

ENVIRONMENTAL TEST REPORT

ACCORDING TO: EN 50130-5:2011

FOR:

**Paradox Security Systems
Ltd**

EUT: PIR Detectors

Models:

- 1) NVR35M**
- 2) NV35M**
- 3) NV35MX**

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Table of contents

1	Applicant information.....	3
2	Equipment under test attributes	3
3	Manufacturer information	3
4	Test details.....	3
5	EUT description.....	4
5.1	General information.....	4
5.2	EUT mechanical characteristics	11
5.3	Acceptance criteria.....	11
5.4	EUT visual inspection and functional check	11
6	Tests summary.....	12
6.1	Dry heat (Endurance) test procedure and results.....	13
6.2	Dry heat (Operational) test procedure and results	16
6.3	Cold (Operational) test procedure and results.....	19
6.4	Damp heat, steady state (endurance) test procedure and results.....	22
6.5	Damp heat, cyclic (Operational and Endurance) test procedure and results.....	25
6.6	Degrees of protection against ingress of water indicated by the second characteristic numeral (IPX4 test) – operational test procedure and results	28
6.7	Degrees of protection against solid foreign objects indicated by the first characteristic numeral (IP5X test) – non operational test procedure and results	31
6.8	Sinusoidal vibration (endurance) test procedure and results.....	36
6.9	Sinusoidal vibration (operational) test procedure and results.....	43
6.10	Shock (Operational) test procedure and results	50
6.11	Impact (Operational) test procedure and results	60
7	APPENDIX A Test equipment and ancillaries used for tests.....	62
8	APPENDIX B Test laboratory description.....	64
9	APPENDIX C Abbreviations and acronyms	64
10	APPENDIX D Tests specifications	65
11	APPENDIX E Measurement uncertainties.....	66

1 Applicant information

Client name: Paradox Security Systems Ltd.
Address: 780 INDUSTRIAL BLVD
 ST-EUSTACHE, QC, CANADA J7R 5V3
Telephone: 450-491-7444
Fax: 450-491-1095
E-mail: nimrodh@paradox.com
Contact name: Mr. Nimrod Herman

2 Equipment under test attributes

No	Model Name	Hardware version	Software release
1	NVR35M	480-5005-000	V0.01
2	NV35M	480-6006-000	V0.01
3*	NV35MX	480-6006-000	V0.01

*Note: Worst case (most populated version-NV35M tested).

Condition of equipment: Test Samples
Receipt date 03-Mar-14

3 Manufacturer information

Manufacturer name: Paradox Security Systems Ltd.
Address: 780 INDUSTRIAL BLVD
 ST-EUSTACHE, QC, CANADA J7R 5V3
Telephone: 450-491-7444
Fax: 450-491-1095
E-Mail: nimrodh@paradox.com
Contact name: Mr. Nimrod Herman

4 Test details

Project ID: 26732
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 02-Oct-14
Test completed: 14-May-15
Test specification(s): EN 50130-5:2011
Test suite: EN 50130-5:2011

5 EUT description

5.1 General information

The Equipment Under Test (EUT) are Security Grade 3 and 2, Environmental Class IV two wired and respectively one wireless PIR motion detectors.

The EUT are presented in Photographs 5.1.1

Photograph 5.1.1

Wireless PIR detector NVR35M general view



Photographs 5.1.2

Wireless PIR detector NVR35M general view



Photographs 5.1.3, 5.1.4

Wireless PIR detector NVR35M internal view



Photograph 5.1.5

Wired PIR detector NV35M and NV35MX general view



Photograph 5.1.6

Wired PIR detector NV35M and NV35MX general view



Photograph 5.1.7

Wired PIR detector NV35M internal view



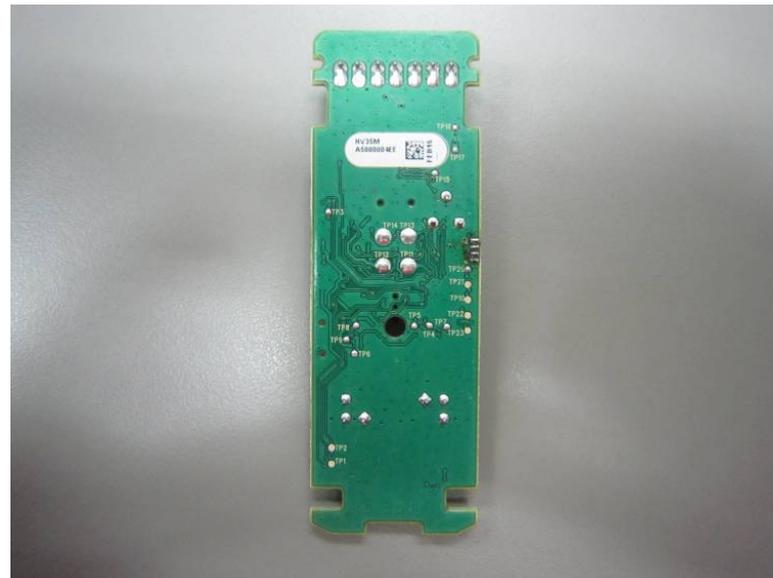
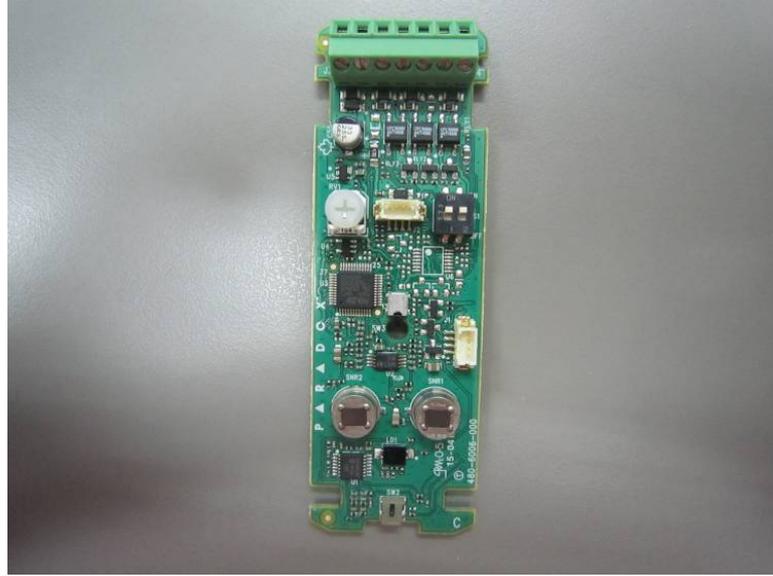
Photograph 5.1.8

Wired PIR detector NV35MX internal view



Photographs 5.1.9, 5.1.10

Wired PIR detector NV35M internal view



5.2 EUT mechanical characteristics

The Equipment Under Test (EUT) measures:
12.3 x 6.1 x 4.3 cm (4.8 x 2.4 x 1.7 in.)
The Equipment Under Test (EUT) weights 0.100 kg.

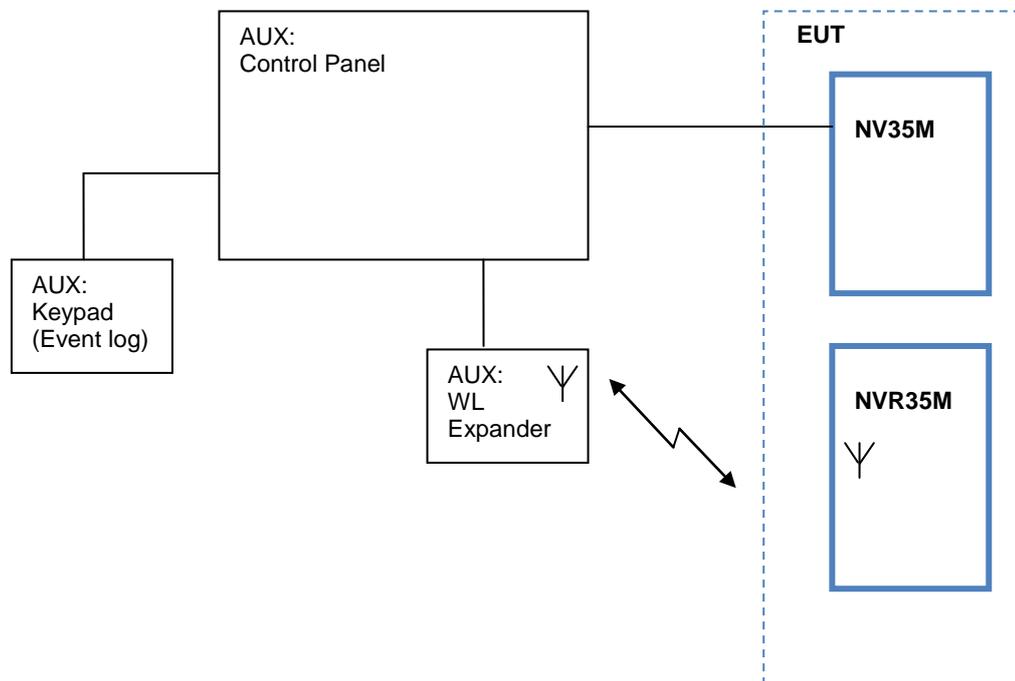
5.3 Acceptance criteria

The EUT shall pass the Basic Detection Tests before and after each test.
The EUT should not generate any unintentional signals or messages during operational tests. The operational tests were performed in set (armed) status of the system.
No EUT physical damage is accepted.
No water or dust penetration is accepted.

5.4 EUT visual inspection and functional check

The functional check is the BDT (basic detection test) specified in EN 50131-2-2.
Before and after each environmental test the EUT was visually inspected by the HL engineers.

Figure 5.4.1 Test setup configuration



6 Tests summary

Test	Status
EN 50130-5:2011	
Dry heat (Endurance) test	Pass
Dry heat (Operational) test	Pass
Cold (Operational) test	Pass
Damp heat, steady state (endurance) test	Pass
Damp heat cyclic (Operational and Endurance) test	Pass
IPX4 Water splashing (Operational) test	Pass
IP 5X: Dust- protected (Category 2) test	Pass
Sinusoidal Vibration (endurance) test	Pass
Sinusoidal vibration (Operational) test	Pass
Shock (Operational) test	Pass
Impact (Operational) test	Pass

	Name and Title	Date	Signatures
Tested by:	Mr. Sergey Nikolsky Environmental Test Engineer	28-May-15	
	Mr. Igor Prigolany, Environmental Test Engineer		
	Mr. Oleg Yakimchuk, Environmental Test Engineer		
	Mr. Mihaeli Feldmann, Project manager		
Reviewed by:	Miss. Anna Gorovoy, Environmental Certification Engineer	28-May-15	
Approved by:	Mr. Vladimir Kogan, Environmental Group Manager	28-May-15	



Test specification:		Dry heat (Endurance) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 2 ENVIRONMENTAL CLASS IV TEST METHOD: IEC 60068-2-2 Test Bb: Dry heat for none heat-dissipating specimens with gradual change of temperature	
Test mode:		Compliance	
Test Date:		03-Nov-14 - 24-Nov-14	
Atmospheric conditions during the test:		Temperature: 24 °C	Air Pressure: 1012 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 45 %	

6.1 Dry heat (Endurance) test procedure and results

6.1.1 Test purpose

The test was performed to demonstrate the EUT ability to function correctly at high ambient temperatures, which may occur for short periods in the anticipated service environment.

6.1.2 Test procedure

6.1.2.1 After BDT The EUTs were placed in the testing chamber, as presented in Photograph 6.1.1.

6.1.2.2 The chamber temperature was adjusted to +25°C. The temperature in the testing chamber was raised to +55°C at a 1°C/min heating rate.

6.1.2.3 The EUTs were subjected to +55°C for 504 hours.

6.1.2.4 At the end of exposure period, the chamber temperature was lowered to +25°C at a 1°C/min cooling rate.

6.1.2.5 The air chamber temperature monitoring is presented in Figure 6.1.1.

6.1.2.6 The EUTs were removed from the testing chamber, BDT and a visual inspection were performed.

6.1.3 Test results

Table 6.1.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All BDT passed. The EUT passed the dry heat (endurance) test.	Pass

Reference numbers of test equipment used:

HL 3203	HL 3599
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Full description is given in Appendix A.



