

**TEST REPORT CONCERNING THE COMPLIANCE OF A
RADAR LEVEL TANK GAUGE,
BRAND HONEYWELL ENRAF,
MODELS**

**SMARTRADAR FLEXLINE HIGH PERFORMANCE,
SMARTRADAR FLEXLINE ADVANCED PERFORMANCE,
SMARTRADAR FLEXLINE XTREME PERFORMANCE
WITH 47 CFR PART 15 (10-1-12) AND THE
REQUIREMENTS OF INDUSTRY CANADA:
RSS-GEN AND RSS-210 (ISSUE 8, DECEMBER 2010).**

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October 29, 2013

FCC listed	90828
Industry Canada	2932G-2
R&TTE, LVD, EMC Notified Body	1856

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Test specification(s): FCC Part 15, RSS-Gen, RSS-210,
 Description of EUT: Radar Level Tank Gauge
 Manufacturer: Enraf B.V.
 Brand mark: Honeywell Enraf
 Models: SmartRadar FlexLine High performance
 SmartRadar FlexLine Advanced performance
 SmartRadar FlexLine Xtreme performance
 FCC ID: LOM990SRFL-2
 IC: 8554A-990SRFL

MEASUREMENT/TECHNICAL REPORT

HONEYWELL-ENRAF

Models :

SmartRadar Flexline High performance,

SmartRadar Flexline Advanced performance,

SmartRadar Flexline Xtreme performance

FCC ID: LOM990SRFL-2

IC: 8554A-990SRFL

This report concerns: Original Certification ~~Class 2 change~~ Verification

Equipment type: Radar Level Tank Gauge

Report prepared by: Name : Richard van der Meer
 Company name : TÜV Rheinland EPS
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-12 edition), RSS-GEN (ISSUE 3 DECEMBER 2010, RSS-210 ISSUE 8 DECEMBER 2010) and the measurement procedures of ANSI C63.4-2009. TÜV Rheinland EPS at Leek, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: October 29, 2013

Signature:



O. Hoekstra
 Senior Engineer Telecom TÜV Rheinland EPS

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Summary

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

Description of test item

Test item : Radar Level Tank Gauge
 Manufacturer : Enraf B.V.
 Brand : Honeywell Enraf
 Models : SmartRadar FlexLine High performance, SmartRadar FlexLine Advanced performance, SmartRadar FlexLine Xtreme performance
 Serial number(s) : 990-proto
 FCC ID : LOM990SRFL-2
 IC : 8554A-990SRFL
 Contains FCC ID / IC : S57500025034 IC:5731-50025034

Applicant information

Applicant's representative : Mr. J. Bok and Mr. W. Vellekoop
 Company : Honeywell Enraf
 Address : Delftchpark 39
 Postal code : 2628 XJ
 City : Delft
 Country : The Netherlands
 Telephone number : +31 15 2701187
 Telefax number : +31 15 2701138

Test(s) performed

Location : Leek
 Test(s) started : September 23, 2013
 Test(s) completed : September , 2013
 Purpose of test(s) : Original certification of the 9.5 -10.6 GHz radar unit.

 Test specification(s) : 47 CFR Part 15 (10-1-12 Edition) and
 RSS-GEN (ISSUE 3, DECEMBER 2010) AND
 RSS-210 (ISSUE 8, DECEMBER 2010)

Test engineer(s) : R. van der Meer 

Report written by : R. van der Meer 

Report date : October 10, 2013

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The test results relate only to the item(s) tested.

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1 General information.

1.1 Product description.

1.1.1 Introduction.

The EUT is designed to measure the level of liquid in storage tanks.

The SmartRadar Flexline consist of 3 models, knowing: SmartRadar Flexline Xtreme performance, SmartRadar Flexline Advanced performance and SmartRadar Flexline High performance.

The difference in these version is purely software, which provide different measurement accuracies.

The content of this report and measurement results have not been changed other than the way of presenting the data.

