



## TEST REPORT

Product Name: Intelligent person  
Trademark: MMC  
Model Number: L1  
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Sample Received Date: May. 07, 2025  
Sample tested Date: May. 07, 2025 to Jun. 04, 2025  
Issue Date: Jun. 04, 2025  
Report No.: CTB25050708703RF04  
Test Standards: ETSI EN 300 440 V2.2.1 (2018-07)  
Test Results: PASS  
Remark: This is 5.8G radio test report.

Compiled by:

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Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "\*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

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(NOTE: N/A MEANS NOT APPLICABLE)

## 1. VERSION

Report No.	Issue Date	Description	Approved
CTB25050708703RF04	Jun. 04, 2025	Original	Valid



## 2. TEST SUMMARY

The Product has been tested according to the following specifications:

Standard	EN 300 440 V2.2.0		
Test Item	Test Requirement	Test Method	Results
Transmitter Parameters			
Transmitter measurement requirements	Clause 4.2.1		
Equivalent isotropically radiated power (e.i.r.p.)	Clause 4.2.2	Clauses 4.2.2.3.1 and 4.2.2.3.2.	PASS
Permitted range of operating frequencies	Clause 4.2.3	Clauses 4.2.3.4.	PASS
Unwanted emissions in the Spurious domain	Clause 4.2.4	Clauses 4.2.4.3	PASS
Duty Cycle	Clause 4.2.5	Clauses 4.2.5.3	PASS
Additional requirements for FHSS equipment	Clause 4.2.6	Clauses 4.2.6.3	N/A
Receiver Parameters			
Receiver category	Clause 4.3.1		
Adjacent channel selectivity	Clause 4.3.3	Clause 4.3.3.3	N/A
Blocking or desensitization	Clause 4.3.4	Clause 4.3.4.3	N/A
Spurious radiations	Clause 4.3.5	Clause 4.3.5.3	PASS
Remark: Note: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device. Tx: In this whole report Tx (or tx) means Transmitter. Rx: In this whole report Rx (or rx) means Receiver. RF: In this whole report RF means Radiated Frequency. CH: In this whole report CH means channel.			

### 3. MEASUREMENT UNCERTAINTY

Where relevant, the measurement uncertainty figures shall be calculated and shall correspond to an expansion factor (coverage factor)  $k = 1,96$  or  $k = 2$  (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Principles for the calculation of measurement uncertainty are contained in ETSI TR 100 028 [i.4], in particular in annex D of the ETSI TR 100 028-2 [i.4].

Item	Uncertainty
Occupancy bandwidth	54.3kHz
Conducted output power Above 1G	0.9dB
Conducted output power below 1G	0.9dB
Power Spectral Density , Conduction	0.9dB
Conduction spurious emissions	2.0dB
Out of band emission	2.0dB
3m chamber Radiated spurious emission(30MHz-1GHz)	4.6dB
3m chamber Radiated spurious emission(1GHz-18GHz)	5.1dB
3m chamber Radiated spurious emission(18GHz-40GHz)	3.4dB
Receiver Reference Sensitivity level	1.9dB
humidity uncertainty	5.5%
Temperature uncertainty	0.63°C
frequency	$1 \times 10^{-7}$

#### 4. PRODUCT INFORMATION AND TEST SETUP

##### 4.1 Product Information

Model(s):	L1
Model Description:	N/A
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	IEEE 802.11a/n/ac/ax(20M): 5725MHz ~5850MHz/ 5 channel IEEE 802.11n/ac/ax(40M): 5725MHz ~5850MHz/ 2 channel IEEE 802.11ac/ax(80M): 5725MHz ~5850MHz/ 1 channel
Max. RF output power:	WiFi (5.8G): 11.71dBm
Type of Modulation:	WiFi (5.8G): OFDM, OFDMA
Antenna installation:	WiFi (5.8G): Internal antenna
Antenna Gain:	WiFi (5.8G): ANT1: 1.0dBi, ANT2: 1.0dBi
Ratings:	DC 5V charging from adapter DC 16.4V by battery

##### 4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

##### 4.3 Support Equipment

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1	Adapter	JIYIN	JY-05100C	/	AE

##### Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



#### 4.4 Channel List

For 802.11a/n/ac( 20M)/ax( 20M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz	NA	NA

For 802.11n/ac(40M)/ax(40M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

For 802.11ac(80M)/ax(80M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
155	5775MHz	NA	NA

#### 4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
802.11a/n/ac/ax( 20M)	5725MHz ~5850 MHz	Channel 149	Channel 157	Channel 165
	5725MHz ~5850 MHz	5745MHz	5785MHz	5825MHz
802.11n/ac/ax(40M)	5725MHz ~5850 MHz	Channel 151	N/A	Channel 159
	5725MHz ~5850 MHz	5755MHz	N/A	5795MHz
		N/A	5775MHz	N/A
802.11ac/ax(80M)	5725MHz ~5850 MHz	N/A	Channel 155	N/A
		N/A	5775MHz	N/A

#### 4.6 Test Environment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(DC)(V):	16.4
Low Voltage(DC)(V):	14.76
High Voltage(DC)(V):	18.04
Normal Temperature(°C) :	23
Low Temperature(°C) :	-20
High Temperature(°C) :	55

Note:

- The temperature range as declared by the manufacturer; or one of the following specified temperature ranges:
  - Temperature category I (General): -20 °C to +55 °C;
  - Temperature category II (Portable): -10 °C to +55 °C;
  - Temperature category III (Equipment for normal indoor use): 5 °C to +35 °C.
- When the radio equipment is intended for operation with the usual types of battery power source, the normal test voltage shall be 1,1 multiplied by the nominal voltage of the battery

(3) When the radio equipment is intended for operation from the usual type of battery power sources the extreme test voltages shall be 1,3 and 0,9 multiplied by the nominal voltage of the battery

**Table 5: Receiver categories**

Receiver category	Relevant receiver clauses	Risk assessment of receiver performance
1	4.3.3, 4.3.4 and 4.3.5	Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person).
2	4.3.4 and 4.3.5	Medium reliable SRD communication media e.g. causing inconvenience to persons, which cannot simply be overcome by other means.
3	4.3.5	Standard reliable SRD communication media e.g. Inconvenience to persons, which can simply be overcome by other means (e.g. manual).



