RADIO TEST REPORT

No. 1521042STO-002, Ed. 2

RF Performance

EQUIPMENT UNDER TEST

Equipment:	Tork Foam Soap Dispenser with Intuition sensor
Type/Model:	EU Version: Image design S4s with EasyCube 460016
Additional type/models*:	NA Version: 466200
Manufacturer:	SCA Hygiene Products AB
Tested by request of:	SCA Hygiene Products AB

*See opinions and interpretations clause 2.6

SUMMARY

Referring to the emission limits, and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards regarding spurious emission:

47 CFR Part 15 (2015): Subpart C: Intentional radiators, section 15.247

47 CFR Part 15 (2015): Subpart B: Unintentional radiators

RSS-GEN Issue 4 (2014): General requirements of compliance of radio apparatus (2014).

RSS-247 Issue 1 (2015): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices

For details, see clause 2 – 4.

Date of issue: 2016-04-01

Tested by: Robert Hietala, Matti Virkki

Approved by: Stefan Andersson

Revision History

Edition	Date	Description	Changes
1	2016-01-29	First release	
2	2016-04-01	Second release	Updated equipment name

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

CONTENTS

Page

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

1 CLIENT INFORMATION

The EUT has been tested by request of

Company	SCA Hygiene Products AB Bäckstensgatan 5 405 03 Gothenburg Sweden
Name of contact	Gunilla Himmelmann Phone +46 31 74 60821

2 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment:	Tork Foam Soap Dispenser with Intuition sensor	
Type/Model:	EU Version: Image design S4s with EasyCube 460016	
Brand name:	SCA Hygiene Products AB	
Serial number:	046 and 0272	
Manufacturer:	SCA Hygiene Products AB Bäckstensgatan 5 405 03 Gothenburg Sweden	
Transmitter frequency range:	2405 MHz	
Receiver frequency range:	2405 MHz	
Frequency agile or hopping:	☐ Yes	☒ No
Antenna:	☒ Internal antenna	☐ External antenna
Antenna connector:	☒ None, internal antenna	☐ Yes
Antenna gain:	1 dBi	
Rating RF output power:	2 dBm	
Type of modulation:	O-QPSK	
Temperature range:	☐ Category I (General): -20°C to +55°C ☐ Category II (Portable equipment): -10°C to +55°C ☒ Category III (Equipment for normal indoor use): +5°C to +35°C ☐ Other: <-20°C to +55°C	
Transmitter standby mode supported:	☒ Yes	☐ No

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

2.2 Additional information about the EUT

The EUT consists of the following units:

Unit	Serial number	Comment
S4 Sensor Dispenser	046	
S4 Sensor Dispenser	0272	

During the tests the EUT supported following software:

Software	Comment
WiiKing_S4_intertek_constant_data_2dBm.hex	
WiiKing_S4_intertek_tx_mode_idle.hex	

2.3 Peripheral equipment

Peripheral equipment is equipment needed for correct operation of the EUT, but not included as part of the testing and evaluation of the EUT.

Equipment	Type / Model	Manufacturer	Serial no.
--			

2.4 Test signals and operation modes

Continuous modulated signal.

2.5 Modifications during the tests

No modifications were made during the tests.

2.6 Opinions and interpretations

The following type is also included as additional type in this test report:

NA Version: 466200

The difference as compared to the tested type is (according to the manufacturer):

Identical units, only difference is in the article number(s) for different regions, in this case North America and Europe.

The difference is considered not to imply different radio-characteristics when compared to the tested type. Therefore, this type is not tested, but considered to have the same radio-characteristics as the tested type.

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

3 TEST SPECIFICATIONS

3.1 Standards

Requirements:
47 CFR Part 15, subpart C: Intentional radiators (2014), section 15.247.

47 CFR Part 15, subpart B: Unintentional radiators

RSS-GEN Issue 4: General requirements of compliance of radio apparatus (2014).

RSS-210 Issue 8 Licence-exempt Radio Apparatus (All Frequency Bands):
Category I Equipment (2010)

Test methods:

ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3.2 Additions, deviations and exclusions from standards and accreditation

Only spurious emission measurements have been performed.

The EUT's radio characteristics are identical to those previously measured in radio test report 1312855STO-002 Ed. 1.

The EUT have been upgraded with a new enclosure which materials differs from those previously measured in radio test report 1312855STO-002 Ed. 1 and is considered to possibly have an impact on the radiated spurious emissions.

