FOCUS
MICROWAVES GROUP

AURIGA
PULSED IV

mesuro

Microstrip & Coaxial Transistor Test Fixtures

For Load Pull Applications

Transistor Fixture Families

- Focus manufactures standard and customized Test Fixtures for packaged small, medium and high power transistors

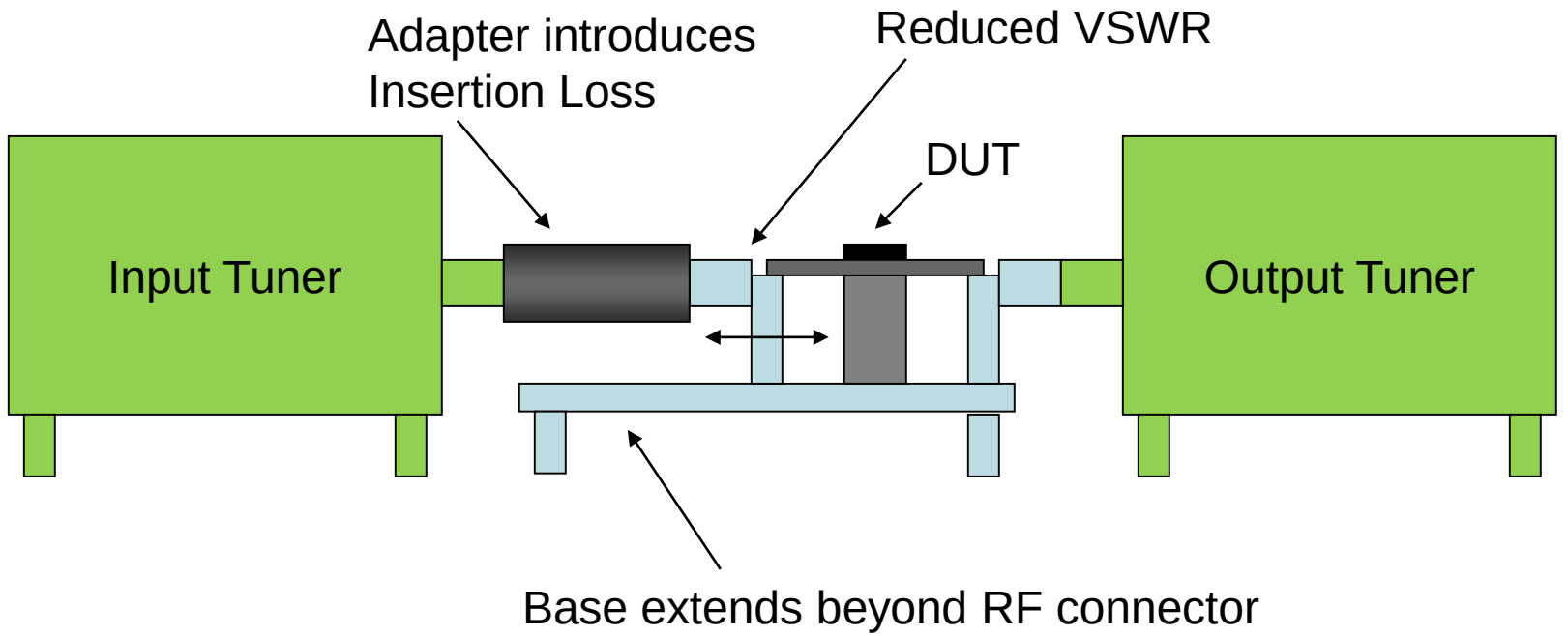
- Two types of Fixtures are available:
  - Microstrip Fixtures, model PTJ-x-y
  - Coaxial Fixtures, model MLTF-x-y

  Suffix “x-y” indicates
  - Type of connector
  - Frequency range
  - Custom type

Fixtures for Load Pull

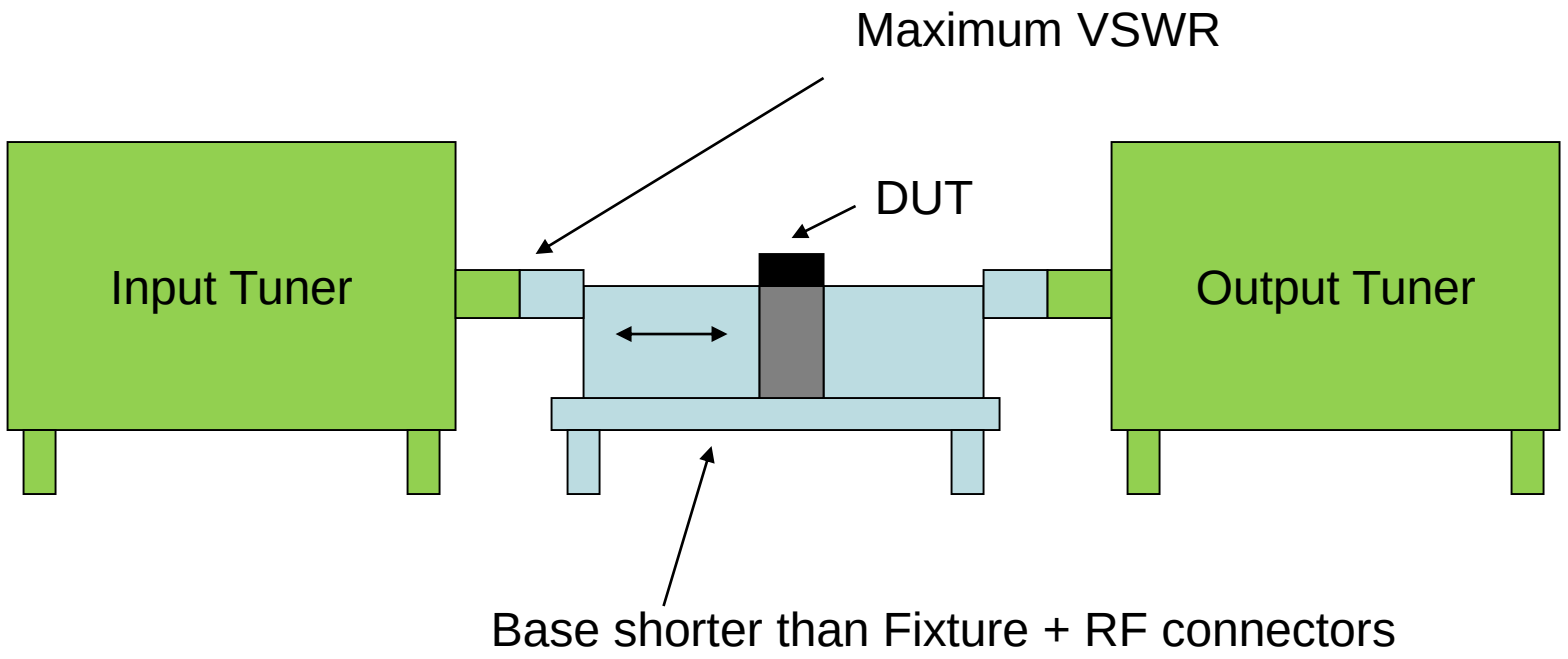
- Load Pull (and Noise) measurements use electro-mechanical Impedance Tuners
- The RF path between DUT and Tuner must be kept as short as possible, as to reduce insertion loss and maximize VSWR@DUT
- Therefore fixtures where the base extends beyond the RF connectors of the fixture are not suitable.
- Many, otherwise good, available fixtures suffer this handicap.
- Fixtures must be easily calibrated as two-ports and S-parameters of the input and output section must be available.

