

# TECHNICAL REPORT



Report No: FCC1704054  
File reference No: 2017-05-10

Applicant: Shenzhen Star Sources Electronic Technology Co., Limited

Product: Wireless Mini Numeric Keypad

Model No: 178846

Brand Name: N/A

Test Standards: FCC Part 15.249

Test result: It is herewith confirmed and found to comply with the requirements set up by ANSI C63.4&FCC Part 15 Subpart C, Paragraph 15.249 regulations for the evaluation of electromagnetic compatibility

Approved By

*Jack Chung*

Jack Chung

Manager

Dated: May 10, 2017

**Results appearing herein relate only to the sample tested**

**The technical reports is issued errors and omissions exempt and is subject to withdrawal at**

## SHENZHEN TIMEWAY TESTING LABORATORIES

Room 512-519, 5/F., East Tower, Building 4, Anhua Industrial Zone, Futian District, Shenzhen, Guangdong, China

Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com



### **Special Statement:**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

#### **CNAS-LAB Code: L2292**

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of testing Laboratories.

#### **FCC-Registration No.: 899988**

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 899988.

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1.0 **General Details**

1.1 Test Lab Details

Name : SHENZHEN TIMEWAY TESTING LABORATORIES.  
Address: Room 512-519,5/F., East Tower,Building 4, Anhua Industrial Zone, Futian District,Shenzhen, Guangdong China  
Telephone: (755) 83448688  
Fax: (755) 83442996  
Site on File with the Federal Communications Commission – United States  
Registration Number: 899988  
For 3m Anechoic Chamber  
Site Listed with Industry Canada of Ottawa, Canada  
Registration Number: IC: 5205A-02  
For 3m Anechoic Chamber

1.2 Applicant Details

Applicant: Shenzhen Star Sources Electronic Technology Co., Limited  
Address: RM2001, Meilan Int'l Business Center, intersection between the road of Xixiang and QianJin BaoAn District, Shenzhen, China  
Telephone: +86-755-86397262  
Fax: +86-755-26609516

1.3 Description of EUT

Product: Wireless Mini Numeric Keypad  
Manufacturer: Shenzhen Star Sources Electronic Technology Co., Limited  
Address: RM2001, Meilan Int'l Business Center, intersection between the road of Xixiang and QianJin BaoAn District, Shenzhen, China  
Brand Name: N/A  
Model Number: 178846  
Additional Model Name N/A  
Input Voltage: 1.5Vdc, 1pcs AAA battery  
Modulation Type: GFSK  
Operation Frequency 2405-2470MHz

Channel List

2,405	2,413
2,422	2,430
2,440	2,450
2,460	2,470

Antenna Designation PCB antenna with gain 0dBi Max

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1.4 Submitted Sample  
2 Sample

1.5 Test Duration  
2017-04-11 to 2017-05-09

1.6 Test Uncertainty  
Conducted Emissions Uncertainty =3.6dB  
Radiated Emissions Uncertainty =4.7dB

1.7 Test Engineer

The sample tested by \_\_\_\_\_

Print Name: Terry Tang

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<b>2.0 Test Equipments</b>					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2016-08-22	2017-08-21
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2016-08-22	2017-08-21
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2016-08-22	2017-08-21
ESDV Test Receiver	R&S	ESDV	100008	2016-08-22	2017-08-21
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2016-08-22	2017-08-21
System Controller	CT	SC100	-	--	--
Loop Antenna	EMCO	6502	00042960	2016-08-23	2017-08-22
ESPI Test Receiver	R&S	ES126	838786/013	2016-08-22	2017-08-21
3m Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W) ) * 6.4(H)	--	2016-08-23	2017-08-22
Horn Antenna	R&S	BBHA 9170	BBHA9170265	2016-08-24	2017-08-23
Horn Antenna	R&S	BBHA 9120D	9120D-631	2016-08-24	2017-08-23
Power meter	Anritsu	ML2487A	6K00003613	2016-08-22	2017-08-21
Power sensor	Anritsu	MA2491A	32263	2016-08-22	2017-08-21
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2016-08-23	2017-08-21
9*6*6 Anechoic	--	--	N/A	2016-08-24	2017-08-23
EMI Test Receiver	RS	ESCS30	100139	2016-08-22	2017-08-21
RF Cable	SCHWARZBECK	--	--	2016-08-23	2017-08-22
Pre-Amplifier	HP	8447D	2727A05017	2016-08-05	2017-08-04
Pre-Amplifier	EM	EM30265	--	2016-08-05	2017-08-04

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### 3.0 Technical Details

#### 3.1 Summary of test results

<b>The EUT has been tested according to the following specifications:</b>			
<b>Standard</b>	<b>Test Type</b>	<b>Result</b>	<b>Notes</b>
<b>FCC Part 15, Paragraph 15.207</b>	<b>Conducted Emission Test</b>	<b>N/A</b>	<b>Complies</b>
<b>FCC Part 15 Subpart C Paragraph 15.249(a) &amp; 15.249(b) Limit</b>	<b>Field Strength of Fundamental</b>	<b>PASS</b>	<b>Complies</b>
<b>FCC Part 15, Paragraph 15.209 and RSS-210</b>	<b>Radiated Emission Test</b>	<b>PASS</b>	<b>Complies</b>
<b>FCC Part 15 Subpart C Paragraph 15.249(d) Limit</b>	<b>Band Edge Test</b>	<b>PASS</b>	<b>Complies</b>

#### 3.2 Test Standards

**FCC Part 15 Subpart C, Paragraph 15.249 , ANSI C63.4 :2014 and ANSI C63.10 :2013**

#### 4.0 EUT Modification

**No modification by SHENZHEN TIMEWAY TESTING LABORATORIES**

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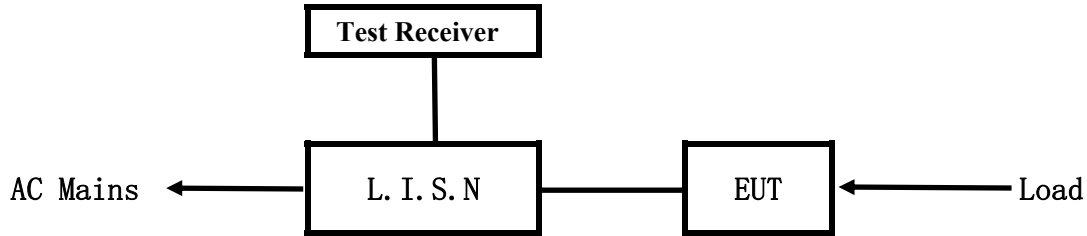
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**5. Power Line Conducted Emission Test**

5.1 Schematics of the test

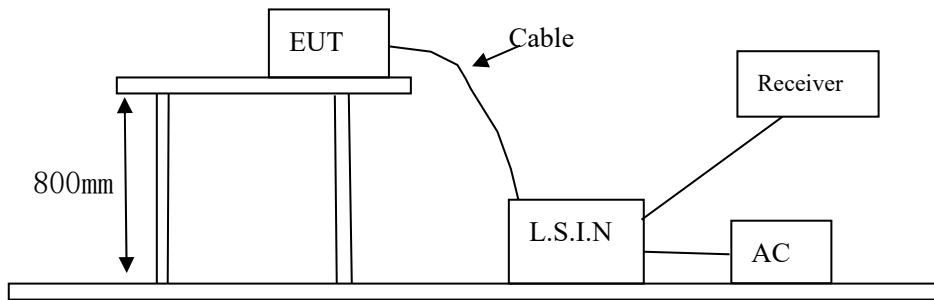


EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2014. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2014.

Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2014. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

One channels are provided to the EUT

A. EUT

Device	Manufacturer	Model	FCC ID
Wireless Mini Numeric Keypad	Shenzhen Star Sources Electronic Technology Co., Limited	178846	ZJEST-WKP302

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B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
N/A				

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2014

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.107 and 15.207

Frequency(MHz)	Class A Limits (dB $\mu$ V)		Class B Limits (dB $\mu$ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	73.0	60.0	56.0	46.0
5.00 ~ 30.00	73.0	60.0	60.0	50.0

- Notes:
- \*Decreasing linearly with logarithm of frequency.
  - The tighter limit shall apply at the transition frequencies

5.6 Test Results

N/A

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

**Note: Due to AA Battery operation, this test item not applicable.**

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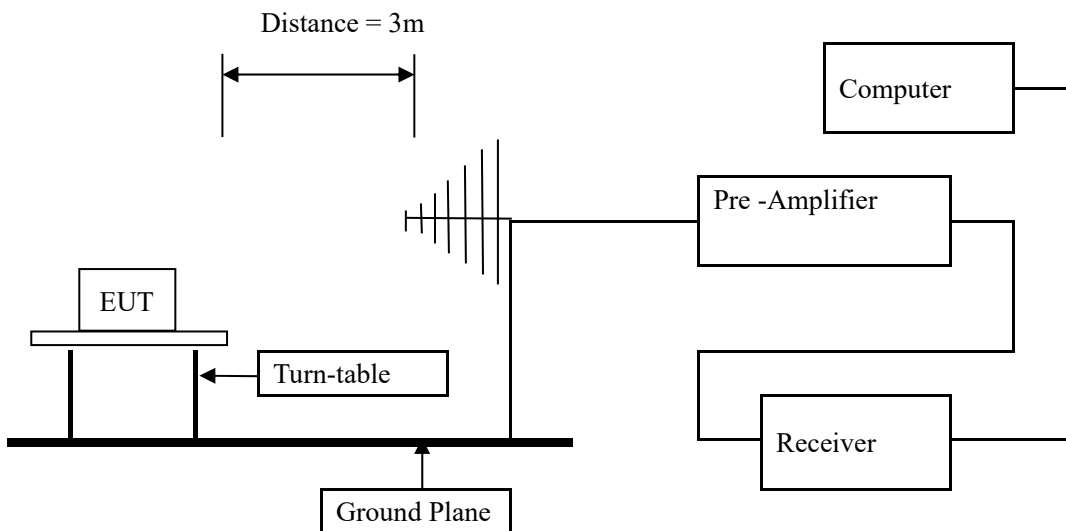


## 6 Radiated Emission Test

### 6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 899988
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) The antenna polarization: Vertical polarization and Horizontal polarization.

#### Block diagram of Test setup



### 6.2 Configuration of The EUT

Same as section 5.3 of this report

### 6.3 EUT Operating Condition

Same as section 5.4 of this report.

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6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

**A FCC Part 15 Subpart C Paragraph 15.249(a) Limit**

Fundamental Frequency (MHz)	Field Strength of Fundamental (3m)		Field Strength of Harmonics (3m)		
	mV/m	dBuV/m	uV/m	dBuV/m	
2400-2483.5	50	94 (Average) 114 (Peak)	500	54 (Average)	74 (Peak)

- Note:
1. RF Field Strength (dBuV) = 20 log RF Voltage (uV)
  2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
  3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

**B. Frequencies in restricted band are complied to limit on Paragraph 15.209.**

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

- Note:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
  4. This is a handheld device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
  5. All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz.As to 1G-18G, the final emission level got using PK. For fundamental measurement, PK detector used.
  6. New batteries were used during tests.

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## 6.5 Test result

### A Fundamental & Harmonics Radiated Emission Data

Product:	Wireless Mini Numeric Keypad	Test Mode:	Keep transmitting-Low Channel
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC1.5V	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2405	87.28(PK)	H	114/94	-6.72
2405	86.73(PK)	V	114/94	-7.27
4810	--	H	74/54	--
4810	--	V	74/54	--
7215	--	H/V	74/54	--
9620	--	H/V	74/54	--
12025	--	H/V	74/54	--
14430	--	H/V	74/54	--
16835	--	H/V	74/54	--
19240	--	H/V	74/54	--
21645	--	H/V	74/54	--
24050	--	H/V	74/54	--

- Note:
- (1) PK= Peak, AV= Average
  - (2) Emission Level = Reading Level + Antenna Factor + Cable Loss.
  - (3) Margin=Emission-Limits
  - (4) According to section 15.35(b), the peak limit is 20dB higher than the average limit
  - (5) For test purpose, keep EUT continuous transmitting

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Product:	Wireless Mini Numeric Keypad	Test Mode:	Keep transmitting-Middle Channel
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC1.5V	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2430	86.00(PK)	H	114/94	-8.00
2430	86.50(PK)	V	114/94	-7.50
4860	--	H	74/54	--
4860	--	V	74/54	--
7290	--	H/V	74/54	--
9720	--	H/V	74/54	--
12150	--	H/V	74/54	--
14580	--	H/V	74/54	--
17010	--	H/V	74/54	--
19440	--	H/V	74/54	--
21870	--	H/V	74/54	--
24300	--	H/V	74/54	--

- Note:
- (1) PK= Peak, AV= Average
  - (2) Emission Level = Reading Level + Antenna Factor + Cable Loss.
  - (3) Margin=Emission-Limits
  - (4) According to section 15.35(b), the peak limit is 20dB higher than the average limit
  - (5) For test purpose, keep EUT continuous transmitting

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Product:	Wireless Mini Numeric Keypad	Test Mode:	Keep transmitting-High Channel
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	DC1.5V	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2470	87.39(PK)	H	114/94	-6.61
2470	86.88(PK)	V	114/94	-7.12
4940	--	H	74/54	--
4940	--	V	74/54	--
7410	--	H/V	74/54	--
9980	--	H/V	74/54	--
12350	--	H/V	74/54	--
14820	--	H/V	74/54	--
17290	--	H/V	74/54	--
19760	--	H/V	74/54	--
22230	--	H/V	74/54	--
24700	--	H/V	74/54	--

- Note:
- (1) PK= Peak, AV= Average
  - (2) Emission Level = Reading Level + Antenna Factor + Cable Loss.
  - (3) Margin=Emission-Limits
  - (4) According to section 15.35(b), the peak limit is 20dB higher than the average limit
  - (5) For test purpose, keep EUT continuous transmitting

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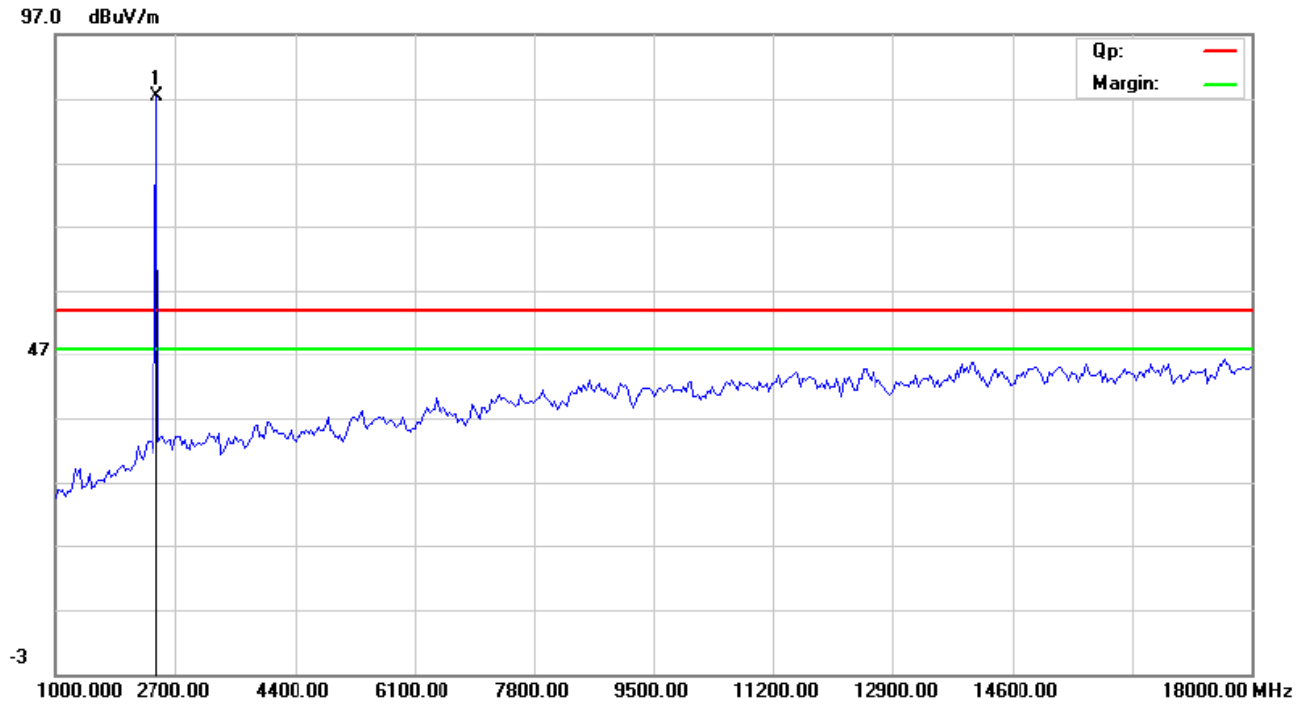
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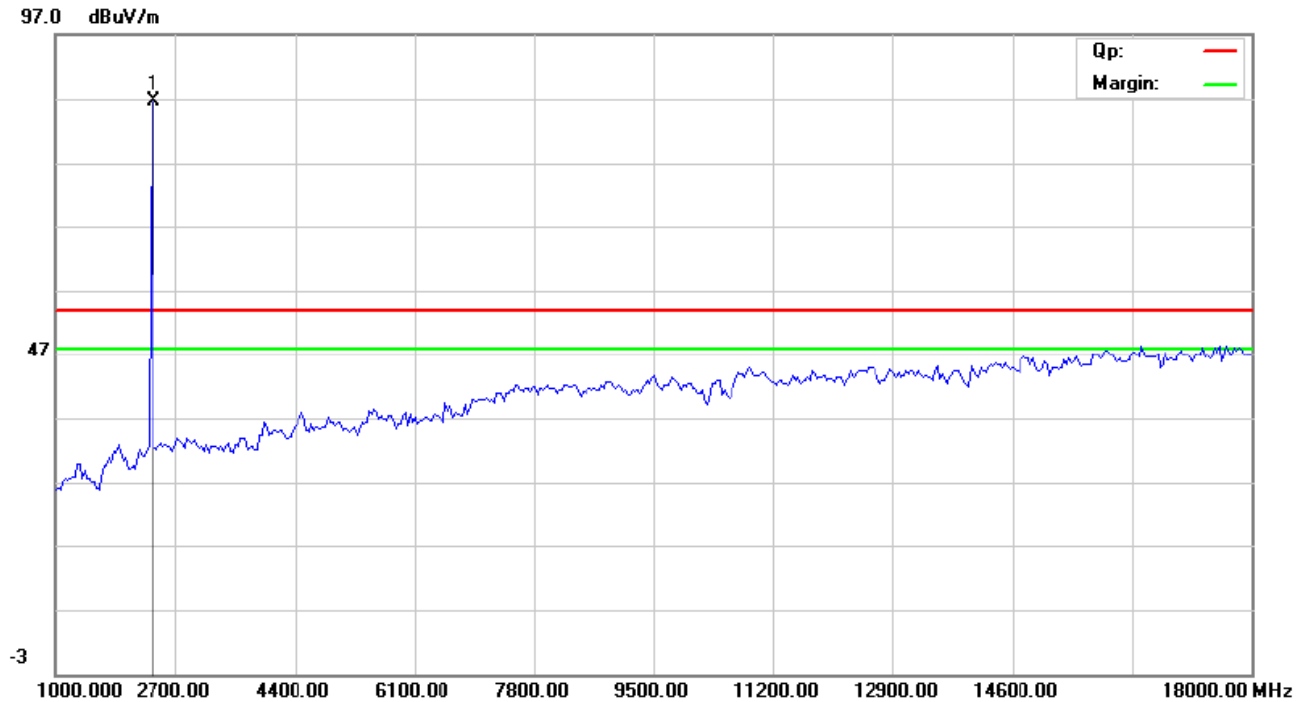


