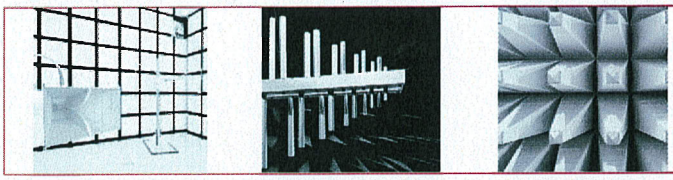


CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test report no.: 1-4254/12-59-17

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01
Area of Testing: Radio/Satellite Communications

Applicant

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN
Phone: +46 46 19 30 00
Fax: +46 46 19 32 95
Contact: Håkan Sjöberg
e-mail: hakan.sjoberg@sonymobile.com
Phone: +46 46 19 35 59

Manufacturer

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices Subpart E – UNII Devices

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	**GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/V/VI/XIX; LTE FDD 1/19/21; WLAN a/b/g/n; BT 3.1; BT LE; RFID; FM Rx; GPS**
Model name:	**PM-0220-BV**
FCC ID:	**PY7PM-0220**
IC:	**-/-**
Frequency:	ISM band 5250 MHz to 5350 MHz ISM band 5470 MHz to 5725 MHz
Technology tested:	WLAN (only DFS client)
Antenna:	Integrated antenna
Power Supply:	3.7 V DC by Li-polymer battery
Temperature Range:	-20°C to +55 °C

Test performed:

2012-10-31 Stefan Bös
Senior Testing Manager

Test report authorised:

2012-10-31 Marco Bertolino
Testing Manager

1 Table of contents

2 General information

2.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.

2.2 Application details

Date of receipt of order:	2012-10-12
Date of receipt of test item:	2012-10-12
Start of test:	2012-10-31
End of test:	2012-10-31
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Version	Test standard description
47 CFR Part 15	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices Subpart E – UNII Devices

4 Test environment

Temperature:	T_{nom}	+22 °C	during room temperature tests
	T_{max}	+55 °C	during high temperature tests
	T_{min}	-20 °C	during low temperature tests
Relative humidity content:		39 %	
Barometric pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	3.7 V	DC by Li-polymer battery
	V_{max}	4.1 V	
	V_{min}	3.3 V	

5 Test item

Kind of test item	:	GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/V/VI/XIX; LTE FDD 1/19/21; WLAN a/b/g/n; BT 3.1; BT LE; RFID; FM Rx; GPS
Type identification	:	PM-0220-BV
S/N serial number	:	Radiated units: CB5A1LN5WE, CB5A1LN60G Conducted units: CB5A1LN60V, CB5A1LN60F
HW hardware status	:	AP1
SW software status	:	10.1.D.0.51
Frequency band [MHz]	:	ISM bands: - 5250 MHz to 5350 MHz - 5470 MHz to 5725 MHz
Type of radio transmission Use of frequency spectrum	: :	OFDM
Channel access method	:	FDMA
Type of modulation	:	QPSK, 16 – QAM & 64 – QAM
Number of channels	:	ISM band 2: 4 ISM band 3: 11
Antenna	:	Integrated antenna
Power supply	:	3.7 V DC by Li-polymer battery
Temperature range	:	-20°C to +55 °C

6 Test laboratories sub-contracted

None

7 Summary of measurement results

☒ **No deviations from the technical specifications were ascertained**

☐ There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
DFS-Testing	CFR Part 15	Pass	2012-12-12	only DFS

Test Report Clause	Test Case	Temperature / Voltage	Pass	Fail	NA	NP	Remark
§15.407 (h)(2) (iii)	Channel move time and channel closing transmission time	nominal / nominal	☒	☐	☐	☐	complies
§15.407 (h)(2) (iv)	Non-Occupancy Period	nominal / nominal	☒	☐	☐	☐	complies

Note: NA = Not Applicable; NP = Not Performed

8 RF measurements

8.1 Description of test setup

8.1.1 Conducted measurements

Setup

Figure 1 shows a setup whereby the UUT is a RLAN device operating in slave mode, without Radar Interference Detection function. This setup also contains a RLAN device operating in master mode. The radar test signals are injected into the master device. The UUT (slave device) is associated with the master device.

Figure 1 shows an example

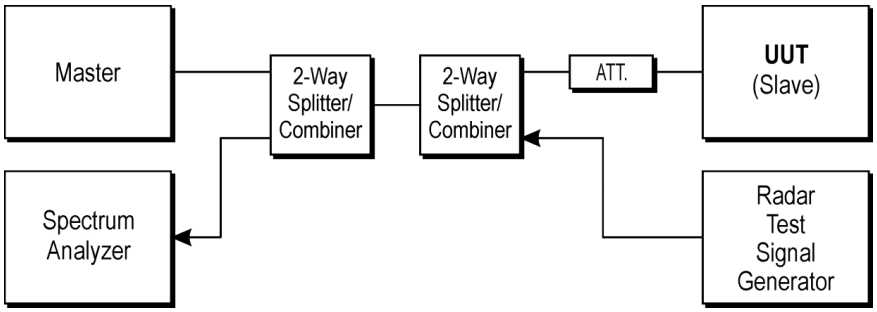


Figure 1: Setup

8.1.2 Parameters of DFS test signals

1. Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 mW	-64 dBm
< 200 mW	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.	

