



## FCC/IC - TEST REPORT

Report Number : **68.760.18.0177.01** Date of Issue: April 12, 2018

Model : K-10349

Product Type : Heated Toilet Seat

Applicant : Kohler Co.

Address : 444 Highland Drive

Manufacturer : Zhongshan Meitu plastic Industrial Co.,Ltd

Address : Dache Industrial area, Nanlang town, Zhongshan City

Test Result :  Positive     Negative

Total pages including Appendices : 21

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## 2 Details about the Test Laboratory

### Details about the Test Laboratory

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch  
Building 12&13, Zhiheng Wisdomland Business Park,  
Nantou Checkpoint Road 2, Nanshan District,  
Shenzhen City, 518052,  
P. R. China

Telephone: 86 755 8828 6998  
Fax: 86 755 8828 5299

FCC Registration No.: 514049

IC Registration No.: 10320A



### 3 Description of the Equipment Under Test

Product:	Heated Toilet Seat
Model no.:	K-10349
FCC ID:	N82-KOHLER023
Brand Name:	Kohler
Options and accessories:	NIL
Rating:	AC 100V-240V~50/60Hz
RF Transmission Frequency:	2402-2480MHz
No. of Operated Channel:	40
Modulation:	GFSK
Antenna Type:	Internal Antenna
Antenna Gain:	2.62dBi
Description of the EUT:	The Equipment Under Test (EUT) is Heated Toilet Seat operated at 2.4GHz



## 4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart B 10-1-17 Edition	Unintentional Radiators
ICES-003 Issue 6 January 2016	Information Technology Equipment (Including Digital Apparatus) - Limits and Methods of Measurement



## 5 Summary of Test Results

Emission Tests				
FCC Part 15 Subpart B 10-1-17 Edition / ICES-003 Issue 6				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
Conducted Emission on AC 150kHz to 30MHz	8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Emission 30MHz to 1000MHz	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



## 6 General Remarks

### Remarks

Nil.

### SUMMARY:

All tests according to the regulations cited on page 5 were

n - Performed

o - **Not** Performed

The Equipment under Test

n - **Fulfills** the general approval requirements.

o - **Does not** fulfill the general approval requirements.

Sample Received Date: March 26, 2018

Testing Start Date: March 28, 2018

Testing End Date: April 11, 2018

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Tested by: Louise Liu 2018-07-30

*Louise Liu*

Prepared by: Moon Xiong 2018-07-30

*Moon*

Reviewed by: John Zhi 2018-07-30

*John Zhi*

## 7 Technical Requirement

### 7.1 Conducted Emission Test

#### Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

#### Limit

According to §15.107, conducted emissions limit as below:

Frequency MHz	QP Limit dB $\mu$ V	AV Limit dB $\mu$ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

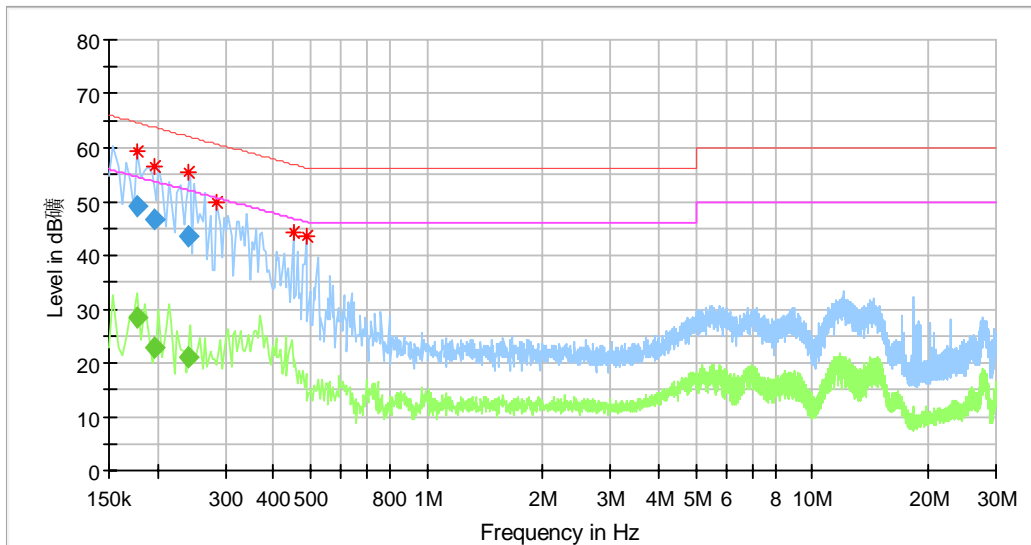
Decreasing linearly with logarithm of the frequency





