

FCC Measurement/Technical Report on Service and Entertainment Module Truck Infotainment Unit

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IC: -

Test Report Reference: MDE_APTIV_1812_FCC_03

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D-PL-12140-01-01
D-PL-12140-01-02
D-PL-12140-01-03

Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

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1 APPLIED STANDARDS AND TEST SUMMARY

1.1 APPLIED STANDARDS

Type of Authorization

Certification for an Intentional Radiator (Digital Device / Spread Spectrum).

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 (10-1-17 Edition) and 15 (10-1-17 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 15, Subpart C – Intentional Radiators

§ 15.201 Equipment authorization requirement

§ 15.207 Conducted limits

§ 15.209 Radiated emission limits; general requirements

Part 15, Subpart E – Unlicensed National Information Infrastructure Devices

§ 15.403 Definitions

§ 15.407 General technical requirements

Note:

The tests were selected and performed with reference to the FCC Public Notice “Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, 789033 D02 General U-NII Test Procedures New Rules v02r01, 2017-12-14”.

ANSI C63.10-2013 is applied.

FCC ET Docket No. 13-49, FIRST REPORT AND ORDER, April 1, 2014 (“new rules”) is applied.

1.2 FCC-IC CORRELATION TABLE

Correlation of measurement requirements for UNII / LE-LAN (e.g. WLAN 5 GHz) equipment from FCC and IC

UNII equipment

Measurement	FCC reference	IC reference
Conducted emissions on AC Mains	§ 15.207	RSS-Gen Issue 5: 8.8
Occupied bandwidth	§ 15.403 (i) (26 dB) / § 15.407 (e) (6 dB)	RSS-247 Issue 2: 6.2.1.1, 6.2.2.1, 6.2.3.1 (99%) RSS-247 Issue 2: 6.2.4.1 (6 dB)
Maximum conducted output power	§ 15.407 (a) (1),(2),(3),(4)	RSS-247 Issue 2: 6.2.1.1, 6.2.2.1, 6.2.3.1, 6.2.4.1
Maximum power spectral density	§ 15.407 (a) (1),(2),(3),(5)	RSS-247 Issue 2: 6.2.1.1, 6.2.2.1, 6.2.3.1, 6.2.4.1
Transmitter undesirable emissions; General Field Strength Limits, Restricted Bands	§ 15.407 (b) § 15.209 (a)	RSS-Gen Issue 5: 6.13/8.9/8.10; RSS-247 Issue 2: 3.3/6.2 6.2.1.2, 6.2.2.2, 6.2.3.2, 6.2.4.2
Frequency stability	§ 15.407 (g)	RSS-Gen Issue 5: 6.11/8.11
Transmit Power Control (TPC) and Dynamic Frequency Selection (DFS)	§ 15.407 (h)	RSS-247 Issue 2: 6.2.2.1, 6.2.3.1, 6.3
Antenna requirement	§ 15.203 / 15.204	RSS-Gen Issue 5: 8.3
Receiver spurious emissions	-	-

1.3 MEASUREMENT SUMMARY

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407

FCC §15.31, §15.403 (i)

26 dB Bandwidth

The measurement was performed according to ANSI C63.10

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	Final Result	
			FCC	IC
WLAN a, high, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN a, high, U-NII-3	S01_ah02	2020-01-06	Performed	N/A
WLAN a, low, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN a, low, U-NII-3	S01_ah02	2020-01-06	Performed	N/A
WLAN a, mid, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN a, mid, U-NII-3	S01_ah02	2020-01-06	Performed	N/A
WLAN ac 20 MHz, high, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN ac 20 MHz, high, U-NII-3	S01_ah02	2020-01-06	Performed	N/A
WLAN ac 20 MHz, low, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN ac 20 MHz, low, U-NII-3	S01_ah02	2020-01-06	Performed	N/A
WLAN ac 20 MHz, mid, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN ac 20 MHz, mid, U-NII-3	S01_ah02	2020-01-06	Performed	N/A
WLAN ac 40 MHz, high, U-NII-1	S01_ah02	2020-01-07	Performed	N/A
WLAN ac 40 MHz, high, U-NII-3	S01_ah02	2020-01-07	Performed	N/A
WLAN ac 40 MHz, low, U-NII-1	S01_ah02	2020-01-07	Performed	N/A
WLAN ac 40 MHz, low, U-NII-3	S01_ah02	2020-01-07	Performed	N/A
WLAN ac 80 MHz, mid, U-NII-1	S01_ah02	2020-01-07	Performed	N/A
WLAN ac 80 MHz, mid, U-NII-3	S01_ah02	2020-01-07	Performed	N/A
WLAN n 20 MHz, high, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN n 20 MHz, high, U-NII-3	S01_ah02	2020-01-06	Performed	N/A
WLAN n 20 MHz, low, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN n 20 MHz, low, U-NII-3	S01_ah02	2020-01-06	Performed	N/A
WLAN n 20 MHz, mid, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN n 20 MHz, mid, U-NII-3	S01_ah02	2020-01-06	Performed	N/A
WLAN n 40 MHz, high, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN n 40 MHz, high, U-NII-3	S01_ah02	2020-01-06	Performed	N/A
WLAN n 40 MHz, low, U-NII-1	S01_ah02	2020-01-06	Performed	N/A
WLAN n 40 MHz, low, U-NII-3	S01_ah02	2020-01-06	Performed	N/A

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407

FCC §15.31, §15.407 (e)

6 dB Bandwidth

The measurement was performed according to ANSI C63.10

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	Final Result	
			FCC	IC
WLAN a, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN a, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed

**47 CFR CHAPTER I FCC PART 15
Subpart E §15.407**

FCC §15.31, §15.407 (e)

6 dB Bandwidth

The measurement was performed according to ANSI C63.10

Final Result

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, mid, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 40 MHz, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 40 MHz, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 40 MHz, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed

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FCC §15.31, IC RSS 247 Ch. 6.2.x

99 % Bandwidth

The measurement was performed according to ANSI C63.10

Final Result

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, high, U-NII-1	S01_ah02	2020-01-06	N/A	Performed
WLAN a, high, U-NII-3	S01_ah02	2020-01-06	N/A	Performed
WLAN a, low, U-NII-1	S01_ah02	2020-01-06	N/A	Performed
WLAN a, low, U-NII-3	S01_ah02	2020-01-06	N/A	Performed
WLAN a, mid, U-NII-1	S01_ah02	2020-01-06	N/A	Performed
WLAN a, mid, U-NII-3	S01_ah02	2020-01-06	N/A	Performed
WLAN ac 20 MHz, high, U-NII-1	S01_ah02	2020-01-06	N/A	Performed
WLAN ac 20 MHz, high, U-NII-3	S01_ah02	2020-01-06	N/A	Performed
WLAN ac 20 MHz, low, U-NII-1	S01_ah02	2020-01-06	N/A	Performed
WLAN ac 20 MHz, low, U-NII-3	S01_ah02	2020-01-06	N/A	Performed
WLAN ac 20 MHz, mid, U-NII-1	S01_ah02	2020-01-06	N/A	Performed
WLAN ac 20 MHz, mid, U-NII-3	S01_ah02	2020-01-06	N/A	Performed
WLAN ac 40 MHz, high, U-NII-1	S01_ah02	2020-01-07	N/A	Performed
WLAN ac 40 MHz, high, U-NII-3	S01_ah02	2020-01-07	N/A	Performed
WLAN ac 40 MHz, low, U-NII-1	S01_ah02	2020-01-07	N/A	Performed
WLAN ac 40 MHz, low, U-NII-3	S01_ah02	2020-01-07	N/A	Performed
WLAN ac 80 MHz, mid, U-NII-1	S01_ah02	2020-01-07	N/A	Performed
WLAN ac 80 MHz, mid, U-NII-3	S01_ah02	2020-01-07	N/A	Performed
WLAN n 20 MHz, high, U-NII-1	S01_ah02	2020-01-06	N/A	Performed
WLAN n 20 MHz, high, U-NII-3	S01_ah02	2020-01-06	N/A	Performed
WLAN n 20 MHz, low, U-NII-1	S01_ah02	2020-01-06	N/A	Performed

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Subpart E §15.407**

FCC §15.31, IC RSS 247 Ch. 6.2.x

99 % Bandwidth

The measurement was performed according to ANSI C63.10

Final Result

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN n 20 MHz, low, U-NII-3	S01_ah02	2020-01-06	N/A	Performed
WLAN n 20 MHz, mid, U-NII-1	S01_ah02	2020-01-06	N/A	Performed
WLAN n 20 MHz, mid, U-NII-3	S01_ah02	2020-01-06	N/A	Performed
WLAN n 40 MHz, high, U-NII-1	S01_ah02	2020-01-06	N/A	Performed
WLAN n 40 MHz, high, U-NII-3	S01_ah02	2020-01-06	N/A	Performed
WLAN n 40 MHz, low, U-NII-1	S01_ah02	2020-01-06	N/A	Performed
WLAN n 40 MHz, low, U-NII-3	S01_ah02	2020-01-06	N/A	Performed

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FCC §15.31, §15.407 (a)(1)

Maximum Conducted Output Power

The measurement was performed according to ANSI C63.10

Final Result

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, high, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN a, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN a, low, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN a, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN a, mid, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN a, mid, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz MIMO, high, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz MIMO, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz MIMO, low, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz MIMO, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz MIMO, mid, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz MIMO, mid, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz, high, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, low, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 40 MHz MIMO, high, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz MIMO, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz MIMO, low, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz MIMO, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz, high, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz, low, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed

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Subpart E §15.407**

FCC §15.31, §15.407 (a)(1)

Maximum Conducted Output Power

The measurement was performed according to ANSI C63.10

Final Result

OP-Mode	Setup	Date	FCC	IC
Radio Technology, Operating Frequency, Subband				
WLAN ac 80 MHz MIMO, mid, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 80 MHz MIMO, mid, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz, high, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 40 MHz, high, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN n 40 MHz, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 40 MHz, low, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN n 40 MHz, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed

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FCC §15.31, §15.407 (a) (1),(5)

Peak Power Spectral Density

The measurement was performed according to ANSI C63.10

Final Result

OP-Mode	Setup	Date	FCC	IC
Radio Technology, Operating Frequency, Subband				
WLAN a, high, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN a, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN a, low, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN a, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN a, mid, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN a, mid, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz MIMO, high, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz MIMO, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz MIMO, low, U-NII-1	S01_ah02	2020-01-07	Passed	Passed

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FCC §15.31, §15.407 (a) (1),(5)

Peak Power Spectral Density

The measurement was performed according to ANSI C63.10

Final Result

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN ac 20 MHz MIMO, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz MIMO, mid, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz MIMO, mid, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 20 MHz, high, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, low, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN ac 40 MHz MIMO, high, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz MIMO, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz MIMO, low, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz MIMO, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz, high, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz, low, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 40 MHz, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 80 MHz MIMO, mid, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 80 MHz MIMO, mid, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 20 MHz, high, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-1	S01_ah02	2020-01-07	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-3	S01_ah02	2020-01-07	Passed	Passed
WLAN n 40 MHz, high, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN n 40 MHz, high, U-NII-3	S01_ah02	2020-01-06	Passed	Passed
WLAN n 40 MHz, low, U-NII-1	S01_ah02	2020-01-06	Passed	Passed
WLAN n 40 MHz, low, U-NII-3	S01_ah02	2020-01-06	Passed	Passed

