TEST REPORT

KCTL Inc.
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Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
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1. Client

- Name : Hanwha Techwin Co., Ltd
- Address : 1204, Changwon-daero, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea
- Date of Receipt : 2016-07-28

2. Use of Report : -

3. Name of Product and Model : 2M 32x N/W Explosion-proof Fixed Camera / TNO-6320E

4. Manufacturer and Country of Origin : Wonwoo Engineering Co., Ltd. / Korea

5. Date of Test : 2017-12-28 to 2018-01-02

6. Test method used : EN 55032:2015, Class A
EN 50130-4:2011/A1:2014
EN 61000-3-2:2014
EN 61000-3-3:2013

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

Affirmation	Tested by Name : Jechang Yu (Signature)	Technical Manager Name : Gunsu Park (Signature)

2018-01-03

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2016-08-26	Originally issued(KR16-SEC0064)	-
2018-01-03	Standard update(EN 55032) (KR18-SEC0002)	-

Contents

1. Applicant information

Applicant:	Hanwha Techwin Co., Ltd
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Contact name:	Jesoon Kang
Manufacturer:	Wonwoo Engineering Co., Ltd.
Address:	7F201, Techno-park Ⅲ Biz-city,397,Seokcheon-ro, Ojeong-gu,Bucheon-city.Gyeonggi-do,korea

2. Laboratory information

Address

KCTL Inc. (Suwon Lab.)

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Telephone Number: 82 31 285 0894

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(RE)	21.9 °C	14.7 % R.H.	-
Shielded room(CE)	21.7 °C	14.8 % R.H.	-

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber
Harmonics current	EMI Test area
Voltage fluctuations and flickers	EMI Test area

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 (Confidence level about 95 %, *k* = 2)		
Shielded Room (CE#1)	9 kHz ~ 150 kHz: 3.66 dB	
	150 kHz ~ 30 MHz: 3.26 dB	
Shielded Room (CE#2)	9 kHz ~ 150 kHz: 3.48 dB	
	150 kHz ~ 30 MHz: 3.06 dB	
Radiated Emission measurement (Confidence level about 95 %, *k* = 2)		
10 m Chamber (4F)	30 MHz ~ 300 MHz	3 m: 5.42 dB
		10 m: 5.40 dB
	300 MHz ~ 1 000 MHz	3 m: 5.56 dB
		10 m: 5.44 dB
	1 GHz ~ 6 GHz	3 m: 6.28 dB
10 m Chamber (2F)	30 MHz ~ 300 MHz	3 m: 5.06 dB
		10 m: 5.04 dB
	300 MHz ~ 1 000 MHz	3 m: 5.18 dB
		10 m: 5.06 dB
	1 GHz ~ 6 GHz	3 m: 6.36 dB
Radio Frequency Electromagnetic Fields (Confidence level about 95 %, *k* = 2)		
0.86 dB		
Disturbance Power Electromagnetic Fields (Confidence level about 95 %, *k* = 2)		
2.82 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	2F	EP5RE_V 4.6.0(TOYO)	☒
	4F	EP5RE_V 5.11.10(TOYO)	
Harmonics current, Voltage fluctuations and flickers	CTS 4_V 4.6.2 (AMETEK)		☒

4. Description of EUT

4.1 General information

Power source - 24VAC

Power Consumption – Max 48W

Operating temperature - -40℃ ≤ Ta ≤ +60℃

Housing material – Stainless steel (SUS316/304)

Weight – 7Kg

Dimension – 145.5(W) x 153(H) x 244(D)

Cable entry size – NTP ¾″

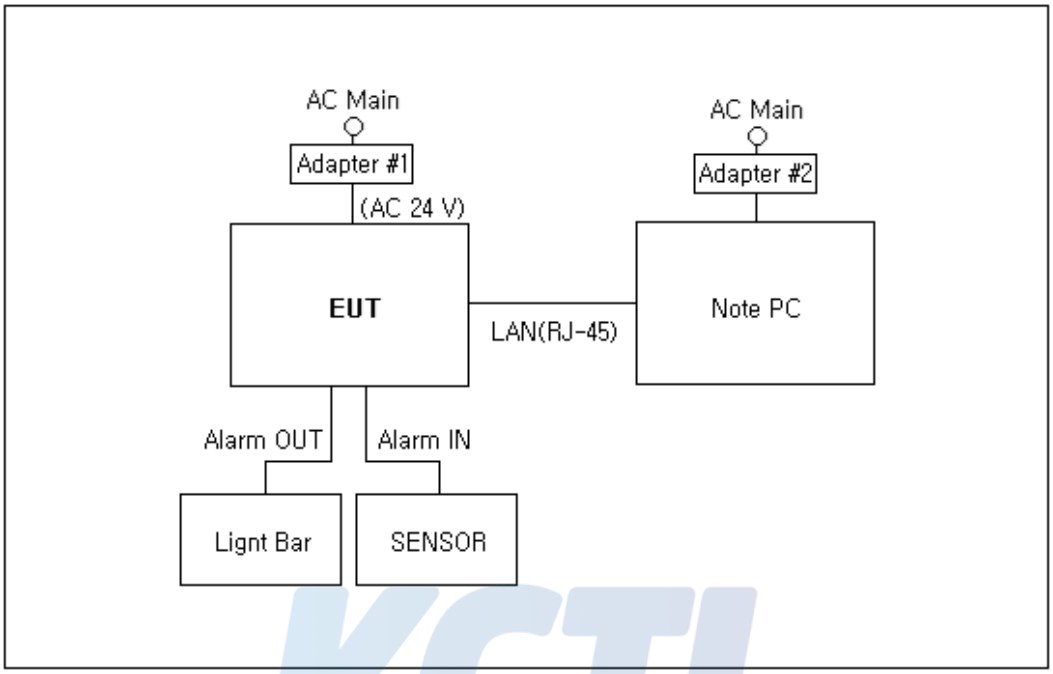
4.2 Product description

Type of product	2M 32x N/W Explosion-proof Fixed Camera
Model name (Basic)	TNO-6320E
Model name (Variant)	-
Difference	-
Serial no	-
Testing voltage	230 V, 50 Hz
Input rating	AC 24 V
Internal clock frequency	400 MHz
Note	Adapter #1 was not provided by the manufacturer

4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer
Adapter #1	W&T-LP72W240300	-	IV&t
Note PC	HP ProBook 470 G2	CND50740W0	HP
Adapter #2	PPP009C	F220881440034774	HP
Light Bar	DS-360	-	DAE MYUNG ELECTRONICS CO., LTD
SENSOR	-	-	DAE MYUNG ELECTRONICS CO., LTD

4.4 Test configuration



	Start		End		Cable		
	Name	I/O port	Name	I/O port	Length (m)	Spec.	Cable
1	**EUT**	Power	Adapter #1	-	1.5	Unshield	-
2		LAN(RJ-45)	Note PC	LAN(RJ-45)	3.0	Shield	Out-door
3		Alarm OUT	Lignt Bar	Alarm IN	3.0	Unshield	Out-door
4		Alarm IN	SENSOR	Alarm OUT	3.0	Unshield	Out-door
5	Note PC	Power	Adapter #2	-	1.5	Unshield	-

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
Test #1	Check the EUT Monitoring test. (Used program: Web view)
	Ping test.
	Alarm IN/OUT test using a Light Bar and SENSOR.

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
☒	Conducted Emission	EN 55032:2015	Pass
☒	Radiated Emission	EN 55032:2015	Pass
☒	Harmonics current	EN 61000-3-2:2014	Pass
☒	Voltage fluctuations and flickers	EN 61000-3-3:2013	Pass

This product complies with the requirements of the EMC Directive 2014/30/EU.

5.2 Performance criteria

The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.
If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.
A functional description and a definition of performance by the manufacture and noted in the test report, based on the following criteria:

Electrostatic discharge

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test (see Clause 6), after the conditioning.

Radiated electromagnetic fields

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change, and no such flickering of indicators occurs at a field strength of 3 V/m.
For components of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at 10 V/m, providing.

(a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable setting etc.)
(b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and
(c) there is no observable deterioration of the picture at 1 V/m.

The EUT shall meet the acceptance criteria for the functional test(see Clause 6), after the conditioning.

Fast transient burst / slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of the bursts is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test

(see Clause 6), after the conditioning.

Slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of the surges is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test (see Clause 6), after the conditioning.

Conducted RF immunity

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change, and no such flickering of indicators occurs at U_0 = 130 dBμV.
For components of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at U_0 = 140 dBμV, providing

(a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable settings, etc.)
(b) at U_0 = 130 dBμV, any deterioration of the picture is so minor that the system could still be used, and
(c) there is no observable deterioration of the picture at U_0 = 120 dBμV.

The EUT shall meet the acceptance criteria for the functional test(see Clause 6), after the conditioning.

Voltage dip/interruption / Voltage variation

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test(see Clause 6), after the conditioning.

Mains supply voltage variations

There shall be no damage, malfunction or change of status due to the different supply voltage conditions. The EUT shall meet the acceptance criteria for the functional test(see Clause 6), during the conditioning.

6. Test results

6.1 Conducted Emission

Test specification	EN 55032:2015, Class A		
Testing voltage	230 V, 50 Hz		
Test facility	Shielded room (CE#2)		
Date	2017-12-28		
Temperature (°C)	21.7 °C	Humidity (% R.H.)	14.8 % R.H.
Remarks	Pass		

Both conducted lines are measured in Quasi-Peak and C/Average mode, including the worst-case data points for each tested configuration. The EUT measured in accordance with the methods described in standards.

6.1.1 Limits of conducted emission measurement

☒ AC main

Frequency [MHz]	Resolution Bandwidth [kHz]	Class A (dB(μV))		Class B (dB(μV))	
		Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	9	79	66	66 ~ 56	56 ~ 46
0.5 ~ 5	9	73	60	56	46
5 ~ 30	9	73	60	60	50

☒ Telecommunication

Frequency [MHz]	Resolution Bandwidth [kHz]	Class A Limits (dB(μV))		Current Limits (dB(μV))	
		Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	9	97 to 87	84 to 74	53 to 43	40 to 30
0.5 ~ 30	9	87	74	43	30
Frequency [MHz]	Resolution Bandwidth [kHz]	Class B Limits (dB(μV))		Current Limits (dB(μV))	
		Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	9	84 to 74	74 to 64	40 to 30	30 to 20
0.5 ~ 30	9	74	64	30	20

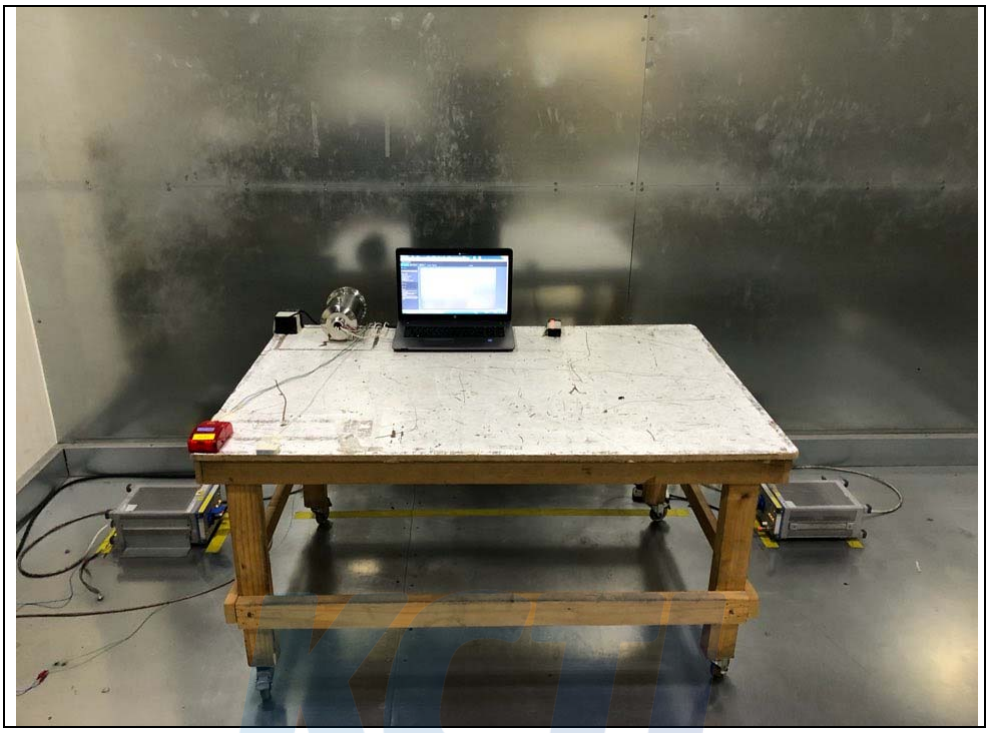
If the reading on the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 seconds at each measurement frequency, the highest reading shall be recorded, with the exception of any brief isolated high reading (which shall be ignored).

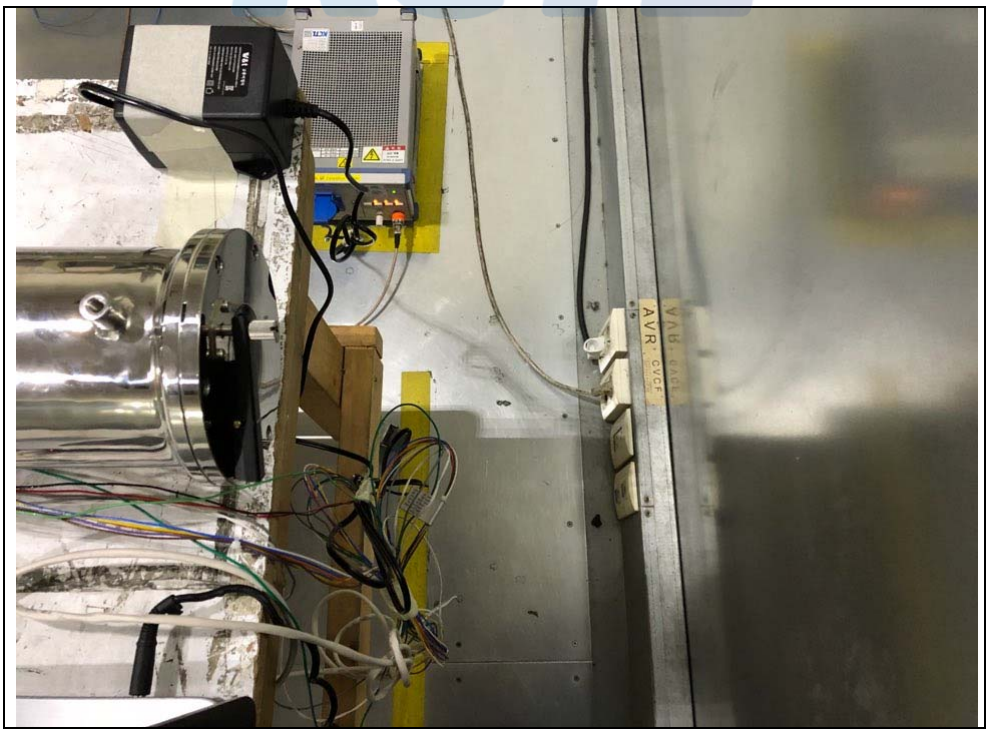
6.1.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI TEST RECEIVER	ESCI	100710	R&S	2018.08.24	☒
TWO-LINE V-NETWORK	ENV216	101352	R&S	2018.08.25	☒
TWO-LINE V-NETWORK	NNLK8121	8121-472	SCHWARZBECK	2018.08.25	☒
IMPEDANCE STABILIZATION NETWORK	ISN ST08	24342	TESEQ	2018.08.24	☒

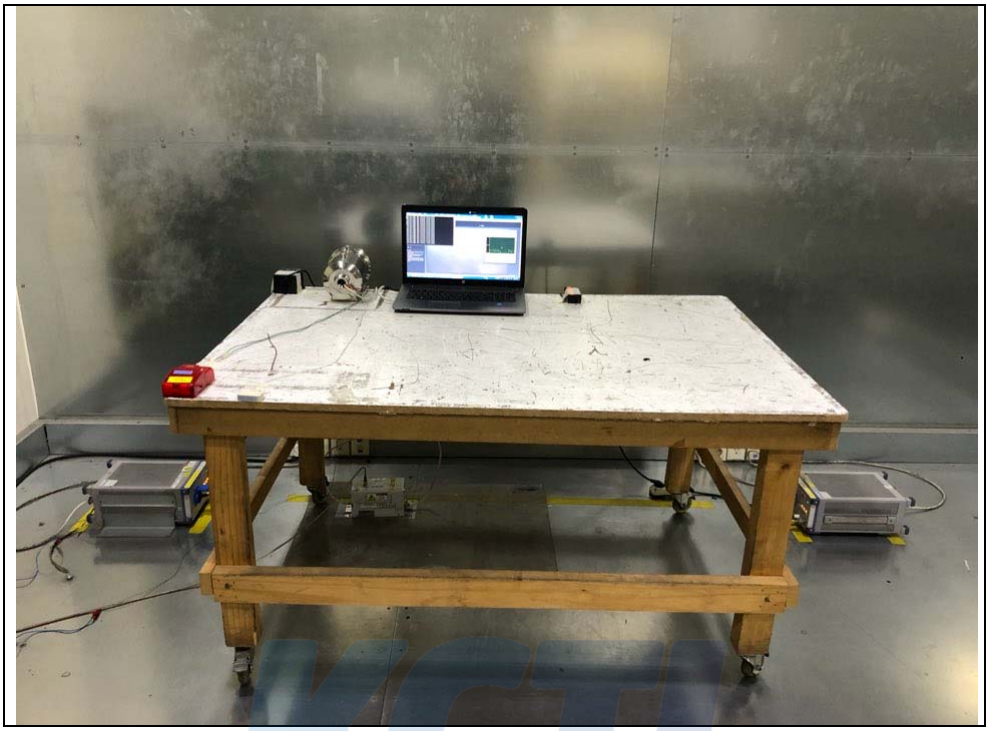
6.1.3 Photographs of test setup

AC Main



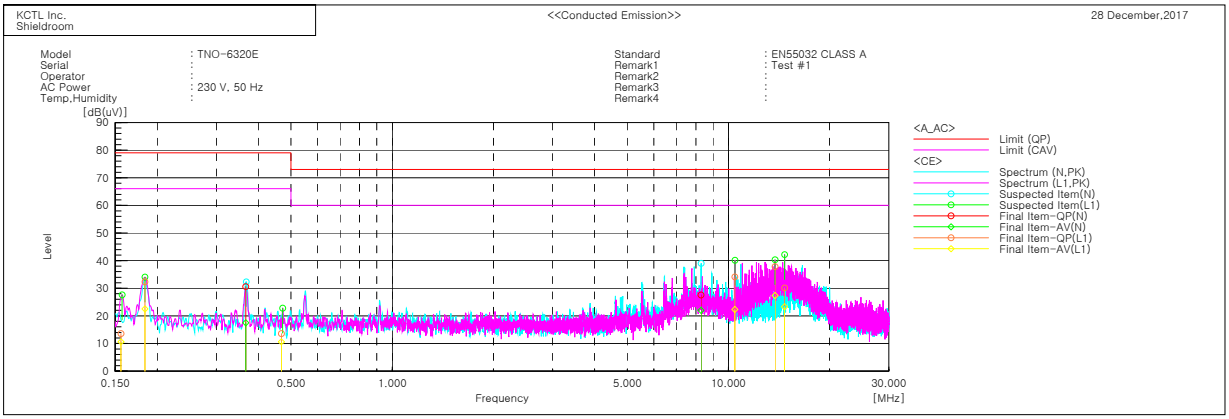


Telecommunication



6.1.4 Conducted emission measurement result

AC Main



Final Result

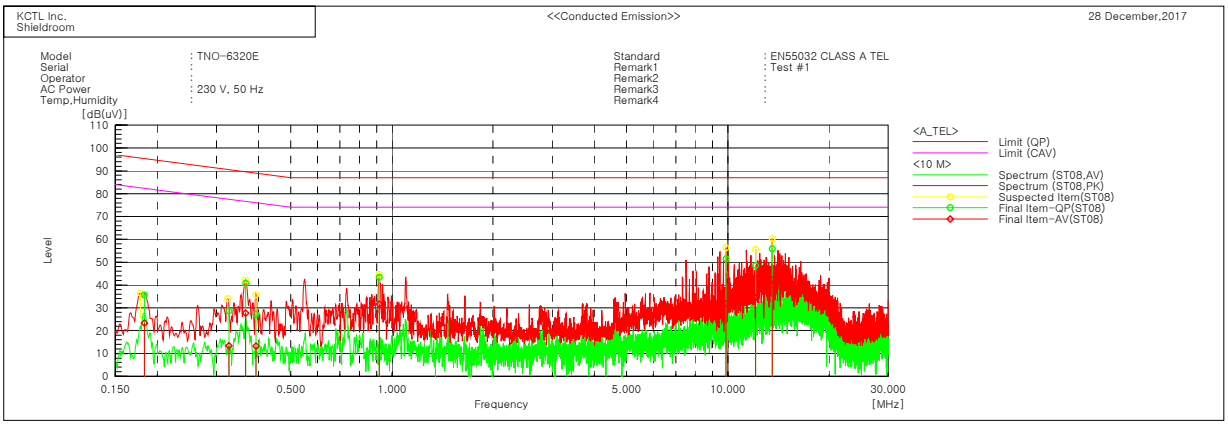
--- N Phase ---

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	0.3669	20.8	7.7	9.8	30.6	17.5	79.0	66.0	48.4	48.5
2	8.29278	17.5	12.0	10.0	27.5	22.0	73.0	60.0	45.5	38.0

