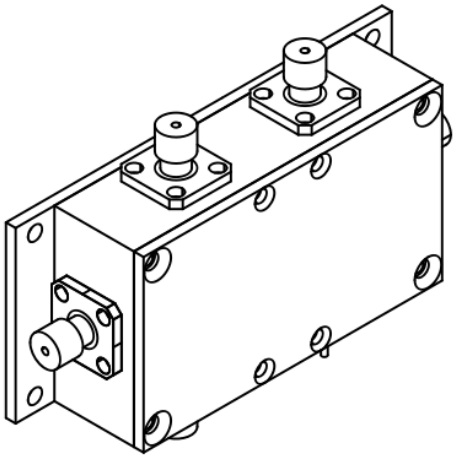
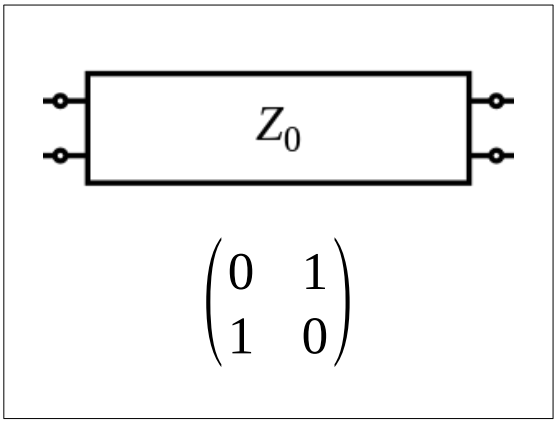
Gquipment

RF Enclosure Mini EXT-FX

PCB reference designs

Application Note





Introduction

In this application note, the S-parameters of the RF Enclosure MINI EXT-FX are measured using various PCB reference designs.

All designs implement a transmission line realized on an PCB. Both insertion loss and return loss are measured by fixing the circuit board in the RF-ENCL-MINI-EXT-FX housing.

There are several reference designs for different PCB thicknesses, transmission line layout (microstrip and grounded coplaner waveguide), and number of copper layers.

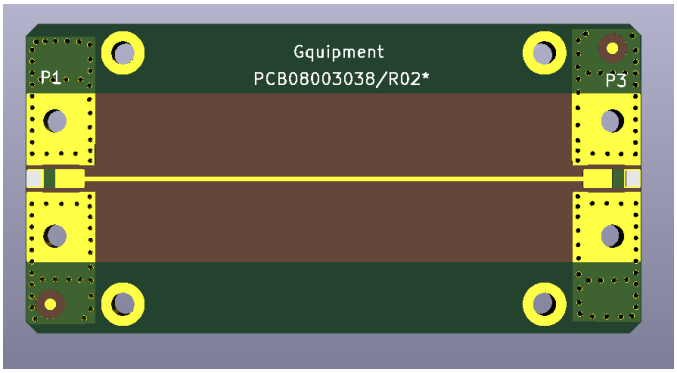
Reference designs

The reference designs are used to demonstrate the performance of the combination of SMA connector, landing area and transmission line. Results may vary due to tolerances in the manufacturing process.

Archive

The PCB gerber files and the S-parameter charts are all archived in the Gquipment repo at Github.

08003038-TL-EXT-FX-USTRIP-M4-H1.6-50-A



Substrate	: FR408
Size	: 53.4 x 26.8 mm
Thickness	: 1.6 mm
Number of layers	: 4 (0.2 / 1.19 / 0.2 mm)
Z_0	: 50 ohm

