



TESTING CERT #1136.04

Chemitox

TEST REPORT

Report Number: 241820

Date of Issue: October 23, 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, consisting of stylized cursive letters.

Responsible Officer
Kiyohiko Sakamoto
Vice President, Director
CTO

A blue ink signature of Mitsuya Mochizuki, consisting of stylized cursive letters.

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

October 16, 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		October 7, 2024				
Generic description	Model Name	PCB Name	PCB Vendor	PCB Type	Layer	Nominal thickness (mm)
PCB	TNV-C8014RM, TNV-C8034RM	Sensor PCB	Hannstar	FR4	6	1.2
		Network PCB	Hannstar	FR4	8	1.6
		Heater PCB	EXPRESS	FR4	4	1.0
		IR PCB	EXPRESS	FR4	2	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

Model Name	PCB name	Contact point *	Test result (°C) **
TNV-C8014RM, TNV-C8034RM	Sensor PCB	1	GWEPT : 850
		2	GWEPT : 850
	Network PCB	1	GWEPT : 850
		2	GWEPT : 850
	Heater PCB	1	GWEPT : 850
	IR PCB	1	GWEPT : 850
		2	GWEPT : 850

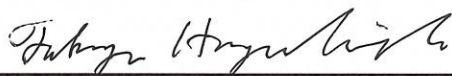
*: The application points were determined by the instruction of the client, with taking into consideration of the requirement in Clause 8.1, BS EN IEC 60695-2-11. See photographs in Appendix for the actual points on the specimens.

* *: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

Note: This report shall not be reproduced except in full without approval of Chemitox, Inc.

Guidance for decision rule

Issued: 2021-11-29

Revised: 0000-00-00

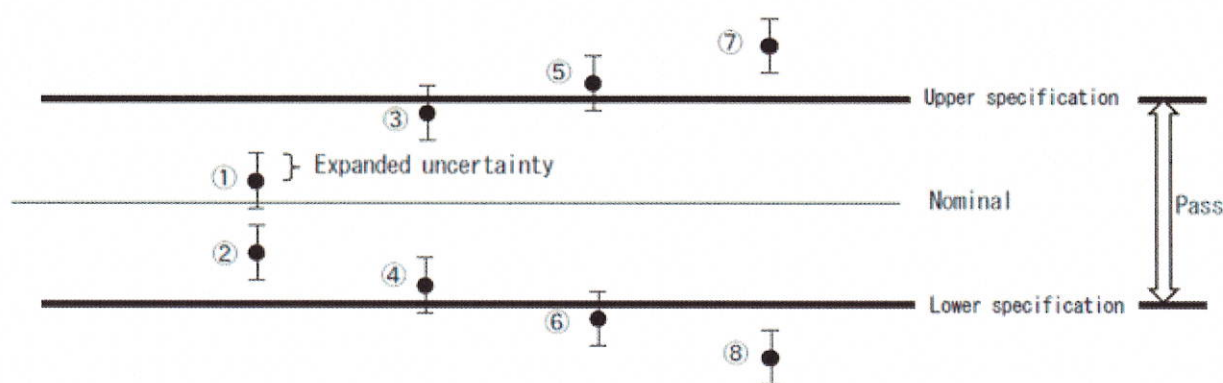
When performing a measurement and subsequently making a statement of conformity, for example Pass/Fail to a particular requirement, decision rule should be made to make a correct decision regarding conformance to specification or requirement.

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

(12 Pages)

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

Project No. - File -

Issued: 2002-12-05

Revised: 2023-08-04

Tested by: Takuya Hayashida Date 2024-10-16
Print Name SignatureReference: 241820

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: BlackThk: 1.2 mm [x] Conditioned >24 h/25±10 °C/60±15%RH

Conditioning

Conditioning

Start Date & time: 2024-10-07 at 16:00

End Date & time: 2024-10-16 at 11:00

#	Thk (mm)	T _{GW} °C	T _I (s)	T _E (s)	T _R (s)	X _I
1	1.24	850	-	-	0.0	(#,1)
2	1.23	850	-	-	0.0	(#,1)
						()
						()
						()
						()

* Contact points #1, 2 see page 11.

