

# Test Report



498-2, Geumeo-ro, Pogok-eup, Cheoin-gu,  
Yongin-si, Gyeonggi-do, Republic of Korea  
TEL. +82-31-338-8837 FAX. +82-32-338-8847

Report No. :  
**MOV-18-EMC-I092**  
Page ( 1 ) / ( 35 ) Pages

## 1. Customer

- Company : MultimediaLink Inc.
- Address : #812, DaehyeonTechnoWorld, 174, Ojeon-dong, Uiwang-si, Gyeonggi-do, 437-753, Korea
- Date of receipt : 2018-11-02
- Contact Person : Hyun Chul Park
- E-mail : hcpark@multimedia-link.com
- Tel/Fax : +82-31-462-0292 / +82-31-462-0293

## 2. Use of report : Evaluation of EMC test

## 3. Equipment Under Test

- Product name : HDMI Touchscreen Monitor
- Model number : UM-760CH-SMK

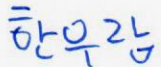

## 4. Date of test : 2018-11-02 ~ 2018-11-12

## 5. Applied Standards : EN 55032: 2012, EN 55024: 2010

## 6. Test results

Test Items	Test Results
Conducted Emission	Complied
Radiated Emission	Complied
Electrostatic Discharge	Complied
RF Electromagnetic Field Immunity	Complied
Electrical fast Transients	Complied
Surges	Complied
Conducted Immunity	Complied
Voltage Dip and Interruptions	Complied

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Affirmation	Tested by Name : Woo Ram Han 	Technical manager Name : Hyung Kook Lee 
-------------	--	---

2018-11-15

**MOVON Corporation**

# **MOVON CORPORATION**

Test Report No. : MOV-18-EMC-I092

---

## **Report History**

Revision	Date	Description
-	2018-11-15	Initial release



## Table of Contents

<b>1</b>	<b>General Information .....</b>	<b>4</b>
1.1	Notes .....	4
1.2	Testing Laboratory .....	4
<b>2</b>	<b>Applicant Information .....</b>	<b>5</b>
2.1	EUT Details.....	5
2.2	Test mode and Condition.....	5
2.3	Peripheral Equipment .....	5
2.4	Cable list.....	5
2.5	Test System Layout.....	6
2.6	Summary of Test Results.....	7
2.7	Performance Criteria.....	7
2.8	Photo Documentation of the EUT.....	8
<b>3</b>	<b>Test summary and results .....</b>	<b>15</b>
3.1	Radiated Emission.....	18
3.2	Electrostatic Discharge .....	23
3.4	RF Electromagnetic Field Immunity.....	27
3.5	Electrical fast transient/Burst .....	29
3.6	Conducted Immunity .....	32

MOVON CORPORATION

## **1 General Information**

### **1.1 Notes**

The test results of this test report relate exclusively to the test item specified in 2.2. The MOVON CORP. does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the MOVON CORP.

### **1.2 Testing Laboratory**

**Test Location :**  
**MOVON CORPORATION.**

**◆Yongin Laboratory**

**P. O. box 17030**

**Address :**

**498-2, Geumeo-ro, Pogok-eup, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea**

**494, Geumeo-ro, Pogok-eup, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea**

**Tel : +82-31-338-8837**

**Fax : +82-31-338-8847**

**E-mail : [emclab@movon.co.kr](mailto:emclab@movon.co.kr)**

**Internet : <http://www.movonlab.co.kr>**

MOVON CORPORATION

## 2 Applicant Information

### 2.1 EUT Details

Product name	HDMI Touchscreen Monitor
Model number	UM-760CH-SMK
Variant model name	UM-760H-SMK
Serial number	N/A
Power supply	AC 230 V, 50 Hz
Frequency range	12 MHz
Manufacture	MultimediaLink Inc. #812, DaehyeonTechnoWorld, 174, Ojeon-dong, Uiwang-si, Gyeonggi-do, 437-753, Korea

### 2.2 Test mode and Condition

Test mode	Normal Operation Mode
Power supply	AC 230 V, 50 Hz

### 2.3 Peripheral Equipment

Test set-up of EUT

Description	Model	Serial No.	Manufacturer
HDMI Touchscreen Monitor	UM-760CH-SMK	None	MultimediaLink Inc.
NoteBook	13ZD970-GX30K	703NZZA026429	LG
ADAPTER	ADS-40MSG-19 19040GPK	EAY63128601	Shenzhen Honor Electronic Co., Ltd

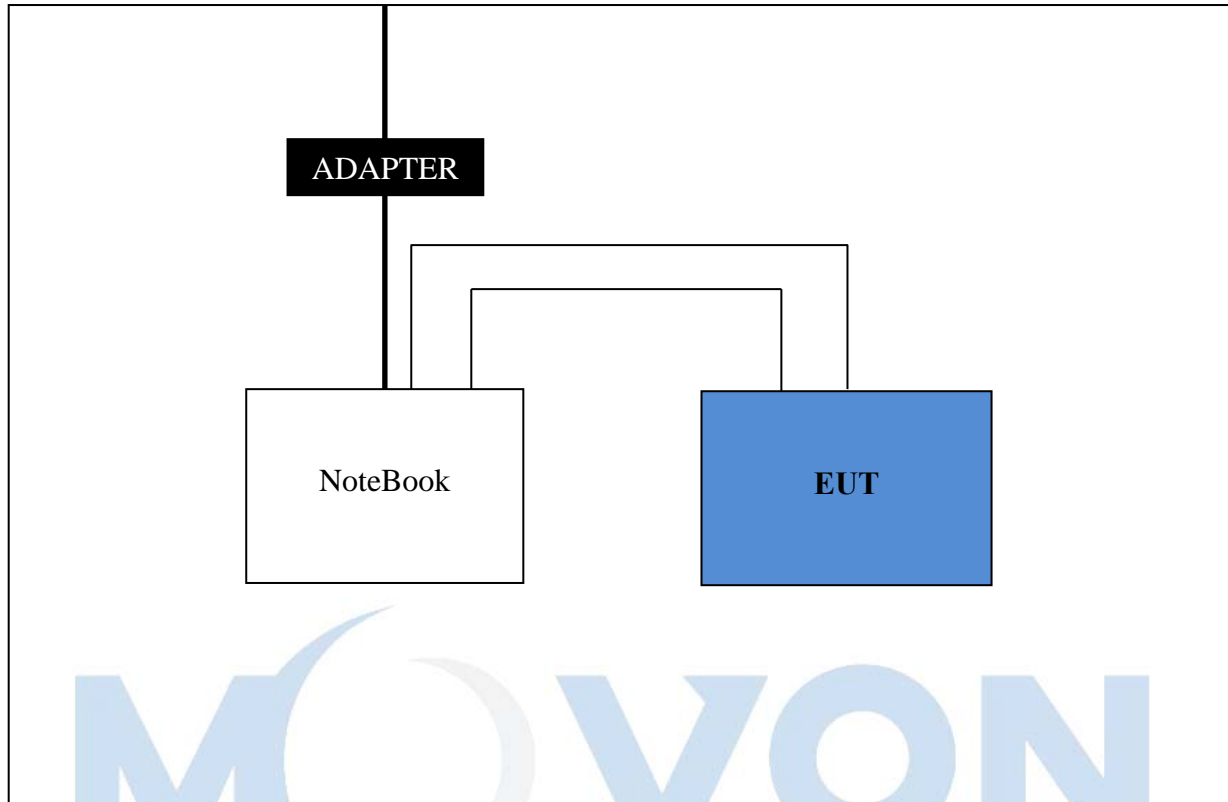
Component parts of EUT

Description	Model	Serial No.	Manufacturer
Main Board	UM-760CH-SMK	None	None
LCD	None	None	None
Sub Board	UM-760CH-SMK-SUB	None	None

### 2.4 Cable list

Start		END		Cable Spec.		
Name	I/O Port	Name	I/O Port	Length(m)	Shield	Core
EUT	USB	NoteBook	USB	2.0	Shielded	Y
	HDMI	NoteBook	HDMI	2.5	Shielded	Y
NoteBook	DC IN	ADAPTER	DC OUT	1.5	Shielded	N

## 2.5 Test System Layout



— Signal  
— Main Power

MOVON CORPORATION

**2.6 Summary of Test Results**

Test Items	Basic Standards	Results
Conducted Emission	EN 55032:2015 (Class B)	Complied
Radiated Emission	EN 55032:2015 (Class B)	Complied
Electrostatic Discharge	EN 61000-4-2: 2009	Complied
RF Electromagnetic Field Immunity	EN 61000-4-3: 2006+A1:2008+A2:2010	Complied
Electrical Fast Transients	EN 61000-4-4: 2004+A1:2010	Complied
Surges	EN 61000-4-5: 2006	Complied
Conducted Immunity	EN 61000-4-6: 2009	Complied
Voltage Dip and interruptions	EN 61000-4-11: 2004	Complied

**2.7 Performance Criteria**

**Criterion A**, no loss of performance or function.

**Criterion B**, the apparatus shall continue operate as intended after test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

**Criterion C**, temporary loss of function or performance, which is provided the function, is self-recoverable or can be restored by the operation of the controls.



