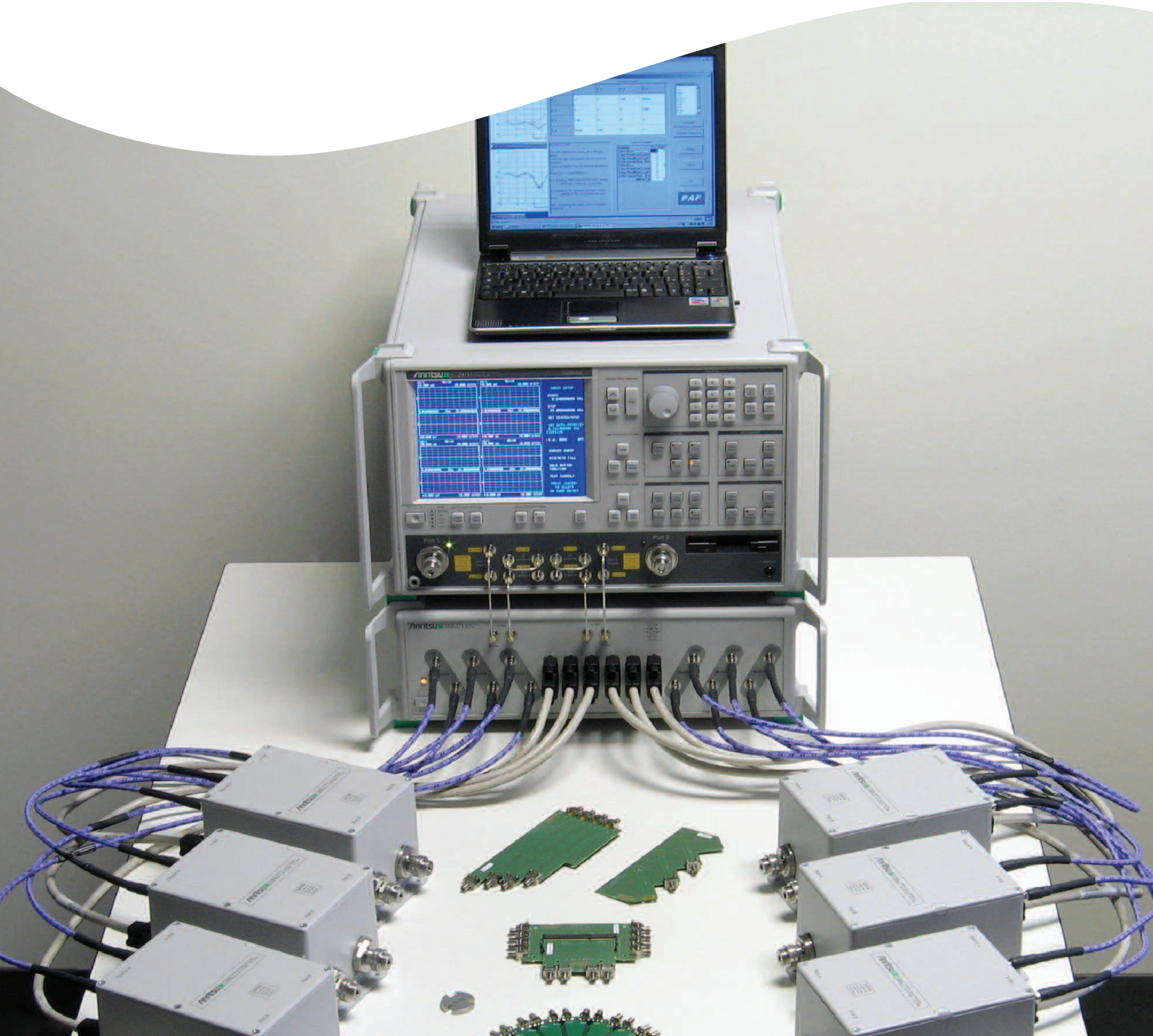
Product Brochure

Anritsu

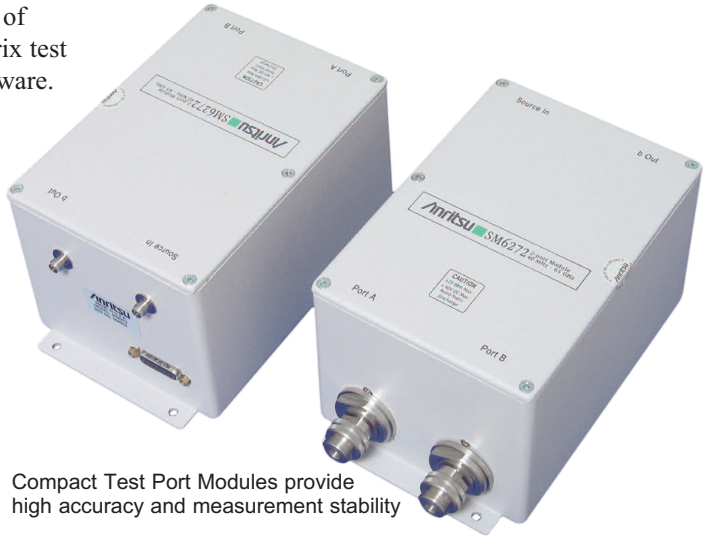
Microwave Multiport Measurement System

40 MHz to 65 GHz 12-Port Mixed-Mode and Balanced/Differential Multiport System



Microwave Mulitport Measurement System

Anritsu's Microwave Multiport Measurement System consist of a 37000D Vector Network Analyzer (VNA), a switching matrix test set, dual-port modules, and calibration and measurement software. The multiport system provides the capability of configuring a 4, 8, or 12 port balanced/differential or mixed-mode measurement utilizing the intuitive PAF, Inc. calibration and measurement software program. The multiport system provides the most accurate measurements up to 65 GHz through the use of high performance couplers and state-of-the-art solid state switches. The critical components reside within external test port modules for high reliability, repeatability and low insertion loss.



