TEST REPORT

ETSI EN 301 893 V2.1.1 (2017-05)

Report Reference No.....:	HK2311205571-5ER
Compiled by (position+printedname+signature):	Testing engineer Bella Huang
Supervised by (position+printed name+signature):	Technique principal Sliver Wan
Approved by (position+printed name+signature):	Manager Jason Zhou
Date of issue.....:	2023/11/30

Representative Laboratory Name:	Shenzhen HUAK Testing Technology Co., Ltd.
Address :	1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Applicant's name :	EDA Technology Shanghai Co., Ltd.
Address :	Building 24, Shengchuang Enterprise Park, No.1661 Jialuo Road, Jiading District, Shanghai, PRC
Test specification :	
Standard :	**ETSI EN 301 893 V2.1.1 (2017-05)**
TRF Originator :	Shenzhen HUAK Testing Technology Co., Ltd.
Master TRF :	Dated 2014-12

Product Name ..... :	ED-IPC2100
Trade Mark.....:	EDA
Product Model.....:	ED-IPC2110
Serial Model.....:	ED-IPC2120, ED-IPC2130, ED-IPC2140
Hardware version.....:	V1.1
Software version.....:	V2.0
Operation Frequency.....:	From 5180MHz-5240MHz & 5260MHz-5320MHz & 5500MHz-5700MHz
Ratings.....:	DC 9-36V
Result.....:	**PASS**

TEST REPORT

Test Report No. :	HK2311205571-5ER	2023/11/30 Date of issue

Product Name	:	ED-IPC2100
Product Model	:	ED-IPC2110
Serial Model	:	ED-IPC2120, ED-IPC2130, ED-IPC2140
Applicant	:	EDA Technology Shanghai Co., Ltd.
Address	:	Building 24, Shengchuang Enterprise Park, No.1661 Jialuo Road, Jiading District, Shanghai, PRC
Manufacturer	:	EDA Technology Shanghai Co., Ltd.
Address	:	Building 24, Shengchuang Enterprise Park, No.1661 Jialuo Road, Jiading District, Shanghai, PRC

Test Result:	PASS

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 1.0	Initial Test Report Release	2023/11/30	Jason Zhou

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1 General Information

1.1. EUT Description

Product Name	ED-IPC2100				
Model/Type reference	ED-IPC2110				
List Model	ED-IPC2120, ED-IPC2130, ED-IPC2140				
Models different description	The main difference between different models is the number of RS232 and RS485 interfaces, and the model with the most interfaces is ED-IPC2110.				
Operate Freq. Band	Frequency Range (MHz)		Modulation	Channel Bandwidth	Data Rate
IEEE 802.11a	UNII Band I	5180 – 5240	OFDM	20MHz	Up to 54Mbps
	UNII Band II	5260 – 5320	OFDM	20MHz	Up to 54Mbps
	UNII Band III	5500 – 5700	OFDM	20MHz	Up to 54Mbps
IEEE 802.11n 5GHz 20MHz IEEE 802.11ac 20MHz	UNII Band I	5180 – 5240	OFDM	20MHz	Up to 144.4Mbps
	UNII Band II	5260 – 5320	OFDM	20MHz	Up to 144.4Mbps
	UNII Band III	5500 – 5700	OFDM	20MHz	Up to 144.4Mbps
IEEE 802.11n 5GHz 40MHz IEEE 802.11ac 40MHz	UNII Band I	5190 – 5230	OFDM	40MHz	Up to 300Mbps
	UNII Band II	5270 – 5310	OFDM	40MHz	Up to 300Mbps
	UNII Band III	5510 – 5670	OFDM	40MHz	Up to 300Mbps
IEEE 802.11ac 80MHz	UNII Band I	5210	OFDM	80MHz	Up to 866.6Mbps
	UNII Band II	5290	OFDM	80MHz	Up to 866.6Mbps
	UNII Band III	5530 – 5610	OFDM	80MHz	Up to 866.6Mbps
Channel Control	Auto				
DFS Equipment Type	Slave(with Radar detection)				
Antenna Delivery	see section 1.3				
Maximum e.i.r.p.	UNII Band I: See Report UL-RPT-RP13337971-716A V2.0 for test data. UNII Band II: See Report UL-RPT-RP13337971-716A V2.0 for test data. UNII Band III: See Report UL-RPT-RP13337971-716A V2.0 for test data.				
Temperature Range	-10 ~ 40 ℃				
Antenna Gain	2dBi				

For 5.0GHz Band Channel List

IEEE 802.11a / IEEE 802.11n 5GHz 20MHz / IEEE 802.11ac 20MHz Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	56	5280 MHz	108	5540 MHz	128	5640 MHz
40	5200 MHz	60	5300 MHz	112	5560 MHz	132	5660 MHz
44	5220 MHz	64	5320 MHz	116	5580 MHz	136	5680 MHz
48	5240 MHz	100	5500 MHz	120	5600 MHz	140	5700 MHz
52	5260 MHz	104	5520 MHz	124	5620 MHz	---	---

IEEE 802.11n 5GHz 40MHz / IEEE 802.11ac 40MHz Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	62	5310 MHz	118	5590 MHz	---	---
46	5230 MHz	102	5510 MHz	126	5630 MHz	---	---
54	5270 MHz	110	5550 MHz	134	5670 MHz	---	---

IEEE 802.11ac 80MHz Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210 MHz	58	5290 MHz	106	5530 MHz	122	5610 MHz

1.2. Product Information Specific to EN 301 893

In accordance with ETSI EN 301 893 clause 5.4.1, the following information is provided by the manufacturer.

a) The Nominal Channel Bandwidth(s):

Nominal Channel Bandwidth 1: 20 MHz
Nominal Channel Bandwidth 2: 40 MHz
Nominal Channel Bandwidth 3: 80 MHz

The associated centre frequencies:

For Nominal Channel Bandwidth 1:
for the band 5150 - 5350 MHz: 5180MHz; 5200MHz; 5220MHz; 5240MHz; 5260MHz; 5280MHz; 5300MHz;5320MHz
for the band 5470 - 5725 MHz: 5500MHz; 5520MHz; 5540MHz; 5560MHz; 5580MHz; 5600MHz; 5620MHz;5640MHz; 5660MHz;; 5680MHz; 5700MHz

For Nominal Channel Bandwidth 2:
for the band 5150 - 5350 MHz: 5190MHz; 5230MHz; 5270MHz; 5310MHz
for the band 5470 - 5725 MHz: 5510MHz; 5550MHz; 5590MHz; 5630MHz; 5670MHz

For Nominal Channel Bandwidth 3:
for the band 5150 - 5350 MHz: 5210MHz; 5290MHz
for the band 5470 - 5725 MHz: 5530MHz; 5610MHz

b) For Load Based Equipment that supports multi-channel operation:

□ The LBE equipment supports Option 1 as described in clause 4.2.7.3.2.3
■ The LBE equipment supports Option 2 as described in clause 4.2.7.3.2.3
●The (maximum) number of channels used for multi-channel operation: .....
●These channels are adjacent channels:
■ Yes □ No
● In case of non-adjacent channels, whether or not these channels are in different sub-bands:
□ Yes ■ No
● for LBE equipment implementing option 1 (see clause 4.2.7.3.2.3), the number of channels used for multi-multichannel operation when performing the test described in clause 5.4.9.3.2.3.1: ……

In case of multi-channel operation, further information defining the channels used for these simultaneous transmissions may be required.

c) The different transmit operating modes (see clause 5.3.3.2) (tick all that apply):

■ Operating mode 1: Single Antenna Equipment

■ a) Equipment with only 1 antenna

□ b) Equipment with diversity antennas but only 1 antenna active at any moment in time

□ c) Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used.

■ Operating mode 2: Smart Antenna Systems - Multiple Antennas without beamforming

□ a) Single spatial stream/Standard throughput

■ b) High Throughput (>1 spatial stream) using Nominal Channel Bandwidth 1

■ c) High Throughput (>1 spatial stream) using Nominal Channel Bandwidth 2

■ d) High Throughput (>1 spatial stream) using Nominal Channel Bandwidth 3

□ Operating mode 3: Smart Antenna Systems - Multiple Antennas with beamforming

□ a) Single spatial stream/Standard throughput

□ b) High Throughput (>1 spatial stream) using Nominal Channel Bandwidth 1

□ c) High Throughput (>1 spatial stream) using Nominal Channel Bandwidth 2

□ d) High Throughput (>1 spatial stream) using Nominal Channel Bandwidth 3

d) In case of Smart Antenna Systems or multiple antenna systems

- The number of Receive chains: 1
- The number of Transmit chains: 1
- Equal power distribution among the transmit chains: ■ Yes □ No
- In case of beamforming, the maximum (additional) beamforming gain: 2.5 dB

Note: Beamforming gain does not include the basic gain of a single antenna (assembly).

e) TPC feature available:

■ Yes □ No

f) For equipment with TPC range:

The lowest and highest power level (or lowest and highest e.i.r.p. level in case of integrated antenna equipment), intended antenna assemblies and corresponding operating frequency range for the TPC range (or for each of the TPC ranges if more than one is implemented).

TPC range 1: Applicable Frequency Range:
■ 5150 MHz to 5350 MHz and 5470 MHz to 5725 MHz (Indoor)
Simultaneous transmissions in both sub-bands: □ Yes ■No
□ 5470 MHz to 5725 MHz only (Outdoor only)

Indicate whether the power levels specified are Transmitter Output Power levels or e.i.r.p. levels in case of integrated antenna equipment.

Power levels are specified for:: □ Tx out ■ e.i.r.p

If more than one transmit chain is present (e.g. in the case of smart antenna systems), the power levels below represent the power settings per active transmit chain (and per sub-band in case of simultaneous transmissions).

Table F.1: Power levels for TPC range 1

	Sub-band (MHz)	Operating Mode 1 (dBm)	Operating Mode 2 (dBm)	Operating Mode 3 (dBm)	Operating Mode 4 (dBm)
Lowest setting (Plow)	5150 to 5350	See Report UL-RPT-RP13337971-716A V2.0 for test data.	---	---	---
	5470 to 5725	See Report UL-RPT-RP13337971-716A V2.0 for test data.	---	---	---
Highest setting (Phigh)	5150 to 5350	See Report UL-RPT-RP13337971-716A V2.0 for test data.	---	---	---
	5470 to 5725	See Report UL-RPT-RP13337971-716A V2.0 for test data.	---	---	---

Beamforming possible: ■Yes □ No
Intended Antenna Assemblies:

Table F.2: Intended Antenna Assemblies for TPC range 1

Antenna Assembly name	Antenna Gain (dBi)	Operating Mode	Sub-band (MHz)	Beam forming gain (dB)	e.i.r.p. for Plow (dBm)	e.i.r.p.for Phigh (dBm)
<Antenna 1>	1	Mode 1	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
		Mode 2	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
		Mode 3	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
<Antenna 2>	1	Mode 1	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
		Mode 2	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
		Mode 3	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
<Antenna 3>	1	Mode 1	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
		Mode 2	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
		Mode 3	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
<Antenna 4>	1	Mode 1	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
		Mode 2	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---
		Mode 3	5150 to 5350	2.5	---	---
			5470 to 5725	2.5	---	---

DFS Threshold level: -62 dBm ■ at the antenna connector
□ in front of the antenna

TPC range 2: Applicable Frequency Range:
□ 5150 MHz to 5350 MHz and 5470 MHz to 5725 MHz (Indoor)
Simultaneous transmissions in both sub-bands: □ Yes □ No
□ 5470 MHz to 5725 MHz only (Outdoor only)

Indicate whether the power levels specified are Transmitter Output Power levels or e.i.r.p. levels in case of integrated antenna equipment.

Power levels are specified for: □ Tx out □e.i.r.p

If more than one transmit chain is present (e.g. in the case of smart antenna systems), the power levels below represent the power settings per active transmit chain (and per sub-band in case of simultaneous transmissions).

Table F.3: Power levels for TPC range 2

Sub-band (MHz)	Operating Mode 1 (dBm)	Operating Mode 2 (dBm)	Operating Mode 3 (dBm)	Operating Mode 4 (dBm)
5150 to 5 250	---	---	---	---
5470 to 5725	---	---	---	---

Beamforming possible: □Yes □No

Note: EUT Only have one test level.

Intended Antenna Assemblies:

Table F.4: Intended Antenna Assemblies for TPC range 2

Antenna Assembly name	Antenna Gain (dBi)	Operating Mode	Sub-band (MHz)	Beam forming gain (dB)	e.i.r.p. for Plow (dBm)	e.i.r.p.for Phigh (dBm)
<Antenna 1>	---	Mode 1	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 2	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 3	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
<Antenna 2>	---	Mode 1	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 2	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 3	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
<Antenna 3>	---	Mode 1	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 2	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 3	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
<Antenna 4>	---	Mode 1	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 2	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 3	5150 to 5350	---	---	---
			5470 to 5725	---	---	---

DFS Threshold level: ..... dBm □ at the antenna connector

□ in front of the antenna

g) For equipment without a TPC range:

Power Setting 1: Applicable Frequency Range:

■ 5150 MHz to 5350 MHz and 5470 MHz to 5725 MHz (Indoor)

Simultaneous transmissions in both sub-bands: □Yes □ No

□ 5470 MHz to 5725 MHz only (Outdoor only)

Indicate whether the power levels specified are Transmitter Output Power levels or e.i.r.p. levels in case of integrated antenna equipment.

Power levels are specified for: □ Tx out □ e.i.r.p.

If more than one transmit chain is present (e.g. in the case of smart antenna systems), the power levels below represent the power settings per active transmit chain (and per sub-band in case of simultaneous transmissions).