## 2.8 Photo Documentation of the EUT

### 2.8.1 EUT Front



### 2.8.2 EUT Rear





## 2.8.3 EUT Right



## 2.8.4 EUT Left



## 2.8.5 EUT Top



## 2.8.6 EUT Bottom

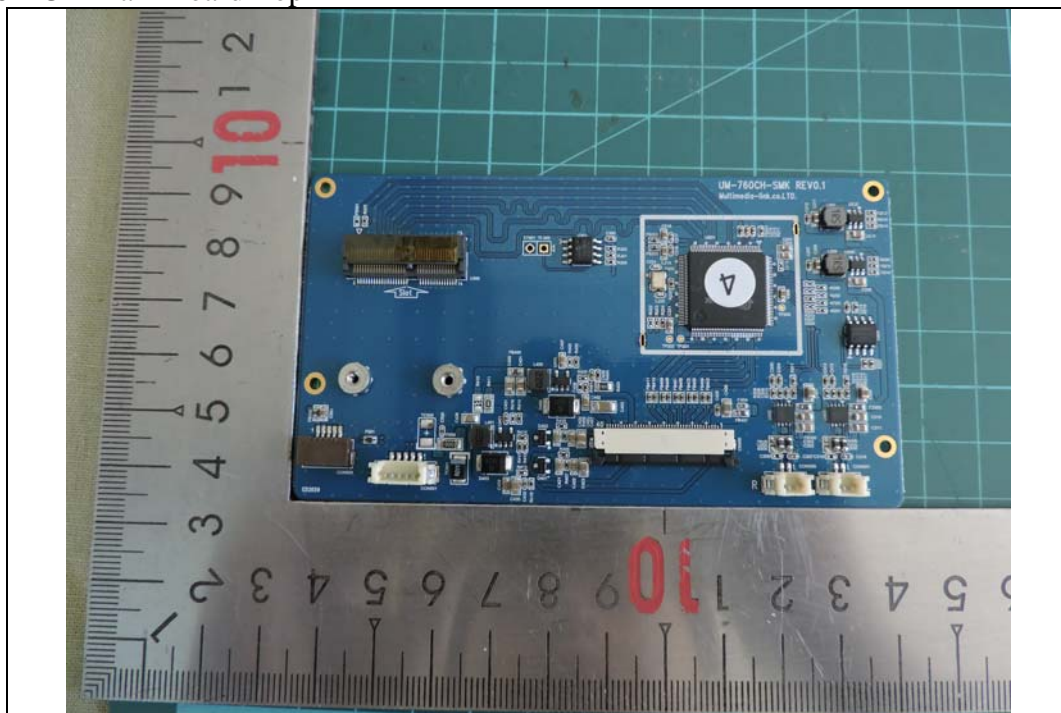


## 2.8.7 EUT Inside

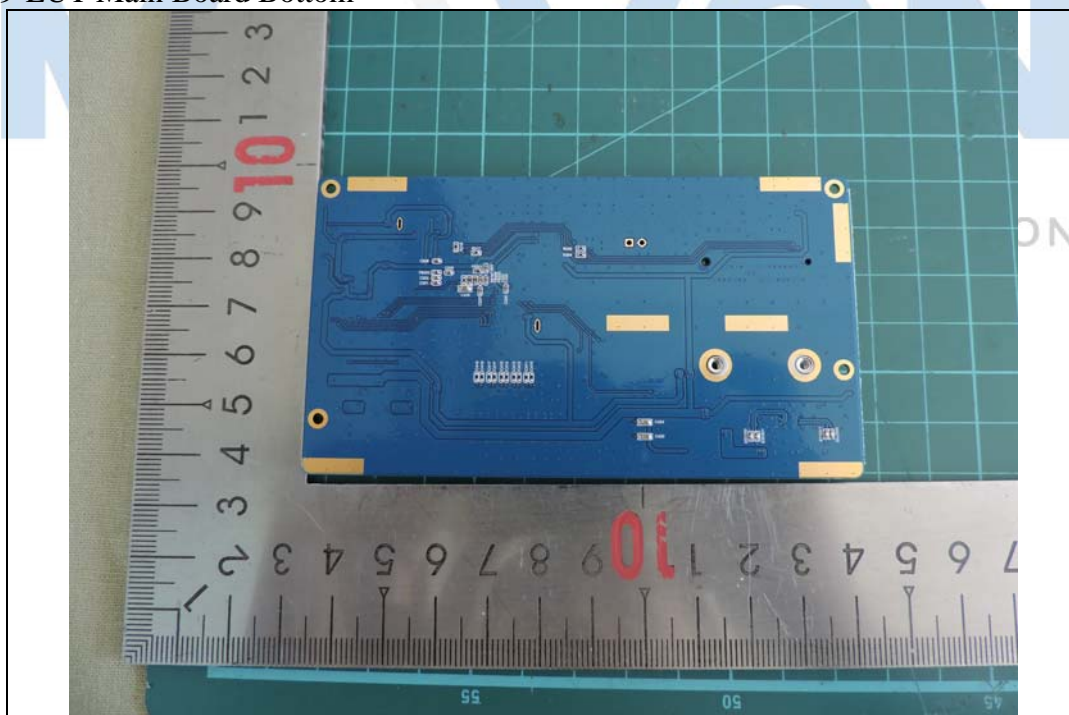




## 2.8.8 EUT Main Board Top



## 2.8.9 EUT Main Board Bottom



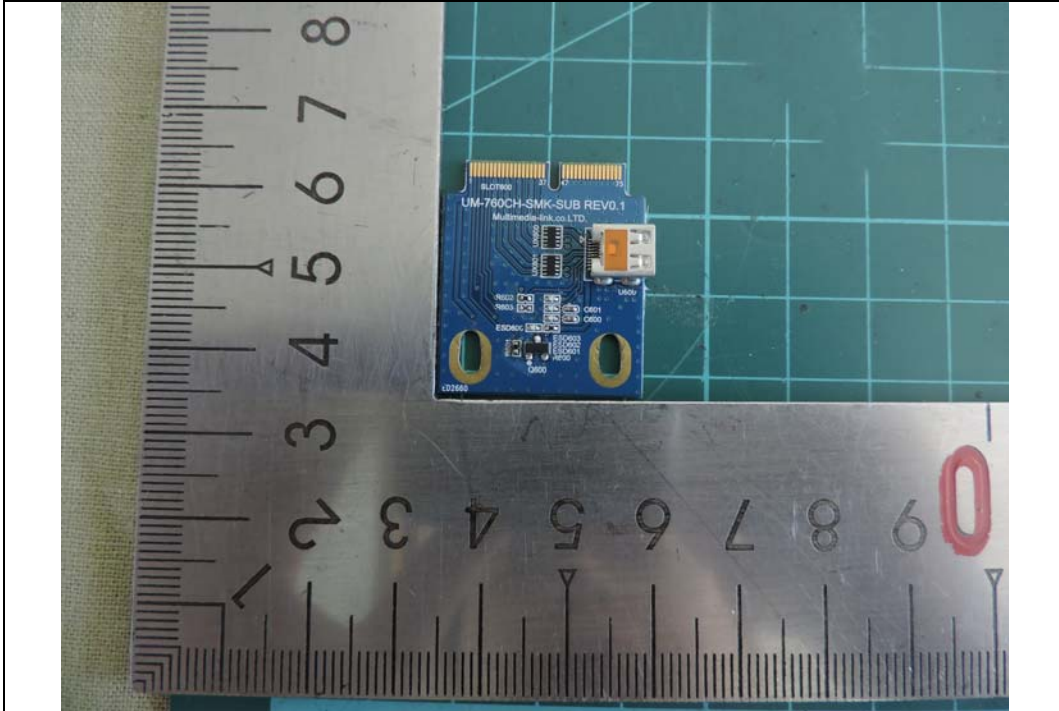
## 2.8.10 EUT LCD Top



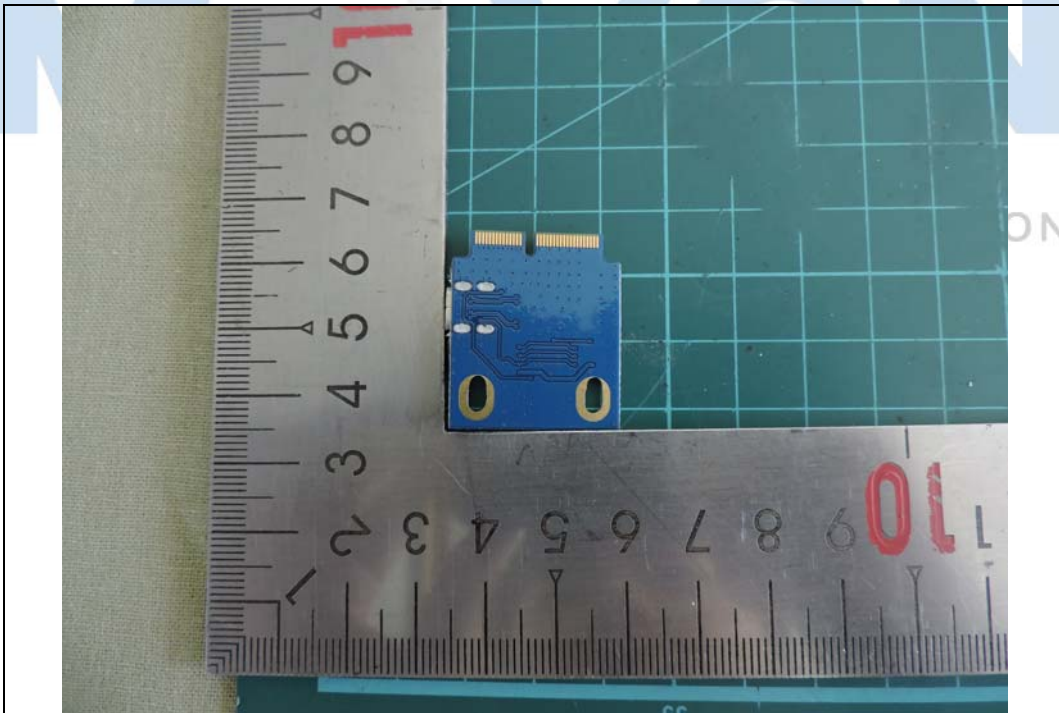
## 2.8.11 EUT LCD Bottom



2.8.12 EUT Sub Board Top



2.8.13 EUT Sub Board Bottom





### 3 Test summary and results

#### 3.1 Conducted Emission

##### 3.1.1 Test Results : **Complied**

##### 3.1.2 Measurement equipment

Kind of Equipment	Manufacture / Model	S/N	Calibrated until
