

EN 300 440 RF Test Report

Report No.: REBBUI-WTW-P21040655-2

Test Model: RTL8852BE

Received Date: Apr. 20, 2021

Test Date: May 05 to June 16, 2021

Issued Date: Aug. 05, 2021

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Release Control Record

Issue No.	Description	Date Issued
REBBUI-WTW-P21040655-2	Original release.	Aug. 05, 2021

1 Certificate of Conformity

Product: 11ax RTL8852BE Combo module

Brand: REALTEK

Test Model: RTL8852BE

Sample Status: Engineering sample

Applicant: Realtek Semiconductor Corp.

Test Date: May 05 to June 16, 2021

Standards: EN 300 440 V2.1.1 (2017-03)

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Phoenix Huang , **Date:** Aug. 05, 2021
Phoenix Huang / Specialist

Approved by : Clark Lin , **Date:** Aug. 05, 2021
Clark Lin / Technical Manager

2 Summary of Test Results

The EUT has been tested according to the following specifications:

EN 300 440 V2.1.1		
Clause	Test Parameter	Result
Transmitter Parameters		
4.2.2	Equivalent Isotropic Radiated Power (e.i.r.p)	Pass
4.2.3	Permitted Range of Operating Frequencies	Pass
4.2.4	Unwanted Emission in the Spurious Domain	Pass
Receiver Parameters		
4.3.5	Receiver spurious radiations	Pass
4.3.3	Adjacent channel selectivity (Applied to Receiver Category 1)	Pass
4.3.4	Blocking or desensitization (Applied to Receiver Category 1 and 2)	Pass

- Note: 1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
 2. The radiated spurious emission of the transmitter on standby mode is equal to that of receiver mode.

2.1 Test Instruments

For Legacy mode - spurious emissions (below 1GHz) test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Keysight	N9030A	MY54490570	June 16, 2020	June 15, 2021
Pre_Amplifier Agilent	8447D	2944A10663	Apr. 26, 2021	Apr. 25, 2022
TRILOG Antenna SCHWARZBECK	VULB9168	9168-162	Nov. 09, 2020	Nov. 08, 2021
Software	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208411	NA	NA
Power meter Anritsu	ML2495A	1529002	July 22, 2020	July 21, 2021
Power sensor Anritsu	MA2411B	1339443	July 22, 2020	July 21, 2021
Power meter Anritsu	ML2496A	1529003	Aug. 05, 2020	Aug. 04, 2021
Power sensor Anritsu	MA2411B	1339442	Aug. 05, 2020	Aug. 04, 2021
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	Nov. 18, 2020	Nov. 17, 2021

- NOTE:**
1. The test was performed in RF Fully Chamber No. 1.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: May 25, 2021

For RU mode - spurious emissions (below 1GHz) test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Keysight	N9030A	MY54490570	June 16, 2021	June 15, 2022
Pre_Amplifier Agilent	8447D	2944A10663	Apr. 26, 2021	Apr. 25, 2022
TRILOG Antenna SCHWARZBECK	VULB9168	9168-162	Nov. 09, 2020	Nov. 08, 2021
Software	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208411	NA	NA
Power meter Anritsu	ML2495A	1529002	July 22, 2020	July 21, 2021
Power sensor Anritsu	MA2411B	1339443	May 31, 2021	May 30, 2022
Power meter Anritsu	ML2496A	1529003	Aug. 05, 2020	Aug. 04, 2021
Power sensor Anritsu	MA2411B	1339442	Aug. 05, 2020	Aug. 04, 2021
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	Nov. 18, 2020	Nov. 17, 2021

- NOTE:**
1. The test was performed in RF Fully Chamber No. 1.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: June 16, 2021

For spurious emissions (above 1GHz) test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Keysight	N9030A	MY55410176	June 30, 2020	June 29, 2021
Pre_Amplifier HP	8449B	3008A01923	Oct. 08, 2020	Oct. 07, 2021
Pre_Amplifier EMC1	EMC184045	980143	Jan. 05, 2021	Jan. 04, 2022
Horn_Antenna SCHWARZBECK	BBHA 9120 D	9120D-1592	Nov. 22, 2020	Nov. 21, 2021
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 22, 2020	Nov. 21, 2021
Software	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208542	NA	NA
Power meter Anritsu	ML2495A	1529002	July 22, 2020	July 21, 2021
Power sensor Anritsu	MA2411B	1339443	July 22, 2020	July 21, 2021
Power meter Anritsu	ML2496A	1529003	Aug. 05, 2020	Aug. 04, 2021
Power sensor Anritsu	MA2411B	1339442	Aug. 05, 2020	Aug. 04, 2021
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	Nov. 18, 2020	Nov. 17, 2021

- NOTE:**
1. The test was performed in RF Fully Chamber No. 2.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: May 05 to 10, 2021

For adjacent channel selectivity & receiver blocking test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSW8	101497	Nov. 10, 2020	Nov. 09, 2021
Spectrum Analyzer Keysight	N9030A	MY55410176	June 30, 2020	June 29, 2021
Universal Wireless Test Set	MT8870A	6201671352	Mar. 07, 2021	Mar. 06, 2022
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	Nov. 18, 2020	Nov. 17, 2021
Upgrade the software license on current E4438C ESG Agilent	E4438CK-403	ESG E4_010001	NA	NA
MXG X-Series RF Vector Signal Generator Agilent	N5182B	MY53052700	July 14, 2020	July 13, 2021
Direct Coupler EMCI	CS20-18-436/16	1139	Jan. 11, 2021	Jan. 10, 2022
Power Splitter/combiner Mini-Circuits	ZN4PD-642W-S+	408501327_03	Sep. 30, 2020	Sep. 29, 2021
Power Splitter/combiner Mini-Circuits	ZN4PD-642W-S+	408501327_04	Sep. 30, 2020	Sep. 29, 2021

- NOTE:**
1. The test was performed in Adaptivity room.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: May 14, 2021

For Legacy mode - other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	May 29, 2020	May 28, 2021
Spectrum Analyzer Keysight	N9030A	MY54490570	June 16, 2020	June 15, 2021
AC Power Source Extech Electronics	6905S	1991551	NA	NA
Temperature & Humidity Chamber TERCHY	MHU-225AU	911033	Nov. 24, 2020	Nov. 23, 2021
DC Power Supply GOOD WILL INSTRUMENT CO., LTD.	GPC - 3030D	7700087	NA	NA
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	Nov. 18, 2020	Nov. 17, 2021
Power meter Anritsu	ML2495A	0824006	Apr. 28, 2021	Apr. 27, 2022
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA
MXG X-Series RF Vector Signal Generator Agilent	N5182B	MY53052700	July 14, 2020	July 13, 2021
MIMO Powermeasurement Test set (4X4) Agilent	U2021XA	U2021XA_01	Sep. 16, 2020	Sep. 15, 2021
MIMO Powermeasurement Test set (4X4) Agilent	U2021XA	U2021XA_02	Nov. 13, 2020	Nov. 12, 2021
Switch Box Agilent	PS-X10-100	PS-X10-100_01	Sep. 17, 2020	Sep. 16, 2021

- NOTE:**
1. The test was performed in Oven room 1.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: May 17 to 21, 2021

For RU mode - other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	101516	Mar. 08, 2021	Mar. 07, 2022
Spectrum Analyzer Keysight	N9030A	MY54490570	June 16, 2020	June 15, 2021
AC Power Source Extech Electronics	6905S	1991551	NA	NA
Temperature & Humidity Chamber TERCHY	MHU-225AU	911033	Nov. 24, 2020	Nov. 23, 2021
DC Power Supply GOOD WILL INSTRUMENT CO., LTD.	GPC - 3030D	7700087	NA	NA
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	Nov. 18, 2020	Nov. 17, 2021
Power meter Anritsu	ML2495A	0824006	Apr. 28, 2021	Apr. 27, 2022
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA
MXG X-Series RF Vector Signal Generator Agilent	N5182B	MY53052700	July 14, 2020	July 13, 2021
MIMO Powermeasurement Test set (4X4) Agilent	U2021XA	U2021XA_01	Sep. 16, 2020	Sep. 15, 2021
MIMO Powermeasurement Test set (4X4) Agilent	U2021XA	U2021XA_02	Nov. 13, 2020	Nov. 12, 2021
Switch Box Agilent	PS-X10-100	PS-X10-100_01	Sep. 17, 2020	Sep. 16, 2021

- NOTE:**
1. The test was performed in Oven room 1.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: June 04, 2021

2.2 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
Radio frequency	$\pm 1 \times 10^{-7}$
RF power (conducted)	± 1.2 dB
Radiated emission of transmitter, valid up to 26.5GHz	± 4.9 dB
Radiated emission of transmitter, valid between 26,5 GHz and 66 GHz	± 4.9 dB
Radiated emission of receivers, valid up to 26.5GHz	± 4.9 dB
Radiated emission of receiver, valid between 26,5 GHz and 66 GHz	± 4.9 dB
Temperature	± 0.4 °C
Humidity	± 0.6 %
Voltages(DC)	± 0.05 %
Voltages(AC, <10kHz)	± 0.05 %

NOTE: For radiated emissions above 26,5 GHz it may not be possible to achieve measurement uncertainties complying with the levels specified in this table. In these cases alone it is acceptable to employ the alternative interpretation procedure specified in clause 10.1.

2.3 Maximum Measurement Uncertainty

For the test methods, according to ETSI EN 300 440 standard, 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, in particular in annex D of the ETSI TR 100 028-2.

Maximum measurement uncertainty

Parameter	Uncertainty
Radio frequency	$\pm 1 \times 10^{-7}$
RF power (conducted)	± 2.5 dB
Radiated emission of transmitter, valid up to 26.5GHz	± 6.0 dB
Radiated emission of transmitter, valid between 26,5 GHz and 66 GHz	± 8.0 dB
Radiated emission of receivers, valid up to 26.5GHz	± 6.0 dB
Radiated emission of receiver, valid between 26,5 GHz and 66 GHz	± 8.0 dB
Temperature	± 1 °C
Humidity	± 5.0 %
Voltages(DC)	± 1.0 %
Voltages(AC, <10kHz)	± 2.0 %

NOTE: For radiated emissions above 26,5 GHz it may not be possible to achieve measurement uncertainties complying with the levels specified in this table. In these cases alone it is acceptable to employ the alternative interpretation procedure specified in clause 10.1.

