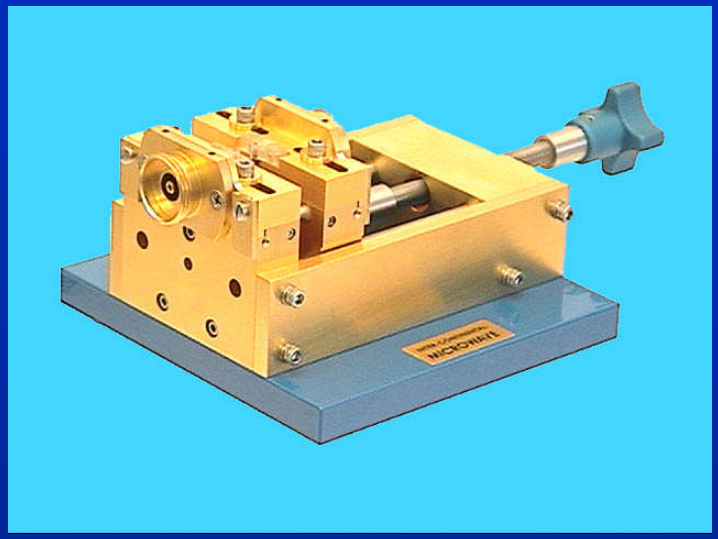
ICM Inter-Continental Microwave

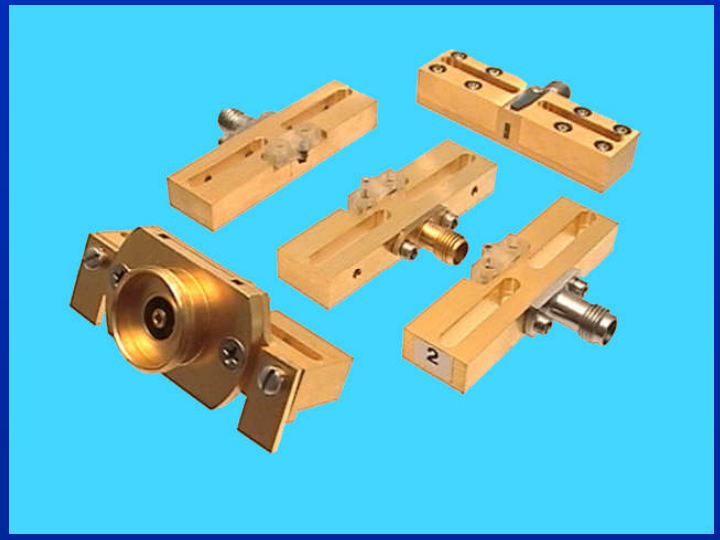
The World-Wide Authority in the Design & Manufacture of Microwave Test Fixtures



Adjustable Mainframe Test Fixture

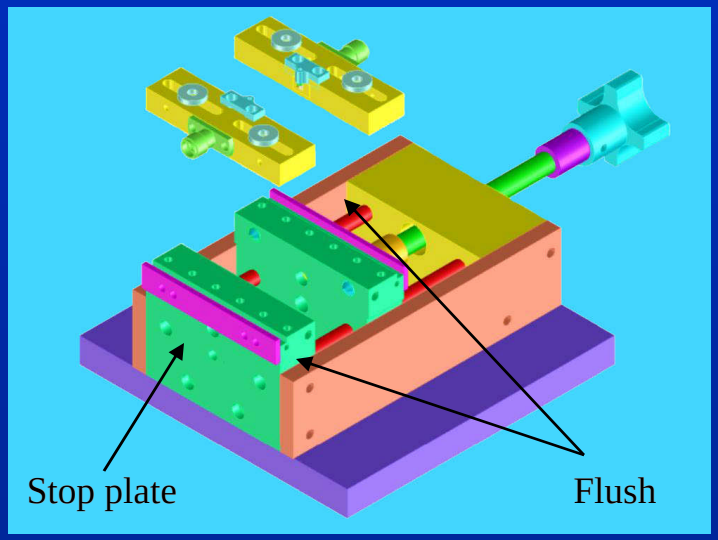
- Test Fixture Mainframe
  - Up to DC – 40 GHz
  - Connector Options:
    - APC-7, APC-3.5, Super-SMA, K, 2.4 mm
  - Interchangeable Transitions
  - RF-in / RF-out offset adjustable
  - Extended length option
  - Full Temp. available (-55 to +125 ºC)
  - Ratchet closing mechanism (option)
  - In field spare parts kit
  - In-fixture TRL Calibration Standards

Transitionsfor AdjustableMainframes



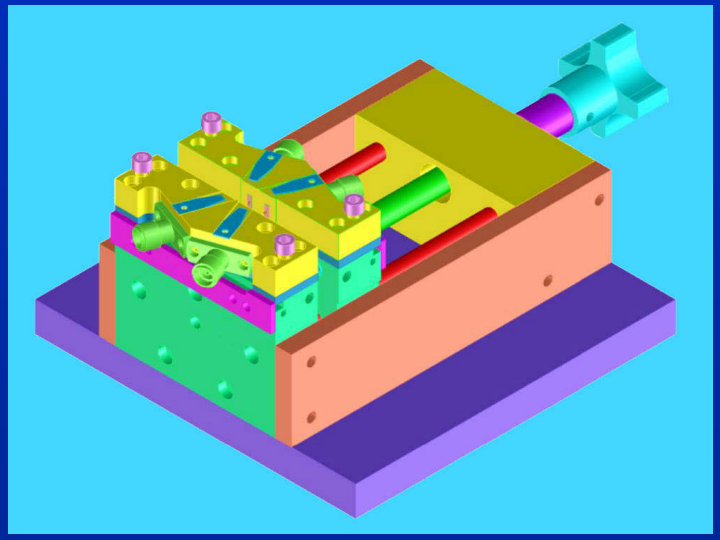
- Transition Assemblies
  - Allows conversion of mainframe to any connector type
  - Available Connectors: APC-7, APC-3.5, Super-SMA, K, 2.4 mm
  - Male or female connectors available
  - Conversion to Full Temp. with Super-SMA Connectors
  - Dual RF launch also available for special insert assemblies
  - Both RF-Launch positions adjustable in x,y and z-axis

