EMI – TEST REPORT

- FCC Part 15.407, 5725-5850 MHz, RSS247 -

Type / Model Name	:	WLAN n-module MPCIE-R1-ABGN-U3
Product Description	:	Module for industrial WLAN applications 2.4 / 5 GHz
Applicant	:	Siemens AG, Industrial Automation Division
Address	:	Gleiwitzer Strasse 555
		90475 NUERNBERG, GERMANY
Manufacturer	:	Siemens AG, Sensors & Communication
Address	:	Oestliche Rheinbrueckenstrasse 50
		76187 KARLSRUHE, GERMANY
Licence holder	:	Siemens AG, Industrial Automation Division
Address	:	Gleiwitzer Strasse 555
		90475 NUERNBERG, GERMANY

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

Test Report No. : T40580-01-00HS	26. April 2016 Date of issue

Deutsche Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

CSA Group Bayern GmbH
Ohmstrasse 1-4 · 94342 STRASSKIRCHEN · GERMANY
Tel.: +49(0)9424-94810 · Fax: +49(0)9424-9481440

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (September 2015)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September 2015)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.204	External radio frequency power amplifiers and antenna modifications
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.207	Conducted limits
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
Part 15, Subpart C, Section 15.212	Modular transmitters

FCC Rules and Regulations Part 15, Subpart E – Unlicensed National Information Infrastructure Devices (December 2015)

Part 15, Subpart E, Section 15.407	Operation within the bands 5.15 - 5.25 GHz, 5.25 - 5.35 GHz, 5.47 - 5.725 GHz and 5.725 - 5.85 GHz
ANSI C63.10: 2013	Testing Unlicensed Wireless Devices
ETSI TR 100 028 V1.3.1: 2001-03	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the Measurement of Mobile Radio Equipment Characteristics—Part 1 and Part 2
KDB 789033 D02 v01r01	Guidance for compliance Testing of U-NII devices, January 8-2016.
KDB 662911 D01 v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band, October 31-2013

2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EUT – Detailed photos see ATTACHMENT A

2.2 General remarks:

The EUT is fully tested and approved according the "old Rules". This test report shall show the further compliance to the "new Rules" under the premise that no operating parameter of the EUT are changed. Therefore the output power and the PSD are re-measured under the "new rules". Spurious emissions stay the same as under the "old Rules" and are already documented with the test report T35222-06-00HS by Mikes testing partners.

2.3 Equipment category

WLAN access point

2.4 Short description of the equipment under test (EUT)

The EUT is a WLAN module. The EUT may be access point or client. The WLAN module is compatible with 802.11a, and 802.11n standard. It supports the 5 GHz frequency band. It supports MIMO at 3 Antenna ports which is 3T3R, but without beam forming. The firmware does not support the ad-hoc modes.

Number of tested samples: 1
Serial number: SVPF7253993
Firmware version: v05.02.00, 27.10.2015

EUT configuration:
(The CDF filled by the applicant can be viewed at the test laboratory.)

2.5 Variants of the EUT

There are no variants.

2.6 Operation frequency and channel plan

The operating frequency is 5725 MHz to 5850 MHz.

Channel plan WLAN Standard 802.11a/n, HT20:

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

Note: The marked channels are measured.

Channel plan WLAN Standard 802.11n, HT40 up and HT40 down mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149up	5755	153down	5755
157up	5775	161down	5775

Note: Both channels are measured.

2.7 Transmit operating modes

The module use OFDM modulation and is capable to provide following data rates:
- 802.11a 54, 48, 36, 24, 18, 12, 9, 6 Mbps
- 802.11n HT20, MCS 0 - 23
- 802.11n HT40, MCS 0 - 23

HT20

MCS parameters for mandatory 20 MHz, NSS = 1, NES = 1

MCS Index	Modulation	*R*	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI (see NOTE)
0	BPSK	1/2	1	52	4	52	26	6.5	7.2
1	QPSK	1/2	2	52	4	104	52	13.0	14.4
2	QPSK	3/4	2	52	4	104	78	19.5	21.7
3	16-QAM	1/2	4	52	4	208	104	26.0	28.9
4	16-QAM	3/4	4	52	4	208	156	39.0	43.3
5	64-QAM	2/3	6	52	4	312	208	52.0	57.8
6	64-QAM	3/4	6	52	4	312	234	58.5	65.0
7	64-QAM	5/6	6	52	4	312	260	65.0	72.2
NOTE—Support of 400 ns GI is optional on transmit and receive.									

MCS parameters for optional 20 MHz, *NSS* = 2, *NES* = 1, EQM

MCS Index	Modulation	*R*	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI (see NOTE)
8	BPSK	1/2	1	52	4	104	52	13.0	14.4
9	QPSK	1/2	2	52	4	208	104	26.0	28.9
10	QPSK	3/4	2	52	4	208	156	39.0	43.3
11	16-QAM	1/2	4	52	4	416	208	52.0	57.8
12	16-QAM	3/4	4	52	4	416	312	78.0	86.7
13	64-QAM	2/3	6	52	4	624	416	104.0	115.6
14	64-QAM	3/4	6	52	4	624	468	117.0	130.0
15	64-QAM	5/6	6	52	4	624	520	130.0	144.4
NOTE—The 400 ns GI rate values are rounded to 1 decimal place.									

MCS parameters for optional 20 MHz, NSS = 3, NES = 1, EQM

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
16	BPSK	1/2	1	52	4	156	78	19.5	21.7
17	QPSK	1/2	2	52	4	312	156	39.0	43.3
18	QPSK	3/4	2	52	4	312	234	58.5	65.0
19	16-QAM	1/2	4	52	4	624	312	78.0	86.7
20	16-QAM	3/4	4	52	4	624	468	117.0	130.0
21	64-QAM	2/3	6	52	4	936	624	156.0	173.3
22	64-QAM	3/4	6	52	4	936	702	175.5	195.0
23	64-QAM	5/6	6	52	4	936	780	195.0	216.7

HT40

MCS parameters for optional 40 MHz, NSS = 1, NES = 1

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
0	BPSK	1/2	1	108	6	108	54	13.5	15.0
1	QPSK	1/2	2	108	6	216	108	27.0	30.0
2	QPSK	3/4	2	108	6	216	162	40.5	45.0
3	16-QAM	1/2	4	108	6	432	216	54.0	60.0
4	16-QAM	3/4	4	108	6	432	324	81.0	90.0
5	64-QAM	2/3	6	108	6	648	432	108.0	120.0
6	64-QAM	3/4	6	108	6	648	486	121.5	135.0
7	64-QAM	5/6	6	108	6	648	540	135.0	150.0

MCS parameters for optional 40 MHz, NSS = 2, NES = 1, EQM

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
8	BPSK	1/2	1	108	6	216	108	27.0	30.0
9	QPSK	1/2	2	108	6	432	216	54.0	60.0
10	QPSK	3/4	2	108	6	432	324	81.0	90.0
11	16-QAM	1/2	4	108	6	864	432	108.0	120.0
12	16-QAM	3/4	4	108	6	864	648	162.0	180.0
13	64-QAM	2/3	6	108	6	1296	864	216.0	240.0
14	64-QAM	3/4	6	108	6	1296	972	243.0	270.0
15	64-QAM	5/6	6	108	6	1296	1080	270.0	300.0

MCS parameters for optional 40 MHz, NSS = 3, EQM

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	N_{ES}	Data rate (Mb/s)	
									800 ns GI	400 ns GI
16	BPSK	1/2	1	108	6	324	162	1	40.5	45.0
17	QPSK	1/2	2	108	6	648	324	1	81.0	90.0
18	QPSK	3/4	2	108	6	648	486	1	121.5	135.0
19	16-QAM	1/2	4	108	6	1296	648	1	162.0	180.0
20	16-QAM	3/4	4	108	6	1296	972	1	243.0	270.0
21	64-QAM	2/3	6	108	6	1944	1296	2	324.0	360.0
22	64-QAM	3/4	6	108	6	1944	1458	2	364.5	405.0
23	64-QAM	5/6	6	108	6	1944	1620	2	405.0	450.0

Symbol	Explanation
N_{SS}	Number of spatial streams
R	Coding rate
N_{BPSC}	Number of coded bits per single carrier (total across spatial streams)
$N_{BPSCS(iSS)}$	Number of coded bits per single carrier for each spatial stream, $i_{SS} = 1,...,N_{SS}$
N_{SD}	Number of complex data numbers per spatial stream per OFDM symbol
N_{SP}	Number of pilot values per OFDM symbol
N_{CBPS}	Number of coded bits per OFDM symbol
N_{DBPS}	Number of data bits per OFDM symbol
N_{ES}	Number of BCC encoders for the DATA field
N_{TBPS}	Total bits per subcarrier

2.8 Antennas

Antennas intended for use are classified into 3 gain groups:

- Antenna gain group 1: Antennas 0 to 6 dBi
- Antenna gain group 2: Antennas 6 to 9 dBi
- Antenna gain group 3: Antennas 9 to 14 dBi

Number	Manufacturer Number	Characteristic	Model number	Connector	Frequency (GHz)	Gain 5GHz	Cable loss (dB)	effective Gain 5 GHz (dBi)	Group
1	6GK5793-8DK00-0AA0	Directed	**ANT 793-8DK**	2x N-female	5 GHz	23	8.8	14.2	9-14
2	6GK5793-8DJ00-0AA0	Directed	**ANT 793-8DJ**	2x N-female	5 GHz	18	4.4	13.6	9-14
3	6GK5793-8DL00-0AA0	Directed	**ANT793-8DL**	2x N-female	2.4 + 5	14	0	14	9-14
4	6GK5793-8DP00-0AA0	Directed	**ANT793-8DP**	N-female	5 GHz	13.5	0	13.5	9-14
5	6GK5795-6DC00-0AA0	Wide angle	**ANT 795-6DC**	N-female	2.4 + 5 GHz	9	0	9	6-9 dBi
6	6GK5793-6DG00-0AA0	Wide angle	**ANT793-6DG**	2x N-female	5 GHz	9	0	9	6-9 dBi
7	6GK5795-6MN10-0AA6	Omni	**ANT 795-6MN**	N-female	2.4 + 5 GHz	8	0	8	6-9 dBi
8	6GK5795-6MP00-0AA0	Omni	**ANT795-6MP**	N-female	2.4 + 5 GHz	7	0	7	6-9 dBi
9	6GK5896-6MM00-0AA0	Omni	**ANT896-6MM**	QMA-female	2.4 + 5 GHz	7	0	7	6-9 dBi
10	6GK5 793-4MN00-0AA6	Omni	**ANT 793-4MN**	N-female	5 GHz	6	0	6	0-6 dBi
11	6GK5795-4MD00-0AA3	Omni	**ANT795-4MD**	N-male	2.4 + 5 GHz	5	0	5	0-6 dBi
12	6GK5795-4MC00-0AA3	Omni	**ANT795-4MC**	N-male	2.4 + 5 GHz	5	0	5	0-6 dBi
13	6GK5795-4MA00-0AA3	Omni	**ANT 795-4MA**	R-SMA male	2.4 + 5 GHz	5	0	5	0-6 dBi
14	6GK5793-6MN00-0AA6	Omni	**ANT 793-6MN**	N-female	5 GHz	5	0	5	0-6 dBi
15	6GK5795-4MX00-0AA0	Omni	**ANT795-4MX**	N-male	2.4 + 5 GHz	2	0	2	0-6 dBi
16	6XV1875-2D	Omni	**IWLAN Rcoax 1/2"**	N-female	5 GHz	0	0	0	0-6 dBi

Note: The directed antenna number 2 may be used only with minimum 5 m antenna cable, Type 6XV 1875-5CH50 with cable loss 4.4 dB at 5.7 GHz.
The directed antenna number 1 may be used only with minimum 10 m antenna cable, Type 6XV 1875-5CN10 with cable loss 8.8 dB at 5.7 GHz.

2.9 Power supply system utilised

Power supply voltage, V_{nom} : 100 - 120 VAC

2.1 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- LAN cable, 3m Model : CAT5
- Power supply cable, 1m Model : Self-made
- C-Plug-Adaptor for test mode control Model : Self-made

2.2 Determination of worst case conditions for final measurement

Measurements are made in all three orthogonal axes and the settings of the EUT are changed to locate at which position and at what setting of the EUT produce the maximum of the emissions. For the further radiated measurement the EUT is set in Y position on cap rail.
The tests are carried out in the following frequency band:

5725 - 5850 MHz

Preliminary tests are performed to find the worst case mode from all possible combinations between available modulations and data rates. The maximum output power depends on used data rate. The EUT is controlled for several tests with special test software used for testing only where continuous signals are needed. For the tests a max possible duty cycle (x) is set.
Following channels and test modes are selected as worst case for the final tests:

WLAN	Available channel	Tested channels	Power setting	Modulation	Modulation type	Data rate
802.11a	149 to 165	149, 157, 165	P20, P17, P12	OFDM	BPSK	6 Mbps
802.11n; HT20	149 to 165	149, 157, 165	P20, P17, P12	OFDM	BPSK	MCS8 (BW=20 MHz)
802.11n; HT40	149up to 157up	149up, 157up	P20, P17, P12	OFDM	BPSK	MCS16 (BW=40 MHz)

- TX continuous mode, 802.11a
  One port mode, 2 port mode, 3 port mode;
- TX continuous mode, 802.11n
  One port mode, 2 port mode, 3 port mode;

2.2.1 Test jig

The used test jig is an end product (RAPn) and provides the necessary power supply and control signals to operate the WLAN module for testing. The test jig is DC power supplied with a view to the planned industrial application. The test ports are connected via UFL-RSMA-Pigtail which is used also in the end application.

2.2.2 Test software

Test software is used to set TX continuous in device service mode. Power, channel and modulation (data rate) setting is done via network interface which is available for professional settings.