2. DFS Response requirement values

Parameter	Value
Non-occupancy period	minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 80% of the 99% transmission power bandwidth See Note 3.
Note 1: The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows: • For the Short pulse radar Test Signals this instant is the end of the Burst. • For the Frequency Hopping radar Test Signal, this instant is the end of the last radar Burst generated. • For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission. Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate Channel changes (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3: During the U-NII Detection Bandwidth detection test, radar type 1 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.	

8.2 DFS test results

8.2.1 Channel move time / channel closing transmission time

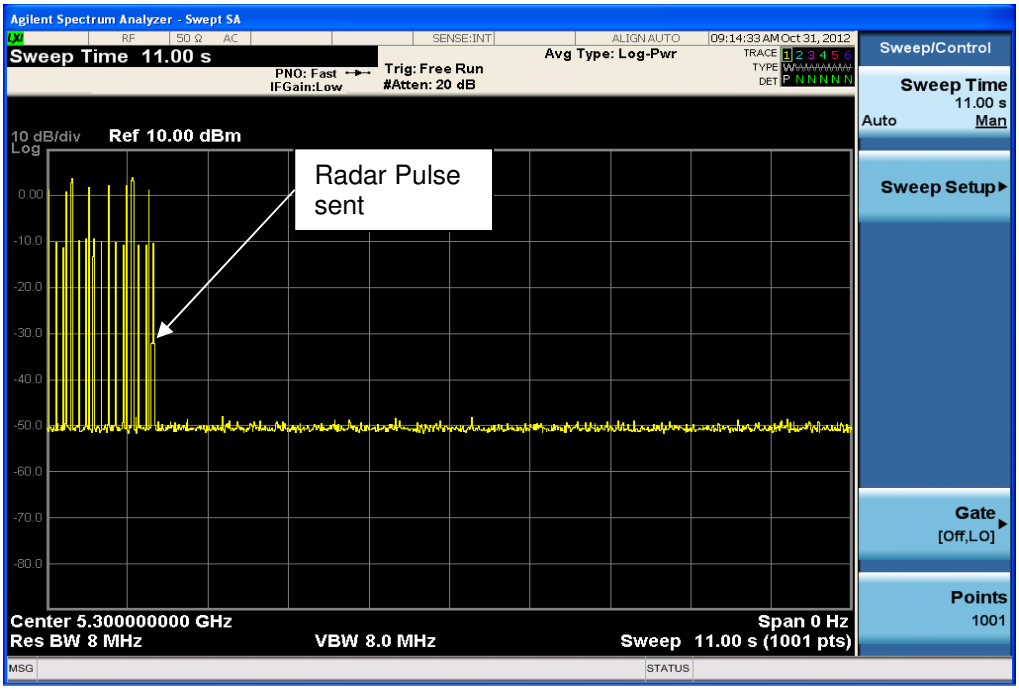
Description:

Channel Move Time. After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel.

Test Procedure:

Perform the test with one of the type 1 to type 4 short pulse radar waveforms.

Result: Channel 60



The arrow shows the time of the radar pulse. On the plot you can see that no transmissions occur from the AP after sending the radar burst. The time difference between the recognition of the radar burst by the AP and its last transmission is called as Channel Move Time (Limit: 10 s). The accumulated transmission time of the AP and for the slave device after detection of a radar signal is called channel closing transmission time (Limit: in total 200 ms + 60 ms).

The accumulated channel closing transmission time after 200ms of the slave device is less than 60 ms.

Final verdict: Pass

8.2.2 Non-Occupancy Period

Description:

Non-occupancy Period. A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The non occupancy period starts at the time when the radar system is detected.

Test Procedure:

Client device is not permitted to transmit beacons on DFS frequencies.