**47 CFR CHAPTER I FCC PART 15
Subpart E §15.407**

**FCC §15.407 (b), (1),(2),(3),(4); FCC
§15.205, §15.209, §15.407 (b) (5),(6)**

Undesirable Emissions; General Field Strength Limits

The measurement was performed according to ANSI C63.10

Final Result

OP-Mode	Setup	Date	FCC	IC
Radio Technology, Operating Frequency, Measurement range, Subband				
WLAN a, high, 1GHz - 26GHz, U-NII-1	S01_ai02	2020-01-18	Passed	Passed
WLAN a, high, 1GHz - 26GHz, U-NII-3	S01_ai02	2020-01-19	Passed	Passed
WLAN a, low, 1GHz - 26GHz, U-NII-1	S01_ai02	2020-01-18	Passed	Passed
WLAN a, low, 1GHz - 26GHz, U-NII-3	S01_ai02	2020-01-18	Passed	Passed
WLAN a, mid, 1GHz - 26GHz, U-NII-1	S01_ai02	2020-01-18	Passed	Passed
WLAN a, mid, 1GHz - 26GHz, U-NII-3	S01_ai02	2020-01-18	Passed	Passed
WLAN a, mid, 26GHz - 40GHz, U-NII-1	S01_ai02	2020-01-13	Passed	Passed
WLAN a, mid, 26GHz - 40GHz, U-NII-3	S01_ai02	2020-01-13	Passed	Passed
WLAN a, mid, 30MHz - 1GHz, U-NII-1	S01_ai02	2020-01-22	Passed	Passed
WLAN a, mid, 30MHz - 1GHz, U-NII-3	S01_ai02	2020-01-22	Passed	Passed
WLAN a, mid, 9kHz - 30MHz, U-NII-1	S01_ai02	2020-01-22	Passed	Passed
WLAN a, mid, 9kHz - 30MHz, U-NII-3	S01_ai02	2020-01-22	Passed	Passed
WLAN ac 40 MHz, high, 1GHz - 26GHz, U-NII-1 Remark: 1-18 GHz	S01_ai02	2020-01-26	Passed	Passed
WLAN ac 40 MHz, high, 1GHz - 26GHz, U-NII-3 Remark: 1-18 GHz	S01_ai02	2020-01-27	Passed	Passed
WLAN ac 40 MHz, low, 1GHz - 26GHz, U-NII-1 Remark: 1-18 GHz	S01_ai02	2020-01-19	Passed	Passed
WLAN ac 40 MHz, low, 1GHz - 26GHz, U-NII-3 Remark: 1-18 GHz	S01_ai02	2020-01-27	Passed	Passed
WLAN n 20 MHz, high, 1GHz - 26GHz, U-NII-1 Remark: 1-18 GHz	S01_ai02	2020-01-19	Passed	Passed
WLAN n 20 MHz, high, 1GHz - 26GHz, U-NII-3 Remark: 1-18 GHz	S01_ai02	2020-01-19	Passed	Passed
WLAN n 20 MHz, low, 1GHz - 26GHz, U-NII-1 Remark: 1-18 GHz	S01_ai02	2020-01-19	Passed	Passed
WLAN n 20 MHz, low, 1GHz - 26GHz, U-NII-3 Remark: 1-18 GHz	S01_ai02	2020-01-19	Passed	Passed
WLAN n 20 MHz, mid, 1GHz - 26GHz, U-NII-1 Remark: 1-18 GHz	S01_ai02	2020-01-19	Passed	Passed
WLAN n 20 MHz, mid, 1GHz - 26GHz, U-NII-3 Remark: 1-18 GHz	S01_ai02	2020-01-19	Passed	Passed
WLAN n 20 MHz, mid, 26GHz - 40GHz, U-NII-1	S01_ai02	2020-01-13	Passed	Passed
WLAN n 20 MHz, mid, 26GHz - 40GHz, U-NII-3	S01_ai02	2020-01-13	Passed	Passed
WLAN n 40 MHz, high, 1GHz - 26GHz, U-NII-1	S01_ai02	2020-01-19	Passed	Passed
WLAN n 40 MHz, high, 1GHz - 26GHz, U-NII-3	S01_ai02	2020-01-20	Passed	Passed
WLAN n 40 MHz, low, 1GHz - 26GHz, U-NII-1	S01_ai02	2020-01-19	Passed	Passed
WLAN n 40 MHz, low, 1GHz - 26GHz, U-NII-3	S01_ai02	2020-01-20	Passed	Passed

**47 CFR CHAPTER I FCC PART 15
Subpart E §15.407**

FCC §15.407 (b), (1),(2),(3),(4)

Band Edge

The measurement was performed according to ANSI C63.10

Final Result

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, high, U-NII-3	S01_ai02	2020-01-19	Passed	Passed
WLAN a, low, U-NII-1	S01_ai02	2020-01-18	Passed	Passed
WLAN a, low, U-NII-3	S01_ai02	2020-01-18	Passed	Passed
WLAN ac 20 MHz, high, U-NII-3	S01_ai02	2020-01-26	Passed	Passed
WLAN ac 20 MHz, low, U-NII-1	S01_ai02	2020-01-26	Passed	Passed
WLAN ac 20 MHz, low, U-NII-3	S01_ai02	2020-01-26	Passed	Passed
WLAN ac 40 MHz, high, U-NII-3	S01_ai02	2020-01-25	Passed	Passed
WLAN ac 40 MHz, low, U-NII-1	S01_ai02	2020-01-19	Passed	Passed
WLAN ac 40 MHz, low, U-NII-3	S01_ai02	2020-01-25	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-1	S01_ai02	2020-01-26	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-3	S01_ai02	2020-01-26	Passed	Passed
WLAN n 20 MHz, high, U-NII-3	S01_ai02	2020-01-19	Passed	Passed
WLAN n 20 MHz, low, U-NII-1	S01_ai02	2020-01-19	Passed	Passed
WLAN n 20 MHz, low, U-NII-3	S01_ai02	2020-01-19	Passed	Passed
WLAN n 40 MHz, high, U-NII-3	S01_ai02	2020-01-20	Passed	Passed
WLAN n 40 MHz, low, U-NII-1	S01_ai02	2020-01-19	Passed	Passed
WLAN n 40 MHz, low, U-NII-3	S01_ai02	2020-01-20	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-1	S01_ai02	2020-01-19	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-3	S01_ai02	2020-01-19	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-1	S01_ai02	2020-01-19	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-3	S01_ai02	2020-01-19	Passed	Passed
WLAN ac 20 MHz MIMO, low, U-NII-1	S01_ai02	2020-01-19	Passed	Passed
WLAN ac 20 MHz MIMO, low, U-NII-3	S01_ai02	2020-01-19	Passed	Passed
WLAN ac 40 MHz MIMO, low, U-NII-1	S01_ai02	2020-01-19	Passed	Passed
WLAN ac 40 MHz MIMO, low, U-NII-3	S01_ai02	2020-01-19	Passed	Passed
WLAN ac 80 MHz MIMO, mid, U-NII-1	S01_ai02	2020-01-19	Passed	Passed
WLAN ac 80 MHz MIMO, mid, U-NII-3	S01_ai02	2020-01-19	Passed	Passed

N/A: Not applicable

N/P: Not performed

Only band edge measurement 5825-5830 MHz for IC band limit.

- 1) Test to be performed by external lab.

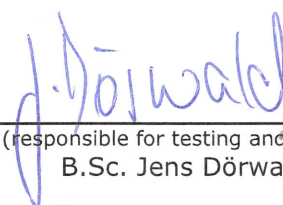
2 REVISION HISTORY / SIGNATURES

Report version control			
Version	Release date	Change Description	Version validity
initial	2020-04-02	--	valid
--	--	--	--

COMMENT: -



(responsible for accreditation scope)
Dipl.-Ing. Marco Kullik



(responsible for testing and report)
B.Sc. Jens Dörwald



7 layers GmbH, Borsigstr. 11
40880 Ratingen, Germany
Phone +49 (0)2102 749 0

3 ADMINISTRATIVE DATA

3.1 TESTING LABORATORY

Company Name: 7layers GmbH
Address: Borsigstr. 11
40880 Ratingen
Germany

The test facility is accredited by the following accreditation organisation:

Laboratory accreditation no: DAKKS D-PL-12140-01-01 | D-PL-12140-01-02 | D-PL-12140-01-03
FCC Designation Number: DE0015
FCC Test Firm Registration: 929146
ISED CAB Identifier: DE0007; ISED#: 3699A
Responsible for accreditation scope: Dipl.-Ing. Marco Kullik
Report Template Version: 2020-03-18

3.2 PROJECT DATA

Responsible for testing and report: B.Sc. Jens Dörwald
Employees who performed the tests: documented internally at 7Layers
Date of Report: 2020-04-02
Testing Period: 2020-01-06 to 2020-01-27

3.3 APPLICANT DATA

Company Name: Aptiv Services Deutschland GmbH
Address: Daimlerring 9
31135 Hildesheim
Germany
Contact Person: Jessica De Jong

3.4 MANUFACTURER DATA

Company Name: Aptiv Services Deutschland GmbH

Address: Am Technologiepark 1
42119 Wuppertal
Germany

Contact Person:

4 TEST OBJECT DATA

4.1 GENERAL EUT DESCRIPTION

Kind of Device product description	Infotainment Unit with integrated Bluetooth radio, WLAN radio and AM/FM/DAB broadcast receivers
Product name	Truck Infotainment Unit
Type	Service and Entertainment Module
Declared EUT data by the supplier	
Voltage Type	DC (vehicular battery)
Voltage Level	12.0 V
Tested Modulation Type	OFDM: BPSK
General product description	The EUT is a Bluetooth and WLAN device
Specific product description	The EUT is a Bluetooth and WLAN car radio
Ports of the device	<ul style="list-style-type: none"> - Cable Harness incl. DC - HDMI - USB - Antenna
Antenna 1	Gain [dBi]: 3.7
Antenna 2	Gain [dBi]: 3.7
Tested Datarates	WLAN a: 6 Mbps WLAN n/ac: MCS0
Special software used for testing	Customer Software installed on test laptop

4.2 EUT MAIN COMPONENTS

Sample Name	Sample Code	Description
EUT A	DE1352005ah02	Conducted Sample with SMA antenna connector
Sample Parameter	Value	
Serial No.	8052286932001914700984	
HW Version	7	
SW Version	P0_RC5	
Comment	-	

Sample Name	Sample Code	Description
EUT B	DE1352005ai02	Radiated Sample without SMA antenna connector
Sample Parameter	Value	
Serial No.	8052286932001914700809	
HW Version	7	
SW Version	P0_RC5	
Comment	-	

NOTE: The short description is used to simplify the identification of the EUT in this test report.

4.3 ANCILLARY EQUIPMENT

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Device	Details (Manufacturer, Type Model, OUT Code)	Description
-	-	-

4.4 AUXILIARY EQUIPMENT

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Auxiliary Equipment can influence the test results.

Device	Details (Manufacturer, Type Model, HW, SW, S/N)	Description
AC Adapter 90W RE05	Fujitsu Ltd., AC Adapter 90W RE05:A13-090P1A, -, -, 184105JB05	A13-090P1A
Laptop RE05	Fujitsu Ltd., Laptop RE05: Lifebook U758, -, -, DSAL009811	Lifebook U758

4.5 EUT SETUPS

This chapter describes the combination of EUTs and equipment used for testing. The rationale for selecting the EUTs, ancillary and auxiliary equipment and interconnecting cables, is to test a representative configuration meeting the requirements of the referenced standards.

Setup	Combination of EUTs	Description and Rationale
S01_ah02	EUT A, AC Adapter 90W RE05, Laptop RE05,	Conducted Sample with SMA antenna connector
S01_ai02	EUT B, AC Adapter 90W RE05, Laptop RE05,	Radiated Sample without SMA antenna connector

4.6 OPERATING MODES / TEST CHANNELS

This chapter describes the operating modes of the EUTs used for testing.

U-NII-Subband 1 5150 - 5250 MHz			U-NII-Subband 3 5725 - 5850 MHz			Nom. BW
low	mid	high	low	mid	high	20 MHz
36	44	48	149	157	165	Ch.-No.
5180	5220	5240	5745	5785	5825	MHz

low	mid	high	low	mid	high	40 MHz
38	-	46	151	-	159	Ch.-No.
5190	-	5230	5755	-	5795	MHz
low	mid	high	low	mid	high	80 MHz
-	42	-	-	155	-	Ch.-No.
-	5210	-	-	5775	-	MHz

4.7 PRODUCT LABELLING

4.7.1 FCC ID LABEL

Please refer to the documentation of the applicant.

4.7.2 LOCATION OF THE LABEL ON THE EUT

Please refer to the documentation of the applicant.

5 TEST RESULTS

5.1 26 DB BANDWIDTH

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.1.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The results recorded were measured with the modulation which produce the worst-case (widest) emission bandwidth.

The EUT was connected to spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:

- Please see measurement plots

5.1.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart E, §15.403 (i)

There exist no applicable limits for the U-NII subbands 1, 2A and 2C. The test was performed to determine the limits for the "Maximum Conducted Output Power" test case. Therefore no result was applied.

