SETUP PHOTOS

Report Number. : R12444044-EP5

Applicant	:	CyberOptics Corporation 5900 Golden Hills Drive Golden Valley, MN 55416, USA
Model	:	APS3 / APS-FPD
FCC ID	:	SPD003
IC	:	6210A-003
EUT Description	:	Airborne Particle Sensor
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5

Date Of Issue:
18 DECEMBER 2018

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400

NVLAP TESTING
NVLAP Lab code: 200246-0

REPORT REVISION HISTORY

Ver.	Issue Date	Revisions	Revised By
1	2018-12-18	Initial Issue	Brian T. Kiewra

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

TABLE OF CONTENTS

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

1. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, North Carolina 27709, USA and 2800 Perimeter Park Dr., Suite B, Morrisville, North Carolina 27560, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

12 Laboratory Dr.	2800 Perimeter Park Dr.
☐ Chamber A (ISED:2180C-1)	☒ Chamber North (ISED:2180C-3)
☐ Chamber C (ISED:2180C-2)	☒ Chamber South (ISED:2180C-4)

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0

2. EQUIPMENT UNDER TEST

2.1. EUT DESCRIPTION

The EUT is an airborne particle sensor with a Bluetooth radio. The EUT only supports GFSK modulation.

APS3 is intended to be used inside semiconductor fabrication tools, and is the shape of a wafer, that is 300 mm diameter. Whereas the APS3-FPD which uses the same PCBA is targeted to the flat panel display industry. The APS3-FPD housing is made of PEEK plastic and is relatively square as opposed to the standard APS3 housing.

Radiated testing performed on both models in this report.
Power measurements performed on APS-FPD.

2.2. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz and above 18GHz, were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

The fundamentals of both EUTs were investigated in three orthogonal orientations X, Y, and Z. It was determined that Z orientation was worst-case orientation for the APS3 and X orientation was worst-case for the APS-FPD. Therefore, all final radiated testing was performed with the APS3 in Z orientation and the APS-FPD in X orientation.

Worst-case data rates as provided by the client were:

GFSK mode: DH5

2.3. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Battery Pack	Power Bank	XT-5000	NA	NA

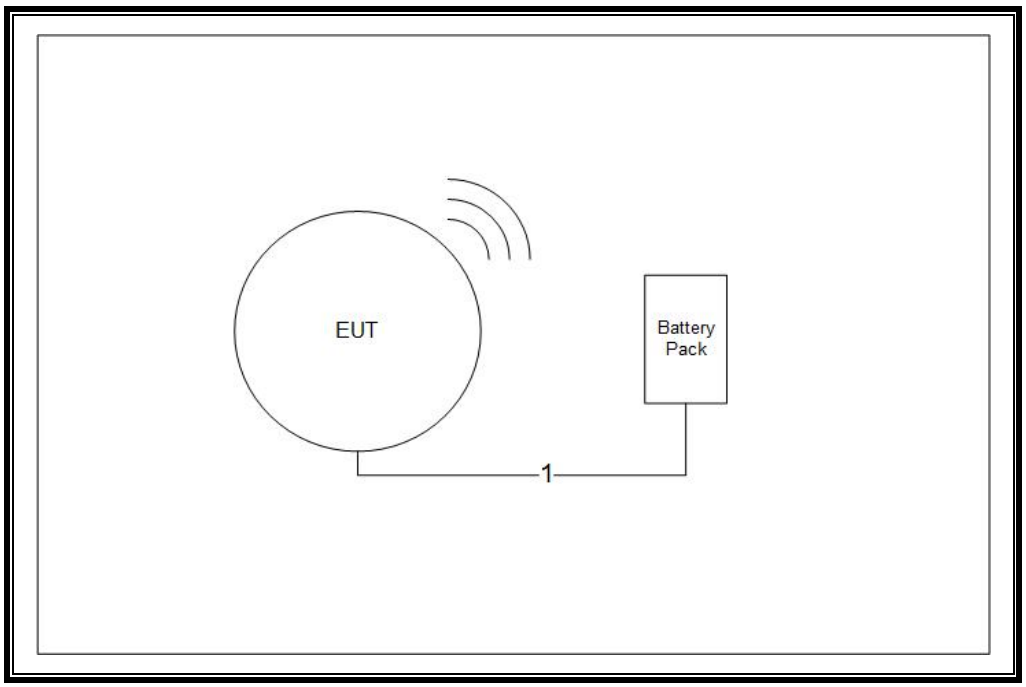
I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB	USB	<1m	Connected to battery pack