2.4 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	11ax RTL8852BE Combo module
Brand	REALTEK
Test Model	RTL8852BE
Status of EUT	Engineering sample
Nominal Voltage	3.3 Vdc from host equipment
Voltage Operation Range	Vnom= 3.3 Vdc Vmin= 2.8 Vdc Vmax= 3.8 Vdc
Temperature Operating Range	-20°C ~ 70°C
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz 1024QAM for OFDMA in 11ax HE mode
Modulation Technology	DSSS, OFDM, OFDMA
Transfer Rate	802.11b: up to 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 300 Mbps 802.11ac: up to 866.7 Mbps 802.11ax: up to 1201.0 Mbps
Operating Frequency	2.4GHz: 2.412 ~ 2.472 GHz 5GHz: 5.18 ~ 5.24 GHz, 5.26 ~ 5.32 GHz, 5.50 ~ 5.70 GHz, 5.745 ~ 5.825 GHz
Number of Channel	2.4GHz: 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 13 802.11n (HT40), VHT40, 802.11ax (HE40): 9 5GHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 24 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 11 802.11ac (VHT80), 802.11ax (HE80): 5
EIRP Power	For 2TX CDD Mode: 2.4 GHz : 19.90 dBm 5.18 ~ 5.24 GHz : 22.77 dBm 5.26 ~ 5.32 GHz : 22.77 dBm 5.50 ~ 5.70 GHz : 22.87 dBm 5.745 ~ 5.825 GHz : 13.91 dBm Beamforming Mode: 2.4 GHz : 19.86 dBm 5.18 ~ 5.24 GHz : 22.75 dBm 5.26 ~ 5.32 GHz : 22.74 dBm 5.50 ~ 5.70 GHz : 22.86 dBm 5.745 ~ 5.825 GHz : 13.79 dBm For 1TX 2.4 GHz : 19.90 dBm 5.18 ~ 5.24 GHz : 22.87 dBm 5.26 ~ 5.32 GHz : 22.88 dBm 5.50 ~ 5.70 GHz : 22.92 dBm 5.745 ~ 5.825 GHz : 13.90 dBm

Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Beamforming Factor	3 dB by manufacturer's declaration
Accessory Device	NA
Data Cable Supplied	NA
Receiver Category	<input checked="" type="checkbox"/> Category 1 <input type="checkbox"/> Category 2 <input type="checkbox"/> Category 3

Note:

1. The EUT has below HW SKU configuration, as below table:

SKU No.	Interface	Description
1	PCIe + USB	Single antenna port
2	PCIe + USB	Dual antenna port
3	PCIe + UART	Dual antenna port

Note:

- For spurious emissions (below 1GHz): From the above HW SKUs, the worse case was found in **SKU No.: 3**. Therefore only the test data of the SKU was recorded in this report.
- For spurious emissions (above 1GHz): From the above HW SKUs, the worse case was found in **SKU No.: 2**. Therefore only the test data of the SKU was recorded in this report.

3. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 5GHz	Bluetooth

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

4. The EUT incorporates a MIMO function.

2.4GHZ Band

MODULATION MODE	TX & RX CONFIGURATION	
802.11b	2TX/1TX Diversity	2RX
802.11g	2TX/1TX Diversity	2RX
802.11n (HT20)	2TX/1TX Diversity	2RX
802.11n (HT40)	2TX/1TX Diversity	2RX
VHT20	2TX/1TX Diversity	2RX
VHT40	2TX/1TX Diversity	2RX
802.11ax (HE20)	2TX/1TX Diversity	2RX
802.11ax (HE40)	2TX/1TX Diversity	2RX
802.11ax (RU26/52/106/242/484)	2TX/1TX Diversity	2RX

5GHz Band

MODULATION MODE	TX & RX CONFIGURATION	
802.11a	2TX/1TX Diversity	2RX
802.11n (HT20)	2TX/1TX Diversity	2RX
802.11n (HT40)	2TX/1TX Diversity	2RX
802.11ac (VHT20)	2TX/1TX Diversity	2RX
802.11ac (VHT40)	2TX/1TX Diversity	2RX
802.11ac (VHT80)	2TX/1TX Diversity	2RX
802.11ax (HE20)	2TX/1TX Diversity	2RX
802.11ax (HE40)	2TX/1TX Diversity	2RX
802.11ax (HE80)	2TX/1TX Diversity	2RX
802.11ax (RU26/52/106/242/484/996)	2TX/1TX Diversity	2RX

Note:

1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
3. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz), 802.11ac mode for 20MHz (40MHz, 80MHz) and 802.11ax mode for 20MHz (40MH, 80MHz), therefore the manufacturer will control the power for 802.11n/ac mode is the same as the 802.11ax or more lower than it and investigated worst case to representative mode in test report.

5. The antennas provided to the EUT, please refer to the following table:

Ant. Set	RF Chain No.	Brand	Model	Ant. Net Gain (dBi)	Frequency Range (GHz)	Ant. Type	Connector Type	Cable Length (mm)
1	Chain 0	ARISTOTLE	RFA-27-JP326-MHF4300	3.5	2.4~2.4835	PIFA	i-pex(MHF)	300
				5	5.15~5.85			
				5	5.875~7.125			
	Chain 1	ARISTOTLE	RFA-27-JP326-MHF4300	3.5	2.4~2.4835	PIFA	i-pex(MHF)	300
				5	5.15~5.85			
				5	5.875~7.125			
2	Chain 0	ARISTOTLE	RFA-27-C38H1-MHF4300	3	2.4~2.4835	Dipole	i-pex(MHF)	300
				5	5.15~5.85			
				5	5.875~7.125			
	Chain 1	ARISTOTLE	RFA-27-C38H1-MHF4300	3	2.4~2.4835	Dipole	i-pex(MHF)	300
				5	5.15~5.85			
				5	5.875~7.125			

Note:

1. From the above transmission chains, the worse case was found in transmission on Chain 0 for 1TX mode. Therefore only the test data of the mode was recorded in this report.
2. Max. gain was selected for the final test, except for Spurious Emissions test.

6. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.
7. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.2 Description of Test Modes

5 channels are provided for 802.11a and 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac (VHT80), 802.11ax (HE80):

Channel	Frequency
155	5775 MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to						Description
	EIRP	PR	SE<1G	SE≥1G	ACS	BD	
1	√	√	√	√	√	√	2TX
2	√	√	√	√	-	-	1TX

Where **EIRP**: Equivalent Isotropic Radiated Power **PR**: Permitted Range
SE<1G: Spurious Emissions below 1GHz **SE≥1G**: Spurious Emissions above 1GHz
ACS: Adjacent channel selectivity **BD**: Blocking or desensitization

Note:

- The EUT's PIFA antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
- For 20MHz bandwidth, 40MHz bandwidth and 80MHz bandwidth of RU mode, the worst case was found in **20MHz bandwidth**. Therefore only the test data of the mode was recorded in this report

Equivalent Isotropic Radiated Power:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, RU configurations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT configure mode	CDD Mode						
	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
1	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6Mb/s	-
	802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	MCS0	-
	802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	MCS0	-
	802.11ac (VHT80)	155	155	OFDM	BPSK	MCS0	-
	802.11ax (HE20)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	151 to 159	151, 159	OFDMA	BPSK	MCS0	-
	802.11ax (HE80)	155	155	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	26/0, 26/4, 26/8
	802.11ax (RU52)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	52/37, 52/38, 52/40
802.11ax (RU106)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	106/53, 106/53, 106/54	
EUT configure mode	Beamforming Mode						
	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
1	802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	MCS0	-
	802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	MCS0	-
	802.11ac (VHT80)	155	155	OFDM	BPSK	MCS0	-
	802.11ax (HE20)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	151 to 159	151, 159	OFDMA	BPSK	MCS0	-
	802.11ax (HE80)	155	155	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	26/0, 26/4, 26/8
	802.11ax (RU52)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	52/37, 52/38, 52/40
	802.11ax (RU106)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	106/53, 106/53, 106/54
EUT configure mode	Beamforming Mode						
	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
2	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6Mb/s	-
	802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	MCS0	-
	802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	MCS0	-
	802.11ac (VHT80)	155	155	OFDM	BPSK	MCS0	-
	802.11ax (HE20)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	151 to 159	151, 159	OFDMA	BPSK	MCS0	-
	802.11ax (HE80)	155	155	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	26/0, 26/4, 26/8
	802.11ax (RU52)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	52/37, 52/38, 52/40
802.11ax (RU106)	149 to 165	149, 157, 165	OFDMA	BPSK	MCS0	106/53, 106/53, 106/54	

Permitted Range Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, RU configurations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT configure mode	CDD Mode						
	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
1	802.11a	149 to 165	149, 165	OFDM	BPSK	6Mb/s	-
	802.11ax (HE20)	149 to 165	149, 165	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	151 to 159	151, 159	OFDMA	BPSK	MCS0	-
	802.11ax (HE80)	155	155	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	149 to 165	149, 165	OFDMA	BPSK	MCS0	26/0, 26/8
	802.11ax (RU52)	149 to 165	149, 165	OFDMA	BPSK	MCS0	52/37, 52/40
	802.11ax (RU106)	149 to 165	151, 159	OFDMA	BPSK	MCS0	106/53, 106/54
EUT configure mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
2	802.11a	149 to 165	149, 165	OFDM	BPSK	6Mb/s	-
	802.11ax (HE20)	149 to 165	149, 165	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	151 to 159	151, 159	OFDMA	BPSK	MCS0	-
	802.11ax (HE80)	155	155	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	149 to 165	149, 165	OFDMA	BPSK	MCS0	26/0, 26/8
	802.11ax (RU52)	149 to 165	149, 165	OFDMA	BPSK	MCS0	52/37, 52/40
	802.11ax (RU106)	149 to 165	151, 159	OFDMA	BPSK	MCS0	106/53, 106/54

