

# 315 MHz-BAND TELEMETER, TELECONTROL LAND DATA TRANSMISSION RADIO EQUIPMENT Test Report

Product Name	Radio Frequency Transmitter
Model No.	FS14T, FS14TK

Applicant	Continental Automotive GmbH
Address	Siemensstrasse 12, 93055 Regensburg Germany

Date of Receipt	Dec. 25, 2018
Issued Date	Jan. 16, 2019
Report No.	18C0339R-RFJPP16V00
Report Version	V1.0

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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# Test Report

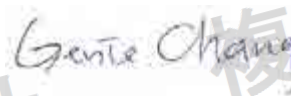
Issued Date : Jan. 16, 2019

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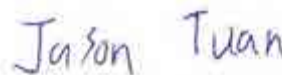
Product Name	Radio Frequency Transmitter
Applicant	Continental Automotive GmbH
Address	Siemensstrasse 12, 93055 Regensburg Germany
Manufacturer	Continental Automotive GmbH
Model No.	FS14T, FS14TK
EUT Rated Voltage	DC 3V(Power by battery)
EUT Test Voltage	DC 3V(Power by battery)
Trade Name	Continental
Measurement Standard	Ministry of Internal Affairs and Communications notification Article 88, Annex 22-1
Test Result	Complied

Documented By :



( Senior Adm. Specialist / Genie Chang )

Tested By :



( Engineer / Jason Tuan )

Approved By :



( Director / Vincent Lin )

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Radio Frequency Transmitter
Trade Name	Continental
Model No.	FS14T, FS14TK
Serial Number	#1
Operation Frequency	315MHz
Number of Channels	1
Type of Modulation	ASK
Transmission mode	<input type="checkbox"/> Auto <input checked="" type="checkbox"/> Manual
Cyclical transmission	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Antenna Type	RF PCB-Antenna
Declared Output Power	0.226 mW

Note:

EUT(FS14T, FS14TK) are only different between the 2x models are the caps.

FS14T (chromate caps)/FS14TK (plastic caps).

## 1.2. Operation Description

The EUT is a Radio Frequency Transmitter with a built-in 315 MHz transmitter. The data modulation is ASK. The EUT is a Low Power Short Range Device designed to provide remote keyless entry, passive entry, passive engine start, and immobilization functionality.

Within the housing is applied an inner container, containing an lower container and container cover which are laser welded. Within the container is placed a PCB, which is the same type for all variants and containing a different number of switches .

Test Mode	Mode 1: Transmitter (Normal Voltage_DC 3V)
	Mode 1: Transmitter (High Voltage_DC 3.3V)
	Mode 1: Transmitter (Low Voltage_DC 2.7V)

### 1.3. EUT Test Setting

- (1) Plug-in a battery on the EUT
- (2) Pressing the unlock button for transmitter signal.
- (3) Verify that the EUT works properly.

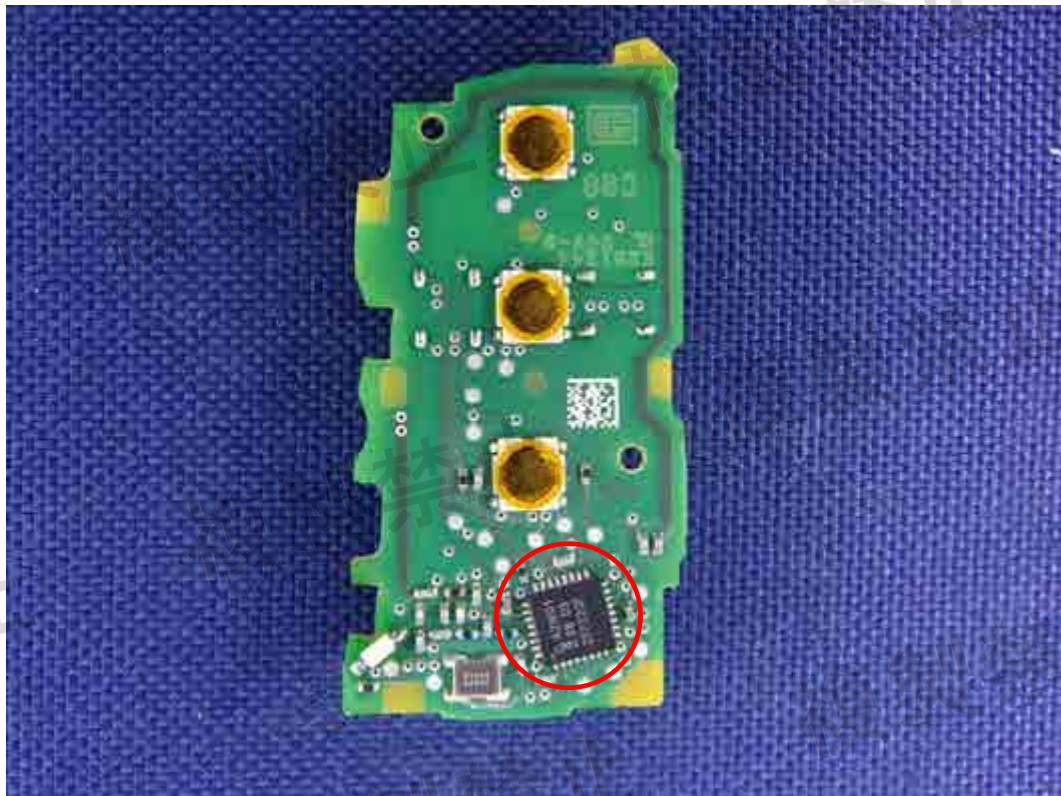
### 1.4. Test Conditions

Temperature	26 °C
Relative Humidity	56%



### 1.5. RF and IF section must be tamper requirement

Requirement	Comments	Result
RF, IF and Modulation section must be tamper	<input type="checkbox"/> Use Special Screw <input type="checkbox"/> Metal Shielding is Soldered (Please see Attachment: EUT Detailed Photographs) <input type="checkbox"/> Use Ball Grid Array (BGA) <input type="checkbox"/> Use Ultrasonic Welding	Complete
	<input checked="" type="checkbox"/> RF module/Chip pin >10 <input checked="" type="checkbox"/> RF module/Chip pins distance <1.5mm (Please see mechanism photograph)	Complete



## 1.6. List of Test Equipment

### For Conducted measurements /CB3

	Equipment	Manufacturer	Model No. / Serial No.	Calibrated	Cal. Method	Cali. Data	Due. Data
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	ETC	*(c)	2018/11/13	2019/11/12

### For Radiated measurements /Site3/CB8

	Equipment	Manufacturer	Model No. / Serial No.	Calibrated	Cal. Method	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSP40 / 100170	ETC	*(c)	2018/03/12	2019/03/11
X	Bilog Antenna	Schaffner Chase	CBL6112B / 2707	ETC	*(c)	2018/06/24	2019/06/23
X	Coaxial Cable	DEKRA	RG 214 / LC003-RG	ETC	*(c)	2018/06/14	2019/06/13
X	Pre-Amplifier	Jet-Power	JPA-10M1G33 /	ETC	*(c)	2018/06/14	2019/06/13
X	Horn Antenna	ETS-Lindgren	3117 / 00135205	ETC	*(c)	2018/05/03	2019/05/02
X	Pre-Amplifier	EMCI	EMC012630SE / 980210	ETC	*(c)	2018/04/10	2019/04/09
X	Filter	MICRO-TRONICS	BRM50702 / G270	ETC	*(c)	2018/08/06	2019/08/05

#### Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : DEKRA Conduction Test System V9.0.1
4.
  - a) Calibration conducted by the National Institute of Information and Communications Technology(NICT) (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1).
  - b) Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992).
  - c) Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated agency under Article 102-18 paragraph (1).
  - d) Calibration conducted by using measuring instruments and other equipment listed in the right column of Table No. 3 attached hereto, which shall have been given any of calibration, etc. listed above from a) to c).