TEST SETUP

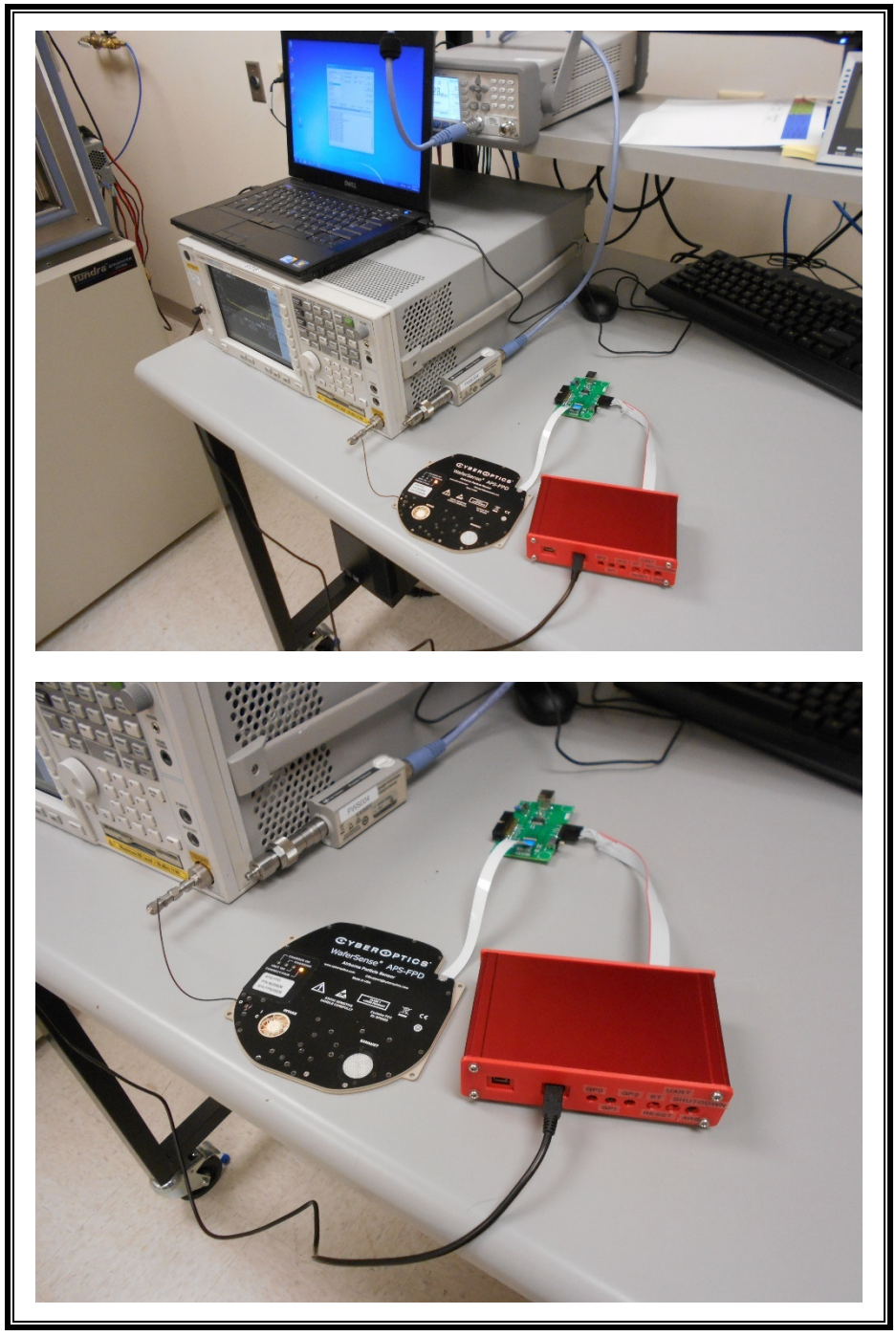
The EUT was installed in a typical configuration. The customer provided test software to exercise the EUTs during test. Refer to the following diagram.

