Taiyo Yuden

Component data information

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1-1. Condition for measuring S-parameter (below 6GHz)

Measuring instrument : E4991A/4294A/4291A/4194A/etc (Impedance Analyzer of Agilent)

8510C/8753D/E8364/E5071C/etc (Network Analyzer of Agilent)

Test Fixture : 16197/16192/16092/16193/16047/etc (for Impedance Analyzer)

Taiyo Yuden ordinal test fixture (for Network Analyzer)

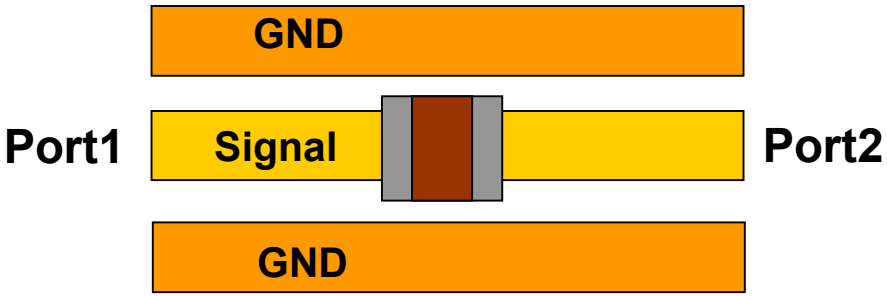
Room Temperature : 25 +/- 1 degree C

Measuring method : Measuring methods are changed at each frequencies and each devices

Example) The case of standard multilayer ceramic capacitor Class1

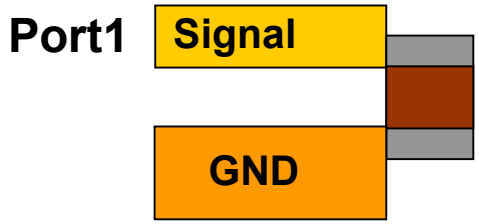
<Low Frequency (under 500 MHz)>

Transmission measurement



<High frequency (over 500MHz)>

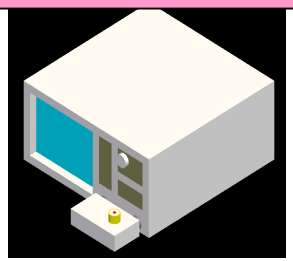
Reflection measurement



※We get rid of the influence of the test fixture by using DE-EMBEDDING

1-2. Data Generating

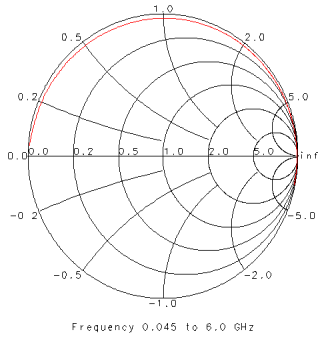
Measurement



Raw data

S11

FREQ RE IM

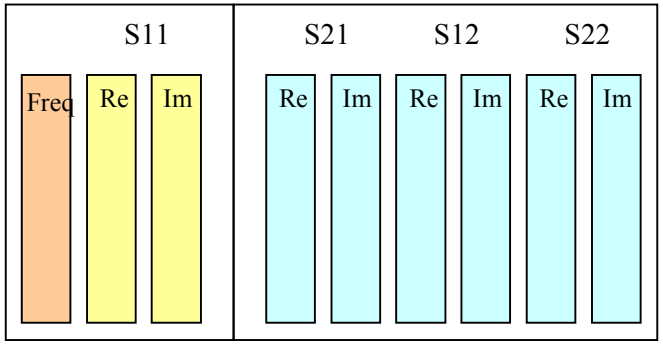


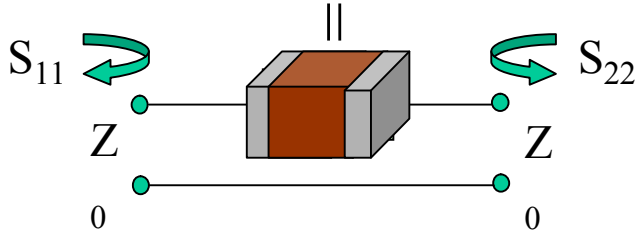
Averaged

$S_{21}=A+jB,\ S_{11}=C+jD$

$S_{21}=1-S_{11}$ ⇒ $A=1-C$, $B=-D$

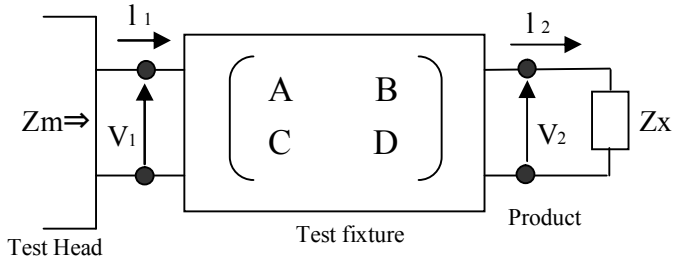
2Port S-parameter





< Electrical Performance:Measuring Method of impedance >

(1) Residual elements and stray elements of test fixture can be described by F-parameter shown in following.



