

TEST REPORT

**CTK Co., Ltd.**

5 Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si,
Gyeonggi-do, Republic of Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

REPORT No.:
CTK-K-2025-00493
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**1. Applicant**

- Name : Hanwha Vision Co., Ltd
- Address : 6 Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488 KOREA
- Date of Receipt : Apr. 16, 2025

2. Manufacturer

- Name : Hanwha Vision Co., Ltd

3. Use of Report :

For submission to customer

4. Test sample / Model :

Network Thermal Camera / TNO-C3080T

5. Date(s) of test :

Apr. 28, 2025 ~ May. 23, 2025

6. Test Standard (Method) used :

MIL-STD-810H

7. Testing Environment :

Temperature: (25 ±10) °C, Humidity: (50 ±25) % R.H.
Pressure: (96 ±10) kPa

8. Test Results :

Refer to the test results

9. Location of Test :

☒ Permanent Testing Lab ☐ On Site Testing
(5 Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea)

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This report cannot be reproduced or copied without the written consent of CTK.

Approval	Tested by	Technical Manager
	Name: KyuNam Park (Signature) 	Name: HoHyun Lee (Signature) 

The above testing certificate is the accredited test result by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA

Jun. 23, 2025

Accredited by KOLAS, Republic of KOREA

CTK Co., Ltd.



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1. Testing laboratory

1.1 Testing laboratory information

Lab. Name	CTK Co., Ltd.
Representative	Young Joseph Seungwon
Address	5 Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea
Tel.	+82-31-339-9970
Fax.	+82-31-624-9501
E-Mail	all.youngin@element.com
Website	www.elementkorea.kr

1.2 Testing laboratory accreditation status

Country	Classification	Accreditation Number	Logo
International	KOLAS	TESTING NO. KT119	

2. Product description and equipment information

2.1 Product description

Product Name	Model Name	Quantity	Comment
Network Thermal Camera	TNO-C3080T	1 EA	—

2.2 Model description

Basic Model	TNO-C3080T
Series model	TNO-C3082T, TNO-C3060T, TNO-C3062T
Model differences	Use of the same external shape and materials (case, finishing material, PCB, cable, etc.), differences in SW and Fixed Lens.

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2.3 Equipment information

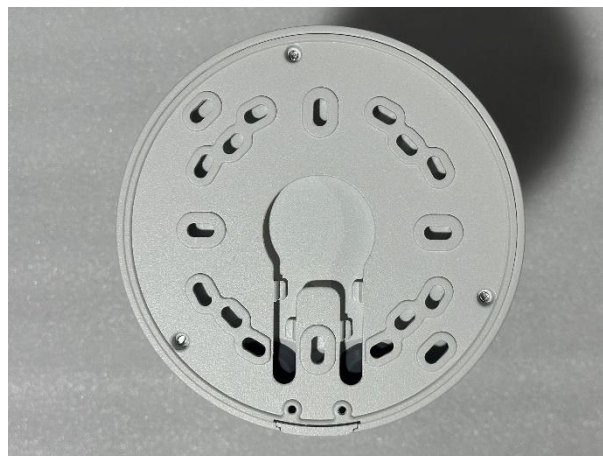
Testing equipment	Model Name	Manufacturer	Manufacturing Number	Calibration Date
Temperature & Humidity Chamber	C4-340	Weiss Technik	54260023190010	Feb. 6, 2026
Temperature & Humidity Chamber	ARS-0390-AE	ESPEC	4120200057	Aug. 22, 2025
ESS	EGNZ28-15NW	ESPEC	1738460	Aug. 22, 2025
Salt spray test chamber	SC/UKWT1000	Weiss Technik	59226214960010	Aug. 23, 2025
PH/ORP/Conductivity meter	Multi Sensor Meter SX731 series	미래사이언스	3116061400	Aug. 27, 2025
Drop Tester	AD 200	L.A.B Equipment	20210205-25	N/A
VIBRATION TESTING SYSTEM	LT1010	FAMTECH	D2012335	N/A
Acceleration sensor	8703A250M5	KISTLER	5830236	Jan. 16, 2026
Acceleration sensor	8703A250M5	KISTLER	5722241	Jan. 16, 2026
Steel measuring meter	KOMELON	5.5 m	225851	Jan. 16, 2026

2.4 Pre-test product images

2.4.1 Test sample



Top



Bottom



Front



Rear



Left side



Right side

2.5 Testing equipment images

2.5.1 Test equipment (1)



Temperature & Humidity Chamber



Temperature & Humidity Chamber



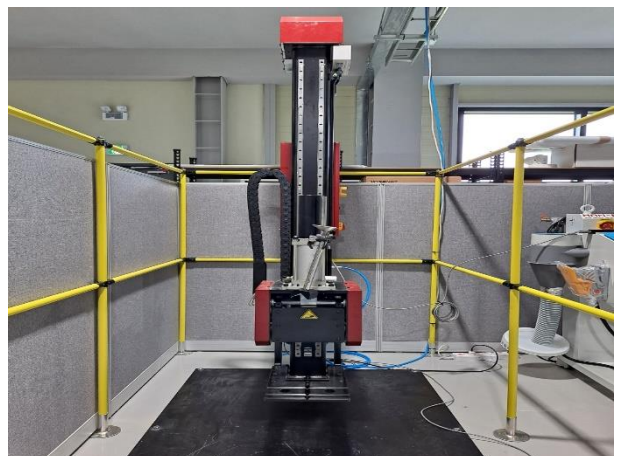
ESS



Salt spray test chamber



PH/ORP/Conductivity meter



Drop Tester

2.5.2 Test equipment (2)



VIBRATION TESTING SYSTEM



Acceleration sensor



Acceleration sensor



Steel measuring meter

3. High temperature Test (MIL-STD-810H 501.7)

3.1 Test date and environmental conditions

3.1.1 Test date: May. 09, 2025 ~ May. 13, 2025

3.1.2 Measured Environmental Conditions

Item	Temperature (°C)	Humidity (% R.H.)	Pressure (kPa)
Measurement	25.2	47.3	95.1

3.2 Test conditions and methods

3.2.1 Sample status: Operation

3.2.2 Evaluation Criteria: Verification of Appearance Before and After Testing, and Confirmation of Proper Product Functionality.

3.2.3 Test method : High temperature cycles, climatic category A2 – Basic Hot 3 Cycles

Time of Day	Induced (Storage and Transit) Conditions	
	Temperature (°C)	Humidity (% R.H.)
0100	33	36
0200	32	38
0300	32	41
0400	31	44
0500	30	44
0600	31	43
0700	34	32
0800	38	30
0900	42	23
1000	45	17
1100	51	14
1200	57	8
1300	61	6
1400	63	6
1500	63	5
1600	62	6
1700	60	6
1800	57	6
1900	50	10
2000	44	14
2100	38	19
2200	35	25
2300	34	28
2400	33	33

3.3 Testing images

3.3.1 Evidence of test setting



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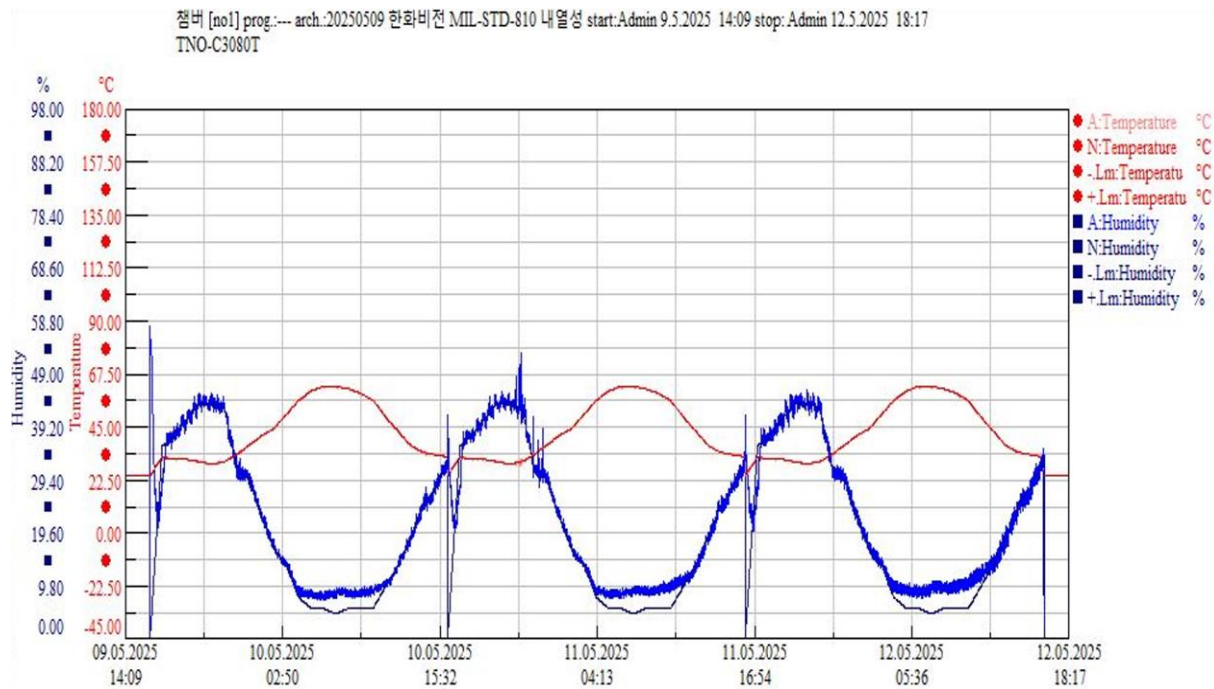
**3.4 Test Result**

3.4.1 Test Result table

Evaluations Criteria	Test result		Comment
Sample	Visual Inspection	Normal	-
	Operation and Function	Normal	-

3.5 Test Data

3.5.1 Test data and graph



Temperature Data



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3.6 Post-test operation and function

3.6.1 Test sample operation and function



4. Low temperature Test (MIL-STD-810H 502.7)

4.1 Test date and environmental conditions

4.1.1 Test date: May. 14, 2025 ~ May. 18, 2025

4.1.2 Measured Environmental Conditions

Item	Temperature (°C)	Humidity (% R.H.)	Pressure (kPa)
Measurement	24.3	46.3	91.3

