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To: EDGES Group

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Subject: Mechanism for interconnection resonances

Figure 1 shows a schematic and equivalent circuit which can lead to a resonance in the case of a loose or partially loose connector. The resonance forms as a result of a loop in the ground path. For a loop with radius 10 cm the inductance,  $L$ , is about  $0.25 \mu\text{H}$  so a poor connection with resistance,  $R$ , of  $10^{-3}$  ohms and capacitance,  $C$ , of  $40 \text{ pf}$  will result in a resonance at 50 MHz with depth of  $10^{-4}$  dB or about 20 mK out of  $10^4$  K.

Unfortunately, the SMA connector design does not guarantee good contact between shields as discussed in memo #270. In general, however the contact via the threads of the connector should be adequate if connectors are tightened with sufficient torque. Placing a ferrite toroid over the coax ensure a large reactance in series with the inductance  $L$  which helps ensure that any sharp resonance will be removed.

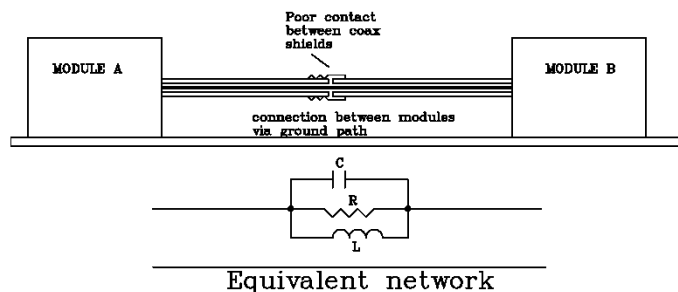


Figure 1. Resonance which results from poor contact between coax line shields.