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TEST REPORT N°: AAJN-ESH-P21050498B

# EMC TEST REPORT

To :	NINGBO ZHANJING OPTICAL INSTRUMENTS CO.,LTD	Fax :	--
Attn :	--	Email :	--
Address :	1 xiongjia street langxia Street, Yuyao City , Zhejiang Province, China		
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Attn :	--		
This document includes : 10 pages		Test date :	May.11 to May.12, 2021

FACTORY NAME :	NINGBO ZHANJING OPTICAL INSTRUMENTS CO.,LTD	
ADDRESS :	1 xiongjia street langxia Street, Yuyao City , Zhejiang Province, China	
PRODUCT :	Astronomical telescope	
TYPE REFERENCE :	21064, 22025, 21061, 21062, 21063, 21073, 21074, 21082, 22065, 22401, 22402, 22403	
RATED VOLTAGE :	Powered by battery	
RATED INPUT POWER :	--	
PROTECTION CLASS :	III	
TESTS REALISED :	On one sample of 21064	

STANDARDS USED(DATE) :	EN 61000-6-3:2007+A1:2011 EN IEC 61000-6-1:2019
CLAUSES EXAMINED :	All Clauses Relevant.

All the tests done in this report are subcontracted to Ningbo Joysun Product Testing Service Co., Ltd. (Test Location: No. 66, Qingyi Road, Hi-Tech District, Ningbo, Zhejiang, China)

CONCLUSION :	<b>The sample does satisfy the clauses examined .</b>
Test done by:	Approved by:
Name : Tony MAO <i>Tony Mao</i> Date : Aug.20, 2021	Name : Daniel SUN Date : Aug.20, 2021

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.  
 "All the modifications applied in this document are identified by a vertical line on the left at the place where information has been modified regarding to the previous edition of the document".



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## 1 TESTING PROGRAM

The tests have been carried out according to the requirements of the following standards :

### Emission standard EN 61000-6-3:2007+A1:2011

- Measurement of the radiated emission.
- Measurement of the conducted emission.
- Measurement of the discontinuous interference.
- Measurement of the harmonic currents.
- Measurement of the voltage fluctuations.

### Immunity standard EN IEC 61000-6-1:2019

- Immunity to electrostatic discharges - publication IEC 61000-4-2.
- Immunity to fast transients/bursts - publication IEC 61000-4-4.
- Immunity to conducted disturbances induced by radio-frequency fields - publication IEC 61000-4-6.
- Immunity to power frequency magnetic field- publication IEC 61000-4-8.
- Immunity to radiated radio-frequency electromagnetic field with amplitude modulation - publication IEC 61000-4-3.
- Immunity to surges - publication IEC 61000-4-5.
- Immunity to voltage dips -publication IEC 61000-4-11.

Special Comment : All Astronomical telescope models are similar in working principle and electrical components except the model name and appearance. So all EMC tests were performed on model 21064.

## 2 HISTORY OF FAILURE

None.

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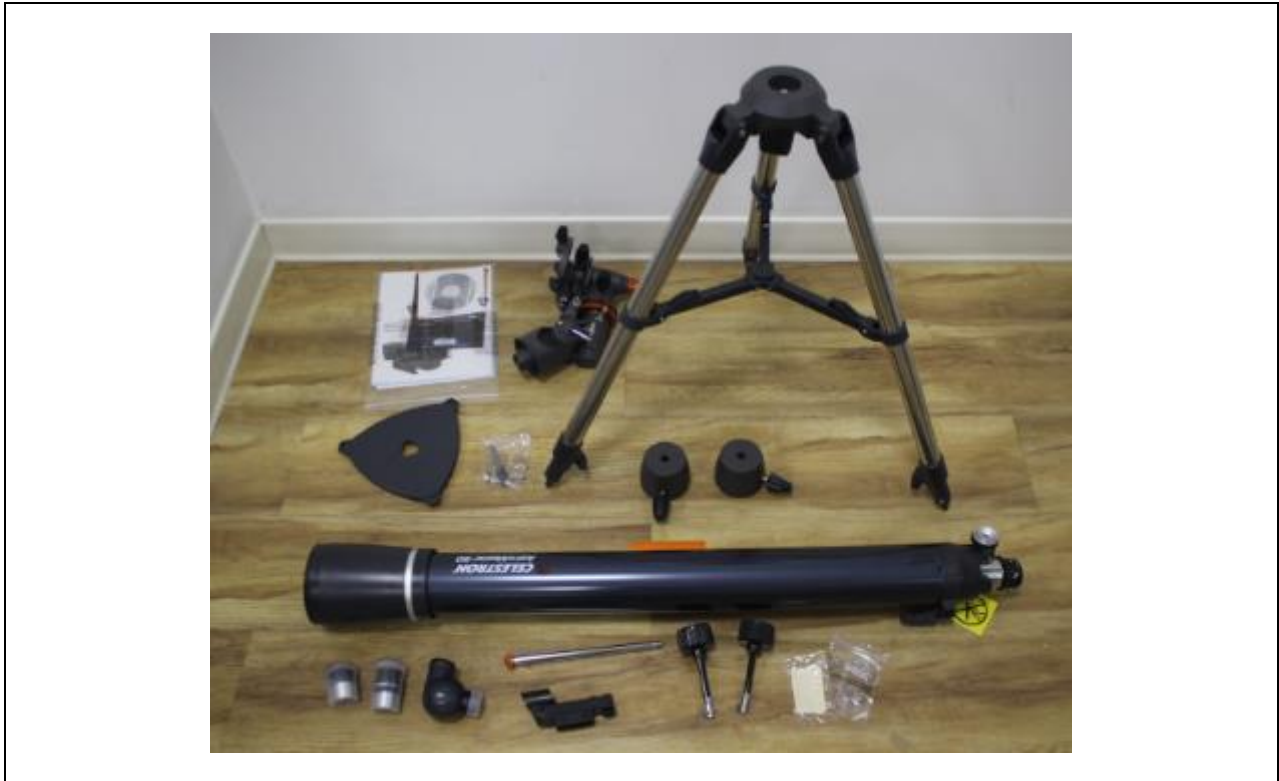


