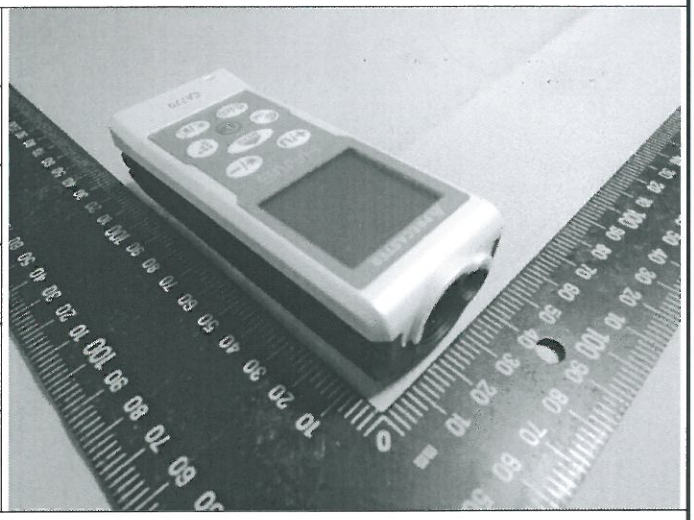
Prüfbericht-Nr.: *Test Report No.:*	10047056 001	**Auftrags-Nr.:** *Order No.:*	114023085	Seite 1 von 19 *Page 1 of 19*
Kunden-Referenz-Nr.: *Client Reference No.:*	426020	**Auftragsdatum:** *Order date.:*	05 Jun. 2014	
Auftraggeber: *Client:*	PRECASTER ENTERPRISES CO., LTD. No. 204, Sec. 2, Fu-Hsing Rd., 402 Taichung, Taiwan, R.O.C.			
Prüfgegenstand: *Test item:*	Laser Distance Meter			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	CA740, CA770, CA7100, CA640, CA670, CA6100, EL70			
Auftrags-Inhalt: *Order content:*	TUV Rheinland - EMC service			
Prüfgrundlage: *Test specification:*	FCC 47 CFR Part 15, Subpart B: 2013			

Wareneingangsdatum: *Date of receipt:*	21 Jul. 2014
Prüfmuster-Nr.: *Test sample No.:*	A000076560-004 to 010
Prüfzeitraum: *Testing period:*	refer test report
Ort der Prüfung: *Place of testing:*	TÜV Rheinland Taiwan Ltd.
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland Taiwan Ltd. Taichung Branch Office
Prüfergebnis*: *Test result*:*	Pass



geprüft von / *tested by:*			**kontrolliert von** / *reviewed by:*		
23 Oct. 2014	Spring C.Y. Wang/ Project Manager		23 Oct. 2014	Max Y. C. Yao/ Department Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges / *Other:*

FCC Verification Report.

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: Test item complete and undamaged

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhalt
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	1 = very good	2 = good	3 = satisfactory	4 = sufficient	5 = poor
	P(ass) = passed a.m. test specifications(s)		F(ail) = failed a.m. test specifications(s)	N/A = not applicable	N/T = not tested

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TEST SUMMARY

5.1 CONDUCTED EMISSION PER SECTION 15.107, FCC 47 CFR PART 15 SUBPART B
RESULT: N/A

5.2 RADIATED EMISSION PER SECTION 15.109, FCC 47 CFR PART 15 SUBPART B
RESULT: PASS

Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report.

2 Laboratory

TUV Rheinland Taiwan Ltd. Taichung Branch Office
No.9, Lane 36, Minsheng Rd., Sec. 3, Daya District, Taichung City 428, Taiwan, R.O.C.

2.1 Test Facilities

TÜV Rheinland Taiwan Ltd.
11F., No.758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105, Taiwan, R.O.C.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facilities and has found these test sites to be in compliance with the requirements under 47 CFR section 2.948. The registration number: 365730.

The Industry Canada has reviewed the technical characteristics of the radiated and conducted emission facilities and has found these test sites to be in compliance with the Canadian requirements. The filing number: 9465A.

The test facility is accredited by TAF (member of ILAC), under number 0759 according to ISO/IEC 17025:2005.

TÜV Rheinland Taiwan Ltd. is accredited by the Federal Communications Commission as a Conformity Assessment Body under Designation Number TW1065 and Test Firm Registration#: 799772.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

For Radiated Emission (Taipei: Semi-Anechoic Chamber)

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Due Date
1	Test Receiver	Rohde & Schwarz	ESR7	101062	2015/08/30
2	Spectrum Analyzer	Rohde & Schwarz	FSV-40	100921	2014/12/09
3	Pre-Amplifier	HP	8447F	2805A03335	2015/08/22
4	Pre-Amplifier	Com-Power	PAM-840	461257	2015/08/25
5	Pre-Amplifier	EM Electronics	EM01G18G	060558	2014/10/24
6	Bilog Antenna	TESEQ	CBL6111D	29802	2015/07/04
7	Horn Antenna	ETS-Lindgren	3117	00138160	2015/01/10
8	Horn Antenna	Com-Power	AH-840	101029	2015/09/19
9	Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	2015/09/28

2.3 Calibration

All equipment requiring calibration is calibrated periodically by the manufacturer or accredited calibration services according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.4 Abbreviations

PASS	means 'complied with requirement'	**N/A**	means 'not applicable'
FAIL	means 'not complied'	**N.C.R.**	means 'no calibration required'

2.5 Measurement Uncertainty

Table 2: Measurement Uncertainty

Testing Item	Frequency Range	Uncertainty
Conducted Emission (Shield Room)	150kHz - 30MHz	2.47 dB
Radiated Emission (966 Chamber: 3m)	30MHz - 1000MHz	2.80 dB
Radiated Emission (10m OATS: 10m)	30MHz – 1000MHz	2.80 dB
Radiated Emission (966 Chamber: 3m)	Above 1GHz	3.04 dB

Note:
The uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3 General Product Information

3.1 Product Function and Intended Use

The tested sample is “Laser Distance Meter” with type designations as described on the cover page for new approval, which used for finding precision distance range from measured target. It can help user to measure the distance by Laser measurement module.
The electrical construction of model “CA740”, “CA7100”, “EL70” is identical to “CA770”, except for different outer design and supported measurement functions. The electrical construction of model “CA640”, “CA670” and “CA6100” is similar to “CA740”, “CA770” and “CA7100”, except for different outer design for AA size batteries. Due to the similar electrical design of all models, one representative sample with model “CA770” was tested and recorded in this report.

3.2 Rating and Physical Characteristics

Type Designation: CA740, CA770, CA7100, CA640, CA670, CA6100, EL70
Input Voltage: DC 3V (batteries)
Safety Protection Class: Class III
For details, refer to user manual.

3.3 System Details

Table 3: Interfaces present on the EUT

Interface	Cable length for Testing, Shielding
N/A	N/A

3.4 Noise Generating or Sources of Interference

1) Laser circuits design
2) Crystal CRYST1: 25.0MHz
3) IC circuits design: U701

Please refer to Attachment Photo Documentation for details.

3.5 Noise Suppressing Parts

Please refer to Attachment Photo Documentation for details.

3.6 Submitted Documents

1) Circuit diagram
2) Operation manual
3) PCB layout

4 Test Set-up and Operation Modes

4.1 Test Methodology

The test methodology used is based on the requirement of 47 CFR PART 15, section 15.31, 15.33, 15.35, 15.107 and 15.109, and of ICES-003.

The test methods, which have been used, are based on ANSI C63.4 or CAN/CSA-CEI/IEC CISPR 22.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Independent and Test Operation Modes

The subject sample was set to continuous measuring function and tested in “Continuous Measuring” mode for test as described in this report.

The test mode for EMI test listed in this report:
Continuous Measuring mode

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C 63.4 or in CAN/CSA-CEI/IEC CISPR22.

Refer to Test setup in chapter 4.5.

4.3 Special Accessories and Auxiliary Equipment

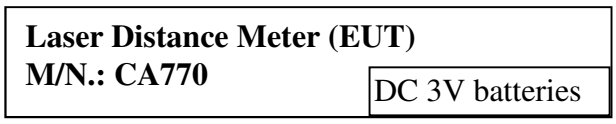
The EUT was tested as an independent unit without additional equipment.

4.4 Countermeasures to achieve EMC compliance

The test sample which has been tested contained the noise suppression parts as described in the constructional data form or technical construction file or refer to the attachment photo document of test report. No additional measures were employed to achieve compliance.

4.5 Test Setup

The test setup was realized on a non-conducted table of 80cm height during all the tests.
The test arrangement is configured and set according to manufacturer's installations.



5 Test Results E M I S S I O N

5.1 Conducted Emission per section 15.107, 47 CFR part 15 subpart B

RESULT:	**N/A**

Port:		AC Mains
Test Procedure	:	ANSI C63.4 (2009) Clause 7.3
Deviations from standard test procedure	:	None
Frequency Range	:	0.15 – 30MHz
Limits	:	FCC Part 15 Subpart B Section 15.107 (a) class B
Kind of Test Site	:	Conducted Room (Shield)

The subject sample is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

5.2 Radiated Emission per section 15.109, 47 CFR part 15 subpart B

RESULT:	**PASS**

Port:		Enclosure
Test Procedure	:	ANSI C63.4 (2009) Clause 8.3
Deviations from standard test procedure	:	None
Frequency Range	:	30 – 1000MHz
Limits	:	FCC Part 15 Subpart B Section 15.109 (a) class B
Kind of Test Site	:	966 Semi-anechoic chamber (3m distance)

Test Setup

The following setup caused the highest disturbance:

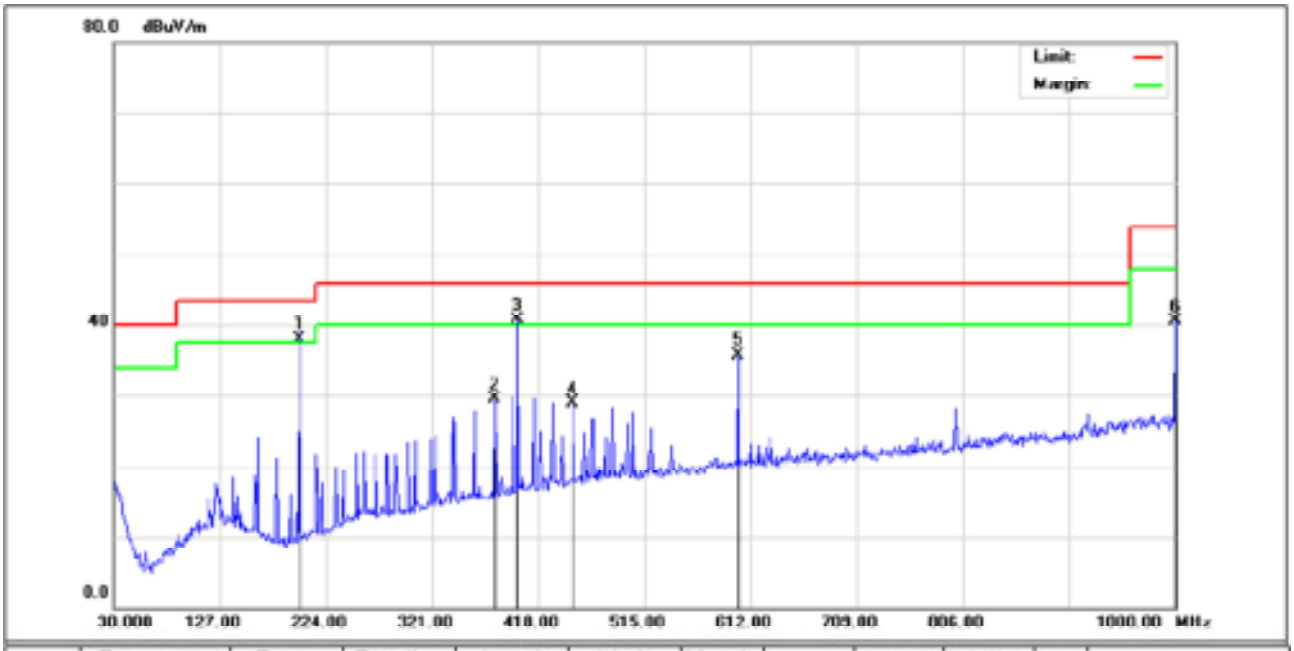
Date of Testing	:	27 Aug. 2014
Input Voltage	:	DC 3V, batteries
Operational Mode	:	See 4.2
Temperature	:	26 ℃
Relative Humidity	:	55 %

The highest frequency generated or used in the device or on which operates or tunes of the EUT:
☐ below 1.705MHz, measuring up to 30MHz
☐ 1.705-108MHz, measuring up to 1000MHz
☒ 108-500MHz, measuring up to 2000MHz
☐ 500-1000MHz, measuring up to 5000MHz
☐ above 1000MHz, measuring up to 5th harmonic of the hightest frequency or 40GHz, whichever is lower

The highest frequency of EUT is 200 MHz which locates in 108-500 MHz, The measured frequency was made up to 2000MHz in this report.

