

TEST REPORT

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The tests reported herein have been performed in accordance with its terms of accreditation.

Test Report No. : LR500112001C
Issue Date : January 06, 2020
Applied Standard : FCC Part 15, Subpart B and ICES-003
Trade Name : Hanwha Techwin Co., Ltd.
Equipment Name : CCTV CAMERA
Model Name : HCZ-6321
Serial Number : Identification

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



Revision history

Revision	Date of issue	Test report No.	Description
0	06.01.2020	LR500112001C	Initial

>>TABLE OF CONTENTS<<

LTA Certification.....	4
General information's	6
1- Brief Information	7
2- Test Site Description.....	9
3- Test Procedure.....	11
4- List of Equipment Used For the Tests	14
5- EMISSION	15
5-1 Conducted Disturbance Measurements	15
5-2 Radiated Disturbance Measurements	17
Conclusions.....	20
Photograph of the measurements	21
Photograph of the EUT	25

LTA Certification

Applicant / Manufacture

Company name : Hanwha Techwin Co., Ltd.
Address : 6, Pangyo-ro 319beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do
Telephone / Facsimile : +82-70-7147-8361 / -

Factory #1

Company name : HANWHA TECHWIN(TIANJIN) CO., LTD
Address : No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA, Tianjin, 300385, People's Republic of China

Factory #2

Company name : HANWHA TECHWIN SECURITY VIETNAM CO., LTD.
Address : Lot O-2, Que Vo Industrial Zone extended area, Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam

Factory #3

Company name : D-TECH CO., LTD.
Address : 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi-do, Korea (Suwon Industrial Complex)

Equipment Under Test (EUT)

Equipment Name : CCTV CAMERA
Model name : HCZ-6321
Serial number : Identification
Intended environment : Industrial area
Date of receipt : December 20, 2019
EUT condition : Pre-production, not damaged
Interface ports : DC IN, AHD, CVBS, RS485, GND
Power rating : DC 12 V
Test Mode : Camera mode
Test Voltage : AC 120 V, 60 Hz

Model Description

- NONE

Model Specification

- NONE

*** To be continued next page ***

LTA Certification –cont.-**Test Performed**

Test started & completed : December 24 - 26, 2019
Location : LTA Co., Ltd.

Test Specification

Purpose of the test : Compliance test to the following standard
Applied standard : FCC Part 15, Subpart B and ICES-003
Classification : Class A
Deviations from Standard Test Method : N/A

Test Results

Measurement	Results*	Test method
Conducted disturbance	Complies	ANSI C 63.4-2014
Radiated disturbance	Complies	ANSI C 63.4-2014

* : The compliance statement is based on nominal value only.

Modification performed by the lab.;

- N.A

Laboratory's Certificate

Report number : LR500112001C
Issue date : January 06, 2020

This test report is issued under the authority of:

The test was supervised by:



Young Kyu Shin, Technical Manager



Joo Hyung Cho, Test Engineer

The results in this report apply only to the sample(s) tested.

It is not allowed to copy this report even partly without the allowance of the test laboratory.

General information's

Purpose

This document is based on the Electromagnetic Interference (EMI) tests performed on the “HCZ-6321”. The measurements were performed according to the measurement procedure described in ANSI C 63.4-2014. The tests were carried out in order to confirm whether the electromagnetic emissions from the EUT(Equipment Under Test), are within the Class A limits defined in FCC Part 15, Subpart B- “Section 15.107- Conducted limits” and “Section 15.109-Radiated emission limits”.

Test Performed

Company name : **LTA Co., Ltd**
Address : 4, Songju-ro 236beon-gil, Yangji-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, 17159, Korea
Telephone : +82-31-323-6008
Facsimile : +82-31-323-6010

Measurement uncertainty

Conducted disturbance (0.15 to 30 MHz) : ± 2.80 [dB] (k=2)
Radiated disturbance (30 to 1,000 MHz) : H : ± 4.84 [dB] (k=2) V : ± 5.00 [dB] (k=2)
(1 GHz to 6 GHz) : H : ± 5.97 [dB] (k=2) V : ± 5.96 [dB] (k=2)
(6 GHz to 18 GHz) : H : ± 6.20 [dB] (k=2) V : ± 6.20 [dB] (k=2)

The coverage factor k=2 yields approx. a 95% level of confidence for near-normal distribution typical of most measurement results.

Accredited agencies

LTA Co., Ltd. Is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2020-09-30	ECT accredited Lab.
RRA	KOREA	KR0049	-	EMC accredited Lab.
FCC	U.S.A	649054	2021-04-11	FCC CAB
VCCI	JAPAN	C-4948,	2020-09-10	VCCI registration
		T-2416,	2020-09-10	
		R-4483(10 m),	2020-10-15	
		G-10847	2022-06-13	
IC	CANADA	5799A	2021-06-16	IC filing
KOLAS	KOREA	NO.KT551	2021-08-20	KOLAS accredited Lab.

1- Brief Information

1-1 Test Summary

Parameter	Applied Standard	Status (note 1)
I. Emission		
Conducted disturbance	FCC Part 15.107 / ICES-003 Clause 6.1	C
Radiated disturbance	FCC Part 15.109 / ICES-003 Clause 6.2	C
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable * The data in this test report are traceable to the national or international standards.		

Frequency range to be scanned:

0.15 MHz - 30 MHz as conducted measurement

30 MHz to 5th harmonic of the highest frequency or 40 GHz, whichever is lower as radiated measurement.

Bandwidth:

Measured by the CISPR quasi-peak function Bandwidth is 9 kHz in the frequency 0.15 MHz to 30 MHz and 120 kHz in the frequency 30 MHz to 1,000 MHz.