TWO LINE-V- NETWORK	Rohde & Schwarz / ESH3-Z5	100296	2019.03.07
EMI TEST RECEIVER	Rohde & Schwarz / ESR3	101873	2019.05.28
PULSE LIMITER	Rohde & Schwarz / ESH3-Z2	100288	2019.05.28
Software	Rohde & Schwarz / EMC32	Version 10.20.01	N/A

##### 3.1.3 Testing Environment

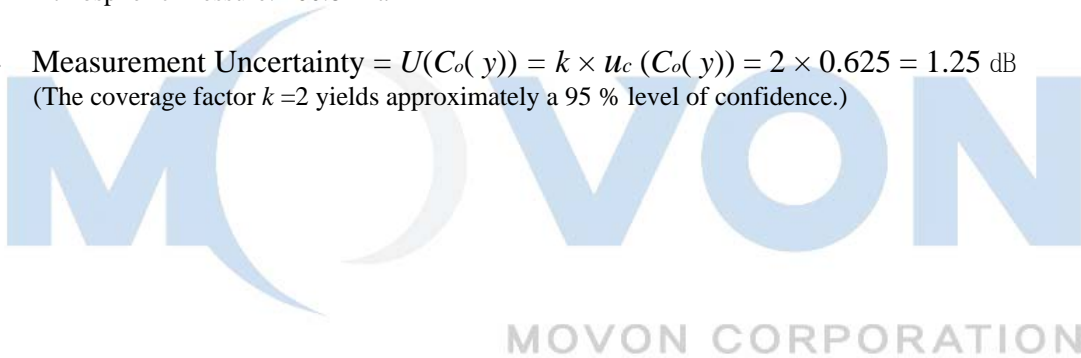
Test Date: 2018-11-02

Temperature: 22.4 °C

Humidity: 36.3 % R.H.

Atmospheric Pressure: 100.8 kPa

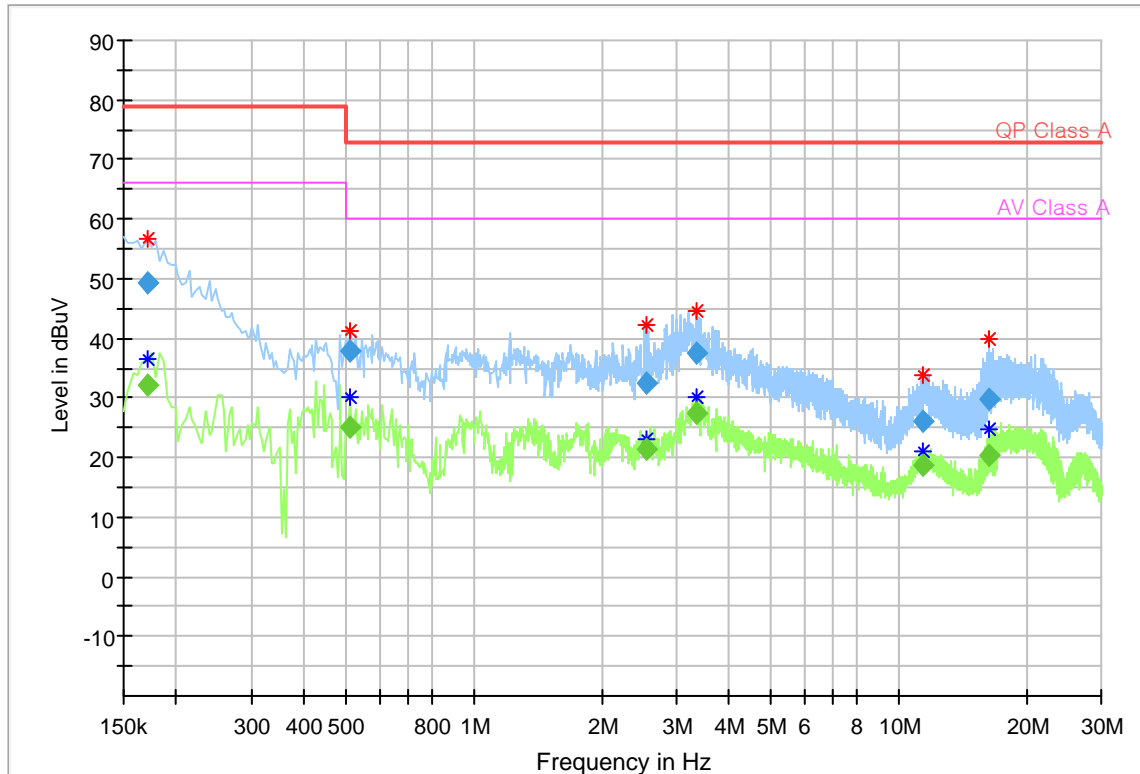
##### 3.1.4 Measurement Uncertainty = $U(C_o(y)) = k \times u_c(C_o(y)) = 2 \times 0.625 = 1.25$ dB (The coverage factor $k=2$ yields approximately a 95 % level of confidence.)