2024-10-16 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 (X_I)

(#) 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-299Equipment No.: Q-7Temp. Indicator: M-15-2Lab Ambient: 23 °C (25±10 °C) and 50 %RH (60±15%RH)

Project No. - File -

Issued: 2002-12-05

Revised: 2023-08-04

Tested by: Takuya Hayashida Date 2024-10-16
Print Name SignatureReference: 241820

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: Network PCB Color: BlackThk: 1.6 mm [x] Conditioned >24 h/25±10 °C/60±15%RH

Conditioning

Conditioning

Start Date & time: 2024-10-07 at 16:00

End Date & time: 2024-10-16 at 11:25

#	Thk (mm)	T _{GW} °C	T _I (s)	T _E (s)	T _R (s)	X ₁
1	1.64	850	-	-	0.0	(#,1)
2	1.54	850	-	-	0.0	(#,1)
						()
						()
						()
						()

* Contact points #1, 2 see page 12.

2024-10-16 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-299Equipment No.: Q-7Temp. Indicator: M-15-2Lab Ambient: 23 °C (25±10 °C) and 50 %RH (60±15%RH)

Project No. - File -

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Revised: 2023-08-04

Tested by: Takuya Hayashida Date 2024-10-16
Print Name SignatureReference: 241820

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: Heater PCB Color: BlackThk: 1.0 mm [x] Conditioned >24 h/25±10 °C/60±15%RH

Conditioning

Conditioning

Start Date & time: 2024-10-07 at 16:00

End Date & time: 2024-10-16 at 11:50

#	Thk (mm)	T _{GW} °C	T _I (s)	T _E (s)	T _R (s)	X _I
1	1.04	850	-	-	0.0	(#,1)
						()
						()
						()
						()
						()

* Contact points #1 see page 13.

2024-10-16 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 (X_I)

(#) 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-299Equipment No.: Q-7Temp. Indicator: M-15-2Lab Ambient: 23 °C (25±10 °C) and 50 %RH (60±15%RH)

Project No. - File -

Issued: 2002-12-05

Revised: 2023-08-04

Tested by: Takuya Hayashida Date 2024-10-16
Print Name SignatureReference: 241820

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: IR PCB Color: BlackThk: 1.2 mm [x] Conditioned >24 h/25±10 °C/60±15%RH

Conditioning

Conditioning

Start Date & time: 2024-10-07 at 16:00

End Date & time: 2024-10-16 at 13:05

#	Thk (mm)	T _{GW} °C	T _I (s)	T _E (s)	T _R (s)	X ₁
1	1.17	850	-	-	0.0	(#,1)
2	1.22	850	-	-	0.0	(#,1)
						()
						()
						()
						()

* Contact points #1, 2 see page 14, 15.

2024-10-16 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.