--- 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	0.15604	3.8	0.8	9.8	13.6	10.6	79.0	66.0	65.4	55.4
2	0.18387	22.3	12.5	10.0	32.3	22.5	79.0	66.0	46.7	43.5
3	0.46824	3.7	0.7	9.9	13.6	10.6	79.0	66.0	65.4	55.4
4	10.45556	24.1	12.3	10.0	34.1	22.3	73.0	60.0	38.9	37.7
5	13.76095	27.8	17.3	10.0	37.8	27.3	73.0	60.0	35.2	32.7
6	14.69359	20.1	13.3	10.0	30.1	23.3	73.0	60.0	42.9	36.7

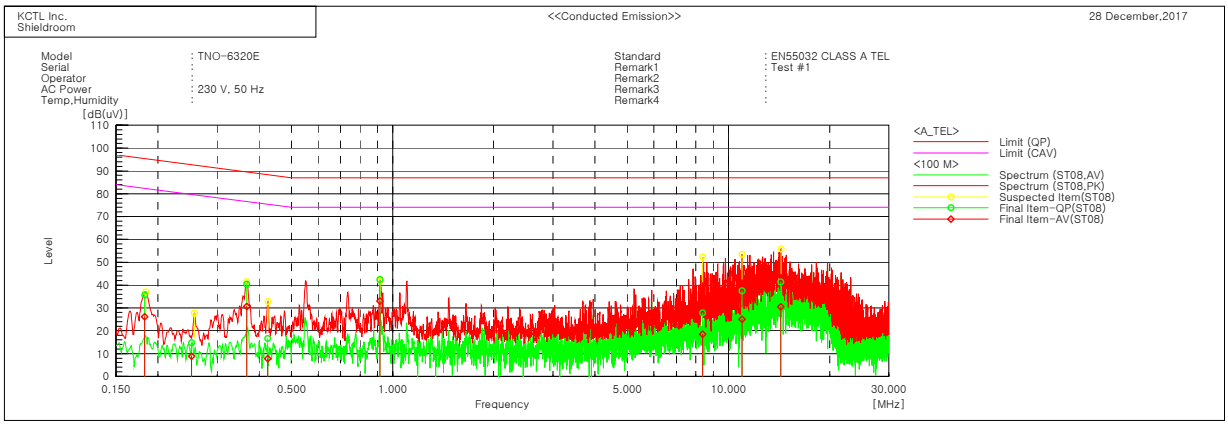
Telecommunication



Final Result

--- ST08 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	0.18306	25.9	13.6	9.7	35.6	23.3	95.3	82.3	59.7	59.0
2	0.32667	18.9	3.7	9.7	28.6	13.4	90.5	77.5	61.9	64.1
3	0.36693	31.0	17.9	9.8	40.8	27.7	89.6	76.6	48.8	48.9
4	0.39317	17.5	3.5	9.8	27.3	13.3	89.0	76.0	61.7	62.7
5	0.91655	33.6	21.8	9.8	43.4	31.6	87.0	74.0	43.6	42.4
6	9.89024	41.3	21.7	10.2	51.5	31.9	87.0	74.0	35.5	42.1
7	12.08623	38.3	24.0	10.3	48.6	34.3	87.0	74.0	38.4	39.7
8	13.55801	45.6	32.0	10.3	55.9	42.3	87.0	74.0	31.1	31.7



Final Result

--- ST08 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	0.18263	26.0	16.5	9.7	35.7	26.2	95.4	82.4	59.7	56.2
2	0.25175	5.1	-0.8	9.7	14.8	8.9	92.7	79.7	77.9	70.8
3	0.36798	30.7	20.9	9.8	40.5	30.7	89.5	76.5	49.0	45.8
4	0.42464	6.8	-2.1	9.8	16.6	7.7	88.4	75.4	71.8	67.7
5	0.91746	32.6	23.3	9.8	42.4	33.1	87.0	74.0	44.6	40.9
6	8.37033	17.8	8.4	10.1	27.9	18.5	87.0	74.0	59.1	55.5
7	10.97832	27.2	14.8	10.2	37.4	25.0	87.0	74.0	49.6	49.0
8	14.32016	31.2	20.2	10.3	41.5	30.5	87.0	74.0	45.5	43.5

6.2 Radiated Emission

Test specification	EN 55032:2015, Class A		
Testing voltage	230 V, 50 Hz		
Test facility	10 m Chamber (4F)		
Test distance	10 m, 3 m		
Date	2017-12-28		
Temperature(°C)	21.9 °C	Humidity (% R.H.)	14.7 % R.H.
Remarks	Pass		

Of those emissions above (*L* – 20 dB), where *L* is the limit level in logarithmic units, record at least the emission levels and the frequencies of the six highest emissions.
The following data lists the significant emission frequencies, measured levels, correction factors (for antenna and cables), orientation of table, polarization and height of antenna, the corrected reading, the limit, and the amount of margin. All measurements were taken utilizing quasi-peak detection unless stated otherwise.
Measurements were performed at an antenna to EUT distance of 10 or 3 meters and elevated between 1 and 4 meters. Both vertical and horizontal antenna polarizations were measured.

Below 1 GHz, peak detector function mode for prescan was used with resolution bandwidth of 120 kHz and a video bandwidth of 300 kHz and sweep method.
The sweep time for prescan set below 200 ms up and final measurement with quasi-peak detector evaluated for suspected frequencies points, which are detected from prescan measurement.

Final measurements consisted of 3 steps.
First step, frequency fine tuning to find exact emission frequency.
Second step, rechecking to search for maximum height and azimuth for interference from EUT
In final step, there are conducted measuring with quasi-peak detector for points which are detected from 1st step & 2nd step.

6.2.1 Limits of radiated emission measurement

☒ Limits below 1 GHz

Frequency [MHz]	Resolution Bandwidth [kHz]	Class A (dB(μV/m)) @ 10 m	Class B (dB(μV/m)) @ 10 m
30 ~ 230	120	40	30
230 ~ 1 000	120	47	37

☒ Limits above 1 GHz

Frequency [GHz]	Resolution Bandwidth [MHz]	Class A @ 3 m		Class B @ 3 m	
		Average limit (dB(μV/m))	Peak limit (dB(μV/m))	Average limit (dB(μV/m))	Peak limit (dB(μV/m))
1 ~ 3	1	56	76	50	70
3 ~ 6	1	60	80	54	74
Note - The lower limit applies at the transition frequency.					

Measurements within 20 dB of the limit were then maximized by adjusting turntable position.

Final measurements were made using an C/Average detector.

Results checked manually and points close to the limit line were re-measured.

6.2.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI TEST RECEIVER	ESR7	101078	R&S	2018.08.24	☒
Bilog Antenna	CBL 6112D	37876	TESEQ	2018.08.05	☒
AMPLIFIER	310N	293004	SONOMA	2018.08.24	☒
ATTENUATOR	8491B	MY39270292	AGILENT	-	☒
Antenna Mast	MA4640-XP-ET	-	Innco Systems	-	☒
Turn Table	TT 3.0-3t	-	MATURO	-	☒
PREAMPLIFIER	8449B	3008A01802	AGILENT	2018.04.06	☒
DOUBLE RIDGED HORN ANTENNA	3115	00155772	ETS-LINDGREN	2018.10.20	☒
Spectrum Analyzer	FSV40	100988	R&S	2018.01.06	☐

6.2.3 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 + 6 dB Att – A.G)

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G = Amplifier Gain

6 dB Att = 6 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 6 dB, A.G 35 dB

The result is 30 + 12 + 5 + 6 – 35 = 18 dB(μN/m)

Bilog Antenna and ATTENUATOR (6 dB) were calibrated together.

AV = CAV : Abbreviation of CISPR Average

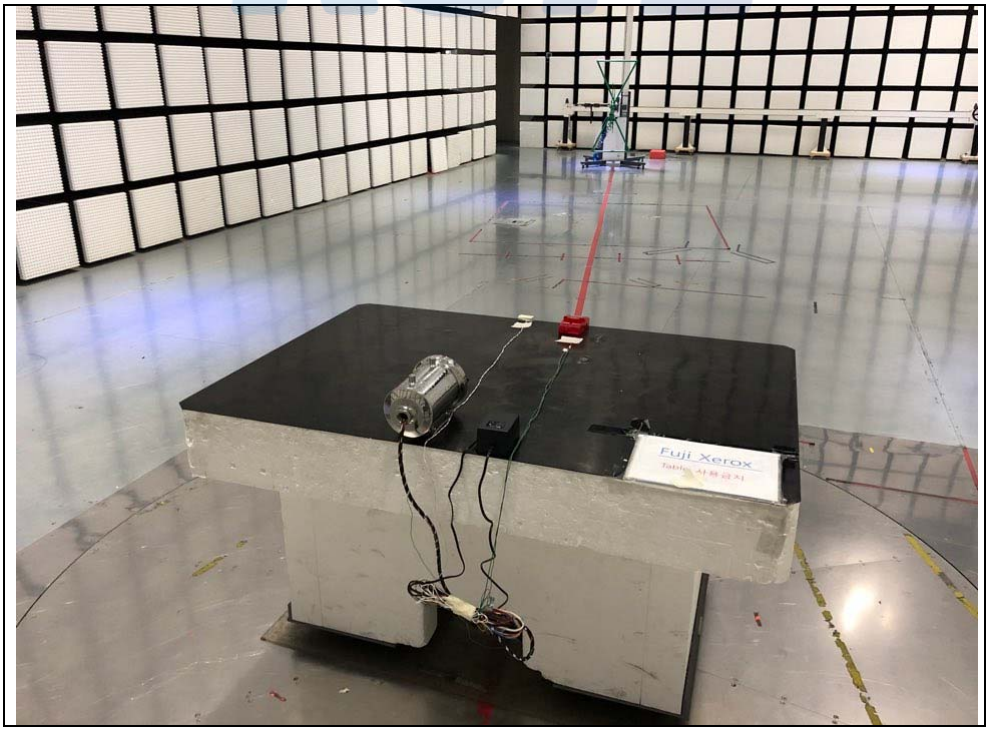
Correction

$E_m = E_{dm} + 20\log(d/3)$

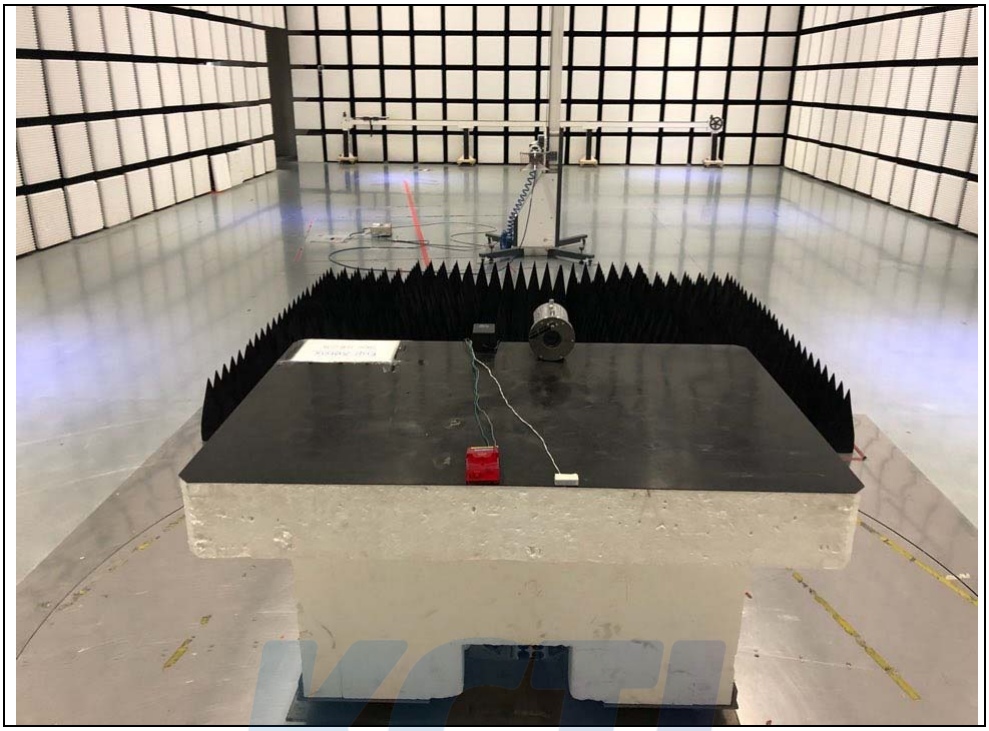
E_m: Result, E_{dm}: Measured value of the measured distance

6.2.4 Photographs of test setup

30 MHz ~ 1 GHz

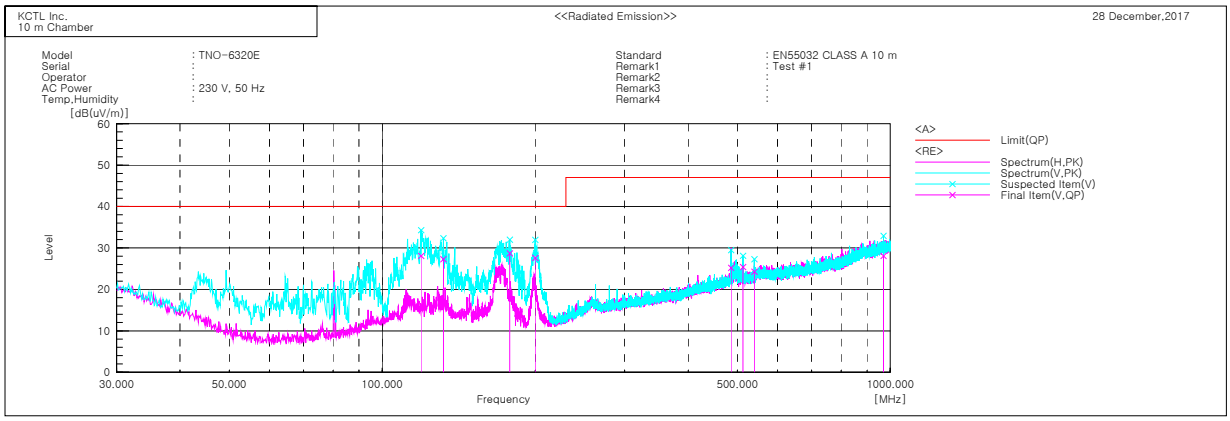


1 GHz ~ 6 GHz



6.2.5 Radiated emission measurement result

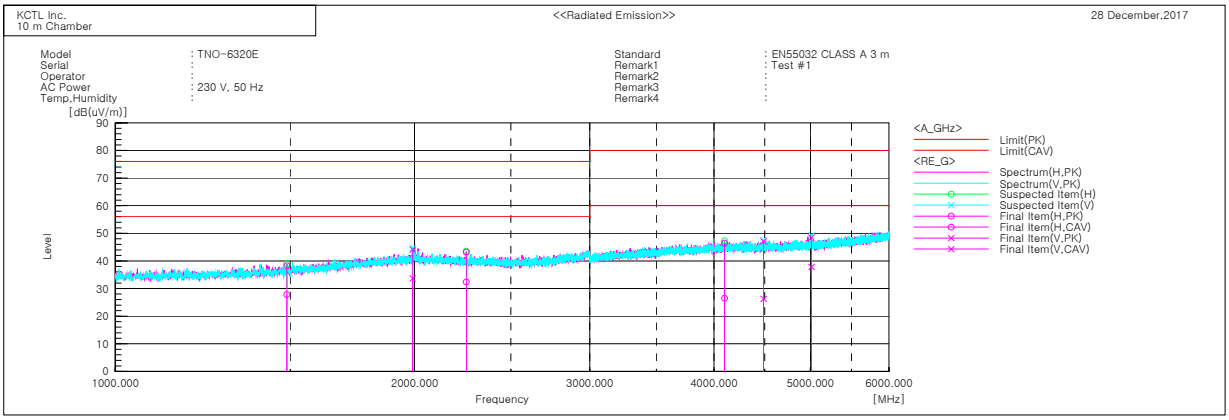
30 MHz ~ 1 GHz



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	119.240	V	39.5	-11.4	28.1	40.0	11.9	121.0	315.3
2	131.971	V	38.9	-11.6	27.3	40.0	12.7	342.0	207.9
3	178.289	V	42.3	-13.6	28.7	40.0	11.3	102.0	212.6
4	200.114	V	40.8	-13.2	27.6	40.0	12.4	100.0	221.6
5	486.021	V	28.2	-3.0	25.2	47.0	21.8	101.0	216.4
6	513.060	V	27.8	-2.4	25.4	47.0	21.6	101.0	17.9
7	539.978	V	26.2	-1.9	24.3	47.0	22.7	226.0	158.1
8	969.809	V	22.8	5.3	28.1	47.0	18.9	139.0	285.2

1 GHz ~ 6 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	1488.125	H	46.1	35.7	-7.9	38.2	27.8	76.0	56.0	37.8	28.2	100.1	153.8
2	1991.250	V	47.1	36.7	-3.0	44.1	33.7	76.0	56.0	31.9	22.3	100.1	353.7
3	2254.375	H	46.2	35.4	-3.0	43.2	32.4	76.0	56.0	32.8	23.6	100.1	78.8
4	4099.375	H	42.7	22.8	3.7	46.4	26.5	80.0	60.0	33.6	33.5	100.1	340.0
5	4487.500	V	43.1	22.3	4.0	47.1	26.3	80.0	60.0	32.9	33.7	100.1	251.5
6	5013.750	V	43.2	32.6	5.3	48.5	37.9	80.0	60.0	31.5	22.1	100.1	134.9

◈ Correction(Distance: 4.2 m)

Frequency [MHz]	(P)	Reading PK [dB(㎶)]	Reading CAV [dB (㎶)]	c.f [dB(1/m)]	Result PK [dB(㎶/m)]	Result CAV [dB(㎶/m)]	Limit PK [dB(㎶/m)]	Limit AV [dB(㎶/m)]	Margin PK [dB]	Margin CAV [dB]
1488.125	H	46.1	35.7	-5.0	41.1	30.7	76.0	56.0	34.9	25.3
1991.250	V	47.1	36.7	-0.1	47.0	36.6	76.0	56.0	29.0	19.4
2254.375	H	46.2	35.4	-0.1	46.1	35.3	76.0	56.0	29.9	20.7
4099.375	H	42.7	22.8	6.6	49.3	29.4	80.0	60.0	30.7	30.6
4487.500	V	43.1	22.3	6.9	50.0	29.2	80.0	60.0	30.0	30.8
5013.750	V	43.2	32.6	8.2	51.4	40.8	80.0	60.0	28.6	19.2

6.3 Harmonics

Test specification	EN 61000-3-2:2014				
Testing voltage	230 V, 50 Hz				
Test facility	EMI Test area(6F)				
Date	2018-01-02				
Temperature(°C)	28.3 °C	Humidity (% R.H.)	11.4 % R.H.	Pressure (kPa)	102.2 kPa
Remarks	Pass				

6.3.1 Measurement procedure

The equipment is supplied in series with shunt(s) Rm or current transformer(s) from a source having the same nominal voltage and frequency as the rated supply voltage and frequency of the equipment. Measurements shall be made under normal load, or conditions for adequate heat discharge, and under normal operating conditions. User's operation controls or automatic programmers shall be set to produce the maximum harmonic component, for each successive harmonic component in turn. For the purpose of harmonic current limitation, equipment is classified as follows :

Class A : Equipment not specified in one of the three other Classes shall be considered as Class A equipment.

- Balanced three-phase equipment;
- Household appliances, excluding equipment identified as Class D;
- Tools, excluding portable tools;
- Dimmers for incandescent lamps;
- Audio equipment.

Class B : Portable tools; Arc welding equipment which is not professional equipment.

Class C : Lighting equipment.