3 TEST RESULT SUMMERY

WLAN device using digital modulation:

Operating in the 5725 MHz – 5850 MHz band:

FCC Rule Part (new rules)	FCC Rule Part (old rules)	Description	Result
15.407(b)(6)	15.207(a)	AC power line conducted emissions	Not tested
15.407(e)	15.247(a)(2)	6 dB EBW	passed
15.407(a)(3)	15.247(b)(3)	Maximum conducted output power	passed
15.407(b)(4)	15.247(d)	Unwanted emission, radiated	Not tested
15.407(b)(7)	15.247(d)	Unwanted emissions in restricted bands	Not tested
15.407(a)(3)	15.247(e)	Maximum power spectral density	passed
15.35(c)	15.35(c)	Pulsed operation	Not tested
15.203	15.247(b)(4)	Antenna requirement	passed
15.407(g)	-	Transmitter frequency stability	Not tested
KDB 789033	-	99 % Bandwidth	passed

RSS Rule Part (new rules)	RSS Rule Part (old rules)	Description	Result
RSS-Gen, 8.8	RSS Gen, 7.2.4.	AC power line conducted emissions	Not tested
RSS247, 6.2.4(1)	RSS210, A8.2(a)	6 dB EBW	passed
RSS247, 6.2.4(1)	RSS-210, A8.4(4)	Maximum conducted output power	passed
RSS247, 6.2.4(2)	RSS-210, A8.5	Unwanted emission, radiated	Not tested
RSS-Gen, 8.9	RSS-Gen, 7.2.2	Unwanted emissions in restricted bands	Not tested
RSS247, 6.2.4(1)	RSS-210, A8.2(b)	Maximum power spectral density	passed
RSS-Gen, 6.10	RSS-Gen, 4.5	Pulsed operation	Not tested
RSS-Gen, 6.6	RSS-Gen, 7.1.2	Antenna requirement	passed
RSS-Gen, 6.11	RSS-Gen, 7.2.6	Transmitter frequency stability	Not tested
RSS-Gen, 6.6	RSS-Gen, 4.6.1	99 % Bandwidth	passed
RSS 102, 2.5.2	RSS 102, 2.5.2	MPE	Not tested

The mentioned new RSS Rule Parts in the above table are related to:
RSS Gen, Issue 4, November 2014
RSS 247, Issue 1, May 2015
RSS 102, Issue 4, March 2015

The mentioned old RSS Rule Parts in the above table are related to:
RSS Gen, Issue 3, December 2010
RSS 210, Issue 8, December 2010
RSS 102, Issue 4, March 2010

3.1 Final assessment

The equipment under test fulfills the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample	:	acc. to storage records
Testing commenced on	:	29 February 2016
Testing concluded on	:	30 March 2016

Checked by:

Klaus Gegenfurtner
I confirm the correctness and Integrity of this document
2016.04.27 07:41:01 +02'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

Hermann Smetana
I am the author of this document
2016.04.26 14:32:52 +02'00'

Hermann Smetana
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 °C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, mikes-testingpartners gmbh, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Measurement uncertainty table	
Measurement output power, conducted	±1.5 dB
Measurement PSD, conducted	±1.5 dB
Measurement spurious emissions, conducted	±3.0 dB
Measurement spurious emissions, radiated	±6.0 dB
Measurement frequency	±1 x 10^{-6}

4.4 Measurement protocol for FCC and IC

4.4.1 General information

4.4.1.1 Test methodology

Conducted and radiated disturbance testing is performed according to the procedures set out by the International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

The open area test site is a listed under the Canadian Test-Sites File-No:

IC 3009A-1

In compliance with RSS 247 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.10 and applying the CISPR 22 limits.

4.4.1.2 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left without termination. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.1.3 Details of test procedures

The test methods used comply with CISPR Publication 22, EN 55022 - " Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.10 - "American national standard of procedures testing of unlicensed wireless devices". In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.10 and applying the CISPR 22 limits.

5 TEST CONDITIONS AND RESULTS

5.1 AC power line conducted emissions

For test instruments and accessories used see section 6 Part **A 4**.

5.1.1 Description of the test location

Test location: NONE

Remarks: This measurement is already documented in the test report T35222-06-00HS.

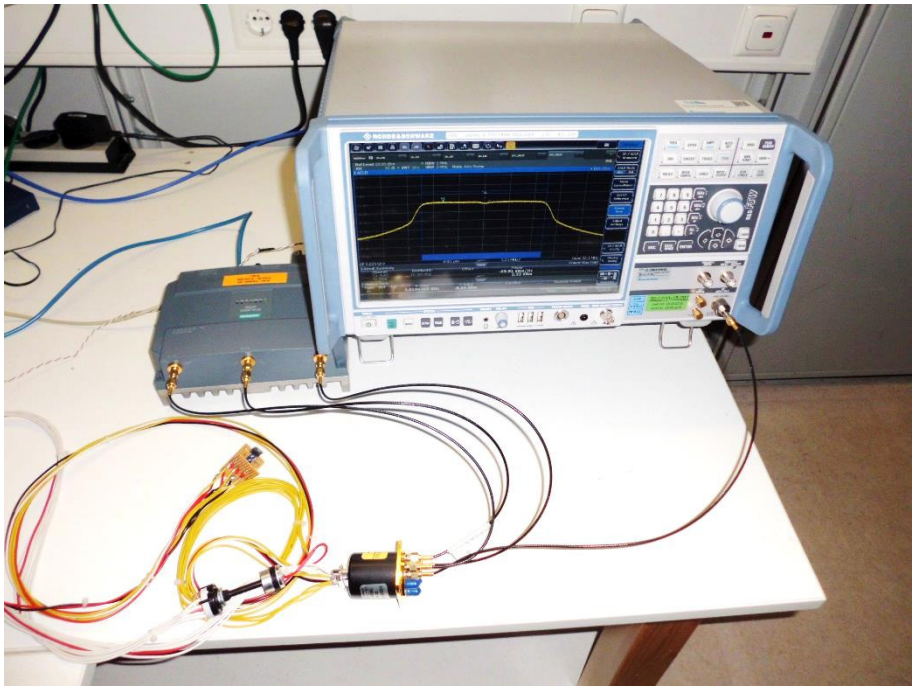
5.2 Emission bandwidth and occupied bandwidth

For test instruments and accessories used see section 6 Part **MB**.

5.2.1 Description of the test location

Test location: AREA4

5.2.2 Photo documentation of the test set-up



5.2.3 Applicable standard

According to FCC Part 15, Section 15.407(e):
Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

5.2.4 Description of Measurement

The minimum 6 dB bandwidth is measured conducted using a spectrum analyser with n-dB down function if applicable otherwise the 6 dB bandwidth is measured manually and following the procedure set out in ANSI C63.10, item 6.9.2 or KDB 789033 D02, item C.2. The bandwidth is measured at Port 1.

Spectrum analyser settings 6 dB bandwidth:
RBW: 100 kHz, VBW: 300 kHz, Detector: Peak, Trace mode: max hold;
Spectrum analyser settings occupied bandwidth:
For 20 MHz channels:
RBW: 300 kHz, VBW: 1 MHz, Detector: Peak, Trace mode: max hold;
For 40 MHz channels:
RBW: 500 kHz, VBW: 2 MHz, Detector: Peak, Trace mode: max hold;

5.2.5 Test result

802.11a mode, Port1:

Channel	Centre frequency	6 dB bandwidth	Minimum 6 dB limit	99% OBW
	(MHz)	(MHz)	(MHz)	(MHz)
149	5745	16.234	0.5	16.758
157	5785	16.329	0.5	17.038
165	5825	16.328	0.5	16.713

802.11n mode, HT 20, Port1:

Channel	Centre frequency	6 dB bandwidth	Minimum 6 dB limit	99% OBW
	(MHz)	(MHz)	(MHz)	(MHz)
149	5745	17.587	0.5	17.904
157	5785	17.587	0.5	17.906
165	5825	17.602	0.5	17.904

802.11n mode, HT 40, Port1:

Channel	Centre frequency	6 dB bandwidth	Minimum 6 dB limit	99% OBW
	(MHz)	(MHz)	(MHz)	(MHz)
149up	5755	36.151	0.5	36.545
157up	5795	36.425	0.5	36.650

Note: There is no limit for the OBW 99 % and 26 dB bandwidth.

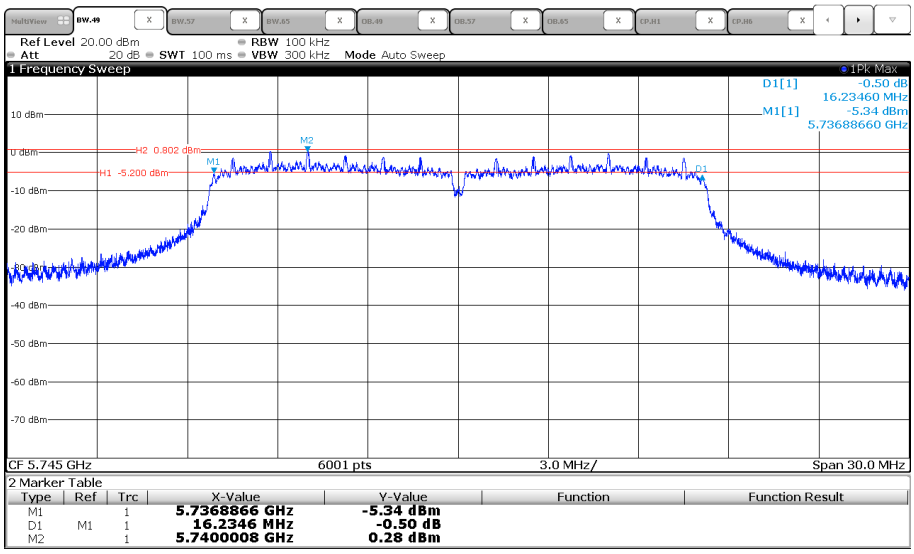
The requirements are **FULFILLED.**

Remarks: For detailed test results please see to following test protocols.

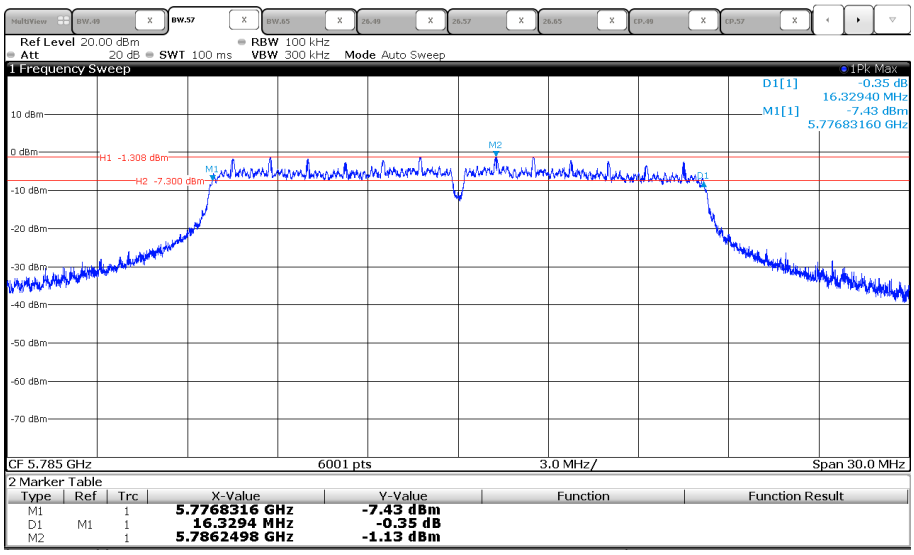
5.2.6 Test protocols emission bandwidth 6 dB

802.11a:

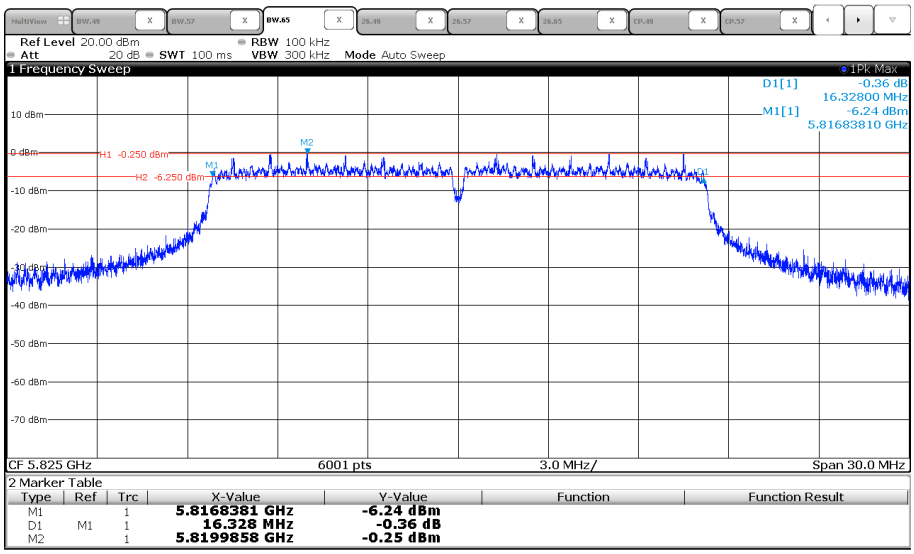
Channel 149 (5745 MHz)



Channel 157 (5785 MHz)

