

**Assessment Report on
Compliance with EN 45545-2
for Model “XNV-6022RM” and “XNV-6022R”**

Certificate Number: IB19030

Date Issued: February 7, 2019

Date Revised: April 5, 2024 (Revision 3)

Issued for:

Hanwha Vision Co., Ltd

6, Pangyo-ro 319 beon-gil, Bundang-gu, Seongnam-si,

Gyeonggi-do, 13488, Korea

Reported by:



Chemitox, Inc.

1-14-18 Kamiikedai, Ohta-ku, Tokyo 145-0064 Japan

A handwritten signature in black ink, appearing to read "Hiroaki Fujioka", written over a horizontal line.

Hiroaki Fujioka / Vice President

1. Objective

To assess the compliance with the series of standards EN 45545-2 for a product designed by the manufacturer, **Hanwha Vision Co., Ltd.** The assessment was conducted based on the information provided by the manufacturer.

2. Client Information

Company Name:	Hanwha Vision Co., Ltd
Company Address:	6, Pangyo-ro 319 beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, 13488, Korea

3. Reference Standards

EN 45545-1:2013 – Railway applications. Fire protection on railway vehicles. General

EN 45545-2:2020+A1:2023 – Railway applications. Fire protection on railway vehicles. Requirements for fire behaviour of materials and components

EN 60695-2-11:2021 – Fire hazard testing. Glowing/hot-wire based test methods. Glow-wire flammability test method for end-products (GWEPT)

4. Product Information

The product under assessment is a network camera designated “**XNV-6022RM**” and “**XNV-6022R**”. These products are made by **Hanwha Vision Co., Ltd.**

These products are developed and designed for application in rolling stock. The enclosure (top and bottom cover) is made of aluminum parts. The dome cover consists of a transparent polycarbonate. The products contain the functional components including printed circuit boards, and other miscellaneous materials inside the enclosure. They also have an outer cable assembly for communication. The difference between “**XNV-6022RM**” and “**XNV-6022R**” is only the outer cable specification.

The overall dimension of the both products is **100mm x 98.9mm with 52mm height**. The total mass of “**XNV-6022RM**” is **299.9g** and “**XNV-6022R**” is **300.9g**.

These products will be installed on the ceiling of rolling stocks. Only the front face will be exposed to a passenger area. While multiple number of the products can be used in one vehicle, each product will be installed separately.

The diagram of “**XNV-6022RM**” and “**XNV-6022R**” is shown in **Figure 1**. The breakdown structure of both products with the part list is shown in **Figure 2**. The part lists of “**XNV-6022RM**” and “**XNV-6022R**” with the information of each mass are shown in **Table 1** and **Table2** respectively.

This parts should not contain any substances which are specified in AH60-0033K

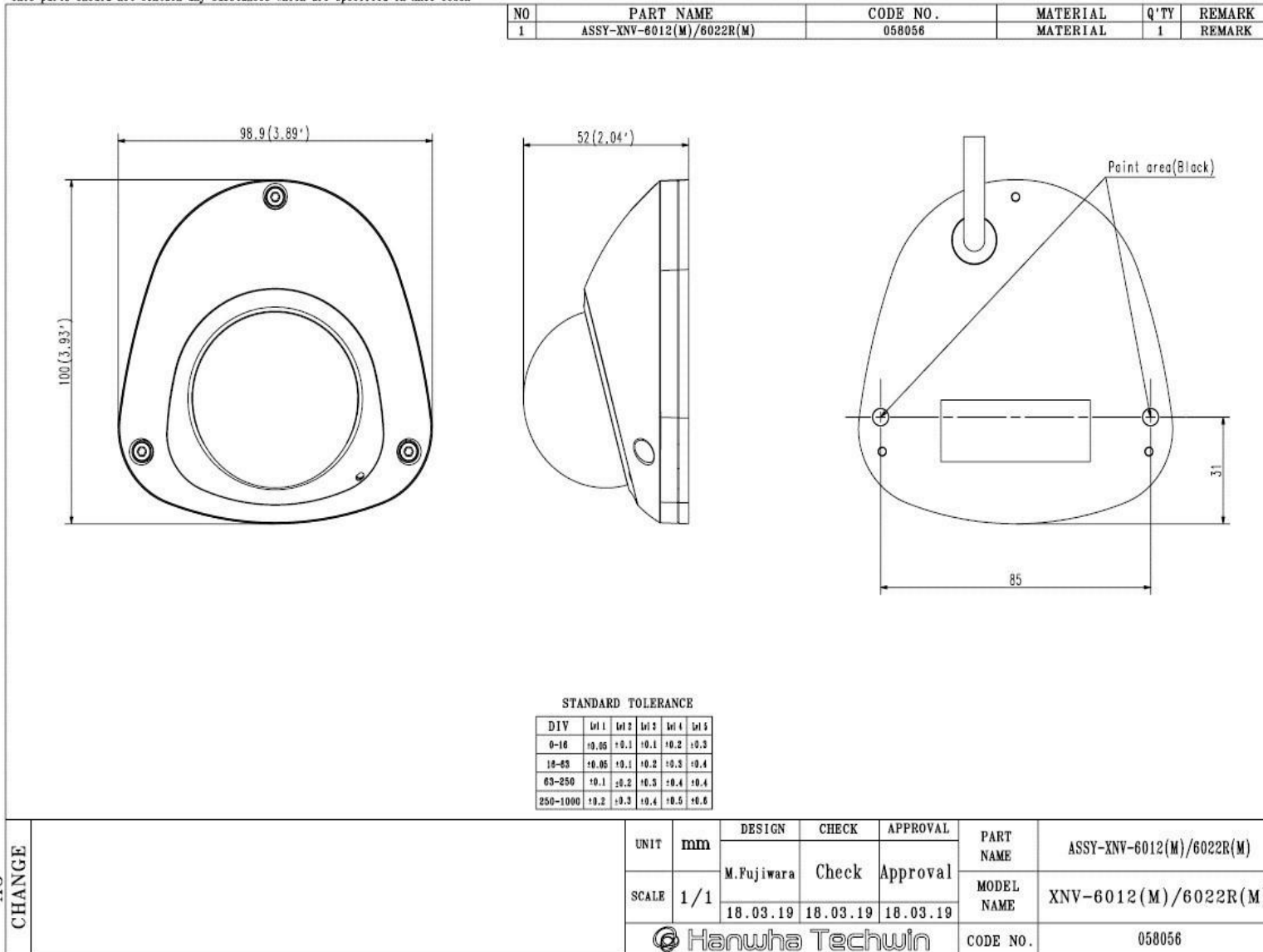
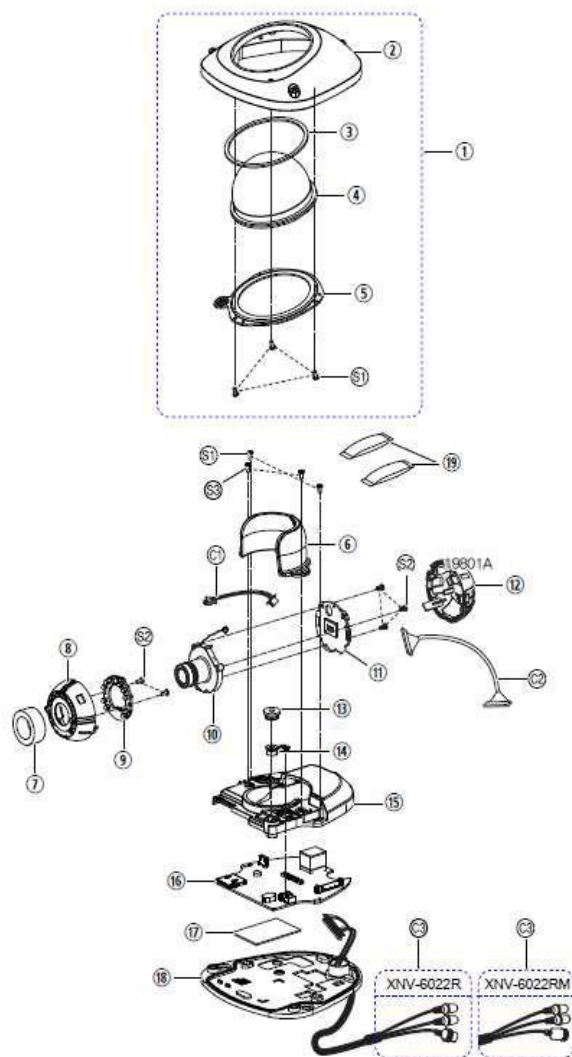