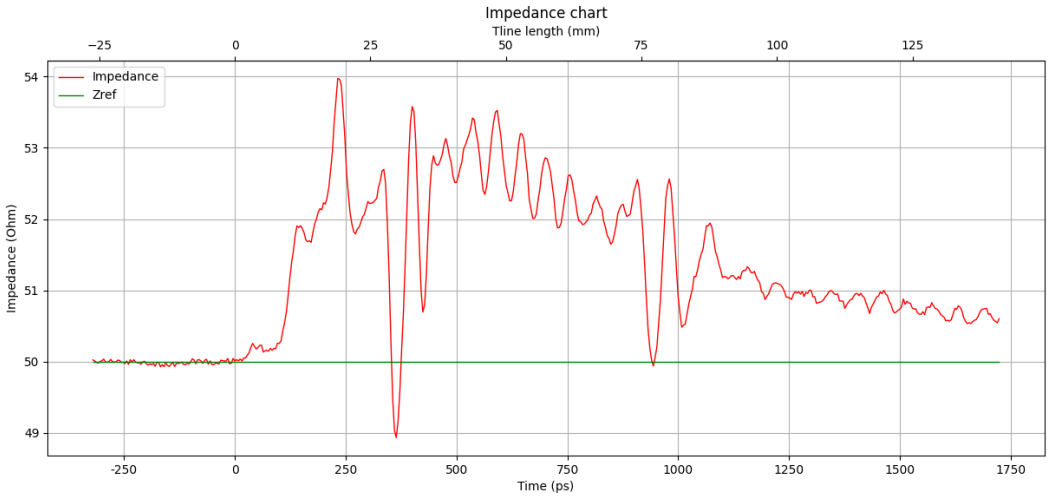


Figure 2: 08003038, TDR trace

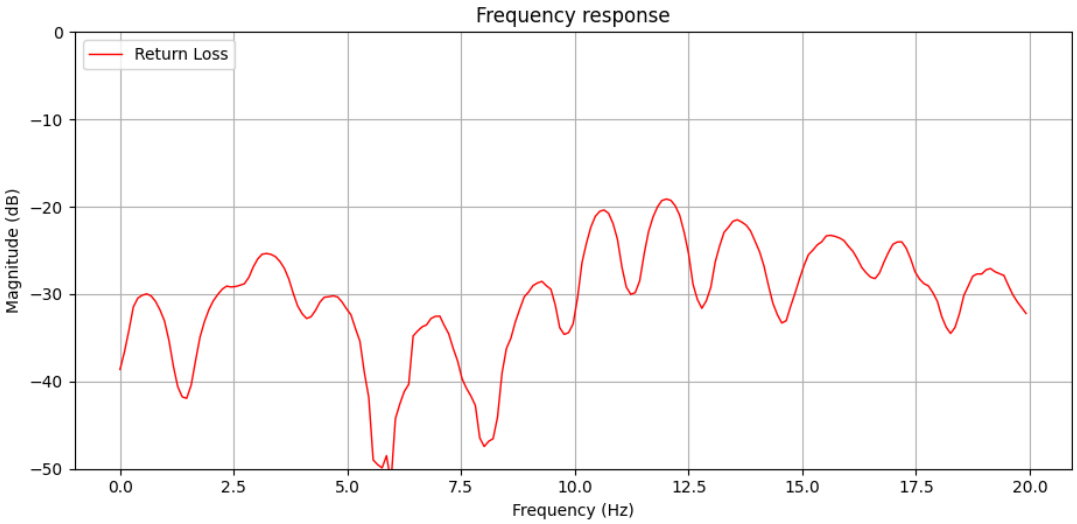


Figure 3: 08003038, return loss (FFT of TDR trace)

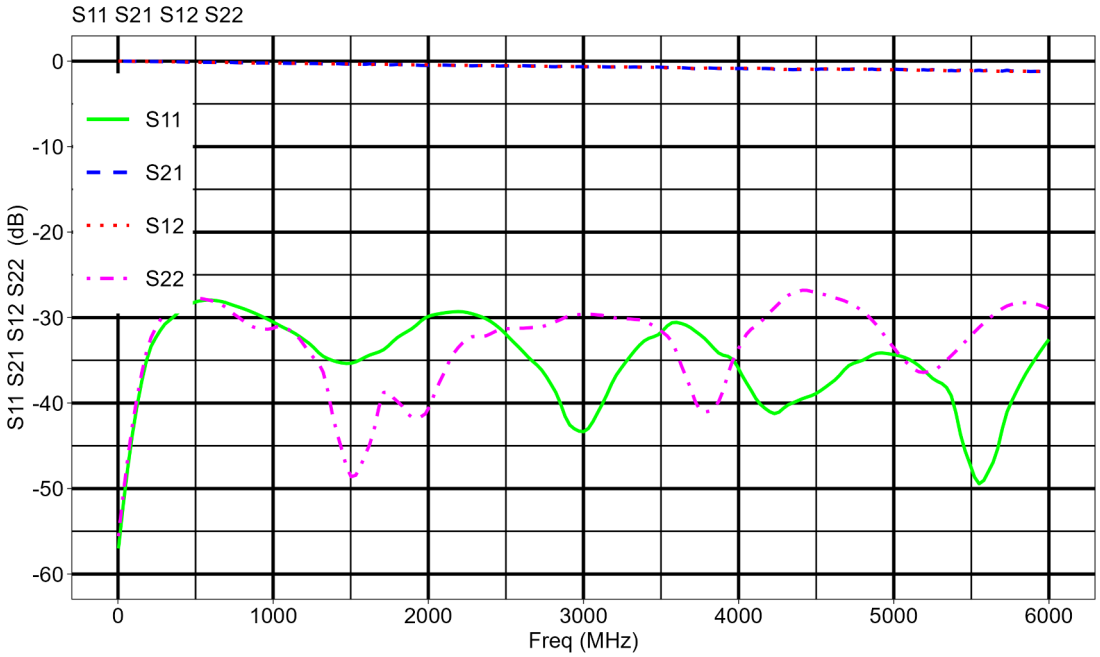
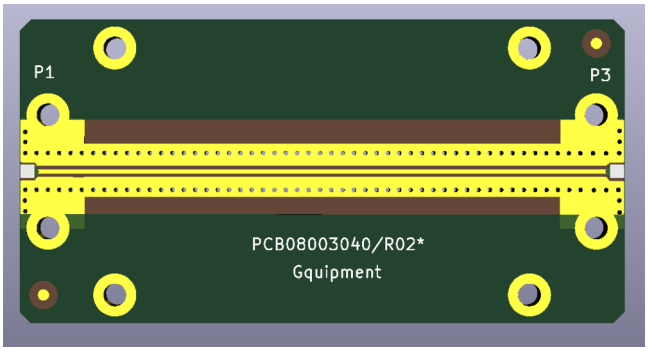