SETUP DIAGRAMS



3. SETUP PHOTOS

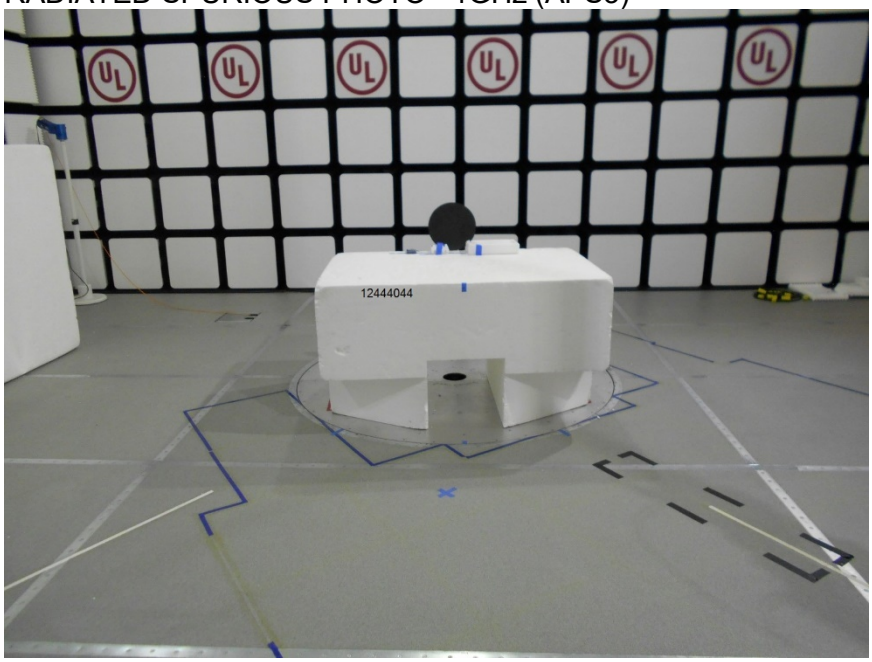
ANTENNA PORT CONDUCTED

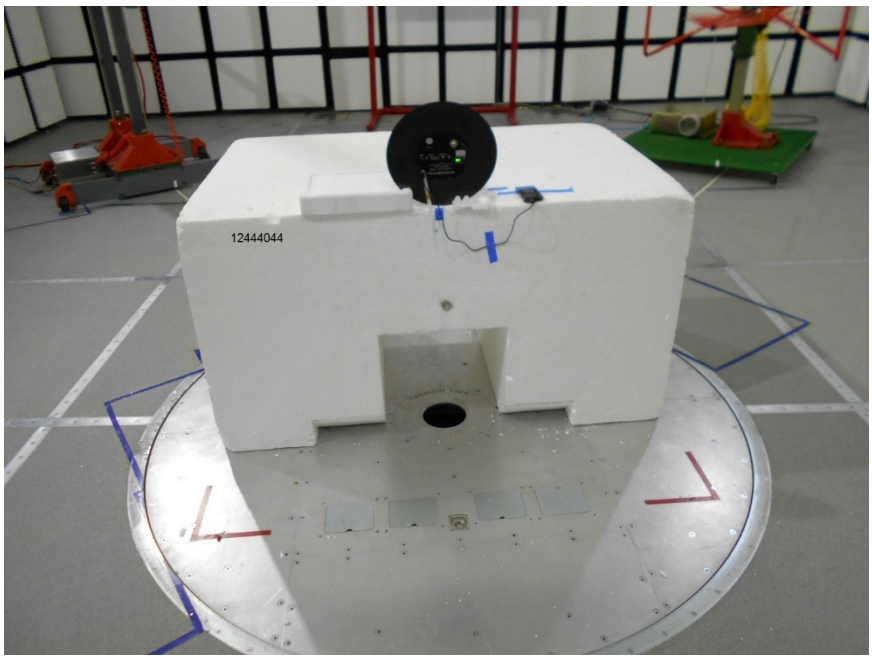


UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