Spurious Emissions Test (Below 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, RU configurations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT configure mode	CDD Mode						
	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
1	802.11a	149 to 165	149	OFDM	BPSK	6Mb/s	-
	802.11ax (RU26)	149 to 165	149	OFDMA	BPSK	MCS0	26/0
	Receiver	149 to 165	149	-	-	-	-
EUT configure mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
2	802.11a	149 to 165	149	OFDM	BPSK	6Mb/s	-
	802.11ax (RU26)	149 to 165	149	OFDMA	BPSK	MCS0	26/0

Spurious Emissions Test (Above 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, RU configurations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT configure mode	CDD Mode						
	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
1	802.11a	149 to 165	149, 165	OFDM	BPSK	6Mb/s	-
	802.11ax (RU26)	149 to 165	149, 165	OFDMA	BPSK	MCS0	26/0, 26/0
	Receiver	149 to 165	149, 165	-	-	-	-
EUT configure mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
2	802.11a	149 to 165	149, 165	OFDM	BPSK	6Mb/s	-
	802.11ax (RU26)	149 to 165	149, 165	OFDMA	BPSK	MCS0	26/0, 26/0

Adjacent Channel Selectivity Test:

- Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology
802.11a	149 to 165	157	OFDM

Blocking or Desensitization:

- Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter
802.11a	149 to 165	157	OFDM	BPSK	6Mb/s

Test Condition:

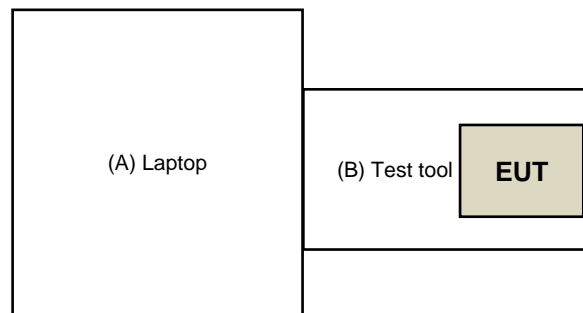
Applicable to	Environmental Conditions	Input Power	Tested by
EIRP	25deg. C, 60%RH	3.3Vdc	Angus Peng
PR	25deg. C, 60%RH	3.3Vdc	Angus Peng
SE<1G	22deg. C, 72%RH, 25deg. C, 65%RH	230Vac, 50Hz (System)	Ethan Hsu, Vic Huang
SE≥1G	25deg. C, 65%RH, 24deg. C, 74%RH	230Vac, 50Hz (System)	Vic Huang, Ethan Hsu
ACS	25deg. C, 60%RH	3.3Vdc	Tobey Chen
BD	25deg. C, 60%RH	3.3Vdc	Tobey Chen

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	DoC	Provided by Lab
B.	Test tool	Realtek	NA	NA	NA	Supplied by client

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standard:

EN 300 440 V2.1.1 (2017-03)

All test items have been performed and recorded as per the above standard.

4 Test Types and Results

Transmitter Parameters

4.1 Equivalent Isotropic Radiated Power

4.1.1 Limits of Equivalent Isotropic Radiated Power

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

Maximum radiated peak power (e.i.r.p.)

Frequency Bands	Power	Application	The EUT Application
2400MHz to 2483.5MHz	10 mW e.i.r.p.	Non-specific short range devices	-
2400MHz to 2483.5MHz	25 mW e.i.r.p.	Radio determination devices	-
(a)2446MHz to 2454MHz	500 mW e.i.r.p.	Radio Frequency Identification (RFID) devices	-
(b)2446MHz to 2454MHz	4 W e.i.r.p.	Radio Frequency Identification (RFID) devices	-
5725MHz to 5875MHz	25 mW e.i.r.p.	Non-specific short range devices	√
9200MHz to 9500MHz	25 mW e.i.r.p.	Radio determination devices	-
9500MHz to 9975MHz	25 mW e.i.r.p.	Radio determination devices	-
10.5GHz to 10.6GMHz	500 mW e.i.r.p.	Radio determination devices	-
13.4GHz to 14GHz	25 mW e.i.r.p.	Radio determination devices	-
17.1GHz to 17.3GHz	400 mW e.i.r.p.	Radio determination devices	-
24GHz to 24.25GHz	100 mW e.i.r.p.	Non-specific short range devices and Radio determination devices	-

For Extreme temperature ranges

Category	Temperature range	The EUT Category
I (General)	-20°C to +55°C	-
II (Portable)	-10°C to +55°C	-
III (Equipment for normal indoor use)	5°C to +35°C	-
Declared by the manufacturer	-20°C ~ 70°C	√

4.1.2 Test Procedures

Refer to EN 300 440 V2.1.1 clause 4.2.2.3

4.1.3 Deviation from Test Standard

No deviation

4.1.4 Test Setup

The test setup has been constructed as the normal use condition. Controlling software (RTL8852B MP Toolkit V1.0.16) has been activated to set the EUT on specific status.

4.1.5 Test Results (Mode 1)

CDD Mode

Test Condition			Maximum EIRP (dBm)		
			(CH 149) 5745 MHz	(CH 157) 5785 MHz	(CH 165) 5825 MHz
802.11a					
T _{nom} (°C)	25	V _{nom} (V)	13.59	13.61	13.65
T _{min} (°C)	-20	V _{min} (V)	13.82	13.81	13.91
		V _{max} (V)	13.80	13.79	13.87
T _{max} (°C)	70	V _{min} (V)	13.34	13.42	13.47
		V _{max} (V)	13.37	13.43	13.48
802.11ac (VHT20)					
T _{nom} (°C)	25	V _{nom} (V)	13.40	13.42	13.54
T _{min} (°C)	-20	V _{min} (V)	13.67	13.63	13.68
		V _{max} (V)	13.64	13.59	13.68
T _{max} (°C)	70	V _{min} (V)	13.30	13.21	13.30
		V _{max} (V)	13.32	13.22	13.33
Test Condition			Maximum EIRP (dBm)		
			(CH 151) 5755 MHz	(CH 159) 5795 MHz	
802.11ac (VHT40)					
T _{nom} (°C)	25	V _{nom} (V)	13.46	13.36	
T _{min} (°C)	-20	V _{min} (V)	13.68	13.65	
		V _{max} (V)	13.66	13.63	
T _{max} (°C)	70	V _{min} (V)	13.44	13.22	
		V _{max} (V)	13.45	13.25	
Test Condition			Maximum EIRP (dBm)		
			(CH 155) 5775 MHz		
802.11ac (VHT80)					
T _{nom} (°C)	25	V _{nom} (V)	13.39		
T _{min} (°C)	-20	V _{min} (V)	13.70		
		V _{max} (V)	13.68		
T _{max} (°C)	70	V _{min} (V)	13.30		
		V _{max} (V)	13.32		
Test Condition			Maximum EIRP (dBm)		
			(CH 149) 5745 MHz	(CH 157) 5785 MHz	(CH 165) 5825 MHz
802.11ax (HE20)					
T _{nom} (°C)	25	V _{nom} (V)	13.50	13.57	13.72
T _{min} (°C)	-20	V _{min} (V)	13.77	13.78	13.86
		V _{max} (V)	13.73	13.75	13.83
T _{max} (°C)	70	V _{min} (V)	13.40	13.36	13.48
		V _{max} (V)	13.42	13.40	13.48

Test Condition			Maximum EIRP (dBm)		
			(CH 151) 5755 MHz		(CH 159) 5795 MHz
802.11ax (HE40)					
T _{nom} (°C)	25	V _{nom} (V)	13.58	13.51	
T _{min} (°C)	-20	V _{min} (V)	13.80	13.80	
		V _{max} (V)	13.79	13.75	
T _{max} (°C)	70	V _{min} (V)	13.56	13.37	
		V _{max} (V)	13.59	13.38	
Test Condition			Maximum EIRP (dBm)		
			(CH 155) 5775 MHz		
802.11ax (HE80)					
T _{nom} (°C)	25	V _{nom} (V)	13.45		
T _{min} (°C)	-20	V _{min} (V)	13.76		
		V _{max} (V)	13.76		
T _{max} (°C)	70	V _{min} (V)	13.36		
		V _{max} (V)	13.36		
Test Condition			Maximum EIRP (dBm)		
			(CH 149) 5745 MHz		
			RU Configuration		
802.11ax (RU26)			26/0	26/4	26/8
T _{nom} (°C)	25	V _{nom} (V)	13.49	13.50	13.63
T _{min} (°C)	-20	V _{min} (V)	13.86	13.81	13.87
		V _{max} (V)	13.82	13.78	13.84
T _{max} (°C)	70	V _{min} (V)	13.39	13.39	13.39
		V _{max} (V)	13.41	13.43	13.39
802.11ax (RU52)			52/37	52/38	52/40
T _{nom} (°C)	25	V _{nom} (V)	13.49	13.56	13.63
T _{min} (°C)	-20	V _{min} (V)	13.78	13.77	13.80
		V _{max} (V)	13.74	13.74	13.77
T _{max} (°C)	70	V _{min} (V)	13.35	13.32	13.49
		V _{max} (V)	13.37	13.36	13.49
802.11ax (RU106)			106/53	106/53	106/54
T _{nom} (°C)	25	V _{nom} (V)	13.49	13.52	13.63
T _{min} (°C)	-20	V _{min} (V)	13.80	13.84	13.87
		V _{max} (V)	13.76	13.81	13.84
T _{max} (°C)	70	V _{min} (V)	13.40	13.36	13.45
		V _{max} (V)	13.42	13.40	13.45