## 3.1.5 Test Data

### Common Information

Test Description:	Conducted Emission
Test Site:	Shield Room
Project No.:	0606-01-02/18
Model Name:	UM-760CH-SMK
Test Mode:	Operating mode

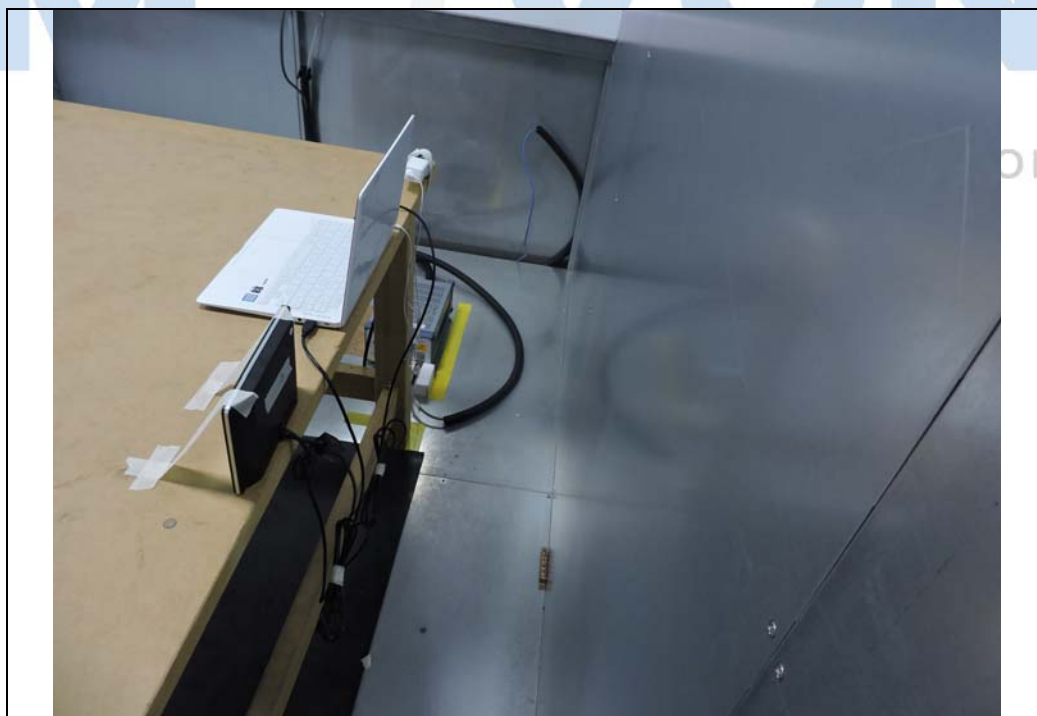
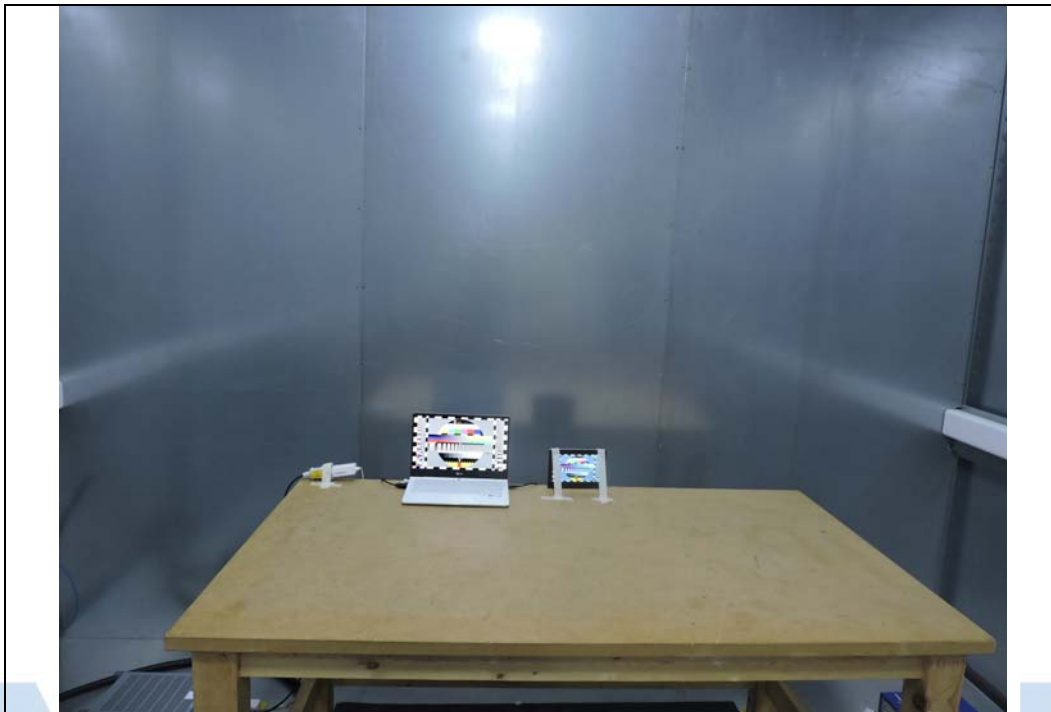


### Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.17	---	32.18	66.00	33.82	7000.0	9.00	L1	GND	10.05
0.17	49.42	---	79.00	29.58	7000.0	9.00	L1	GND	10.05
0.51	---	25.14	60.00	34.86	7000.0	9.00	L1	GND	10.08
0.51	37.94	---	73.00	35.06	7000.0	9.00	N	GND	10.07
2.54	---	21.53	60.00	38.47	7000.0	9.00	L1	GND	10.19
2.54	32.55	---	73.00	40.45	7000.0	9.00	L1	GND	10.19
3.35	37.46	---	73.00	35.54	7000.0	9.00	N	GND	10.22
3.35	---	27.47	60.00	32.53	7000.0	9.00	N	GND	10.22
11.43	26.07	---	73.00	46.93	7000.0	9.00	N	GND	10.79
11.43	---	18.56	60.00	41.44	7000.0	9.00	N	GND	10.79
16.26	---	20.25	60.00	39.75	7000.0	9.00	N	GND	11.06
16.26	29.89	---	73.00	43.11	7000.0	9.00	N	GND	11.06

## 3.1.6 Test Set-up

### 3.1.6.1 Photograph of Conducted Disturbance



**3.2 Radiated Emission****3.2.1 Test Results : Complied****3.2.2 Measurement equipment**

Kind of Equipment	Manufacture / Model	S/N	Calibrated until
EMI TEST RECEIVER	Rohde & Schwarz / ESVS30	829673/015	2018.12.07
Antenna Mast	INNCO / MA4000-EP	MA4000/285/23880210/L	N/A
Controller	INNCO / CO2000	CO2000/561/23880210/L	N/A
TRILOG Supper Broadband test Antenna	SCHWARZBECK / VULB9161 SE	4159	2020.06.11
EMI TEST RECEIVER	Rohde & Schwarz / ESIB26	100196	2018.12.07
Antenna Master	INNCO / MA4640-XP-ET	None	N/A
Controller	INNCO / CO3000	CO3000/812/34240914/L	N/A
Double-ridged horn antenna	R&S / HF906	100236	2019.04.25
Low Noise Amplifier	TESTEK / TK-PA18H	170013-L	2019.05.28
Software	ROHDE & SCHWARZ / EMC32	Version 10.20.01	N/A

**3.2.3 Testing Environment for below 1 GHz**

Test Date: 2018-11-06

Temperature: (17.2 ~ 17.3) °C

Humidity: (31.5 ~ 31.7) % R.H.

Atmospheric Pressure: 101.3 kPa

 $\text{Measurement Uncertainty} = U(C_o(y)) = k \times u_c(R_o(y)) = 2 \times 2.208 = 4.42 \text{ dB}$ (The coverage factor  $k=2$  yields approximately a 95 % level of confidence.)**3.2.4 Testing Environment for below 1 GHz**

Test Date: 2018-11-07

Temperature: (20.5 ~ 20.6) °C

Humidity: 35.8 % R.H.

Atmospheric Pressure: 101.2 kPa

 $\text{Measurement Uncertainty} = U(C_o(y)) = k \times u_c(R_o(y)) = 2 \times 2.546 = 5.09 \text{ dB}$ (The coverage factor  $k=2$  yields approximately a 95 % level of confidence.)