1.2 Related submittal(s) and/or Grant(s).

1.2.1 General.

This test report summarizes testdata of compliances testing intended to support equipment certification (FCC as Class 2 Permissive Change and IC as original certification).

1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	Radar Level Tank Gauge
Manufacturer	:	Enraf B.V.
Brand	:	Honeywell Enraf
Models	:	SmartRadar FlexLine High performance, SmartRadar FlexLine Advanced performance, SmartRadar FlexLine Xtreme performance
Serial number	:	990-proto
Operating frequency	:	9.5 – 10.6 GHz
Voltage input rating	:	24-65 V DC and 65 – 240 V AC
Remarks	:	During the tests the following internal modules were functional: CAN-PSX/TII-PSX (power supply), CAN BPM/HCI-BPM (field communication bus), TII-XR+Art2b, HMI-TSI/FII-SMV, HCI-1WL(WiFi-board) and SV(smartview).

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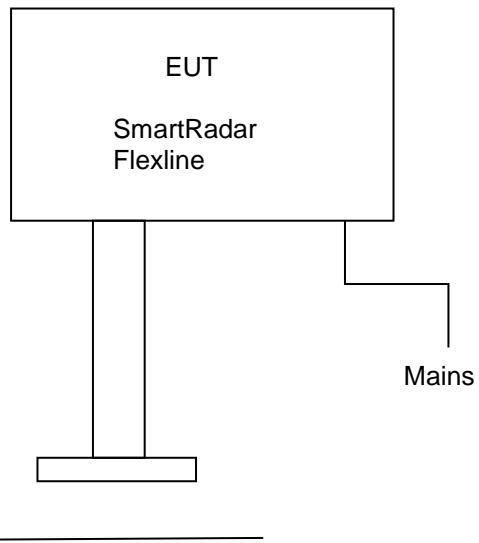


Figure 1. Basic set-up total system during testing

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1.4 Test Summary

The EUT was tested in accordance with the specifications given in the table below.

Test Standard		Description	Page	Pass / Fail
FCC 47 CFR Part 15 (10-1-10 Edition)	IC			
15.209	RSS-Gen(4.9 and 7.2.5)	Radiated emissions	10 - 11	Pass
15.207	RSS-Gen(7.2.4)	Conducted emissions	12 - 13	Pass
15.215(c)	RSS-Gen(4.6.1)	Occupied bandwidth	14	Pass

Table : testspecifications

Testmethods: ANSI C63.4:2009 and RSS-Gen Issue 3, December 2010

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1.5 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-12 Edition), sections 15.31, 15.207 and 15.209, RSS-GEN (ISSUE 3, DECEMBER 2010) RSS-210 (ISSUE 8, DECEMBER 2010).

The test methods, which have been used, are based on ANSI C63.4: 2009.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.

The measuring receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

1.6 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland EPS , located in Leek, 9351VT Eiberkamp 10, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-2. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

1.7 Test conditions.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: 120VAC/60Hz
Air pressure	: 950 – 1050 hPa

When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.

2 System test configuration.

2.1 Justification.

The system was configured for testing in a typical situation as a customer would normally use it.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2009.

2.2 EUT mode of operation.

The intentional radiator tests have been performed with a complete functioning EUT and interconnections. Final tests have been performed with Antenna W06 which has the highest gain (26 dB) and from pre-tests proved to be the worst case.

The EUT is swept frequency equipment working in the frequency band 9.5 GHz to 10.6 GHz. Conducted emission tests and Radiated emission tests were performed in normal operational mode with the frequency sweep turned on, and with the sweep stopped at the following frequencies. Worst case results were noted down.

Test Channel	Frequency (GHz)
1	9.512
2	10.049
3	10.0561

The EUT is tested built on a test tank (dummy). In normal operation mode with the frequency sweep turned on, it continuously reads the height level and displays it on the standard display.

2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance.

2.4 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance.

2.5 Product Labelling

The product labeling information is available in the technical documentation package.

