

About Characteristic Parameters of Murata Components Library

This library contains equivalent circuit model data made from S-parameter measured data. Following shows the details how to make the equivalent circuit model data.

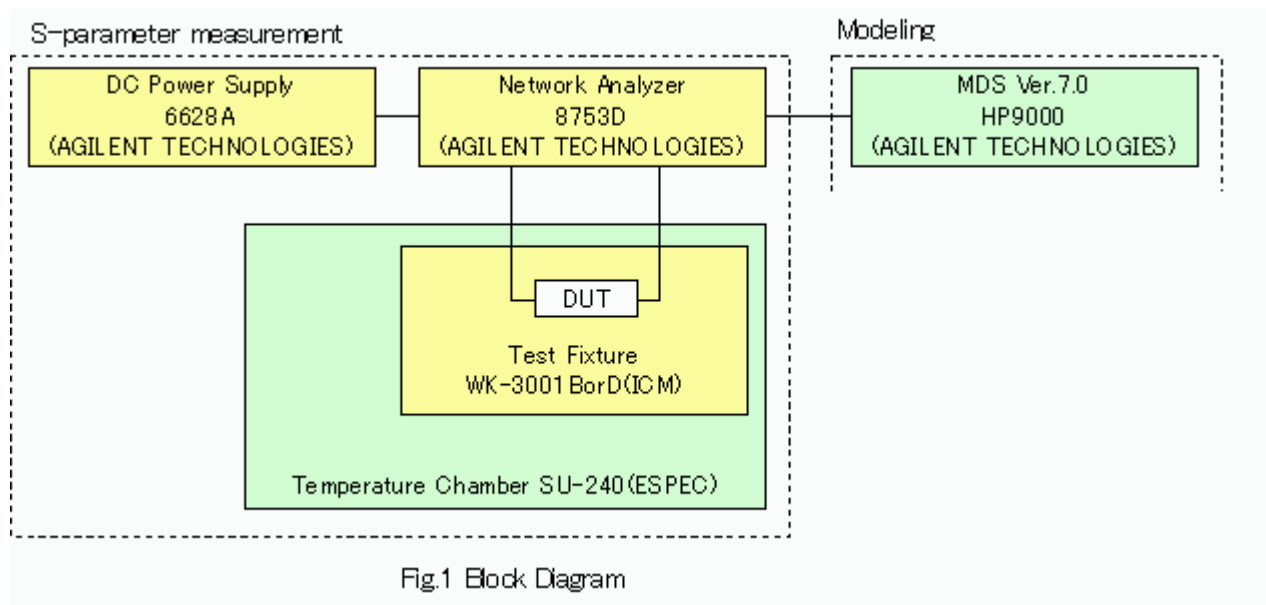
1. For maximum frequency 6GHz or less

1-1. Equipment for measuring S-parameter

- (a) Network analyzer : 8753D
- (b) Calibration kit : 85033D
- (c) Test fixture : Inter-Continental Microwave Model WK-3001B or WK-3001D
- (d) DC power supply : 6628A
- (e) Temperature chamber : ESPEC Model SU-240
- (f) Test substrate : Murata original substrate
Material: Glass fluorine resin (0.32mm thick)
Land pattern material:
Copper foil (0.035mm thick), Gold plate (0.002mm thick)
Microstrip-line: 20mm long, 0.86mm wide

1-2. Block diagram

Shown in Fig.1.



1-3. Condition for measuring S-parameter

1) Capacitor

- (a) Calibration method : Full 2 port Calibration(Reflection, Transmission, Isolation)
- (b) Frequency range : C0G/C0H Characteristics : 300kHz-6GHz
X7R/X5R/Y5V Characteristics : 30kHz-6GHz
- (c) Frequency points : 401pts.
- (d) Circuit mode : Shunt thru mode

2) Inductor

- (a) Calibration method : Full 2 port Calibration(Reflection, Transmission, Isolation)
- (b) Frequency range : 1MHz-6GHz
- (c) Frequency points : 201pts.
- (d) Circuit mode : Series thru mode

1-4. Procedure

This S-parameter data is generally measured using the vector network analyzer (VNA) and the test fixture in 2 port circuit. But when the measuring frequency is higher than 1 GHz, it is difficult to separate the test fixture characteristics from the measured S-parameter data.