# MOVON CORPORATION

Test Report No. : MOV-18-EMC-I092

## 3.2.5 Test Data for below 1 GHz

Frequency (MHz)	Reading[dB $\mu$ V]		H(cm)	Antenna Factor (dB/m)	Cable loss (dB)	Limit (dB $\mu$ V/m)	Results (dB $\mu$ V/m)	Margin (dB)
	H	V						
241.70	-	8.9	100	11.20	3.35	47	23.5	23.5
255.74	-	20.5	100	11.34	3.46	47	35.3	11.7
306.89	-	7.6	100	13.02	3.81	47	24.4	22.6
358.04	-	9.7	150	14.27	3.99	47	28.0	19.0
716.08	-	8.9	110	20.96	5.11	47	35.0	12.0
818.38	-	6.8	200	21.89	5.50	47	34.2	12.8

Note. ◆ Reading H = Antenna Horizontal  
◆ H(m) = Antenna Height  
◆ Margin = Limit - Results

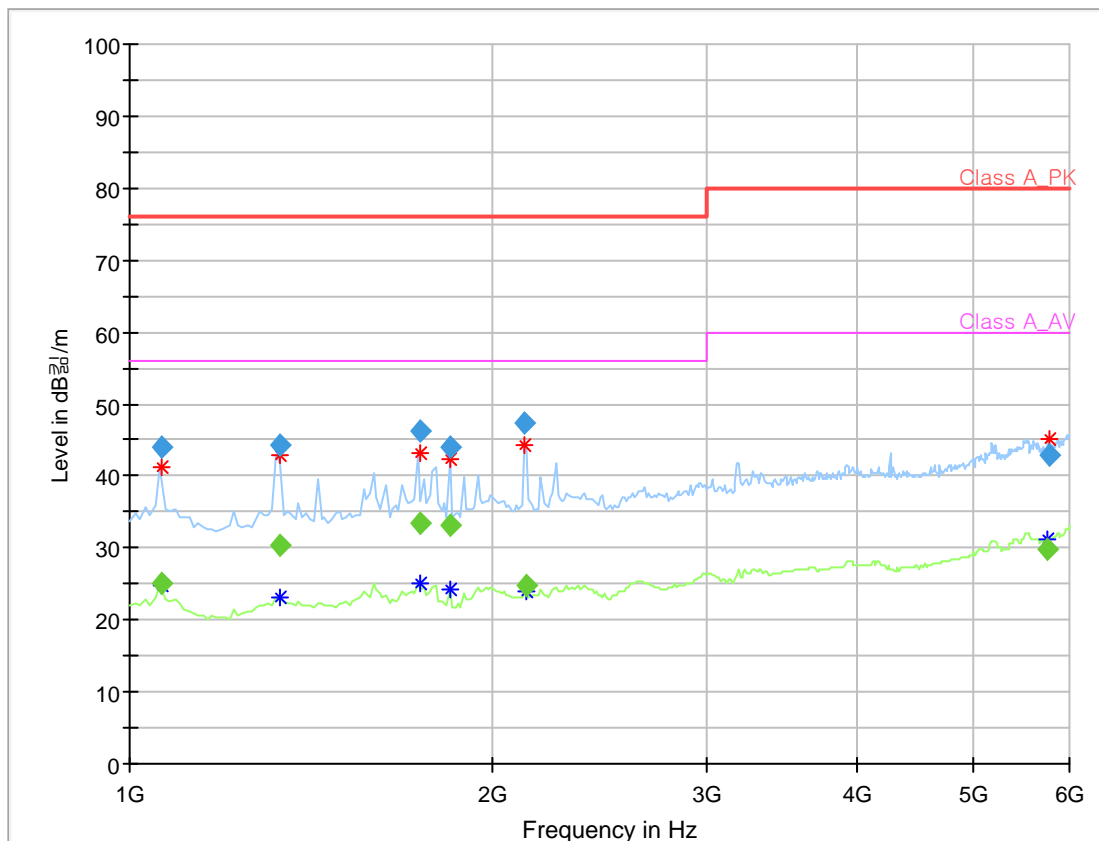
◆ Reading V = Antenna Vertical      ◆ A(°) = Turn table Angle  
◆ Results = Reading + Antenna factor + Cable loss



## 3.2.6 Test Data for above 1 GHz.

### Common Information

Test Description:	Radiated Emission Above 1GHz
Project No.:	0606-01-02/18
Test Site:	3 m Semi Anechoic Chamber
Model Name:	UM-760CH-SMK
Test Mode:	Operating mode



### Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1064.859719	44.13	---	76.00	31.87	1000.000	100.0	H	176.0	-15.3
1065.036072	---	25.05	56.00	30.95	1000.000	100.0	H	175.0	-15.3
1329.789580	---	30.26	56.00	25.74	1000.000	100.0	H	208.0	-14.1
1330.010020	44.18	---	76.00	31.82	1000.000	100.0	H	190.0	-14.1
1738.979960	---	33.32	56.00	22.68	1000.000	100.0	H	192.0	-12.1
1739.024048	46.13	---	76.00	29.87	1000.000	100.0	H	193.0	-12.1
1841.396794	---	33.03	56.00	22.97	1000.000	100.0	H	334.0	-11.7
1841.440882	44.01	---	76.00	31.99	1000.000	100.0	H	317.0	-11.7
2125.176353	47.35	---	76.00	28.65	1000.000	100.0	H	258.0	-10.5
2132.991984	---	24.91	56.00	31.09	1000.000	100.0	H	115.0	-10.5
5750.503006	---	29.85	60.00	30.15	1000.000	100.0	H	110.0	1.7
5764.126252	42.76	---	80.00	37.24	1000.000	100.0	H	110.0	1.8

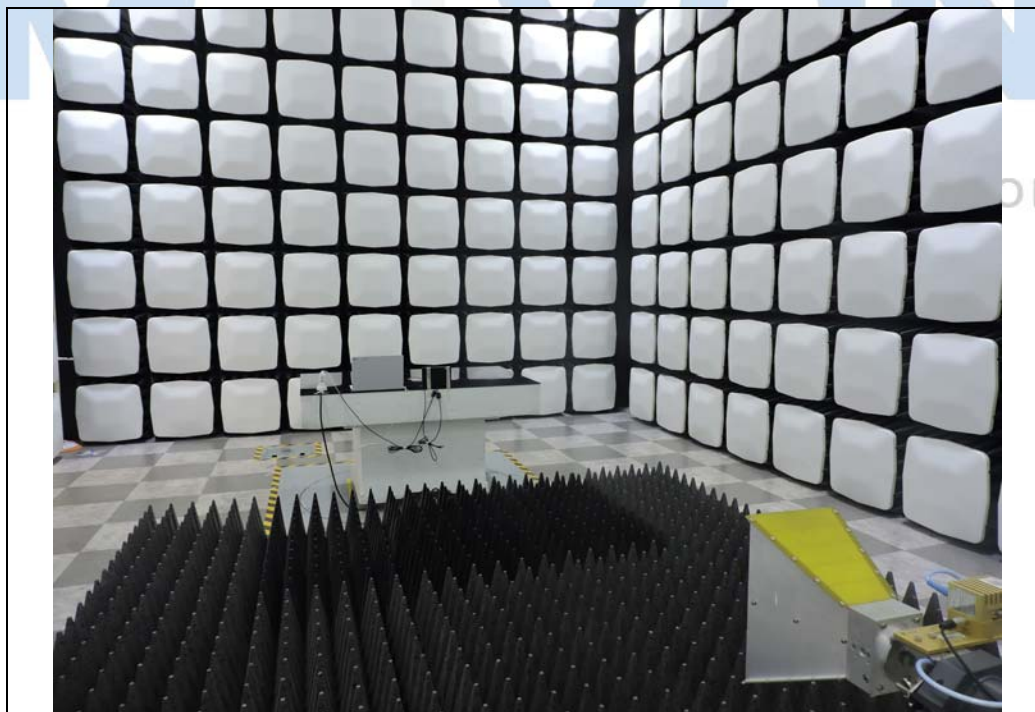
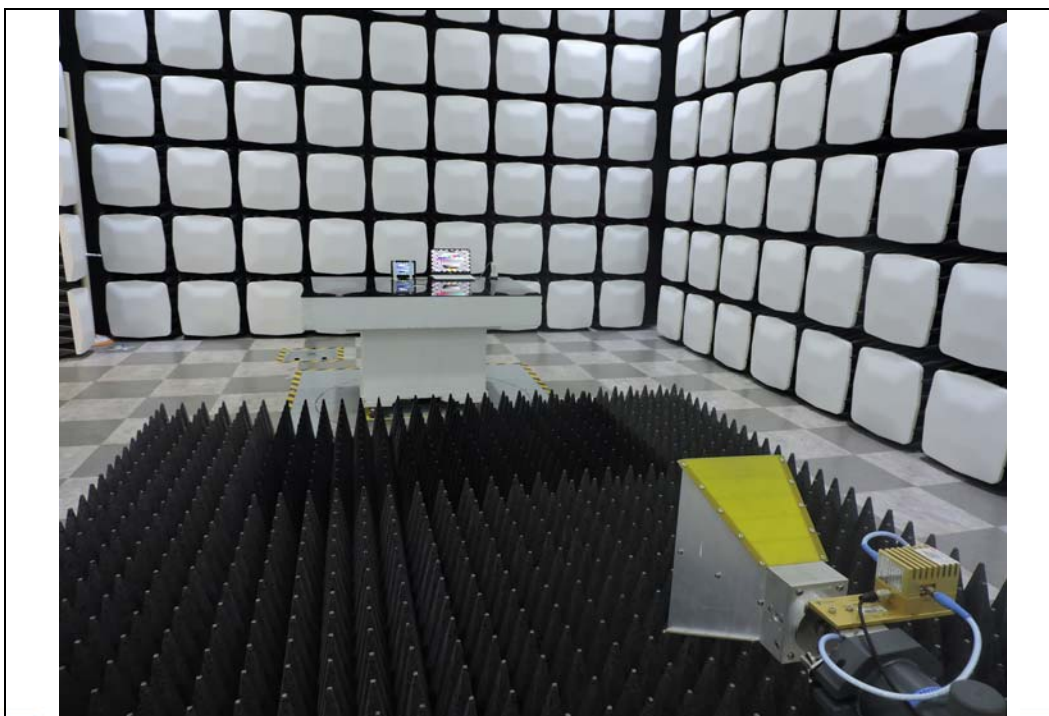


