TEST REPORT

KCTL Inc.
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Applicant	:	UNIVE Co.,Ltd. RM 405, SUNTECHCITY 1, 474 Dunchon-daero, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea
Manufacturer	:	UNIVE Co.,Ltd. RM 405, SUNTECHCITY 1, 474 Dunchon-daero, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea
Type of equipment	:	HDMI Acitve Optical Cable
Model Name	:	UHO-A0KB
Variant Model Name	:	UHP-XY*#
Date of Receipt	:	June 21, 2016
Date of Test	:	July 01 ~ July 02, 2016
Test method used	:	FCC part 15 subpart B, Class B
FCC ID	:	2AIW8-UHO-A0KB
Test Results	:	Complied

The above equipment was tested by KCTL Laboratory for compliance with the requirements of FCC Rules and Regulations. The results of testing in this report apply to the product/system which was tested only.
Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.
These results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations.

Affirmation	Tested by  Name: Jinyoung Yeo	Technical Manager  Name: Gunsu Park

2016. 07. 06

Contents

1. Applicant information

Applicant:	UNIVE Co.,Ltd.
Address:	RM 405, SUNTECHCITY 1, 474 Dunchon-daero, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea
Telephone :	+82-31-706-2211
Contact name:	**Jonggu Park**

Manufacturer:	UNIVE Co.,Ltd.
Address:	RM 405, SUNTECHCITY 1, 474 Dunchon-daero, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea
Telephone :	+82-31-706-2211
Contact name:	**Jonggu Park**

2. Laboratory information

Address

KCTL Inc.

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-390, Korea

Telephone Number: 82 70 5008 1021

Facsimile Number: 82 505 299 8311

FCC Site Designation No: KR0040, FCC Site Registration No: 687132

VCCI Registration No. : R-3327, G-198, C-3706, T-1849

Industry Canada Registration No. : 8035A

KOLAS NO.: KT231

SITE MAP

3. Test system configuration

3.1 Operation environment

		Temperature	Humidity	Pressure
Chamber(10 m)	:	26.1 °C	41.2 % R.H.	-
Shielded room(CE)	:	25.5 °C	42.2 % R.H.	-

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.
The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Conducted emission measurement (C.L.: Approx 95 %, k = 2)		
Shielded Room (CE#1)	9 kHz ~ 150 kHz: 3.80 dB 150 kHz ~ 30 MHz: 3.42 dB	
Shielded Room (CE#2)	9 kHz ~ 150 kHz: 3.82 dB 150 kHz ~ 30 MHz: 3.40 dB	
Radiated Emission measurement (C.L.: Approx 95 %, k = 2)		
10 m Chamber (4F)	30 MHz ~ 300 MHz	3 m: 5.48 dB 10 m: 5.48 dB
	300 MHz ~ 1 000 MHz	3 m: 5.60 dB 10 m: 5.48 dB
	1 GHz ~ 6 GHz	3 m: 6.00 dB
	6 GHz ~ 18 GHz	3 m: 6.56 dB
10 m Chamber (2F)	30 MHz ~ 300 MHz	3 m: 5.04 dB 10 m: 5.04 dB
	300 MHz ~ 1 000 MHz	3 m: 5.16 dB 10 m: 5.04 dB
	1 GHz ~ 6 GHz	3 m: 6.10 dB
	6 GHz ~ 18 GHz	3 m: 6.38 dB

3.3 Measurement Program

These test items were performed by software programs;

Test item	Measurement Program
Conducted Emission	EP5CE_V 5.4.0(TOYO)
Radiated Emission	EP5RE_V 4.6.0(TOYO)

4. Description of E.U.T.

4.1 General information

• Video format	1080p Full HD, 4K, 3D and deep color
• Supported features	HDCP , HDMI-CEC
• Voltage	DC 5V
• Power	0.07W
• Operating temperature	0° - 50°C
• Operating humidity	5% - 85% RH

