PUBLIC ENTEIRPRISE TESTING CENTER «OMEGA»

Approved by
Acting director
PE TC "OMEGA"

_____Bogach S.V.

July 29, 2011

TEST REPORT No. 11/651
Issue 2

on type approval of Council Directive 96/98/EC on marine equipment (MED)
Survival craft portable two-way VHF radiotelephone apparatus

Model:	**V100**
FCC ID	**XYEV100**
Manufacturer:	**Ocean Signal Ltd., Great Britain**

Sevastopol
2011

PUBLIC ENTERPRISE TESTING CENTER «OMEGA»	ACCREDITATION
P.O.B. No.37, Sevastopol, 99053, Ukraine **Phone: +380 692 240 373** **Fax: +380 692 469 679** **E-mail: stcomega@stc-omega.biz**	**COSPAS-SARSAT Secretariat Reference No. CS497/F530 dated 21/09/1994**
	Ministry of Transport Russian Federation Certificate of accreditation of testing laboratory No. AKP.0510-14 PTH dated 19.05.2010 valid until 19.05.2015
	Russia Maritime Register of Shipping Certificate of Recognition testing laboratory No. 07.18114.184 dated 21.08.2007 valid until 21.08.2012
	National Accreditation Agency of Ukraine Certificate of accreditation for compliance DSTU ISO 17025:2006 No. 2H339 dated 18.05.2011 valid until 17.05.2014
	Letter of FCC acceptance #181479 dated August 19, 2008
	IC registration of 3/10m OATS #8780A-1 dated January 18, 2010
	IC registration of 3m alternative test site #8780A-2 dated January 18, 2010
	BABT Certificate of Recognition testing laboratory No.LAB/033 dated 30.06.2011 valid until 30.06.2013
	Letter of USCG Acceptance for testing EPIRBs #16714/161.011/OMEGA dated February 7, 2008

Equipment under test	Survival craft portable two-way VHF radiotelephone apparatus model: V100
Manufacturer	Ocean Signal limited, Unit 4, Ocivan way, Margate, Kent, CT9 4NN, United Kingdom
Applicant	Ocean Signal limited, Unit 4, Ocivan way, Margate, Kent, CT9 4NN, United Kingdom
Technical officer **job title** **phone number** **e-mail address**	Stefan Kennedy +44(0) 1843 282930 stefan.kennedy@oceansignal.com
Test commencement date	30.06.2011
Test completion date	15.07.2011

CONTENTS

DOCUMENT REVISION HISTORY

Version	Date	Description
Issue 1	21.07.2011	Initial release
Issue 2	29.07.2011	Complete list of all test equipment is added

INTRODUCTION

The V100 radio is available as two variants, V100 and V100 with accessory socket. The two radios are identical except for an additional socket assembly that is fitted to the V100 with accessory socket variant. All tests were carried out on the V100 with accessory socket variant as this provides the worse case configuration. The accessory socket also provides the electrical signals necessary for laboratory testing.

This document contains the results of testing of VHF radio to the requirements of the standard IEC 61097-12.

EQUIPMENT UNDER TEST

1.1 Equipment type name	Survival craft portable two-way VHF radiotelephone apparatus
1.2 Equipment trade mark	SafeSea
1.3 Equipment model	V100 with Accessory Socket (Variant)
1.4 Equipment category	Portable ship station (GMDSS)
1.5 Equipment serial number	Sample 1 (VHF Radio V100): No. TA001 Sample 2 (VHF Radio V100): No. TA002 Sample 3 (Dummy VHF Radio V100): N/A Sample 4 (Charger): N/A
1.6 Firmware version	0100
1.7 Software version	0100

TEST CONDITIONS AND METHODS

The following referenced document describes procedures, conditions and methods of testing:

IEC 61097-12, First edition 1996-11 – Global maritime distress and safety system (GMDSS) - Part 12: Survival craft portable two-way VHF radiotelephone apparatus - Operational and performance requirements, methods of testing and required test results.

IEC 60945 Ed. 4 Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results

TEST PROGRAM

Item	Test name	Requirements of IEC 61097-12	Method of IEC 61097-12	Sample for test
1.	Warming-up test	3.3.7	5.1.3, 5.1.6	Sample 2
2.	The source of energy shall be integrated in the equipment and may be replaceable by the user. In addition, provision may be made to operate the equipment using an external source of electrical energy	3.3.8.1	5.1.6	Sample 2
3.	Equipment intended for the source of energy to be user replaceable shall be provided with a dedicated primary battery for use in the event of a distress situation. This battery shall be equipped with a non-replaceable seal to indicate that it has not be used	3.3.8.2	5.1.6	Sample 2
4.	The primary battery shall have sufficient capacity to ensure 8h operation at its highest rated power with a duty cycle of 1:9. The duty cycle is defined as 6s transmission, 6s reception above squelch operating level and 48s reception below squelch opening level	3.3.8.4	5.3.2.1	Sample 2
5.	Primary batteries shall have a shelf life of at least 2 years and if intended to be user replaceable shall be of a colour or marking as defined in 3.2.3	3.3.8.5	5.3.2.2	Sample 2
6.	Primary or secondary batteries not intended for the use in the event of distress situation shall be of a colour or marking so that they cannot be confused with batteries intended for such use	3.3.8.6	5.3.2.3	Sample 2

Item	Test name	Requirements of IEC 61097-12	Method of IEC 61097-12	Sample for test
7.	The equipment shall be designed to operate satisfactorily with a channel separation of 25 kHz	4.1	5.1.6	Sample 2
8.	The class of emission shall be G3E.	4.2.1.	5.1.6	Sample 2
9.	The necessary bandwidth shall be 16 kHz	4.2.2.	5.1.6	Sample 2
10.	Frequency error	4.3.1, 5.4.1.3	5.4.1.2	Sample 2
11.	Effective radiated power	4.3.2, 5.4.2.3	5.4.2.2	Sample 2
12.	Carrier power, referenced to ERP	4.3.2., 5.4.3.3	5.4.3.2	Sample 2
13.	Frequency deviation	4.3.3, 5.4.4.2.2, 5.4.4.3.2	5.4.4	Sample 2
14.	Limitation characteristics of the modulator	4.3.3, 5.4.5.3	5.4.5.2	Sample 2
15.	Sensitivity of the modulator, including microphone	5.4.6.3	5.4.6.2	Sample 2
16.	Audio frequency response	5.4.7.3	5.4.7.2	Sample 2
17.	Audio frequency harmonic distortion of the emission	5.4.8.3	5.4.8.2	Sample 2
18.	Adjacent channel power	5.4.9.3	5.4.9.2	Sample 2
19.	The upper limit of the audiofrequency band shall not exceed 3 kHz	4.3.4.	5.1.6	Sample 2
20.	Conducted spurious emissions conveyed to the antenna	4.3.5, 5.4.10.3	5.4.10.2	Sample 2
21.	Residual modulation of the transmitter	5.4.11.3	5.4.11.2	Sample 2
22.	Transient frequency behaviour of the transmitter	5.4.12.3	5.4.12.2	Sample 2

Item	Test name	Requirements of IEC 61097-12	Method of IEC 61097-12	Sample for test
23.	The cabinet radiated power shall not exceed 25 mW. In some radio environments, lower values may be required.	4.3.6.	5.1.6	Sample 2
24.	Maximum usable sensitivity	4.4.1, 5.5.3.3	5.5.3.2	Sample 2
25.	Audio frequency response	4.2, 5.5.2.3	5.5.2.2	Sample 2
26.	Co-channel rejection	4.4.2, 5.5.4.3	5.5.4.2	Sample 2
27.	Harmonic distortion and rated audio frequency output power	4.4.3, 5.5.1.3	5.5.1.2	Sample 2
28.	In the transmit condition the output of the receiver shall be muted	4.4.4.	5.1.6	Sample 2
29.	Adjacent channel selectivity	4.4.5, 5.5.5.3	5.5.5.2	Sample 2
30.	Spurious response rejection	4.4.6, 5.5.6.3	5.5.6.2	Sample 2
31.	Intermodulation response	4.4.7, 5.5.7.3	5.5.7.2	Sample 2
32.	Blocking or desensitization	4.4.2, 5.5.8.3	5.5.8.2	Sample 2
33.	Conducted spurious emissions conveyed to the antenna	4.4.8, 5.5.9.3	5.5.9.2	Sample 2
34.	Amplitude response of the receiver limiter	5.5.10.3	5.5.10.2	Sample 2
35.	Receiver hum and noise level	5.5.11.3,	5.5.11.2	Sample 2
36.	Squelch operation	3.3.2.3, 5.5.12.3	5.5.12.2	Sample 2
37.	Squelch hysteresis	5.5.13.3	5.5.13.2	Sample 2
38.	Drop test on hard surface	3.4.2, 5.1.5.1	8.6.1.2 of IEC 60945	Sample 1 Sample 2

Item	Test name	Requirements of IEC 61097-12	Method of IEC 61097-12	Sample for test
39.	Thermal shock test	3.4.4, 5.1.5.2	5.1.5.2	Sample 1
40.	Immersion test	3.4.3, 5.1.5.3	5.1.5.3	Sample 1
41.	Dry heat cycle test	3.4.1, 8.2.1.3 of IEC 60945	8.2.1.2, 8.2.2.2 of IEC 60945	Sample 1
42.	Damp heat Test	8.3.1.3 of IEC 60945	5.1.5.5 8.3.1.2 of IEC 60945	Sample 1
43.	Low temperature cycle test	3.4.1, 8.4.1.3 of IEC 60945	8.4.1.2, 8.4.2.2 of IEC 60945	Sample 1
44.	Vibration test	8.3 of IEC 60945	5.1.5.7 8.3 of IEC 60945	Sample 1
45.	Oil resistance test	3.4.5, 5.1.5.8	5.1.5.8	Separate test and separate report: Test report No.11/ 652
46.	Corrosion test	5.1.5.10	5.1.5.10 8.12.3 of IEC 60945	Separate test and separate report: Test report No.11/ 652
47.	Conducted spurious emissions(charger only)	5.7.1 9.2.3 of IEC 60945	9.2.2 of IEC 60945	Sample 4
48.	Radiated spurious emissions(EUT, charger)	4.3.6. 9.3.3 of IEC 60945	5.7.2 9.3.2 of IEC 60945	Sample 2 Sample 4
49.	Immunity to radiated radiofrequencies	4.4.2 10.4.3 of IEC 60945	5.7.3 10.4.2 of IEC 60945	Sample 2 Sample 4
50.	Immunity to electrostatic discharge	4.4.2 10.9.3 of IEC 60945	5.7.3 10.9.2 of IEC 60945	Sample 2 Sample 4
51.	Conducted RF	4.4.2 10.3.3 of IEC 60945	5.7.3 10.3.2 of IEC 60945	Sample 4
52.	Antenna Short circuit / open circuit test in Transmit	3.3.4.1	3.3.4.1	Sample 1
53.	Compass Safe Distance	4.5.3 of IEC 60945	11.2.2 of IEC 60945	Sample 1, Sample 4

Item	Test name	Requirements of IEC 61097-12	Method of IEC 61097-12	Sample for test
54.	Immunity to Power supply failure	10.8.3.	10.8.2	Sample 4
55.	Lanyard present and Break test	2.3.11 of MSC.149(77)	2.3.11 of MSC.149(77)	Sample 3

TEST SCHEDULE

Item	Test name	Date
1.	Warming-up test	30.06.2011
2.	The source of energy shall be integrated in the equipment and may be replaceable by the user. In addition, provision may be made to operate the equipment using an external source of electrical energy	13.07.2011
3.	Equipment intended for the source of energy to be user replaceable shall be provided with a dedicated primary battery for use in the event of a distress situation. This battery shall be equipped with a non-replaceable seal to indicate that it has not be used	13.07.2011
4.	The primary battery shall have sufficient capacity to ensure 8h operation at its highest rated power with a duty cycle of 1:9. The duty cycle is defined as 6s transmission, 6s reception above squelch operating level and 48s reception below squelch opening level	12.07.2011
5.	Primary batteries shall have a shelf life of at least 2 years and if intended to be user replaceable shall be of a colour or marking as defined in 3.2.3	13.07.2011
6.	Primary or secondary batteries not intended for the use in the event of distress situation shall be of a colour or marking so that they cannot be confused with batteries intended for such use	13.07.2011
7.	The equipment shall be designed to operate satisfactorily with a channel separation of 25 kHz	07.07.11
8.	The class of emission shall be G3E.	02.07.2011
9.	The necessary bandwidth shall be 16 kHz	07.07.11
10.	Frequency error	30.06.2011
11.	Effective radiated power	04.07.2011
12.	Carrier power, referenced to ERP	04.07.2011
13.	Frequency deviation	30.06.2011
14.	Limitation characteristics of the modulator	30.06.2011
15.	Sensitivity of the modulator, including microphone	01.07.2011

Item	Test name	Date
16.	Audio frequency response	02.07.2011
17.	Audio frequency harmonic distortion of the emission	08.07.2011
18.	Adjacent channel power	07.07.11
19.	The upper limit of the audiofrequency band shall not exceed 3 kHz	30.06.2011
20.	Conducted spurious emissions conveyed to the antenna	06.07.2011
21.	Residual modulation of the transmitter	02.07.2011
22.	Transient frequency behaviour of the transmitter	02.07.2011
23.	The cabinet radiated power shall not exceed 25 mW. In some radio environments, lower values may be required.	05.07.2011
24.	Maximum usable sensitivity	02.07.2011
25.	Audio frequency response	02.07.2011
26.	Co-channel rejection	02.07.2011
27.	Harmonic distortion and rated audio frequency output power	06.07.11
28.	In the transmit condition the output of the receiver shall be muted	30.06.2011
29.	Adjacent channel selectivity	02.07.2011
30.	Spurious response rejection	02.07.2011
31.	Intermodulation response	02.07.11
32.	Blocking or desensitization	06.07.2011
33.	Conducted spurious emissions conveyed to the antenna	06.07.2011
34.	Amplitude response of the receiver limiter	06.07.2011
35.	Receiver hum and noise level	06.07.2011
36.	Squelch operation	06.07.2011
37.	Squelch hysteresis	06.07.2011
38.	Drop test on hard surface	01.07.2011
39.	Thermal shock test	04.07.2011
40.	Immersion test	04.07.2011

Item	Test name	Date
41.	Dry heat cycle test	04.07.2011 – 05.07.2011
42.	Damp heat Test	05.07.2011 – 06.07.2011
43.	Low temperature cycle test	06.07.2011
44.	Vibration test	08.07.2011
45.	Oil resistance test	Separate test and separate report: Test report No.11/652
46.	Corrosion test	Separate test and separate report: Test report No.11/652
47.	Conducted spurious emissions(charger only)	09.07.2011
48.	Radiated spurious emissions(EUT, charger)	05.07.2011
49.	Immunity to radiated radiofrequencies	12.07.2011- 13.07.2011
50.	Immunity to electrostatic discharge	11.07.2011
51.	Conducted RF	11.07.2011
52.	Antenna Short circuit / open circuit test in Transmit	14.07.2011
53.	Compass Safe Distance	14.07.2011
54.	Immunity to Power supply failure	08.07.2011
55.	Lanyard present and Break test	14.07.2011

TEST RESULT

Item	Test name	Conclusion
1.	Warming-up test	Pass
2.	The source of energy shall be integrated in the equipment and may be replaceable by the user. In addition, provision may be made to operate the equipment using an external source of electrical energy	Pass
3.	Equipment intended for the source of energy to be user replaceable shall be provided with a dedicated primary battery for use in the event of a distress situation. This battery shall be equipped with a non-replaceable seal to indicate that it has not be used	Pass
4.	The primary battery shall have sufficient capacity to ensure 8h operation at its highest rated power with a duty cycle of 1:9. The duty cycle is defined as 6s transmission, 6s reception above squelch operating level and 48s reception below squelch opening level	Pass
5.	Primary batteries shall have a shelf life of at least 2 years and if intended to be user replaceable shall be of a colour or marking as defined in 3.2.3	Pass
6.	Primary or secondary batteries not intended for the use in the event of distress situation shall be of a colour or marking so that they cannot be confused with batteries intended for such use	Pass
7.	The equipment shall be designed to operate satisfactorily with a channel separation of 25 kHz	Pass
8.	The class of emission shall be G3E.	Pass
9.	The necessary bandwidth shall be 16 kHz	Pass
10.	Frequency error	Pass
11.	Effective radiated power	Pass
12.	Carrier power, referenced to ERP	Pass
13.	Frequency deviation	Pass
14.	Limitation characteristics of the modulator	Pass
15.	Sensitivity of the modulator, including microphone	Pass
16.	Audio frequency response	Pass
17.	Audio frequency harmonic distortion of the emission	Pass
18.	Adjacent channel power	Pass
19.	The upper limit of the audiofrequency band shall not exceed 3 kHz	Pass
20.	Conducted spurious emissions conveyed to the antenna	Pass

Item	Test name	Conclusion
21.	Residual modulation of the transmitter	Pass
22.	Transient frequency behaviour of the transmitter	Pass
23.	The cabinet radiated power shall not exceed 25 mW. In some radio environments, lower values may be required.	Pass
24.	Maximum usable sensitivity	Pass
25.	Audio frequency response	Pass
26.	Co-channel rejection	Pass
27.	Harmonic distortion and rated audio frequency output power	Pass
28.	In the transmit condition the output of the receiver shall be muted	Pass
29.	Adjacent channel selectivity	Pass
30.	Spurious response rejection	Pass
31.	Intermodulation response	Pass
32.	Blocking or desensitization	Pass
33.	Conducted spurious emissions conveyed to the antenna	Pass
34.	Amplitude response of the receiver limiter	Pass
35.	Receiver hum and noise level	Pass
36.	Squelch operation	Pass
37.	Squelch hysteresis	Pass
38.	Drop test on hard surface	Pass
39.	Thermal shock test	Pass
40.	Immersion test	Pass
41.	Dry heat cycle test	Pass
42.	Damp heat Test	Pass
43.	Low temperature cycle test	Pass
44.	Vibration test	Pass
45.	Oil resistance test	Pass[1]

Item	Test name	Conclusion
46.	Corrosion test	Pass/Fail[2]
47.	Conducted spurious emissions(charger only)	Pass
48.	Radiated spurious emissions(EUT, charger)	Pass
49.	Immunity to radiated radiofrequencies	Pass
50.	Immunity to electrostatic discharge	Pass
51.	Conducted RF	Pass
52.	Antenna Short circuit / open circuit test in Transmit	Pass
53.	Compass Safe Distance	Pass
54.	Immunity to Power supply failure	Pass
55.	Lanyard present and Break test	Pass

[1] Detail test results are presented in Test report No.11/652

[2] Fail for V100 with Accessory Socket (Variant) – there are signs of deterioration only on the accessory socket dust cap cable clamp.

Pass for V100 as this model doesn’t have the accessory socket with dust cap cable clamp.

Detail test results are presented in Test report No.11/652

CONCLUSION

Name and Location of Test Facility:	**PUBLIC ENTEIRPRISE TESTING CENTER «OMEGA», 99053, Sevastopol, ul. Vakulenchuka, 29, Ukraine**
Date of Submission for Testing:	**June 30, 2011**
Applicable Standards:	**IEC 61097-12 First edition (1996-11) IEC 60945 Edition 4.0 (2002-08)**

I hereby confirm that the VHF radiotelephone described above has been successfully tested in accordance with the Applicable standards and complies with the requirement of Applicable standards as demonstrated in the attached report with the exception of item 5.1.5.10 IEC 61097-12 (Corrosion test).

29.07.2011

Evgeniy Yurasov, Department manager

SUMMARY OF TEST RESULTS

Item	Test name	Requirements of IEC 61097-12	Results
1.	Warming-up test	3.3.7	Annex 1
2.	The source of energy shall be integrated in the equipment and may be replaceable by the user. In addition, provision may be made to operate the equipment using an external source of electrical energy	3.3.8.1	Annex 2
3.	Equipment intended for the source of energy to be user replaceable shall be provided with a dedicated primary battery for use in the event of a distress situation. This battery shall be equipped with a non-replaceable seal to indicate that it has not be used	3.3.8.2	Annex 2
4.	The primary battery shall have sufficient capacity to ensure 8h operation at its highest rated power with a duty cycle of 1:9. The duty cycle is defined as 6s transmission, 6s reception above squelch operating level and 48s reception below squelch opening level	3.3.8.4	Annex 3
5.	Primary batteries shall have a shelf life of at least 2 years and if intended to be user replaceable shall be of a colour or marking as defined in 3.2.3	3.3.8.5	Annex 4
6.	Primary or secondary batteries not intended for the use in the event of distress situation shall be of a colour or marking so that they cannot be confused with batteries intended for such use	3.3.8.6	Annex 2
7.	The equipment shall be designed to operate satisfactorily with a channel separation of 25 kHz	4.1	Annex 23
8.	The class of emission shall be G3E.	4.2.1.	Annex 12
9.	The necessary bandwidth shall be 16 kHz	4.2.2.	Annex 14
10	Frequency error	4.3.1, 5.4.1.3	Annex 6
11	Effective radiated power	4.3.2, 5.4.2.3	Annex 7

Item	Test name	Requirements of IEC 61097-12	Results
12	Carrier power, referenced to ERP	4.3.2., 5.4.3.3	Annex 8
13	Frequency deviation	4.3.3, 5.4.4.2.2, 5.4.4.3.2	Annex 9
14	Limitation characteristics of the modulator	4.3.3, 5.4.5.3	Annex 10
15	Sensitivity of the modulator, including microphone	5.4.6.3	Annex 11
16	Audio frequency response	5.4.7.3	Annex 12
17	Audio frequency harmonic distortion of the emission	5.4.8.3	Annex 13
18	Adjacent channel power	5.4.9.3	Annex 14
19	The upper limit of the audiofrequency band shall not exceed 3 kHz	4.3.4.	Annex 9
20	Conducted spurious emissions conveyed to the antenna	4.3.5, 5.4.10.3	Annex 15
21	Residual modulation of the transmitter	5.4.11.3	Annex 16
22	Transient frequency behaviour of the transmitter	5.4.12.3	Annex 17
23	The cabinet radiated power shall not exceed 25 mW. In some radio environments, lower values may be required.	4.3.6.	Annex 18
24	Maximum usable sensitivity	4.4.1, 5.5.3.3	Annex 19
25	Audio frequency response	4.2, 5.5.2.3	Annex 20
26	Co-channel rejection	4.4.2, 5.5.4.3	Annex 21
27	Harmonic distortion and rated audio frequency output power	4.4.3, 5.5.1.3	Annex 22
28	In the transmit condition the output of the receiver shall be muted	4.4.4.	Annex 1
29	Adjacent channel selectivity	4.4.5, 5.5.5.3	Annex 23
30	Spurious response rejection	4.4.6, 5.5.6.3	Annex 24

Item	Test name	Requirements of IEC 61097-12	Results
31	Intermodulation response	4.4.7, 5.5.7.3	Annex 25
32	Blocking or desensitization	4.4.2, 5.5.8.3	Annex 26
33	Conducted spurious emissions conveyed to the antenna	4.4.8, 5.5.9.3	Annex 27
34	Amplitude response of the receiver limiter	5.5.10.3	Annex 28
35	Receiver hum and noise level	5.5.11.3,	Annex 29
36	Squelch operation	3.3.2.3, 5.5.12.3	Annex 30
37	Squelch hysteresis	5.5.13.3	Annex 31
38	Drop test on hard surface	3.4.2, 5.1.5.1	Annex 32
39	Thermal shock test	3.4.4, 5.1.5.2	Annex 33
40	Immersion test	3.4.3, 5.1.5.3	Annex 34
41	Dry heat cycle test	3.4.1, 8.2.1.3 of IEC 60945	Annex 35
42	Damp heat Test	8.3.1.3 of IEC 60945	Annex 36
43	Low temperature cycle test	3.4.1, 8.4.1.3 of IEC 60945	Annex 37
44	Vibration test	8.3 of IEC 60945	Annex 38
45	Oil resistance test	3.4.5, 5.1.5.8	Separate tests and separate report: Test report No.11/ 652 (July 20, 2011)
46	Corrosion test	5.1.5.10	Separate tests and separate report: Test report No.11/ 652 (July 20, 2011)
47	Conducted spurious emissions(charger only)	5.7.1 9.2.3 of IEC 60945	Annex 39
48	Radiated spurious emissions(EUT, charger)	4.3.6. 9.3.3 of IEC 60945	Annex 18
49	Immunity to radiated radiofrequencies	4.4.2 10.4.3 of IEC 60945	Annex 40
50	Immunity to electrostatic discharge	4.4.2 10.9.3 of IEC 60945	Annex 41
51	Conducted RF	4.4.2 10.3.3 of IEC 60945	Annex 42

Item	Test name	Requirements of IEC 61097-12	Results
52	Antenna Short circuit / open circuit test in Transmit	3.3.4.1	Annex 43
53	Compass Safe Distance	4.5.3 of IEC 60945	Annex 44
54	Immunity to Power supply failure	10.8.3.	Annex 45
55	Lanyard present and Break test	2.3.11 of MSC.149(77)	Annex 46

ANNEX 1.
WARMING-UP PERIOD TEST

Warming-up period Test (items 1, 28 of Test Program)
Test Procedure: Warming-up period Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 30.06.2011
The Name and Test - Site Location: Laboratory No. 10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Warming-up period	3.3.7	5.1.6
2.	In the transmit condition the output of the receiver shall be muted	4.4.4	5.1.6

Warming-up period

TEST DESCRIPTION

The Warming-up period test was carried out.

The equipment was operational within 5 s of switching on

TEST CONDITIONS

- Ambient temperature: 26 °C
- Relative humidity: 56 %
- Atmospheric pressure: 752 mm/Hg
- Measurement duration: 15 minutes
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Stop watch	SOSpr-2b-2	2328	08.2011
3.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Performance check within 5 s of switching on

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.005	Pass
Output power	>0.25	W	2.53	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+6	dBμV	-6.54	Pass

In the transmit condition the output of the receiver shall be muted

TEST DESCRIPTION

1) VHF Radio was switched on in Receiver mode
2) A test signal with normal test modulation was applied to the receiver input.
3) Then VHF Radio was switched to the Transmitter mode
4) Reaction of VHF Radio was observed. There was no sound on the speaker.

Parameters	Conclusion
In the transmit condition the output of the receiver shall be muted	Pass

ANNEX 2.
POWER SUPPLY TEST

Power Supply Test (item 2, 3, 6 of Test Program)
Test Procedure: Power Supply Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 13.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B,

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	The source of energy shall be integrated in the equipment and may be replaceable by the user. In addition, provision may be made to operate the equipment using an external source of electrical energy	3.3.8.1	5.1.6
2.	Equipment intended for the source of energy to be user replaceable shall be provided with a dedicated primary battery for use in the event of a distress situation. This battery shall be equipped with a non-replaceable seal to indicate that it has not been used	3.3.8.2	5.1.6
3.	Primary or secondary batteries not intended for the use in the event of distress situation shall be of a colour or marking so that they cannot be confused with batteries intended for such use	3.3.8.6	5.3.2.3

TEST DESCRIPTION

- The source of energy is integrated in the equipment and may be replaceable by the user. In addition, provision may be made to operate the equipment using an external source of electrical energy
- Equipment intended for the source of energy to be user replaceable shall be provided with a dedicated primary battery for use in the event of a distress situation. This battery shall be equipped with a non-replaceable seal to indicate that it has not been used
- Primary or secondary batteries not intended for the use in the event of distress situation shall be of a colour or marking so that they cannot be confused with batteries intended for such use.

TEST CONDITIONS

- Ambient temperature: 26 °C
- Relative humidity: 56 %
- Atmospheric pressure: 752 mm/Hg
- Measurement duration: 15 minutes

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011

TEST RESULT

Figure 2.1 – Battery is integrated and may replaceable by the user

Figure 2.2 – Not used battery in distress situations

Figure 2.3 – Used battery in distress situations

Figure 2.4 – Primary battery for the use in the distress situation (yellow colour)

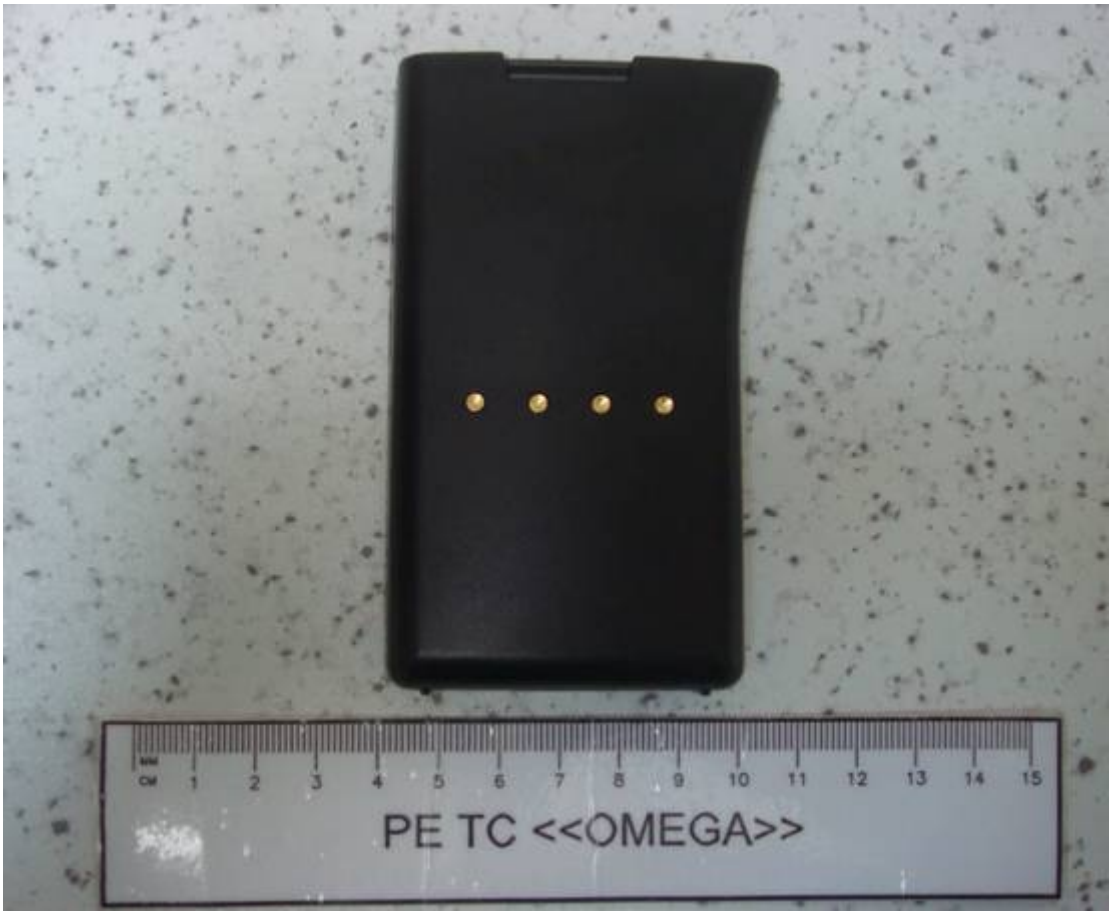


Figure 2.5 – Secondary battery not for the use in the distress situation (black colour)

ANNEX 3.
BATTERY CAPACITY TEST

Battery Capacity Test (item 4 of Test Program)
Test Procedure: Capacity Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 12.07.2011
The Name and Test - Site Location: Laboratory No. 10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Battery capacity test	3.3.8.4	5.3.2.1

TEST DESCRIPTION

The equipment with an unused primary battery was tested in accordance with the duty cycle specified in 3.3.8.4. The test to verify compliance with the capacity requirements of 3.3.8.4 under extreme low conditions was carried out.

The requirements of 3.3.8.4 are: The primary battery shall have sufficient capacity to ensure 8h operation at its highest rated power with a duty cycle of 1:9. The duty cycle is defined as 6s transmission, 6s reception above squelch operating level and 48s reception below squelch opening level.

TEST CONDITIONS

- Ambient temperature: 26 °C
- Relative humidity: 55 %
- Atmospheric pressure: 752 mm/Hg
- Test duration: 10 hours
- Measurement duration: 10 hours

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011
2.	Hygrometer	VIT-2	D688	12.2011
3.	Climatic chamber	KPK-400V	15	08.2012
4.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Figure 3.1 — General view of test site

Figure 3.2 – EUT with unused battery in climatic chamber

Timestamp	Frequency error, Hz	Output power, W
0:00	-5	2.65
1:00	-5	2.65
2:00	-4	2.64
3:00	-5	2.64
4:00	-5	2.64
5:00	-5	2.66
6:00	-5	2.65
7:00	-5	2.65
8:00	-5	2.65
8:15	-5	2.65
8:30	-5	2.65
8:45	-5	2.65
9:00	-5	2.65
9:15	-5	2.64
9:30	-5	2.64
9:45	-5	2.63
10:00	-5	2.63

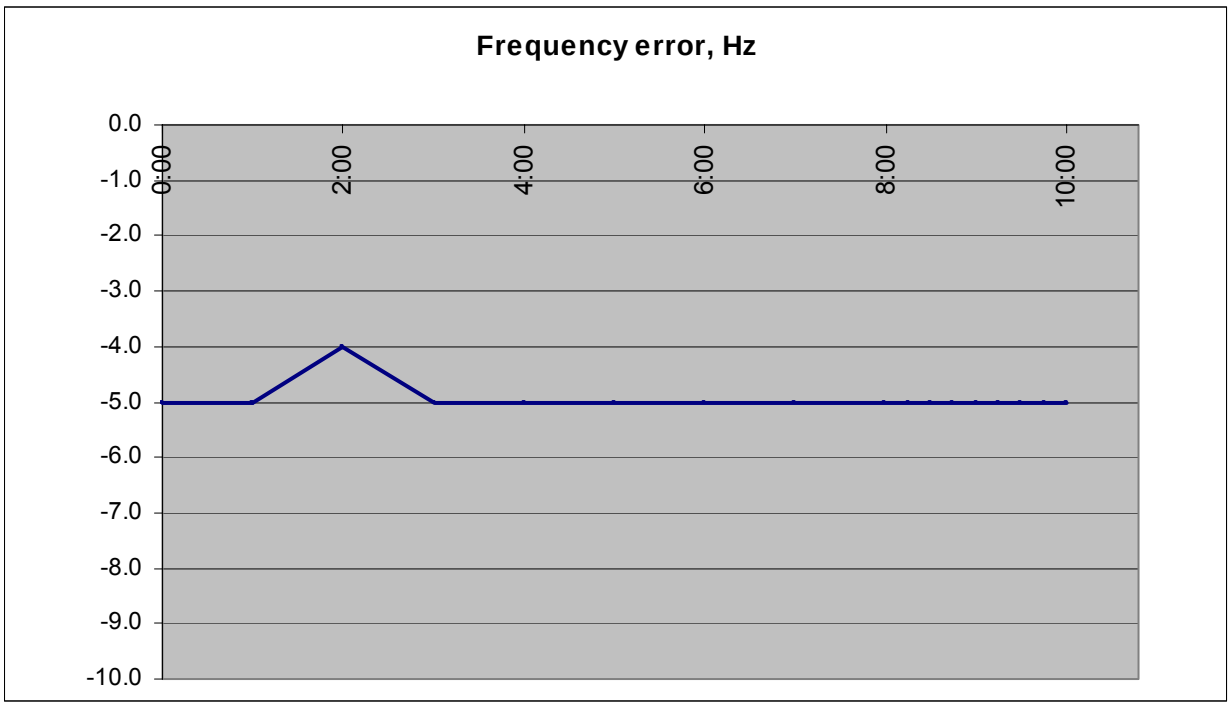


Figure 3.3 – Plot of frequency error during the test

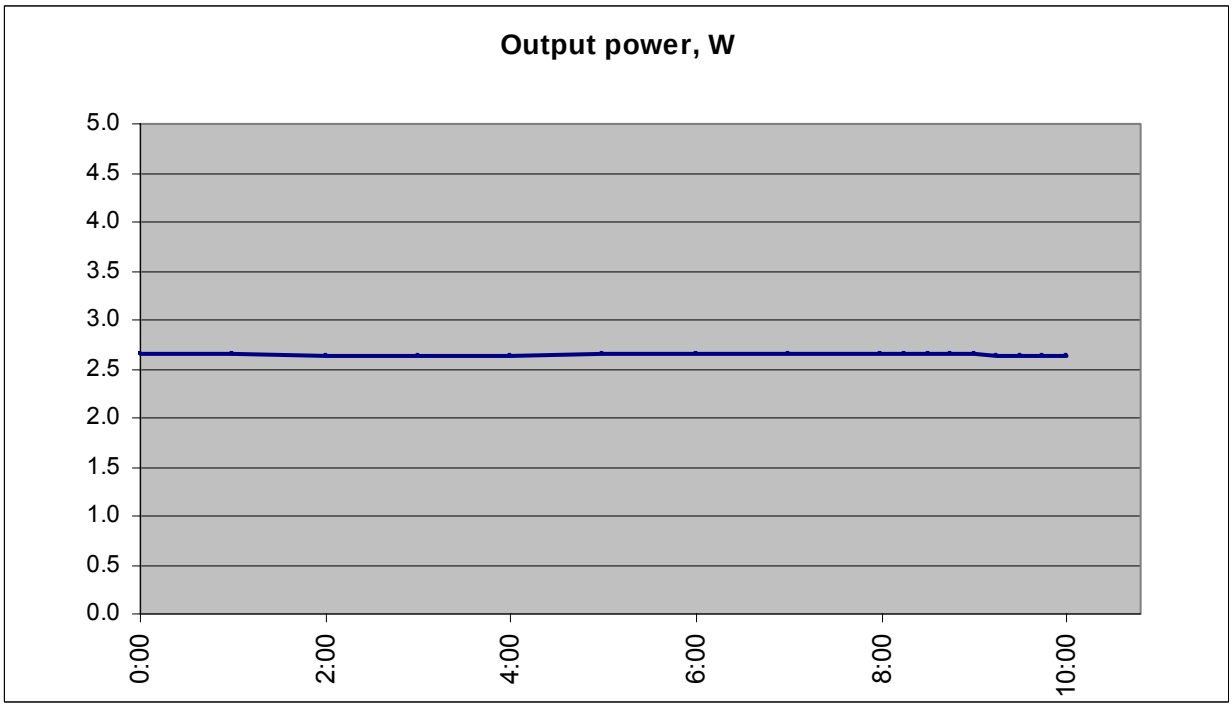


Figure 3.4 – Plot of output power during the test

Performance check after the test

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.005	Pass
Output power	>0.25	W	2,58	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-7,03	Pass

ANNEX 4.
BATTERY EXPIRY DATE TEST

Battery Expiry Date Test (item 5 of Program)
Test Procedure: Expiry Date Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 13.07.2011
The Name and Test - Site Location: Laboratory No. 10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Battery expiry date test	3.3.8.5	5.3.2.2

TEST DESCRIPTION

The Battery expiry date test was carried out.

The manufacturer declared the expiry date of the battery.

Primary battery has a shelf life of 5 years. The battery is replaceable by user.

Battery has a colour or marking as defined in 3.2.3.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 59 %
- Atmospheric pressure: 752 mm/Hg
- Measurement duration: 15 minutes

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011

TEST RESULT

Figure 4.1 — Expiry date of battery.

Figure 4.2 – Photo of a marking battery

ANNEX 5.
IDENTIFICATION OF VHF RADIO BEFORE ELECTRICAL TESTS AND PHOTO OF TYPICAL TEST SITE

Identification of VHF Radio
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 30.06.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

Figure 5.1 —General view of VHF radio before the tests.

