



TEST REPORT
IEC 60825-1
Safety of laser products -
Part 1: Equipment classification and requirements

Report Number.....: 48.420.19.0843.00

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Name of Testing Laboratory

preparing the Report: TÜV SÜD Certification and Testing (China) Co., Ltd.

Applicant's name: Ningbo Oubo Hardware Industrial Ltd.

Address: No. 185, Shunyu West Road, Yuyao, 315400 Ningbo, PEOPLE'S
REPUBLIC OF CHINA

Test specification:

Standard.....: IEC 60825-1:2014 (Third Edition)

Test procedure.....: N/A

Non-standard test method.....: N/A

Test Report Form No.: IEC60825_1E

Test Report Form(s) Originator.....: ÖVE

Master TRF: Dated 2014-07

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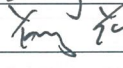
Test item description.....: Laser Distance Meter

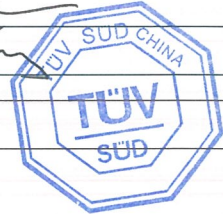
Trade Mark: N/A

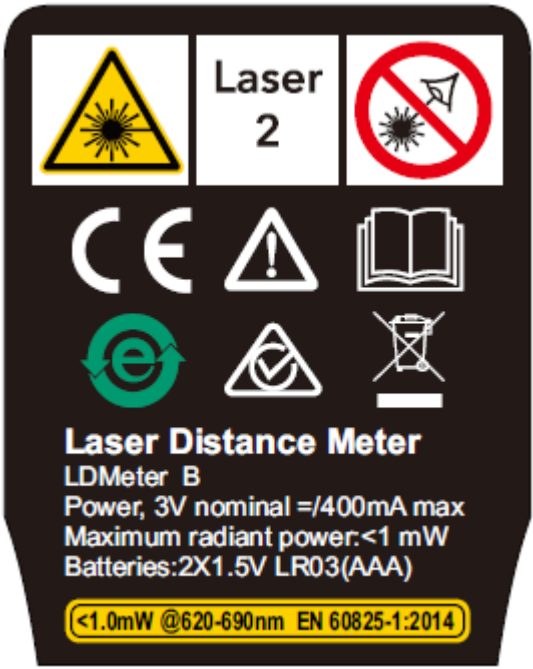
Manufacturer.....: Ningbo Oubo Hardware Industrial Ltd.

No. 185, Shunyu West Road, Yuyao, 315400 Ningbo, PEOPLE'S
REPUBLIC OF CHINA

Model/Type reference	: LDMeter B40, LDMeter B50, LDMeter B60, LDMeter B80, LDMeter B100, LDMeter B120
Ratings	: 3V DC (2x1.5V AAA/LR03 Battery), 620-690nm, Class 2, CW

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	Testing Laboratory:	TÜV SÜD Certification and Testing (China) Co., Ltd.
	Testing location/ address	10 Huaxia Road (M), Dongting, Wuxi, 214100, Jiangsu, People's Republic of China
<input type="checkbox"/>	Associated Testing Laboratory:	N/A
	Testing location/ address	N/A
	Tested by (name, function, signature)	Dong SHAO 
	Approved by (name, function, signature) ..	Yang YANG 
<input type="checkbox"/>	Testing procedure: TMP/CTF Stage 1:	
	Testing location/ address	N/A
	Tested by (name, function, signature)	N/A
	Approved by (name, function, signature) ..	N/A
<input type="checkbox"/>	Testing procedure: WMT/CTF Stage 2:	
	Testing location/ address	N/A
	Tested by (name, function, signature)	N/A
	Witnessed by (name, function, signature) ..	N/A
	Approved by (name, function, signature) ..	N/A
<input type="checkbox"/>	Testing procedure: SMT/CTF Stage 3 or 4:	
	Testing location/ address	N/A
	Tested by (name, function, signature)	N/A
	Witnessed by (name, function, signature) ..	N/A
	Approved by (name, function, signature) ..	N/A
	Supervised by (name, function, signature) :	N/A



