

EMC TEST REPORT For CE

Test Report No. : KES-E2-18T0049
Date of Issue : Nov. 26, 2018
Product name : HOME CAMERA
Model/Type No. : SNH-P6415BN
Variant Model : SNH-P6416BN, SNH-C6415BN, SNH-C6416BNB
Applicant : Hanwha Techwin Co., Ltd.
Applicant Address : 6, Pangyo-ro 319 Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488, KOREA
Manufacturer : 1. Hanwha Techwin (Tianjin) Co.,Ltd.
2. HANWHA TECHWIN SECURITY VIETNAM CO.,LTD.
3. D-TECH CO.,LTD.
Manufacturer Address : 1. No.11 Weiliu Rd, Micro-Electronic Industrial Park, TEDA, Tianjin,
300385, People's Republic of China
2. Lot O-2, Que Vo Industrial Zone extended area,
Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam
3. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi-do,
Korea (Suwon Industrial Complex)
Date of Receipt : Nov. 14, 2018
Test date : Nov. 19, 2018 ~ Nov. 24, 2018
Test Results : **In Compliance** **Not in Compliance**

Tested by



Dae Hyun, Kim
EMC Test Engineer

Reviewed by



Dong-Hun, Jang
EMC Technical Manager



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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Nov. 26, 2018	KES-E2-18T0049	Issued

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1.0 General Product Description

Main Specifications of E.U.T are:

Item	Description
Wireless	WiFi 802.11a/b/g/n/ac (Dual Band) , BLE
Operating Power	AC 230 V / 50 Hz (Adapter DC 5 V / 2 A)
Video Compression Format	H.264
Audio Communication	2-way Audio with Echo Cancellation
Digital Zoom	4x(Mobile)
App viewer	Supported OS : iOS, Android
Recording	Micro SD Card
Size	(48 x 135 x 32) mm



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1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage 220 Vac 230 Vac 240 Vac 12 Vdc PoE

Frequency 50 Hz 60 Hz Hz

1.2 Variant Model Differences

Adding derivatives with simple color changes.

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
HOME CAMERA	SNH-P6415BN	-	Hanwha Techwin (Tianjin) Co., Ltd.	EUT
AC/DC Adapter	SLU10	-	SOLU M	-

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Smart Phone	SM-G950	-	Samsung Electronics Co., Ltd.	-
Wireless Router	A2004plus	-	Iptime	-
Wireless Router Adapter	TY-2007	-	Zioncoin Electronics (Shenzhen) Ltd.	-
Micro SD Card	-	-	Sandisk	-

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1.6 External I/O Cabling

■ BT Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
HOME CAMERA (EUT)	USB C Type	AC/DC Adapter	USB	3.5	U
	Wireless	Smart Phone	Wireless	-	-

* Unshielded = U, Shielded = S

■ WIFI 2.4 GHz / WIFI 5 GHz Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
HOME CAMERA (EUT)	USB C Type	AC/DC Adapter	USB	3.5	U
	Micro SD Card Slot	Micro SD Card	Micro SD Card Slot	-	-
	Wireless	Wireless Router	Wireless	-	-
Wireless Router	Wireless	Smart Phone	Wireless	-	-

* Unshielded = U, Shielded = S

1.7 EUT Operating Mode(s)

Test mode	operating
BT	Confirmed the bluetooth connection status through Smart Cam+ program.
WIFI 2.4 GHz	We checked the video using smartphone, confirmed the wifi connection status through Smart Cam+ program.
WIFI 5 GHz	

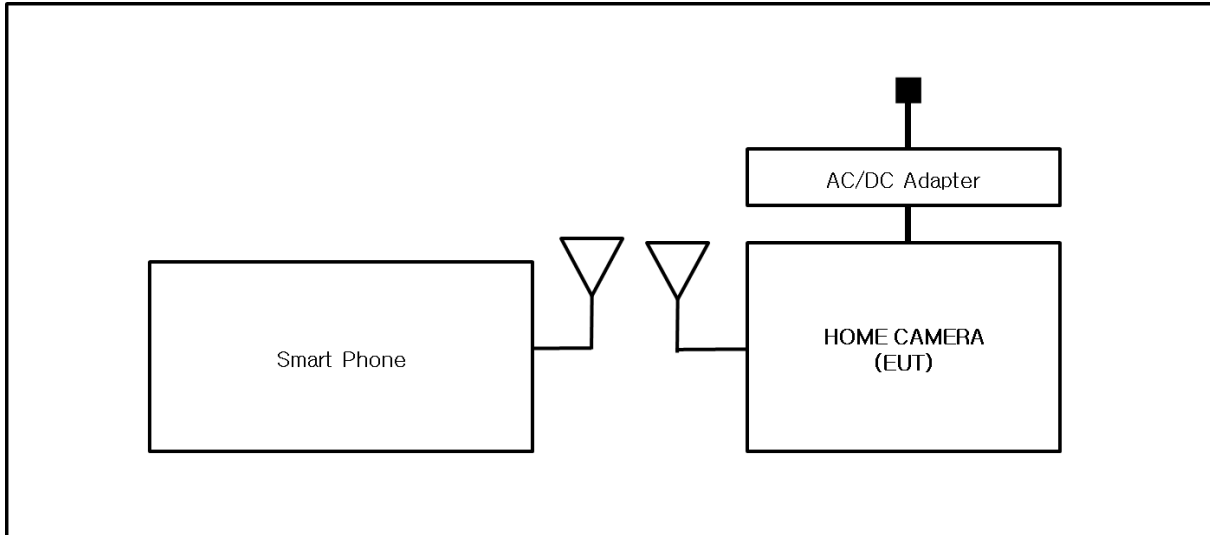
E.U.T Test operating S/W		
Name	Version	Manufacture Company
Smart Cam+	V.2.22	Hanwha Techwin Co., Ltd.

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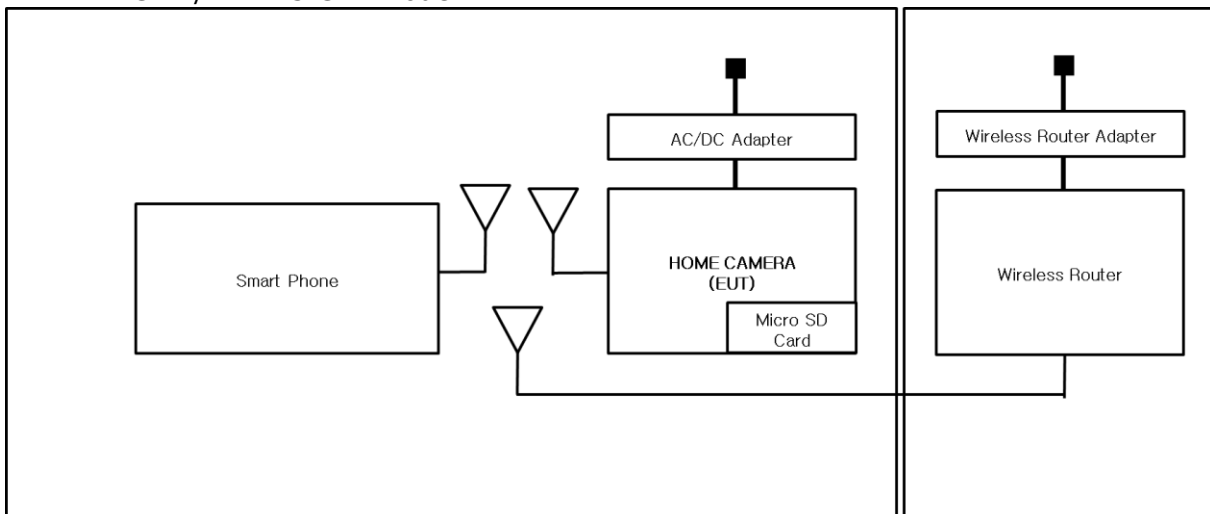
1.8 Configuration

■ AC Main
 □ DC Main

■ BT Mode



■ WIFI 2.4 GHz / WIFI 5 GHz Mode



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1.9 Remarks when standards applied

N/A







1.10 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

1.11 Test Facility

The measurement facility is located at 473-21 Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea. The sites are constructed in conformance with the requirements of ANSI C63.4:2014 and CISPR 16-1-4:2012

1.12 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Aechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Aechoic Chamber and Conducted test site	 23298-1
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-4308, C-4798, T-2311, G-914
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Aechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 17 07 01633 001

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2.0 Test Regulations

The emissions tests were performed according to following regulations:

EMC – Directive 2014/30/EU

EN 61000-6-3:2011

EN 61000-6-1:2007

EN 61000-6-4:2007 +A1:2011

EN 61000-6-2:2005

EN 55011:2007 +A1:2010

Group 1

Group 2

Class A

Class B

EN 55014-1:2006 +A2:2011

EN 55014-2:1997 +A2:2008

EN 55015:2013

EN 55022:2010

Class A

Class B

EN 55024:2010

EN 50130-4:2011 +A1:2014

EN 61326-1:2013



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-
- | | | |
|--|----------------------------------|---|
| <input type="checkbox"/> VCCI V-3 / 2015.04 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> AS/NZS CISPR22:2009 +A1:2010 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> 47 CFR Part 15, Subpart B | | |
| <input type="checkbox"/> CISPR 22:2009 +A1:2010 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2009 | | |
| <input type="checkbox"/> IC Regulation ICES-003 : 2017 | | |
| <input type="checkbox"/> CAN/CSA CISPR 22-10 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> ANSI C63.4-2014 | | |
| <input checked="" type="checkbox"/> RE – Directive 2014/53/EU | | |
| <input checked="" type="checkbox"/> EN 301 489-1 V2,1,1 | | |
| <input checked="" type="checkbox"/> Equipment for fixed use | <input type="checkbox"/> Class A | <input checked="" type="checkbox"/> Class B |
| <input type="checkbox"/> Equipment for vehicular use | | |
| <input type="checkbox"/> Equipment for portable use | | |
| <input type="checkbox"/> EN 301 489-3 V1,6,1 | | |
| <input type="checkbox"/> EN 301 489-9 V1,4,1 | | |
| <input checked="" type="checkbox"/> EN 301 489-17 V3,1,1 | | |
| <input type="checkbox"/> EN 60945:2002 | | |
| <input checked="" type="checkbox"/> EN 61000-3-2:2014 | | |
| <input checked="" type="checkbox"/> EN 61000-3-3:2013 | | |

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Nov. 22, 2018

Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101781	04, 25, 2019
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	01, 05, 2019
<input type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	04, 25, 2019
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 27, 2018

Test Conditions

Temperature: 23,1 °C
Relative Humidity: 51,8 % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

See Appendix A for test data.



2.2 Conducted Emissions at Telecommunication Ports

Test Date

N/A

Test Location

Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	EMI Test S/W	EMC32	R & S	9.12.00	-
<input type="checkbox"/>	EMI TEST RECEIVER	ESR3	R & S	101783	04, 25, 2019
<input type="checkbox"/>	LISN	ENV216	R & S	101137	01, 31, 2019
<input type="checkbox"/>	LISN	ENV216	R & S	101786	04, 25, 2019

Test Conditions

Temperature:

°C

Relative Humidity:

% R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

N/A



2.3 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Nov. 20, 2018

Test Location

Open Area Test Site #2 Semi Anechoic Chamber #4(10 m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESU26	R & S	100551	04, 11, 2019
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 26, 2019
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 26, 2019

Test Conditions

Temperature: 22,8 °C
Relative Humidity: 52,7 % R.H.

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

- PASS
 NOT PASS
 NOT APPLICABLE

Remarks

See Appendix A for test data.



2.4 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

Nov. 20, 2018

Test Location

Semi Anechoic Chamber #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESR7	R & S	101190	08, 06, 2019
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01967	05, 31, 2019
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	35496	03, 21, 2019
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

Test Conditions

Temperature: 22,7 °C
Relative Humidity: 52,9 % R.H.

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

See Appendix A for test data.



2.5 Harmonic Current Emissions

Test Date

Nov. 21, 2018

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	dpa.control	EM TEST	5.4.11.0	-
<input checked="" type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 08, 2019
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 53,1 % R.H.

Classification of Equipment for Harmonic Current Emissions

- Class A
- Class B
- Class C(Below 25 W)
- Class C(Above 25 W)
- Class D

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

See Appendix A for test data.



2.6 Voltage Fluctuations and Flicker

Test Date

Nov. 21, 2018

Test Location

Electro wave Shieldroom #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMI Test S/W	dpa.control	EM TEST	5.4.11.0	-
<input checked="" type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	08, 08, 2019
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: 23,0 °C
Relative Humidity: 53,1 % R.H.

Test Results

The requirements are:

- PASS
- NOT PASS
- NOT APPLICABLE

Remarks

See Appendix A for test data.

3.0 Criteria for compliance

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the performance criteria as specified in the following clauses.

Performance table

Criteria	During test	After test
A	Shall operate as intended. May show degradation of performance (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 2). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 1). No unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2).
NOTE 1:	Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.	
NOTE 2:	No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.	



Performance criteria for Continuous phenomena applied to Transmitters (CT)

The performance criteria A shall apply.

We checked the video using smartphone, confirmed the wifi connection status through Smart Cam+ program and Confirmed the bluetooth connection status through Smart Cam+ program.

Performance criteria for Transient phenomena applied to Transmitters (TT)

The EUT shall not unintentional transmission after the test.