Figure 1: Radiated Emission, 30 – 1000 MHz

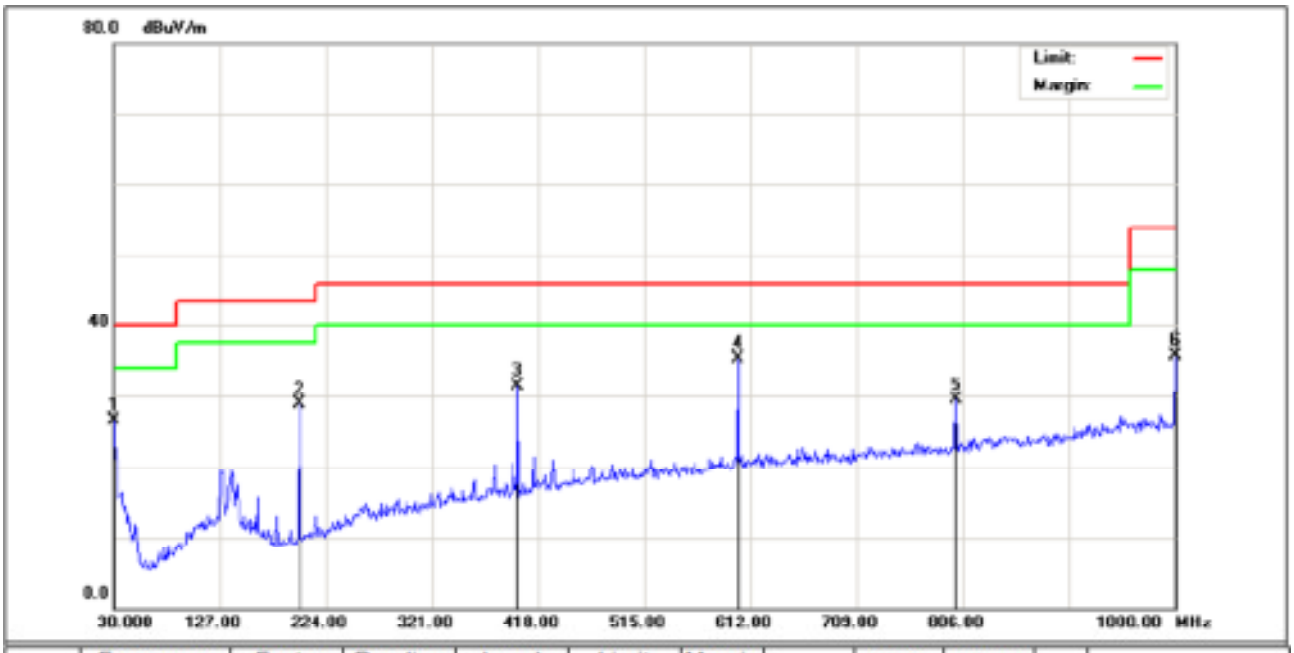
Horizontal



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (-)	P/F	Remark
1	199.7500	-16.29	54.29	38.00	43.50	-5.50	QP	100	187	P	
2	378.2300	-10.39	39.96	29.57	46.00	-16.43	QP	100	187	P	
3	399.5699	-10.07	50.76	40.69	46.00	-5.31	QP	400	360	P	
4	450.0099	-9.35	38.28	28.93	46.00	-17.07	QP	200	171	P	
5	600.3600	-7.10	42.89	35.79	46.00	-10.21	QP	200	360	P	
6	1000.0000	-0.79	41.39	40.60	54.00	-13.40	QP	100	328	P	

Note: Level = Reading + Factor
Margin = Level – Limit

Vertical

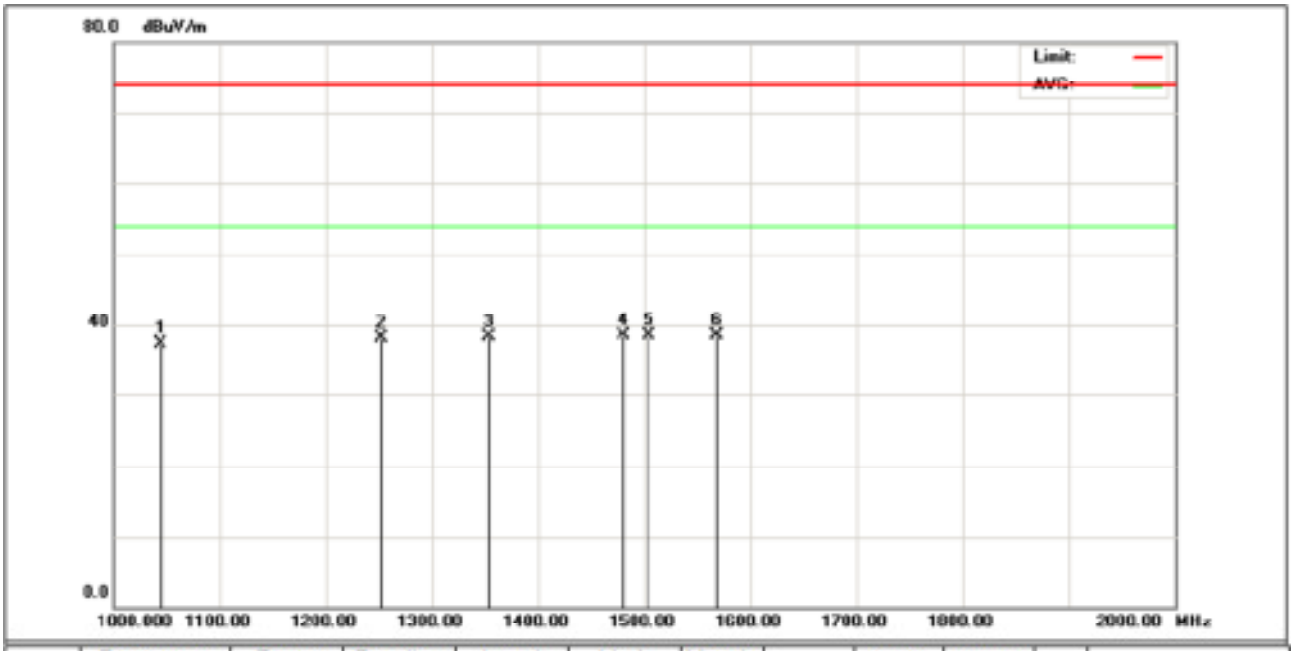


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (-)	P/F	Remark
1	30.0000	-7.35	33.91	26.56	40.00	-13.44	QP	100	360	P	
2	199.7500	-16.28	45.20	28.92	43.50	-14.58	QP	200	104	P	
3	399.5700	-10.07	41.64	31.57	46.00	-14.43	QP	400	115	P	
4	600.3600	-7.10	42.40	35.30	46.00	-10.70	QP	100	213	P	
5	800.1800	-4.59	34.18	29.59	46.00	-16.41	QP	100	6	P	
6	1000.0000	-0.79	36.41	35.62	54.00	-18.38	QP	100	360	P	

Note: Level = Reading + Factor
Margin = Level – Limit

Figure 2: Radiated Emission, above 1 GHz

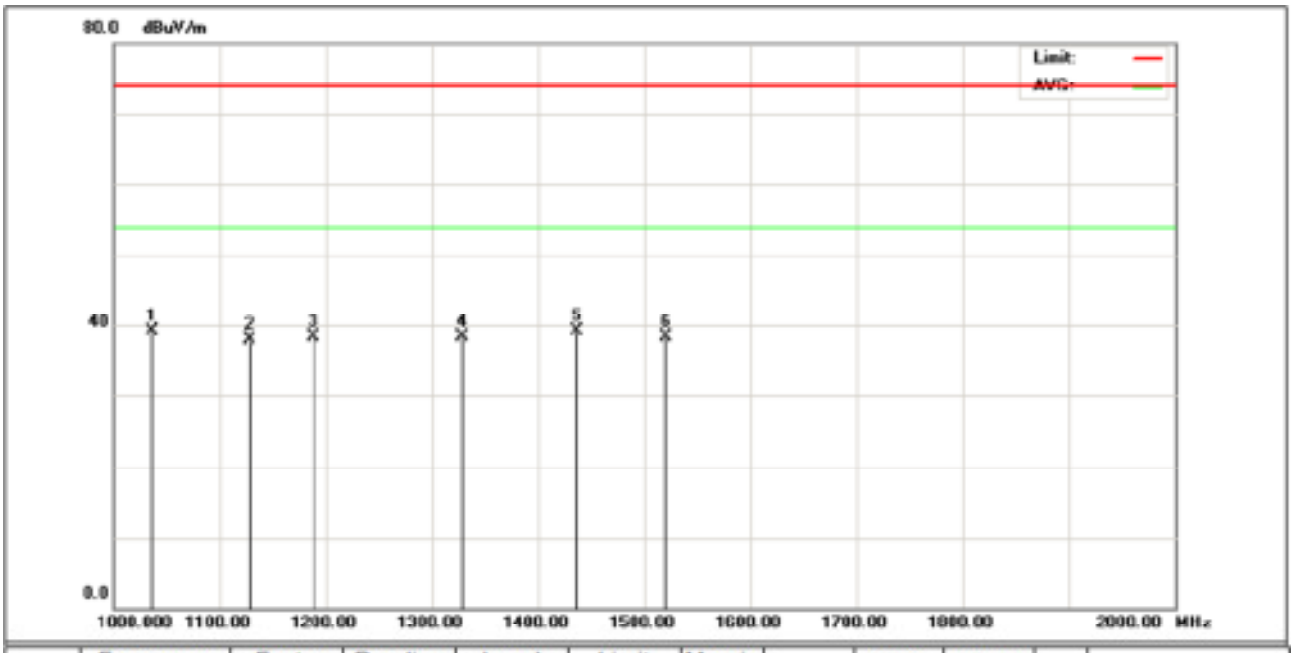
Horizontal



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (·)	P/F	Remark
1	1045.000	-10.34	47.60	37.26	74.00	-36.74	peak	100	320	P	
2	1252.000	-10.92	49.08	38.16	74.00	-35.84	peak	100	168	P	
3	1354.000	-11.20	49.52	38.32	74.00	-35.68	peak	100	56	P	
4	1480.000	-11.56	50.07	38.51	74.00	-35.49	peak	100	266	P	
5	1505.000	-11.59	50.03	38.44	74.00	-35.56	peak	100	304	P	
6	1568.000	-11.18	49.73	38.55	74.00	-35.45	peak	100	144	P	

Note: Level = Reading + Factor
Margin = Level – Limit
All peak readings were below the average limit, thus no average measuring was required.

Vertical



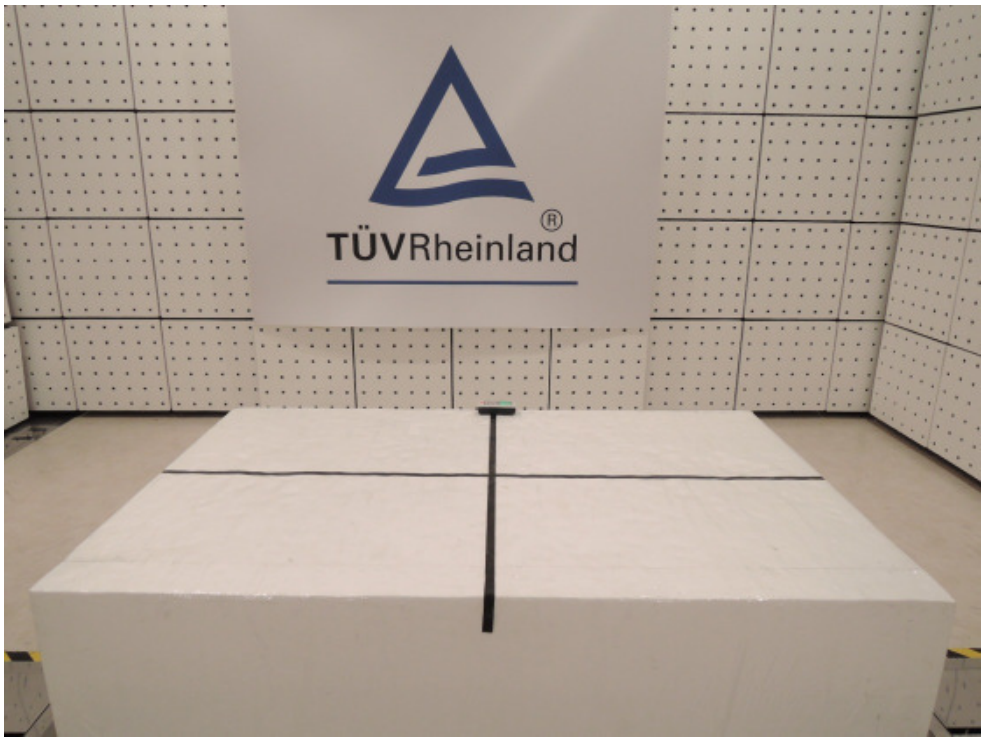
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (-)	P/F	Remark
1	1037.000	-10.32	49.45	39.13	74.00	-34.87	peak	100	204	P	
2	1128.000	-10.57	48.48	37.91	74.00	-36.09	peak	100	310	P	
3	1188.000	-10.74	48.98	38.24	74.00	-35.76	peak	100	198	P	
4	1329.000	-11.13	49.46	38.33	74.00	-35.67	peak	100	174	P	
5	1437.000	-11.44	50.46	39.02	74.00	-34.98	peak	100	65	P	
6	1521.000	-11.48	49.80	38.32	74.00	-35.68	peak	100	182	P	

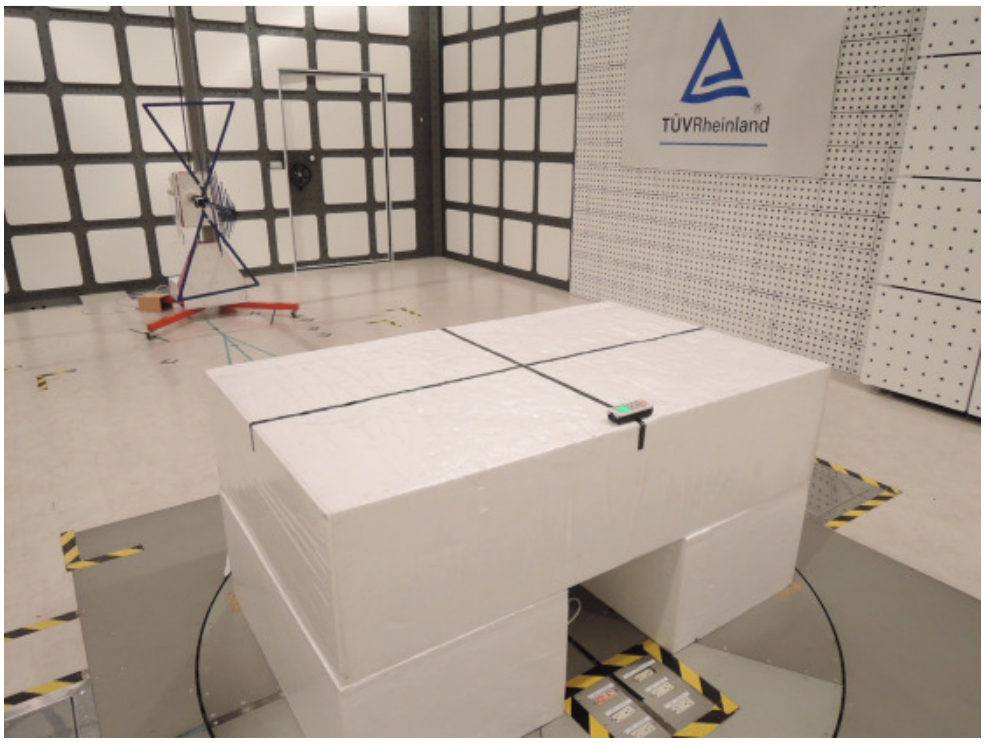
Note: Level = Reading + Factor
Margin = Level – Limit

All peak readings were below the average limit, thus no average measuring was required.