Not accredited for RSS-GEN Issue 4 (2014): General requirements of compliance of radio apparatus (2014).

Not accredited for RSS-247 Issue 1 (2015): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices

No other additions, deviations or exclusions have been made from standards and accreditation.

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

3.3 Test site

Measurements were performed at:

Intertek Semko AB.
Torshamnsgatan 43,
P.O. Box 1103
SE-164 22 Kista

Intertek Semko AB is a FCC listed test site with site registration number 90913
Intertek Semko AB is a FCC accredited conformity assessment body with designation number SE0002
Intertek Semko AB is an Industry Canada listed test facility with IC assigned code 2042G

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
BJÖRKHALLEN	Semi-anechoic 3 m	2042G-1

4 TEST SUMMARY

The results in this report apply only to sample tested:

Requirement	Description	Result
FCC §15.203 **RSS-GEN 8.3**	**Antenna requirement**	**NT[1]**
FCC §15.207, 15.107 **RSS-GEN 8.8 table 3**	**Conducted continuous emission in the frequency range 150 kHz to 30 MHz, AC Power input port**	**NA**
FCC §15.247 (b)(4) **RSS-247 5.4(4), 5.4(5)**	**Field strength of fundamental and antenna gain**	**NT[1]**
FCC §15.247 (d), 15.209(a) **RSS-GEN 8.9** **RSS-247 5.5**	**Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz** The EUT complies with the limits.	**PASS**
FCC §15.247(d), 15.209(a) **RSS-GEN 8.9** **RSS-247 5.5**	**Radiated emission of electromagnetic fields in the frequency range above 1 GHz** The EUT complies with the limits.	**PASS**
FCC §15.247(a)(2) **RSS-GEN 6.6** **RSS-247 5.2(1)**	**Occupied bandwidth**	**NT[1]**
FCC §15.247(b) **RSS-247 5.4(4)**	**Conducted output power**	**NT[1]**
FCC §15.247(e) **RSS-247 5.2(2)**	**Peak power spectral density**	**NT[1]**
FCC §15.247(e) **RSS-247 5.5**	**Band edge**	**NT[1]**

NT = Not Tested
NA = Not Applicable

[1] See section 3.2 for further information.

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

5 RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ TO 26.5 GHZ

Date of test:	2015-12-18	**Test location:**	Björkhallen
EUT Serial:	046 / 0272	**Ambient temp:**	20 °C
Tested by:	Robert Hietala	**Relative humidity:**	28 %
Test result:	Pass	**Margin:**	5.9 dB

5.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10-2013.

The EUT was set up in order to emit maximum disturbances.

The EUT was placed on an insulating support 0.8 and 1.5 m above the turntable which is part of the reference ground plane.

Overview sweeps were performed with the measurement receiver in max-hold mode and the peak detector activated in the frequency-range 30 – 1000 MHz, above 1 GHz additionally the average detector was activated.

5.2 Test conditions

Test set-up:	**30 MHz to 1000 MHz**		
Test receiver set-up:			
Preview test:	Peak,	RBW 120 kHz	VBW 1 MHz
Final test:	Quasi-Peak,	RBW 120 kHz	VBW 1 MHz
EUT height above ground plane:	0.8 m		
Measuring distance:	3 m		
Measuring angle:	0 – 359°		
Antenna			
Height above ground plane:	1 – 4 m		
Polarisation:	Vertical and Horizontal		
Type:	Bilog		

Test set-up:	**1 GHz – 26.5 GHz**		
Test receiver set-up:			
Preview test:	Peak,	RBW 1 MHz	VBW 3 MHz
	Average,	RBW 1 MHz	VBW 3 MHz
Final test:	Peak,	RBW 1 MHz	VBW 3 MHz
	Average	RBW 1 MHz	VBW 3 MHz
EUT height above ground plane:	1.5 m		
Measuring distance:	3 m		
Measuring angle:	0 – 359°		
Antenna			
Height above ground plane:	1 – 4 m		
Polarisation:	Vertical and Horizontal		
Type:	Horn		
Antenna tilt:	Activated		

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

5.3 Requirements

Within restricted bands and receive mode:
Reference: CFR 47 §15.209, §15.109, RSS-Gen section 8.9