Fixtures *not good* for Load Pull



Example of fixture not suitable for load pull measurements

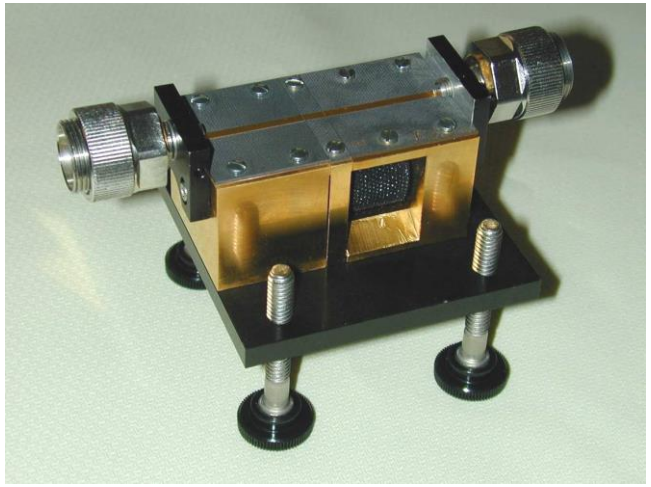
Fixtures *suitable* for Load Pull



Example of fixture suitable for load pull measurements

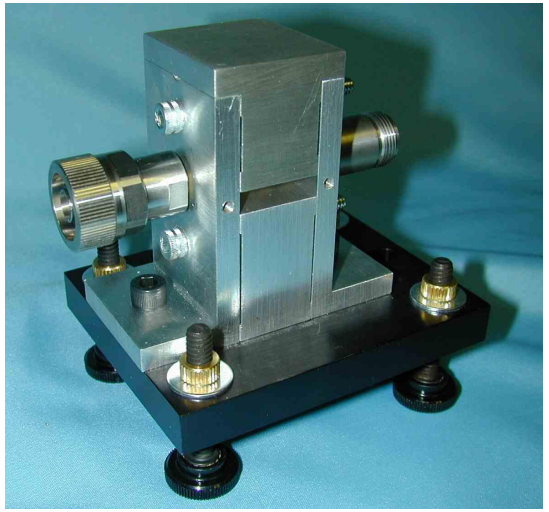
Focus Test Fixtures to 18GHz

Microstrip Fixtures



•One fixed block, one adjustable
•block
•Mstrip transformers and bias networks on fixture
•Available with 7/16, N, 7 and 3.5
•DUT fixed using a clamp
•TRL Calibration Standards

Coaxial Fixtures



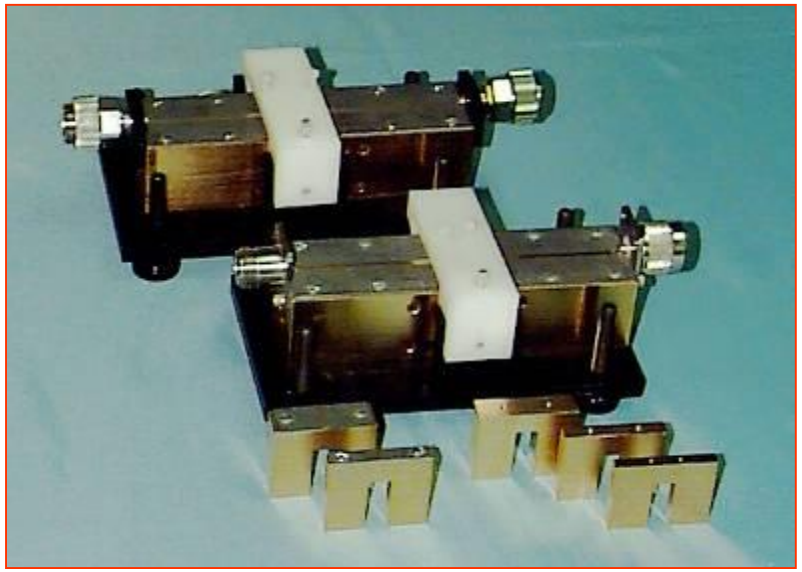
•Minimum Loss; No dielectric
•Only 50Ω
•DUT leads clamped into coax
•APC-7, N, 7/16
•TRL Calibration Standards

Overview Test Fixtures

- Microstrip – Standard and Custom
  - PTJ-S DC-4GHz SMA, N, 3.5, 7, 7/16
  - PTJ-C DC-6GHz SMA, N, 3.5, 7, 7/16
  - PTJ-X DC-12GHz SMA, N, 3.5, 7
  - PTJ-Ku DC-18GHz SMA, N, 3.5, 7

- Coaxial – Low Loss
  - MLTF-C DC-6GHz N, 7, 7/16
  - MLTF-X DC-12GHz N, 7
  - MLTF-Ku DC-18GHz N, 7