Figure 4: 08003038, S-parameters (0-6GHz)

08003040-TL-EXT-FX-GCPW-M4-H1.6-50-S0.3-A



Substrate	: FR408
PCB size	: 53.4 x 26.8 mm
PCB thickness	: 1.6 mm
Number of layers	: 4 (0.2 / 1.19 / 0.2 mm)
GCPW gap size	: 0.3 mm
Z_0	: 50 ohm

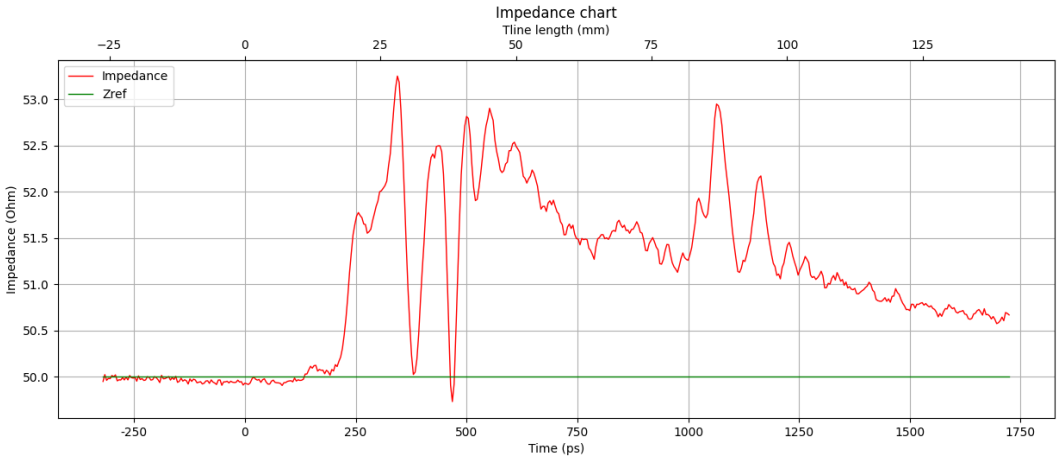


Figure 5: 08003040, TDR trace

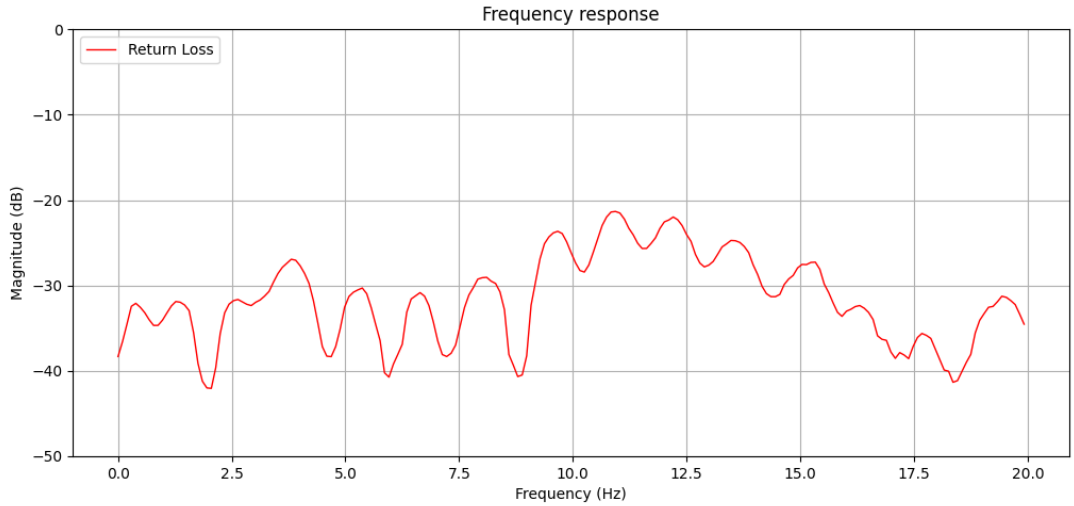


Figure 6: 08003040, return loss (FFT of TDR trace)