We checked the video using smartphone, confirmed the wifi connection status through Smart Cam+ program and Confirmed the bluetooth connection status through Smart Cam+ program. The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. However, internal battery benchmark since it is applied B

Performance criteria for Continuous phenomena applied to Receivers (CR)

The performance criteria A shall apply.

The EUT shall not unintentional transmission during the test.

We checked the video using smartphone, confirmed the wifi connection status through Smart Cam+ program and Confirmed the bluetooth connection status through Smart Cam+ program.

Performance criteria for Transient phenomena applied to Receivers (TR)

The EUT shall not unintentional transmission after the test.

Connect the EUT and BLE TAG wirelessly. Checked normal operation of the EUT through the telnet program on the notebook.

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply. However, internal battery benchmark since it is applied B



3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009

Test Date

Nov. 24, 2018

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	10, 11, 2019
<input checked="" type="checkbox"/>	HCP	-	KES	-	-
<input checked="" type="checkbox"/>	VCP	-	KES	-	-

Test Conditions

Temperature: 23,4 °C
Relative Humidity: 51,6 % R.H.
Atmospheric Pressure: 101,1 kPa



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Test Specifications

Discharge Factor: ≥ 1 s
Discharge Impedance: 330 ohm / 150 pF
Kind of Discharge: Air, Contact (direct and indirect)
Polarity: Positive and Negative
Number of Discharge: more than 10 time

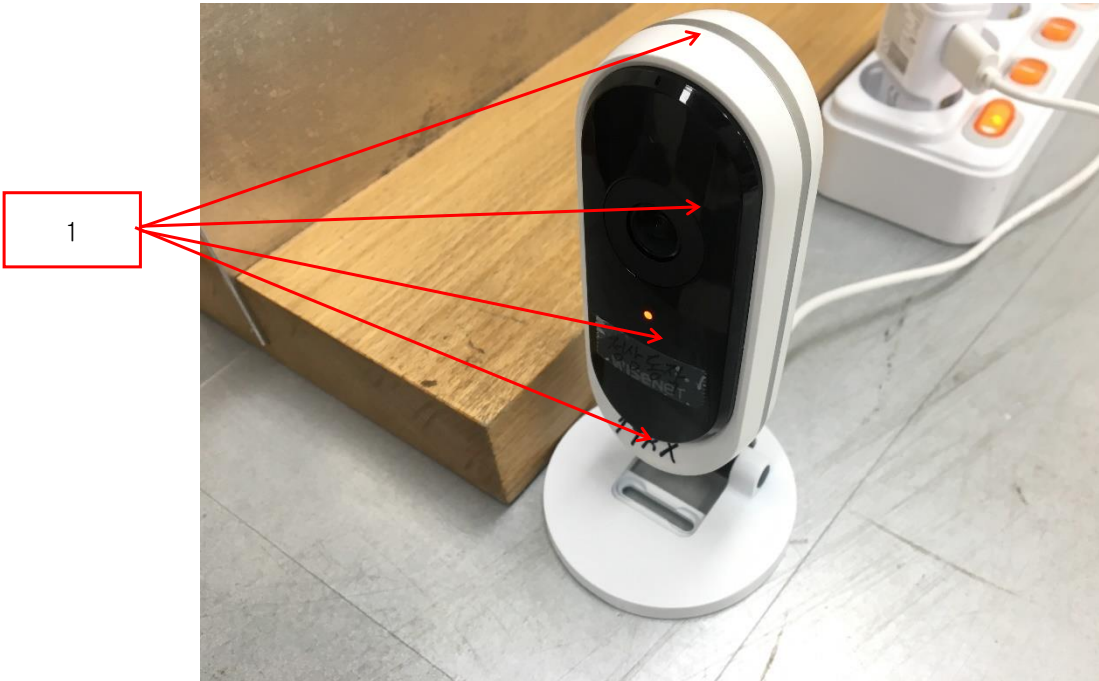
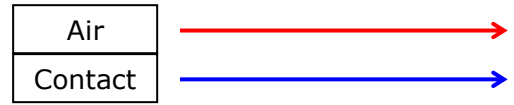
Discharge Voltage:	Contact	Air	HCP	VCP
	<input checked="" type="checkbox"/> 2 kV	<input checked="" type="checkbox"/> 2 kV	<input checked="" type="checkbox"/> 2 kV	<input checked="" type="checkbox"/> 2 kV
	<input checked="" type="checkbox"/> 4 kV	<input checked="" type="checkbox"/> 4 kV	<input checked="" type="checkbox"/> 4 kV	<input checked="" type="checkbox"/> 4 kV
	<input type="checkbox"/> 6 kV	<input type="checkbox"/> 6 kV	<input type="checkbox"/> 6 kV	<input type="checkbox"/> 6 kV
	<input type="checkbox"/> 8 kV	<input checked="" type="checkbox"/> 8 kV	<input type="checkbox"/> 8 kV	<input type="checkbox"/> 8 kV
	<input type="checkbox"/> 15 kV	<input type="checkbox"/> 15 kV	<input type="checkbox"/> 15 kV	<input type="checkbox"/> 15 kV

Notes: HCP: Horizontal coupling plane
VCP: Vertical coupling plane

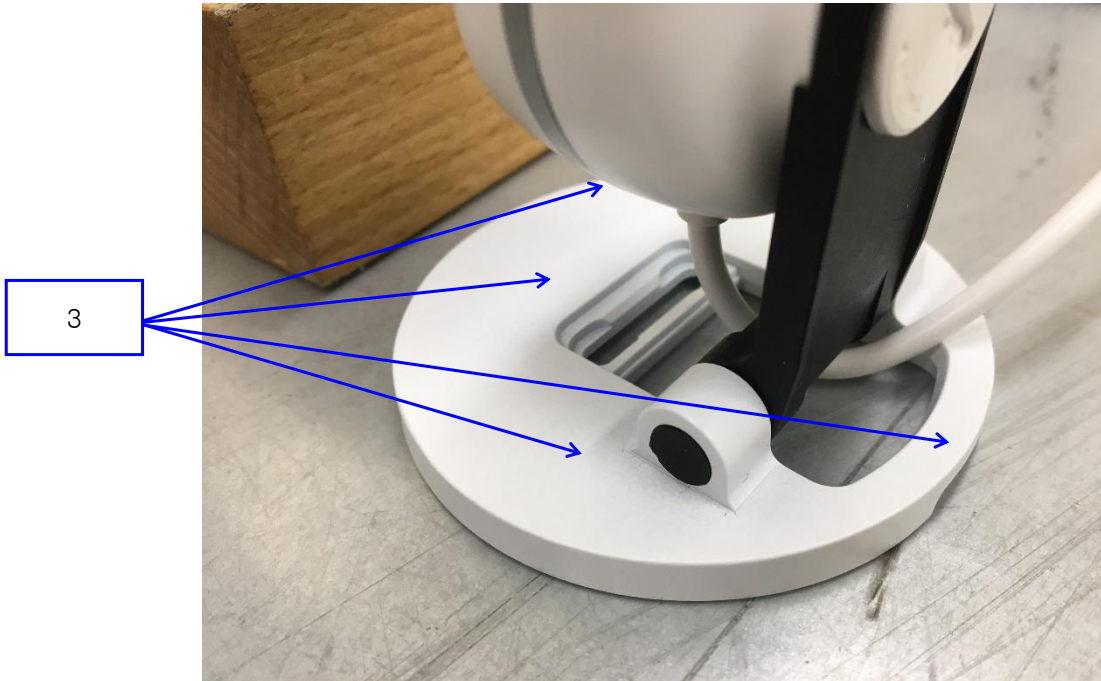
Required Performance Criteria: B

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Location of Discharge:



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Test Data

■ BT Mode

Indirect Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	HCP Contact	Contact Discharge	B	A	-
2	VCP Contact	Contact Discharge	B	A	-

Direct Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	Front Enclosure	Air Discharge	B	A	-
2	Port	Air Discharge	B	A	-
3	Pedestal Enclosure	Contact Discharge	B	A	-

■ WIFI 2.4 GHz Mode

Indirect Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	HCP Contact	Contact Discharge	B	A	-
2	VCP Contact	Contact Discharge	B	A	-

Direct Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	Front Enclosure	Air Discharge	B	A	-
2	Port	Air Discharge	B	A	-
3	Pedestal Enclosure	Contact Discharge	B	A	-

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■ WIFI 5 GHz Mode

Indirect Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	HCP Contact	Contact Discharge	B	A	-
2	VCP Contact	Contact Discharge	B	A	-

Direct Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	Front Enclosure	Air Discharge	B	A	-
2	Port	Air Discharge	B	A	-
3	Pedestal Enclosure	Contact Discharge	B	A	-

Direct Discharge

Note: "Blank" = Not performed

Results:

- A - No degradation of function
- B - Distortion/Error of function (self-recoverable)
- C - Loss of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria
- NOT APPLICABLE

Remarks

PASS Required Performance Criteria.

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3.2 Radiated Electric Field Immunity

Reference Standard

EN 61000-4-3:2006 +A2:2010

Test Date

Nov. 19, 2018

Test Location

EMS-RS: Semi Anechoic Chamber #2 Semi Anechoic Chamber #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	EMC32	R & S	10.10.02	-
<input checked="" type="checkbox"/>	SIGNAL GENERATOR	SMB 100A	R & S	177586	08, 06, 2019
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	BBA100	R & S	101239	08, 06, 2019
<input checked="" type="checkbox"/>	BROADBAND AMPLIFIER	100S1G6M1	AR	579931	08, 06, 2019
<input checked="" type="checkbox"/>	POWER METER	NRP2	R & S	103475	08, 06, 2019
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102526	08, 06, 2019
<input checked="" type="checkbox"/>	AVG POWER SENSOR	NRP-Z91	R & S	102527	08, 06, 2019
<input checked="" type="checkbox"/>	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
<input checked="" type="checkbox"/>	DIRECTIONAL COUPLER	KYDC-D1070-DX40	KY TELECOM	KY150001	08, 06, 2019
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	05, 02, 2019

Test Conditions

Temperature: 22,6 °C
Relative Humidity: 53,2 % R.H.
Atmospheric Pressure: 101,2 kPa

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Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: 3 m

Field Strength: 1 V/m 3 V/m
 10 V/m

Frequency Range: 80 MHz to 6 GHz 1,4 GHz to 2,7 GHz
 80 MHz to 2,7 GHz

Modulation: AM, 80 %, 1 kHz sine wave
 PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: 1 % step

Dwell Time: 1 s 3 s

of Sides Radiated: 4

Required Performance Criteria: A

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Test Data

■ BT Mode

Side Exposed	Performance Criteria	Results	
		Horizontal	Vertical
Front	A	A	A
Right	A	A	A
Back	A	A	A
Left	A	A	A

■ WIFI 2.4 GHz Mode

Side Exposed	Performance Criteria	Results	
		Horizontal	Vertical
Front	A	A	A
Right	A	A	A
Back	A	A	A
Left	A	A	A

■ WIFI 5 GHz Mode

Side Exposed	Performance Criteria	Results	
		Horizontal	Vertical
Front	A	A	A
Right	A	A	A
Back	A	A	A
Left	A	A	A

Note: "Blank" = Not performed

Results:

- A - No degradation of function
- B - Distortion/Error of function (self-recoverable)
- C - Loss of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria
- NOT APPLICABLE

Remarks

PASS Required Performance Criteria.

3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

Test Date

Nov. 21, 2018

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2018
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018
<input type="checkbox"/>	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	11, 27, 2018

Test Conditions

Temperature: 23,2 °C
 Relative Humidity: 52,1 % R.H.
 Atmospheric Pressure: 101,3 kPa

Test Specifications

Pulse Amplitude & Polarity: ± 1.0 kV ± 2.0 kV
 (Power Lines) ± 4.0 kV

Pulse Amplitude & Polarity: ± 0.5 kV ± 1.0 kV
 (Signal Lines) ± 2.0 kV

Burst Period: 300 ms 2 s

Repetition Rate: 5 kHz 100 kHz

Duration of Test Voltage: ≥ 1 min

Required Performance Criteria: B

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Test Data

■ BT Mode

Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
L	B	A	A
N	B	A	A
L - N	B	A	A

Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
-	B	-	-

Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
-	B	-	-

■ WIFI 2.4 GHz Mode

Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
L	B	A	A
N	B	A	A
L - N	B	A	A

Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
-	B	-	-

Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
-	B	-	-

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■ WIFI 5 GHz Mode

Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
L	B	A	A
N	B	A	A
L - N	B	A	A

Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
-	B	-	-

Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
-	B	-	-

Note: "Blank" = Not performed

Results:

- A – No degradation of function
- B – Distortion/Error of function (self-recoverable)
- C – Loss of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria
- NOT APPLICABLE

Remarks

PASS Required Performance Criteria.

