



TEST REPORT

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

Report Reference No. : TZ210902557-SRD2

Compiled by

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Date of issue : 2021/11/3

Testing Laboratory Name : Shenzhen Tongzhou Testing Co.,Ltd

Address : 1th Floor, Building 1, Haomai High-tech Park, Huating Road 387,
Dalang Street, Longhua, Shenzhen, China

Applicant's name : Dongguan YINYAN Electric Tech.LTD

Address : EMAX Industrial Park, Gao-long Industrial Zone, Huanzhuli Village,
Changping Town, Dongguan City, Guangdong Province, China

Test specification..... :

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

TRF Originator : Shenzhen Tongzhou Testing Co.,Ltd

Master TRF : Dated 2018-09

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Test item description..... : Tinyhawk 3

Trade Mark..... : EMAX

Model/Type reference : Tinyhawk 3

List Model..... : N/A

Hardware Version : V1.0

Software Version..... : V1.0

Operation Frequency : 5733MHz to 5866MHz

Modulation Type : FM

Ratings..... : 1,DC 5V in
2,DC 3.8V by battery

Result..... : PASS

Anna Hu



Andy Zhang



TEST REPORT

Test Report No. : TZ210902557-SRD2	2021/11/3 Date of issue
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Equipment under Test : Tinyhawk 3

Model /Type : Tinyhawk 3

Listed Models : N/A

Applicant : Dongguan YINYAN Electric Tech.LTD

Address : EMAX Industrial Park, Gao-long Industrial Zone, Huanzhuli Village, Changping Town, Dongguan City, Guangdong Province, China

Manufacturer : Dongguan YINYAN Electric Tech.LTD

Address : EMAX Industrial Park, Gao-long Industrial Zone, Huanzhuli Village, Changping Town, Dongguan City, Guangdong Province, China

Test Result:	PASS
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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.

**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 00	Initial Test Report Release	2021/11/3	Andy Zhang



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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 covering the essential requirements of article 3.2 of Directive 2016/53/EU



2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	2021/9/20
Testing commenced on	:	2021/9/20
Testing concluded on	:	2021/11/1

2.2 Product Description

The **Dongguan YINYAN Electric Tech.LTD**'s Model: Tinyhawk 3 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Tinyhawk 3
Model(s) Number	Tinyhawk 3
List Model	N/A
Difference description	N/A
Hardware version	V1.0
Software version	V1.0
Antenna Type	Integral

Wireless Type	Working Frequency	Modulation Type	Version
SRD-RX	2404MHz to 2476MHz	GFSK,2-FSK	/
SRD-TX	5733MHz to 5866MHz	FM	/



2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/>	120V / 60 Hz	<input type="radio"/>	115V / 60Hz
		<input type="radio"/>	12 V DC	<input type="radio"/>	24 V DC
		<input checked="" type="radio"/>	Other (specified in blank below)		

Refer to section 3.2 of this report

2.4 Short description of the Equipment under Test (EUT)

Tinyhawk 3(M/N: Tinyhawk 3)

For more details, refer to the user's manual of the EUT.

2.5 EUT operation mode

The EUT has been tested under typical operating condition. The Applicant provides software to control the EUT for staying in continuous transmitting and receiving mode for testing.

2.6 EUT configuration

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

● - supplied by the manufacturer

○ - supplied by the lab

2.7 Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt	Type of Test
TZ210902557-1#	N/A	V1.0	V1.0	2021/9/20	Radio
TZ210902557-2#	N/A	V1.0	V1.0	2021/9/20	EMF
TZ210902557-3#	N/A	V1.0	V1.0	2021/9/20	EMC

2.8 Modifications

No modifications were implemented to meet testing criteria.



2.9 NOTE

Function	Test Standards	Reference Report
EMC	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.1.1 (2019-03) EN55032:2015+A11:2020/EN55035:2017+A11:2020 EN IEC 61000-3-2:2019/EN61000-3-3:2013+A1:2019	TZ210902557-RE
SRD	ETSI EN 300 440 V2.2.1 (2018-07)	TZ210902557-SRD1
		TZ210902557-SRD2
EMF	EN 62479:2010 EN 50663:2017	TZ210902557-EMF



3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen Tongzhou Testing Co.,Ltd
1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua, Shenzhen,
China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2014) and CISPR Publication 22.