Howto ChangeTransitions



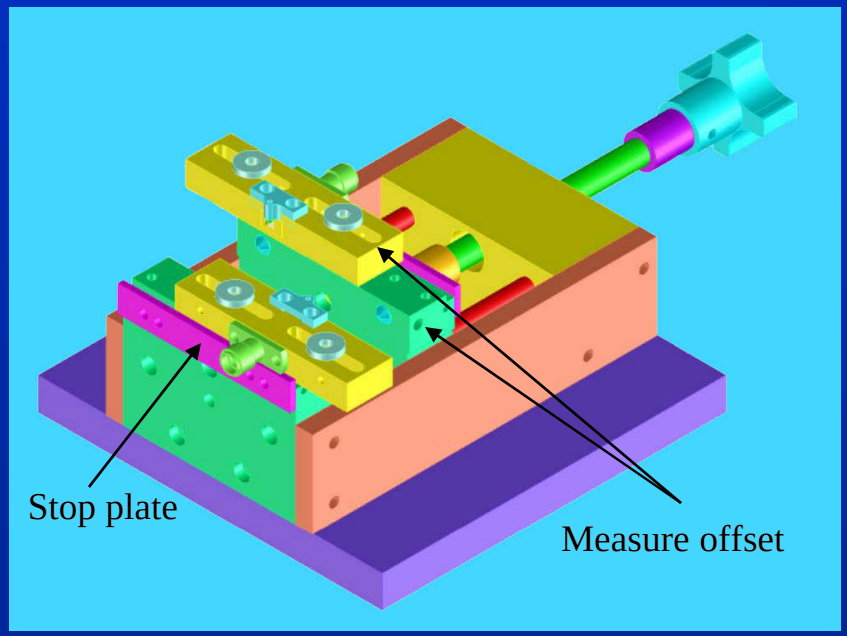
- Mainframe Transition Assemblies
  - Mounted with 2 screws on each side
  - Stop plate for parallel alignment
  - Slot for offset mounting
  - Mount transition ends flush for RF-Pin centering
  - Use shim (not shown) under transition for adjustment in z-axis
  - Use spare transition assemblies for level 1 in-field service

MultipleRF Inputs



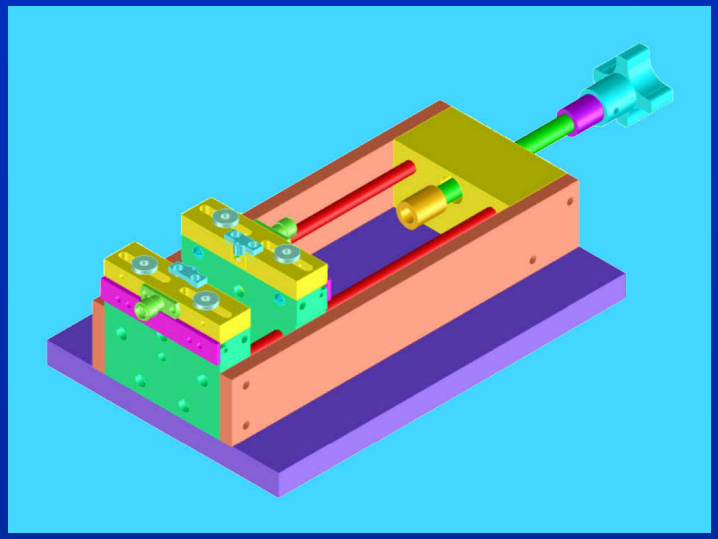
- Custom Transitions
  - Mount onto basic mainframe
  - Up to 4 RF inputs per mainframe
  - Different RF to RF pin spacing can be specified
  - DC – 40 GHz designs available
  - Custom Calibration Kits upon request
  - Contact Factory with your requirements

OffsettingInput andOutput

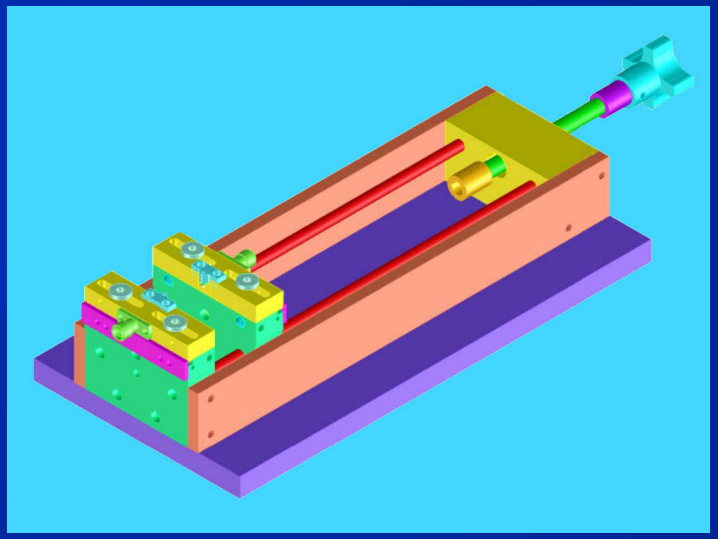


- Transitions offset
  - 0 to 600 mils left or right offset of RF-pins
  - Measure offset from the edges
  - Before fastening push the transition up against the stop plate
  - TRL or TOSL Calibration can be performed with the RF-pins centered and then adjust the offset