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3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

Test Date

Nov. 21, 2018

Test Location

EMS-Surge: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2018
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018
<input type="checkbox"/>	CDN	CNV 508N1	EM TEST	P1610176296	11, 28, 2018
<input type="checkbox"/>	CDN	CNV 504N7.3	EM TEST	P1744207079	12, 18, 2018

Test Conditions

Temperature: 23,2 °C
Relative Humidity: 52,1 % R.H.
Atmospheric Pressure: 101,3 kPa



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Test Specifications

Power Lines

- Source Impedance: 12 ohm for common mode and 2 ohm for differential mode
- Surge Amplitude: Common Mode
 (0,5 / 1,0 / 2,0) kV
Differential Mode
 (0,5 / 1,0) kV
- Number of Surges: 5 surges per angle
- Angle: 0°, 90°, 180°, 270° (input a.c. power port)
- Polarity: Positive & Negative
- Repetition Rate: 1 surge per min 1 surge per 30 sec.
- Required Performance Criteria: B

Signal Lines

- Source Impedance: 42 ohm for common mode
- Surge Amplitude: Common Mode
 (0,5 / 1,0) kV
- Number of Surges: 5 Surges
- Polarity: Positive & Negative
- Repetition Rate: 1 surge per min 1 surge per 30 sec.
- Required Performance Criteria: B

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Test Data

■ BT Mode

Line to Line – Differential Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
L - N	B	A	A

Line to Earth – Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-
-	B	-	-

Signal Lines

Line to Earth – Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-

■ WIFI 2.4 GHz Mode

Line to Line – Differential Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
L - N	B	A	A

Line to Earth – Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-
-	B	-	-

Signal Lines

Line to Earth – Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-

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■ WIFI 5 GHz Mode

Line to Line - Differential Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
L - N	B	A	A

Line to Earth - Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-
-	B	-	-

Signal Lines

Line to Earth - Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-

Results:

- A - No degradation of function
- B - Distortion/Error of function (self-recoverable)
- C - Loss of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria
- NOT APPLICABLE

Remarks

PASS Required Performance Criteria.

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3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

Test Date

Nov. 23, 2018

Test Location

EMS-CS: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	icd.control	EM TEST	5.3.11	-
<input checked="" type="checkbox"/>	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 27, 2018
<input checked="" type="checkbox"/>	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 27, 2018
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43694	11, 27, 2018

Test Conditions

Temperature: 23,0 °C
 Relative Humidity: 52,3 % R.H.
 Atmospheric Pressure: 100,9 kPa

Test Specifications

Frequency range: 150 kHz to 80 MHz 10 kHz to 30 MHz
 150 kHz to 230 MHz 10 kHz to 100 MHz

Voltage Level: 1 Vrms 3 Vrms
 10 Vrms

Modulation: AM, 80 %, 1 kHz sine wave
 PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: 1 % step

Dwell Time: 1 s 3 s

Required Performance Criteria: A

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Test Data

■ BT Mode

Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
L - N	CDN	A	A

Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	-	-	-

Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	-	-	-

■ WIFI 2.4 GHz Mode

Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
L - N	CDN	A	A

Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	-	-	-

Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	-	-	-

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■ WIFI 5 GHz Mode

Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
L - N	CDN	A	A

Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	-	-	-

Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	-	-	-

Notes: CDN = Coupling Decoupling Network
EMC = Electro Magnetic Clamp
"blank" = Not performed

Results:

- A - No degradation of function
- B - Distortion/Error of function (self-recoverable)
- C - Loss of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria
- NOT APPLICABLE

Remarks

PASS Required Performance Criteria.

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3.6 Power Frequency Magnetic Field Immunity

Reference Standard

EN 61000-4-8:2010

Test Date

N/A

Test Location

EMS-Magnetic: Electro wave Shieldroom

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2018
<input type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018
<input type="checkbox"/>	MAGNETIC FIELD COIL	MS 100N	EM TEST	P1536163691	11, 28, 2018
<input type="checkbox"/>	CURRENT TRANSFORMER	MC 2630	EM TEST	P1629182219	11, 28, 2018

Test Conditions

Temperature: °C
Relative Humidity: % R.H.
Atmospheric Pressure: kPa

Test Specifications

Field Strength: 1 A/m 3 A/m
 30 A/m

Frequency: 50 Hz 60 Hz

Required Performance Criteria: A

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Test Data

Immersion method

Coil orientation	Observation
X - axis	-
Y - axis	-
Z - axis	-

Proximity method

Coil orientation	Observation
-	-
-	-
-	-

Note: "blank" = Not performed

Results:

- A - No degradation of function
- B - Distortion/Error of function (self-recoverable)
- C - Loss of function

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria
- NOT APPLICABLE

Remarks

N/A : Not affected by magnetic fields.

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3.7 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004

Test Date

Nov. 21, 2018

Test Location

EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.7	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	11, 27, 2018
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	11, 27, 2018

Test Conditions

Temperature: 23,2 °C
 Relative Humidity: 52,1 % R.H.
 Atmospheric Pressure: 101,3 C

Test Specifications

Number of Tests : 3 times
 Test Intervals : 10 sec
 Performance Criteria : B for Voltage Dips (100 %, 0.5 T)
 B for Voltage Dips (100 %, 1 T)
 B for Voltage Dips (30%, 25 T)
 C for Voltage Interruptions (100 %, 250 T)



Test Data

■ BT Mode

Voltage Dips

NO	Depth	Duration	Performance		Remarks
			Criteria	Results	
1	100 %	0.5 T	B	A	-
2	100 %	1 T	B	A	-
3	30 %	25 T	B	A	-

Short Interruptions

NO	Depth	Duration	Performance		Remarks
			Criteria	Results	
1	100 %	250 T	C	C	-

■ WIFI 2.4 GHz Mode

Voltage Dips

NO	Depth	Duration	Performance		Remarks
			Criteria	Results	
1	100 %	0.5 T	B	A	-
2	100 %	1 T	B	A	-
3	30 %	25 T	B	A	-

Short Interruptions

NO	Depth	Duration	Performance		Remarks
			Criteria	Results	
1	100 %	250 T	C	C	-

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■ WIFI 5 GHz Mode

Voltage Dips

NO	Depth	Duration	Performance		Remarks
			Criteria	Results	
1	100 %	0.5 T	B	A	-
2	100 %	1 T	B	A	-
3	30 %	25 T	B	A	-

Short Interruptions

NO	Depth	Duration	Performance		Remarks
			Criteria	Results	
1	100 %	250 T	C	C	-

Results:

- A - No response observed from E.U.T
- B - Unit shuts down then automatically restarts when full voltage is restored.
- C - Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

- PASS Required Performance Criteria
- NOT PASS Required Performance Criteria
- NOT APPLICABLE

Remarks

During the interruption test (100%, 250T), EUT was turned off But after the test, It was recovered by operatoris intervention.

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APPENDIX A – TEST DATA

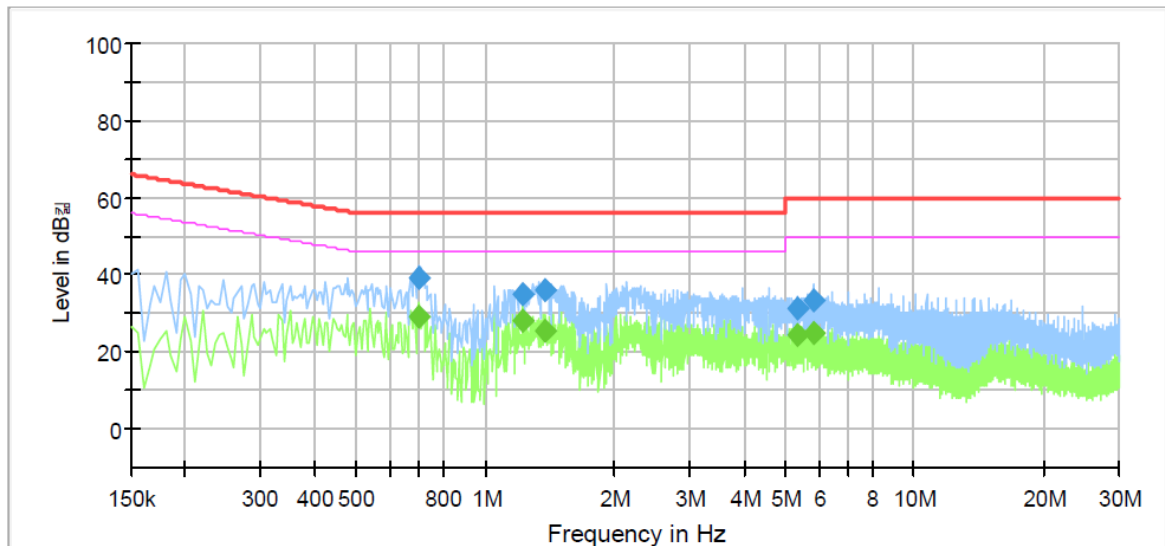
Conducted Emissions at Mains Power Ports

■ BT Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	SNH-P6415BN
Mode	BT
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dB _{μV})	CAverage (dB _{μV})	Limit (dB _{μV})	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.700000	---	29.18	46.00	16.82	1000.0	9.000	L1	19.9
0.700000	39.11	---	56.00	16.89	1000.0	9.000	L1	19.9
1.225000	---	28.34	46.00	17.66	1000.0	9.000	L1	20.2
1.225000	35.07	---	56.00	20.93	1000.0	9.000	L1	20.2
1.385000	---	25.45	46.00	20.55	1000.0	9.000	L1	20.2
1.385000	35.81	---	56.00	20.19	1000.0	9.000	L1	20.2
5.315000	---	24.28	50.00	25.72	1000.0	9.000	L1	19.8
5.315000	31.38	---	60.00	28.62	1000.0	9.000	L1	19.8
5.800000	---	24.98	50.00	25.02	1000.0	9.000	L1	19.7
5.800000	33.31	---	60.00	26.69	1000.0	9.000	L1	19.7

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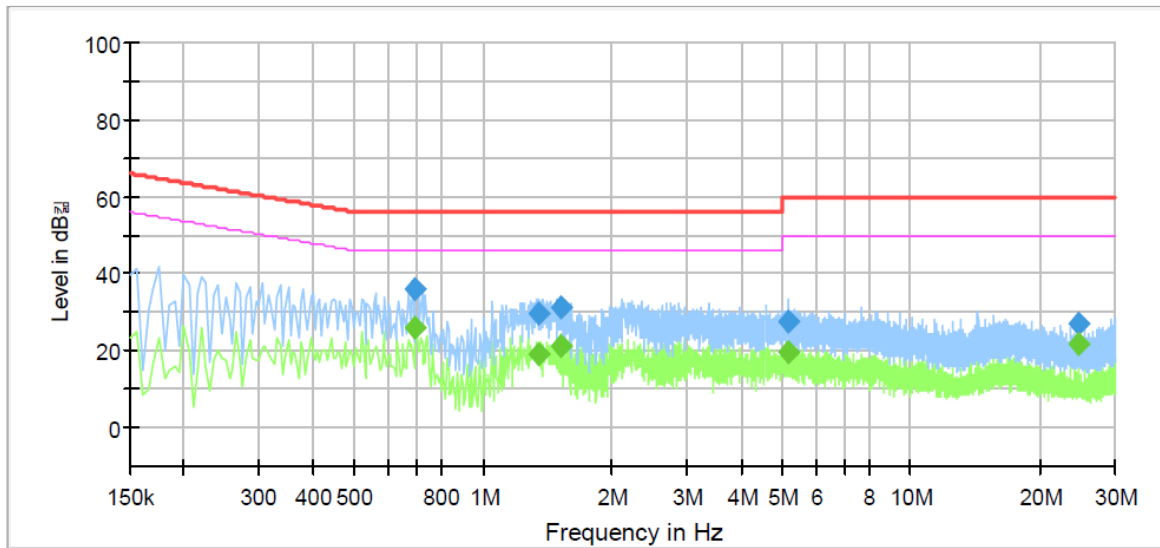
3701, 40, Simin-daero 365beon-gil,
 Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
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 www.kes.co.kr

Report No.:
 KES-E2-18T0049
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[NEUTRAL]

Common Information

Test Description: Conducted Emission
 Model No.: SNH-P6415BN
 Mode: BT
 Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.695000	---	25.77	46.00	20.23	1000.0	9.000	N	19.9
0.695000	35.86	---	56.00	20.14	1000.0	9.000	N	19.9
1.350000	---	19.19	46.00	26.81	1000.0	9.000	N	20.2
1.350000	29.71	---	56.00	26.29	1000.0	9.000	N	20.2
1.525000	---	21.19	46.00	24.81	1000.0	9.000	N	20.2
1.525000	31.04	---	56.00	24.96	1000.0	9.000	N	20.2
5.190000	---	19.45	50.00	30.55	1000.0	9.000	N	19.8
5.190000	27.81	---	60.00	32.19	1000.0	9.000	N	19.8
24.575000	---	21.70	50.00	28.30	1000.0	9.000	N	20.5
24.575000	27.09	---	60.00	32.91	1000.0	9.000	N	20.5