### 1.7. Measurement Uncertainty

Test Items	Uncertainty
Frequency Allocation	279.10Hz
Occupied Bandwidth	279.10Hz
Transmission time	0.01%
All emissions, radiated	3.687dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

### 1.8. Test Facility

Ambient conditions in the laboratory:

Items	Required (JIS Z8703)	Actual
Temperature (°C)	5-35	18-28
Humidity (%RH)	45 - 85%	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

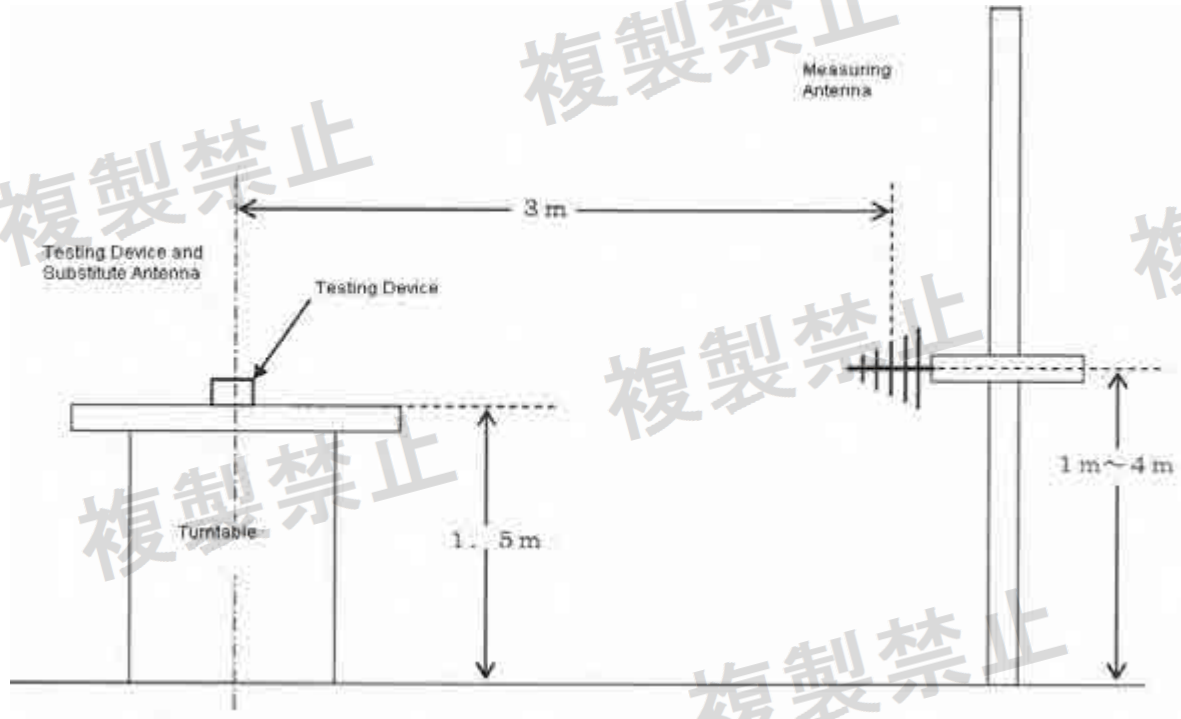
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: [http://www.dekra.com.tw/index\\_en.aspx](http://www.dekra.com.tw/index_en.aspx)

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Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd  
Site Address: No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451,  
Taiwan, R.O.C.  
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E-Mail : [info.tw@dekra.com](mailto:info.tw@dekra.com)

## 2. Output Power and Output Power Tolerance

### 2.1. Test Setup



### 2.2. Test Procedure

The EUT is placed on a turn table which is 1.5 meters above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Broadband antenna (calibrated bi-log and horn antenna) are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on measurement. And a high frequency preamplifier were used increase the sensitivity of the measuring. In order to find the maximum emission, all of the interface cables must be manipulated according to Ministry of Internal Affairs and Communications notification Article 88, Annex 41 on radiated measurement.

The additional notch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of Output Power measurement. The bandwidth setting on the field strength meter is 100 kHz and 1MHz. The frequency range from is checked.

### 2.3. Limits

#### Output power

312MHz- 315.05MHz below 0.25mW (-6dBm E.I.R.P)

315.05MHz- 315.25MHz below 0.025mW (-16dBm E.I.R.P)

#### Power Tolerance

Upper Limit+20%

## 2.4. Test Result of Output Power and Output Power Tolerance

Product : Radio Frequency Transmitter  
 Test Item : Output Power  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Normal Voltage\_DC 3V)

### X-Axial

Frequency MHz	Correct Factor dB	Reading Level dBm	Measurement Level dBm	Margin dB	Limit dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
315.000	4.149	-12.631	-8.482	-2.482	-6.000
<b>Vertical</b>					
<b>Peak Detector</b>					
315.000	3.388	-10.096	-6.708	-0.708	-6.000

### Y-Axial

Frequency MHz	Correct Factor dB	Reading Level dBm	Measurement Level dBm	Margin dB	Limit dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
315.000	4.149	-12.169	-8.020	-2.020	-6.000
<b>Vertical</b>					
<b>Peak Detector</b>					
315.000	3.388	-10.378	-6.990	-0.990	-6.000



**Z-Axial**

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBm	dBm	dB	dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
315.000	4.149	-11.234	-7.085	-1.085	-6.000
<b>Vertical</b>					
<b>Peak Detector</b>					
315.000	3.388	-13.228	-9.840	-3.840	-6.000

Note:

1. All Reading are peak value.
2. "■" means this data is the worst emission level.
3. Emission Level = Reading Level + Correction Factor.

<b>Test Result</b>	PASS
--------------------	------

Product : Radio Frequency Transmitter  
Test Item : Output Power  
Test Site : No.3 OATS  
Test Mode : Mode 1: Transmitter (High Voltage\_DC 3.3V)

**X-Axial**

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBm	dBm	dB	dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
315.000	4.149	-13.385	-9.236	-3.236	-6.000
<b>Vertical</b>					
<b>Peak Detector</b>					
315.000	3.388	-9.909	-6.521	-0.521	-6.000

**Y-Axial**

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBm	dBm	dB	dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
315.000	4.149	-14.199	-10.050	-4.050	-6.000
<b>Vertical</b>					
<b>Peak Detector</b>					
315.000	3.388	-10.338	-6.950	-0.950	-6.000

**Z-Axial**

Frequency MHz	Correct Factor dB	Reading Level dBm	Measurement Level dBm	Margin dB	Limit dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
315.000	4.149	-11.099	-6.950	-0.950	-6.000
<b>Vertical</b>					
<b>Peak Detector</b>					
315.000	3.388	-12.308	-8.920	-2.920	-6.000

Note:

1. All Reading are peak value.
2. " " means this data is the worst emission level.
3. Emission Level = Reading Level + Correction Factor.

<b>Test Result</b>	PASS
--------------------	------

Product : Radio Frequency Transmitter  
Test Item : Output Power  
Test Site : No.3 OATS  
Test Mode : Mode 1: Transmitter (Low Voltage\_DC 2.7V)

**X-Axial**

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBm	dBm	dB	dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
315.000	4.149	-13.343	-9.194	-3.194	-6.000
<b>Vertical</b>					
<b>Peak Detector</b>					
315.000	3.388	-10.228	-6.840	-0.840	-6.000

**Y-Axial**

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBm	dBm	dB	dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
315.000	4.149	-14.409	-10.260	-4.260	-6.000
<b>Vertical</b>					
<b>Peak Detector</b>					
315.000	3.388	-10.702	-7.314	-1.314	-6.000

**Z-Axial**

Frequency MHz	Correct Factor dB	Reading Level dBm	Measurement Level dBm	Margin dB	Limit dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
315.000	4.149	-11.039	-6.890	-0.890	-6.000
<b>Vertical</b>					
<b>Peak Detector</b>					
315.000	3.388	-13.058	-9.670	-3.670	-6.000

Note:

1. All Reading are peak value.
2. "■" means this data is the worst emission level.
3. Emission Level = Reading Level + Correction Factor.

<b>Test Result</b>	PASS
--------------------	------



Product : Radio Frequency Transmitter  
 Test Item : Output Power Tolerance  
 Test Mode : Mode 1: Transmitter (Normal Voltage\_DC 3V)

**X-Axial**

H /V*	Frequency (MHz)	Declared Output Power (mW)	Output Power (mW)	Tolerance (%)	Limit (%)
H	315.000	0.226	0.142	-37.23875345	+20%
V	315.000	0.226	0.213	-5.574006954	+20%

Note : \*H/V= Horizontal or Vertical

Tolerance = (Channel Power - Declared Output Power) / Declared Output Power \* 100%

**Y-Axial**

H /V*	Frequency (MHz)	Declared Output Power (mW)	Output Power (mW)	Tolerance (%)	Limit (%)
H	315.000	0.226	0.158	-30.19419161	+20%
V	315.000	0.226	0.200	-11.51053674	+20%

Note : \*H/V= Horizontal or Vertical

Tolerance = (Channel Power - Declared Output Power) / Declared Output Power \* 100%

**Z-Axial**

H /V*	Frequency (MHz)	Declared Output Power (mW)	Output Power (mW)	Tolerance (%)	Limit (%)
H	315.000	0.226	0.196	-13.42518726	+20%
V	315.000	0.226	0.104	-54.09166302	+20%

Note : \*H/V= Horizontal or Vertical

Tolerance = (Channel Power - Declared Output Power) / Declared Output Power \* 100%

<b>Test Result</b>	PASS
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Product : Radio Frequency Transmitter  
 Test Item : Output Power Tolerance  
 Test Mode : Mode 1: Transmitter (High Voltage\_DC 3.3V)

**X-Axial**

H / V*	Frequency (MHz)	Declared Output Power (mW)	Output Power (mW)	Tolerance (%)	Limit (%)
H	315.000	0.226	0.119	-47.24160673	+20%
V	315.000	0.226	0.223	-1.419376452	+20%

Note : \*H/V= Horizontal or Vertical

$$\text{Tolerance} = (\text{Channel Power} - \text{Declared Output Power}) / \text{Declared Output Power} * 100\%$$

**Y-Axial**

H / V*	Frequency (MHz)	Declared Output Power (mW)	Output Power (mW)	Tolerance (%)	Limit (%)
H	315.000	0.226	0.099	-56.25871263	+20%
V	315.000	0.226	0.202	-10.69175382	+20%