Test specification:	Dry heat (Endurance) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 2 ENVIRONMENTAL CLASS IV TEST METHOD: IEC 60068-2-2 Test Bb: Dry heat for none heat-dissipating specimens with gradual change of temperature		
Test mode:	Compliance	Verdict:	PASS
Test Date:	03-Nov-14 - 24-Nov-14		
Atmospheric conditions during the test:	Temperature: 24 °C	Air Pressure: 1012 hPa	Relative Humidity: 45 %
Remarks:			

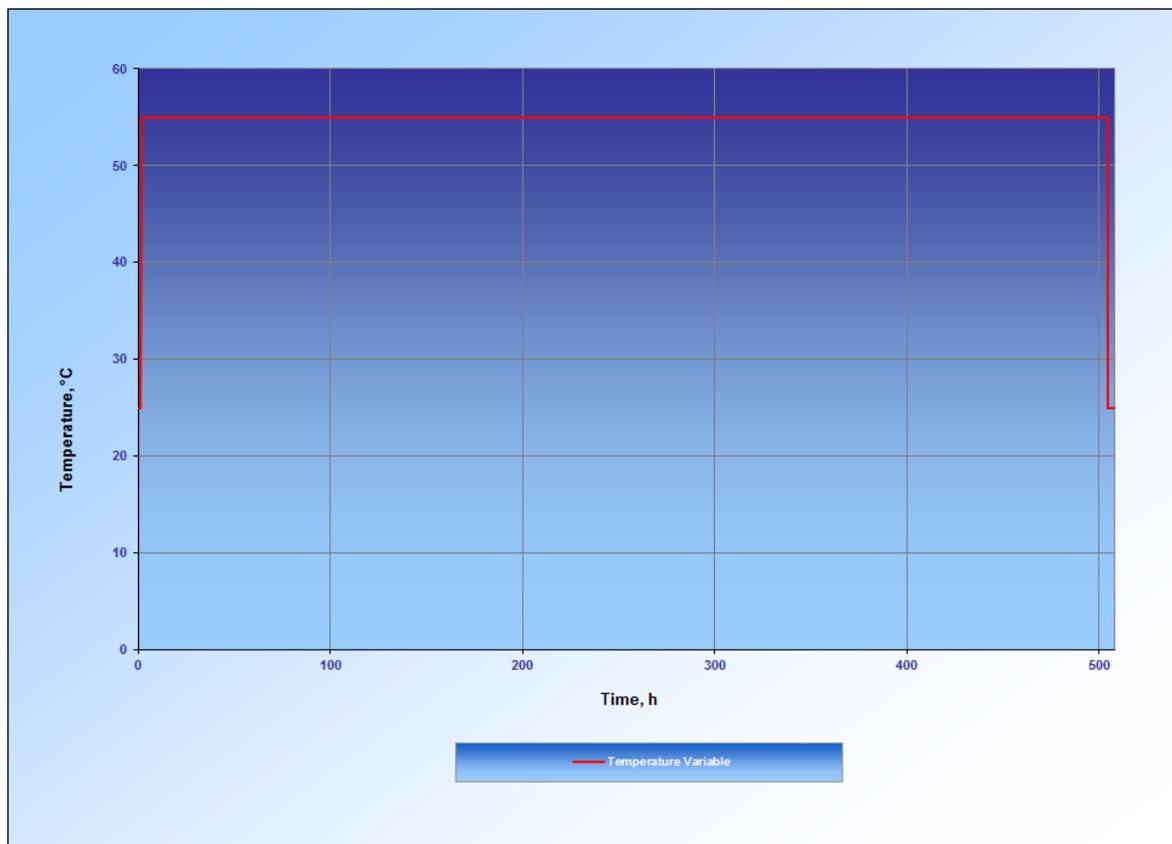
Photograph 6.1.1 The EUTs in the high temperature chamber





Test specification:	Dry heat (Endurance) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 2 ENVIRONMENTAL CLASS IV TEST METHOD: IEC 60068-2-2 Test Bb: Dry heat for none heat-dissipating specimens with gradual change of temperature		
Test mode:	Compliance	Verdict: PASS	
Test Date:	03-Nov-14 - 24-Nov-14		
Atmospheric conditions during the test:	Temperature: 24 °C	Air Pressure: 1012 hPa	Relative Humidity: 45 %
Remarks:			

Figure 6.1.1 Dry heat test profile





Test specification:		Dry heat (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 1 ENVIRONMENTAL CLASS IV TEST METHOD: IEC 60068-2-2 Test Bd: Dry heat for heat-dissipating specimens with gradual change of temperature	
Test mode:		Compliance	
Test Date:		08-Apr-15 - 09-Apr-15	
Atmospheric conditions during the test:		Temperature: 24 °C	Air Pressure: 1009 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 42 %	

6.2 Dry heat (Operational) test procedure and results

6.2.1 Test purpose

The test was performed to demonstrate the EUT ability to function correctly at high ambient temperatures, which may occur for short periods in the anticipated service environment.

6.2.2 Test procedure

6.2.2.1 After BDT, the operational EUTs were placed in the testing chamber, as presented in Photograph 6.2.1.

6.2.2.2 The chamber temperature was adjusted to +25°C.

6.2.2.3 The temperature in the testing chamber was raised to +70°C at a 1°C/min heating rate.

6.2.2.4 The EUTs were subjected to +70°C temperature for 16 hours.

6.2.2.5 At the end of exposure period, the chamber temperature was lowered to +25°C at a 1°C/min cooling rate.

6.2.2.6 The air chamber temperature monitoring is presented in Plot 6.2.1.

6.2.2.7 The EUTs were removed from the testing chamber, BDT and a visual inspection were performed.

6.2.3 Test results

Table 6.2.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All BDT passed. No un intentional signals or messages, no change in system status (armed). The EUT passed the dry heat (operational) test. <u>Note:</u> The test at +70°C includes, by simple means, the effect of heat radiation from the sun.	Pass

Reference numbers of test equipment used:

HL 3821	HL 3599
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Full description is given in Appendix A.



Test specification:	Dry heat (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 1 ENVIRONMENTAL CLASS IV TEST METHOD: IEC 60068-2-2 Test Bd: Dry heat for heat-dissipating specimens with gradual change of temperature		
Test mode:	Compliance	Verdict:	PASS
Test Date:	08-Apr-15 - 09-Apr-15		
Atmospheric conditions during the test:	Temperature: 24 °C	Air Pressure: 1009 hPa	Relative Humidity: 42 %
Remarks:			

Photograph 6.2.1 The EUTs in the high temperature chamber





Test specification:	Dry heat (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 1 ENVIRONMENTAL CLASS IV TEST METHOD: IEC 60068-2-2 Test Bd: Dry heat for heat-dissipating specimens with gradual change of temperature		
Test mode:	Compliance	Verdict:	PASS
Test Date:	08-Apr-15 - 09-Apr-15		
Atmospheric conditions during the test:	Temperature: 24 °C	Air Pressure: 1009 hPa	Relative Humidity: 42 %
Remarks:			

Plot 6.2.1 Temperature monitoring during the dry heat (operational) test





Test specification:		Cold (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 3 ENVIRONMENTAL CLASS IV TEST METHOD: IEC 60068-2-1 Test Ad: Cold heat-dissipating specimen with gradual change of temperature	
Test mode:		Compliance	
Test Date:		12-Apr-15 - 13-Apr-15	
Atmospheric conditions during the test:		Temperature: 24 °C	Air Pressure: 1015 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 45 %	

6.3 Cold (Operational) test procedure and results

6.3.1 Test purpose

The test was performed to demonstrate the EUT ability to function correctly at low ambient temperatures appropriate to the anticipated service environment.

6.3.2 Test procedure

6.3.2.1 After BDT, the operational EUTs were placed in the testing chamber, as presented in Photograph 6.3.1.

6.3.2.2 The chamber temperature was adjusted to +25°C.

6.3.2.3 The temperature in the testing chamber was lowered to -40°C at a 1°C/min cooling rate.

6.3.2.4 The EUTs were subjected to -40°C temperature for 16 hours.

6.3.2.5 At the end of exposure period, the chamber temperature was raised to +25°C at a 1°C/min heating rate.

6.3.2.6 The air chamber temperature monitoring is presented in Plot 6.3.1.

6.3.2.7 The EUTs were removed from the testing chamber, BDT and a visual inspection were performed.

6.3.3 Test results

Table 6.3.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All BDT passed. No un intentional signals or messages, no change in system status (armed). The EUT passed the cold (operational) test. Note: Following customer request -40 °C was tested according with class IVA.	Pass

Reference numbers of test equipment used:

HL 3821	HL 3599
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Full description is given in Appendix A.



Test specification:	Cold (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 3 ENVIRONMENTAL CLASS IV TEST METHOD: IEC 60068-2-1 Test Ad: Cold heat-dissipating specimen with gradual change of temperature		
Test mode:	Compliance	Verdict:	PASS
Test Date:	12-Apr-15 - 13-Apr-15		
Atmospheric conditions during the test:	Temperature: 24 °C	Air Pressure: 1015 hPa	Relative Humidity: 45 %
Remarks:			

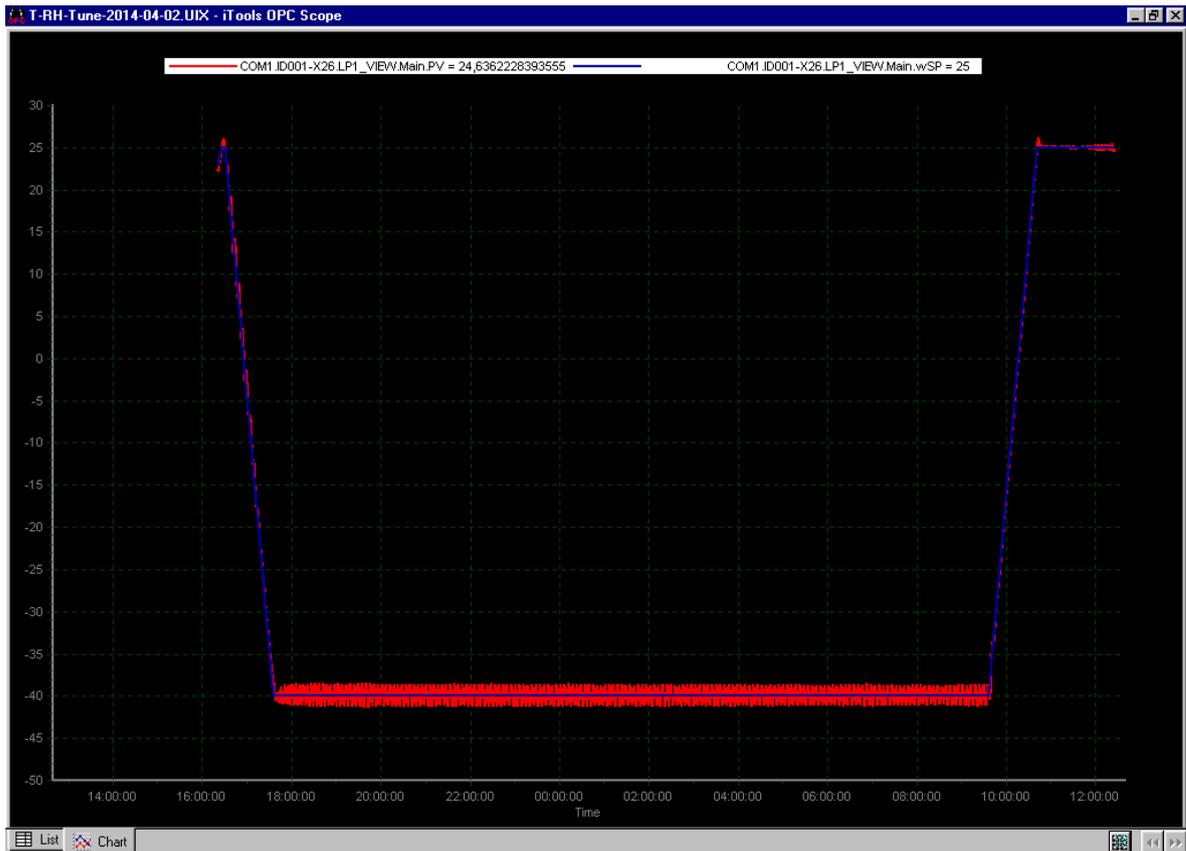
Photograph 6.3.1 The EUTs in the low temperature chamber





Test specification:	Cold (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 3 ENVIRONMENTAL CLASS IV TEST METHOD: IEC 60068-2-1 Test Ad: Cold heat-dissipating specimen with gradual change of temperature		
Test mode:	Compliance	Verdict:	PASS
Test Date:	12-Apr-15 - 13-Apr-15		
Atmospheric conditions during the test:	Temperature: 24 °C	Air Pressure: 1015 hPa	Relative Humidity: 45 %
Remarks:			

Plot 6.3.1 Temperature monitoring during the cold (operational) test





Test specification:		Damp heat, steady state (endurance) test	
Test procedure:		STEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 6 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-78 Test Cab: Damp heat, steady state	
Test mode:		Compliance	
Test Date:		02-Oct-14 - 23-Oct-14	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1011 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 45 %	

6.4 Damp heat, steady state (endurance) test procedure and results

6.4.1 Test purpose

The test was performed to demonstrate the EUT ability to withstand the long term effects of humidity in the service environment (changes in electrical proprieties due to absorption, chemical reactions involving moisture, galvanic corrosion etc.)

6.4.2 Test procedure

- 6.4.2.1 After BDT ,the non-operational EUTs were placed into the testing chamber, as presented in Photograph 6.4.1, and subjected to high humidity.
- 6.4.2.2 The chamber temperature was raised to +40°C and relative humidity to 93%.
- 6.4.2.3 The conditions of Paragraph 6.4.2.2 were maintained for 504 hours (21 days).
- 6.4.2.4 At the end of exposure period, the chamber temperature and humidity were lowered to ambient.
- 6.4.2.5 The EUTs were removed from the chamber and a visual inspection followed by BDT was performed.
- 6.4.2.6 The humidity and temperature measuring results are presented in Figure 6.4.1.

6.4.3 Test results

Table 6.4.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All BDT passed. The EUT passed the damp heat, steady state (endurance) test.	Pass

Reference numbers of test equipment used:

HL 574	HL 1959
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Full description is given in Appendix A.



