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## CTK Co., Ltd.

386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea  
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# EMC TEST REPORT For FCC



Test Report No. : CTK-2012-00686  
Date of Issue : July 13, 2012  
Model/Type No. : SPES 70W  
Kind of Product : SPES  
Applicant : KMW INC.  
Applicant Address : 183-6 Youngchun-ro, Dongtan-myun, Hwasung-si, Kyungki-do, Republic of Korea  
Manufacturer : KMW INC.  
Manufacturer Address : 183-6 Youngchun-ro, Dongtan-myun, Hwasung-si, Kyungki-do, Republic of Korea  
Contact Person : Sung Seok / Principal Research Engineer  
Telephone : +81-31-370-8621  
Received Date : March 27, 2012  
Test Date : June 27, 2012  
Test Results : ☒ In Compliance ☐ Not in Compliance

The test results presented in this report relate only to the object tested.

Tested by

Bong-jun, Jang  
EMC Test Engineer  
Date: July 13, 2012

Reviewed by

James Hong  
EMC Technical Manager  
Date: July 13, 2012



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### REPORT REVISION HISTORY

Date	Revision	Page No
July 13, 2012	Issued (CTK-2012-00686)	All

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## 1.0 General Product Description

### 1.0.1 Tested Equipment

- ☒ Unless otherwise indicated, all tests were conducted on Model SPES 70W.
- ☐ Tests performed on Model \_\_\_\_\_ were considered to be representative of Model \_\_\_\_\_.

### 1.0.2 Equipment Size, Mobility and Identification

Dimensions: 626(W) by 104.8(D) by 236.5(H)/Including antenna ☒ mm  
626(W) by 104.8(D) by 86.9(H)/Except for the antenna ☒ mm

Mobility: ☐ Table-top ☒ Stationary ☐ Built-in ☐ Portable Serial

No.: Prototype

### 1.0.3 Electrical Ratings

[AC/DC ADAPTOR] Input: 100 - 240 Vac, 47-63 Hz  
Output: 24 Vdc, 3.0 A

[EUT] Input: 24 Vdc, 3.0 A  
Output: -

### 1.0.4 Test Voltage & Frequency

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

Voltage: 120 Vac  
Frequency: 60 Hz

### 1.0.5 Clock & Other Frequencies Utilized

386 MHz




## 1.1 Model Differences

Not applicable

## 1.2 Device Modifications

The following modifications were necessary for compliance and was applied by applicant.



	<b>Core Manufacturer</b>	<b>Part No.</b>	<b>Number of turns</b>
	TAEJIN INT	TR14-13-11	2 Turns
	<b>Component Manufacturer</b>	<b>Part No.</b>	<b>Number of turns</b>
	Dongiltech	CL2-F16-12R	PASS
	Ground reinforcement		



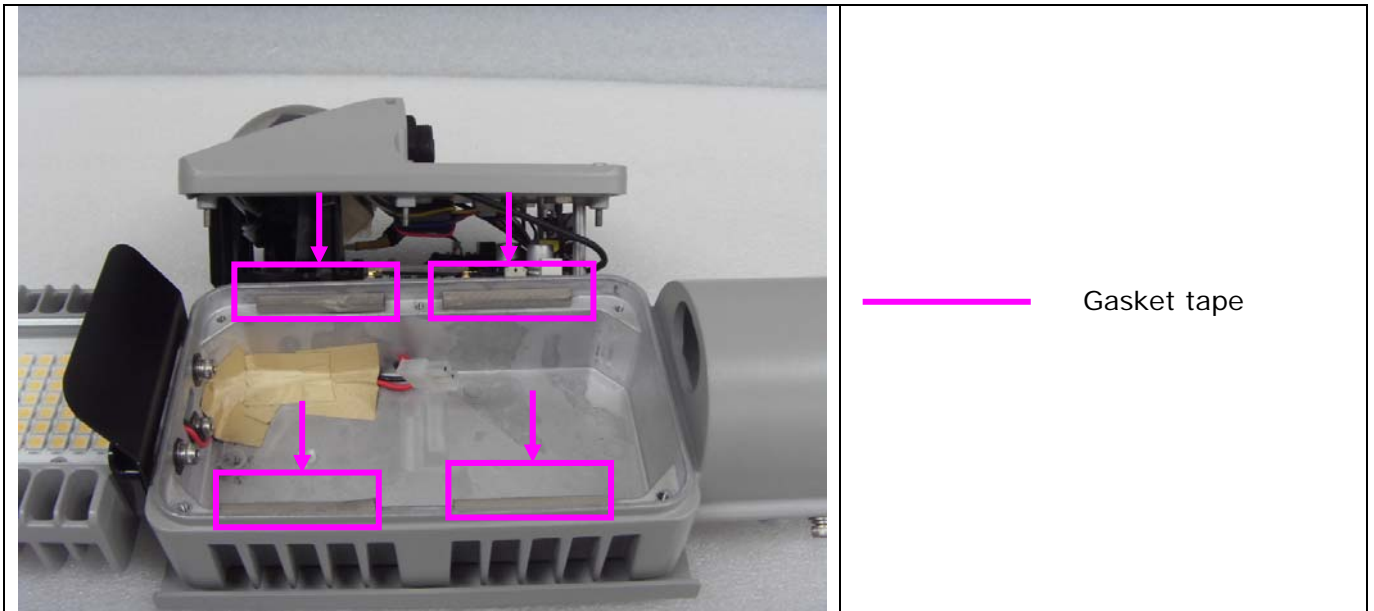
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### 1.3 EUT Configuration(s)

See Appendix B for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
AC/DC ADAPTOR1	MEAN WELL Enterprises Co., Ltd.	HLG-80H-24A	-
Note PC	Samsung Electronics Co., Ltd.	NT-R60Y	Z9GJ93GS302109B
AC/DC ADAPTOR2	Samsung ELECTRO-MECHANICS	AD-6019	-
PoE Switch	NETGEAR Inc.	FS108P	1DL29A3B007C9
PoE Switching Adapter	NETGEAR Inc.	DSA-0421S-50	-

☒ Cable Description

#	Description	Ferrite Core	Length (m)	Other Details
1	AC power Cable, Unshielded	No	1.8	Connect to AC power
2	DC In Cable, Unshielded	No	1.2	Between a Note PC and an AC/DC ADAPTOR2
3	LAN Cable, Shielded	No	1.5	Between a Note PC and a PoE Switch
4	DC In Cable, Unshielded	Yes	1.2	Between a Switch and a PoE Switching Adapter
5	AC power Cable, Unshielded	No	1.8	Connect to AC power
6	LAN Cable, Shielded	No	3.0	Between the EUT and a PoE Switch
7	AC power Cable, Unshielded	No	1.8	Connect to AC power
8	DC In Cable, Unshielded	Yes	1.2	Between the EUT and an AC/DC ADAPTOR1

### 1.4 Test Software

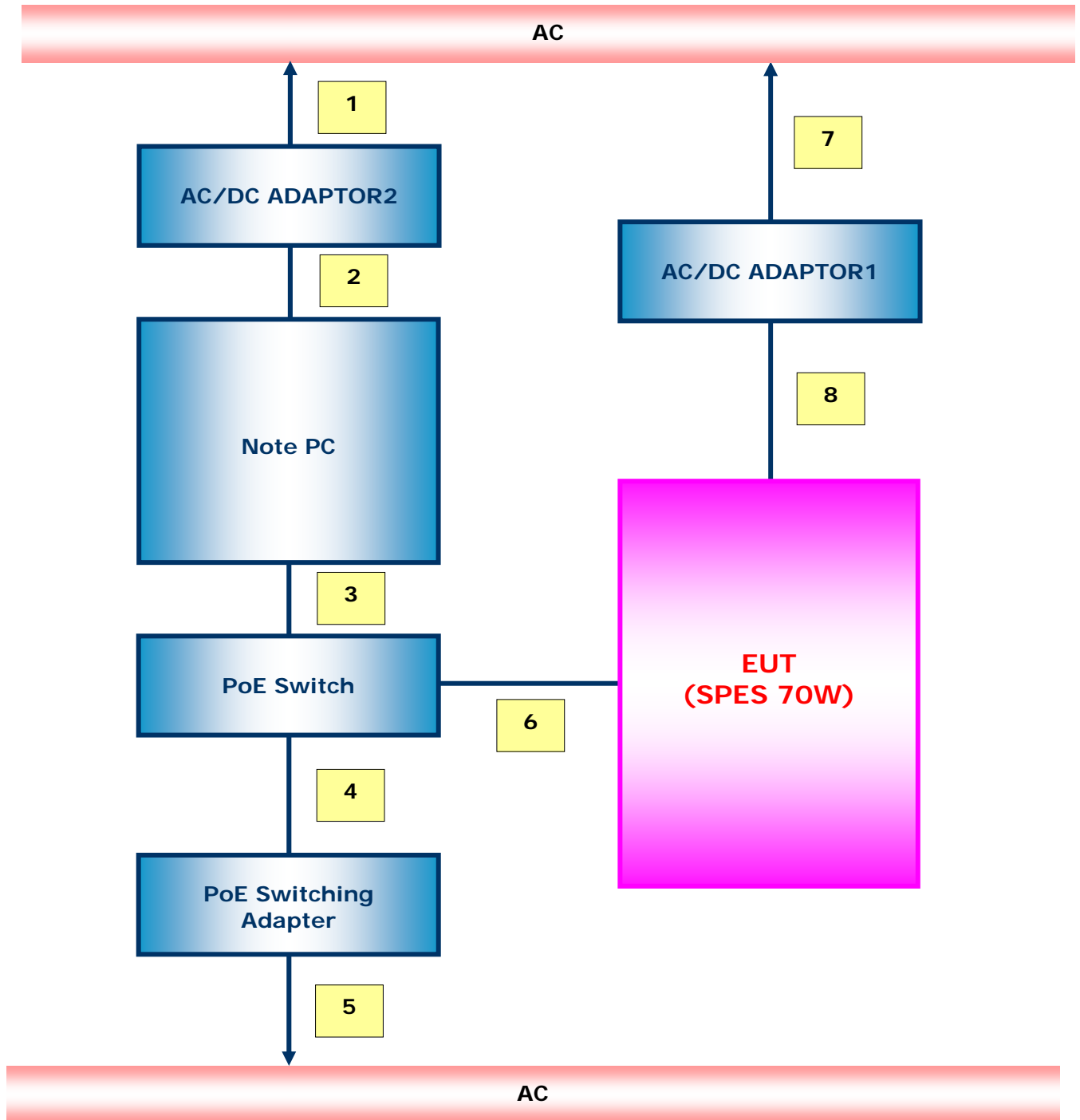
- ☐ EMC Test V 1.0  
☐ Display Test Patterns – V1.8  
☒ Ping.exe  
☐ Not applicable

