

FCC DTS RF TEST REPORT



Vista Labs
TEST • CERTIFY • COMPLY

Test Report Number.....	FLR-19012402-LC-RF-FCC-BLE
Applicant.....	FLIR Commercial Systems Inc.
Applicant Address.....	6769 Hollister Ave, Goleta, CA 93117
Product Name.....	Saros Dome Camera
Model Number.....	DH-390
Family Product/Model.....	N/A
FCC ID.....	2AS9Q-DH-390
Date of EUT received.....	02/20/2019
Date of Test.....	02/20/2019 – 03/29/2019
Report Issue Date.....	04/04/2019
Test Standards.....	47CFR Part 15.247: 2018
Test Result.....	Pass

Issued By:

Vista Laboratories

1261 Puerta Del Sol, San Clemente, CA 92673 USA

www.vista-compliance.com

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report. This report is not to be reproduced by any means except in full and in any case not without the written approval of Vista Laboratories.

Tested by:

Sherwin Lee/Test Engineer

Approved By:

David Zhang/Technical Manager

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



Laboratory Introduction

Vista Labs is an A2LA accredited 17025 compliant regulatory compliance testing laboratories (Cert. number: 4848-01) strategically located in Orange County, providing services in the electrical and telecommunication industries. Vista labs is also recognized testing facility for Australia (ACMA), Chinese Taipei (BSMI), Chinese Taipei (NCC), Hong Kong (OFCA), Israel (MOC), Korea (RRA), Singapore (IMDA), Vietnam (MIC), etc.

Our comprehensive testing services include safety testing, EMC emission and susceptibility testing, RF and wireless testing (including DFS).

As your partner, Vista investigates appropriate test standards, develops test plans, performs troubleshooting & failure analysis, reviews documentation, and provides test reports for a complete compliance testing and certification package.



17025 Product Testing Accreditation Certificate



17065 Product Certification Accreditation Certificate

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



TABLE OF CONTENTS

1	GENERAL INFORMATION	5
1.1	Applicant	5
1.2	Product information	5
1.3	Test standard and method	6
1.4	Test Purpose and statement	6
2	TEST SITE INFORMATION	7
3	MODIFICATION OF EUT	7
4	TEST CONFIGURATION AND OPERATION	7
4.1	EUT test configuration.....	7
4.2	EUT test mode	7
4.3	Supporting Equipment	8
4.4	EUT setup diagram	8
4.5	EUT operation	8
4.6	Test software.....	8
5	EUT AND TEST SETUP PICTURES	9
5.1	EUT pictures	9
5.2	EUT test setup pictures	10
6	TEST SUMMARY	14
7	UNCERTAINTY OF MEASUREMENT	15
8	TEST SUMMARY AND RESULT	16
8.1	Antenna Requirement.....	16
8.2	DTS (6 dB) Bandwidth.....	17
8.3	Maximum Output Power.....	20
8.4	Power Spectral Density	23
8.5	Conducted Band-Edge & Unwanted Emissions Measurement	26
8.6	Radiated Band-Edge & Spurious Emissions into Restricted Frequency Bands.....	29
8.7	Conducted Emissions	42
9	TEST INSTRUMENT LIST	46

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



REVISION HISTORY

Revision	Issue Date	Description	Note
Original	04/04/2019	Original release	N/A

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



1 General Information

1.1 Applicant

Applicant:	FLIR Commercial Systems Inc.
Applicant address:	6769 Hollister Ave, Goleta, CA 93117
Manufacturer:	FLIR Commercial Systems Inc.
Manufacturer Address:	6769 Hollister Ave, Goleta, CA 93117

1.2 Product information

Product Name	Saros Dome Camera
Model Number	DH-390
Family Model Number	N/A
Serial Number	N/A
Frequency Band	2.4GHz Wi-Fi: 802.11b/g/n-20MHz: 2412-2462MHz 2.4GHz BLE: 2402-2480MHz
Type of modulation	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) BLE: GFSK
Equipment Class/ Category	DTS
Maximum output power	Wi-Fi: 17.79 dBm; BLE: 2.022 dBm
Antenna Information	PCB antenna: -6 dBi
Clock Frequencies	N/A
Port/Connectors	PoE, Audio in, DC in
Input Power	48VDC (PoE), 12VDC (DC input)
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Simultaneous Transmission	2.4GHz Wi-Fi and BLE can transmit simultaneously
Additional Info	N/A

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



1.3 Test standard and method

Test standard	47CFR Part 15.247: 2018
Test method	ANSI C63.10: 2013 558074 D01 15.247 Meas Guidance v05r02

1.4 Test Purpose and statement

The purpose of this test report is intended to demonstrate the compliance of product listed in section 1.2, received from company listed in section 1.1, to the requirements of standard and method listed in section 1.3. Based on our test results, we conclude that the product tested complies with the requirements of the standards indicated.

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



2 Test site information

Lab performing tests	Vista Laboratories
Lab Address	1261 Puerta Del Sol, San Clemente, CA 92673 USA
Phone Number	+1 (949) 393-1123
Website	www.Vista-compliance.com

Test condition	Test Engineer	Test Environment	Test Date
RF conducted	David Zhang	23.5°C / 58.2%/996 mbar	02/20/2019 – 03/29/2019
Radiated	David Zhang	23.5°C / 58.2%/996 mbar	02/20/2019 – 03/29/2019

3 Modification of EUT

The EUT is an engineering test sample loaded with RF test firmware specifically designed to support the RF TX/RX measurement in different aspects. No modification on the hardware.

4 Test configuration and operation

4.1 EUT test configuration

EUT is powered by external PoE power supply or AC/DC power adapter. For RF conducted measurement, the original antenna is removed and connected to spectrum analyzer for measurement. The test command is used to set EUT to different transmission mode in terms of radio mode (WLAN, BLE), test channel, data rate, etc.

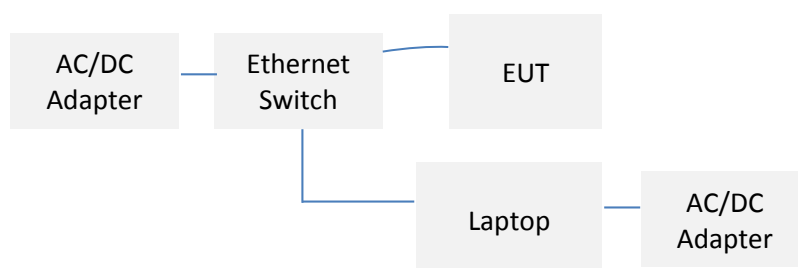
4.2 EUT test mode

Radio	Channel	Frequency (MHz)	Data Rate (Mbps)
BLE	0	2402	1
BLE	19	2440	1
BLE	39	2480	1

4.3 Supporting Equipment

Index	Description	Model	S/N	Brand	Remark
1	Ethernet Switch	FS108P	2HK1223100C67	NETGEAR	Provide PoE and communication
2	AC/DC adapter	NU60-F480125-I1NN	332-10290-01	NETGEAR	-
3	Laptop	G752V	F9N0CY758592398	ASUS	Remote access
4	AC/DC adapter	ADP-180MB	N/A	ASUS	-

4.4 EUT setup diagram



4.5 EUT operation

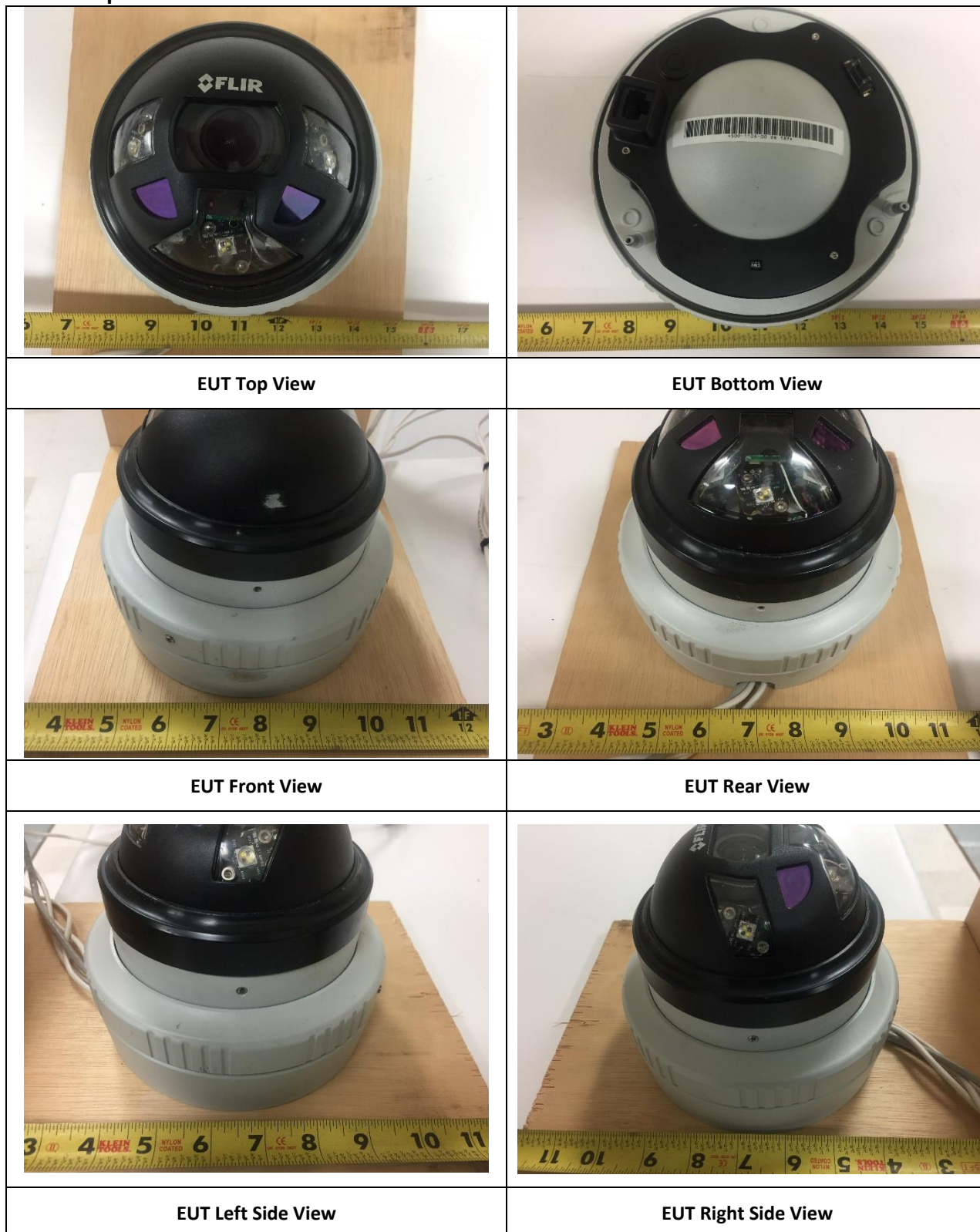
The control of EUT is either through the Linux WL command or Web UI on test laptop.

4.6 Test software

Index	Description	Remark
1	Web UI	Remote access to EUT
2	Linux WL command	Control radio setting to set EUT under RF test mode
3	EMISoft Vasona 6.0049	EMC/Spurious emission test software used during testing