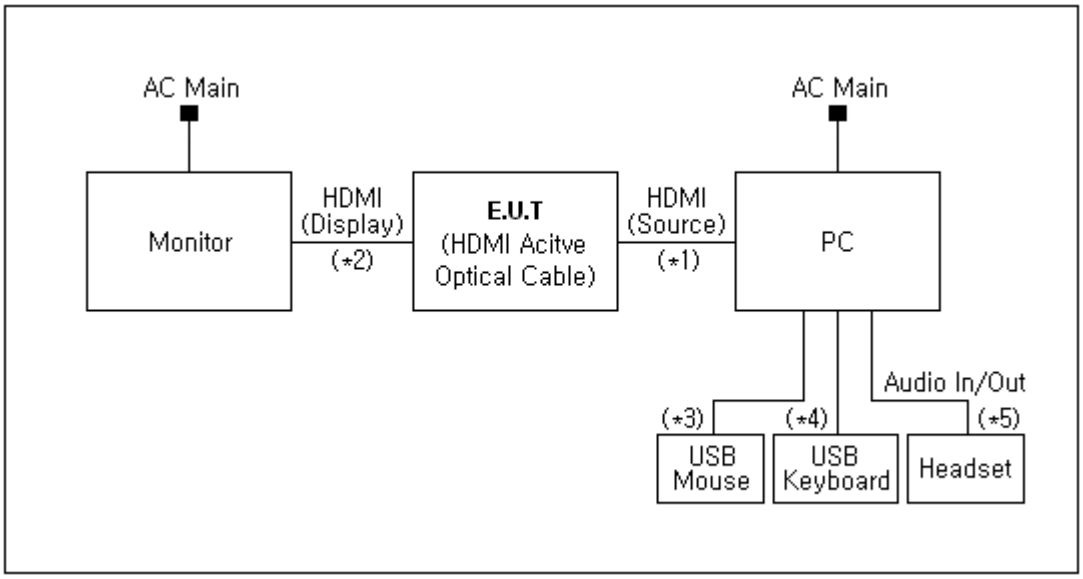
4.2 Product description

Type of product	HDMI Acitve Optical Cable
Model name (Basic)	UHO-A0KB
Model name (Variant)	UHP-XY*#
Difference	Factory: U; Function: H; Type: O XY: 03 3m, 05 5m, 10 10m, 15 15m, 20 20m, 50 50m, A0 100m, A2 120m, B0 200m, X2 1.2m, X5 1.5m *: J AGC Non UL Green, K AGC Plennum Black, L AGC Plennum Orange, M AGC Plennum Aqua #: N Non Buffer IC, B Buffer IC
Brand name	-
Trade name	-
Serial no	-
Testing Voltage	120 V, 60 Hz
Input range	120 V, 60 Hz
Internal clock frequency	12 kHz
Note	-

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
PC	550-150KR	-	HP
Monitor	LT24B350	ZWP0HMCD102039M	SAMSUNG
USB Mouse	1088	8165906050950	Microsoft
USB Keyboard	SKG-3000UB	TAKB516930J	SAMSUNG
Headset	SHS-250V	-	SAMSUNG

4.4 Test configuration



Note	Start		End		Cable	
*	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	**EUT** (HDMI Acitve Optical Cable)	HDMI(Source)	PC	HDMI(Source)	3.0	Shield
2		HDMI(Display)	Monitor	HDMI(Display)	3.0	Shield
3	PC	USB	USB Mouse	USB	1.4	Shield
4		USB	USB Keyboard	USB	1.5	Shield
5		Audio In/Out	Headset	Audio In/Out	1.5	Unshield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
1	Check the 'H' pattern output to using the monitor. (Used program: EMI Tool)
	1 kHz MP3 play test.