Table F.5: Maximum Transmitter Output Power for Power Setting 1

Sub-band (MHz)	Operating Mode 1 (dBm)	Operating Mode 2 (dBm)	Operating Mode 3 (dBm)	Operating Mode 4 (dBm)
5150 to 5 250	---	---	---	---
5470 to 5725	---	---	---	---

Beamforming possible: □ Yes ■ No

Intended Antenna Assemblies:

Table F.6: Intended Antenna Assemblies for Power Setting 1

Antenna Assembly name	Antenna Gain (dBi)	Operating Mode	Sub-band (MHz)	Beam forming gain (dB)	e.i.r.p. for Plow (dBm)	e.i.r.p.for Phigh (dBm)
<Antenna 1>	---	Mode 1	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
		Mode 2	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
		Mode 3	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
<Antenna 2>	---	Mode 1	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
		Mode 2	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
		Mode 3	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
<Antenna 3>	---	Mode 1	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 2	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 3	5150 to 5350	---	---	---
			5470 to 5725	---	---	---

DFS Threshold level: ..... dBm □at the antenna connector
□ in front of the antenna

Power Setting 2: Applicable Frequency Range:
□ 5150 MHz to 5350 MHz and 5470 MHz to 5725 MHz (Indoor)
Simultaneous transmissions in both sub-bands:□Yes □ No
□ 5470 MHz to 5725 MHz only (Outdoor only)
Applicable power levels (see note): □Tx out □e.i.r.p.

Indicate whether the power levels specified are Transmitter Output Power levels or e.i.r.p. levels in case of integrated antenna equipment.

Power levels are specified for: □ Tx out □e.i.r.p.

If more than one transmit chain is present (e.g. in the case of smart antenna systems), the power levels below represent the power settings per active transmit chain (and per sub-band in case of simultaneous transmissions).

Table F.7: Maximum Transmitter Output Power for Power Setting 2

Sub-band (MHz)	Operating Mode 1 (dBm)	Operating Mode 2 (dBm)	Operating Mode 3 (dBm)
5150 to 5 250	---	---	---
5470 to 5725	---	---	---

Beamforming possible: □ Yes □ No

Intended Antenna Assemblies:

Table F.8: Intended Antenna Assemblies for Power Setting 2

Antenna Assembly name	Antenna Gain (dBi)	Operating Mode	Sub-band (MHz)	Beam forming gain (dB)	e.i.r.p. for Plow (dBm)	e.i.r.p.for Phigh (dBm)
<Antenna 1>	---	Mode 1	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
		Mode 2	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
		Mode 3	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
<Antenna 2>	---	Mode 1	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
		Mode 2	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
		Mode 3	5150 to 5 250	---	---	---
			5470 to 5725	---	---	---
<Antenna 3>	---	Mode 1	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 2	5150 to 5350	---	---	---
			5470 to 5725	---	---	---
		Mode 3	5150 to 5350	---	---	---
			5470 to 5725	---	---	---

DFS Threshold level: ..... dBm □ at the antenna connector

□ in front of the antenna

h) The DFS related operating mode(s) of the equipment

□ Master

■ Slave with radar detection

□ Slave without radar detection

If the equipment has more than one operating mode, tick all that apply.

i) User access restrictions (please check box below to confirm)

■ the equipment is constructed to comply with the requirements contained in clause 4.2.9 in ETSI EN 301 893 V2.1.1

j) For equipment with Off-Channel CAC functionality

The equipment has an *"Off-Channel CAC"* function: □ Yes ■ No

If yes, specify the *"Off-Channel CAC Time"*

- For channels outside the 5600 MHz to 5650 MHz range: hours
- If applicable, for channels (partially) within the 5 600 MHz to 5 650 MHz range: hours

k) The equipment can operate in ad-hoc mode:

□ no ad-hoc operation

□ ad-hoc operation in the frequency range 5150 MHz to 5250 MHz without DFS

■ ad-hoc operation with DFS

If more than 1 is applicable, tick all that apply.

l) Operating Frequency Range(s):

■ Range 1: 5150 MHz to 5350 MHz and 5470 MHz to 5725 MHz

□ Range 2: 5470 MHz to 5725 MHz only

□ Range 3: 5150 MHz to 5250 MHz (ad-hoc without DFS)

□ Range 4: other, please specify: ……..

If the equipment has more than one Operating Frequency Range, tick all that apply.

m) The extreme operating temperature and supply voltage range that apply to the equipment:

□ -20 °C to +55 °C (Outdoor & Indoor usage)

□ 0 °C to +35 °C (Indoor usage only)

■ Other: -10 °C to +40 °C

The supply voltages of the stand-alone radio equipment or the supply voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the: ■ stand-alone equipment
□ combined (or host) equipment
□ test jig

Supply Voltage

■ AC mains State AC voltage:
Minimum: Nominal: Maximum:

■ DC State DC voltage:
Minimum: 10.8V Nominal: 12V Maximum: 13.2V

In case of DC, indicate the type of power source:

□ Internal Power Supply

■ External Power Supply or AC/DC adapter

□ Battery

□ Nickel Cadmium □ Lithium-Ion
□ Alkaline □ Lead acid (Vehicle regulated)
□ Nickel-Metal Hydride □ Other .....

n) The test sequence/test software used (see also EN 301 893 (V1.8.1), clause 5.3.1.2)

EIRP first test and then measured the remaining test items. The test setup has been constructed as the normal use condition. Controlling software (provided by manufacturer) has been activated to set the EUT on specific status.

o) Type of Equipment

■ Stand-alone

□ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)

□ Plug-in radio device (Equipment intended for a variety of host systems)

□ Other .....

p) Adaptivity (Channel Access Mechanism)

□ Frame Based Equipment

■ Load Based Equipment

q) With regards to Adaptivity for Frame Based Equipment

□ The Frame Based Equipment operates as an Initiating Device

□ The Frame Based Equipment operates as an Responding Device

□ The Frame Based Equipment can operate as an Initiating Device and as a Responding Device

The Frame Based Equipment has implemented the following Fixed Frame Period(s):
……. Ms
……. Ms
……. Ms

r) With regards to Adaptivity for Load Based Equipment

□ The Load Based Equipment operates as a Supervising Device
■ The Load Based Equipment operates as a Supervised Device
□ The Load Based Equipment can operate as a Supervising and as a Supervised Device
□ The Load Based Equipment makes use of note 1 in table 7 or note 1 in table 8 of ETSI EN 301 893 V2.1.1
□ The Load Based Equipment , when operating as a Supervising Device, makes use of note 2 in table 7 of ETSI EN 301 893 V2.1.1

The Priority Classes implemented by the Load Based Equipment
●When operating as a Supervising Device
□ Priority Class 4 (Highest priority)
□ Priority Class 3
□ Priority Class 2
□ Priority Class 1 (Lowest priority)
●When operating as a Supervised Device
■ Priority Class 4 (Highest priority)
□ Priority Class 3
□ Priority Class 2
□ Priority Class 1 (Lowest priority)

□The Load Based Equipment operates as an Initiating Device
■The Load Based Equipment operates as an Responding Device
□The Load Based Equipment can operate as an Initiating Device and as a Responding Device

With regard to Energy Detection Threshold, the Load Based Equipment has implemented either option 1 of clause 4.2.7.3.2.5 of ETSI EN 301 893 V2.1.1 or option 2 of clause 4.2.7.3.2.5 of ETSI EN 301 893 V2.1.1:
■ Option 1
□ Option 2
Specify which protocol has been implemented: ■ IEEE 802.11™ □ Other: .....

s) The equipment supports a geo-location capability as defined in clause 4.2.10 of ETSI EN 301 893 V2.1.1:

■ Yes □ No

t) **The minimum performance criteria (see ETSI EN 301 893 V2.1.1, clause 4.2.8.3) that corresponds to the intended use of the equipment.**

A Mode 6Mbps : PER 10% P_{min}= -91dBm

u) **The theoretical maximum radio performance of the equipment (e.g. maximum throughput) (see ETSI EN 301 893 V2.1.1, clause 5.4.9.3.1)**

1733.2Mbps

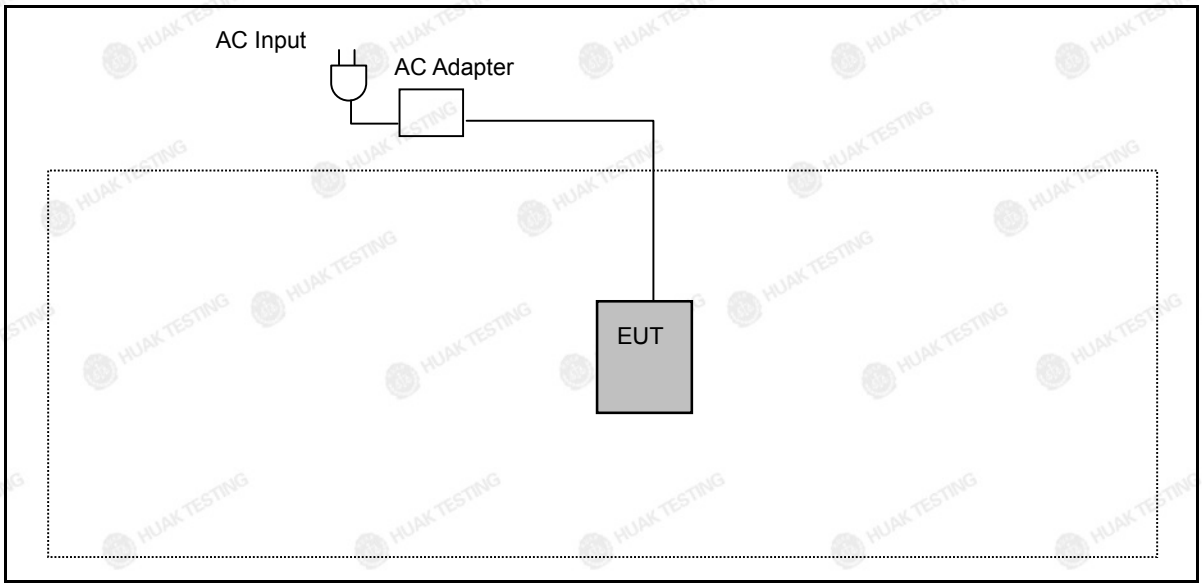
1.3. Mode of Operation

ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode	Antenna Delivery	Test Channel	Data Rate
Mode 1: IEEE 802.11a U-NII Band Link Mode	1TX / 1RX	36, 64, 100, 140	6M
Mode 2: IEEE 802.11n 5GHz 20MHz U-NII Band Link Mode	1TX / 1RX	36, 64, 100, 140	13M
Mode 3: IEEE 802.11n 5GHz 40MHz U-NII Band Link Mode	1TX / 1RX	38, 62, 102, 134	27M
Mode 4: IEEE 802.11ac 80MHz U-NII Band Link Mode	1TX / 1RX	42, 58, 106	58.6M

Test Mode	ANT-0	ANT-1	ANT-2	ANT-3	ANT-0+1+2+3
Mode 1: IEEE 802.11a U-NII Band Link Mode	---	---	---	---	V
Mode 2: IEEE 802.11n 5GHz 20MHz U-NII Band Link Mode	---	---	---	---	V
Mode 3: IEEE 802.11n 5GHz 40MHz U-NII Band Link Mode	---	---	---	---	V
Mode 4: IEEE 802.11ac 80MHz U-NII Band Link Mode	---	---	---	---	V

1.4. Configuration of Test System Details



1.5. Test Site Environment

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	24
Humidity (%RH)	20-75	55
Barometric pressure (mbar)	860-1060	989

1.6. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Parameter	Uncertainty
RF frequency	± $1.1*10^{-6}$
RF power conducted	± 1.017 dB
RF power radiated	± 2.5 dB
Spurious emissions, conducted	± 1.68 dB
Spurious emissions, radiated	± 5.5 dB
Humidity	± 4.5 %
Temperature	± 0.9 ℃
Time	± 3 %

1.7. Test Instruments

Centre frequencies & RF output power & Power density & OCB & TPC						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Spectrum analyzer	Agilent	N9020A	HKE-048	2023/02/17	2024/02/16
2	Signal generator	Agilent	N5182A	HKE-029	2023/02/17	2024/02/16
3	Signal generator	Agilent	83630A	HKE-028	2023/02/17	2024/02/16
4	RF automatic control unit	Tonscend	JS0806-2	HKE-060	2023/02/17	2024/02/16
5	Power Sensor	Agilent	E9300A	HKE-086	2023/02/17	2024/02/16
6	Temperature and humidity meter	Boyang	HTC-1	HKE-075	2023/02/17	2024/02/16

Adaptively & Receiver Blocking						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Spectrum analyzer	R&S	FSP40	HKE-025	2023/02/17	2024/02/16
2	Wireless Communication Test	R&S	CMU200	HKE-026	2023/02/17	2024/02/16
3	Wireless Communication Test	R&S	CMW500	HKE-027	2023/02/17	2024/02/16
4	RF automatic control	Tonscend	JS0806-2	HKE-060	2023/02/17	2024/02/16

Transmitter spurious emissions & Receiver spurious emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	2023/02/17	2024/02/16
2	Horn antenna	Schwarzbeck	9120D	HKE-013	2023/02/17	2024/02/16
3	Receiver	R&S	ESCI 7	HKE-010	2023/02/17	2024/02/16
4	Position controller	Taiwan MF	MF7802	HKE-011	2023/02/17	2024/02/16
5	Preamplifier	EMCI	EMC051845SE	HKE-015	2023/02/17	2024/02/16
6	Preamplifier	Agilent	83051A	HKE-016	2023/02/17	2024/02/16
7	High pass filter unit	Tonscend	JS0806-F	HKE-055	2023/02/17	2024/02/16
8	Spectrum analyzer	Agilent	N9020A	HKE-048	2023/02/17	2024/02/16

The calibration interval is 1 year.

