RR051-15-101375-1-A Ed. 0

RADIO TEST REPORT

RADIATION PATTERNS

Equipment under test :

Back shell for Smartphone,
tested with a mobile phone

Company :
Mr.P.Duthilleul

Distribution : Mr.P.Duthilleul

Company : -

Number of pages: 13 included 1 appendix

Ed.	Date	Modified Page	Written by Name / Visa	Technical Verification and Quality Approval Name / Visa
0	28-Apr-15	Creation	G. Hyaumet	M .Dumesnil

Duplication of this document is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.
This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample

Product	:	Back shell for Smartphone
Reference	:	Duthilleul Process - No name back shell for smartphone
Serial Number	:	-
Reference of mobile phone	:	SAMSUNG model GT-I9505 IMEI N°356843/05/584814/0

COMPANY SUBMITTING THE PRODUCTS:

Applicant	:	M. Duthilleul
Address	:	13, rue Nouzeran Chavas 34190 Ganges France
Trial participants	:	-
Contact	:	M. Duthilleul
DATE OF TEST	:	April 24, 2015
TESTING LOCATION	:	EMITECH 9, rue M. Trintignant Le Mans (72) France
TESTED BY	:	Gilles Hyaumet

CONTENTS

1. INTRODUCTION

This report presents the results of test, carried out on the equipment: *No name back shell for smartphone* (subsequently denominated E.U.T.: equipment under test), in combination with a mobile phone *SAMSUNG* model GT-I9505.

2. REFERENCE SPECIFICATION

ETSI TS 151 010-1 V4.9.0 (07-2002)

It is applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

3. ABREVIATIONS

Following abbreviations are expressed in the present report:

E.U.T.: equipment under test
E.I.R.P.: equivalent isotropic radiated power
Tx :transmitter
Rx : receiver
C : communication channel
MIMO : Multiple Input Multiple Output
MISO : Multiple Input Single Output

4. PERFORMED TESTS

The sections of the following standards have been taken for reference for the measure of radiated patterns of the mobile phone:

Transmitter:

ETSI TS 151 010-1:
- art. 13.3: Transmitter output powers, using radiation patterns

Receiver :

Sensitivity in static mode, using radiation patterns

5. SETUP OF E.U.T.

Description of E.U.T :

The mobile phone SAMSUNG GT-I9505, powered with its internal battery, has been measured with and without the back cover, in order to quantify the provided attenuation.

The photo on appendix shows the location of the Cover on the phone.

Operating mode during the tests:

Mobile phone is in communication mode with a tester, at its maximal output power.

During test, phone and test antenna are in the vertical positions.

6. TESTS RESULTS SUMMARY

In the following table are reported the average values of radiated patterns, for transmitter and receiver, on the low and high channel of the tested band.

Attenuation is positive for receiver: average sensitivity with the Cover is reduced by the value of the attenuation

Attenuation is positive for transmitter: average output power with the back cover is lower than one emitted by the mobile phone itself.

Communication band	Average level for receiver phone (dBm)	Average level for receiver phone + Cover (dBm)	Average attenuation for receiver (dB)	Average E.I.R.P. phone (dBm)	Average E.I.R.P. Average phone+Cover (dBm)	Average attenuation for transmitter (dB)
GSM900	-105.09	-92.01	**13.1**	31.73	22.94	**8.8**

Communication band	Average output power phone (W)	Average output power cover (W)	Average attenuation for transmitter (W)	Average attenuation for transmitter (%)
GSM900	1.488	0,197	1.292	**87**

Note: The tested mobile could contain an antenna diversity technology, as MIMO or MISO. The control of the antenna's scheme has not been provided by the applicant. Thus, the radiated performances of the EUT are dependent on the test set-up; an antenna diversity control could lead to different results from those reported in this test report.

7. RECEIVER AND TRANSMITTER RADIATION PATTERNS

Reference specification

ETSI TS 151 010-1 art. 13.3.4.2 limited to the band GSM900

Test procedure

The mobile phone is on an isolated support, on a turntable, at 1.8m high, in an anechoic room.