Test specification:	Damp heat, steady state (endurance) test		
Test procedure:	STEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 6 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-78 Test Cab: Damp heat, steady state		
Test mode:	Compliance	Verdict:	PASS
Test Date:	02-Oct-14 - 23-Oct-14		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 45 %
Remarks:			

Photograph 6.4.1 The EUTs in the humidity chamber

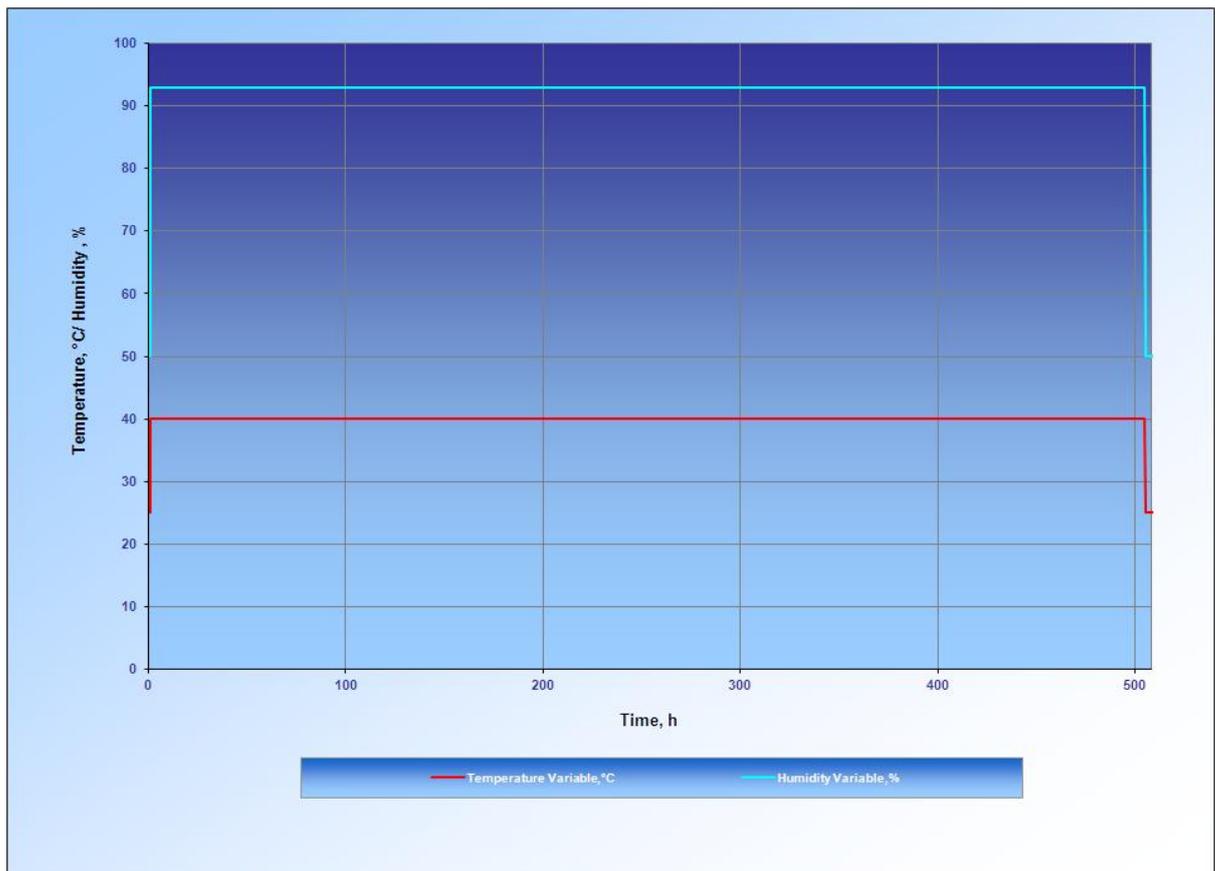


EUT



Test specification:	Damp heat, steady state (endurance) test		
Test procedure:	STEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 6 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-78 Test Cab: Damp heat, steady state		
Test mode:	Compliance	Verdict:	PASS
Test Date:	02-Oct-14 - 23-Oct-14		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 45 %
Remarks:			

Figure 6.4.1 Damp heat test profile





Test specification:		Damp heat cyclic (Operational and Endurance) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLES: Table 7 and 8 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-30 Test Db and guidance: Damp heat cyclic (12+12 hour cycle)	
Test mode:		Compliance	
Test Date:		13-Apr-15 - 21-Apr-15	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1018 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 42 %	

6.5 Damp heat, cyclic (Operational and Endurance) test procedure and results

6.5.1 Test purpose

The test was performed to demonstrate the EUT immunity to an environment with high relative humidity, where condensation occurs on the equipment.

6.5.2 Test procedure

6.5.2.1 After BDT the operational EUTs were placed into the testing chamber, as presented in Photograph 6.5.1.

6.5.2.2 The chamber temperature was adjusted to +25°C and relative humidity was increased to 95%.

6.5.2.3 The chamber temperature was raised to +55°C within a period of 3 hours. During this period relative humidity was maintained at 95%.

6.5.2.4 These conditions (+55°C and 95% RH) were maintained for 9 hours.

6.5.2.5 The chamber temperature was lowered to + 25°C within 3 hours. During this period relative humidity was maintained at 95%.

6.5.2.6 These conditions (+25°C and 95% RH) were maintained for 9 hours.

6.5.2.7 The steps of Paragraphs 6.5.2.3 to 1.1.2.6 were repeated once more. The EUTs were switched off and additional 6 cycles were performed.

6.5.2.8 At the end of exposed period, the relative humidity was reduced to ambient.

6.5.2.9 The EUTs were removed from the chamber, BDT and a visual inspection were performed.

6.5.2.10 The humidity and temperature measuring results are presented in Plot 6.5.1.

6.5.3 Test results

Table 6.5.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All BDT passed. No un intentional signals or messages, no change in system status (armed) for the two operational cycles. The EUT passed the damp heat cyclic (operational 2 cycles and endurance 6 cycles) test.	Pass

Reference numbers of test equipment used:

HL 2906	HL 3599
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Full description is given in Appendix A.



Test specification:	Damp heat cyclic (Operational and Endurance) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLES: Table 7 and 8 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-30 Test Db and guidance: Damp heat cyclic (12+12 hour cycle)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	13-Apr-15 - 21-Apr-15		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 42 %
Remarks:			

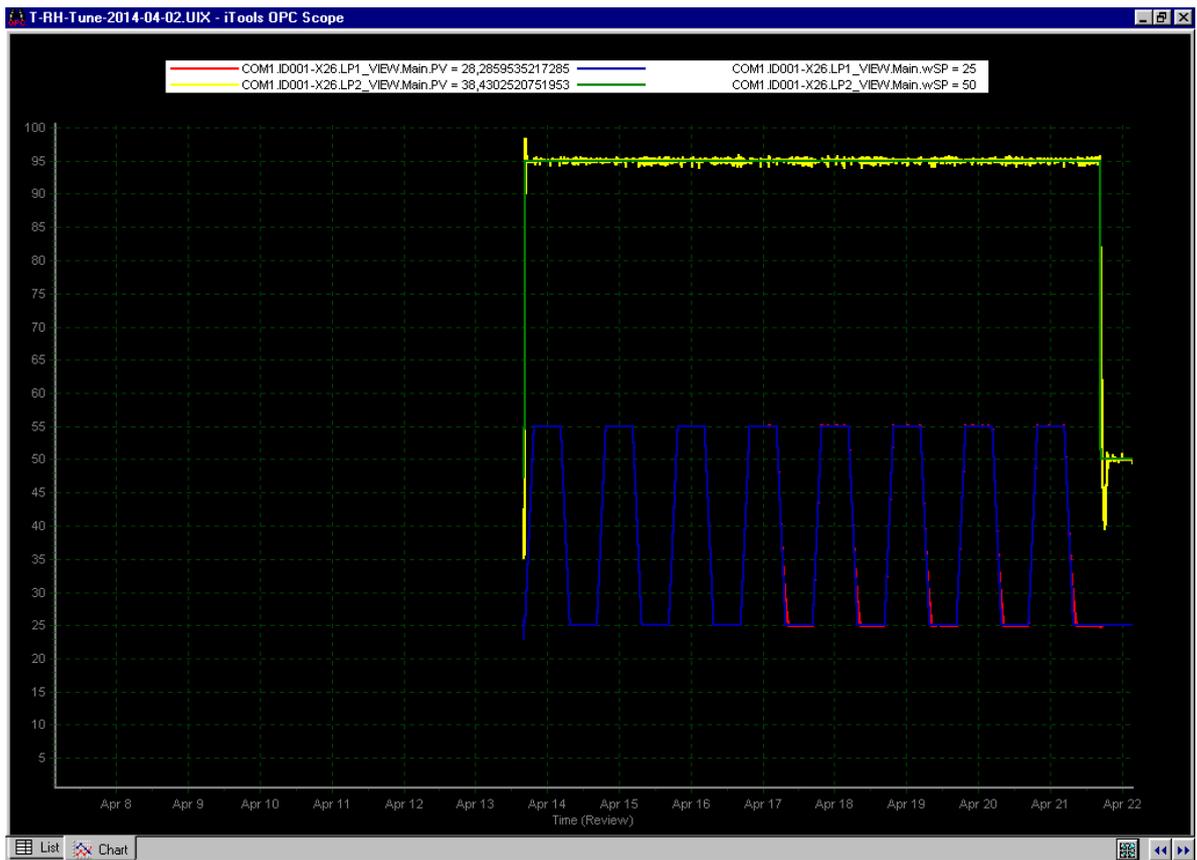
Photograph 6.5.1 The EUT in the humidity chamber





Test specification:	Damp heat cyclic (Operational and Endurance) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLES: Table 7 and 8 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-30 Test Db and guidance: Damp heat cyclic (12+12 hour cycle)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	13-Apr-15 - 21-Apr-15		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1018 hPa	Relative Humidity: 42 %
Remarks:			

Plot 6.5.1 Temperature and relative humidity monitoring during the damp heat cyclic (operational) test





Test specification:		IPX4 Water splashing (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 9 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60529 PROCEDURE: IPX4, Water splashing Section 14.2.4	
Test mode:	Compliance	Verdict: PASS	
Test Date:	03-May-15		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1013 hPa	Relative Humidity: 45 %
Remarks:			

6.6 Degrees of protection against ingress of water indicated by the second characteristic numeral (IPX4 test) – operational test procedure and results

6.6.1 Test purpose

The test was performed to verify that the EUT withstands water penetration under water splashing.

6.6.2 Test procedure

6.6.2.1 After BDT, the EUTs were installed in its normal operation position, as presented in Photograph 6.6.1.

6.6.2.2 The enclosure was splashed from spray nozzle from all practicable directions.

6.6.2.3 The water at a delivery rate of 10 l/min and pressure 100 kPa were sprayed on the EUTs for 15 minutes. The test conditions are presented in Table 6.6.2.

6.6.2.4 The EUTs were removed from the place of splashing and a visual inspection followed by BDT was performed, as presented in Photograph 6.6.2.

6.6.3 Test results

Table 6.6.1 Test results

Observation	Verdict
No water penetration was noticed. All BDT passed No change in system status. The EUTs passed IPX4 test.	Pass

Reference numbers of test equipment used:

HL 2663	HL 3600	HL 2143	HL 3633
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Full description is given in Appendix A.



Test specification:		IPX4 Water splashing (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 9 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60529 PROCEDURE: IPX4, Water splashing Section 14.2.4	
Test mode:		Compliance	
Test Date:		03-May-15	
Atmospheric conditions during the test:		Verdict: PASS	
Temperature: 23 °C		Air Pressure: 1013 hPa	
Relative Humidity: 45 %			
Remarks:			

Table 6.6.2 Water splashing test severity

Test means	Water pressure	Water flow rate	Distance to enclosure	Test duration
	kPa	l/min	m	min
Water splashing IPX4	100	10	0.3-0.5	15

Photograph 6.6.1 The EUT under splashing water





Test specification:	IPX4 Water splashing (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 9 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60529 PROCEDURE: IPX4, Water splashing Section 14.2.4		
Test mode:	Compliance	Verdict:	PASS
Test Date:	03-May-15		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1013 hPa	Relative Humidity: 45 %
Remarks:			

Photograph 6.6.2 The EUT visual inspection after water splashing test





Test specification:	IP 5X: Dust- protected (Category 2) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 9 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60529 TEST PROCEDURE: IP5X, Dust-Protected SECTIONS:13.4, 13.5 CATEGORY: 2 enclosures		
Test mode:	Compliance	Verdict:	PASS
Test Date:	14-May-15		
Atmospheric conditions during the test:	Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 50%
Remarks:			

6.7 Degrees of protection against solid foreign objects indicated by the first characteristic numeral (IP5X test) – non operational test procedure and results

6.7.1 Test purpose

The test was performed to verify that the EUT enclosure withstand the dust penetration.

6.7.2 Test procedure

6.7.2.1 After BDT The EUTS were placed in the dust chamber as presented in Figure 6.7.1 and Photograph 6.7.1

6.7.2.2 The chamber temperature was adjusted to +40°C and relative humidity to less than 30%.

6.7.2.3 After chamber condition stabilization the dust feed was switched on and the device was subjected to the blowing dust as presented below in Table 6.7.2.

6.7.2.4 The conditions of Paragraphs 6.7.2.2 and 6.7.2.3 were maintained for 8 (eight) hours.

6.7.2.5 At the end of the exposure period the dust feed was switched off and the chamber temperature was returned to ambient.

6.7.2.6 The EUTs were removed from the chamber and cleaned from an accumulated dust.

6.7.2.7 A Visual inspection and BDT were performed, as presented in Photographs 6.7.2 and 6.7.3.

6.7.2.8 The temperature and humidity monitoring are presented in Plot 6.7.1.

6.7.3 Test results

Table 6.7.1 Test results

Observation	Verdict
No EUT damages, dust penetration, enclosure surface abrasion, and erosion were noticed. All BDT passed The EUTs passed the IP5X test.	Pass

Reference numbers of test equipment used:

HL 1420	HL 1932	HL 1974	HL 3931	HL 2449	HL 950
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Full description is given in Appendix A.