Figure 1: Diagram of "XNV-6022RM" and "XNV-6022R"

5-3 XNV-6022R/6022RM



Loc. No	Parts No.	Description	Specification	Q'ty	Availability	Remark
1	AM07-007536D	ASSY,CASE-TOP-WISENET,SNV-L8014RM	Logo: WISENET	1	SA	
2	FC29-007846D	CASE-TOP-WISENET,SNV-L8014RM,ADC12	Logo: WISENET	1	SA	
3	HP07-000254A	GASKET-DOME,SILICON,SNV-8013,GRAY		1	SA	
4	FC15-002790B	COVER-DOME,PC V2,MIGRA-TION,TRP,OD52		1	SA	
5	FC09-007358A	BRACKET-DOME,SNV-L8014RM,SECC		1	SA	
6	FC09-007359B	BRACKET-MODULE-FIXED		1	SA	
7	FC29-007845A	HOOD-IR-SNV-L8014RM		1	SA	
8	FC29-007844A	HOLDER-MODULE-TOP,SNV-L8014RM		1	SA	
9	AM08-008919A	ASSY,PCB-SNV-L8013R/L8014RM_LED_CYBRIGH		1	SA	
10	AM07-008140A	ASSY,DN MODULE-DC,SNV-L8014RM,EX-PORT		1	SA	
11	AM08-007803A	ASSY,PCB-XNV-8013M(SENSOR)		1	SA	
12	FC29-007845A	HOLDER-MODULE-BOTTOM,SNV-L8014RM		1	SA	
13	FC15-005001A	COVER-MIC-RUBBER,SILICON RUBBER		1	SA	
14	EP10-001083A	MODULE,ELECTRON-IC-WHO8035CW-R50-A28J-510		1	SA	
15	FC39-003801A	FRAME-MAIN,SNV-L8014RM		1	SA	
16	AM08-007805A	ASSY,PCB-XNV-8012M(MAIN, INDOOR)		1	SA	
17	FC28-000731B	PAD-THERMAL,SILICON RUB-BER,45*30*1.0		1	SA	
18	AM07-007881B	ASSY,CASE BOTTOM-XNV-8012		1	SA	XNV-6022R
	AM07-007537C	ASSY,CASE-BOTTOM,XNV-8012M		1	SA	XNV-6022RM
19	PM02-001973A	DESIPAK-1G;DESIPAK		2	SA	
C1	EP02-004376A	HARNESS-XNV-8013M;WIRE,4P,4P,55MM		1	SA	
C2	EP02-004377A	HARNESS-XNV-8013M;MCX,40P-40P,80MM		1	SA	
C3	EP02-004388A	HARNESS-XNV-8012;WIRE,14P-14P,580MM	RJ45	1	SA	XNV-6022R
	EP02-004390A	HARNESS-XNV-8013M;WIRE,14P-10P,580MM	M12	1	SA	XNV-6022RM
S1	Z8001055101A	SCREW-MACHINE	BH,+,M2,L4,ZP	5	SA	
S2	Z8003019801A	SCREW-TAPTYPE	BH,+,B,M2,L4	5	SA	
S3	Z8001042201A	MACHINE SCREW	WASHER HEAD,M2.6xL4	2	SA	

Figure 2: Breakdown Structure of “XNV-6022RM” and “XNV-6022R” with Part List

Part Name	ea	Unit wt	Total wt	Material Type
(Part Name)	(개)	(g)	(g)	
ASSY,FINAL-XNV-6012M	1		253.9	
ASSY,PCB-XNV-6012M(MAIN, INDOOR)	1	26.37	26.37	PCB
PAD-THERMAL;SILICON RUBBER,45*30*1.0	1	2.4	2.40	Rubber
ASSY,CASE-BOTTOM,XNV-6012M	1		57	Aluminum units(REF)
CASE-BOTTOM,XNV-6012M;ADC12	1	46		Aluminum
HARNESS-XNV-6013M;WIRE,14P-10P,580MM	1	11		cable(assembly) metallic materials
		46		cable(assembly) non-metallic materials
FRAME-MAIN,SNV-L6014RM	1	14	14.00	PC
SCREW-MACHINE;6001-001707,BH,+,M2,L4,ZP	2	0.1	0.20	Steel-screw
HOLDER-MODULE-TOP,SNV-L6014RM	1	4	4.00	PC
CABLE-SNV-L6013R/L6014RM LED CABLE;4P,30	1	0.6	0.60	cable(inside)
ASSY,PCB-SNV-L6013R/L6014RM_LED	1	2.4	2.40	PCB
SCREW-TAPTYPE;6003-001440,BH,+,B,M2,L4,	2	0.1	0.20	Steel-screw
HOLDER-MODULE-BOTTOM,SNV-L6014RM	1	5	5.00	PC
SCREW-TAPTYPE;6003-001440,BH,+,B,M2,L4,	5	0.1	0.50	Steel-screw
WAVE_WASHER_H3	1	0.1	0.10	Stainless steel
HOOD-IR-SNV-L6014RM	1	0.2	0.20	PE
ASSY,DN MODULE-DC,SNV-L6014RM	1	6	6.00	Plastics(mixed)
LENS SET-2M_3.6MM_CHIOPT;FIXED	1	4.9	4.90	Glass
ASSY,PCB-XNV-6013M(SENSOR)	1	4.1	4.10	PCB
HARNESS-XNV-6013M;MCX,40P-40P,80MM	1	1.2	1.20	cable(inside)
MODULE,ELECTRONIC-WHO6035CW-R50-A28J-510	1	0.3	0.30	Steel-speaker
COVER-MIC-RUBBER;SILICON RUBBER	1	0.2	0.20	Rubber
BRACKET-MODULE-FIXED,XNV-6013M;PC	1	5.6	5.60	PC
MACHINE SCREW(이불 이)WASHER HEAD,M2.6xL4)	2	0.3	0.60	Steel-screw
ASSY,CASE-TOP-WISENET,SNV-L6014RM	1		114.9	Aluminum
CASE-TOP,SNV-L6014RM;ADC12	1	90		Aluminum
COVER-DOME;PC V2,MIGRATION,TRP,OD52	1	14		PC
GASKET-DOME;SILICON,SNV-6013,GRAY	1	0		Rubber
BRACKET-DOME,SNV-L6014RM;SECC	1	9.8		Steel
SHEET-GORE-VE90308-3.6X7.6	1	0.1		Tape
SCREW-MACHINE;6001-001707,BH,+,M2,L4,ZP	3	0.1		Steel-screw
SCREW-SPECIAL_TORX10_M3_L8;TORX,BH,FP,M3	3	0.2		Steel-screw
GASKET-TOP,SNV-L6014RM;SILICON RUBBER	1	0.1		Rubber
DESIPAK-1G;DESIPAK	2	1.4	2.80	
TAPE_1425	2	0.1	0.20	Tape
LABEL-RATING,NW3,UL-A130	1	0.1	0.10	Label

