

Precision RF & Microwave Components



The Industry Leader for High Frequency Components

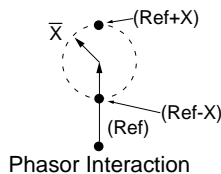
2002/2003 Edition

RF MEASUREMENT CHART

SWR	Reflection Coefficient	Return Loss (dB)	Relative to Unity Reference			
			X dB Below Reference	Ref +X (dB)	Ref -X (dB)	Ref ±X (dB)
17.3910	0.8913	1	1	5.5350	19.2715	24.8065
8.7242	0.7943	2	2	5.0780	13.7365	18.8145
5.8480	0.7079	3	3	4.6495	10.6907	15.3402
4.4194	0.6310	4	4	4.2489	8.6585	12.9073
3.5698	0.5623	5	5	3.8755	7.1773	11.0528
3.0095	0.5012	6	6	3.5287	6.0412	9.5699
2.6146	0.4467	7	7	3.2075	5.1405	8.3480
2.3229	0.3981	8	8	2.9108	4.4096	7.3204
2.0999	0.3548	9	9	2.6376	3.8063	6.4439
1.9250	0.3162	10	10	2.3866	3.3018	5.6884
1.7849	0.2818	11	11	2.1567	2.8756	5.0322
1.6709	0.2512	12	12	1.9465	2.5126	4.4590
1.5769	0.2239	13	13	1.7547	2.2013	3.9561
1.4985	0.1995	14	14	1.5802	1.9331	3.5133
1.4326	0.1778	15	15	1.4216	1.7007	3.1224
1.3767	0.1585	16	16	1.2778	1.4988	2.7766
1.3290	0.1413	17	17	1.1476	1.3227	2.4703
1.2880	0.1259	18	18	1.0299	1.1687	2.1986
1.2528	0.1122	19	19	0.9237	1.0337	1.9574
1.2222	0.1000	20	20	0.8279	0.9151	1.7430
1.1957	0.0891	21	21	0.7416	0.8108	1.5524
1.1726	0.0794	22	22	0.6639	0.7189	1.3828
1.1524	0.0708	23	23	0.5941	0.6378	1.2319
1.1347	0.0631	24	24	0.5314	0.5661	1.0975
1.1192	0.0562	25	25	0.4752	0.5027	0.9779
1.1055	0.0501	26	26	0.4248	0.4466	0.8714
1.0935	0.0447	27	27	0.3798	0.3969	0.7765
1.0829	0.0398	28	28	0.3391	0.3529	0.6919
1.0736	0.0355	29	29	0.3028	0.3138	0.6166
1.0653	0.0316	30	30	0.2704	0.2791	0.5495
1.0580	0.0282	31	31	0.2414	0.2483	0.4897
1.0515	0.0251	32	32	0.2155	0.2210	0.4365
1.0458	0.0224	33	33	0.1923	0.1967	0.3890
1.0407	0.0200	34	34	0.1716	0.1751	0.3467
1.0362	0.0178	35	35	0.1531	0.1558	0.3090
1.0322	0.0158	36	36	0.1366	0.1388	0.2753
1.0287	0.0141	37	37	0.1218	0.1236	0.2454
1.0255	0.0126	38	38	0.1087	0.1100	0.2187
1.0227	0.0112	39	39	0.0969	0.0980	0.1949
1.0202	0.0100	40	40	0.0864	0.0873	0.1737
1.0180	0.0089	41	41	0.0771	0.0778	0.1548
1.0160	0.0079	42	42	0.0687	0.0693	0.1380
1.0143	0.0071	43	43	0.0613	0.0617	0.1230
1.0127	0.0063	44	44	0.0546	0.0550	0.1096
1.0113	0.0056	45	45	0.0487	0.0490	0.0977
1.0101	0.0050	46	46	0.0434	0.0436	0.0871
1.0090	0.0045	47	47	0.0387	0.0389	0.0776
1.0080	0.0040	48	48	0.0345	0.0346	0.0692
1.0071	0.0035	49	49	0.0308	0.0309	0.0616
1.0063	0.0032	50	50	0.0274	0.0275	0.0549
1.0057	0.0028	51	51	0.0244	0.0245	0.0490
1.0050	0.0025	52	52	0.0218	0.0218	0.0436
1.0045	0.0022	53	53	0.0194	0.0195	0.0389
1.0040	0.0020	54	54	0.0173	0.0173	0.0347
1.0036	0.0018	55	55	0.0154	0.0155	0.0309
1.0032	0.0016	56	56	0.0138	0.0138	0.0275
1.0028	0.0014	57	57	0.0123	0.0123	0.0245
1.0025	0.0013	58	58	0.0109	0.0109	0.0219
1.0022	0.0011	59	59	0.0097	0.0098	0.0195
1.0020	0.0010	60	60	0.0087	0.0087	0.0174

- The first three columns are conversion tables for return loss, reflection coefficient, and SWR.
- The last four columns are values for interactions of a small phasor X with a large phasor (unity reference) expressed in dB related to reference.

The RF Measurement Chart can be used to determine the uncertainty due to bridge/autotester VNA directivity. The "X dB Below Reference" column represents the difference between the directivity and the measured reflection (return loss). The "ref + X dB" and "ref - X dB" values are the algebraic sum of the error signal and the measured reflected signal as their phase relationship varies over 360°. Therefore, the peak-to-peak ripple (1 ± X) is the total measurement uncertainty caused by the error signal.



For example, if a 30 dB return loss is measured with a 40 dB directivity autotester, the X dB Below Reference value is 10 dB. Ref + X dB is 2.3866 dB and ref - X dB is 3.3018 dB. The actual return loss is between 27.6134 dB (-30 + 2.3866) and 33.3018 dB (-30 - 3.3018). The peak to peak ripple on a swept measurement will be 5.6884 dB. If the error and directivity signals are equal, ref + X dB equals 6 dB (voltage doubled causes 6 dB change) and ref - X dB becomes infinite, since the two signals are equal in amplitude and 180° out of phase (zero voltage).

ANSI Standard

X mm	5 mm
X.X mm	0.5 mm
X.XX mm	0.15 mm
X.XXX mm	±0.05 mm

Above ANSI Standard tolerance applies to all components unless otherwise noted.

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OUTLINE OF PRECISION MEASUREMENT COMPONENTS



Precision Components-Precision Measurements

Anritsu is a leader in the design and production of precision microwave components.

- *Precision Coaxial Connector Systems to 65 GHz*
- *Precision Coaxial and Waveguide to Coax Adapters*
- *High Directivity SWR Autotesters and Bridges*
- *RF Detectors*
- *Precision Terminations and Air lines*
- *Precision Fixed Attenuators*
- *Precision Step Attenuators*
- *Precision Power Dividers and Splitters*
- *Precision Bias Tees*
- *Broadband Microwave Limiters*

Connector Design Leadership

Anritsu is the leader of high frequency microwave connector technology and is driven by an ongoing commitment to exceed customer needs. Anritsu created and trademarked the K Connector® with coverage to 40 GHz, along with a complete family of 40 GHz test equipment. It was an immediate success and today is used on many commercial components, test fixtures, and military systems.

The V Connector® offers coaxial coverage to 65 GHz and uses a 1.85 mm geometry endorsed by the International Electrotechnical Commission (IEC). It mates with commercially available 2.4 mm connectors.

Anritsu continues its leadership role with the introduction of the Integrated V Connector, which combines compatibility with V Connectors with easy installation and consistent excellent performance.

The VP™ Connector delivers push-on simplicity with excellent performance to 65 GHz.

Coaxial and Waveguide to Coax Adapters

A series of precision measurement adapters are available to adapt one connector type to another. Poor adapter VSWR (or poor return loss) can be a major source of measurement error and, therefore adapters,

must be carefully selected. Anritsu precision adapters typically have 6-12 dB better return loss than competitive units. Waveguide-to-Coax Adapters are available to 65 GHz.

Precision Terminations and Air Lines

Anritsu is recognized as the leader in the field of impedance standards. Anritsu air lines and terminations are unsurpassed for accuracy and impedance match. Not only do these products increase measurement accuracy, they also provide the only method of certifying the performance of SWR Autotesters, bridges, directional couplers, and other devices.

Precision Fixed Attenuators

Anritsu attenuators offer superior performance in a low cost package. The low VSWR (excellent return loss) minimizes signal reflections and simultaneously reduces ripple effects in the output frequency response. This assures flat, consistent attenuation characteristics regardless of other devices reflection characteristics. One of the simplest ways to improve impedance match is to insert a precision attenuator between the device under test and the source or RF detector. The 41K and 41V Series attenuators are specifically designed for such applications where accuracy is a basic requirement.

In addition to being available as individual units of 3, 6, 10, or 20 dB, the 41K and 41V Series Fixed Attenuators are also available in sets with certified calibration data. Available frequency ranges cover DC to 26.5 GHz, 40 GHz, or 60 GHz.

Many other attenuator applications have as their principal objective the reduction of power. Since the attenuator might not be inserted at a measurement point, the measurement precision discussed earlier is not required. In such a power-reducing system application, attenuators are often required in large quantities, making price an important consideration. The 43K Series includes models covering DC to 26.5 GHz, and DC to 40 GHz. All are available with 3, 6, 10, or 20 dB attenuation values. All have the Anritsu K Connectors and are compatible with SMA connectors.

Whatever your fixed attenuator needs might be, Anritsu provides the solution.



Precision Step Attenuators

Anritsu offers low loss, high precision step attenuators. These programmable step attenuators are available with 10 dB steps from 0 to 70 dB or 0 to 110 dB ranges. DC to 40 GHz frequency range ensures the broadest attenuation and frequency coverage available. Contact Anritsu for needs above 40 GHz.

Precision Power Dividers and Splitters

Anritsu produces precision V Connector® dividers and splitters to 60 GHz and precision K Connector® dividers and splitters to 40 GHz.

All Anritsu power dividers are 3-resistor symmetrical designs with excellent amplitude and phase tracking. Anritsu power splitters are 2-resistor designs, used to accurately split signals for ratio measurements.

Precision Bias Tees

Anritsu Bias Tees are used to combine DC and RF for active device measurements. Low RF throughline loss and low SWR ensure negligible effect on measurements from 50 kHz to 60 GHz.

Broadband Microwave Limiters

Anritsu broadband microwave limiters provide the widest frequency range available in a limiter. Designed to protect sensitive microwave equipment, these limiters incorporate unique single-side limiting to provide soft limiting characteristics over 10 MHz to 26.5 GHz.

High Directivity SWR Autotesters and Bridges

SWR Autotesters and SWR Bridges are directional measurement devices that separate the incident and the reflected signals of a device under test. The reflected component can then be compared to the incident signal to determine the difference between the device's impedance and its characteristic impedance.

An SWR bridge has a precision termination inside the bridge, eliminating the need for an external reference. An autotester further simplifies the user interface by incorporating a detector into the RF output that provides a DC output proportional to the DUT mismatch.



The directivity of the SWR Autotester or bridge is the measure of how well the incident and reflected signals can be separated. For example, 40 dB directivity means that the error signal in the output is 40 dB below the reflected signal to be measured.

Anritsu's high directivity bridges and autotesters set the standards for reflection measurements. High directivity translates to accurate measurements. Anritsu high directivity bridges are available for GPC-7, 50 Ω and 75 Ω Type N. High directivity autotesters are available with GPC-7, Type N, and SMA, 3.5, K Connectors®, and V Connectors®.

RF Detectors

Just as directivity is the principal error contributor in reflection measurements, the impedance match of the signal source and RF detector is a significant error contributor in transmission measurements.

Anritsu offers a complete line of coaxial RF detectors covering from 100 kHz to 50 GHz with the lowest SWR available. The excellent impedance match of the detectors, along with that of the test port on the SWR Autotesters and bridges, minimize errors when making simultaneous transmission and measurements.

Calibration and Verification Kits

Anritsu offers calibration kits which contain all the precision components and tools required to calibrate an Anritsu VNA in a connector style of your choice.

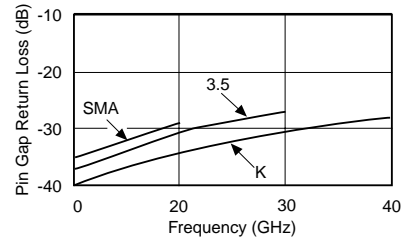
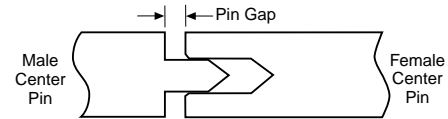
Specials

Anritsu also manufactures assemblies and components to meet specific customer requirements in both coaxial and waveguide structures. These include such components as Connectors, Bias Tee, Step Attenuator, Detector, Power Sensors, Waveguide, Coaxial Adapters, and RF Cables etc.

When requesting quotations on special assemblies, as a minimum please provide this information: frequency range, electrical characteristics, mechanical details and outline dimensions if any.

K CONNECTOR®

DC to 40 GHz



Effect of Pin Gap

The K Connector® is a precision coaxial connector system that operates up to 40 GHz. It is compatible with SMA, WSMA, and 3.5 mm connectors. It is well suited to applications in components, systems, or instrumentation.

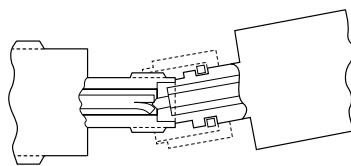
K Connector® features

- Excellent performance up to 40 GHz
- Performance exceeding SMA below 18 GHz
- Superior reliability
- Compatibility with SMA, WSMA, and 3.5 mm
- Complete testability on existing network analyzers

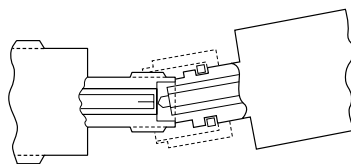
Exceptional reliability and repeatability

Microwave connector reliability is affected by insertion force, outer conductor strength, stress relief while mating, and mating alignment. The K Connector exhibits exceptional performance in all of these areas.

For proper seating, a standard SMA or 3.5 mm connector can require in excess of 27N* of insertion force. In contrast, the K Connector requires only 2.3N*. The reduced wear on the female center conductor improves reliability. In addition, the K Connectors outer conductor is four times thicker than that of SMA. Taken together, the lower insertion force and the thicker wall offer more reliable connections than available from an SMA connector. Life tests show that the K Connector makes greater than 10,000 connections with negligible change in electrical characteristics.



SMA/APC-3.5



K Connector

Shortened Male Pin Eliminates Damage to Female K Connector

All K Connectors, including the cable connectors, incorporate a feature that eliminates a major cause of connector failure; misalignment of the male pin with respect to the female contacts. To solve the problems the K Connector male pin is deliberately made shorter than the SMA or 3.5 mm pin. With this arrangement, the outer housing is properly aligned prior to the mating of the center conductors. Thus a proper, non-destructive alignment before mating is ensured.

The effect of pin gap on a connection is often overlooked, but is the dominant source of error in many connection systems. Pin gap is the short length of smaller diameter caused when a connector pair is mated. Pin gap causes a discontinuity at the connector interface. The K Connector has considerably less susceptibility to pin gap than either SMA or 3.5 mm connectors.

Many connector manufacturers specify connector performance assuming no pin gap, an unrealistic assumption. K Connectors are specified assuming pin gap to be at its maximum tolerance, to provide you the assurance of real-world specifications.

Compatibility

The K Connector interfaces electrically and mechanically with 3.5 mm connectors, including SMA and 3.5 mm without degradation in performance.

Launcher design

At the heart of the K Connector product line are the launchers. As their name implies, the launchers “launch” (make the transition) from a microwave circuit (microstrip, suspended substrate, stripline, or coplanar waveguide) to a coaxial connector and an outside transmission line. The key to making the transition without compromising electrical and mechanical objectives is the glass bead in the launcher assembly.

*Force is measured in Newtons (N).

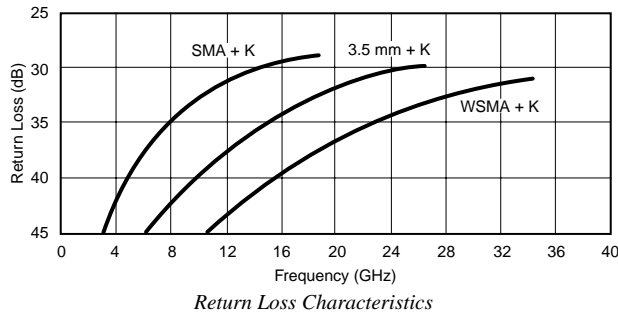
K CONNECTOR®

DC to 40 GHz

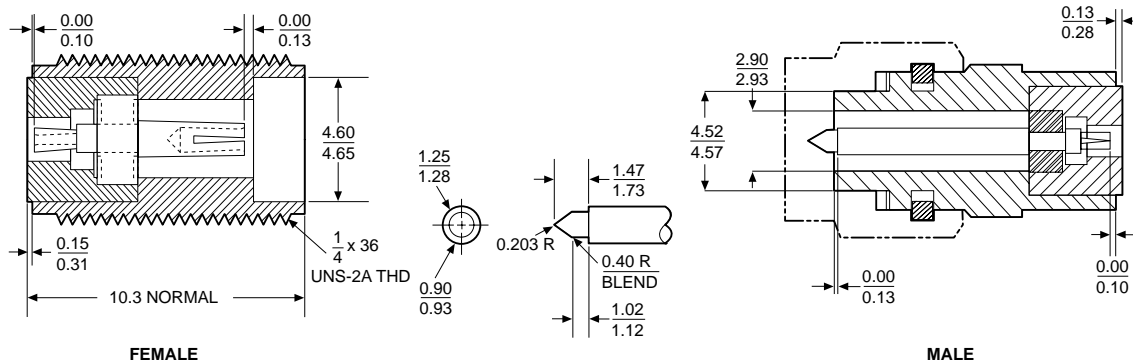
Low-reflection bead

The K Connector®'s standard glass bead has a 0.30 mm center conductor and readily connects to fragile devices. The bead is appropriate for most applications employing Duroid® and ceramic (Alumina) microstrip, such as the 0.25 mm wide transmission line on a 0.25 mm thick Alumina substrate. Applications using suspended substrate geometry are equally well satisfied. The bead is constructed of Corning 7070 glass and has a gold-plated center conductor and a gold-plated Kovar® collar.

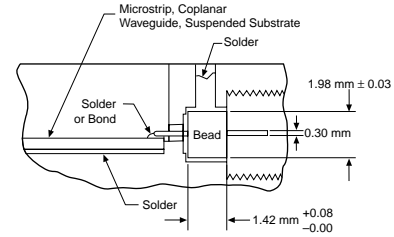
The outstanding design of the bead is largely accountable for the excellent performance of the K Connector launchers. Because the small 0.30 mm pin introduces minimal discontinuity, return loss is typically better than 20 dB at 40 GHz and better than 25 dB below 18 GHz. In addition, the design provides for soldering the bead to achieve a hermetic seal. 310°C max. soldering temperature is recommended.



