

Declaration of Certifications for ViGiSense Sensors

CHINOTECH INTERNATIONAL LIMITED

Unit 803, Data Technology Hub
5 Chun Cheong Street,
TKO Industrial Estate,
Tseung Kwan O, N.T.
HKSAR

29th August, 2026

To whom it may concern,

We hereby declare that our listed products with are based on the hardware with of a solidstate light radar CS20, Raspberry Pi 4, and the LoRaWan Sensor Node AECIHWSNE2xx. The hardware are used in its original form without any modifications. Our contribution is limited to the addition of proprietary AI software, which does not alter the hardware design, function, or compliance characteristics.

As such, our product inherits all certifications and compliance approvals that apply to the hardware part number **CS20, Raspberry Pi 4 and AECIHWSNE2xx**. These include, but may not be limited to, FCC, CE, RoHS and those listed in Appendix I. Please refer to Appendix I for related certificates.

This declaration confirms that the certifications already granted to the above mentioned hardware remain valid and applicable to our product part number listed below.

Product Number included in this letter:

VGEL12HF03, VGEL13HF03, VGEL23HFD4, VGEL24HFD4, VGEL32HF03, VGEL33HF03, VGEL33HFD4, VGEL34HFD4.

Should you require further documentation or supporting evidence regarding the certifications, we will be pleased to provide them upon request.

Sincerely,



Chinotech International Limited

Appendix I



CERTIFICATE OF TYPE APPROVAL

類 型 檢 定 證 書

This is to certify that the equipment below has been evaluated and found to comply with the **HKCA1039 (Issue 6)** performance specification issued by the Communications Authority.

茲證明下述無線電訊設備已予鑑定，符合通訊事務管理局所發出的 **HKCA1039 (第六版)**效能規格。

Certificate Holder 證書持有人	: Raspberry Pi Trading LTD Maurice Wilkes Building, Cowley Road, Cambridge, CB4 0DS
Manufacturer 製造商	: Sony UK Technology
Brand Name 牌子	: Raspberry Pi
Type Number 型號	: Raspberry Pi 4 Model B
Trade Name 商用名稱	: Raspberry Pi 4
Category 類別	: 1) Wireless LAN Equipment 無線局部區域網絡設備 2) Radio Equipment Exempted from Licensing – Bluetooth 豁免領牌的無線電設備 – 藍牙
Type of Modulation 調制種類	: 1) WLAN: DSSS (DBPSK, DQPSK, CCK) OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 2) Bluetooth: GFSK, $\pi/4$ DQPSK, 8-DPSK

- R.F. Channel Separation : 1) WLAN: 5 MHz, 20 MHz, 40 MHz, 80 MHz
射頻頻道間距 2) Bluetooth: 1 MHz, 2 MHz
- R.F. Output Power : 1) WLAN: 17.00 dBm (e.i.r.p.) (2400.0 – 2483.5 MHz)
射頻輸出功率 17.20 dBm (e.i.r.p.) (5150.0 – 5350.0 MHz)
16.20 dBm (e.i.r.p.) (5470.0 – 5725.0 MHz)
15.60 dBm (e.i.r.p.) (5725.0 – 5850.0 MHz)
2) Bluetooth: 8.00 dBm (e.i.r.p.)
- Operating Frequency : 1) WLAN: 2400.0 – 2483.5 MHz, 5150 – 5350 MHz,
Range 5470.0 – 5725.0 MHz, 5725 – 5850MHz
操作頻率範圍 2) Bluetooth: 2400.0 – 2483.5 MHz

The issue of this Certificate is subject to the conditions stated overleaf.

本證書的發出受到背頁所列的條件規限。

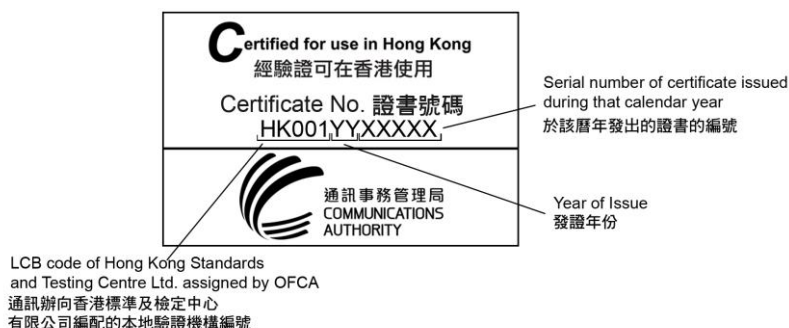
Date of Issue: 2019-06-28
發證日期: 二零一九年六月二十八日



Dr. LEE Kam Chuen,
Authorized Signatory, for and on behalf of
The Hong Kong Standards and Testing Centre Ltd.
(Local Certification Body accredited under section 32E of
the Telecommunications Ordinance, Hong Kong SAR)

CONDITIONS

1. The certificate holder is agreed to abide by the Regulations for Scheme on Certification of Telecommunications Equipment and Industrial, Scientific and Medical (ISM) Equipment by the Local Certification Bodies (“LCB Scheme”) as set forth and amended from time to time by The Hong Kong Standards and Testing Centre Ltd.
2. Prior approval from The Hong Kong Standards and Testing Centre Ltd. is required for any alteration in Model No. / Brand Name or other particulars for this equipment.
3. No electrical or mechanical change shall be made to this equipment without prior approval from The Hong Kong Standards and Testing Centre Ltd.
4. The Hong Kong Standards and Testing Centre Ltd. reserves the right to call for additional samples of the equipment marketed for testing against the Communications Authority’s specifications.
5. This certificate may be withdrawn if the equipment marketed is found not meeting the technical specification(s) prescribed by the Communications Authority of Hong Kong or any of the conditions on this certificate is breached.
6. The certificate holder shall perform remedial actions or recall the certified equipment marketed in Hong Kong as may be required by The Hong Kong Standards and Testing Centre Ltd. or the Communications Authority of Hong Kong if they are found not meeting the prescribed technical or safety requirements.
7. The Communications Authority retains all authority under the law to interpret, implement and enforce the relevant technical regulations governing telecommunications equipment, as well as industrial, scientific and medical equipment emitting radio frequency energy intentionally, which is for use or sale in Hong Kong.
8. The grantee of this certificate allows the Office of the Communications Authority to publish the relevant technical information on its website.
9. This certificate may be withdrawn and all the marketed equipment may be recalled if the equipment is a customer premises equipment and generates connection problems in the Hong Kong public telecommunications network.
10. Product certification system is Type 1a as defined in ISO/IEC 17067:2013. Certification is based on the “Scheme on Certification of Telecommunications Equipment and Industrial, Scientific and Medical (ISM) Equipment by the Local Certification Body (LCB Scheme), OFCA I 426(14) Issue 3”.
11. The equipment certified can be voluntarily identified by a label in a format stipulated in the HKCA3211 – Standardisation Guide for Labelling of Telecommunications Equipment. Manufacturers, suppliers or dealers can affix a label as shown below to the equipment or to the packing materials on a voluntary basis. (Note: The Hong Kong Standards and Testing Centre Ltd. does not own the proprietary right of the label nor do we have the authority to interpret the requirements in that HKCA Guide. For avoidance of doubt, the aforesaid label is prescribed by the Communications Authority.)



----- END -----



CERTIFICATE OF TYPE APPROVAL 類 型 檢 定 證 書

This is to certify that the equipment below has been evaluated and found to comply with the **HKCA1078 (Issue 1)** performance specification issued by the Communications Authority.

茲證明下述設備已予鑑定，符合通訊事務管理局所發出的 **HKCA1078 (第一版)** 效能規格。

Certificate Holder 證書持有人	: Enlighten Company Limited Rm 12, 12/F, Blk A, Profit Industrial Building, No.1-15 Kwai Fung Crescent, Kwai Chung, N.T., Hong Kong
Manufacturer 製造商	: Enlighten Company Limited
Brand Name 牌子	: ChinoINT
Type Number 型號	: AECIHWSNE2xx
Category 類別	: Wireless IoT Radio Equipment 無線物聯網器材
Type of Modulation 調制種類	: FSK, GFSK
R.F. Channel Separation 射頻頻道間距	: 375 kHz
R.F. Output Power 射頻輸出功率	: 7.65 dBm (e.i.r.p.)
Operating Frequency Range 操作頻率範圍	: 920.0 – 925.0 MHz

The issue of this Certificate is subject to the conditions stated overleaf.

本證書的發出受到背頁所列的條件規限。

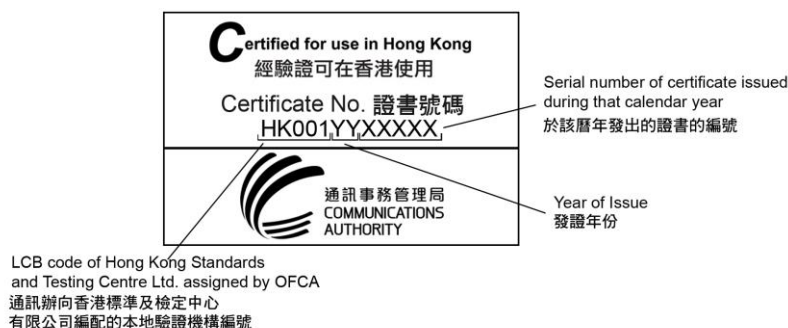


Date of Issue: 2021-07-12
發證日期: 二零二一年七月十二日

Dr. LEE Kam Chuen,
Authorized Signatory, for and on behalf of
The Hong Kong Standards and Testing Centre Ltd.
(Local Certification Body accredited under section 32E of
the Telecommunications Ordinance, Hong Kong SAR)

CONDITIONS

1. The certificate holder is agreed to abide by the Regulations for Scheme on Certification of Telecommunications Equipment and Industrial, Scientific and Medical (ISM) Equipment by the Local Certification Bodies (“LCB Scheme”) as set forth and amended from time to time by The Hong Kong Standards and Testing Centre Ltd.
2. Prior approval from The Hong Kong Standards and Testing Centre Ltd. is required for any alteration in Model No. / Brand Name or other particulars for this equipment.
3. No electrical or mechanical change shall be made to this equipment without prior approval from The Hong Kong Standards and Testing Centre Ltd.
4. The Hong Kong Standards and Testing Centre Ltd. reserves the right to call for additional samples of the equipment marketed for testing against the Communications Authority’s specifications.
5. This certificate may be withdrawn if the equipment marketed is found not meeting the technical specification(s) prescribed by the Communications Authority of Hong Kong or any of the conditions on the certificate is breached.
6. The certificate holder shall perform remedial actions or recall the certified equipment marketed in Hong Kong as may be required by The Hong Kong Standards and Testing Centre Ltd. or the Communications Authority of Hong Kong if they are found not meeting the prescribed technical or safety requirements.
7. The Communications Authority retains all authority under the law to interpret, implement and enforce the relevant technical regulations governing telecommunications equipment, as well as industrial, scientific and medical equipment emitting radio frequency energy intentionally, which is for use or sale in Hong Kong.
8. The grantee of this certificate allows the Office of the Communications Authority to publish the relevant technical information on its website.
9. This certificate may be withdrawn and all the marketed equipment may be recalled if the equipment is a customer premises equipment and generates connection problems in the Hong Kong public telecommunications network.
10. Product certification system is Type 1a as defined in ISO/IEC 17067:2013. Certification is based on the “Scheme on Certification of Telecommunications Equipment and Industrial, Scientific and Medical (ISM) Equipment by the Local Certification Body (LCB Scheme), OFCA I 426(20) Issue 4”.
11. The equipment certified can be voluntarily identified by a label in a format stipulated in the HKCA3211 – Standardisation Guide for Labelling of Telecommunications Equipment. Manufacturers, suppliers or dealers can affix a label as shown below to the equipment or to the packing materials on a voluntary basis. (Note: The Hong Kong Standards and Testing Centre Ltd. does not own the proprietary right of the label nor do we have the authority to interpret the requirements in that HKCA Guide. For avoidance of doubt, the aforesaid label is prescribed by the Communications Authority).



----- END -----

FEDERAL COMMUNICATIONS COMMISSION

Accredited Registration number: 486818

Designation Number: CN5016

FCC-Supplier's Declaration of Conformity(SDoC)

Verification No.: GZEM2111006861ATV

This verification that the following designated product

Product Description: CS20

Model: CS20

(Product Identification)

It is herewith confirmed and found to comply with the requirements set up by ANSI C63.4 & 47 CFR PART 15 regulations for the evaluation of electromagnetic compatibility.

This Device complies with Part 15 of the FCC rules, operation is subject to the following two conditions.

- (1) This device may not cause harmful interference and,
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Test Report Number(s): GZEM211100686101

(Identification of regulations / standards)

This declaration is responsible by the manufacturer / importer

Shanghai Xiyin Technology Co., Ltd

**Building C, No.888, Huanhu West 2nd Road, Special Area of China (Shanghai) Pilot
Free Trade Zone, Shanghai, China**

Test Laboratory

This is the result of test, that was carried out from the submitted type-samples of a product in conformity with the specification of the respective standards.



Kobe Jian

EMC Laboratory Manager

2021-12-27

This verification is only valid for the equipment and configuration described, in conjunction with the test report detailed above.



TEST REPORT

Application No.: GZEM2111006861AT
Applicant: Shanghai Xiyin Technology Co., Ltd
Address of Applicant: Building C, No.888, Huanhu West 2nd Road, Special Area of China (Shanghai) Pilot Free Trade Zone, Shanghai, China
Manufacturer: Shanghai Xiyin Technology Co., Ltd
Address of Manufacturer: Building C, No.888, Huanhu West 2nd Road, Special Area of China (Shanghai) Pilot Free Trade Zone, Shanghai, China
Factory: Shanghai Xiyin Technology Co., Ltd
Address of Factory: Building C, No.888, Huanhu West 2nd Road, Special Area of China (Shanghai) Pilot Free Trade Zone, Shanghai, China
Equipment Under Test (EUT):
EUT Name: CS20
Model No.: CS20
Standard(s) : 47 CFR Part 15, Subpart B
Date of Receipt: 2021-11-16
Date of Test: 2021-12-21
Date of Issue: 2021-12-27

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian
EMC Laboratory Manager



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Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-12-27		Original

Authorized for issue by:			
		Yumiko Zhan	
		Yumiko Zhan/Project Engineer	
		Terry Lai	
		Terry Lai/Reviewer	

2 Test Summary

Emission Part				
Item	Standard	Method	Requirement	Result
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

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4 General Information

4.1 Details of E.U.T.

Power supply: DC 5V 0.5A
Highest operating frequency:
below 108MHz
Cable(s): USB cable:1.0 m unshielded

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Note Book Computer	LENOVO	ThinkPad T490	PF1D1MVJ
Note Book Computer	LENOVO	Lenovo Xiaoxinchao 5000	PF0TNMG8
Note Book Computer	LENOVO	Lenovo Xiaoxinchao 5000	PF0TLJX7

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Radiated Emissions (30MHz-1GHz)	5.00dB (30MHz-1GHz):3m; 4.38dB (30MHz-1GHz):10m
Remark: The U_{lab} (lab Uncertainty) is less than U_{cisp} (CISPR Uncertainty), so the test results – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.	

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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SGS-CSTC Standards Technical Services Co., Ltd.
Guangzhou Branch EMC Laboratory

No.198 Kaizhu Road, Science Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgsgroup.com.cn
中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

5 Equipment List

Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Chamber cable	HangTianXing	N/A	EMC0542	2020-09-09	2022-09-08
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
EMI Test Receiver (1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2021-05-26	2022-05-25
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-1GHz)-Lab	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2021-07-05	2022-07-05
DMM	Fluke	73	EMC0007	2021-07-05	2022-07-05



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6 Emission Test Results

6.1 Radiated Emissions (30MHz-1GHz)

Test Requirement:	47 CFR Part 15, Subpart B
Test Method:	ANSI C63.4:2014
Limit:	Class B
Test Distance:	10m
30MHz -88MHz	29.5(dBμV/m) quasi-peak
88MHz-216MHz	33.1(dBμV/m) quasi-peak
216MHz-960MHz	35.6(dBμV/m) quasi-peak
960MHz-1000MHz	43.5(dBμV/m) quasi-peak
Detector:	Peak for pre-scan (120kHz resolution bandwidth) 30MHz to1000MHz

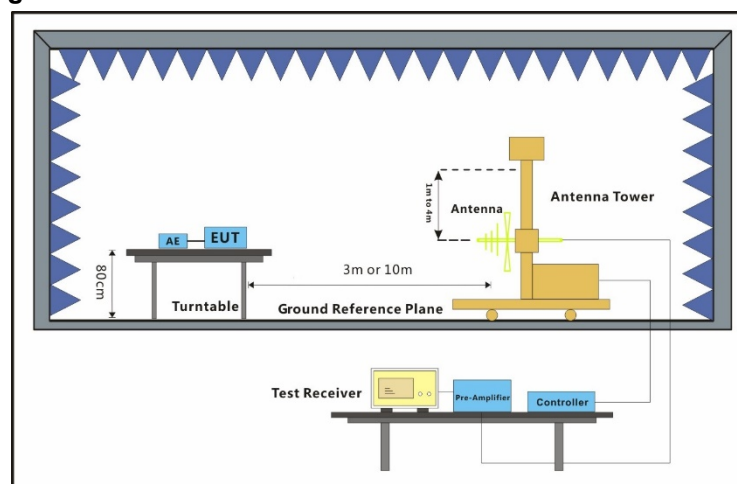
6.1.1 E.U.T. Operation

Operating Environment:			
Temperature:	23.0 °C	Humidity:	55.7 % RH
		Atmospheric Pressure:	1022 mbar

6.1.2 Test Mode Description

Pre-scan /	Mode	Description
Final test	Code	
Final test	00	Test the EUT in operating normally mode.
Pre-scan	01	Test the EUT in standby mode.