Field strength of emissions must comply with limits shown in table below

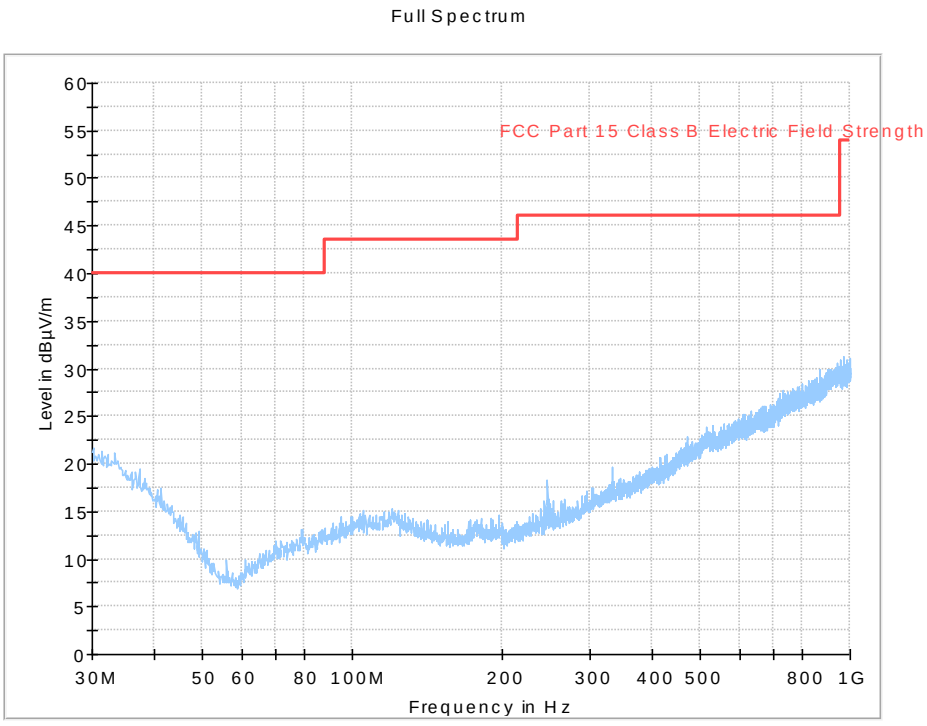
Frequency range [MHz]	Field strength at 3 m (dBµV/m)	Field strength at 10 m (dBµV/m)	Detector (dBµV/m)
30 – 88	40.0	29.5	Quasi Peak
88 – 216	43.5	33.0	Quasi Peak
216 – 960	46.0	35.5	Quasi Peak
960 – 1000	54.0	43.5	Quasi Peak
Above 1000	54.0 / 74.0	43.5 / 63.5	Average / Peak

The values for 10 m measuring distance are calculated by subtracting 10.5 dB from the 3 m limit. (i.e. an extrapolation factor of 20 dB/decade according to CFR 47 §15.31(f)(1))

Outside the restricted bands:
Reference: CFR 47 §15.247(d), RSS-247 5.5,

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

5.4 Test results 30 MHz – 1000 MHz, TX



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance, TX.

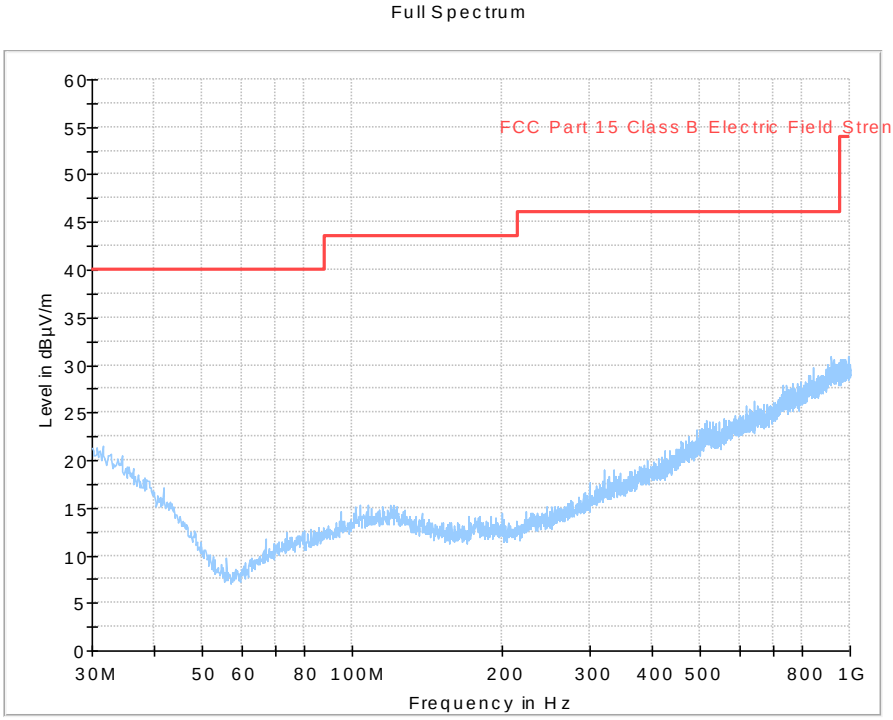
Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

