

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CWLAN_RM-825_22	Date of Report:	14-Sep-2012
Number of pages:	30	Customer's Contact person:	Melava Tia
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FCC listing no.:	94436		
IC recognition no.:	661AK-1		
Tested devices/ accessories:	Phone RM-825 / Battery BP-5T / Charger AC-50E / Data Cable CA-190CD / Headset WH-208		
FCC ID:	PYARM-825	IC:	661V-RM825
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, RSS-210 (Issue 8, December 2010). 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:			

Jari Jantunen, System Manager, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	29-Jun-2012
Testing completed	04-Jul-2012
The customer's contact person	Melava Tia
Test Plan referred to	T:\Projects\RM-824\TestPlan\RS_testplan_RM-824.xls
Notes	-
Document name	T:\Projects\RM-825\EMC\FCC15CWLAN_RM-825_22.docx

1.1. EUT and Accessory Information

The EUT is a mobile phone with following features:

GSM/WCDMA/WLAN/Bluetooth

The EUT is tested with maximum rated TX power.

Devices under tests

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-824	004402139761484	2210	-	1121.0002.8297.9657.110	42842
Battery	BP-5T	3932132224140100128;0670665	-	-	-	42845
Phone	RM-824	004402139761476	2210	-	1121.0002.8297.9657.110	42843
Battery	BP-5T	3932132224140100129;0670665	-	-	-	42844
Charger	AC-50E	4090492023260400312;0675619	0.5	0.4	-	42776
Data Cable	CA-190CD	-	-	-	-	42778
Headset	WH-208	-	-	-	-	42831

1.2. Summary of Test Results

WLAN:

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	-
15.247(d), 15.205(b)	A8(0.5)	Band edge compliance of RF emissions	-
15.247(d)	A8(0.5)	Spurious RF conducted emissions	-
15.247(d), 15.209	A8(0.5)	Spurious radiated emissions	-
15.207	7.2.2	AC powerline conducted emissions	-
15.247(a)(2)	A8(0.1(1))	6dB(bandwidth)	-
15.247(e)	A8(0.1(2))	Power spectral density	-

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	-
15.247(d)	A8(0.5)	Spurious RF conducted emissions	PASSED
15.247(d), 15.209	A8(0.5)	Spurious radiated emissions	-
15.207	7.2.2	AC powerline conducted emissions	PASSED
15.247(a)(2)	A8(0.1(1))	6dB(bandwidth)	PASSED
15.247(e)	A8(0.1(2))	Power spectral density	PASSED

PASSED

The EUT complies with the essential requirements in the standard.

FAILED

The EUT does not comply with the essential requirements in the standard.

NP

The test was not performed by the TCC Nokia Laboratory.

The test results of PYARM-824 are re-used for certification of the PYARM-825. The table above indicates the results, which will be re-used.

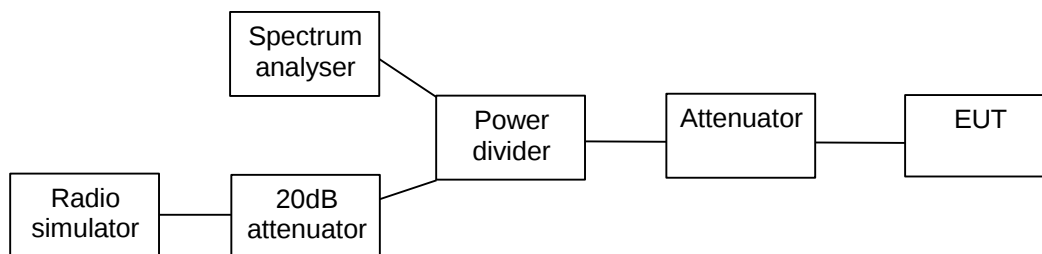
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2. Conducted peak output power (15.247(b)(1), RSS-210 A8.4 (4))

EUT with DUT number	RM-824, DUT 42842
Accessories with DUT numbers	BP-5T, DUT 42845
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 51 / 100
Date of measurements	04-Jul-2012
Measured by	Hannu Söderholm

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. 5 GHz RLAN Test results

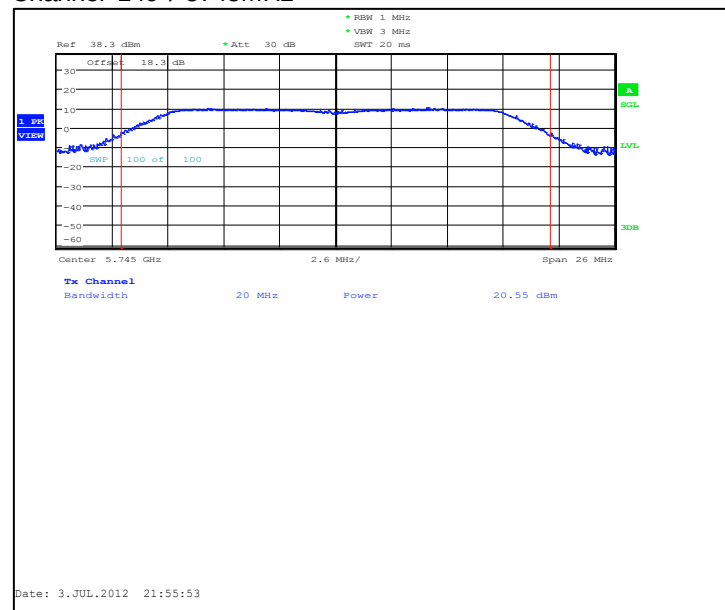
RLAN 5 GHz, peak output power [dBm]	
Mode & data speed	Ch 157
g-mode WLAN OFDM 6 Mbps	21.79
g-mode WLAN OFDM 9 Mbps	20.83
g-mode WLAN OFDM 12 Mbps	20.75
g-mode WLAN OFDM 18 Mbps	20.64
g-mode WLAN OFDM 24 Mbps	19.92
g-mode WLAN OFDM 36 Mbps	20.05
g-mode WLAN OFDM 48 Mbps	19.05
g-mode WLAN OFDM 54 Mbps	18.97
n-mode MCS 0: OFDM 6.5 / 7.25 Mbps	20.55
n-mode MCS 1: OFDM 13.0 / 14.4 Mbps	20.58
n-mode MCS 2: OFDM 19.5 / 21.7 Mbps	19.64
n-mode MCS 3: OFDM 26.0 / 28.9 Mbps	20.07
n-mode MCS 4: OFDM 39.0 / 43.3 Mbps	19.05
n-mode MCS 5: OFDM 52.0 / 57.8 Mbps	19.19
n-mode MCS 6: OFDM 58.5 / 65.0 Mbps	18.23
n-mode MCS 7: OFDM 65.0 / 72.2 Mbps	18.29

RLAN 5 GHz, peak output power [dBm]	
Mode & data speed	Ch 151
n-mode MCS 0: OFDM 13.5 / 15.0 Mbps	21.12
n-mode MCS 1: OFDM 27.0 / 30.0 Mbps	21.12
n-mode MCS 2: OFDM 40.5 / 45.0 Mbps	21.12
n-mode MCS 3: OFDM 54.0 / 60.0 Mbps	21.48
n-mode MCS 4: OFDM 81.0 / 90.0 Mbps	21.49
n-mode MCS 5: OFDM 108.0 / 120.0 Mbps	21.58
n-mode MCS 6: OFDM 121.5 / 135.0 Mbps	21.53
n-mode MCS 7: OFDM 135.0 / 150.0 Mbps	21.53

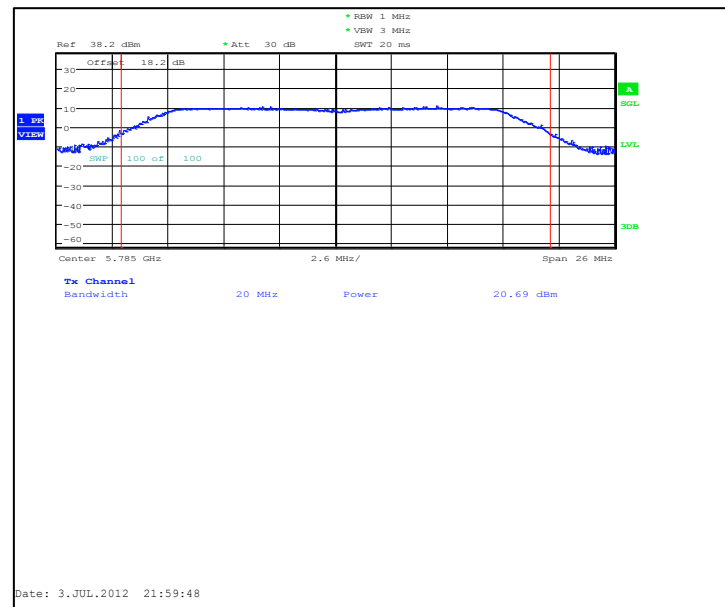
2.3.1 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel / f_c [MHz]	P [dBm]	P [mW]	Result
149 / 5745	20.55	113.501	PASSED
157 / 5785	20.69	117.22	PASSED
165 / 5825	20.63	115.611	PASSED