Note : \*H/V= Horizontal or Vertical

$$\text{Tolerance} = (\text{Channel Power} - \text{Declared Output Power}) / \text{Declared Output Power} * 100\%$$

**Z-Axial**

H / V*	Frequency (MHz)	Declared Output Power (mW)	Output Power (mW)	Tolerance (%)	Limit (%)
H	315.000	0.226	0.202	-10.69175382	+20%
V	315.000	0.226	0.128	-43.25970873	+20%

Note : \*H/V= Horizontal or Vertical

$$\text{Tolerance} = (\text{Channel Power} - \text{Declared Output Power}) / \text{Declared Output Power} * 100\%$$

<b>Test Result</b>	PASS
--------------------	------

Product : Radio Frequency Transmitter  
 Test Item : Output Power Tolerance  
 Test Mode : Mode 1: Transmitter (Low Voltage\_DC 2.7V)

**X-Axial**

H /V*	Frequency (MHz)	Declared Output Power (mW)	Output Power (mW)	Tolerance (%)	Limit (%)
H	315.000	0.226	0.120	-46.72891273	+20%
V	315.000	0.226	0.207	-8.400825275	+20%

Note : \*H/V= Horizontal or Vertical

Tolerance = (Channel Power - Declared Output Power) / Declared Output Power \* 100%

**Y-Axial**

H /V*	Frequency (MHz)	Declared Output Power (mW)	Output Power (mW)	Tolerance (%)	Limit (%)
H	315.000	0.226	0.094	-58.32346918	+20%
V	315.000	0.226	0.186	-17.87194063	+20%

Note : \*H/V= Horizontal or Vertical

Tolerance = (Channel Power - Declared Output Power) / Declared Output Power \* 100%

**Z-Axial**

H /V*	Frequency (MHz)	Declared Output Power (mW)	Output Power (mW)	Tolerance (%)	Limit (%)
H	315.000	0.226	0.205	-9.449352357	+20%
V	315.000	0.226	0.108	-52.25899459	+20%

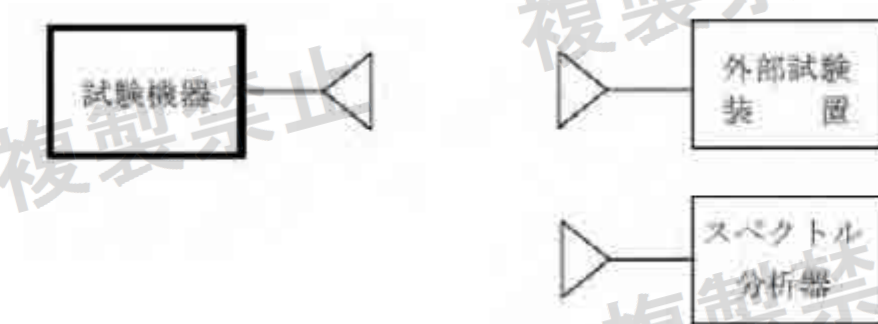
Note : \*H/V= Horizontal or Vertical

Tolerance = (Channel Power - Declared Output Power) / Declared Output Power \* 100%

<b>Test Result</b>	PASS
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### 3. Frequency Allocations and Occupied Bandwidth

#### 3.1. Test Setup



#### 3.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- (1) Repeat sweep until variations are not observed in the display, and input all the data point values to the computer array variable.
- (2) Transform dB value to dimensional power antilogarithm, for all the data.
- (3) Starting from the minimum frequency data, power is added in increasing order, this value should be 0.5% of the "Occupied bandwidth", and the critical (limit) data is obtained. The critical point is converted to frequency and registered as "Lower limit frequency".
- (4) Starting from the maximum frequency data, power is added in decreasing order, this value should be 0.5% of the "Occupied bandwidth", and the critical (limit) data is obtained. The critical point is converted to frequency and registered as "Upper limit frequency".

#### 3.3. Limits

Frequency Allocations in 312MHz – 315.25MHz

Occupied Bandwidth below 1MHz

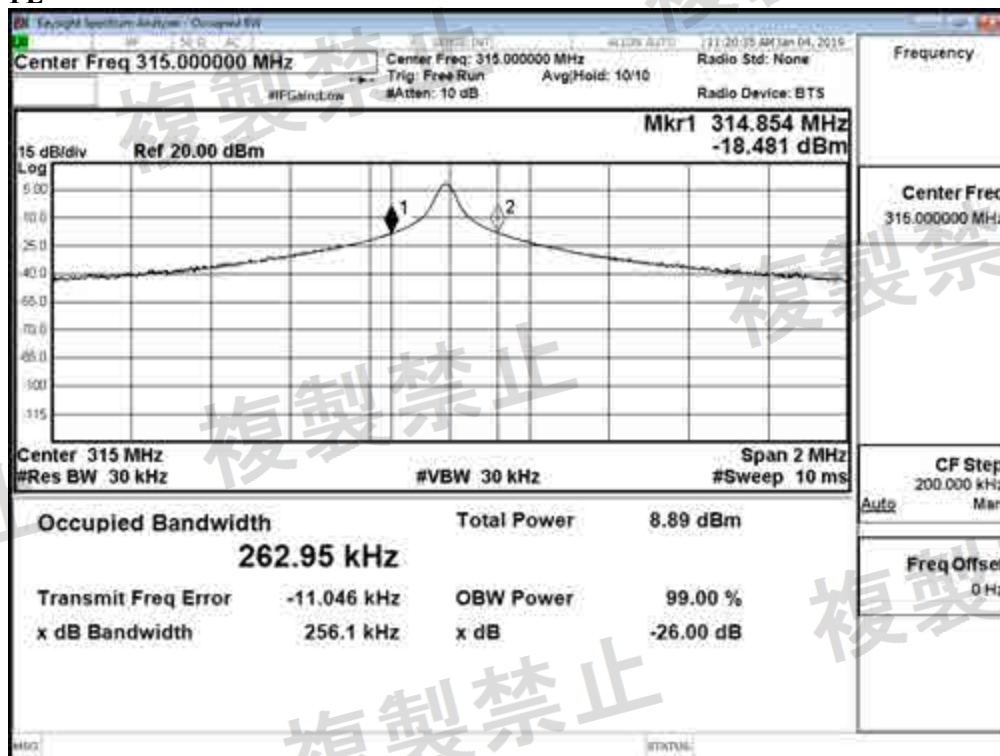
### 3.4. Test Result of Frequency Allocations and Occupied Bandwidth

Product : Radio Frequency Transmitter  
 Test Item : Frequency Allocations and Occupied Bandwidth  
 Test Mode : Mode 1: Transmitter (Normal Voltage DC 3V)

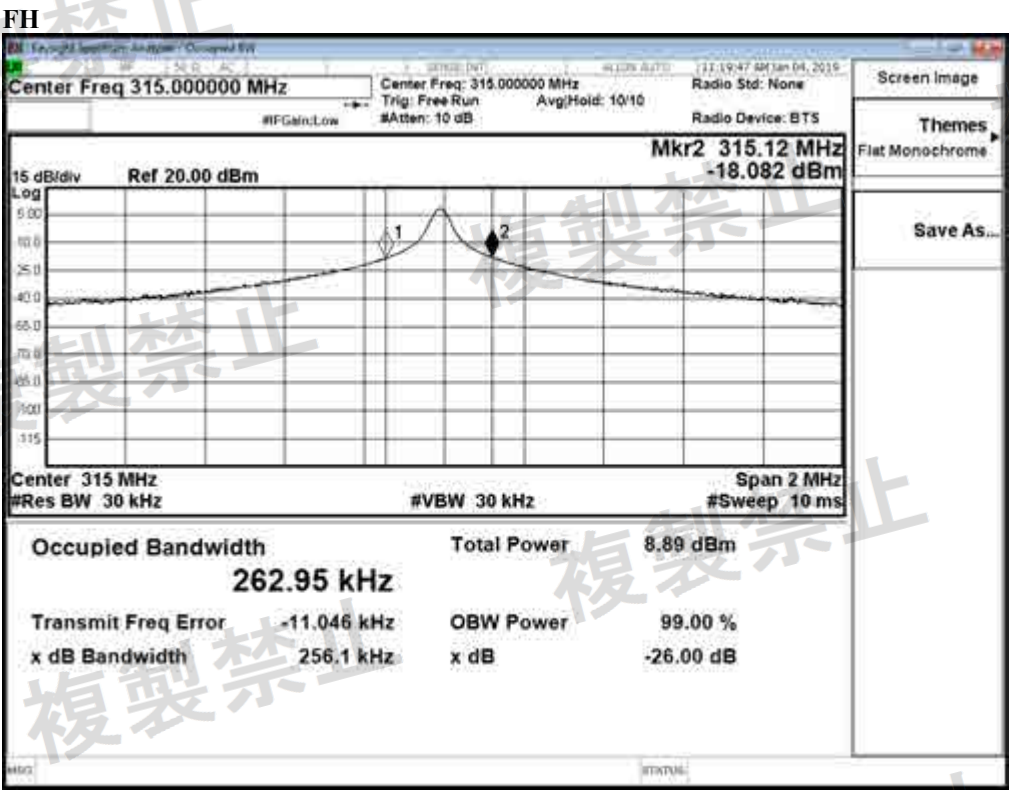
Frequency Range	Frequency (MHz)	Limit (kHz)
FL	314.854	--
FH	315.120	--
Frequency Allocations	Frequency (MHz)	Limit (MHz)
(FL+FH) / 2	314.987	312 – 315.25
Occupied Bandwidth	Frequency (MHz)	Limit (MHz)
FH - FL	0.26295	≤1

