

**Shenzhen Global Test Service Co.,Ltd.**

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

## TEST REPORT

### ETSI EN 300 440 V2.2.1 (2018-07)

Report Reference No. ....: **GTS20200610019-1-5**

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Date of issue.....: Aug.15, 2020

**Representative Laboratory Name ..: Shenzhen Global Test Service Co.,Ltd.**

Address.....: No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

**Applicant's name .....: Shenzhen Makerfire Technology Co.,Ltd.**

Address.....: Room 502, Panbao Building, No.7-1 Lipu Street, Bantian, Longgang District, Shenzhen, China

**Test specification ..... :**

Standard .....: **ETSI EN 300 440 V2.2.1 (2018-07)**

TRF Originator .....: Shenzhen Global Test Service Co.,Ltd.

Master TRF .....: Dated 2014-12

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**Test item description..... : LiteBee Wing EDU Drone(Remote Control)**

Trade Mark .....: LiteBee

Manufacturer .....: Shenzhen Makerfire Technology Co.,Ltd.

Model/Type reference.....: C06-MC2

List Model .....: N/A

Operation Frequency.....: From 2404MHz to 2459MHz

Ratings.....: DC 4.5V by 3\*AAA

Result.....: PASS

## TEST REPORT

<b>Test Report No. :</b> GTS20200610019-1-5	Aug.15, 2020 Date of issue
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Equipment under Test : LiteBee Wing EDU Drone(Remote Control)

Model /Type : C06-MC2

Listed Models : N/A

Applicant : **Shenzhen Makerfire Technology Co.,Ltd.**

Address : Room 502, Panbao Building, No.7-1 Lipu Street, Bantian,  
Longgang District, Shenzhen, China

Manufacturer : **Shenzhen Makerfire Technology Co.,Ltd.**

Address : Room 502, Panbao Building, No.7-1 Lipu Street, Bantian,  
Longgang District, Shenzhen, China

<b>Test Result:</b>	<b>PASS</b>
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The test report merely corresponds to the test sample.  
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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## **1. TEST STANDARDS**

The tests were performed according to following standards:

[ETSI EN 300 440 V2.2.1 \(2018-07\)](#) : Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum

## 2. SUMMARY

### 2.1. General Remarks

Date of receipt of test sample	:	Jul.31, 2020
Testing commenced on	:	Jul.31, 2020
Testing concluded on	:	Aug.15, 2020

### 2.2. Product Description

Product Name:	LiteBee Wing EDU Drone(Remote Control)
Trade Mark:	LiteBee
Model/Type reference:	C06-MC2
List Model:	N/A
Model Declaration	N/A
2.4G(TX/RX)	
Power supply:	DC 4.5V by 3*AAA
Hardware Version	C06-RC-V0.1
Software Version	C06-remote-V1.1.0
Operation frequency	2404-2459MHz
Modulation Type	GFSK
Channel number:	56 Channels
Antenna Description	Internal Antenna; 1.8dBi(Max.)

### 2.3. Equipment Under Test

#### Power supply system utilised

Power supply voltage	:	<input type="radio"/> 230V / 50 Hz	<input type="radio"/> 120V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input checked="" type="radio"/> Other (specified in blank below)	

DC 4.5 V

### 2.4. Equipment Under Test

#### Description of the test mode

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2404	26	2429
2	2405	27	2430
3	2406	28	2431
--	--	--	--
--	--	--	--
24	2427	55	2458
25	2428	56	2459

### 2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

☐ - supplied by the manufacturer

☒ - supplied by the lab

<input type="radio"/> /	M/N:	/
	Manufacturer:	/

### 2.6. Test summary

ETSI EN 300 440 Requirements		
Equivalent isotropic radiated power(Radiated)	ETSI EN 300 440 Sub-clause 4.2.2	Pass
Permitted range of operating frequencies	ETSI EN 300 440 Sub-clause 4.2.3	Pass
Spurious emissions	ETSI EN 300 440 Sub-clause 4.2.4	Pass
Duty cycle	ETSI EN 300 440 Sub-clause 4.2.5	Pass
Additional requirements for FHSS equipment	ETSI EN 300 440 Sub-clause 4.2.6	N/A
Adjacent channel selectivity	ETSI EN 300 440 Sub-clause 4.3.3	Pass
Blocking or desensitization	ETSI EN 300 440 Sub-clause 4.3.4	Pass
Receiver Spurious emissions	ETSI EN 300 440 Sub-clause 4.3.5	Pass

### 2.7. Modifications

No modifications were implemented to meet testing criteria.