## Conducted Emission

Product Type : Heated Toilet Seat  
 M/N : K-10349  
 Operating Condition : BT link and warming and lighting  
 Test Specification : Line  
 Comment : AC 120V/60Hz



### Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.177500	59.37	---	64.58	5.20	L1	10.2
0.197500	56.51	---	63.53	7.01	L1	10.2
0.241500	55.36	---	62.03	6.67	L1	10.2
0.286000	49.92	---	60.64	10.72	L1	10.2
0.450000	44.06	---	56.88	12.81	L1	11.0
0.486000	43.35	---	56.24	12.88	L1	10.4

### Final Result

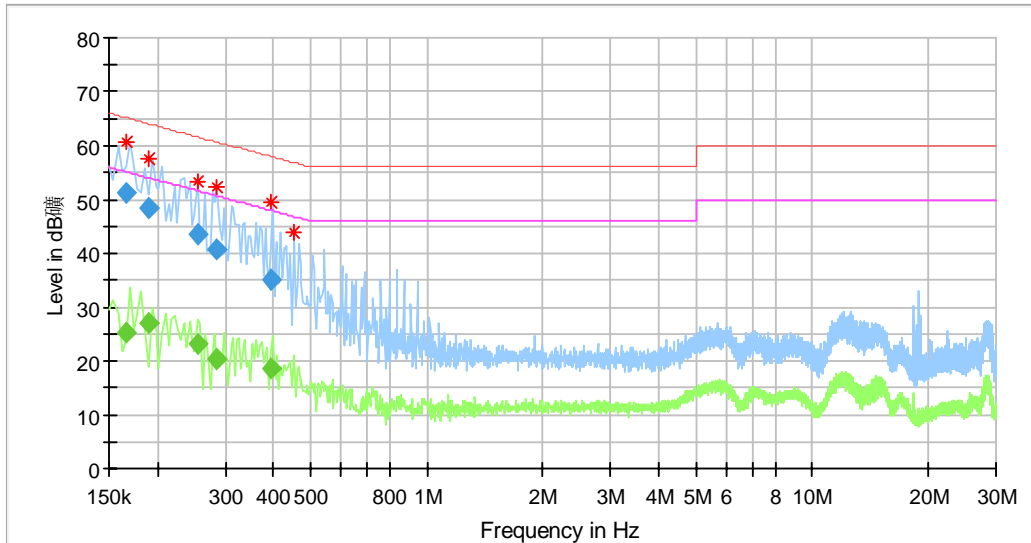
Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.177500	---	28.45	54.60	26.15	L1	10.2
0.177500	49.28	---	64.60	15.32	L1	10.2
0.197500	---	22.65	53.72	31.07	L1	10.2
0.197500	46.84	---	63.72	16.88	L1	10.2
0.241500	---	21.21	52.04	30.83	L1	10.2
0.241500	43.60	---	62.04	18.44	L1	10.2

\*Correct factor=cable loss + LISN factor



## Conducted Emission

Product Type : Heated Toilet Seat  
 M/N : K-10349  
 Operating Condition : BT link and warming and lighting  
 Test Specification : Neutral  
 Comment : AC 120V/60Hz



### Critical\_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.165500	60.69	---	64.96	4.27	N	10.3
0.189500	57.57	---	63.86	6.30	N	10.3
0.253500	53.33	---	61.63	8.30	N	10.3
0.285500	52.18	---	60.64	8.46	N	10.3
0.393500	49.51	---	57.90	8.38	N	10.3
0.454000	43.75	---	56.80	13.05	N	10.3

### Final\_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.165500	---	25.37	55.18	29.81	N	10.3
0.165500	51.24	---	65.18	13.94	N	10.3
0.189500	---	26.87	54.06	27.19	N	10.3
0.189500	48.43	---	64.06	15.63	N	10.3
0.253500	---	23.08	51.64	28.56	N	10.3
0.253500	43.64	---	61.64	18.00	N	10.3
0.285500	---	20.49	50.65	30.16	N	10.3
0.285500	40.66	---	60.65	19.99	N	10.3
0.393500	---	18.62	47.99	29.37	N	10.3
0.393500	34.95	---	57.99	23.04	N	10.3

