

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CWLAN_RM-927_11.docx	Date of Report:	29-Aug-2013
Number of pages:	34	Customer's Contact person:	Victoria Abadilla
Testing laboratory:	TCC Nokia San Diego Laboratory 16620 West Bernardo Drive San Diego, CA 92127 USA Tel. +1 858 831 5000 Fax. +1 858 831 6500	Customer:	Nokia, Inc. 16620 West Bernardo Drive San Diego, CA 92127 USA Tel. +1 858 831 5000 Fax. +1 858 385 1598
FCC listing no.:	586140		
IC recognition no.:	10162A-1		
Tested devices/ accessories:	Phone RM-927 / Dummy Battery SD-217R		
FCC ID:	QMND	IC:	661X-D
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003), DTS procedures KDB 558074, IC standards. Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.		
Test Results:	The EUT complies with the requirements in respect of all parameters subject to the test. The test results relate only to devices specified in this document		
Date and signature for the contents:			

Tyrone Hawes, Specialist

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	20-Jul-2013
Testing completed	28-Aug-13
The customer's contact person	Victoria Abadilla
Test Plan referred to	T:\Projects\RM-927\TestPlan\RS_testplan_RM-927.xlsm
Notes	-
Document name	T:\Projects\RM-927\EMC\FCC15CWLAN_RM-927_11.docx

1.1. EUT and Accessory Information

The EUT is a mobile phone with following features:
GSM/CDMA/WCDMA/LTE/WLAN/Bluetooth
The EUT is tested with maximum rated TX power.

Devices under tests

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-927	355906050012748	0161	-	1028.0305.1329.2000	30738
Dummy Battery	SD-217R	50346	0.3	-	-	30742

1.2. Summary of Test Results

5 GHz RLAN:

Section in CFR 47	Section in RSS-GEN or RSS-210	Name of the test	Result
15.247(b)(1)	A8(0.4(4))	Conducted peak output power	PASSED
15.247(d), 15.205(b)	A8(0.5)	Band edge compliance of RF emissions	NP
15.247(d)	A8(0.5)	Spurious RF conducted emissions	PASSED
15.247(d), 15.209	A8(0.5)	Spurious radiated emissions	NP
15.207	7.2.2	AC powerline conducted emissions	NP
15.247(a)(2)	A8(0.1(1))	6dB(bandwidth)	PASSED
15.247(e)	A8(0.1(2))	Power spectral density	PASSED

PASSED
FAILED
NP

The EUT complies with the essential requirements in the standard.
The EUT does not comply with the essential requirements in the standard.
The test was not performed by the TCC Nokia Laboratory.

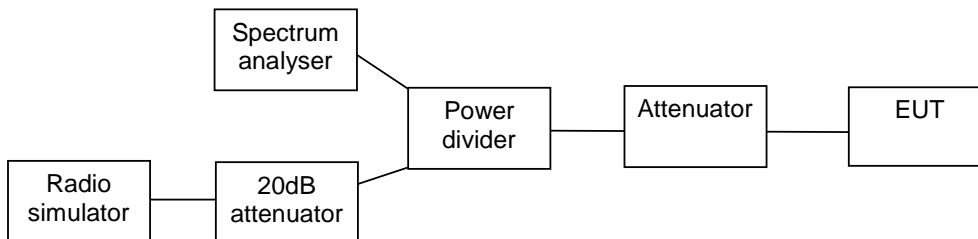
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2. Conducted peak output power (15.247(b)(1), RSS-210 A8.4 (4))

EUT with DUT number	RM-927, DUT 30738
Accessories with DUT numbers	SD-217R, DUT 30742
Operation Voltage [V] / [Hz]	3.8V DC
Results	PASSED
Remarks	
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20.5 / 50 / 1050
Date of measurements	28-Aug-2013
Measured by	Tyrone Hawes

2.1. Test Setup



2.2. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

Limits for conducted peak output power measurements

Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5 5725 - 5850	<= 1	<= 30

2.3. Power results summary

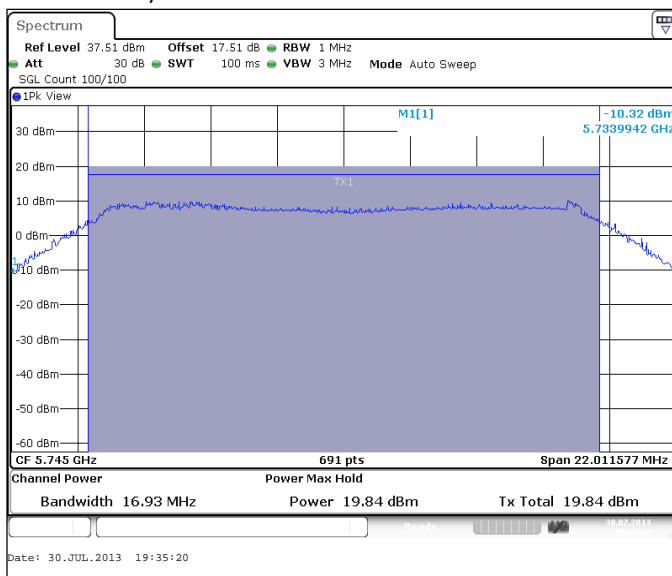
Channel / f_c [MHz]	Mode	Modulation	Data rate	Level [dBm]
149 / 5745	802.11a	BPSK	9 Mbps	19.84
157 / 5785	802.11a	BPSK	9 Mbps	22.08
165 / 5825	802.11a	BPSK	9 Mbps	20.37
149 / 5745	802.11n	QPSK	13.0 / 14.4 Mbps	20.15
157 / 5785	802.11n	QPSK	13.0 / 14.4 Mbps	22.62
165 / 5825	802.11n	QPSK	13.0 / 14.4 Mbps	20.78
149+153 / 5755	802.11n	BPSK	13.5 / 15.0 Mbps	15.12
157+161 / 5795	802.11n	BPSK	13.5 / 15.0 Mbps	15.89
149+153 / 5755	802.11n	QPSK	27.0 / 30.0 Mbps	15.02
157+161 / 5795	802.11n	QPSK	27.0 / 30.0 Mbps	15.7
149-161 / 5775	802.11ac	BPSK	29.3 / 32.5 Mbps	16.75
149-161 / 5775	802.11ac	QPSK	58.5 / 65.0 Mbps	16.4

2.4. 5 GHz RLAN Test results

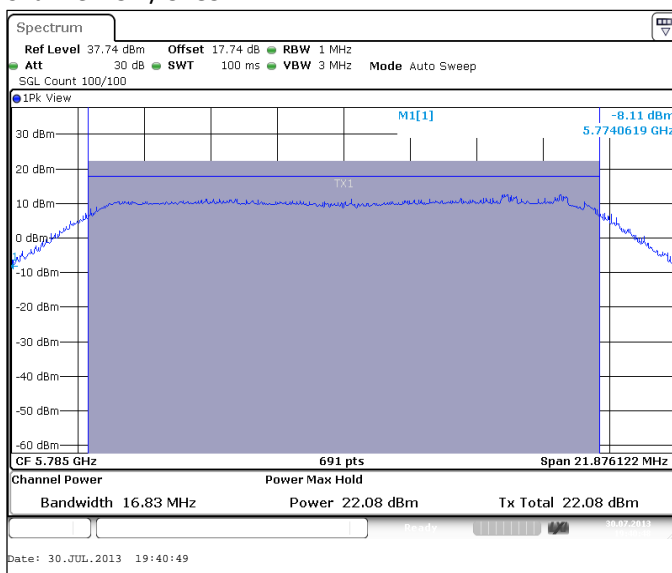
2.4.1 802.11a mode, BPSK modulation, 9 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
149 / 5745	19.84	96.383	PASSED
157 / 5785	22.08	161.436	PASSED
165 / 5825	20.37	108.893	PASSED

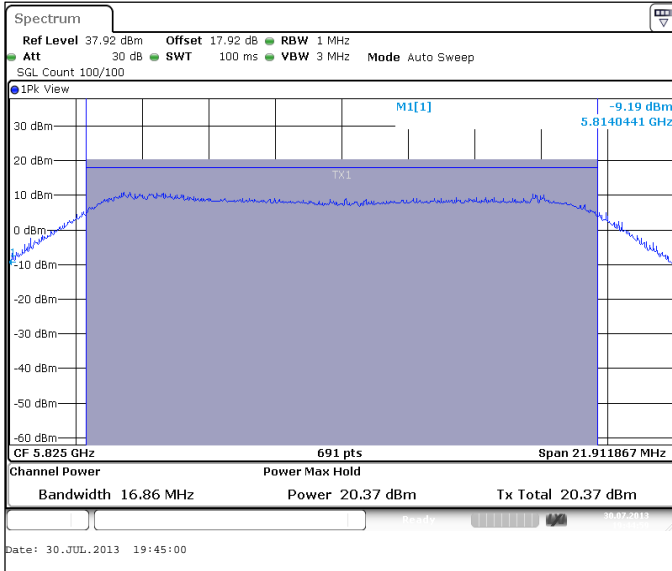
Channel 149 / 5745MHz



Channel 157 / 5785MHz



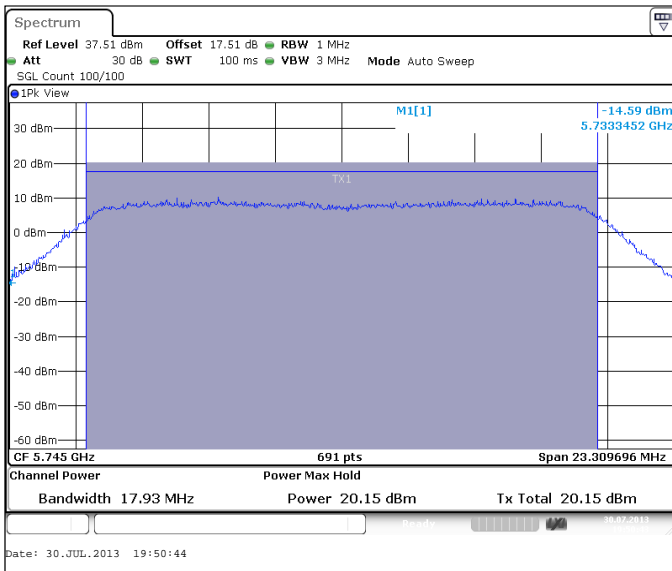
Channel 165 / 5825MHz



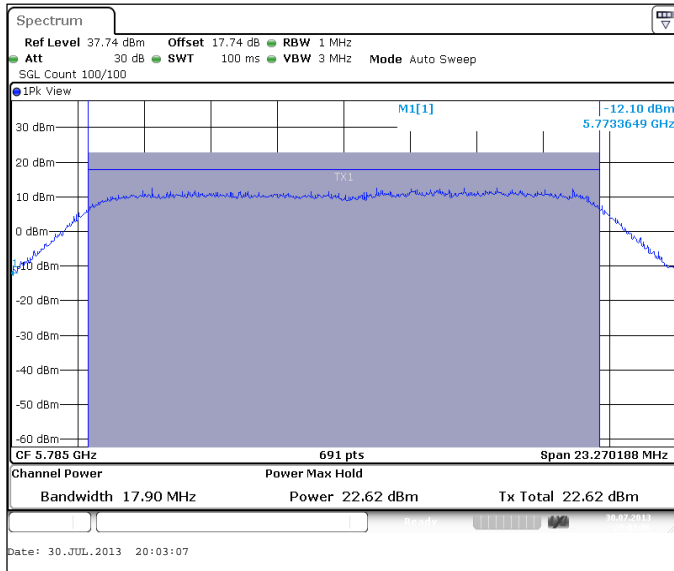
2.4.2 802.11n mode, QPSK modulation, 13.0 / 14.4 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
149 / 5745	20.15	103.514	PASSED
157 / 5785	22.62	182.81	PASSED
165 / 5825	20.78	119.674	PASSED