Figure 5.2 — EUT before the test

Figure 5.3 — EUT before the test

Figure 5.4 – General view of the test site at normal test conditions

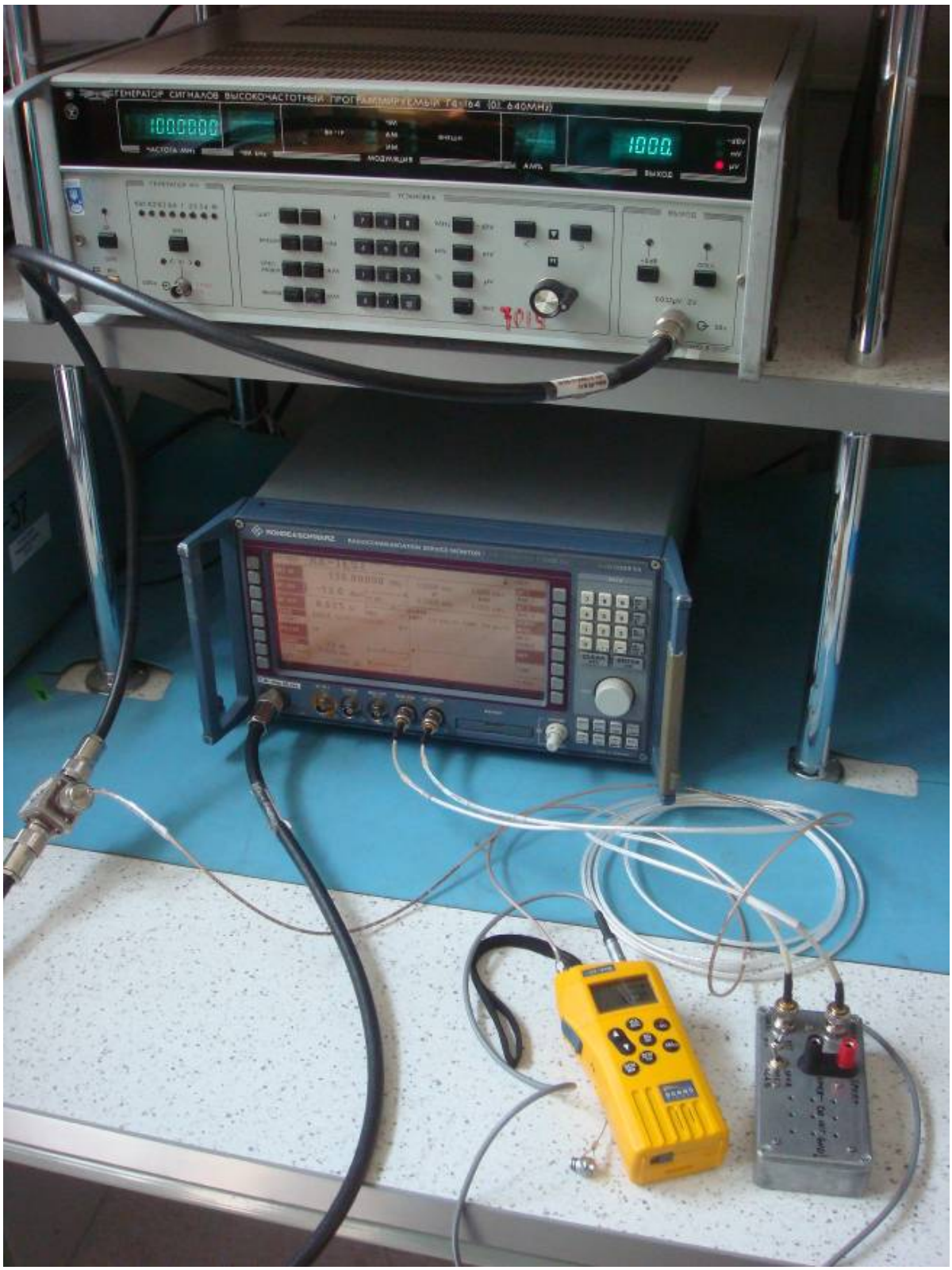


Figure 5.5 – General view of the test site at normal test conditions

Figure 5.6 — EUT in climatic chamber before electrical tests at extreme temperatures

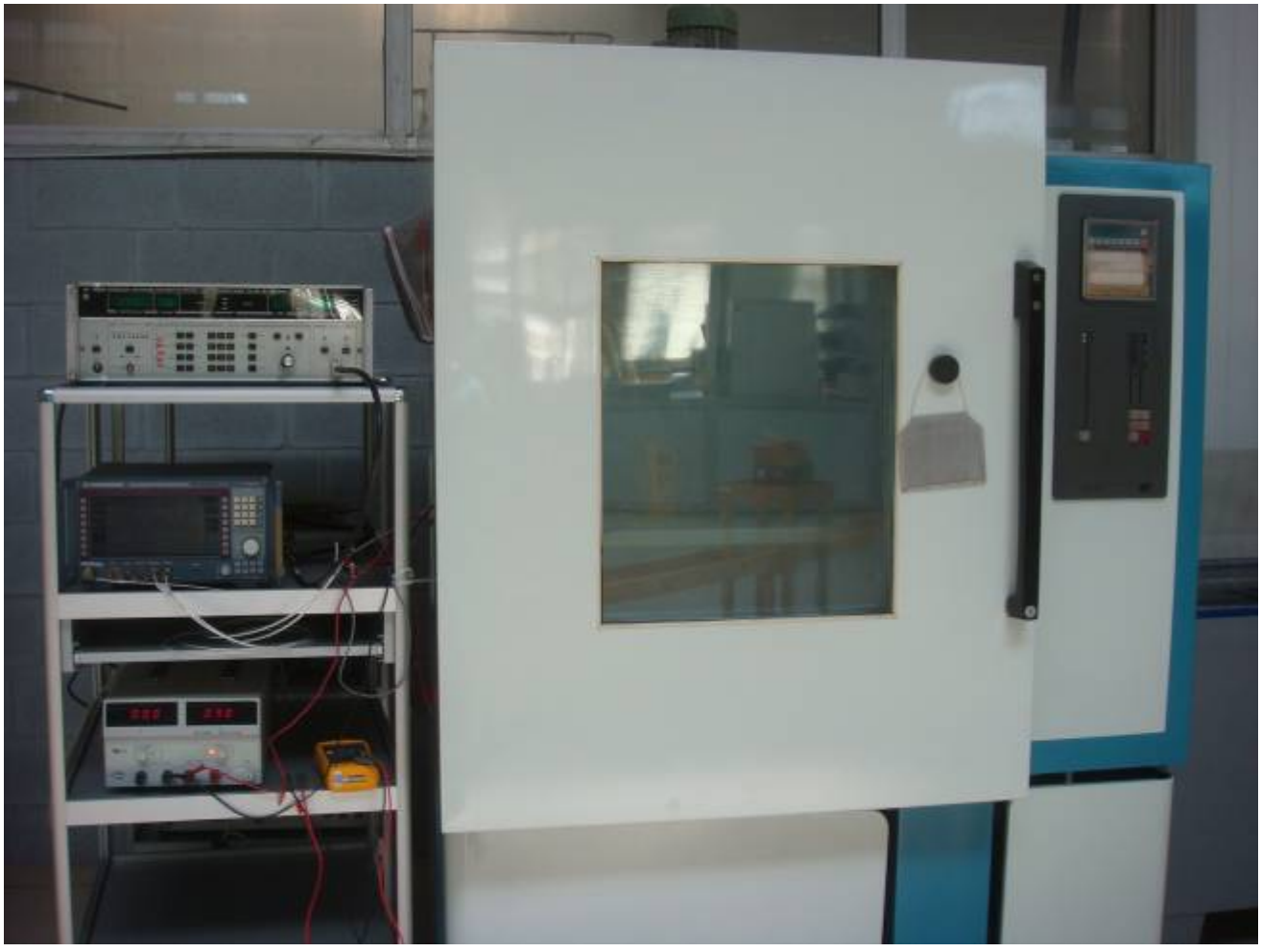


Figure 5.7 – General view of the test site at extreme temperatures

ANNEX 6.
FREQUENCY ERROR TEST

Frequency Error Test (item 10 of Test Program)
Test Procedure: Frequency Error Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 30.06.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Frequency error	4.3.1	5.4.1.2

TEST DESCRIPTION

The Frequency error test was carried out.

The carrier frequency was measured in the absence of modulation with the transmitter connected to an artificial antenna. The measured was carried out under normal test conditions and extreme test conditions as defined in IEC 60945, of dry heat and the upper limit of supply voltage applied simultaneously and low temperature and the lower limit of supply voltage applied simultaneously.

TEST CONDITIONS

- Ambient temperature: 26 °C
- Relative humidity: 45 %
- Atmospheric pressure: 752 mm/Hg
- Measurement duration: 2 hours
- Upper limit of supply voltage: 9.0 V
- Lower limit of supply voltage:7.2 V
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Climatic chamber	KPK-400V	15	08.2012
3.	Multimeter	FLUKE - 189/FVF2	89750179	09.2011
4.	Power supply	SEA PS 3020	100185	01.2012
5.	Temperature meter	Center-309	100074/1	08.2011
6.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Measurement at normal test conditions

Parameters to be Measured	**Range of Specification**	**Units**	**Test Results**	**Conclusion**
Frequency error	Not exceed ±1500	Hz	-5	Pass

Measurement at +55 °C maximum operational temperature

Parameters to be Measured	**Range of Specification**	**Units**	**Test Results**	**Conclusion**
Frequency error	Not exceed ±1500	Hz	-5	Pass

Measurement at -20 °C minimum operational temperature

Parameters to be Measured	**Range of Specification**	**Units**	**Test Results**	**Conclusion**
Frequency error	Not exceed ±1500	Hz	-4	Pass

ANNEX 7.
EFFECTIVE RADIATED POWER TEST

Effective Radiated Power Test (item 11 of Test Program)
Test Procedure: Effective Radiated Power Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 04.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Effective radiated power	4.3.2	5.4.2.2

TEST DESCRIPTION

On a suitable test site the EUT was placed at a height of 1,5 m on a non-conducting support and in the configuration closest to normal use as declared by the manufacturer.

A test antenna was oriented for vertical polarization and the length of the test antenna was chosen to correspond to the frequency of the transmitter. The output of the test antenna was connected to a measuring receiver.

The transmitter was switched on, with the power reduction switch (when provided) in the maximum position, without modulation and the measuring receiver were tuned to the frequency of the transmitter of the EUT. The test was conducted using channel 17.

The substitution antenna was raised and lowered to ensure that the maximum signal level is received.

Then the EUT was rotated through 360° in the horizontal plane until the maximum level is detected by the measuring receiver. The maximum signal level was recorded.

The EUT was replaced by a suitable substitution antenna. The substitution antenna was orientated for vertical polarization and the length of the substitution antenna was adjusted to correspond to the frequency of the transmitter of the EUT. The substitution antenna was connected to a calibrated signal generator.

The input attenuator setting of the measuring receiver was adjusted in order to increase the sensitivity of the measuring receiver.

The test antenna was raised and lowered to ensure that the maximum signal is received. The input signal to the substitution antenna was adjusted to the levels that produce levels, detected by the measuring receiver, that are equal to the levels recorded while the transmitter effective radiated powers were measured, corrected for the change of input attenuator setting of the measuring receiver.

The input levels to the substitution antenna was recorded as power levels, corrected for the change of input attenuator setting of the measuring receiver.

The measurements were repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

The measure of the e.r.p. is the larger of the two power levels recorded, at the input to the substitution antenna, corrected for gain of the antenna if necessary.

TEST CONDITIONS

- Ambient temperature: 22 °C
- Relative humidity: 65 %
- Atmospheric pressure: 750 mm/Hg
- Measurement duration: 2 hours
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Test antenna	BBUK9139	9114-215	11.2011
3.	Power measuring device	M3-56	04738	05.2012
4.	Substitution antenna	BBUK9139	9114-214	11.2011
5.	Generator	G4-176	5290	01.2012
6.	Amplifier	BBS2E4AHM	101164	03.2014
7.	Service monitor	CMS-54	835587/036	06.2012
8.	Measuring receiver	ESPC	848553/024	05.2012

TEST RESULT

Measurements when the test antenna was oriented for vertical polarization

Figure 7.1 – General view of the test site

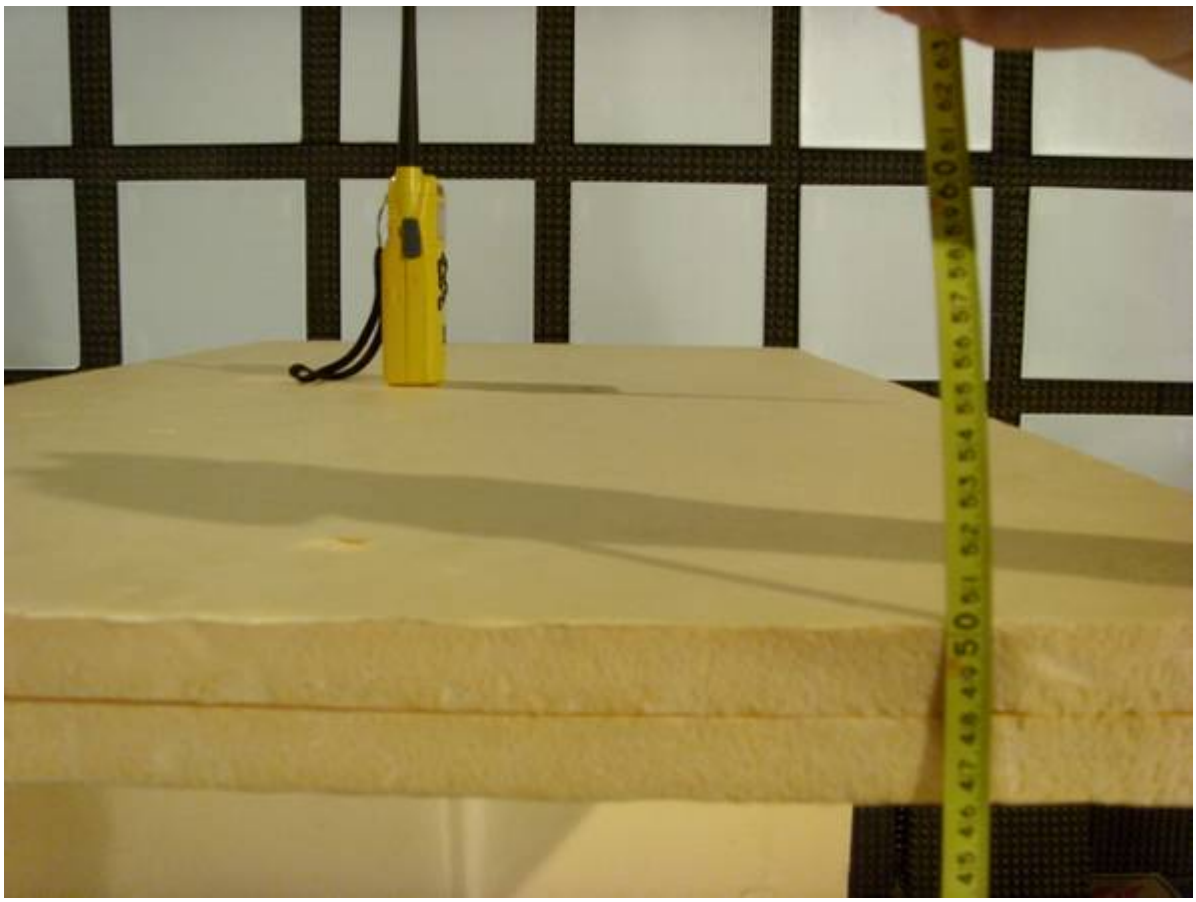


Figure 7.2 – Height of the support

Measurements when the substitution antenna was oriented for vertical polarization

Parameters to be Measured	Range of Specification	Units	Test Results
E.R.P. High level	0.25<E.R.P.<25	W	1.047
E.R.P. Low level	0.25<E.R.P.<25	W	0.417

Measurements when the substitution antenna was oriented for horizontal polarization

Parameters to be Measured	Range of Specification	Units	Test Results
E.R.P. High level	0.25<E.R.P.<25	W	1.260
E.R.P. Low level	0.25<E.R.P.<25	W	0.482

ERP level of the EUT is

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
E.R.P. High level	0.25<E.R.P.<25	W	1.260	Pass
E.R.P. Low level	0.25<E.R.P.<25	W	0.482	Pass

ANNEX 8.
CARRIER POWER TEST

Carrier Power Test (item 12 of Test Program)
Test Procedure: Carrier Power Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 04.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Carrier Power Test	4.3.2	5.4.3.2

TEST DESCRIPTION

The Carrier power test was carried out at normal and extreme test conditions.

The transmitter was connected to an artificial antenna and the output power delivered to this artificial antenna was measured.

To determine the antenna gain the measurement was made using channel 17 under normal test conditions.

The measurements was repeated using channel 16 under extreme test conditions as defined in IEC 60945, of dry heat and the upper limit of supply voltage applied simultaneously and low temperature and the lower limit of supply voltage applied simultaneously.

The power reduction switch was positioned in the maximum position.

The carried power measured, corrected for the antenna gain was recorded as the E.R.P.

Test was repeated with the power reduction switch in the minimum position.

TEST CONDITIONS

- Ambient temperature: 23 °C
- Relative humidity: 65 %
- Atmospheric pressure: 750 mm/Hg
- Measurement duration: 2 hours
- Upper limit of supply voltage: 9.0 V
- Lower limit of supply voltage: 7.2 V
- Operational channel: 17 channel 156.85 MHz, 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Climatic chamber	КРК-400V	15	08.2012
3.	Temperature meter	Center-309	100074/1	08.2011
4.	Multi meter	FLUKE - 189/FVF2	89750179	09.2011
5.	Power supply	SEA PS 3020	100185	01.2012
6.	Power measuring device	M3-56	04738	05.2012
7.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Measurement at normal test conditions

Parameters to be Measured	Range of Specification	Units	Test Results
Carrier power. Power reduction switch in maximum position	>0.25 <25	W	2.53
Carrier power. Power reduction switch in minimum position	>0.25 <1	W	1.01

Antenna gain:

Power reduction switch in maximum position: G=-3.03 dB

Power reduction switch in minimum position: G=-3.21 dB

Measurement at +55 °C maximum operational temperature

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Carrier power corrected for antenna gain. Power reduction switch in maximum position.	>0.25 <25	W	1.28	Pass
Carrier power corrected for antenna gain. Power reduction switch in minimum position	>0.25 <1	W	0.50	Pass

Measurement at -20 °C minimum operational temperature

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Carrier power corrected for antenna gain.. Power reduction switch in maximum position	>0.25 <25	W	1.28	Pass
Carrier power corrected for antenna gain. Power reduction switch in minimum position	>0.25 <1	W	0.52	Pass

ANNEX 9.
FREQUENCY DEVIATION TEST

Frequency Deviation Test (item 13, 9 of Program)
Test Procedure: Frequency Deviation Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 30.06.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Frequency deviation test	4.3.3	5.4.4
1.1	Maximum permissible frequency deviation	4.3.3	5.4.4.2.1
1.2	Reduction of frequency deviation at modulation frequencies above 3 kHz	4.3.3	5.4.4.3.1

1.1 Maximum permissible frequency deviation

TEST DESCRIPTION

The frequency deviation was measured at the output with the transmitter connected to an artificial antenna, by means of deviation meter capable of measuring the maximum deviation, including that due to any harmonics and intermodulation products which may be generated in the transmitter.

The modulation was varied between 100 Hz and 3kHz. The level of this test signal was 20 dB above the test level which produces normal test modulation.

TEST CONDITIONS

- Ambient temperature: 26 °C
- Relative humidity: 46 %
- Atmospheric pressure: 752 mm/Hg
- Measurement duration: 2 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Measurement at normal test modulation:

Frequency deviation at normal test modulation 1 kHz: 3 kHz

Measurement at modulation frequencies:

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Maximum permissible frequency deviation, 100 Hz modulation	±5	kHz	1.56	Pass
Maximum permissible frequency deviation, 200 Hz modulation	±5	kHz	3.68	Pass
Maximum permissible frequency deviation, 400 Hz modulation	±5	kHz	3.71	Pass
Maximum permissible frequency deviation, 800 Hz modulation	±5	kHz	4.32	Pass
Maximum permissible frequency deviation, 1000 Hz modulation	±5	kHz	4.73	Pass
Maximum permissible frequency deviation, 2000 Hz modulation	±5	kHz	4.04	Pass
Maximum permissible frequency deviation, 3000 Hz modulation	±5	kHz	4.08	Pass

1.2 Reduction of frequency deviation at modulation frequencies above 3 kHz

TEST DESCRIPTION

The transmitter was operated under normal test conditions, and terminated with an artificial antenna. The transmitter was modulated with normal test modulation. With the modulation signal at constant input level, the frequency was varied from 3 kHz to 25 kHz and the frequency deviation was measured.

For modulation frequencies between 3 kHz and 6 kHz the frequency deviation was not exceed the frequency deviation with a modulation frequency of 3 kHz.

For a modulation frequency of 6 kHz deviation was not exceed ±1.5 kHz

For modulation frequencies between 6 kHz and 25 kHz, the frequency deviation was not exceed that given by a linear response of frequency deviation (in decibels) against modulation frequency, starting at the point where the modulation frequency is 6 kHz and the frequency deviation is ±1.5 kHz and inclined at 14 dB/octave, with the frequency deviation diminishing as the modulation frequency

The required results are illustrated in figure 9.1

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 45 %
- Atmospheric pressure: 752 mm/Hg
- Measurement duration: 2 hours

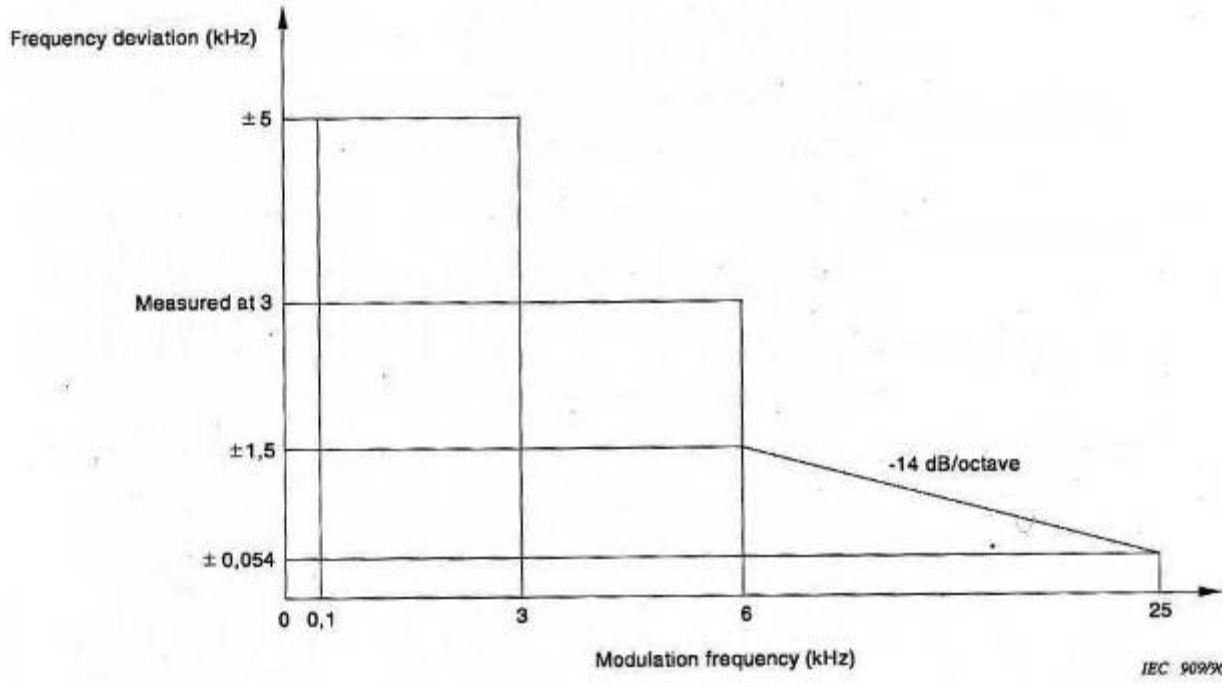


Figure 9.1 — Transmitter permissible frequency deviation

Measurement at modulation frequency 3 kHz:

Frequency deviation at modulation frequency 3 kHz:4,10 kHz

Measurement at modulation frequencies 3 kHz to 6 kHz:

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Maximum permissible frequency deviation, 3 kHz modulation frequency	--	kHz	4.10	Pass
Maximum permissible frequency deviation, 3.5 kHz modulation frequency	Not exceed ±4.10 kHz	kHz	2.48	Pass
Maximum permissible frequency deviation, 4 Hz modulation frequency	Not exceed ±4.10 kHz	kHz	1.20	Pass
Maximum permissible frequency deviation, 4.5 kHz modulation frequency	Not exceed ±4.10 kHz	kHz	0.68	Pass
Maximum permissible frequency deviation, 5 kHz modulation frequency	Not exceed ±4.10 kHz	kHz	0.46	Pass
Maximum permissible frequency deviation, 5.5 kHz modulation frequency	Not exceed ±4.10 kHz	kHz	0.13	Pass

Measurement at modulation frequency 6 kHz:

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Maximum permissible frequency deviation, 6 kHz modulation frequency	±1.5	kHz	0.011	Pass

Measurement at modulation frequency 6 kHz to 25 kHz:

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Maximum permissible frequency deviation, 6 kHz modulation frequency	±1.5	kHz	0.011	Pass
Maximum permissible frequency deviation, 10 kHz modulation frequency	±0.3	kHz	0.008	Pass
Maximum permissible frequency deviation, 15 Hz modulation frequency	±0.13	kHz	0.007	Pass
Maximum permissible frequency deviation, 20 kHz modulation frequency	±0.062	kHz	0.008	Pass
Maximum permissible frequency deviation, 25 kHz modulation frequency	±0.054	kHz	0.008	Pass

ANNEX 10.
LIMITATION CHARACTERISTICS OF THE MODULATOR TEST

Limitation Characteristics Of The Modulator Test (item 14 of Test Program)
Test Procedure: Limitation Characteristics Of The Modulator Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 30.06.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Limitation characteristics of the modulator	4.3.3	5.4.5.2

TEST DESCRIPTION

A modulation signal at a frequency of 1 kHz was applied to the transmitter and its level adjusted so that the frequency deviation is ±1 kHz. The level of the modulation signal than was increased by 20 dB and the deviation was again measured. This test was conducted under normal test condition and extreme test conditions as defined in IEC 60945, of dry heat and the upper limit of supply voltage applied simultaneously and low temperature and lower limit of supply voltage applied simultaneously

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 45 %
- Atmospheric pressure: 752 mm/Hg
- Measurement duration: 2 hours
- Upper limit of supply voltage:9.0 V
- Lower limit of supply voltage:7.2 V
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011
2.	Hygrometer	VIT-2	D688	12.2011
3.	Climatic chamber	КРК-400V	15	08.2012
4.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Measurement at normal test conditions

Modulation signal at a frequency of 1 kHz :

Level of the modulation signal with frequency deviation ±1 kHz: - 47,0 dBm

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency deviation	±3.5<X<±5	kHz	4.41	Pass

Measurement at +55 °C maximum operational temperature

Modulation signal at a frequency of 1 kHz :

Level of the modulation signal with frequency deviation ±1 kHz: - 47,2 dBm

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency deviation	±3.5<X<±5	kHz	4.51	Pass

Measurement at -20 °C minimum operational temperature

Modulation signal at a frequency of 1 kHz :

Level of the modulation signal with frequency deviation ±1 kHz: - 47,0 dBm

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency deviation	±3.5<X<±5	kHz	4.46	Pass

ANNEX 11.
SENSITIVITY OF THE MODULATOR, INCLUDING MICROPHONE TEST

Sensitivity Of The Modulator, Including Microphone Test (item 15 of Test Program)
Test Procedure: Sensitivity of The Modulator, Including Microphone Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 01.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Sensitivity of the modulator, including microphone test	5.4.6.3	5.4.6.2

TEST DESCRIPTION

An acoustic signal with a frequency of 1 kHz and sound level of 94 dBA relative to 2 x 10^{-5} Pa was applied to the microphone. The resulting deviation was measured

TEST CONDITIONS

- Ambient temperature: 23 °C
- Relative humidity: 67 %
- Atmospheric pressure: 748 mm/Hg
- Measurement duration: 30 minutes
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Service monitor	CMS-54	835587/036	06.2012
3.	Artificial mouth	MA-3	455	09.2011
4.	Generator	G3-118	27542	05.2012
5.	Sound level meter (with a microphone 4155) B&K	2230	1428594	10.2011

TEST RESULT

Figure 11.1 — General view of the test site

Figure 11.2 — General view of the test site

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency deviation	±1.5<Δf<±3	kHz	2,9	Pass

ANNEX 12.
AUDIOFREQUENCY RESPONSE TEST

Audiofrequency Response Test (item 16, 8 of Test Program)
Test Procedure: Audiofrequency Response Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 02.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Audiofrequency response test	5.4.7.3	5.4.7.2

TEST DESCRIPTION

A modulation signal, at a frequency 1 kHz adjusted in level to produce a frequency deviation of ±1 kHz, was applied to transmitter. Then the modulation frequency was varied between 300 Hz and 3 kHz, keeping the audio input level constant.

TEST CONDITIONS

- Ambient temperature: 24 °C
- Relative humidity: 57 %
- Atmospheric pressure: 750 mm/Hg
- Measurement duration:30 minutes
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Measurements at a frequency modulation 1 kHz.

Modulation index = Frequency deviation/ Modulation frequency

Measurements at a frequency modulation varied between 300 Hz and 3 kHz.

Parameters to be Measured	Range of Specification	Range of Specification	Units	Test Results	Conclusion
Index modulation at modulation frequency 300 Hz	-9.5	-13.5	dB	-11.9	Pass
Index modulation at modulation frequency 400 Hz	-7.0	-11.0	dB	-8.9	Pass
Index modulation at modulation frequency 1000 Hz	0.0	0.0	dB	0	Pass
Index modulation at modulation frequency 1250 Hz	2.9	-1.1	dB	2.0	Pass
Index modulation at modulation frequency 3000 Hz	10.5	6.5	dB	8.7	Pass

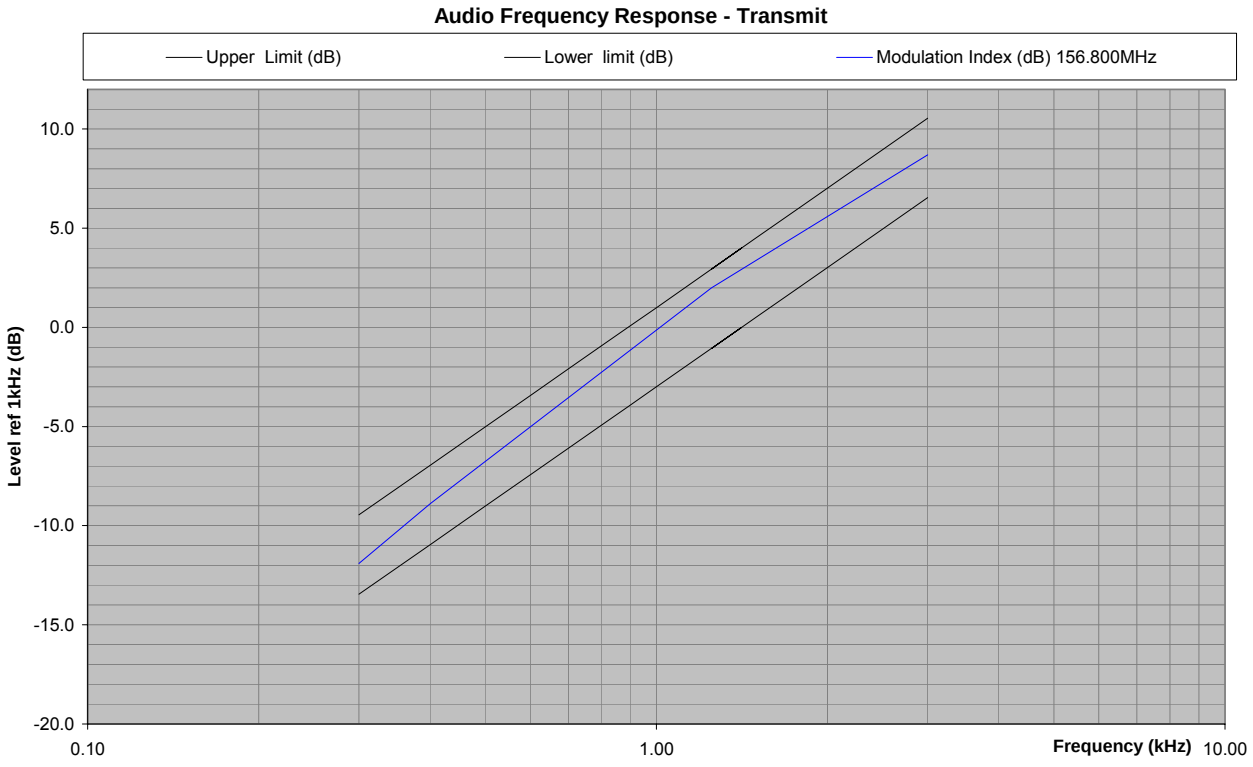


Figure 12 — Graph of modulation index

ANNEX 13.
AUDIOFREQUENCY HARMONIC DISTORTION TEST

Audiofrequency Harmonic Distortion Of The Emission Test (item 17 of Test Program)
Test Procedure: Audiofrequency Harmonic Distortion Of The Emission Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 08.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Audiofrequency harmonic distortion of the emission test	5.4.8.3	5.4.8.2

TEST DESCRIPTION

The RF signal produced by the transmitter was applied via an appropriate coupling device to a linear demodulator with a de-emphasis network of 6 dB/octave.

Under normal test conditions. the radio frequency signal was modulated successively at frequencies of 300 Hz and 1 kHz with a constant modulation index of three. The distortion of the audiofrequency signal was measured at the frequencies specified above.

Under extreme test conditions as defined in IEC 60945. of dry heat and upper limit of supply voltage applied simultaneously and low temperature and the lower limit of supply voltage applied simultaneously. the measurements was carried out at 1 kHz with a frequency deviation of ±3 kHz

TEST CONDITIONS

- Ambient temperature: 26 °C
- Relative humidity: 65 %
- Atmospheric pressure: 755 mm/Hg
- Measurement duration:30 minutes
- Upper limit of supply voltage: 9.0 V
- Lower limit of supply voltage: 7.2 V
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type. model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011
2.	Hygrometer	VIT-2	D688	30.12.2011
3.	Climatic chamber	KPK-400V	15	08.2012
4.	Service monitor	CMS-54	835587/036	14.06.2012

TEST RESULT

Measurement at normal test conditions

Modulation index = Frequency deviation/ Modulation frequency

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Audiofrequency harmonic distortion at 300 Hz modulation frequency	10	%	1.3	Pass
Audiofrequency harmonic distortion at 1000 Hz modulation frequency	10	%	1.2	Pass

Measurement at +55 °C maximum operational temperature

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Audiofrequency harmonic distortion at 1000 Hz modulation frequency	10	%	0.9	Pass

Measurement at -20 °C minimum operational temperature

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Audiofrequency harmonic distortion at 1000 Hz modulation frequency	10	%	0.8	Pass

ANNEX 14.
ADJACENT CHANNEL POWER TEST

Adjacent Channel Power Test (item 18, 9 of Test Program)
Test Procedure: Adjacent Channel Power Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 07.07.11
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Adjacent Channel Power Test	5.4.9.3	5.4.9.2

TEST DESCRIPTION

The adjacent channel power shall be measured with a power measuring receiver . referred to as the “receiver”. which consists of a mixer, an IF filter, an oscillator, an amplifier, a variable attenuator and r.m.s. value indicator. Instead of the variable attenuator with the r.m.s. value indicator it is possible to use r.m.s. voltmeter calibrated in decibels.

a) The transmitter shall be operated at the carrier power determined in 5.4.3 under normal test conditions. The output of the transmitter shall be linked to the input of the “receiver” by a connecting device such that the impedance presented to the transmitter is 50 Ohm and the level at the “receiver” inputs is appropriate.

b) With the transmitter unmodulated. the tuning of the “receiver” shall be adjusted so that a maximum response is obtained. This is the 0 dB response point. The “receiver” attenuator setting and the reading of the meter shall be recorded.

c) The tuning of the “receiver” shall be adjusted away from the carrier so that the “receiver” - 6dB response nearest to the transmitter carrier frequency is located at a displacement from the nominal carrier frequency of 17 kHz.

d) The transmitter shall be modulated with 1.25 kHz at level which is 20 dB higher than that required to produce a ±3 kHz deviation.

e) The “receiver” variable attenuator shall be adjusted to obtain the same meter reading as in step b) or a known relation to it.

f) The ratio of adjacent channel power to carrier power is the difference between the attenuator settings in step b) and e). corrected for any differences in the reading of the meter

g) The measurement shall be repeated with the “receiver” turned to the other side of the carrier

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 63 %
- Atmospheric pressure: 753 mm/Hg
- Measurement duration: 2 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type. model	Ser. No	Next calibration date
1.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Adjacent channel power for the one side of the carrier

F=156.775 MHz

Adjacent channel power for the other side of the carrier

F=156.825 MHz

Parameters to be Measured	**Range of Specification**	**Units**	**Test Results**	**Conclusion**
Adjacent channel power F=156.775 MHz	<0.2	μW	0.19	Pass
Adjacent channel power F=156.825 MHz	<0.2	μW	0.18	Pass

ANNEX 15.
CONDUCTED SPURIOUS EMISSION CONVEYED TO THE ANTENNA TEST

Conducted Spurious Emission Conveyed To The Antenna Test (item 20 of Test Program)
Test Procedure: Conducted Spurious Emission Conveyed To The Antenna Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 06.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Conducted spurious emission conveyed to the antenna test	4.3.5	5.4.10.2

TEST DESCRIPTION

Conducted spurious emissions were measured with the unmodulated transmitter connected to the artificial antenna. The measurement was extended over a frequency range from 150 kHz to 2 GHz. excluding the channel on which the transmitter is operating and its adjacent channels.

The power of any spurious emissions on any discrete frequency was not exceed 0.25 μW in the frequency range 150 kHz to 1 GHz and 1 μW in the frequency range 1 GHz to 2 GHz

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 53 %
- Atmospheric pressure: 751 mm/Hg
- Measurement duration: 8 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type. model	Ser. No	Next calibration date
1.	Generator	G 4-164	3019	01.2012
2.	Service monitor	CMS-54	835587/036	06.2012
3.	Rejector filters 0.1-2 GHz	3TNF	100091-100095	12.2012
4.	Spectrum analyzer 9 kHz-22 GHz	HP8593E	3831U02306	07.2012

TEST RESULT

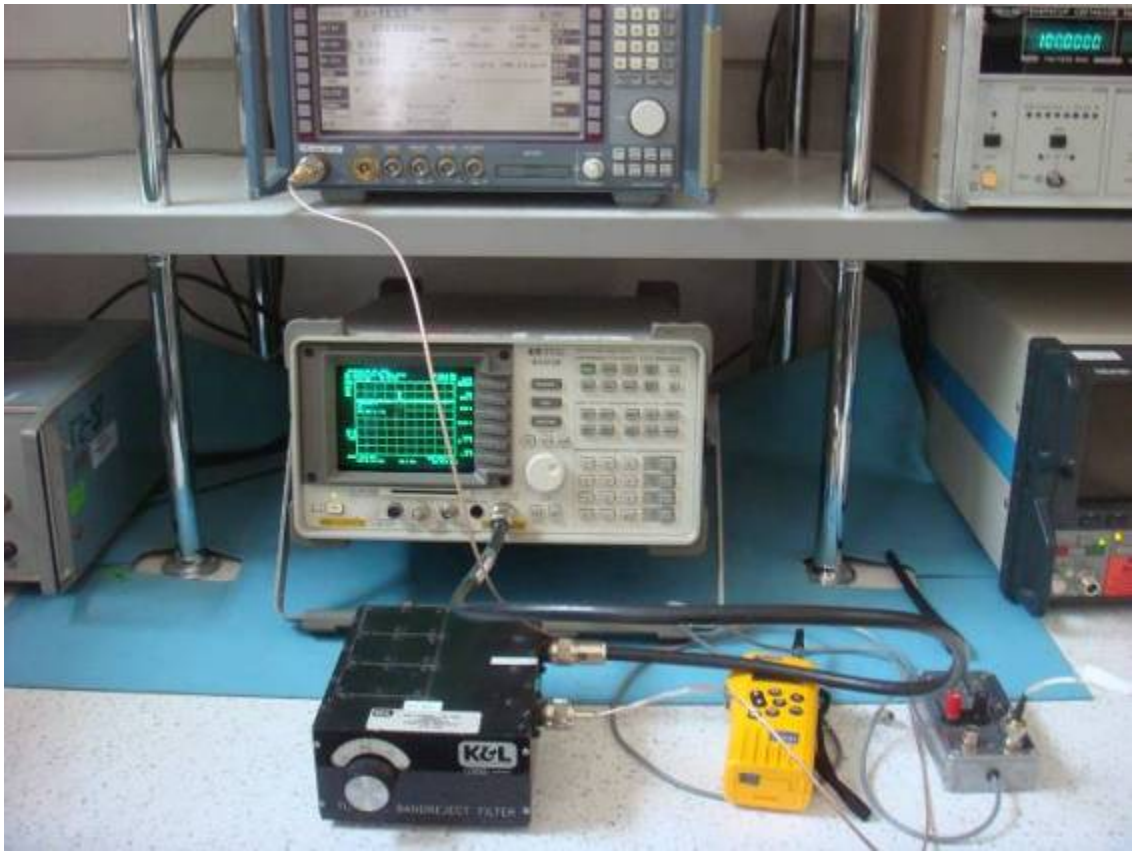


Figure 15.1 — General view of the test site

Figure 15.2 — General view of the test site

Measurements at a frequency range 150 kHz to 1 GHz.

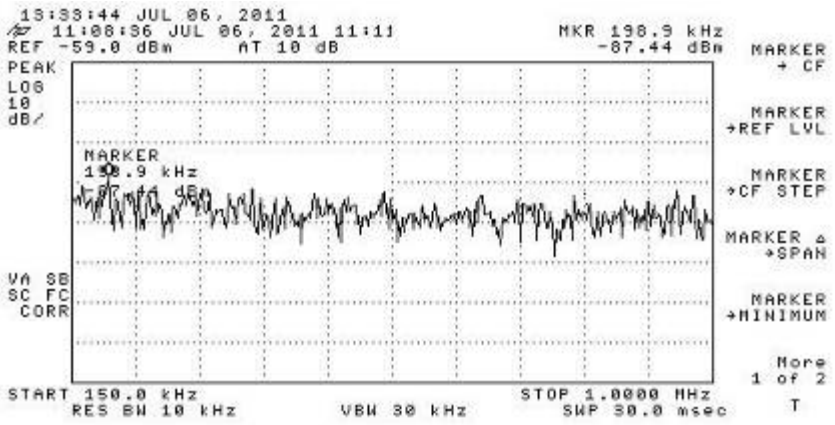


Figure 15.3 — Plot of measurements at a frequency range 150 kHz to 1 MHz

Measurements at a frequency range 1 MHz to 10 MHz.