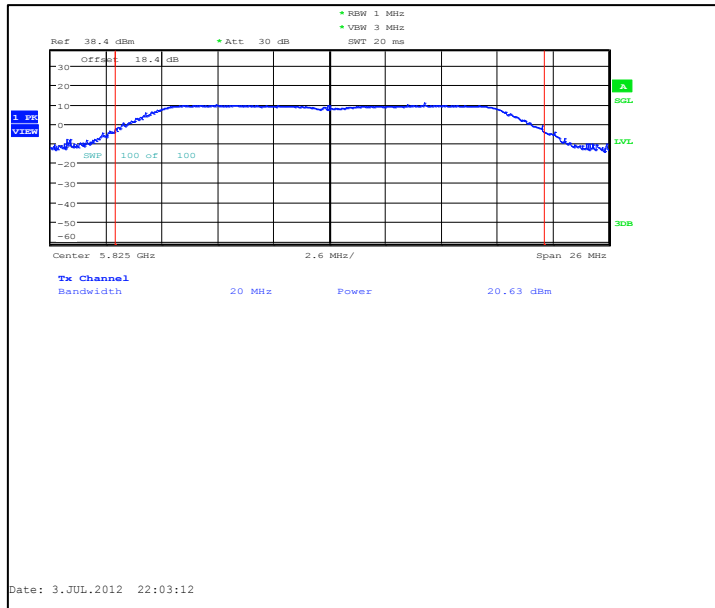
Channel 149 / 5745MHz



Channel 157 / 5785MHz



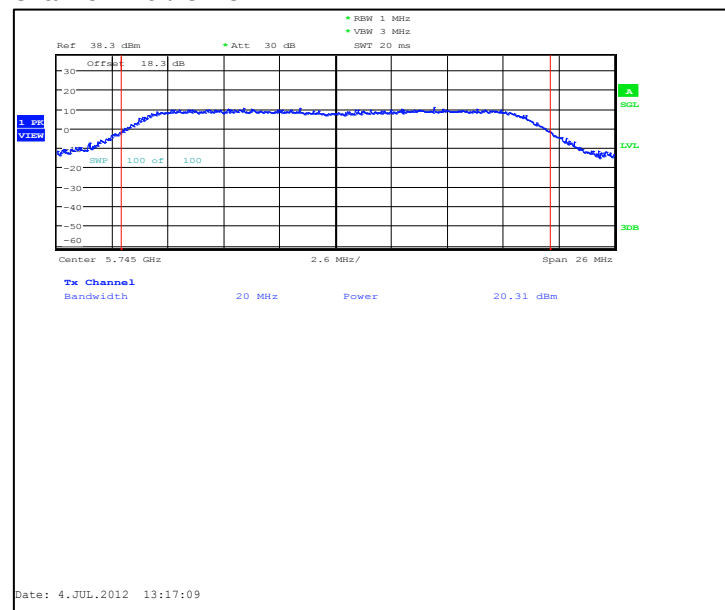
Channel 165 / 5825MHz



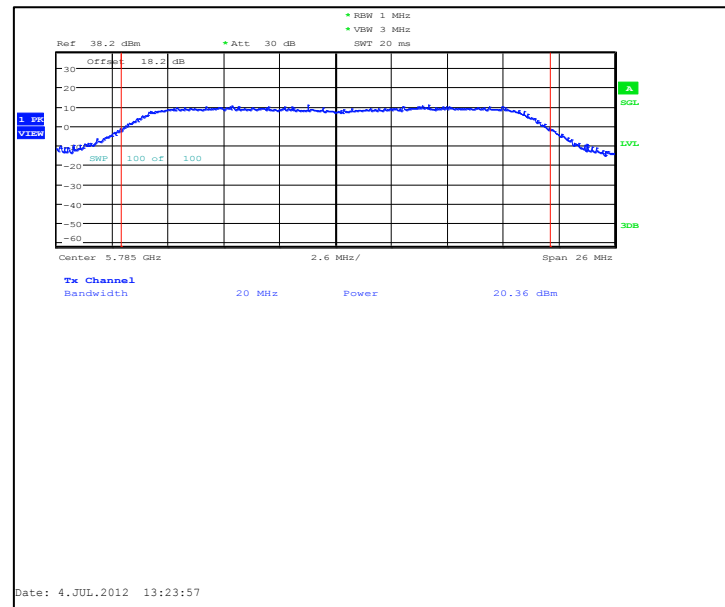
2.3.2 802.11n HT20 MCS1, 20 MHz CBW mode, BPSK modulation, 13.0 / 14.4 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
149 / 5745	20.31	107.399	PASSED
157 / 5785	20.36	108.643	PASSED
165 / 5825	20.21	104.954	PASSED

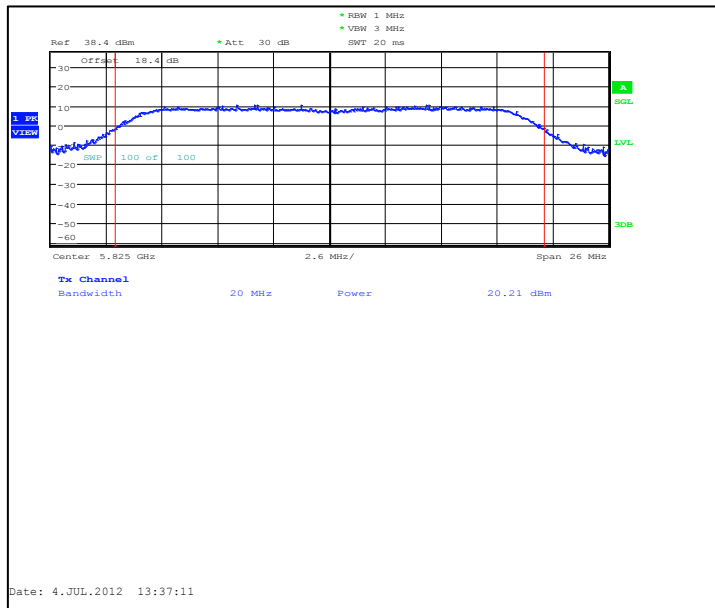
Channel 149 / 5745MHz



Channel 157 / 5785MHz



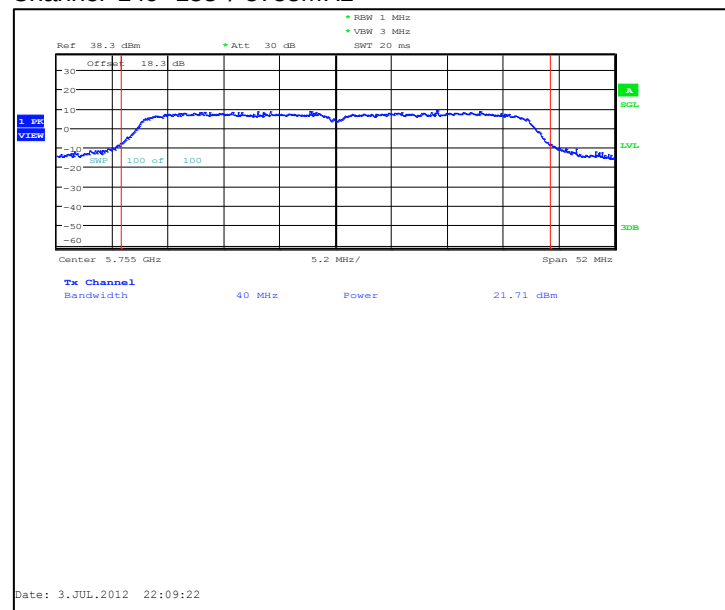
Channel 165 / 5825MHz



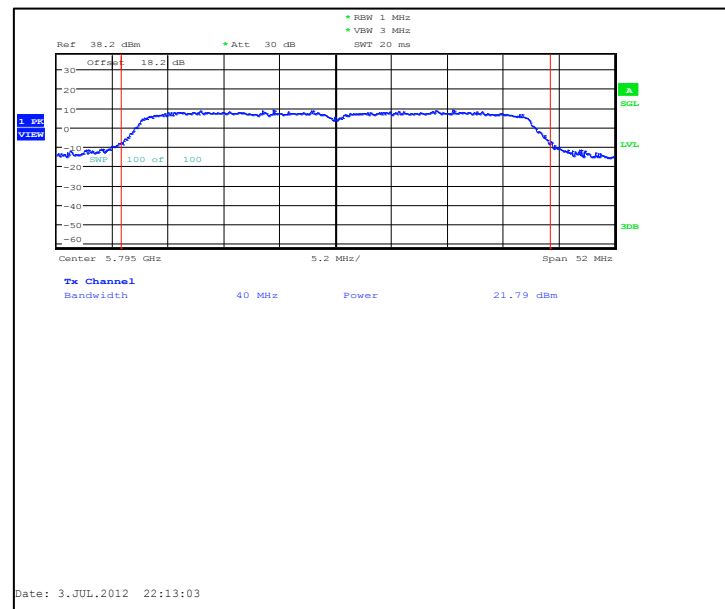
2.3.3 802.11n HT40 MCS5, 40 MHz CBW mode, BPSK modulation, 108.0 / 120.0 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
149+153 / 5755	21.71	148.252	PASSED
157+161 / 5795	21.79	151.008	PASSED

Channel 149+153 / 5755MHz



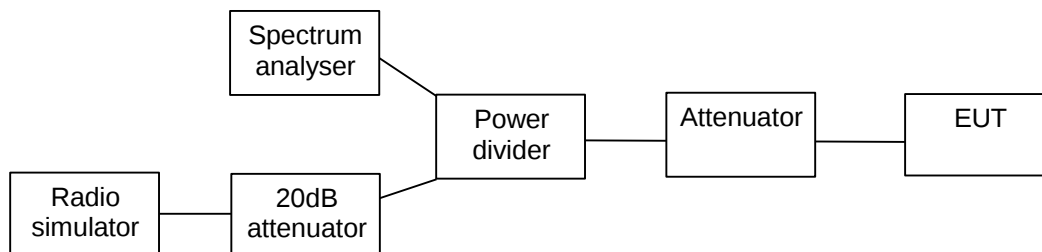
Channel 157+161 / 5795MHz



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

EUT with DUT number	RM-824, DUT 42842
Accessories with DUT numbers	BP-5T, DUT 42845
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 51 / 100
Date of measurements	04-Jul-2012
Measured by	Hannu Söderholm

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 5.4.1.1 of the KDB 558074, using 5-30 % wider span than the EBW.