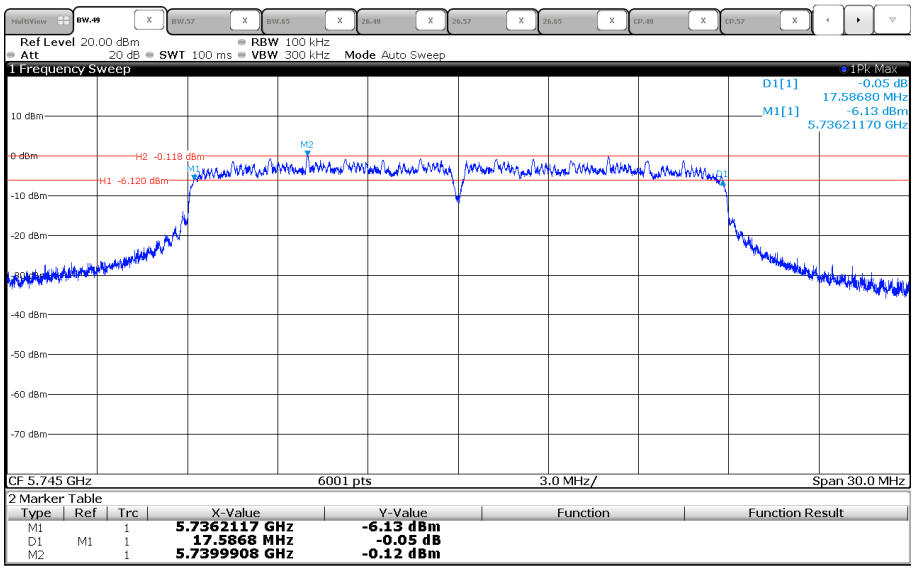


Channel 165 (5825 MHz)

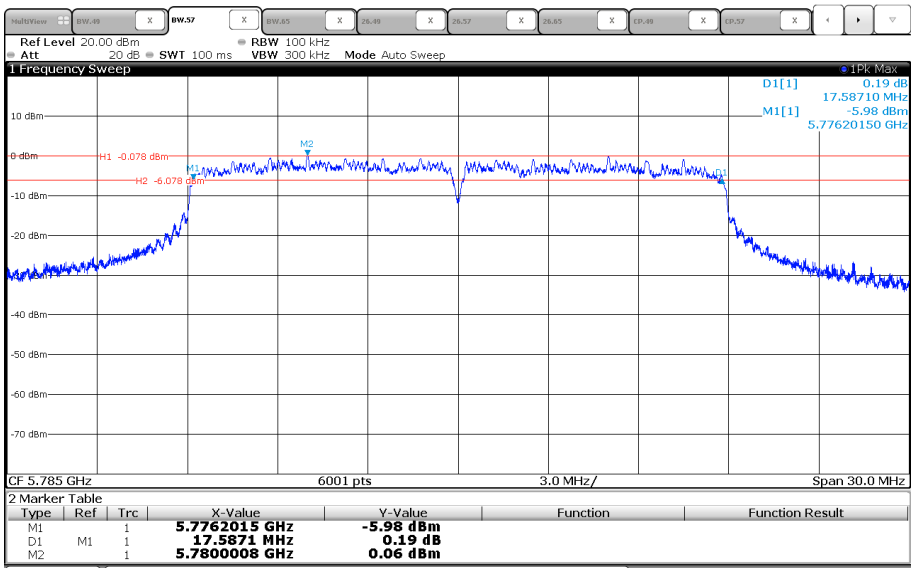


HT20:

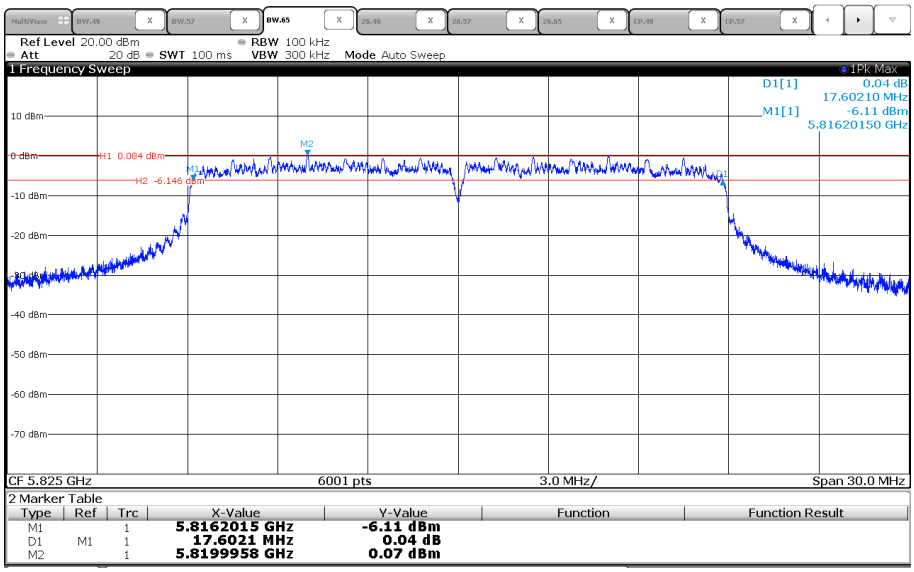
Channel 149 (5745 MHz)



Channel 157 (5785 MHz)

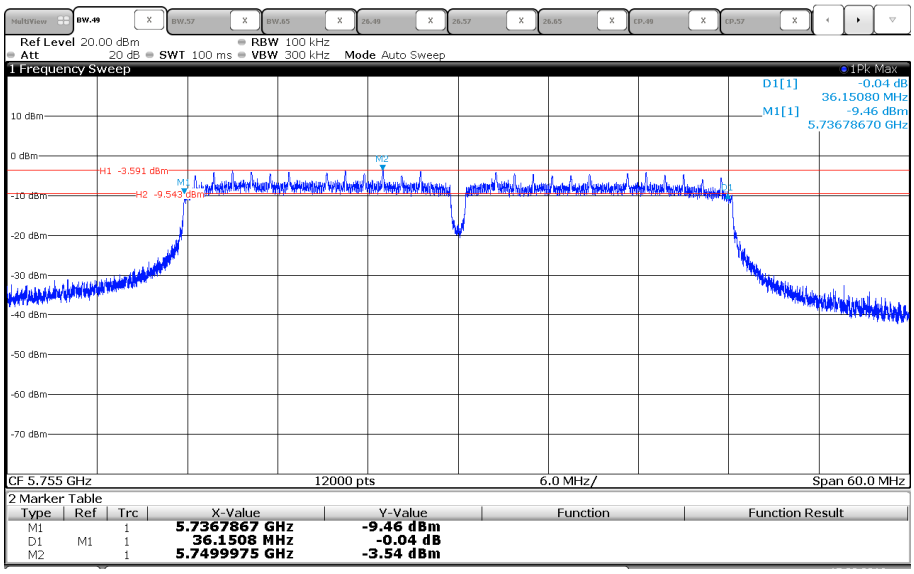


Channel 165 (5825 MHz)

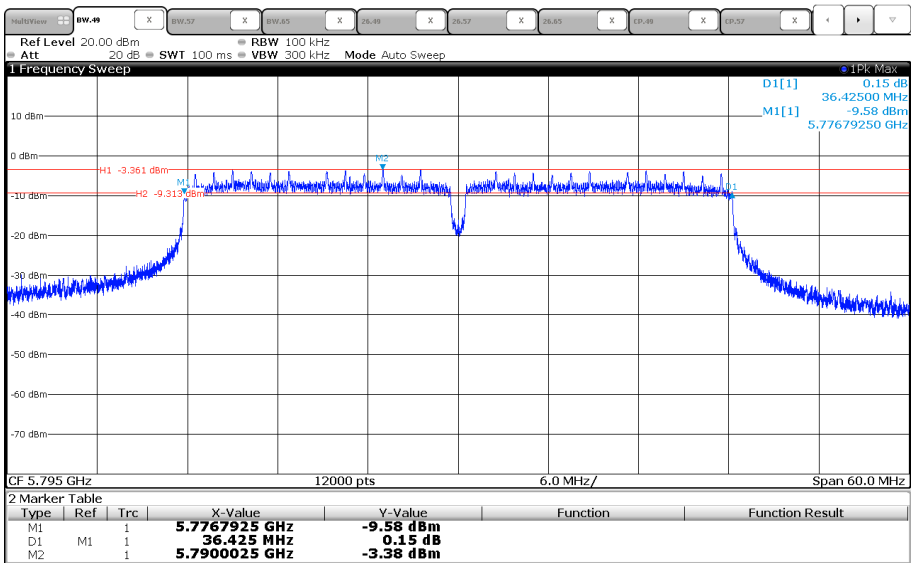


HT40:

Channel 149up (5755 MHz)



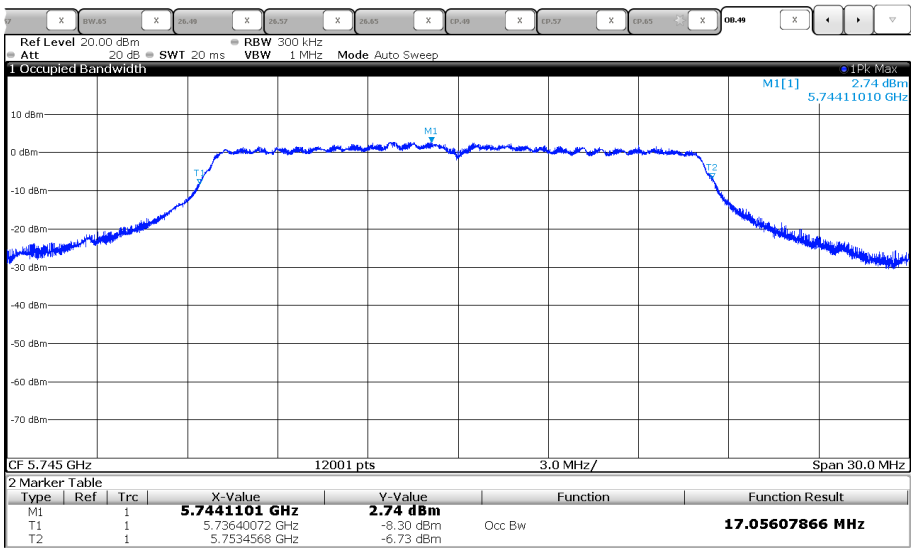
Channel 157up (5795 MHz)



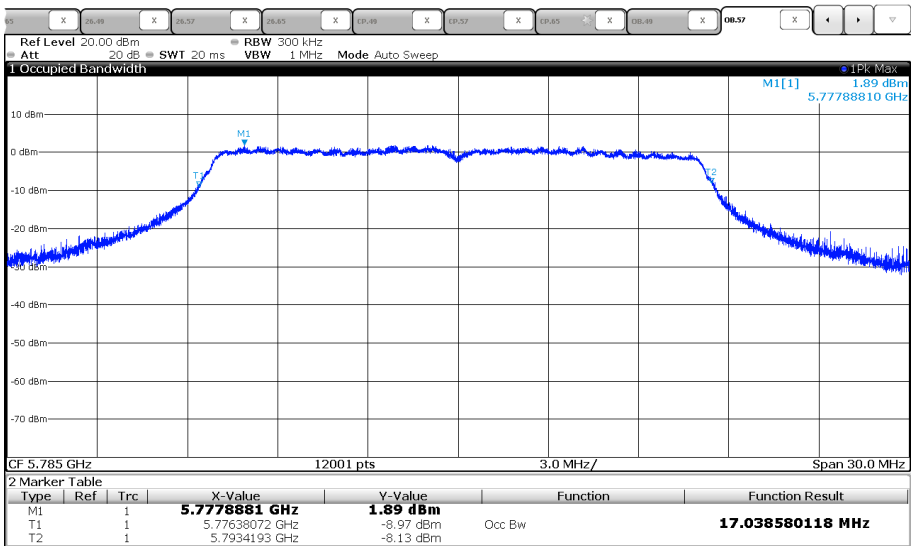
5.2.7 Test protocols OBW 99 %

802.11a:

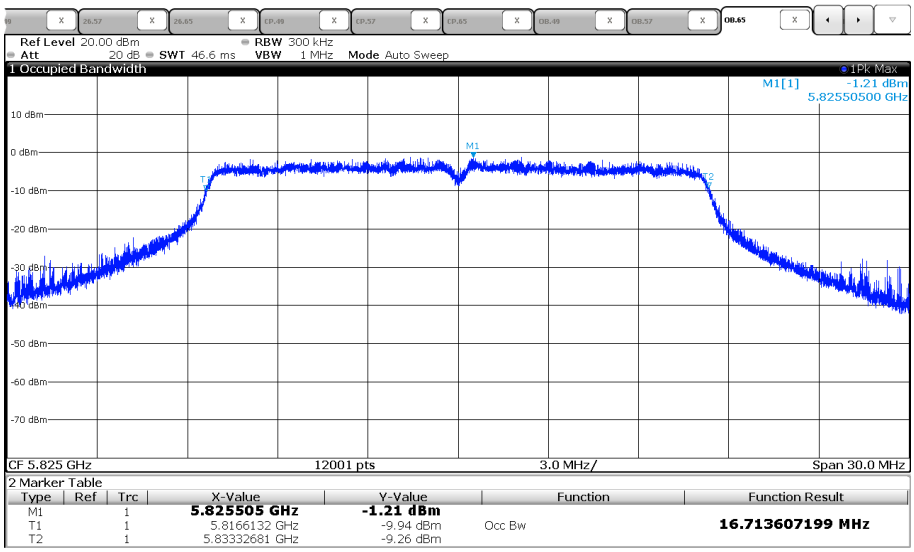
Channel 149 (5745 MHz)



Channel 157 (5785 MHz)

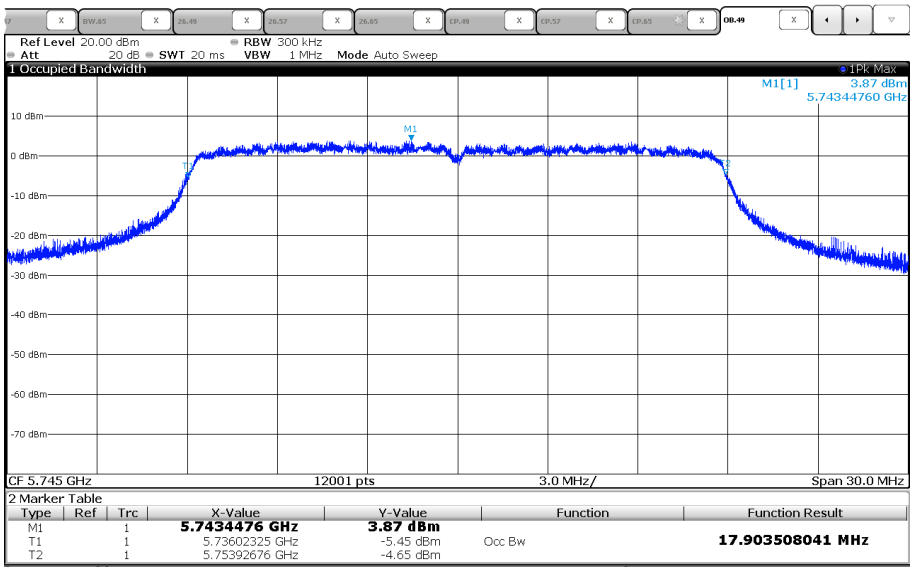


Channel 165 (5825 MHz)