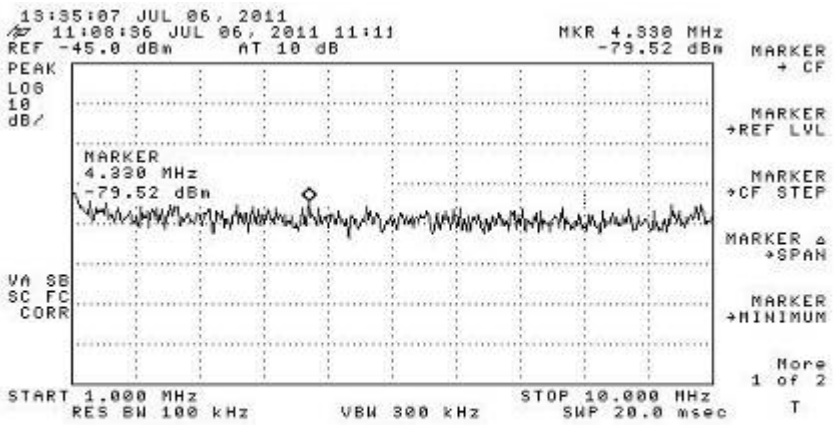


Figure 15.4 — Plot of measurements at a frequency range 1 GHz to 10 MHz

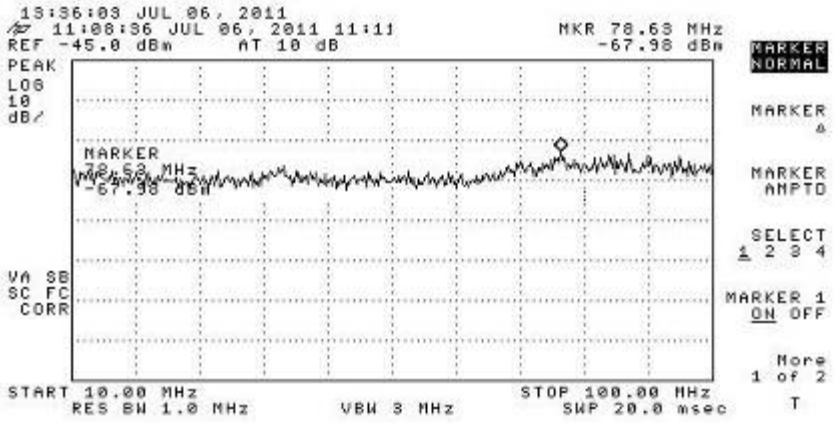


Figure 15.5 — Plot of measurements at a frequency range 10 MHz to 100 MHz

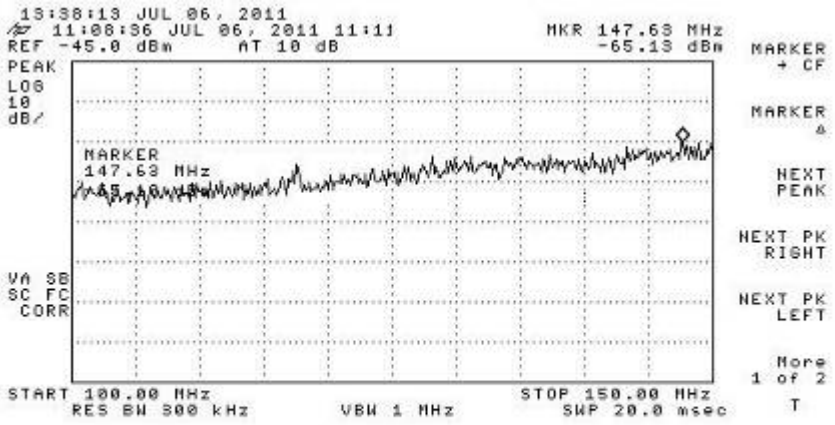


Figure 15.6 — Plot of measurements at a frequency range 100 MHz to 150 MHz

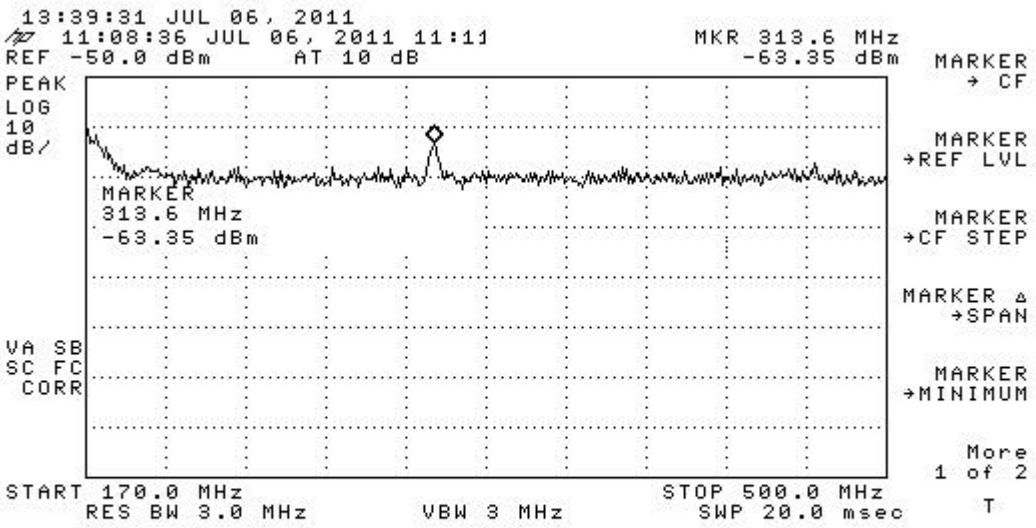


Figure 15.7 — Plot of measurements at a frequency range 170 MHz to 500 MHz

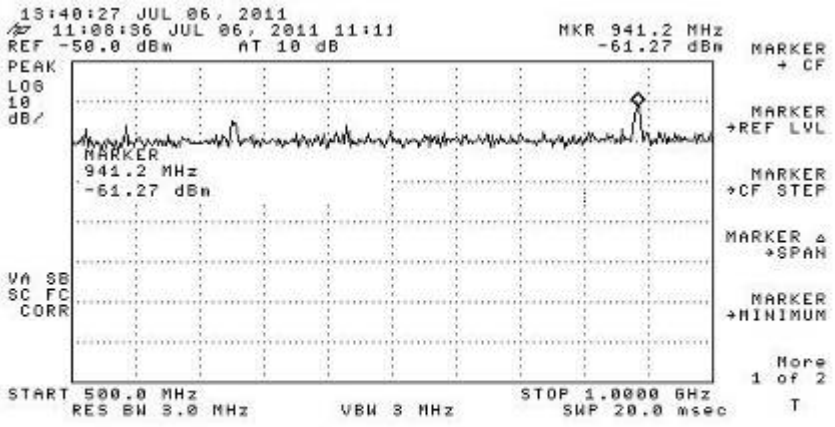


Figure 15.8 — Plot of measurements at a frequency range 500 MHz to 1 GHz

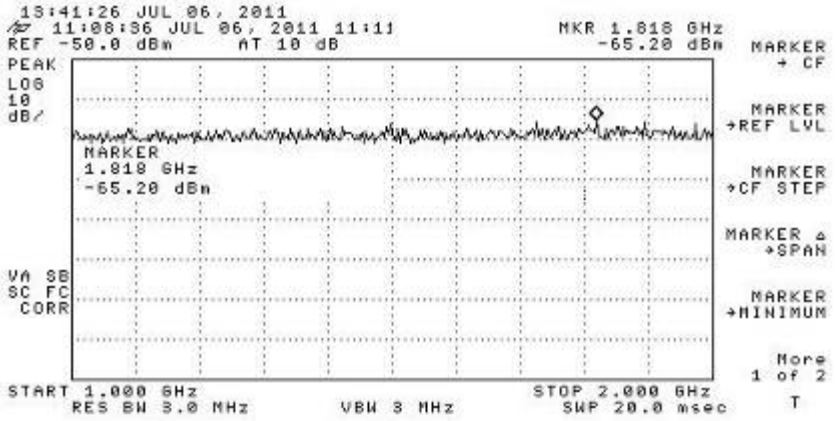


Figure 15.9 — Plot of measurements at a frequency range 1 GHz to 2 GHz

Parameters to be Measured	**Range of Specification**	**Units**	**Test Results**	**Conclusion**
Power of a spurious emission at a frequency range 150 kHz to 2 GHz	Not exceed 0.25	μW	$0.392 \cdot 10^{-3}$ at 313.6 MHz	Pass
Power of a spurious emission at a frequency range 150 kHz to 2 GHz	Not exceed 0.25	μW	$0.8 \cdot 10^{-3}$ at 941.2 MHz	Pass
Power of a spurious emission at a frequency range 1 GHz to 2 GHz	Not exceed 1	μW	$< 0.1 \cdot 10^{-3}$	Pass

ANNEX 16.
RESIDUAL MODULATION OF THE TRANSMITTER TEST

Residual Modulation Of The Transmitter Test (item 21 of Test Program)
Test Procedure: Residual Modulation Of The Transmitter Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 02.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Residual modulation of the transmitter test	5.4.11.3	5.4.11.2

TEST DESCRIPTION

The normal test modulation was applied to the transmitter. The radio frequency signal produced by the transmitter was applied. via an appropriate coupling device. to a linear demodulator with a de-emphasis network of 6 dB/octave. Precautions shall be taken to avoid the effects of emphasizing the low audio frequencies produced by internal noise.

The signal was measured by using an r.m.s. voltmeter. Then the modulation was switched off and the level of the residual audiofrequencies signal at the output was measured again

The residual modulation of the transmitter is the ratio. in decibels. of the demodulated radiofrequency signal in the absence of wanted modulation. to the modulated radio frequency signal produced when the normal test modulation is applied.

TEST CONDITIONS

- Ambient temperature: 24 °C
- Relative humidity: 57 %
- Atmospheric pressure: 750 mm/Hg
- Measurement duration:30 minutes
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type. model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Residual modulation= 20lg(Demodulation radio frequency signal/Modulation radio frequency signal)

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Residual modulation	Not exceed -40	dB	-48.1	Pass

ANNEX 17.
TRANSIENT FREQUENCY BEHAVIOUR OF THE TRANMITTER

Transient Frequency Behaviour of the Transmitter Test (item 22 of Program)
Test Procedure: Transient Frequency Behaviour of the Transmitter Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 02.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Transient frequency behaviour of the transmitter	5.4.12.3	5.4.12.2

TEST DESCRIPTION

Two signals were connected to the test discriminator via a combining network. The transmitter was connected to a 50 OHm power attenuator. The output of the power attenuator was connected to the test discriminator via one input of the combining network.

A test signal generator was connected to the second input of the combining network. The test signal was adjusted to the nominal frequency of the transmitter. The test signal was modulated by a frequency of 1 kHz with a deviation of ±25 kHz.

The test signal level was adjusted to correspond to 0,1 % of the power of the transmitter under test measured at the input of the test discriminator. This level was maintained throughout the measurement.

The amplitude difference (ad) and the frequency difference (fd) output of the test discriminator was connected to a storage oscilloscope. The storage oscilloscope was set to display the channel corresponding to the (fd) input up to ±1 channel frequency difference, corresponding to the relevant channel separation, from the nominal frequency.

The storage oscilloscope shall be set to a sweep rate of 1 ms/division and set so that the triggering occurs at 1 division from the left edge of the display. The display showed the 1 kHz test signal continuously. The storage oscilloscope was set to trigger on the channel corresponding to the amplitude difference (ad) input at a low level, rising.

The transmitter was switched on, without modulation, to produce the trigger pulse and a picture on the display. The result of the change in the ratio of power between the test signal and the transmitter output will, due to the capture ratio of the test discriminator, produce two separate sides on the picture, one showing the 1 kHz test signal, the other the frequency of the transmitter versus time.

The moment when the 1 kHz test signal is completely suppressed is considered to provide ton. The period of time t1 and t2 as defined in table 1 was used to define the appropriate template.

The result was recorded as frequency difference versus time.

The transmitter was remained switched on.

The storage oscilloscope was set to trigger on the channel corresponding to the amplitude difference (ad) input at a high level, decaying and set so that the triggering occurs at 1 division from the right edge of the display. The transmitter was switched off. The moment when the 1 kHz test signal starts to rise is considered to provide t_{0ff}. The period of time t3 as defined in table was used to define the appropriate template.

The result was recorded as frequency difference versus time.

Table - Transmitter transient timing (ms)

t_1	5.0
t_2	20.0
t_3	5.0

TEST CONDITIONS

- Ambient temperature: 23 °C
- Relative humidity: 64 %
- Atmospheric pressure: 753 mm/Hg
- Measured duration:1 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011
2.	Hygrometer	VIT-2	D688	12.2011
3.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Parameters to be Measured	**Range of Specification**	**Units**	**Test Results**	**Conclusion**
t_1	5.0	ms	1.4	Pass
t_2	20.0	ms	0.16	Pass
t_3	5.0	ms	0.24	Pass

ANNEX 18.
RADIATED SPURIOUS EMISSIONS

Radiated Spurious Emissions Test (item 23, 48 of Test Program)
Test Procedure: Radiated Spurious Emissions Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 05.07.2011
The Name and Test - Site Location: Laboratory No. 10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard ETSI EN 300 225
1.	Radiated spurious emissions of transmitter test	4.3.6	8.3.2
2.	Radiated spurious emissions of receiver test	4.3.6	8.4.2
3.	Radiated spurious emissions of charger test	4.3.6	9.3 of IEC 60945

Radiated spurious emissions of transmitter

TEST DESCRIPTION

At a test site, the transmitter was operated with the output power switch in the maximum position. Radiation of any spurious components was detected by a test antenna (in the vertical and horizontal polarization) and receiver, over the frequency range 30 MHz to 2 GHz, except for the channel on which the transmitter is intended to operate and its adjacent channels.

At each frequency (and polarization) at which a component is detected, the sample was rotated to obtain maximum response and the effective radiated power of that component determined by the substitution method.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 65 %
- Atmospheric pressure: 752 mm/Hg
- Measurement duration: 4 hours
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Test antenna	BBUK9139	9114-215	11.2011
3.	Measuring antenna	BBUK9139	9114-214	11.2011
4.	Amplifier	BBS2E4AHM	101164	03.2014
5.	Service monitor	CMS-54	835587/036	06.2012
6.	Generator	G4-176	5290	01.2012
7.	Measuring receiver	ESPC	848553/024	05.2012

TEST RESULT

Parameters to be Measured*	Range of Specification	Units	Test Results	Conclusion
Power of a spurious emission at a frequency range 150 kHz to 1 GHz	Not exceed 25	μW	0.19 μW at 313.6 MHz	Pass
Power of a spurious emission at a frequency range 1 GHz to 2 GHz	Not exceed 25	μW	$< 1 \cdot 10^{-3}$ μW	Pass

Radiated spurious emissions of receiver

TEST DESCRIPTION

At a test site the receiver was operated from a power source via a radio frequency filter to avoid radiation from the power leads.

Radiation of any spurious components was detected by a test antenna (in the vertical and horizontal polarization) and receiver over the frequency range 30 MHz to 2 GHz.

At each frequency (and polarization) at which a component is detected, the sample was rotated to obtain maximum response and the effective radiated power of that component determined by the substitution measurement.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 65 %
- Atmospheric pressure: 752 mm/Hg
- Measurement duration: 4 hours
- Operational channel: 17 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	30.12.2011
2.	Test antenna	BBUK9139	9114-215	11.2011
3.	Measuring antenna	BBUK9139	9114-214	11.2011
4.	Amplifier	BBS2E4AHM	101164	03.2014
5.	Service monitor	CMS-54	835587/036	14.06.2012
6.	Generator	G4-176	5290	01.2012
7.	Measuring receiver	ESPC	848553/024	05.2012

TEST RESULT

Figure 18.1 — General view of the test site

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Power of a spurious emission at a frequency range 150 kHz to 1 GHz	Not exceed 25	μW	< 0.5 nW	Pass
Power of a spurious emission at a frequency range 1 GHz to 2 GHz	Not exceed 25	μW	< 0.5 nW	Pass

Radiated spurious emissions of charger test

TEST DESCRIPTION

Charger was testing in charging mode with VHF Radio in Receive mode.

The quasi-peak measuring receivers specified in CISPR 16-1 shall be used. The receiver bandwidth in the frequency ranges 150 kHz to 30 MHz shall be 9 kHz and in the frequency ranges 30 MHz to 2 GHz shall be 120 kHz.

For frequencies from 150 kHz to 30 MHz measurements shall be made of the magnetic H field. The measuring antenna shall be an electrically screened loop antenna of dimension so that the antenna can be completely enclosed by a square having sides of 60 cm in length, or an appropriate ferrite rod as described in CISPR 16-1.

The correction factor for the antenna shall include the factor +51,5 dB to convert the magnetic field strength to equivalent electric field strength.

For frequencies above 30 MHz measurements shall be made of the electric E field. The measuring antenna shall be a balanced dipole of resonant length, or alternate shortened dipole or higher gain antenna as described in CISPR 16-1. The dimension of the measuring antenna in the direction of the EUT shall not exceed 20 % of its distance from the EUT. At frequencies above 80 MHz it shall be possible to vary the height of the centre of the measuring antenna above the ground over a range of 1 m to 4 m.

The test site shall be compliant with CISPR 16-1, using a metal ground plane and of dimensions to allow a measurement distance of 3 m.

The EUT shall be fully assembled, complete with its associated interconnecting cables and mounted in its normal plane of operation.

When the EUT consists of more than one unit, the interconnecting cables (other than antenna feeders) between the main unit and all other units shall be the maximum length as specified by the manufacturer or 20 m whichever is shorter. Available input and output ports shall be connected to the maximum length of cable as specified by the manufacturer or 20 m whichever is shorter, and terminated to simulate the impedance of the ancillary equipment to which they are normally connected.
The excess length of these cables shall be bundled at the approximate centre of the cable with bundles 30 cm to 40 cm in length running in the horizontal plane from the port to which they are connected. If it is impractical to do so because of cable bulk or stiffness, the disposition of the excess cable shall be as close as possible to that required, and shall be precisely described in the test report. The test antenna shall be placed at a distance of 3 m from the EUT. The centre of the antenna shall be at least 1,5 m above the ground plane. The E-field antenna only shall be adjusted in height and rotated to give horizontal and vertical polarization, one being parallel to the ground, in order to determine the maximum emission level. Finally the antenna shall either be moved around the EUT, again in order to determine the maximum emission level, or alternatively, the EUT may be placed on a plane orthogonal to the test antenna at its mid-point and rotated to achieve the same effect.

b) In addition, for the frequency band 156 MHz to 165 MHz, the measurement shall be repeated with a receiver bandwidth of 9 kHz, all other conditions of a) hereinbefore remaining unchanged.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 63 %
- Atmospheric pressure: 756 mm/Hg
- Test duration is 1 hour.
- Equipment mode: Charging mode

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
8.	Hygrometer	VIT-2	D688	12.2011
9.	Test antenna	BBUK9139	9114-215	11.2011
10.	Measuring antenna	BBUK9139	9114-214	11.2011
11.	Amplifier	BBS2E4AHM	101164	03.2014
12.	Service monitor	CMS-54	835587/036	06.2012
13.	Generator	G4-176	5290	01.2012
14.	Measuring receiver	ESPC	848553/024	05.2012

TEST RESULT

Figure 18.2 – The general view of test site for radiated emissions test

Figure 18.3 – The general view of test site for radiated emissions test

Figure 18.4 – The general view of test site for radiated emissions test

Frequency, MHz	Permissible emission value, dBμV/m, less than QP detector	Calibration factor, dB	Value from measuring receiver, dBμV	Max. QP-level dBμV	Margin to limit, dBμV/m	Conclusion
0.15	80	-25.6	70.7	45.1	34.9	Pass
0.30	52	-25.8	64.1	38.3	13.7	Pass
1.00	47.2	-25.7	61.9	36.2	11	Pass
2.00	44.6	-25.6	62	36.4	8.2	Pass
6.00	40.3	-25.6	53.2	27.6	12.7	Pass
10.00	38.3	-25.7	52.9	27.2	11.1	Pass
67.50	54	10.2	9.3	19.5	34.5	Pass
93.15	54	11.4	13.8	25.2	28.8	Pass
150.31	54	8.1	8.1	16.2	37.8	Pass
186.11	54	9.8	7	16.8	37.2	Pass
220.13	54	11.5	7.4	18.9	35.1	Pass
300.23	54	13.7	6.5	20.2	33.8	Pass
450.54	54	16.5	8.3	24.8	29.2	Pass
600.00	54	19.5	5	24.5	29.5	Pass
750.00	54	20.5	6.5	27.0	27	Pass
900.00	54	22.3	6.2	28.5	25.5	Pass
1000.00	54	22.9	6.8	29.7	24.3	Pass
1200.00	54	24.5	5.6	30.1	23.9	Pass
1500.00	54	26.7	5.2	31.9	22.1	Pass
1750.00	54	28.1	8.8	36.9	17.1	Pass
1900.00	54	29.4	8.5	37.9	16.1	Pass
2000.00	54	28.8	11	39.8	14.2	Pass
156	30(PK) 24(QP)	7.8	4.8(PK)	12.6	17.4(PK)	Pass
165	30(PK) 24(QP)	8.4	2.5(PK)	13.9	16.1(PK)	Pass

ANNEX 19.
MAXIMUM USABLE SENSITIVITY TEST

Maximum Usable Sensitivity Test (item 24 of Test Program)
Test Procedure: Maximum Usable Sensitivity Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 02.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Maximum usable sensitivity test	4.4.1	5.5.3.2

TEST DESCRIPTION

A test signal at a carrier frequency equal to the nominal frequency of the receiver, modulated by the normal test modulation was applied to the receiver input. An audiofrequency load and measuring instrument for measuring the SINAD ratio through the psophometric network was connected to the receiver output terminals.

The level of the test signal was adjusted until a SINAD ratio of 20 dB is obtained and with the audio frequency power control of the receiver adjusted to produce 50 % of the rated output power. Under these conditions, the level of the test signal at the input is the value of the maximum usable sensitivity.

The measurements was carried out under normal test conditions and extreme test conditions as defined in IEC 60945, of dry heat and the upper limit of supply voltage applied simultaneously and low temperature and the lower limit of supply voltage applied simultaneously.

A receiver audiofrequency output power variation of up to ±3 dB relative to 50 % of the rated output power was allowed for sensitivity measurement under extreme test conditions.

TEST CONDITIONS

- Ambient temperature: 24 °C
- Relative humidity: 46 %
- Atmospheric pressure: 750 mm/Hg
- Measurement duration: 2 hours
- Upper limit of supply voltage: 9.0 V
- Lower limit of supply voltage:7.2 V
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Climatic chamber	KPK-400V	15	08.2012
2.	Hygrometer	VIT-2	D688	12.2011
3.	Temperature meter	Center-309	100074/1	08.2011
4.	Multi meter	FLUKE - 189/FVF2	89750179	09.2011
5.	Power supply	SEA PS 3020	100185	01.2012
6.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Measurement at normal test conditions

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Maximum usable sensitivity	<+6	dBµV	- 6,54	Pass

Measurement at +55 °C maximum operational temperature

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Maximum usable sensitivity	<+12	dBµV	-5.53	Pass

Measurement at -20 °C minimum operational temperature

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Maximum usable sensitivity	<+12	dBµV	-7.83	Pass

ANNEX 20.
AUDIOFREQUENCY RESPONSE TEST

Audiofrequency Response Test (item 25 of Test Program)
Test Procedure: Audiofrequency Response Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 02.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Audiofrequency response	4.2	5.5.2.2

TEST DESCRIPTION

A test signal of +60 dBμV, at a carrier frequency equal to the nominal frequency of the receiver, was applied to the receiver input. The audiofrequency power control of the receiver was set so as to produce a level equal to 50 % of the rated audiofrequency output power when normal test modulation is applied. This setting was remained unchanged during the test.

Then the frequency deviation was reduced to ±1 kHz. The frequency deviation was remained constant while the modulation frequency is varied between 300 Hz and 3 kHz, and the output level was measured. The measurement was repeated with a test signal at the same frequency as the nominal frequency of the receiver ±1,5 kHz.

The receiver response was not deviate by more than +1 dB or -3 dB from a characteristic giving the output level as a function of the audiofrequency, decreasing by 6 dB/octave and passing through the measured point at 1 kHz.

TEST CONDITIONS

- Ambient temperature: 24 °C
- Relative humidity: 57 %
- Atmospheric pressure: 750 mm/Hg
- Measurement duration: 2 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Measurement at nominal frequency 156.8 MHz:

Parameters to be Measured	Range of Specification upper limit	Range of Specification lower limit	Units	Test Results	Conclusion
Response , 300 Hz modulation	11.5	7.5	dB	7.7	Pass
Response, 400 Hz modulation	9.0	5.0	dB	6.6	Pass
Response , 1000 Hz modulation	0	0	dB	0.0	Pass
Response, 1250 Hz modulation	-0.9	-4.9	dB	-1.9	Pass
Response, 3000 Hz modulation	-8.5	-12.5	dB	-9.5	Pass

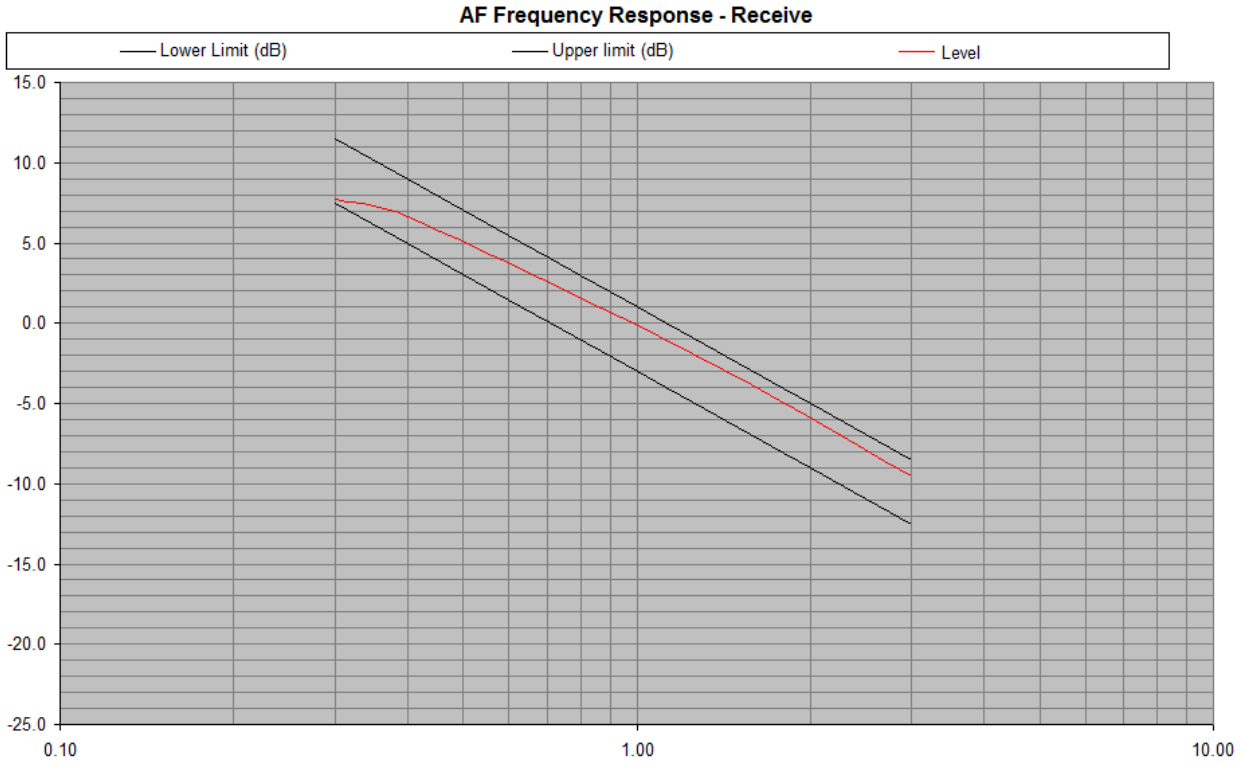


Figure 20.1 — Graph of audiofrequency response at nominal frequency

Measurement at low limit of frequency 156.7985 MHz:

Parameters to be Measured	Range of Specification upper limit	Range of Specification lower limit	Units	Test Results	Conclusion
Response , 300 Hz modulation	11.5	7.5	dB	7.8	Pass
Response, 400 Hz modulation	9.0	5.0	dB	6.6	Pass
Response , 1000 Hz modulation	0	0	dB	0.0	Pass
Response, 1250 Hz modulation	-0.9	-4.9	dB	-1.9	Pass
Response, 3000 Hz modulation	-8.5	-12.5	dB	-9.7	Pass

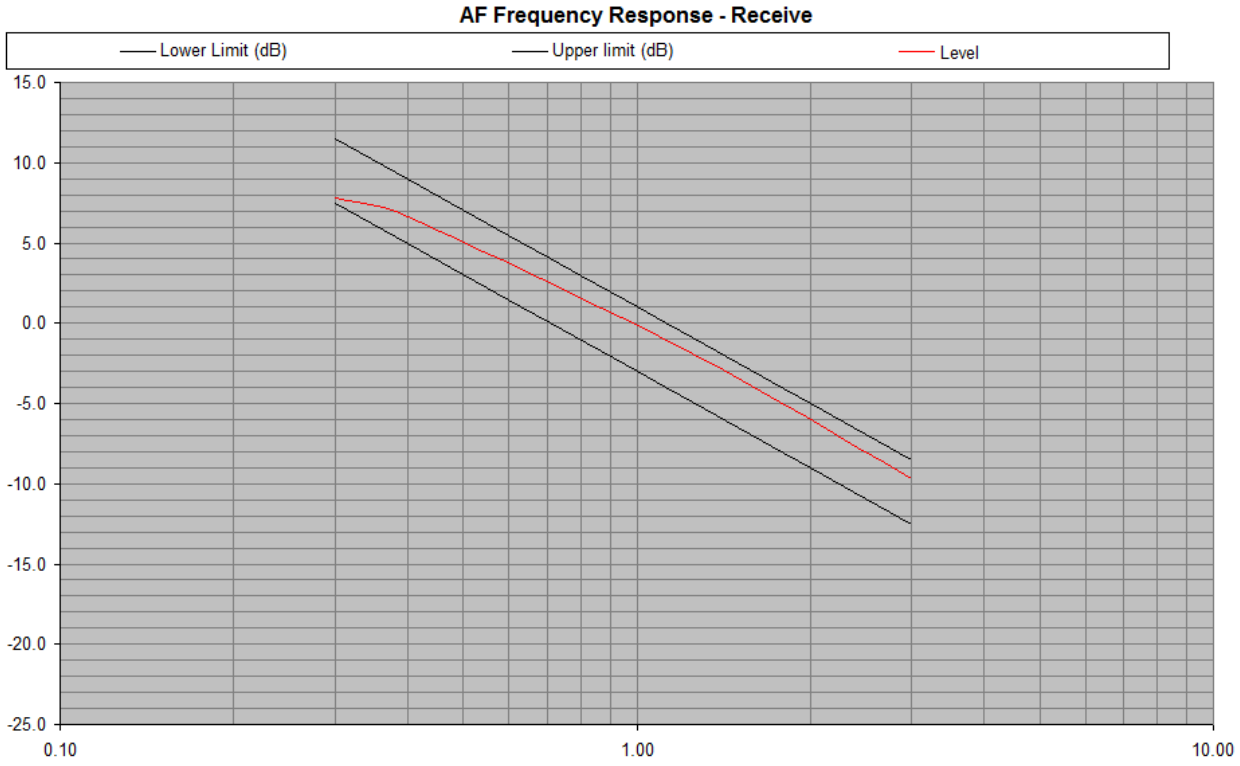


Figure 20.2 — Graph of audiofrequency response at frequency 156.7985 MHz

Measurement at high limit of frequency 156.8015 MHz:

Parameters to be Measured	Range of Specification upper limit	Range of Specification lower limit	Units	Test Results	Conclusion
Response , 300 Hz modulation	11.5	7.5	dB	7.7	Pass
Response, 400 Hz modulation	9.0	5.0	dB	6.6	Pass
Response , 1000 Hz modulation	0	0	dB	0.0	Pass
Response, 1250 Hz modulation	-0.9	-4.9	dB	-1.9	Pass
Response, 3000 Hz modulation	-8.5	-12.5	dB	-9.5	Pass

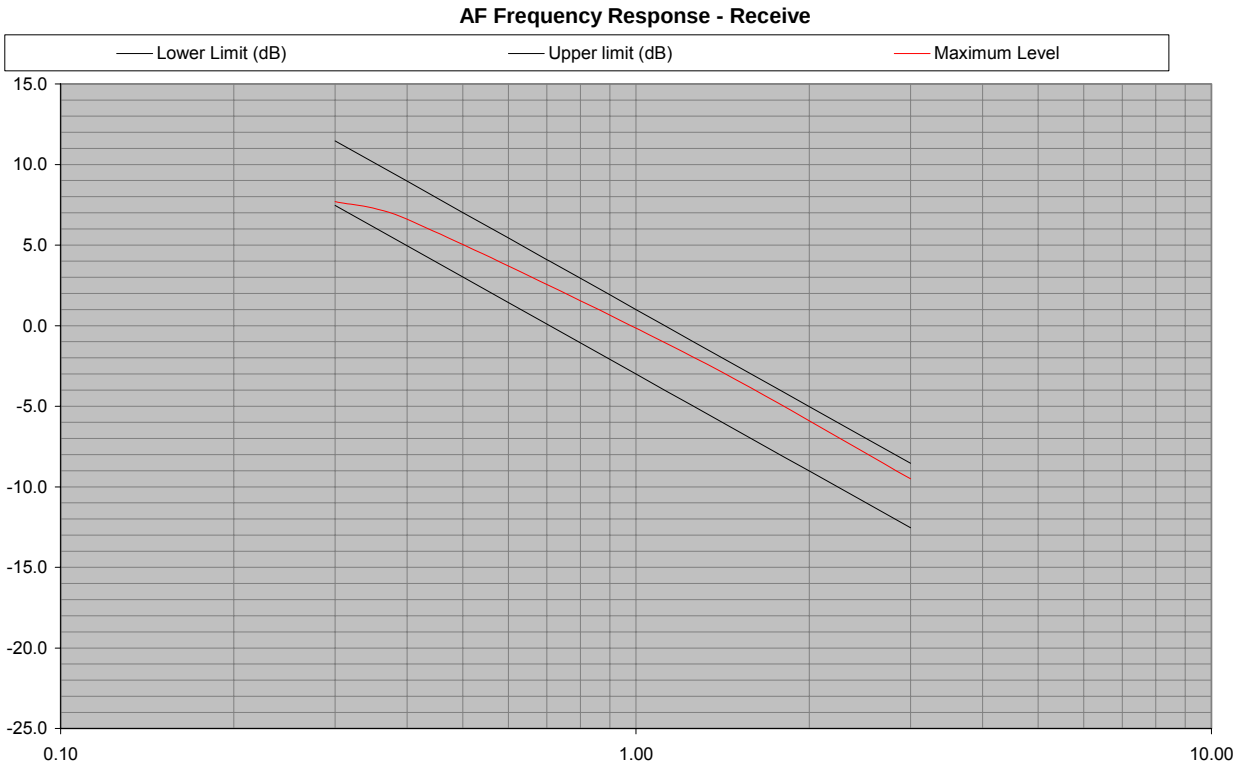


Figure 20.3 — Graph of audiofrequency response at frequency 156.8015 MHz

ANNEX 21.
CO-CHANNEL REJECTION RATIO TEST

Co-Channel Rejection Ratio Test (item 26 of Test Program)
Test Procedure: Co-Channel Rejection Ratio Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 02.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Co-channel rejection ratio test	4.4.2	5.5.4.2

TEST DESCRIPTION

The two input signals were connected to the receiver via a combining network. The wanted signal has normal test modulation. The unwanted signal was modulated by 400 Hz with a deviation of ±3 kHz. Both input signals at the nominal frequency of the receiver under test and the measurement was repeated for displacements of the unwanted signal of up to ±3 kHz.The wanted input signal level was set to the value corresponding to the maximum usable sensitivity, as measured in 5.5.3.3 under normal test conditions. Then the amplitude of the unwanted input signal was adjusted until the SINAD ratio at the receiver audiofrequency output, psophometrically weighted, is reduced to 14 dB.

The co-channel rejection ratio shall be expressed as the ratio in decibels, of the level of the unwanted signal to the level of the wanted signal at the receiver input, for which the specified reduction in SINAB ratio occurs.

TEST CONDITIONS

- Ambient temperature: 24 °C
- Relative humidity: 57 %
- Atmospheric pressure: 750 mm/Hg
- Measurement duration: 2 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Matching device Type I, Type II	No.1, No.2	7	07.2012
2.	Generator	G4-164	3019	01.2012
3.	Service monitor	CMS-54	835587/036	06.2012
4.	Hygrometer	VIT-2	D688	12.2011

TEST RESULT

Measurements at nominal frequency 156.8 MHz:

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Co-channel rejection	-10<X<0	dB	-9.4	Pass

Measurements at low frequency 156.797 MHz:

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Co-channel rejection	-10<X<0	dB	-7.0	Pass

Measurements at high frequency 156.803 MHz:

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Co-channel rejection	-10<X<0	dB	-7.1	Pass

ANNEX 22.
HARMONIC DISTORTION AND RATED AUDIOFREQUENCY OUTPUT POWER TEST

Harmonic Distortion And Rated Audiofrequency Output Power Test (item 27 of Test Program)
Test Procedure: Harmonic Distortion And Rated Audiofrequency Output Power Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 06.07.11
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Harmonic distortion and rated audiofrequency output power test	4.4.3	5.5.1.2

TEST DESCRIPTION

A test signal of +100dBμV, at a carrier frequency equal to the nominal frequency of the receiver and modulated by the normal test modulation was applied to the receiver input.

For the measurement, the audiofrequency output power control of the receiver was set so as to obtain, in a resistive load which simulates the operating load of the receiver, the rated audiofrequency output power. The value of this load was stated by the manufacturer.

Under normal test conditions, the test signal was modulated successively at 300 Hz and 1 kHz with a constant modulation index of three. The harmonic distortion and audiofrequency output power was measured at all the frequencies specified above.

Under extreme test conditions as defined in IEC 945, of dry heat and the upper limit of supply voltage applied simultaneously and low temperature and the lower limit of supply voltage applied simultaneously, the test was made at the nominal frequency of the receiver and at the nominal frequency ±1,5 kHz. For these tests, the modulation frequency was 1 kHz and the frequency deviation was ±3 kHz.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 53 %
- Atmospheric pressure: 751 mm/Hg
- Measurement duration: 2 hours
- Upper limit of supply voltage:9.0 V
- Lower limit of supply voltage:7.2 V
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Climatic chamber	KPK-400V	15	08.2012
2.	Temperature meter	Center-309	100074/1	08.2011
3.	Multi meter	FLUKE - 189/FVF2	89750179	09.2011
4.	Power supply	SEA PS 3020	100185	01.2012
5.	Service monitor	CMS-54	835587/036	06.2012
6.	Hygrometer	VIT-2	D688	12.2011

TEST RESULT

Measurement at normal test conditions

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
The harmonic distortion. 300 Hz modulation frequency	Not exceed 10	%	1.0	Pass
The harmonic distortion. 400 Hz modulation frequency	Not exceed 10	%	1.1	Pass
The harmonic distortion. 600 Hz modulation frequency	Not exceed 10	%	1.1	Pass
The harmonic distortion. 800 Hz modulation frequency	Not exceed 10	%	1.53	Pass
The harmonic distortion. 1000 Hz modulation frequency	Not exceed 10	%	2.12	Pass
Rated output power 300 Hz modulation frequency	At least 200	mW	318	Pass
Rated output power 400 Hz modulation frequency	At least 200	mW	430	Pass
Rated output power 600 Hz modulation frequency	At least 200	mW	516	Pass
Rated output power 800 Hz modulation frequency	At least 200	mW	536	Pass
Rated output power 1000 Hz modulation frequency	At least 200	mW	536	Pass

Measurement at +55 °C maximum operational temperature

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
The harmonic distortion. 1000 Hz modulation frequency at nominal frequency 156.800 MHz	Not exceed 10	%	2.65	Pass
The harmonic distortion. 1000 Hz modulation frequency at frequency 156.8015 MHz	Not exceed 10	%	5.83	Pass
The harmonic distortion. 1000 Hz modulation frequency at frequency 156.79985 MHz	Not exceed 10	%	2.61	Pass
Rated output power at nominal frequency 156.800 MHz	At least 200	mW	573	Pass
Rated output at frequency 156.8015 MHz	At least 200	mW	498	Pass
Rated output power at frequency 156.79985 MHz	At least 200	mW	577	Pass

Measurement at -20 °C minimum operational temperature

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
The harmonic distortion. 1000 Hz modulation frequency at nominal frequency 156.800 MHz	Not exceed 10	%	5.72	Pass
The harmonic distortion. 1000 Hz modulation frequency at frequency 156.8015 MHz	Not exceed 10	%	8.70	Pass
The harmonic distortion. 1000 Hz modulation frequency at frequency 156.79985 MHz	Not exceed 10	%	5.80	Pass
Rated output power at nominal frequency 156.800 MHz	At least 200	mW	587	Pass
Rated output at frequency 156.8015 MHz	At least 200	mW	648	Pass
Rated output power at frequency 156.79985 MHz	At least 200	mW	571	Pass

ANNEX 23.
ADJACENT CHANNEL SELECTIVITY TEST

Adjacent Channel Selectivity Test (item 29, 7 of Test Program)
Test Procedure: Adjacent Channel Selectivity Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 02.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Adjacent channel selectivity test	4.4.5	5.5.5.2

TEST DESCRIPTION

The two input signals were applied to the receiver input via a combining network. The wanted signal was modulated at normal test modulation and the nominal frequency of the receiver. The unwanted signal was modulated by 400 Hz with a deviation of ±3 kHz, and at the frequency of the channel immediately above that of the wanted signal.

The wanted input signal level was set to the value corresponding to the maximum usable sensitivity, as measured in 5.5.3.3. Then the amplitude of the unwanted input signal was adjusted until the SINAD ratio at the receiver audiofrequency output, psophometrically weighted, is reduced to 14 dB. The measurement was repeated with an unwanted signal at the frequency of the channel below that of the wanted signal. The adjacent channel selectivity was expressed as the lower value of the ratio in decibels for the upper and lower adjacent channels of the level of the unwanted signal to the level of the wanted signal.

The measurement was repeated under extreme test conditions as defined in IEC 945, of dry heat and the upper limit of supply voltage applied simultaneously and low temperature and the lower limit of supply voltage applied simultaneously, with the wanted signal set to the value corresponding to the maximum usable sensitivity under extreme test conditions.

TEST CONDITIONS

- Ambient temperature: 24 °C
- Relative humidity: 57 %
- Atmospheric pressure: 750 mm/Hg
- Measurement duration: 2 hours
- Upper limit of supply voltage:9.0 V
- Lower limit of supply voltage:7.2 V
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011
2.	Climatic chamber	KPK-400V	15	08.2010
3.	Matching device Type I, Type II	No.1, No.2	7	07.2012
4.	Generator	G4-164	3019	01.2012
5.	Service monitor	CMS-54	835587/036	06.2012
6.	Hygrometer	VIT-2	D688	12.2011

TEST RESULT

Measurement at normal test conditions

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Adjacent channel selectivity for the upper adjacent channel	Not less 70	dB	72.7	Pass
Adjacent channel selectivity for the upper lower channel	Not less 70	dB	72.7	Pass

Measurement at +55 °C maximum operational temperature

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Adjacent channel selectivity for the upper adjacent channel	Not less 60	dB	70.3	Pass
Adjacent channel selectivity for the upper lower channel	Not less 60	dB	69.9	Pass

Measurement at -20 °C minimum operational temperature

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Adjacent channel selectivity for the upper adjacent channel	Not less 60	dB	77.2	Pass
Adjacent channel selectivity for the upper lower channel	Not less 60	dB	77.2	Pass

ANNEX 24.
SPURIOUS RESPONSE REJECTION TEST

Spurious Response Rejection Test (item 30 of Test Program)
Test Procedure: Spurious Response Rejection Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 02.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Spurious response rejection test	4.4.6	5.5.6.2

TEST DESCRIPTION

Two input signals were applied to the receiver input via a combining network. The wanted signal has normal test modulation at the nominal frequency of the receiver. The unwanted signal was modulated by 400 Hz with a deviation of ±3 kHz.

