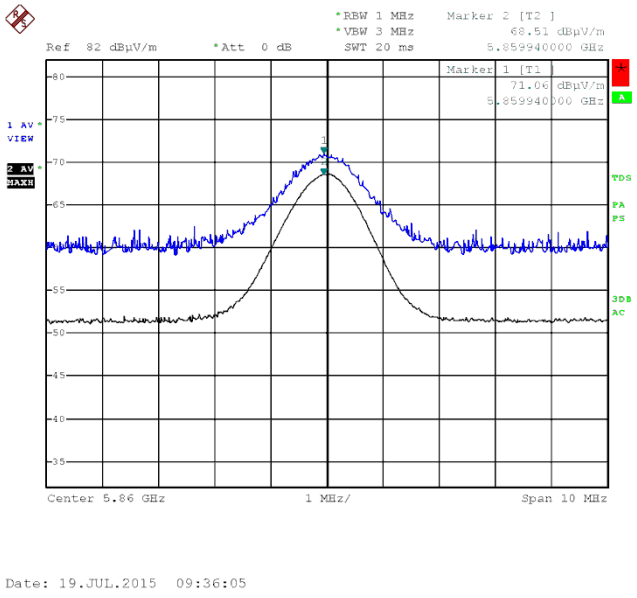

Figure 16. Field Strength of Fundamental. HORIZONTAL - High

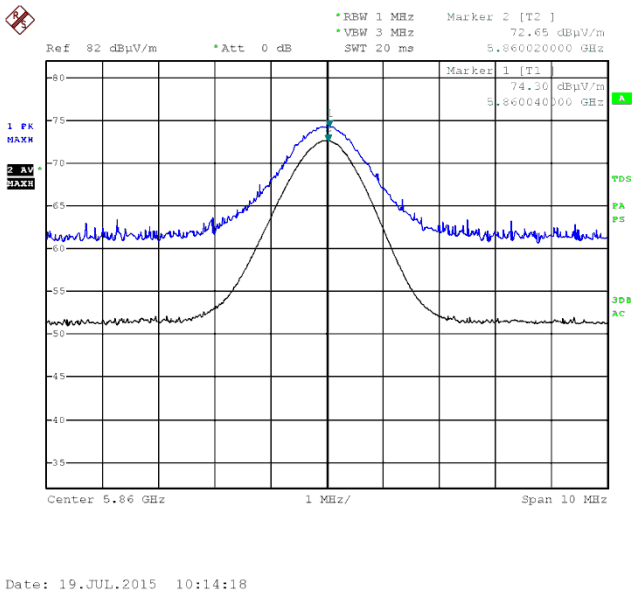

Figure 17. Field Strength of Fundamental VERTICAL - High

5.4 Test Instrumentation Used; Field Strength of Fundamental

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	R&S	ESCI7	100724	January 4, 2015	1 Year
Horn Antenna	ETS	3115	29845	May 19, 2015	3 Years
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 18 Test Equipment Used

6. Radiated Emission, 9 kHz – 30 MHz

6.1 Test Specification

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

6.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 2.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying with CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

The E.U.T. was operated at the frequency Low, Mid and High.

6.3 Test Results

JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

All emissions were more than the EMI receiver noise level which is greater than 6dB below the specification limit.

6.4 Test Instrumentation Used; Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	R&S	ESIB7	100120	January 1, 2015	1 Year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 Year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 19 Test Equipment Used

6.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

Example: FS = 30.7 dBμV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBμV

No external pre-amplifiers are used.

7. Spurious Radiated Emission 30 MHz – 40 GHz

7.1 Test Specification

F.C.C., Part 15, Subpart C, Section 15.249(b)

7.2 Test Results

The E.U.T. operation mode and test set-up are as described in Section 2.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.