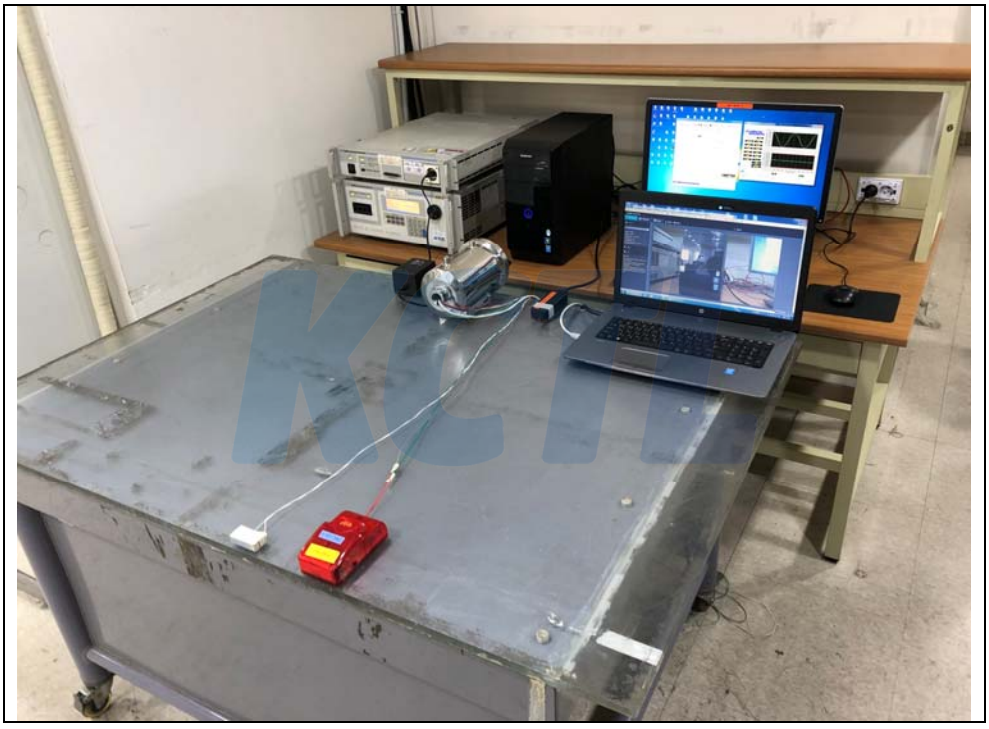
Class D : Equipment having a specified power according to 6.2.2 less than or equal to 600 w, of the following types:

- Personal computers and personal computer monitors;
- Television receivers.
- Refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

6.3.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Hamonic / Flicker Meter (AC POWER SOURCE)	5001IX	54894	C.I.	2018.03.21	☒
Hamonic / Flicker Meter (Analyzer)	PACS-1	72072	C.I.	2018.04.07	☒

6.3.3 Photographs of test setup



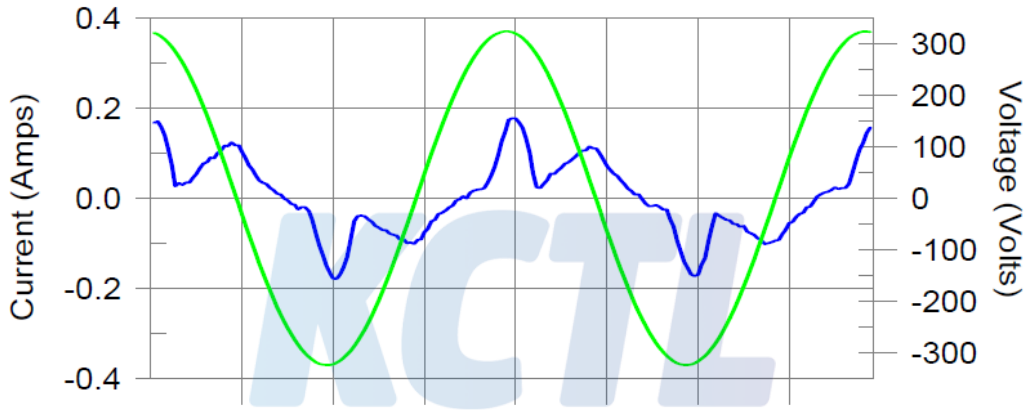
6.3.4 Measurement result

Harmonics – Class-A per Ed. 4.0 (2014)(Run time)

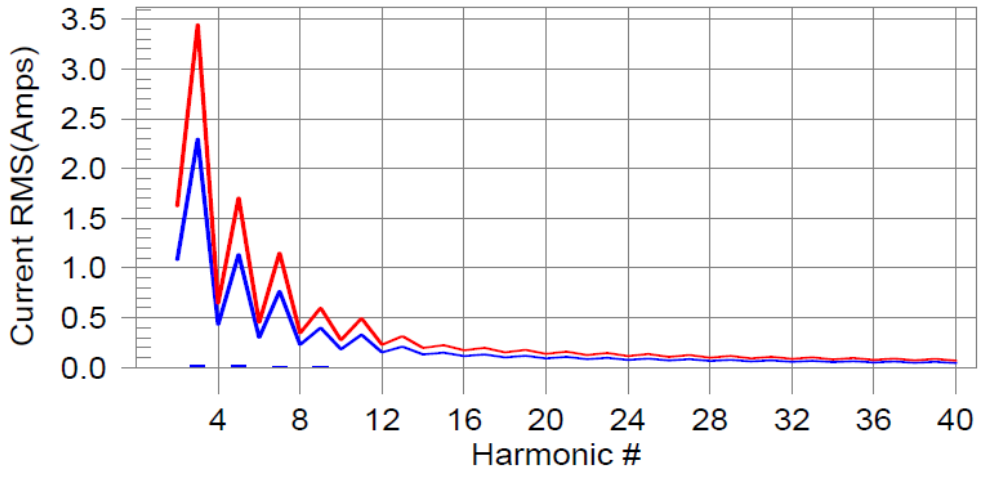
EUT: TNO-6320E **Tested by: KCTL Inc.**
Test category: Class-A per Ed. 4.0 (2014) (European limits) **Test Margin: 100**
Test date: 02/01/2018 **Start time: 07:27:40** **End time: 07:30:32**
Test duration (min): 2.5 **Data file name: H-000475.cts_data**
Comment: Comments
Customer: Hanwha Techwin Co., Ltd

Test Result: Pass **Source qualification: Normal**

Current & voltage waveforms



Harmonics and Class A limit line **European Limits**



Test result: Pass **Worst harmonic was #5 with 2.3% of the limit.**

Current Test Result Summary (Run time)

EUT: TNO-6320E
Test category: Class-A per Ed. 4.0 (2014) (European limits)
Test date: 02/01/2018 Start time: 07:27:40
Test duration (min): 2.5 Data file name: H-000475.cts_data
Comment: Comments
Customer: Hanwha Techwin Co., Ltd

Tested by: KCTL Inc.
Test Margin: 100
End time: 07:30:32

Test Result: Pass Source qualification: Normal
THC(A): 0.039 I-THD(%): 53.0 POHC(A): 0.000 POHC Limit(A): 0.251
Highest parameter values during test:

V_RMS (Volts):	229.42	Frequency(Hz):	50.00
I_Peak (Amps):	0.194	I_RMS (Amps):	0.083
I_Fund (Amps):	0.073	Crest Factor:	2.350
Power (Watts):	12.4	Power Factor:	0.654

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.001	1.620	N/A	Pass
3	0.024	2.300	1.0	0.024	3.450	0.7	Pass
4	0.001	0.430	N/A	0.001	0.645	N/A	Pass
5	0.026	1.140	2.3	0.026	1.710	1.5	Pass
6	0.000	0.300	N/A	0.000	0.450	N/A	Pass
7	0.012	0.770	1.6	0.012	1.155	1.1	Pass
8	0.000	0.230	N/A	0.000	0.345	N/A	Pass
9	0.008	0.400	1.9	0.008	0.600	1.3	Pass
10	0.000	0.184	N/A	0.000	0.276	N/A	Pass
11	0.001	0.330	N/A	0.002	0.495	N/A	Pass
12	0.000	0.153	N/A	0.000	0.230	N/A	Pass
13	0.002	0.210	N/A	0.002	0.315	N/A	Pass
14	0.000	0.131	N/A	0.000	0.197	N/A	Pass
15	0.002	0.150	N/A	0.002	0.225	N/A	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.001	0.132	N/A	0.001	0.198	N/A	Pass
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass
19	0.001	0.118	N/A	0.001	0.178	N/A	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.001	0.107	N/A	0.001	0.161	N/A	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.001	0.098	N/A	0.001	0.147	N/A	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.001	0.090	N/A	0.001	0.135	N/A	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.001	0.083	N/A	0.001	0.125	N/A	Pass
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass
29	0.001	0.078	N/A	0.001	0.116	N/A	Pass
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass
31	0.000	0.073	N/A	0.000	0.109	N/A	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.000	0.068	N/A	0.000	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.000	0.064	N/A	0.000	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.000	0.061	N/A	0.000	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.000	0.058	N/A	0.000	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

Voltage Source Verification Data (Run time)

EUT: TNO-6320E **Tested by: KCTL Inc.**
Test category: Class-A per Ed. 4.0 (2014) (European limits) **Test Margin: 100**
Test date: 02/01/2018 **Start time: 07:27:40** **End time: 07:30:32**
Test duration (min): 2.5 **Data file name: H-000475.cts_data**
Comment: Comments
Customer: Hanwha Techwin Co., Ltd

Test Result: Pass **Source qualification: Normal**

Highest parameter values during test:

Voltage (Vrms):	229.42	Frequency(Hz):	50.00
I_Peak (Amps):	0.194	I_RMS (Amps):	0.083
I_Fund (Amps):	0.073	Crest Factor:	2.350
Power (Watts):	12.4	Power Factor:	0.654

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.099	0.459	21.56	OK
3	0.509	2.065	24.65	OK
4	0.023	0.459	4.96	OK
5	0.022	0.918	2.35	OK
6	0.026	0.459	5.75	OK
7	0.012	0.688	1.72	OK
8	0.017	0.459	3.74	OK
9	0.024	0.459	5.32	OK
10	0.008	0.459	1.76	OK
11	0.022	0.229	9.78	OK
12	0.023	0.229	10.16	OK
13	0.024	0.229	10.32	OK
14	0.011	0.229	4.87	OK
15	0.006	0.229	2.55	OK
16	0.010	0.229	4.32	OK
17	0.008	0.229	3.65	OK
18	0.019	0.229	8.41	OK
19	0.009	0.229	4.09	OK
20	0.014	0.229	6.25	OK
21	0.010	0.229	4.15	OK
22	0.017	0.229	7.42	OK
23	0.005	0.229	2.00	OK
24	0.023	0.229	9.95	OK
25	0.011	0.229	4.74	OK
26	0.021	0.229	9.16	OK
27	0.003	0.229	1.31	OK
28	0.009	0.229	3.83	OK
29	0.008	0.229	3.67	OK
30	0.017	0.229	7.55	OK
31	0.007	0.229	3.20	OK
32	0.009	0.229	3.82	OK
33	0.009	0.229	4.09	OK
34	0.006	0.229	2.83	OK
35	0.008	0.229	3.55	OK
36	0.006	0.229	2.47	OK
37	0.011	0.229	4.73	OK
38	0.009	0.229	3.77	OK
39	0.014	0.229	5.92	OK
40	0.011	0.229	4.96	OK

6.4 Flicker

Test specification	EN 61000-3-3:2013				
Testing voltage	230 V, 50 Hz				
Test facility	EMI Test area(6F)				
Date	2018-01-02				
Temperature(°C)	23.8 °C	Humidity (% R.H.)	11.4 % R.H.	Pressure (kPa)	102.2 kPa
Remarks	Pass				

6.4.1 Measurement procedure

EUT was connected to the power analyzer system.

Measurement was performed to obtain the desired flicker parameters.

The measuring time depends on which parameters are to be measured.

P_{lt} = 2 h

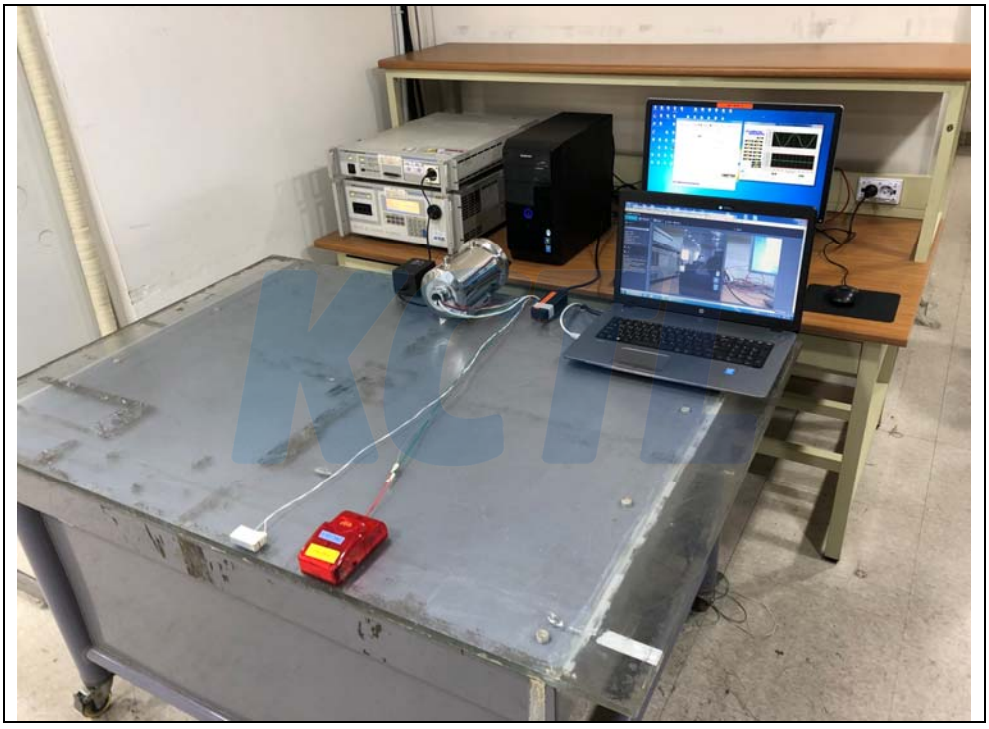
P_{st} = 10 min

Controls and automatic programs shall be set to produce the most unfavorable sequence of voltage changes, using only those combinations of controls and programs are mentioned by the manufacturer in the instruction manual.

6.4.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Hamonic / Flicker Meter (AC POWER SOURCE)	5001IX	54894	C.I.	2018.03.21	☒
Hamonic / Flicker Meter (Analyzer)	PACS-1	72072	C.I.	2018.04.07	☒

6.4.3 Photographs of test setup



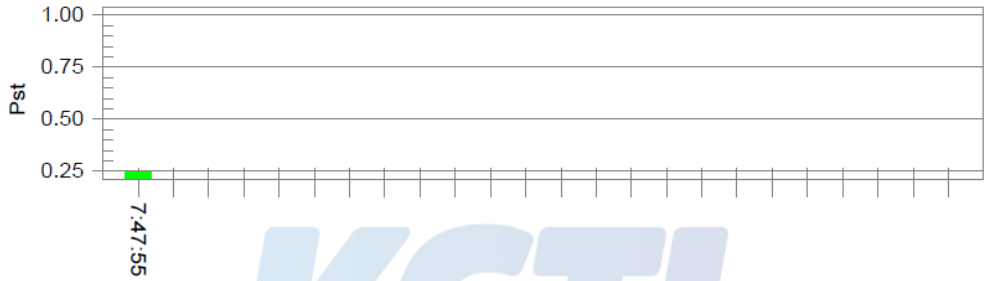
6.4.4 Measurement result

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

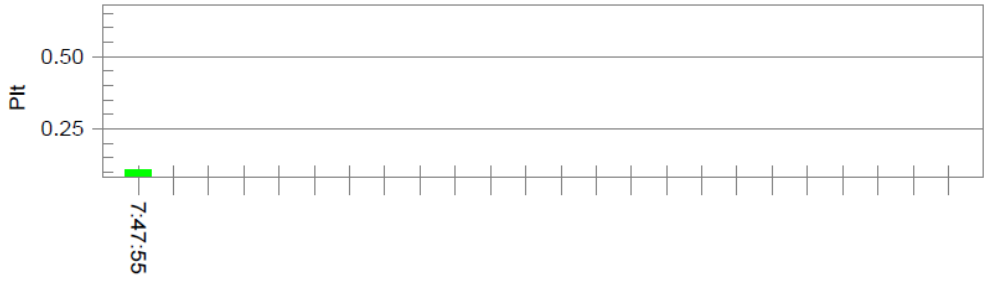
EUT: TNO-6320E **Tested by: KCTL Inc.**
Test category: All parameters (European limits) **Test Margin: 100**
Test date: 02/01/2018 **Start time: 07:37:25** **End time: 07:47:56**
Test duration (min): 10 **Data file name: F-000476.cts_data**
Comment: Comments
Customer: Hanwha Techwin Co., Ltd

Test Result: Pass **Status: Test Completed**

Pst and limit line **European Limits**



Plt and limit line

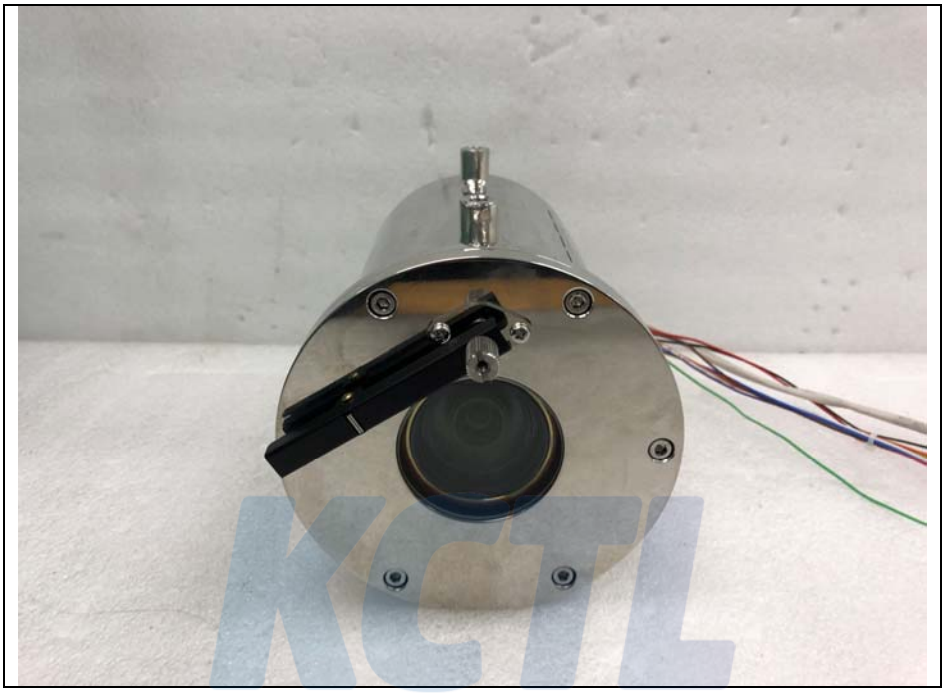


Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.38			
Highest dt (%):	0.00	Test limit (%):	N/A	N/A
T-max (mS):	0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.02	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.248	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.108	Test limit:	0.650	Pass