Table 1: Part List of “XNV-6022RM” with Information of Each Mass

Part Name	ea	Unit wt	Total wt	Material Type
(Part Name)	(개)	(g)	(g)	
ASSY,FINAL-XNV-6012M	1		256.9	
ASSY,PCB-XNV-6012M(MAIN, INDOOR)	1	26.37	26.37	PCB
PAD-THERMAL;SILICON RUBBER,45*30*1.0	1	2.4	2.40	Rubber
ASSY,CASE-BOTTOM,XNV-6012M	1		60	Aluminum units(REF)
CASE-BOTTOM,XNV-6012M;ADC12	1	46		Aluminum
HARNESS-XNV-6012;WIRE,14P-14P,580MM	1	14		cable(assembly) metallic materials
		44		cable(assembly) non-metallic materials
FRAME-MAIN,SNV-L6014RM	1	14	14.00	PC
SCREW-MACHINE;6001-001707,BH,+,M2,L4,ZP	2	0.1	0.20	Steel-screw
HOLDER-MODULE-TOP,SNV-L6014RM	1	4	4.00	PC
CABLE-SNV-L6013R/L6014RM LED CABLE;4P,30	1	0.6	0.60	cable(inside)
ASSY,PCB-SNV-L6013R/L6014RM_LED	1	2.4	2.40	PCB
SCREW-TAPTYPE;6003-001440,BH,+,B,M2,L4,	2	0.1	0.20	Steel-screw
HOLDER-MODULE-BOTTOM,SNV-L6014RM	1	5	5.00	PC
SCREW-TAPTYPE;6003-001440,BH,+,B,M2,L4,	5	0.1	0.50	Steel-screw
WAVE_WASHER_H3	1	0.1	0.10	Stainless steel
HOOD-IR-SNV-L6014RM	1	0.2	0.20	PE
ASSY,DN MODULE-DC,SNV-L6014RM	1	6	6.00	Plastics(mixed)
LENS SET-2M_3.6MM_CHIOPT;FIXED	1	4.9	4.90	Glass
ASSY,PCB-XNV-6013M(SENSOR)	1	4.1	4.10	PCB
HARNESS-XNV-6013M;MCX,40P-40P,80MM	1	1.2	1.20	cable(inside)
MODULE,ELECTRONIC-WHO6035CW-R50-A28J-510	1	0.3	0.30	Steel-speaker
COVER-MIC-RUBBER;SILICON RUBBER	1	0.2	0.20	Rubber
BRACKET-MODULE-FIXED,XNV-6013M;PC	1	5.6	5.60	PC
MACHINE SCREW(이볼트)WASHER HEAD,M2.6xL4)	2	0.3	0.60	Steel-screw
ASSY,CASE-TOP-WISENET,SNV-L6014RM	1		114.9	Aluminum
CASE-TOP,SNV-L6014RM;ADC12	1	90		Aluminum
COVER-DOME;PC V2,MIGRATION,TRP,OD52	1	14		PC
GASKET-DOME;SILICON,SNV-6013,GRAY	1	0		Rubber
BRACKET-DOME,SNV-L6014RM;SECC	1	9.8		Steel
SHEET-GORE-VE90308-3.6X7.6	1	0.1		Tape
SCREW-MACHINE;6001-001707,BH,+,M2,L4,ZP	3	0.1		Steel-screw
SCREW-SPECIAL_TORX10_M3_L8;TORX,BH,FP,M3	3	0.2		Steel-screw
GASKET-TOP,SNV-L6014RM;SILICON RUBBER	1	0.1		Rubber
DESIPAK-1G;DESIPAK	2	1.4	2.80	
TAPE_1425	2	0.1	0.20	Tape
LABEL-RATING,NW3,UL-A130	1	0.1	0.10	Label

Table 2: Part List of “XNV-6022R” with Information of Each Mass

5. Assessment

5.1 Specifying Target Hazard Level

The product “XNV-6022RM” and “XNV-6022R” are to be used in vehicles of all design categories and for operations corresponding to operation categories 1 to 4 specified in Section 5 of EN 45545-1. According to Clause 4.1 of EN 45545-2, the targeted Hazard Level will be “HL3”.

5.2 Evaluation of Each Material

1) Printed Circuit Board (PCB)

In accordance with Table 2 and Table 5 of EN 45545-2, PCBs are classified as “EL9” in Listed Products, then required to comply with either of Requirement Set “R24” or “R25”. In this project, “R25” was selected. The test result is summarized in **Table 3**, which demonstrated the compliance with the requirement.

For more detail, refer to the test report (240210-2) issued by **Chemitox** which is ISO 17025 accredited for the relevant testing (**Appendix 1**).

Table 3: Test results of EN 60695-2-11 for PCB

Part name	Test Parameter	Results
ASSY,PCB-XNV-6012M(MAIN, INDOOR)	Glow Wire Temperature	GWEPT:850C R25/HL3 Compliant
ASSY,PCB-SNV-L6013R/L6014RM_LED	Glow Wire Temperature	GWEPT:850C R25/HL3 Compliant
ASSY,PCB-XNV-6013M(SENSOR)	Glow Wire Temperature	GWEPT:850C R25/HL3 Compliant

2) Dome Cover:

Dome cover is made of polycarbonate, which is combustible, and therefore should be assessed.

Although this part is exposed to a passenger area in the way that it is installed on the ceiling, the exposed area is limited to approx. 4,247mm², which is less than 0.2m². See **Figure 3** for the calculation of the exposed area.