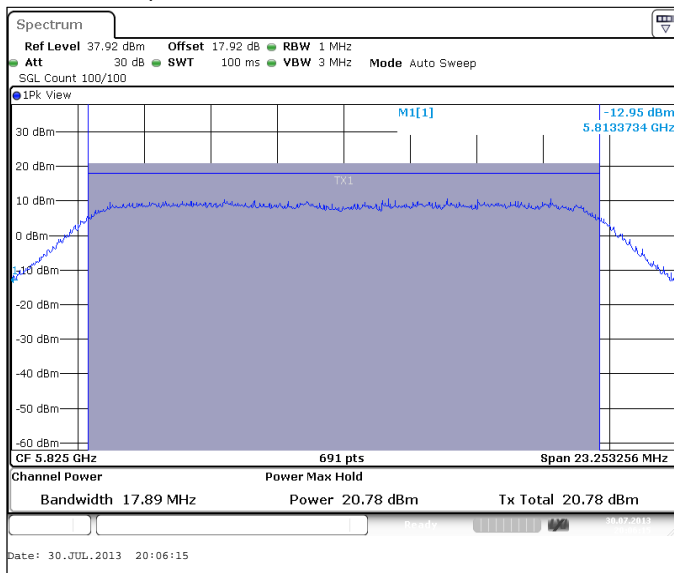
Channel 149 / 5745MHz



Channel 157 / 5785MHz



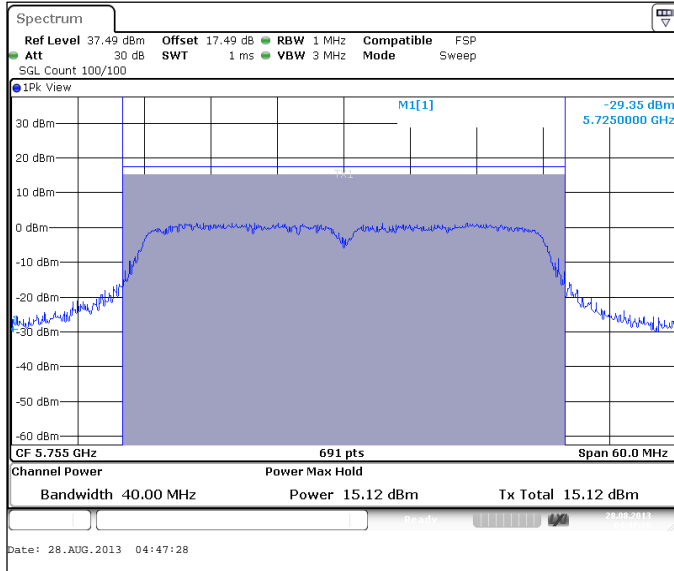
Channel 165 / 5825MHz



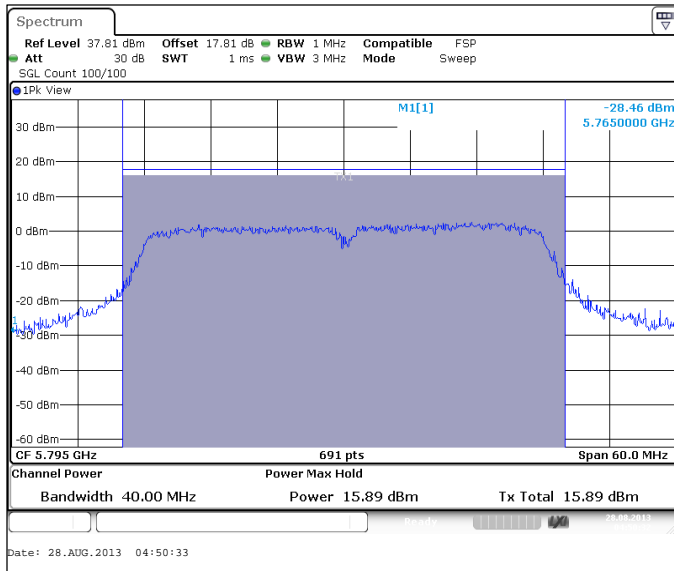
2.4.3 802.11n mode, BPSK modulation, 13.5 / 15.0 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
149+153 / 5755	15.12	32.509	PASSED
157+161 / 5795	15.89	38.815	PASSED

Channel 149+153 / 5755MHz



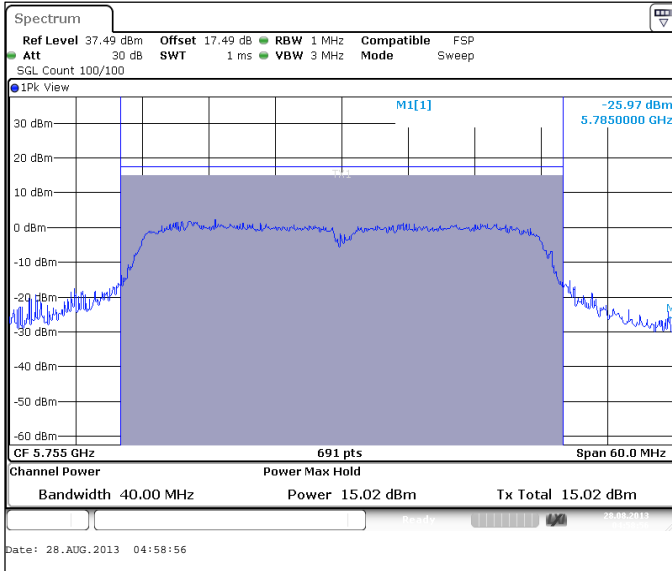
Channel 157+161 / 5795MHz



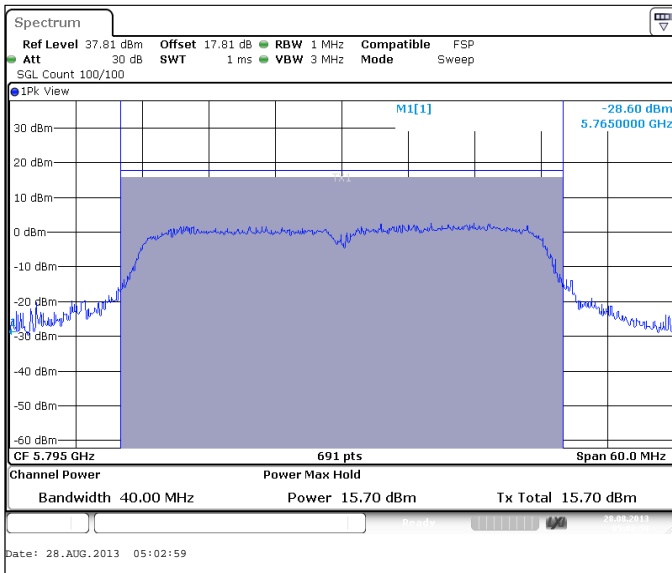
2.4.4 802.11n mode, QPSK modulation, 27.0 / 30.0 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
149+153 / 5755	15.02	31.769	PASSED
157+161 / 5795	15.7	37.154	PASSED

Channel 149+153 / 5755MHz



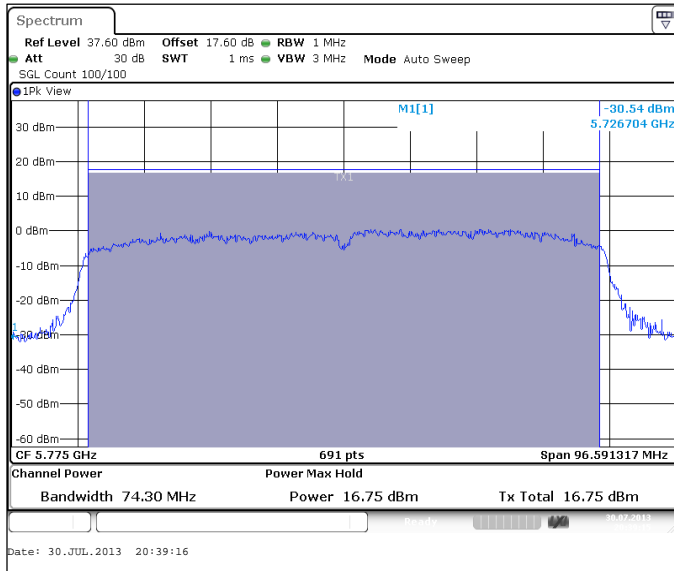
Channel 157+161 / 5795MHz



2.4.5 802.11ac mode, BPSK modulation, 29.3 / 32.5 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
149-161 / 5775	16.75	47.315	PASSED

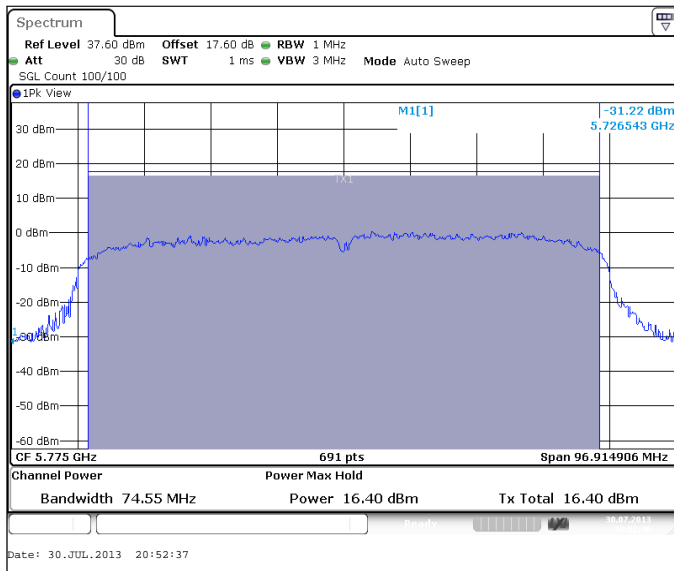
Channel 149-161 / 5775MHz



2.4.6 802.11ac mode, QPSK modulation, 58.5 / 65.0 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
149-161 / 5775	16.4	43.652	PASSED

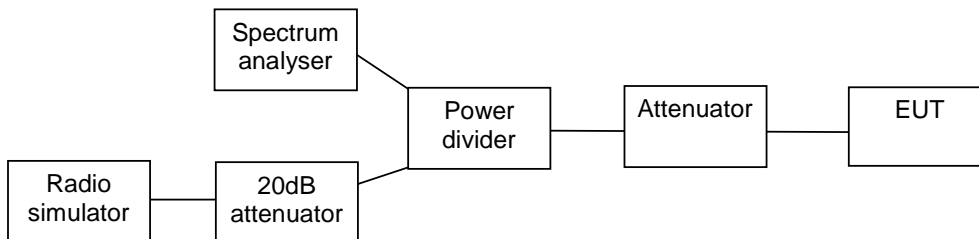
Channel 149-161 / 5775MHz



3. Spurious RF conducted emissions (FCC §15.247(d), RSS-210 A8.5)

EUT with DUT number	RM-927, DUT 30738
Accessories with DUT numbers	SD-217R, DUT 30742
Operation Voltage [V] / [Hz]	3.8V DC
Results	PASSED
Remarks	
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20.5 / 51.1 / 1050
Date of measurements	30-Jul-2013
Measured by	Feng You

3.1. Test Setup



3.2. Test method and limit

The measurement is made according to Public notice KDB 558 074 and IC standard RSS-210.