### **3. TEST ENVIRONMENT**

#### **3.1. Address of the test laboratory**

**Shenzhen Global Test Service Co.,Ltd.**

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

#### **3.2. Test Facility**

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

CNAS (No. CNAS L8169)

Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2019 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA (Certificate No. 4758.01)

Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.

Industry Canada Registration Number. is 24189.

FCC Designation Number is CN1234.

FCC Registered Test Site Number is 165725.

#### **3.3. Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature: 25 °C

High Temperature: 45 °C

Low Temperature: -20 °C

Normal Voltage : DC 4.5V

High Voltage: DC 5.0V

Low Voltage: DC 4.0V

Relative Humidity: 55 %

Air Pressure: 989 hPa

#### **3.4. Statement of the measurement uncertainty**

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen Global Test Service Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Conducted spurious emission	1.60 dB	(1)
Radiated spurious emission	2.20 dB	(1)

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

**3.5. Equipments Used during the Test**

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
ULTRA-BROADBAND ANTENNA	Schwarzbeck	VULB9163	000976	2019/09/20	2020/09/19
ULTRA-BROADBAND ANTENNA	Schwarzbeck	VULB9163	000975	2019/09/20	2020/09/19
Horn Antenna	Schwarzbeck	BBHA 9120D	01622	2019/09/20	2020/09/19
Horn Antenna	Schwarzbeck	BBHA 9120D	01623	2019/09/20	2020/09/19
EMI Test Receiver	Rohde&Schwarz	ESCI	101102	2019/09/20	2020/09/19
Spectrum Analyzer	Agilent	N9020A	MY4801042 5	2019/09/20	2020/09/19
Spectrum Analyzer	Agilent	E4407B	MY4510835 5	2019/09/20	2020/09/19
Pre-Amplifier	Schwarzbeck	BBV 9743	#202	2019/09/20	2020/09/19
Pre-Amplifier	Chenyi	EMC051845 B	980355	2019/09/20	2020/09/19
Horn Antenna	Schwarzbeck	BBHA9170	25841	2019/09/20	2020/09/19
High pass filter	Compliance Direction systems	BSU-6	34202	2019/09/20	2020/09/19
Signal Generator	Rohde&Schwarz	SMB100A	177649	2019/09/20	2020/09/19

The calibration interval is 1 year.

## 4. TEST CONDITIONS AND RESULTS

### 4.1. Equivalent Isotropically Radiated Power (e.i.r.p)

#### LIMIT

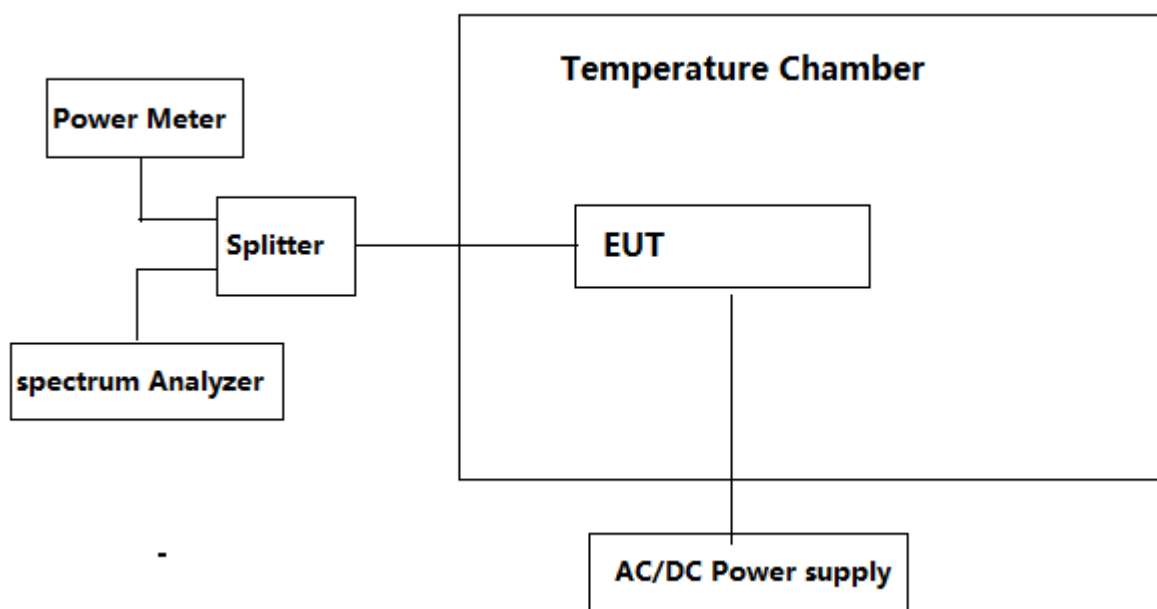
According to ETSI EN 300 440 clause 4.2.2.3.2