Measuring distance is 3m, with antenna in vertical position.

The display of the mobile phone is front to the antenna (0°), and 90° is its right side.

Rotation step of the turntable is 30°

The power measurements have been done with 30 bursts on low and high channel on the GSM900 band.

The receiver measurement is performed according to the sensitivity, with a Bit Error Rate (BER class II) evaluation. Error rate value is 2.4% on 50 bursts.

Test equipments used

Equipment	Manufacturer	Type	EMITECH N°
Antenna	Emco	3115	7186
Wire	-	N-3m	6995
Wire	-	N-8m	11831
Radiocomunication tester	Rohde & Schwarz	CMU200	7090
Software	Rohde & Schwarz	CMUgo v2.0.0	-
Anechoic room	Siepel	10.7x6.6x7.2 m	7181
Turntable controler	Rohde & Schwarz	HCC	7101

Results

The values listed hereafter are referred to a isotropic antenna (E.I.R.P: Equivalent Isotropically Radiated Power)

The measurements results are presented in the following tables, with the related radiation patterns.

The values in the columns “Phone” and “Cover” are the average power values of the 2 channels.

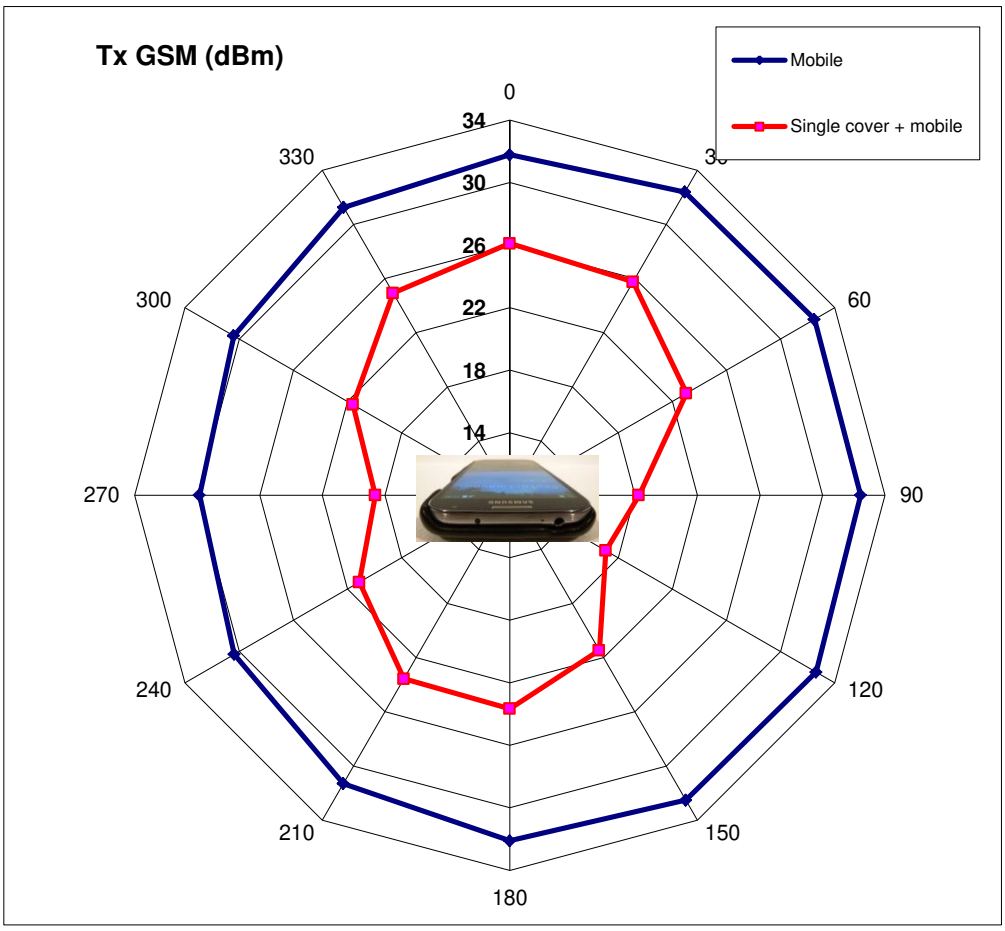
Note: Measurements have been done with the home button of the mobile phone at the top. Diagrams are elaborated for a standard position of the mobile phone, i.e. home button at the bottom.