Compact Test Port Modules provide high accuracy and measurement stability

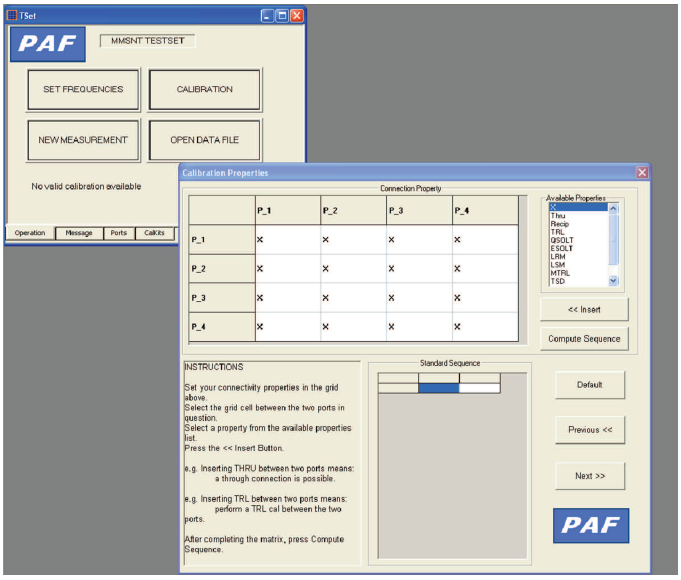
The compact Mobile Port Module is ideal for on-wafer and other probing applications because test ports can now be positioned close to the DUT for optimal performance. Locating the switches and RF routing cables inside the Mobile Port Modules and behind the couplers provide improved raw directivity and best calibration stability. High performance solid state switching is used for high reliability and minimum insertion loss. The system is controlled by flexible, configurable software that is both intelligent and intuitive. The software automatically converts the measurement connection plan into the best multi-port calibration scenario including compensation for external fixtures.

