



TEST REPORT

Test Report No. : UL-RPT-RP-12298246-316-FCC

Applicant : COMEPI S.r.l.

Model No. : FEP5KR1FR3-024M (FEP-RFID series)

FCC ID : 2AP8TCMP9LRF

Technology : RFID 125 kHz

Test Standard(s) : FCC Parts 15.209

For details of applied tests refer to test result summary

1. This test report shall not be reproduced in full or partial, without the written approval of UL International Germany GmbH.
2. The results in this report apply only to the sample tested.
3. The test results in this report are traceable to the national or international standards.
4. Test Report Version 1.0
5. Result of the tested sample: **PASS**

Prepared by: Segun I., Adeniji
Title: Engineer
Date: 31.August.2018

Approved by: Ajit, Phadtare
Title: Lead Test Engineer
Date: 31.August.2018



Deutsche
Akkreditierungsstelle
D-PL-19381-02-00

This laboratory is accredited by DAkkS.
The tests reported herein have been performed in
accordance with its' terms of accreditation.

UL INTERNATIONAL GERMANY GMBH

Hedelfinger Str. 61
70327 Stuttgart, Germany
STU.CTECHLab@ul.com

This page has been left intentionally blank.

Table of Contents

1. Customer Information	4
1.1.Applicant Information	4
1.2.Manufacturer Information	4
2. Summary of Testing	5
2.1. General Information	5
Applied Standards	5
Location	5
Date information	5
2.2. Summary of Test Results	6
2.3. Methods and Procedures	6
2.4. Deviations from the Test Specification	6
3. Equipment Under Test (EUT)	7
3.1. Identification of Equipment Under Test (EUT)	7
3.2. Description of EUT	7
3.3. Modifications Incorporated in the EUT	7
3.4. Additional Information Related to Testing	8
3.5. Support Equipment	8
4. Operation and Monitoring of the EUT during Testing	9
4.1. Operating Modes	9
4.2. Configuration and Peripherals	9
5. Measurements, Examinations and Derived Results	10
5.1. General Comments	10
5.2. Test Results	11
5.2.3 Transmitter Radiated Spurious Emissions	11
6. Measurement Uncertainty	15
7. Used equipment	16
8. Open-Area-Test Site comparison	17
9. Report Revision History	21

1. Customer Information

1.1.Applicant Information

Company Name:	COMEPI S.r.l.
Company Address:	Via Novarino 9L – Robbiate – LC - ITALY
Contact Person:	Dario Broggi
Contact E-Mail Address:	Dario.broggi@comepi.it
Contact Phone No.:	+39 039 9906408

1.2.Manufacturer Information

Company Name:	COMEPI S.r.l.
Company Address:	Via Novarino 9L – Robbiate – LC - ITALY
Contact Person:	Dario Broggi
Contact E-Mail Address:	Dario.broggi@comepi.it
Contact Phone No.:	+39 039 9906408

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.225
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Radio Frequency Devices) - Section 15.225
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
Test Firm Registration:	399704

Applied Standards

Location

Location of Testing:	UL International Germany GmbH Hedelfinger Str. 61 70327 Stuttgart Germany
-----------------------------	--

Date information

Order Date:	01 March 2018
EUT arrived:	16 July 2018
Test Dates:	20 July 2018
EUT returned:	-/-

2.2. Summary of Test Results

Clause	Measurement	Complied	Did not comply	Not performed	Not applicable
Part 15.207	Transmitter AC Conducted Emissions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Part 15.209(a)	Transmitter Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note(s):

2.3. Methods and Procedures

Reference:	ANSI C63.4-2014
Title:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	COMEPI
Model Name or Number:	FEP5KR1FR3-024M (FEP-RFID series)
Test Sample Serial Number:	NOT MARKED (Pre-production sample)
Hardware Version Number:	REV B
Software Version Number:	REV 1.5
FCC ID:	2AP8TCMP9LRF