## 5. TEST FACILITY AND TEST INSTRUMENT USED

### 5.1 Test Facility

All measurement facilities used to collect the measurement data are located at 1&2F., Building A, No. 26, Xinhua Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

### 5.2 Test Instrument Used

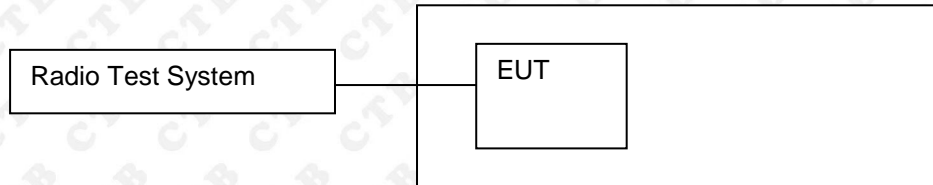
RF conduction and Radiation Test equipment

No.	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	A.14.16	2025/6/28
2	Power Sensor	Agilent	U2021XA	MY56120032	/	2025/6/28
3	Power Sensor	Agilent	U2021XA	MY56120034	/	2025/6/28
4	Communication test set	R&S	CMW500	108058	V3.5.80	2025/6/28
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2025/6/28
6	Signal Generator	Agilent	N5181A	MY50140365	A.01.60	2025/6/28
7	Vector signal generator	Agilent	N5182A	MY47420195	A.01.87	2025/6/28
8	Communication test set	Agilent	E5515C	MY50102567	B.19.07 (E1962B)	2025/6/28
9	2.4 GHz Filter	Shenxiang	MSF2400-24 83.5MS-1154	20181015001	/	2025/6/30
10	5 GHz Filter	Shenxiang	MSF5150-58 50MS-1155	20181015001	/	2025/6/30
11	Filter	Xingbo	XBLBQ-DZA 120	190821-1-1	/	2025/6/30
12	BT&WI-FI Automatic test software	Microwave	MTS8310	Ver. 2.0.0.0	/	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	/	2025/6/28
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	/	2025/6/28
15	234G Automatic test software	Microwave	MTS8200	Ver. 2.0.0.0	/	/
16	966 chamber	C.R.T.	966	/	/	2027/6/21
17	Receiver	R&S	ESPI	100362	RF_ATTEN_7 (104489/003)	2025/6/28
18	Amplifier	HP	8447E	2945A02747	/	2025/6/28
19	Amplifier	Agilent	8449B	3008A01838	/	2025/6/28
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	/	2025/6/28
21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	/	2025/6/28

22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2025/6/28
24	loop antenna	ZHINAN	ZN30900A	GTS534	/	/
25	40G Horn antenna	A/H/System	SAS-574	588	/	2025/6/28
26	Amplifier	AEROFLEX	Aeroflex	097	/	2025/6/28
27	Power Metter	KEYSIGHT	N1912AP	N/A	A.05.00	2025/6/28

## 6. EQUIVALENT ISOTROPICALLY RADIATED POWER (E.I.R.P.)

### 6.1 Block Diagram Of Test Setup



### 6.2 Limit

**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
24,0 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and Radio determination devices	

### 6.3 Test procedure

#### Step 1:

- using a suitable means, the output of the transmitter shall be coupled to a matched diode detector;
- the output of the diode detector shall be connected to the vertical channel of an oscilloscope;
- the combination of the diode detector and the oscilloscope shall be capable of faithfully reproducing the envelope peaks and the duty cycle of the transmitter output signal;
- the observed duty cycle of the transmitter (Tx on/(Tx on + Tx off)) shall be noted as x, ( $0 < x < 1$ ) and recorded.

#### Step 2:

- the average output power of the transmitter shall be determined using a wideband, calibrated RF power meter with a matched thermocouple detector or an equivalent thereof and, where applicable, with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The observed value shall be recorded as "A" (in dBm);
- the e.i.r.p. shall be calculated from the above measured power output A, the observed duty cycle x, and the applicable antenna assembly gain "G" in dBi, according to the formula:

$$- P = A + G + 10 \log (1/x);$$



#### 6.4 Test Result

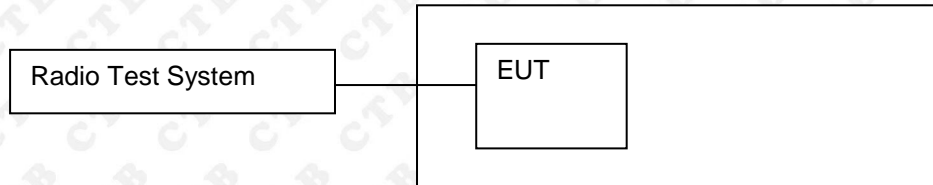
ANT1+ANT2:

Modulation	Test conditions (Temperature)	Antenna	Low Channel		Middle Channel		High Channel	
			EIRP	Total EIRP	EIRP	Total EIRP	EIRP	Total EIRP
802.11a	NVNT	ANT1	8.42	/	7.34	/	7.96	/
		ANT2	8.51		7.94		8.65	
	NVLT	ANT1	8.34	/	7.02	/	7.57	/
		ANT2	8.01		7.63		8.66	
	NVHT	ANT1	8.47	/	6.98	/	7.85	/
		ANT2	8.59		7.91		8.73	
802.11(ac20)	NVNT	ANT1	8.3	11.06	7.22	10.40	7.8	10.87
		ANT2	7.78		7.55		7.92	
	NVLT	ANT1	8.18	10.90	7.14	10.35	7.74	10.78
		ANT2	7.59		7.54		7.80	
	NVHT	ANT1	8.28	11.01	7.20	10.37	7.77	10.76
		ANT2	7.70		7.52		7.74	
802.11(ax20)	NVNT	ANT1	8.57	11.38	7.56	10.54	8.11	11.56
		ANT2	8.15		7.5		8.95	
	NVLT	ANT1	8.56	11.35	7.56	10.45	7.88	11.44
		ANT2	8.11		7.32		8.91	
	NVHT	ANT1	8.44	11.29	7.47	10.40	7.91	11.46
		ANT2	8.12		7.31		8.93	
802.11(n20)	NVNT	ANT1	8.23	11.38	7.26	10.22	7.91	11.08
		ANT2	8.51		7.16		8.23	
	NVLT	ANT1	8.06	11.24	7.25	10.20	7.70	10.97
		ANT2	8.39		7.13		8.20	
	NVHT	ANT1	8.18	11.36	7.06	10.09	7.74	10.98
		ANT2	8.51		7.10		8.18	
802.11(n40)	NVNT	ANT1	8	11.18	/	/	8.33	10.86
		ANT2	8.34		/		7.32	
	NVLT	ANT1	7.71	11.03	/	/	8.32	10.80
		ANT2	8.31		/		7.18	
	NVHT	ANT1	7.82	11.05	/	/	8.32	10.83
		ANT2	8.26		/		7.25	
802.11(ac40)	NVNT	ANT1	7.97	10.90	/	/	7.29	10.28
		ANT2	7.8		/		7.25	
	NVLT	ANT1	7.72	10.75	/	/	7.15	10.12
		ANT2	7.75		/		7.07	
	NVHT	ANT1	7.75	10.65	/	/	7.22	10.21
		ANT2	7.51		/		7.17	
802.11(ac80)	NVNT	ANT1	8.83	11.71	/	/	/	/
		ANT2	8.57		/		/	
	NVLT	ANT1	8.80	11.64	/	/	/	/
		ANT2	8.46		/		/	
	NVHT	ANT1	8.71	11.61	/	/	/	/
		ANT2	8.48		/		/	

802.11( ax40)	NVNT	ANT1	8.19	11.10	/	/	7.35	10.36
		ANT2	7.99				7.34	
	NVLT	ANT1	8.08	10.96	/	/	7.34	10.34
		ANT2	7.83				7.32	
	NVHT	ANT1	8.05	10.94	/	/	7.09	10.17
		ANT2	7.80				7.22	
802.11( ax80)	NVNT	ANT1	7.45	11.16	/	/	/	/
		ANT2	8.76				/	/
	NVLT	ANT1	7.30	11.06	/	/	/	/
		ANT2	8.69				/	/
	NVHT	ANT1	7.27	10.99	/	/	/	/
		ANT2	8.59				/	/
Limit			≤25mW (14dBm)					
Remark: P = A + G + Y,ANT1 G=1.0dBi, ANT2 G=1.0dBi, x=100%								

## 7. PERMITTED RANGE OF OPERATING FREQUENCIES

### 7.1 Block Diagram Of Test Setup



### 7.2 Limit

5725MHz to 5825MHz

### 7.3 Test procedure

- put the spectrum analyser in video averaging mode with a minimum of 50 sweeps selected;
- select the lowest operating frequency of the equipment under test and activate the transmitter with modulation applied. The RF emission of the equipment shall be displayed on the spectrum analyser;
- using the marker of the spectrum analyser, find the lowest frequency below the operating frequency at which the spectral power density drops below the level given in clause 4.2.3. This frequency shall be recorded in the test report;
- select the highest operating frequency of the equipment under test and find the highest frequency at which the spectral power density drops below the value given in clause 4.2.3. This frequency shall be recorded in the test report;
- the difference between the frequencies measured in steps c) and d) is the operating frequency range. It shall be recorded in the test report.

This measurement shall be repeated for each frequency range declared by the manufacturer.



## 7.4 Test Result

5.8G\_5725MHz-5850MHz

ANT 1:

Test Conditions	Frequencies (MHz) at -30dBm/30kHz (EIRP)	
	Lowest Frequency (fL)	Highest Frequency (fH)
Normal	5724.062	5850.027
LTLV	5724.714	5850.108
LTHV	5724.254	5850.071
HTHV	5724.040	5850.718
HTLV	5724.625	5850.538

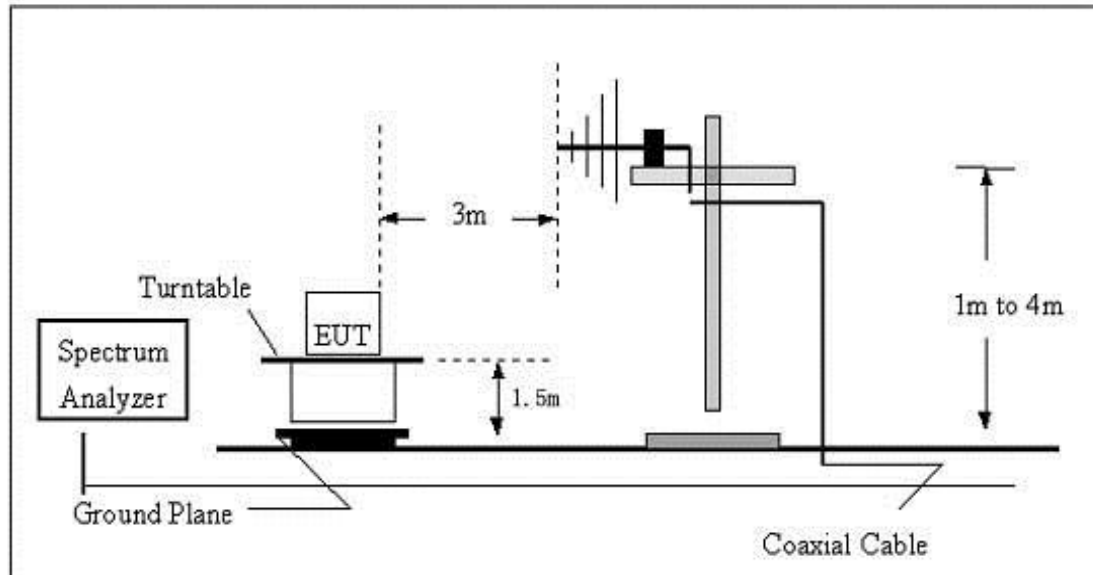
ANT 2:

Test Conditions	Frequencies (MHz) at -30dBm/30kHz (EIRP)	
	Lowest Frequency (fL)	Highest Frequency (fH)
Normal	5724.860	5850.476
LTLV	5724.726	5850.018
LTHV	5724.306	5850.833
HTHV	5724.047	5850.392
HTLV	5724.449	5850.587

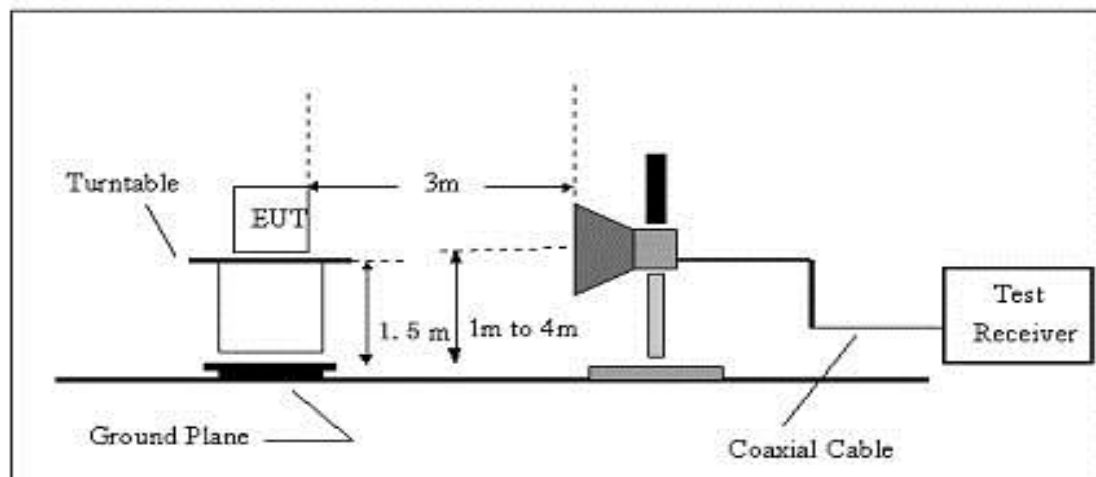
## 8. UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

### 8.1 Block Diagram Of Test Setup

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



## 8.2 Limits

**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 ≤ 1 000 MHz	Frequencies > 1 000 MHz
State			
Operating	4 nW	250 nW	1 μW
Standby	2 nW	2 nW	20 nW

## 8.3 Test Procedure

### 30MHz ~ 1GHz:

- The Product was placed on the nonconductive turntable 1.5m above the ground in a full anechoic chamber.
- Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

### Above 1GHz:

- The Product was placed on the non-conductive turntable 1.5 m above the ground in a full anechoic chamber..
- Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.



## 8.4 Test Results

Remark: This Report only show the test plots of the ANT1+ANT2 worst case.  
The worse test 802.11n(HT20) Low channel

Tx in operation mode					
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result	
	polarization	Level(dBm)			
48.80	Vertical	-70.24	-54.00	Pass	
130.10	V	-72.09	-36.00		
188.80	V	-75.22	-54.00		
389.56	V	-76.61	-36.00		
510.45	V	-73.90	-54.00		
678.72	V	-56.49	-54.00		
956.45	V	-52.24	-36.00		
1740.04	V	-40.56	-30.00		
2425.02	V	-44.11	-30.00		
3294.58	V	-43.22	-30.00		
134.43	Horizontal	-70.47	-36.00		
217.67	H	-71.40	-54.00		
359.40	H	-72.87	-36.00		
485.82	H	-72.96	-54.00		
694.21	H	-72.57	-54.00		
870.21	H	-48.08	-36.00		
1738.78	H	-42.96	-30.00		
2426.11	H	-42.23	-30.00		
3294.10	H	-46.45	-30.00		
Tx in standby Mode					
N/A: Not applicable, since the spurious emission of the EUT is too weak to be detected.(≤-80dBm)					

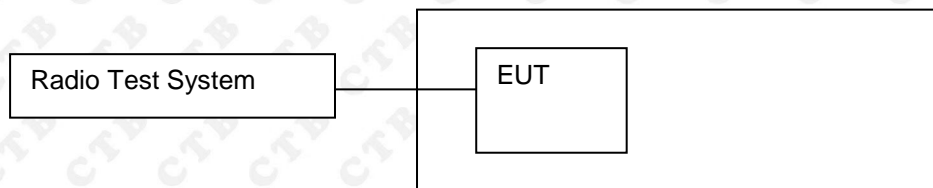
802.11n(HT20) High channel

Tx in operation mode				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
50.43	Vertical	-70.35	-54.00	Pass
127.91	V	-72.94	-36.00	
189.45	V	-75.20	-54.00	
388.83	V	-76.32	-36.00	
509.58	V	-74.03	-54.00	
676.89	V	-57.02	-54.00	
955.88	V	-52.10	-36.00	
1737.93	V	-40.73	-30.00	
2423.25	V	-43.65	-30.00	
3294.71	V	-42.79	-30.00	
133.20	Horizontal	-69.95	-36.00	
216.76	H	-71.77	-54.00	
359.50	H	-72.65	-36.00	
487.07	H	-73.61	-54.00	
694.15	H	-72.54	-54.00	
870.29	H	-47.90	-36.00	
1739.09	H	-43.07	-30.00	
2424.26	H	-42.40	-30.00	
3292.82	H	-46.47	-30.00	
Tx in standby Mode				
N/A: Not applicable, since the spurious emission of the EUT is too weak to be detected.(≤-80dBm)				

Remark: This Report only show the test plots of the ANT0 worst case.

