

Report No.: SZEM200500386401

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TEST REPORT

Application No.: SZEM2005003864AT

Applicant: Shenzhen Inno-Maker technology Co., Itd

Address of Applicant: Floor 8, QinNian City State Park, HePing Road, Longhua District, Shenzhen

Guangdong.

Manufacturer: Shenzhen Inno-Maker technology Co., Itd

Address of Manufacturer: Floor 8, QinNian City State Park, HePing Road, Longhua District, Shenzhen

Guangdong.

Equipment Under Test (EUT):

EUT Name: CAM-OV5647 Model No.: CAM-OV5647

47 CFR Part 15, Subpart B Standard(s):

Date of Receipt: 2020-05-18

Date of Test: 2020-05-19 to 2020-08-25

2020-08-29 Date of Issue:

Pass* Test Result:

EMC Laboratory Manager

Keny. Ku



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



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	Revision Record							
Version Chapter Date Modifier Re								
01		2020-08-29		Original				

Authorized for issue by:		
	Toychen	
	Foray Chen /Project Engineer	
	EvicFu	
	Eric Fu /Reviewer	



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Test Summary

Emission Part							
Item	Standard	Method	Requirement	Result			
Conducted Emissions at Mains Terminals (150kHz-30MHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass			
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass			
Radiated Emissions (above 1GHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass			

Internal Source	Upper Frequency
Below 1.705MHz	30MHz
1.705MHz to 108MHz	1GHz
108MHz to 500MHz	2GHz
500MHz to 1GHz	5GHz
Above 1GHz	5th harmonic of the highest frequency or 40GHz, whichever is lower



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General Information

4.1 Details of E.U.T.

Power Supply:	DC3.3V 100mA
Cable:	Data cable: 20cm unshielded

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Adapter	Apple	A1357 W010A051	REF. No.SEA0500
HDMI Cable	Apple	MC838FE/B	REF. No.SEA0900
Micro USB Cable	Supply by client	N/A	N/A
Monitor	Lenovo	A16215FT0	V5FF584500PC160
Support board	Supply by client	Raspberry Pi 3 model B V1.2	N/A
Monitor	MITSUBISHI	AX025	1X201617AC
Monitor	SONY	KDL-32W600D	2115461

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conduction Emission	± 3.0dB (150kHz to 30MHz)
2	Dadioted Emission	± 4.5dB (30MHz-1GHz)
2	Radiated Emission	± 4.8dB (1GHz-6GHz)
13	Temperature test	± 1°C
14	Humidity test	± 3%



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

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

A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC -Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 **Equipment List**

Conducted Emissions at Mains Terminals (150kHz-30MHz)						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Shielding Room	ChangZhou ZhongYu	GB-88	SEM001-06	2019-06-13	2022-06-12	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM024-01	2020-07-10	2021-07-09	
LISN	Rohde & Schwarz	ENV216	SEM007-01	2019-09-24	2020-09-23	
LISN	ETS-LINDGREN	3816/2	SEM007-02	2020-04-01	2021-03-31	
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2020-03-24	2021-03-23	

Radiated Emissions (30MHz-1GHz)						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM029-01	2020-07-10	2021-07-09	
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-16	2019-12-16	2020-12-15	
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-18	2019-08-08	2022-08-07	
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2020-04-09	2021-04-08	

Radiated Emissions (above 1GHz)						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-10	2021-07-09	
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08	
Horn Antenna	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12	
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23	



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General used equipment						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2019-09-26	2020-09-25	
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25	
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25	
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2020-04-07	2021-04-06	



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6 Emission Test Results

6.1 Conducted Emissions at Mains Terminals (150kHz-30MHz)

Test Requirement: 47 CFR Part 15, Subpart B

Test Method: ANSI C63.4:2014 Frequency Range: 150kHz to 30MHz

Limit:

0.15M-0.5MHz 66dB(μ V)-56dB(μ V) quasi-peak, 56dB(μ V)-46dB(μ V) average

0.5M-5MHz 56dB(μ V) quasi-peak, 46dB(μ V) average 5M-30MHz 60dB(μ V) quasi-peak, 50dB(μ V) average

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

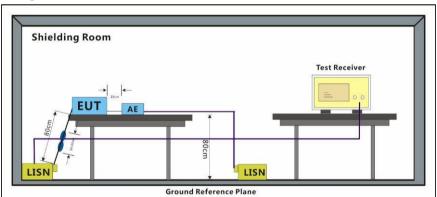
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22.3 °C Humidity: 58 % RH Atmospheric Pressure: 1010 mbar

Test mode a: On mode, keep EUT working normally.

6.1.2 Test Setup Diagram



6.1.3 Measurement Data

An initial pre-scan was performed with peak detector. Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.



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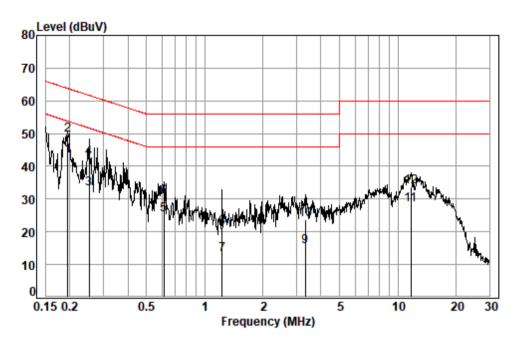
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Mode:a; Line:Live Line



: Shielding Room

Condition: Line Job No. : 03864AT

Test mode: a

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.1955	0.02	9.68	33.44	43.14	53.80	-10.66	Average
2	0.1955	0.02	9.68	40.01	49.71	63.80	-14.09	QP
3	0.2521	0.03	9.68	23.46	33.17	51.69	-18.52	Average
4	0.2521	0.03	9.68	32.77	42.48	61.69	-19.21	QP
5	0.6140	0.07	9.69	15.41	25.17	46.00	-20.83	Average
6	0.6140	0.07	9.69	20.96	30.72	56.00	-25.28	QP
7	1.2357	0.11	9.71	3.38	13.20	46.00	-32.80	Average
8	1.2357	0.11	9.71	11.59	21.41	56.00	-34.59	QP
9	3.3281	0.16	9.77	5.68	15.61	46.00	-30.39	Average
10	3.3281	0.16	9.77	13.70	23.63	56.00	-32.37	QP
11	11.6826	0.19	10.28	17.70	28.17	50.00	-21.83	Average
12	11.6826	0.19	10.28	23.40	33.87	60.00	-26.13	QP



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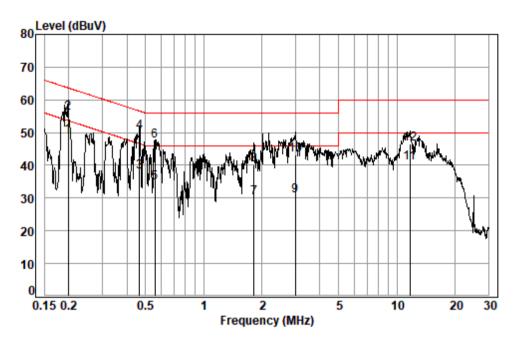
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Mode:a; Line:Neutral Line



: Shielding Room

Condition: Neutral Job No. : 03864AT

Test mode: a

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.1986	0.02	9.66	39.21	48.89	53.67	-4.78	Average
2	0.1986	0.02	9.66	46.40	56.08	63.67	-7.59	QP
3	0.4661	0.06	9.67	28.22	37.95	46.58	-8.63	Average
4	0.4661	0.06	9.67	40.61	50.34	56.58	-6.24	QP
5	0.5581	0.07	9.68	24.94	34.69	46.00	-11.31	Average
6	0.5581	0.07	9.68	37.81	47.56	56.00	-8.44	QP
7	1.8192	0.15	9.72	20.36	30.23	46.00	-15.77	Average
8	1.8192	0.15	9.72	30.22	40.09	56.00	-15.91	QP
9	2.9935	0.16	9.76	20.66	30.58	46.00	-15.42	Average
10	2.9935	0.16	9.76	33.17	43.09	56.00	-12.91	QP
11	11.6826	0.19	10.36	30.27	40.82	50.00	-9.18	Average
12	11.6826	0.19	10.36	36.08	46.63	60.00	-13.37	QP