$$\begin{pmatrix} V_1 \\ I_1 \end{pmatrix} = \begin{pmatrix} A & B \\ C & D \end{pmatrix} \begin{pmatrix} V_2 \\ I_2 \end{pmatrix}$$

(2) The impedance of chip Zx and measured value Zm can be described by input/output current/voltage

$$Zm=\frac{V_1}{I_1} \qquad Zx=\frac{V_2}{I_2}$$

(3) Thus,the relation between Zx and Zm is following.

$$Zx=\frac{Zm-\beta}{1-Zm\Gamma}$$

Where, α =D/A=1

β =B/D=Zsm-(1-Yom･Zsm)Zss

Γ =C/A=Yom

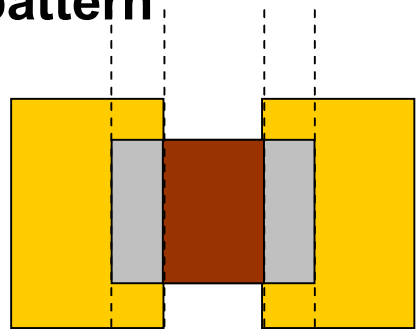
(Zsm:measured impedance of short chip
Zss:residual impedance of short chip
Yom:measured admittance when opening the fixture)

(4) Cx,Lx,Zx and Qx shall be calculated with the following equation.

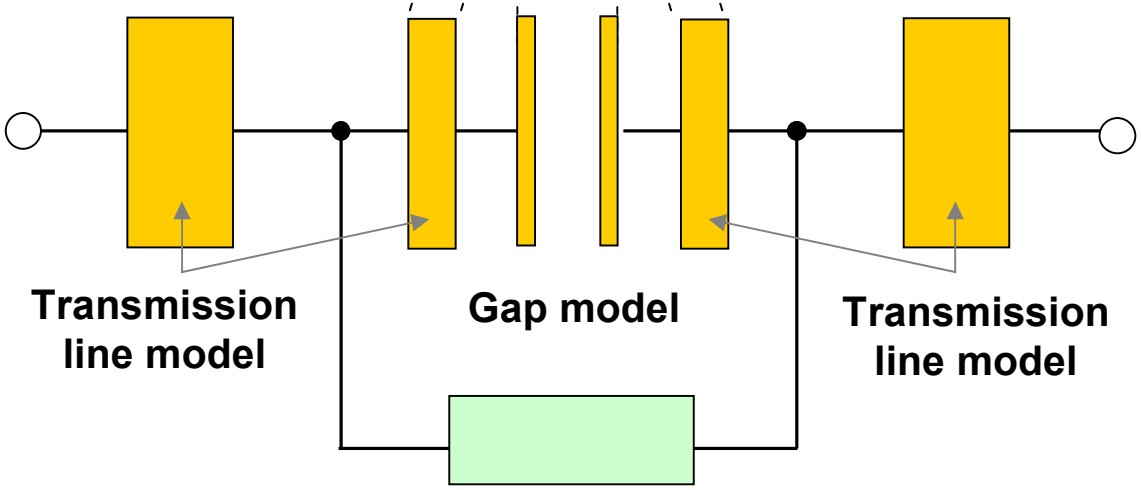
$$Cx=\frac{-1}{2\pi f \cdot Im(Zx)} \qquad Lx=\frac{Im(Zx)}{2\pi f} \qquad Zx=\sqrt{Re(Zx)^2+Im(Zx)^2} \qquad Qx=\left|\frac{Im(Zx)}{Re(Zx)}\right|$$

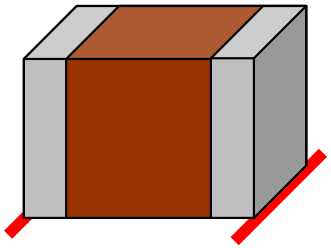
2-1. Port reference of our component data / page 1

Actual land pattern



Recommendation model for Simulation





The port reference of components is set up at both ends of the bottom surface.

If you use our component data for circuit design , we recommend the following usage.

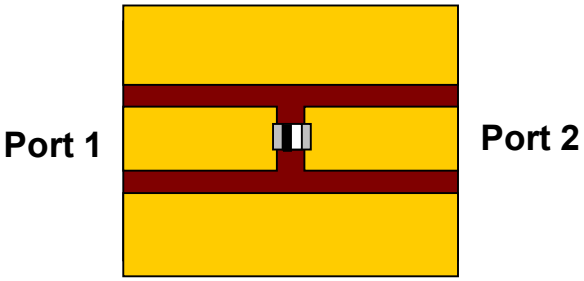
1).The transmission lines located outside of port reference are connected to the component data in series.

