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TEST REPORT

KCTL Inc.
52-20, Sinjeong-ro 41beon-gil, Giheung-gu,
Yongin-si, Gyonggi-Do, Korea
TEL: 82-31-326-6700 FAX: 82-505-299-8311
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1. Client

- Name : MultimediaLink Inc.
- Address : #812, 19, Ojeongongeop-gil, Uiwang-si, Gyeonggi-do, 16072 Republic of Korea
- Date of Receipt : 2018-11-07

2. Use of Report : -

3. Name of Product and Model : 10.1 inch HDMI Touch Screen Monitor / UM-1080CH

4. Manufacturer and Country of Origin : MultimediaLink Inc. / Korea

5. Date of Test : 2018-11-16 to 2018-11-19

6. Test method used : FCC Part 15 Subpart B, Class B
ANSI C63.4:2014
ICES-003 Issue 6

7. Test Results : Refer to the test result in the test report

Affirmation	Tested by Name : Youngbae Seo (Signature)	Technical Manager Name : Jaeho Park (Signature)

2018-11-23

KCTL Inc.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2018-11-23	Originally issued	-

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Contents

1. Applicant information 4
2. Laboratory information 5
3. Test system configuration 6
3.1 Operation environment 6
3.2 Measurement Uncertainty 7
3.3 Measurement Program 8
4. Description of EUT 9
4.1 General information 9
4.2 Product description 10
4.3 Auxiliary equipments 10
4.4 Test configuration 11
4.5 Operating conditions 12
5. Summary of test results 13
5.1 Summary of EMI emission test results 13
6. Test results 14
6.1 Conducted Emissions 14
6.2 Radiated Emission 18
7. EUT photographs 25

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1. Applicant information

Applicant:	MultimediaLink Inc.
Address:	#812, 19, Ojeongongeop-gil, Uiwang-si, Gyeonggi-do, 16072 Republic of Korea
Telephone:	+82-31-462-0290
Fax:	+82-303-0943-0293
E-mail:	hcpark@multimedia-link.com
Contact name:	Hyunchul Park

Manufacturer:	MultimediaLink Inc.
Address:	#812, 19, Ojeongongeop-gil, Uiwang-si, Gyeonggi-do, 16072 Republic of Korea
Telephone:	+82-31-462-0290
Fax:	+82-303-0943-0293
E-mail:	hcpark@multimedia-link.com
Contact name:	Hyunchul Park

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2. Laboratory information

Address

KCTL Inc. (Yongin Lab.)