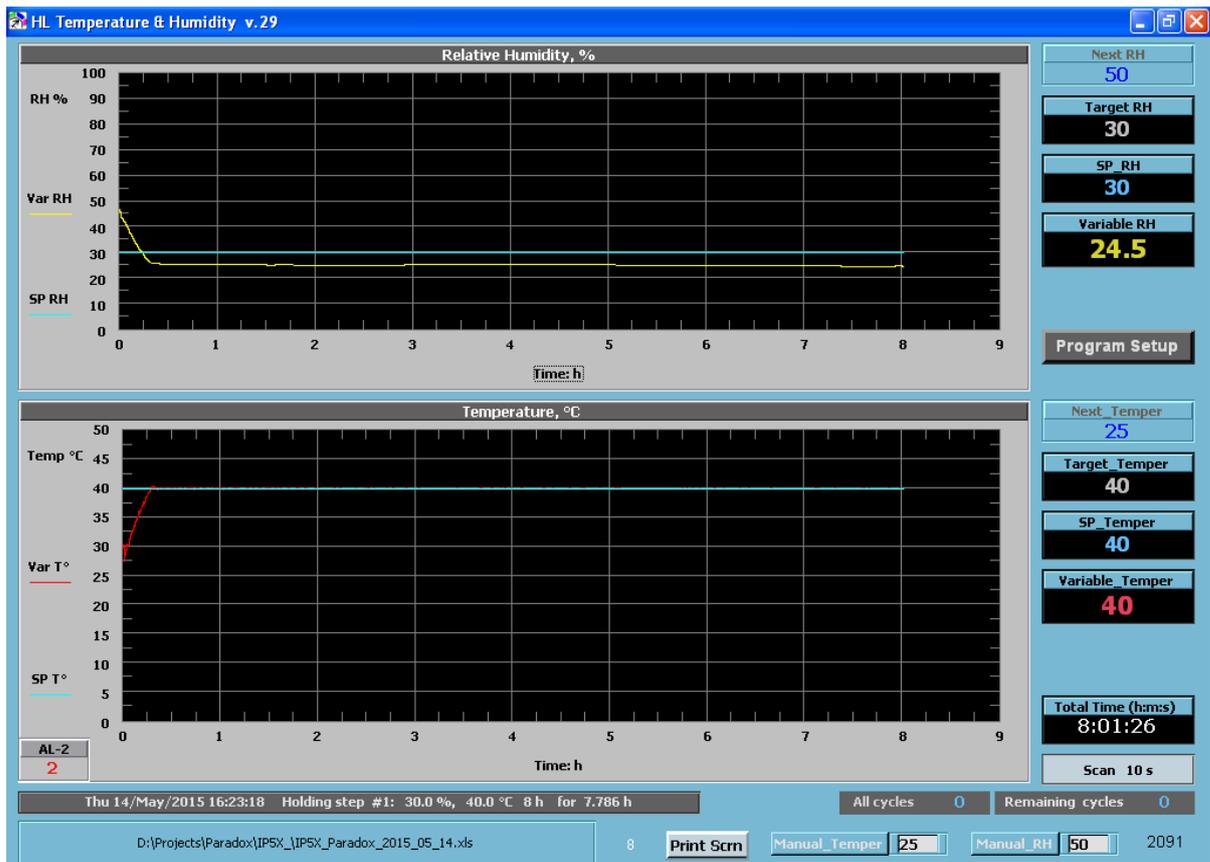


Test specification:	IP 5X: Dust- protected (Category 2) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 9 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60529 TEST PROCEDURE: IP5X, Dust-Protected SECTIONS:13.4, 13.5 CATEGORY: 2 enclosures		
Test mode:	Compliance	Verdict:	PASS
Test Date:	14-May-15		
Atmospheric conditions during the test:	Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 50%
Remarks:			

Table 6.7.2 Dust protected test sequence

Step No	Event	Temperature, °C	RH, %	Duration, h
1	Stabilization	+40 ± 2	20 ± 3	8

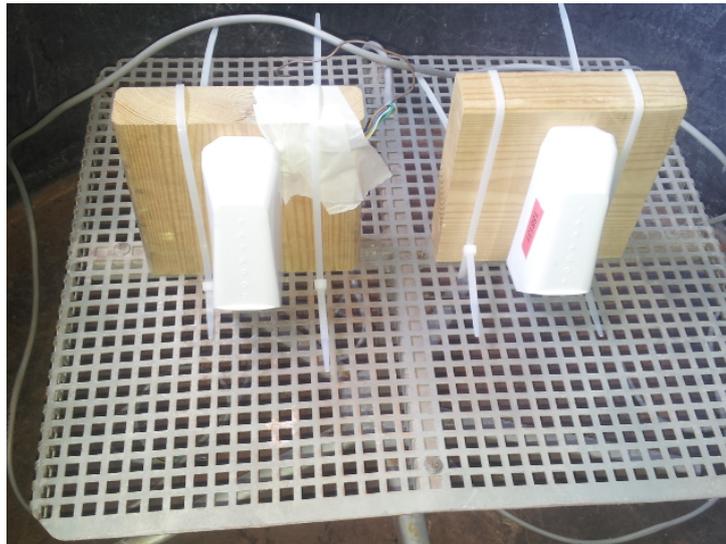
Plot 6.7.1 Temperature - humidity monitoring during dust test





Test specification:	IP 5X: Dust- protected (Category 2) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 9 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60529 TEST PROCEDURE: IP5X, Dust-Protected SECTIONS:13.4, 13.5 CATEGORY: 2 enclosures		
Test mode:	Compliance	Verdict:	PASS
Test Date:	14-May-15		
Atmospheric conditions during the test:	Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 50%
Remarks:			

Photograph 6.7.1 The EUT in the dust chamber (before the test)



Photograph 6.7.2 The EUT in the dust chamber (after the test)





Test specification:	IP 5X: Dust- protected (Category 2) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 9 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60529 TEST PROCEDURE: IP5X, Dust-Protected SECTIONS:13.4, 13.5 CATEGORY: 2 enclosures		
Test mode:	Compliance	Verdict:	PASS
Test Date:	14-May-15		
Atmospheric conditions during the test:	Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 50%
Remarks:			

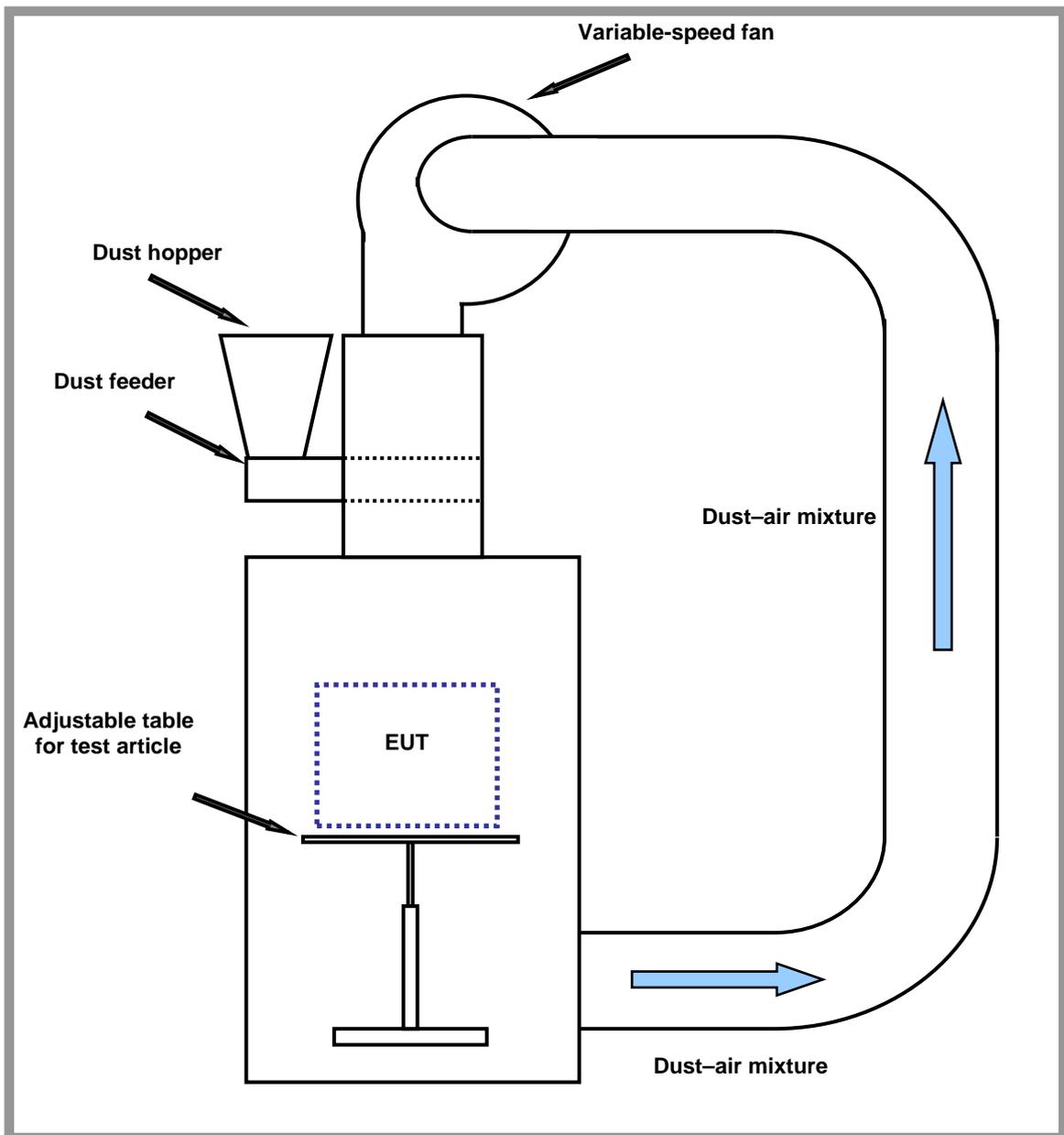
Photograph 6.7.3 The EUT inside inspection after the test





Test specification:	IP 5X: Dust- protected (Category 2) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 9 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60529 TEST PROCEDURE: IP5X, Dust-Protected SECTIONS:13.4, 13.5 CATEGORY: 2 enclosures		
Test mode:	Compliance	Verdict:	PASS
Test Date:	14-May-15		
Atmospheric conditions during the test:	Temperature: 25 °C	Air Pressure: 1011 hPa	Relative Humidity: 50%
Remarks:			

Figure 6.7.1 Dust setup block scheme





Test specification:	Sinusoidal Vibration (endurance) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 17 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

6.8 Sinusoidal vibration (endurance) test procedure and results

6.8.1 Test purpose

The test was performed to demonstrate the EUT ability to withstand the long-term effects of vibration at levels appropriate to the environment.

6.8.2 Test procedure

6.8.2.1 After BDT the EUTs in non-operational mode and the control accelerometer were installed on the vibration test system, as presented in Figure 6.8.1 and Photograph 6.8.1.

6.8.2.2 The required vibration level was applied to the EUTs, along the vertical axes, according to EN 50130-5 standard Class IV requirements, as presented in Table 6.8.2.

6.8.2.3 The Paragraphs 6.8.2.1 and 6.8.2.2 were repeated for two other excitation axes, as presented in Figure 6.8.1, Photograph 6.8.2 and Photograph 6.8.3.

6.8.2.4 The control accelerometer signal was monitored and results are presented in Plots from 6.8.1 to 6.8.3.

6.8.2.5 A visual inspection followed by BDT was performed after the sinusoidal vibration test.

6.8.3 Test results

Table 6.8.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. The EUT passed the BDT. The EUT passed the sinusoidal vibration test (endurance).	Pass

Reference numbers of test equipment used:

HL 2190	HL 3460	HL 4020	HL 4888	HL 3953	HL 3960
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Full description is given in Appendix A.



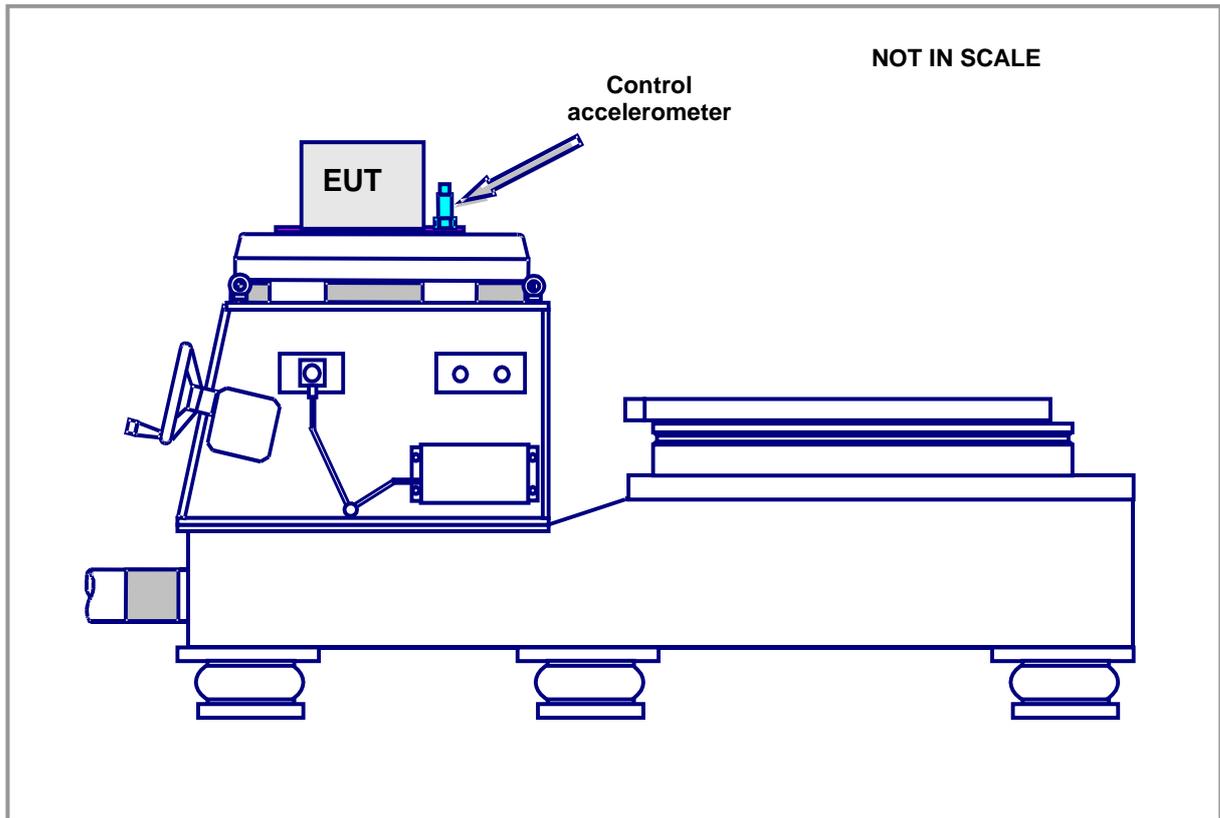
Test specification:		Sinusoidal Vibration (endurance) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 17 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)	
Test mode:		Compliance	
Test Date:		28-Apr-15 - 29-Apr-15	
Atmospheric conditions during the test:		Temperature: 23.4 °C	Air Pressure: 1010 hPa
Remarks:		Relative Humidity: 48 %	Verdict: PASS

Table 6.8.2 Sinusoidal vibration test profile (Endurance)

Frequency range, Hz	Frequency, Hz	Displacement, (mm) Peak-Peak	Velocity, (m/s) Peak	Acceleration, (m/s ²) Peak	Duration (per each axis) min
10-150	10	5.066	0.159	10.000	157
	150	0.023	0.011	10.000	

Note: Number of sweep cycles / axis / functional mode =20 cycles (1 Octave / min).