The reference level for the -20 dBc measurement was obtained as instructed in section 11.2 of the KDB 558074, using span of 1.5 times the OBW.

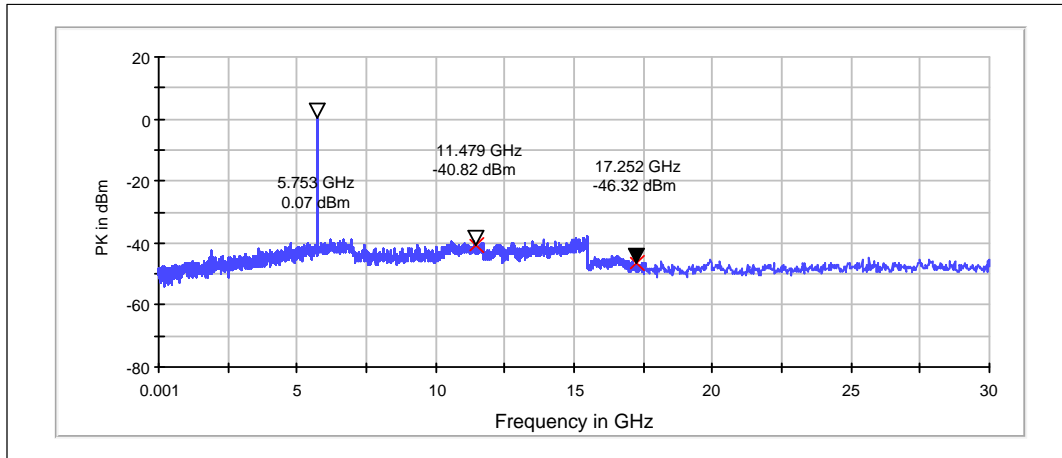
Limits for spurious RF conducted emissions measurements

Frequency range [MHz]	Limit [dBc]
1 – 30000	<= -20

3.3. 5 GHz RLAN Test results

3.3.1 802.11a mode, BPSK modulation, 9 Mbps data rate

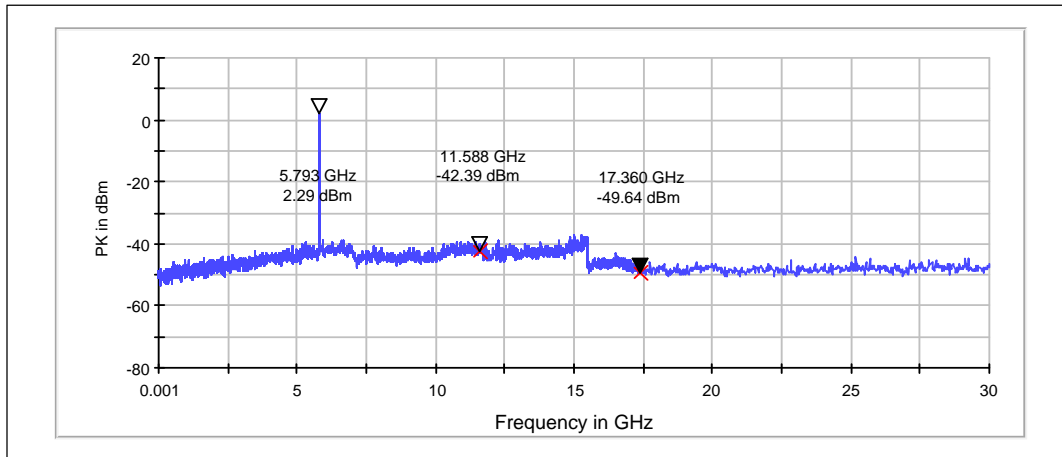
Channel 149 / 5745MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11478.800	-40.82	PASSED
17252.000	-46.32	PASSED

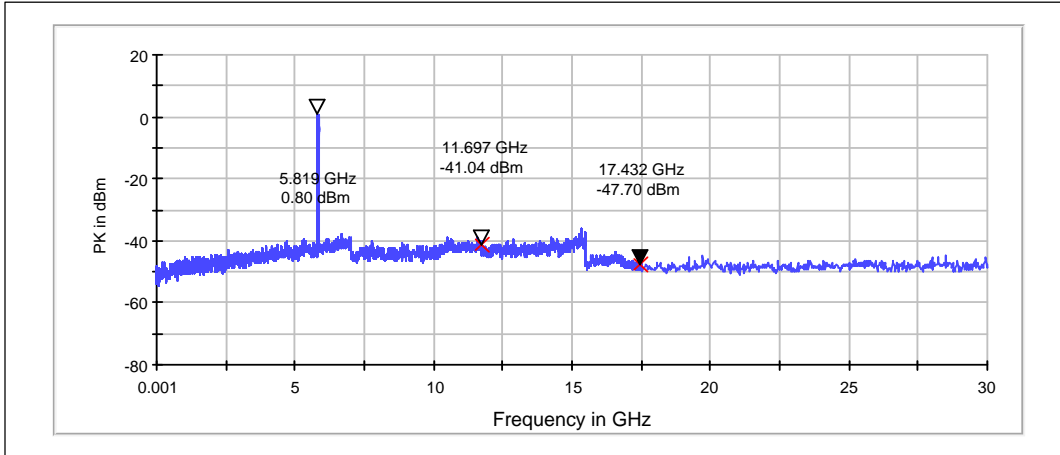
Channel 157 / 5785MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11588.000	-42.39	PASSED
17360.000	-49.64	PASSED

Channel 165 / 5825MHz

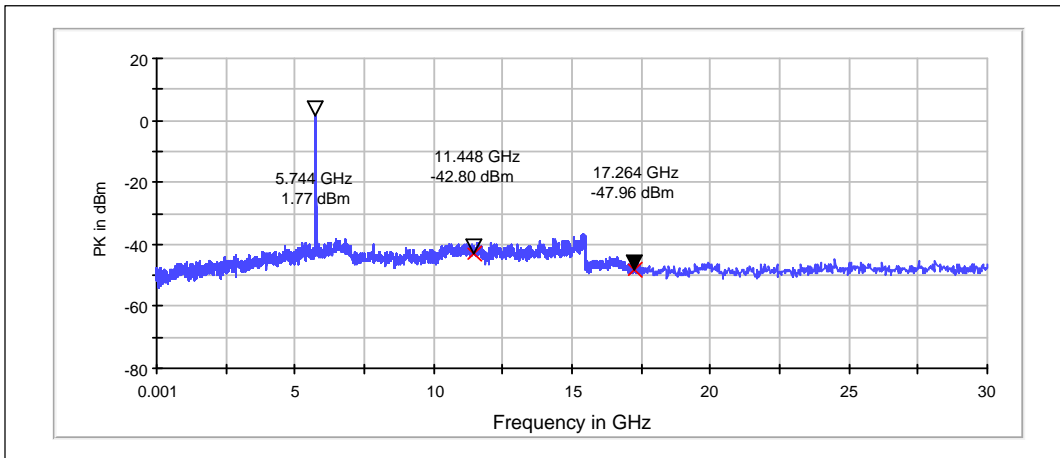


Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11697.200	-41.04	PASSED
17432.000	-47.70	PASSED

3.3.2 802.11n mode, QPSK modulation, 13.0 / 14.4 Mbps data rate

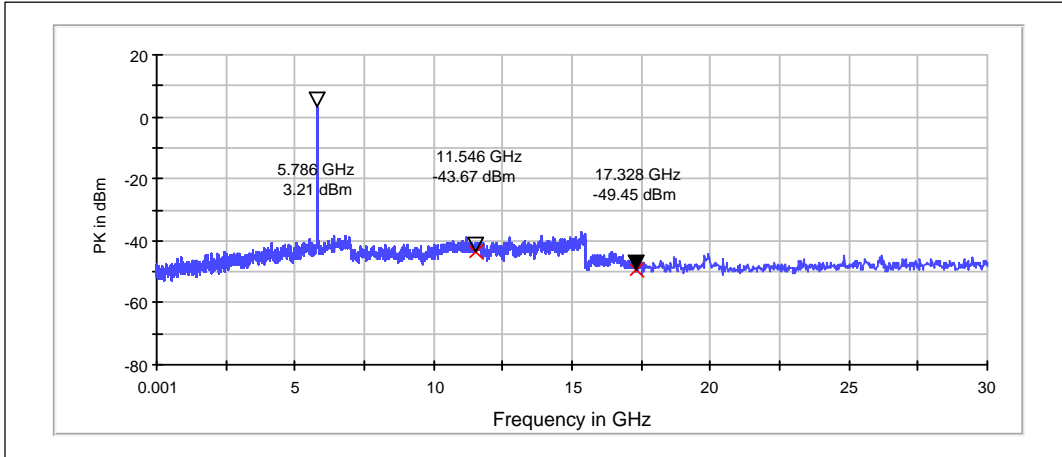
Channel 149 / 5745MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11448.000	-42.80	PASSED
17264.000	-47.96	PASSED

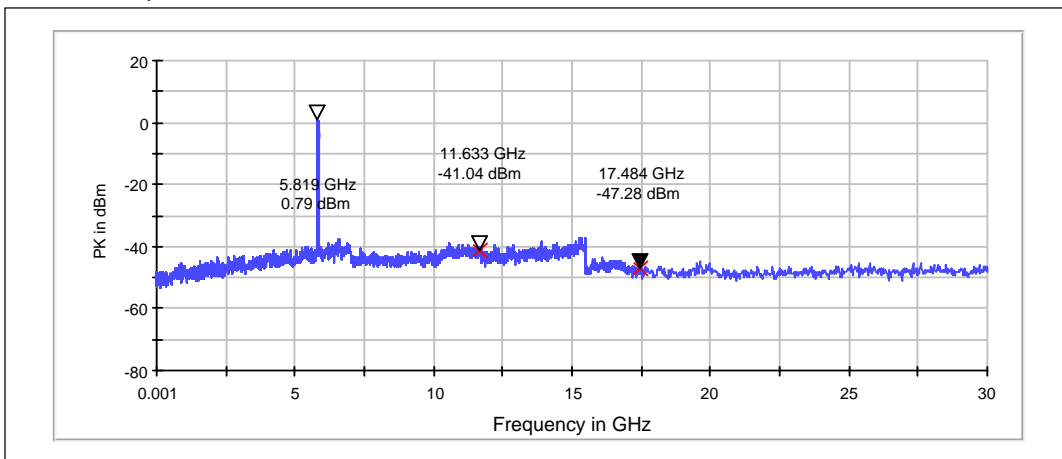
Channel 157 / 5785MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11546.000	-43.67	PASSED
17328.000	-49.45	PASSED