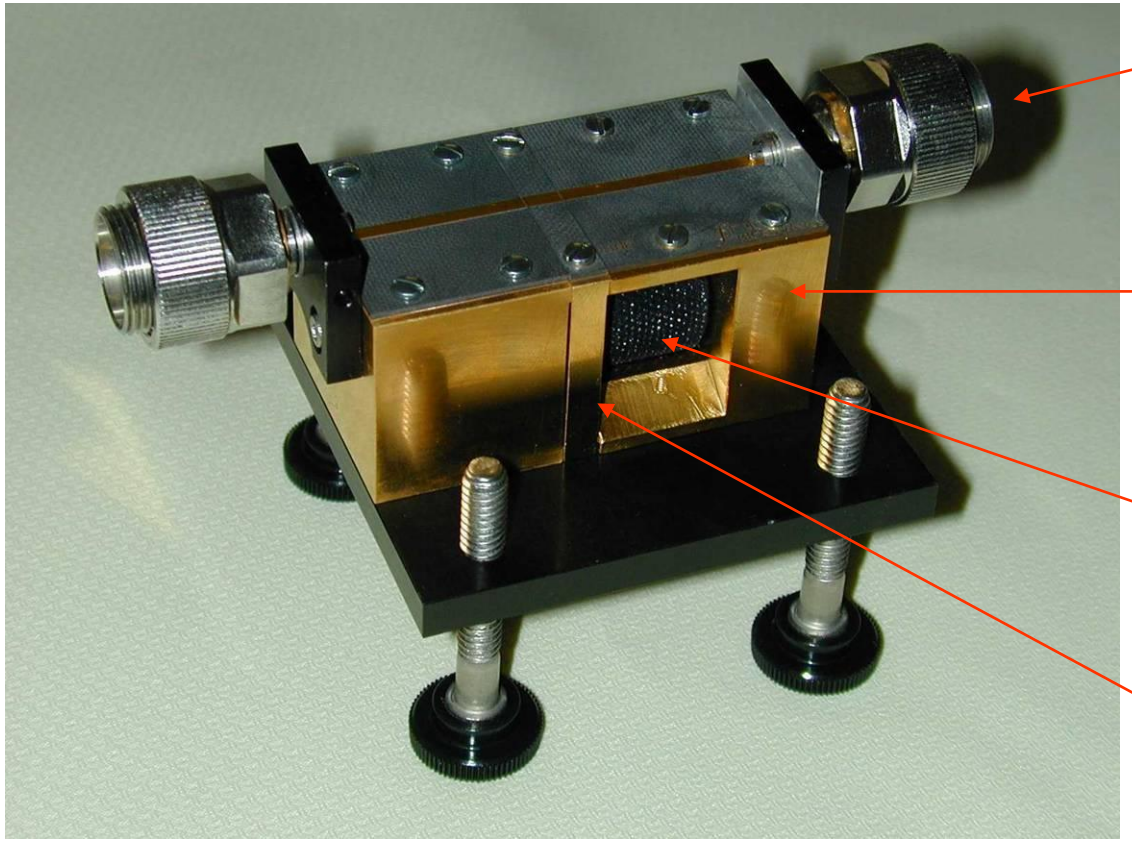
Microstrip Test Fixtures



PTJ-0 with APC-7 and
N connectors

PTJ-0/N with water cooling

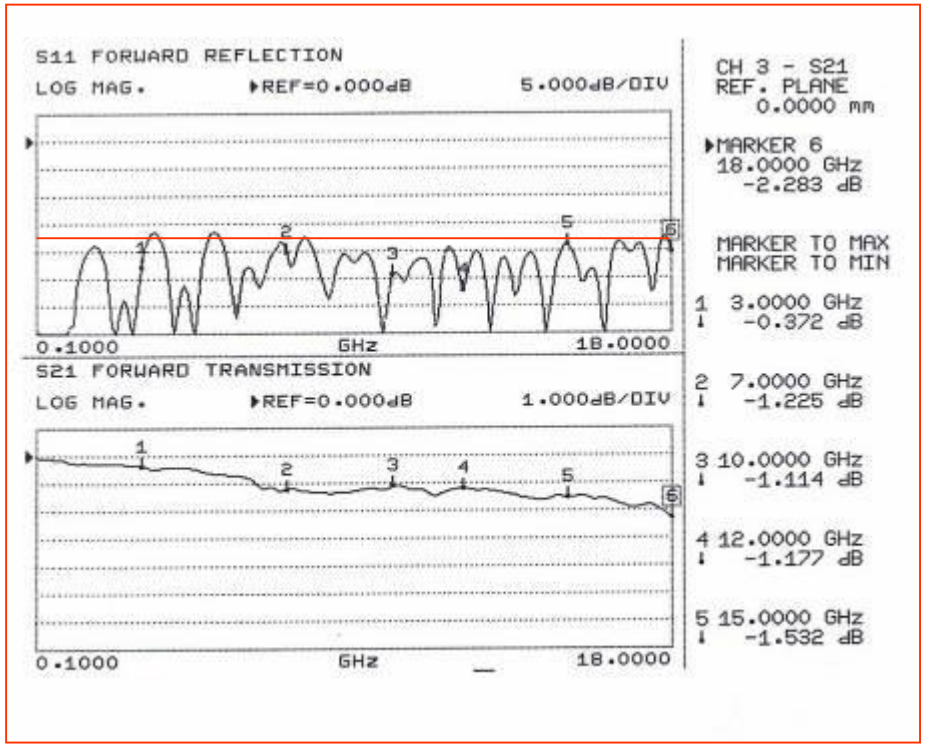
Microstrip Fixtures PTJ-Ku-7 (Operating to 18 GHz)



Overall S-Parameters

PTJ-Ku-7

-17.5dB



Total Reflection

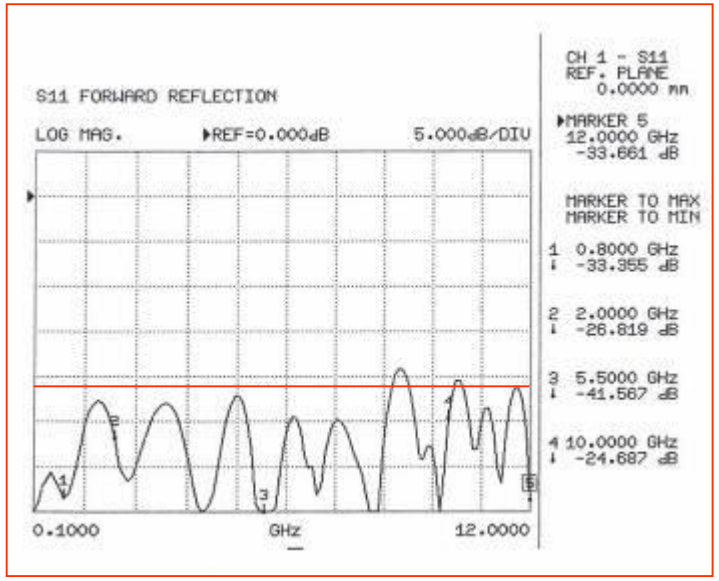
Insertion Loss of Input and Output sections:

$IL = 0.06 \cdot f\,[GHz]\ dB$

Overall S-Parameters

PTJ-X-7

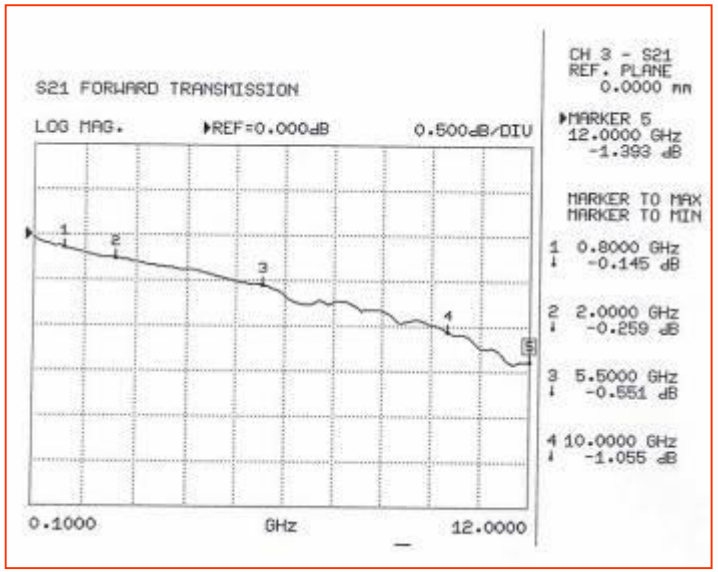
-21dB



Total Reflection

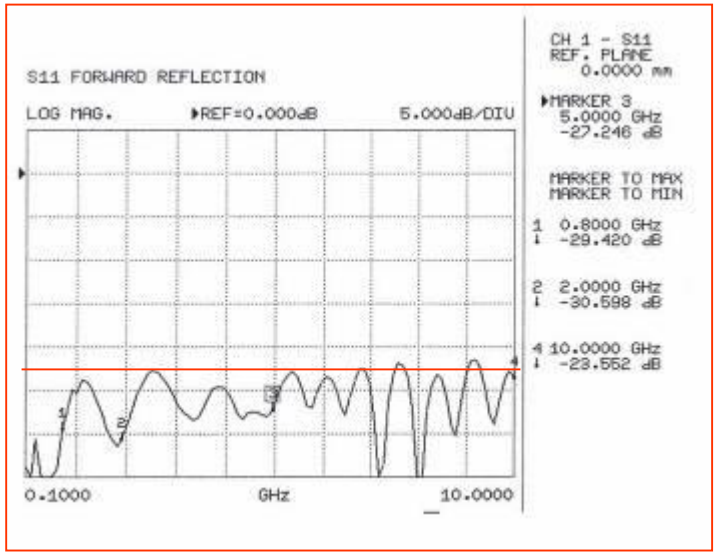
Insertion Loss of Input and Output sections:

$$IL = 0.06 \cdot f\,[GHz]\ dB$$



Overall S-Parameters

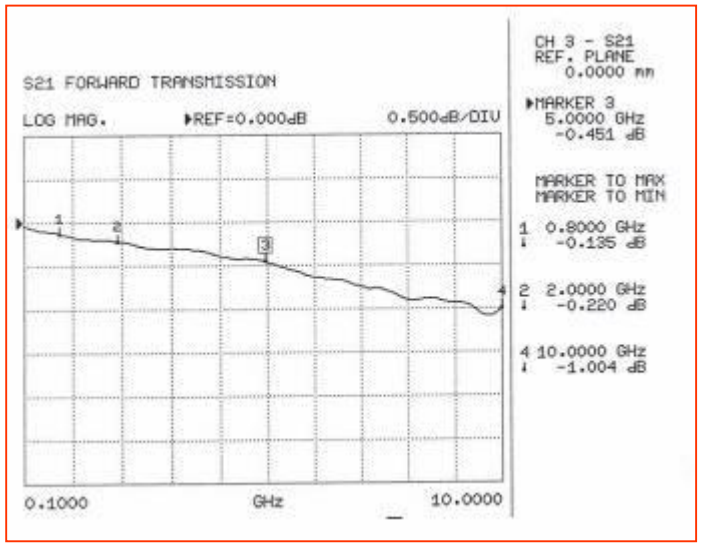
PTJ-C-SMA



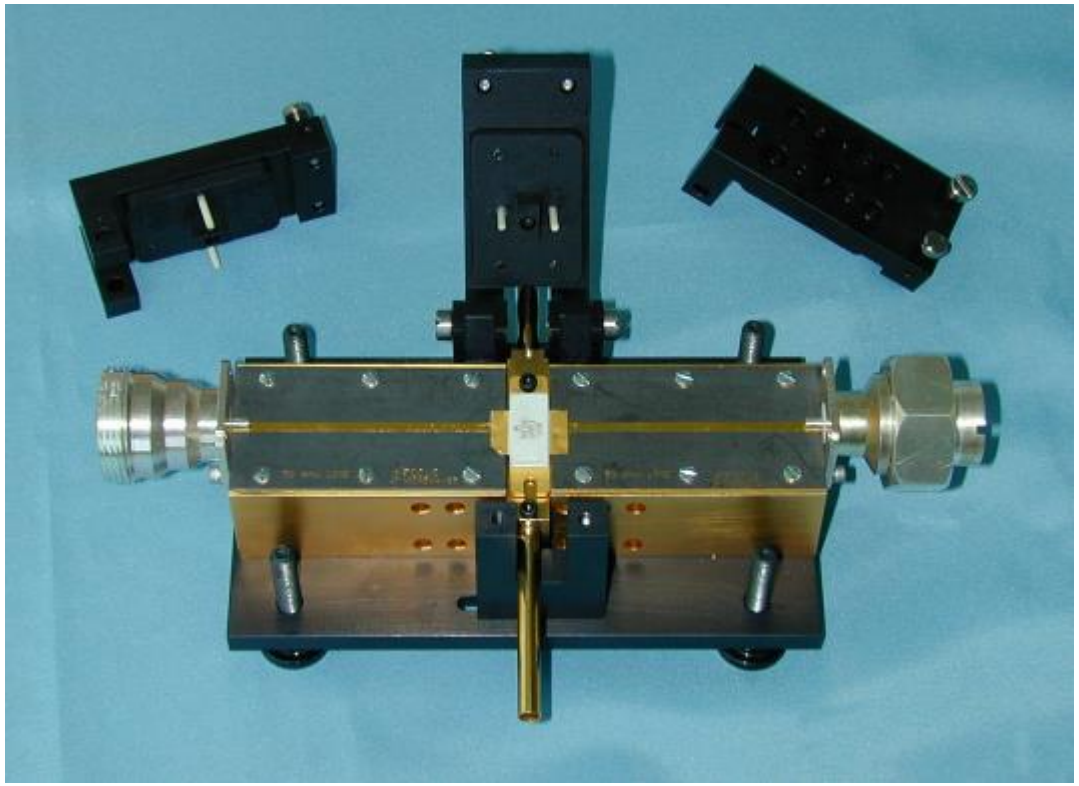
Total Reflection

Insertion Loss of Input and Output sections:

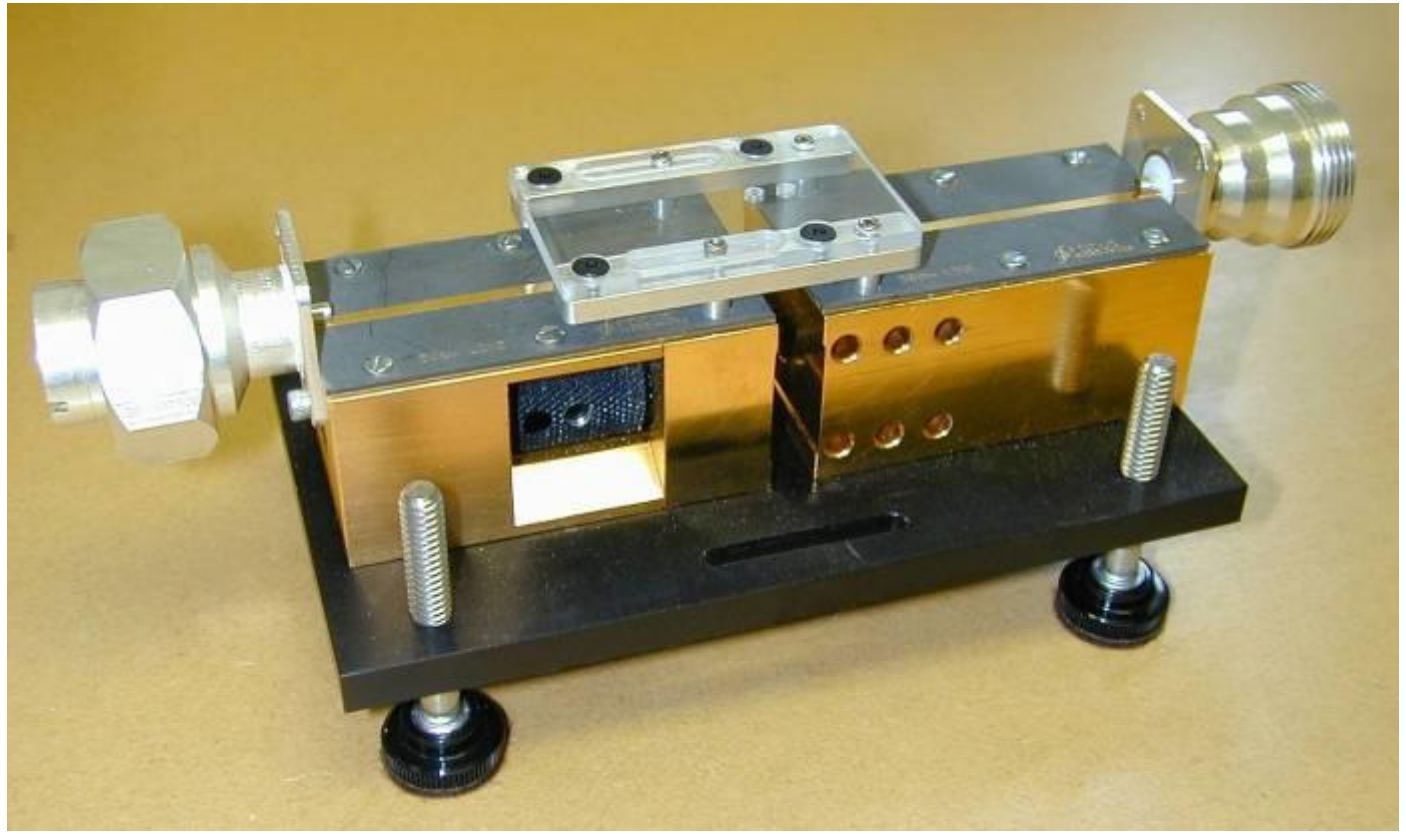
$$IL = 0.05 \cdot f\,[GHz]\ dB$$



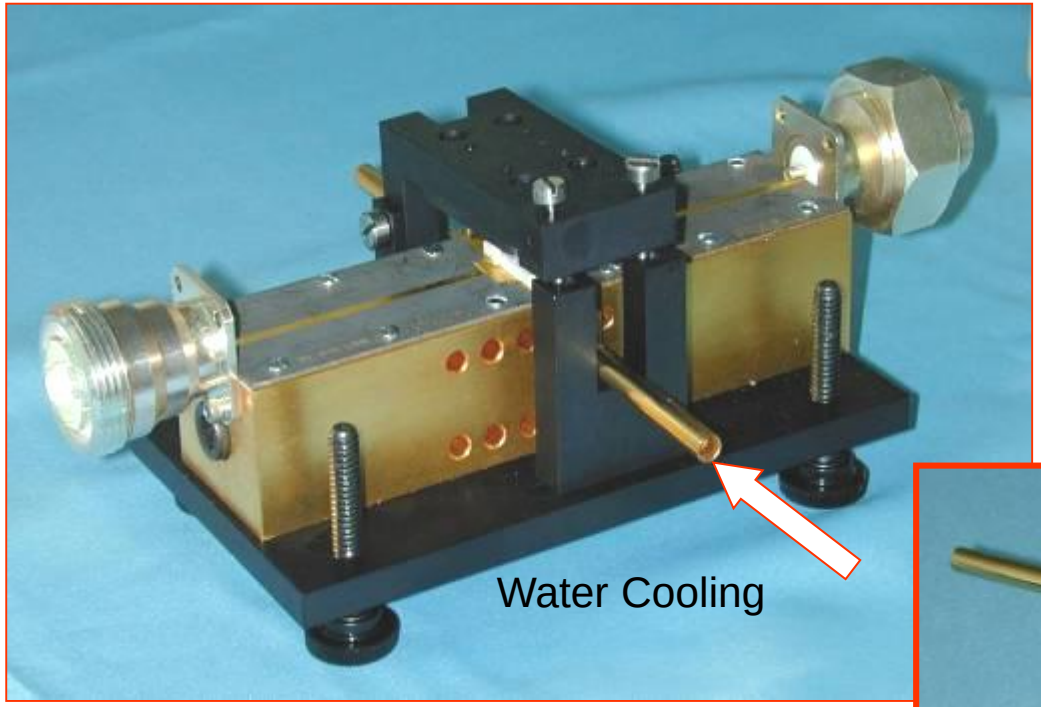
Microstrip Fixtures PTJ-C in 7/16 with Transistor Clamps & Water Cooled Insert