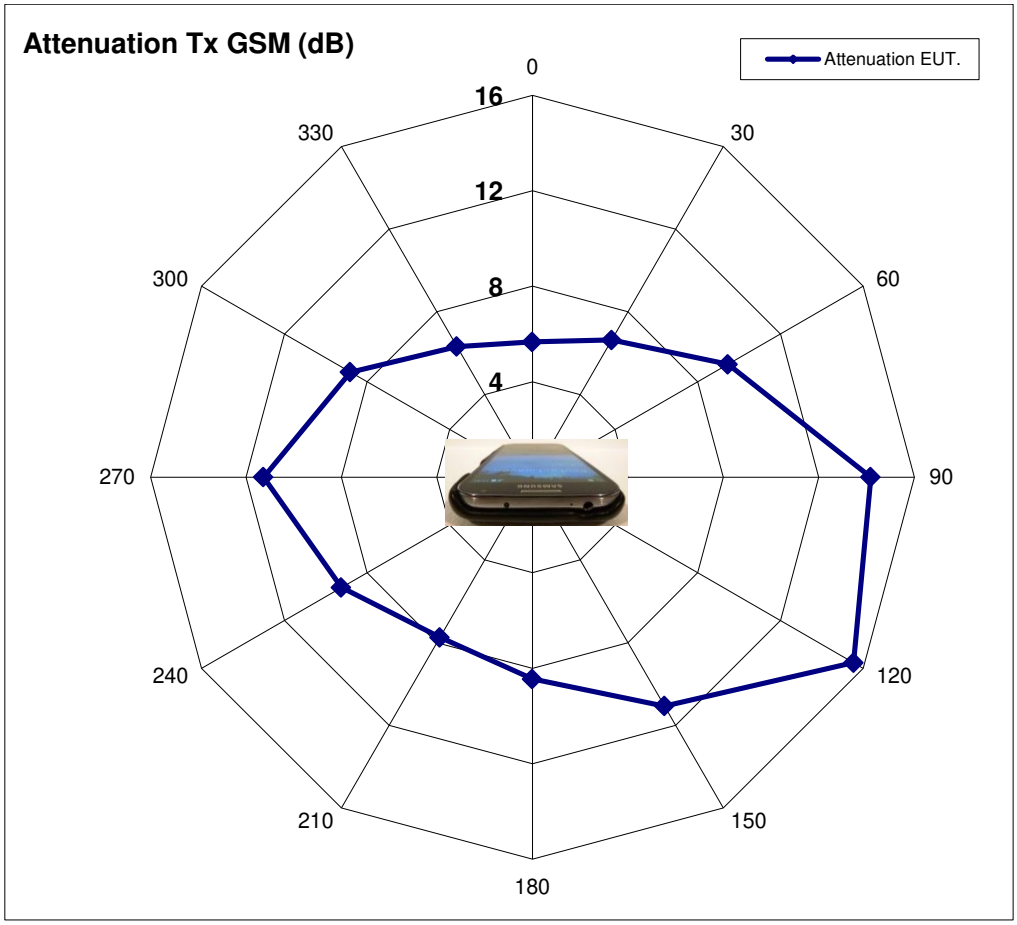
Transmitter GSM900

Angle (°)	Phone C975 (dBm)	Phone C124 (dBm)	Phone (dBm)	Cover C975 dBm	Cover C124 dBm	Cover + phone (dBm)	**Cover attenuation** (dB)
0	31,2	32,3	31,78	27,0	25,0	26,11	**5,7**
30	31,7	33,0	32,40	26,8	24,4	25,76	**6,6**
60	31,8	33,1	32,50	24,0	21,8	23,04	**9,5**
90	31,8	33,0	32,44	19,4	16,7	18,26	**14,2**
120	32,1	33,1	32,63	17,9	16,1	17,09	**15,5**
150	32,1	32,9	32,52	21,5	21,4	21,45	**11,1**
180	31,8	32,4	32,11	23,4	23,9	23,66	**8,5**
210	31,0	31,6	31,31	23,2	23,9	23,56	**7,8**
240	30,0	30,7	30,36	20,7	21,5	21,12	**9,2**
270	29,6	30,1	29,86	18,5	18,7	18,60	**11,3**
300	30,2	30,6	30,40	22,4	20,6	21,59	**8,8**
330	31,0	31,5	31,26	25,9	23,7	24,94	**6,3**
Average	31,3	32,1	31,73	23,5	22,3	22,94	**8,8**

Note: Attenuation is positive for transmitter: average output power with the Cover is lower than one emitted by the mobile phone itself

Step (°)	Phone power (W)	Cover + phone power (W)	Cover attenuation (W)	Cover attenuation (%)
0	1,507	0,408	1,098	**73**
30	1,738	0,377	1,361	**78**
60	1,778	0,201	1,577	**89**
90	1,754	0,067	1,687	**96**
120	1,832	0,051	1,781	**97**
150	1,786	0,140	1,647	**92**
180	1,626	0,232	1,393	**86**
210	1,352	0,227	1,125	**83**
240	1,086	0,129	0,957	**88**
270	0,968	0,072	0,896	**93**
300	1,096	0,144	0,952	**87**
330	1,337	0,312	1,025	**77**
Average	1,488	0,197	1,292	**87**