Beamforming Mode

Test Condition			Maximum EIRP (dBm)		
			(CH 149) 5745 MHz	(CH 157) 5785 MHz	(CH 165) 5825 MHz
802.11ac (VHT20)					
T _{nom} (°C)	25	V _{nom} (V)	13.39	13.41	13.50
T _{min} (°C)	-20	V _{min} (V)	13.66	13.62	13.64
		V _{max} (V)	13.63	13.58	13.64
T _{max} (°C)	70	V _{min} (V)	13.29	13.20	13.26
		V _{max} (V)	13.31	13.21	13.29
Test Condition			Maximum EIRP (dBm)		
			(CH 151) 5755 MHz	(CH 159) 5795 MHz	
802.11ac (VHT40)					
T _{nom} (°C)	25	V _{nom} (V)	13.42	13.35	
T _{min} (°C)	-20	V _{min} (V)	13.64	13.64	
		V _{max} (V)	13.62	13.62	
T _{max} (°C)	70	V _{min} (V)	13.40	13.21	
		V _{max} (V)	13.41	13.24	
Test Condition			Maximum EIRP (dBm)		
			(CH 155) 5775 MHz		
802.11ac (VHT80)					
T _{nom} (°C)	25	V _{nom} (V)	13.37		
T _{min} (°C)	-20	V _{min} (V)	13.68		
		V _{max} (V)	13.66		
T _{max} (°C)	70	V _{min} (V)	13.28		
		V _{max} (V)	13.30		
Test Condition			Maximum EIRP (dBm)		
			(CH 149) 5745 MHz	(CH 157) 5785 MHz	(CH 165) 5825 MHz
802.11ax (HE20)					
T _{nom} (°C)	25	V _{nom} (V)	13.48	13.56	13.63
T _{min} (°C)	-20	V _{min} (V)	13.75	13.77	13.77
		V _{max} (V)	13.71	13.74	13.74
T _{max} (°C)	70	V _{min} (V)	13.38	13.35	13.39
		V _{max} (V)	13.40	13.39	13.39

Test Condition			Maximum EIRP (dBm)	
			(CH 151) 5755 MHz	(CH 159) 5795 MHz
802.11ax (HE40)				
T _{nom} (°C)	25	V _{nom} (V)	13.56	13.50
T _{min} (°C)	-20	V _{min} (V)	13.78	13.79
		V _{max} (V)	13.77	13.74
T _{max} (°C)	70	V _{min} (V)	13.54	13.36
		V _{max} (V)	13.57	13.37
Test Condition			Maximum EIRP (dBm)	
			(CH 155) 5775 MHz	
802.11ax (HE80)				
T _{nom} (°C)	25	V _{nom} (V)	13.44	
T _{min} (°C)	-20	V _{min} (V)	13.75	
		V _{max} (V)	13.75	
T _{max} (°C)	70	V _{min} (V)	13.35	
		V _{max} (V)	13.35	

4.1.6 Test Results (Mode 2)

Test Condition			Maximum EIRP (dBm)		
			(CH 149) 5745 MHz	(CH 157) 5785 MHz	(CH 165) 5825 MHz
802.11a					
T _{nom} (°C)	25	V _{nom} (V)	13.52	13.66	13.63
T _{min} (°C)	-20	V _{min} (V)	13.75	13.76	13.89
		V _{max} (V)	13.74	13.74	13.88
T _{max} (°C)	70	V _{min} (V)	13.27	13.47	13.45
		V _{max} (V)	13.30	13.48	13.50
802.11ac (VHT20)					
T _{nom} (°C)	25	V _{nom} (V)	13.43	13.48	13.56
T _{min} (°C)	-20	V _{min} (V)	13.70	13.69	13.70
		V _{max} (V)	13.68	13.67	13.69
T _{max} (°C)	70	V _{min} (V)	13.33	13.27	13.32
		V _{max} (V)	13.34	13.30	13.35
Test Condition			Maximum EIRP (dBm)		
			(CH 151) 5755 MHz	(CH 159) 5795 MHz	
802.11ac (VHT40)					
T _{nom} (°C)	25	V _{nom} (V)	13.54	13.47	
T _{min} (°C)	-20	V _{min} (V)	13.76	13.76	
		V _{max} (V)	13.74	13.74	
T _{max} (°C)	70	V _{min} (V)	13.52	13.33	
		V _{max} (V)	13.54	13.33	
Test Condition			Maximum EIRP (dBm)		
			(CH 155) 5775 MHz		
802.11ac (VHT80)					
T _{nom} (°C)	25	V _{nom} (V)	13.44		
T _{min} (°C)	-20	V _{min} (V)	13.75		
		V _{max} (V)	13.72		
T _{max} (°C)	70	V _{min} (V)	13.35		
		V _{max} (V)	13.37		
Test Condition			Maximum EIRP (dBm)		
			(CH 149) 5745 MHz	(CH 157) 5785 MHz	(CH 165) 5825 MHz
802.11ax (HE20)					
T _{nom} (°C)	25	V _{nom} (V)	13.61	13.68	13.73
T _{min} (°C)	-20	V _{min} (V)	13.88	13.89	13.87
		V _{max} (V)	13.88	13.87	13.82
T _{max} (°C)	70	V _{min} (V)	13.51	13.47	13.49
		V _{max} (V)	13.55	13.49	13.50

Test Condition			Maximum EIRP (dBm)	
			(CH 151) 5755 MHz	(CH 159) 5795 MHz
802.11ax (HE40)				
T _{nom} (°C)	25	V _{nom} (V)	13.68	13.49
T _{min} (°C)	-20	V _{min} (V)	13.90	13.78
		V _{max} (V)	13.87	13.73
T _{max} (°C)	70	V _{min} (V)	13.66	13.35
		V _{max} (V)	13.69	13.40
Test Condition			Maximum EIRP (dBm)	
			(CH 155) 5775 MHz	
802.11ax (HE80)				
T _{nom} (°C)	25	V _{nom} (V)	13.46	
T _{min} (°C)	-20	V _{min} (V)	13.77	
		V _{max} (V)	13.73	
T _{max} (°C)	70	V _{min} (V)	13.37	
		V _{max} (V)	13.39	

Test Condition			Maximum EIRP (dBm)		
			(CH 149) 5745 MHz	(CH 157) 5785 MHz	(CH 165) 5825 MHz
			RU Configuration		
802.11ax (RU26)			26/0	26/4	26/8
T _{nom} (°C)	25	V _{nom} (V)	13.44	13.57	13.48
T _{min} (°C)	-20	V _{min} (V)	13.81	13.88	13.82
		V _{max} (V)	13.81	13.86	13.77
T _{max} (°C)	70	V _{min} (V)	13.34	13.46	13.24
		V _{max} (V)	13.38	13.48	13.25
802.11ax (RU52)			52/37	52/38	52/40
T _{nom} (°C)	25	V _{nom} (V)	13.58	13.64	13.67
T _{min} (°C)	-20	V _{min} (V)	13.87	13.85	13.84
		V _{max} (V)	13.82	13.84	13.81
T _{max} (°C)	70	V _{min} (V)	13.44	13.40	13.53
		V _{max} (V)	13.45	13.43	13.54
802.11ax (RU106)			106/53	106/53	106/54
T _{nom} (°C)	25	V _{nom} (V)	13.53	13.66	13.61
T _{min} (°C)	-20	V _{min} (V)	13.84	13.78	13.85
		V _{max} (V)	13.80	13.75	13.82
T _{max} (°C)	70	V _{min} (V)	13.44	13.50	13.43
		V _{max} (V)	13.46	13.54	13.43

4.2 Permitted Range of Operating Frequencies

4.2.1 Limits of Permitted Range of Operating Frequencies

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

For all equipment the frequency range shall lie within the frequency band given by below table

Frequency Bands	Application	The EUT Application
2400MHz to 2483.5MHz	Non-specific short range devices	
2400MHz to 2483.5MHz	Radio determination devices	-
(a)2446MHz to 2454MHz	Radio Frequency Identification (RFID) devices	-
(b)2446MHz to 2454MHz	Radio Frequency Identification (RFID) devices	-
5725MHz to 5875MHz	Non-specific short range devices	√
9200MHz to 9500MHz	Radio determination devices	-
9500MHz to 9975MHz	Radio determination devices	-
10.5GHz to 10.6GMHz	Radio determination devices	-
13.4GHz to 14GHz	Radio determination devices	-
17.1GHz to 17.3GHz	Radio determination devices	-
24GHz to 24.25GHz	Non-specific short range devices and Radio determination devices	-

For non-harmonized frequency bands the available frequency range may differ between national administrations.

4.2.2 Test Procedure

Refer to EN 300 440 V2.1.1 clause 4.2.3.3

4.2.3 Deviation from Test Standard

No deviation.

4.2.4 Test Setup

The EUT has been placed in an environment where the temperature can be controlled. The power source should be replaced by a power supply for voltage change. Before testing, the transmitter has to be able to send signal to receiver.

4.2.5 Test Results (Mode 1)

CDD Mode

802.11a

Test Condition			Frequency (MHz)	
			Lowest	Highest
T _{nom} (°C)	25	V _{nom} (V)	5736.40	5833.49
T _{min} (°C)	-20	V _{min} (V)	5736.32	5833.60
		V _{max} (V)	5736.28	5833.60
T _{max} (°C)	70	V _{min} (V)	5736.50	5833.36
		V _{max} (V)	5736.54	5833.34
Measured frequency (lowest and highest)			FL = 5736.28	FH = 5833.60

802.11ax (HE20)

Test Condition			Frequency (MHz)	
			Lowest	Highest
T _{nom} (°C)	25	V _{nom} (V)	5735.29	5834.61
T _{min} (°C)	-20	V _{min} (V)	5735.21	5834.72
		V _{max} (V)	5735.24	5834.74
T _{max} (°C)	70	V _{min} (V)	5735.39	5834.48
		V _{max} (V)	5735.34	5834.47
Measured frequency (lowest and highest)			FL = 5735.21	FH = 5834.74

802.11ax (HE40)

Test Condition			Frequency (MHz)	
			Lowest	Highest
T _{nom} (°C)	25	V _{nom} (V)	5735.77	5814.13
T _{min} (°C)	-20	V _{min} (V)	5735.69	5814.24
		V _{max} (V)	5735.67	5814.19
T _{max} (°C)	70	V _{min} (V)	5735.87	5814.00
		V _{max} (V)	5735.85	5813.99
Measured frequency (lowest and highest)			FL = 5735.67	FH = 5814.24

802.11ax (HE80)

Test Condition			Frequency (MHz)	
			Lowest	Highest
T _{nom} (°C)	25	V _{nom} (V)	5735.81	5814.06
T _{min} (°C)	-20	V _{min} (V)	5735.73	5814.17
		V _{max} (V)	5735.76	5814.13
T _{max} (°C)	70	V _{min} (V)	5735.91	5813.93
		V _{max} (V)	5735.88	5813.95
Measured frequency (lowest and highest)			FL = 5735.73	FH = 5814.17

802.11ax (RU26)

