No. SP02-23-48133

Date: February 22, 2002

SPECIFICATION

FOR

2.4/5.2 GHz Dual-band Internal Antenna for Laptop Computers (HTL008 P52)

Quantity

Your Ref. No.

Our Ref. No.

Signed by H Tate

Hisashi Tate
Expert
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Hitaka Works, Electronic Supplies Group

Hitachi Cable, Ltd.

Issue and revision record

Rev. No.	Issue Date	Item	Prepared by	Reviewed by	Approved by
-	Feb 22, 2002	First Edition	Y. Yamamoto	S. Suzuki	T. Tate

1. Scope

This specification covers the 2.4/5.2 GHz dual-band internal antenna suitable for laptop computers (hereinafter called "this product").

2. Product Name

This product is called "**HTL008 P52**".

3. Abbreviations

OD	Outer Diameter
LCD	Liquid Crystal Display
VSWR	Voltage Standing Wave Ratio
HCL	Hitachi Cable, Ltd.

4. Structure

This product consists of two individual antennas as shown in the attached drawing EH3847466.

Each antenna consists of the following three elements:

1) Radiator
2) Coaxial cable
3) Connector

Each of the antennas is shown in the attached drawings of which numbers are described in the following Table 4-1.

Table 4-1 Individual antennas composing the product.

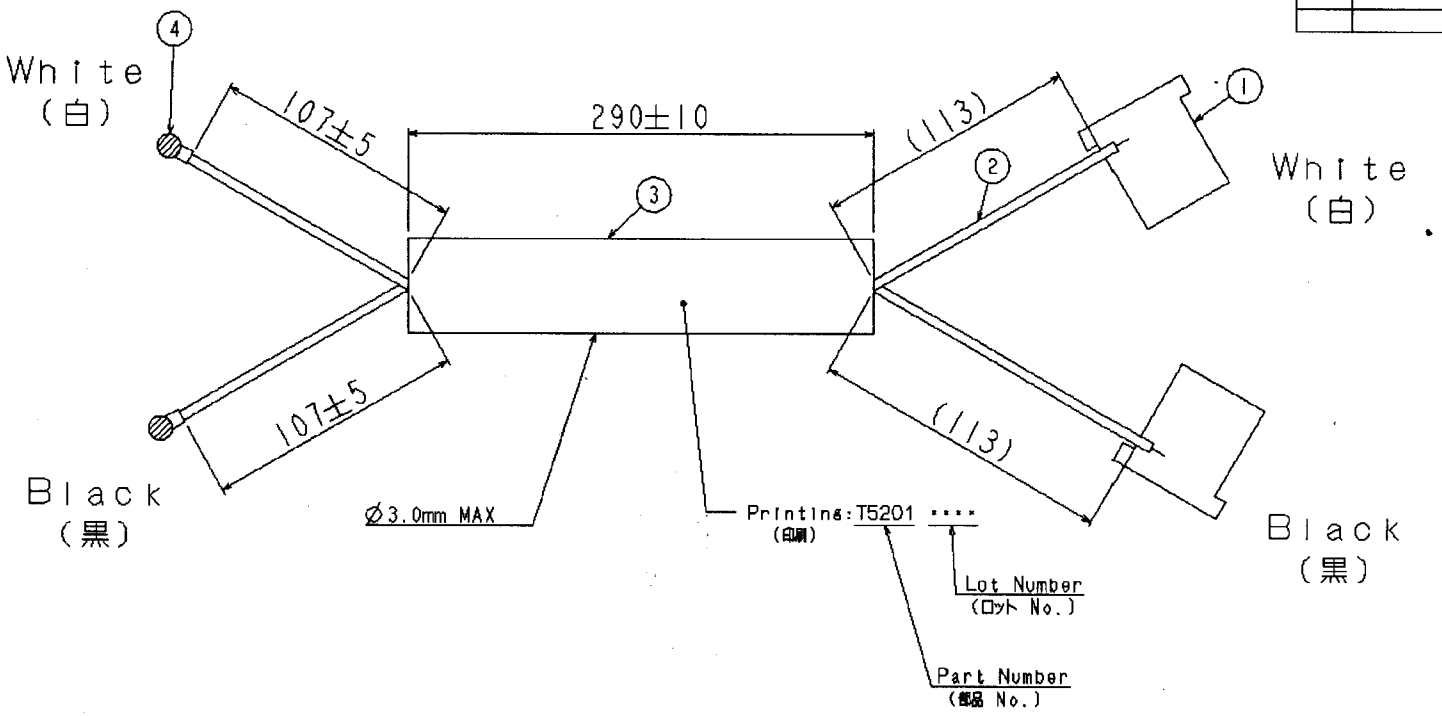
Antenna Type	Drawing No.	Applicable Frequency	Cable Spec.			Connector
			OD	Color	Length (mm)	Marking Color
HTL008-L	EH4813463	2.4/5.2 GHz dual-band	ϕ 0.8 mm	white	510 ± 7	red
HTL008-R	EH4813464	2.4/5.2 GHz dual-band	ϕ 0.8 mm	black	510 ± 7	red