5 EUT and test setup pictures

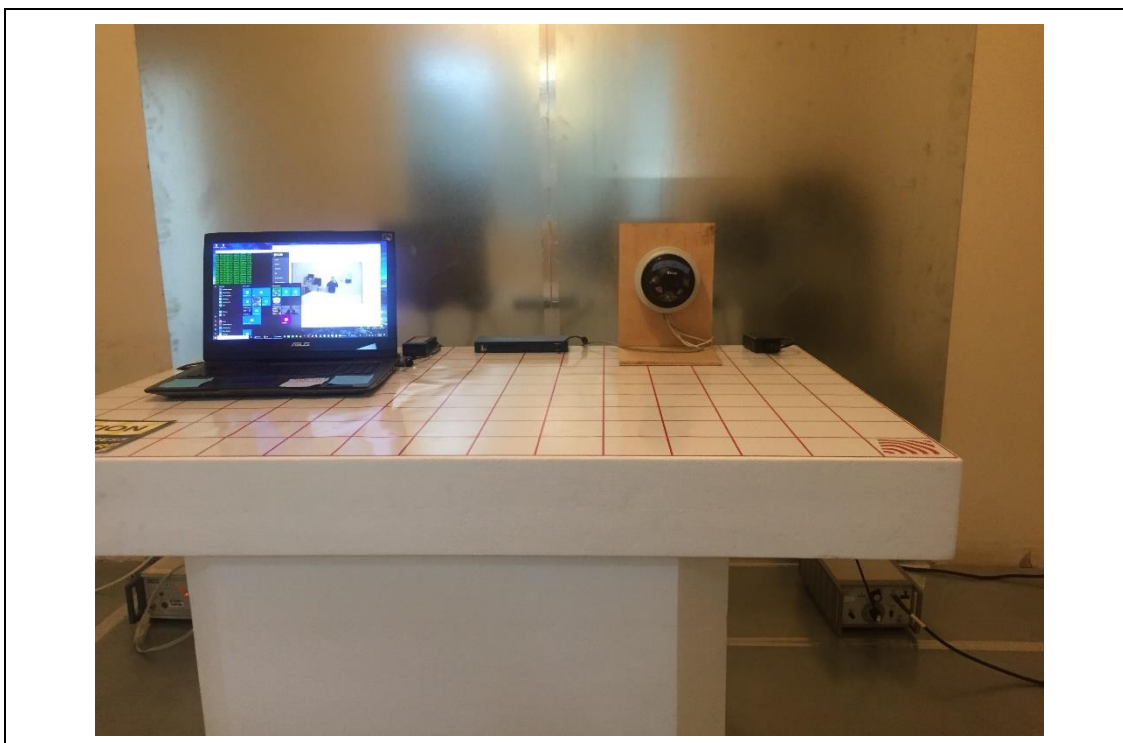
5.1 EUT pictures



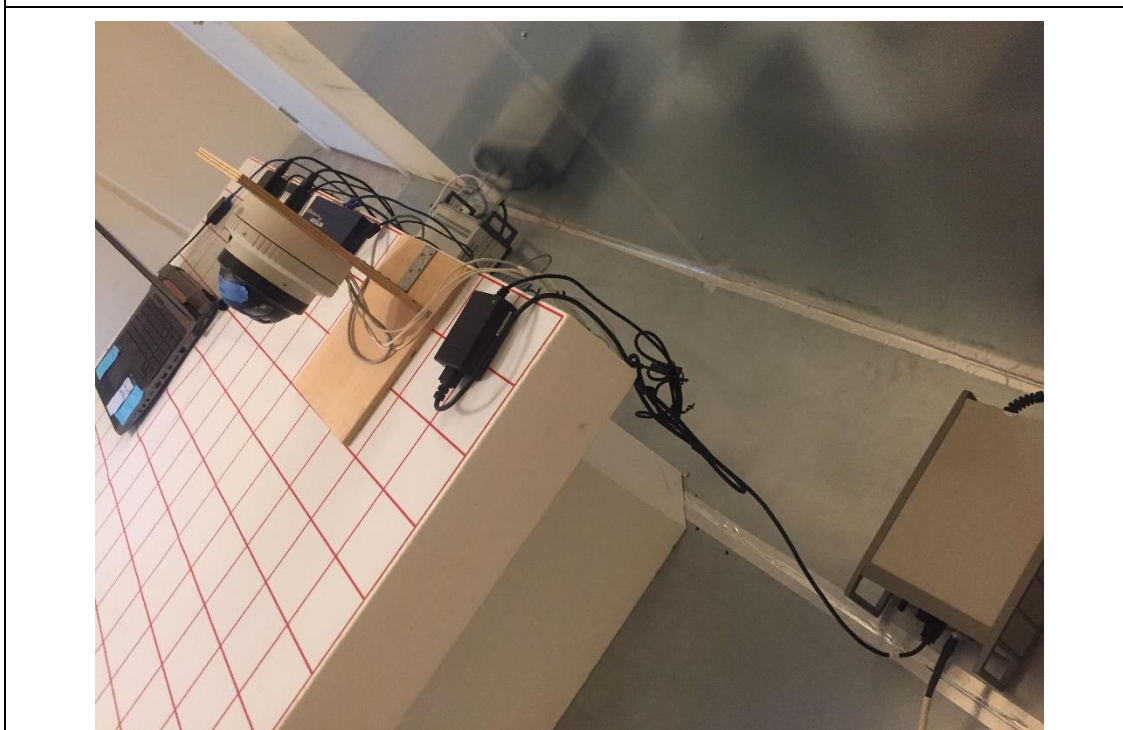
Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



5.2 EUT test setup pictures



AC Line Conducted Emission setup – Front

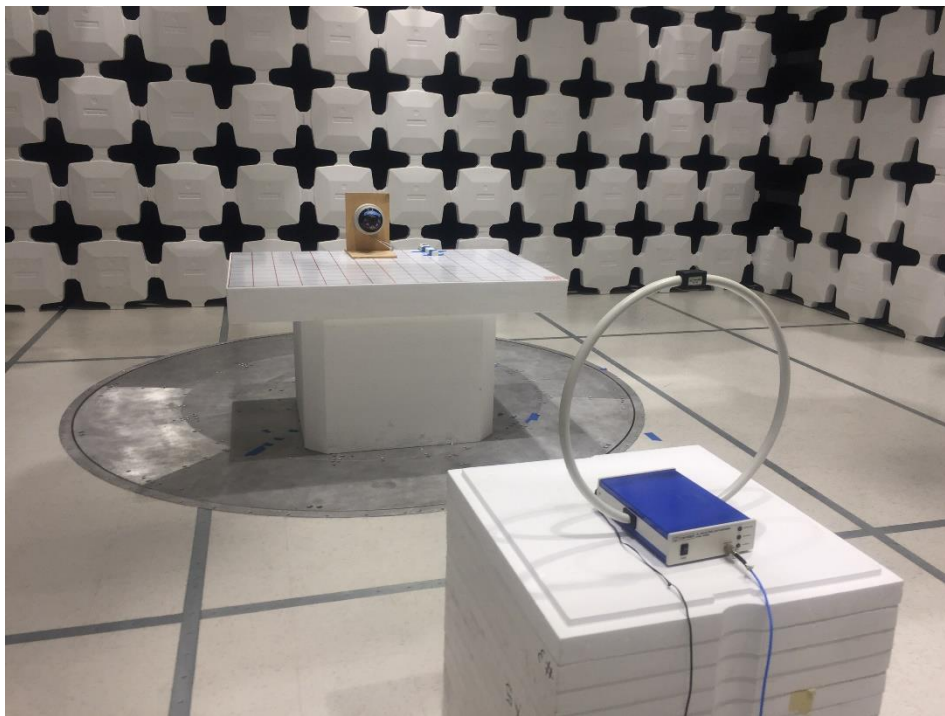


AC Line Conducted Emission setup – Rear

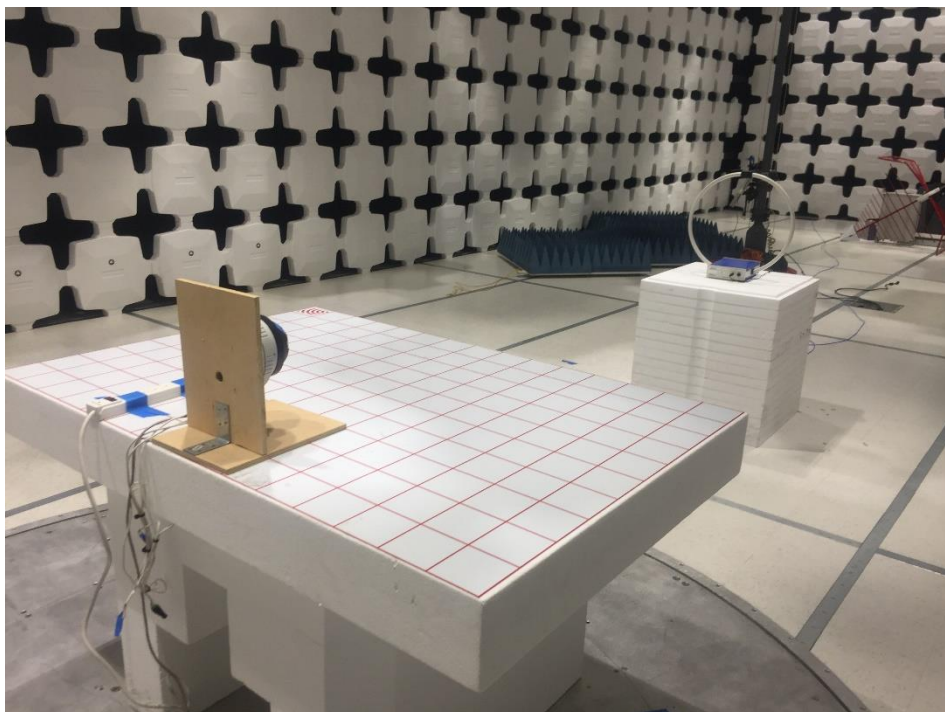
Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



Page 11 of 46



Radiated Emissions Below 30MHz setup – Front

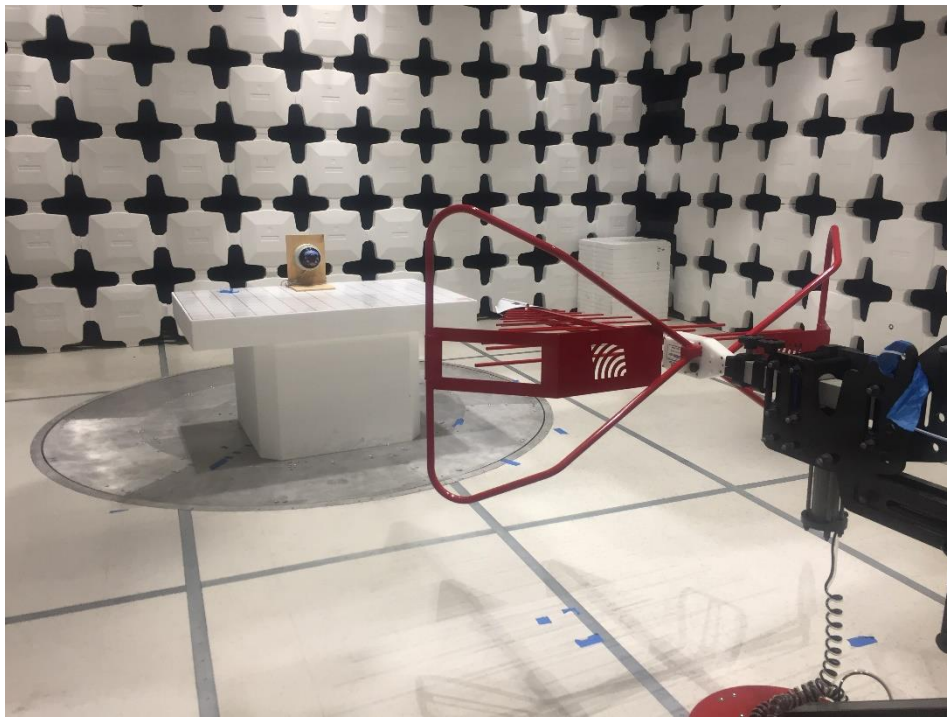


Radiated Emissions Below 30MHz setup – Rear

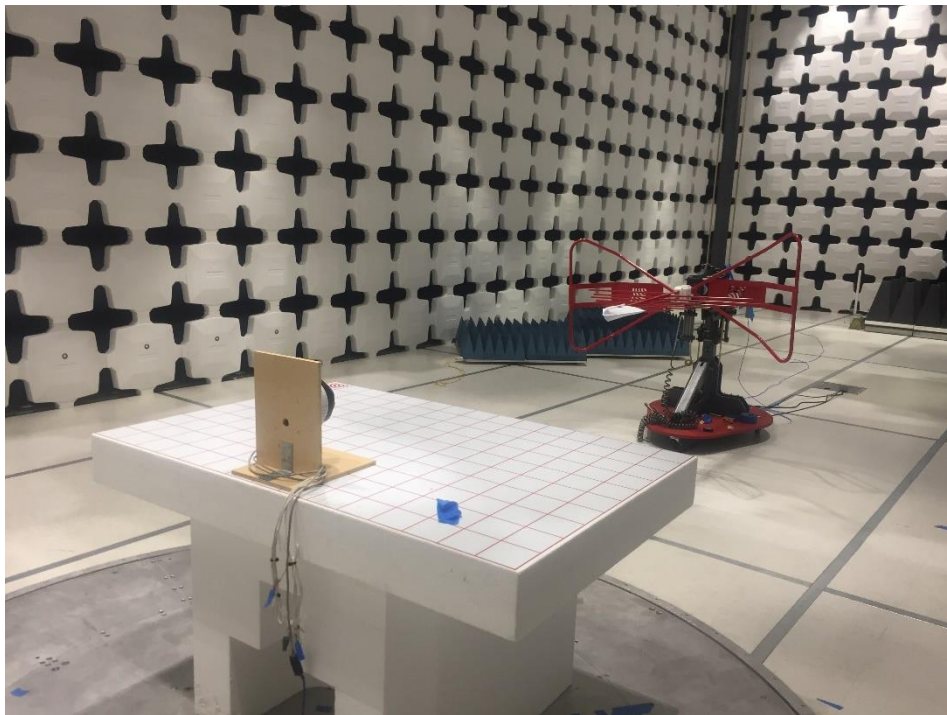
Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