Separating method of this test fixture is two ways. One is In Fixture Calibration Method using port extensions function key in VNA, another is a modeling method using a computer. This software has applied the modeling method.

First, the S-parameter of the test fixture and the microstrip line is measured and an equivalent circuit model is made. Then the model values of the test fixture are obtained.

Next step, DUT is mounted on microstrip-line of the test substrate, and the S-parameter is measured. The equivalent circuit model elements of DUT and the test fixture are optimized using EDP simulator.

Therefore, equivalent circuit model elements of DUT are deembedded removing elements of the test fixture from the measured S-parameter data.

In inductor measurement, equivalent circuit model element of the test fixture is generally calculated without any chips between the pads. However, at LQG15HS series, (Not LQG15HN series) equivalent circuit model element of the test fixture is calculated with a short chip (0.556nH) between pads.

1-5. Land Pattern

Shown in Fig.2.

LW Dimension		Land Pattern [mm]		
JIS[mm]	EIA[inch]	a	b	c
0603	0201	0.3	0.3	0.3
1005	0402	0.5	0.4	0.5
1608	0603	0.8	0.7	0.8
2012	0805	1.2	0.7	1.1
3216	1206	2.4	0.8	1.4
3225	1210	2.4	0.8	2.3
4532	1812	3.4	1.0	3.0
5750	2220	4.6	1.1	4.8
1414	0606	0.7	0.7	1.2
2828	1212	2.0	0.8	2.6
0510	0204	0.2	0.3	1
0816	0306	0.4	0.4	1.4
1220	0508	0.5	0.5	1.8
1632	0612	0.8	0.7	2.8

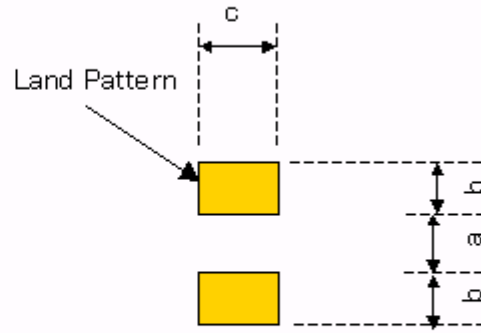


Fig.2 Land Pattern

2. For maximum frequency 20GHz

2-1. Equipment for measuring S-parameter

- (a) Network analyzer : 8720D AGILENT TECHNOLOGIES
- (b) Test fixture : Inter-Continental Microwave Model WK-3001D
- (c) Test substrate : Murata original substrate
 - Material: Glass fluorine resin
 - (0.32mm thick, 01005type is 0.16mm thick)
- Land pattern material:
 - Copper foil (0.035mm thick, 01005type is 0.018mm thick)
 - Gold plate (0.002mm thick)
- Microstrip-line:
 - 20mm long, 0.86mm wide, 01005type is 6mm long, 0.45mm wide

2-2. Block diagram

Shown in Fig.3.

