

TEST REPORT

 CTK Co., Ltd. <small>The Power Leader of Global Regulatory Certification</small>	CTK Co., Ltd. (Ho-dong) 113, Yejik-ro, Cheoin-gu, Yongin-shi Gyeonggi-do KOREA, REPUBLIC OF Tel: +82-31-339-9970 Fax: +82-31-624-9501	REPORT No.: CTK-2019-00183 Page (1) / (24) pages	
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1. Applicant

- Name: Hanwha Techwin Co., Ltd.
- Address: Hanwha Techwin R&D center, 6 Pangyo-ro 319Beon-gil,
Bundang-gu, Seongnam-si, Gyeonggi-do, 13488 KOREA
- **Date of Receipt**.....: 2017-10-26

2. Manufacturer

- Name: HANWHA TECHWIN (TIANJIN) CO.,LTD.
- Address: No.11 Weiliu Rd, Micro-Electronic Industrial
Park, TEDA, Tianjin, 300385, People's Republic of China

3. **Use of Report**: Quality control

4. **Test sample / Model**: THERMAL CAMERA / TNO-4040T* (*N:NT/P:PAL)



5. **Date(s) of test**: 2017-11-06 to 2017-12-17

6. **Test Standard (Method) used**.....: KS C IEC 60529:2006

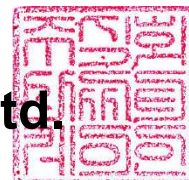
7. **Testing Environment**.....: Temperature: (25.0 ± 10.0) °C, Humidity: (50 ± 25) %R.H.,
Air Pressure: (99.0 ± 2) kPa

8. **Results**: Reference test results

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
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Approval	Tested by: WonHyeon. Choi  (Signature)	Technical Manager: YenHwang Jung  (Signature)
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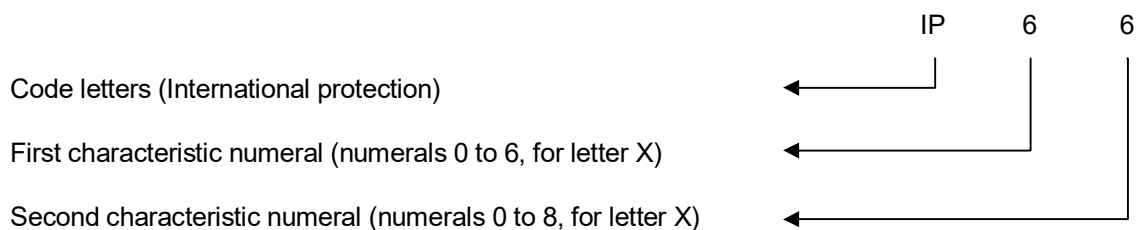


2019-01-16

1. Degrees of protection provided by enclosures (IP code)


1.1 Test standard: KS C IEC 60529:2006

1.2 Arrangement of the IP code



1.2.1 Degree of protection against access to hazardous parts indicated by the first characteristic numeral

First characteristic numeral	Degree of protection	Application
0	Non-protected	<input type="checkbox"/>
1	Protected against access to hazardous parts with the back of a hand. The access probe, sphere of 50 mmØ, shall have adequate clearance from hazardous parts. Test force: 50 N ± 10 %	<input type="checkbox"/>
2	Protected against access to hazardous parts with a finger. The jointed test finger of 12 mmØ, 80 mm length, shall have adequate clearance from hazardous parts. Test force: 10 N ± 10 %	<input type="checkbox"/>
3	Protected against access to hazardous parts with a tool. The access probe of 2.5 mmØ, shall not penetrate. Test force: 3 N ± 10 %	<input type="checkbox"/>
4	Protected against access to hazardous parts with a wire. The access probe of 1.0 mmØ, shall not penetrate. Test force: 1 N ± 10 %	<input type="checkbox"/>
5	Protected against access to hazardous parts with a wire. The access probe of 1.0 mmØ, shall not penetrate. Test force: 1 N ± 10 %	<input type="checkbox"/>

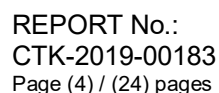
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First characteristic numeral	Degree of protection	Application
6	Protected against access to hazardous parts with a wire. The access probe of 1.0 mmØ, shall not penetrate. Test force: 1 N ± 10 %	☒

NOTE In the case of the first characteristic numerals 3, 4, 5 and 6, protection against access to hazardous parts is satisfied if adequate clearance is kept. The adequate clearance should be specified by the relevant product committee in accordance with 12.3. Due to the simultaneous requirement specified in table 2, the definition "shall not penetrate" is given in table 1.