Page 12 of 46

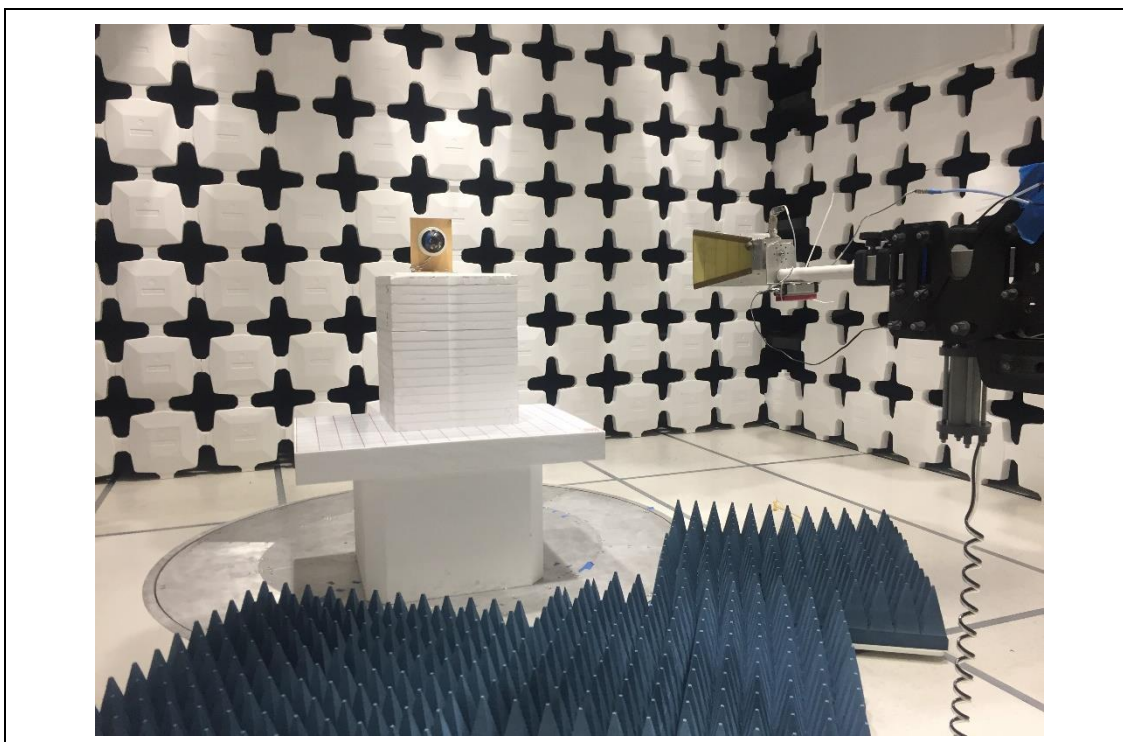


Radiated Emissions Below 1GHz setup – Front

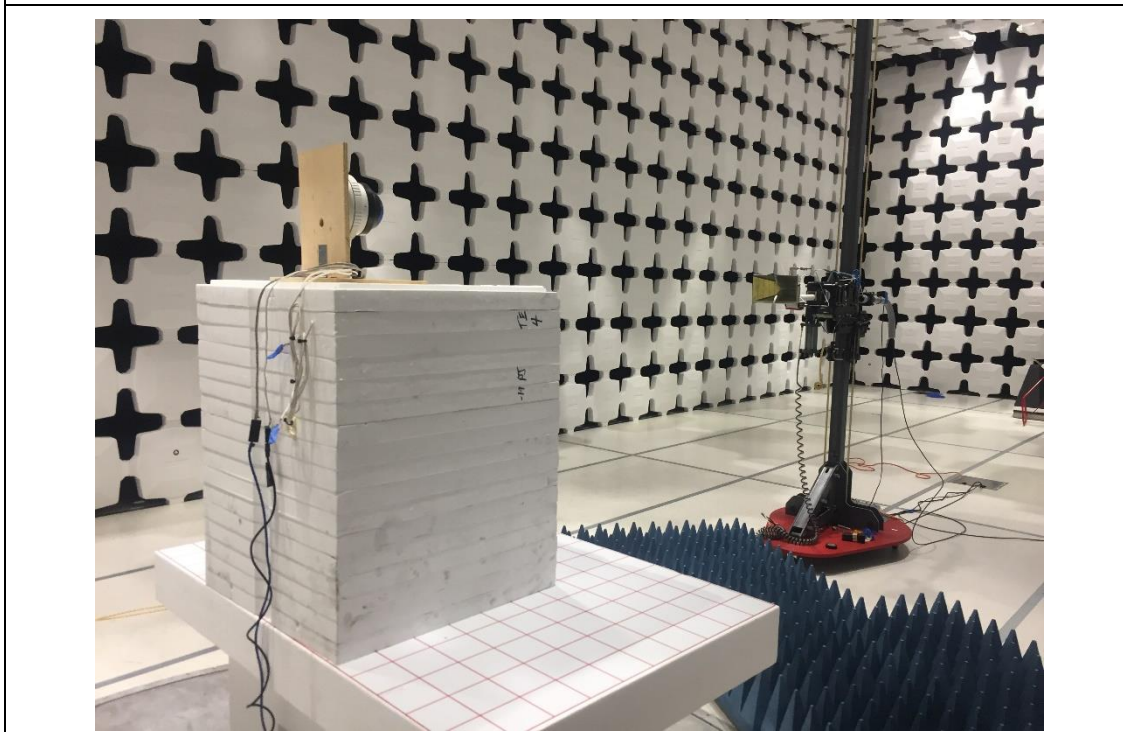


Radiated Emissions Below 1GHz setup – Rear

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



Radiated Emissions Above 1GHz setup – Front



Radiated Emissions Above 1GHz setup – Rear

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



6 Test Summary

FCC Rules	Test Item	Section	Verdict
§15.203	Antenna Requirement	8.1	Pass
§15.247 (a)(2)	DTS (6 dB) Channel Bandwidth	8.2	Pass
§15.247(b)(3)	Conducted Maximum Output Power	8.3	Pass
§15.247(e)	Power Spectral Density	8.4	Pass
§15.247(d)	Conducted Band-Edge & Unwanted Emissions	8.5	Pass
§15.205, §15.209, §15.247(d)	Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	8.6	Pass
§15.207 (a)	AC Power Line Conducted Emissions	8.7	Pass

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



7 Uncertainty of Measurement

Test item	Measurement Uncertainty (dB)
RF Output Power (Conducted)	±1.2 dB
Power Spectral Density	±0.9 dB
Unwanted Emission (conducted)	±2.6 dB
Occupied Channel Bandwidth	±5 %
Radiated Emission (9KHz-30MHz)	±3.5 dB
Radiated Emission (30MHz-1GHz)	±4.6 dB
Radiated Emission (1-18GHz)	±4.9 dB
Radiated Emission (18-40GHz)	±3.5 dB

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



8 Test summary and result

8.1 Antenna Requirement

8.1.1 Requirement

Per § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

8.1.2 Result

Analysis:

- EUT has one removable PCB trace antennas which connect to the main board through unique U.FL RF connectors.
- Both main board and antenna are equipped with U.FL connector. No standard RF connector is used.

Conclusion:

EUT complies with antenna requirement in § 15.203.

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



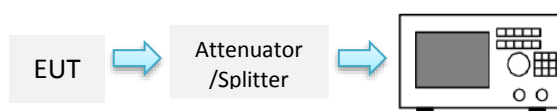
8.2 DTS (6 dB) Bandwidth

8.2.1 Requirement

§ 15.247 (a)(2)

Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 KHz.

8.2.2 Test setup



8.2.3 Test Procedure

According to section 8.2, option 2, in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.8 of ANSI C63.10-2013:

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW $\geq 3 \times$ RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Use automatic bandwidth measurement capability on instrument to obtain BW result.

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



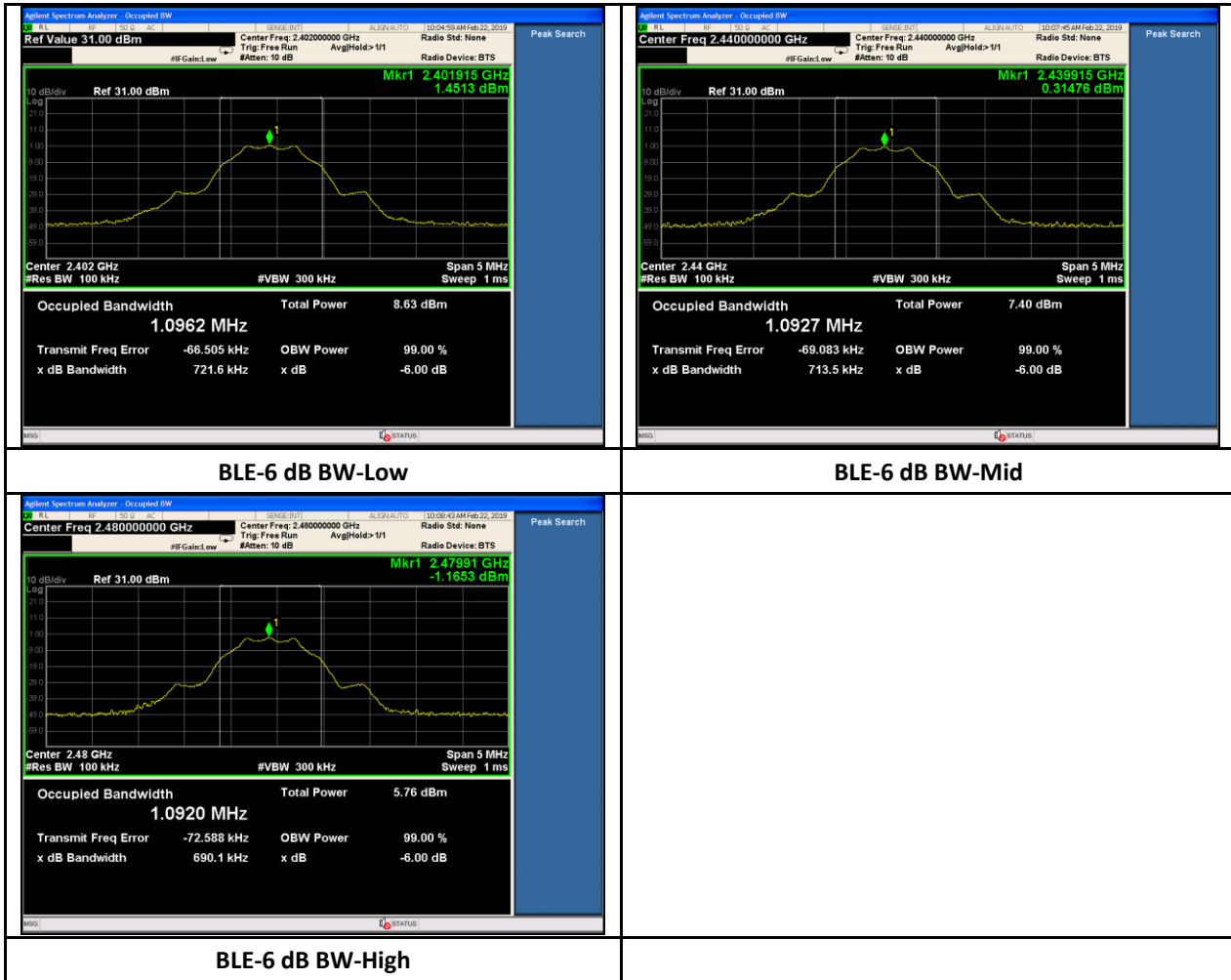
8.2.4 Test Result

Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured Bandwidth (KHz)	Minimum Bandwidth (KHz)	Result
BLE	2402	1	721.6	500	Pass
BLE	2440	1	713.5	500	Pass
BLE	2480	1	690.1	500	Pass

Report Number: FLR-19012402-LC-RF-FCC-BLE
Product: Saros Dome Camera
Model Number: DH-390



8.2.5 Test Plots



Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



8.3 Maximum Output Power

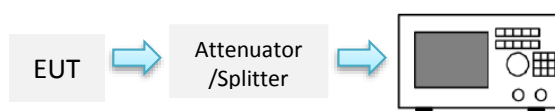
8.3.1 Requirement

§ 15.247 (b)(3)

or systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: the maximum output power is 1 Watt.

If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.3.2 Test setup



8.3.3 Test Procedure

For BLE, power measurement is according to subclause 11.9.1.1 of ANSI C63.10-2013:

1. Set the RBW $\geq$ DTS bandwidth
2. Set VBW $\geq 3 \times$ RBW.
2. Set SPAN $\geq 3 \times$ RBW.
3. Sweep time = auto couple.
4. Detector = peak.
5. Trace mode = max hold
6. Allow trace to fully stabilize.
7. Use peak marker function to determine the peak amplitude level.