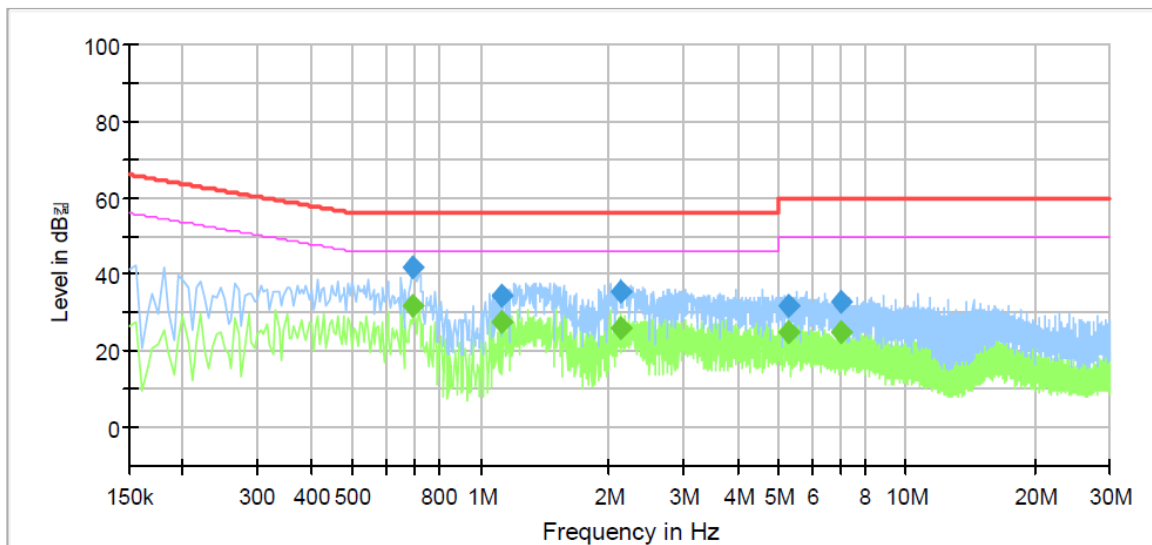
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■ WIFI 2.4 GHz Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	SNH-P6415BN
Mode:	WIFI 2.4 GHz
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dB _{μV})	CAverage (dB _{μV})	Limit (dB _{μV})	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.695000	---	31.95	46.00	14.05	1000.0	9.000	L1	19.9
0.695000	41.79	---	56.00	14.21	1000.0	9.000	L1	19.9
1.115000	---	27.52	46.00	18.48	1000.0	9.000	L1	20.1
1.115000	34.56	---	56.00	21.44	1000.0	9.000	L1	20.1
2.135000	---	25.99	46.00	20.01	1000.0	9.000	L1	20.3
2.135000	35.54	---	56.00	20.46	1000.0	9.000	L1	20.3
5.295000	---	24.78	50.00	25.22	1000.0	9.000	L1	19.8
5.295000	31.94	---	60.00	28.06	1000.0	9.000	L1	19.8
7.025000	---	24.73	50.00	25.27	1000.0	9.000	L1	19.7
7.025000	32.76	---	60.00	27.24	1000.0	9.000	L1	19.7

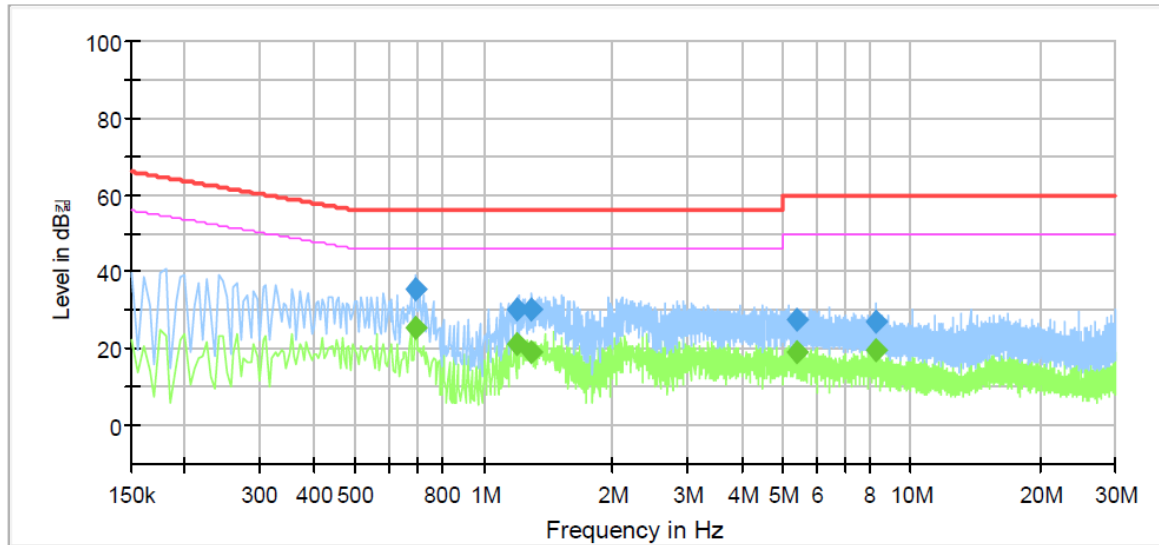
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[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	SNH-P6415BN
Mode:	WIFI 2.4 GHz
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.695000	---	25.52	46.00	20.48	1000.0	9.000	N	19.9
0.695000	35.44	---	56.00	20.56	1000.0	9.000	N	19.9
1.200000	---	21.07	46.00	24.93	1000.0	9.000	N	20.2
1.200000	29.99	---	56.00	26.01	1000.0	9.000	N	20.2
1.295000	---	19.30	46.00	26.70	1000.0	9.000	N	20.2
1.295000	30.21	---	56.00	25.79	1000.0	9.000	N	20.2
5.405000	---	19.11	50.00	30.89	1000.0	9.000	N	19.8
5.405000	27.29	---	60.00	32.71	1000.0	9.000	N	19.8
8.245000	---	19.61	50.00	30.39	1000.0	9.000	N	19.9
8.245000	27.22	---	60.00	32.78	1000.0	9.000	N	19.9

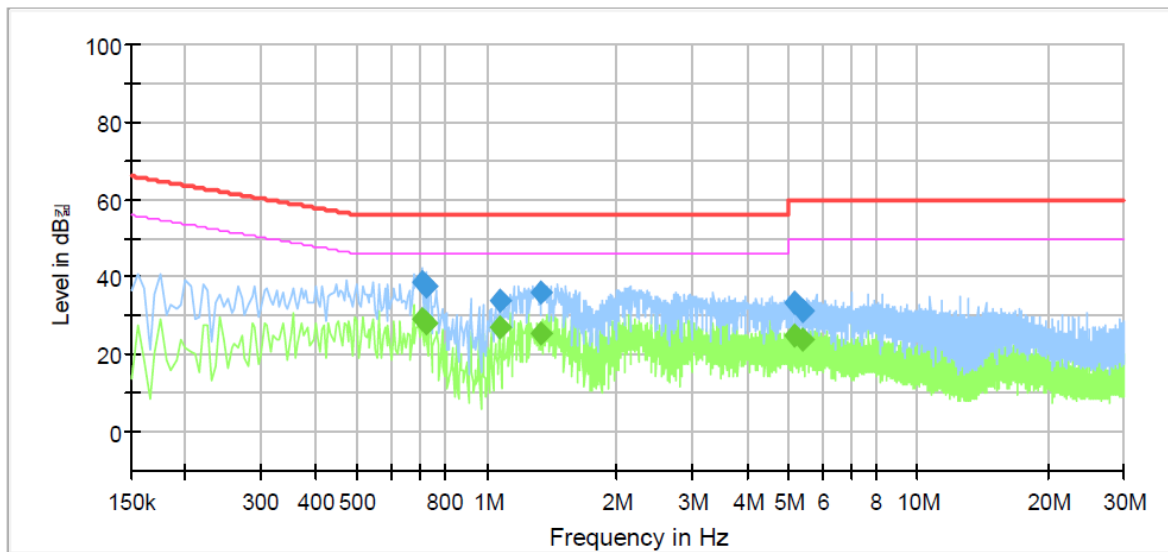
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■ WIFI 5 GHz Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	SNH-P6415BN
Mode	WIFI 5 GHz
Operator Name:	KES



Final Result

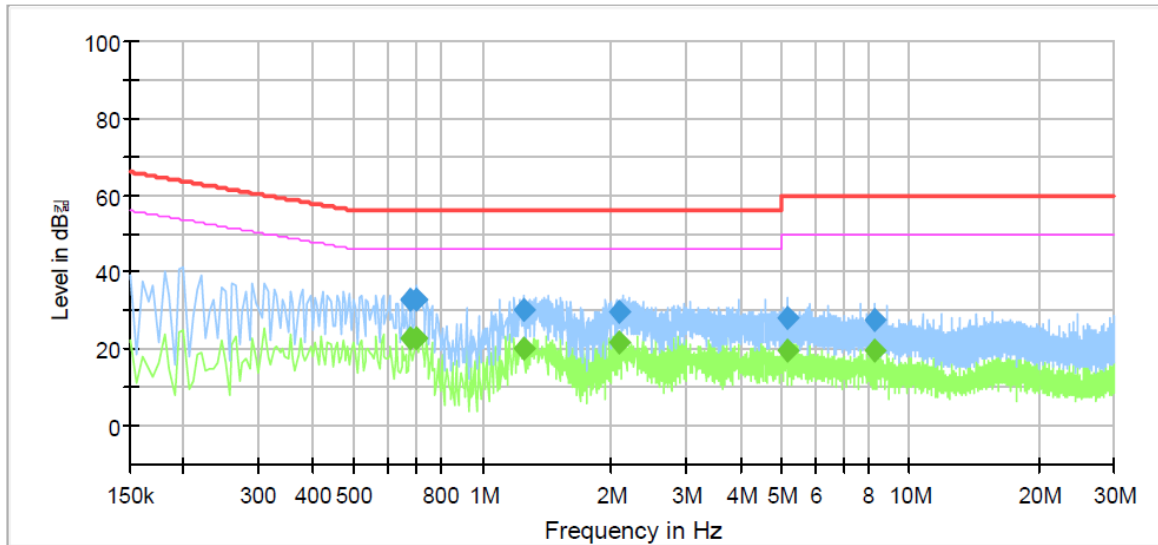
Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.705000	---	29.14	46.00	16.86	1000.0	9.000	L1	19.9
0.705000	38.60	---	56.00	17.40	1000.0	9.000	L1	19.9
0.720000	---	28.00	46.00	18.00	1000.0	9.000	L1	19.9
0.720000	37.54	---	56.00	18.46	1000.0	9.000	L1	19.9
1.070000	---	26.79	46.00	19.21	1000.0	9.000	L1	20.1
1.070000	33.88	---	56.00	22.12	1000.0	9.000	L1	20.1
1.330000	---	25.56	46.00	20.44	1000.0	9.000	L1	20.2
1.330000	35.79	---	56.00	20.21	1000.0	9.000	L1	20.2
5.190000	---	25.01	50.00	24.99	1000.0	9.000	L1	19.8
5.190000	33.20	---	60.00	26.80	1000.0	9.000	L1	19.8
5.385000	---	24.02	50.00	25.98	1000.0	9.000	L1	19.8
5.385000	31.36	---	60.00	28.64	1000.0	9.000	L1	19.8

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[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	SNH-P6415BN
Mode:	WIFI 5 GHz
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.675000	---	23.03	46.00	22.97	1000.0	9.000	N	19.9
0.675000	32.84	---	56.00	23.16	1000.0	9.000	N	19.9
0.700000	---	22.68	46.00	23.32	1000.0	9.000	N	19.9
0.700000	32.71	---	56.00	23.29	1000.0	9.000	N	19.9
1.250000	---	19.92	46.00	26.08	1000.0	9.000	N	20.2
1.250000	30.19	---	56.00	25.81	1000.0	9.000	N	20.2
2.095000	---	21.53	46.00	24.47	1000.0	9.000	N	20.3
2.095000	29.75	---	56.00	26.25	1000.0	9.000	N	20.3
5.190000	---	19.47	50.00	30.53	1000.0	9.000	N	19.8
5.190000	27.95	---	60.00	32.05	1000.0	9.000	N	19.8
8.245000	---	19.76	50.00	30.24	1000.0	9.000	N	19.9
8.245000	27.29	---	60.00	32.71	1000.0	9.000	N	19.9

◆ Calculation

QuasiPeak [dB μ V] / CAverage [dB μ V] = Reading Value [dB μ V] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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Report No.:
KES-E2-18T0049
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Conducted Emissions at Telecommunication Ports

[10 Mbps]

N/A

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (ISN FACTOR+ Cable Loss)

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[100 Mbps]

N/A

◆ Calculation

QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

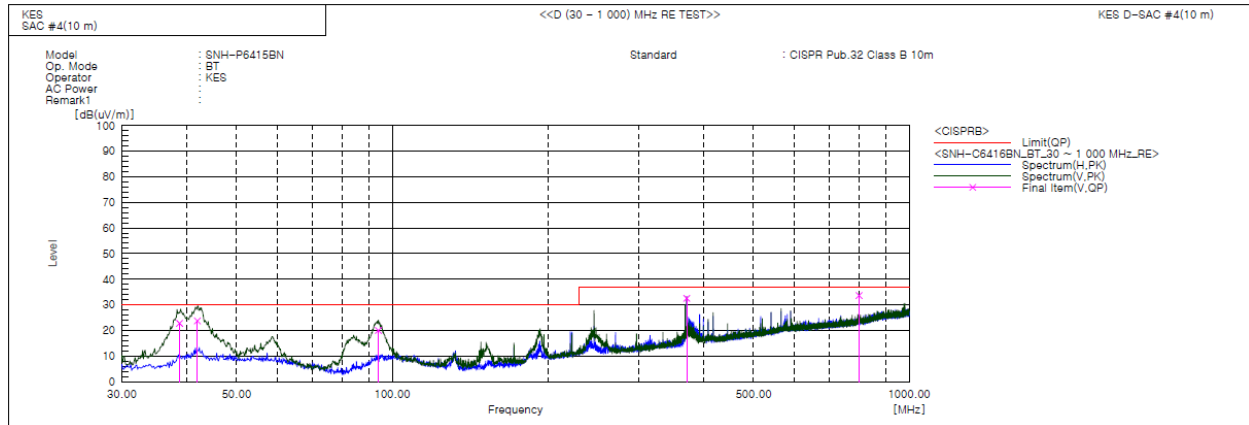
Corr. : Correction values (ISN FACTOR+ Cable Loss)