4.2 Test conditions and methods

4.2.1 Sample status: Operation

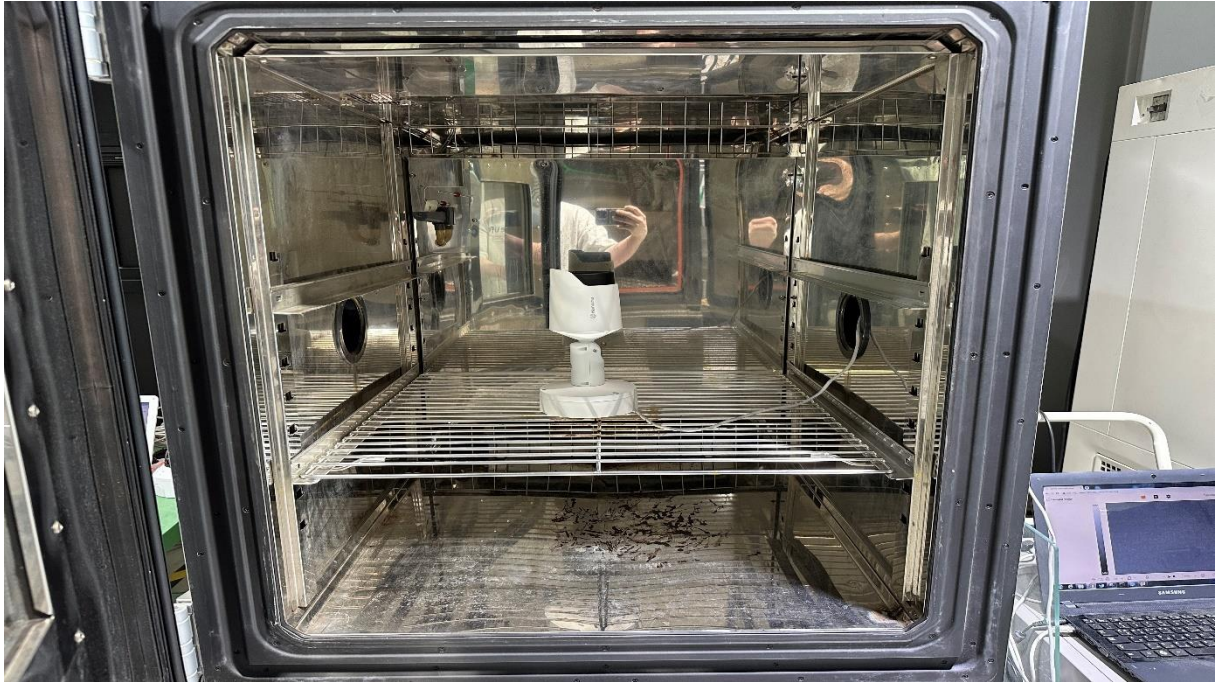
4.2.2 Test temperature: -33 °C

4.2.3 Test time: 72 h

4.2.4 Evaluation Criteria: Verification of Appearance Before and After Testing, and Confirmation of Proper Product Functionality.

4.3 Testing images

4.3.1 Evidence of test setting



4.4 Test result

4.4.1 Test results table

Evaluations Criteria	Test result		Comment
Sample	Visual Inspection	Normal	-
	Operation and Function	Normal	-



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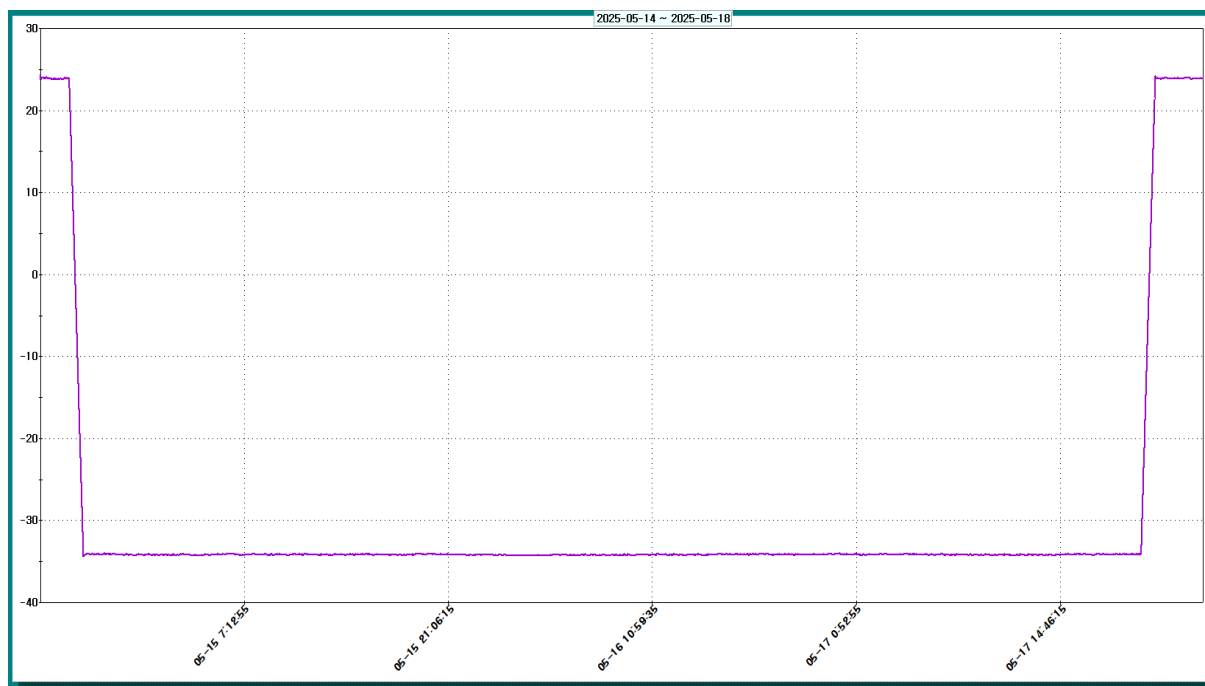
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4.5 Test Data

4.5.1 Test data and graph



Temperature Data



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4.6 Post-test operation and function

4.6.1 Test sample operation and function



5. Salt fog Test (MIL-STD-810H 509.7)

5.1 Test date and environmental conditions

5.1.1 Test date: May. 19, 2025 ~ May. 23, 2025

5.1.2 Measured Environmental Conditions

Item	Temperature (°C)	Humidity (% R.H.)	Pressure (kPa)
Measurement	23.6	49.6	98.3

5.2 Test conditions and methods

5.2.1 Sample status: Non-operation

5.2.2 Salt concentration: Nacl 5 %, pH (6.85 ±0.35)

5.2.3 Temperature condition: 35 °C

5.2.4 Spray amount: (2 ±1) ml, 80 cm²/h

5.2.5 Salt fog Exposure time : 48 h

5.2.6 Dry time: 48 h

5.2.7 Evaluation Criteria: Verification of Appearance Before and After Testing (whitening, red rust, or corrosion on metal parts), and Confirmation of Proper Product Functionality.



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5.3 Testing images

5.3.1 Evidence of test setting



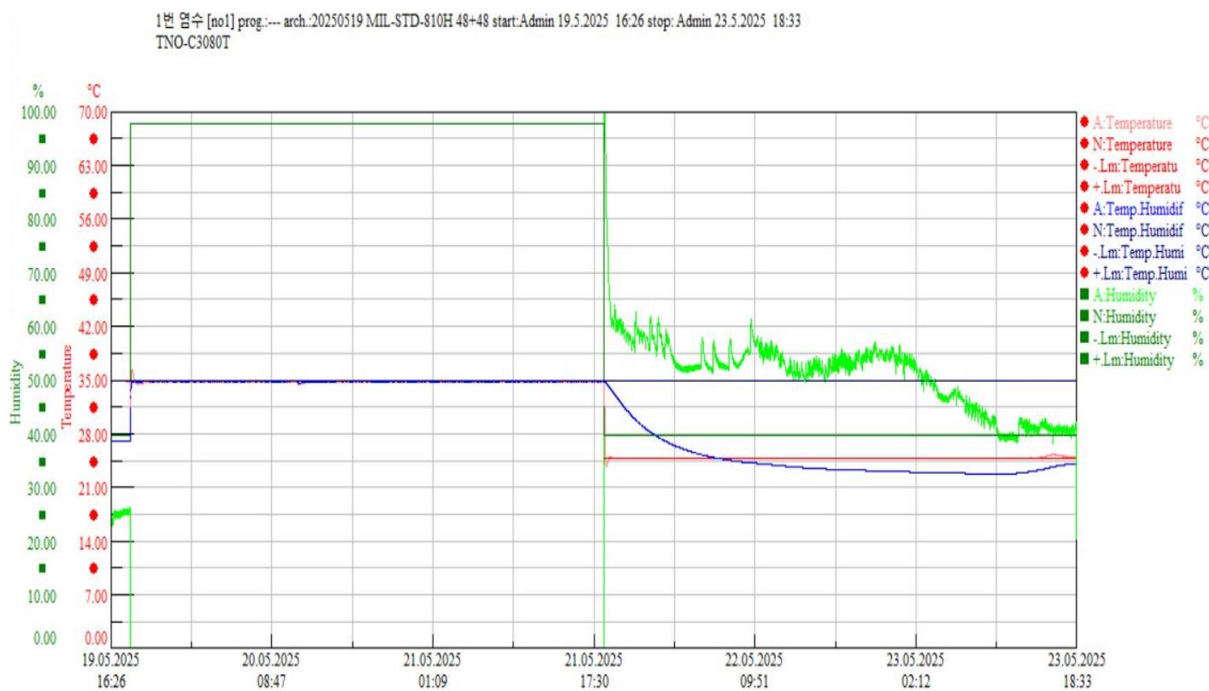
5.4 Test result

5.4.1 Test results table

Evaluations Criteria	Test result		Comment
Sample	Visual Inspection	Normal	-
	Operation and Function	Normal	-

5.5 Test Data

5.5.1 Test data and graph



Temperature Data



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5.6 Post-test operation and function

5.6.1 Test sample operation and function



6. Shock Test (MIL-STD-810H 516.8)

6.1 Test date and environmental conditions

6.1.1 Test date: May. 21, 2025

6.1.2 Measured Environmental Conditions

Item	Temperature (°C)	Humidity (% R.H.)	Pressure (kPa)
Measurement	24.1	47.2	98.5