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



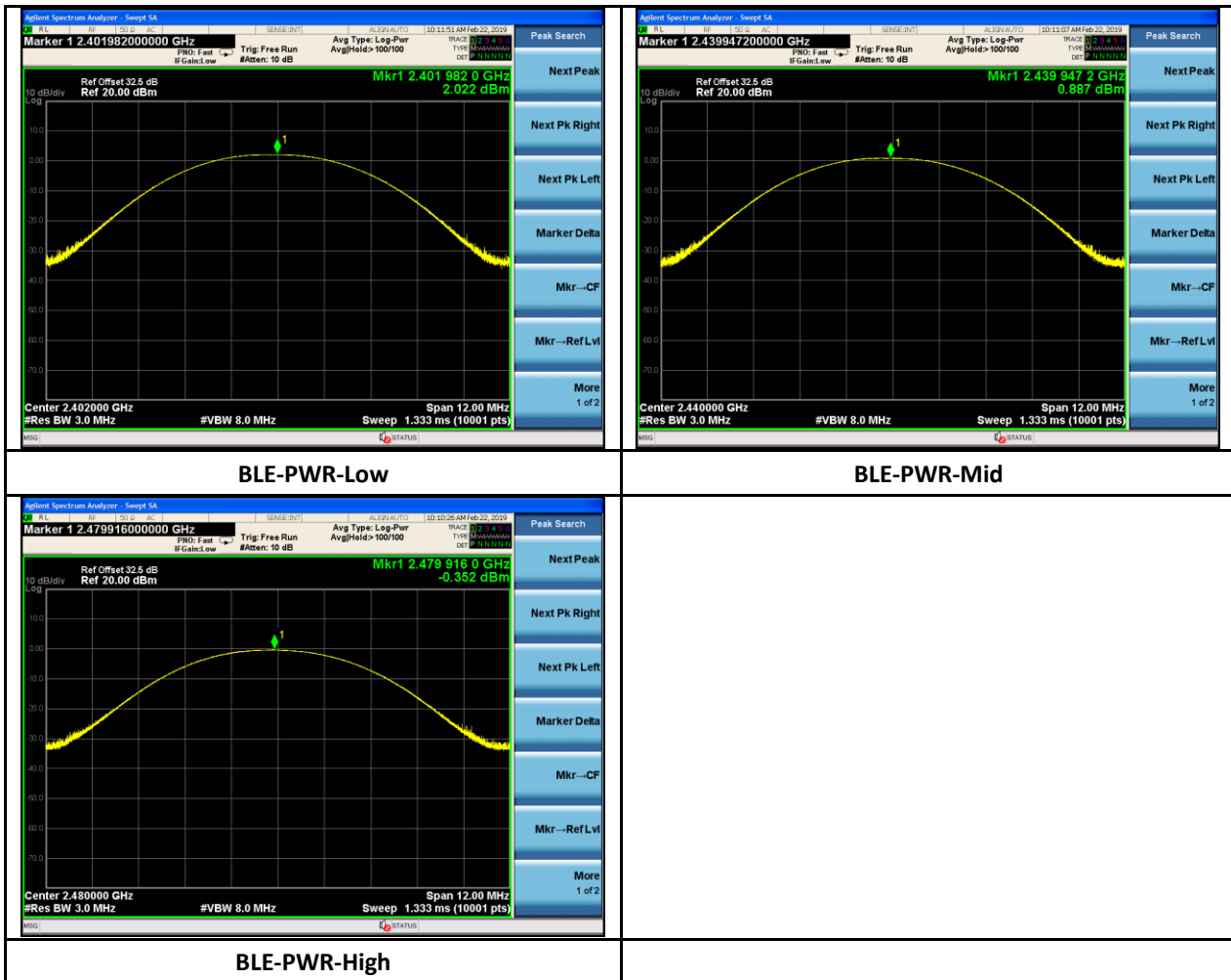
8.3.4 Test Result

Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured Output Power (dBm)	Max Output Power (dBm)	Result
BLE	2402	1	2.022	30	Pass
BLE	2440	1	0.887	30	Pass
BLE	2480	1	-0.352	30	Pass

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



8.3.5 Test Plots



Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



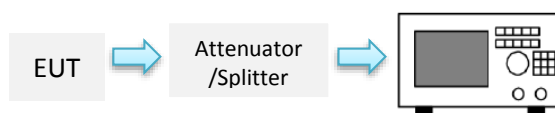
8.4 Power Spectral Density

8.4.1 Requirement

§ 15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power is used to determine the power spectral density.

8.4.2 Test setup



8.4.3 Test Procedure

For BLE, PSD measurement is according to section 8.4 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.10.2 PKPSD of ANSI C63.10-2013:

1. Set analyser centre frequency to DTS channel centre frequency.
2. Set the span to 1.5 X DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

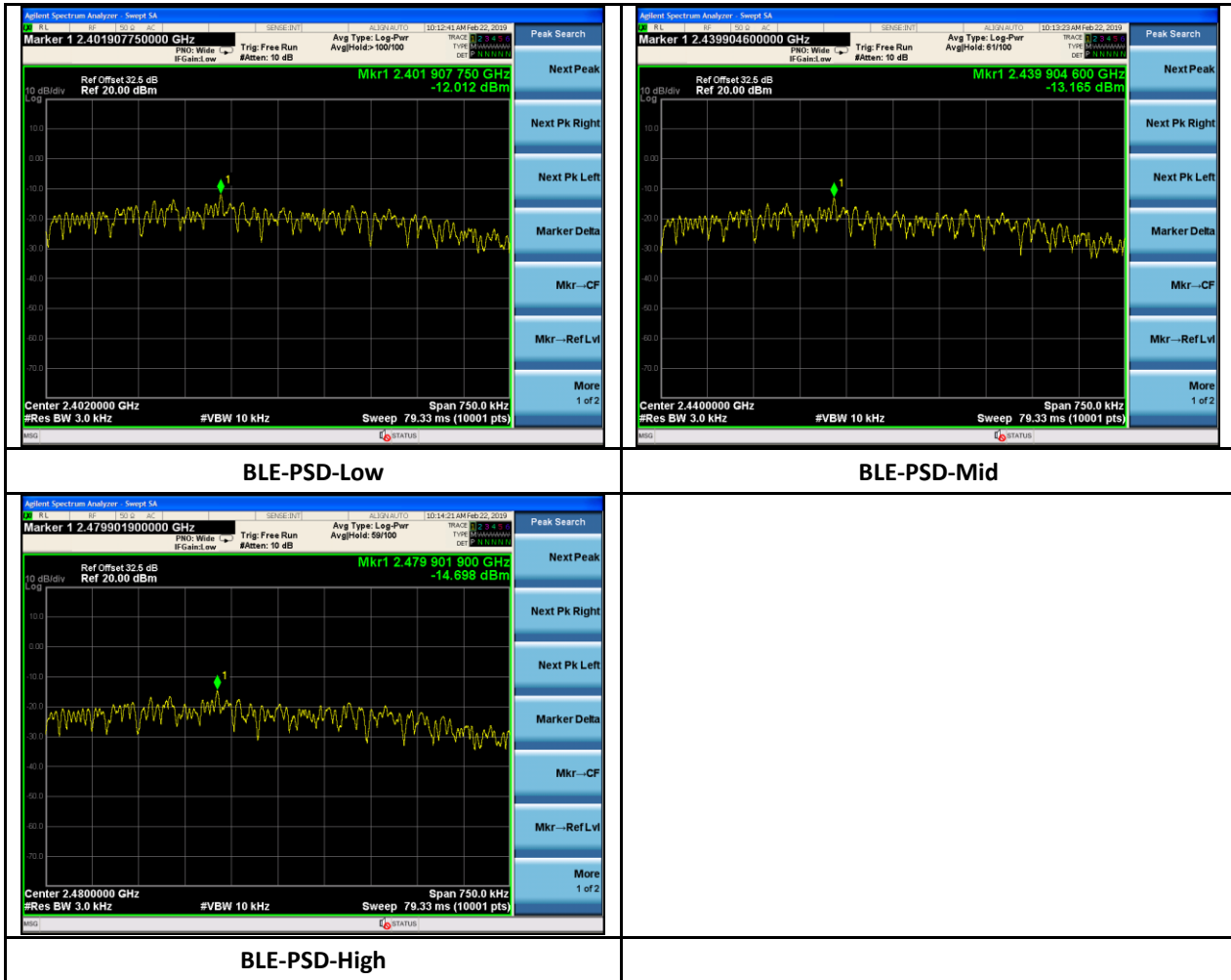
Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



8.4.4 Test Result

Mode/ Bandwidth	Frequency (MHz)	Data rate	Measured PSD (dBm/3KHz)	Max PSD (dBm/3KHz)	Result
BLE	2402	1	-12.012	30	Pass
BLE	2440	1	-13.165	30	Pass
BLE	2480	1	-14.698	30	Pass

8.4.5 Test Plots



Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



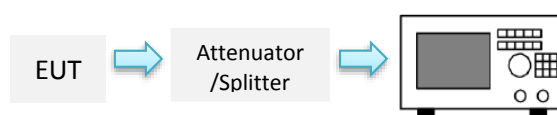
8.5 Conducted Band-Edge & Unwanted Emissions Measurement

8.5.1 Requirement

§ 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

8.5.2 Test setup



8.5.3 Test Procedure

According to section 8.5 Emission level measurement, in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.11.3 in ANSI C63.10-2013:

1. Set the centre frequency and span to encompass frequency range to be measured.
2. Set the RBW = 100 kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

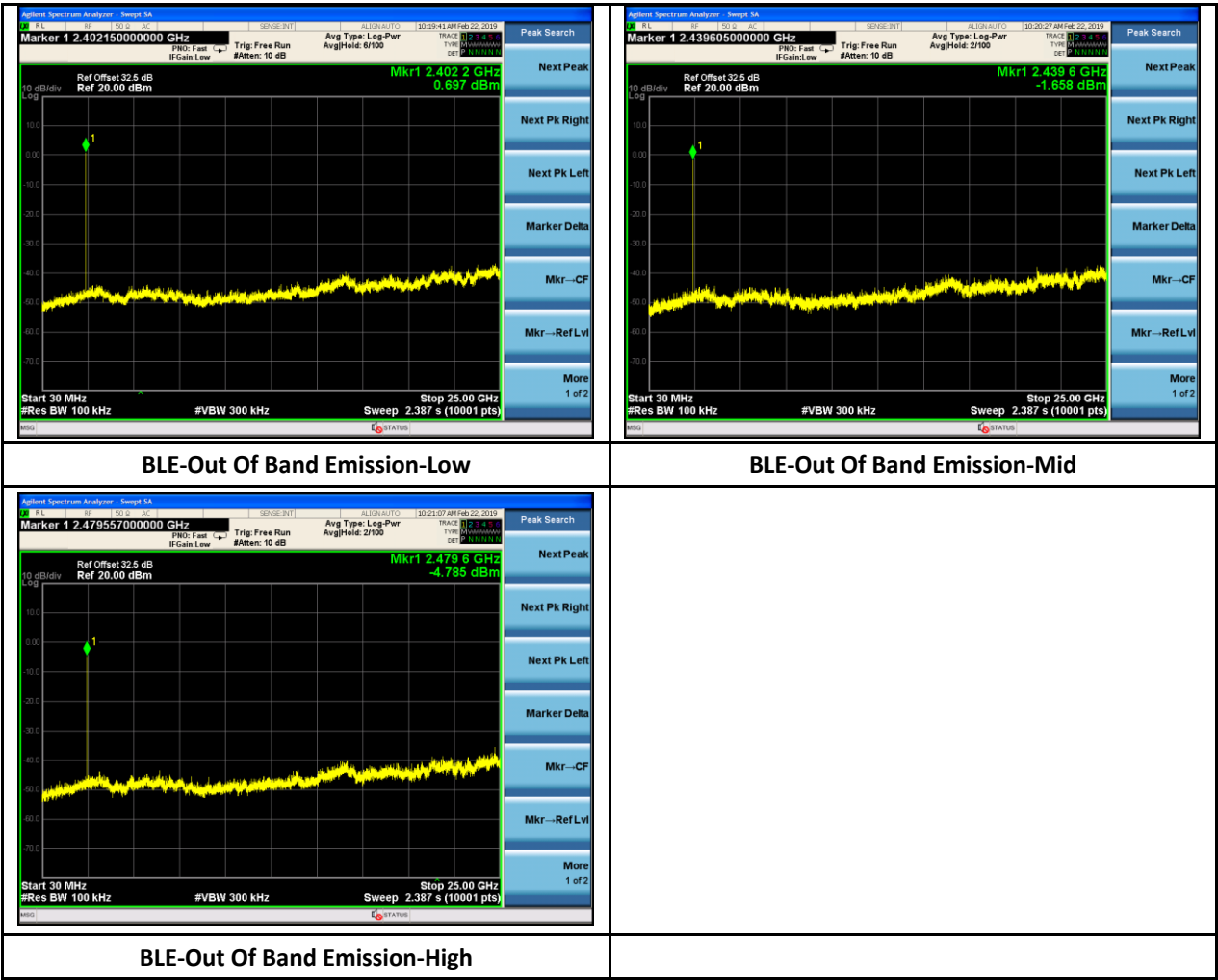
8.5.4 Test Result

See test plots

8.5.5 Test Plots



Report Number: FLR-19012402-LC-RF-FCC-BLE
 Product: Saros Dome Camera
 Model Number: DH-390



8.6 Radiated Band-Edge & Spurious Emissions into Restricted Frequency Bands

8.6.1 Requirement

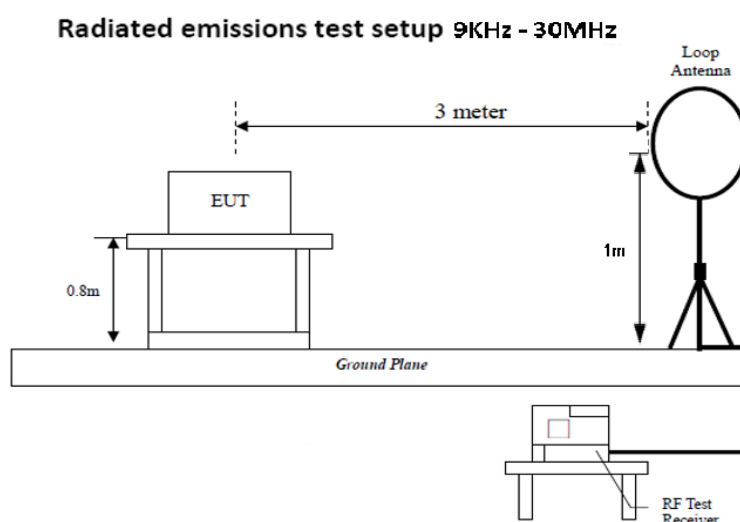
§ 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in §15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency range (MHz)	Field Strength ($\mu\text{V/m}$)
0.009~0.490	2400/F(KHz)
0.490~1.705	24000/F(KHz)
1.705~30.0	30
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