3.2. Description of EUT

The equipment under test was a RFID coded Safety Interlocking device operating at 125 kHz.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Tested Technology:	RFID	
Category of Equipment:	Transceiver	
Channel Spacing:	Single channel device	
Transmit Frequency Range:	125 kHz	
Power Supply Requirement:	Nominal	24 V DC
Tested Temperature Range:	Minimum	25 °C

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Item	Description	Brand Name	Model Name or Number	Serial Number
1	3 m PVC Cable	8xAWG22 Cable	Not marked/ stated	Not marked/ stated

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

Constantly transmitting at full power with a modulated carrier in RFID test mode.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The RFID continuous transmission mode (100 % duty cycle) was enabled simply by powering up the device via a 24 V DC power supply.
- EUT was supplied pre-wired with cable and two clamps ready to be connected.
- On the clamp there is the indication for the relative polarity (+,-) signed with black marking pen. By connecting cable as indicated (power supply 24VDC, Max current 0.5A) the devices are ready to be tested in the required conditions.
- EUT operation was monitored during the test (LED numeration increasing from the closer to the top red head):
 - LED 1 still remain red
 - LED 2 still remain out of service
 - LED 3 still remain red
 - External LED still remain out of service.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 6 *Measurement Uncertainty* for details.

In accordance with DAkkS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.3 Transmitter Radiated Spurious Emissions

Test Summary:

Test Engineer:	Segun I. Adeniji	Test Date:	20 July 2018
Test Sample Serial Number:	NOT MARKED (Pre-production sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.209(a)
Test Method Used:	ANSI C63.10 Sections 6.3, 6.4 and 6.5
Frequency Range:	9 kHz to 1000 MHz

Environmental Conditions:

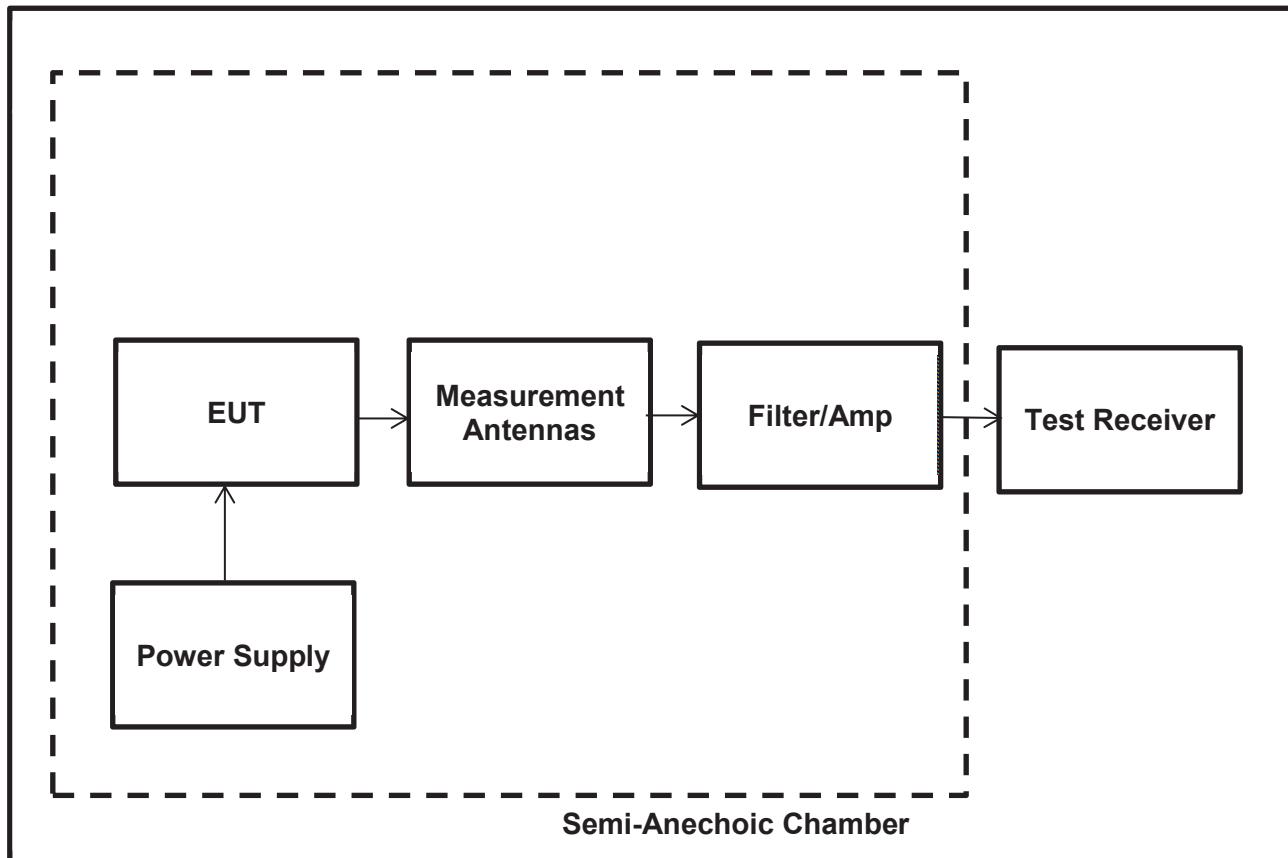
Temperature (°C):	25
Relative Humidity (%):	35