### 1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

- ☐ Standby  
☐ Display circles pattern  
☒ Practice operation – Monitoring the EUT's video signal and Ping Test.  
☐ Scrolling 'H'  
☐ Display color bar pattern

## 1.6 Configuration







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### 1.7 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. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

### 1.8 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### 1.9 Measurement Procedure




Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested. Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)  
Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed semi-anechoic chambers. To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed semi-anechoic chambers. Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

\* Measurement procedures was In accordance with ANSI C63.4-2009 7.3.3, 7.3.4, 8.3.1, 8.3.2

## 1.10 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 m & 10 m OATS, 3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements	 805871
JAPAN	VCCI	10 m OATS, 3 m & 10 m SAC and Conducted Test Site	 R-948, C-986, T-1843, R-3627, G-387
KOREA	KCC	EMI (10 m OATS, 10 m SAC and Conducted Test Site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and Interruptions)	 No. 51, KR0025

## 1.11 Measurement Uncertainty

Compliance of the product is based on the measured value.

However, the measurement uncertainty is included for information purposes.

The measurement uncertainties given below are based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

Measurement Type	Frequency Range	Expanded Uncertainty
Conducted Emission	150 kHz to 30 MHz	$\pm 2.48$ dB (C.L.: Approx. 95 %, $k=2$ )
Radiated Emission	30 MHz to 1000 MHz	$\pm 3.70$ dB (C.L.: Approx. 95 %, $k=2$ )



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## 2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

- |                                                              |                                                                      |                                                                      |
|--------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------|
| <input type="checkbox"/> EN 61000-6-3:2007                   |                                                                      |                                                                      |
| <input type="checkbox"/> EN 61000-6-4:2007                   |                                                                      |                                                                      |
| <input type="checkbox"/> EN 55011:2007 +A2:2007              | <input type="checkbox"/> Group 1<br><input type="checkbox"/> Class A | <input type="checkbox"/> Group 2<br><input type="checkbox"/> Class B |
| <input type="checkbox"/> EN 55013:2001 +A1:2003 +A2:2006     |                                                                      |                                                                      |
| <input type="checkbox"/> EN 55014-1:2006                     |                                                                      |                                                                      |
| <input type="checkbox"/> EN 55014-1:2006 +A1:2009            |                                                                      |                                                                      |
| <input type="checkbox"/> EN 55015:2006 +A1:2007 +A2:2009     |                                                                      |                                                                      |
| <input type="checkbox"/> EN 61204-3:2000                     | <input type="checkbox"/> Class A                                     | <input type="checkbox"/> Class B                                     |
| <input type="checkbox"/> EN 61131-2:2007                     |                                                                      |                                                                      |
| <input type="checkbox"/> EN 61326-1:2006                     | <input type="checkbox"/> Class A                                     | <input type="checkbox"/> Class B                                     |
| <input type="checkbox"/> EN 55022:2006 +A1:2007              | <input type="checkbox"/> Class A                                     | <input type="checkbox"/> Class B                                     |
| <input type="checkbox"/> EN 61000-3-2:2006 +A1:2009 +A2:2009 |                                                                      |                                                                      |
| <input type="checkbox"/> EN 61000-3-3:2008                   |                                                                      |                                                                      |
| <input type="checkbox"/> VCCI V-3/2011.04                    | <input type="checkbox"/> Class A                                     | <input type="checkbox"/> Class B                                     |
| <input type="checkbox"/> AS/NZS CISPR22:2009                 | <input type="checkbox"/> Class A                                     | <input type="checkbox"/> Class B                                     |
| <input checked="" type="checkbox"/> FCC Part 15 Subpart B    | <input type="checkbox"/> Class A                                     | <input checked="" type="checkbox"/> Class B                          |
| <input type="checkbox"/> CISPR 22:2006                       | <input type="checkbox"/> Class A                                     | <input type="checkbox"/> Class B                                     |



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## 2.1 Conducted Voltage Emissions

### Test Date

June 27, 2012

### Test Location

Shielded Room

### Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	Rohde & Schwarz	ESCI7	100816	2012-12-16
<input checked="" type="checkbox"/>	LISN	Rohde & Schwarz	ENV216	101235	2012-08-18
<input checked="" type="checkbox"/>	LISN	Rohde & Schwarz	ENV216	101236	2012-08-06
<input type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESHS30	828144/002	2013-02-09
<input type="checkbox"/>	LISN	Rohde & Schwarz	ENV216	101150	2013-02-09
<input type="checkbox"/>	LISN	Rohde & Schwarz	ENV216	101151	2013-02-09

### Frequency Range of Measurement

150 kHz to 30 MHz

### Instrument Settings

IF Band Width: 9 kHz

### Test Results

The requirements are: ☒ MET ☐ NOT MET ☐ NOT APPLICABLE

Frequency (MHz)	Measured Data (dBμV)	Margin (dB)	Remark
0.150 000	48.4	17.6	Quasi-peak

### Remarks

See Appendix A for test data.



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## 2.2 Radiated Electric Field Emissions

### Test Date

June 27, 2012

### Test Location

Testing was performed at a test distance of:

- ☐ 10 m OATS ☐ 3 m OATS  
☒ 10 m SAC ☒ 3 m SAC

### Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	Rohde & Schwarz	ESCI7	100814	2012-12-13
<input checked="" type="checkbox"/>	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	100203	2013-07-05
<input checked="" type="checkbox"/>	AMPLIFIER	Sonoma Instrument Co.	310	291721	2013-03-27
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	Rohde & Schwarz	ESCI7	100816	2012-12-16
<input checked="" type="checkbox"/>	Double Ridged Guide Antenna	ETS-Lindgren	3115	00078894	2013-03-22
<input checked="" type="checkbox"/>	PREAMPLIFIER	Agilent Technologies	8449B	3008A02307	2012-11-17

### Frequency Range of Measurement

- ☒ 30 MHz to 1 GHz  
☒ 1 GHz to 2 GHz

### Instrument Settings

- ☒ IF Band Width: 120 kHz  
☒ IF Band Width: 1 MHz

### Test Results

The requirements are: ☒ MET ☐ NOT MET ☐ NOT APPLICABLE

Frequency (MHz)	Measured Data (dB $\mu$ V/m)	Margin (dB)	Remark
957.320	41.8	4.2	Quasi-peak