Test Condition			Frequency (MHz)	
			Lowest	Highest
RU Configuration			26/0	26/8
T _{nom} (°C)	25	V _{nom} (V)	5735.22	5834.71
T _{min} (°C)	-20	V _{min} (V)	5735.14	5834.82
		V _{max} (V)	5735.17	5834.84
T _{max} (°C)	70	V _{min} (V)	5735.32	5834.58
		V _{max} (V)	5735.27	5834.57
Measured frequency (lowest and highest)			FL = 5735.14	FH = 5834.84

802.11ax (RU52)

Test Condition			Frequency (MHz)	
			Lowest	Highest
RU Configuration			52/37	52/40
T _{nom} (°C)	25	V _{nom} (V)	5735.29	5834.61
T _{min} (°C)	-20	V _{min} (V)	5735.21	5834.72
		V _{max} (V)	5735.24	5834.74
T _{max} (°C)	70	V _{min} (V)	5735.39	5834.48
		V _{max} (V)	5735.34	5834.47
Measured frequency (lowest and highest)			FL = 5735.21	FH = 5834.74

802.11ax (RU106)

Test Condition			Frequency (MHz)	
			Lowest	Highest
RU Configuration			106/53	106/54
T _{nom} (°C)	25	V _{nom} (V)	5735.28	5834.61
T _{min} (°C)	-20	V _{min} (V)	5735.20	5834.76
		V _{max} (V)	5735.23	5834.78
T _{max} (°C)	70	V _{min} (V)	5735.38	5834.49
		V _{max} (V)	5735.33	5834.48
Measured frequency (lowest and highest)			FL = 5735.2	FH = 5834.78

4.2.6 Test Results (Mode 2)

802.11a

Test Condition			Frequency (MHz)	
			Lowest	Highest
T _{nom} (°C)	25	V _{nom} (V)	5736.39	5833.48
T _{min} (°C)	-20	V _{min} (V)	5736.34	5833.53
		V _{max} (V)	5736.34	5833.52
T _{max} (°C)	70	V _{min} (V)	5736.49	5833.41
		V _{max} (V)	5736.45	5833.44
Measured frequency (lowest and highest)			FL = 5736.34	FH = 5833.53

802.11ax (HE20)

Test Condition			Frequency (MHz)	
			Lowest	Highest
T _{nom} (°C)	25	V _{nom} (V)	5735.28	5834.59
T _{min} (°C)	-20	V _{min} (V)	5735.14	5834.66
		V _{max} (V)	5735.15	5834.67
T _{max} (°C)	70	V _{min} (V)	5735.38	5834.51
		V _{max} (V)	5735.37	5834.47
Measured frequency (lowest and highest)			FL = 5735.14	FH = 5834.67

802.11ax (HE40)

Test Condition			Frequency (MHz)	
			Lowest	Highest
T _{nom} (°C)	25	V _{nom} (V)	5735.74	5814.12
T _{min} (°C)	-20	V _{min} (V)	5735.66	5814.18
		V _{max} (V)	5735.62	5814.23
T _{max} (°C)	70	V _{min} (V)	5735.80	5814.03
		V _{max} (V)	5735.82	5813.98
Measured frequency (lowest and highest)			FL = 5735.62	FH = 5814.23

802.11ax (HE80)

Test Condition			Frequency (MHz)	
			Lowest	Highest
T _{nom} (°C)	25	V _{nom} (V)	5735.76	5814.10
T _{min} (°C)	-20	V _{min} (V)	5735.68	5814.21
		V _{max} (V)	5735.71	5814.23
T _{max} (°C)	70	V _{min} (V)	5735.86	5813.97
		V _{max} (V)	5735.81	5813.96
Measured frequency (lowest and highest)			FL = 5735.68	FH = 5814.23

802.11ax (RU26)

Test Condition			Frequency (MHz)	
			Lowest	Highest
RU Configuration			26/0	26/8
T _{nom} (°C)	25	V _{nom} (V)	5735.13	5834.86
T _{min} (°C)	-20	V _{min} (V)	5734.99	5834.93
		V _{max} (V)	5735.00	5834.94
T _{max} (°C)	70	V _{min} (V)	5735.23	5834.78
		V _{max} (V)	5735.22	5834.74
Measured frequency (lowest and highest)			FL = 5734.99	FH = 5834.94

802.11ax (RU52)

Test Condition			Frequency (MHz)	
			Lowest	Highest
RU Configuration			52/37	52/40
T _{nom} (°C)	25	V _{nom} (V)	5735.22	5834.72
T _{min} (°C)	-20	V _{min} (V)	5735.07	5834.87
		V _{max} (V)	5735.09	5834.82
T _{max} (°C)	70	V _{min} (V)	5735.31	5834.59
		V _{max} (V)	5735.32	5834.55
Measured frequency (lowest and highest)			FL = 5735.07	FH = 5834.87

802.11ax (RU106)

Test Condition			Frequency (MHz)	
			Lowest	Highest
RU Configuration			106/53	106/54
T _{nom} (°C)	25	V _{nom} (V)	5735.22	5834.69
T _{min} (°C)	-20	V _{min} (V)	5735.17	5834.81
		V _{max} (V)	5735.20	5834.83
T _{max} (°C)	70	V _{min} (V)	5735.29	5834.65
		V _{max} (V)	5735.24	5834.64
Measured frequency (lowest and highest)			FL = 5735.17	FH = 5834.83

4.3 Unwanted Emissions in the Spurious Domain

4.3.1 Limit of Unwanted Emissions in the Spurious Domain

Frequency Range	47MHz to 74MHz 87.5MHz to 108MHz 174MHz to 230MHz 470MHz to 862MHz	Other Frequencies Below 1GHz	>1GHz
Limit (Operating)	4nW (-54dBm)	250nW (-36dBm)	1 μ W (-30dBm)
Limit (Standby)	2nW (-57dBm)	2nW (-57dBm)	20nW (-47dBm)

4.3.2 Test Procedure

Refer to EN 300 440 V2.1.1 clause 4.2.4.3

4.3.3 Deviation from Test Standard

No deviation.

4.3.4 Test Setup

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The test setup has been constructed as the normal use condition. Controlling software (RTL8852B MP Toolkit V1.0.16) has been activated to set the EUT on specific status.

4.3.5 Test Results (Mode 1)

PIFA Antenna

Below 1GHz Worst-Case Data

802.11a

Spurious Emission Frequency Range	25MHz ~ 1GHz	Operating Channel	149
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
214.90	H	-68.87	-54.00	-14.87
222.70	H	-68.63	-54.00	-14.63
480.00	H	-64.64	-54.00	-10.64
480.00	V	-69.67	-54.00	-15.67
499.85	H	-65.61	-54.00	-11.61
502.60	V	-68.97	-54.00	-14.97
515.50	H	-66.24	-54.00	-12.24
541.05	V	-67.45	-54.00	-13.45
548.50	H	-68.26	-54.00	-14.26
559.25	V	-68.73	-54.00	-14.73
600.00	H	-68.12	-54.00	-14.12
600.00	V	-64.23	-54.00	-10.23
663.85	H	-63.73	-54.00	-9.73
666.45	V	-64.98	-54.00	-10.98
699.80	V	-65.67	-54.00	-11.67
711.50	V	-69.51	-54.00	-15.51
758.90	V	-68.83	-54.00	-14.83
795.45	H	-68.01	-54.00	-14.01
805.25	H	-70.04	-54.00	-16.04
833.80	V	-68.05	-54.00	-14.05

802.11ax (RU26)

Spurious Emission Frequency Range	25MHz ~ 1GHz	Operating Channel	149
		RU Configuration	26/0

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
55.80	H	-61.08	-54.00	-7.08
68.45	H	-61.21	-54.00	-7.21
99.95	V	-65.12	-54.00	-11.12
479.97	H	-64.75	-54.00	-10.75
480.02	H	-64.90	-54.00	-10.90
480.02	V	-69.62	-54.00	-15.62
542.23	H	-62.93	-54.00	-8.93
545.43	V	-72.27	-54.00	-18.27
561.93	H	-66.96	-54.00	-12.96
562.63	V	-72.74	-54.00	-18.74
587.73	V	-71.70	-54.00	-17.70
663.83	H	-63.82	-54.00	-9.82
666.43	V	-66.83	-54.00	-12.83
697.93	V	-69.58	-54.00	-15.58
698.33	H	-61.21	-54.00	-7.21
749.74	V	-70.14	-54.00	-16.14
783.94	V	-69.34	-54.00	-15.34
785.64	H	-69.60	-54.00	-15.60
810.34	V	-69.85	-54.00	-15.85
839.64	H	-67.94	-54.00	-13.94

Above 1GHz Worst-Case Data

802.11a

Spurious Emission Frequency Range	1GHz ~ 40GHz	Operating Channel	149, 165
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Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
149	11490.00	H	-48.45	-30.00	-18.45
	11490.00	V	-47.02	-30.00	-17.02
	17234.00	H	-50.20	-30.00	-20.20
	17239.00	V	-47.14	-30.00	-17.14
	22980.00	H	-55.08	-30.00	-25.08
	22980.00	V	-55.25	-30.00	-25.25
165	11650.00	H	-53.09	-30.00	-23.09
	11650.00	V	-50.04	-30.00	-20.04
	17475.00	H	-54.51	-30.00	-24.51
	17479.00	V	-51.63	-30.00	-21.63
	23300.00	H	-53.61	-30.00	-23.61
	23300.00	V	-55.16	-30.00	-25.16

802.11ax (RU26)

Spurious Emission Frequency Range	1GHz ~ 40GHz	Operating Channel	149, 165
		RU Configuration	26/0, 26/0

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
149	11472.60	H	-43.40	-30.00	-13.40
	11472.60	V	-43.25	-30.00	-13.25
	17210.04	V	-41.07	-30.00	-11.07
	17211.19	H	-41.55	-30.00	-11.55
	22943.96	V	-51.98	-30.00	-21.98
	22944.45	H	-50.83	-30.00	-20.83
165	11632.85	H	-43.84	-30.00	-13.84
	11632.85	V	-44.36	-30.00	-14.36
	17449.02	H	-52.33	-30.00	-22.33
	17449.02	V	-45.88	-30.00	-15.88
	23300.00	H	-54.13	-30.00	-24.13
	23300.00	V	-54.92	-30.00	-24.92