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Radiated Electric Field Emissions(Below 1 GHz)

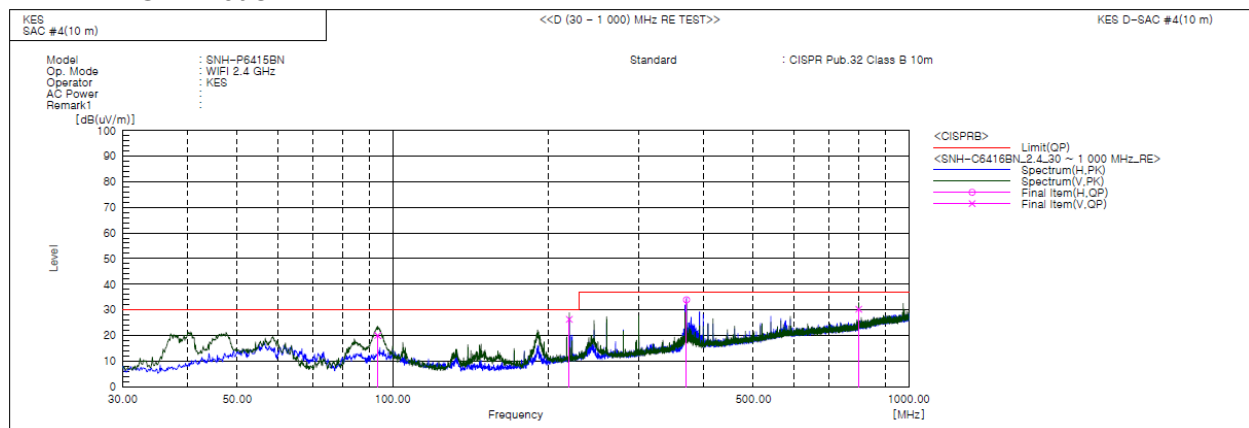
BT Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	38.789	V	52.8	-30.0	22.8	30.0	7.2	100.0	298.0	
2	42.011	V	52.6	-28.9	23.7	30.0	6.3	100.0	139.0	
3	93.973	V	48.9	-28.9	20.0	30.0	10.0	150.0	136.0	
4	371.258	V	54.7	-22.2	32.5	37.0	4.5	336.0	127.0	
5	800.012	V	47.4	-13.8	33.6	37.0	3.4	204.0	67.0	

WIFI 2.4 GHz Mode



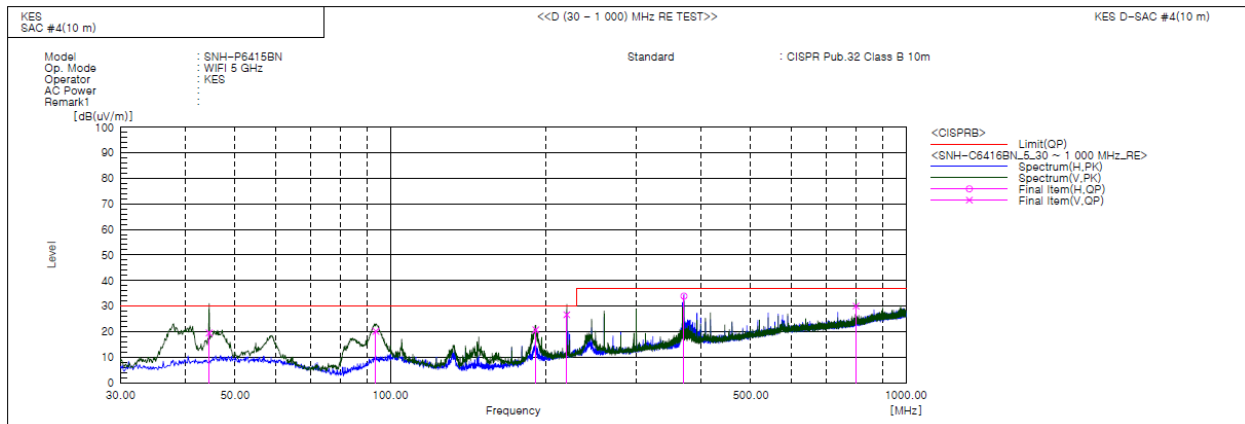
Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	93.564	V	49.0	-29.0	20.0	30.0	10.0	141.0	251.0	
2	219.999	V	53.1	-26.8	26.3	30.0	3.7	150.0	146.0	
3	371.198	H	56.1	-22.2	33.9	37.0	3.1	400.0	10.0	
4	800.025	V	44.0	-13.8	30.2	37.0	6.8	396.0	52.0	

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■ WIFI 5 GHz Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	44.556	V	48.1	-28.6	19.5	30.0	10.5	112.0	355.0	
2	93.751	V	49.0	-28.9	20.1	30.0	9.9	100.0	248.0	
3	191.524	V	49.8	-29.1	20.7	30.0	9.3	182.0	106.0	
4	219.966	V	53.4	-26.8	26.6	30.0	3.4	135.0	130.0	
5	371.166	H	56.1	-22.2	33.9	37.0	3.1	380.0	3.0	
6	800.045	V	43.8	-13.8	30.0	37.0	7.0	264.0	290.0	

◆ Calculation – SAC #4(10 m)

Result(QP) [dB(μV/m)] = (Reading(QP)[dB(μV)] + c.f[dB(1/m)])

Margin(QP)[dB] = Limit[dB(μV/m)] - Result(QP) [dB(μV/m)]

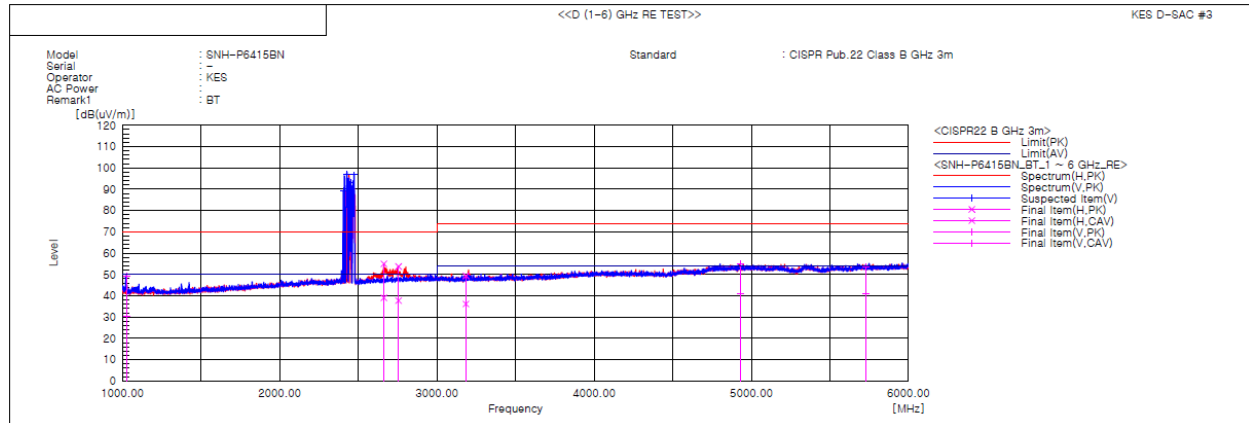
Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value



Radiated Electric Field Emissions(Above 1 GHz)

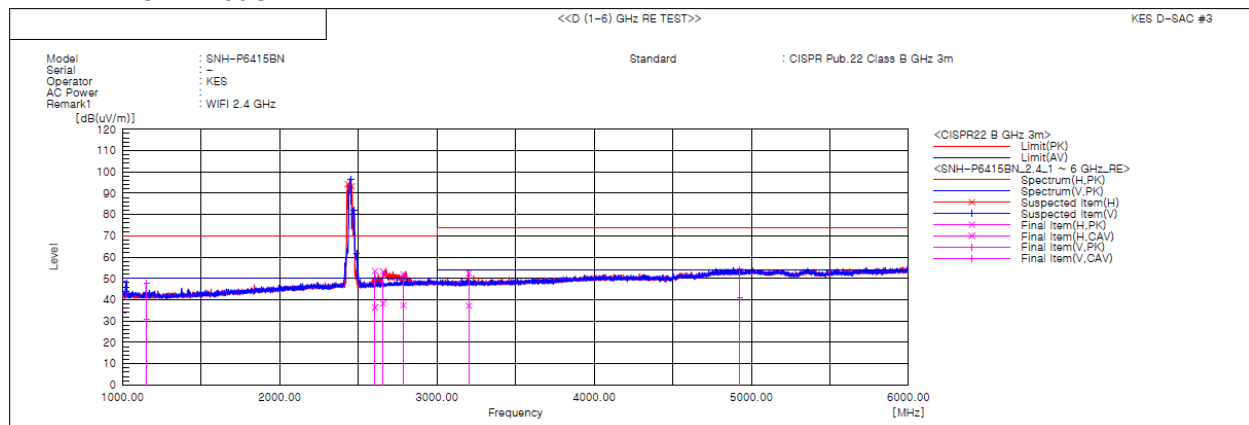
BT Mode



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]	Remark
1	1028.489	V	50.9	32.0	-1.8	49.1	30.2	70.0	50.0	20.9	19.8	100.0	359.6	
2	2662.620	H	48.4	32.5	6.6	55.0	39.1	70.0	50.0	15.0	10.9	100.0	0.4	
3	2754.976	H	46.7	30.8	7.0	53.7	37.8	70.0	50.0	16.3	12.2	100.0	5.8	
4	3184.413	H	41.7	28.4	7.7	49.4	36.1	74.0	54.0	24.6	17.9	100.0	354.1	
5	4931.937	V	40.5	26.6	14.4	54.9	41.0	74.0	54.0	19.1	13.0	100.0	183.1	
6	5728.507	V	38.9	26.0	14.8	53.7	40.8	74.0	54.0	20.3	13.2	100.0	149.9	
7	2404.000	V						70.0	50.0			100.0	288.8	
8	2427.000	V						70.0	50.0			100.0	348.2	
9	2451.000	V						70.0	50.0			100.0	167.5	
10	2473.000	V						70.0	50.0			100.0	355.4	

WIFI 2.4 GHz Mode



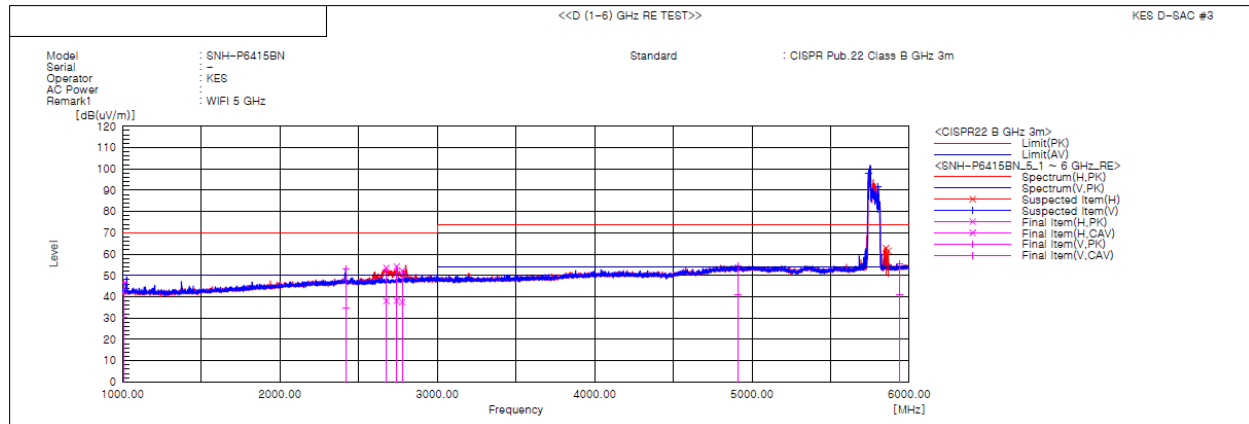
Final Result

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]	Remark
1	1000.025	V	50.5	35.7	-1.9	48.6	33.8	70.0	50.0	21.4	16.2	100.0	7.8	
2	1154.259	V	49.2	32.1	-1.4	47.8	30.7	70.0	50.0	22.2	19.3	100.0	17.3	
3	2606.001	H	47.1	30.0	6.4	53.5	36.4	70.0	50.0	16.5	13.6	100.0	2.9	
4	2657.714	H	46.6	31.6	6.6	53.2	38.2	70.0	50.0	16.8	11.8	100.0	357.4	
5	2786.382	H	44.7	30.3	7.1	51.8	37.4	70.0	50.0	18.2	12.6	100.0	20.3	
6	3202.260	H	44.8	29.5	7.7	52.5	37.2	74.0	54.0	21.5	16.8	100.0	4.6	
7	4925.907	V	39.9	26.5	14.3	54.2	40.8	74.0	54.0	19.8	13.2	100.0	336.5	
8	2433.000	H						70.0	50.0			100.0	357.3	
9	2449.000	V						70.0	50.0			100.0	351.1	
10	2458.000	H						70.0	50.0			100.0	357.3	
11	2469.000	V						70.0	50.0			100.0	299.3	
12	2489.000	V						70.0	50.0			100.0	299.3	