Settings of the Instrument

Frequency Range	RBW	VBW	Pre-Scan-Detector	Final Scan-Detector
9 kHz-150 kHz	300 Hz	1 KHz	Peak Detector	Quasi Peak Detector
150 kHz-30 MHz	10 KHz	30 kHz	Peak Detector	Quasi Peak Detector
30 MHz-1 GHz	100 kHz	300 kHz	Peak Detector	Quasi Peak Detector

Note(s):

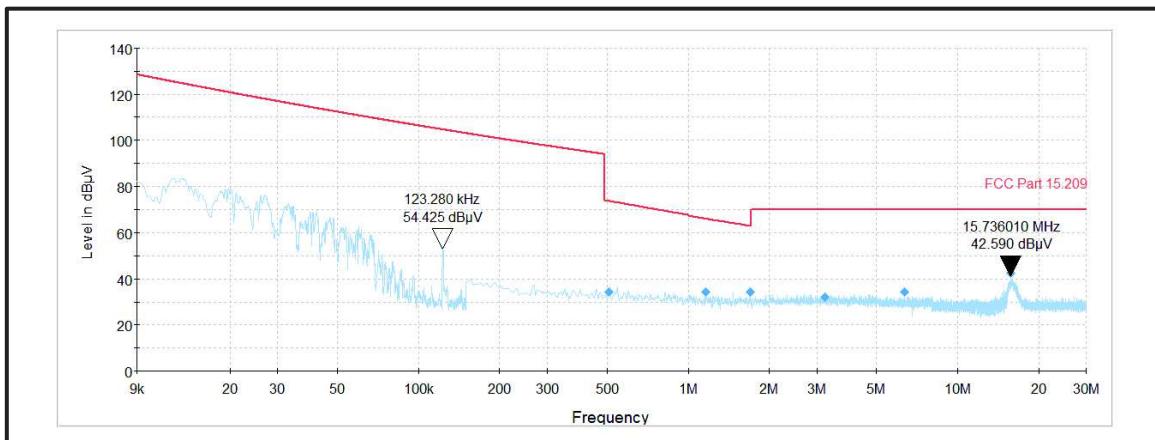
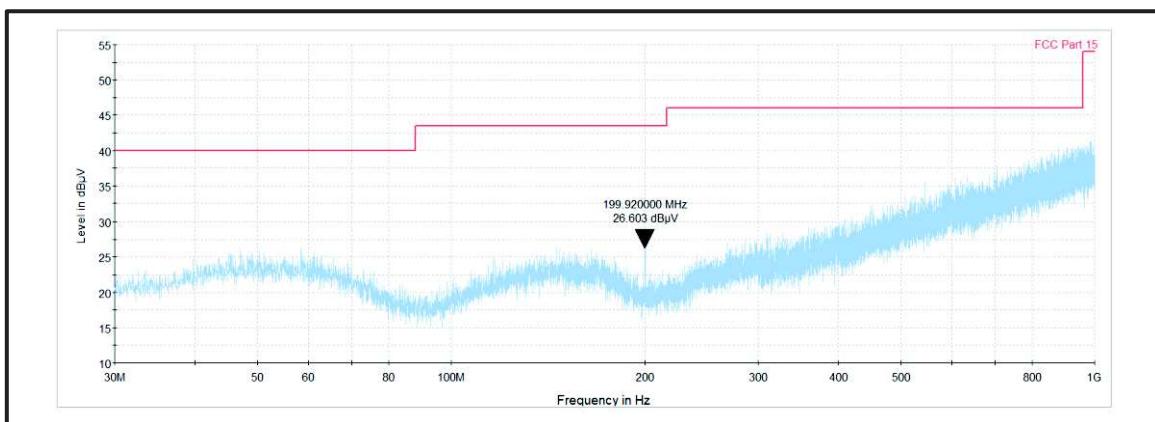
1. In accordance with FCC KDB 414788, an alternative test site may be used for the measurement. Therefore the result from the semi-anechoic chamber tests on 20th July 2018 is shown in this section of the test report.
2. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
3. All emissions were greater than 14 dB below the applicable limit, below the noise floor of the measurement system or ambient.
4. Measurements on 20th July 2018 were performed in a semi-anechoic chamber at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Between 30 MHz and 1 GHz, maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
5. A transducer factor was used on the spectrum analyser during open field tests. This factor includes correction between the fixed gain of the magnetic loop antenna and the calibration values. It also includes the value of the RF cable used to connect the antenna to the spectrum analyser which was incorporated into the annual calibration of the magnetic loop antenna.