Please refer to the following test plots for details: Low Channel

### Horizontal



### Vertical

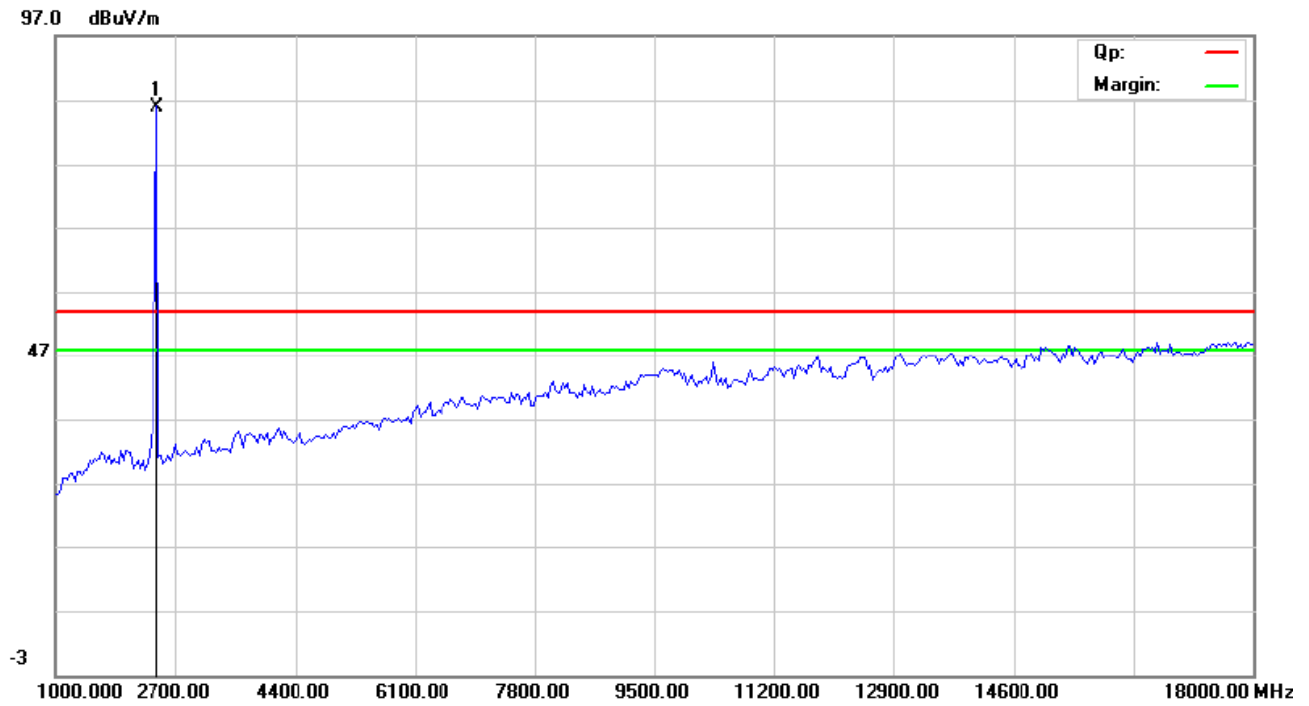


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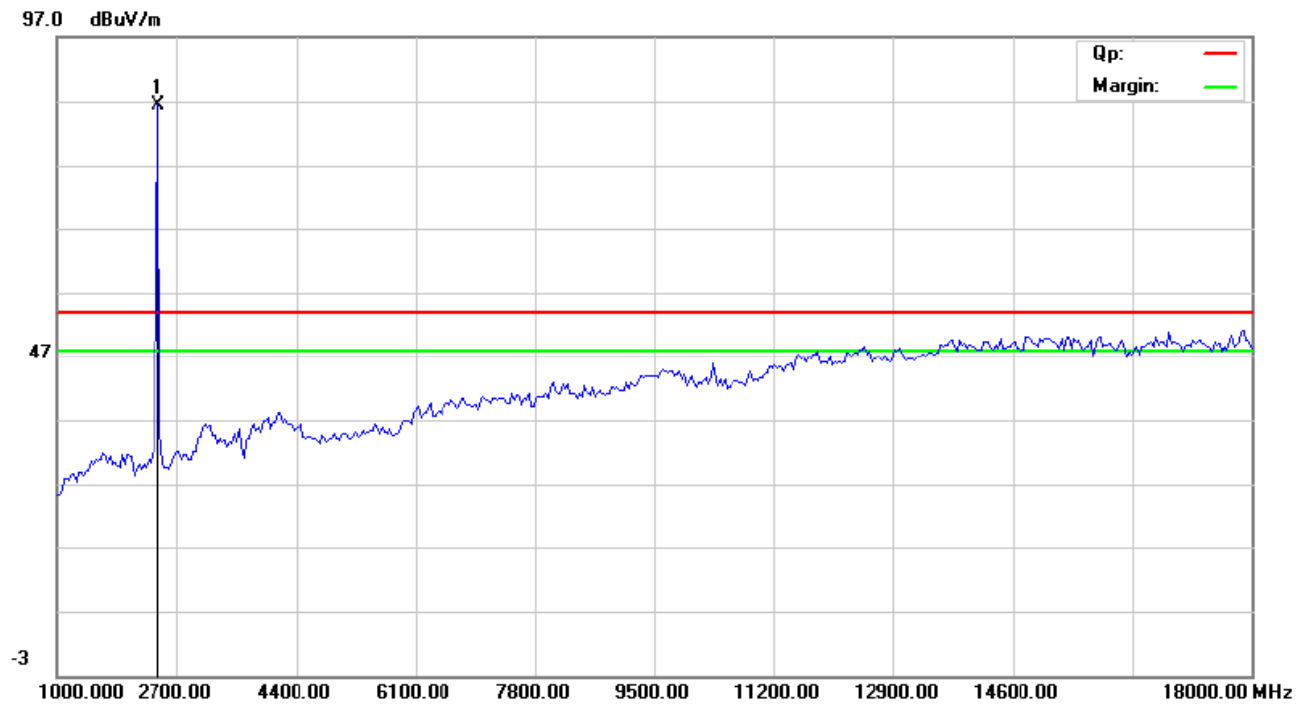


