

TEST REPORT

Reference No...... : WTD21D10112606W
FCC ID : 2ABH3-FOS05TA
Applicant..... : Furrion Ltd.
Address..... : 4/F, Flat C & D, The Grid, 133 Wai Yip Street Kwun Tong, Kowloon Hong Kong
Manufacturer : Furrion Ltd.
Address..... : 4/F, Flat C & D, The Grid, 133 Wai Yip Street Kwun Tong, Kowloon Hong Kong
Product..... : Vision S Camera System - Monitor
Model(s) : FOS05TADS
Standards..... : FCC CFR47 Part 15.247
Date of Receipt sample : 2021-10-22
Date of Test : 2021-11-22 to 2021-11-24
Date of Issue..... : 2021-12-08
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

Waltek Testing Group Co., Ltd.

Address: No. 77, Houjie Section, Guantai Road, Houjie Town, Dongguan City, Guangdong, China

Tel: +86-769-2267 6998

Fax: +86-769-2267 6828

Compiled by:

Estel Qian

Estel Qian / Project Engineer

Approved by:



Daniel Liu

Daniel Liu / Designated Reviewer

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3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD21D10112606 W	2021-10-22	2021-11-22 to 2021-11-24	2021-12-08	Original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Vision S Camera System - Monitor
Model(s):	FOS05TADS
Model Description:	N/A
Hardware Version:	V1.1
Software Version:	V1.1

4.2 Details of E.U.T.

Operation Frequency:	2412~2462MHz
Type of Modulation:	CCK
Antenna installation:	Whip antenna
Antenna Gain:	3dBi
Ratings:	12/24V ==

4.3 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

4.4 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462	12	-

4.5 Test Mode

Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Transmitter Spurious Emissions	CCK	11 Mbps	1/6/11	TX

Note: Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product.

5 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.247(d) 15.205(a) 15.209(a)	PASS
Conducted Spurious Emissions	15.247(d)	N/A
Conducted Emissions	15.207(a)	N/A
6dB Bandwidth	15.247(a)(2)	N/A
Maximum Peak Output Power	15.247(b)(3), (4)	N/A
Power Spectral Density	15.247(e)	N/A
Band Edge	15.247(d)	N/A
Antenna Requirement	15.203	N/A

6 Equipment Used during Test

6.1 Equipments List

Conducted Emissions Test Site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date	Valid
1	EMI Test Receiver	R&S	ESCI	100947	2021-07-26	1Year
2	LISN	R&S	ENV216	101215	2021-07-26	1Year
3	Cable	Top	TYPE16(3.5M)	-	2021-07-26	1Year
Conducted Emissions Test Site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date	Valid
1	EMI Test Receiver	R&S	ESCI	101155	2021-07-26	1Year
2	LISN	SCHWARZBECK	NSLK 8128	8128-289	2021-07-26	1Year
3	Limiter	York	MTS-IMP-136	261115-001-0024	2021-07-26	1Year
4	Cable	LARGE	RF300	-	2021-07-26	1Year
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date	Valid
1	Spectrum Analyzer	R&S	FSP30	100091	2021-04-26	1Year
2	Amplifier	Agilent	8447D	2944A10178	2021-07-26	1Year
3	Tri-log Broadband Antenna	SCHWARZBECK	VULB9163	336	2021-08-23	1Year
4	Coaxial Cable	Top	TYPE16(13M)	-	2021-04-26	1Year
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2021-04-30	1Year
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2021-07-30	1Year
7	Amplifier	COMPLIANCE	PAP-1G18	2004	2021-07-26	1Year
8	Coaxial Cable	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2021-04-26	1Year
9	Amplifier	SCHWARZBECK	BBV 9721	100472	2021-07-30	1Year
10	Coaxial Cable	ZT40-2.92J-2.92J-2.0M	10MHz-40GHz	17100919	2021-04-26	1Year
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Cal. Date	Valid
1	Test Receiver	R&S	ESCI	101296	2021-04-26	1Year
2	Tri-log Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2021-10-29	1Year
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2021-04-29	1Year
4	Amplifier	ANRITSU	MH648A	M43381	2021-04-26	1Year
5	Cable	HUBER+SUHNER	CBL2	525178	2021-04-26	1Year
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date	Valid
1	Spectrum Analyzer	R&S	FSP40	100501	2021-08-13	1Year
2	Signal Analyzer	Agilent	N9010A	MY50520207	2021-04-19	1Year