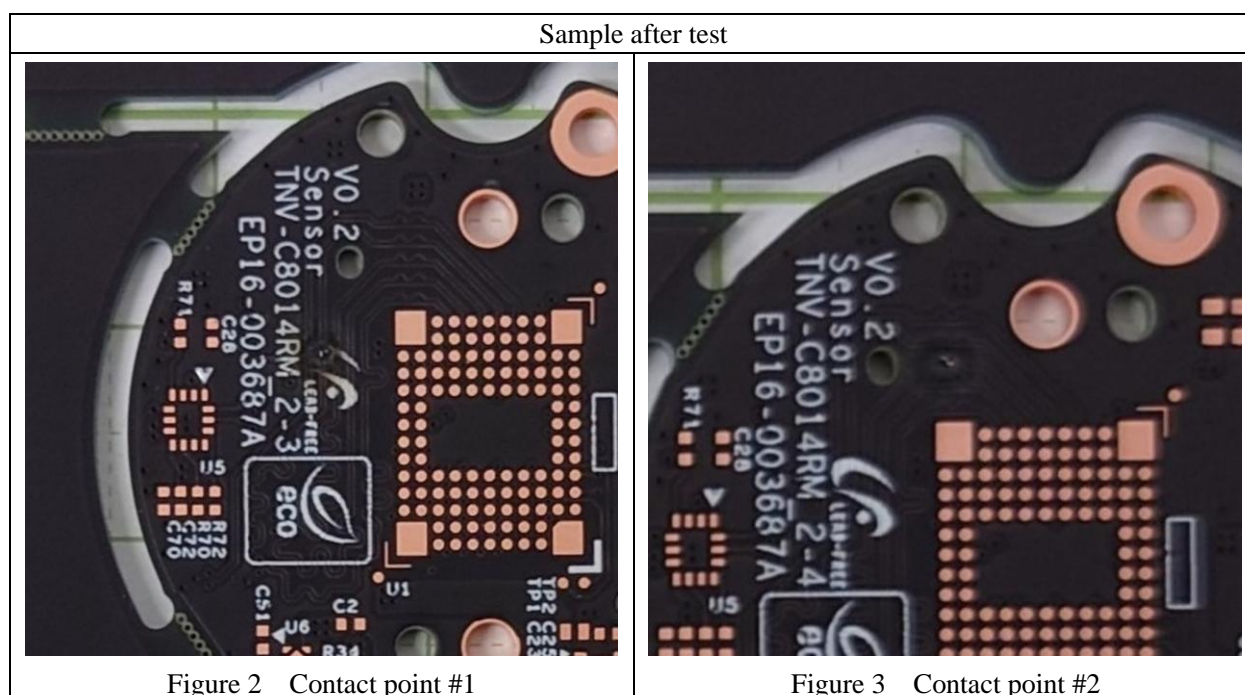
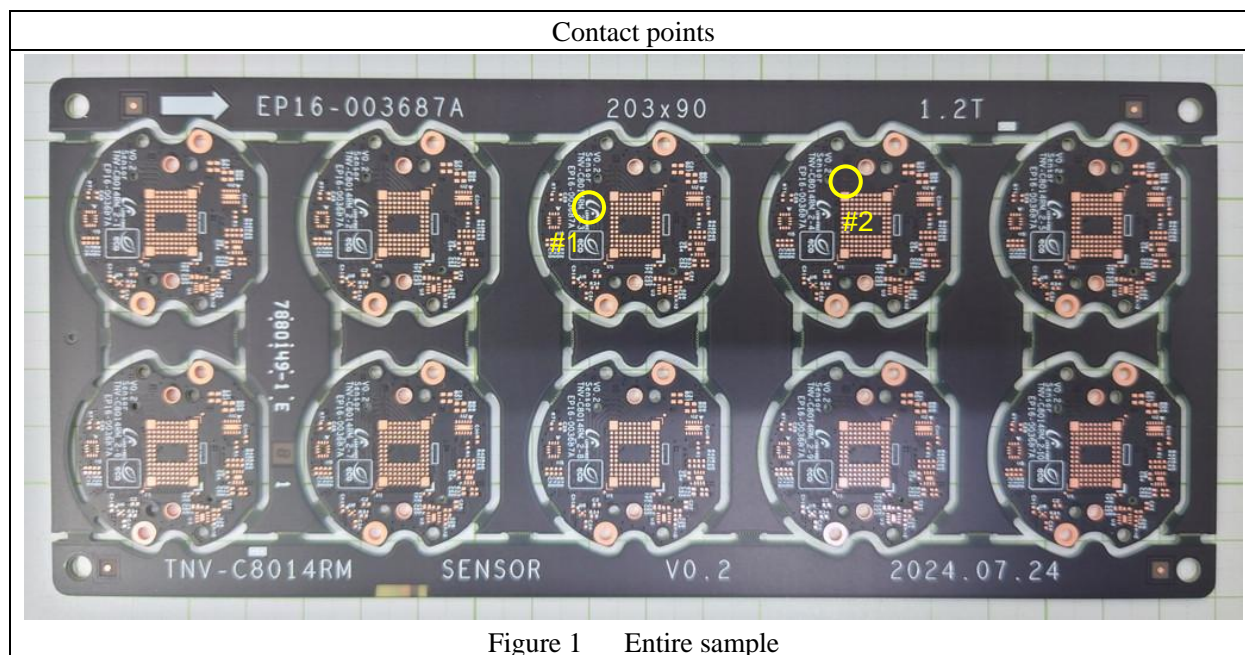
(4) Tip penetrated sample.