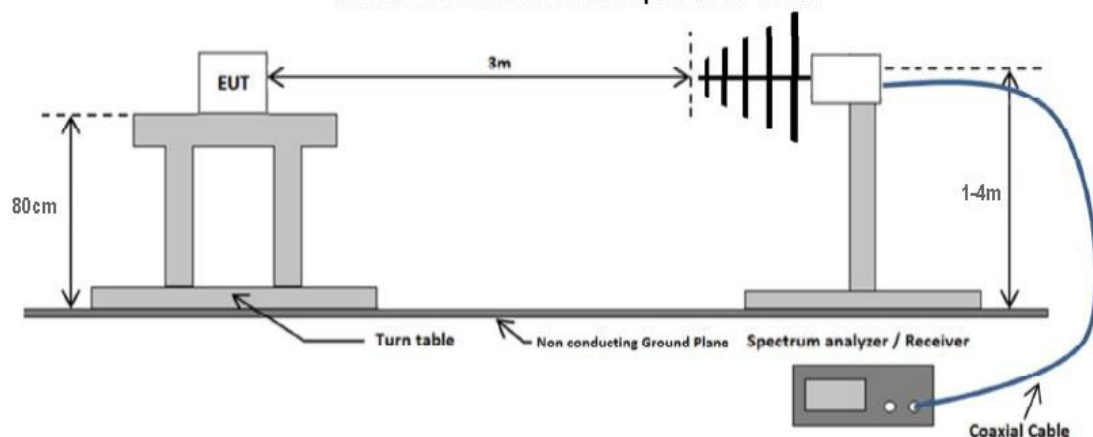
8.6.2 Test setup



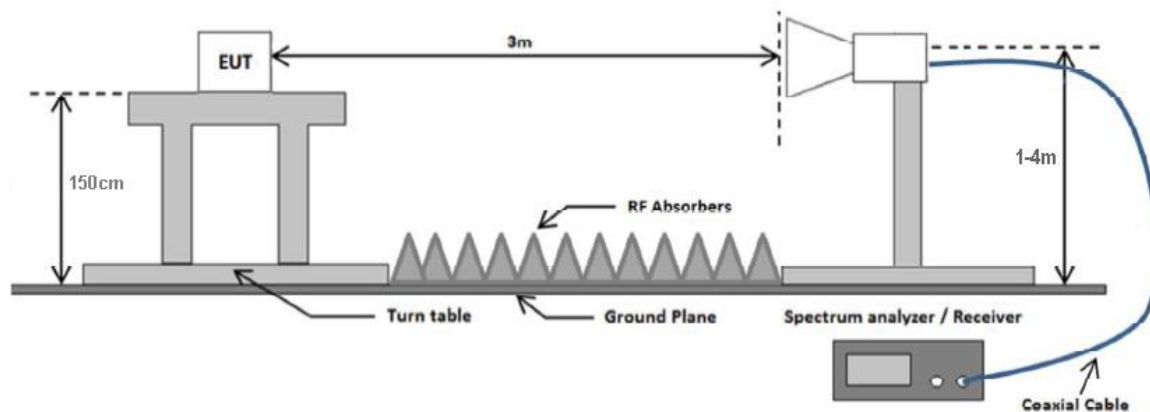
Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



Radiated emissions test setup 30 MHz - 1 GHz



Radiated emissions test setup above 1 GHz



Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



8.6.3 Test Procedure

According to section 8.6 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.12.2.7 Radiated spurious emission measurements in ANSI C62.10-2013 as well as the procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 was followed. Boresight antenna mast was used during the scanning to point to EUT to maximize the emission. The process will be repeated in 3 EUT orientations.

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
 - a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
 - b. The EUT was then rotated to the direction that gave the maximum emission.
 - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 300 Hz for frequency below 150KHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for frequency between 150KHz – 30MHz.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency between 30MHz - 1GHz.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak and average measurement at frequency above 1GHz.
7. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

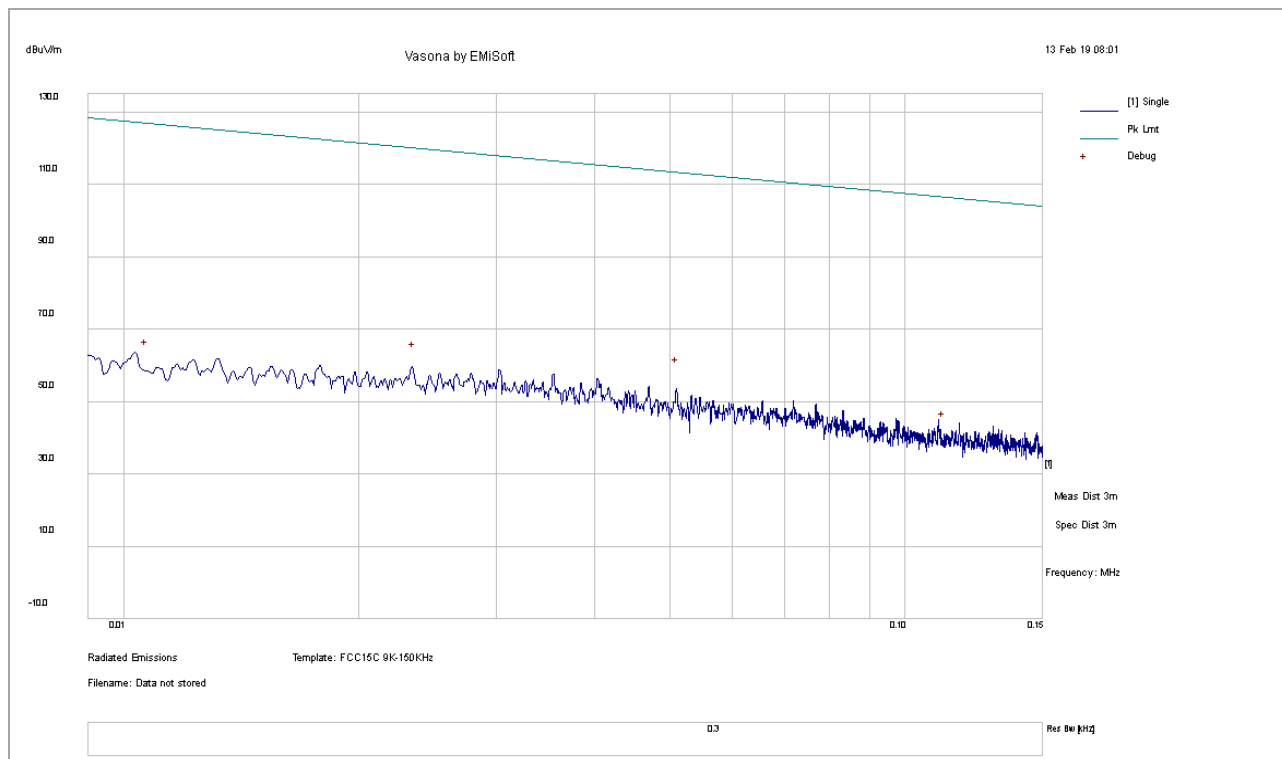
Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



8.6.4 Test Result

9KHz – 150KHz test result

Test Standard:	15.209	Mode:	2437MHz
Frequency Range:	Below 150KHz	Test Date:	02/12/2019
Antenna Type/Polarity:	Loop / 0 deg & 90 deg	Test Personnel:	Sherwin Lee
Remark:	Internal antenna	Test Result:	Pass



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
0.015	49.85	0.35	10.83	61.03	PK	0	100	28	124.07	-63.04
0.070	37.99	0.51	12.50	51.00	PK	0	100	110	110.68	-59.68
0.026	44.81	0.41	12.99	58.20	PK	0	100	101	119.38	-61.18
0.010	52.84	0.31	10.15	63.30	PK	0	100	139	127.74	-64.44
0.127	28.20	0.56	11.00	39.76	PK	0	100	0	105.55	-65.79
0.015	49.85	0.35	10.83	61.03	PK	0	100	0	124.07	-63.04

Note: 1) Both 0 deg and 90 deg setup of the loop antenna have been verified and the worst case result is presented here.

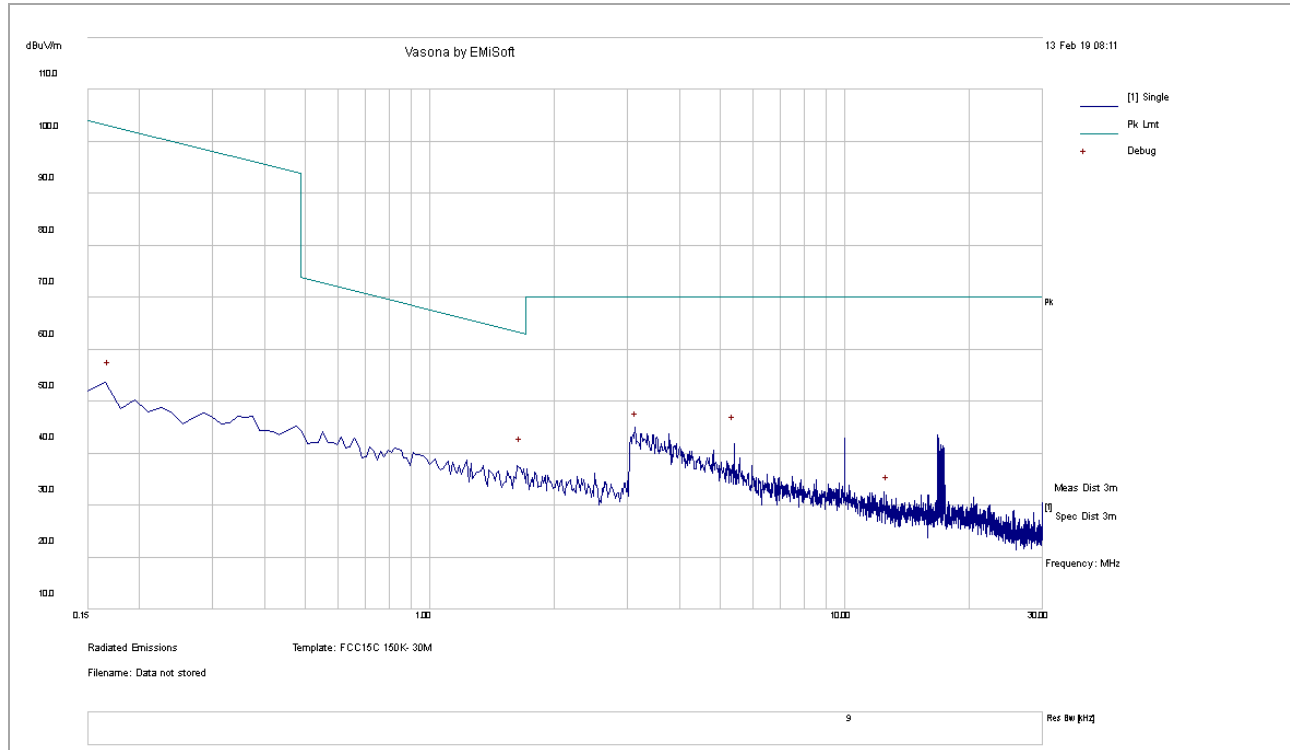
2) EUT was tested in 3 orientations.