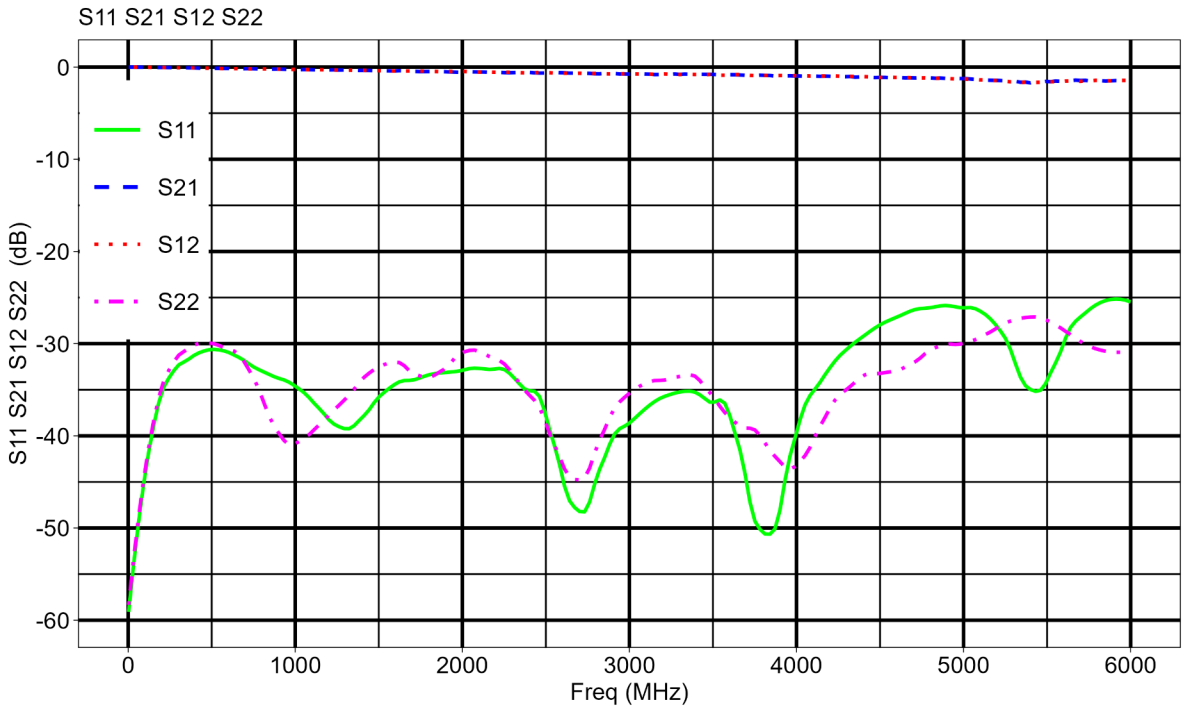
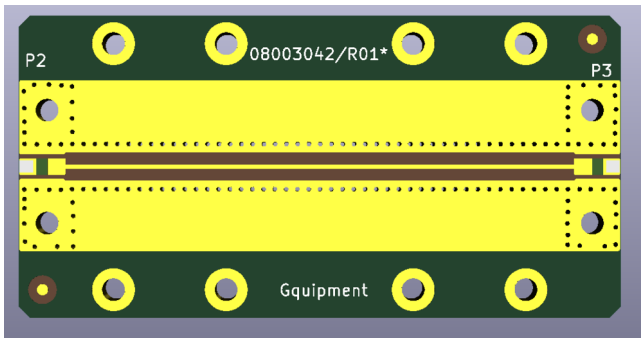


Figure 7: 08003040, S-parameters (0-6 GHz)

08003042-TL-EXT-FX-USTRIP-M4-H1.6-50-B



Substrate	: FR408
PCB size	: 53.4 x 26.8 mm
PCB thickness	: 1.6 mm
Number of layers	: 4 (0.2 / 1.19 / 0.2 mm)
Z_0	: 50 ohm