#### Frequency Allocations

FL







Test Result

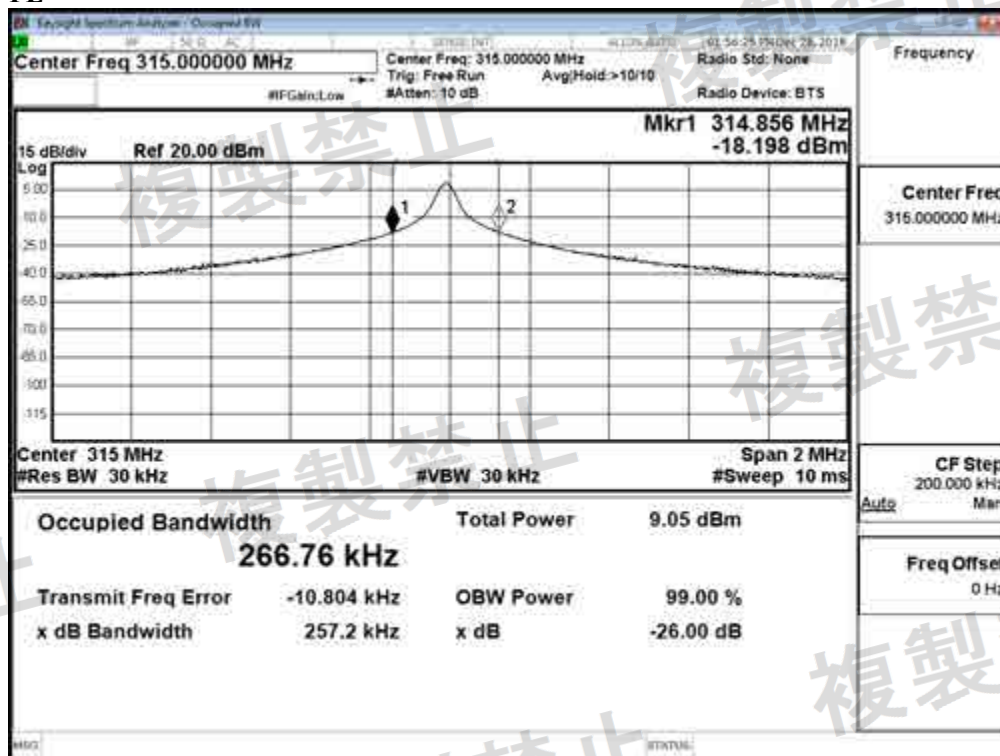
PASS

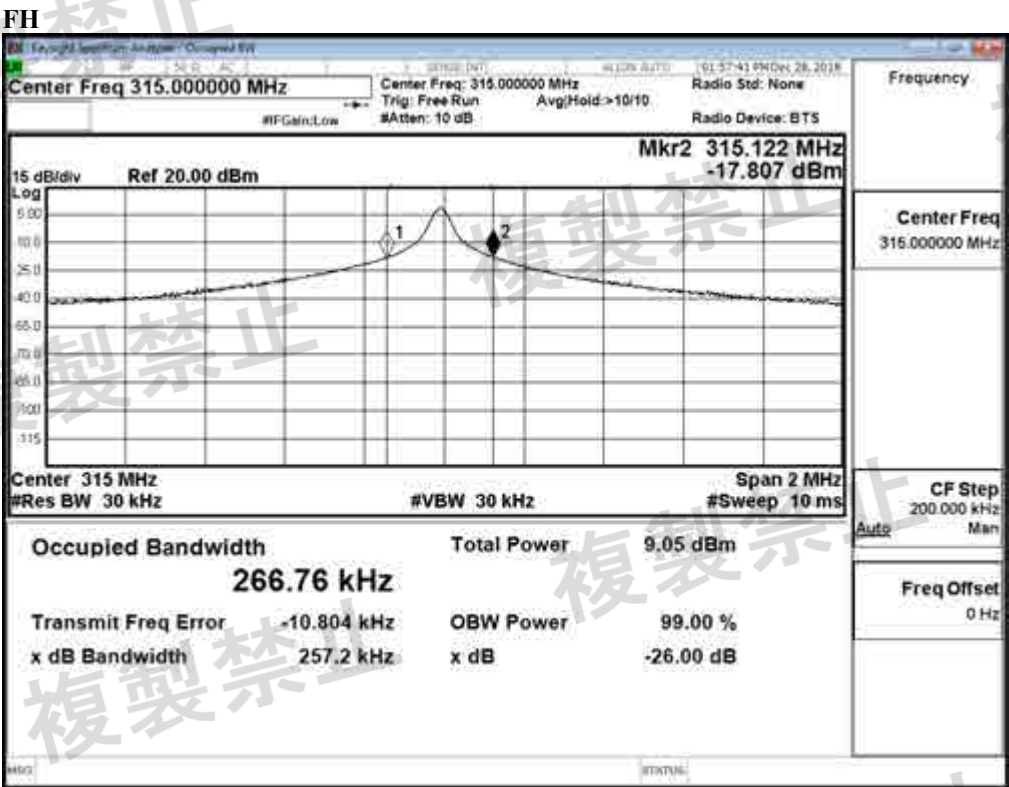
Product : Radio Frequency Transmitter  
 Test Item : Frequency Allocations and Occupied Bandwidth  
 Test Mode : Mode 1: Transmitter (High Voltage\_DC 3.3V)

Frequency Range	Frequency (MHz)	Limit (kHz)
FL	314.856	--
FH	315.122	--
Frequency Allocations	Frequency (MHz)	Limit (MHz)
(FL+FH) / 2	314.989	312 – 315.25
Occupied Bandwidth	Frequency (MHz)	Limit (MHz)
FH - FL	0.26676	≤1

#### Frequency Allocations

FL





Test Result

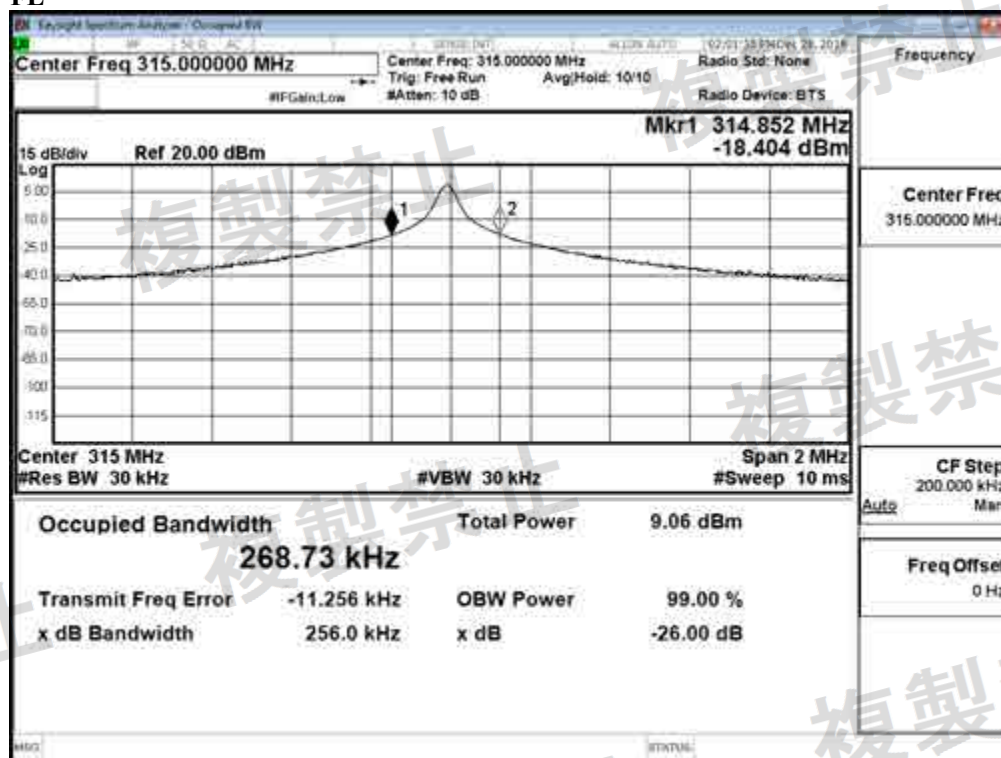
PASS

Product : Radio Frequency Transmitter  
 Test Item : Frequency Allocations and Occupied Bandwidth  
 Test Mode : Mode 1: Transmitter (Low Voltage\_DC 2.7V)