Transmitter Radiated Spurious Emission test setup

Results: Quasi Peak

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.123	0° to EUT	54.42	105.78	51.36	Complied
15.730	0° to EUT	42.59	70	27.41	Complied
199.920	0° to EUT	26.03	42.5	16.47	Complied

Result: Pass

Transmitter Radiated Spurious Emissions (continued)**Plot (9 kHz – 30 MHz)****Plot (30 MHz – 1GHz)**

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying table.

6. Measurement Uncertainty

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Confidence Level (%)	Calculated Uncertainty
Radiated Spurious Emissions	95%	±3.10 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Used equipment

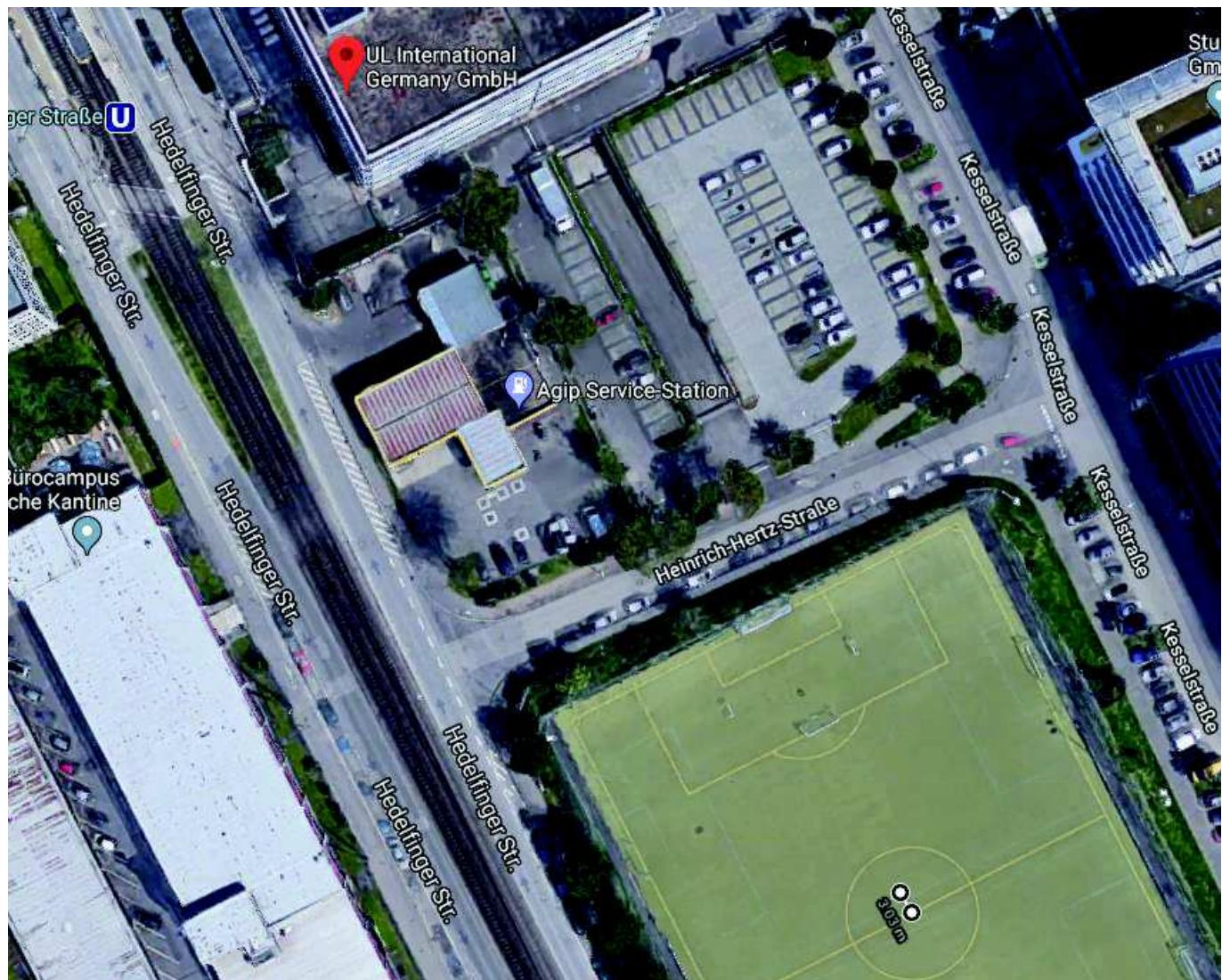
Test site: SR 1/2

ID	Manufacturer	Type	Model	Serial No.	Calibration Date	Cal. Cycle
350	Rohde & Schwarz	Receiver, EMI Test	ESIB7	836697/014	7/12/2018	12
377	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	7/12/2018	12
423	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 1840-1A	055929	7/12/2018	12
460	Deisl	Turntable	DT 4250 S		n/a	n/a
465	Schwarzbeck	Antenna, Trilog Broadband	VULB 9168	9168-240	8/8/2016	36
496	Rohde & Schwarz	Antenna, log. - periodical	HL050	100297	7/20/2016	24
587	Maturo	antenna mast, tilting	TAM 4.0-E	011/7180311	n/a	n/a
588	Maturo	Controller	NCD	029/7180311	n/a	n/a
591	Rohde & Schwarz	Receiver	ESU 40	100244/040	7/12/2018	12
608	Rohde & Schwarz	Switch Matrix	OSP 120	101227	4/8/2014	60
620	Bonn Elektronik	pre-amplifier	BLNA 0110-01N	1510111	7/12/2017	24
628	Maturo	Antenna mast	CAM 4.0-P	224/19590716	n/a	n/a
629	Maturo	Kippeinrichtung	KE 2.5-R-M	MAT002	n/a	n/a

8. Open-Area-Test Site comparison

GPS coordinates

48.765746, 9.250684



The following listed equipment was used for the measurement:

Manufacturer	Type	Model	Frequency Range
Rohde & Schwarz	Receiver, EMI Test	SML03	9 kHz – 30 MHz
Rohde & Schwarz	Receiver, EMI Test	ESIB7	20 Hz – 7 GHz
Rohde & Schwarz	Antenna, Loop	HFH2-Z2	1 kHz – 30 MHz
ETS LINDGREN	Antenna, Loop	6512	1 kHz – 30 MHz
Huber and Suhner	RF Cable	-	-
Elspec	BNC Cable	-	-

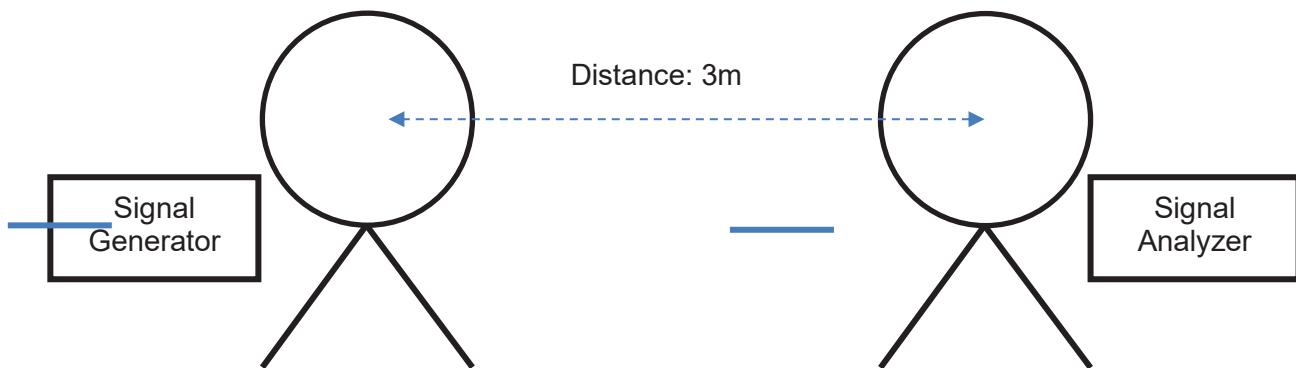
The transmit signal to the ETS Lindgren loop antenna is supplied by the SML signal generator.

The distance of the transmit and receive Antenna was 3m. No other distances can be achieved in SR1 so 10m and 30m distances are not possible. Due to this no comparison is possible.

The Results are valid for equipment which is not larger as the loop antenna which represents in the comparison the EUT.

If an EUT is bigger measurements on an OATS are needed.

The measurement was performed on the lowest frequency 9 kHz and was increased by 10 kHz Steps up to 100 kHz. Then the step size was 100 kHz up to 1000 kHz. From 1 MHz up to the last frequency of 30 MHz the step size was 1 MHz. The HFH2-Z2 loop antenna placed at 80 cm height was used as the receive antenna. The intercepted RF signal from this antenna was measured with the ESIB7 Test Receiver and the values were recorded accordingly.