7. EUT photographs

Front View

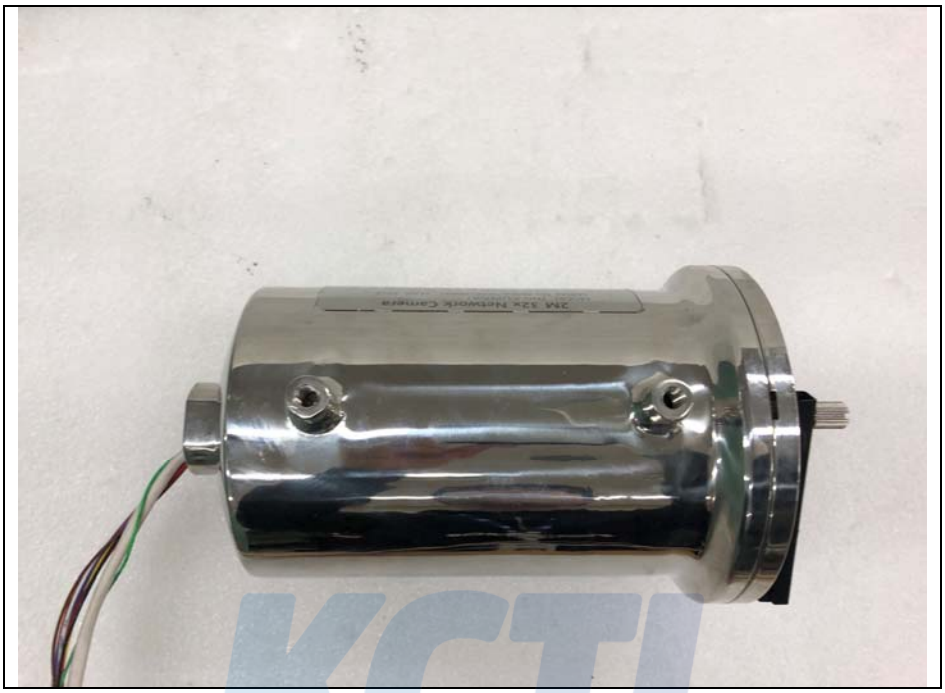


Rear View

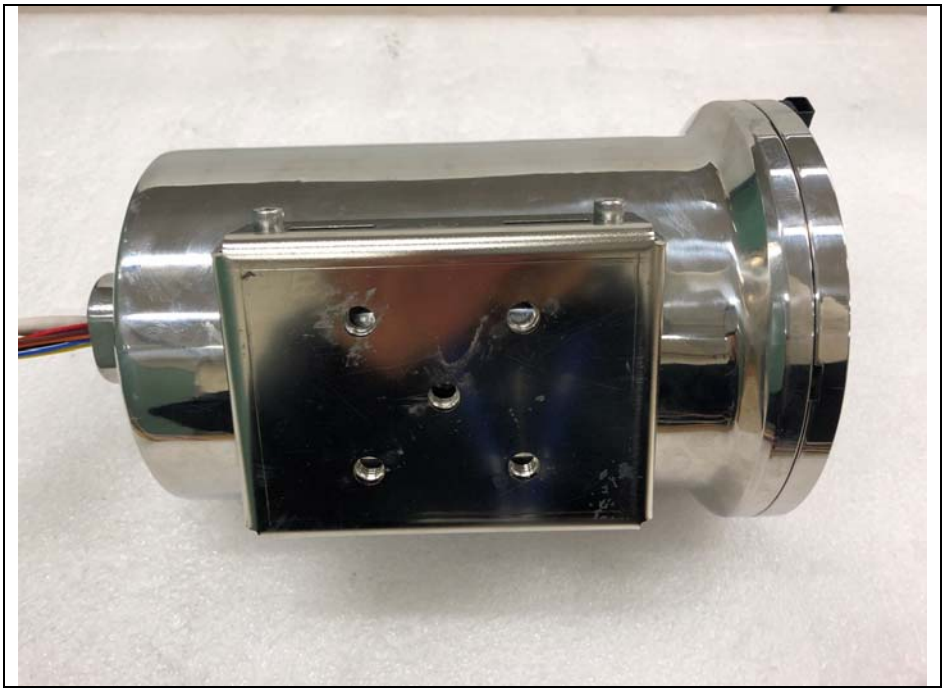
Left View

Right View

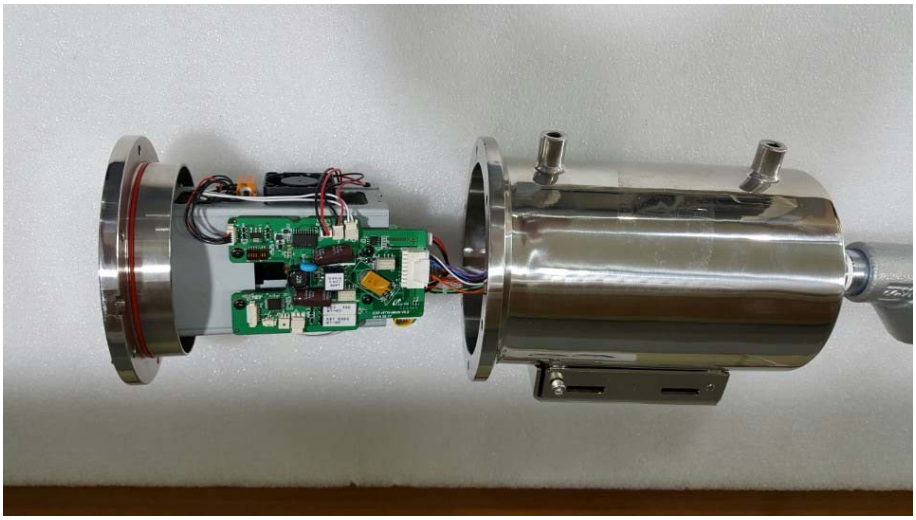
Top View



Bottom View



Inside



TEST REPORT

KCTL Inc.
65, Sinwon-ro, Yeongtong-gu, Suwon-si,
Gyeonggi-do, 16677, Korea
TEL: 82 70 5008 1021
FAX: 82 505 299 8311

http://www.kctl.co.kr

Applicant	:	Hanwha Techwin Co., Ltd 701, Sampyeong-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
Manufacturer	:	Wonwoo Engineering Co., Ltd. 7F201, Techno-park Ⅲ Biz-city, 397, Seokcheon-ro, Ojeong-gu, Bucheon-city, Gyeonggi-do, Korea
Type of equipment	:	2M 32x N/W Explosion-proof Fixed Camera
Model Name	:	TNO-6320E
Date of Receipt	:	July 28, 2016
Date of Test	:	August 06 ~ August 15, 2016
Test method used	:	EN 55022:2010, Class A EN 50130-4:2011/A1:2014 EN 61000-3-3:2013
Test Results	:	Complied

This product complies with the requirements of the EMC Directive 2014/30/EU.
The results in this report apply only to the sample tested.
This Test Report cannot be reproduced, except in full, without the written approval of KCTL Laboratory.

Affirmation	Tested by  Name: Jechang Yu	Technical Manager  Name: Gunsu Park

2016. 08. 26

Contents

1. Applicant information

Applicant:	Hanwha Techwin Co., Ltd
Address:	1204, Changwon-daero, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea
Telephone:	+82-70-7147-8361
Fax:	+82-31-8018-3717
E-mail:	js2002.kang@hanwha.com
Contact name:	**Jesoon Kang**

Manufacturer:	Wonwoo Engineering Co., Ltd.
Address:	7F201, Techno-park Ⅲ Biz-city, 397, Seokcheon-ro, Ojeong-gu, Bucheon-city, Gyeonggi-do, Korea

2. Laboratory information

Address

KCTL Inc.

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, 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)	:	23.8 °C	53.6 % R.H.	-
Shielded room(CE)	:	23.7 °C	51.9 % R.H.	-
Shielded room(ESD)	:	20.9 °C	57.2 % R.H.	100.6 kPa

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber
Harmonics current	EMI Test area(6F)
Voltage fluctuations and flickers	EMI Test area(6F)
Electrostatic discharge	Shielded Room
Radiated RF immunity	6F Fully anechoic chamber (3 m)
Electrical Fast Transient/BURST	Shielded Room
Surge	Shielded Room
Conducted RF immunity	Shielded Room
Voltage dip/interruption	Shielded Room
Mains supply voltage variations	Shielded Room

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
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
Radio Frequency Electromagnetic Fields (C.L.: Approx 95 %, k = 2)		
1.85 dB		
Disturbance power Electromagnetic Fields (C.L.: Approx 95 %, k = 2)		
3.20 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)	
Harmonics current, Voltage fluctuations and flickers	CTS 4_V 4.6.2 (AMETEK)	
Radiated RF immunity	3F	EMC32_V 9.01.0 (ROHDE & SCHWARZ)
	6F	EMC32_V 8.53.0 (ROHDE & SCHWARZ)
Electrical Fast Transient/BURST, Surge, Magnetic field immunity, Voltage dip/interruption	6F(#1)	ISMIEC_V 4.08(EM TEST)
	6F(#2)	ISMIEC_V 4.07(EM TEST)
	3F(#3)	IEC_V 5.2.9(EM TEST)
Conducted RF immunity	6F(#1)	EMC32_V 9.25.00 (ROHDE & SCHWARZ)
	3F(#2)	ICD_V 5.3.4(EM TEST)

4. Description of E.U.T.

4.1 General information

Power source - 24VAC
Power Consumption – Max 48W
Operating temperature - -40℃ ≤ Ta ≤ +60℃
Housing material – Stainless steel (SUS316/304)
Weight – 7Kg
Dimension – 145.5(W) x 153(H) x 244(D)
Cable entry size – NTP ¾″

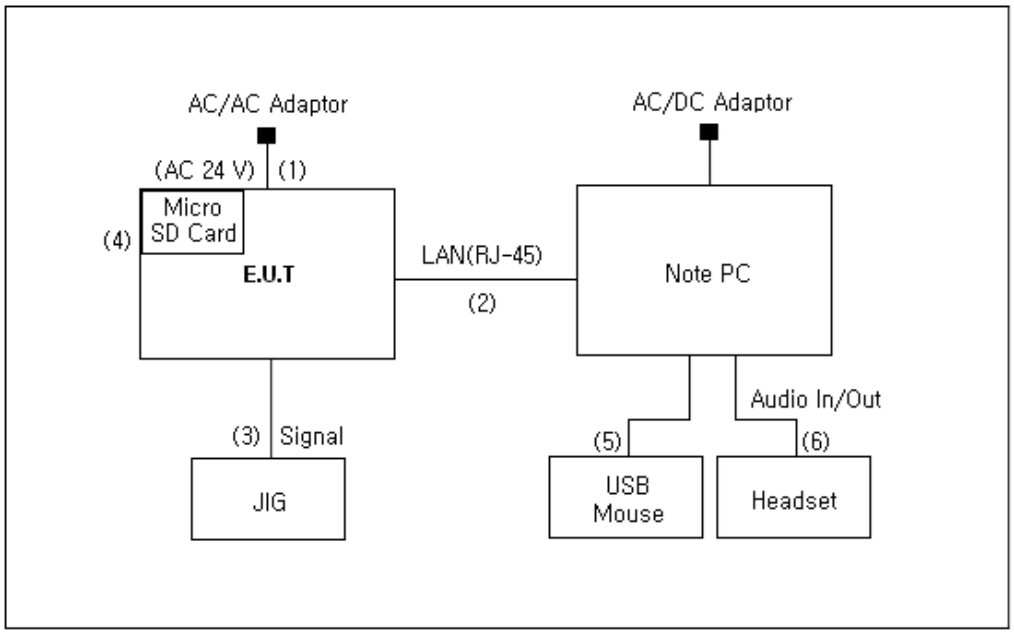
4.2 Product description

Type of product	2M 32x N/W Explosion-proof Fixed Camera
Model name (Basic)	TNO-6320E
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	-
Testing Voltage	AC 24 V
Input/Output range	AC 24 V
Internal clock frequency	Above 108 MHz
Note	* AC/AC Adaptor was not provided by the manufacturer.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	PSLQ0K-02N005	3A045920Q	TOSHIBA
USB Mouse	SMH-215UB	M2UBTAKQ335311R	SAMSUNG
Headset	SHS-250V	-	SAMSUNG
JIG	-	-	-
Micro SD Card	-	-	-
AC/AC Adaptor (AC 24 V)	W&T-LP145W240600	-	V&T

4.4 Test configuration



Note	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	**EUT** (2M 32x N/W Explosion-proof Fixed Camera)	Power	AC/AC Adaptor	Power	1.8	Unshield
2		LAN(RJ-45)	Note PC	LAN(RJ-45)	3.0	Shield
3		Signal	JIG	Signal	3.0	Unshield
4		Micro SD	Micro SD Card	Micro SD	Direct	-
5	Note PC	USB	USB Mouse	USB	1.2	Shield
6		Audio In/Out	Headset	Audio In/Out	1.2	Unshield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
1	Check the output video of the EUT in the Webview of the Note PC.
	Ping test.
	Check the Signal test to using the JIG.

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
☒	Conducted Emission	EN 55022:2010	Pass
☒	Radiated Emission	EN 55022:2010	Pass
☐	Harmonics current	EN 61000-3-2:2014	N/A
☒	Voltage fluctuations and flickers	EN 61000-3-3:2013	Pass

5.2 Summary of immunity test results

Applied	Test items	Test method	Result
* **EN 50130-4:2011/A1:2014**			
☒	Electrostatic discharge	EN 61000-4-2:2009	Pass
☒	Radiated RF immunity	EN 61000-4-3:2006/A2:2010	Pass
☒	Electrical Fast Transient/BURST	EN 61000-4-4:2012	Pass
☒	Surge	EN 61000-4-5:2014	Pass
☒	Conducted RF immunity	EN 61000-4-6:2014	Pass
☐	Voltage dip/interruption	EN 61000-4-11:2004	N/A
☐	Mains supply voltage variations	EN 50130-4:2011/A1:2014	N/A

5.3 Performance criteria

The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.
If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.
A functional description and a definition of performance by the manufacture and noted in the test report, based on the following criteria:

Electrostatic discharge

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test (see Clause 6), after the conditioning.

Radiated electromagnetic fields

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change, and no such flickering of indicators occurs at a field strength of 3 V/m.
For components of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at 10 V/m, providing.

(a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable setting etc.)
(b) at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and
(c) there is no observable deterioration of the picture at 1 V/m.

The EUT shall meet the acceptance criteria for the functional test(see Clause 6), after the conditioning.

Fast transient burst / slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of the bursts is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test (see Clause 6), after the conditioning.

Slow high energy voltage surge

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of the surges is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test (see Clause 6), after the conditioning.

Conducted RF immunity

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change, and no such flickering of indicators occurs at U_0 = 130 dBμV.
For components of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at U_0 = 140 dBμV, providing

(a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable settings, etc.)
(b) at U_0 = 130 dBμV, any deterioration of the picture is so minor that the system could still be used, and
(c) there is no observable deterioration of the picture at U_0 = 120 dBμV.

The EUT shall meet the acceptance criteria for the functional test(see Clause 6), after the conditioning.

Voltage dip/interruption / Voltage variation

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test(see Clause 6), after the conditioning.

Mains supply voltage variations

There shall be no damage, malfunction or change of status due to the different supply voltage conditions.
The EUT shall meet the acceptance criteria for the functional test(see Clause 6), during the conditioning.

6. Test results

6.1 Conducted Emission

Test specification	EN 55022:2010, Section 5, Class A		
Testing voltage	AC 24 V		
Test facility	Shielded room (CE#1)		
Date	2016. 08. 10		
Temperature (°C)	23.7 °C	Humidity (% R.H.)	51.9 % R.H.
Remarks	Pass		

6.1.1 Limits of conducted emission measurement

☐ AC main

Frequency [㎒]	Class A Limits (dB(㎶))		Class B Limits (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.

☒ Telecommunication

Frequency [㎒]	Class A Voltage Limits (dB(㎶))		Class A Current Limits (dB(㎂))	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	97 to 87	84 to 74	53 to 43	40 to 30
0.5 ~ 30	87	74	43	30
Frequency [㎒]	Class B Voltage Limits (dB(㎶))		Class B Current Limits (dB(㎂))	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	84 to 74	74 to 64	40 to 30	30 to 20
0.5 ~ 30	74	64	30	20

* The limits decrease linearly with the logarithm of the frequency in the range 0.15 ㎒ to 0.5 ㎒

* The current and voltage disturbance limits are derived for use with an impedance stabilization Network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is 20 $\log_{10}$ 150/I = 44 dB).

6.1.2 Measurement procedure

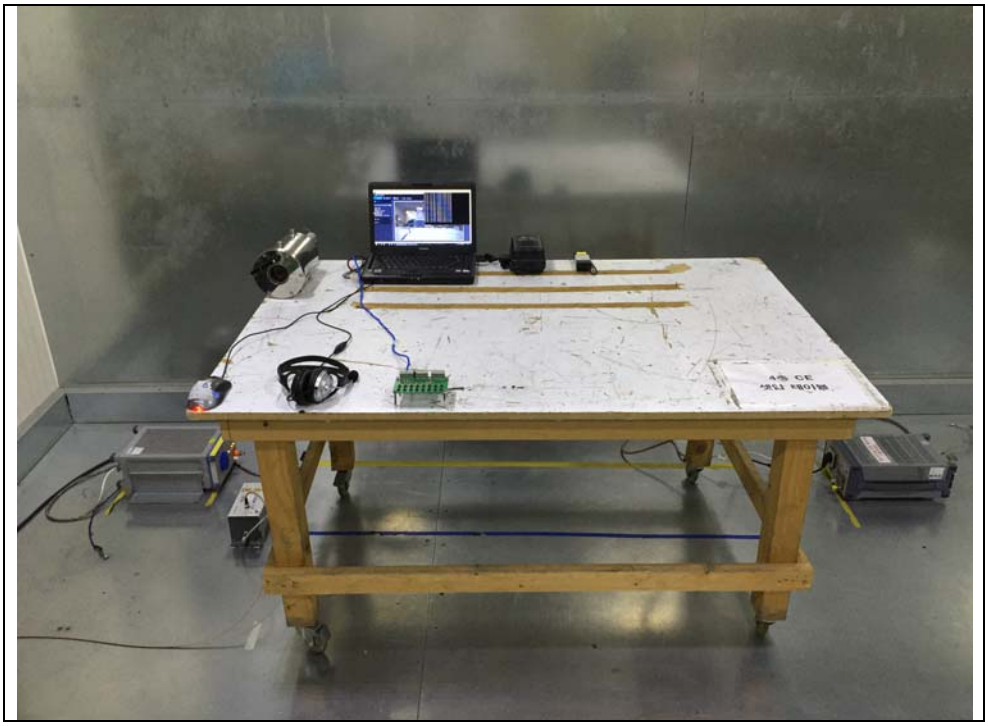
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground 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.

6.1.3 Used equipment

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESCI	100001	R&S	2017.02.26	☒
TWO-LINE V-NETWORK	ENV216	101358	R&S	2016.09.03	☒
TWO-LINE V-NETWORK	ESH3-Z5	100267	R&S	2017.04.07	☒
IMPEDANCE STABILIZATION NETWORK	ISN ST08	24342	TESEQ	2017.02.28	☒
8-WIRE ISN	NTFM 8158 CAT3	CAT3-8158-0020	SCHWARZBECK	2016.09.02	☐

6.1.4 Photographs of test setup

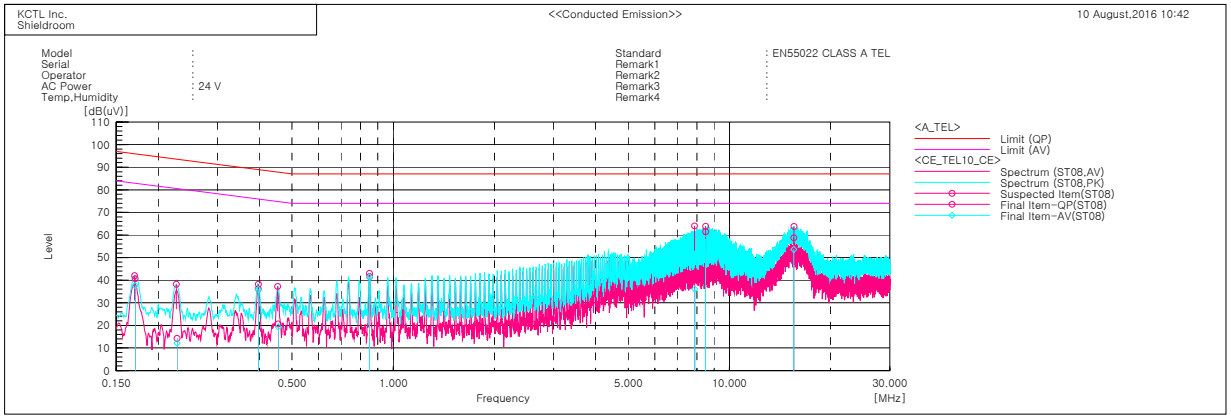
* Telecommunication



6.1.5 Conducted emission measurement result

* Telecommunication port

LAN Port (LCL 65 dB)_10 Mbps (TNO-6320E)

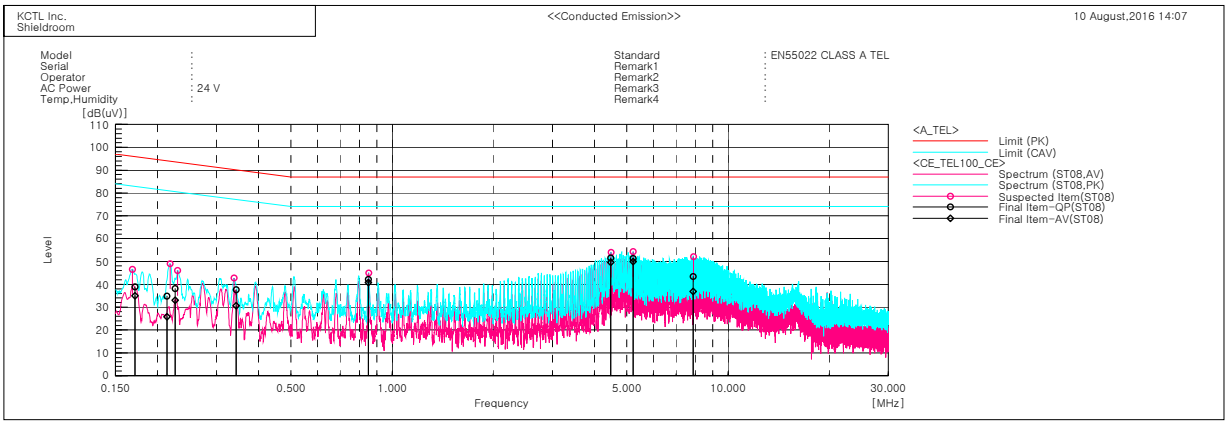


Final Result

--- ST08 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	0.17085	30.8	27.8	9.8	40.6	37.6	95.9	82.9	55.3	45.3
2	0.22751	4.4	2.3	9.8	14.2	12.1	93.5	80.5	79.3	68.4
3	0.39696	26.3	26.1	9.8	36.1	35.9	88.9	75.9	52.8	40.0
4	0.45507	10.8	9.6	9.8	20.6	19.4	87.8	74.8	67.2	55.4
5	0.85088	31.9	31.8	9.7	41.6	41.5	87.0	74.0	45.4	32.5
6	7.8782	30.4	26.2	9.9	40.3	36.1	87.0	74.0	46.7	37.9
7	8.50336	51.6	48.4	9.9	61.5	58.3	87.0	74.0	25.5	15.7
8	15.55104	48.5	43.3	10.3	58.8	53.6	87.0	74.0	28.2	20.4

LAN Port (LCL 65 dB)_100 Mbps (TNO-6320E)