Key Features and Benefits

- 4, 8 or 12 port configuration available depending on the number of SM6272 test port modules used.
- The compact test port modules contain high directivity couplers and can easily be positioned close to the DUTs, in coaxial or on-wafer environments, for minimum loss.
- The SM6271 interface module provides the switch matrix path between the Lightning VNA and the test port modules.
- Switch matrix located behind the couplers for best raw directivity and maximum calibration stability.
- Calibration software dynamically adapts to multiport DUT configuration and produces the best sequence of standards connection.
- System Interface Module contains the switch matrix and interface between the Lightning VNA and the test port modules
- Each Mobile Port Module contains two test ports with Ruggedized V (male) Connectors and internal couplers

Accurate, intelligent software automatically reduces connections and calibration time

The PAF, Inc. MMS-NT Calibration Software adapts to unique test port configurations providing the best accuracy with a minimum of connections. The software has powerful graphic capabilities, 12 port differential parameters, TDR, EyeDiagram, custom macro capabilities, direct link to Excel for fast data processing and can export data as a Touchstone file. Using the MMS-NT software in conjunction with the connection matrix, a 12 port measurement system can be calibrated with as few as 16 connections and in as little as 20 minutes!



The calibration software contains internal algorithms and data structures that automatically computes and manages the error coefficients of the multi-port measurement system. Once the multiport connection plan is defined (Figure 1 and Table 1), the software determines the optimum, most efficient connection scheme for calibration of all defined ports. The software automatically:

- Defines the system ports and connector organization
- Describes the proper set of calibration standards
- Optimizes the sequence of calibration standard connections
- Minimizes the number of required connections
- Computes the error coefficients
- De-embeds the measurement data

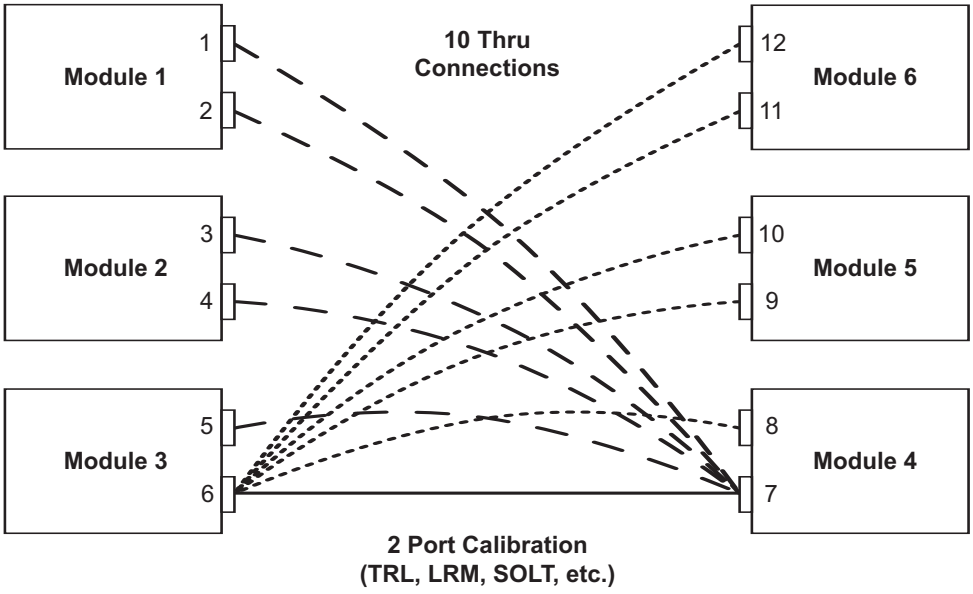


Figure 1. Physical Port Connection Map

Ports	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	-	Thru	-	-	-	-	-
2	-	-	-	-	-	-	Thru	-	-	-	-	-
3	-	-	-	-	-	-	Thru	-	-	-	-	-
4	-	-	-	-	-	-	Thru	-	-	-	-	-
5	-	-	-	-	-	-	Thru	-	-	-	-	-
6	-	-	-	-	-	-	LRM	-	-	-	-	-
7	-	-	-	-	-	LRM	-	-	-	-	-	-
8	-	-	-	-	-	Thru	-	-	-	-	-	-
9	-	-	-	-	-	Thru	-	-	-	-	-	-
10	-	-	-	-	-	Thru	-	-	-	-	-	-
11	-	-	-	-	-	Thru	-	-	-	-	-	-
12	-	-	-	-	-	Thru	-	-	-	-	-	-