Both the sparkplug (screw-in) and the flange-mount K Connector launchers offer an additional advantage over existing designs. These launchers do not use an epoxy pin to secure the center conductor, as used in some SMA designs. Without an epoxy pin, the outer conductor remains solid, and thereby eliminates the leakage path common to pin-captivated designs. Furthermore, K launchers have a wall thickness that is four times that of typical launchers (0.8 vs. 0.2 mm). The heavier wall results in superior resistance to over-torquing. Finally, the K Connector launcher can be removed for repair without removal of the glass bead. This ensures that during removal the critical microcircuit-to-glass bead interface is not disturbed, hermeticity is preserved, and the micro-circuit will not be subjected to the additional stress caused by heating to soldering temperature. Hardware locking compound such as "Removable Loctite®" should be used to further secure the screw-in launcher in its housing.



K Connector® interface dimensions in metric measurements



Transition from Microcircuit to External Transmission Line

Complete family

Virtually every interface need can be satisfied by one or more of the K Connector items offered. There are six different models of K Connector launchers. Two sparkplug (screw-in) launchers are available, the K102F female version and the K102M male version. Both screw into the housing that encloses the microwave circuit, and, like all Anritsu launchers, they can be easily removed for replacement or repair without unsoldering the glass bead and its interface to the microwave circuit.

When the housing that encloses the microwave circuit is not thick enough to support a threaded, screw-in launcher, flush-mounted (flange) launchers are required. Models with two mounting holes are available in both male and female versions, K103M and K103F. Two other models, the K104F and K104M, have four mounting holes. Mounting hole spacing is identical to that of similar SMA flange launchers. The glass bead interface, of course, is the same design used for the sparkplug launcher.

Cable connectors

Both male and female cable connectors are available. The cable connectors, K101M and K101F, use gold-plated, beryllium-copper center conductors for optimum performance and wear characteristics. Typical return loss at 40 GHz for finished cables exceeds 16 dB (1.35 SWR).

K CONNECTOR®

DC to 40 GHz



Evaluation kit

**01-101A
Evaluation Kit**
Kit contains one K120 25 cm Male/Male Cable Assembly, two K102F Female Sparkplug Launcher Connector Assemblies, two K104F Female Flange Launcher Connector Assemblies, five K100 Glass Beads, one 01-102A Test Fixture, one 01-104 Drill and Tap Set, five K110-1 Microstrip Sliding Contacts, and all other parts and fixtures required to assemble launchers with or without sliding contacts.

Tools and fixtures



01-103
Soldering Fixture for sparkplug launcher glass beads, package of 10



01-104
Drill and Tap Set
for precision machining of concentric holes for mounting K Connector® in microwave housing. (Drill Part No. B14094) (Tap Part No. 783-255)



01-105A
Male and Female Sparkplug Torquing Kit



01-106
K Soldering Fixture for flange launcher glass bead, package of 5.



01-107M or 01-107F
Cable Sleeve Soldering Fixture for K101M Male and K101F Female Cable Connectors, package of 10.



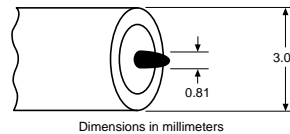
01-108
Drill and Tap Set
For precision machining of concentric holes for mounting K Connector® in microwave housing in applications where stress relief contacts are used. (Drill Part No. B16526) (Tap Part No. 783-255)

Semi-rigid coaxial cable

Type	Semi-rigid coaxial, tin-plated copper outer conductor, silver-plated copper center conductor.
Impedance	50 ± 2 Ohms
Dielectric type	Microporous Teflon, 0.24 cm diameter
Dielectric constant	1.687
Relative velocity	0.77
Outside diameter	3.00 mm
Center conductor diameter	0.81 mm
Minimum bend radius	0.65 cm
Attenuation	1.6 dB/m at 10 GHz 2.3 dB/m at 20 GHz 3.3 dB/m at 30 GHz 4.7 dB/m at 40 GHz



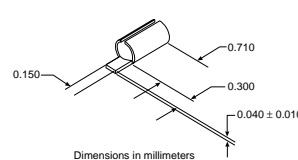
K118
Semi-rigid Coaxial Cable
1.5m length of 3.00 mm semi-rigid cable for K101 series connector



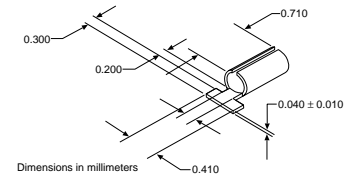
Stress relief contacts

Stress Relief Contacts provide an elegant yet simple solution to relieving stress at the interface of the microcircuit and its connecting coaxial conductor. These contacts simply slide onto the standard K100 and K100B glass bead pins.

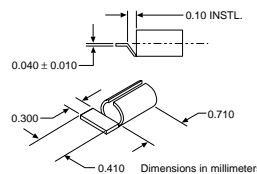
Frequency range	DC to 40 GHz
Material	0.025 mm heat-treated BeCu
Plating	Bondable gold over nickel



K110-1^① Microstrip and Coplanar Waveguide



K110-3^③ Microstrip



K110-2^① Stripline



01-118
K Connector® Cable Assembling Fixture Kit for K118 semi-rigid coaxial cable.

① Use with 01-108 Drill and Tap Set

K CONNECTOR®

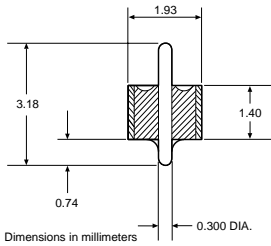
DC to 40 GHz

Launchers and cable connectors

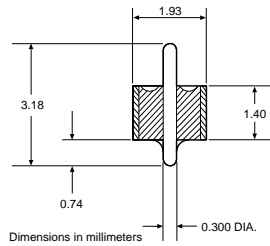
Return loss (launchers only)	15 dB up to 40 GHz
Coupling nut tightening torque	1.36 N-m max
Material	Passivated stainless steel with heat-treated beryllium copper center conductors
Pin depth	0.000 to -0.13 mm for male and female connectors
Temperature range	-55°C to +125°C (200°C available: contact factory)



K100^{①②}
Glass Beads for
K102, K103, and
K104 connectors

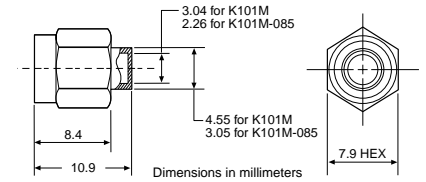


K100B^{①②}
High Hermeticity* Glass
Beads for K102, K103,
and K104 connectors

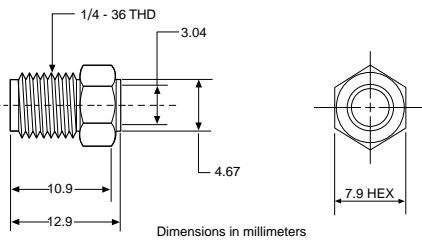


K101M^③
K Male In-Line Cable
Connector, DC-40 GHz
for 0.118 cable

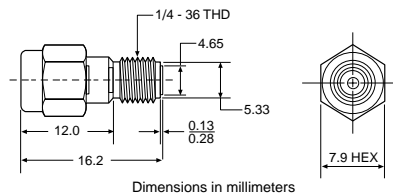
K101M-085^③
for 0.085 cable



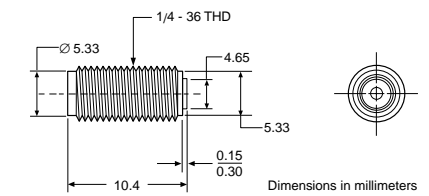
K101F^③
K Female In-Line Cable
Connector, DC-40 GHz for
0.118 cable



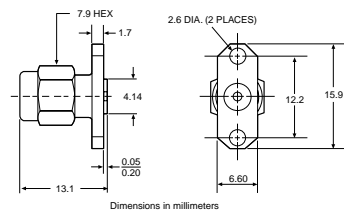
K102M^③
K Male Sparkplug
Launcher Connector,
DC-40 GHz



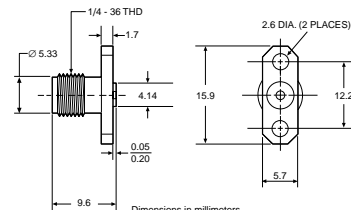
K102F^③
K Female Sparkplug
Launcher Connector,
DC-40 GHz



K103M
K Male Flange Launcher,
two-hole, DC-40 GHz



K103F
K Female Flange
Launcher, two-hole,
DC-40 GHz



- ① Use with 01-104 or 01-108 Drill and Tap Sets
- ② Use with 01-103 or 01-106 Soldering Fixtures
- ③ Use with 01-105A Male and Female Sparkplug Torquing Kit
- ④ Use with 01-107M Cable Sleeve Fixture
- ⑤ Use with 01-107F Cable Sleeve Fixture

*Glass Bead Hermeticity Spec: Hermetic to 1 x 10⁻⁸ std cc He/sec at 1 atm differential

K CONNECTOR®

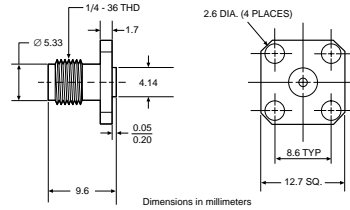
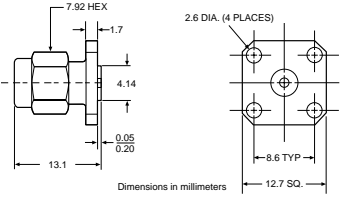
DC to 40 GHz



K104M
K Male Flange Launcher,
four-hole, DC-40 GHz



K104F
K Female Flange Launcher,
four-hole, DC-40 GHz



K202F
Combination of
K102F, K100,
K110-1



K202FB
Combination of
K102F, K100B,
K110-1

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
01-101A	K Connector® (evaluation kit)
01-103	Soldering fixture for sparkplug launcher glass bead
01-104	Drill and tap set
01-105A	Male and female sparkplug torquing kit
01-106	Soldering fixture for flange launcher glass bead
01-107F	Cable sleeve soldering fixture, female connector
01-107M	Cable sleeve soldering fixture, male connector
01-108	Drill and tap set
01-118	Cable assembling fixture for K118 semi-rigid coax cable
K110-1	Microstrip stress relief contact
K110-2	Stripline stress relief contact
K110-3	Microstrip stress relief contact
K100	Glass bead for K102/103/104 connector
K100B	Hermetic glass bead for K102/103/104 connector
K101M	K(m) in-line cable connector, DC to 40 GHz for K118 cable
K101M-085	K(m) in-line cable connector, DC to 40 GHz for V085 cable
K101F	K(f) in-line cable connector, DC to 40 GHz
K102M	K(m) sparkplug launcher connector, DC to 40 GHz
K102F	K(f) sparkplug launcher connector, DC to 40 GHz
K103M	K(m) flange launcher connector, DC to 40 GHz, 2 mounting holes
K103F	K(f) flange launcher connector, DC to 40 GHz, 2 mounting holes
K104M	K(m) flange launcher connector, DC to 40 GHz, 4 mounting holes
K104F	K(f) flange launcher connector, DC to 40 GHz, 4 mounting holes
K118	Coaxial cable, 1.5m of 3.00 mm semi-rigid cable for K101 series connector
K202F	Combination of K100, K102F, and K110-1
K202FB	Combination of K100B, K102F, and K110-1

V CONNECTOR®

DC to 65 GHz



The V Connector® is a reliable 1.85 mm device that operates up to 65 GHz. It is compatible with 2.4 mm connectors and is assembled using procedures that are similar to those used on K Connectors. It is well suited to applications in components, systems, or instrumentation.

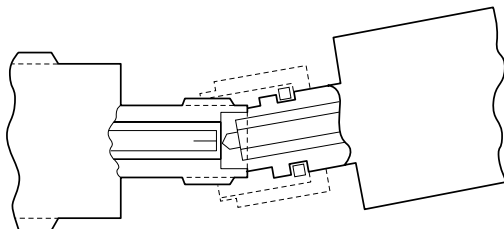
V Connector® features

- Excellent performance up to 65 GHz
- Low VSWR
- Superior reliability
- Low Loss

Exceptional reliability and repeatability

Microwave connector reliability is affected by insertion force, outer conductor strength, stress relief while mating, and mating alignment. The V Connector exhibits exceptional performance in all of these areas.

For proper seating, the V Connector requires only 1/2 the insertion force of a 2.4 mm connector. The reduced wear on the center conductor equates to greater reliability. All V Connectors, including the cable connectors, incorporate another feature that eliminates a major cause of connector failure; misalignment of the male pin with respect to the female. To solve the problem, the V Connector male pin is deliberately made sufficiently short to prevent damage to the female connector by misalignment. With this arrangement, the outer housing must be properly aligned prior to the mating of the center conductors. Thus a proper, non-destructive alignment before mating is ensured.

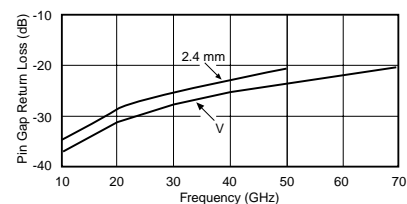
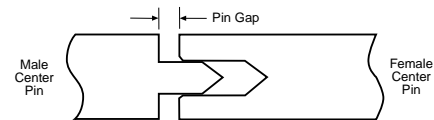


V Connector

Shortened Male Pin Eliminates Damage to Female V Connector

The effect of pin gap on a connection is often overlooked, but is the dominant source of error in many connection systems. Pin gap is the short length of smaller diameter created when a connector pair is mated. Pin gap causes a discontinuity at the connector interface. The V Connector has considerably less susceptibility to pin gap than 2.4 mm connectors.

Many connector manufacturers specify connector performance assuming no pin gap, an unrealistic assumption. V Connectors are specified assuming pin gap to be at its maximum tolerance, to provide you the assurance of real-world specifications.



Effect of Pin Gap

Launcher design

At the heart of the V Connector product line are the launchers. As their name implies, the launchers “launch” (make the transition) from a microwave circuit (microstrip, suspended substrate, stripline, or coplanar waveguide) to a coaxial connector and an outside transmission line. The key to making the transition without compromising electrical and mechanical objectives is the glass bead in the launcher assembly.

Low-reflection glass bead

The V Connector’s standard glass bead has a unique 0.23 mm center conductor and readily connects to fragile devices. The bead is appropriate for most applications employing Duroid and ceramic (Alumina) microstrip, such as the 0.25 mm wide center conductor on a 0.25 mm thick Alumina substrate. Applications using suspended substrate geometry are equally well satisfied. The bead is constructed of Corning 7070 glass and has a gold-plated center conductor and a gold-plated Kovar® collar.

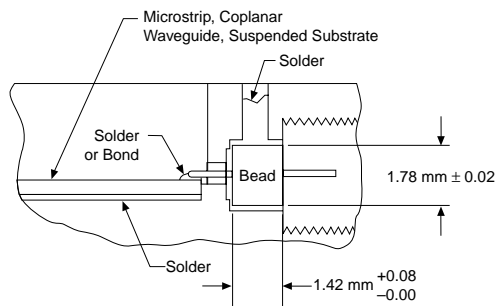
The outstanding design of the bead is largely accountable for the excellent performance of the V Connector launchers. In addition, the design provides for soldering the bead to achieve a hermetic seal. 310°C max. soldering temperature is recommended. The V Connector® launchers can be removed for repair without removal of the glass bead. This ensures that during removal the critical microcircuit-to-glass bead interface is not disturbed, that hermeticity is preserved, and that the microcircuit will not be subjected to the additional stress caused by heating to soldering temperature. Hardware locking compound such as “Removable Loctite®” should be used to further secure the launcher in its housing.

V CONNECTOR®

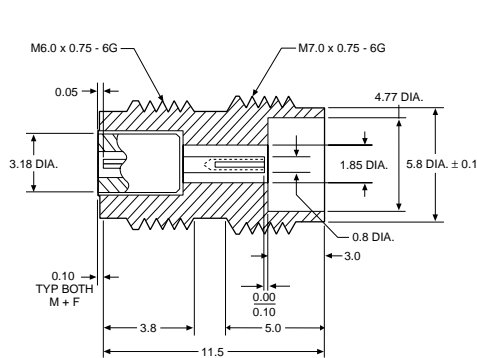
DC to 65 GHz

Complete family

Anritsu's family of V Connector® products is large and growing. Virtually every interface need can be satisfied by one or more of the items offered. As a convenience to the design engineer, each item is completely specified with both guaranteed and typical performance. There are four different models of V Connector launchers. Two types of sparkplug (screw-in) launchers are available; the V102F female version and the V102M male version. Both screw into the housing that encloses the microwave circuit. And, like all Anritsu launchers, they can be easily removed for replacement or repair without unsoldering the glass bead and its interface to the microwave circuit.

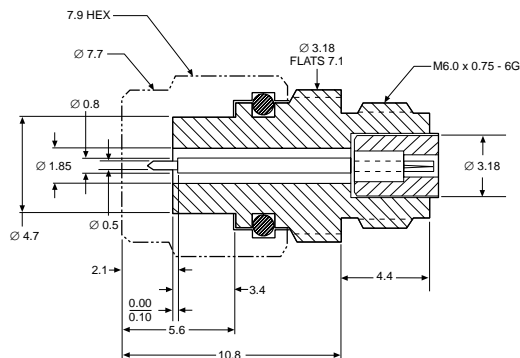


Transition from Microcircuit to Outside Transmission Line



FEMALE

Dimensions in millimeters



MALE

V Connector interface dimensions

When the housing that encloses the microwave circuit is not thick enough to support a threaded, screw-in launcher, flush-mounted (flange) launchers are required. Models with two mounting holes are available in both male and female versions, V103M and V103F. The mounting hole spacing is identical to that of similar SMA flange launchers. The glass bead interface, of course, is the same design used for the sparkplug launcher.

Cable connectors

To complement high performance V085 cable, both male and female cable connectors are available. Typical return loss at 60 GHz for finished cables exceeds 16 dB (1.35 SWR).

The V Connector® coaxial cable connectors use a 2.16 mm cable with a microporous Teflon dielectric and a copper center conductor. The cable assemblies use the center conductor of the coax as the male pin. This is similar to the UT-141 SMA-type assembly and 2.4 mm cable assemblies. The microporous Teflon dielectric has maximum phase stability and minimum insertion loss. This type of cable assembly allows for easy assembly and maximum RF performance; however, since the male pin is copper, the cable assemblies are not suitable for repeated connections. In applications where the cable will be subject to more than 100 connections, we recommend that a connector saver be used.

Evaluation kit

01-301

V Connector Evaluation Kit contains one V120MM - 25CM Male/Male Cable Assembly, two V102F Female Sparkplug Launcher Connector Assemblies, two V103F Female Flange Launcher Connector Assemblies, two V101M Male In-line Cable Connector Assemblies, five V100 Glass Beads, one 01-304 Drill and Tap Set, one 01-302 Test Fixture, two 01-303 Soldering Fixtures.



Tools and fixtures

01-303

Soldering Fixture for sparkplug launcher glass beads, package of 10.