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

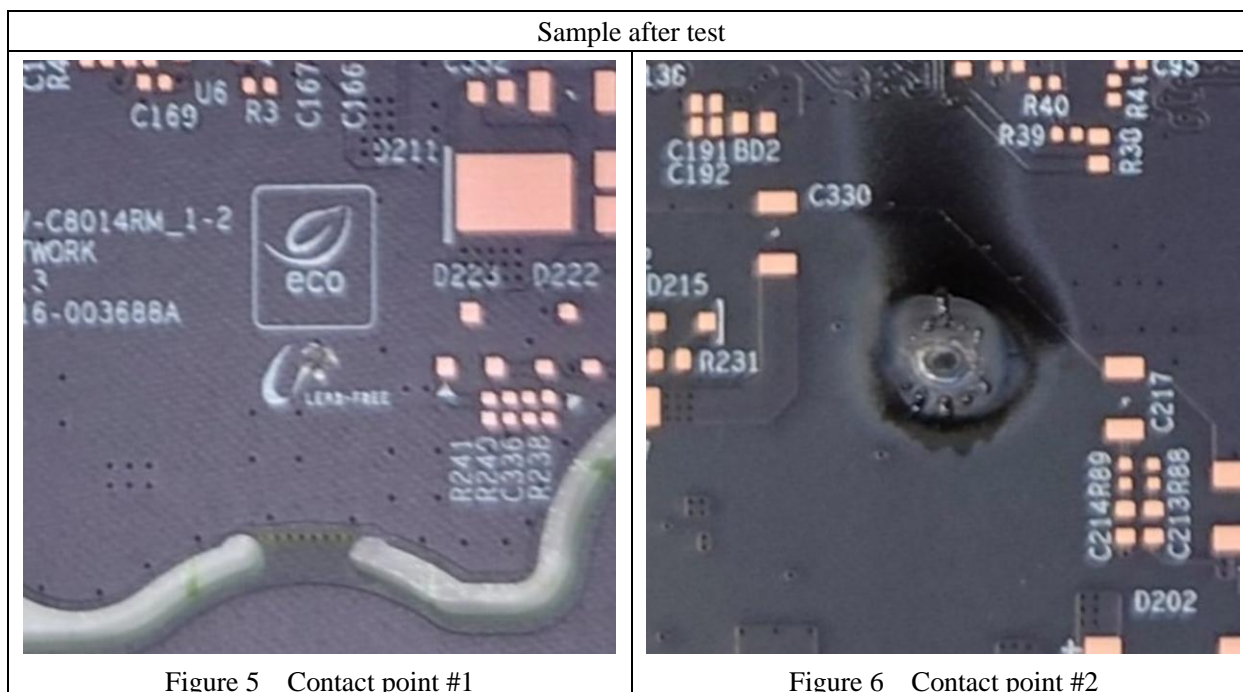
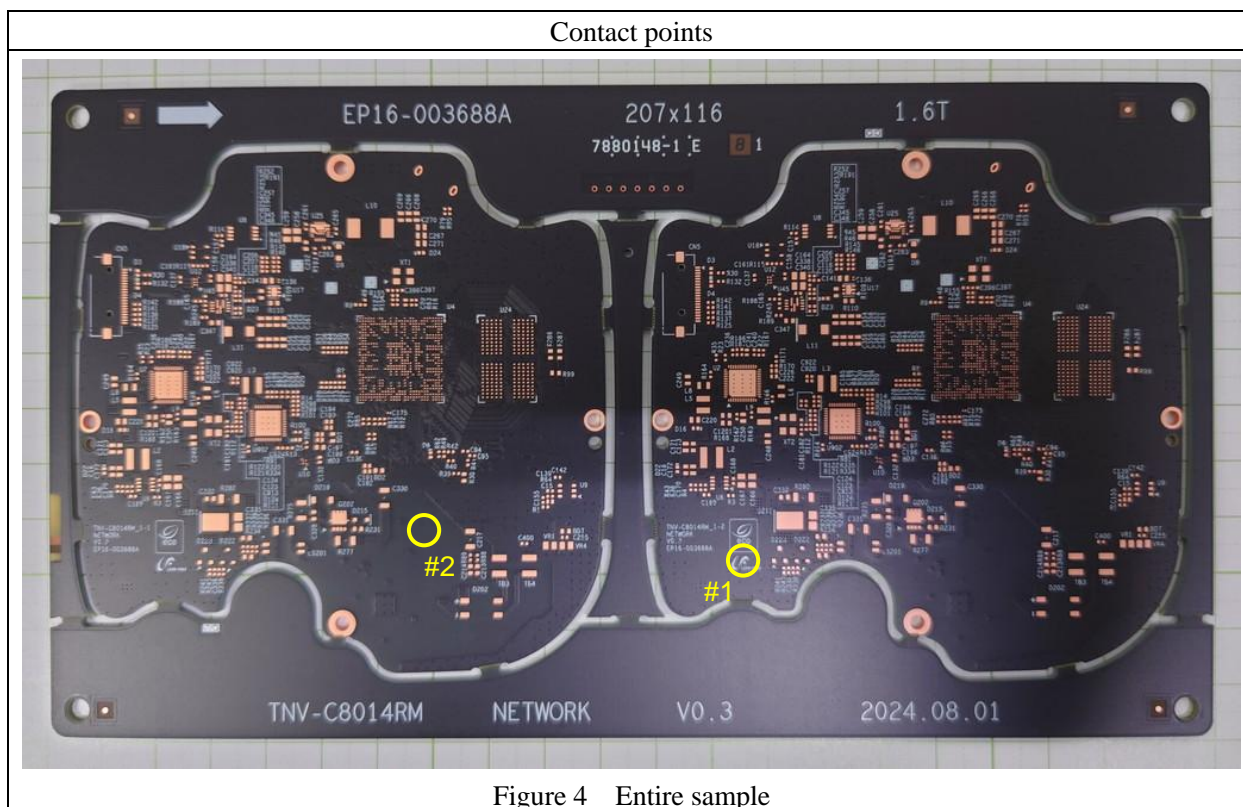
(6) Misc: _____