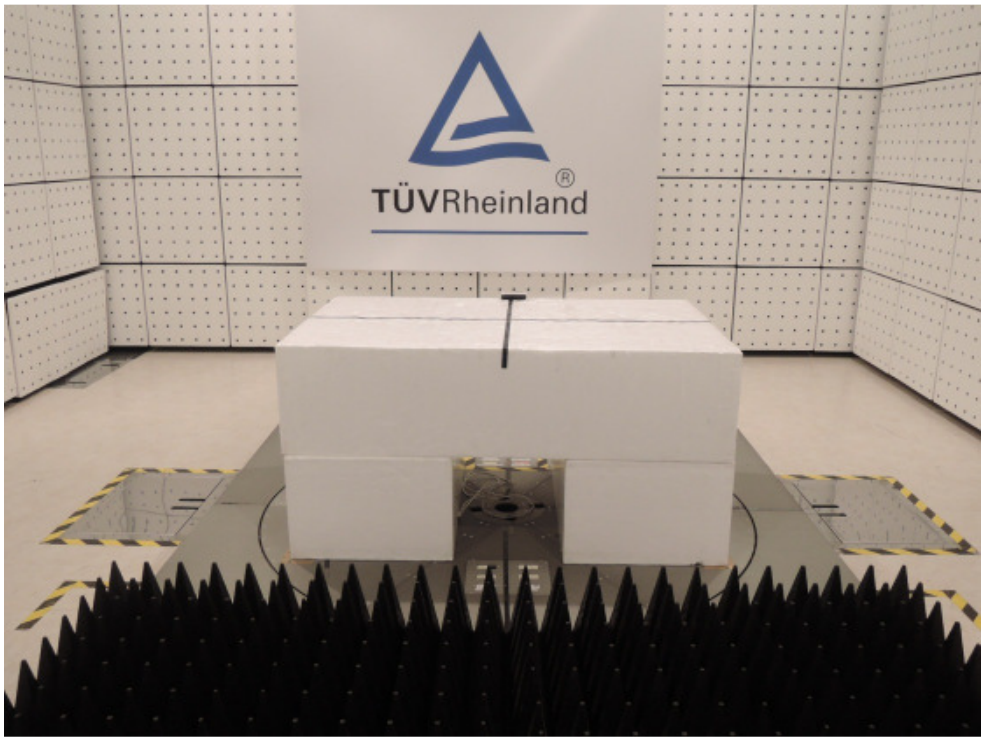
6 Photographs of Test Setup

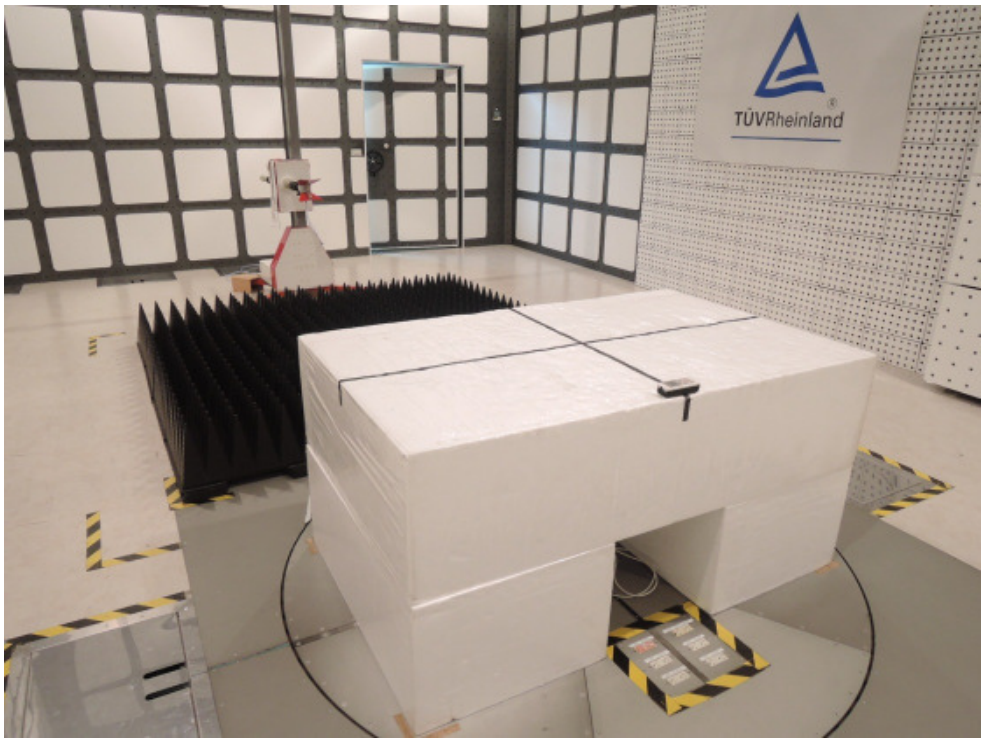
Picture 1: Radiated Emission, 30 - 1000 MHz





Picture 2: Radiated Emission, above 1 GHz





7 List of Tables

8 List of Figures

9 List of Pictures

Product: Laser Distance Meter

Type Designation: CA770

Product: Laser Distance Meter

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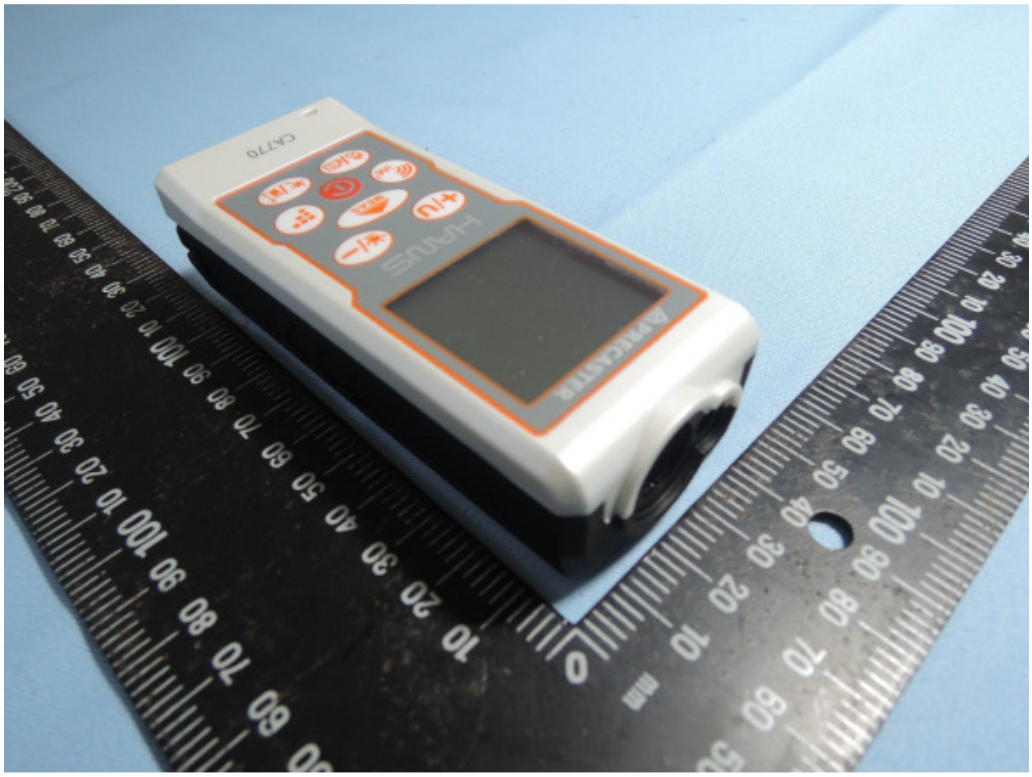

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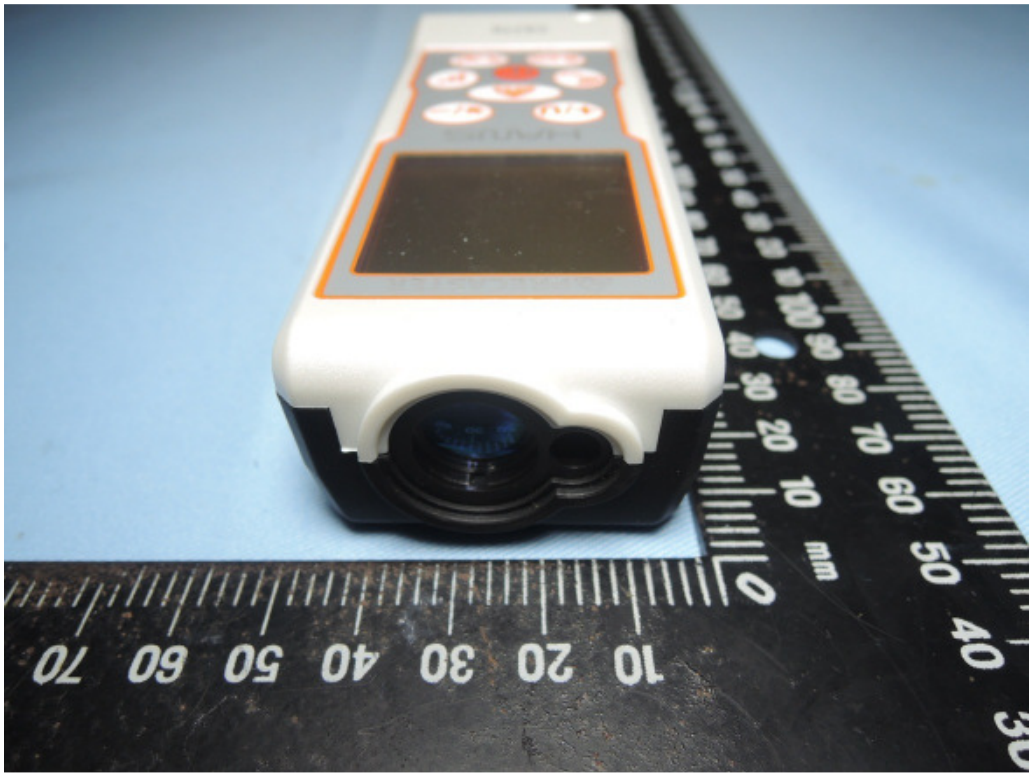

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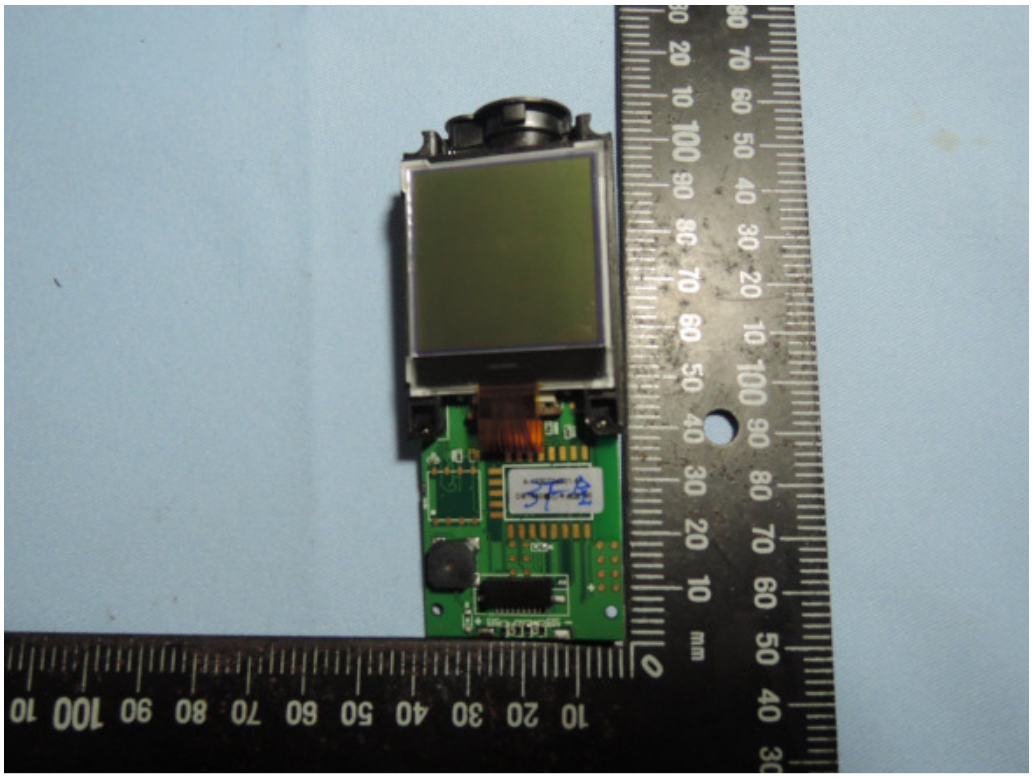

Product: Laser Distance Meter

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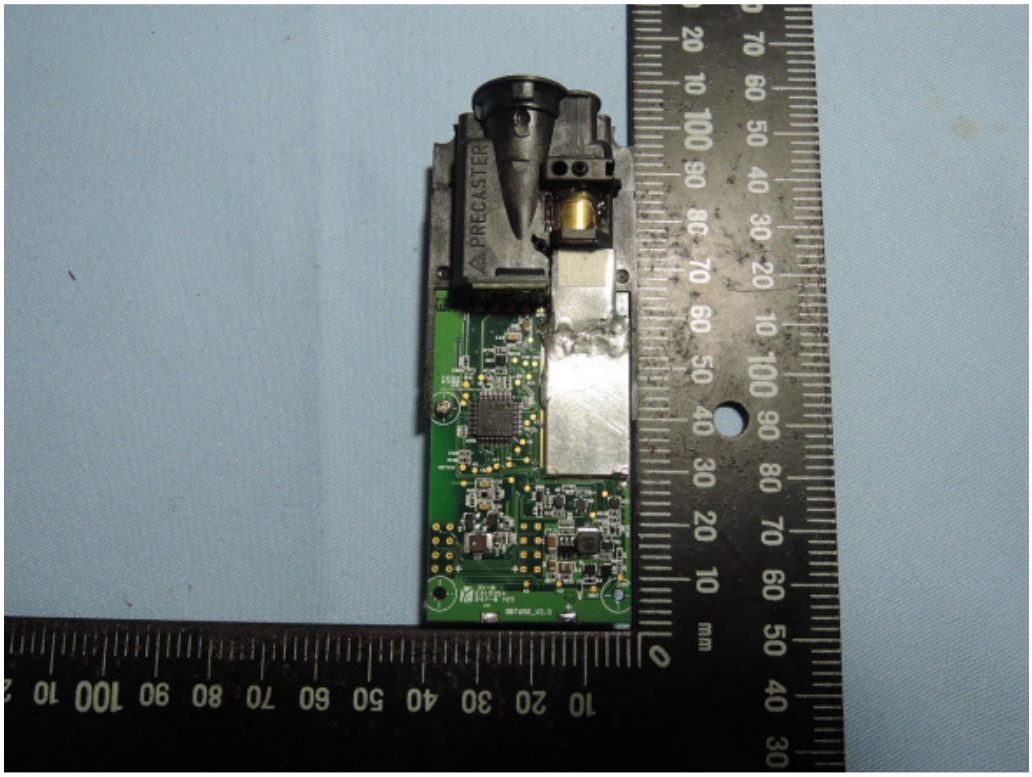