5. Summary of test results

In the above configuration tested, The EUT complied with the requirement of the specification

5.1 Summary of EMI emission test results

FCC Part 15 Subpart B (Class B)

ANSI C63.4:2009

Applied	Test items	Test method	Result
☒	Conducted Emission	ANSI C63.4:2009	Pass
☒	Radiated Emission	ANSI C63.4:2009	Pass

6. Test results

6.1 Conducted Emission

Test specification	FCC Part 15, Section 15.107(a), Class B		
Testing voltage	120 V, 60 Hz		
Test facility	Shielded room (CE#2)		
Date	2016. 07. 02		
Temperature (°C)	25.5 °C	Humidity (% R.H.)	42.2 % R.H.
Remarks	Pass		

6.1.1 Limits of conducted emission measurement

Frequency [㎒]	Class A (dB(㎶))		Class B (dB(㎶))	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	79	66	66 ~ 56 *	56 ~ 46*
0.5 ~ 5	73	60	56	46
5 ~ 30	73	60	60	50

*The limit decreases linearly with the logarithm of frequency.

6.1.2 Measurement procedure

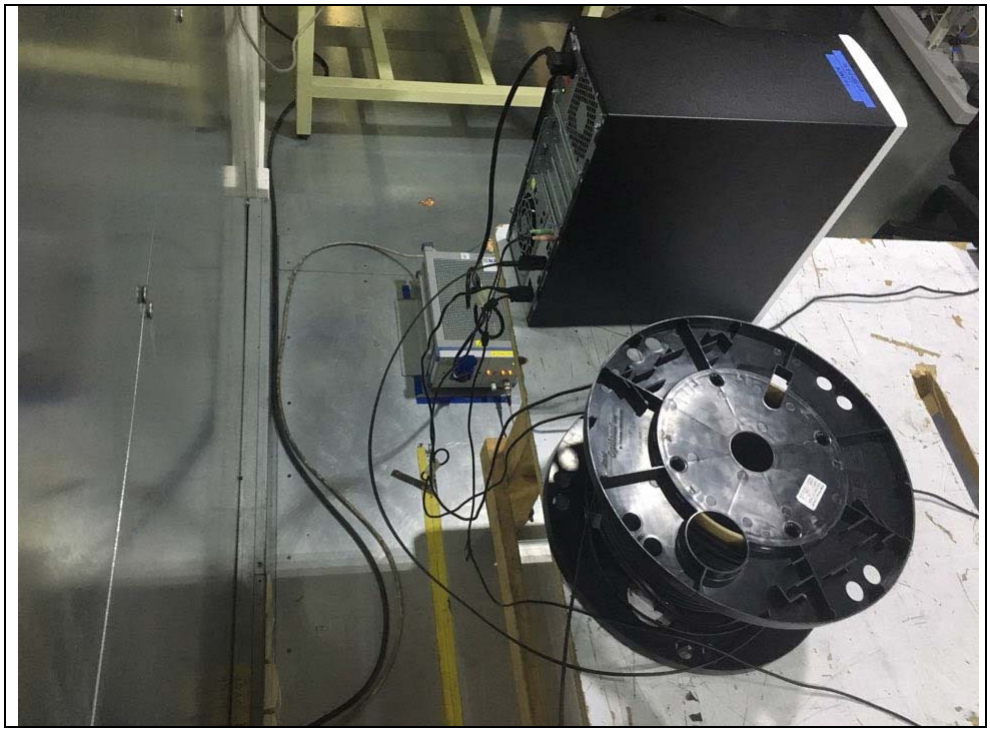
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 0.4 m to the Horizontal metal ground 0.3 m ~ 0.4 m long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 0.8 m from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement.