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■ WIFI 5 GHz Mode



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]	Remark
1	1005.854	V	48.7	32.4	-1.9	46.8	30.5	70.0	50.0	23.2	19.5	100.0	355.4	
2	2417.340	V	47.1	29.1	5.7	52.8	34.8	70.0	50.0	17.2	15.2	100.0	2.5	
3	2675.700	H	46.8	31.3	6.7	53.5	38.0	70.0	50.0	16.5	12.0	100.0	27.8	
4	2741.561	H	47.4	31.3	6.9	54.3	38.2	70.0	50.0	15.7	11.8	100.0	3.0	
5	2777.265	H	45.1	30.3	7.1	52.2	37.4	70.0	50.0	17.8	12.6	100.0	3.2	
6	4910.689	V	40.3	26.7	14.3	54.6	41.0	74.0	54.0	19.4	13.0	100.0	290.7	
7	5935.757	V	40.0	25.6	15.4	55.4	41.0	74.0	54.0	18.6	13.0	100.0	205.3	
8	5742.000	V	-----	-----	-----	-----	-----	74.0	54.0	-----	-----	100.0	348.6	
9	5804.000	V	-----	-----	-----	-----	-----	74.0	54.0	-----	-----	100.0	40.9	
10	5852.000	H	-----	-----	-----	-----	-----	74.0	54.0	-----	-----	100.0	313.4	
11	5865.000	H	-----	-----	-----	-----	-----	74.0	54.0	-----	-----	100.0	4.1	

◆ Calculation

Over Limit [dB] = (Read Level [dB μ V] + Ant Factor [dB/m] + Cable Loss [dB] - Preamp Factor [dB] + ATT [dB]) - Limit Line [dB μ V]

Over Limit : Margin, Read Level : Reading value, Ant Factor : ANT Factor, Cable Loss : Cable loss, Preamp Factor : Preamp Factor, ATT : Attenuator Factor

* Exclusion Band: 2.4 GHz, 5.7 GHz, 5.8 GHz

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Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ BT Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	11.689E-3			
2	1.115E-3			PASS
3	9.499E-3	0.413	2.30	PASS
4	1.413E-3			PASS
5	9.361E-3	0.821	1.14	PASS
6	1.357E-3			PASS
7	8.841E-3	1.148	770.00E-3	PASS
8	1.135E-3			PASS
9	8.467E-3	2.117	400.00E-3	PASS
10	1.589E-3			PASS
11	8.073E-3	2.446	330.00E-3	PASS
12	1.044E-3			PASS
13	7.593E-3	3.615	210.00E-3	PASS
14	1.270E-3			PASS
15	6.995E-3	4.664	150.00E-3	PASS
16	995.577E-6			PASS
17	6.389E-3	4.827	132.35E-3	PASS
18	952.026E-6			PASS
19	5.805E-3	4.902	118.42E-3	PASS
20	913.503E-6			PASS
21	5.037E-3	3.134	160.71E-3	PASS
22	909.563E-6			PASS
23	4.340E-3			PASS
24	1.199E-3			PASS
25	3.721E-3			PASS
26	873.406E-6			PASS
27	3.051E-3			PASS
28	903.758E-6			PASS
29	2.529E-3			PASS
30	906.320E-6			PASS
31	1.887E-3			PASS
32	890.347E-6			PASS
33	1.502E-3			PASS
34	1.150E-3			PASS
35	1.195E-3			PASS
36	897.845E-6			PASS
37	1.057E-3			PASS
38	923.783E-6			PASS
39	1.125E-3			PASS
40	891.844E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	11.939E-3			
2	1.398E-3			PASS
3	9.771E-3	0.283	3.45	PASS
4	1.581E-3			PASS
5	9.605E-3	0.562	1.71	PASS
6	1.483E-3			PASS
7	9.098E-3	0.788	1.15	PASS
8	1.232E-3			PASS
9	8.734E-3	1.456	600.00E-3	PASS
10	1.764E-3			PASS
11	8.228E-3	1.662	495.00E-3	PASS
12	1.188E-3			PASS
13	7.750E-3	2.460	315.00E-3	PASS
14	1.461E-3			PASS
15	7.159E-3	3.182	225.00E-3	PASS
16	1.140E-3			PASS
17	6.579E-3	3.314	198.52E-3	PASS
18	1.079E-3			PASS
19	5.981E-3	3.367	177.63E-3	PASS
20	1.013E-3			PASS
21	5.164E-3	3.213	160.71E-3	PASS
22	1.016E-3			PASS
23	4.468E-3			PASS
24	1.395E-3			PASS
25	3.834E-3			PASS
26	966.101E-6			PASS
27	3.174E-3			PASS
28	1.011E-3			PASS
29	2.823E-3			PASS
30	994.550E-6			PASS
31	2.009E-3			PASS
32	989.693E-6			PASS
33	1.600E-3			PASS
34	1.285E-3			PASS
35	1.313E-3			PASS
36	995.088E-6			PASS
37	1.155E-3			PASS
38	1.041E-3			PASS
39	1.243E-3			PASS
40	979.995E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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■ WIFI 2.4 GHz Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	11.783E-3			
2	1.041E-3			PASS
3	9.527E-3	0.414	2.30	PASS
4	1.363E-3			PASS
5	9.387E-3	0.823	1.14	PASS
6	1.313E-3			PASS
7	8.872E-3	1.152	770.00E-3	PASS
8	1.297E-3			PASS
9	8.522E-3	2.130	400.00E-3	PASS
10	1.439E-3			PASS
11	8.127E-3	2.463	330.00E-3	PASS
12	1.022E-3			PASS
13	7.661E-3	3.648	210.00E-3	PASS
14	1.050E-3			PASS
15	7.075E-3	4.717	150.00E-3	PASS
16	988.990E-6			PASS
17	6.446E-3	4.870	132.35E-3	PASS
18	953.766E-6			PASS
19	5.859E-3	4.948	118.42E-3	PASS
20	974.017E-6			PASS
21	5.079E-3	3.160	160.71E-3	PASS
22	936.709E-6			PASS
23	4.381E-3			PASS
24	1.211E-3			PASS
25	3.747E-3			PASS
26	902.654E-6			PASS
27	3.089E-3			PASS
28	929.727E-6			PASS
29	2.575E-3			PASS
30	910.192E-6			PASS
31	1.939E-3			PASS
32	894.043E-6			PASS
33	1.558E-3			PASS
34	1.093E-3			PASS
35	1.258E-3			PASS
36	1.003E-3			PASS
37	1.075E-3			PASS
38	937.786E-6			PASS
39	1.153E-3			PASS
40	924.844E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	12.183E-3			
2	1.320E-3			PASS
3	9.789E-3	0.284	3.45	PASS
4	1.519E-3			PASS
5	9.674E-3	0.566	1.71	PASS
6	1.467E-3			PASS
7	9.308E-3	0.806	1.15	PASS
8	1.474E-3			PASS
9	8.766E-3	1.461	600.00E-3	PASS
10	1.585E-3			PASS
11	8.379E-3	1.693	495.00E-3	PASS
12	1.127E-3			PASS
13	7.899E-3	2.508	315.00E-3	PASS
14	1.192E-3			PASS
15	7.274E-3	3.233	225.00E-3	PASS
16	1.096E-3			PASS
17	6.599E-3	3.324	198.52E-3	PASS
18	1.065E-3			PASS
19	6.056E-3	3.409	177.63E-3	PASS
20	1.065E-3			PASS
21	5.287E-3	3.290	160.71E-3	PASS
22	1.045E-3			PASS
23	4.536E-3			PASS
24	1.349E-3			PASS
25	3.893E-3			PASS
26	1.005E-3			PASS
27	3.218E-3			PASS
28	1.027E-3			PASS
29	2.757E-3			PASS
30	1.001E-3			PASS
31	2.067E-3			PASS
32	1.011E-3			PASS
33	1.689E-3			PASS
34	1.239E-3			PASS
35	1.405E-3			PASS
36	1.122E-3			PASS
37	1.196E-3			PASS
38	1.053E-3			PASS
39	1.301E-3			PASS
40	1.048E-3			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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■ WIFI 5 GHz Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	11.749E-3			
2	1.091E-3			PASS
3	9.491E-3	0.413	2.30	PASS
4	1.449E-3			PASS
5	9.361E-3	0.821	1.14	PASS
6	1.460E-3			PASS
7	8.861E-3	1.151	770.00E-3	PASS
8	1.198E-3			PASS
9	8.493E-3	2.123	400.00E-3	PASS
10	1.443E-3			PASS
11	8.100E-3	2.455	330.00E-3	PASS
12	1.055E-3			PASS
13	7.630E-3	3.633	210.00E-3	PASS
14	1.074E-3			PASS
15	7.082E-3	4.721	150.00E-3	PASS
16	1.012E-3			PASS
17	6.437E-3	4.864	132.35E-3	PASS
18	974.925E-6			PASS
19	5.826E-3	4.920	118.42E-3	PASS
20	973.007E-6			PASS
21	5.092E-3	3.169	160.71E-3	PASS
22	946.731E-6			PASS
23	4.380E-3			PASS
24	1.198E-3			PASS
25	3.756E-3			PASS
26	889.592E-6			PASS
27	3.105E-3			PASS
28	926.146E-6			PASS
29	2.589E-3			PASS
30	914.674E-6			PASS
31	1.952E-3			PASS
32	883.846E-6			PASS
33	1.553E-3			PASS
34	1.056E-3			PASS
35	1.244E-3			PASS
36	889.658E-6			PASS
37	1.109E-3			PASS
38	973.170E-6			PASS
39	1.134E-3			PASS
40	905.359E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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Test Data - Harmonics (continued)

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	11.971E-3			
2	1.386E-3			PASS
3	9.725E-3	0.282	3.45	PASS
4	1.590E-3			PASS
5	9.578E-3	0.560	1.71	PASS
6	1.661E-3			PASS
7	9.103E-3	0.788	1.15	PASS
8	1.321E-3			PASS
9	8.696E-3	1.449	600.00E-3	PASS
10	1.549E-3			PASS
11	8.272E-3	1.671	495.00E-3	PASS
12	1.151E-3			PASS
13	7.784E-3	2.471	315.00E-3	PASS
14	1.162E-3			PASS
15	7.252E-3	3.223	225.00E-3	PASS
16	1.109E-3			PASS
17	6.600E-3	3.324	198.52E-3	PASS
18	1.088E-3			PASS
19	5.984E-3	3.369	177.63E-3	PASS
20	1.113E-3			PASS
21	5.243E-3	3.263	160.71E-3	PASS
22	1.075E-3			PASS
23	4.493E-3			PASS
24	1.312E-3			PASS
25	3.897E-3			PASS
26	991.687E-6			PASS
27	3.253E-3			PASS
28	1.034E-3			PASS
29	2.707E-3			PASS
30	1.008E-3			PASS
31	2.117E-3			PASS
32	1.000E-3			PASS
33	1.714E-3			PASS
34	1.188E-3			PASS
35	1.358E-3			PASS
36	1.000E-3			PASS
37	1.241E-3			PASS
38	1.124E-3			PASS
39	1.260E-3			PASS
40	1.029E-3			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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Test Data - Voltage Fluctuations

■ BT Mode

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.045	4.00	PASS
Tmax [s]	0.000	0.50	PASS

■ WIFI 2.4 GHz Mode

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.045	4.00	PASS
Tmax [s]	0.000	0.50	PASS

■ WIFI 5 GHz Mode

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.044	4.00	PASS
Tmax [s]	0.000	0.50	PASS

Test Setup Photos and Configuration

Conducted Voltage Emissions



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Conducted Emissions at Telecommunication Ports

N/A

N/A

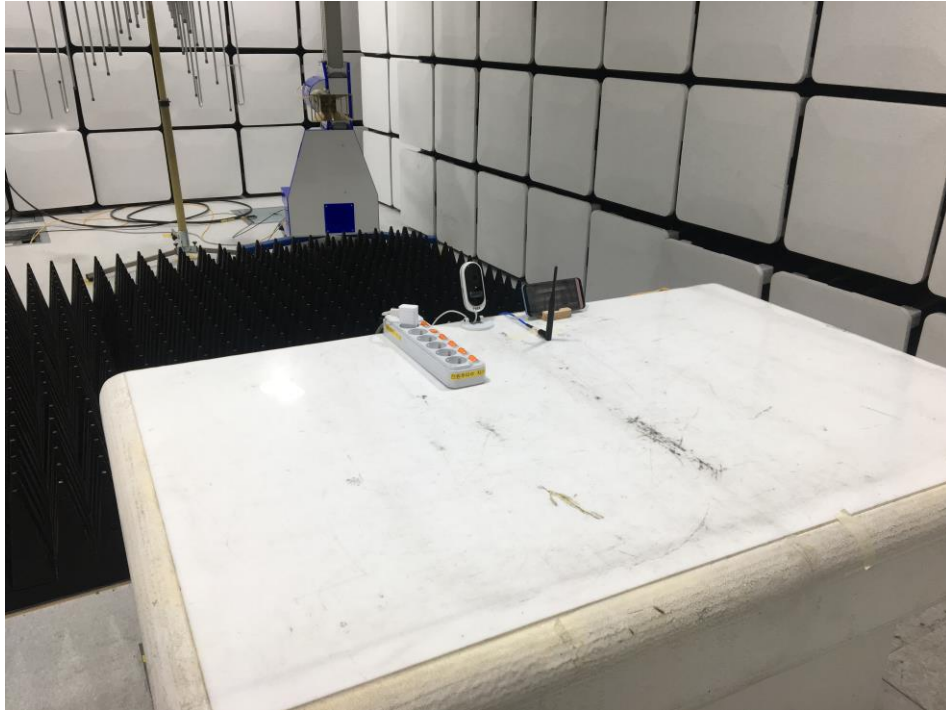
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Radiated Electric Field Emissions(Below 1 GHz)



