



IMQ S.p.A. - Società con Socio Unico
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RF Exposure Evaluation

No. ARSQ00016

performed in accordance with
FCC Rules: Code of Federal Regulations and KDB 447498

PRODUCT	Data Analyzer
MODEL(s) TESTED	STa 6000
FCC ID	2AEWDSTA6K
TRADE MARK(s)	ATLAS COPCO BLM

APPLICANT	ATLAS COPCO BLM S.r.l. ~ Via G. Pepe, 11 ~ I-20037 Paderno Dugnano (MI)
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Tested by	Roberto Radice	 
Approved by	Giovanni Di Turi [Laboratory manager]	 

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2016-03-24	First edition Digital signed - ARSQ00016_TR_FCC RF Exposure Evaluation_ATLAS COPCO_Mod. STa 6000

The results of tests and checks reported in this Test Report refer exclusively to the samples tested and described in the Report itself.
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1. GENERAL DATA

SAMPLE		
Samples received on	2016-03-15	(item sent and sampling by applicant)
IMQ reference samples	BEM	81049
Samples tested No.	1	
Object under analysis recognition	Not carried out Except where stated, characteristics of products were taken from client description and were not verified by the laboratory	
TEST LOCATION		
Testing dates	2016-13-15	
Testing laboratory	Viale Lombardia, 20 - I-20021 Bollate (MI)	
ENVIRONMENTAL CONDITIONING		
Parameter	Measured	
Ambient Temperature	20 ÷ 25 °C	
Relative Humidity	50 ÷ 60 %	
Atmospheric Pressure	900 ÷ 1000 mbar	

2. REFERENCE DOCUMENT

	DOCUMENT	DATE	TITLE
☒	47 CFR Part 15	2015	Radio Frequency Device
☒	ANSI C63.4	2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
☒	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices



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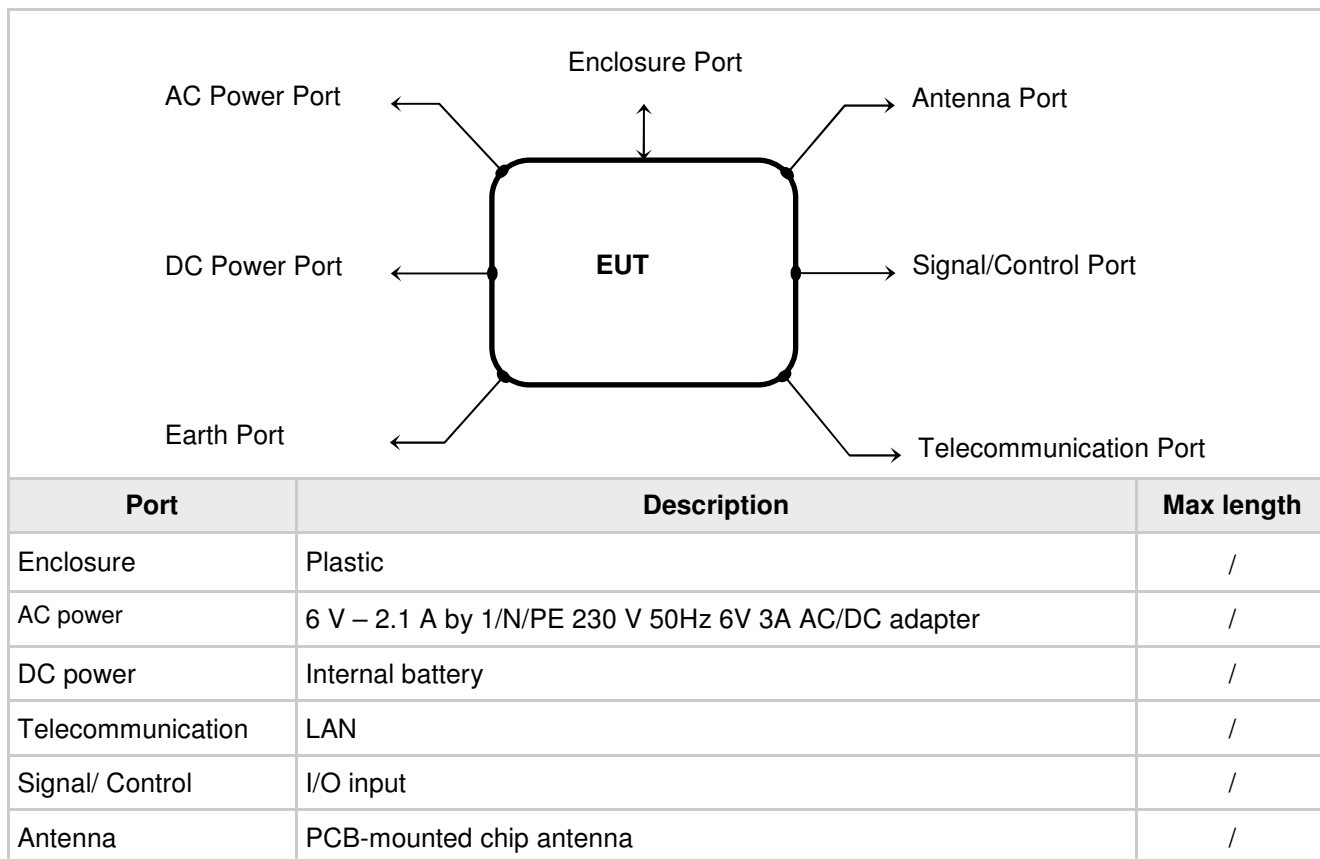
3. EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL DATA