6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESCI	100710	R&S	2017.02.26	☒
TWO-LINE V-NETWORK	ENV216	101352	R&S	2016.09.02	☒
TWO-LINE V-NETWORK	NNLK8121	8121-472	SCHWARZBECK	2017.06.16	☒

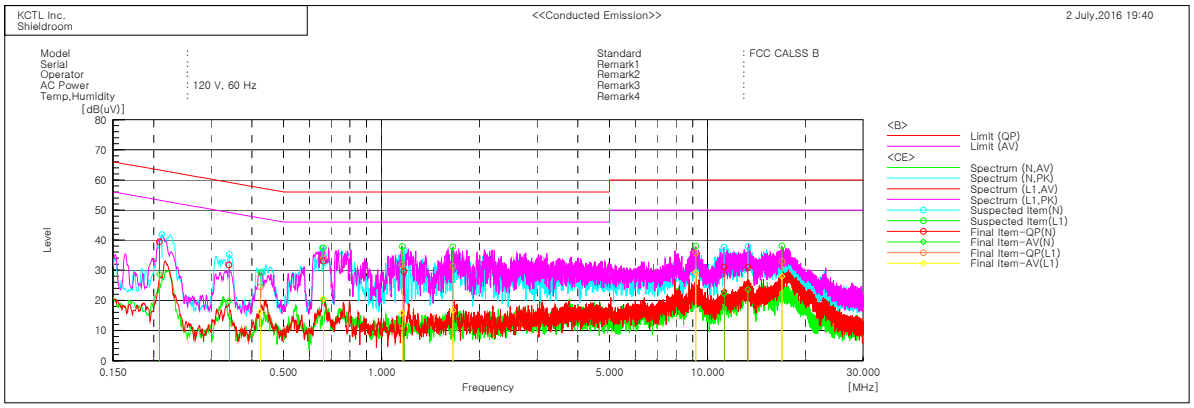
6.1.4 Photographs of test setup

* AC Main



6.1.5 Conducted emission measurement result

* AC Main (UHO-A0KB)



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.20833	29.7	18.9	9.8	39.5	28.7	63.3	53.3	23.8	24.6
2	0.34044	22.1	10.1	9.7	31.8	19.8	59.2	49.2	27.4	29.4
3	0.66195	23.3	10.2	9.7	33.0	19.9	56.0	46.0	23.0	26.1
4	1.17154	19.9	2.2	9.7	29.6	11.9	56.0	46.0	26.4	34.1
5	11.24357	21.3	12.5	9.8	31.1	22.3	60.0	50.0	28.9	27.7
6	13.29761	21.3	13.7	9.8	31.1	23.5	60.0	50.0	28.9	26.5

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.4248	14.5	6.3	9.9	24.4	16.2	57.4	47.4	33.0	31.2
2	0.66314	24.3	10.8	9.8	34.1	20.6	56.0	46.0	21.9	25.4
3	1.15623	22.2	6.1	9.7	31.9	15.8	56.0	46.0	24.1	30.2
4	1.65469	21.6	6.9	9.7	31.3	16.6	56.0	46.0	24.7	29.4
5	9.19689	25.9	19.4	9.8	35.7	29.2	60.0	50.0	24.3	20.8
6	16.89788	23.0	18.0	9.9	32.9	27.9	60.0	50.0	27.1	22.1

6.2 Radiated Emission

Test specification	FCC Part 15, Section 15.109(g), Class B		
Testing voltage	120 V, 60 Hz		
Test facility	10 m Chamber (4F)		
Test distance	3 m		
Date	2016. 07. 01		
Temperature (°C)	26.1 °C	Humidity (% R.H.)	41.2 % R.H.
Remarks	Pass		

6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A (dB(μV/m)) @ 10 m	Class B (dB(μV/m)) @ 3 m
30-88	39	40
88-216	43.5	43.5
216-960	46.4	46
Above 960	49.5	54