5.1.3 TEST PROTOCOL

Ambient temperature: 24 °C
 Air Pressure: 1010 hPa
 Humidity: 35 %

Radio Technology	Operating Frequency	Subband	26 dB Bandwidth [MHz]
WLAN a	low	U-NII-1	19.8
WLAN a	mid	U-NII-1	19.8
WLAN a	high	U-NII-1	19.7
WLAN a	low	U-NII-3	19.8
WLAN a	mid	U-NII-3	19.8
WLAN a	high	U-NII-3	19.8
WLAN n 20 MHz	low	U-NII-1	20.2
WLAN n 20 MHz	mid	U-NII-1	20.3
WLAN n 20 MHz	high	U-NII-1	20.2
WLAN n 20 MHz	low	U-NII-3	20.4
WLAN n 20 MHz	mid	U-NII-3	20.3
WLAN n 20 MHz	high	U-NII-3	20.2
WLAN n 40 MHz	low	U-NII-1	40.7
WLAN n 40 MHz	high	U-NII-1	40.4
WLAN n 40 MHz	low	U-NII-3	40.2
WLAN n 40 MHz	high	U-NII-3	40.5
WLAN ac 20 MHz	low	U-NII-1	20.3
WLAN ac 20 MHz	mid	U-NII-1	20.3
WLAN ac 20 MHz	high	U-NII-1	20.2
WLAN ac 20 MHz	low	U-NII-3	20.3
WLAN ac 20 MHz	mid	U-NII-3	20.2
WLAN ac 20 MHz	high	U-NII-3	20.2
WLAN ac 40 MHz	low	U-NII-1	41.0
WLAN ac 40 MHz	high	U-NII-1	40.4
WLAN ac 40 MHz	low	U-NII-3	40.4
WLAN ac 40 MHz	high	U-NII-3	40.8
WLAN ac 80 MHz	mid	U-NII-1	82.5
WLAN ac 80 MHz	mid	U-NII-3	83.5

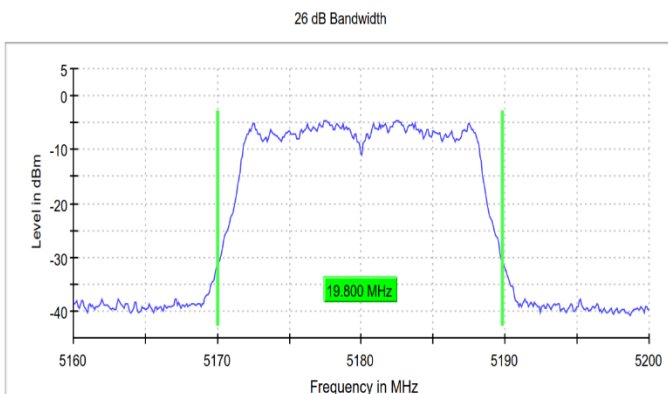
Remark: Please see next sub-clause for the measurement plot.

5.1.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

Radio Technology = WLAN a, Operating Frequency = low, Subband = U-NII-1
 (S01_ah02)

26 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5180.000000	19.800000	---	---	5170.050000	5189.850000	-4.7	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	5.16000 GHz	5.16000 GHz
Stop Frequency	5.20000 GHz	5.20000 GHz
Span	40.000 MHz	40.000 MHz
RBW	200.000 kHz	~ 200.000 kHz
VBW	1.000 MHz	>= 600.000 kHz
SweepPoints	400	~ 400
SweepTime	28.477 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	42 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.01 dB	0.30 dB

Radio Technology = WLAN n 20 MHz, Operating Frequency = low, Subband = U-NII-3 (S01_ah02)

26 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5745.000000	20.400000	---	---	5734.850000	5755.250000	-6.2	PASS



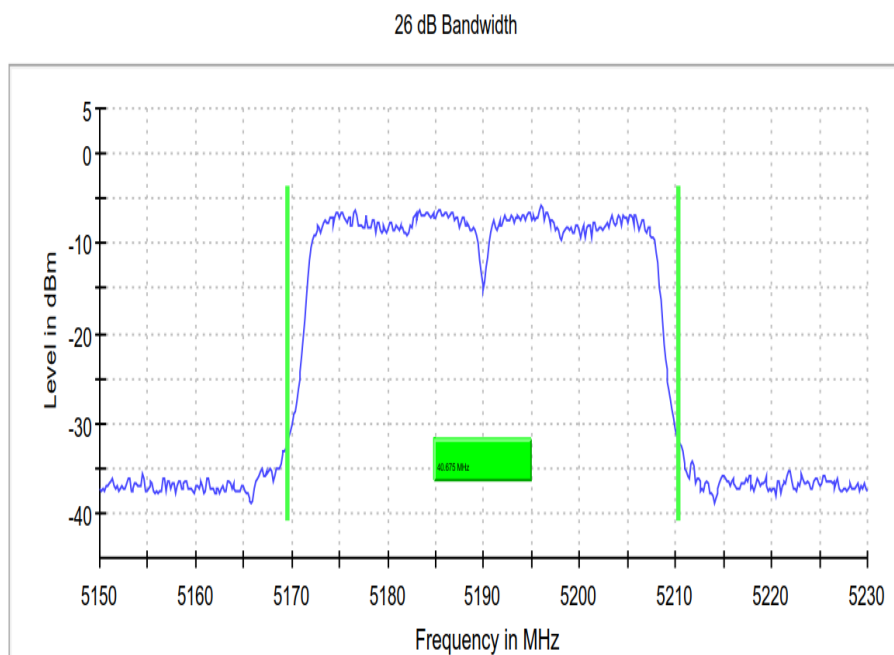
Measurement

Setting	Instrument Value	Target Value
Start Frequency	5.72500 GHz	5.72500 GHz
Stop Frequency	5.76500 GHz	5.76500 GHz
Span	40.000 MHz	40.000 MHz
RBW	200.000 kHz	~ 200.000 kHz
VBW	1.000 MHz	>= 600.000 kHz
SweepPoints	400	~ 400
Sweeptime	28.477 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	47 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.22 dB	0.30 dB

Radio Technology = WLAN n 40 MHz, Operating Frequency = low, Subband = U-NII-1 (S01_ah02)

26 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5190.000000	40.675422	---	---	5169.587242	5210.262664	-5.7	PASS



Measurement

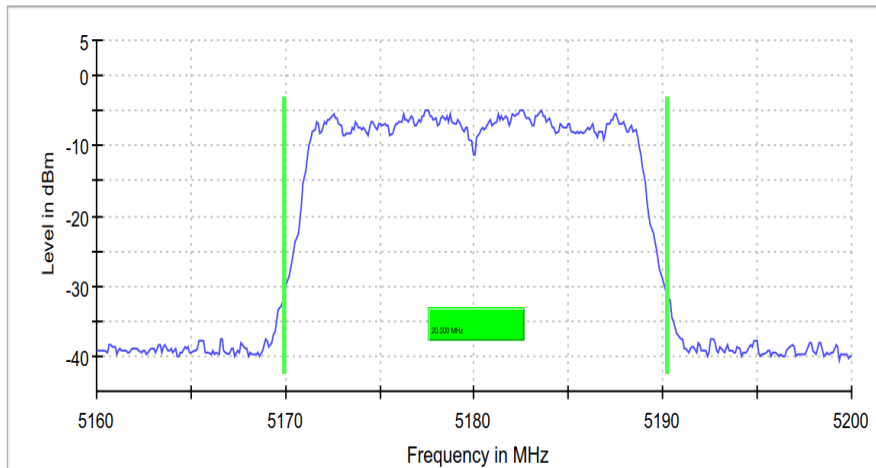
Setting	Instrument Value	Target Value
Start Frequency	5.15000 GHz	5.15000 GHz
Stop Frequency	5.23000 GHz	5.23000 GHz
Span	80.000 MHz	80.000 MHz
RBW	300.000 kHz	~ 400.000 kHz
VBW	1.000 MHz	>= 900.000 kHz
SweepPoints	533	~ 533
Sweeptime	31.621 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	107 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.21 dB	0.30 dB

Radio Technology = WLAN ac 20 MHz, Operating Frequency = low, Subband = U-NII-1 (S01_ah02)

26 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5180.000000	20.300000	---	---	5169.950000	5190.250000	-5.0	PASS

26 dB Bandwidth



Measurement

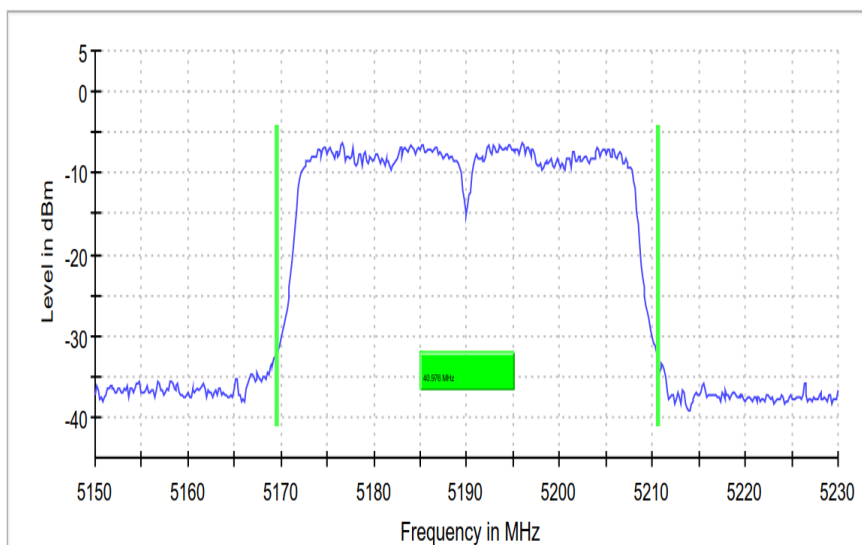
Setting	Instrument Value	Target Value
Start Frequency	5.16000 GHz	5.16000 GHz
Stop Frequency	5.20000 GHz	5.20000 GHz
Span	40.000 MHz	40.000 MHz
RBW	200.000 kHz	~ 200.000 kHz
VBW	1.000 MHz	>= 600.000 kHz
SweepPoints	400	~ 400
SweepTime	28.477 μs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	44 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.19 dB	0.30 dB

Radio Technology = WLAN ac 40 MHz, Operating Frequency = low, Subband = U-NII-1 (S01_ah02)

26 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5190.000000	40.975610	---	---	5169.587242	5210.562852	-6.2	PASS

26 dB Bandwidth



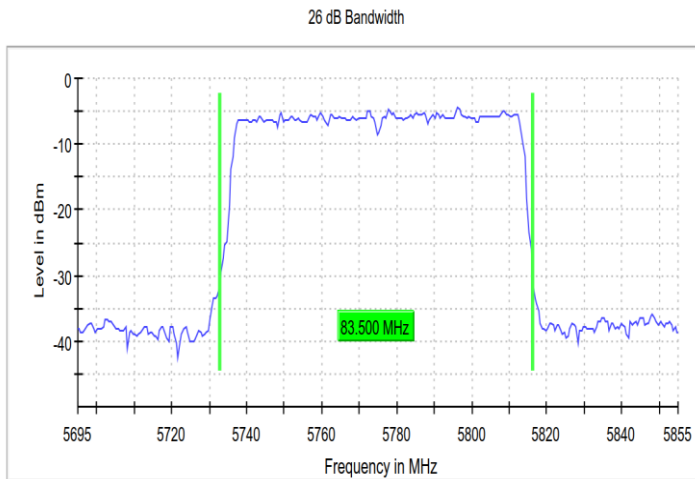
Measurement

Setting	Instrument Value	Target Value
Start Frequency	5.15000 GHz	5.15000 GHz
Stop Frequency	5.23000 GHz	5.23000 GHz
Span	80.000 MHz	80.000 MHz
RBW	300.000 kHz	~ 400.000 kHz
VBW	1.000 MHz	>= 900.000 kHz
SweepPoints	533	~ 533
SweepTime	31.621 μs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	65 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.14 dB	0.30 dB

Radio Technology = WLAN ac 80 MHz, Operating Frequency = mid, Subband = U-NII-3 (S01_ah02)

26 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5775.000000	83.500000	--	--	5732.750000	5816.250000	-4.3	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	5.69500 GHz	5.69500 GHz
Stop Frequency	5.85500 GHz	5.85500 GHz
Span	160.000 MHz	160.000 MHz
RBW	1.000 MHz	~ 800.000 kHz
VBW	3.000 MHz	>= 3.000 MHz
SweepPoints	320	~ 320
Sweeptime	22.875 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	66 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.01 dB	0.30 dB

5.1.5 TEST EQUIPMENT USED

- R&S TS8997

5.2 6 DB BANDWIDTH

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.2.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was setup in a shielded room to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The results recorded were measured with the modulation which produce the worst-case (smallest) emission bandwidth.