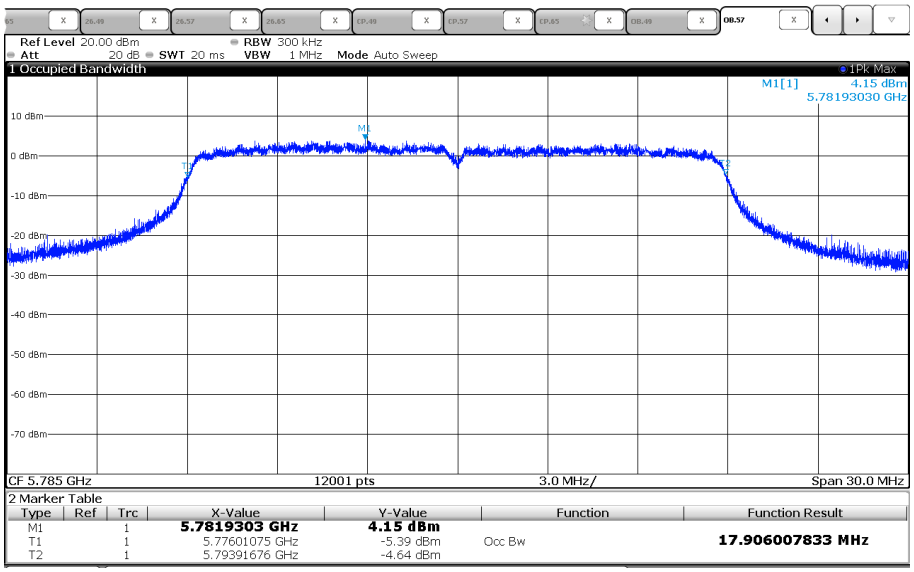


HT20:

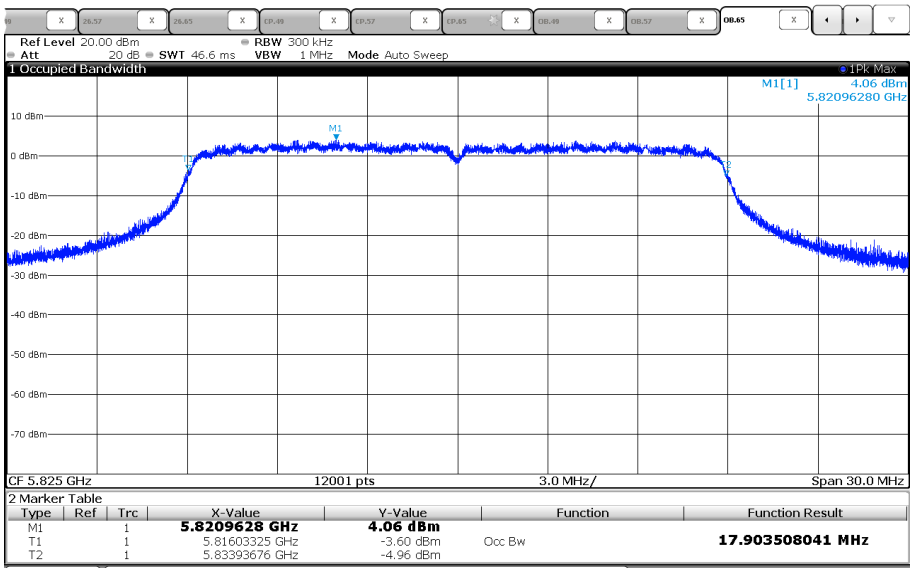
Channel 149 (5745 MHz)



Channel 157 (5785 MHz)

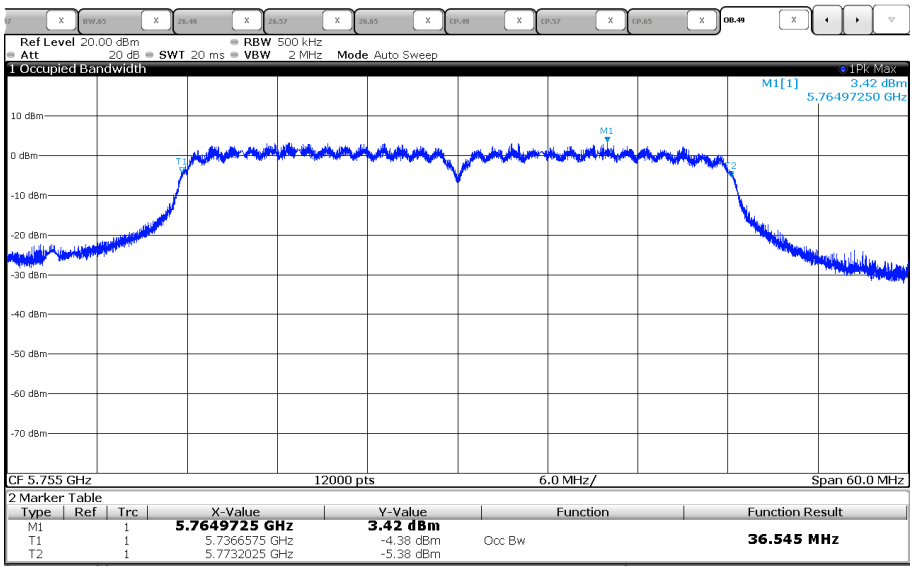


Channel 165 (5825 MHz)

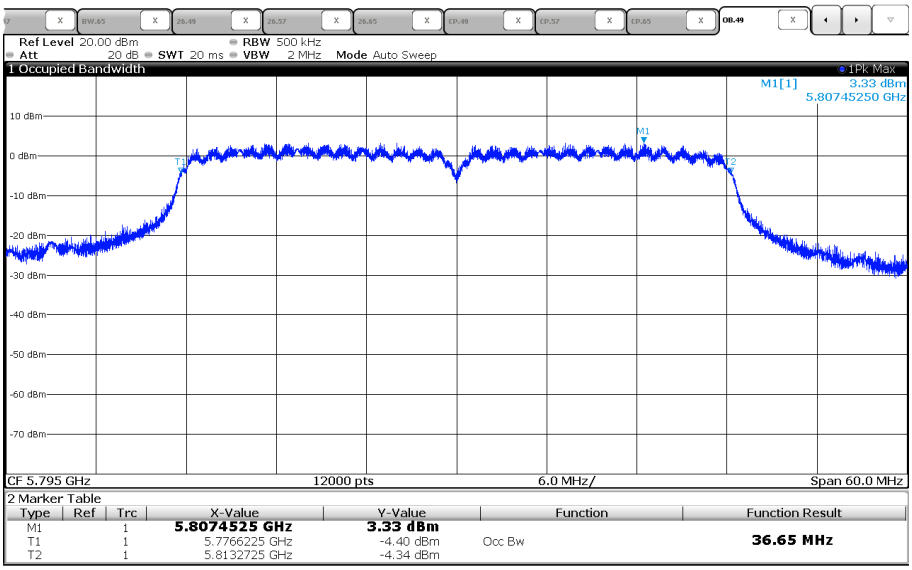


HT40:

Channel 149up (5755 MHz)



Channel 157up (5795 MHz)



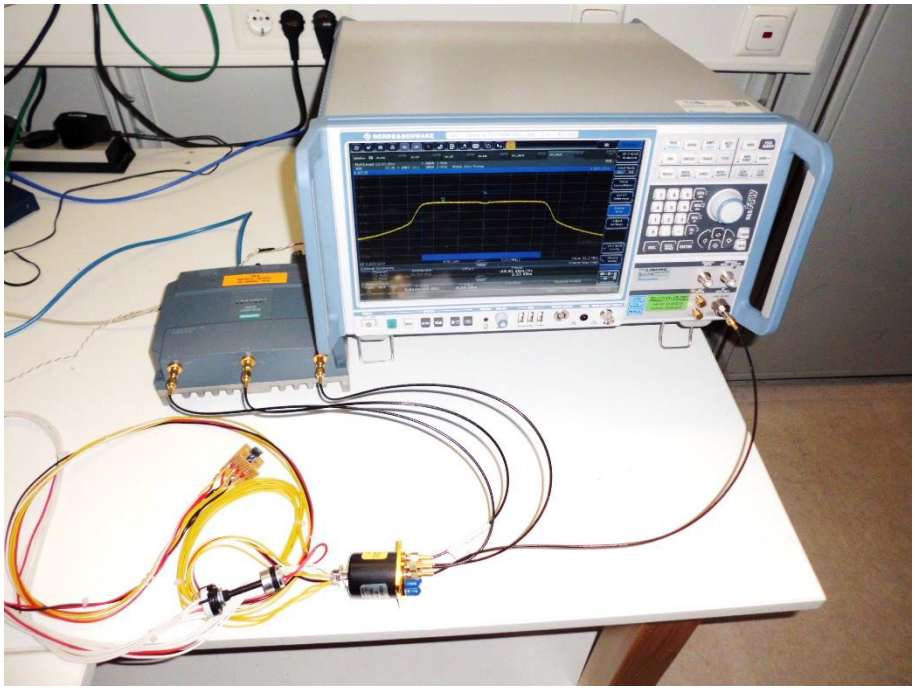
5.3 Maximum conducted output power

For test instruments and accessories used see section 6 Part **CPC 3**.

5.3.1 Description of the test location

Test location: AREA 4

5.3.2 Photo documentation of the test set-up



5.3.3 Applicable standard

According to FCC Part 15, Section 15.407(a)(3):
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

5.3.4 Description of Measurement

The maximum conducted output power is measured using a spectrum analyser with the function “integrated band power measurement” following the procedure set out in KDB 789033 D02, item C.f) Method SA-3. The EUT is set in TX continuous mode while measuring. The EUT is measured following the procedure set out in KDB 662911 for MIMO devices. The output power is measured separate at chain 1, 2 and chain 3. The measurement values are converted into linear values, summed and converted back into log values. The resulting values are listed in the following tables.

Spectrum analyser settings:
RBW: 1 MHz, VBW: 3 MHz, Detector: RMS (power averaging), Trace mode: max hold;
Number of points: 6401, Sweep time: 10 s, Band power function;

5.3.5 Test result

1 Port mode (only one port is active, port 2 and 3 are internally terminated):
Raw data as representative for all one Port measurements, used for 802.11a:

	A1 [P12] (dBm)	A1 [P17] (dBm)	A1 [P20] (dBm)
CH149	6.33	9.35	9.42
CH157	5.70	8.78	8.77
CH165	6.00	8.57	8.56

Calculation of the total output power:

802.11a, 6 Mbps, 1TX		Test results conducted				
Port 1		A [P12] (dBm)	A [P17] (dBm)	A [P20] (dBm)	Limit (dBm)	Min Margin (dB)
Lowest						
T_{nom}	V_{nom}	10.3	13.4	13.4	30.0	-16.6
Middle						
T_{nom}	V_{nom}	9.7	12.8	12.8	30.0	-17.2
Highest						
T_{nom}	V_{nom}	10.0	12.6	12.6	30.0	-17.4

Note. An insertion loss of 4.0 dB for measurement cable and switch is taken into account.

HT20, MCS0, 1TX		Test results conducted				
Port 1		A [P12] (dBm)	A [P17] (dBm)	A [P20] (dBm)	Limit (dBm)	Min Margin (dB)
Lowest frequency: CH149						
T_{nom}	V_{nom}	9.9	12.8	13.0	30.0	-17.1
Middle frequency: CH157						
T_{nom}	V_{nom}	9.1	12.4	12.4	30.0	-17.6
Highest frequency: CH165						
T_{nom}	V_{nom}	9.3	12.3	12.3	30.0	-17.7

HT40, MCS8, 1TX		Test results conducted				
Port 1		A [P12] (dBm)	A [P17] (dBm)	A [P20] (dBm)	Limit (dBm)	Min Margin (dB)
Lowest frequency: CH149up						
T_{nom}	V_{nom}	8.5	11.5	11.6	30.0	-18.4
Highest frequency: CH157up						
T_{nom}	V_{nom}	7.9	11.1	11.1	30.0	-19.0

2 Port mode (two ports are active, port 3 is internally terminated):
Raw data as representative for all 2 Port measurements, used for 802.11a:

	A1 [P12] (dBm)	A2 [P12] (dBm)	A1 [P17] (dBm)	A2 [P17] (dBm)	A1 [P20] (dBm)	A2 [P20] (dBm)
CH149	3.33	4.49	8.37	8.91	9.45	9.68
CH157	3.03	3.48	8.23	8.66	9.13	9.68
CH165	3.13	2.22	7.75	7.20	8.97	8.21

Calculation of the total output power:

802.11a, 6 Mbps, 2TX		Test results conducted				
Port 1+2		A [P12] (dBm)	A [P17] (dBm)	A [P20] (dBm)	Limit (dBm)	Min Margin (dB)
Lowest						
T_{nom}	V_{nom}	11.0	15.7	16.6	30.0	-13.4
Middle						
T_{nom}	V_{nom}	10.3	15.5	16.4	30.0	-13.6
Highest						
T_{nom}	V_{nom}	9.7	14.5	15.6	30.0	-14.4

Note. An insertion loss of 4.0 dB for measurement cable and switch is taken into account.