1.8. Summary of Test Result

Transmitter Parameters			
Description	Clause	Result	Remark
Centre Frequencies	4.2.1	Pass	---
Nominal Channel Bandwidth and Occupied Channel Bandwidth	4.2.2	Pass	---
RF Output Power	4.2.3	Pass	---
Transmit Power Control (TPC)	4.2.3	Pass	---
Power Density	4.2.3	Pass	---
Adaptivity (Channel Access Mechanism)	4.2.7	Pass	---
User Access Restrictions	4.2.9	Pass	---
Transmitter unwanted emissions outside the 5GHz RLAN bands	4.2.4.1	Pass	---
Transmitter unwanted emissions within the 5GHz RLAN bands	4.2.4.2	Pass	---
Dynamic Frequency Selection (DFS)	4.2.6	Pass	---
Receiver Parameters			
Receiver Spurious Emissions	4.2.5	Pass	---
Receiver Blocking	4.2.8	Pass	---
Geo-location Capability	4.2.10	Not Applicable or Meet requirement	Ref. section 8

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

2 Centre Frequencies Test

2.1. Limit

The Nominal Centre Frequencies (fc) for a Nominal Channel Bandwidth of 20 MHz are defined by equation (1). See also figure 3.

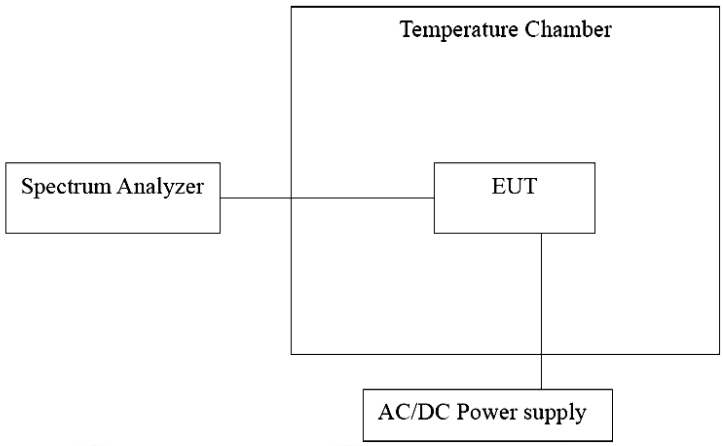
fc = 5 160 + (g × 20) MHz, where 0 ≤ g ≤ 9 or 16 ≤ g ≤ 27 and where g shall be an integer. (1)

A maximum offset of the Nominal Centre Frequency of ± 200 kHz is permitted. Where the manufacturer decides to make use of this frequency offset, the manufacturer shall declare the actual centre frequencies used by the equipment. See clause 5.4.1, item a).

The actual centre frequency for any given channel shall be maintained within the range fc ± 20 ppm.

Equipment may have simultaneous transmissions on more than one Operating Channel with a Nominal Channel Bandwidth of 20 MHz.

2.2. Test Setup



2.3. Test Procedure

1. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.2.1 for the test conditions.
2. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.2.2 for the test methods.

2.4. Test Result

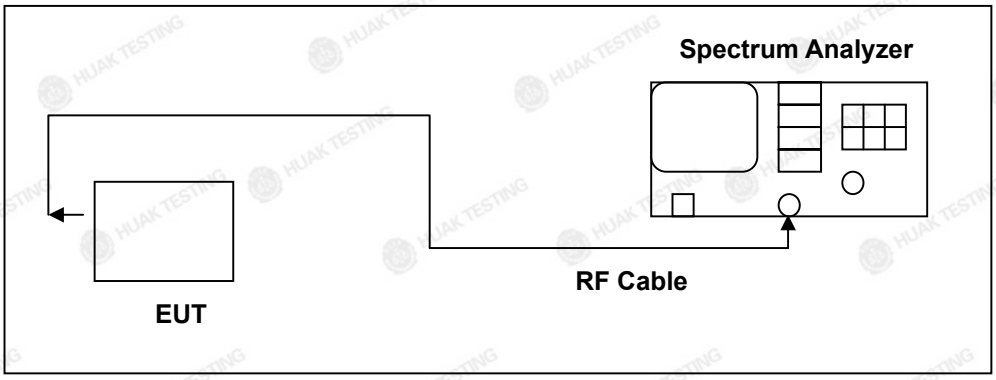
See Report UL-RPT-RP13337971-716A V2.0 for test data.

3 Nominal Channel Bandwidth and Occupied Channel Bandwidth Test

3.1. Limit

The Nominal Channel Bandwidth for a single Operating Channel shall be 20 MHz.
Alternatively, equipment may implement a lower Nominal Channel Bandwidth with a minimum of 5 MHz, providing they still comply with the Nominal Centre Frequencies defined in clause 4.2.1 (20 MHz raster).
The Occupied Channel Bandwidth shall be between 80 % and 100 % of the Nominal Channel Bandwidth.
In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.
The Occupied Channel Bandwidth might change with time/payload.
During a Channel Occupancy Time (COT), equipment may operate temporarily with an Occupied Channel Bandwidth of less than 80 % of its Nominal Channel Bandwidth with a minimum of 2 MHz.

3.2. Test Setup



3.3. Test Procedure

1. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.3.1 for the test conditions.
2. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.3.2 for the test method

3.4. Test Result

See Report UL-RPT-RP13337971-716A V2.0 for test data.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

4 RF Output Power, Transmit Power Control (TPC) and Power Density Test

4.1. Limit

RF output power and power density at the highest power level

TPC is not required for channels whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz. For devices with TPC, the RF output power and the Power Density when configured to operate at the highest stated power level (PH) of the TPC range shall not exceed the levels given in table 2. Devices are allowed to operate without TPC. See table 2 for the applicable limits that shall apply in this case.

Table 1: Mean e.i.r.p. limits for RF output power and power density at the highest power level

Frequency Range (MHz)	Mean e.i.r.p. Limit (dBm)		Mean e.i.r.p. Density Limit (dBm/MHz)	
	with TPC	without TPC	with TPC	without TPC
5150 to 5350	23	20 / 23(see Note1)	10	7 / 10 (see Note2)
5470 to 5725	30 (see Note3)	27 (see Note3)	17 (see Note3)	14 (see Note3)

Note 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz, in which case the applicable limit is 23 dBm.

Note 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz, in which case the applicable limit is 10 dBm/MHz.

Note 3: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5250 MHz to 5350 MHz.

RF output power at the lowest power level of the TPC range

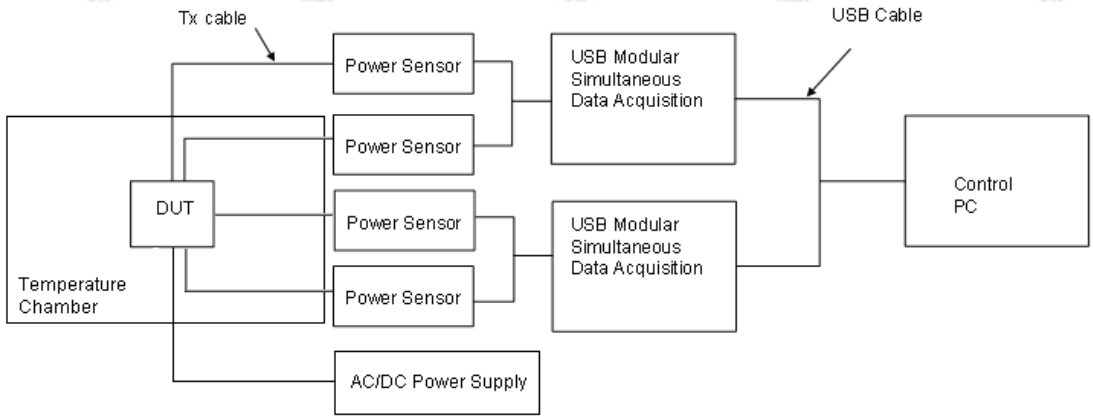
For devices using TPC, the *RF Output Power* during a transmission burst when configured to operate at the lowest stated power level (PL) of the TPC range shall not exceed the levels given in table 3. For devices without TPC, the limits in table 3 do not apply.Table 2: Mean e.i.r.p. limits for RF output power at the lowest power level of the TPC range

Frequency Range (MHz)	Mean e.i.r.p. Limit (dBm)
5250 to 5350	17
5470 to 5725	24 (see Note1)

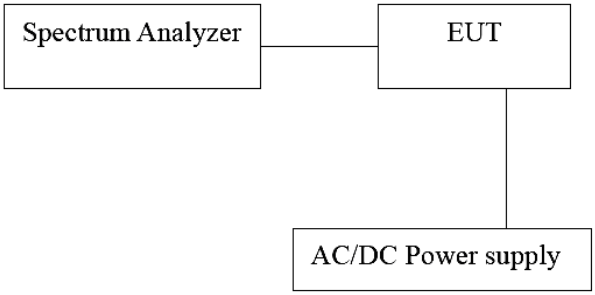
Note 1: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5250 MHz to 5350 MHz.

4.2. Test Setup

Temperature and Voltage Measurement (under normal and extreme test conditions)



Power Density Test



4.3. Test Procedure

1. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.4.1 for the test conditions.
2. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.4.2 for the test method

4.4. Test Result

See Report UL-RPT-RP13337971-716A V2.0 for test data.

5 Adaptivity (Channel Access Mechanism) Test

5.1. Limit

This requirement applies to equipment. The manufacturer shall state whether the UUT is capable of operating as a Frame Based Equipment or Load Based Equipment. See tables for the applicability of adaptive requirements and limit for each of the operational modes.

Applicability of adaptive requirements and limit:

Requirement	Operational Mode		
	LBT based Detect and Avoid		
	Frame Based Equipment	Load Based Equipment	
	Initiating Device	Option A	Option B
Maximum Channel Occupancy (COT) Time	1 ms to 10 ms	(See Note 1)	manufacturer to declare
Idle Period	5% of COT(100 us)	>27us	manufacturer to declare
Short Control Signalling Transmissions	(see Note 2)		

Note1: Table 7 and table 8 each contain four different sets of Channel Access parameters for Supervising Devices and Supervised Devices respectively, resulting in different Priority Classes and different maximum Channel Occupancy Times.

Note2: The use of Short Control Signalling Transmissions is constrained as follows:

within an observation period of 50 ms, the number of Short Control Signalling Transmissions by the equipment shall be equal to or less than 50; and the total duration of the equipment's Short Control Signalling Transmissions shall be less than 2 500 µs within said observation period.

Table 7: Priority Class dependent Channel Access parameters for *Supervising Devices*

Class #	p0	CWmin	CWmax	Maximum Channel Occupancy Time (COT)
4	1	3	7	2 ms
3	1	7	15	4 ms
2	3	15	63	6 ms (see note 1 and note 2)
1	7	15	1023	6 ms (see note 1)

Note 1:The maximum Channel Occupancy Time (COT) of 6 ms may be increased to 8 ms by inserting one or more pauses. The minimum duration of a pause shall be 100 μs. The maximum duration (Channel Occupancy) before including any such pause shall be 6 ms. Pause duration is not included in the channel occupancy time.

Note 2 The maximum Channel Occupancy Time (COT) of 6 ms may be increased to 10 ms by extending CW to CW × 2 + 1 when selecting the random number q for any backoff(s) that precede the Channel Occupancy that may exceed 6 ms or which follow the Channel Occupancy that exceeded 6 ms. The choice between preceding or following a Channel Occupancy shall remain unchanged during the operation time of the device.

Note 3:The values for p0, CWmin, CWmax are minimum values. Greater values are allowed.

Table 8: Priority Class dependent Channel Access parameters for *Supervised Devices*

Class #	p0	CWmin	CWmax	Maximum Channel Occupancy Time (COT)
4	2	3	7	2 ms
3	2	7	15	4 ms
2	3	15	1023	6 ms (see note 1)
1	7	15	1023	6 ms (see note 1)

Note 1:The maximum Channel Occupancy Time (COT) of 6 ms may be increased to 8 ms by inserting one or more pauses. The minimum duration of a pause shall be 100 μs. The maximum duration (Channel Occupancy) before including any such pause shall be 6 ms. Pause duration is not included in the channel occupancy time.

Note 2:The values for p0, CWmin, CWmax are minimum values. Greater values are allowed.

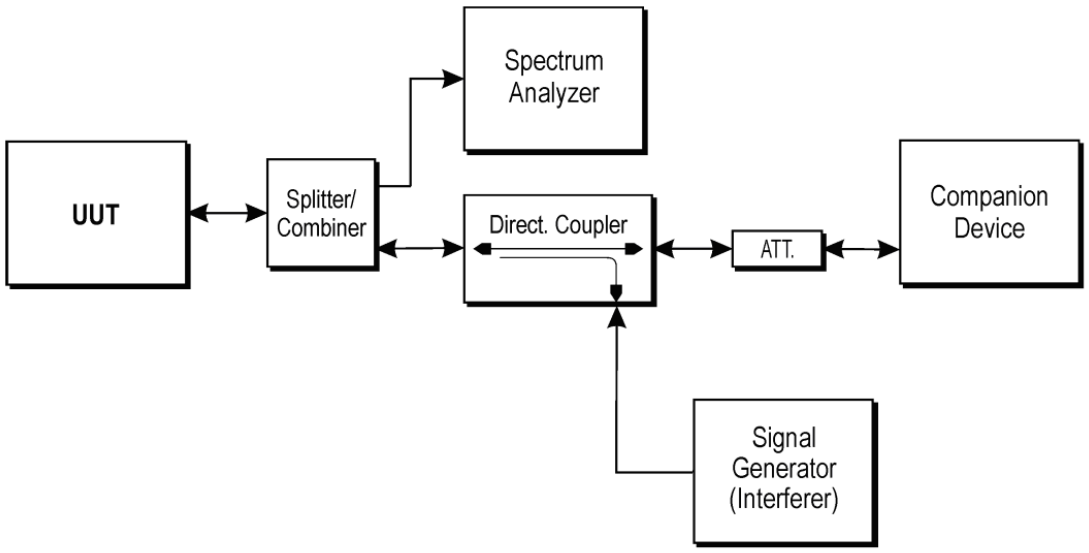
Interference threshold level

Channel Operating	Threshold level (TL) dBm / MHz
Low Channel	-85 (Option 1)

Note 1:Option 1 TL = -75 dBm/MHz

Note 2:Option 2 For PH ≤ 13 dBm: TL = -75 dBm/MHz / For 13 dBm < PH < 23 dBm: TL = -85 dBm/MHz + (23 dBm - PH) / For PH ≥ 23 dBm: TL = -85 dBm/MHz

5.2. Test Setup



5.3. Test Procedure

1. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.9.1 for the test conditions
2. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.9.2 / 5.4.9.3 for the test method.