The above two antennas are bundled each other with a heat shrinkable tube.

The connectors shall be painted with the color shown in Table 4-1.

EH3847466

MARK	REVISION	DATE	NAME	CHKD



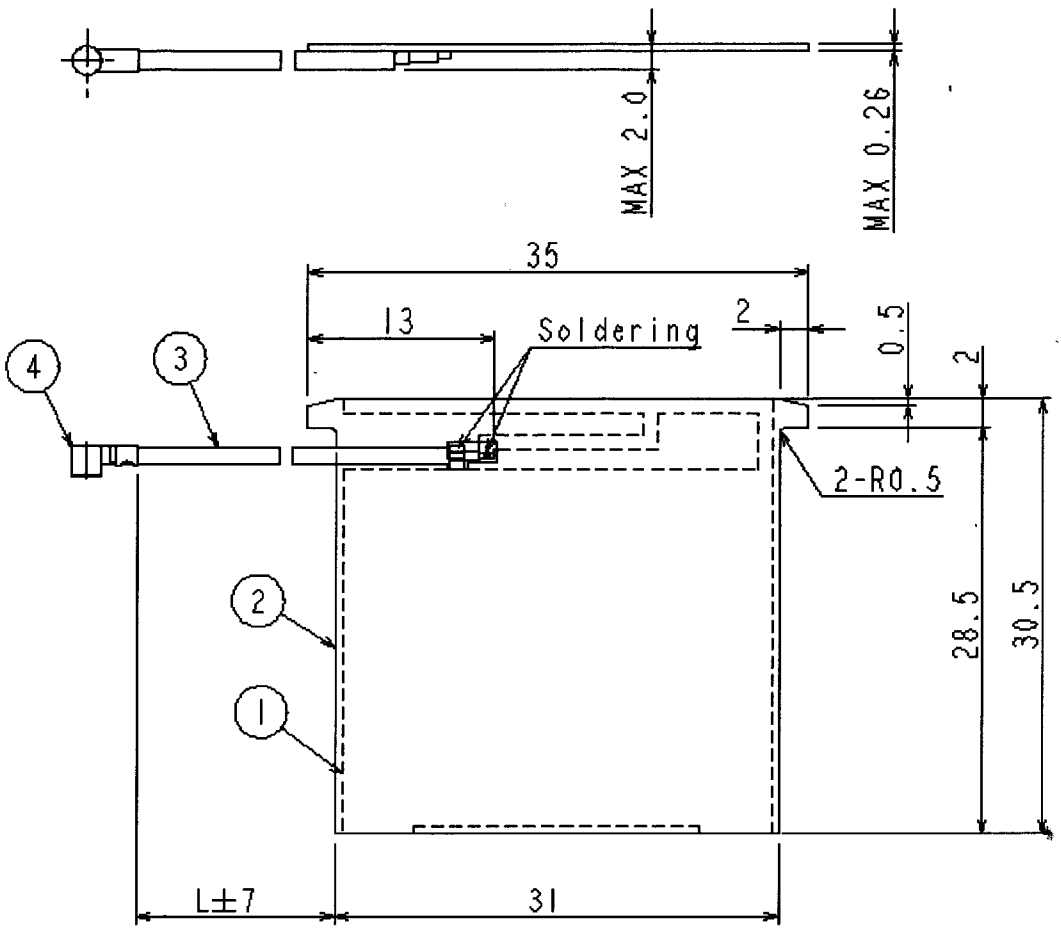
No. (品番)	Description (品 名)
①	Antenna (アンテナ)
②	Co-axial Cable (同軸ケーブル)
③	Tube (チューブ)
④	Connector (コネクタ:HRS U.FL(V))