The transmitter maximum e.i.r.p. under normal and extreme test conditions shall not exceed the values given in table 2.

**Table 2: Maximum radiated peak power (e.i.r.p.)**

Frequency Bands	Power	Application	Notes
2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Non-specific short range devices	
2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Radio determination devices	
(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex D
(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex D
5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Non-specific short range devices	
9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radio determination devices	
9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radio determination devices	
10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radio determination devices	
13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radio determination devices	
17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radio determination devices	See annex F
24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and Radio determination devices	

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. Please refer to ETSI EN 300 440 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 clause 4.2.2.3 for the measurement method.

**TEST RESULTS**

Test conditions		Channel/ Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (°C)	Voltage (V)						
T <sub>Nor</sub> (+25°C)	DC 4.5	2404.0	7.05	1.50	8.55	10.00	PASS
T <sub>min</sub> (-20°C)	DC 5.0		7.01	1.50	8.51		
	DC 4.0		7.86	1.50	9.36		
T <sub>Max</sub> (+45°C)	DC 5.0		7.43	1.50	8.93		
	DC 4.0		7.10	1.50	8.60		
T <sub>Nor</sub> (+25°C)	DC 4.5		7.33	1.50	8.83		
T <sub>min</sub> (-20°C)	DC 5.0	2428.0	7.10	1.50	8.60		
	DC 4.0		7.08	1.50	8.58		
T <sub>Max</sub> (+45°C)	DC 5.0		7.20	1.50	8.70		
	DC 4.0		7.75	1.50	9.25		
T <sub>Nor</sub> (+25°C)	DC 4.5	2459.0	7.79	1.50	9.29		
T <sub>min</sub> (-20°C)	DC 5.0		7.67	1.50	9.17		
	DC 4.0		7.85	1.50	9.35		
T <sub>Max</sub> (+45°C)	DC 5.0		7.28	1.50	8.78		
	DC 4.0		7.93	1.50	<b>9.43</b>		

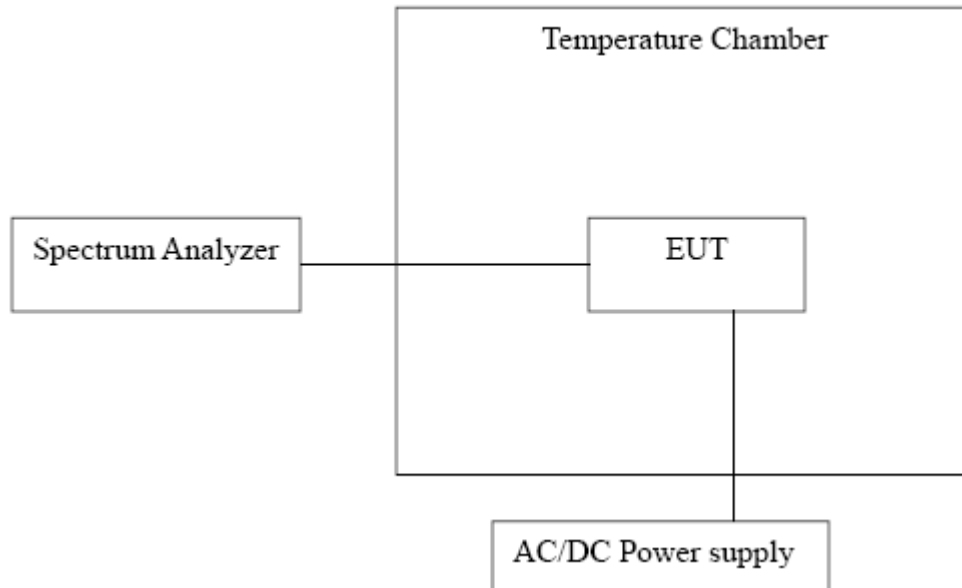
## 4.2. Permitted Range of Operating Frequencies

