Waveguide VNA Calibration Kits

CK10/12 & CK30/32 MODELS

Features

- 2.6 to 50 GHz
- WR284 Through WR22
- SSLT and TRL calibration
- Keysight, Rohde & Schwarz and Anritsu VNAs Supported

Components Included in CK10/12 Kits

Qty	Description	Model
1**	Fixed flush (reference plane) short	344 series
1	1/8-λ fixed offset short	340 series
1	3/8-λ fixed offset short	340 series
1	Precision fixed termination	301 series
1**	Straight section (rectangular)	102/3/6 series
1*	3/32-in. hex ball driver *	J998T2
1	Flange hardware (including the indexing pin set)	—
1	Instrument case	—

Components Included in CK30/32 Kits

Qty	Description	Model
1	Fixed flush (reference plane) short	344 series
1	1/4-λ straight section (shim)	322 series
1	Precision fixed termination	301 series
1**	Straight section (rectangular)	102/3/6 series
1*	3/32-in. hex ball driver *	J998T2
1	Flange hardware (including the indexing pin set)	—
1	Instrument case	—

** Included in the K, Q, U and J band kits only.*

*** Included in CK12/32 kits.*

DATA SHEET
3H-081

The Importance of VNA Calibration

Any uncalibrated test setup has systematic errors inherent in the equipment used. The ability to obtain an accurate measurement of a device under test. The basis of network analyzer error correction is the measurement of known electrical standards, such as a thru, open circuit, short circuit, and precision load impedance. By calibrating your network analyzer with these standards, you can compensate for the inherent imperfections.

Description

CK10/12 - The CK10/12 SSLT Waveguide Calibration Kits are designed to provide accurate calibration of vector network analyzers (VNAs) that are used for measurements in standard rectangular waveguide from 2.6 to 50 GHz (WR284–WR22). Each kit includes all the components needed for accurate calibration of most VNAs to ensure high effective directivity after calibration.

CK30/32 - Maury CK30/32 calibration kits are designed to provide accurate Thru-Reflect-Line (TRL), Short-Short-Load-Thru (SSLT) and Offset Load calibrations of vector network analyzers (VNAs) for measurements in rectangular waveguide from 2.6 to 50 GHz (WR284 to WR22). Each kit includes all the components needed for accurate TRL, SSLT or Offset Load calibration of supported VNA models.

**Precision straight sections and a fixed (reference plane) short are also provide as verification standards in the CK12 or CK32 options.*

Flange Description

The components in these kits are equipped with Maury Precision Flanges (MPF) which conform to EIA WR standards for rectangular or round waveguide flanges. MPF flanges have precision indexing holes and corresponding indexing pins for precise alignment when mating, which ensures excellent measurement repeatability. Flange diagrams and other details can be found at http://www.maurymw.com. (Use the search feature with search term “MPF”.)

Calibration Methods

CK10/12 - These kits are configured for use in performing one-port SSL (Short-Short-Load) calibrations for measuring VSWR/Return Loss, or full two-port SSLT (Short-Short-Load-Thru) calibrations to perform forward and reverse transmission and reflection measurements.

CK30/32 - These kits are configured for use in performing full two-port TRL (Thru-Reflect-Line) and SSLT (Short-Short-Load-Thru) calibrations; two standard methods for measuring forward and reverse transmission and reflection measurements). They can also be used to perform Offset Load calibrations on VNAs that support that calibration method.

Component Specifications

CK10/12 SSLT & CK30/32 TRL Kits

Fixed Flush Shorts – Model Series 344

These machined fixed shorts are flat-face/flat-plane shorts designed to terminate round or rectangular waveguide connectors at the mating plane, over a frequency range from 2.6 to 50 GHz. They are used to establish a reference plane in systems and in making loss measurements.