6.1.3 Test Setup Diagram

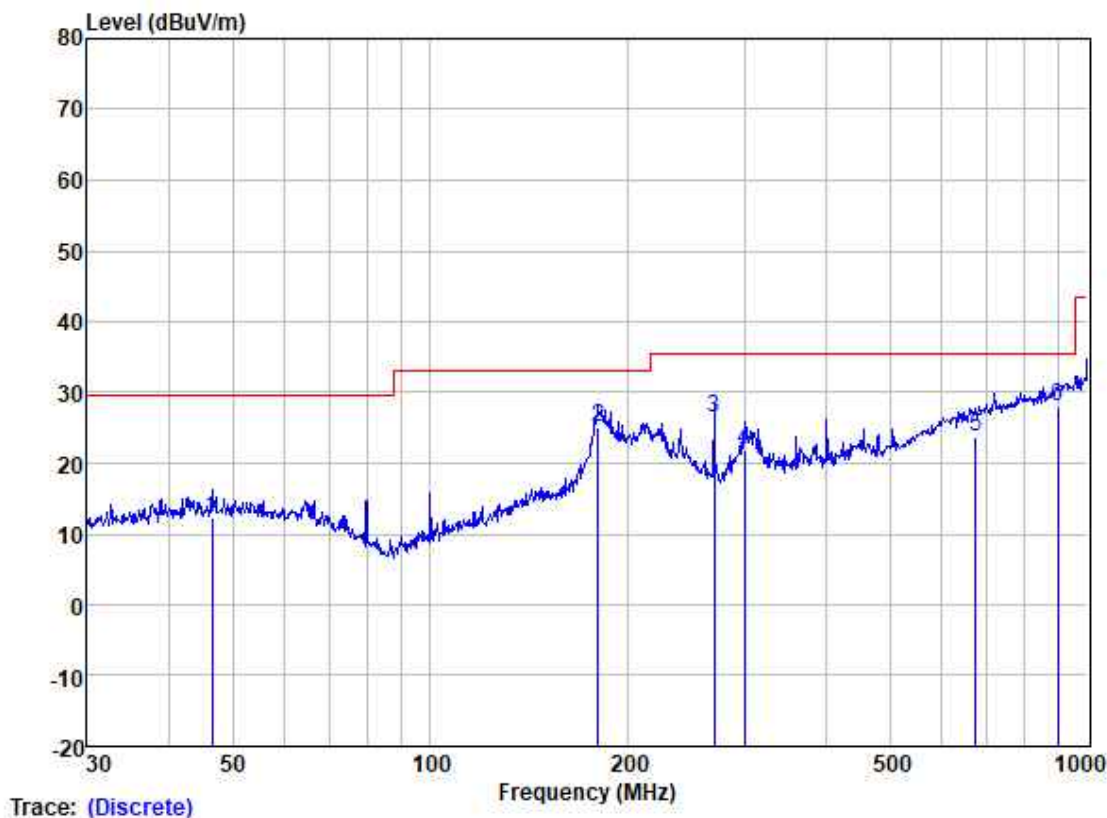


6.1.4 Measurement Procedure and Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

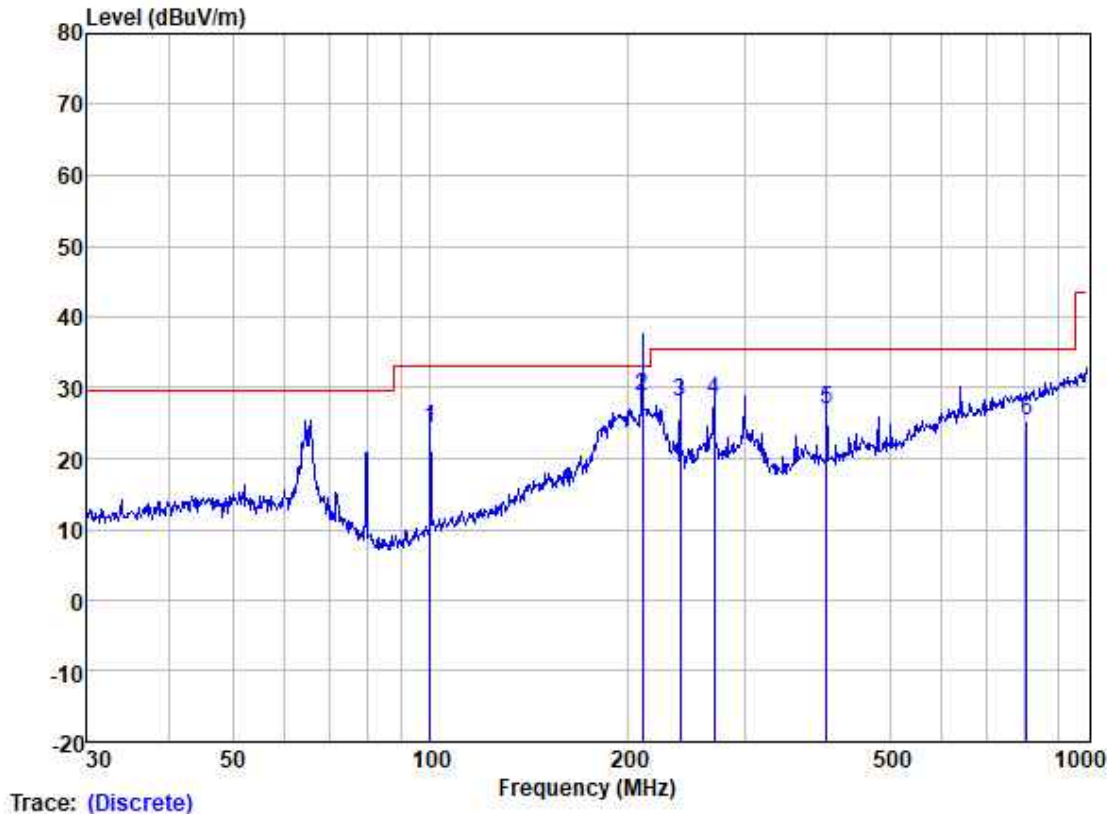
Test Mode: 00; Polarity: Horizontal



Site : SGS
Job :
Model :
Power :
Test Mode : RT

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	46.50	24.42	13.92	1.13	27.17	12.30	29.50	-17.20	HORIZONTAL	QP
2	180.02	37.44	12.00	2.44	26.75	25.13	33.10	-7.97	HORIZONTAL	QP
3	270.37	37.23	12.70	3.04	26.58	26.39	35.60	-9.21	HORIZONTAL	QP
4	300.37	31.58	13.60	3.16	26.56	21.78	35.60	-13.82	HORIZONTAL	QP
5	675.21	25.54	20.75	5.65	28.17	23.77	35.60	-11.83	HORIZONTAL	QP
6	900.15	25.68	23.30	6.92	27.85	28.05	35.60	-7.55	HORIZONTAL	QP

Test Mode: 00; Polarity: Vertical

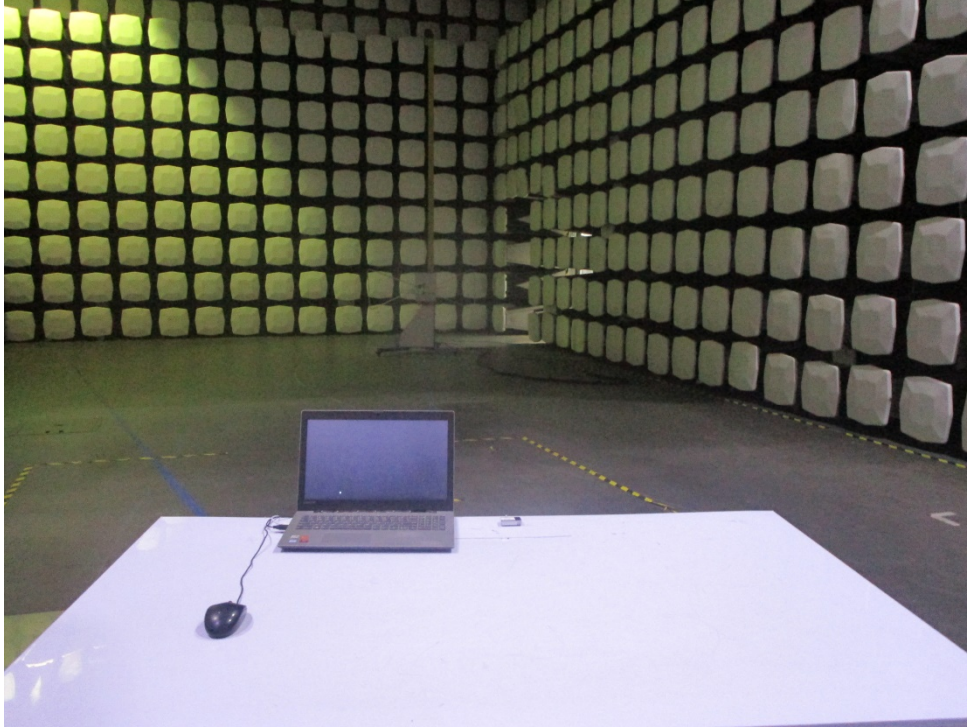


Site : SGS
Job :
Model :
Power :
Test Mode : RT

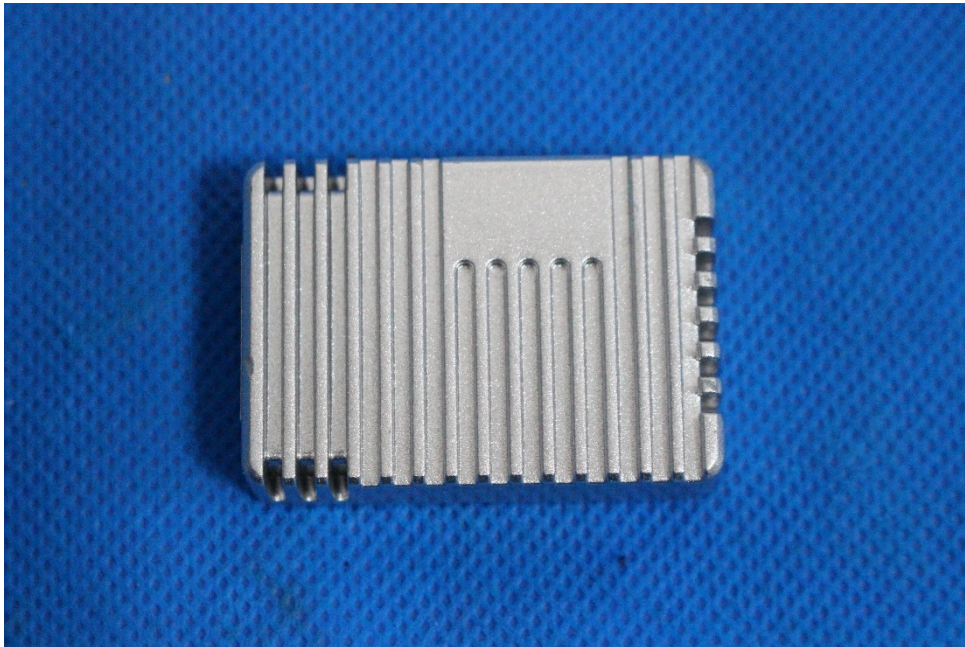
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	99.88	40.59	9.10	1.73	27.08	24.34	33.10	-8.76	VERTICAL	QP
2	210.08	43.10	9.80	2.59	26.72	28.77	33.10	-4.33	VERTICAL	QP
3	239.99	40.00	11.90	2.81	26.66	28.05	35.60	-7.55	VERTICAL	QP
4	270.37	39.14	12.70	3.04	26.58	28.30	35.60	-7.30	VERTICAL	QP
5	400.43	34.50	15.70	3.93	27.33	26.80	35.60	-8.80	VERTICAL	QP
6	807.43	24.40	22.68	6.23	28.02	25.29	35.60	-10.31	VERTICAL	QP

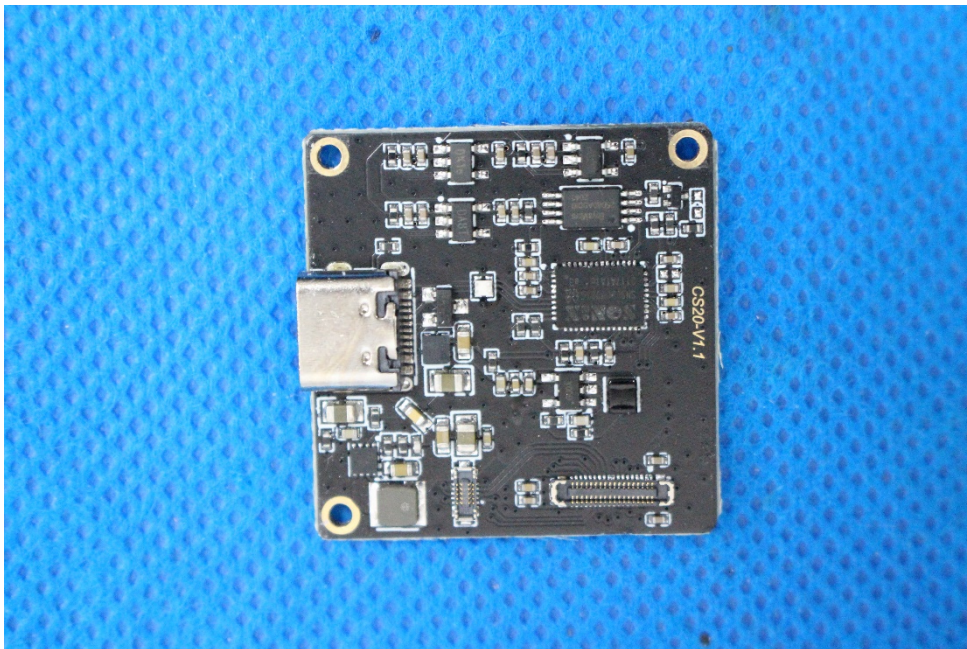
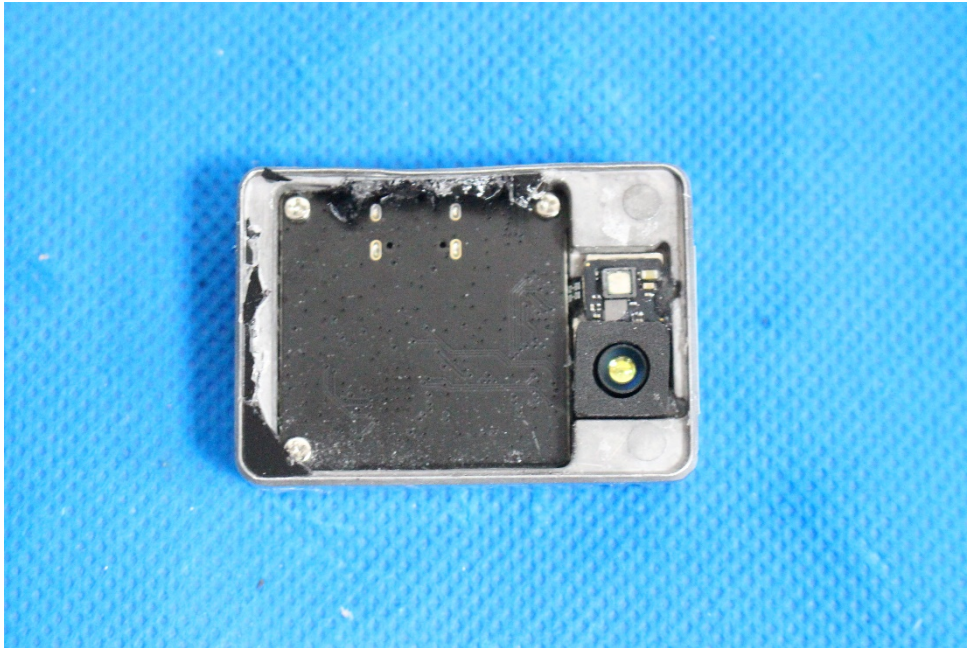
7 Test Setup Photo

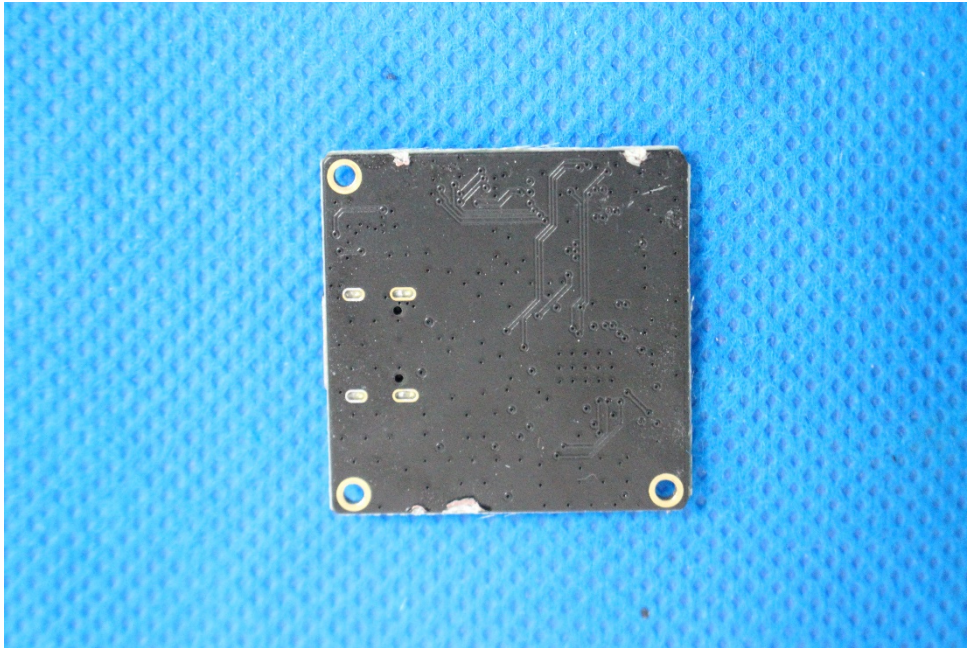
Radiated Emissions (30MHz-1GHz)

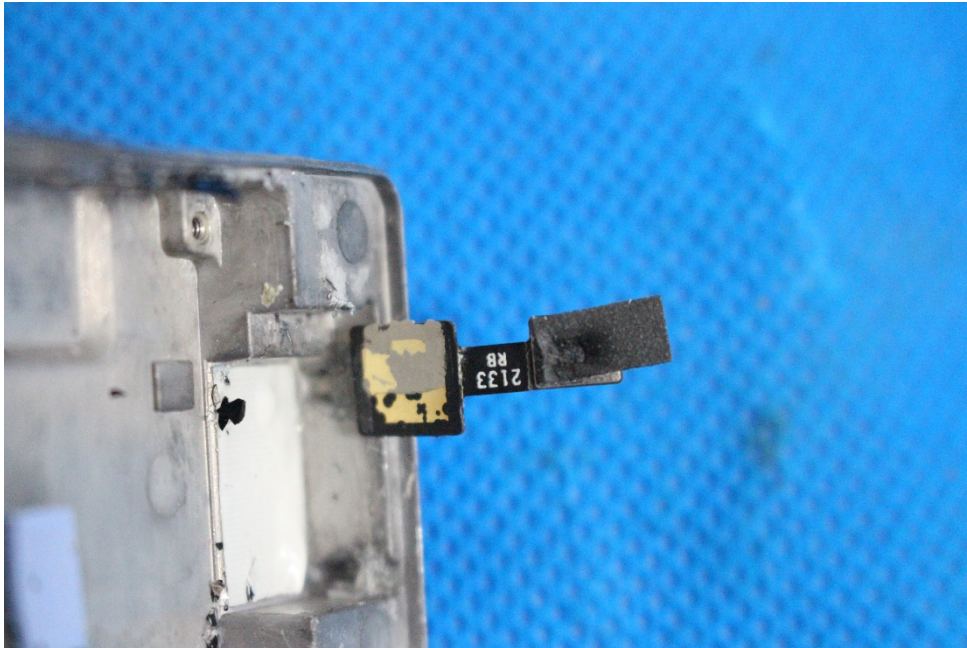


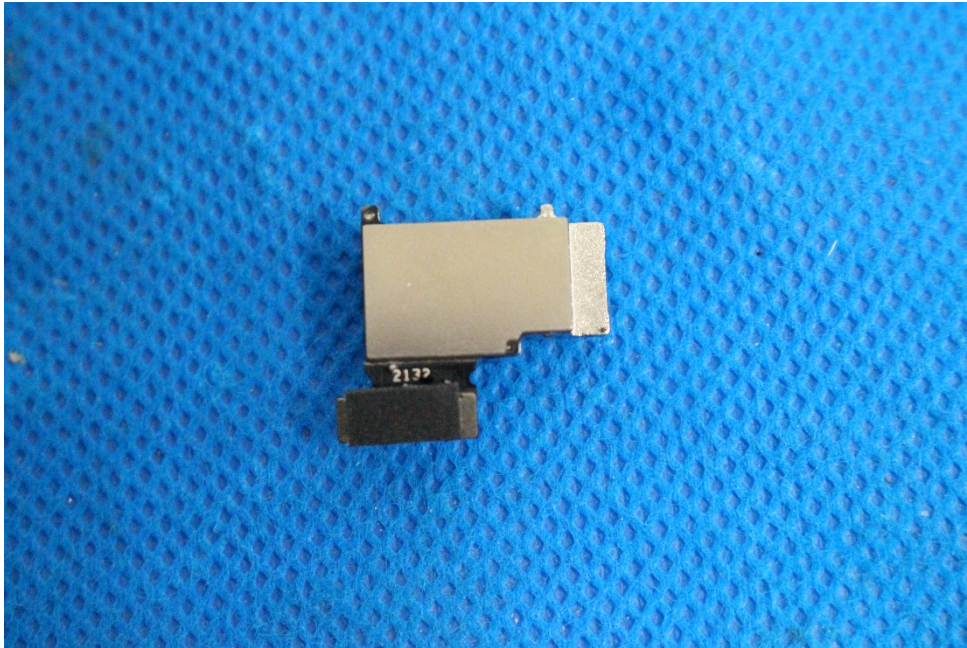
8 EUT Constructional Details (EUT Photos)











- End of the Report -

VERIFICATION OF EMC COMPLIANCE

Verification No.: GZEM2111006860ATV
 Applicant: Shanghai Xiyin Technology Co., Ltd
 Address of Applicant: Building C, No.888, Huanhu West 2nd Road, Special Area of China (Shanghai) Pilot Free Trade Zone, Shanghai, China
 Manufacturer: Shanghai Xiyin Technology Co., Ltd
 Address of Manufacturer: Building C, No.888, Huanhu West 2nd Road, Special Area of China (Shanghai) Pilot Free Trade Zone, Shanghai, China
 Factory: Shanghai Xiyin Technology Co., Ltd
 Address of Factory: Building C, No.888, Huanhu West 2nd Road, Special Area of China (Shanghai) Pilot Free Trade Zone, Shanghai, China
 Product Description: CS20
 Model No.: CS20
 Sufficient samples of the product have been tested and found to be in conformity with
 Test Standards: EN 55032: 2015+A1:2020
 EN 55035: 2017+A11:2020
 As shown in the
 Test Report Number(s): GZEM211100686001

This verification of EMC Compliance has been granted to the applicant based on the results of the tests, performed by laboratory of SGS-CSTC Standards Technical Services Co., Ltd. on the sample of the above-mentioned product in accordance with the provisions of the relevant specific standards under Directive 2014/30/EU.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EU Declaration of Conformity and compliance with all relevant EU Directives.