3.2 Environmental conditions

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

Normal Temperature/NT: 25°C

High Temperature/HT: 35°C

Low Temperature/LT: -10°C

Normal Voltage: DC 3.8V

High Voltage/HV: DC 4.35V

Low Voltage/LV: DC 3.5V

Relative Humidity: 55 %

Air Pressure: 989 hPa



3.3 Test Description

ETSI EN 300 440 requirements		
Test Items	standard	Verdict
Transmitter requirements		
Equivalent isotropically radiated power (e.i.r.p.)	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.2.2	PASS
Permitted range of operating frequencies	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.2.3	PASS
Unwanted emissions in the spurious domain	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.2.4	PASS
Duty cycle	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.2.5	N/A
Additional requirements for FHSS equipment	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.2.6	PASS
Receiver requirements		
Adjacent channel selectivity	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.3.3	N/A
Blocking or desensitization	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.3.4	N/A
Spurious emissions	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.3.5	N/A
Spectrum access techniques		
Listen Before Talk (LBT)	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.4.2	N/A
Detect And Avoid techniques (DAA)	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.4.3	N/A
Adaptive Frequency Agility (AFA)	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.4.4	N/A
2,45 GHz RFID systems		
Effective radiated power	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.5	N/A
GBSAR systems		
Effective radiated power	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.6.1	N/A
Permitted range of operating frequencies	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.6.2	N/A
DAA threshold	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.6.3	N/A
Antenna pattern	ETSI EN 300 440 V2.2.1 (2018-07)) Sub-clause 4.6.4	N/A

Remark: The measurement uncertainty is not included in the test result.



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 Tongzhou Testing 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 Tongzhou Testing Co.,Ltd is reported:

Test Items	Measurement Uncertainty	Notes
Frequency error	25 Hz	(1)
Frequency range	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Adjacent and alternate channel power Conducted	1.20 dB	(1)
Conducted spurious emission	1.60 dB	(1)
Radiated spurious emission	2.20 dB	(1)
Intermodulation attenuation	1.00 dB	(1)
Maximum useable receiver sensitivity	2.80 dB	(1)
Co-channel rejection	2.80 dB	(1)
Adjacent channel selectivity	2.80 dB	(1)
Spurious response rejection	2.80 dB	(1)
Intermodulation response rejection	2.80 dB	(1)
Blocking or desensitization	2.80 dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.



3.5 Equipments Used during the Test

Conducted Method						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	MXA Signal Analyzer	Keysight	N9020A	MY52091623	2021/1/4	2022/1/3
2	Signal Generator	Keysight	N5182A	MY4620709	2021/1/4	2022/1/3
3	Signal Generator	R&S	SML03	102924/0013	2021/1/4	2022/1/3
4	Power Sensor	Agilent	U2021XA	MY5365004	2021/1/4	2022/1/3
5	Power Meter	Agilent	U2531A	TW53323507	2021/1/4	2022/1/3
6	Climate Chamber	KRUOMR	KRM-1000	KRM16072901	2021/1/4	2022/1/3
7	Wideband Radio Communication Tester	R&S	CMW500	101855	2021/1/4	2022/1/3
8	Test Software	Tonscend	JS1120-3	V2.5.77.0418	--	--

Radiated Method						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Wideband Antenna	schwarzbeck	VULB 9163	958	2019/11/16	2022/11/15
2	Horn Antenna	schwarzbeck	9120D-1141	1574	2019/11/16	2022/11/15
3	EMI Test Receiver	R&S	ESCI	100849/003	2021/1/4	2022/1/3
4	Controller	MF	MF7802	N/A	N/A	N/A
5	Amplifier	schwarzbeck	BBV 9743	209	2021/1/4	2022/1/3
6	Amplifier	Tonscend	TSAMP-0518SE	--	2021/1/4	2022/1/3
7	RF Cable	HUBER+SUHNER	RG214	N/A	2021/1/4	2022/1/3
8	MXA Signal Analyzer	Keysight	N9020A	MY52091623	2021/1/4	2022/1/3
9	Horn Antenna	ETS	3117	00218874	2019/11/16	2022/11/15
10	Wideband Antenna	Sunol	JB3	A020115	2019/1/16	2022/1/15
11	Test Software	Tonscend	JS36-RSE	V1.0.2.0	--	--

