EN 300 328 RF Test Report

Report No.:	REBBUI-WTW-P21040655
Test Model:	RTL8852BE
Received Date:	Apr. 21, 2021
Test Date:	May 04 to July 05, 2021
Issued Date:	Aug. 05, 2021
Applicant:	Realtek Semiconductor Corp.
Address:	No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan

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Release Control Record

Issue No.	Description	Date Issued
REBBUI-WTW-P21040655	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 04 to July 05, 2021

Standards: EN 300 328 V2.2.2 (2019-07)

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 : Vivian Huang , **Date:** Aug. 05, 2021

Vivian Huang / Specialist

Approved by : , **Date:** Aug. 05, 2021

Clark Lin / Technical Manager

2 Summary of Test Results

The EUT has been tested according to the following specifications:

EN 300 328 V2.2.2		
Clause	**Test Parameter**	**Results**
4.3.2.2	RF Output Power	Pass
4.3.2.3	Power Spectral Density	Pass
4.3.2.4	Duty cycle, Tx-sequence, Tx-gap (Non-adaptive equipment)	Not Applicable
4.3.2.5	Medium Utilization (MU) Factor (Non-Adaptive Equipment)	Not Applicable
4.3.2.6	Adaptivity (non-FHSS)	Pass
4.3.2.7	Occupied Channel Bandwidth	Pass
4.3.2.8	Transmitter Unwanted Emissions in the out-of-band Domain	Pass
4.3.2.9	Transmitter Unwanted Emissions in the Spurious Domain	Pass
4.3.2.10	Receiver Spurious Emissions	Pass
4.3.2.11	Receiver Blocking	Pass
4.3.2.12	Geo-location capability	Not Applicable

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Test Instruments

For spurious emissions test (Below 1GHz)

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 to 28, 2021

For spurious emissions test (Below 1GHz) for RU mode

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 test (Above 1GHz)

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 EMCI	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 04 to 06, 2021

For adaptivity 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 25, 2021	June 24, 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: July 05, 2021

For 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
AD1AD191XA one box tester	MT8860C	1705001	Feb. 20, 2021	Feb. 19, 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 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: May 12 to 13, 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
Occupied Channel Bandwidth	±0.14x10^{-4} %
RF output power, conducted	±1.2 dB
Power Spectral Density, conducted	±1.2 dB
Unwanted Emissions, conducted	±2.5 dB
All emissions, radiated	±4.9 dB
Temperature	±0.4 °C
Supply voltages	±0.05 %
Time	±5 %

2.3 Maximum Measurement Uncertainty

For the test methods, according to ETSI EN 300 328 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 100 028-1, in particular in annex D of the ETSI TR 100 028-2.

Maximum measurement uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±1 °C
Supply voltages	±3 %
Time	±5 %

2.4 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (WLAN)

Product	11ax RTL8852BE Combo module
Brand	REALTEK
Test Model	RTL8852BE
Status of EUT	Engineering sample
Power Supply Rating	3.3Vdc from host equipment
Voltage Operation Range	Vnom= 3.3Vdc
Temperature Operating Range	-20℃ ~ 70℃
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 Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.472GHz **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
Adaptive/Non-Adaptive	☐ non-adaptive Equipment ☒ adaptive Equipment without the possibility to switch to a non-adaptive mode ☐ adaptive Equipment which can also operate in a non-adaptive mode
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 : 22.75dBm 5.26 ~ 5.32 GHz : 22.74dBm 5.50 ~ 5.70 GHz : 22.86dBm 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

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:
1. 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.
2. 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.

2. 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.		

3. 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 & Adaptivity test.

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), VHT mode for 20MHz (40MHz) and 802.11ax mode for 20MHz (40MHz), therefore the manufacturer will control the power for 802.11n/VHT 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 above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.
6. 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

13 channels are provided for 802.11b, 802.11g and 802.11n (HT20), VHT20, 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
1	2412 MHz	8	2447 MHz
2	2417 MHz	9	2452 MHz
3	2422 MHz	10	2457 MHz
4	2427 MHz	11	2462 MHz
5	2432 MHz	12	2467 MHz
6	2437 MHz	13	2472 MHz
7	2442 MHz		

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

Channel	Frequency	Channel	Frequency
3	2422 MHz	8	2447 MHz
4	2427 MHz	9	2452 MHz
5	2432 MHz	10	2457 MHz
6	2437 MHz	11	2462 MHz
7	2442 MHz		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to										Description
	ROP	PSD	DC/TS/TG	MU	AD	OCB	EOB	SE< 1G	SE≥ 1G	RB	
1	√	√	-	-	√	√	√	√	√	√	2TX
2	√	√	-	-	-	√	√	√	√	-	1TX

Where **ROP:** RF Output Power **PSD:** Power Spectral Density

DC/TS/TG: Duty Cycle/ Tx-Sequence / Tx-gap **MU:** Medium Utilization

AD: Adaptivity (Channel Access Mechanism) **OCB:** Occupied Channel Bandwidth

EOB: Transmitter unwanted emissions in the out-of-band domain **SE<1G:** Unwanted Emissions in the Spurious Domain below 1 GHz

SE≥1G: Unwanted Emissions in the Spurious Domain above 1 GHz **RB:** Receiver Blocking

Note: 1. 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**.

2. For 20MHz bandwidth and 40MHz 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.

RF Output Power 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	802.11b	1 to 13	1, 7, 13	DSSS	DBPSK	1Mb/s	-
	802.11g	1 to 13	1, 7, 13	OFDM	BPSK	6Mb/s	-
	VHT20	1 to 13	1, 7, 13	OFDM	BPSK	MCS0	-
	VHT40	3 to 11	3, 7, 11	OFDM	BPSK	MCS0	-
	802.11ax (HE20)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	3 to 11	3, 7, 11	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	26/0, 26/4, 26/8
	802.11ax (RU52)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	52/37, 52/38, 52/40
	802.11ax (RU106)	1 to 13	1, 7, 13	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	VHT20	1 to 13	1, 7, 13	OFDM	BPSK	MCS0	-
	VHT40	3 to 11	3, 7, 11	OFDM	BPSK	MCS0	
	802.11ax (HE20)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	
	802.11ax (HE40)	3 to 11	3, 7, 11	OFDMA	BPSK	MCS0	

EUT configure mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
2	802.11b	1 to 13	1, 7, 13	DSSS	DBPSK	1Mb/s	-
	802.11g	1 to 13	1, 7, 13	OFDM	BPSK	6Mb/s	-
	VHT20	1 to 13	1, 7, 13	OFDM	BPSK	MCS0	-
	VHT40	3 to 11	3, 7, 11	OFDM	BPSK	MCS0	-
	802.11ax (HE20)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	3 to 11	3, 7, 11	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	26/0, 26/4, 26/8
	802.11ax (RU52)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	52/37, 52/38, 52/40
	802.11ax (RU106)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	106/53, 106/53, 106/54

Power Spectral Density 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	802.11b	1 to 13	1, 7, 13	DSSS	DBPSK	1Mb/s	-
	802.11g	1 to 13	1, 7, 13	OFDM	BPSK	6Mb/s	-
	VHT20	1 to 13	1, 7, 13	OFDM	BPSK	MCS0	-
	VHT40	3 to 11	3, 7, 11	OFDM	BPSK	MCS0	-
	802.11ax (HE20)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	3 to 11	3, 7, 11	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	26/0, 26/4, 26/8
	802.11ax (RU52)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	52/37, 52/38, 52/40
	802.11ax (RU106)	1 to 13	1, 7, 13	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	VHT20	1 to 13	1, 7, 13	OFDM	BPSK	MCS0	-
	VHT40	3 to 11	3, 7, 11	OFDM	BPSK	MCS0	
	802.11ax (HE20)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	
	802.11ax (HE40)	3 to 11	3, 7, 11	OFDMA	BPSK	MCS0	
EUT configure mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
2	802.11b	1 to 13	1, 7, 13	DSSS	DBPSK	1Mb/s	-
	802.11g	1 to 13	1, 7, 13	OFDM	BPSK	6Mb/s	-
	VHT20	1 to 13	1, 7, 13	OFDM	BPSK	MCS0	-
	VHT40	3 to 11	3, 7, 11	OFDM	BPSK	MCS0	-
	802.11ax (HE20)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	3 to 11	3, 7, 11	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	26/0, 26/4, 26/8
	802.11ax (RU52)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	52/37, 52/38, 52/40
	802.11ax (RU106)	1 to 13	1, 7, 13	OFDMA	BPSK	MCS0	106/53, 106/53, 106/54

Adaptivity Test:

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

Mode	Available Channel	Tested Channel	Modulation Type
802.11b	1 to 13	1, 13	DBPSK
802.11g	1 to 13	1, 13	BPSK
802.11ax (HE20)	1 to 13	1, 13	BPSK
802.11ax (HE40)	3 to 11	3, 11	BPSK

Occupied Channel Bandwidth 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	802.11b	1 to 13	1, 13	DSSS	DBPSK	1Mb/s	-
	802.11g	1 to 13	1, 13	OFDM	BPSK	6Mb/s	-
	802.11ax (HE20)	1 to 13	1, 13	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	3 to 11	3, 11	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	1 to 13	1, 13	OFDMA	BPSK	MCS0	26/0, 26/8
	802.11ax (RU52)	1 to 13	1, 13	OFDMA	BPSK	MCS0	52/37, 52/40
	802.11ax (RU106)	1 to 13	1, 13	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	802.11b	1 to 13	1, 13	DSSS	DBPSK	1Mb/s	-
	802.11g	1 to 13	1, 13	OFDM	BPSK	6Mb/s	-
	802.11ax (HE20)	1 to 13	1, 13	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	3 to 11	3, 11	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	1 to 13	1, 13	OFDMA	BPSK	MCS0	26/0, 26/8
	802.11ax (RU52)	1 to 13	1, 13	OFDMA	BPSK	MCS0	52/37, 52/40
	802.11ax (RU106)	1 to 13	1, 13	OFDMA	BPSK	MCS0	106/53, 106/54

Transmitter Unwanted Emissions in the Out-of-band Domain 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	802.11b	1 to 13	1, 13	DSSS	DBPSK	1Mb/s	-
	802.11g	1 to 13	1, 13	OFDM	BPSK	6Mb/s	-
	802.11ax (HE20)	1 to 13	1, 13	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	3 to 11	3, 11	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	1 to 13	1, 13	OFDMA	BPSK	MCS0	26/0, 26/8
	802.11ax (RU52)	1 to 13	1, 13	OFDMA	BPSK	MCS0	52/37, 52/40
	802.11ax (RU106)	1 to 13	1, 13	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	802.11b	1 to 13	1, 13	DSSS	DBPSK	1Mb/s	-
	802.11g	1 to 13	1, 13	OFDM	BPSK	6Mb/s	-
	802.11ax (HE20)	1 to 13	1, 13	OFDMA	BPSK	MCS0	-
	802.11ax (HE40)	3 to 11	3, 11	OFDMA	BPSK	MCS0	-
	802.11ax (RU26)	1 to 13	1, 13	OFDMA	BPSK	MCS0	26/0, 26/8
	802.11ax (RU52)	1 to 13	1, 13	OFDMA	BPSK	MCS0	52/37, 52/40
	802.11ax (RU106)	1 to 13	1, 13	OFDMA	BPSK	MCS0	106/53, 106/54

Unwanted Emissions in the Spurious Domain 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	802.11b	1 to 13	1	DSSS	DBPSK	1Mb/s	-
	802.11ax (RU26)	1 to 13	1	OFDMA	BPSK	MCS0	26/0
	Receiver	1 to 13	1	-	-	-	-
EUT configure mode	**Mode**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate Parameter**	**RU Configuration**
2	802.11b	1 to 13	1	DSSS	DBPSK	1Mb/s	-
	802.11ax (RU26)	1 to 13	1	OFDMA	BPSK	MCS0	26/0

Unwanted Emissions in the Spurious Domain 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	802.11b	1 to 13	1, 13	DSSS	DBPSK	1Mb/s	-
	802.11ax (RU26)	1 to 13	1, 13	OFDMA	BPSK	MCS0	26/0, 26/8
	Receiver	1 to 13	1, 13	-	-	-	-
EUT configure mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate Parameter	RU Configuration
2	802.11b	1 to 13	1, 13	DSSS	DBPSK	1Mb/s	-
	802.11ax (RU26)	1 to 13	1, 13	OFDMA	BPSK	MCS0	26/0, 26/8

Receiver Blocking test:

☒ 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
802.11b	1 to 13	1, 13	OFDM	BPSK	1Mb/s

Test Condition:

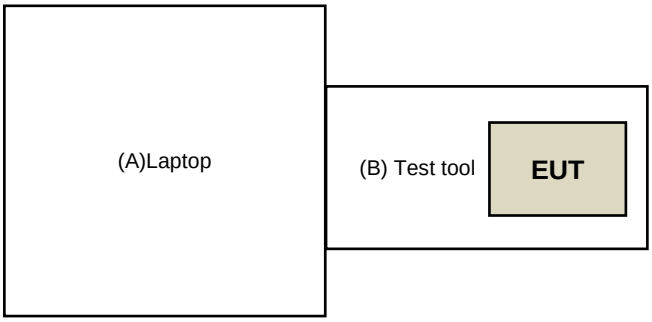
Applicable to	Environmental Conditions	Input Power	Tested by
ROP	25deg. C, 60%RH	3.3Vdc	Angus Peng,
PSD	25deg. C, 60%RH	3.3Vdc	Angus Peng,
AD	25deg. C, 60%RH	3.3Vdc	Tobey Chen
OCB	25deg. C, 60%RH	3.3Vdc	Angus Peng,
EOB	25deg. C, 60%RH	3.3Vdc	Angus Peng,
SE<1G	22deg. C, 72%RH,	230Vac, 50Hz (System)	Ethan Hsu
SE≥1G	25deg. C, 67%RH,	230Vac, 50Hz (System)	Ethan Hsu
RB	22deg. C, 61%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	FCC DoC	Provided by Lab
B.	Test tool	Realtek	N/A	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 300 328 V2.2.2 (2019-07)

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

4 Test Procedure and Results

4.1 RF Output Power

4.1.1 Limits of RF Output Power

Condition	Frequency Band	Limit (e.i.r.p.)
Under all test conditions	2400 ~ 2483.5 MHz	AV: 20dBm

4.1.2 Test Procedures

Refer to chapter 5.4.2 of EN 300 328 V2.2.2.

Measurement Method	
☒ Conducted measurement	☐ Radiated measurement

For extreme test condition refer to chapter Annex B.4 and procedure follow Annex B.4.3.

4.1.3 Deviation from Test Standard

No deviation.

4.1.4 Test Setup

The measurements for RF output power was performed at both normal environmental conditions and at the extremes of the operating temperature. Controlling software (RTL8852B MP Toolkit V1.0.16) has been activated to set the EUT on specific channel and power level.

4.1.5 Test Results (Mode 1)

CDD Mode

Test Condition			EIRP Power (dBm)		
			(CH1) 2412 MHz	(CH7) 2442 MHz	(CH13) 2472 MHz
802.11b					
T_{nom}(℃)	25	V_{nom}(v)	19.27	19.28	19.30
T_{min}(℃)	-20	V_{nom}(v)	19.40	19.38	19.56
T_{max}(℃)	70	V_{nom}(v)	18.92	18.99	19.12
802.11g					
T_{nom}(℃)	25	V_{nom}(v)	19.62	19.66	19.71
T_{min}(℃)	-20	V_{nom}(v)	19.89	19.87	19.85
T_{max}(℃)	70	V_{nom}(v)	19.32	19.40	19.37
VHT20					
T_{nom}(℃)	25	V_{nom}(v)	19.29	19.50	19.56
T_{min}(℃)	-20	V_{nom}(v)	19.58	19.61	19.63
T_{max}(℃)	70	V_{nom}(v)	19.15	19.16	19.32
802.11ax (HE20)					
T_{nom}(℃)	25	V_{nom}(v)	19.48	19.74	19.70
T_{min}(℃)	-20	V_{nom}(v)	19.77	19.85	19.77
T_{max}(℃)	70	V_{nom}(v)	19.34	19.40	19.46
TEST CONDITION			**EIRP POWER (dBm)**		
			(CH3) 2422 MHz	(CH7) 2442 MHz	(CH11) 2462 MHz
VHT40					
T_{nom}(℃)	25	V_{nom}(v)	19.48	19.62	19.53
T_{min}(℃)	-20	V_{nom}(v)	19.69	19.64	19.72
T_{max}(℃)	70	V_{nom}(v)	19.29	19.36	19.25
802.11ax (HE40)					
T_{nom}(℃)	25	V_{nom}(v)	19.68	19.76	19.71
T_{min}(℃)	-20	V_{nom}(v)	19.89	19.78	19.90
T_{max}(℃)	70	V_{nom}(v)	19.49	19.50	19.43

Test Condition			EIRP Power (dBm)		
			(CH1) 2412 MHz	(CH7) 2442 MHz	(CH13) 2472 MHz
			RU Configuration		
802.11ax (RU26)			26/0	26/4	26/8
T_{nom}(℃)	25	V_{nom}(v)	12.70	13.18	12.69
T_{min}(℃)	-10	V_{nom}(v)	12.92	13.40	13.03
T_{max}(℃)	70	V_{nom}(v)	12.57	12.94	12.62
802.11ax (RU52)			52/37	52/38	52/40
T_{nom}(℃)	25	V_{nom}(v)	15.52	15.89	15.56
T_{min}(℃)	-10	V_{nom}(v)	15.74	16.11	15.90
T_{max}(℃)	70	V_{nom}(v)	15.39	15.65	15.49
802.11ax (RU106)			106/53	106/53	106/54
T_{nom}(℃)	25	V_{nom}(v)	18.62	18.72	18.27
T_{min}(℃)	-10	V_{nom}(v)	18.84	18.94	18.61
T_{max}(℃)	70	V_{nom}(v)	18.49	18.48	18.20

Beamforming Mode

Test Condition			EIRP Power (dBm)		
			(CH1) 2412 MHz	(CH7) 2442 MHz	(CH13) 2472 MHz
VHT20					
T_{nom}(℃)	25	V_{nom}(v)	19.28	19.47	19.53
T_{min}(℃)	-20	V_{nom}(v)	19.57	19.58	19.60
T_{max}(℃)	70	V_{nom}(v)	19.14	19.13	19.29
802.11ax (HE20)					
T_{nom}(℃)	25	V_{nom}(v)	19.47	19.72	19.68
T_{min}(℃)	-20	V_{nom}(v)	19.76	19.83	19.75
T_{max}(℃)	70	V_{nom}(v)	19.33	19.38	19.44
TEST CONDITION			EIRP POWER (dBm)		
			(CH3) 2422 MHz	(CH7) 2442 MHz	(CH11) 2462 MHz
VHT40					
T_{nom}(℃)	25	V_{nom}(v)	19.43	19.59	19.37
T_{min}(℃)	-20	V_{nom}(v)	19.64	19.61	19.56
T_{max}(℃)	70	V_{nom}(v)	19.24	19.33	19.09
802.11ax (HE40)					
T_{nom}(℃)	25	V_{nom}(v)	19.65	19.73	19.57
T_{min}(℃)	-20	V_{nom}(v)	19.86	19.75	19.76
T_{max}(℃)	70	V_{nom}(v)	19.46	19.47	19.29

4.1.6 Test Results (Mode 2)

Test Condition			EIRP Power (dBm)		
			(CH1) 2412 MHz	(CH7) 2442 MHz	(CH13) 2472 MHz
802.11b					
T_{nom}(℃)	25	V_{nom}(v)	19.25	19.27	19.34
T_{min}(℃)	-20	V_{nom}(v)	19.38	19.37	19.60
T_{max}(℃)	70	V_{nom}(v)	18.90	18.98	19.16
802.11g					
T_{nom}(℃)	25	V_{nom}(v)	19.63	19.62	19.65
T_{min}(℃)	-20	V_{nom}(v)	19.80	19.83	19.79
T_{max}(℃)	70	V_{nom}(v)	19.35	19.51	19.44
VHT20					
T_{nom}(℃)	25	V_{nom}(v)	19.38	19.50	19.58
T_{min}(℃)	-20	V_{nom}(v)	19.67	19.61	19.65
T_{max}(℃)	70	V_{nom}(v)	19.24	19.16	19.34
802.11ax (HE20)					
T_{nom}(℃)	25	V_{nom}(v)	19.53	19.64	19.79
T_{min}(℃)	-20	V_{nom}(v)	19.82	19.75	19.86
T_{max}(℃)	70	V_{nom}(v)	19.39	19.30	19.55
TEST CONDITION			EIRP POWER (dBm)		
			(CH3) 2422 MHz	(CH7) 2442 MHz	(CH11) 2462 MHz
VHT40					
T_{nom}(℃)	25	V_{nom}(v)	19.51	19.63	19.43
T_{min}(℃)	-20	V_{nom}(v)	19.72	19.65	19.62
T_{max}(℃)	70	V_{nom}(v)	19.32	19.37	19.15
802.11ax (HE40)					
T_{nom}(℃)	25	V_{nom}(v)	19.69	19.83	19.59
T_{min}(℃)	-20	V_{nom}(v)	19.90	19.85	19.78
T_{max}(℃)	70	V_{nom}(v)	19.50	19.57	19.31

Test Condition			EIRP Power (dBm)		
			(CH1) 2412 MHz	(CH7) 2442 MHz	(CH13) 2472 MHz
			RU Configuration		
802.11ax (RU26)			26/0	26/4	26/8
T_{nom}(℃)	25	V_{nom}(v)	12.73	12.92	12.80
T_{min}(℃)	-10	V_{nom}(v)	12.95	13.14	13.14
T_{max}(℃)	70	V_{nom}(v)	12.60	12.68	12.73
802.11ax (RU52)			52/37	52/38	52/40
T_{nom}(℃)	25	V_{nom}(v)	15.46	15.98	15.36
T_{min}(℃)	-10	V_{nom}(v)	15.68	16.20	15.70
T_{max}(℃)	70	V_{nom}(v)	15.33	15.74	15.29
802.11ax (RU106)			106/53	106/53	106/54
T_{nom}(℃)	25	V_{nom}(v)	18.65	18.64	18.66
T_{min}(℃)	-10	V_{nom}(v)	18.87	18.86	19.00
T_{max}(℃)	70	V_{nom}(v)	18.52	18.40	18.59

4.2 Power Spectral Density

4.2.1 Limit of Power Spectral Density

Condition	Frequency Band	Limit (e.i.r.p.)
Under normal conditions	2400 ~ 2483.5 MHz	10dBm / 1MHz

4.2.2 Test Procedures

Refer to chapter 5.4.3 of EN 300 328 V2.2.2.