Report Number: FLR-19012402-LC-RF-FCC-BLE
Product: Saros Dome Camera
Model Number: DH-390



150KHz – 30MHz test result

Test Standard:	15.209-247	Mode:	2440MHz
Frequency Range:	150KHz – 30MHz	Test Date:	11/14/2018
Antenna Type/Polarity:	Loop / 0 deg & 90 deg	Test Personnel:	Sherwin Lee
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
0.169	40.38	0.59	11.00	51.97	PK	0	100	62	0.169	40.38
1.654	23.27	0.82	13.12	37.21	PK	0	100	88	1.654	23.27
5.406	27.31	0.94	13.21	41.46	PK	0	100	13	5.406	27.31
12.649	15.36	1.26	13.21	29.83	PK	0	100	102	12.649	15.36
3.156	27.99	0.88	13.08	41.96	PK	0	100	9	3.156	27.99

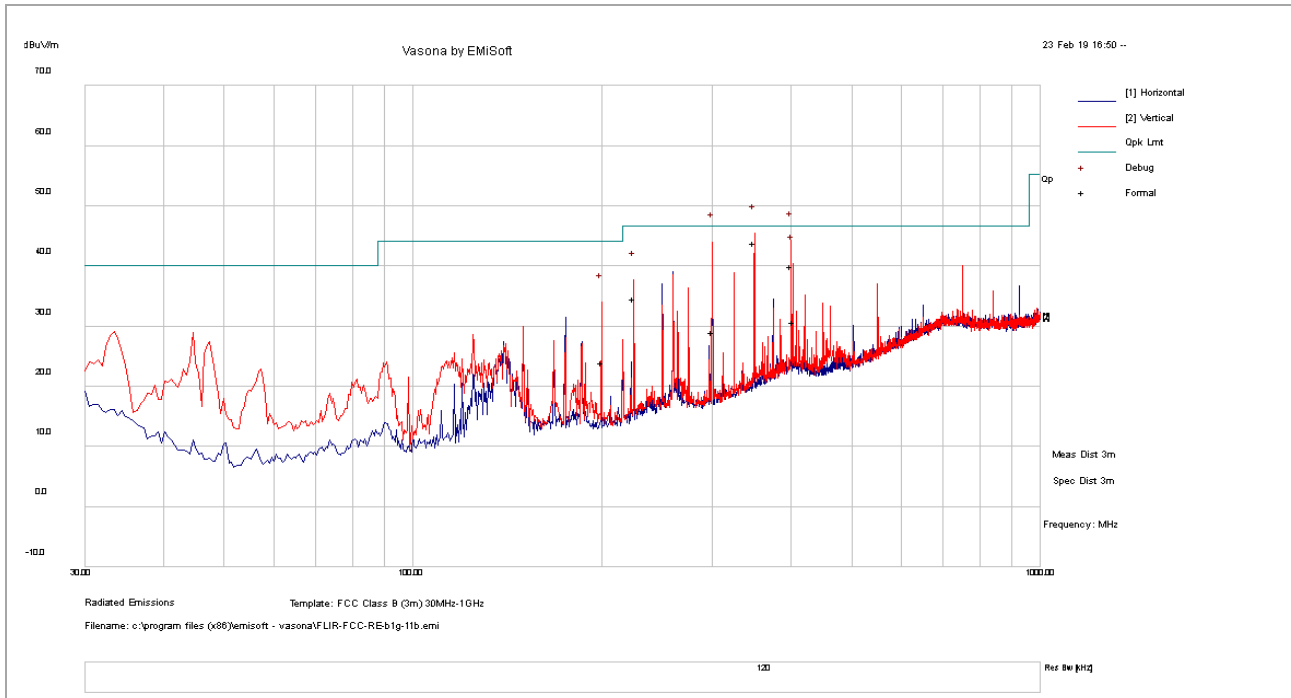
Note: 1) Both 0 deg and 90 deg setup of the loop antenna have been verified and the worst case result is presented here.

2) EUT was tested in 3 orientations.

Report Number: FLR-19012402-LC-RF-FCC-BLE
Product: Saros Dome Camera
Model Number: DH-390



Test Standard:	15.209	Mode:	BLE
Frequency Range:	30-1000MHz	Test Date:	02/23/2019
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Sherwin Lee
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
199.99	41.14	4.73	-21.81	24.06	QP	V	100	128	43.50	-19.44
225.01	50.17	5.01	-20.46	34.72	QP	V	145	110	46.00	-11.28
299.91	42.09	5.68	-18.73	29.04	QP	V	115	154	46.00	-16.96
350.00	53.96	6.05	-16.13	43.88	QP	V	104	354	46.00	-2.12
400.00	47.03	6.37	-13.43	39.97	QP	H	226	29	46.00	-6.03
403.19	37.81	6.36	-13.47	30.70	QP	V	293	287	46.00	-15.30

Note:

- 1) For below 1GHz, all different channel and modes were verified but only the worst case result under mid channel is shown here.



Electromagnetic Compatibility
Radio Frequency
Product Certification
International Approval

1261 Puerta Del Sol
San Clemente, CA, 92673
+1 (949) 393-1123
www.vista-compliance.com

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



30-1000MHz test result for WLAN & BLE simultaneous transmission

Result: Pass

Note:

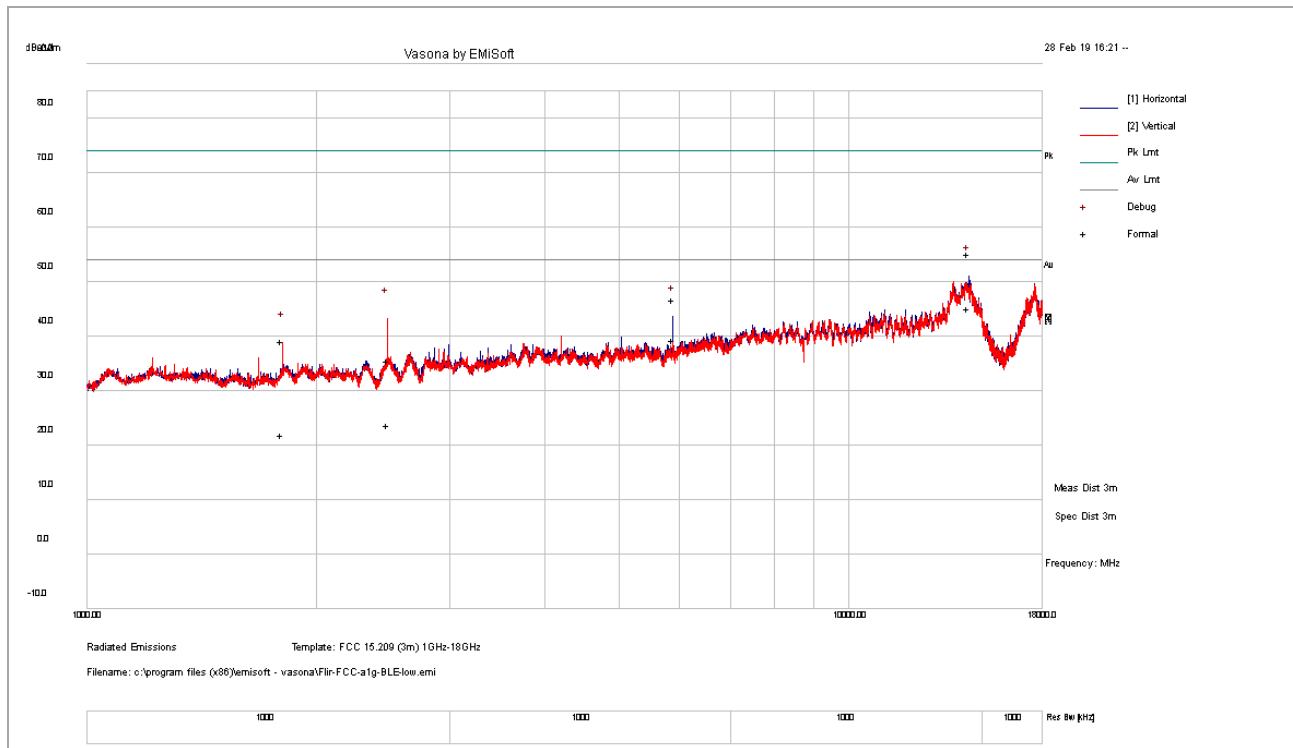
EUT is capable of transmitting simultaneously in both WLAN and BLE mode. Additional evaluation has been performed and found no change in the result when both WLAN and BLE transmissions are enabled.

Report Number: FLR-19012402-LC-RF-FCC-BLE
Product: Saros Dome Camera
Model Number: DH-390



1GHz – 18GHz test result

Test Standard:	15.209	Mode:	BLE-2402MHz
Frequency Range:	1GHz-18GHz	Test Date:	02/28/2019
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Sherwin Lee
Remark:	N/A	Test Result:	Pass



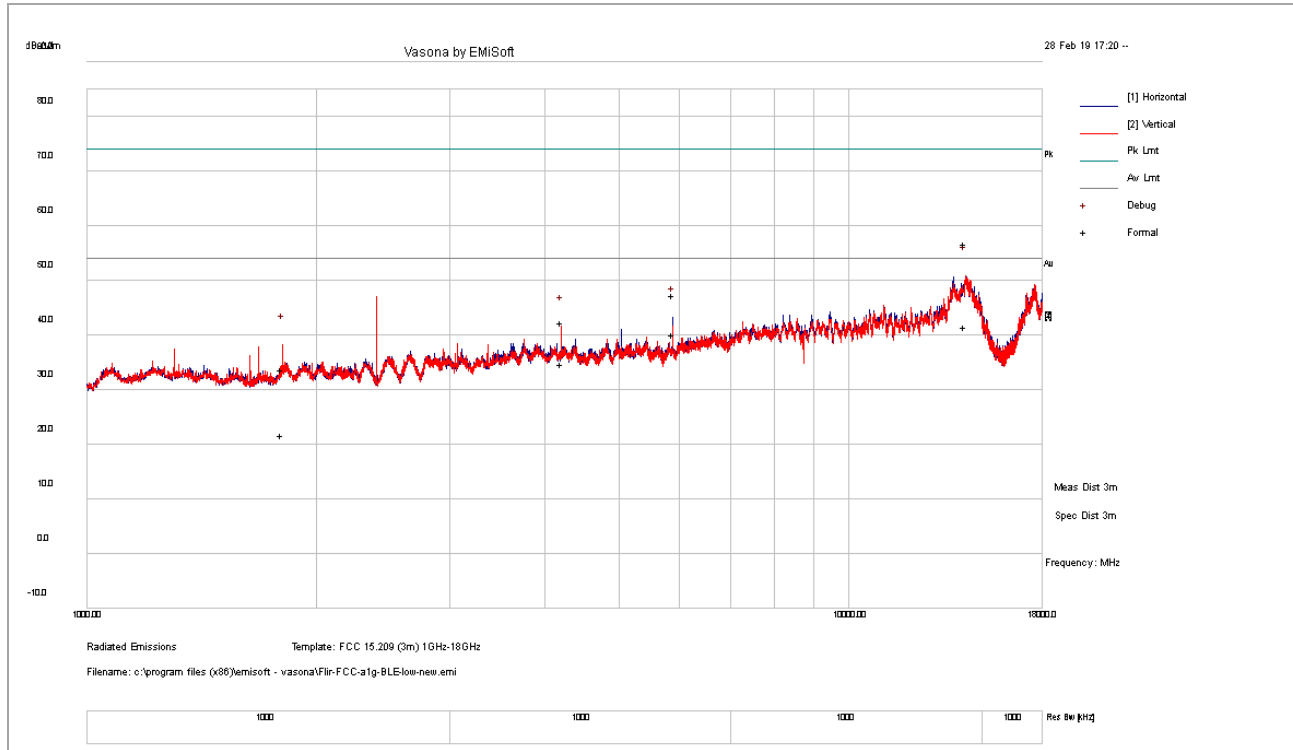
Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table cm	Limit dBuV/m	Margin dB
14390.61	26.44	20.62	8.25	55.32	PK	H	355	185	74	-18.68
5879.75	37.05	13.64	-3.81	46.88	PK	H	241	5	74	-27.12
2481.49	34.31	10.90	-9.49	35.72	PK	V	200	21	74	-38.29
1806.02	39.69	10.45	-10.82	39.32	PK	V	155	107	74	-34.68
14390.61	16.28	20.62	8.25	45.15	AV	H	355	185	54	-8.85
5879.75	29.55	13.64	-3.81	39.38	AV	H	241	5	54	-14.62
2481.49	22.33	10.90	-9.49	23.74	AV	V	200	21	54	-30.27
1806.02	22.47	10.45	-10.82	22.09	AV	V	155	107	54	-31.91

Report Number: FLR-19012402-LC-RF-FCC-BLE
Product: Saros Dome Camera
Model Number: DH-390



1GHz – 18GHz test result

Test Standard:	15.209	Mode:	BLE-2440MHz
Frequency Range:	1GHz-18GHz	Test Date:	02/28/2019
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Sherwin Lee
Remark:	N/A	Test Result:	Pass



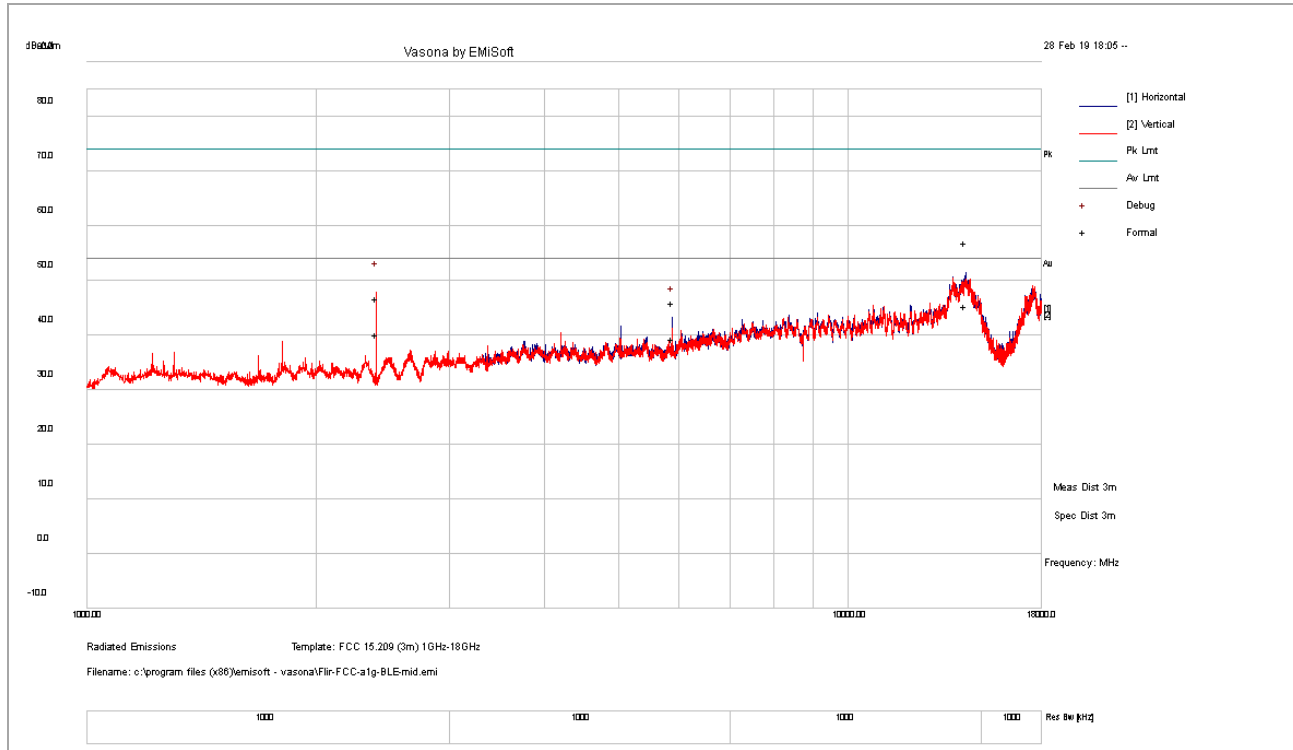
Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table cm	Limit dBuV/m	Margin dB
14239.10	28.56	20.25	8.03	56.84	PK	V	326	51	74	-17.17
5880.10	37.59	13.64	-3.81	47.42	PK	H	230	1	74	-26.58
4199.71	36.43	12.57	-6.63	42.37	PK	V	124	360	74	-31.63
1805.87	34.21	10.45	-10.82	33.84	PK	V	346	297	74	-40.16
14239.10	13.32	20.25	8.03	41.59	AV	V	326	51	54	-12.41
5880.10	30.30	13.64	-3.81	40.13	AV	H	230	1	54	-13.87
4199.71	28.91	12.57	-6.63	34.85	AV	V	124	360	54	-19.15
1805.87	22.26	10.45	-10.82	21.89	AV	V	346	297	54	-32.11