StretchedMainframes

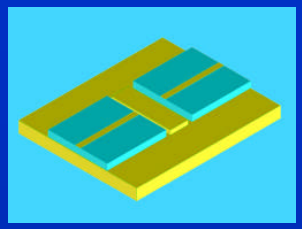


Extended length (+2”), TF-3002-x

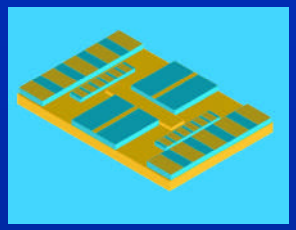


Extended length (+4”), TF-3003

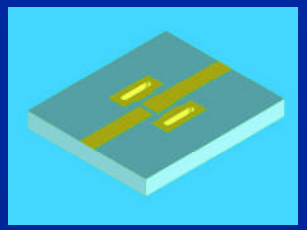
Universaluse ofMainframe



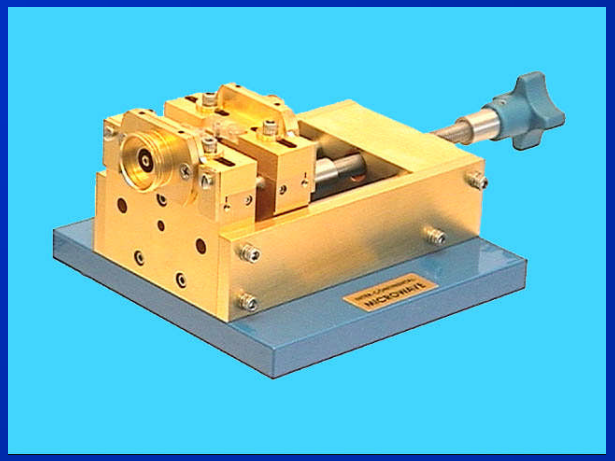
FET Chip Testing



MMIC Chip Testing

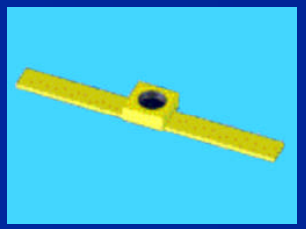


Bipolar Chip Testing

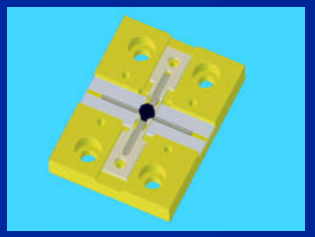


Adjustable Mainframe

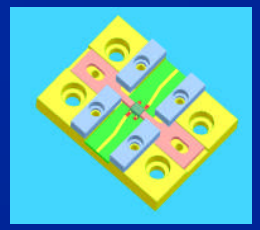
Calibration Standards



Diode Testing

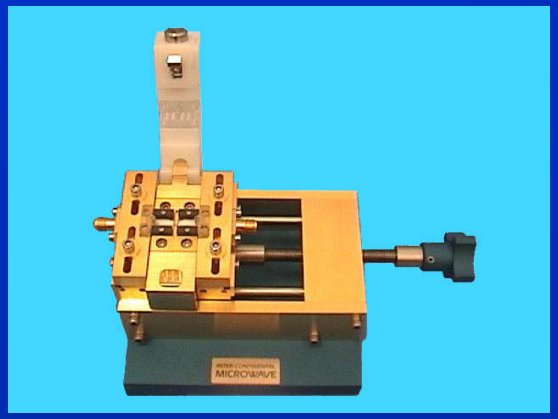


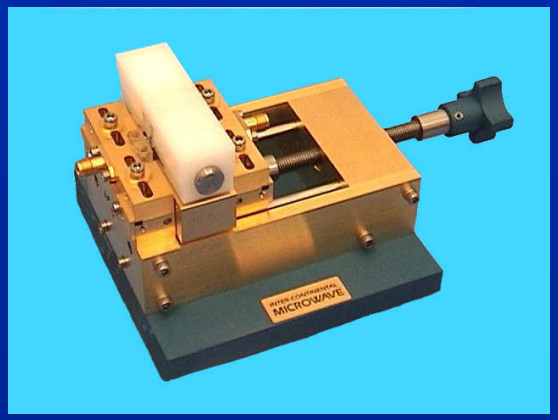
Transistor Testing



SOT & SOD Testing

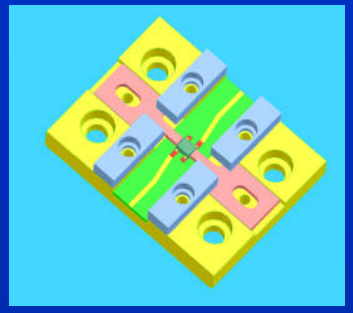
Mainframewith Midsection

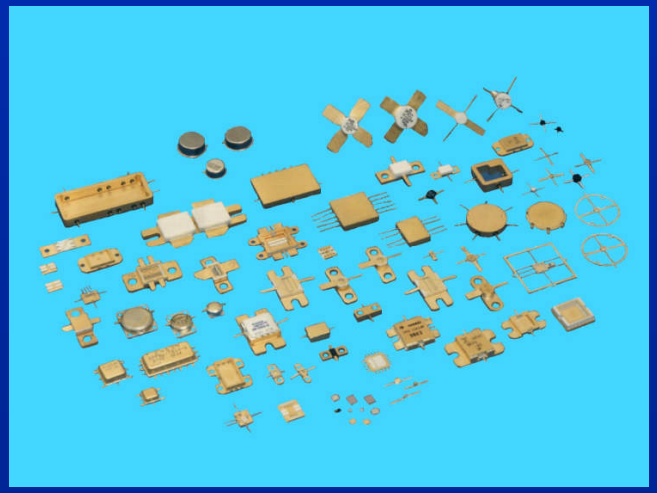




- Midsection Adapters
  - Turning the knob counter-clockwise opens the mainframe
  - The Midsection Adapter is placed between the Transitions
  - Turning the knob clockwise will close the mainframe
  - The Midsection Adapter will be automatically aligned and lifted up under the RF-pins when the Mainframe is closed
  - The Mainframe should be closed real tight for perfect grounding

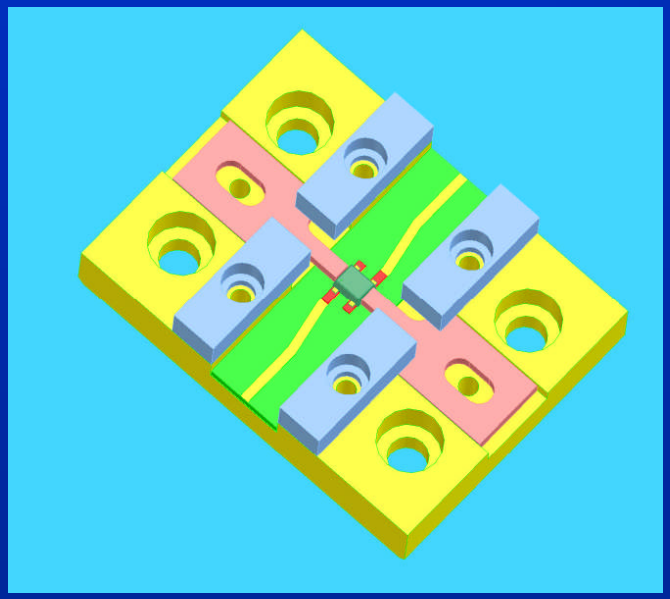
LowPower Transistors





- Packaged Transistor Measurements
  - Ideal for S-parameter, Noise Figure and Power measurements
  - 10, 15, and 25 mil substrates available
  - De-embedding with TRL/LRM Calibration Standards
  - Measurement Environment Equal to Application Environment
  - Midsections for over 1000 different packages
  - Full Temp. (-55 to +125 ^{o} C) as option
  - Custom Midsections available