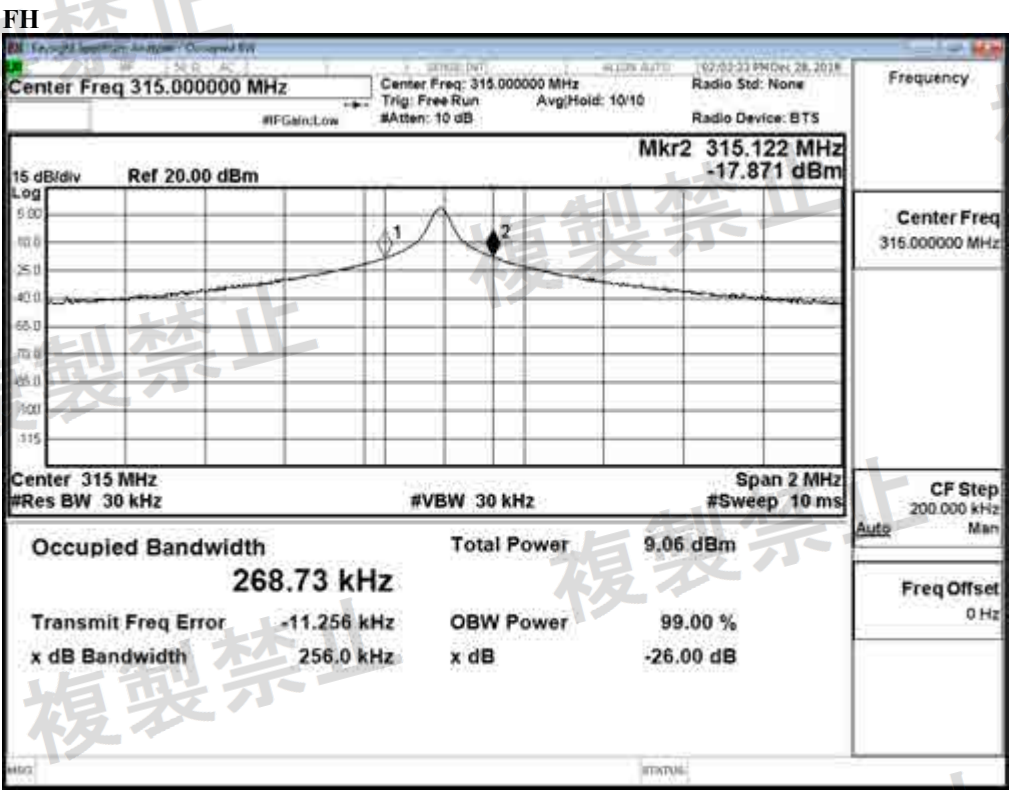
Frequency Range	Frequency (MHz)	Limit (kHz)
FL	314.852	--
FH	315.122	--
Frequency Allocations	Frequency (MHz)	Limit (MHz)
(FL+FH) / 2	314.987	312 – 315.25
Occupied Bandwidth	Frequency (MHz)	Limit (MHz)
FH+FL	0.26873	≤1

#### Frequency Allocations

FL







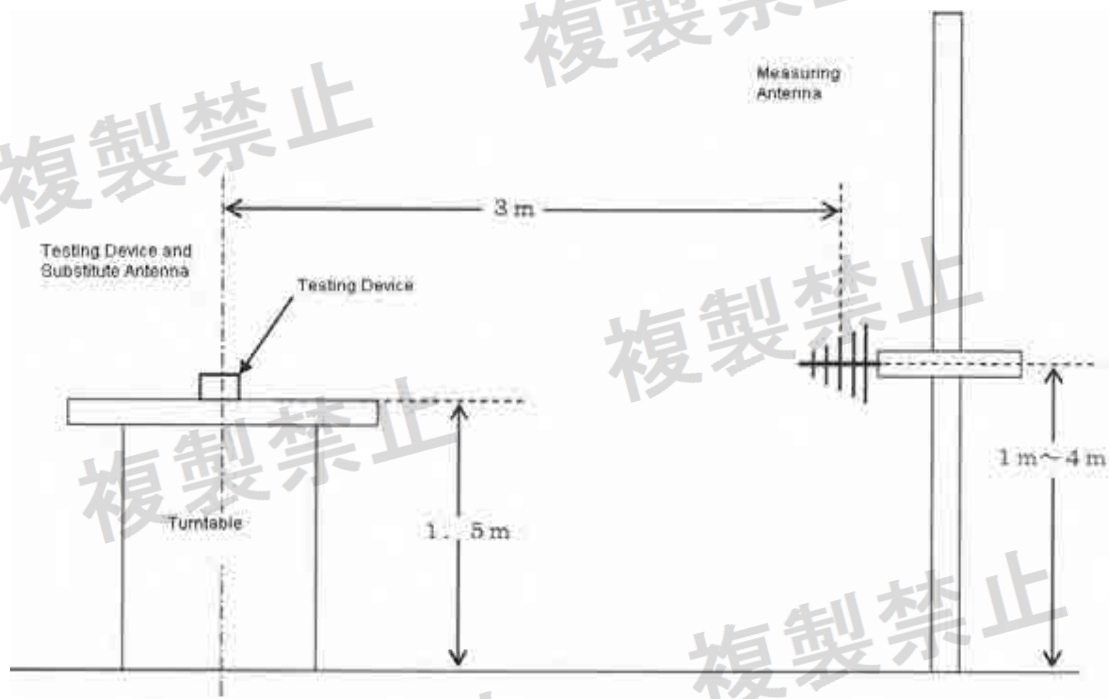
Test Result

PASS



## 4. Transmitter Suprious Emissions

### 4.1. Test Setup



### 4.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

The EUT is placed on a turn table which is 1.5 meters above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Broadband antenna (calibrated bi-log and horn antenna) are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on measurement. And a high frequency preamplifier were used increase the sensitivity of the measuring. In order to find the maximum emission, all of the interface cables must be manipulated according to Ministry of Internal Affairs and Communications notification Article 88, Annex 41 on radiated measurement.

The additional notch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of Output Power measurement. The bandwidth setting on the field strength meter is 100 kHz and 1MHz. The frequency range from is checked.

#### 4.3. Limits

**30MHz-312MHz** : < 250nW/100KHz (-36dBm/100KHz)

**315.25MHz-1GHz** : < 250nW/100KHz (-36dBm/100KHz)

**Above 1GHz** : <1uW/1MHz (-30dBm/1MHz)

#### 4.4. Test Result of Transmitter Spurious Emissions

Product : Radio Frequency Transmitter  
 Test Item : Transmitter Spurious Emissions  
 Test Mode : Mode 1: Transmitter (Normal Voltage DC 3V) - X-Axial

Frequency MHz	Correct Factor dB	Reading Level dBm	Measurement Level dBm	Margin dB	Limit dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
90.140	2.710	-79.113	-76.403	-40.403	-36.000
179.380	-0.620	-74.714	-75.334	-39.334	-36.000
539.250	10.960	-83.698	-72.738	-36.738	-36.000
629.460	9.500	-66.382	-56.882	-20.882	-36.000
786.600	11.150	-83.378	-72.228	-36.228	-36.000
944.710	11.600	-76.955	-65.355	-29.355	-36.000
1260.000	6.420	-73.801	-67.381	-37.381	-30.000
1575.000	5.940	-72.842	-66.902	-36.902	-30.000
1890.000	8.147	-74.103	-65.956	-35.956	-30.000
2205.000	10.889	-75.303	-64.414	-34.414	-30.000
2520.000	10.027	-72.506	-62.479	-32.479	-30.000
2835.000	10.249	-76.130	-65.881	-35.881	-30.000
3150.000	11.094	-76.568	-65.474	-35.474	-30.000

Note:

1. All Reading are peak value.
2. " " means this data is the worst emission level.
3. Emission Level = Reading Level + Correction Factor.

Frequency MHz	Correct Factor dB	Reading Level dBm	Measurement Level dBm	Margin dB	Limit dBm
<b>Vertical</b>					
<b>Peak Detector</b>					
47.460	3.460	-65.909	-62.449	-26.449	-36.000
176.470	0.520	-78.873	-78.353	-42.353	-36.000
532.460	10.360	-83.595	-73.235	-37.235	-36.000
629.460	10.000	-70.972	-60.972	-24.972	-36.000
741.980	11.180	-81.910	-70.730	-34.730	-36.000
944.710	12.680	-80.694	-68.014	-32.014	-36.000
1260.000	5.894	-72.856	-66.962	-36.962	-30.000
1575.000	6.545	-67.653	-61.108	-31.108	-30.000
1890.000	8.445	-68.264	-59.819	-29.819	-30.000
2205.000	10.366	-72.232	-61.866	-31.866	-30.000
2520.000	10.027	-73.657	-63.630	-33.630	-30.000
2835.000	10.249	-76.216	-65.967	-35.967	-30.000
3150.000	11.094	-76.525	-65.431	-35.431	-30.000

Note:

1. All Reading are peak value.
2. " " means this data is the worst emission level.
3. Emission Level = Reading Level + Correction Factor.