Please refer to the following test plots for details: Middle Channel

### Horizontal



### Vertical



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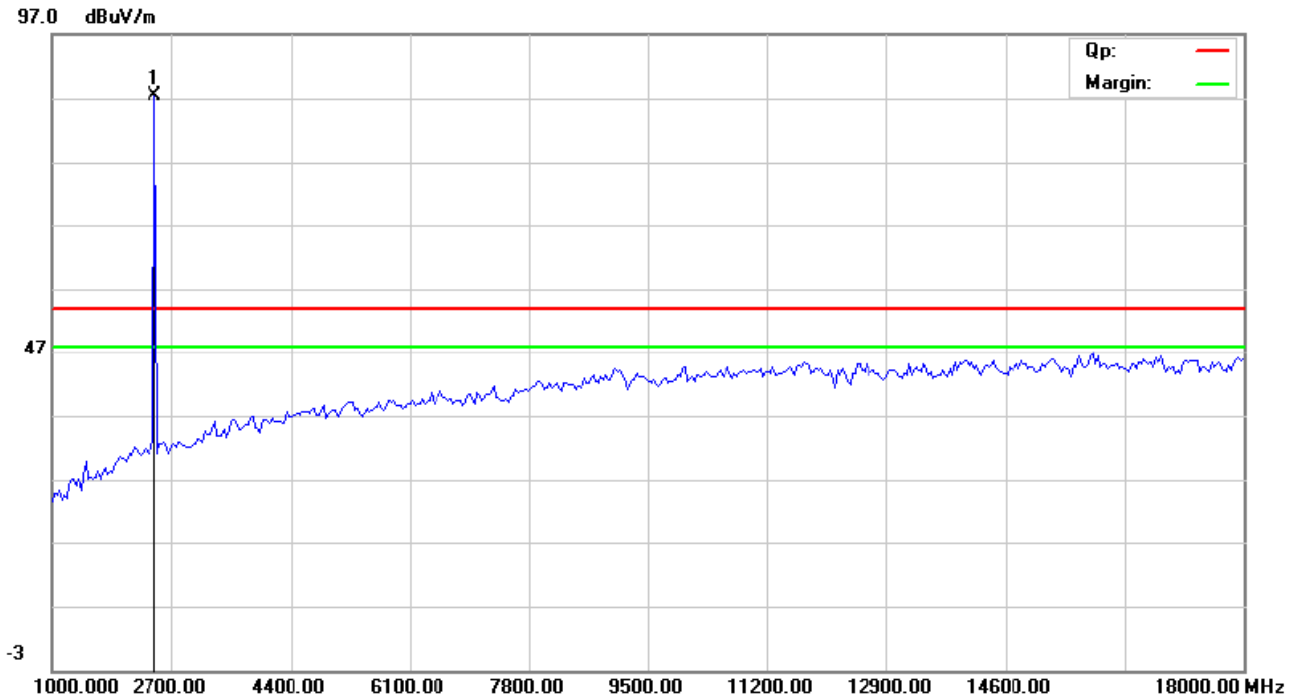
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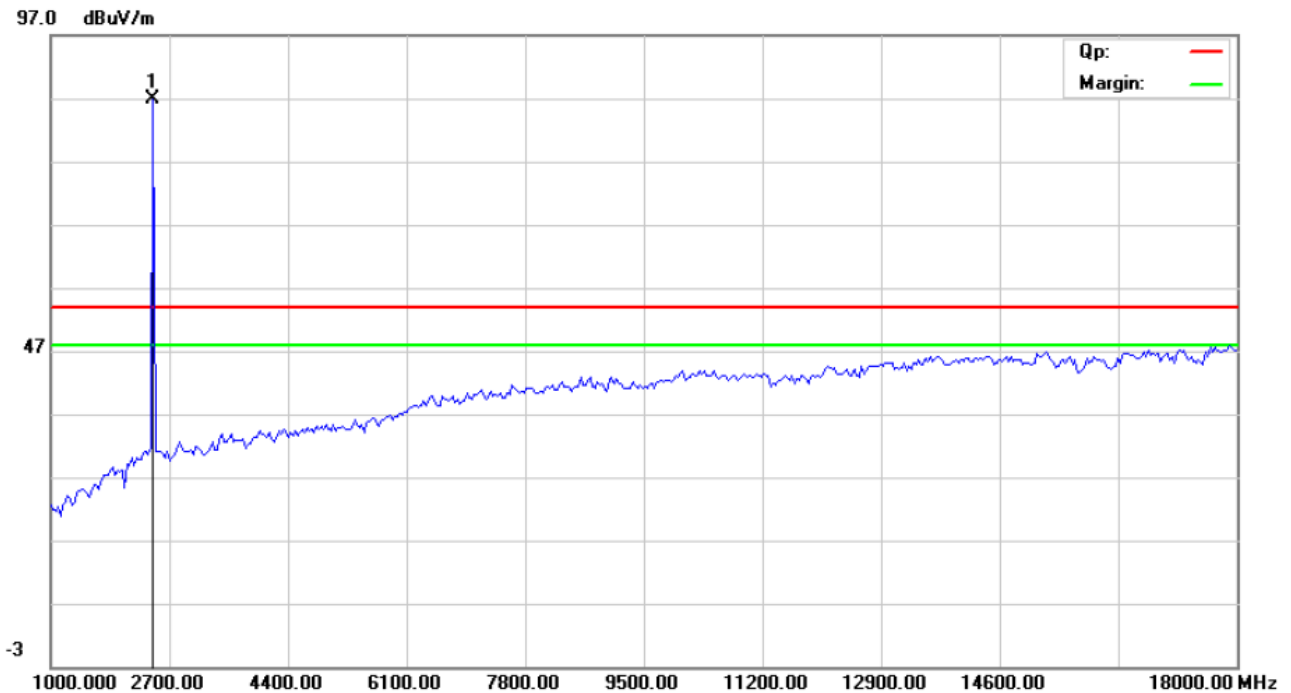


Please refer to the following test plots for details: High Channel

### Horizontal



### Vertical



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**B. General Radiated Emission Data**  
**Radiated Emission In Horizontal (30MHz----1000MHz)**

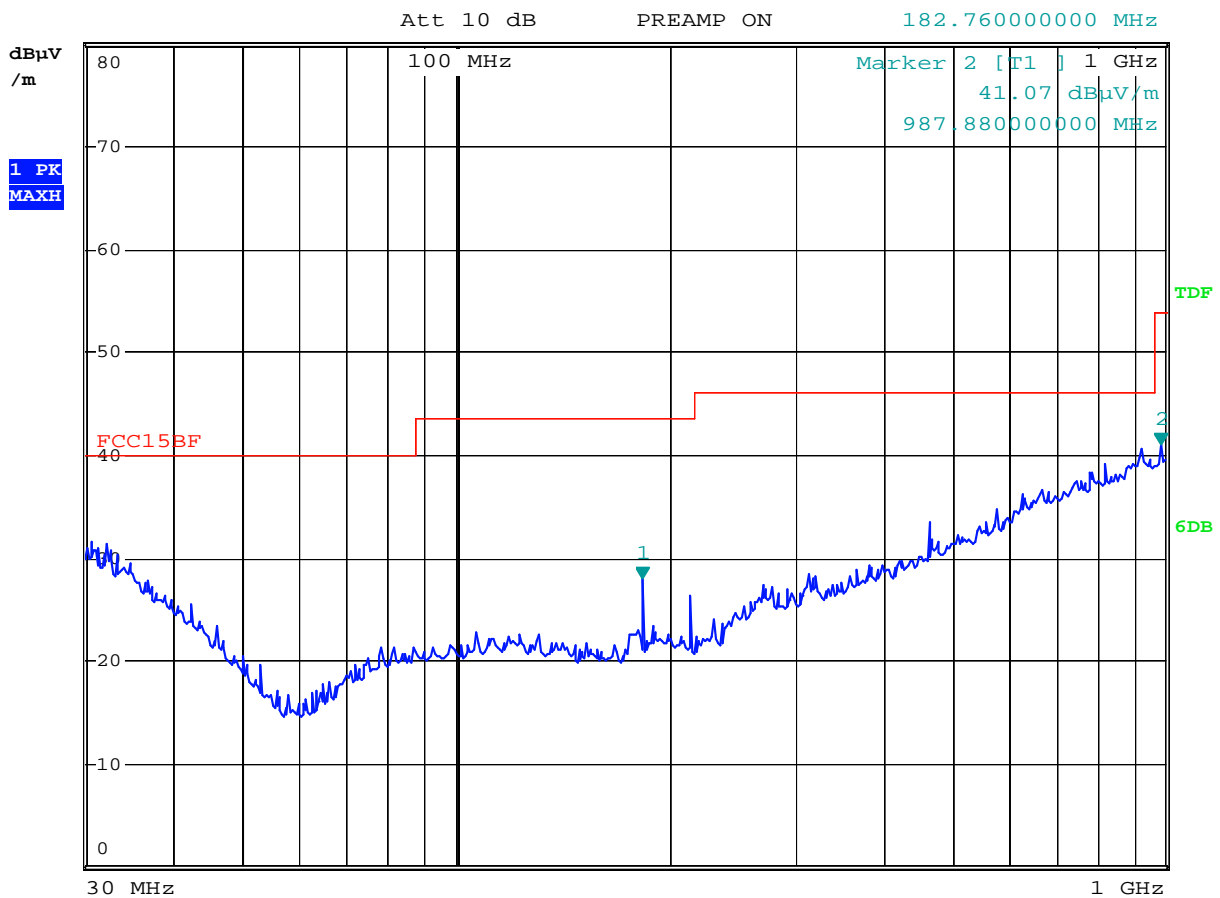
EUT set Condition: Keep Tx transmitting

**Results: Pass**

Please refer to following diagram for individual



RBW 120 kHz Marker 1 [T1 ]  
 MT 50 μs 27.95 dBμV/m  
 PREAMP ON 182.760000000 MHz