Measurement Method	
☒ Conducted measurement	☐ Radiated measurement
☒ Option 1: For equipment with continuous and non-continuous transmissions	
☐ Option 2: For equipment with continuous transmission capability or for equipment operating (or with the capability to operate) with a constant duty cycle (e.g. Frame Basedequipment)	

4.2.3 Deviation of Test Standard

No deviation.

4.2.4 Test Setup

The test setup has been constructed as the normal test condition. The power spectral density as defined in EN 300 328 clause 4.3.2.3 shall be measured and recorded. Controlling software (RTL8852B MP Toolkit V1.0.16) has been activated to set the EUT on specific status.

4.2.5 Test Results (Mode 1)

CDD Mode

802.11b

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	9.56	10	Pass
7	2442	9.58	10	Pass
13	2472	9.58	10	Pass

802.11g

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	7.74	10	Pass
7	2442	7.73	10	Pass
13	2472	7.91	10	Pass

VHT20

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	7.24	10	Pass
7	2442	7.27	10	Pass
13	2472	7.22	10	Pass

VHT40

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
3	2422	4.53	10	Pass
7	2442	4.61	10	Pass
11	2462	4.72	10	Pass

802.11ax (HE20)

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	7.27	10	Pass
7	2442	7.29	10	Pass
13	2472	7.26	10	Pass

802.11ax (HE40)

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
3	2422	4.56	10	Pass
7	2442	4.65	10	Pass
11	2462	4.77	10	Pass

802.11ax (RU26)

Channel	Channel Frequency (MHz)	RU Configuration	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	26/0	9.88	10	Pass
7	2442	26/4	9.99	10	Pass
13	2472	26/8	9.86	10	Pass

802.11ax (RU52)

Channel	Channel Frequency (MHz)	RU Configuration	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	52/37	9.70	10	Pass
7	2442	52/38	9.94	10	Pass
13	2472	52/40	9.97	10	Pass

802.11ax (RU106)

Channel	Channel Frequency (MHz)	RU Configuration	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	106/53	9.95	10	Pass
7	2442	106/53	9.72	10	Pass
13	2472	106/54	9.64	10	Pass

Beamforming Mode

VHT20

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	7.21	10	Pass
7	2442	7.23	10	Pass
13	2472	7.19	10	Pass

VHT40

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
3	2422	4.51	10	Pass
7	2442	4.58	10	Pass
11	2462	4.66	10	Pass

802.11ax (HE20)

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	7.25	10	Pass
7	2442	7.26	10	Pass
13	2472	7.24	10	Pass

802.11ax (HE40)

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
3	2422	4.52	10	Pass
7	2442	4.63	10	Pass
11	2462	4.72	10	Pass

4.2.6 Test Results (Mode 2)

802.11b

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	9.60	10	Pass
7	2442	9.77	10	Pass
13	2472	9.69	10	Pass

802.11g

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	7.59	10	Pass
7	2442	7.82	10	Pass
13	2472	7.72	10	Pass

VHT20

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	7.24	10	Pass
7	2442	7.30	10	Pass
13	2472	7.26	10	Pass

VHT40

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
3	2422	4.03	10	Pass
7	2442	4.04	10	Pass
11	2462	3.98	10	Pass

802.11ax (HE20)

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	7.26	10	Pass
7	2442	7.31	10	Pass
13	2472	7.29	10	Pass

802.11ax (HE40)

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
3	2422	4.05	10	Pass
7	2442	4.08	10	Pass
11	2462	4.01	10	Pass

802.11ax (RU26)

Channel	Channel Frequency (MHz)	RU Configuration	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	26/0	9.84	10	Pass
7	2442	26/4	9.74	10	Pass
13	2472	26/8	9.94	10	Pass

802.11ax (RU52)

Channel	Channel Frequency (MHz)	RU Configuration	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	52/37	9.63	10	Pass
7	2442	52/38	9.97	10	Pass
13	2472	52/40	9.56	10	Pass

802.11ax (RU106)

Channel	Channel Frequency (MHz)	RU Configuration	Power Density (dBm/1MHz) (EIRP)	Limit (dBm/1MHz) (EIRP)	Pass/Fail
1	2412	106/53	9.78	10	Pass
7	2442	106/53	9.79	10	Pass
13	2472	106/54	9.96	10	Pass

4.3 Adaptivity (non-FHSS)

This requirement does not apply to non-adaptive non-FHSS equipment or adaptive non-FHSS equipment operating in a non-adaptive mode.

In addition, this requirement does not apply for non-FHSS equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for non-FHSS equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

4.3.1 Limit of Adaptive

Applicability of adaptive requirements and limit for wide band modulation techniques

Requirement	Operational Mode			
	Using Detect and Avoid	LBT mechanism		
		Frame Based Equipment	Load Based Equipment (Base on 'Spectrum Sharing' mechanisms)	Load Based Equipment (Not using any of the mechanisms referenced)
Minimum Clear Channel Assessment (CCA) Time	NA	18 us	(see note 1)	18 us
Maximum Channel Occupancy (COT) Time	40 ms	1 ms - 10 ms	(see note 1)	13ms
Minimum Idle Period	5% of COT	5% of COT	(see note 1)	18us (see note 2)
Extended CCA check	NA	NA	(see note 1)	18us – 160us
Short Control Signalling Transmissions	Maximum duty cycle of 10 % within an observation period of 50 ms (see note 3)			

NOTE 1: Load Based Equipment may implement an LBT based spectrum sharing mechanism based on the Clear Channel Assessment (CCA) mode using energy detect as described in IEEE 802.11™ [i.3], clause 10 clause 11, clause 15,clause 16, clause 18 and clause 19, or in IEEE 802.15.4™ [i.4], clause 5, clause 6 and clause 10

NOTE 2: The Idle Period in between transmissions is considered to be the CCA or the Extended CCA check as there are no transmissions during this period.

NOTE 3: Adaptive equipment may or may not have Short Control Signalling Transmissions

Threshold Level for Non-LBT based Detect and Avoid	
Maximum transmit power (P_H) EIRP dBm	**Threshold level (TL) (see notes 1 and 2)**
20	-70 dBm / MHz

NOTE 1: For a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G)

NOTE 2: For power levels less than 20 dBm e.i.r.p., the detection threshold level may be relaxed to: $TL = -70 \text{ dBm/MHz} + 10 \times \log_{10}(100 \text{ mW} / P_{out})$; (P_{out} in mW e.i.r.p.)

Unwanted signal parameters for Non-LBT based Detect and Avoid		
Wanted signal mean power from companion device (dBm)	**Unwanted signal frequency (MHz)**	**Unwanted CW signal power (dBm)**
-30	2 395 or 2 488,5 (see note 1)	-35 (see note 2)

NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz.

NOTE 2: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna.

Threshold Level for LBT based Detect and Avoid (Frame Based Equipment)	
Maximum transmit power (P_H) EIRP dBm	**Threshold level (TL) (see notes 1 and 2)**
20	-70 dBm / MHz
NOTE 1: For a 20 dBm e.i.r.p. transmitter the CCA threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G)	
NOTE 2: For power levels less than 20 dBm e.i.r.p. the CCA threshold level may be relaxed to: TL = -70 dBm/MHz + 10 × $\log_{10}$ (100 mW / P_{out}) ; (P_{out} in mW e.i.r.p.)	

Unwanted signal parameters for LBT based Detect and Avoid (Frame Based Equipment)		
Wanted signal mean power from companion device	**Unwanted signal frequency (MHz)**	**Unwanted signal power (dBm)**
sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 3)
NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1.		
NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.		
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna.		

Threshold Level for LBT based Detect and Avoid (Load Based Equipment)	
Maximum transmit power (P_H) EIRP dBm	**Threshold level (TL) (see notes 1 and 2)**
20	-70 dBm / MHz
NOTE 1: For a 20 dBm e.i.r.p. transmitter the CCA threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G)	
NOTE 2: For power levels less than 20 dBm e.i.r.p. the CCA threshold level may be relaxed to: TL = -70 dBm/MHz + 10 × $\log_{10}$ (100 mW / P_{out}) ; (P_{out} in mW e.i.r.p.)	

Unwanted signal parameters for LBT based Detect and Avoid (Load Based Equipment)		
Wanted signal mean power from companion device	**Unwanted signal frequency (MHz)**	**Unwanted signal power (dBm)**
sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 3)
NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1.		
NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.		
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna.		

4.3.2 Test Procedure

Refer to chapter 5.4.6 of EN 300 328 V2.2.2.

Measurement Method	
☒ Conducted measurement	☐ Radiated measurement

4.3.3 Deviatrion from Test Standard

No deviation.

4.3.4 Test Setup Configuration

Companion Device information

PRODUCT	BRAND	MODEL NO.	SOFTWARE/FIRMWARE VERSION
AX3000 4-Stream WiFi Router	NETGEAR	RAX40v2	V1.0.2.24_2.0.32

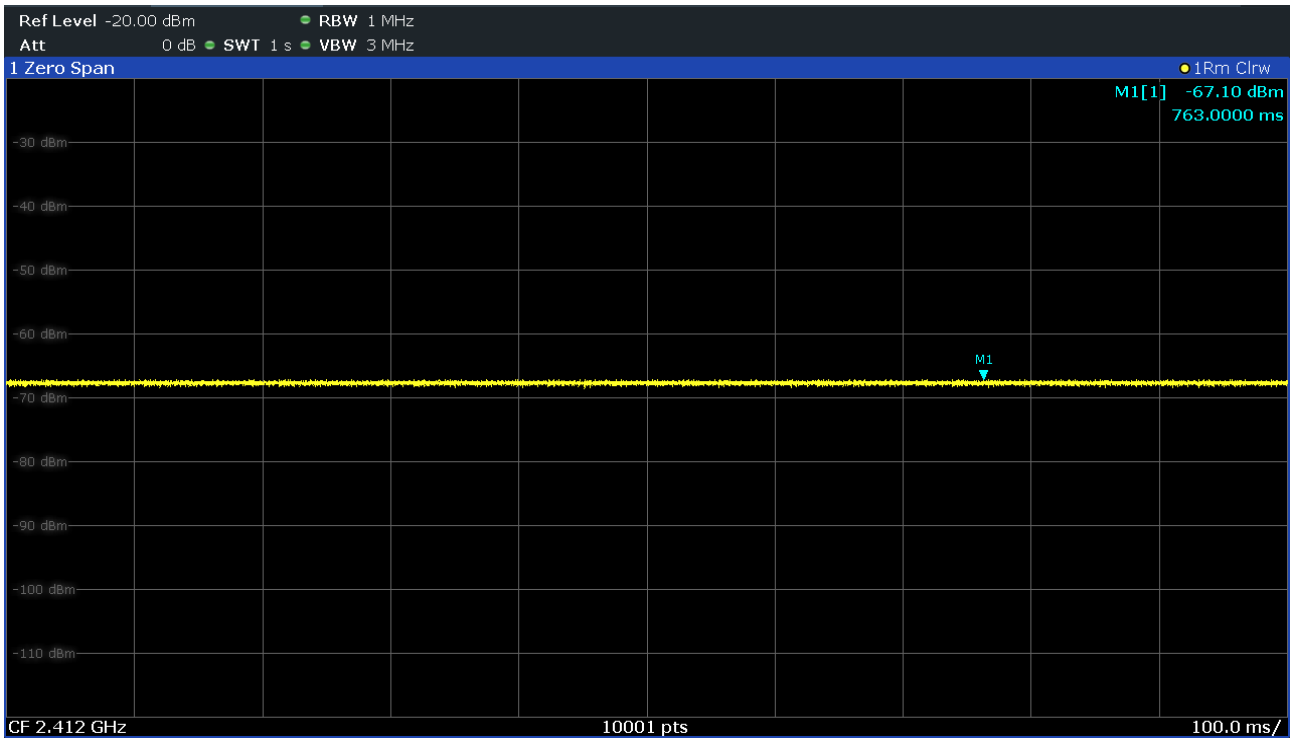
4.3.5 List of Measurements

UUT Operational Mode	Applicable	Limit	
		The Maximum Channel Occupancy Time	The Minimum idle Period
Frame Based Equipment		meet in 1ms ~ 10ms	>5% x channel occupancy time
Load Based Equipment (Base on 'Spectrum Sharing' mechanisms)		Follow IEEE 802.11 Less than _____ms	Follow IEEE 802.11 More than _____ms
Load Based Equipment (Not using any of the mechanisms referenced)	v	13ms	18us

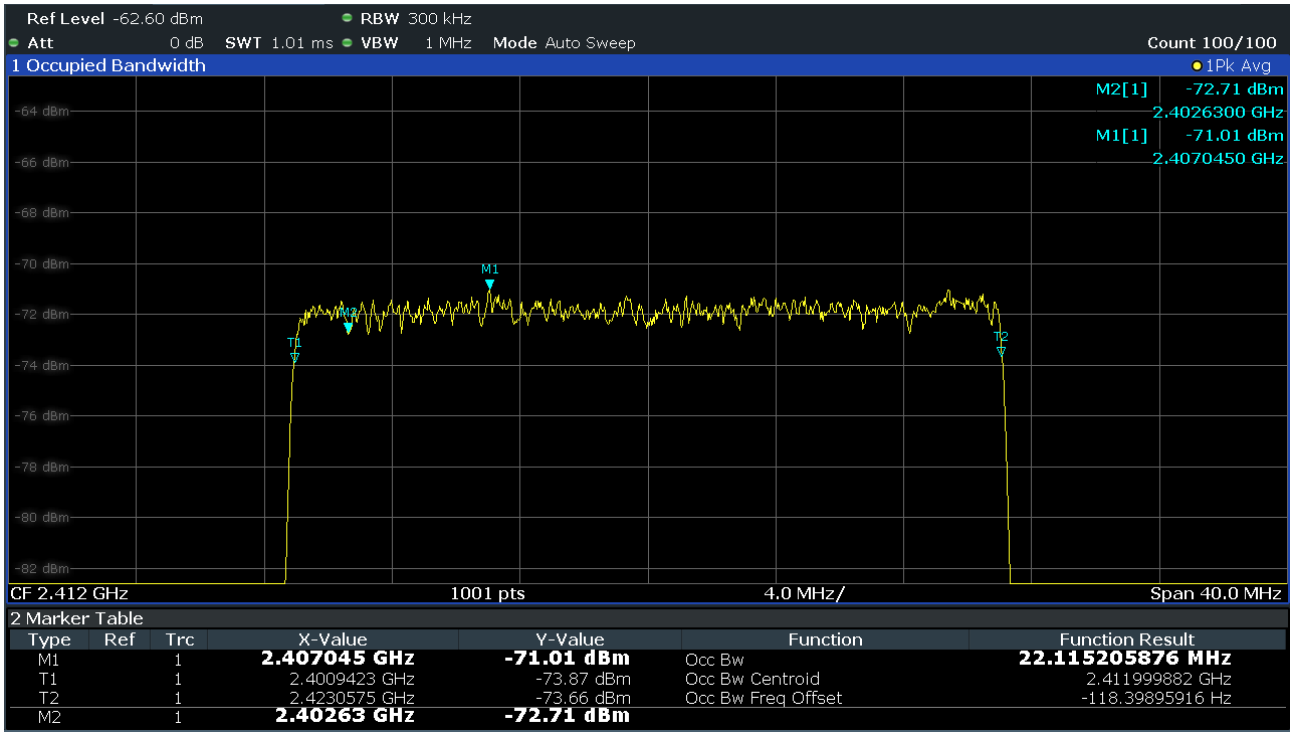
Clause	Test Parameter	Remarks	Pass/Fail
4.3.2.6.3.2.2	Adaptive (Frame Based Equipment)	Not Applicable	NA
4.3.2.6.3.2.3	Adaptive (Load Based Equipment)	Applicable	PASS
4.3.2.6.4	Short Control Signalling Transmissions	Applicable	PASS
4.3.2.6.3.2.3.6	Unwanted signal test	Applicable	PASS

4.3.6 Interference Threshold Level

Detection Threshold Level
The maximum EIRP (nom) power is 19.76 dBm (94.62 mW) and antenna gain is 3 dBi. Detection Threshold level= -70 dBm/MHz + 10×log(100 mW / Pout (94.62 mW)) + G (3 dBi) = -66.76 dBm/MHz The interference signal level to the UUT is lower than -66.76 dBm/MHz.