## 9. DUTY CYCLE

### 9.1 Block Diagram Of Test Setup



### 9.2 Limit

**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	

### 9.3 Test procedure

An assessment of the overall Duty Cycle shall be made for a representative period of Tobs over the observation bandwidth Fobs. Unless otherwise specified, Tobs is 1 hour and the observation bandwidth Fobs is the operational frequency band.

The representative period shall be the most active one in normal use of the device. As a guide "Normal use" is considered as representing the behaviour of the device during transmission of 99 % of the [emissions] generated during its operational lifetime.

Procedures such setup, commissioning, and maintenance are not considered part of normal operation.

For manual operated or event dependant devices, with or without software controlled functions, the manufacturer shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmitter remains on until the trigger is released or the device is manually reset. The manufacturer shall also give a description of the application



for the device and include a typical usage pattern. The typical usage pattern as declared by the manufacturer shall be used to determine the duty cycle and compare to the limit in table 4.

Where an acknowledgement is required, the additional transmitter on-time shall be included and declared by the manufacturer.

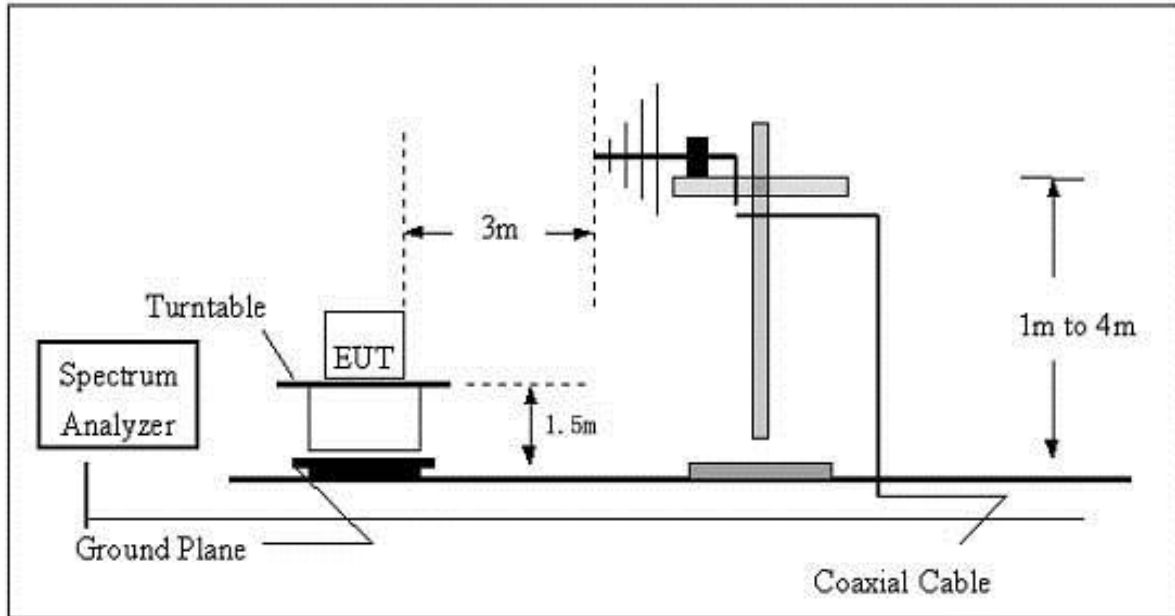
#### 9.4 Test Result

For generic use devices operating at frequency range 5725-5825MHz, according to Final draft ETSI EN 300 440 V2.2.1 (2018-05), the duty cycle is no restriction.

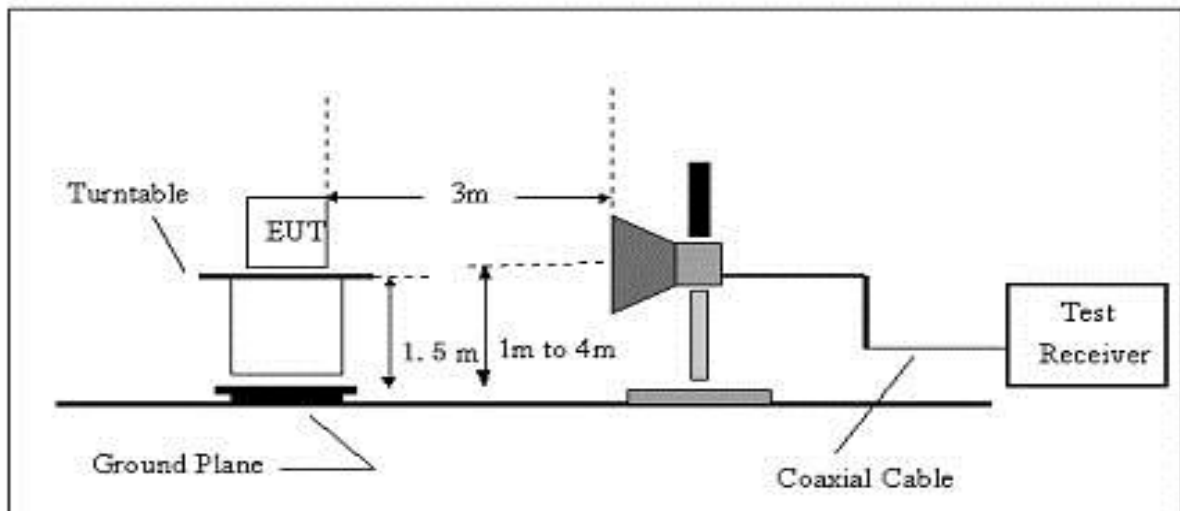
## 10. SPURIOUS EMISSIONS

### 10.1 Block Diagram Of Test Setup

#### (A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



#### (B) Radiated Emission Test Set-Up Frequency Above 1 GHz



## 10.2 Limits

According to the Final draft ETSI EN 300 440 V2.2.1 (2018-05) Section 4.3.5.4, 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.