Channel 165 / 5825MHz

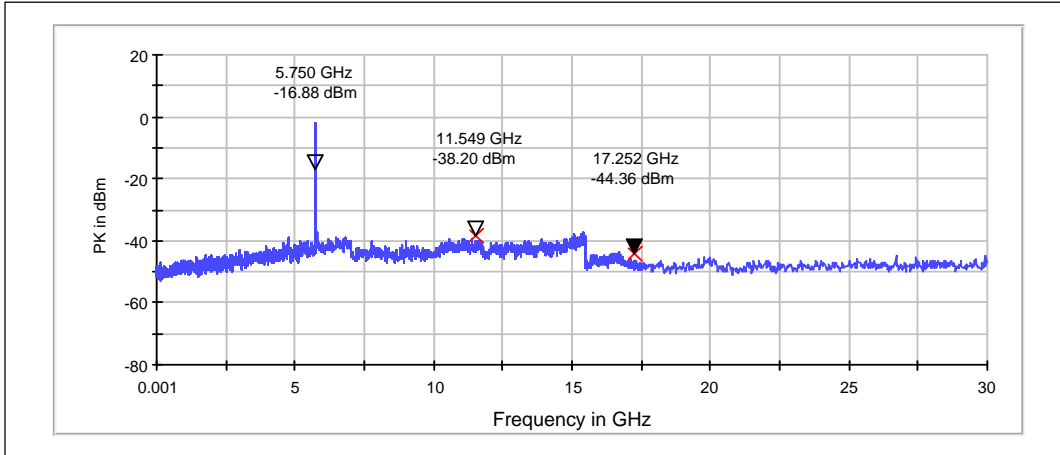


Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11632.800	-41.04	PASSED
17484.000	-47.28	PASSED

3.3.3 802.11n mode, BPSK modulation, 13.5 / 15.0 Mbps data rate

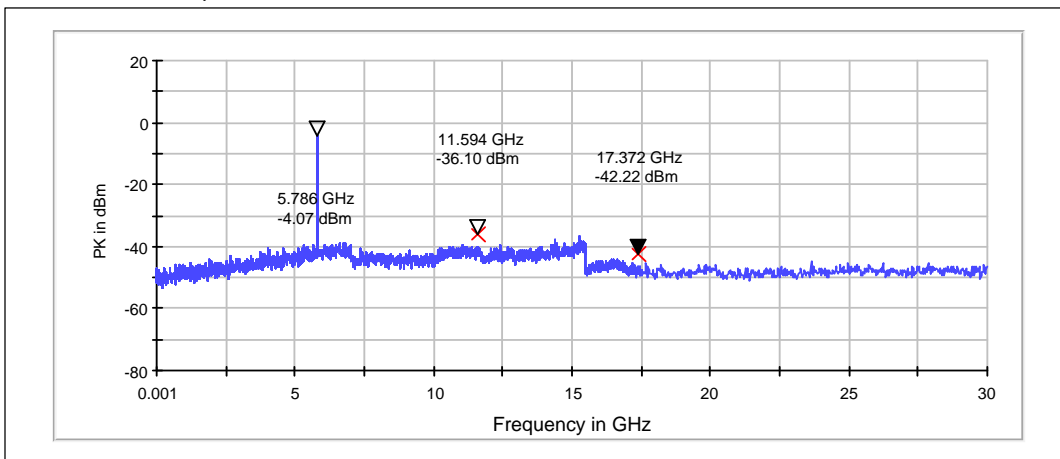
Channel 149+153 / 5755MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11548.800	-38.20	PASSED
17252.000	-44.36	PASSED

Channel 157+161 / 5795MHz

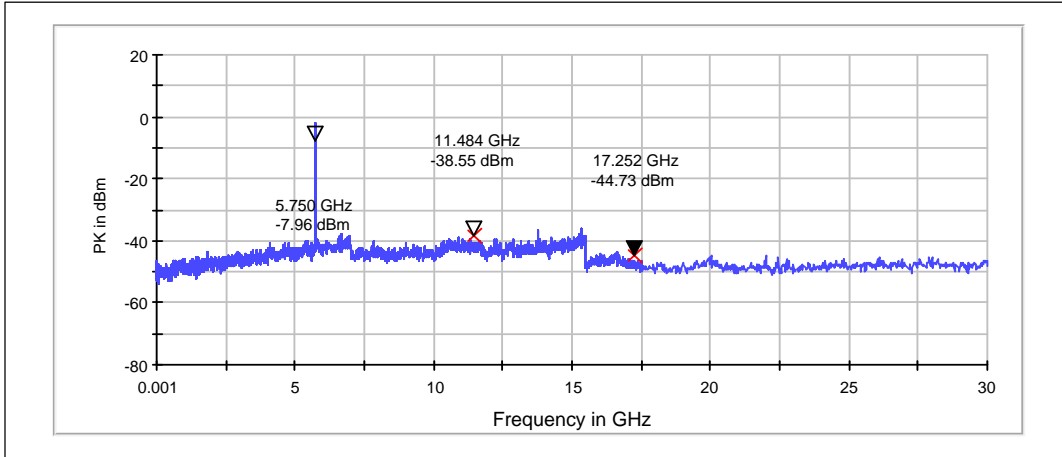


Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11593.600	-36.10	PASSED
17372.000	-42.22	PASSED

3.3.4 802.11n mode, QPSK modulation, 27.0 / 30.0 Mbps data rate

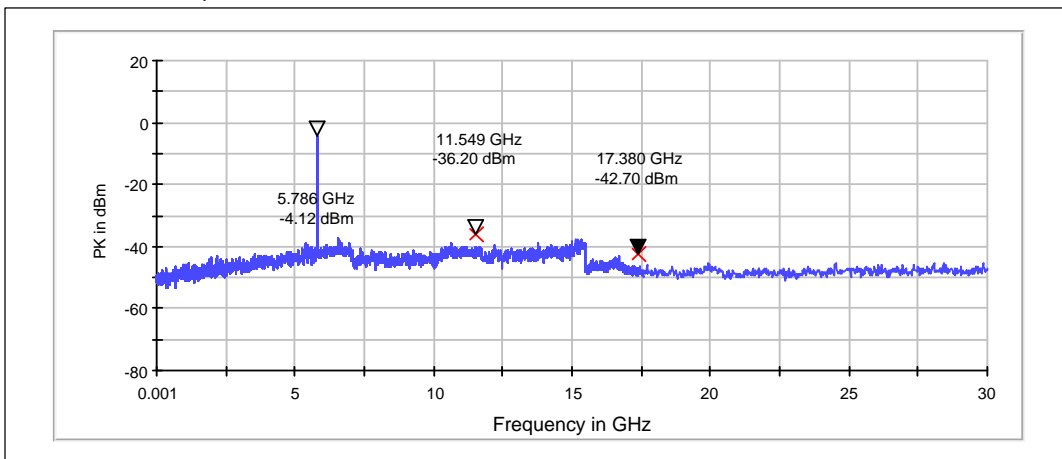
Channel 149+153 / 5755MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11484.400	-38.55	PASSED
17252.000	-44.73	PASSED

Channel 157+161 / 5795MHz

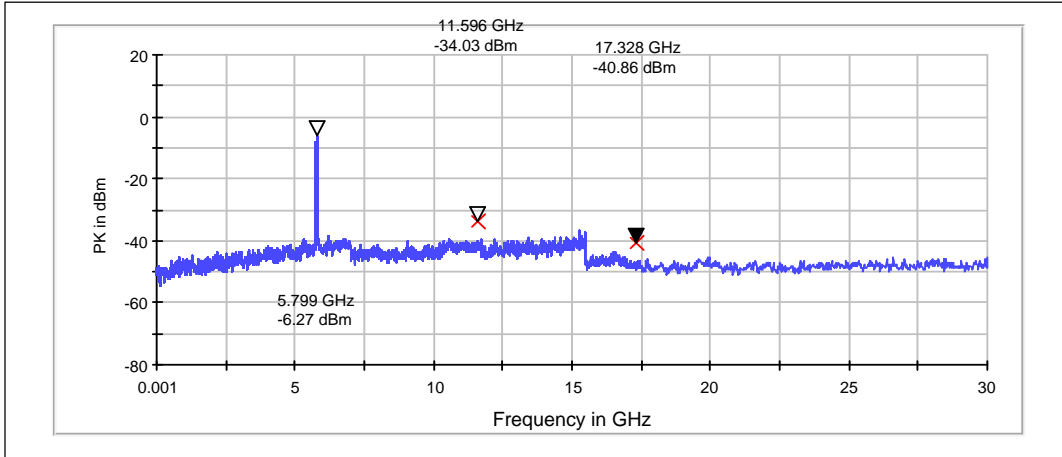


Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11548.800	-36.20	PASSED
17380.000	-42.70	PASSED

3.3.5 802.11ac mode, BPSK modulation, 29.3 / 32.5 Mbps data rate

Channel 149-161 / 5775MHz

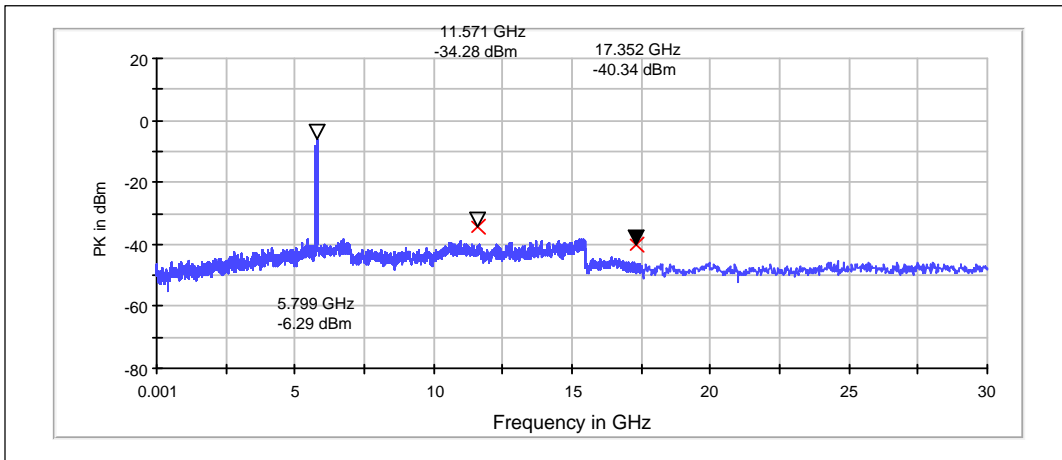


Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11596.400	-34.03	PASSED
17328.000	-40.86	PASSED

3.3.6 802.11ac mode, QPSK modulation, 58.5 / 65.0 Mbps data rate

Channel 149-161 / 5775MHz



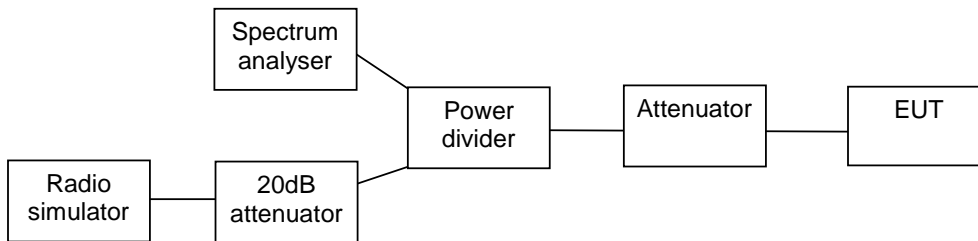
Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11571.200	-34.28	PASSED
17352.000	-40.34	PASSED