6.2 Test conditions and methods

6.2.1 Sample status: Master carton packaging status

6.2.2 Test methods: Logistic transit drop test

Weight of test item & case (kg)	Largest Dimension (cm)	Height of drop (cm)	Number of Drops
Under 45.4 Man-packed or man-portable	Under 91	122	Drop on each face, edge and conner, total of 26 drops

6.2.3 Evaluation Criteria: Verification of Appearance Before and After Testing, and
Confirmation of Proper Product Functionality



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6.3 Pre-test product images

6.3.1 Test sample (1)



Master carton packaging Top



Master carton packaging Bottom



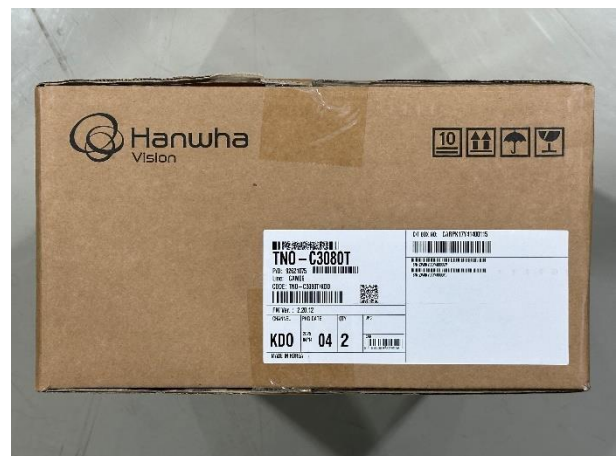
Master carton packaging Front



Master carton packaging Rear



Master carton packaging Left side



Master carton packaging Right side



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6.3.2 Test sample (2)



Master carton packaging Inside



Single packaging Top



Single packaging Bottom



Single packaging Front



Single packaging Rear



Single packaging Left side

6.3.3 Test sample (3)



Single packaging Right side



Single packaging Inside



Single packaging Inside



Top



Bottom



Front

6.3.4 Test sample (4)



Rear



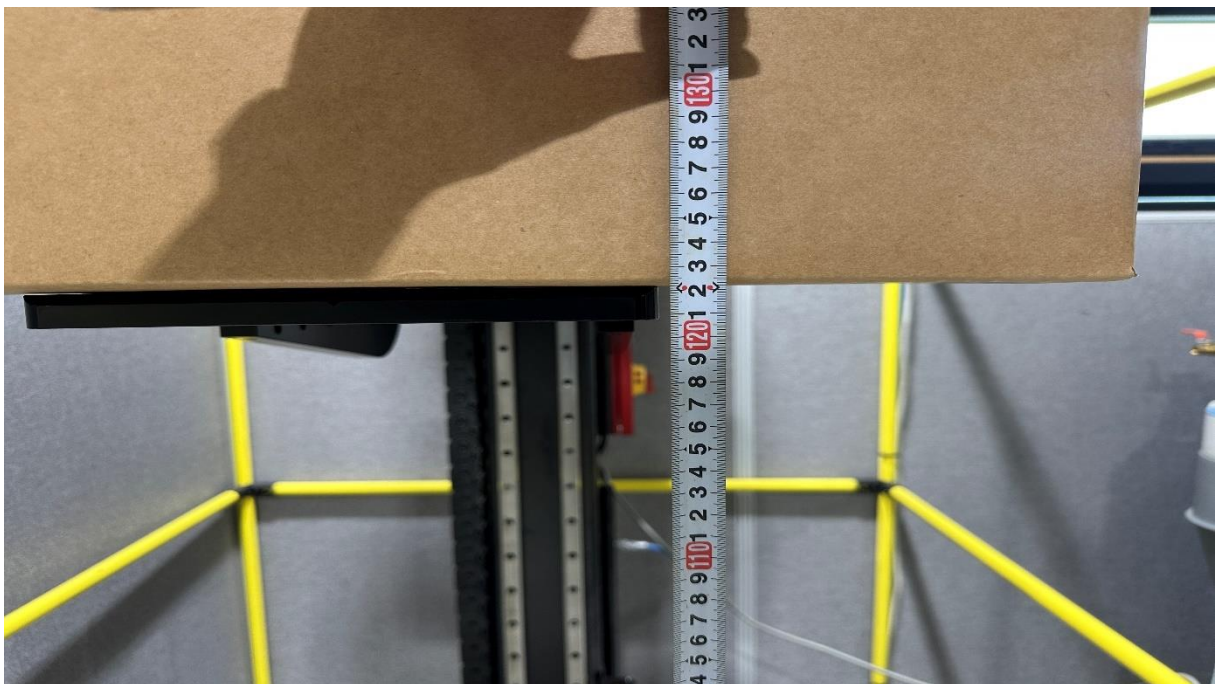
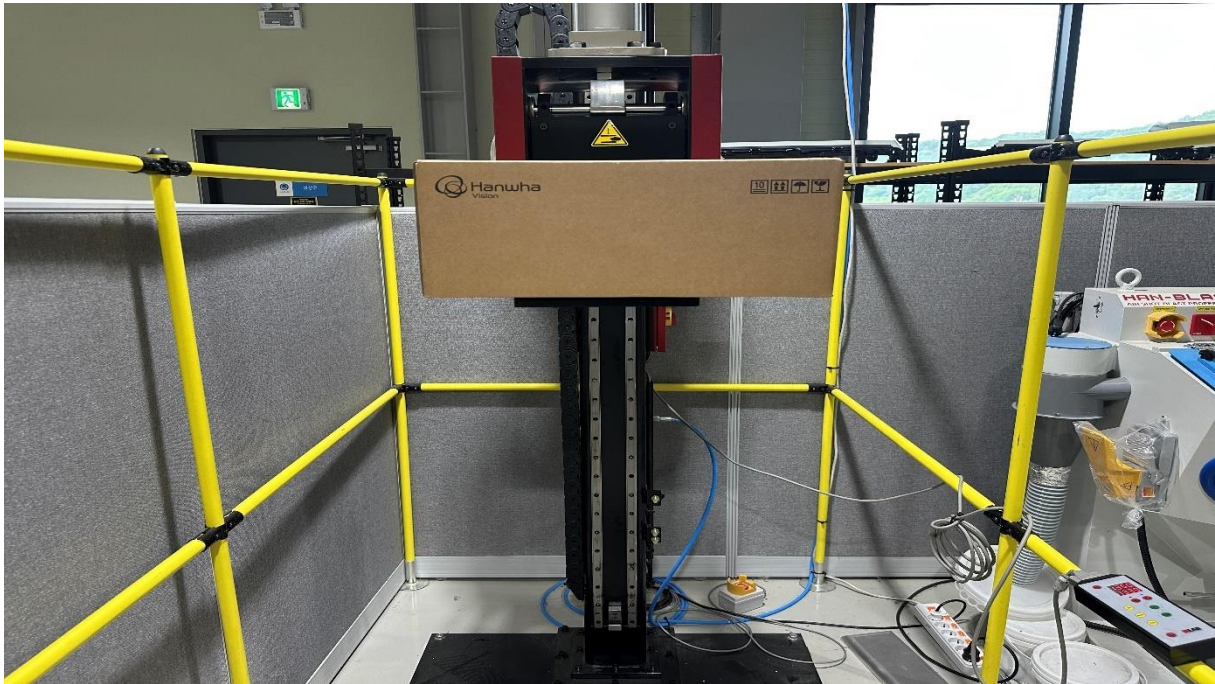
Left side



Right side

6.4 Testing images

6.4.1 Evidence of test setting



6.5 Test result

6.5.1 Test results table

Evaluations Criteria	Test result		Comment
Sample	Visual Inspection	Normal	-
	Operation and Function	Normal	-

6.6 Post-test product images

6.6.1 Test sample (1)



Master carton packaging Top



Master carton packaging Bottom



Master carton packaging Front



Master carton packaging Rear



Master carton packaging Left side



Master carton packaging Right side



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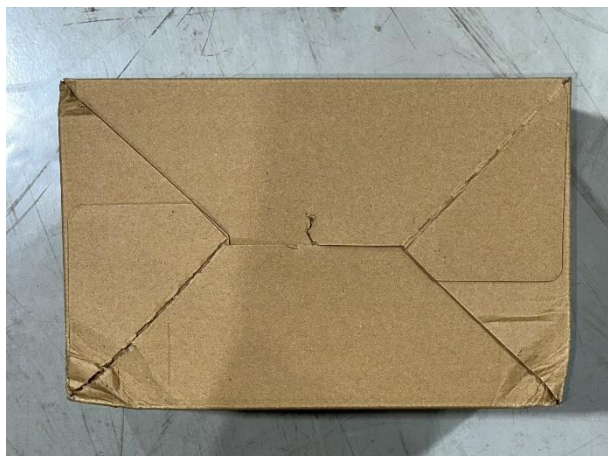
6.6.2 Test sample (2)



Master carton packaging Inside



Single packaging Top



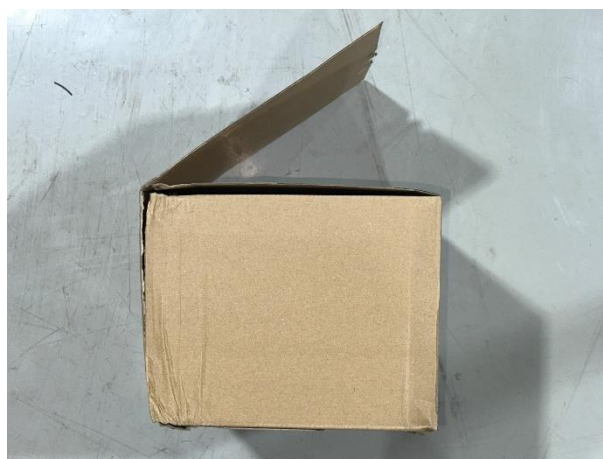
Single packaging Bottom



Single packaging Front



Single packaging Rear



Single packaging Left side

6.6.3 Test sample (3)



Single packaging Right side



Single packaging Inside



Single packaging Inside



Top



Bottom



Front

6.6.4 Test sample (4)



Rear



Left side



Right side



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6.7 Post-test operation and function

6.7.1 Test sample operation and function





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7. Humidity Test (MIL-STD-810H 507.6)

7.1 Test date and environmental conditions

7.1.1 Test date: Apr. 28, 2025 ~ May. 09, 2025

7.1.2 Measured Environmental Conditions

Item	Temperature (°C)	Humidity (% R.H.)	Pressure (kPa)
Measurement	24.1	48.5	94.9