Detection Threshold Level



Flatness and Bandwidth

4.3.7 Test Result

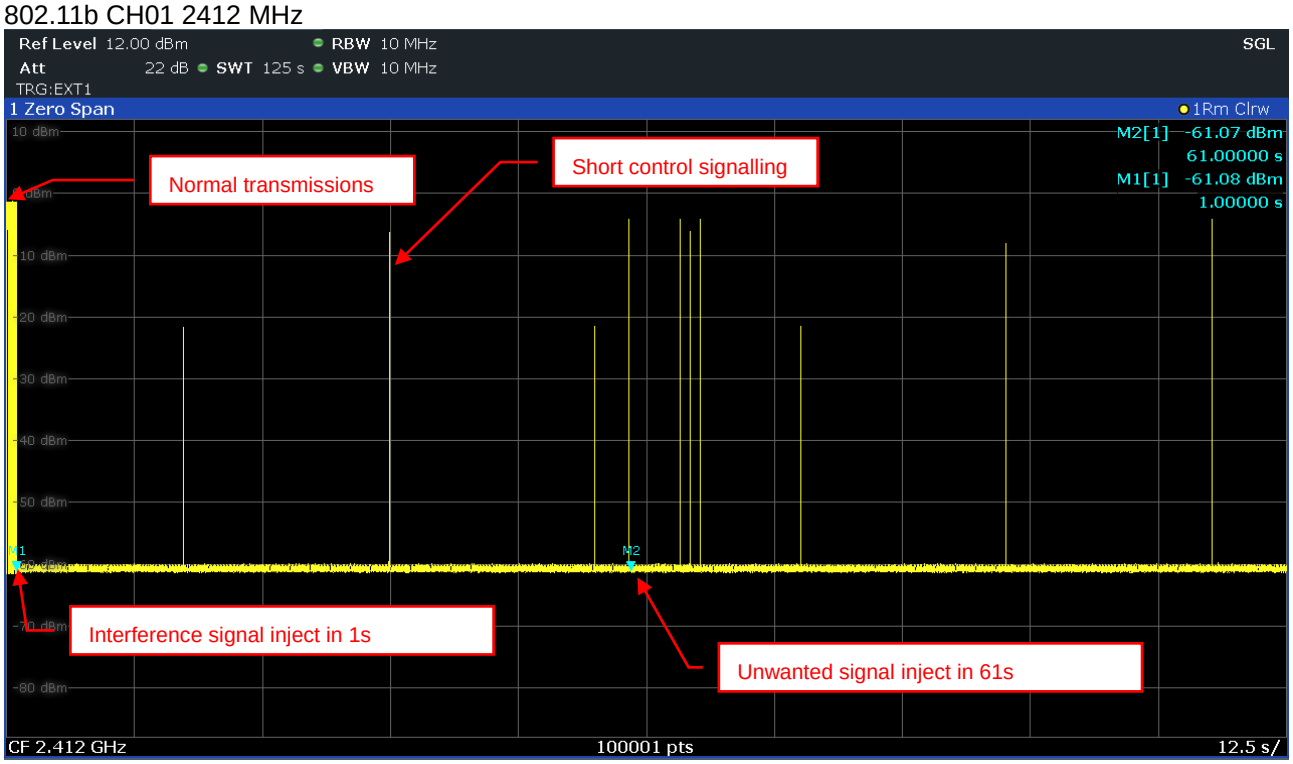
☐	Not applicable to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode
☐	Not applicable to equipment with RF output power is less than 10 dBm e.i.r.p.
☒	Refer to below test result

4.3.7.1 Adaptive Result

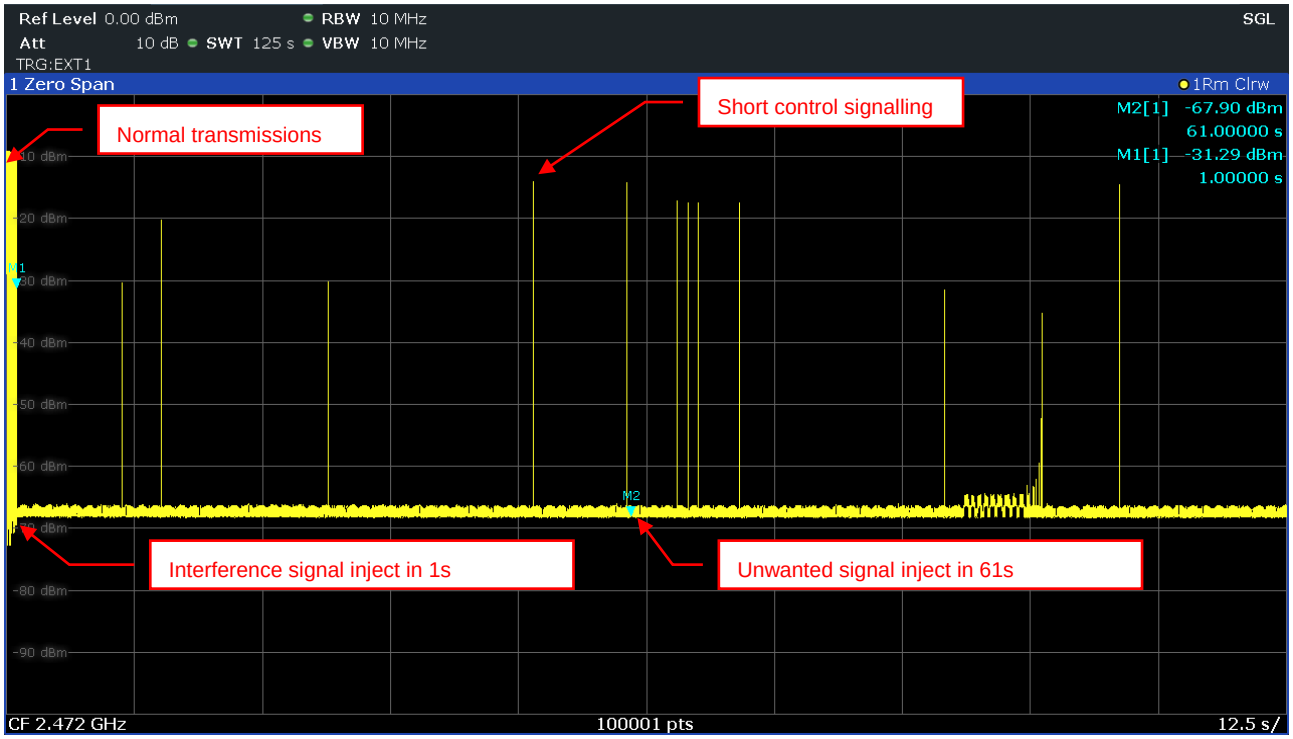
Operating Frequency Bands and Mode of EUT

Operational Mode	Operating Frequency (Low Channel, MHz)	Operating Frequency (High Channel, MHz)	Test Result
802.11b	2412	2472	PASS
802.11g	2412	2472	PASS
802.11ax (HE20)	2412	2472	PASS
802.11ax (HE40)	2422	2462	PASS