5.4. Test Result

See Report UL-RPT-RP13337971-716A V2.0 for test data.

6 Receiver Blocking

6.1. Limit

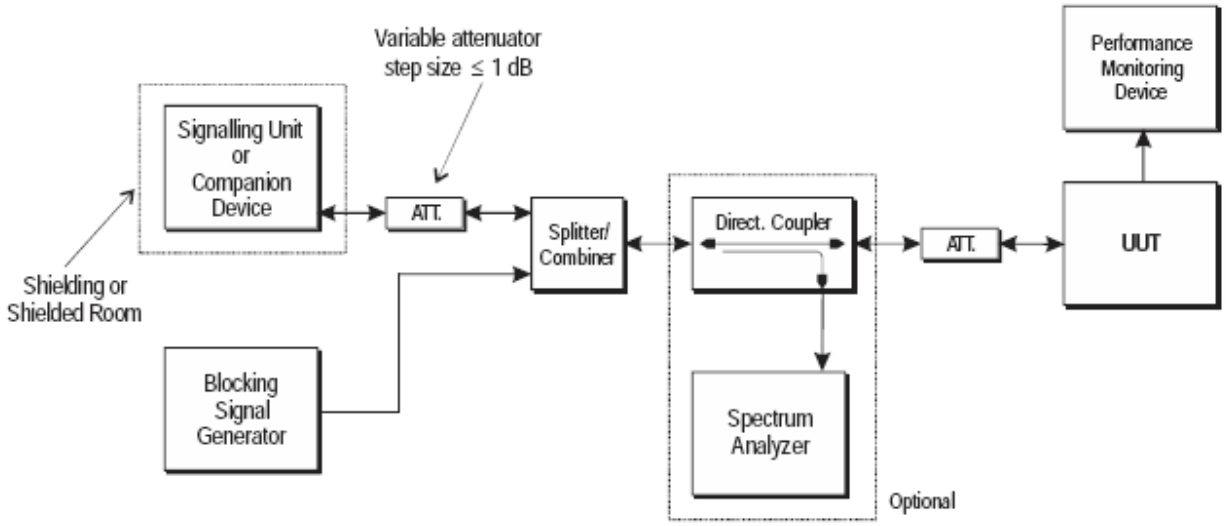
While maintaining the minimum performance criteria as defined in clause 4.2.8.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined in table 9.Table 1: Mean e.i.r.p. limits for RF **Table 9: Receiver Blocking parameters**

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)		Type of blocking signal
		Master or Slave with radar detection (see table D.2, note 2)	Slave without radar detection (see table D.2, note 2)	
Pmin + 6 dB	5 100	-53	-59	Continuous Wave
Pmin + 6 dB	4 900 5 000 5 975	-47	-53	Continuous Wave

Note 1: Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal.

Note 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.

6.2. Test Setup



6.3. Test Procedure

1. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.10.1 for the test conditions.
2. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.10.2 for the test method

6.4. Test Result

See Report UL-RPT-RP13337971-716A V2.0 for test data.

7 User Access Restrictions

7.1. Requirement

User Access Restrictions are restraints implemented in the RLAN to restrict access for the user to certain hardware and/or software settings of the equipment.

7.2. Declare

Manufacturer provides declaration form to meet this requirement.

8 Geo-location capability

8.1. Requirement

The geographical location determined by the equipment as defined in ETSI EN 301 893 (V2.1.1) clause 4.2.10.2 shall not be accessible to the user.

8.2. Declare

The geo-location capability comply with ETSI EN 301 893 (V2.1.1) clause 4.2.10.2 requirement.

9 Transmitter Unwanted Emissions outside the 5GHz RLAN Bands Test

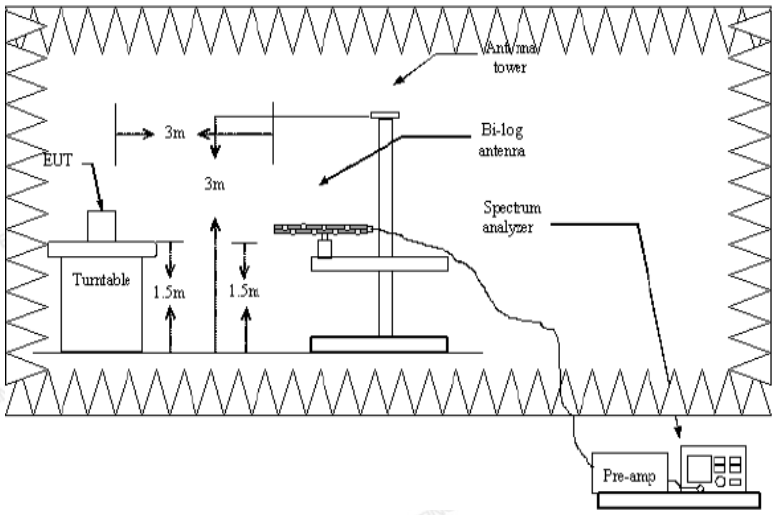
9.1. Limit

Transmitter limits for narrowband spurious emissions

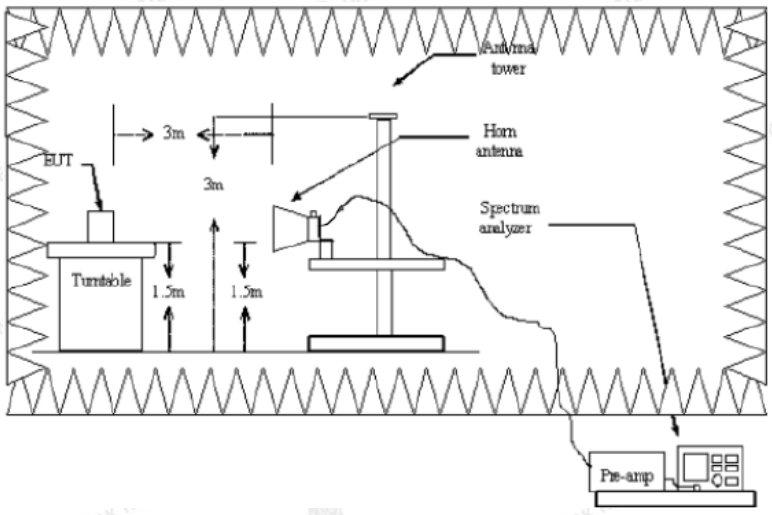
Frequency Range (MHz)	Maximum power	Bandwidth
30 MHz to 47 MHz	-36	100 kHz
47 MHz to 74 MHz	-54	100 kHz
74 MHz to 87.5 MHz	-36	100 kHz
87.5 MHz to 118 MHz	-54	100 kHz
118 MHz to 174 MHz	-36	100 kHz
174 MHz to 230 MHz	-54	100 kHz
230 MHz to 470 MHz	-36	100 kHz
470 MHz to 862 MHz	-54	100 kHz
862 MHz to 1 GHz	-36	100 kHz
1 GHz to 5.15 GHz	-30	1 MHz
5.35 GHz to 5.47 GHz	-30	1 MHz
5.725 GHz to 26 GHz	-30	1 MHz

9.2. Test Setup

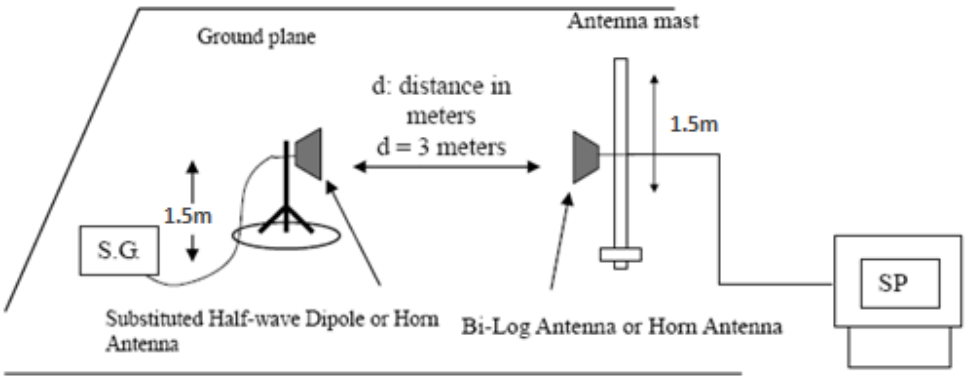
Below 1GHz



Above 1GHz



Substituted Method Test Set-up



9.3. Test Procedure

1. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.5.1 for the test conditions
2. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.5.2 for the test method.

9.4. Test Result

5180MHz-5240MHz

802.11n HT 20, CH 36, Horizontal/Vertical

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
212.48	V	-77.55	-54	-23.55	PASS
228.13	V	-77.94	-54	-23.94	PASS
322.11	V	-78.35	-36	-42.35	PASS
431.32	V	-74.78	-36	-38.78	PASS
529.48	V	-75.48	-54	-21.48	PASS
822.26	V	-78.57	-54	-24.57	PASS
184.84	H	-73.64	-54	-19.64	PASS
238.03	H	-78.16	-54	-24.16	PASS
329.19	H	-72.67	-36	-36.67	PASS
413.95	H	-75.16	-36	-39.16	PASS
620.81	H	-75.88	-54	-21.88	PASS
850.81	H	-78.19	-54	-24.19	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2. Other point of the measurements are below 20dB from the limit.					

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
1807.19	V	-50.85	-30	-20.85	PASS
2243.91	V	-57.67	-30	-27.67	PASS
3368.02	V	-60.88	-30	-30.88	PASS
4193.45	V	-56.36	-30	-26.36	PASS
5418.15	V	-50.71	-30	-20.71	PASS
5824.69	V	-56.84	-30	-26.84	PASS
2025.19	H	-52.06	-30	-22.06	PASS
2224.72	H	-58.44	-30	-28.44	PASS
2923.97	H	-53.38	-30	-23.38	PASS
3769.91	H	-55.57	-30	-25.57	PASS
4701.98	H	-55.54	-30	-25.54	PASS
6454.69	H	-50.55	-30	-20.55	PASS

Note:

1.Cable loss and antenna gain was combined in the calculated result.

2. Other point of the measurements are below 20dB from the limit.

5260MHz -5320MHz

802.11n HT 20, CH 52, Horizontal/Vertical

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
217.99	V	-76.25	-54	-22.25	PASS
235.48	V	-77.65	-54	-23.65	PASS
332.28	V	-77.27	-36	-41.27	PASS
430.28	V	-76.58	-36	-40.58	PASS
528.14	V	-75.76	-54	-21.76	PASS
827.88	V	-78.95	-54	-24.95	PASS
192.68	H	-74.51	-54	-20.51	PASS
233.75	H	-78.37	-54	-24.37	PASS
328.84	H	-71.81	-36	-35.81	PASS
422.98	H	-75.34	-36	-39.34	PASS
628.23	H	-74.77	-54	-20.77	PASS
845.84	H	-78.46	-54	-24.46	PASS

Note:

1.Cable loss and antenna gain was combined in the calculated result.

2. Other point of the measurements are below 20dB from the limit.

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
1823.31	V	-52.15	-30	-22.15	PASS
2308.62	V	-57.09	-30	-27.09	PASS
3437.28	V	-60.54	-30	-30.54	PASS
4223.08	V	-56.44	-30	-26.44	PASS
5354.12	V	-50.44	-30	-20.44	PASS
5866.91	V	-56.85	-30	-26.85	PASS
2169.05	H	-51.08	-30	-21.08	PASS
2298.21	H	-57.68	-30	-27.68	PASS
2948.09	H	-52.95	-30	-22.95	PASS
3830.54	H	-54.71	-30	-24.71	PASS
4785.38	H	-54.54	-30	-24.54	PASS
6560.26	H	-48.46	-30	-18.46	PASS

Note:

1.Cable loss and antenna gain was combined in the calculated result.

2. Other point of the measurements are below 20dB from the limit.

5500MHz -5700MHz

802.11n HT 20, CH 100, Horizontal/Vertical

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
222.24	V	-77.06	-54	-23.06	PASS
239.99	V	-77.35	-54	-23.35	PASS
340.93	V	-76.74	-36	-40.74	PASS
443.01	V	-76.44	-36	-40.44	PASS
531.95	V	-77.08	-54	-23.08	PASS
840.59	V	-77.78	-54	-23.78	PASS
200.06	H	-74.05	-54	-20.05	PASS
240.55	H	-79.05	-54	-25.05	PASS
333.91	H	-71.68	-36	-35.68	PASS
419.39	H	-75.71	-36	-39.71	PASS
630.26	H	-75.36	-54	-21.36	PASS
854.65	H	-80.94	-54	-26.94	PASS

Note:

1.Cable loss and antenna gain was combined in the calculated result.