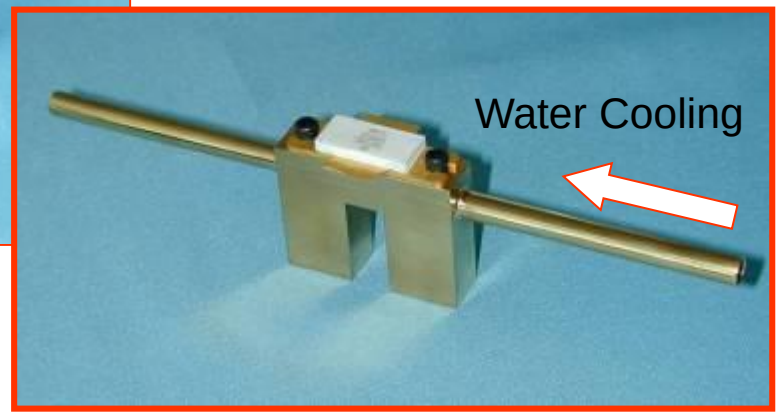


Microstrip Fixtures PTJ-C with Adjustable Transistor Clamp

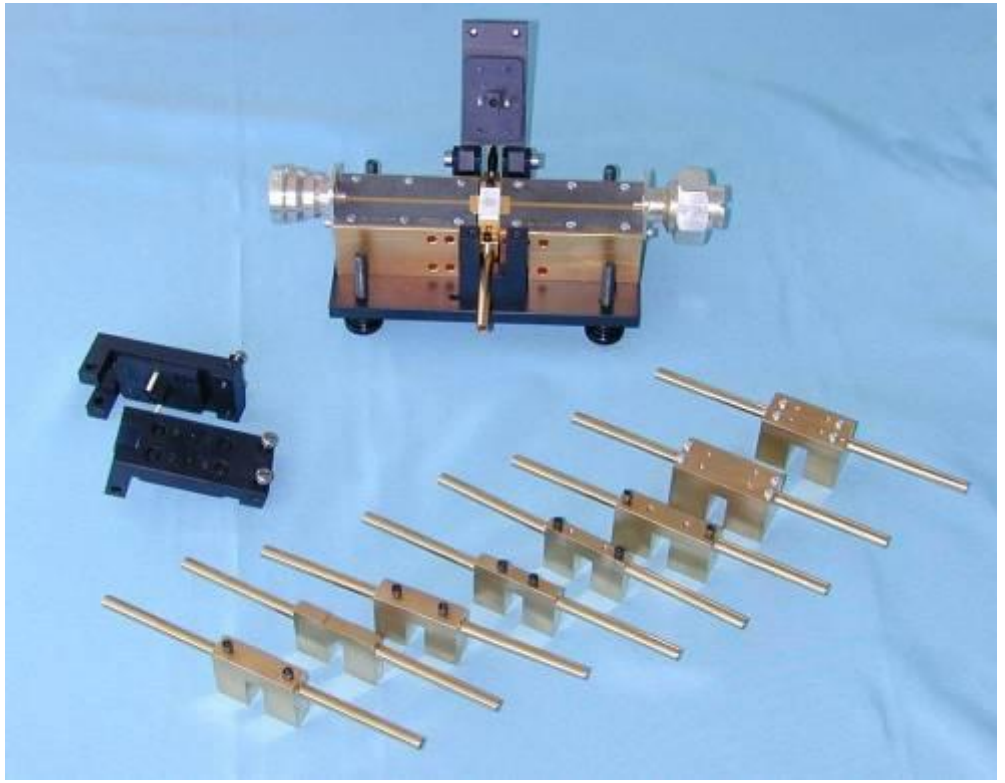


High Power Test Fixture PTJ-C with Water Cooled Inserts (>250 Watts)