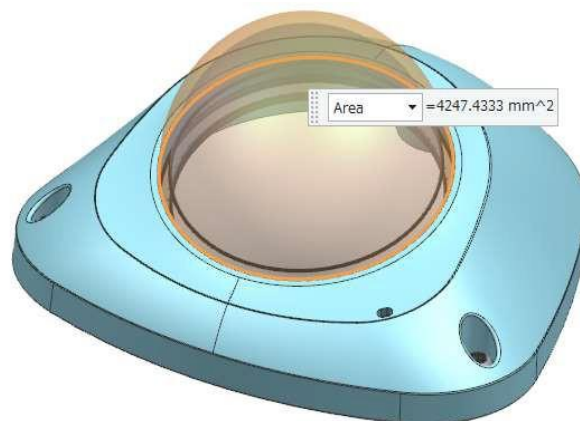


Figure 3: Calculated Result of Exposed Area of Dome Cover

According to **Table 1**, the mass of this part is 14g, which is less than 100g.

With the above information, and based on the requirement specified in Clause 4.3 and Figure 1 of EN 45545-2 (Grouping Rules), this material is considered as unclassified, and no additional testing will be required.

3) Coating of Aluminum Enclosure:

The outer enclosure parts are coated with certain organic painting.

Although this part is exposed to a passenger area in the way that it is installed on the ceiling, the exposed area is limited to approx. 9,513mm², which is less than 0.2m². See **Figure 4** for the calculation of the exposed area.

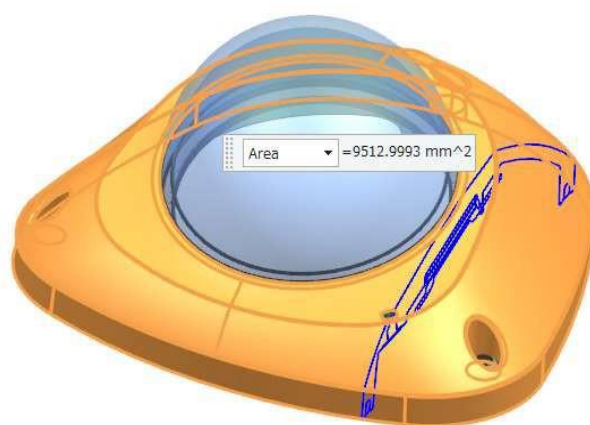


Figure 4: Calculated Result of Exposed Area of Enclosure

The mass of coating only is not specified, but the client has confirmed that it is not more than 10g.

With the above information, and based on the requirement specified in Clause 4.3 and Figure 1 of EN 45545-2 (Grouping Rules), this material is considered as unclassified, and no additional testing will be required.

4) Other miscellaneous combustible materials:

There are other miscellaneous materials, part of which are combustible. However, all those materials are very small (i.e. exposed area less than 0.2m²). Also, according to **Table 1** and **Table 2**, total mass of these combustible parts is less than 100g.

With the above information, and based on the requirement specified in Clause 4.3 and Figure 1 of EN 45545-2 (Grouping Rules), those materials are considered as unclassified, and no additional testing will be required.

6. Verification of compliance with EN 45545-2

The assessment result detailed in Section 5 has demonstrated that the product “XNV-6022RM” and “XNV-6022R” meet the requirements of the following classification;

EN 45545-2 Hazard Levels HL1 to HL 3

IMPORTANT NOTE: The assessment result in this document is based on the assumption that no other non-compliant products are adjacent to the product (i.e. within 20mm horizontally, and 200mm vertically) in the end use application of railway vehicles. Depending on installation condition, additional testing may be required according to Grouping Rules specified in Clause 4.3 and Figure 1 of EN 45545-2.

7. Assessment conducted by

Hiroaki Fujioka (Mr.) – Vice President of International Business Department
Chemitox Inc.

8. Revision History

Revision number	Revised date	Detail
1	April 1, 2019	“for Model “XNV-6022RM “” has been added to the title of the report on Page 1.
2	February 24, 2023	Company name of the client was updated from “HANWHA TECHWIN CO., LTD” to “Hanwha Vision Co., Ltd” based on the client’s request.
3	April 5, 2024	- An alternate model name of “XNV-6022R” as well as its detailed product information has been added throughout the document based on the client’s request. - Publication year of reference standards have been added on Page 2. - Test report number of the test for PCBs have been updated on Page 5.

Validity of this assessment report:

This assessment is based on the information provided by the manufacturer at the time of work. If any of the information is changed, or there is any additional information to be assessed, re-assessment may be required.

This assessment is based on the requirements of reference standards at the date of the contract. If any parts in the standard are revised or amended in any way subsequent to that date, care must be taken to ensure that this assessment is not invalidated by those revisions or amendments.

The results of this assessment depend on the precision of the information provided by the manufacturer. If there is anything incorrect and / or insufficient in terms of the information which is critical for the evaluation, this assessment may be invalid.

This assessment is intended only to check the compliance with the standards for the design of the vehicles. Chemitox, Inc. shall not be liable for any damages and/or costs incurred as a result of incidents, defects or other similar situations in service whether in contract, tort (including negligence), breach of statutory duty or otherwise for any loss of profit, loss of business, loss of market, loss of contract, damage to goodwill, loss of anticipated savings, loss of revenue, loss or damage incurred as a result of third party claims or any indirect or consequential loss howsoever caused.

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Appendix 1

Test Report for Printed Circuit Board



TESTING CERT #1136.04

Chemitox

TEST REPORT

Report Number: 240210-2

Date of Issue: February 26, 2024

Report to:

Hanwha Vision Co., Ltd.

6, Pangyo-ro 319beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, 13488, Korea

Reported by:

Chemitox, Inc., Yamanashi Testing Center KAI

18349, Egusa, Sutama-cho, Hokuto-shi, Yamanashi 408-0103, Japan

A blue ink signature of Kiyohiko Sakamoto.

Responsible Officer
Kiyohiko Sakamoto
Vice President, Director
CTO

A blue ink signature of Mitsuya Mochizuki.

Authorized
Mitsuya Mochizuki
Manager

- (1) Chemitox is accredited by the following agency to ISO/IEC 17025:2017.
American Association for Laboratory Accreditation (A2LA) — Certificated No: 1136.04
- (2) This TEST REPORT refers only to the sample tested, unless stated otherwise.

Hanwha Vision Co., Ltd.

6, Pangyo-ro 319beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, 13488, Korea

Glow-wire Flammability Test for End Products (GWEPT) Test Report

1. Objective

As per client's request, Glow-wire flammability test for end products (GWEPT) is conducted in accordance with BS EN IEC 60695-2-11:2021 "Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end products (GWEPT)".

2. Date of Test

February 21, 2024

3. Test Environment

See individual data sheet.

4. Description of Test Specimens

The description of the specimens given in **Table 1** has been prepared from information provided by Hanwha Vision Co., Ltd. This information has not been independently verified by Chemitox. All values quoted are nominal, unless specified:

Table 1 Description of Specimens

Received on		January 31, 2024			
Generic description	PCB Name	PCB Vendor	PCB Type	Layer	Nominal thickness (mm)
PCB	Main PCB	APCB	CK 77-1 3 94V-0	6	1.2
	LED PCB	EXPRESS	94V-0	2	1.6
	Sensor PCB	APCB	CK 77-1 3 94V-0	4	1.2

5. Sampling

The specimens were supplied by the client. Chemitox was not involved in any sampling procedure. The results stated in this report apply to the specimens as received from the client.