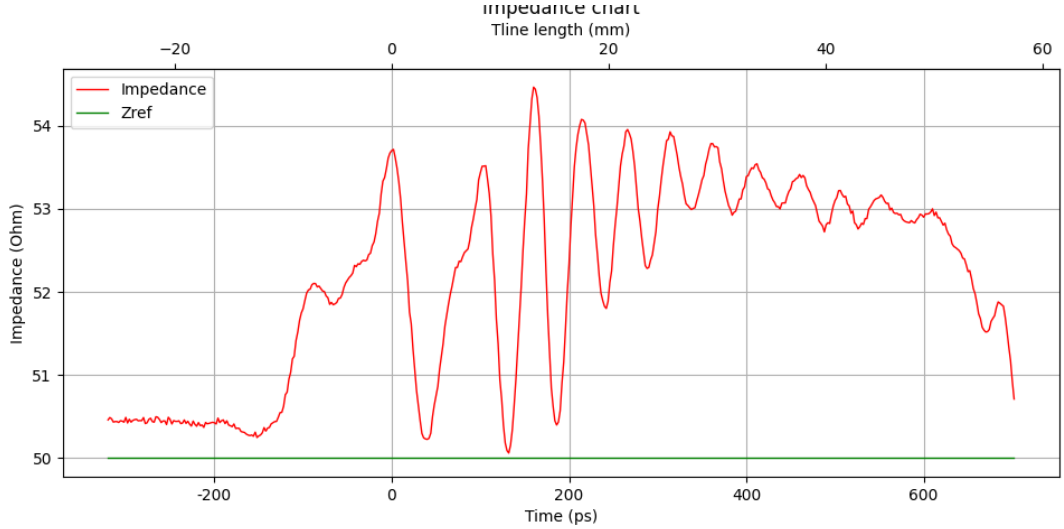


Figure 8: 08003042, TDR trace

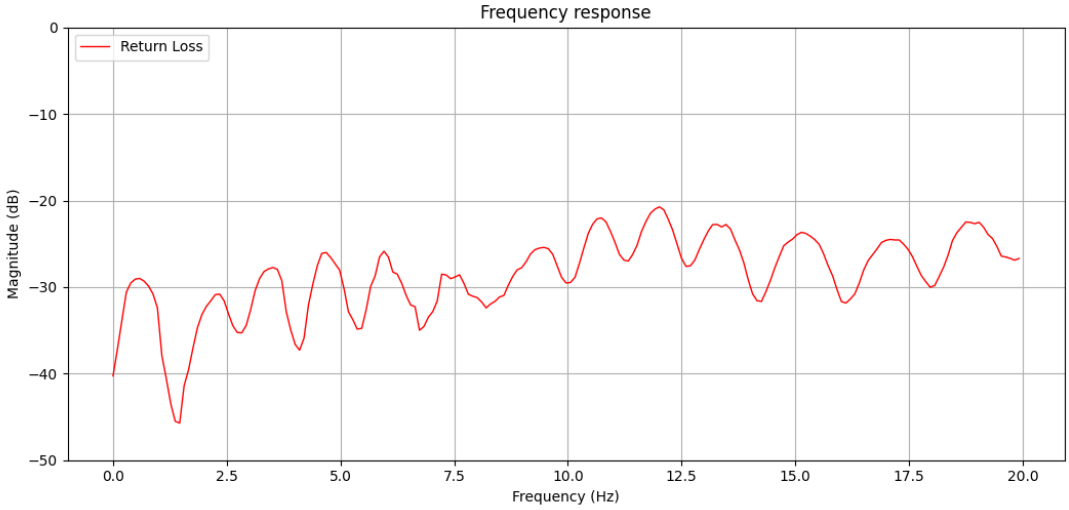


Figure 9: 08003042, return loss (FFT of TDR trace)

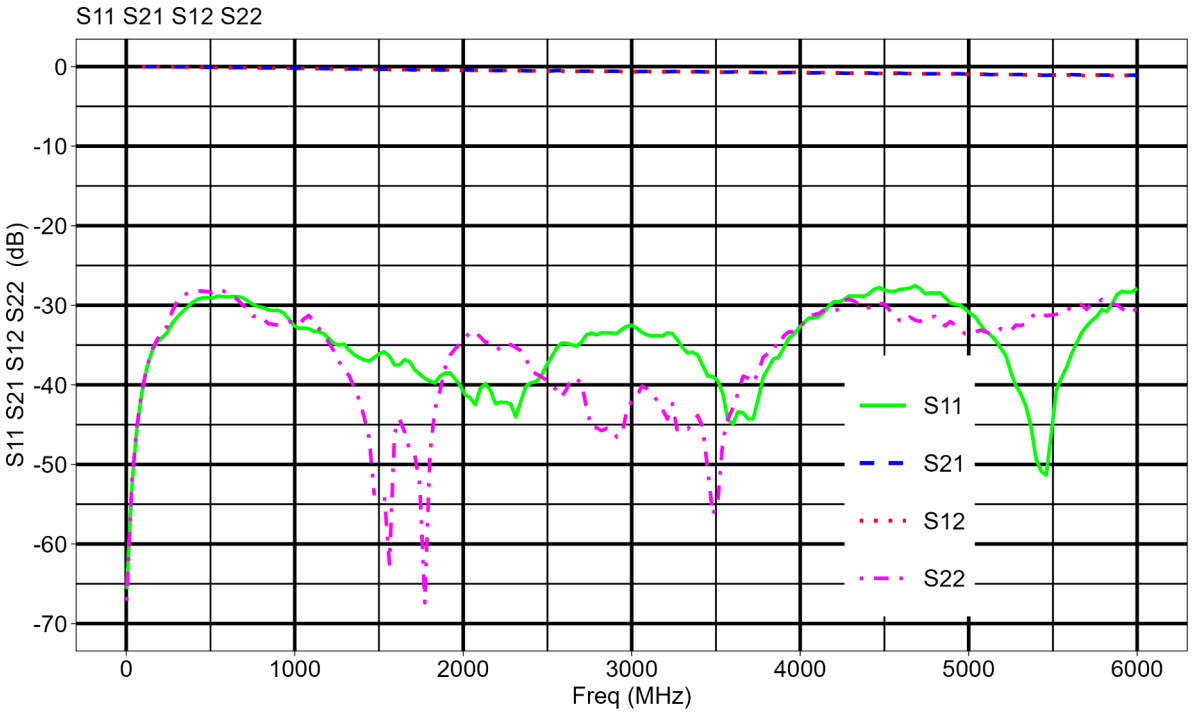


Figure 10: 08003042, S-parameters (0-6 GHz)