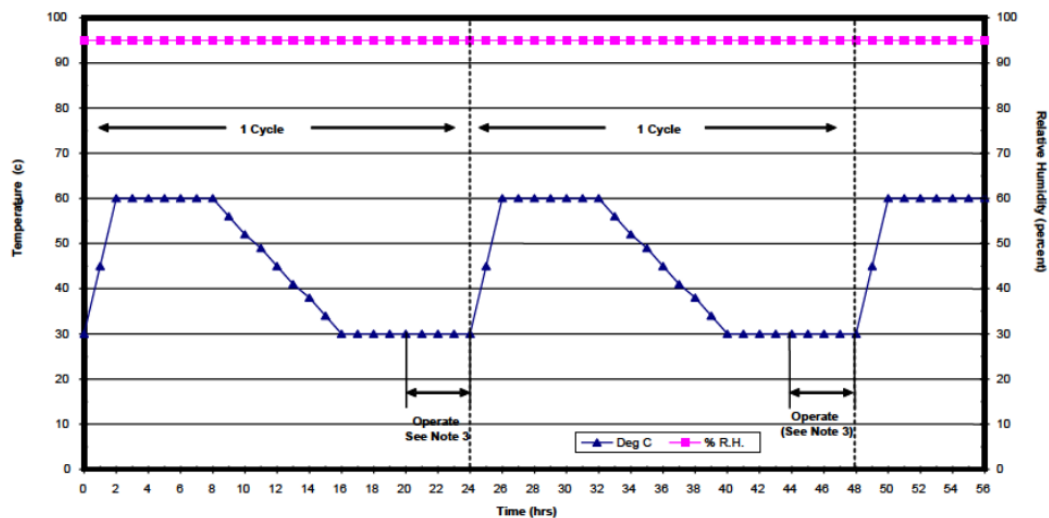
7.2 Test conditions and methods

7.2.1 Sample status: Non-operation (end of the 5 cycle and 10 cycle Operational check)

7.2.2 Test methods : Aggravated temperature-humidity cycle

23 ± 2°C and 50 ± 5% RH, hold for more than 24 hours and adjust to 30°C, RH 95%

Exposure of test items more than 10 times in a 24-hour cycle in the range of 30-60 °C

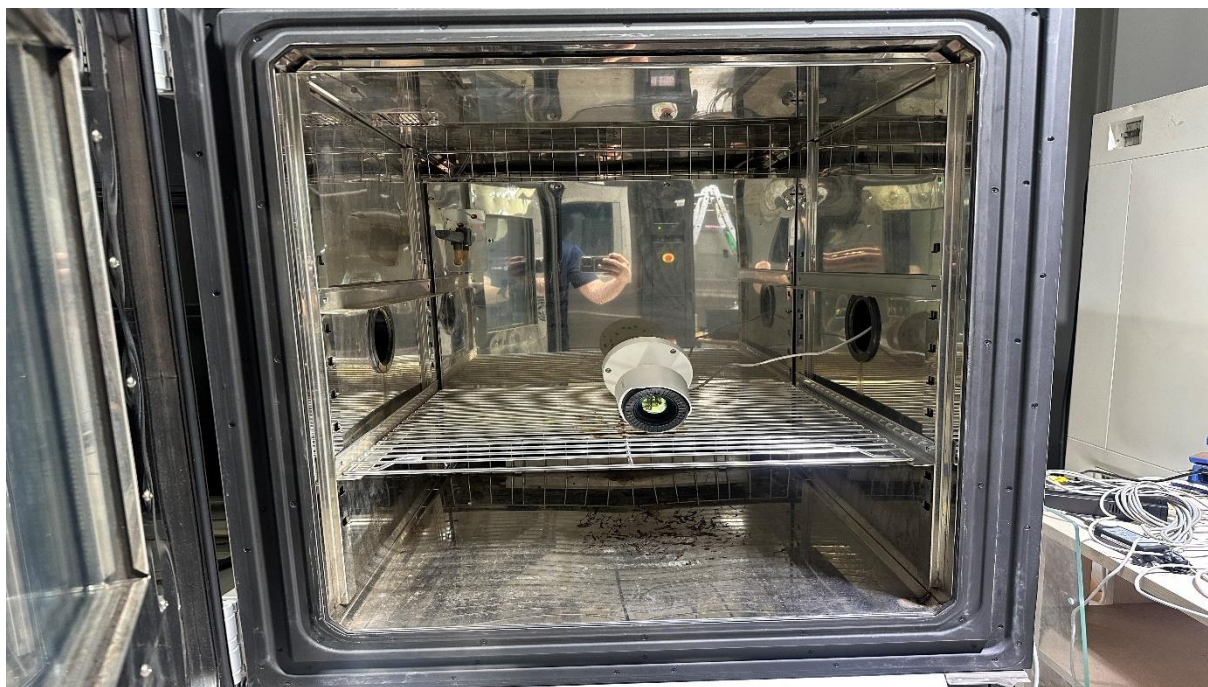


Time	Temperature (°C)	Humidity (% R.H.)
0000	30	95
0200	60	
0800	60	
1600	30	
2400	30	

7.2.3 Evaluation Criteria: Verification of Appearance Before and After Testing, and Confirmation of Proper Product Functionality.

7.3 Testing images

7.3.1 Evidence of test setting



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**7.4 Test result**

7.4.1 Test results table

Evaluations Criteria	Test result		Comment
Sample	Visual Inspection	Normal	-
	Operation and Function	Normal	-



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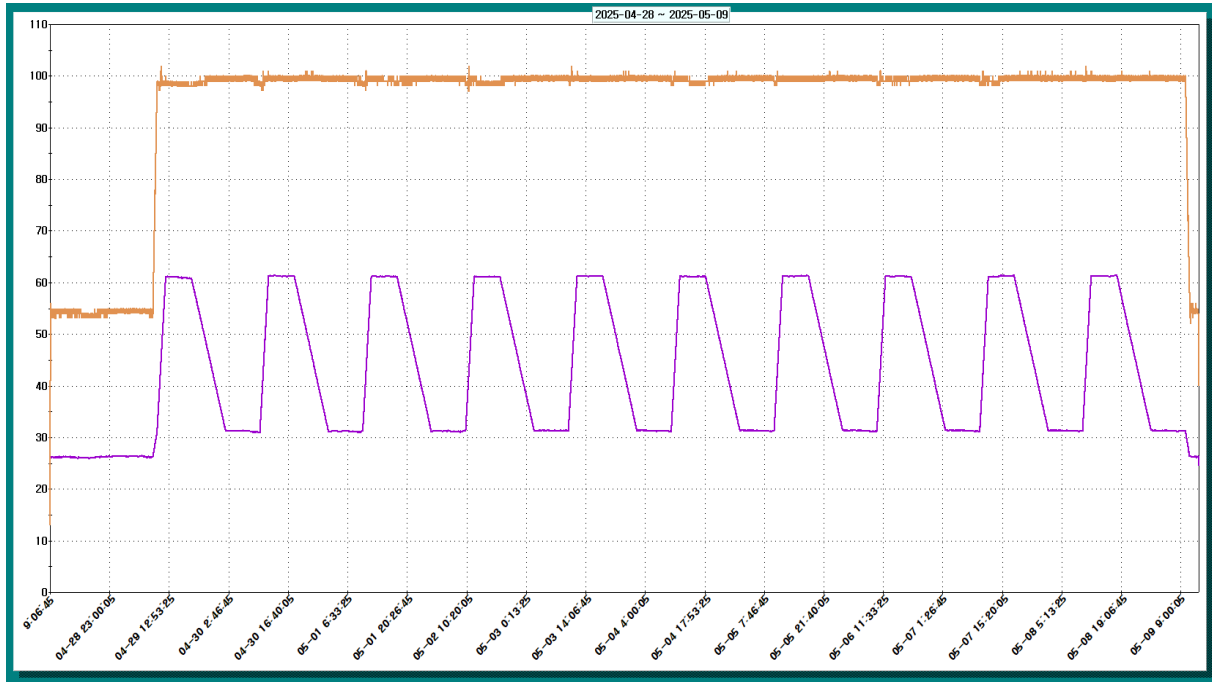
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7.5 Test Data

7.5.1 Test data and graph



Temperature Data



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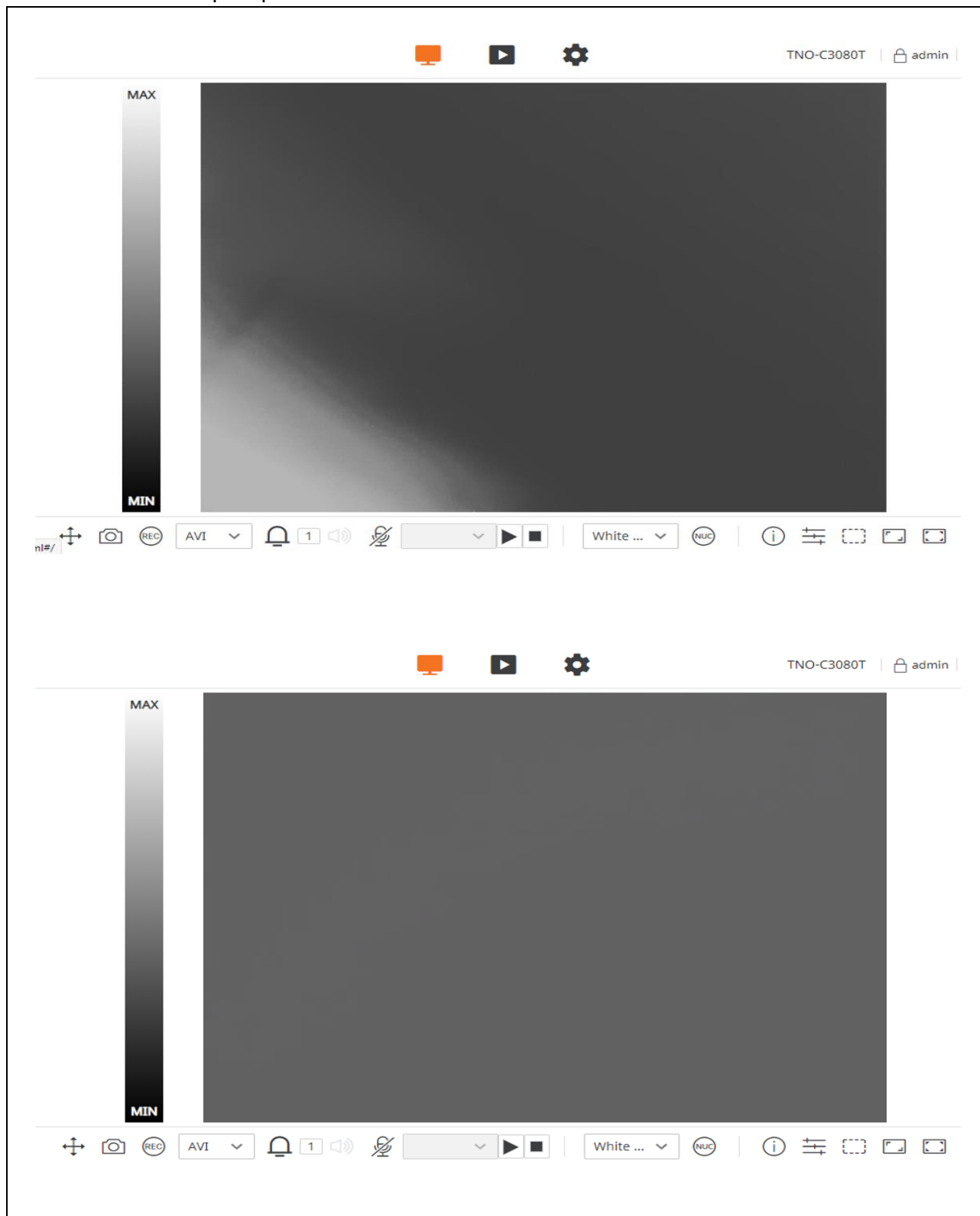
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7.6 Operation and function