Kobe Jian
EMC Laboratory Manager



Date: 2021-12-27



TEST REPORT

Application No.: GZEM2111006860AT
Applicant: Shanghai Xiyin Technology Co., Ltd
Address of Applicant: Building C, No.888, Huanhu West 2nd Road, Special Area of China (Shanghai) Pilot Free Trade Zone, Shanghai, China
Manufacturer: Shanghai Xiyin Technology Co., Ltd
Address of Manufacturer: Building C, No.888, Huanhu West 2nd Road, Special Area of China (Shanghai) Pilot Free Trade Zone, Shanghai, China
Factory: Shanghai Xiyin Technology Co., Ltd
Address of Factory: Building C, No.888, Huanhu West 2nd Road, Special Area of China (Shanghai) Pilot Free Trade Zone, Shanghai, China
Equipment Under Test (EUT):
EUT Name: CS20
Model No.: CS20
Standard(s) : EN 55032: 2015+A1:2020
EN 55035: 2017+A11:2020
Date of Receipt: 2021-11-16
Date of Test: 2021-12-21
Date of Issue: 2021-12-27

Test Result:	Pass*
---------------------	--------------

* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian

Kobe Jian
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-12-27		Original

Authorized for issue by:			
		Yumiko Zhan	
		Yumiko Zhan/Project Engineer	
		Terry Lai	
		Terry Lai/Reviewer	

2 Test Summary

Emission Part				
Item	Standard	Method	Requirement	Result
Radiated Emissions (30MHz-1GHz)	EN 55032: 2015+A1:2020	EN 55032: 2015+A1:2020	Class B	Pass**

Immunity Part				
Item	Standard	Method	Requirement	Result
Electrostatic Discharge	EN 55035: 2017 +A11:2020	EN 61000-4-2: 2009	4kV Contact Discharge, 8kV Air Discharge	Pass
Radiated Immunity (80MHz- 1GHz,1800MHz,2600 MHz,3500MHz,5000 MHz)		EN IEC 61000 -4-3: 2020	3V/m, 80%, 1kHz Amp. Mod.	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

** : The EUT passed the Radiated Emissions (30MHz-1GHz) test after modification.

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4 General Information

4.1 Details of E.U.T.

Power supply: DC 5V 0.5A
Highest operating frequency: below 108MHz
Cable(s): USB cable:1.0 m unshielded

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Note Book Computer	LENOVO	ThinkPad T490	PF1D1MVJ
Note Book Computer	LENOVO	Lenovo Xiaoxinchao 5000	PF0TNMG8
Note Book Computer	LENOVO	Lenovo Xiaoxinchao 5000	PF0TLJX7
MacBook Air	APPLE	Apple A1370	C02GR7BPDJYD

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Radiated Emissions (30MHz-1GHz)	5.00dB (30MHz-1GHz):3m; 4.38dB (30MHz-1GHz):10m
Remark: The U_{lab} (lab Uncertainty) is less than U_{cisp} (CISPR Uncertainty), so the test results – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.	

4.4 Test Location

All tests were performed at:
SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

The EUT passed the Radiated Emissions (30MHz-1GHz) test after modification.

4.8 EMS Monitor

Visual: monitor software supplied by applicant whether normal or unnormal



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5 Equipment List

Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Chamber cable	HangTianXing	N/A	EMC0542	2020-09-09	2022-09-08
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
EMI Test Receiver (1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2021-05-26	2022-05-25
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-1GHz)-Lab	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22

Electrostatic Discharge					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Temperature & Humidity	Shanghai Meteorological Instrument Factory Co., Ltd.	ZJ1-2B	EMC0078	2021-07-04	2022-07-03
ESD Ground Plane	SGS-EMC	3m x 3m	EMC0804	N/A	N/A
Aneroid Barometer	Shanghai Meteorological Instrument Factory Co., Ltd.	YM3	EMC2181	2021-11-26	2022-11-25
ESD Simulator-E	EMTEST	NX30	EMC2186	2021-02-27	2022-02-26



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Radiated Immunity (80MHz-1GHz,1800MHz,2600MHz,3500MHz,5000MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
743 Compact 3m Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	EMC0525	2019-10-20	2022-10-19
Monitor System	Mitsubish Corp.	M-0552AB	EMC0909	N/A	N/A
Oscilloscope	Tektronix	TDS3052C	EMC2055	2021-11-23	2022-11-22
Laser Probe Interface	RF Microwave Instrumentation	FI7000	EMC2089	N/A	N/A
Open Switch And Control Unit	Rohde & Schwarz	OSP130	EMC2090	N/A	N/A
Broadband Amplifier (80MHz~1GHz/250W)	Rohde & Schwarz	BBA150	EMC2091	2021-12-17	2022-12-16
Broadband Amplifier (800MHz~3GHz/110W)	Rohde & Schwarz	BBA150	EMC2092	2021-03-05	2022-03-04
Signal Generator (9kHz-6GHz)	Rohde & Schwarz	SMB100A	EMC2093	2021-12-17	2022-12-16
Laser Probe	RF Microwave Instrumentation	FL7006	EMC2094	2021-03-04	2022-03-03
NRP-Z91 Power Sensor (9kHz-6GHz)	Rohde & Schwarz	NPR-Z91	EMC2095	2021-12-17	2022-12-16
NRP-Z91 Power Sensor (9kHz-6GHz)	Rohde & Schwarz	NPR-Z91	EMC2096	2021-12-17	2022-12-16
High-Gain Log-periodic Antenna	Rohde & Schwarz	HL046E	EMC2097	2019-02-15	2022-02-14
RI Cable	Rohde & Schwarz	7m	EMC2098	2021-05-24	2022-05-23
Broadband Amplifier (2.5~6GHz/30W)	Rohde & Schwarz	BBA150	EMC2105	2021-09-24	2022-09-23
Audio Analyzer	Keysight	U8903B	EMC2180	2021-09-14	2022-09-13
Test Software EMC32	Rohde & Schwarz	Ver. 9.26.00	GZE100-63	N/A	N/A
Stacked Logarithmic-Periodic Broadband Antenna (0.7~9GHz)/300W	Schwarzbeck	STLP 9149	SEM003-21	2021-09-18	2024-09-17

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2021-07-05	2022-07-05
DMM	Fluke	73	EMC0007	2021-07-05	2022-07-05



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6 Emission Test Results

6.1 Radiated Emissions (30MHz-1GHz)

Test Requirement: EN 55032: 2015+A1:2020
 Test Method: EN 55032: 2015+A1:2020
 Limit:
 Test Distance: 10m
 30MHz-230MHz: 30 dB(μ V/m) quasi-peak
 230MHz-1GHz: 37 dB(μ V/m) quasi-peak
 Detector: Peak for pre-scan (120kHz resolution bandwidth) 30MHz to 1000MHz
 Highest internal frequency (F_x): F_x ≤ 108MHz
 Highest measured frequency: 1GHz

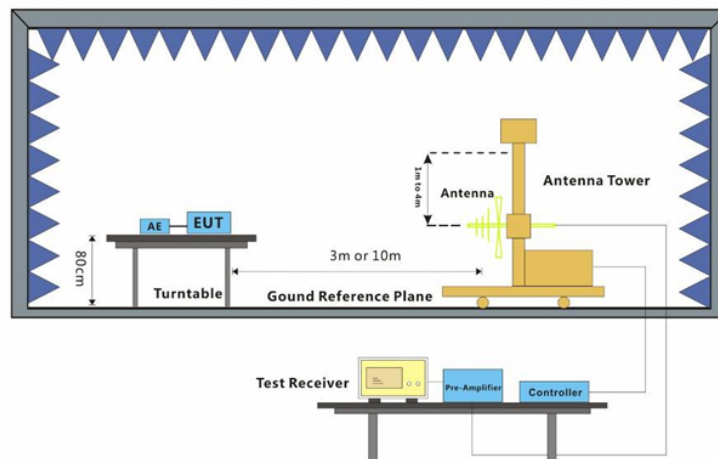
6.1.1 E.U.T. Operation

Operating Environment:
 Temperature: 23.0 °C Humidity: 55.9 % RH Atmospheric Pressure: 1022 mbar

6.1.2 Test Mode Description

Pre-scan /	Mode	Description
Final test	Code	
Final test	00	Test the EUT in operating normally mode.

6.1.3 Test Setup Diagram



6.1.4 Measurement Procedure and Data

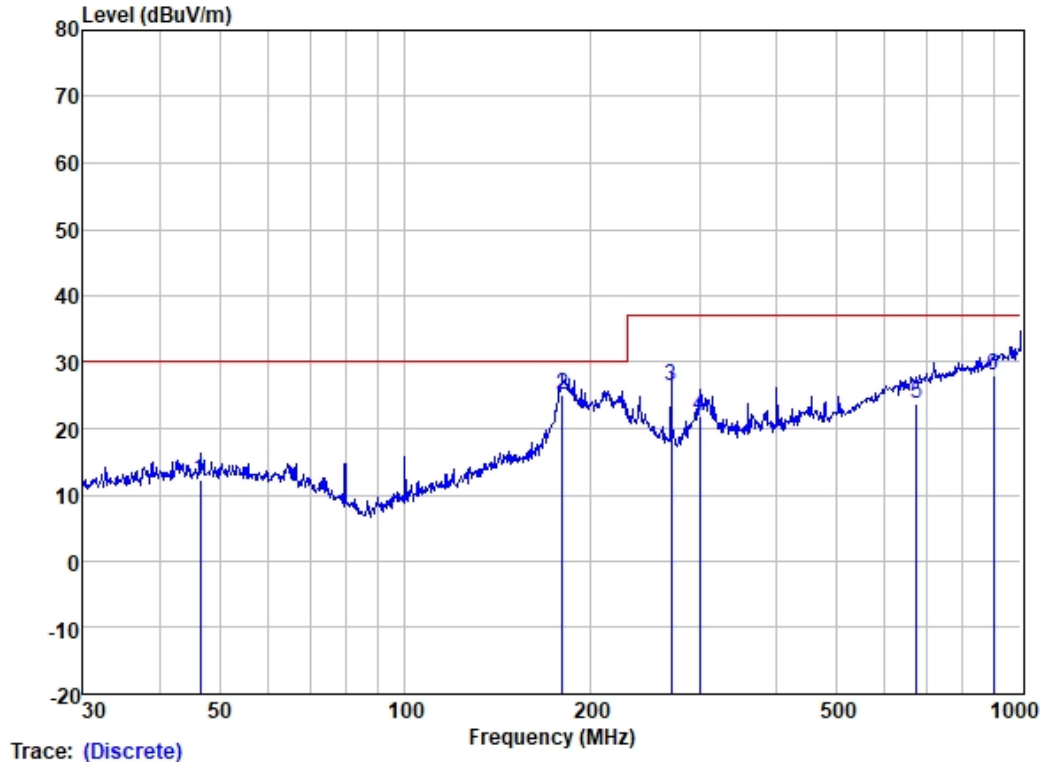
Frequency range: 30MHz-1GHz

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

The red line show in graphic is the limit in standard used in this section.

Level=Read Level + Antenna Factor + Cable Loss - Preamp Factor

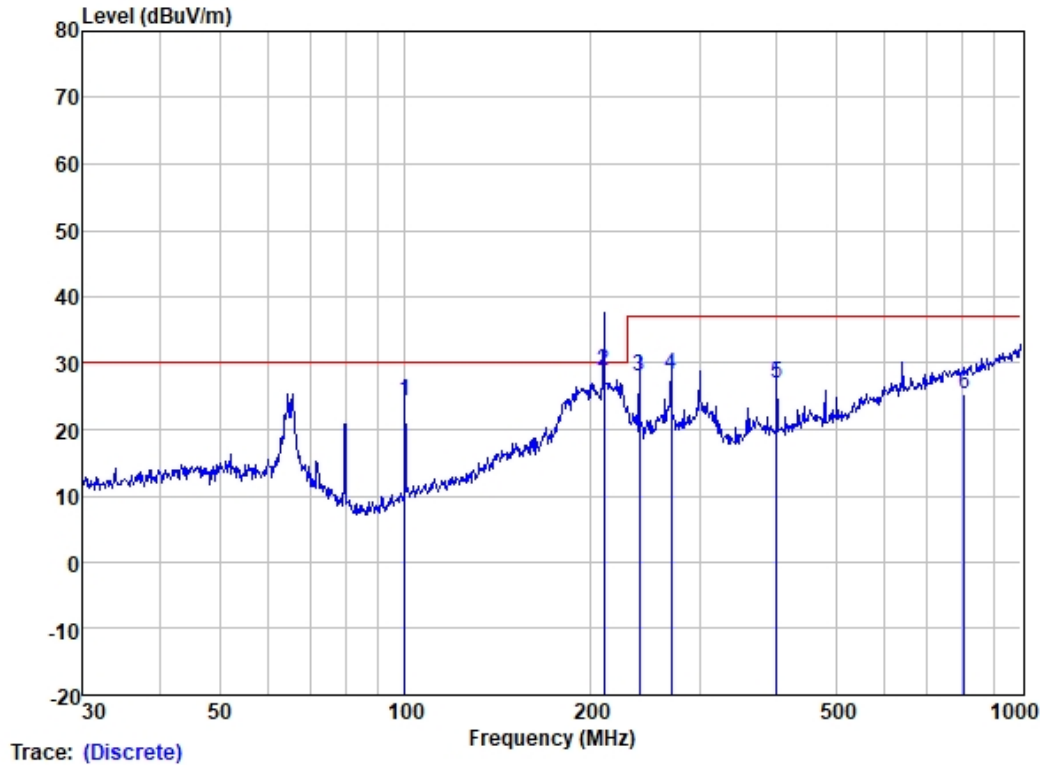
Test Mode: 00; Polarity: Horizontal



Site : SGS
Job :
Model :
Power :
Test Mode : RT

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	46.50	24.42	13.92	1.13	27.17	12.30	30.00	-17.70	HORIZONTAL	QP
2	180.02	37.44	12.00	2.44	26.75	25.13	30.00	-4.87	HORIZONTAL	QP
3	270.37	37.23	12.70	3.04	26.58	26.39	37.00	-10.61	HORIZONTAL	QP
4	300.37	31.58	13.60	3.16	26.56	21.78	37.00	-15.22	HORIZONTAL	QP
5	675.21	25.54	20.75	5.65	28.17	23.77	37.00	-13.23	HORIZONTAL	QP
6	900.15	25.68	23.30	6.92	27.85	28.05	37.00	-8.95	HORIZONTAL	QP

Test Mode: 00; Polarity: Vertical



Site : SGS
Job :
Model :
Power :
Test Mode : RT

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	99.88	40.59	9.10	1.73	27.08	24.34	30.00	-5.66	VERTICAL	QP
2	210.08	43.10	9.80	2.59	26.72	28.77	30.00	-1.23	VERTICAL	QP
3	239.99	40.00	11.90	2.81	26.66	28.05	37.00	-8.95	VERTICAL	QP
4	270.37	39.14	12.70	3.04	26.58	28.30	37.00	-8.70	VERTICAL	QP
5	400.43	34.50	15.70	3.93	27.33	26.80	37.00	-10.20	VERTICAL	QP
6	807.43	24.40	22.68	6.23	28.02	25.29	37.00	-11.71	VERTICAL	QP

7 Immunity Test Results

General Performance Criteria Description in EN 55035: 2017+A11:2020

- Criterion A The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
- Criterion B During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.
After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
- Criterion C Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.
Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.



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Performance Criteria Description for Broadcast reception function

The broadcast reception function shall comply with the general performance criteria given in Clause 8 and any relevant annex with the deviations defined in Table A.2.

NOTE For the continuous RF electromagnetic field immunity test specified in the table clauses 1.2 and 1.3, deviations apply for in-band frequencies. The deviations depend on the class of the broadcast receiver (Group 1 or 2) and are defined in Table A.2.

Table A.2 – Modified test levels for performance criterion A for the broadcast reception function

Performance criteria	Test type table clause	Group 1	Group 2
A	1.2	The disturbance level is reduced to 1 V/m for in-band frequencies.	No test requirements apply
	1.3		
	2.1 3.1 4.1	The disturbance level is reduced to 1 V for in-band frequencies.	

In-band is defined as the entire tuneable operating range of the selected broadcast reception function. The tuned channel $\pm 0,5$ MHz (lower edge frequency – 0,5 MHz up to the upper edge frequency + 0,5 MHz of the tuned channel) is excluded from testing.

NOTE In some countries, there is a requirement to test the tuned channels. Refer to the relevant regional requirements for guidance.

Performance Criteria Description for Print function

- Criterion A** Apply criterion A as defined in 8.2. Additionally, the following shall not occur as a consequence of the application of the disturbance:
- change of operating state;
 - unintended pausing of the print operation;
 - a change of print quality or legibility, as appropriate to the test pattern;
 - change of character font;
 - unintended line feed;
 - unintended page feed;
 - paper feed failure.
- Criterion B** Apply criterion B as defined in 8.3 with the following specifics and additional limitations. Paper feed failures are allowed only if, after removal of the jammed sheets, the job is automatically recovered and there is no loss of printed information. Any low-quality print output caused by the application of the disturbance shall not continue beyond the sheet of media being printed, or beyond the typical length of a finished page or sheet printed from continuous roll media. False indicators are permitted during the test provided that a normal operator response to that false indicator is simple (such as pressing a button). False indicators are not acceptable if they would cause the user to discard printing supplies such as ink, toner or paper, when those supplies are actually not empty or faulty. Any false indicator shall either clear automatically or after the operator's response. After the disturbance, the print function may print the remainder of the print job at a quality level within the manufacturer's specifications. Alternately, the print function may halt processing of a print job as a result of the disturbance, but only if the operator is capable of reprinting the job (for example, a fax printing job where the image to be printed still resides in local memory). Automatically restarting the print job from the beginning is also acceptable. In any scenario, the pairing of front and back images during double-sided printing shall be correct.
- Criterion C** Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Performance Criteria Description for Scan function

- Criterion A** Apply criterion A as defined in 8.2. Additionally, the following shall not occur as a consequence of the application of the test:
- change of settings, such as which side(s) of the page to be scanned, colour or monochrome, and resolution;
 - corruption of the image, for example stretching, compressing or change in colour;
 - paper feed failures;
 - errors in the reading of bar codes.
- Criterion B** Apply criterion B as defined in 8.3 with the following specifics and additional limitations:
- Document feed failures are allowed only if the original documents are undamaged and, after removal of the jammed sheets, the job is automatically recovered and there is no loss of scanned information.
 - During the test, the representation of the image shall not be degraded such that reading mistakes occur.
- Criterion C** Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.
- Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Performance Criteria Description for Display and display output functions

Performance criterion A for continuous radiated and conducted disturbances tests

Apply criterion A as defined in 8.2. Additionally, an increase in any degradation greater than just perceptible by observation of the image shall not occur as a consequence of the application of the test. Examples of such degradations are:

- superimposed patterning;
- positional disturbances due to synchronisation errors;
- geometric distortion;
- change of contrast or brightness;
- picture artefacts;
- freezing or disturbance of motion;
- image loss;
- video data or decoding errors.

Performance criterion A for the power frequency magnetic field tests

Alternative 1: A continuous magnetic field of 1 A/m:

The jitter (in mm) shall not exceed the value
$$\frac{(\text{character height in mm} + 0,3) \times 2,5}{33,3}$$



Alternative 2: An increased power frequency magnetic field ≤ 50 A/m:

The amplitude of the disturbing field shall be increased by a factor K , where $1 \leq K \leq 50$. The jitter shall not exceed K times the value given in alternative 1. The value of K should be chosen to avoid saturation of any magnetic screening materials.

When the EUT is subjected to fields above $K = 1$ and the performance criteria are satisfied for all relevant functions of the EUT, the EUT shall be deemed to satisfy the requirement. When the EUT is subjected to fields above $K = 1$ and the display function is shown to meet these performance criteria, but the performance criteria for other relevant functions are NOT satisfied, the EUT shall be retested at $K = 1$ (the field level required in table clause 1.1) to assess compliance for those other functions.

Performance criterion B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended.

The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Performance Criteria Description for Musical tone generating function

General

The particular performance criteria for evaluating the musical tone generating function are defined in E.3.2, E.3.3 and E.3.4.

Performance criterion A

Performance criterion A is subdivided according to the type of equipment and its use. Three subgroups corresponding to different equipment types are defined in Table E.1 and have corresponding performance criteria A1, A2 and A3. The relevant subgroup shall be selected by the manufacturer in accordance with the product specification. The description of criteria

A1, A2 and A3 are presented in Table E.2.

Table E.1 – Subgroups and performance criteria A for the musical tone generating function

Equipment type and use	Subgroup	Performance Criteria
High-end quality suitable for professional use or studio recording	1	A1
Middle grade quality suitable for amateur use or home use	2	A2
Entry grade quality for practice or exercise use	3	A3

Table E.2 – Performance criteria for different subgroups given in Table E.1

Description of degradation in performance	Performance Criteria		
	A1	A2	A3
Specific unintended change in the characteristic of the tone generated 1. interruption 2. stopping (or ceasing) 3. holding 4. sudden change in amplification	Not acceptable	Not acceptable	Not acceptable
Specific unintended change in the characteristic of the tone generated 1. frequency 2. harmonic distortion	Not acceptable	Not acceptable if the degradation is beyond the level specified by the manufacturer	Not acceptable if the manufacturer judges such degradations interfere with the continuation of playing music
Other changes in the type of tone generated	Not acceptable	Not acceptable	Not acceptable if the manufacturer judges such degradations interfere with the continuation of playing music

The specified degradations shall be perceptible to a listener.