Micrometer No.: M-299Equipment No.: Q-7Temp. Indicator: M-15-2Lab Ambient: 23 °C (25±10 °C) and 50 %RH (60±15%RH)

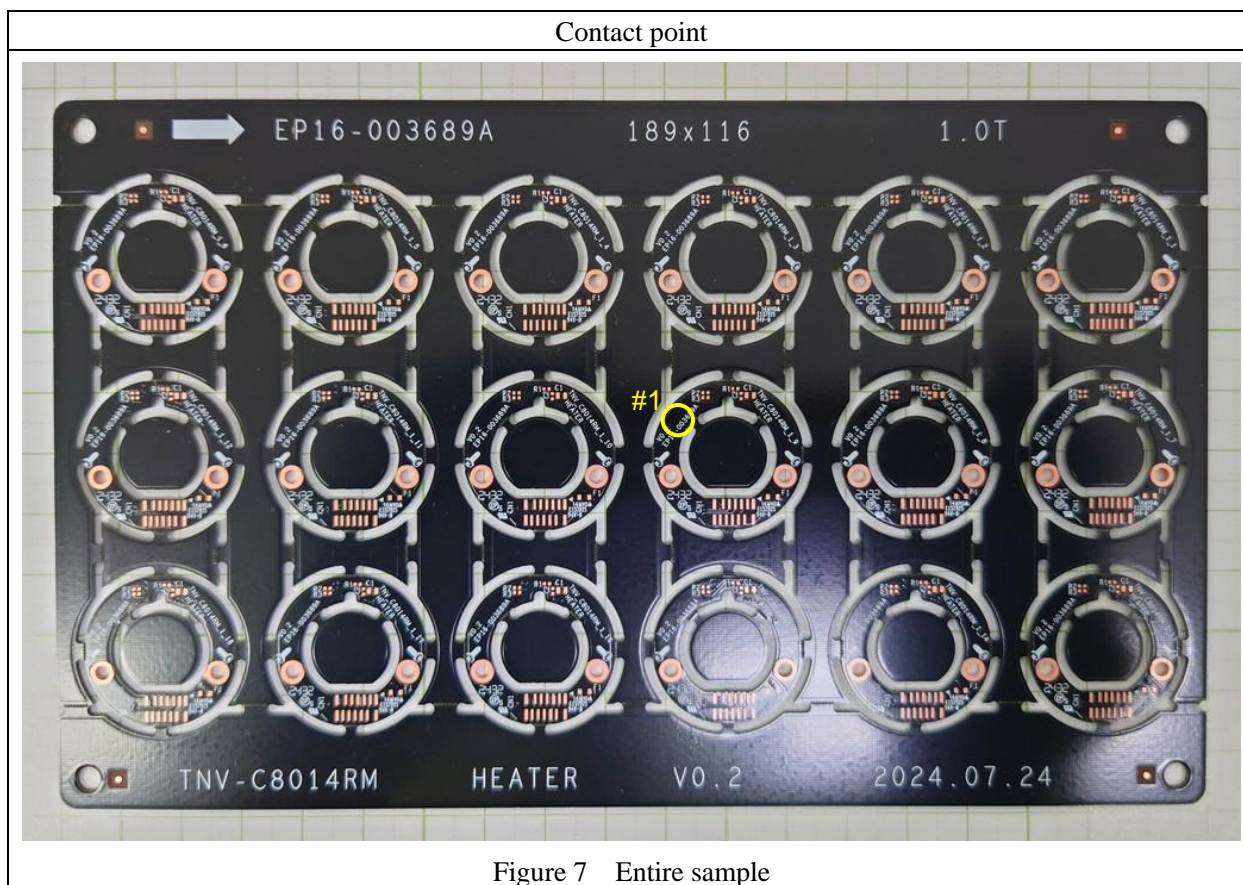
Reference: 241820 Material: Sensor PCB