2. Other point of the measurements are below 20dB from the limit.

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
1952.51	V	-50.78	-30	-20.78	PASS
2381.44	V	-57.97	-30	-27.97	PASS
3499.94	V	-61.39	-30	-31.39	PASS
4323.38	V	-55.35	-30	-25.35	PASS
5464.02	V	-49.89	-30	-19.89	PASS
5948.74	V	-56.61	-30	-26.61	PASS
2167.21	H	-50.98	-30	-20.98	PASS
2303.52	H	-57.76	-30	-27.76	PASS
3070.78	H	-51.56	-30	-21.56	PASS
3884.29	H	-56.07	-30	-26.07	PASS
4806.81	H	-54.74	-30	-24.74	PASS
6620.08	H	-47.65	-30	-17.65	PASS

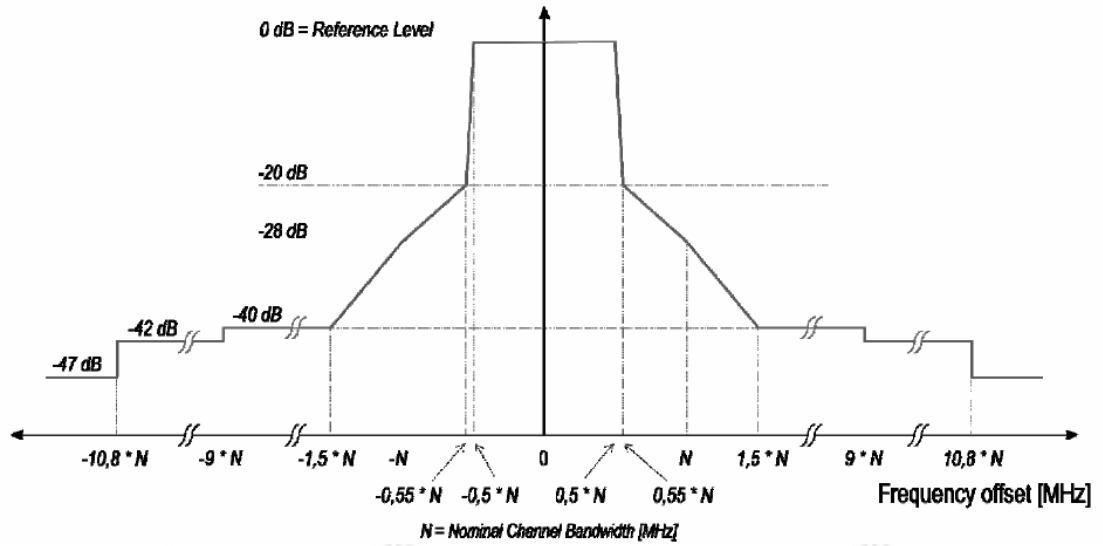
Note:

1.Cable loss and antenna gain was combined in the calculated result.

2. Other point of the measurements are below 20dB from the limit.

10 Transmitter Unwanted Emissions within the 5GHz RLAN Bands Test

10.1. Limit



Note: dBc is the spectral density relative to the maximum spectral power density of the transmitted signal.

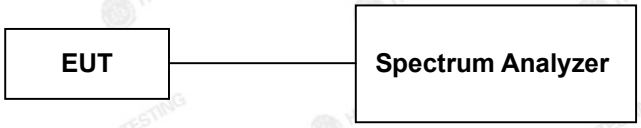
The mean Power Density (measured with a 1 MHz measurement bandwidth) of the transmitter unwanted emissions within the 5 GHz RLAN bands shall not exceed the limits of the mask provided in figure 1 or an absolute level of -30 dBm/MHz, whichever is greater. The limits in figure 1 are relative to the maximum Power Density of the RLAN device when measured with a reference bandwidth of 1 MHz.

The mask is only applicable within the band of operation. Beyond the band edges the requirements of clause 4.2.4.1apply.

In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet the limits provided in figure 1.

For transmitter unwanted emissions within the 5 GHz RLAN bands, simultaneous transmissions in adjacent channels may be considered as one signal with an actual Nominal Channel Bandwidth of "n" times the individual Nominal Channel Bandwidth where "n" is the number of adjacent channels used simultaneously. For simultaneous transmissions in multiple non-adjacent channels, the overall transmit spectral power mask is constructed in the following manner. First, a mask as provided in figure 1 is applied to each of the channels. Then, for each frequency point, the greatest value from the spectral masks of all the channels assessed shall be taken as the overall spectral mask requirement at that frequency.

10.2. Test Setup



10.3. Test Procedure

1. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4. 6.1 for the test conditions
2. Please refer to ETSI EN 301 893 (V2.1.1)c lause 5.4.6.2 for the test method.

10.4. Test Graphs

See Report UL-RPT-RP13337971-716A V2.0 for test data.

11 Receiver Spurious Emissions

11.1. Limit

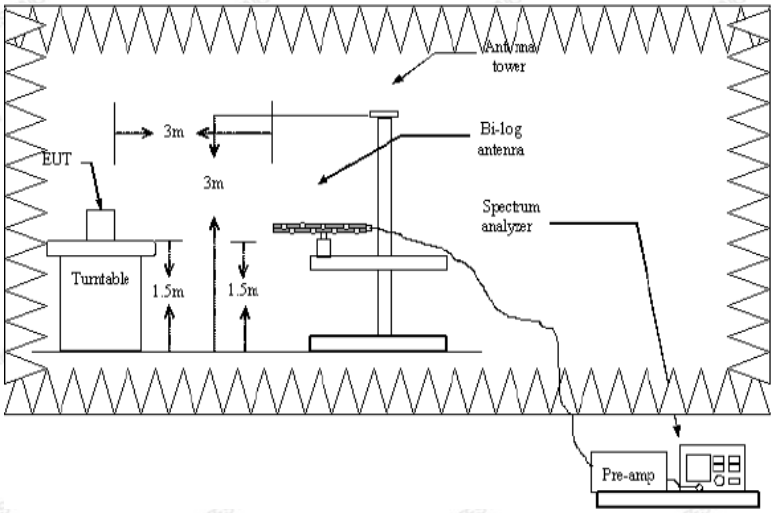
The spurious emissions of the receiver shall not exceed the limits given as follows.

Table 4: Spurious radiated emission limits

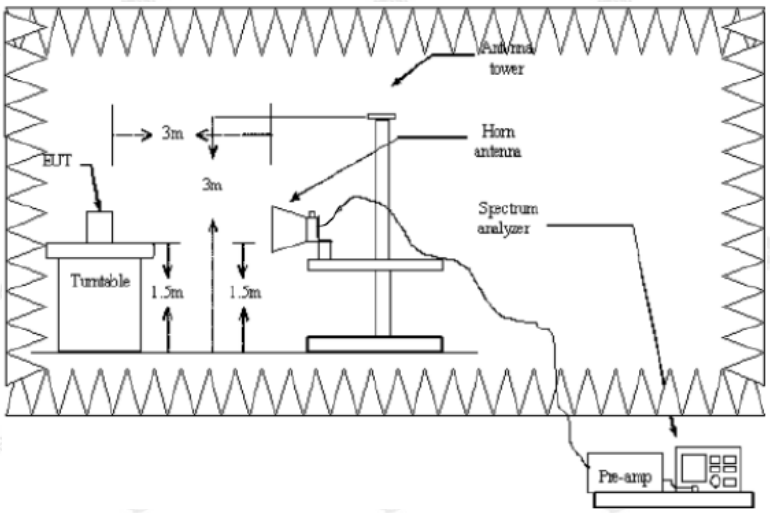
Frequency Range	Maximum power	Measurement Bandwidth
30 MHz to 1GHz	-57 dBm	100 kHz
1GHz to 26.5GHz	-47 dBm	1 MHz

11.2. Test Setup

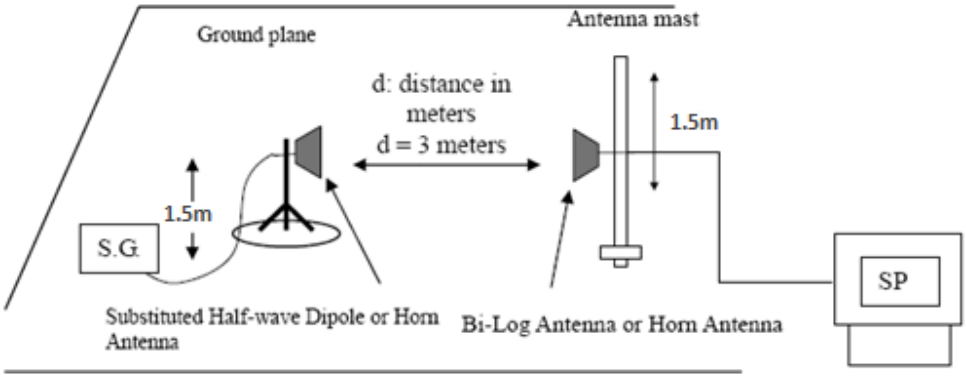
Below 1GHz



Above 1GHz



Substituted Method Test Set-up



11.3. Test Procedure

1. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.7.1 for the test conditions
2. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.7.2 for the test method.

11.4. Test Result

5180MHz -5240MHz

802.11n HT 20, CH 36, Horizontal/Vertical

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
197.24	V	-72.74	-57	-15.74	PASS
231.23	V	-74.05	-57	-17.05	PASS
328.49	V	-80.47	-57	-23.47	PASS
444.78	V	-75.16	-57	-18.16	PASS
526.05	V	-75.94	-57	-18.94	PASS
822.33	V	-79.41	-57	-22.41	PASS
263.81	H	-77.57	-57	-20.57	PASS
271.23	H	-78.27	-57	-21.27	PASS
316.81	H	-79.94	-57	-22.94	PASS
424.26	H	-78.86	-57	-21.86	PASS
621.14	H	-74.16	-57	-17.16	PASS
850.32	H	-74.28	-57	-17.28	PASS

Note:

1.Cable loss and antenna gain was combined in the calculated result.

2. Other point of the measurements are below 20dB from the limit.

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
1958.32	V	-73.85	-47	-26.85	PASS
2250.17	V	-76.15	-47	-29.15	PASS
3374.74	V	-69.45	-47	-22.45	PASS
4174.07	V	-75.65	-47	-28.65	PASS
5207.65	V	-73.55	-47	-26.55	PASS
5816.12	V	-75.47	-47	-28.47	PASS
2073.01	H	-74.06	-47	-27.06	PASS
2125.87	H	-78.95	-47	-31.95	PASS
2980.11	H	-72.93	-47	-25.93	PASS
3769.69	H	-77.57	-47	-30.57	PASS
4690.92	H	-76.68	-47	-29.68	PASS
6450.85	H	-80.04	-47	-33.04	PASS

Note:

1.Cable loss and antenna gain was combined in the calculated result.

2. Other point of the measurements are below 20dB from the limit.

5260MHz -5320MHz

802.11n HT 20, CH 52, Horizontal/Vertical

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
201.19	V	-74.15	-57	-17.15	PASS
241.38	V	-74.84	-57	-17.84	PASS
333.79	V	-80.34	-57	-23.34	PASS
457.38	V	-76.29	-57	-19.29	PASS
530.76	V	-76.47	-57	-19.47	PASS
825.63	V	-79.54	-57	-22.54	PASS
266.18	H	-77.31	-57	-20.31	PASS
282.11	H	-76.39	-57	-19.39	PASS
321.33	H	-79.21	-57	-22.21	PASS
433.12	H	-79.96	-57	-22.96	PASS
620.53	H	-74.97	-57	-17.97	PASS
853.45	H	-75.99	-57	-18.99	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2. Other point of the measurements are below 20dB from the limit.					

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
2014.01	V	-73.77	-47	-26.77	PASS
2282.39	V	-76.91	-47	-29.91	PASS
3453.97	V	-70.15	-47	-23.15	PASS
4144.98	V	-74.67	-47	-27.67	PASS
5291.75	V	-73.15	-47	-26.15	PASS
5814.24	V	-74.78	-47	-27.78	PASS
2186.31	H	-72.58	-47	-25.58	PASS
2254.87	H	-78.25	-47	-31.25	PASS
3052.17	H	-73.49	-47	-26.49	PASS
3820.24	H	-77.81	-47	-30.81	PASS
4726.72	H	-76.29	-47	-29.29	PASS
6495.27	H	-79.19	-47	-32.19	PASS

Note:

1.Cable loss and antenna gain was combined in the calculated result.

2. Other point of the measurements are below 20dB from the limit.

5500MHz -5700MHz

802.11n HT 20, CH 100, Horizontal/Vertical

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
197.46	V	-74.18	-57	-17.18	PASS
226.08	V	-73.35	-57	-16.35	PASS
324.43	V	-82.44	-57	-25.44	PASS
454.76	V	-75.36	-57	-18.36	PASS
535.26	V	-77.48	-57	-20.48	PASS
829.24	V	-78.41	-57	-21.41	PASS
259.47	H	-78.04	-57	-21.04	PASS
278.69	H	-77.85	-57	-20.85	PASS
316.26	H	-81.47	-57	-24.47	PASS
429.84	H	-78.04	-57	-21.04	PASS
624.51	H	-72.95	-57	-15.95	PASS
855.39	H	-72.83	-57	-15.83	PASS

Note:

1.Cable loss and antenna gain was combined in the calculated result.

2. Other point of the measurements are below 20dB from the limit.

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
2106.13	V	-73.17	-47	-26.17	PASS
2279.68	V	-75.99	-47	-28.99	PASS
3354.61	V	-70.43	-47	-23.43	PASS
4185.68	V	-77.17	-47	-30.17	PASS
5281.37	V	-74.47	-47	-27.47	PASS
5855.38	V	-75.41	-47	-28.41	PASS
2207.09	H	-73.19	-47	-26.19	PASS
2229.81	H	-79.89	-47	-32.89	PASS
3068.47	H	-72.44	-47	-25.44	PASS
3868.37	H	-78.49	-47	-31.49	PASS
4776.04	H	-77.27	-47	-30.27	PASS
6593.19	H	-80.47	-47	-33.47	PASS

Note:

1.Cable loss and antenna gain was combined in the calculated result.