Date: 14.APR.2017 11:31:12

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
182.760	27.95(PK)	H	43.50
987.880	41.07(PK)	H	54.00

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**Radiated Emission In Vertical (30MHz----1000MHz)**

EUT set Condition: Keep Tx transmitting

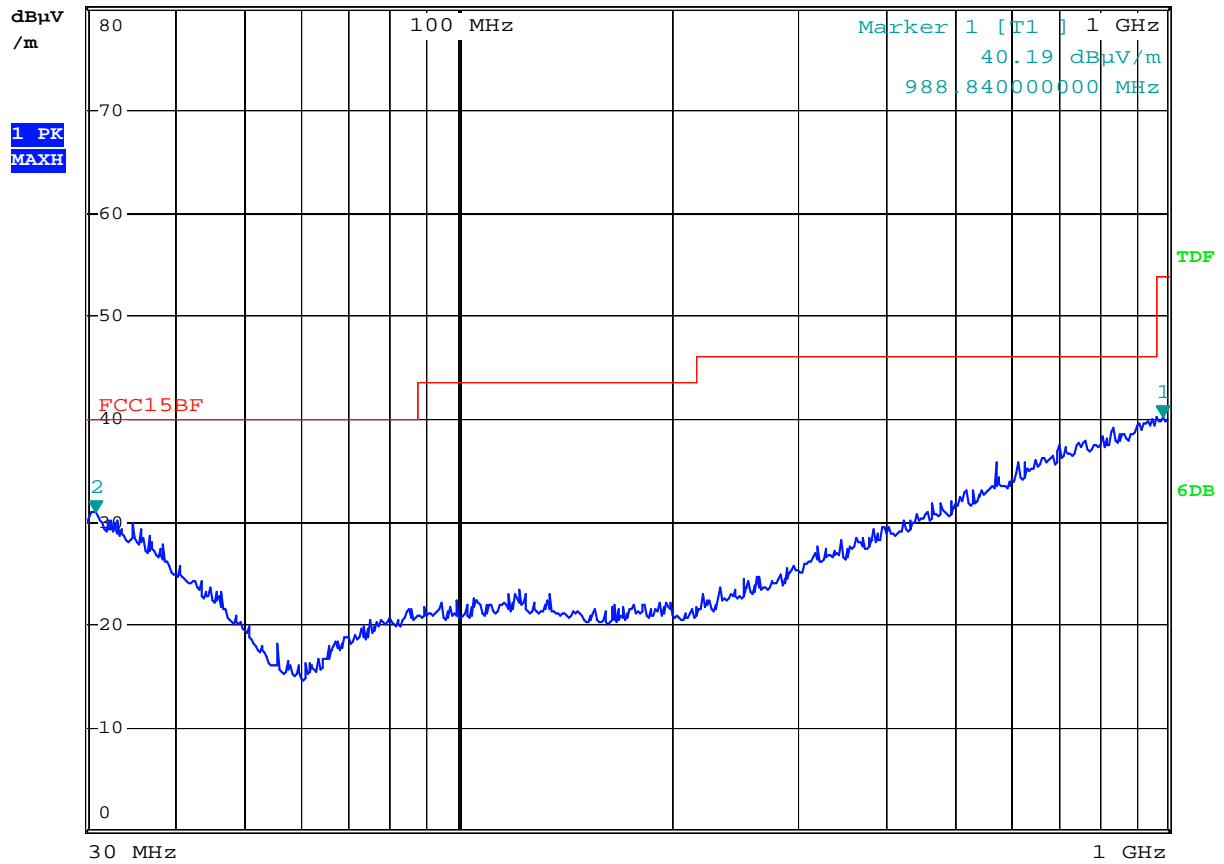
**Results: Pass**

Please refer to following diagram for individual



**MARKER 2**  
 30.76 MHz  
 Att 10 dB

RBW 120 kHz Marker 2 [T1 ]  
 MT 50 μs 31.01 dBμV/m  
 PREAMP ON 30.760000000 MHz



Date: 14.APR.2017 11:35:01

Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
30.760	31.01 (PK)	V	40.00
988.840	40.19 (PK)	V	54.00

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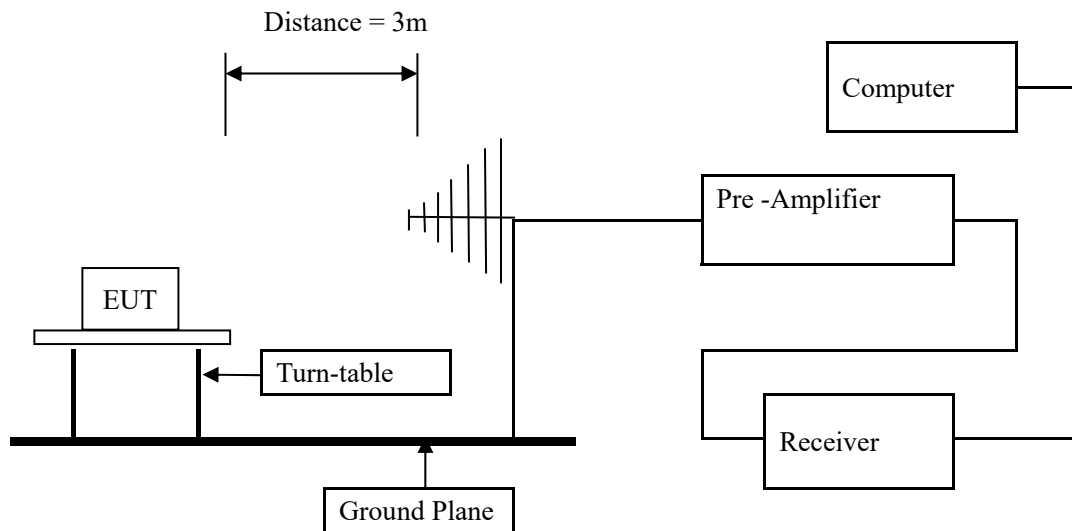


## 7. Band Edge

### 7.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.10–2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 899988
- (2) Set Spectrum as RBW=1MHz, VBW=3MHz and Peak detector used
- (3) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (4) The antenna polarization: Vertical polarization and Horizontal polarization.

### 7.2 Radiated Test Setup



For the actual test configuration , please refer to the related items – Photos of Testing

### 7.3 Configuration of The EUT

Same as section 5.3 of this report

### 7.4 EUT Operating Condition

Same as section 5.4 of this report.

### 7.5 Band Edge Limit

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

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**7.6 Test Result** Low channel:

Product:	Wireless Mini Numeric Keypad		Polarity	Horizontal
Mode	Keeping Transmitting		Test Voltage	DC1.5V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		--	--
2400MHz	PK (dB $\mu$ V/m)	43.52	Limit	74 dB $\mu$ V/m
2400MHz	AV (dB $\mu$ V/m)	--	Limit	54 dB $\mu$ V/m
2390 MHz	PK (dB $\mu$ V/m)	39.16	Limit	74 dB $\mu$ V/m
2390 MHz	AV (dB $\mu$ V/m)	--	Limit	54 dB $\mu$ V/m

Low channel:

Product:	Wireless Mini Numeric Keypad		Detector	Vertical
Mode	Keeping Transmitting		Test Voltage	DC1.5V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		--	--
2400MHz	PK (dB $\mu$ V/m)	42.80	Limit	74 dB $\mu$ V/m
2400MHz	AV (dB $\mu$ V/m)	--	Limit	54 dB $\mu$ V/m
2390 MHz	PK (dB $\mu$ V/m)	39.13	Limit	74 dB $\mu$ V/m
2390 MHz	AV (dB $\mu$ V/m)	--	Limit	54 dB $\mu$ V/m

High channel:

Product:	Wireless Mini Numeric Keypad		Polarity	Horizontal
Mode	Keeping Transmitting		Test Voltage	DC1.5V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		--	--
2483.5MHz	PK (dB $\mu$ V/m)	41.62	Limit	74 dB $\mu$ V/m
2483.5MHz	AV (dB $\mu$ V/m)	--	Limit	54 dB $\mu$ V/m

High channel:

Product:	Wireless Mini Numeric Keypad		Detector	Vertical
Mode	Keeping Transmitting		Test Voltage	DC1.5V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		--	--
2483.5MHz	PK (dB $\mu$ V/m)	41.05	Limit	74 dB $\mu$ V/m
2483.5MHz	AV (dB $\mu$ V/m)	--	Limit	54 dB $\mu$ V/m

Note: The PK emission level less than the AV limit. No necessary to record the AV emission level.