01-304

Drill and Tap Set for precision machining of concentric holes for mounting V Connector in microwave housing. (Drill Part No. 783-568) (Tap Part No. 783-569)



V CONNECTOR®

DC to 65 GHz

01-105A

K and V Connector® Male and Female Sparkplug Torquing Kit.



01-306

Soldering Fixture for flange launcher glass bead, package of 5.



01-307M or 01-307F

Cable Sleeve Soldering Fixture for V101M Male and V101F Female Cable Connectors, package of 10.



01-308

Drill and Tap set for precision machining of concentric holes for mounting V Connector in microwave housing in applications where stress-relief contacts are used.



01-309

V Connector Cable Assembling Fixture for V085 semi-rigid cable.

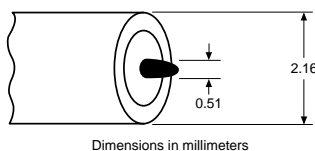


Semi-rigid coaxial cable

Type	Semi-rigid coaxial, tin-plated copper outer conductor, silver-plated copper center conductor.
Impedance	50 ± 2 Ohms
Dielectric type	Microporous Teflon, 0.14 cm diameter
Dielectric constant	1.687
Relative velocity	0.77
Outside diameter	2.16 mm
Center conductor diameter	0.51 mm
Minimum bend radius	0.65 cm
Attenuation	2.3 dB/m at 10 GHz 3.6 dB/m at 20 GHz 4.3 dB/m at 30 GHz 5.2 dB/m at 40 GHz 7.2 dB/m at 60 GHz

V085

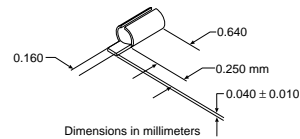
*semirigid coaxial cable
1.5m length of 2.16 mm semirigid cable for V101 series connector*



Stress relief contacts

Stress Relief Contacts provide an elegant yet simple solution to relieving stress at the interface of the microcircuit and its connecting coaxial conductor. These contacts simply slide onto the standard glass bead pins and can be soldered, bonded or parallel-gap welded to a circuit trace.

Frequency range	DC to 67 GHz
Material	0.025 mm heat-treated BeCu
Plating	Bondable gold
Packaging	Lots of 25



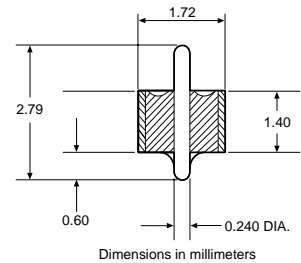
V110-1
Microstrip and Coplanar Waveguide when using the V110-1, use 01-308 Drill and Tap set to make the required concentric holes.

Launchers and cable connectors

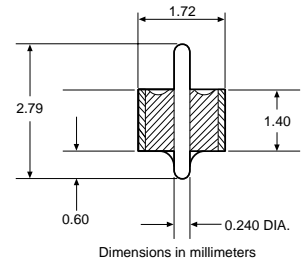
Return loss (launchers only)	13 dB up to 60 GHz
Coupling nut tightening torque	1.36 N-m max
Material	Passivated stainless steel with heat-treated beryllium copper center conductors
Pin depth	0.000 to -0.130 mm for male and female connectors
Temperature range	-55°C to +125°C



V100^{①②}
Glass Beads for V102, and V103 connectors (package of 5)



V100B^{①②}
High Hermeticity Glass Beads for V102, and V103 connectors (package of 5)*



*Glass Bead Hermeticity Spec: Hermetic to 1 x 10⁻⁸ std cc He/sec at 1 atm differential

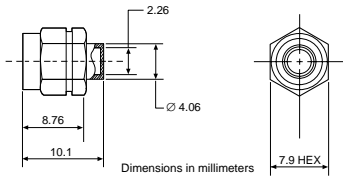
- ① Use with 01-303 or 01-306 Soldering Fixtures
- ② Use with 01-304 or 01-308 Drill and Tap Sets

V CONNECTOR®

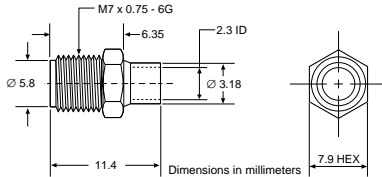
DC to 65 GHz



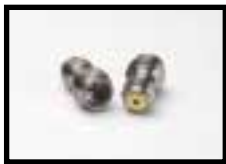
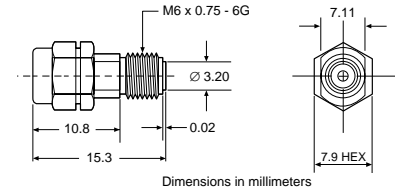
V101M^{②④}
V Male In-Line Cable Connector, DC-65 GHz for V085 cable



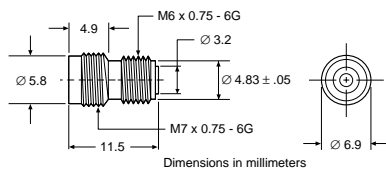
V101F^{③④}
V Female In-Line Cable Connector, DC-65 GHz for V085 cable



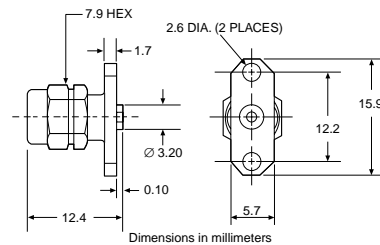
V102M^①
V Male Sparkplug Launcher Connector, DC-65 GHz



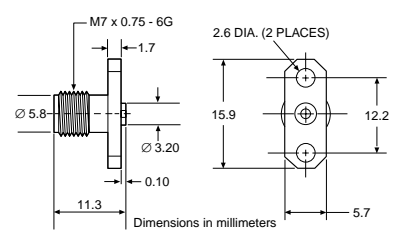
V102F^①
V Female Sparkplug Launcher Connector, DC-65 GHz



V103M
V Male Flange Launcher, two-hole, DC-65 GHz



V103F
V Female Flange Launcher, two-hole, DC-65 GHz



V202F
Combination of V102F, V100, V110-1



V202FB
Combination of V102F, V100B, V110-1

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
01-105A	Male and female sparkplug torquing kit
01-301	V Connector® (evaluation kit)
01-303	Soldering fixture for sparkplug launcher glass bead
01-304	Drill and tap set
01-306	Soldering fixture for flange launcher glass bead
01-307M	Cable sleeve soldering fixture, male connector
01-307F	Cable sleeve soldering fixture, female connector
01-308	Drill and tap set
01-309	Cable assembling fixture
V085	Coaxial cable, 152 cm (5 feet) length of 2.16 mm semi-rigid cable
V100	Glass bead for V102/103 connectors
V100B	Hermetic glass beads for V102/103 connectors
V101M	V(m) in-line cable connector, DC to 65 GHz
V101F	V(f) in-line cable connector, DC to 65 GHz
V102M	V(m) sparkplug launcher connector, DC to 65 GHz
V102F	V(f) sparkplug launcher connector, DC to 65 GHz
V103M	V(m) flange launcher connector, DC to 65 GHz, 2 mounting holes
V103F	V(f) flange launcher connector, DC to 65 GHz, 2 mounting holes
V110-1	Microstrip stress relief contact
V202F	Combination of V100, V102F, and V110-1
V202FB	Combination of V100B, V102F, and V110-1

- ① Use with 01-105A Male and Female Sparkplug Torquing Kit
- ② Use with 01-307M Cable Sleeve Fixture
- ③ Use with 01-307F Cable Sleeve Fixture
- ④ Use with 01-309 Cable Assembling Fixture

INTEGRATED V CONNECTORS

DC to 65 GHz



V115FMS10
Integrated V Female solder-in connector, with ground lip, DC to 65 GHz. Designed for Microstrip. For use with 0.25 mm (10 mil) substrates.



V115FMS75
Integrated V Female solder-in connector, with ground lip, DC to 65 GHz. Designed for Microstrip. For use with 0.19 mm (7.5 mil) substrates.

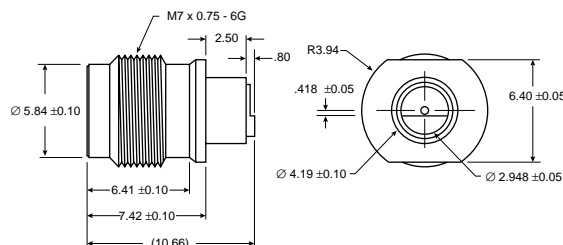


V115FCPW
Integrated V Female solder-in connector, with ground lip, DC to 65 GHz. Designed for Coplanar Waveguide.

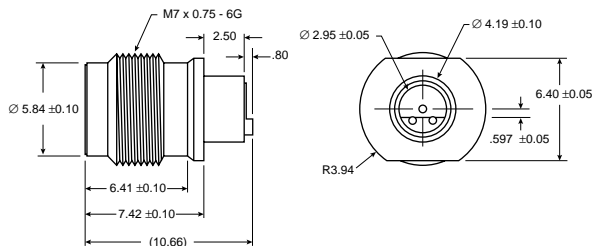


V116F
Integrated V Female Sparkplug (screw-in) connector, DC to 65 GHz.

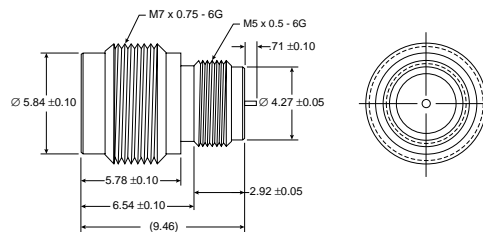
The Integrated V Connector® family is a group of female connectors which have the launcher and the glass bead integrated into one piece. All compensation steps for matching to Microstrip or Coplanar Waveguide (CPW) are included in the solder-in hermetic* connectors, ensuring that they deliver excellent performance. The integrated V connectors come in two easy-to-install styles: the solder-in version, which is the V115F group, and the V116F screw-in version, which allows more versatility of microcircuit launch design. In addition, the V116F can be soldered in for hermeticity. These connectors, except for the CPW version, are designed to be used with the V110-1 Stress Relief Contacts. The Integrated V connectors are compatible with other V Connectors.



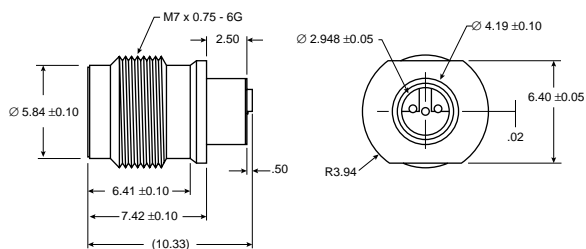
V115FMS75* Outline



V115FMS10* Outline



V116F* Outline



V115FCPW* Outline

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
V115FMS10	Integrated V(f) solder-in connector for use with 0.25 mm (10 mil) substrates
V115FMS75	Integrated V(f) solder-in connector for use with 0.19 mm (7.5 mil) substrates
V115FCPW	Integrated V(f) solder-in connector for Coplanar Waveguide
V116F	Integrated V(f) sparkplug connector

* Hermeticity specification: 1 x10⁻⁸ std cc He/sec at 1 atm differential.

CONNECTOR TOOLS

DC to 65 GHz



Anritsu provides two connector tools that make connecting and disconnecting tiny connectors more easily and surely accomplished. These tools are featured below.

Features

- *01-201 Torque wrench: 0.9 N-M (8 in-lb) for standard SMA and 3.5 mm connectors, and for the Anritsu K Connector® and V Connector®.*
- *01-204 Handy stainless steel connector wrench for standard SMA, 3.5 mm, and 2.4 mm connectors, and for the Anritsu K Connector® and V Connector®.*

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
01-201	Torque wrench, for SMA, 3.5mm, and K Connector and V Connector
01-204	Anritsu stainless steel connector wrench

VP™ CONNECTOR

DC to 65 GHz



The new VP Connector family, with shrouds and adapters, is well suited for applications in components, systems and instrumentation to 65 GHz. Anritsu's family of VP Connectors satisfies virtually every interface and provides excellent and reliable performance.

VP™ Connector features

- Superior RF Performance to 65 GHz
- Hermetic Connection
- Sliding Contact Connection to Microstrip
- Ground lip for handling substrates on carriers
- Testing capabilities using VP-VF Adapter
- Auto alignment capabilities on VP-VF Adapters

VP Bullet

The VP Bullet is a VP-VP adapter, designed to connect two modules with shrouds, back to back. The VP Bullet exhibits exceptional performance due to its unique design concept.

The VP Bullet is designed with six slots in the outer conductor and four slots in the center conductor. The increase in the number of slots in the outer conductor reduces the insertion and extraction force to less than one half of the force required for conventional SMP connectors and thus reduces wear and tear. In the lab VP Bullets have been tested to 1000 insertions with no degradation in performance. Anritsu guarantees at least 500 connections. In addition, the VP Bullet provides a positive stop so that fingers can not be damaged during insertion.

VP Shroud Design

Anritsu VP Shrouds are based on the design concept first used in Anritsu's Integrated V Connector®. VP Shrouds use the standard V Glass bead and the critical compensation steps required to install the glass bead in the housing are a part of the hermetic shroud design. Since Anritsu controls the critical internal dimensions, consistent performance is assured.

Additionally, the ground lip allows the substrate ground to be attached directly to the connector, eliminating the long ground path common to other connector families. This short ground path improves return loss performance, especially at the high end of the frequency range.

The VP Shrouds, except for the CPW version, are designed to be used with the Anritsu V110-1 Stress Relief Contact (sliding contact). The CPW Shrouds backside interface is a pin overlap design, so the center pin is directly connected to the transmission line and the substrate ground is directly attached to the ground lip.

Cable Connector

The VP Cable connector uses standard semi-rigid 2.16 mm cable just like the V cable Connectors. One can install a standard V Cable connector on the opposite end which makes the testing of modules much easier. The VP cable connector has a flange to ensure a rigid connection to the module. The cable connectors can also be utilized for connecting two modules back to back.

VP-VF Adapters

VP-VF Adapters are specifically designed for testing the modules using the Precision V Connector. The VP-VF Adapter can be replaced with a VP Bullet or VP Cable Connector.



01-501
Bullet Insertion
and Removal Tool



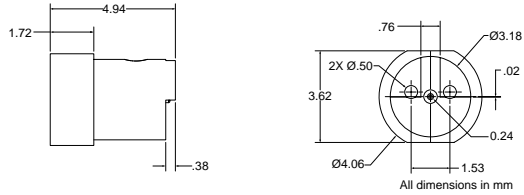
01-502
Torque
screwdriver
adapter

VP™ CONNECTOR

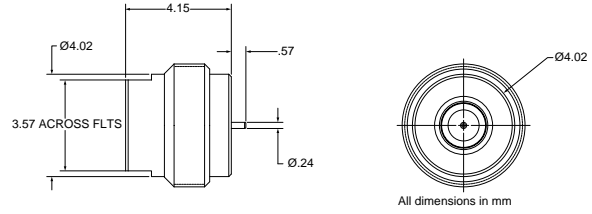
DC to 65 GHz



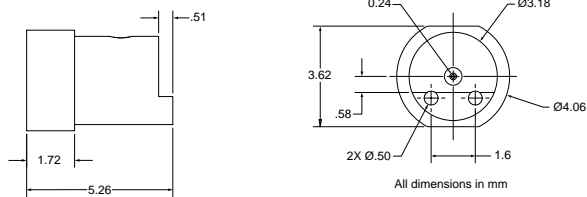
VP100BCPW
Solder-in CPW
hermetic shroud



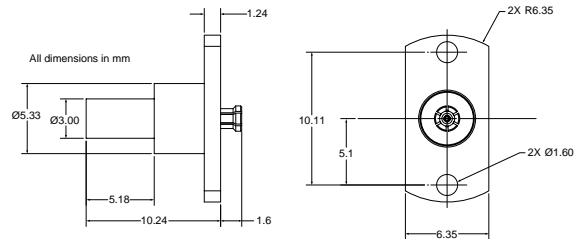
VP100B
Screw-in hermetic shroud



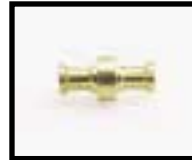
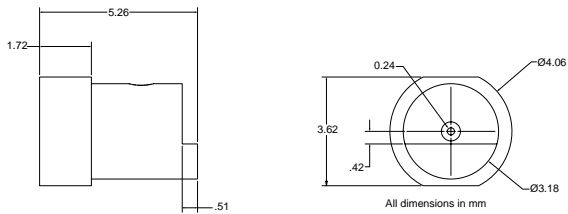
VP100BMS10
Solder-in
10 mil Microstrip
hermetic shroud



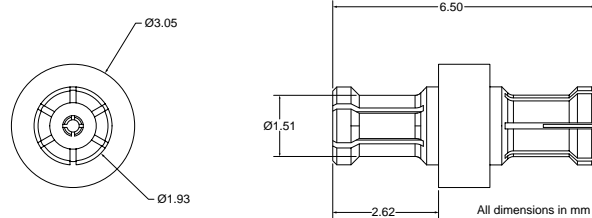
VP101F
VP cable adapter



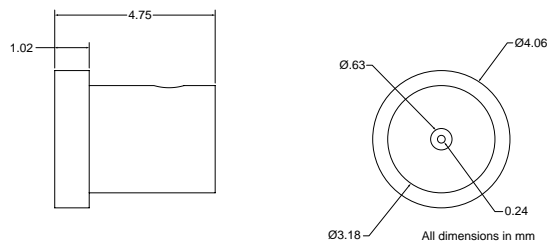
VP100BMS75
Solder-in 7.5 mil
Microstrip hermetic
shroud



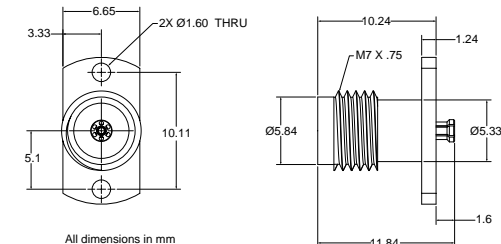
VP102F
VP Bullet



VP100BNL
No lip hermetic
shroud

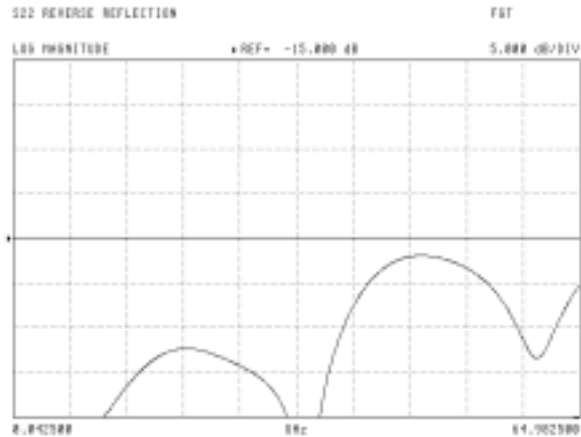


VP103F
VP-VF Adapter



VP™ CONNECTOR

DC to 65 GHz



Typical High Frequency Return-Loss measured on V102F over the range of 40 MHz to 65 GHz.