During the test no performance degradation other than that permitted by this table is allowed. After the test the EUT shall operate without performance degradation.

Performance criterion B

During the test, degradation of performance beyond that defined in criterion A1 of Table E.2 is allowed. However, sudden amplification of tone to a level that exceeds the expected level by more than 6 dB is not allowed.

After the test, normal operation of the EUT shall be self-recovered.

In the case of unintended tone holding caused by a MIDI protocol communication error, the EUT can be re-initialised by the operation of the controls by the user controls in accordance with the manufacturer's instructions.

Due to the nature of the MIDI protocol, it is necessary to modify the performance criterion B to allow user intervention when the unintended tone holding is caused by a missing MIDI communication error (for example missing a 'NOTE OFF' message).

Performance criterion C

Degradation of the performance beyond that defined in criterion A1 of Table E.2 is permitted provided that the normal operation of the EUT can be restored after the test by operator intervention. However, sudden amplification of tone to a level that exceeds the expected level by more than 6 dB is not allowed.



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Performance Criteria Description for Networking functions**General Requirements for Network functions****Performance criterion A**

Where relevant, during the application of the test the network function shall, as a minimum, operate ensuring that:

- established connections shall be maintained throughout the application of the test;
- no change of operational state or corruption of stored data occurs;
- no increase in error rate above the figure defined by the manufacturer occurs. The manufacturer should select the most appropriate performance measurement criteria for the product or system, for example bit error rate, block error rate;
- no request for retry above the figure defined by the manufacturer;
- the data transmission rate does not reduce below the figure defined by the manufacturer;
- no protocol failure occurs;
- the audio noise level at a two-wire analogue interface (supporting telephony) shall satisfy the requirements of Table G.3. The audio level measurements shall be performed at the demodulated frequency of the disturbance using a narrowband filter with a 3dB bandwidth of 100 Hz using the method defined in table clause G.1.4. See G.6.1.

As described in the example given in J.3.5 the networking function is monitored during testing using direct functions specified elsewhere in this document.

If needed to verify the operation of the protocol, the following functions shall be verified as described in Table H.1 when performing the additional spot frequency tests contained in Clause 5:

- ability to establish a connection,
- ability to clear a connection.

Where an EUT has supervisory functions they shall not be affected. Elements that should be monitored include, but are not limited to:

- alarms,
- signalling lamps,
- printer output errors,
- network traffic rates,
- network monitor errors,
- measured network parameters.

Performance criterion B

Established connections shall be maintained throughout the test, or shall self-recover in a way and timescale that is imperceptible to the user.

The error rate, request for retry and data transmission rates may be degraded during the application of the test. Degradation of the performance as described in criterion A is permitted, provided that the normal operation of the EUT is self-recoverable to the condition established prior to the application of the test.

Where required, as defined in Clause 5, the acceptable operation of the function shall be verified at the completion of the test as described in Table H.1, by confirming the following:

- the EUT's ability to establish a connection,
- the EUT's ability to clear a connection.

During surge testing disconnection is allowed on the analogue/digital data port being tested.

If the EUT is a supervisory equipment, it shall not impact the normal operation of the network being monitored. In addition, any supervisory functions impacted during the period of the test shall return to the state prior to the test. Elements to consider include:

- alarms,
- signalling lamps,
- printer output,
- network traffic rates,
- network monitoring.



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Performance criterion C

Degradation of performance as described in criteria A and B is permitted provided that the normal operation of the EUT is self-recoverable to the condition immediately before the application of the test, or can be restored after the test by the operator.

Requirements for CPE containing xDSL ports**Performance criterion A****Applicable for the test requirement defined in table clause 2.1**

During the swept frequency test, the established connection shall be maintained throughout the testing and the information transferred without any additional reproducible errors or loss of synchronisation. If degradation in performance is observed and the system is adaptive, for example has the capability to automatically retrain in the presence of an interfering signal, then perform the following procedure:

- For each range of interfering frequencies in which degradation in performance is observed, three frequencies (beginning, middle and end) shall be identified.
- At each of the frequencies identified in step a), the interfering signal shall be applied and the system shall be allowed to retrain.
- If the system is able to retrain and then functions correctly for a dwell time of at least 60 s without any additional reproducible errors or loss of synchronisation, then the performance level of the system is considered acceptable.
- The frequencies identified in step a) and the data rates achieved in step b) shall be recorded in the test report.

Applicable for the test requirement defined in table clause 2.2

It is important that the modems are able to train in the presence of repetitive impulsive noise and minimize disruption to the end-user where a repetitive impulsive noise source starts after the link has synchronized. Therefore the following procedure and performance criteria shall apply.

The manufacturer shall select the class of impulsive noise protection (INP) to be used for the immunity test and should state this information in the technical documentation and in the test report. The maximum delay shall be set to 8 ms.

In the absence of impulsive noise: The modem shall operate without retraining at its target noise margin with a bit rate value depending on the line attenuation and the stationary noise being present on the line. (The actual value will be between the minimum and maximum bit rate values programmed in the port).

The impulsive noise source shall then be applied at the required test level.

With the impulsive noise applied: The modem shall operate without retraining and without SES at the bit rate established prior to the application of the impulsive noise. No extra CRC errors shall occur due to the impulsive noise.

Applicable for the test requirements defined in other subclauses

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

F.4.3.1 Applicable for the test requirement defined in table clause 2.3

Modems shall withstand the application of the isolated impulsive noise events. The performance criteria defined in Table F.3 shall be applied.

Table F.3 – Performance criteria against impulse duration

Impulse duration ms	Performance criteria
0,24	The application of the impulse shall not cause the xDSL link to lose synchronisation. No CRC errors are permitted.
10	The application of the 5 impulses shall result in less than 75 CRC errors and shall not cause the link to lose synchronisation.
300	The application of the impulse shall not cause the xDSL link to lose synchronisation.



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Applicable for the test requirements defined in table clauses 2.5 and 4.5

For application of this test to the xDSL port, a repetition rate of 100 kHz (burst length 0,75 ms) shall be used. For the application of this test to the AC mains power port, a repetition rate of 5 kHz shall be used. Degradation of the performance as described in criterion A (defined in F.4.2.1) is permitted in that errors are acceptable during the application of the test. However the application of the test shall not cause the system to lose the established connection or re-train. At the cessation of the test, the system shall operate in the condition established prior to the application of the test without user intervention. After the application of the EFT/B tests to the xDSL or AC mains power port, as defined in table clauses 2.5 and 4.5, the CRC error count shall not have increased by more than 600 when compared to the count prior to the application of the test.

Applicable for the test requirements defined in other subclauses

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended.

The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Degradation of the performance beyond that defined in criteria A and B is permitted provided that the normal operation of the EUT is self-recoverable to the condition established prior to application of the test or can be restored after the test by the operator.



Performance Criteria Description for Audio output function

Performance criterion A

General

During the test the audio output function shall be maintained and the requirements of G.7.1.2 or G.7.1.3 shall be met.

Devices supporting telephony functions

For devices that support telephony functions the limits of Table G.3 shall apply. With respect to Table G.3,

- the interference ratio (electrical or acoustic) shall meet the limits in column 3; or,
- the acoustic level of the demodulated audio shall be less than the limits in column 4; or,
- the digitally coded level of demodulated audio shall be less than limits in column 5; or,
- the analogue level of the demodulated audio shall be less than the limits in column 6.

Table G.3 – Performance criterion A – Limits for devices supporting telephony

Type of immunity test	Frequency range MHz	Acoustic or electrical interference ratio	Equivalent direct measurement		
			dB(SPL)	Digital dBm0	Analogue dBm
Conducted ^a	0, 15 to 30	–20 dB	55	–50	–50
	30 to 80	–10 dB	65	–40	–40
Radiated	80 to 1 000	0 dB	75	–30	–30

^a At the step in the frequency range, the lower limit shall be applied.

The equivalent direct measurement values are presented to show the equivalency of the interference ratio in comparison to a direct measured value. These values may be used if the direct measurement method of the test is used.

The values within this table are aligned with CISPR 24, noting that the test levels are different between this document and CISPR 24.

For terminals connected to digital wired network ports (such as Ethernet, ISDN), measurements of the demodulated 1 kHz may be performed on a remote AE, ideally of the same design.

NOTE The amplitude demodulation disturbances will arise, almost invariably, from semi-conductor junctions behaving as inadvertent square law detectors. This means that for a 10 dB increase in the applied test level, for example, from 1 V to 3 V, the demodulated line noise will increase by 20 dB. This 20dB offset was used to derive the values in Table G.3.

For all other devices

The measured acoustic interference ratio and/or the measured electrical interference ratio during the test shall be –20 dB or better.

Performance criterion B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended.

The performance level may be replaced by a permissible loss of performance.

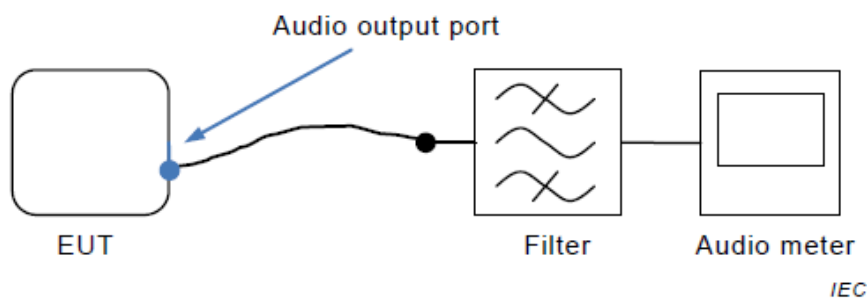
If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.

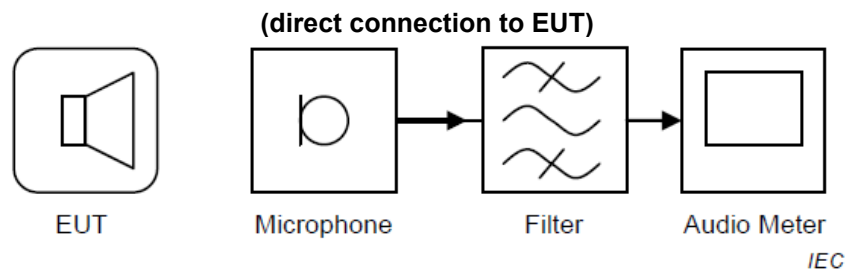
Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Test setup examples



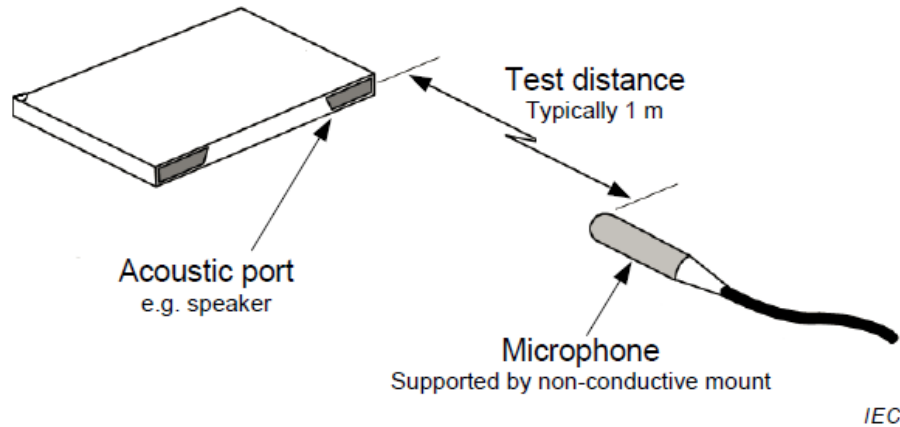
The filter is the audio filter specified in G.6.1 and is typically incorporated into the audio meter. Additional filtering might be necessary to ensure that the RF disturbance signal does not interfere with the measurement.

Figure G.1 – Example basic test setup for electrical measurements



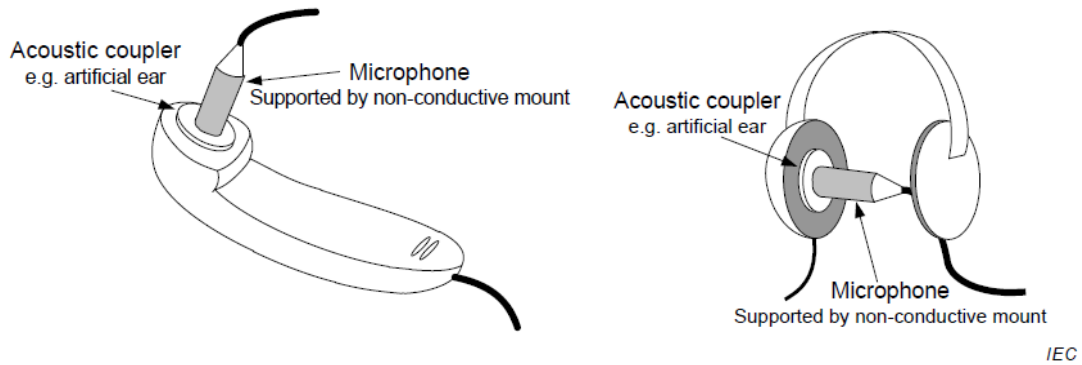
The filter is the audio filter specified in G.6.1 and is typically incorporated into the audio meter. Additional filtering might be necessary to ensure that the RF disturbance signal does not interfere with the measurement.

Figure G.2 – Example basic test setup for acoustic measurements



The microphone is connected via the cable to a suitable amplifier. Ensure that there is minimal acoustic loss between EUT and microphone.

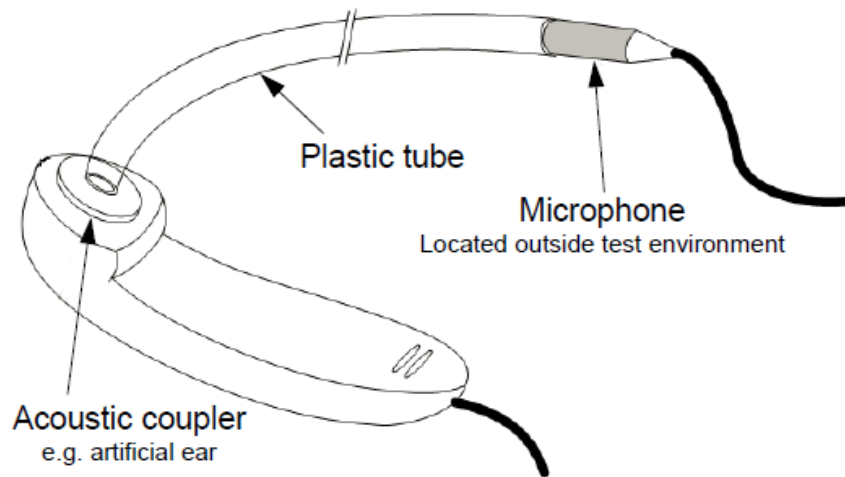
Figure G.3 – Example test setup for acoustic measurements on loudspeakers



NOTE 1 The microphone is connected via the cable to a suitable amplifier.

NOTE 2 This setup cannot be suitable for radiated testing. See G.6.3.

Figure G.4 – Example test setup for on-ear acoustic measurements

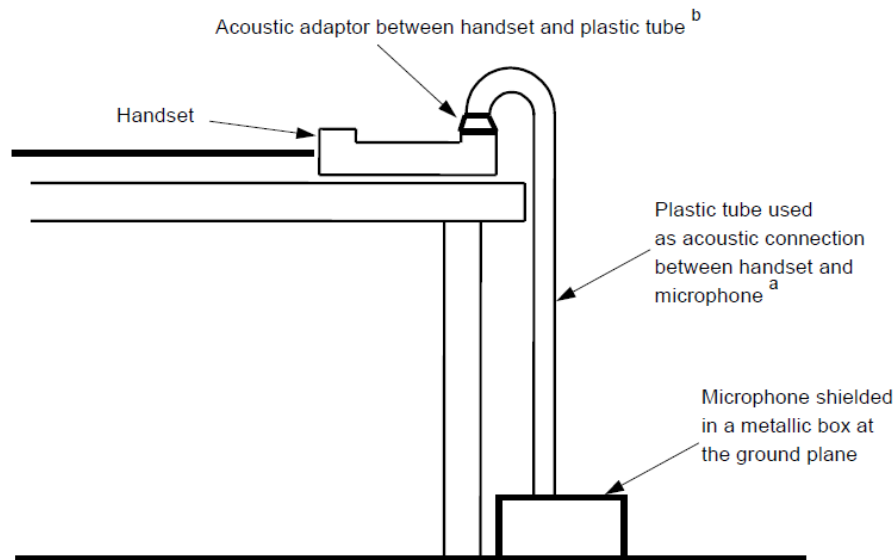


IEC

NOTE 1 The microphone is connected via the cable to a suitable amplifier.

NOTE 2 This setup is suitable for radiated immunity testing. See G.6.3

Figure G.5 – Example test setup for on-ear acoustic measurements, microphone located away from earpiece transducer



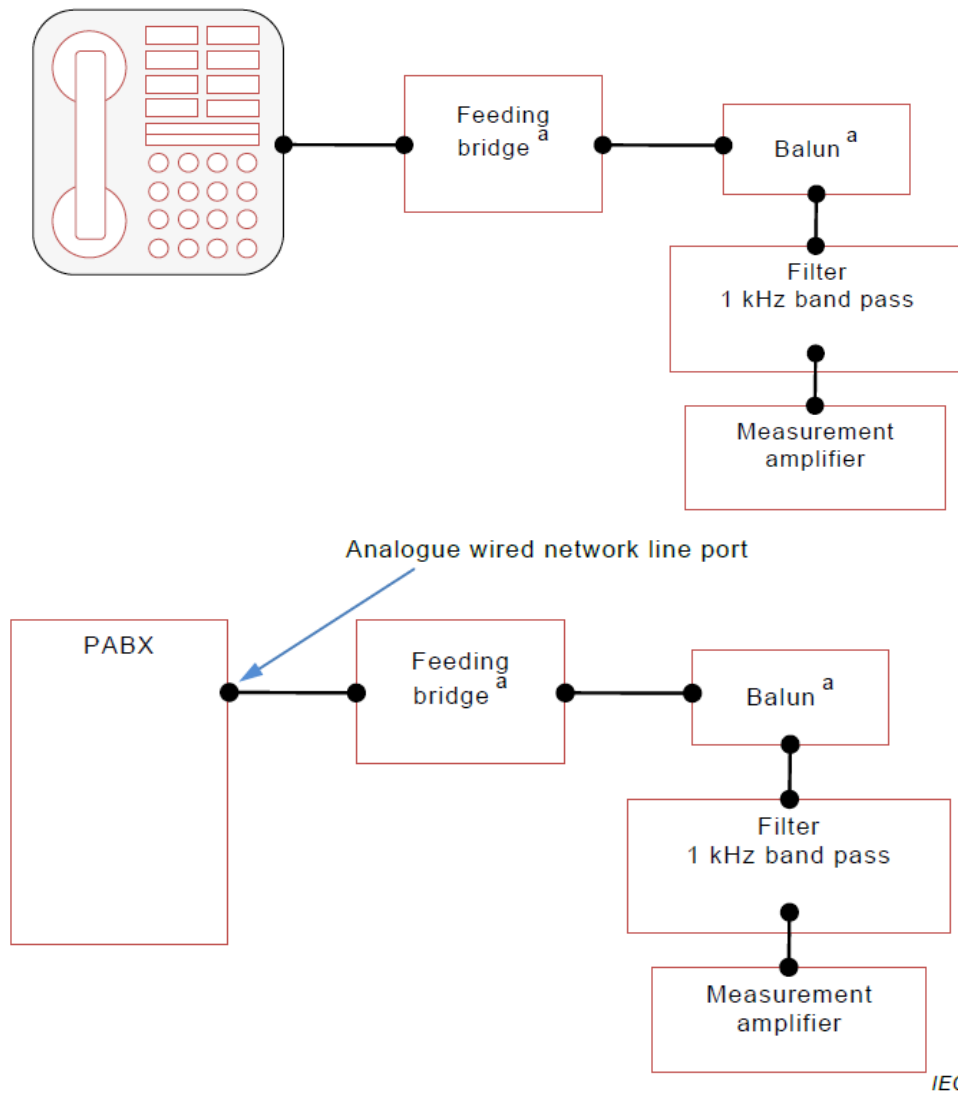
IEC

NOTE This set up is suitable for radiated immunity testing. See G.6.3.