Reference: 241820 Material: Network PCB



Reference: 241820 Material: Heater PCB



Reference: 241820 Material: IR PCB

Contact points

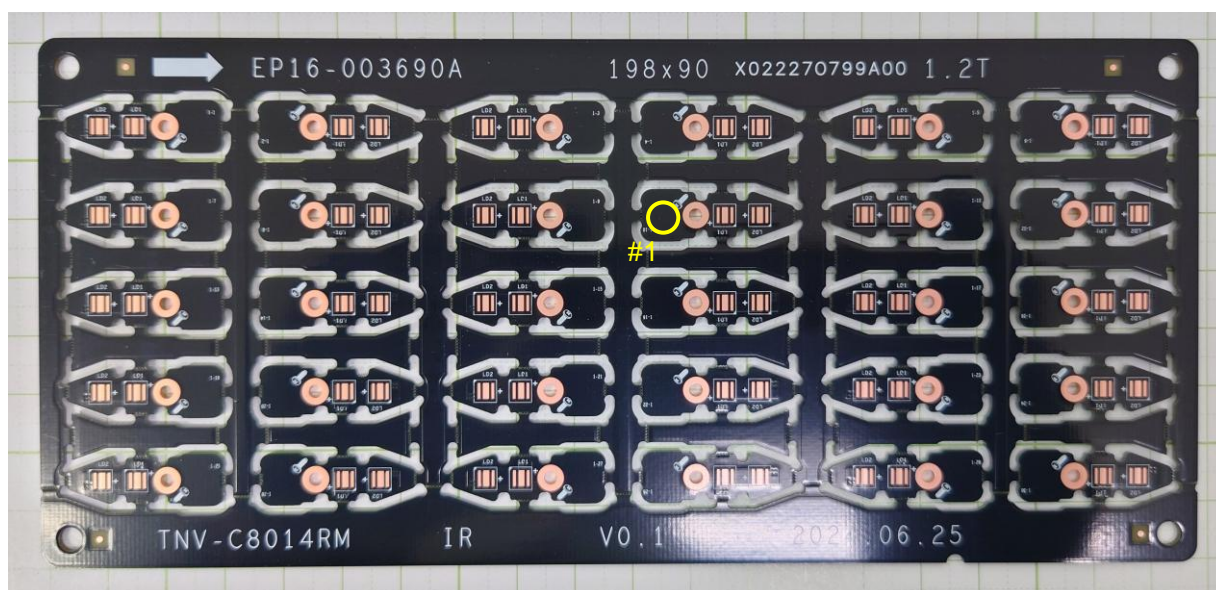


Figure 9 Entire sample (Front side)