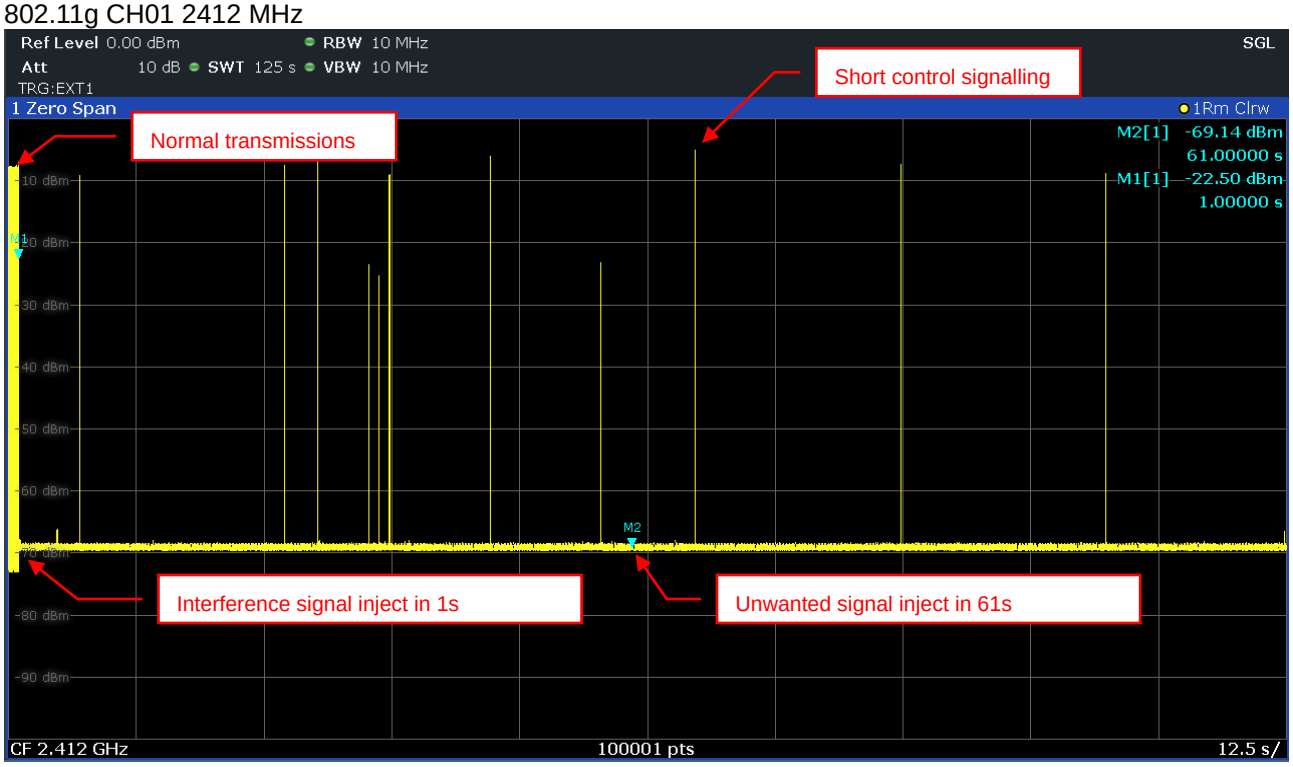
802.11b CH01 2412 MHz



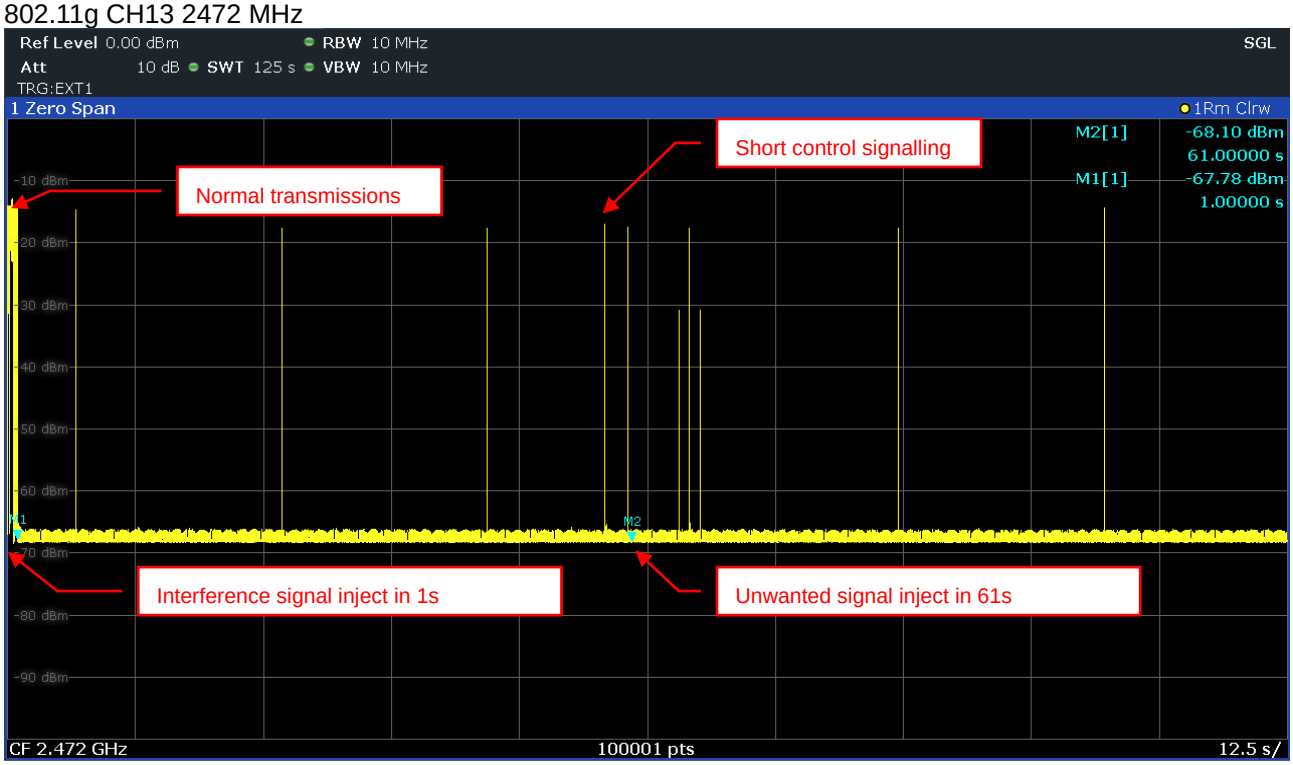
802.11b CH13 2472 MHz



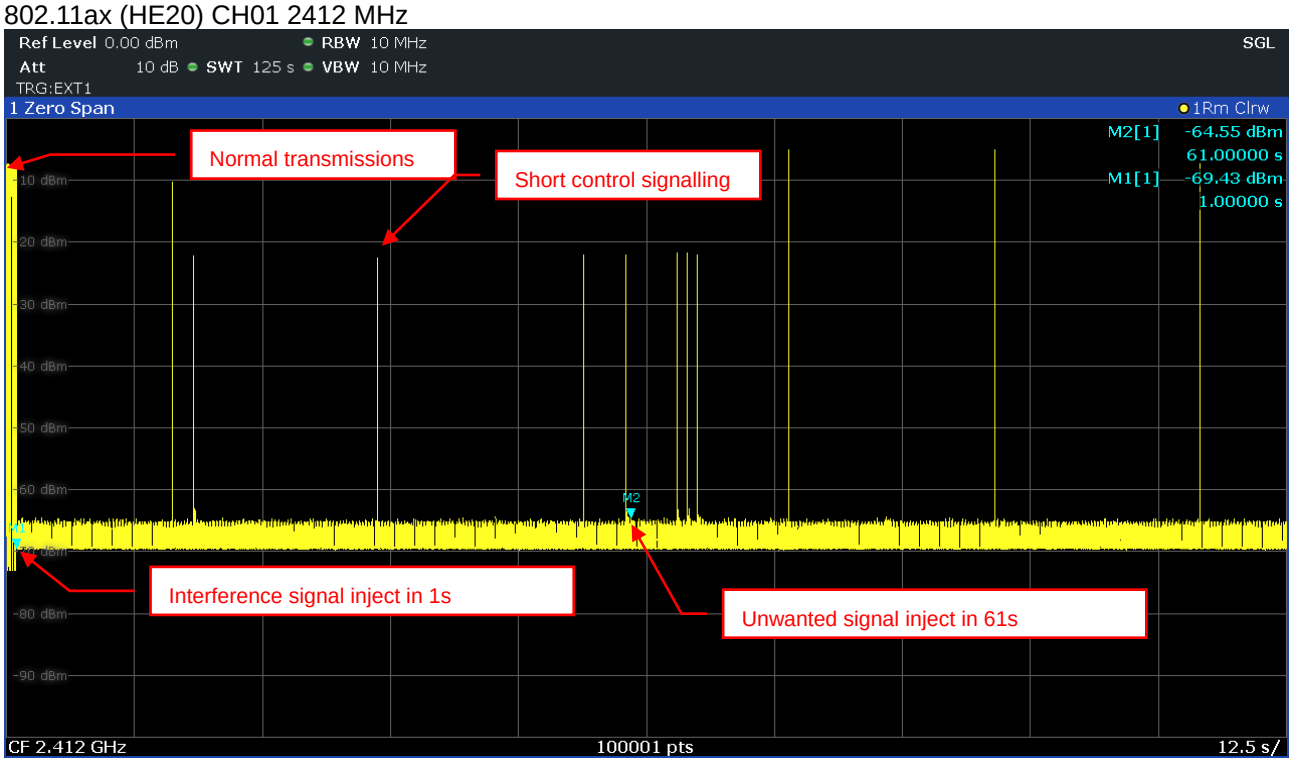
802.11g CH01 2412 MHz



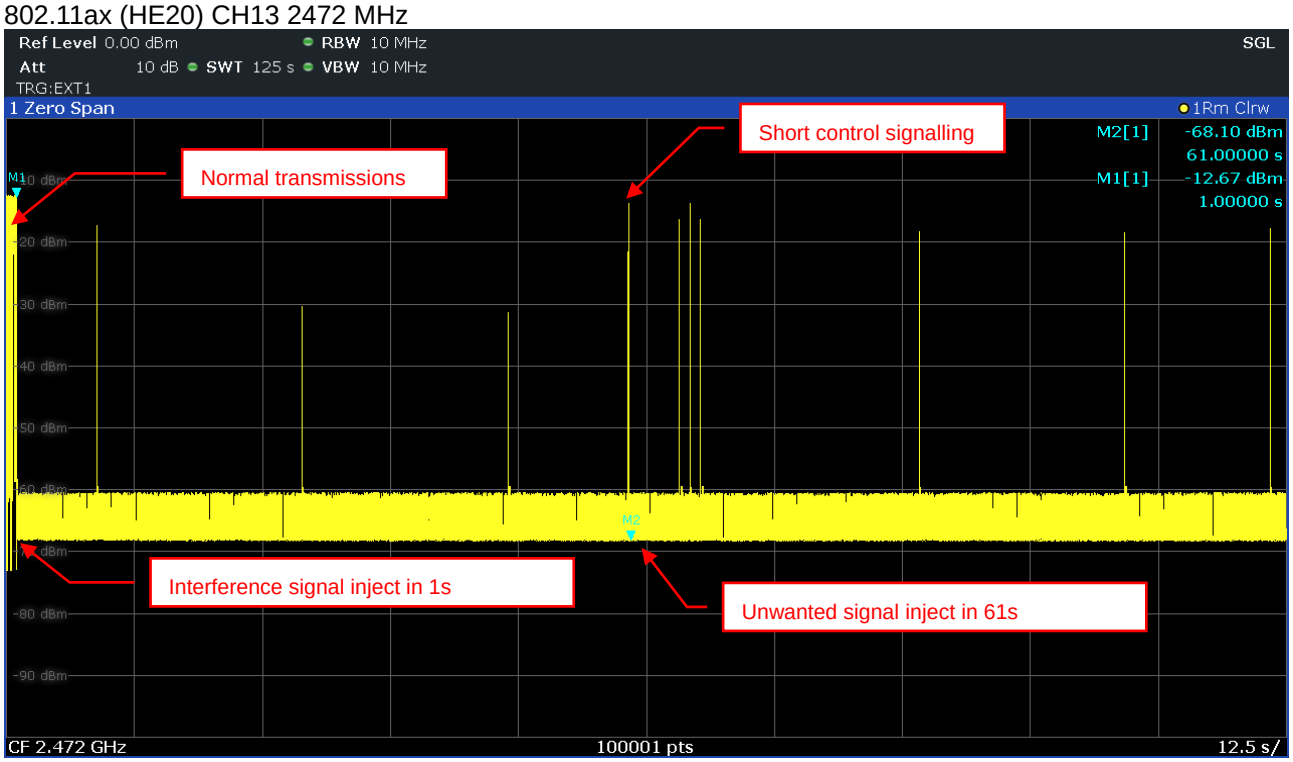
802.11g CH13 2472 MHz



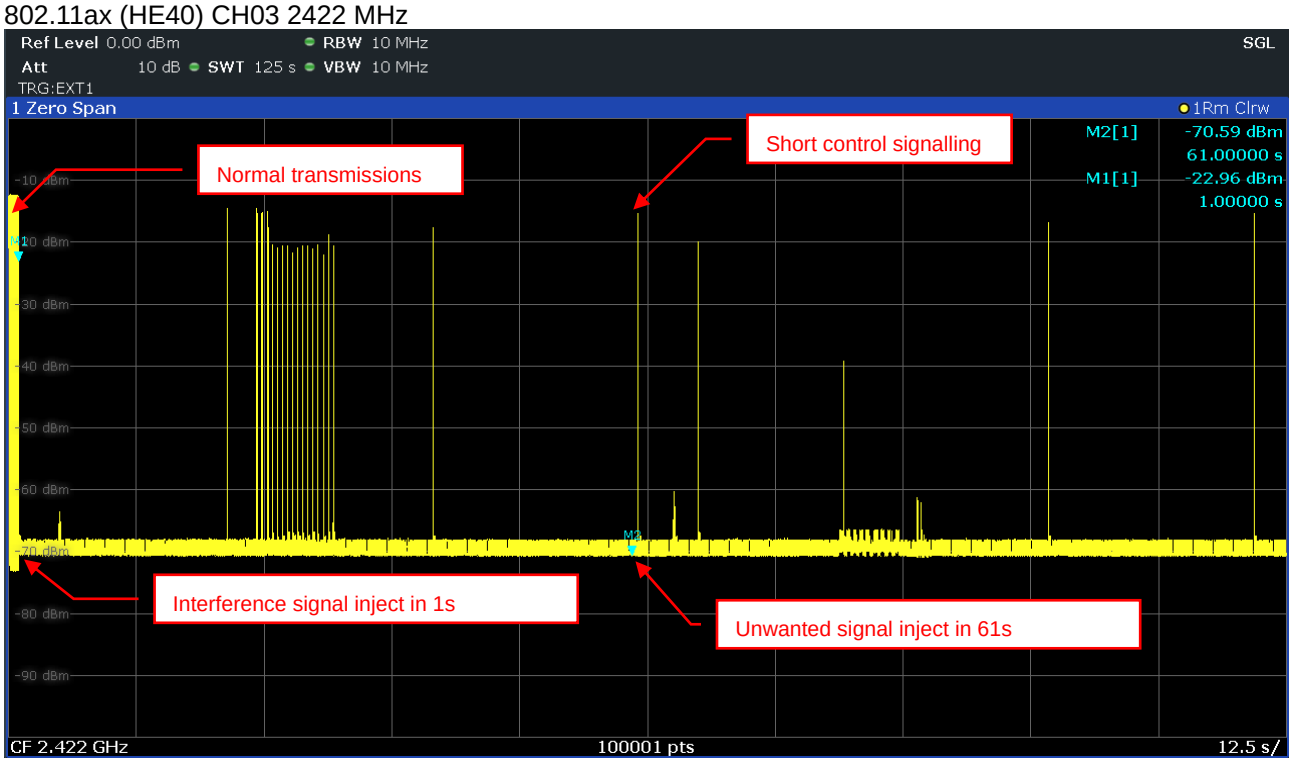
802.11ax (HE20) CH01 2412 MHz



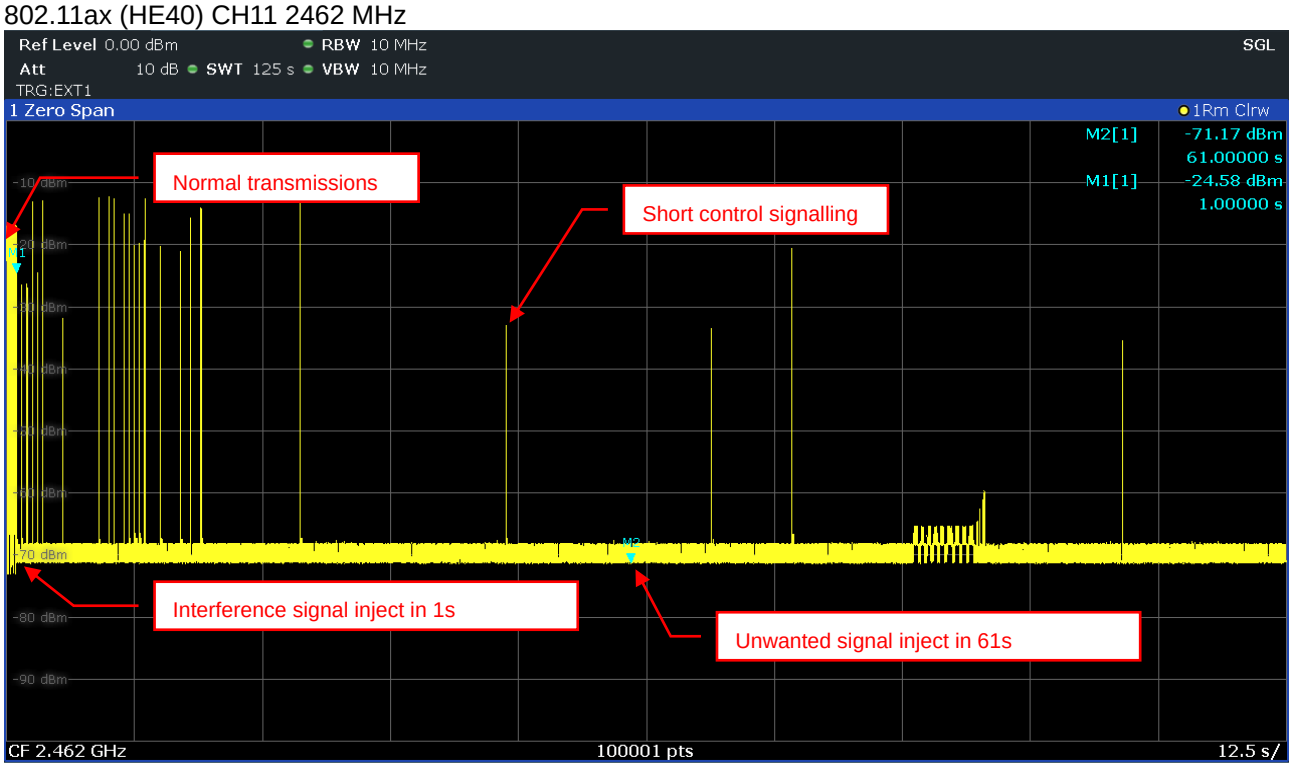
802.11ax (HE20) CH13 2472 MHz



802.11ax (HE40) CH03 2422 MHz



802.11ax (HE40) CH11 2462 MHz

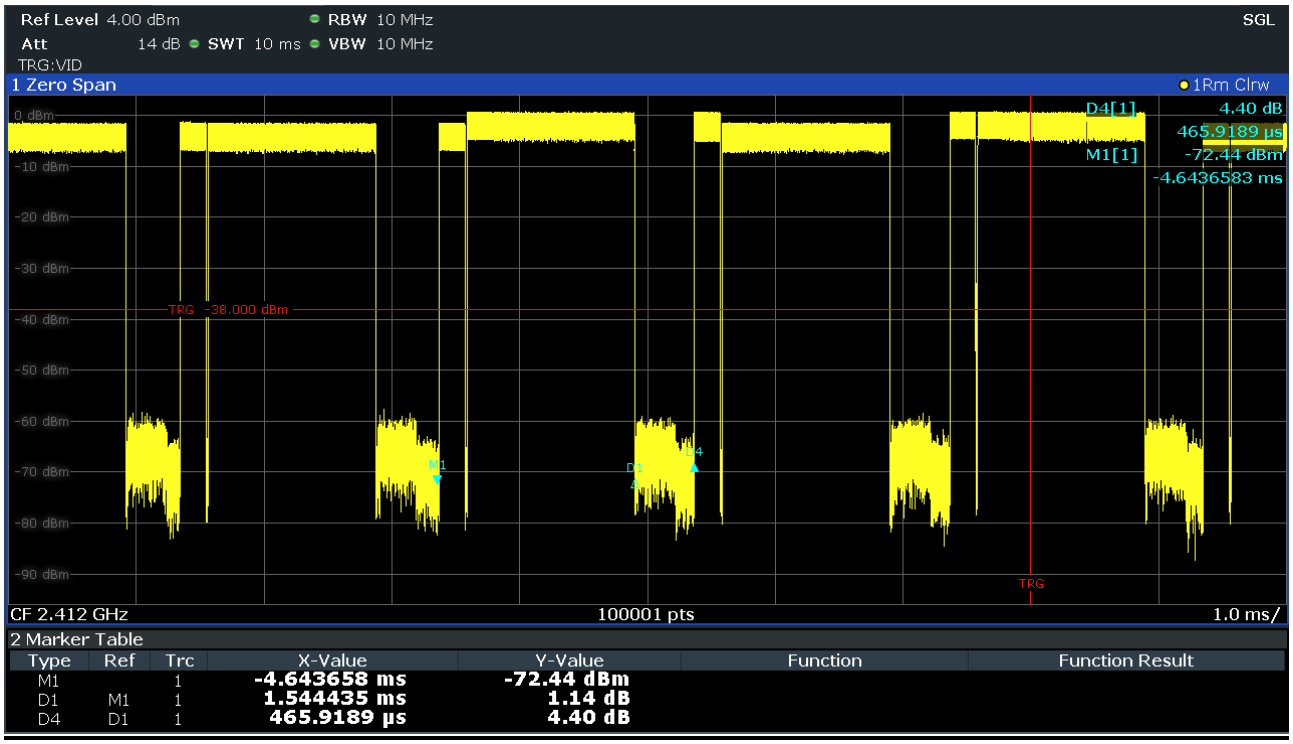


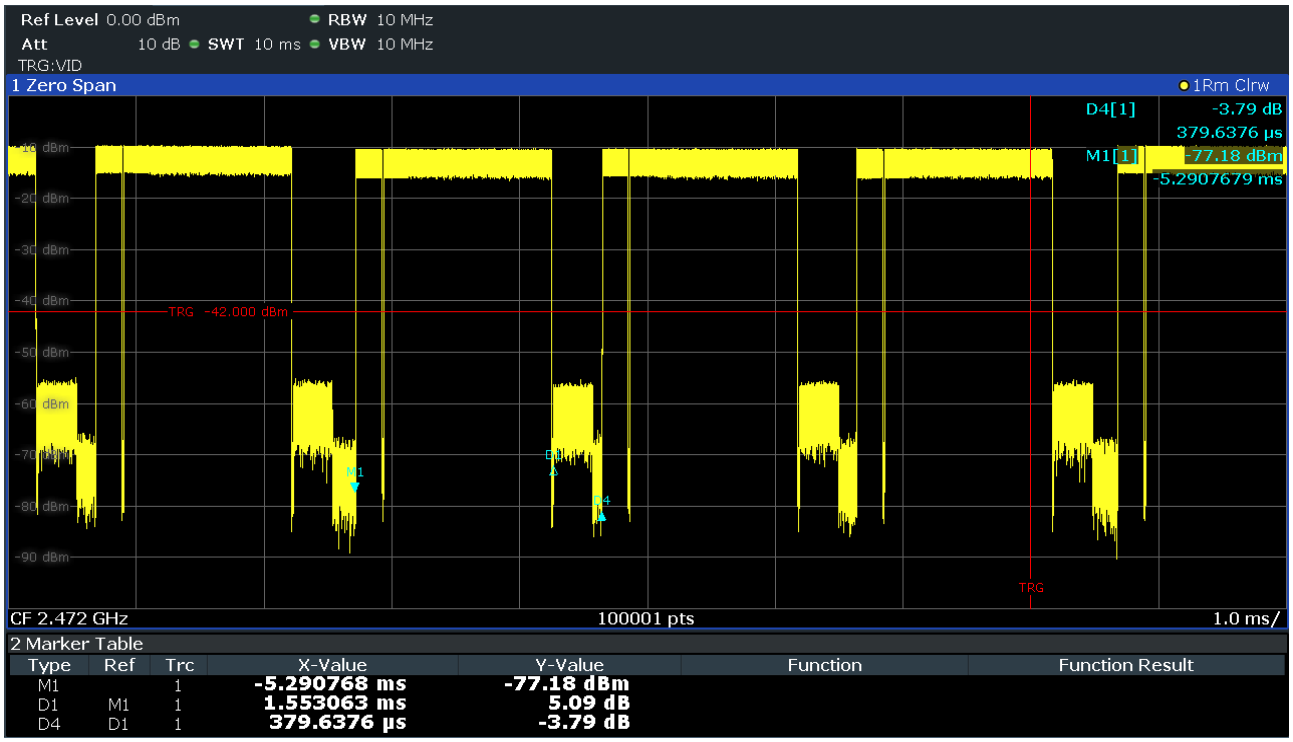
4.3.7.2 The Channel Occupancy Time Result

Operating Frequency Bands and Mode of EUT

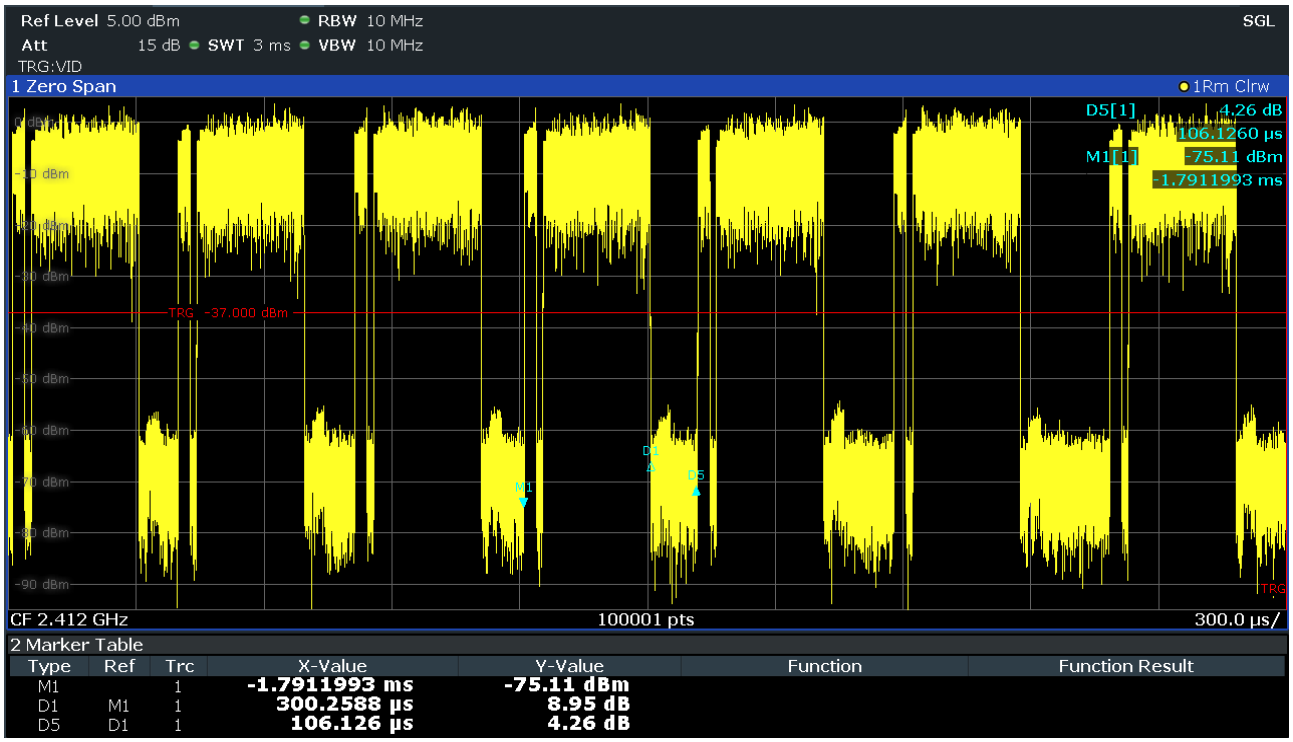
Operational Mode	Operating Frequency Low Channel (MHz)	The Channel Occupancy Time (ms)	Minimum Idle Period (us)	Test Result
802.11b	2412	1.54	465.92	PASS
802.11b	2472	1.55	379.64	PASS
802.11g	2412	0.3	106.13	PASS
802.11g	2472	0.3	113.89	PASS
802.11ax (HE20)	2412	5.27	90.6	PASS
802.11ax (HE20)	2472	5.26	86.28	PASS
802.11ax (HE40)	2422	3.03	112.17	PASS
802.11ax (HE40)	2462	3.03	172.56	PASS

802.11b mode


Ref Level 4.00 dBm
RBW 10 MHz
SGL
Att 14 dB SWT 10 ms VBW 10 MHz
TRG:VID
1 Zero Span
1Rm Clrw
D4[1] 4.40 dB
465.9189 µs
M1[1] -72.44 dBm
-4.6436583 ms
TRG -38.000 dBm
CF 2.412 GHz
100001 pts
1.0 ms/
2 Marker Table
Type Ref Trc X-Value Y-Value Function Function Result
M1 1 -4.643658 ms -72.44 dBm
D1 M1 1 1.544435 ms 1.14 dB
D4 D1 1 465.9189 µs 4.40 dB

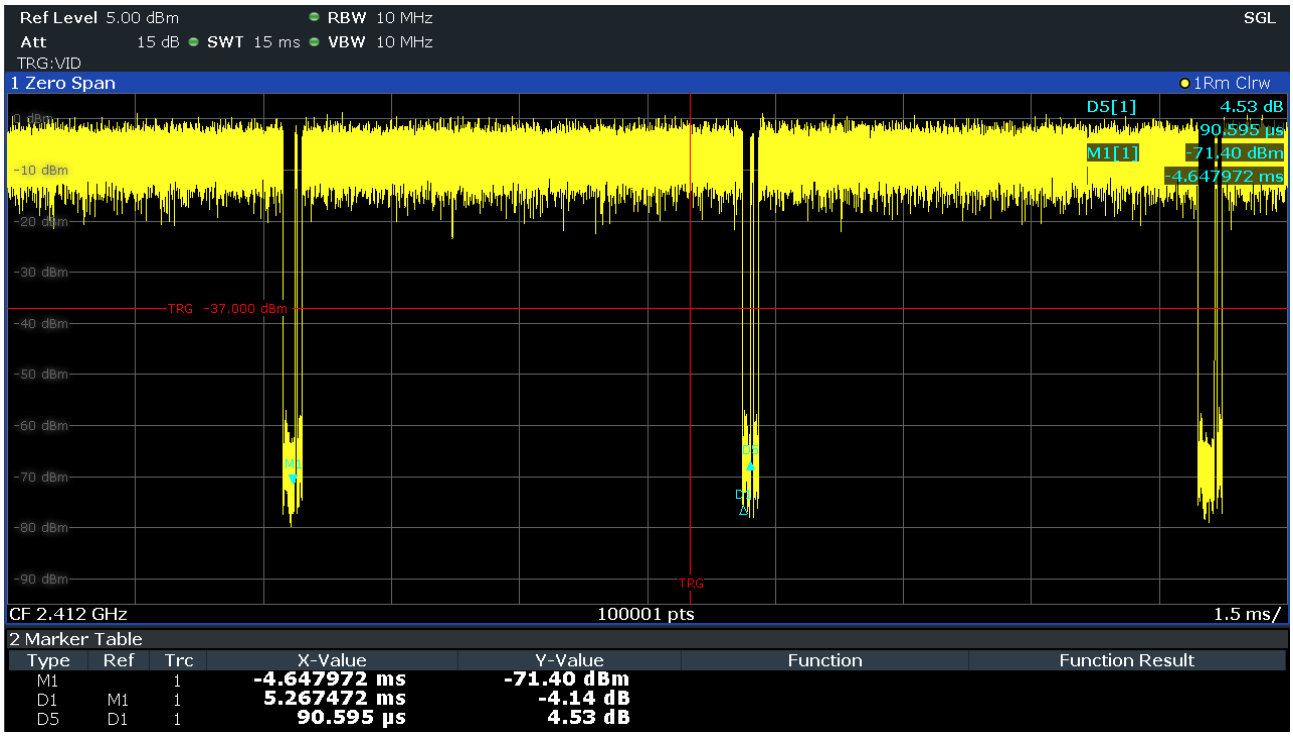

Ref Level 0.00 dBm
RBW 10 MHz
Att 10 dB SWT 10 ms VBW 10 MHz
TRG:VID
1 Zero Span
1Rm Clrw
D4[1] -3.79 dB
379.6376 µs
M1[1] -77.18 dBm
-5.2907679 ms
TRG -42.000 dBm
CF 2.472 GHz
100001 pts
1.0 ms/
2 Marker Table
Type Ref Trc X-Value Y-Value Function Function Result
M1 1 -5.290768 ms -77.18 dBm
D1 M1 1 1.553063 ms 5.09 dB
D4 D1 1 379.6376 µs -3.79 dB