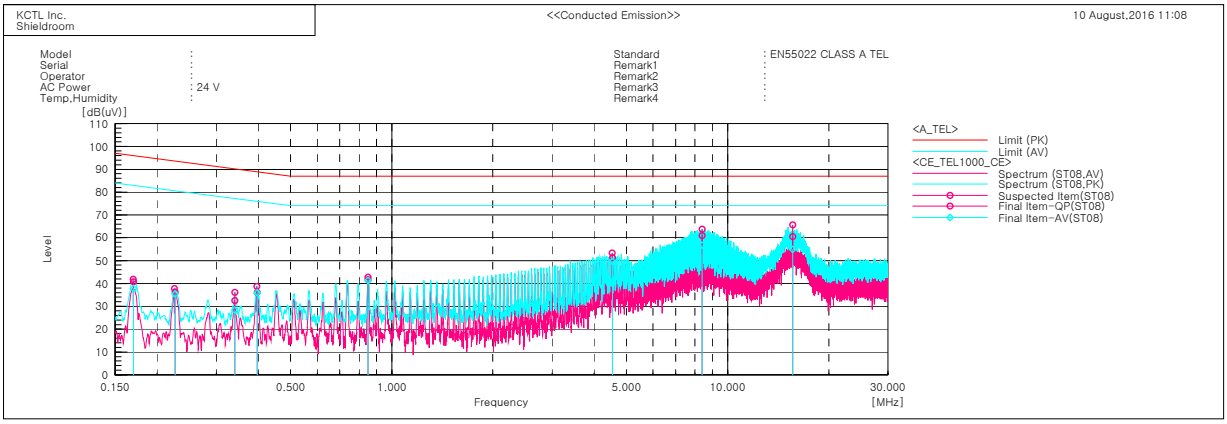


Final Result

--- ST08 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	0.17163	29.1	25.2	9.8	38.9	35.0	95.9	82.9	57.0	47.9
2	0.21357	25.0	16.0	9.8	34.8	25.8	94.1	81.1	59.3	55.3
3	0.22574	28.4	23.2	9.8	38.2	33.0	93.6	80.6	55.4	47.6
4	0.34332	27.8	20.9	9.8	37.6	30.7	90.1	77.1	52.5	46.4
5	0.84934	32.5	31.0	9.7	42.2	40.7	87.0	74.0	44.8	33.3
6	4.47706	41.6	39.9	9.8	51.4	49.7	87.0	74.0	35.6	24.3
7	5.21307	41.6	40.1	9.8	51.4	49.9	87.0	74.0	35.6	24.1
8	7.88321	33.6	27.0	9.9	43.5	36.9	87.0	74.0	43.5	37.1

LAN Port (LCL 65 dB)_1000 Mbps (TNO-6320E)



Final Result

--- ST08 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	0.17033	31.0	28.1	9.8	40.8	37.9	95.9	82.9	55.1	45.0
2	0.22665	26.4	25.7	9.8	36.2	35.5	93.6	80.6	57.4	45.1
3	0.34129	22.7	18.5	9.8	32.5	28.3	90.2	77.2	57.7	48.9
4	0.39754	26.3	26.1	9.8	36.1	35.9	88.9	75.9	52.8	40.0
5	0.85052	32.0	31.8	9.7	41.7	41.5	87.0	74.0	45.3	32.5
6	4.53759	41.5	39.8	9.8	51.3	49.6	87.0	74.0	35.7	24.4
7	8.38994	51.1	46.9	9.9	61.0	56.8	87.0	74.0	26.0	17.2
8	15.60194	50.2	44.5	10.4	60.6	54.9	87.0	74.0	26.4	19.1

6.2 Radiated Emission

Test specification	EN 55022:2010, Section 6, Class A		
Testing voltage	AC 24 V		
Test facility	10 m Chamber (2F)		
Test distance	10 m, 3 m		
Date	2016. 08. 06		
Temperature (°C)	23.8 °C	Humidity (% R.H.)	53.6 % R.H.
Remarks	Pass		

6.2.1 Limits of radiated emission measurement

☒ Limits below 1 ㎓

Frequency [㎒]	Class A Limits (dB(㎶/m)) @ 10 m	Class B Limits (dB(㎶/m)) @ 10 m
30 ~ 230	40	30
230 ~ 1000	47	37

☒ Limits above 1 ㎓

Frequency [㎓]	Class A @ 3 m		Class B @ 3 m	
	Average limit (dB(㎶/m))	Peak limit (dB(㎶/m))	Average limit (dB(㎶/m))	Peak limit (dB(㎶/m))
1 ~ 3	56	76	50	70
3 ~ 6	60	80	54	74
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.

6.2.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Test Receiver	ESCI7	100732	R&S	2017.02.26	☒
Bilog Antenna	VULB9163	552	SCHWARZBECK	2018.06.27	☒
Amplifier	310N	344922	SONOMA INSTRUMENT	2016.09.02	☒
ATTENUATOR	DGA9552N	BU2404	AGILENT	2017.04.08	☒
Antenna Mast	MA4000-EP	303	Innco Systems	-	☒
Turn Table	DT2000S-1t	079	Innco Systems	-	☒
Preamplifier	8449B	3008A02343	AGILENT	2016.09.02	☒
Horn ANT	3115	00155772	ETS	2016.11.12	☒
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

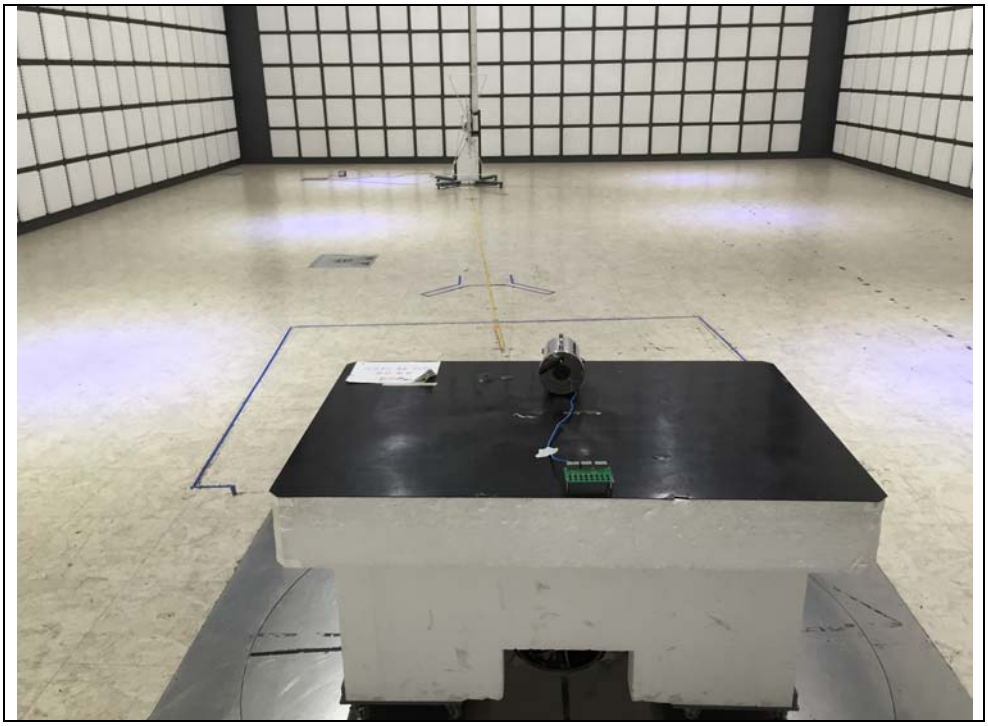
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

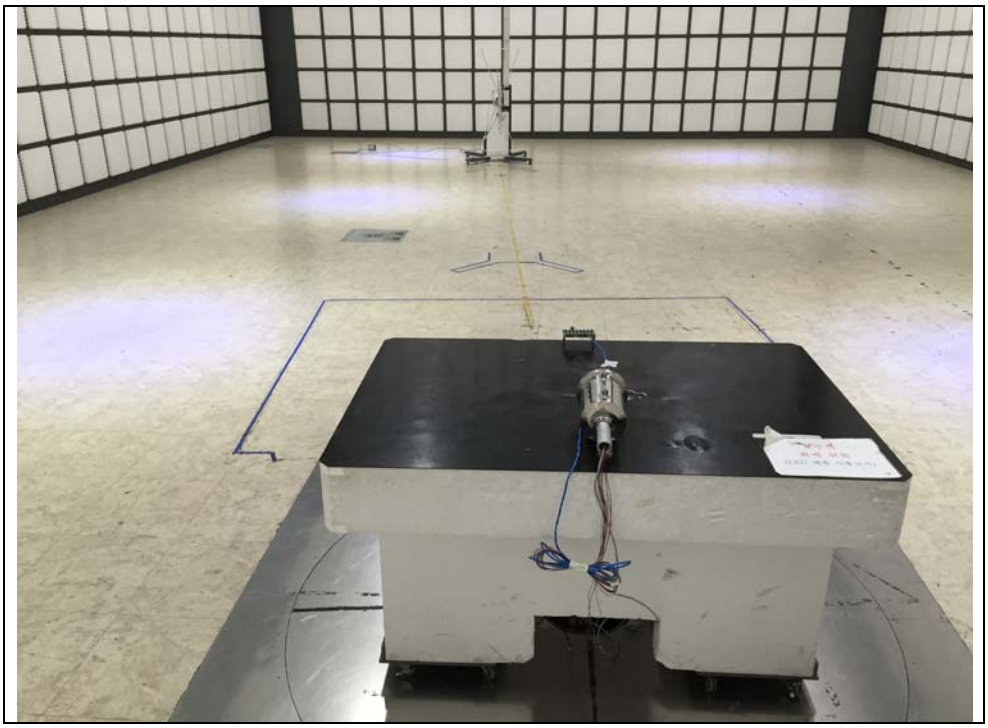
The result is

30 + 12 + 5 + 3 – 35 = 15 dB(μV/m)

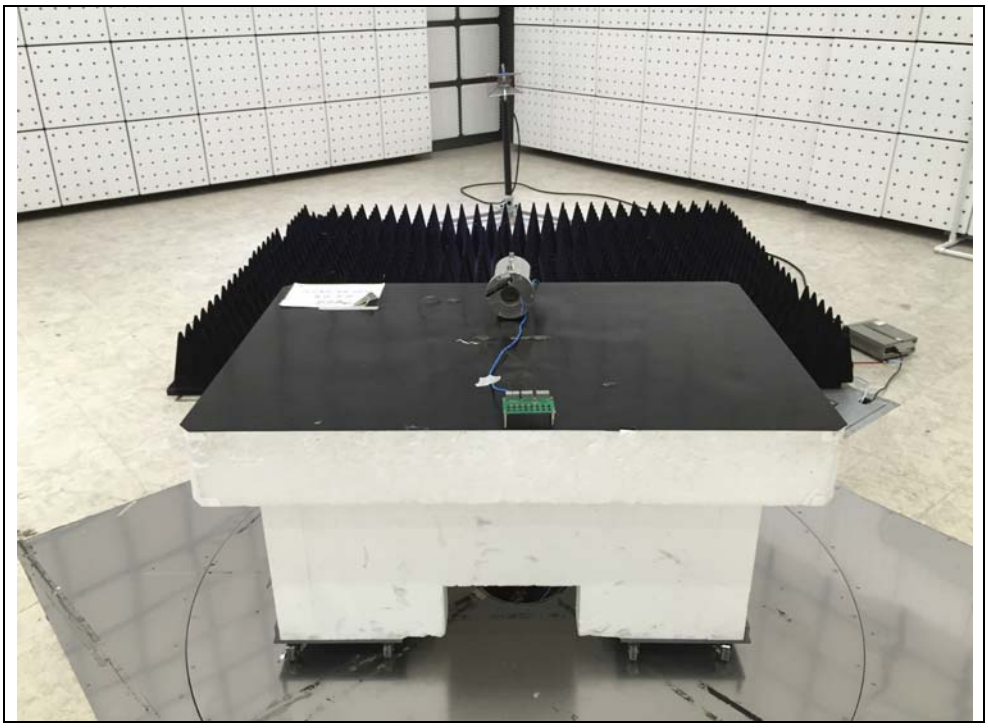
6.2.5 Photographs of test setup

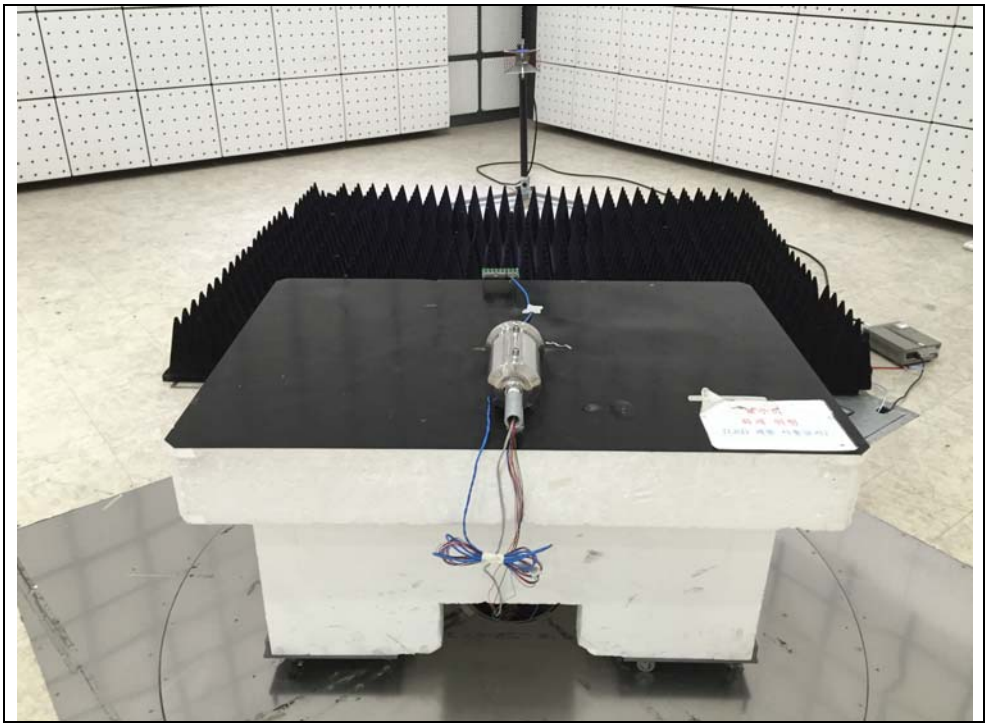
* 30 ㎒ ~ 1 ㎓





* 1 ㎓ ~ 6 ㎓

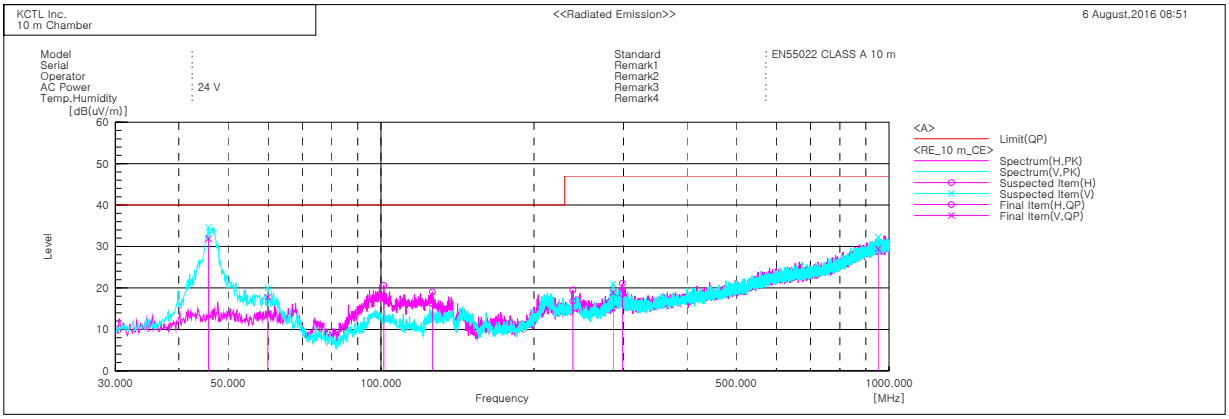




6.2.6 Radiated emission measurement result

*** Graph and Data**

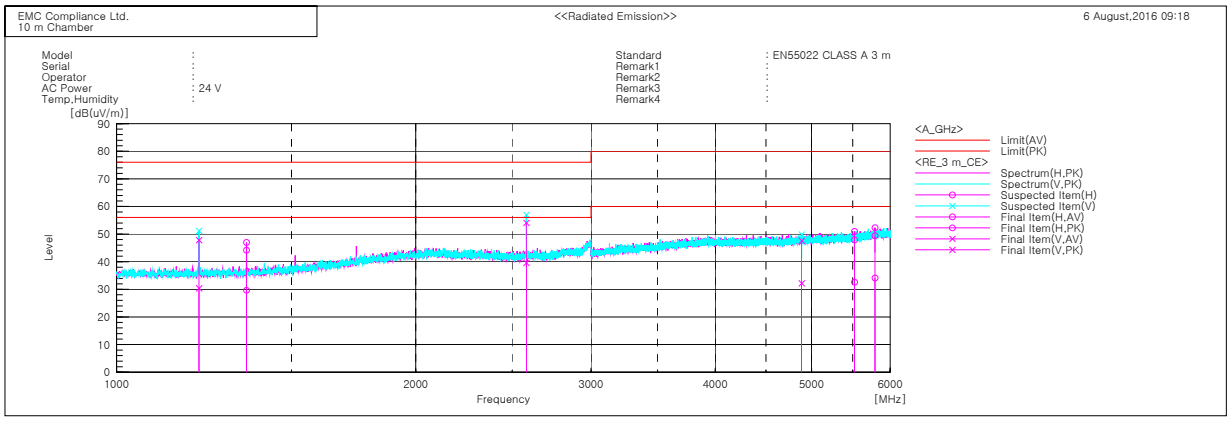
* 30 ㎒ ~ 1 ㎓ (TNO-6320E)



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	45.763	V	44.8	-12.9	31.9	40.0	8.1	100.0	345.3
2	59.828	V	31.8	-14.0	17.8	40.0	22.2	100.0	105.3
3	101.295	H	32.7	-14.5	18.2	40.0	21.8	400.0	109.0
4	126.151	H	32.7	-16.5	16.2	40.0	23.8	400.0	114.1
5	238.429	H	28.4	-11.6	16.8	47.0	30.2	400.0	131.8
6	286.201	V	29.2	-10.3	18.9	47.0	28.1	290.0	141.6
7	298.569	H	28.5	-9.9	18.6	47.0	28.4	400.0	253.6
8	951.500	V	24.3	5.2	29.5	47.0	17.5	100.0	171.3

* 1 ㎓ ~ 6 ㎓ (TNO-6320E)



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	1210.625	V	36.2	53.6	-5.8	30.4	47.8	56.0	76.0	25.6	28.2	100.0	90.3
2	1351.250	H	34.8	49.3	-5.1	29.7	44.2	56.0	76.0	26.3	31.8	100.0	45.1
3	2583.750	V	37.5	52.0	2.1	39.6	54.1	56.0	76.0	16.4	21.9	100.0	345.4
4	4887.500	V	22.5	37.9	9.7	32.2	47.6	60.0	80.0	27.8	32.4	100.0	149.2
5	5525.000	H	21.3	36.6	11.3	32.6	47.9	60.0	80.0	27.4	32.1	100.0	203.7
6	5793.750	H	21.8	37.1	12.3	34.1	49.4	60.0	80.0	25.9	30.6	100.0	286.9

6.3 Flicker

Test specification	EN 61000-3-3:2013				
Testing voltage	230 V, 50 Hz (From AC/AC Adaptor)				
Test facility	EMI Test area(6F)				
Date	2016. 08. 12				
Temperature(°C)	26.3 °C	Humidity (% R.H.)	48.9 % R.H.	Pressure (kPa)	100.4 kPa
Remarks	Pass				

6.3.1 Measurement procedure

EUT was connected to the power analyzer system.

Measurement was performed to obtain the desired flicker parameters.

The measuring time depends on which parameters are to be measured.