4. 6 dB bandwidth
(FCC §15.247(a)(2), RSS-210 A8.2 (1))

EUT with DUT number	RM-927, DUT 30738
Accessories with DUT numbers	SD-217R, DUT 30742
Operation Voltage [V] / [Hz]	3.8V DC
Results	PASSED
Remarks	
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 50 / 1050
Date of measurements	28-Aug-2013
Measured by	Tyrone Hawes

4.1. Test Setup



4.2. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

Limits for 6 dB bandwidth measurements

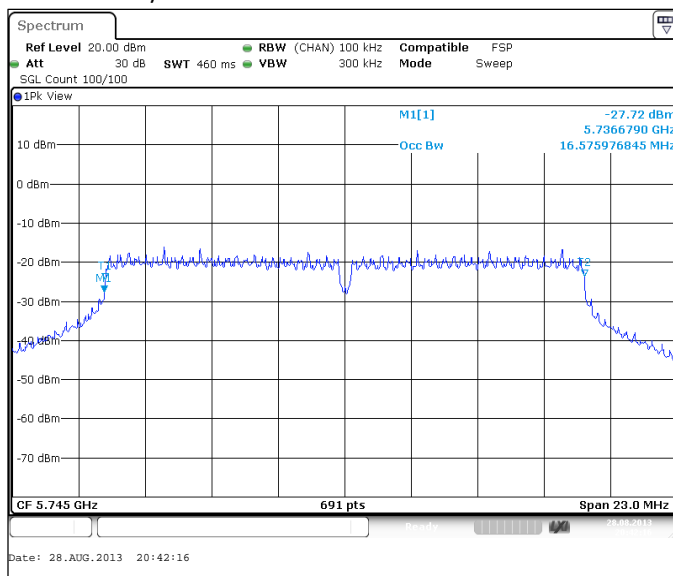
Limit [kHz]
>= 500

4.3. 5 GHz RLAN Test results

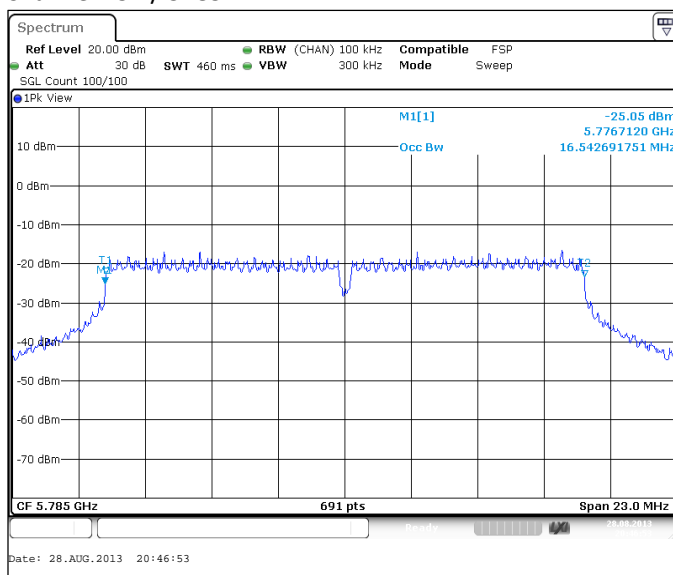
4.3.1 802.11a mode, BPSK modulation, 9 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
149 / 5745	16576	PASSED
157 / 5785	16542.7	PASSED
165 / 5825	16542.7	PASSED

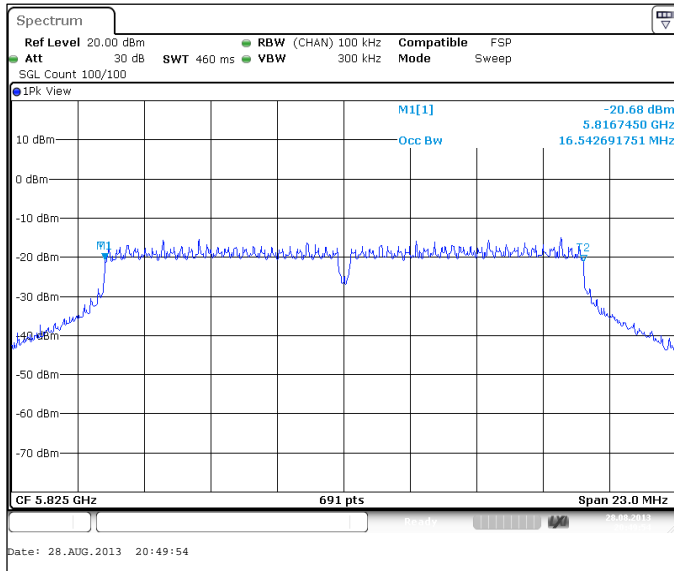
Channel 149 / 5745MHz



Channel 157 / 5785MHz



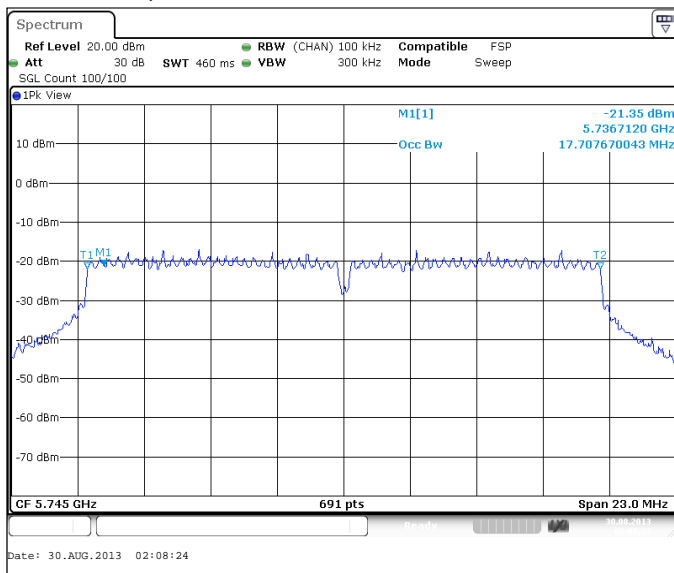
Channel 165 / 5825MHz



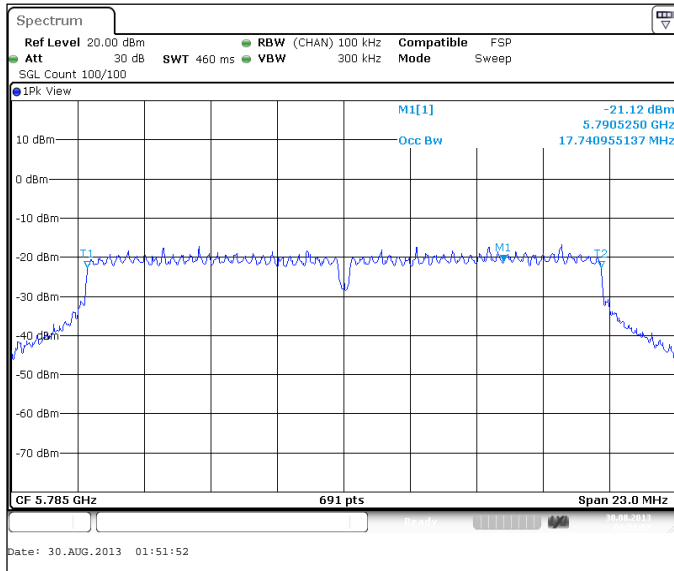
4.3.2 802.11n mode, QPSK modulation, 13.0 / 14.4 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
149 / 5745	17707.7	PASSED
157 / 5785	17741	PASSED
165 / 5825	17674.4	PASSED

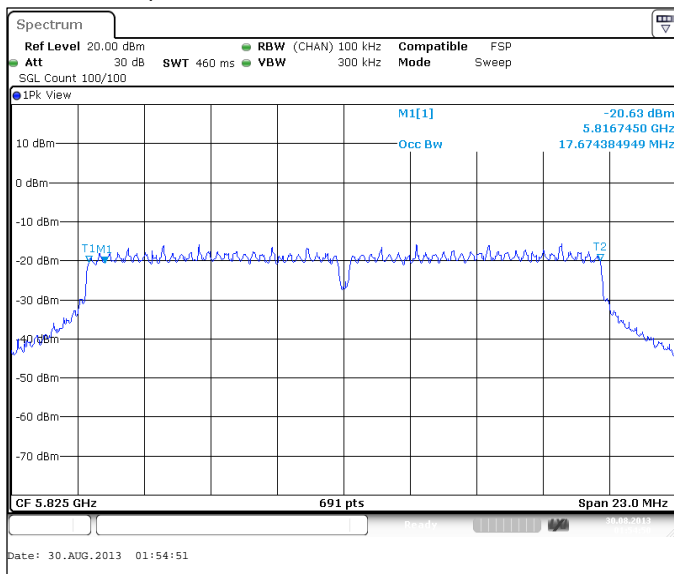
Channel 149 / 5745MHz



Channel 157 / 5785MHz



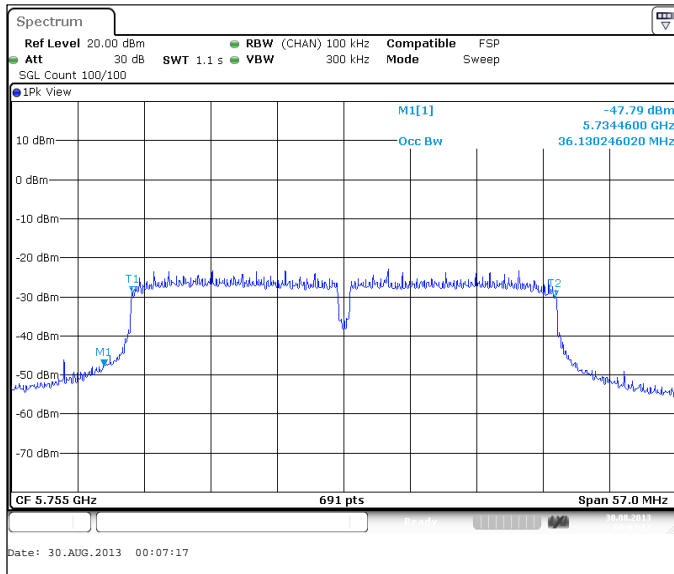
Channel 165 / 5825MHz



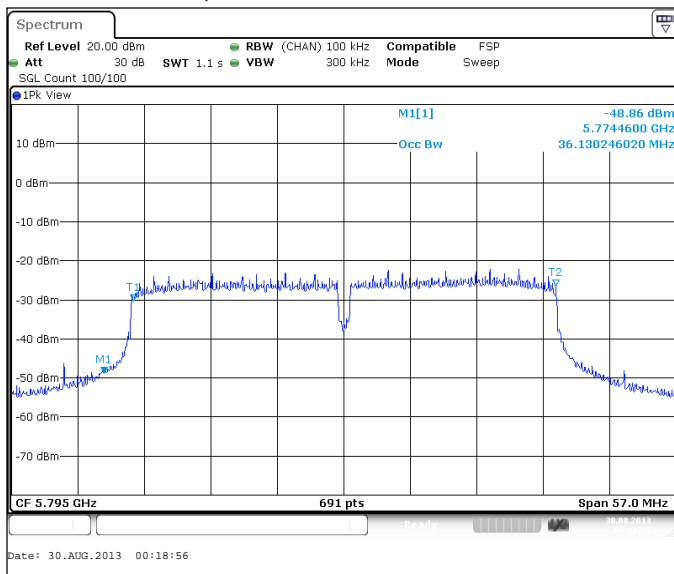
4.3.3 802.11n mode, BPSK modulation, 13.5 / 15.0 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
149+153 / 5755	36130.2	PASSED
157+161 / 5795	36130.2	PASSED