*** Note- Alternative standard: CISPR, Pub. 22 ***

6.2.2 Measurement procedure

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.
Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.2.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Test Receiver	ESR	101078	R&S	2017.02.26	☒
Bi-Log Antenna	CBL 6112D	37876	TESEQ	2016.08.28	☒
Amplifier	310N	284608	SONOMA INSTRUMENT	2017.05.09	☒
Coaxial Fixed Attenuator	8491A	16861	HP	2017.04.07	☒
Antenna Mast	AM4.0	079/3440509	MATURO	-	☒
Turn Table	CO2000-SOFT	-	MATURO	-	☒
Preamplifier	8449B	3008A01802	AGILENT	2017.04.07	☒
Horn ANT	3115	00086706	ETS	2016.09.02	☒
Spectrum Analyzer	FSV40	100988	R&S	2017.01.07	☐

6.2.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

Result = M.R + C.F(A.F + C.L +3 dB Att – A.G)

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G= Amplifier Gain

3 dB Att = 3 dB Attenuator

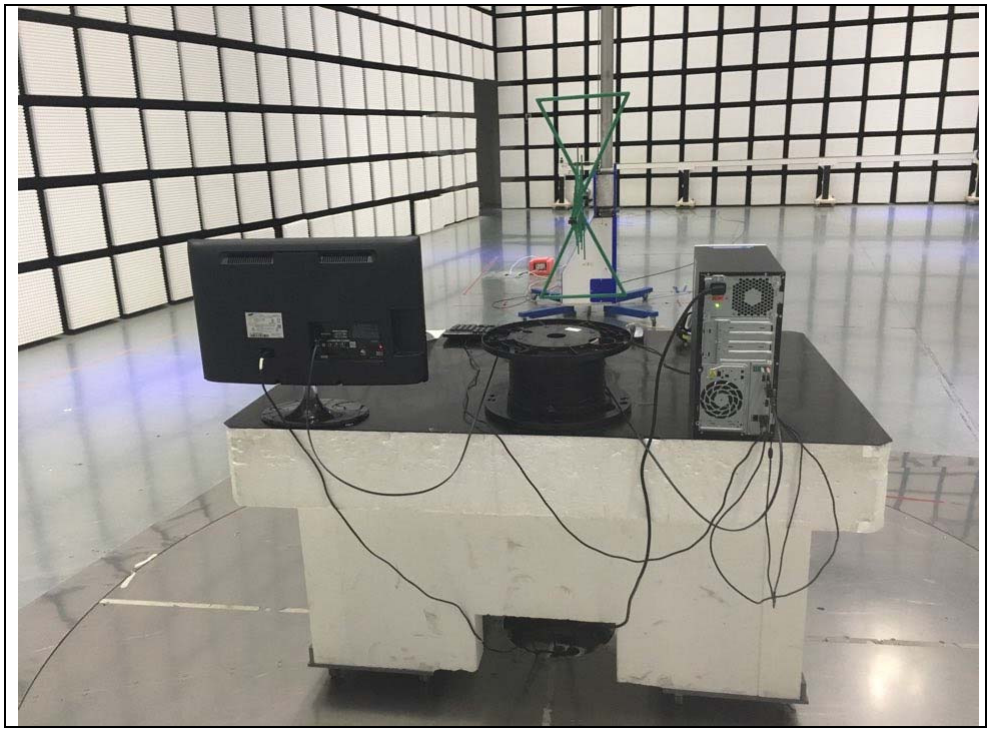
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

30 + 12 + 5 + 3 – 35 = 15 dB (μV/m)