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## 8.0 Antenna Requirement

### Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

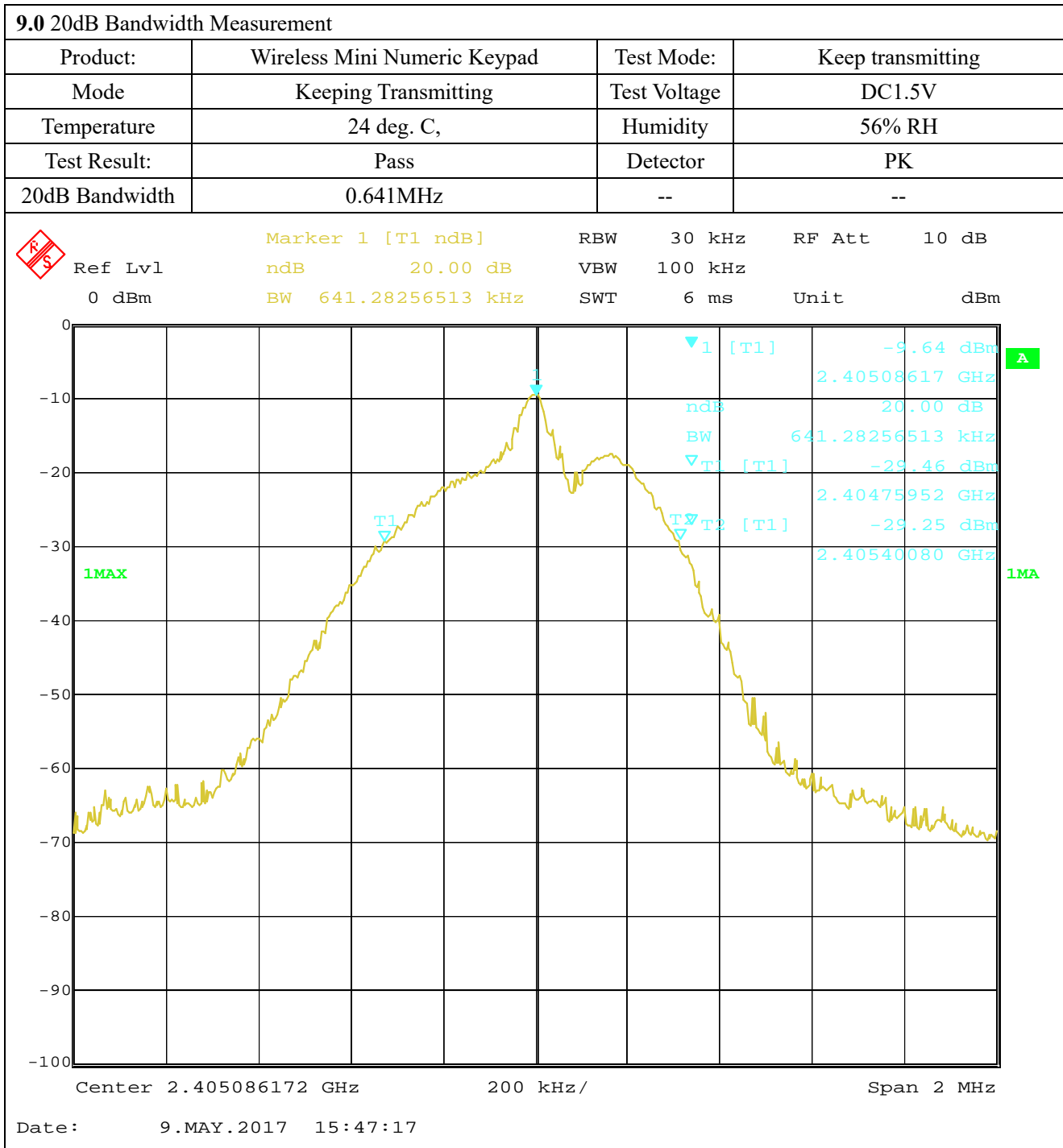
This product has a PCB antenna. The antenna gain is 0dBi Max. It fulfills the requirement of this section.

Test Result: Pass

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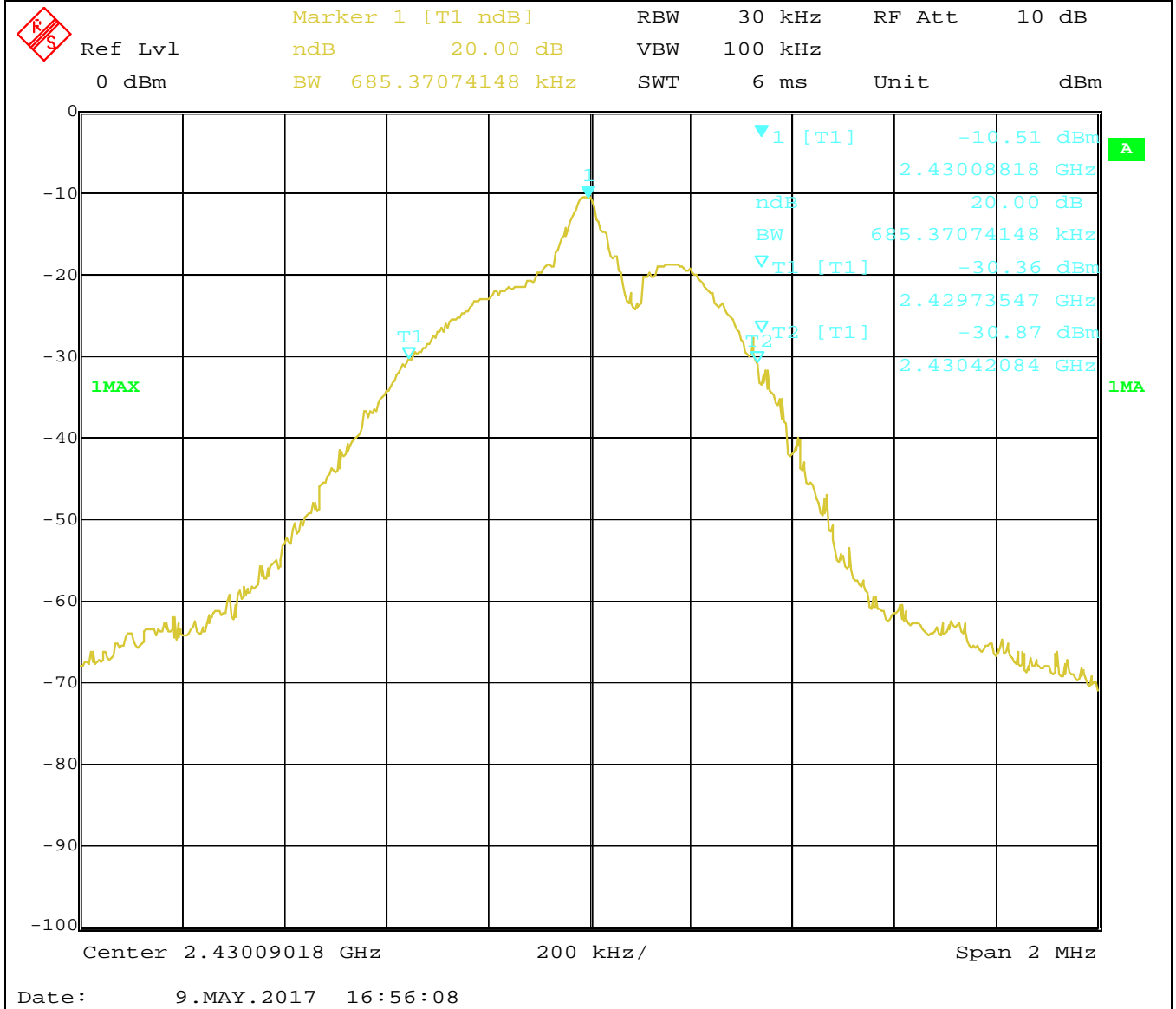
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Product:	Wireless Mini Numeric Keypad	Test Mode:	Keep transmitting
Mode	Keeping Transmitting	Test Voltage	DC1.5V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	0.685MHz	--	--

