

TEST REPORT

Client Name	BENEWAKE(BEIJING) CO., LTD
Name of product	TFmini-S
Manufacturer	BENEWAKE(BEIJING) CO., LTD
Model	TFmini-S
Test sort	Commission Test



CCIC Southern Testing Co., Ltd.

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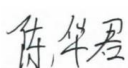


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CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

TEST REPORT

Name of sample	TFmini-S	Trade mark	Benewake
Manufacturer	BENEWAKE(BEIJING) CO., LTD	Model/Type	TFmini-S
Client	BENEWAKE(BEIJING) CO., LTD	Sampling method	sample deliver by client
Sampler	/	Amount of samples	/
Sampling place	/	Quantity of samples	1 piece
Production date	/	Sampling date	/
		Application date	2019-12-02
Test date	2019-12-03	Environment condition	24.6℃, 52%RH
<p>Sample description:</p> <p>Before testing, sample's appearance is good, and the function is normal.</p>			
<p>Test item:</p> <p>Laser radiation test</p>			
<p>Reference documents:</p> <p>IEC 60825-1:2014 Safety of laser products – Part 1: Equipment classification and requirements</p>			
<p>Summary:</p> <p>Refer to the test result.</p>			
<p>Test conclusion:</p> <p>The product is classified as Class 1.</p>			
(Stamp)			
Tested by:		Inspected by:	
	2019Y 12M 20D		2019Y 12M 20D
		Approved by:	
			2019Y 12M 20D



EN 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	CLASSIFICATION PRINCIPLES		
4.3	Classification rules		---
4.3 a	Radiation of a single wavelength		P
4.3 b	Radiation of multiple wavelengths		N/A
	1) Laser product emits at two or more wavelengths shown as additive in Table 1		N/A
	2) Laser product emits at two or more wavelengths not shown as additive in Table 1		N/A
4.3 c	Radiation from extended sources (see 5.4.3)		N/A
4.3 d	Non-uniform, non-circular or multiple apparent source		N/A
4.3 e	Time bases		---
	1) 0,25 s		N/A
	2) 100 s		P
	3) 30000 s		N/A
4.3 f	Repetitively pulsed or modulated lasers		P
	1) Any single pulse		P
	2) Average power for pulse trains		P
	3) Pulse duration $t \leq T_i$: Number of pulses N and C_5 :	t=50ns N=820000000	P
	3) Pulse duration $t > T_i$: Number of pulses N and C_5 :		N/A
4.4	Laser products designed to function as conventional lamps.		N/A
	α measured at 200 mm distance from closest point of human access ($\alpha > 5$ mrad).		N/A
	Un-weighted radiance L measured at 200 mm distance (comparison with $L_T = 1 \text{ MWm}^{-2}\text{sr}^{-1}/\alpha$) under reasonably foreseeable single fault conditions.		N/A



EN 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Evaluation of emission according to IEC 62471 series (optional): Standard applied (IEC 62471 series).....: Risk Group.....: Labelling.....: Classification of product based on accessible laser radiation (if no laser radiation accessible: Class 1).		N/A

5	DETERMINATION OF THE ACCESSIBLE EMISSION LEVEL and PRODUCT CLASSIFICATION		
5.1	Tests		---
	Compliance under reasonably foreseeable single fault conditions.		N/A
5.3	Determination of the class of the laser product ... : For Class 1C: vertical safety standard applied with requirements for Class 1C.		---
5.4	Measurement geometry		---
5.4.1	General		---
5.4.2	Default (simplified) evaluation		P
	Conditions applied	Condition 3	P
	Aperture diameter	7mm for Condition 3	P
	Reference point :.....	Physical location of the emitting chip	P
	Measurement distance	100mm for Condition 3	P
	(for each condition)		
5.4.3	Evaluation condition for extended sources		N/A
	Conditions applied		N/A
	Most restrictive position	See the test result	N/A
	(distance from reference point)		



EN 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Angular subtense of the apparent source α and C_6 : (for each condition)	See the test result	N/A
5.4.3 a	Aperture diameters (for each condition)..... :	See the test result	N/A
5.4.3 b	Angle of acceptance (for each condition)..... :	See the test result	N/A

Possible test case verdicts:

- test case does not apply to the test object..... : N(/A)
- test object does meet the requirement..... : P(ass)
- test object does not meet the requirement..... : F(ail)



Measured laser radiation, calculations and comparison with AEL limits:

1. Measuring condition

- The radiant power is measured under normal condition.
- Measurement condition 3 is measured.