2).The transmission lines located inside of port reference are connected to the component data in parallel.

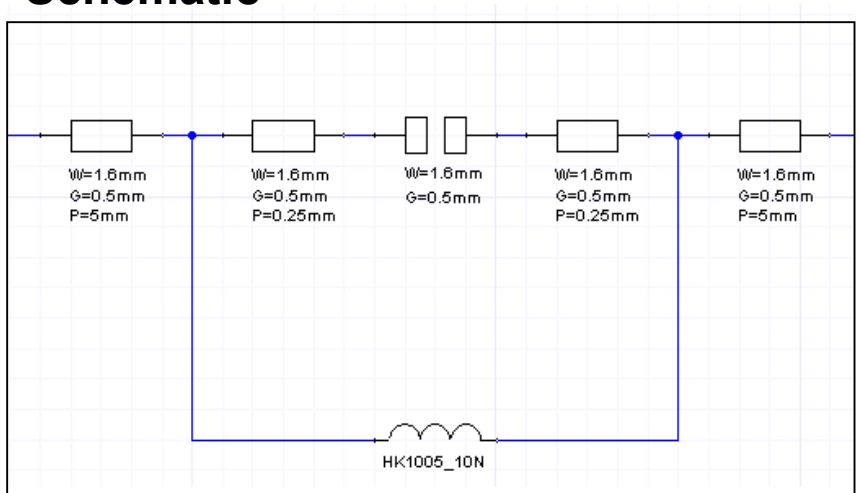
3).The influence of slot in land pattern is expressed by using gap models

2-1. Port reference of our component data / page 2

Actual pattern

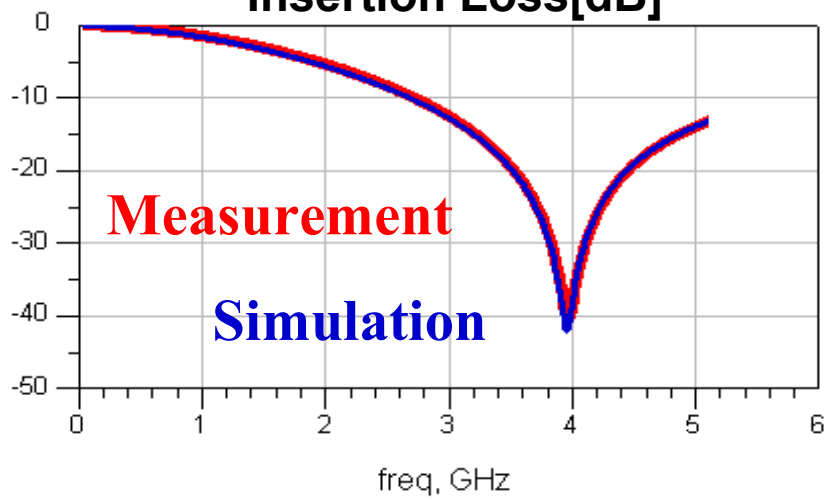


Schematic

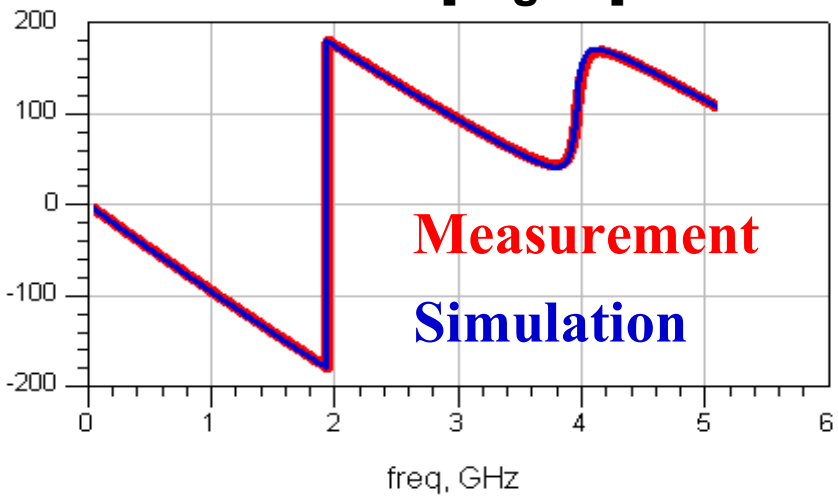


Substrate	BT-resin (0.8mm thickness)
Line type	CPW (1.6mm width ,0.5mm gap)
Slot width	0.5mm

Insertion Loss[dB]



Phase [degree]



Equally Match!!

*These graphs are reference data, and they don't guarantee the accuracy of the S parameters.
Please note that there are some cases that the simulation result doesn't match perfectly the measurements data due to the material conditions (thickness, tan δ) and the transmission line conditions (width,length).