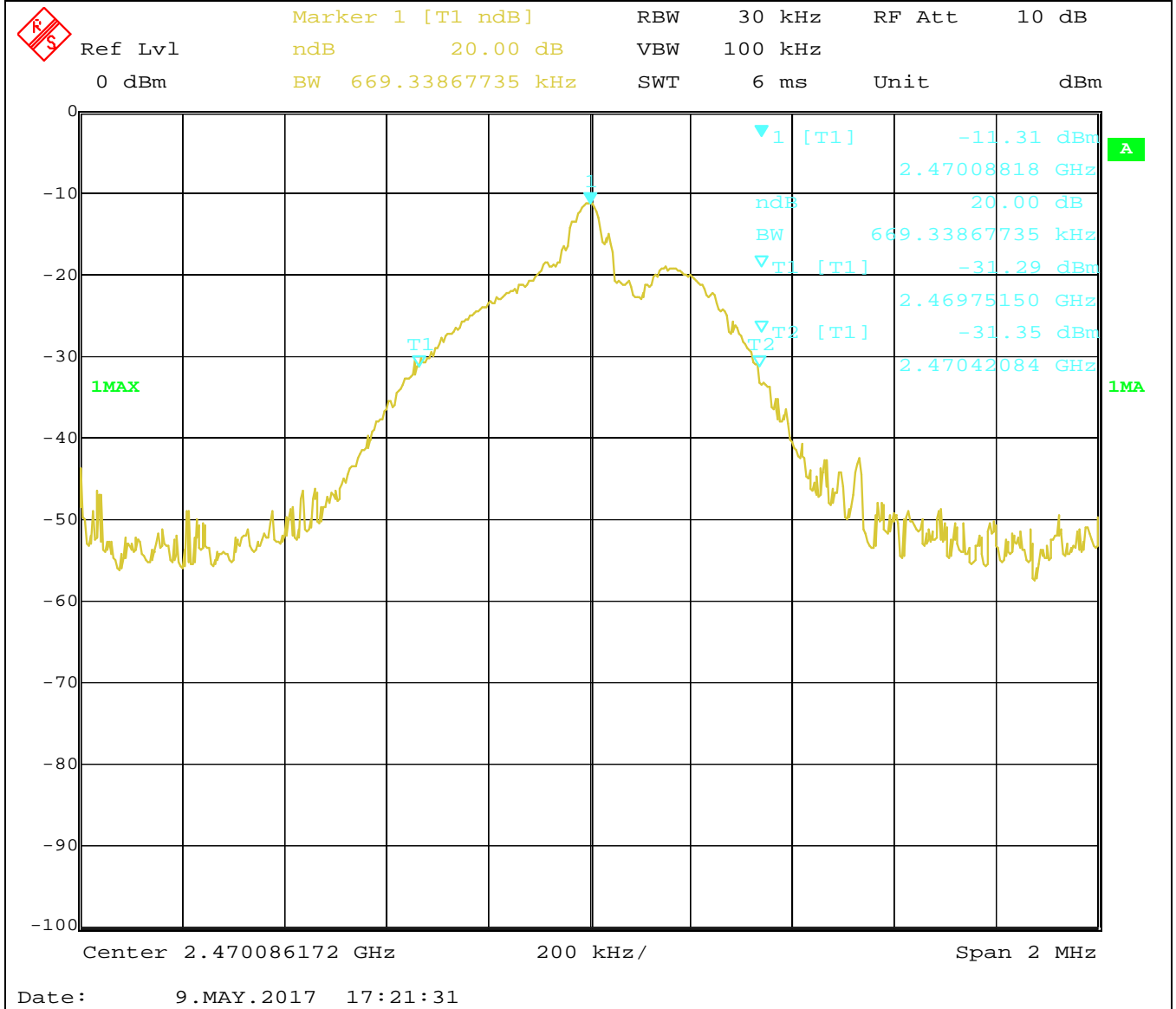


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Product:	Wireless Mini Numeric Keypad	Test Mode:	Keep transmitting
Mode	Keeping Transmitting	Test Voltage	DC1.5V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	0.669MHz	--	--



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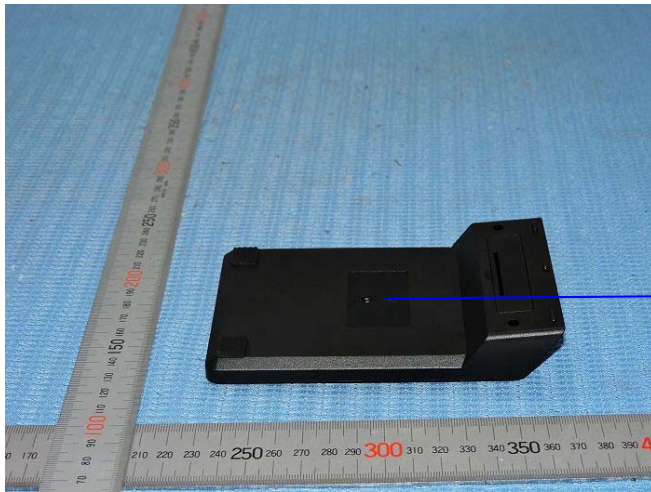
## 10.0 FCC ID Label

### FCC ID: ZJEST-WKP302

**This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

#### Mark Location:



FCC Label Location

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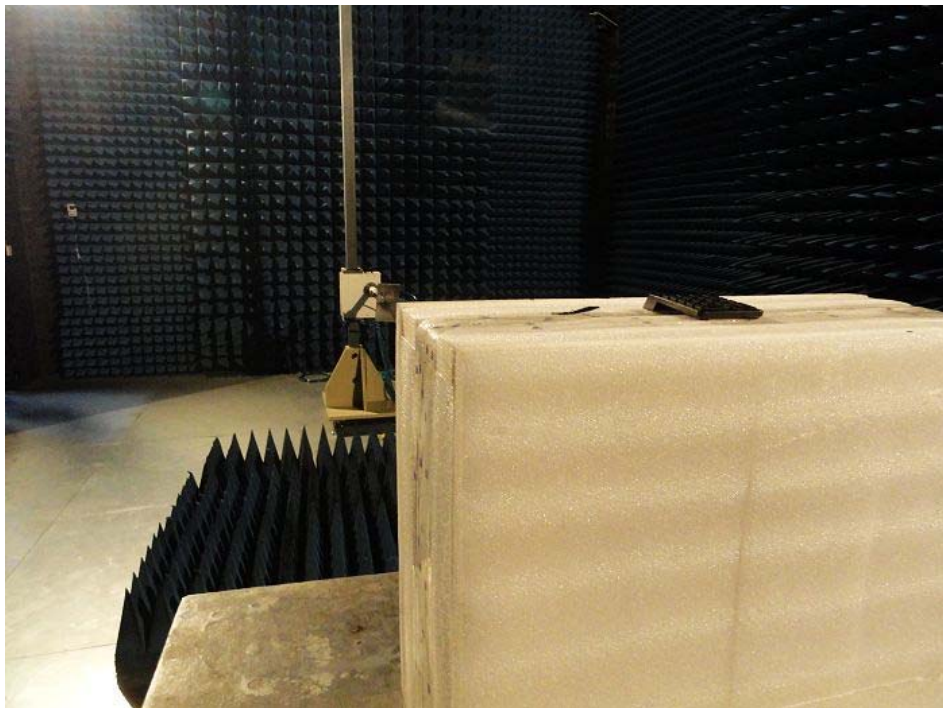
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**11.0 Photo of testing**