The EUT was connected to spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:

- See measurement plots

5.2.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart E, §15.407 (e)

Within the 5.725-5.850 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

5.2.3 TEST PROTOCOL

Ambient temperature: 24 °C
 Air Pressure: 1010 hPa
 Humidity: 35 %

Radio Technology	Operating Frequency	6 dB Bandwidth [MHz]	Limit [MHz]	Margin [MHz]	Min. 6 dB Frequency [MHz]	Max. 6 dB Frequency [MHz]
WLAN a	low	16.45	0.5	15.95	5736.78	5753.23
WLAN a	mid	16.40	0.5	15.90	5776.83	5793.23
WLAN a	high	16.45	0.5	15.95	5816.78	5833.23
WLAN n 20 MHz	low	17.65	0.5	17.15	5736.18	5753.83
WLAN n 20 MHz	mid	17.65	0.5	17.15	5776.18	5793.83
WLAN n 20 MHz	high	17.65	0.5	17.15	5816.18	5833.83
WLAN n 40 MHz	low	35.65	0.5	35.15	5737.18	5772.83
WLAN n 40 MHz	high	35.75	0.5	35.25	5777.18	5812.93
WLAN ac 20 MHz	low	17.65	0.5	17.15	5736.18	5753.83
WLAN ac 20 MHz	mid	17.65	0.5	17.15	5776.18	5793.83
WLAN ac 20 MHz	high	17.65	0.5	17.15	5816.18	5833.83
WLAN ac 40 MHz	low	35.65	0.5	35.15	5737.18	5772.83
WLAN ac 40 MHz	high	35.55	0.5	35.05	5777.38	5812.93
WLAN ac 80 MHz	mid	76.45	0.5	75.95	5736.78	5813.23

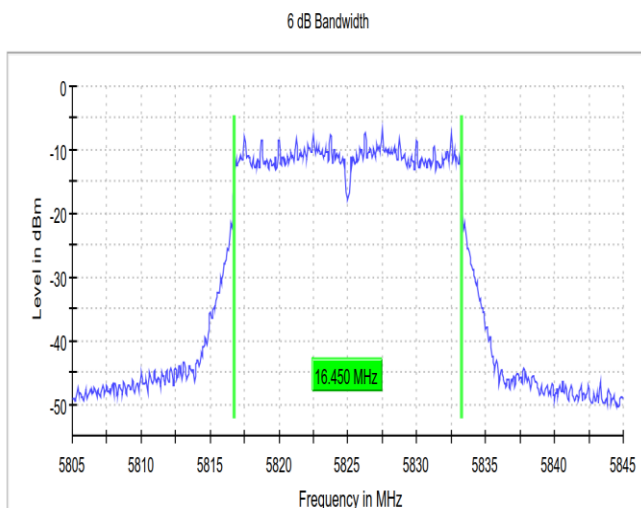
Remark: Please see next sub-clause for the measurement plot.

5.2.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

Radio Technology = WLAN a, Operating Frequency = high, Subband = U-NII-3 (S01_ah02)

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5825.000000	16.450000	0.500000	--	5816.775000	5833.225000	-6.6	PASS



Measurement

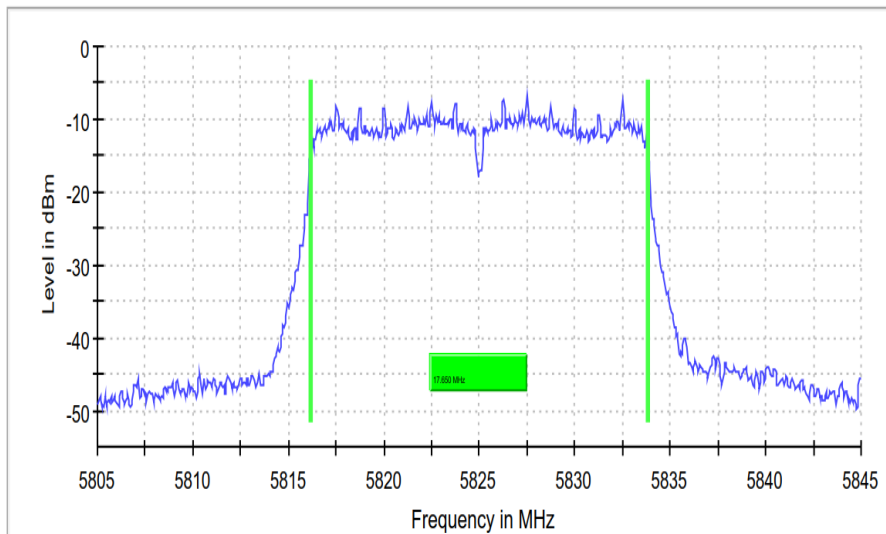
Setting	Instrument Value	Target Value
Start Frequency	5.80500 GHz	5.80500 GHz
Stop Frequency	5.84500 GHz	5.84500 GHz
Span	40.000 MHz	40.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	800	~ 800
SweepTime	56.836 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	43 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.14 dB	0.30 dB

Radio Technology = WLAN n 20 MHz, Operating Frequency = high, Subband = U-NII-3 (S01_ah02)

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5825.000000	17.650000	0.500000	---	5816.175000	5833.825000	-6.6	PASS

6 dB Bandwidth



Measurement

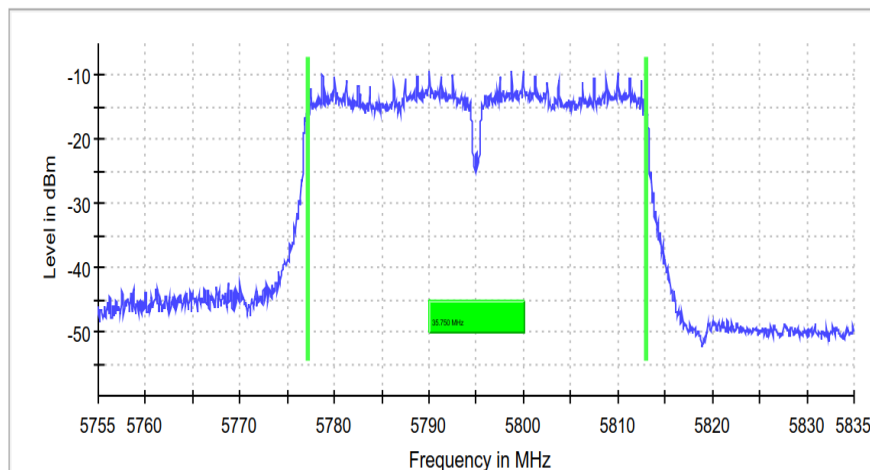
Setting	Instrument Value	Target Value
Start Frequency	5.80500 GHz	5.80500 GHz
Stop Frequency	5.84500 GHz	5.84500 GHz
Span	40.000 MHz	40.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	800	~ 800
SweepTime	56.836 us	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	72 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.24 dB	0.30 dB

Radio Technology = WLAN n 40 MHz, Operating Frequency = high, Subband = U-NII-3 (S01_ah02)

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5795.000000	35.750000	0.500000	---	5777.175000	5812.925000	-9.2	PASS

6 dB Bandwidth



Measurement

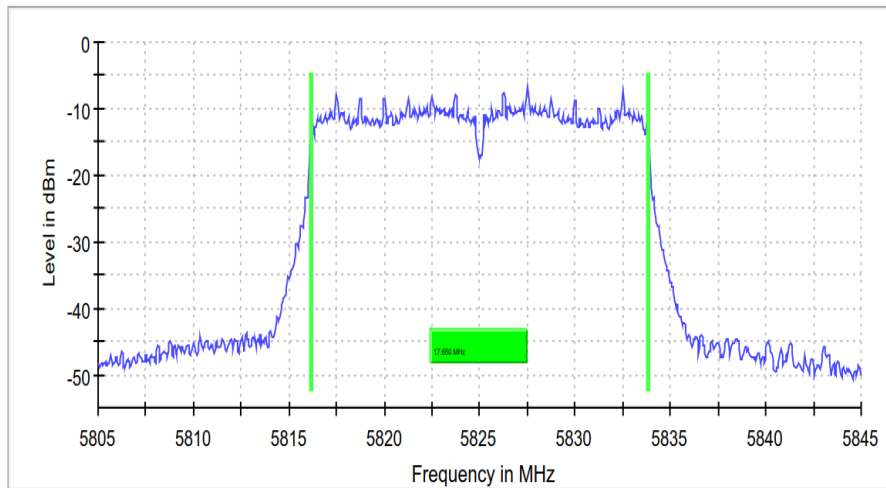
Setting	Instrument Value	Target Value
Start Frequency	5.75500 GHz	5.75500 GHz
Stop Frequency	5.83500 GHz	5.83500 GHz
Span	80.000 MHz	80.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	1600	~ 1600
SweepTime	94.727 us	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	61 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.03 dB	0.30 dB

Radio Technology = WLAN ac 20 MHz, Operating Frequency = high, Subband = U-NII-3 (S01_ah02)

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5825.000000	17.650000	0.500000	---	5816.175000	5833.825000	-6.6	PASS

6 dB Bandwidth



Measurement

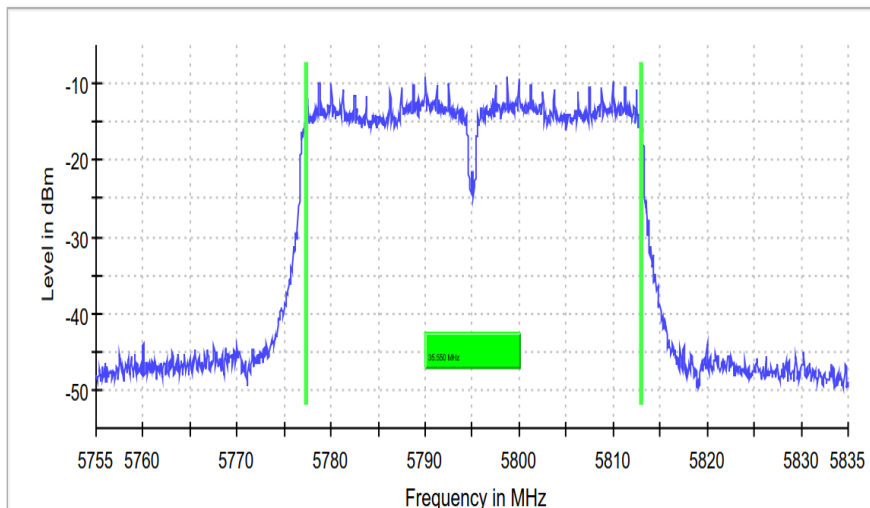
Setting	Instrument Value	Target Value
Start Frequency	5.80500 GHz	5.80500 GHz
Stop Frequency	5.84500 GHz	5.84500 GHz
Span	40.000 MHz	40.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	800	~ 800
SweepTime	56.836 us	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	53 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.30 dB

Radio Technology = WLAN ac 40 MHz, Operating Frequency = high, Subband = U-NII-3 (S01_ah02)

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5795.000000	35.550000	0.500000	---	5777.375000	5812.925000	-9.2	PASS

6 dB Bandwidth



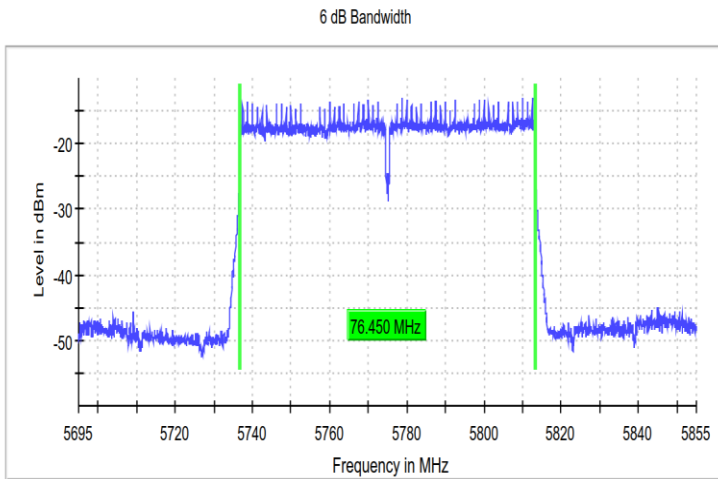
Measurement

Setting	Instrument Value	Target Value
Start Frequency	5.75500 GHz	5.75500 GHz
Stop Frequency	5.83500 GHz	5.83500 GHz
Span	80.000 MHz	80.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	1600	~ 1600
SweepTime	94.727 us	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	72 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.19 dB	0.30 dB

Radio Technology = WLAN ac 80 MHz, Operating Frequency = mid, Subband = U-NII-3 (S01_ah02)

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
5775.000000	76.450000	0.500000	--	5736.775000	5813.225000	-12.9	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	5.69500 GHz	5.69500 GHz
Stop Frequency	5.85500 GHz	5.85500 GHz
Span	160.000 MHz	160.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	3200	~ 3200
SweepTime	189.453 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	89 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.30 dB

5.2.5 TEST EQUIPMENT USED

- R&S TS8997

5.3 99 % BANDWIDTH

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.3.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The results recorded were measured with the modulation which produce the worst-case (widest) emission bandwidth.