P_{lt} = 2 h

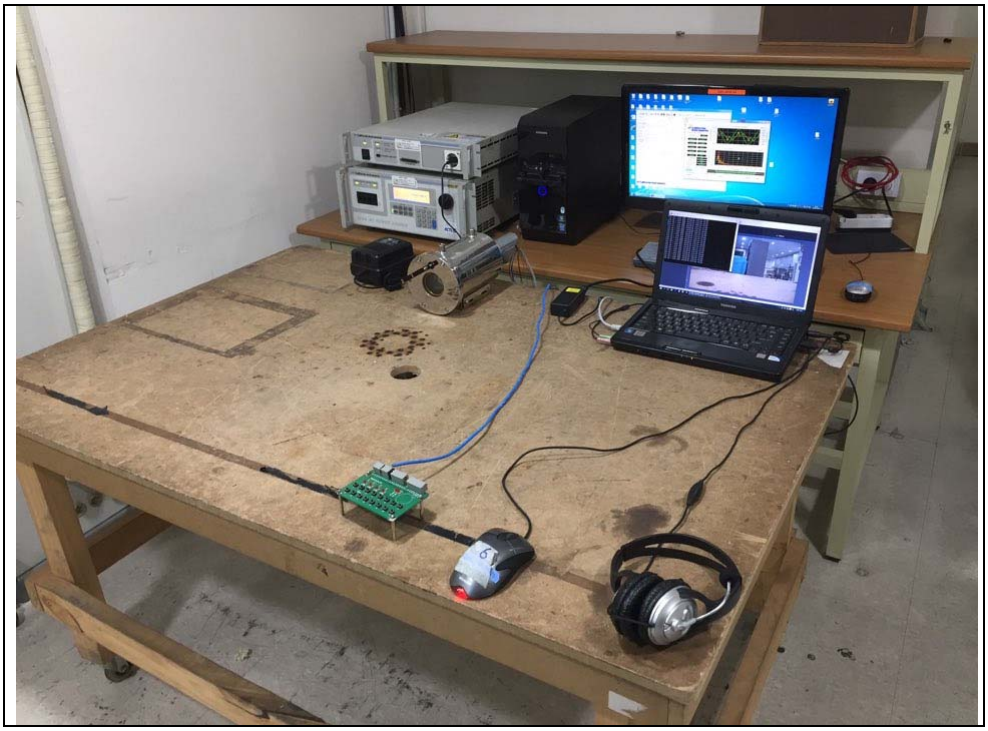
P_{st} = 10 min

Controls and automatic programs shall be set to produce the most unfavorable sequence of voltage changes, using only those combinations of controls and programs are mentioned by the manufacturer in the instruction manual.

6.3.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Harmonics/Flicker meter (AC POWER SOURCE)	5001x-CTS -400-413	54894	C.I.	2017.03.16	☒
Harmonics/Flicker meter (Analyzer)	PACS-1	72072	C.I.	2017.03.16	☒

6.3.3 Photographs of test setup



6.3.4 Measurement result

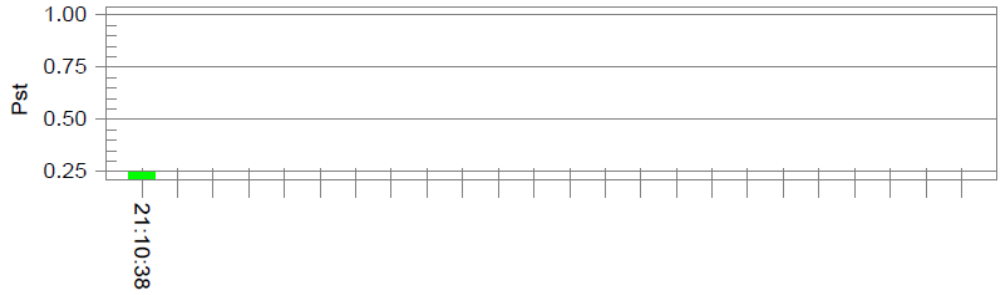
Flicker Test Summary per EN/IEC61000-3-3 (Run time)

EUT: TNO-6320E
Test category: All parameters (European limits)
Test date: 12/08/2016 Start time: 21:00:08
Test duration (min): 10 Data file name: F-000529.cts_data
Comment: Comments
Customer: Hanwha Techwin Co., Ltd

Tested by: Test Operator
Test Margin: 100
End time: 21:10:39

Test Result: Pass
Status: Test Completed

Pst_i and limit line — European Limits



Plt and limit line

Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.43			
Highest dt (%):	0.00	Test limit (%):	N/A	N/A
T-max (mS):	0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.02	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.248	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.108	Test limit:	0.650	Pass

6.4 Electrostatic Discharge

Test specification	EN 61000-4-2:2009				
Test level	☒ Contact: ± 6 kV ☒ Air: ± 2 kV, ± 4 kV, ± 8 kV ☐ HCP: ± 6 kV ☒ VCP: ± 6 kV				
Discharge impedance	330 Ω / 150 pF				
Number of discharge (Each polarity)	☒ Contact: 10 ☒ Air: 10 ☒ HCP / VCP: 10				
Interval between discharges	1 s				
Testing voltage	AC 24 V				
Test facility	Shielded room (3F)				
Date	2016. 08. 09				
Temperature (°C)	20.9 °C	Humidity (% R.H.)	57.2 % R.H.	Pressure (kPa)	100.6 kPa
Remarks	Pass -There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs.				

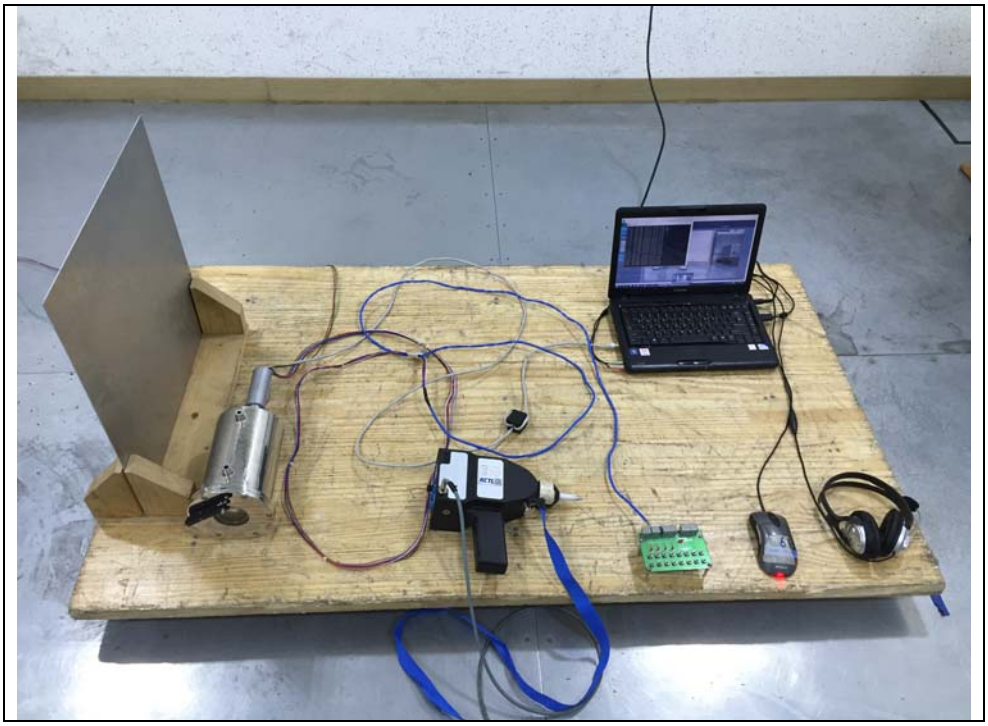
6.4.1 Measurement procedure

A ground reference plane was located on the floor, and connected to earth via a low Impedance connection. The return cable of the ESD generator was connected to the reference plane.
In case of floor standing equipment, EUT was placed on the reference plane on 0.1 m of insulating Support. In case of table top equipment, EUT was placed on a wooden table 0.8 m above the reference grounded floor. A horizontal coupling plane (HCP) was placed on the table, and Connected to the reference plane via a 470 kΩ resistor located in each end (0.5 mm insulating support between EUT and HCP). In both cases a vertical coupling plane(VCP) OF 0.5 X 0.5 m was located 0.1 m from the EUT's sides. The VCP was connected to the reference plane in the same matter as the HCP.

6.4.2 Used equipments

Equipment	Model No.	Serial No.	Makers	Next Cal. Date	Used
ESD Tester	PESD-1600	H011 309	HAEFELY	2017.05.10	☒
ESD Tester	NSG 437	182	TESEQ	2017.04.26	☐
HCP	-	-	-	-	☐
VCP	-	-	-	-	☒

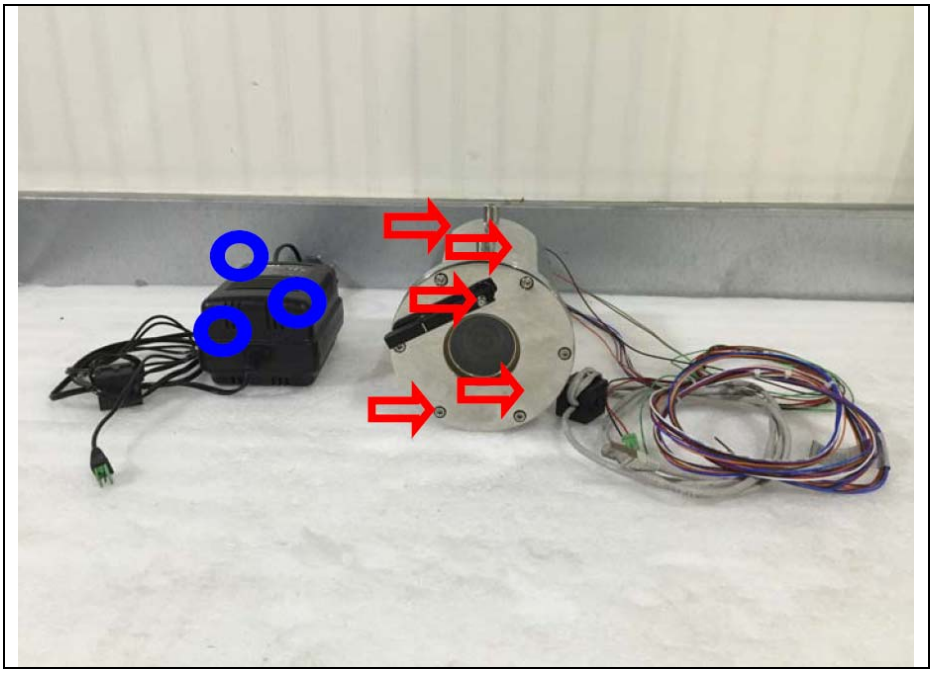
6.4.3 Photographs of test setup

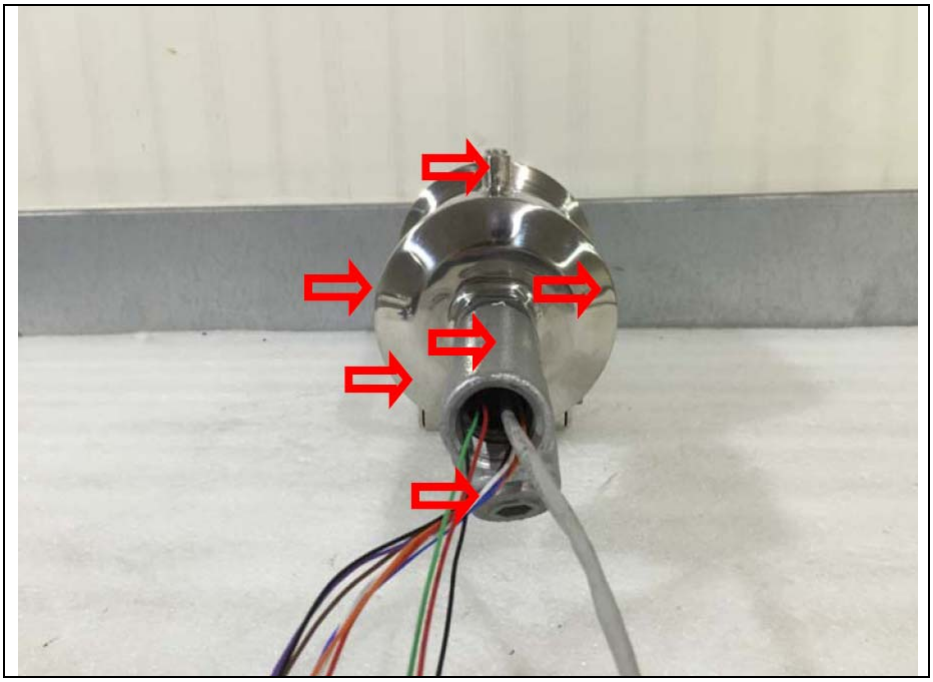


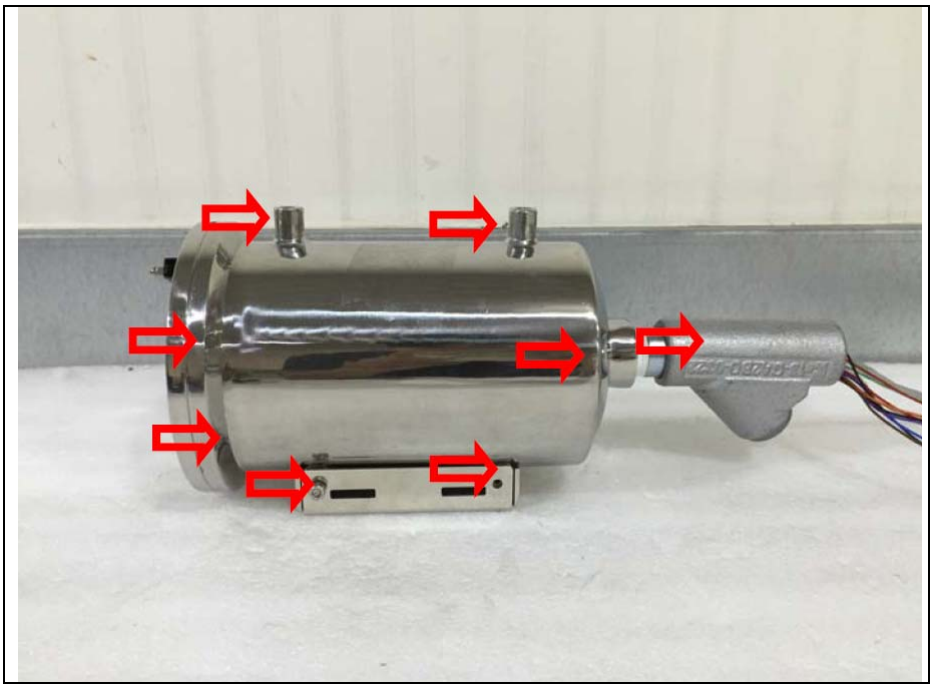
6.4.4 Measurement result

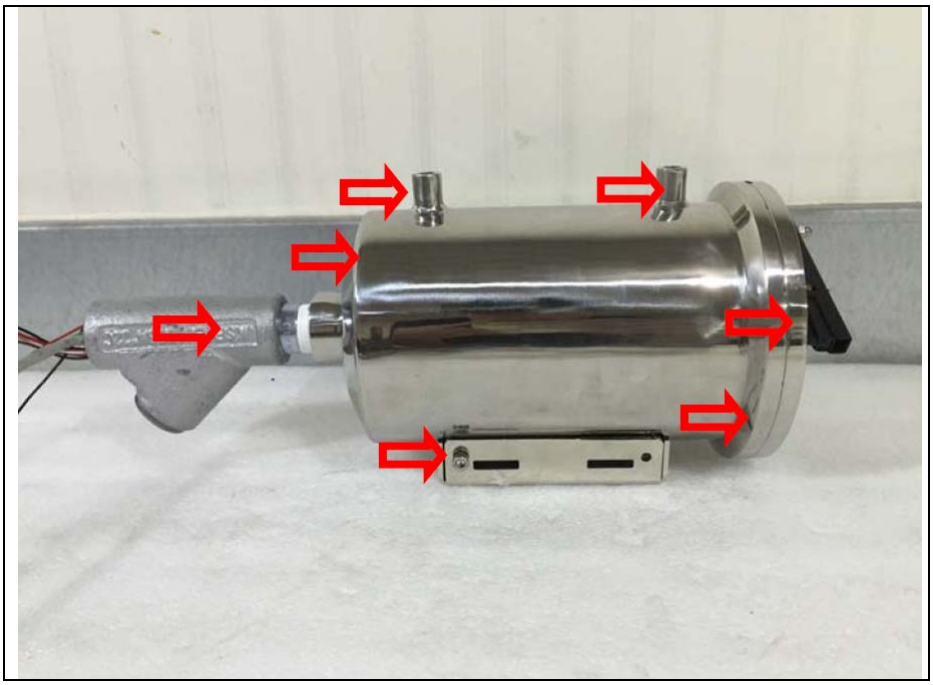
Electrostatic Discharge (Test Point)

Air discharge	○
Contact discharge	⇨









HCP/VCP discharge

Location(EUT)	Applied level (±)	Result
HCP (All 4 sides)	± 2 kV, ± 4 kV, ± 6 kV	-
VCP (All 4 sides)	± 2 kV, ± 4 kV, ± 6 kV	Pass

Contact discharge

Location(EUT)	Applied level (±)	Result
Front	± 6 kV	Pass
Rear	± 6 kV	Pass
Left	± 6 kV	Pass
Right	± 6 kV	Pass

Air discharge

Location(EUT)	Applied level (±)	Result
Front	± 2 kV, ± 4 kV, ± 8 kV	Pass
Rear	± 2 kV, ± 4 kV, ± 8 kV	-
Left	± 2 kV, ± 4 kV, ± 8 kV	-
Right	± 2 kV, ± 4 kV, ± 8 kV	-

6.5 Radio Frequency Electromagnetic Fields

Test specification	EN 61000-4-3:2006/A2:2010				
Tested frequency	80 ㎒ ~ 1 ㎓, 1 ㎓ ~ 2.7 ㎓				
Test level & Modulation	1 ㎷/m, 3 ㎷/m, 10 ㎷/m, 80 % Amplitude Modulation (1 ㎑) 1 ㎷/m, 3 ㎷/m, 10 ㎷/m, Pulse Modulation (1 ㎐ (0.5 s ON: 0.5 s OFF))				
Frequency Step	1 % step				
Dwell time	1 s				
Distance	3 m from EUT to tip of antenna				
Testing Voltage	AC 24 V				
Test facility	6F Fully anechoic chamber (3 m)				
Date	2016. 08. 15				
Temperature(°C)	28.0 °C	Humidity (% R.H.)	38.2 % R.H.	Pressure (kPa)	100.3 kPa
Remarks	Pass -There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs.				

6.5.1 Measurement procedure

The test was performed at 3 m full anechoic chamber.

For floor standing equipment, the EUT was standing on the floor.

For tabletop equipment, the EUT was located on a wooden table 0.8 m above the floor.

The EUT was tested all sides, horizontal and vertical polarization.

6.5.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Power meter	PM2002	302852	AR	2016.09.03	☒
Power sensor	PH2000	303224	AR	2016.09.03	☒
Power sensor	PH2000	311217	AR	2016.09.03	☒
Directional coupler	DC6180	303976	AR	2016.09.03	☒
Directional coupler	DC7144M1	320279	AR	2016.09.03	☒
Signal generator	E4421B	GB40052295	AGILENT	2016.09.03	☒
Broadband Amplifier	BBA100	100996-1	R&S	-	☒
Amplifier	60S1G3M2	320444	AR	-	☒
Log Periodic Dipole Antenna	LPDA-0803	130269	ETS	-	☒
Antenna master	-	-	ETS	-	☒

6.5.3 Photographs of test setup

6.5.4 Measurement result

Location(EUT)	Antenna polarization	Result
Front side	Horizontal	Pass
	Vertical	Pass
Rear side	Horizontal	Pass
	Vertical	Pass
Left side	Horizontal	Pass
	Vertical	Pass
Right side	Horizontal	Pass
	Vertical	Pass

6.6 Electrical Fast Transient/BURST

Test specification	EN 61000-4-4:2012				
Coupling	☒ AC 24 V ☒ Signal/Control: Clamp ☒ Telecommunication: Clamp				
Test level	☒ AC 24 V: ± 2 kV Peak ☒ Signal/Control: ± 1 kV Peak ☒ Telecommunication: ± 1 kV Peak				
Repetition frequency	100 ㎑, Tr/Th = 5 / 50 ㎱				
Coupling time (Minimum)	60 s				
Testing Voltage	AC 24 V				
Test facility	Shielded room (3F)				
Date	2016. 08. 08				
Temperature(°C)	21.5 °C	Humidity (% R.H.)	56.7 % R.H.	Pressure (kPa)	100.6 kPa
Remarks	Pass -There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs.				