2. Other point of the measurements are below 20dB from the limit.

12 Dynamic Frequency Selection (DFS) Test

Applicability of DFS requirements

Requirement	DFS Operational mode		
	Master	Slave without radar detection (see table D.2, note 2)	Slave with radar detection (see table D.2, note 2)
Channel Availability Check (see Note 3 & 4)	✓	Not required	✓ (see Note2)
Off-Channel CAC (see Note 1 & 3 & 4 & 5)	✓	Not required	✓ (see Note2)
In-Service Monitoring (see Note 3 & 4)	✓	Not required	✓
Channel Shutdown (see Note 3)	✓	✓	✓
Non-Occupancy Period (see Note 3 & 4)	✓	Not required	✓
Uniform Spreading (see Note 3 & 6)	✓	Not required	Not required

Note 1: Where implemented by the manufacturer.

Note 2: A slave with radar detection is not required to perform a CAC or Off-Channel CAC at initial use of the channel but only after the slave has detected a radar signal on the Operating Channel by In-Service Monitoring.

Note 3: DFS is not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MHz.

Note 4: Slave devices with a maximum transmit power of less than 200 mW e.i.r.p. do not have to implement the Channel Availability Check, the Off-Channel CAC, the In-service Monitoring and the Non-Occupancy Period. Slave devices with a maximum transmit power of 200 mW e.i.r.p. or more do not have to perform Channel Availability Check or Off-Channel CAC at initial use of a channel.

Note 5: Where implemented by the manufacturer.

Note 6: Uniform Spreading is not required for Slave devices.

The radar detection requirements specified in clause 4.2.6.2.2 to clause 4.2.6.2.4 assume that the centre frequencies of the radar signals fall within the central 80 % of the *Occupied Channel Bandwidth* of the RLAN (see clause 4.2.2).

12.1. Test Setup

Set-up B is a set-up whereby the UUT is an RLAN device operating in slave mode, with or without Radar Interference Detection function. This set-up also contains an RLAN device operating in master mode. The radar test signals are injected into the master device. The UUT (slave device) is associated with the master device.

Figure 5 shows an example for Set-up B. The set-up used shall be documented in the test report.

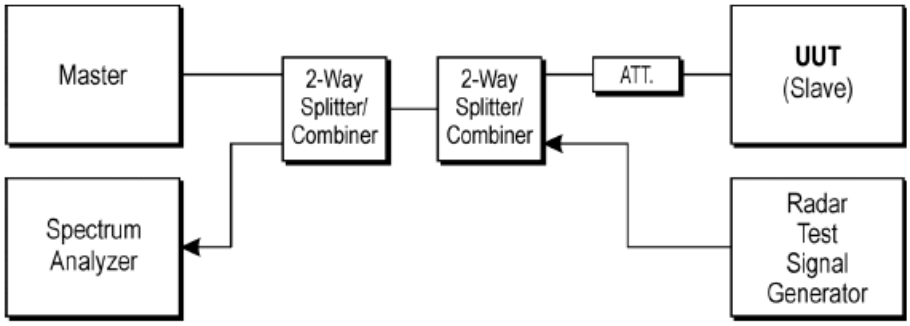


Figure 5: Set-up B

The UUT is an RLAN device operating in slave mode with Radar Interference Detection function. Radar test signals are injected into the slave device. This set-up also contains an RLAN device operating in master mode. The UUT (slave device) is associated with the master device.

Figure 6 shows an example for Set-up C. The set-up used shall be documented in the test report.

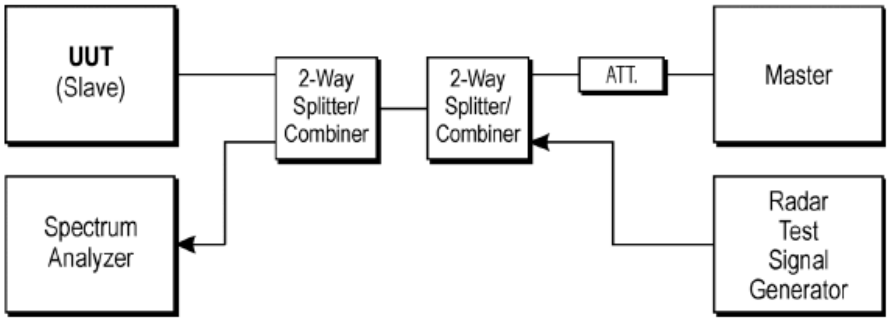


Figure 6: Set-up C

12.2. Test Procedure

1. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.8.1 for the test conditions.
2. Please refer to ETSI EN 301 893 (V2.1.1) clause 5.4.8.2 for the test method

12.3. Limit

Table D.1: DFS requirement values

Parameter	Value
Channel Availability Check Time	60 s (see Note 1)
Minimum Off-Channel CAC Time	6 minutes (see Note 2)
Maximum Off-Channel CAC Time	4 hours (see Note 2)
Channel Move Time	10 s
Channel Closing Transmission Time	1 s
Non-Occupancy Period	30 minutes

Note 1: For channels whose nominal bandwidth falls completely or partly within the band 5600 MHz to 5650 MHz, the Channel Availability Check Time shall be 10 minutes.

Note 2: For channels whose nominal bandwidth falls completely or partly within the band 5600 MHz to 5650 MHz, the Off-Channel CAC Time shall be within the range 1 hour to 24 hours.

Table D.2: Interference threshold values

e.i.r.p. Spectral Density (dBm/MHz)	Value (see Notes 1 and 2)
10	-62 dBm

Note 1: This is the level at the input of the receiver of an RLAN device with a maximum e.i.r.p. density of 10 dBm/MHz and assuming a 0 dBi receive antenna. For devices employing different e.i.r.p. spectral density and/or a different receive antenna gain G (dBi) the DFS threshold level at the receiver input follows the following relationship: DFS Detection Threshold (dBm) = -62 + 10 - e.i.r.p. Spectral Density (dBm/MHz) + G (dBi); however the DFS threshold level shall not be less than -64 dBm assuming a 0 dBi receive antenna gain.

Note 2: Slave devices with a maximum e.i.r.p. of less than 23 dBm do not have to implement radar detection unless these devices are used in fixed outdoor point to point or fixed outdoor point to multipoint applications (see ETSI EN 301 893 clause 4.7.1.3).

Table D.3: Parameters of the reference DFS test signal

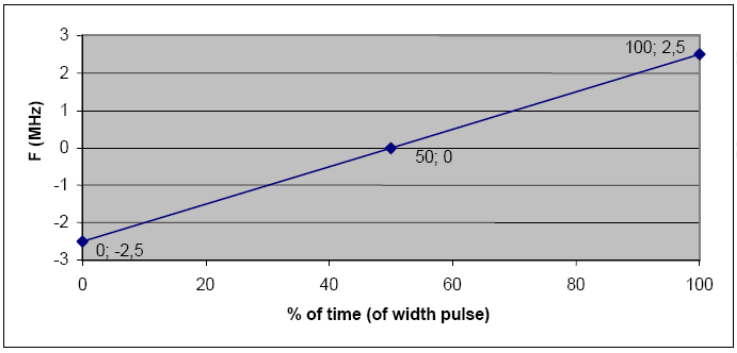
Pulse width (W [µs])	Pulse repetition frequency PRF (pps)	Pulses per burst (PPB)
1	700	18

Table D.4: Parameters of radar test signals

Radar test signal # (see Notes 1 to 3)	Pulse width W [µs]		Pulse repetition frequency PRF (PPS)		Number of different PRFs	Pulses per burst for each PRF (PPB) (see Note 5)
	Min	Max	Min	Max		
1	0.5	5	200	1000	1	10 (see Note 6)
2	0.5	15	200	1600	1	15 (see Note 6)
3	0.5	15	2300	4000	1	25
4	20	30	2000	4000	1	20
5	0.5	2	300	400	2/3	10 (see Note 6)
6	0.5	2	400	1200	2/3	15 (see Note 6)

Note 1: Radar test signals 1 to 4 are constant PRF based signals. See figure D.1. These radar test signals are intended to simulate also radars using a packet based Staggered PRF. See figure D.2.

Note 2: Radar test signal 4 is a modulated radar test signal. The modulation to be used is a chirp modulation with a ±2,5 MHz frequency deviation which is described below.



Note 3: Radar test signals #5 and #6 are single pulse based Staggered PRF radar test signals using 2 or 3 different PRF values. For radar test signal #5, the difference between the PRF values chosen shall be between 20 PPS and 50 PPS. For radar test signal #6, the difference between the PRF values chosen shall be between 80 PPS and 400 PPS. See figure D.3.

Note 4: Apart for the Off-Channel CAC testing, the radar test signals above shall only contain a single burst of pulses. See figure D.1, figure D.3 and figure D.4. For the Off-Channel CAC testing, repetitive bursts shall be used for the total duration of the test. See figure D.2 and figure D.5. See also ETSI EN 301 893 clauses 4.7.2.3, ETSI EN 301 893 clauses 5.3.8.2.1.4.2 and ETSI EN 301 893 clauses 5.3.8.2.1.4.3.

Note 5: The total number of pulses in a burst is equal to the number of pulses for a single PRF multiplied by the number of different PRFs used.

Note 6: For the CAC and Off-Channel CAC requirements, the minimum number of pulses (for each PRF) for any of the radar test signals to be detected in the band 5600 MHz to 5650 MHz shall be 18.

Table D.5: Detection probability

Parameter	Detection Probability (Pd)	
	Channels whose nominal bandwidth falls partly or completely within the 5600 MHz to 5650 MHz band	Other channels
CAC, Off-Channel CAC	99.99 %	60 %
In-Service Monitoring	60 %	60 %

Note 1: P_d gives the probability of detection per simulated radar burst and represents a minimum level of detection performance under defined conditions. Therefore P_d does not represent the overall detection probability for any particular radar under real life conditions.

12.4. Channel Availability Check

12.4.1. Limit

The Channel Availability Check shall be performed during a continuous period in time (Channel Availability Check Time) which shall not be less than the value defined in table D.1.

During the Channel Availability Check, the RLAN device shall be capable of detecting any of the radar test signals that fall within the ranges given by table D.4 with a level above the Radar Detection Threshold defined in table D.2.

The minimum required detection probability is defined in table D.5.

12.4.2. Test Result

Not applicable, the EUT is a slave RLAN device without radar detection.

Therefore the Channel Availability Check is not required.

12.5. Off-Channel CAC (Off-Channel Channel Availability Check) (Optional)

12.5.1. Limit

Where implemented, the Off-Channel CAC Time shall be declared by the manufacturer. However, the declared Off-Channel CAC Time shall be within the range specified in table D.1.
During the Off-Channel CAC, the RLAN shall be capable of detecting any of the radar test signals that fall within the ranges given by table D.4 with a level above the Radar Detection Threshold defined in table D.2. The minimum required detection probability is defined in table D.5.

12.5.2. Test Result

Not applicable, the EUT is a slave RLAN device without radar detection.
Therefore the Channel Availability Check is not required.

12.6. In-Service Monitoring

12.6.1. Limit

The In-Service Monitoring shall be used to monitor each Operating Channel.
The In-Service-Monitoring shall start immediately after the RLAN device has started transmissions on a channel. During the In-Service Monitoring, the RLAN device shall be capable of detecting any of the radar test signals that fall within the ranges given by table D.4 with a level above the Radar Detection Threshold defined in table D.2. The minimum required detection probability associated with a given radar test signal is defined in table D.5.

12.6.2. Test Result

Not applicable, the EUT is a slave RLAN device without radar detection.
Therefore the In-Service Monitoring is not required.

12.7. Channel Shutdown

12.7.1. Limit

The Channel Move Time shall not exceed the limit defined in table D.1.

The Channel Closing Transmission Time shall not exceed the limit defined in table D.1.

12.7.2. Test Result

See Report UL-RPT-RP13337971-716A V2.0 for test data.

12.8. Non-Occupancy Period

12.8.1. Limit

The Non-Occupancy Period shall not be less than the value defined in table D.1.

12.8.2. Test Result

Not applicable, the EUT is a slave RLAN device without radar detection.
Therefore the Non-Occupancy Period is not required.

12.9. Uniform Spreading

12.9.1. Limit

Each of the declared Channel Plans (see ETSI EN 301 893 clause 3.1) shall make use of at least 60 % of the spectrum available in the applicable sub-band(s).

The Uniform Spreading is limited to the usable channels being declared as part of the channel plan.

Usable channels do not include channels which are precluded by either:

1) the intended outdoor usage of the RLAN; or

2) previous detection of a radar on the channel (Unavailable Channel or Unusable Channel); or

3) national regulations; or

4) the restriction to only operate in the band 5150 MHz to 5250 MHz for RLAN devices without a radar detection capability.

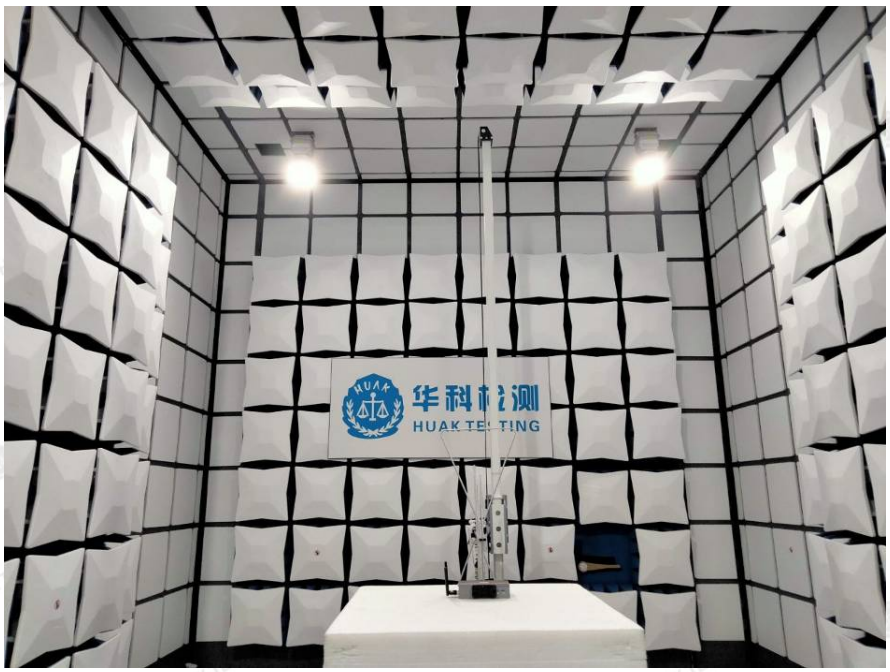
Each of the Usable Channels shall be used with approximately equal probability. RLAN equipment for which the declared channel plan includes channels whose nominal bandwidth falls completely or partly within the band 5600 MHz to 5650 MHz may omit these channels from the list of Usable Channels at initial power up or at initial installation. Channels being used by other RLAN equipment may be omitted from the list of Usable Channels.