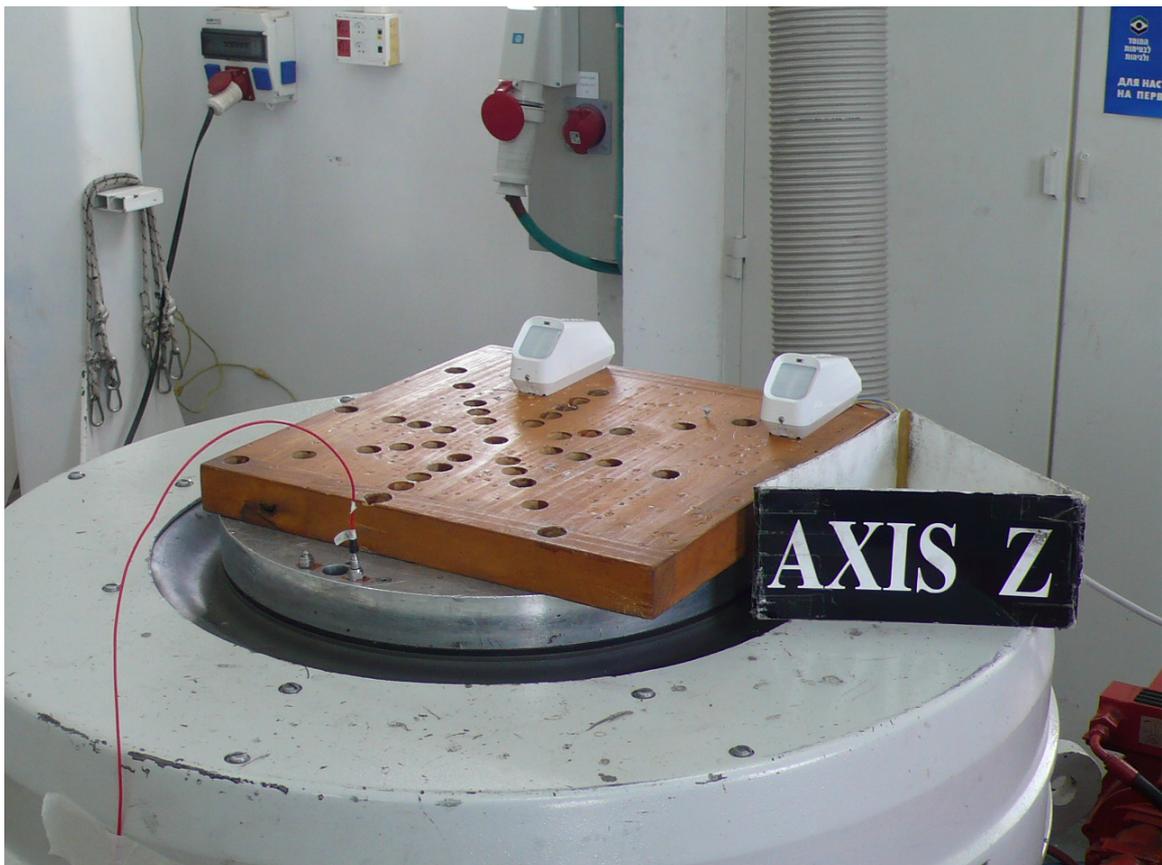
Figure 6.8.1 Sinusoidal vibration test setup





Test specification:	Sinusoidal Vibration (endurance) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 17 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Photograph 6.8.1 Sinusoidal vibration test setup (vertical axis)





Test specification:	Sinusoidal Vibration (endurance) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 17 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Photograph 6.8.2 Sinusoidal vibration test setup (transverse axis)



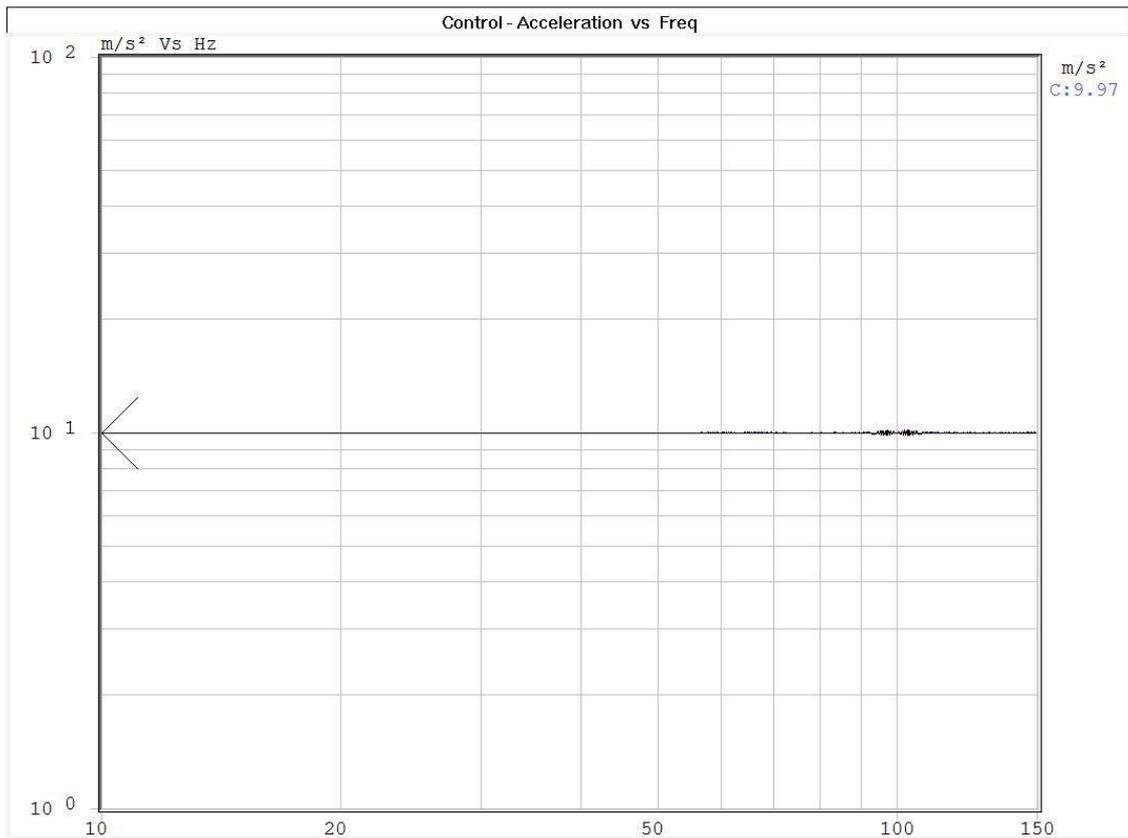
Photograph 6.8.3 Sinusoidal vibration test setup (longitudinal axis)





Test specification:	Sinusoidal Vibration (endurance) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 17 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

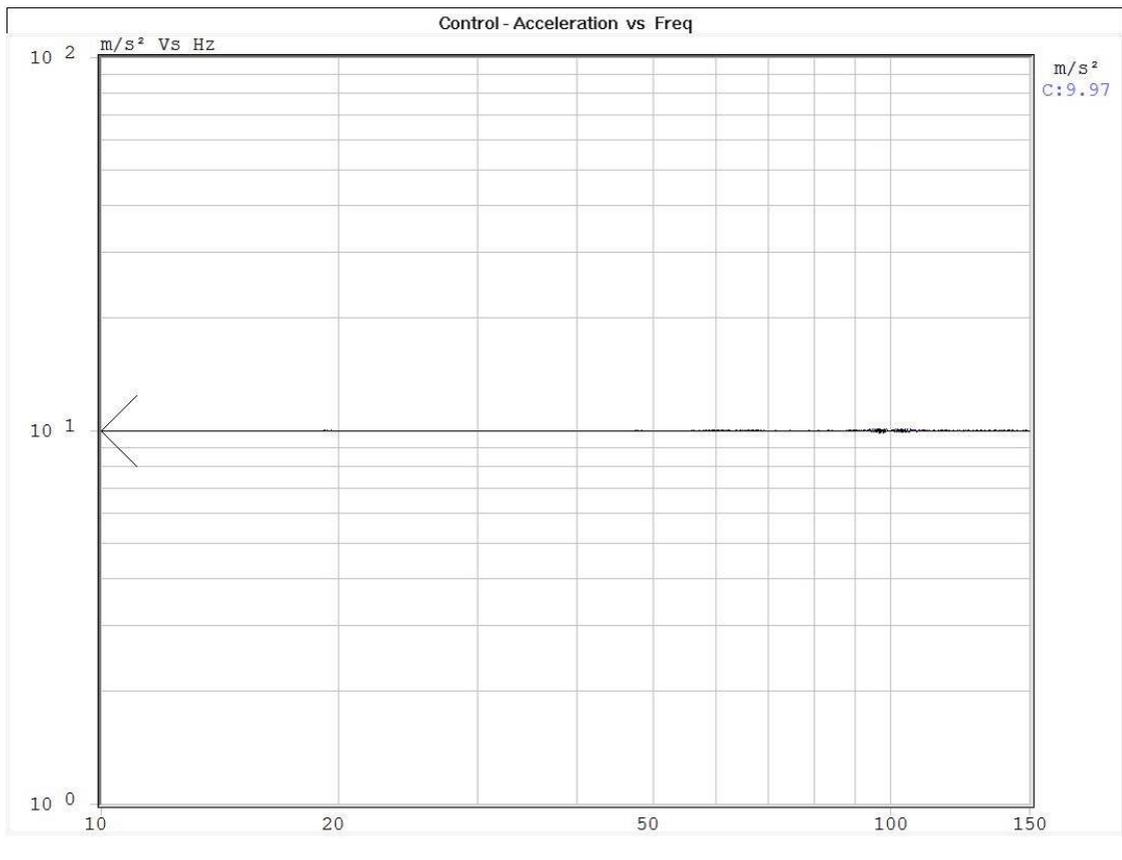
Plot 6.8.1 Sinusoidal vibration along vertical axis (endurance)





Test specification:	Sinusoidal Vibration (endurance) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 17 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

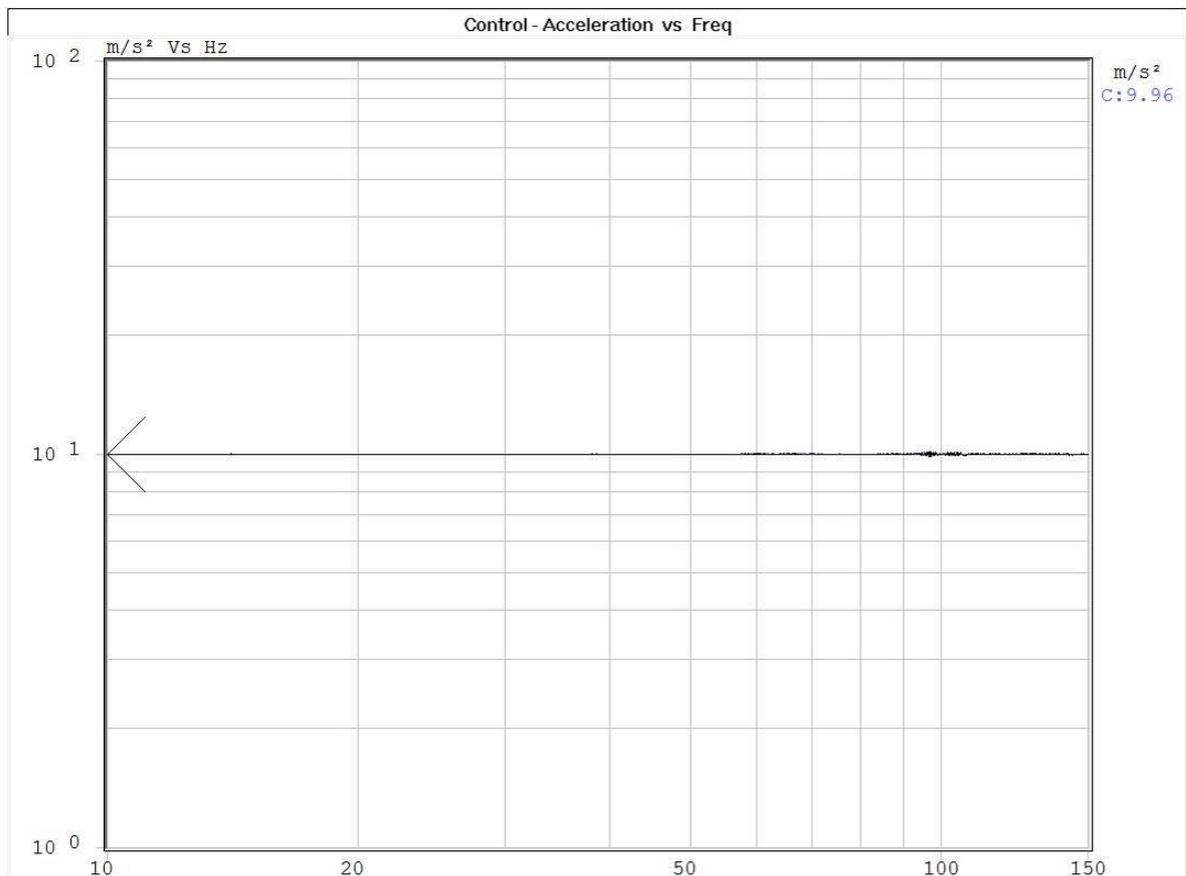
Plot 6.8.2 Sinusoidal vibration along transverse axis (endurance)





Test specification:	Sinusoidal Vibration (endurance) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 17 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Plot 6.8.3 Sinusoidal vibration along longitudinal axis (endurance)





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

6.9 Sinusoidal vibration (operational) test procedure and results

6.9.1 Test purpose

The test was performed to demonstrate the EUT ability to withstand the long-term effects of vibration at levels appropriate to the service environment.

6.9.2 Test procedure

- 6.9.2.1** After BDT the EUTs in operational mode and the control accelerometer were installed on the vibration test system, as presented in Figure 6.9.1 and Photograph 6.9.1.
- 6.9.2.2** The required vibration level was applied to the operational EUTs according to EN 50130-5 standard Class IV requirements, as presented in Table 6.9.2.
- 6.9.2.3** The Paragraphs 6.9.2.1 and 6.9.2.2 were repeated for two other excitation axes, as presented in Figure 6.9.1, Photograph 6.9.2 and Photograph 6.9.3.
- 6.9.2.4** The control accelerometer signal was monitored and results are presented in Plots from 6.9.1 to 6.9.3.
- 6.9.2.5** A visual inspection and BDT were performed after the sinusoidal vibration test.

6.9.3 Test results

Table 6.9.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All BDT passed. No un intentional signals or messages, no change in system status (armed). The EUT passed the sinusoidal vibration test (operational).	Pass

Reference numbers of test equipment used:

HL 2190	HL 3460	HL 4020	HL 4888	HL 3953	HL 3960
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Full description is given in Appendix A.