The wanted input signal level was set to the value corresponding to the maximum usable sensitivity, as measured in 5.5.3.3. The amplitude of the unwanted input signal was adjusted to +86 dBμV. Then the frequency was swept over the frequency range from 100 kHz to 2 GHz.

At any frequency at which a response is obtained, the input level was adjusted until the SINAD ratio at the receiver audiofrequency output, psophometrically weighted, is reduced to 14 dB.

The spurious response rejection ratio was expressed as the ratio in decibels between the unwanted signal and the wanted signal at the receiver input when the specified reduction in the SINAD ratio is obtained.

TEST CONDITIONS

- Ambient temperature: 24 °C
- Relative humidity: 57 %
- Atmospheric pressure: 750 mm/Hg
- Measurement duration: 2 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
7.	Temperature meter	Center-309	100074/1	08.2011
8.	Climatic chamber	KPK-400V	15	08.2010
9.	Matching device Type I, Type II	No.1, No.2	7	07.2012
10.	Generator	G4-164	3019	01.2012
11.	Service monitor	CMS-54	835587/036	06.2012
12.	Hygrometer	VIT-2	D688	12.2011

TEST RESULT

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Spurious response rejection at frequency 21.4 MHz	Not less 70	dB	> 90	Pass
Spurious response rejection at frequency 0.450 MHz	Not less 70	dB	> 90	Pass
Spurious response rejection at frequency 199.6 MHz	Not less 70	dB	> 90	Pass
Spurious response rejection at frequency 157.1 MHz	Not less 70	dB	> 90	Pass
Spurious response rejection at frequency 114.0 MHz	Not less 70	dB	85.0	Pass
Spurious response rejection at frequency 155.9 MHz	Not less 70	dB	> 90	Pass
Spurious response rejection at frequency 167.5 MHz	Not less 70	dB	> 90	Pass
Spurious response rejection at frequency 157.025 MHz	Not less 70	dB	> 90	Pass
Spurious response rejection at frequency 146.1 MHz	Not less 70	dB	83.1	Pass
Spurious response rejection at frequency 156.575 MHz	Not less 70	dB	> 90	Pass
Spurious response rejection at frequency 249.4 MHz	Not less 70	dB	> 90	Pass
Spurious response rejection at frequency 384.4 MHz	Not less 70	dB	> 90	Pass
Spurious response rejection at frequency 520.2 MHz	Not less 70	dB	> 90	Pass

ANNEX 25.
INTERMODULATION RESPONSE TEST

Intermodulation Response Test (item 31 of Test Program)
Test Procedure: Intermodulation Response Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 02.07.11
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Intermodulation response test	4.4.7	5.5.7.2

TEST DESCRIPTION

Three signal generators A, B and C was connected to the receiver via a combining network. The wanted signal, represented by signal generator A was set at the nominal frequency of the receiver and has normal test modulation. The unwanted signal from signal generator B was unmodulated and adjusted to a frequency 50 kHz above or below the nominal frequency of the receiver. The second unwanted signal from signal generator C was modulated by 400 Hz with a deviation of ±3 kHz, and adjusted to a frequency 100 kHz above or below the nominal frequency of the receiver.

The wanted input signal was set to a value corresponding to the maximum usable sensitivity, as measured in 5.5.3.3. The amplitude of the two unwanted signals was maintained equal and adjusted until the SINAD ratio at the receiver audiofrequency output, psophometrically weighted, is reduced to 14 dB. The frequency of signal generator B was adjusted to produce the maximum degradation to the SINAD ratio. The level of the two unwanted test signals was readjusted to restore the SINAD ratio of 14 dB.

The intermodulation response ratio was expressed as the ratio in decibels between the two unwanted signals and the wanted signal at the receiver input, when the specified reduction in the SINAD ratio is obtained.

TEST CONDITIONS

- Ambient temperature: 24 °C
- Relative humidity: 57 %
- Atmospheric pressure: 750 mm/Hg
- Measurement duration: 1 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	30.12.2011
2.	Matching device Type I, Type II	No.1, No.2	7	07.2012
3.	Generator	G4-176	5290	01.2012
4.	Generator	G4-164	3019	01.2012
5.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Figure 25.1 – General view of the test site

a) The unwanted signal from signal generator B adjusted to a frequency 50 kHz above the nominal frequency

The unwanted signal from signal generator C adjusted to a frequency 100 kHz above the nominal frequency

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Intermodulation response ratio	Not less 65	dB	68.8	Pass

b) The unwanted signal from signal generator B adjusted to a frequency 50 kHz below the nominal frequency

The unwanted signal from signal generator C adjusted to a frequency 100 kHz below the nominal frequency

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Intermodulation response ratio	Not less 65	dB	69.4	Pass

ANNEX 26.
BLOCKING TEST

Blocking Test (item 32 of Test Program)
Test Procedure: Blocking Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 06.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Blocking	4.4.2	5.5.8.2

TEST DESCRIPTION

Two input signals were applied to the receiver via a combining network. The modulated wanted signal has normal test modulation at the nominal frequency of the receiver. Initially the unwanted signal shall be switched off and the wanted signal set to the value corresponding to the maximum usable sensitivity, as measured in 5.5.3.3.

The audiofrequency output power of the wanted signal was adjusted, where possible, to 50 % of the rated output power and in the case of stepped power controls, to the first step that provides an output power of at least 50 % of the rated output power. The unwanted signal was unmodulated and the frequency was swept between +1 MHz and +10 MHz, and also -1 MHz and - 1 0 MHz, relative to the nominal frequency of the receiver.

The input level of the unwanted signal, at all frequencies in the specified ranges, was adjusted so that the unwanted signal causes a reduction of 3 dB in the output level of the wanted signal or a reduction to 14 dB of the SINAD ratio at the receiver audiofrequency output, psophometrically weighted, whichever occurs first.

This level expressed in dBμV was noted.

TEST CONDITIONS

- Ambient temperature: 24 °C
- Relative humidity: 57 %
- Atmospheric pressure: 751 mm/Hg
- Measurement duration: 2 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Hygrometer	VIT-2	D688	12.2011
2.	Matching device Type I, Type II	No.1, No.2	7	07.2012
3.	Generator	G4-164	3019	01.2012
4.	Service monitor	CMS-54	835587/036	06.2012

TEST RESULT

Parameters to be Measured	**Range of Specification**	**Units**	**Test Results**	**Conclusion**
Blocking level - 1 MHz relative to the nominal frequency	+90	dBµV	97.0	Pass
Blocking level + 1 MHz relative to the nominal frequency	+90	dBµV	88	Pass*
Blocking level + 1,01 MHz relative to the nominal frequency	+90	dBµV	96.0	Pass
Blocking level - 1,01 MHz relative to the nominal frequency	+90	dBµV	96.1	Pass
Blocking level - 2 MHz relative to the nominal frequency	+90	dBµV	99.0	Pass
Blocking level + 2 MHz relative to the nominal frequency	+90	dBµV	98.7	Pass
Blocking level - 5 MHz relative to the nominal frequency	+90	dBµV	98.0	Pass
Blocking level + 5 MHz relative to the nominal frequency	+90	dBµV	96.7	Pass
Blocking level - 10 MHz relative to the nominal frequency	+90	dBµV	97.5	Pass
Blocking level + 10 MHz relative to the nominal frequency	+90	dBµV	98.5	Pass

*The result is disregarded because this frequency is spurious response

ANNEX 27.
CONDUCTED SPURIOUS EMISSION CONVEYED TO THE ANTENNA TEST

Conducted Spurious Emission Conveyed To The Antenna Test (item 33 of Test Program)
Test Procedure: Conducted Spurious Emission Conveyed To The Antenna Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 06.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Conducted spurious emission conveyed to the antenna test	4.4.8	5.5.9.2

TEST DESCRIPTION

Conducted spurious emissions were measured as the power level of any frequency component at the antenna terminals of the receiver. The receiver antenna terminals was connected to a spectrum analyzer and the receiver is switched on.

The measurement was extended over a frequency range from 150 kHz to 2 GHz.

The power of any spurious emissions in the specified range at the antenna terminal was not exceed -57 dBm (2 nW) in the frequency range 150 kHz to 1 GHz and -37 dBm (20 nW) in the frequency range 1 GHz to 2 GHz

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 57 %
- Atmospheric pressure: 751 mm/Hg
- Measurement duration: 8 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Generator	G4-164	3019	01.2012
2.	Service monitor	CMS-54	835587/036	06.2012
3.	Hygrometer	VIT-2	D688	12.2011

TEST RESULT

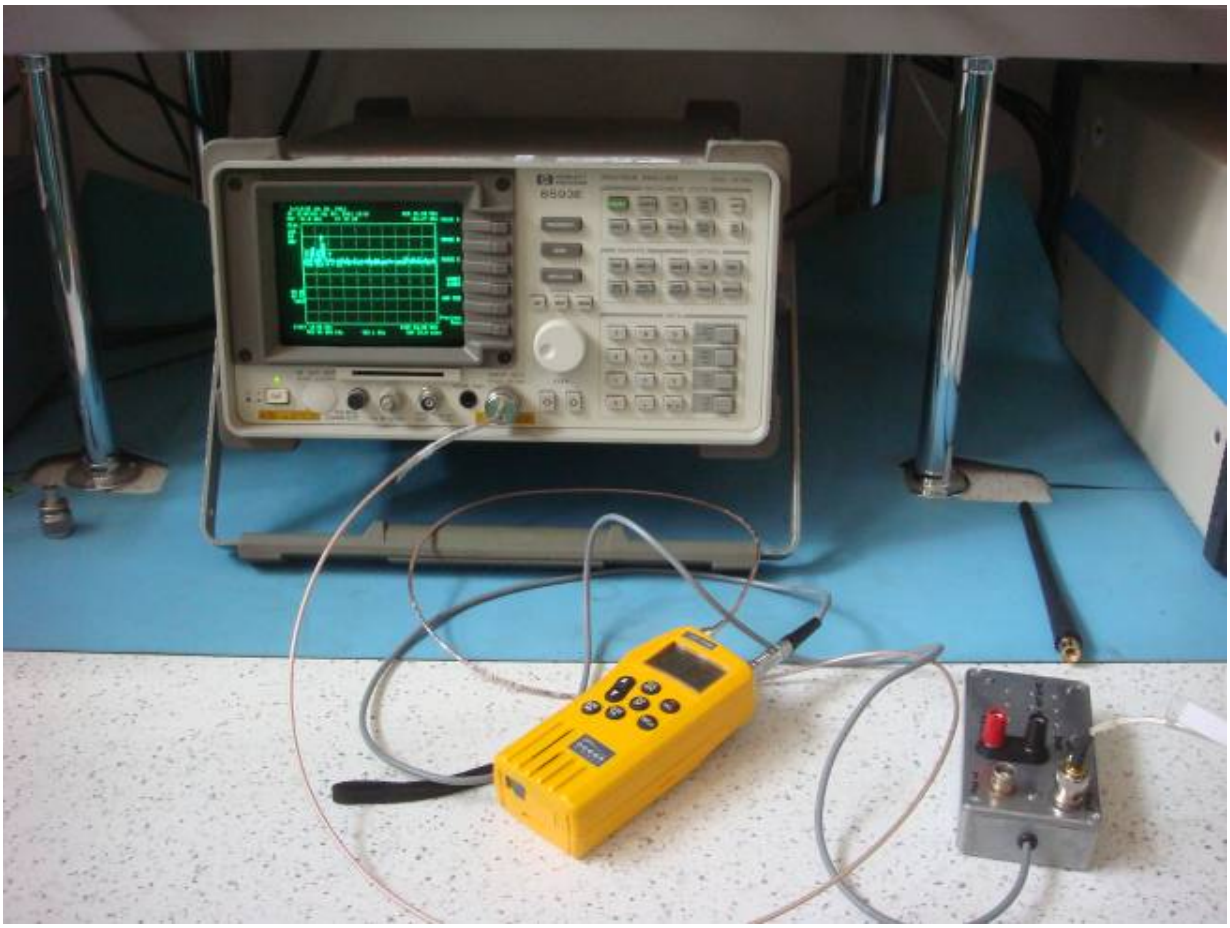


Figure 27.1 — General view of the test site

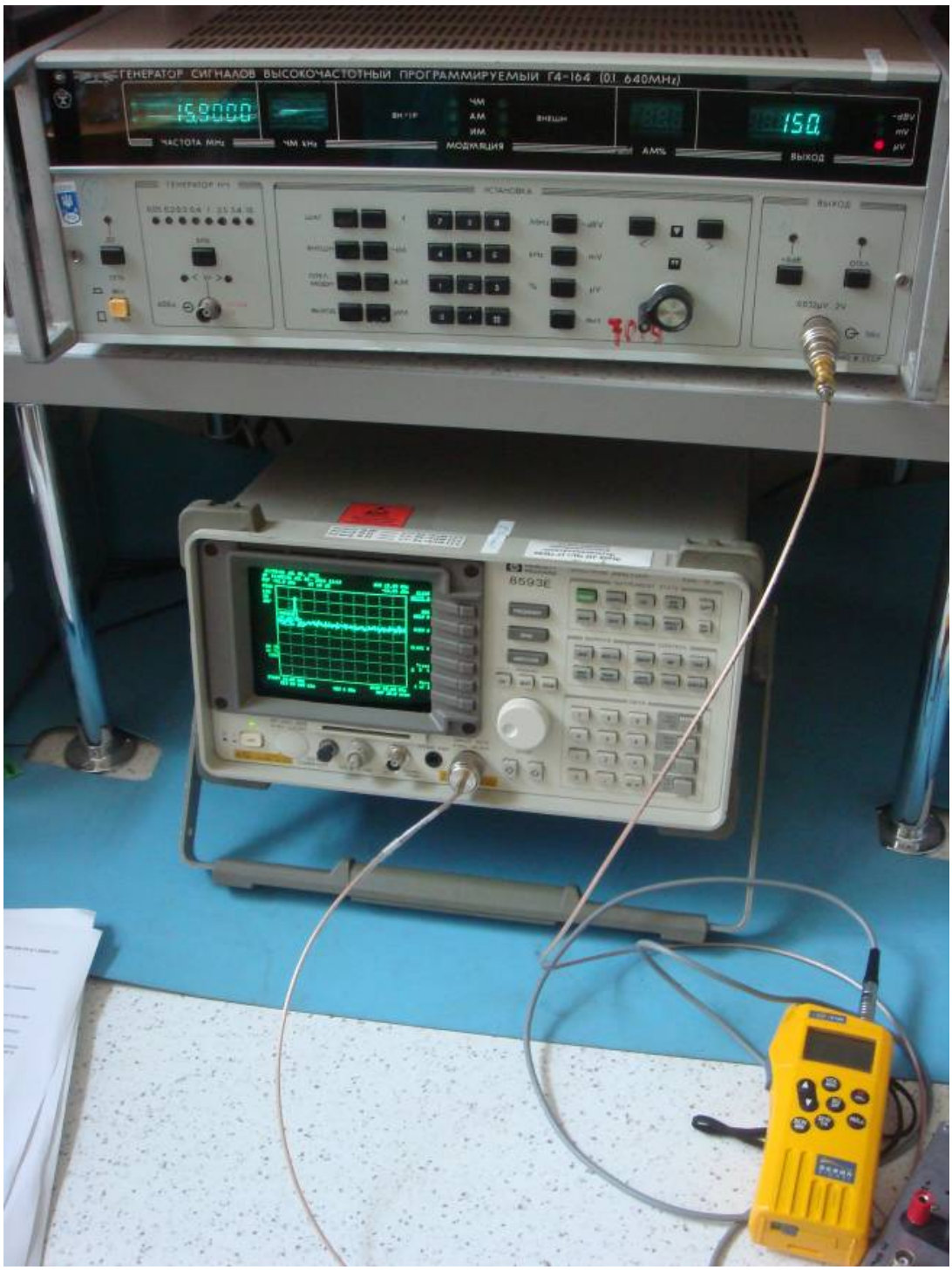


Figure 27.2 — General view of the test site

Measurements at a frequency range 150 kHz to 2 GHz.

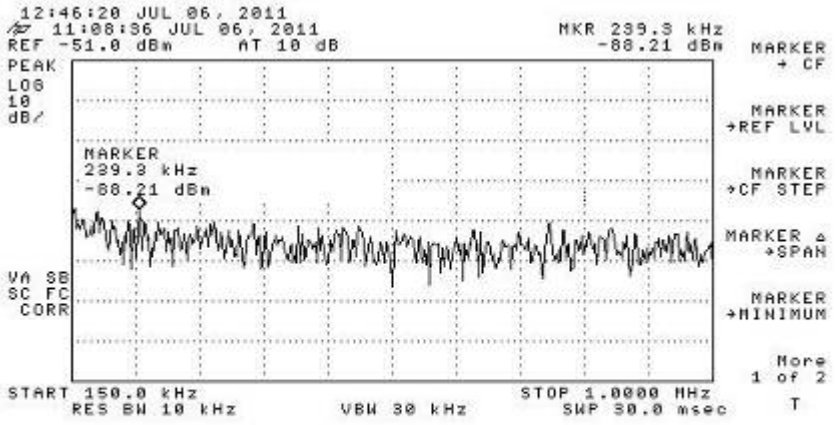


Figure 27.3 — Plot of measurements at a frequency range 150 kHz to 1 MHz

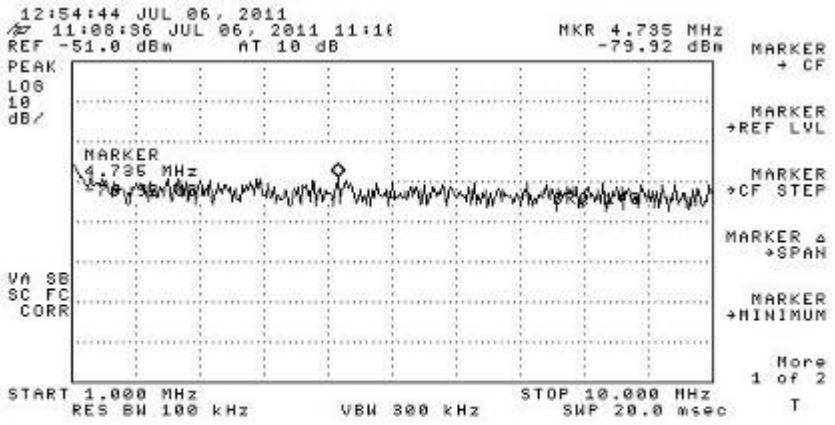


Figure 27.4 — Plot of measurements at a frequency range 1 MHz to 10 MHz

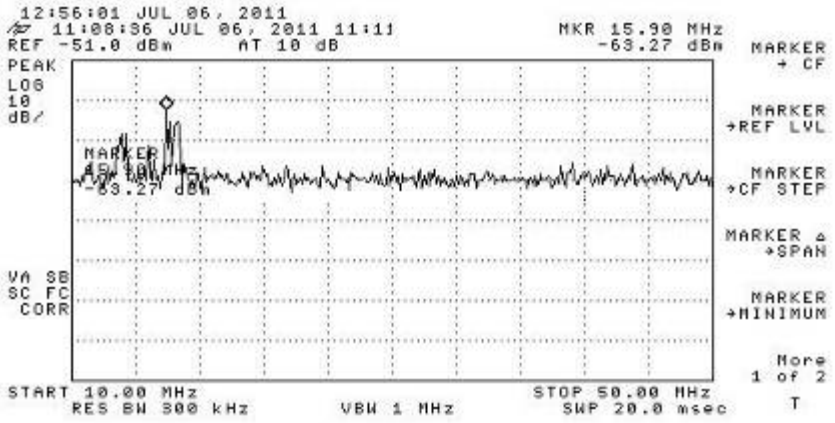


Figure 27.5 — Plot of measurements at a frequency range 10 MHz to 50 MHz

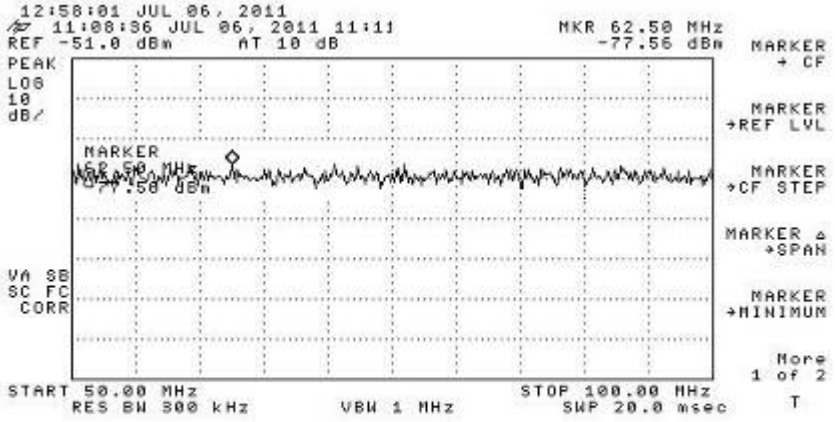


Figure 27.6 — Plot of measurements at a frequency range 50 MHz to 100 MHz

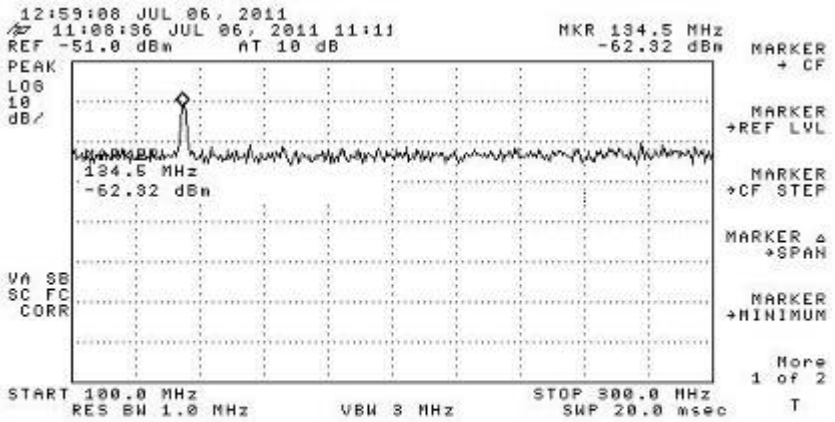


Figure 27.7 — Plot of measurements at a frequency range 100 MHz to 300 MHz

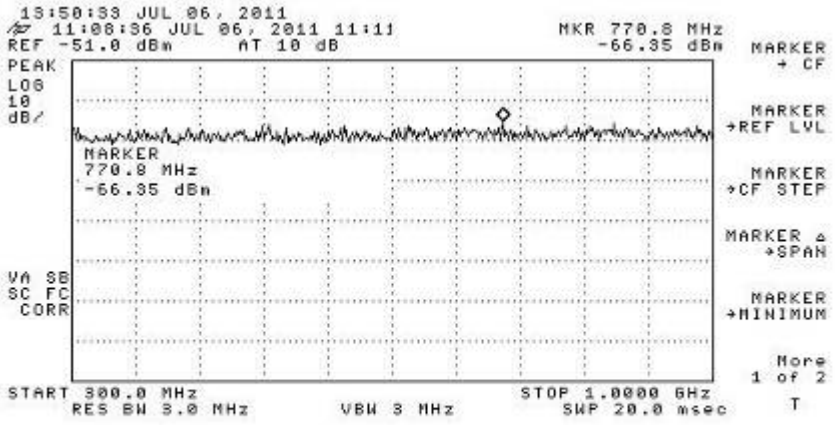


Figure 27.8 — Plot of measurements at a frequency range 300 MHz to 1 GHz

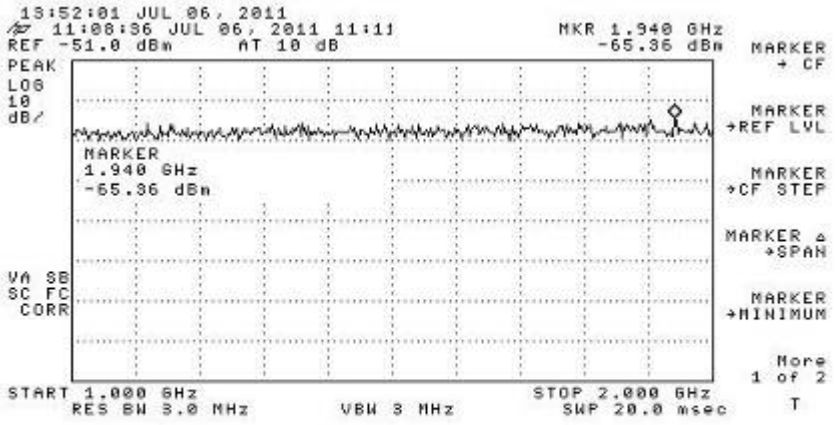


Figure 27.9 — Plot of measurements at a frequency range 1 GHz to 2 GHz

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Power of a spurious emission at a frequency range 150 kHz to 2 GHz	Not exceed -57	dBm	– 63.47 at 15.9 MHz	Pass
Power of a spurious emission at a frequency range 150 kHz to 2 GHz	Not exceed -57	dBm	– 62.35 at 134.5 MHz	Pass
Power of a spurious emission at a frequency range 1 GHz to 2 GHz	Not exceed - 37	dBm	< -65	Pass

ANNEX 28.
AMPLITUDE RESPONSE OF THE RECEIVER LIMITER TEST

Amplitude Response Of The Receiver Limiter Test (item 34 of Test Program)
Test Procedure: Amplitude Response Of The Receiver Limiter Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 06.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Amplitude response of the receiver limiter test	5.5.10.3	5.5.10.2

TEST DESCRIPTION

A test signal at the nominal frequency of the receiver and modulated by the normal test modulation at a level of +6 dBμV was applied to the receiver input and the audiofrequency output power level was adjusted to a level of 6 dB lower than the rated output power. The level of the input signal was increased to +100 dBμV and the audiofrequency output power level was measured again.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 53 %
- Atmospheric pressure: 751 mm/Hg
- Measurement duration: 1 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Service monitor	CMS-54	835587/036	06.2012
2.	Hygrometer	VIT-2	D688	12.2011

TEST RESULT

Minimum value of audiofrequency output power: 24,1 dBm

Maximum value of audiofrequency output power: 24,7 dBm

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Variation between the maximum and minimum value	Not exceed 3	dB	0.6	Pass

ANNEX 29.
RECEIVER HUM AND NOISE LEVEL TEST

Receiver Hum And Noise Level Test (item 35 of Test Program)
Test Procedure: Receiver Hum And Noise Level Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 06.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Receiver hum and noise level test	5.5.11.3	5.5.11.2

TEST DESCRIPTION

The test signal with a level of +30 dBμV at a carrier frequency equal to the nominal frequency of the receiver, and modulated by the normal test modulation was applied to the receiver input. An audiofrequency load was connected to the output terminal of the receiver. The audiofrequency power control set so as to produce the rated output power level conforming to 5.5.1.3.

The output signal was measured. Then the modulation was switched off and the audiofrequency output level was measured again.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 53 %
- Atmospheric pressure: 751 mm/Hg
- Measurement duration: 1 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Service monitor	CMS-54	835587/036	06.2012
2.	Hygrometer	VIT-2	D688	12.2011

TEST RESULT

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Hum and noise level	Not exceed -40	dB	-42.7	Pass

ANNEX 30.
SQUELCH OPERATION TEST

Squelch Operation Test (item 36 of Test Program)
Test Procedure: Squelch Operation Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 06.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Squelch operation test	3.3.2.3	5.5.12.2

TEST DESCRIPTION

a) With the squelch facility switched off, a test signal of +30 dBμV, at a carrier frequency equal to the nominal frequency of the receiver and modulated by the normal test modulation was applied to the input terminals of the receiver. An audiofrequency load and the psophometric filtering network was connected to the output terminals of the receiver. The audiofrequency power output control of the receiver set so as to produce the rated audiofrequency output power defined in 5.5.1.3. The output signal was measured with an r.m.s. voltmeter. Then the input signal was suppressed, the squelch facility switched on and the audiofrequency output power level was measured again.

b) With the squelch facility switched off again, a test signal modulated by the normal test modulation shall be applied to the receiver input at a level of +6 dBμV and the receiver shall be set to produce 50 % of the rated audiofrequency output power. The level of the input signal shall then be reduced and the squelch facility shall be switched on. The input signal shall then be increased until the above-mentioned audiofrequency output power is reached. The SINAD ratio and the input level shall then be measured.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 53 %
- Atmospheric pressure: 751 mm/Hg
- Measurement duration: 2 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Service monitor	CMS-54	835587/036	06.2012
2.	Hygrometer	VIT-2	D688	12.2011

TEST RESULT

a)

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Difference between signals	Not exceed -40	dB	-42.2	Pass

b)

Parameters to be Measured*	Range of Specification	Units	Test Results	Conclusion
Input signal level	Not exceed +6	dBµV	3.76	Pass
SINAD ratio	At least 20	dB	28.4	Pass

*In this measurement squelch control was set at maximum position

ANNEX 31.
SQUELCH HYSTERESIS TEST

Squelch Hysteresis Test (item 37 of Test Program)
Test Procedure: Squelch Hysteresis Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 06.07.11
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Marynin A.B.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Squelch hysteresis test	5.5.13.3	5.5.13.2

TEST DESCRIPTION

Squelch control on the exterior of the equipment was placed in its maximum muted position. With the squelch facility switched on, an unmodulated input signal at a carrier frequency equal to the nominal frequency of the receiver was applied to the input of the receiver at a level sufficiently low to avoid opening the squelch.

The input signal was increased to the level just opening the squelch. This level was recorded. With the squelch still open, the level of the input signal was slowly decreased until the squelch mutes the receiver audio output again. This level was recorded.

Squelch hysteresis is the difference in decibels between the receiver input signal levels at which the squelch opens and closes.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 53 %
- Atmospheric pressure: 751 mm/Hg
- Measurement duration: 2 hours
- Operational channel: 16 channel 156.8 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Service monitor	CMS-54	835587/036	06.2012
2.	Hygrometer	VIT-2	D688	12.2011

TEST RESULT

Input signal level at which the squelch open: - 6.3 dBµV

Input signal level at which the squelch close: -1.1 dBµV

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Squelch hysteresis	3<H<6	dB	5.2	Pass

ANNEX 32.
DROP TEST

Drop Test (item 38 of Test Program)
Test Procedure: Drop Test
Equipment Under Test: VHF Radio V100
Serial No.: TA001 (Sample 1), TA002 (Sample 1)
Firmware Version: 0100
Software Version: 0100
Test Date: 01.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Baydachnyi A.V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Drop test onto hard surface	3.4.2	5.1.5.1 of IEC 61097-12 8.6.1.2 of IEC 60945

TEST DESCRIPTION

The test surface consist of a piece of solid hard wood with a thickness of at least 150 mm and a mass of 30 kg The height of the lowest part of the EUT relative to the test surface at the moment of release was 1000 mm ± 10 mm. The EUT was subjected to this test configured for use as in operational circumstances.

At the end of the test the EUT was subjected to a performance check, and was examined for external indications of damage.

During the test the equipment was fitted with a suitable set of batteries and its antenna, but it was switched off.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 45 %
- Atmospheric pressure: 752 mm/Hg
- Test duration: 1 hours
- Measurement duration: 15 minutes
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011
2.	Free fall installation	SAPB-20	101377	05.2013
3.	Service monitor	Stabilock 4032	1788060	06.2012

TEST RESULT

Sample 1

Figure 32.1 – View of the EUT before the Drop Test

Figure 32.2 – View of the EUT before the Drop Test

Figure 32.3 – Thickness of wood test surface

Figure 32.4 – General view of test site of the drop from a height of 1 m above the test surface

Figure 32.5 – Dimensions of the wood test surface

Figure 32.6 – Orientation of the EUT before 1-st drop

Figure 32.7 – EUT after 1-st drop

Figure 32.8 – Orientation of the EUT before 2-nd drop

Figure 32.9 – EUT after 2-nd drop

Figure 32.10 – Orientation of the EUT before 3-rd drop

Figure 32.11 – EUT after 3-rd drop

Figure 32.12 – Orientation of the EUT before 4-th drop

Figure 32.13 – EUT after 4-th drop

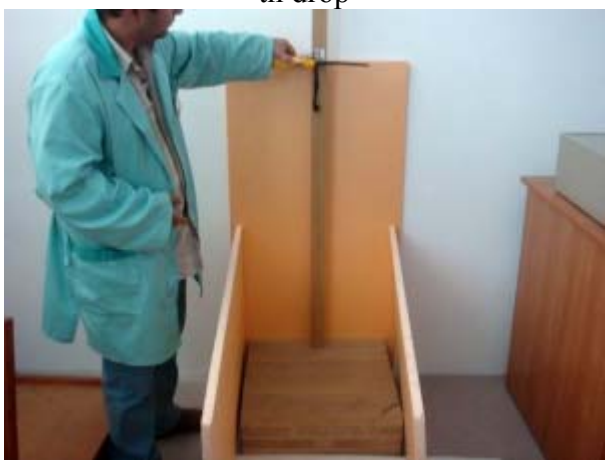


Figure 32.14 – Orientation of the EUT before 5-th drop

Figure 32.15 – EUT after 5-th drop

Figure 32.16 – Orientation of the EUT before 6-th drop

Figure 32.17 – EUT after 6-th drop

Figure 32.18 – Detailed photos of the EUT upon completion of the drop test

Performance check at the end of test (sample 1)

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.011	Pass
Output power	>0.25	W	2.54	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBµV	-6.14	Pass

Sample 2

Figure 32.19– View of the EUT before the Drop Test

Figure 32.20 – View of the EUT before the Drop Test

Figure 32.21– Orientation of the EUT before 1-st drop

Figure 32.22 – EUT after 1-st drop

Figure 32.23 – Orientation of the EUT before 2-nd drop

Figure 32.24 – EUT after 2-nd drop

Figure 32.25 – Orientation of the EUT before 3-rd drop

Figure 32.26 – EUT after 3-rd drop

Figure 32.27 – Orientation of the EUT before 4-th drop

Figure 32.28 – EUT after 4-th drop

Figure 32.29 – Orientation of the EUT before 5-th drop

Figure 32.30 – EUT after 5-th drop

Figure 32.31 – Orientation of the EUT before 6-th drop

Figure 32.32 – EUT after 6-th drop

Figure 32.33 – Detailed photo of the EUT upon completion of the drop test

Performance check at the end of test (sample 2)

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.006	Pass
Output power	>0.25	W	2.59	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.54	Pass

ANNEX 33.
THERMAL SHOCK

Thermal Shock Test (item 39 of Test Program)
Test Procedure: Thermal Shock Test
Equipment Under Test: VHF Radio V100
Serial No.: TA001
Firmware Version: 0100
Software Version: 0100
Test Date: 04.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Baydachnyi A.V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Thermal shock test	3.4.4	5.1.5.2

TEST DESCRIPTION

The EUT was placed in an atmosphere of +65 °C ± 3 °C for 1 h. It was immersed in water at +20 °C ± 3 °C to a derth of 100 mm ± 5mm, measured from the highest point of the equipment to the surface. At the end of the test the EUT was subjected to a performance check and was examined for damage.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 58 %
- Atmospheric pressure: 750 mm/Hg
- Water temperature: 20 °C
- Test duration: 3 hours
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011
2.	Set of immersion	-	102070	08.2011
3.	Climatic Chamber	KPK-400V	15	05.2012
3.	Service monitor	Stabilock 4032	1788060	06.2012

TEST RESULT

Figure 33.1 – View of the EUT before the Thermal Shock Test

Figure 33.2 – View of the EUT in the temperature test chamber during the Thermal Shock Test

Figure 33.3 – EUT in the water. Indicator of depth

Figure 33.4 – The temperature of the water

Figure 33.5 – View of the EUT in the water during the Thermal Shock Test

Figure 33.6 – View of the interiors of the EUT upon completion of the Thermal Shock Test.

Figure 33.7 – View of the interiors of the EUT upon completion of the Thermal Shock Test

Performance check at the end of test

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.010	Pass
Output power	>0.25	W	2.54	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.35	Pass

ANNEX 34.
IMMERSION TEST

Immersion Test (item 40 of Test Program)
Test Procedure: Immersion Test
Equipment Under Test: VHF Radio V100
Serial No.: TA001
Firmware Version: 0100
Software Version: 0100
Test Date: 04.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Baydachnyi A.V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Immersion test	3.4.3	5.1.5.3

TEST DESCRIPTION

The test was carried out by completely immersing the EUT in water so that the following conditions are satisfied:

- The highest point of the EUT was located 1m below the surface of the water;
- The duration of the test was 5 min;
- The water temperature was not differ from that of the equipment by more that 5°C

At the end of the test the EUT was subjected to a performance check and was examined for damage and for unwanted ingress of water.

Following the examination, the EUT was resealed in accordance with manufacturer’s instructions.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 53 %
- Atmospheric pressure: 750 mm/Hg
- Water temperature: 20 °C
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

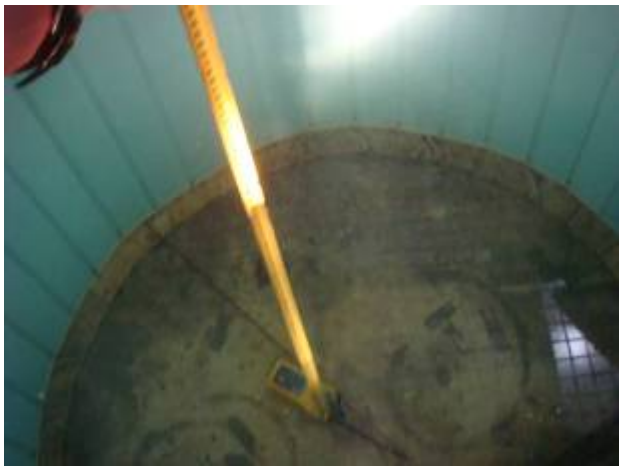
No	Name	Type, model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011
2.	Set of immersion	-	102070	08.2011
3.	Service monitor	Stabilock 4032	1788060	06.2012

TEST RESULT

Figure 34.1 – View of the EUT before the Immersion Test

Figure 34.2 – General view of immersion test site

Figure 34.3 – EUT during the immersion test



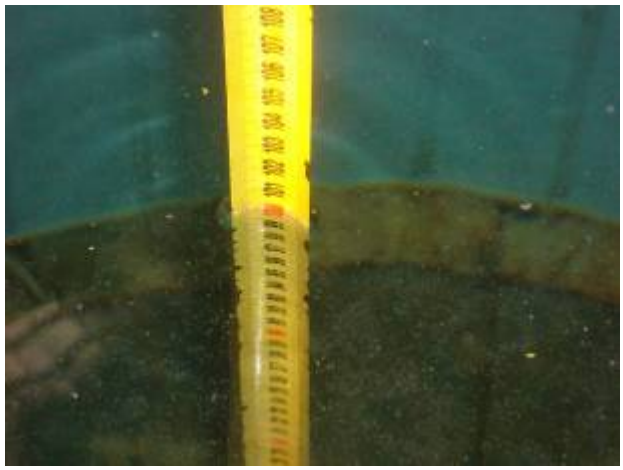


Figure 34.4 – Immersion test. Indicator of depth.

Figure 34.5 – EUT after the immersion test

Figure 34.6 – EUT after the immersion test (resealed). There is no free water

Performance check at the end of test

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	Hz	-0.009	Pass
Output power	>0.25	W	2.24	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.35	Pass

ANNEX 35.
DRY HEAT CYCLE

Dry Heat Cycle (item 41 of Test Program)
Test Procedure: Dry Heat Cycle
Equipment Under Test: VHF Radio V100
Serial No.: TA001
Firmware Version: 0100
Software Version: 0100
Test Date: 04.07.2011 – 05.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Baydachnyi A.V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC IEC 61097-12
1.	Dry heat test	3.4.1	8.2 of IEC 60945
1.1.	Storage test	3.4.1	8.2.1 of IEC 60945
1.2.	Functional test	3.4.1	8.2.2 of IEC 60945

DESCRIPTION OF TEST

The EUT shall be subjected to **Storage Test** of item 8.2.1 of IEC 60945 and **Functional Test** of item 8.2.2 of IEC 60945.

Storage Test (Item 8.2.1 of IEC 60945)
– The EUT shall be in position OFF.
– The EUT shall be placed according to the manufacturer’s specifications with all connectors and fittings engaged in a temperature test chamber at normal room temperature and relative humidity.
– The temperature shall then be raised to +70 º C and maintained at +70 ± 3 º C during the whole performance test period.
– At the end of the test, the EUT shall be returned to normal environmental conditions and then subjected to a performance check.

Functional Test (Item 8.2.2 of IEC 60945)
– The EUT shall be in position ON.
– The EUT shall be placed according to the manufacturer’s specifications with all connectors and fittings engaged in a temperature test chamber at normal room temperature and relative humidity.
– The temperature shall then be raised to +55 º C and maintained at +55 ± 3 º C during the whole performance test period.
– At the end of a soak period of 10 h at +55 ± 3 º C, the EUT shall be subjected to a performance test and check.
– At the end of the test, the EUT shall be returned to normal environmental conditions.

The requirements of the performance check shall be met.

TEST CONDITIONS

- Ambient temperature: 23..26 ^{O}C.
- Relative air humidity: 54..57 %.
- Atmospheric pressure: 750..752 mm/Hg.
- Test duration: 24 hours
- Measurement duration:30 minutes
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	KPK-400V	15	08.2012
2.	Temperature meter	Center-309	50310908	08.2011
3.	Service monitor	Stabilock 4032	1788060	06.2012

TEST RESULT

Test Result Storage Test (Item 8.2.1 of IEC 60945):

- STEP 1. The EUT was switched OFF and was placed in the temperature test chamber at ambient temperature. The chamber temperature was raised to 70 º C, and the EUT was allowed to stabilize at 70 ± 3 º C for two hours.
- STEP 2. During the next 10-hour period, the temperature was maintained in the test chamber 70 ± 3 º C.
- STEP 3. The test chamber temperature was reduced to ambient temperature, and EUT was allowed to stabilize at ambient temperature for two hours.
- STEP 4. The EUT was removed from the test chamber and was tested for compliance with the performance check.