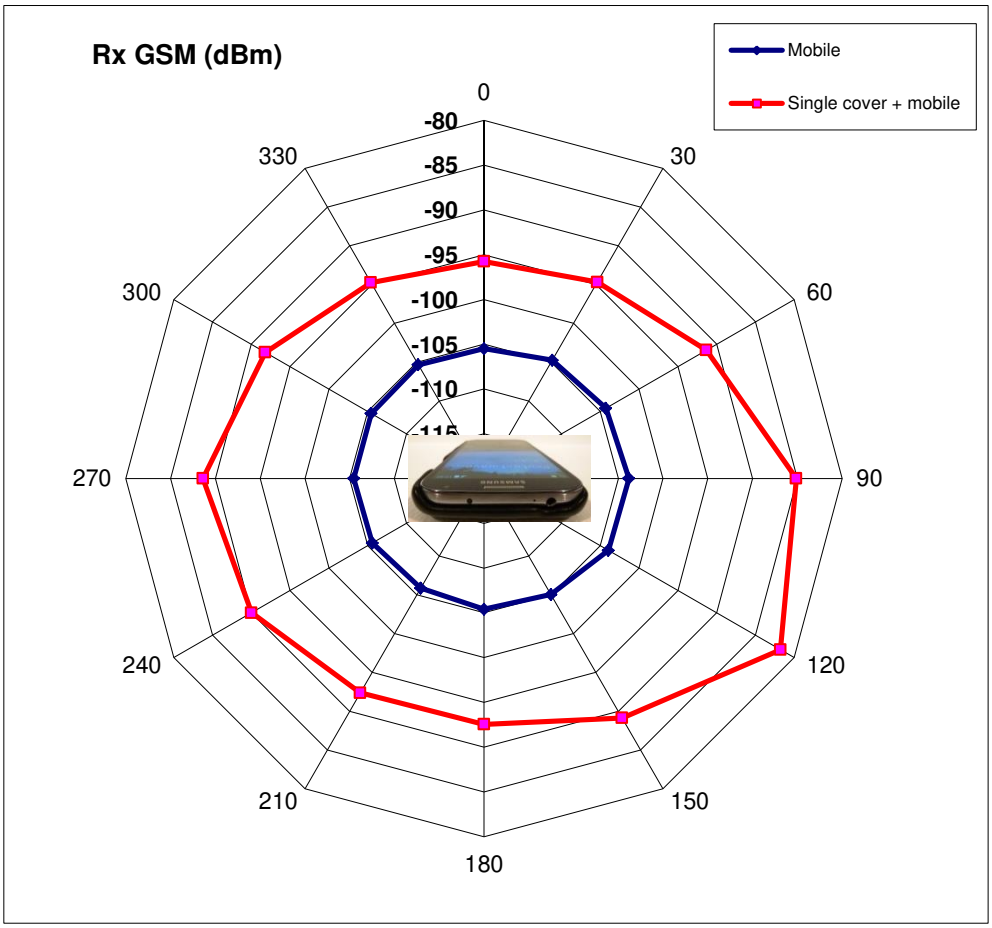

Tx GSM (dBm)
Mobile
Single cover + mobile
0
30
60
90
120
150
180
210
240
270
300
330
34
30
26
22
18
14