Note
(注記)

1. White cable length;510±7(Ø0.8mm)
   (白ケーブル長)
2. Black cable length;510±7(Ø0.8mm)
   (黒ケーブル長)
3. ▨ Shall be painted by red.
   (図中の▨部は、赤色で着色する事にします。)

DWN.		02.02.20	TITLE
CHKD.		REGD. PROJ.	HTL008 P52 (Dual Band Antenna)
APPD.			
SCALE			
Hitachi Cable, Ltd. Hitaka Works			EH3847466

MARK	REVISION	DATE	NAME	CHKD.



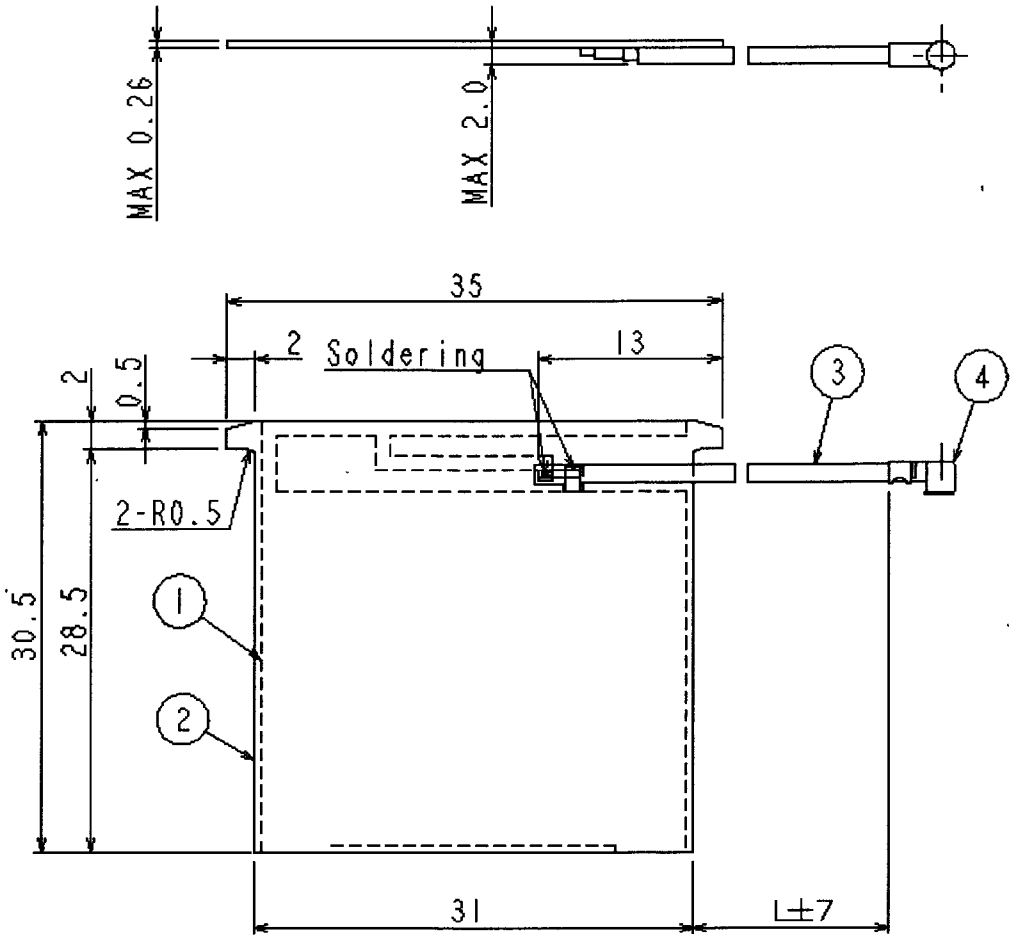
No.	Description
(1)	Conductor
(2)	Insulating Film
(3)	Co-axial Cable
(4)	Connector

Note

1. Dimension L shall be based on TOSHIBA's Purchase Specification

REGD.	DWN.	02.01.09	TITLE	Hitachi Cable, Ltd. Hitaka Works	Rev.
	CHKD.	PROJ.			
	APPD.		HTL008-L	EH4813463	
	SCALE. N.T.S				

MARK	REVISION	DATE	NAME	CHKD.



