

PRODUCT SPECIFICATION



Product specification for product no. 39435.1 Retractable Bottom Helical Antenna System for *Samsung American PCS* model *SCH-2000* hand portable unit.

DOCUMENT

39435.1 Issue 2

See page 18 changes from earlier issues.

1998 © COPYRIGHT ALLGON

This document is issued by Allgon Mobile Communications AB (hereinafter called Allgon) in confidence, and is not to be reproduced in whole or in part without the prior written permission of Allgon. The information contained herein is the property of Allgon, and is intended solely for contractual use between Allgon and Samsung Electronics CO LTD (hereinafter called Samsung).

An international patent application is filed for the product described in this document (PCT/SE93/00886 or PCT/SE94/00391).

Prepared RF, date: April 15, 1998

Irene Lasson

Irene Lasson
RF-Engineer

Prepared Mech., date: April 15, 1998

Hans Svelander

Hans Svelander
Mechanical Engineer

Approved date: April 15, 1998

Allgon Mobile Communications AB

Anders Sandgren

Project Manager

On behalf of

Christer Sporrang

Global Account Manager

Approved date:

, 1998

Samsung Electronics CO LTD

1 THE PRODUCT

1.1 FEATURES

A *retractable bottom helical antenna system*, consisting of a *helical element fixed* in the fitting and a retractable *whip through* the helical element, for use in a hand portable cellular telephone unit (referred to as a *handset*).

1.2 PRODUCT NUMBER

Allgon Product Number 39435.1

1.3 UNITS AND DEFINITIONS

Unless otherwise stated, SI units are used.

Tx	Transmit Band
Rx	Receive Band
PCB	Printed Circuit Board
VSWR	Voltage Standing Wave Ratio
Room Temperature	+20 ±3 °C
dBd	dB relative to a dipole
CW	Continuous Wave
g	acceleration of gravity $\cong 9.81 \text{ m/s}^2$

2 ELECTRICAL DATA

2.1 FREQUENCY BANDS

2.1.1 Transmit Band (Tx)

1850 - 1910 MHz

2.1.2 Receive Band (Rx)

1930 - 1990 MHz

2.2 IMPEDANCE

2.2.1 Nominal Value

50 Ω

2.2.2 Method

Allgon will supply engineering assistance to get the best possible matching of the antenna system both in extended and retracted modes. The impedance over the frequency bands shall be as close as possible to 50 Ω after matching. Both free space and talk position are considered.

2.3 HANDSET REVISION

2.3.1 PCB Revision

Received at Allgon April 6, 1998

Allgon reference number for Chassis and PCB: 612

2.3.2 Matching

The matching in the handset shall be equivalent to figure 2.3.2.

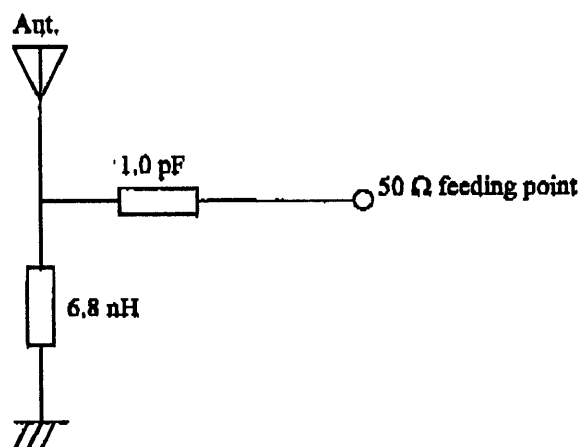


Figure 2.3.2. Matching circuit.

2.4 VSWR¹

2.4.1 Free Space

Mode	Maximum Values	
	Tx	Rx
Extended	2:1	2:1
Retracted	3:1	3:1

2.4.2 Measuring Method

A 50 Ω coaxial cable is connected (soldered) to the 50 Ω point, at the duplex-filter connection (ANT.), on the PCB. The connection of the coaxial cable shall be done to introduce a minimum of mismatch. As much as possible the coaxial cable arrangement shall prevent influences from induced currents on the cable. In the other end, the coaxial cable is connected to a network analyzer. The measurements are performed at room temperature. The handset, including the PCB, must not in any significant way differ from the mass produced handset, i.e. the antenna feeding network has to be equivalent to the network in mass production. The specification shall be met in the entire frequency band. Free space means that the handset is placed on a non-conductive surface of cellular plastic. Talk position means that the handset is held in the left hand to the left ear with the microphone directed towards the mouth.