### LIMIT

According to ETSI EN 300 440 clause 4.2.3.5

Frequency range Limit	
$F_{Low} > 2400.0\text{MHz}$	$F_{High} < 2483.5\text{M}$

### TEST CONFIGURATION



### TEST PROCEDURE

1. Please refer to ETSI EN 300 440 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 clause 4.2.3.3 for the measurement method.

### TEST RESULTS

Antenna Gain: 1.00dBi		Test Method: Conducted	
Test Condition			
Test environmental			
Temperature ( °C )	Voltage ( V )	fL Low	fH High
T Nor ( 25℃ )	DC 4.5	2403.350145	2459.455563
T min ( -20℃)	DC 5.0	2403.350875	2459.455378
T min (-20℃)	DC 4.0	2403.351244	2459.456321
T Max ( +45℃ )	DC 5.0	2403.351536	2459.456145
T Max ( +45℃ )	DC 4.0	2403.351785	2459.455742
Limits		>2400MHz	<2483.5M
Result		Pass	

### 4.3. Spurious emissions and cabinet

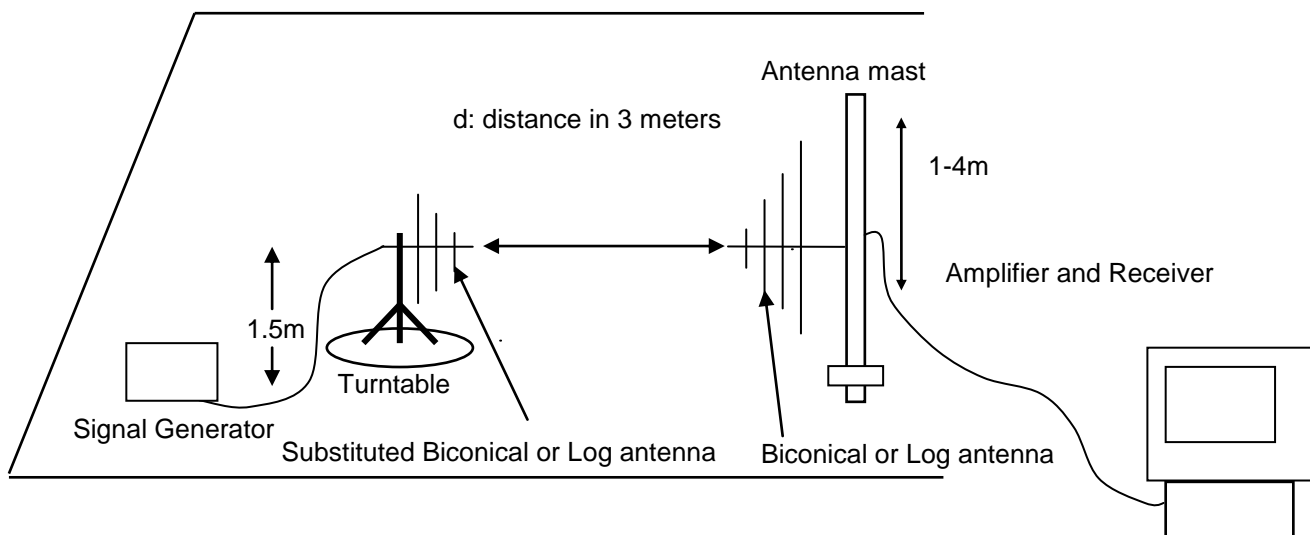
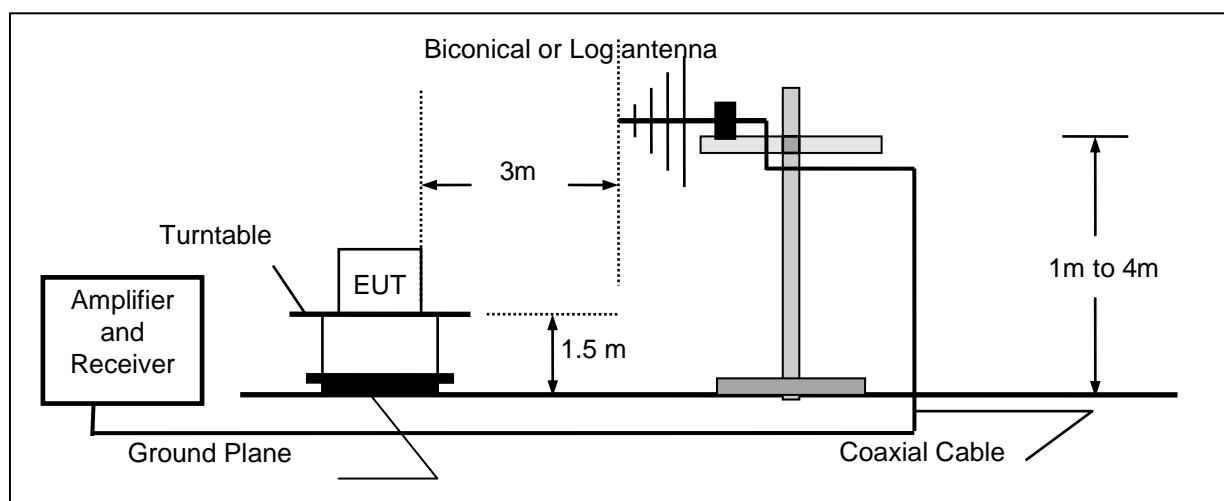
#### LIMIT