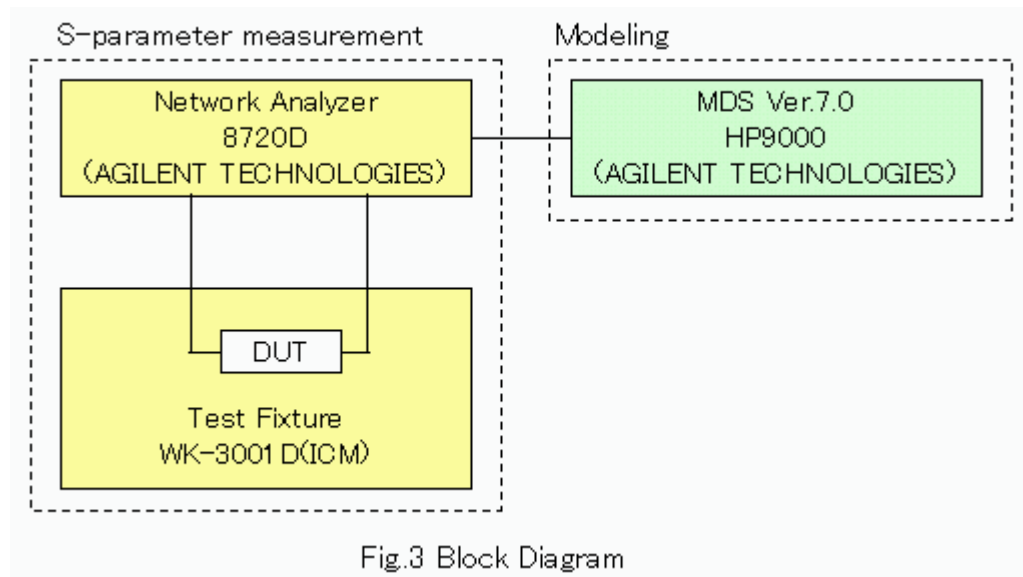


Fig.3 Block Diagram

2-3. Condition for measuring S-parameter

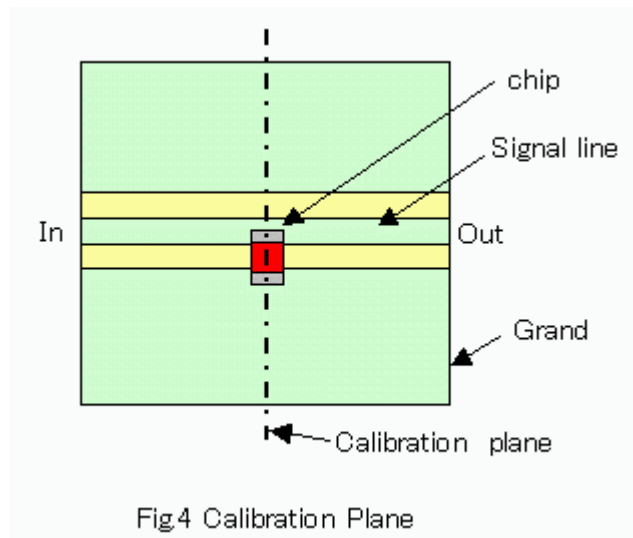
- (a) Calibration method : TRL Calibration(Thru, Reflection, Line)
- (b) Frequency range : COG/C0H Characteristics : 300kHz-20GHz
X7R/X5R/Y5V Characteristics : 30kHz-6GHz
- (c) Frequency points : 401pts.
- (d) Circuit mode : Shunt thru mode

2-4. Procedure

This S-parameter data is generally measured using the vector network analyzer (VNA) and the test fixture in 2 port circuit.

The TRL calibration is used for the high frequency. Because the calibration plane is a signal line central part as shown in Fig.4, S parameter data of the chip unit can be obtained.

The equivalent circuit model elements are obtained from S parameter data of the chip unit with a simulator for the circuit design.



2-5. Land Pattern

Shown in Fig.5.

LW Dimension		Land Pattern [mm]		
JIS[mm]	EIA[inch]	a	b	c
0402	01005	0.2	0.15	0.2
0603	0201	0.3	0.3	0.3
1005	0402	0.5	0.4	0.5

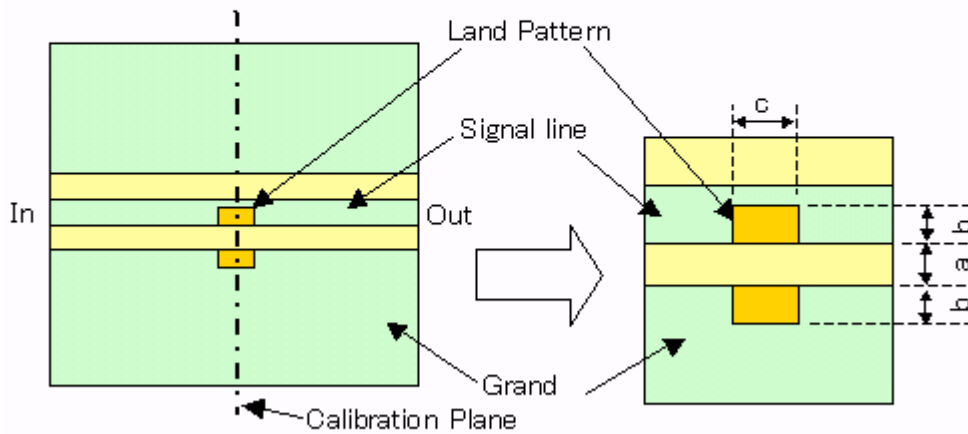


Fig5 Land Pattern

3. Notes

This S-parameter data contain the chip capacitor or inductor data itself, and it does not include the land pattern data. Therefore, when you simulate, please prepare the actual land pattern model you use.