Measurement results, Quasi Peak, TX

No emissions are found above noise floor or closer than 20 dB from limit. Margin to noise floor is at least 22 dB.

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

5.5 Test results 30 MHz – 1000 MHz, RX



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance, RX.

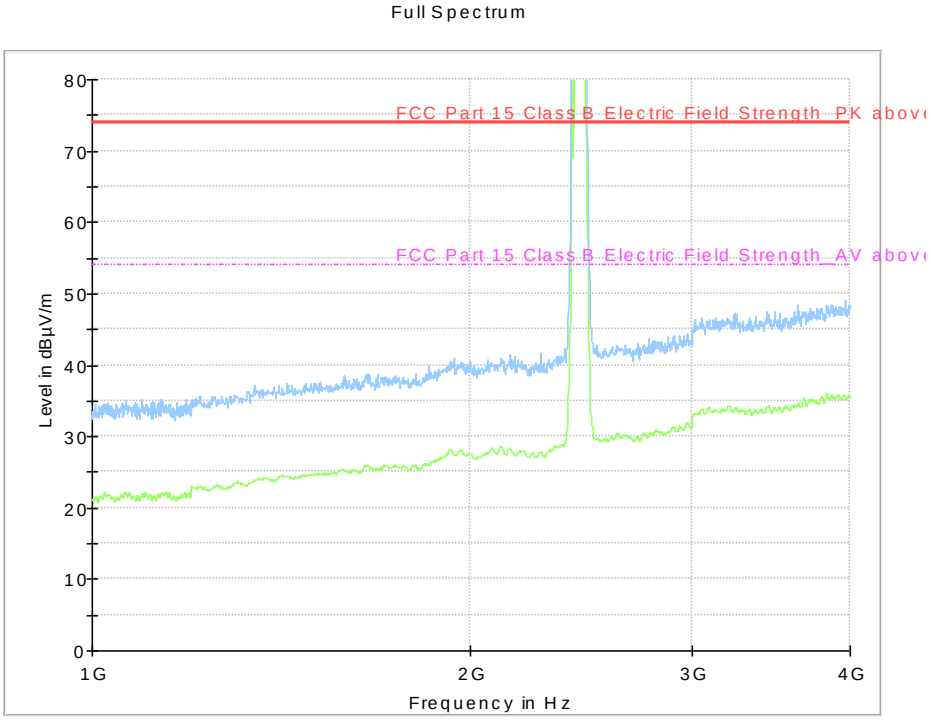
Measurement results, Quasi Peak, TX

No emissions are found above noise floor or closer than 20 dB from limit. Margin to noise floor is at least 22 dB.

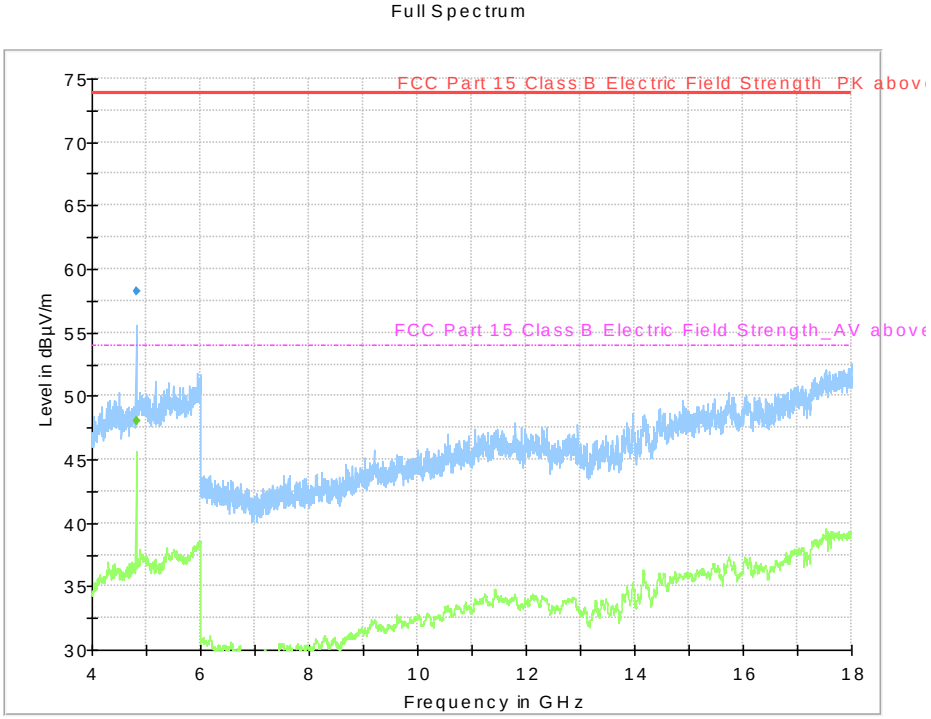
Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