InsertAssembly



Insert Assembly for Midsection

- Insert Assemblies for Midsection Adapters
  - Insert Assemblies are custom designed to match the DUT
  - The length of the microstrip at the RF input and output is standardized to 330 mils
  - Adjustable Dielectric Guides align the DUT with the RF lines
  - DURA contacts provide long life in the contact areas
  - Different pin connections require different insert assemblies

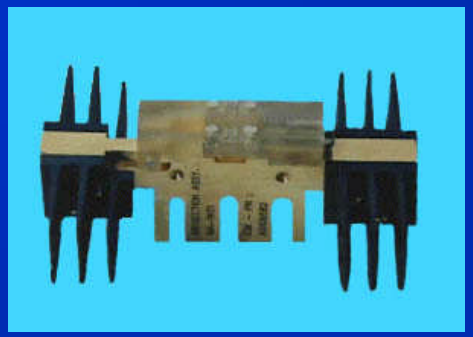
MidsectionAdapter

Midsection Adapter with insert

- Midsection Adapter
  - Consists of:
    - Insert Assembly and Midsection Assembly
    - Midsection and Insert have to have the same width
    - Midsection cover assembly is matched to insert and DUT
    - For some devices multiple inserts can fit the same midsection (different pin connections to DUT)

Midsectionswith Cooling

With liquid cooling



With air cooling

With air and liquid cooling

TRL and TOSL Calibration Kits

Medium Power Transistor

- Ideal for S-parameter, Noise Figure and Power measurements

-Fit into all mainframes

10, 15, and 25 mil substrates available

De-embedding with TRL Calibration Standards

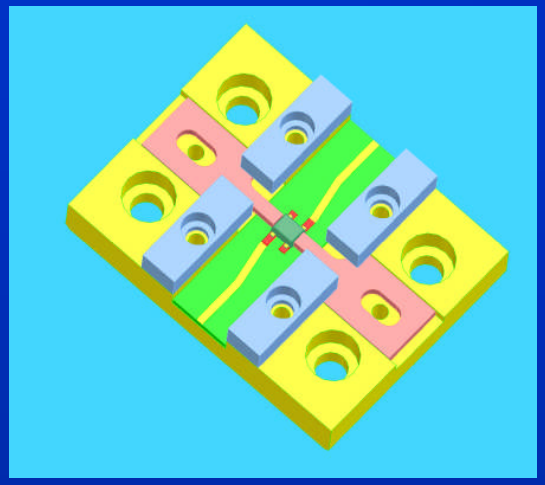
Measurement Environment Equal to Application Environment

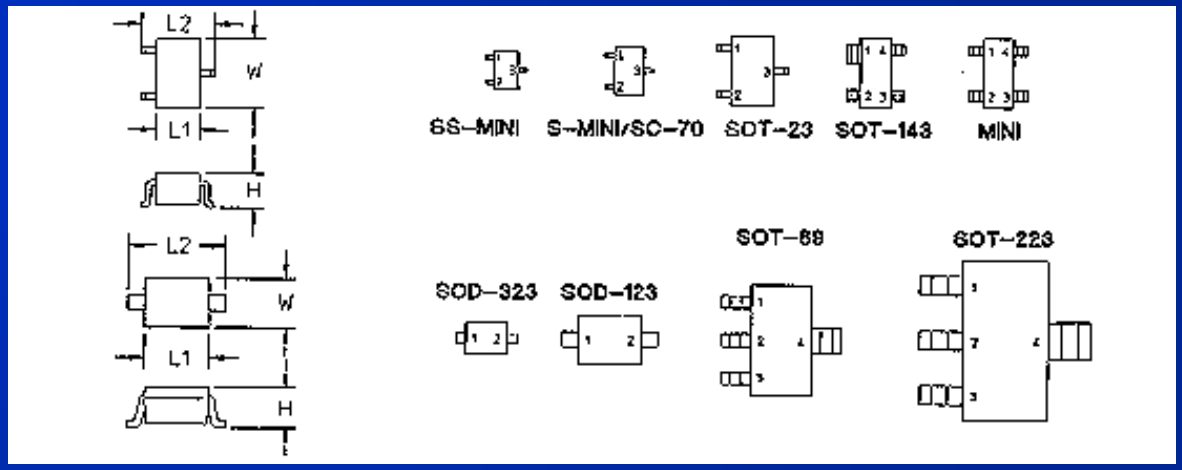
With Air fin or liquid cooling

Full Temp. available
(-55 to +125^{o} C)

Custom Midsections available

ModernSurface MountTransistors





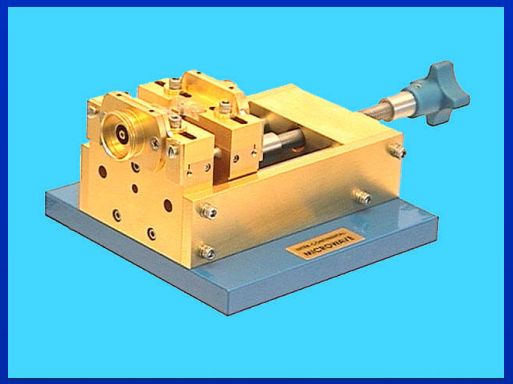
- Surface Mount Transistors
  - Midsection Adapters for all packaged SOT & SOD devices
  - Ideal for S-parameter, Noise Figure and Power measurements
  - De-embedding with TRL Calibration Standards

TRLCalibration forMidsections

Calibration Kit

- TRL Calibration Kit
  - Matched to Inserts using 25 mil alumina and 330 mil long substrates
  - DC – 26.5 GHz
  - All Calibration Coefficients included
  - Includes complete set of Replacement Standards
  - Standards build as matched sets
  - All Standards mounted on Midsection Adapters