Note: Sampling means the prescribed procedure for extracting a part of a substance, material, or product to provide a representative specimen for testing.

6. Test Method and Conditioning

Test Method and Conditioning is indicated in **Table 2**.

Table 2 Test Method and Conditioning

Test name	Glow-wire flammability test for end-products (GWEPT)
Test method	BS EN IEC 60695-2-11: 2021 (See Appendix)
Sample conditioning	Specimens were conditioned for at least 24 hours at a temperature of $(25 \pm 10) ^\circ\text{C}$ and a relative humidity of $(60 \pm 15) \%$
Glow-wire temperature	850°C (as stipulated in BS EN 45545-2:2020+A1:2023, R25)
Glow-wire point of contact	See Appendix

7. Test Results

Summarized test results are shown in **Table 3**. See Appendix for details.

Table 3 Summarized test results

Generic description	Product name	Contact point *	Test result ($^\circ\text{C}$) **
PCB	Main PCB	1	GWEPT : 850
		2	GWEPT : 850
		3	GWEPT : 850
	LED PCB	1	GWEPT : 850
		2	GWEPT : 850
	Sensor PCB	1	GWEPT : 850
		2	GWEPT : 850

*: The application points were determined by the instruction of the client, with taking into consideration of the requirement in Clause 8.1, BS EN IEC 60695-2-11. See photographs in Appendix for the actual points on the specimens.

* *:When performing a measurement and subsequently making a statement of conformity, for example Pass/Fail to a particular requirement, Simple Acceptance Rule is used which is same as Upper/Lower Specification . (Please see "Guidance for decision rule" in detail.)

8. Test Location

Chemitox, Inc., Yamanashi Testing Center KAI
18349, Egusa, Sutama-cho, Hokuto-shi, Yamanashi 408-0103

9. Performed by



Takuya Hayashida, Senior Engineer (Level 1)

Witnessed by Mitsuya Mochizuki, Manager (Level 3)

10. Reviewed by



Mitsuya Mochizuki, Manager

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Guidance for decision rule

Issued: 2021-11-29

Revised: 0000-00-00

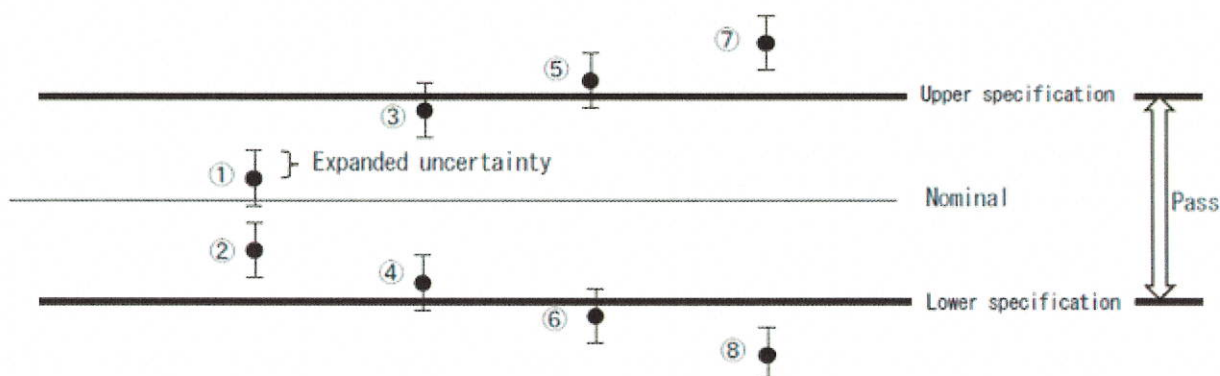
When performing a measurement and subsequently making a statement of conformity, for example Pass/Fail to a particular requirement, decision rule should be made to make a correct decision regarding conformance to specification or requirement.

In case of Chemitox, we use Simple Acceptance Rule, unless customers request or test standard specifically requests otherwise. Simple Acceptance Rule is the acceptance limit is the same as Upper/Lower Specification.

This means the guard band is zero.

What means the guard and is zero

Since no adjustment is made to make a decision, decision for conformance or classification is made using the measured test value. In the figure below, uncertainty is indicated, but not uncertainty is considered when making a judgement.



In this case, the result will be

	①, ②	③, ④	⑤, ⑥	⑦, ⑧
Simple Acceptance	Pass	Pass	Fail	Fail

Reference: ILAC G8: Guidelines on Decision Rules and Statements of Conformity

Appendix

(9 Pages)

- Detailed Test Results (GWEPT)
- Photographs of the specimens (GWEPT)
- Test Method (GWEPT)

Project No. - File -Tested by: Takuya Hayashida Date 2024-02-21
Print Name SignatureReference: 240210-2

GLOW WIRE Flammability Test for End-Product Test

☐ IEC 60695-2-11 (____) Ed. (Rev.____)☒ BS EN IEC 60695-2-11 (-)Ed. (Rev. 2021)Set#: - Material: Main PCB Color: GreenThk: - [x] Conditioned >24 h/25±10 °C/60±15%RH

Conditioning

Start Date & time: 2024-01-31 at 16:00

Conditioning

End Date & time: 2024-02-21 at 16:30

#	Thk (mm)	T _{GW} °C	T _I (s)	T _E (s)	T _R (s)	X ₁
1 *	1.18	850	-	-	0.0	(#,1)
2 *	1.15	850	-	-	0.0	(#,1)
3 *	1.19	850	-	-	0.0	(#,1)
						()
						()
						()

* Contact points #1, 2, 3 see page 10.

2024-02-21 TH

GWEPT= 850 °C

T_{GW} = Glow Wire Tip TemperatureT_I = the duration from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites.T_E = The time of extinguishmentT_R = Total Flaming and Glowing Time After Glow Wire Tip RemovalObservations (X₁)

(#) No ignition after 30 second application

(1) Specimen did not drip.

(2) Specimen dripped particles which did not ignite tissue paper.

(3) Specimen dripped particles which ignited tissue paper.

(4) Tip penetrated sample.

(5) Passed by virtue of most of the flaming material being withdrawn with glow wire

(6) Misc: _____

Micrometer No.: M-299 Equipment No.: Q-7 Temp. Indicator: M-15-2Lab Ambient: 25 °C (25±10 °C) and 47 %RH (60±15%RH)

Issued: 2002-12-05

Revised: 2023-08-04

Project No. - File -Tested by: Takuya Hayashida Date 2024-02-21
Print Name SignatureReference: 240210-2

GLOW WIRE Flammability Test for End-Product Test

☐ IEC 60695-2-11 (____) Ed. (Rev.____)☒ BS EN IEC 60695-2-11 (-)Ed. (Rev. 2021)Set#: - Material: LED PCB Color: GreenThk: - [x] Conditioned >24 h/25±10 °C/60±15%RH

Conditioning

Start Date & time: 2024-01-31 at 16:00

Conditioning

End Date & time: 2024-02-21 at 17:30

#	Thk (mm)	T _{GW} °C	T _I (s)	T _E (s)	T _R (s)	X ₁
1 *	1.66	850	-	-	0.0	(#,1)
2 *	1.67	850	-	-	0.0	(#,1)
						()
						()
						()
						()

* Contact points #1, 2 see page 11.

