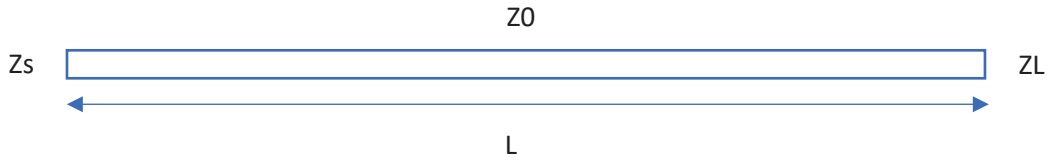
Appendix A

- Transmission Line Matching Technology-

Infineon's Official Evaluation Board used Stepped Impedance Filter for impedance matching. Stepped Impedance Filter can be used to match the impedance within the relatively small PCB footprint. However, the design process is not straightforward enough. Transmission Line Matching Technology can be used to solve the impedance matching problem straightforwardly within the relatively larger PCB footprint.



For a transmission line with characteristic impedance Z0, load ZL and length L.

$$Zs = Z0\frac{ZL+jZ0*\tan(\beta l)}{Z0+jZL*\tan(\beta l)} \quad (1)$$

Plug Zs=Rs+jXs and ZL=RL+jXL into the equation (1) and we also know that the transmission line length $\theta = \beta l$:

$$Z0 = \sqrt{\frac{Rs*|ZL|^2-RL*|Zs|^2}{RL-Rs}} \quad (2)$$

$$\theta = \arctan\left(\frac{Z0*(Rs-RL)}{Rs*XL+RL*Xs}\right) \quad (3)$$

For BGT24LTR11N16, the tapered transformer transformed the impedance from Z_{RX} =104.667+38.391j Ohm to 54.18-49.294j Ohm. We are going to match the impedance form 54.18-49.294j Ohm to 50 Ohm.

We know that Rs=54.18 Ohm, Xs=-49.294 Ohm, RL=50 Ohm, XL=0 Ohm. So that Zs=54.18-49.294j Ohm and ZL=50 Ohm

Thus, according to equations (2) and (3):

Z0=178.2547917 Ohm

$$\theta = 16.82062539\ degrees$$