PackagedTransistor TestSolution



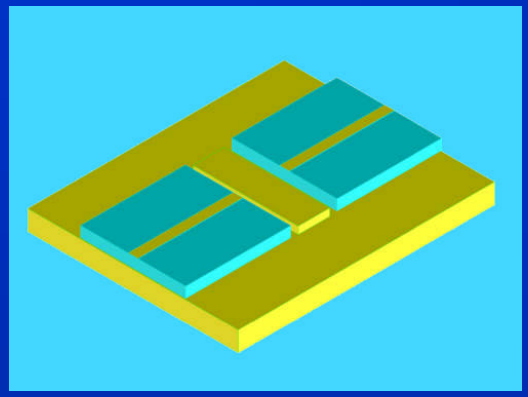
Mainframe

Calibration Kit

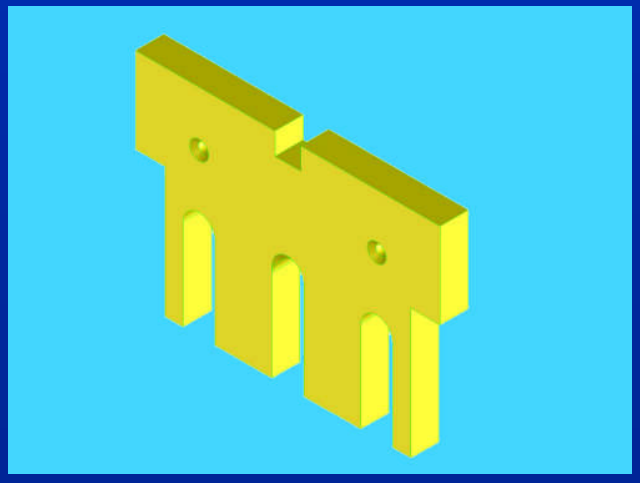
Midsection Adapter

Includes Adjustable Mainframe, TRL
Calibration Standards and Midsection Adapter

FETMeasurements atChip Level



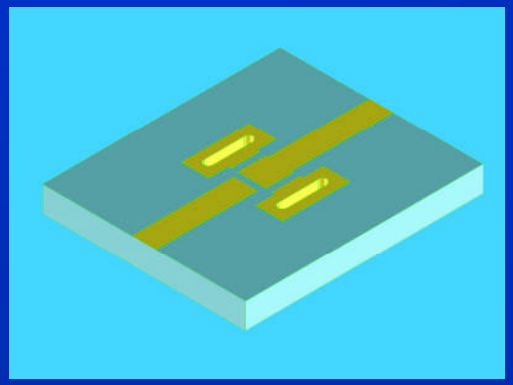
FET Carrier Assembly



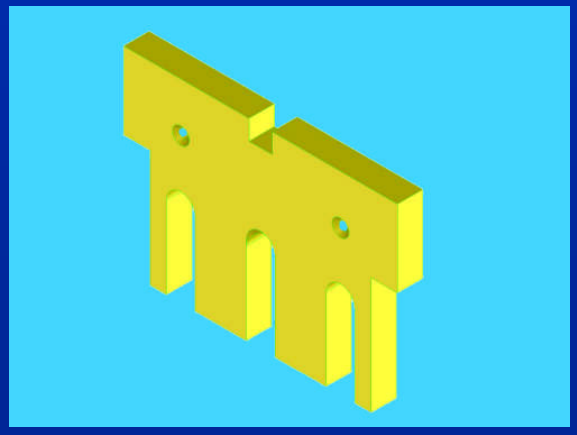
FET Midsection

- FET Carrier Assemblies
  - Ideal for S-parameter measurements
  - De-embedding with TRL Calibration Standards
  - Measurement Environment Equal to Application Environment
  - 10 and 15 mil substrates for DC – 40 GHz
    25 mil substrates for DC – 25 GHz
  - Customer to specify dimensions
  - Use ICM Product Note B6137208 and B0137209 FET Carrier Assembly Data Input Form

BipolarChip Measurements



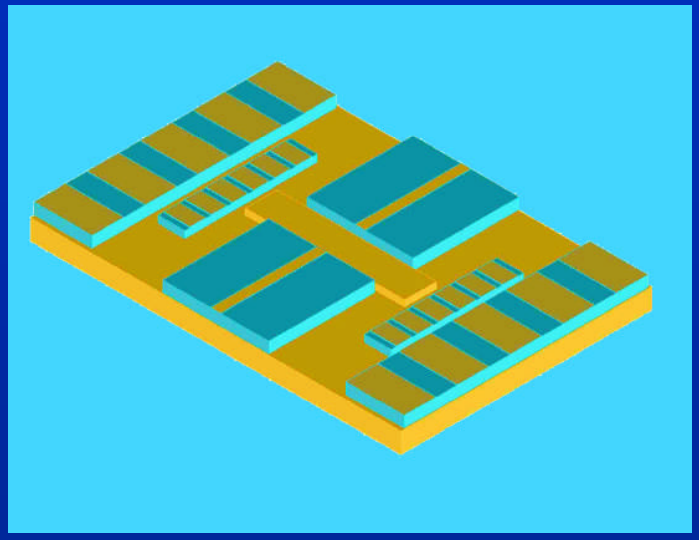
Bipolar Chip Substrate



Bipolar Midsection

- Bipolar Substrates
  - Ideal for S-parameter measurements
  - De-embedding with TRL Calibration Standards
  - Measurement Environment equal to Application environment
  - 10 and 15 mil substrates for DC – 40 GHz
    25 mil substrates for DC – 26.5 GHz
  - Use ICM Product Note B6137210

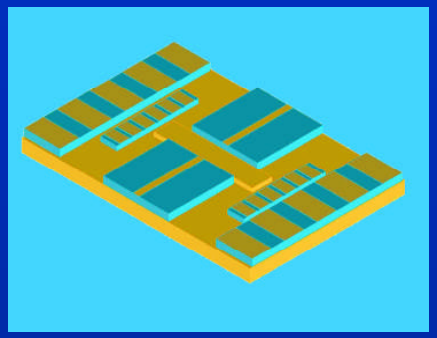
MMICCarrier Assemblies

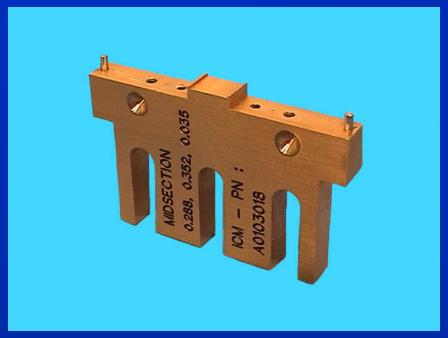


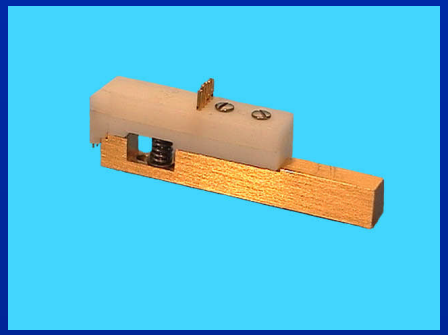
MMIC Carrier Assembly

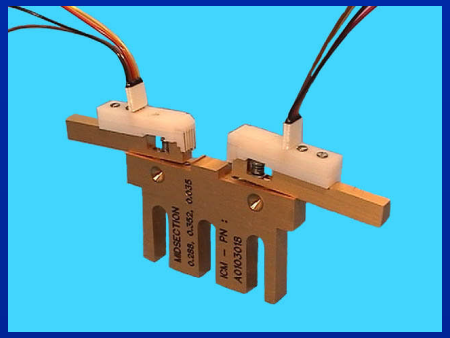
- MMIC Carrier Assemblies
  - Ideal for S-parameter measurements
  - De-embedding with TRL Calibration Standards
  - Measurement Environment Equal to Application Environment
  - 10 and 15 mil substrates for DC – 40 GHz
    25 mil substrates for DC – 25 GHz
  - Customer to specify dimensions
  - Use ICM Product Note B6137206 and B0137207 MMIC Carrier Assembly Data Input Form