Channel 149+153 / 5755MHz



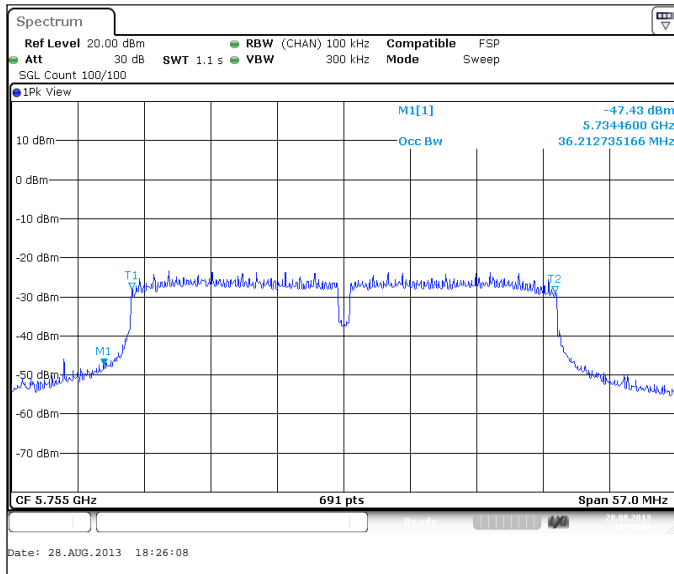
Channel 157+161 / 5795MHz



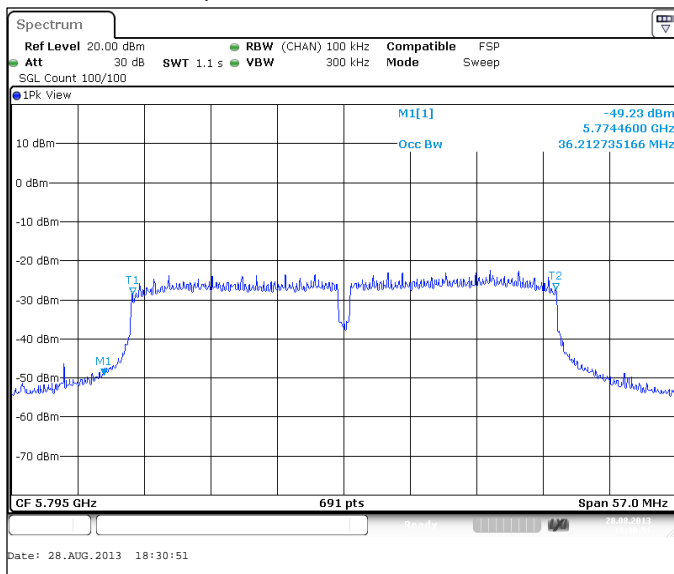
4.3.4 802.11n mode, QPSK modulation, 27.0 / 30.0 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
149+153 / 5755	36212.7	PASSED
157+161 / 5795	36212.7	PASSED

Channel 149+153 / 5755MHz



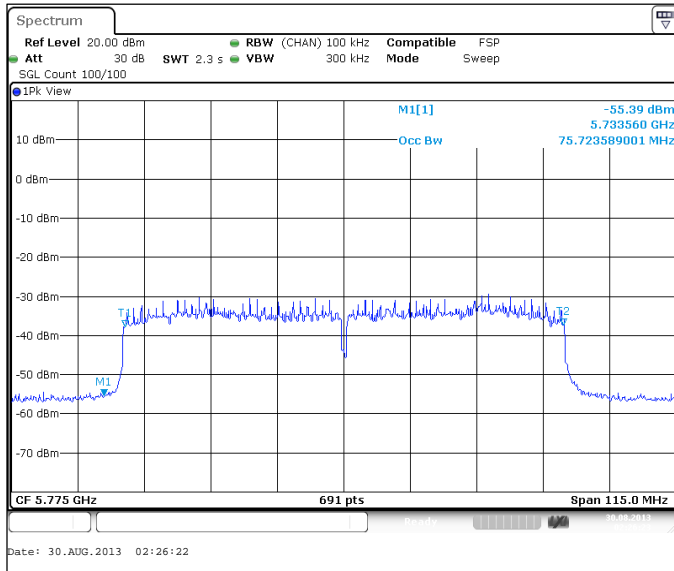
Channel 157+161 / 5795MHz



4.3.5 802.11ac mode, BPSK modulation, 29.3 / 32.5 Mbps data rate

Channel / f_c [MHz]	6 dB bandwidth [kHz]	Result
149-161 / 5775	75723.6	PASSED

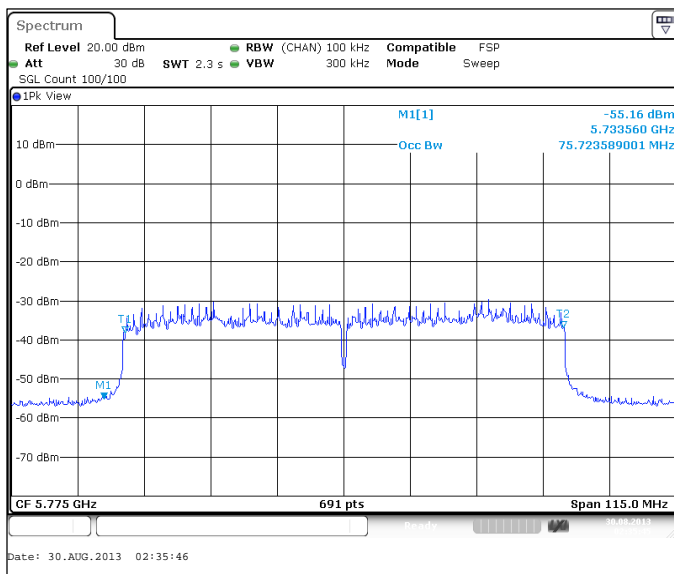
Channel 149-161 / 5775MHz



4.3.6 802.11ac mode, QPSK modulation, 58.5 / 65.0 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
149-161 / 5775	75723.6	PASSED

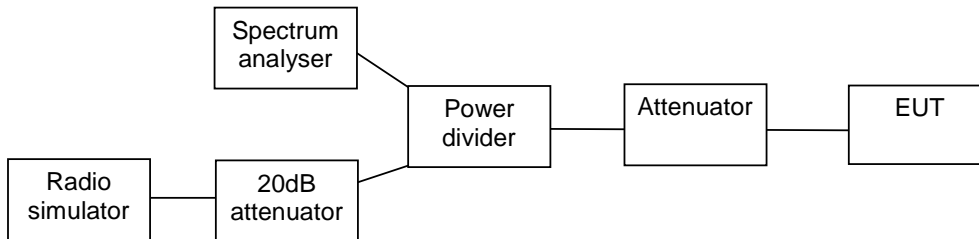
Channel 149-161 / 5775MHz



5. Power spectral density
(FCC §15.247(e), RSS-210 A8.2 (2))

EUT with DUT number	RM-927, DUT 30738
Accessories with DUT numbers	SD-217R, DUT 30742
Operation Voltage [V] / [Hz]	3.8V DC
Results	PASSED
Remarks	
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20/ 50 /1050
Date of measurements	29-Aug-2013
Measured by	Tyrone Hawes

5.1. Test Setup



5.2. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

Limits for power spectral density measurements

Limit [dBm] @ 3 kHz
<= 8

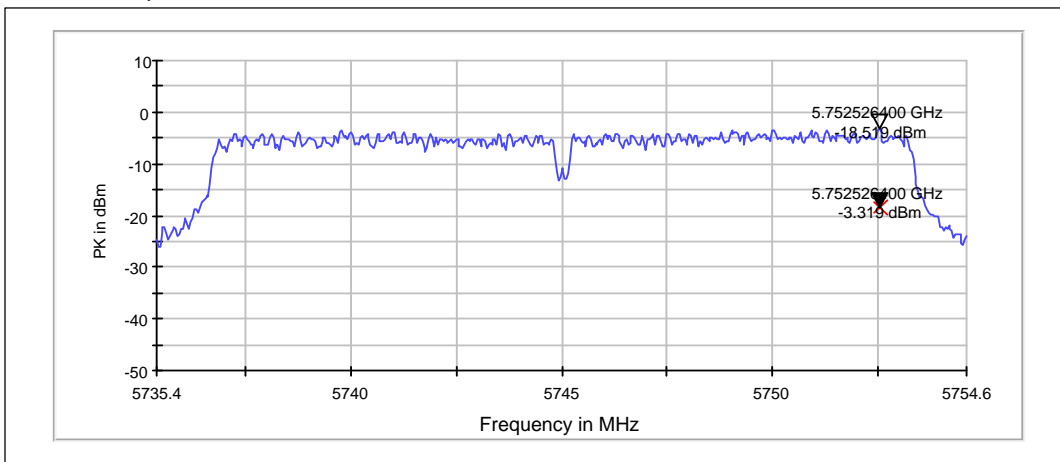
5.3. 5 GHz RLAN Test results

5.3.1 802.11a mode, BPSK modulation, 9 Mbps data rate

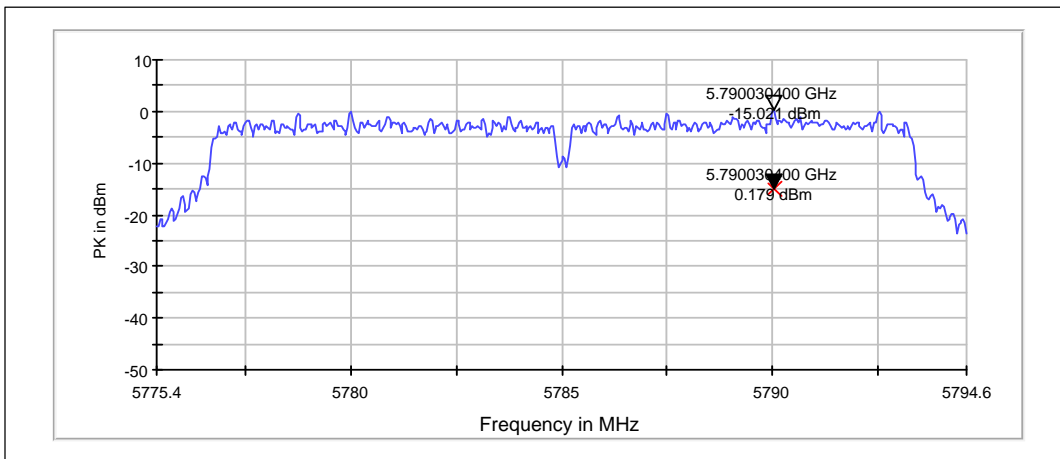
Peak (RBW: 100 kHz, VBW: 300 kHz, Max hold)