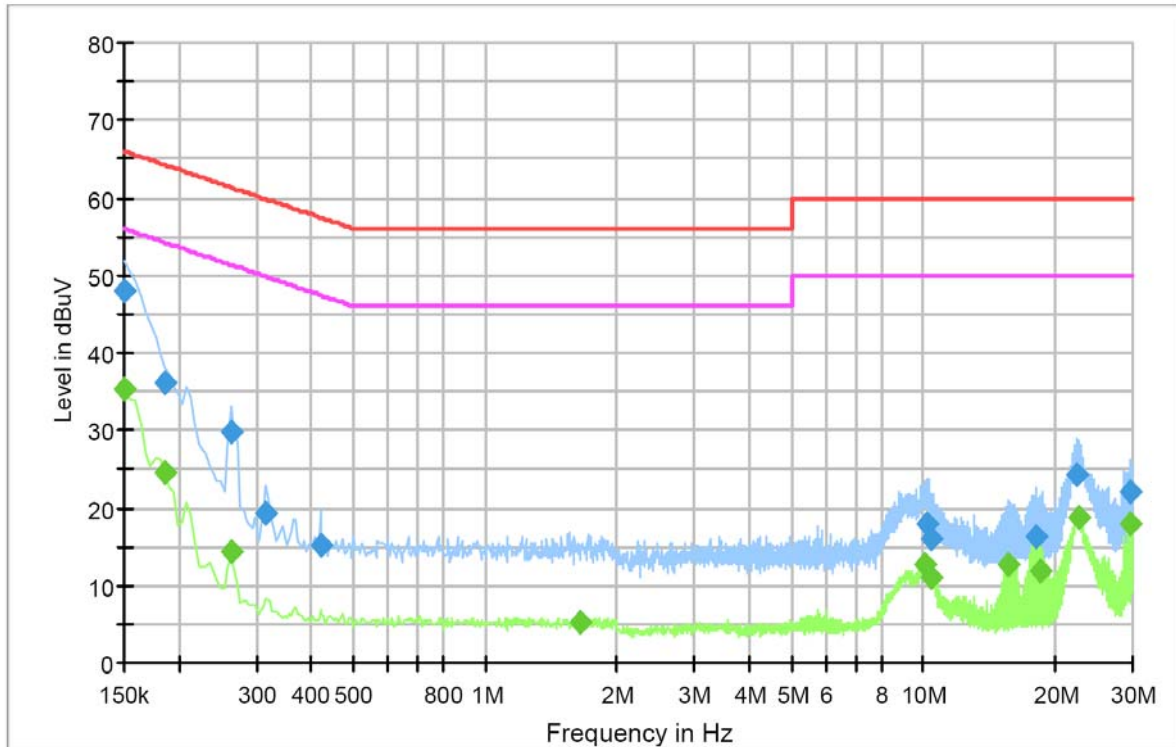
### Remarks

See Appendix A for test data.

## APPENDIX A – TEST DATA

### Conducted Voltage Emissions

[HOT]



#### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	48.0	1000.0	9.000	On	L1	10.2	18.0	66.0
0.186000	36.1	1000.0	9.000	On	L1	10.0	28.1	64.2
0.262500	29.9	1000.0	9.000	On	L1	10.1	31.5	61.4
0.316500	19.4	1000.0	9.000	On	L1	10.0	40.4	59.8
0.420000	15.3	1000.0	9.000	On	L1	10.0	42.2	57.4
10.149000	17.8	1000.0	9.000	On	L1	9.7	42.2	60.0
10.437000	16.0	1000.0	9.000	On	L1	9.7	44.0	60.0
18.159000	16.2	1000.0	9.000	On	L1	9.8	43.8	60.0
22.353000	24.2	1000.0	9.000	On	L1	9.9	35.8	60.0
29.787000	22.1	1000.0	9.000	On	L1	10.0	37.9	60.0

#### Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	35.3	1000.0	9.000	On	L1	10.2	20.7	56.0
0.186000	24.6	1000.0	9.000	On	L1	10.0	29.6	54.2
0.262500	14.2	1000.0	9.000	On	L1	10.1	37.1	51.4
1.639500	5.1	1000.0	9.000	On	L1	9.9	40.9	46.0
10.059000	12.6	1000.0	9.000	On	L1	9.7	37.4	50.0
10.468500	11.1	1000.0	9.000	On	L1	9.7	38.9	50.0
15.634500	12.7	1000.0	9.000	On	L1	9.8	37.3	50.0
18.415500	11.8	1000.0	9.000	On	L1	9.8	38.2	50.0
22.596000	18.9	1000.0	9.000	On	L1	9.9	31.2	50.0
29.782500	17.9	1000.0	9.000	On	L1	10.0	32.1	50.0



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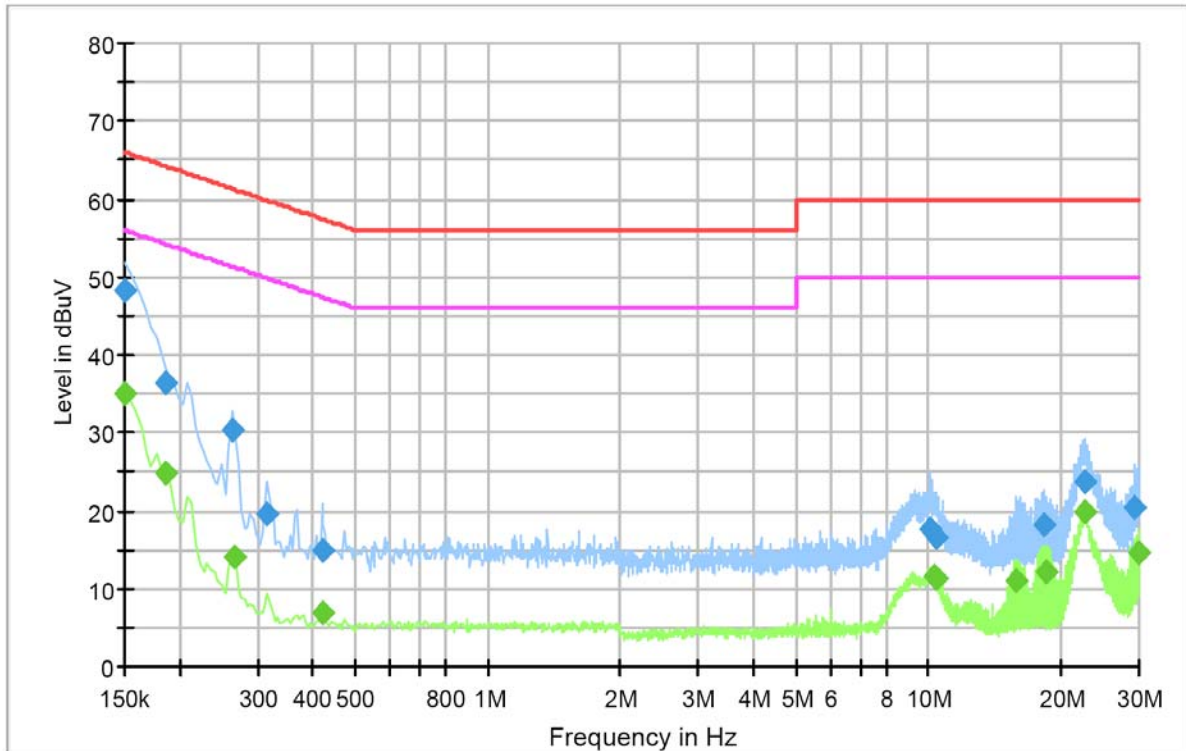
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[NEUTRAL]



### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	48.4	1000.0	9.000	On	N	10.2	17.6	66.0
0.186000	36.4	1000.0	9.000	On	N	10.1	27.8	64.2
0.262500	30.3	1000.0	9.000	On	N	10.1	31.1	61.4
0.316500	19.5	1000.0	9.000	On	N	10.0	40.3	59.8
0.420000	15.0	1000.0	9.000	On	N	10.0	42.5	57.4
10.054500	17.6	1000.0	9.000	On	N	9.7	42.4	60.0
10.414500	16.4	1000.0	9.000	On	N	9.7	43.6	60.0
18.357000	18.3	1000.0	9.000	On	N	9.9	41.7	60.0
22.762500	23.8	1000.0	9.000	On	N	10.0	36.2	60.0
29.278500	20.3	1000.0	9.000	On	N	10.2	39.7	60.0

### Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	35.0	1000.0	9.000	On	N	10.2	21.0	56.0
0.186000	24.8	1000.0	9.000	On	N	10.1	29.4	54.2
0.267000	14.0	1000.0	9.000	On	N	10.1	37.2	51.2
0.420000	6.9	1000.0	9.000	On	N	10.0	40.6	47.4
10.324500	11.7	1000.0	9.000	On	N	9.7	38.3	50.0
10.410000	11.4	1000.0	9.000	On	N	9.7	38.6	50.0
15.774000	11.0	1000.0	9.000	On	N	9.8	39.0	50.0
18.424500	12.0	1000.0	9.000	On	N	9.9	38.0	50.0
22.555500	19.8	1000.0	9.000	On	N	10.0	30.2	50.0
29.994000	14.7	1000.0	9.000	On	N	10.2	35.3	50.0