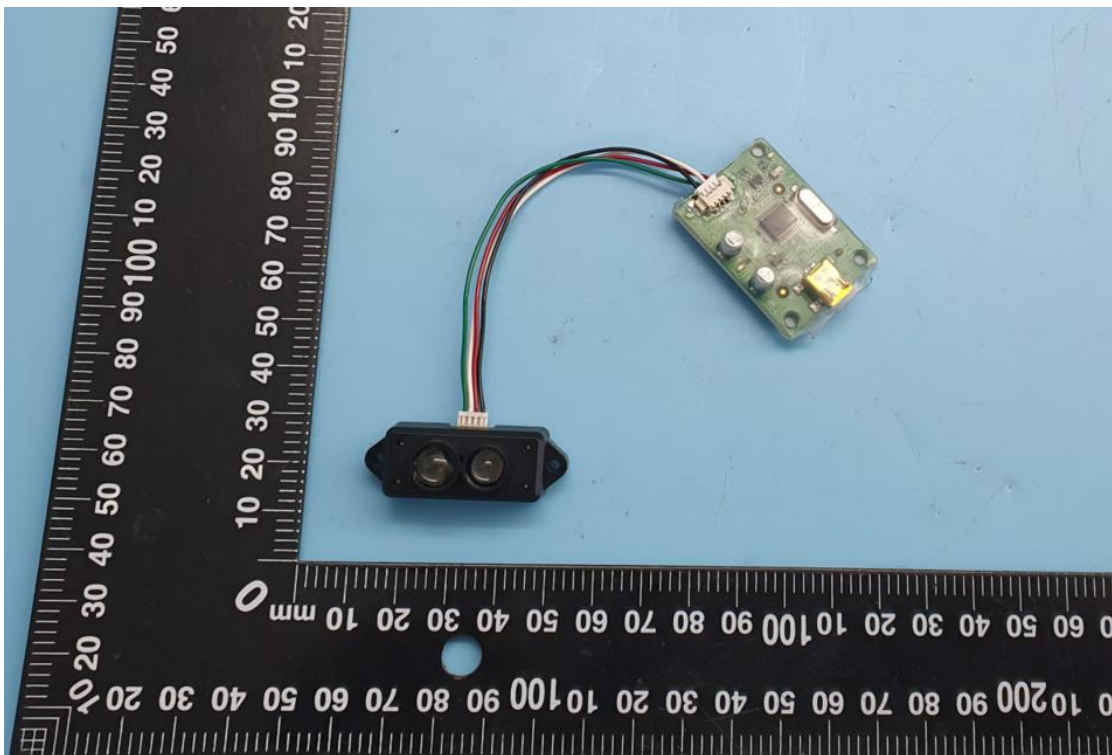
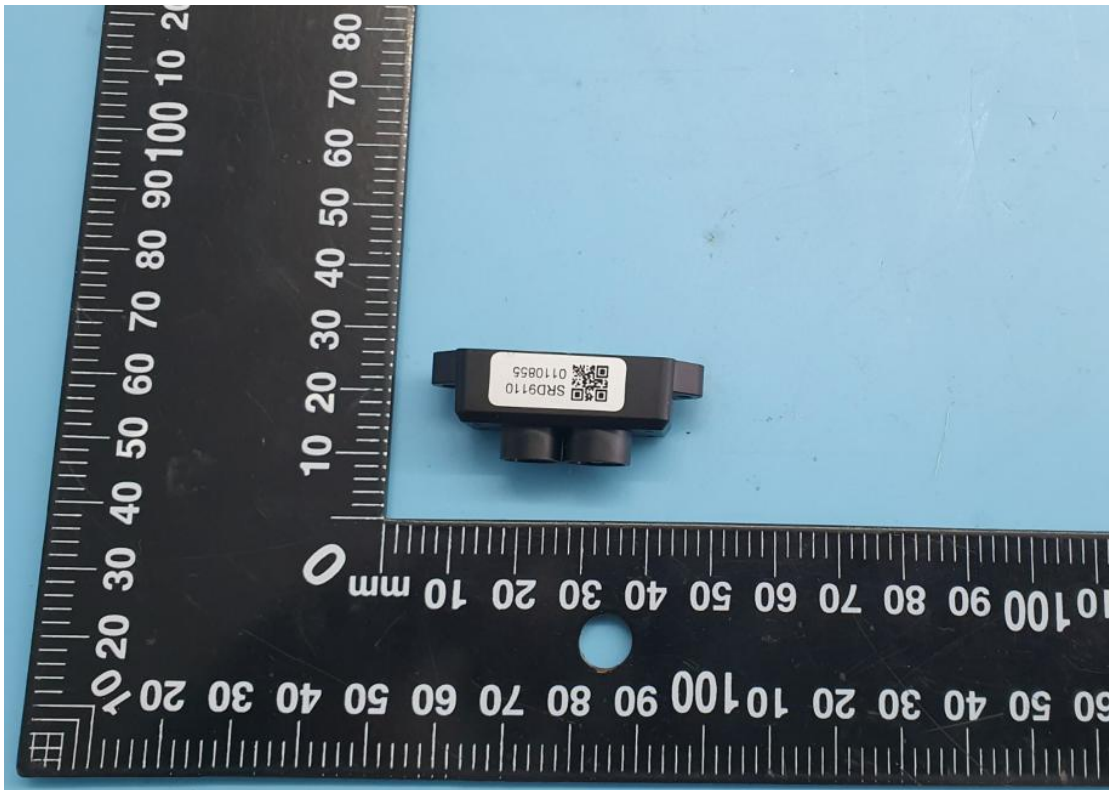
2. Measured Results