^a The acoustic measurement procedure compensates for the acoustic properties of the tube. Typically, the tube has an inner diameter of 15 mm, an outer diameter of 19 mm, and a total length of 1,5 m.

^b Conically formed adaptor which is connected acoustically to the various forms of handsets with some type of soft rubber. This stable coupling of the handset to the acoustical tube should not be changed between establishing the reference level and measuring the demodulated levels.

Figure G.6 – Example test setup for measuring the sound pressure level from the acoustic output device of a telephone handset



^a The feeding bridge current and the balun impedance are to be chosen according to the intended purpose of the EUT. In addition the feeding bridge may provide the power required for the MME to operate.

Figure G.7 – Example test setups for measuring the demodulation on analogue wired network lines

Performance Criteria Description for Telephony function

Table H.1 defines the performance criteria for various telephony functions that shall be exercised (or operated) in the presence of the disturbances specified in Table 1 to Table 4.

Table H.1 – Telephony functions, performance criteria

Function to be exercised	Performance criteria		
	A	B	C
Establish new communication	At the additional spot frequency tests ^{a, c}	Performed before and after the application of the test or disturbance	Performed before and after the application of the test or disturbance
Maintain established communication	Yes In addition, the requirements of Annex G for the audio output function shall be satisfied ^c	Yes ^b	No
Terminate established communication	At the additional spot frequency tests ^{a, c}	Performed before and after the application of the test or disturbance	Performed before and after the application of the test or disturbance

Communication refers to a telephone call or other form of voice connection.

^a Applicable to TTE with a dial function that provides dedicated emergency service/safety of life call capability. Where the EUT does not provide this functionality, this limitation shall be stated in the equipment user manual.

^b Communication shall be established prior to the application of the disturbance, the communication shall be maintained and the quality of that communication (for example, volume setting, the level of background noise) shall be maintained after completion of the test or disturbance.

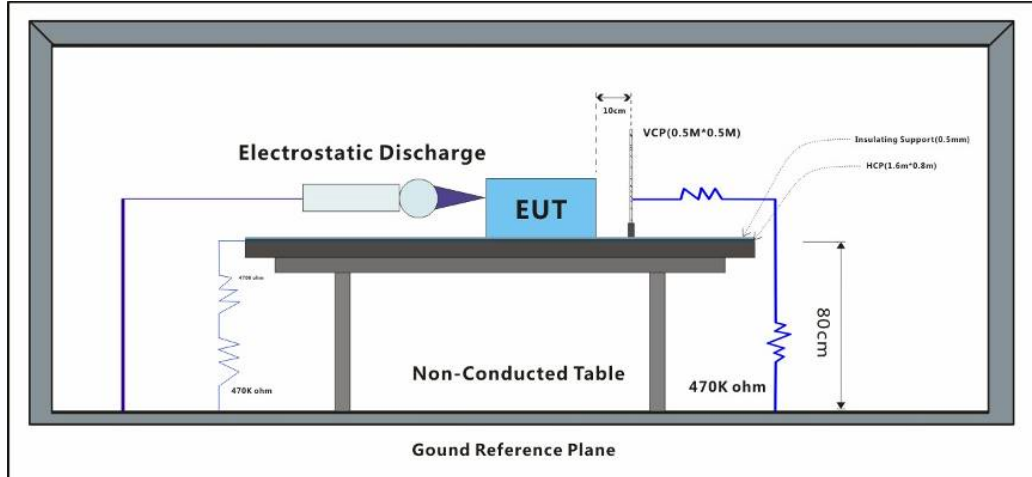
^c Where defined in Clause 5 (for the tests in Table 1 to Table 4), these functional tests shall be performed during the additional spot frequency tests.

7.1 Electrostatic Discharge

Test Requirement: EN 55035: 2017+A11:2020

Test Method: EN 61000-4-2: 2009

7.1.1 Test Setup Diagram



7.1.2 E.U.T. Operation

Operating Environment:

Temperature: 22.1 °C

Humidity: 51.4 % RH

Atmospheric Pressure: 1022 mbar

7.1.3 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 00	Test the EUT in operating normally mode.
Final test 01	Test the EUT in standby mode.

7.1.4 Test Condition and Results:

Performance Criterion: B

Discharge Impedance: 330Ω/150pF

Number of Discharge: Minimum 10 times at each test point

Discharge Mode: Single Discharge

Discharge Period: 1 second minimum

Test Point 1: All insulated enclosure & seams.

Test Point 2: All accessible metal parts of the enclosure.

Test Point 3: All sides.

Discharge type	Level (kV)	Polarity	Test Point	Result / Observations
Air Discharge	2,4,8	+	1	A
Air Discharge	2,4,8	-	1	A
Contact Discharge	4	+	2	A
Contact Discharge	4	-	2	A
Horizontal Coupling	4	+	3	A
Horizontal Coupling	4	-	3	A
Vertical Coupling	4	+	3	A
Vertical Coupling	4	-	3	A

A: No degradation in the performance of the EUT was observed



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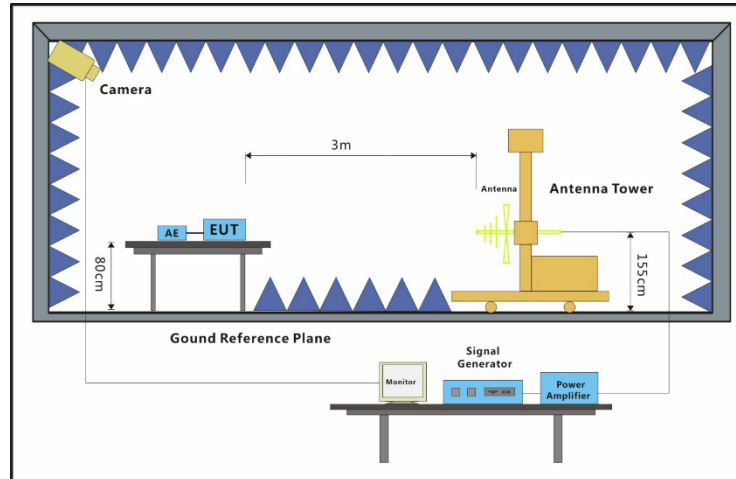
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7.2 Radiated Immunity (80MHz-1GHz,1800MHz,2600MHz,3500MHz,5000MHz)

Test Requirement: EN 55035: 2017+A11:2020

Test Method: EN IEC 61000-4-3: 2020

7.2.1 Test Setup Diagram



7.2.2 E.U.T. Operation

Operating Environment:

Temperature: 22.8 °C

Humidity: 50.6 % RH

Atmospheric Pressure: 1022 mbar

7.2.3 Test Mode Description

Pre-scan /	Mode	Description
Final test	Code	
Final test	00	Test the EUT in operating normally mode.
Final test	01	Test the EUT in standby mode.

7.2.4 Test Condition and Results:

Performance Criterion: A

Frequency Range: 80MHz to 1GHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz

Antenna Polarisation: Vertical and Horizontal

Modulation: 1kHz,80% Amp. Mod,1% increment

Test Distance:3m

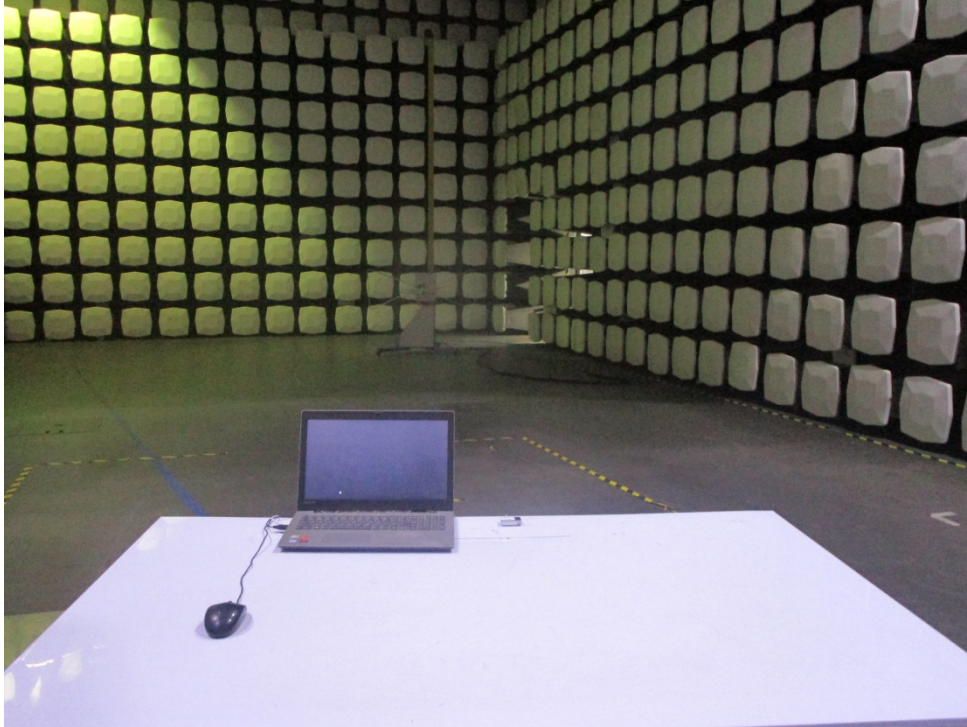
Frequency	Level (V/m)	EUT Face	Dwell time	Result / Observations
80MHz-1GHz	3	Front	3s	A
80MHz-1GHz	3	Back	3s	A
80MHz-1GHz	3	Left	3s	A
80MHz-1GHz	3	Right	3s	A
80MHz-1GHz	3	Top	3s	A
80MHz-1GHz	3	Underside	3s	A
1800MHz	3	Front	3s	A
1800MHz	3	Back	3s	A
1800MHz	3	Left	3s	A
1800MHz	3	Right	3s	A
1800MHz	3	Top	3s	A
1800MHz	3	Underside	3s	A
2600MHz	3	Front	3s	A
2600MHz	3	Back	3s	A
2600MHz	3	Left	3s	A
2600MHz	3	Right	3s	A
2600MHz	3	Top	3s	A
2600MHz	3	Underside	3s	A
3500MHz	3	Front	3s	A
3500MHz	3	Back	3s	A
3500MHz	3	Left	3s	A
3500MHz	3	Right	3s	A
3500MHz	3	Top	3s	A
3500MHz	3	Underside	3s	A
5000MHz	3	Front	3s	A
5000MHz	3	Back	3s	A
5000MHz	3	Left	3s	A
5000MHz	3	Right	3s	A
5000MHz	3	Top	3s	A
5000MHz	3	Underside	3s	A

A: No degradation in the performance of the EUT was observed



8 Test Setup Photo

Radiated Emissions (30MHz-1GHz)

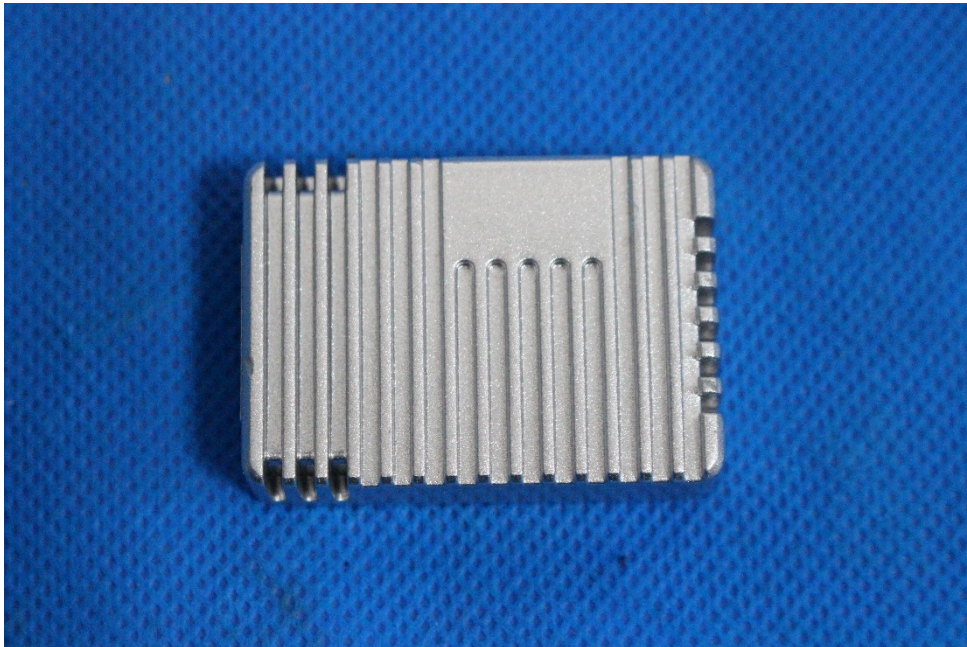


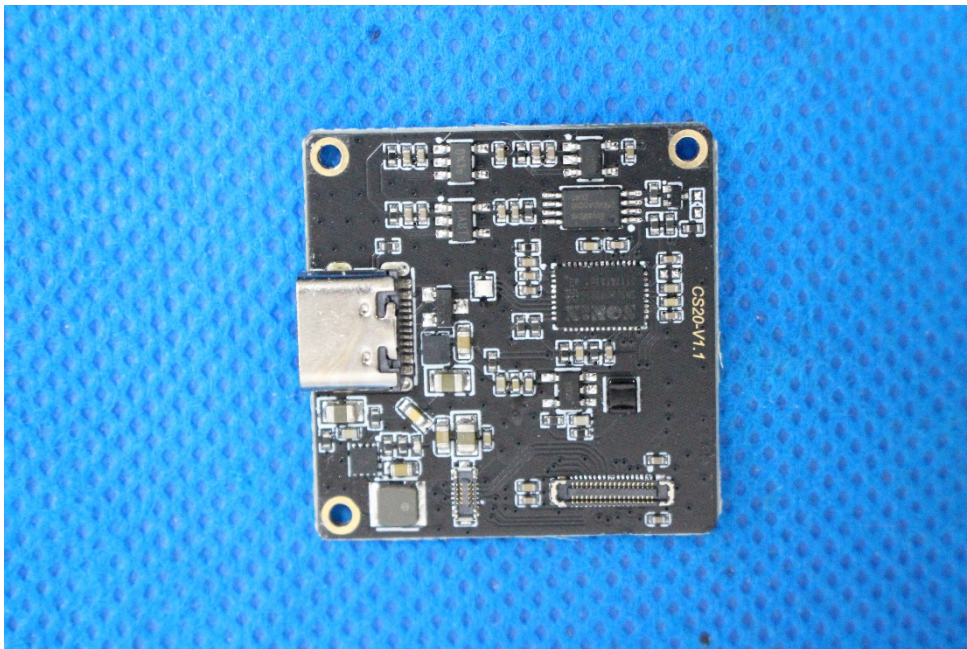
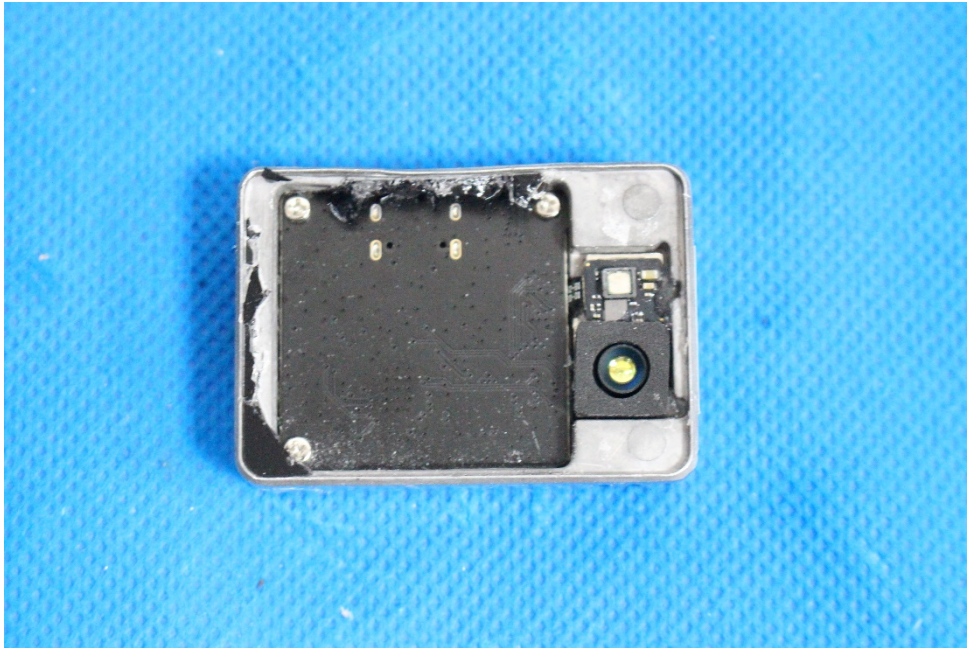
Electrostatic Discharge

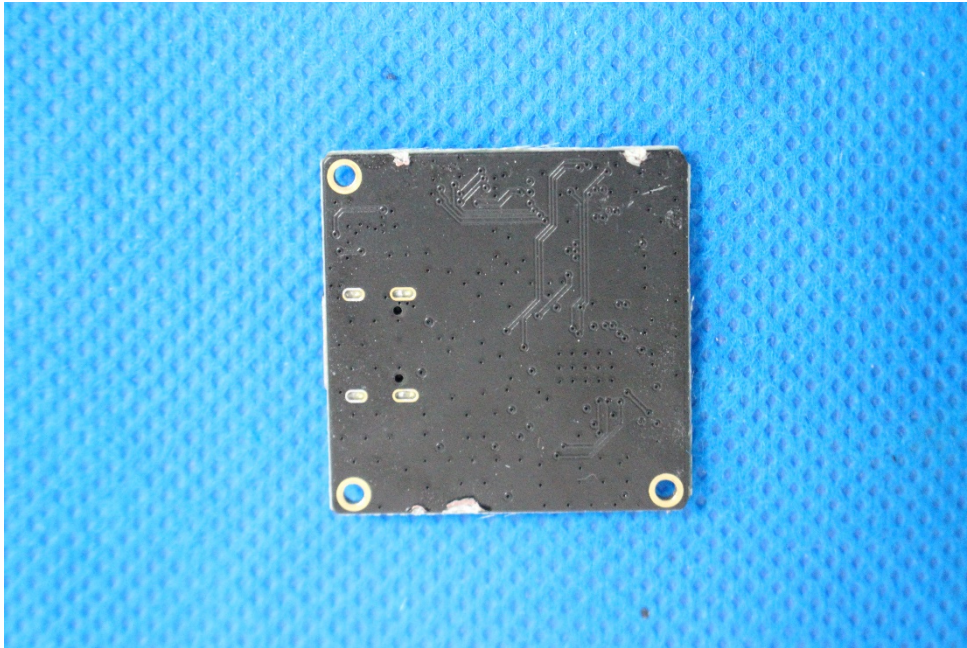


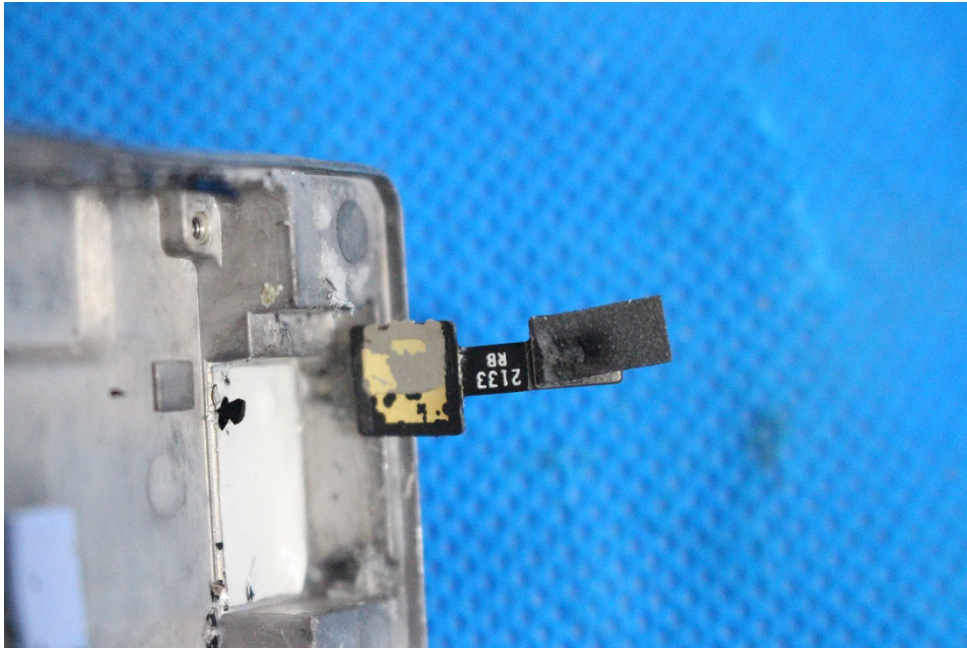
Radiated Immunity (80MHz-1GHz,1800MHz,2600MHz,3500MHz,5000MHz)