List of Attachments (including a total number of pages in each attachment): N/A	
Summary of testing:	
Tests performed: Complete tests were performed on model LDMeter B120. The test results comply with the requirements of Class 2 laser product.	Testing location: TÜV SÜD Certification and Testing (China) Co., Ltd. 10 Huaxia Road (M), Dongting, Wuxi, 214100, Jiangsu, People's Republic of China
Summary of compliance with National Differences:	
List of countries addressed European Group Differences and National Differences According to the endorsement notice of EN 60825-1:2014, the text of the International Standard IEC 60825-1:2014 was approved by CENELEC as a European Standard without any modification. There are no deviation between IEC 60825-1:2014 and EN 60825-1:2014	
<input checked="" type="checkbox"/> The product fulfils the requirements of EN 60825-1:2014 and IEC 60825-1:2014	
Copy of marking plate: The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.	
	

Test item particulars :	
Classification of installation and use :	Portable
Supply Connection :	Battery powered
..... :	
Possible test case verdicts:	
- test case does not apply to the test object	N/A
- test object does meet the requirement	P (Pass)
- test object does not meet the requirement	F (Fail)
Testing :	
Date of receipt of test item	2019-06-17
Date (s) of performance of tests	2019-06-17 to 2019-06-28
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.	
Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Name and address of factory (ies)	Shenzhen Dobi Electronic Co.,LTD 6th Floor, Building B, Qiaode Science, Park Rd 7, west area of High tech Park, Tianliao Community Guangming New District, 518107 Shenzhen, PEOPLE'S REPUBLIC OF CHINA
General product information:	
The product in this report is a laser distance meter which emits visible laser point for alignment purpose. Ratings: 3V DC (2x1.5V AAA/LR03 Battery), 620-690nm, Class 2, CW All models used same laser modules and only different in measuring distance. Model LDMeter B120 was selected as representative model to perform all test. The radiation measurements for the product are performed under normal condition and foreseeable single fault conditions. The angular subtense is considered to be less than 1.5 mrad. After the measurements and classification analysis, the product is classified as Class 2 laser product.	

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	For class 2 classification	P
	2) 100 s		N/A
	3) 30000 s		N/A
4.3 f	Repetitively pulsed or modulated lasers		N/A
	1) Any single pulse		N/A
	2) Average power for pulse trains		N/A
	3) Pulse duration $t \leq T_i$: Number of pulses N and C_5:		N/A
	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.	Not used 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
	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.		P
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	See appended tables	P
	Aperture diameter	See appended tables	P
	Reference point	See appended tables	P
	Measurement distance	See appended tables	P
	(for each condition)		
5.4.3	Evaluation condition for extended sources	Not an extended source	N/A
	Conditions applied		N/A
	Most restrictive position		N/A
	(distance from reference point)		
	Angular subtense of the apparent source α and C_6 : (for each condition)		N/A
5.4.3 a	Aperture diameters (for each condition).....		N/A
5.4.3 b	Angle of acceptance (for each condition).....		N/A