The power of the spurious emissions shall not exceed the limits of table

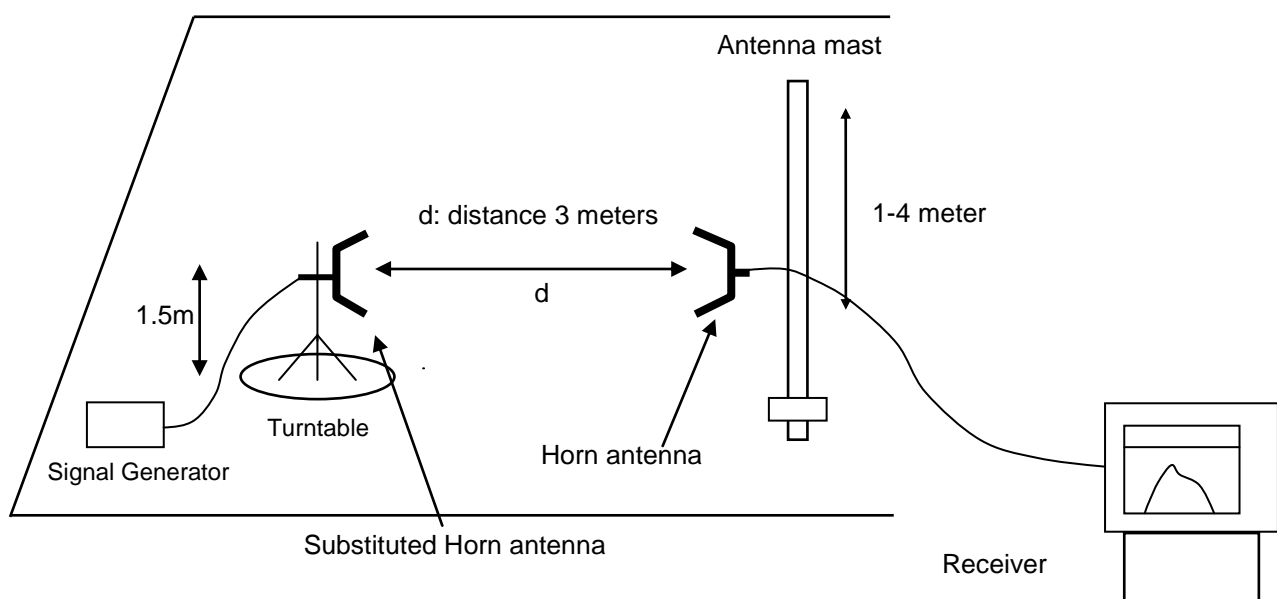
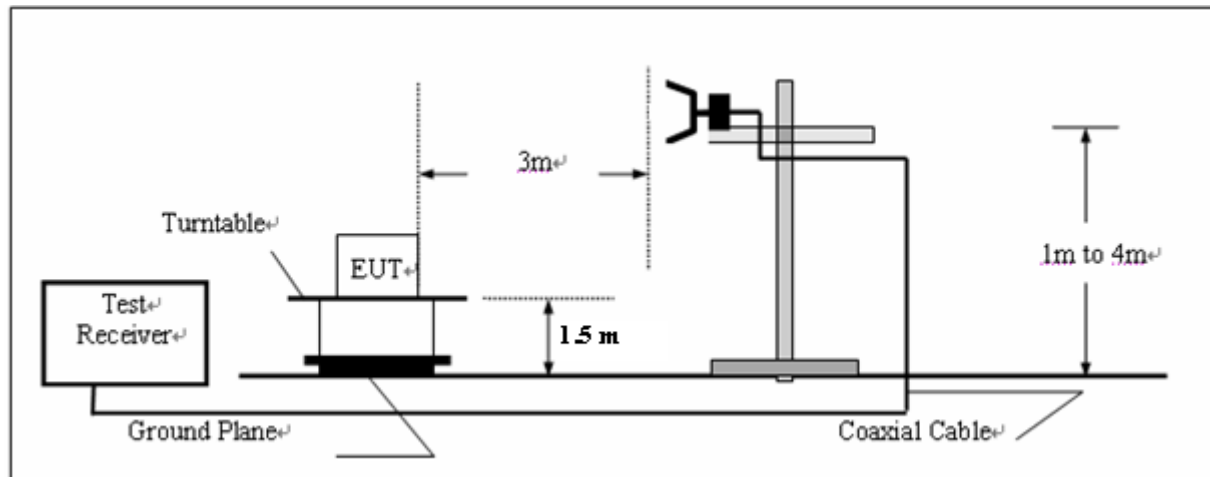
State	47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies $\leq 1\ 000$ MHz	Frequencies > 1 000 MHz
Operating	4 nW /-54dBm	250 nW/-36dBm	1 $\mu$ W /-30dBm
Standby	2 nW /-57dBm	2 nW /-57dBm	20 nW /-47dBm

#### TEST CONFIGURATION

Below 1GHz



## Above 1GHz

**TEST PROCEDURE**

1. Please refer to ETSI EN 300 440 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 clause 4.2.4.3 for the measurement method.

**TEST RESULTS**

Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
61.44	Vertical	-81.67	-36.00	Pass
911.97	V	-68.18	-36.00	
3987.10	V	-63.71	-30.00	
6138.86	V	-59.27	-30.00	
164.80	Horizontal	-84.31	-36.00	
921.77	H	-72.27	-36.00	
3990.60	H	-64.89	-30.00	
4906.42	H	-51.85	-30.00	
Middle Channel				
67.92	Vertical	-79.40	-36.00	Pass
913.77	V	-67.45	-36.00	
3984.34	V	-60.49	-30.00	
6141.01	V	-53.25	-30.00	
165.37	Horizontal	-78.46	-36.00	
922.10	H	-77.36	-36.00	
3985.78	H	-62.62	-30.00	
4902.98	H	-54.95	-30.00	
Highest Channel				
68.05	Vertical	-85.11	-36.00	Pass
914.32	V	-70.11	-36.00	
3990.11	V	-61.68	-30.00	
6141.59	V	-56.59	-30.00	
169.88	Horizontal	-84.57	-36.00	
925.84	H	-72.77	-36.00	
3990.13	H	-61.25	-30.00	
4908.59	H	-54.89	-30.00	

#### 4.4. Duty cycle

According to ETSI EN 300 440 clause 4.2.5.4

Table 4 defines the maximum duty cycle within a 1 hour period.