Measured by the Peak function Bandwidth is 1 MHz in the frequency 1 GHz to 40 GHz.

A sample calculation:

COR. F (correction factor)= Antenna factor + Cable loss- Amp.gain- Distance correction

Emission Level= meter reading + COR.F

1-2 Test mode of the EUT

The tests have been conducted with the following operational mode(s) of the EUT.

Camera mode

1-3 Modification

- NONE

1-4 List of EUT and accessory

EUT				
Equipment Name	Model Name	Serial No.	Manufacturer	Remarks
CCTV CAMERA	HCZ-6321	N/A	HANWHA TECHWIN(TIANJIN) CO., LTD HANWHA TECHWIN SECURITY VIETNAM CO.,LTD. D-TECH CO.,LTD.	-
ACCESSORY				
Equipment Name	Model Name	Serial No.	Manufacturer	Remarks
Adapter	KPL-060F-VI	N/A	CHANNEL WELL TECHNOLOGY	-
SDI Monitor	PRM-501A	N/A	POSTIUM	-
SDI Monitor Adapter	PA-1061-0	N/A	LITEON	-
Monitor	2407HDT LED	N/A	Samwha Display	-
Monitor Adapter	N/A	N/A	N/A	-
Notebook	N16Q2	NXGRYSJ0017300 B5F77500	Acer	-
Notebook Adapter	PA-1650-86	N/A	Acer	-

1-5 Cable List

Cable List						
From		To		Length (m)	Shielding	
Type	I/O Port	Type	I/O Port		Cable	backshell
EUT	DC IN	Adapter	DC OUT	1.0	NO	Plastic
	RS485	Notebook	USB	3.0	NO	Plastic
	CVBS	SDI Monitor	BNC	3.0	NO	Plastic
	AHD	Monitor	Compornent	3.0	NO	Plastic
	GND	GND	GND	3.0	NO	Plastic
Adapter	AC IN	AC Power Source	3 Pin AC Line	1.5	NO	Plastic
Notebook	DC IN	Notebook Adapter	DC OUT	1.2	NO	Plastic
Notebook Adapter	AC IN	AC Power Source	3 Pin AC Line	1.1	NO	Plastic
Monitor	DC IN	Monitor Adapter	DC OUT	1.0	NO	Plastic
Monitor Adapter	AC IN	AC Power Source	3 Pin AC Line	1.5	NO	Plastic

2- Test Site Description

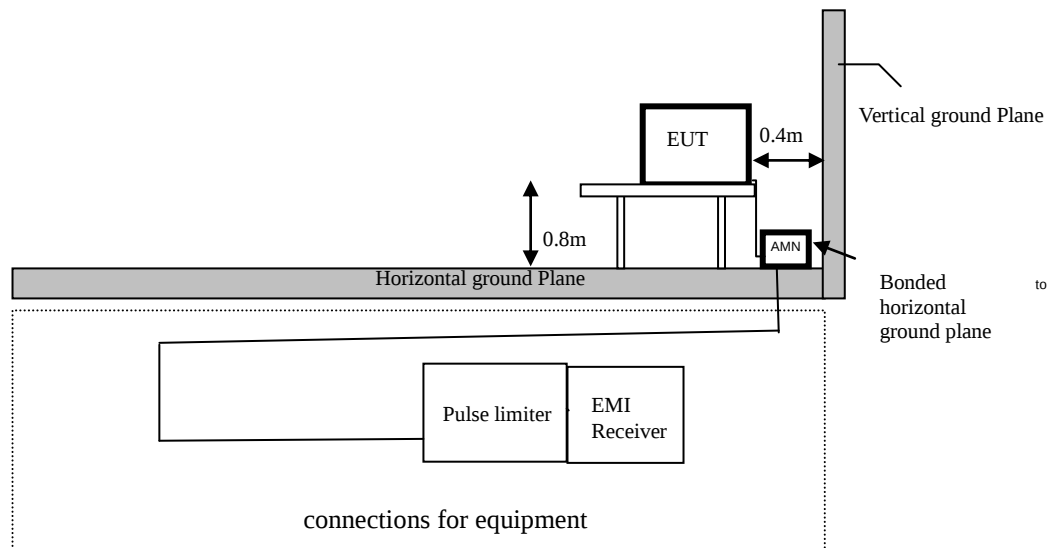
1-Facility

All the testing facilities are periodically serviced as a daily check for equipment and cables systems, an every 6 months facility check for the facilities and a monthly check and annual calibration for testing equipment according to ISO/IEC 17025. All the testing facilities are used as the same specifications shown below. There are descriptions both for radiated disturbance measurement and conducted disturbance measurement conformed by ANSI C 63.4-2014.