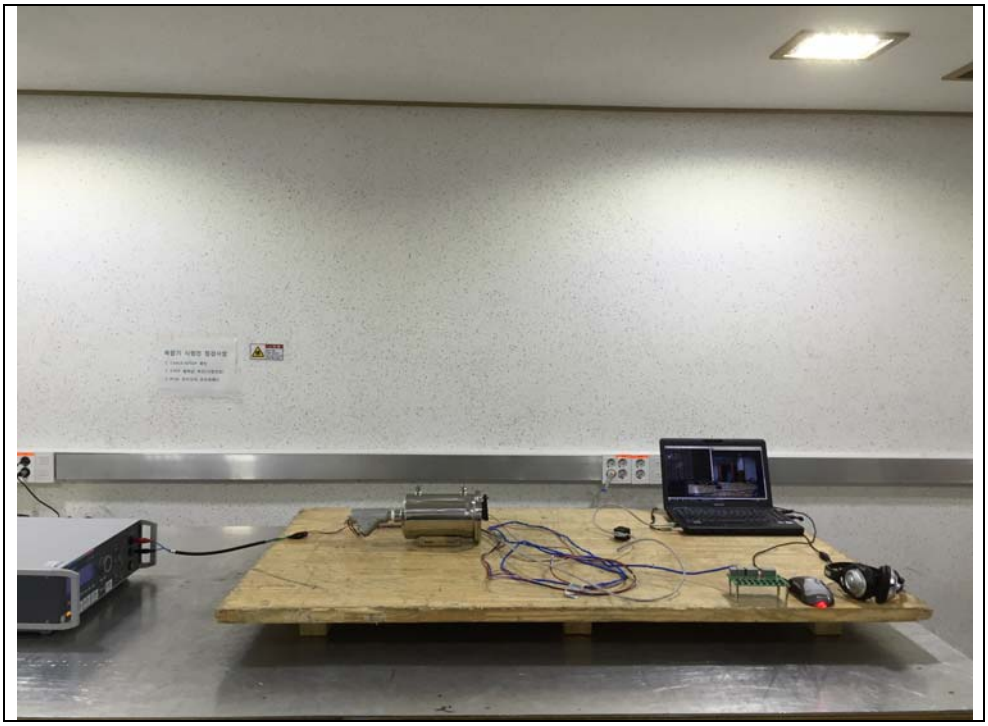
6.6.1 Measurement procedure

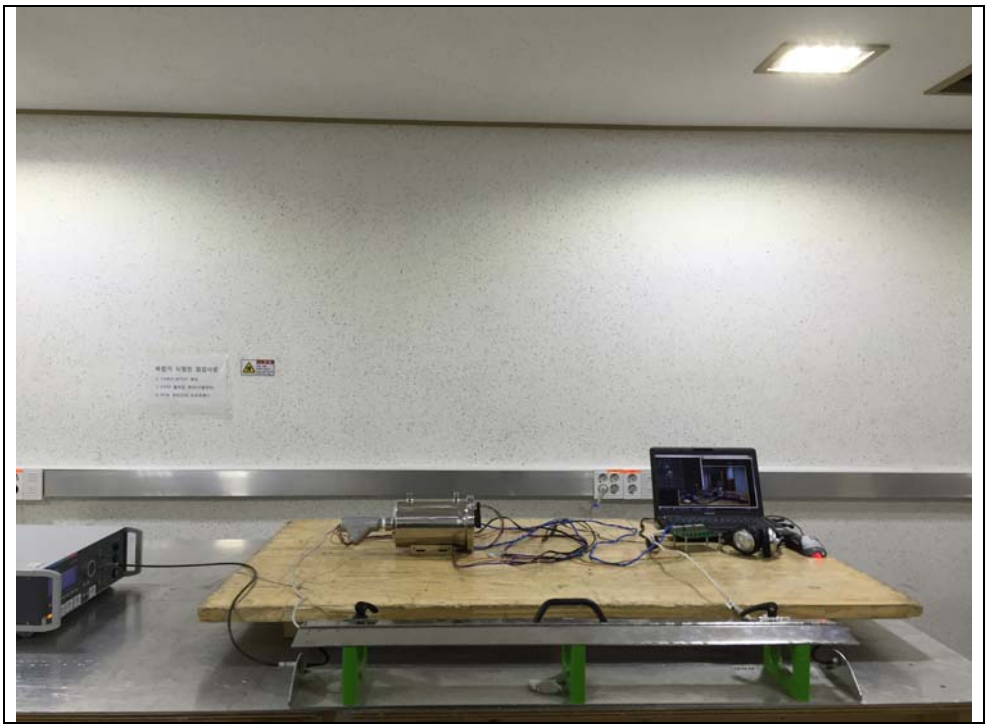
A ground reference plane was located on the floor.
EFT generator was connected to reference ground plane via low impedance connection.
For floor standing equipment, EUT was placed on a 0.1 ㎜ wooden table.
For tabletop equipment, EUT was placed on a 0.1 ㎜ above the ground reference plane.
Test generator and coupling/decoupling network was placed on, and bounded to, the ground reference plane. When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces, except the ground reference plane beneath the coupling clamp, Shall be 0.5 ㎜.

6.6.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Ultra compact simulator	UCS500N	V1238113636	EM TEST	2016.09.02	☒
Capacitive coupling clamp	HFK	P1411132494	EM TEST	2017.04.08	☒

6.6.3 Photographs of test setup





6.6.4 Measurement result

* AC main

Coupling point	(+)	(-)	Result
L+N	+ 2 kV	- 2 kV	Pass

* Signal/Control

Coupling point	(+)	(-)	Result
Signal	+ 1 kV	- 1 kV	Pass

* Telecommunication

Coupling point	(+)	(-)	Result
LAN(RJ-45)	+ 1 kV	- 1 kV	Pass

6.7 Surge

Test specification	EN 61000-4-5:2014				
Coupling	☒ AC 24 V: Direct ☒ Signal/Control: Direct ☒ Telecommunication: Direct				
Test level	☒ AC 24 V: ☒Differential mode: ± 0.5 kV, ± 1 kV ☐Common mode: ± 0.5 kV, ± 1 kV, ± 2 kV ☒ Signal/Control: ± 0.5 kV, ± 1 kV ☒ Telecommunication: ± 0.5 kV, ± 1 kV				
Coupling Impedance	☒ Differential mode: 18 ㎌ ☐ Common mode: 10 Ω + 9 ㎌ ☐ 40 Ω + 0.5 ㎌ ☐ Direct				
Surge pulse shape	Tr/Th = 1.2 / 50 ㎲				
Number of surge	5				
Coupling time	30 s				
Testing Voltage	AC 24 V				
Test facility	Shielded room (3F)				
Date	2016. 08. 08				
Temperature(°C)	21.5 °C	Humidity (% R.H.)	56.7 % R.H.	Pressure (kPa)	100.6 kPa
Remarks	Pass -There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs.				

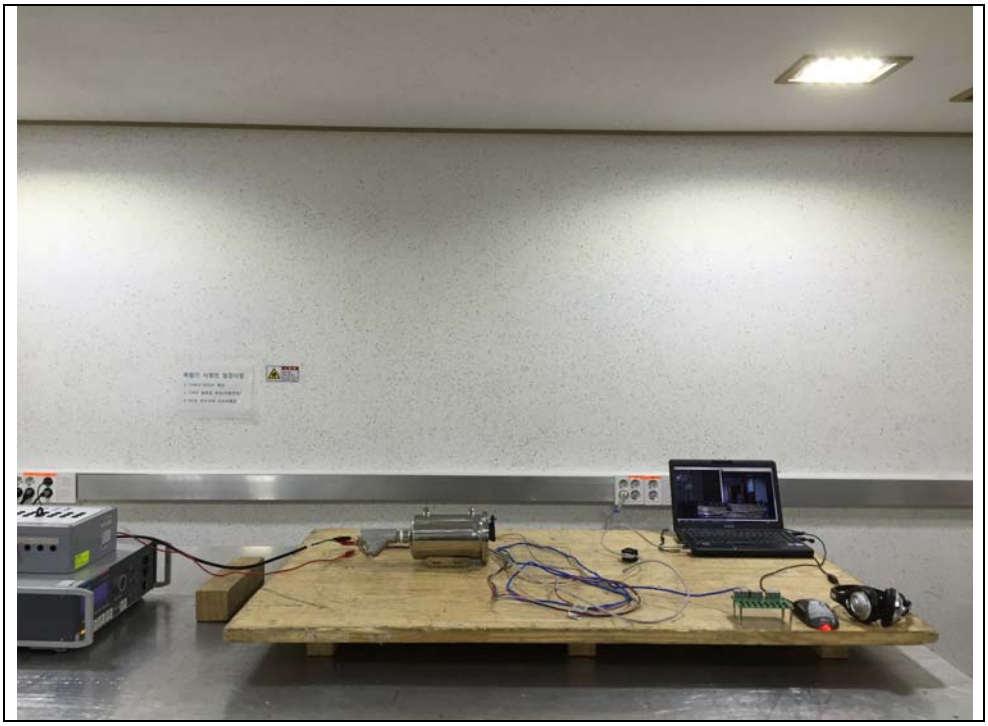
6.7.1 Measurement procedure

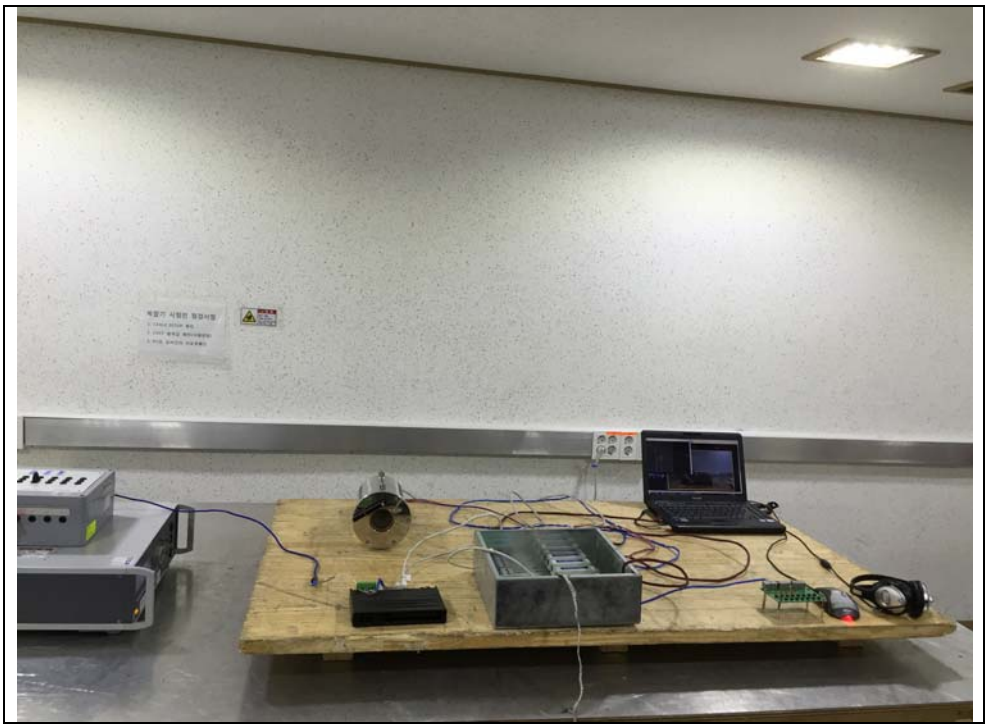
A ground reference plane was located on the floor. SURGE generator was connected to reference ground plane via low impedance connection. For floor standing equipment & table top equipment, EUT was placed on a wooden table.

6.7.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Ultra compact simulator	UCS500N	V1238113636	EM TEST	2016.09.02	☒
CDN	CNV 508 N1	V1108108861	EM TEST	2016.09.02	☒

6.7.3 Photographs of test setup





6.7.4 Measurement result

* AC main

Coupling point	(+)	(-)	Result
L-N	+ 0.5 kV, + 1 kV	- 0.5 kV, - 1 kV	Pass

* Signal/Control

Coupling point	(+)	(-)	Result
Alarm In/Out	+ 0.5 kV, + 1 kV	- 0.5 kV, - 1 kV	Pass

* Telecommunication

Coupling point	(+)	(-)	Result
LAN(RJ-45)	+ 0.5 kV, + 1 kV	- 0.5 kV, - 1 kV	Pass

6.8 Conducted Immunity

Test specification	EN 61000-4-6:2014				
Tested frequency	0.15 ㎒ ~ 100 ㎒				
Test level & Modulation	1 V, 3 V, 10 V, 80 % Amplitude Modulation (1 ㎑) 1 V, 3 V, 10 V, Pulse Modulation (1 ㎐ (0.5 s ON: 0.5 s OFF))				
Frequency Step	1 % step				
Dwell time	1 s				
Coupling method	☒ AC Main: CDN(M2) ☒ Signal/Control: Clamp ☒ Telecommunication: ISN(ST08)				
Testing Voltage	AC 24 V				
Test facility	Shielded room (3F)				
Date	2016. 08. 09				
Temperature(°C)	20.8 °C	Humidity (% R.H.)	57.3 % R.H.	Pressure (kPa)	100.6 kPa
Remarks	Pass -There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs.				

6.8.1 Measurement procedure

A ground reference plane was located on the floor.

The test was performed on a ground reference plane on a 0.1 m wooden table. This test were Performed using CDN for mains, clamp for signal and injection probe. The frequency range was swept from 0.15 ㎒ to 80 ㎒. This frequency range was Modulated with 1 ㎑ sine wave at 80 %.

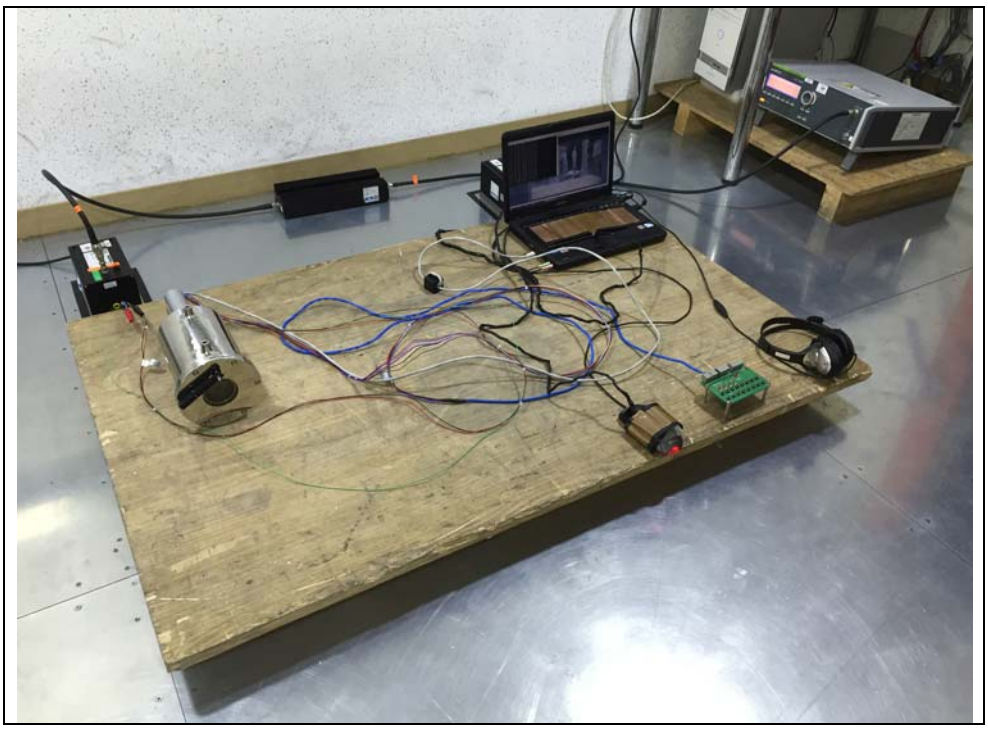
The signal generators provided the modulated frequency at a 1 % step size.

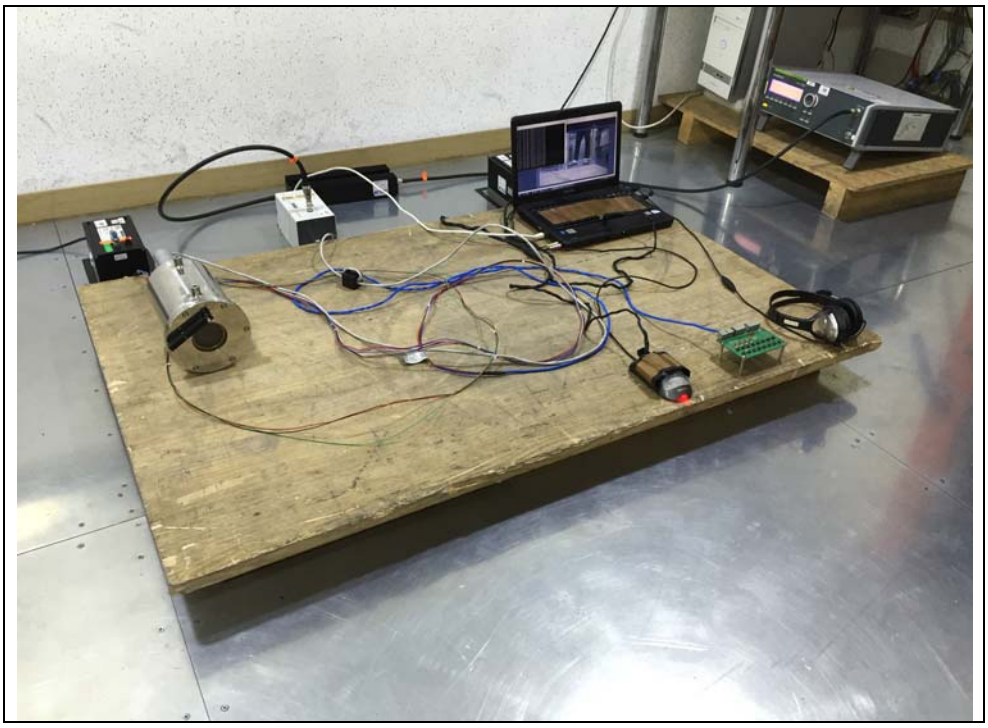
The power and all network cable, I/O cables longer than 3 m length were tested.

6.8.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Continuous Wave Simulator	CWS500N1.4	P1409132195	EM TEST	2017.04.07	☒
CDN	CDN M2/M3	P1402128648	EM TEST	2017.04.08	☒
CDN	CDN M2/M3	P1402128649	EM TEST	2017.04.08	☒
Attenuation	ATT6/80	P1402129094	EM TEST	2017.04.08	☒
Electromagnetic Injection Clamp	EM101	36197	EM TEST	2017.04.15	☒
IMPEDANCE STABILIZATION NETWORK	ISN ST08	24342	TESEQ	2017.02.28	☒

6.8.3 Photographs of test setup





6.8.4 Measurement result

* AC main

Coupling point	Coupling method	Result
Power	CDN(M2)	Pass

* Signal/Control

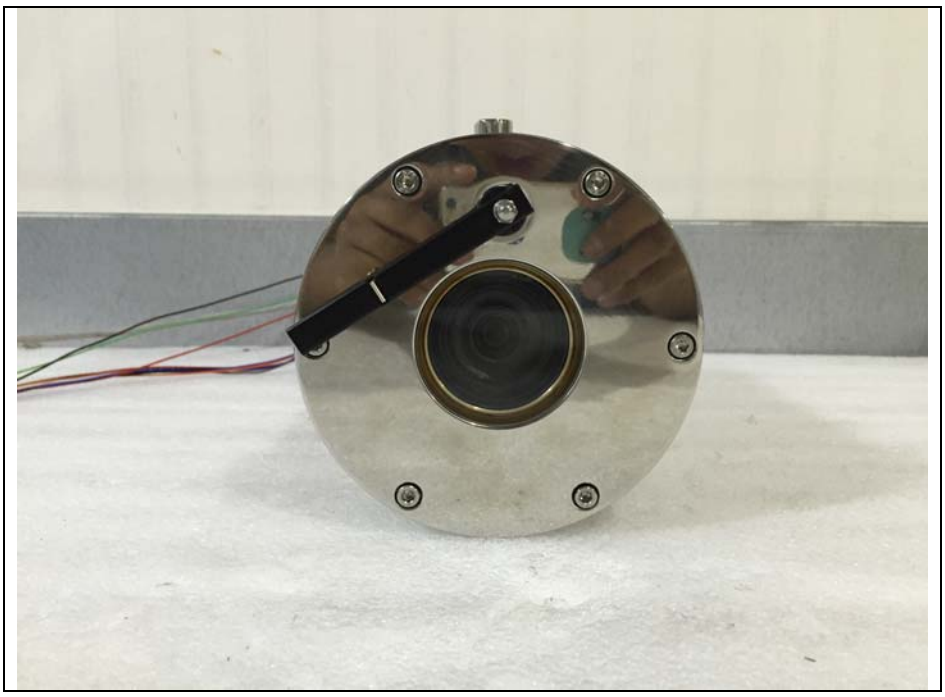
Coupling point	Coupling method	Result
Signal	Clamp	Pass

* Telecommunication

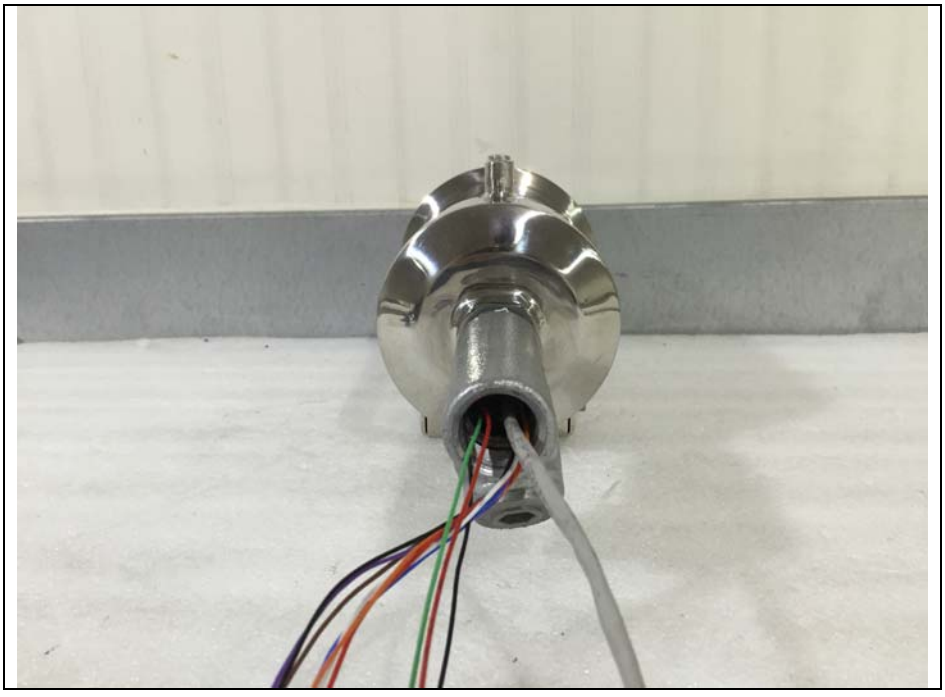
Coupling point	Coupling method	Result
LAN(RJ-45)	ISN(ST08)	Pass