7.6.1 Test sample operation and function



8. Vibration Test (MIL-STD-810H 514.8)

8.1 Test date and environmental conditions

8.1.1 Test date: May. 08, 2025 ~ May. 12, 2025

8.1.2 Measured Environmental Conditions

Item	Temperature (°C)	Humidity (% R.H.)	Pressure (kPa)
Measurement	25.3	46.3	92.1

8.2 Test conditions and methods

8.2.1 Sample status: Operation

8.2.2 Frequency: (5 ~ 500) Hz

8.2.3 Acceleration: 1 G

8.2.4 Sweep rate: 1 oct/min

8.2.5 Test Axis: X, Y, Z

8.2.6 Test time: each axis 1 hours

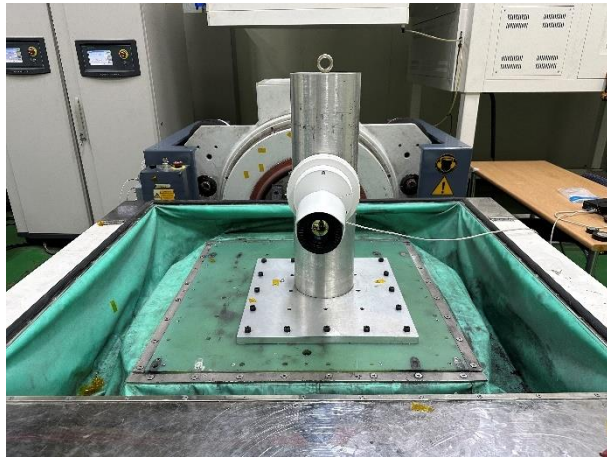
8.2.7 Test methods: Category 4 – Common carrier

Vertical		Transverse		Longitudinal	
Frequency, Hz	ASD, g ² /Hz	Frequency, Hz	ASD, g ² /Hz	Frequency, Hz	ASD, g ² /Hz
5	0.015	5	0.00013	5	0.0065
40	0.015	10	0.00013	20	0.0065
500	0.00015	20	0.00065	120	0.0002
Rms = 1.08 g		30	0.00065	121	0.003
		78	0.00002	200	0.003
		79	0.00019	240	0.0015
		120	0.00019	340	0.00003
		500	0.00001	500	0.00015
		Rms = 0.21 g		Rms = 0.76 g	

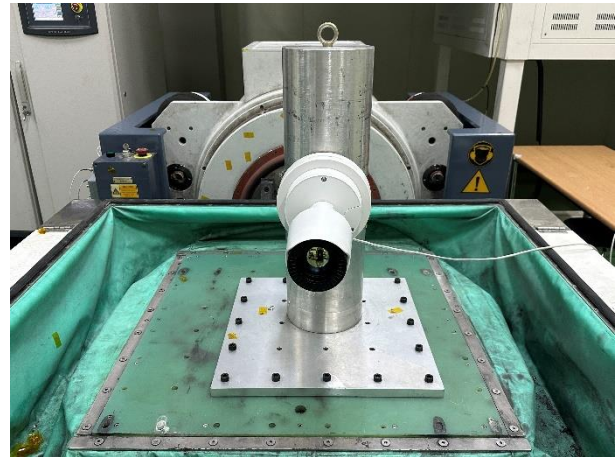
8.2.8 Evaluation Criteria: Verification of Appearance Before and After Testing, and Confirmation of Proper Product Functionality.