HT20, MCS8, 2TX		Test results conducted				
Port 1+2		A [P12] (dBm)	A [P17] (dBm)	A [P20] (dBm)	Limit (dBm)	Min Margin (dB)
Lowest frequency: CH149						
T_{nom}	V_{nom}	10.7	15.7	16.7	30.0	-13.3
Middle frequency: CH157						
T_{nom}	V_{nom}	9.9	14.8	15.7	30.0	-14.3
Highest frequency: CH165						
T_{nom}	V_{nom}	9.1	14.2	14.9	30.0	-15.1

HT40, MCS16, 2TX		Test results conducted				
Port 1+2		A [P12] (dBm)	A [P17] (dBm)	A [P20] (dBm)	Limit (dBm)	Min Margin (dB)
Lowest frequency: CH149up						
T_{nom}	V_{nom}	9.0	14.0	14.9	30.0	-15.1
Highest frequency: CH157up						
T_{nom}	V_{nom}	8.3	13.4	14.3	30.0	-15.7

3 Port mode (all ports are active):
Raw data as representative for all 3 Port measurements, used for 802.11a:

	A1 [P12] (dBm)	A2 [P12] (dBm)	A3 [P12] (dBm)	A1 [P17] (dBm)	A2 [P17] (dBm)	A3 [P17] (dBm)	A1 [P20] (dBm)	A2 [P20] (dBm)	A3 [P20] (dBm)
CH149	1.72	2.60	2.24	6.62	7.30	7.39	10.59	10.36	9.63
CH157	1.72	2.35	2.54	6.57	7.03	7.59	10.68	9.92	9.30
CH165	1.59	0.55	2.88	7.10	5.69	7.72	9.58	8.30	10.57

Calculation of the total output power:

802.11a, 6 Mbps, 3TX		Test results conducted				
Port 1+2+3		A [P12] (dBm)	A [P17] (dBm)	A [P20] (dBm)	Limit (dBm)	Min Margin (dB)
Lowest						
T_{nom}	V_{nom}	11.0	15.9	19.0	30.0	-11.0
Middle						
T_{nom}	V_{nom}	11.0	15.9	18.8	30.0	-11.2
Highest						
T_{nom}	V_{nom}	10.5	15.7	18.4	30.0	-11.6

Note. An insertion loss of 4.0 dB for measurement cable and switch is taken into account.

HT20, MCS8, 3TX		Test results conducted				
Port 1+2+3		A [P12] (dBm)	A [P17] (dBm)	A [P20] (dBm)	Limit (dBm)	Min Margin (dB)
Lowest frequency: CH149						
T_{nom}	V_{nom}	10.4	15.2	18.2	30.0	-11.8
Middle frequency: CH157						
T_{nom}	V_{nom}	10.3	15.2	17.8	30.0	-12.2
Highest frequency: CH165						
T_{nom}	V_{nom}	9.9	14.7	17.6	30.0	-12.4

Note. An insertion loss of 4.0 dB for measurement cable and switch is taken into account.

HT40, MCS16, 3TX		Test results conducted				
Port 1+2+3		A [P12] (dBm)	A [P17] (dBm)	A [P20] (dBm)	Limit (dBm)	Min Margin (dB)
Lowest frequency: CH149up						
T_{nom}	V_{nom}	8.9	13.9	16.6	30.0	-13.4
Highest frequency: CH157up						
T_{nom}	V_{nom}	8.6	13.6	16.3	30.0	-13.7

Note. An insertion loss of 4.0 dB for measurement cable and switch is taken into account.

Peak Power Limit according to FCC Part 15, Section 15.407(a)(3):

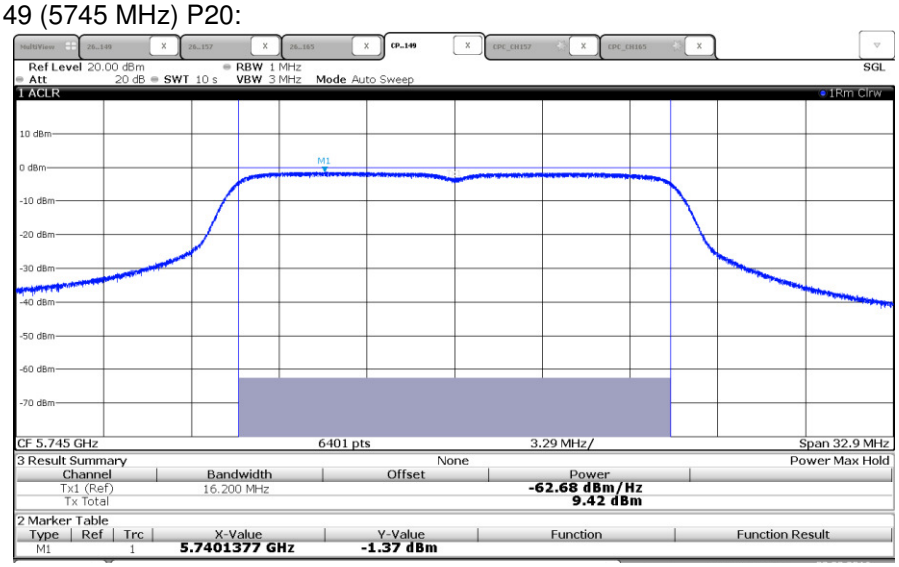
Frequency (MHz)	Maximum conducted power limit	
	(dBm)	(Watt)
5725 - 5850	30	1.0

The requirements are **FULFILLED.**

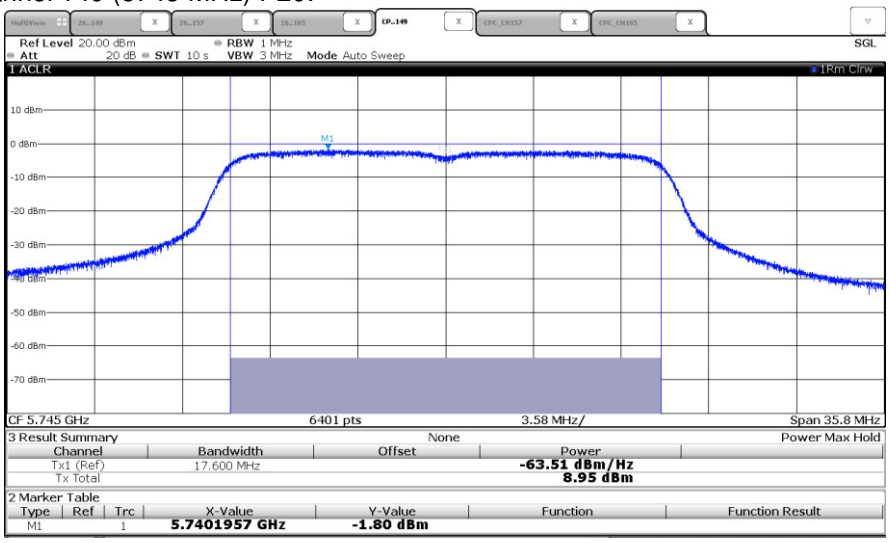
Remarks: For detailed test results please see the following test protocols. Only the worst case plots of CH149 at highest output power are listed.

5.3.6 Test protocols

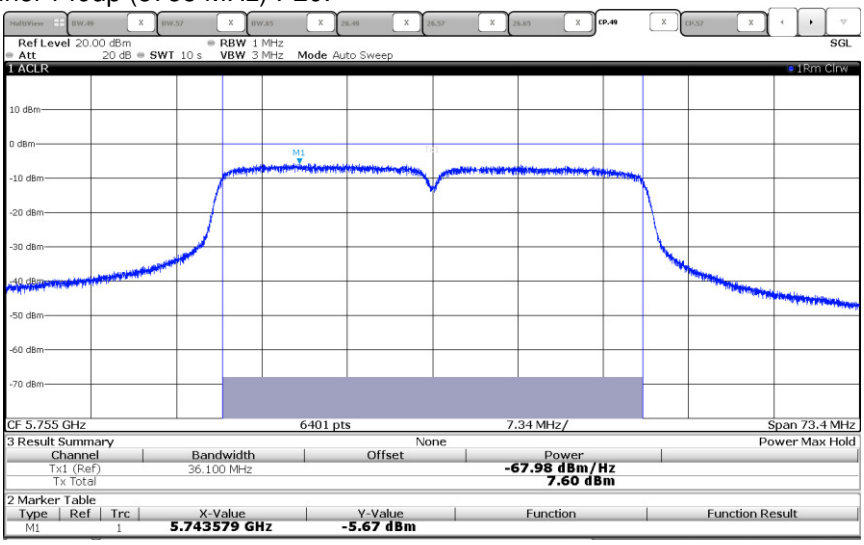
1 Port mode (only one port is active, port 2 and 3 are internally terminated):
802.11a, Channel 149 (5745 MHz) P20:



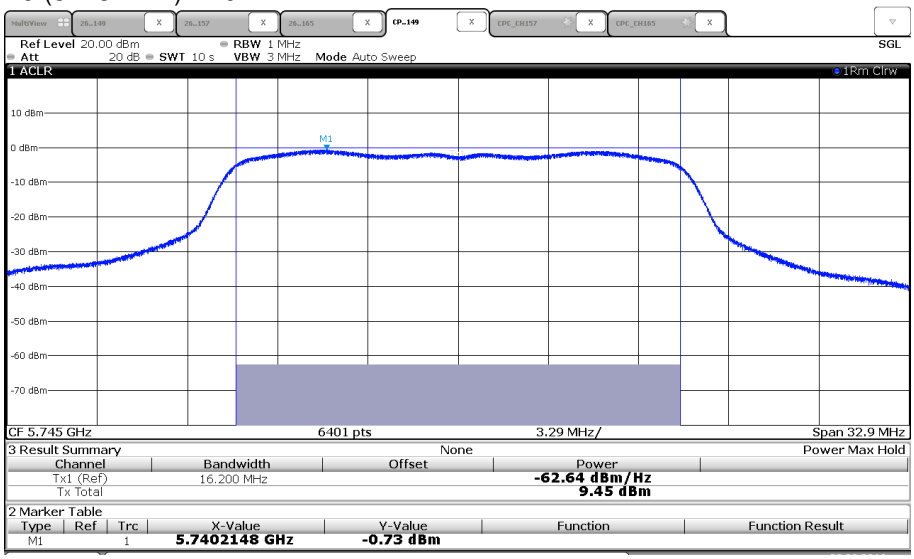
802.11n, HT20, Channel 149 (5745 MHz) P20:



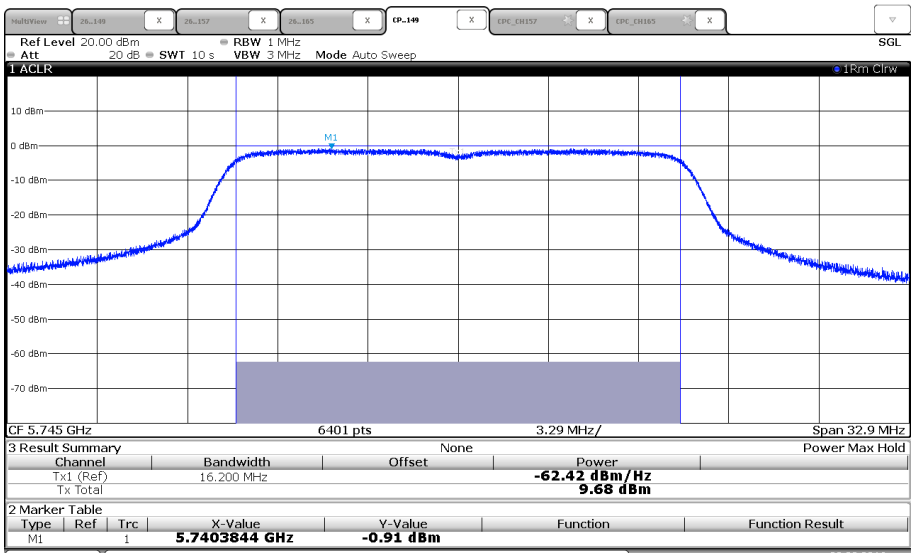
802.11n, HT40, Channel 149up (5755 MHz) P20:



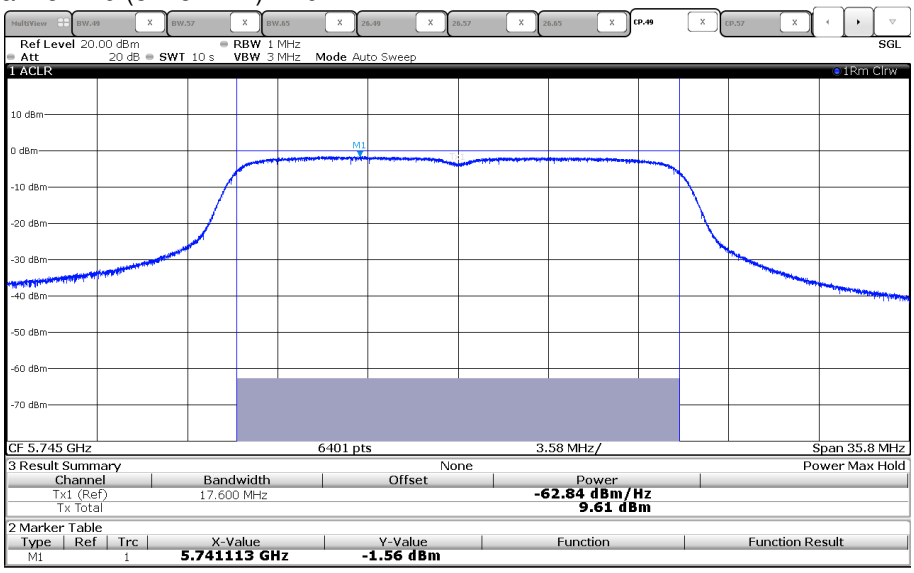
2 Port mode (two ports are active, port 3 is internally terminated):
802.11a, Channel 149 (5745 MHz) P20:



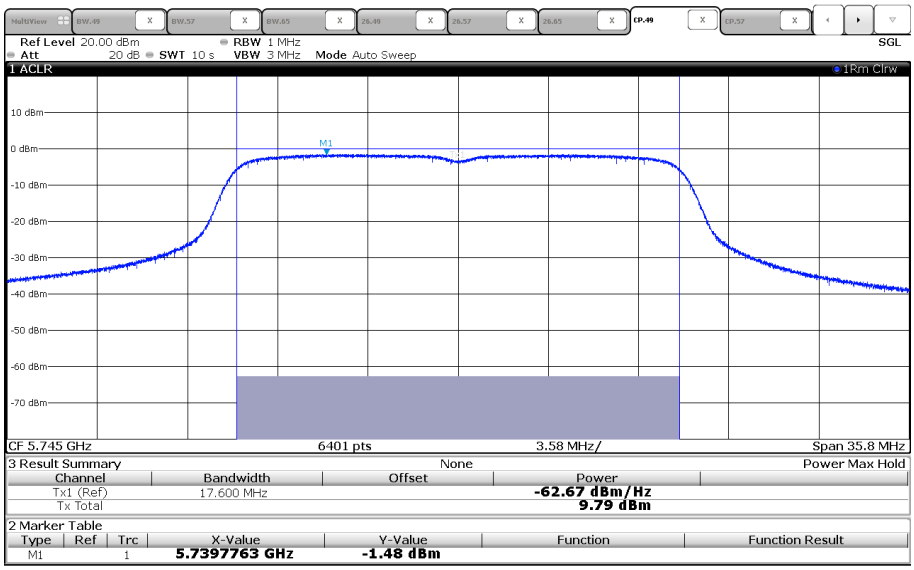
Port 2:



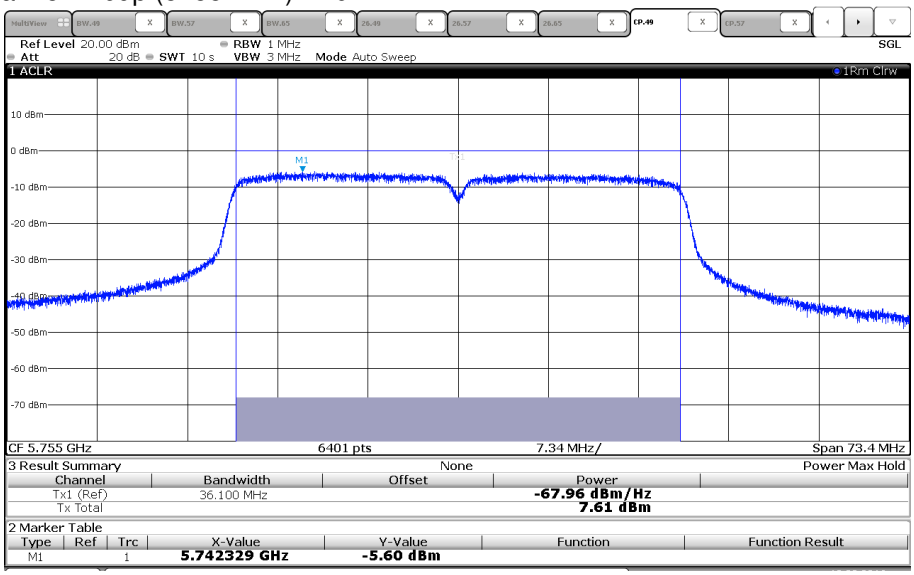
802.11n, HT20, Channel 149 (5745 MHz) P20:



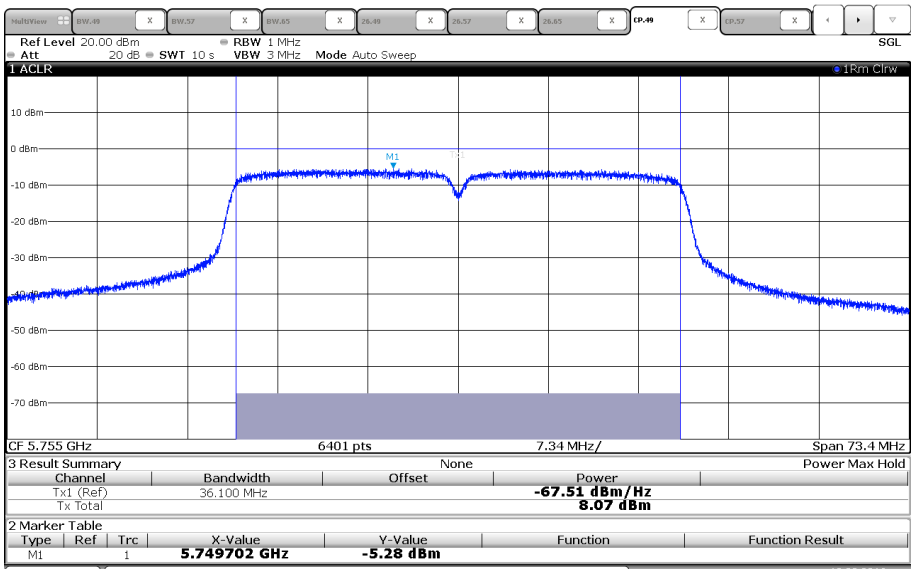
Port 2:



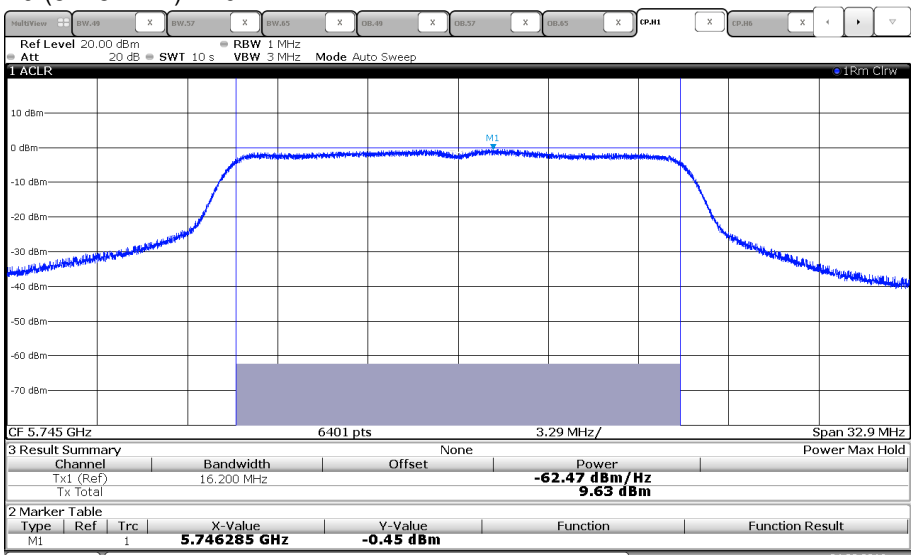
802.11n, HT40, Channel 149up (5755 MHz) P20:



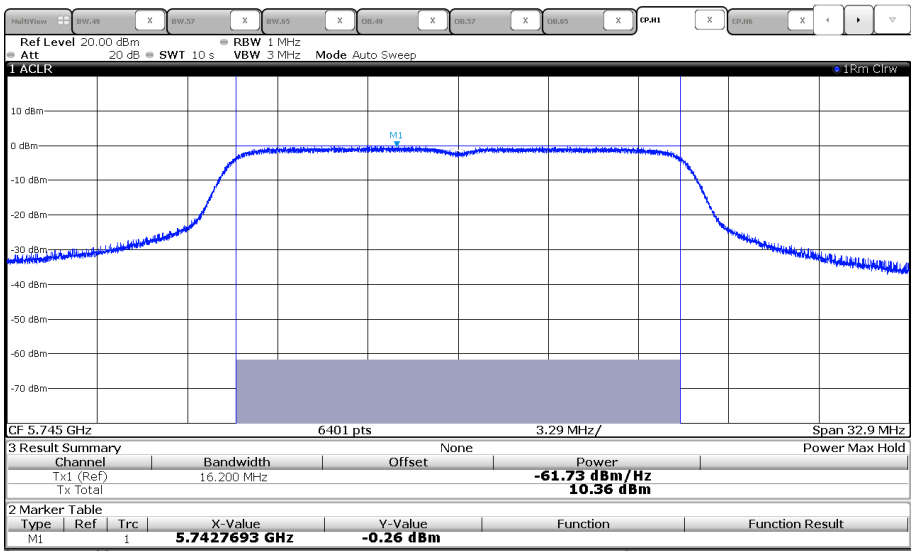
Port 2:



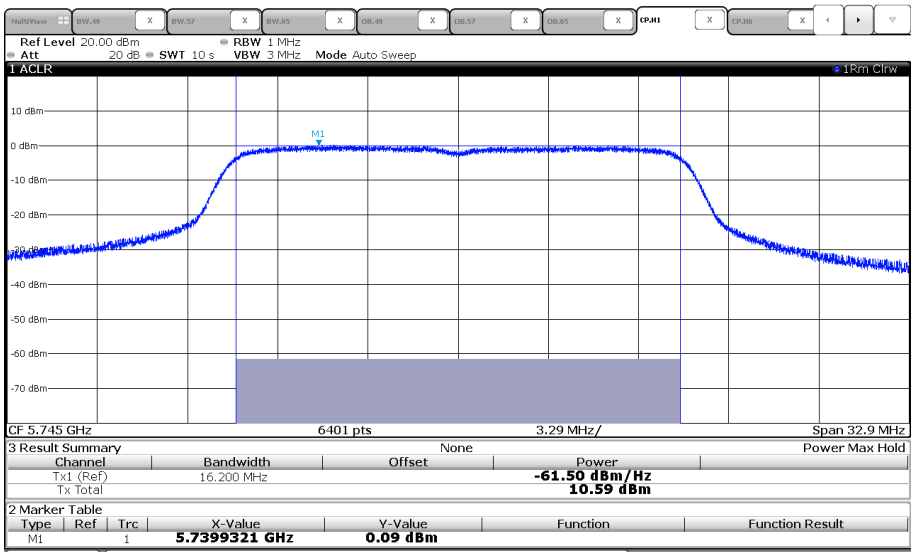
3 Port mode (all ports are active):
802.11a, Channel 149 (5745 MHz) P20:



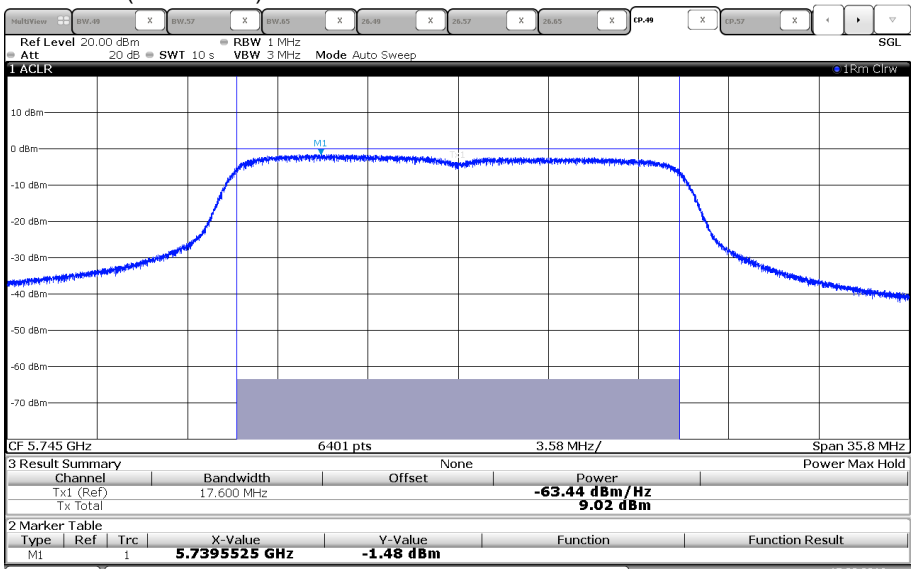
Port 2:



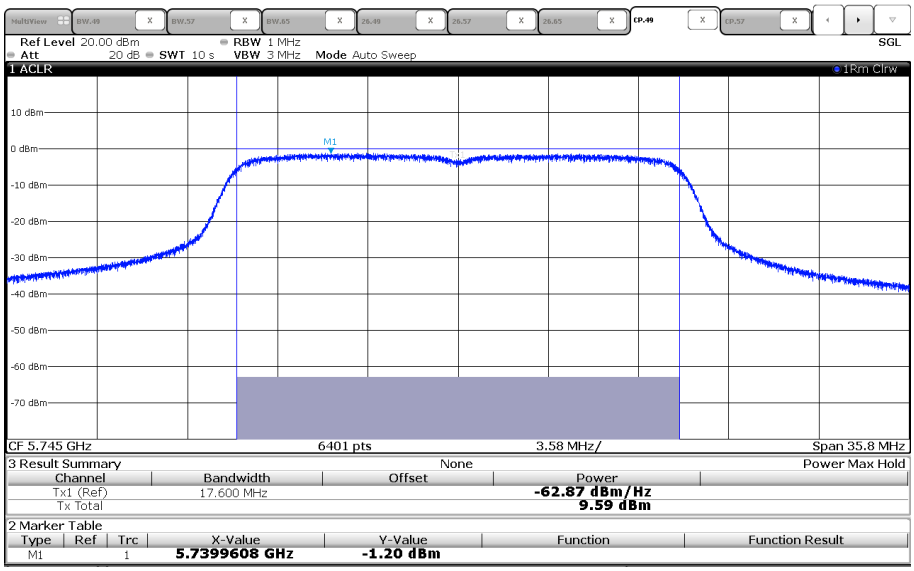
Port 3:



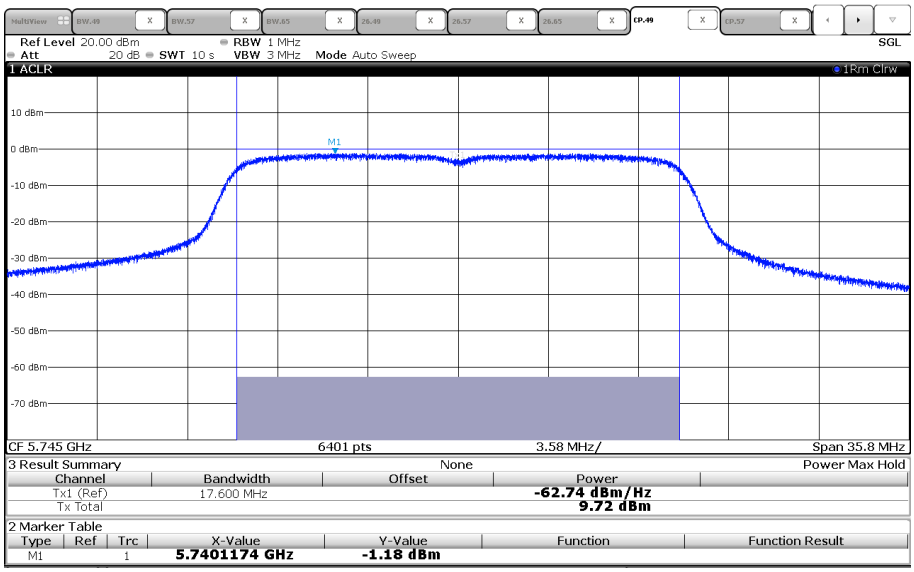
802.11n, HT20, Channel 149 (5745 MHz) P20:



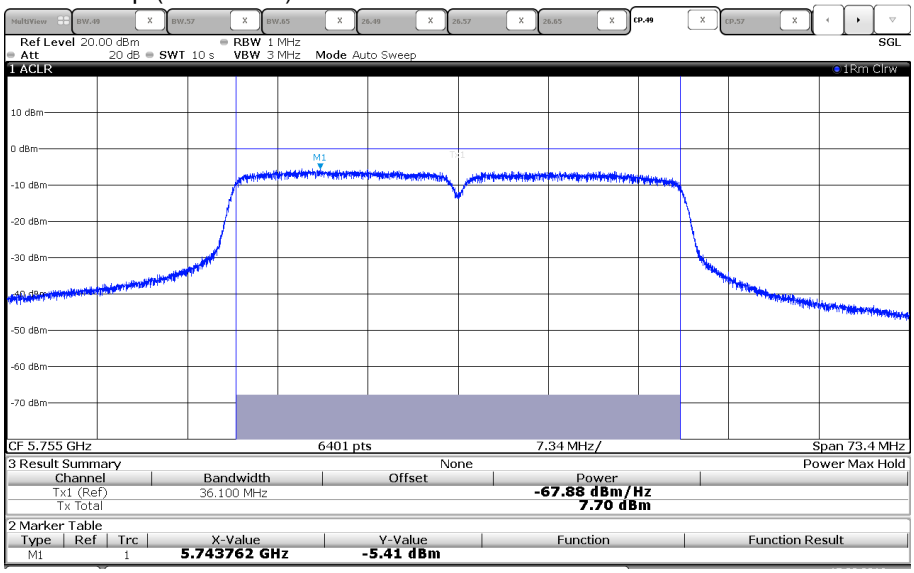
Port 2:



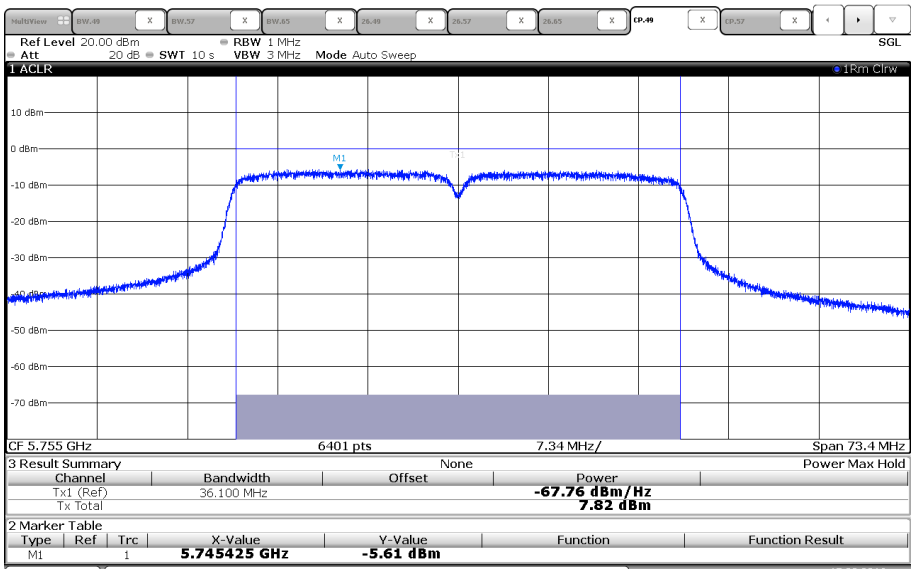
Port 3:



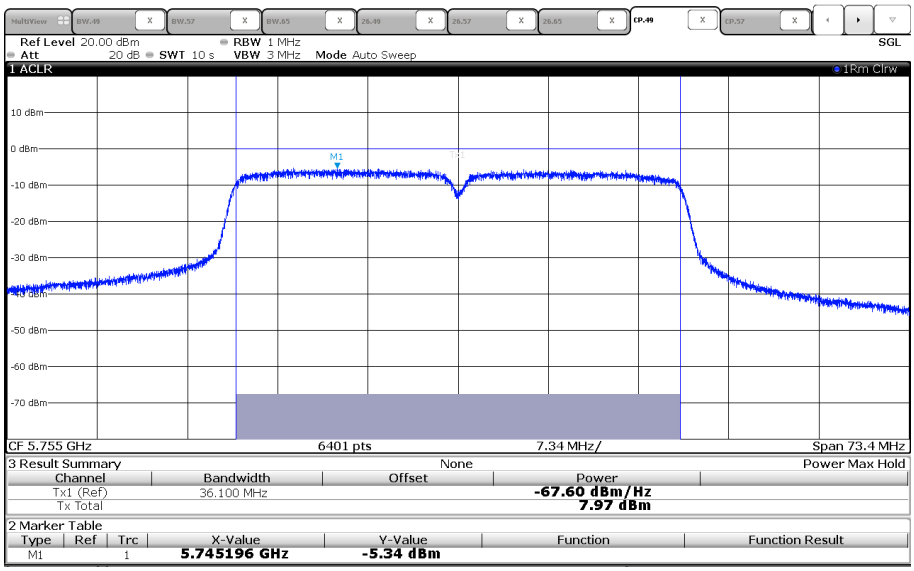
802.11n, HT40, Channel 149up (5755 MHz) P20:



Port 2:



Port 3:



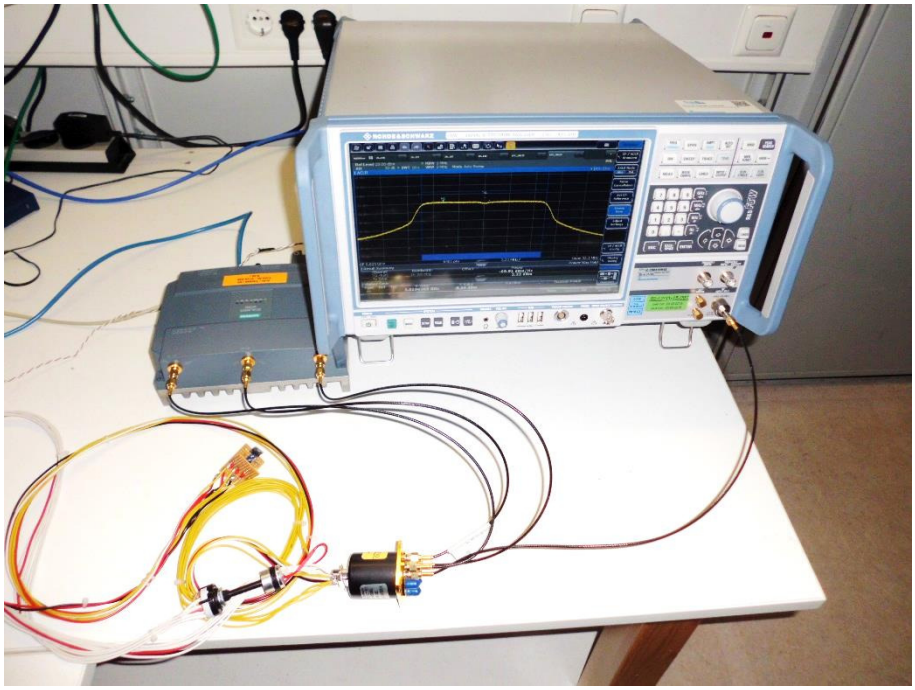
5.4 Maximum power spectral density

For test instruments and accessories used see section 6 Part **CPC 3**.

5.4.1 Description of the test location

Test location: AREA 4

5.4.2 Photo documentation of the test set-up



5.4.3 Applicable standard

According to FCC Part 15, Section 15.407(e):
The maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

5.4.4 Description of Measurement

The maximum conducted output power is measured using a spectrum analyser with the function “integrated band power measurement” following the procedure set out in KDB 789033 D02, item F. Therefore the PSD is measured the same way. The “integrated band power measurement” is related to PSD (dBm/Hz). The EUT is set in TX continuous mode while measuring. The EUT is measured separate at chain 1, 2 and chain 3. The measurement values are converted into linear values. The chain 1, 2 and chain 3 are summed and converted back into log values and corrected with the conversion factor Hz to 500 kHz, 57.0 dB. The resulting values are listed in the following tables. The insertion loss of cable and switch is taken into account with 4.0 dB at 5.8 GHz.

Spectrum analyser settings:
RBW: 1 MHz, VBW: 3 MHz, Detector: RMS (power averaging), Trace mode: max hold;
Number of points: 6401, Sweep time: 10 s;

5.4.5 Test result

1 Port mode (only one port is active, port 2 and 3 are internally terminated):
Raw data as representative for all one Port measurements, used for 802.11a:

	PD1 [P12] (dBm/Hz)	PD1 [P17] (dBm/Hz)	PD1 [P20] (dBm/Hz)
CH149	-65.77	-65.77	-62.68
CH157	-66.42	-63.34	-63.35
CH165	-66.12	-63.55	-63.56

Calculation of the total output power:

802.11a, 6 Mbps, 1TX		Test results conducted				
Port 1		PD [P12] (dBm/500kHz)	PD [P17] (dBm/500kHz)	PD [P20] (dBm/500kHz)	Limit (dBm/500kHz)	Margin (dB)
Lowest						
T_{nom}	V_{nom}	-4.8	-4.8	-1.7	30.0	-31.7
Middle						
T_{nom}	V_{nom}	-5.4	-2.3	-2.4	30.0	-32.4
Highest						
T_{nom}	V_{nom}	-5.1	-2.6	-2.6	30.0	-32.6

Note. An insertion loss of 4.0 dB for measurement cable and switch is taken into account.

HT20, MCS0, 1TX		Test results conducted				
Port 1		PD [P12] (dBm/500kHz)	PD [P17] (dBm/500kHz)	PD [P20] (dBm/500kHz)	Limit (dBm/500kHz)	Margin (dB)
Lowest frequency: CH149						
T_{nom}	V_{nom}	-5.6	-2.6	-2.5	30.0	-32.5
Middle frequency: CH157						
T_{nom}	V_{nom}	-6.4	-3.0	-3.1	30.0	-33.1
Highest frequency: CH165						
T_{nom}	V_{nom}	-6.2	-3.1	-3.2	30.0	-33.2

HT40, MCS8, 1TX		Test results conducted				
Port 1		PD [P12] (dBm/500kHz)	PD [P17] (dBm/500kHz)	PD [P20] (dBm/500kHz)	Limit (dBm/500kHz)	Margin (dB)
Lowest frequency: CH149up						
T_{nom}	V_{nom}	-10.1	-7.1	-7.0	30.0	-37.0
Middle frequency: CH157up						
T_{nom}	V_{nom}	-10.7	-7.6	-7.6	30.0	-37.6

2 Port mode (two ports are active, port 3 is internally terminated):
Raw data as representative for all one Port measurements, used for 802.11a:

	PD1 [P12] (dBm/Hz)	PD2 [P12] (dBm/Hz)	PD1 [P17] (dBm/Hz)	PD2 [P17] (dBm/Hz)	PD1 [P20] (dBm/Hz)	PD2 [P20] (dBm/Hz)
CH149	-68.77	-67.60	-63.73	-63.19	-62.64	-62.42
CH157	-69.09	-68.64	-63.89	-63.46	-62.99	-62.45
CH165	-68.99	-69.91	-64.38	-64.92	-63.15	-63.91

Calculation of the total output power:

802.11a, 6 Mbps, 2TX		Test results conducted				
Port 1+2		PD [P12] (dBm/500kHz)	PD [P17] (dBm/500kHz)	PD [P20] (dBm/500kHz)	Limit (dBm/500kHz)	Margin (dB)
Lowest						
T_{nom}	V_{nom}	-4.1	-1.2	0.6	30.0	-29.4
Middle						
T_{nom}	V_{nom}	-4.8	-1.6	0.3	30.0	-29.7
Highest						
T_{nom}	V_{nom}	-5.4	-2.3	-0.6	30.0	-30.6

Note. An insertion loss of 4.0 dB for measurement cable and switch is taken into account.