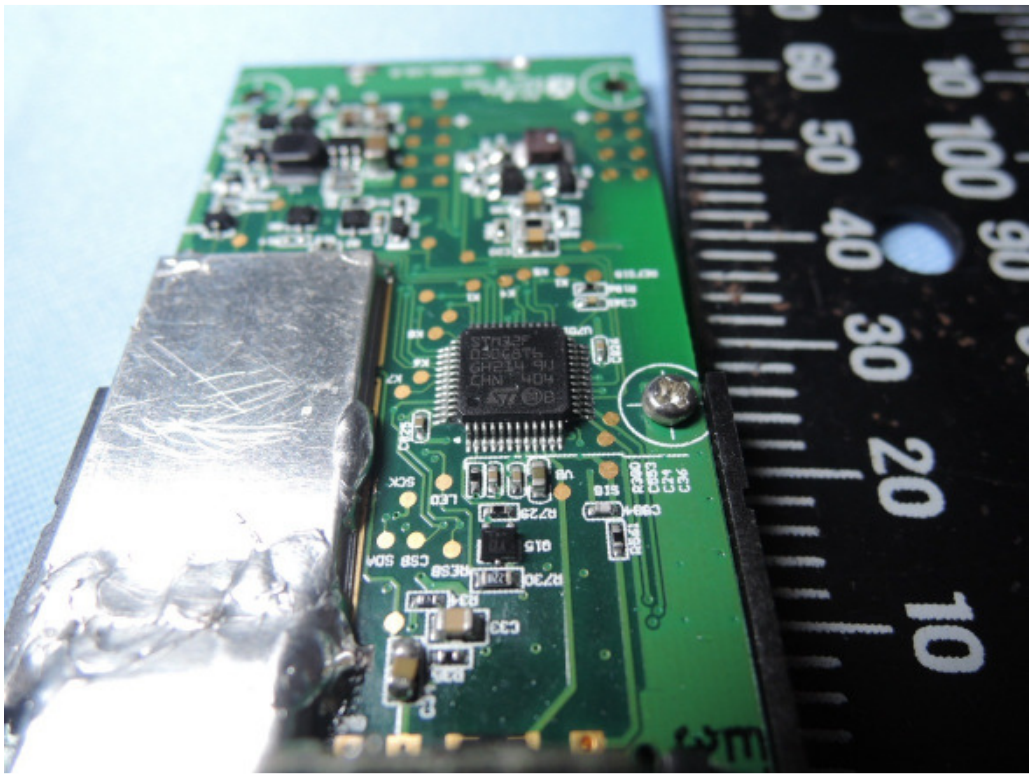

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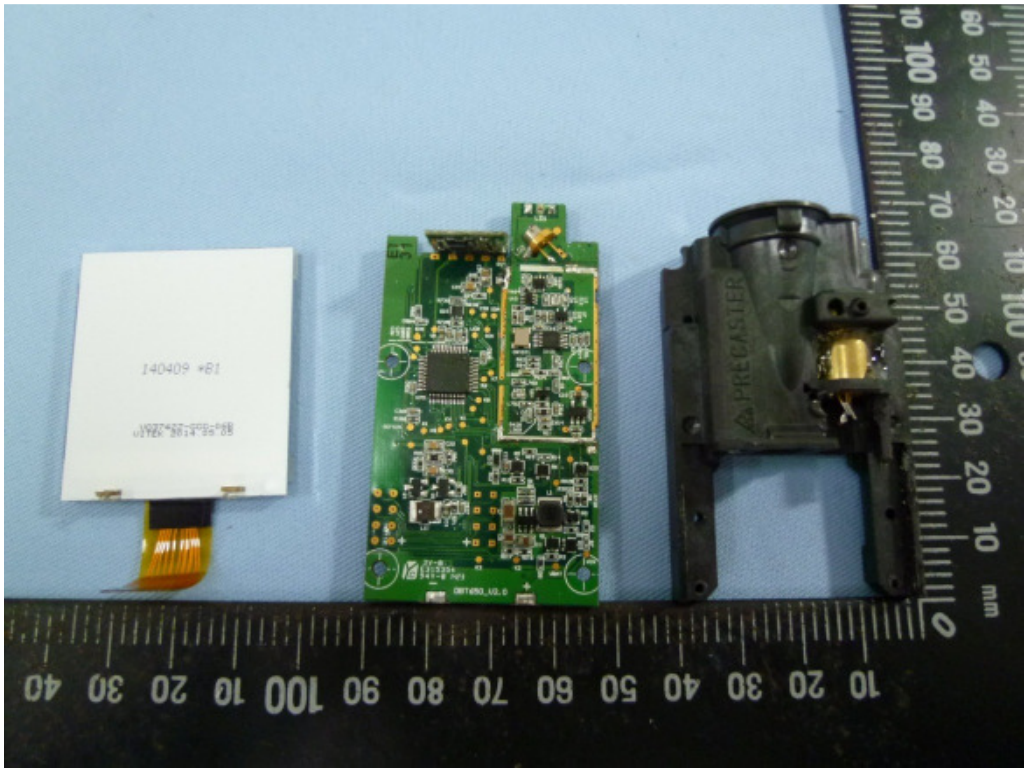

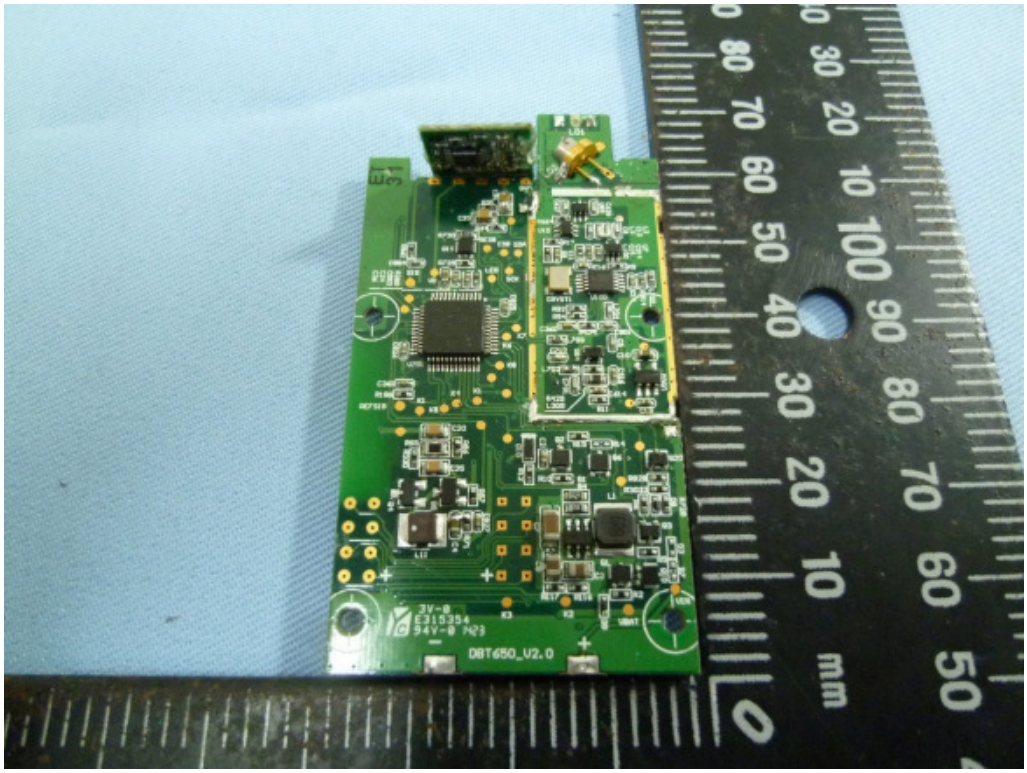

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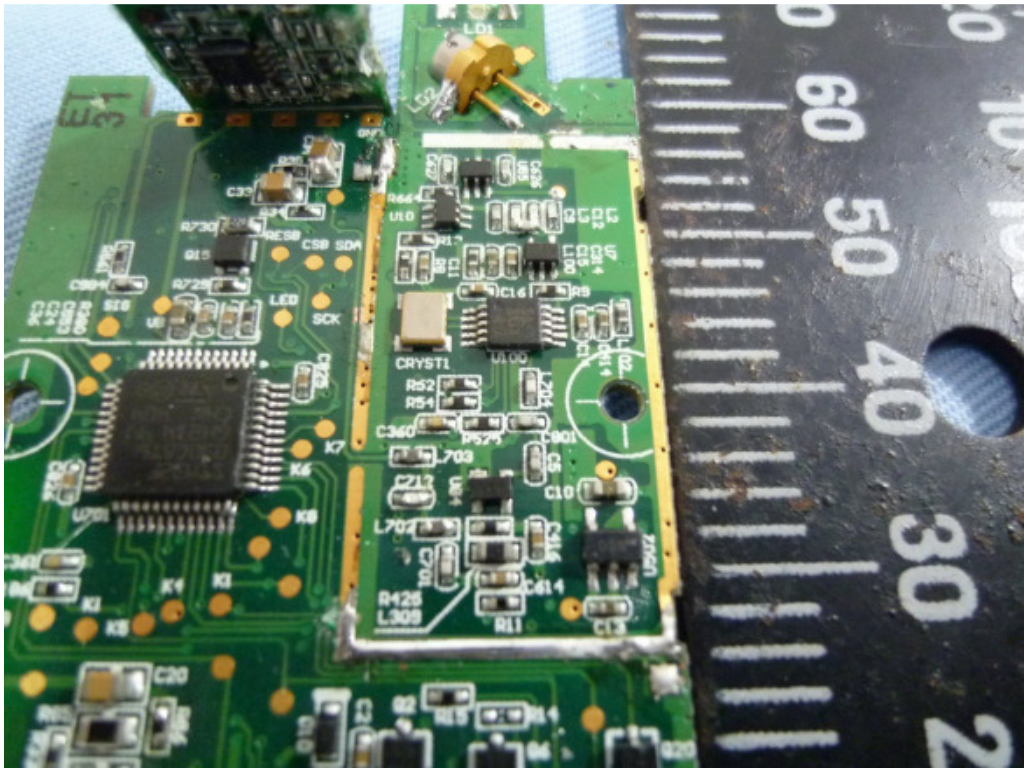