2.4.3 Reference (REF) Antenna

From early production, *ten* antennas are selected; *five* defining the lower frequency limit, marked "Approved VSWR low", and *five* defining the higher frequency limit, marked "Approved VSWR high". See figure 2.4.3. These ten antennas are our REF antennas. Only the helical elements are considered when finding the REF antennas.

¹ The specified values implies that a correct handset (see 2.3) has been received from Samsung.

3 MECHANICAL DATA

3.1 APPEARANCE

The appearance shall be according to the specification drawing 39435.1 version 2. The antenna shall have no marks, cuts, abrasion or other mechanical damages.

3.2 HELIX DEFORMATION

3.2.1 Angle

$$\alpha = 70^\circ$$

3.2.2 Bending Force

$$F_b = 30 \text{ N}$$

3.2.3 Demands

No visual deterioration shall occur, and the fitting and plastic shall remain mechanically bonded, during the test. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

3.2.4 Measuring Method

The antenna is assembled to the test equipment according to figure 3.2.4. A force is applied perpendicular to the antenna 10 mm below the top of the helix. The antenna is bent until the specified angle, α or the specified force, F_b , is reached.

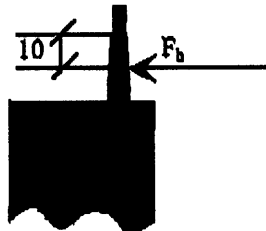


Figure 3.2.4. Helix Deformation.

3.3 TORQUE

3.3.1 Minimum Value

$$T = 10 \text{ Ncm}$$

3.3.2 Demands

No visual deterioration shall occur, and the fitting and plastic shall remain mechanically bonded, during the test. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

3.3.3 Measuring Method

The antenna is assembled to the test equipment. A torque instrument is attached to the helical antenna. The antenna is exposed to the specified torque, T , between fitting and plastic in clockwise direction according to figure 3.3.3.



Figure 3.3.3. Torque.

3.4 WHIP DEFORMATION

3.4.1 Bending Diameter

$$D = 40 \text{ mm}$$

3.4.2 Demands

Zone 1: No remaining deformation.

Zone 2: No fracture. The original shape shall be possible to restore. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

3.4.3 Measuring Method

The antenna is assembled to the test equipment according to figure 3.4.3 a). A test fixture is attached to the top of the antenna in extended mode. The antenna is bent 180° around a cylinder with diameter D . The antenna is released and sprung back to vertical position. Zone 1 and 2, according to figure 3.4.3 b), are examined.

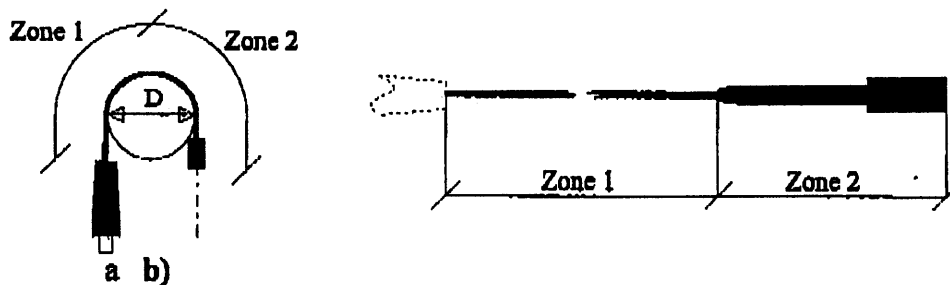


Figure 3.4.3. Whip deformation. A) Bent antenna. B) Close up of the two zones.