1.2.2 Degree of protection against solid foreign objects indicated by the first characteristic numeral

First characteristic numeral	Degree of protection	Application
0	Non-protected	☐
1	Protected against solid foreign objects of 50 mmØ and greater. The object probe, sphere of 50 mmØ, shall not fully penetrate ¹⁾ . Test force: 50 N ± 10 %	☐
2	Protected against solid foreign objects of 12.5 mmØ and greater. The object probe, sphere of 12.5 mmØ, shall not fully penetrate ¹⁾ . Test force: 30 N ± 10 %	☐
3	Protected against solid foreign objects of 2.5 mmØ and greater. The object probe, sphere of 2.5 mmØ, shall not penetrate at all ¹⁾ . Test force: 3 N ± 10 %	☐
4	Protected against solid foreign objects of 1.0 mmØ and greater. The object probe, sphere of 1.0 mmØ, shall not penetrate at all ¹⁾ . Test force: 1 N ± 10 %	☐
5	Dust Testing Equipment Whether reductions in pressure below the atmospheric pressure are present or not, ingress of dust is not totally preventive, but dust shall not penetrate in a quantity to interfere with satisfactory operation of the apparatus or to impair safety. (Talcum powder have to go through the measured sieve by Φ 50 um wire that are spacing 75 um in squared, per volume and union Talcum powder have to be 2 kg/m ³)	—




First characteristic numeral	Degree of protection	Application
	<p>Category 1: Enclosures where the normal working cycle of the equipment causes reductions in air pressure within the enclosure below that of the surrounding air, for example, due to thermal cycling effects.</p> <p>Products in volume : cm³ → L</p> <p>Target intake volume (Products in volume 80) : L</p> <p>Suction volume (Max product in volume 60) .: LPH → LPM</p> <p>Actual Suction volume..... : L</p> <p>Suction pressure (Up to 2 kPa) : kPa</p> <p>Test time (Up to 8 time) : hr</p>	<input type="checkbox"/>
	<p>Category 2: Enclosures where no pressure difference relative to the surrounding air is present.</p>	<input type="checkbox"/>
6 (TOP)	<p>In Dust Testing Equipment, the test sample has to have no ingress of dust after testing atmospheric pressure present condition for 8 hr.</p> <p>(Talcum powder have to go through the measured sieve by Φ 50 um wire that are spacing 75 um in squared, per volume and union Talcum powder have to be 2 kg/m³)</p> <p>Products in volume : 3 795.734 cm³ → 3.795 L</p> <p>Target intake volume (Products in volume 80) : 303.658 L</p> <p>Suction volume (Max product in volume 60) .: 227.744 LPH → 3.795 LPM</p> <p>Actual Suction volume..... : 3.7 L</p> <p>Suction pressure (Up to 2 kPa) : 2 kPa</p> <p>Test time (Up to 8 time) : 8 hr</p>	<input checked="" type="checkbox"/>
6 (BOTTOM)	<p>Products in volume : 1 708.097 cm³ → 1.708 L</p> <p>Target intake volume (Products in volume 80) : 136.647 L</p>	<input checked="" type="checkbox"/>

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First characteristic numeral	Degree of protection	Application
	<p style="text-align: right;">102.485 LPH → 1.708 LPM</p> <p>Suction volume (Max product in volume 60) ..</p> <p>Actual Suction volume.....: 1.9 L</p> <p>Suction pressure (Up to 2 kPa): 2 kPa</p> <p>Test time (Up to 8 time): 8 hr</p>	
¹⁾ The full diameter of the object probe shall not pass through an opening of the enclosure. Due to the simultaneous requirement specified in table 2, the definition "shall not penetrate" is given in table 1.		