<p>Measured accessible laser radiation and comparison with AEL: Please refer to attached tables.</p>
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6	ENGINEERING SPECIFICATIONS		
6.2	Protective housing		---
6.2.1	General		---
	Protective housing prevents access to energy levels in excess of the AEL for Class 1.	The product with Class 2 laser is necessary for the function of the product.	N/A
	Protective housing prevents access to energy levels equivalent to Class 4 and withstands exposures under reasonably foreseeable single fault conditions.		N/A
	Maintenance of Class 1, 1C, 1M, 2, 2M, or 3R (access to emissions of Class 3B or 4 is prevented).		P
	Maintenance of Class 3B product (access to emission of Class 4 is prevented).		N/A
6.2.2	Service		N/A
6.2.3	Removable laser system (laser system complies with requirements of Clauses 6 and 7).		N/A
6.3	Access panels and safety interlocks		---
6.3.1	Panel is intended to be removed during operation (or maintenance) and would give access to higher energy levels (see Table 13).		N/A
	Accessible emission (after removal of the panel) corresponds to product Class (designated by "X" in Table 13)		N/A
	Emission through the opening if interlocked panel of Class 1, 1C, 1M, 2, or 2M is removed (Emission < AEL of Class 1M or 2M).		N/A
	Emission through the opening if interlocked panel of Class 3R, 3B, or 4 is removed (Emission < AEL of Class 3R).		N/A
	Requirements regarding reasonably foreseeable single fault condition.		N/A
6.3.2	Override mechanism		N/A
	Behaviour of override in operation when the panel is replaced.		N/A
	Visible or audible warning for override mode.		N/A
6.4	Remote interlock connector		N/A
6.5	Manual reset		N/A
6.6	Key control		N/A
6.7	Laser radiation emission warning		---
6.7.1	Laser product is a 3R ($\lambda < 400$ nm; $\lambda > 700$ nm), 1C, 3B or 4 laser systems.		N/A
6.7.2	Audible or visible warning.		N/A

	Warning is failsafe or redundant.		N/A
	Viewing of the visible warning does not require exposure to emissions > AEL for Class 1M and 2M.		N/A
6.7.3	Operational control and laser aperture are provided with a warning device when they are separated more than 2 m from warning device.		N/A
6.7.4	Visible indication of output aperture if laser emission may be distributed through more than one output.		N/A
6.7.5	Switch for handheld Class 3R device must be depressed for emission (in lieu of emission indicator).		N/A
6.8	Beam stop or attenuator		N/A
6.9	Controls		N/A
6.10	Viewing optics		N/A
	a) Human access to laser radiation in excess of Class 1M prevented when the shutter is opened or attenuation varied.		N/A
	b) Opening of the shutter or variation of the attenuation prevented when exposure to laser radiation in excess of Class 1M is possible.		N/A
6.11	Scanning safeguard	Not classified on scanning basis	N/A
6.12	Safeguard for Class 1C products		N/A
	a) Human access to laser radiation in excess of AEL for Class 1 measured under Condition 3 is prevented.		N/A
	b) Human access to laser radiation in excess of AEL for Class 3B measured through 3,5 mm aperture at 5 mm distance from applicator is prevented.		N/A
6.13	Walk-in access		N/A
	a) Means provided so that any person inside the housing can prevent activation of Class 3B or 4 laser hazards.		N/A
	b) A warning device provides adequate warning of emission to any person within the housing.		N/A
	c) Where "walk-in" access during operation is intended or reasonably foreseeable, emission of laser radiation that is equivalent to Class 3B or 4 while someone is present inside the enclosure of Class 1, Class 2 or Class 3R product is prevented by engineering means.		N/A
6.14	Environmental conditions		---
	- climatic conditions	Not consider in this report	N/A
	- vibration and shock	Not consider in this report	N/A
6.15	Protection against other hazards		---

6.15.1	Non-optical hazards (product safety standard)	Not consider in this report	N/A
	- electrical hazards;		N/A
	- excessive temperature;		N/A
	- spread of fire from the equipment;		N/A
	- sound and ultrasonics;		N/A
	- harmful substances;		N/A
	- explosion;		N/A
6.15.2	Collateral radiation		N/A
6.16	Power limiting circuit	The laser power measurement is performed under both normal condition and conditions with single fault in the power limiting circuit	P

7	LABELLING		
7.1	General		---
	Labels durable, permanently affixed		P
	Labels clearly visible		P
	Reading of labels is possible without exposure to laser radiation in excess of AEL for Class 1.		P
	Colour combination	Black on yellow background	P
	Labelling impractical due to the size or design of the product.	Label on product	N/A
	Warning label – Hazard symbol (Figure 3)	See labels	P
7.2 - 7.7	Text on explanatory label or pictogram (laser class, warning text)	See labels	P
7.8	Aperture label		N/A
7.9	Radiation output and standards information		---
	Max output of laser radiation	See labels.	P
	Pulse duration		N/A
	Emitted wavelength(s)	See labels.	P
	Name and publication date of the standard	See labels.	P
7.10	Labels for access panels		---
7.10.1 a) – f)	Labels for panels - warning wording used		N/A
7.10.2	Labels for safety interlocked panels - Warning wording used		N/A
7.11	Warning for invisible laser radiation		N/A
7.12	Warning for visible laser radiation		P