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### 3 EQUIPMENT CHARACTERISTICS

#### 3.1 Picture of the samples





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## 4 OPERATING CONDITIONS

The apparatus was placed in a shielded room, full or semi anechoic chamber, and was powered with battery. The apparatus was worked continuously.

Climatic conditions :  
Temperature : 20 °C-30°C  
Relative humidity : 30 %-60 %  
Atmospheric pressure : 101 kPa

## 5 PERFORMANCE CRITERIA

- Criterion A : The apparatus operate as intended during the test. No degradation of performance or loss of function is allowed below the performance level.
- Criterion B : The apparatus operate as intended after the test. No change of operating state and the stored data are allowed. During the test, degradation of performance is allowed.
- Criterion C : Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

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## 6 TEST RESULTS

### 6.1 EMISSION STANDARD EN 61000-6-3:2007+A1:2011

Article	TEST	TEST SPECIFICATION	RESULTS			
			P	F	NA	Rem
9	<b><u>Radiated disturbance</u></b> Frequency range: 30 – 1000 MHz  Table 1: Emission Enclosure Basic standard: EN 55022, Class B	Operating conditions : according to the article 9 Measuring Distance: 3 m Antenna : - horizontal position - vertical position  Diagram(s) No. <1>	[X] [X]	[ ] [ ]	[ ] [ ]	[ ] [ ]
9	<b><u>Conducted disturbance</u></b> Frequency range: 0,15 – 30 MHz  Table 1: Emission AC mains Basic standard: EN 55022, Class B	Operating conditions : according to the article 9 Port(s) : • AC mains port  Diagram(s) No. < >	[ ]	[ ]	[X]	[1]
9	<b><u>Discontinuous interference</u></b> Frequency range: 0,15 – 30 MHz  Table 1: Emission AC mains Basic standard: EN 55014-1	Operating conditions : according to the article 9 Port(s) : • AC mains port  Table(s) No. < >	[ ]	[ ]	[X]	[1]
9	<b><u>Limits for harmonic currents emission</u></b>  Basic standard: EN 61000-3-2	Frequency range: 0 to 2 kHz  Class of the apparatus : A  Table(s) No. < >	[ ]	[ ]	[X]	[1]
9	<b><u>Limitation of voltage fluctuations and flicker in low-voltage supply systems</u></b>  Basic standard: EN 61000-3-3	Frequency range: 0 to 2 kHz  Table(s) No. < >	[ ]	[ ]	[X]	[1]

P : pass – F : Fail – NA : not applicable – Rem : remark



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**6.2 IMMUNITY STANDARD EN IEC 61000-6-1:2019**