The EUT was connected to spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:

- See measurement plots

The 99 % measurement function of the spectrum analyser function was used to determine the 99 % bandwidth.

5.3.2 TEST REQUIREMENTS / LIMITS

No applicable limit:

5.3.3 TEST PROTOCOL

Ambient temperature: 24 °C
 Air Pressure: 1010 hPa
 Humidity: 35 %

Radio Technology	Operating Frequency	Subband	99% Bandwidth [MHz]
WLAN a	low	U-NII-1	16.6
WLAN a	mid	U-NII-1	16.7
WLAN a	high	U-NII-1	16.5
WLAN a	low	U-NII-3	16.6
WLAN a	mid	U-NII-3	16.6
WLAN a	high	U-NII-3	16.7
WLAN n 20 MHz	low	U-NII-1	17.7
WLAN n 20 MHz	mid	U-NII-1	17.7
WLAN n 20 MHz	high	U-NII-1	17.7
WLAN n 20 MHz	low	U-NII-3	17.7
WLAN n 20 MHz	mid	U-NII-3	17.7
WLAN n 20 MHz	high	U-NII-3	17.7
WLAN n 40 MHz	low	U-NII-1	40.7
WLAN n 40 MHz	high	U-NII-1	40.4
WLAN n 40 MHz	low	U-NII-3	40.2
WLAN n 40 MHz	high	U-NII-3	40.5
WLAN ac 20 MHz	low	U-NII-1	17.7
WLAN ac 20 MHz	mid	U-NII-1	17.7
WLAN ac 20 MHz	high	U-NII-1	17.7
WLAN ac 20 MHz	low	U-NII-3	17.7
WLAN ac 20 MHz	mid	U-NII-3	17.7
WLAN ac 20 MHz	high	U-NII-3	17.7
WLAN ac 40 MHz	low	U-NII-1	36.3
WLAN ac 40 MHz	high	U-NII-1	36.3
WLAN ac 40 MHz	low	U-NII-3	36.3
WLAN ac 40 MHz	high	U-NII-3	36.3
WLAN ac 80 MHz	mid	U-NII-1	76.5
WLAN ac 80 MHz	mid	U-NII-3	76.5

Remark: Please see next sub-clause for the measurement plot.

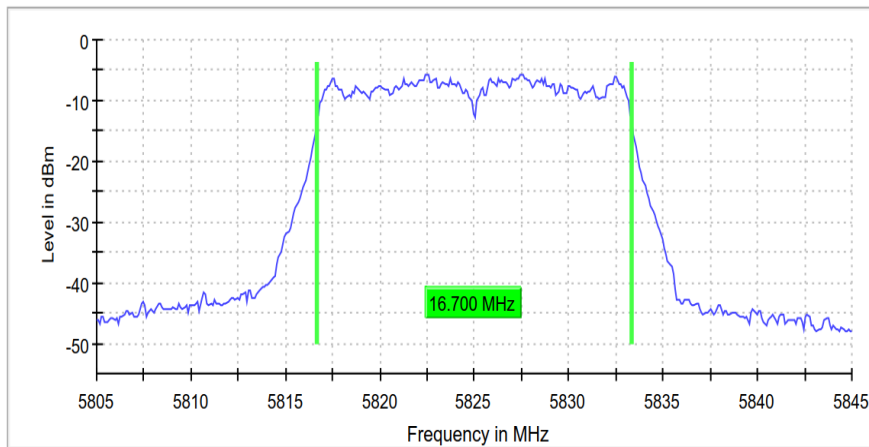
5.3.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

Radio Technology = WLAN a, Operating Frequency = high, Subband = U-NII-3 (S01_ah02)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
5825.000000	16.700000	---	---	5816.650000	5833.350000	PASS

99 % Bandwidth



Measurement

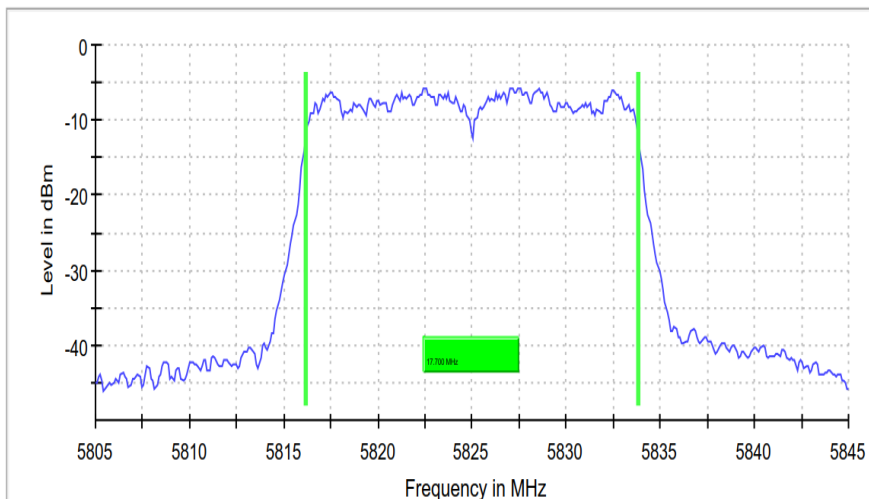
Setting	Instrument Value	Target Value
Start Frequency	5.80500 GHz	5.80500 GHz
Stop Frequency	5.84500 GHz	5.84500 GHz
Span	40.000 MHz	40.000 MHz
RBW	200.000 kHz	>= 200.000 kHz
VBW	1.000 MHz	>= 600.000 kHz
SweepPoints	400	~ 400
Sweeptime	28.477 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	26 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.06 dB	0.30 dB

Radio Technology = WLAN n 20 MHz, Operating Frequency = high, Subband = U-NII-3 (S01_ah02)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
5825.000000	17.700000	---	---	5816.150000	5833.850000	PASS

99 % Bandwidth



Measurement

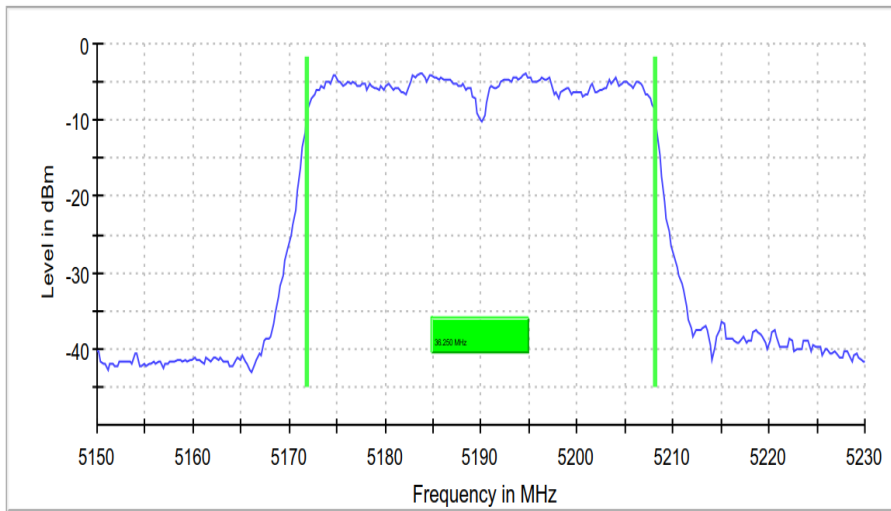
Setting	Instrument Value	Target Value
Start Frequency	5.80500 GHz	5.80500 GHz
Stop Frequency	5.84500 GHz	5.84500 GHz
Span	40.000 MHz	40.000 MHz
RBW	200.000 kHz	>= 200.000 kHz
VBW	1.000 MHz	>= 600.000 kHz
SweepPoints	400	~ 400
Sweeptime	28.477 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	54 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.20 dB	0.30 dB

Radio Technology = WLAN n 40 MHz, Operating Frequency = low, Subband = U-NII-1 (S01_ah02)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
5190.000000	36.250000	---	---	5171.875000	5208.125000	PASS

99 % Bandwidth



Measurement

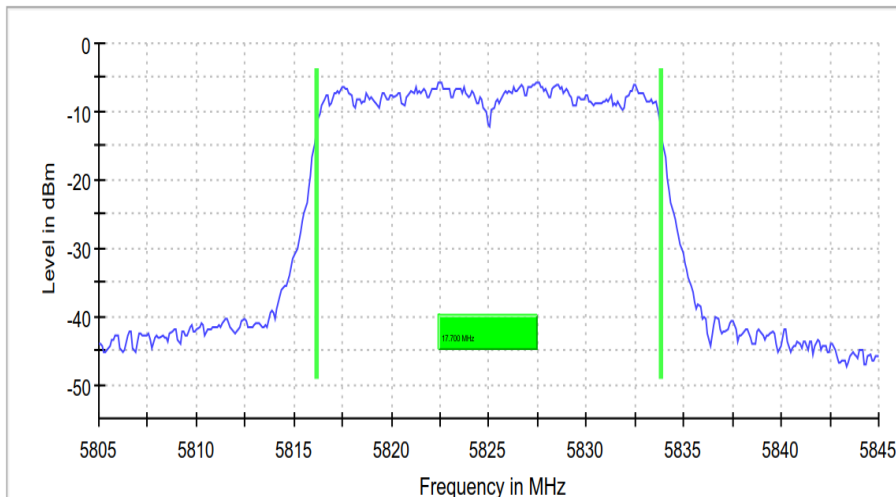
Setting	Instrument Value	Target Value
Start Frequency	5.15000 GHz	5.15000 GHz
Stop Frequency	5.23000 GHz	5.23000 GHz
Span	80.000 MHz	80.000 MHz
RBW	500.000 kHz	>= 400.000 kHz
VBW	2.000 MHz	>= 1.500 MHz
SweepPoints	320	~ 320
SweepTime	18.906 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	101 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.30 dB

Radio Technology = WLAN ac 20 MHz, Operating Frequency = high, Subband = U-NII-3 (S01_ah02)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
5825.000000	17.700000	---	---	5816.150000	5833.850000	PASS

99 % Bandwidth



Measurement

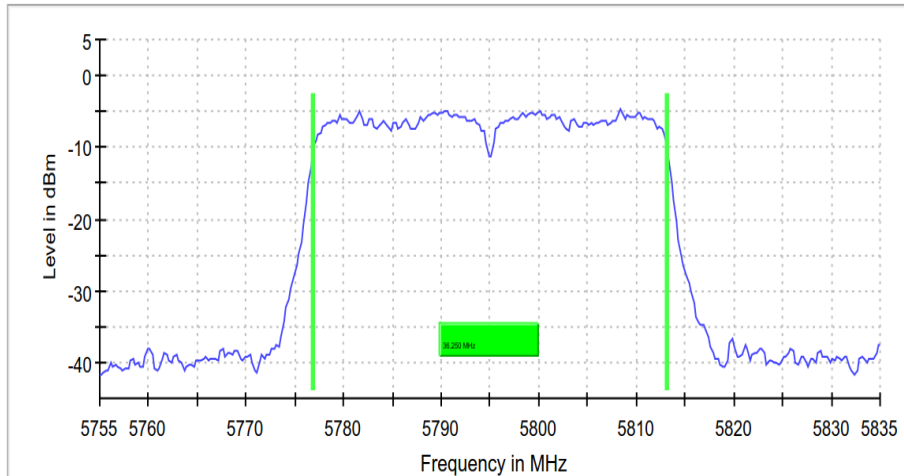
Setting	Instrument Value	Target Value
Start Frequency	5.80500 GHz	5.80500 GHz
Stop Frequency	5.84500 GHz	5.84500 GHz
Span	40.000 MHz	40.000 MHz
RBW	200.000 kHz	>= 200.000 kHz
VBW	1.000 MHz	>= 600.000 kHz
SweepPoints	400	~ 400
SweepTime	28.477 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	61 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.07 dB	0.30 dB

Radio Technology = WLAN ac 40 MHz, Operating Frequency = high, Subband = U-NII-3 (S01_ah02)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
5795.000000	36.250000	---	---	5776.875000	5813.125000	PASS