Specifications:

Impedance	50 Ohms
Frequency	DC to 65 GHz
Insertion Loss	0.05 √ f (GHz)
VSWR:	1.1:1 to 26.5 GHz typical; 1.22:1 to 50 GHz typical; 1.5:1 to 65 GHz typical
Insulation Resistance	> 1200 MΩ
Center conductor contact resistance	6 mΩ typical
Force to engage	4.2 N typical (1 lbf typical)
Force to disengage	7 N typical. (1.5 lbf typical)
Center contact Retention	83 N typical. (18 lbf typical)
Radial Misalignment	0.25 mm (0.010")
Axial Misalignment	0-0.15mm (0 to 0.006")
Hermeticity	1 x10 ⁻⁸ std cc He/sec at 1 atmosphere differential for all shrouds

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
VP100BCPW	Solder-in CPW hermetic shroud
VP100BMS10	Solder-in 10 mil microstrip hermetic shroud
VP100BMS75	Solder-in 7.5 mil microstrip hermetic shroud
VP100BNL	No lip hermetic shroud
VP100B	Screw-in hermetic shroud
VP101F	VP cable adapter
VP102F	VP bullet
VP103F	VP-VF adapter
01-501	Bullet insertion and removal tool
01-502	V100B Torque tool adapter

Materials:

Shrouds, VP100B, VP100BCPW, VP100BMS10, VP100BMS75 and VP100BNL	Material: Brass, gold plated over nickel per Mil-G-45204C Center pin: Kovar, gold plated over nickel per Mil-G-45204C Bead body: Kovar, gold plated over nickel per Mil-G-45204C Bead dielectric: Corning 7070 glass
VP101F VP Cable adapter	Beryllium-copper, gold plated over nickel per Mil-G-45204C
VP102F VP Bullet	Heat treated Beryllium-copper, Gold plated over nickel per Mil-G-45204C Dielectric: Polyphenylene Oxide Noryl (PPO)
VP103F VP-VF adapter	Body: Passivated stainless steel Bead: Polyphenylene Oxide Noryl (PPO) Center conductor: Beryllium-copper, gold plated over nickel per Mil-G-45204C

Environmental Information:

Tests are performed per MIL-STD-202F

Operating Temperature Range	-54° to +200° C for VP100BXXXX, -54°C to +125°C for VP102F, VP101F and VP103F adapter
Temperature Shock	25° C to -55° C and 25° C to +200° C, method 107G, Condition B for shrouds to +125°C for bullet and cable adapter
Humidity	95% at 40°C, 96 hours, Test 103B, Condition B
Shock	100 G peak sawtooth, method 213, test condition 1
Vibration	Sinewave: 10 Hz to 2000 Hz, 0.06" DA, method 204, test condition D Random: 50 Hz to 2000 Hz, 11.6 Grms, Power Spectral Density 0.1 Grms ² /Hz, Method 214, Test Condition I, Letter D
Salt Spray	5% concentration for 48 hours, Method 101D, Condition B
Voltage withstanding	500 Vac RMS, 60 seconds, method 301

RF CABLES

K120, V120 DC to 65 GHz



Semi-rigid RF cable features

- Up to 65 GHz frequency ranges
- Type N, K Connector®, and V Connector®
- K Connector® compatibility with SMA and 3.5 mm
- V Connector® compatibility with 2.4 mm

Specifications

Model	Frequency range (GHz)	Impedance (Ohms)	Length	Connectors
N120-6	DC to 18	50	15 cm	N(m) - N(m)
NS120MF-6	DC to 18	50	15 cm	N(m) - SMA(f)
K120MM	DC to 40	50	See table	K(m) - K(m)
K120MF	DC to 40	50	See table	K(m) - K(f)
K120FF	DC to 40	50	See table	K(f) - K(f)
V120MM	DC to 65	50	See table	V(m) - V(m)
V120MF	DC to 65	50	See table	V(m) - V(f)
V120FF	DC to 65	50	See table	V(f) - V(f)

Temperature range: -55°C to +125°C

Contact the Anritsu Company for low loss, low VSWR cable bending services.

Semi-rigid coaxial cable specifications for V Connectors®

Type	Semi-rigid coaxial, tin-plated copper outer conductor, silver-plated copper center conductor.
Impedance	50 ± 2Ωs
Dielectric type	Microporous Teflon, 0.14 cm diameter
Dielectric constant	1.687
Relative velocity	0.77
Outside diameter	2.18 mm
Center conductor diameter	0.51 mm
Minimum bend radius	0.65 cm
Attenuation	2.3 dB/m at 10 GHz 3.6 dB/m at 20 GHz 4.3 dB/m at 30 GHz 5.2 dB/m at 40 GHz 7.2 dB/m at 60 GHz

Semi-rigid coaxial cable specifications for K Connectors®

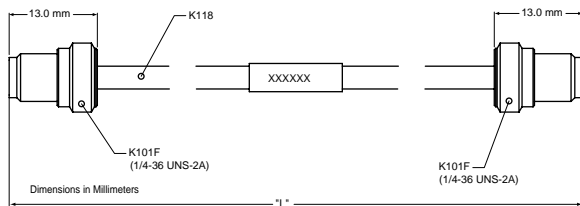
Type	Semi-rigid coaxial, tin-plated copper outer conductor, silver-plated copper center conductor.
Impedance	50 ± 2Ωs
Dielectric type	Microporous Teflon, 0.24 cm diameter
Dielectric constant	1.687
Relative velocity	0.77
Outside diameter	3.00 mm
Center conductor diameter	0.81 mm
Minimum bend radius	0.65 cm
Attenuation	1.6 dB/m at 10 GHz 2.3 dB/m at 20 GHz 3.3 dB/m at 30 GHz 4.7 dB/m at 40 GHz
K118 semirigid coaxial cable	1.52 m length of 3.00 mm Semirigid cable for K101 series connector

RF CABLES

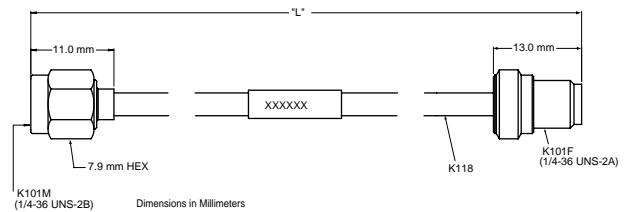
K120, V120 DC to 65 GHz

Cable assembly part number reference

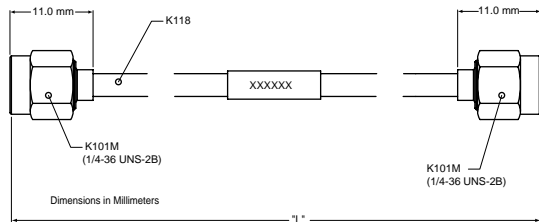
Length	Metric cable assemblies					
	K120MM	K120MF	K120FF	V120MM	V120MF	V120FF
5	K120MM-5CM	K120MF-5CM	K120FF-5CM	V120MM-5CM	V120MF-5CM	V120FF-5CM
10	K120MM-10CM	K120MF-10CM	K120FF-10CM	V120MM-10CM	V120MF-10CM	V120FF-10CM
15	K120MM-15CM	K120MF-15CM	K120FF-15CM	V120MM-15CM	V120MF-15CM	V120FF-15CM
20	K120MM-20CM	K120MF-20CM	K120FF-20CM	V120MM-20CM	V120MF-20CM	V120FF-20CM
25	K120MM-25CM	K120MF-25CM	K120FF-25CM	V120MM-25CM	V120MF-25CM	V120FF-25CM
30	K120MM-30CM	K120MF-30CM	K120FF-30CM	V120MM-30CM	V120MF-30CM	V120FF-30CM
35	K120MM-35CM	K120MF-35CM	K120FF-35CM	V120MM-35CM	V120MF-35CM	V120FF-35CM
40	K120MM-40CM	K120MF-40CM	K120FF-40CM	V120MM-40CM	V120MF-40CM	V120FF-40CM
45	K120MM-45CM	K120MF-45CM	K120FF-45CM	V120MM-45CM	V120MF-45CM	V120FF-45CM
50	K120MM-50CM	K120MF-50CM	K120FF-50CM	V120MM-50CM	V120MF-50CM	V120FF-50CM
60	K120MM-60CM	K120MF-60CM	K120FF-60CM	V120MM-60CM	V120MF-60CM	V120FF-60CM
70	K120MM-70CM	K120MF-70CM	K120FF-70CM	V120MM-70CM	V120MF-70CM	V120FF-70CM
80	K120MM-80CM	K120MF-80CM	K120FF-80CM	V120MM-80CM	V120MF-80CM	V120FF-80CM
90	K120MM-90CM	K120MF-90CM	K120FF-90CM	V120MM-90CM	V120MF-90CM	V120FF-90CM
100	K120MM-100CM	K120MF-100CM	K120FF-100CM	V120MM-100CM	V120MF-100CM	V120FF-100CM
125	K120MM-125CM	K120MF-125CM	K120FF-125CM	V120MM-125CM	V120MF-125CM	V120FF-125CM
150	K120MM-150CM	K120MF-150CM	K120FF-150CM	V120MM-150CM	V120MF-150CM	V120FF-150CM



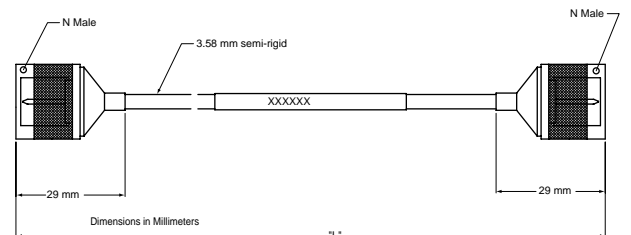
K120FF outline



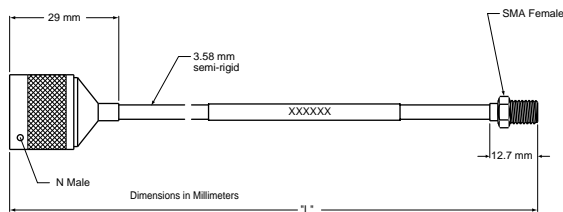
K120MF outline



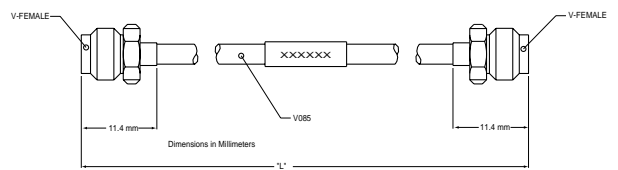
K120MM outline



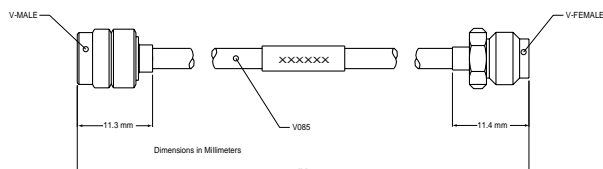
N120-6 outline



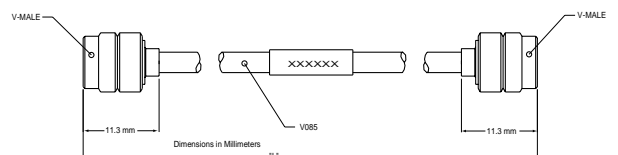
NS120MF-6 outline



V120FF outline



V120MF outline



V120MM outline

For further information about these products and more, contact us at 1-800-Anritsu or visit www.us.anritsu.com

RF CABLES

K120, V120 DC to 65 GHz

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
	Cable, semi-rigid
N120-6	001 to 18 GHz, 50 Ω, 15 cm, N(m) to N(m)
NS120MF-6	0.01 to 18 GHz, 50 Ω, 15 cm, N(m) to SMA(f)
K120MM-5CM	DC to 40 GHz, 50 Ω, 5 cm, K(m) to K(m)
K120MM-10CM	DC to 40 GHz, 50 Ω, 10 cm, K(m) to K(m)
K120MM-15CM	DC to 40 GHz, 50 Ω, 15 cm, K(m) to K(m)
K120MM-20CM	DC to 40 GHz, 50 Ω, 20 cm, K(m) to K(m)
K120MM-25CM	DC to 40 GHz, 50 Ω, 25 cm, K(m) to K(m)
K120MM-30CM	DC to 40 GHz, 50 Ω, 30 cm, K(m) to K(m)
K120MM-35CM	DC to 40 GHz, 50 Ω, 35 cm, K(m) to K(m)
K120MM-40CM	DC to 40 GHz, 50 Ω, 40 cm, K(m) to K(m)
K120MM-45CM	DC to 40 GHz, 50 Ω, 45 cm, K(m) to K(m)
K120MM-50CM	DC to 40 GHz, 50 Ω, 50 cm, K(m) to K(m)
K120MM-60CM	DC to 40 GHz, 50 Ω, 60 cm, K(m) to K(m)
K120MM-70CM	DC to 40 GHz, 50 Ω, 70 cm, K(m) to K(m)
K120MM-80CM	DC to 40 GHz, 50 Ω, 80 cm, K(m) to K(m)
K120MM-90CM	DC to 40 GHz, 50 Ω, 90 cm, K(m) to K(m)
K120MM-100CM	DC to 40 GHz, 50 Ω, 100 cm, K(m) to K(m)
K120MM-125CM	DC to 40 GHz, 50 Ω, 125 cm, K(m) to K(m)
K120MM-150CM	DC to 40 GHz, 50 Ω, 150 cm, K(m) to K(m)
K120MF-5CM	DC to 40 GHz, 50 Ω, 5 cm, K(m) to K(f)
K120MF-10CM	DC to 40 GHz, 50 Ω, 10 cm, K(m) to K(f)
K120MF-15CM	DC to 40 GHz, 50 Ω, 15 cm, K(m) to K(f)
K120MF-20CM	DC to 40 GHz, 50 Ω, 20 cm, K(m) to K(f)
K120MF-25CM	DC to 40 GHz, 50 Ω, 25 cm, K(m) to K(f)
K120MF-30CM	DC to 40 GHz, 50 Ω, 30 cm, K(m) to K(f)
K120MF-35CM	DC to 40 GHz, 50 Ω, 35 cm, K(m) to K(f)
K120MF-40CM	DC to 40 GHz, 50 Ω, 40 cm, K(m) to K(f)
K120MF-45CM	DC to 40 GHz, 50 Ω, 45 cm, K(m) to K(f)
K120MF-50CM	DC to 40 GHz, 50 Ω, 50 cm, K(m) to K(f)
K120MF-60CM	DC to 40 GHz, 50 Ω, 60 cm, K(m) to K(f)
K120MF-70CM	DC to 40 GHz, 50 Ω, 70 cm, K(m) to K(f)
K120MF-80CM	DC to 40 GHz, 50 Ω, 80 cm, K(m) to K(f)
K120MF-90CM	DC to 40 GHz, 50 Ω, 90 cm, K(m) to K(f)
K120MF-100CM	DC to 40 GHz, 50 Ω, 100 cm, K(m) to K(f)
K120MF-125CM	DC to 40 GHz, 50 Ω, 125 cm, K(m) to K(f)
K120MF-150CM	DC to 40 GHz, 50 Ω, 150 cm, K(m) to K(f)
K120FF-5CM	DC to 40 GHz, 50 Ω, 5 cm, K(f) to K(f)
K120FF-10CM	DC to 40 GHz, 50 Ω, 10 cm, K(f) to K(f)
K120FF-15CM	DC to 40 GHz, 50 Ω, 15 cm, K(f) to K(f)
K120FF-20CM	DC to 40 GHz, 50 Ω, 20 cm, K(f) to K(f)
K120FF-25CM	DC to 40 GHz, 50 Ω, 25 cm, K(f) to K(f)
K120FF-30CM	DC to 40 GHz, 50 Ω, 30 cm, K(f) to K(f)
K120FF-35CM	DC to 40 GHz, 50 Ω, 35 cm, K(f) to K(f)
K120FF-40CM	DC to 40 GHz, 50 Ω, 40 cm, K(f) to K(f)
K120FF-45CM	DC to 40 GHz, 50 Ω, 45 cm, K(f) to K(f)
K120FF-50CM	DC to 40 GHz, 50 Ω, 50 cm, K(f) to K(f)
K120FF-60CM	DC to 40 GHz, 50 Ω, 60 cm, K(f) to K(f)
K120FF-70CM	DC to 40 GHz, 50 Ω, 70 cm, K(f) to K(f)
K120FF-80CM	DC to 40 GHz, 50 Ω, 80 cm, K(f) to K(f)
K120FF-90CM	DC to 40 GHz, 50 Ω, 90 cm, K(f) to K(f)
K120FF-100CM	DC to 40 GHz, 50 Ω, 100 cm, K(f) to K(f)
K120FF-125CM	DC to 40 GHz, 50 Ω, 125 cm, K(f) to K(f)
K120FF-150CM	DC to 40 GHz, 50 Ω, 150 cm, K(f) to K(f)

