20081010 SAW on EWOD test summary

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Fig 1 and 2 were obtained from a same SAW devices (8μm IDT), which had different length of wire connection (about 7cm length of wire connection for Fig 1 and 1cm length of wire connection for Fig 2).

Fig 3 was obtained from the SAW on EWOD chip with IC test clips connection.

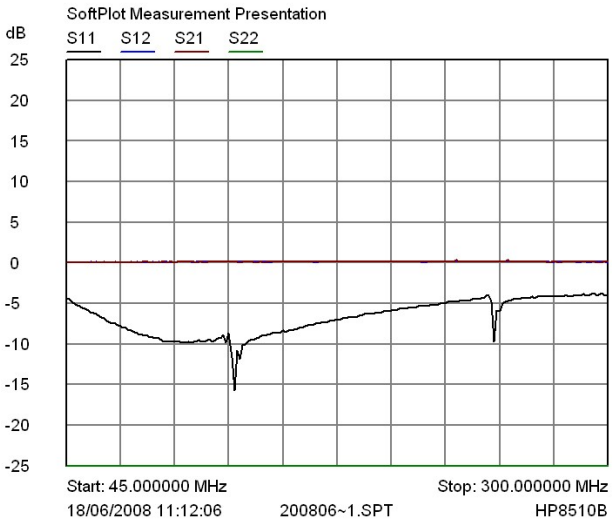

Fig 1 Reflection of SAW device with 7cm length of wire connection

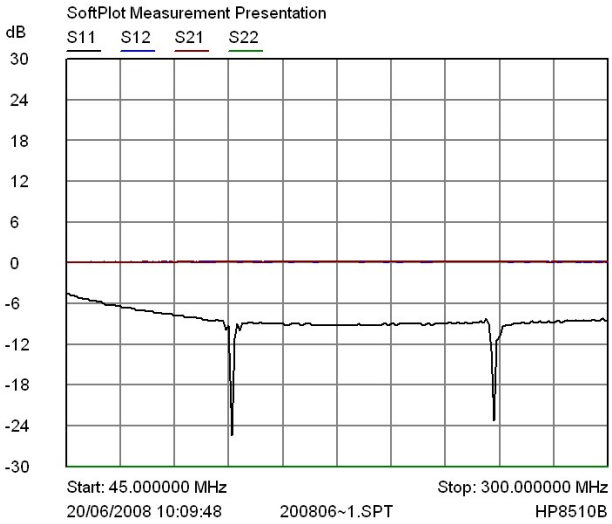

Fig 2 Reflection of SAW device with 1cm length of wire connection

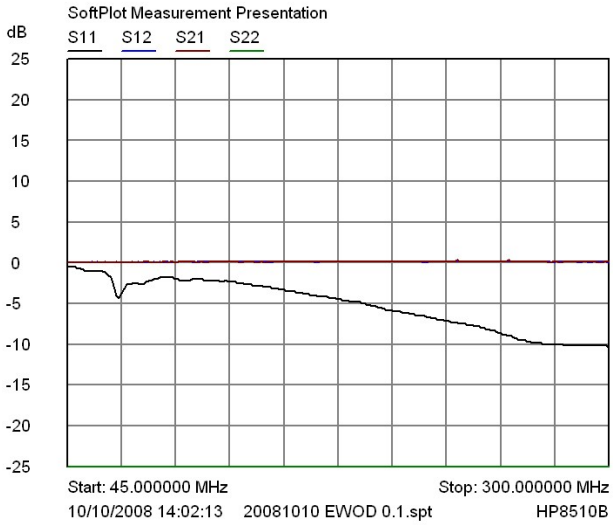

Fig 3 Reflection of SAW device on EWOD chip with IC test clips connection

Summary

1 Comparing with Fig 1 and 2, it shows that less wire connection made the better impedance matching, which could offer a better signal for sensing application with only system loss applied.
2 Fig 2 shows the energy loss was as much as 90% during the reflection measurement of the SAW device.
3 According the results in Fig 3 at low frequency, it shows that the application of the IC test clips had reduced the system loss rather than the results in Fig 1 and 2 with the application of wire connection.
4 According the results in Fig 3 at high frequency, the parasitic capacitance and inductance along with the devices' connection pads would effect more and even overwhelm the signal peak of reflection.

Conclusions

1 It would make the impedance matching better if it is about 50Ω between the connectors of test clips and SMA GND.
2 Why was the system loss as much as 90% for the reflection of single SAW device?
3 It would be necessary to character the effects of the parasitic capacitance and inductance for device design. Maybe simulation with HFSS or ANSYS could be necessary as well.