3.5 PULLING FORCE

3.5.1 Pulling Force

$$F_p = 30 \text{ N (static)}$$

3.5.2 Demands

No visual deterioration shall occur, and the knob and wire shall remain mechanically bonded, during the test. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

3.5.3 Measuring Method

The antenna is assembled in the test equipment according to figure 3.5.3. The specified load, F_p , is applied during 30 s to the top of the antenna.

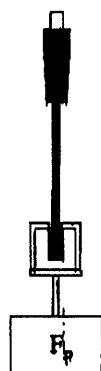


Figure 3.5.3. Pulling force.

3.6 DROP

3.6.1 Drops

1 drop in extended mode and 1 drop in retracted mode

3.6.2 Drop Height

0,75 m

3.6.3 Drop Angle

45°

3.6.4 Handset Weight

200 gram

3.6.5 Demands

The original shape shall be possible to restore. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

3.6.6 Measuring Method

The antenna is attached to the handset or an equivalent test fixture. The handset is dropped with the antenna downwards onto a concrete surface covered with 20 sheets of Xerox quality paper, having a specific weight of 80 g/m².

3.7 BENDING ENDURANCE

3.7.1 Bending Cycles

400 cycles, according to figure 3.7.3

3.7.2 Demands

No visual deterioration shall occur during the test. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

3.7.3 Measuring Method

The antenna is assembled to the test equipment in vertical extended mode according to 3.7.3. The antenna is bent 90° left and 90° right (1 cycle). This is repeated for the duration of the test.

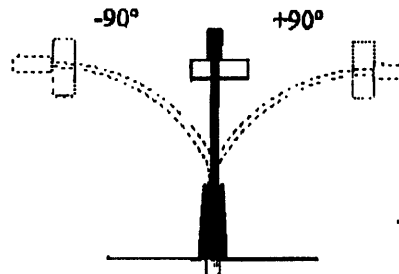


Figure 3.7.3. Bending endurance.

3.8 RETRACTION FROM EXTENDED MODE

3.8.1 Retraction Force

1.0- 8.0 N

3.8.2 Demands

The mean value from 5 measurements, on each antenna, shall be within the specified limits.

3.8.3 Measuring Method

The antenna is pushed down from extended mode with a speed of 2.5 mm/s. The maximum force before the antenna is released from extended mode is registered.

3.9 RETRACTION FORCE CONSISTENCY

3.9.1 Retraction Cycles

10,000 cycles

3.9.2 Demands

No visual deterioration shall occur, and the retraction force must not differ from the specified values, according to 3.8.1, during the