Model/Order No.	Name
	Cable, semi-rigid
V120MM-5CM	DC to 65 GHz, 50 Ω, 5 cm, V(m) to V(m)
V120MM-10CM	DC to 65 GHz, 50 Ω, 10 cm, V(m) to V(m)
V120MM-15CM	DC to 65 GHz, 50 Ω, 15 cm, V(m) to V(m)
V120MM-20CM	DC to 65 GHz, 50 Ω, 20 cm, V(m) to V(m)
V120MM-25CM	DC to 65 GHz, 50 Ω, 25 cm, V(m) to V(m)
V120MM-30CM	DC to 65 GHz, 50 Ω, 30 cm, V(m) to V(m)
V120MM-35CM	DC to 65 GHz, 50 Ω, 35 cm, V(m) to V(m)
V120MM-40CM	DC to 65 GHz, 50 Ω, 40 cm, V(m) to V(m)
V120MM-45CM	DC to 65 GHz, 50 Ω, 45 cm, V(m) to V(m)
V120MM-50CM	DC to 65 GHz, 50 Ω, 50 cm, V(m) to V(m)
V120MM-60CM	DC to 65 GHz, 50 Ω, 60 cm, V(m) to V(m)
V120MM-70CM	DC to 65 GHz, 50 Ω, 70 cm, V(m) to V(m)
V120MM-80CM	DC to 65 GHz, 50 Ω, 80 cm, V(m) to V(m)
V120MM-90CM	DC to 65 GHz, 50 Ω, 90 cm, V(m) to V(m)
V120MM-100CM	DC to 65 GHz, 50 Ω, 100 cm, V(m) to V(m)
V120MM-125CM	DC to 65 GHz, 50 Ω, 125 cm, V(m) to V(m)
V120MM-150CM	DC to 65 GHz, 50 Ω, 150 cm, V(m) to V(m)
V120MF-5CM	DC to 65 GHz, 50 Ω, 5 cm, V(m) to V(f)
V120MF-10CM	DC to 65 GHz, 50 Ω, 10 cm, V(m) to V(f)
V120MF-15CM	DC to 65 GHz, 50 Ω, 15 cm, V(m) to V(f)
V120MF-20CM	DC to 65 GHz, 50 Ω, 20 cm, V(m) to V(f)
V120MF-25CM	DC to 65 GHz, 50 Ω, 25 cm, V(m) to V(f)
V120MF-30CM	DC to 65 GHz, 50 Ω, 30 cm, V(m) to V(f)
V120MF-35CM	DC to 65 GHz, 50 Ω, 35 cm, V(m) to V(f)
V120MF-40CM	DC to 65 GHz, 50 Ω, 40 cm, V(m) to V(f)
V120MF-45CM	DC to 65 GHz, 50 Ω, 45 cm, V(m) to V(f)
V120MF-50CM	DC to 65 GHz, 50 Ω, 50 cm, V(m) to V(f)
V120MF-60CM	DC to 65 GHz, 50 Ω, 60 cm, V(m) to V(f)
V120MF-70CM	DC to 65 GHz, 50 Ω, 70 cm, V(m) to V(f)
V120MF-80CM	DC to 65 GHz, 50 Ω, 80 cm, V(m) to V(f)
V120MF-90CM	DC to 65 GHz, 50 Ω, 90 cm, V(m) to V(f)
V120MF-100CM	DC to 65 GHz, 50 Ω, 100 cm, V(m) to V(f)
V120MF-125CM	DC to 65 GHz, 50 Ω, 125 cm, V(m) to V(f)
V120MF-150CM	DC to 65 GHz, 50 Ω, 150 cm, V(m) to V(f)
V120FF-5CM	DC to 65 GHz, 50 Ω, 5 cm, V(f) to V(f)
V120FF-10CM	DC to 65 GHz, 50 Ω, 10 cm, V(f) to V(f)
V120FF-15CM	DC to 65 GHz, 50 Ω, 15 cm, V(f) to V(f)
V120FF-20CM	DC to 65 GHz, 50 Ω, 20 cm, V(f) to V(f)
V120FF-25CM	DC to 65 GHz, 50 Ω, 25 cm, V(f) to V(f)
V120FF-30CM	DC to 65 GHz, 50 Ω, 30 cm, V(f) to V(f)
V120FF-35CM	DC to 65 GHz, 50 Ω, 35 cm, V(f) to V(f)
V120FF-40CM	DC to 65 GHz, 50 Ω, 40 cm, V(f) to V(f)
V120FF-45CM	DC to 65 GHz, 50 Ω, 45 cm, V(f) to V(f)
V120FF-50CM	DC to 65 GHz, 50 Ω, 50 cm, V(f) to V(f)
V120FF-60CM	DC to 65 GHz, 50 Ω, 60 cm, V(f) to V(f)
V120FF-70CM	DC to 65 GHz, 50 Ω, 70 cm, V(f) to V(f)
V120FF-80CM	DC to 65 GHz, 50 Ω, 80 cm, V(f) to V(f)
V120FF-90CM	DC to 65 GHz, 50 Ω, 90 cm, V(f) to V(f)
V120FF-100CM	DC to 65 GHz, 50 Ω, 100 cm, V(f) to V(f)
V120FF-125CM	DC to 65 GHz, 50 Ω, 125 cm, V(f) to V(f)
V120FF-150CM	DC to 65 GHz, 50 Ω, 150 cm, V(f) to V(f)

COAXIAL ADAPTERS

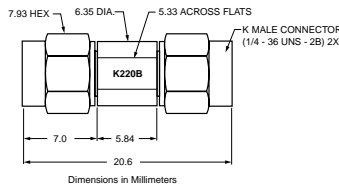
K, V, K to V DC to 60 GHz



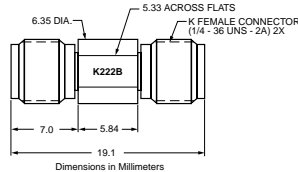
The K220 and 34V Series of precision adapters enable accurate measurements with K or V connectors. Every adapter is fully specified and 100% tested to ensure low reflections and optimum performance over the DC to 60 GHz range.

Precision K and V adapter features

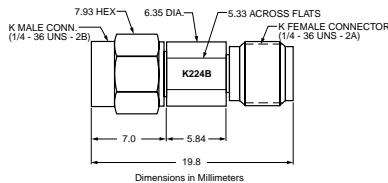
- K Connector® DC to 40 GHz frequency range
- V Connector® DC to 60 GHz frequency range
- Low SWR and insertion loss



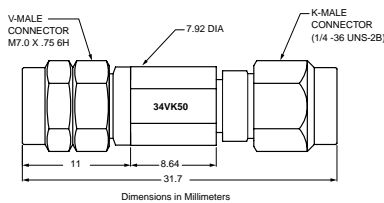
K220B Outline



K222B Outline



K224B Outline

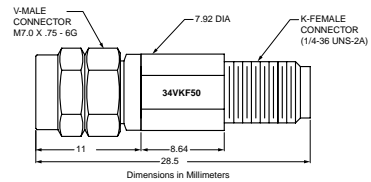


34VK50 Outline

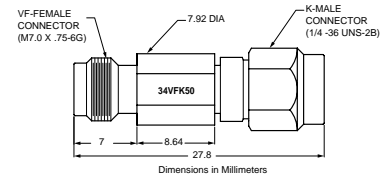
Specifications

Model	Frequency range (GHz)	Connectors	SWR
K220B K222B K224B	DC to 40	K(m) to K(m) K(f) to K(f) K(f) to K(m)	1.12
34VK50 34VKF50	DC to 40	V(m) to K(m) V(m) to K(f)	1.3
34VFK50 34VFKF50	DC to 40	V(f) to K(m) V(f) to K(f)	1.3
34VV50 34VVF50 34VVF50	DC to 60	V(m) to V(m) V(f) to V(f) V(m) to V(f)	1.5

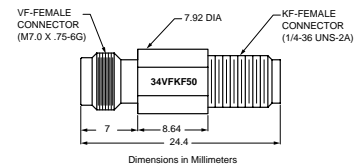
Temperature range: -55°C to +125°C



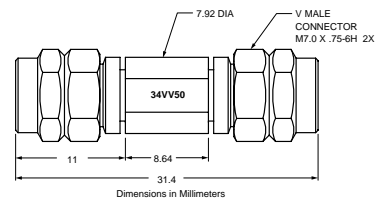
34VKF50 Outline



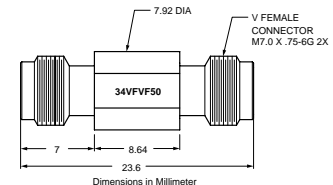
34VFK50 Outline



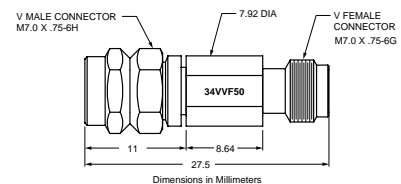
34VFKF50 Outline



34VV50 Outline



34VVF50 Outline



34VVF50 Outline

COAXIAL ADAPTERS

K, V, K to V DC to 60 GHz

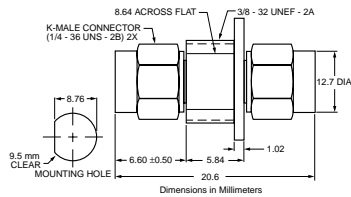
The K230 Series is the panel-mount version of the K220 Series Adapters. These units mount in a standard 9.5 mm “D” hole.

K and V panel adapter features

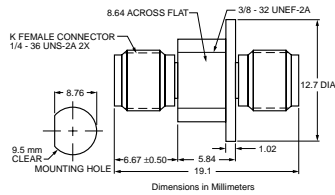
- Precision, panel-mounted feedthru adapter
- Broad, DC to 65 GHz frequency range

K panel adapter specifications

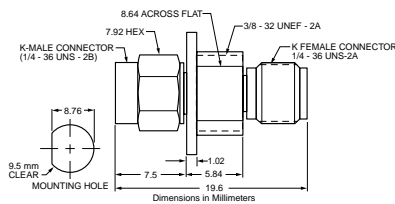
Model	Frequency range (GHz)	Connectors	SWR
K230B	DC to 40	K(m) to K(m)	1.12
K232B		K(f) to K(f)	
K234B		K(f) to K(m)	



K230B Outline



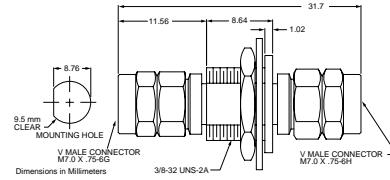
K232B Outline



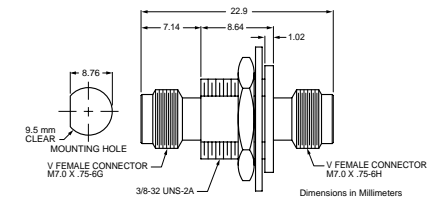
K234B Outline

V panel adapter specifications

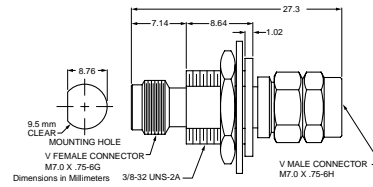
Model	Frequency range (GHz)	Connectors	SWR
V230	DC to 65	V(m) to V(m)	1.5
V232		V(f) to V(f)	
V234		V(f) to V(m)	



V230 Outline



V232 Outline



V234 Outline

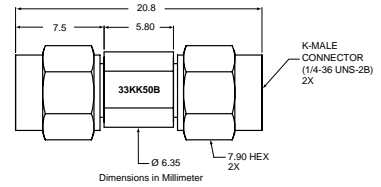
Ordering information

Please specify model/order number, name and quantity when ordering.

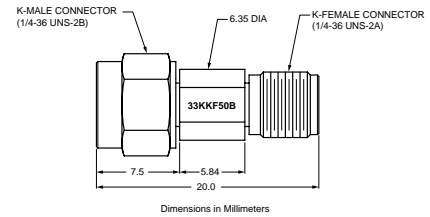
Model/Order No.	Name
	Precision adapter
K220B	DC to 40 GHz, 50 Ohm, K(m)-K(m)
K222B	DC to 40 GHz, 50 Ohm, K(f)-K(f)
K224B	DC to 40 GHz, 50 Ohm, K(m)-K(f)
34VK50	DC to 46.5 GHz, 50 Ohm, V(m)-K(m)
34VKF50	DC to 40 GHz, 50 Ohm, V(m)-K(f)
34VFK50	DC to 40 GHz, 50 Ohm, V(f)-K(m)
34VFKF50	DC to 40 GHz, 50 Ohm, V(f)-K(f)
34VV50	DC to 60 GHz, 50 Ohm, V(m)-V(m)
34VVF50	DC to 60 GHz, 50 Ohm, V(m)-V(f)
34VVF50	DC to 60 GHz, 50 Ohm, V(f)-V(f)
V230	DC to 65 GHz, 50 Ohm, V(m)-V(m)
V232	DC to 65 GHz, 50 Ohm, V(f)-V(f)
V234	DC to 65 GHz, 50 Ohm, V(f)-V(m)

CALIBRATION GRADE ADAPTERS

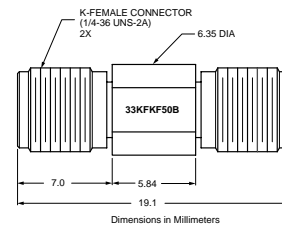
33 Series DC to 65 GHz



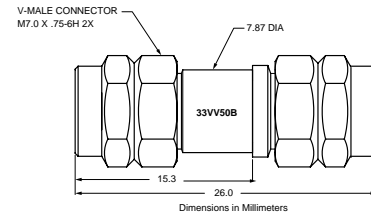
33KK50B Outline



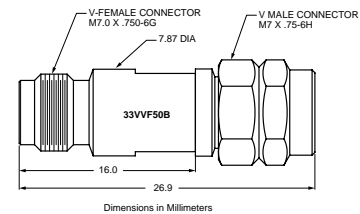
33KKF50B Outline



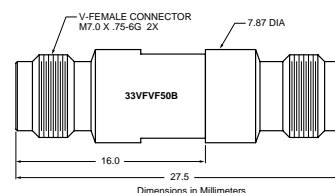
33KFKF50B Outline



33VV50B Outline



33VVF50B Outline



33VFVF50B Outline

The 33 Series of precision adapters enable accurate measurements with Anritsu V Connector® and K Connector® interfaces. Every adapter is fully specified and 100% tested to ensure low reflections and optimum phase performance over a broad frequency range.

Features

- Low SWR and insertion loss
- DC to 65 GHz, with V Connector® interface
- DC to 40 GHz, with K Connector® interface
- 50 Ω impedance

Specifications

Model	Frequency range (GHz)	Impedance (Ohms)	Connectors	SWR
33KK50B	DC to 40	50	K(m)-K(m)	1.01
33KKF50B	DC to 40	50	K(m)-K(f)	1.07
33KFKF50B	DC to 40	50	K(f)-K(f)	1.09
33VV50B	DC to 65	50	V(m)-V(m)	1.22
33VVF50B	DC to 65	50	V(m)-V(f)	1.33
33VFVF50B	DC to 65	50	V(f)-V(f)	1.33

Temperature range: -55°C to +125°C

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
	Calibration grade adapter
33KFKF50B	DC to 40 GHz, 50 Ω, K(f)-K(f)
33KK50B	DC to 40 GHz, 50 Ω, K(m)-K(m)
33KKF50B	DC to 40 GHz, 50 Ω, K(m)-K(f)
33VFVF50B	DC to 65 GHz, 50 Ω, V(f)-V(f)
33VV50B	DC to 65 GHz, 50 Ω, V(m)-V(m)
33VVF50B	DC to 65 GHz, 50 Ω, V(m)-V(f)

INSTRUMENTATION GRADE ADAPTERS

34 Series



34ASF50



34NN50A



34RKRK50



34RSN50

The 34 Series of precision adapters enable accurate measurements with GPC-7, Type N, or WSMA interfaces. Every adapter is fully specified and 100% tested to ensure low reflections and optimum phase performance over a broad frequency range.

Precision adapter features

- Low SWR and insertion loss
- GPC-7, Type N, and WSMA connectors
- Convenient transition with minimal effect on signal
- 50 Ω or 75 Ω impedance

Specifications

Model	Frequency range (GHz)	Impedance (Ohms)	Connectors	SWR	Dimensions L(cm) x dia(cm)
34NN75B 34NFN75B	DC to 3	75	N(m) to N(m) N(f) to N(f)	1.1	6.0 x 2.2 4.7 x 1.6
34AN50 34ANF50	DC to 18	50	GPC-7 to N(m) GPC-7 to N(f)	1.02	4.2 x 2.2 4.2 x 2.2
34AS50 34ASF50	DC to 18	50	GPC-7 to WSMA(m) GPC-7 to WSMA(f)	1.033	3.8 x 2.2 3.8 x 2.2
34NN50A 34NFN50	DC to 18	50	N(m) to N(m) N(f) to N(f)	1.1	6.0 x 2.2 4.7 x 1.6
34NK50 34NKF50 34NFK50 34NKF50	DC to 18	50	N(m) to K(m) N(m) to K(f) N(f) to K(m) N(f) to K(f)	1.12	3.8 x 2.2 3.8 x 2.2 3.8 x 1.6 3.8 x 1.6
34SFSF50	DC to 26.5	50	WSMA(f) to WSMA(f)	1.11 to 18.5 GHz 1.18 to 26.5 GHz	1.6 x 0.8

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	Precision adapter
34NN75B	DC to 3 GHz, 75 Ω, N(m)-N(m)
34NFN75B	DC to 3 GHz, 75 Ω, N(f)-N(f)
34AN50	DC to 18 GHz, 50 Ω, GPC-7-N(m)
34ANF50	DC to 18 GHz, 50 Ω, GPC-7-N(f)
34AS50	DC to 18 GHz, 50 Ω, GPC-7-WSMA(m)
34ASF50	DC to 18 GHz, 50 Ω, GPC-7-WSMA(f)
34NN50A	DC to 18 GHz, 50 Ω, N(m)-N(m)
34NFN50	DC to 18 GHz, 50 Ω, N(f)-N(f)
34NK50	DC to 18 GHz, 50 Ω, N(m)-K(m)
34NKF50	DC to 18 GHz, 50 Ω, N(m)-K(f)
34NFK50	DC to 18 GHz, 50 Ω, N(f)-K(m)
34NKF50	DC to 18 GHz, 50 Ω, N(f)-K(f)
34SFSF50	DC to 26.5 GHz, 50 Ω, WSMA(f)-WSMA(f)

The 34R Series precision adapters provide a rugged, rigid connection between Anritsu instruments with WSMA, K Connector®, or V Connector® outputs and Anritsu SWR Autotesters and SWR Bridges or other instruments.

The adapters have an outside diameter equal to that of a Type N connector, adding mechanical strength to the test setup and making installation convenient and fast.

Ruggedized adapter features

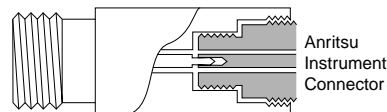
- Enhance reliability of microwave test setup
- Easy-to-grasp Type N outside diameter
- Rigid test connections for improved test data repeatability

Specifications

Model	Frequency range (GHz)	Connectors	SWR	Dimensions L(cm) x dia(cm)
34RSN50	DC to 18	RS(m) to N(m)	1.40	5.1 x 2.2
34RKNF50	DC to 18	RK(m) to N(f)	1.40	5.1 x 1.7
34RVNF50	DC to 18	RV(m) to N(f)	1.40	5.1 x 1.7
34RKRK50	DC to 40	RK(m) to RK(m)	2.00	5.8 x 1.7
34RVRK50	DC to 40	RV(m) to RK(m)	2.00	5.8 x 1.7
34RVRV50	DC to 60	RV(m) to RV(m)	2.30	5.8 x 1.7

Impedance: 50 ohms

Temperature range: 0°C to +75°C



34R Series Adapter

INSTRUMENTATION GRADE ADAPTERS

35WR Series 18 to 65 GHz



The 35 Series precision adapters transform standard or double-ridge waveguide to coaxial K Connector® and V Connector® interfaces, thus enabling convenient millimeter wave coaxial measurements.

Features

- 18 to 65 GHz frequency coverage
- K Connector® compatibility with SMA and 3.5 mm
- V Connector® compatibility with 2.4 mm
- Standard and double-ridge designs

Specifications

Model	Frequency range (GHz)	Connectors	W/G flange UG-(_) U	SWR
35WRD180K 35WRD180KF	18 to 40	WRD180 to K(m) WRD180 to K(f)	N/A	1.25
35WR42K 35WR42KF	18 to 26.5	WR42 to K(m) WR42 to K(f)	595	1.25
35WR28K 35WR28KF	26.5 to 40	WR28 to K(m) WR28 to K(f)	599	1.25
35WR22K 35WR22KF	33 to 50	WR22 to K(m) WR22 to K(f)	383	1.30
35WR22V 35WR22VF	33 to 50	WR22 to V(m) WR22 to V(f)	383	1.30
35WR19K 35WR19KF	40 to 50 Usable to 54	WR19 to K(m) WR19 to K(f)	383	1.30
35WR19V 35WR19VF	40 to 60	WR19 to K(m) WR19 to K(f)	383	1.30
35WR15V 35WR15VF	50 to 65	WR15 to V(m) WR15 to V(f)	385	1.30

Impedance: 50 ohms

Maximum input power: 1 Watt

Temperature range: -55°C to +125°C

Ordering information

Please specify model/order number, name, and quantity when ordering.