6.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

6.3 Measurement Uncertainty

Parameter	Uncertainty
Conducted Emission	± 3.64 dB(AC mains 150KHz~30MHz)
Radiated Spurious Emissions	± 5.08 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Radio Frequency	± 1 x 10 ⁻⁷ Hz
RF Power	± 0.42 dB
RF Power Density	± 0.7dB
Conducted Spurious Emissions	± 2.76 dB (9kHz~26500MHz)
Confidence interval: 95%. Confidence factor:k=2	

6.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment:

Temperature: 21.5 °C

Humidity: 49.9 % RH

Atmospheric Pressure: 101.2kPa

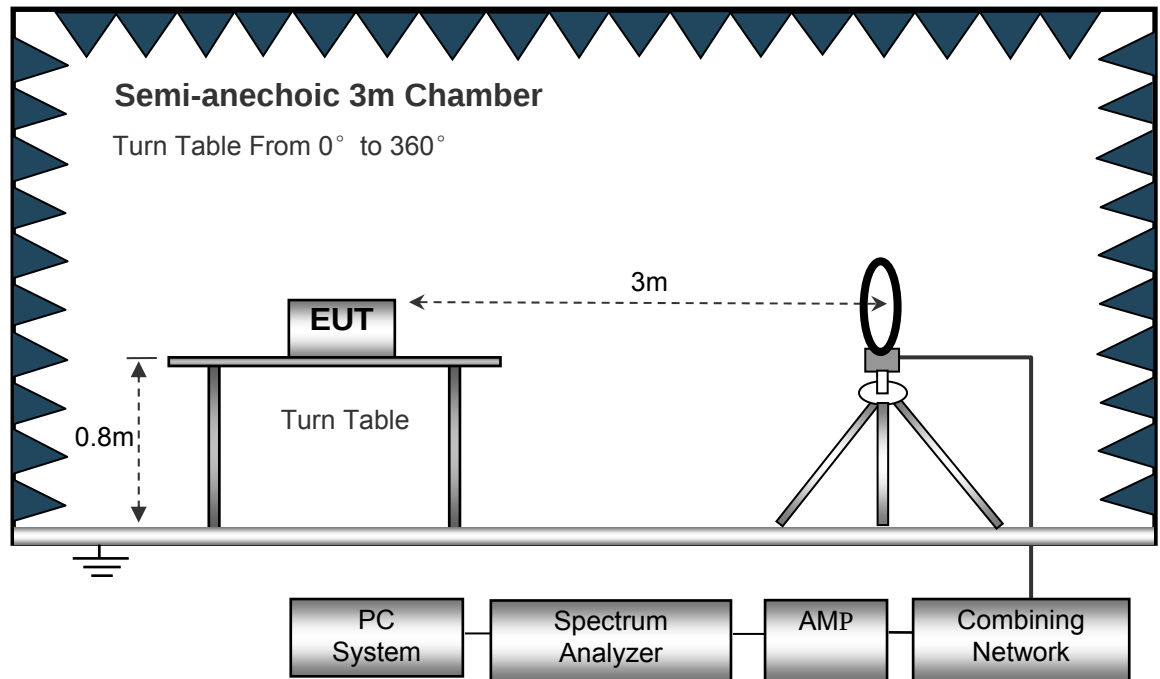
EUT Operation:

The test was performed in TX transmitting mode, the test data were shown in the report.