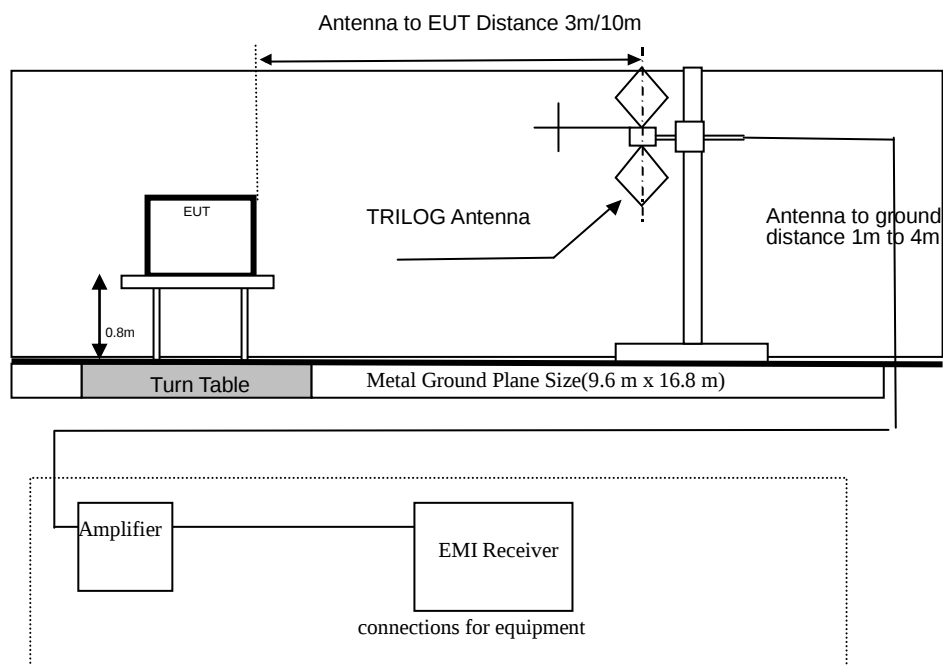
The NSA measurement of the 10 m chamber was performed on February 05, 2018 according to ANSI C 63.4:2014

The SVSWR measurement of the 10 m chamber was performed on February 03, 2018 according to ANSI C 63.4:2014

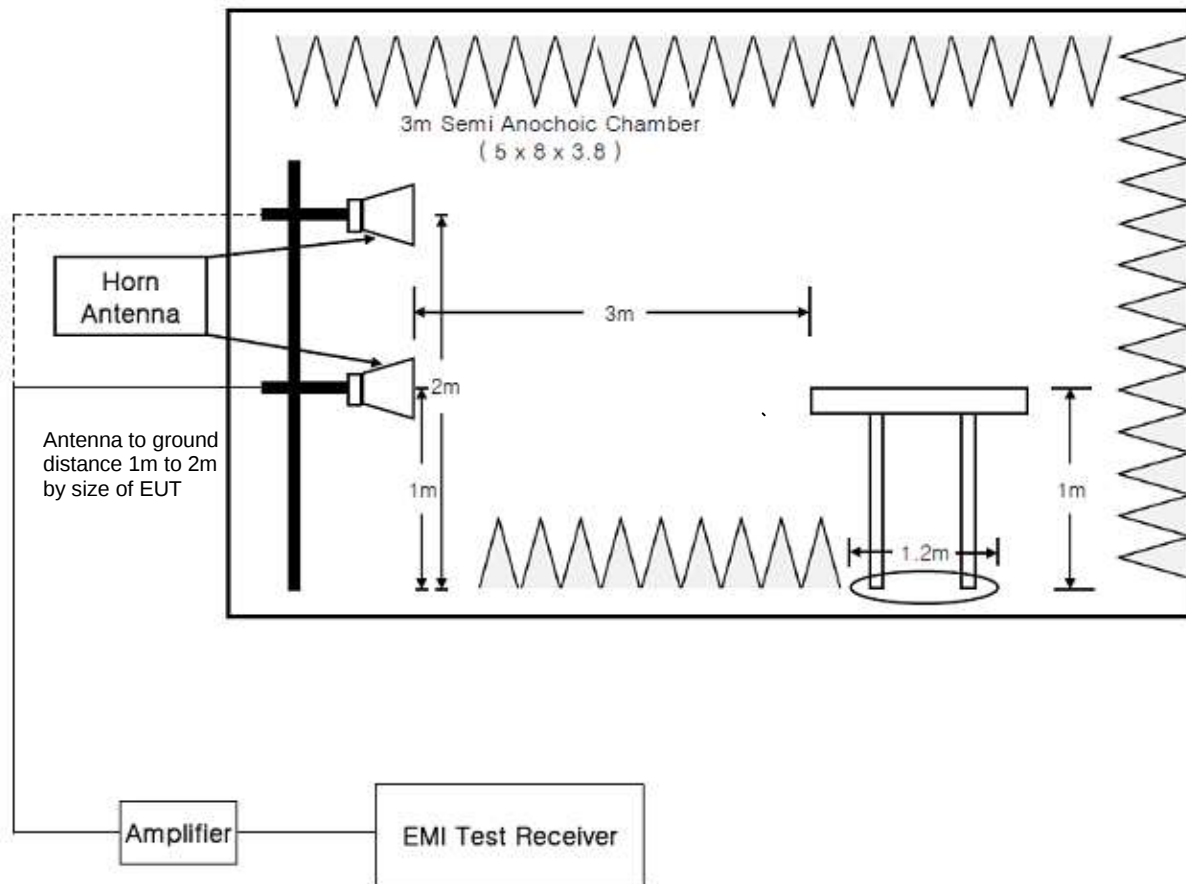
2-1 Conducted Disturbance Measurement



2-2 Radiated Disturbance Measurement – Below 1 GHz



2-3 Radiated Disturbance Measurement – Above 1 GHz



3- Test Procedure

3-1 Conducted Disturbance Measurements

- The measurement is carried out on an open site with horizontal and metallic ground plane.
- An AMN(Artificial Mains Network) with a nominal impedance ($50\ \Omega/50\ \mu\text{H}$) as defined in ANSI C 63.4-2014., shall be utilized.
- The AMN is grounded on a horizontal metal ground plane.
- Measurement is carried out using an EMI receiver with quasi-peak detectors and average detector.
(Refer to the List of test equipment used for the test.)
- The shortest distance between the EUT and the AMN is 0.8 m.
- The EUT is placed on the non-conducting table with 0.8 m height.
- A remote switch is used for changing phases between Line (L) and Neutral (N).
- Refer to "Brief Information"(page 7-8) about details of the EUT and configuration of the cables.