Test Result Functional Test (Item 8.2.2 IEC 60945):

- STEP 1. The EUT was switched ON and was placed in the temperature test chamber at ambient temperature. The chamber temperature was raised to 55 º C, and the EUT was allowed to stabilize at 55 ± 3 º C for two hours.
- STEP 2. During the next 10-hour period, the temperature was maintained in the test chamber to 55 ± 3 º C.
- STEP 3. At the end of the exposure period, the EUT was removed from the test chamber.
- STEP 4. The EUT was allowed to stabilize at ambient temperature for two hours.

Figure 35.1 – General view of functional test site

Figure 35.2 – EUT after dry heat cycle

Figure 35.3 – EUT after dry heat cycle

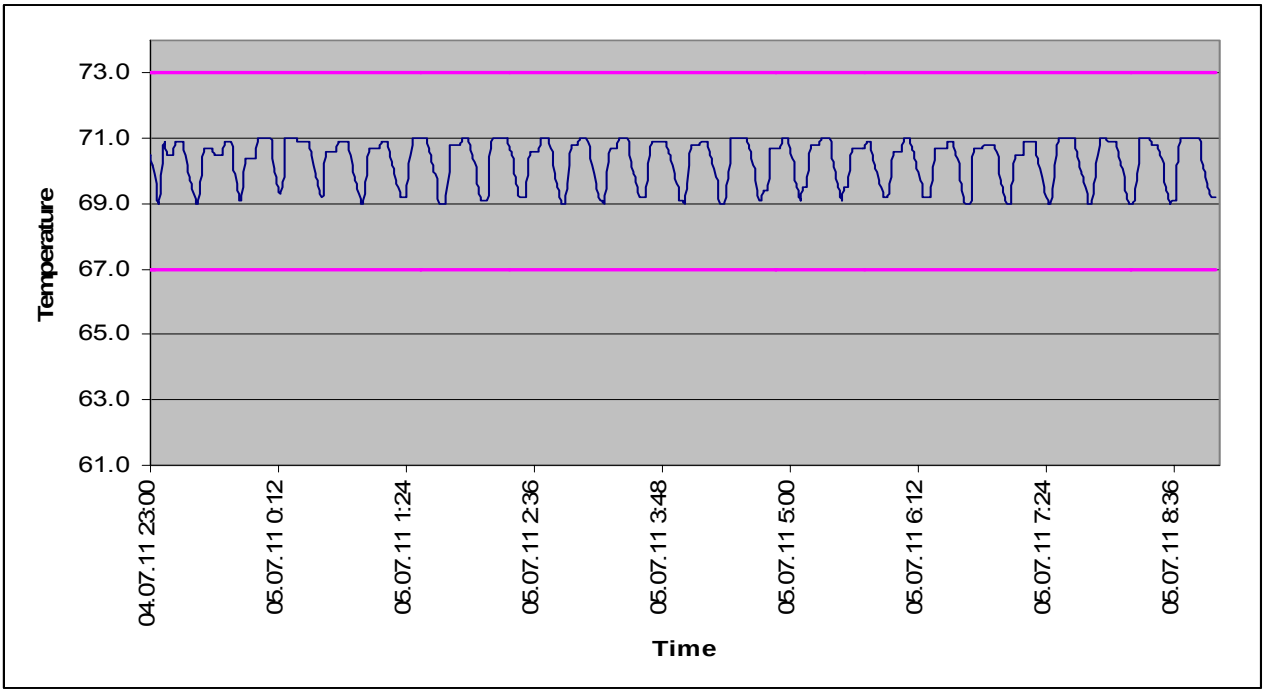


Figure 35.4 – Plot of temperatures during the storage test

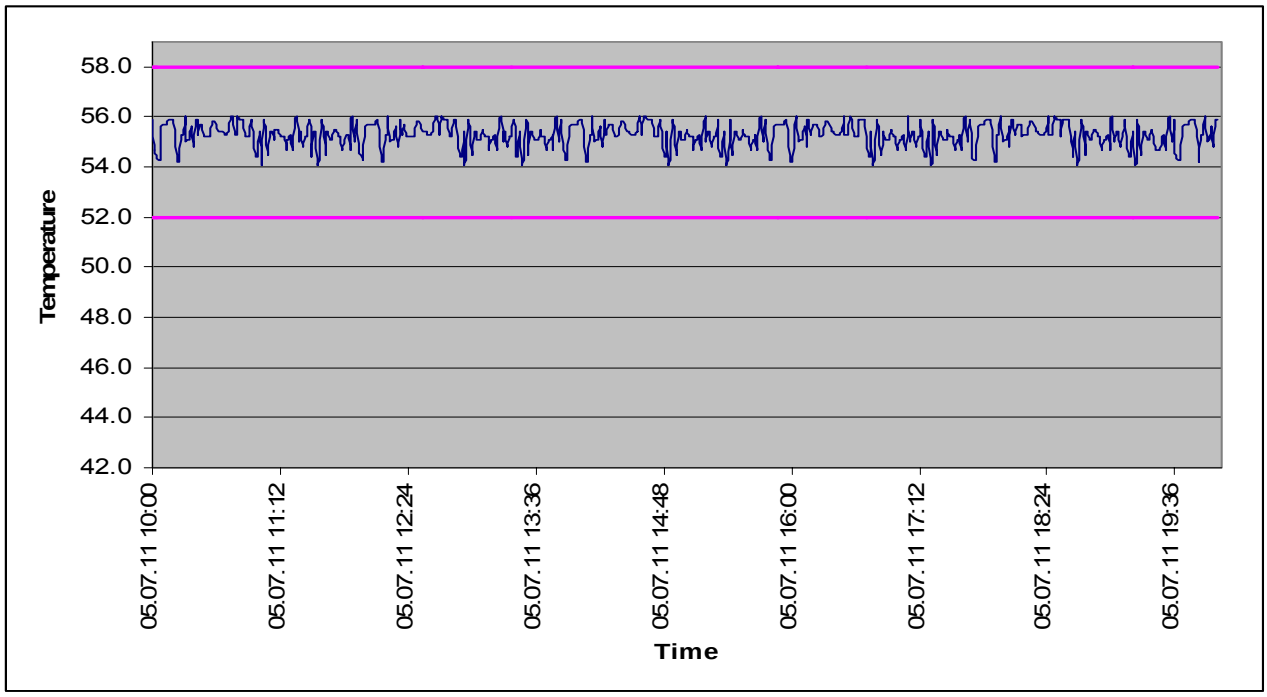


Figure 35.5 – Plot of temperatures during the functional test

Performance check after storage test

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.009	Pass
Output power	>0.25	W	2.54	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBµV	-5.85	Pass

Performance check after functional test

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.009	Pass
Output power	>0.25	W	2.54	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBµV	-5.55	Pass

ANNEX 36.
DAMP HEAT CYCLE

Damp Heat Cycle (item 42 of Test Program)
Test Procedure: Damp Heat Cycle
Equipment Under Test: VHF Radio V100
Serial No.: TA001
Firmware Version: 0100
Software Version: 0100
Test Date: 05.07.2011 – 06.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Baydachnyi A.V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC IEC 61097-12
1.	Damp heat test	5.1.5.5	8.3 of IEC 60945

DESCRIPTION OF TEST

– The EUT shall be in position OFF.
– The EUT shall be placed in a chamber at normal room temperature and relative humidity.
– The temperature shall then be raised to +40 ± 2 ° C, and the relative humidity raised to 93 % ± 3 % over a period of 3 h ± 0.5 h.
– These conditions shall be maintained for a period of 10 h.
– After period of 10 h the EUT shall be kept operational for at least 2 h during which period the EUT shall be subjected to a performance check.
– The temperature and relative humidity of the chamber shall be maintained as specified during the whole test period.
– At the end of the test period and with the EUT still in the chamber, the chamber shall be brought to room temperature in not less than 1 h.
– At the end of the test the EUT shall be returned to normal environmental conditions.
The requirements of the performance check shall be met.

TEST CONDITIONS

– Ambient temperature: 24..25 ^{O}C.
– Relative air humidity: 47..56 %.
– Atmospheric pressure: 752 mm/Hg.
– Test duration: 13 hours
– Measurement duration:2 hours
– Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	KPK-400V	15	08.2010
2.	Temperature meter	Center-309	50310908	05.2011
3.	Service monitor	Stabilock 4032	1788060	06.2012

TEST RESULT

– STEP 1. The EUT was switched OFF and was placed in the climatic test chamber at ambient temperature and relative humidity.
The temperature was raised to +40 º C, and the relative humidity was raised to 93 % over the period of 3 h.
– STEP 2. During the next 10-hour period, the temperature were maintained in the climatic test chamber 40 ± 2 º C and the relative humidity 93 % ± 3 %.
– STEP 3. After period of 10 h the EUT was switched ON and was kept operational at the temperature 40 ± 2 º C and the relative humidity 93 % ± 3 % for 2 h.
– STEP 4. At the end of the test period and with the EUT still in the chamber, the chamber was brought to room temperature during 1 h.

Figure 36.1 – General view of the test site

Figure 36.2 – EUT inside chamber

Figure 36.3 – EUT before damp heat cycle

Figure 36.4 – EUT after damp heat cycle

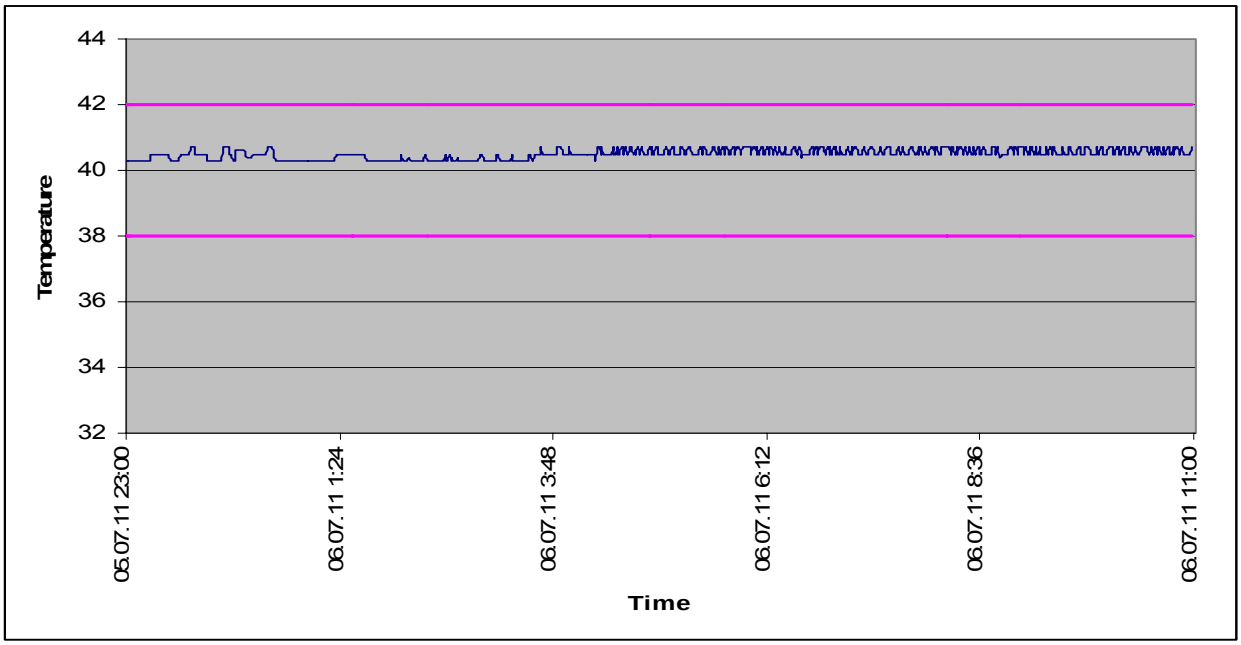


Figure 36.5 – Plot of temperatures during damp heat cycle

Performance check after 15 min of the 2 hour period

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.009	Pass
Output power	>0.25	W	2.32	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.15	Pass

Performance check after 1 hour of the 2 hour period

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.009	Pass
Output power	>0.25	W	2.32	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.15	Pass

Performance check at the end of the 2 hour period

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.010	Pass
Output power	>0.25	W	2.26	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.15	Pass

ANNEX 37.
LOW TEMPERATURE CYCLE

Low Temperature Cycle (item 43 of Test Program)
Test Procedure: Low Temperature Cycle
Equipment Under Test: VHF Radio V100
Serial No.: TA001
Firmware Version: 0100
Software Version: 0100
Test Date: 06.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Baydachnyi A.V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Low temperature cycle	3.4.1	8.4.2 of IEC 60945
1.1.	Storage test	3.4.1	8.4.1.2 of IEC 60945
1.2.	Functional test	3.4.1	8.4.2.2 of IEC 60945

DESCRIPTION OF TEST

The EUT shall be subjected to **Storage Test** of item 8.4.1 of IEC 60945 and **Functional Test** of item 8.4.2 of IEC 60945.

Storage Test (Item 8.4.1 of IEC 60945)
– The EUT shall be in position OFF.
– The EUT shall be placed according to the manufacturer’s specifications with all connectors and fittings engaged in a temperature test chamber at normal room temperature and relative humidity.
– The temperature shall then be lowered to -30 º C and maintained at -30 º C ± 3 º C during the whole performance test period.
– At the end of the test, the EUT shall be returned to normal environmental conditions and then subjected to a performance check.

Functional Test (Item 8.4.2 of IEC 60945)
– The EUT shall be in position OFF.
– The EUT shall be placed according to the manufacturer’s specifications with all connectors and fittings engaged in a temperature test chamber at normal room temperature and relative humidity.
– The temperature shall then be lowered to -20 º C and maintained at-20 º C ± 3 º C during the whole performance test period.
– At the end of a soak period of 10 h at -20 ± 3 º C, the EUT shall be switched ON and subjected to a performance test and check.
– At the end of the test, the EUT shall be returned to normal environmental conditions.

TEST CONDITIONS

- Ambient temperature: 24-26 °C
- Relative humidity: 49-55 %
- Atmospheric pressure: 752 mm/Hg
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Climatic chamber	KPK-400V	15	08.2010
2.	Temperature meter	Center-309	100074/1	08.2011
3.	Service monitor	Stabilock 4032	1788060	06.2012

TEST RESULT

Test Result Storage Test (Item 8.4.1 of IEC 60945):

- STEP 1. The EUT was switched OFF and was placed in the temperature test chamber at ambient temperature. The chamber temperature was lowered to -30 º C, and the EUT was allowed to stabilize at -30 ± 3 º C for two hours.
- STEP 2. During the next 10-hour period, the temperature was maintained in the test chamber 7-30 ± 3 º C.
- STEP 3. The test chamber temperature was reduced to ambient temperature, and EUT was allowed to stabilize at ambient temperature for two hours.
- STEP 4. The EUT was removed from the test chamber and was tested for compliance with the performance check.

Test Result Functional Test (Item 8.2.2 IEC 60945):

- STEP 1. The EUT was placed in the temperature test chamber at ambient temperature. The chamber temperature was lowered to -20 º C, and the EUT was allowed to stabilize at -20 ± 3 º C for two hours.
- STEP 2. During the next 10-hour period, the temperature was maintained in the test chamber to -20 ± 3 º C.
- STEP 3. At the end of the exposure period, the EUT was switched ON and was operated for 2 hours. During this period EUT was subjected to a performance check.
- STEP 4. The EUT was allowed to stabilize at ambient temperature for two hours.

Figure 37.1 – General view of the test site

Figure 37.2 – EUT inside chamber

Figure 37.3 – EUT before low temperature cycle

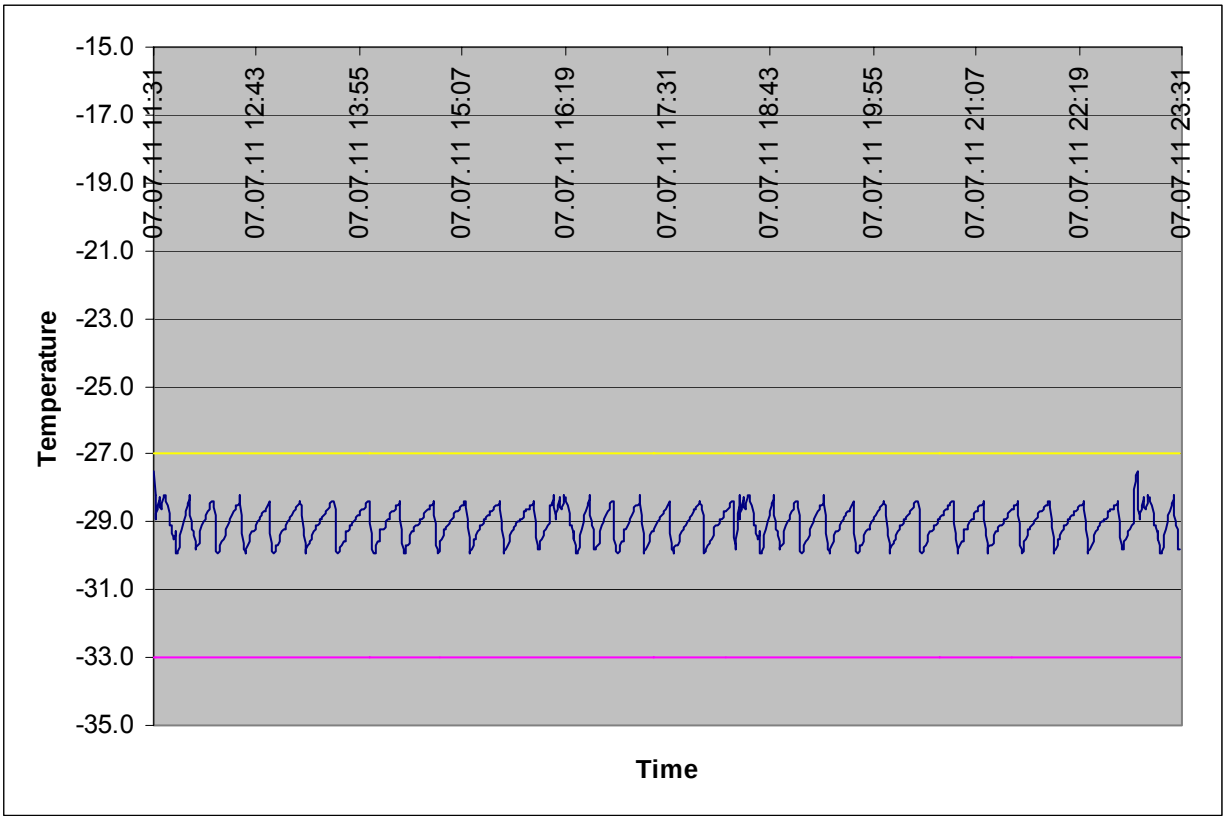


Figure 37.4 – Plot of temperatures during the storage test

Figure 37.5 – EUT after low temperature cycle

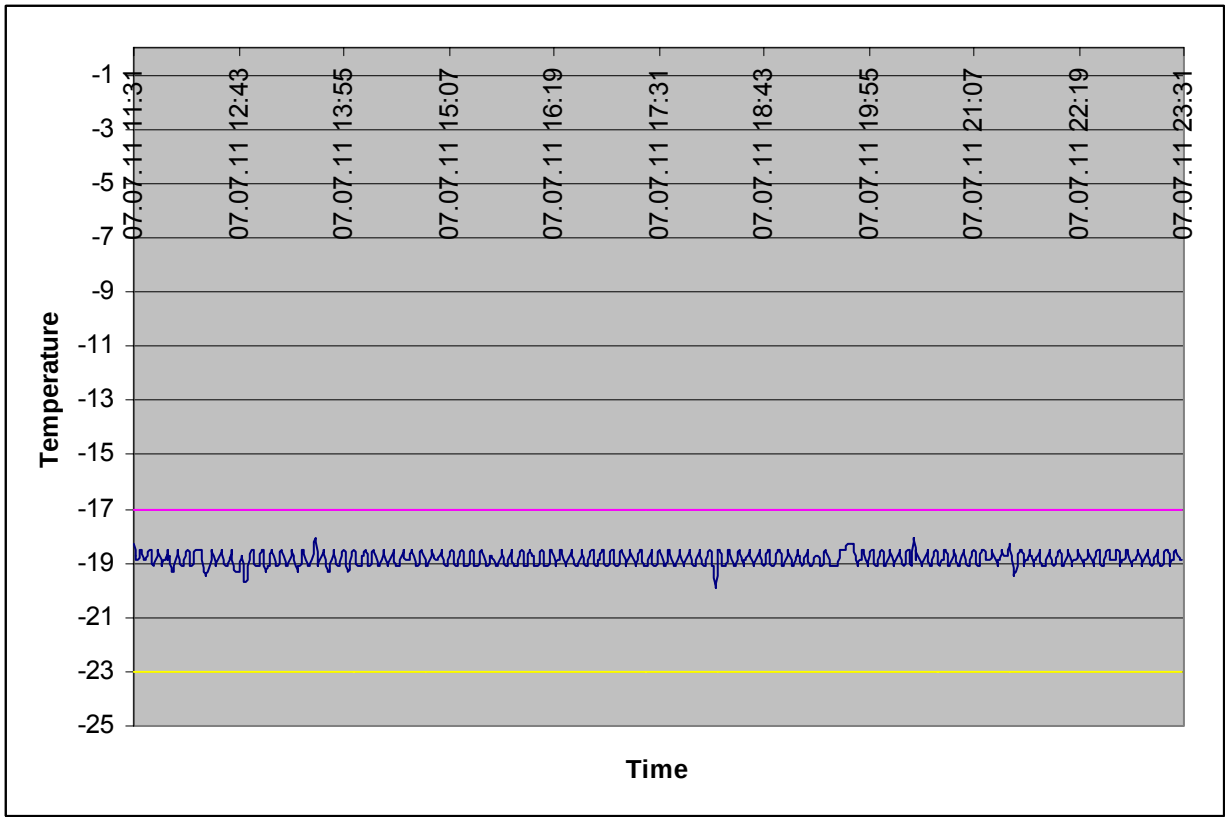


Figure 37.6 – Plot of temperatures during the functional test

Performance check after storage test

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.010	Pass
Output power	>0.25	W	2.26	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.24	Pass

Performance check after 15 min of the 2 hour period

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.009	Pass
Output power	>0.25	W	2.53	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.44	Pass

Performance check after 1 hour of the 2 hour period

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.009	Pass
Output power	>0.25	W	2.53	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.54	Pass

Performance check at the end of the 2 hour period

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.010	Pass
Output power	>0.25	W	2.59	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.54	Pass

ANNEX 38.
VIBRATION TEST

Vibration Test (item 44 of Test Program)
Test Procedure: Vibration Test
Equipment Under Test: VHF Radio V100
Serial No.: TA001
Firmware Version: 0100
Software Version: 0100
Test Date: 08.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Baydachnyi A.V.

TEST PROGRAM

Item	Test name	Requirements item of standard	Methods item of standard
		IEC 61097-12	IEC 61097-12
1.	Vibration test	5.1.5.7	8.7.3 of IEC 60945
1.1	Vibration test and resonance search vertical axis Z	5.1.5.7	8.7.3 of IEC 60945
1.2	Vibration test and resonance search horizontal axis X		
1.3	Vibration test and resonance search horizontal axis Y		

Upon completion of the each endurance test period PERFORMANCE CHECK was carried out.

TEST DESCRIPTION

Testing was performed in accordance to the methods of the standard IEC 60945 item 8.7.

Vibrations were conducted sequentially in vertical and two horizontal orthogonal axes.

The EUT was subjected to sequentially vibration at all frequencies between:

-2 Hz to 13.2 Hz with an excursion of ±1mm ±10%

-above 13.2 Hz and up to 100 Hz with a constant acceleration of 7 m/s^2 (0.71 g)

The frequency sweep rate was less than 0.5 octaves/min. A resonance search was carried out throughout the frequency sweep period. Then relative magnitude ratio was calculated as magnitude measured by a sensor fixed to the outside of the EUT divided to magnitude on the surface where the EUT is fastened.

If resonance with a magnitude ratio ≥5 (i.e. excursion ≥5 mm or acceleration ≥3.57 g) occurs, the EUT shall be subjected to a vibration endurance test at each resonant frequency at the vibration level specified in the test with duration of 2 h.

If no resonance with a magnitude ratio <5 occurs, the endurance test shall be carried out at one single observed frequency.

If no resonance occurred, the endurance test shall be carried out at a frequency of 30 Hz in all three axes. Performance check was carried out upon completion of the each endurance test period.

TEST CONDITIONS

- Ambient temperature: 25-26 °C
- Relative humidity: 52-56%
- Atmospheric pressure: 750 mm/Hg
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Vibration table	G 0227	496	07.2011
2.	Temperature meter	Center-309	100074/1	08.2011
3.	Vibration table	TIRAvib5242	26/88	07.2011
4.	Digital vibration meter	V-1103A	1013/2	09.2011
5.	Service monitor	Stabilock 4032	1788060	06.2012

TEST RESULT

For vertical vibration, EUT was fastened to the vibration table in its normal attitude using special brackets

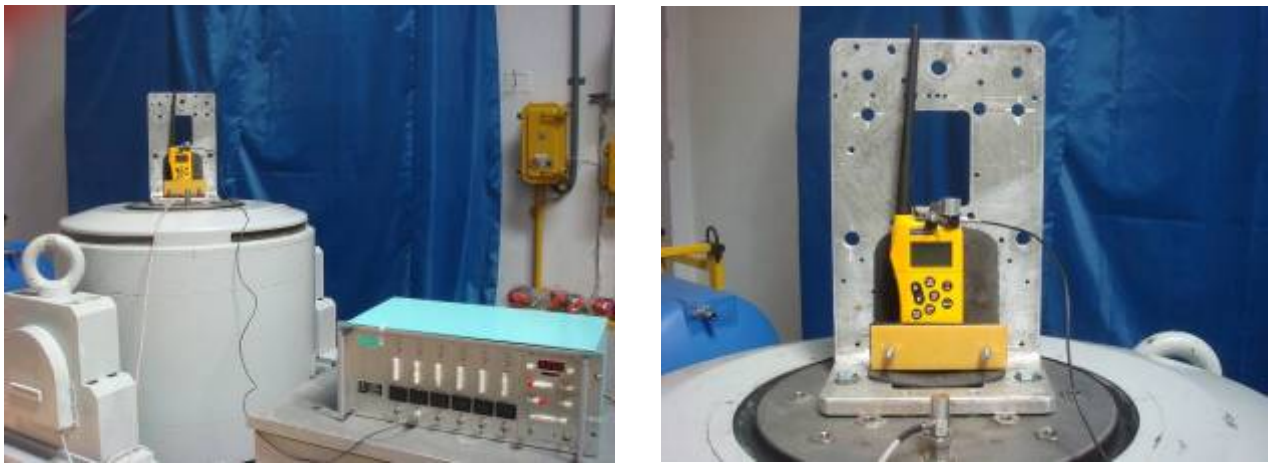


Figure 38.1 – General view of the test site vertical vibration (Z axe)

During the search of EUT resonance, tested sample was externally observed by unaided aural and visual means. Relative magnitude is shown in table below.

Frequency, Hz	Magnitude ratio	Frequency, Hz	Magnitude ratio	Frequency, Hz	Magnitude ratio
2	0.93	25	0.53	75	0.66
4	0.95	30	0.52	80	0.67
6	1.03	35	0.67	85	0.68
8	0.94	40	0.65	90	0.68
10	0.96	45	0.65	95	0.67
12	0.91	50	0.65	100	0.67
13	1.00	55	0.66		
13,2	0.50	60	0.66		
15	0.51	65	0.66		
20	0.53	70	0.66		

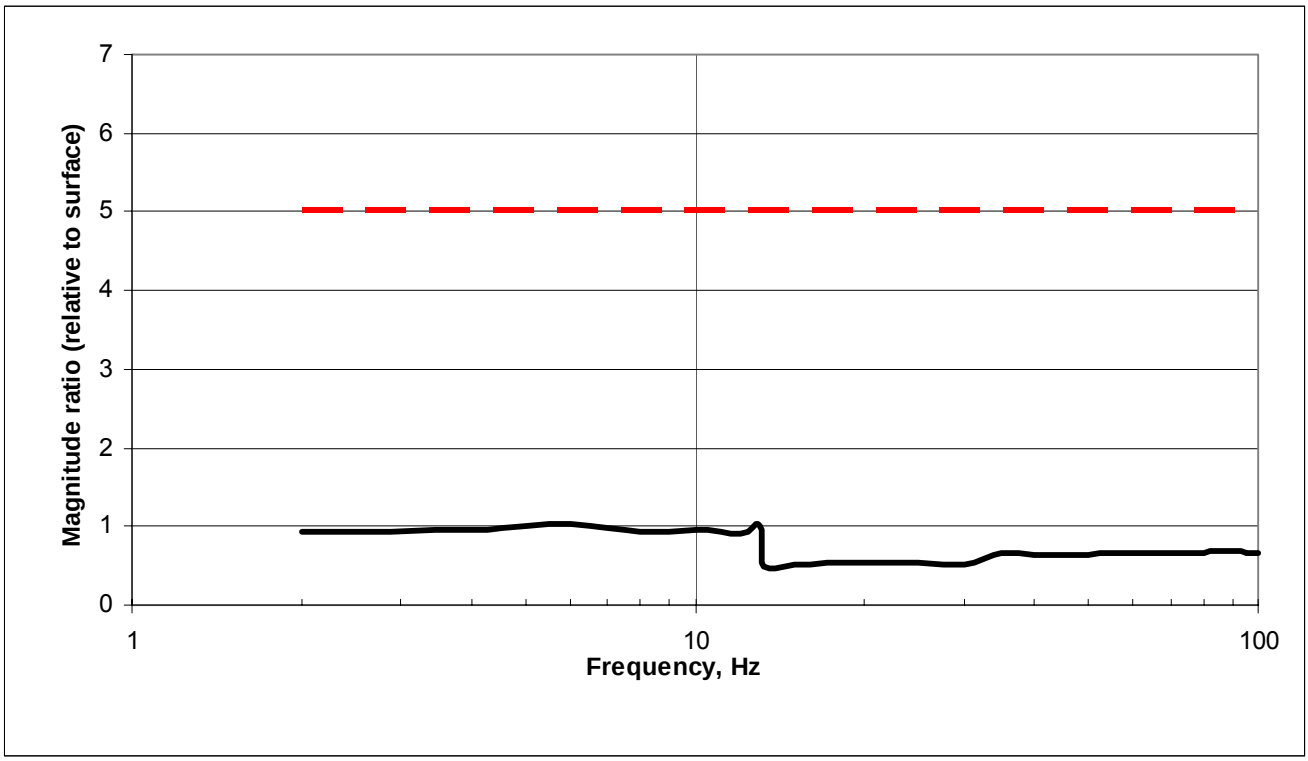


Figure 38.2 – Magnitude ratio vs. frequency during vibration on vertical axe Z

As no resonance with magnitude ratio ≥5 occurred, the endurance test was carried out at one single observed frequency 30 Hz during 2 hours. After endurance test EUT was subjected to performance check. The requirements of the performance check was met.

Performance check after vibration on Z axe

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.020	Pass
Output power	>0.25	W	2.53	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-4.54	Pass

For horizontal vibration in X horizontal axe, EUT was then fastened to the vibration table in its normal attitude using special brackets

Figure 38.3 – General view of the horizontal vibration test (X axe)

During the search of EUT resonance, tested specimen was externally observed by unaided aural and visual means. Relative magnitude is shown in table below.

Frequency, Hz	**Magnitude ratio**	**Frequency, Hz**	**Magnitude ratio**	**Frequency, Hz**	**Magnitude ratio**
2	1.17	25	0.65	75	0.66
4	1.15	30	0.65	80	0.65
6	1.09	35	0.66	85	0.66
8	1.10	40	0.66	90	0.67
10	1.11	45	0.65	95	0.73
12	1.09	50	0.66	100	0.67
13	1.09	55	0.68		
13,2	0.65	60	0.63		
15	0.65	65	0.65		
20	0.65	70	0.67		

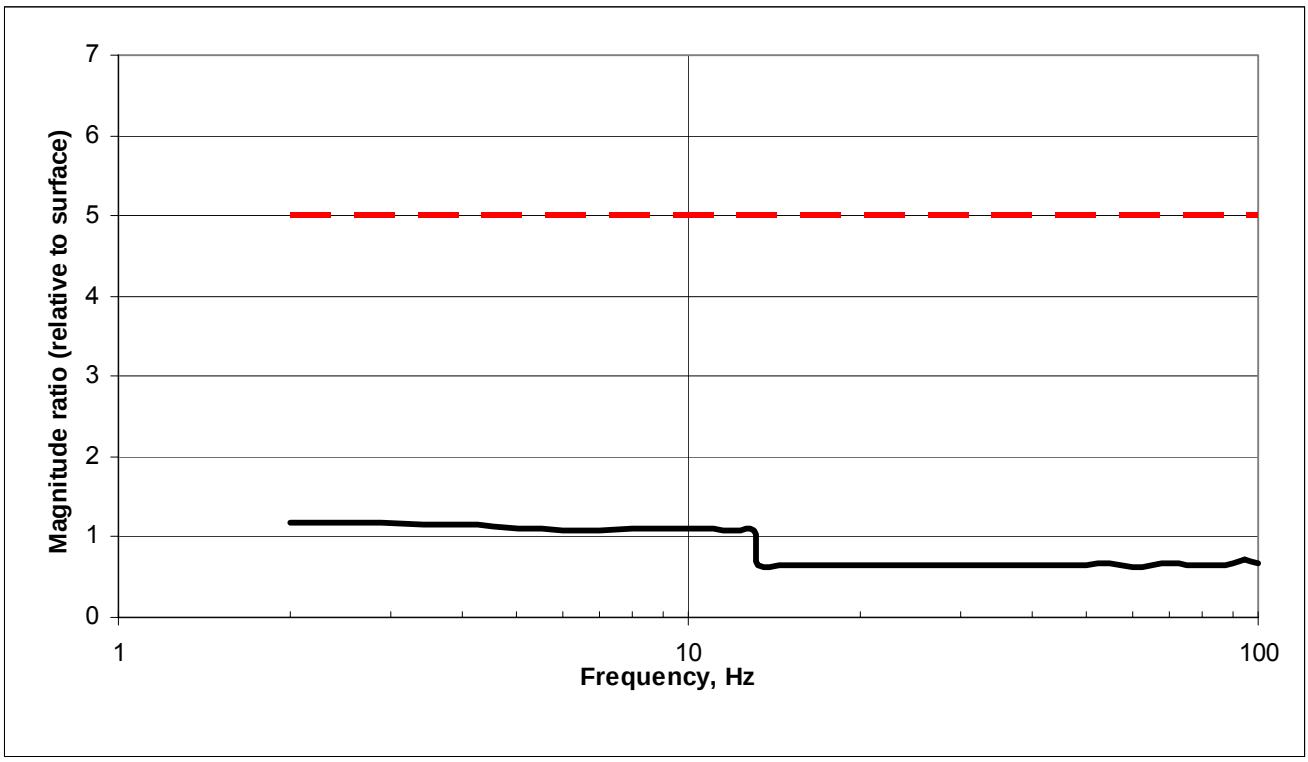


Figure 38.4 – Magnitude ratio vs. frequency during vibration on vertical axe X

As resonance with magnitude ratio ≥ 5 occurred, the endurance test was carried out at resonance frequency 30 Hz (maximum in the band) during 2 hours. After endurance test EUT was subjected to performance check. The requirements of the performance check was met.

Performance check after vibration on X axe

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.024	Pass
Output power	>0.25	W	2.53	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-4.54	Pass

For horizontal vibration in Y axe, EUT was fastened to the vibration table in its normal attitude using special brackets

Figure 38.5 – General view of the horizontal vibration test (Y axe)

During the search of EUT resonance, tested specimen was externally observed by unaided aural and visual means. Relative magnitude is shown in table below.

Frequency, Hz	**Magnitude ratio**	**Frequency, Hz**	**Magnitude ratio**	**Frequency, Hz**	**Magnitude ratio**
2	1.12	25	0.67	75	0.73
4	1.12	30	0.66	80	0.74
6	1.07	35	0.67	85	0.77
8	1.08	40	0.70	90	0.80
10	1.10	45	0.69	95	0.79
12	1.11	50	0.70	100	0.82
13	1.11	55	0.71		
13,2	0.65	60	0.69		
15	0.64	65	0.64		
20	0.65	70	0.69		

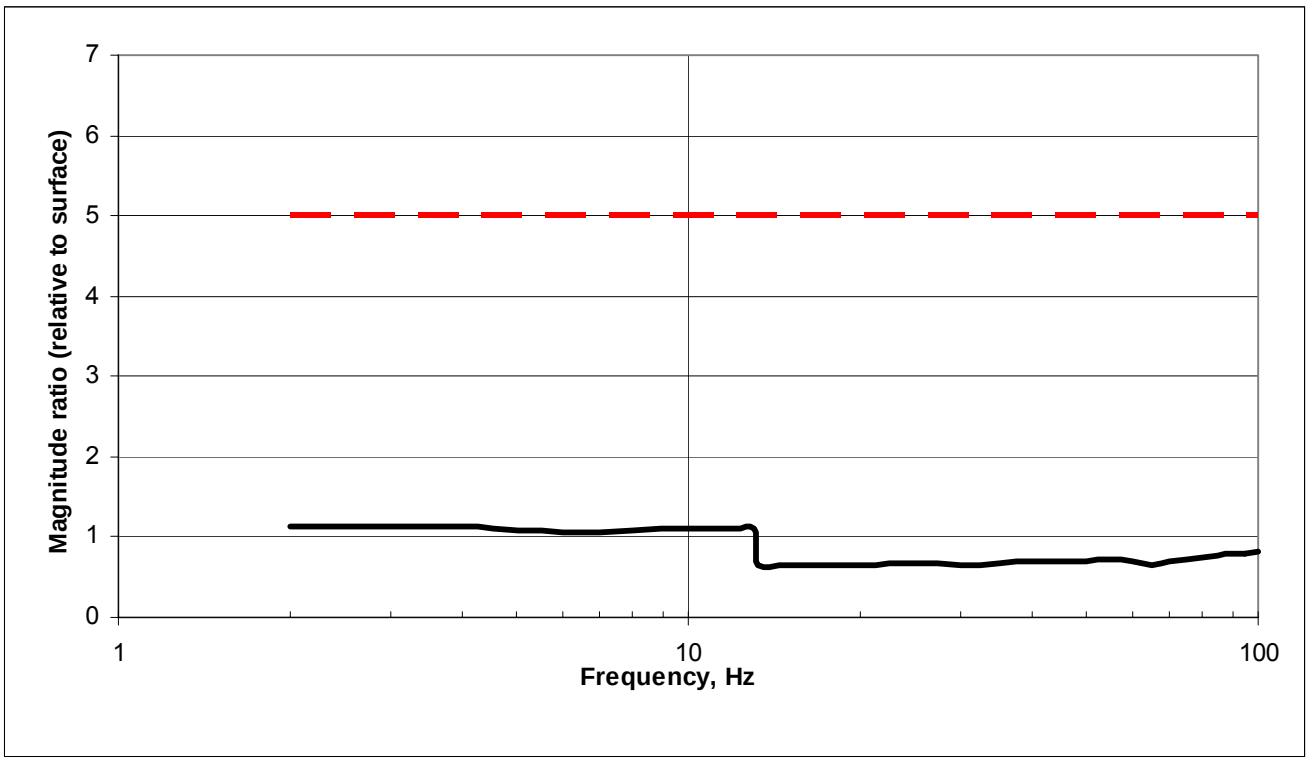


Figure 38.6 – Magnitude ratio vs. frequency during vibration on vertical axe Y

As resonance with magnitude ratio ≥ 5 occurred, the endurance test was carried out at resonance frequency 30 Hz (maximum in the band) during 2 hours. After endurance test EUT was subjected to performance check. The requirements of the performance check were met.

Performance check after vibration on X axe

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.024	Pass
Output power	>0.25	W	2.53	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBµV	-3.54	Pass

EUT have passed Vibration Test.

ANNEX 39.
CONDUCTED EMISSION

Conducted Emission Test (item 47 of Test Program)
Test Procedure: Conducted Emission Test
Equipment Under Test: Charger
Serial No.: N/A
Firmware Version: N/A
Software Version: N/A
Test Date: 09.07.2011
The Name and Test - Site Location: Laboratory No. 3
The Name and Qualification of Person Responsible for the test: Osaulko V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 60945	Methods item of standard IEC 60945
1.	Conducted emission	9.2.3	9.2.2

TEST DESCRIPTION

The emission was measured by means of the quasi-peak measuring receivers specified in ClSPR 16-1. An artificial mains V-network in accordance with ClSPR 16-1 was used to provide a defined impedance at high frequencies across the terminals of the EUT, and to isolate the test circuit from unwanted radio frequency signals on the supply mains. The measuring bandwidth in the frequency range 10 kHz to 150 kHz was 200 Hz, and in the frequency range 150 kHz to 30 MHz was 9 kHz.

The power input cables between the a.c, and the d.c. power ports of the EUT and the artificial mains network were screened and not exceed 0,8 m in length.

Measurements were made with all measuring equipment and the EUT mounted on, and bonded to the earth plane.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 63 %
- Atmospheric pressure: 756 mm/Hg
- Test duration is 1 hour.