52-20, Sinjeong-ro 41beon-gil, Giheung-gu, Yongin-si, Gyonggi-Do, Korea

Telephone Number: 82 31 326 6700

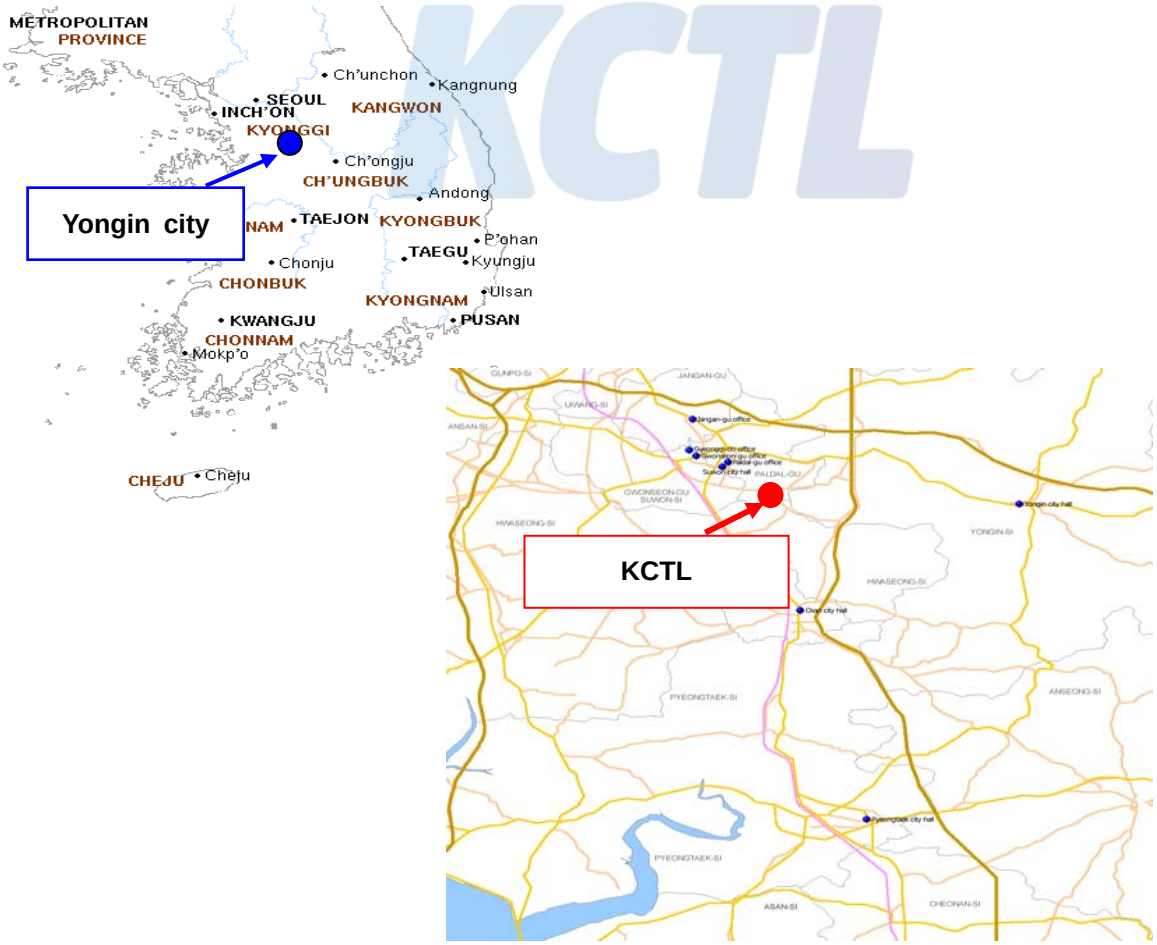
Facsimile Number: 82 505 299 8311

FCC Site Designation No: KR0040

VCCI Registration No. : C-2915, T-11320, R-4386, G-10547

KOLAS NO.: KT231

SITE MAP



3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber 10 m(RE)	18.0 °C	34.1 % R.H.	-
Chamber 10 m(RE)	18.3 °C	48.0 % R.H.	-
Shielded room(CE)	19.3 °C	34.1 % R.H.	-

Test site

These testing items were performed following locations;

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

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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_AMN (Confidence level about 95 %, *k* = 2)		
Shielded Room (CE#1)	9 kHz ~ 150 kHz: 3.63 dB	
	150 kHz ~ 30 MHz : 3.18 dB	
Shielded Room (CE#2)	9 kHz ~ 150 kHz: 3.70 dB	
	150 kHz ~ 30 MHz : 3.25 dB	
Conducted Emission measurement_AAN (Confidence level about 95 %, *k* = 2)		
Shielded Room	150 kHz ~ 30 MHz	AAN with a_{LCL} = 55…40 dB : 4.16 dB
		AAN with a_{LCL} = 65…50 dB : 4.54 dB
		AAN with a_{LCL} = 75…60 dB : 4.98 dB
Radiated Emission measurement (Confidence level about 95 %, *k* = 2)		
10 m Chamber	30 MHz ~ 300 MHz	3 m : 5.04 dB
		10 m : 5.00 dB
	300 MHz ~ 1 000 MHz	3 m : 5.34 dB
		10 m : 5.20 dB
	1 GHz ~ 6 GHz	3 m : 5.72 dB
3m Chamber	1 GHz ~ 6 GHz	3 m : 5.62 dB
Disturbance Power Electromagnetic Fields (Confidence level about 95 %, *k* = 2)		
Shielded Room	30 MHz ~ 300 MHz	3.15 dB

3.3 Measurement Program

These test items were performed by software programs;

Test item	Measurement Program	Used
Conducted Emission	EP5CE_V 5.4.0(TOYO)	☒
Radiated Emission	EP5RE_V 4.6.0(TOYO)	☒
Disturbance Power	EMC32_V 9.12(R&S)	☐
Radiated Electromagnetic Disturbance	EMC32_V 9.2(R&S)	☐
Discontinuous interference	AFJ Click Meter Soft CMS_V 1.0	☐
Radiated RF Immunity	TDK Radiated Immunity Lab_V 9.62	☐
Conducted RF Immunity	TDK Conducted Immunity Lab_V 3.33	☐
Immunity of Broadcast Receivers	T80-K1_V 2.21(R&S)	☐
Harmonics current emissions, Voltage fluctuations and flicker	IEC Soft_V 2.4f(N4L)	☐

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4. Description of EUT

4.1 General information

Product Name		10.1 inch USB Touch Screen Monitor
Model Name		UM-1080CH
Display	Display Type	10.1 inch, IPS TFT-LCD
	Resolution	1280 x 800, WXGA
	Aspect Ration	16:10
	Brightness	250cd/
	Contrast ration	800:01:00
	View Angle	85/85/85/85(Typ.)(L/R/U/D)
TSP	Panel Structure	Glass/Glass Type, Capacitive Touch Panel
	Finger contact area	Φ≥5mm
	Multi-point	10 touch-point
Display processor		DisplayLink DL-125
Memory		DDR-400(Max up to 200MHz)
HDMI Receiver IC		TC358743 : HDMI Signal Input to CSI Signal Output
Bridge IC		RTS5880 : CSI Signal Input to USB 3.0 Signal Output
USB Audio IC		CM6510B : I2S Signal Input to USB 2.0 Signal Output
Connector(I/O Port)		Micro HDMI, Mini USB 10p, Mini USB 5P
Key		Brightness up / down button, Reset button
USB Adapter		5.0V / 3A Adapter
Power Consumption		Max 7.5W (5V / 1.5A)
Dimension		275.50mm(W)x174.60mm(H)x16.20mm(D)