## 3.2.7 Test Set-up

### 3.2.7.1 Photograph of Radiated Disturbance \_10 m [30 MHz ~ 1GHz]



3.2.7.2 Photograph of Radiated Disturbance \_3 m [1 GHz ~ 6 GHz]



**3.3 Electrostatic Discharge****3.3.1 Test Results : Complied****3.3.2 Measurement equipment**

Kind of Equipment	Manufacture / Model	S/N	Calibrated until
ELECTROSTATIC DISCHARGE SIMULATOR	NoiseKen / ESS-2000	ESS0442748	2019.05.30
HCP / VCP	MOVON / -	N/A	N/A

**3.3.3 Testing Environment**

Test Date: 2018-11-05

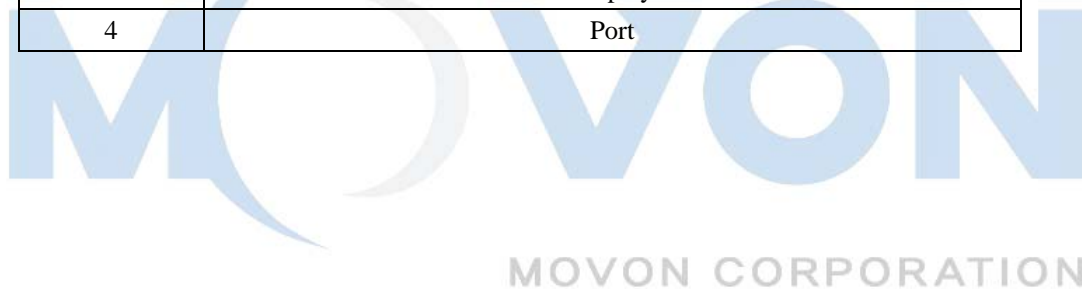
Temperature: 20.7 °C

Humidity: 32.5 % R.H.

Atmospheric Pressure: 101.3 kPa

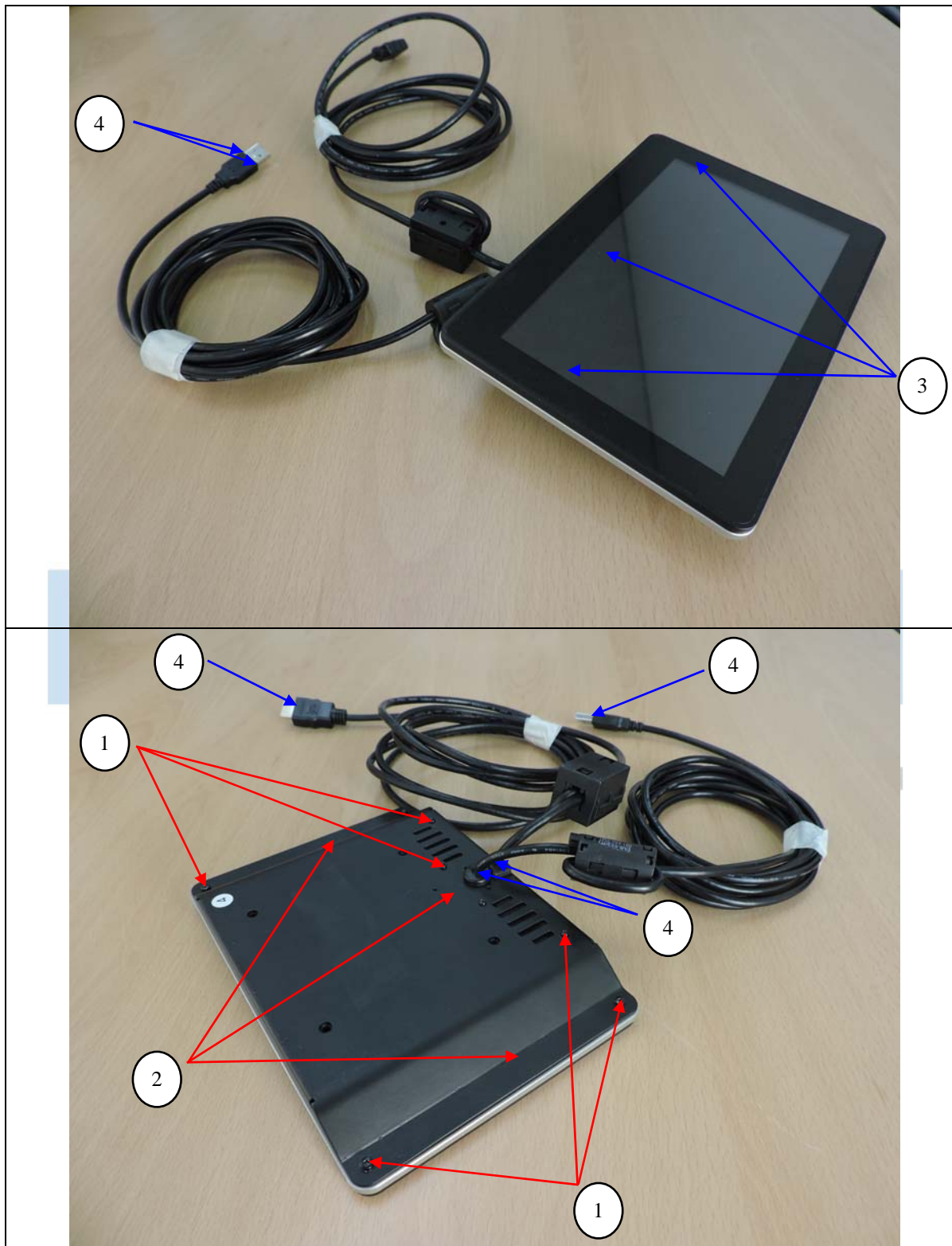
**3.3.4 Test Point**

1	Screw
2	Enclosure(Metal)
3	Display
4	Port





3.3.5 Photograph of Test Point



## 3.3.6 Test Results

Test Level(kV)	Test Point	Discharge Method	Results
$\pm 4$	HCP/VCP	Contact	Complied
$\pm 2, \pm 4, \pm 8$	3, 4	Air	Complied

◆ All modes were tested and complied. **Performance Criteria A**, the EUT normally operates during and after the test.