Limits for spurious RF conducted emissions measurements

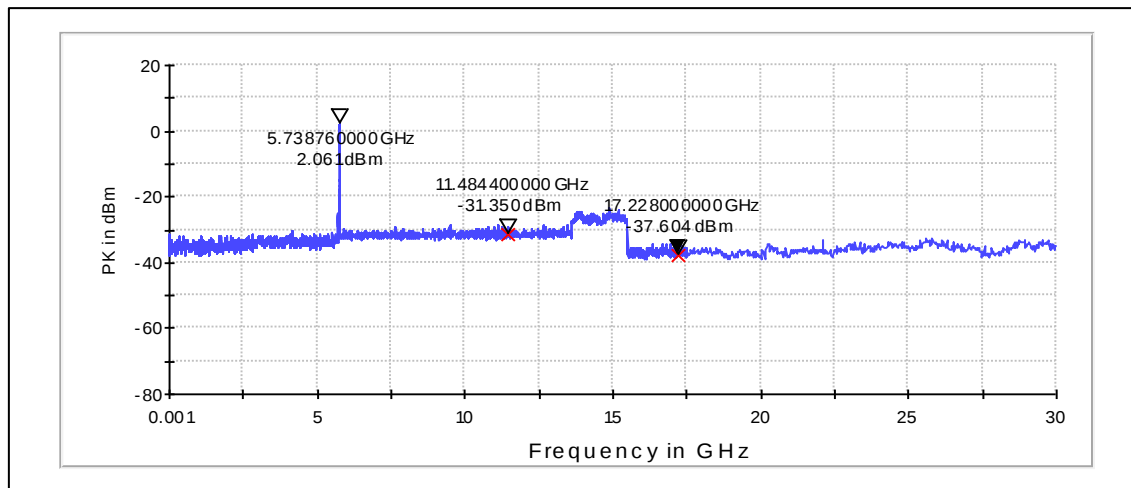
Frequency range [MHz]	Limit [dBc]
1 – 25000	<= -20

3.3. WLAN Test results

3.4. 5 GHz WLAN Test results

3.4.1 OFDM mode, BPSK modulation, 6 Mbps data rate

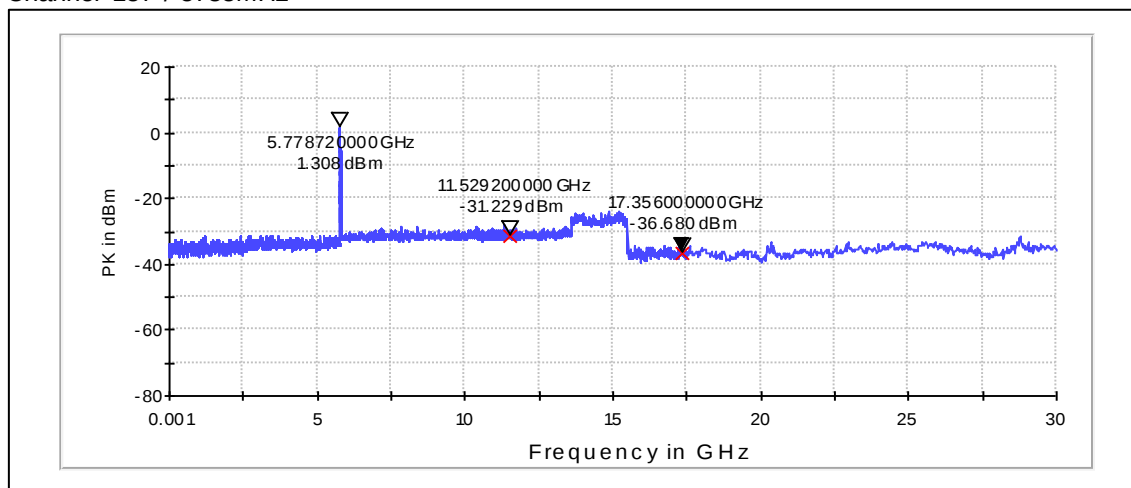
Channel 149 / 5745MHz



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

Frequency [MHz]	P [dBc]	Result
11484.4	-31.35	PASSED
17228	-37.6	PASSED

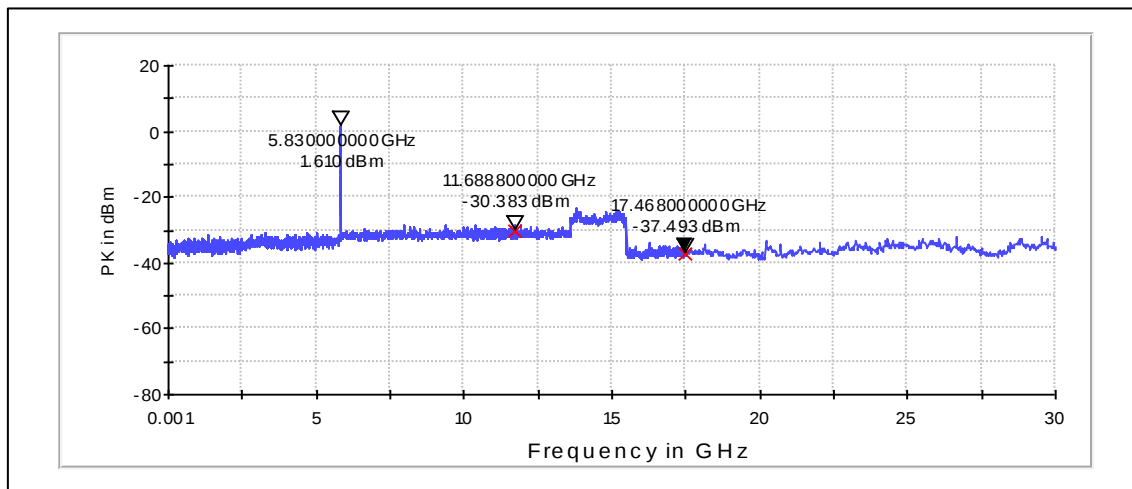
Channel 157 / 5785MHz



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

Frequency [MHz]	P [dBc]	Result
11529.2	-31.23	PASSED
17356	-36.68	PASSED

Channel 165 / 5825MHz

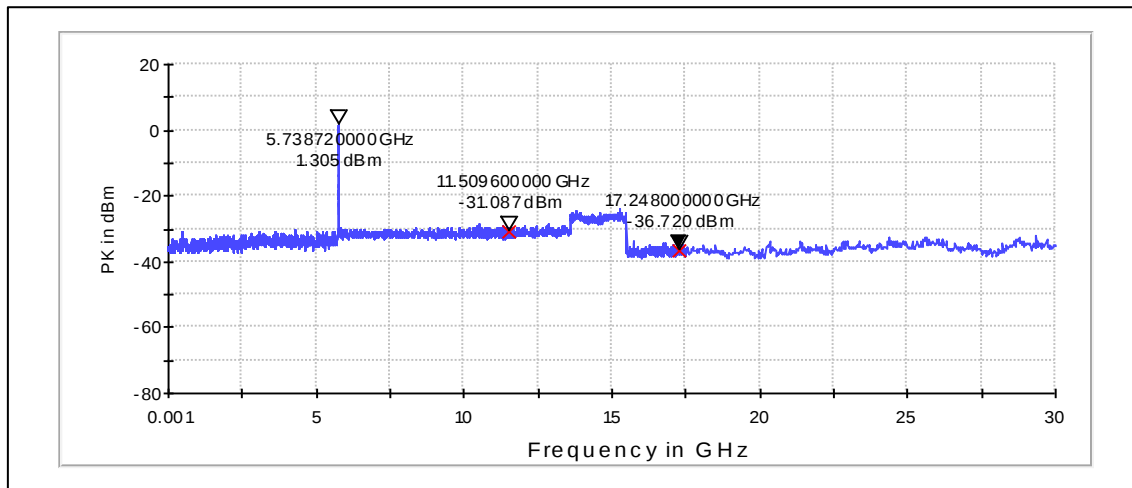


Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11688.8	-30.38	PASSED
17468	-37.49	PASSED

3.4.2 802.11n HT20 MCS1, 20 MHz CBW mode, BPSK modulation, 13.0 / 14.4 Mbps data rate