Numeric values

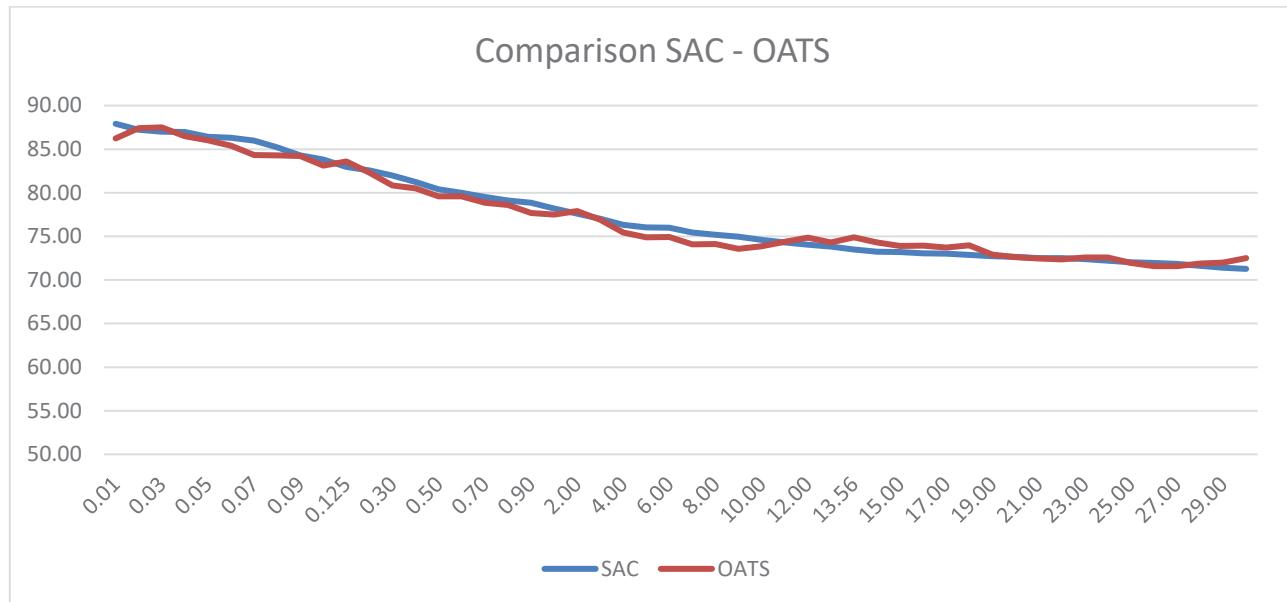
Frequency (MHz)	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.125	0.20
SR1 Measured power (dB μ V)	87.91	87.22	87.01	86.98	86.40	86.32	85.98	85.20	84.30	83.80	82.96	82.55
OATS Measured power (dB μ V)	86.22	87.42	87.50	86.49	86.01	85.39	84.32	84.29	84.20	83.10	83.60	82.32
Delta (dB)	-1.69	0.20	0.49	-0.49	-0.39	-0.93	-1.66	-0.91	-0.10	-0.70	0.64	-0.23

Frequency (MHz)	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	2.00	3.00	4.00	5.00
SR1 Measured power (dB μ V)	81.98	81.23	80.39	80.00	79.53	79.10	78.87	78.20	77.60	77.01	76.32	76.04
OATS Measured power (dB μ V)	80.84	80.49	79.58	79.58	78.85	78.59	77.69	77.50	77.91	76.90	75.45	74.90
Delta (dB)	-1.14	-0.74	-0.81	-0.42	-0.68	-0.51	-1.18	-0.70	0.31	-0.11	-0.87	-1.14

Frequency (MHz)	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	13.56	14.00	15.00	16.00
SR1 Measured power (dB μ V)	75.98	75.43	75.20	74.97	74.59	74.32	74.05	73.83	73.50	73.22	73.20	73.05
OATS Measured power (dB μ V)	74.94	74.09	74.11	73.58	73.87	74.38	74.84	74.31	74.88	74.29	73.90	73.93
Delta (dB)	-1.04	-1.34	-1.09	-1.39	-0.72	0.06	0.79	0.48	1.38	1.07	0.70	0.88

Frequency (MHz)	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00
SR1 Measured power (dB μ V)	73.00	72.86	72.74	72.64	72.50	72.52	72.39	72.20	72.04	71.97	71.86	71.64	71.41	71.27
OATS Measured power (dB μ V)	73.70	73.98	72.90	72.60	72.45	72.34	72.59	72.59	71.97	71.59	71.58	71.88	71.98	72.49
Delta (dB)	0.70	1.12	0.16	-0.04	-0.05	-0.18	0.20	0.39	-0.07	-0.38	-0.28	0.24	0.57	1.22

Graph



Conclusion: Maximum difference is 1.69 dB @ 9 kHz

9. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version