99 % Bandwidth



Measurement

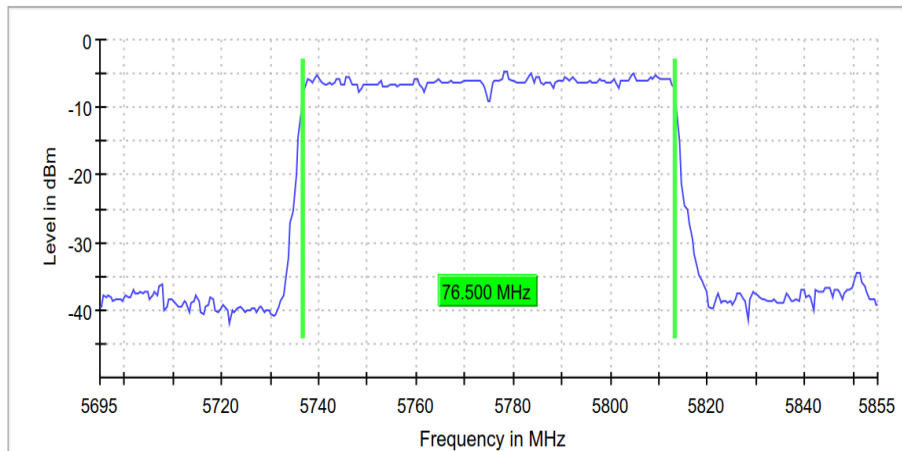
Setting	Instrument Value	Target Value
Start Frequency	5.795000 GHz	5.795000 GHz
Stop Frequency	5.835000 GHz	5.835000 GHz
Span	80.0000 MHz	80.0000 MHz
RBW	500.0000 kHz	>= 400.0000 kHz
VBW	2.0000 MHz	>= 1.5000 MHz
SweepPoints	320	~ 320
SweepTime	18.906 us	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	37 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.14 dB	0.30 dB

Radio Technology = WLAN ac 80 MHz, Operating Frequency = mid, Subband = U-NII-3 (S01_ah02)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
5775.000000	76.500000	---	---	5736.750000	5813.250000	PASS

99 % Bandwidth



Measurement

Setting	Instrument Value	Target Value
Start Frequency	5.695000 GHz	5.695000 GHz
Stop Frequency	5.855000 GHz	5.855000 GHz
Span	160.0000 MHz	160.0000 MHz
RBW	1.0000 MHz	>= 800.0000 kHz
VBW	3.0000 MHz	>= 3.0000 MHz
SweepPoints	320	~ 320
SweepTime	22.875 us	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	56 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.11 dB	0.30 dB

5.3.5 TEST EQUIPMENT USED

- R&S TS8997

5.4 MAXIMUM CONDUCTED OUTPUT POWER

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.4.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up to perform the output power measurements. The results recorded were measured with the modulation which produces the worst-case (highest) output power. The reference level of the spectrum analyzer was set higher than the output power of the EUT.

The EUT was connected to the spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:

- See measurement plots

The channel power function of the spectrum analyser was used (Used channel bandwidth = nominal bandwidth)

Note:

The analyser settings are according FCC Public Note "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, 789033 D02", method **SA-1**.

5.4.2 TEST REQUIREMENTS / LIMITS

A) FCC

For systems using digital modulation techniques in the 5.15 – 5.25 GHz bands:

§15.407 (a) (1)

Limit: 50 mW (17 dBm) or 4 dBm + 10 log (26 dB bandwidth/MHz) whatever is the lesser.

FCC ET Docket No. 13-49, FIRST REPORT AND ORDER, April 1, 2014 ("new rules"):

§15.407 (a) (1) (i): Outdoor access point:

Limit: 1 W (30 dBm) provided the maximum antenna gain does not exceed 6 dBi.

The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

§15.407 (a) (1) (ii): Indoor access point:

Limit: 1 W (30 dBm) provided the maximum antenna gain does not exceed 6 dBi.

§15.407 (a) (1) (iv): Mobile and portable client devices:

Limit: 250 mW (24 dBm) provided the maximum antenna gain does not exceed 6 dBi.

For systems using digital modulation techniques in the 5.25 – 5.35 GHz and 5.47 – 5.725 GHz bands:

§15.407 (a) (2)

Limit: 250 mW (24 dBm) or 11 dBm + 10 log (26 dB bandwidth/MHz) whatever is the lesser.

For systems using digital modulation techniques in the 5.725 – 5.850 GHz bands:

§15.407 (a) (3)

Limit: 1 W (30 dBm) or $17 \text{ dBm} + 10 \log (26 \text{ dB bandwidth/MHz})$ whatever is the lesser.

FCC ET Docket No. 13-49, FIRST REPORT AND ORDER, April 1, 2014 ("new rules"):

§15.407 (a) (3):

Limit: 1 W (30 dBm).

§15.407 (a) (4):

The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

B) IC

Different frequency bands and limits apply, as compared to the FCC requirements.

RSS-247, 6.2.1 (1), Band 5150-5250 MHz, indoor operation only:

Limit (e.i.r.p.): 200 mW (23 dBm) or $10 + 10 \log_{10} B$ [dBm], whichever power is less.

B is the 99% emission bandwidth in MHz.

RSS-247, 6.2.2 (1), Band 5250-5350 MHz:

Limits:

Maximum conducted Power: 250 mW (24 dBm) or $11 + 10 \log_{10} B$ [dBm], whichever power is less.

e.i.r.p.: 1.0 W (30 dBm) or $17 + 10 \log_{10} B$ [dBm], whichever power is less.

Note: For EUTs operating at a higher e.i.r.p. than 200 mW (23 dBm), compliance with the e.i.r.p. elevation mask is required.

RSS-247, 6.2.3 (1), Bands 5470-5600 MHz and 5650-5725 MHz:

Limits:

Maximum conducted Power: 250 mW (24 dBm) or $11 + 10 \log_{10} B$ [dBm], whichever power is less.

e.i.r.p.: 1.0 W (30 dBm) or $17 + 10 \log_{10} B$ [dBm], whichever power is less.

RSS-247, 6.2.4 (1), Band 5725-5825 MHz:

Limits:

Maximum conducted Power: 1W (30 dBm) or $17 + 10 \log_{10} B$ [dBm], whichever power is less.

e.i.r.p.: 4.0 W (36 dBm) or $23 + 10 \log_{10} B$ [dBm], whichever power is less.

All frequency bands: B is the 99% emission bandwidth in MHz.

5.4.3 TEST PROTOCOL

Ambient temperature: 24 °C
 Air Pressure: 1010 hPa
 Humidity: 35 %
 WLAN a-Mode; 20 MHz; 6 Mbit/s

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	36	5180	5.3	9.0	30.0	24.7	N/A	N/A	N/A	N/A
	44	5220	5.5	9.2	30.0	24.5	N/A	N/A	N/A	N/A
	48	5240	5.6	9.3	30.0	24.4	N/A	N/A	N/A	N/A
3	149	5745	3.8	7.5	30.0	26.2	30.0	26.2	36.0	28.5
	157	5785	4.9	8.6	30.0	25.1	30.0	25.1	36.0	27.4
	165	5825	4.3	8.0	30.0	25.7	30.0	25.7	36.0	28.0

WLAN n-Mode; 20 MHz; MCS0; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	36	5180	5.1	8.8	30.0	24.9	N/A	N/A	N/A	N/A
	44	5220	5.6	9.3	30.0	24.4	N/A	N/A	N/A	N/A
	48	5240	5.7	9.4	30.0	24.3	N/A	N/A	N/A	N/A
3	149	5745	4.1	7.8	30.0	25.9	30.0	25.9	36.0	28.2
	157	5785	4.9	8.6	30.0	25.1	30.0	25.1	36.0	27.4
	165	5825	4.5	8.2	30.0	25.5	30.0	25.5	36.0	27.8

WLAN n-Mode; 40 MHz; MCS0; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	38	5180	5.2	8.9	30.0	24.8	N/A	N/A	N/A	N/A
	46	5230	5.2	8.9	30.0	24.8	N/A	N/A	N/A	N/A
3	151	5755	4.0	7.7	30.0	26.0	30.0	26.0	36.0	28.3
	159	5795	4.8	8.5	30.0	25.2	30.0	25.2	36.0	27.5

WLAN ac-Mode; 20 MHz; MCS0; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	36	5180	5.3	9.0	30.0	24.7	N/A	N/A	N/A	N/A
	44	5220	5.5	9.2	30.0	24.5	N/A	N/A	N/A	N/A
	48	5240	5.6	9.3	30.0	24.4	N/A	N/A	N/A	N/A
3	149	5745	4.0	7.7	30.0	26.0	30.0	26.0	36.0	28.3
	157	5785	4.8	8.5	30.0	25.2	30.0	25.2	36.0	27.5
	165	5825	4.5	8.2	30.0	25.5	30.0	25.5	36.0	27.8

WLAN ac-Mode; 40 MHz; MCS0; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	38	5190	5.1	8.8	30.0	24.9	N/A	N/A	N/A	N/A
	46	5230	5.2	8.9	30.0	24.8	N/A	N/A	N/A	N/A
3	151	5755	4.0	7.7	30.0	26.0	30.0	26.0	36.0	28.3
	159	5795	4.8	8.5	30.0	25.2	30.0	25.2	36.0	27.5

WLAN ac-Mode; 80 MHz; MCS0; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	42	5210	5.4	9.1	30.0	24.6	N/A	N/A	N/A	N/A
3	155	5775	4.3	8.0	30.0	25.7	30.0	25.7	36.0	28.0

WLAN n-Mode; 20 MHz; MCS0; MIMO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	36	5180	10.4	14.1	30.0	19.6	N/A	N/A	N/A	N/A
	44	5220	10.4	14.1	30.0	19.6	N/A	N/A	N/A	N/A
	48	5240	10.4	14.1	30.0	19.6	N/A	N/A	N/A	N/A
3	149	5745	9.0	12.7	30.0	21.0	30.0	21.0	36.0	23.3
	157	5785	9.3	13.0	30.0	20.7	30.0	20.7	36.0	23.0
	165	5825	9.2	12.9	30.0	20.8	30.0	20.8	36.0	23.1

WLAN n-Mode; 40 MHz; MCS0; MIMO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	38	5190	10.0	13.7	30.0	20.0	N/A	N/A	N/A	N/A
	46	5230	10.3	14.0	30.0	19.7	N/A	N/A	N/A	N/A
3	151	5755	8.9	12.6	30.0	21.1	30.0	21.1	36.0	23.4
	159	5795	9.5	13.2	30.0	20.5	30.0	20.5	36.0	22.8

WLAN ac-Mode; 20 MHz; MCS0; MIMO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	36	5180	10.3	14.0	30.0	19.7	N/A	N/A	N/A	N/A
	44	5220	10.4	14.1	30.0	19.6	N/A	N/A	N/A	N/A
	48	5240	10.4	14.1	30.0	19.6	N/A	N/A	N/A	N/A
3	149	5745	8.7	12.4	30.0	21.3	30.0	21.3	36.0	23.6
	157	5785	9.3	13.0	30.0	20.7	30.0	20.7	36.0	23.0
	165	5825	9.1	12.8	30.0	20.9	30.0	20.9	36.0	23.2

WLAN ac-Mode; 40 MHz; MCS0; MIMO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	38	5190	10.1	13.8	30.0	19.9	N/A	N/A	N/A	N/A
	46	5230	10.1	13.8	30.0	19.9	N/A	N/A	N/A	N/A
3	151	5755	8.8	12.5	30.0	21.2	30.0	21.2	36.0	23.5
	159	5795	9.5	13.2	30.0	20.5	30.0	20.5	36.0	22.8

WLAN ac-Mode; 80 MHz; MCS0; MIMO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
1	42	5210	10.3	14.0	30.0	19.7	N/A	N/A	N/A	N/A
3	155	5775	9.0	12.7	30.0	21.0	30.0	21.0	36.0	23.3

Remark: Please see next sub-clause for the measurement plot.