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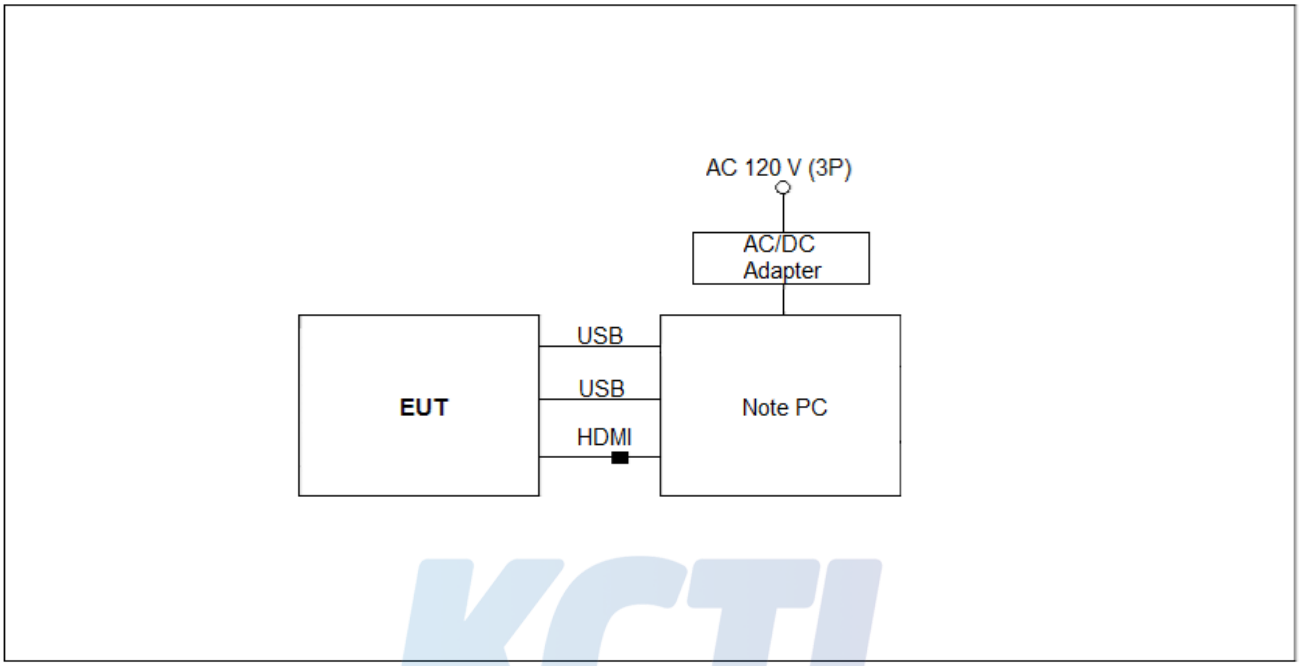
4.2 Product description

Type of product	10.1 inch HDMI Touch Screen Monitor
Model name (Basic)	UM-1080CH
Model name (Variant)	UM-1080H, UM-1080CH-G, UM-1080CH-NB, UM-1080H-NB, UM-1080CH-G-NB
Difference	Stand
Trade name	-
Serial no	-
Testing voltage	120 V, 60 Hz
Input rating	DC 5 V(USB) Note PC Adapter Input: AC (100-240) V, (50/60) Hz, 1.41 A Output: DC 19.5 V, 2.31 A
Internal clock frequency	Above 108 MHz
Note	-

4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer
Note PC	HSTNN-Q96C	-	HP Inc.
AC/DC Adapter	HSTNN-AA44	-	ACBEL POLYTECH INC.

4.4 Test configuration



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	**EUT**	Mini USB	Note PC	USB	1.2	Unshield
2		Mini USB	Note PC	USB	1.2	Unshield
3		Micro HDMI	Note PC	HDMI	1.2	Shield (Core 1EA)
4	Note PC	DC In	AC/DC Adapter	DC Out	1.6	Unshield
5	AC/DC Adapter	Power	AC Main	-	1.8	Unshield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
#1	HDMI Mode(1280 x 800)

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5. Summary of test results

5.1 Summary of EMI emission test results

FCC Part 15 Subpart B (Class B)

ANSI C63.4:2014

ICES-003 Issue 6

Applied	Test items	Test method	Result
☒	Conducted Emission	FCC Part 15 Subpart B ANSI C63.4:2014 ICES-003 Issue 6	Pass
☒	Radiated Emission	FCC Part 15 Subpart B ANSI C63.4:2014 ICES-003 Issue 6	Pass

These results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations.

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6. Test results

6.1 Conducted Emissions

Test specification	FCC Part 15 Subpart B, Class B, ANSI C63.4:2014, ICES-003 Issue 6		
Testing voltage	120 V, 60 Hz		
Test facility	Shielded room (CE#1)		
Date	2018. 11. 19		
Temperature (°C)	19.3 °C	Humidity (% R.H.)	34.1 % R.H.
Remarks	Pass		

6.1.1 Limits of conducted emissions measurement

☒ AC main

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. Both lines of power cord, hot and neutral, were measured.