MMICChip Measurements



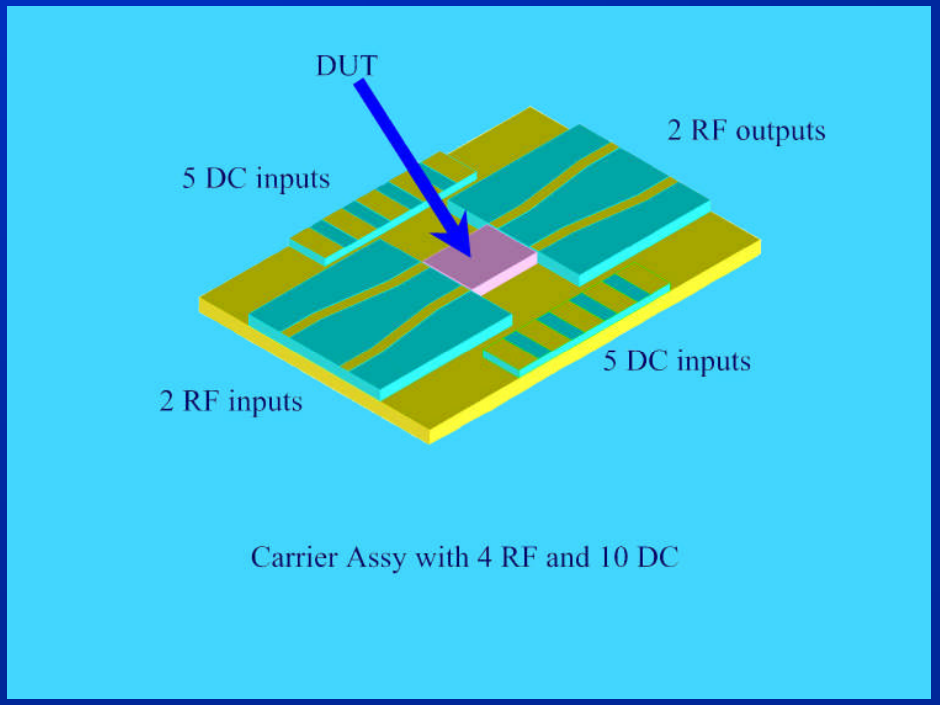






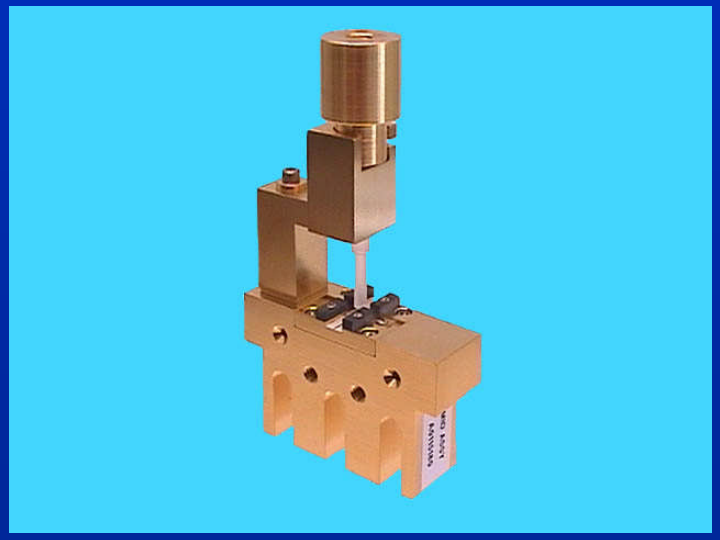
- MMIC Measurements Setup
  - MMIC Carrier Assembly made to fit DUT
  - 10 and 15 mil substrates for DC – 40 GHz; 25 mil substrates for DC – 26.5 GHz
  - MMIC Midsection to fit Carrier Assembly Width
  - Uses 2 ea DC Probe Assemblies
  - Uses 2 ea DC Cable Assemblies
  - DC Probe Assemblies can be moved to other size midsections
  - Use ICM product Note B6137206 and MMIC carrier assy. Data Input Form B0137207

CustomMMIC CarrierAssembly Example



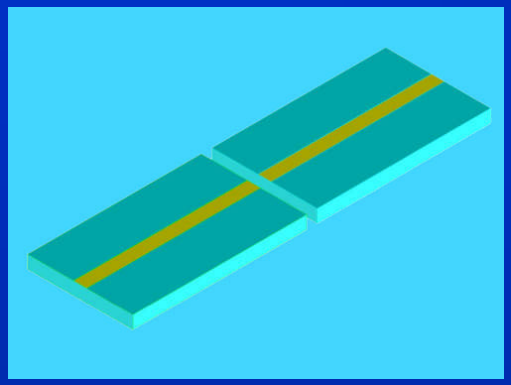
Carrier Assy with 4 RF and 10 DC

OtherMainframe Applications

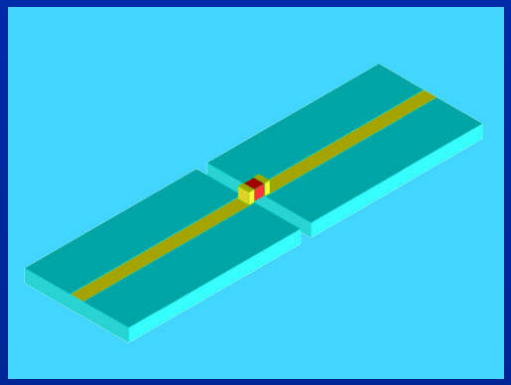


- Capacitor and Inductor Measurements
  - For Surface Mount Devices (SMD)
  - All popular sizes can be tested
  - 3 Measurement Configurations
    - Series Thru
    - Shunt Thru
    - Shunt to Ground
  - All Mainframe can be used
  - TRL Calibration Standards available
  - All Tests non-destructive (no soldering)