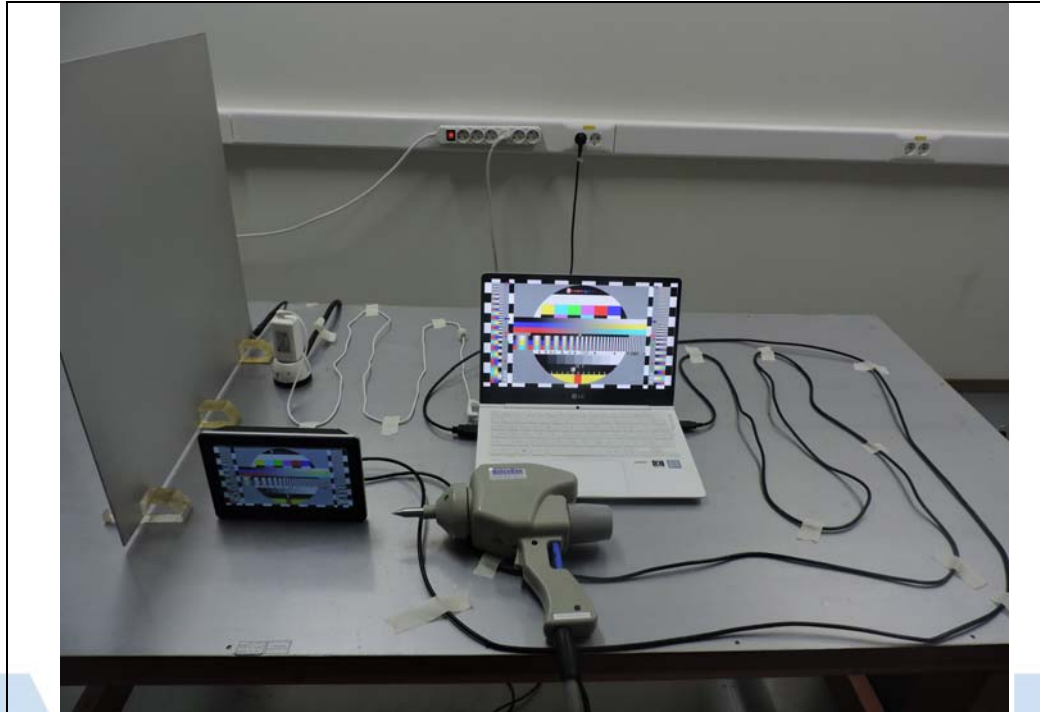
Test Level(kV)	Test Point	Discharge Method	Results
$\pm 4$	1, 2	Contact	Complied

◆ All modes were tested and complied. **Performance Criteria B**, the EUT normally operates during and after the test.



## 3.3.7 Test Set-up

### 3.3.7.1 Photograph of Electrostatic Discharge





**3.4 RF Electromagnetic Field Immunity****3.4.1 Test Results : Complied****3.4.2 Measurement equipment**

Kind of Equipment	Manufacture / Model	S/N	Calibrated until
Amplifier	ROHDE & SCHWARZ / BBA 100	101770	N/A
Amplifier	ROHDE & SCHWARZ / BBA 150	101718	N/A
Amplifier	SUNGSAN / SSA510A	SSEC0001	N/A
Signal Generator	ROHDE & SCHWARZ / SMA100A	102188	2019.05.28
HIGH GAIN LOG-PERIODIC ANTENNA	ROHDE & SCHWARZ / HL046E	4065.5960.02-100168-gN	N/A
Power Meter	ROHDE & SCHWARZ / NRP2	103876	2018.12.07
Software	ROHDE & SCHWARZ / EMC32	Version 10.20.01	N/A

**3.4.3 Environment Conditions**

Test Date: 2018-11-06

Temperature: (22.1 ~ 22.4) °C

Humidity: (33.6 ~ 34.1) % R.H.

Atmospheric Pressure: 101.3 kPa

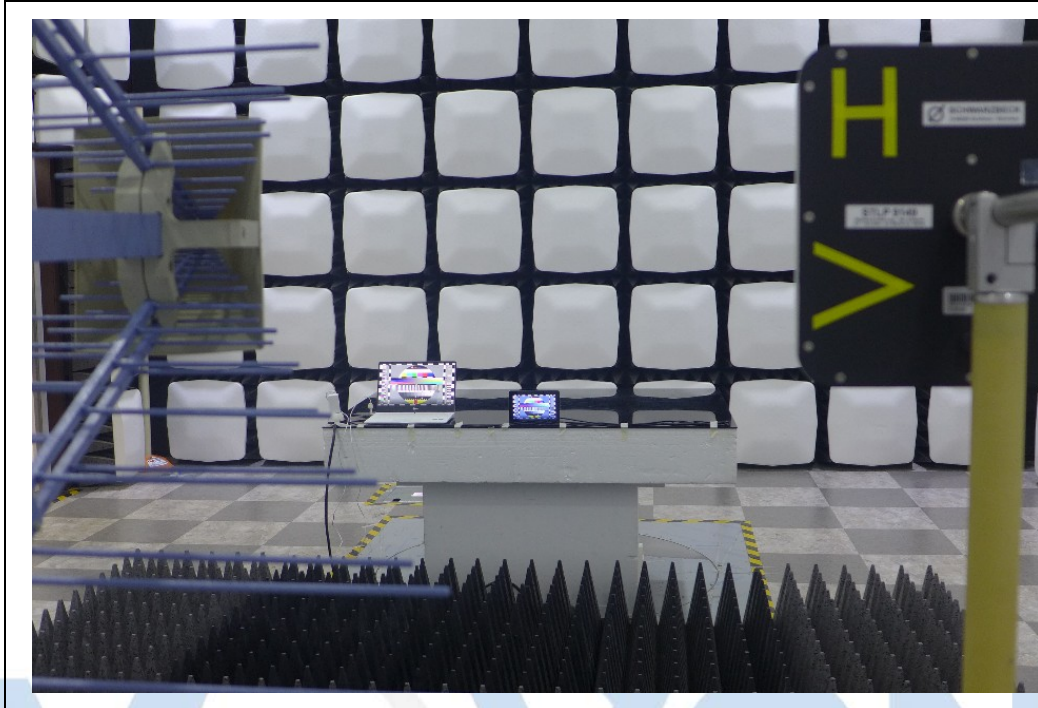
**3.4.4 Test Results**

Frequency Range (MHz)	Position	Polarity	Field Strength	Modulation	Results
80 ~ 1 000	Front	Horizontal	3 V/m	80 % AM(1 kHz)	Complied
		Vertical	3 V/m	80 % AM(1 kHz)	Complied
80 ~ 1 000	Rear	Horizontal	3 V/m	80 % AM(1 kHz)	Complied
		Vertical	3 V/m	80 % AM(1 kHz)	Complied
80 ~ 1 000	Left	Horizontal	3 V/m	80 % AM(1 kHz)	Complied
		Vertical	3 V/m	80 % AM(1 kHz)	Complied
80 ~ 1 000	Right	Horizontal	3 V/m	80 % AM(1 kHz)	Complied
		Vertical	3 V/m	80 % AM(1 kHz)	Complied

◆ All modes were tested and complied. **Performance Criteria A**, the EUT normally operates during and after the test.

## 3.4.5 Test Set-up

### 3.4.5.1 Photograph of Electromagnetic Field Immunity



**3.5 Electrical fast transient/Burst****3.5.1 Test Results : Complied****3.5.2 Measurement equipment**

Kind of Equipment	Manufacture / Model	S/N	Calibrated until
Conducted immunity generator	TESEQ / NSG 3060	1447	2019.05.29
Single motor driven variable transformer	TESEQ AQ / 3005-S16	891	2019.05.28
CDN	TESEQ AQ / CDN 3061	1542	2019.05.28

**3.5.3 Environment Conditions**

Test Date: 2018-11-07

Temperature: 21.4 °C

Humidity: (32.0 ~ 32.2) % R.H.

Atmospheric Pressure: 101.2 kPa

**3.5.4 Test Results**

[AC Main]

Test Point	Polarity	Coupling	Test Level	Results
L1	+ / -	Direct	1.0 kV	Complied
N	+ / -	Direct	1.0 kV	Complied
L1 + N	+ / -	Direct	1.0 kV	Complied

◆ All modes were tested and complied. **Performance Criteria B**, the EUT normally operates after the test.

[Signal Line]

Test Point	Polarity	Coupling	Test Level	Results
Signal Line	+ / -	Capacitive Coupling clamp	0.5 kV	-

## 3.5.5 Test Set-up

### 3.5.5.1 Photograph of Electrical fast transient/burst\_Power



### 3.5.5.2 Photograph of Electrical fast transient/burst\_Signal



### 3.6 Surges

#### 3.6.1 Test Results : **Complied**

#### 3.6.2 Measurement equipment

Kind of Equipment	Manufacture / Model	S/N	Calibrated until
Conducted immunity generator	TESEQ / NSG 3060	1447	2019.05.29
Single motor driven variable transformer	TESEQ AQ / 3005-S16	891	2019.05.28
CDN	TESEQ AQ / CDN 3061	1542	2019.05.28

#### 3.6.3 Environment Conditions

Test Date: 2018-11-07

Temperature: (21.4 ~ 21.6) °C

Humidity: (32.2 ~ 32.7) % R.H.

