



# Dual Band Antenna specification

## CUSTOMER handset

*PRELIMINARY*

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39 rue du Gouverneur Général Eboué  
92130 Issy les Moulineaux  
Tél : 01 46 29 08 00  
Fax : 01 46 29 08 08  
[www.wavecom.com](http://www.wavecom.com)



# Amendments

Release	Date	Author	Comments
1.0	18/11/99	JCL	1 <sup>st</sup> release



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# 1. Presentation

## 1.1 Objectives

This document describes specifications for a Dual band antenna (GSM900 and DCS1800) in a stubby case.

As product is intended to be mounted on Customer Handset, Characteristics and specifications are available for complete phone : including all mechanical and electronic parts in a final configuration.

## 1.2 Advertising

Due to critical function and shape of the antenna, all content of this specification could not be broadcast without a written authorisation of Wavecom under a Non-Disclosure Agreement.

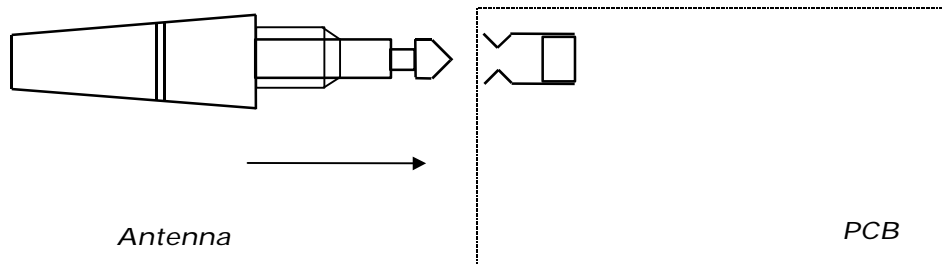
## 1.3 References

- ETSI GSM specification : part 05.05 and 11.10
- Wavecom WM2C-Dual module specification
- Cenelec ES59005 : considerations for the evaluation of human exposure to Electromagnetic Fields (EMFs) from Mobile Telecommunication Equipment (MTE) in the frequency range 30 MHz - 6 GHz.
- Fcc OET65 : Guidelines for Human Exposure to Radio frequency Electromagnetic Fields



## 2. Contact

Mobile connection is a « lyre type ». Lyre is soldered on module PCB at RF access point. The hot point of the antenna is ended by a cylindrical form with a diameter reduction:



Antenna is screwed on chassis. Metallic part of the antenna support a M4x0,5 screw.

## 3 Electrical properties

### 3.1 Frequency bands

GSM relevant band : Tx : 880 MHz to 915 MHz  
Rx : 925 MHz to 960 MHz

DCS relevant band : Tx : 1,71 GHz to 1,785 GHz  
Rx : 1,805 GHz to 1,88 GHz

### 3.2 Impedance

Nominal impedance value is 50Ω.

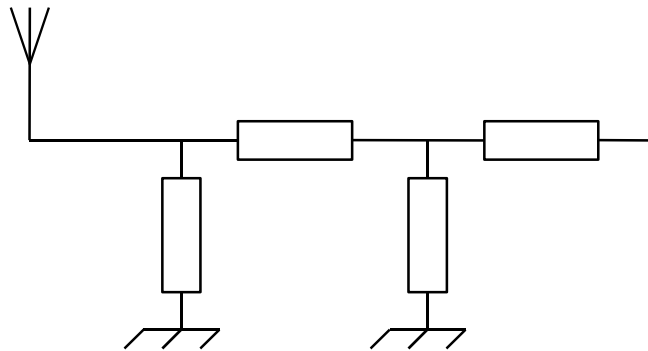
Standard measurement set-up is a far-field environment, return losses in both bands must be less than -10 dB.

Degradation of SWR when the mobile is close to the head (talking position) must give a return losses less than -5 dB.



### 3.3 Matching circuit

The configuration of the matching network is :



Each element could be an inductor or a capacitor. A DC path from antenna to ground is strongly recommended for ESD avoidance.

Tuning of component should be done for each release of antenna, chassis or PCB.

### 3.4 Antenna gain

The radiation pattern of the antenna/mobile assembly must be  $>0$  dBi in all azimuth, at  $0^\circ$  elevation angle. For all Tx and Rx bands.

Radiation measurements must be delivered in azimuth and elevation angles.

*Note : dBi are referred to isotropic antenna*

### 3.5 SAR compliance

Final product (antenna + mobile) shall comply with SAR specifications given by Cenelec and Fcc. Test configuration (eg positions, phantom, brain liquid properties, frequencies, test method and uncertainty) shall be the state of the art. Whereas, Electromagnetic power within human body must not exceed :

SAR  $< 1.6$  W/kg in 1g cube of continuous tissues  
 $< 2$  W/kg in 10g cube of continuous tissues



## 4 Mechanical properties

### 4.1 Shape

Antenna shape shall be as drawn.

Form factor, shape and radome external aspect are properties of Wavecom and CUSTOMER.

Assembling of all mechanical parts of the antenna must not affect the electrical properties.

### 4.2 Materials

TBD

### 4.3 Production process

TBD

### 4.4 Drop tests

Handset is dropped with antenna downward onto a concrete plane. Height of drop is  $H=1.7$  for 5 times.

Requirement: No visual degradation shall appear and antenna shall perform same electrical characteristics after test than specified in 3.

### 4.5 Torque tests

Torque tool is placed on antenna. Coupling factor  $T=20\text{Ncm}$  is applied between plastic case of the antenna and chassis.

Requirement: No visual degradation shall appear and antenna shall perform same electrical characteristics after test than specified in 3.



## 4.6 Bend tests

A force is applied perpendicular to antenna axis. Force is applied at a height 10mm beyond the top of the antenna, until the specified angle  $\alpha=30^\circ$  or the specified force  $F_b=50N$  is reached.

Requirement: Antenna shall replace original shape after release. No visual degradation shall appear and antenna shall perform same electrical characteristics after test than specified in 3.

## 4.7 Vibration tests

Handset is placed on a vibrating table, both plan axis (x and y). Excitation applied is:

- Frequencies: 5 – 55 – 5 Hz
- Sweep rate: 1 octave/mn
- Amplitude: 2mm
- Test time: 1 hour

Requirement: No visual degradation shall appear and antenna shall perform same electrical characteristics after test than specified in 3.

# 5 Environmental Specifications

## 5.1 Temperature

Operating temperature: -40°C to +80°C

Antenna shall be compliant with electrical performance and without visual degradation.

Stockage temperature: -40°C to +120°C

## 5.2 Salt spray

Antenna is exposed for 48 hours at +35°C to salt fog (5% NaCl recipe)

Antenna shall not change its conductivity characteristics, no corrosion.

## 5.3 Moisture resistance

TBD