\*Correct factor=cable loss + LISN factor



## Test Equipment List

### Conducted emission test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2018-7-14
LISN	Rohde & Schwarz	ENV4200	100249	2018-7-14
LISN	Rohde & Schwarz	ENV432	101318	2018-7-14
LISN	Rohde & Schwarz	ENV216	100326	2018-7-14
ISN	Rohde & Schwarz	ENY81	100177	2018-7-14
ISN	Rohde & Schwarz	ENY81-CA6	101664	2018-7-14
High Voltage Probe	Rohde & Schwarz	TK9420(VT94 20)	9420-584	2018-7-14
RF Current Probe	Rohde & Schwarz	EZ-17	100816	2018-7-14
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2018-7-7
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A



## 7.2 Radiated Emission Test

### Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:  
 For Above 1GHz  
 Span = wide enough to capture the peak level of the in-band emission and all spurious  
 RBW = 1MHz, VBW ≥ RBW for peak measurement and VBW = 10Hz for average measurement,  
 Sweep = auto, Detector function = peak, Trace = max hold.

- For Below 1GHz  
 Use the following spectrum analyzer settings:  
 Span = wide enough to capture the peak level of the in-band emission and all spurious  
 RBW = 100 KHz, VBW ≥ RBW for peak measurement, Sweep = auto, Detector function = peak,  
 Trace = max hold.

### Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle)).
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz

### Limits

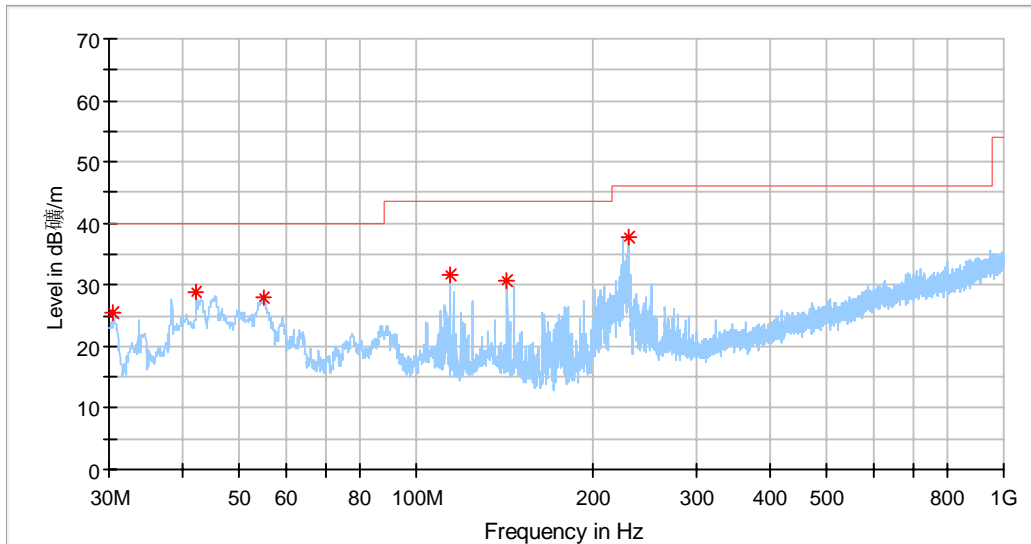
The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209 and ICES-003 clause 6.2.

Frequency MHz	Field Strength µV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK



## Radiated Emission Test 30MHz – 1000MHz

Product Type : Heated Toilet Seat  
 M/N : K-10349  
 Operating Condition : BT link and warming and lighting  
 Ant. Polarity : Vertical  
 Comment : 30-1000MHz