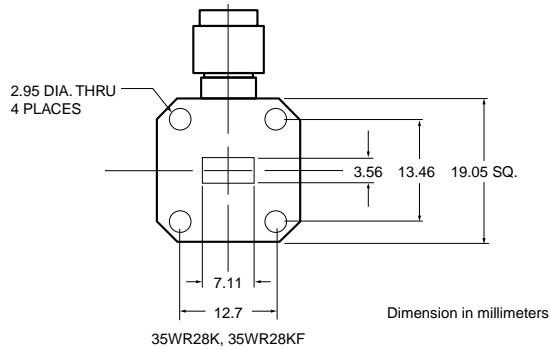
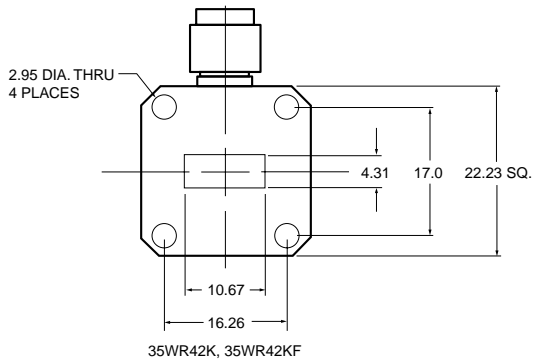
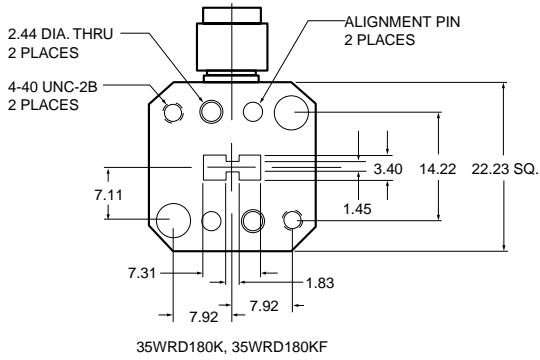
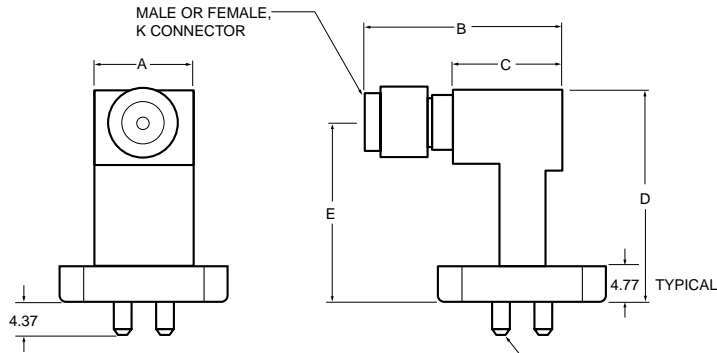
Model/Order No.	Name
	Precision waveguide to coax adapter
35WRD180K	18 to 40 GHz, WRD180 (double ridge waveguide) to K(m)
35WRD180KF	18 to 40 GHz, WRD180 (double ridge waveguide) to K(f)
35WR42K	18 to 26.5 GHz, WR42-K(m)
35WR42KF	18 to 26.5 GHz, WR42-K(f)
35WR28K	26.5 to 40 GHz, WR28-K(m)
35WR28KF	26.5 to 40 GHz, WR28-K(f)
35WR22K	33 to 50 GHz, WR22-K(m)
35WR22KF	33 to 50 GHz, WR22-K(f)
35WR22V	33 to 50 GHz, WR22-V(m)
35WR22VF	33 to 50 GHz, WR22-V(f)
35WR19K	40 to 50 GHz (usable to 54 GHz), WR19-K(m)
35WR19KF	40 to 50 GHz (usable to 54 GHz), WR19-K(f)
35WR19V	40 to 60 GHz, WR19-V(m)
35WR19VF	40 to 60 GHz, WR19-V(f)
35WR15V	50 to 65 GHz (usable to 67 GHz), WR15-V(m)
35WR15VF	50 to 65 GHz (usable to 67 GHz), WR15-V(f)

Outline drawings for the 35 Series Waveguide-to-Coaxial Adapters, 18 to 65 GHz, are shown on the following two pages.

INSTRUMENTATION GRADE ADAPTERS

35WR Series 18 to 65 GHz

Outline Drawings



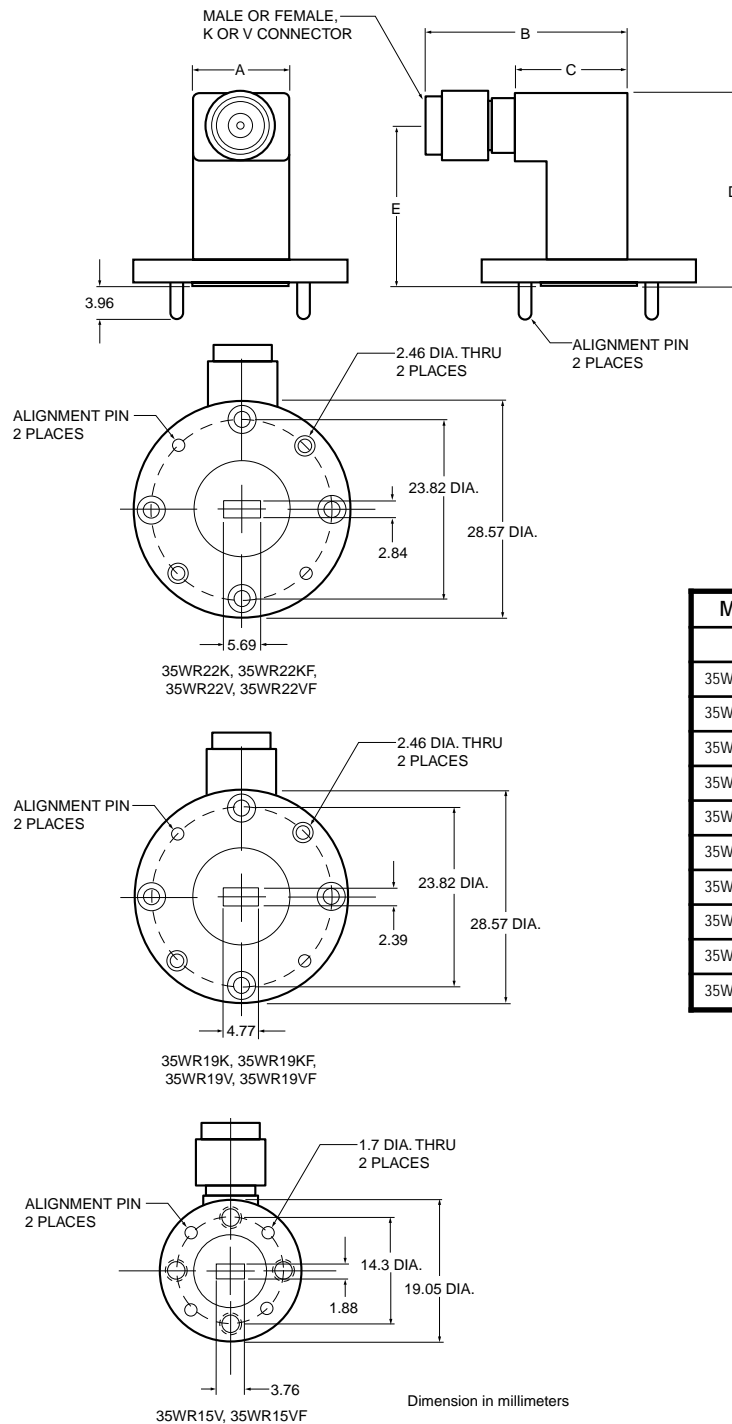
Model	Dimensions (mm)				
	A	B	C	D	E
35WRD180K8	13.20	27.9	14.43	28.40	23.80
35WRD180KF	13.20	22.9	14.43	28.40	23.80
35WR42K	13.20	27.9	14.43	28.14	23.93
35WR42KF	13.20	22.9	14.43	28.14	23.93
35WR28K	10.67	27.9	14.86	28.78	23.93
35WR28KF	10.67	22.9	14.86	28.78	23.88

35WRD180K, 35WRD180KF, 35WR42K, 35WR42KF, 35WR28K, 35WR28KF outlines

INSTRUMENTATION GRADE ADAPTERS

35WR Series 18 to 65 GHz

Outline Drawings



Model	Dimensions (mm)				
	A	B	C	D	E
35WR22K	12.70	26.9	14.73	25.76	21.44
35WR22KF	12.70	21.6	14.73	25.76	21.44
35WR22V	12.70	26.9	14.73	25.76	21.44
35WR22VF	12.70	21.6	14.73	25.76	21.44
35WR19K	12.70	26.9	14.73	25.76	21.44
35WR19KF	12.70	21.6	14.73	25.76	21.44
35WR19V	12.70	27.9	14.73	25.76	21.44
35WR19VF	12.70	22.6	14.73	25.76	21.44
35WR15V	12.70	24.4	12.19	26.97	21.62
35WR15VF	12.70	20.3	12.19	26.97	21.62

35WR22K, 35WR22KF, 35WR22V, 35WR22VF, 35WR19K, 35WR19KF, 35WR19V, 35WR19VF, 35WR15V, and 35WR15VF outlines

INSTRUMENTATION GRADE ADAPTERS

35U, 35C Series 3.3 to 26.5 GHz



The 35U and 35C Series precision adapters transform standard waveguide to coaxial N and K Connector® interfaces, thus enabling convenient microwave coaxial measurements.

Features

- 3.3 to 26.5 GHz frequency coverage
- N connector compatibility
- K Connector® compatibility with SMA and 3.5 mm

Specifications

Model	Frequency range (GHz)	Connectors	W/G flange UG(-) U	SWR
35UM40N	3.3 to 4.9	WR229 to N(m) WG11A to N(m)	PDR40	1.08
35UM48N	3.9 to 5.8	WR187 to N(m) WG12 to N(m)	CAR48, PAR48, UAR48, PDR48	1.08
35UM58N	4.9 to 7.0	WR159 to N(m) WG13 to N(m)	CAR58, PAR58, UAR58, PDR58	1.08
35UM70N	5.8 to 8.2	WR137 to N(m) WG14 to N(m)	CAR70, PAR70, UAR70, PDR70	1.08
35UM84N	7.0 to 10	WR112 to N(m) WG15 to N(m)	CBR84, UBR84, PBR84, PDR84	1.08
35UM100N	8.2 to 12.4	WR90 to N(m) WG16 to N(m)	CBR100, UBR100, PBR100, PDR100	1.08
35UM120N	10 to 15	WR75 to N(m) WG17 to N(m)	CBR120, UBR120, PBR120, PDR120	1.08
35UM140N	12.4 to 18	WR62 to N(m) WG18 to N(m)	CBR140, UBR140, PBR140, PDR140	1.08
35UM220K	17 to 26.5	WR42 to K(m) WG20 to K(m)	CBR220, UBR220, PBR220, PDR220	1.20
35UA229N	3.3 to 4.9	WR229 to N(m) WG11A to N(m)	CPR229F, CPR229G, UG-1350/U, UG-1351/U, UG-1726/U, UG-1727/U	1.08
35UA187N	3.9 to 5.8	WR187 to N(m) WG12 to N(m)	CPR187F, CPR187G, UG-1352/U, UG-1353/U, UG-1728/U, UG-1729/U, UG-148/U, UG-149A/U	1.08
35UA159N	4.9 to 7.0	WR159 to N(m) WG13 to N(m)	CPR159F, CPR159G, UG-1354/U, UG-1355/U, UG-1730/U, UG-1731/U	1.08
35UA137N	5.8 to 8.2	WR137 to N(m) WG14 to N(m)	CPR137F, CPR137G, UG-1356/U, UG-1357/U, UG-1732/U, UG-1733/U, UG-343B/U, UG-344/U, UG-440B/U, UG-441/U	1.08

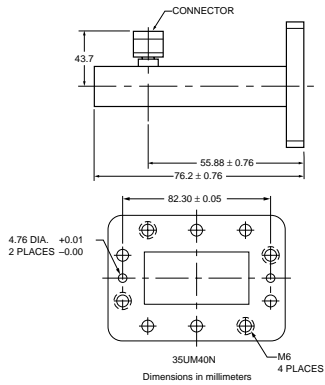
Specifications

Model	Frequency range (GHz)	Connectors	W/G flange UG(-) U	SWR
35UA112N	7.0 to 10	WR112 to N(m) WG15 to N(m)	CPR112F, CPR112G, UG-1358/U, UG-1359/U, UG-1734/U, UG-1735/U, UG-52B/U, UG-51/U, UG-137B/U, UG-138/U	1.08
35UA90N	8.2 to 12.4	WR90 to N(m) WG16 to N(m)	CPR90F, CPR90G, UG-1360/U, UG-1361/U, UG-1736/U, UG-1737/U, UG-40B/U, UG-39/U, UG-135B/U, UG-136/U	1.08
35UA75N	10 to 15	WR75 to N(m) WG17 to N(m)	WR75	1.08
35UA62N	12.4 to 18	WR62 to N(m) WG18 to N(m)	UG-541A/U, UG-419A/U UG-1665/U, UG-1666/U	1.08
35UA42K	17 to 26.5	WR42 to K(m) WG20 to K(m)	UG-596A/U, UG-595/U, UG-597/U, UG-598A/U	1.08
35CMR229N	3.3 to 4.9	WR229 to N(m)	CMR229	1.08
35CMR187N	3.9 to 5.8	WR187 to N(m) WG12 to N(m)	CMR187, UG-1475/U, UG-148/U	1.08
35CMR159N	4.9 to 7.0	WR159 to N(m) WG13 to N(m)	CMR159	1.08
35CMR137N	5.8 to 8.2	WR137 to N(m) WG14 to N(m)	CMR137, UG-1476/U 1UG-1481/U	1.08
35CMR112N	7.0 to 10	WR112 to N(m) WG15 to N(m)	CMR112, UG-1477/U UG-1482/U	1.08
35CMR90N	8.2 to 12.4	WR90 to N(m) WG16 to N(m)	CMR90, UG-1478/U UG-1483/U	1.08
35UER40N	3.3 to 4.9	WR229 to N(m) WG11A to N(m)	UER40	1.08
35UER48N	3.9 to 5.8	WR187 to N(m) WG12 to N(m)	UER48	1.08
35UER58N	4.9 to 7.0	WR159 to N(m) WG13 to N(m)	UER58	1.08
35UER70N	5.8 to 8.2	WR137 to N(m) WG14 to N(m)	UER70	1.08
35UER84N	7 to 10	WR112 to N(m) WG15 to N(m)	UER84	1.08
35UER100N	8.2 to 12.4	WR90 to N(m) WG16 to N(m)	UER100	1.08