<b>Test Result</b>	PASS
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Product : Radio Frequency Transmitter  
 Test Item : Transmitter Spurious Emissions  
 Test Mode : Mode 1: Transmitter (High Voltage\_DC 3.3V) - X-Axial

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBm	dBm	dB	dBm
<b>Horizontal</b>					
<b>Peak Detector</b>					
47.460	6.270	-76.571	-70.301	-34.301	-36.000
179.380	-0.620	-75.609	-76.229	-40.229	-36.000
541.190	11.000	-83.048	-72.048	-36.048	-36.000
629.460	9.500	-67.846	-58.346	-22.346	-36.000
821.520	11.080	-82.172	-71.092	-35.092	-36.000
944.710	11.600	-76.946	-65.346	-29.346	-36.000
1260.000	6.420	-74.773	-68.353	-38.353	-30.000
1575.000	6.545	-72.607	-66.062	-36.062	-30.000
1890.000	8.445	-74.246	-65.801	-35.801	-30.000
2205.000	10.366	-75.703	-65.337	-35.337	-30.000
2520.000	10.620	-73.038	-62.418	-32.418	-30.000
2835.000	11.506	-76.122	-64.616	-34.616	-30.000
3150.000	12.040	-76.680	-64.640	-34.640	-30.000

Note:

1. All Reading are peak value.
2. "██████" means this data is the worst emission level.
3. Emission Level = Reading Level + Correction Factor.



Frequency MHz	Correct Factor dB	Reading Level dBm	Measurement Level dBm	Margin dB	Limit dBm
<b>Vertical</b>					
<b>Peak Detector</b>					
47.460	3.460	-67.372	-63.912	-27.912	-36.000
159.980	-1.000	-78.470	-79.470	-43.470	-36.000
538.280	11.030	-83.590	-72.560	-36.560	-36.000
629.460	10.000	-72.260	-62.260	-26.260	-36.000
785.630	11.700	-83.153	-71.453	-35.453	-36.000
944.710	12.680	-79.827	-67.147	-31.147	-36.000
1260.000	5.894	-72.974	-67.080	-37.080	-30.000
1575.000	6.545	-67.795	-61.250	-31.250	-30.000
1890.000	8.445	-68.309	-59.864	-29.864	-30.000
2205.000	10.366	-72.638	-62.272	-32.272	-30.000
2520.000	10.620	-73.851	-63.231	-33.231	-30.000
2835.000	11.506	-76.243	-64.737	-34.737	-30.000
3150.000	12.040	-76.700	-64.660	-34.660	-30.000

Note:

1. All Reading are peak value.
2. " " means this data is the worst emission level.
3. Emission Level = Reading Level + Correction Factor.

<b>Test Result</b>	PASS
--------------------	------

Product : Radio Frequency Transmitter  
 Test Item : Transmitter Spurious Emissions  
 Test Mode : Mode 1: Transmitter (Low Voltage\_DC 2.7V) - X-Axial

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBm	dBm	dB	dBm
<b>Horizontal Peak Detector</b>					
47.460	6.270	-76.438	-70.168	-34.168	-36.000
179.380	-0.620	-74.439	-75.059	-39.059	-36.000
533.430	10.310	-83.464	-73.154	-37.154	-36.000
629.460	9.500	-68.997	-59.497	-23.497	-36.000
764.290	10.730	-82.759	-72.029	-36.029	-36.000
944.710	11.600	-75.067	-63.467	-27.467	-36.000
1260.000	6.420	-74.457	-68.037	-38.037	-30.000
1575.000	5.940	-72.968	-67.028	-37.028	-30.000
1890.000	8.147	-74.449	-66.302	-36.302	-30.000
2205.000	10.889	-75.831	-64.942	-34.942	-30.000
2520.000	10.027	-72.985	-62.958	-32.958	-30.000
2835.000	10.249	-76.336	-66.087	-36.087	-30.000
3150.000	11.094	-76.706	-65.612	-35.612	-30.000

Note:

1. All Reading are peak value.
2. " " means this data is the worst emission level.
3. Emission Level = Reading Level + Correction Factor.

Frequency MHz	Correct Factor dB	Reading Level dBm	Measurement Level dBm	Margin dB	Limit dBm
<b>Vertical</b>					
<b>Peak Detector</b>					
47.460	3.460	-66.525	-63.065	-27.065	-36.000
194.900	1.700	-81.140	-79.440	-43.440	-36.000
477.170	8.990	-82.915	-73.925	-37.925	-36.000
629.460	10.000	-73.533	-63.533	-27.533	-36.000
790.480	11.790	-83.363	-71.573	-35.573	-36.000
944.710	12.680	-78.696	-66.016	-30.016	-36.000
1260.000	5.894	-72.764	-66.870	-36.870	-30.000
1575.000	6.545	-67.736	-61.191	-31.191	-30.000
1890.000	8.445	-68.309	-59.864	-29.864	-30.000
2205.000	10.366	-72.483	-62.117	-32.117	-30.000
2520.000	10.620	-73.881	-63.261	-33.261	-30.000
2835.000	11.506	-76.097	-64.591	-34.591	-30.000
3150.000	12.040	-76.487	-64.447	-34.447	-30.000

Note:

1. All Reading are peak value.
2. " " means this data is the worst emission level.
3. Emission Level = Reading Level + Correction Factor.

<b>Test Result</b>	PASS
--------------------	------

#### 4.5. Restriction Function of Transmission Time

#### 4.6. Test Setup



#### 4.7. Test Procedure

##### (1) RF device with cyclical transmission

- Verify wave emission using spectrum analyzer when receiving seizure signal from an external test equipment, and RF device emits waves and receives seizure signal.
- Verify wave emission using spectrum analyzer when not receiving seizure signal from an external test equipment and RF device emits waves.
- Measure maximum transmission time and minimum transmission suspension time.

##### (2) RF device with no cyclical transmission

- Verify wave emission using spectrum analyzer when receiving seizure signal form external test equipment or manual operation.
- Measure maximum transmission time by receiving once a seizure signal form an external testing equipment or manual operation.

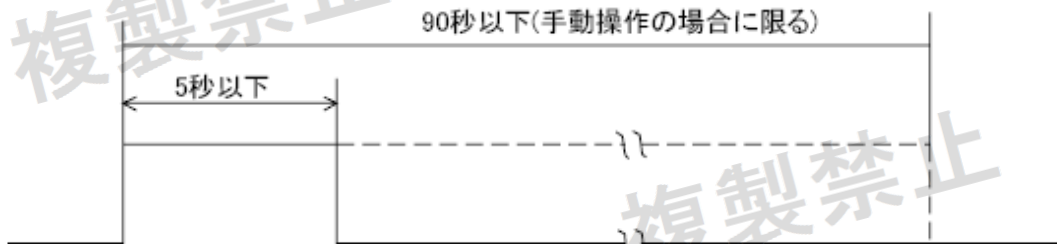
Moreover, verify that does not emit waves exceeding the maximum permissible transmission time.

#### 4.8. Limits

(1) RF equipment with no cyclical:

Transmission time: below 5 s

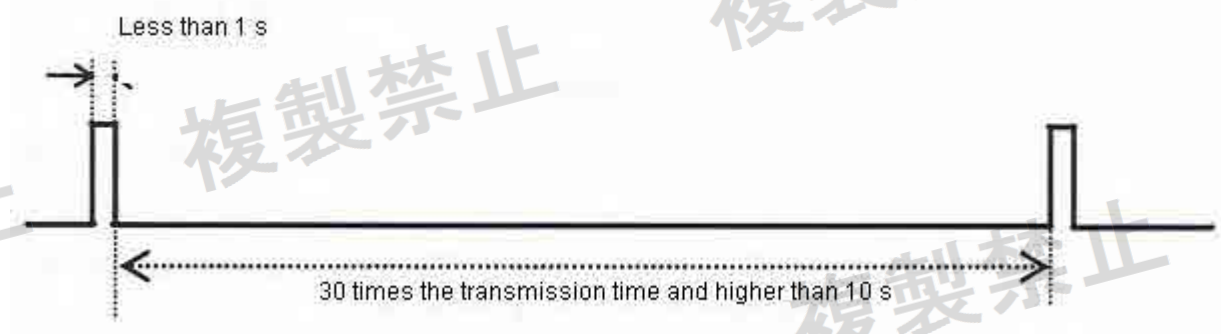
In manual transmission: below 90 s



(2) RF equipment with cyclical transmission:

Transmission time: For each transmission time, below 1 s

Transmission suspension time 30 times the transmission time, and higher than 10 s