## 10.3 Test Procedure

### **30MHz ~ 1GHz:**

- a. The Product was placed on the nonconductive turntable 1.5m above the ground in a full anechoic chamber.
- b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

### **Above 1GHz:**

- a. The Product was placed on the non-conductive turntable 1.5 m above the ground in a full anechoic chamber..
- b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.



#### 10.4 Test Results

Remark: This Report only show the test plots of the ANT1+ANT2 worst case.

The worse test 802.11n(HT20) Low channel

Rx in operation mode				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
51.02	Vertical	-69.99	-57.00	Pass
128.13	V	-70.36	-57.00	
190.55	V	-70.61	-57.00	
389.93	V	-69.11	-57.00	
508.45	V	-69.64	-57.00	
679.06	V	-68.83	-57.00	
956.13	V	-68.10	-57.00	
1739.47	V	-66.85	-47.00	
2423.97	V	-67.69	-47.00	
3293.20	V	-66.83	-47.00	
133.81	Horizontal	-69.67	-57.00	
217.95	H	-68.86	-57.00	
360.95	H	-68.72	-57.00	
485.83	H	-68.90	-57.00	
692.25	H	-67.94	-57.00	
870.67	H	-68.76	-57.00	
1738.78	H	-67.97	-47.00	
2423.98	H	-67.96	-47.00	
3292.68	H	-67.65	-47.00	
Rx in standby Mode				
N/A: Not applicable, since the spurious emission of the EUT is too weak to be detected.(≤-80dBm)				

802.11n(HT20) High channel

Rx in operation mode					
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result	
	polarization	Level(dBm)			
50.80	Vertical	-70.22	-57.00	Pass	
130.84	V	-70.08	-57.00		
190.70	V	-70.59	-57.00		
388.63	V	-69.18	-57.00		
509.89	V	-69.72	-57.00		
677.08	V	-68.57	-57.00		
956.92	V	-67.73	-57.00		
1738.70	V	-66.63	-47.00		
2423.38	V	-67.77	-47.00		
3293.21	V	-67.43	-47.00		
132.80	Horizontal	-69.43	-57.00		
215.46	H	-69.02	-57.00		
358.47	H	-68.85	-57.00		
485.53	H	-68.65	-57.00		
693.17	H	-67.95	-57.00		
869.63	H	-68.18	-57.00		
1739.01	H	-67.25	-47.00		
2426.86	H	-68.01	-47.00		
3292.04	H	-68.10	-47.00		
Rx in standby Mode					
N/A: Not applicable, since the spurious emission of the EUT is too weak to be detected.(≤-80dBm)					

Remark: This Report only show the test plots of the ANT0 worst case.

## 11. ADJACENT CHANNEL SELECTIVITY

### 11.1 Applicability

This requirement applies to Equipment Category 1 receivers, when invoked, as defined in EN 300440 V2.2.0 clause 4.3.1.

### 11.2 LIMITS

The adjacent channel selectivity of the equipment under specified conditions shall not be less than  $-30 \text{ dBm} + k$ .

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:

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

The measured adjacent channel selectivity shall be stated in the test report.

### 11.3 Methods of measurement

This measurement shall be conducted under normal conditions.

Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:

- a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna; or
- b) directly to the receiver permanent or temporary antenna connector.

The method of coupling to the receiver shall be stated in the test report.

Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal.

Signal generator B shall be unmodulated and shall be adjusted to the adjacent channel centre frequency immediately above that of the wanted signal.

Initially signal generator B shall be switched off and using signal generator A the level that still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB.

Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.

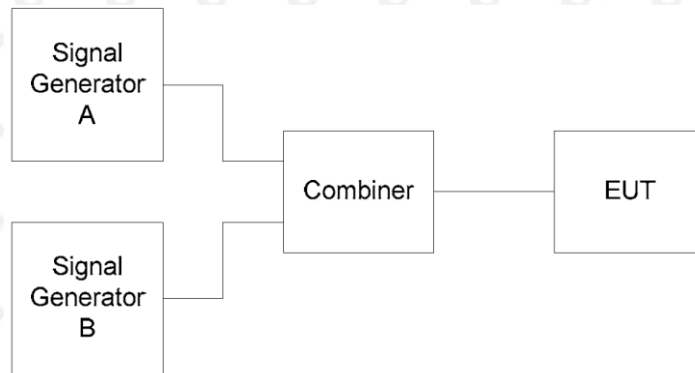
The measurements shall be repeated with signal generator B unmodulated and adjusted to the adjacent channel centre immediately below the wanted signal.

The adjacent channel selectivity shall be recorded for the upper and lower adjacent channels as the level in dBm of the unwanted signal.

For tagging systems (e.g. RF identification, anti-theft, access control, location and similar systems) signal generator A may be replaced by a physical tag positioned at 70 % of the measured system range in metres. In this case, the blocking or desensitization shall be recorded as the ratio in dB of lowest level of the unwanted signal (generator B) resulting in a non-read of the tag, to the declared sensitivity of the receiver +3 dB.