MODEL (basic)	Description
STa 6000	Data Analyzer, contained: RF QAT IRC-B Module with u-blox Bluetooth cB-OBS421i QAT IRC-W Dual Module with u-blox WLAN OWL253i
Contain module with FCC ID	PVH0946 for Bluetooth module PVH0941 for WLAN module
Manufacturer	ATLAS COPCO BLM S.r.l. ~ Via G. Pepe, 11 ~ I-20037 Paderno Dugnano (MI)
Equipment classification	According to the definition 15.3 (o) EUT is a Intentional Radiator operating within the bands 2400 ÷ 2483.5 MHz so it shall fulfill provisions of 47CFR Part 15 Subpart C – Intentional radiators – and Section 15.247 According to the definition 15.3 (o) EUT is a Intentional Radiator operating within the bands 5150 ÷ 5725 MHz so it shall fulfill provisions of 47CFR Part 15 Subpart C – Intentional radiators – and Section 15.407
Type of equipment	Data analyzer for Tools and Joints checking
Operating frequency	2402 ÷ 2480 MHz 5180 ÷ 5320 MHz 5500 ÷ 5700 MHz
Antenna	Fractus mod. FR05-S1-N-0-102 (for cB-OBS421i module) Fractus mod. FR05-S1-NO-1-004 (for OWL253i module)

4. TEST CONFIGURATION OF EQUIPMENT UNDER TEST

EUT PORTS



STATE OF THE EUT DURING TESTS

#1	Operating	Continuous transmission (single channel transmission 2402MHz, 2440MHz, 2480MHz) with GFSK, $\pi/4$ -DQPSK and 8DPSK modulation. Signal pattern PRBS9 The EUT is in continuously transmitting with max. RF power setting
#2	Operating	Continuous transmission (single channel transmission 2412MHz, 2437MHz, 2462MHz) with protocol 802.11b, 802.11g, 802.11n The EUT is in continuously transmitting with max. RF power setting
#3	Operating	Continuous transmission (single channel transmission 5180MHz, 5280MHz, 5320MHz) with protocol 802.11a The EUT is in continuously transmitting with max. RF power setting
#4	Operating	Continuous transmission (single channel transmission 5500MHz, 5600MHz, 5700MHz) with protocol 802.11a The EUT is in continuously transmitting with max. RF power setting

SUPPORT EQUIPMENT

Defined as equipment needed for correct operation or loading of the EUT, but not considered as tested:

Equipment	Manufacturer	Model
Router as access point	CISCO	Aironet 1240AG

ELECTROMAGNETICALLY RELEVANT COMPONENTS

Component	No.	Manufacturer	Model
QAT IRC-B Module	1	ATLAS COPCO	8059092010
Bluetooth radio module	1	u-blox	cB-0946 (cB-OBS421i)
QAT IRC-W Dual	1	ATLAS COPCO	8059092015
Wi-Fi radio module	1	u-blox	cB-0941 (OWL253i)
Mainboard	1	ATLAS COPCO	STa 6000

RFI SUPPRESSION DEVICES

Component	No.	Manufacturer	Model
/	/	/	/

EMI PROTECTION DEVICES

Component	No.	Manufacturer	Model
/	/	/	/

EUT TECHNICAL DOCUMENTATION

Document	Reference
User Guide	9836 8243 01 - 2015-07 Edition 2.4



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6. SUMMARY OF TEST RESULTS

POSSIBLE TEST CASE VERDICTS	
Test object does meet the requirement	PASS
Test object does not meet the requirement	FAIL
Test case does not apply to the test object	N.A.
Test not performed	N.P.