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Measuring receiver	ESPC	848553/024	04.2012
2.	Artificial mains network	NNLK 8121	8121465	12.2012
3.	Power supply	EP3.3005.2.2	100204	04.2013

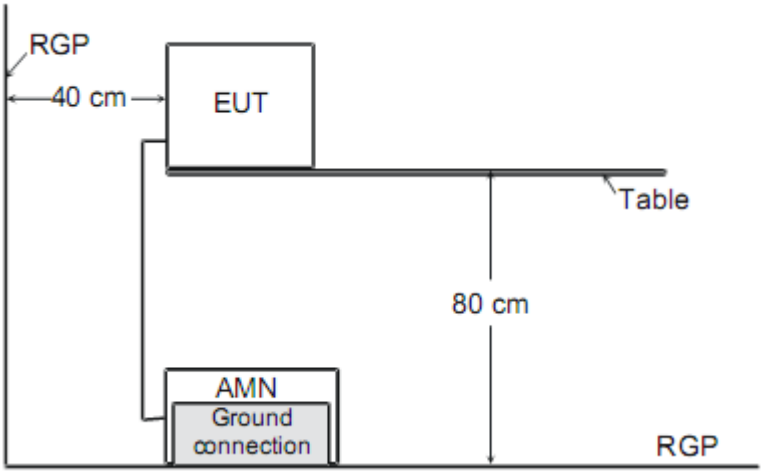


Figure 39.1 — Set up for Test of Conducted emission

TEST RESULT

Figure 39.2 – The general view of test site for test of conducted emission

TEST REPORT
CONDUCTED EMISSION

Date: 09. Jul 11 13:48

Scan Settings (1 Range)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten
10k	30M	1.6%	200Hz	PK	1ms	AUTO LN

Transducer No.	Start	Stop	Name
1	10k	30M	NNB111

Final Measurement: x QP
Mean Time: 1 s
Subranges: 8
Acc Margin: 60dB

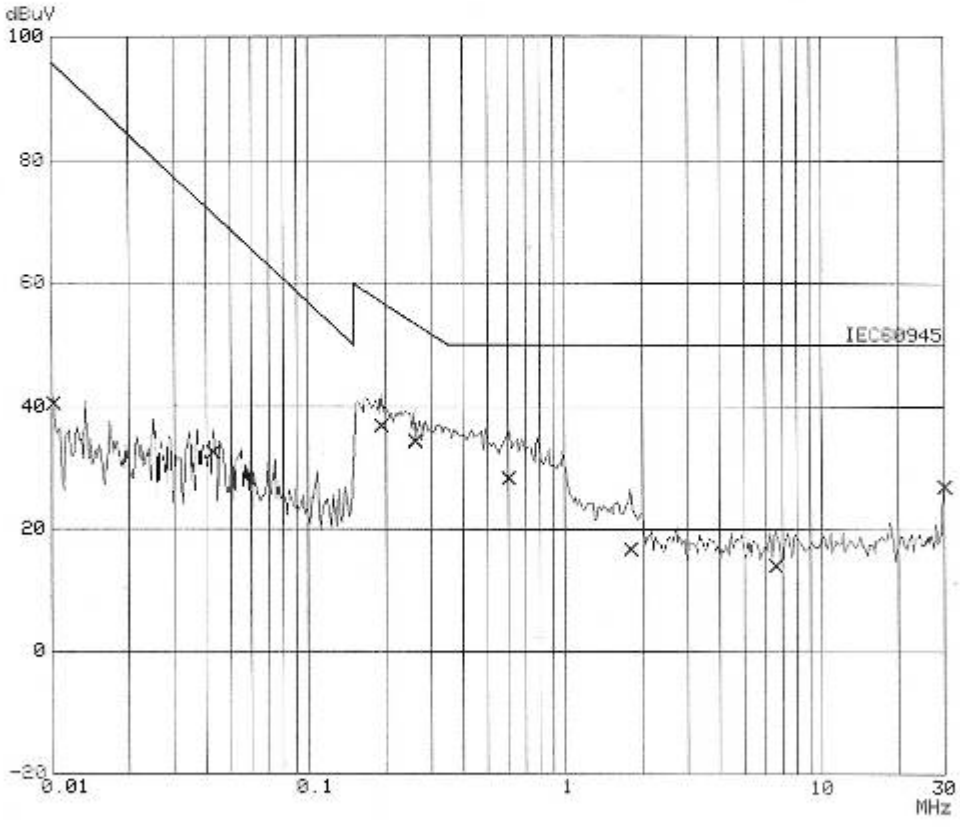


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Figure 39.3 – Spectral Diagram, Conducted Emission, Positive Wire

TEST REPORT
CONDUCTED EMISSION

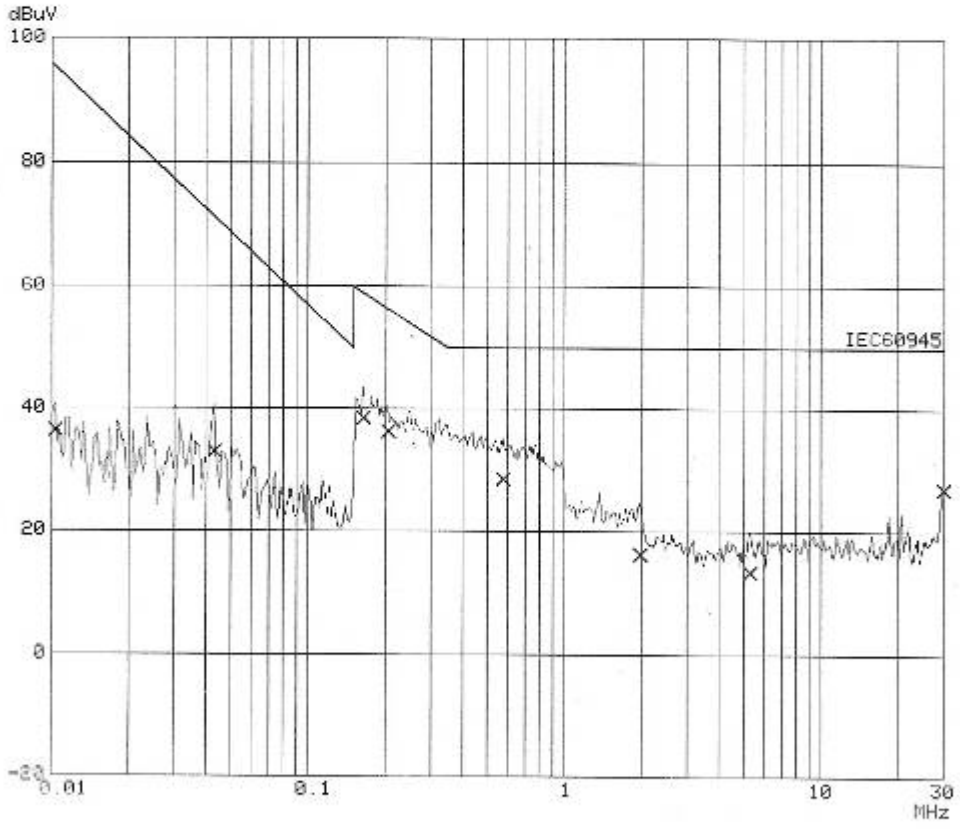
Date: 09. Jul 11 13:44

Scan Settings (1 Range)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten
10k	30M	1.6%	200Hz	PK	1ms	AUTO LN

Transducer No.	Start	Stop	Name
1	10k	30M	NNB111

Final Measurement: x QP
Meas Time: 1 s
Subranges: 8
Acc Margin: 60dB



PAGE 1

Figure 39.4 - Spectral Diagram, Conducted Emission, Negative Wire

Table 39.1 – Conducted Emission, Positive Wire

Frequency, MHz	Permissible emission value, dBμV, less than QP detector	Calibration factor, dB	Value from measuring receiver, dBμV	Max. QP-level dBμV	Margin to limit, dBμV
0.0101600	96.0	10.0	30.7	40.7	55.3
0.0423962	71.5	10.0	22.6	32.6	38.9
0.19153	57.2	10.0	26.9	36.9	20.3
0.25895	52.7	10.0	24.5	34.5	18.2
0.60059	50.0	10.0	18.4	28.4	21.6
1.79574	50.0	10.0	6.8	16.8	33.2
6.59974	50.0	10.0	4.2	14.2	35.8
30.00000	50.0	10.0	17.1	27.1	22.9

Table 39.2 – Conducted Emission, Negative Wire

Frequency, MHz	Permissible emission value, dBμV, less than QP detector	Calibration factor, dB	Value from measuring receiver, dBμV	Max. QP-level dBμV	Margin to limit, dBμV
0.0103226	95.6	10	26.5	36.5	59.1
0.0430746	71.5	10	23	33.0	38.5
0.16342	59.1	10	28.4	38.4	20.7
0.20408	56.5	10	26.3	36.3	20.2
0.57266	50.0	10	18.6	28.6	21.4
1.97517	50.0	10	6.3	16.3	33.7
5.28463	50.0	10	3.6	13.6	36.4
30.00000	50.0	10	17.2	27.2	22.8

ANNEX 40.
IMMUNITY TO RADIATED RADIOFREQUENCIES

Immunity To Radiated Radiofrequencies Test (item 49 of Test Program)
Test Procedure: Immunity To Radiated Radiofrequencies Test
Equipment Under Test: Sample 2: VHF Radio V100
Sample 4: Charger
Serial No.: TA002 (Sample 2), N/A (Sample 4)
Firmware Version: 0100
Software Version: 0100
Test Date: 11.07.2011
The Name and Test - Site Location: Laboratory No. 3
The Name and Qualification of Person Responsible for the test: Osaulko V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Immunity to radiated radiofrequencies	4.4.2	5.7.3 of IEC 61097-12 10.4.2 of IEC 60945

TEST DESCRIPTION

The EUT was installed in the radio adsorbing shielded room of a size 5.5 m x 10 m and commensurate with the size of the EUT. The EUT set in the area of uniform field and insulated from the floor by a wood rotating table that high is 0,8 m. The uniform area is calibrated with the test room empty. The test was carried out as described in IEC 61000-4-3, at severity level 3 that equal 10 V/m at the 3 meter distance.
EUT use in vertical orientations and the test was carried out with the generating antenna facing each of the four sides of the EUT. Additionally the test was carried out with the generating antenna facing of the up side and down side of the EUT.
Generating antenna placed at vertical and horizontal polarizations during the test.
The EUT is initially placed with one face coincident with the calibration plane.

The frequency range was swept at a rate in the order of $1{,}5\times10^{-3}$ decades/s for the frequency range 80 MHz to 1 GHz and $0{,}5\times10^{-3}$ decades/s for the frequency range 1 GHz to 2 GHz, and was slow enough to allow the detection of any malfunction of the EUT.

The EUT was placed in a modulated electric field of strength 10 V/m swept over the frequency range 80 MHz to 2 GHz. The modulation shall be at 400 Hz ± 10 % to a depth of 80 % ± 10 %

EUT was tested in two configurations:

1) Receive mode.
2) Transmit mode

The requirements of the EMC performance check of IEC 61097-12 met during and after the test in accordance with the performance criterion A. During the immunity to radiated radiofrequencies test for receiver SINAD ratio was observed. The requirement for SINAD ratio was: not less 20 dB. During the immunity to radiated radiofrequencies test for transmitter SINAD ratio, Frequency error and Output power were observed. The requirement was: SINAD ratio not less 20 dB, Frequency error within ±1.5 kHz, Output power not less than 0.25 W.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 61 %
- Atmospheric pressure: 753 mm/Hg
- Equipment set- up: Table top.
- Test duration is 16 hour.
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Test bench	AISK-01	468223.002	02.2012
2.	Test bench	AISK-03	468223.0027	02.2012
3.	Antenna	VULB9163	DS0512089163244	03.2012
4.	Power supply	EP3.3005.2.2	100204	04.2013

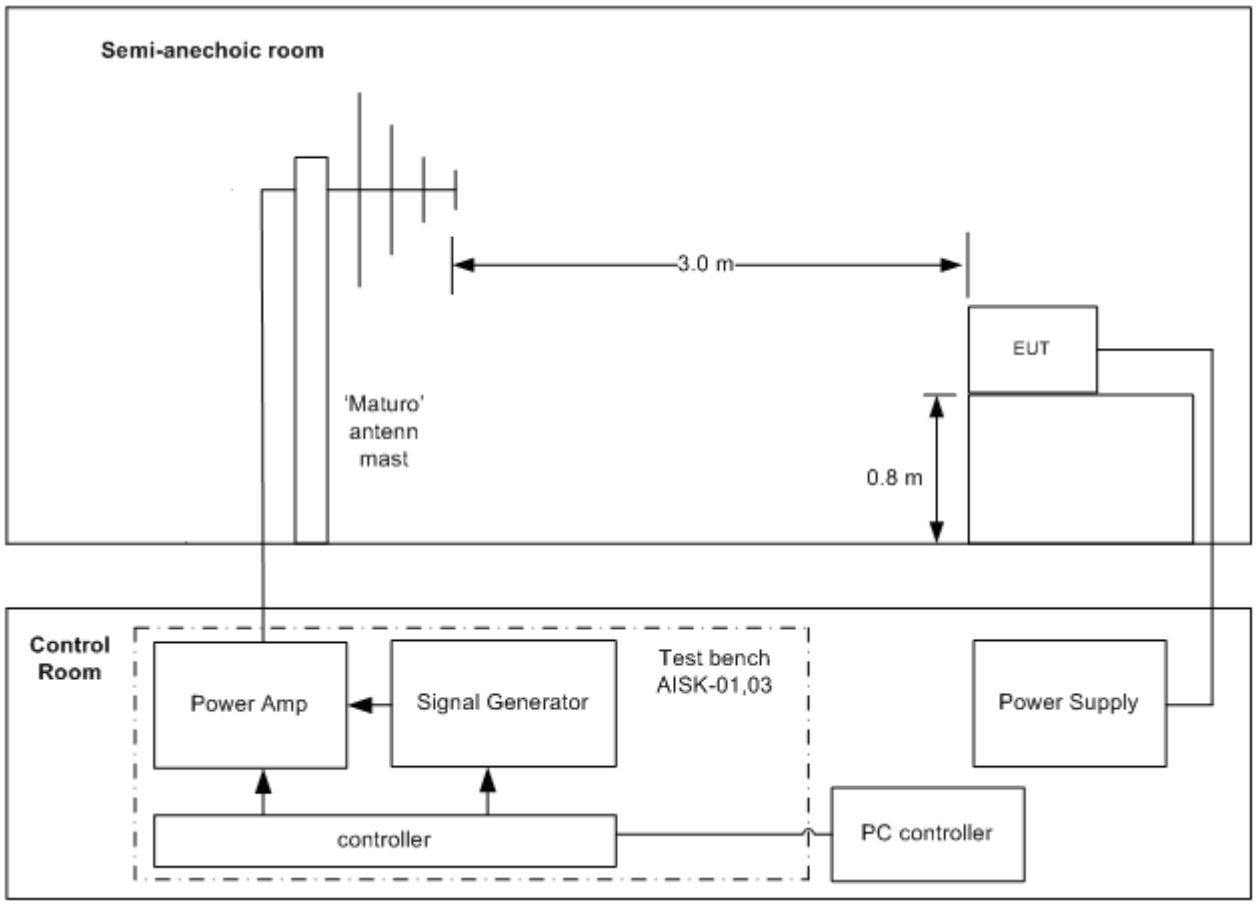


Figure 40.1 — Set up for Test of Immunity to radiated radiofrequencies

TEST RESULT

Figure 40.2 — General view of the test site. EUT’s front side reference to generating antenna

Figure 40.3 — General view of the test site. Back side reference to generating antenna

Figure 40.4 — General view of the test site. Left side reference to generating antenna

Figure 40.5 — General view of the test site. Right side reference to generating antenna

Figure 40.6 — General view of the test site. Down side reference to generating antenna

Figure 40.7 — General view of the test site. Upper side reference to generating antenna

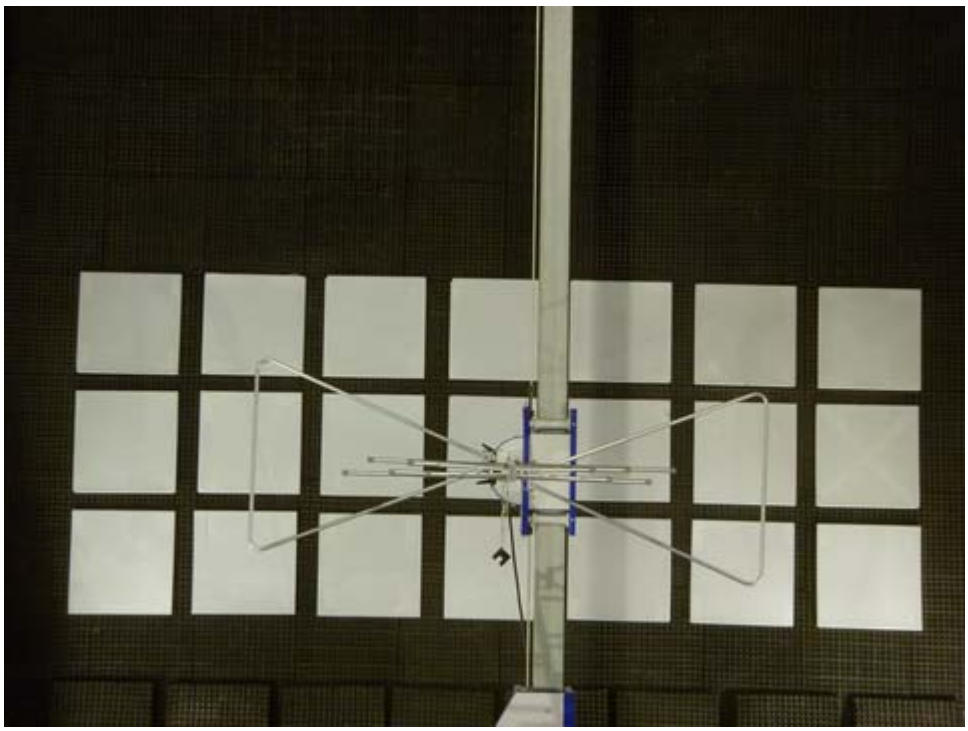


Figure 40.8 — Antenna in horizontal position

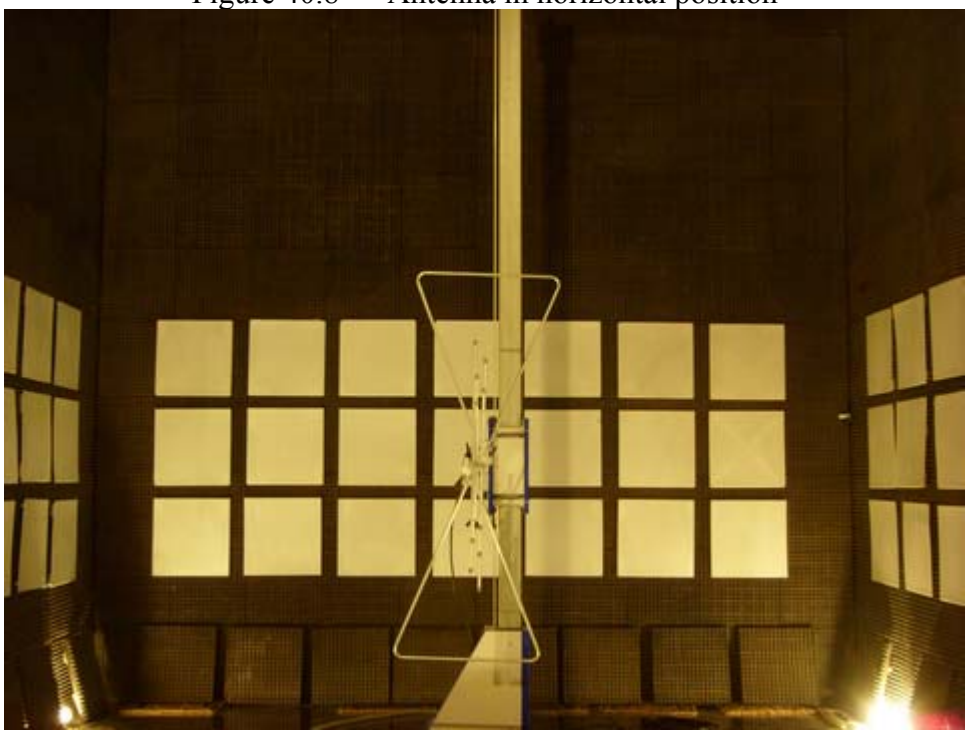


Figure 40.9 — Antenna in vertical position

Table 40.1– Immunity to radiated radio frequency disturbance. Test Results of VHF Radio in Receiver mode, and Transmitter mode

		Frequency range			
		80 MHz -1.0 GHz		1.0 GHz -2.0 GHz	
EUT mode	EUT position	Antenna polarization			
		Horizontal	Vertical	Horizontal	Vertical
Receiver mode	Forward side	√ 1)	√	√	√
	Back side	√	√	√	√
	Right side	√	√	√	√
	Left side	√	√	√	√
	Up side	√	√	√	√
	Down side	√	√	√	√
Transmitter mode	Forward side	√	√	√	√
	Back side	√	√	√	√
	Right side	√	√	√	√
	Left side	√	√	√	√
	Up side	√	√	√	√
	Down side	√	√	√	√

1) Indicate that testing demonstrated conformance VHF Radio to requirements (criteria A) by placing the √ symbol in Table

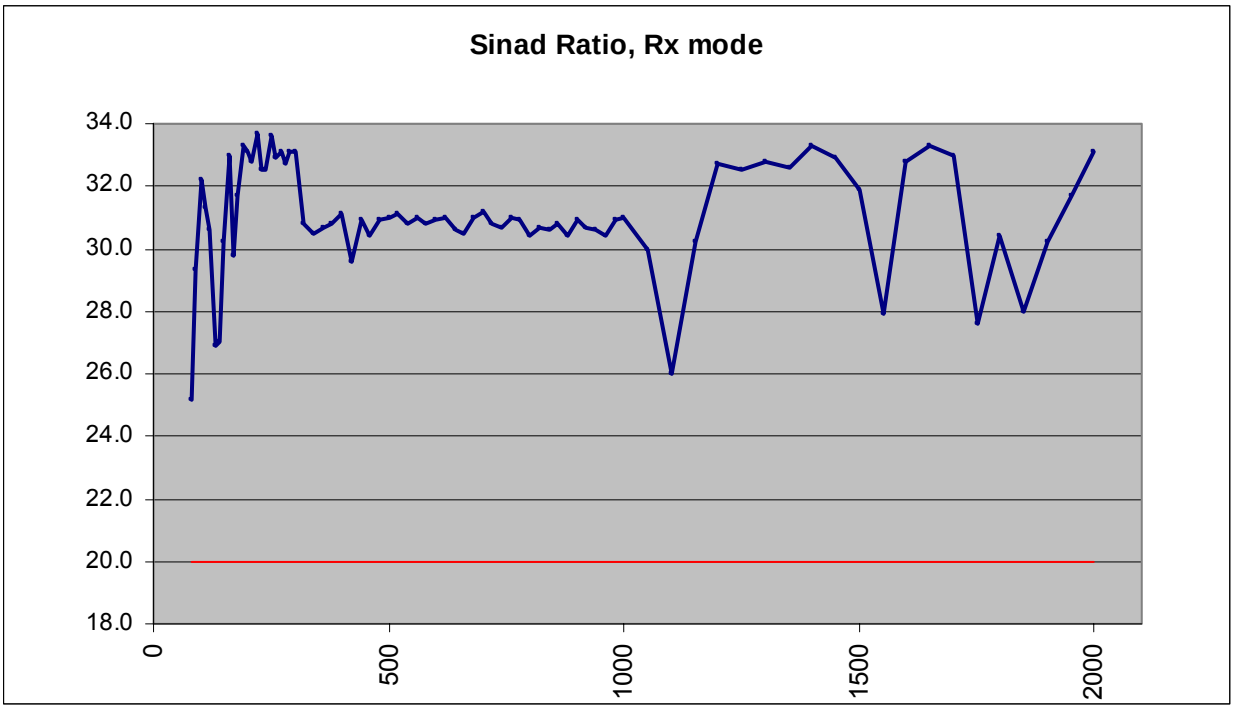


Figure 40.10 — SINAD ratio of the Receiver. Vertical polarization. Front side reference to generating antenna

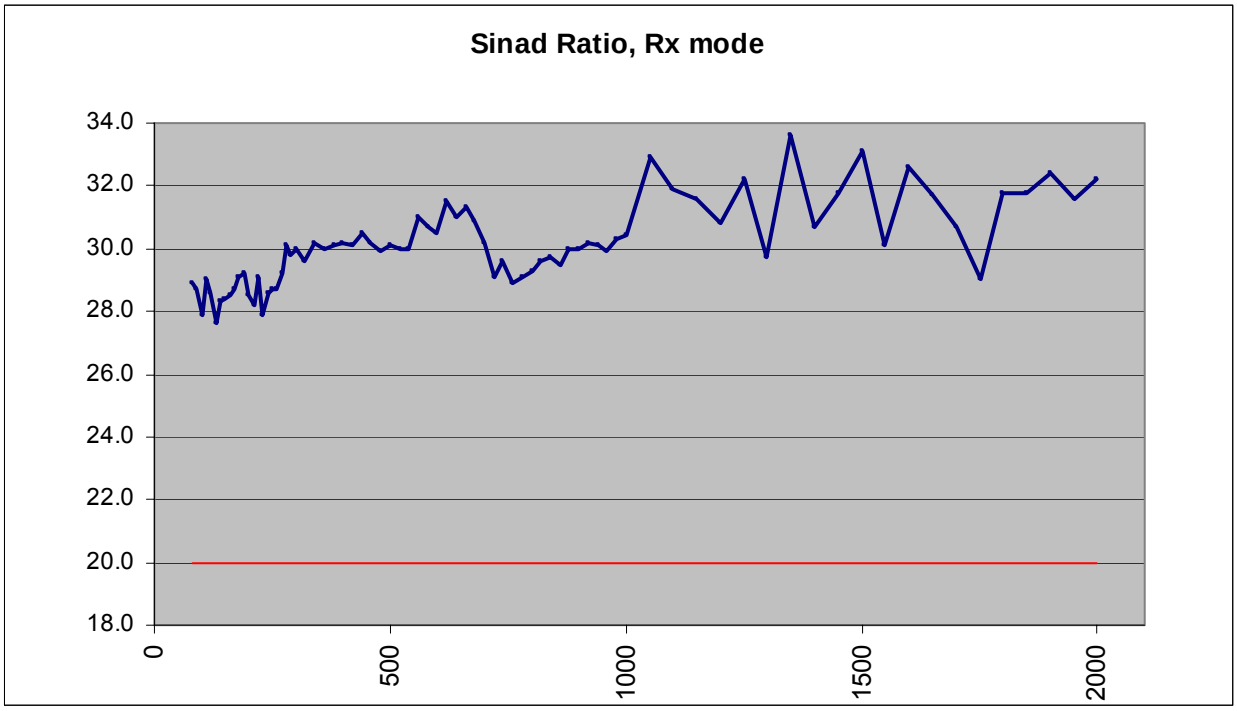


Figure 40.11 — SINAD ratio of the Receiver. Vertical polarization. Back side reference to generating antenna

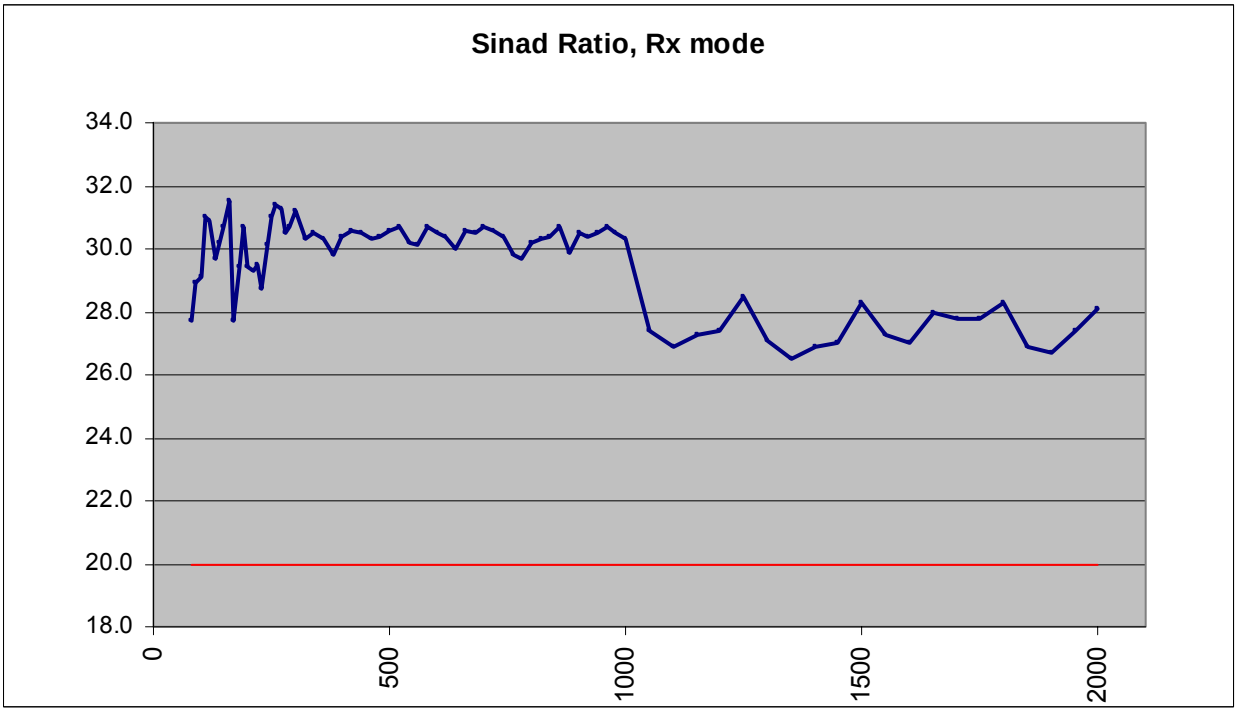


Figure 40.12 — SINAD ratio of the Receiver. Vertical polarization. Left side reference to generating antenna

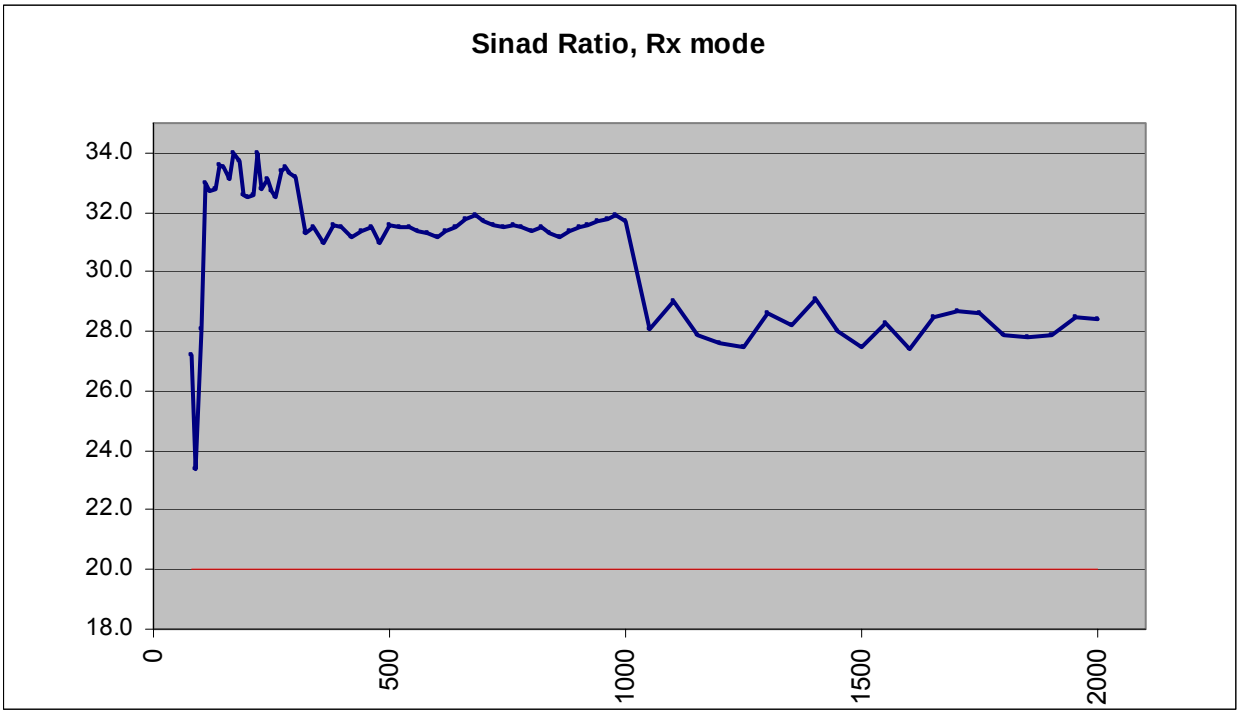


Figure 40.13 — SINAD ratio of the Receiver. Vertical polarization. Right side reference to generating antenna

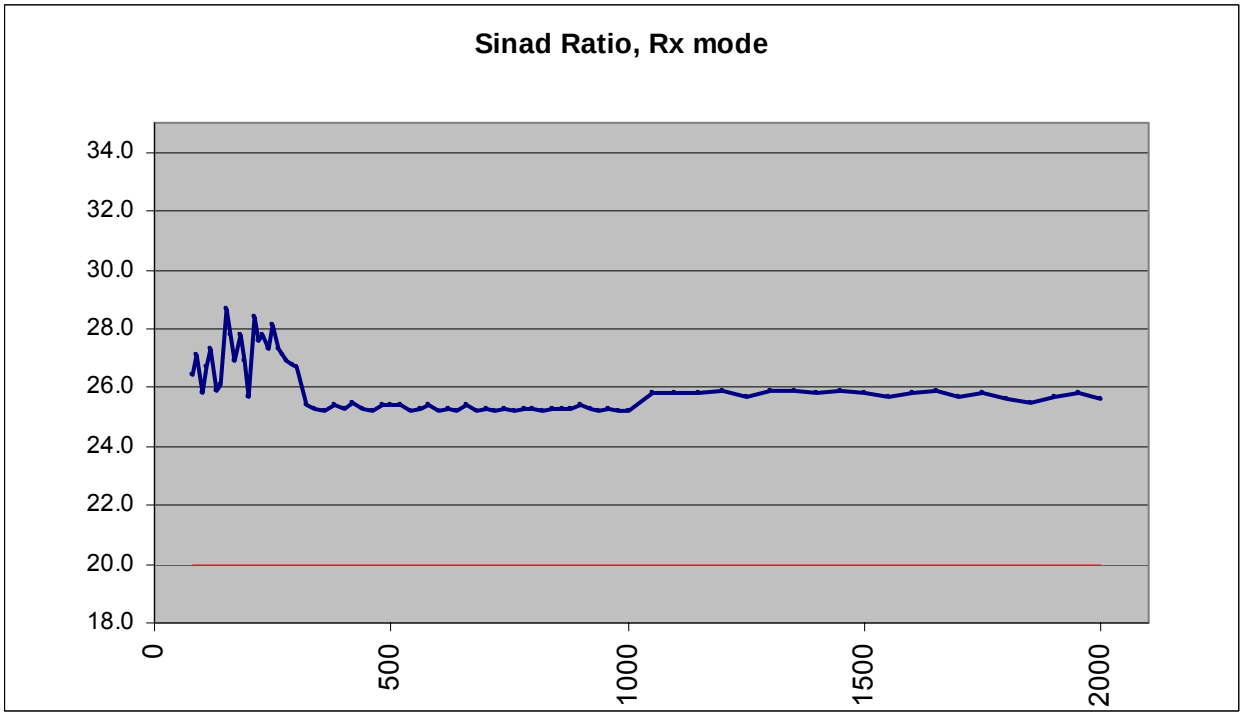


Figure 40.14 — SINAD ratio of the Receiver. Vertical polarization. Down side reference to generating antenna

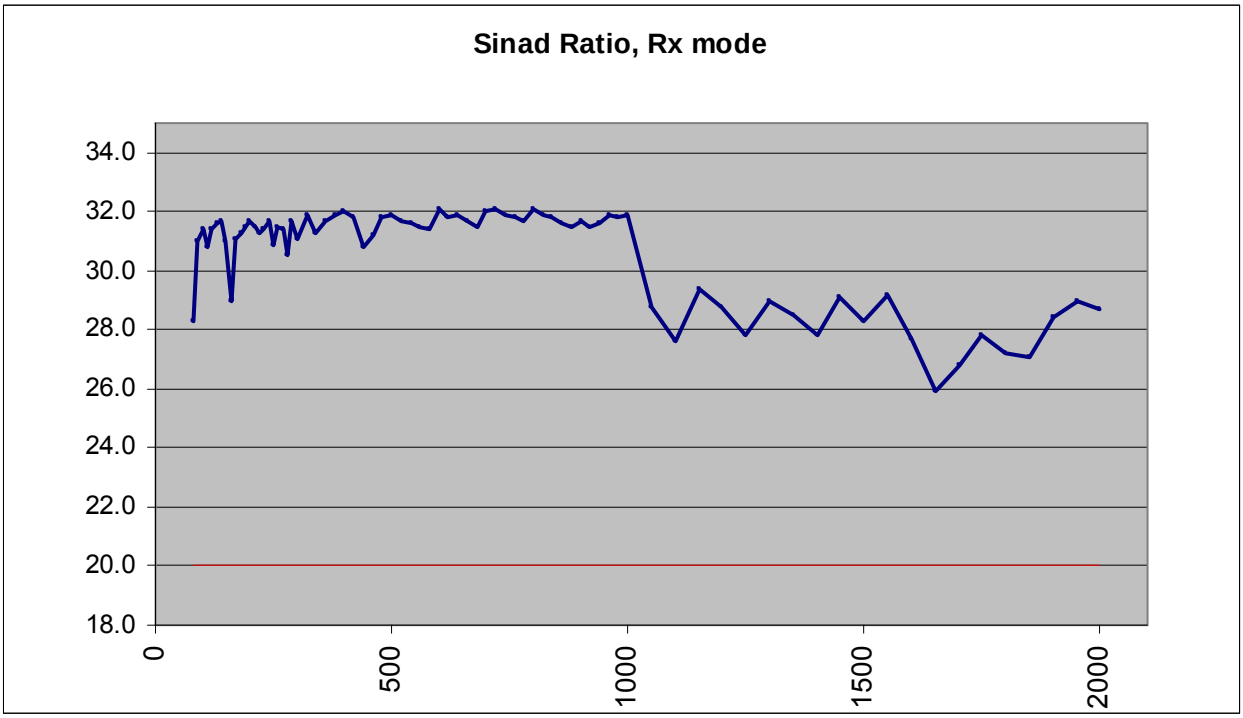


Figure 40.15 — SINAD ratio of the Receiver. Vertical polarization. Upper side reference to generating antenna

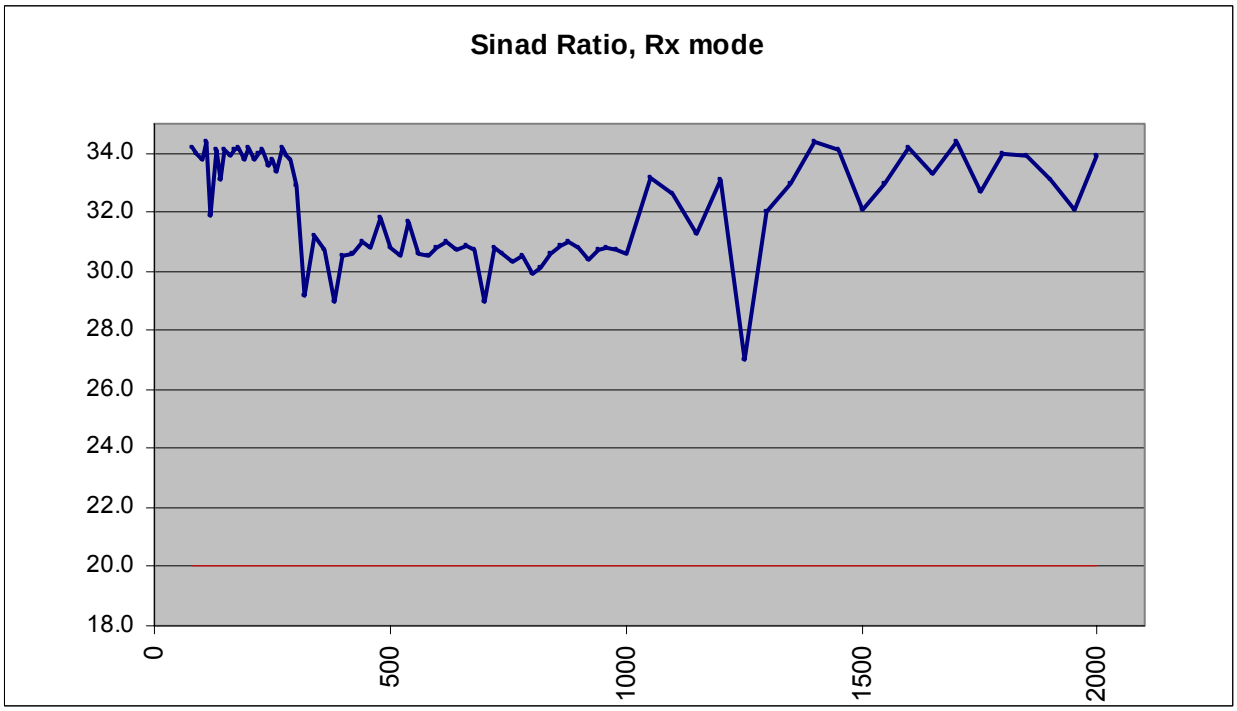


Figure 40.16 — SINAD ratio of the Receiver. Horizontal polarization. Front side reference to generating antenna