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Radiated Electric Field Emissions(Above 1 GHz)



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Harmonic Current Emissions and Voltage Fluctuations and Flicker



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Electrostatic Discharge



Radiated Electric Field Immunity



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Electrical Fast Transients/Bursts



Surge Transients



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Conducted Disturbance



Power Frequency Magnetic Field Immunity

N/A

Voltage Dips and Short Interruptions



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E.U.T External Photographs

(Top)



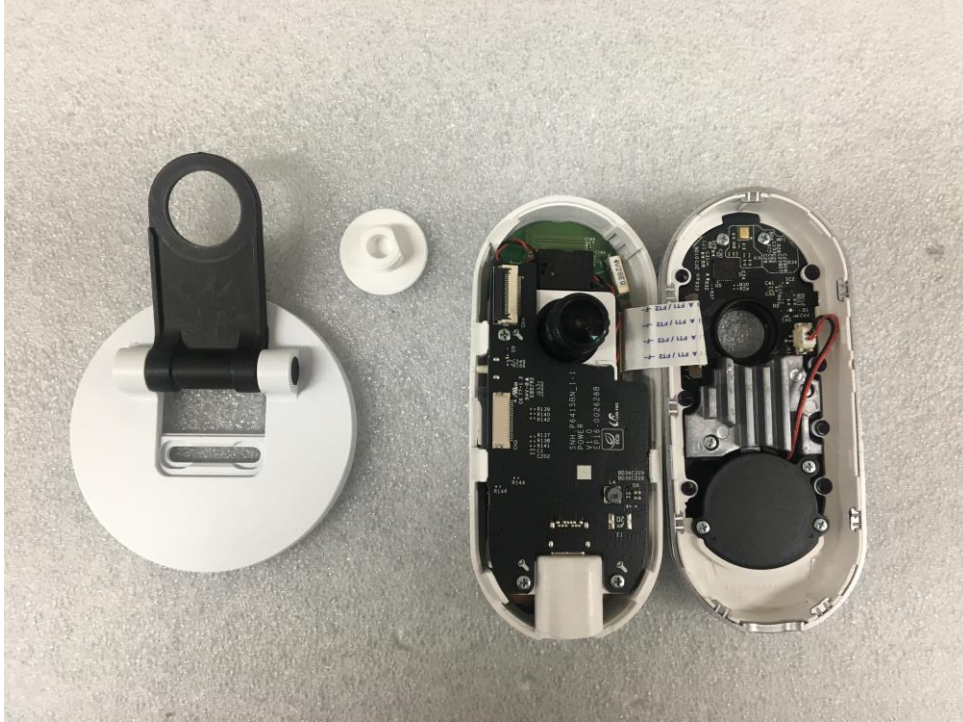
(Bottom)



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E.U.T Internal Photographs

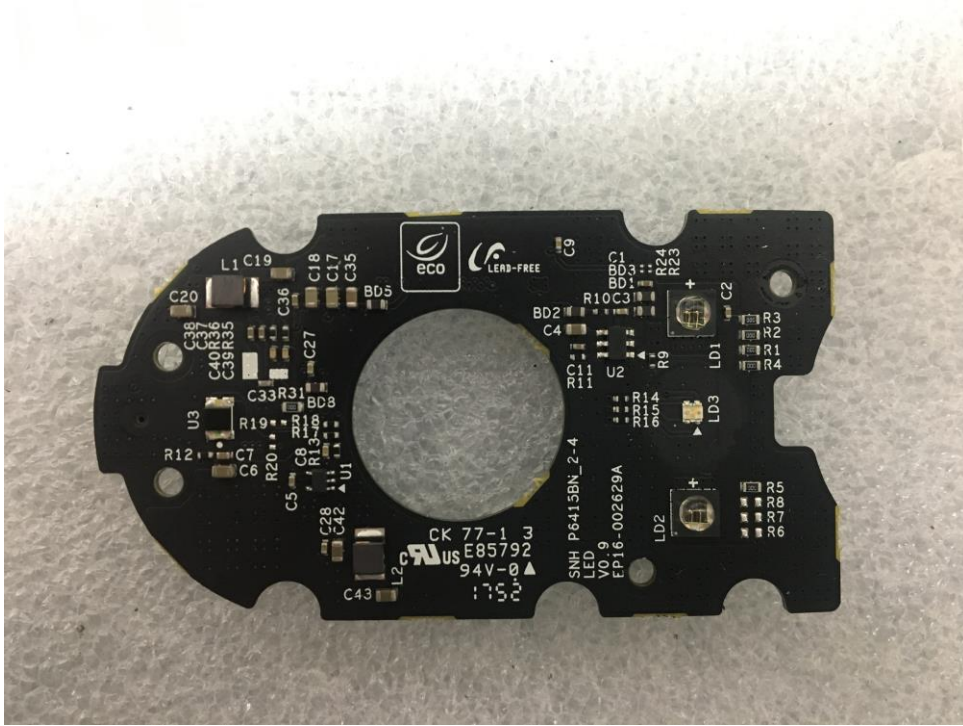
(Internal View)



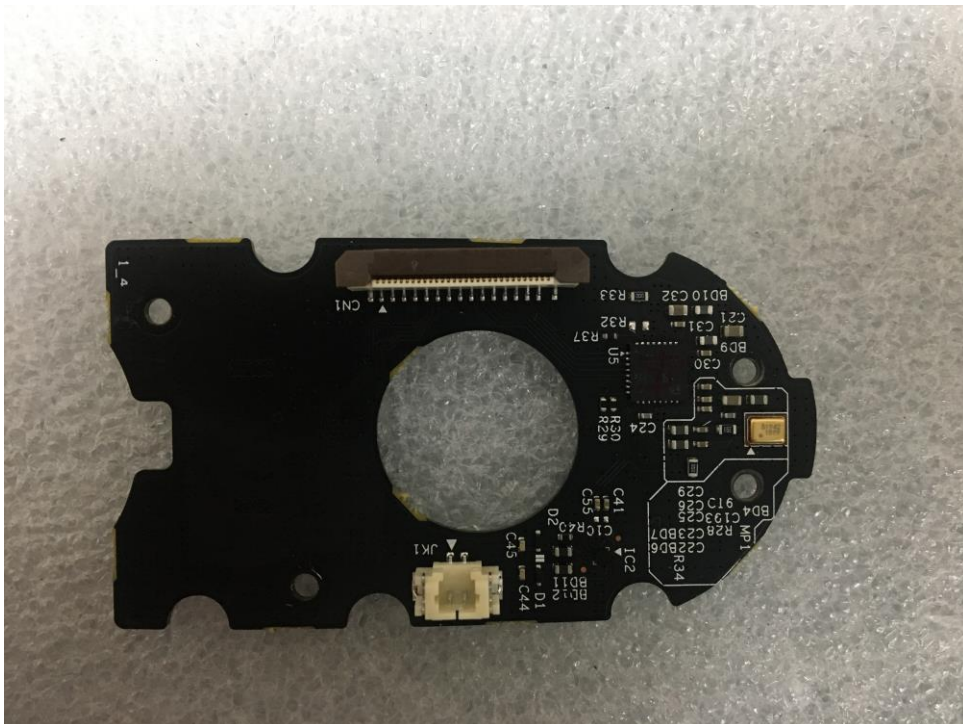
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EUT Internal View – Board 1

(Top)



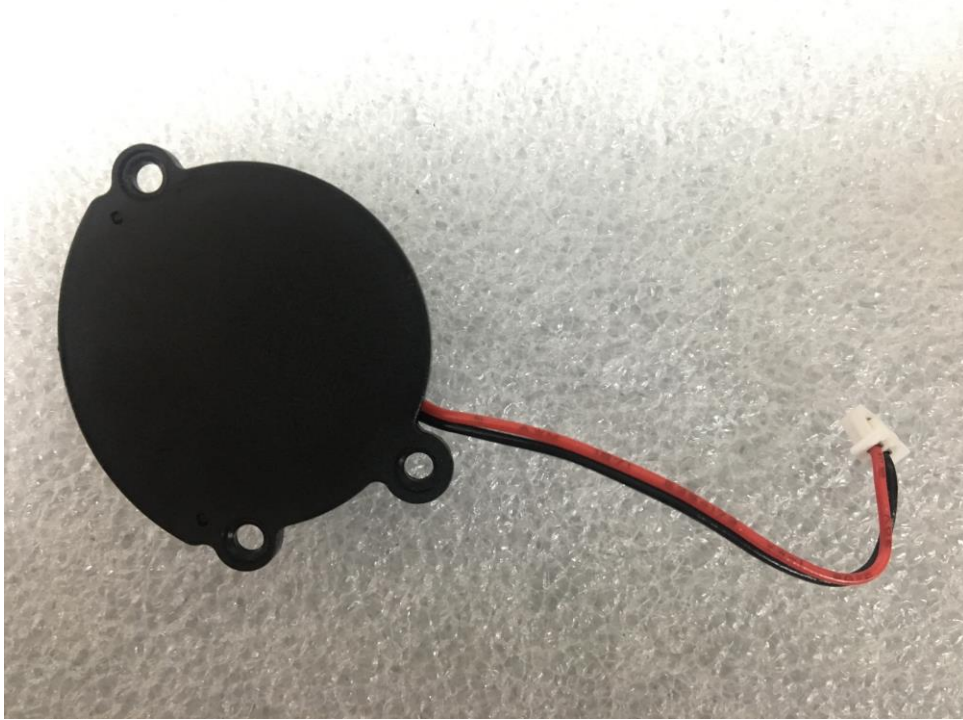
(Bottom)



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EUT Internal View – Board 2

(Top)



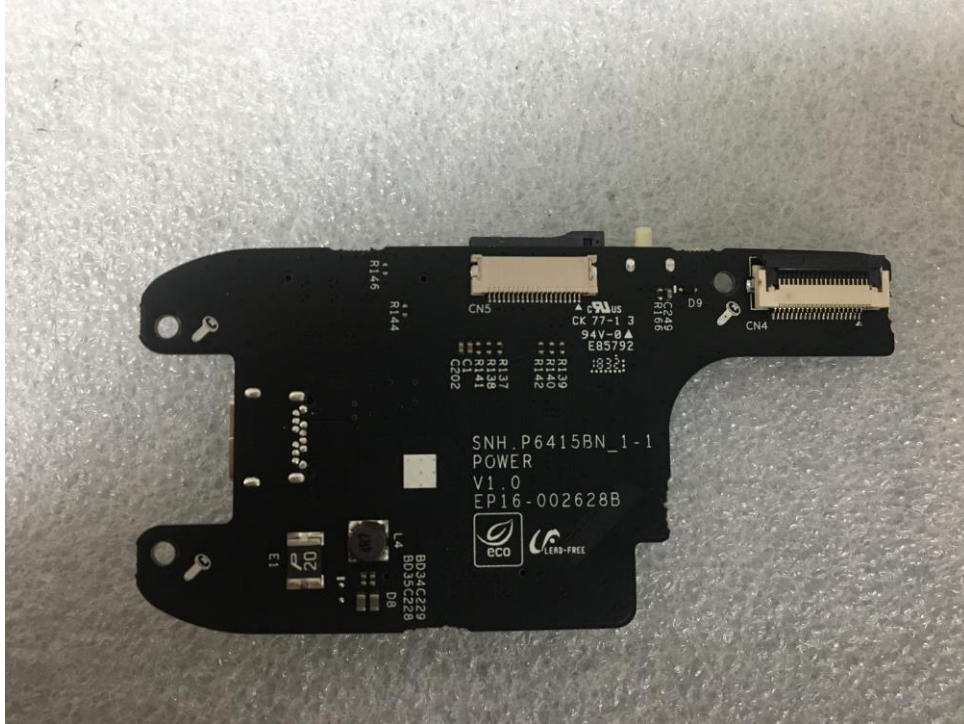
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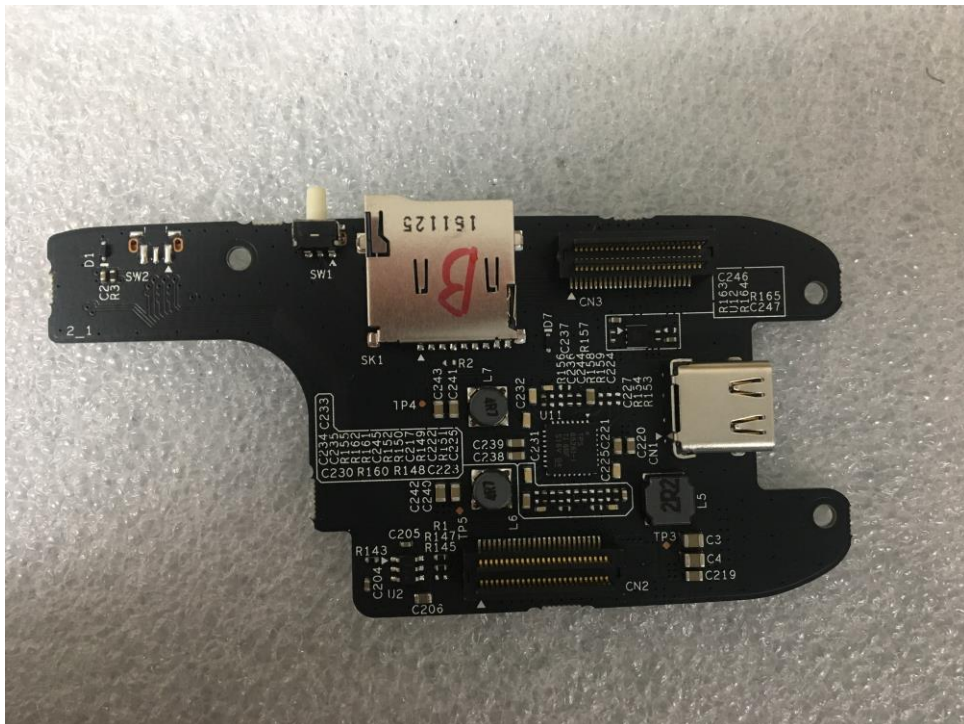
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EUT Internal View – Board 3

