

Track B (Passive): Printed circuit board (PCB) bandpass filter design competition

Requirement for applicants: students

1. Target specifications

- (a) Frequency : The filter should pass through 2.5 GHz \pm 100 MHz signals.
- (b) Insertion loss : The filter should have less than 5 dB insertion loss over the above mentioned frequency range. (Figure 1)
- (c) Return loss : The filter should have more than 10 dB return loss over the above mentioned frequency range. (Figure 2)
- (d) Rejection : The filter should satisfy rejection characteristics shown below. (Figure 1)
 - from 0.5 GHz to 2.2 GHz and 2.8 GHz to 4.5 GHz : more than 15 dB
- (e) Size (Excluding the connector) : The size must be 50 mm \times 50 mm \times 20 mm or smaller.

The highest score of "Rej[dB]-3 \times IL[dB]" wins the competition. (Figure 3)

Rej : Minimum rejection over 0.5 GHz to 2.2 GHz and 2.8 GHz to 4.5 GHz

IL : Maximum insertion loss over 2.4 GHz to 2.6 GHz

The measurement will be done with a network analyzer from 0.5GHz to 4.5GHz with 5MHz resolution.

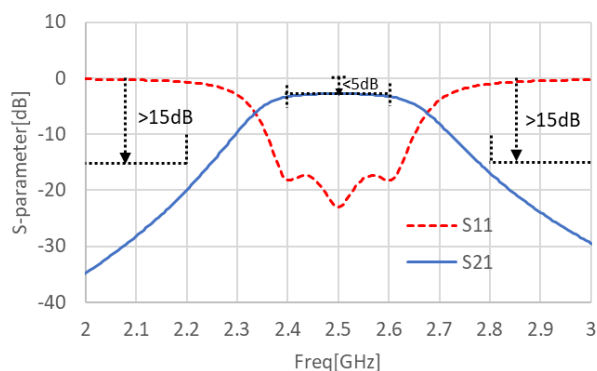


Figure 1 Target specifications of S21

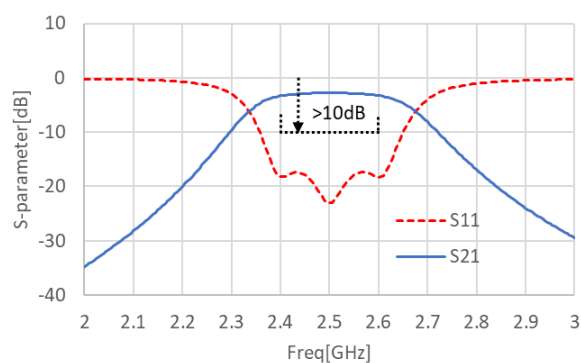


Figure 2 Target specification of S11

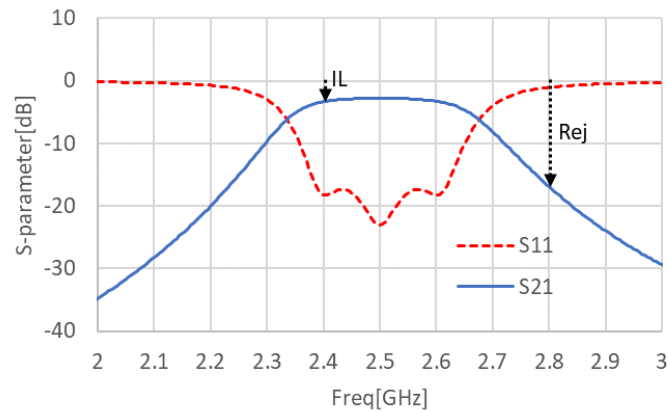


Figure 3 What Rej and IL mean (Example).

2. Design conditions

(1)Board:

One-side or both-sides resin printed circuit board. Multilayer board is not allowed.

(2)Pattern formation:

One-side or both-sides pattern formation is acceptable.

(3)Board material:

Composite material containing glass, ceramic filler, etc. are acceptable.

(4)Board shape:

Square or rectangular. No regulation with substrate thickness.

(5)Number of printed circuit boards: one

(6)Interface for input and output signals:

50 ohm female SMA connector (ISO metric screw threads)

(7)Available components:

Only passive components (R, L, C) may be used. Any active components or devices are NOT allowed.

(8)Case:

Radio shielding case can be used. However, ensure that the judges can check the inside.

(9)Design consideration:

Design with consideration of variation due to measurement environment (e.g.: temperature fluctuation).