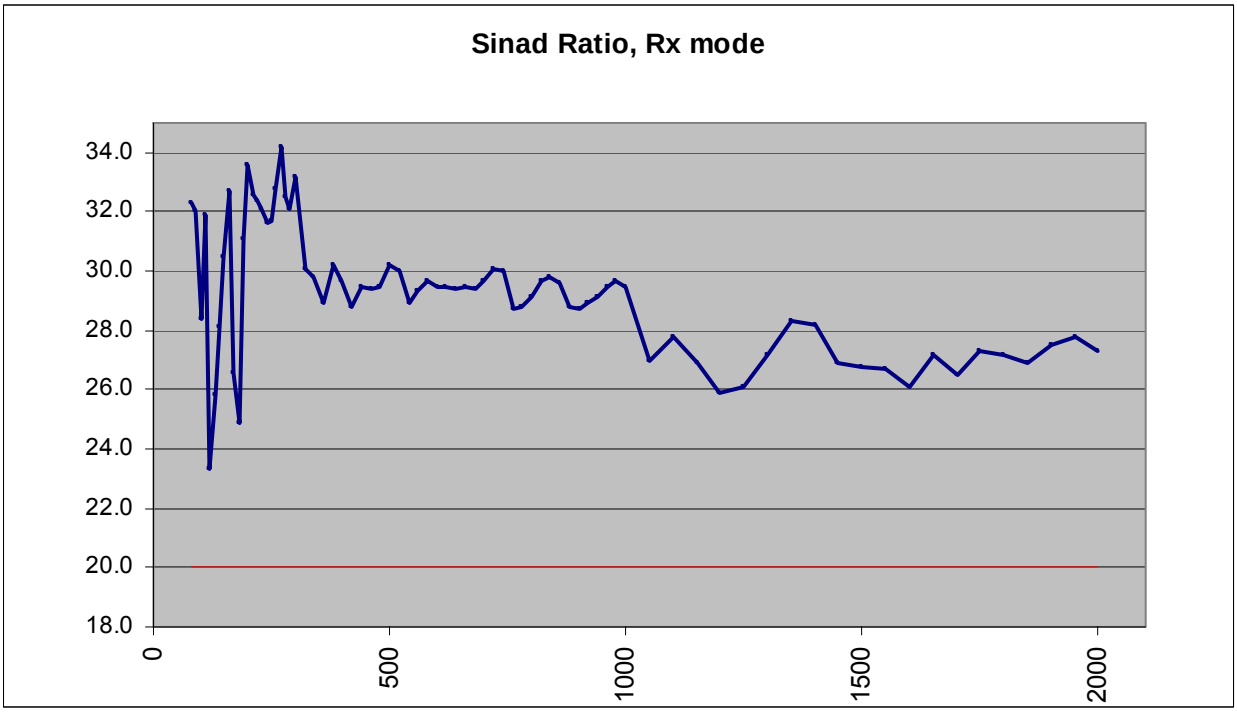


Figure 40.17 — SINAD ratio of the Receiver. Horizontal polarization. Back side reference to generating antenna

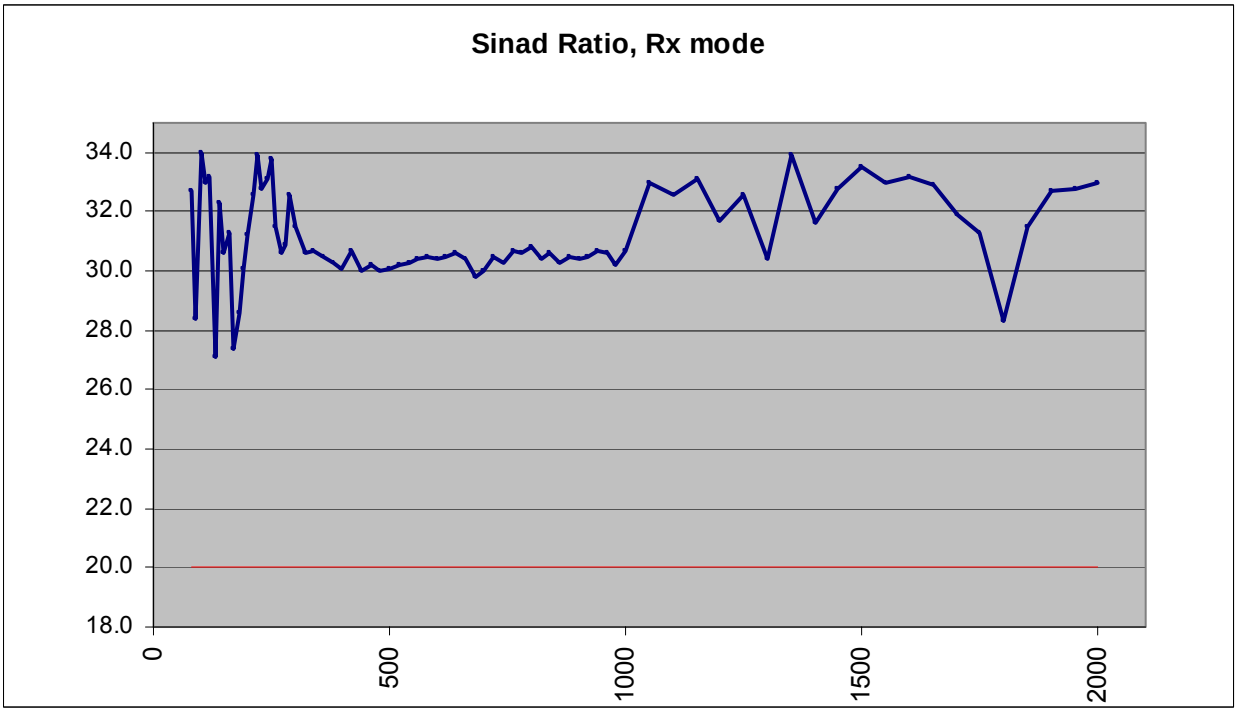


Figure 40.18 — SINAD ratio of the Receiver. Horizontal polarization. Left side reference to generating antenna

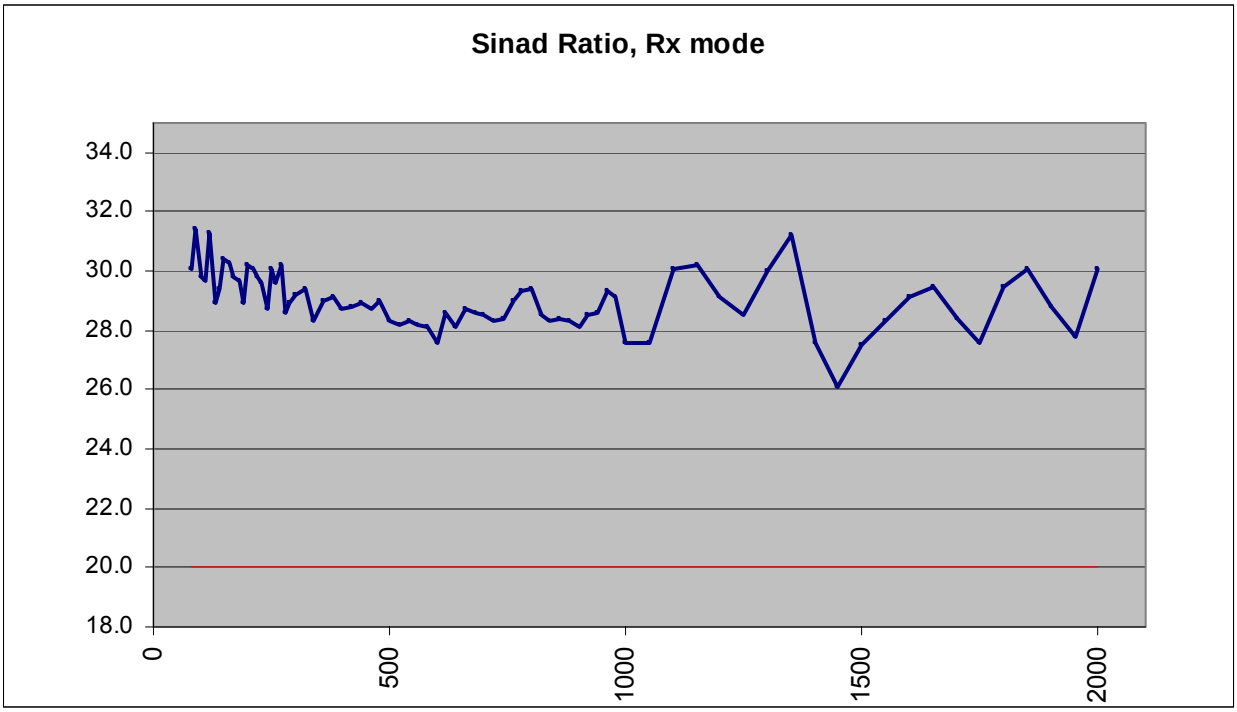


Figure 40.19 — SINAD ratio of the Receiver. Horizontal polarization. Right side reference to generating antenna

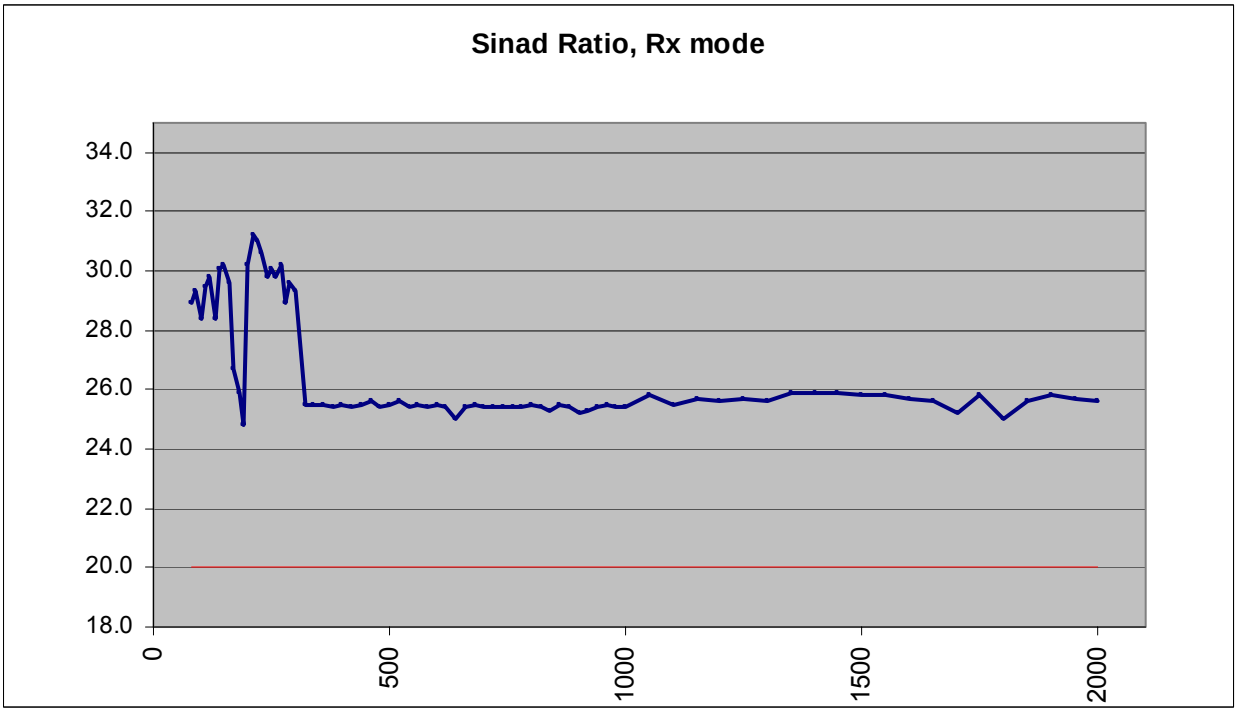


Figure 40.20 — SINAD ratio of the Receiver. Horizontal polarization. Down side reference to generating antenna

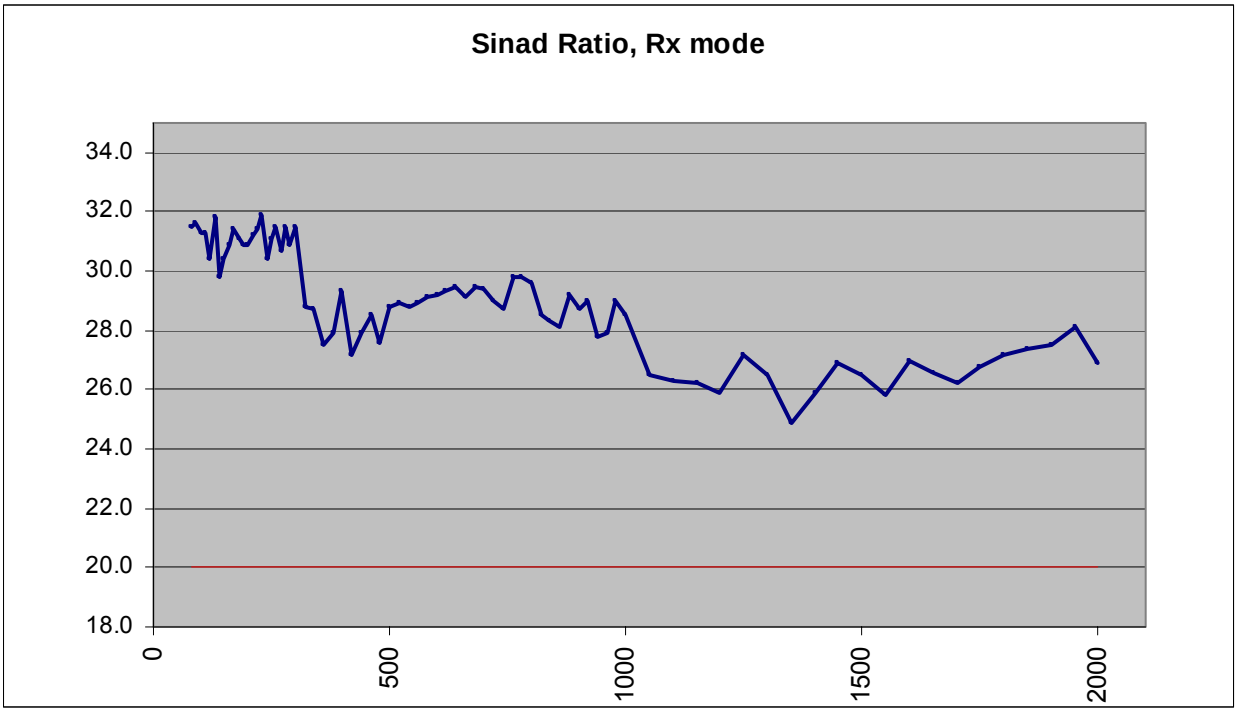


Figure 40.21 — SINAD ratio of the Receiver. Horizontal polarization. Upper side reference to generating antenna

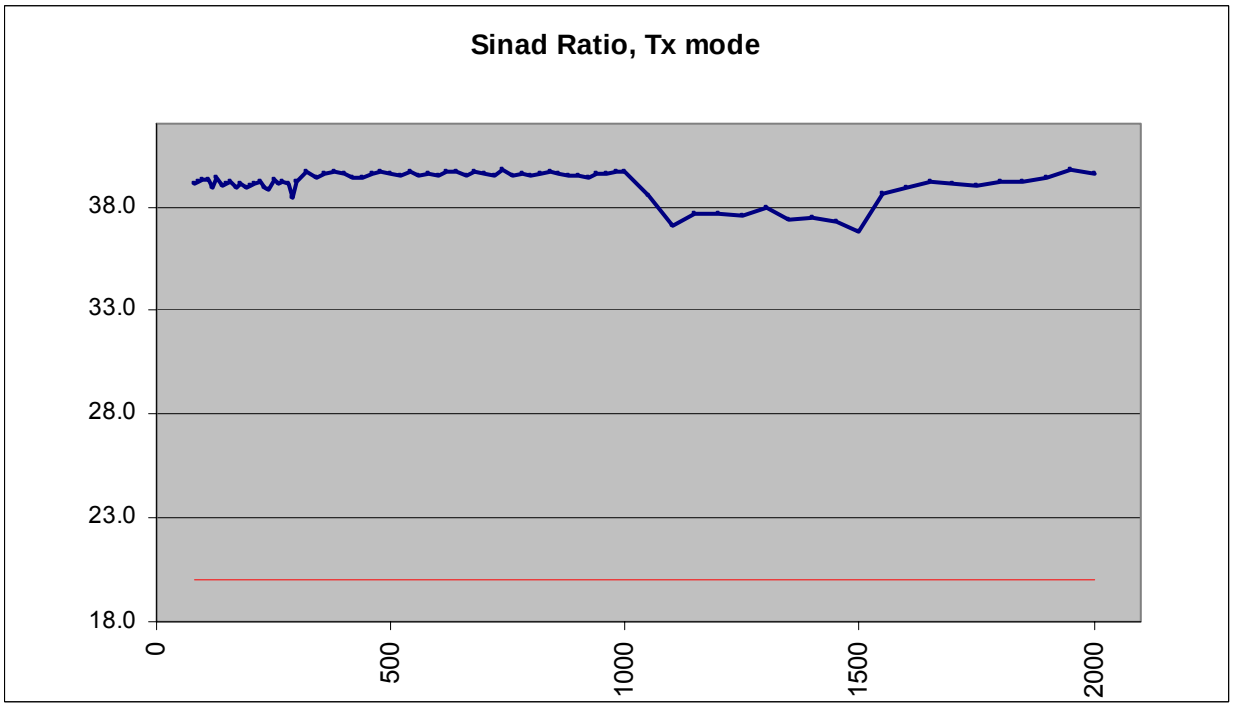


Figure 40.22 — SINAD ratio of the Transmitter. Vertical polarization. Front side reference to generating antenna

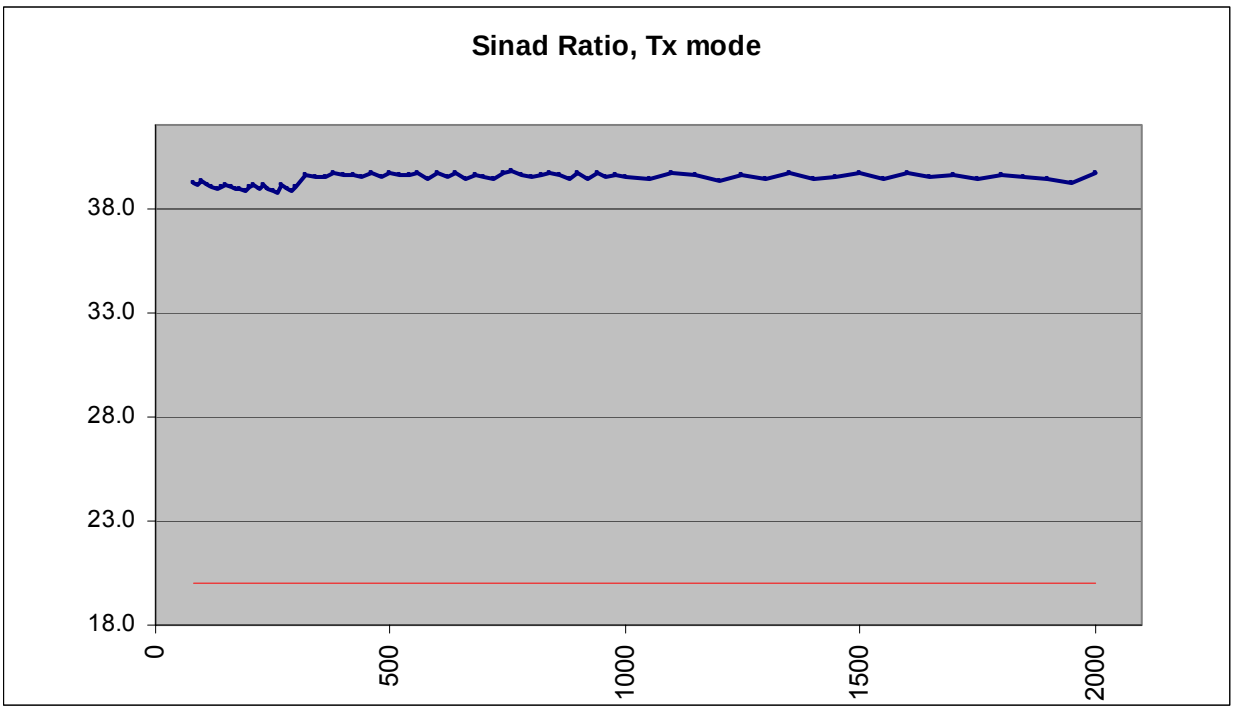


Figure 40.23 — SINAD ratio of the Transmitter. Vertical polarization. Back side reference to generating antenna

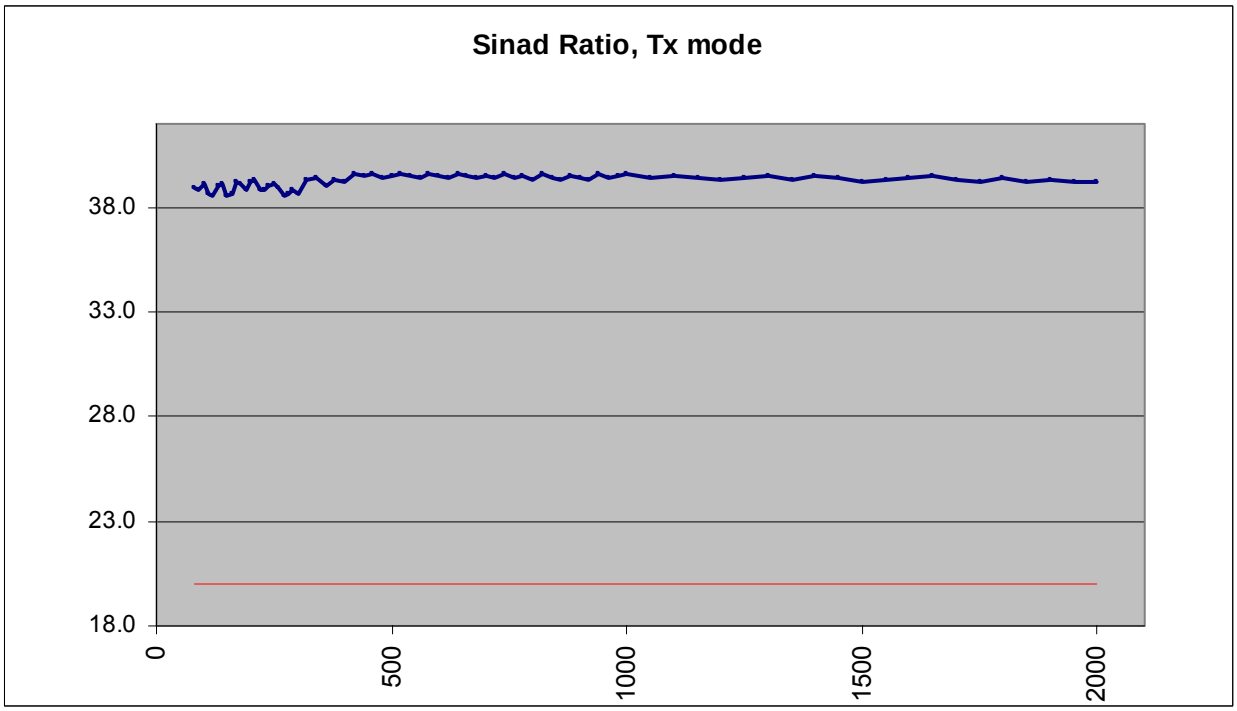


Figure 40.24 — SINAD ratio of the Transmitter. Vertical polarization. Left side reference to generating antenna

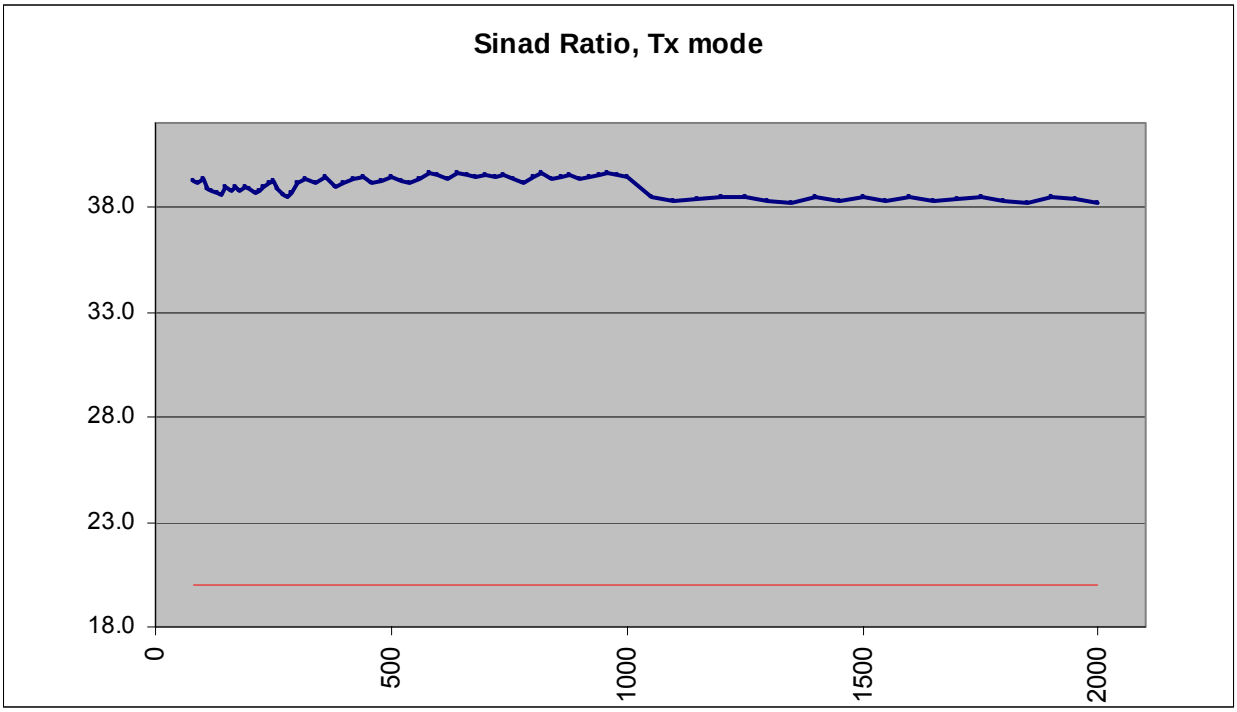


Figure 40.25 — SINAD ratio of the Transmitter. Vertical polarization. Right side reference to generating antenna

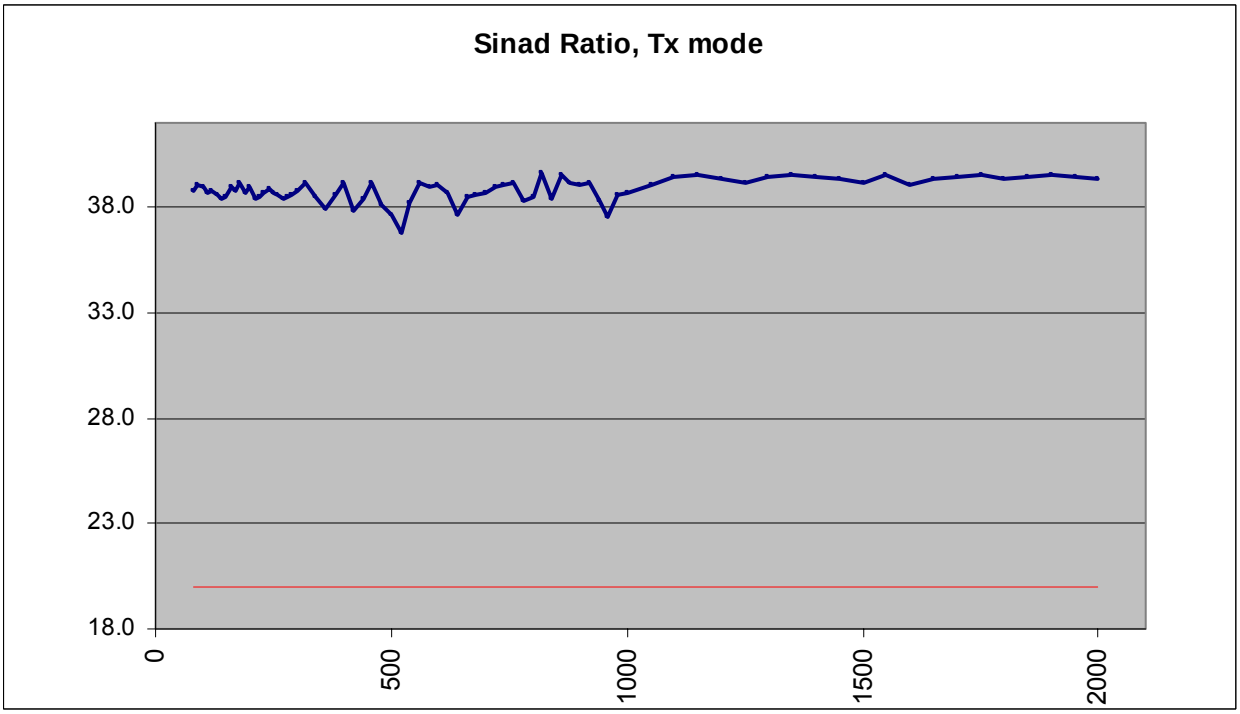


Figure 40.26 — SINAD ratio of the Transmitter. Vertical polarization. Down side reference to generating antenna

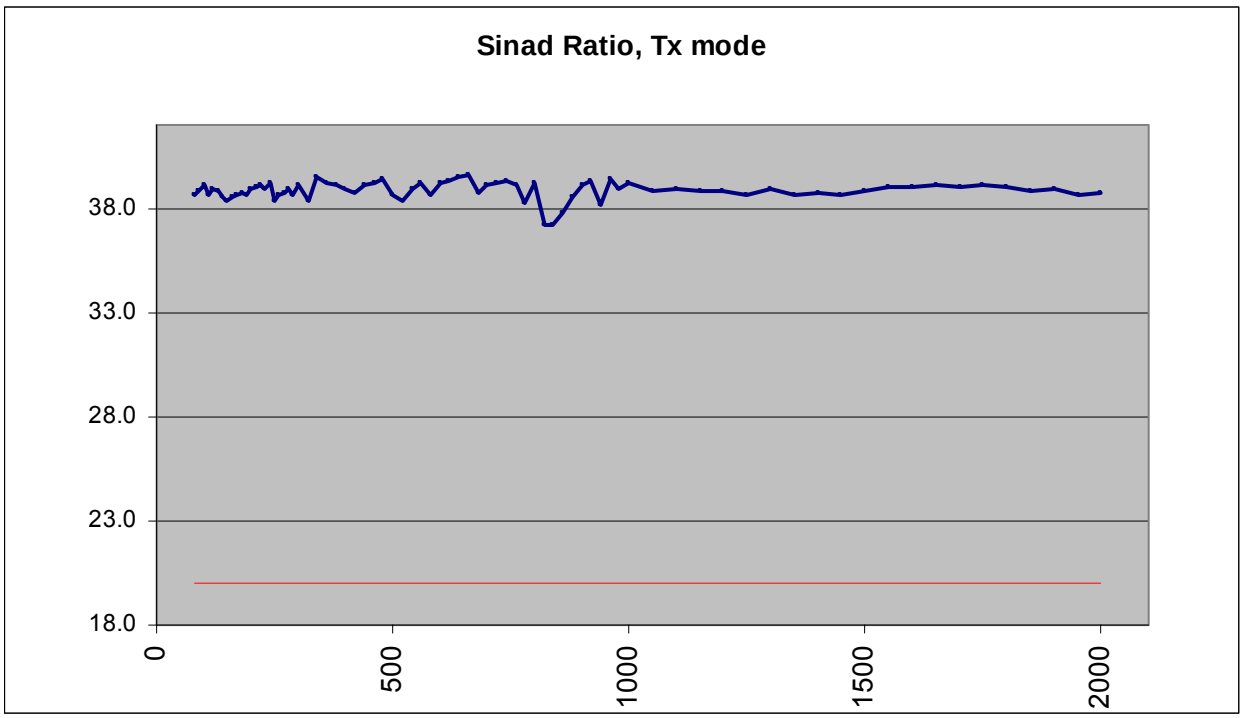


Figure 40.27 — SINAD ratio of the Transmitter. Vertical polarization. Upper side reference to generating antenna

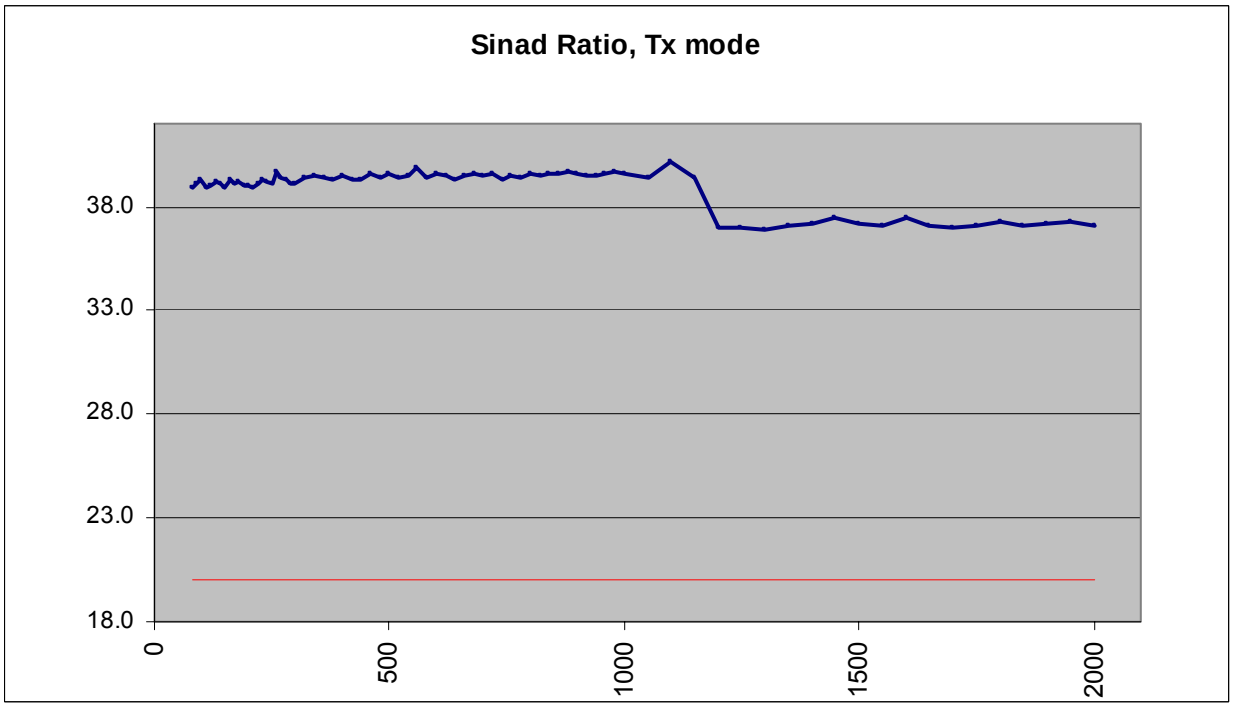


Figure 40.28 — SINAD ratio of the Transmitter. Horizontal polarization. Front side reference to generating antenna

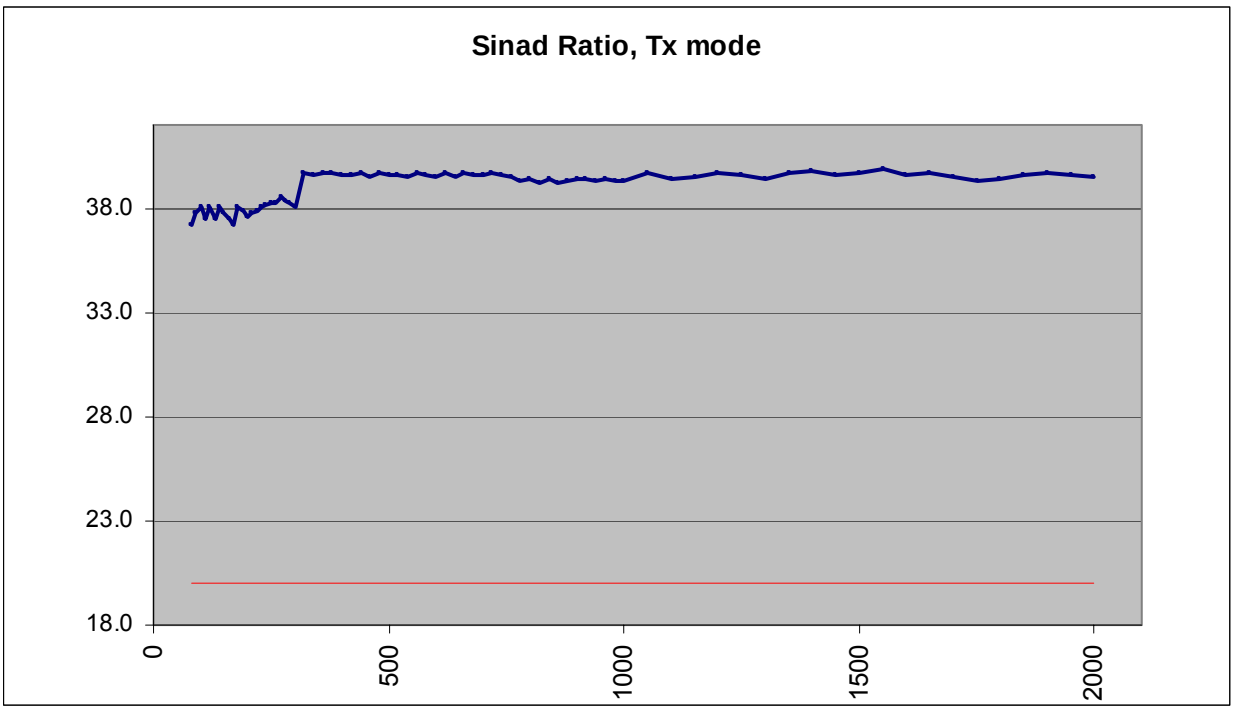


Figure 40.29 — SINAD ratio of the Transmitter. Horizontal polarization. Back side reference to generating antenna

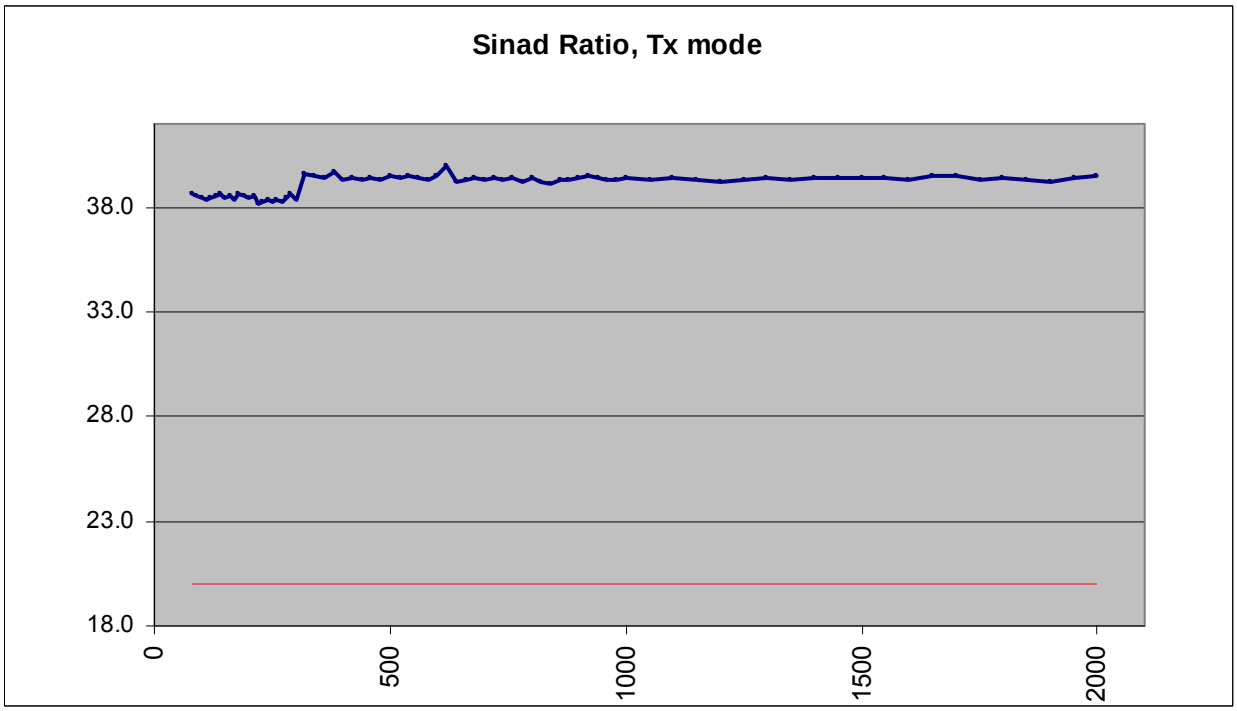


Figure 40.30 — SINAD ratio of the Transmitter. Horizontal polarization. Left side reference to generating antenna

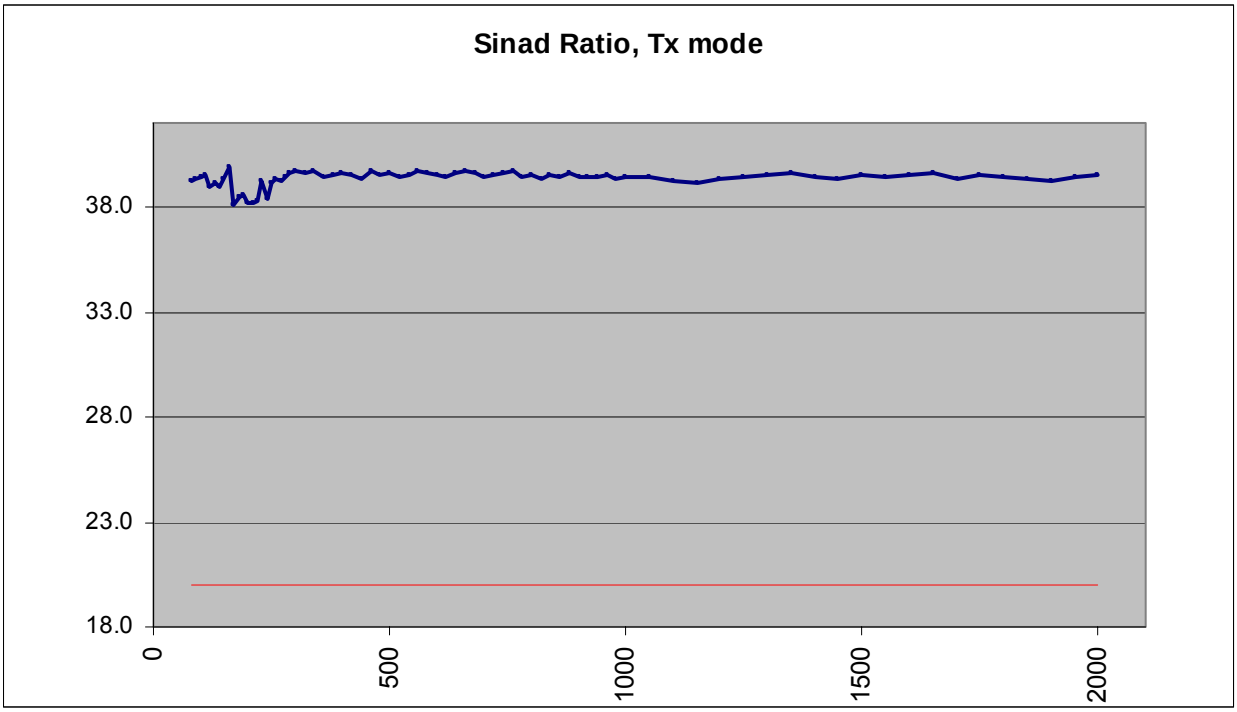


Figure 40.31 — SINAD ratio of the Transmitter. Horizontal polarization. Right side reference to generating antenna