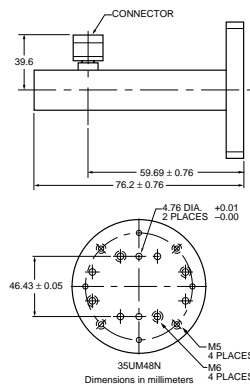
INSTRUMENTATION GRADE ADAPTERS

35U, 35C Series 3.3 to 26.5 GHz

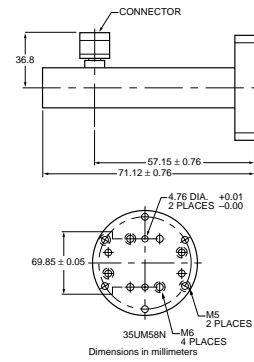
Outline Drawings



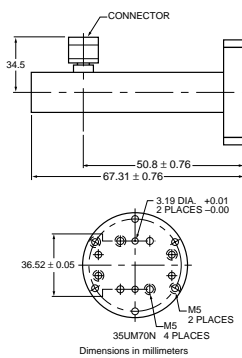
35UM40N outline



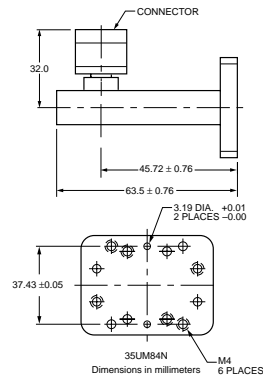
35UM48N outline



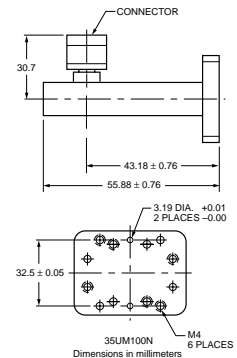
35UM58N outline



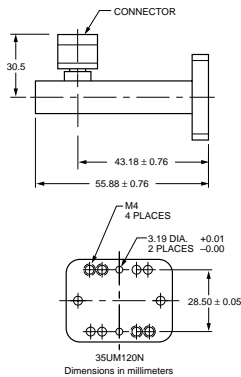
35UM70N outline



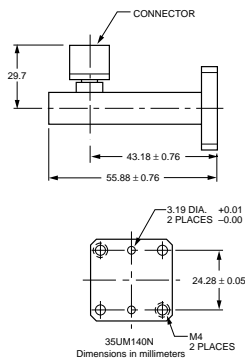
35UM84N outline



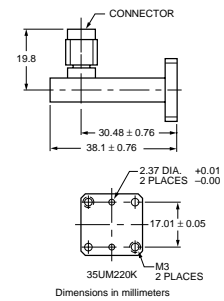
35UM100N outline



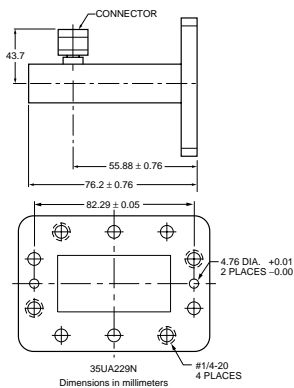
35UM120N outline



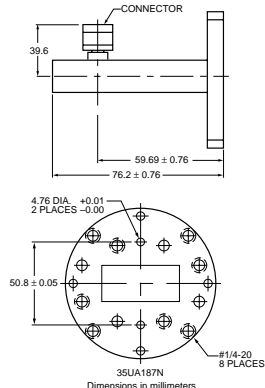
35UM140N outline



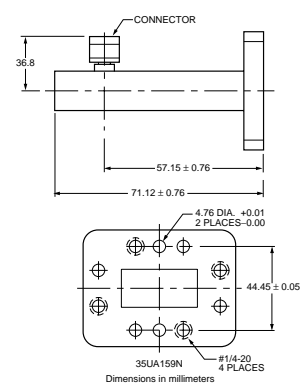
35UM220K outline



35UA229N outline



35UA187N outline

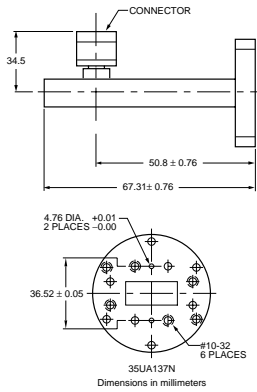


35UA159N outline

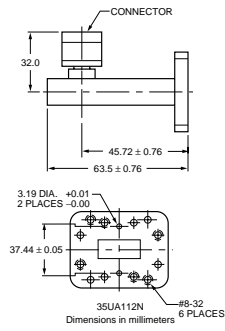
INSTRUMENTATION GRADE ADAPTERS

35U, 35C Series 3.3 to 26.5 GHz

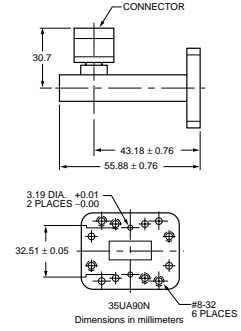
Outline Drawings



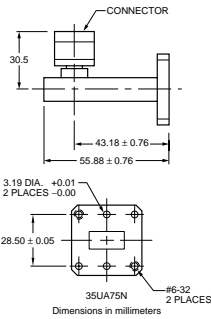
35UA137N outline



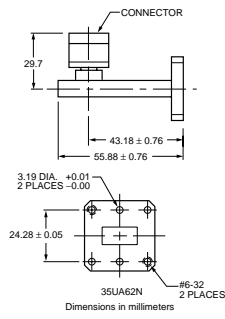
35UA112N outline



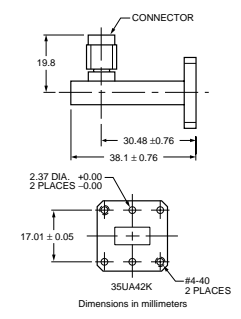
35UA90N outline



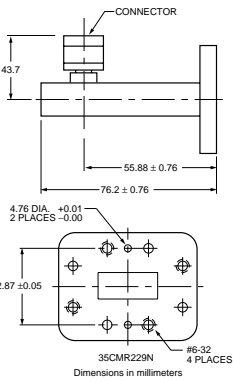
35UA75N outline



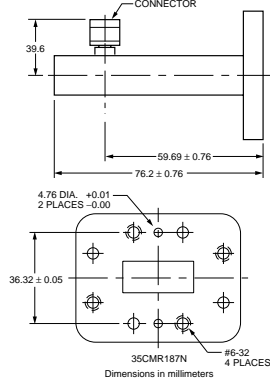
35UA62N outline



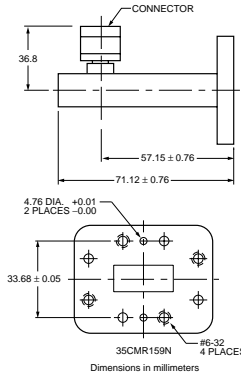
35UA42K outline



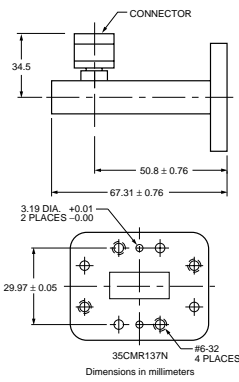
35CMR229N outline



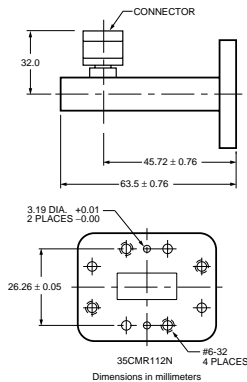
35CMR187N outline



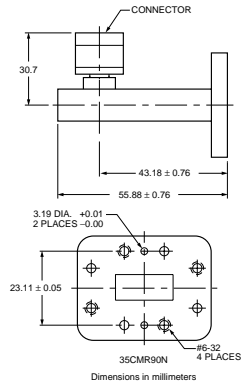
35CMR159N outline



35CMR137N outline



35CMR112N outline

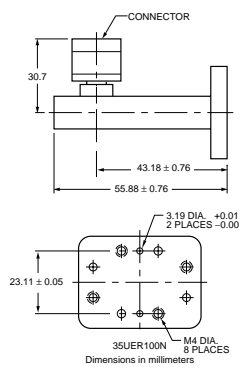
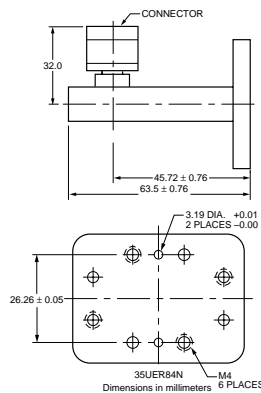
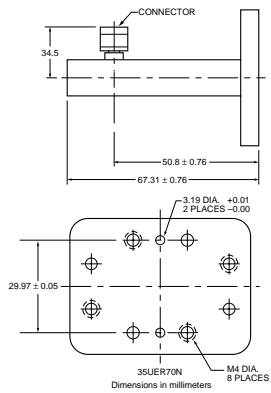
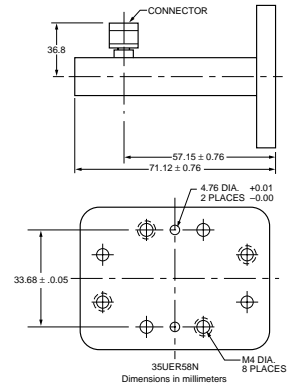
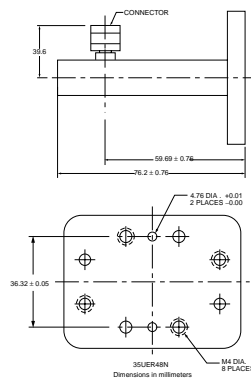
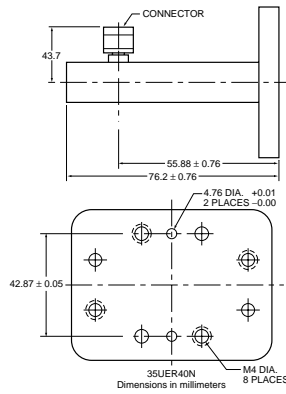


35CMR90N outline

INSTRUMENTATION GRADE ADAPTERS

35U, 35C Series 3.3 to 26.5 GHz

Outline Drawings



Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	Coaxial adapter
35UM40N	N(m), metric, 3.30 to 4.90 GHz
35UM48N	N(m), metric, 3.95 to 5.85 GHz
35UM58N	N(m), metric, 4.90 to 7.05 GHz
35UM70N	N(m), metric, 5.85 to 8.20 GHz
35UM84N	N(m), metric, 7.05 to 10.00 GHz
35UM100N	N(m), metric, 8.20 to 12.40 GHz
35UM120N	N(m), metric, 10.00 to 15.00 GHz
35UM140N	N(m), metric, 12.40 to 18.0 GHz
35UM220K	K(m), metric, 17.00 to 26.5 GHz
35UA229N	N(m), US, 3.30 to 4.90 GHz
35UA187N	N(m), US, 3.95 to 5.85 GHz
35UA159N	N(m), US, 4.90 to 7.05 GHz
35UA137N	N(m), US, 5.85 to 8.20 GHz
35UA112N	N(m), US, 7.05 to 10.00 GHz
35UA90N	N(m), US, 8.20 to 12.40 GHz
35UA75N	N(m), US, 10.00 to 15.00 GHz
35UA62N	N(m), US, 12.40 to 18.0 GHz
35UA42K	K(m), US, 17.00 to 26.5 GHz
35CMR229N	N(m), CMR, 3.30 to 4.90 GHz
35CMR187N	N(m), CMR, 3.95 to 5.85 GHz
35CMR159N	N(m), CMR, 4.90 to 7.05 GHz
35CMR137N	N(m), CMR, 5.85 to 8.20 GHz
35CMR112N	N(m), CMR, 7.05 to 10.00 GHz
35CMR90N	N(m), CMR, 8.20 to 12.40 GHz
35UER40N	N(m), UER, 3.30 to 4.90 GHz
35UER48N	N(m), UER, 3.95 to 5.85 GHz
35UER58N	N(m), UER, 4.90 to 7.05 GHz
35UER70N	N(m), UER, 5.85 to 8.20 GHz
35UER84N	N(m), UER, 7.05 to 10.00 GHz
35UER100N	N(m), UER, 8.20 to 12.40 GHz

For further information about these products and more, contact us at 1-800-ANRITSU or visit www.us.anritsu.com

COAXIAL TERMINATIONS

26, 28, 29 Series DC to 67 GHz



26NF75



28KF50



28K50



28V50B



29A50-20



28N50-2

These precision, metrology-grade terminations are used in measurement systems that need to achieve the smallest possible reflections. Their excellent match makes them ideal as a reference for fault location measurements on scalar network analyzers.

Precision termination features

- Accurate reference for SWR measurements
- Precise termination for test instrument or device under test

Precision termination specifications

Model	Frequency range (GHz)	Test port connector	Input impedance (Ohms)	SWR (F in GHz)	Dimensions L(cm) x dia(cm)
26N75A 26NF75A	DC to 3	N(m) N(f)	75	1.013 Max.	5.2 x 2.2 4.8 x 1.6
28A50-1	DC to 18	GPC-7	50	1.02 Max.	5.2 x 2.2
28N50-2 28NF50-2	DC to 18	N(m) N(f)	50	1.02 Max.	5.2 x 2.2 4.8 x 1.6
28N50-3 28NF50-3	DC to 8	N(m) N(f)	50	1.03 Max.	5.2 x 2.2 4.8 x 1.6
28S50-1 28SF50-1	DC to 26.5	WSMA(m) WSMA(f)	50	1.020 to 18.5 GHz 1.153 to 26.5 GHz	3.7 x 1.2 3.7 x 1.2
28K50 28KF50	DC to 40	K(m) K(f)	50	1.040 to 18.5 GHz 1.070 to 26.5 GHz 1.135 to 40 GHz	3.7 x 1.2 3.7 x 1.2
28V50B 28VF50B	DC to 67	V(m) V(f)	50	1.018 to 6 GHz 1.058 to 26.5 GHz 1.074 to 40 GHz 1.12 to 60 GHz 1.25 to 67 GHz	3.7 x 1.2 3.7 x 1.2

Maximum Input Power: 0.5 W

When used with Anritsu airlines, the 29 Series Offset Terminations permit measurements down to 1.006 SWR to 18 GHz, 1.01 SWR to 26.5 GHz, and 1.02 SWR to 40 GHz.

Offset termination features

- 50 Ω Offset Terminations for precise measurement of low SWR or high directivity
- Measurements down to 1.006 SWR to 18 GHz, 1.01 SWR to 26.5 GHz, and 1.02 SWR to 40 GHz

Offset termination specifications

Model	Frequency range (GHz)	Test port connector	Return loss (dB)	Dimensions L(cm) x dia(cm)
29A50-20	DC to 18	GPC-7	20 ±0.5 to 1 GHz 20 ±1.0 to 4 GHz 20 ±1.5 to 18 GHz	5.2 x 2.2
29S50-20	DC to 26.5	WSMA(m)	20 ±1.5 to 18.5 GHz 20 ±2.5 to 26.5 GHz	3.7 x 1.2
29SF50-20	DC to 26.5	WSMA(f)	20 ±1.5 to 18.5 GHz 20 ±2.5 to 26.5 GHz	3.7 x 1.2
29K50-15	DC to 40	K(m)	15 ±1.5 to 18.5 GHz 15 ±2.5 to 26.5 GHz 15 ±3.5 to 40 GHz	3.7 x 1.2
29KF50-15	DC to 40	K(f)	15 ±1.5 to 18.5 GHz 15 ±2.5 to 26.5 GHz 15 ±3.5 to 40 GHz	3.7 x 1.2

Temperature range: +25°C ±5°C

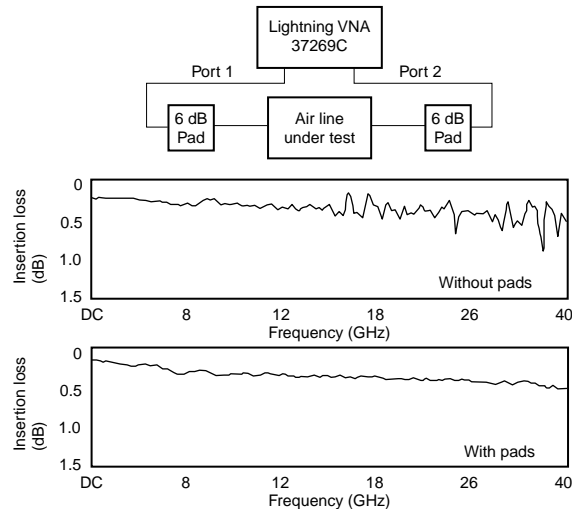
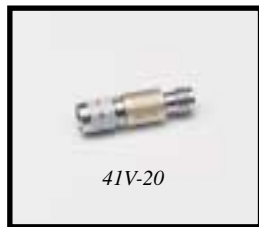
Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
Precision termination	
26N75A	DC to 3 GHz, 75 Ω, N(m)
26NF75A	DC to 3 GHz, 75 Ω, N(f)
28A50-1	DC to 18 GHz, 50 Ω, GPC-7, Max. SWR=1.02
28N50-2	DC to 18 GHz, 40 dB, 50 Ω, N(m)
28NF50-2	DC to 18 GHz, 40 dB, 50 Ω, N(f)
28N50-3	DC to 8.6 GHz, 50 Ω, N(m)
28NF50-3	DC to 8.6 GHz, 50 Ω, N(f)
28S50-1	DC to 26.5 GHz, 50 Ω, WSMA(m) (selected for higher accuracy)
28SF50-1	DC to 26.5 GHz, 50 Ω, WSMA(f) (selected for higher accuracy)
28K50	DC to 40 GHz, 50 Ω, K(m)
28KF50	DC to 40 GHz, 50 Ω, K(f)
28V50B	DC to 65 GHz, V(m)
28VF50B	DC to 65 GHz, V(f)
Offset termination	
29A50-20	DC to 18 GHz, 50 Ω, GPC-7, 20 dB return loss
29S50-20	DC to 26.5 GHz, 50 Ω, WSMA(m), 20 dB return loss
29SF50-20	DC to 26.5 GHz, 50 Ω, WSMA(f), 20 dB return loss
29K50-15	DC to 40 GHz, 50 Ω, K(m), 15 dB return loss
29KF50-15	DC to 40 GHz, 50 Ω, K(f), 15 dB return loss

FIXED ATTENUATORS

41, 43 Series DC to 60 Series



Improved Measured Accuracy

Anritsu offers two series of fixed attenuators:

- *The Gold Line (Series 41) for precision measurement applications covering DC to 60 GHz*
- *The Silver Line (Series 43) for use in systems and OEM equipment covering DC to 40 GHz*

Both series offer fixed attenuation values of 3, 6, 10, or 20 dB with models that span frequency range of DC to 26.5 GHz, 40 GHz, or 60 GHz

Features

- *3, 6, 10, or 20 dB Attenuation up to 60 GHz*
- *Low SWR, 1.28 Up to 40 GHz*
- *SMA, 3.5 mm, and 2.4 mm compatibility*
- *Rugged and reliable K Connector® and V Connector®*

Advanced performance and reliability

Anritsu attenuators define the standard for fixed attenuator performance and reliability. Performance, however, is not their only distinguishing feature. Attenuators that use the K Connector® offer a vast improvement in reliability, compared to attenuators with SMA connectors. Attenuators that use the V Connector® can be connected directly to 2.4 mm devices.

For applications in metrology and calibration laboratories where precise characterization is essential, the Gold Line models are available in sets consisting of 3, 6, 10, and 20 dB units. Each is provided with attenuation and SWR calibration data. Calibration data is also optionally available for individual units, each of which is serialized.

The reliability of the attenuator connectors is affected by insertion force, outer conductor mating area, and mating alignment. The K Connector® is used because it has excellent performance in all of these areas. For example, a typical female SMA, 3.5 mm center conductor requires up to 27N* of insertion force compared to 2.2N* for the K Connector®. In addition, the K Connector® outer conductor is four times thicker than SMA, resulting in a conservative order-of-magnitude improvement in the number of reliable connections.

To avoid a major cause of connector failure, the K Connector® male pin is deliberately made shorter than the SMA pin. Therefore, the outer housing is properly aligned prior to center conductor mating, preventing destructive alignment.

Gold Line - improved measurement accuracy

Adding Gold Line attenuators to your attenuation measurement setup will improve your measurement accuracy. In the test setup shown, the insertion loss of an air line was measured, first without and then with matching 6 dB pads. The difference in the accuracy of the two measurements is striking. By attenuating reflections and re-reflections that occur at the input and output of the air line, the pads reduce mismatch errors and allow the system to measure more accurately the actual insertion loss.

Silver Line - improved system reliability

Fixed attenuators used in systems or OEM equipment must be small, lightweight, economical, and reliable under severe environmental conditions. The Silver Line meets these requirements. K Connectors ensure well-seated, low-reflection connections that provide consistent operation year after year.

The Series 43 (Silver Line) attenuator's small size, 8 mm dia. x 28.8 mm length, and light weight, 8g make them an attractive choice for miniaturized, lightweight systems.

* Force is measured in Newtons (N).

FIXED ATTENUATORS

41, 43 Series DC to 60 Series

Common specifications

Impedance		50 Ohms
Power rating (average)		2W at 20°C; 1W at 85°C
Temperature coefficient		0.001 dB/dB/°C
Connectors	V Connector®	Male and female compatible with 2.4 mm
	K Connector®	Male and female, compatible with SMA and 3.5 mm
Material		Passivated stainless steel housing
Size	Length	28.8 mm ±0.5 mm
	Diameter	8 mm
Weight		8g
Temperature range	Operating	-55°C to +85°C
	Nonoperating	-55°C to +125°C

Specifications

	Model ¹	Attenuation (dB)	Attenuation Accuracy				SWR				
			DC-18 GHz	18-26.5 GHz	26.5-40 GHz	40-60 GHz	DC-12 GHz	12-18 GHz	18-26.5 GHz	26.5-40 GHz	40-60 GHz
Gold Line	DC to 60 GHz										
	41V-3	3	±0.5	±0.6	±0.9	±1.20	1.15	1.20	1.30	1.50	1.90
	41V-6	6	±0.5	±0.6	±0.9	±1.20	1.15	1.20	1.25	1.40	1.70
	41V-10	10	±0.5	±0.6	±0.9	±1.20	1.15	1.20	1.25	1.40	1.70
	41V-20	20	±0.5	±0.6	±0.9	±1.20	1.15	1.20	1.25	1.40	1.70
	DC to 40 GHz										
	41KC-3	3	±0.4	±0.5	±0.8	-	1.10	1.15	1.23	1.42	-
	41KC-6	6	±0.4	±0.5	±0.8	-	1.10	1.15	1.18	1.28	-
	41KC-10	10	±0.4	±0.5	±0.8	-	1.10	1.15	1.18	1.28	-
	41KC-20	20	±0.4	±0.5	±0.8	-	1.10	1.15	1.18	1.28	-
	DC to 26.5 GHz										
	41KB-3	3	±0.4	±0.5	-	-	1.10	1.15	1.23	-	-
41KB-6	6	±0.4	±0.5	-	-	1.10	1.15	1.18	-	-	
41KB-10	10	±0.4	±0.5	-	-	1.10	1.15	1.18	-	-	
41KB-20	20	±0.4	±0.5	-	-	1.10	1.15	1.18	-	-	
Silver Line	DC to 40 GHz										
	43KC-3	3	±0.5	±0.6	±0.9	-	1.15	1.20	1.30	1.50	-
	43KC-6	6	±0.5	±0.6	±0.9	-	1.15	1.20	1.30	1.40	-
	43KC-10	10	±0.5	±0.6	±0.9	-	1.15	1.20	1.30	1.40	-
	43KC-20	20	±0.5	±0.6	±0.9	-	1.15	1.20	1.30	1.40	-
	DC to 26.5 GHz										
	43KB-3	3	±0.5	±0.6	-	-	1.15	1.20	1.30	-	-
	43KB-6	6	±0.5	±0.6	-	-	1.15	1.20	1.30	-	-
	43KB-10	10	±0.5	±0.6	-	-	1.15	1.20	1.30	-	-
	43KB-20	20	±0.5	±0.6	-	-	1.15	1.20	1.30	-	-

1. For traceability, all Gold Line attenuators are serialized.

2. ±1 dB from DC to 26.5 GHz; ±1.3 dB from >26.5 to 40 GHz, including frequency response and DC offset.