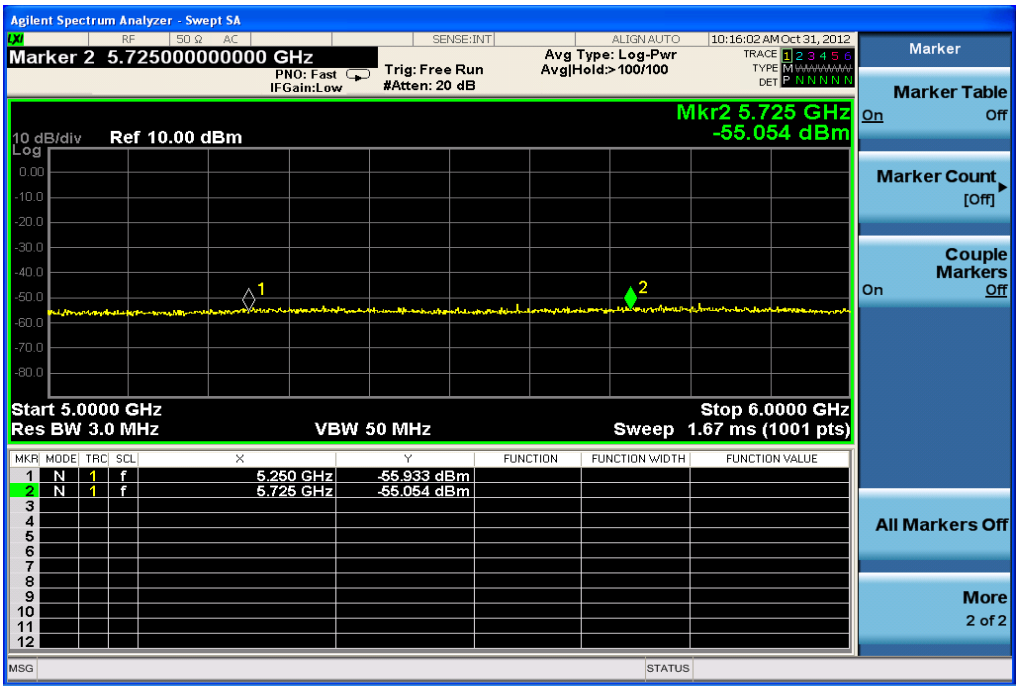
1) Non-associated test:
The master has been off, monitor the analyzer on the test mode frequency that have been selected for testing, power up the client for 30 minutes to make sure no beacons have been transmitted.

2) Associated test:
Associate the master and client and stream the movie as specified for non- occupancy test. Transmit Radar type 1; monitor the test frequency to make sure no beacons have been transmitted for 30 minutes.

Mode	Results
Non-Associated	No Beacons transmit
Associated	No transmissions

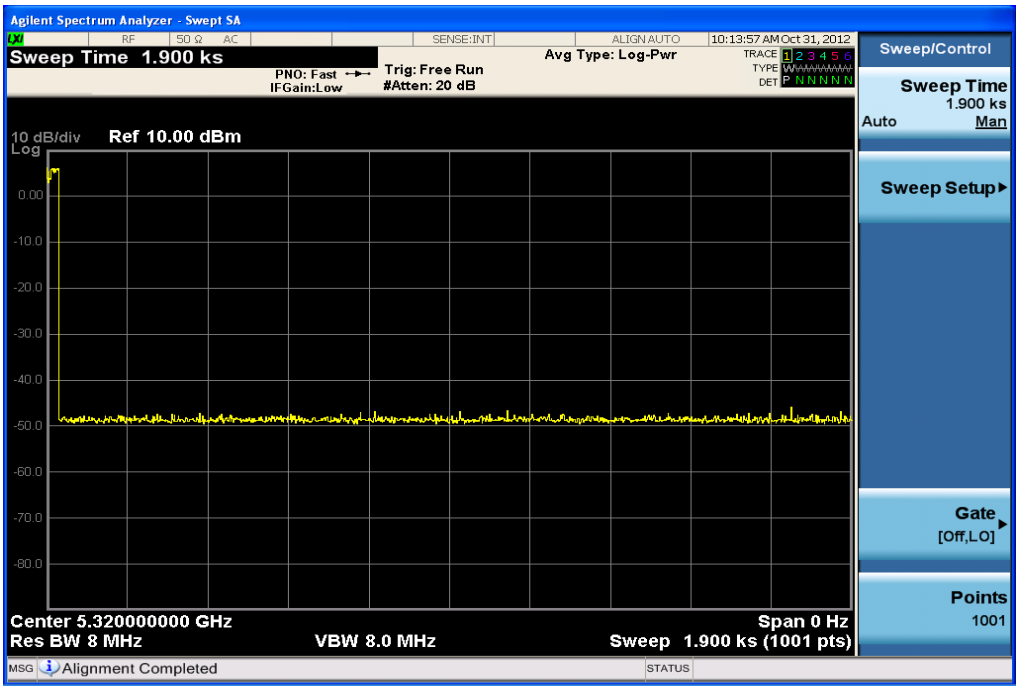
Please refer to the following plots.

1) Non-associated:



The plot shows no transmissions over a 30 minutes period over the whole frequency band 5 GHz - 6 GHz.

2) Associated:



In the plot above you can see, that the client does not transmit any emission within 30 minutes after having received the “stop transmit” order from the Access Point (DFS-Master).

Final verdict: Pass

9 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	06.01.2012	06.01.2014
2	n. a.	Signal Generator	SMU200A	Rohde & Schwarz	101633	300003496	k	19.08.2011	19.08.2014
3	n. a.	Power-Splitter	11667B	Hewlett Packard	00616	300002421	ev		
4	n. a.	Power-Splitter	DMS 211	Technical Research Manufacturing Inc.	9321		ev		
5	U025	Cables	Sucotest 18	Huber & Suhner	div.		ev		
6		Attenuator 30dB, k-con.	Inmet	40A-30dB	div.		ev		

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

10 Observations

No observations exceeding those reported with the single test cases have been made.