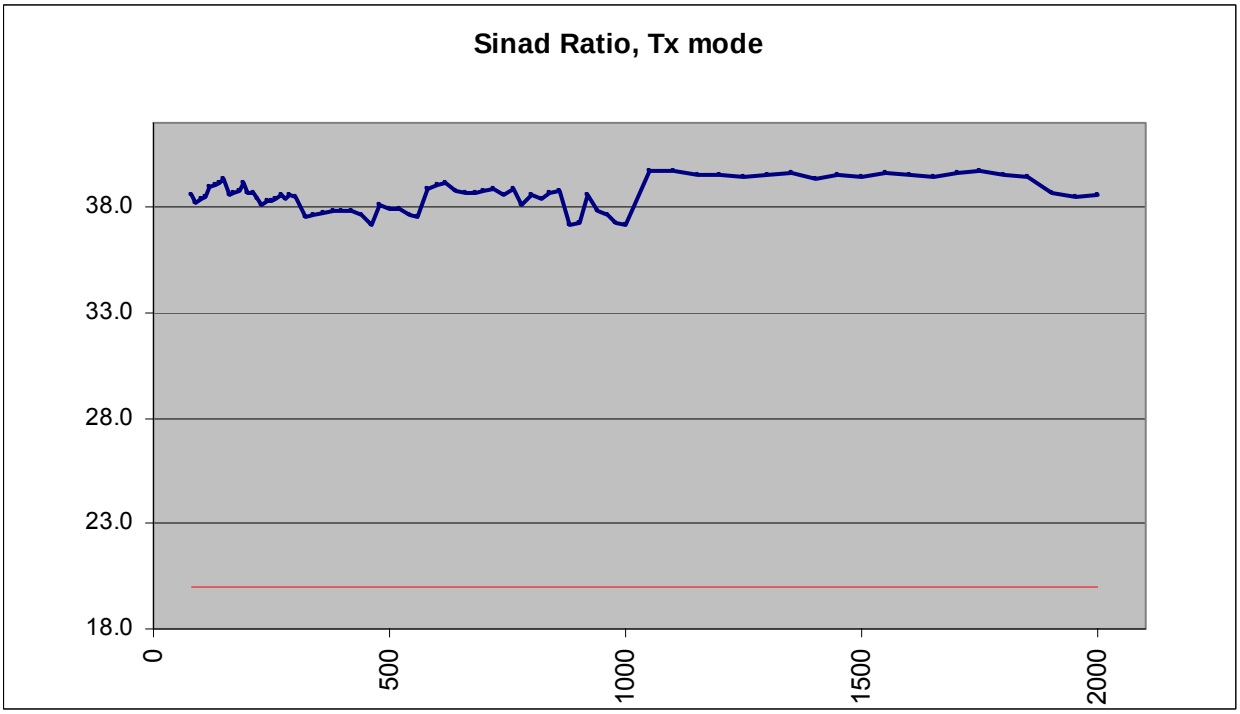


Figure 40.32 — SINAD ratio of the Transmitter. Horizontal polarization. Down side reference to generating antenna

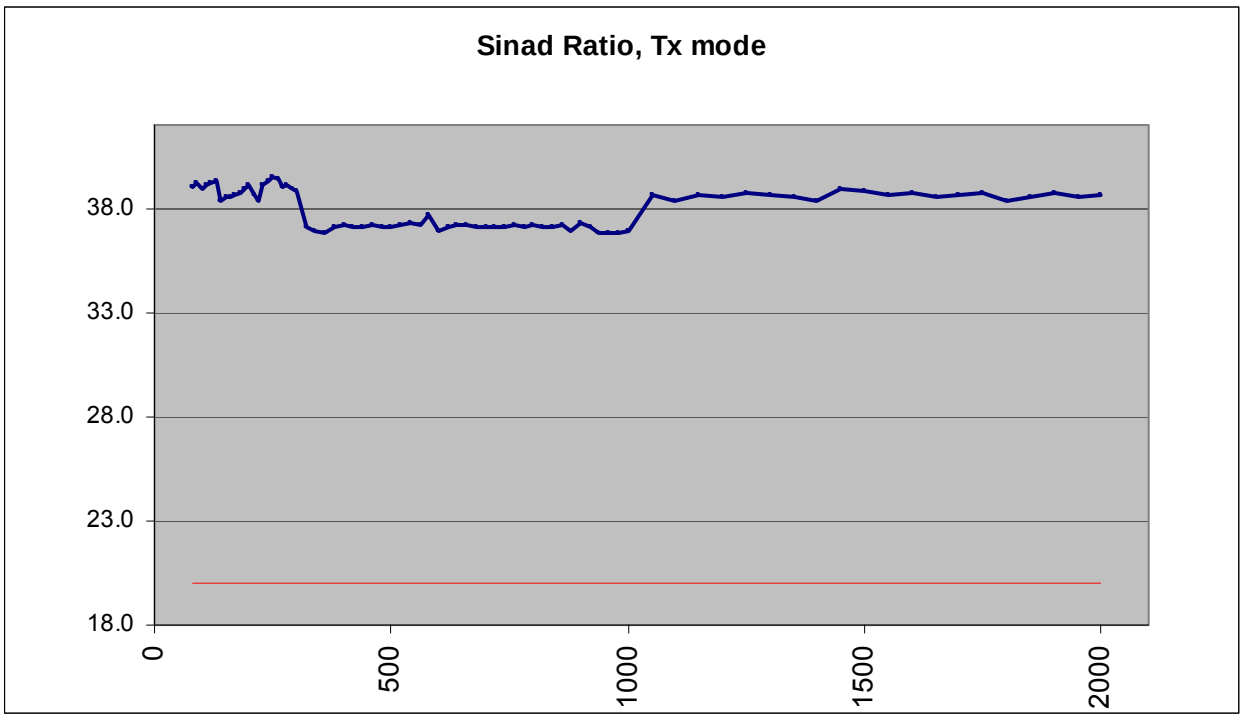


Figure 40.33 — SINAD ratio of the Transmitter. Horizontal polarization. Upper side reference to generating antenna

Polarization	Position	Frequency error	Output power	Conclusion
Vertical polarization	Forward side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
	Back side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
	Right side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
	Left side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
	Up side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
	Down side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
Horizontal polarization	Forward side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
	Back side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
	Right side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
	Left side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
	Up side	Not exceed 6 Hz	Not less 32.8 dBm	Pass
	Down side	Not exceed 6 Hz	Not less 32.8 dBm	Pass

Performance check after the test

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.06	Pass
Output power	>0.25	W	2.51	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.49	Pass

Figure 40.34 — General view of the test site. Charger testing.

Table 40.2 – Immunity to radiated radio frequency disturbance. Test Results of Charger in charging mode.

		Frequency range			
		80 MHz -1.0 GHz		1.0 GHz -2.0 GHz	
EUT mode	EUT position	Antenna polarization			
		Horizontal	Vertical	Horizontal	Vertical
Charging mode	Forward side	√	√	√	√
	Back side	√	√	√	√
	Right side	√	√	√	√
	Left side	√	√	√	√
	Up side	√	√	√	√
	Down side	√	√	√	√

The LED status and supply current to the charger were observed during the test. When power was applied LED status was green then change to red after a few seconds once it was detected the battery and re-started the charging cycle. LED status of charger with charged battery was red. Current consumption was changed less than 10% during the test.

Test result	**Conclusion**
LED status	Pass
Current consumption	Pass

ANNEX 41.
IMMUNITY TO ELECTROSTATIC DISCHARGE

Electrostatic Discharge Test (item 50 of Test Program)
Test Procedure: Electrostatic Discharge Test
Equipment Under Test: Sample 2: VHF Radio V100
Sample 4: Charger
Serial No.: TA002 (Sample 2), N/A (Sample 4)
Firmware Version: 0100
Software Version: 0100
Test Date: 11.07.2011
The Name and Test - Site Location: Laboratory No. 3
The Name and Qualification of Person Responsible for the test: Osaulko V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Electrostatic Discharge	4.4.2	5.7.3 of IEC 61097-12 10.9.2 of IEC 60945

TEST DESCRIPTION

The test was carried out as described in IEC 61000-4-2 using an electrostatic discharge (ESD) generator, that was an energy storage capacitance of 150 pF and a discharge resistance of 330 Ω connected to a discharge tip.

The EUT was placed on, but insulated from, a metal ground plane which projected beyond the EUT on all sides

Discharges from the generator were applied to those points and surfaces that are accessible to personnel during normal usage. The ESD generator was held perpendicular to the surface. Each position was tested with 10 discharges positive and negative with intervals of 1 s between discharges.

In order to simulate discharges on objects placed or installed near to the EUT, 10 single contact discharges, positive and negative, were applied to the ground plane at positions on each side of, and 0,l in from, the EUT. A further 10 discharges were applied to the centre of one edge of a vertical coupling plane (VCP), with this plane in enough different positions so that the four faces of the EUT were completely illuminated.
The test levels were 6 kV contact discharge and 8 kV air discharge.

TEST CONDITIONS

- Ambient temperature: 24 °C
- Relative humidity: 62 %
- Atmospheric pressure: 754 mm/Hg
- Equipment set- up: Table top.
- Test duration is 1 hour.
- Measurement duration is 30 minutes.
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Temperature meter	Center-309	100074/1	08.2011
2.	Electrostatic discharge simulator	ESR 8000K		03.2012
3.	Service monitor	Stabilock 4032	1788060	06.2012
4.	Power supply	EP3.3005.2.2	100204	04.2013

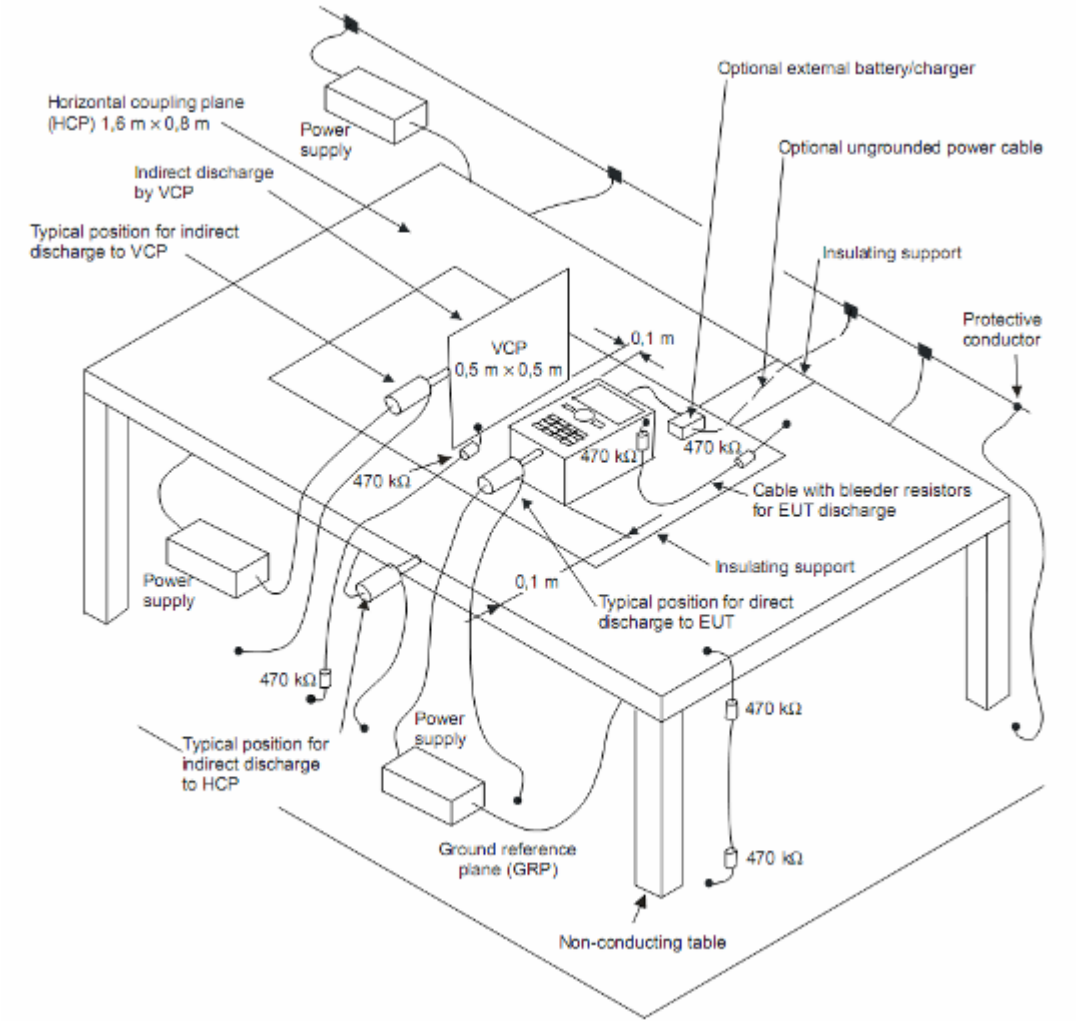


Figure 41.1 — Set up for Test of Immunity to Electrostatic Discharge

TEST RESULT

Table 41.1 –Immunity to electrostatic discharge. Test Results of the VHF Radio in Rx, Tx and off modes.

	Contact discharge To conducted surfaces and to coupling planes				Air discharge At insulating surfaces	
	Direct contact discharge		Indirect contact discharge			
Test voltage	Reaction of EUT	Result	Reaction of EUT	Result	Reaction of EUT	Result
+ 2 kV – 2 kV	absent	√	absent	√	n/a	n/a
+ 4 kV – 4 kV	absent	√	absent	√	n/a	n/a
+ 6 kV – 6 kV	absent	√	absent	√	n/a	n/a
+ 8 kV – 8 kV	n/a	n/a	n/a	n/a	absent	√
Comment: 10 Single impulses at each test point and for each test voltage						

[1] Indicate that testing demonstrated conformance to requirements by placing the √ symbol in Table 41.1

n/a – not applicable

Applicable photos and tables of measured VHF radio parameters by tester are presented below

Figure 42.2 – The general view of test site for test of immunity to electrostatic discharge

Performance check before the test

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.08	Pass
Output power	>0.25	W	2.53	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.54	Pass






Figure 41.3 – Application points for VHF Radio

Performance check at the end of test in off mode

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.007	Pass
Output power	>0.25	W	2.54	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBµV	-6.55	Pass

Performance check at the end of test in Rx mode

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.008	Pass
Output power	>0.25	W	2.53	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBµV	-6.54	Pass

Performance check at the end of test in Tx mode

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.007	Pass
Output power	>0.25	W	2.53	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.52	Pass

Table 41.2 –Immunity to electrostatic discharge. Test Results of the Charger on charging mode and stand-by mode.

	Contact discharge To conducted surfaces and to coupling planes				Air discharge At insulating surfaces	
	Direct contact discharge		Indirect contact discharge			
Test voltage	Reaction of EUT	Result	Reaction of EUT	Result	Reaction of EUT	Result
+ 2 kV – 2 kV	absent	√	absent	√	n/a	n/a
+ 4 kV – 4 kV	absent	√	absent	√	n/a	n/a
+ 6 kV – 6 kV	absent	√	absent	√	n/a	n/a
+ 8 kV – 8 kV	n/a	n/a	n/a	n/a	absent	√
Comment: 10 Single impulses at each test point and for each test voltage						

[1] Indicate that testing demonstrated conformance to requirements by placing the √ symbol in Table 41.2, n/a – not applicable

Figure 41.4 – The general view of test site for test of immunity to electrostatic discharge (charger with battery)

Figure 41.5 – The general view of test site for test of immunity to electrostatic discharge (charger without battery)

Figure 41.6 – Application points for Charger

Figure 41.7 – Application points for Charger

The LED status and supply current to the charger were observation during the test. When power was applied LED status was green then change to red after a few seconds once it was detected the battery and re-started the charging cycle. LED status of charger without battery was green. Current consumption was changed less than 10% during the test.

Test result	Conclusion
LED status	Pass
Current consumption	Pass

ANNEX 42.
IMMUNITY TO CONDUCTED RADIOFREQUENCIES

Immunity To Conducted Radiofrequencies Test (item 51 of Test Program)
Test Procedure: Immunity To Conducted Radiofrequencies Test
Equipment Under Test: Charger
Serial No.: N/A
Firmware Version: N/A
Software Version: N/A
Test Date: 11.07.2011
The Name and Test - Site Location: Laboratory No. 3
The Name and Qualification of Person Responsible for the test: Osaulko V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 60945	Methods item of standard IEC 60945
1.	Immunity to conducted radiofrequencies	10.3.3	10.3.2

TEST DESCRIPTION

The EUT shall be placed on an insulating support of 0,1 m height above a ground reference plane (figure 5). The auxiliary equipment (AE) necessary to provide the EUT with power, and the signals required for normal operation and verification of performance shall be connected by cables, which shall be provided with appropriate coupling and decoupling devices at a distance between 0,1 m and 0,3 m from the EUT (figure 6). IEC 61000-4-6 describes the design of CDNs and alternative injection clamps if the use of CDNs is not possible.

– 3 V r.m.s. amplitude swept over the frequency range 150 kHz to 80 MHz (severity level 2);
– 10 V r.m.s. amplitude at spot frequencies: 2 MHz, 3 MHz, 4 MHz, 6,2 MHz, 8,2 MHz, 12,6 MHz, 16,5 MHz, 18,8 MHz, 22 MHz and 25 MHz.
During testing, amplitude modulation at 400 Hz ±10 % to a depth of 80 % ± 10 % shall be used. The frequency sweep rate shall not exceed $1,5 \times 10^{-3}$ decades/s in order to allow for the detection of any malfunction of the EUT.

The above signals shall be superimposed on the power, signal and control lines of the EUT. An EMC performance check shall be applied during and after the test.

TEST CONDITIONS

- Ambient temperature: 25 °C
- Relative humidity: 63 %
- Atmospheric pressure: 756 mm/Hg
- Test duration is 1 hour.
- Equipment mode: Charging mode

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Test bench	AISK-02	468223.006	02.2012
3.	Injection clamp	Fischer F-203I-23mm	08582	06.2012
4.	Power supply	GPR7550	100112	07.2012
5.	Power supply	EP3.3005.2.2	100204	04.2013

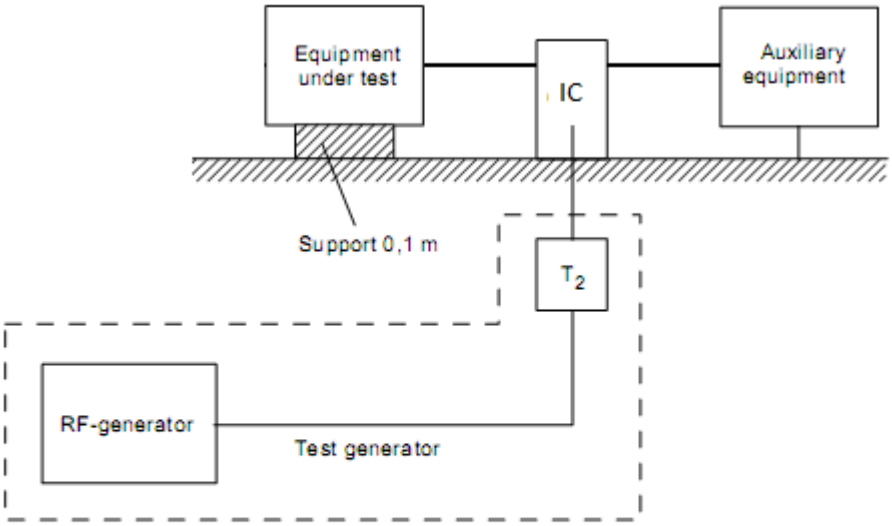


Figure 42.1 — Set up for immunity to conducted radiofrequencies test

TEST RESULT

Figure 42.2 – The general view of test site for immunity to conducted radiofrequencies test

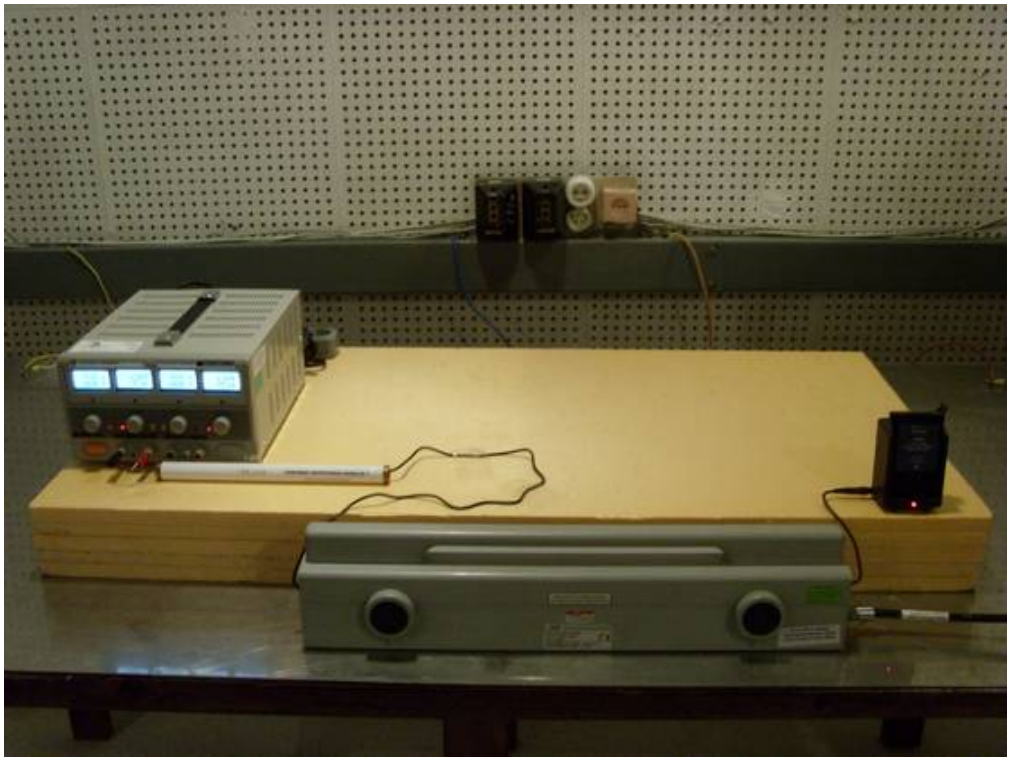


Figure 42.3 – The general view of test site for immunity to conducted radiofrequencies test

Frequency, MHz	Field, V r.m.s.	Modulation	Sweep Rate, decades/s.	Note
0.15 - 80	3	AM, 400 Hz, depth of 80%	$1.5 * 10^{-3}$	Pass

Frequency, Mhz	Field, V r.m.s.	Modulation	Note
2	10	AM, 400 Hz, depth of 80%	Pass
3	10	AM, 400 Hz, depth of 80%	Pass
4	10	AM, 400 Hz, depth of 80%	Pass
6.2	10	AM, 400 Hz, depth of 80%	Pass
8.2	10	AM, 400 Hz, depth of 80%	Pass
12.6	10	AM, 400 Hz, depth of 80%	Pass
16.5	10	AM, 400 Hz, depth of 80%	Pass
18.8	10	AM, 400 Hz, depth of 80%	Pass
22	10	AM, 400 Hz, depth of 80%	Pass
25	10	AM, 400 Hz, depth of 80%	Pass

The LED status and supply current to the charger were observed during the test. When power was applied LED status was green then change to red after a few seconds once it was detected the battery and re-started the charging cycle. Current consumption was changed less than 10% during the test.

Test result	Conclusion
LED status	Pass
Current consumption	Pass

ANNEX 43.
ANTENNA SHORT-CIRCUITING AND OPEN-CIRCUITING TEST

Antenna Short-Circuiting And Open-Circuiting Test (item 52 of Test Program)
Test Procedure: Antenna Short-Circuiting And Open-Circuiting Test
Equipment Under Test: VHF Radio V100
Serial No.: TA002
Firmware Version: 0100
Software Version: 0100
Test Date: 14.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Baydachnyi A.V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 61097-12	Methods item of standard IEC 61097-12
1.	Antenna short-circuiting and open-circuiting test	3.3.4.1	3.3.4.1

TEST DESCRIPTION

The Antenna short-circuiting and open-circuiting test was carried out.

The equipment was not damaged by the effect of open-circuiting and short-circuiting the antenna.

TEST CONDITIONS

- Ambient temperature: 28 °C
- Relative humidity: 51 %
- Atmospheric pressure: 754 mm/Hg
- Measured duration: 15 minutes
- Operational channel: 17 channel 156.85 MHz

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Service monitor	Stabilock 4032	1788060	06.2012

TEST RESULT

Figure 43.1 – VHF radio with open-circuit antenna

Figure 43.2 – VHF radio with short-circuit antenna

Performance check after the open-circuit antenna test

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.005	Pass
Output power	>0.25	W	2.59	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.54	Pass

Performance check after the short-circuit antenna test

Parameters to be Measured	Range of Specification	Units	Test Results	Conclusion
Frequency error	<±1.5	kHz	-0.006	Pass
Output power	>0.25	W	2.59	Pass
Receiver maximum usable sensitivity (e.m.f.)	<+12	dBμV	-6.54	Pass

ANNEX 44.
COMPASS SAFE DISTANCE

Compass safe distance (item 53 of Test Program)
Test Procedure: Compass safe distance
Equipment Under Test: Sample 1: VHF Radio V100
Sample 4: Charger
Serial No.: TA001 (Sample 1), N/A (Sample 4)
Firmware Version: 0100
Software Version: 0100
Test Date: from 14.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Baydachnyi A.V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 60945	Methods item of standard IEC 60945
1.	Compass safe distance	4.5.3	11.2

Description of test:

Each unit of the EUT was tested in the position and attitude relative to the compass at which the error produced at the compass was a maximum, provided the item was fitted in this way.

The compass-safe distance of any unit of the EUT is defined as the distance between the nearest point of the unit and the centre of the compass or magnetometer at which it will not produce a deviation in the standard compass of more than 5,4°/H where H is the horizontal component of the magnetic flux density in μT (microtesla) at the place of testing. For the steering compass, the standby steering compass and the emergency compass, the permitted deviation is 18°/H, H being defined as above.

Each unit of the EUT was tested:
a) in the magnetic condition in which it is received with the EUT unpowered;
b) after normalizing with the EUT unpowered;
c) in the powered condition, if the unit is capable of being energized electrically.

Normalizing means a procedure to maximize the homogeneity of the magnetic flux in the EUT by placing it in Helmholtz coils or by other adequate means.

In each of the above tests, the unit was rotated to determine the direction in which it produces the maximum deviation.

TEST CONDITIONS:

- Ambient temperature at open area test site: 26 ^{O}C.
- Relative air humidity: 54 %.
- Atmospheric pressure: 754 mm/Hg.
- Test duration is 2 hours
- Measurement duration is 2 hours
- Measured horizontal earth magnetic field – 19.75 μT

TEST EQUIPMENT USED

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Uncompensated magnetic compass	-	101555	05.2013
2.	Tape measure	SH5016	620168	03.2012
3.	Magnetometer	HB0599A	12010701	09.2011

TEST RESULT:

V100 was tested in the magnetic condition.

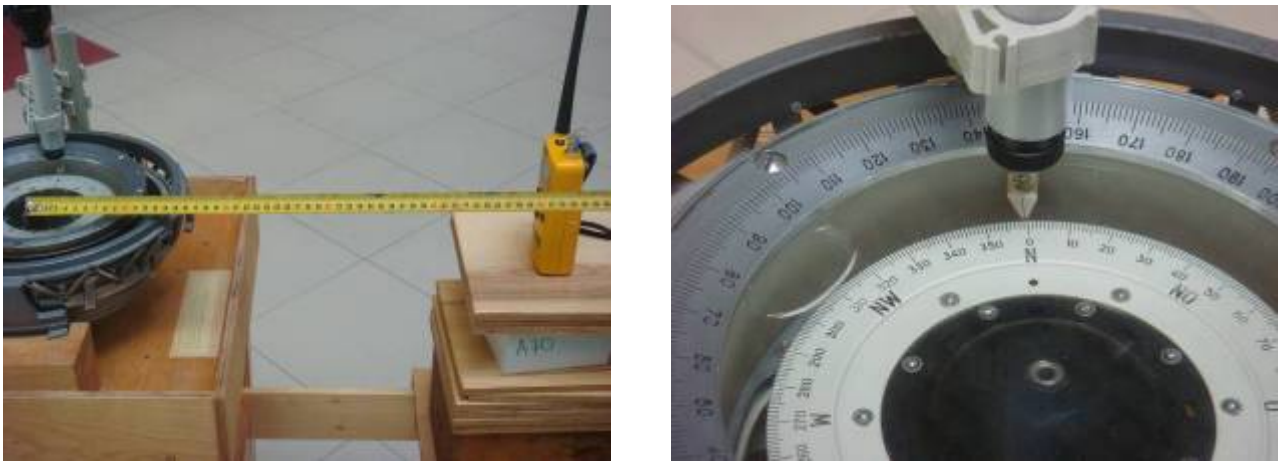


Figure 44.1 – Position VHF Radio with maximum deviation in OFF mode

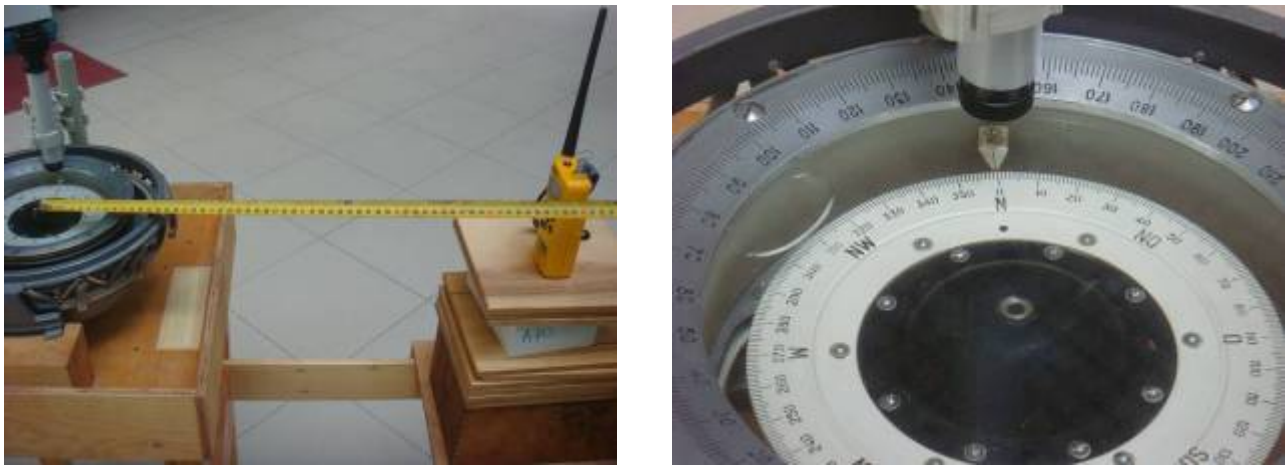


Figure 44.2 – Position VHF Radio with maximum deviation in RX mode

Figure 44.3 – Position VHF Radio with maximum deviation in TX mode

Charger was tested in the magnetic condition.

Figure 44.4 – Charger position with maximum deviation in OFF mode

Figure 44.5 – Charger position with maximum deviation in ON mode

Test results:	
	The safety distance from V100 off mode to compass is 0.51 m. The safety distance from V100 RX operational mode to compass is 0.57 m. The safety distance from V100 TX operational mode to compass is 0.59 m. The safety distance from Charger OFF mode to compass is 0.20 m. The safety distance from Charger ON mode to compass is 0.35 m.
Results required IEC 60945 item 11.2.3 :	
	“The greatest distance obtained under all these conditions is the safe distance. Distances are to be rounded up to the nearest 50 mm or 100 mm. The findings shall be noted in the test report. The safe distance shall be marked on the EUT.”

CONCLUSION	
Sample for testing	conforms to the requirements of the standard IEC 60945 item 4.5.3, 11.2
V100	Yes
Charger	Yes

ANNEX 45.
IMMUNITY TO POWER SUPPLY FAILURE TEST

Immunity To Power Supply Failure Test (item 54 of Test Program)
Test Procedure: Immunity To Power Supply Failure Test
Equipment Under Test: Charger
Serial No.: N/A
Firmware Version: N/A
Software Version: N/A
Test Date: 08.07.2011
The Name and Test - Site Location: Laboratory No. 3
The Name and Qualification of Person Responsible for the test: Osaulko V.

TEST PROGRAM

Item	Test name	Requirements item of standard IEC 60945	Methods item of standard IEC 60945
1.	Immunity to power supply failure test	10.8.4	10.8.3

TEST DESCRIPTION

The EUT was subjected to three breaks in power supply of duration 60 s each.

The requirements of the EMC performance check were met after the test in accordance with the performance criterion C. There were no corruption of operational software or loss of essential data.

TEST CONDITIONS

- Ambient temperature: 23 °C
- Relative humidity: 64 %
- Atmospheric pressure: 753 mm/Hg
- Measured duration: 1 hours

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	Power supply	EP3.3005.2.2	100204	04.2013

TEST RESULT

Figure 45.1 — General view of the test site (Charger before break in power supply)

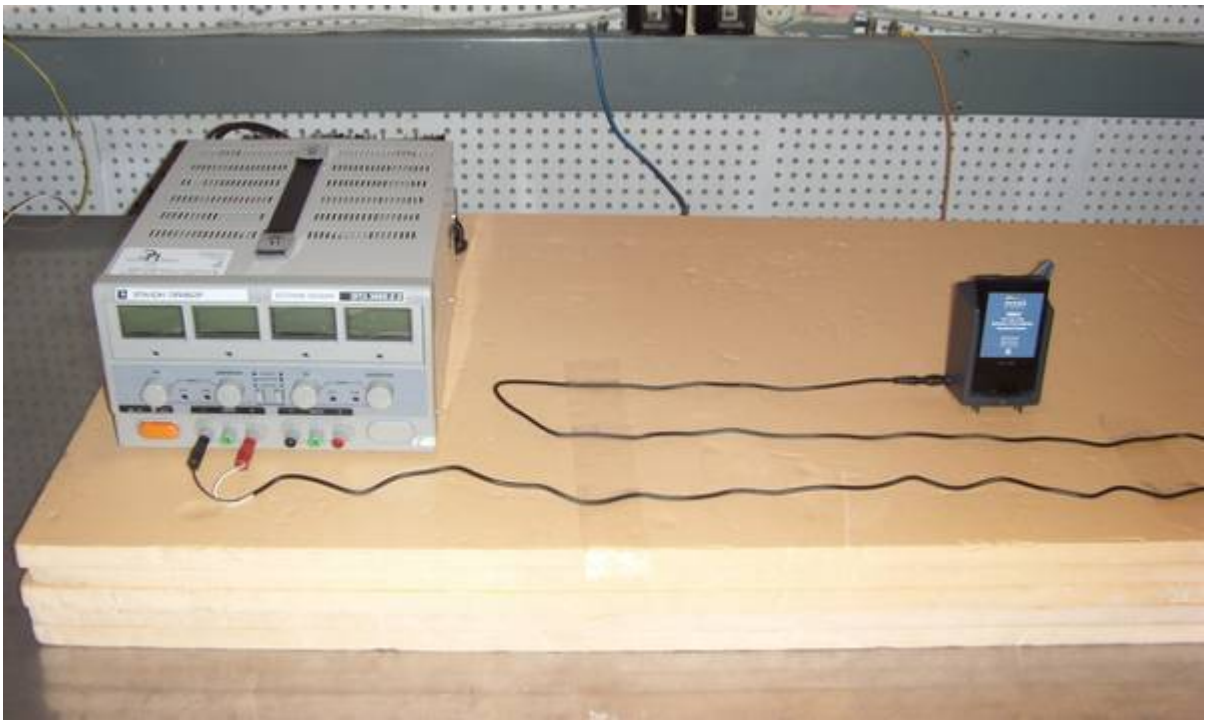


Figure 45.2 — General view of the test site (Charger without power)

The LED status and supply current to the charger were observation during the test. After each 60 s interruption the charger was operate normally and have the same supply current. When power was applied after break LED status was green then change to red after a few seconds once it was detected the battery and re-started the charging cycle. Current consumption was changed less than 10% during the test.

Test result	Conclusion
LED status	Pass
Current consumption	Pass

ANNEX 46.
LANYARD PRESENT AND BREAK TEST

Lanyard Present And Break Test (item 55 of Test Program)
Test Procedure: Lanyard Present And Break Test
Equipment Under Test: VHF Radio V100
Serial No.: TA003
Firmware Version: 0100
Software Version: 0100
Test Date: 14.07.2011
The Name and Test - Site Location: Laboratory No.10
The Name and Qualification of Person Responsible for the test: Baydachnyi A.V.

TEST PROGRAM

Item	Test name	Requirements
1.	Lanyard Present And Break Test	MSC149(77)

TEST DESCRIPTION

The lanyard present and break test was carried out.

The strap has a suitable weak link to prevent the bearer from being ensnared;

TEST CONDITIONS

- Ambient temperature: 27 °C
- Relative humidity: 754 %
- Atmospheric pressure: 754 mm/Hg
- Measured duration: 15 minutes

TEST EQUIPMENT USED

No	Name	Type, model	Ser. No	Next calibration date
1.	The set of testing weights	-	101087	06.2014

TEST RESULT

Figure 46.1 – VHF radio with weight 4 kg

Figure 46.2 – VHF radio with weight 5 kg

Figure 46.3 – VHF radio with weight 10 kg


Figure 46.4 – VHF radio with weight 14 kg


Figure 46.5 – Strap after the break. Detail photo.

LIST OF TEST INSTRUMENTS

Test Instruments	Manufacturer	Model	Serial No.	Date of last calibration	Calibration interval
Hygrometer	Steklopribor	VIT-2	D688	December, 2010	1 year
Temperature meter	CENTER (CTC)	Center-309	100074/1	August, 2010	1 year
Stop watch	ZCM	SOSpr-2b-2	2328	October, 2010	1 year
Service monitor	Rohde&Shwarz	CMS-54	835587/036	June, 2011	1 year
Climatic chamber	Feutron	KPK-400V	15	August, 2010	2 year
Multimeter	Fluke	FLUKE - 189/FVF2	89750179	September, 2010	1 year
Power supply	Sea	SEA PS 3020	100185	January, 2011	1 year
Test antenna	Schwarzbeck	BBUK9139	9114-215	November, 2010	1 year
Power measuring device	Prompribor	M3-56	04738	May, 2011	1 year
Substitution antenna	Schwarzbeck	BBUK9139	9114-214	November, 2010	1 year
Generator	GM im. Frunze	G4-176	5290	January, 2011	1 year
Amplifier	Empower	BBS2E4AHM	101164	March, 2011	3 year
Measuring receiver	Rohde&Shwarz	ESPC	848553/024	May, 2011	1 year
Artificial mouth	SD	MA-3	455	September, 2010	1 year
Generator	Radiopribor	G3-118	27542	May, 2011	1 year
Sound level meter (with a microphone 4155) B&K	Bruel & Kjaer	2230	1428594	September, 2010	1 year
Generator	NM im. Frunze	G 4-164	3019	January, 2011	1 year
Rejecter filters 0.1-2 GHz	K&L Microwave	3TNF	100091-100095	December, 2009	3 year
Spectrum analyzer 9 kHz-22 GHz	Hewlett-Parckard Co.	HP8593E	3831U02306	July, 2011	1 year
Matching device Type I, Type II	Pasternack	No.1, No.2	7	July, 2011	1 year
Service monitor	Wavetek	Stabilock 4032	1788060	June, 2011	1 year
Free fall installation	PE TC “OMEGA”	SAPB-20	101377	May, 2010	3 year
Set of immersion	PE TC “OMEGA”	-	102070	August, 2008	3 year

Test Instruments	Manufacturer	Model	Serial No.	Date of last calibration	Calibration interval
Vibration table	Shinken	G 0227	496	June, 2011	1 year
Vibration table	TIRA	TIRAvib5242	26/88	June, 2011	1 year
Digital vibration meter	Shinken	V-1103A	1013/2	September, 2010	1 year
Artificial mains network	Schwarzbeck	NNLK 8121	8121465	January, 2011	1 year
Test bench	Loniir	AISK-01	468223.002	February, 2011	1 year
Test bench	Loniir	AISK-03	468223.0027	February, 2011	1 year
Antenna	Schwarzbeck	VULB9163	DS0512089163244	March, 2010	1 year
Power supply	Etalonpribor	EP3.3005.2.2	100204	April, 2011	2 year
Electrostatic discharge simulator	Elenkom	ESR 8000K	5	March, 2011	1 year
Test bench	Loniir	AISK-02	468223.006	February, 2011	1 year
Injection clamp	Fischer custom communications inc.	Fischer F-203I-23mm	08582	July, 2011	1 year
Power supply	Eliz	GPR7550	100112	June, 2009	3 year
Uncompensated magnetic compass	-	-	101555	June, 2010	3 year
Tape measure	PE TC “OMEGA”	SH5016	620168	March, 2011	1 year
Magnetometer	NPO ENT	HB0599A	12010701	September, 2010	1 year
The set of testing weights	PE TC “OMEGA”	-	101087	June, 2011	3 year