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6.2 Radiated Emissions (30MHz-1GHz)

Test Requirement: 47 CFR Part 15, Subpart B

Test Method: ANSI C63.4:2014 Frequency Range: 30MHz to 1GHz

Measurement Distance: 10m

Limit:

30 MHz - 88 MHz $29.5 (\text{dB}\mu\text{V/m})$ quasi-peak 88 MHz - 216 MHz $33.1 (\text{dB}\mu\text{V/m})$ quasi-peak 216 MHz - 960 MHz $35.6 (\text{dB}\mu\text{V/m})$ quasi-peak $43.5 (\text{dB}\mu\text{V/m})$ quasi-peak

Detector: Peak for pre-scan (120kHz resolution bandwidth) 30M to1000MHz

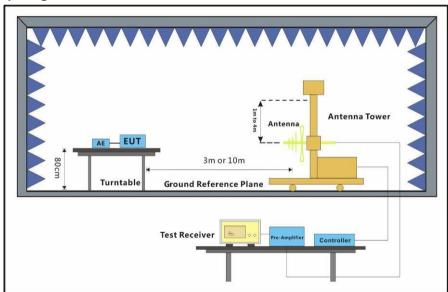
6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode a: On mode, keep EUT working normally.

6.2.2 Test Setup Diagram



6.2.3 Measurement 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.



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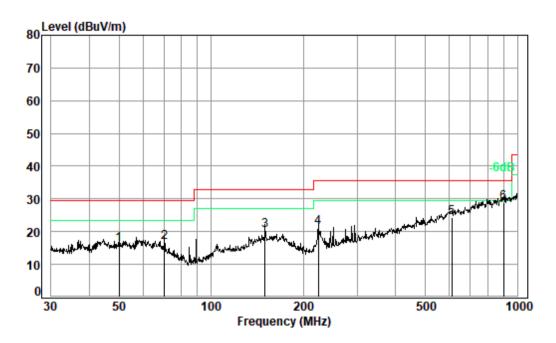
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Mode:a: Polarization:Horizontal



Condition: 10m HORIZONTAL

Job No. : 03864AT

Test Mode: a

		Ant	Preamp	Cable	Read		Limit	0ver	
	Freq	Factor	Factor	Loss	Level	Level	Line	Limit	Remark
-	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
4	FO 0F7	20. 20	22.46	0.00	27.20	46.00	20 50	43.40	OD
1	50.05/	20.29	32.46	0.99	27.20	16.02	29.50	-13.48	Q٢
2	70.337	17.48	32.39	1.08	30.45	16.62	29.50	-12.88	QP
3	150.011	20.20	32.30	1.47	30.92	20.29	33.00	-12.71	QP
4	223.733	16.26	32.30	1.79	35.67	21.42	35.60	-14.18	QP
5	609.922	26.50	32.05	3.17	26.83	24.45	35.60	-11.15	QP
6 pp	900.147	29.30	31.52	3.41	27.60	28.79	35.60	-6.81	QP



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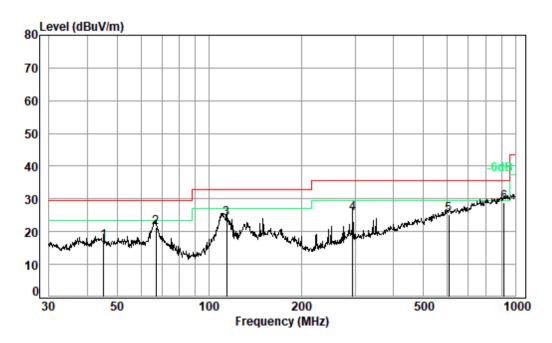
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Mode:a: Polarization:Vertical