8.3 Testing images

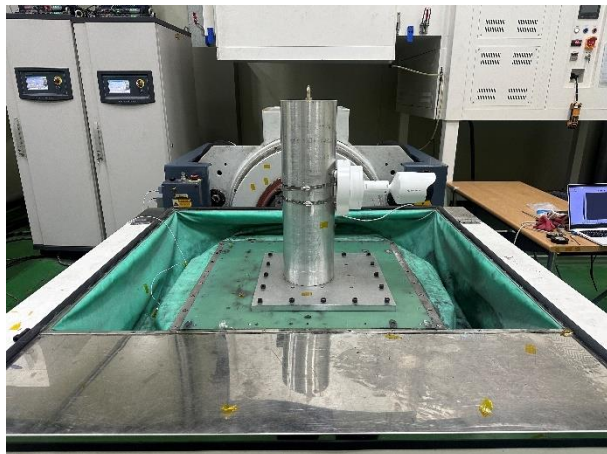
8.3.1 Evidence of test setting



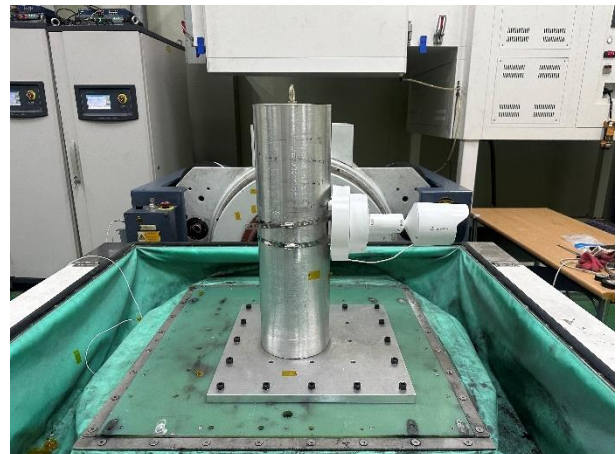
X axis_1



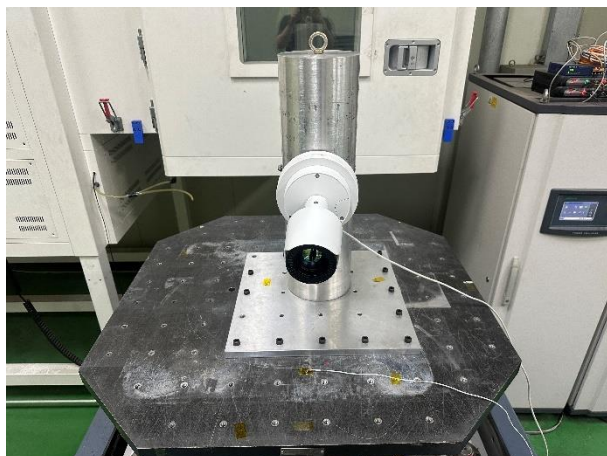
X axis_2



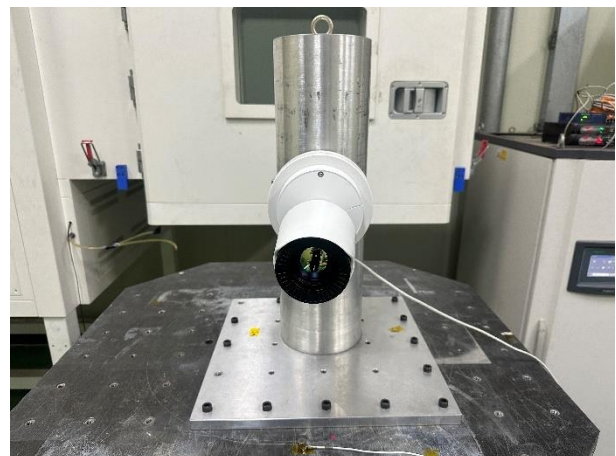
Y axis_1



Y axis_2



Z axis_1



Z axis_2

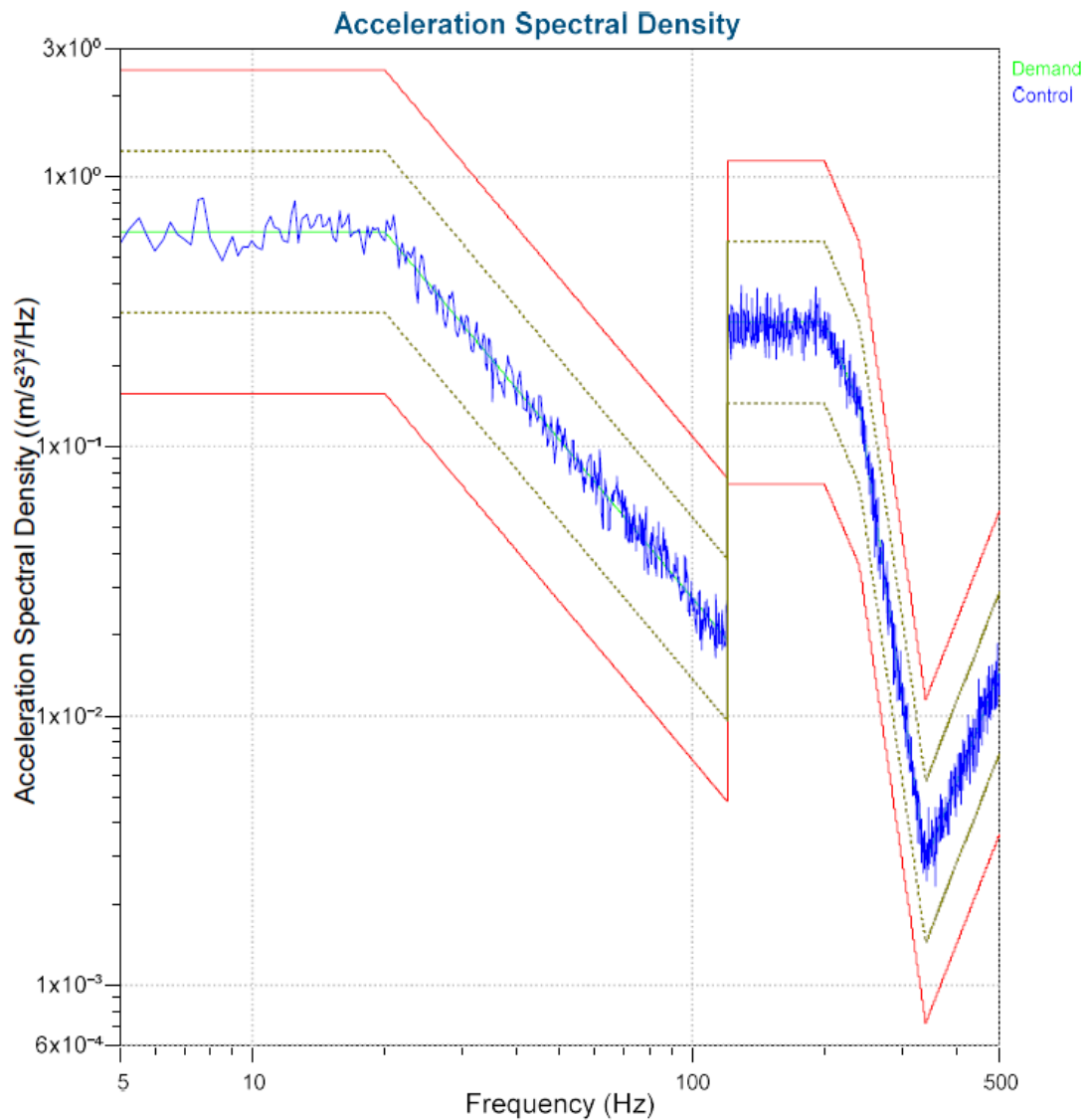
8.4 Test result

8.4.1 Test results table

Evaluations Criteria	Test result		Comment
Sample	Visual Inspection	Normal	-
	Operation and Function	Normal	-

8.5 Test Data

8.5.1 Test data and graph (Vibration Test X Axis)



5 08, 2025 09:31:51 Level 1) 100 %

Output: 0 Volts RMS

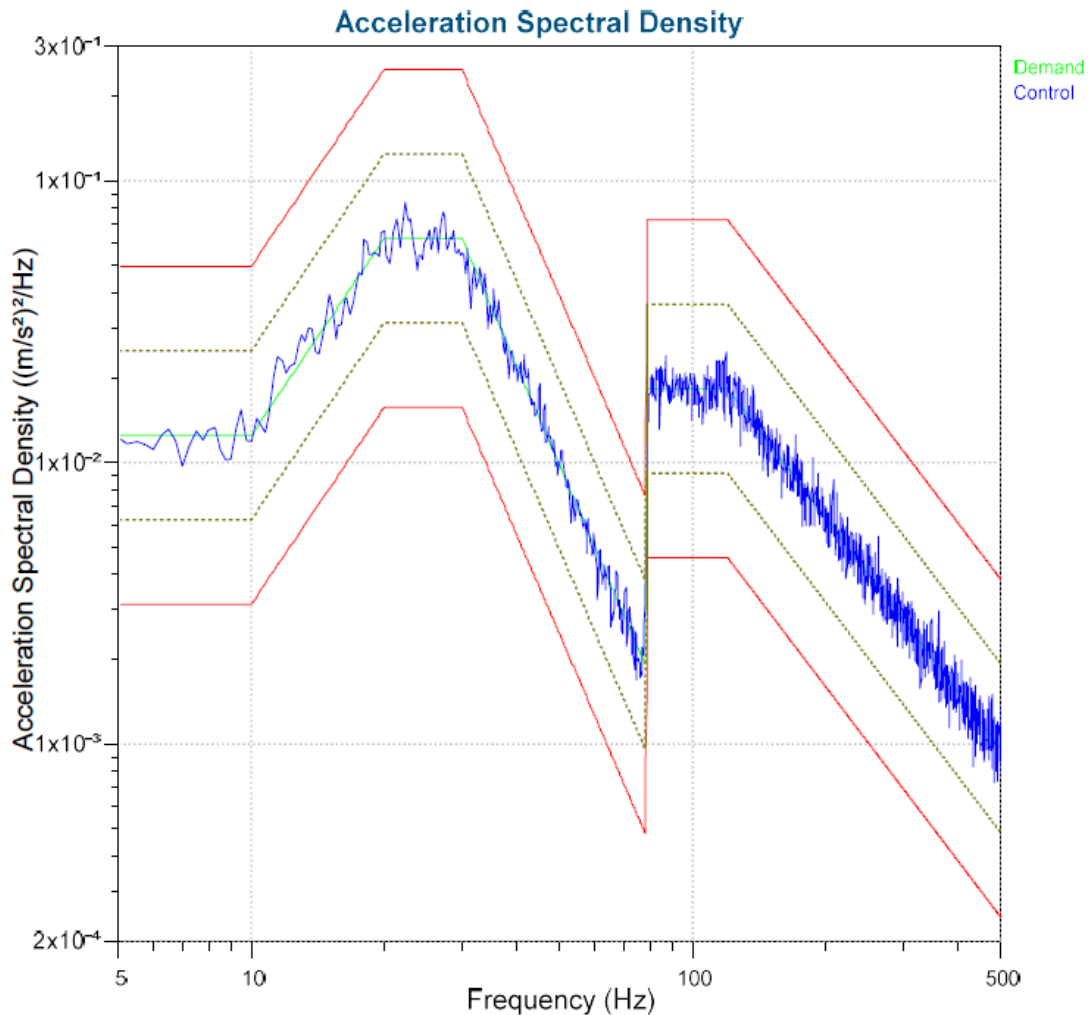
한화비전 MIL-STD-810H 514.8

Demand: 0.7624 G RMS Level Time: 1:00:00

Control: 0.7597 G RMS **Total Time: 1:00:22** End of Test

X Axis

8.5.2 Test data and graph (Vibration Test Y Axis)



5 09, 2025 15:21:36 Level 1) 100 %

Output: 0 Volts RMS

한화비전 MIL-STD-810H 514.8

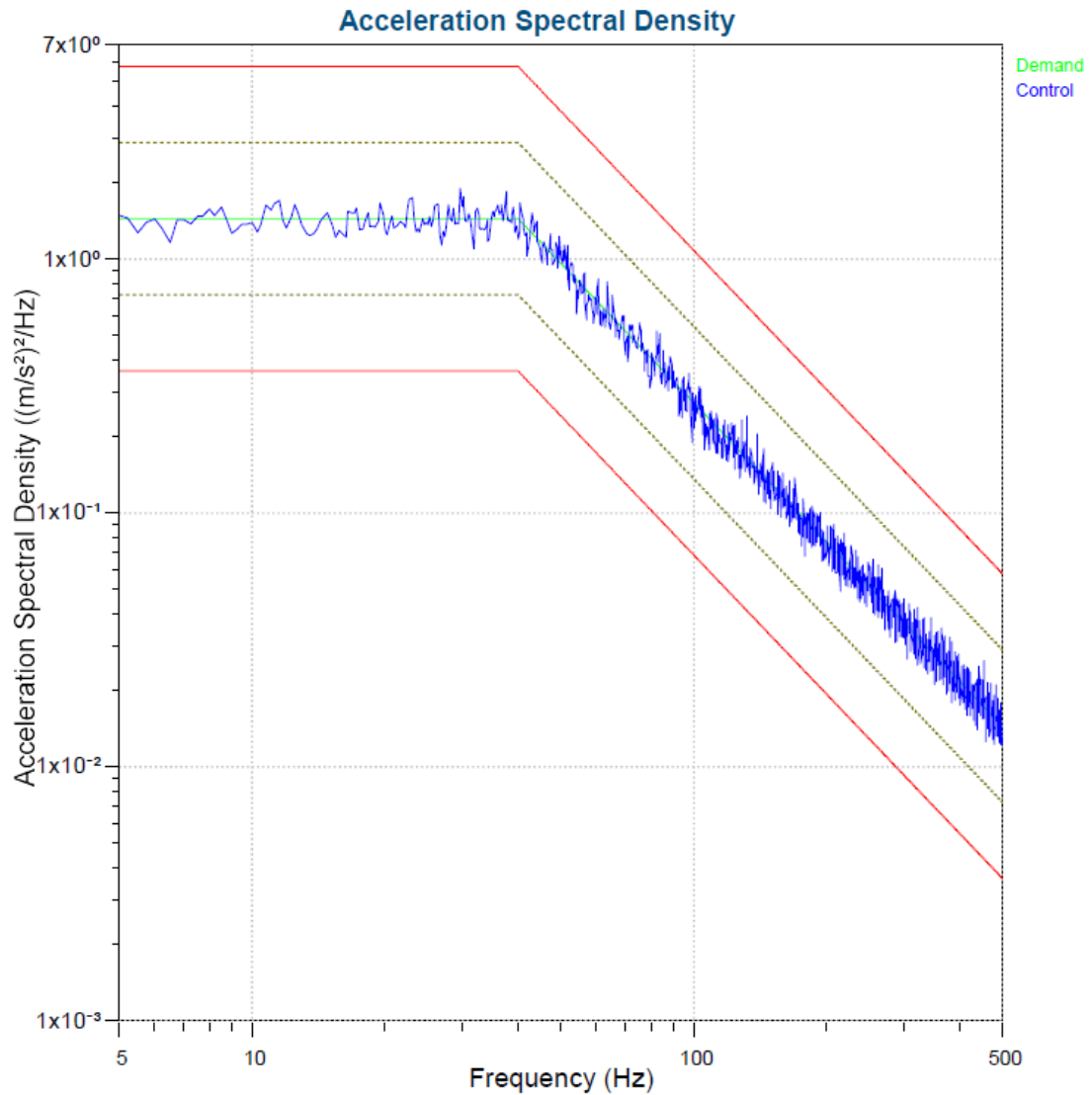
Demand: 0.2052 G RMS Level Time: 1:00:01