The frequency range 30 MHz-1000 MHz was scanned and the list of the highest emissions was verified and updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

In the frequency range 30 MHz – 7 GHz, the emissions were measured using a computerized EMI receiver complying with CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 7 - 40GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1MHz and the video bandwidth was 100Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3MHz.
The test distance was 3 meters.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

7.3 Test Results

JUDGEMENT: Passed by 4.0 dB

No signals were detected in the frequency range of 30 – 1000 MHz.

For the operation frequency of 5740.0 MHz, the margin between the emission level and the specification limit is in the worst case 4.37 dB at the frequency of 2160.0 MHz, vertical polarization.

For the operation frequency of 5800.0 MHz, the margin between the emission level and the specification limit is in the worst case 4.37 dB at the frequency of 2160.0 MHz, vertical polarization.

For the operation frequency of 5860.0 MHz, the margin between the emission level and the specification limit is in the worst case 4.0 dB at the frequency of 11720.0 MHz, horizontal polarization.

The EUT met the requirements of the F.C.C. Part 15, Subpart C specification.

The details of the highest emissions are given in *Figure 20* to *Figure 21*.

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 15.249 specification.

Spurious Radiated Emission 30 MHz – 40 GHz

E.U.T Description	Outdoor Radar Based Perimeter Security Sensor
Type	SR500
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 40.0 GHz

Test Distance: 3 meters Detector: Peak

Operation Frequency (MHz)	Freq. (MHz)	Polarity (H/V)	Peak Amp (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
5740.0	2160.0	H	64.73	74.0	-9.27
5740.0	2160.0	V	69.63	74.0	-4.37
5740.0	2320.0	H	62.75	74.0	-11.25
5740.0	2320.0	V	68.13	74.0	-5.87
5740.0	11480.0	H	61.15	74.0	-13.85
5740.0	11480.0	V	66.03	74.0	-7.97
5800.0	2160.0	H	64.73	74.0	-9.27
5800.0	2160.0	V	69.63	74.0	-4.37
5800.0	2320.0	H	62.75	74.0	-11.25
5800.0	2320.0	V	68.13	74.0	-5.87
5800.0	11600.0	H	61.22	74.0	-12.78
5800.0	11600.0	V	66.35	74.0	-7.65
5860.0	2160.0	H	64.73	74.0	-9.27
5860.0	2160.0	V	69.63	74.0	-4.37
5860.0	2320.0	H	62.75	74.0	-11.25
5860.0	2320.0	V	68.13	74.0	-5.87
5860.0	11720.0	H	62.12	74.0	-11.88
5860.0	11720.0	V	67.22	74.0	-6.78

Figure 20. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Peak Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Spurious Radiated Emission 30 MHz – 40 GHz

E.U.T Description Outdoor Radar Based Perimeter Security Sensor
Type SR500
Serial Number: Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 40.0 GHz
Test Distance: 3 meters Detector: Average

Operation Frequency	Freq.	Polarity	Average Amp	Average Specification	Peak. Margin
(MHz)	(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
5740.0	2160.0	H	45.9	54.0	-8.1
5740.0	2160.0	V	45.6	54.0	-8.4
5740.0	2320.0	H	46.6	54.0	-7.4
5740.0	2320.0	V	47.8	54.0	-6.2
5740.0	11480.0	H	48.2	54.0	-5.8
5740.0	11480.0	V	48.7	54.0	-5.3
5800.0	2160.0	H	45.9	54.0	-8.1
5800.0	2160.0	V	45.6	54.0	-8.4
5800.0	2320.0	H	46.6	54.0	-7.4
5800.0	2320.0	V	47.8	54.0	-6.2
5800.0	11600.0	H	48.5	54.0	-5.5
5800.0	11600.0	V	48.7	54.0	-5.3
5860.0	2160.0	H	45.9	54.0	-8.1
5860.0	2160.0	V	45.6	54.0	-8.4
5860.0	2320.0	H	46.6	54.0	-7.4
5860.0	2320.0	V	47.8	54.0	-6.2
5860.0	11720.0	H	50.0	54.0	-4.0
5860.0	11720.0	V	49.3	54.0	-4.7