7.13	Warning for potential hazard to the skin or anterior parts of the eye - warning wording used.....:	Laser power not exceed AEL for Class 3B with a 3.5 mm diameter aperture placed at the closest point of human access	N/A
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8	OTHER INFORMATIONAL REQUIREMENTS		
8.1	Information for the user		---
	a) adequate instructions for assembly, maintenance and safe use and description of the classification limitations, if appropriate.	See user manual	P
	b) additional warning for Class 1M and 2M		N/A
	c) laser beam parameters for radiation above the AEL of Class 1		---
	• Wavelength	620-690nm	P
	• Beam divergence		N/A
	• Pulse pattern (pulse duration, repetition rate, ...)		N/A
	• Maximum power or energy output	<1mW	P
	d) safety instruction for embedded laser products and other incorporated laser products.		N/A
	e) MPE and NOHD for Class 3B and 4 laser products; For collimated beam Class 1M and 2M lasers the extended NOHD (ENOH).)		N/A
	f) information for the selection of eye protection.		N/A
	g) reproduction of all required labels and warnings.		P
	h) location of laser apertures		P
	i) list of controls, adjustments of procedures for operation and maintenance - and warning statement.		N/A
	j) information (compatibility requirements) about laser energy source if not incorporated.		N/A
	k) additional warning for Class 1, 1M, 2, 2M, and 3R regarding skin or corneal burns.		N/A
	l) Information for Class 1C products (e.g. warning that repeated application may pose a risk).		N/A
8.2	Purchasing and service information		P
	a) safety classification of each laser product stated in all descriptive material (e.g. brochures).		P

	b) adequate instructions for servicing available: <ul style="list-style-type: none"> • warnings and precautions regarding exposure of laser emission above Class 1 • maintenance schedule • list of controls and procedures that could increase accessible emissions • description of displaceable parts • protective procedures for service personnel • reproduction of labels and hazard warnings 		P
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9	ADDITIONAL REQUIREMENTS FOR SPECIFIC LASER PRODUCTS		
9.1	Applicable other parts of the standard series IEC 60825		---
	IEC 60825-2 (Safety of optical communication systems)		N/A
	IEC 60825-4 (Laser guards)		N/A
	IEC 60825-12 (Safety of free space optical communication systems used for transmission of information)		N/A
9.2	Medical laser products: Class 3B and Class 4 medical laser products comply with IEC 60601-2-22		N/A
9.3	Laser processing machines: Comply with IEC/ISO 11553 series.		N/A
9.4	Electric toys: Comply with IEC 62115		N/A
9.5	Consumer electronic products: Comply with IEC 60950 (IT-equipment) or IEC 60065 (AV equipment)		N/A

TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾
Laser diode	Quantum Semiconductor International Co., Ltd.	QL65D5S-A	Optical output: 5mW; Operating voltage: V _{op} =2.2-2.6V; Wavelength: λ =650-660nm	IEC/EN 60825-1:2014	Test with unit
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

Attached Tables:

Measurements (default method)			
Measurement geometry (Table 11):			
Condition 1	:		<input type="checkbox"/>
Condition 3	:		<input checked="" type="checkbox"/>
Wavelength (nm)	:	655	
Aperture diameter (mm)	:	7	
Measurement distance (mm)	:	100	
Reference point	:	Physical location of the emitting chip	
Angular subtense α (mrad)	:	Less than 1.5	
Angle of acceptance γ	:	Not limited	
Continuous wave laser	:		<input checked="" type="checkbox"/>
Repetitively pulsed laser	:		<input type="checkbox"/>
Measurement under normal condition:			
<u>Emission level expressed in</u>	<u>Symbol</u>	<u>Unit</u>	<u>Measured value</u>
Irradiance	E	W/m ²	—
Radiant power	P	W	0.813mW
Radiant exposure	H	J/m ²	—
Radiant energy	Q	J	—
No.	Single fault condition	Measured value	
1	R81 short circuit	Up to 0.862mW, then shut down; recoverable	
2	R71 short circuit	No obvious change in laser output.	
3	IC9 pin 1 to pin 2 short circuit	Shut down with no laser output.	
4	IC9 pin 2 to pin 3 short circuit	Shut down with no laser output.	
5	IC9 pin 1 to pin 3 short circuit	Shut down with no laser output.	
Note:			
1. Normal supply voltage: 3V DC (2x1.5V AAA Battery)			
2. Max. obtainable radiant power 0.862mW is used for the classification of this laser product under this measurement condition.			

Measurements (default method)			
Measurement geometry (Table 11):			
Condition 1	:		<input checked="" type="checkbox"/>
Condition 3	:		<input type="checkbox"/>
Wavelength (nm)	:	655	
Aperture diameter (mm)	:	50	
Measurement distance (mm)	:	2000	
Reference point	:	Physical location of the emitting chip	
Angular subtense α (mrad)	:	Less than 1.5	
Angle of acceptance γ	:	Not limited	
Continuous wave laser	:		<input checked="" type="checkbox"/>
Repetitively pulsed laser	:		<input type="checkbox"/>
Measurement under normal condition:			
<u>Emission level expressed in</u>	<u>Symbol</u>	<u>Unit</u>	<u>Measured value</u>
Irradiance	E	W/m ²	—
Radiant power	P	W	0.708mW
Radiant exposure	H	J/m ²	—
Radiant energy	Q	J	—
No.	Single fault condition	Measured value	
1	R81 short circuit	Up to 0.742mW, then shut down; recoverable	
Note:			
3. Normal supply voltage: 3V DC (2x1.5V AAA Battery)			
4. Max. obtainable radiant power 0.742mW is used for the classification of this laser product under this measurement condition.			

Classification rule		
<p>The maximum radiation measured under normal or single fault condition for each condition is used for the classification.</p> <ul style="list-style-type: none"> • If the following requirements met, the product is classified as Class 1: <ul style="list-style-type: none"> ➤ Accessible emission is less than or equal to AEL of Class 1 for Condition 1 and 3. • If the following requirements met, the product is classified as Class 1M: <ul style="list-style-type: none"> ➤ Accessible emission is greater than AEL of Class 1 for Condition 1. ➤ Accessible emission is less than AEL of Class 3B for Condition 1. ➤ Accessible emission is less than or equal to AEL of Class 1 for Condition 3. • If the following requirements met, the product is classified as Class 2: <ul style="list-style-type: none"> ➤ Accessible emission less than or equal to AEL of Class 2 for Condition 1 and 3. • If the following requirements met, the product is classified as Class 2M: <ul style="list-style-type: none"> ➤ Accessible emission is greater than AEL of Class 2 for Condition 1. ➤ Accessible emission is less than AEL of Class 3B for Condition 1. ➤ Accessible emission is less than or equal to AEL of Class 2 for Condition 3. • If the following requirements met, the product is classified as Class 3R: <ul style="list-style-type: none"> ➤ Accessible emission is less than or equal to AEL of Class 3R for Condition 1 and 3. ➤ Accessible emission exceeds AEL of Class 1 and 2 for Condition 3. • If the following requirements met, the product is classified as Class 3B: <ul style="list-style-type: none"> ➤ Accessible emission is less than or equal to AEL of Class 3B for Condition 1 and 3. ➤ Accessible emission exceeds AEL of Class 3R for Condition 1 or 3. ➤ Accessible emission exceeds AEL of Class 1 and 2 for Condition 3. • If the following requirements met, the product is classified as Class 4: <ul style="list-style-type: none"> ➤ Accessible emission exceeds AEL of Class 3B for Condition 1 or 3. <p>The Classification is started from Class 1, if the requirements not met, then consider the next higher Class, and so on, until the proper Class is classified.</p>		
Classification		
AEL of Class 1		
Value selected from Table 3.....		0.39mW
AEL of Class 2		
Value selected from Table 5.....		1mW
AEL of Class 3R		
Value selected from Table 6.....		5mW
AEL of Class 3B		
Value selected from Table 8.....		0.5W
Radiation measured under Condition 1.....		0.742mW
Radiation measured under Condition 3.....		0.862mW
Limit value	Condition 1	Condition 3
AEL of Class 1	Exceeded	Exceeded
AEL of Class 2	Not exceeded	Not exceeded
AEL of Class 3R	—	—
AEL of Class 3B	—	—
<p>Conclusion:</p> <p>The product complies with the requirements of Class 2 laser product under normal condition and foreseeable single fault conditions.</p>		