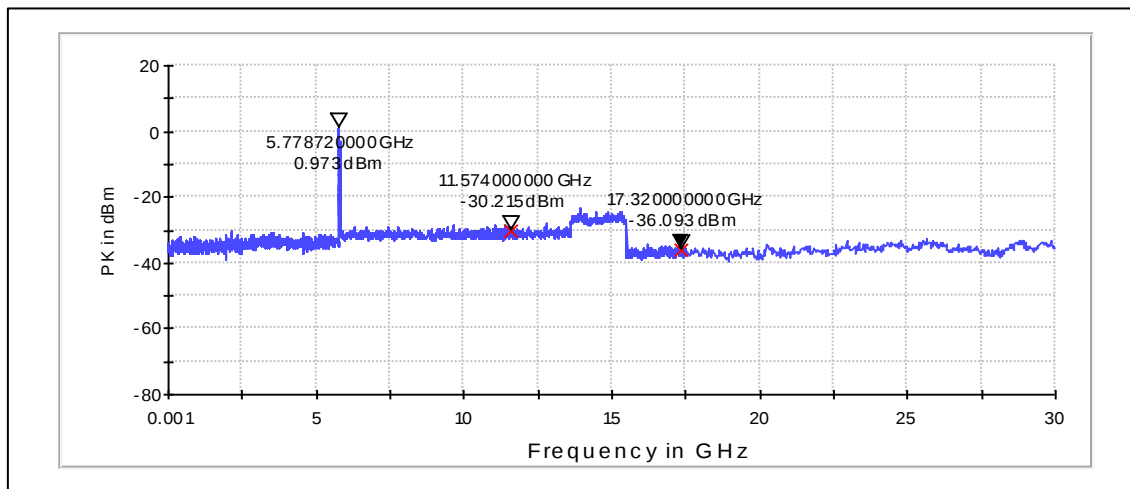
Channel 149 / 5745MHz



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

Frequency [MHz]	P [dBc]	Result
11509.6	-31.09	PASSED
17248	-36.72	PASSED

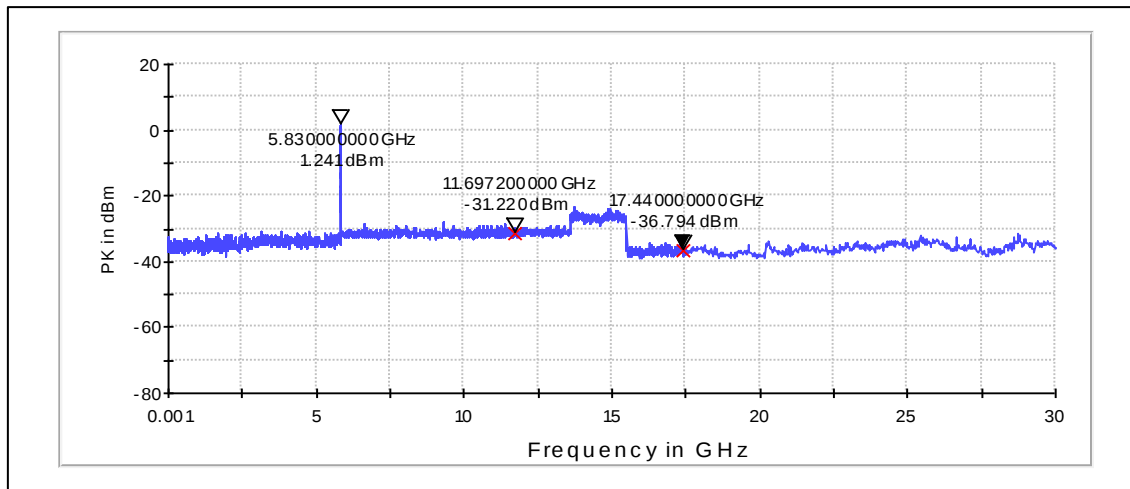
Channel 157 / 5785MHz



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

Frequency [MHz]	P [dBc]	Result
11574	-30.21	PASSED
17320	-36.09	PASSED

Channel 165 / 5825MHz

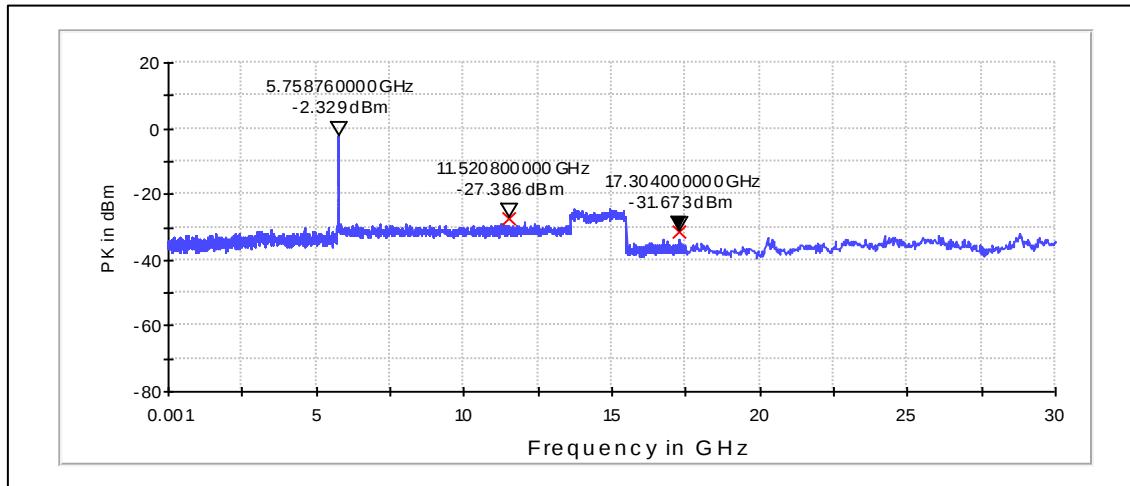


Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11697.2	-31.22	PASSED
17440	-36.79	PASSED

3.4.3 802.11n HT40 MCS5, 40 MHz CBW mode, BPSK modulation, 108.0 / 120.0 Mbps data rate

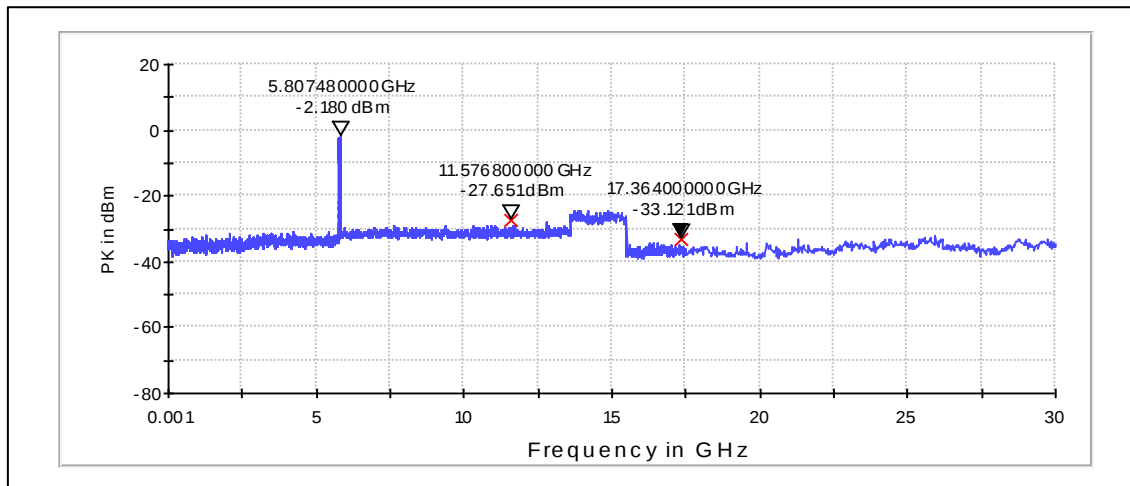
Channel 149+153 / 5755MHz



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

Frequency [MHz]	P [dBc]	Result
11520.8	-27.39	PASSED
17304	-31.67	PASSED

Channel 157+161 / 5795MHz



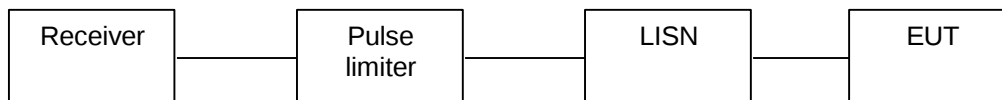
Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11576.8	-27.65	PASSED
17364	-33.12	PASSED

4. AC powerline conducted emissions (FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-824, DUT 42843
Accessories with DUT numbers	BP-5T, DUT 42844 ; AC-50E, DUT 42776 ; CA-190CD, DUT 42778 ; WH-208, DUT 42831
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	24 / 49 / 98.5
Date of measurements	10-Jul-2012
Measured by	Jari Jantunen

4.1. Test Setup



4.2. Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-GEN as follows:

The EUT is placed on a wooden table 80 cm above the reference groundplane.

The EUT is connected via LISN to a test power supply.

The measurement results are obtained as described below:

$$U [dB\mu V] = U_{RX} + A_{TOT}$$

Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable and pulse limiter attenuations.