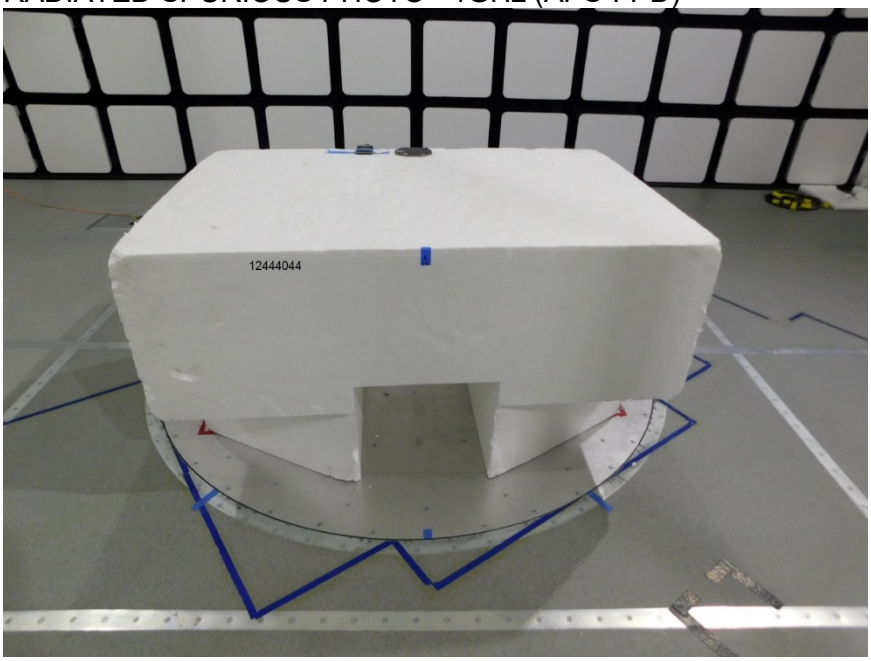
RADIATED SPURIOUS EMISSIONS

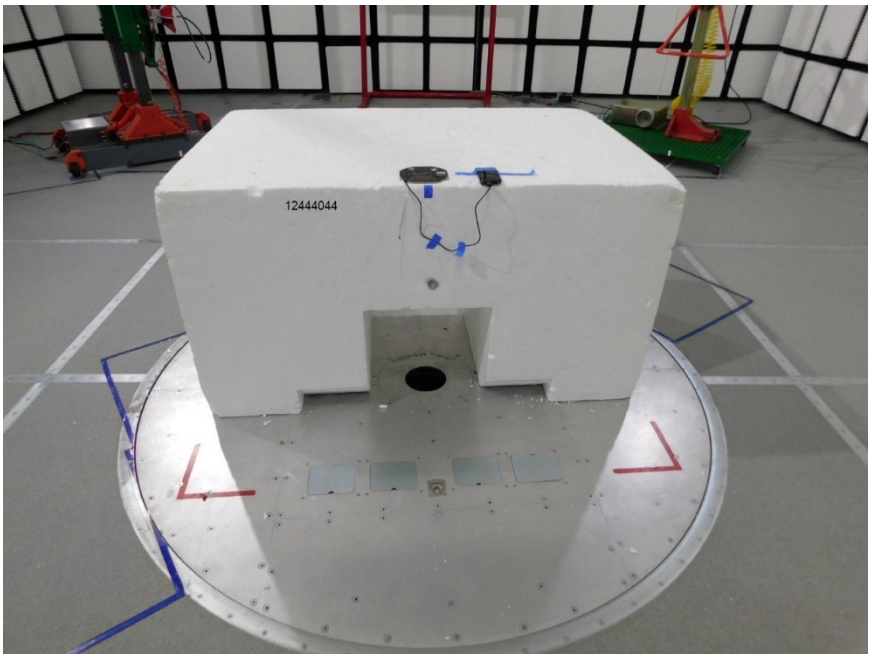
RADIATED SPURIOUS PHOTO <1GHz (APS3)