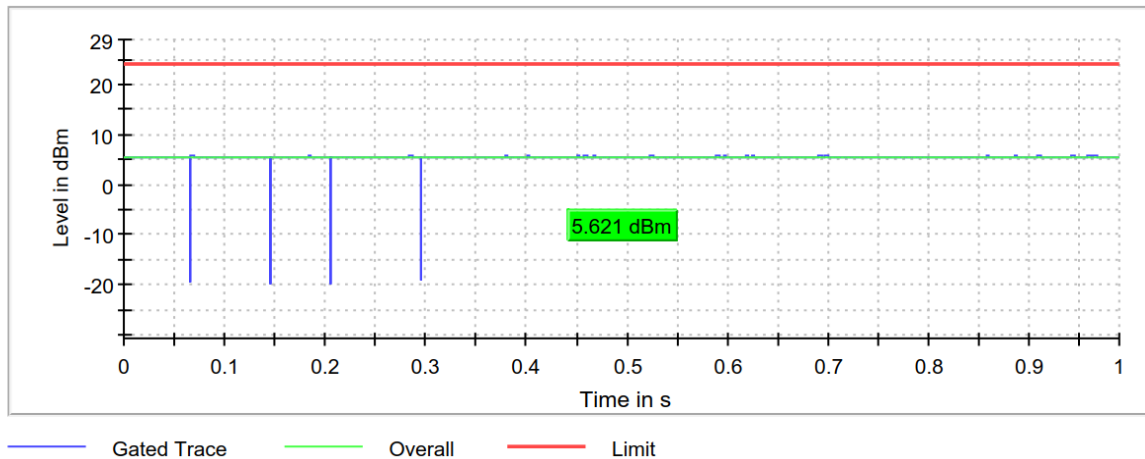
5.4.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

Radio Technology = WLAN a, Operating Frequency = high, Subband = U-NII-1 (S01_ah02)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5240.000000	5.6	24.0	5.6	99.410	PASS

Gated Trace

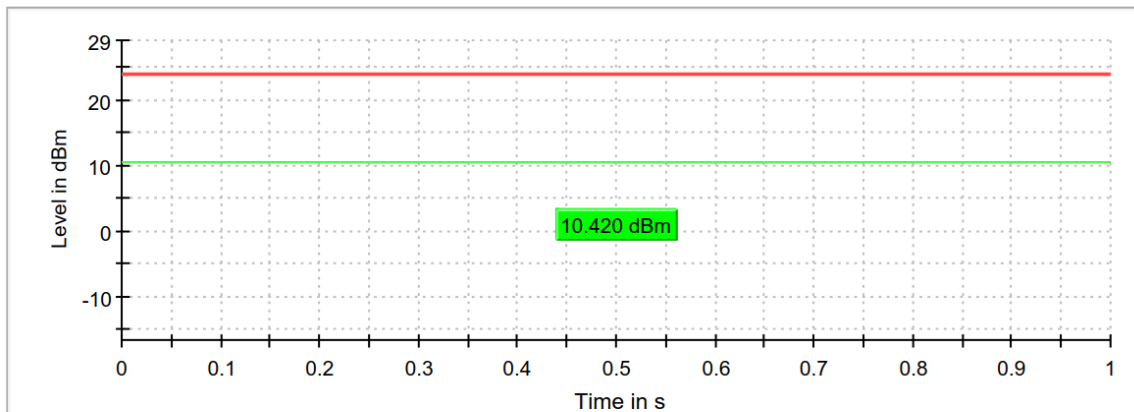


Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = low, Subband = U-NII-1 (S01_ah02)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5180.000000	10.4	24.0	10.4	100.000	PASS

Gated Trace



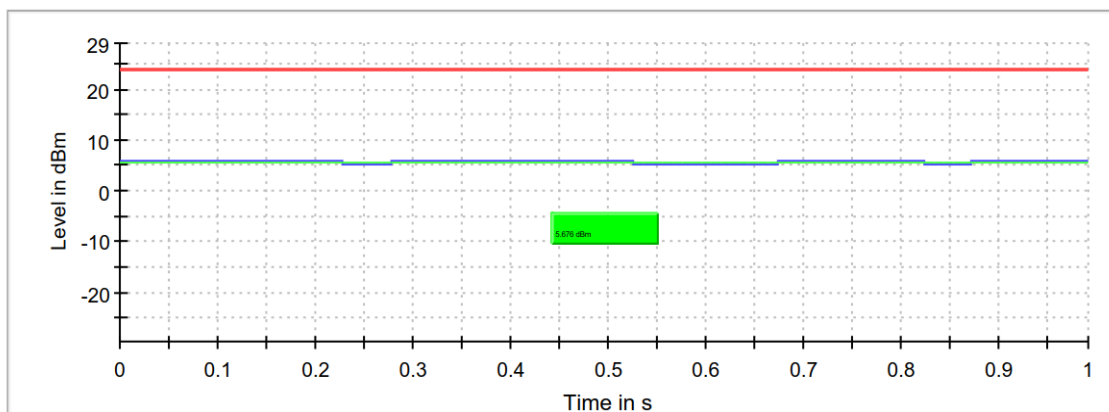
— Gated Trace — Overall — Limit

Radio Technology = WLAN n 20 MHz, Operating Frequency = high, Subband = U-NII-1 (S01_ah02)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5240.000000	5.7	24.0	5.7	99.811	PASS

Gated Trace

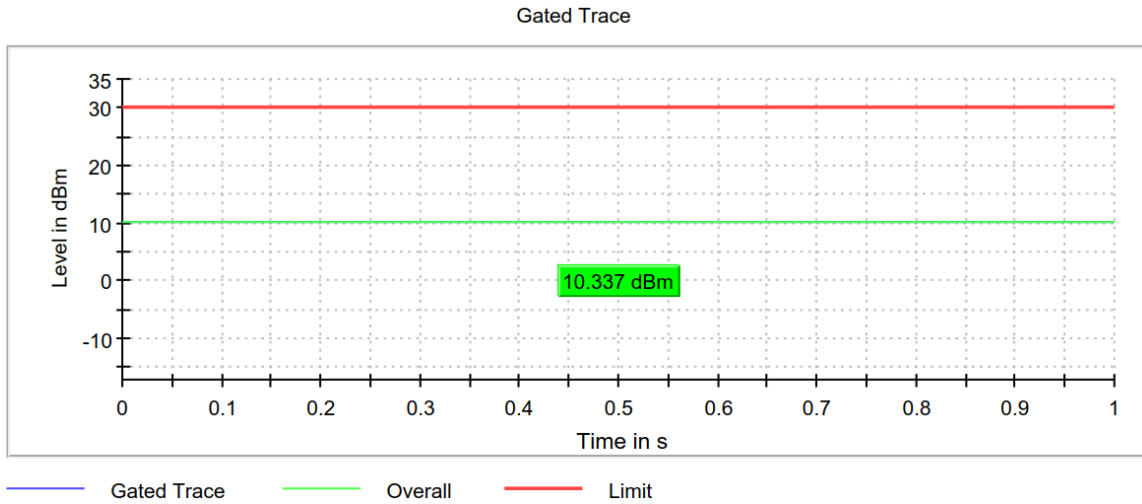


— Gated Trace — Overall — Limit

Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = high, Subband = U-NII-1 (S01_ah02)

Result

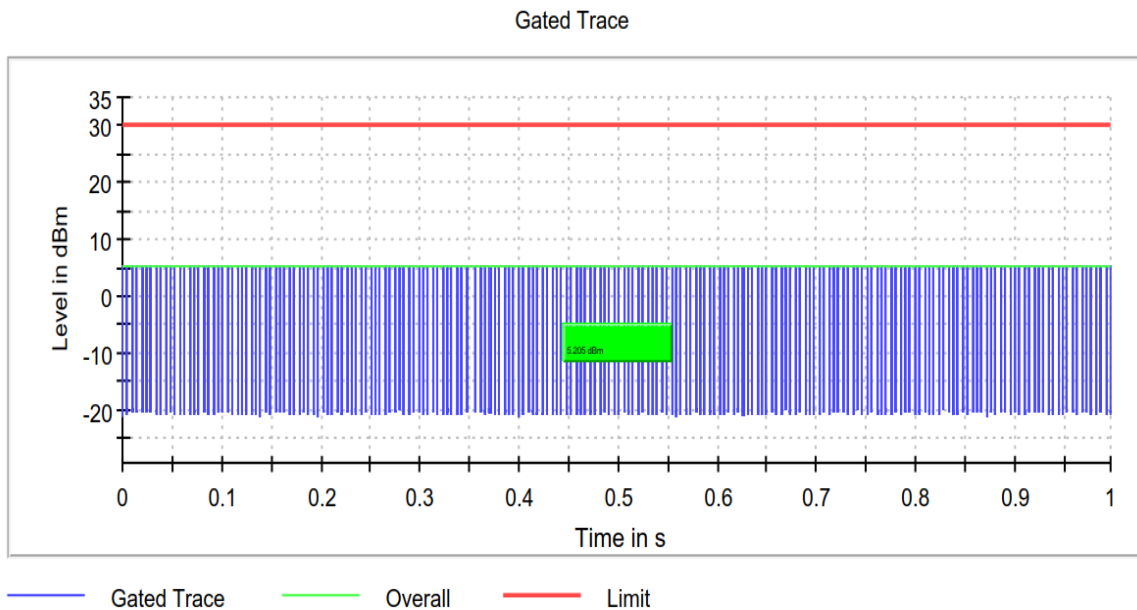
DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5230.000000	10.3	30.0	10.3	100.000	PASS



Radio Technology = WLAN n 40 MHz, Operating Frequency = low, Subband = U-NII-1 (S01_ah02)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5190.000000	5.2	30.0	5.2	99.956	PASS

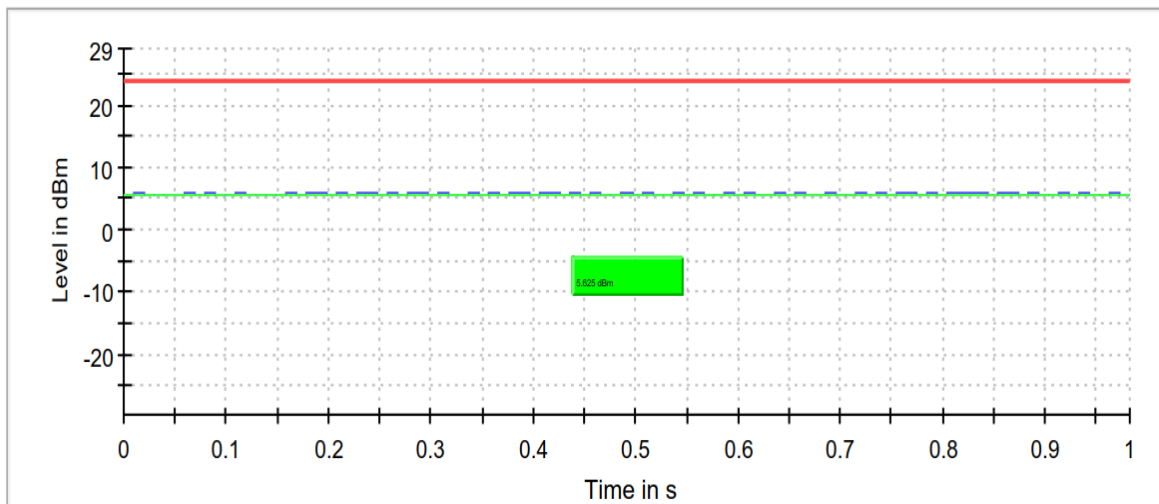


Radio Technology = WLAN ac 20 MHz, Operating Frequency = high, Subband = U-NII-1 (S01_ah02)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5240.000000	5.6	24.0	5.6	99.811	PASS

Gated Trace



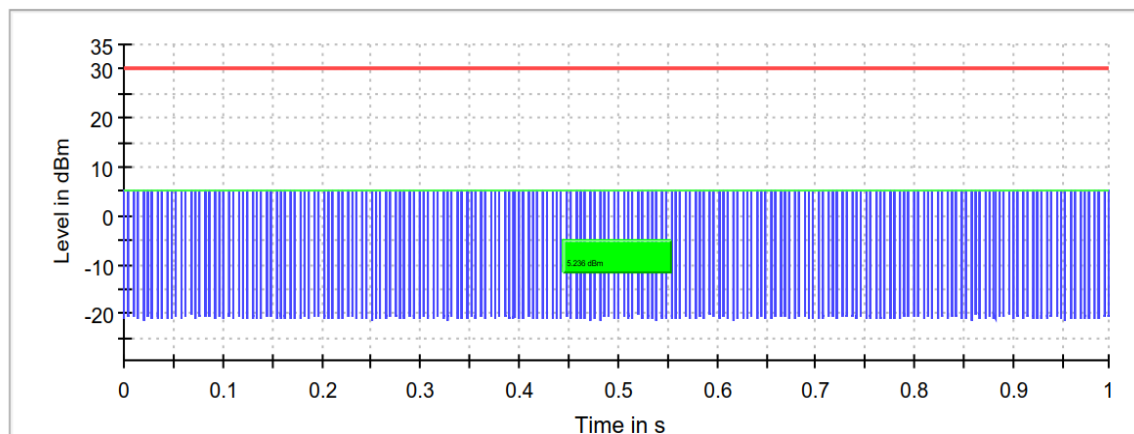
— Gated Trace — Overall — Limit

Radio Technology = WLAN ac 40 MHz, Operating Frequency = high, Subband = U-NII-1 (S01_ah02)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5230.000000	5.2	30.0	5.2	99.905	PASS