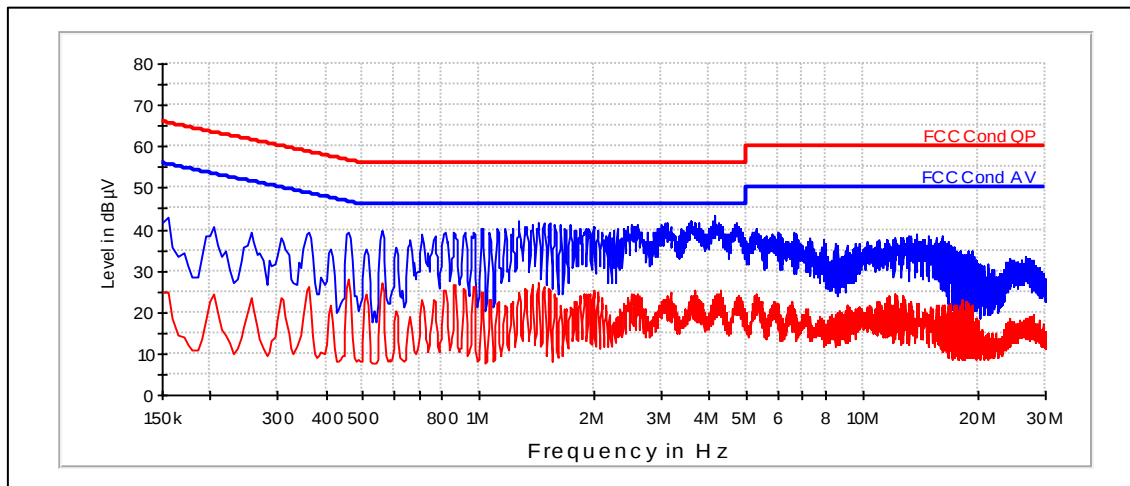
CISPR 22 Class B limits

Frequency range [MHz]	Quasi peak limit [dBμV]	Average limit [dBμV]
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

4.3. 5 GHz RLAN Test results

4.3.1 OFDM mode, BPSK modulation, 6 Mbps data rate

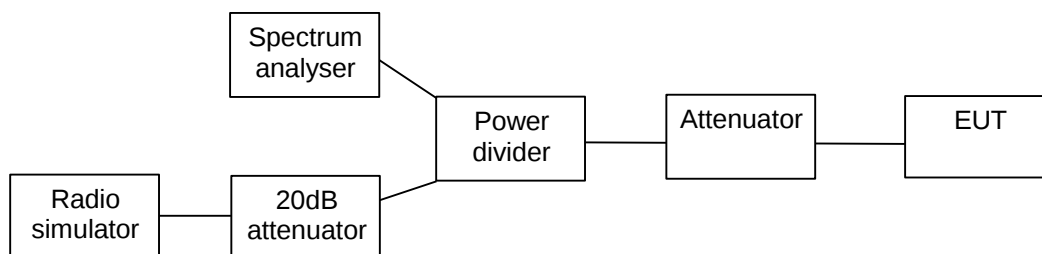
Channel 157 / 5785MHz



5. 6 dB bandwidth (FCC §15.247(a)(2), RSS-210 A8.2 (1))

EUT with DUT number	RM-824, DUT 42842
Accessories with DUT numbers	BP-5T, DUT 42845
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 51 / 100
Date of measurements	04-Jul-2012
Measured by	Hannu Söderholm

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 6 dB bandwidth measurements

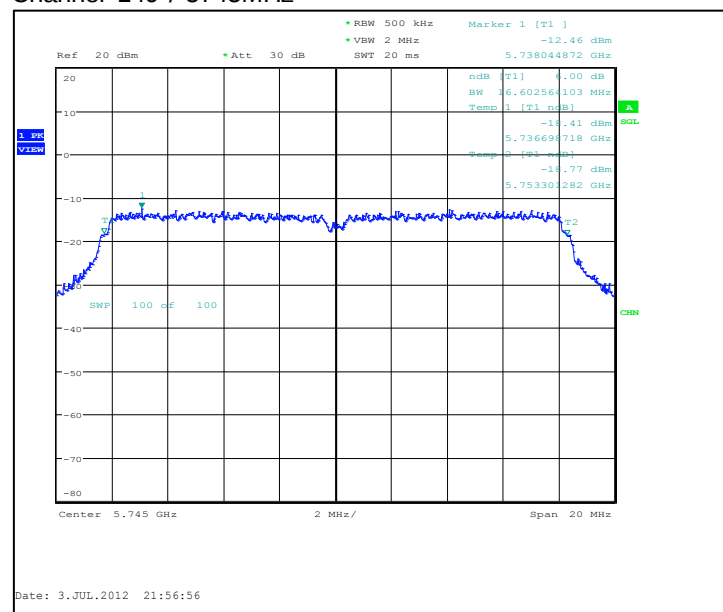
Limit [kHz]
≥ 500

5.3. 5 GHz RLAN Test results

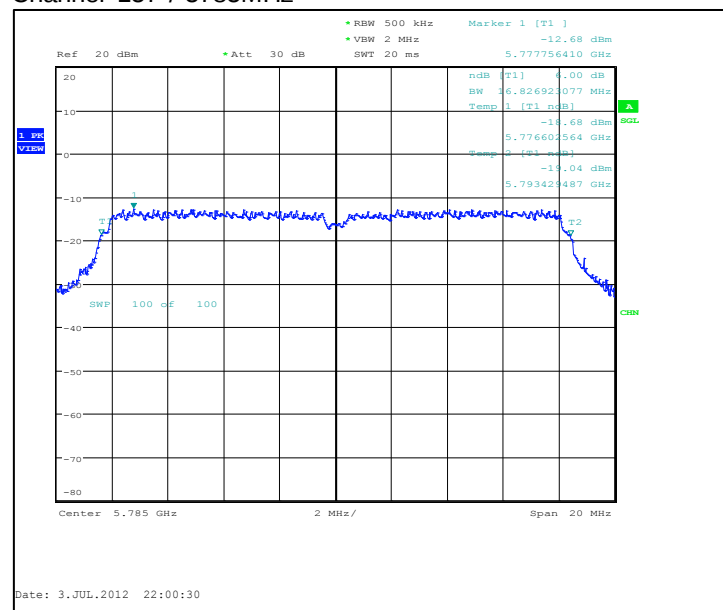
5.3.1 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
149 / 5745	16602.6	PASSED
157 / 5785	16826.9	PASSED
165 / 5825	16634.6	PASSED

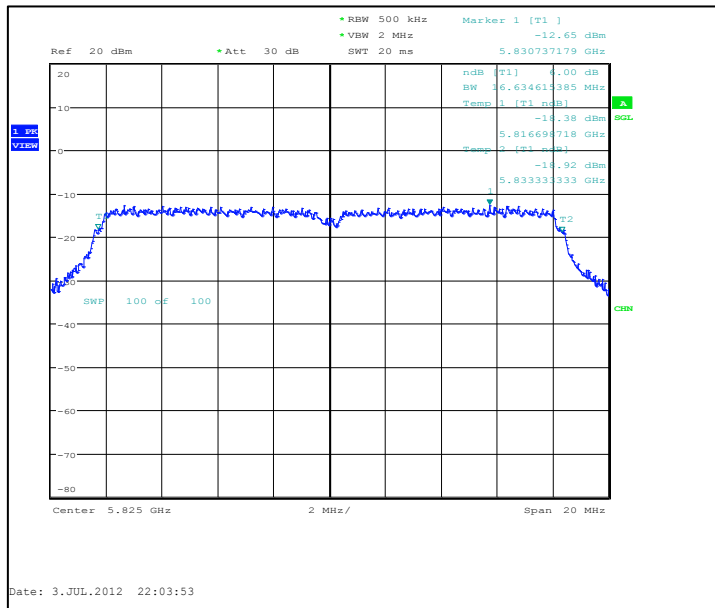
Channel 149 / 5745MHz



Channel 157 / 5785MHz



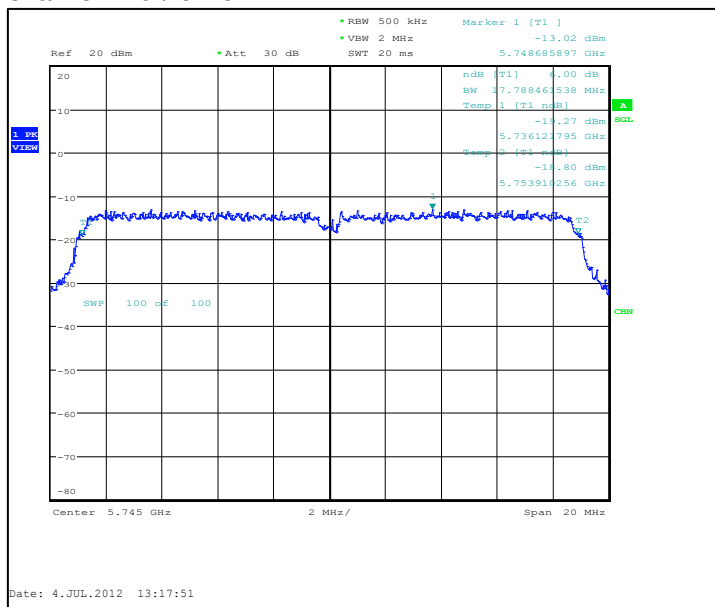
Channel 165 / 5825MHz



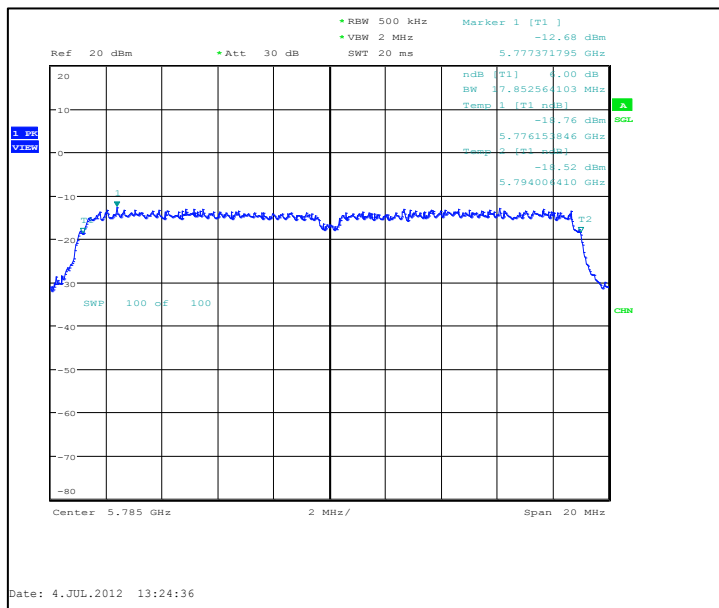
5.3.2 802.11n HT20 MCS1, 20 MHz CBW mode, BPSK modulation, 13.0 / 14.4 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
149 / 5745	17788.5	PASSED
157 / 5785	17852.6	PASSED
165 / 5825	17884.6	PASSED