08003030-TL-EXT-FX-GCPW-H16-50-S0.4

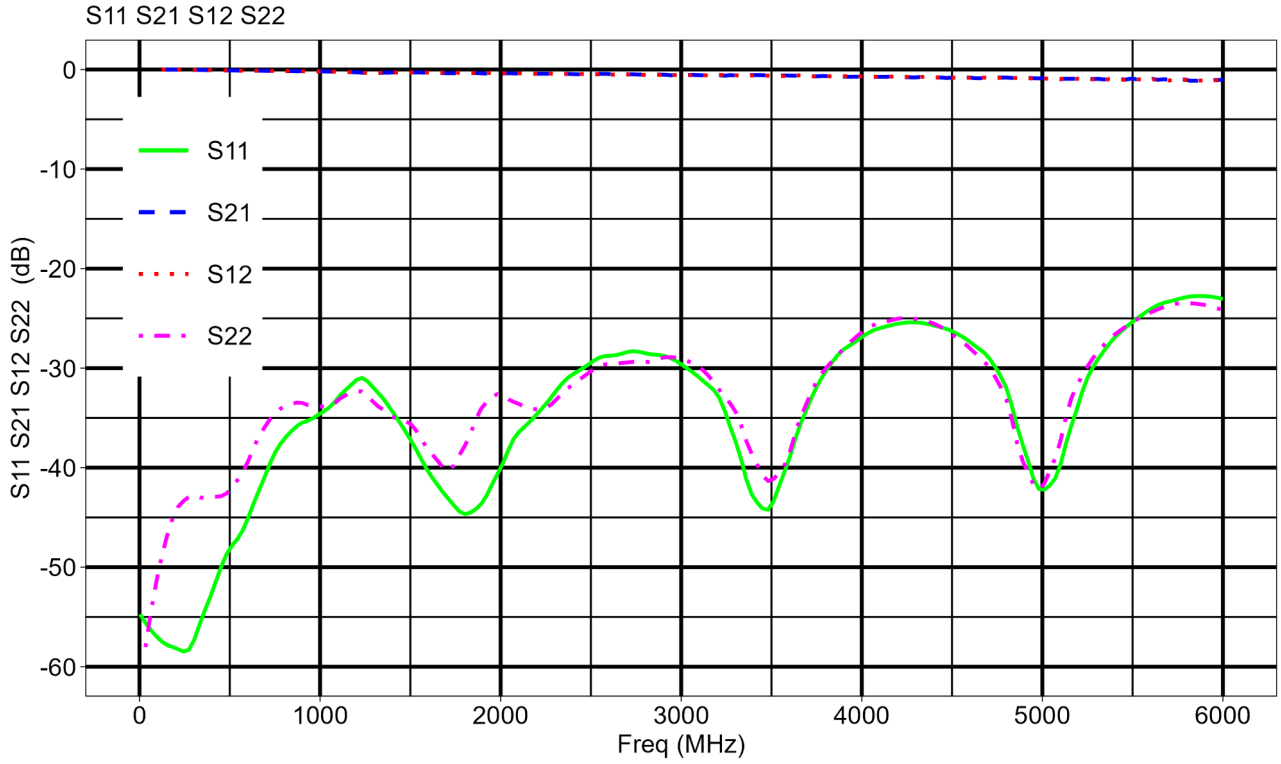
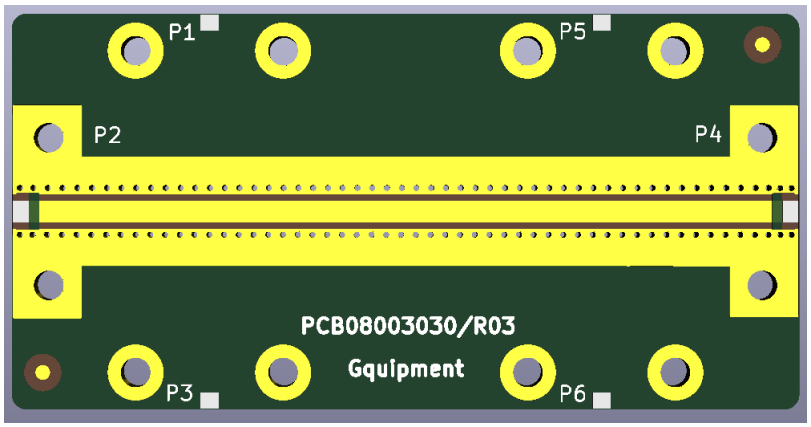


Figure 11: 08003030, S-parameters (0-6 GHz)

Substrate	: FR4
PCB size	: 53.4 x 26.8 mm
PCB thickness	: 1.6 mm
Number of layers	: 2
Z_0	: 50 ohm