Condition: 10m VERTICAL

Job No. : 03864AT

Test Mode: a

		Ant	Preamp	Cable	Read		Limit	0ver	
	Freq	Factor	Factor	Loss	Level	Level	Line	Limit	Remark
-	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	45.217	20.42	32.44	0.96	28.13	17.07	29.50	-12.43	QP
2	66.967	18.11	32.40	1.07	34.50	21.28	29.50	-8.22	QP
3	114.114	16.64	32.31	1.30	38.26	23.89	33.00	-9.11	QP
4	294.114	19.44	32.31	2.05	36.30	25.48	35.60	-10.12	QP
5	605.659	26.33	32.04	3.16	27.68	25.13	35.60	-10.47	QP
6 pp	919.287	29.78	31.42	3.44	27.23	29.03	35.60	-6.57	OP



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6.3 Radiated Emissions (above 1GHz)

Test Requirement: 47 CFR Part 15, Subpart B

Test Method: ANSI C63.4:2014 Frequency Range: Above 1GHz

Measurement Distance: 3m

Limit:

Above 1GHz 74(dBµV/m) peak, 54(dBµV/m) average

Detector: Peak for pre-scan (1000kHz resolution bandwidth) 1000M to18000MHz

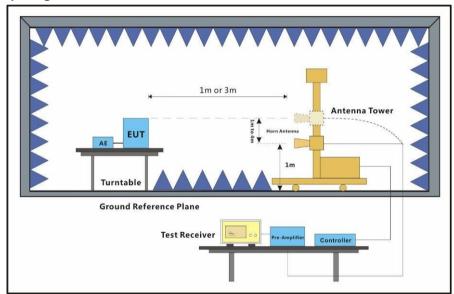
6.3.1 E.U.T. Operation

Operating Environment:

Temperature: Humidity: Atmospheric Pressure: 1010 mbar 53

Test mode a: On mode, keep EUT working normally.

6.3.2 Test Setup Diagram



6.3.3 Measurement Data

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



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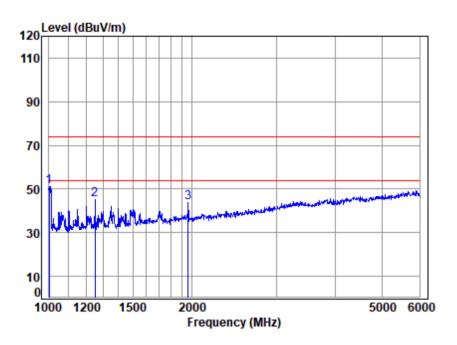
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Mode:a: Polarization:Horizontal



Site : chamber

Condition: 3m HORIZONTAL

: 03864AT Job No

Mode Note

	-								
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1001.793	2.20	23.61	40.10	65.54	51.25	74.00	-22.75	Peak
2	1251.033	2.77	24.82	40.32	57.77	45.04	74.00	-28.96	Peak
3	1961.484	3.31	27.66	40.77	53.81	44.01	74.00	-29.99	Peak



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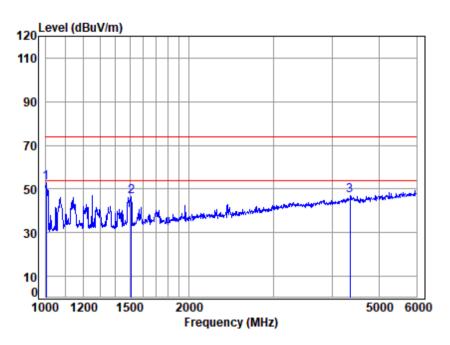
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Mode:a: Polarization:Vertical