7. E.U.T. photographs

Front View



Rear View

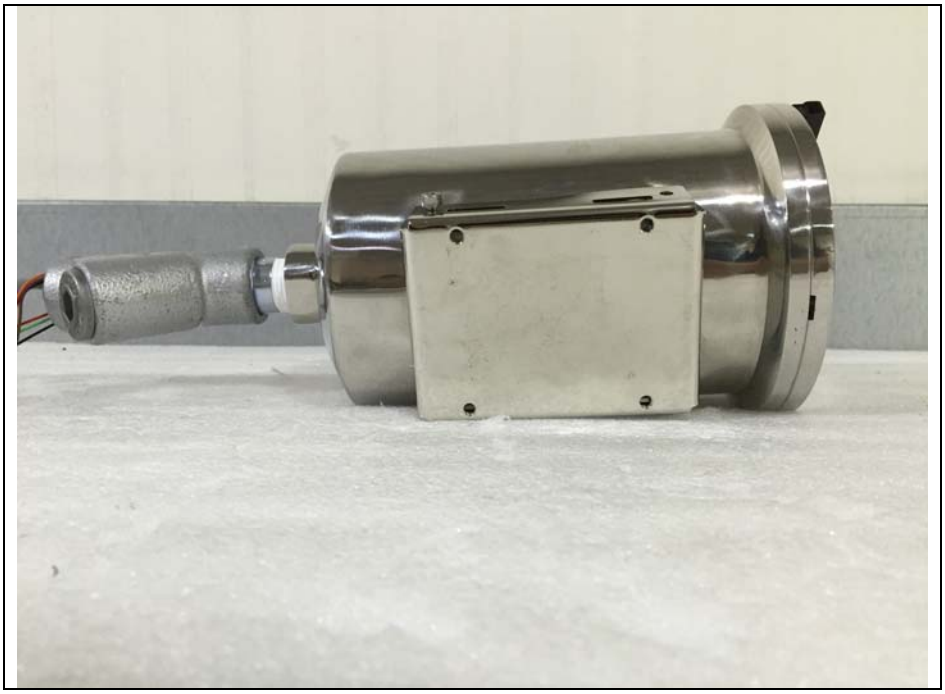


Left View

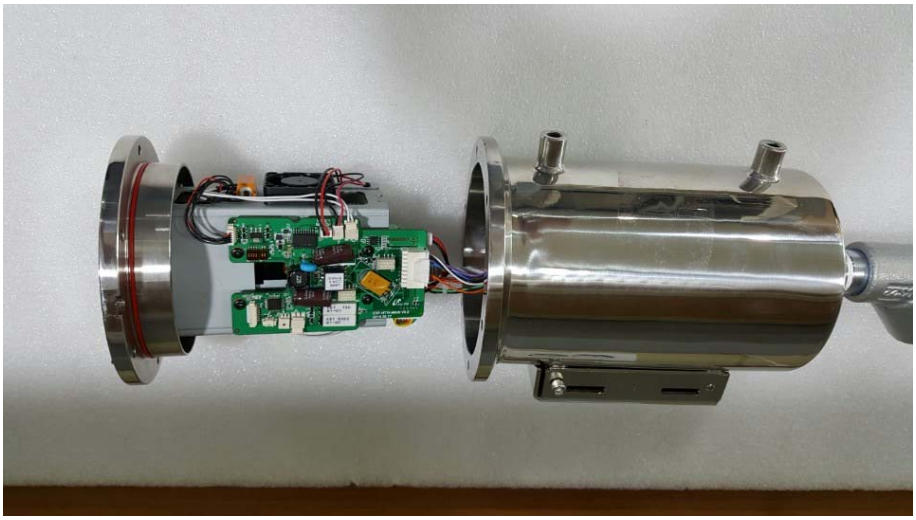
Right View

Top View

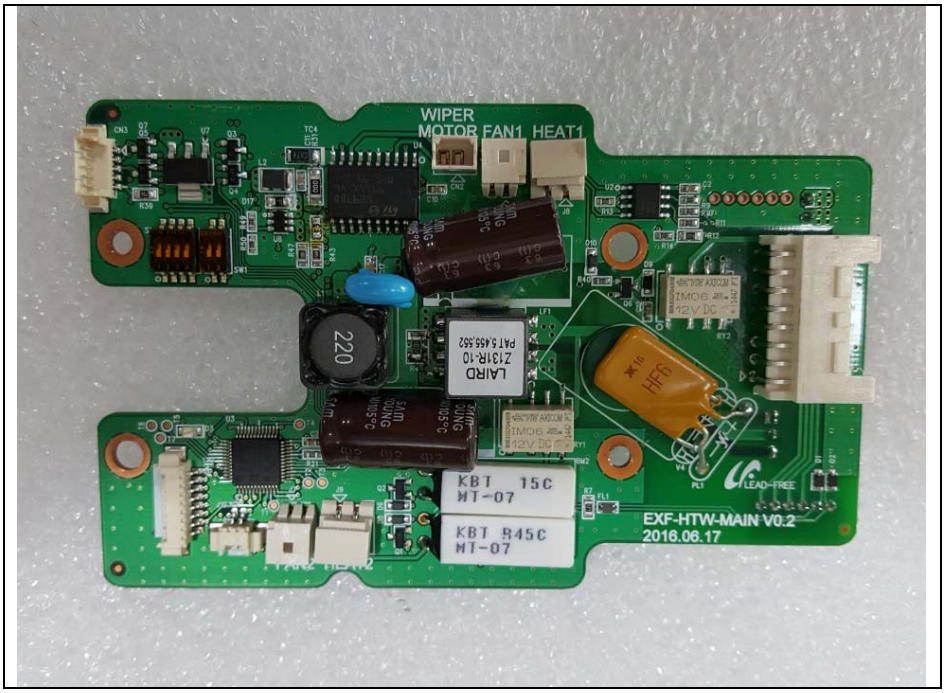
Bottom View

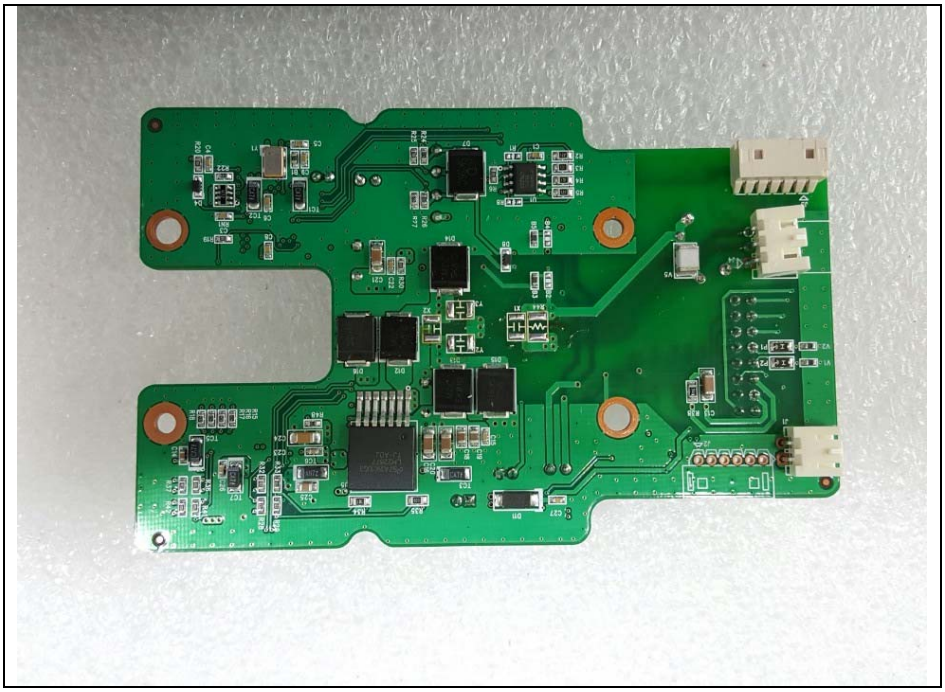


Inside

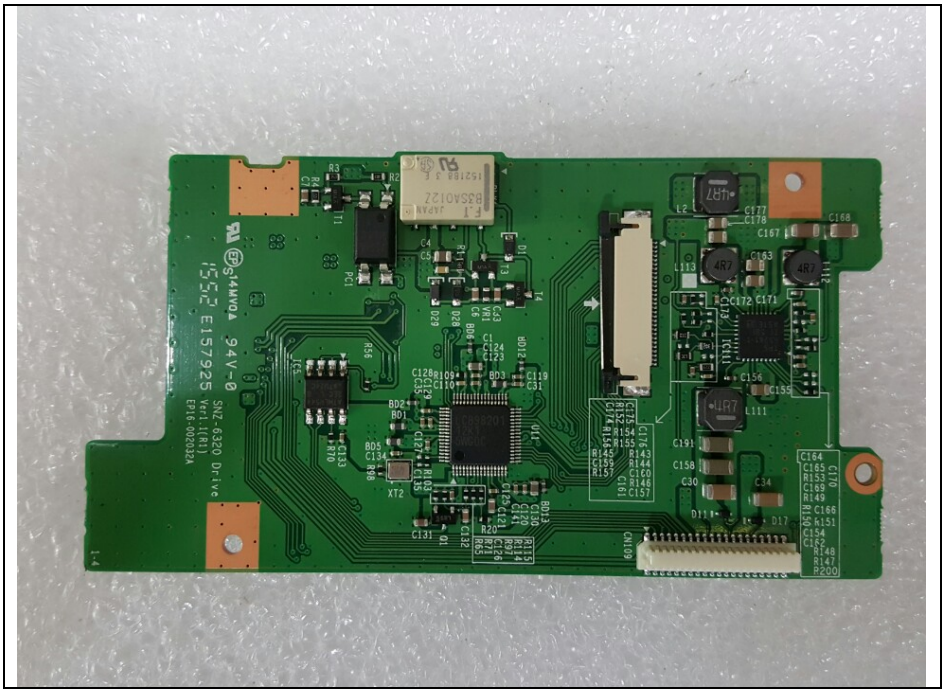


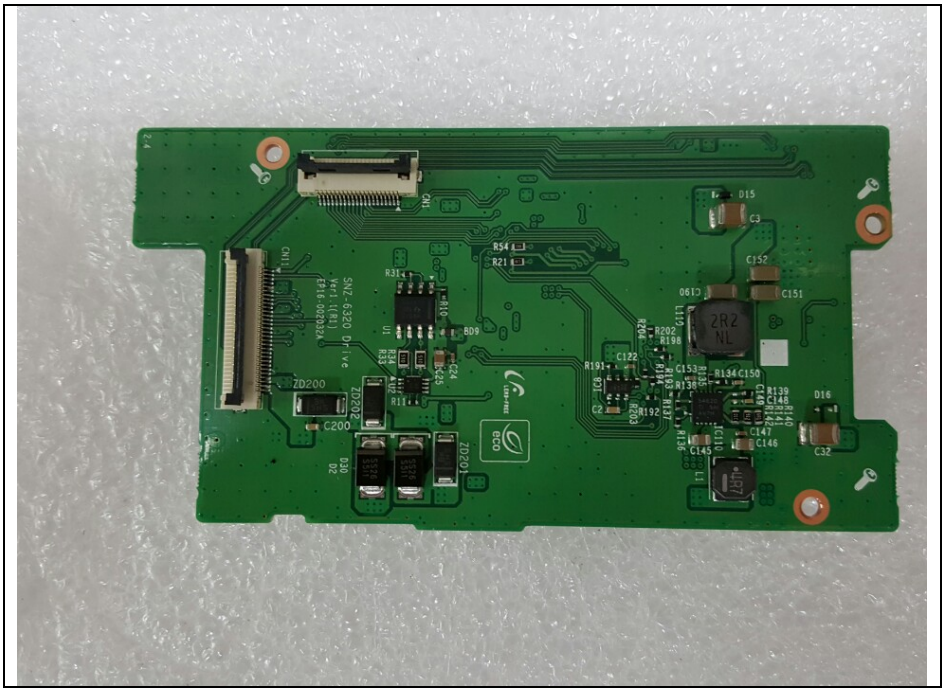
Main Board



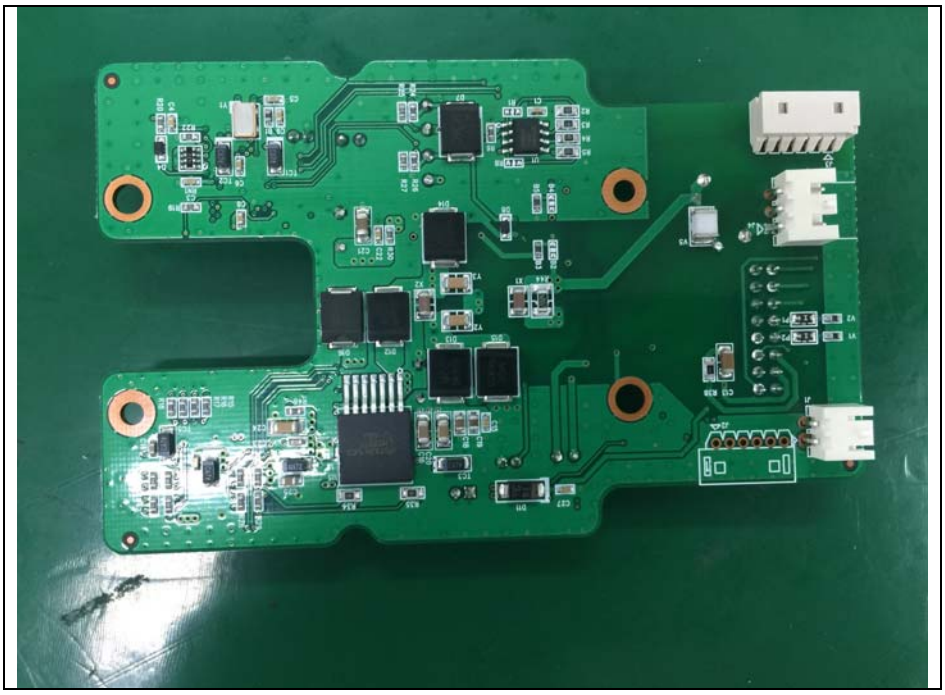


SUB Board

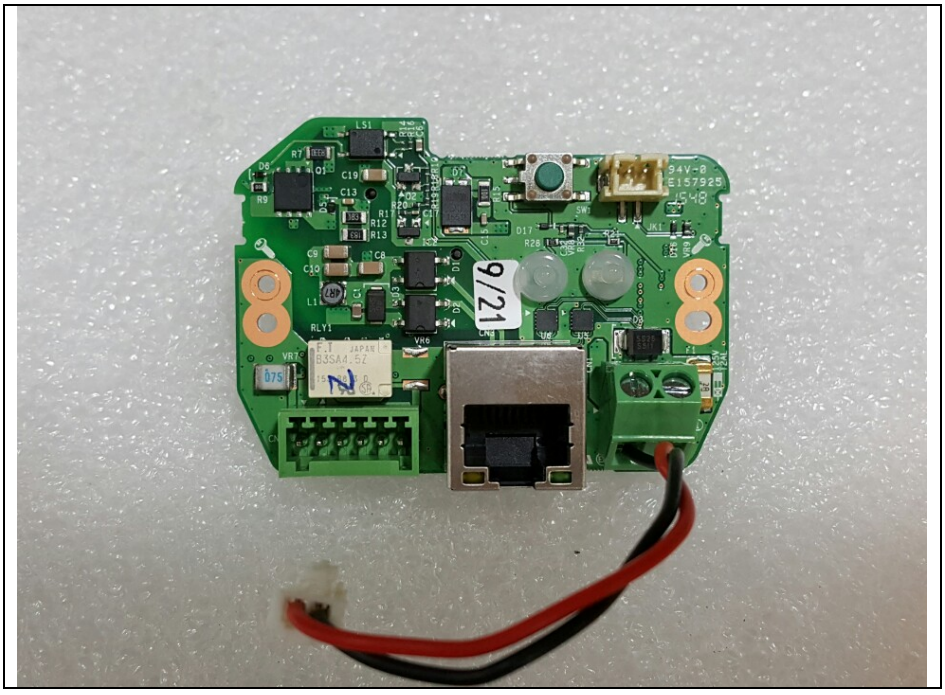


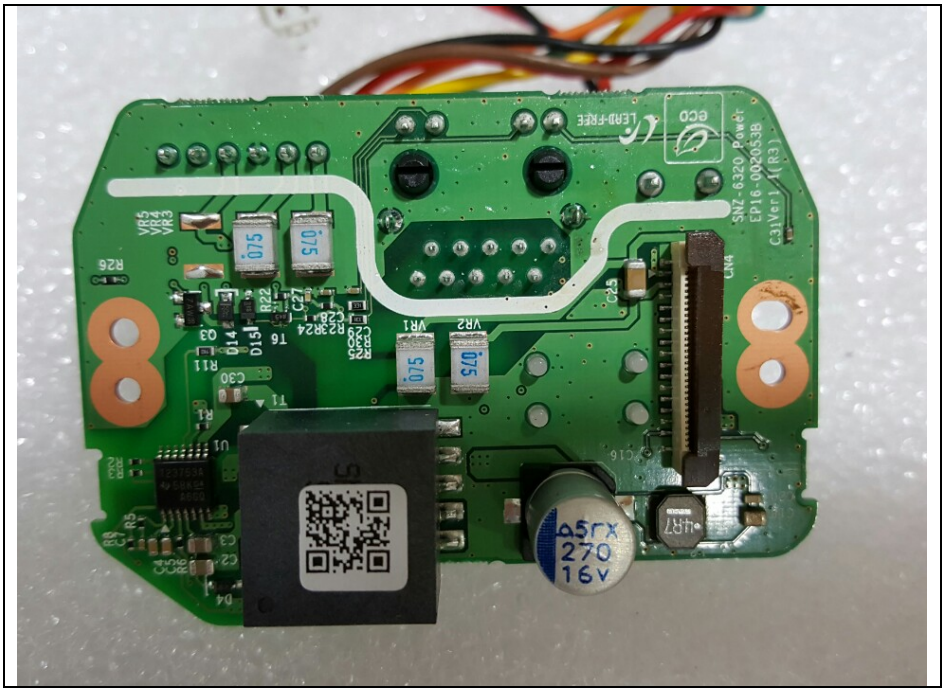


Camera Board

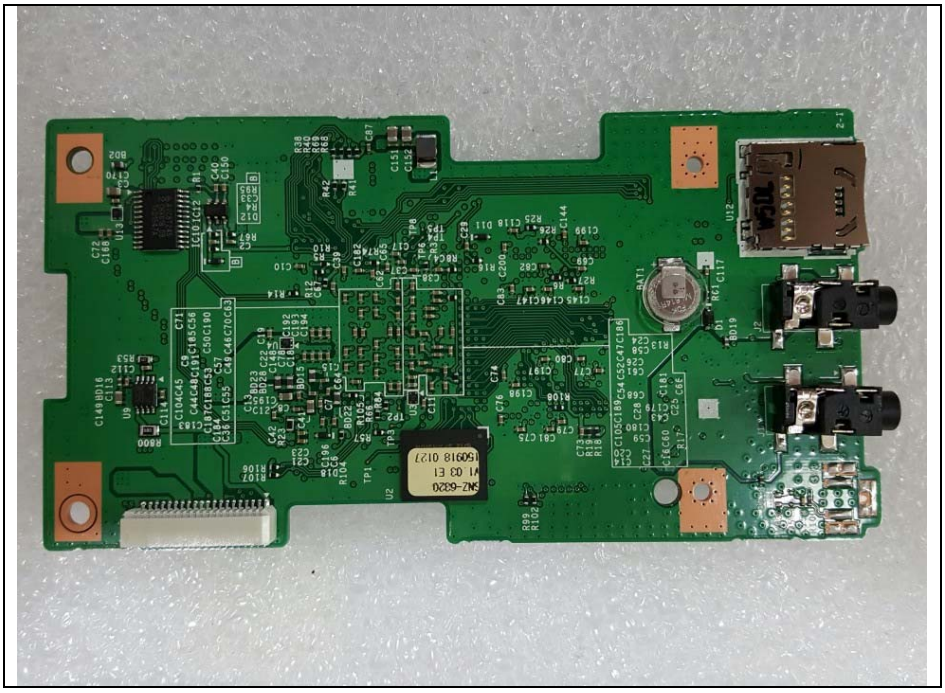


LAN Board





Network Board



External Cable