**Table 4: Duty cycle limits**

Frequency Band	Duty cycle	Application	Notes
2 400 MHz to 2 483,5 MHz	No Restriction	Generic use	
2 400 MHz to 2 483,5 MHz	No Restriction	Detection, movement and alert applications	
(a) 2 446 MHz to 2 454 MHz	No Restriction	RFID	Limits shown in annex D shall apply
(b) 2 446 MHz to 2 454 MHz	≤ 15 %	RFID	Limits shown in annex D shall apply
5 725 MHz to 5 875 MHz	No Restriction	Generic use	
9 200 MHz to 9 500 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
9 500 MHz to 9 975 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
10,5 GHz to 10,6 GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
13,4 GHz to 14,0 GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
17,1 GHz to 17,3 GHz	DAA or equivalent techniques	Radiodetermination: GBSAR detecting and movement and alert applications	Limits shown in annex F shall apply
24,00 GHz to 24,25 GHz	No Restriction	Generic use and for Radiodetermination: radar, detection, movement and alert applications	

#### **TEST RESULTS**

this test item is not applicable for this EUT.

## 4.5. Receiver Emissions

### LIMIT

The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.

### TEST CONFIGURATION

The same as described in section 4.4

### TEST PROCEDURE

1. Please refer to ETSI EN 300 440 Sub-clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 Sub-clause 4.3.5.4 for the measurement method.

### TEST RESULTS

Frequency (MHz)	Test Data		Limit (dBm)	Conclusion
	Polarization	Level (dBm)		
Lowest Channel				
61.53	Vertical	-77.75	-57.00	Pass
921.06	V	-74.12	-57.00	
1805.05	V	-66.43	-47.00	
2714.03	V	-65.64	-47.00	
55.37	Horizontal	-81.89	-57.00	
809.36	H	-77.16	-57.00	
1802.78	H	-67.23	-47.00	
2703.51	H	-64.32	-47.00	
Middle Channel				
62.10	Vertical	-79.85	-57.00	Pass
924.66	V	-75.70	-57.00	
1802.87	V	-70.10	-47.00	
2712.93	V	-62.66	-47.00	
58.71	Horizontal	-85.23	-57.00	
810.10	H	-80.17	-57.00	
1803.44	H	-69.36	-47.00	
2705.47	H	-69.21	-47.00	
Highest Channel				
62.89	Vertical	-78.45	-57.00	Pass
921.01	V	-73.73	-57.00	
1802.04	V	-64.80	-47.00	
2715.41	V	-63.07	-47.00	
55.20	Horizontal	-85.02	-57.00	
808.92	H	-80.53	-57.00	
1800.65	H	-68.94	-47.00	
2708.23	H	-70.82	-47.00	

## 4.6. ADJACENT CHANNEL SELECTIVITY

### Definition and Limit

The adjacent channel selectivity is a measure of the capability of the receiver to operate satisfactorily in the presence of an unwanted signal that differs in frequency from the wanted signal by an amount equal to the adjacent channel. The adjacent channel selectivity of the equipment under specified conditions shall not be less than the levels of the unwanted signal as stated in table 6.

**Table 6: Limit for adjacent channel selectivity**

Receiver category	Limit
1	-30 dBm + k
2	No limit
3	No limit

The correction factor, k, is as follows:

$$k = -20\log f - 10\log BW$$

Where:

- f is the frequency in GHz;
- BW is the channel bandwidth in MHz.

The factor k is limited within the following:

$$-40 < k < 0 \text{ dB.}$$

### Test Procedure

Please refer to ETSI EN 300 440 clause 4.3.3.3 for the measurement method.

### Test Result

Pass.

Test Channel (Worst Case)		The signal of adjacent channel(signal generator B)						
		Adjacent channel		BW (MHz)	K (dB)	Test Value (dBm)	Limit (dBm)	Verdict
25	2428MHz	24	2427.0MHz(lower)	1.00	-7.70	-31.14	$\geq -37.70$	Pass
		26	2429.0MHz(upper)	1.00	-7.70	-31.68	$\geq -37.70$	Pass

Note: The BW(channel bandwidth) is 1MHz which is declared by the manufacturer of the equipment.