CFR47 Part 15	TITLE	RESULT
(§ 47CFR 1.1307(b)(1))	RF humane exposure	PASS

7. RF EXPOSURE EVALUATION

TEST REQUIREMENT

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines § 1.1307(b)(1).

EUT classification (fixed, mobile or portable devices)

Portable according to § 2.1093(b) of this Chapter

LIMITS

According to § 2.1093 of this Chapter, by means of the following guidelines: OET Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies (447498 D01 General RF Exposure Guidance v06)

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

447498 D01 General RF Exposure Guidance v06 – Appendix A

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

The test separation distances ≥ 5 mm is applied to determine SAR test exclusion.

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

447498 D01 General RF Exposure Guidance v06 § 4.3

#1	Operating	Continuous transmission (single channel transmission 2402MHz, 2441MHz, 2480MHz) Signal pattern PRBS9 The EUT is in continuously transmitting with max. RF power setting
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Channel No.	Frequency (MHz)	Max. E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Lowest	2402	1.22	5	0.37	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Channel No.	Frequency (MHz)	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Middle	2441	1.26	5	0.39	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Channel No.	Frequency (MHz)	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Highest	2480	1.48	5	0.47	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Note: The measures above are the worst case on 3 axes X Y and Z and both polarization, with all types of modulation and data rate.

#2	Operating	Continuous transmission (single channel transmission 2412MHz, 2437MHz, 2462MHz) with protocol 802.11b, 802.11g, 802.11n The EUT is in continuously transmitting with max. RF power setting
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Channel No.	Frequency (MHz)	Max. E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Lowest	2412	0.90	5	0.28	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Channel No.	Frequency (MHz)	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Middle	2437	0.79	5	0.25	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Channel No.	Frequency (MHz)	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Highest	2462	0.58	5	0.18	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Note: The measures above are the worst case on 3 axes X Y and Z and both polarization, with all types of modulation and data rate.

#3	Operating	Continuous transmission (single channel transmission 5180MHz, 5280MHz, 5320MHz) with protocol 802.11a The EUT is in continuously transmitting with max. RF power setting
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Channel No.	Frequency (MHz)	Max. E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Lowest	5180	0.41	5	0.18	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Channel No.	Frequency (MHz)	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Middle	5280	0.52	5	0.24	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Channel No.	Frequency (MHz)	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Highest	5320	0.64	5	0.30	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Note: The measures above are the worst case on 3 axes X Y and Z and both polarization, with all types of modulation and data rate.

#4	Operating	Continuous transmission (single channel transmission 5500MHz, 5600MHz, 5700MHz) with protocol 802.11a The EUT is in continuously transmitting with max. RF power setting
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Channel No.	Frequency (MHz)	Max. E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Lowest	5500	2.11	5	0.99	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Channel No.	Frequency (MHz)	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Middle	5600	1.67	5	0.79	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Channel No.	Frequency (MHz)	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(mW)	(mm)		
Highest	5700	1.30	5	0.62	≤ 3.0 for 1-g head SAR or ≤ 7.5 for 10-g extremity SAR

Note: The measures above are the worst case on 3 axes X Y and Z and both polarization, with all types of modulation and data rate.



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TEST RESULT

Max level calculated with Bluetooth module is 0.47

Max level calculated with WLAN module is 0.99

With simultaneous transmission of the 2 modules in these 2 extreme conditions, max level is: 1.46

This value is less than the low threshold limit. No SAR test is required.

8. MEASUREMENTS AND TESTS UNCERTAINTY

Unless otherwise stated the uncertainties for the tests and measurements are evaluated in according to IMQ Operational Instruction IO-LAB-001 and IO-LAB-004. and requirement of NIST Technical Note 1297 and NIS 81: 1994 "The Treatment of Uncertainty in EMC Measurements"

The expanded uncertainty was calculated for all measurements and tests listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainty in EMC Measurements", with UKAS document LAB 34 and is documented in the quality system accordance to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device

Internal Procedure PI-037 ensures that the requirements for traceability of calibrations, of all test equipment requiring calibration, and calibration intervals are met.