Report Number: FLR-19012402-LC-RF-FCC-BLE
Product: Saros Dome Camera
Model Number: DH-390



1GHz – 18GHz test result

Test Standard:	15.209	Mode:	BLE-2480MHz
Frequency Range:	1GHz-18GHz	Test Date:	02/28/2019
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Sherwin Lee
Remark:	N/A	Test Result:	Pass



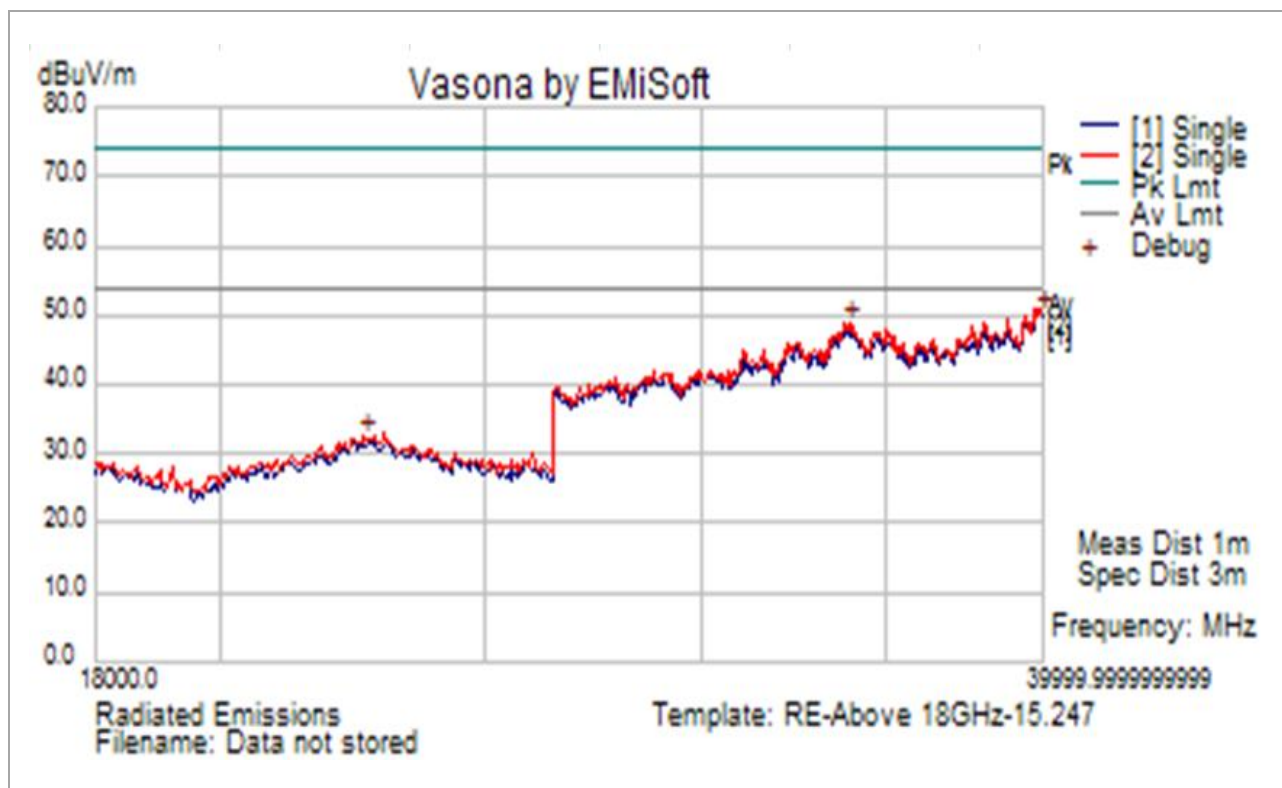
Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table cm	Limit dBuV/m	Margin dB
14300.73	28.48	20.40	8.25	57.13	PK	H	346	154	74	-16.87
2401.78	45.78	10.83	-9.86	46.75	PK	V	326	28	74	-27.25
5879.89	36.16	13.64	-3.81	45.99	PK	H	227	4	74	-28.01
14300.73	16.72	20.40	8.25	45.37	AV	H	346	154	54	-8.63
2401.78	39.29	10.83	-9.86	40.26	AV	V	326	28	54	-13.74
5879.89	29.62	13.64	-3.81	39.45	AV	H	227	4	54	-14.55

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



18GHz – 40GHz test result

Test Standard:	15.209	Mode:	BLE-2440MHz
Frequency Range:	18GHz-40GHz	Test Date:	03/01/2019
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Sherwin Lee
Remark:	N/A	Test Result:	Pass



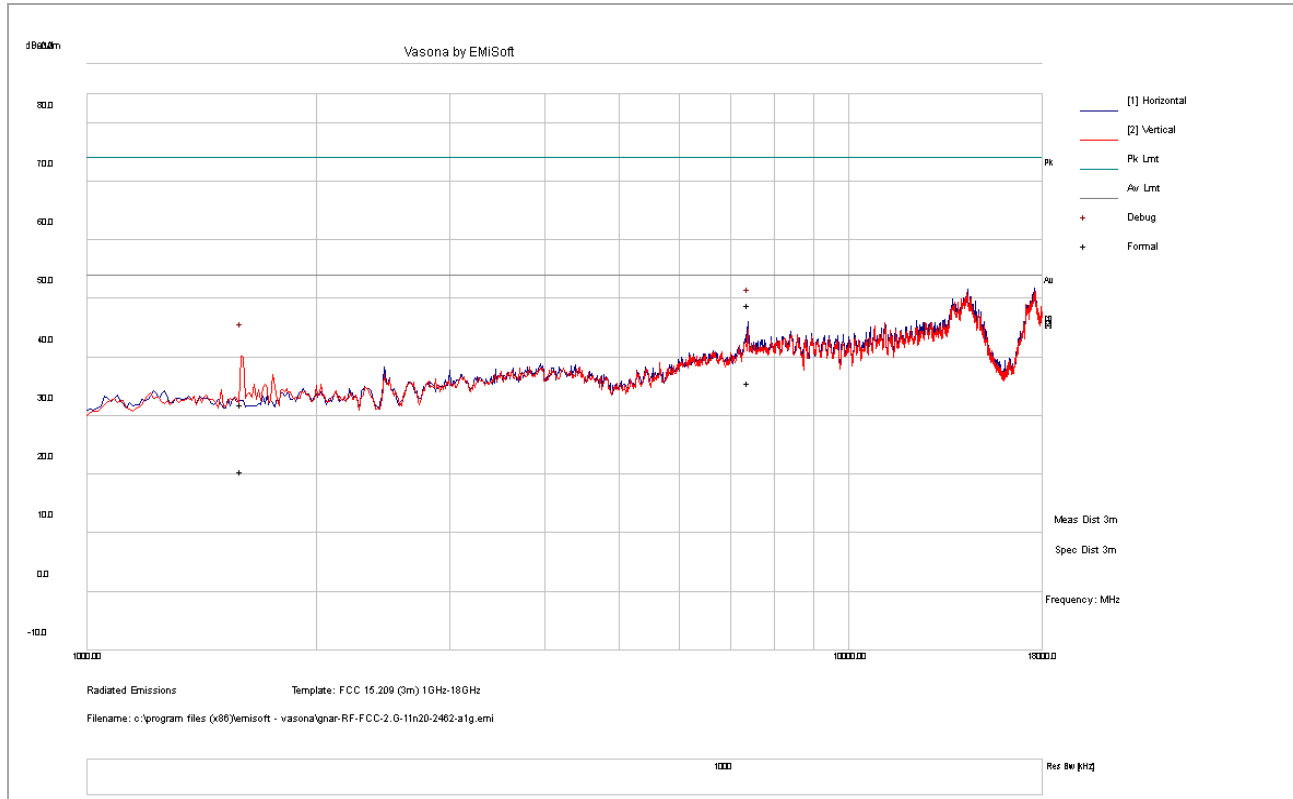
Note: no substantial emission is found other than the noise floor. Different modes have been verified and the worst case one is presented here.

Report Number: FLR-19012402-LC-RF-FCC-BLE
Product: Saros Dome Camera
Model Number: DH-390



Above 1GHz test result for WLAN & BLE simultaneous transmission

Test Standard:	15.209	Mode:	11g-2437MHz & BLE High CH
Frequency Range:	1GHz-18GHz	Test Date:	03/21/2019
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Sherwin Lee
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
1594.89	33.34	10.45	-11.80	32.00	PK	V	341	238	74.00	-42.01
7384.76	34.56	15.56	-1.12	48.99	PK	H	205	166	74.00	-25.01
1594.89	21.95	10.45	-11.80	20.60	AV	V	341	238	54.00	-33.40
7384.76	21.21	15.56	-1.12	35.64	AV	H	205	166	54.00	-18.36

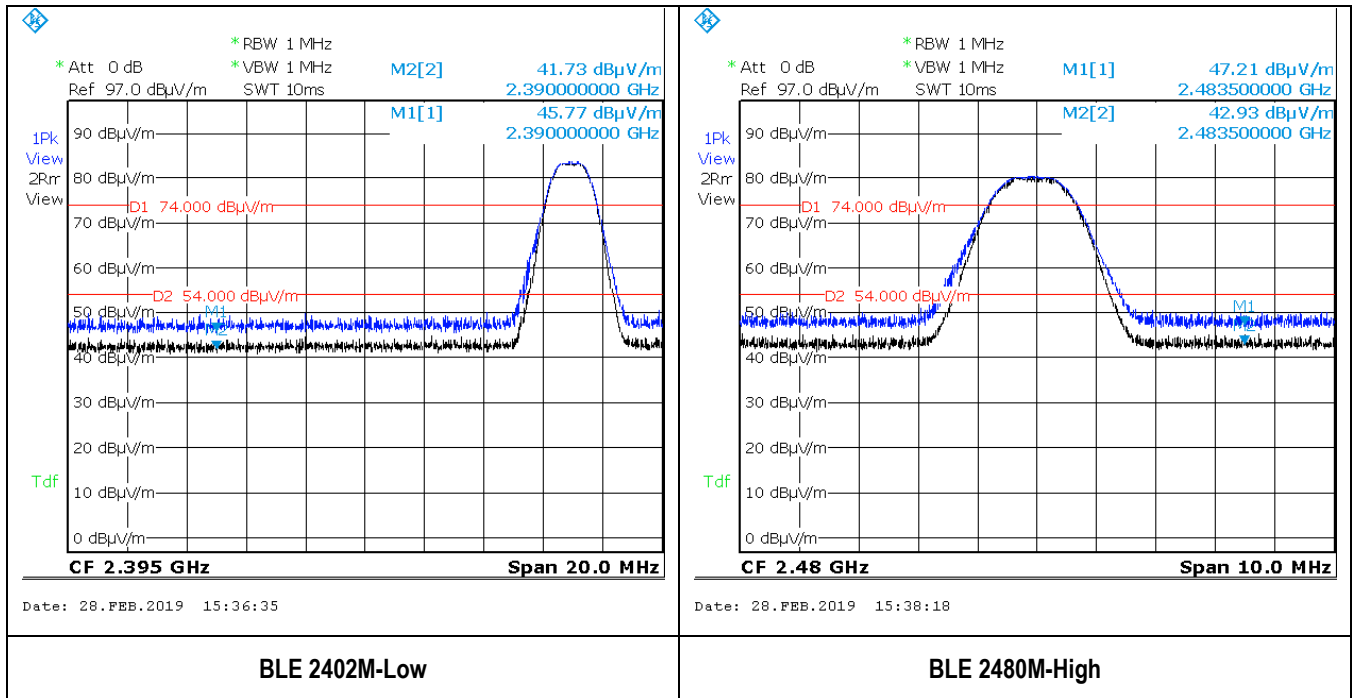
Note:

EUT is capable of transmitting simultaneously in both WLAN and BLE mode. Additional evaluation has been performed and found no change in the result when both WLAN and BLE transmissions are enabled.