Dipole Antenna

Below 1GHz Worst-Case Data

802.11a

Spurious Emission Frequency Range	25MHz ~ 1GHz	Operating Channel	149
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
99.95	V	-67.51	-54.00	-13.51
480.00	H	-65.02	-54.00	-11.02
480.00	V	-69.08	-54.00	-15.08
499.80	V	-68.69	-54.00	-14.69
508.60	H	-65.19	-54.00	-11.19
540.00	H	-65.20	-54.00	-11.20
544.40	V	-68.42	-54.00	-14.42
558.40	V	-66.51	-54.00	-12.51
569.95	H	-66.66	-54.00	-12.66
594.50	H	-67.79	-54.00	-13.79
666.45	H	-63.16	-54.00	-9.16
666.45	V	-66.86	-54.00	-12.86
699.75	H	-62.18	-54.00	-8.18
699.75	V	-63.03	-54.00	-9.03
758.90	V	-69.26	-54.00	-15.26
804.55	H	-67.92	-54.00	-13.92
813.60	V	-69.95	-54.00	-15.95
815.35	H	-68.04	-54.00	-14.04
848.50	H	-68.57	-54.00	-14.57
853.35	V	-69.07	-54.00	-15.07

802.11ax (RU26)

Spurious Emission Frequency Range	25MHz ~ 1GHz	Operating Channel	149
		RU Configuration	26/0

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
52.85	H	-69.59	-54.00	-15.59
199.51	H	-67.32	-54.00	-13.32
479.97	H	-65.56	-54.00	-11.56
480.02	V	-70.12	-54.00	-16.12
498.82	H	-65.23	-54.00	-11.23
510.87	V	-71.49	-54.00	-17.49
543.38	H	-64.76	-54.00	-10.76
560.88	V	-69.35	-54.00	-15.35
663.83	V	-66.52	-54.00	-12.52
666.43	H	-63.17	-54.00	-9.17
697.03	V	-61.84	-54.00	-7.84
698.18	H	-66.12	-54.00	-12.12
714.99	V	-70.99	-54.00	-16.99
757.24	H	-69.73	-54.00	-15.73
759.69	V	-70.48	-54.00	-16.48
783.24	V	-70.10	-54.00	-16.10
803.54	H	-65.65	-54.00	-11.65
825.39	V	-69.05	-54.00	-15.05
856.19	H	-69.80	-54.00	-15.80
861.29	V	-69.79	-54.00	-15.79

Above 1GHz Worst-Case Data
802.11a

Spurious Emission Frequency Range	1GHz ~ 40GHz	Operating Channel	149, 165
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Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
149	11490.00	H	-51.46	-30.00	-21.46
	11496.00	V	-47.77	-30.00	-17.77
	17230.00	V	-49.36	-30.00	-19.36
	17241.00	H	-53.50	-30.00	-23.50
	22980.00	H	-54.45	-30.00	-24.45
	22980.00	V	-55.99	-30.00	-25.99
165	11650.00	H	-52.15	-30.00	-22.15
	11656.00	V	-48.47	-30.00	-18.47
	17474.00	V	-49.09	-30.00	-19.09
	17479.00	H	-55.54	-30.00	-25.54
	23300.00	H	-53.23	-30.00	-23.23
	23300.00	V	-54.39	-30.00	-24.39

802.11ax (RU26)

Spurious Emission Frequency Range	1GHz ~ 40GHz	Operating Channel	149, 165
		RU Configuration	26/0, 26/0

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
149	11472.00	V	-40.02	-30.00	-10.02
	11473.00	H	-43.22	-30.00	-13.22
	17209.00	V	-42.81	-30.00	-12.81
	17211.00	H	-46.50	-30.00	-16.50
	22946.00	H	-52.68	-30.00	-22.68
	22946.00	V	-54.77	-30.00	-24.77
165	11633.00	H	-43.20	-30.00	-13.20
	11633.00	V	-42.50	-30.00	-12.50
	17449.00	H	-51.01	-30.00	-21.01
	17449.00	V	-48.72	-30.00	-18.72
	23264.00	H	-58.73	-30.00	-28.73
	23264.00	V	-53.75	-30.00	-23.75

4.3.6 Test Results (Mode 2)

PIFA Antenna

Below 1GHz Worst-Case Data

802.11a

Spurious Emission Frequency Range	25MHz ~ 1GHz	Operating Channel	149
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
99.95	V	-66.24	-54.00	-12.24
203.75	H	-68.07	-54.00	-14.07
204.35	V	-70.02	-54.00	-16.02
480.00	H	-63.52	-54.00	-9.52
489.55	V	-69.16	-54.00	-15.16
497.95	H	-64.03	-54.00	-10.03
522.90	H	-66.00	-54.00	-12.00
525.00	V	-67.76	-54.00	-13.76
548.60	H	-65.22	-54.00	-11.22
551.00	V	-66.98	-54.00	-12.98
578.20	H	-67.81	-54.00	-13.81
600.00	V	-63.71	-54.00	-9.71
621.20	H	-65.29	-54.00	-11.29
666.45	H	-64.32	-54.00	-10.32
666.45	V	-64.48	-54.00	-10.48
692.95	V	-69.41	-54.00	-15.41
699.45	H	-68.33	-54.00	-14.33
738.55	V	-70.82	-54.00	-16.82
799.40	H	-68.48	-54.00	-14.48
842.45	V	-66.19	-54.00	-12.19

802.11ax (RU26)

Spurious Emission Frequency Range	25MHz ~ 1GHz	Operating Channel	149
		RU Configuration	26/0

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
56.35	H	-64.85	-54.00	-10.85
107.45	V	-64.03	-54.00	-10.03
207.61	H	-68.64	-54.00	-14.64
479.97	H	-65.19	-54.00	-11.19
480.02	V	-69.69	-54.00	-15.69
498.67	H	-65.04	-54.00	-11.04
515.98	H	-66.67	-54.00	-12.67
542.43	V	-70.71	-54.00	-16.71
551.03	H	-66.66	-54.00	-12.66
624.98	V	-73.36	-54.00	-19.36
666.43	H	-63.86	-54.00	-9.86
666.43	V	-66.25	-54.00	-12.25
697.03	H	-66.27	-54.00	-12.27
697.08	V	-65.38	-54.00	-11.38
725.79	V	-70.70	-54.00	-16.70
760.04	V	-70.60	-54.00	-16.60
770.09	H	-69.61	-54.00	-15.61
791.94	V	-70.69	-54.00	-16.69
803.49	H	-68.49	-54.00	-14.49
839.54	V	-69.46	-54.00	-15.46

Above 1GHz Worst-Case Data
802.11a

Spurious Emission Frequency Range	1GHz ~ 40GHz	Operating Channel	149, 165
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Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
149	11490.00	H	-51.32	-30.00	-21.32
	11490.00	V	-52.00	-30.00	-22.00
	17239.00	H	-47.45	-30.00	-17.45
	17249.00	V	-51.14	-30.00	-21.14
	22980.00	H	-54.70	-30.00	-24.70
	22980.00	V	-54.27	-30.00	-24.27
165	11650.00	H	-52.15	-30.00	-22.15
	11650.00	V	-53.16	-30.00	-23.16
	17471.00	V	-53.69	-30.00	-23.69
	17477.00	H	-54.34	-30.00	-24.34
	23300.00	H	-54.34	-30.00	-24.34
	23300.00	V	-53.07	-30.00	-23.07

802.11ax (RU26)

Spurious Emission Frequency Range	1GHz ~ 40GHz	Operating Channel	149, 165
		RU Configuration	26/0, 26/0

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
149	11473.79	H	-51.21	-30.00	-21.21
	11473.79	V	-48.58	-30.00	-18.58
	17209.00	H	-43.62	-30.00	-13.62
	17210.00	V	-42.84	-30.00	-12.84
	22946.00	H	-55.08	-30.00	-25.08
	22946.00	V	-53.28	-30.00	-23.28
165	11632.26	V	-48.38	-30.00	-18.38
	11632.85	H	-47.01	-30.00	-17.01
	17449.00	H	-47.05	-30.00	-17.05
	17451.00	V	-47.16	-30.00	-17.16
	23264.00	H	-55.30	-30.00	-25.30
	23264.00	V	-52.72	-30.00	-22.72

Dipole Antenna

Below 1GHz Worst-Case Data

802.11a

Spurious Emission Frequency Range	25MHz ~ 1GHz	Operating Channel	149
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
144.00	H	-51.65	-36.00	-15.65
201.95	H	-68.88	-54.00	-14.88
480.00	H	-67.29	-54.00	-13.29
480.00	V	-69.43	-54.00	-15.43
499.80	H	-63.98	-54.00	-9.98
505.80	V	-70.69	-54.00	-16.69
530.90	H	-65.99	-54.00	-11.99
532.65	V	-67.33	-54.00	-13.33
565.90	H	-65.56	-54.00	-11.56
568.20	V	-68.74	-54.00	-14.74
589.60	H	-67.15	-54.00	-13.15
600.00	V	-63.29	-54.00	-9.29
663.85	V	-66.30	-54.00	-12.30
666.45	H	-64.40	-54.00	-10.40
699.20	V	-66.48	-54.00	-12.48
699.80	H	-60.90	-54.00	-6.90
758.85	V	-68.90	-54.00	-14.90
772.60	V	-69.77	-54.00	-15.77
801.35	H	-70.72	-54.00	-16.72
837.20	V	-69.29	-54.00	-15.29

802.11ax (RU26)

Spurious Emission Frequency Range	25MHz ~ 1GHz	Operating Channel	149
		RU Configuration	26/0

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
99.65	H	-64.99	-54.00	-10.99
99.65	V	-65.24	-54.00	-11.24
206.66	H	-69.02	-54.00	-15.02
480.02	H	-65.50	-54.00	-11.50
480.02	V	-69.33	-54.00	-15.33
515.68	H	-66.53	-54.00	-12.53
548.98	V	-70.66	-54.00	-16.66
558.18	H	-67.76	-54.00	-13.76
588.63	H	-69.86	-54.00	-15.86
643.98	V	-71.97	-54.00	-17.97
666.43	H	-63.36	-54.00	-9.36
666.43	V	-66.48	-54.00	-12.48
698.13	V	-70.34	-54.00	-16.34
698.43	H	-61.56	-54.00	-7.56
749.24	V	-70.85	-54.00	-16.85
777.04	V	-69.49	-54.00	-15.49
805.69	V	-70.63	-54.00	-16.63
806.64	H	-68.48	-54.00	-14.48
839.99	H	-69.99	-54.00	-15.99
846.79	V	-70.00	-54.00	-16.00