Methods/Standard	Parameter	Expanded Uncertainty	Unit	Confidence level	Coverage Factor	Degree of freedom
Radiated disturbance	QP detector (30 MHz - 100 MHz) H polarization	4,33	dB	95%	2,00	> 60
	QP detector (30 MHz - 100 MHz) V polarization	4,22	dB	95%	2,00	> 60
	QP detector (100 MHz - 200 MHz) H polarization	3,40	dB	95%	2,00	> 60
	QP detector (100 MHz - 200 MHz) V polarization	4,76	dB	95%	2,00	> 60
	QP detector (200 MHz - 1000 MHz) H polarization	3,91	dB	95%	2,00	> 60
	QP detector (200 MHz - 1000 MHz) V polarization	3,82	dB	95%	2,00	> 60
	P detector 1-6 GHz	4,77	dB	95%	2,00	> 60
	P detector 6 – 18 GHz	5,14	dB	95%	2,00	> 60



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9. LIST OF MEASURING EQUIPMENT AND CALIBRATION INFORMATION

IMQ Serial Number	Instrument	Manufacturer	Type	Last Cal.	Cal. Period.	Calibration Company
P-02386	Shielded anechoic chamber	SIDT	/	03-15	24	IMQ
S05562	EMI Receiver/Spectrum analyzer	ROHDE & SCHWARZ	ESU 8	05-15	12	Rohde & Schwarz
S-06704	Fast power sensor	ROHDE & SCHWARZ	NRP-Z81	01-16	12	Rohde & Schwarz
S-03463	Horn Antenna	SCHWARZBECK	BBHA 9120D	12-14	36	NPL
S-04272	Horn antenna	SCHWARZBECK	BBHA 9120D	07-14	36	NPL