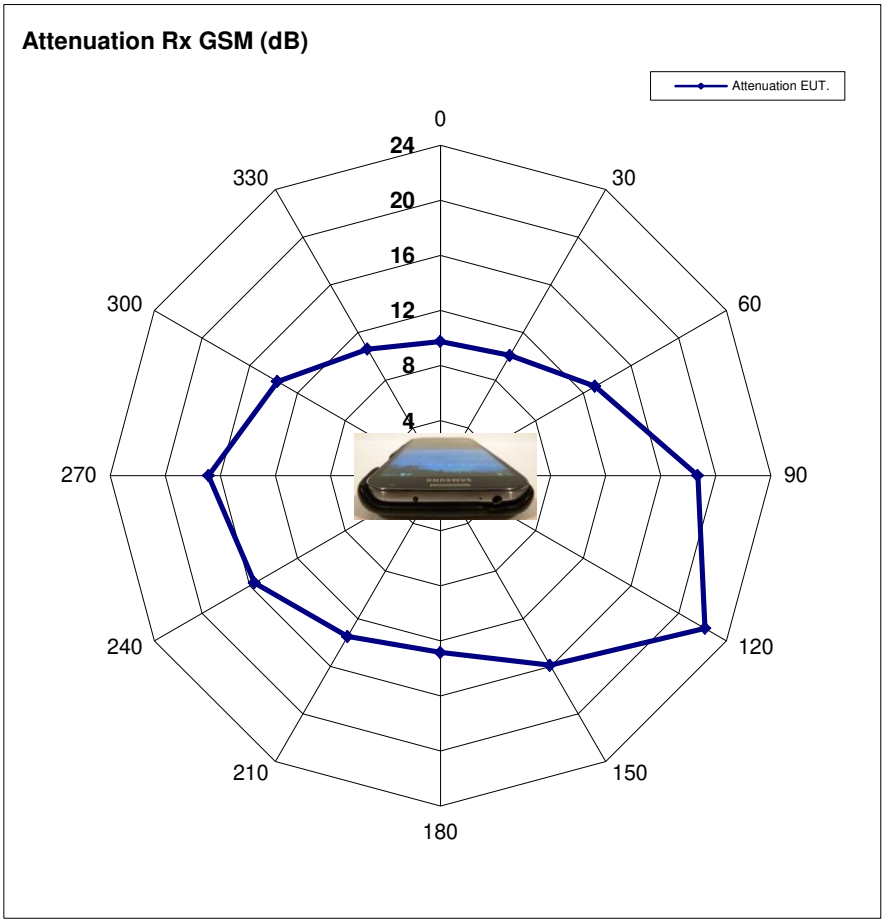

Attenuation Tx GSM (dB)
Attenuation EUT.
0
30
60
90
120
150
180
210
240
270
300
330
16
12
8
4

Receiver GSM900 :