11.1 Conducted test View—N/A

11.2 Radiated emission test view



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11.3 Photographs – EUT

Outside view



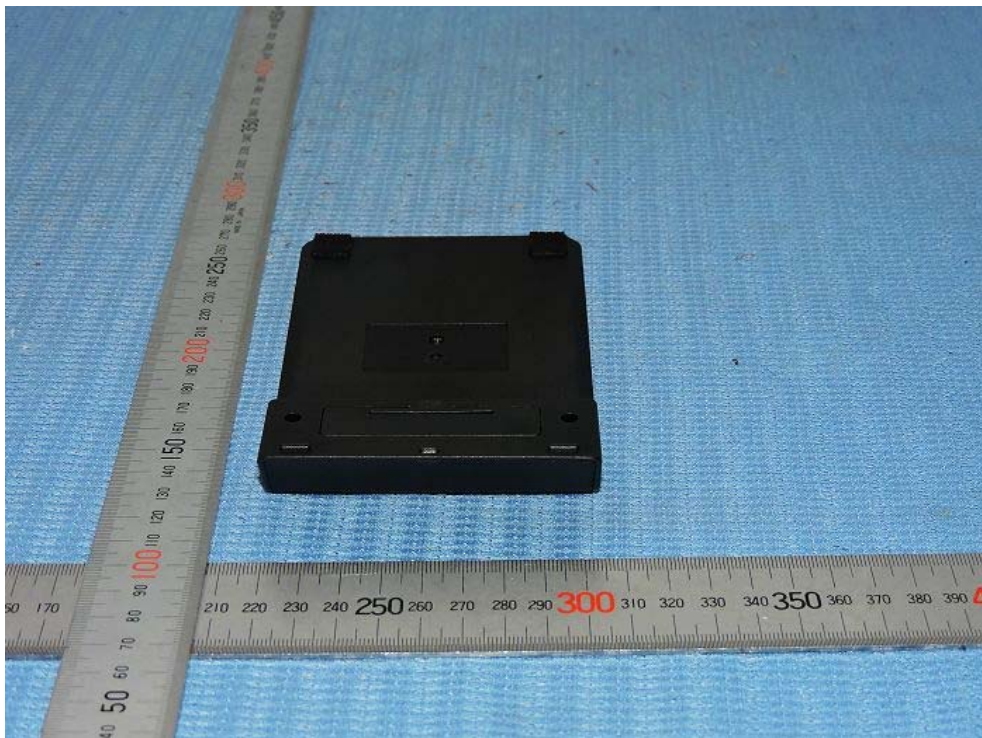
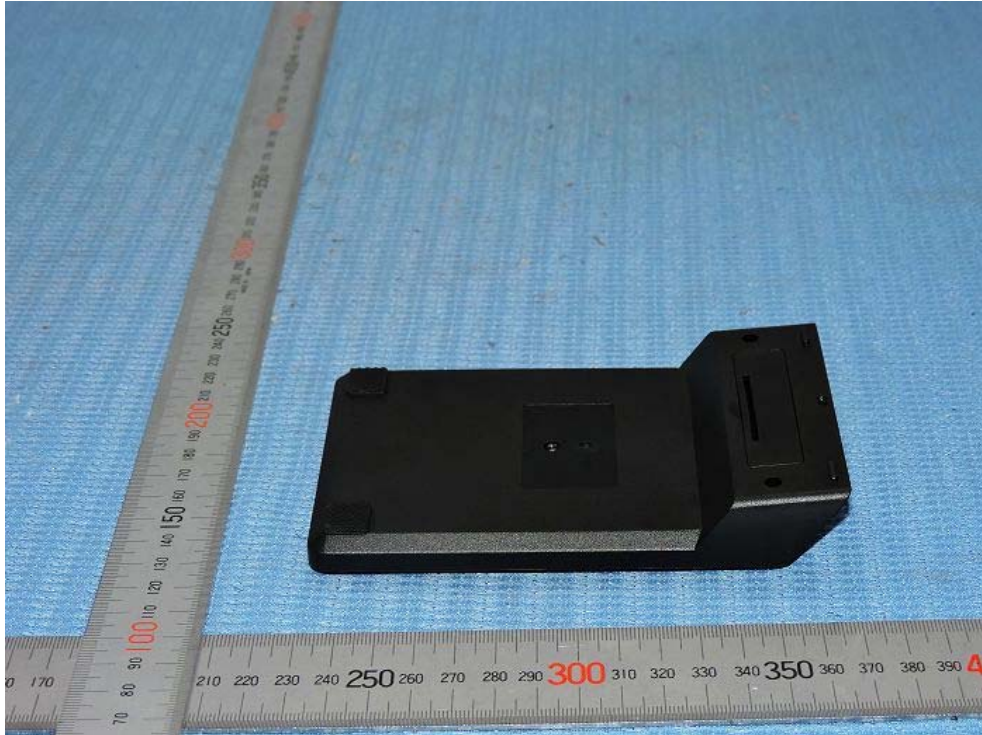
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Outside view



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Outside view

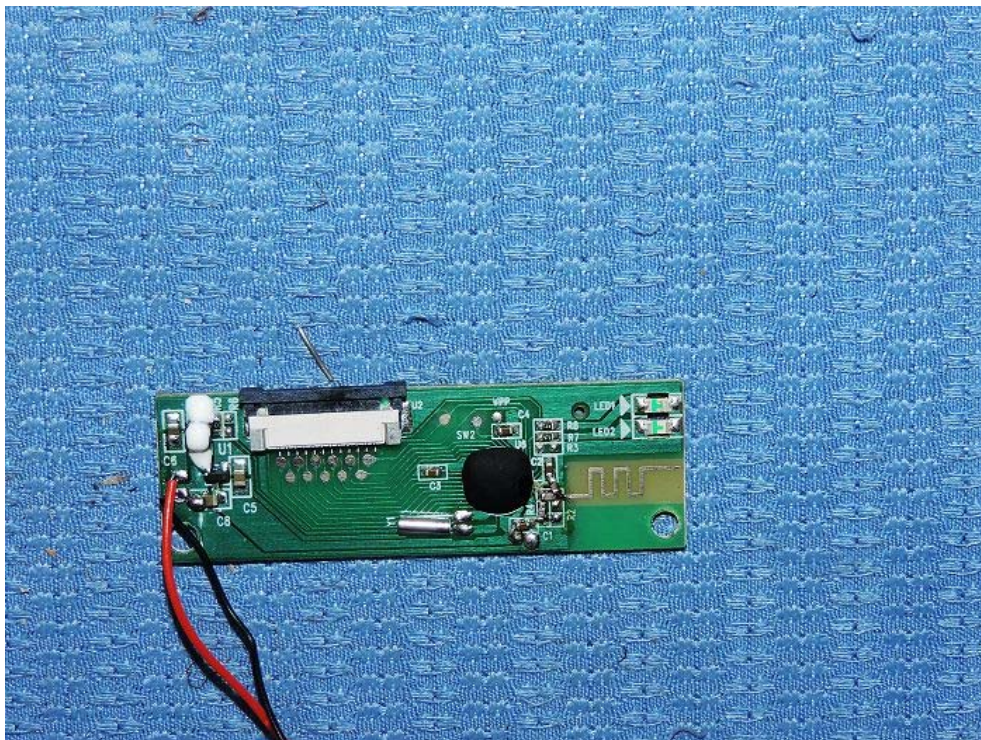


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Inside view



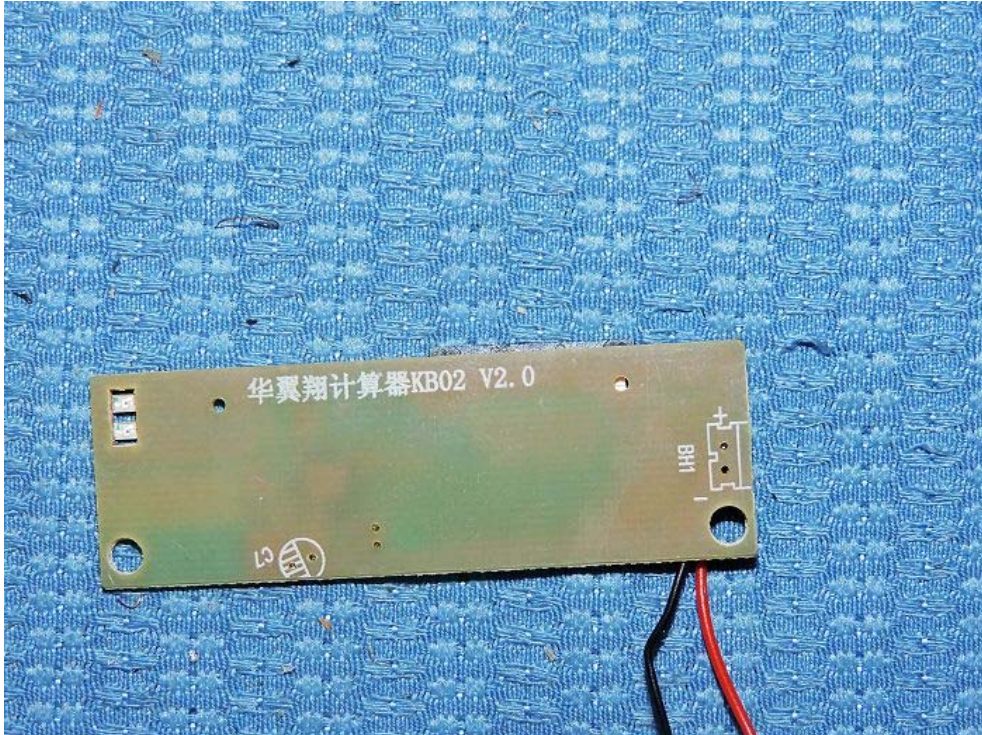
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Inside view



**--End of the report--**

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