(Top)



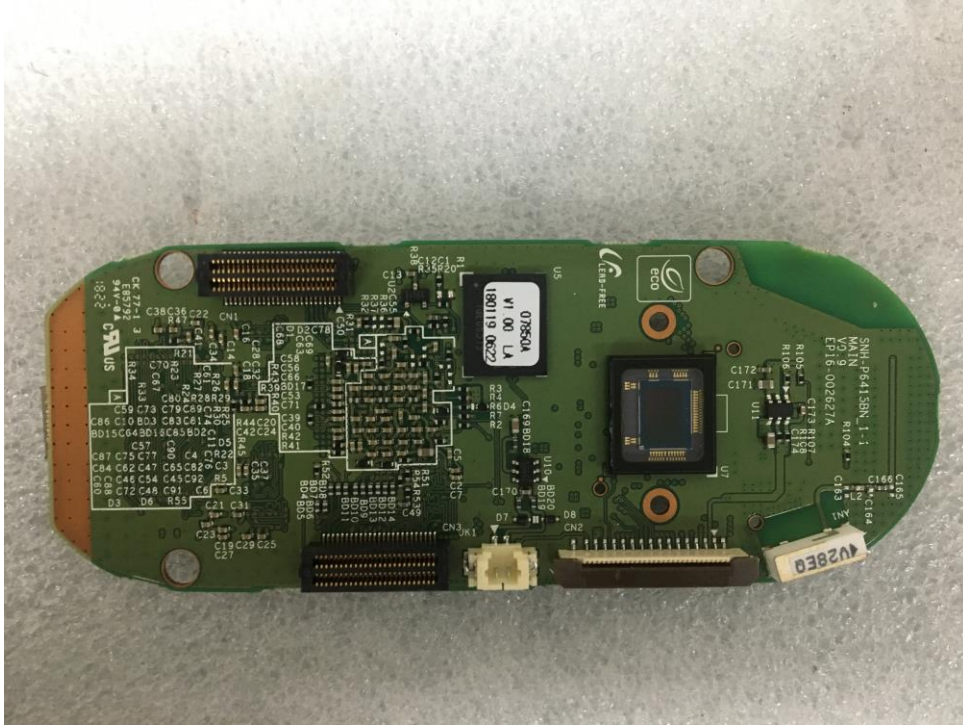
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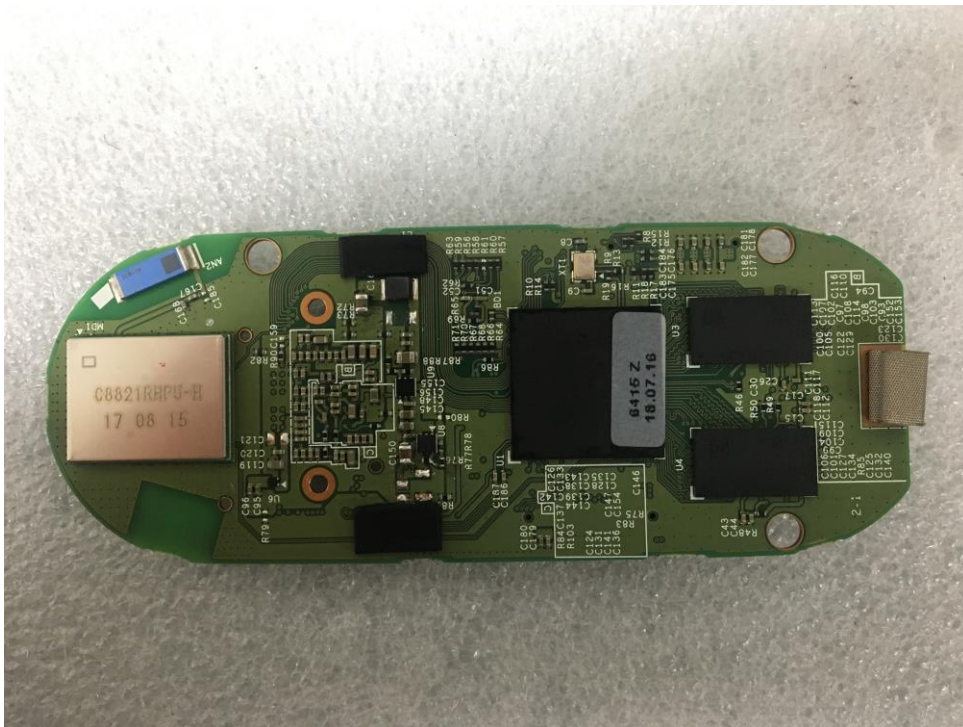
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EUT Internal View – Board 4

(Top)



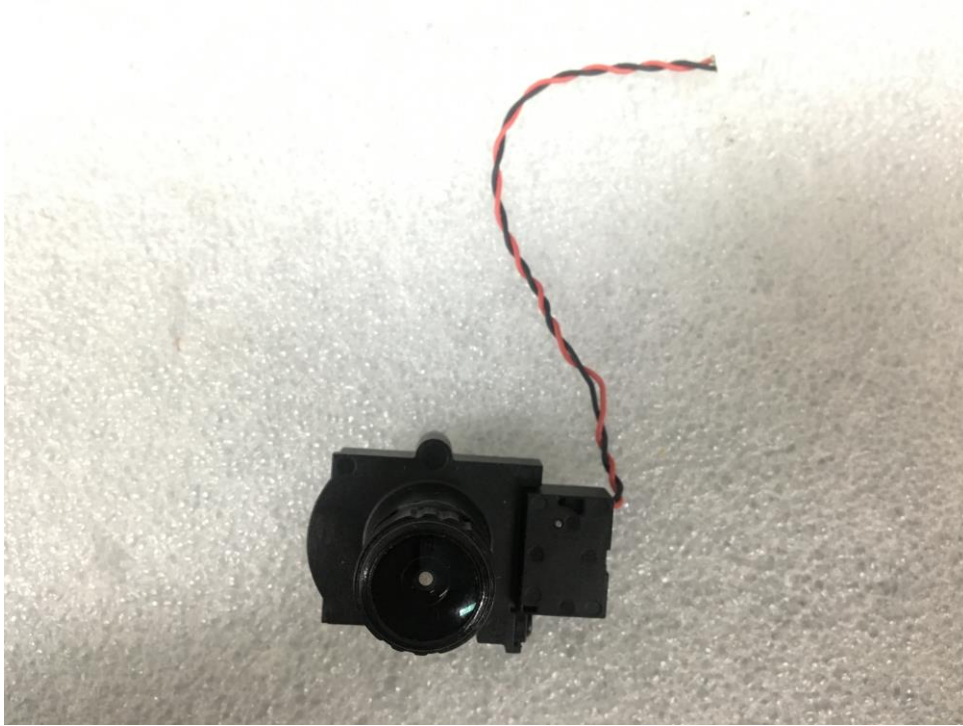
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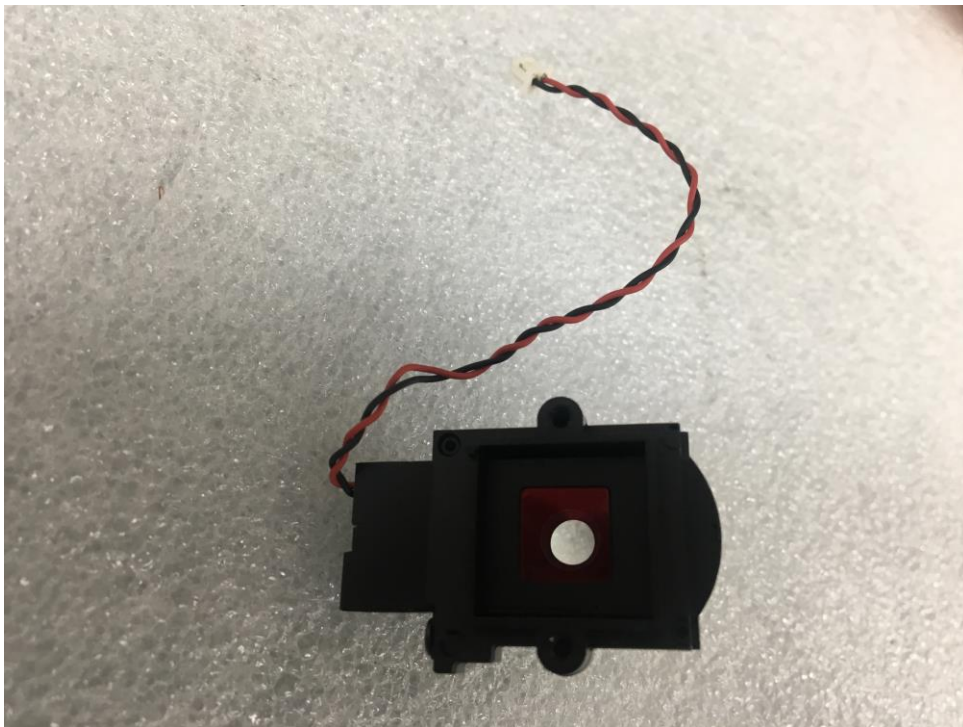
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EUT Internal View – Camera

(Top)

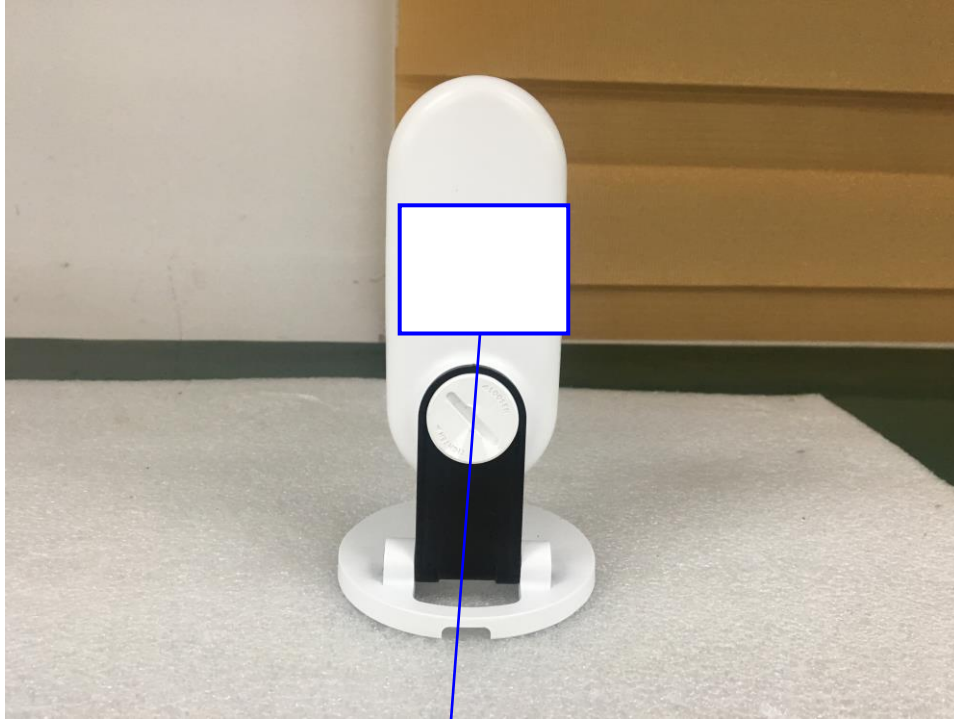



(Bottom)



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Label and Location



<p><u>HOME CAMERA</u></p> <p>Model No : SNH-P6415BN</p> <p>Manufacturer : Hanwha Techwin (Tianjin) Co., Ltd.</p> <p>Made in China</p>	
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