Result QP/CAV[dB(μV)] = Reading QP/CAV[dB(μV)] + c.f(Insertion Loss [dB] + Cable Loss [dB])
Result QP/CAV : Result, Reading QP/CAV : Meter Reading, c.f : Correction Factor
Margin (QP/CAV) = Limit (QP/CAV) – Results (QP/CAV)
Note1) QP : Abbreviation of Quasi-Peak
Note2) CAV : Abbreviation of CISPR Average

6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
EMI Test Receiver	ESCI	100373	R&S	2019.03.05	☒
Two Line V-Network	ENV216	101718	R&S	2019.09.18	☒
Two Line V-Network	ESH2-Z5	842966/014	R&S	2019.09.18	☐
EMI Test Receiver	ESCI	100374	R&S	2019.04.26	☐
Two Line V-Network	ENV216	101719	R&S	2019.07.31	☐
Two Line V-Network	ESH3-Z5	862770/025	R&S	2019.04.26	☐
V-Network	ESH3-Z6	100431	R&S	2019.04.26	☐
V-Network	ESH3-Z6	100432	R&S	2019.04.26	☐

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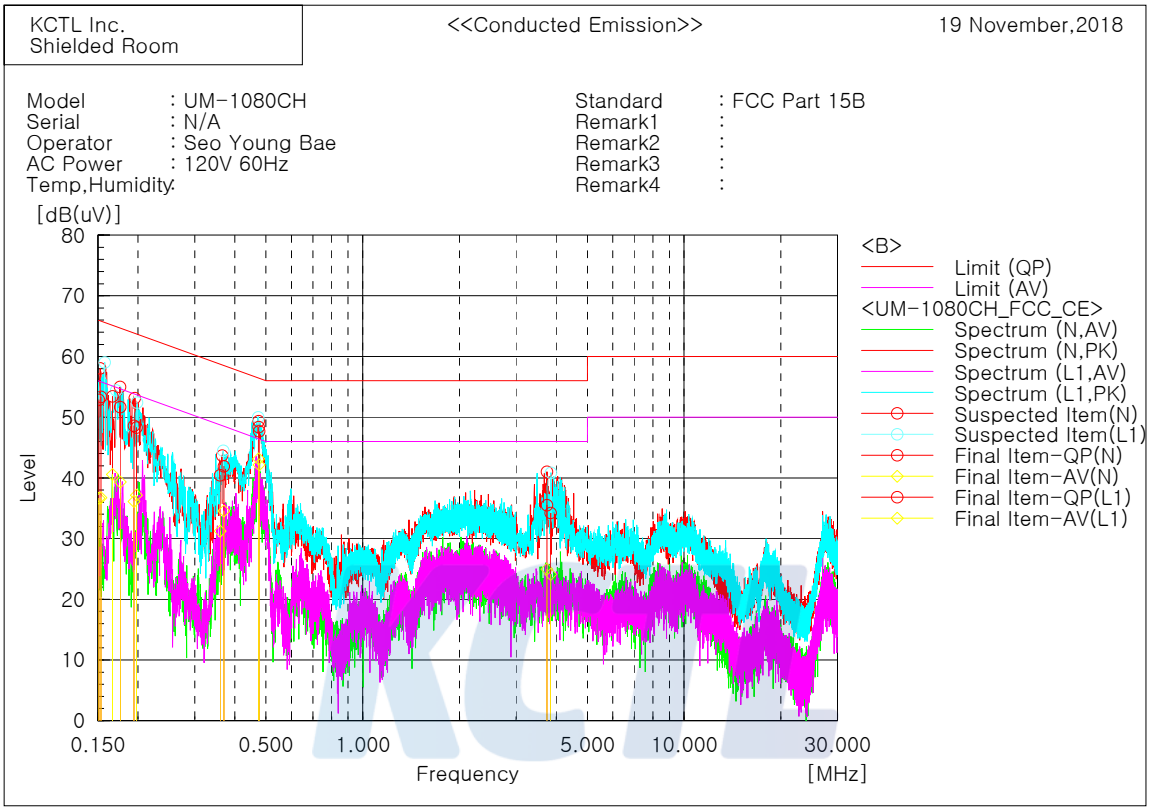
6.1.4 Photographs of test setup

* AC Main

6.1.5 Conducted emissions measurement result

* AC Main



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	0.15103	43.0	26.9	9.8	52.8	36.7	65.9	55.9	13.1	19.2
2	0.17582	41.6	29.2	10.1	51.7	39.3	64.7	54.7	13.0	15.4
3	0.19764	38.3	27.2	10.0	48.3	37.2	63.7	53.7	15.4	16.5
4	0.35989	30.5	21.3	9.9	40.4	31.2	58.7	48.7	18.3	17.5
5	0.47603	37.7	32.2	10.0	47.7	42.2	56.4	46.4	8.7	4.2
6	3.74349	25.7	15.2	9.8	35.5	25.0	56.0	46.0	20.5	21.0