## 11.4 Test Setup Layout



## 11.5 TEST RESULTS

ANT1:

Model	Frequency A (MHz)	Test Frequency B (MHz)	The Result (dBm)	Limit (dBm)	Measured
802.11a	5745	5725	-46.57	-50.82	Pass
		5765	-47.26	-50.82	Pass
	5825	5805	-56.90	-58.32	Pass
		5845	-46.40	-58.32	Pass
802.11 n20	5745	5725	-47.41	-58.20	Pass
		5765	-46.10	-58.20	Pass
	5825	5802	-46.51	-58.32	Pass
		5845	-46.01	-58.32	Pass
802.11 n40	5755	5715	-46.74	-61.22	Pass
		5795	-46.74	-61.22	Pass
	5795	5755	-47.19	-61.28	Pass
		5835	-43.19	-61.28	Pass
802.11 ac80	5775	5695	-46.55	-64.26	Pass
		5855	-47.25	-64.26	Pass
802.11 ax80	5775	5695	-47.04	-64.26	Pass
		5855	-46.97	-64.26	Pass

ANT2:

Model	Frequency A (MHz)	Test Frequency B (MHz)	The Result (dBm)	Limit (dBm)	Measured
802.11a	5745	5725	-46.42	-50.82	Pass
		5765	-47.26	-50.82	Pass
	5825	5805	-57.27	-58.32	Pass
		5845	-46.43	-58.32	Pass
802.11 n20	5745	5725	-47.28	-58.20	Pass
		5765	-46.15	-58.20	Pass
	5825	5802	-46.97	-58.32	Pass
		5845	-46.02	-58.32	Pass
802.11 n40	5755	5715	-47.41	-61.22	Pass
		5795	-46.79	-61.22	Pass
	5795	5755	-47.54	-61.28	Pass
		5835	-42.80	-61.28	Pass
802.11 ac80	5775	5695	-46.61	-64.26	Pass
		5855	-46.83	-64.26	Pass
802.11 ax80	5775	5695	-46.48	-64.26	Pass
		5855	-46.91	-64.26	Pass



## 12. BLOCKING OR DESENSITIZATION

### 12.1 Applicability

This requirement applies to Equipment Category 1 and Category 2 receivers, when invoked, as defined in EN 300440 V2.2.0 clause 4.3.1.

### 12.2 LIMITS

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table 6, except at frequencies on which spurious responses are found.

**Table 6: Limits for blocking or desensitization**

Receiver category	Limit
1	-30 dBm + k
2	-45 dBm + k
3	-60 dBm + k

The correction factor,  $k$ , is as follows:

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

Where:

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

The factor  $k$  is limited within the following:

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

The measured blocking level shall be stated in the test report.

### 12.3 Test Procedures

This measurement shall be conducted under normal conditions.

Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:

- a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna; or
- b) directly to the receiver permanent or temporary antenna connector.

The method of coupling to the receiver shall be stated in the test report.

Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal.

Signal generator B shall be unmodulated and shall be adjusted to a test frequency at approximately 10 times, 20 times and 50 times of the receive channel bandwidth above upper band edge of the receive channel.

Initially signal generator B shall be switched off and using signal generator A the level which still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB.

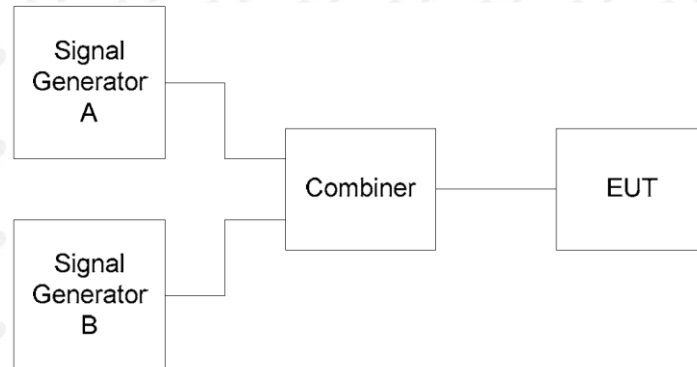
Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.

The measurement shall be repeated with the test frequency for signal generator B at approximately 10 times, 20 times and 50 times of the receive channel bandwidth below the lower band edge of the receive channel.

The blocking or desensitization shall be recorded as the level in dBm of lowest level of the unwanted signal (generator B).

For tagging systems (e.g. RF identification, anti-theft, access control, location and similar systems) signal generator A may be replaced by a physical tag positioned at 70 % of the measured system range in metres. In this case, the blocking or desensitization shall be recorded as the ratio in dB of lowest level of the unwanted signal (generator B) resulting in a non-read of the tag. to the declared sensitivity of the receiver +3 dB.

#### 12.4 Test Setup Layout



## 12.5 TEST RESULTS

ANT1:

Model	Frequency A (MHz)	Test Frequency B (MHz)	The Result (dBm)	Limit (dBm)	Measured
802.11a	5745	Centre Frequency +50*BW	-44.56	-57.33	Pass
		Centre Frequency +20*BW	-47.27	-57.33	Pass
		Centre Frequency +10*BW	-49.16	-57.33	Pass
		Centre Frequency -10*BW	-49.20	-57.33	Pass
		Centre Frequency -20*BW	-47.20	-57.33	Pass
		Centre Frequency -50*BW	-43.09	-57.33	Pass
	5825	Centre Frequency +50*BW	-43.67	-57.45	Pass
		Centre Frequency +20*BW	-47.40	-57.45	Pass
		Centre Frequency +10*BW	-50.15	-57.45	Pass
		Centre Frequency -10*BW	-49.29	-57.45	Pass
		Centre Frequency -20*BW	-46.38	-57.45	Pass
		Centre Frequency -50*BW	-42.91	-57.45	Pass
802.11n-HT20	5745	Centre Frequency +50*BW	-43.65	-57.63	Pass
		Centre Frequency +20*BW	-46.35	-57.63	Pass
		Centre Frequency +10*BW	-50.50	-57.63	Pass
		Centre Frequency -10*BW	-48.69	-57.63	Pass
		Centre Frequency -20*BW	-46.08	-57.63	Pass
		Centre Frequency -50*BW	-43.17	-57.63	Pass
	5725	Centre Frequency +50*BW	-43.05	-57.75	Pass
		Centre Frequency +20*BW	-47.93	-57.75	Pass
		Centre Frequency +10*BW	-49.25	-57.75	Pass
		Centre Frequency -10*BW	-49.07	-57.75	Pass
		Centre Frequency -20*BW	-47.25	-57.75	Pass
		Centre Frequency -50*BW	-43.72	-57.75	Pass