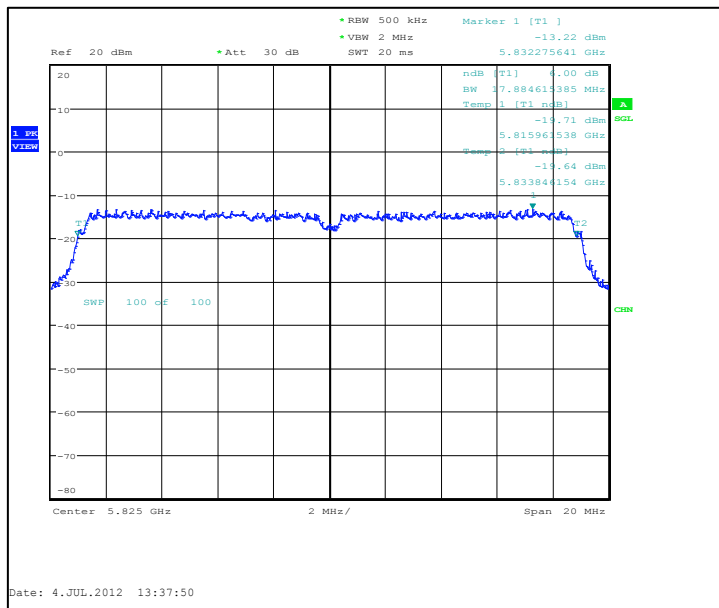
Channel 149 / 5745MHz



Channel 157 / 5785MHz



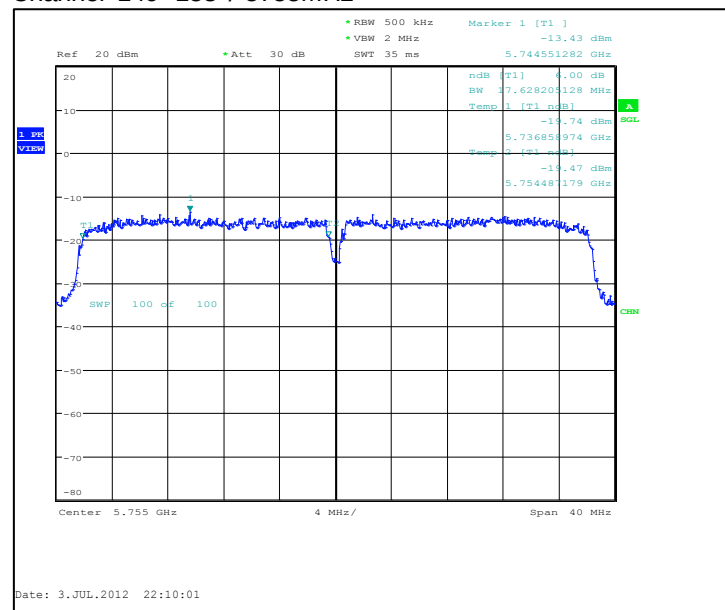
Channel 165 / 5825MHz



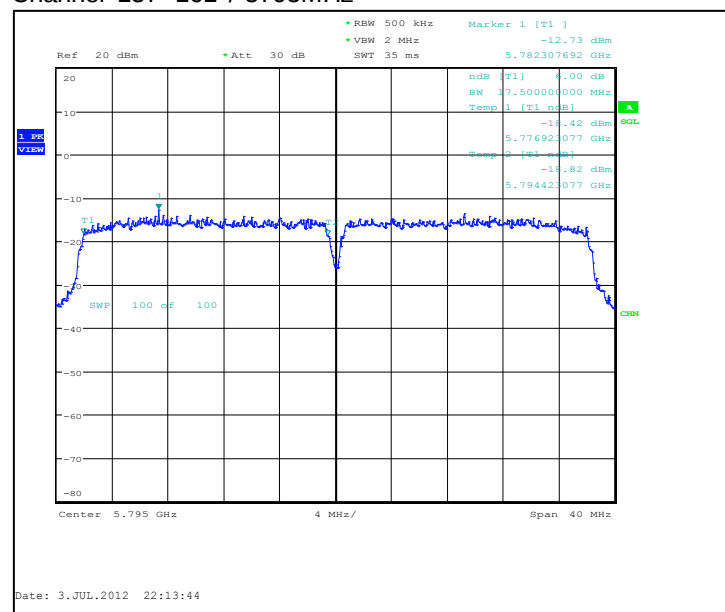
5.3.3 802.11n HT40 MCS5, 40 MHz CBW mode, BPSK modulation, 108.0 / 120.0 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
149+153 / 5755	17628.2	PASSED
157+161 / 5795	17500	PASSED

Channel 149+153 / 5755MHz



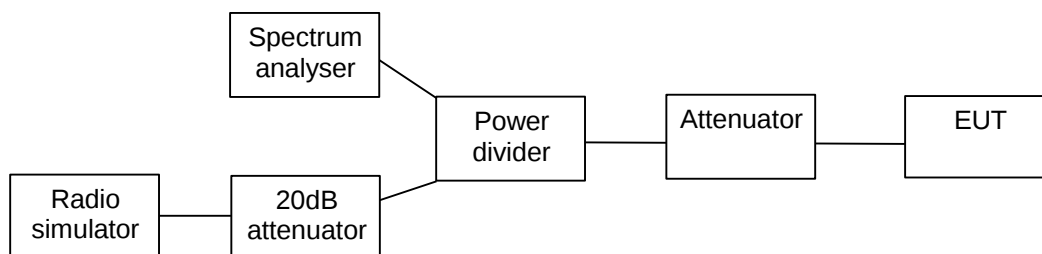
Channel 157+161 / 5795MHz



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

EUT with DUT number	RM-824, DUT 42842
Accessories with DUT numbers	BP-5T, DUT 42845
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 51 / 100
Date of measurements	04-Jul-2012
Measured by	Hannu Söderholm

6.1. Test Setup



6.2. Test method and limit

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

Result is corrected by bandwidth correction factor -15.2dB (BWCF = $10\log(3\text{ kHz}/100\text{ kHz}) = -15.2\text{ dB}$).