--- 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	0.15331	43.4	26.8	9.9	53.3	36.7	65.8	55.8	12.5	19.1
2	0.16638	43.3	30.5	10.1	53.4	40.6	65.1	55.1	11.7	14.5
3	0.19418	38.6	26.1	10.0	48.6	36.1	63.9	53.9	15.3	17.8
4	0.36937	32.0	24.7	9.9	41.9	34.6	58.5	48.5	16.6	13.9
5	0.47448	38.4	33.1	10.0	48.4	43.1	56.4	46.4	8.0	3.3
6	3.84261	24.4	14.3	9.8	34.2	24.1	56.0	46.0	21.8	21.9

6.2 Radiated Emission

Test specification	FCC Part 15 Subpart B, Class B, ANSI C63.4:2014, ICES-003 Issue 6		
Testing voltage	120 V, 60 Hz		
Test facility	10 m Chamber		
Test distance	3 m		
Date	2018. 11. 16		
Temperature (°C)	18.0 °C	Humidity (% R.H.)	34.1 % R.H.
Remarks	Pass		

Test specification	FCC Part 15 Subpart B, Class B, ANSI C63.4:2014, ICES-003 Issue 6		
Testing voltage	120 V, 60 Hz		
Test facility	10 m Chamber		
Test distance	3 m		
Date	2018. 11. 16		
Temperature (°C)	18.3 °C	Humidity (% R.H.)	48.0 % R.H.
Remarks	Pass		

6.2.1 Limits of radiated emission measurement

☒ Limits below 1 GHz

Frequency [MHz]	Class A (dB(μV/m)) @ 10 m	Class B (dB(μV/m)) @ 3 m
30-88	39.08	40.00
88-216	43.52	43.52
216-960	43.44	46.02
Above 960	49.54	53.98

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

☒ Limits above 1 GHz

Frequency [GHz]	Class A @ 3 m		Class B @ 3 m	
	Peak limit (dB(μV/m))	Average limit (dB(μV/m))	Peak limit (dB(μV/m))	Average limit (dB(μV/m))
Above 1 GHz	79.5	59.5	74	54
Note - The lower limit applies at the transition frequency.				

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.

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6.2.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI Test Receiver	ESCI7	100872	R&S	2019.07.12	☒
Amplifier	310N	353132	SONOMA	2019.09.18	☒
Attenuator	8491B 6dB	MY39270721	KEYSIGHT	2019.09.18	☒
Bi-Log Antenna	CBL 6112D	40522	TESEQ	2020.03.06	☒
Amplifier	8449B OPT H02	3008A0530	HP	2019.09.18	☒
Horn Antenna	3115	9012-3602	EMCO	2020.03.06	☒

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:

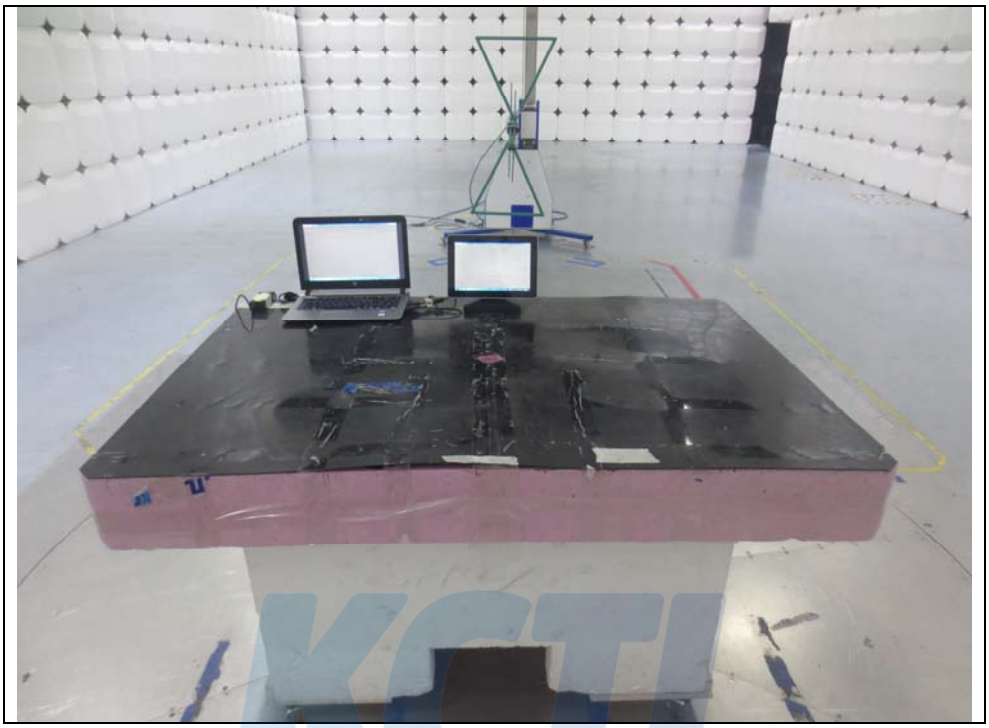
-Below 1 GHz
Result QP[dB(μV/m)] = Reading QP[dB(μV)] + c.f(Antenna Factor [dB/m] + Cable Loss [dB]
+ 6 dB Att [dB] − Amp Gain [dB])
Result QP : Result, Reading QP : Meter Reading, c.f : Correction Factor
Margin (QP) = Limit (QP) – Results (QP)
Note1) QP : Abbreviation of Quasi-Peak