5.6 Test results 1 GHz – 26.5 GHz, TX

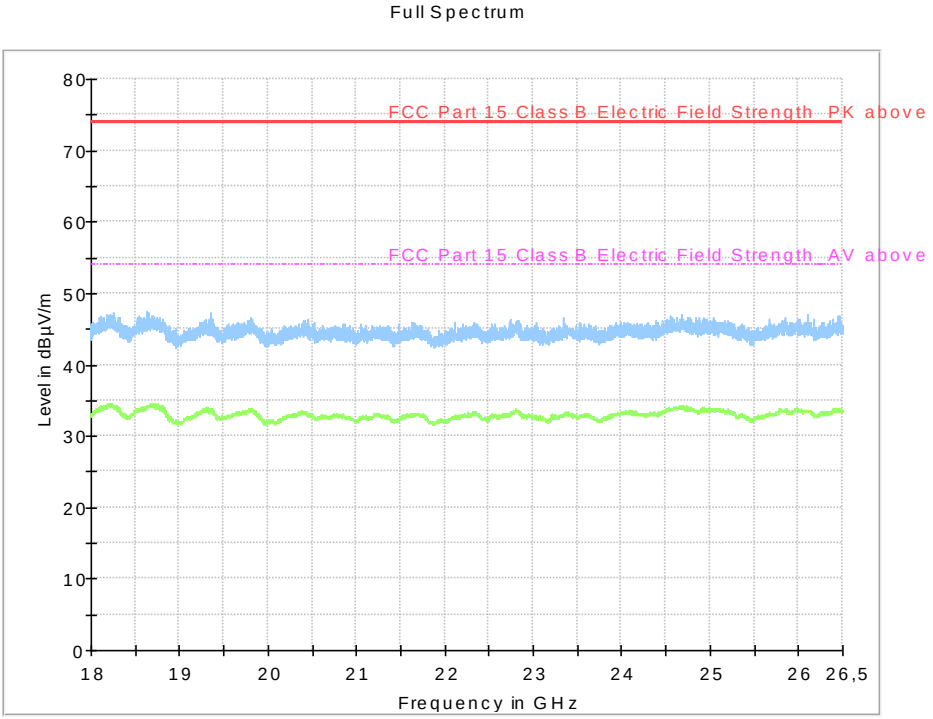


Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance, TX. Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0.



Diagram, Peak overview sweep, 4– 18 GHz at 3 m distance. TX. Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0.

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address



Diagram, Peak overview sweep, 18 - 26.5 GHz at 3 m distance. TX.