Limits for power spectral density measurements

Limit [dBm] @ 3 kHz
≤ 8

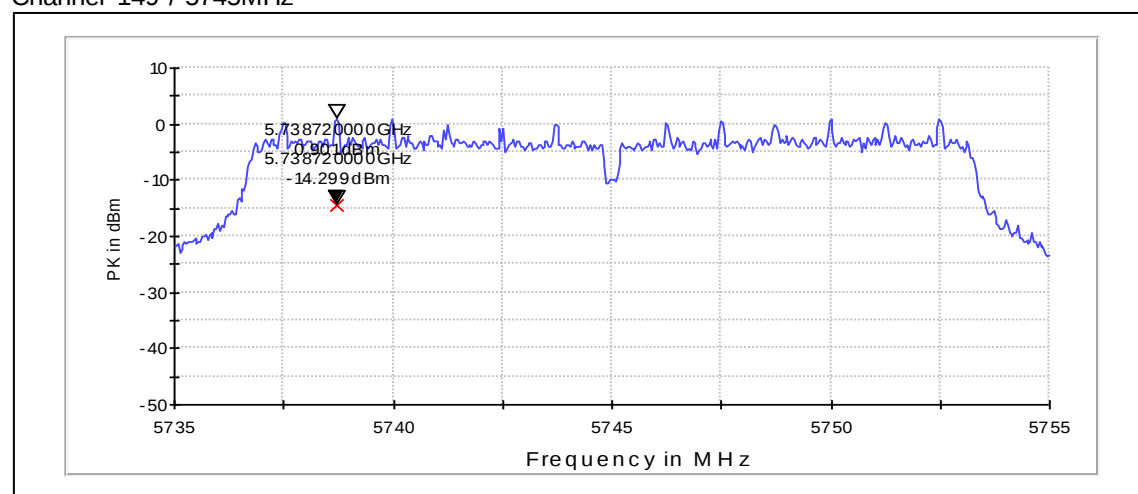
6.3. 5 GHz RLAN Test results

6.3.1 OFDM mode, BPSK modulation, 6 Mbps data rate

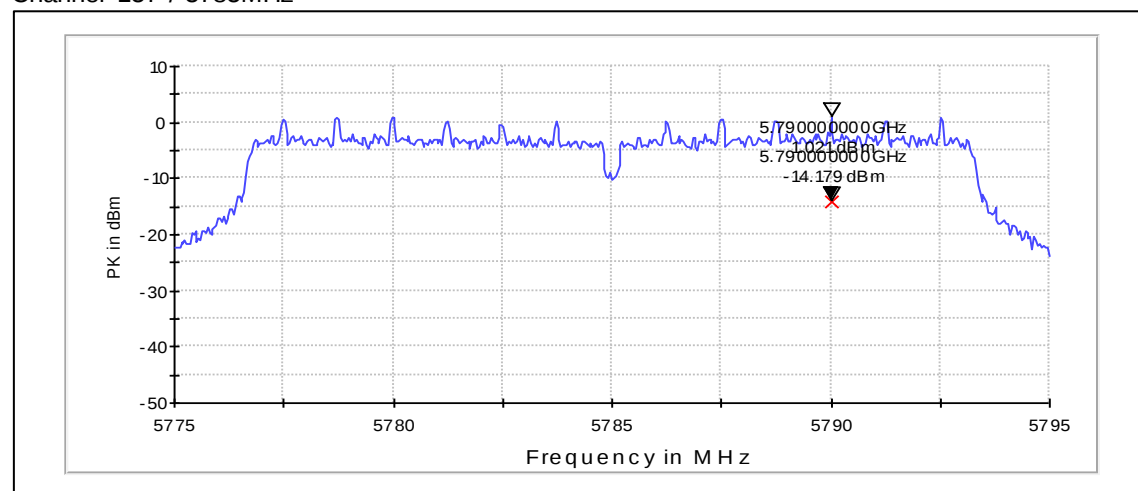
Peak (RBW: 100 kHz, VBW: 300 kHz, Max hold)

Channel / f _c [MHz]	P [dBm]	Result
149 / 5745	-14.3	PASSED
157 / 5785	-14.18	PASSED
165 / 5825	-14.28	PASSED

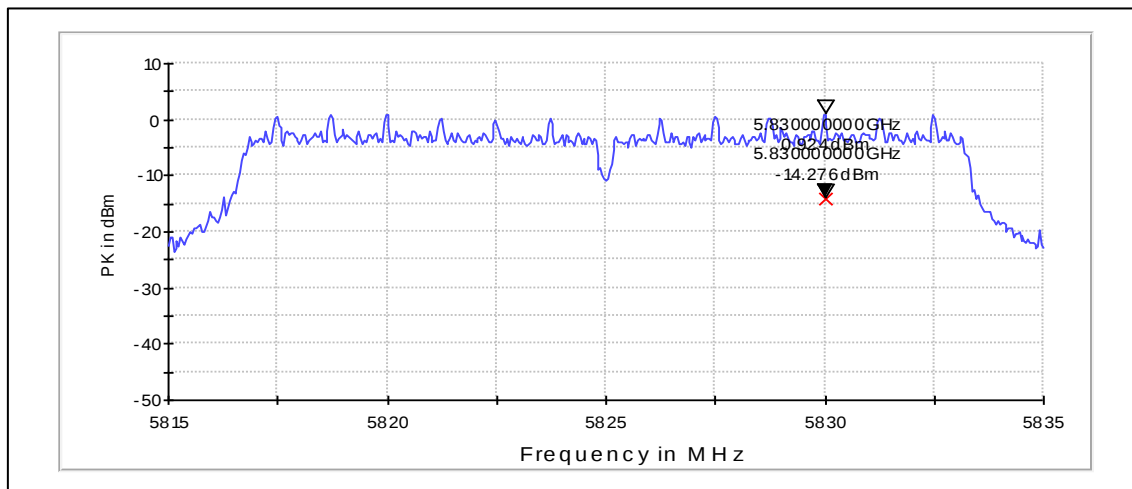
Channel 149 / 5745MHz



Channel 157 / 5785MHz



Channel 165 / 5825MHz

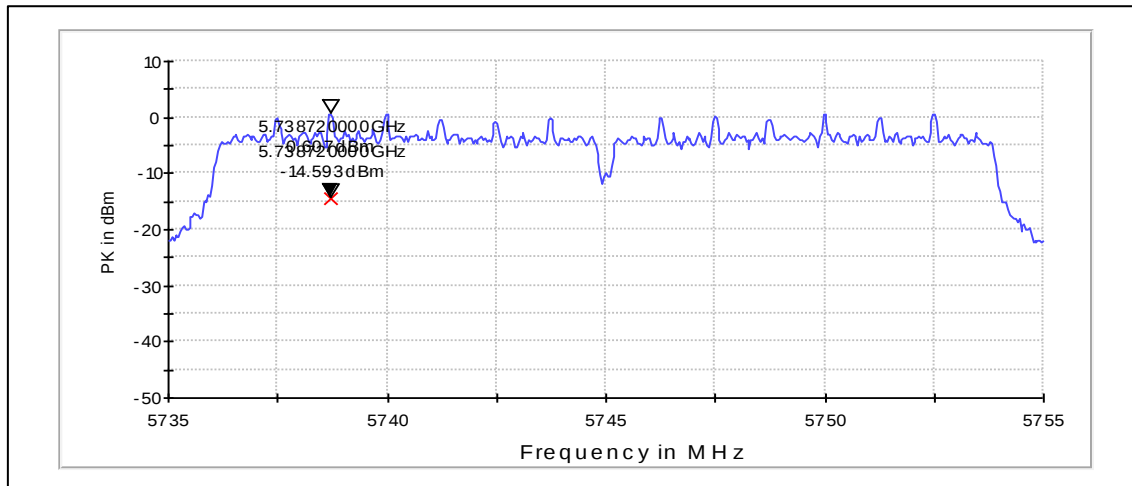


6.3.2 802.11n HT20 MCS1, 20 MHz CBW mode, BPSK modulation, 13.0 / 14.4 Mbps data rate

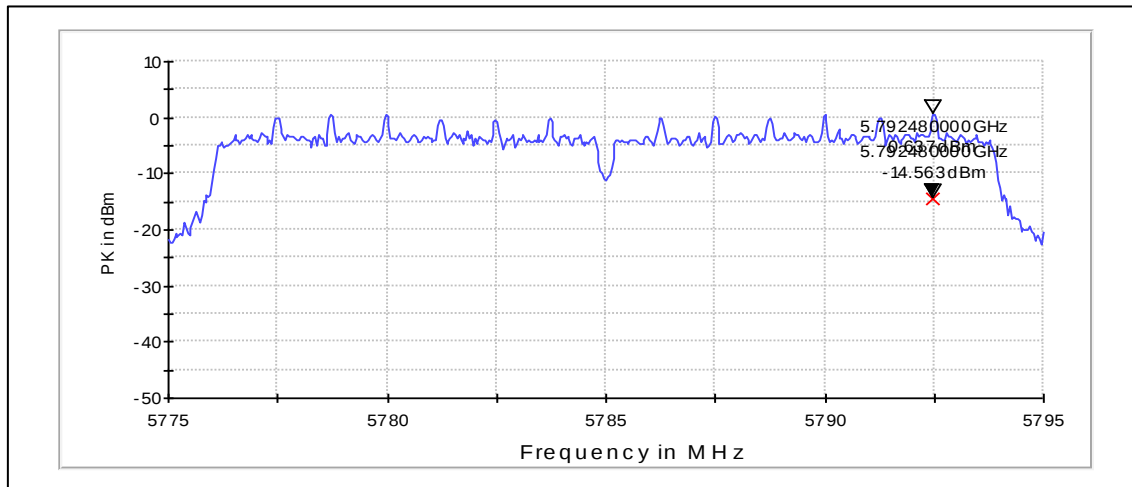
Peak (RBW: 100 kHz, VBW: 300 kHz, Max hold)

Channel / f _c [MHz]	P [dBm]	Result
149 / 5745	-14.59	PASSED
157 / 5785	-14.56	PASSED
165 / 5825	-14.59	PASSED