Article	TEST	TEST SPECIFICATION	RESULTS			
			P	F	NA	Rem
9	<b><u>Electrostatic discharges</u></b>  Table 1 Enclosure  Performance criteria B	Contact discharges Level : $\pm$ 4 kV Application points : • horizontal coupling plane	[X]	[ ]	[ ]	[2]
		• vertical coupling plane	[X]	[ ]	[ ]	[2]
		• metal part	[X]	[ ]	[ ]	[2]
	Performance criteria B	Air discharges Level : $\pm$ 8 kV Application points : • enclosure • switch	[X] [X]	[ ] [ ]	[ ] [ ]	[2] [2]
9	<b><u>Radio-frequency electromagnetic fields 80 to 1000 MHz</u></b>  Table 1 Enclosure  Performance criteria A	Test field strength : 3 V/m (unmodulated signal) Modulation frequency : 1 kHz Modulation depth : 80 % Frequency Step : 1% Dwell Time : 2 s Logperiodic antenna : - horizontal position	[X] [X]	[ ] [ ]	[ ] [ ]	[2] [2]
		- vertical position	[X]	[ ]	[ ]	[2]
	<b><u>Radio-frequency electromagnetic fields 1400 to 6000 MHz</u></b>  Performance criteria A	Test field strength : 3 V/m (unmodulated signal) Modulation frequency : 1 kHz Modulation depth : 80 % Frequency Step : 1% Dwell Time : 2 s Horn antenna : - horizontal position - vertical position	[X] [X]	[ ] [ ]	[ ] [ ]	[2] [2]
9	<b><u>Power Frequency Magnetic Field</u></b>  Table 1 Enclosure Performance criteria A	Field frequency : 50/60 Hz Level : 3 A/m	[ ]	[ ]	[X]	[3]

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Article	TEST	TEST SPECIFICATION	RESULTS			
			P	F	NA	Rem
9	<b><u>Fast transients/bursts</u></b>  Table 4 Alternative current power input and output ports Performance criteria B	Level : $\pm 1$ kV Rise time/hold time : 5/50 ns Repetition rate : 5 kHz Testing time : 2 min Port(s) : • AC mains	[ ]	[ ]	[X]	[1]
9	<b><u>Injected current 0.15 to 80 MHz</u></b>  Table 4 Alternative current power input and output ports  Performance criterion A	Voltage level : 3 V (unmodulated signal) Modulation frequency : 1 kHz Frequency Step : 1% Dwell Time: 2 s Modulation depth : 80 % Application with Port(s) : • AC mains	[ ]	[ ]	[X]	[1]
9	<b><u>Surges</u></b>  Table 4 Alternative current power input and output ports  Performance criterion B	Tr/Th( $\mu$ s) : 1.2/50 (8/20) Number of surges : 5 positive and 5 negative Phase angles : 0°, 90°, 180° and 270° Level : $\pm 1$ kV Port(s) : • power input, between lines and neutral	[ ]	[ ]	[X]	[1]
	Performance criterion B	Level : $\pm 2$ kV Port(s) : • power input, between lines and earth • power input, between neutral and earth	[ ]	[ ]	[X]	[1]
			[ ]	[ ]	[X]	[1]

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Article	TEST	TEST SPECIFICATION	RESULTS			
			P	F	NA	Rem
9	<b><u>Voltage dips and voltage interruptions</u></b>  Table 4 Alternative current power input port(s) Performance criterion C	<u>Voltage interruptions</u> Test level : 0 % Ut-> 0 V Duration : 5 s Phase angles : 0° and 180° Port(s) : • AC mains	[ ]	[ ]	[X]	[1]
	Table 4 Alternative current power input port(s)  Performance criterion C	<u>Voltage dips</u> Test level : 0 % Ut-> 0 V Duration : 10/20 ms Phase angles : 0° and 180° Port(s) : • AC mains	[ ]	[ ]	[X]	[1]
	Table 4 Alternative current power input port(s)  Performance criterion B	<u>Voltage dips</u> Test level : 70 % Ut-> 161 V Duration : 500 ms Phase angles : 0° Port(s) : • AC mains	[ ]	[ ]	[X]	[1]

P : pass – F : Fail – NA : not applicable – Rem : remark

**Remark(s) :**

- 1 : The EUT is powered by battery.
- 2 : During and after the test, there are no loss of function and no change of power consumption and operating state.
- 3 : As there is no components in the EUT susceptible to magnetic fields, so it is not needed to perform this test.

## 7 CONCLUSION

The apparatus Astronomical telescope and models 21064, 22025, 21061, 21062, 21063, 21073, 21074, 21082, 22065, 22401, 22402, 22403 are in compliance with the requirements of the standards EN 61000-6-3:2007+A1:2011 and EN IEC 61000-6-1:2019.