1.2.3 Degrees of protection against water indicated by the second characteristic numeral

Second characteristic numeral	Degrees of protection	Application
0	Non-protected	<input type="checkbox"/>
1	<p>Water that drops verticality has to be harmless</p> <p>Drip box Fig.3, Enclosure on turntable</p> <p>Water flow rate: 1 mm/min</p> <p>Speed of Rotating platform: 1 r/min</p> <p>Eccentricity: Approximately 100 mm</p> <p>Duration of test: 10 min</p>	<input type="checkbox"/>
2	<p>When outskirts of the product have been tilted by 15° Water that drops verticality has to be harmless.</p> <p>Drip box Fig.3, Enclosure in 4 fixed positions of 15° tilt</p> <p>Water flow rate: 3 mm/min</p> <p>Duration of test: 2.5 min for each position of tilt</p>	<input type="checkbox"/>

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Second characteristic numeral	Degrees of protection	Application
3	<p>Vertical line of water that moves by $\pm 60^\circ$ and its drops has to be harmless</p> <p><input type="checkbox"/> Oscillating tube Fig.4, Spray $\pm 60^\circ$ from vertical, Distance max. 200 mm Water flow rate: each of watering pit 0.07 l/min $\pm 5\%$ per hole Duration of test: 10 min</p> <p><input type="checkbox"/> spray nozzle Fig. 5, Spray $\pm 60^\circ$ from vertical Water flow rate: 10 l/min $\pm 5\%$ Duration of test: 1 min/m² at least 5 min: min</p>	<input type="checkbox"/>
4	<p>The product must not be harmed in any direction even splashing water.</p> <p>As for numeral 3, Spray $\pm 180^\circ$ from vertical</p> <p><input type="checkbox"/> Oscillating tube Fig.4, Spray $\pm 180^\circ$ from vertical, Distance max. 200 mm Water flow rate: each of watering pit 0.07 l/min $\pm 5\%$ per hole Duration of test: 10 min</p> <p><input type="checkbox"/> spray nozzle Fig. 5, Spray $\pm 180^\circ$ from vertical Water flow rate: 10 l/min $\pm 5\%$ Duration of test: 1 min/m² at least 5 min: min</p>	<input type="checkbox"/>
5	<p>The product must not be harmed in any direction even a single jet water.</p> <p>Water jet hose nozzle Fig.6, Nozzle 6.3 mm diameter Water flow rate: 12.5 l/min $\pm 5\%$ Distance: 2.5 m to 3 m: m Duration of test: 1 min/m² at least 3 min : min</p>	<input type="checkbox"/>
6	<p>The product must not be harmed in any direction even strong jet water.</p> <p>Water jet hose nozzle Fig.6, Nozzle 12.5 mm diameter Water flow rate: 100 l/min $\pm 5\%$ Distance: 2.5 m to 3 m: 3 m Duration of test: 1 min/m² at least 3 min: 3 min</p>	<input checked="" type="checkbox"/>

Second characteristic numeral	Degrees of protection	Application
7	<p>Sink the product in the water by the Pressure and Time according to regulation and the product must not be harmed.</p> <p>Immersion tank water-level on enclosure with:</p> <p><input type="checkbox"/> height equal to or greater than 850 mm: the highest point of enclosures located 0.15 m below the surface of the water</p> <p><input type="checkbox"/> height less than 850 mm: the lowest point of enclosures located 1 m below the surface of the water</p> <p>Duration of test: 30 min</p>	<input type="checkbox"/>
8	<p>Unless there is a relevant product standard, the test conditions are subject to agreement between manufacturer and user, but they shall be more severe than those prescribed in IP X7 and they shall take account of the condition that the enclosure will be continuously immersed in actual use.</p> <p>the lowest point of enclosures located below the surface of the water:</p> <p style="text-align: center;">m</p> <p>Duration of test: min</p>	<input type="checkbox"/>


1.3 Test Result

IP code	Remark
IP 6X	No penetration of probe No ingress of dust
IP X6	No ingress of water.