### Critical\_Freqs

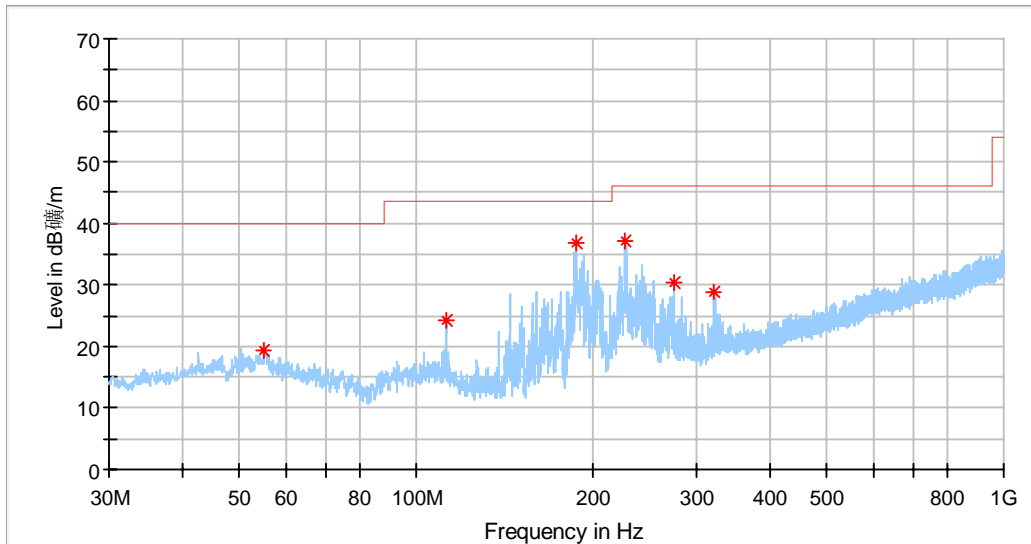
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.485000	25.47	40.00	14.53	100.0	V	171.0	15.1
42.125000	28.89	40.00	11.11	100.0	V	187.0	17.5
54.856250	28.02	40.00	11.98	100.0	V	171.0	17.8
114.147500	31.57	43.50	11.93	100.0	V	179.0	15.8
142.883750	30.59	43.50	12.91	100.0	V	101.0	12.9
229.880625	37.84	46.00	8.16	100.0	V	117.0	17.4

Corrector factor = Antenna Factor + Cable Loss



## Radiated Emission Test 30MHz – 1000MHz

Product Type : Heated Toilet Seat  
 M/N : K-10349  
 Operating Condition : BT link and warming and lighting  
 Ant. Polarity : Horizontal  
 Comment : 30-1000MHz



### Critical Freqs

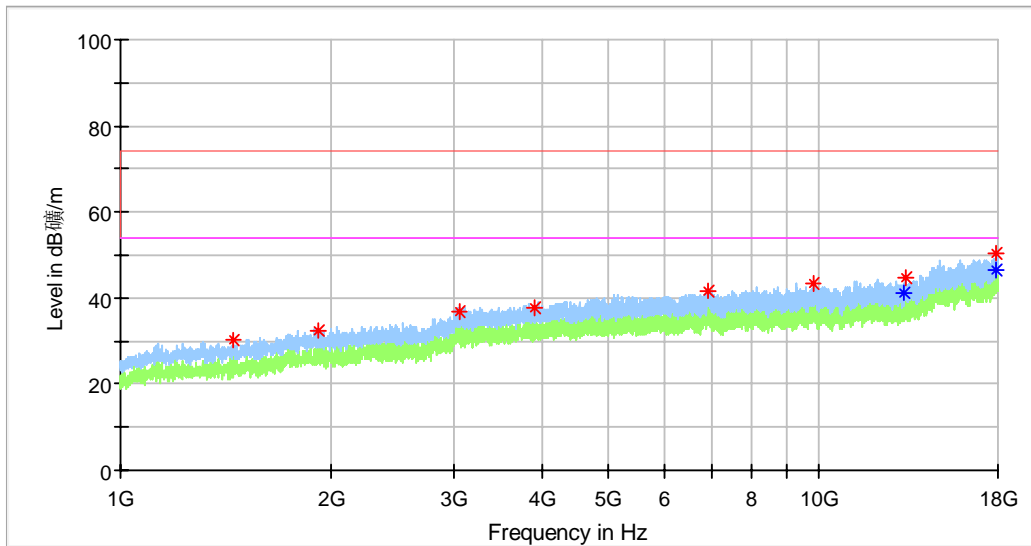
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
54.977500	19.34	40.00	20.66	100.0	H	345.0	17.5
112.389375	24.10	43.50	19.40	100.0	H	179.0	15.6
186.958125	36.94	43.50	6.56	100.0	H	0.0	14.8
227.576875	37.22	46.00	8.78	100.0	H	210.0	16.9
274.925000	30.43	46.00	15.57	100.0	H	0.0	18.4
321.970000	28.99	46.00	17.01	100.0	H	0.0	19.3