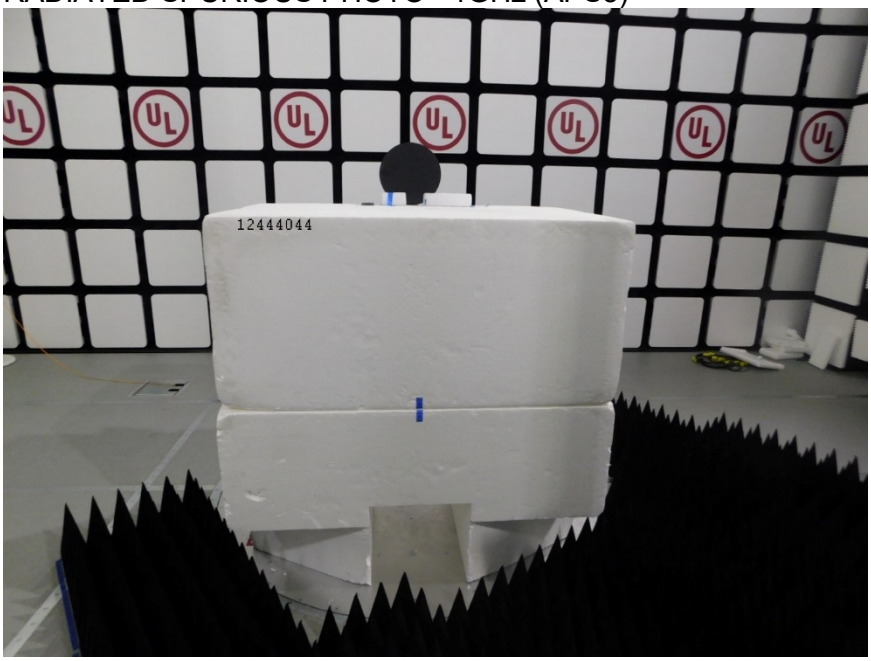


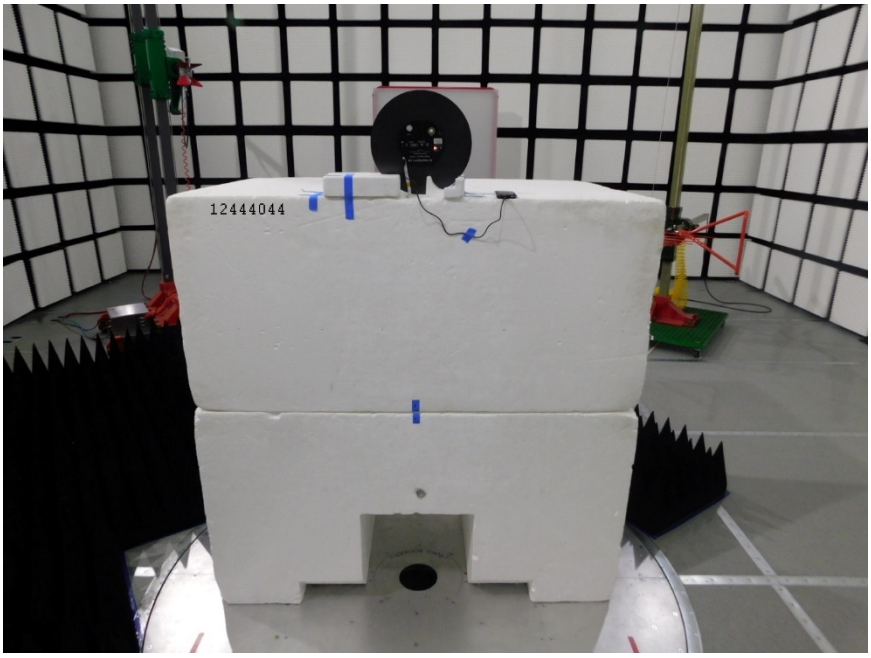
RADIATED SPURIOUS PHOTO <1GHz (APS-FPD)