Measurement results, Peak, TX

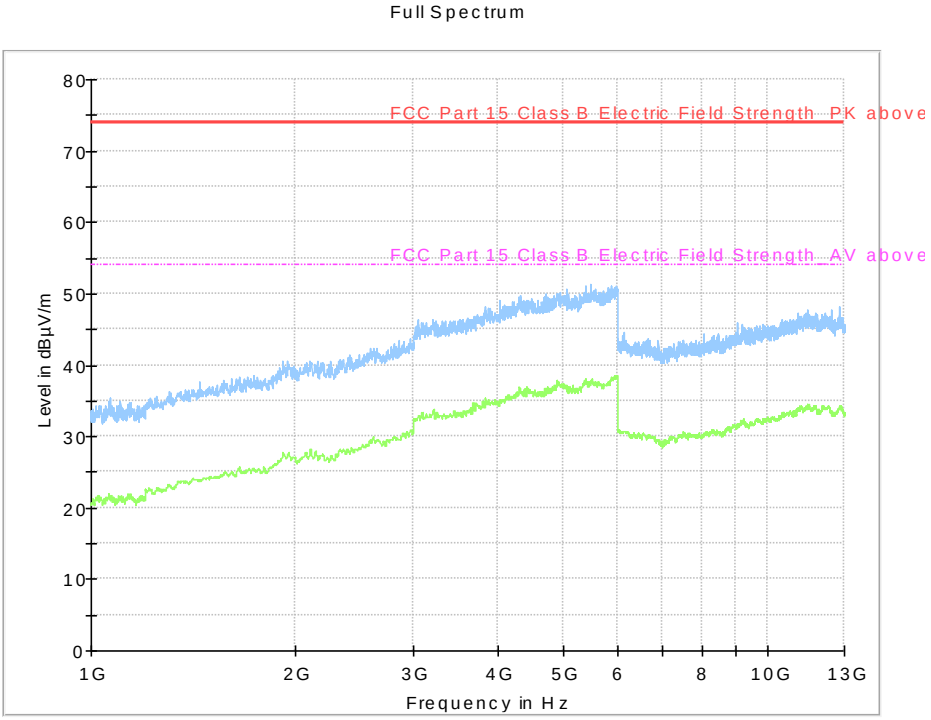
Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	EUT orientation	Polarization H/V	Margin [dB]
4809.0	58.3	74.0	--	H	15.7

Measurement results, Average, TX

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	EUT orientation	Polarization H/V	Margin [dB]
4809.0	48.1	54.0	--	H	5.9

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

5.7 Test results 1 GHz – 13 GHz, RX



Diagram, Peak overview sweep, 1 – 13 GHz at 3 m distance. RX

Measurement results, Peak, RX

No emissions are found above noise floor or closer than 20 dB from limit. Margin to noise floor is at least 23 dB.

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

6 TEST EQUIPMENT

Björkhallen

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. Dat	Cal. interval
Measurement software	Rohde & Schwarz	EMC 32 – v9.12.10	--	--	--
Receiver	Rohde & Schwarz	ESIB 26	32291	2015-07-07	1 year(s)
Receiver	Rohde & Schwarz	ESU 40	13178	2015-07-07	1 year(s)
BiLog antenna	Chase	CBL6110A	8578	2013-07-16	3 year(s)
Preamplifier	Rohde & Schwarz	TS-PRE1	32306	2015-07-02	1 year(s)
Horn antenna	Rohde & Schwarz	HF907	32307	2015-07-28	3 year(s)
Horn antenna	Bonn Elektronik GmBH	BLMA1816-5A	31247	2014-01-22	3 year(s)
2,4 GHz band reject filter:	K&L MICROWAVE INC	6N45-2450/T100-0/0	12389	2015-07-03	1 year(s)
4 GHz high pass filter	K&L MICROWAVE INC	4410-X4500/18000-0/0	5133	2015-07-03	1 year(s)
Coaxial cable	Radiall	SHF8M	9975	2015-08-06	1 year(s)
Coaxial cable	Rosenberger	UFB311A	39054	2015-07-06	1 year(s)
Coaxial cable	Rosenberger	UFB311A	39055	2015-07-06	1 year(s)
Coaxial cable	Rosenberger	UFB311A	39057	2015-07-06	1 year(s)

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

7 MEASUREMENT UNCERTAINTY

Continuous conducted disturbances with AMN in the frequency range 9 kHz to 30 MHz ± 3.7 dB

Measurement uncertainty for radiated disturbance

Uncertainty for the frequency range 30 to 1000 MHz at 3 m	± 5.1 dB
Uncertainty for the frequency range 30 to 1000 MHz at 10 m	± 5.0 dB
Uncertainty for the frequency range 1.0 to 18 GHz at 3 m	± 4.7 dB
Uncertainty for the frequency range 18 to 26 GHz at 3 m	± 4.8 dB
Uncertainty for the frequency range 26 to 40 GHz at 3 m	± 5.7 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2011.
The measurement uncertainty is given with a confidence of 95 %.

8 TEST SET UP AND EUT PHOTOS

EUT photos are in separate document 1312855STO Annex 1.
Test set up photos are in separate document 1312855STO Annex 2.

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address