2.6 Block diagram of the EUT.

The block diagram is available in the technical documentation package.

2.7 Schematics of the EUT.

The schematics are available in the technical documentation package.

2.8 Part list of the EUT.

The part list is available in the technical documentation package.

3 Radiated emission data.

3.1 Radiated field strength measurements (30 MHz – 40 GHz, E-field)

Frequency (MHz)	Antenna polarisation	Detector	Test Results (dB μ V/m)	Limits @3m (dB μ V/m)	Pass/ Fail
31.940	Horizontal	Qp	21.2	40.0	Pass
375.320	Vertical	Qp	20.2	46.0	Pass
437.400	Vertical	Qp	22.3	46.0	Pass
474.260	Vertical	Qp	23.6	46.0	Pass
868.080	Vertical	Qp	32.0	46.0	Pass
1823	Vertical	Pk	44.7	74.0 Pk / 54.0 Av	Pass
3255	Vertical	Pk	45.1	74.0 Pk / 54.0 Av	Pass
4215	Vertical	Pk	47.3	74.0 Pk / 54.0 Av	Pass
8559	Vertical	Pk	47.5	74.0 Pk / 54.0 Av	Pass
9512.0 fundamental	Horizontal	Pk	51.1	74.0 Pk / 54.0 Av	Pass
10324.0 fundamental	Horizontal	Pk	51.0	74.0 Pk / 54.0 Av	Pass
10584.0 fundamental	Horizontal	Pk	51.8	74.0 Pk / 54.0 Av	Pass
14252	Horizontal	Pk	51.2	74.0 Pk / 54.0 Av	Pass
25009	Vertical	Pk	50.2	74.0 Pk / 54.0 Av	Pass

Table 1a Radiated emissions of the EUT.

The results of the radiated emission tests. carried out in accordance with 47 CFR Part 15 section 15.209. RSS-210 and RSS-Gen are depicted in Table 1a. The system is tested as in whole, so with all equipment as shown in Figure.1 in place and functioning. Being the worst case situation.

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Notes:

1. Field strength values of radiated emissions at frequencies not listed in the Table 1a are more than 20 dB below the applicable limit.
2. Measurement uncertainty is $\pm 5.0\text{dB}$
3. The reported field strength values are the worst case values at the indicated frequency. The EUT was varied in three positions. the antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
4. A Quasi-peak detector was used with a resolution bandwidth of 120 kHz below 1 GHz. Above 1 GHz a bandwidth of 1 MHz was used..
5. Tested with Wifi-board in receive mode. Low. mid and high Wifi RX channels tested. worst case noted.
6. Pk values already within Av limits. Therefor Av not tested.
7. Tested with and without the communication connection.

Used test equipment and ancillaries:

99855	99538	12484	99714	99710	12486	99580/99847	99609	99608
99861	99877	99606	99858	99136	99596			

Test engineer

Signature : 
 Name : Richard van der Meer
 Date : October 09, 2013

4 Conducted emission data.

4.1 Conducted emission data of the EUT

Frequency (MHz)	Measurement results dB(µV) Line 1		Measurement results dB(µV) Neutral		Limits dB(µV)		Result
	QP	AV	QP	AV	QP	AV	
0.26328	50.0	40.0	59.8	51.2	61.4	51.4	PASS
0.26700	51.3	42.9	50.0	40.0	61.1	51.1	PASS
0.38047	45.0	32.9	47.6	39.6	58.3	48.3	PASS
0.52109	45.1	34.1	47.6	36.6	56.0	46.0	PASS
1.05625	40.8	31.7	42.6	24.8	56.0	46.0	PASS
1.19297	40.0	22.2	41.5	24.7	56.0	46.0	PASS
1.83359	39.6	19.3	41.2	21.8	56.0	46.0	PASS
2.63438	38.6	17.1	39.3	17.8	56.0	46.0	PASS
3.98594	39.2	22.6	39.0	19.1	56.0	46.0	PASS
4.79844	39.4	16.8	39.4	17.1	56.0	46.0	PASS
5.30234	41.1	22.4	39.1	20.2	60.0	50.0	PASS
20.32578	37.8	21.3	41.2	25.2	60.0	50.0	PASS