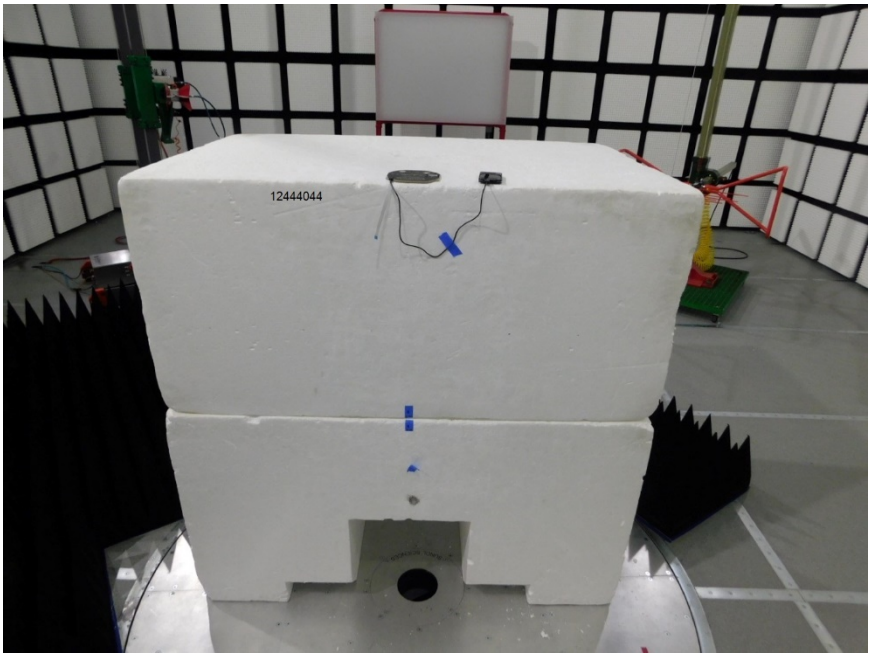


RADIATED SPURIOUS PHOTO >1GHz (APS3)

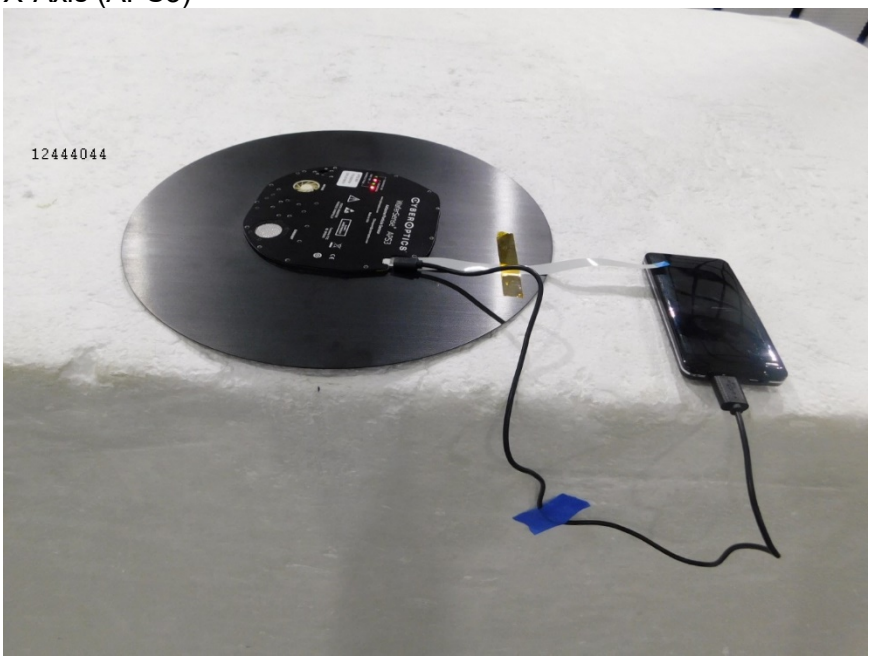




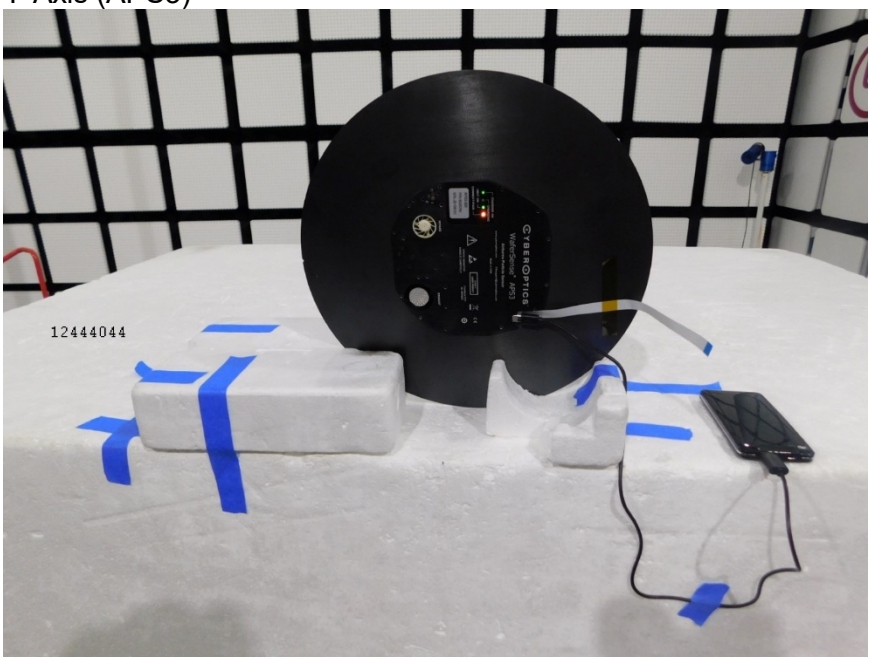
RADIATED SPURIOUS PHOTO >1GHz (APS-FPD)