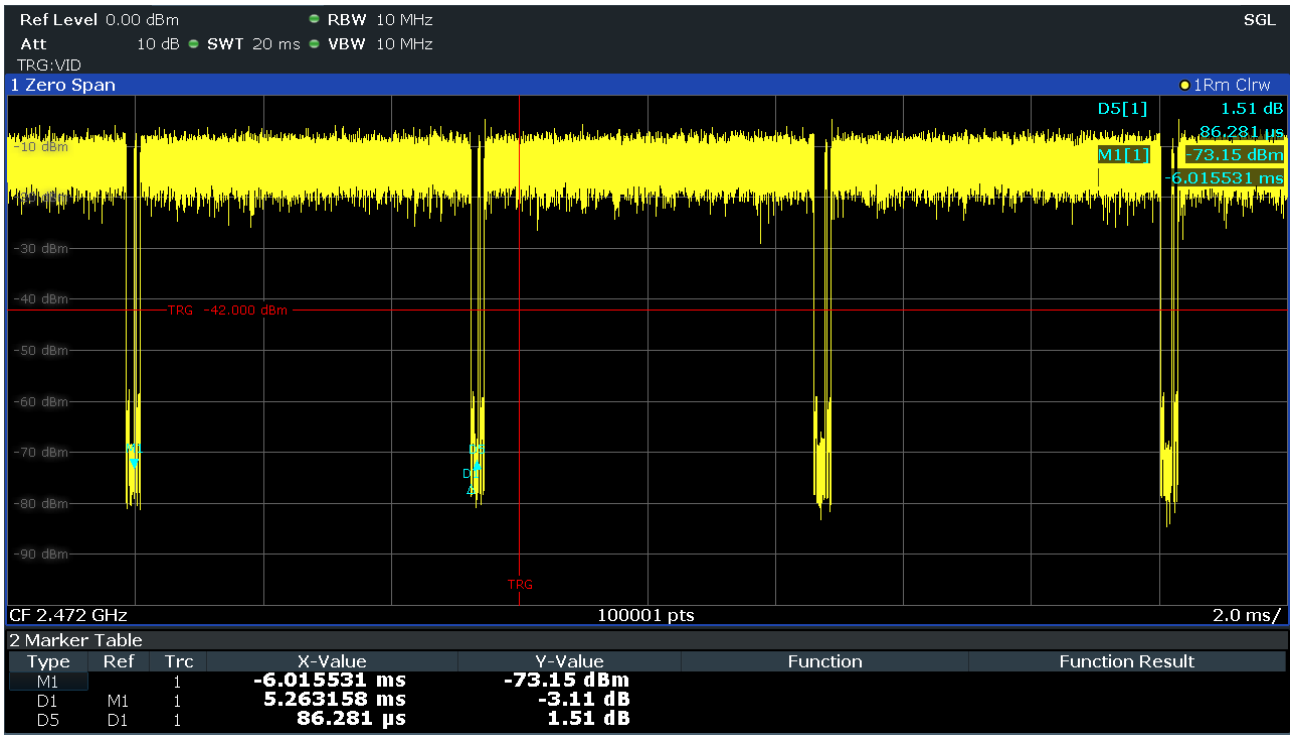
802.11g mode


Ref Level 5.00 dBm
RBW 10 MHz
SGL
Att 15 dB SWT 3 ms VBW 10 MHz
TRG:VID
1 Zero Span
1Rm Clrw
D5[1] 4.26 dB
106.1260 µs
M1[1] -75.11 dBm
-1.7911993 ms
TRG -37.000 dBm
CF 2.412 GHz
100001 pts
300.0 µs/
2 Marker Table
Type Ref Trc X-Value Y-Value Function Function Result
M1 1 -1.7911993 ms -75.11 dBm
D1 M1 1 300.2588 µs 8.95 dB
D5 D1 1 106.126 µs 4.26 dB

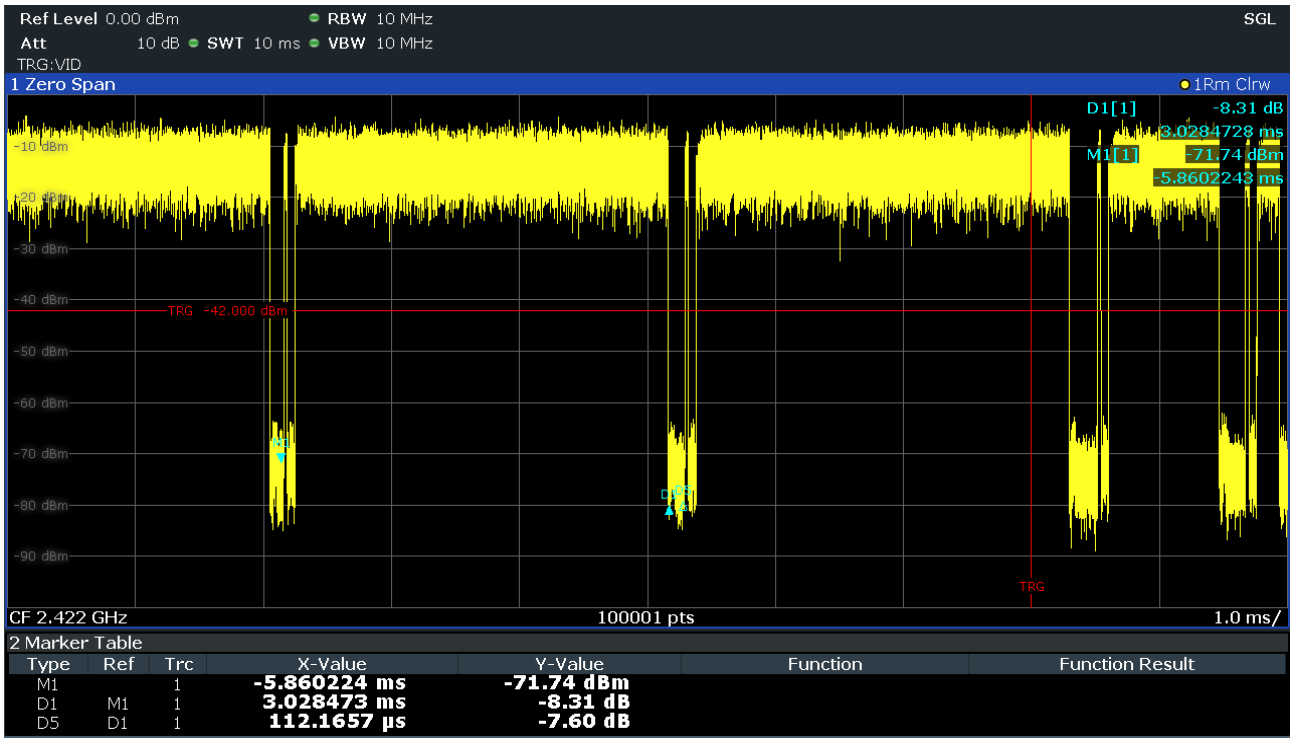

Ref Level 0.00 dBm
RBW 10 MHz
SGL
Att 10 dB SWT 3 ms VBW 10 MHz
TRG:VID
1 Zero Span
1Rm Clrw
D5[1] 8.85 dB
113.8913 µs
M1[1] -86.12 dBm
-443.4858 µs
TRG -42.000 dBm
CF 2.472 GHz
100001 pts
300.0 µs/
2 Marker Table
Type Ref Trc X-Value Y-Value Function Function Result
M1 1 -443.4858 µs -86.12 dBm
D1 M1 1 300.2588 µs 14.47 dB
D5 D1 1 113.8913 µs 8.85 dB

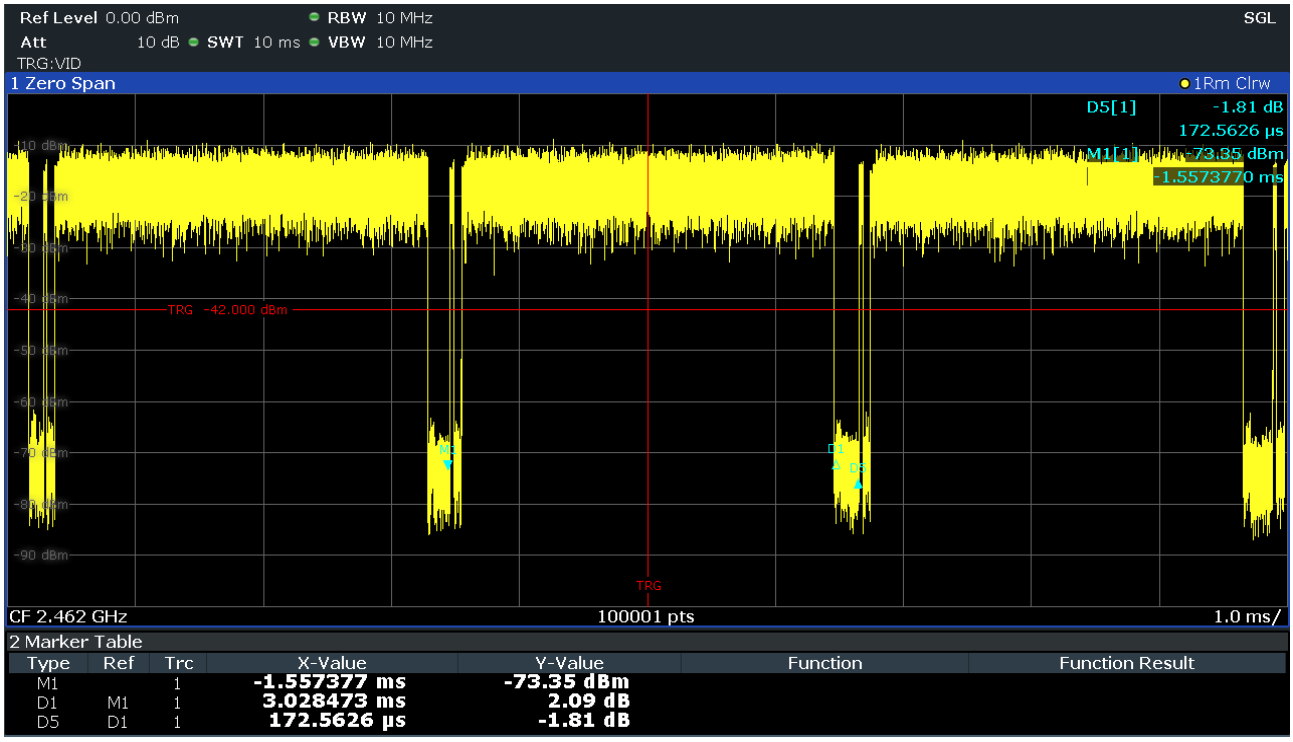
802.11ax (HE20) mode





802.11ax (HE40) mode



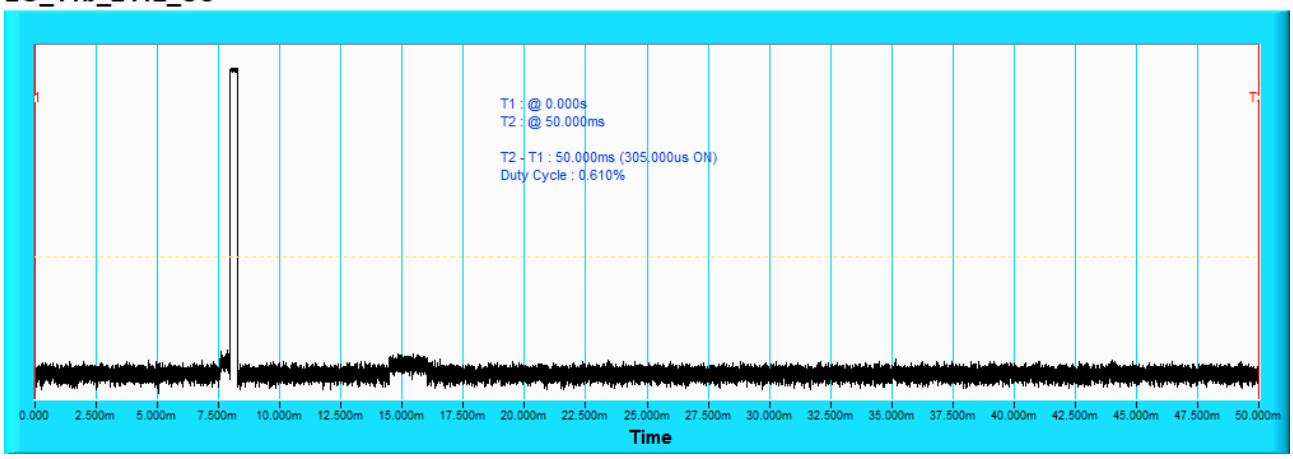


4.3.7.3 Short Control Signalling Transmissions Result

802.11b CH01 2412 MHz

Short Control Signalling Transmission Result		
SCST total on time	SCST Limit	PASS/FAIL
0.31 ms	5ms	PASS

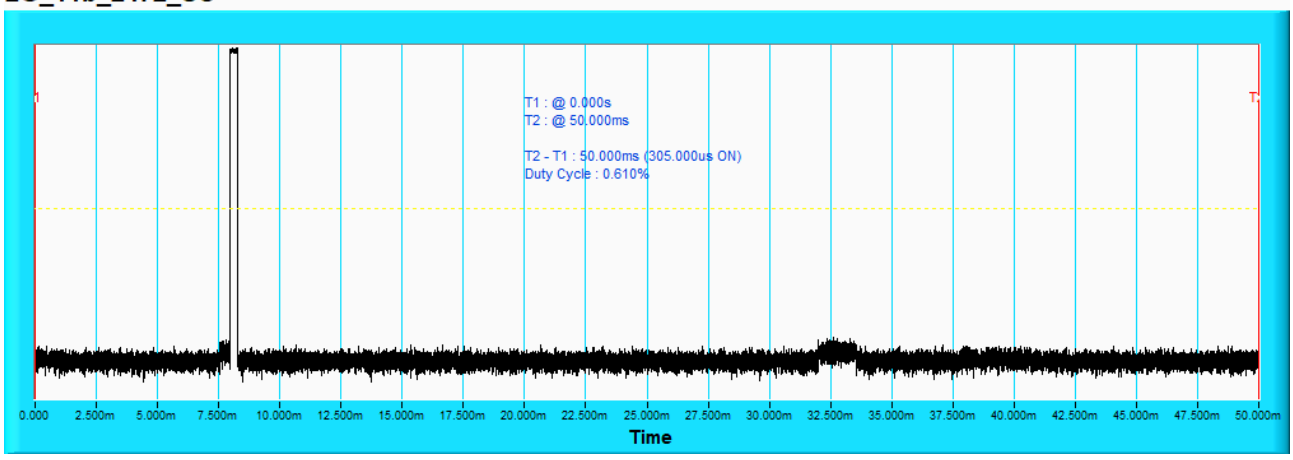
2G_11b_2412_SC



802.11b CH13 2472 MHz

Short Control Signalling Transmission Result		
SCST total on time	SCST Limit	PASS/FAIL
0.31 ms	5ms	PASS

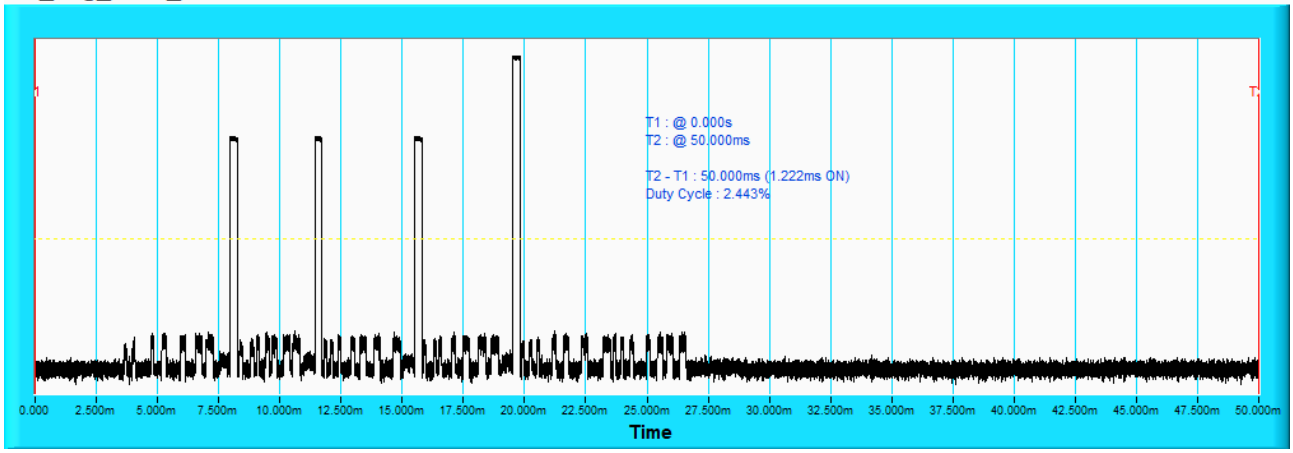
2G_11b_2472_SC



802.11g CH01 2412 MHz

Short Control Signalling Transmission Result		
SCST total on time	SCST Limit	PASS/FAIL
1.22 ms	5ms	PASS

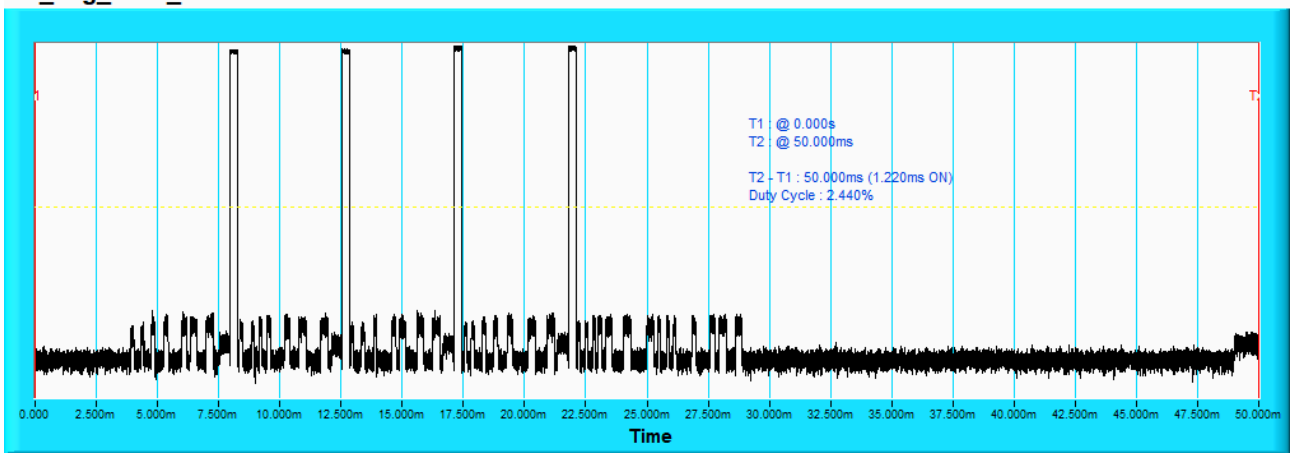
2G_11g_2412_SC



802.11g CH13 2472 MHz

Short Control Signalling Transmission Result		
SCST total on time	SCST Limit	PASS/FAIL
1.22 ms	5ms	PASS

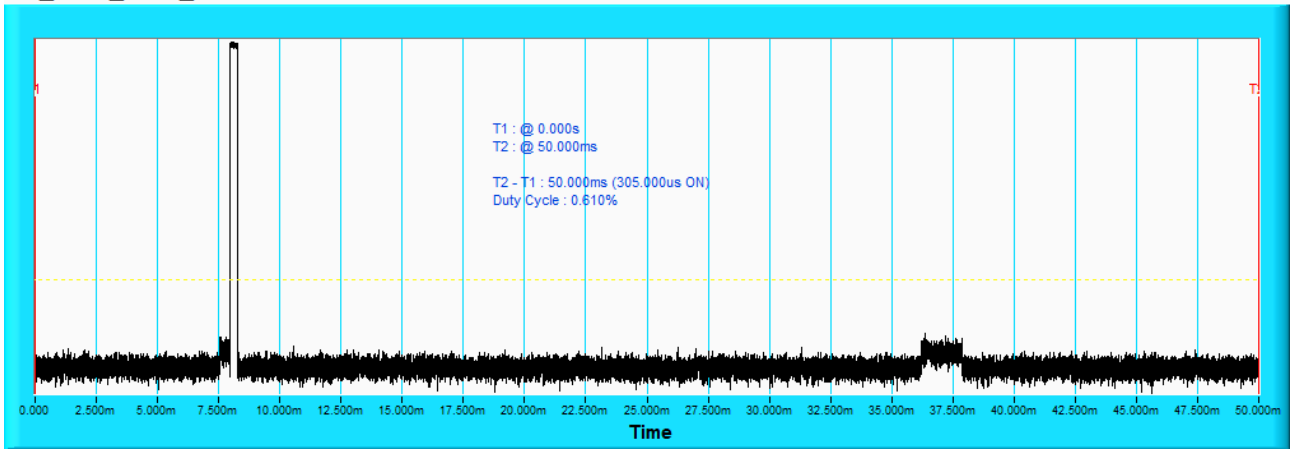
2G_11g_2472_SC



802.11ax (HE20) CH01 2412 MHz

Short Control Signalling Transmission Result		
SCST total on time	SCST Limit	PASS/FAIL
0.31 ms	5ms	PASS