Parameters	TFmini-S
Wavelength	850nm
Angle of acceptance (γ)	35mrad
Measurement aperture(d)	7mm
Exposure time(t)	100s
pulse duration(t)	50ns
Radiant power(P)	0.159mW
single pulse Radiant energy (Q)	0.019nJ
Class 1 AEL _{single}	$7.7 \times 10^{-8} C_4 C_6 J=3.59\mu J$
Class 1 AEL _{S.P.T}	$7 \times 10^{-4} C_4 C_6 T_2^{-0.25} W/RPF=$ $10.3mW/8200000=1.26nJ$
Class 1 AEL _{S.P.Train}	AEL s.p.train = AEL single x $C_5=1.4\mu J$
Class	1

3. Classification

The product is classified as Class 1.

Photo document





Test Equipment List

Name	Maker	Model	Serial No.	Date expired
Laser power meter	Newport	1930-C2936-R	A180603086	2020-7-30
Detector	Newport	919P-003-10		2020-7-30
Laser spectrum analyzer	Newport	OSM-400-UV-NIR	A0705480	2020-4-08

*****End of report*****



STATEMENT

1. The test report is invalid without stamp of laboratory.
2. The test report is invalid without signature of person(s) testing and authorizing.
3. The test report is invalid if erased and corrected.
4. Test results of the report is valid to the test samples if sampling by client.
5. “☆”item cannot be Accredited by CNAS.
6. “☆” item to be outside the scope of CMA, the test method、 data and results are available for reference.
7. The test report shall not be reproduced except in full, without written approval of the laboratory.
8. If there is any objection to report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

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