10. PHOTOGRAPHIC DOCUMENTATION

UUT IDENTIFICATION



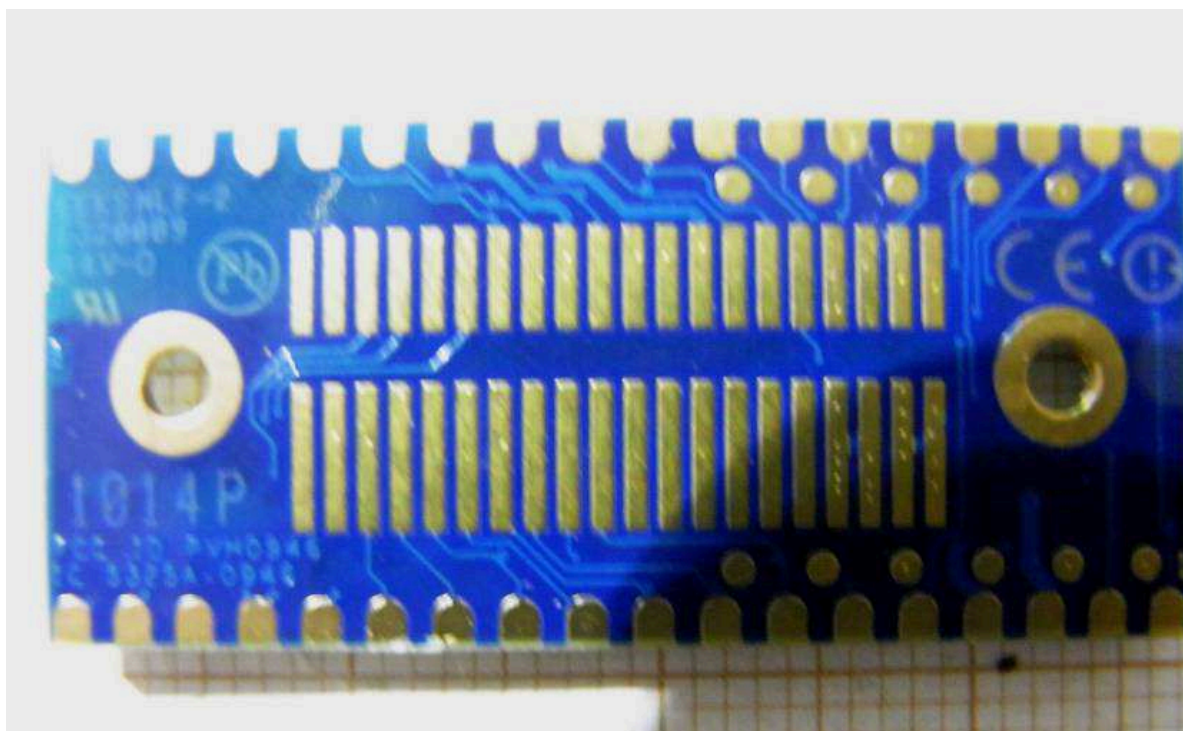
UUT IDENTIFICATION



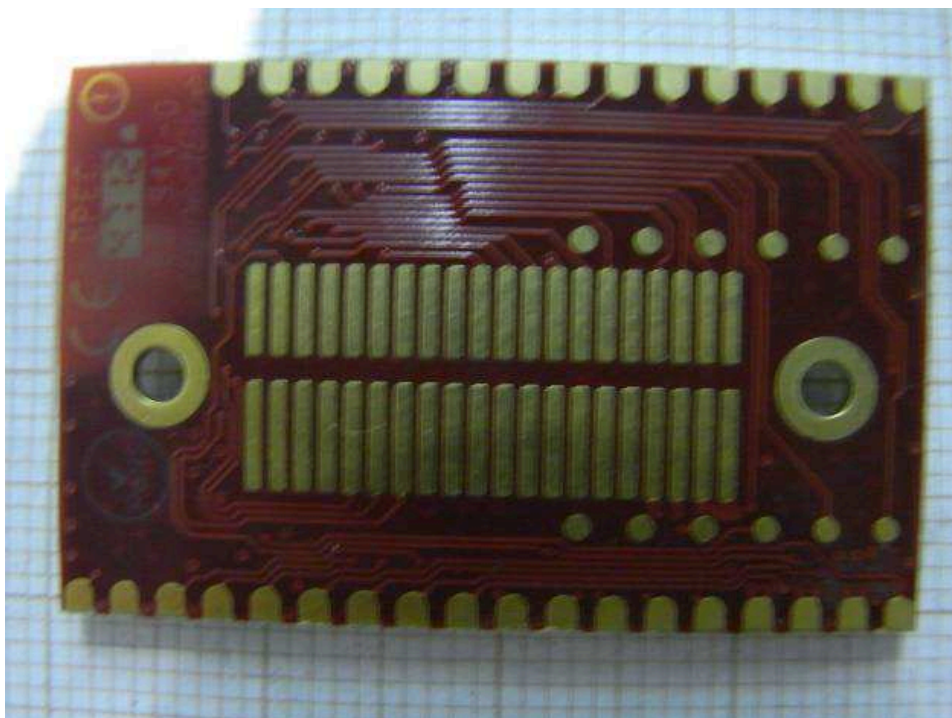
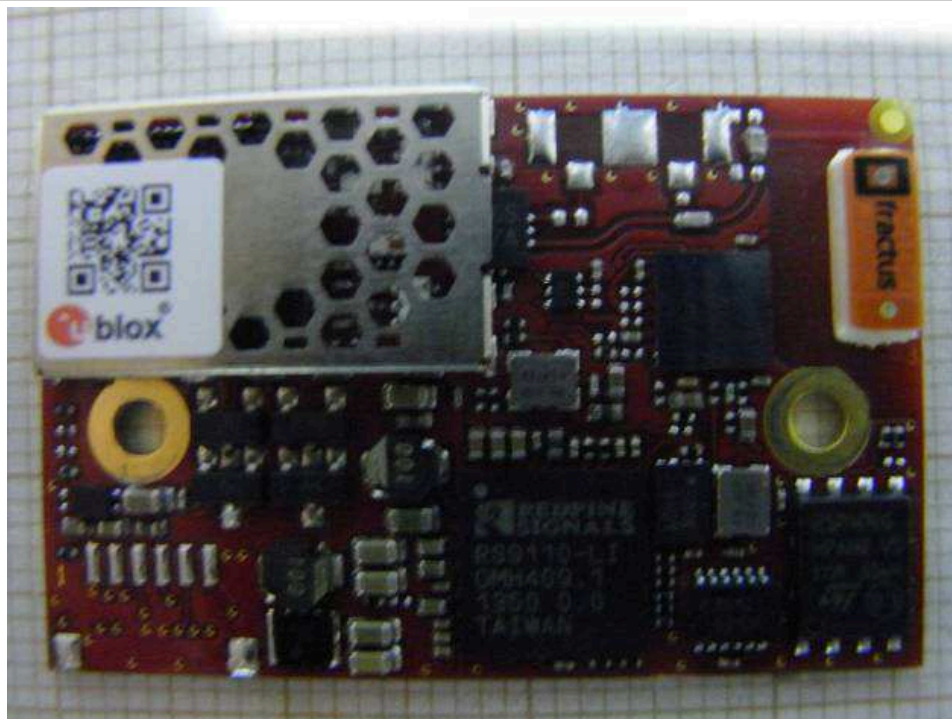
UUT IDENTIFICATION



Bluetooth radio module



WLAN radio module



SET-UP

Test set-up radiated emission test



END OF TEST REPORT