Figure 21. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Peak Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

7.4 Test Instrumentation Used; Radiated Emission

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	Rohde & Schwarz	ESIB7	100120	January 4, 2015	1 year
EMC Analyzer	HP	HP8593	3536A00120	February 24, 2015	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	May 19, 2015	3 years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Spectrum Analyzer	HP	8592L	3826A01204	March 4, 2015	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 22 Test Equipment Used

7.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[dB\mu v/m]\ FS = RA + AF + CF$$

FS: Field Strength [dBμv/m]
RA: Receiver Amplitude [dBμv]
AF: Receiving Antenna Correction Factor [dB/m]
CF: Cable Attenuation Factor [dB]

8. Antenna Gain/Information

Antenna gain is 10.0 dBi.

9. R.F Exposure/Safety

Typical use of the E.U.T. is as a radar system for outdoor use.

The typical placement of the E.U.T. is on an outside wall.

The typical distance between the E.U.T. and the user is 10cm.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1310 Requirements

(a) FCC limits at 5740 MHz is:

$$1\frac{mW}{cm^2}$$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t- Transmitted Power 80.7 dBuV/m (Peak) = -14.5 dbm = 0.035 mW (Note – because antenna is integral and tests were conducted radiated, the transmitted power, P_t, takes the antenna gain into account)

G_T- Antenna Gain, 10dBi

R- Distance from Transmitter using 10 cm worst case

(c) The peak power density is:

$$S_p = \frac{0.035}{4\pi(10)^2} = 2.79x10^{-5}\frac{mW}{cm^2}$$

(e) This is below the FCC limit.

10. APPENDIX A - CORRECTION FACTORS

10.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
0.010	0.4	50.00	1.2
0.015	0.2	100.00	0.7
0.020	0.2	150.00	20.1
0.030	0.3	200.00	2.3
0.050	0.3	300.00	2.9
0.075	0.3	500.00	3.8
0.100	0.2	750.00	4.8
0.150	0.2	1000.00	5.4
0.200	0.3	1500.00	6.7
0.500	0.4	2000.00	9.0
1.00	0.4	2500.00	9.4
1.50	0.5	3000.00	9.9
2.00	0.5	3500.00	10.2
5.00	0.6	4000.00	11.2
10.00	0.8	4500.00	12.1
15.00	0.9	5000.00	13.1
20.00	0.8	5500.00	13.5
		6000.00	14.5

NOTES:

1. The cable type is SPUMA400 RF-11N(X2) and 39m long

2. The cable is manufactured by Huber + Suhner

10.2 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

1. The cable type is RG-8.

2. The overall length of the cable is 10 meters.

10.3 Correction factors for CABLE

from spectrum analyzer to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.

2. The cable is used for measurements above 2.9 GHz.

3. The overall length of the cable is 10 meters.

10.4 Correction factors for Horn Antenna

Model: SWH-28
at 1 meter range.

FREQUENCY (GHz)	AFE (dB /m)	Gain (dB1)
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4

10.5 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2

10.6 Correction factors for Horn ANTENNA

Model: 3115
Antenna serial number: 29845
3 meter range

FREQUENCY (MHz)	Antenna Factor (dB/m)	FREQUENCY (MHz)	Antenna Factor (dB/m)
1000	23.9	10500	38.4
1500	25.4	11000	38.5
2000	27.3	11500	39.4
2500	28.5	12000	39.2
3000	30.4	12500	39.4
3500	31.6	13000	40.7
4000	33	14000	42.1
4500	32.7	15000	40.1
5000	34.1	16000	38.2
5500	34.5	17000	41.7
6000	34.9	17500	45.7
6500	35.1	18000	47.7
7000	35.9		
7500	37.5		
8000	37.6		
8500	38.3		
9000	38.5		
9500	38.1		
10000	38.6		