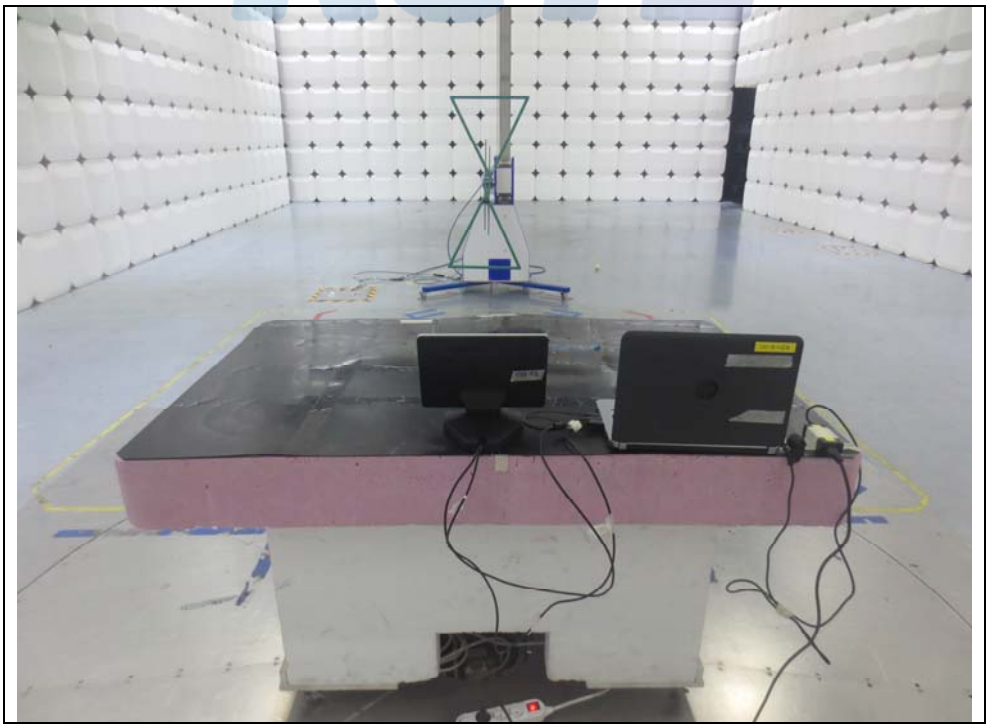
-Above 1 GHz
Result PK/CAV [dB(μV/m)] = Reading PK/CAV [dB(μV)] + c.f(Antenna Factor [dB/m] + Cable Loss [dB]
− Amp Gain [dB])
Result PK/CAV : Result, Reading PK/CAV : Meter Reading, c.f : Correction Factor
Margin (PK/CAV) = Limit (QP/CAV) – Results (QP/CAV)
Note1) PK : Abbreviation of Peak
Note2) CAV : Abbreviation of CISPR Average

If Reading is 30 dBμV, Antenna Factor 12 dB/m, Cable Loss 5 dB, Attenuator 6 dB,
Amp Gain 35 dB
The result is
30 + 12 + 5 + 6 - 35 = 18 dB(μV/m)