4 TEST CONDITIONS AND RESULTS

4.1 Transmitter Requirements

4.1.1 Effective Radiated Power (radiated measurement)

APPLICABILITY

The equivalent isotropically radiated power requirement shall apply to all transmitters.

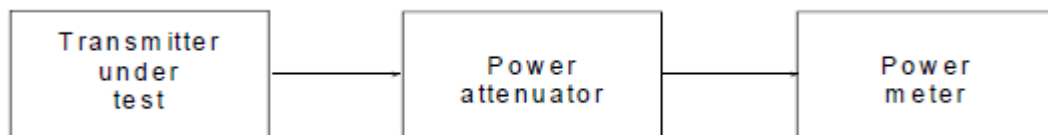
LIMIT

The transmitter maximum e.i.r.p. under normal and extreme test conditions is provided 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

☐ 4.2.2.3.1 Non spread spectrum transmitters with a -6 dB bandwidth of up to 20 MHz and spread spectrum transmitters with channel bandwidth of up to 1 MHz

☒ 4.2.2.3.2 Transmitters other than those defined in clause 4.2.2.3.1

TEST RESULTS

Pass



5733MHz			
Test Condition	EIRP	EIRP	Limit
	(dBm)	(mW)	(mW)
NTC	11.94	15.64	25
HTLV	11.89	15.44	25
HTHV	11.52	14.18	25
LTLV	11.99	15.80	25
LTHV	11.86	15.34	25

5800MHz			
Test Condition	EIRP	EIRP	Limit
	(dBm)	(mW)	(mW)
NTC	11.93	15.59	25
HTLV	11.58	14.38	25
HTHV	11.63	14.57	25
LTLV	11.74	14.91	25
LTHV	11.97	15.73	25

5866MHz			
Test Condition	EIRP	EIRP	Limit
	(dBm)	(mW)	(mW)
NTC	11.90	15.49	25
HTLV	11.70	14.78	25
HTHV	11.52	14.18	25
LTLV	11.86	15.36	25
LTHV	11.82	15.21	25

4.1.2 Permitted range of operating frequencies

APPLICABILITY

The Permitted range of operating frequencies shall apply to all transmitters.

LIMIT

According to ETSI EN 300 440 V2.2.1 (2018-07) 4.2.3.5

The width of the power spectrum envelope is $f_H - f_L$ for a given operating frequency. In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allowed band. The frequency range is determined by the lowest value of f_L and the highest value of f_H resulting from the adjustment of the equipment to the lowest and highest operating frequencies.

The occupied bandwidth (i.e. the bandwidth in which 99 % of the wanted emission is contained) of the transmitter shall fall within the assigned frequency band.

For all equipment the frequency range shall lie within the frequency band given by clause 4.2.2.4, table 2. For non-harmonized frequency bands the available frequency range may differ between national administrations.

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

☐ 4.2.2.3.1 Non spread spectrum transmitters with a -6 dB bandwidth of up to 20 MHz and spread spectrum transmitters with channel bandwidth of up to 1 MHz

☒ 4.2.2.3.2 Transmitters other than those defined in clause 4.2.2.3.1

**RESULTS**

5733 MHz				
Test Condition	Lower (MHz)	Highest (MHz)	Limit (MHz)	Result
NTC	5730.70	5736.58	(5725,5875)	
HTLV	5730.75	5736.56	(5725,5875)	Pass
HTHV	5730.72	5736.53	(5725,5875)	Pass
LTLV	5730.68	5736.60	(5725,5875)	Pass
LTHV	5730.70	5736.54	(5725,5875)	Pass