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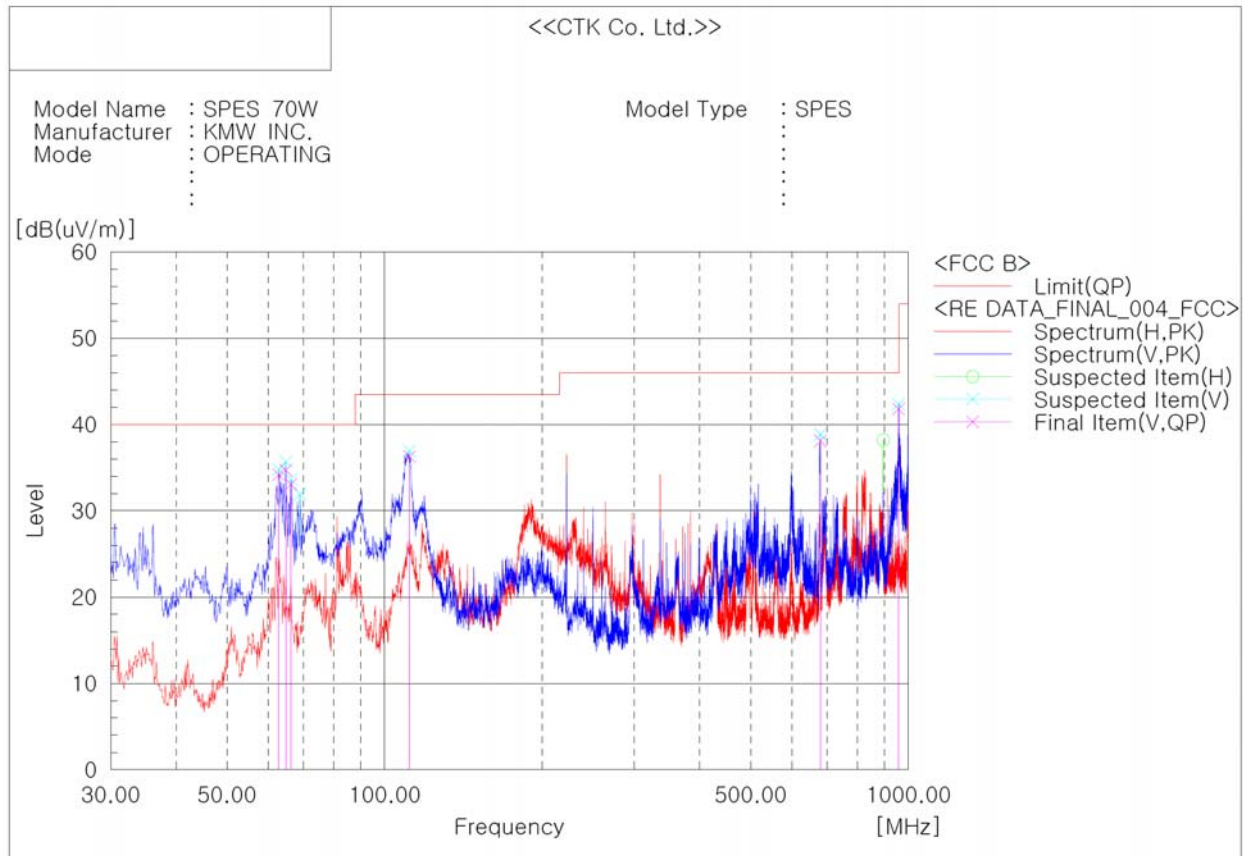
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### Radiated Electric Field Emissions

-Below 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	62.738	V	60.2	-26.0	34.2	40.0	5.8	193.0	102.0
2	64.799	V	60.3	-25.6	34.7	40.0	5.3	100.0	70.0
3	66.254	V	58.4	-25.3	33.1	40.0	6.9	193.0	0.0
4	111.601	V	56.1	-19.8	36.3	43.5	7.2	100.0	144.0
5	679.536	V	45.3	-7.2	38.1	46.0	7.9	100.0	181.0
6	957.320	V	43.7	-1.9	41.8	46.0	4.2	100.0	0.0





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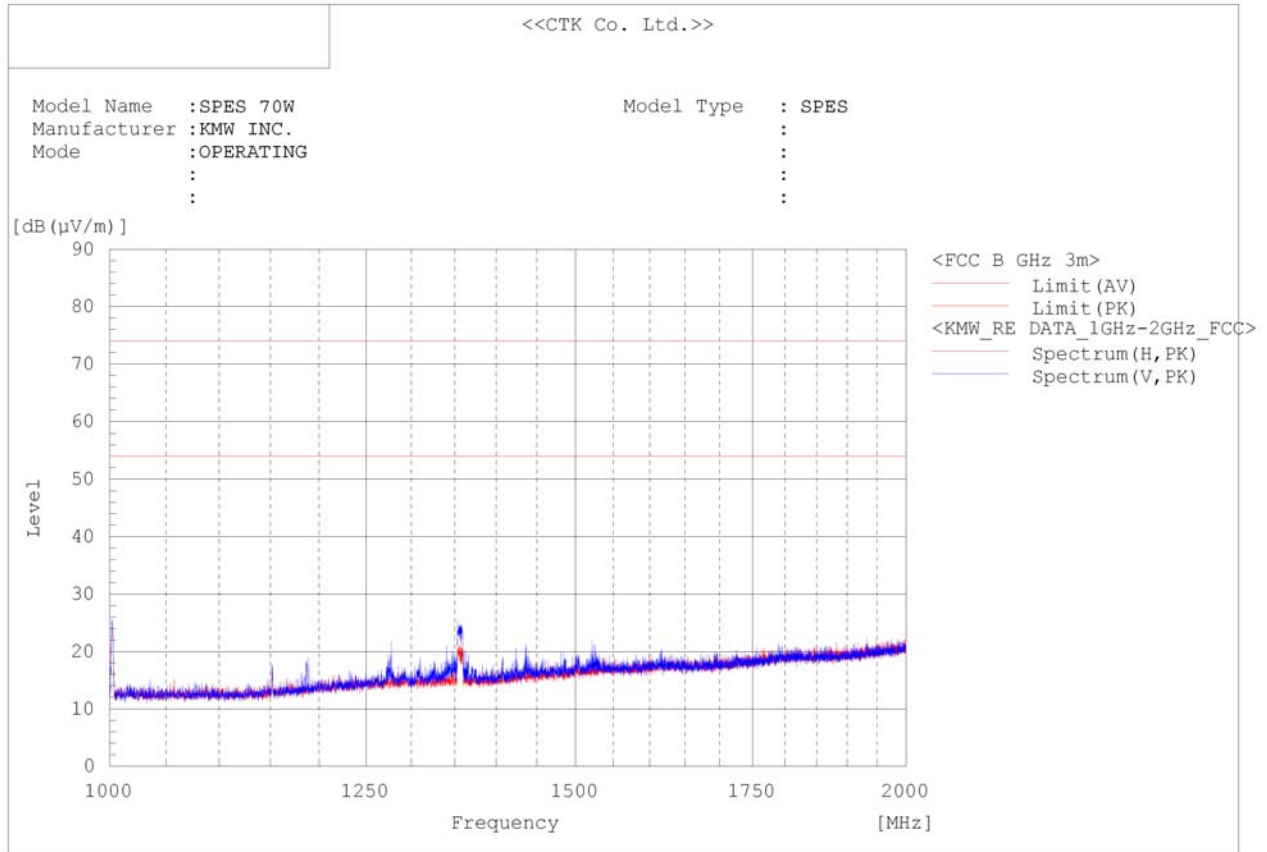
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-Above 1 GHz-