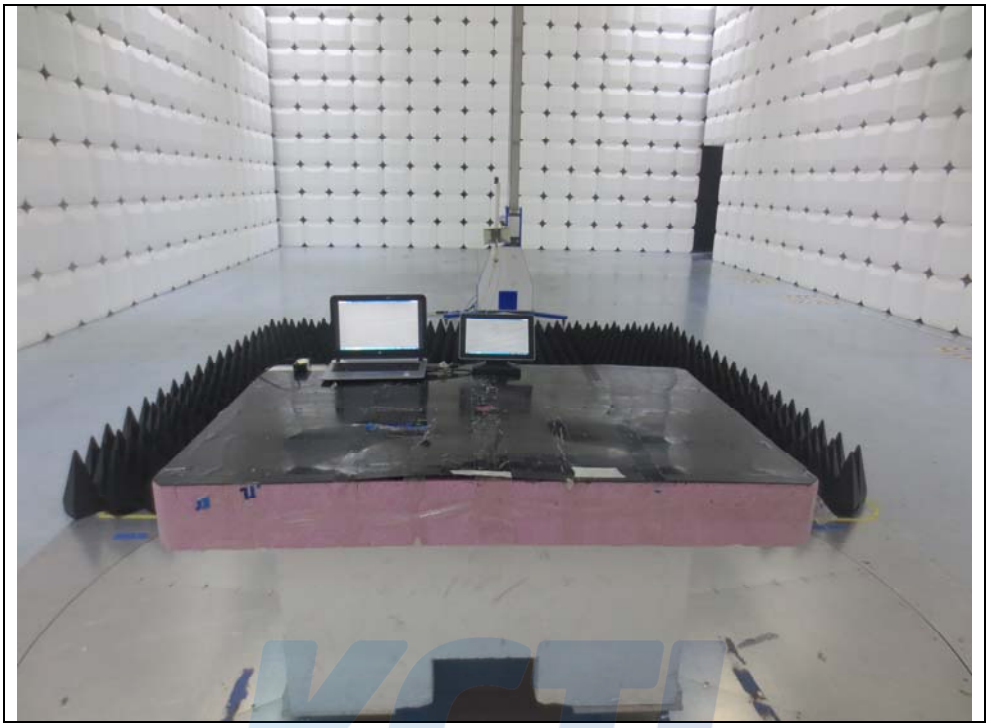
6.2.5 Photographs of test setup

* 30 ㎒ ~ 1 ㎓





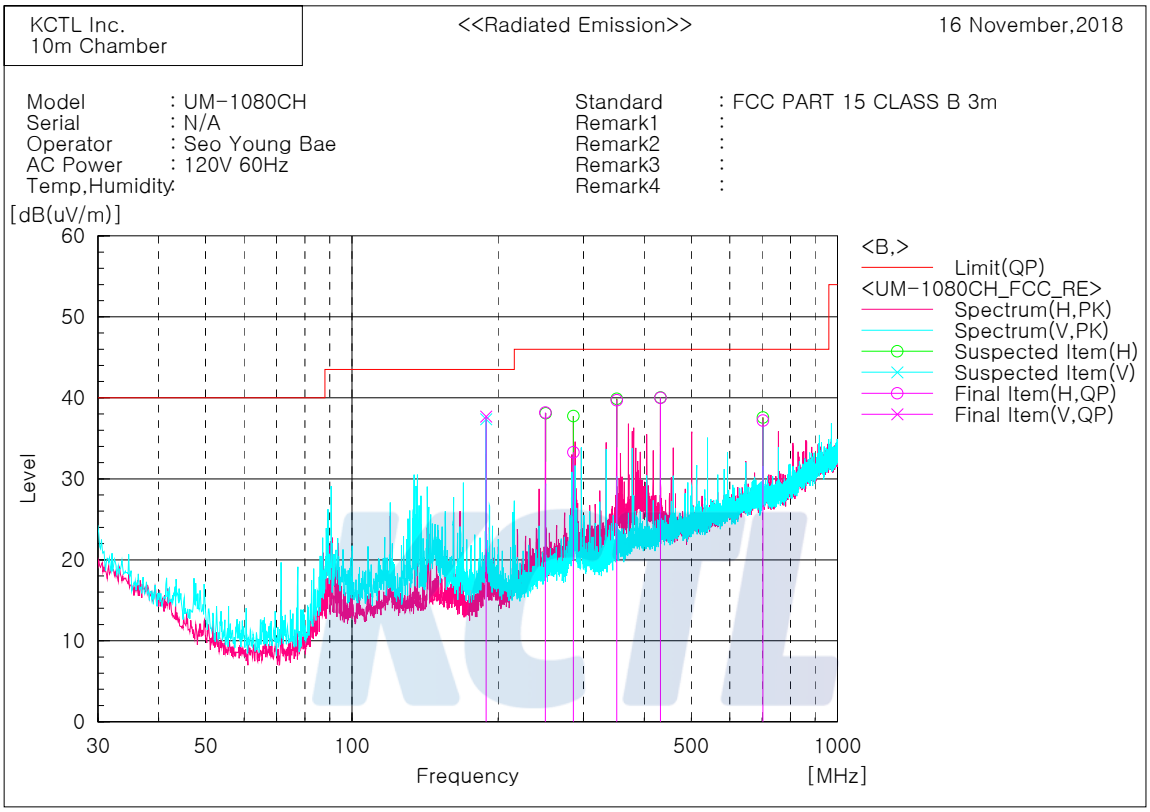
* 1 ㎓ ~ 6 ㎓



6.2.6 Radiated emission measurement result

*** Graph and Data**

* 30 ㎒ ~ 1 ㎓



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]	Remark
1	188.995	V	51.5	-13.8	37.7	43.5	5.8	100.0	341.0	
2	250.486	H	47.9	-9.7	38.2	46.0	7.8	400.0	190.0	
3	286.067	H	41.8	-8.5	33.3	46.0	12.7	100.0	69.0	
4	351.002	H	46.6	-6.9	39.7	46.0	6.3	315.0	208.0	
5	431.989	H	44.0	-4.0	40.0	46.0	6.0	100.0	116.0	
6	701.973	H	36.4	0.8	37.2	46.0	8.8	341.0	197.0	