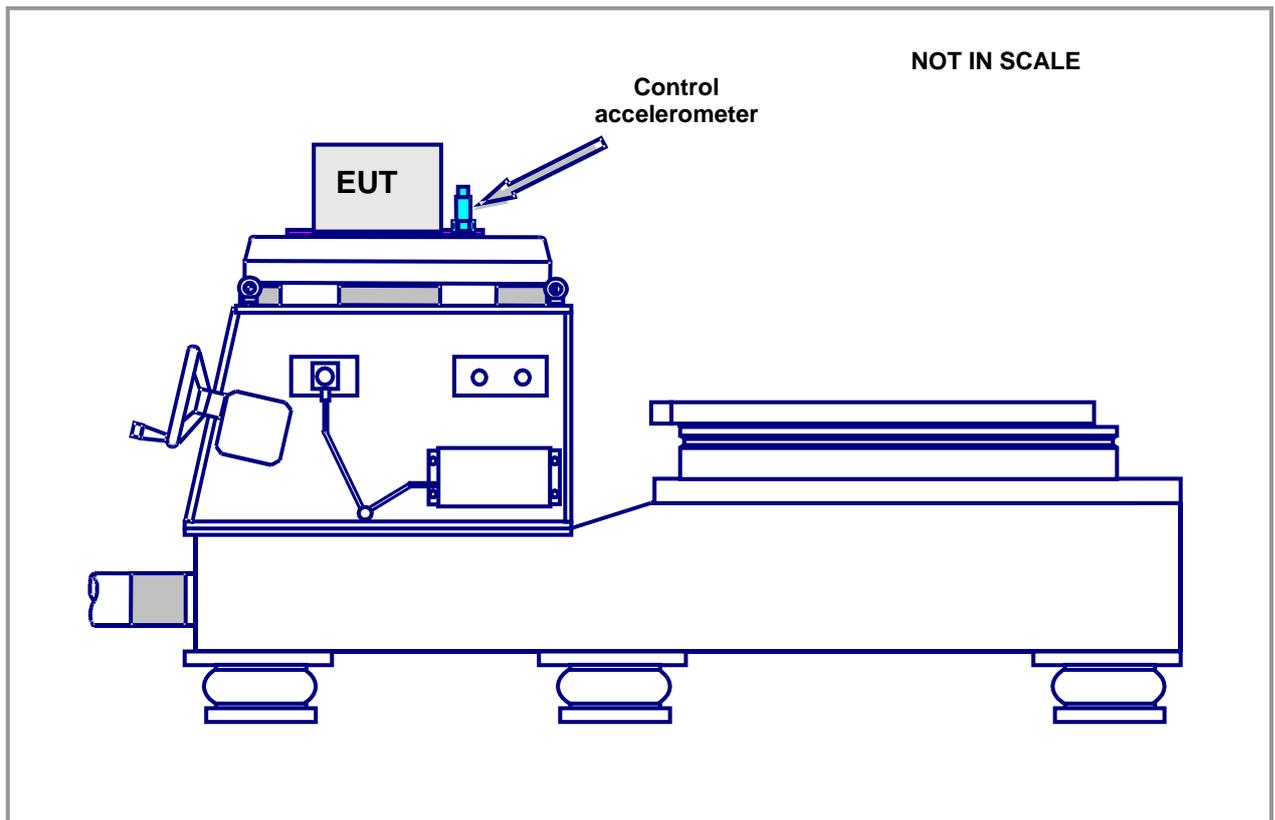
Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Table 6.9.2 Sinusoidal vibration test profile (operational)

Frequency range, Hz	Frequency, Hz	Displacement, (mm) Peak-Peak	Velocity, (m/s) Peak	Acceleration, (m/s ²) Peak	Duration (per each axis) min
10-150	10	2.533	0.080	5.000	07:50
	150	0.011	0.005	5.000	

Note: Number of sweep cycles / axis / functional mode =1 cycle (1 Octave / min).

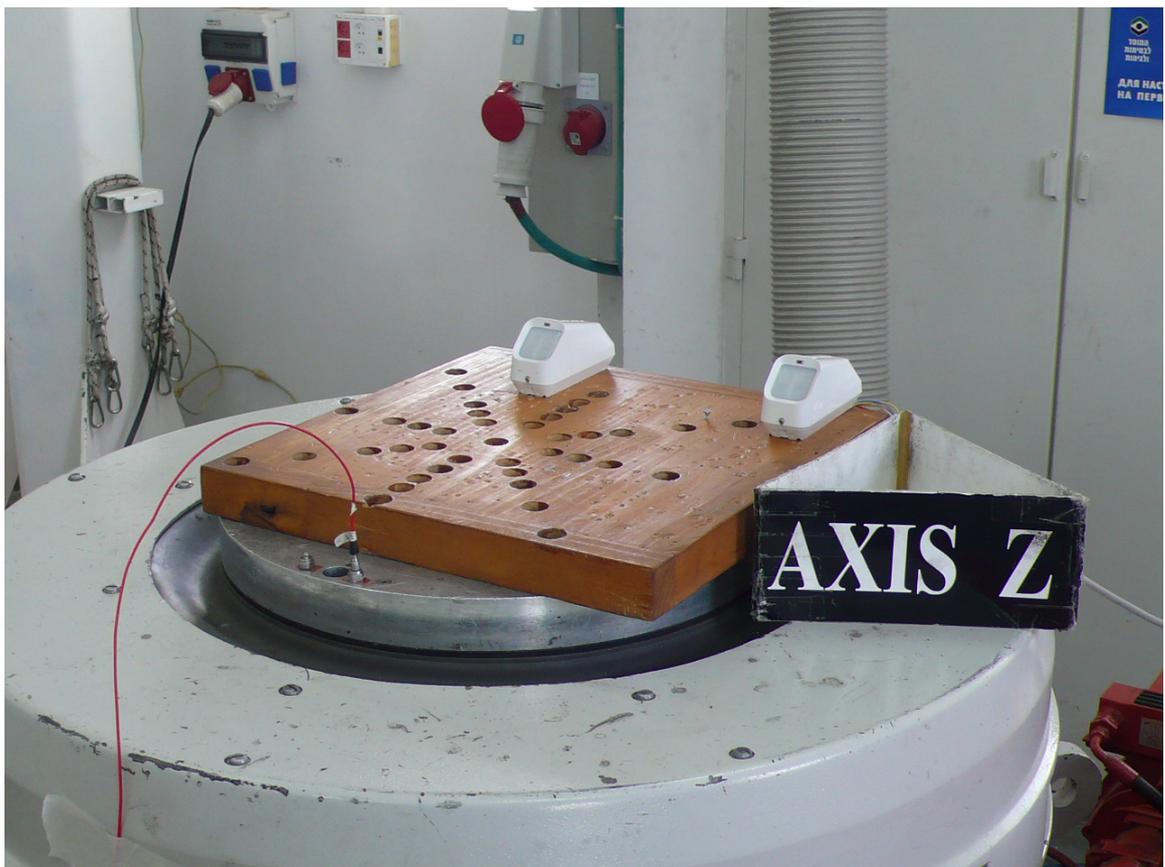
Figure 6.9.1 Sinusoidal vibration test setup





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Photograph 6.9.1 Sinusoidal vibration test setup (vertical axis)





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Photograph 6.9.2 Sinusoidal vibration test setup (transverse axis)



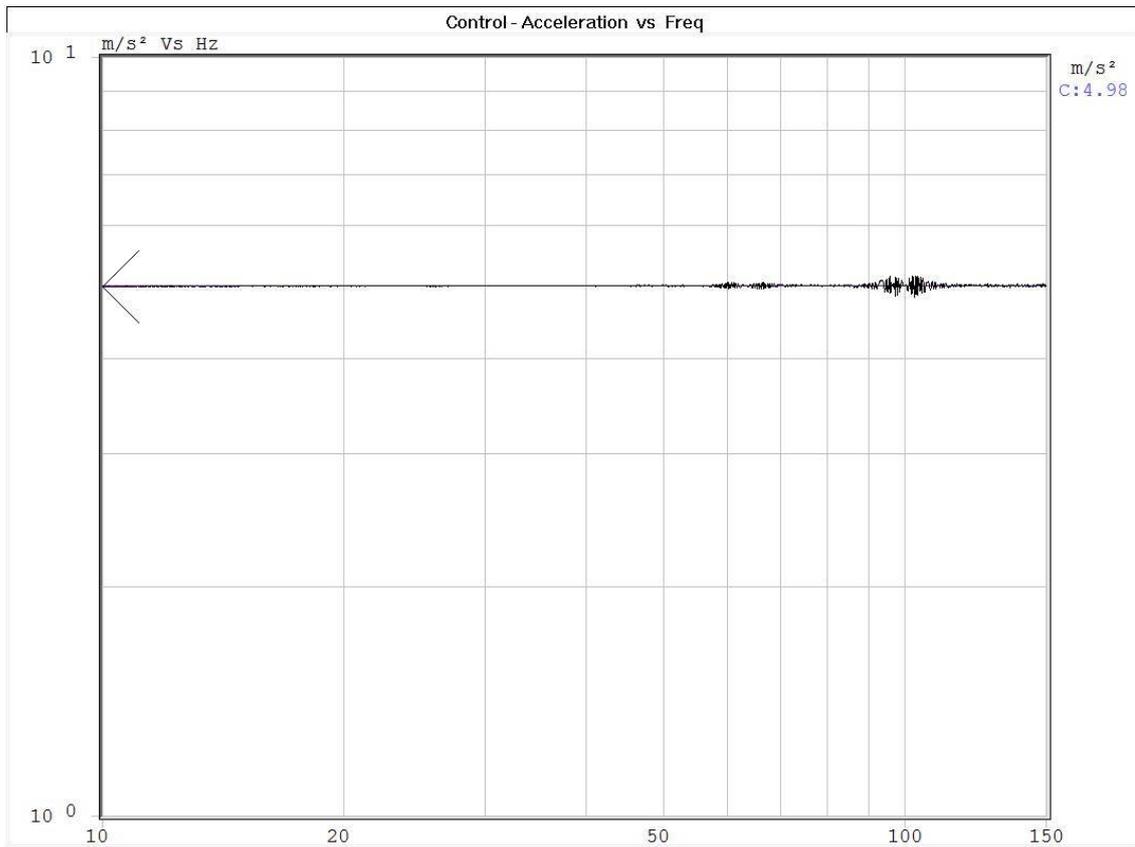
Photograph 6.9.3 Sinusoidal vibration test setup (longitudinal axis)





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

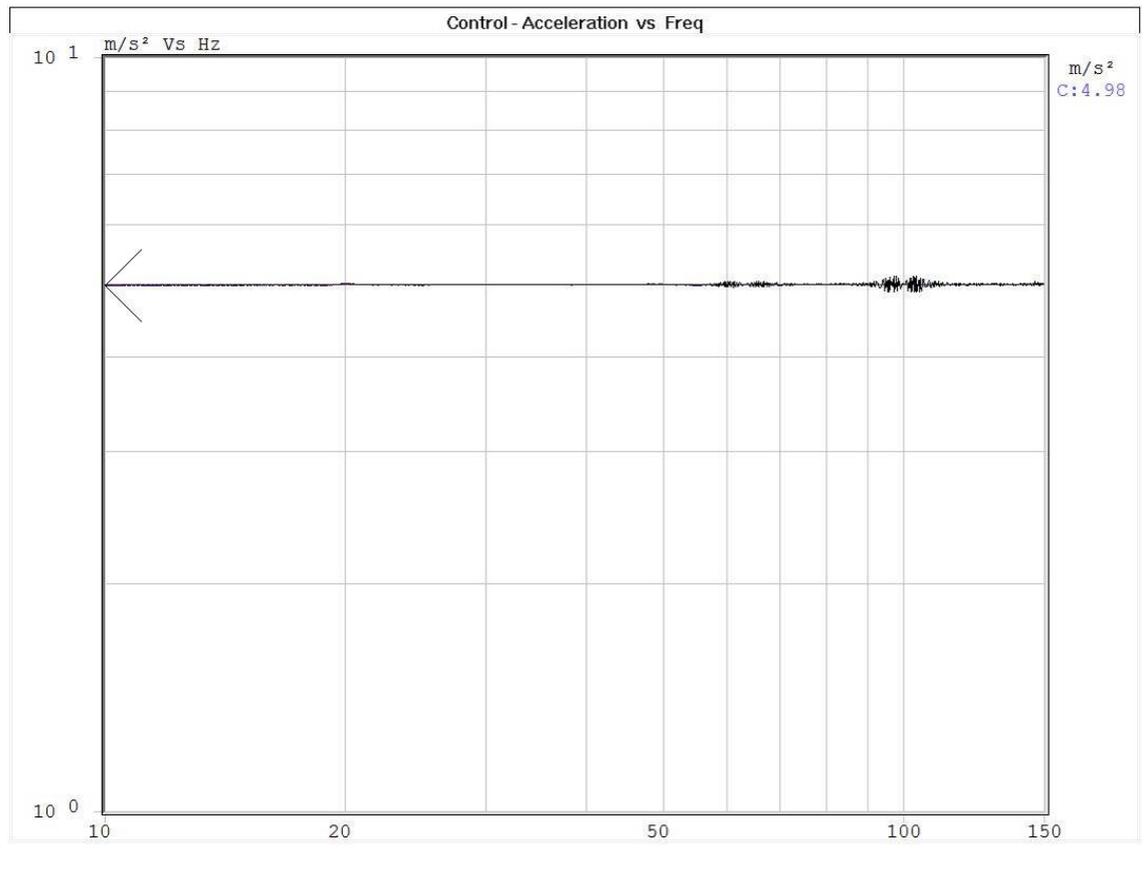
Plot 6.91 Sinusoidal vibration along vertical axis (operational)