12.9.2. Test Result

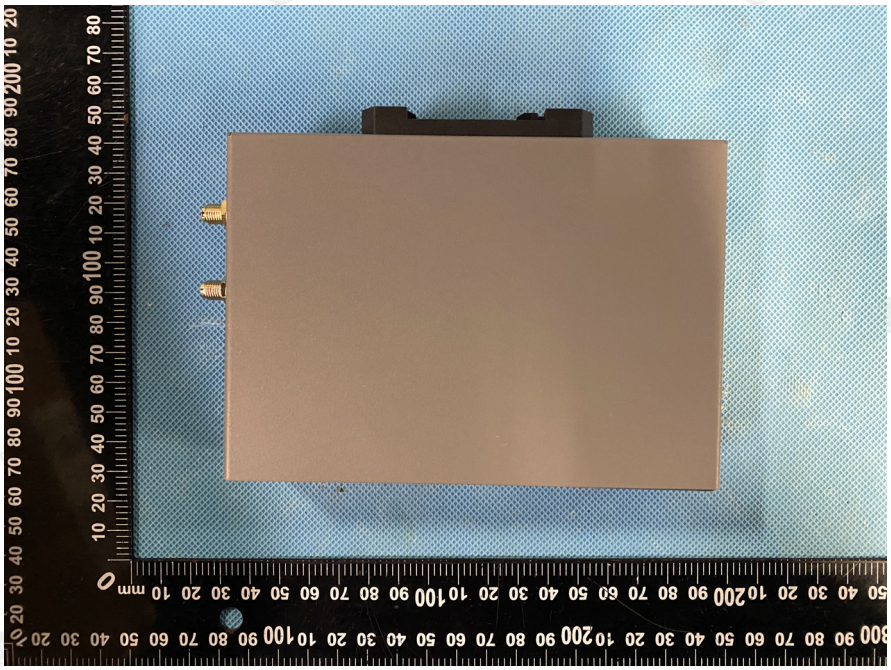
Not applicable, the EUT is a slave RLAN device without radar detection.

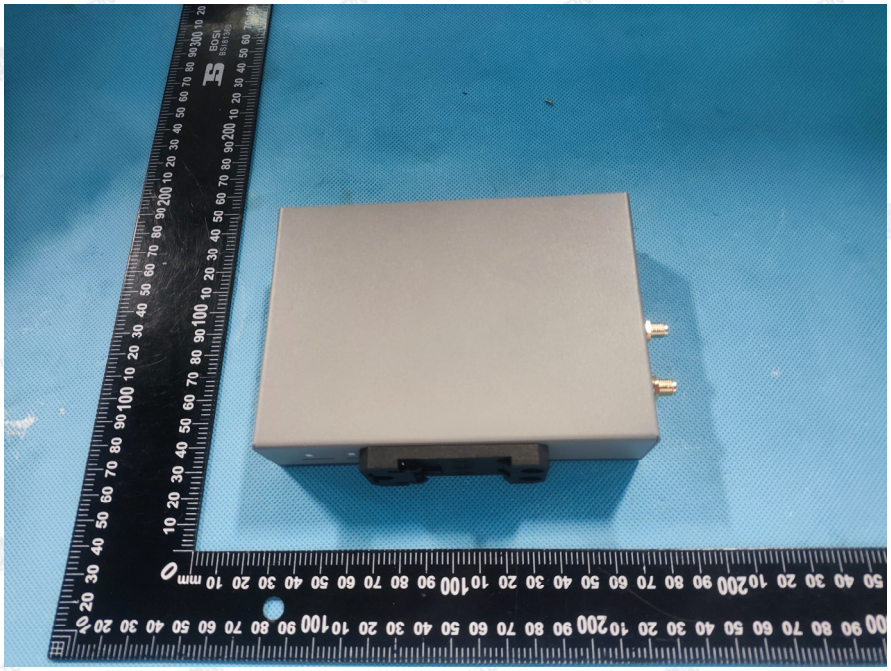
Therefore the Uniform Spreading is not required.

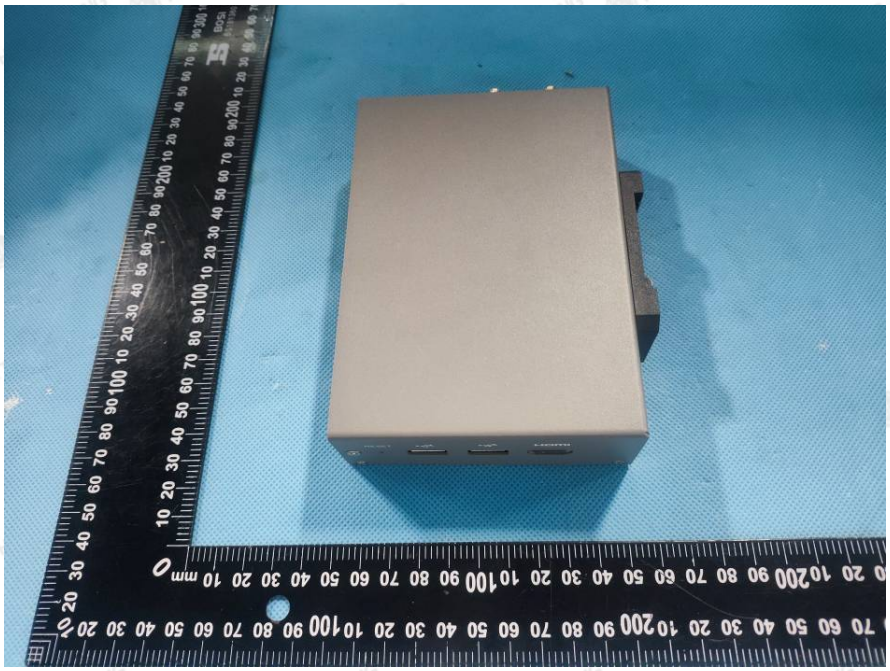
13 Test Setup Photograph



14 EUT Photograph

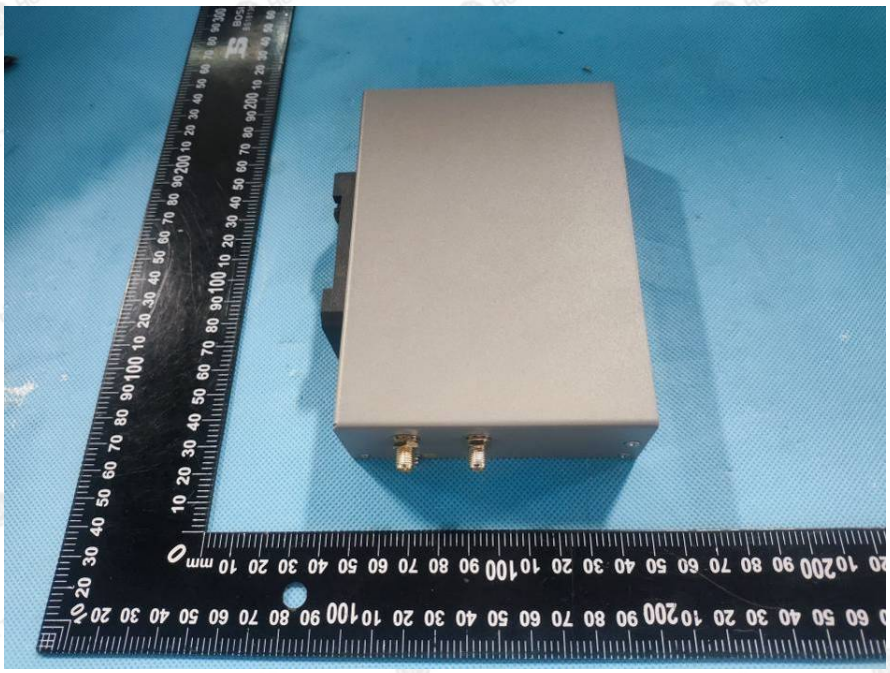


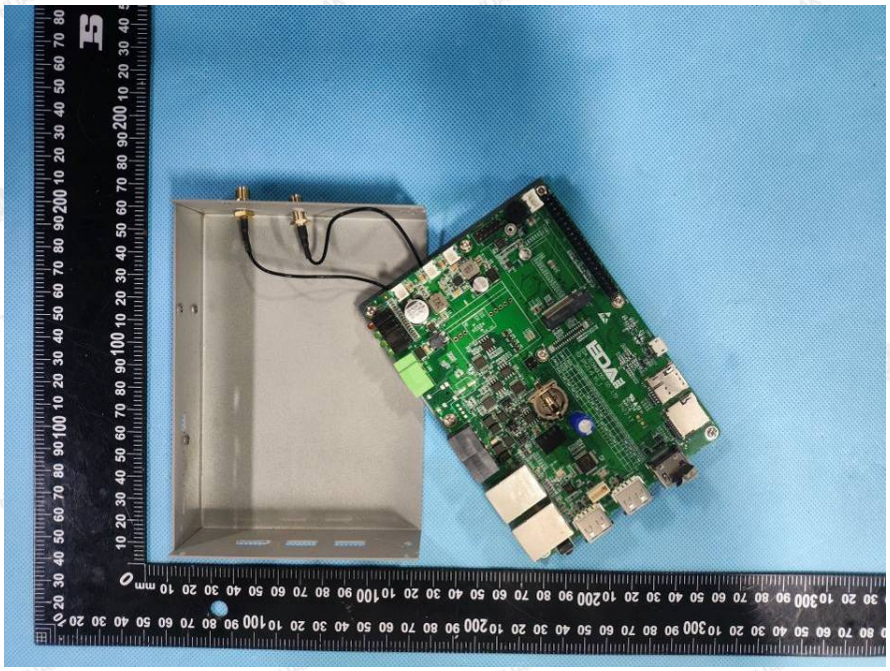




TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China





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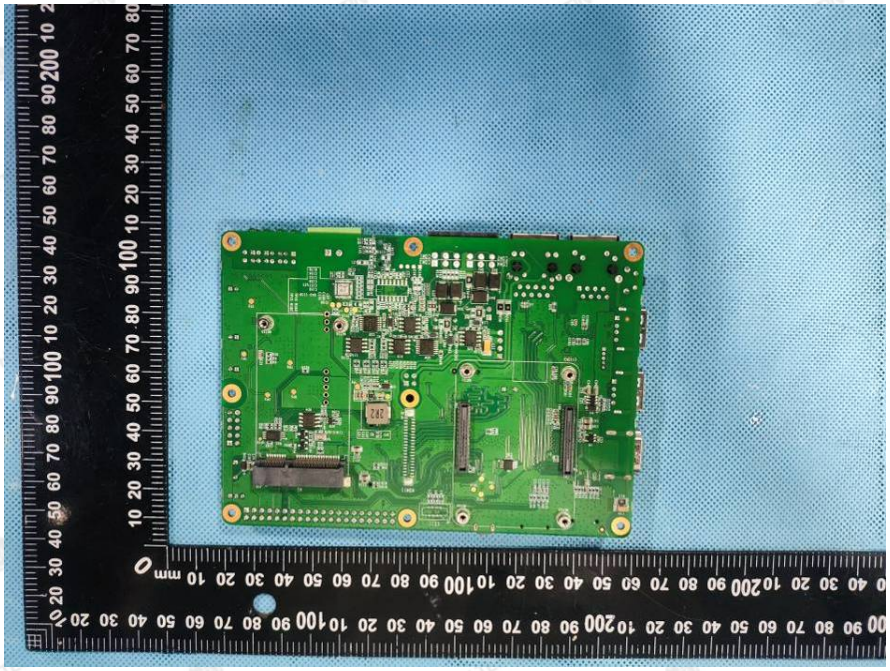
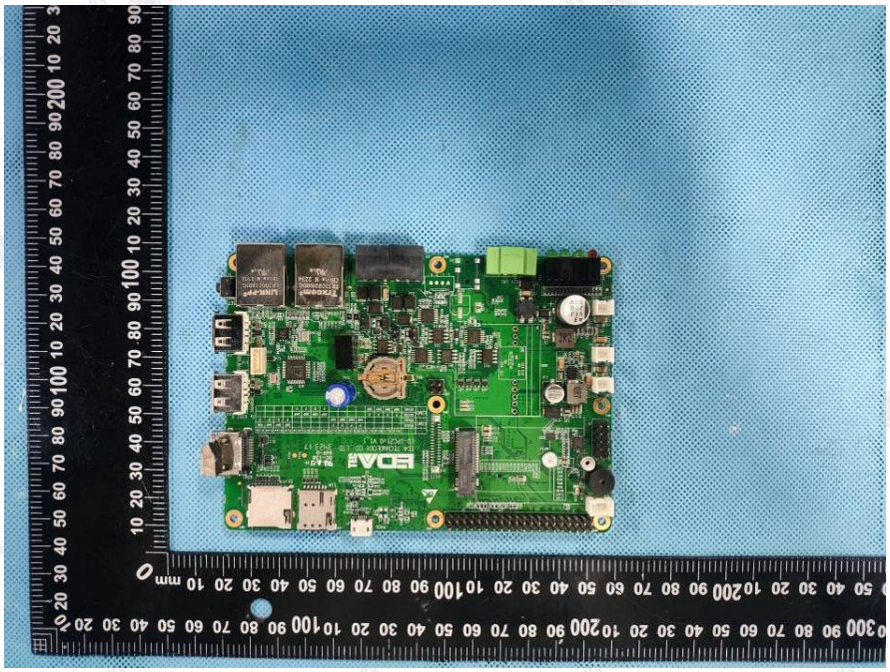
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China