2024-02-21 TH

GWEPT= 850 °C

T_{GW} = Glow Wire Tip TemperatureT_I = the duration from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites.T_E = The time of extinguishmentT_R = Total Flaming and Glowing Time After Glow Wire Tip RemovalObservations (X₁)

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Micrometer No.: M-299 Equipment No.: Q-7 Temp. Indicator: M-15-2Lab Ambient: 25 °C (25±10 °C) and 47 %RH (60±15%RH)

Project No. - File -Tested by: Takuya Hayashida Date 2024-02-21
Print Name SignatureReference: 240210-2

GLOW WIRE Flammability Test for End-Product Test

☐ IEC 60695-2-11 (____) Ed. (Rev.____)☒ BS EN IEC 60695-2-11 (-)Ed. (Rev. 2021)Set#: - Material: Sensor PCB Color: GreenThk: - [x] Conditioned >24 h/25±10 °C/60±15%RH

Conditioning

Start Date & time: 2024-01-31 at 16:00

Conditioning

End Date & time: 2024-02-21 at 18:00

#	Thk (mm)	T _{GW} °C	T _I (s)	T _E (s)	T _R (s)	X ₁
1 *	1.22	850	-	-	0.0	(#,1)
2 *	1.23	850	-	-	0.0	(#,1)
						()
						()
						()
						()

* Contact points #1, 2 see page 12.

2024-02-21 TH

GWEPT= 850 °C

T_{GW} = Glow Wire Tip TemperatureT_I = the duration from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites.T_E = The time of extinguishmentT_R = Total Flaming and Glowing Time After Glow Wire Tip RemovalObservations (X₁)

(#) No ignition after 30 second application

(1) Specimen did not drip.

(2) Specimen dripped particles which did not ignite tissue paper.

(3) Specimen dripped particles which ignited tissue paper.

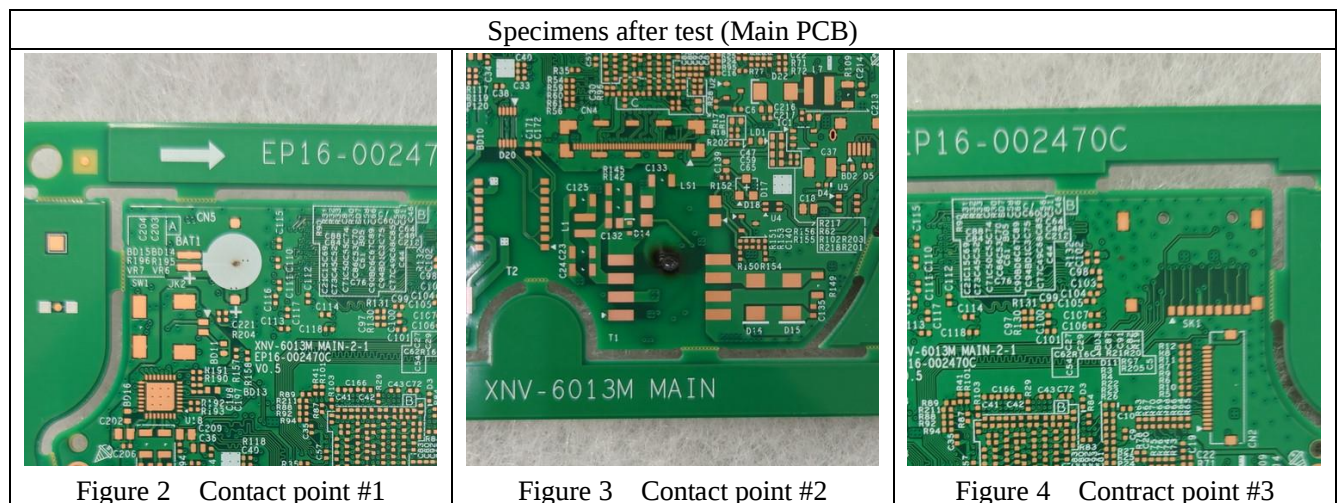
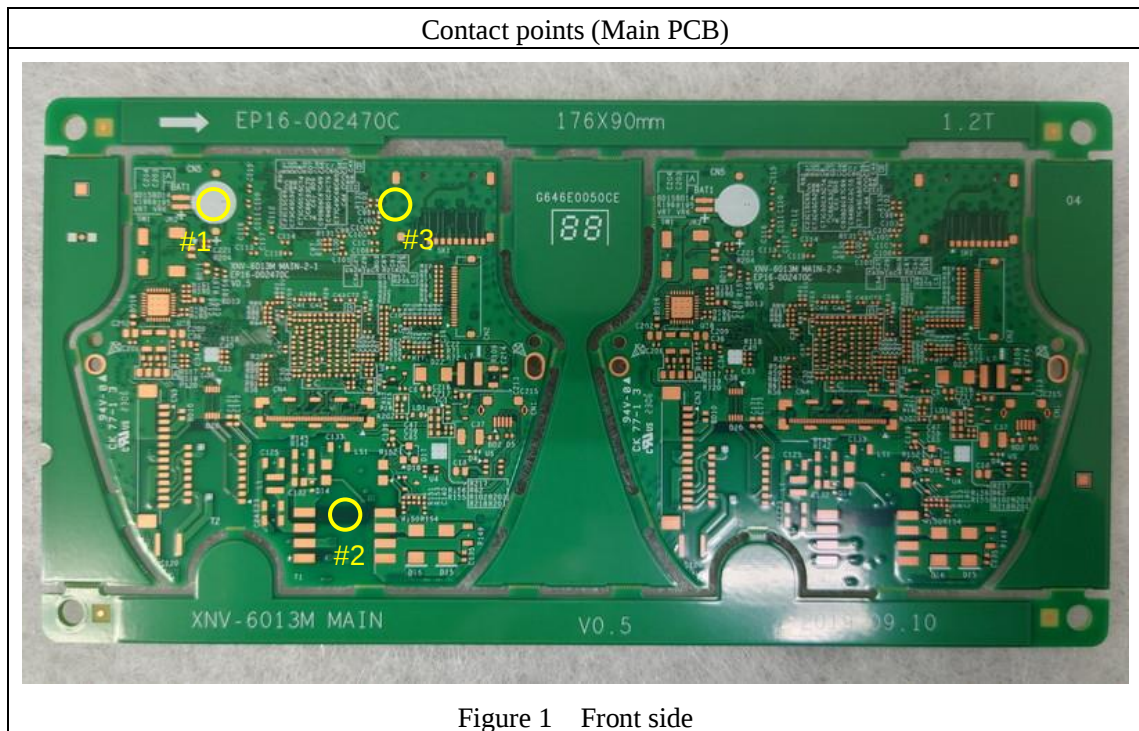
(4) Tip penetrated sample.