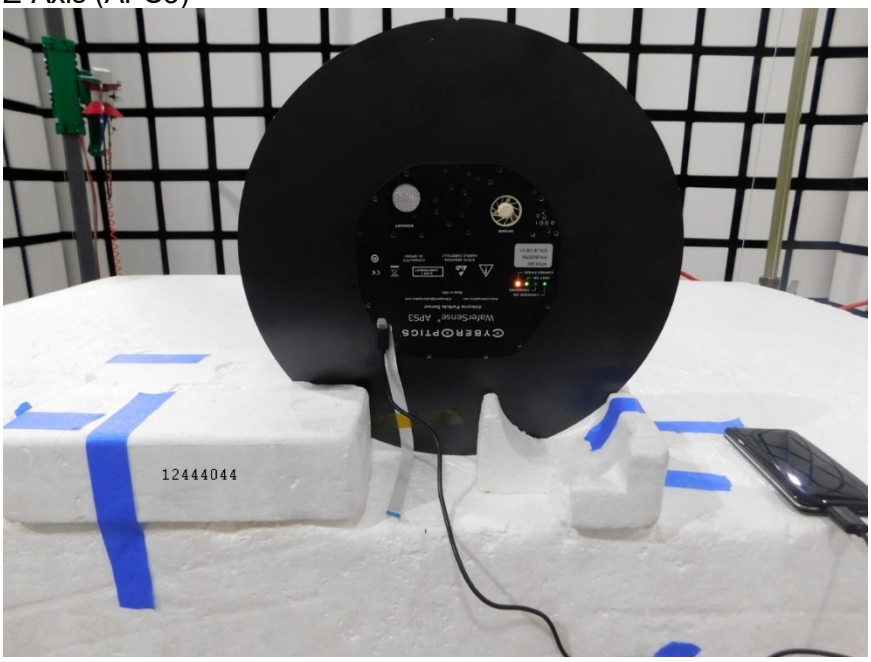
X-Axis (APS3)



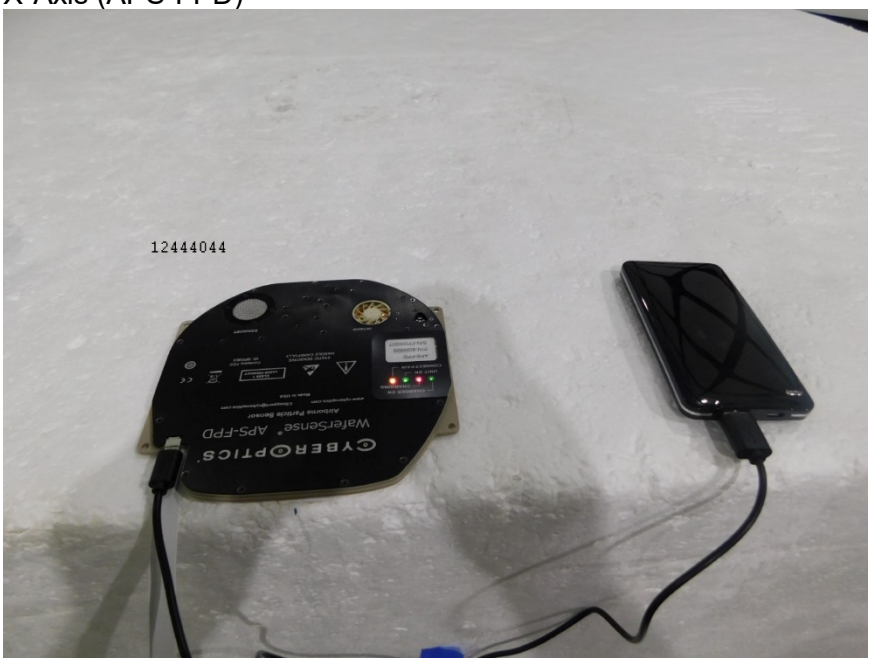
Y-Axis (APS3)