Table 1. The Connectivity Matrix

The Physical Port Connectivity Matrix (Table 1) indicates the intended port connection during the calibration process. In this example, ports 1 through 6 are to be connected via the DUT to ports 7 through 12. It is not intended that ports 1 through 6 are connected to each other. Using the connectivity matrix, the connection path between any port 1 through 6 to any port 7 through 12 can be calibrated by simply applying a 12-term calibration between ports 6 and 7 (in this case LRM) and applying through connections between the remaining ports. If a through connection is difficult to achieve, then an SOLR calibration can be used as an alternative between the ports. The multi port calibration algorithm produces the best sequence of the standards connection and determines the logical mapping of the group ports (Figure 2).

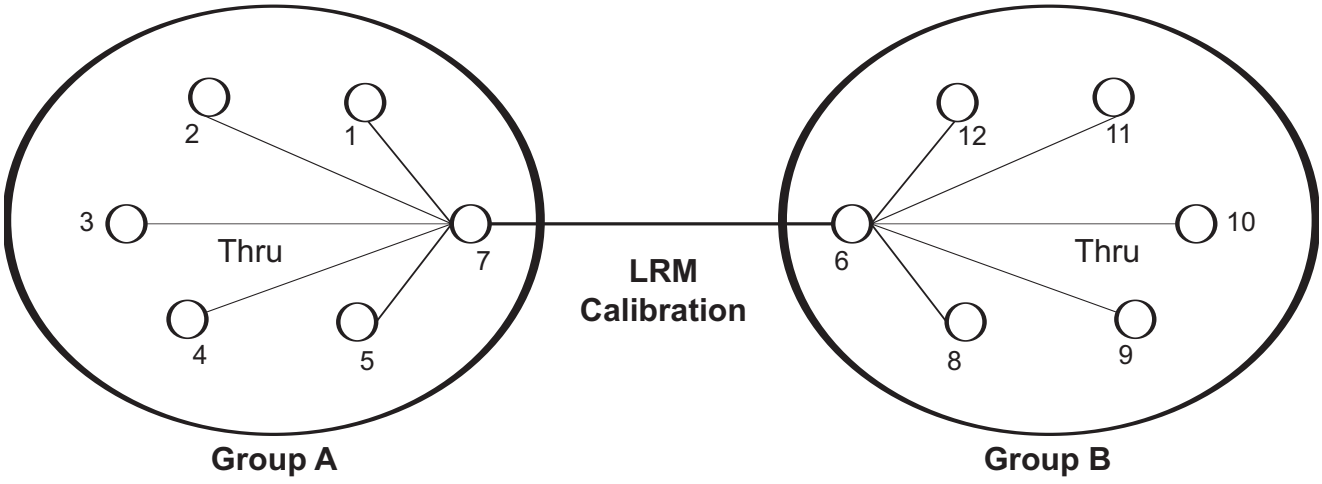


Figure 2. Group mapping of ports during calibrations process

Microwave Multiport Balanced-Differental Block Diagram

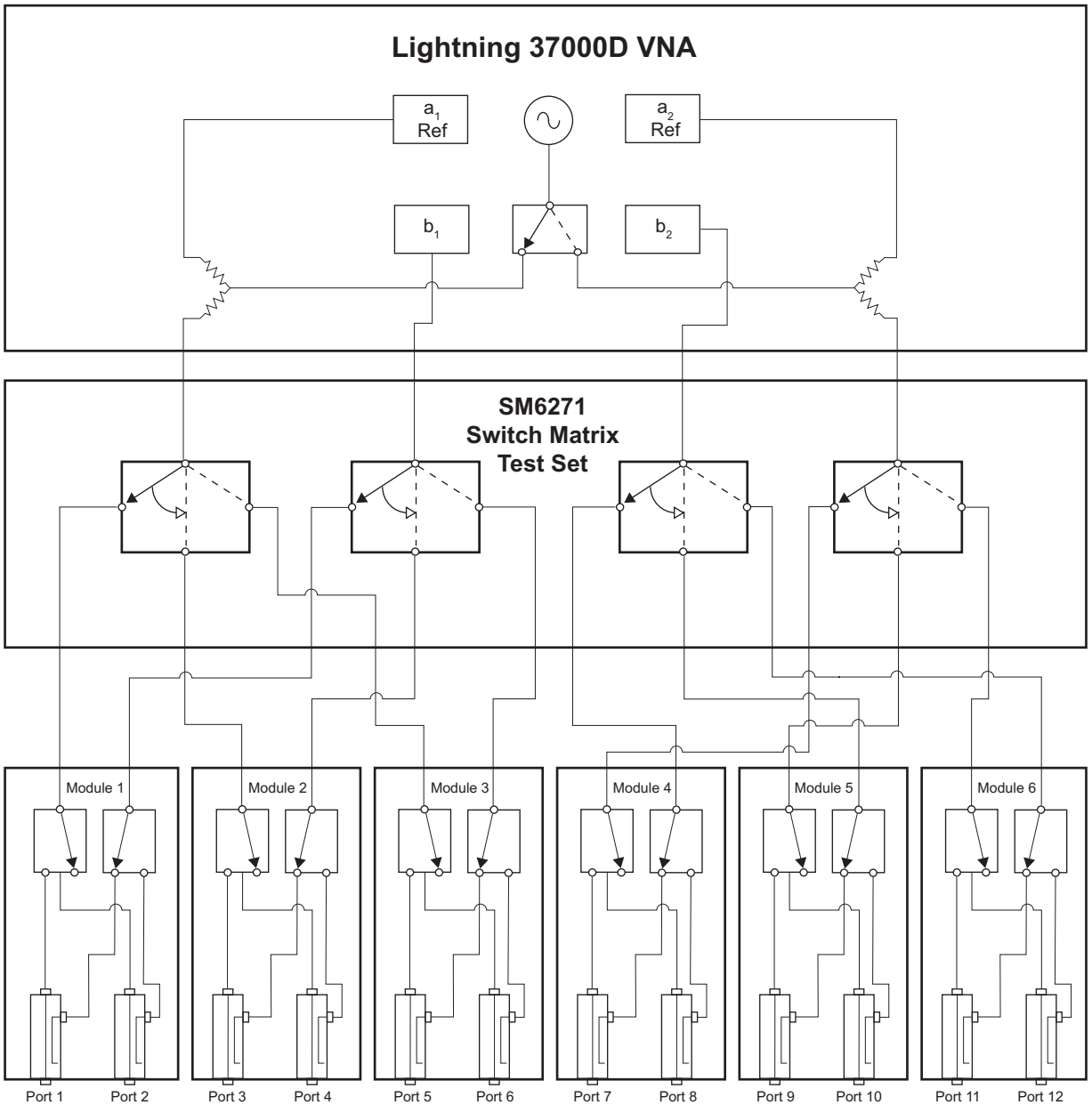


Figure 3. Block diagram of mulit-port switching matrix

Unlike traditional multi-port systems, the unique switching matrix (Figure 3) locates the switches behind the couplers thereby ensuring maximum performance of raw directivity and calibration stability.