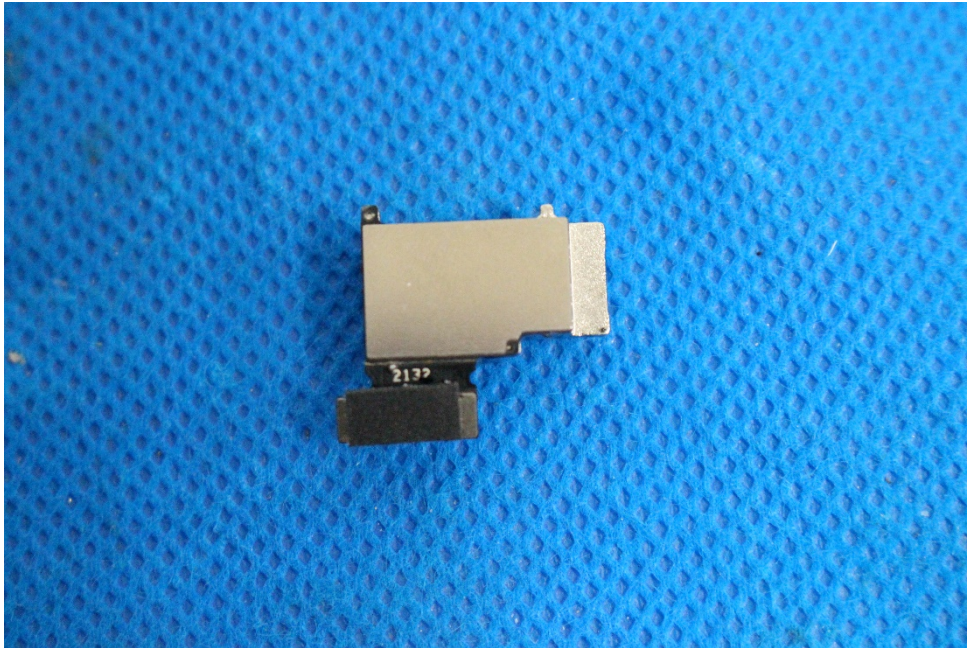
9 EUT Constructional Details (EUT Photos)











- End of the Report -

VERIFICATION OF CONFORMITY FOR RADIO EQUIPMENT DIRECTIVE

No.: RED GZES2111031474AT

Applicant: Shanghai Xiyin Technology Co., Ltd.
Building C, No.888, Huanhu West 2nd Road, Special Area of
China (Shanghai) Pilot Free Zone, Shanghai, China

Manufacturer: Same as applicant

Product Name: Solid State Lidar

Model No.: CS20

Rating: 5 Vd.c., 0,5 A

Protection against Electric Shock: Class III

Additional Information (if any): --

Sufficient samples of the product have been tested and found to be in conformity with

Test Standard: EN 61010-1:2010 + A1: 2019

as shown in the

Test Report Number(s): GZES211103147401

This Verification of Safety consideration has been granted to the applicant based on the results of tests, performed by Laboratory of SGS-CSTC Standards Technical Services Co., Ltd. on sample of the above-mentioned product in accordance with the provisions of the relevant specific standards, which demonstrates compliance of essential safety requirements claimed in article 3 1(a) of 2014/53/EU Radio Equipment directive. The CE marking as shown below can be affixed, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The affixing of the CE marking presumes in addition that the conditions in annexes III and IV of the Directive are fulfilled.


David Guo
Senior Technical Manager
SGS-CSTC



2022-01-14

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Test Report

Report No: GZES211103147401

Date: 2022-01-07

The following sample(s) was/were submitted and identified on behalf of the client as:

Applicant : Shanghai Xiyin Technology Co., Ltd.
Building C, No.888, Huanhu West 2nd Road, Special Aera of China (Shanghai)
Pilot Free Zone, Shanghai, China

Manufacturing location (factory): Same as applicant.

Test object : Solid State Lidar

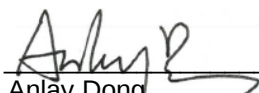
Model : CS20

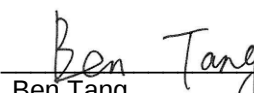
Test specifications / Test standard : EN 61010-1:2010 + A1: 2019

Purpose of examination : Test according to the test specification.

Test result : In the opinion of SGS-CSTC the presented appliance was found to be in compliance with the test specification.

Remark : Throughout this report a comma is used as the decimal separator


Anlay Dong
Project Reviewer
Safety Laboratory


Ben Tang
Project Engineer



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Test Report

Report No: GZES211103147401

Date: 2022-01-07

1. Function / Description :

Solid State Lidar is a device with image sensor used for measuring three-dimensional information of object and space.

It powered by DC via Type-C terminal.

Plastic and glass enclosure was fixed by glue and indoor used only.

2. Test item particulars :

Ratings	5 Vd.c., 0,5 A
Type of item	Measurement
Description of equipment function	Measure three-dimensional information
Connection to mains supply	None
Overvoltage category	Powered by DC
Pollution degree	2
Means of protection	Class III
Environmental conditions	Ambient: -10 – +50 °C
For use in wet locations	No
Equipment mobility	Movable
Operating conditions	Continuous
Overall size of equipment (W x D x H)	48mm x 34mm x 12mm
Mass of equipment (kg)	0,033
Marked degree of protection to IEC 60529	N/A



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Report No: GZES211103147401

Date: 2022-01-07

3. Label :

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.

Shang Hai XiYin Technology Co., Ltd.

CLASS 1 LASER PRODUCT

Product Name: Solid State Lidar

Part No. : CS20



Serial No. : XXXXXXXXXXXXX



RoHS



Remark:

1. The Height of CE logo shall not be less than 5 mm; Height of WEEE logo shall not be less than 7 mm.
2. As declared by the applicant, the importer (and manufacturer, if it is different)'s name, registered trade name or registered trademark and the postal address will be marked on the products before being placed on the market. The contact details shall be in a language easily understood by end-users and market surveillance authorities.



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Test Report

Report No: GZES211103147401

Date: 2022-01-07

4. Test :

The test was done in the Electrical Safety Laboratory of SGS-CSTC in Guangzhou.

These tests fulfil the requirements of standard ISO/IEC 17025.

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

The max. recommended ambient temperature is 50 °C declared by manufacturer.

Input voltage: 5 VDC.

Possible test case verdicts:

Test case does not apply to the test object : N/A (or N)

Test item does meet the requirement : P(ass)

Test item does not meet the requirement : F(ail)

Testing :

Date of receipt of test item : 2021-11-15

Date(s) of performance of tests : 2021-11-18 – 2022-01-04



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Test Report

Report No: GZES211103147401

Date: 2022-01-07

Clause	Requirement	Remarks	Verdict
4	Tests		P
5	Marking and documentation		P
6	Protection against electric shock	Powered by 5,0 VDC via Type-C terminal which voltage is below the limits of clause 6.3, no electric shock hazard	N/A
7	Protection against mechanical HAZARDS	No sharp edges	P
8	Resistance to mechanical stresses		P
9	Protection against the spread of fire	Powered by 5,0 VDC via Type-C terminal which consider as limited-energy circuit	P
10	Equipment temperature limits and resistance to heat		P
11	Protection against HAZARDS from fluids		N/A
12	Protection against radiation, including laser sources, and against sonic and ultrasonic pressure	Class 1 laser product, refer to EN 60825-1 report No. GZEE210900250431	P
13	Protection against liberated gases and substances, explosion and implosion		N/A
14	Components and subassemblies		P
15	Protection by interlocks		N/A
16	HAZARDS resulting from application		N/A
17	RISK assessment		N/A
Annex A	Measuring circuits for touch current (see 6.3)		N/A
Annex B	Standard test fingers (see 6.2)		N/A
Annex C	Measurement of CLEARANCES and CREEPAGE DISTANCES		N/A
Annex D	Parts between which insulation requirements are specified (see 6.4 and 6.5.3)		N/A
Annex F	ROUTINE TESTS		N/A
Annex H	Qualification of conformal coatings for protection against POLLUTION		N/A
Annex K	Insulation requirements not covered by 6.7		N/A



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Report No: GZES211103147401

Date: 2022-01-07

5.1.3c)	TABLE: MAINS supply				Form A.2	N/A
	Marked rating.....:		--	V		—
	Phase		--			—
	Frequency		--	Hz		—
	Current		--	A		—
	Power		--	W		—
	Power		--	VA		—
Test No.	Voltage [V]	Frequency [Hz]	Current [mA]	Power [mW] [VA]		Comments
1	--	--	--	--	--	--
NOTE – Measurements are only required for marked ratings.						
Supplementary information:						



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Date: 2022-01-07

6.7	TABLE: Insulation requirements- Clearances and Creepage					Form A.15				N/A		
6.2.2	Examination					6.5.4	Protective impedance				—	
6.4.2	ENCLOSURES and protective barriers					6.5.6	Current- or voltage-limiting device				—	
6.4.4	Impedance					9.6.1	BASIC INSULATION between opposite polarity				—	
Area	Location (See Form A.14)	Insulation type (NOTE 1)	WORKING VOLTAGE (NOTE 2)			Clearance		Creepage		CTI	Verdict	Comments
			RMS [V]	Peak [V]	Frequency [kHz]	Required [mm]	Measured [mm]	Required [mm]	Measured [mm]			
--	--	--	--	--	--	--	--	--	--	--	--	--
NOTE 1 – refer to Form A.14 for type of insulation shown in the insulation diagram used for definition of required insulation (see Form A.14)										NOTE 2 - to be		
Input supply voltage.....:		--	V	--	Hz							
Supplementary information:												



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Test Report

Report No: GZES211103147401

Date: 2022-01-07

6.7	TABLE: Insulation requirements- Clearances and Creepages							Form A.16			N/A	
6.4.2	ENCLOSURES OR PROTECTIVE BARRIERS							9.6.1	Overcurrent protection basic insulation between MAINS parts			—
8	Mechanical resistance to shock and impact							10.5.1	Integrity of CLEARANCES and CREEPAGE distances			—
Area	Location (See Form A.14)	Insulation type	Mechanical tests (NOTE)					Test at max.	Measured after test (if required)		Verdict	Comments
			Applied force	Rigidity (8.2)		Drop (8.3)		RATED ambient	Clearance	Creepage distance		
			N	Static (8.2.1)	Impact (8.2.2)	Normal (8.3.1)	Hand-held/ Plug-in	(10.5.1)	mm	mm		
--	--	--	--	--	--	--	--	--	--	--	--	--
NOTE – Refer to Form A.18 for dielectric strength tests following the above tests.												
Supplementary information:												



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Report No: GZES211103147401

Date: 2022-01-07

10.	TABLE : Temperature Measurements			Form A.26A	P
10.1	Surface temperature limits – NORMAL CONDITION and / or SINGLE FAULT CONDITION				P
10.2	Temperature of windings – NORMAL CONDITION and / or SINGLE FAULT CONDITION				P
10.3	Other temperature measurements				P
Operating conditions:		Normal operation			
Frequency		-- Hz	Test room ambient temperature (ta) .. :		25 °C
Voltage		5 V	Test duration..... :		1 h 52 min
Part / Location		t_m [°C]	t_c [°C]	t_{max} [°C]	Verdict
PWB surface (near U1)		32,0	57,0	130	P
PWB surface (near U2)		33,2	58,2	130	P
PWB surface (near U3)		28,9	53,9	130	P
PWB surface (near U4)		33,2	58,2	130	P
Glass enclosure surface (top)		28,1	53,1	80 + (50-40) = 90	P
Plastic enclosure surface (bottom)		28,4	53,4	85 + (50-40) = 95	P
NOTE 1 - t_m = measured temperature $t_c = t_m$ corrected ($t_m - t_a + 50$ °C max. RATED ambient) t_{max} = maximum permitted temperature NOTE 2 - see also 14.1 with reference to component operating conditions NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary NOTE 4 - see Form A.26B for details of winding temperature measurements					
Supplementary information:					



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Report No: GZES211103147401

Date: 2022-01-07

5. Component List

object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity ¹⁾
Metal enclosure	Interchangeable	Interchangeable	alloy, min. thickness: 1,0 mm	--	UL (E56070)
PWB	Shenzhen Jia Li Chuang Technology Development Co LTD	JLC-2	V-0, 130 °C	--	UL (E479892)
Alt.	Interchangeable	Interchangeable	Min. V-1, 130 °C	--	UL
Laser module	Vertilite, Inc.	P35940S2G003	Operating Voltage (Vop): 2,14 V Operating Current (Iop): 3,5 A Wavelength(λ): 940 nm	EN 61010-1: 2010 + A1	Tested with appliance



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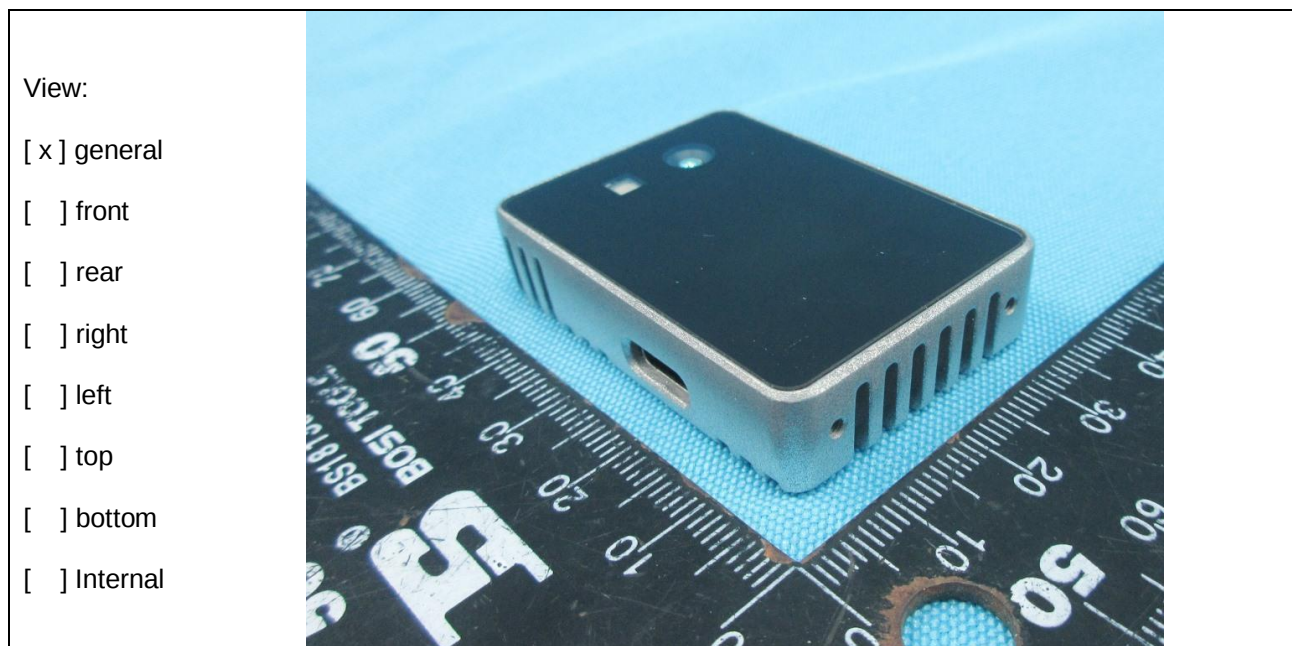
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6. Photo document

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Details of:

View:

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☐ front

☐ rear

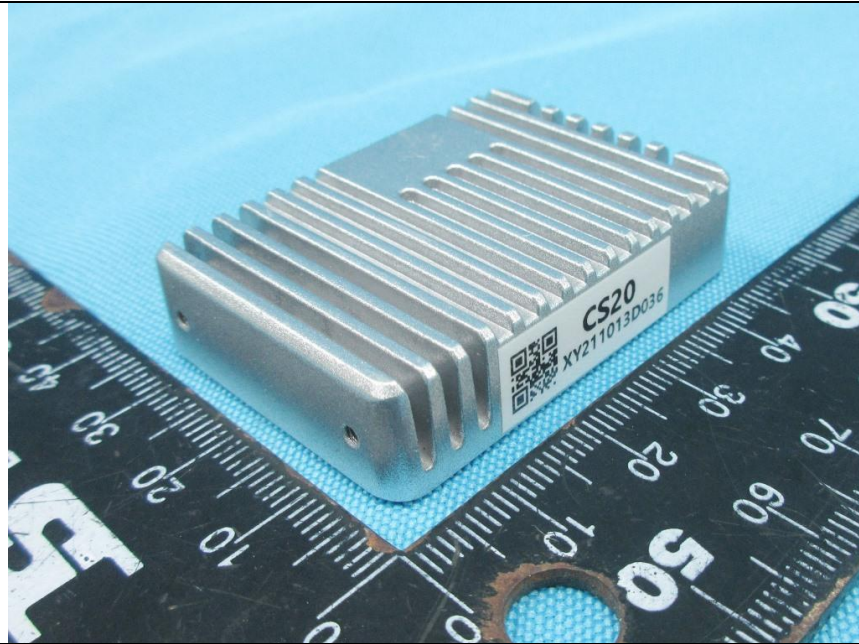
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Details of:

View:

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Date: 2022-01-07

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☐ general

☐ front

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View:

☐ general

☐ front

☐ rear

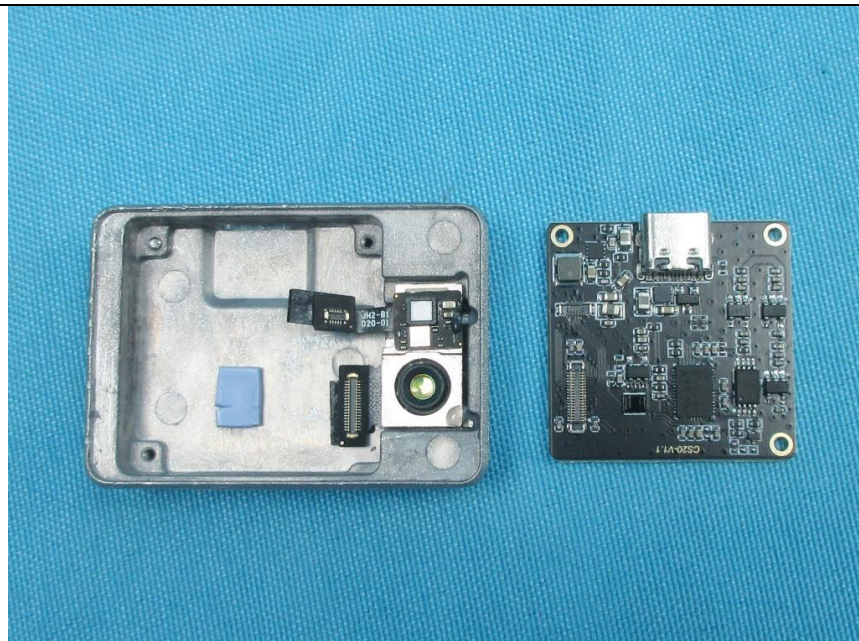
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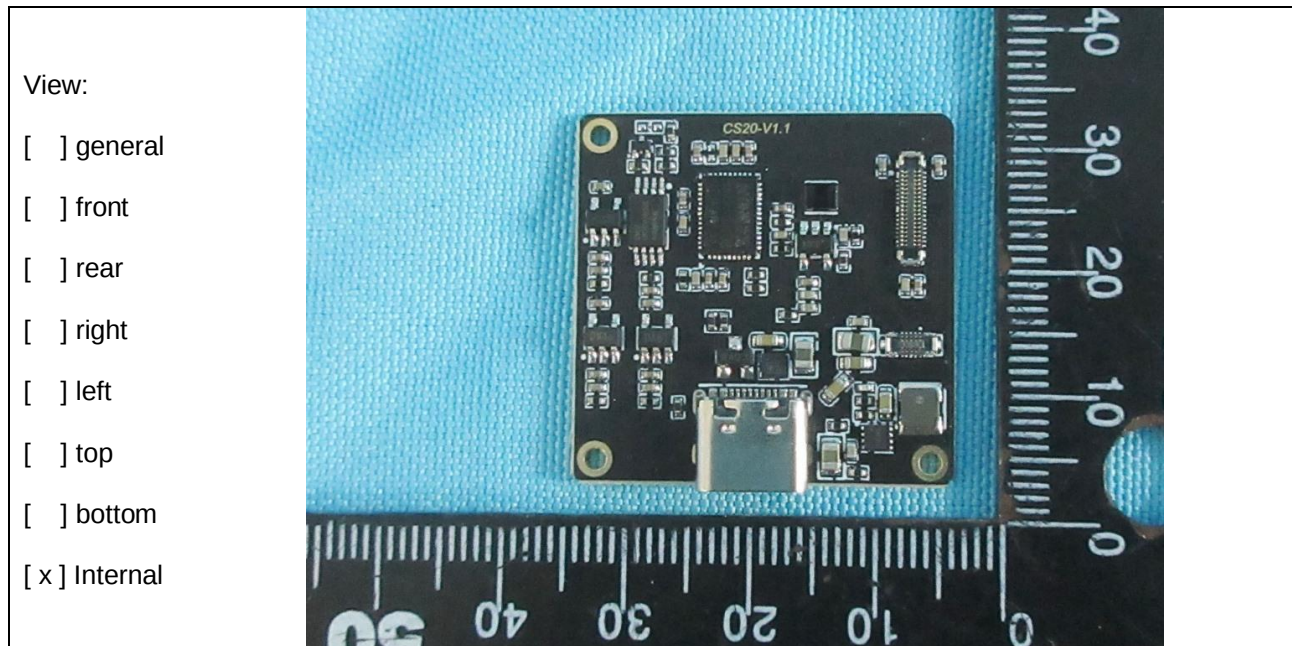
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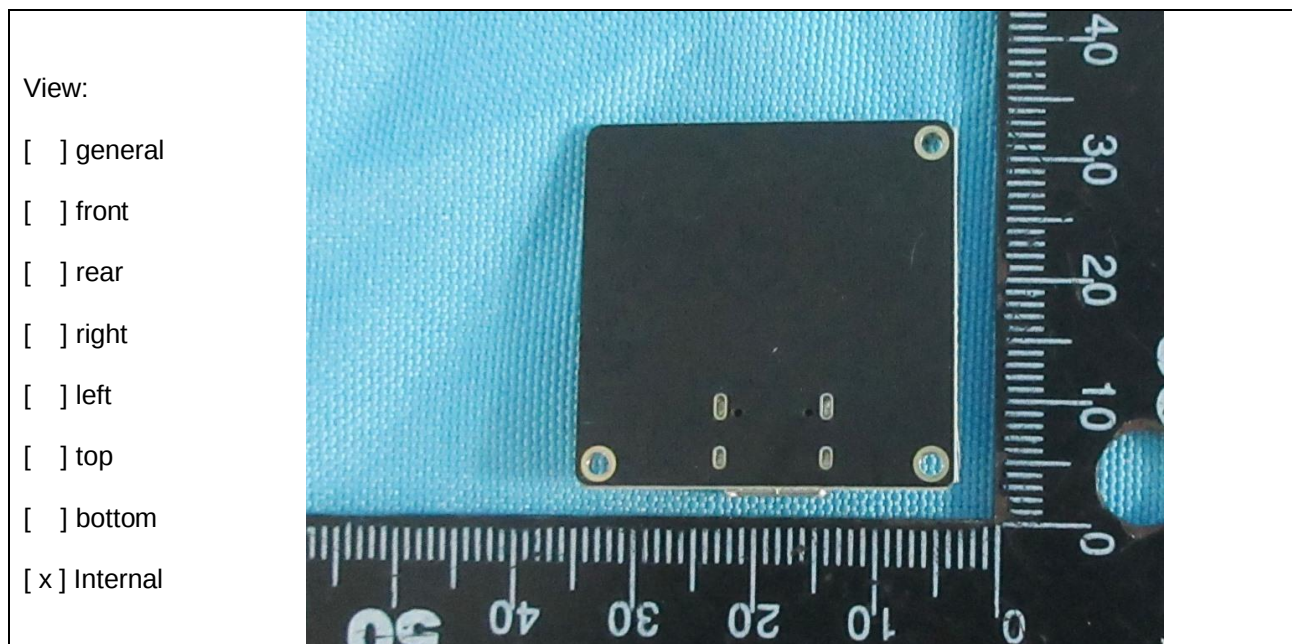
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NOTES TO THIS TEST REPORT

1. The following language(s) of marking(s) and instruction sheets were submitted during the test application:

- English
- Throughout this report a comma is used as the decimal separator.

According to the standard, instruction sheets and other texts required by the standard should be written in the official language(s) of the country in which the product is to be sold. The applicant should ensure that the product in future production fulfils the receptive standard requirements.

2. The components performed satisfactorily during testing and are considered to be suitable for use in the sample tested. Acceptances of the safety critical components and materials were based on:

- the certification record(s) and/or test report submitted by the applicant; or
- component / material tested with the appliance

3. Plug (and socket) used in this product must be compiled with the local plug and socket regulation of the respective country.

- - - End of Report - - -



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TEST REPORT IEC 60825-1 Safety of laser products - Part 1: Equipment classification and requirements	
Report Number.....: GZEE211100325231 Tested by (name + signature).....: Simon Chen / Project Engineer <i>Simon Chen</i> Approved by (name + signature)..: Alex Tan / Reviewer <i>Alex Tan</i> Date of issue 2021-12-02 Total number of pages.....: 11	
Name of Testing Laboratory SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou preparing the Report.....: Branch Address 198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China	
Applicant's name Shanghai Xiyin Technology Co., Ltd. Address Building C, No. 888, Huanhu West 2 nd Road, Special Area of China (Shanghai) Pilot Free Trade Zone, Shanghai, China	
Manufacturer's name.....: Same as applicant Address.....: Same as applicant	
Test specification: Standard ☐ IEC 60825-1:2014 ☒ EN 60825-1: 2014 Test procedure.....: Test Report Non-standard test method.....: N/A	
Test Report Form No.....: IECEN60825-1A Test Report Form(s) Originator SGS-CSTC Master TRF Dated 2021-09-02	
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Test item description	CS20
Trade Mark	—
Factory	Same as applicant
Model/Type reference	CS20
Ratings	DC 5 V; 0,5 A; 1,2 W

Summary of testing:	
CS20 is tested the laser radiation under normal operation and evaluated to be Class 1 according to EN 60825-1:2014.	
Only Clause 4 & 5 were taken account.	
This report is based on report GZEE210900250431 (dated 2021-11-02) issued by SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch, with all test data being copied.	
Test item particulars..... :	
Classification of installation and use..... :	Portable
Supply Connection..... :	DC Connector
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	2021-09-30
Date (s) of performance of tests..... :	2021-09-30 to 2021-10-20
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 ☒ comma / ☐ point is used as the decimal separator. This document is issued by the Company subject to its General Conditions of Service, available on request or accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company’s findings at the time of its intervention only and within the limits of Client’s instructions, if any. The Company’s sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.	
General product information:	
The product contains a 940 nm laser diode.	

IEC 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		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.		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

IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
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	Condition 1 and Condition 3	P
	Aperture diameter	50 mm (for Condition 1) 7 mm (for Condition 3)	P
	Reference point :	Surface of diffuser (For condition 3) The closest point to human access (For Condition 1)	P
	Measurement distance: (for each condition)	2000 mm (for Condition 1) 100 mm (for Condition 3)	P
5.4.3	Evaluation condition for extended sources		—
	Conditions applied		N/A
	Most restrictive position: (distance from reference point)		N/A
	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

IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict

Measured laser radiation, calculations and comparison with AEL limits:

1. TEST CONDITIONS

(1) General requirement

Temperature: 20 – 25 °C
Relative humidity: Max. 75 %

(2) Normal operation

The Laser is simulating normal operation to emit intentional optical power.

(3) Fault condition: Refer to the test result.

2. MEASUREMENT METHOD

(1) Measurement of Peak wavelength

The peak wavelength of Laser is measured under normal operation, used SPR-5000B spectrometer.

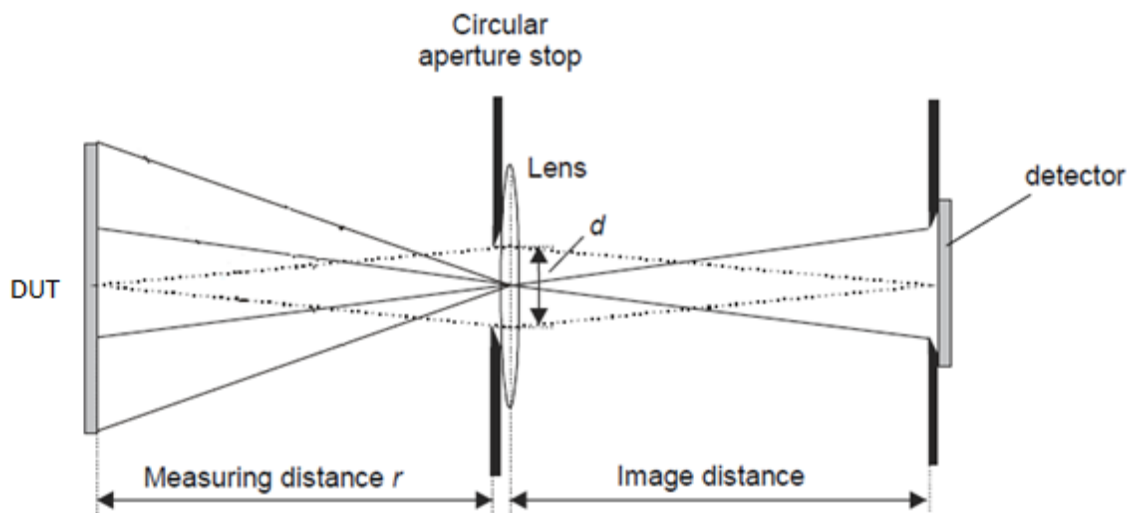
(2) Measuring distance

For condition 1: $r = 2000$ mm.
For condition 3: $r = 100$ mm.
For condition Skin Thermal hazard: $r = 0$ mm

(3) Measurement of radiant power (used optical power meter)

The radiant power emitted from Laser of the product is measured under normal operation.

In case of condition 1, the Laser radiation is collected through a circular aperture stop having a diameter 50 mm and its location is 2000 mm away from the closet point of human access, consists of a lens with 150 mm focal length. See below picture.



In case of condition 3, same as condition 1 except the Laser radiation is collected through a circular aperture stop having a diameter 7 mm and its location is 100 mm away from the apparent source, and focal length of the lens is 35 mm.

IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
In case of condition Skin Thermal Hazard, Laser radiation is collected through a circular aperture stop having a diameter 3,5 mm and its location is 0 mm away from the apparent source. The measurement is performed at a position to detect a maximum radiation emitted from the apparent source. 3. TEST RESULT All below measurements were performed at dark room with ambient temperature $24,5 \pm 0,5$ °C, Relative humidity $60 \pm 5\%$, the product was powered by DC connector. (1) Measurement of wavelength $\lambda_1 = 940$ nm (infrared) (2) Measurement of leakage laser radiant power Normal operation: For condition 1: Obviously, condition 3 was harsher than condition 1 and was not tested. For condition 3 $P_{\lambda 1} = 18,75$ µW; For condition Skin Thermal hazard: $r = 0$ mm $P_{\lambda 1} = 10,2$ µW; Single fault condition: Condition 3: Fault #1: C bridged: not worked, 0 W. Fault #2: R bridged: not worked, 0 W. 4. CLASSIFICATION OF LASER RADIATION (1) Compare the accessible emission level of radiation emitted from Laser of the product with the accessible emission limit of certain class. This comparison is evaluated using the measurement value under each condition. Accessible emission levels are measurement value or calculated from the measurement value if necessary. (2) Time base The time base is 100 s. (3) Correction factor for Laser For simplified (default) method: Correction factor $C_4 = 3,02$; $C_7 = 1$ (4) Comparison with AEL			

IEC 60825-1				
Clause	Requirement + Test		Result - Remark	
Condition	Evaluation method	Distance (mm)	AE (μW)	AEL Class 1
Condition 3	Simplified (default) evaluation	100	18,75	1177,8 μW
Skin Thermal	Simplified (default) evaluation	0	10,2	1177,8 μW
Conclusion: Measured emission power is not exceeding the AEL for Class 1, therefore the product is classified as Class 1 laser product.				

IEC 60825-1			
Clause	Requirement + Test	Result - Remark	Verdict
6	ENGINEERING SPECIFICATIONS		—
7	LABELLING		—
8	OTHER INFORMATIONAL REQUIREMENTS		—
9	ADDITIONAL REQUIREMENTS FOR SPECIFIC LASER PRODUCTS		—

Attachment 1: Photo documentation

Details of: View for product

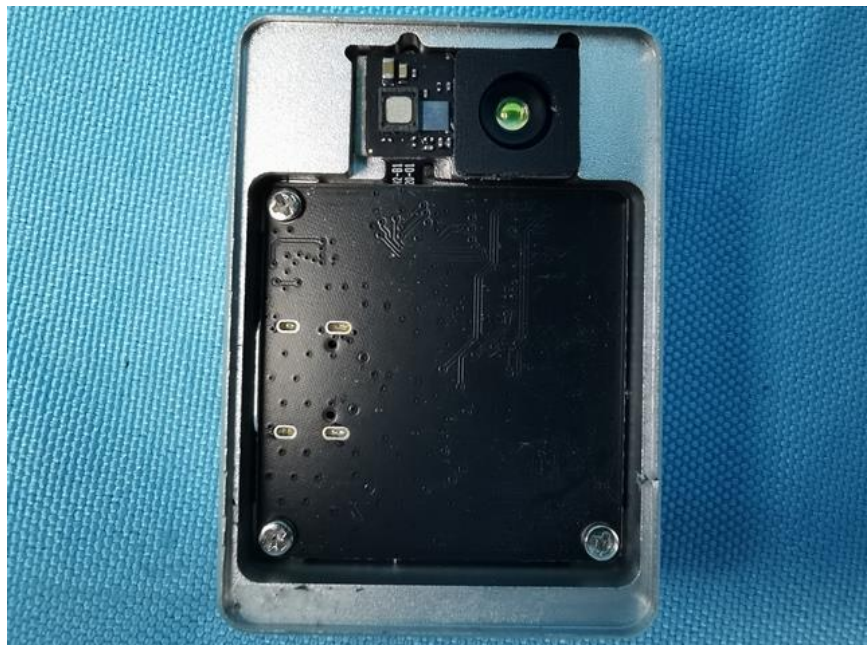
View:

- ☒ general
☐ front
☐ rear
☐ right
☐ left
☐ top
☐ bottom
☐ internal

Details of: View for product inside

View:

- ☒ general
☐ front
☐ rear
☐ right
☐ left
☐ top
☐ bottom
☐ internal

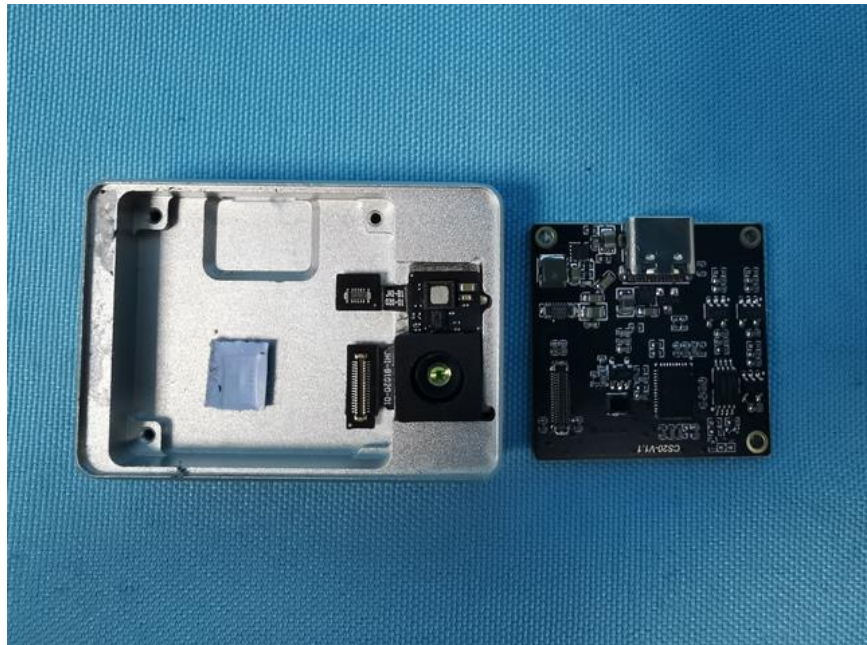


Attachment 1: Photo documentation

Details of: View for product inside

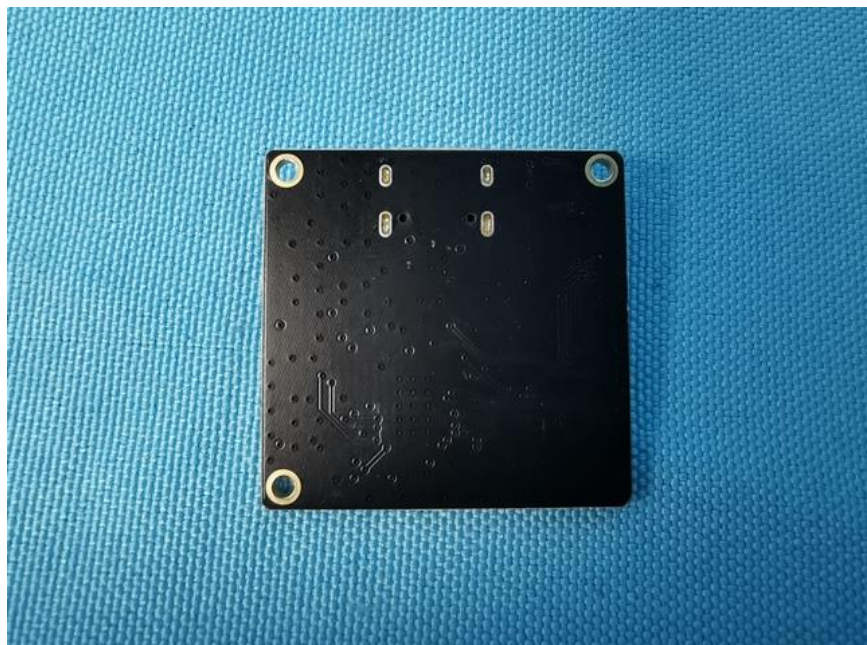
View:

- ☒ general
- ☐ front
- ☐ rear
- ☐ right
- ☐ left
- ☐ top
- ☐ bottom
- ☐ internal

Details of: PCB

View:

- ☒ general
- ☐ front
- ☐ rear
- ☐ right
- ☐ left
- ☐ top
- ☐ bottom
- ☐ internal



- - - END OF REPORT - - -

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SHANGHAI XIYIN TECHNOLOGY CO.,LTD

BUILDING C, NO.888, HUANHU WEST 2ND ROAD, SPECIAL AREA OF CHINA (SHANGHAI) PILOT FREE TRADE ZONE, SHANGHAI,CHINA

Sample Name : CS20
 SGS Job No. : CP21-061693 - SZ
 Tested Basic Model No. CS20
 (P.O.No) :
 Date of Sample Received : 18 Nov 2021
 Verification Period : 18 Nov 2021 - 20 Dec 2021
 Verification Requested : With reference to RoHS Directive (EU) 2015/863 amending 2011/65/EU.
 Verification Method : Please refer to next page(s).
 Verification Result : Please refer to next page(s).
 Verification Conclusion : Based on the verification results of the submitted samples, the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP) , Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) , and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
 SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Violet Shi

Violet, Shi
 Approved Signatory

scan to see the report



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 Guangzhou Branch Testing Center Chemical Laboratory

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Verification Method :

1. With reference to IEC 62321-2:2013, review was performed for the samples disjointed from the submitted articles.
2. With reference to IEC 62321-1:2013, tests were performed for the samples indicated by the photos in this report
 - (1) With reference to IEC 62321-3-1:2013, screening by EDXRF spectroscopy.
 - (2) Wet chemical test method: With reference to IEC 62321-4:2013+A1:2017, IEC62321-5:2013, IEC 62321-7-1:2015, IEC 62321-7-2:2017, ISO 17075-1:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES,UV-Vis and GC-MS.

In accordance with the result of material risk assessment, the following disjointed parts in the submitted sample have been verified.

Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
1	White adhesive plastic w/black printing	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
2	Silver-gray metal shell	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	IN	---	ND	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	



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Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
3	Black surfaced glass sheet	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	BL	---	Comply	
		BBP	---	BL	---	Comply	
		DEHP	---	BL	---	Comply	
		DIBP	---	BL	---	Comply	
4	Beige adhesive paper sheet	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
5	Silvery metal screw	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	



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Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
6	Black "PCB"	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	IN	---	ND	Comply	
		PBDEs	IN	---	ND	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
7	Black adhesive foam part	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	



Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
8	Black body	Pb	BL	---	---	Comply	18 Nov 2021 06 Dec 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
9	Black body	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	BL	---	Comply	
		BBP	---	BL	---	Comply	
		DEHP	---	BL	---	Comply	
		DIBP	---	BL	---	Comply	
10	Light purple material sheet	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	



Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
11	Black body	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	26 Nov 2021
		Hg	BL	---	---	Comply	
		Cr(VI)▼	IN	---	ND	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
12	Black body (chip capacitor)	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	06 Dec 2021
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	



Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
13	Silvery metal shell	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	IN	---	ND	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
14	Golden/silvery metal pin	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
15	Dark grey plastic part	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	BL	---	Comply	



Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
		BBP	---	BL	---	Comply	
		DEHP	---	BL	---	Comply	
		DIBP	---	BL	---	Comply	
16	Gery paste(solder)	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	26 Nov 2021
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	IN	---	ND	Comply	
		PBDEs	IN	---	ND	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
17	Black body	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	BL	---	Comply	
		BBP	---	BL	---	Comply	
		DEHP	---	BL	---	Comply	
		DIBP	---	BL	---	Comply	



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Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
18	Black/white body	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	BL	---	Comply	
		BBP	---	BL	---	Comply	
		DEHP	---	BL	---	Comply	
		DIBP	---	BL	---	Comply	
19	Black "FPC"	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	BL	---	Comply	
		BBP	---	BL	---	Comply	
		DEHP	---	BL	---	Comply	
		DIBP	---	BL	---	Comply	
20	White glue	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	



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Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
21	Silvery metal frame	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
22	Black "FPC"	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	BL	---	Comply	
		BBP	---	BL	---	Comply	
		DEHP	---	BL	---	Comply	
		DIBP	---	BL	---	Comply	



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Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
23	Dark grey plastic frame	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	BL	---	Comply	
		BBP	---	BL	---	Comply	
		DEHP	---	BL	---	Comply	
		DIBP	---	BL	---	Comply	
24	Dark grey plastic frame	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	BL	---	Comply	
		BBP	---	BL	---	Comply	
		DEHP	---	BL	---	Comply	
		DIBP	---	BL	---	Comply	
25	Silvery glass sheet	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	---	---	



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Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	
26	Transparent plastic sheet	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	BL	---	Comply	
		BBP	---	BL	---	Comply	
		DEHP	---	BL	---	Comply	
		DIBP	---	BL	---	Comply	
27	Silvery metal sheet	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	IN	---	ND	Comply	
		PBBs	---	---	---	---	
		PBDEs	---	---	---	---	
		DBP	---	---	---	---	
		BBP	---	---	---	---	
		DEHP	---	---	---	---	
		DIBP	---	---	---	---	



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Part No.	Part Description	Restricted Substances	Results of EDXRF ⁽¹⁾	Screening Result of PHTH ⁽²⁾	Result of Wet Chemical Testing ⁽³⁾ (mg/kg)	Conclusion	Sample Submitted / Resubmitted Date
28	Black adhesive foam sheet	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	
29	White glue	Pb	BL	---	---	Comply	18 Nov 2021
		Cd	BL	---	---	Comply	
		Hg	BL	---	---	Comply	
		Cr(VI)▼	BL	---	---	Comply	
		PBBs	BL	---	---	Comply	
		PBDEs	BL	---	---	Comply	
		DBP	---	---	ND	Comply	
		BBP	---	---	ND	Comply	
		DEHP	---	---	ND	Comply	
		DIBP	---	---	ND	Comply	



Remark

- (1) (a) There are the results on total Br while test items on restricted substances are PBBs and PBDEs.

There is the result on total Cr while test item on restricted substances is Cr(VI).

- (b) Results are obtained by EDXRF for primary screening, and further chemical testing by ICP-OES (for Cd, Pb, Hg), UV-Vis (for Cr(VI)) and GC-MS (for PBBs, PBDEs) is recommended to be performed if the concentration exceeds the below warning value according to IEC62321-3-1:2013 (unit: mg/kg).

Element	Polymer	Metal	Composite Materials
Cd	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$LOD < X < (150+3\sigma) \leq OL$
Pb	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
Hg	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
Br	$BL \leq (300-3\sigma) < X$	Not Applicable	$BL \leq (250-3\sigma) < X$
Cr	$BL \leq (700-3\sigma) < X$	$BL \leq (700-3\sigma) < X$	$BL \leq (500-3\sigma) < X$

- (c) BL = Below Limit, OL = Over Limit, IN = Inconclusive, LOD = Limit of Detection.

- (d) The XRF screening test for RoHS elements – The reading may be different to the actual content in the sample be of non-uniformity composition.

- (2) Screening results of PHTH are for primary screening, and further chemical testing by GC-MS (for DBP, BBP, DEHP and DIBP) are recommended to be performed if the concentration exceeds the below warning value(unit: mg/kg).

Compound	Polymer
DBP	$BL \leq 600 < X$
BBP	$BL \leq 600 < X$
DEHP	$BL \leq 600 < X$
DIBP	$BL \leq 600 < X$

- (3) (a) mg/kg = 0.0001%, MDL=Method detection Limit, ND = Not Detected (<MDL), --- = Not Applicable, - = Without BOM.

- (b) Unit and MDL in wet chemical test

Test Item	Pb	Cd	Hg	DBP	BBP	DEHP	DIBP
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MDL	10	10	10	100	100	100	100

The MDL for single compound of PBBs and PBDEs is 100 mg/kg,

MDL of Cr(VI) for polymer, composite and leather sample is 10 mg/kg.

MDL of Cr(VI) for metal sample is 0.10µg/cm².



(c) ▼ =Metal sample

a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 µg/cm².

The sample coating is considered to contain Cr(VI)

b. The sample is negative for Cr(VI) if Cr(VI) is ND (concentration less than 0.10 µg/cm²).

The coating is considered a non- Cr(VI) based coating

c. The result between 0.10 µg/cm² and 0.13 µg/cm² is considered to be inconclusive

- unavoidable coating variations may influence the determination

Information on storage conditions and production date of the tested sample is unavailable and thus Cr(VI) results represent status of the sample at the time of testing.

(4) Restricted substances and maximum concentration values tolerated by weight in homogeneous materials under RoHS Directive: Cd: 0.01%, Pb/Hg/Cr(VI)/PBBs/PBDEs/DEHP/DBP/BBP/DIBP: 0.1%. The limit is quoted from RoHS Directive (EU) 2015/863.

(5) IEC 62321 series is equivalent to EN 62321 series

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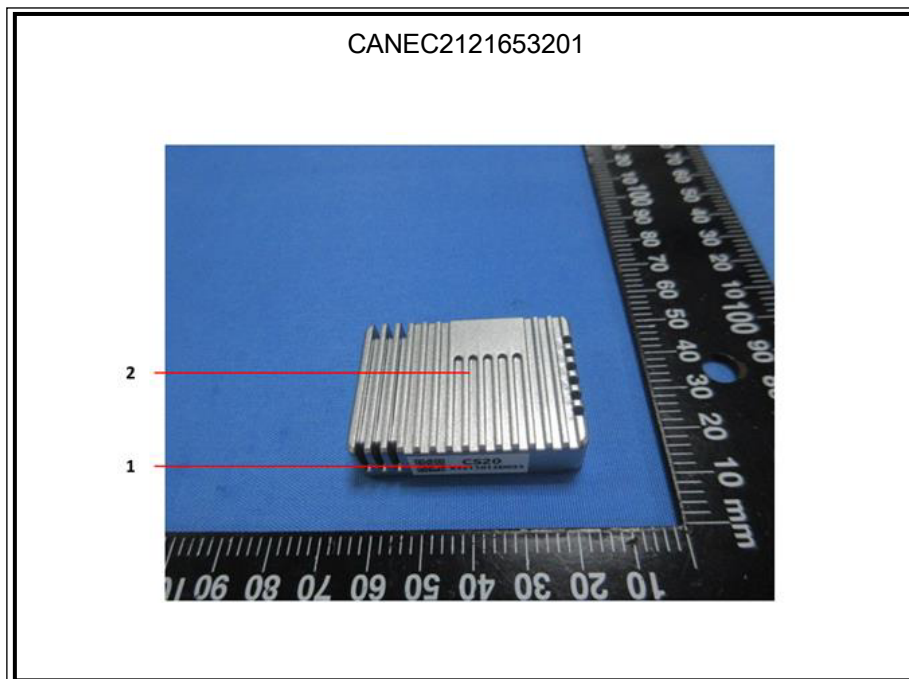
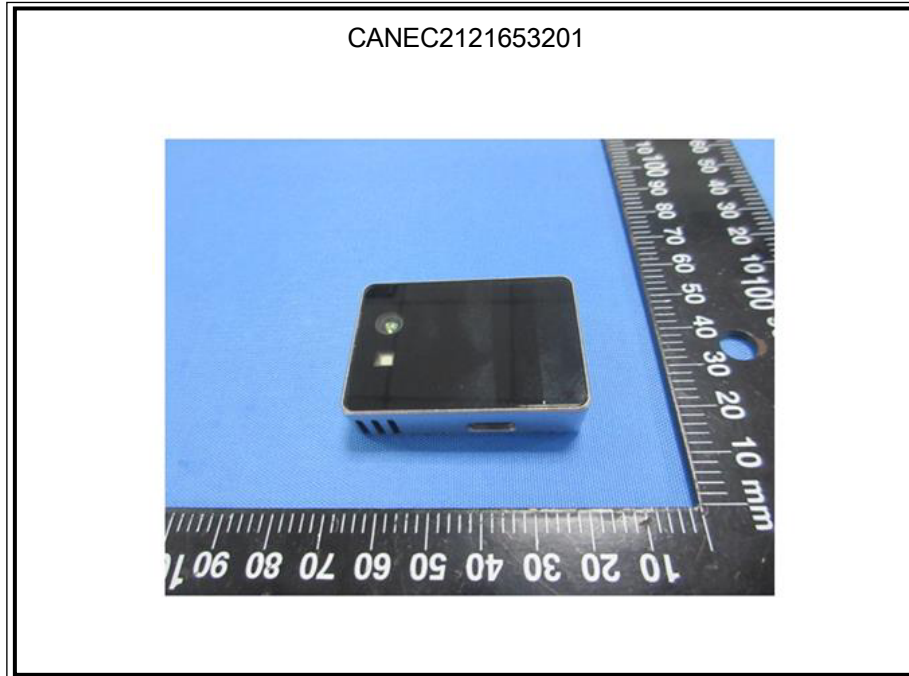
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Sample photo:



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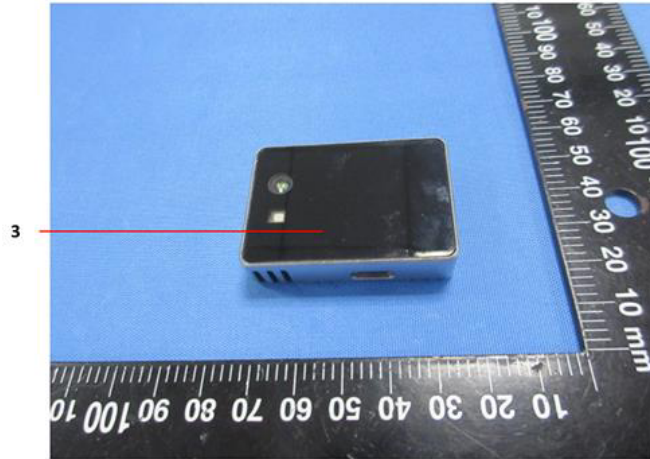
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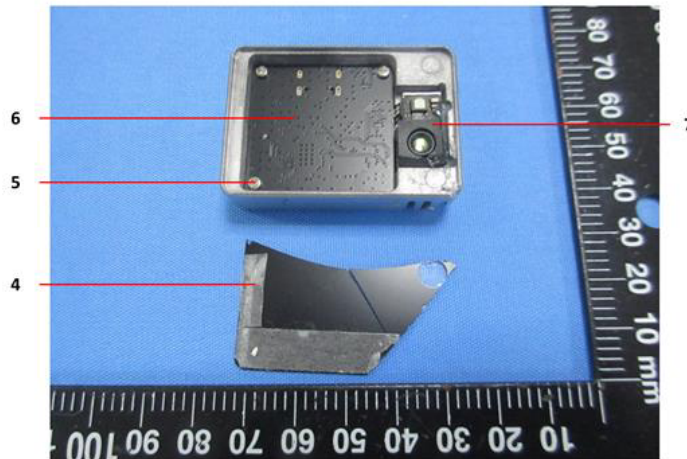
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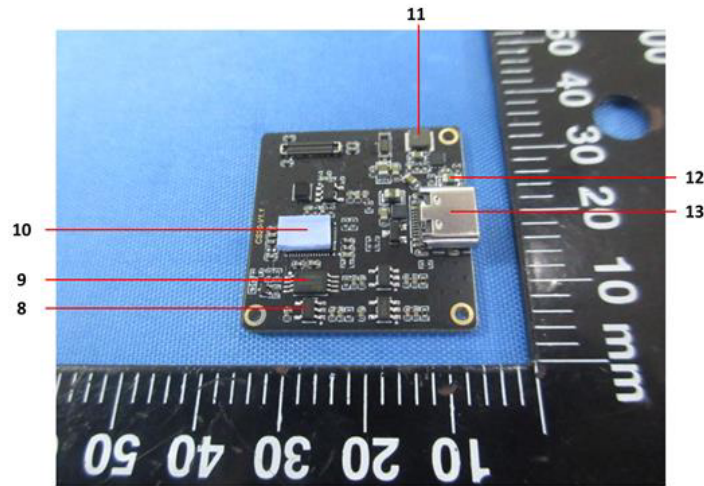
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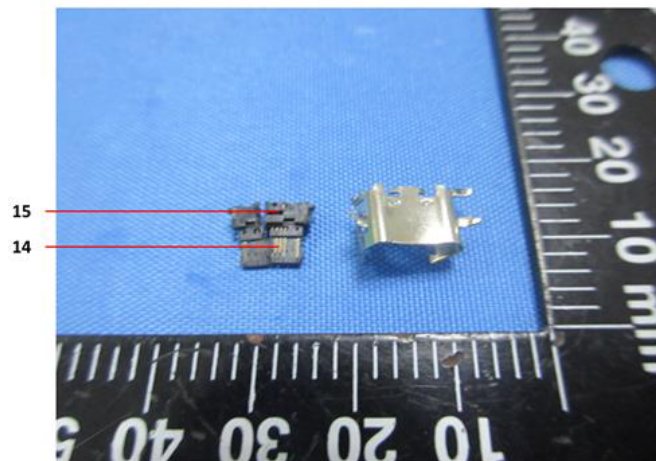
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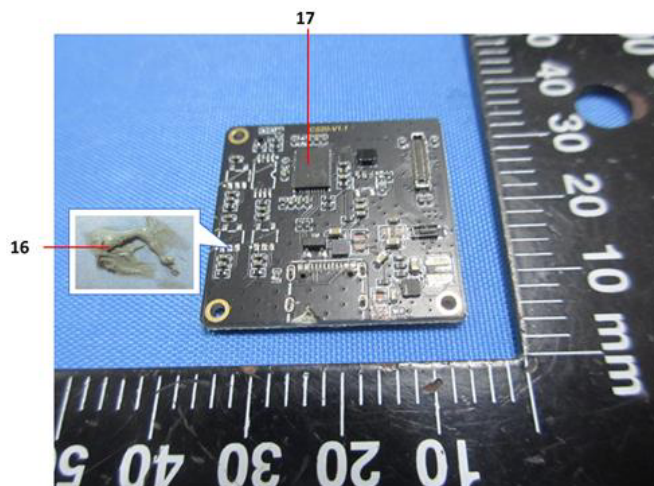
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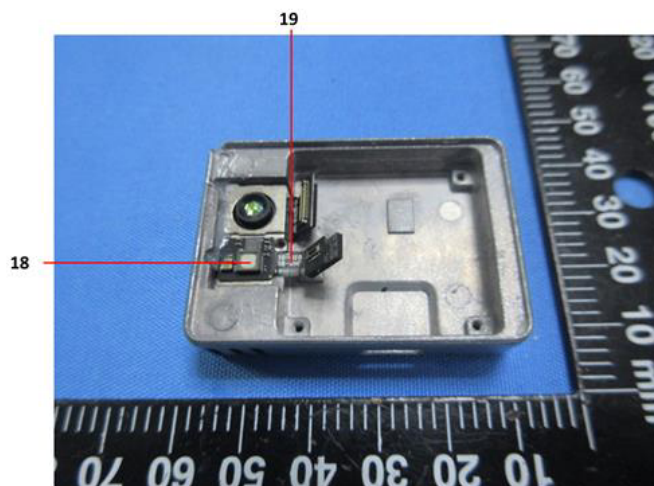
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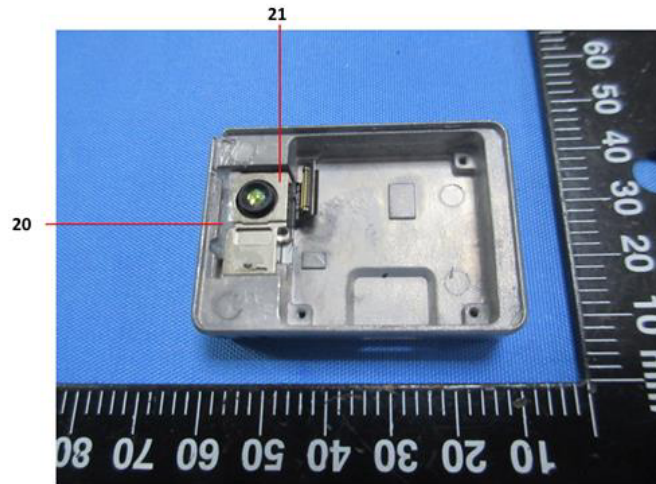
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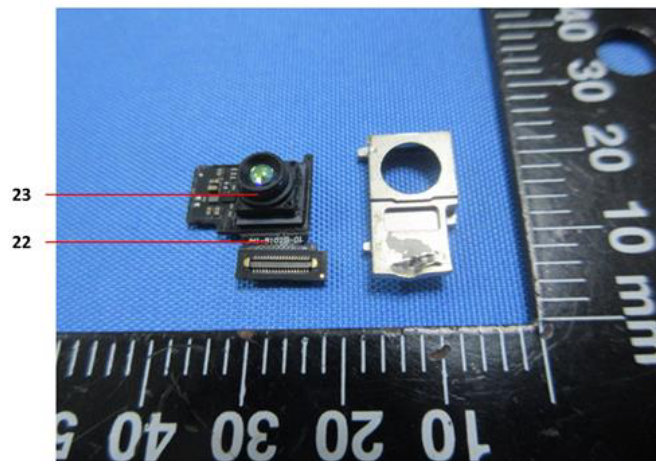
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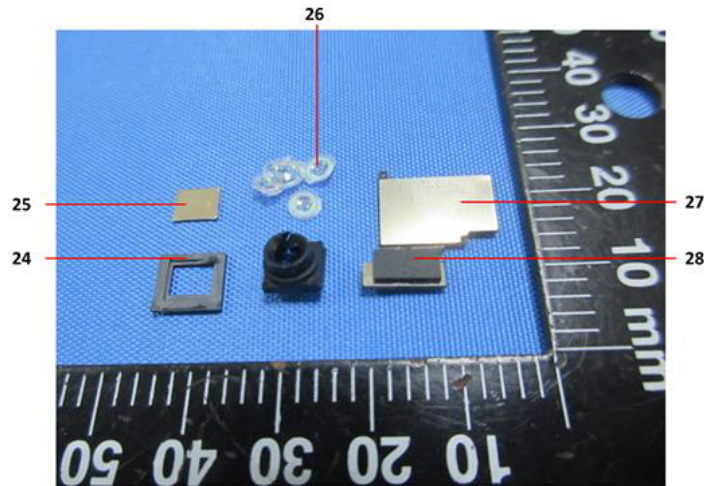
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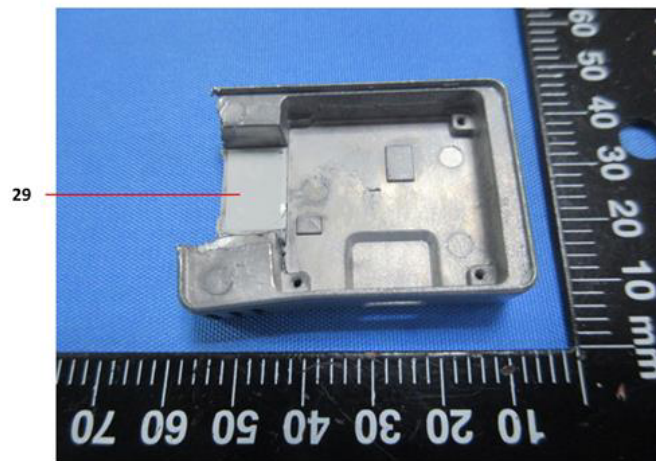
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