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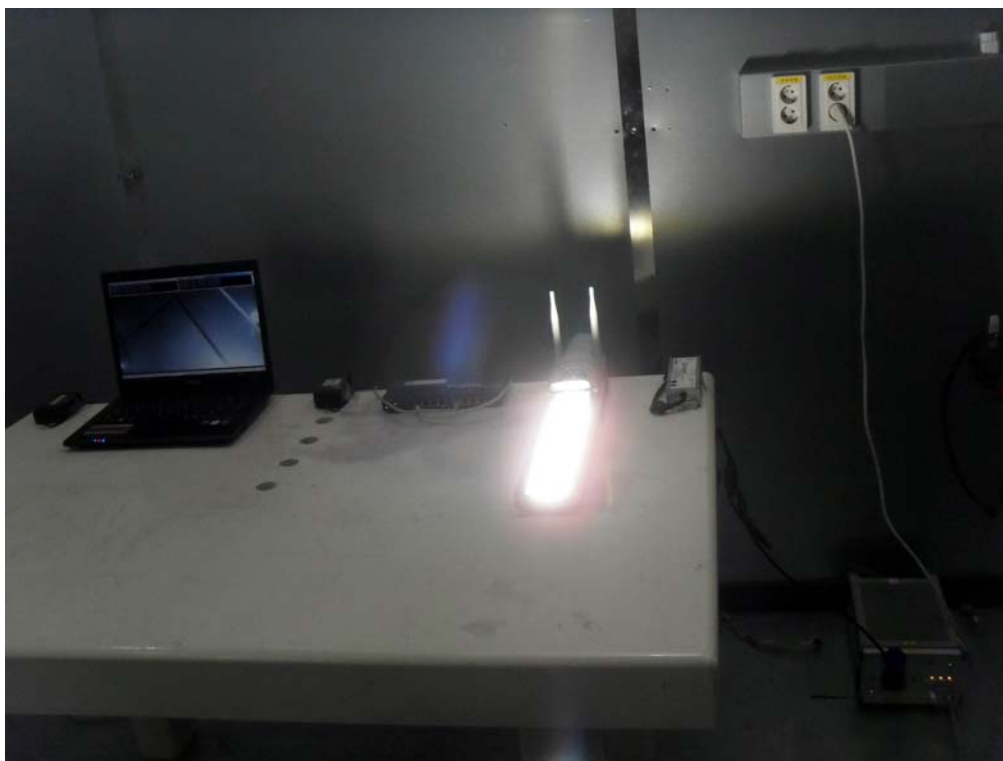
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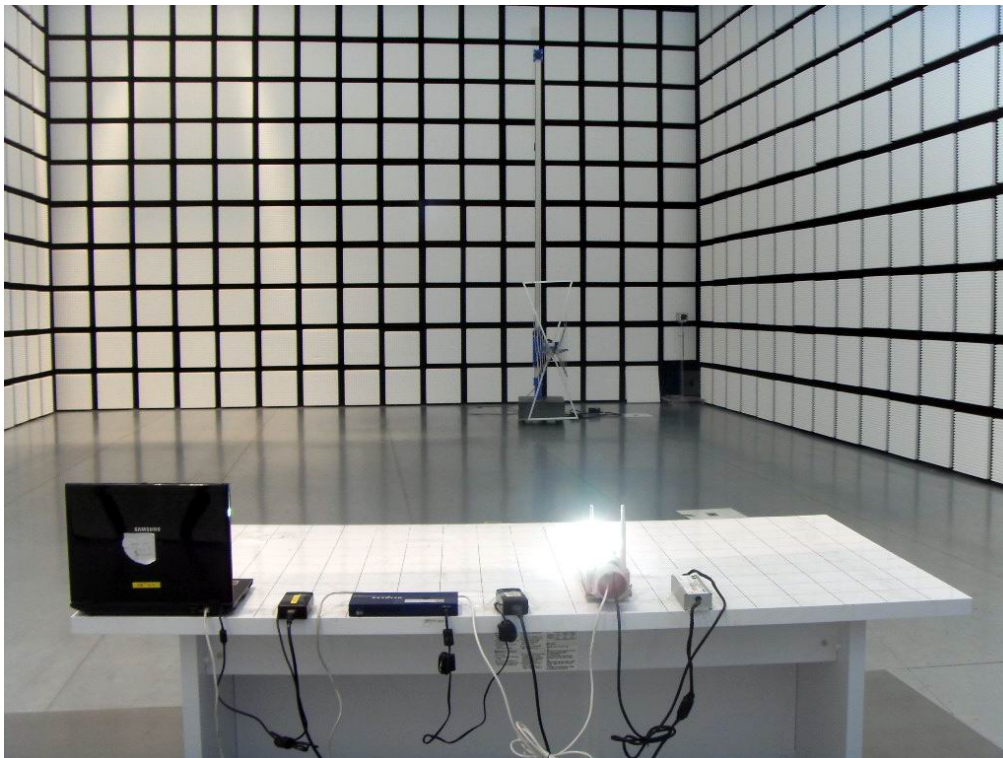
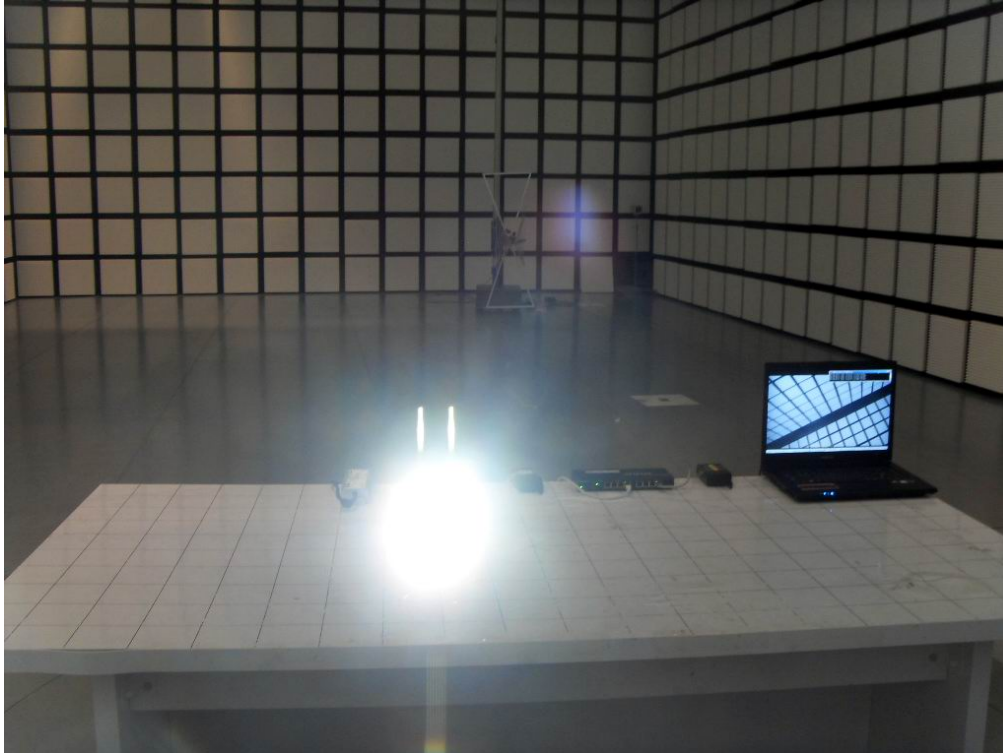
### APPENDIX B - Test Setup Photos and Configuration

#### Conducted Voltage Emissions



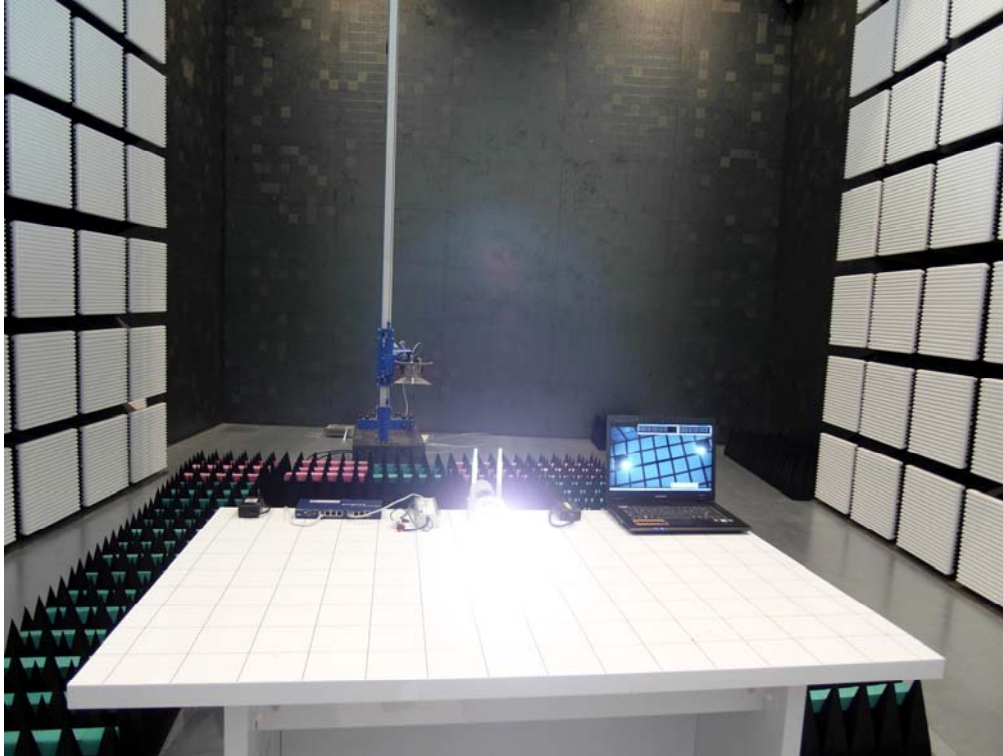
## Radiated Electric Field Emissions

-Below 1 GHz-





-Above 1 GHz-





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## APPENDIX C – EUT Photographs



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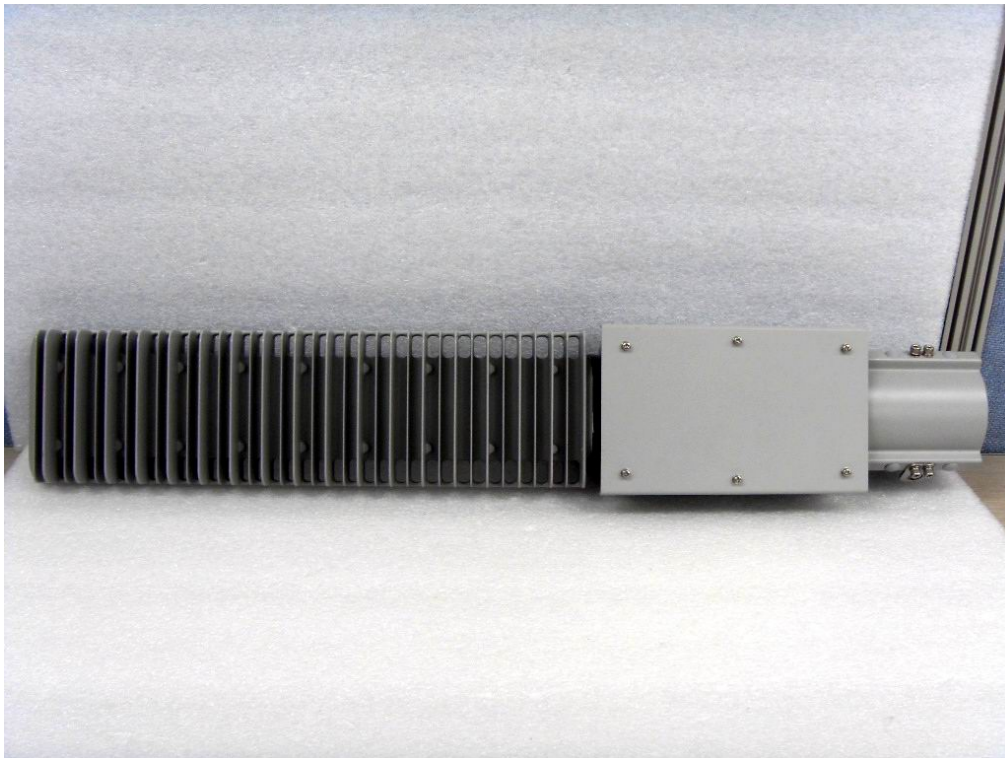
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### EUT External Photographs