Footprint drawing of Mobile Port Module (Figure 4). Each module provides two V Connector test ports and contains the high performance RF switches and couplers for optimum calibration and measurement stability

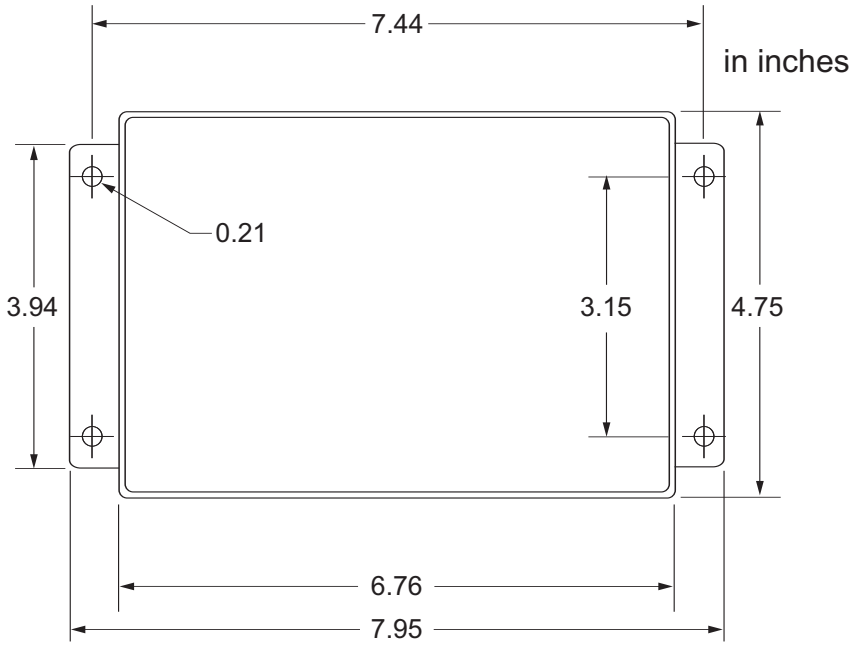


Figure 4. Port Module Footprint

Typical 12-Port System Configurations

37x97D	1 each	Lightning VNA, 0.04-65 GHz, 200 or 300 series
3700/15V	1 each	Lightning VNA front panel direct access loop option
SM6271	1 each	Interface and Switch Matrix Module (includes power cord, GPIB cable, 4 VNA interface cables)
SM6272	6 each	Mobile Port Module, with 2 Ruggidized V Connector test ports (includes control cable)
SC7543	12 each	V(m-m) flexible cable, 36”, for connection to interface module (2 needed per SM6272 port module)
SM6340	1 each	MMS-NT Measurement software from PAF*

* External PC with GPIB module and GPIB cord supplied by customer.
PAF also offers a one week on-site training class, followed by one year of phone support.
This training can only be purchased from PAF at www.pafmicro.com.
MMS-NT can also be purchased directly from PAF.

System Performance

SM6271, Interface Module:

One required per system. 19” unit, 3u height. Includes power cord, GPIB cable to VNA, and 4 each semi-rigid V cables (male-male) to VNA. Controlled by an external PC, via GPIB cable, running PAF’s MMS-NT. The PC and GPIB cables are provided by the customer.

Insertion Loss through cables and interface module: –10 dB max at 65 GHz (–8 dB typical)

SM6272, Port Module:

2 each needed for 4-Port, 4 each for 8-Port, and 6 each for 12-Port solutions. Test Ports are Ruggedized V (male). Test port cables supplied by customer.

Each module includes a control cable. Each module requires 2 each 36” V flexible cables (male-male), SC7543, sold separately, for connection to the SM6271 Interface Module.

Module size: 4.5” height, 5” width, 7” depth.

Insertion Loss through cables and port module, to the test port:

Source Path: –17 dB max at 65 GHz (–15 dB typical)

Test (b) Path: –29 dB max at 65 GHz (–27 dB typical)

Overall System Performance:

The overall system performance is based on the 2-Port VNA and on the calibration. Port Power and Dynamic Range can be calculated from the 2-Port VNA specifications.

For Port Power, reduce the VNA Output Power by the loss through SM6271, plus the loss through the Source Path of SM6272.

For Dynamic Range, reduce the VNA Dynamic Range by twice the loss through SM6271, plus the loss through the Source Path of SM6272, plus the loss through the Test Path of SM6272.

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