## 4.7. BLOCKING OR DESENSITIZATION

### Definition and Limit

Blocking is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at any frequencies other than those of the spurious responses or the adjacent channels or bands, see clauses 4.3.3 and 4.3.4.

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table 7, except at frequencies on which spurious responses are found.

**Table 7: Limits for blocking or desensitization**

Receiver category	Limit
1	-30 dBm + k
2	-45 dBm + k
3	No limit

The correction factor, k, is as follows:

Where:

- f is the frequency in GHz;
- BW is the channel bandwidth in MHz.

The factor k is limited within the following:

$$-40 < k < 0 \text{ dB}$$

### Test Procedure

Please refer to ETSI EN 300 440 clause 4.3.4.3 for the measurement method.

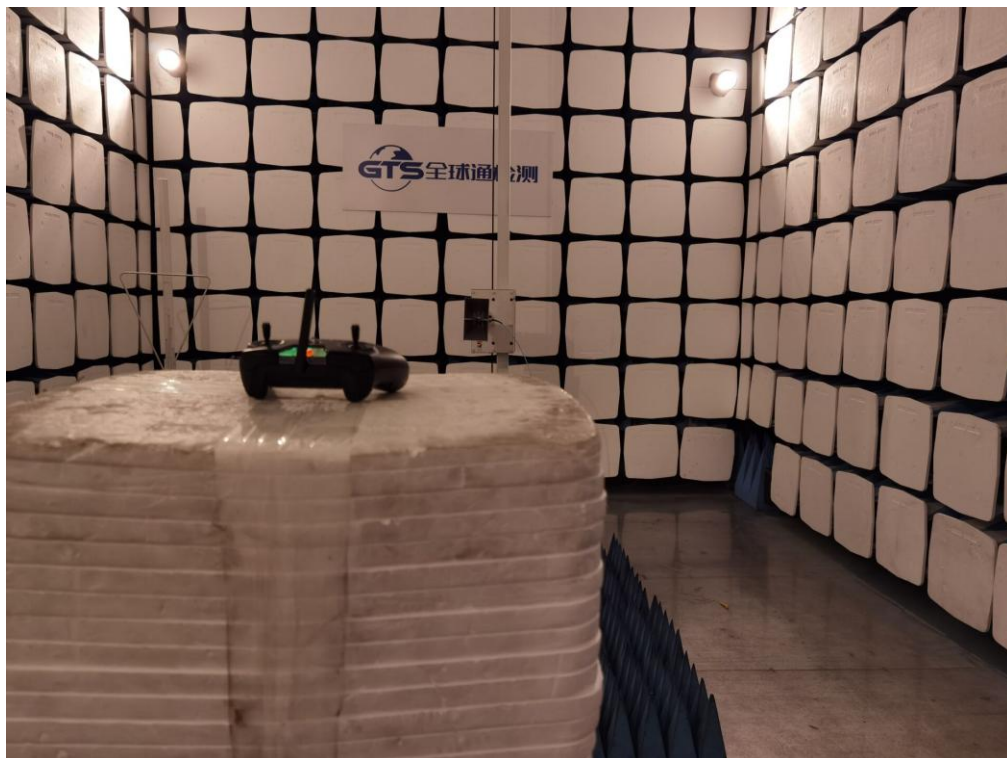
### Test Result

Pass

Test Channel		Lower or upper	Frequency (MHz)	BW (MHz)	K (dB)	Test Value (dBm)	Limit (dBm)	Verdict
25	2428MHz	Lower	2427.0	1.00	-7.70	-31.87	$\geq -37.70$	Pass
		Upper	2429.0	1.00	-7.70	-32.12	$\geq -37.70$	Pass

Note: The BW(channel bandwidth) is 1MHz which is declared by the manufacturer of the equipment.

## **5. TEST SETUP PHOTOS OF THE EUT**



## **6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT**

Reference to the test report No. GTS20200610019-1-3.

.....End of Report.....