Channel / f _c [MHz]	P [dBm]	Result
149 / 5745	-18.52	PASSED
157 / 5785	-15.02	PASSED
165 / 5825	-15.96	PASSED

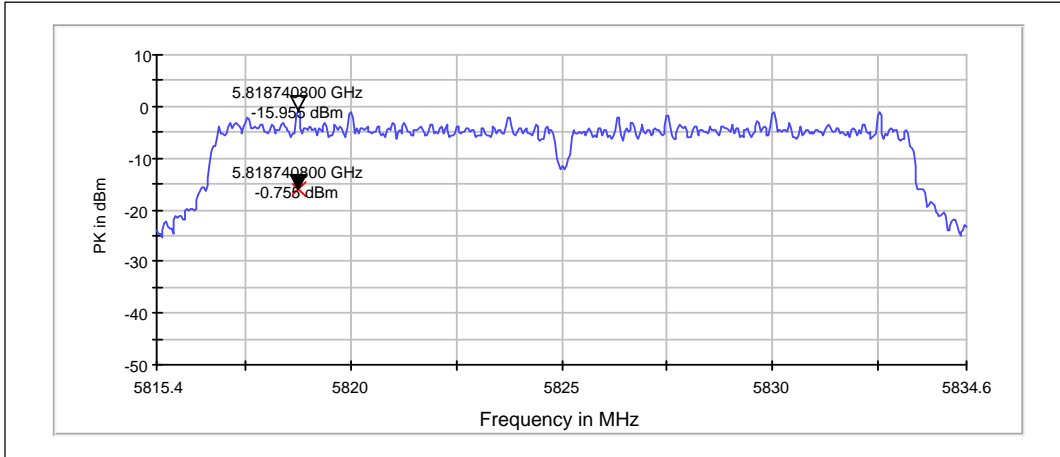
Channel 149 / 5745MHz



Channel 157 / 5785MHz



Channel 165 / 5825MHz

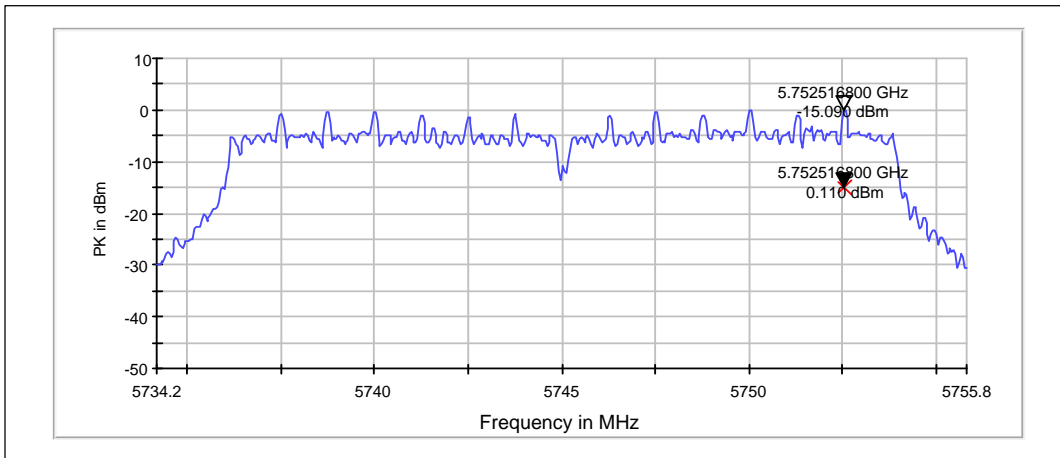


5.3.2 802.11n mode, QPSK modulation, 13.0 / 14.4 Mbps data rate

Peak (RBW: 100 kHz, VBW: 300 kHz, Max hold)

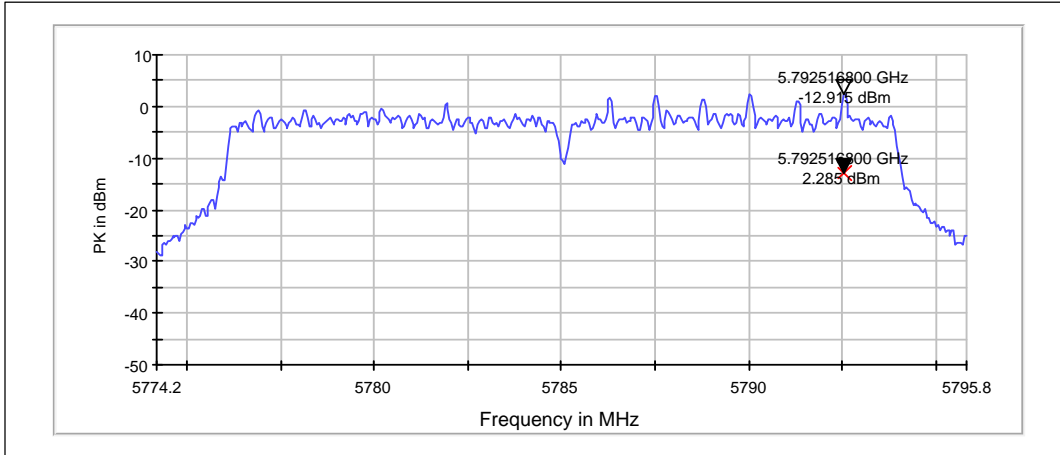
Channel / f _c [MHz]	P [dBm]	Result
149 / 5745	-15.09	PASSED
157 / 5785	-12.92	PASSED
165 / 5825	-17.68	PASSED

Channel 149 / 5745MHz

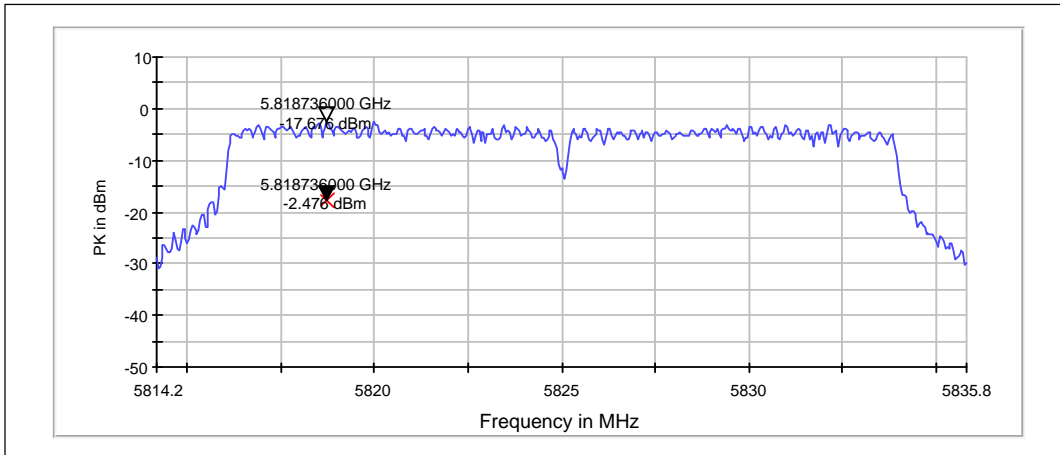


Channel

157 / 5785MHz



Channel 165 / 5825MHz

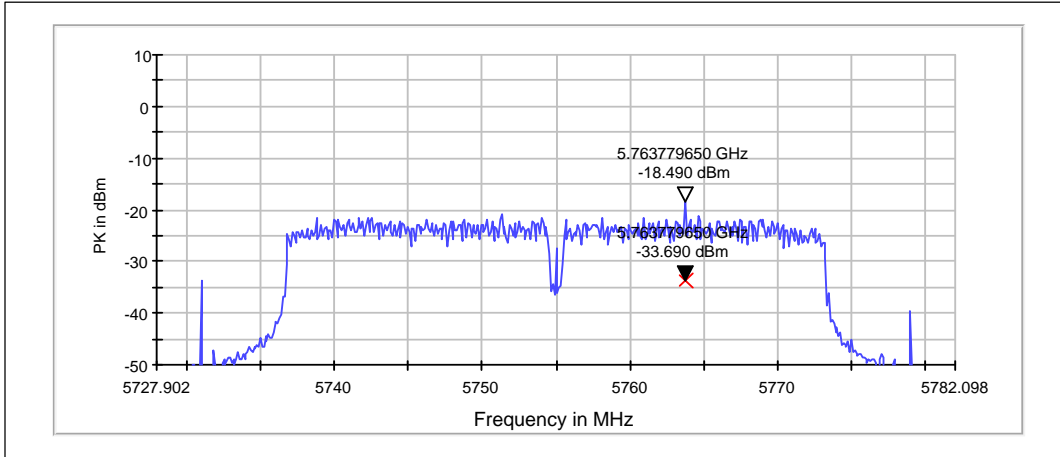


5.3.3 802.11n mode, BPSK modulation, 13.5 / 15.0 Mbps data rate

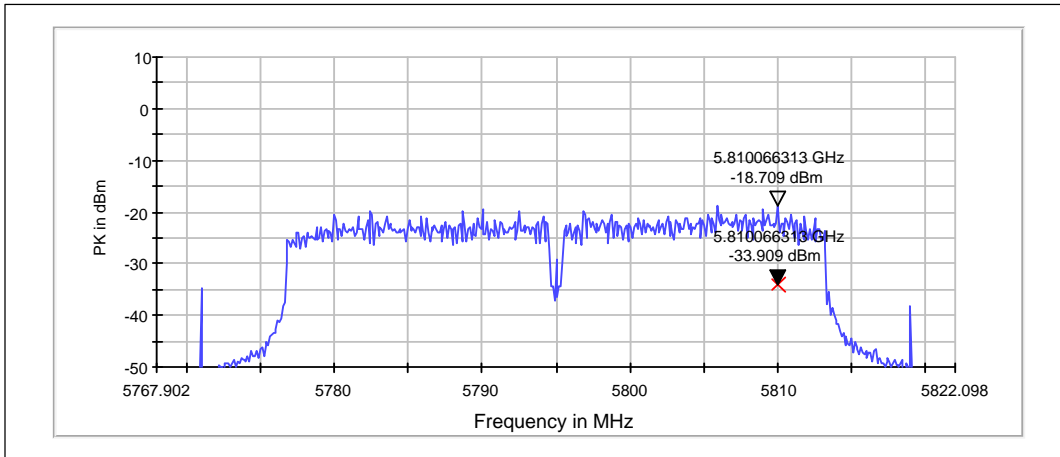
Peak (RBW: 3 kHz, VBW: 10 kHz, Max hold)

Channel / f _c [MHz]	P [dBm]	Result
149+153 / 5755	-33.69	PASSED
157+161 / 5795	-33.91	PASSED