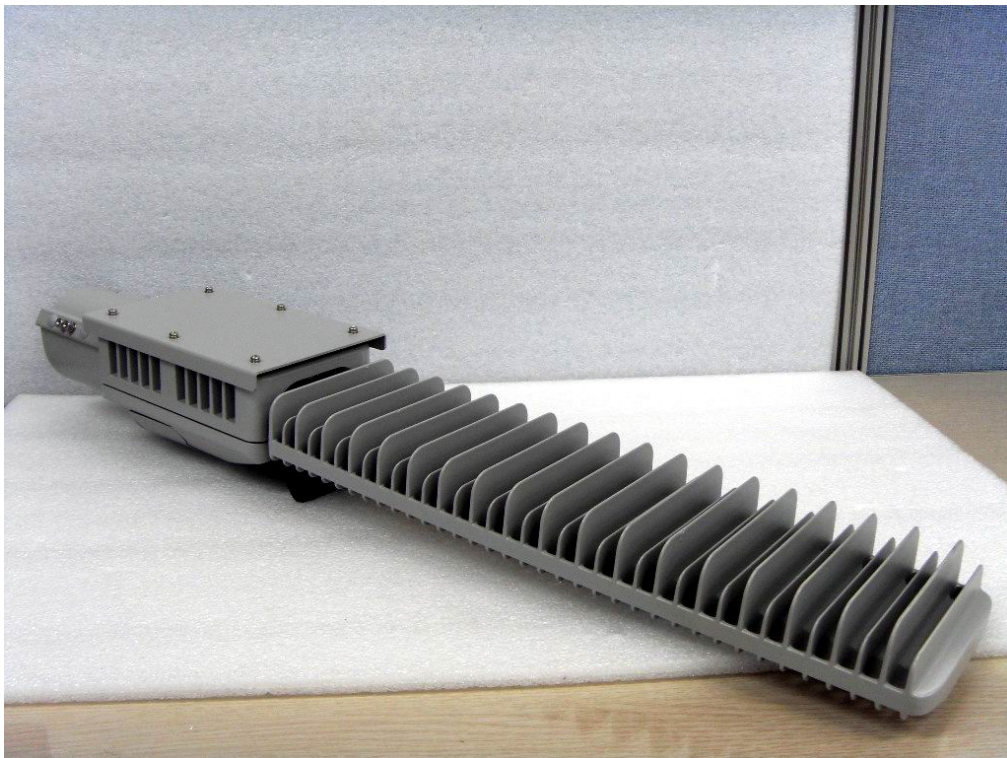
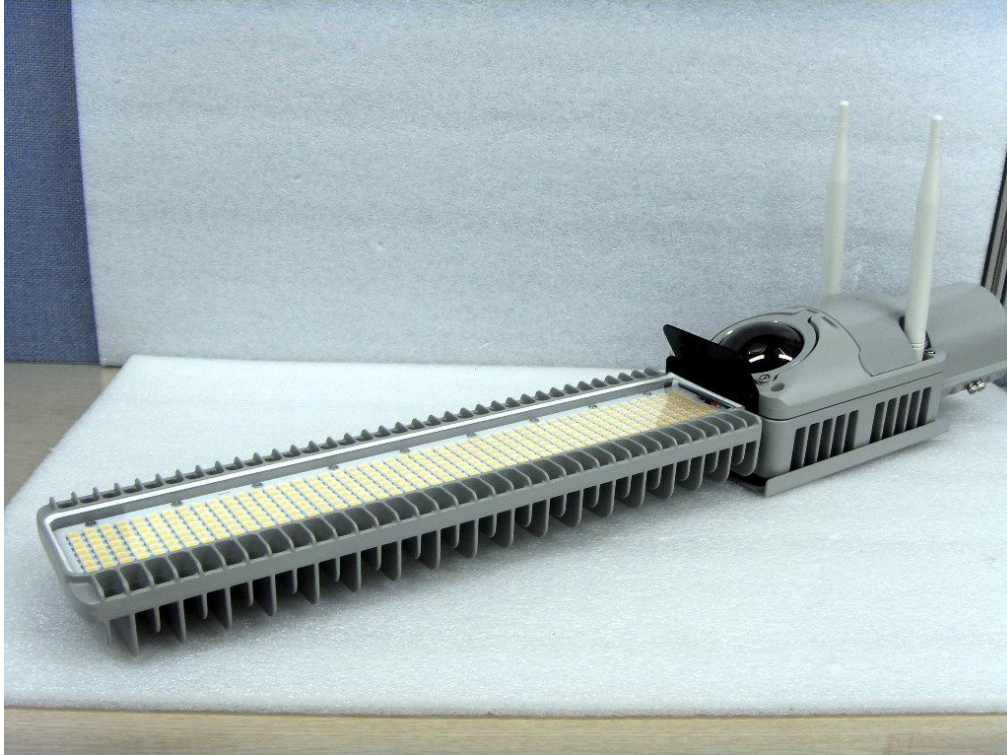


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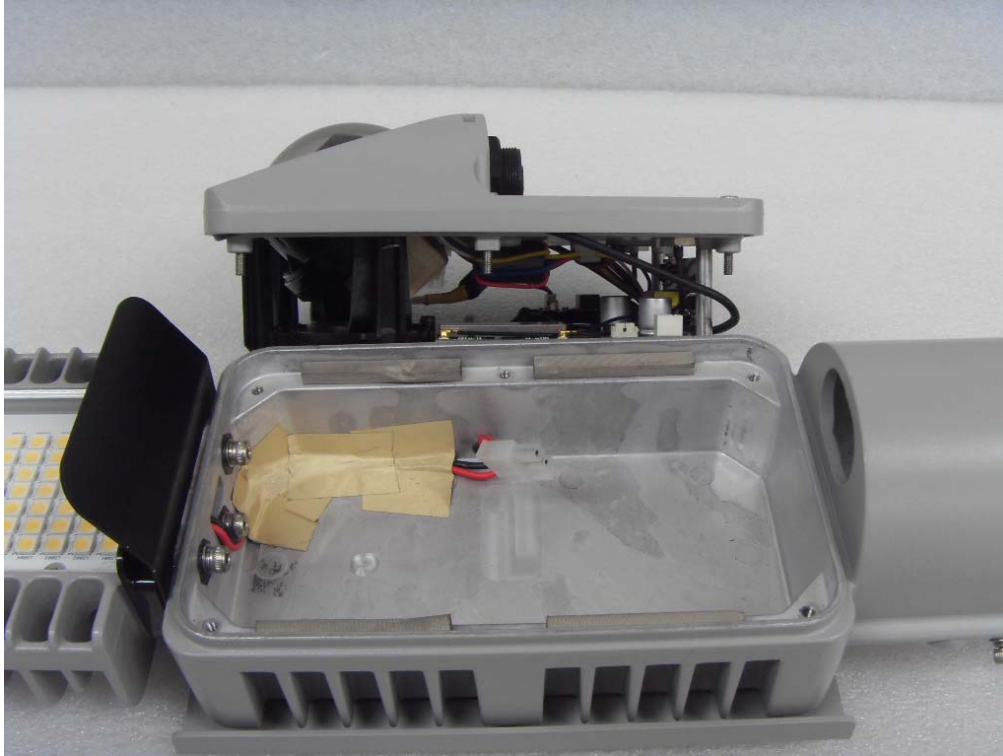
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## EUT Internal Photographs