6.2.5 Photographs of test setup

* 30 MHz ~ 1 GHz

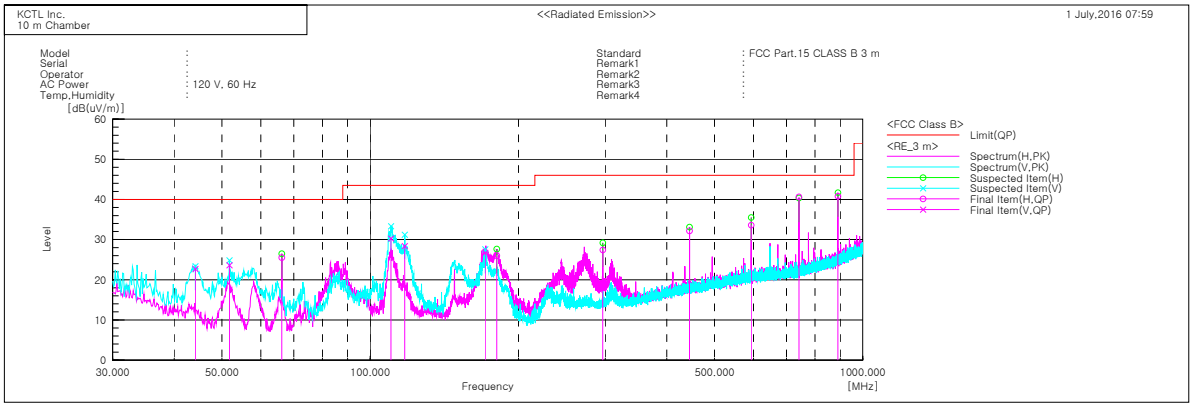


* 1 GHz ~ 6 GHz

6.2.6 Radiated emission measurement result

*** Graph and Data**

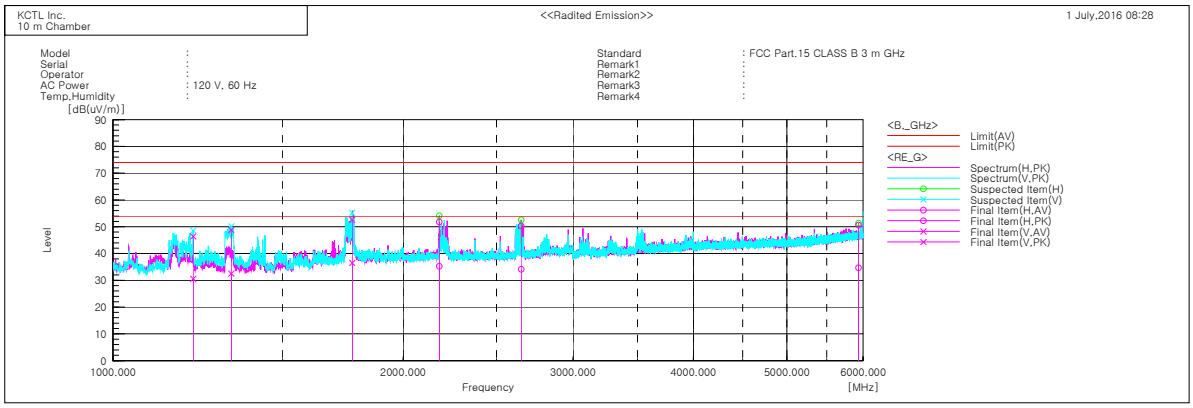
* 30 MHz ~ 1 GHz (UHO-A0KB)



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	44.186	V	39.0	-16.3	22.7	40.0	17.3	100.0	44.3
2	51.825	V	43.3	-19.7	23.6	40.0	16.4	100.0	38.6
3	66.133	H	45.9	-20.4	25.5	40.0	14.5	100.0	264.3
4	110.268	V	44.4	-14.1	30.3	43.5	13.2	100.0	74.0
5	117.543	V	42.0	-13.6	28.4	43.5	15.1	198.0	37.5
6	171.256	V	42.5	-15.8	26.7	43.5	16.8	100.0	38.6
7	180.714	H	41.9	-15.9	26.0	43.5	17.5	201.0	354.0
8	296.750	H	38.2	-10.8	27.4	46.0	18.6	201.0	256.7
9	445.039	H	38.4	-6.2	32.2	46.0	13.8	100.0	251.5
10	593.449	H	36.8	-3.2	33.6	46.0	12.4	301.0	326.0
11	741.859	H	42.3	-1.7	40.6	46.0	5.4	100.0	347.9
12	890.147	H	39.8	1.0	40.8	46.0	5.2	100.0	331.7