- Measurement is carried out as manual operation.
 - detecting the maximized emission level using the maxhold function after setting the spectrum analyzer bandwidth 1 kHz and the frequency range from 150 kHz to 1 MHz , 1 MHz to 5 MHz and 5 MHz to 30 MHz.
 - searching the maximum frequency point of the disturbance wave in each frequency range.
 - reading the disturbance level of quasi-peak, average and Line (L) and Neutral (N) in 9 kHz bandwidth by the EMI receiver.
 - calculating the measurement result with the following formula or equation.
(Result = Reading + Cor.F.(LISN Factor + Cable Loss + Pulse Limiter)
(ex) = 13.23 dB μ V + (9.63 dB + 0.01 dB + 9.86 dB)
 = 32.73 dB μ V

3-2 Radiated Disturbance Measurements – Below 1 GHz

- Test site is met the requirements of ANSI C 63.4-2014 and the distance between the EUT and the antenna is adjusted 3 m/10 m.
 - The turntable can be rotated 360 degrees.
 - The antenna can be adjusted between 1m and 4m in height above the ground.
 - The EUT is placed on the non-conducting table with 0.8 m height on the turntable.
 - Measurements are carried out using a EMI test receiver with peak detectors (100 kHz bandwidth) and an EMI receiver with quasi-peak detectors (120 kHz bandwidth).
 - Refer to the list of test equipment used for the test.
 - TRILOG antenna are used as wideband antenna.
 - The TRILOG antenna is used in the frequency range of 30 MHz to 1 000 MHz.
 - A variable attenuator is used for verifying amplifier's linearity.
 - Rotating the turntable and adjusting the height of the antenna are carried out by control buttons on the console.
 - Refer to "Brief Information"(page 7-9) about details of the EUT and configuration of the cables.
-
- Measurement is carried out by a LTA operator as manual operation.
 - searching for some of High disturbance frequency points than the other points with the following settings; bandwidth 100 kHz, frequency range 10 MHz between 30 MHz and 300 MHz and frequency range 50 MHz between 300 MHz and 1 GHz.
 - searching the worst direction with the maximum level of the disturbance wave in rotating the turntable 360 degrees at each searched frequency point.
 - setting the height of the antenna with the maximum level of the disturbance wave from 1m to 4m.
 - reading the disturbance level by the EMI receiver with quasi-peak detectors (120 kHz bandwidth) according to ANSI C 63.4-2014.
 - measuring to vertical and horizontal polarization.
 - calculating the measurement result with the following formula or equation:
(Result = Reading +Cor.F (antenna factor + cable loss – PreAmp Gain)
(ex) = 50.6 dB μ V/m + (11.08 dB(1/m) + 1.31 dB -27.32 dB)
= 35.67 dB μ V/m

3-3 Radiated Disturbance Measurements – Above 1 GHz

- Test site is met the requirements of ANSI C 63.4-2014 and the distance between the EUT and the antenna is adjusted 3 m.
 - The turntable can be rotated 360 degrees.
 - The antenna can be adjusted between 1m and 4 m in height above the ground.
 - The EUT is placed on the non-conducting table with 1 m height on the turntable.
 - Measurements are carried out using a EMI test receiver with peak detectors (1 MHz bandwidth) and an EMI receiver with peak and average detectors(1 MHz bandwidth).
 - Refer to the list of test equipment used for the test.
 - HORN antenna are used as wideband antenna.
 - The HORN antenna is used in the frequency range of 1 GHz to 18 GHz.
 - A variable attenuator is used for verifying amplifier's linearity.
 - Rotating the turntable and adjusting the height of the antenna are carried out by control buttons on the console.
 - Refer to "Brief Information"(page 7-9) about details of the EUT and configuration of the cables.
 - Measurement is carried out by a LTA operator as manual operation.
 - searching the worst direction with the maximum level of the disturbance wave in rotating the turntable 360 degrees at each searched frequency point.
 - setting the height of the antenna with the maximum level of the disturbance wave from 1 m to 4 m
 - reading the disturbance level by the EMI receiver with peak and average detectors (1 MHz bandwidth) according to ANSI C 63.4-2014.
 - measuring to vertical and horizontal polarization.
 - calculating the measurement result with the following formula or equation:
(Result = Reading +Cor.F (antenna factor + cable loss – PreAmp Gain)
- (ex) = 35.9 dBμV/m + (23.92 dB(1/m) + 7.01 dB - 38.33 dB)
 = 28.5 dBμV/m

4- List of Equipment Used For the Tests

Conducted emissions

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESR	Rohde & Schwarz	101499	2020.07.04	1 year
☒	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	100710	2020.03.16	1 year
☐	LISN	ESH3-Z6	Rohde & Schwarz	100378	2020.09.05	1 year
☐	LISN	ESH3-Z6	Rohde & Schwarz	101468	2020.09.05	1 year
☒	LISN(main)	ENV216	Rohde & Schwarz	101222	2020.09.06	1 year
☒	LISN(sub)	LT32C/10	AFJ	32031518210	2020.09.05	1 year
☒	TEST PROGRAM	e3_ce 20181212a (V9)	AUDIX	-	-	-

Radiated Emission – Below 1 GHz

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESU	Rohde & Schwarz	100092	2020.09.05	1 year
☒	Amplifier (25 dB)	8447D	HP	2944A07684	2020.03.16	1 year
☐	BILOG Antenna	VULB 9168	SCHWARZBECK	775	2021.03.26 (KOLAS)	2 year
☒	BILOG Antenna	VULB 9168	SCHWARZBECK	775	2021.11.12 (RRA)	2 year
☒	TEST PROGRAM	e3 20181212a (V9)	AUDIX	-	-	-