Control: 0.2053 G RMS Total Time: 1:00:23

End of Test

Y Axis

8.5.3 Test data and graph (Vibration Test Z Axis)



5 12, 2025 14:22:01 Level 1) 100 %

Output: 0.1679 Volts RMS 한화비전 MIL-STD 810H 514.8

Demand: 1.079 G RMS Level Time: 1:00:0

Control: 1.077 G RMS Total Time: 1:00:2

End of Test

Z Axis



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Gyeonggi-do, Republic of Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

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8.6 Post-test operation and function

8.6.1 Test sample operation and function



9. Packaging Vibration Test (MIL-STD-810H 514.8)

9.1 Test date and environmental conditions

9.1.1 Test date: May. 08, 2025 ~ May. 09, 2025

9.1.2 Measured Environmental Conditions

Item	Temperature (°C)	Humidity (% R.H.)	Pressure (kPa)
Measurement	25.3	48.3	99.7

9.2 Test conditions and methods

9.2.1 Sample status: Single packaging

9.2.2 Frequency: (5 ~ 500) Hz

9.2.3 Acceleration: 1 G

9.2.4 Sweep rate: 1 oct/min

9.2.5 Test Axis: X, Y, Z

9.2.6 Test time: each axis 3 hours

9.2.7 Test methods: Category 4 – Common carrier

Vertical		Transverse		Longitudinal	
Frequency, Hz	ASD, g ² /Hz	Frequency, Hz	ASD, g ² /Hz	Frequency, Hz	ASD, g ² /Hz
5	0.015	5	0.00013	5	0.0065
40	0.015	10	0.00013	20	0.0065
500	0.00015	20	0.00065	120	0.0002
Rms = 1.08 g		30	0.00065	121	0.003
		78	0.00002	200	0.003
		79	0.00019	240	0.0015
		120	0.00019	340	0.00003
		500	0.00001	500	0.00015
		Rms = 0.21 g		Rms = 0.76 g	

9.2.8 Evaluation items: Verification of Packaging and Appearance Before and After Testing, and Confirmation of Proper Product Functionality.



CTK Co., Ltd.

5 Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si,
Gyeonggi-do, Republic of Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

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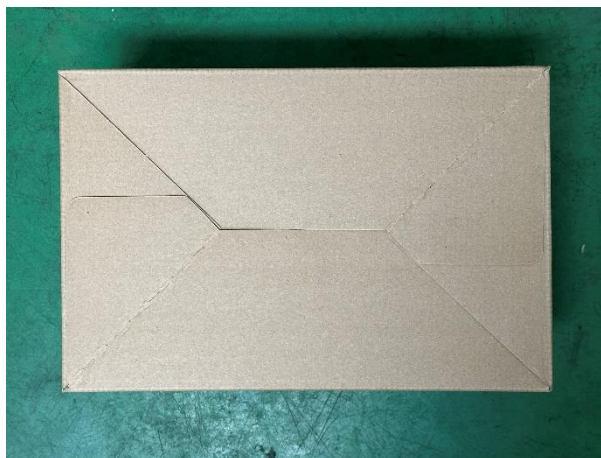


9.3 Pre-test product images

9.3.1 Test sample (1)



Single packaging Top



Single packaging Bottom



Single packaging Front



Single packaging Rear



Single packaging Left side



Single packaging Right side

9.3.2 Test sample (2)



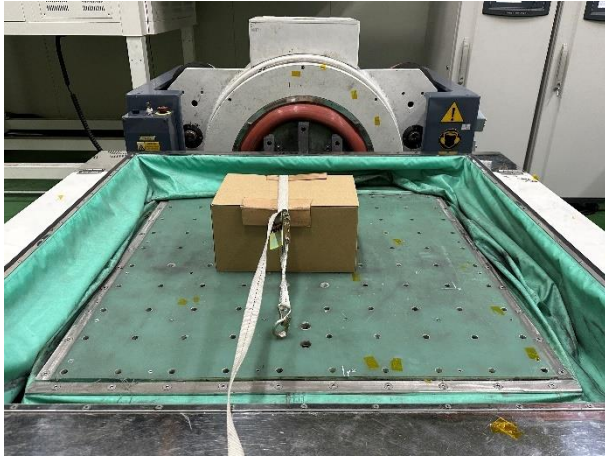
Single Packaging inside



Single Packaging inside

9.4 Testing images

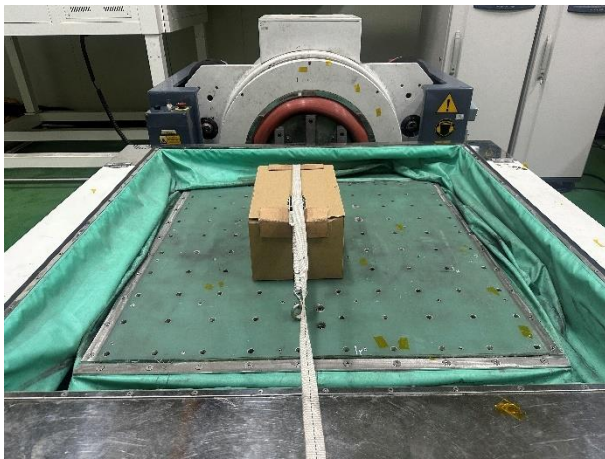
9.4.1 Evidence of test setting



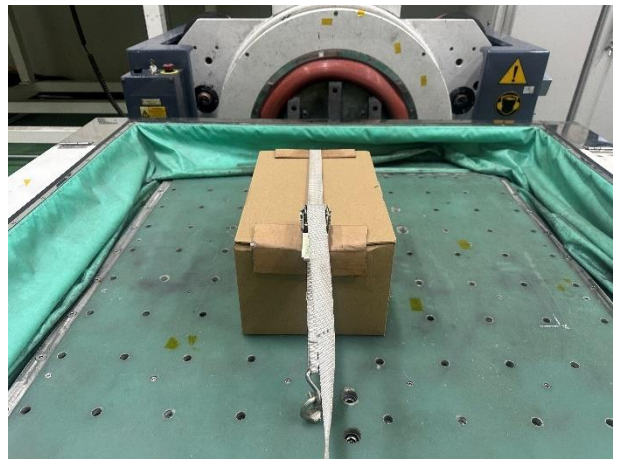
X axis_1



X axis_2



Y axis_1



Y axis_2



Z axis_1



Z axis_2

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5 Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si,
Gyeonggi-do, Republic of Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

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**9.5 Test result**

9.5.1 Test results table

Evaluations Criteria	Test result		비고
	Visual Inspection	Normal	
Sample	Visual Inspection	Normal	-
	Operation and Function	Normal	-



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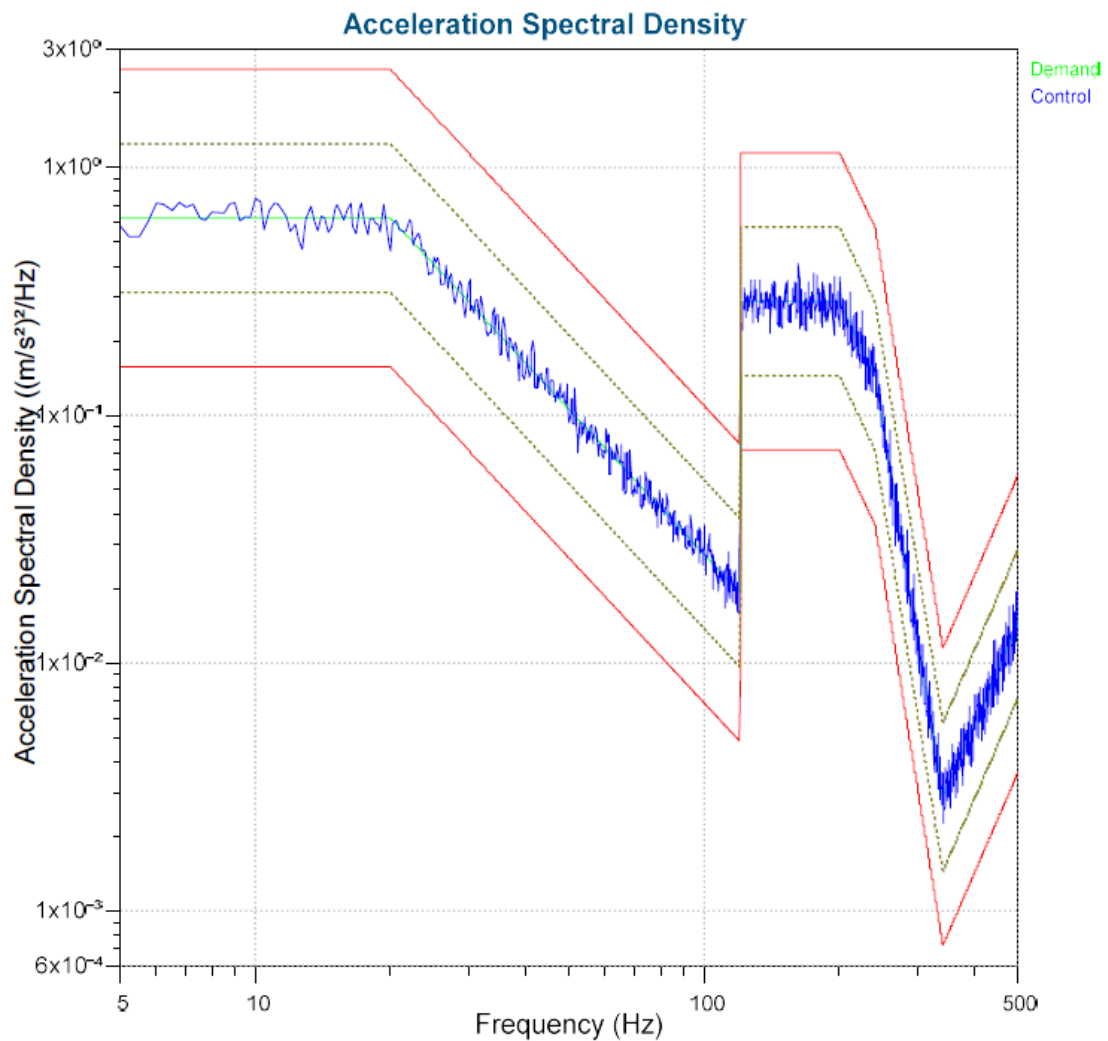
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Gyeonggi-do, Republic of Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