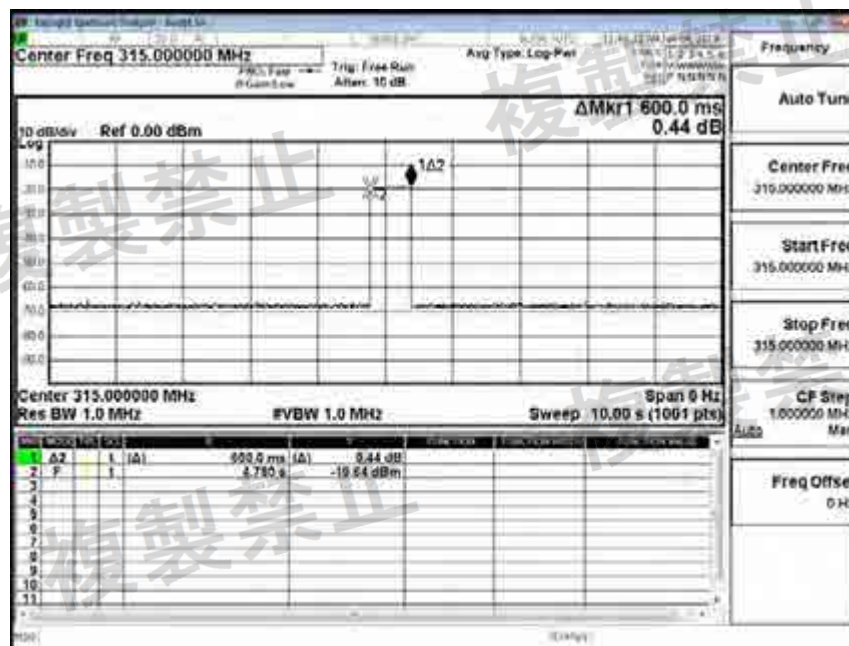




#### 4.9. Test Result of Transmission Time

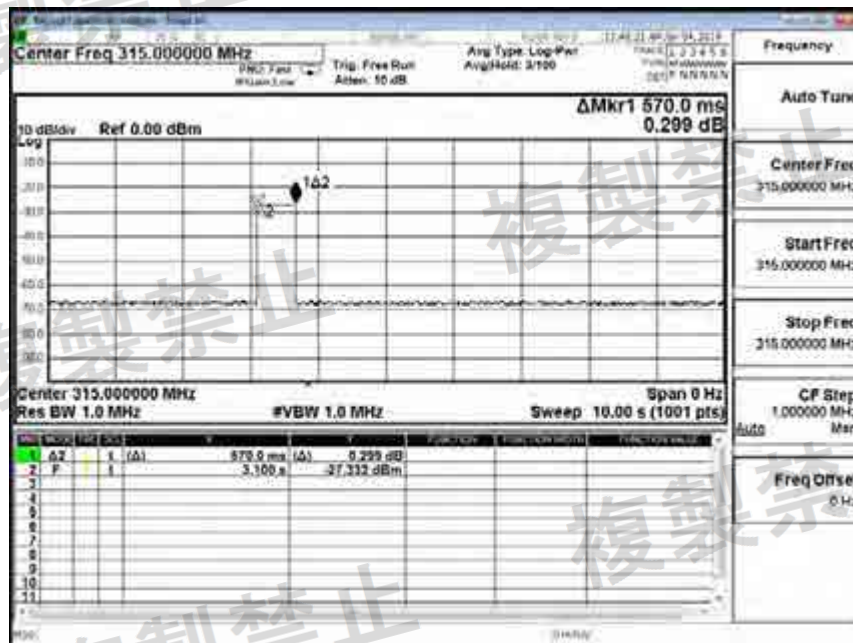
Product : Radio Frequency Transmitter  
 Test Item : Transmission Time  
 Test Mode : Mode 1: Transmitter (Normal Voltage\_DC 3V)

Frequency MHz	Manual Transmission Time	Limit
315	0.6s	<90s



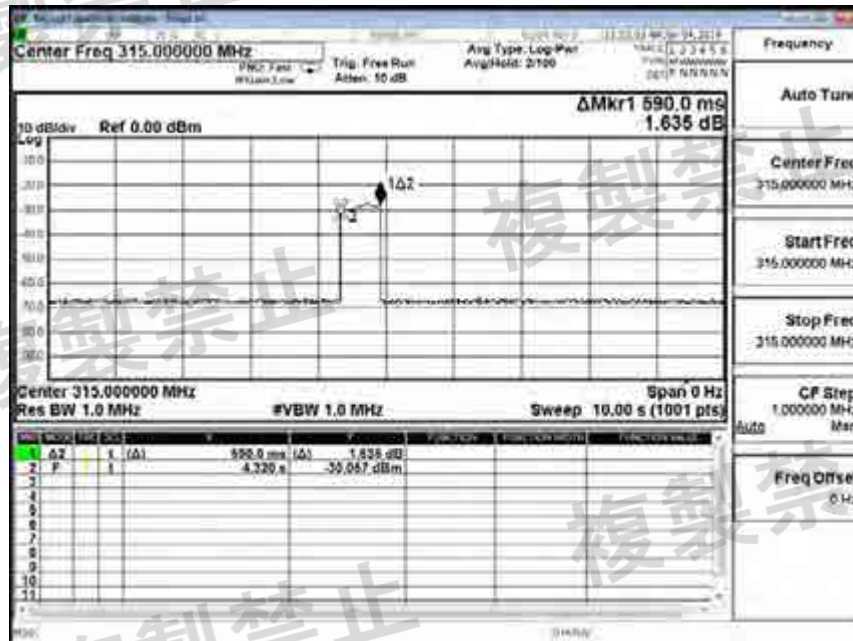
Product : Radio Frequency Transmitter  
 Test Item : Transmission Time  
 Test Mode : Mode 1: Transmitter (High Voltage\_DC 3.3V)

Frequency MHz	Manual Transmission Time	Limit
315	0.57s	<90s



Product : Radio Frequency Transmitter  
 Test Item : Transmission Time  
 Test Mode : Mode 1: Transmitter (Low Voltage\_DC 2.7V)

Frequency MHz	Manual Transmission Time	Limit
315	0.59s	<90s



**5. EMI Reduction Method During Compliance Testing**

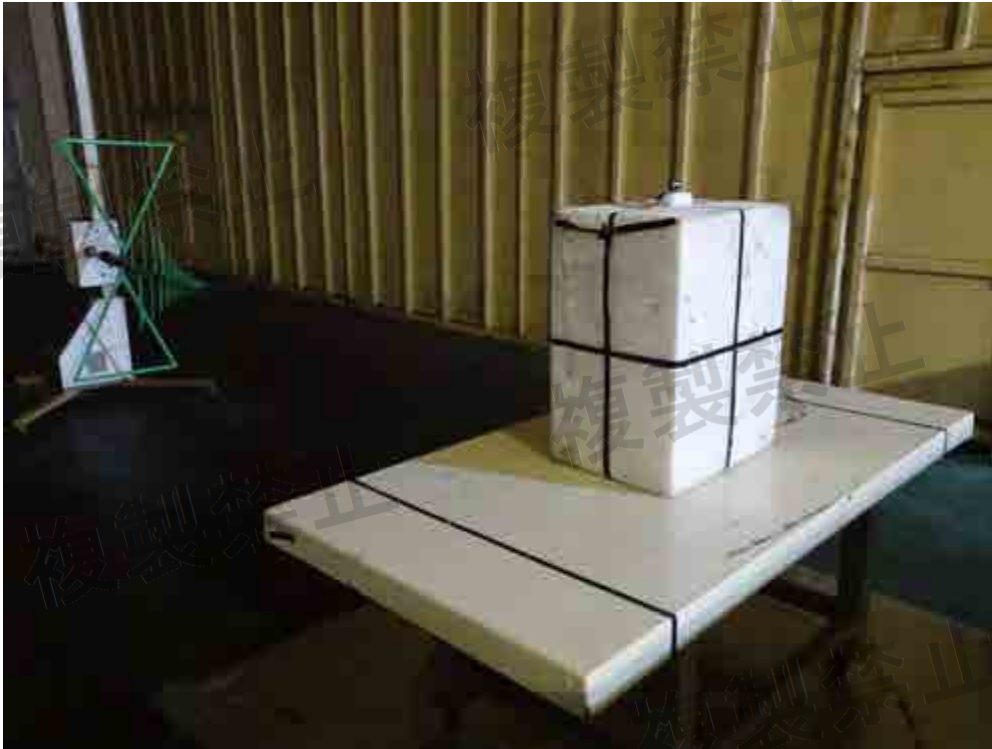
No modification was made during testing.



## Attachment

### ➤ EUT Test Photographs

Front View of Radiated Test



Back View of Radiated Test





Front View of Radiated Test (Horn)



Back View of Radiated Test (Horn)



Attachment 2 : EUT Detailed Photographs

(1) EUT Photo (M/N: FS14T)