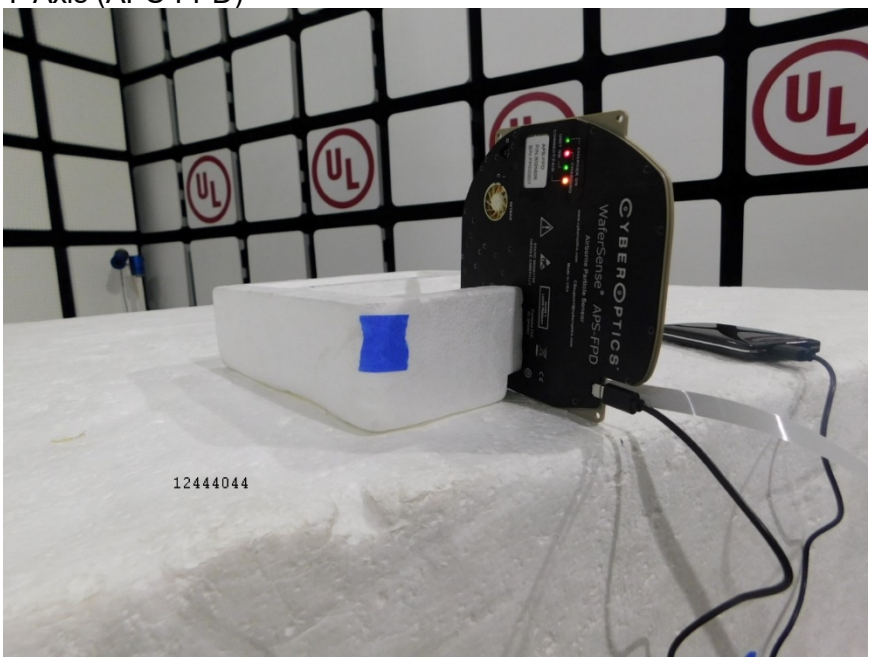
Z-Axis (APS3)



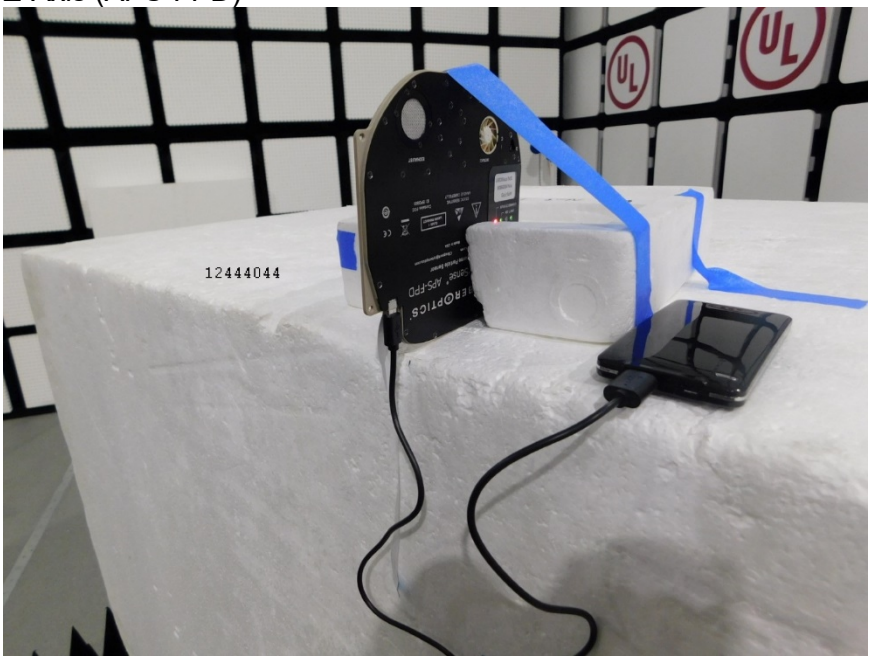
X-Axis (APS-FPD)



Y-Axis (APS-FPD)



Z-Axis (APS-FPD)



END OF REPORT

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400