* 1 GHz ~ 6 GHz

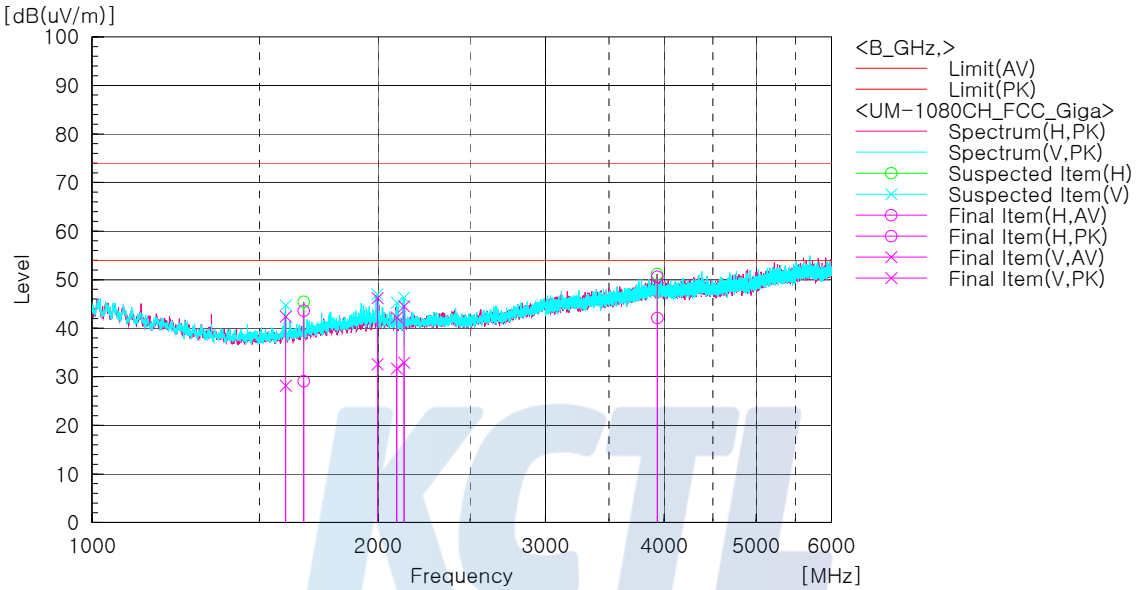
KCTL Inc.
10m Chamber

<<Radiated Emission>>

16 November,2018

Model : UM-1080CH
Serial : N/A
Operator : Seo Young Bae
AC Power : 120V 60Hz
Temp,Humidity:

Standard : FCC Part 15 CLASS B 3m
Remark1 :
Remark2 :
Remark3 :
Remark4 :



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]	Remark
1	1598.921	V	30.6	44.8	-2.4	28.2	42.4	54.0	74.0	25.8	31.6	100.0	4.0	
2	1670.014	H	30.8	45.3	-1.7	29.1	43.6	54.0	74.0	24.9	30.4	100.0	336.0	
3	1996.845	V	31.2	44.8	1.4	32.6	46.2	54.0	74.0	21.4	27.8	100.0	165.0	
4	2092.587	V	30.1	40.6	1.6	31.7	42.2	54.0	74.0	22.3	31.8	100.0	6.0	
5	2130.118	V	31.2	42.8	1.7	32.9	44.5	54.0	74.0	21.1	29.5	100.0	3.0	
6	3933.198	H	32.3	40.8	9.8	42.1	50.6	54.0	74.0	11.9	23.4	100.0	100.0	

7. EUT photographs

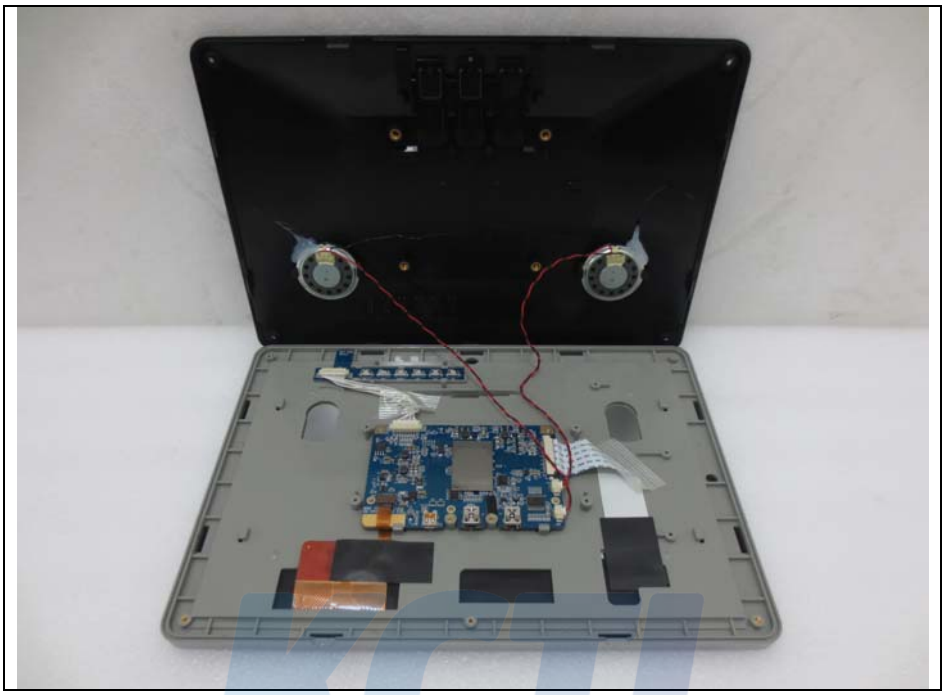
Front View

Rear View

Left View

Right View

Inside



Panel Label