HT20, MCS8, 2TX		Test results conducted				
Port 1+2		PD [P12] (dBm/500kHz)	PD [P17] (dBm/500kHz)	PD [P20] (dBm/500kHz)	Limit (dBm/500kHz)	Margin (dB)
Lowest frequency: CH149						
T_{nom}	V_{nom}	-4.7	-1.7	0.4	30.0	-29.6
Middle frequency: CH157						
T_{nom}	V_{nom}	-5.6	-2.5	-0.6	30.0	-30.6
Highest frequency: CH165						
T_{nom}	V_{nom}	-6.4	-2.9	-1.2	30.0	-31.2

HT40, MCS16, 2TX		Test results conducted				
Port 1+2		PD [P12] (dBm/500kHz)	PD [P17] (dBm/500kHz)	PD [P20] (dBm/500kHz)	Limit (dBm/500kHz)	Margin (dB)
Lowest frequency: CH149up						
T_{nom}	V_{nom}	-9.6	-6.3	-4.6	30.0	-34.6
Middle frequency: CH157up						
T_{nom}	V_{nom}	-10.3	-7.1	-5.2	30.0	-35.2

3 Port mode (all ports are active):
Raw data as representative for all one Port measurements, used for 802.11a:

	PD1 [P12] (dBm/Hz)	PD2 [P12] (dBm/Hz)	PD3 [P12] (dBm/Hz)	PD1 [P17] (dBm/Hz)	PD2 [P17] (dBm/Hz)	PD3 [P17] (dBm/Hz)	PD1 [P20] (dBm/Hz)	PD2 [P20] (dBm/Hz)	PD3 [P20] (dBm/Hz)
CH149	-70.38	-69.50	-69.86	-65.48	-64.79	-64.70	-61.50	-61.73	-62.47
CH157	-70.40	-69.78	-69.59	-65.55	-65.09	-64.53	-61.44	-62.20	-62.82
CH165	-70.53	-71.57	-69.24	-65.02	-66.43	-64.40	-62.54	-63.83	-61.55

Calculation of the total output power:

802.11a, 6 Mbps, 3TX		Test results conducted				
Port 1+2+3		PD [P12] (dBm/500kHz)	PD [P17] (dBm/500kHz)	PD [P20] (dBm/500kHz)	Limit (dBm/500kHz)	Margin (dB)
Lowest						
T_{nom}	V_{nom}	-4.1	0.8	3.9	30.0	-26.1
Middle						
T_{nom}	V_{nom}	-4.1	0.7	3.7	30.0	-26.3
Highest						
T_{nom}	V_{nom}	-4.6	0.6	3.2	30.0	-26.8

Note. An insertion loss of 4.0 dB for measurement cable and switch is taken into account.

HT20, MCS8, 3TX		Test results conducted				
Port 1+2+3		PD [P12] (dBm/500kHz)	PD [P17] (dBm/500kHz)	PD [P20] (dBm/500kHz)	Limit (dBm/500k	Margin (dB)
Lowest frequency: CH149						
T_{nom}	V_{nom}	-5.1	-0.2	2.8	30.0	-27.2
Middle frequency: CH157						
T_{nom}	V_{nom}	-5.2	-0.2	2.4	30.0	-27.6
Highest frequency: CH165						
T_{nom}	V_{nom}	-5.5	-0.8	2.1	30.0	-27.9

HT40, MCS16, 3TX		Test results conducted				
Port 1+2+3		PD [P12] (dBm/500kHz)	PD [P17] (dBm/500kHz)	PD [P20] (dBm/500kHz)	Limit (dBm/500k	Margin (dB)
Lowest frequency: CH149up						
T_{nom}	V_{nom}	-9.7	-4.7	-2.0	30.0	-32.0
Middle frequency: CH157up						
T_{nom}	V_{nom}	-10.0	-5.0	-2.3	30.0	-32.3

Power spectral density limit according to FCC Part 15, Section 15.407(e):
The maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

Frequency (MHz)	Power spectral density limit (dBm/500 kHz)
5725 - 5850	30

The requirements are **FULFILLED.**

Remarks: For detailed test results please see the test protocols under 5.3.6.

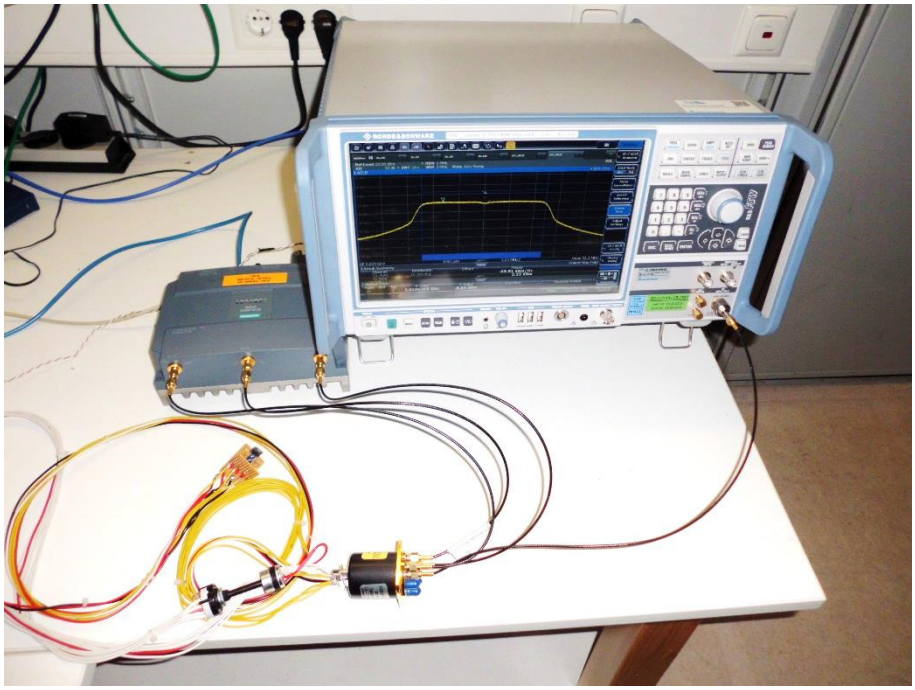
5.5 Defacto limit

For test instruments and accessories used see section 6 Part **CPC 3**.

5.5.1 Description of the test location

Test location: AREA 4

5.5.2 Photo documentation of the test set-up



5.5.3 Applicable standard

According to FCC Part 15, Section 15.407(a)(3):
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.5.4 Test result

The amount of reduction is calculated using the following formula: Pout = 30 – (Gx – 6);
Where
Pout = maximum conducted output power
Gx = antenna gain of the applied antenna

1 Port mode (only one port is active, port 2 and 3 are internally terminated):
Output power:

Antenna	Gx	Cond. limit	G	Amax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)	5 GHz
ANT 793-8DK	14.2	30.0	6.0	10.3	21.8	0.0	P12
ANT 793-8DJ	13.6	30.0	6.0	10.3	22.4	0.0	P12
ANT793-8DL	14.0	30.0	6.0	10.3	22.0	0.0	P12
ANT793-8DP	13.5	30.0	6.0	10.3	22.5	0.0	P12

Antenna	Gx	Cond. limit	G	Amax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)	5 GHz
ANT 795-6DC	9.0	30.0	6.0	13.4	27.0	0.0	P17
ANT793-6DG	9.0	30.0	6.0	13.4	27.0	0.0	P17
ANT 795-6MN	8.0	30.0	6.0	13.4	28.0	0.0	P17
ANT795-6MP	7.0	30.0	6.0	13.4	29.0	0.0	P17
ANT896-6MM	7.0	30.0	6.0	13.4	29.0	0.0	P17

PSD:

Antenna	Gx	Cond. limit	G	PSDmax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm/500 kHz)	(dBi)	(dBm/500 kHz)	(dBm/500 kHz)	(dB)	5 GHz
ANT 793-8DK	14.2	30.0	6.0	-4.8	21.8	0.0	P12
ANT 793-8DJ	13.6	30.0	6.0	-4.8	22.4	0.0	P12
ANT793-8DL	14.0	30.0	6.0	-4.8	22.0	0.0	P12
ANT793-8DP	13.5	30.0	6.0	-4.8	22.5	0.0	P12

Antenna	Gx	Cond. limit	G	PSDmax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm/500 kHz)	(dBi)	(dBm/500 kHz)	(dBm/500 kHz)	(dB)	5 GHz
ANT 795-6DC	9.0	30.0	6.0	-2.3	27.0	0.0	P17
ANT793-6DG	9.0	30.0	6.0	-2.3	27.0	0.0	P17
ANT 795-6MN	8.0	30.0	6.0	-2.3	28.0	0.0	P17
ANT795-6MP	7.0	30.0	6.0	-2.3	29.0	0.0	P17
ANT896-6MM	7.0	30.0	6.0	-2.3	29.0	0.0	P17

2 Port mode (two ports are active, port 3 is internally terminated):
Output power:

Antenna	Gx	Cond. limit	G	Amax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)	5 GHz
ANT 793-8DK	14.2	30.0	6.0	11.0	21.8	0.0	P12
ANT 793-8DJ	13.6	30.0	6.0	11.0	22.4	0.0	P12
ANT793-8DL	14.0	30.0	6.0	11.0	22.0	0.0	P12
ANT793-8DP	13.5	30.0	6.0	11.0	22.5	0.0	P12

Antenna	Gx	Cond. limit	G	Amax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)	5 GHz
ANT 795-6DC	9.0	30.0	6.0	15.7	27.0	0.0	P17
ANT793-6DG	9.0	30.0	6.0	15.7	27.0	0.0	P17
ANT 795-6MN	8.0	30.0	6.0	15.7	28.0	0.0	P17
ANT795-6MP	7.0	30.0	6.0	15.7	29.0	0.0	P17
ANT896-6MM	7.0	30.0	6.0	15.7	29.0	0.0	P17

PSD:

Antenna	Gx	Cond. limit	G	PSDmax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm/500 kHz)	(dBi)	(dBm/500 kHz)	(dBm/500 kHz)	(dB)	5 GHz
ANT 793-8DK	14.2	30.0	6.0	-4.1	21.8	0.0	P12
ANT 793-8DJ	13.6	30.0	6.0	-4.1	22.4	0.0	P12
ANT793-8DL	14.0	30.0	6.0	-4.1	22.0	0.0	P12
ANT793-8DP	13.5	30.0	6.0	-4.1	22.5	0.0	P12

Antenna	Gx	Cond. limit	G	PSDmax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm/500 kHz)	(dBi)	(dBm/500 kHz)	(dBm/500 kHz)	(dB)	5 GHz
ANT 795-6DC	9.0	30.0	6.0	-1.2	27.0	0.0	P17
ANT793-6DG	9.0	30.0	6.0	-1.2	27.0	0.0	P17
ANT 795-6MN	8.0	30.0	6.0	-1.2	28.0	0.0	P17
ANT795-6MP	7.0	30.0	6.0	-1.2	29.0	0.0	P17
ANT896-6MM	7.0	30.0	6.0	-1.2	29.0	0.0	P17

3 Port mode (all ports are active):

Output power:

Antenna	Gx	Cond. limit	G	Amax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)	5 GHz
ANT 793-8DK	14.2	30.0	6.0	11.0	21.8	0.0	P12
ANT 793-8DJ	13.6	30.0	6.0	11.0	22.4	0.0	P12
ANT793-8DL	14.0	30.0	6.0	11.0	22.0	0.0	P12
ANT793-8DP	13.5	30.0	6.0	11.0	22.5	0.0	P12

Antenna	Gx	Cond. limit	G	Amax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)	5 GHz
ANT 795-6DC	9.0	30.0	6.0	15.9	27.0	0.0	P17
ANT793-6DG	9.0	30.0	6.0	15.9	27.0	0.0	P17
ANT 795-6MN	8.0	30.0	6.0	15.9	28.0	0.0	P17
ANT795-6MP	7.0	30.0	6.0	15.9	29.0	0.0	P17
ANT896-6MM	7.0	30.0	6.0	15.9	29.0	0.0	P17

PSD:

Antenna	Gx	Cond. limit	G	PSDmax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm/500 kHz)	(dBi)	(dBm/500 kHz)	(dBm/500 kHz)	(dB)	5 GHz
ANT 793-8DK	14.2	30.0	6.0	-4.1	21.8	0.0	P12
ANT 793-8DJ	13.6	30.0	6.0	-4.1	22.4	0.0	P12
ANT793-8DL	14.0	30.0	6.0	-4.1	22.0	0.0	P12
ANT793-8DP	13.5	30.0	6.0	-4.1	22.5	0.0	P12

Antenna	Gx	Cond. limit	G	PSDmax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm/500 kHz)	(dBi)	(dBm/500 kHz)	(dBm/500 kHz)	(dB)	5 GHz
ANT 795-6DC	9.0	30.0	6.0	0.8	27.0	0.0	P17
ANT793-6DG	9.0	30.0	6.0	0.8	27.0	0.0	P17
ANT 795-6MN	8.0	30.0	6.0	0.8	28.0	0.0	P17
ANT795-6MP	7.0	30.0	6.0	0.8	29.0	0.0	P17
ANT896-6MM	7.0	30.0	6.0	0.8	29.0	0.0	P17

Defacto limit according to FCC Part 15, Section 15.407(a)(3):
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Frequency (MHz)	Maximum EIRP limit	
	(dBm)	(Watt)
5725 - 5850	36	4.0

Frequency (MHz)	Maximum radiated PSD limit	
	(dBm/500 kHz)	(Watt/500 kHz)
5725 - 5850	36	4.0

The requirements are **FULFILLED.**

Remarks: The used antennas requires neither reduction of the output power nor PSD.

5.6 Unwanted emissions in restricted bands, conducted

For test instruments and accessories used see section 6 Part **SEC 1, 2** and **SEC 3**.

5.6.1 Description of the test location

Test location: NONE

Remarks: This measurement is already documented in the test report T35222-06-00HS.

5.7 Unwanted emissions, radiated

For test instruments and accessories used see section 6 Part **SER 1, SER 2, SER 3**.

5.7.1 Description of the test location

Test location: NONE

Remarks: This measurement is already documented in the test report T35222-06-00HS.

5.1 Antenna application

5.1.1 Applicable standard

According to FCC Part 15C, Section 15.203:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited.

The EUT use the listed antennas for MIMO technique. The equipment connector is subject to the end product.

Remarks:

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Next Verif.
CPC 3	FSW43	02-02/11-15-001	05/08/2016	05/08/2015		
MB	FSW43	02-02/11-15-001	05/08/2016	05/08/2015		