08003028-TL-EXT-FX-GCPW-H10-50-S0.4

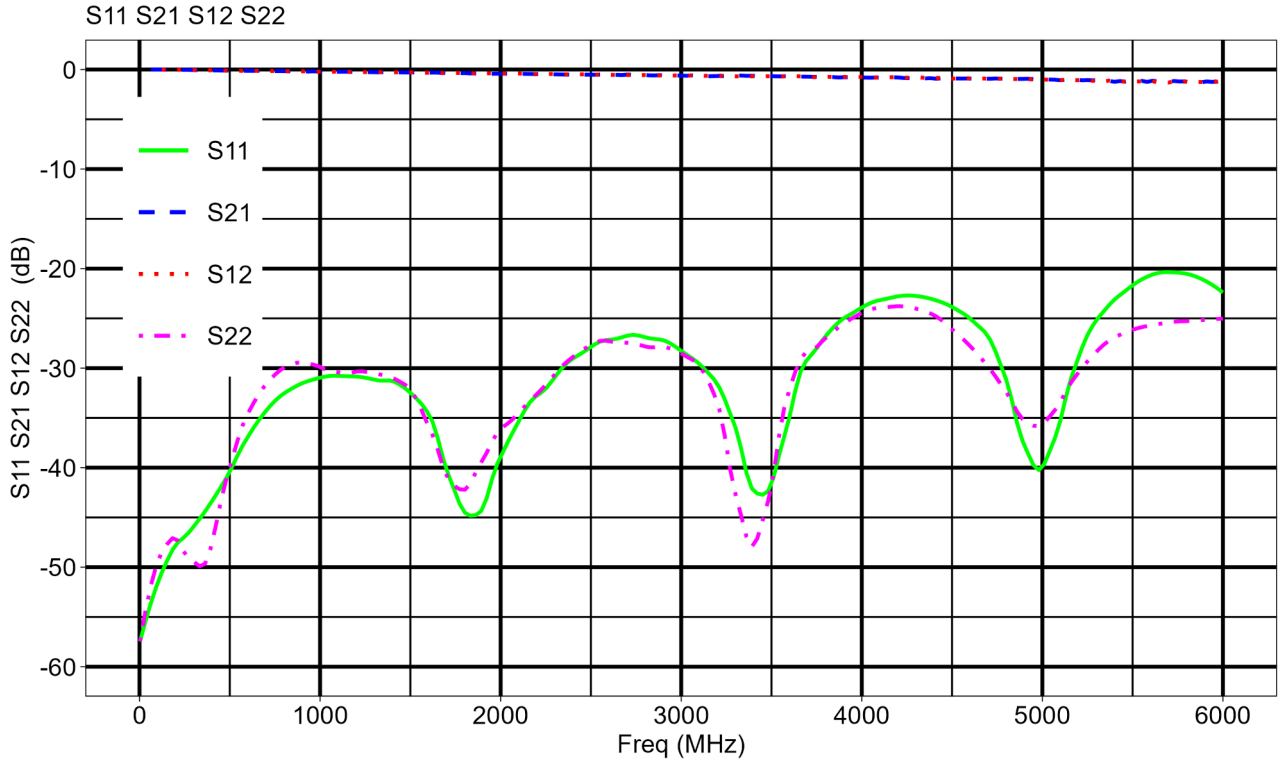
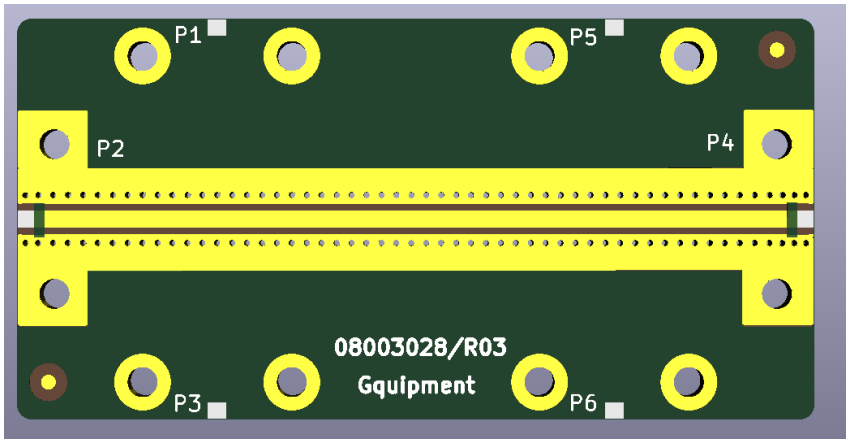


Figure 12: 08003028, S-parameters (0-6 GHz)

Substrate	: FR4
PCB size	: 53.4 x 26.8 mm
PCB thickness	: 1.0 mm
Number of layers	: 2
Z_0	: 50 ohm