Report Number: FLR-19012402-LC-RF-FCC-BLE
Product: Saros Dome Camera
Model Number: DH-390



Restricted Band Measurement Plots:



8.7 Conducted Emissions

8.7.1 Requirement

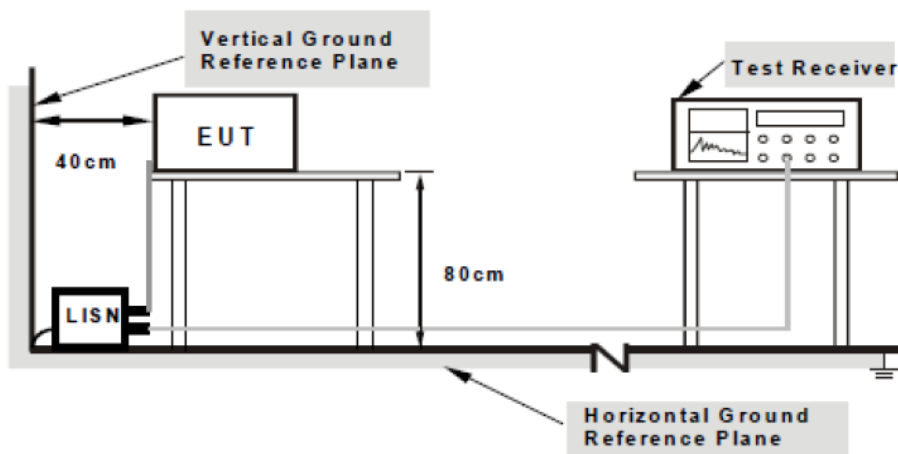
Per § 15.207 (a), an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Limits for Conducted Emissions at the Mains Ports

Section	Frequency ranges (MHz)	Limit (dBuV)	
		QP	Average
Class B devices	0.15 – 0.5	66 – 56	56 – 46
	0.5 – 5	56	46
	5 - 30	60	50

NOTE 1 The lower limit shall apply at the transition frequencies.

8.7.2 Test setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



8.7.3 Test Procedure

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment was powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, were then selected.
8. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made
9. All possible modes of operation were investigated. Only the worst case emissions were measured and reported. All other emissions were relatively insignificant.

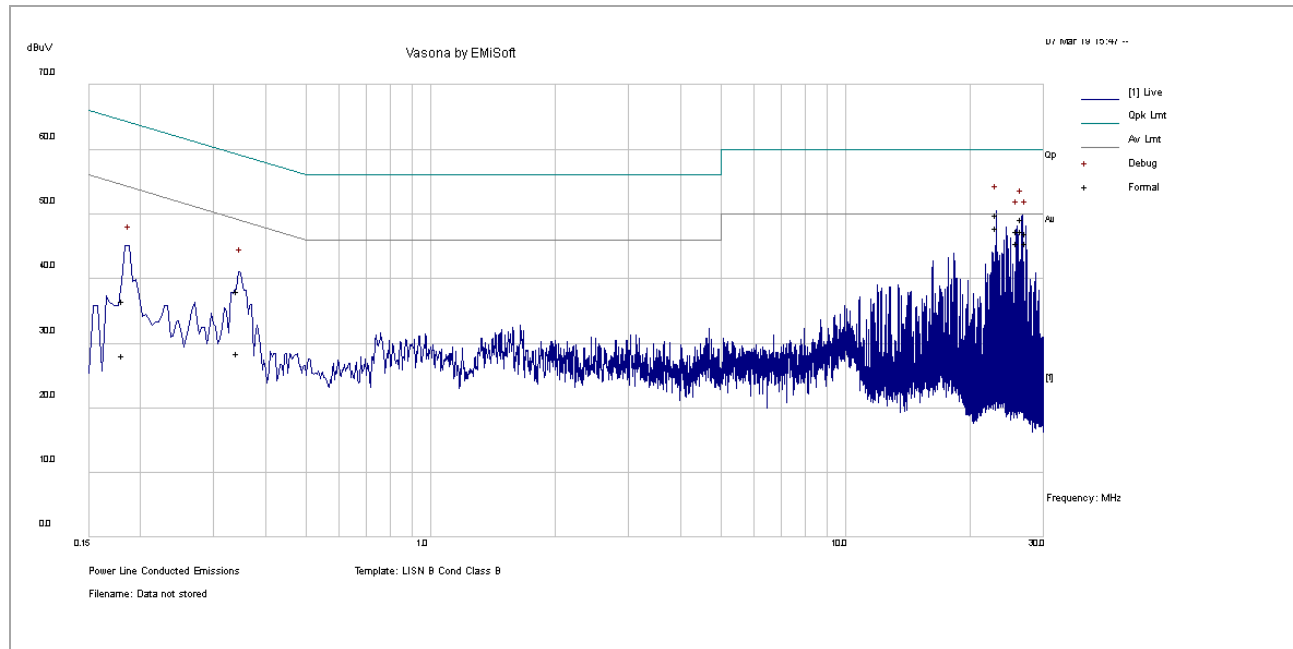
Report Number: FLR-19012402-LC-RF-FCC-BLE
Product: Saros Dome Camera
Model Number: DH-390



8.7.4 Test Result

Live Line

Test Standard:	47CFR 15.207	Mode:	Line
Frequency Range:	0.15-30MHz	Test Date:	03/07/2019
Antenna Type/Polarity:	N/A	Test Personnel:	Sherwin Lee
Remark:	120VAC, 60Hz	Test Result:	Pass



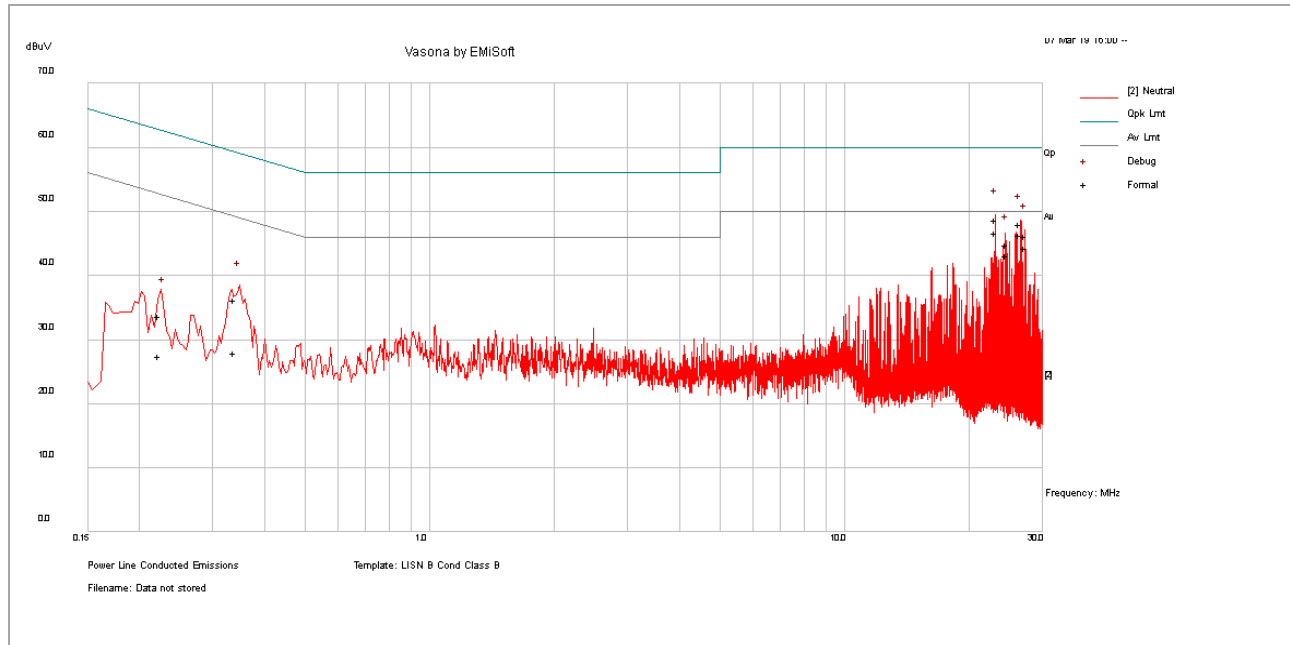
Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV/m)	Meas. Type	Line	Limit (dBuV/m)	Margin (dB)	Pass /Fail
23.13	38.14	11.20	0.61	49.96	QP	Live	60.00	-10.04	Pass
26.61	37.15	11.33	0.77	49.26	QP	Live	60.00	-10.74	Pass
25.88	35.27	11.30	0.73	47.30	QP	Live	60.00	-12.70	Pass
27.16	34.85	11.35	0.87	47.06	QP	Live	60.00	-12.94	Pass
0.34	27.61	10.36	0.13	38.09	QP	Live	59.12	-21.03	Pass
0.18	26.04	10.33	0.20	36.57	QP	Live	64.41	-27.84	Pass
23.13	36.06	11.20	0.61	47.88	AV	Live	50.00	-2.12	Pass
26.61	35.22	11.33	0.77	47.33	AV	Live	50.00	-2.67	Pass
25.88	33.55	11.30	0.73	45.58	AV	Live	50.00	-4.42	Pass
27.16	33.26	11.35	0.87	45.47	AV	Live	50.00	-4.53	Pass
0.34	18.00	10.36	0.13	28.49	AV	Live	49.12	-20.63	Pass
0.18	17.56	10.33	0.20	28.09	AV	Live	54.41	-26.32	Pass

Report Number: FLR-19012402-LC-RF-FCC-BLE
Product: Saros Dome Camera
Model Number: DH-390



Neutral Line

Test Standard:	47CFR 15.207	Mode:	Neutral
Frequency Range:	0.15-30MHz	Test Date:	03/07/2019
Antenna Type/Polarity:	N/A	Test Personnel:	Sherwin Lee
Remark:	120VAC, 60Hz	Test Result:	Pass



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV/m)	Meas. Type	Line	Limit (dBuV/m)	Margin (dB)	Pass /Fail
23.13	36.86	11.20	0.61	48.67	QP	Neutral	60.00	-11.33	Pass
26.49	35.99	11.33	0.77	48.08	QP	Neutral	60.00	-11.92	Pass
27.16	34.00	11.35	0.87	46.21	QP	Neutral	60.00	-13.79	Pass
24.53	32.98	11.26	0.68	44.91	QP	Neutral	60.00	-15.09	Pass
0.34	25.66	10.36	0.13	36.15	QP	Neutral	59.22	-23.07	Pass
0.22	23.26	10.34	0.17	33.77	QP	Neutral	62.74	-28.96	Pass
23.13	34.85	11.20	0.61	46.67	AV	Neutral	50.00	-3.33	Pass
26.49	34.23	11.33	0.77	46.33	AV	Neutral	50.00	-3.67	Pass
27.16	32.18	11.35	0.87	44.40	AV	Neutral	50.00	-5.60	Pass
24.53	31.13	11.26	0.68	43.07	AV	Neutral	50.00	-6.93	Pass
0.34	17.48	10.36	0.13	27.97	AV	Neutral	49.22	-21.26	Pass
0.22	17.02	10.34	0.17	27.53	AV	Neutral	52.74	-25.21	Pass

Report Number:	FLR-19012402-LC-RF-FCC-BLE
Product:	Saros Dome Camera
Model Number:	DH-390



9 Test instrument list

Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	5/11/2018	5/11/2019
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A	N/A
Spectrum Analyzer	Keysight	N9020A	MY50110074	5/4/2018	5/4/2019
EMC Test Receiver	R&S	ESL6	100230	5/7/2018	5/7/2019
LISN (9KHz – 30MHz)	EMCO	3816/2	9705-1066	5/4/2018	5/4/2019
Bi-Log Antenna	ETS-Lindgren	3142E	217921	11/15/2018	11/15/2019
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	5/2/2018	5/2/2019
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	5/2/2018	5/2/2019
Preamplifier	RF Bay, Inc.	LPA-10-20	11180621	5/10/2018	5/10/2019
True RMS Multi-meter	UNI-T	UT181A	C173014829	5/10/2018	5/10/2019
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	5/9/2018	5/9/2019
RF Attenuator	Pasternack	PE7005-3	VL061	5/10/2018	5/10/2019
Preamplifier 100KHz - 40GHz	Aeroflex	33711-392- 77150-11	064	5/10/2018	5/10/2019
EM Center Control	ETS-Lindgren	7006-001	160136	N/A	N/A
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A	N/A
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A	N/A
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	5/9/2018	5/9/2019
RE test cable(below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	5/10/2018	5/10/2019
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	5/10/2018	5/10/2019
RE test cable (>18GHz)	Sucoflex	104	344903/4	5/10/2018	5/10/2019
Pulse limiter	Com-Power	LIT-930A	531727	5/15/2018	5/15/2019
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	5/10/2018	5/10/2019
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	5/9/2018	5/9/2019