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### PCB





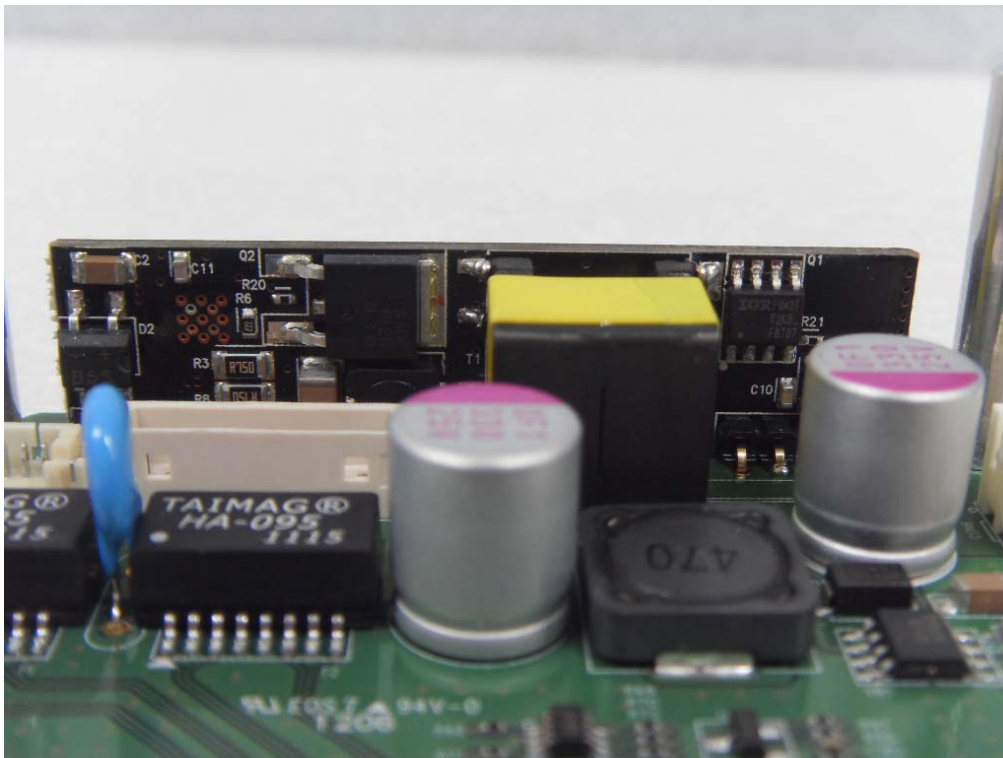
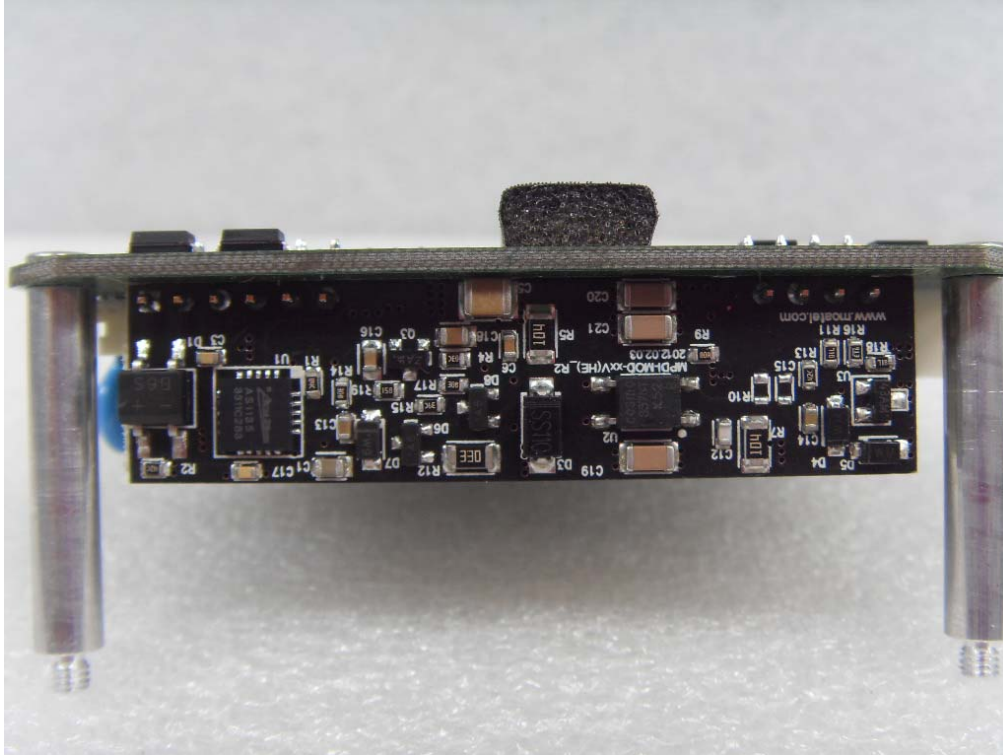
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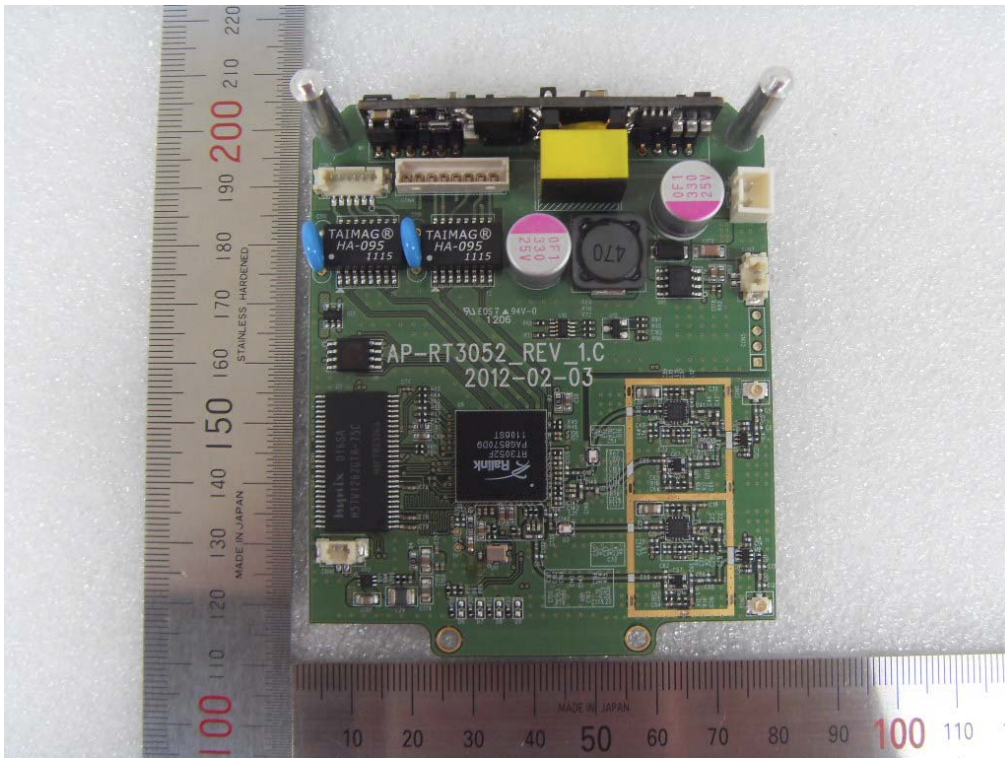
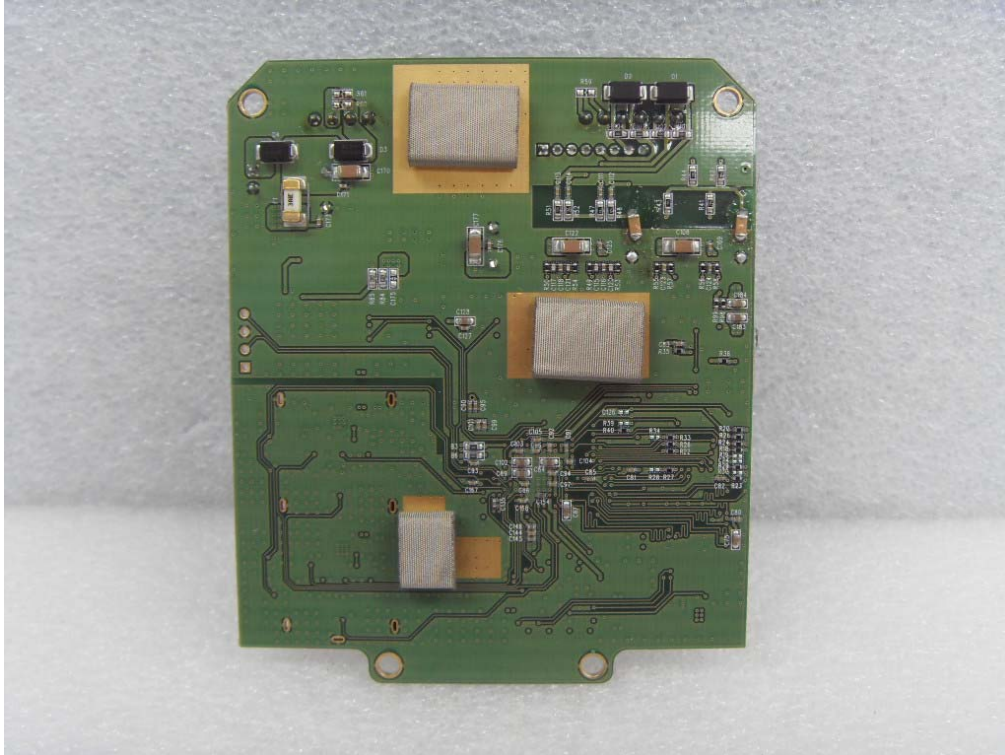
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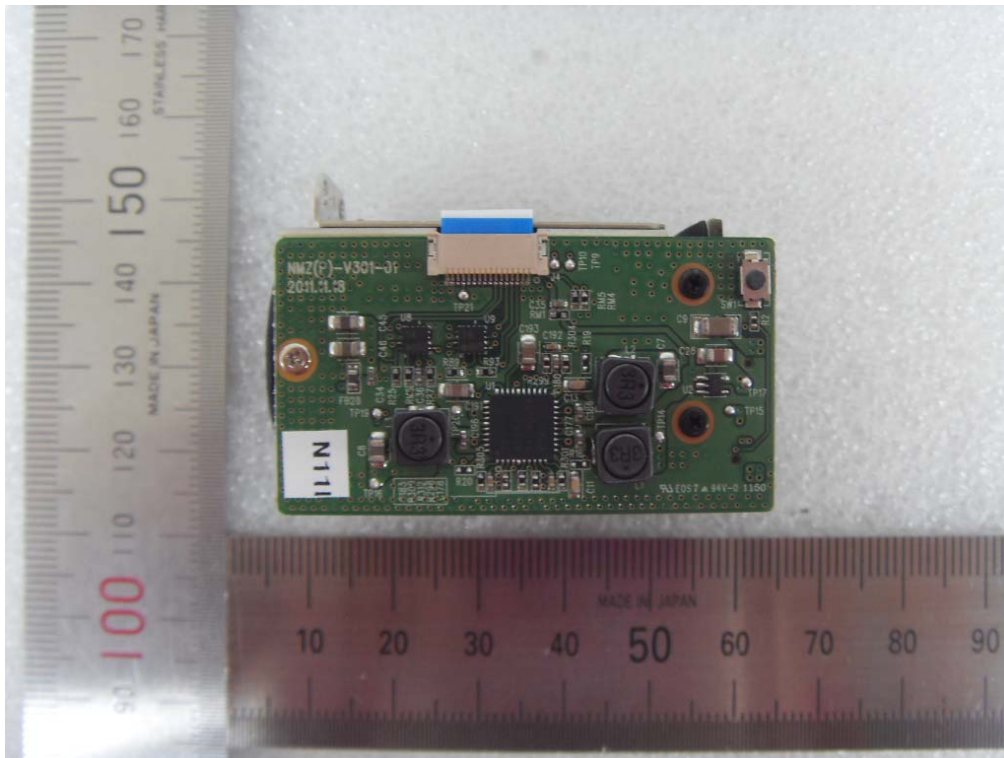