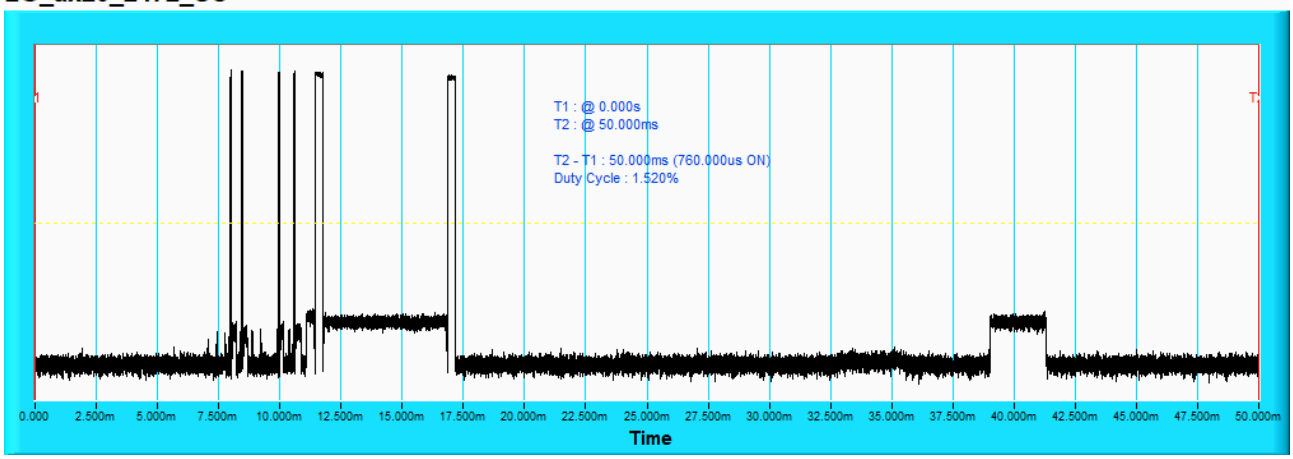
2G_ax20_2412_SC



802.11ax (HE20) CH13 2472 MHz

Short Control Signalling Transmission Result		
SCST total on time	SCST Limit	PASS/FAIL
0.76 ms	5ms	PASS

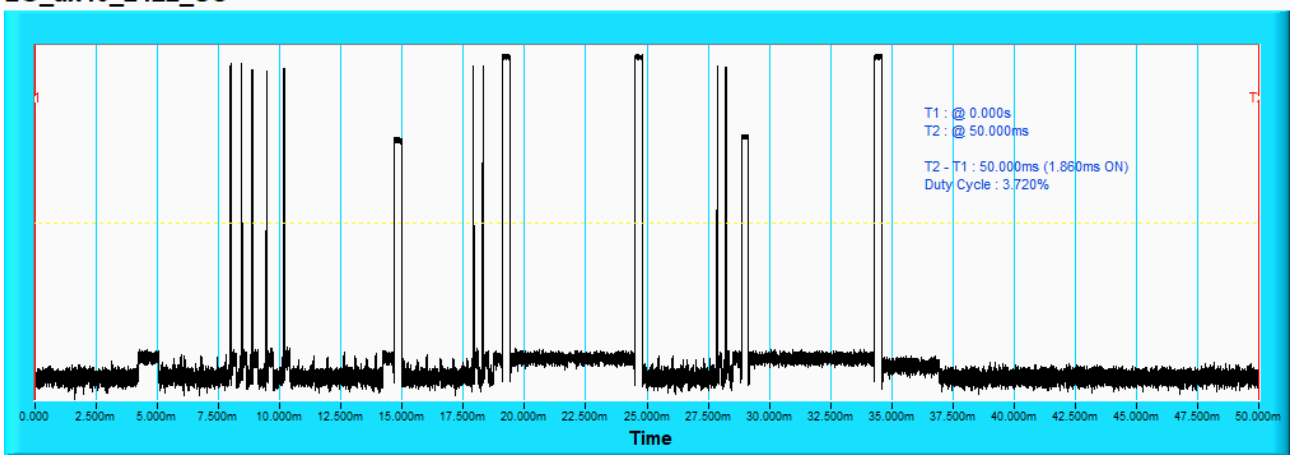
2G_ax20_2472_SC



802.11ax (HE40) CH03 2422 MHz

Short Control Signalling Transmission Result		
SCST total on time	SCST Limit	PASS/FAIL
1.86 ms	5ms	PASS

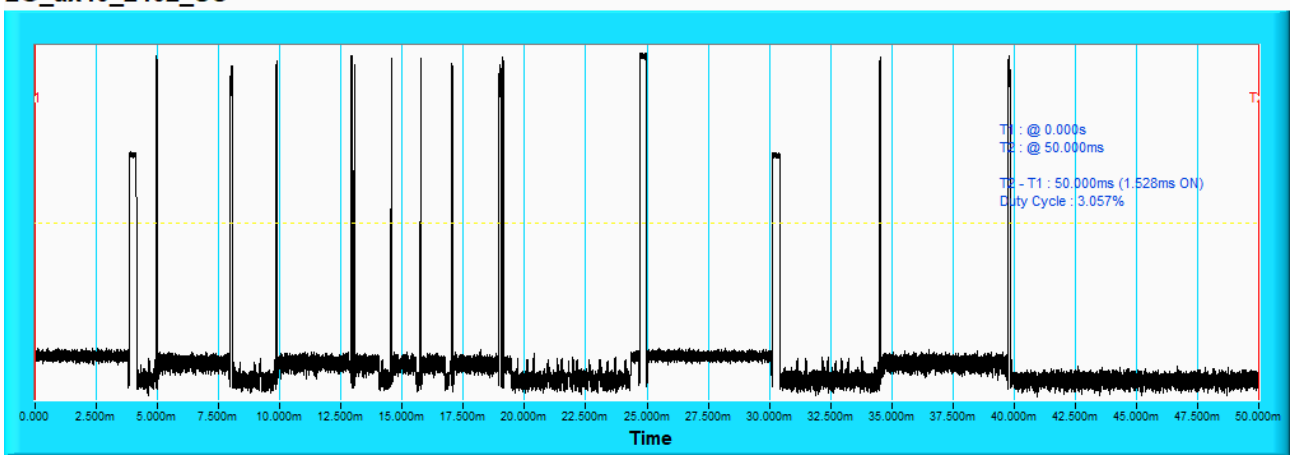
2G_ax40_2422_SC



802.11ax (HE40) CH11 2462 MHz

Short Control Signalling Transmission Result		
SCST total on time	SCST Limit	PASS/FAIL
1.53 ms	5ms	PASS

2G_ax40_2462_SC



4.3.7.4 Unwanted Signal interference Test Results

802.11b

Channel	Channel Frequency (MHz)	Wanted Signal Mean Power from Companion Device (dBm/MHz)	Unwanted Signal Frequency (MHz)	Unwanted Signal Power (dBm)	Pass/Fail
1	2412	-50	2488.5	-31.5	Pass
13	2472	-50	2395	-31.5	Pass

802.11g

Channel	Channel Frequency (MHz)	Wanted Signal Mean Power from Companion Device (dBm/MHz)	Unwanted Signal Frequency (MHz)	Unwanted Signal Power (dBm)	Pass/Fail
1	2412	-50	2488.5	-31.5	Pass
13	2472	-50	2395	-31.5	Pass

802.11ax (HE20)

Channel	Channel Frequency (MHz)	Wanted Signal Mean Power from Companion Device (dBm/MHz)	Unwanted Signal Frequency (MHz)	Unwanted Signal Power (dBm)	Pass/Fail
1	2412	-50	2488.5	-31.5	Pass
13	2472	-50	2395	-31.5	Pass

802.11ax (HE40)

Channel	Channel Frequency (MHz)	Wanted Signal Mean Power from Companion Device (dBm/MHz)	Unwanted Signal Frequency (MHz)	Unwanted Signal Power (dBm)	Pass/Fail
3	2422	-50	2488.5	-31.5	Pass
11	2462	-50	2395	-31.5	Pass

4.4 Occupied Channel Bandwidth

4.4.1 Limit of Occupied Channel Bandwidth

Condition		Limit
All types of equipment		Shall fall completely within the band 2400 to 2483.5 MHz.
Additional requirement	For non-adaptive using wide band modulations other than FHSS system and e.i.r.p >10dBm.	Less than 20MHz
	For non-adaptive Frequency Hopping system and e.i.r.p >10dBm.	Less than 5MHz

4.4.2 Test Procedure

Refer to chapter 5.4.7 of EN 300 328 V2.2.2.

Measurement	
☒ Conducted measurement	☐ Radiated measurement

4.4.3 Deviation from Test Standard

No deviation.

4.4.4 Test Setup

These measurements only were performed at normal test conditions. The measurement shall be performed only on the lowest and the highest frequency within the stated frequency range. Controlling software (RTL8852B MP Toolkit V1.0.16) has been activated to set the EUT on specific status.

4.4.5 Test Results (Mode 1)

CDD Mode

802.11b

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
			F_L (MHz)	F_H (MHz)		
1	2412	14.88	2404.56	2419.44	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	14.88	2464.52	2479.4		Pass

802.11g

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
			F_L (MHz)	F_H (MHz)		
1	2412	16.4	2403.76	2420.16	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	16.44	2463.72	2480.16		Pass

802.11ax (HE20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
			F_L (MHz)	F_H (MHz)		
1	2412	18.92	2402.48	2421.4	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	18.92	2462.48	2481.4		Pass

802.11ax (HE40)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
			F_L (MHz)	F_H (MHz)		
3	2422	38	2402.88	2440.88	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
11	2462	38	2442.8	2480.8		Pass

Note: F_L is the lowest frequency of the 99% occupied bandwidth of power envelope.
F_H is the highest frequency of the 99% occupied bandwidth of power envelope.

802.11ax (RU26)

Channel	Channel Frequency (MHz)	RU Configuration	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
				F_L (MHz)	F_H (MHz)		
1	2412	26/0	15.92	2402.36	2418.28	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	26/8	15.88	2465.72	2481.6		Pass

802.11ax (RU52)

Channel	Channel Frequency (MHz)	RU Configuration	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
				F_L (MHz)	F_H (MHz)		
1	2412	52/37	15.2	2402.4	2417.6	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	52/40	15.48	2466.04	2481.52		Pass

802.11ax (RU106)

Channel	Channel Frequency (MHz)	RU Configuration	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
				F_L (MHz)	F_H (MHz)		
1	2412	106/53	15.2	2402.4	2417.6	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	106/54	15.24	2466.28	2481.52		Pass

Note: F_L is the lowest frequency of the 99% occupied bandwidth of power envelope.
F_H is the highest frequency of the 99% occupied bandwidth of power envelope.

4.4.6 Test Results (Mode 2)

802.11b

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
			F_L (MHz)	F_H (MHz)		
1	2412	14.88	2404.56	2419.44	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	14.88	2464.52	2479.4		Pass

802.11g

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
			F_L (MHz)	F_H (MHz)		
1	2412	16.44	2403.76	2420.2	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	16.44	2463.76	2480.2		Pass

802.11ax (HE20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
			F_L (MHz)	F_H (MHz)		
1	2412	18.92	2402.52	2421.44	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	18.92	2462.52	2481.44		Pass

802.11ax (HE40)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
			F_L (MHz)	F_H (MHz)		
3	2422	38	2402.96	2440.96	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
11	2462	38	2442.96	2480.96		Pass

Note: F_L is the lowest frequency of the 99% occupied bandwidth of power envelope.
F_H is the highest frequency of the 99% occupied bandwidth of power envelope.

802.11ax (RU26)

Channel	Channel Frequency (MHz)	RU Configuration	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
				F_L (MHz)	F_H (MHz)		
1	2412	26/0	15.44	2402.36	2417.8	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	26/8	15.76	2465.84	2481.6		Pass

802.11ax (RU52)

Channel	Channel Frequency (MHz)	RU Configuration	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
				F_L (MHz)	F_H (MHz)		
1	2412	52/37	15.4	2402.4	2417.8	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	52/40	15.44	2466.08	2481.52		Pass

802.11ax (RU106)

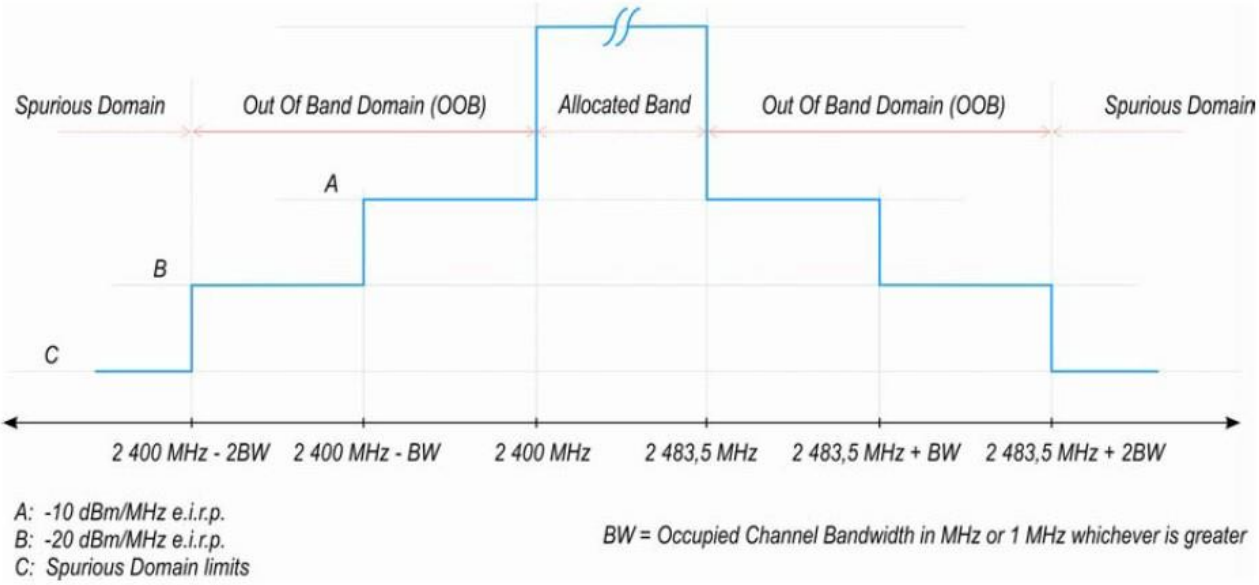
Channel	Channel Frequency (MHz)	RU Configuration	Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass/Fail
				F_L (MHz)	F_H (MHz)		
1	2412	106/53	15.28	2402.4	2417.68	F_L > 2400 MHz and F_H < 2483.5 MHz	Pass
13	2472	106/54	15.12	2466.4	2481.52		Pass

Note: F_L is the lowest frequency of the 99% occupied bandwidth of power envelope.
F_H is the highest frequency of the 99% occupied bandwidth of power envelope.

4.5 Transmitter Unwanted Emissions in the Out-of-band Domain

4.5.1 Limits of Transmitter Unwanted Emissions in the Out-of-band Domain

Condition	Limit
Under all test conditions	The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in below figure.



4.5.2 Test Procedure

Refer to chapter 5.4.8 of EN 300 328 V2.2.2.

Measurement Method	
☒ Conducted measurement	☐ Radiated measurement

4.5.3 Deviation from Test Standard

No deviation

4.5.4 Test Setup

The measurements were performed at normal environmental conditions. The measurement was performed at the lowest and the highest channel on which the equipment can operate. The equipment was configured to operate under its worst case situation with respect to output power. The frequency has to be recorded for the right and left end above threshold of highest and lowest channel respectively.

4.5.5 Test Results (Mode 1)

CDD Mode

802.11b

Channel Frequency		2412 MHz				2472 MHz			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2385.12 ~ 2400		2370.24 ~ 2385.12		2483.5 ~ 2498.38		2498.38 ~ 2513.26	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-37.54	2382.62	-44.53	2485.00	-36.70	2503.88	-44.43
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11g

Channel Frequency		2412 MHz				2472 MHz			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2383.6 ~ 2400		2367.2 ~ 2383.6		2483.5 ~ 2499.94		2499.94 ~ 2516.38	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-33.74	2383.10	-44.02	2484.00	-34.15	2504.44	-44.27
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11ax (HE20)

Channel Frequency		2412 MHz				2472 MHz			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2381.08 ~ 2400		2362.16 ~ 2381.08		2483.5 ~ 2502.42		2502.42 ~ 2521.34	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-33.77	2380.58	-43.75	2484.00	-30.92	2503.92	-44.06
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11ax (HE40)

Channel Frequency		2422 MHz				2462 MHz			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2362 ~ 2400		2324 ~ 2362		2483.5 ~ 2521.5		2521.5 ~ 2559.5	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2398.50	-34.10	2358.50	-44.37	2500.00	-34.34	2526.00	-44.60
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11ax (RU26)

Channel Frequency		2412 MHz				2472 MHz			
RU Configuration		26/0				26/8			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2384.08 ~ 2400		2368.16 ~ 2384.08		2483.5 ~ 2499.38		2499.38 ~ 2515.26	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-36.67	2383.58	-46.55	2484.00	-33.89	2499.88	-46.64
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11ax (RU52)

Channel Frequency		2412 MHz				2472 MHz			
RU Configuration		52/37				52/40			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2384.8 ~ 2400		2369.6 ~ 2384.8		2483.5 ~ 2498.98		2498.98 ~ 2514.46	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-37.24	2384.30	-45.87	2484.00	-31.69	2500.48	-45.60
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11ax (RU106)

Channel Frequency		2412 MHz				2472 MHz			
RU Configuration		106/53				106/54			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2384.8 ~ 2400		2369.6 ~ 2384.8		2483.5 ~ 2498.74		2498.74 ~ 2513.98	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-33.03	2384.30	-44.64	2484.00	-30.80	2500.24	-44.19
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

4.5.6 Test Results (Mode 2)

802.11b

Channel Frequency		2412 MHz				2472 MHz			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2385.12 ~ 2400		2370.24 ~ 2385.12		2483.5 ~ 2498.38		2498.38 ~ 2513.26	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2397.50	-38.06	2384.62	-46.23	2485.00	-34.97	2503.88	-45.44
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11g

Channel Frequency		2412 MHz				2472 MHz			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2383.56 ~ 2400		2367.12 ~ 2383.56		2483.5 ~ 2499.94		2499.94 ~ 2516.38	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-34.93	2383.06	-44.60	2488.00	-32.68	2500.44	-44.15
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11ax (HE20)

Channel Frequency		2412 MHz				2472 MHz			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2381.08 ~ 2400		2362.16 ~ 2381.08		2483.5 ~ 2502.42		2502.42 ~ 2521.34	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-30.60	2380.58	-40.59	2484.00	-28.64	2502.92	-41.50
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11ax (HE40)

Channel Frequency		2422 MHz				2462 MHz			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2362 ~ 2400		2324 ~ 2362		2483.5 ~ 2521.5		2521.5 ~ 2559.5	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2379.50	-32.03	2359.50	-45.55	2500.00	-31.80	2523.00	-44.22
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11ax (RU26)

Channel Frequency		2412 MHz				2472 MHz			
RU Configuration		26/0				26/8			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2384.56 ~ 2400		2369.12 ~ 2384.56		2483.5 ~ 2499.26		2499.26 ~ 2515.02	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-35.46	2384.06	-49.10	2484.00	-33.29	2499.76	-48.93
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11ax (RU52)

Channel Frequency		2412 MHz				2472 MHz			
RU Configuration		52/37				52/40			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2384.6 ~ 2400		2369.2 ~ 2384.6		2483.5 ~ 2498.94		2498.94 ~ 2514.38	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-36.44	2384.10	-48.03	2484.00	-30.74	2499.44	-46.88
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

802.11ax (RU106)

Channel Frequency		2412 MHz				2472 MHz			
RU Configuration		106/53				106/54			
Test Condition		OOB Emission (MHz)				OOB Emission (MHz)			
		2384.72 ~ 2400		2369.44 ~ 2384.72		2483.5 ~ 2498.62		2498.62 ~ 2513.74	
		Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)	Freq. (MHz)	Power (dBm/ MHz)
T_{nom} 25℃	V_{nom}(v)	2399.50	-29.43	2384.22	-46.44	2484.00	-27.48	2499.12	-44.05
Limit (dBm/MHz)		-10.00		-20.00		-10.00		-20.00	
Pass/Fail		Pass		Pass		Pass		Pass	

4.6 Transmitter Spurious Emissions in the Spurious Domain

4.6.1 Limits of Transmitter Spurious Emissions

Frequency Range	Maximum Power Limit	Bandwidth
30 MHz to 47 MHz	-36dBm	100kHz
47 MHz to 74 MHz	-54dBm	100kHz
74 MHz to 87,5 MHz	-36dBm	100kHz
87,5 MHz to 118 MHz	-54dBm	100kHz
118 MHz to 174 MHz	-36dBm	100kHz
174 MHz to 230 MHz	-54dBm	100kHz
230 MHz to 470 MHz	-36dBm	100kHz
470 MHz to 694 MHz	-54dBm	100kHz
694 MHz to 1 GHz	-36dBm	100kHz
1GHz ~ 12.75GHz	-30dBm	1MHz

Note: These limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

4.6.2 Test Procedure

Refer to chapter 5.4.9 of EN 300 328 V2.2.2.