Atmospheric Pressure: 101.2 kPa

#### 3.6.4 Test Results

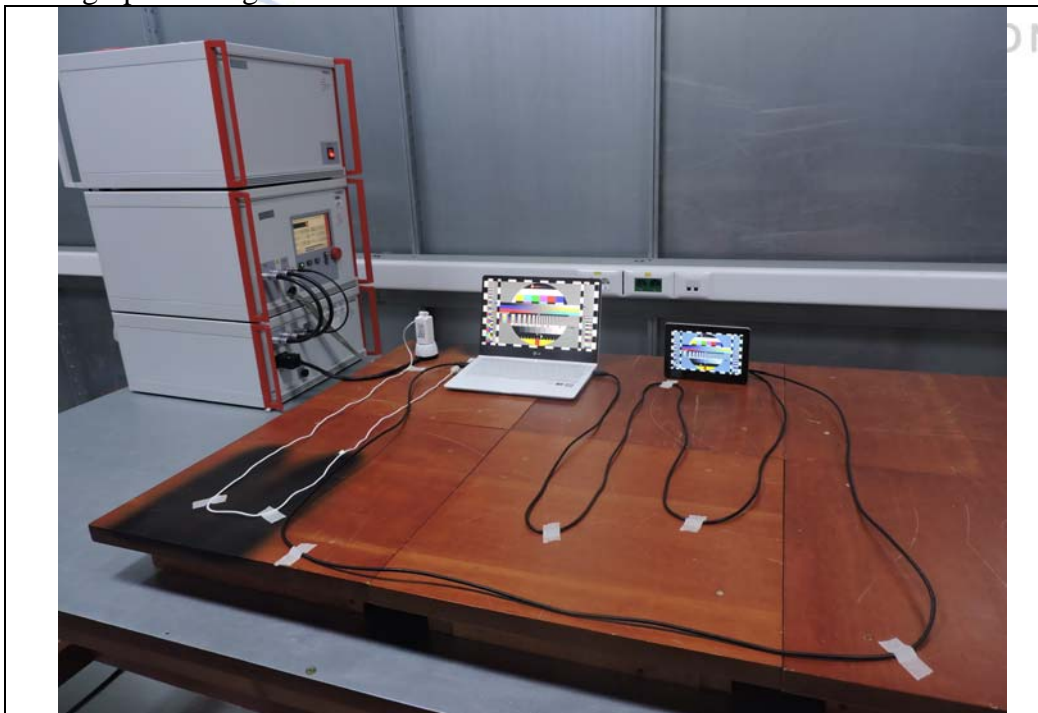
[AC Main]

Test Point	Polarity	Coupling	Phase Angle(°)	Test Level(kV)	Results
L1 + N	+ / -	Direct	0, 90, 180, 270	1.0	<b>Complied</b>

◆ All modes were tested and complied. **Performance Criteria A**, the EUT normally operates during and after the test.

#### 3.6.5 Test Set-up

##### 3.6.5.1 Photograph of Surges



**3.7 Conducted Immunity****3.7.1 Test Results : Complied****3.7.2 Measurement equipment**

Kind of Equipment	Manufacture / Model	S/N	Calibrated until
Amplifier	AR / 150A250	307656	N/A
CDN	FCC / FCC-801-M2/M3-16A	04007	2019.05.28
Signal Generator	ROHDE & SCHWARZ / SML03	103468	2018.12.07
Power Meter	ROHDE & SCHWARZ / NRVD	101083	2019.05.28
6dB Attenuator	BIRD / 150-A-FFN-06	35	2018.12.07
Software	ROHDE & SCHWARZ / EMC32	Version 10.35.10	N/A

**3.7.3 Environment Conditions**

Test Date: 2018-11-12

Temperature: (22.0 ~ 22.3) °C

Humidity: (34.6 ~ 34.9) % R.H.

Atmospheric Pressure: 100.9 kPa

**3.7.4 Test Results****[AC Main]**

Frequency Range (MHz)	Test Point	Coupling	Voltage Level	Modulation	Results
0.15 ~ 80	AC IN	CDN(M2)	3 V	80 % AM(1 kHz)	Complied

◆ All modes were tested and complied. **Performance Criteria A**, the EUT normally operates during and after the test.

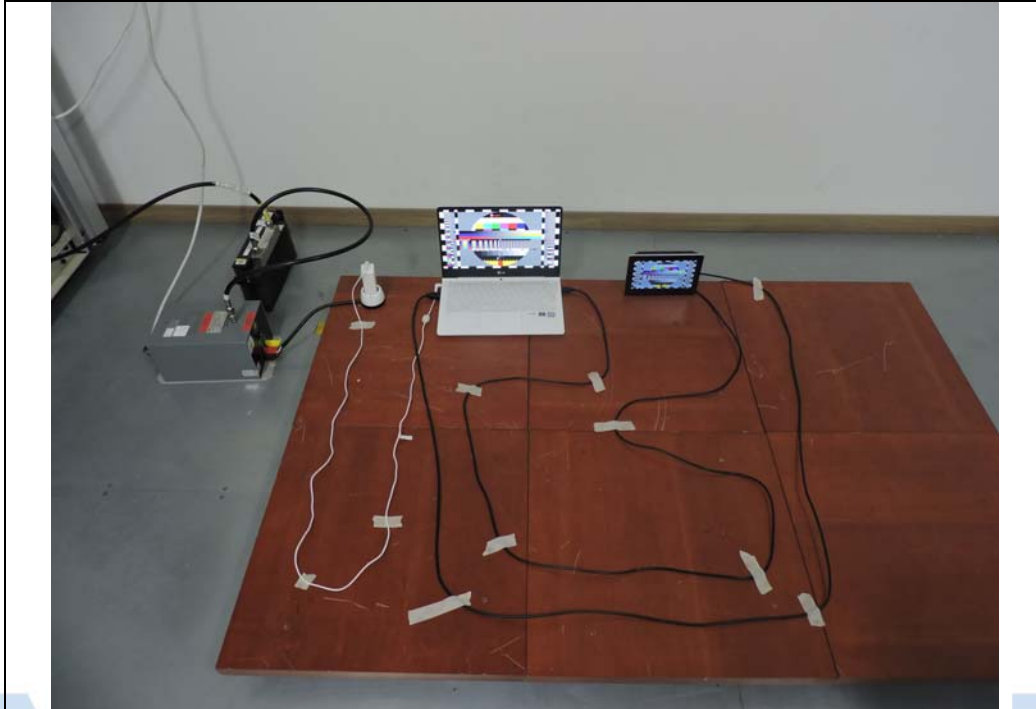
**[Signal Line]**

Frequency Range (MHz)	Test Point	Coupling	Voltage Level	Modulation	Results
0.15 ~ 80	Signal Line	CDN(M3)	3 V	80 % AM(1 kHz)	-



## 3.7.5 Test Set-up

### 3.7.5.1 Photograph of Conducted Immunity\_Power



### 3.7.5.2 Photograph of Conducted Immunity\_Signal



**3.8 Voltage dips and Interruptions****3.8.1 Test Results : Complied****3.8.2 Measurement equipment**

Kind of Equipment	Type	S/N	Calibrated until
Conducted immunity generator	NSG 3060	1447	2017.06.28
CDN	CDN 3061	1542	2017.06.28
Single motor driven variable transformer	VAR 3005-S16	891	2017.06.28

**3.8.3 Environment Conditions**

Test Date: 2018-11-07

Temperature: 21.6 °C

Humidity: 32.7 % R.H.

Atmospheric Pressure: 101.2 kPa

**3.8.4 Test Results****3.8.4.1 Voltage dips**

Reduction (%U <sub>T</sub> )	Reduction period (s)	Number	Results
30 %	25	3	Complied
> 95 %	0.5	3	Complied

◆ All modes were tested and complied. **Performance Criteria A**, the EUT normally operates during and after the test.

**3.8.4.2 Voltage Interruptions**

Reduction (%U <sub>T</sub> )	Reduction period (s)	Number	Results
> 95 %	250	3	Complied

◆ All modes were tested and complied. **Performance Criteria A**, the EUT normally operates during and after the test.

## 3.8.5 Test Set-up

### 3.8.5.1 Photograph of Voltage dips and Interruptions



MOVON CORPORATION