Site : chamber Condition: 3m VERTICAL Job No : 03864AT

Mode Note

	Freq			Preamp Factor					Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	1001.793	2.20	23.61	40.10	67.03	52.74	74.00	-21.26	Peak	
2	1512.700	2.98	25.86	40.51	58.19	46.52	74.00	-27.48	Peak	
3	4353.737	6.51	33.35	42.44	49.80	47.22	74.00	-26.78	Peak	



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Photographs 7

7.1 Conducted Emissions at Mains Terminals (150kHz-30MHz) Test Setup



7.2 Radiated Emissions (30MHz-1GHz) Test Setup





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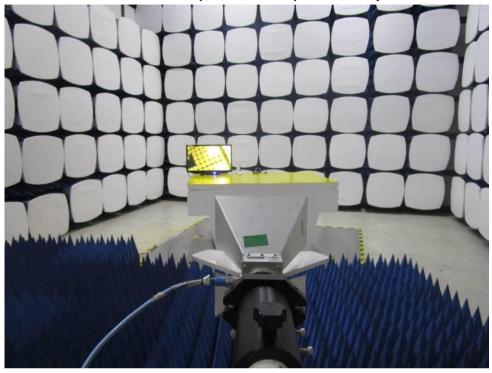
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7.3 Radiated Emissions (above 1GHz) Test Setup





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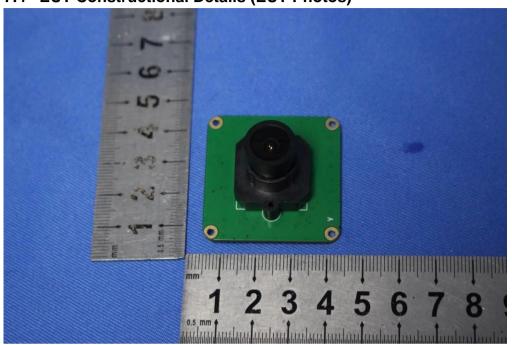
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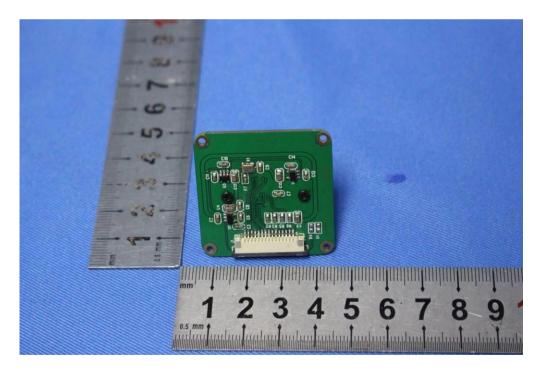


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7.4 EUT Constructional Details (EUT Photos)







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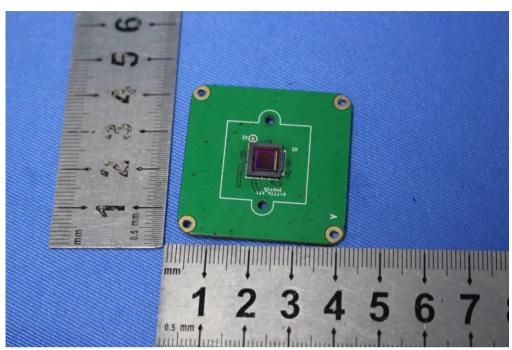
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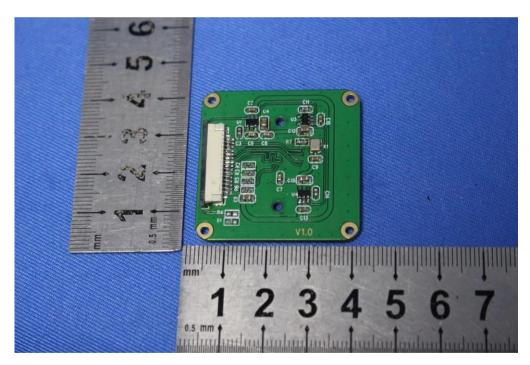
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