Radiated Emission – Above 1 GHz

	Item	Model Name	Manufacturer	Serial No.	Next Cal.	Interval
☒	EMI TEST Receiver	ESU	Rohde & Schwarz	100092	2020.09.05	1 year
☒	Amplifier	8449B	HP	3008A00671	2020.09.05	1 year
☐	Amplifier	PAM-840A	COM-POWER	461314	2020.03.18	2 year
☐	HORN ANTENNA	3116B	ETS	133350	2020.05.10	2 year
☐	HORN ANTENNA	3116B	ETS	81109	2020.05.10	2 year
☐	HORN ANTENNA	3115	ETS	114105	2021.09.17 (KOLAS)	2 year
☒	HORN ANTENNA	3115	ETS	114105	2021.11.11 (RRA)	2 year
☒	TEST PROGRAM	e3 20181212a (V9)	AUDIX	-	-	-

5- EMISSION

5-1 Conducted Disturbance Measurements

(LINE)



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Cheoin-gu, Youngin-si, Gyeonggi-do
449-822 Korea
Tel:+82-31-3236008,9
Fax:+82-31-3236010

EUT /Model No. : HCZ-6321

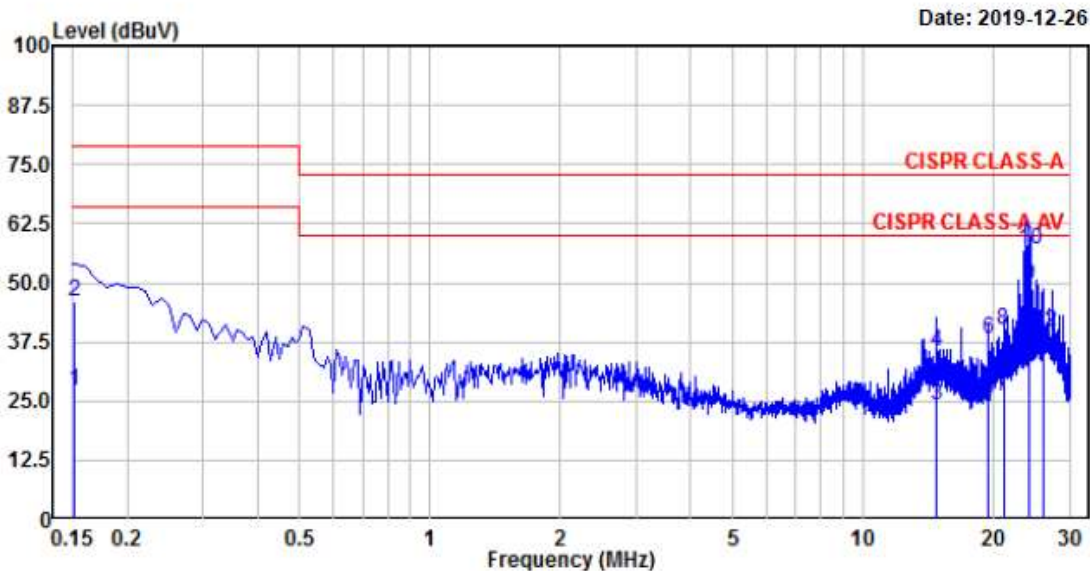
Phase : Line

Test Mode : Camera mode

Test Power : 120 V / 60 Hz

Temp./ Humi. : 21 'C / 36 % R.H.

Test Engineer : CHO J H



No.	Freq MHz	RD QP dBuV	RD AV dBuV	C.F dB	Result QP dBuV	Result AV dBuV	Limit QP dBuV	Limit AV dBuV	Margin QP dB	Margin AV dB	Phase
2.	0.151	26.77	7.81	19.43	46.20	27.24	79.00	66.00	32.80	38.76	Line
4.	14.747	15.79	4.26	19.84	35.63	24.10	73.00	60.00	37.37	35.90	Line
6.	19.474	18.40	5.36	19.89	38.29	25.25	73.00	60.00	34.71	34.75	Line
8.	21.060	19.96	6.30	19.92	39.88	26.22	73.00	60.00	33.12	33.78	Line
10.	24.114	36.84	29.53	19.96	56.80	49.49	73.00	60.00	16.20	10.51	Line
12.	26.108	19.52	12.06	19.99	39.51	32.05	73.00	60.00	33.49	27.95	Line

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

-Continue

(NEUTRAL)



4, Songjuro 236 Beon-gil, Yangji-myeon
Cheoin-gu, Youngin-si, Gyeonggi-do
449-822 Korea
Tel:+82-31-3236008,9
Fax:+82-31-3236010