* 1 GHz ~ 6 GHz (UHO-A0KB)



Final Result

No.	Frequency [MHz]	(P)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	c.f [dB(1/m)]	Result AV [dB(uV/m)]	Result PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]
1	1211.250	V	42.7	58.5	-12.1	30.6	46.4	54.0	74.0	23.4	27.6	100.0	0.3
2	1326.250	V	44.1	60.4	-11.6	32.5	48.8	54.0	74.0	21.5	25.2	100.0	11.5
3	1770.625	V	44.2	60.3	-7.7	36.5	52.6	54.0	74.0	17.5	21.4	100.0	11.5
4	2180.000	H	41.0	57.6	-5.8	35.2	51.8	54.0	74.0	18.8	22.2	100.0	12.7
5	2651.875	H	39.3	55.5	-5.2	34.1	50.3	54.0	74.0	19.9	23.7	100.0	6.7
6	5934.375	H	28.8	44.7	5.9	34.7	50.6	54.0	74.0	19.3	23.4	100.0	46.5

7. E.U.T. photographs

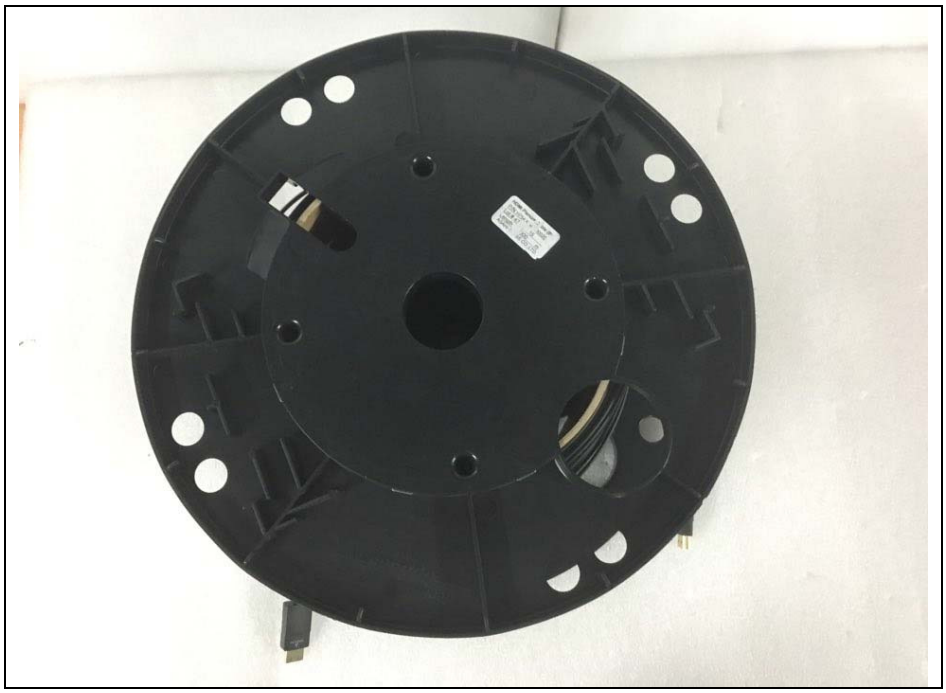
Front View

Rear View

Left View

Right View

Top View

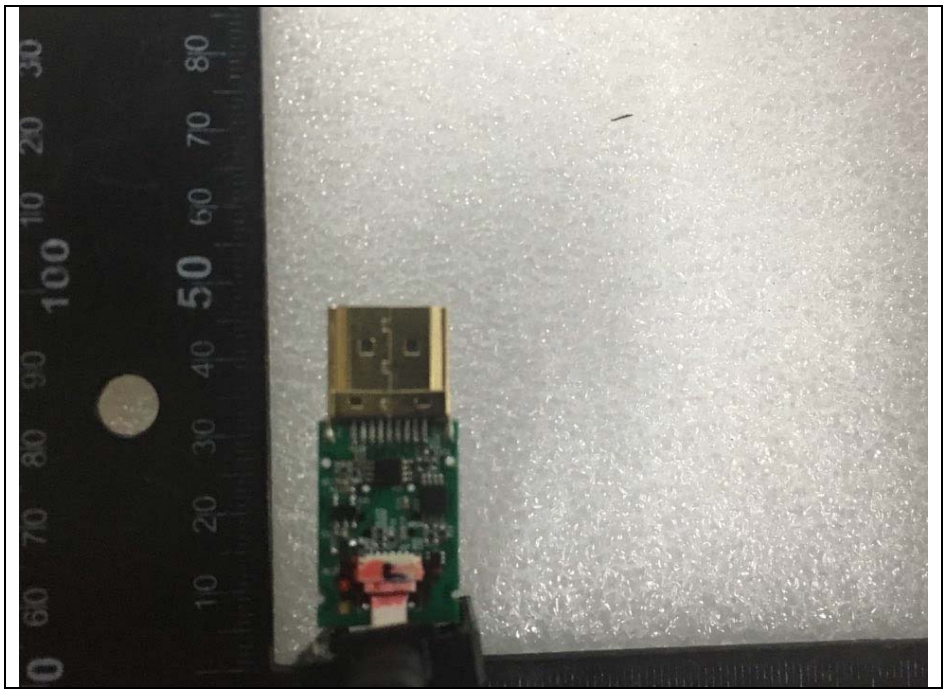


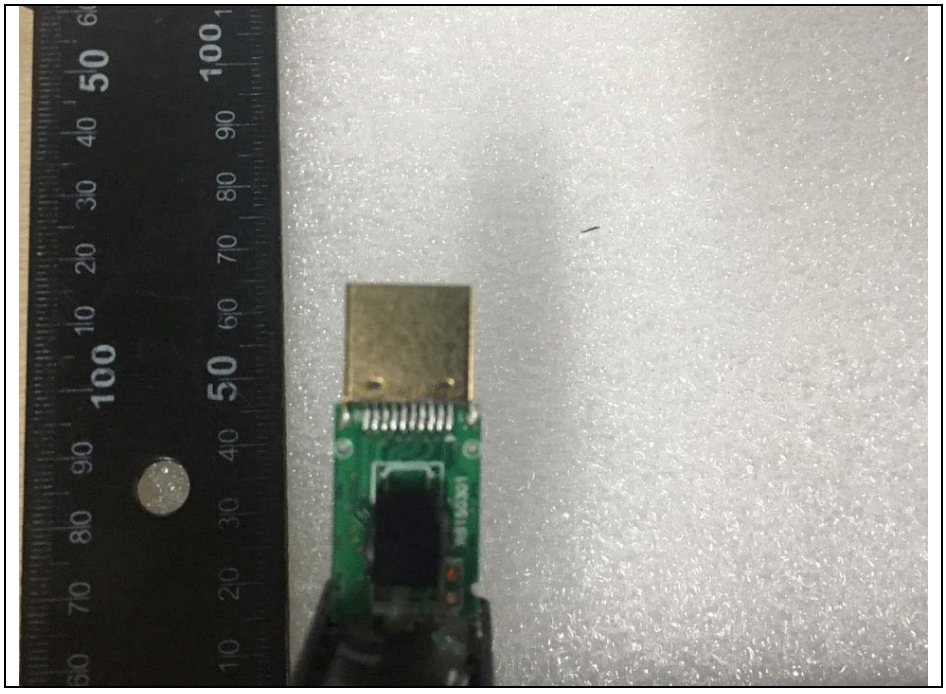
Bottom View

Label

Inside

Main Board #1





Main Board #2