Series-ThruCapacitors andInductor Measurements



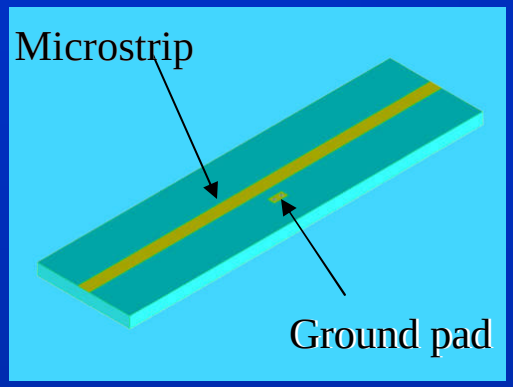
Series-Thru Substrate



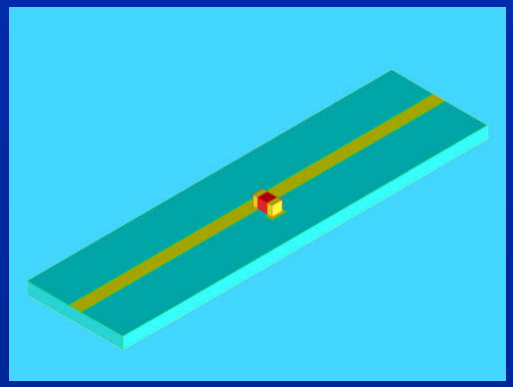
Series-Thru Substrates with DUT

- Measured in Series with a 50 Ohm microstrip Line
  - Features:
    - Calibration establishes reference planes at end of substrate where the DUT makes contact
    - Substrates available with different microstrip width for smaller and larger components
    - Non-destructive clampdown of DUT
    - DURA contacts for long contact life
    - See our website for available sizes

Shunt-ThruCapacitors andInductor Measurements



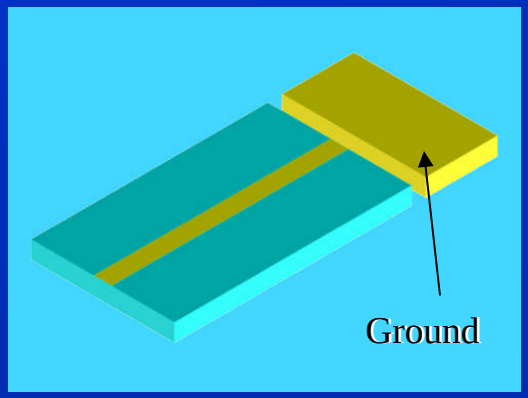
Thru line with ground pad



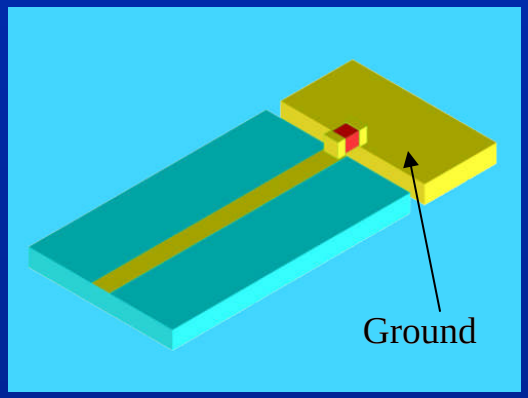
Shunt-Thru Substrate with DUT

- Measured in Shunt with a 50 Ohm microstrip Line
  - Features:
    - Calibration establishes reference planes at + and – 50 mils from the center of the substrate
    - DUT is placed between the microstrip line and ground
    - Substrates available with different gaps between microstrip and ground pad for smaller and larger components
    - Non-destructive clampdown of DUT
    - DURA contacts for long contact life
    - See our website for available sizes

Shunt-to-Ground Capacitors and Inductor Measurements



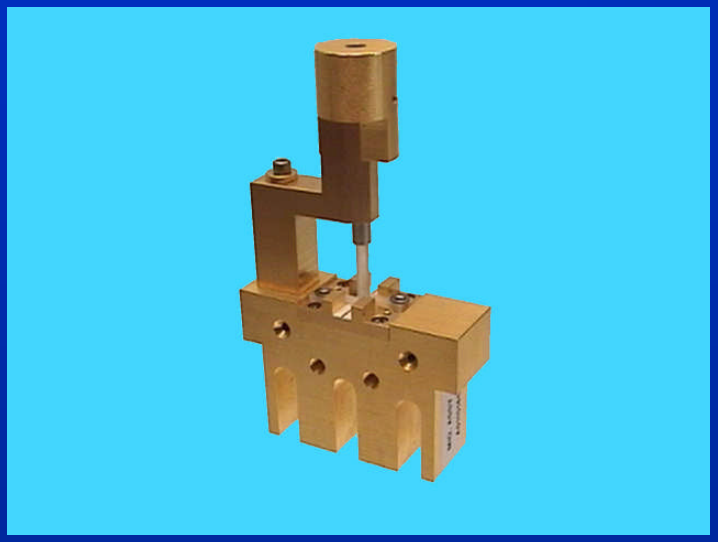
Microstrip with ground pad



Microstrip with DUT to ground

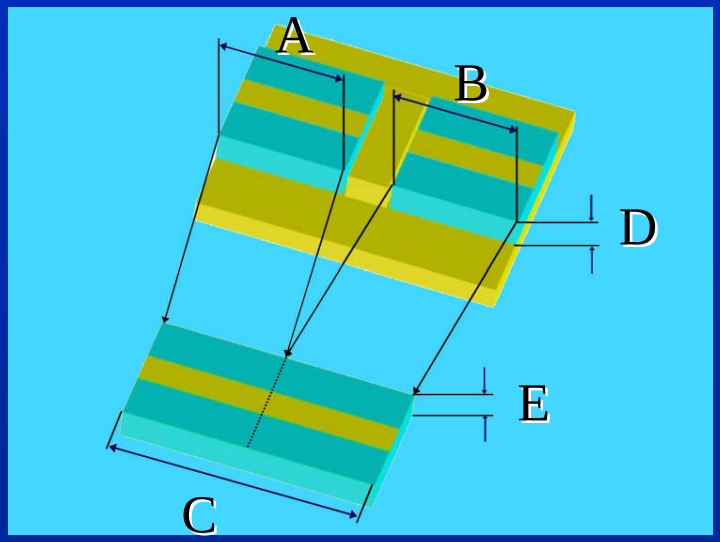
- Measured with a 50 Ohm microstrip Line to ground
  - Features:
    - Calibration establishes reference planes at the end of the substrate
    - DUT is placed between the microstrip line and ground
    - Substrates available with different gaps between microstrip and ground pad for smaller and larger components
    - Non-destructive clampdown of DUT
    - DURA contacts for long contact life
    - See our website for available sizes