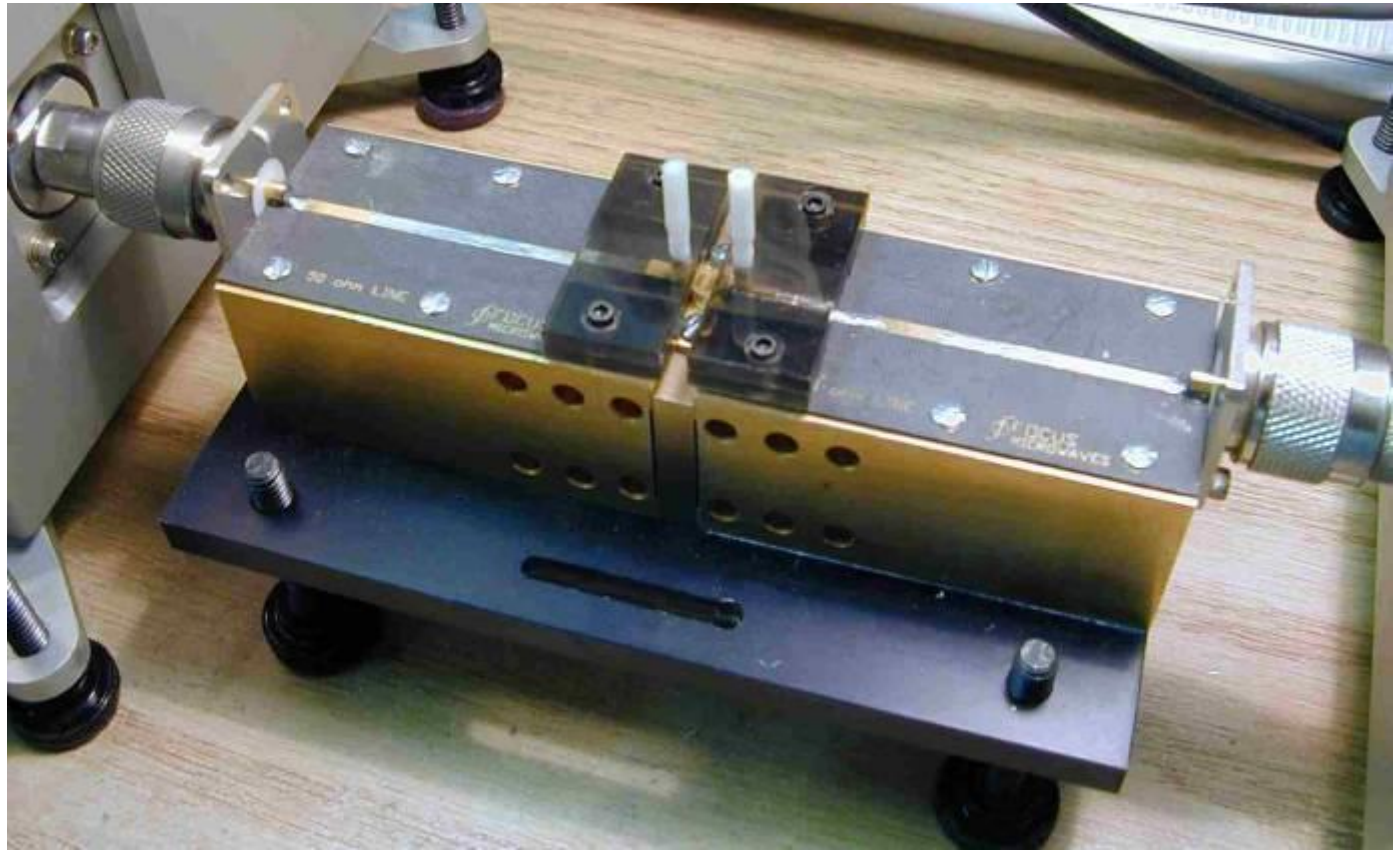




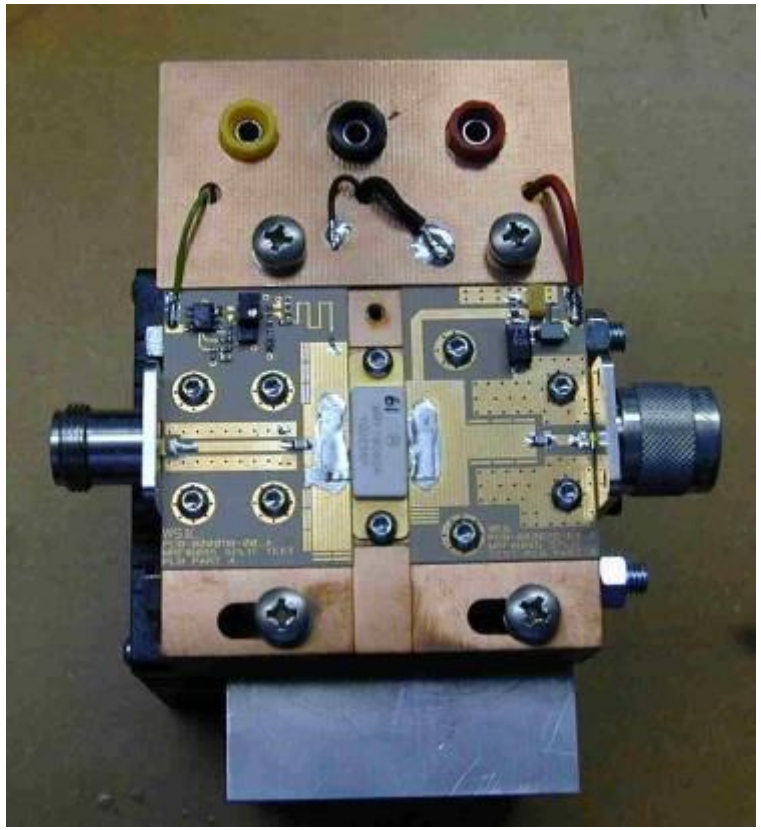
Microstrip Fixtures with Water Cooled Transistor Inserts



Microstrip Fixtures PTJ-X-N in Load Pull Operation

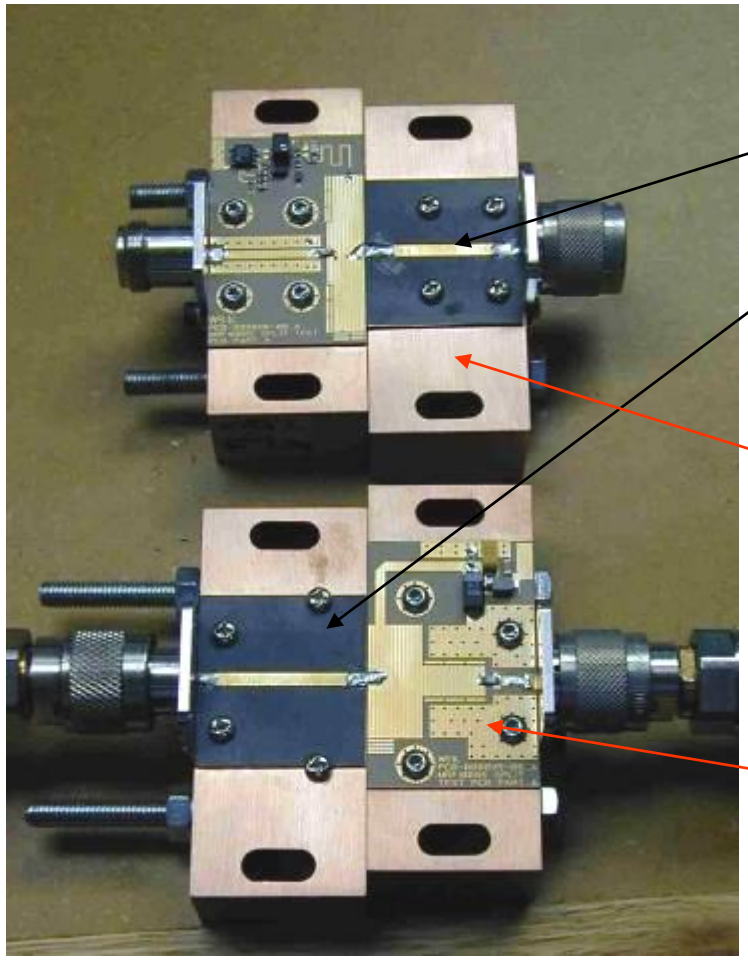


Microstrip Fixtures Complete with Transformers, Bias Networks, & Harmonic Traps



Focus calibration Software allows accurate characterization of input and output section of this fixture

Calibrating Microstrip Fixtures

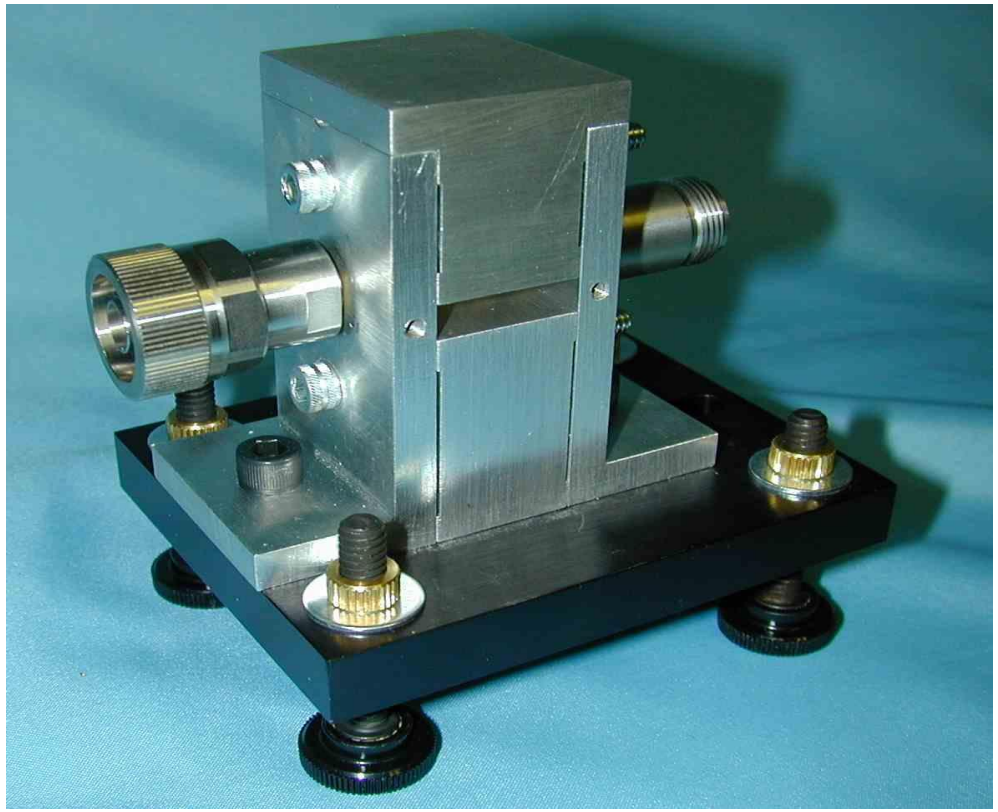


Use Adapter Removal to measure S-parameters of fixture half, since TRL fails when harmonic traps are included on the matching networks