Table 2 Conducted emission measurements

The results of the conducted emission tests carried out in accordance with 47 CFR Part 15 section 15.107 and RSS-Gen section 7.2.4. at the 120 Volts AC mains connection terminals of the EUT are depicted in Table 2. The system is tested as in whole, so with all equipment as shown in Figure.1 in place and functioning. Being the worst case situation.

Notes:

1. Measurement uncertainty is ± 3.5 dB
2. The resolution bandwidth used was 9 kHz.

Used test equipment and ancillaries:

99852	99161	12512	15677	13313		

Test engineer

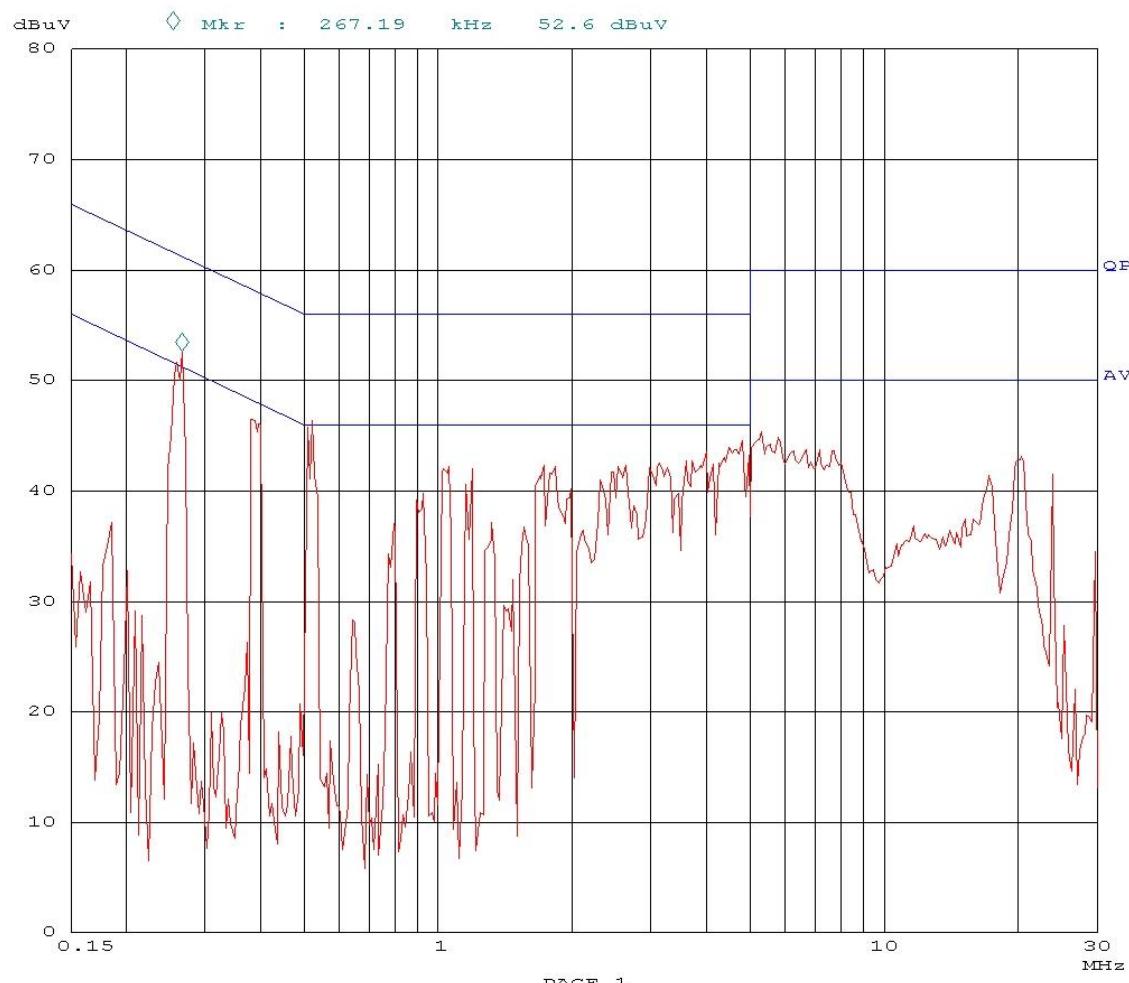
Signature : 