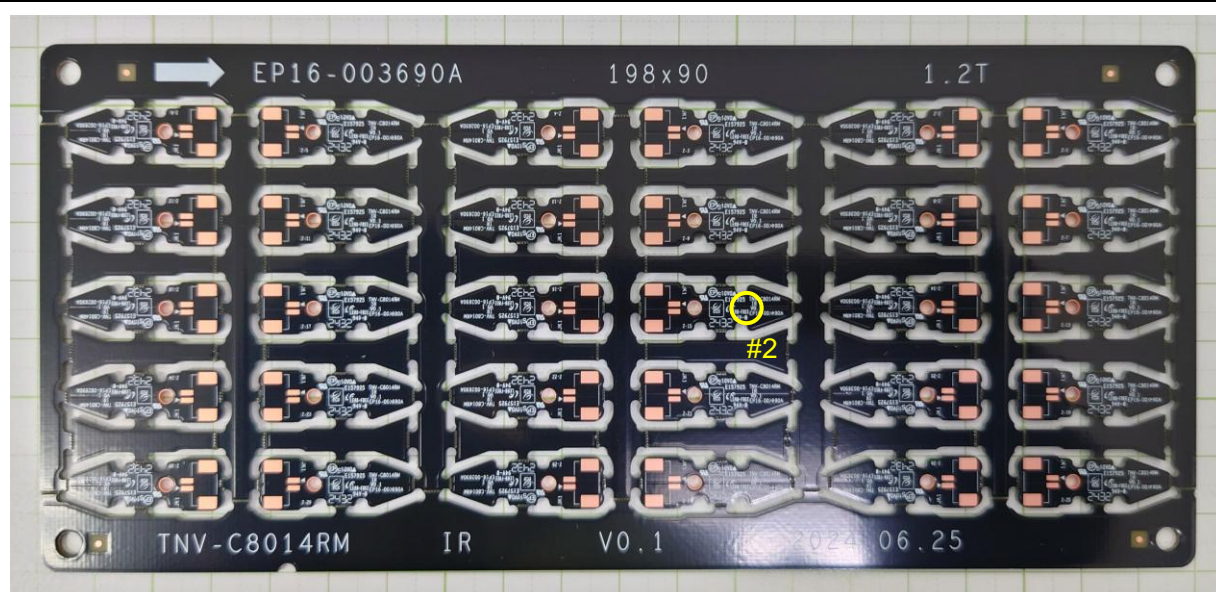


Figure 10 Entire sample (Back side)