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

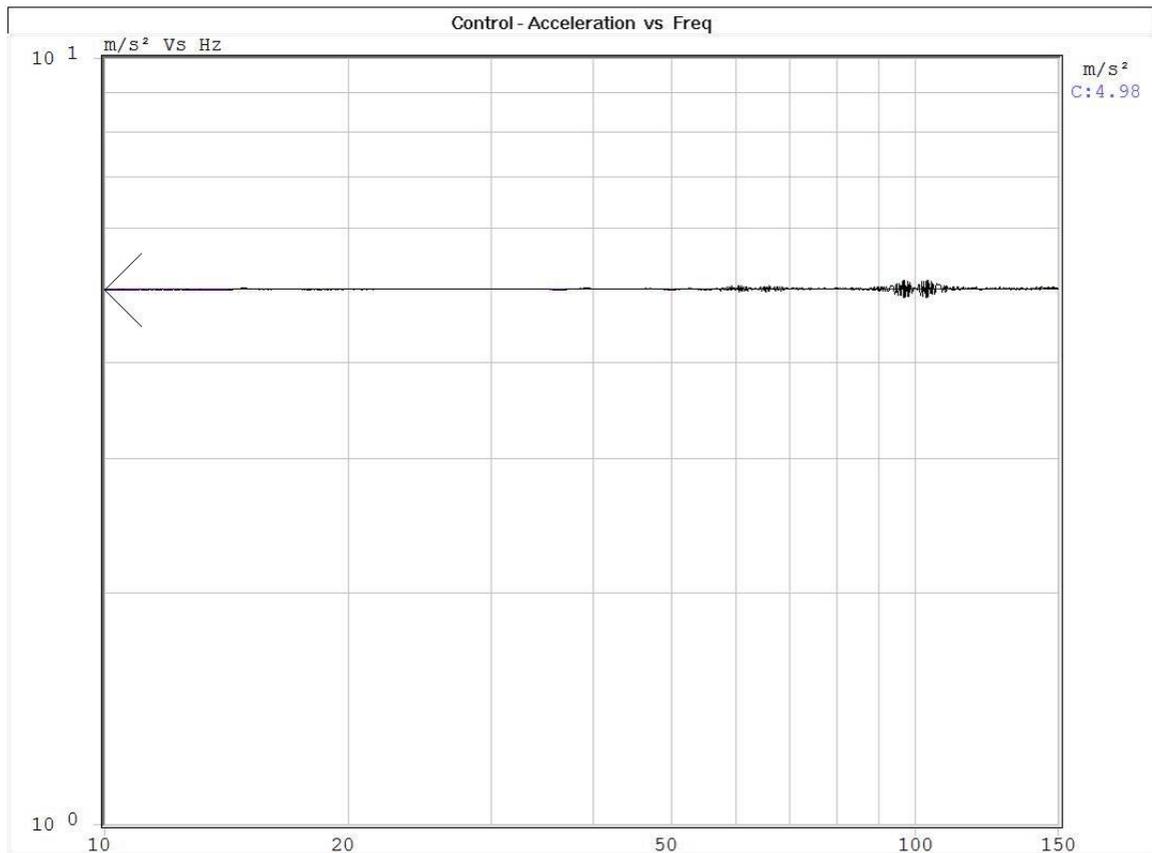
Plot 6.9.2 Sinusoidal vibration along transverse axis (operational)





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Plot 6.9.3 Sinusoidal vibration along longitudinal axis (operational)





Test specification:		Shock (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock	
Test mode:		Compliance	
Test Date:		28-Apr-15 - 29-Apr-15	
Atmospheric conditions during the test:		Temperature: 23.4 °C	Air Pressure: 1010 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 48 %	

6.10 Shock (Operational) test procedure and results

6.10.1 Test purpose

This test was performed to demonstrate the EUT immunity to mechanical shocks, which are likely to occur, in the service environment.

6.10.2 Test procedure

6.10.2.1 After BDT, the EUTs in operational mode were fastened to the shaker's armature as presented in Figure 6.10.1 and Photograph 6.10.1.

6.10.2.2 The shocks were applied to the EUTs along the vertical axis, according to EN 50130-5 standard Class IV, as presented in Table 6.10.2.

6.10.2.3 The Paragraphs 6.10.2.1 and 6.10.2.2 were repeated for two other excitation axes, as presented in Figure 6.10.1, Photograph 6.10.2 and Photograph 6.10.3.

6.10.2.4 The control accelerometer signal was monitored and results are presented in Plots from 6.10.1 to 6.10.6.

6.10.2.5 A visual inspection followed by a BDT was performed.

6.10.3 Test results

Table 6.10.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All BDT passed. No un intentional signals or messages, no change in system status (armed). The EUTs passed the Shock operational test	Pass

Reference numbers of test equipment used:

HL 2190	HL 3460	HL 4020	HL 4888	HL 3953	HL 3960
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Full description is given in Appendix A.

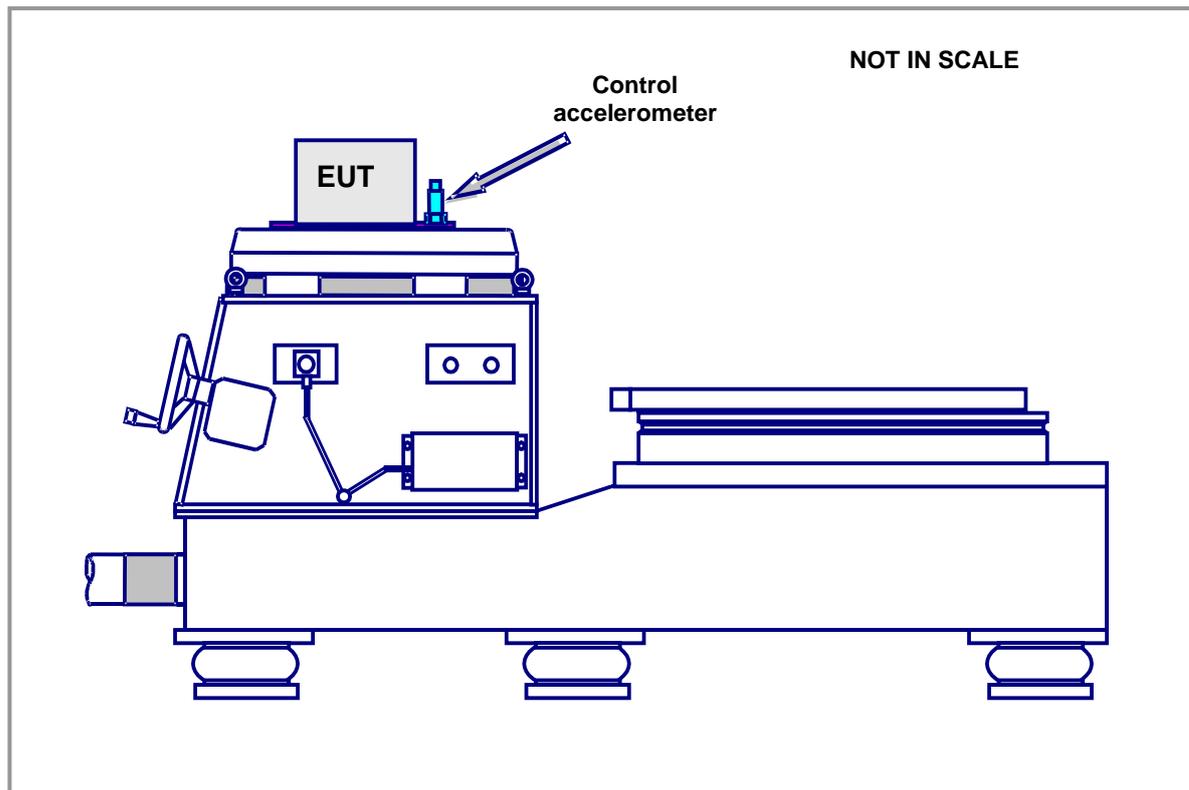


Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Table 6.10.2 Shock test specification (Operational)

Parameter	Unit	Severity
Amplitude	m/s ²	980
Pulse type	N/A	half sine
Pulse width	ms	6
Direction of shocks	±Z, ±X, ±Y	6
Number of pulses per direction	N/A	3
Total number of pulses	N/A	18

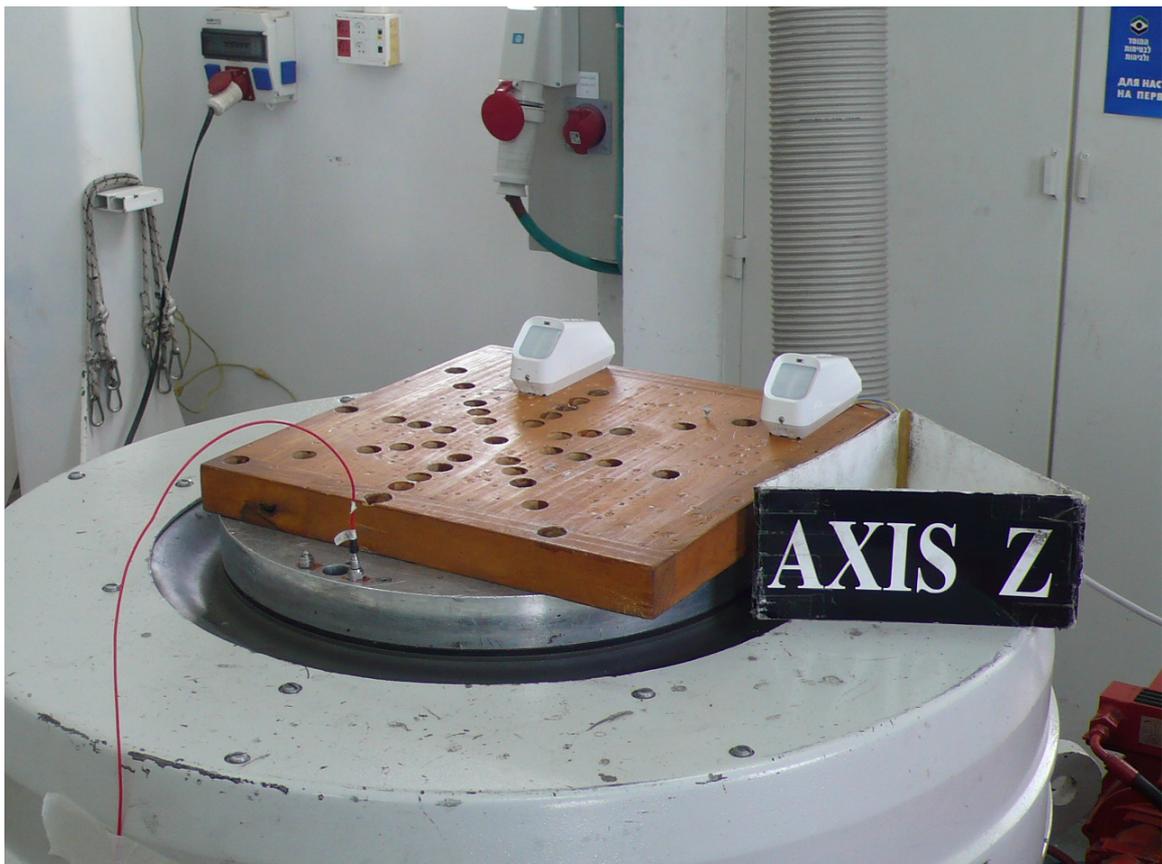
Figure 6.10.1 Shock test setup





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Photograph 6.10.1 Shock test setup (vertical axis)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Photograph 6.10.2 Shock test setup (transverse axis)



Photograph 6.10.3 Shock test setup (longitudinal axis)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Plot 6.10.1 The positive shock pulse along vertical axis (operational)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

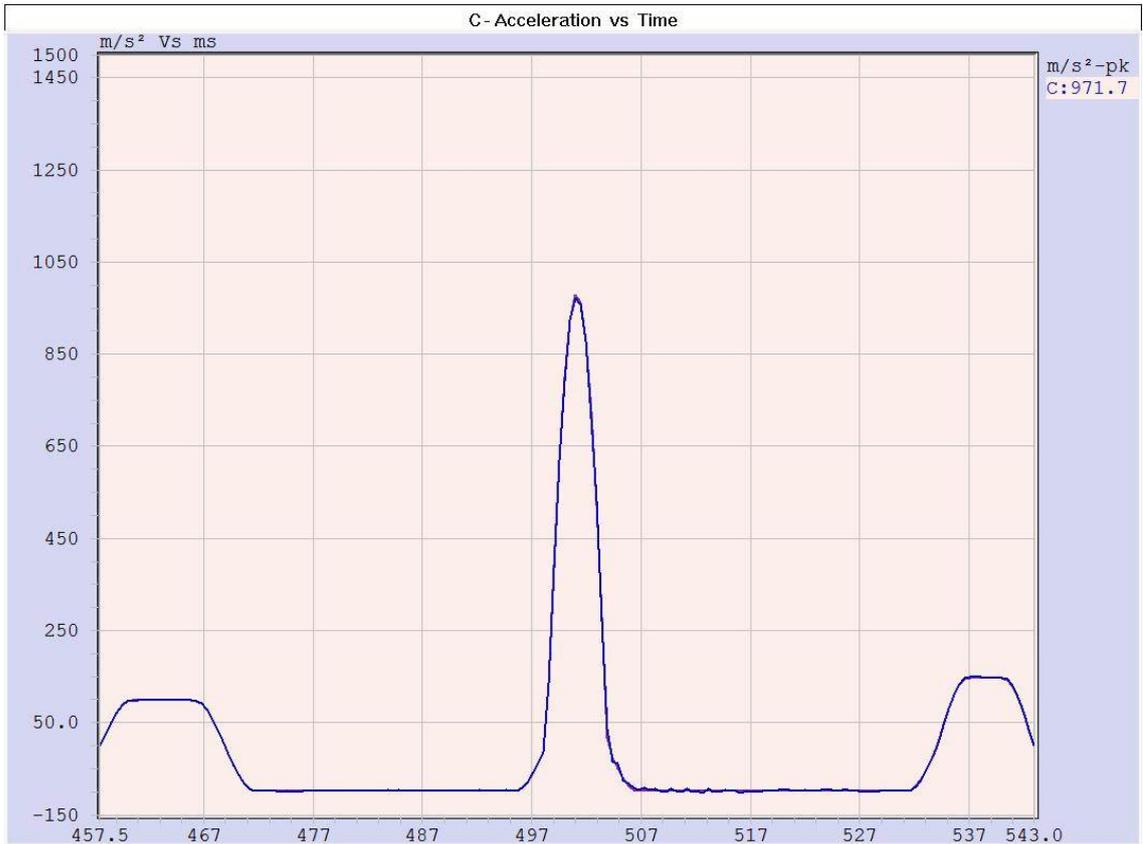
Plot 6.10.2 The negative shock pulse along vertical axis (operational)