Name : R. van der Meer
 Date : September 23, 2013

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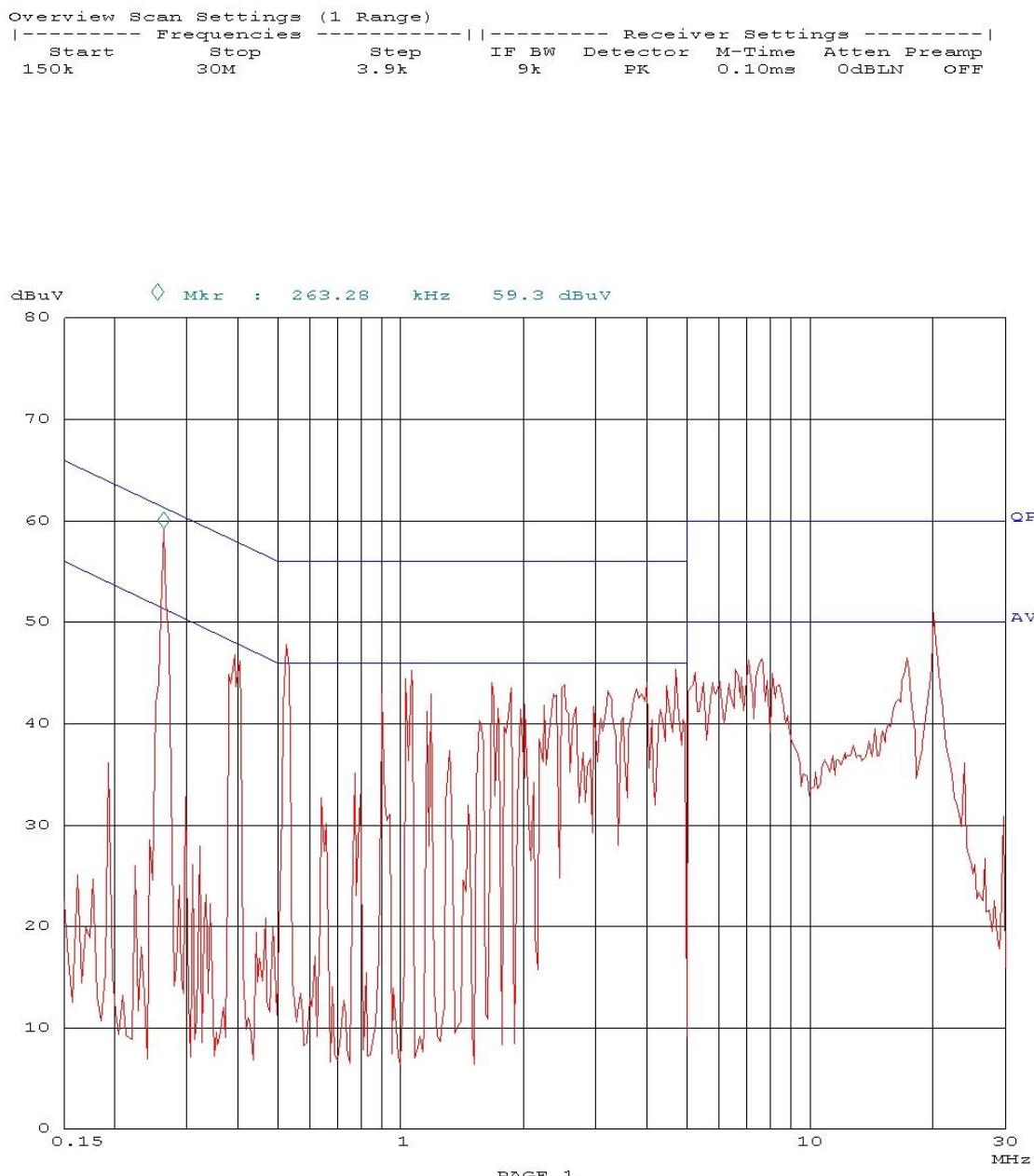
Overview Scan Settings (1 Range)			Receiver Settings					
Frequencies			IF BW	Detector	M-Time	Atten	Preamp	
Start	Stop	Step	9k	PK	0.10ms	0dBBLN	OFF	
150k	30M	3.9k						