EUT /Model No. : HCZ-6321

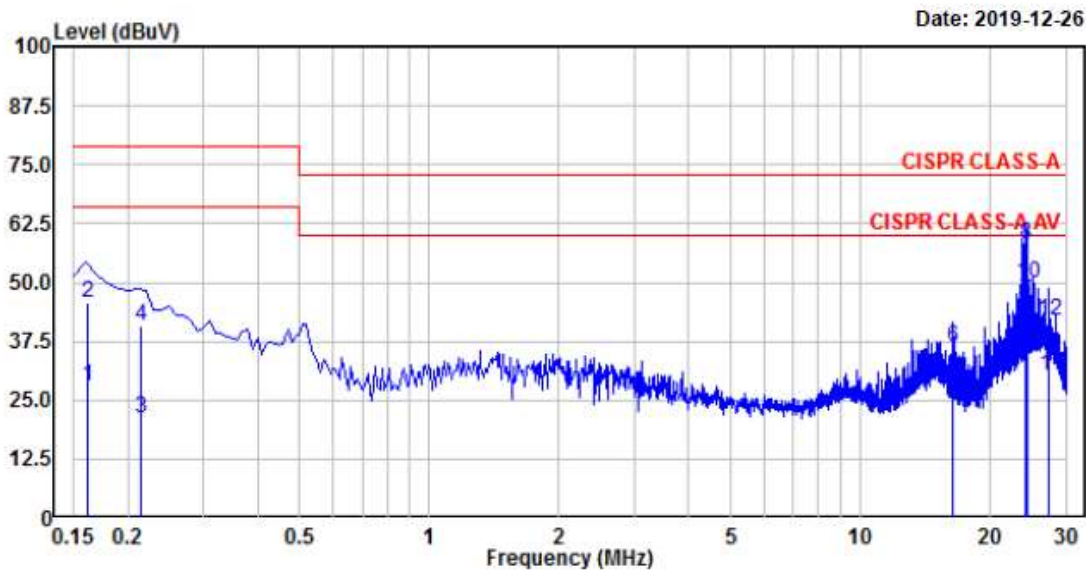
Phase : Neutral

Test Mode : Camera mode

Test Power : 120 V / 60 Hz

Temp./ Humi. : 21 'C / 36 % R.H.

Test Engineer : CHO J H



No.	Freq MHz	RD QP dBuV	RD AV dBuV	C.F dB	Result QP dBuV	Result AV dBuV	Limit QP dBuV	Limit AV dBuV	Margin QP dB	Margin AV dB	Phase
2.	0.161	26.04	8.31	19.49	45.53	27.80	79.00	66.00	33.47	38.20	neutral
4.	0.215	21.17	1.52	19.49	40.66	21.01	79.00	66.00	38.34	44.99	neutral
6.	16.336	16.34	4.05	19.92	36.26	23.97	73.00	60.00	36.74	36.03	neutral
8.	24.216	38.05	25.95	20.04	58.09	45.99	73.00	60.00	14.91	14.01	neutral
10.	24.449	29.94	22.93	20.04	49.98	42.97	73.00	60.00	23.02	17.03	neutral
12.	27.370	21.69	10.04	20.09	41.78	30.13	73.00	60.00	31.22	29.87	neutral

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss + Pulse Limiter

5-2 Radiated Disturbance Measurements

(Below 1GHz) / V



4, Songjuro 236Beon-gil, yanggi-myeon,
Yongin-si, Gyeonggi-do, Korea
Tel : +82-31-3236008,9
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www.ltalab.com

EUT/Model No.: HCZ-6321

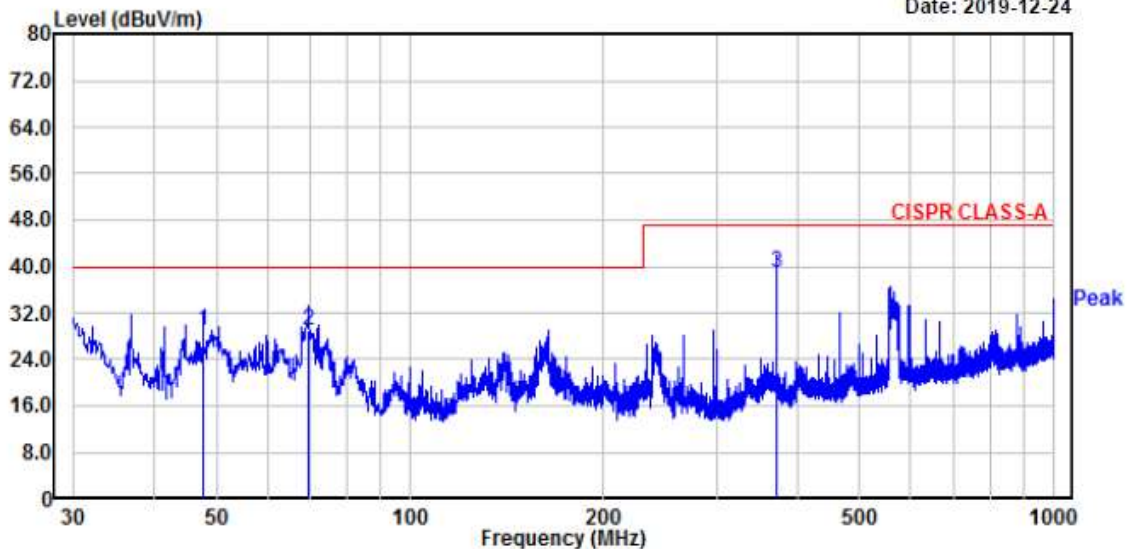
Temp/Humi: 22 'C / 41 % R.H.

Test Mode : Camera mode

Tested by: CHO J H

Power : 120 V / 60 Hz

Date: 2019-12-24



No.	Freq MHz	Reading dBuV	C.F dB	Result QP dBuV/m	Limit dBuV/m	Margin dB	Height cm	Angle deg	Polarity
1.	47.70	42.17	-13.31	28.86	40.00	11.14	100	137	vertical
2.	69.41	44.42	-15.30	29.12	40.00	10.88	103	231	vertical
3.	371.20	48.45	-9.46	38.99	47.00	8.01	124	44	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