Photos

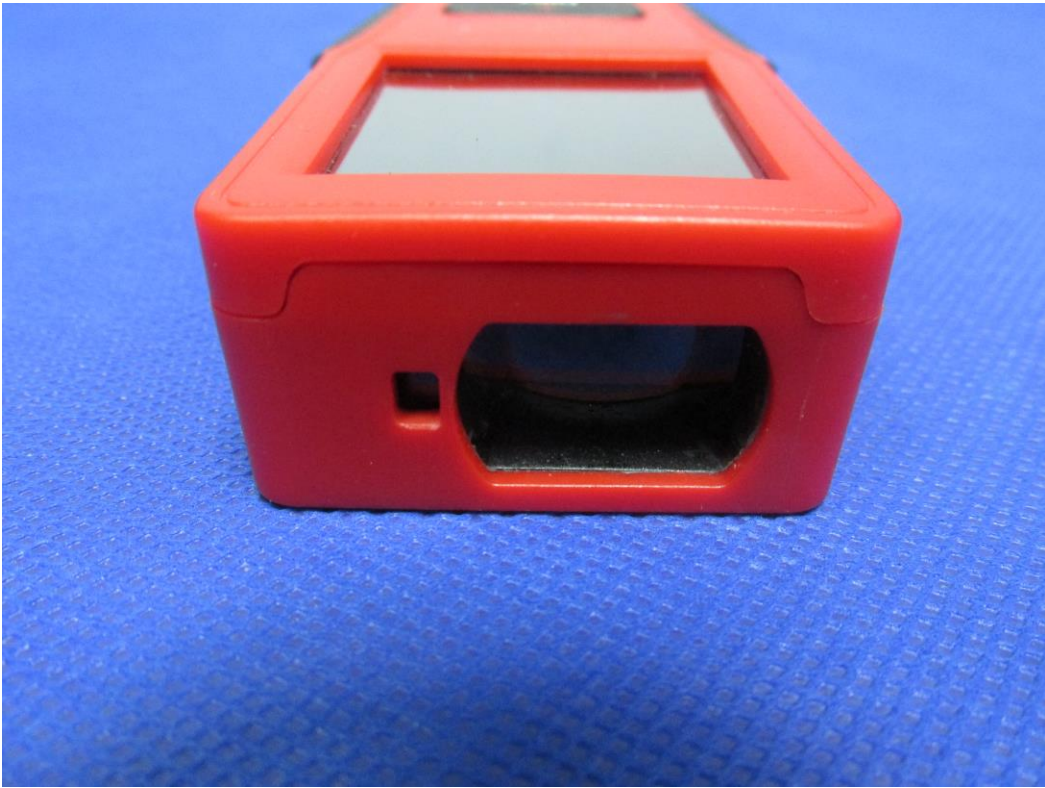
General view



General view



General view



Internal view



Internal view



Internal view