Plot 1: Conducted emissions on L1 (Pk)

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Plot 2: Conducted emissions on L2 (Pk)

5 Frequency band of operation

The table below shows compliance with the 47 CFR Part 15 section 15.215(c). this section requires the 20 dB emission bandwidth is within the frequencyband designated.

Lower frequency f_L (GHz)	Center frequency f_C (GHz)	Higher frequency f_H (GHz)
9.512	10.324	10.584

The table below shows compliance with the RSS-210 and RSS-Gen that requires the 99% emission bandwidth is within the frequency band designated.

Lower frequency f_L (GHz)	Center frequency f_C (GHz)	Higher frequency f_H (GHz)
9.532	10.324	10.564

5.1.1 Test equipment used (for reference see test equipment listing).

12483	99580/99847	99538	99858			
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6 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12483	Guidehorn	EMCO	3115	04/2013	04/2014
12484	Guidehorn	EMCO	3115	04/2013	04/2014
12486	Guidehorn 18-40 GHz	EMCO	RA42-K-F-4B-C	04/2013	04/2014
12512	LISN	EMCO	3625/2	01/2012	01/2014
13078	Preamplifier 0.1 GHz - 12 GHz	Miteq	AMF-3D-001120-35-14p	NA	NA
13313	Pulse Limiter	R&S	ESH3-Z2	01/2013	01/2014
13954	Preamplifier 10 GHz - 25 GHz	Miteq	AMF-6D-100250-10p	NA	NA
15677	Measuring receiver	R&S	ESCS-30	10/2012	10/2013
99877	Biconilog Testantenna	Chase	CBL 6111B	06/2013	06/2014
99136	Bandpass filter 10-26 GHz	Reactel	9HS-10G/26.5G-S11	NA	NA
99596	Preamplifier 0.5 - 18 GHz	Miteq	AMF-5D-005180-28-13p	NA	NA
99858	RF Cable S-AR	Gigalink	APG0500	02/2013	02/2014
99710	Power supply Pre-test setup	EMCS	--	NA	NA
99606	Filterbox	EMCS	RFS06S	10/2012	10/2013
99107	Controller	Heinrich Deisel	4630-100	NA	NA
99136	Bandpassfilter 10 - 26.5 GHz	Reactel	9HS-10G/26.5G-S11	NA	NA
99161	Variac 250V 6A	RFT	LTS006	NA	NA
99852/ 99855	Temperature-Humiditymeter	Extech	SD500	02/2013	10/2014
99580/ 99847	Testsite registration	Comtest	FCC listed: 90828 IC: 2932G-2	12/2011	12/2014
99608	Controller	EMCS	DOC202	NA	NA
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99714	RF cable	Huber + Suhner	Sucoflex102	04/2013	04/2014
99538	Spectrum analyzer	R&S	FSV	05/2013	05/2014
99699	Measuring receiver	R&S	ESCI	03/2013	03/2014
99861	Controller	Maturo	SCU/088/8090811	NA	NA

NA= Not Applicable