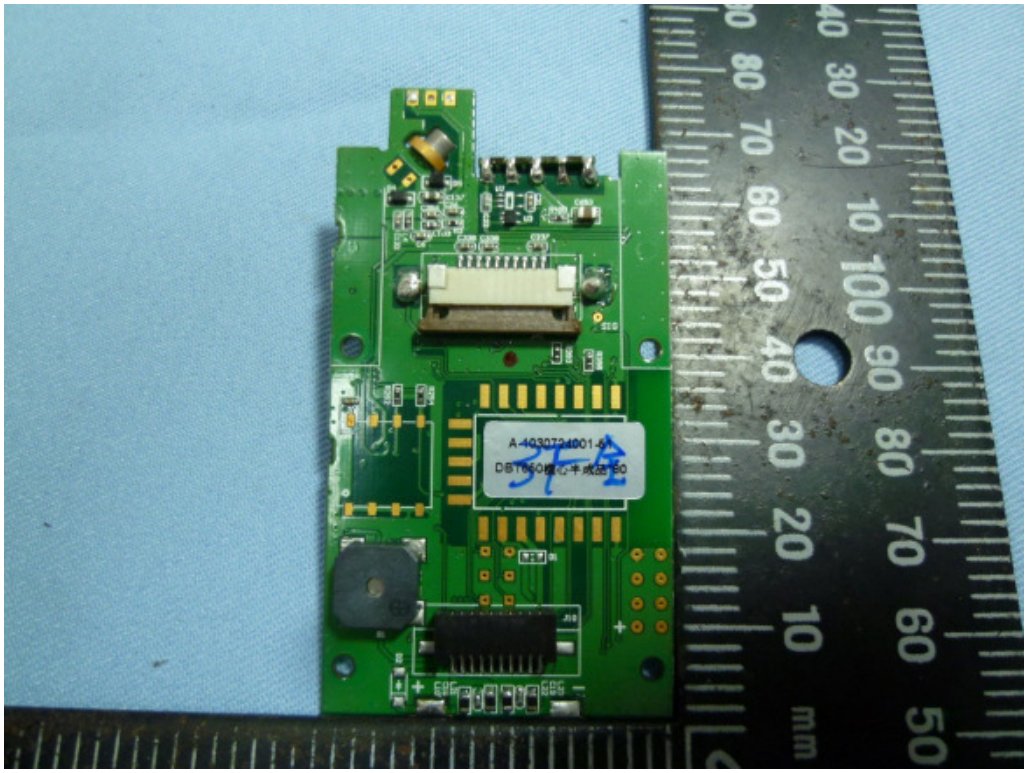

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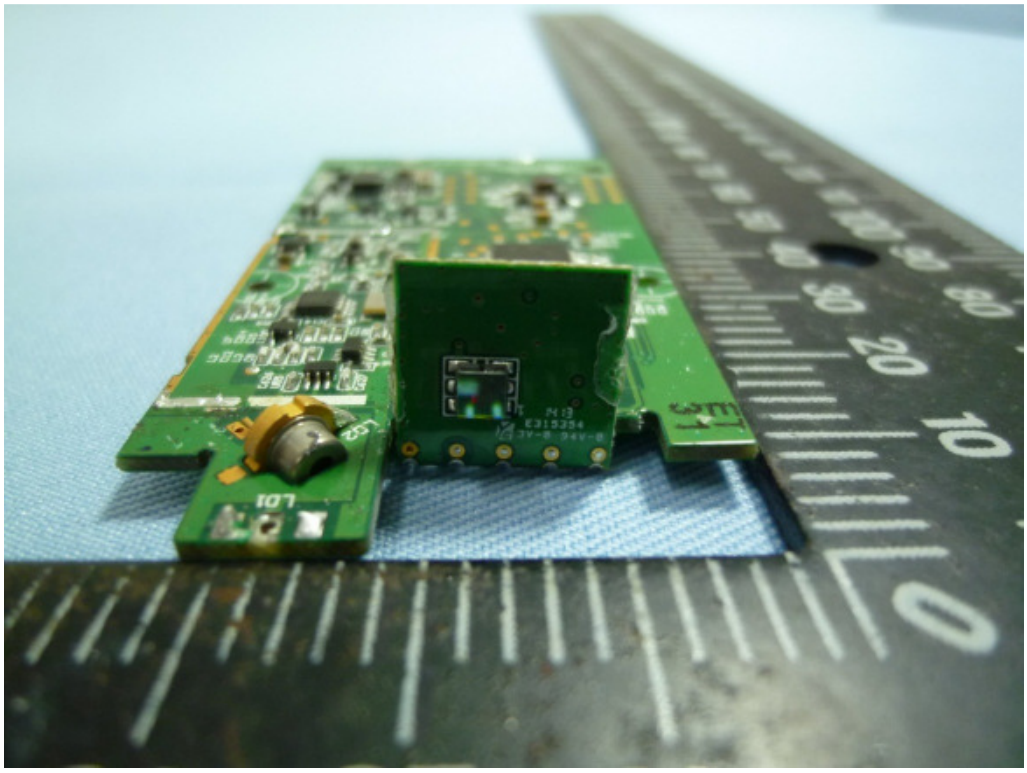
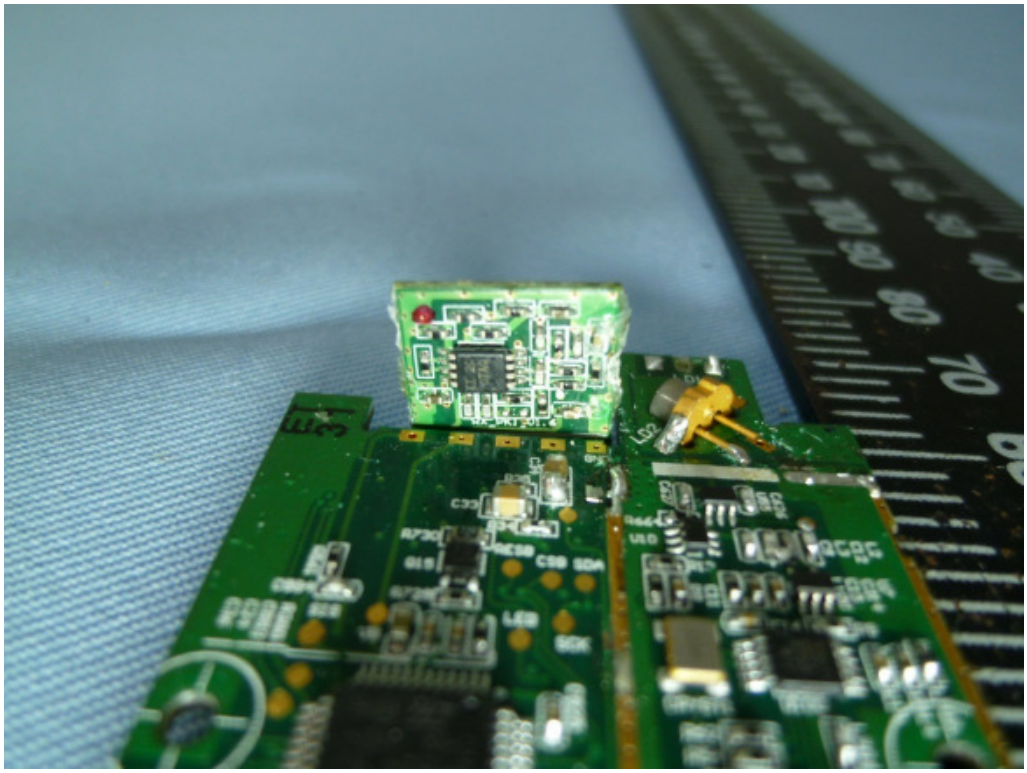
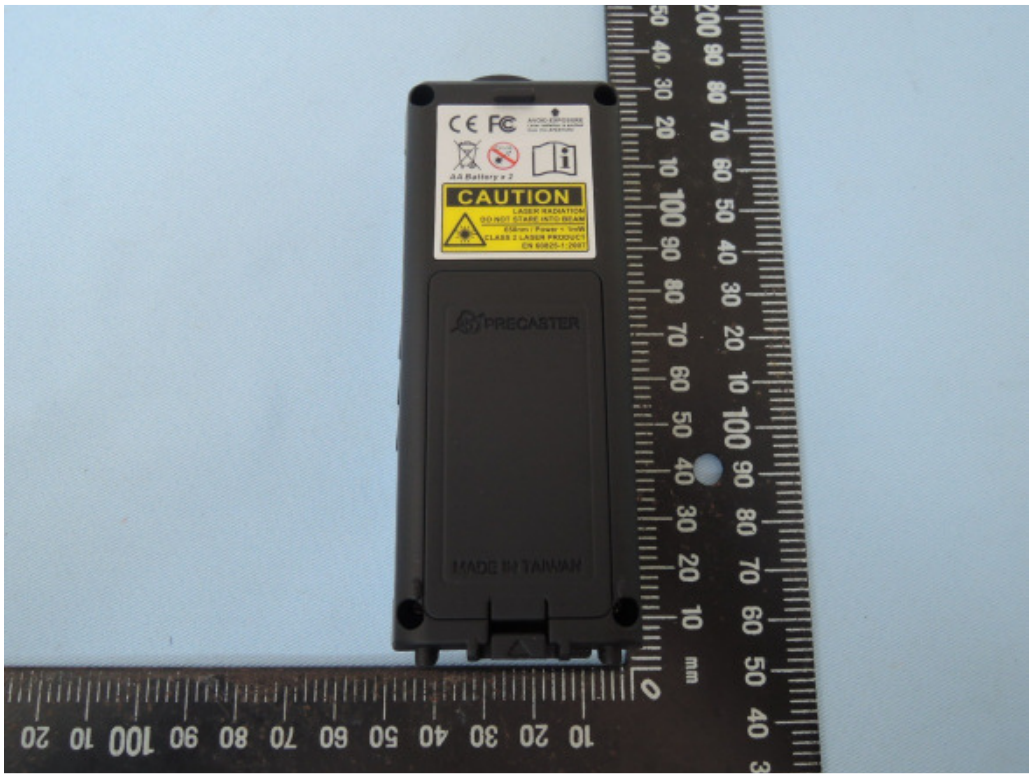