Measurement Method	
☐ Conducted measurement	☒ Radiated measurement

For Conducted measurement:

The level of unwanted emissions shall be measured as their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation).

Conducted measurement (For equipment with multiple transmit chains):

☐ Option 1: The results for each of the transmit chains for the corresponding 1MHz segments shall be added and compared with the limits.

☐ Option 2: The results for each of the transmit chains shall be individually compared with the limits after these limits have been reduced by 10 x log (N) (number of active transmit chains)

4.6.3 Deviation from Test Standard

No deviation.

4.6.4 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 equipment was configured to operate under its worst case situation with respect to output power.
3. 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.

4.6.5 Test Results (Mode 1)

PIFA Antenna

Below 1GHz Data:

802.11b

Spurious Emission Frequency Range	30MHz ~ 1GHz	Operating Channel	1

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	H	-54.26	-36.00	-18.26
30.00	V	-53.57	-36.00	-17.57
99.74	V	-67.97	-54.00	-13.97
143.96	H	-53.66	-36.00	-17.66
199.92	V	-72.04	-54.00	-18.04
208.18	H	-65.89	-54.00	-11.89
479.98	H	-64.72	-54.00	-10.72
479.98	V	-70.52	-54.00	-16.52
499.53	H	-65.59	-54.00	-11.59
505.25	V	-67.91	-54.00	-13.91
527.98	H	-65.61	-54.00	-11.61
535.30	V	-69.61	-54.00	-15.61
578.07	V	-68.49	-54.00	-14.49
578.52	H	-66.54	-54.00	-12.54
599.96	H	-68.66	-54.00	-14.66
599.96	V	-62.62	-54.00	-8.62
624.98	H	-74.49	-54.00	-20.49
624.98	V	-72.23	-54.00	-18.23
663.83	H	-65.05	-54.00	-11.05
666.42	V	-64.06	-54.00	-10.06

802.11ax (RU26)

Spurious Emission Frequency Range	30MHz ~ 1GHz	Operating Channel	1

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
52.88	V	-64.73	-54.00	-10.73
61.89	H	-70.88	-54.00	-16.88
99.74	H	-65.00	-54.00	-11.00
109.15	V	-65.00	-54.00	-11.00
208.54	H	-66.85	-54.00	-12.85
211.18	V	-74.61	-54.00	-20.61
480.00	H	-65.23	-54.00	-11.23
480.00	V	-70.09	-54.00	-16.09
500.50	H	-66.41	-54.00	-12.41
506.07	V	-71.13	-54.00	-17.13
521.19	H	-64.31	-54.00	-10.31
546.66	V	-69.24	-54.00	-15.24
555.92	H	-66.75	-54.00	-12.75
564.87	V	-69.76	-54.00	-15.76
579.99	V	-70.35	-54.00	-16.35
581.14	H	-70.80	-54.00	-16.80
623.32	V	-72.27	-54.00	-18.27
634.07	H	-72.58	-54.00	-18.58
663.87	H	-62.69	-54.00	-8.69
666.45	V	-66.78	-54.00	-12.78

Above 1GHz Data:

802.11b

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	1, 13

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1	7236.00	H	-42.77	-30.00	-12.77
	7236.00	V	-50.35	-30.00	-20.35
	9648.00	H	-52.79	-30.00	-22.79
	9648.00	V	-54.00	-30.00	-24.00
13	7416.00	H	-43.63	-30.00	-13.63
	7416.00	V	-51.98	-30.00	-21.98
	9888.00	H	-51.98	-30.00	-21.98
	9888.00	V	-53.78	-30.00	-23.78

802.11ax (RU26)

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	1
		RU CONFIGURATION	26/0

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1	4822.66	H	-52.52	-30.00	-22.52
	4822.77	V	-58.88	-30.00	-28.88
	7237.77	H	-34.04	-30.00	-4.04
	7238.27	V	-40.04	-30.00	-10.04

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	13
		RU CONFIGURATION	26/8

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
13	4942.17	H	-48.80	-30.00	-18.80
	4944.00	V	-60.29	-30.00	-30.29
	7414.77	V	-41.31	-30.00	-11.31
	7416.39	H	-38.11	-30.00	-8.11

Dipole Antenna

Below 1GHz Data:

802.11b

SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	1

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	H	-53.71	-36.00	-17.71
30.00	V	-52.29	-36.00	-16.29
117.90	V	-65.13	-54.00	-11.13
144.01	H	-53.40	-36.00	-17.40
209.87	H	-67.01	-54.00	-13.01
224.75	V	-71.68	-54.00	-17.68
479.98	H	-64.88	-54.00	-10.88
482.02	V	-69.62	-54.00	-15.62
499.83	H	-63.46	-54.00	-9.46
509.93	V	-68.82	-54.00	-14.82
518.93	H	-62.81	-54.00	-8.81
544.50	V	-67.76	-54.00	-13.76
562.01	H	-67.01	-54.00	-13.01
562.36	V	-68.86	-54.00	-14.86
599.96	V	-63.26	-54.00	-9.26
600.01	H	-68.20	-54.00	-14.20
624.98	H	-73.51	-54.00	-19.51
624.98	V	-72.59	-54.00	-18.59
666.42	V	-63.77	-54.00	-9.77
666.47	H	-64.86	-54.00	-10.86

802.11ax (RU26)

Spurious Emission Frequency Range	30MHz ~ 1GHz	Operating Channel	1

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
91.44	V	-66.96	-54.00	-12.96
91.78	H	-63.81	-54.00	-9.81
107.90	V	-63.59	-54.00	-9.59
109.54	H	-64.55	-54.00	-10.55
206.00	H	-68.44	-54.00	-14.44
206.80	V	-73.20	-54.00	-19.20
299.82	H	-52.97	-36.00	-16.97
479.95	V	-69.88	-54.00	-15.88
480.00	H	-65.85	-54.00	-11.85
494.33	V	-71.40	-54.00	-17.40
506.52	H	-66.90	-54.00	-12.90
541.24	V	-69.93	-54.00	-15.93
550.59	H	-65.96	-54.00	-11.96
566.56	V	-72.31	-54.00	-18.31
583.53	H	-69.12	-54.00	-15.12
610.39	V	-72.52	-54.00	-18.52
632.67	V	-71.32	-54.00	-17.32
639.99	H	-70.59	-54.00	-16.59
663.82	H	-62.90	-54.00	-8.90
666.40	V	-66.17	-54.00	-12.17

Above 1GHz Data:

802.11b

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	1, 13

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1	7236.00	H	-50.24	-30.00	-20.24
	7236.00	V	-39.45	-30.00	-9.45
	9648.00	H	-53.36	-30.00	-23.36
	9648.00	V	-52.63	-30.00	-22.63
13	7416.00	H	-52.34	-30.00	-22.34
	7416.00	V	-44.51	-30.00	-14.51
	9888.00	H	-52.21	-30.00	-22.21
	9888.00	V	-52.26	-30.00	-22.26

802.11ax (RU26)

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	1
		RU CONFIGURATION	26/0

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1	4823.66	H	-53.16	-30.00	-23.16
	4823.66	V	-49.86	-30.00	-19.86
	7235.27	H	-37.44	-30.00	-7.44
	7236.85	V	-35.65	-30.00	-5.65

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	13
		RU CONFIGURATION	26/8

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
13	4942.17	V	-43.76	-30.00	-13.76
	4944.67	H	-50.23	-30.00	-20.23
	7414.77	H	-41.40	-30.00	-11.40
	7415.87	V	-40.57	-30.00	-10.57

4.6.6 Test Results (Mode 2)

PIFA Antenna

Below 1GHz Data:

802.11b

Spurious Emission Frequency Range	30MHz ~ 1GHz	Operating Channel	1

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	H	-54.39	-36.00	-18.39
30.00	V	-51.90	-36.00	-15.90
99.59	V	-66.94	-54.00	-12.94
194.70	V	-71.94	-54.00	-17.94
211.37	H	-66.20	-54.00	-12.20
479.98	H	-64.24	-54.00	-10.24
479.98	V	-71.12	-54.00	-17.12
499.53	V	-70.40	-54.00	-16.40
499.83	H	-64.19	-54.00	-10.19
521.37	H	-66.47	-54.00	-12.47
535.25	V	-69.52	-54.00	-15.52
563.65	V	-70.55	-54.00	-16.55
565.44	H	-67.78	-54.00	-13.78
599.96	H	-68.08	-54.00	-14.08
599.96	V	-63.66	-54.00	-9.66
624.98	H	-71.97	-54.00	-17.97
624.98	V	-71.56	-54.00	-17.56
645.53	H	-76.44	-54.00	-22.44
663.83	H	-63.44	-54.00	-9.44
666.47	V	-64.49	-54.00	-10.49

802.11ax (RU26)

Spurious Emission Frequency Range	30MHz ~ 1GHz	Operating Channel	1

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
60.74	H	-73.30	-54.00	-19.30
99.59	H	-65.39	-54.00	-11.39
99.59	V	-64.91	-54.00	-10.91
209.58	H	-67.29	-54.00	-13.29
213.36	V	-75.99	-54.00	-21.99
298.78	H	-55.73	-36.00	-19.73
299.47	V	-66.75	-36.00	-30.75
479.95	H	-65.70	-54.00	-11.70
480.00	V	-69.39	-54.00	-15.39
502.24	V	-71.37	-54.00	-17.37
530.30	H	-65.91	-54.00	-11.91
536.17	V	-70.76	-54.00	-16.76
548.75	H	-67.94	-54.00	-13.94
551.54	V	-71.08	-54.00	-17.08
588.00	H	-70.83	-54.00	-16.83
599.99	V	-71.98	-54.00	-17.98
623.57	H	-71.40	-54.00	-17.40
625.31	V	-72.23	-54.00	-18.23
666.40	H	-63.47	-54.00	-9.47
666.45	V	-66.90	-54.00	-12.90

Above 1GHz Data:

802.11b

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	1, 13

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1	7236.00	H	-43.71	-30.00	-13.71
	7236.00	V	-52.98	-30.00	-22.98
	9648.00	H	-53.98	-30.00	-23.98
	9648.00	V	-53.64	-30.00	-23.64
13	7416.00	H	-44.49	-30.00	-14.49
	7416.00	V	-52.34	-30.00	-22.34
	9888.00	H	-52.47	-30.00	-22.47
	9888.00	V	-51.76	-30.00	-21.76

802.11ax (RU26)

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	1
		RU CONFIGURATION	26/0

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1	4822.16	H	-52.99	-30.00	-22.99
	4824.00	V	-59.15	-30.00	-29.15
	7234.77	V	-41.42	-30.00	-11.42
	7235.26	H	-37.46	-30.00	-7.46

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	13
		RU CONFIGURATION	26/8

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
13	4945.67	H	-46.44	-30.00	-16.44
	4945.67	V	-56.70	-30.00	-26.70
	7415.27	V	-38.97	-30.00	-8.97
	7415.89	H	-38.37	-30.00	-8.37

Dipole Antenna

Below 1GHz Data:

802.11b

SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	1

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	V	-52.98	-36.00	-16.98
62.43	V	-68.30	-54.00	-14.30
99.79	V	-67.86	-54.00	-13.86
194.45	V	-72.05	-54.00	-18.05
209.08	H	-66.22	-54.00	-12.22
479.98	H	-66.90	-54.00	-12.90
479.98	V	-72.09	-54.00	-18.09
497.84	H	-62.29	-54.00	-8.29
499.58	V	-70.01	-54.00	-16.01
518.73	H	-70.39	-54.00	-16.39
539.97	V	-69.06	-54.00	-15.06
540.02	H	-68.38	-54.00	-14.38
568.87	H	-72.84	-54.00	-18.84
574.99	V	-71.28	-54.00	-17.28
599.96	H	-68.63	-54.00	-14.63
599.96	V	-63.27	-54.00	-9.27
624.98	H	-74.86	-54.00	-20.86
639.06	H	-76.86	-54.00	-22.86
666.42	H	-64.70	-54.00	-10.70
666.42	V	-66.28	-54.00	-12.28

802.11ax (RU26)

Spurious Emission Frequency Range	30MHz ~ 1GHz	Operating Channel	1

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
47.86	H	-68.97	-54.00	-14.97
95.02	V	-66.19	-54.00	-12.19
109.35	H	-64.59	-54.00	-10.59
204.96	H	-68.83	-54.00	-14.83
210.63	V	-75.26	-54.00	-21.26
298.78	V	-60.22	-36.00	-24.22
299.82	H	-54.60	-36.00	-18.60
335.99	V	-67.95	-36.00	-31.95
480.00	H	-65.08	-54.00	-11.08
480.00	V	-70.06	-54.00	-16.06
496.22	H	-67.01	-54.00	-13.01
537.61	V	-69.87	-54.00	-15.87
550.99	H	-65.72	-54.00	-11.72
560.84	V	-70.83	-54.00	-16.83
581.39	H	-71.32	-54.00	-17.32
581.54	V	-70.88	-54.00	-16.88
625.01	V	-72.78	-54.00	-18.78
639.99	H	-71.62	-54.00	-17.62
663.82	H	-63.43	-54.00	-9.43
666.40	V	-66.83	-54.00	-12.83

Above 1GHz Data:

802.11b

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	1, 13

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1	7236.00	H	-47.11	-30.00	-17.11
	7236.00	V	-40.69	-30.00	-10.69
	9648.00	H	-48.92	-30.00	-18.92
	9648.00	V	-49.89	-30.00	-19.89
13	7416.00	H	-50.44	-30.00	-20.44
	7416.00	V	-44.47	-30.00	-14.47
	9888.00	H	-52.12	-30.00	-22.12
	9888.00	V	-54.14	-30.00	-24.14

802.11ax (RU26)

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	1
		RU CONFIGURATION	26/0

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1	4823.66	H	-52.61	-30.00	-22.61
	4823.66	V	-51.08	-30.00	-21.08
	7236.21	V	-35.99	-30.00	-5.99
	7238.77	H	-37.47	-30.00	-7.47

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	13
		RU CONFIGURATION	26/8

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
13	4943.67	H	-49.42	-30.00	-19.42
	4945.17	V	-46.95	-30.00	-16.95
	7414.27	H	-44.01	-30.00	-14.01
	7418.27	V	-37.52	-30.00	-7.52

4.7 Receiver Spurious Emissions

4.7.1 Limit of Receiver Spurious Radiation

Frequency Range	Maximum Power Limit	Bandwidth
30 MHz ~ 1 GHz	-57dBm	100 kHz
1 GHz ~ 12.75 GHz	-47dBm	1 MHz

Note: These limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

4.7.2 Test Procedure

Refer to chapter 5.4.10 of EN 300 328 V2.2.2.

Measurement Method	
☐ Conducted measurement	☒ Radiated measurement
For Conducted measurement: The level of unwanted emissions shall be measured as their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation).	
Conducted measurement (For equipment with multiple transmit chains): ☐ Option 1: The results for each of the transmit chains for the corresponding 1MHz segments shall be added and compared with the limits. ☐ Option 2: The results for each of the transmit chains shall be individually compared with the limits after these limits have been reduced by 10 x log (N) (number of active transmit chains)	

4.7.3 Deviation from Test Standard

No deviation.

4.7.4 Test Setup

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. Testing was performed when the equipment was in a receive-only mode.
3. 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.

4.7.5 Test Results

PIFA Antenna

Below 1GHz data:

SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	1

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
35.97	V	-61.99	-57.00	-4.99
53.08	H	-62.10	-57.00	-5.10
90.14	H	-61.98	-57.00	-4.98
99.84	V	-61.99	-57.00	-4.99
128.90	V	-65.43	-57.00	-8.43
128.95	H	-60.22	-57.00	-3.22
165.96	V	-67.28	-57.00	-10.28
206.15	H	-65.63	-57.00	-8.63
298.82	H	-62.34	-57.00	-5.34
299.33	V	-63.66	-57.00	-6.66
521.49	H	-64.82	-57.00	-7.82
542.68	H	-63.16	-57.00	-6.16
663.87	H	-62.22	-57.00	-5.22
666.45	V	-61.76	-57.00	-4.76
698.14	H	-61.89	-57.00	-4.89
699.73	V	-61.20	-57.00	-4.20
736.49	V	-67.57	-57.00	-10.57
750.77	H	-64.08	-57.00	-7.08
824.89	V	-65.58	-57.00	-8.58
972.14	V	-67.88	-57.00	-10.88

Above 1GHz data:

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	1, 13

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1	6432.00	H	-53.94	-47.00	-6.94
	6432.00	V	-58.40	-47.00	-11.40
13	6592.00	H	-54.99	-47.00	-7.99
	6592.00	V	-58.38	-47.00	-11.38

Dipole Antenna

Below 1GHz data:

SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	1

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
36.07	V	-62.77	-57.00	-5.77
53.03	H	-62.84	-57.00	-5.84
92.38	H	-60.94	-57.00	-3.94
99.74	V	-60.82	-57.00	-3.82
128.25	V	-65.09	-57.00	-8.09
128.60	H	-60.08	-57.00	-3.08
165.41	V	-66.40	-57.00	-9.40
231.37	V	-66.67	-57.00	-9.67
232.32	H	-62.83	-57.00	-5.83
298.78	H	-62.53	-57.00	-5.53
299.47	V	-60.38	-57.00	-3.38
541.04	H	-61.14	-57.00	-4.14
663.82	H	-61.39	-57.00	-4.39
666.45	V	-62.58	-57.00	-5.58
699.78	H	-61.65	-57.00	-4.65
699.78	V	-61.03	-57.00	-4.03
748.68	H	-62.08	-57.00	-5.08
841.31	V	-65.83	-57.00	-8.83
871.90	H	-63.87	-57.00	-6.87
952.14	V	-66.02	-57.00	-9.02

Above 1GHz data:

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 12.75GHz	OPERATING CHANNEL	1, 13

Spurious Emission Level					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1	6431.66	V	-52.56	-47.00	-5.56
	6432.00	H	-60.02	-47.00	-13.02
13	6592.00	H	-56.45	-47.00	-9.45
	6592.00	V	-52.07	-47.00	-5.07

4.8 Receiver Blocking

4.8.1 Limit of Receiver Blocking

This requirement applies to all receiver categories.

Receiver Category		
☒Category 1	☐Category 2	☐Category 3
Minimum performance criterion	☒PER or FER ≦10%	
	☐Alternative performance criteria (See note)	
Note: The minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment.		

Receiver Category 1 Equipment			
Wanted signal mean power from companion device (dBm) (see notes 1 to 4)	**Blocking Signal Frequency (MHz)**	**Blocking Signal Power (dBm) (see note 4)**	**Type of blocking signal**
(-133 dBm + 10 × $\log^{10}$(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × $\log^{10}$(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured / positioned as recorded in clause 5.4.3.2.2.

Receiver Category 2 Equipment			
Wanted signal mean power from companion device (dBm) (see notes 1 to 3)	**Blocking Signal Frequency (MHz)**	**Blocking Signal Power (dBm) (see note 3)**	**Type of blocking signal**
(-139 dBm + 10 × $\log_{10}$(OCBW) +10) or (-74 dBm + 10) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured / positioned as recorded in clause 5.4.3.2.2.			

Receiver Category 3 Equipment			
Wanted signal mean power from companion device (dBm) (see notes 1 to 3)	**Blocking Signal Frequency (MHz)**	**Blocking Signal Power (dBm) (See note 3)**	**Type of blocking signal**
(-139 dBm + 10 × $\log_{10}$(OCBW) +20) or (-74 dBm + 20) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured / positioned as recorded in clause 5.4.3.2.2.			