Corrector factor = Antenna Factor + Cable Loss



### Radiated Emission

Product Type : Heated Toilet Seat  
 M/N : K-10349  
 Operating Condition : BT link and warming and lighting  
 Ant. Polarity : Horizontal  
 Comment : 1GHz-18GHz



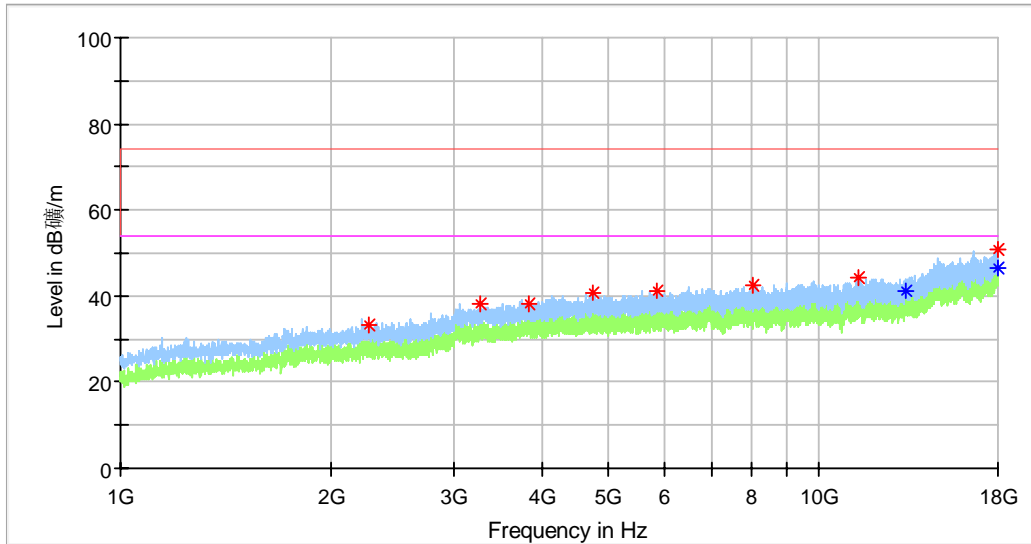
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1449.791667	30.24	---	74.00	43.76	100.0	H	152.0	-12.9
1918.000000	32.40	---	74.00	41.60	100.0	H	270.0	-9.5
3052.750000	36.86	---	74.00	37.14	100.0	H	0.0	-3.9
3915.500000	37.75	---	74.00	36.25	100.0	H	139.0	-1.5
6929.458333	41.56	---	74.00	32.44	100.0	H	0.0	2.8
9827.250000	43.35	---	74.00	30.65	100.0	H	218.0	6.2
13232.208333	---	41.11	54.00	12.89	100.0	H	34.0	9.7
13266.208333	44.54	---	74.00	29.46	100.0	H	324.0	10.0
17888.083333	---	46.53	54.00	7.47	100.0	H	152.0	18.1
17938.375000	50.46	---	74.00	23.54	100.0	H	192.0	18.2

Corrector factor = Antenna Factor + Cable Loss



## Radiated Emission

Product Type : Heated Toilet Seat  
 M/N : K-10349  
 Operating Condition : BT link and warming and lighting  
 Ant. Polarity : Vertical  
 Comment : 1GHz-18GHz



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2263.666667	33.37	---	74.00	40.63	100.0	V	0.0	-8.3
3273.750000	38.33	---	74.00	35.67	100.0	V	182.0	-3.2
3836.875000	38.15	---	74.00	35.85	100.0	V	103.0	-1.2
4735.041667	40.92	---	74.00	33.08	100.0	V	103.0	0.6
5849.958333	41.16	---	74.00	32.84	100.0	V	208.0	2.0
8050.041667	42.52	---	74.00	31.48	100.0	V	208.0	4.4
11379.208333	44.16	---	74.00	29.84	100.0	V	0.0	7.8
13297.375000	---	41.38	54.00	12.62	100.0	V	326.0	10.4
17984.416667	50.98	---	74.00	23.02	100.0	V	12.0	18.6
17998.583333	---	46.60	54.00	7.40	100.0	V	339.0	18.7

Corrector factor = Antenna Factor + Cable Loss





## Test Equipment List

### Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2018-7-14
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2018-7-14
Horn Antenna	Rohde & Schwarz	HF907	102294	2018-7-14
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2018-7-14
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2018-7-7
Attenuator	Agilent	8491A	MY39264334	2018-7-7
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