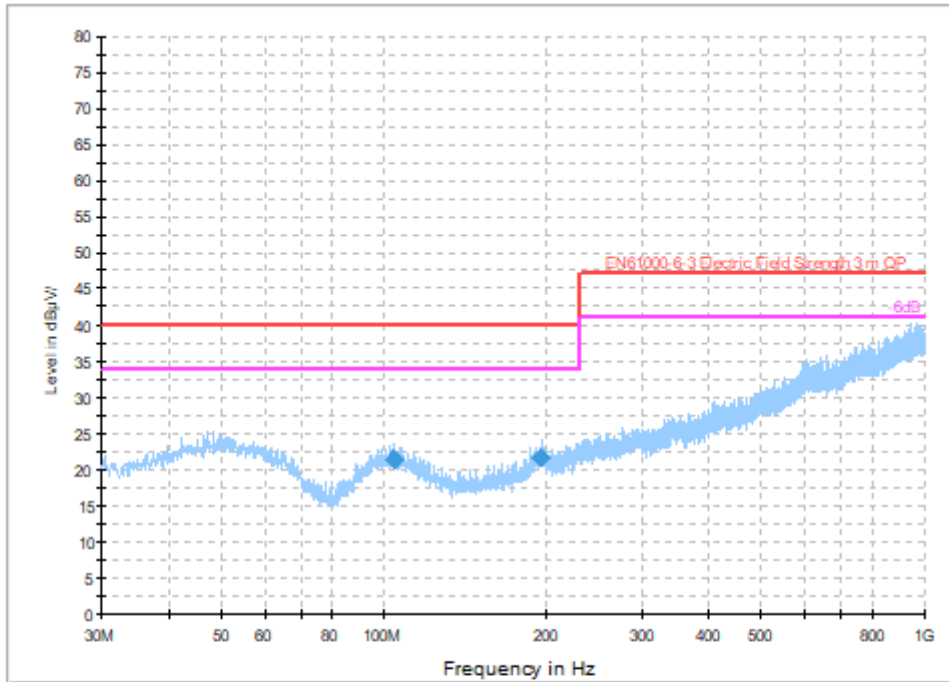


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**Diagram No. 1**

**Horizontal**



**Final Result 1**

Frequency (MHz)	QuasiPeak (dB µ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
104.496000	21.5	1000.0	120.000	100.0	H	282.0	13.3	18.5
195.274000	21.8	1000.0	120.000	100.0	H	132.0	13.2	18.2

(continuation of the "Final Result 1" table from column 9 ...)

Frequency (MHz)	Limit (dB µ)	Comment
104.496000	40.0	
195.274000	40.0	

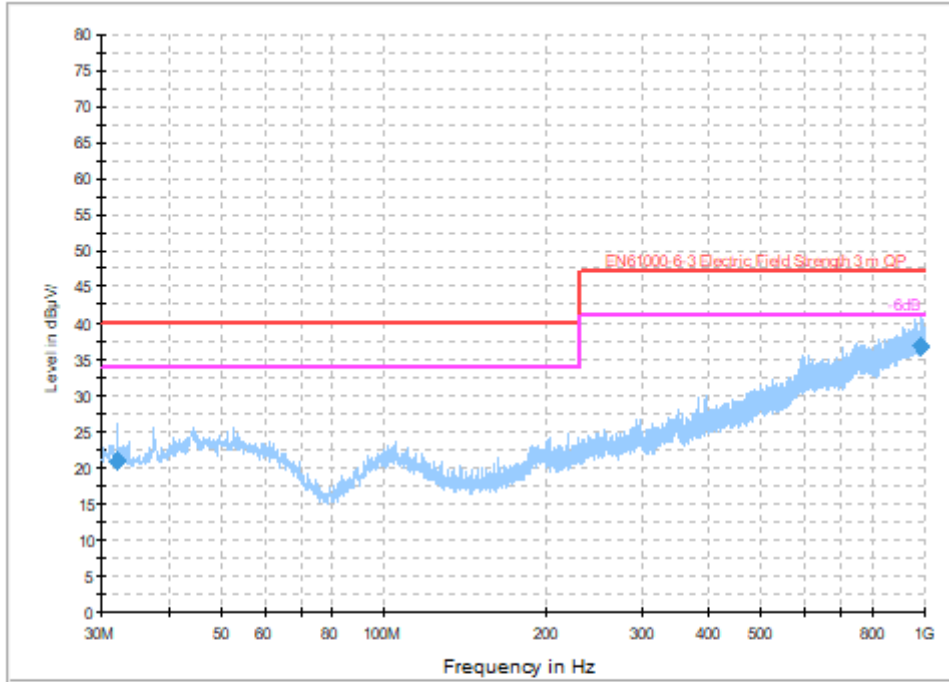


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**Continued**

**Vertical**



**Final Result 1**

Frequency (MHz)	QuasiPeak (dB µV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
32.054000	21.0	1000.0	120.000	100.0	V	343.0	10.8	19.0
986.942000	37.0	1000.0	120.000	196.0	V	300.0	26.9	10.0

(continuation of the "Final Result 1" table from column 9 ...)

Frequency (MHz)	Limit (dB µ)	Comment
32.054000	40.0	
986.942000	47.0	