Test specification:		Shock (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock	
Test mode:		Compliance	
Test Date:		28-Apr-15 - 29-Apr-15	
Atmospheric conditions during the test:		Temperature: 23.4 °C	Air Pressure: 1010 hPa
			Relative Humidity: 48 %
Remarks:			
		Verdict:	PASS

Plot 6.10.3 The positive shock pulse along transverse axis (operational)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

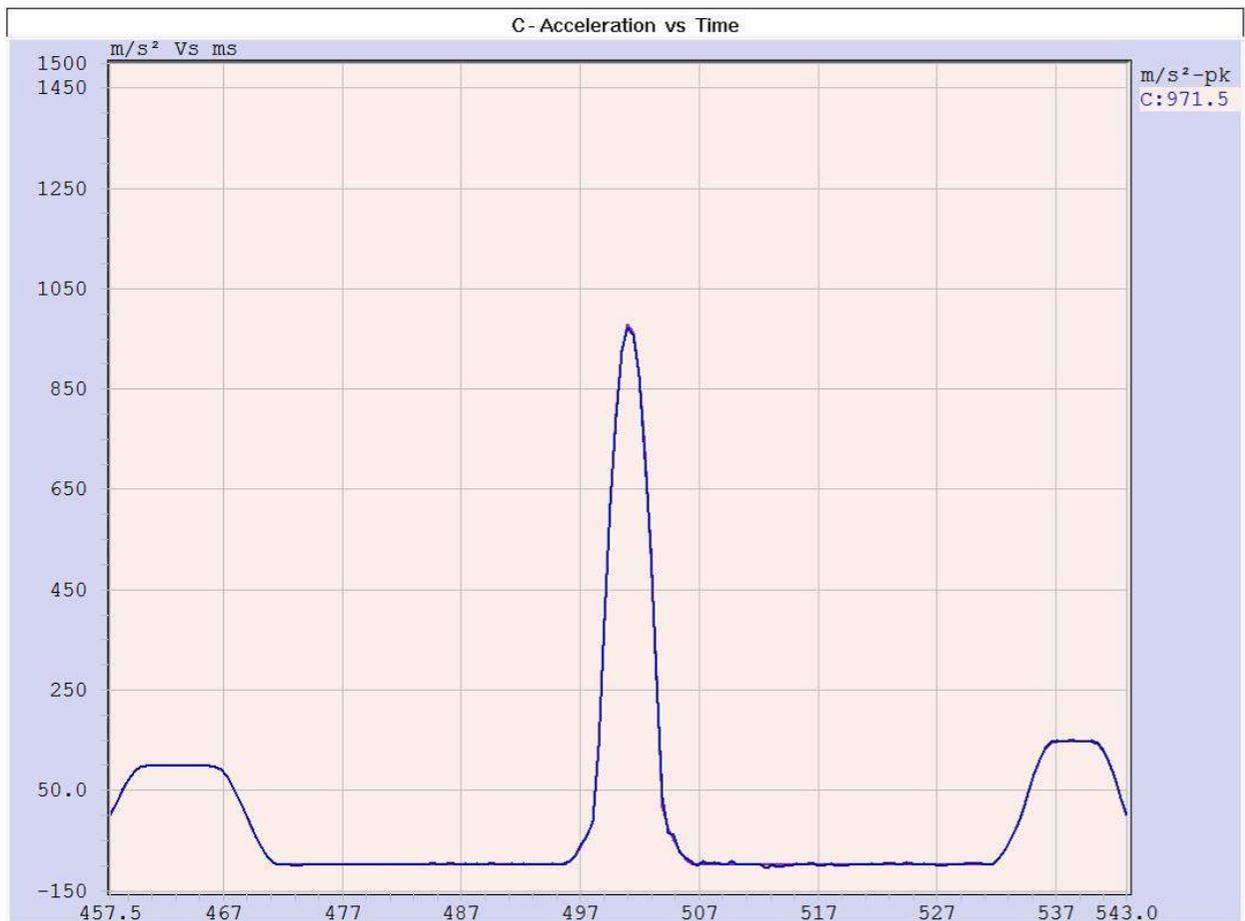
Plot 6.10.4 The negative shock pulse along transverse axis (operational)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Plot 6.10.5 The positive shock pulse along longitudinal axis (operational)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	28-Apr-15 - 29-Apr-15		
Atmospheric conditions during the test:	Temperature: 23.4 °C	Air Pressure: 1010 hPa	Relative Humidity: 48 %
Remarks:			

Plot 6.10.6 The negative shock pulse along longitudinal axis (operational)





Test specification:		Impact (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 14 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-75 Test Eh: Hammer tests	
Test mode:		Compliance	
Test Date:		29-Apr-15	
Atmospheric conditions during the test:		Temperature: 24 °C	Air Pressure: 1012 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 46 %	

6.11 Impact (Operational) test procedure and results

6.11.1 Test purpose

The impact test was performed to demonstrate EUT immunity to mechanical impacts upon the surface, which it may sustain in the normal service environment.

6.11.2 Test procedure

6.11.2.1 The EUTs were installed in their operational position, as presented in Photograph 6.11.1.

6.11.2.2 The EUTs were subjected to impacts (according to Table 6.11.2) from a small hemispherical hammer-head on any exposed surfaces of the each EUT.

6.11.2.3 A visual inspection followed by a functional test was performed after the impact test.

6.11.3 Test results

Table 6.11.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. BDT passed before and after test. No un intentional signals or messages. The EUT passed the impact test.	Pass

Reference numbers of test equipment used:

HL 3013

Full description is given in Appendix A.



Test specification:		Impact (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 14 ENVIRONMENTAL CLASS: IV TEST METHOD: IEC 60068-2-75 Test Eh: Hammer tests	
Test mode:		Compliance	
Test Date:		29-Apr-15	
Atmospheric conditions during the test:		Temperature: 24 °C	Air Pressure: 1012 hPa
Remarks:		Relative Humidity: 46 %	Verdict: PASS

Table 6.11.2 Impact test configuration

EUT name	Impact energy (J)	Number of points	Number of impacts per point	Number of exposed surfaces
NVR35M	1	5	3	5
NV35M	1	5	3	5

Photograph 6.11.1 Impact test setup



**7 APPENDIX A Test equipment and ancillaries used for tests**

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./Check	Due Cal./Check
574	Humidity Chamber, temperature range: -70 to +177 deg C, RH: 10 to 98%.	Tenney Engineering	Tenney 14	19	07-Apr-15	07-Apr-16
3599	HygroThermometer, (0 to +50) °C, internal sensor, (-50 to +70) °C external sensor	Delta TRAK	13307	NA	22-May-14	22-May-15
3821	Chamber, Temperature from -70 to 177 °C, Humidity from 20 to 98% RH	Thermotron	SM-18C-3-3	25137	02-Apr-15	02-Apr-16
1959	Humidity and Temperature Controller with Adaptor RS 232/RS 485	Hermon Laboratories	HTCL-2	1959	07-Apr-15	07-Apr-16
2906	Temperature / Humidity Test Chamber, -60°C to +180°C, 15-95% RH	Thermotron	S-8C	557/12808 RF	01-Apr-15	01-Apr-16
2663	Flowmeter, 12-115 LPM	Blue-White Industries Ltd	F-451	0403	04-May-15	04-May-16
3600	HygroThermometer, (0 to +50) °C, internal sensor, (-50 to +70) °C external sensor	Delta TRAK	13307	NA	22-May-14	22-May-15
2143	Rain Test Spray- head Piping, UL50, MIL-STD-108E	Hermon Laboratories	WS1	2143	03-Jun-14	03-Jun-15
3633	Tape-measure, 8 m	The Stanley works Israel Ltd	33-198	NA	18-Dec-14	18-Dec-15
1420	Digital Thermo Anemometer	Dwyer Instruments	471	NA	29-Apr-15	29-Apr-16
1932	Walk-in Chamber	Hermon Laboratories	WC-1	1932	20-Jul-14	20-Jul-15
1974	Humidity and Temperature Controller	Hermon Laboratories	HTCL-3	1974	28-May-14	28-May-15
3931	Humidity & Temperature sensors	CARLO GAVAZZI	CGESHT D AL	NA	21-May-14	21-May-15
2449	Precision Barometer, 910 - 1060 hPa	LUFFT Mess-und Regeltechnik GmbH	2039.7039 2	100087	12-May-13	12-May-15
950	Dehumidifier	Munters	MG90	950	20-Jul-14	20-Jul-15
3013	ED&D Universal Spring Hammer	Educated Design & development, Inc.	F 22.50	11145127	29-Dec-14	29-Dec-16
2190	Vibration Test System (Amplifier #SP6893-011/1, Remote Control Panel #SP6963-008/1, Vibrator #SP6893-005/1, Slip Table, Driver Bar, Pomp, Fan, Head Expander)	Ling Dynamic Systems	V875	SP6963-005/1-011/1	23-Apr-15	23-Apr-16
3460	Precision Barometer, 870 - 1050 hPa	LUFFT Mess-und	DKD-K-26701	100469	07-May-14	07-May-16



HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./Check	Due Cal./Check
		Regeltechnik GmbH				
4020	Temp. & Humidity Meter, (-50 - +70) deg, (20 - 99)% RH	Mad Electronics	HTC-1	NA	03-Sep-14	03-Sep-15
4888	APEX SL VIBRATION CONTROLLER	Unholtz-Dickie	Apex SL	1244	31-Mar-15	31-Mar-16
3953	Isotron Accelerometer 100.2 mV/g	Dytran Instruments Inc.	3256A2	10373	12-Mar-15	12-Mar-16
3960	Isotron Accelerometer 10.2 mV/g	Dytran Instruments Inc.	3049E1	711	12-Mar-15	12-Mar-16



8 APPENDIX B Test laboratory description

The tests were performed at Hermon Laboratories Ltd., which is a fully independent, private Environmental, EMC, Radio, Product safety and telecommunication testing facility recognized through the entire world. The Laboratory is accredited by American Association for Laboratory Accreditation (A2LA, USA) for Environmental testing (Certificate No. 0839.04, Mechanical testing).

Address: P.O. Box 23, Binyamina 30500, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

9 APPENDIX C Abbreviations and acronyms

BDT	basic detection test
°C	degree Celsius
cm	centimeter
dB	decibel
EUT	equipment under test
g_n	acceleration due to gravity
HL	Hermon Laboratories
hPa	hectopascal
Hz	Hertz
kg	kilogram
m	meter
min	minute
ms	millisecond
oct	octave
pH	acidity scale
RMS	root mean square
RH	relative humidity
s	second

10 APPENDIX D Tests specifications

- | | | |
|-----|------------------------------------|--|
| 1. | EN 50130-5:2011 | Alarm systems -
Part 5: Environmental test methods |
| 2. | IEC 60068-2-1:07 | Environmental Testing - Part 2: Tests – Tests A: Cold |
| 3. | IEC 60068-2-2:07 | Environmental Testing - Part 2: Tests - Tests B:
Dry Heat |
| 4. | IEC 60068-2-6:07 | Environmental testing - Part 2: Tests - Test Fc: Vibration
(Sinusoidal) |
| 5. | IEC 60068-2-14:09 | Environmental Testing - Part 2: Tests - Test N:
Change of Temperature |
| 6. | IEC 60068-2-27:08 | Environmental Testing - Part 2:
Tests - Test Ea and Guidance: Shock |
| 7. | IEC 60068-2-30:05 | Environmental Testing - Part 2-30: Tests - Test Db:
Damp Heat, Cyclic (12 h + 12 h cycle) |
| 8. | IEC 60068-2-32:75 + A1:88 + A2:90; | Environmental Testing - Part 2: Tests - Test Ed:
Free Fall (Procedure 1) |
| 9. | IEC 60068-2-75:97 | Environmental testing - Part 2: Tests - Test Eh:
Hammer Tests |
| 10. | IEC 60068-2-78:01 | Environmental Testing - Part 2-78: Tests - Test 2-78: Body Cab:
Damp Heat, Steady State |
| 11. | IEC 60529:89+A1:99 | Degrees of Protection Provided by Enclosure (IP Code) |
| 12. | Dust IP Code TP-5_2013 | Dust Test Procedure according to IEC 60068-2-68, IEC 60529
standards |
| 13. | Impact_TP-2_2011 | Impact Test Procedure according to EN 50130-5 and
IEC 60068-2-75 Test Ehb |
| 14. | Temperature and humidity TP-8_2014 | Temperature And Humidity Test Procedure according to
MIL-STD-202G, MIL-STD- 810 B, C, D, E, F, G, RTCA DO-160D, E,
F, G, IEC 60068-2-1, -2, -14, -30, - 38, -56, -78 and GR-63-CORE
standards |
| 15. | Vibration and shock TP-7_2014 | Vibration And Shock Test Procedure according to MIL-STD – 810 B,
C, D, E, F, G, MIL-STD-167 -1A, GR-63-CORE, IEC 60068-2-6, -27,
-29, -64, RTCA DO-160D, E, F, G, ASTM D999 and ISTA 2A
standards |
| 16. | Water IP Code TP-7_2014 | Water Test Procedure according to IEC 60068-2-18, IEC 60529
standards |

**11 APPENDIX E Measurement uncertainties**

Parameter	Uncertainty estimation at 95% confidence	
	Calculated	Limit
Air pressure	± 1.16 mBar	± 4.1 mBar
High (Low) temperature – HL 574, 1932	$\pm 2.2^{\circ}\text{C}$	± 2 (3) $^{\circ}\text{C}$
High (Low) temperature – HL 2906, 3203	$\pm 1.4^{\circ}\text{C}$	± 2 (3) $^{\circ}\text{C}$
High (Low) temperature – HL 3821	$\pm 1.8^{\circ}\text{C}$	± 2 (3) $^{\circ}\text{C}$
Relative humidity	± 2.86 %	± 5.0 %
Sine acceleration	+14.8/-13.8 %	+41/-30 %
Shock acceleration	+7.2/-8.2 %	± 20.0 %
Water rate	3.6 %	5 %
Wind velocity	5 %	10 %

END OF TEST REPORT