1/8λ & 3/8λ Fixed Offset Shorts – Model Series 340

These fixed offset shorts are considered one of the more accurate means of obtaining a 180° phase difference in waveguide. Using these single-piece devices reduces the number of flange interfaces during calibration; helping to maintain an essentially constant magnitude of current flow across the calibration plane. Those in rectangular waveguide are nominally 1/8λ and 3/8λ offset at frequencies near the waveguide band centers. These frequencies are chosen to equalize phase differences at band edges, and thus are not at the exact band centers.

Offset delay ranges from 50.835 – 4.007 ps for the 1/8λ shorts and 152.506 – 12.002 for the 3/8λ shorts; calculated without consideration for the dispersive effect of waveguide if the short is in air dielectric coaxial line. This conforms to the convention established for Agilent network analyzers. Anritsu analyzers use the actual mechanical offset in centimeters.

1/4λ Precision Straight Sections – Model Series 322B

These 322B series 1/4λ straight sections are reduced height spacers or shims which provide an accurately known VSWR which is directly calculable from their mechanical dimensions. The shims are designed for a theoretical VSWR of 1.00. The shims are fabricated from aluminum and are provided with precision indexing holes for excellent flange alignment. Their simple geometry allows direct calculation of reflection, loss, transfer and group delay characteristics and makes them ideally suited for quickly checking the performance and accuracy of automated network analyzers.

Precision Fixed Terminations – Model Series 301

These low power fixed terminations feature low VSWR (1.025 – 1.040 max up to 50.0 GHz; typically <1.02 from 3.95 to 18.0 GHz). Power handling is rated from 25W (avg)/10kW (peak) to 0.2W (avg)/0.03kW (peak) depending on frequency range.

Verification Stds – Precision Straight Sections

These precision straight sections exhibit low VSWR (1.025 max) across the frequency range of operation. These precision stds can be used along with the fixed flush shorts as verification stds to validate accuracy of calibration.

Available Models

Waveguide Designation (EIA WR NO.)	FREQUENCY RANGE (GHz)	MMC WAVEGUIDE BAND	SSLT CALIBRATION KIT	SSLT CALIBRATION KIT w\ VERIFICATION STD.	TRL CALIBRATION KIT	TRL CALIBRATION KIT w\ VERIFICATION STD.	FLANGE DESIGN
WR284	2.60 - 3.95	S	WR284CK10	WR284CK12	WR284CK30	WR284CK32	MPF284C
WR229	3.30 - 4.90	E	WR229CK10	WR229CK12	WR229CK30	WR229CK32	MPF229B
WR187	3.95 - 5.85	G	WR187CK10	WR187CK12	WR187CK30	WR187CK32	MPF187C
WR159	4.90 - 7.05	F	WR159CK10	WR159CK12	WR159CK30	WR159CK32	MPF159B
WR137	5.85 - 8.20	C	WR137CK10	WR137CK12	WR137CK30	WR137CK32	MPF137C
WR112	7.05 - 10.0	H	WR112CK10	WR112CK12	WR112CK30	WR112CK32	MPF112B
WR90	8.20 - 12.4	X	WR90CK10	WR90CK12	WR90CK30	WR90CK32	MPF90C
WR75	10.0 - 15.0	M	WR75CK10	WR75CK12	WR75CK30	WR75CK32	MPF75B
WR62	12.4 - 18.0	P	WR62CK10	WR62CK12	WR62CK30	WR62CK32	MPF62
WR51	15.0 - 22.0	N	WR51CK10	WR51CK12	WR51CK30	WR51CK32	MPF51B
WR42	18.0 - 26.5	K	WR42CK10	WR42CK12	WR42CK30	WR42CK32	MPF42
WR34	22.0 - 33.0	Q	—	—	WR34CK30	WR34CK32	MPF34
WR28	26.5 - 40.0	U	WR28CK10	WR28CK12	WR28CK30	WR28CK32	MPF28
WR22	33.0 - 50.0	J	WR22CK10	WR22CK12	WR22CK30	WR22CK32	MPF22