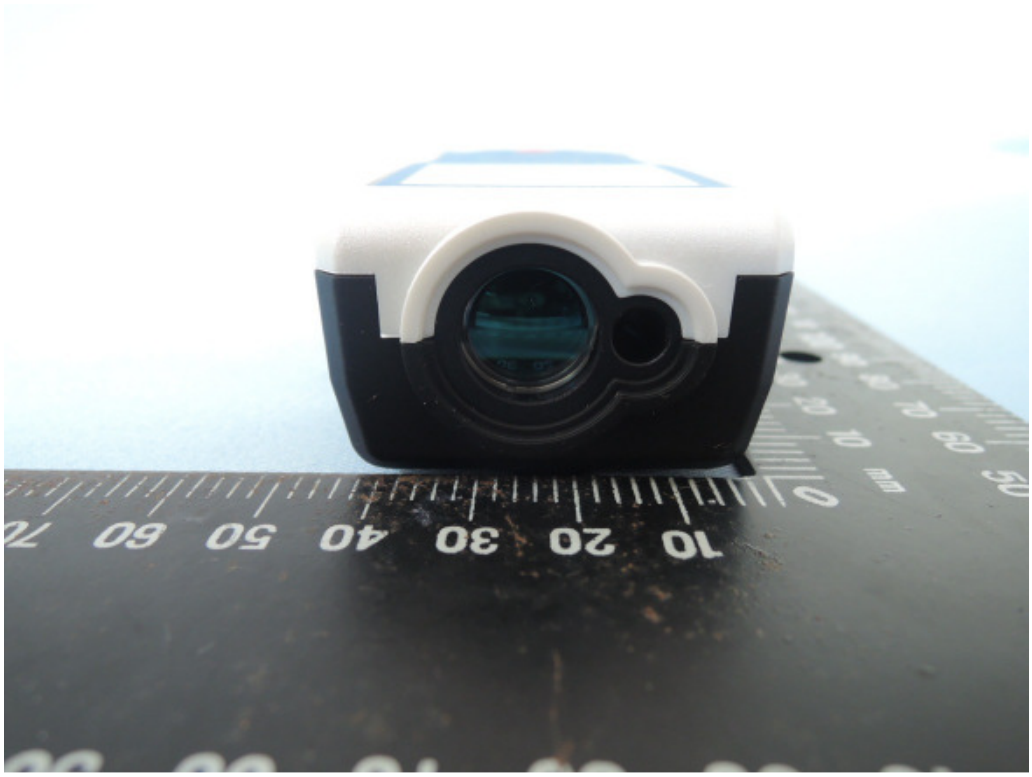
Product: Laser Distance Meter

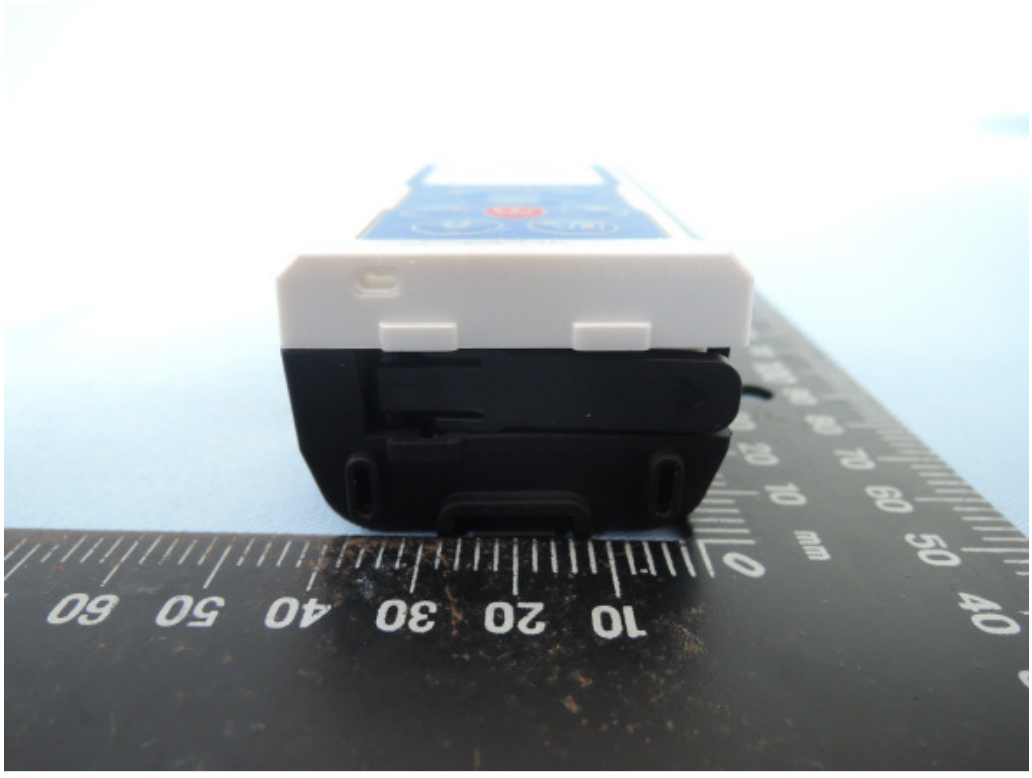
Type Designation: CA740



Product: Laser Distance Meter

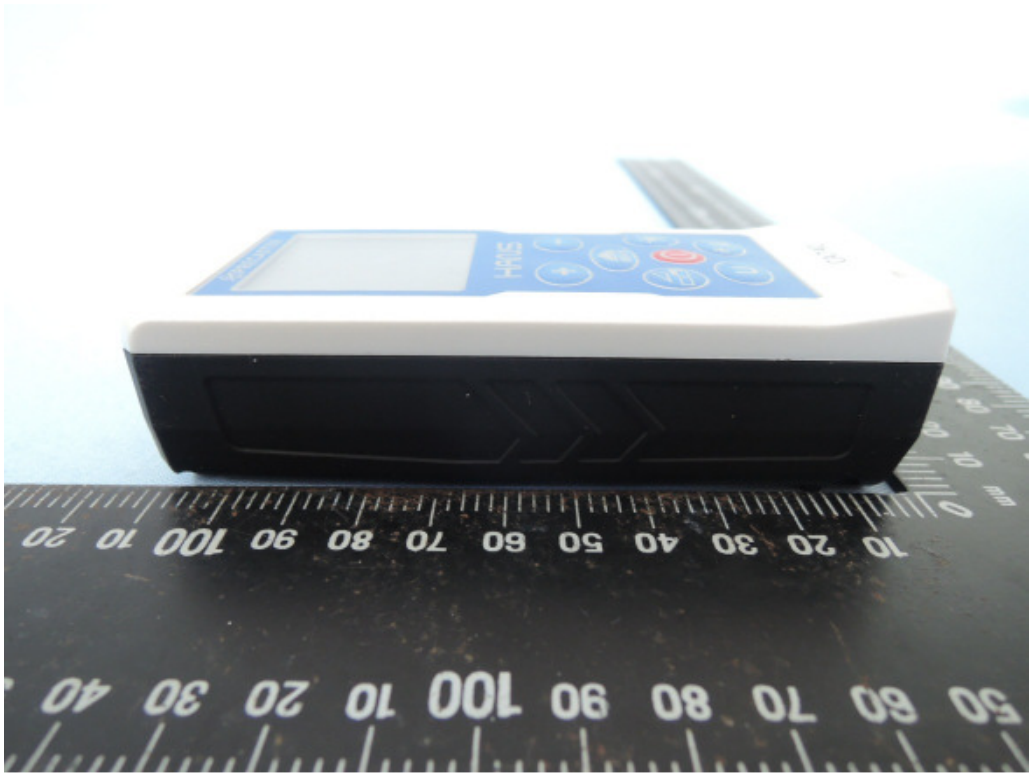
Type Designation: CA740

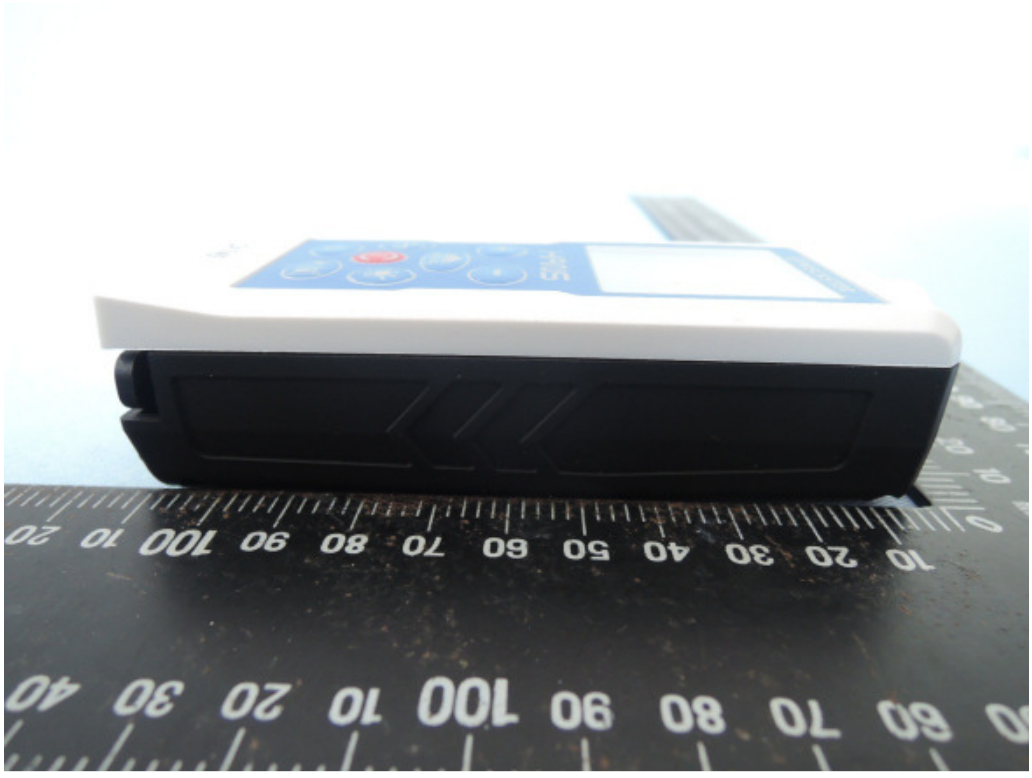




Product: Laser Distance Meter

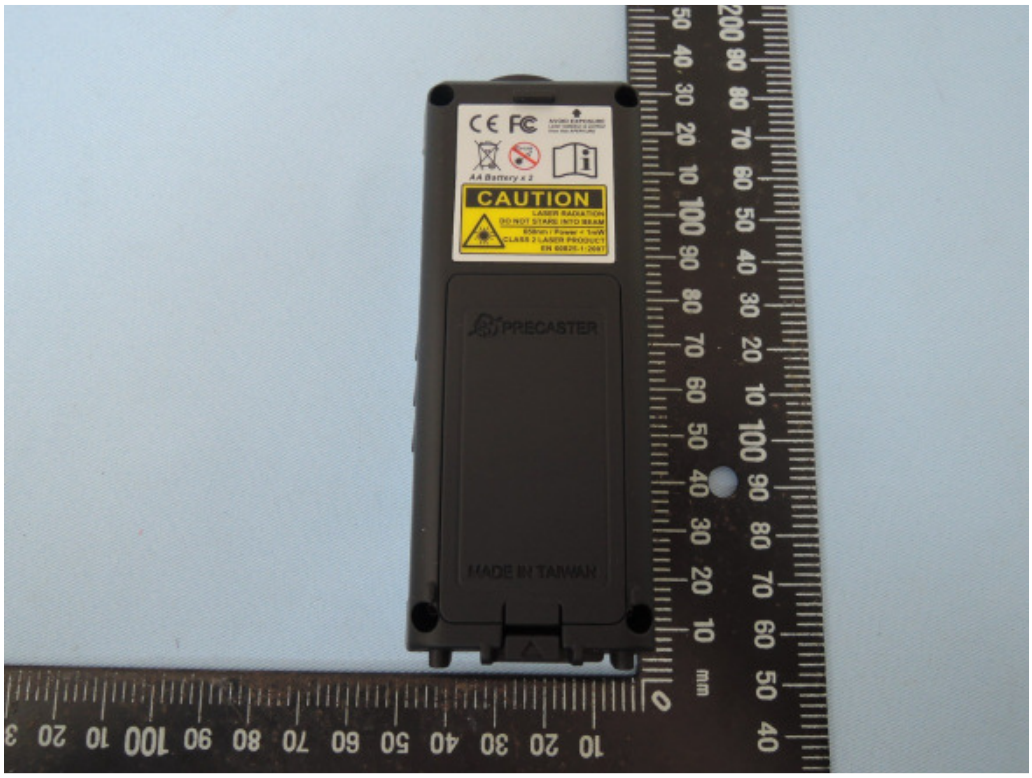
Type Designation: CA740





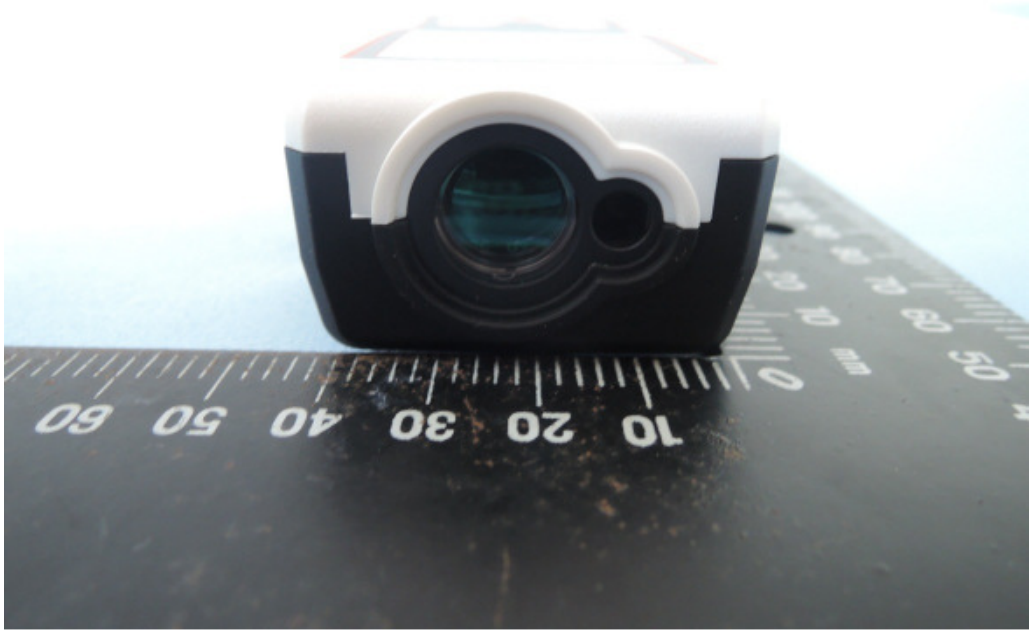
Product: Laser Distance Meter

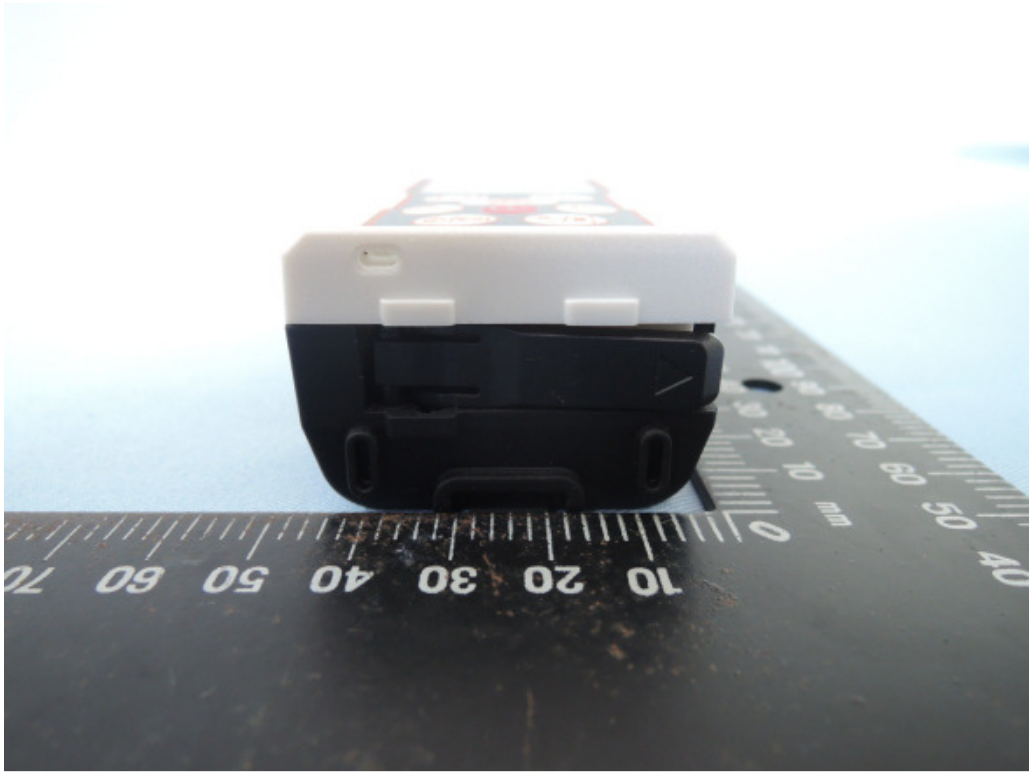
Type Designation: CA7100



Product: Laser Distance Meter

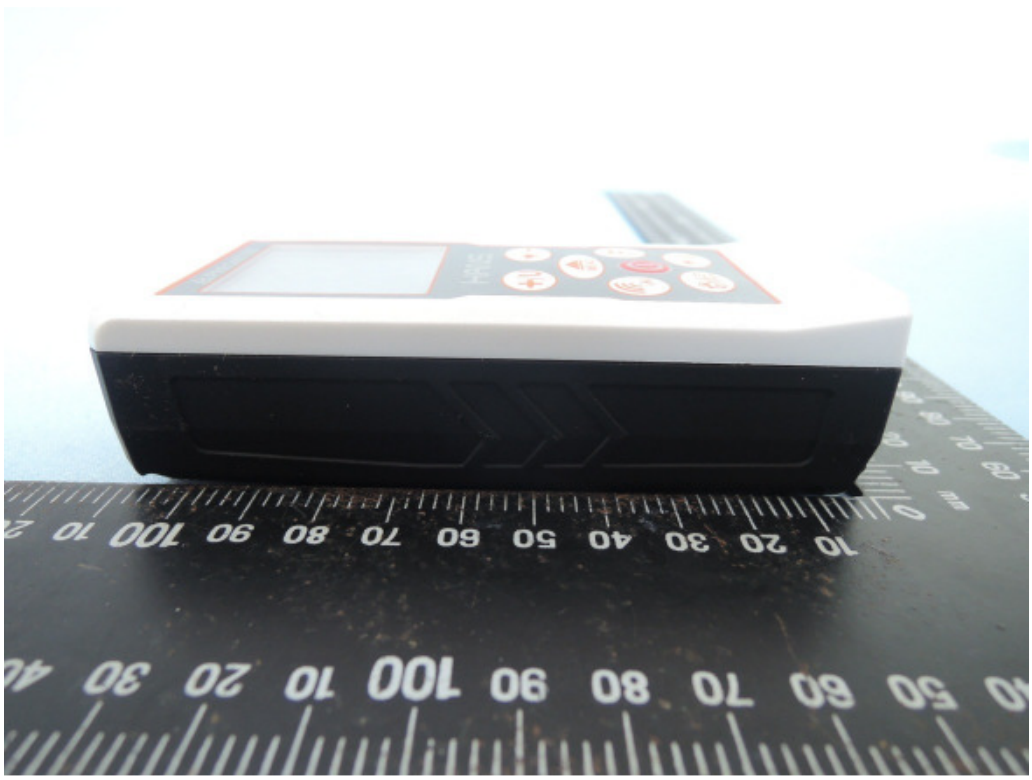
Type Designation: CA7100

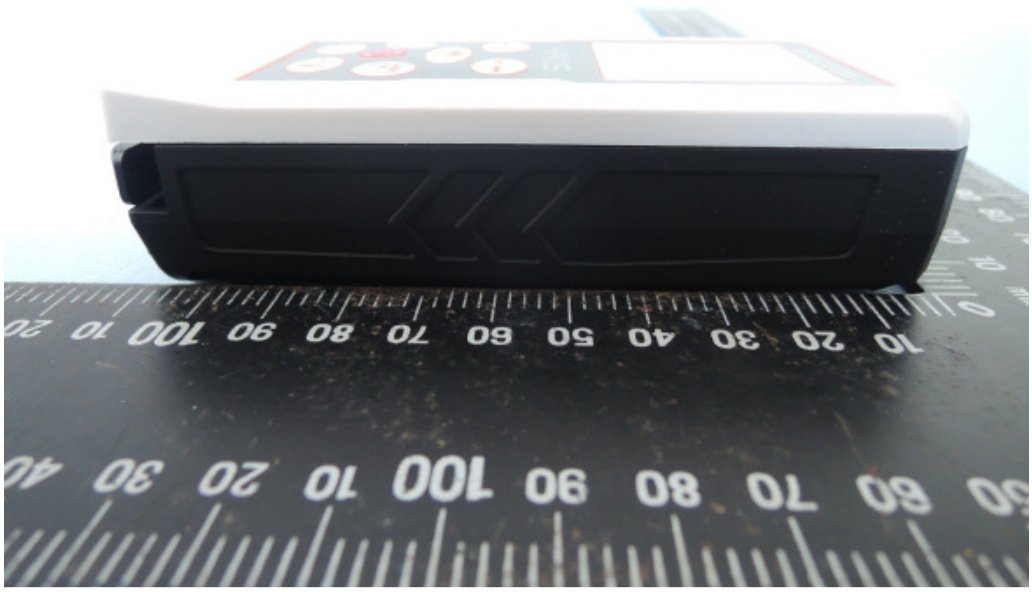