802.11n-HT40	5755	Centre Frequency +50*BW	-43.52	-60.78	Pass
		Centre Frequency +20*BW	-47.06	-60.78	Pass
		Centre Frequency +10*BW	-49.64	-60.78	Pass
		Centre Frequency -10*BW	-48.98	-60.78	Pass
		Centre Frequency -20*BW	-46.12	-60.78	Pass
		Centre Frequency -50*BW	-42.80	-60.78	Pass
	5795	Centre Frequency +50*BW	-43.70	-60.84	Pass
		Centre Frequency +20*BW	-47.30	-60.84	Pass
		Centre Frequency +10*BW	-49.23	-60.84	Pass
		Centre Frequency -10*BW	-45.85	-60.84	Pass
		Centre Frequency -20*BW	-49.08	-60.84	Pass
		Centre Frequency -50*BW	-43.92	-60.84	Pass
802.11ac-VT80	5775	Centre Frequency +50*BW	-43.75	-63.97	Pass
		Centre Frequency +20*BW	-47.24	-63.97	Pass
		Centre Frequency +10*BW	-49.30	-63.97	Pass
		Centre Frequency -10*BW	-49.02	-63.97	Pass
		Centre Frequency -20*BW	-46.44	-63.97	Pass
		Centre Frequency -50*BW	-43.01	-63.97	Pass
802.11ax-VT80	5775	Centre Frequency +50*BW	-43.93	-63.97	Pass
		Centre Frequency +20*BW	-47.43	-63.97	Pass
		Centre Frequency +10*BW	-49.25	-63.97	Pass
		Centre Frequency -10*BW	-49.58	-63.97	Pass
		Centre Frequency -20*BW	-47.09	-63.97	Pass
		Centre Frequency -50*BW	-42.73	-63.97	Pass

ANT2:

Model	Frequency A (MHz)	Test Frequency B (MHz)	The Result (dBm)	Limit (dBm)	Measured
802.11a	5745	Centre Frequency +50*BW	-44.36	-57.33	Pass
		Centre Frequency +20*BW	-47.42	-57.33	Pass
		Centre Frequency +10*BW	-49.49	-57.33	Pass
		Centre Frequency -10*BW	-48.66	-57.33	Pass
		Centre Frequency -20*BW	-46.95	-57.33	Pass
		Centre Frequency -50*BW	-42.83	-57.33	Pass
	5825	Centre Frequency +50*BW	-44.34	-57.45	Pass
		Centre Frequency +20*BW	-47.38	-57.45	Pass
		Centre Frequency +10*BW	-50.01	-57.45	Pass
		Centre Frequency -10*BW	-49.45	-57.45	Pass
		Centre Frequency -20*BW	-46.58	-57.45	Pass
		Centre Frequency -50*BW	-43.18	-57.45	Pass
802.11n-HT20	5745	Centre Frequency +50*BW	-44.17	-57.63	Pass
		Centre Frequency +20*BW	-46.56	-57.63	Pass
		Centre Frequency +10*BW	-50.09	-57.63	Pass
		Centre Frequency -10*BW	-48.95	-57.63	Pass
		Centre Frequency -20*BW	-46.04	-57.63	Pass
		Centre Frequency -50*BW	-43.05	-57.63	Pass
	5725	Centre Frequency +50*BW	-43.50	-57.75	Pass
		Centre Frequency +20*BW	-47.27	-57.75	Pass
		Centre Frequency +10*BW	-48.93	-57.75	Pass
		Centre Frequency -10*BW	-48.69	-57.75	Pass
		Centre Frequency -20*BW	-46.55	-57.75	Pass
		Centre Frequency -50*BW	-43.48	-57.75	Pass
802.11n-HT40	5755	Centre Frequency +50*BW	-43.55	-60.78	Pass
		Centre Frequency +20*BW	-47.42	-60.78	Pass

		Centre Frequency +10*BW	-49.96	-60.78	Pass
		Centre Frequency -10*BW	-48.64	-60.78	Pass
		Centre Frequency -20*BW	-46.52	-60.78	Pass
		Centre Frequency -50*BW	-42.34	-60.78	Pass
	5795	Centre Frequency +50*BW	-43.38	-60.84	Pass
		Centre Frequency +20*BW	-47.61	-60.84	Pass
		Centre Frequency +10*BW	-49.15	-60.84	Pass
		Centre Frequency -10*BW	-46.05	-60.84	Pass
		Centre Frequency -20*BW	-48.88	-60.84	Pass
		Centre Frequency -50*BW	-43.81	-60.84	Pass
802.11ac-VT80	5775	Centre Frequency +50*BW	-43.97	-63.97	Pass
		Centre Frequency +20*BW	-47.61	-63.97	Pass
		Centre Frequency +10*BW	-49.22	-63.97	Pass
		Centre Frequency -10*BW	-49.04	-63.97	Pass
		Centre Frequency -20*BW	-47.24	-63.97	Pass
		Centre Frequency -50*BW	-42.63	-63.97	Pass
802.11ax-VT80	5775	Centre Frequency +50*BW	-44.23	-63.97	Pass
		Centre Frequency +20*BW	-47.48	-63.97	Pass
		Centre Frequency +10*BW	-49.83	-63.97	Pass
		Centre Frequency -10*BW	-48.92	-63.97	Pass
		Centre Frequency -20*BW	-46.75	-63.97	Pass
		Centre Frequency -50*BW	-42.51	-63.97	Pass



## 12 EUT PHOTOGRAPHS

Refer to Report No.:CTB25050708703RE03 for EUT external and internal photos.

**13 EUT TEST SETUP PHOTOGRAPHS**

Spurious emissions



\*\*\*\*\* END OF REPORT \*\*\*\*\*