No.	Description
1	Conductor
2	Insulating Film
3	Co-axial Cable
4	Connector

Note

1. Dimension L shall be based on TOSHIBA's Purchase Specification.

REGD.	DWN.		02.01.09	TITLE	Hitachi Cable, Ltd. Hitaka Works	Rev.
	CHKD.		PROJ.	HTL008-R	EH4813464	
	APPD.					
	SCALE.	N.T.S				

5. Materials

5.1. Radiator

The radiator consists of the following two materials:

5.1.1. Phosphor bronze as the electrical conductor

Thickness: 0.1 mm

The conductor is laminated on both surfaces with the following insulating film.

5.1.2. Polyimide as the insulating film

Thickness: 0.025 mm
Printings: "Hitachi Cable, Ltd." and "HTL008"

5.2. Coaxial Cable

5.2.1. OD: See Table 4-1.

5.2.2. Color: See Table 4-1.

5.2.3. Length: See Table 4-1.

NOTE: The "cable length" referred in this document means the distance between the joint of the connector and the edge of the insulating film of the antenna (see Fig. 5-1). Here the cable should be measured under the condition that the cable is drawn horizontally to the antenna.

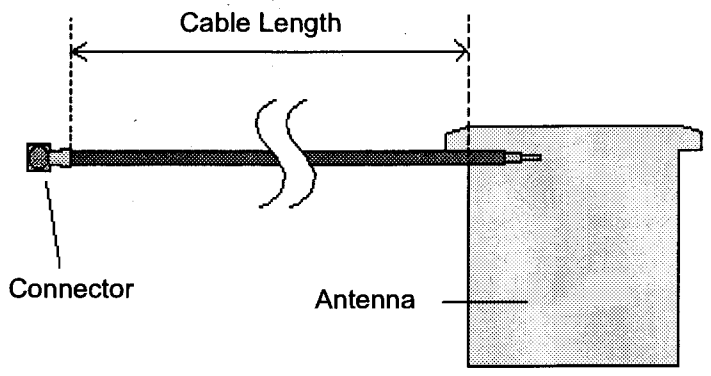


Fig. 5-1 Definition of cable length.

5.3. Connector

5.3.1. Product Name

Coaxial Connector

5.3.2. Product Code

U.FL (V)

5.3.3. Manufacturer

HIROSE ELECTRIC CO., LTD.

5.3.4. Marking

The connectors shall be painted with the color shown in Table 4-1.

5.4. Bundling Tube

5.4.1. Product Name

Heat Shrinkable Tube

5.4.2. Product Code

HCV4

5.4.3. Manufacturer

Tyco Electronics Raychem

5.4.4. Color

Black

5.4.5. Printings

"T5201 *****"

where "T5201" is product ID number (fixed)
"*****" is HCL manufacturing lot number (variable)

6. Electrical Properties

Table 6-1 Return loss properties (in free space).

Antenna Type	Frequency (GHz)*
HTL008-L HTL008-R	2.60 - 2.80 & 5.50 - 6.50

*) When return loss is less than -9.5 dB.

7. Mechanical Properties

7.1. Appearance

Specifications are as follows:

1) Such harmful substances or scratches as affect the antenna performance are not allowed.
2) No peeling of the insulating film at the corners allowed.
3) No bent in the conductor allowed.
4) No significant fault in the soldering allowed.

Appearance is inspected visually at the distance of approx. 30 cm by using no microscopes or any other magnifying aids.