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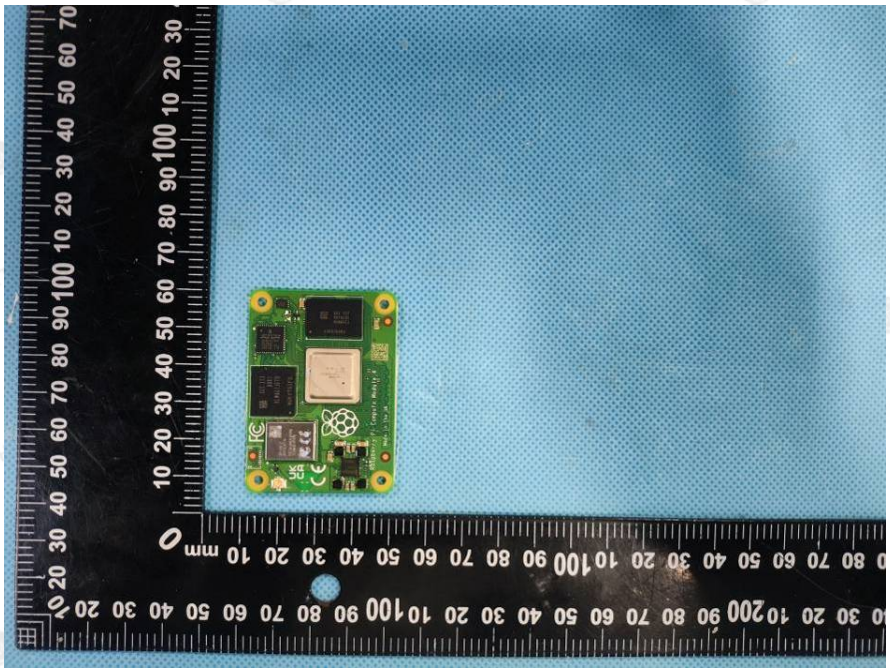

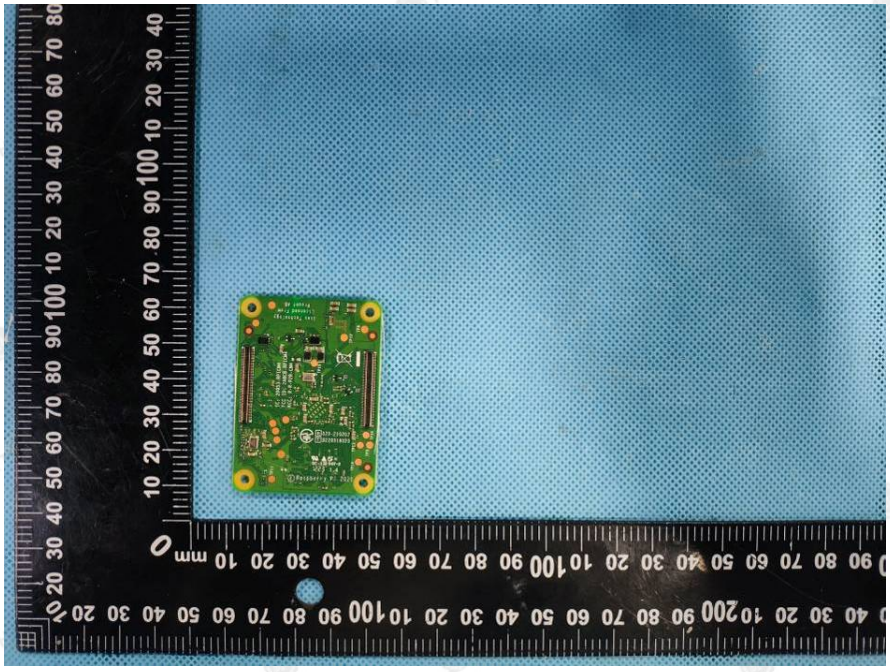

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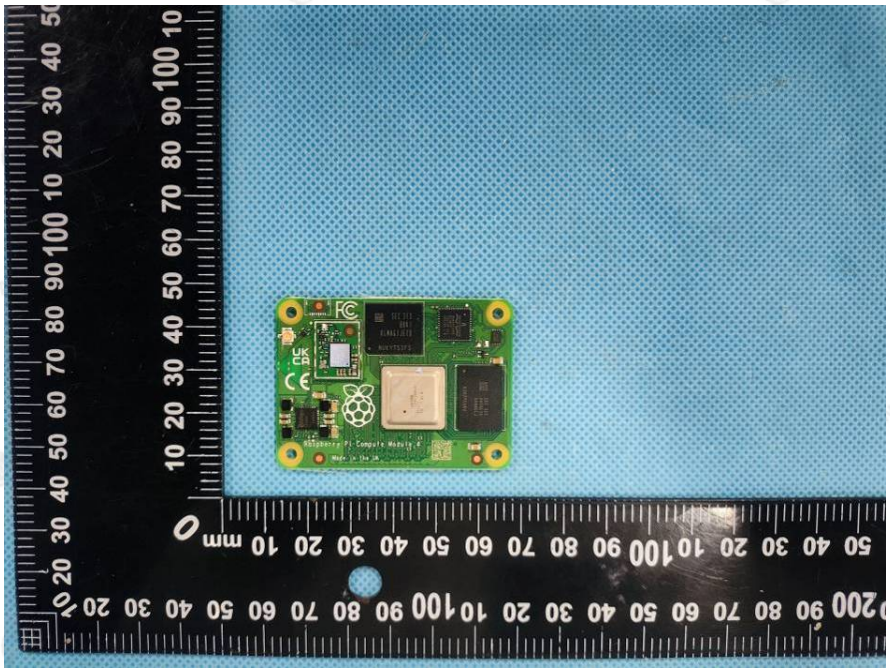
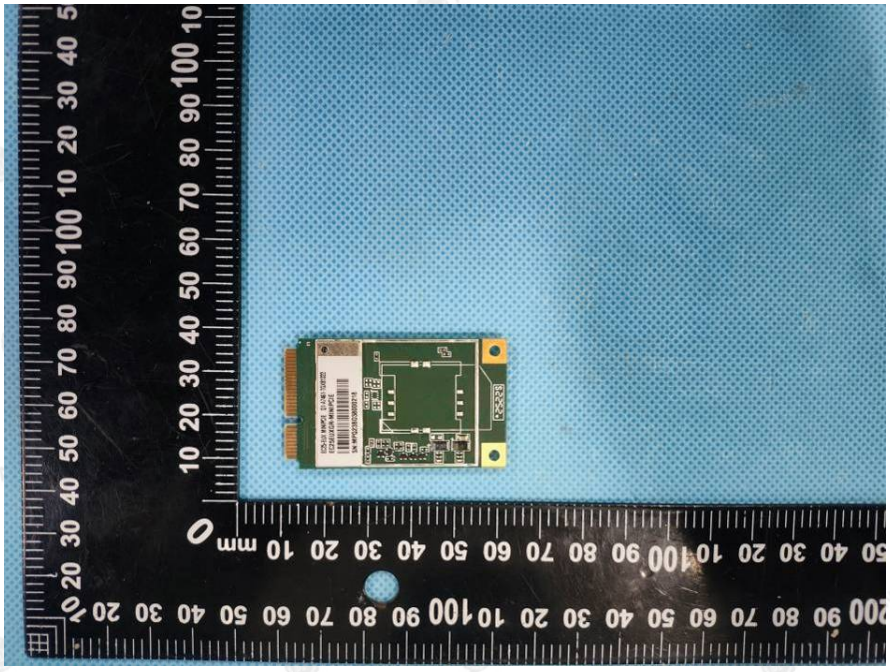
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China





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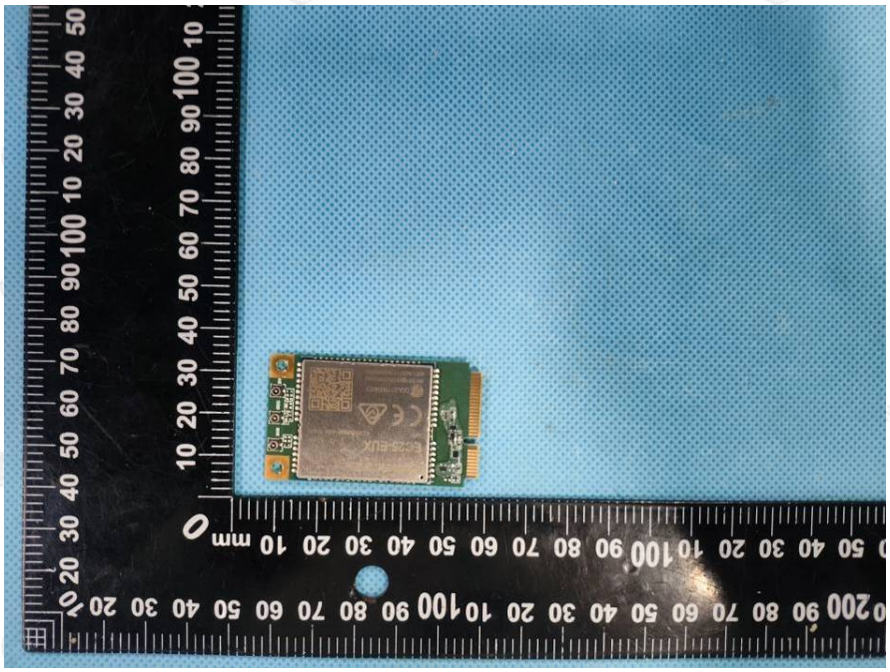

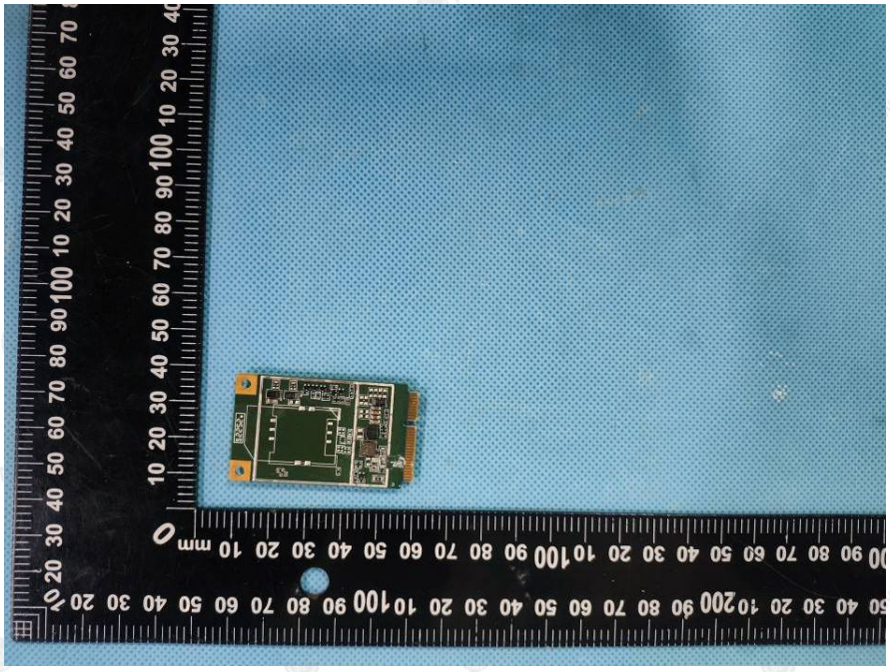

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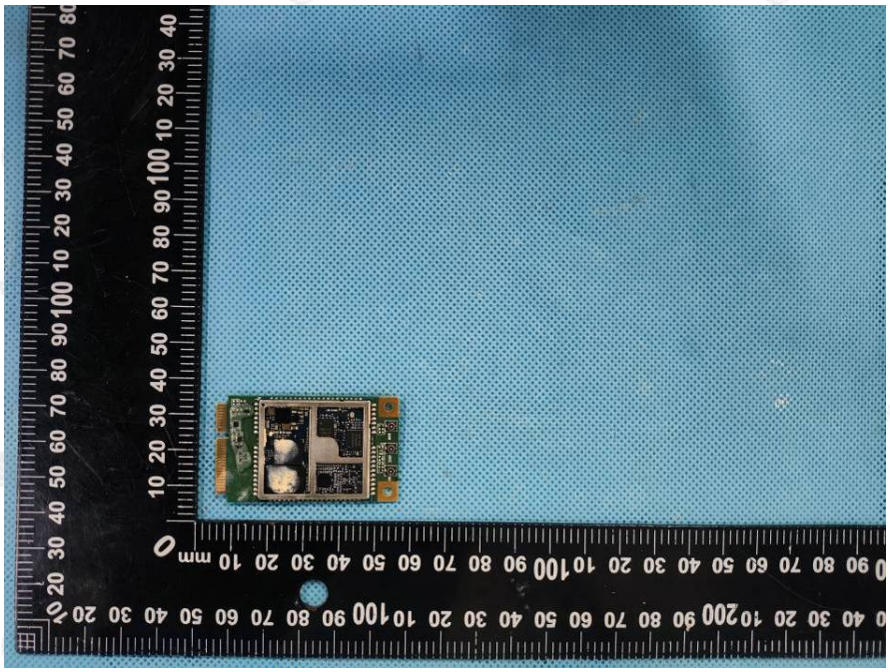

.....End of Report.....

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