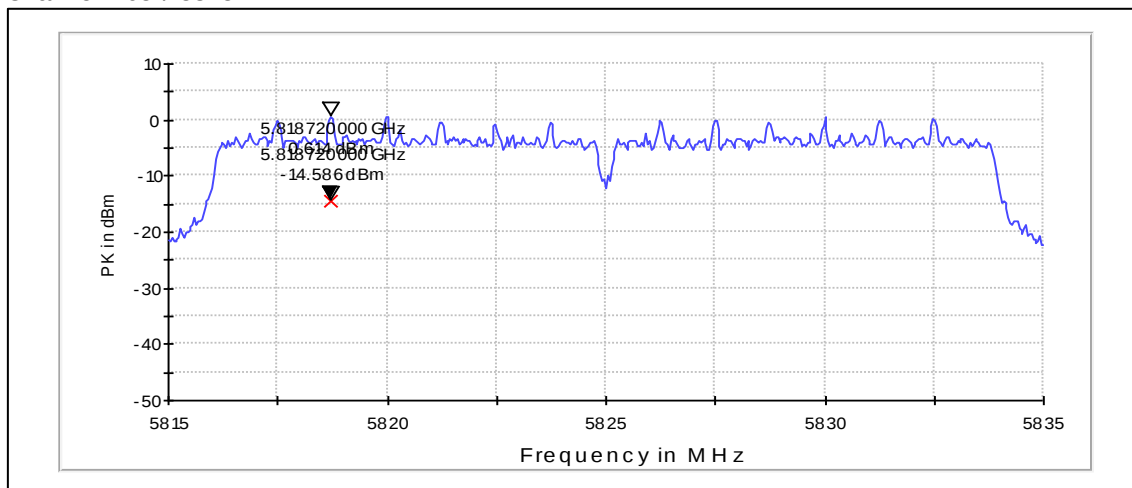
Channel 149 / 5745MHz



Channel 157 / 5785MHz



Channel 165 / 5825MHz

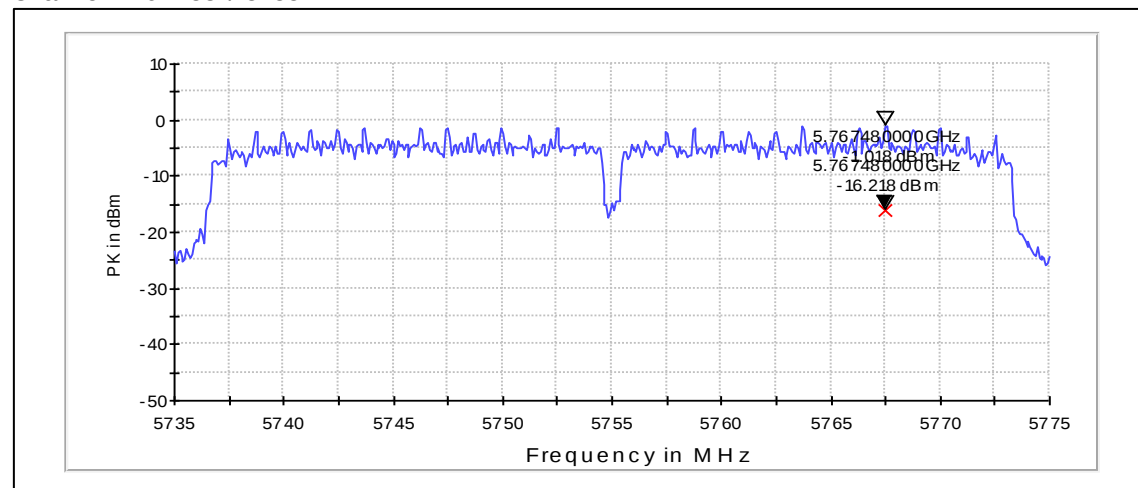


6.3.3 802.11n HT40 MCS5, 40 MHz CBW mode, BPSK modulation, 108.0 / 120.0 Mbps data rate

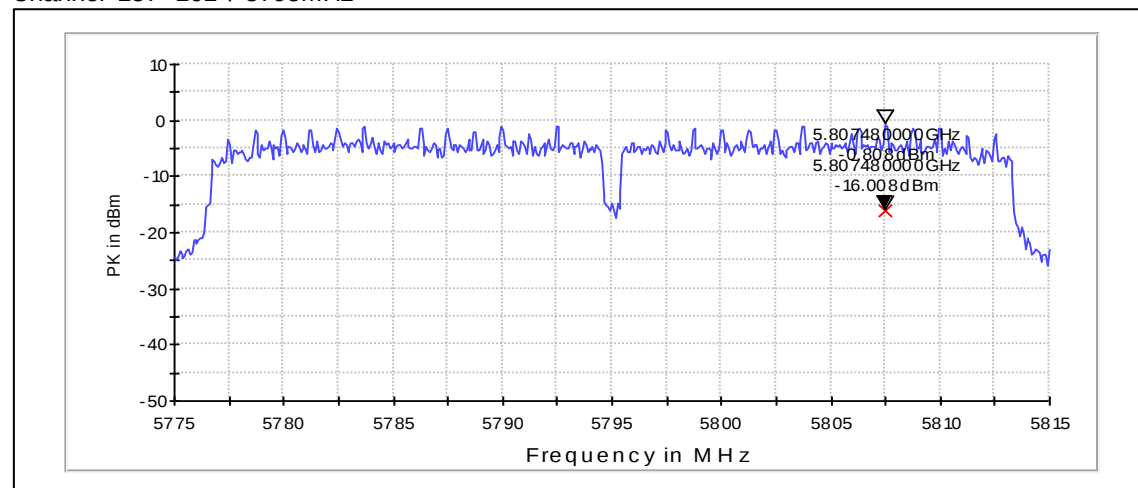
Peak (RBW: 100 kHz, VBW: 300 kHz, Max hold)

Channel / f _c [MHz]	P [dBm]	Result
149+153 / 5755	-16.22	PASSED
157+161 / 5795	-16.01	PASSED

Channel 149+153 / 5755MHz



Channel 157+161 / 5795MHz



7. Test Equipment

7.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM38112	Power supply	6632A	Agilent	22/24/27, 15C
TM38631	Signal Generator	83640L	Agilent	22/24/27, 15C, 15B
OM06312	Signal Generator	E4422B	Agilent	22/24
TM37678	Communication Tester	CMU200	R&S	15C, 15B
TM30600	Impulse limiter	ESH3-Z2	R&S	15C, 15B
TM26490	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
TM26491	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
TM37610	Spectrum Analyzer	FSU26	R&S	22/24/27, 15C
TM22806	Battery	BAT 20/E	Fiskars	15C, 15B
TM22805	UPS	PS 20/1.2	Fiskars	15C, 15B
-	Temperature and humidity logger	175-H2	Testo	15C, 15B
-	Temperature and humidity logger	175-H2	Testo	22/24/27, 15C
-	Air pressure and temperature logger	635-2	Testo	22/24/27, 15C, 15B
-	Air pressure sensor	0638-1835	Testo	22/24/27, 15C, 15B
-	Temperature test chamber	VT 4002	Vötsch	22/24
2058	Receiver	ESPC	R&S	15C, 15B
2001	Bluetooth tester	CBT	R&S	22/24/27, 15C, 15B
2002	Communication Tester	CMU200	R&S	22/24/27, 15C
2009	LISN 50 µH	ENV216	R&S	15C, 15B
2010	LISN 50 µH	ENV216	R&S	15C, 15B
2012	Power splitter	11667B	Agilent	22/24/27, 15C
2013	Attenuator	8493C	Agilent	22/24/27, 15C
2014	Attenuator	8493C	Agilent	22/24/27, 15C
2019	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E
2020	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E
2023	Spectrum Analyzer	ESMI-RF	R&S	15B/15C
2024	Analyzer displayunit	ESAI-D	R&S	15B/15C

7.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM38114	Power supply	6632A	Agilent	22/24/27, 15C, 15B
TM38631	Signal Generator	83640L	Agilent	22/24/27, 15C, 15B
TM38323	Preamplifier	PA-02 18-26 GHz	EMC Automation	22/24/27, 15C, 15B
-	Antenna	BBHA 9120 D	Schwarzbeck	22/24/27, 15C
TM26497	Antenna	3115	Emco	22/24/27, 15C, 15B
TM37773	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
TM38845	Receiver	ESIB 26	R&S	22/24/27, 15C, 15B
-	Antenna	HL562	R&S	22/24/27, 15C, 15B
-	Turntable	2188	EMCO	22/24/27, 15C, 15B
-	Turntable controller	2090	EMCO	22/24/27, 15C, 15B
-	RF system panel	TS-RSP	R&S	22/24/27, 15C, 15B
-	RF system panel	TS-RSP	R&S	22/24/27, 15C, 15B
-	Mini mast	2075-2	ETS Lindgren	22/24/27, 15C, 15B
TM38843	Mini mast	2075	Emco	22/24/27, 15C, 15B
TM38842	Antenna mast controller	2090	Emco	22/24/27, 15C, 15B
TM30643	LISN 50 µH	LISN-5-20-2	FCC	22/24/27, 15C, 15B
TM30644	LISN 50 µH	LISN-5-20-2	FCC	22/24/27, 15C, 15B
-	Temperature and humidity logger	175-H2	Testo	22/24/27, 15C, 15B
-	Air pressure and temperature logger	635-2	Testo	22/24/27, 15C, 15B
-	Air pressure sensor	0638-1835	Testo	22/24/27, 15C, 15B
TM39180	Laser distance meter	Disto Pro	Leica	22/24/27, 15C, 15B
TM37523	Preamplifier	AMF-4D-10M-3G-25-20P	Miteq	22/24/27, 15C, 15B
TM37498	Preamplifier	AMF-5D-020180-26-10P	Miteq	22/24/27, 15C, 15B
TM30599	Semi anechoic chambre	UNKNOWN	TDK	22/24/27, 15C, 15B
TM22638	Power supply	OL63743-901	-	22/24/27, 15C, 15B
TM38066	High pass filter	4HC3000/18000-3-KK	Trilithic	22/24/27, 15C, 15B
-	High pass filter	WHKX 1.6/15G-12SS	Wainwright	22/24/27, 15C, 15B
TM37545	Tunable notch filter	800.0/960.0-0.2/40-8SSK	Wainwright	22
TM26512	Tunable notch filter	WRCD1850/1910-0.2/40-10SSK	Wainwright	24
-	Band reject filter	WRCG1877/1883-1870/1890-40/6EE	Wainwright	24
-	Band reject filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27
-	Band reject filter	WRCG832/838-825/848-40/5SS	Wainwright	22
TM23892	Controller	G-1000SDX	Yaesu	22/24/27
2001	Bluetooth tester	CBT	R&S	22/24/27, 15C, 15B
6023	Antenna	VUBA 9117	Schwarzbeck	22/24/27, 15C