## 8 Photographs of Test Set-ups



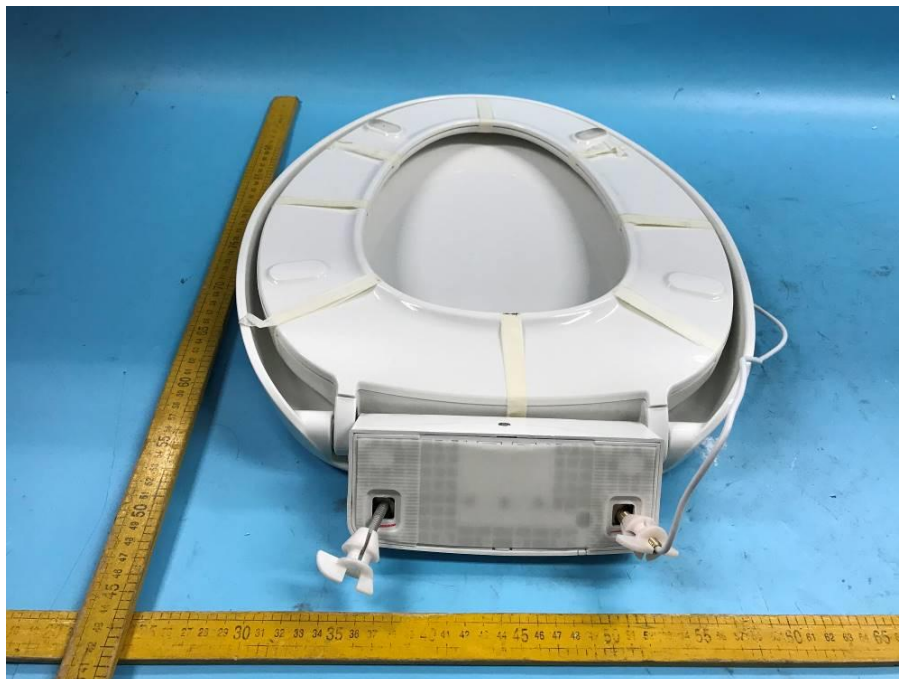
Conducted emission test



Radiated emission

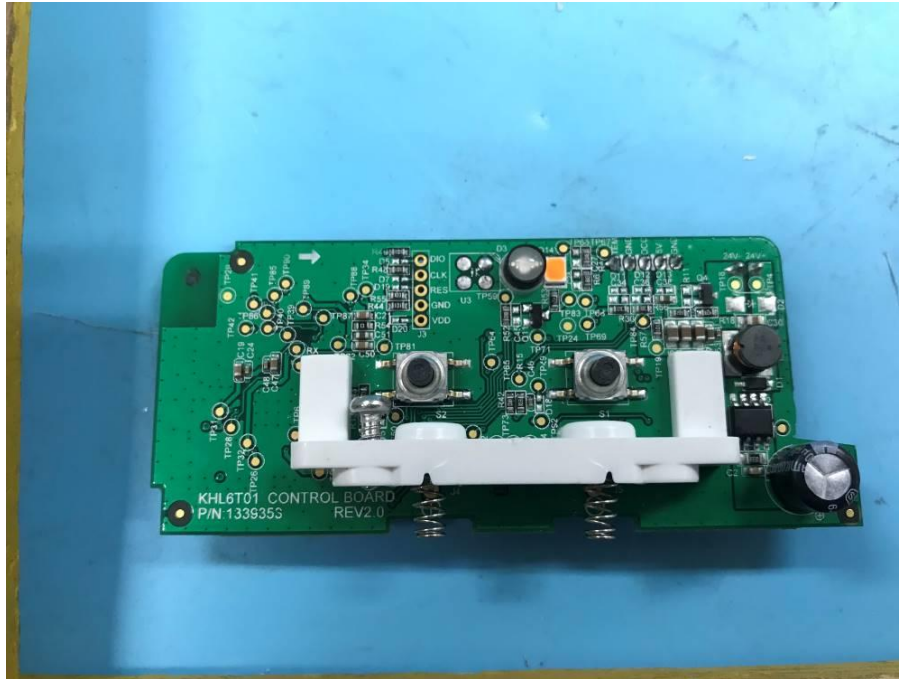
## 9 Photographs of EUT

External photo:



Internal photo:









Adapter photo:



THE END