Product: Laser Distance Meter

Type Designation: CA7100



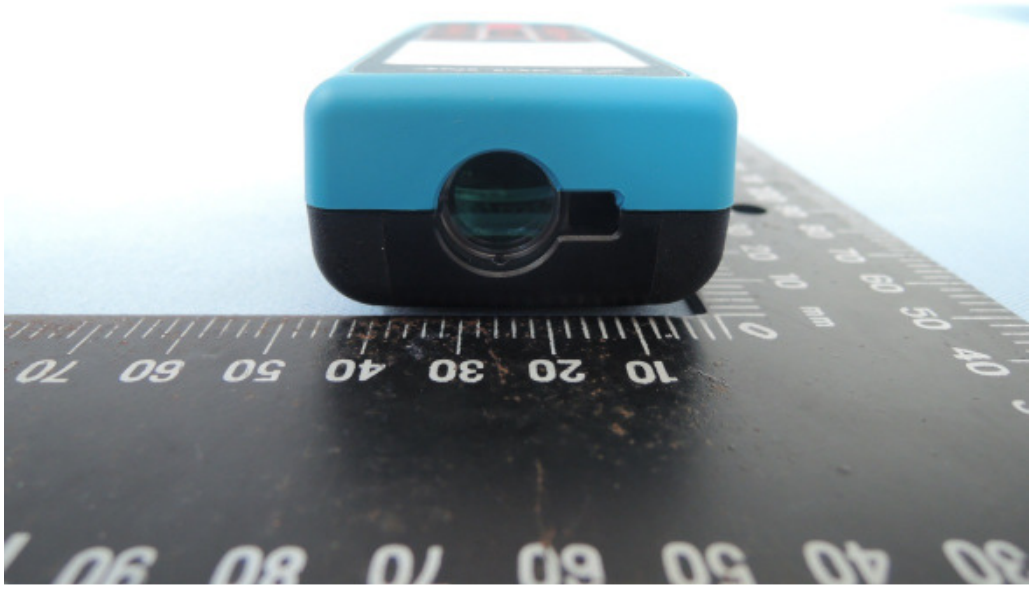


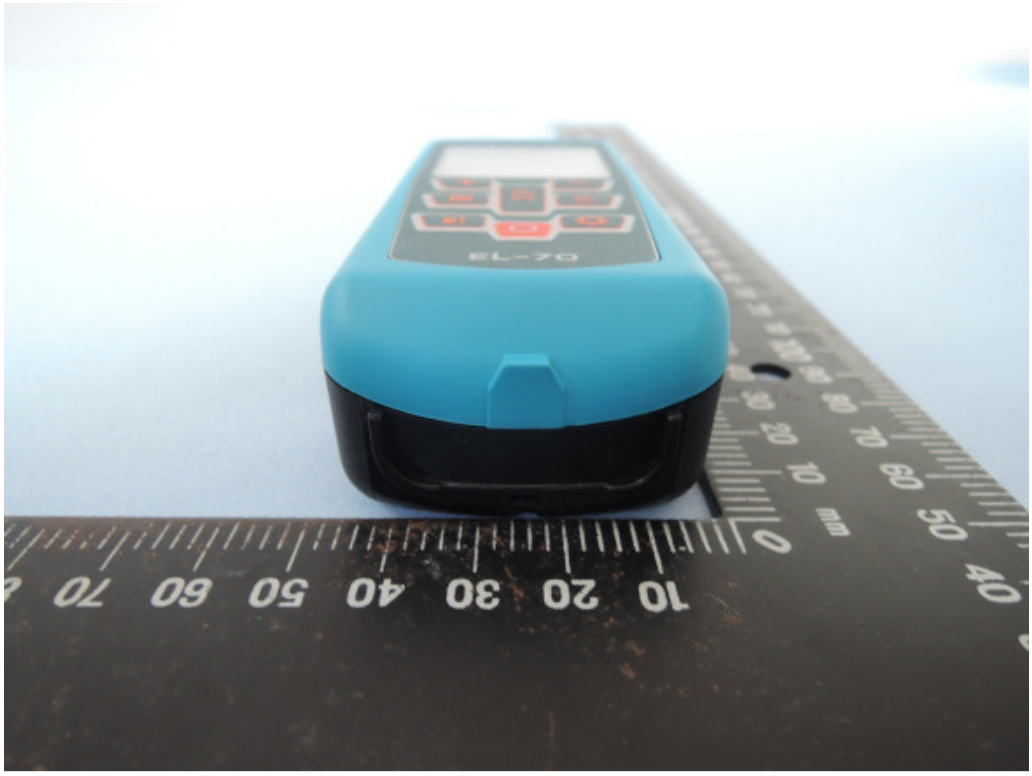
Product: Laser Distance Meter

Type Designation: EL70

Product: Laser Distance Meter

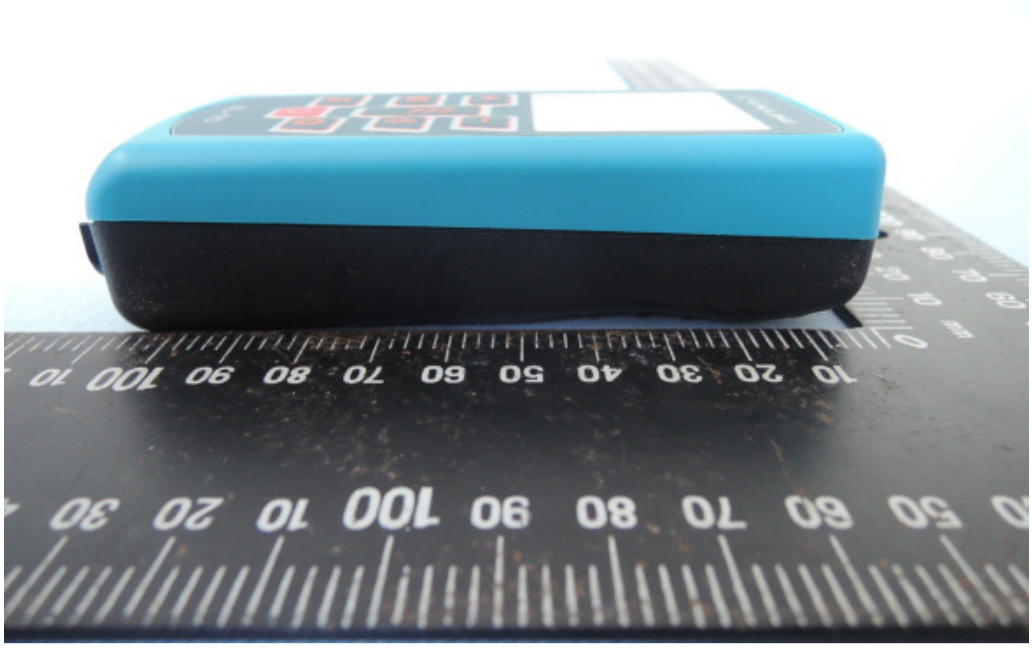
Type Designation: EL70





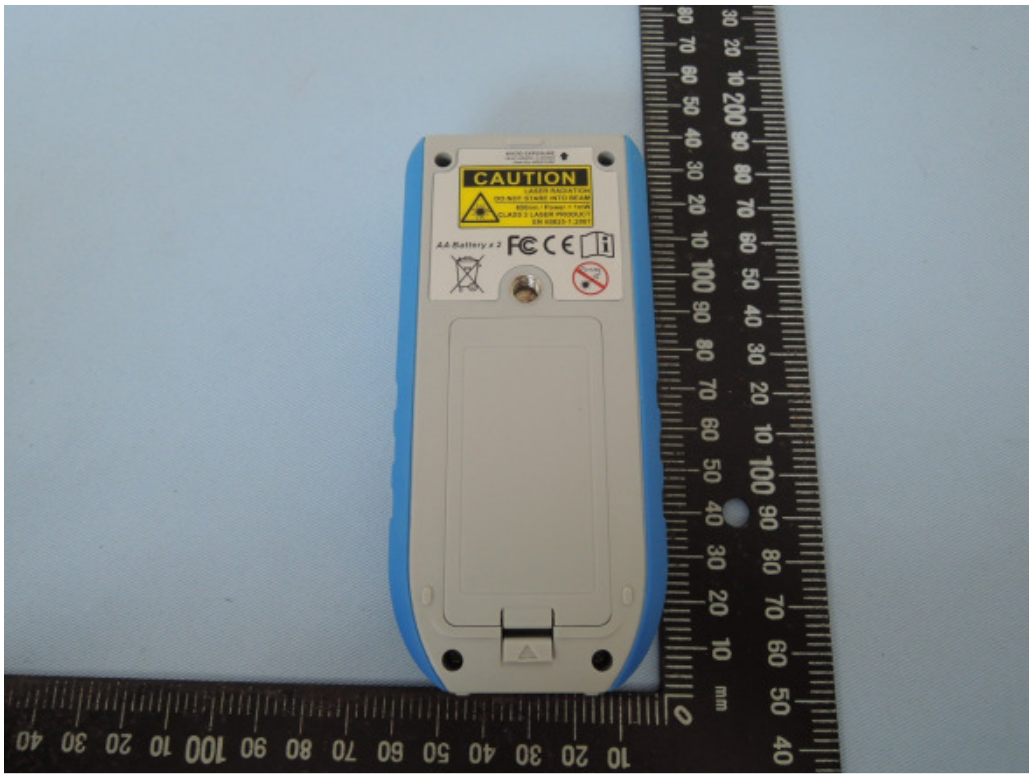
Product: Laser Distance Meter

Type Designation: EL70



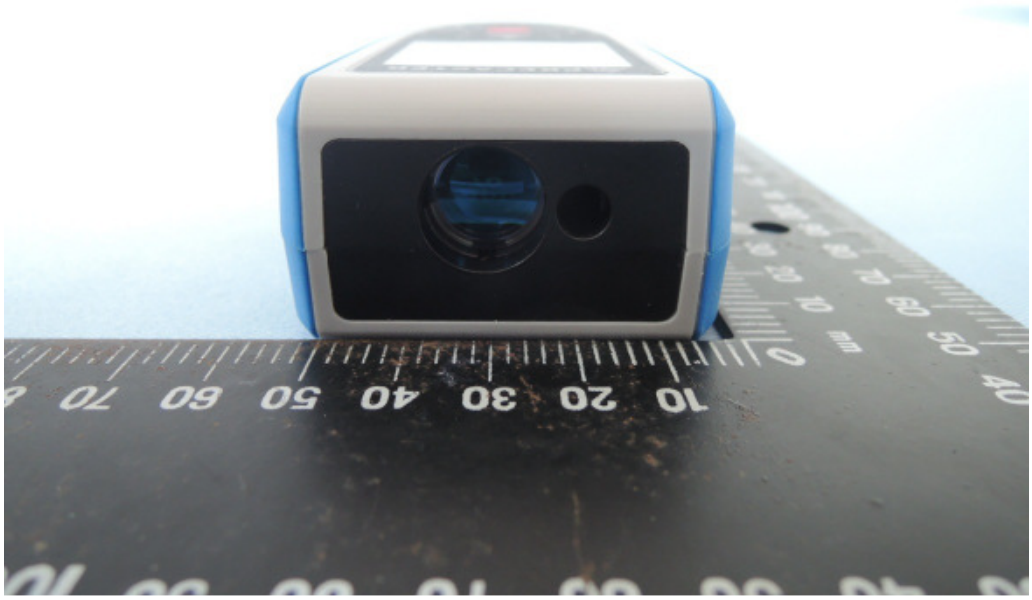
Product: Laser Distance Meter

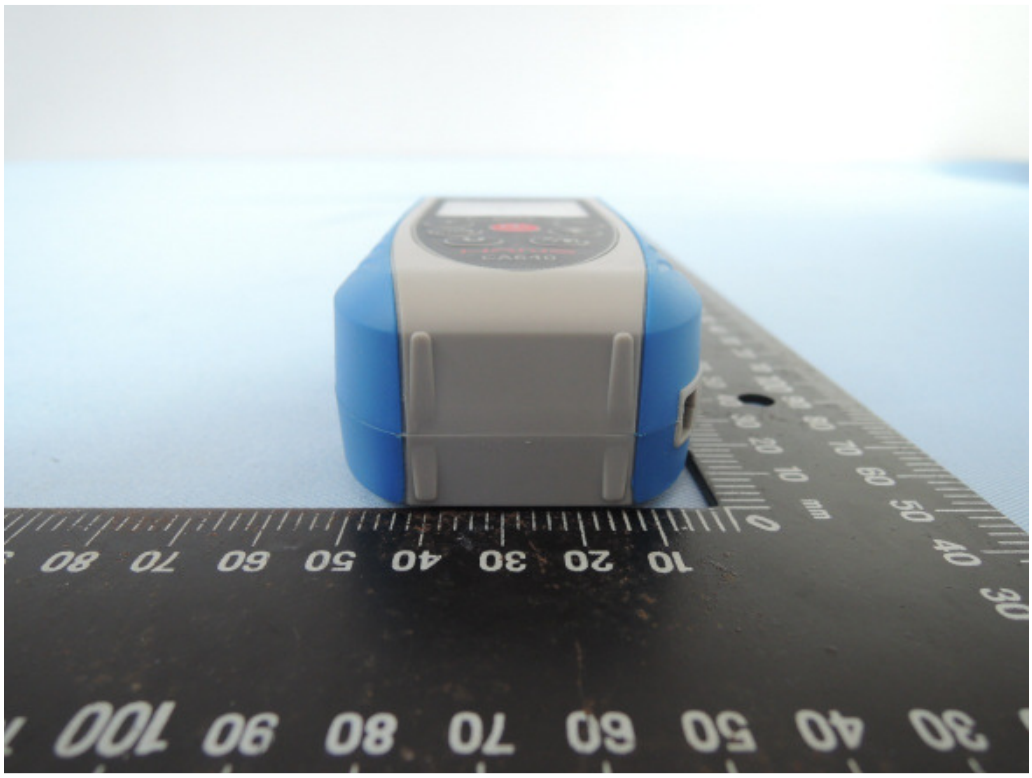
Type Designation: CA640



Product: Laser Distance Meter

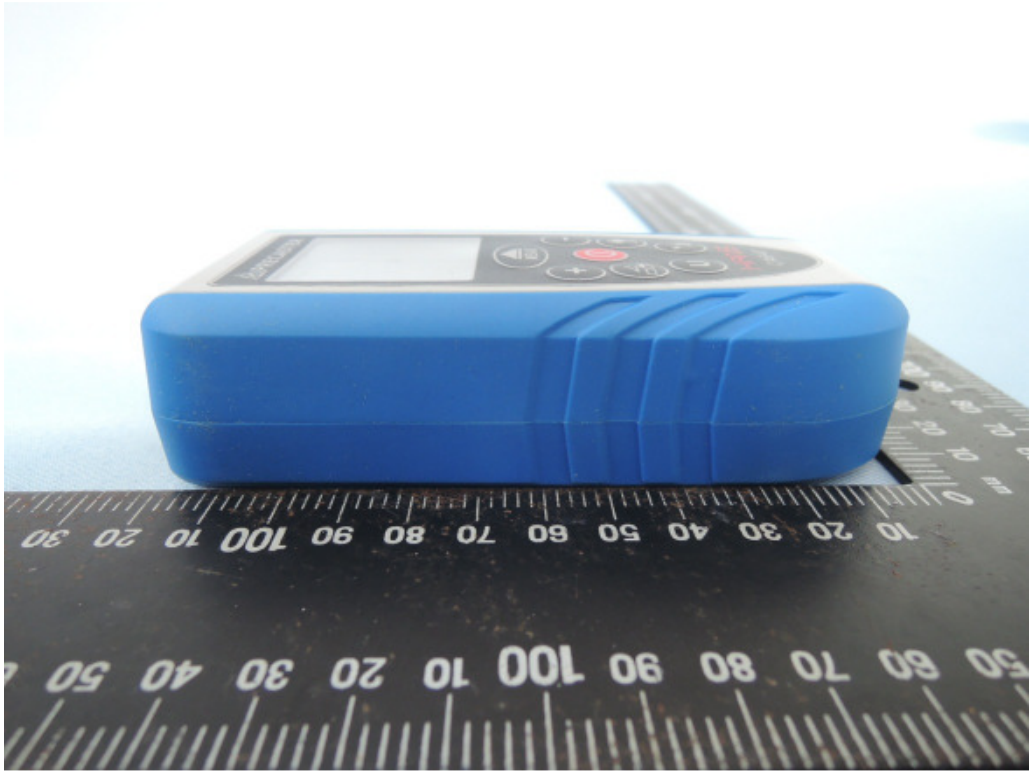
Type Designation: CA640

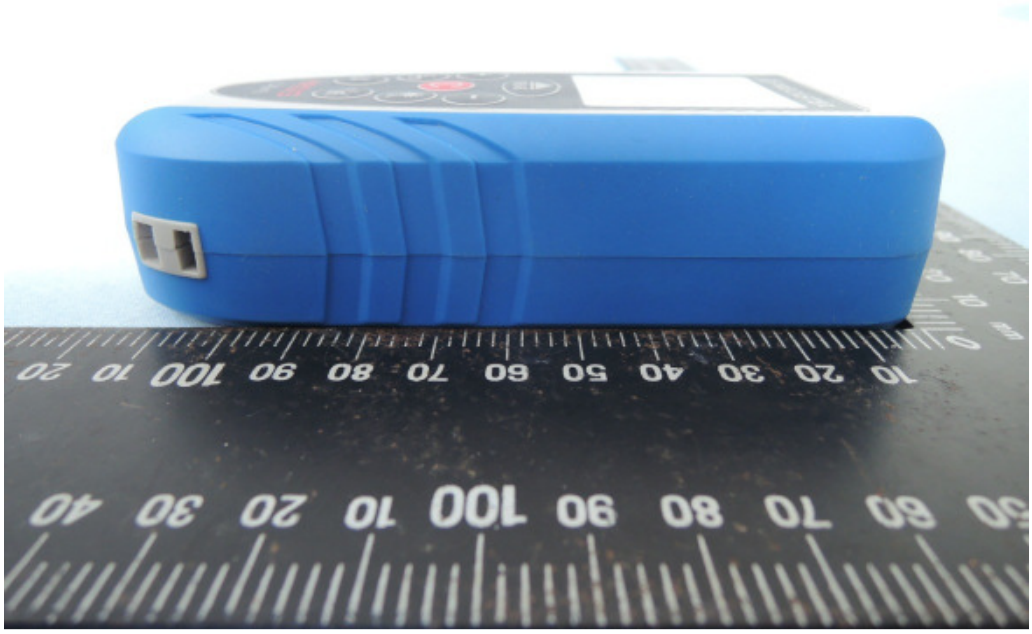