-Continue

(Below 1 GHz) / H



4, Songjuro 236Beon-gil, yanggi-myeon,
Yongin-si, Gyeonggi-do, Korea
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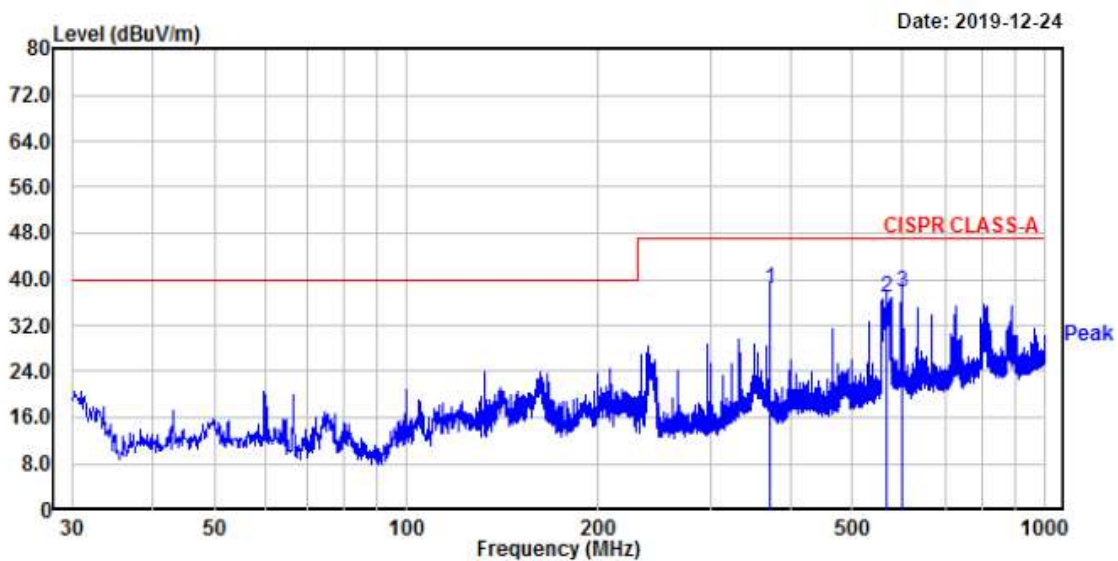
EUT/Model No.: HCZ-6321

Temp/Humi: 22 'C / 41 % R.H.

Test Mode : Camera mode

Tested by: CHO J H

Power : 120 V / 60 Hz



No.	Freq MHz	Reading dBμV	C.F dB	Result QP dBμV/m	Limit dBμV/m	Margin dB	Height cm	Angle deg	Polarity
1.	371.20	47.91	-9.46	38.45	47.00	8.55	400	135	horizontal
2.	565.56	42.27	-5.52	36.75	47.00	10.25	154	135	horizontal
3.	598.78	42.31	-4.66	37.65	47.00	9.35	121	360	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

-Continue

(Above 1 GHz) / V

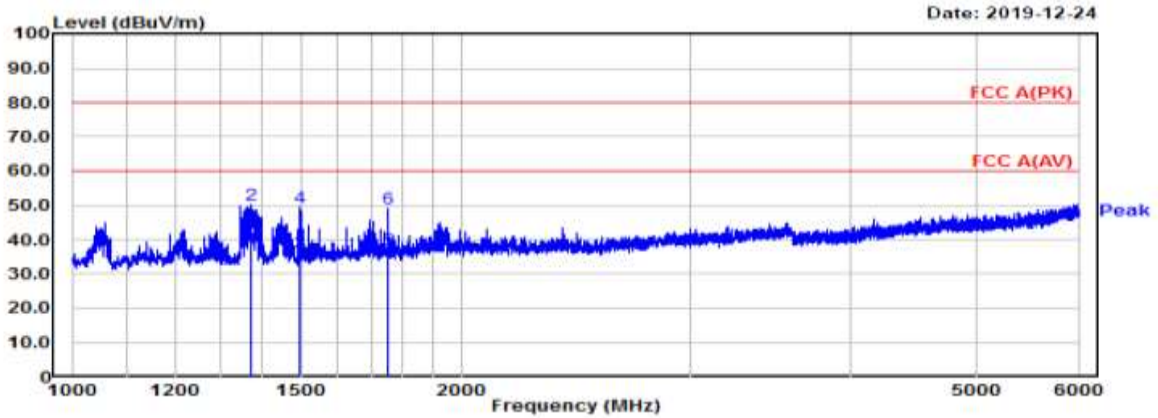
EUT/Model No.: HCZ-6321

Temp/Humi: 22 'C / 41 % R.H.

Test Mode : Camera mode

Tested by: CHO J H

Power : 120 V / 60 Hz



(Above 1 GHz) / H

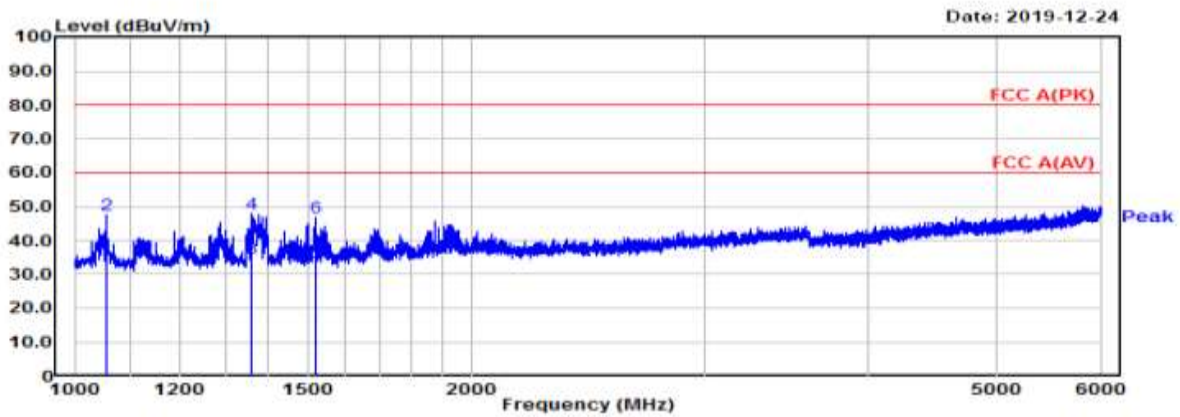
EUT/Model No.: HCZ-6321

Temp/Humi: 22 'C / 41 % R.H.