(5) Passed by virtue of most of the flaming material being withdrawn with glow wire

(6) Misc: _____

Micrometer No.: M-299 Equipment No.: Q-7 Temp. Indicator: M-15-2Lab Ambient: 25 °C (25±10 °C) and 47 %RH (60±15%RH)

Reference: 240210-2 Material: Main PCB



Reference: 240210-2 Material: LED PCB

Contact points (LED PCB)

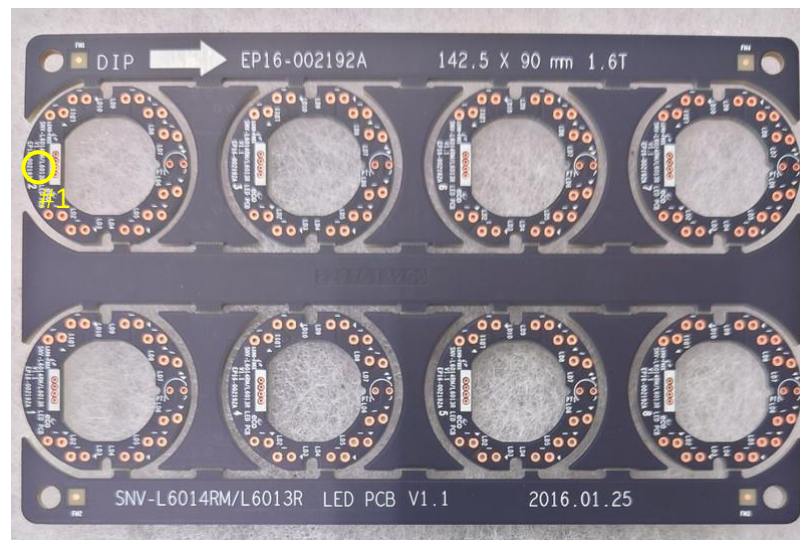


Figure 5 Front side

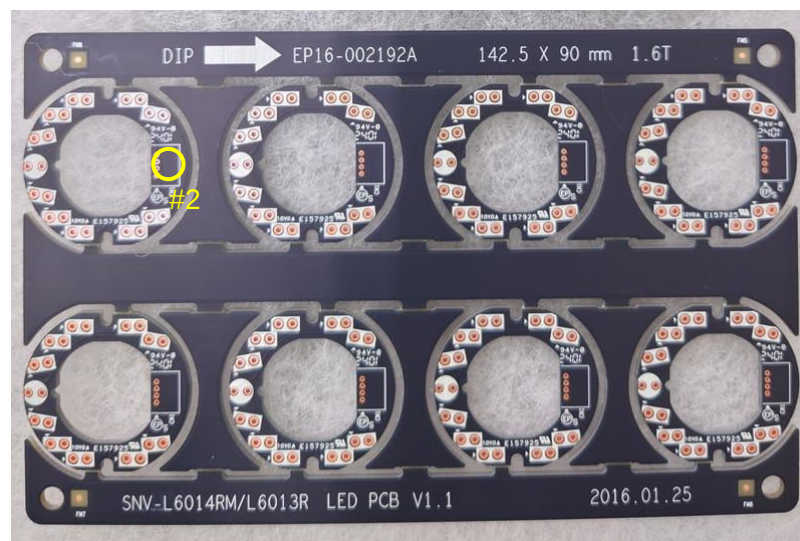


Figure 6 Back side

Specimens after test (LED PCB)

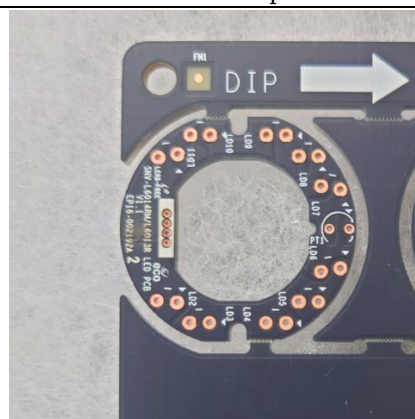


Figure 7 Contact point #1

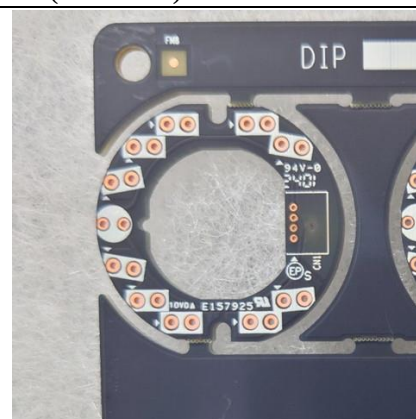
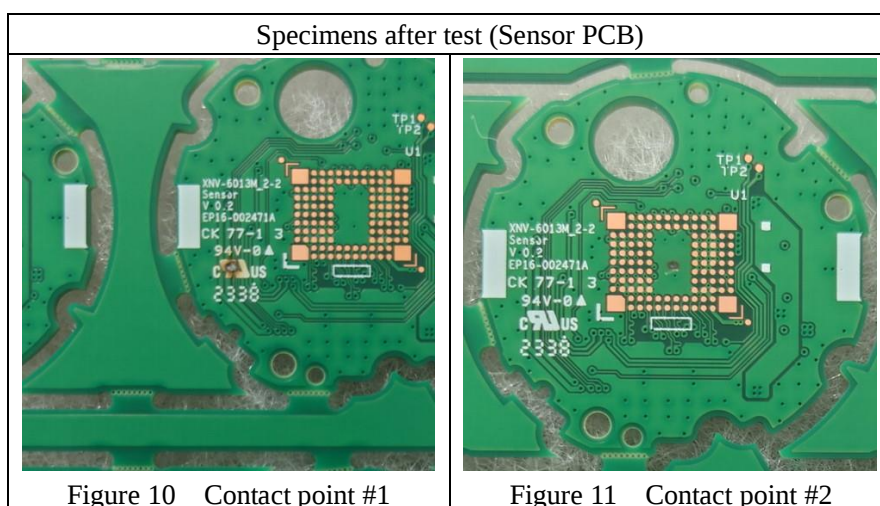
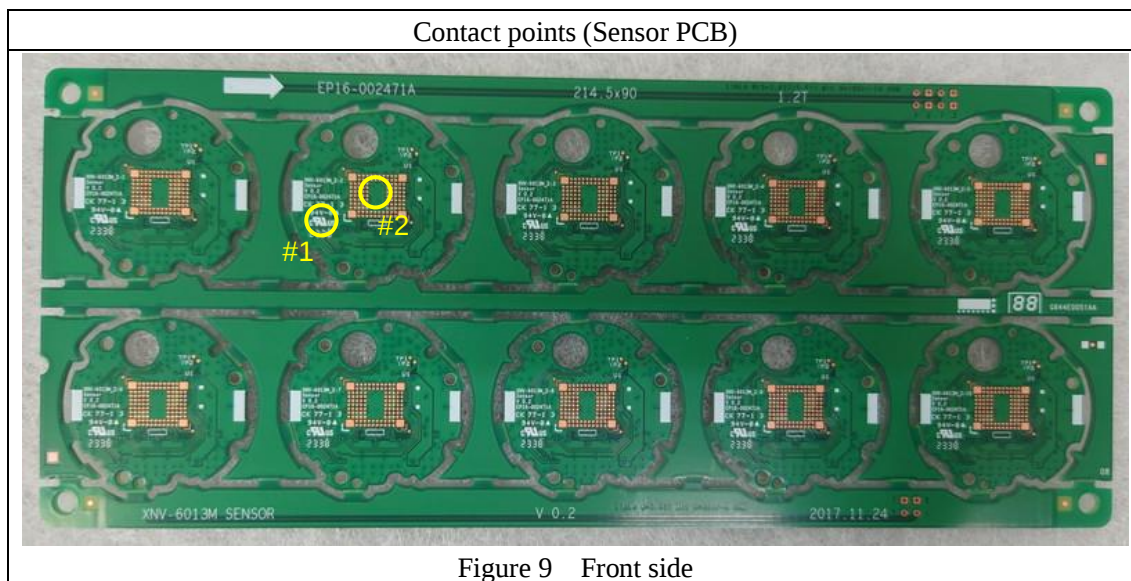