5800 MHz				
Test Condition	Lower (MHz)	Highest (MHz)	Limit (MHz)	Result
NTC	5797.84	5803.18	(5725,5875)	
HTLV	5797.89	5803.18	(5725,5876)	Pass
HTHV	5797.86	5803.18	(5725,5877)	Pass
LTLV	5797.87	5803.18	(5725,5878)	Pass
LTHV	5797.80	5803.23	(5725,5879)	Pass

5866 MHz				
Test Condition	Lower (MHz)	Highest (MHz)	Limit (MHz)	Result
NTC	5863.86	5869.94	(5725,5875)	
HTLV	5863.85	5869.97	(5725,5875)	Pass
HTHV	5863.91	5869.96	(5725,5875)	Pass
LTLV	5863.90	5869.95	(5725,5875)	Pass
LTHV	5863.87	5869.92	(5725,5875)	Pass

4.1.3 Unwanted emissions in the spurious domain

APPLICABILITY

The unwanted emissions in the spurious domain requirement shall apply to all transmitters.

LIMIT

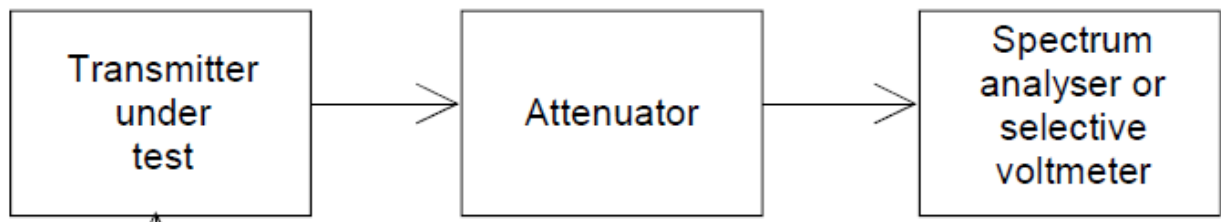
The maximum power limits of any unwanted emissions in the spurious domain are given in table 3.

Table 3: Spurious emissions

Frequency ranges	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies $\leq 1\,000$ MHz	Frequencies $> 1\,000$ MHz
State			
Operating	4 nW	250 nW	1 μ W
Standby	2 nW	2 nW	20 nW