※ The results shown in this test report refer only to the sample(s) tested unless otherwise stated

Model description

Basic Model	TNO-4040T* (*N:NT/P:PAL)
Series model	TNO-4040TR, TNO-4030T, TNO-4050T, TNO-4030TR
Model differences	Use of the same external shape and materials (case, finishing material, PCB, cable, etc.), differences in electronic parts inside the product.

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List of test equipment used:

Instr. No.	Instrument type	Model	Make	Serial	Used
S3-T11	Sphere 50 mm diameter	IEC60529 IP1X	Kingpo	KP-TP001	<input type="checkbox"/>
S1-J10	Jointed test finger	TFP-01	ED&D	S1-J10	<input type="checkbox"/>
S1-J14	Test rod (2.5 mm)	TRP-01	ED&D	S1-J14	<input type="checkbox"/>
S1-J15	Test wire (1.0 mm)	TRP-02	ED&D	S1-J15	<input checked="" type="checkbox"/>
S1-X01	Push Pull Gage	FB30K	Imada	83805	<input checked="" type="checkbox"/>
S3-IP8	Dust Chamber	IEC60529 IP 5X6X	Kingpo	TX0010	<input checked="" type="checkbox"/>
S3-IP17	Big Dust Chamber	BR-TL-3F	Kingpo	S3-IP17	<input type="checkbox"/>
S3-IP1	Drip Box	IEC 60529 Drip Box, IPX1/ IPX2	Kingpo	-	<input type="checkbox"/>
S1-J19-1	ANGLE METER	AM-01	ED&D	CTK-IN- S1-154	<input type="checkbox"/>
S3-IP3	Oscillating Tube	IEC 60529 oscillating tube, with rotate table, IPX3/ IPX4	Kingpo	-	<input type="checkbox"/>
S3-IP4	Spray Nozzle	IEC 60529 Spray Nozzle, IPX3/ IPX4	Kingpo	-	<input type="checkbox"/>
S3-IP5	Hose Nozzle (6.3 mm)	IPX5	Kingpo	ZH13388	<input type="checkbox"/>
S3-IP6	Hose Nozzle (12.5 mm)	IPX6	Kingpo	ZH13388	<input checked="" type="checkbox"/>
S3-IP7	Immersion tank	Cage for IPX7	Kingpo	-	<input type="checkbox"/>
S1-E19	Electronics Load	EUL-75JL	Fujitsu	00373	<input type="checkbox"/>
S1-P10	Digital Power Meter	WT210	Yokogawa	96F302605	<input type="checkbox"/>
S1-W02	Withstanding voltage tester	TOS5051	KIKUSUI	14050357	<input type="checkbox"/>
S1-SW2	Stop Watch	NONE	Casio	612Q1R-1	<input checked="" type="checkbox"/>
S1-H05	Aneroid Barometer	BAROMEX	SATO	84682	<input checked="" type="checkbox"/>
S1-H06	Hygro Thermograph	ST-50M	SEKONIC	HE51- 000147	<input checked="" type="checkbox"/>