(2) EUT Photo



(3) EUT Photo



(4) EUT Photo





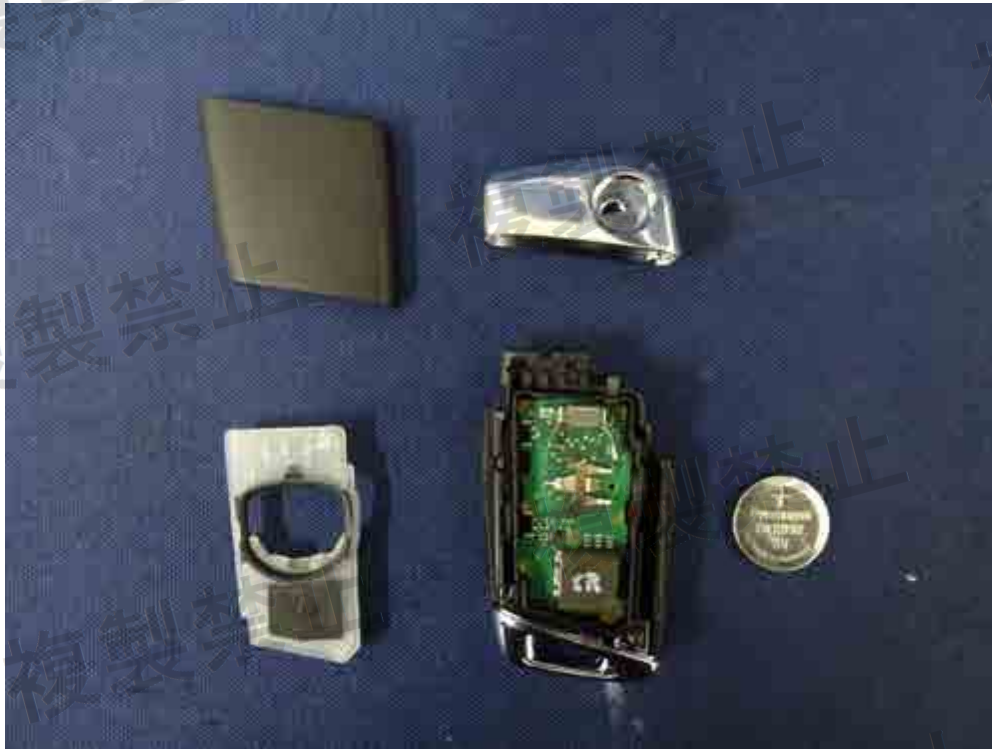
(5) EUT Photo



(6) EUT Photo



(7) EUT Photo



(8) EUT Photo





(9) EUT Photo



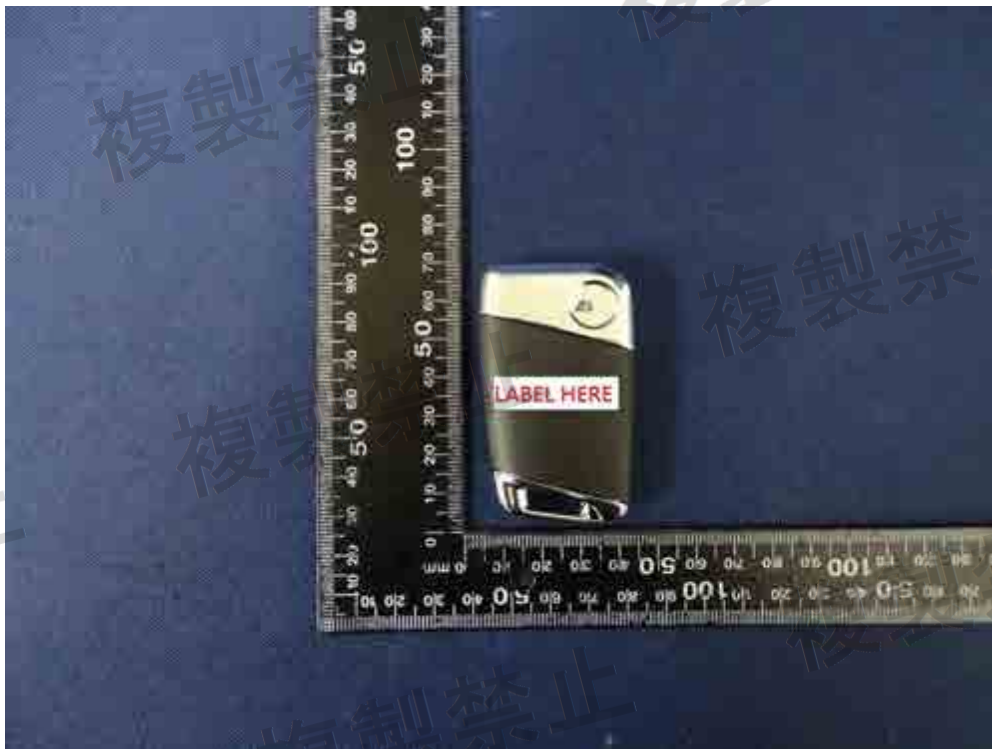
(10) EUT Photo



(11) EUT Photo



(12) EUT Photo





(13) EUT Photo (M/N: FS14TK)



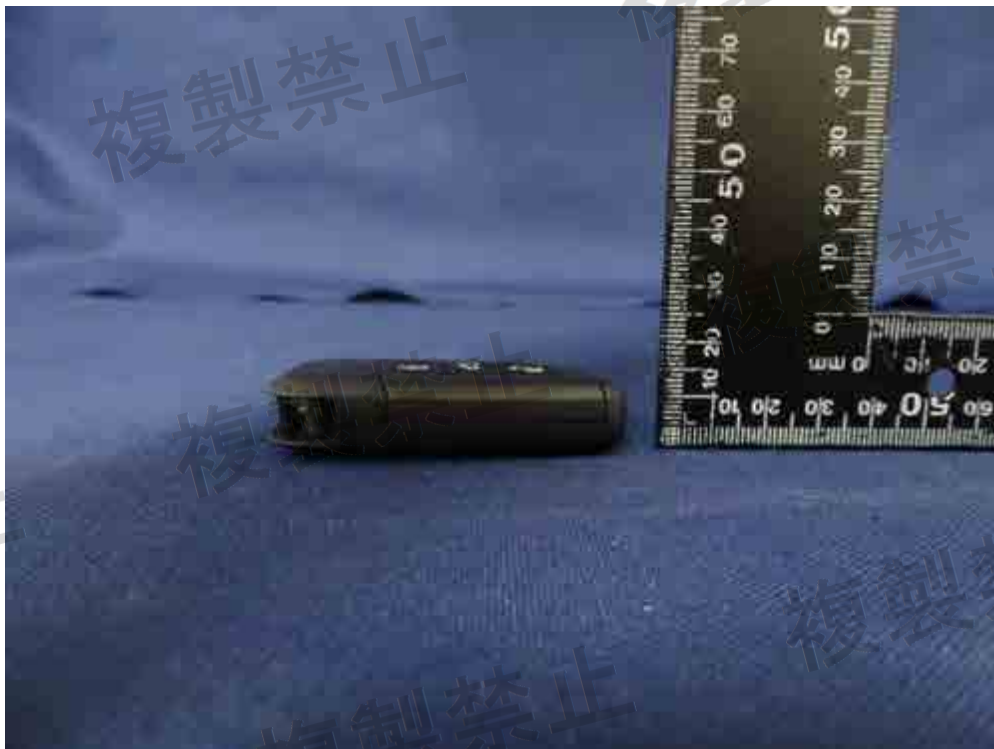
(14) EUT Photo



(15) EUT Photo



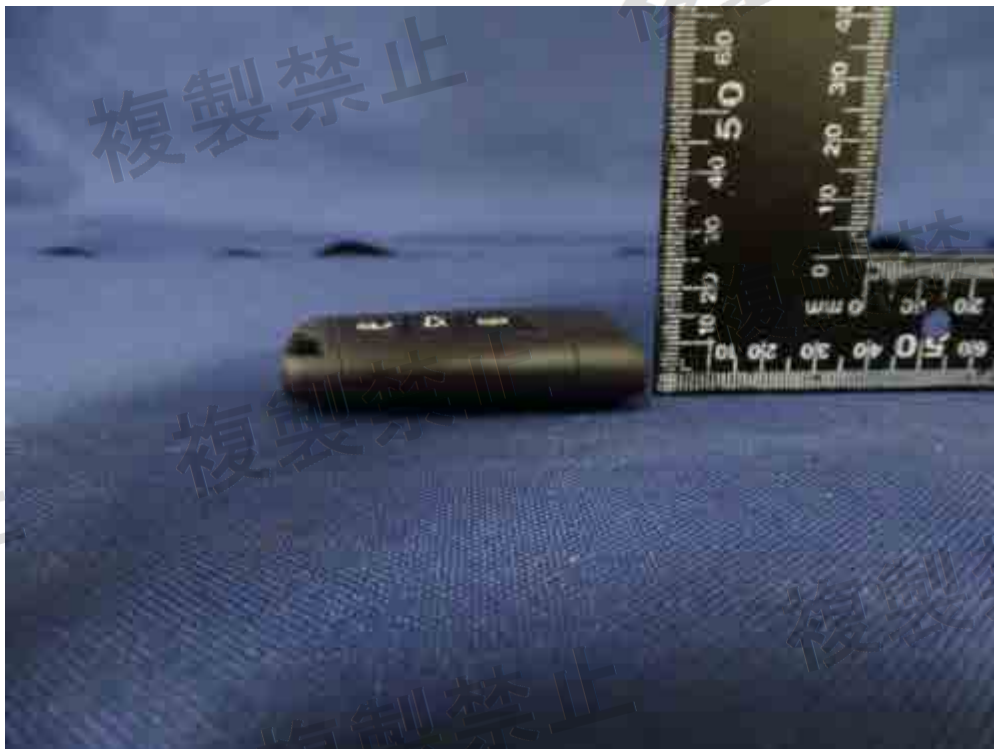
(16) EUT Photo



(17) EUT Photo



(18) EUT Photo





(19) EUT Photo



(20) EUT Photo



(21) EUT Photo



(22) EUT Photo





(23) EUT Photo



(24) EUT Photo