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9.6 Test Data

9.6.1 Test data and graph (Vibration Test X Axis)



5 08, 2025 09:30:2

Level 1) 100 %

Output: 0 Volts RM

한화비전 MIL-STD 810H 514.8

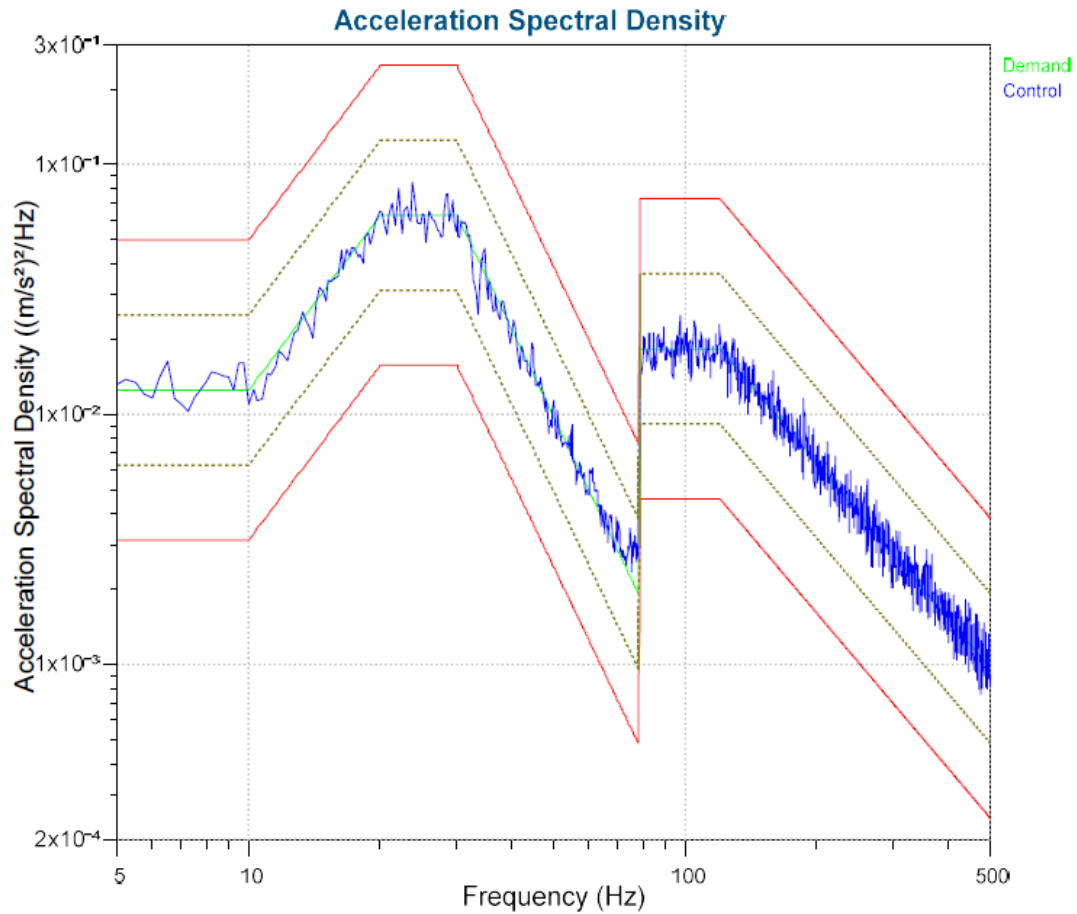
Demand: 0.7624 G RM Level Time: 1:00:0

Control: 0.7626 G RM Total Time: 1:00:2

End of Tes

X Axis

9.6.2 Test data and graph (Vibration Test Y Axis)



5 08, 2025 13:47:30 Level 1) 100 %

Output: 0 Volts RMS

한화비전 MIL-STD 810H 514.8

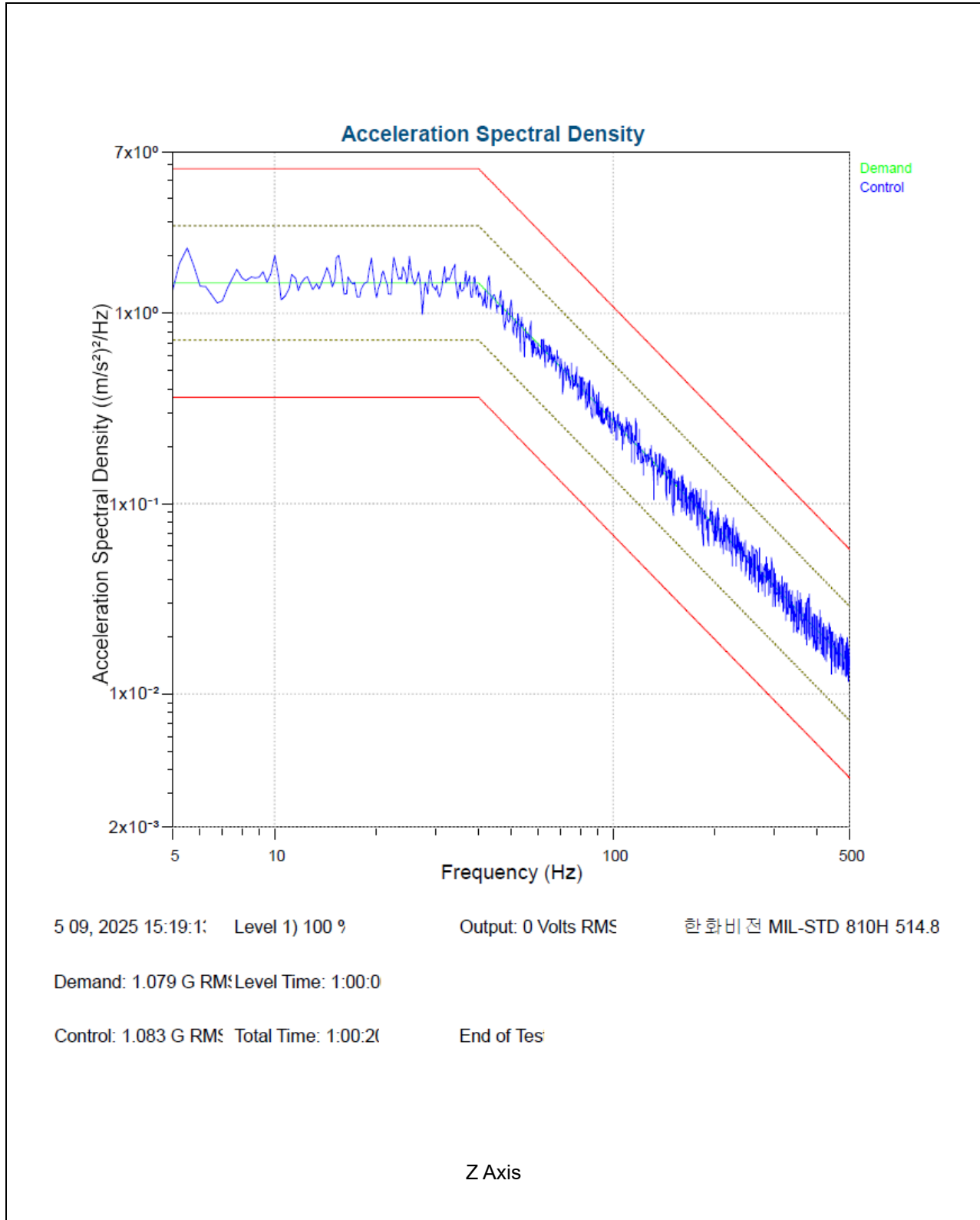
Demand: 0.2052 G RM; Level Time: 1:00:0

Control: 0.205 G RM; Total Time: 1:00:2

End of Test

Y Axis

9.6.3 Test data and graph (Vibration Test Z Axis)





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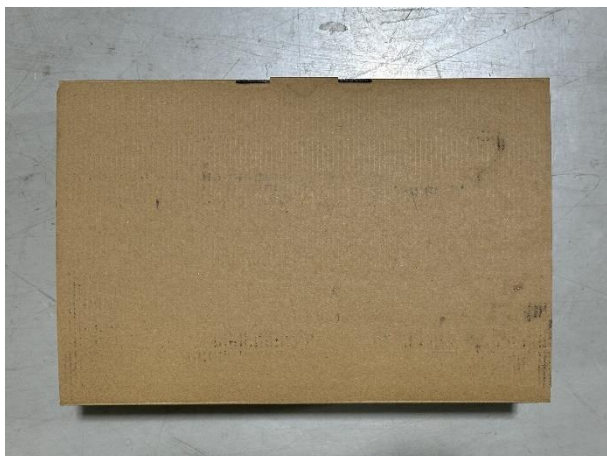
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Gyeonggi-do, Republic of Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

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9.7 Pre-test product images

9.7.1 Test sample (1)



Single packaging Top



Single packaging Bottom



Single packaging Front



Single packaging Rear



Single packaging Left side



Single packaging Right side



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Gyeonggi-do, Republic of Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

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9.7.2 Test sample (2)



Single Packaging inside



Single Packaging inside



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Gyeonggi-do, Republic of Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

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9.8 Post-test operation and function

9.8.1 Test sample operation and function

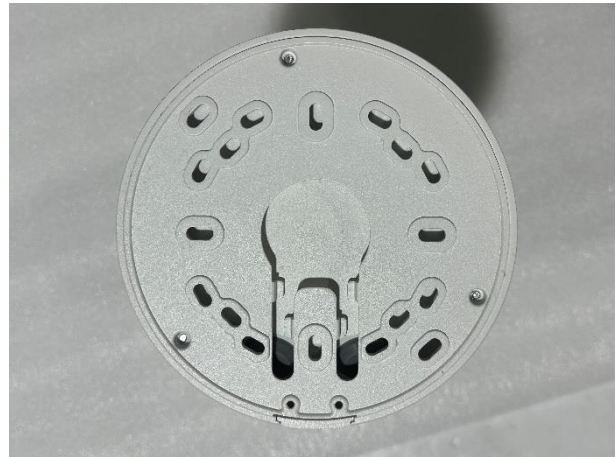


9.9 Post-test product images

9.9.1 Test sample



Top



Bottom



Front



Rear



Left side



Right side

- End -