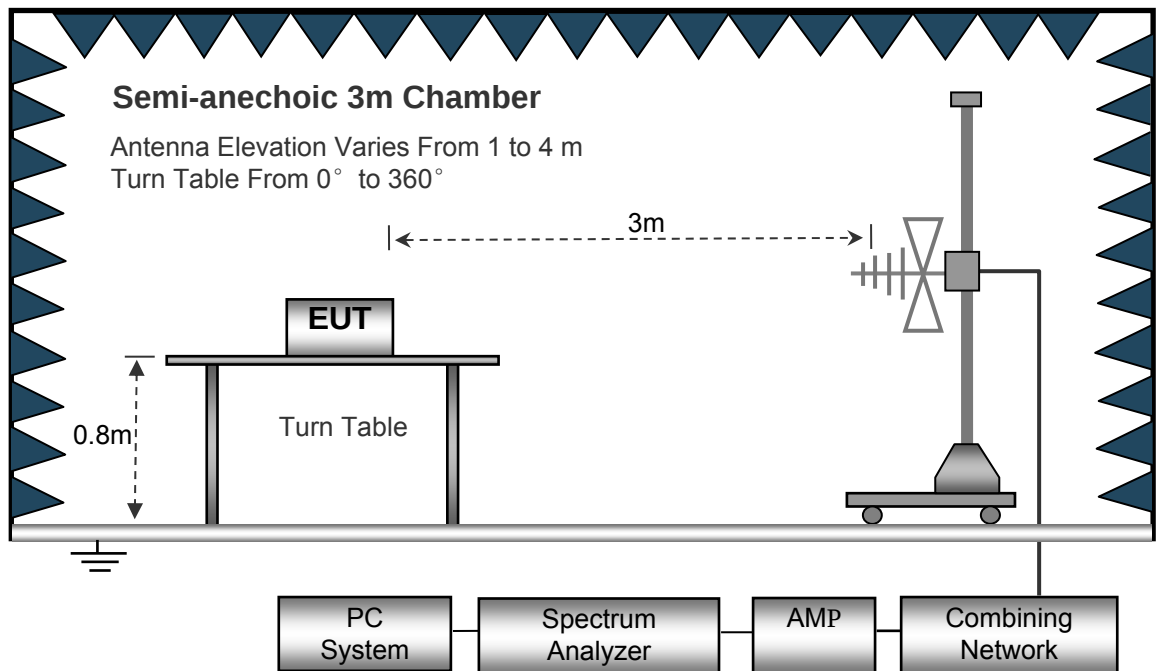
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

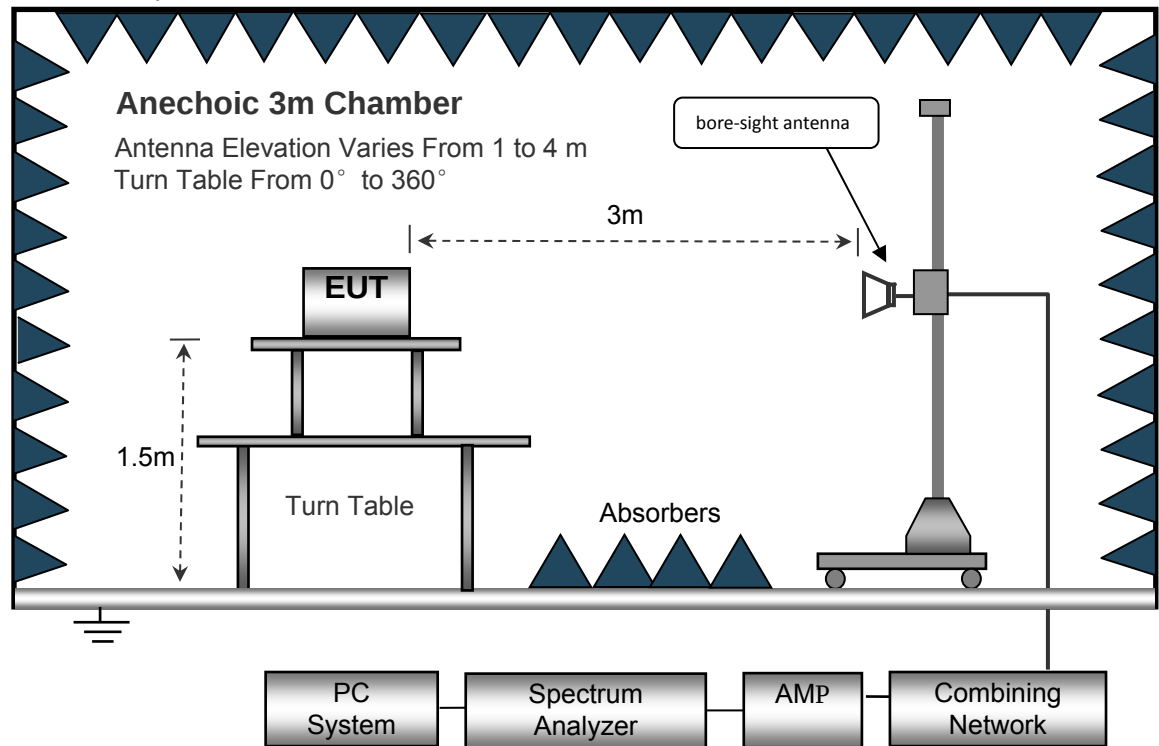
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed Auto
Detector PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed Auto
Detector PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used during radiated emissions above 1GHz measurement.