Step (°)	Phone C975 (dBm)	Phone C124 (dBm)	Phone (dBm)	Cover C975 dBm	Cover. C124 dBm	Cover + phone (dBm)	**Cover attenuation** (dB)
0	-105,6	-105,4	-105,50	-96,8	-94,4	-95,76	**9,7**
30	-105,3	-104,1	-104,74	-96,1	-92,5	-94,66	**10,1**
60	-105,6	-102,4	-104,29	-93,0	-88,5	-91,31	**13,0**
90	-105,1	-102,0	-103,82	-87,1	-81,4	-85,12	**18,7**
120	-105,0	-102,6	-103,96	-83,6	-78,5	-81,76	**22,2**
150	-105,6	-104,4	-105,04	-90,8	-86,4	-89,13	**15,9**
180	-105,2	-105,6	-105,40	-94,1	-90,1	-92,55	**12,9**
210	-105,6	-106,1	-105,86	-94,0	-89,7	-92,36	**13,5**
240	-104,9	-106,2	-105,60	-91,7	-87,2	-90,01	**15,6**
270	-104,4	-106,3	-105,45	-89,5	-87,5	-88,61	**16,8**
300	-105,1	-105,8	-105,46	-91,9	-91,7	-91,80	**13,7**
330	-104,8	-105,8	-105,33	-95,2	-94,2	-94,73	**10,6**
Average	-105,2	-105,0	-105,09	-93,2	-90,4	-92,01	**13.1**

Note: Attenuation is positive for receiver: average sensitivity with the Cover is reduced by the value of the attenuation





□□□ End of report, 1 annex to be forwarded □□□

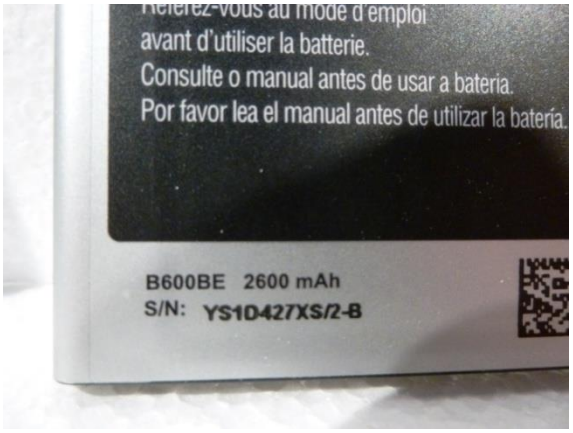
APPENDIX : PHOTOGRAPHIES

Tested Cover and phone:

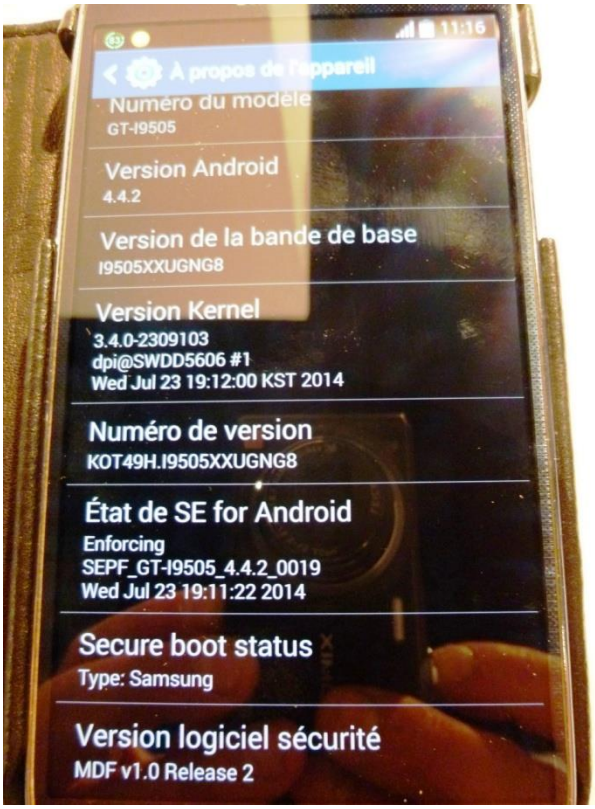
Cover:

Mobile phone:

Labels:



Mobile version:



Test setup

Phone and Cover (step 0°) :