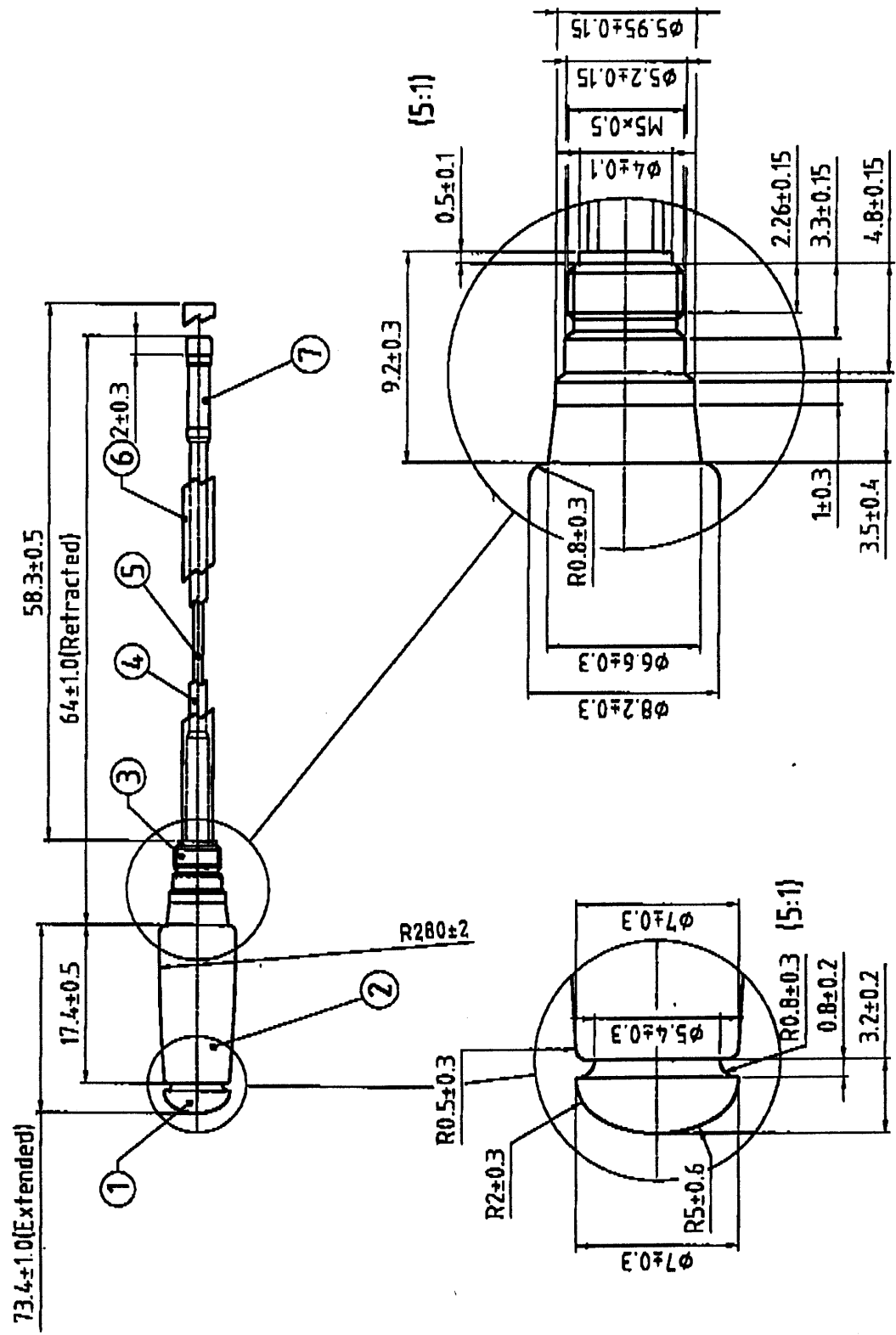
extension/retraction cycles. The antenna shall satisfy the electrical demands, according to 2.4.1, after the test.

3.9.3 *Measuring Method*

The antenna is fully extended/retracted (1 cycle) with random rotation. The retraction force is measured every 5,000 cycles.

1. 本圖為 ALLGON 移動式通訊設備之規格圖，所有尺寸均以毫米為單位，除非另有註明。2. 本圖為 ALLGON 移動式通訊設備之規格圖，所有尺寸均以毫米為單位，除非另有註明。3. 本圖為 ALLGON 移動式通訊設備之規格圖，所有尺寸均以毫米為單位，除非另有註明。4. 本圖為 ALLGON 移動式通訊設備之規格圖，所有尺寸均以毫米為單位，除非另有註明。5. 本圖為 ALLGON 移動式通訊設備之規格圖，所有尺寸均以毫米為單位，除非另有註明。6. 本圖為 ALLGON 移動式通訊設備之規格圖，所有尺寸均以毫米為單位，除非另有註明。7. 本圖為 ALLGON 移動式通訊設備之規格圖，所有尺寸均以毫米為單位，除非另有註明。

PRODUL, SPECIFICATION DRAWING 9435.1 Version 2



NO.	MATERIAL	SURFACE TREATMENT
1	Plastic Zytel 66 E101 L	Surface acc. to Charilles VDI 3400 no. 30, Colour according to NCS 9500
2	Plastic Santoprene 103-40	Surface acc. to Charilles VDI 3400 no. 33, Colour according to NCS 8500
3	Brass SS 5170-04	Cu/Cu3Ni2-4b acc. to SS ISO 1458
4	Plastic PVC	
5	Ni-Ti-Cr Super elastic alloy	
6	Plastic PA12/P1FE	Colour Black
7	Brass SS 5170-04	Cu/Cu3Ni10b acc. to SS ISO 1458