Product: Laser Distance Meter

Type Designation: CA640



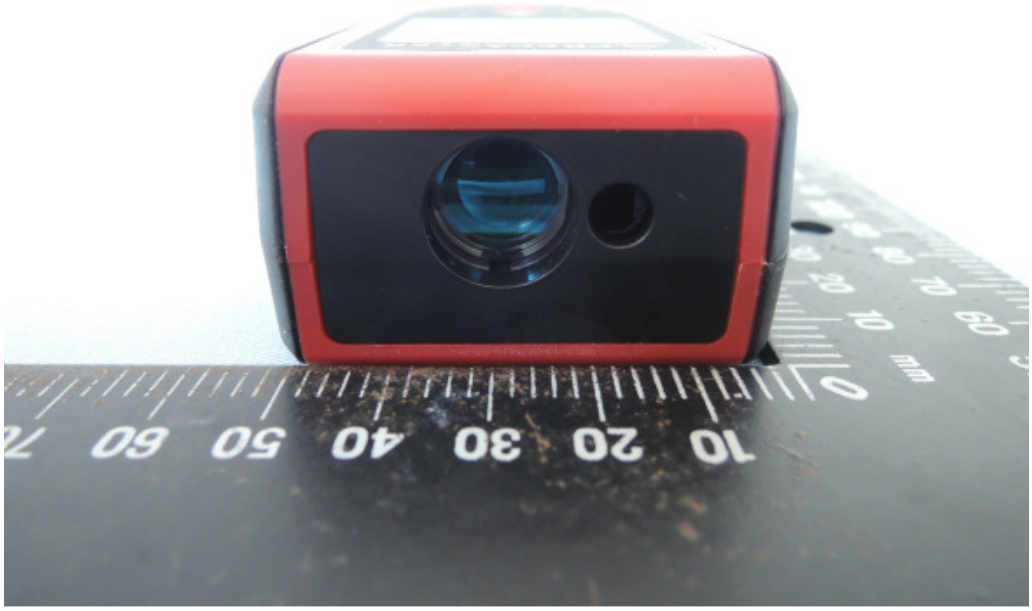


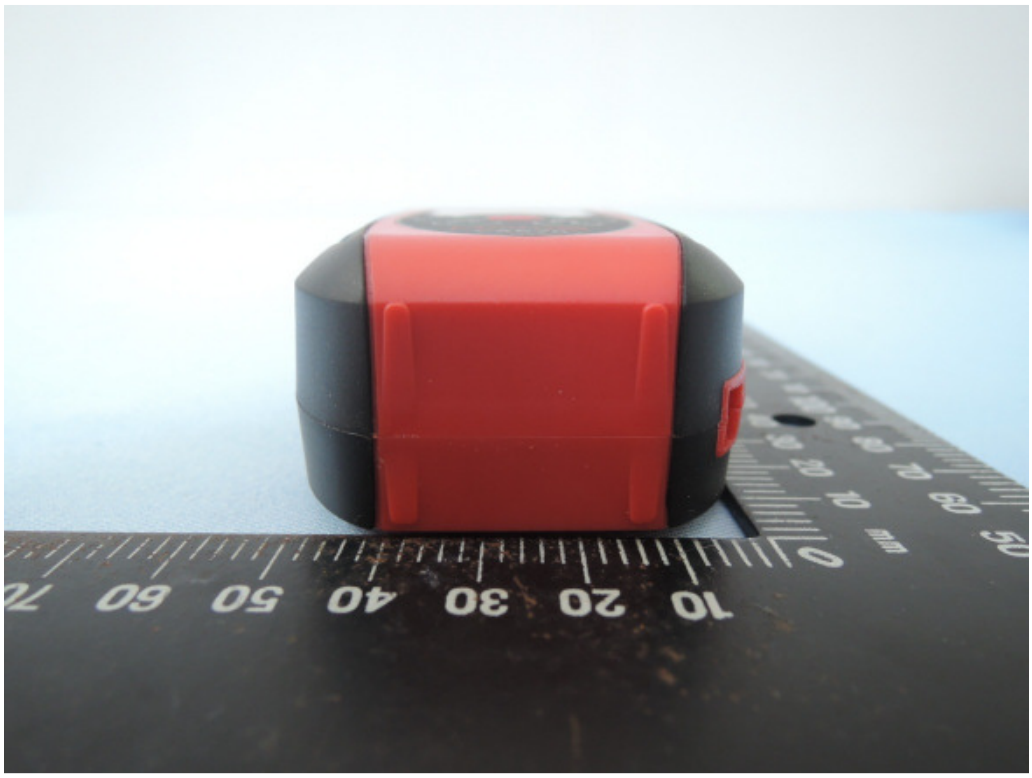
Product: Laser Distance Meter

Type Designation: CA670

Product: Laser Distance Meter

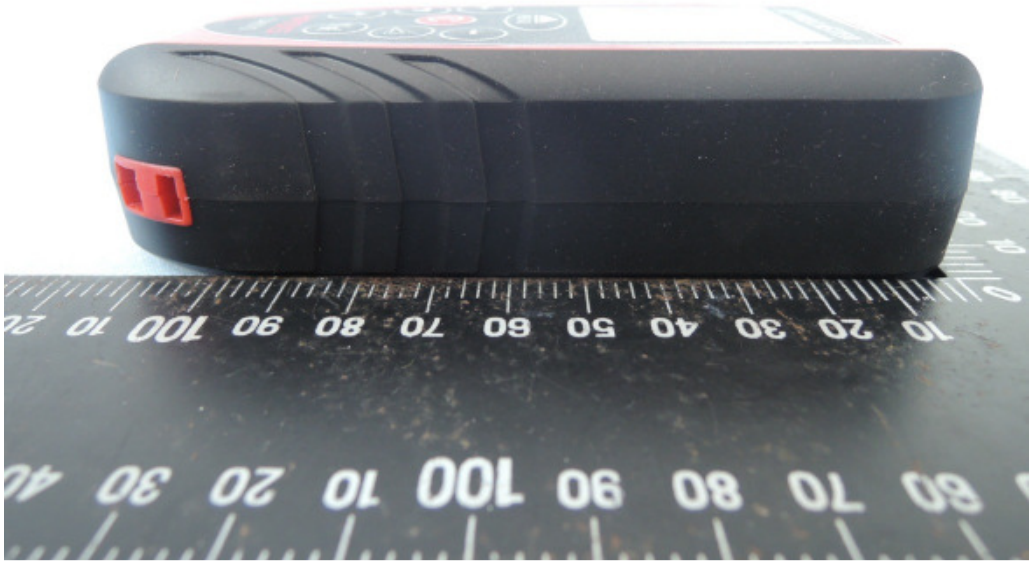
Type Designation: CA670





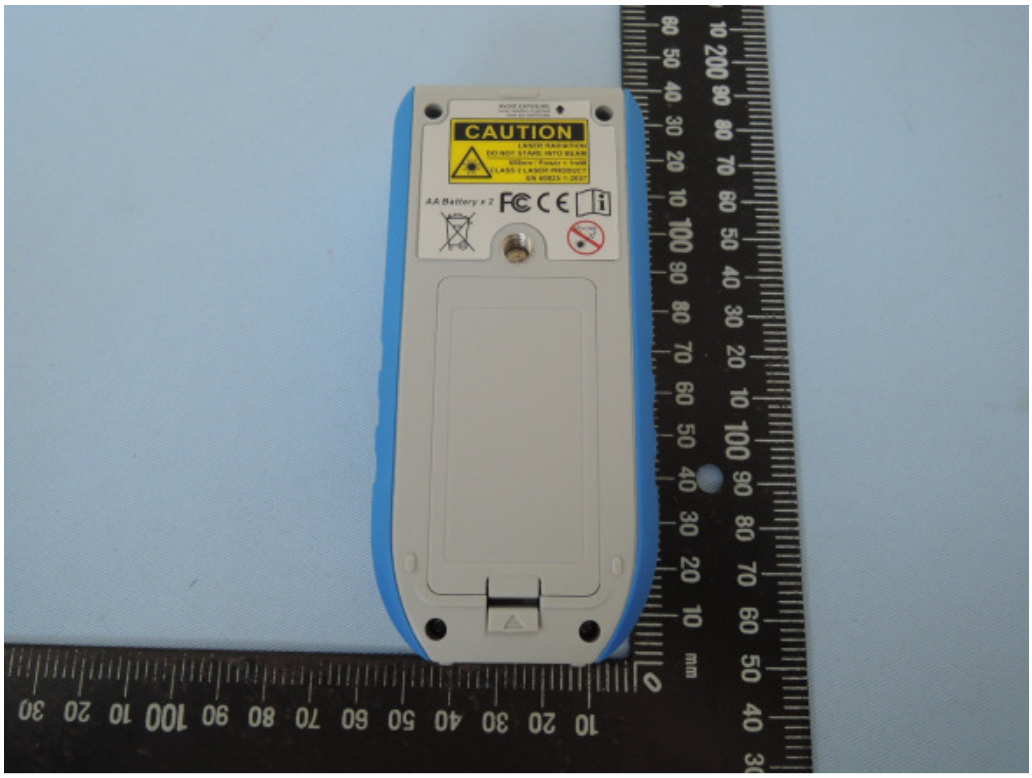
Product: Laser Distance Meter

Type Designation: CA670



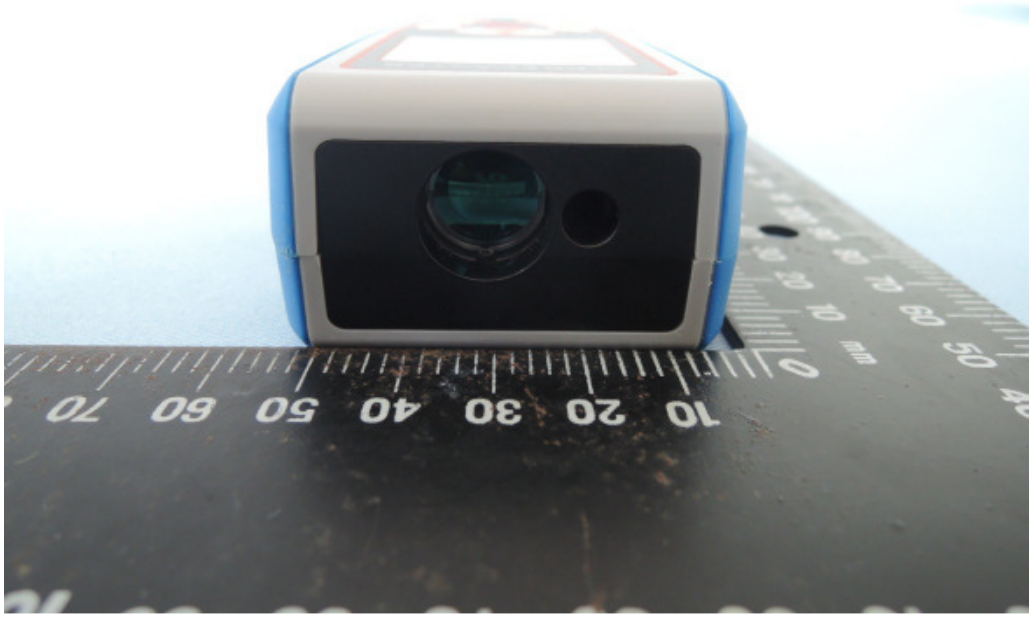
Product: Laser Distance Meter

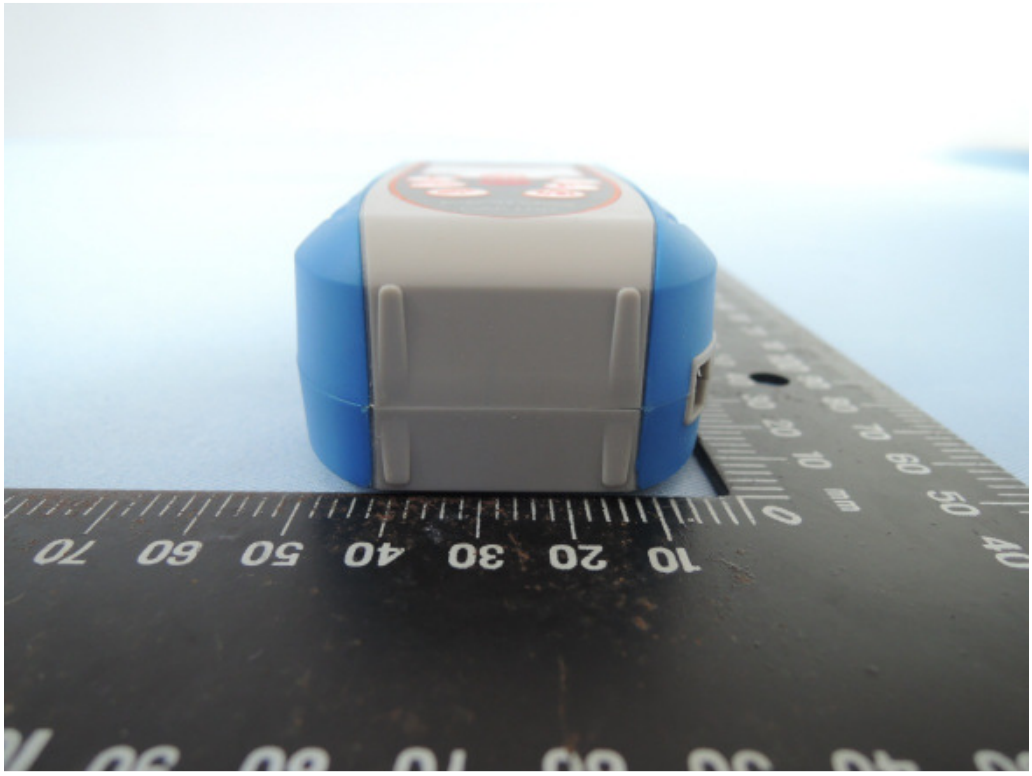
Type Designation: CA6100



Product: Laser Distance Meter

Type Designation: CA6100





Product: Laser Distance Meter

Type Designation: CA6100