4.8.2 Test Procedure

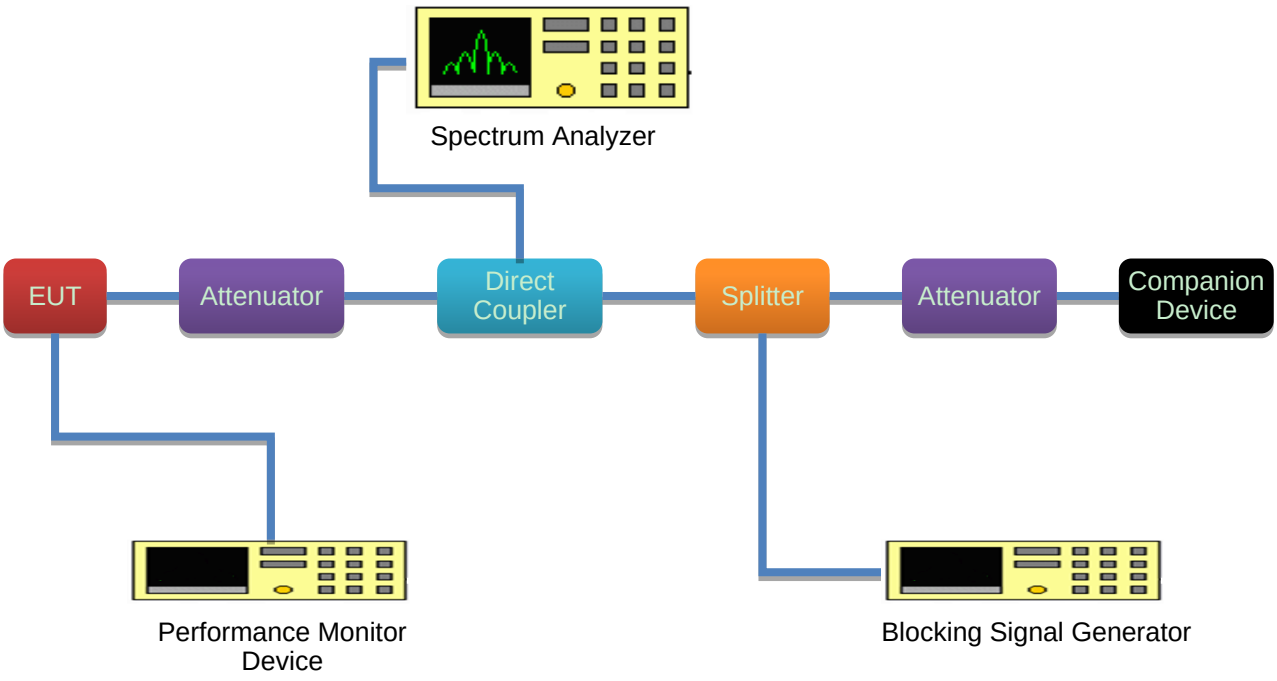
Refer to chapter 5.4.11 of EN 300 328 V2.2.2.

Measurement Method	
☒ Conducted measurement	☐ Radiated measurement

4.8.3 Deviation from Test Standard

No deviation.

4.8.4 Test Setup Configuration



4.8.5 Test Results

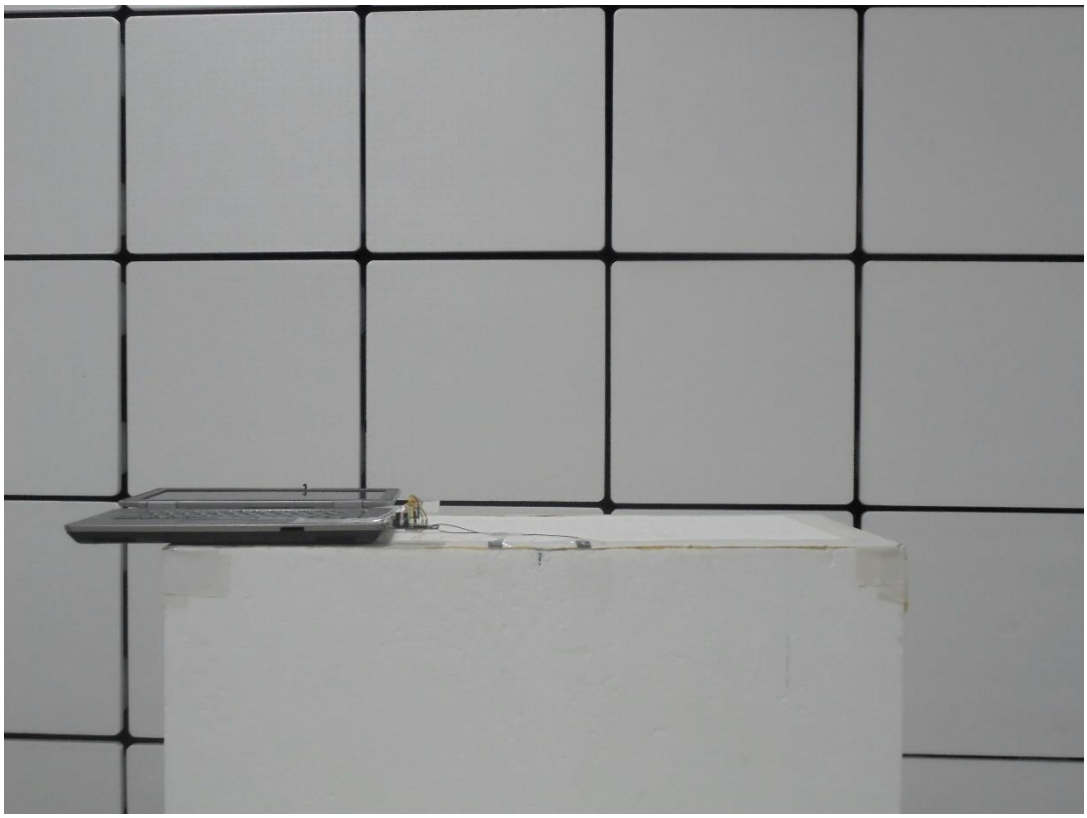
Receiver Category 1 Equipment

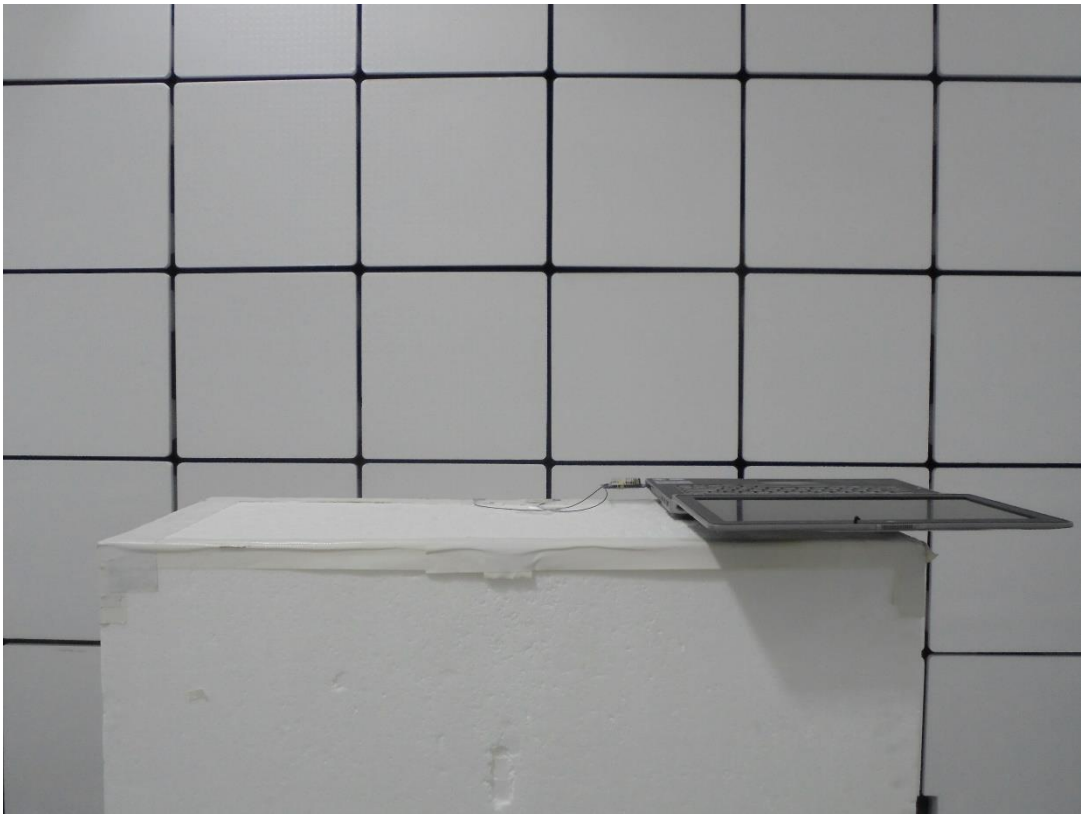
Receiver Blocking Measure Of The Capability					Blocking Signal Power		
CH 1:	OCBW (MHz):	14.88	Antenna Gain (dBi):	3.5	■ at the antenna connector		
CH 13:	OCBW (MHz):	14.88			□ in front of the antenna		
Operation Mode	**Channel Number**	**Wanted Signal Mean Power From Companion Device (dBm) (Note 1)**	**Blocking Signal Frequency (MHz)**	**Blocking Signal Frequency Shift (MHz) (Note 2)**	**Blocking Signal Power (dBm) (Note 1)**	**PER (%)**	**Test Result**
11b	1	-64.5	2380	-	-30.5	2.4	Pass
		-70.5	2300	-	-30.5	1.8	Pass
			2330	-	-30.5	1.3	Pass
			2360	-	-30.5	1.1	Pass
	13	-64.5	2504	-	-30.5	2.6	Pass
		-70.5	2524	-	-30.5	2.1	Pass
			2584	-	-30.5	1.7	Pass
			2674	-	-30.5	1.5	Pass

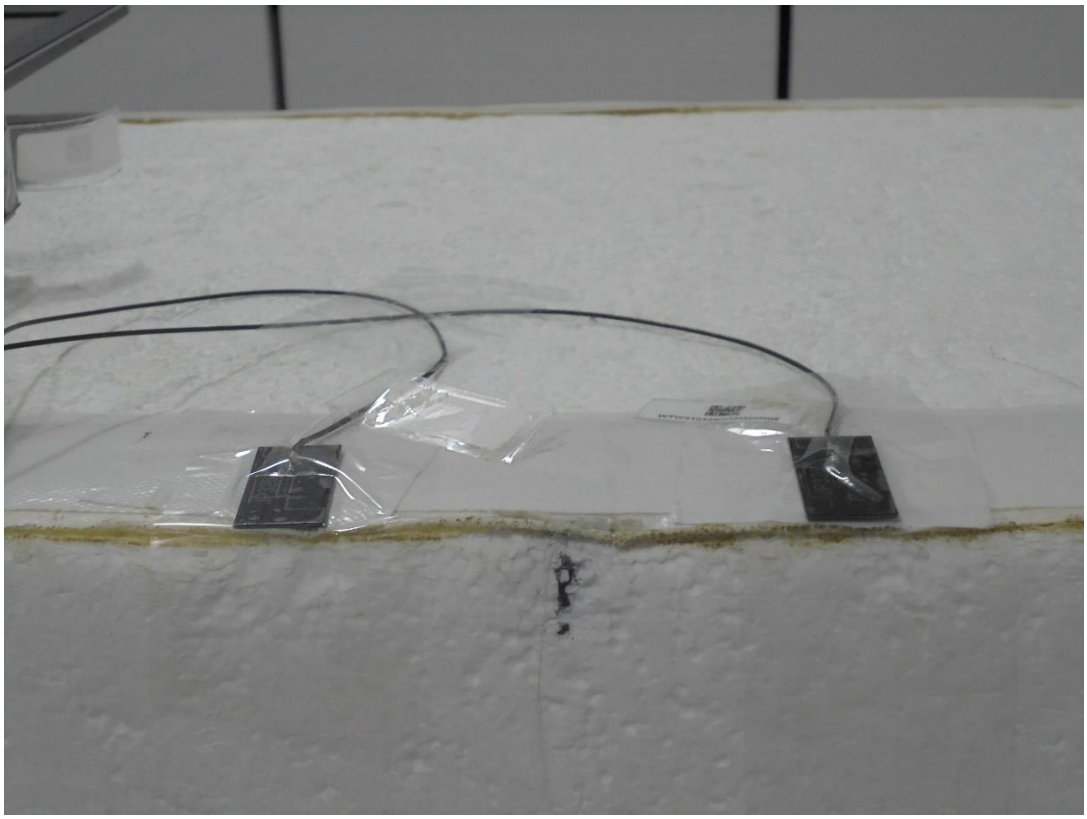
Note 1: In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G).
Note 2: If the performance criteria is not met, those frequencies of the blocking signal has been increased/decreased with a value equal to the Occupied Channel Bandwidth except the blocking frequencies 2380, 2504MHz shall be increased/decreased with a value equal to 10MHz also if the frequency offset is more than 7MHz, the level of the wanted signal shall be increased by 3dB.

5 Photographs of the Test Configuration

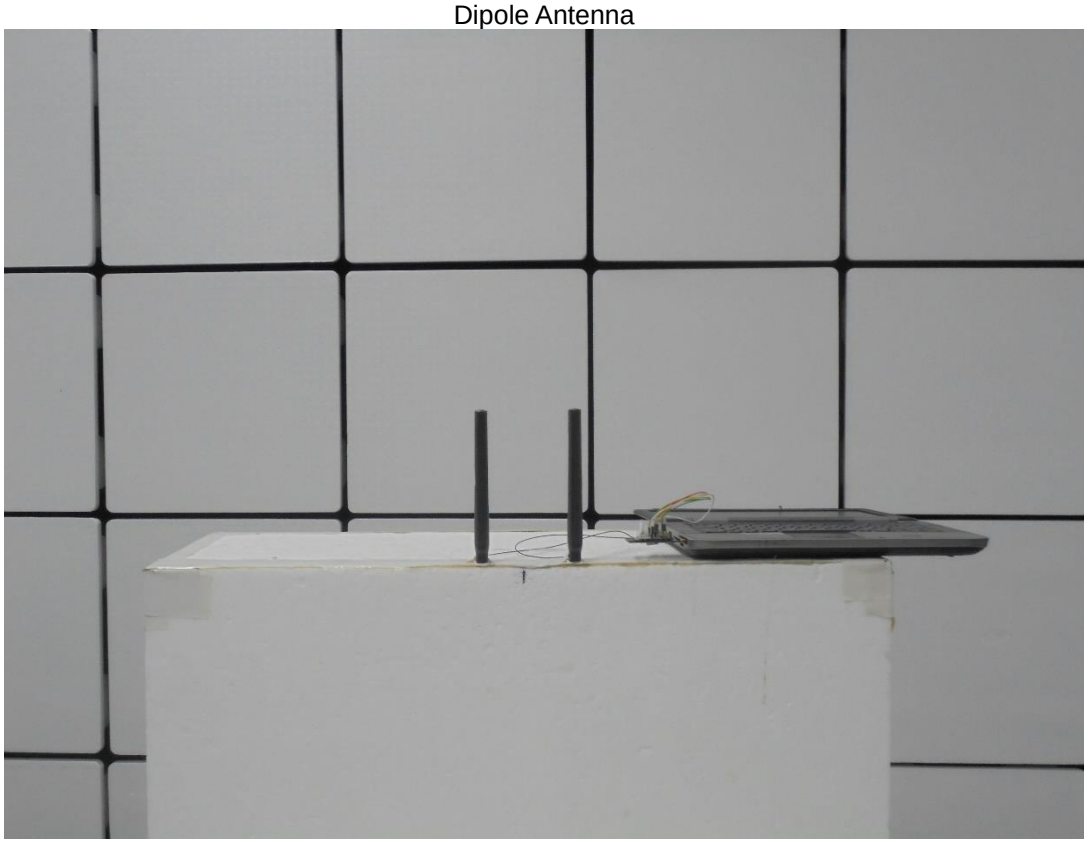
TX / RX Spurious Emission Test
PIFA Antenna

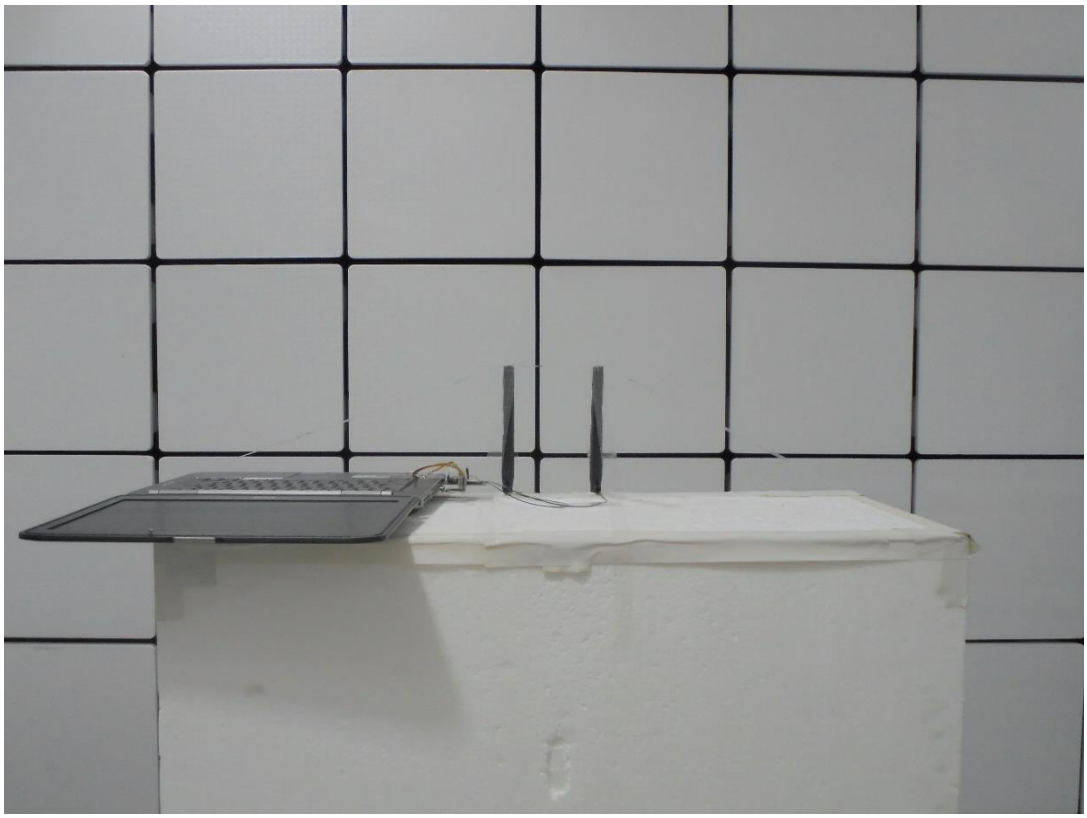






Dipole Antenna





Appendix A- 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:

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
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Fax: 886-3-6668323

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Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

--- END ---

Appendix B- Test Results for reference by client's requirement

Receiver Category 1 Equipment

Receiver Blocking Measure Of The Capability					Blocking Signal Power		
CH 1:	OCBW (MHz):	14.88	Antenna Gain (dBi):	3.5	■ at the antenna connector		
CH 13:	OCBW (MHz):	14.88			□ in front of the antenna		
Operation Mode	**Channel Number**	**Worst Wanted Signal Mean Power From Companion Device (dBm) (Note 1)**	**Blocking Signal Frequency (MHz)**	**Blocking Signal Frequency Shift (MHz) (Note 2)**	**Blocking Signal Power (dBm) (Note 1)**	**PER (%)**	**Test Result**
11b	1	-80	2380	-	-30.5	3.5	Pass
		-80	2300	-	-30.5	4.2	Pass
			2330	-	-30.5	2.6	Pass
			2360	-	-30.5	3.3	Pass
	13	-80	2504	-	-30.5	3.1	Pass
		-80	2524	-	-30.5	3.8	Pass
			2584	-	-30.5	2.9	Pass
			2674	-	-30.5	4	Pass

Note 1: In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G).
Note 2: If the performance criteria is not met, those frequencies of the blocking signal has been increased/decreased with a value equal to the Occupied Channel Bandwidth except the blocking frequencies 2380, 2504MHz shall be increased/decreased with a value equal to 10MHz also if the frequency offset is more than 7MHz, the level of the wanted signal shall be increased by 3dB.