7.2. Cable

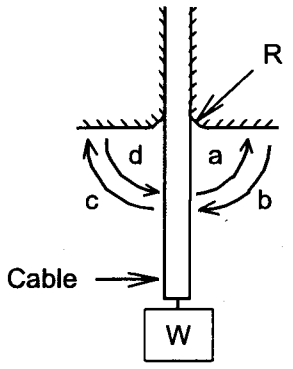
7.2.1. Allowable Tensile Strength: Max. 15 N

7.2.2. Minimum Bending Radius

(1) 4.8 mm in the fixed area (e.g. computer casing)
(2) 8.0 mm in the movable area (e.g. hinge)

7.2.3. Allowable Bending Cycle: Max. 20,000 cycles

Testing method is shown in Fig. 7-1.



1 cycle: +90° → 0° → -90° → 0°
a → b → c → d

Weight (W): 0.5 kg

Bending Radius (R): 8 mm

Fig. 7-1 Testing method of the bending cycle.

7.3. Soldering

7.3.1. Allowable Peeling Strength

Table 7-1 Allowable peeling strength.

Direction	Allowable Peeling Strength (N)
Direction 1	12
Direction 2	4
Direction 3	1
Direction 4	4
Direction 5	1

Testing method is shown in Fig. 7-2.

NOTE: It is possible that the antenna is deformed even if the tensile load is below the allowable peeling strength. In this case, the antenna performance may change.

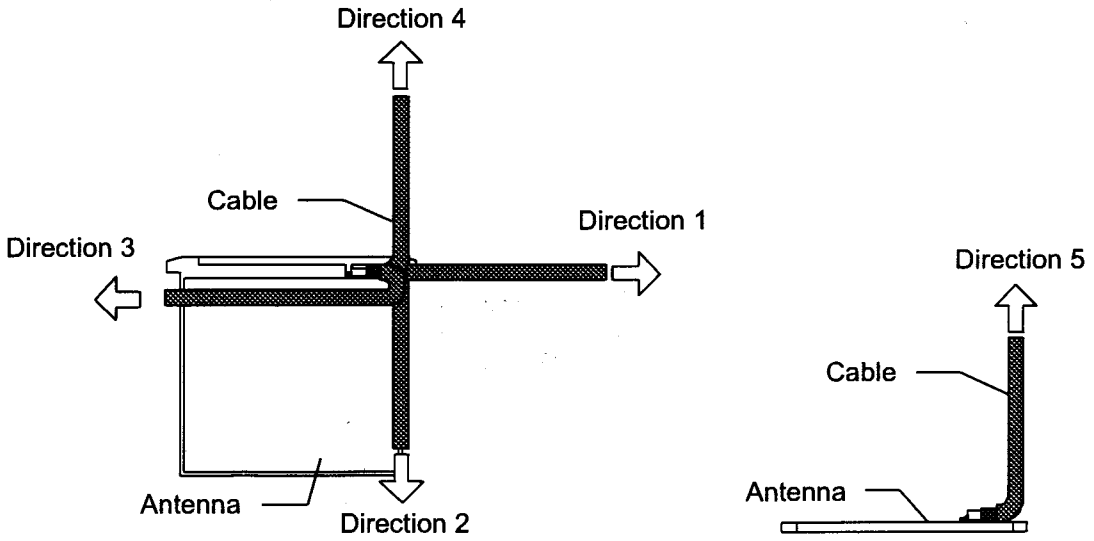


Fig. 7-2 Testing method of the peeling strength.

7.3.2. Wire Breaks

Such stresses as pressure, bending, etc. to the soldered portions may cause the wire breaks.

7.4. Connector

The connectors should be handled according to the user's manual and/or the specification provided by the connector manufacturer.

8. Quality

The items shown in Table 8-1 shall be inspected for each manufacturing lot before the shipment:

Table 8-1 Inspection items.

Inspection Items	Quantity
Appearance	All pieces
Cable length	Sampling
Return loss property	Sampling

9. Packing

9.1. Method

The product shall be packed to keep its quality during the transportation.

9.2. Label

A Label in which the following items are described shall be attached to each package.

1) Product Name
2) Specification
3) Quantity
4) Manufacturing No.
5) Date of shipment