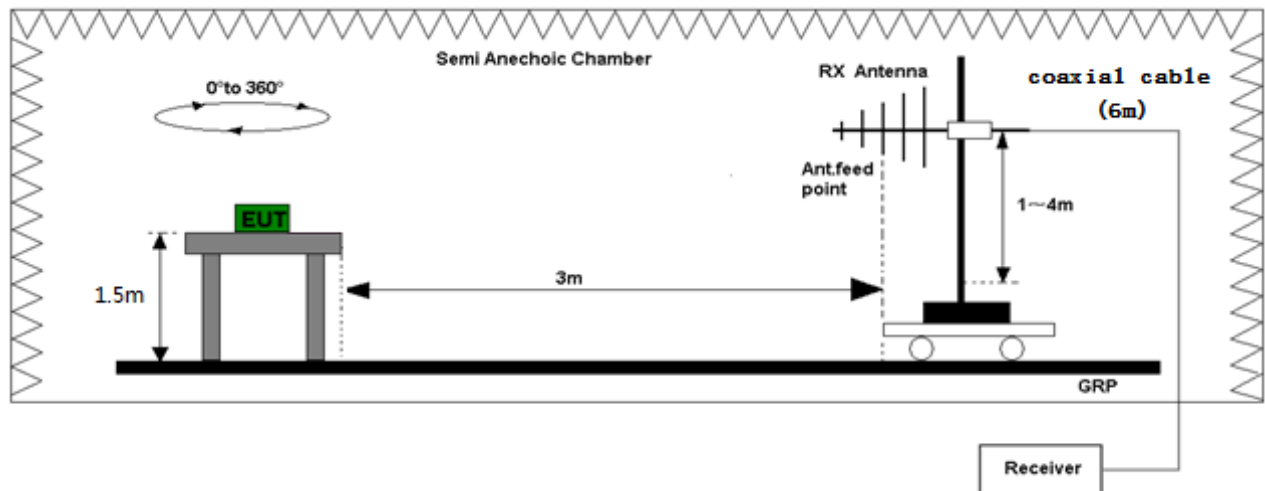
TEST CONFIGURATION

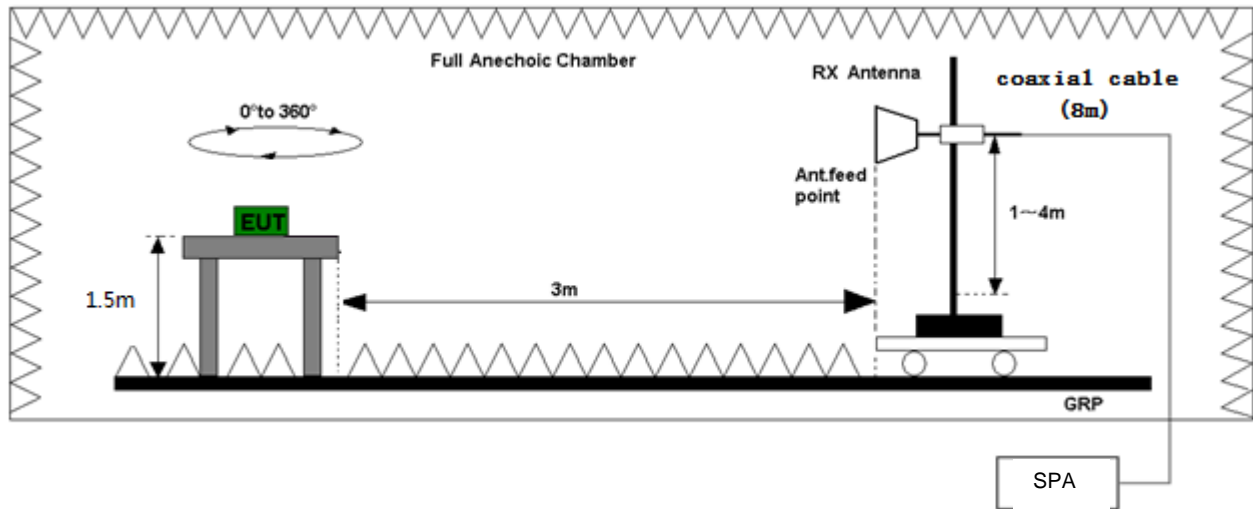
Conducted Method:



Radiated Method:

Below 1GHz



**Above 1GHz****Conformance**

- ☐ 4.2.4.3.1 Conducted spurious emission
- ☐ 4.2.4.3.2 Method of measurement - cabinet spurious radiation
- ☒ 4.2.4.3.3 Method of measurement - radiated spurious emission

TEST RESULTS

Temperature:	22.8° C
Humidity:	56%
Test Engineer:	Tony Luo

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit (dBm)	Margin (dB)	Conclusion
Below 1GHz:					
764.87	V	-59.84	-36	23.84	764.87
772.53	H	-59.85	-36	23.85	772.53
Above 1GHz:					
Test Mode: Low Channel					
11465.2	H	-40.18	-30	10.18	PASS
11465.5	V	-40.42	-30	10.42	PASS
17196.9	H	-40.57	-30	10.57	PASS
17200.9	V	-43.36	-30	13.36	PASS
22932	H	-47.98	-30	17.98	PASS
22934.7	V	-41.39	-30	11.39	PASS
Test Mode: High Channel					
11729.5	H	-44.14	-30	14.14	PASS
11728.9	V	-42.87	-30	12.87	PASS
17600.7	H	-47.27	-30	17.27	PASS
17599.9	V	-44.46	-30	14.46	PASS
23462	H	-47.34	-30	17.34	PASS
23465.5	V	-48.92	-30	18.92	PASS
Note:					
1. Cable loss and antenna gain was combined in the calculated result.					
2. No record for margin above 20dB.					