Isolation

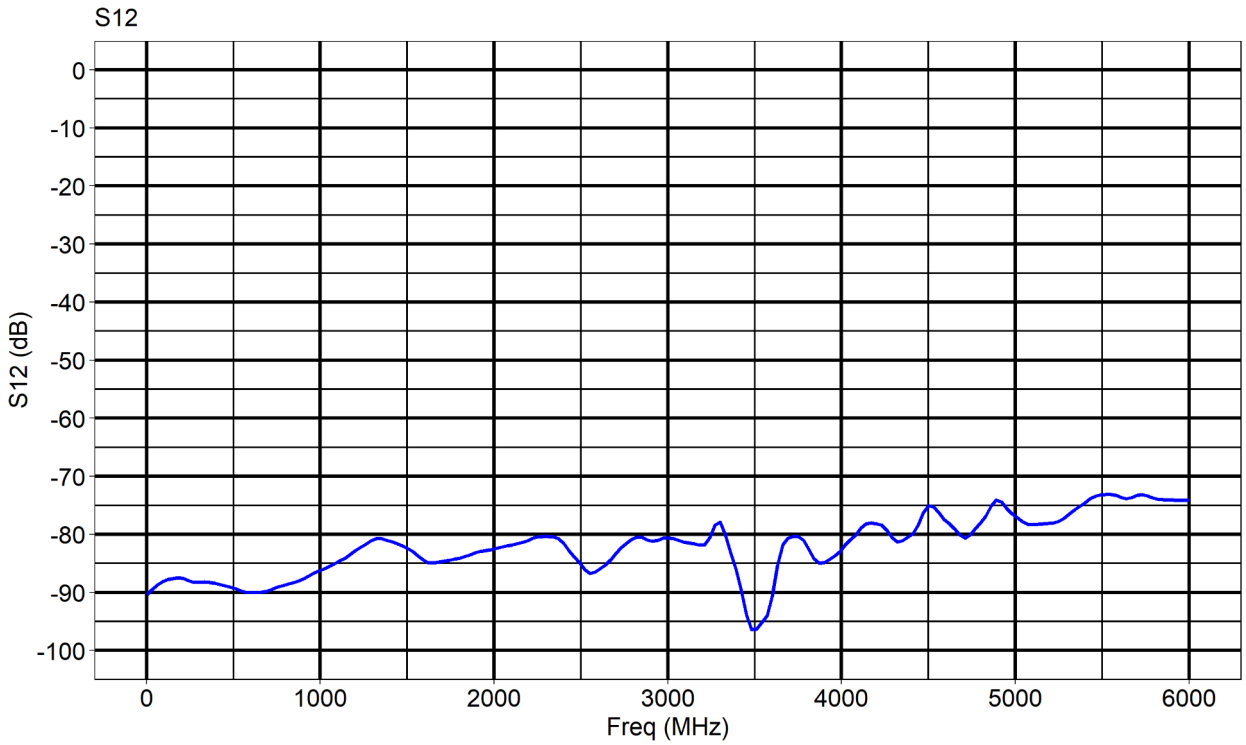


Figure 13: Isolation between SMA ports 2 and 4. Empty enclosure (no PCB)

Solder instruction

Soldering affects the performance of any SMA to PCB transition and is design dependent. For all reference designs presented in this application note, the same soldering method was used: apply solder until the base of the connector pin is completely covered. This creates an impedance gradient between the housing wall and the printed circuit board without discontinuities (blue circle in figure 14).

Figure 14 shows a TDR trace of PCB 08003042 soldered in this manner. The figure shows that the impedance is within +10% / -0% of 50 ohms. The first impedance peak at 0 ps is at the receptacle of the SMA connector. The impedance dip at 125 ps corresponds to the SMA pad on the PCB.

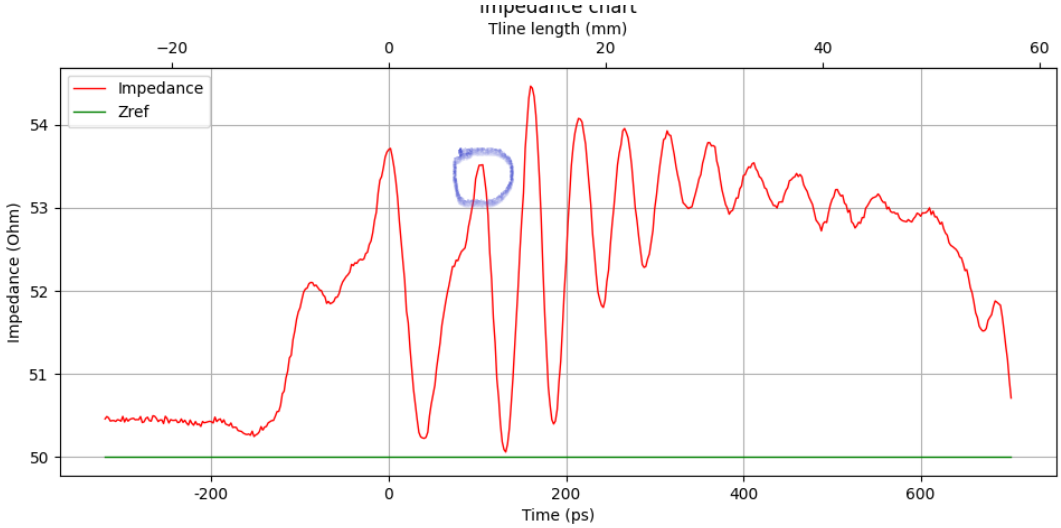
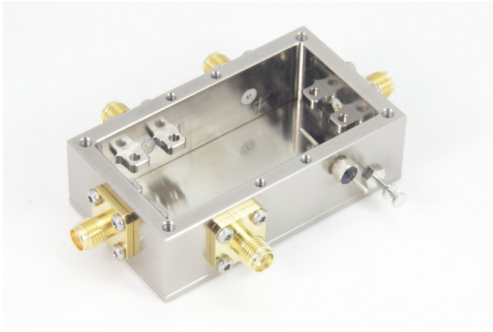


Figure 14: TDR trace of PCB 08003042 measured in the RF-ENCL-MINI-EXT-FX

Product overview

Image	Product
 (*version with 5 SMA connectors*)	RF Enclosure MINI-EXT-FX - with mounting flange
 (*version with 5 SMA connectors*)	RF Enclosure MINI-EXT-FX

Order information RF Enclosure Mini

Select the number of SMA connectors when ordering the RF-Enclosure-Mini-EXT-FX. The default is two SMA connectors.

Documents

Datasheet RF Enclosure MINI-EXT-FX
RF Enclosure Mini EXT-FX Repo in Github

Revision history

Revision	Status	Date
002	Released	June 04, 2023

Legal

Specifications are subject to change without notice.

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