7.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

7.6 Summary of Test Results

Test Frequency: 9KHz~30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency: 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Low Channel 2412MHz									
226.77	39.15	QP	239	1.7	H	-11.62	27.53	46.00	-18.47
226.77	37.33	QP	351	1.7	V	-11.62	25.71	46.00	-20.29
4824.00	52.09	PK	161	1.7	V	-1.06	51.03	74.00	-22.97
4824.00	40.88	Ave	161	1.7	V	-1.06	39.82	54.00	-14.18
7236.00	40.85	PK	330	1.3	H	1.33	42.18	74.00	-31.82
7236.00	36.15	Ave	330	1.3	H	1.33	37.48	54.00	-16.52
2321.60	46.32	PK	284	1.1	V	-13.19	33.13	74.00	-40.87
2321.60	37.19	Ave	284	1.1	V	-13.19	24.00	54.00	-30.00
2359.43	44.23	PK	64	1.9	H	-13.14	31.09	74.00	-42.91
2359.43	38.83	Ave	64	1.9	H	-13.14	25.69	54.00	-28.31
2494.74	42.62	PK	265	1.5	V	-13.08	29.54	74.00	-44.46
2494.74	37.52	Ave	265	1.5	V	-13.08	24.44	54.00	-29.56

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
Middle Channel 2437MHz									
226.77	37.85	QP	61	1.5	H	-11.62	26.23	46.00	-19.77
226.77	36.47	QP	47	1.6	V	-11.62	24.85	46.00	-21.15
4874.00	53.37	PK	76	1.9	V	-0.62	52.75	74.00	-21.25
4874.00	42.34	Ave	76	1.9	V	-0.62	41.72	54.00	-12.28
7311.00	41.36	PK	264	1.4	H	2.21	43.57	74.00	-30.43
7311.00	36.51	Ave	264	1.4	H	2.21	38.72	54.00	-15.28
2346.13	46.93	PK	270	1.5	V	-13.19	33.74	74.00	-40.26
2346.13	37.00	Ave	270	1.5	V	-13.19	23.81	54.00	-30.19
2371.60	42.34	PK	119	1.5	H	-13.14	29.20	74.00	-44.80
2371.60	36.24	Ave	119	1.5	H	-13.14	23.10	54.00	-30.90
2486.53	43.81	PK	289	1.2	V	-13.08	30.73	74.00	-43.27
2486.53	36.98	Ave	289	1.2	V	-13.08	23.90	54.00	-30.10

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
High Channel 2462MHz									
226.77	37.37	QP	48	2.0	H	-11.62	25.75	46.00	-20.25
226.77	37.16	QP	326	1.7	V	-11.62	25.54	46.00	-20.46
4924.00	54.22	PK	84	1.3	V	-0.24	53.98	74.00	-20.02
4924.00	43.59	Ave	84	1.3	V	-0.24	43.35	54.00	-10.65
7386.00	41.55	PK	43	1.1	H	2.84	44.39	74.00	-29.61
7386.00	35.31	Ave	43	1.1	H	2.84	38.15	54.00	-15.85
2319.06	46.27	PK	190	1.5	V	-13.19	33.08	74.00	-40.92
2319.06	39.97	Ave	190	1.5	V	-13.19	26.78	54.00	-27.22
2360.75	43.25	PK	38	1.5	H	-13.14	30.11	74.00	-43.89
2360.75	37.49	Ave	38	1.5	H	-13.14	24.35	54.00	-29.65
2491.58	44.82	PK	153	1.4	V	-13.08	31.74	74.00	-42.26
2491.58	37.75	Ave	153	1.4	V	-13.08	24.67	54.00	-29.33

Test Frequency: 18GHz~25GHz

The measurements were more than 20 dB below the limit and not reported.

8 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-FOS05TADS-Photos.

=====End of Report=====