Gated Trace



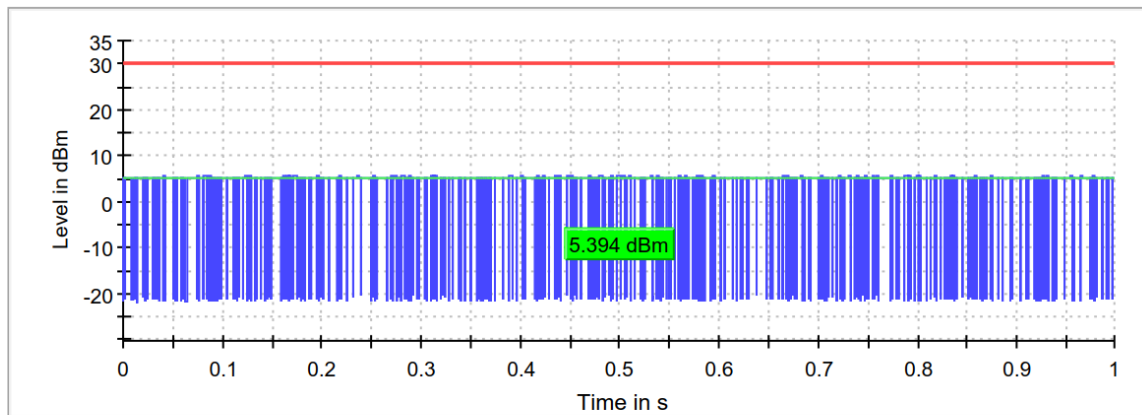
— Gated Trace — Overall — Limit

Radio Technology = WLAN ac 80 MHz, Operating Frequency = mid, Subband = U-NII-1 (S01_ah02)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5210.000000	5.4	30.0	5.4	99.988	PASS

Gated Trace



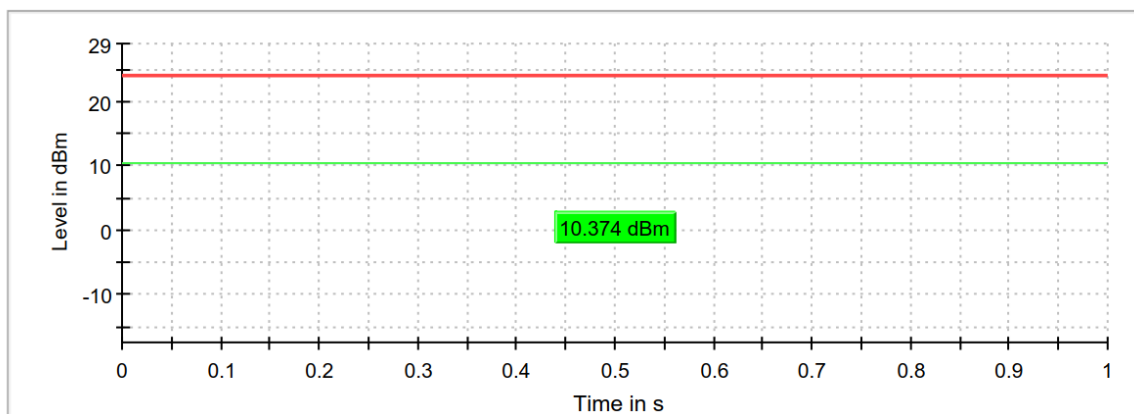
— Gated Trace — Overall — Limit

Radio Technology = WLAN ac 20 MHz MIMO, Operating Frequency = high, Subband = U-NII-1 (S01_ah02)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5240.000000	10.4	24.0	10.4	100.000	PASS

Gated Trace

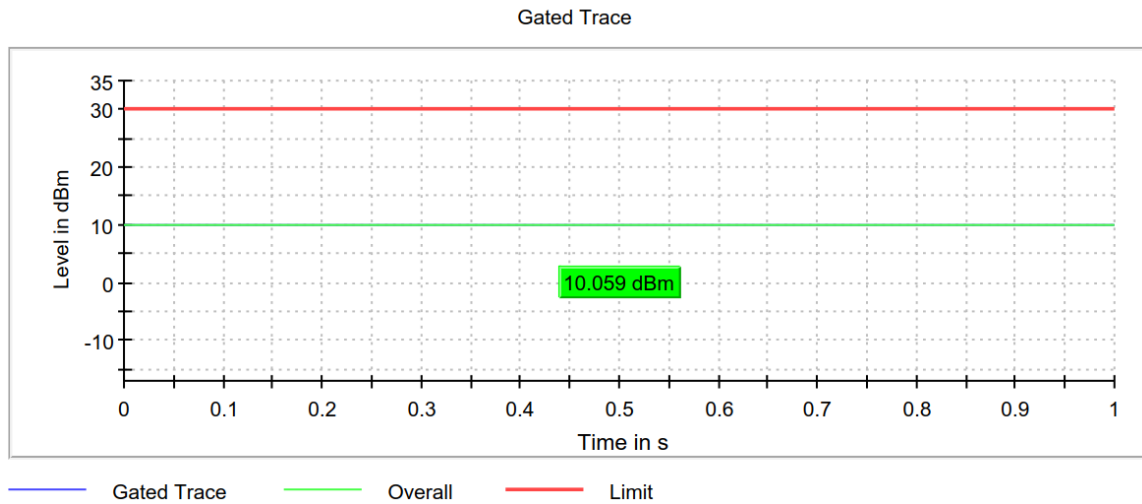


— Gated Trace — Overall — Limit

Radio Technology = WLAN ac 40 MHz MIMO, Operating Frequency = high, Subband = U-NII-1 (S01_ah02)

Result

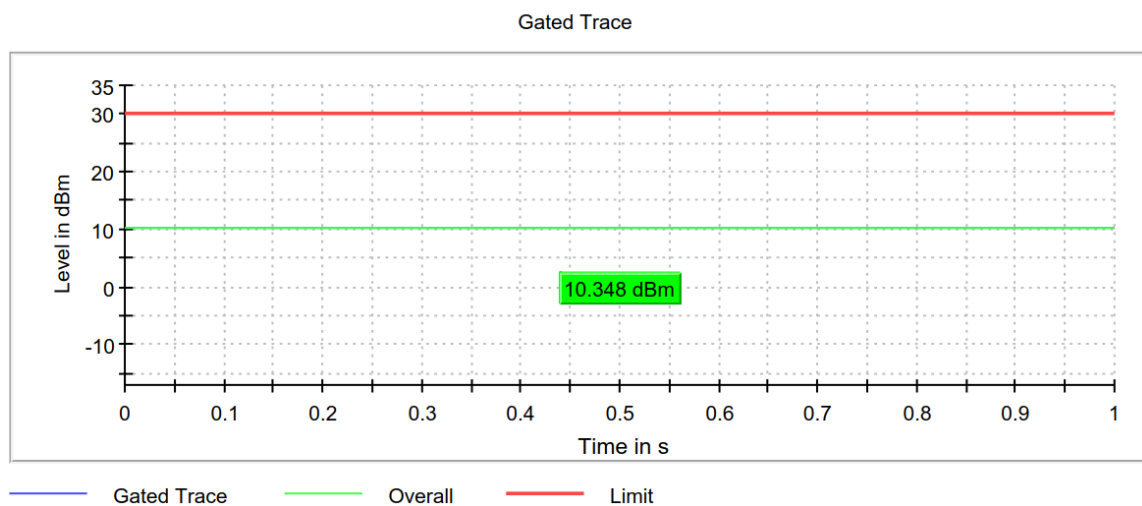
DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5230.000000	10.1	30.0	10.1	100.000	PASS



Radio Technology = WLAN ac 80 MHz MIMO, Operating Frequency = mid, Subband = U-NII-1 (S01_ah02)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5210.000000	10.3	30.0	10.3	100.000	PASS



5.4.5 TEST EQUIPMENT USED

- R&S TS8997

5.5 PEAK POWER SPECTRAL DENSITY

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.5.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up in a shielded room to perform the Maximum Power Spectral Density measurements.
The results recorded were measured with the modulation which produces the worst-case (highest) output power.

The EUT was connected to the spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:

- See measurement plots

Note:

The analyser settings are according FCC Public Note "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, 789033 D02", method **SA-1**.

5.5.2 TEST REQUIREMENTS / LIMITS

A) FCC

FCC Part 15, Subpart E, §15.407 (a) (1)

For systems using digital modulation techniques in the 5.15 – 5.25 GHz bands:

(i) and (ii), outdoor and indoor access points: Limit: 17 dBm/MHz.

(iv), mobile and portable client devices: Limit: 11 dBm/MHz.

FCC Part 15, Subpart E, §15.407 (a) (2)

For systems using digital modulation techniques in the 5.25 – 5.35 GHz and 5.47 – 5.725 GHz bands:

Limit: 11 dBm/MHz.

FCC Part 15, Subpart E, §15.407 (a) (3)

For systems using digital modulation techniques in the 5.725 – 5.850 GHz bands:

Limit: 30 dBm/500 kHz.

Note: The limit will be also fulfilled when measuring at any bandwidth greater than 500 kHz.

This applies to signals where the maximum conducted output power was measured at a bandwidth exceeding 500 kHz and which fulfil that limit of 30 dBm.

B) IC

Different frequency bands and limits apply, as compared to the FCC requirements.

RSS-247, 6.2.1 (1), Band 5150-5250 MHz, indoor operation only:

Limit (e.i.r.p.): 10 dBm/MHz.

RSS-247, 6.2.2 (1), Band 5250-5350 MHz:
Limit: 11 dBm/MHz.

RSS-247, 6.2.3 (1), Bands 5470-5600 MHz and 5650-5725 MHz:
Limit: 11 dBm/MHz.

RSS-247, 6.2.4 (1), Band 5725-5850 MHz:
Limit: 30 dBm/500 kHz.

5.5.3 TEST PROTOCOL

Ambient temperature: 24 °C
Air Pressure: 1010 hPa
Humidity: 35 %
WLAN a-Mode; 20 MHz; 6 Mbit/s

U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm/500 kHz]	FCC Limit [dBm/500 kHz]	Margin [dB]	IC Limit [dBm/500 kHz]	Margin [dB]
1	36	5180	-5.9	17.0	22.9	N/A	N/A
	44	5220	-5.8	17.0	22.8	N/A	N/A
	48	5240	-5.6	17.0	22.6	N/A	N/A
3	149	5745	-10.4	30.0	40.4	30.0	40.4
	157	5785	-9.3	30.0	39.3	30.0	39.3
	165	5825	-9.9	30.0	39.9	30.0	39.9

WLAN n-Mode; 20 MHz; MCS0; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm/500 kHz]	FCC Limit [dBm/500 kHz]	Margin [dB]	IC Limit [dBm/500 kHz]	Margin [dB]
1	36	5180	-6.0	17.0	23.0	N/A	N/A
	44	5220	-6.0	17.0	23.0	N/A	N/A
	48	5240	-5.7	17.0	22.7	N/A	N/A
3	149	5745	-10.5	30.0	40.5	30.0	40.5
	157	5785	-9.7	30.0	39.7	30.0	39.7
	165	5825	-10.0	30.0	40.0	30.0	40.0

WLAN n-Mode; 40 MHz; MCS0; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm/500 kHz]	FCC Limit [dBm/500 kHz]	Margin [dB]	IC Limit [dBm/500 kHz]	Margin [dB]
1	38	5190	-6.2	17.0	23.2	N/A	N/A
	46	5230	-6.1	17.0	23.1	N/A	N/A
3	151	5755	-8.7	30.0	38.7	30.0	38.7
	159	5795	-8.5	30.0	38.5	30.0	38.5

WLAN ac-Mode; 20 MHz; MCS0; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm/500 kHz]	FCC Limit [dBm/500 kHz]	Margin [dB]	IC Limit [dBm/500 kHz]	Margin [dB]
1	36	5180	-6.0	17.0	23.0	N/A	N/A
	44	5220	-6.0	17.0	23.0	N/A	N/A
	48	5240	-5.9	17.0	22.9	N/A	N/A
3	149	5745	-10.5	30.0	40.5	30.0	40.5
	157	5785	-9.7	30.0	39.7	30.0	39.7
	165	5825	-10.1	30.0	40.1	30.0	40.1