Figure 8 Contact point #2

Reference: 240210-2 Material: Sensor PCB



Appendix

Glow-Wire Test Method for End-Product

1. Applicable standard: BS EN IEC 60695-2-11 "Glowing/hot-wire based test methods – Glow-wire flammability test method for end products (GWEPT)"

2. Sample:

It is preferred that the test specimen should be a complete end product.

If the test cannot be made on a complete end product then, unless otherwise specified by the relevant product standard, it is acceptable to

- a) cut a piece containing the part under examination from a complete and assembled end product, or
- b) cut an aperture in the complete end product to allow the glow-wire access, or
- c) remove the part under examination in its entirety and test it separately.

note: The glow-wire flammability test method for end products shall not be used for testing small parts. The following are considered to be small parts:

- a) where each surface lies completely within a circle of 15 mm in diameter; or
- b) where it is not possible to fit a circle of 8 mm in diameter completely on at least one of the surfaces while, at least one part dimension is > 15 mm.

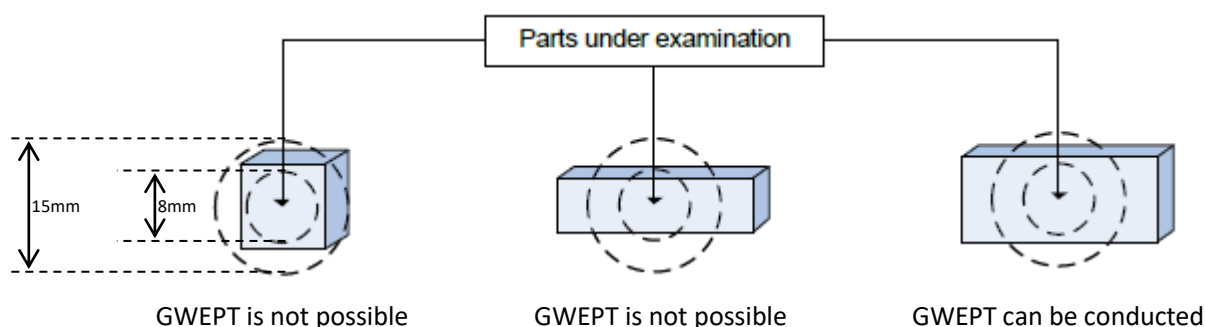


Figure 1 Definition of small parts

3. Conditioning: Conditioned for 24 hours in an atmosphere having a temperature at $25 \pm 10^\circ\text{C}$ and relative humidity $60 \pm 15\%$.

4. Test:

A. Test equipment:

Glow-wire:

Nichrome wire (nominal >77% nickel/ 20% chromium) with a nominal 4.0mm diameter formed not to break on the tip

Thermocouples to measure the temperature:

A sheathed fine-wire thermocouple, having an overall nominal diameter of 1.0mm and Type K wire of NiCr and NiAl.

Applying force: $0.95 \pm 0.10\text{N}$

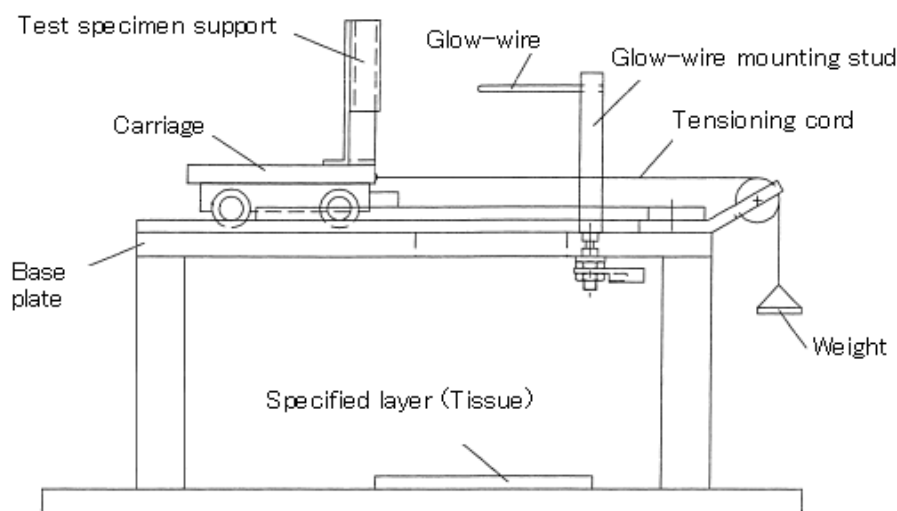


Figure 2 Image of testing apparatus

B. Procedure:

The tip of glow-wire is applied to the sample with a force of $0.95 \pm 0.10\text{N}$ for 30 seconds.

Test Temperature (°C)	Tolerances (°C)	Test Temperature (°C)	Tolerances (°C)
550	± 10	800	± 15
600	± 10	850	± 15
650	± 10	900	± 15
700	± 10	960	± 15
750	± 10		

The test temperature shall be chosen from the values indicated in table above.

C. Observation:

- T_I : The duration from the beginning of tip application up to the time at which the test specimen or the specified layer placed below it ignites.
- T_E : The duration from tip application up to the time when all flames extinguish, during or after the period of application
- T_R : Total flaming and glowing time after glow wire tip removal

Note of Datasheet:

No ignition after 30 second application

- (1) Specimen did not drip.
- (2) Specimen dripped particles which did not ignite paper.
- (3) Specimen dripped particles which ignited tissue paper.
- (4) Tip penetrated sample.
- (5) Passed by virtue of most of the flaming material being withdrawn with glow wire.

5. Criteria: The test specimen is considered to have a GWEPT of T if at a test temperature of T °C,

- a) there is no ignition, or
- b) all of the following situations apply when ignition has occurred:
 - i) flames or glowing combustion of the test specimen extinguish within 30 s after removal of the glow wire, i.e. $T_R \leq 30$ s; and
 - ii) the specified layer placed underneath the test specimen does not ignite.