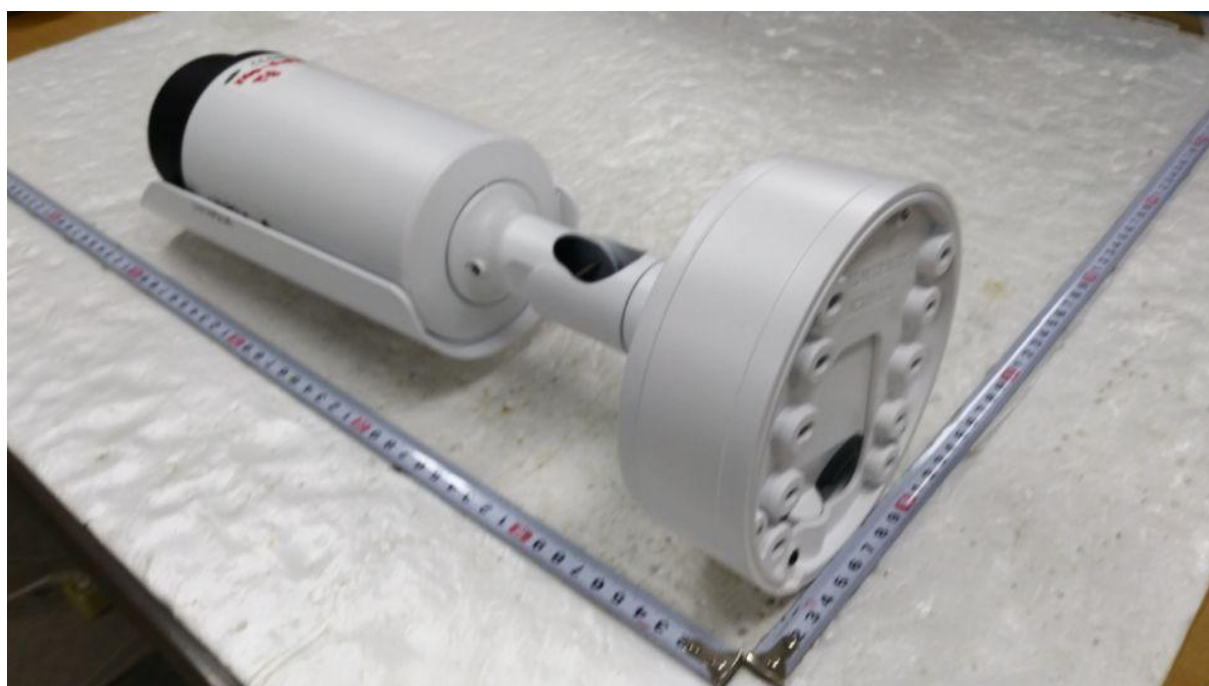
2. APPENDIX

2.1 Product Photographs

< Photo 1 > Product External view

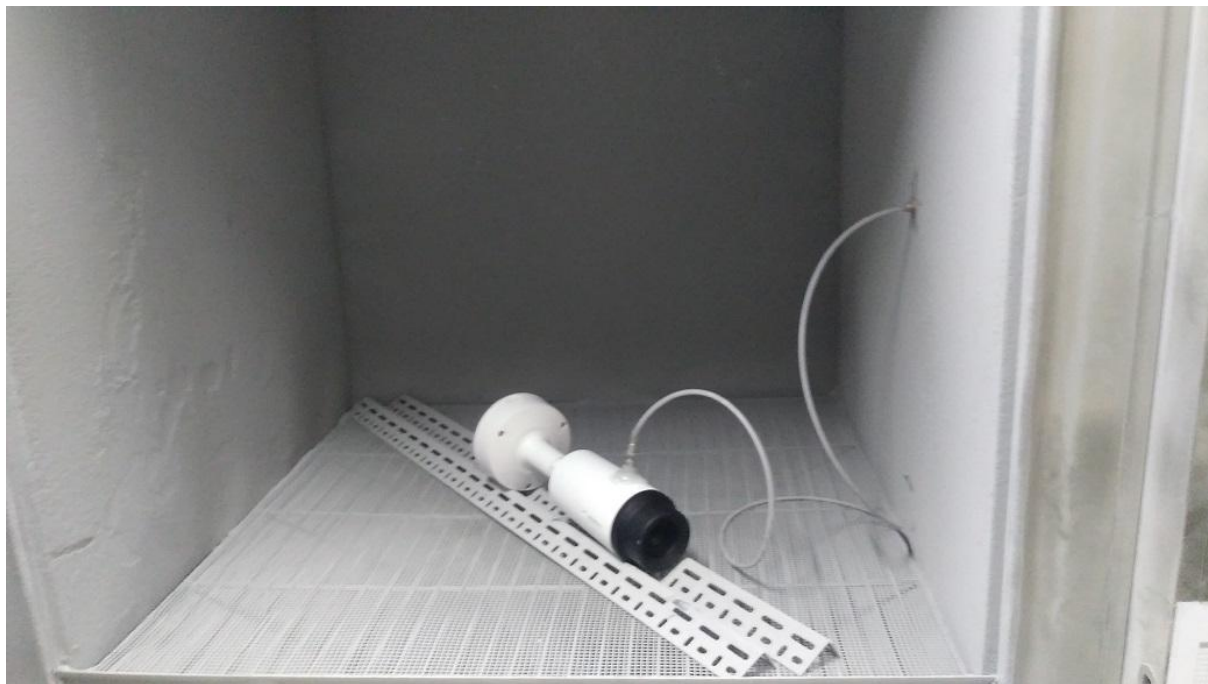


< Photo 2 > Product External view

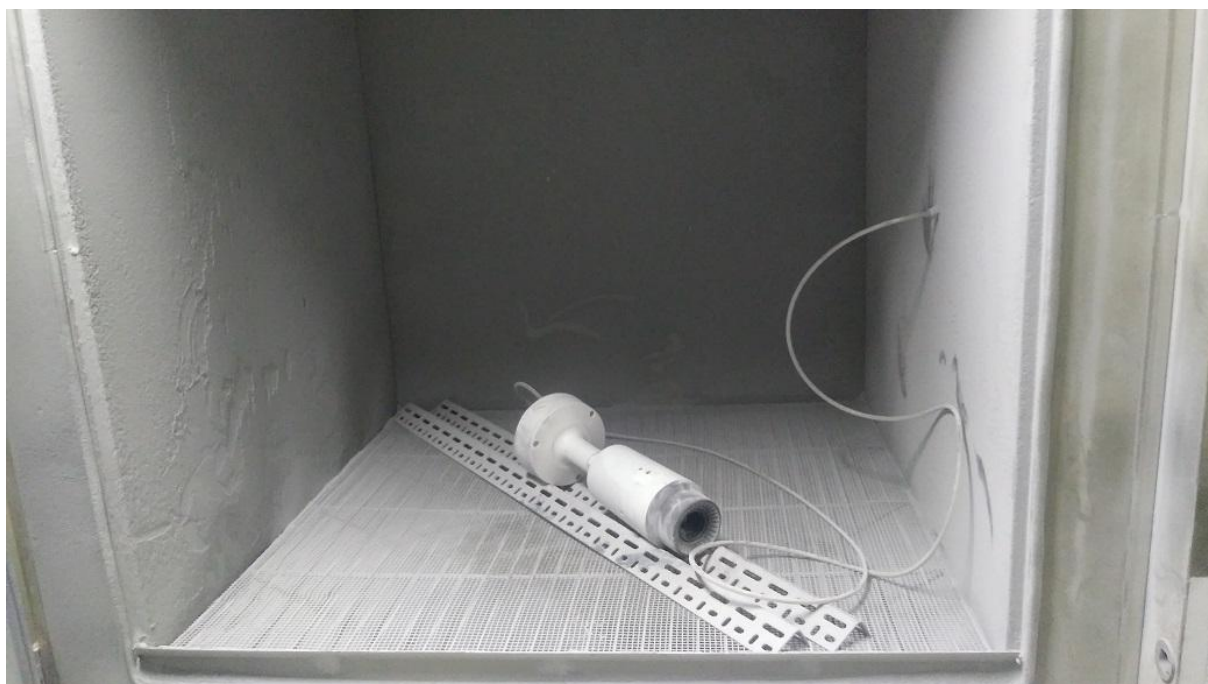


2.2 Test Setup Photos and Configuration

< Photo 3 > The first characteristic numeral test [TOP]



< Photo 4 > The first characteristic numeral test [BOTTOM]



< Photo 5 > The second characteristic numeral test



2.3 Product internal photographs after test

< Photo 6 > The first characteristic numeral test



< Photo 7 >



< Photo 8 >



< Photo 9 >



< Photo 10 >



< Photo 11 >



< Photo 12 >



< Photo 13 >



< Photo 14 >



< Photo 15 >



< Photo 16 > The second characteristic numeral test



< Photo 17 >



< Photo 18 >



< Photo 19 >



< Photo 20 >



< Photo 21 >



< Photo 22 >



< Photo 23 >



< Photo 24 >



< Photo 25 >



2.4 Product Appearance

Enclosure Dimensions [Unit: mm]