Test Mode : Camera mode

Tested by: CHO J H

Power : 120 V / 60 Hz


Manufacture : HANWHA TECHWIN(TIANJIN)
CO., LTD

Test Date
2019-12-24

Temp.: 22.00
Humidity : 41.00
Distance (m)
3.8

Model : HCZ-6321

TEST mode : Camera mode

Frequency MHz	Reading(PK) dBuV	Reading(AV) dBuV	C.F dB	Result(PK) dBuV/m	Result(AV) dBuV/m	Limit(PK) dBuV/m	Limit(AV) dBuV/m	Margin(PK) dB	Margin(AV) dB	Height cm	Angle deg	Polarity H/V
1056.25	42.82	42.82	-6.39	36.43	36.43	80.00	60.00	43.57	23.57	100	105	H
1360.00	41.51	41.51	-4.60	36.91	36.91	80.00	60.00	43.09	23.09	100	92	H
1520.00	39.35	39.35	-3.59	35.76	35.76	80.00	60.00	44.24	24.24	100	116	H
1373.75	56.82	43.82	-4.52	52.30	39.30	80.00	60.00	27.70	20.70	100	103	V
1499.38	55.14	42.14	-3.78	51.36	38.36	80.00	60.00	28.64	21.64	100	57	V
1751.88	52.43	40.43	-1.34	51.09	39.09	80.00	60.00	28.91	20.91	100	45	V

Conclusions

Product models "**HCZ-6321**" meets all of the Class A requirements of the FCC Part 15, Subpart B. Limits of radio disturbance characteristics of ITE).

(Refer to Test Specification and Test Results in the "LTA certification", page 7 and 8)

- The highest internal source of an EUT is higher than 108 MHz, the measurement shall be made up to 6 GHz.

(The highest internal source of an EUT : higher than 108 MHz)

Photograph of the measurements

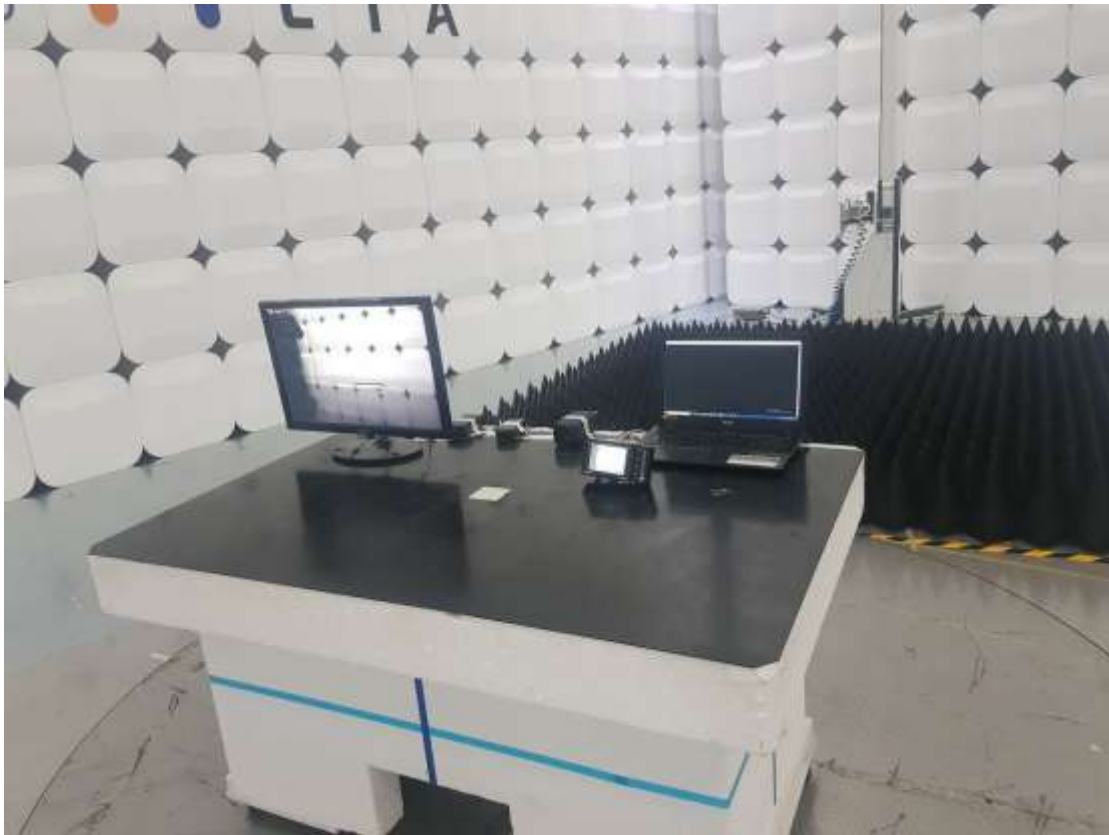
Photograph of the Conducted Disturbance Measurements



Photograph of the Radiated Disturbance Measurements (Below 1GHz)



Photograph of the Radiated Disturbance Measurements (Above 1GHz)



Photograph of the EUT

Photograph of the Equipment Under Test



Photograph of the Equipment Under Test