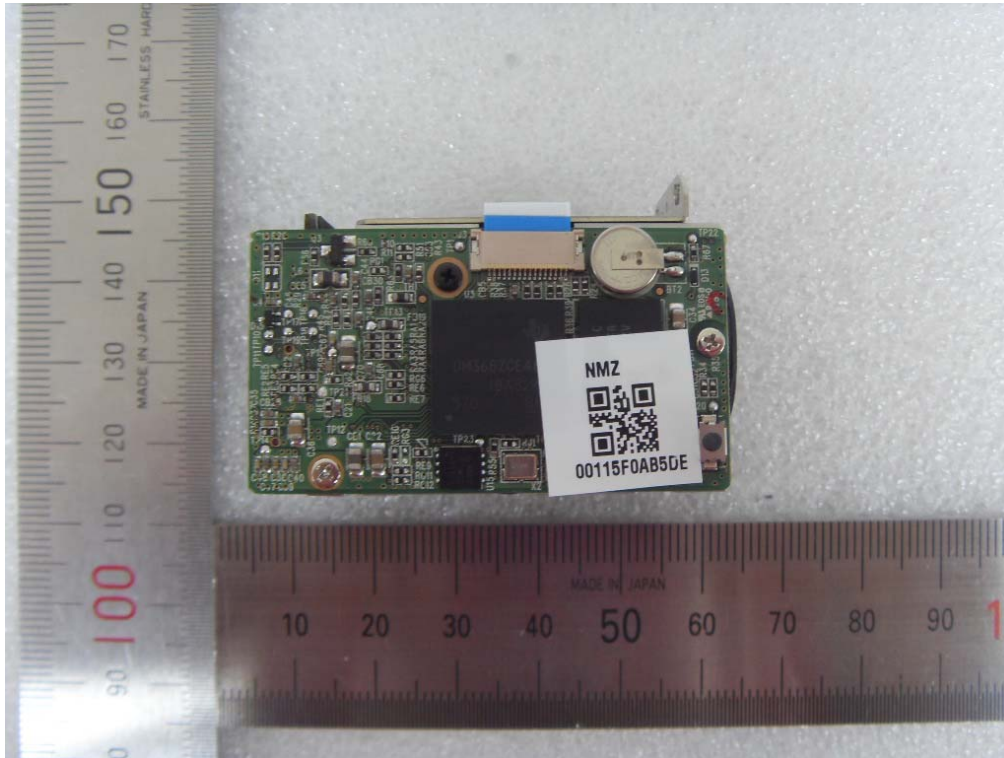
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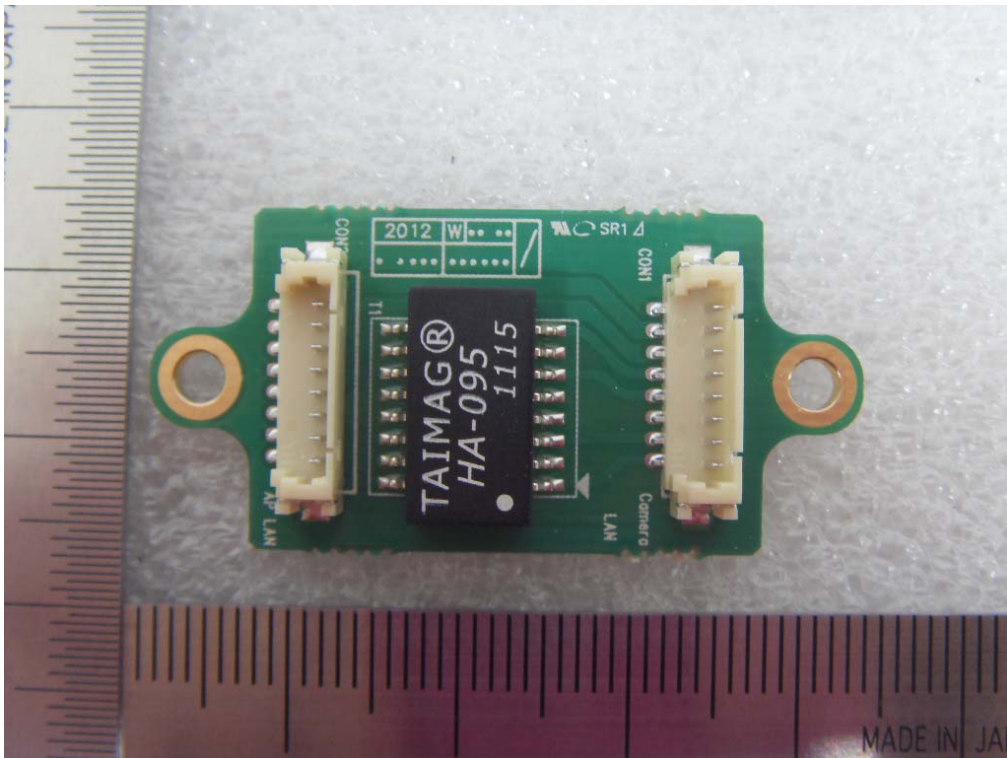
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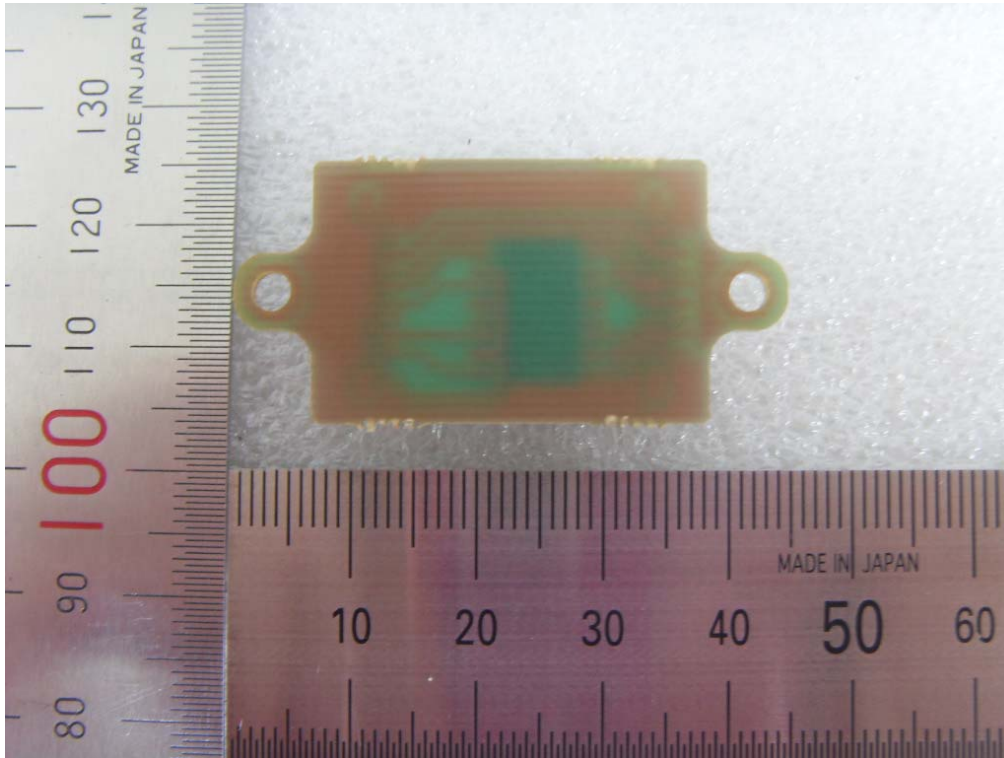
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### Label and Location