4.1.4 Duty Cycle

APPLICABILITY

Duty Cycle (DC) shall apply to all transmitting equipment except those which utilize Listen Before Talk (LBT) clause 4.4.2, or Detect And Avoid (DAA), clause 4.4.3. RFID transmitters operating in the 2 446 MHz to 2 454 MHz frequency band that transmit at a maximum radiated peak power level of less than 500 mW e.i.r.p. are also excluded.

LIMIT

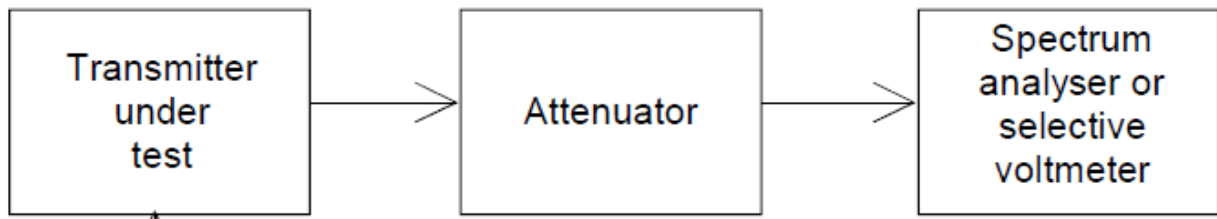
Table 4 defines the maximum duty cycle within a 1 hour period.

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	

For devices with a 100 % duty cycle transmitting an unmodulated carrier most of the time, a time-out shut-off facility shall be implemented in order to improve the efficient use of spectrum. The method of implementation shall be declared by the manufacturer.

TEST CONFIGURATION



TEST PROCEDURE

☐ 4.2.5.3 Method of measurement



TEST RESULTS

N/A, EUT work in 5725 MHz to 5825 MHz.

4.1.5 Additional requirements for FHSS equipment

APPLICABILITY

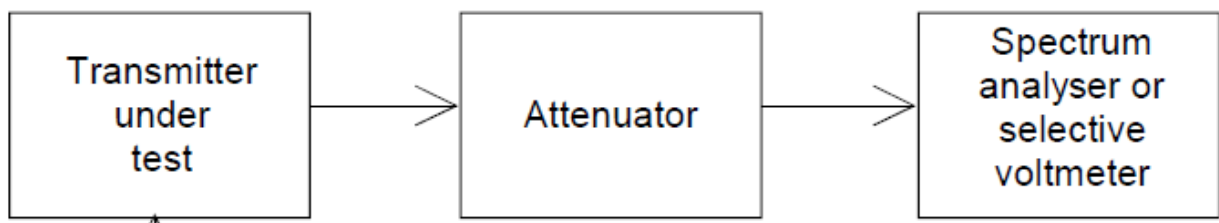
The requirements in this clause apply only to equipment using FHSS modulation.

LIMIT

FHSS modulation shall make use of at least 20 channels hopping over > 90 % of the assigned frequency band.

The dwell time per channel shall not exceed 1 s. While the equipment is operating (transmitting and/or receiving) each channel of the hopping sequence shall be occupied at least once during a period not exceeding four times the product of the dwell time per hop and the number of channels.

TEST CONFIGURATION



Conformance

Hopping Channels:

- 1) Set SPA as follow:
Start frequency: MHz, stop frequency: MHz, RBW = 1 MHz, VBW = 3 MHz, Trace = Max Hold, Detector = Peak, Sweep Time = Auto.
- 2) Set EUT work in a condition which every channel can work, Count the channels(TX_{on}) and record as C_c .

Dwell Time:

Step 1:

- 1) Set SPA as follow:
Center frequency = working frequency, sweep time = 1 S.
- 2) Set EUT work in the specific frequency, and record the TX_{on} (one pluse) time as C_d .

Step 2(only for FHSS):

- 1) Set SPA as follow: center frequency = evaluate frequency, sweep time = $4 \cdot C_c \cdot C_d$
- 2) Count the times of TX_{on} .

TEST RESULTS

N/A, EUT is not a FHSS Device

5 Test Setup Photos of the EUT





6 External and Internal Photos of the EUT

Reference to the test report No. TZ210902557-RE

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