Measure Input section

Measure Output section

Coaxial Fixtures, MLTF*-X-N



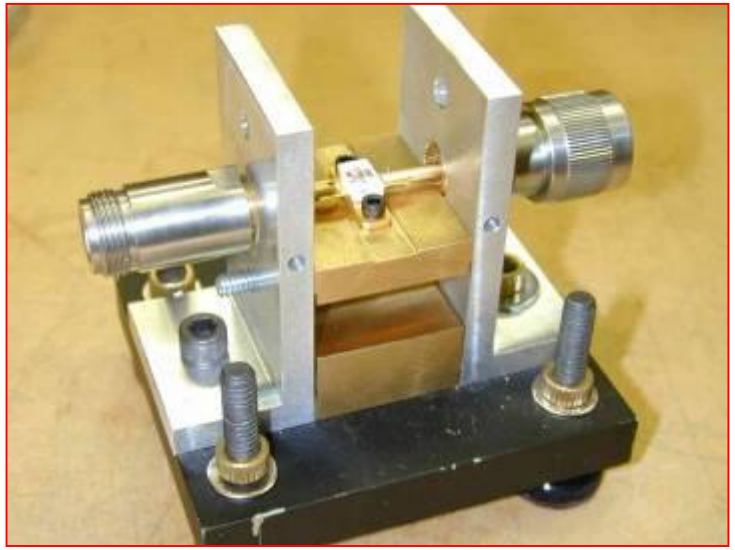
*MLTF = Minimum Loss Test Fixture

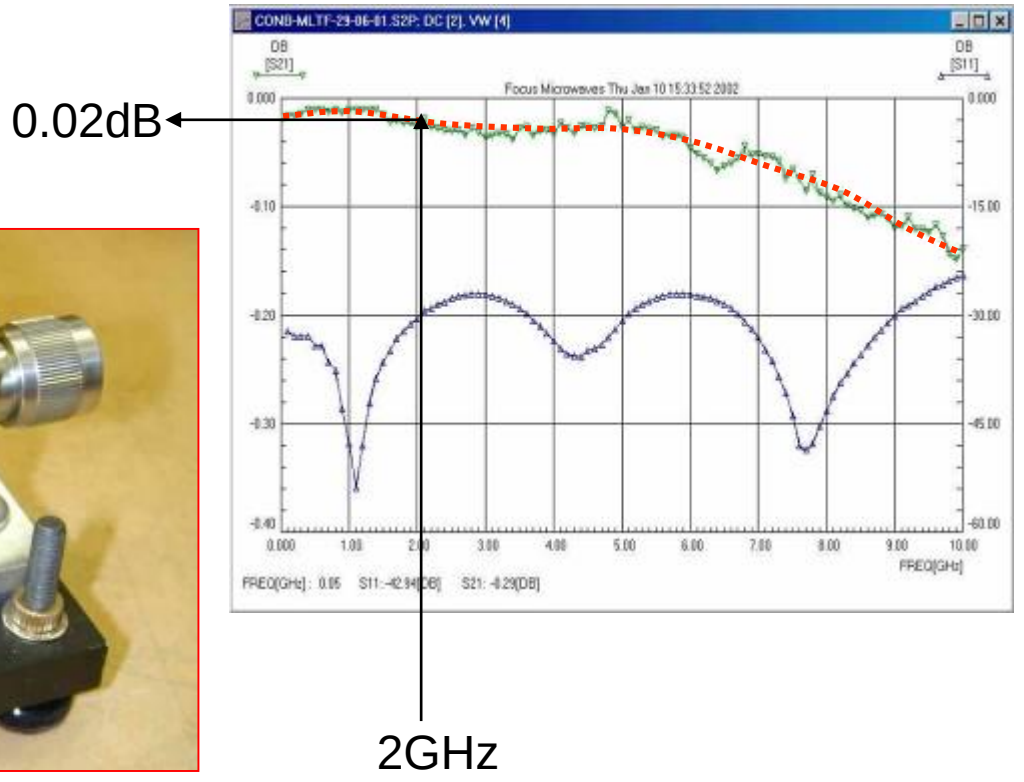
MLTF-X-N with Accessories*

*TRL Calibration Standards and Transistor Insert

MLTF-X-N

Insertion Loss per Half: 0.02dB @ 2GHz





[+]US patent 6,414,563

MLTF-Ku-7 Ready to Ship

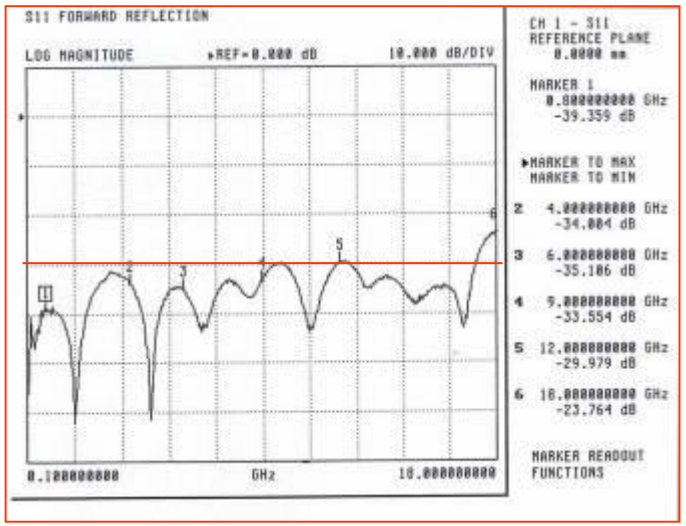
S-parameters of input and output sections

MLTF with Insert

TRL Calibration Standards

MLTF-Ku-7

-30dB



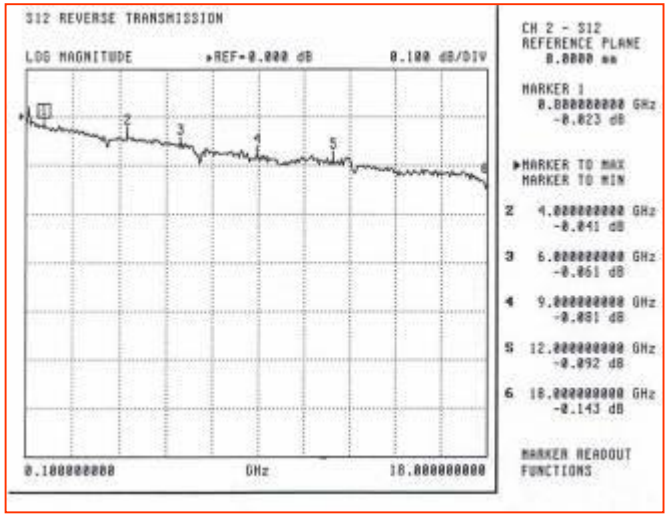
Total Reflection

DC-18 GHz

S2P of Total Fixture

Insertion Loss of Input and Output sections:

IL = 0.0033 · f [GHz] dB



PMT & MLTF Performance

Using MLTF and PMT allows us to generate extremely high Γ (~0.98) @DUT ref. plane