Non-destructiveBeam -LeadTesting



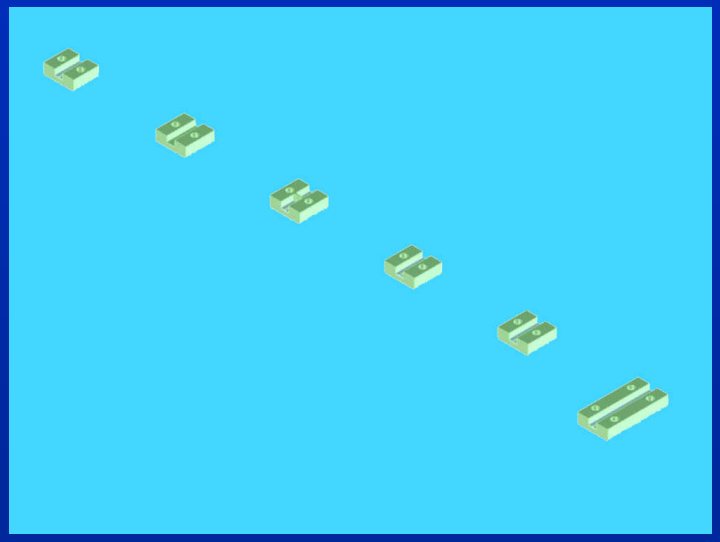
- Beam Lead Diode Testing
  - Non-destructive RF Measurement
  - DC - 40 GHz
  - Low insertion loss (1 dB typ.)
  - High Return loss (20 dB typ.)
  - Thru Standard for Calibration included
  - Ideal for Pin Diodes, SRD's, etc.
  - Midsection Style for mainframes or stand alone
  - TRL Calibration Standards for de-embedding (S-parameters)

CalibrationStandards



- THRU Standard Length
  - Length of THRU Standard is related to the carrier assembly
  - Length A and Length B = THRU Standard Length C
  - Substrate Materials have to be the same
  - Thickness of substrate has to be the same (E = D)
  - Reference planes at center of THRU Standard
  - Reference planes on Carrier Assembly at inside edge of substrates

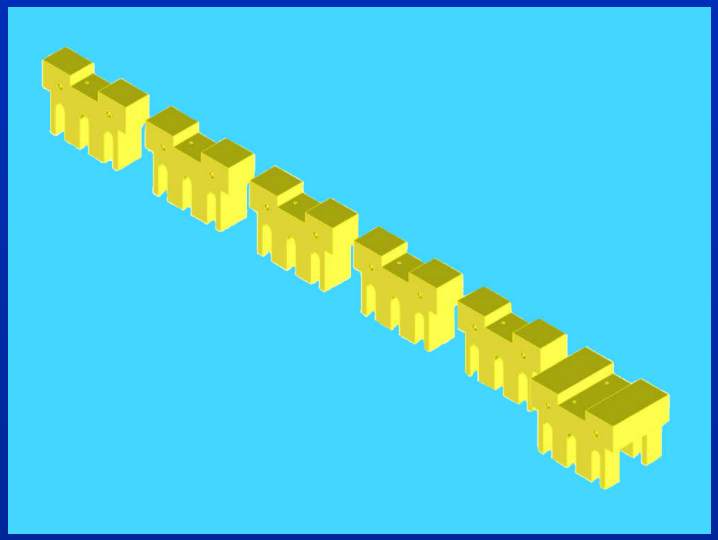
TRLStandards are “MatchedSets ”



Matched set of Calibration Kit Inserts

- Matched sets
  - TRL Standards are manufactured as matched sets
  - Requires to use same mask
  - Requires to be manufactured from same substrate
  - Tested as Matched Sets
  - To achieve the best calibration Accuracy the standards should only be used as matched sets
  - Replacement Standards are available as Matched Sets only

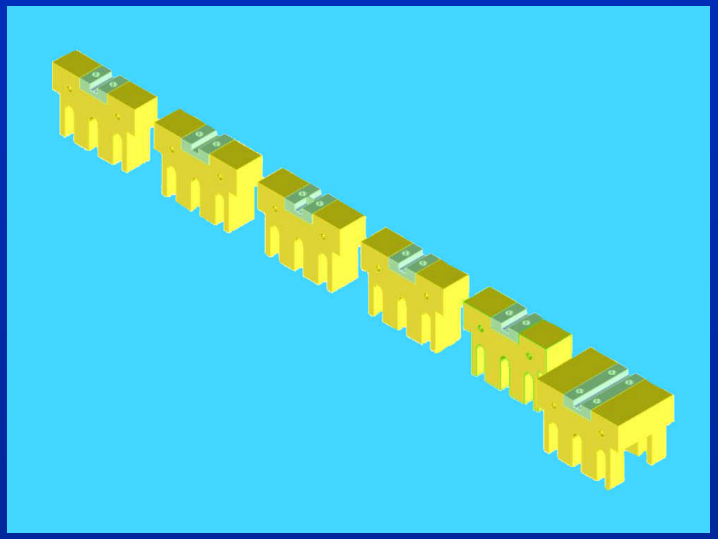
CalibrationAdapters



Calibration Adapters

- Calibration Adapters
  - Calibration Kits for Mainframes have the standards mounted on Calibration Adapters
  - The Calibration Adapters match the width of the Calibration Inserts
  - The Calibration Adapter align the Calibration Standards automatically when inserted into the Mainframe

TRLCalibration Standards



Calibration Adapters with Calibration Inserts

- Adapters and Inserts
  - The Calibration Inserts are mounted onto the Calibration Adapters
  - The Insert have to be flush with the Adapter when mounted
  - Each Calibration Kit is completely assembled when shipped
  - A set of Replacement Standards is included with every Mainframe Calibration Kit

ICMTRL CalibrationStandards

Calibration Kits

- TRL Calibration Standards
  - Microstrip in-fixture standards
  - DC – 40 GHz
  - For Adjustable Mainframe Fixtures
  - 10, 15, 20, 25, and 50 mil alumina substrate thickness available
  - Replacement Standards Kits
  - Many soft board material Calibration Kits available
  - All Calibration coefficients supplied
  - Custom Calibration Kits on request