Above 1GHz Worst-Case Data
802.11a

Spurious Emission Frequency Range	1GHz ~ 40GHz	Operating Channel	149, 165
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Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
149	11490.00	H	-51.78	-30.00	-21.78
	11490.00	V	-52.20	-30.00	-22.20
	17226.00	H	-50.67	-30.00	-20.67
	17241.00	V	-48.99	-30.00	-18.99
	22980.00	H	-54.33	-30.00	-24.33
	22980.00	V	-53.82	-30.00	-23.82
165	11650.00	H	-52.97	-30.00	-22.97
	11650.00	V	-50.46	-30.00	-20.46
	17468.00	H	-56.25	-30.00	-26.25
	17479.00	V	-49.24	-30.00	-19.24
	23300.00	H	-55.71	-30.00	-25.71
	23300.00	V	-53.25	-30.00	-23.25

802.11ax (RU26)

Spurious Emission Frequency Range	1GHz ~ 40GHz	Operating Channel	149, 165
		RU Configuration	26/0, 26/0

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
149	11472.00	H	-50.59	-30.00	-20.59
	11472.00	V	-50.10	-30.00	-20.10
	17211.00	H	-44.53	-30.00	-14.53
	17211.00	V	-42.15	-30.00	-12.15
	22946.00	H	-54.61	-30.00	-24.61
	22946.00	V	-51.92	-30.00	-21.92
165	11632.00	H	-50.88	-30.00	-20.88
	11632.00	V	-49.19	-30.00	-19.19
	17450.00	H	-49.48	-30.00	-19.48
	17451.00	V	-45.43	-30.00	-15.43
	23264.00	H	-54.17	-30.00	-24.17
	23264.00	V	-54.39	-30.00	-24.39

Receiver Parameters

4.4 Receiver Spurious Emissions

4.4.1 Limits of Receiver Spurious Emissions

Frequency Range	Frequencies below 1GHz	Frequencies above 1GHz
Limit	2nW (-57dBm)	20nW (-47dBm)

4.4.2 Test Procedure

Refer to EN 300 440 V2.1.1 clause 4.3.5.3

4.4.3 Deviation from Test Standard

No deviation.

4.4.4 Test Setup

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The test setup has been constructed as the normal use condition. Controlling software (RTL8852B MP Toolkit V1.0.16) has been activated to set the EUT on specific status.

4.4.5 Test Results

PIFA Antenna

Below 1GHz worst-Case Data:

Spurious Emission Frequency Range	25MHz ~ 1GHz	Operating Channel	149
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
27.05	V	-60.23	-57.00	-3.23
53.05	H	-60.97	-57.00	-3.97
84.75	V	-64.57	-57.00	-7.57
87.90	H	-60.26	-57.00	-3.26
99.90	V	-61.78	-57.00	-4.78
124.01	V	-64.70	-57.00	-7.70
129.06	H	-60.41	-57.00	-3.41
144.01	V	-64.94	-57.00	-7.94
161.51	H	-63.86	-57.00	-6.86
206.11	H	-63.91	-57.00	-6.91
298.76	H	-61.38	-57.00	-4.38
299.31	V	-62.82	-57.00	-5.82
545.88	H	-62.01	-57.00	-5.01
666.48	H	-61.79	-57.00	-4.79
666.48	V	-62.92	-57.00	-5.92
697.03	V	-61.75	-57.00	-4.75
699.86	H	-61.59	-57.00	-4.59
826.74	V	-65.58	-57.00	-8.58
997.65	V	-66.00	-57.00	-9.00
998.55	H	-61.25	-57.00	-4.25

Above 1GHz worst-Case Data:

Spurious Emission Frequency Range	1GHz ~ 40GHz	Operating Channel	149, 165
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Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
149	7660.19	V	-53.86	-47.00	-6.86
	7660.31	H	-52.43	-47.00	-5.43
165	7766.66	H	-54.50	-47.00	-7.50
	7766.66	V	-56.29	-47.00	-9.29

Dipole Antenna

Below 1GHz worst-Case Data:

Spurious Emission Frequency Range	25MHz ~ 1GHz	Operating Channel	149
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
27.10	V	-62.93	-57.00	-5.93
53.05	H	-62.41	-57.00	-5.41
88.35	H	-63.93	-57.00	-6.93
99.90	V	-61.70	-57.00	-4.70
129.26	H	-60.32	-57.00	-3.32
144.01	V	-65.20	-57.00	-8.20
161.06	V	-66.38	-57.00	-9.38
298.85	H	-60.93	-57.00	-3.93
299.21	V	-63.11	-57.00	-6.11
499.77	H	-63.72	-57.00	-6.72
524.93	H	-63.98	-57.00	-6.98
553.28	H	-65.74	-57.00	-8.74
663.88	H	-62.35	-57.00	-5.35
666.43	V	-62.02	-57.00	-5.02
697.03	V	-62.78	-57.00	-5.78
754.54	H	-65.01	-57.00	-8.01
906.80	V	-66.19	-57.00	-9.19
956.95	V	-66.35	-57.00	-9.35
960.00	H	-65.94	-57.00	-8.94
989.45	V	-66.78	-57.00	-9.78

Above 1GHz worst-Case Data:

Spurious Emission Frequency Range	1GHz ~ 40GHz	Operating Channel	149, 165
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Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
149	7660.00	H	-55.08	-47.00	-8.08
	7660.00	V	-51.69	-47.00	-4.69
165	7766.66	H	-55.01	-47.00	-8.01
	7766.66	V	-53.62	-47.00	-6.62

4.5 Adjacent Channel Selectivity

This requirement applies to Equipment Category 1 receivers.

4.5.1 Limits of Adjacent Channel Selectivity

The adjacent channel selectivity of the equipment under specified conditions shall not be less than the levels of the unwanted signal as stated in table.

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

The correction factor, k, is as follows:

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

Where:

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

The factor k is limited within the following:

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

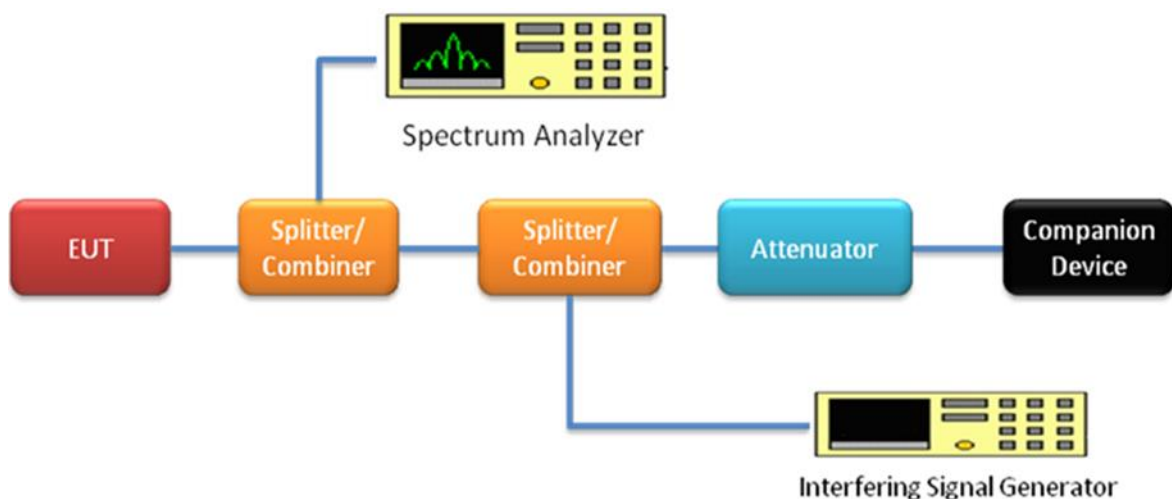
4.5.2 Test Procedure

Refer to EN 300 440 V2.1.1 clause 4.3.3.3

4.5.3 Deviation from Test Standard

No deviation.

4.5.4 Test Setup



4.5.5 Test Results

Adjacent Channel Selectivity Measure Of The Capability				Adjacent Signal Power		
Pmin (dBm):		-91		■ at the antenna connector		
				□ in front of the antenna		
Operation Mode	Channel Number	Wanted Signal Mean Power From Companion Device (dBm)	Adjacent Signal Frequency (MHz)	Adjacent Signal Power (dBm) (Note 1)	Wanted criteria are met (dBm)	Test Result
11a	157	-88	5765	-58.25	-58.25	Pass
			5805	-58.25	-58.25	Pass

Note: In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.

4.6 Blocking or Desensitization

This requirement applies to Equipment Category 1 and Category 2 receivers.

4.6.1 Limits of Blocking or Desensitization

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

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

The correction factor, k, is as follows:

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

Where:

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

The factor k is limited within the following:

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

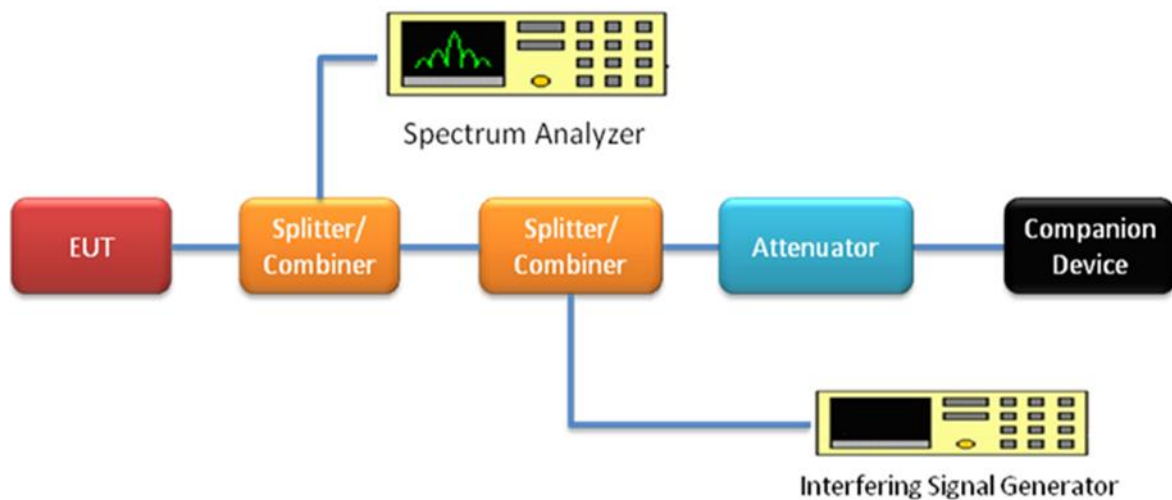
4.6.2 Test Procedure

Refer to EN 300 440 V2.1.1 clause 4.3.4.3

4.6.3 Deviation from Test Standard

No deviation.