Channel 149+153 / 5755MHz



Channel 157+161 / 5795MHz

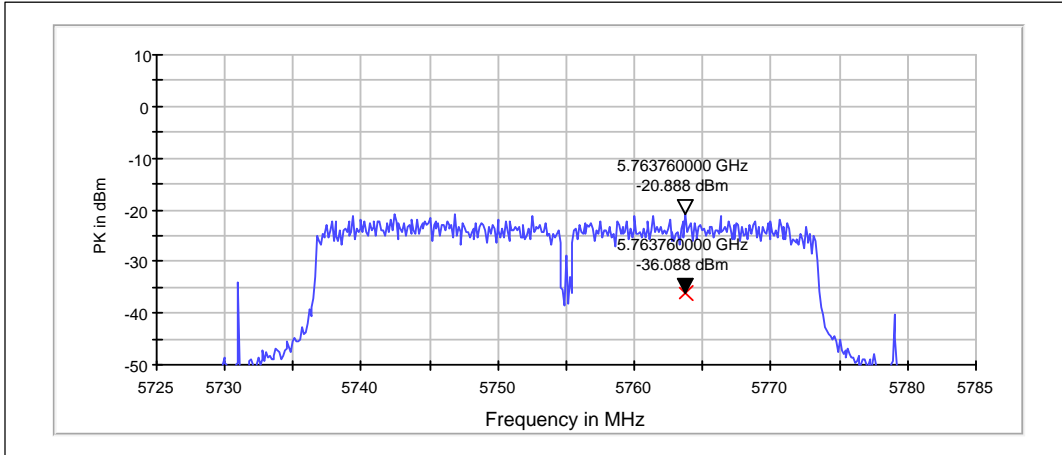


5.3.4 802.11n mode, QPSK modulation, 27.0 / 30.0 Mbps data rate

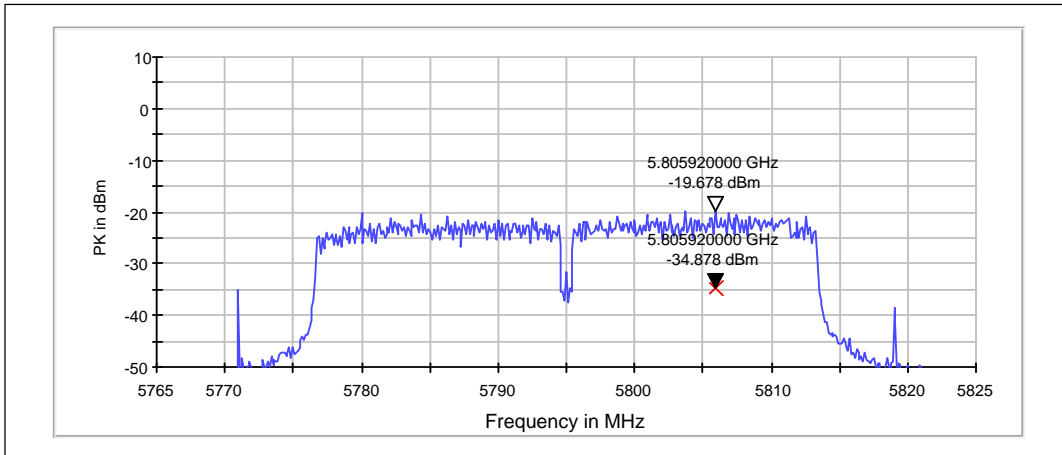
Peak (RBW: 3 kHz, VBW: 10 kHz, Max hold)

Channel / f _c [MHz]	P [dBm]	Result
149+153 / 5755	-36.09	PASSED
157+161 / 5795	-34.88	PASSED

Channel 149+153 / 5755MHz



Channel 157+161 / 5795MHz

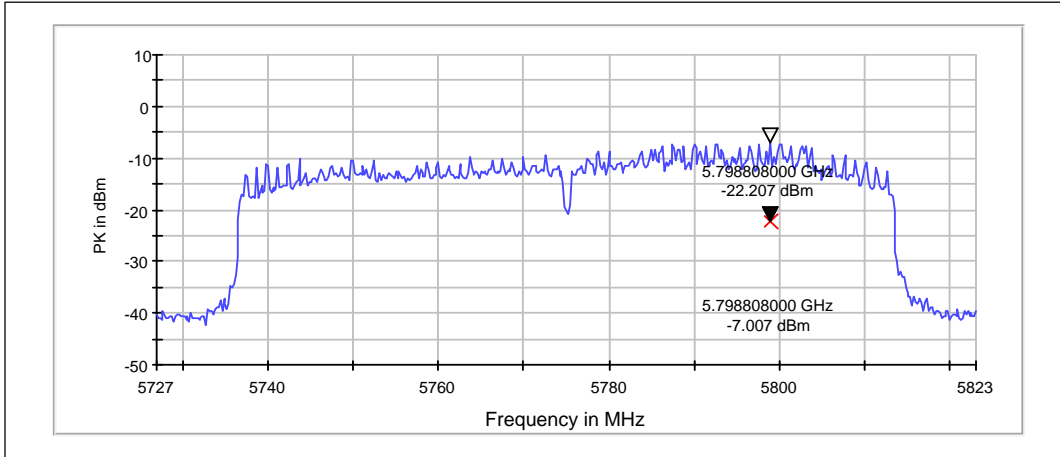


5.3.5 802.11ac mode, BPSK modulation, 29.3 / 32.5 Mbps data rate

Peak (RBW: 100 kHz, VBW: 300 kHz, Max hold)

Channel / f _c [MHz]	P [dBm]	Result
149-161 / 5775	-22.21	PASSED

Channel 149-161 / 5775MHz

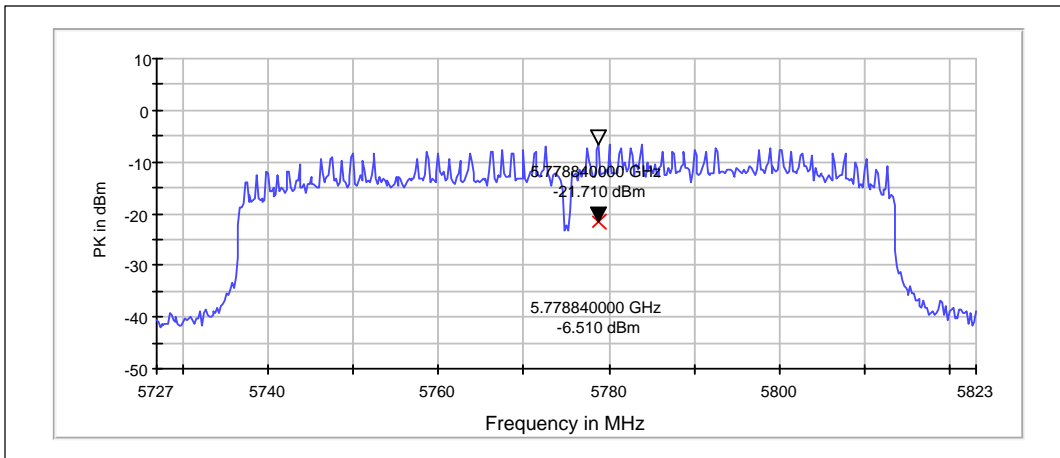


5.3.6 802.11ac mode, QPSK modulation, 58.5 / 65.0 Mbps data rate

Peak (RBW: 100 kHz, VBW: 300 kHz, Max hold)

Channel / f _c [MHz]	P [dBm]	Result
149-161 / 5775	-21.71	PASSED

Channel 149-161 / 5775MHz



6. Test Equipment

6.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
4406	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
7602	Communication Tester	CMW500	R&S	22/24/27, 15C, 15B
7151	Bluetooth Tester	CBT	R&S	15B
-	GPS RX Antenna w/AMP	L1A-PM-NF	GPS Source	15C
-	GPS Inline amplifier	A11M-V-NF-NM	GPS Source	15C
-	GPS signal Splitter	S12-P110/5-NF	GPS Source	15C
-	GPS TX Antenna	L1P-PV-NF	GPS Source	15C
7912	Spectrum Analyzer	FSV-30	R&S	22/24/27, 15C
-	Thermal Chamber	VT-4002	Vötsch	22/24/27, 15C
-	Power splitter	11667B	Agilent	22/24/27, 15C
3396	EMC Analyzer	E7405A	HP	-
7451	EMI Receiver	ESU-26	R&S	22/24/27, 15C, 15B
4188	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
6981	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
-	Pulse Limiter	ESH3-Z2	R&S	15C, 15B
7582	Signal Generator	SMB100A	R&S	15C, 15B

6.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
7591	Antenna	HL562	R&S	22/24/27, 15C, 15B
7572	Double Ridge Horn Antenna	3117	ETS-Lindgren	22/24/27, 15C
7607	Standard Gain HornAntenna	SAS 586	A.H. System	22/24/27, 15C
7624	Standard Gain HornAntenna	SAS 587	A.H. System	22/24/27, 15C
7561	Antenna	HFH2-Z2	R&S	15C, 15B
5715	Antenna	MBA-3030	EMC Automation	22/24/27, 15C
5712	Antenna	PLP3003	EMC Automation	22/24/27, 15C
7457	Relay Switch Unit	TS-RSP	R&S	22/24/27, 15C, 15B
7459	Relay Switch Unit	TS-RSP	R&S	22/24/27, 15C, 15B
5729	Relay Switch Unit	TS-RSP	R&S	22/24/27, 15C, 15B
5728	EMI Receiver	ESIB26	R&S	22/24/27, 15C, 15B
4406	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
7602	Communication Tester	CMW500	R&S	22/24/27, 15C, 15B
7151	Bluetooth Tester	CBT	R&S	15B
3406	Controller	Sc99V	Sunol	22/24/27, 15C, 15B
-	Controller	G-1000DXC	Yaesu	22/24/27, 15C, 15B
-	Computer Controller	GS-232B	Yaesu	22/24/27, 15C, 15B
7040	Preamplifier	TS-PR3	R&S	22/24/27, 15C, 15B
-	Preamplifier	AMF-6D-020180-29-20P	Miteq	22/24/27, 15C, 15B
-	Preamplifier	AMF-4D-01000800-30-29P	Miteq	22/24/27, 15C, 15B
-	Preamplifier	AMF-5F-18002650-25-10P	Miteq	22/24/27, 15C, 15B
-	High Pass Filter	4HC1700-1-KK	R&S	22
-	High Pass Filter	F-15041	RLC	22/24/27, 15C
-	Band Reject Filter	WRCA824/849-0,2-6SS	Wainwright	22
-	Band Reject Filter	WRCC1800/2000-0.2-10SS	Wainwright	24
-	Band Reject Filter	WRCG2400/2483-2390/2493-35/10SS	Wainwright	15C
-	Band Reject Filter	WRCG832/838-825/845-40/5SS	Wainwright	22
-	Band Reject Filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27

Eq. No	Equipment	Type	Manufacturer	Used in
-	Band Reject Filter	WRCG1877/1883 - 1870/1890-40/6SS	Wainwright	24
-	Notch Filter	WRCD1880-1.1.25/50-10SS	Wainwright	22/24/27
-	Notch Filter	WRCT902.4-0.4/40-8SS	Wainwright	-
Planned	Notch Filter	WRCJV2531/2539-2523/2547-60/12SS	Wainwright	22/24/27
-	GPS RX Antenna w/AMP	L1A-PM-NF	GPS Source	15C
-	GPS Inline amplifier	A11M-V-NF-NM	GPS Source	15C
-	GPS signal Splitter	S12-P110/5-NF	GPS Source	15C
-	GPS TX Antenna	L1P-PV-NF	GPS Source	15C