Reference: 241820 Material: IR PCB

Sample after test

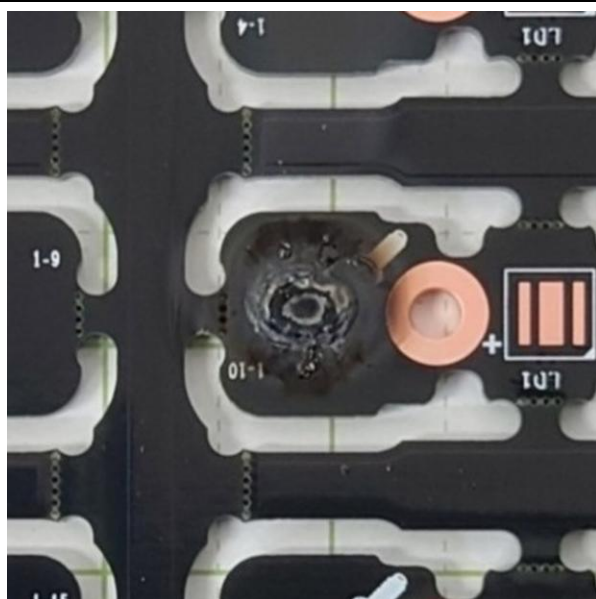


Figure 11 Contact point #1

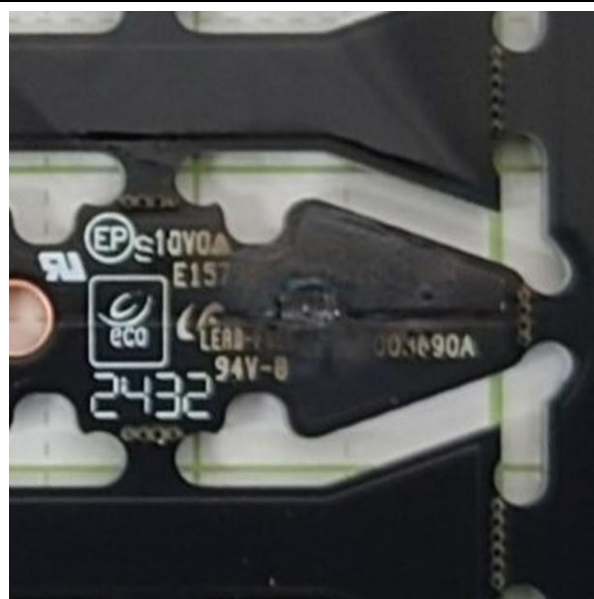


Figure 12 Contact point #2

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.*

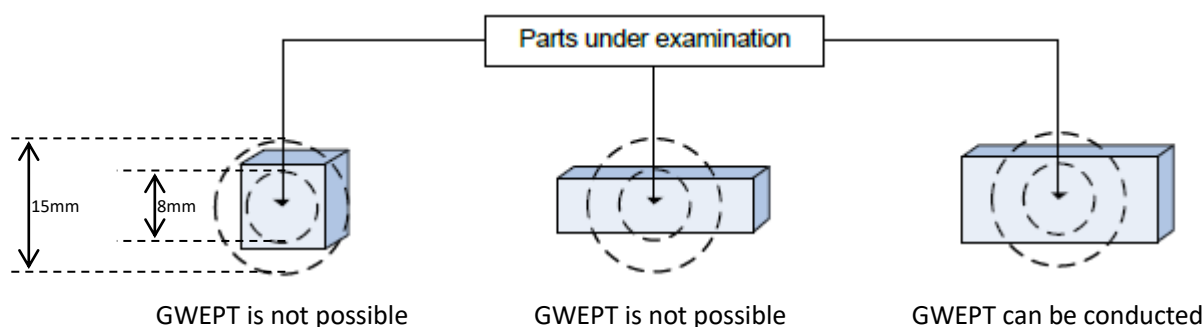


Figure 1 Definition of small parts

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

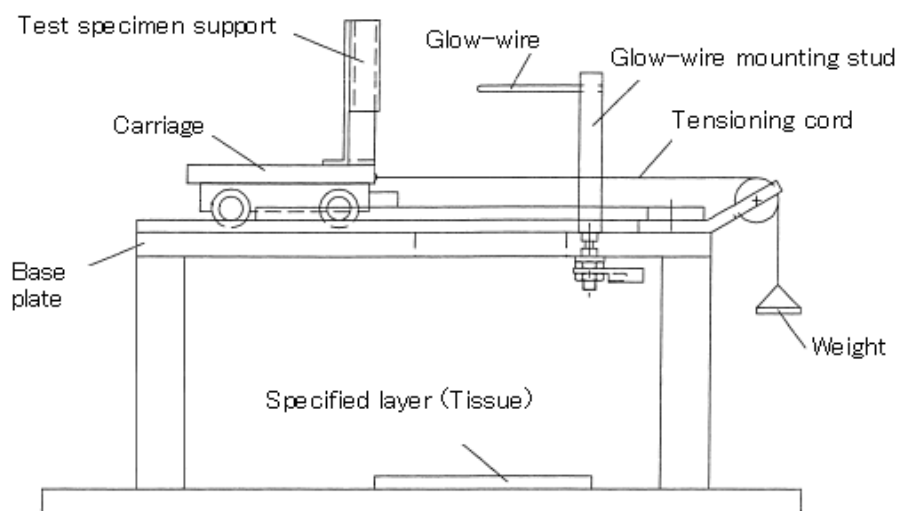


Figure 2 Image of testing apparatus

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)
550	± 10
600	± 10
650	± 10
700	± 10
750	± 10

Test Temperature (°C)	Tolerances (°C)
800	± 15
850	± 15
900	± 15
960	± 15

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.