4.6.4 Test Setup



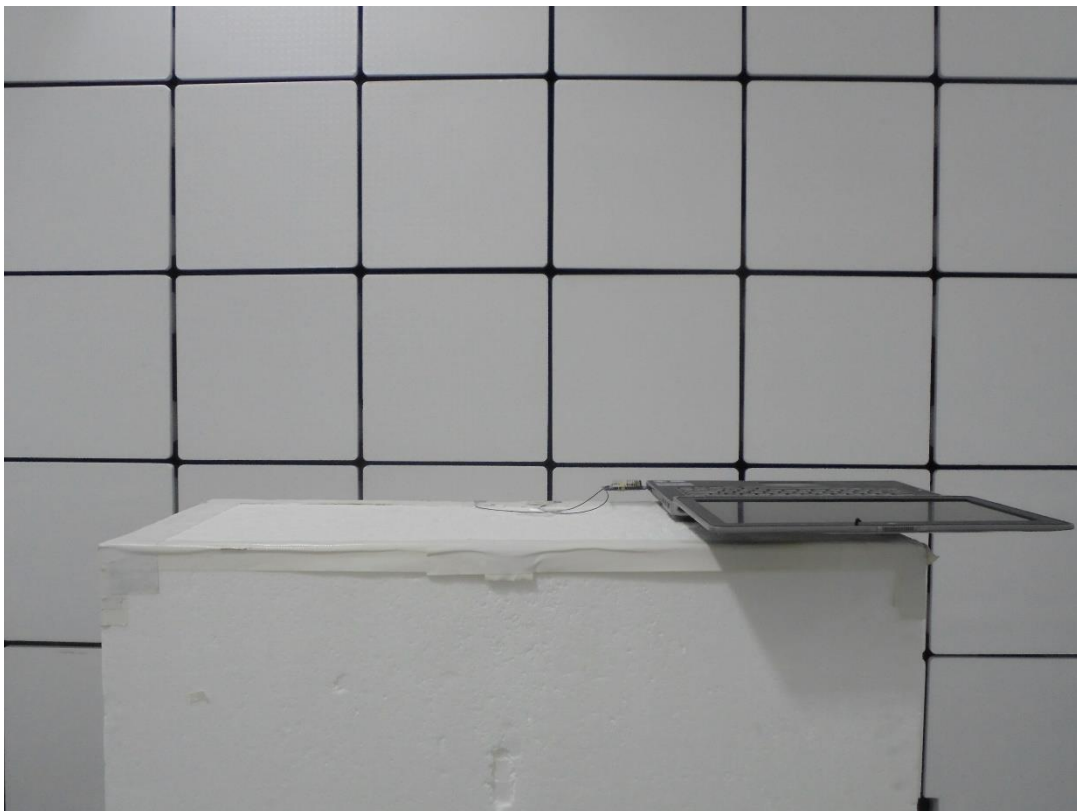
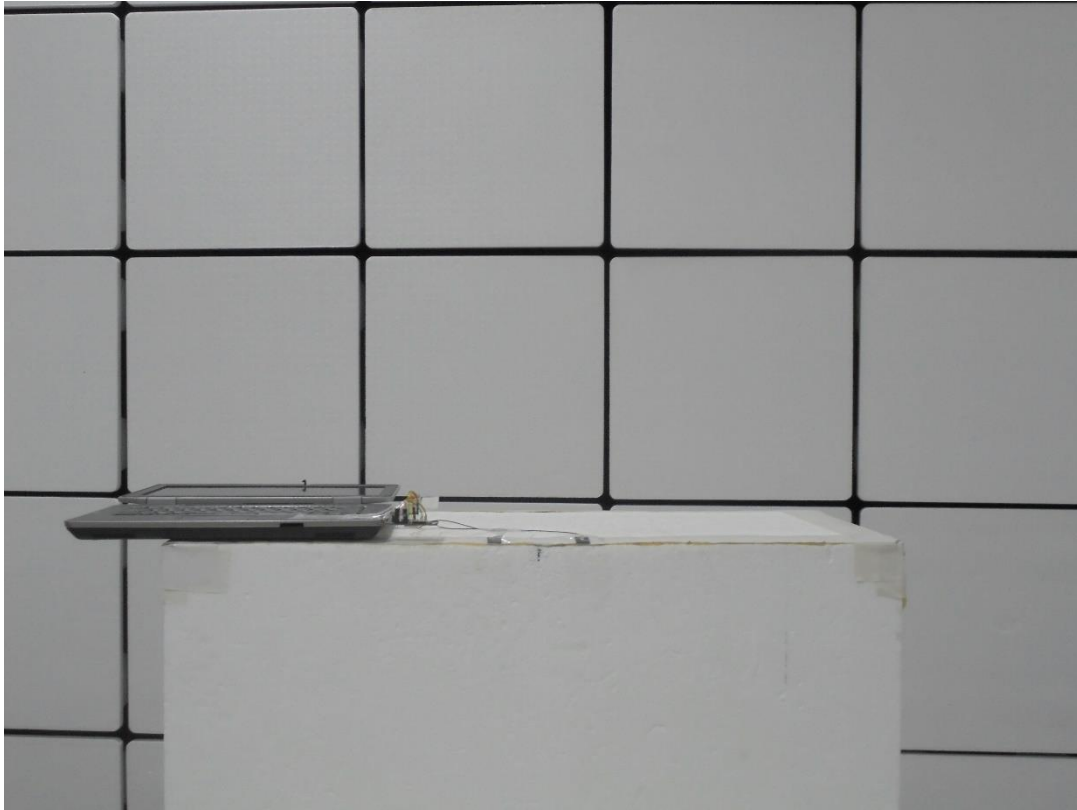
4.6.5 Test Results

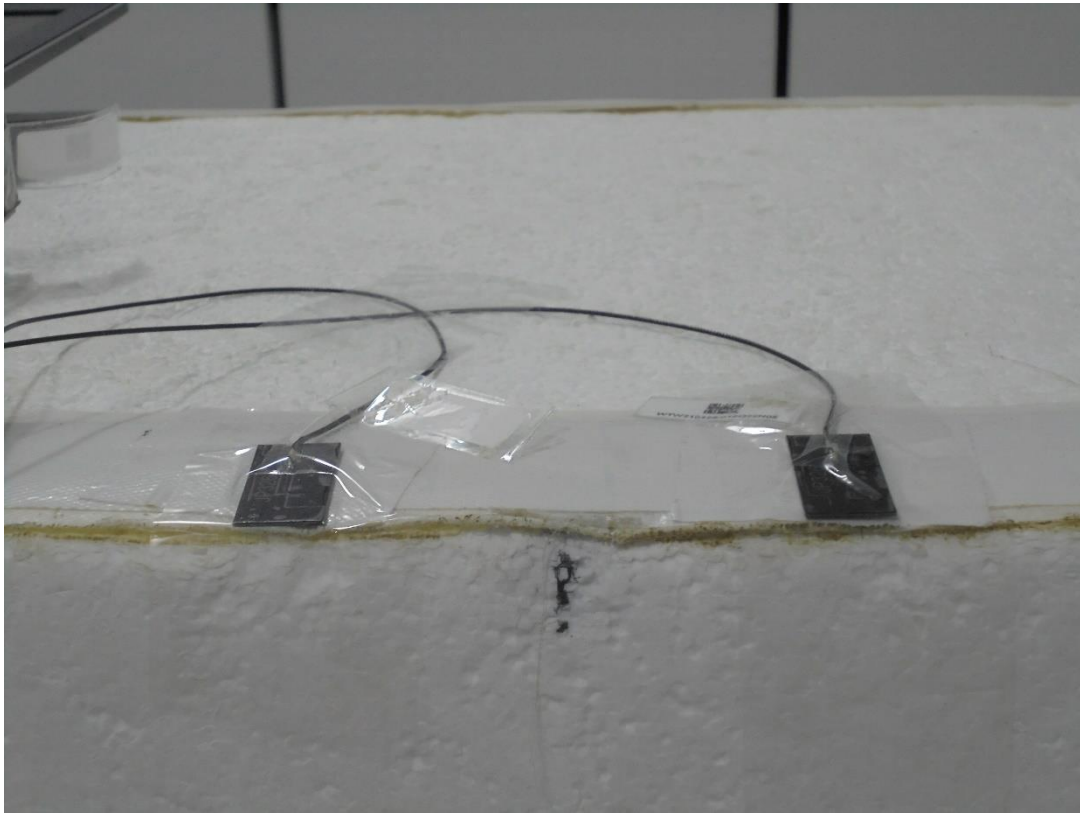
Blocking Measure Of The Capability				Blocking Signal Power			
Pmin (dBm):		-91		<input checked="" type="checkbox"/> at the antenna connector <input type="checkbox"/> in front of the antenna			
Operation Mode	Channel Number	Wanted Signal Mean Power From Companion Device (dBm)	Measurement Points: Offset From Centre Frequency (Times)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm) (Note 1)	Wanted criteria are met (dBm)	Test Result
11a	157	-88	-10	5585	-58.25	-58.25	Pass
			-20	5385	-58.25	-58.25	Pass
			-50	4785	-58.25	-58.25	Pass
			10	5985	-58.25	-58.25	Pass
			20	6185	-58.25	-58.25	Pass
			50	6785	-58.25	-58.25	Pass

Note: In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.

5 Photographs of the Test Configuration

TX / RX Spurious Emission Test
PIFA Antenna





Dipole Antenna



Appendix - Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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