Ordering information

Please specify model/order number, name, and quantity when ordering.

Single fixed attenuators may be ordered from the table above.

Model/Order No.	Name
	Precision Fixed Attenuator
41KB-3, 6, 10, or 20	3 dB, DC to 26.5 GHz, 50 Ω, K(m)-K(f)
41KC-3, 6, 10, or 20	3 dB, DC to 40 GHz, 50 Ω, K(m)-K(f)
41V-3, 6, 10, or 20	3 dB, DC to 60 GHz, 50 Ω, V(m)-V(f)
	Precision Fixed Attenuator Set
41KB-S*	41KB Series
41KC-S*	41KC Series
41V-S*	41V Series
	Fixed Attenuator
43KB-3, 6, 10, or 20	3 dB, DC to 26.5 GHz, 50 Ω, K(m)-K(f)
43KC-3, 6, 10, or 20	3 dB, DC to 40 GHz, 50 Ω, K(m)-K(f)
	Option
Option C**	Calibration Data

* A set of 3, 6, 10, and 20 dB Gold line (Series 41). Attenuators are supplied in a handsome hardwood case. Calibration data are included for each unit.

** Attenuation and SWR test data are provided for input and output ports at 500 MHz frequency intervals.

STEP ATTENUATORS

4400, 4500, 4600 Series DC to 40 GHz



4612K



4622K

Anritsu programmable step attenuators bring a substantial increase in the frequency and attenuation range available in one small package. Using the latest technology, these units offer superior performance, reliability, and ease of use to 40 GHz. All are plug-compatible with competitive units.

Features

- DC-20 GHz, DC-26.5 GHz, DC-40 GHz
- 70 dB and 110 dB attenuation ranges
- Lowest insertion loss
- Precise repeatability
- Life of 5 million operations
- Small, rugged, light weight

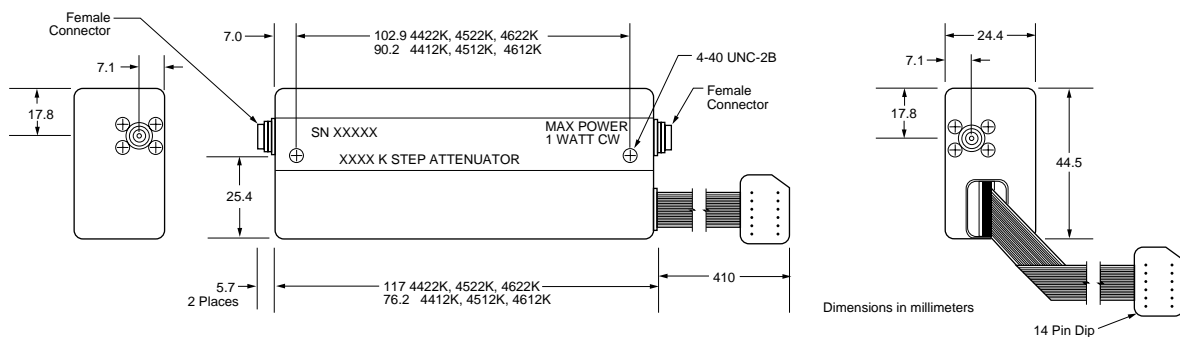
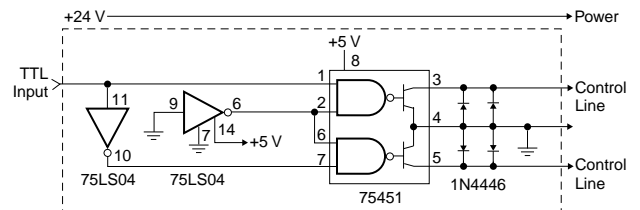
Advanced technology-advanced performance

Anritsu has lowered throughline loss by designing the first 40 dB attenuator sections to operate above 18 GHz. Compared with designs that use 30 dB sections, these attenuators have a shorter thru path and fewer switching contacts. As a result, insertion loss is as much as 1.7 dB less than that of units made by other companies. RF input power requirements for systems that use these attenuators can be reduced, saving money, space, and weight.

Integrated switching structure

The push rods that switch in the attenuator modules and thru lines are driven by a solenoid actuator. By designing the solenoid as an integral part of the attenuator assembly, switching speeds of 20 ms (including settling time) are achieved. Upon completion of the switching operation, the solenoid is magnetically latched to withstand severe shock and vibration. At the same time, the solenoid current is automatically turned off to save power and to minimize temperature rise.

Also integrated in the design is solid state dc switching circuitry that avoids the relatively high failure rate of mechanical DC switches. Each attenuator section is controlled by its own driver circuit, which requires 24V, 125 mA. A typical external driver circuit for one section is shown in the figure below.



4400, 4500, and 4600 series outline

STEP ATTENUATORS

4400, 4500, 4600 Series DC to 40 GHz

Accuracy enhancing calibration data

Attenuation accuracy can be improved by using optional calibration data taken on an Anritsu vector network analyzer. The calibration data can be used to normalize the effect of frequency response and reflections. The calibration data is traceable to NIST.

Specifications

Frequency and attenuation ranges

Model	Frequency range	Attenuation range in 10 dB steps	Connectors
4412K 4422K	DC to 20 GHz	0 to 70 dB 0 to 110 dB	K(f)
4512K 4522K	DC to 26.5 GHz	0 to 70 dB 0 to 110 dB	K(f)
4612K 4622K	DC to 40 GHz	0 to 70 dB 0 to 110 dB	K(f)

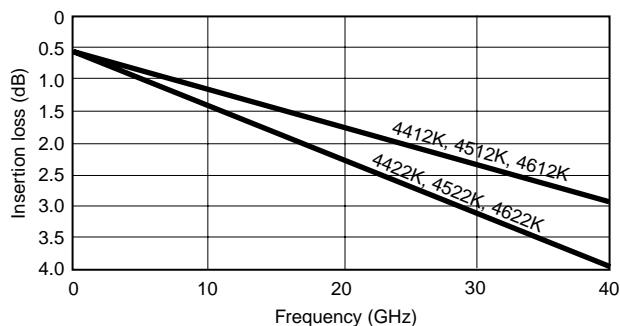
Attenuator accuracy (\pm dB)

Frequency (GHz)	Attenuation (dB)							
	10	20	30	40	50	60	70	80-110
DC to 8	0.3	0.5	0.6	0.7	0.8	1.0	1.1	1.4
>8 to 12	0.4	0.5	0.7	0.9	1.0	1.3	1.5	2.0
>12 to 20	0.5	0.6	0.8	1.1	1.2	1.4	1.7	2.2
>20 to 26.5	0.7	0.8	1.0	1.5	1.6	1.9	2.3	2.8
>26.5 to 40	0.9	1.0	1.2	1.7	1.9	2.3	2.6	3.2

Electrical

Switching speed (maximum)	20 ms
Operating voltage	20 to 30 Volts
Switching control current	125 mA at 24V nominal per section 3 sections in 4412K, 4512K, 4612K 4 sections in 4422K, 4522K, 4622K
Solenoid coil impedance	190 Ohms
Solenoid coil inductance	65 mH
RF input power (maximum)	1W average, 100W peak for 10 μ s
RF power sensitivity	0.001 dB/W
Life (minimum operations per section)	5 million
Repeatability (typical after 1 million operations)	\pm 0.03 dB to 18 GHz \pm 0.05 dB to 26.5 GHz \pm 0.08 dB to 40 GHz

Insertion loss (maximum)



Impedance match

Frequency (GHz)	Return loss (dB)	SWR
DC to 8	19	1.25
>8 to 12	14	1.5
>12 to 20	12.7	1.6
>20 to 26.5	11	1.8
>26.5 to 40	9	2.1

Mechanical

Weight	4412K, 4512K, 4612K: 170g 4422K, 4522K, 4622K: 213g
Mounting position	Any
RF connectors	K Connectors, female, in-line
Programming connector	14 pin DIP
Programming cable length	406 mm

Environment

Temperature	Operating:	0C to +70C
	Non-operating:	-55C to +85C
Altitude	Operating:	4.6 km (440 mm Hg)
	Non-operating:	15 km
Shock	Operating:	10g, 6 ms, on 6 sides, 3 blows
	Non-operating:	500g, 1.8 ms, in 6 directions
Humidity	0 to 95% relative humidity	
EMC	Mil-Std-461, Method RE02, VDE 0871, CISPR#2	

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
4412K	Step Attenuator, DC to 20 GHz, 70 dB
4512K	Step Attenuator, DC to 26.5 GHz, 70 dB
4612K	Step Attenuator, DC to 40 GHz, 70 dB
4422K	Step Attenuator, DC to 20 GHz, 110 dB
4522K	Step Attenuator, DC to 26.5 GHz, 110 dB
4622K	Step Attenuator, DC to 40 GHz, 110 dB
Options	
Option C*	Calibration Data (4412K, 4512K, 4612K)

*Calibration data is taken every 100 MHz from DC to 900 MHz and every 500 MHz from 1 GHz to 40 GHz.

SWR BRIDGES

61 Series 5 to 2500 MHz and 87 Series 2 to 18 GHz



61N50



87A50

The 61 series RF SWR Bridges are precision directional devices designed to make very accurate measurements of SWR. All models contain a built-in reference termination and preserve phase and amplitude of the reflected signal.

Features

- 5 to 2500 MHz frequency coverage
- 40 dB directivity
- Built-in reference termination
- Type N test port connectors

Specifications

Model	Frequency range (MHz)	Test port connector	Directivity (dB)	Impedance (Ohms)	Accuracy*
61N50	5-2500	Type N(m)	40	50	$0.01 + 0.09p^2$
61NF50	5-2500	Type N(f)	40	50	$0.01 + 0.09p^2$

Insertion loss	6.5 dB nominal from input to test port
Maximum input power	0.5W
Input and output connectors	Type N(f)
Dimensions	6.7 x 5.1 x 2.54 cm (excluding connectors)
Weight	340g

* Includes the effects of test port reflections and directivity.
p is the measured reflection coefficient.

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
61N50	SWR Bridge, 5 to 2500 MHz, Type N(m), 40 dB directivity
61NF50	SWR Bridge, 5 to 2500 MHz, Type N(f), 40 dB directivity

The 87 Series SWR Bridges are precision, high directivity measurement components, ideal for SWR and return loss measurements. Models include a built-in termination, and they are provided with an overall accuracy equation. These SWR bridges can be used for making very low-level SWR measurements by amplifying the RF output prior to detection. Since both the phase and amplitude of the reflected signal are preserved in the RF output, these components can also be used to make accurate phase comparisons in a network analyzer system.

Features

- Broadband 2 to 18 GHz frequency range
- High 38 dB directivity
- Precise GPC-7 test port connector
- Built-in reference termination

Specifications

Model	Directivity (dB)	Accuracy ¹		
		2 to 3 GHz	3 to 4 GHz	4 to 18 GHz
87A50	35	$0.018 + 0.32p^2$	$0.018 + 0.23p^2$	$0.018 + 0.015p^2$
87A50-1	38	$0.013 + 0.32p^2$	$0.013 + 0.23p^2$	$0.013 + 0.015p^2$

Frequency range	2 to 18 GHz
Insertion loss	6.5 dB nominal ²
Maximum input power	0.5W
Test port connector	GPC-7
Input and output connector	Type N(f)
Dimensions	7.3 x 5.2 x 2.9 cm plus connectors
Weight	340g

1. Where p is the measured reflection coefficient.
2. Typically 9 dB at 18 GHz from input to test port.

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
87A50	SWR Bridge, 2 to 18 GHz, GPC-7, 35 dB directivity
87A50-1	SWR Bridge, 2 to 18 GHz, GPC-7, 38 dB directivity

Temperature range: +25°C ±5°C

SWR AUTOTESTERS

97 Series and 560-97, 560-98 Series 10 MHz to 50 GHz



The Series 97, 560-97 and 560-98 SWR Autotesters integrate a high directivity bridge, a detector, a low reflection test port, and a precision reference termination. The 560-97 and -98 Series units are broadband microwave measurement components that are used with the Model 56100A Scalar Network Analyzer and with Series 54100A Scalar Measurement System for making fixed-frequency and swept-frequency return loss (SWR) measurements. Return loss measurements are used over a wide range of radio and microwave frequencies to check the performance of systems, subsystems, and microwave components such as amplifiers, directional couplers, attenuators, filters, splitters, and terminations.

560-97, 98 Series SWR autotester features

- Up to 40 dB directivity
- 10 MHz to 50 GHz range
- Test port connectors to fit most measurement applications; avoids use of adapters

97 Series SWR autotester features

- High 40 dB directivity
- Low test port reflections
- Broadband 10 MHz to 18 GHz frequency range
- Small package including bridges, termination, and detector
- Selection of GPC-7, WSMA, or Type N test port connectors

Specifications

Models	Directivity (dB)	Accuracy ^①		Frequency Sensitivity (dB)	Test Port Connection	Physical
97 Series SWR Autotesters, 10 MHz to 18 GHz ^②						
97A50	36	10 MHz-8 GHz 0.016 ±0.06p ²	8-18 GHz 0.016 ±0.10p ²	±1.5 max.	GPC-7	Dimensions 7.6 x 5 x 2.8 cm plus connectors Weight: 340 g
97A50-1	40	0.010 ±0.06p ²	0.010 ±0.10p ²	±1.5 max.	GPC-7	
97N50 97NF50	35	0.018 ±0.08p ²	0.018 ±0.12p ²	±1.5 max.	Type N (m) Type N (f)	
97N50-1 97NF50-1	38	0.013 ±0.08p ²	0.013 ±0.12p ²	±1.5 max.	Type N (m) Type N (f)	
97S50 97SF50	35	0.018 ±0.08p ²	0.018 ±0.12p ²	±1.5 max.	WSMA (m) WSMA (f)	
97S50-1 97SF50-1	38	0.013 ±0.08p ²	0.013 ±0.12p ²	±1.5 max.	WSMA (m) WSMA (f)	
560-97 Series SWR Autotesters, 10 MHz to 18 GHz ^②						
560-97A50	36	0.01-8 GHz 0.013 ±0.08p ²	8-18 GHz 0.016 ±0.10p ²	±1.2	GPC-7	Dimensions ^③ 7.6 x 5 x 2.8 cm plus connectors Weight: 340 g
560-97A50-1	40	0.010 ±0.06p ²	0.010 ±0.10p ²	±1.2	GPC-7	
560-97N50 560-97NF50	35	0.018 ±0.08p ²	0.018 ±0.12p ²	±1.5	Type N (m) Type N (f)	
560-97N50-1 560-97NF50-1	38	0.013 ±0.08p ²	0.013 ±0.12p ²	±1.5	Type N (m) Type N (f)	

① Where ρ is the reflection coefficient being measured. Accuracy includes the effects of test port reflections and directivity.

② Input Connector: Type N Female

③ Plus connectors and cable

Temperature range: +25°C ±5°C

Continued on next page

SWR AUTOTESTERS

97 Series and 560-97, 560-98 Series 10 MHz to 50 GHz

Models	Directivity (dB)	Accuracy ^①				Freq. Sensitivity (dB)	Test Port Connection	Physical
560-98 Series SWR Autotesters, 10 MHz to 40 GHz ^②								
560-98S50 560-98SF50	37 36	0.01-8 GHz	8-18 GHz 0.014 ±0.01p ²	18-26.5 GHz 0.016 ±0.13p ²	26.5-40 GHz	±2.0	WSMA (m) WSMA (f)	Dimensions ^④ : 1.9 x 3.8 x 2.9 cm Weight: 198 g
560-98S50-1 560-98SF50-1	40 38	0.010 ±0.07p ²	0.010 ±0.01p ²	0.013 ±0.13p ²		±2.0	WSMA (m) WSMA (f)	
560-98K50 560-98KF50	35 32 30	0.018 ±0.07p ²	0.018 ±0.07p ²	0.026 ±0.15p ²	0.032 ±0.18p ²	±3.0	Type K (m) Type K (f)	
560-98 Series SWR Autotesters, 10 MHz to 50 GHz ^③								
560-98VA50 560-98VFA50	30	0.01-50 GHz 0.032 ±0.11p ²				±4.0	Type V (m) Type V (f)	Dimensions ^④ : 2.2 x 6.6 x 5.3 cm Weight: 198 g
560-97, 560-98 Offset SWR autotesters, 10 MHz to 40 GHz								
560-97A50-20	20	500 MHz-18 GHz ^⑤ 0.0015				±2.5	GPC-7	Dimensions ^④ : 7.6 x 5.1 x 2.8 cm Weight: 340 g
560-98KF50-15	15	800 MHz-40 GHz ^⑥ 0.0100				±4.0	Type K (m)	Dimensions ^④ : 2.2 x 6.6 x 5.3 cm Weight: 198 g

All Models:

Input Port Impedance: 50Ω

Insertion Loss (from input to test port): 6.5 dB nominal

Detector Output Polarity: Negative

Output Time Constant: 2 ms

Maximum Power Input: 0.5 watts (+27 dBm) (560-98C50A: +24 dBm)

Cable Length: 122 cm (4 ft)

① Where p is the reflection coefficient being measured. Accuracy includes the effects of test port reflections and directivity.

② Input Connector: Ruggedized Type K Female

③ Input Connector: Ruggedized Type V Female

④ Plus connectors and cable

⑤ When used with 18A50 Airline

⑥ When used with 19K50 Airline

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	SWR Autotester
97A50	10 MHz to 18 GHz, GPC-7, 36 dB directivity
97A50-1	10 MHz to 18 GHz, GPC-7, 40 dB directivity
97N50	10 MHz to 18 GHz, N(m), 35 dB directivity
97N50-1	10 MHz to 18 GHz, N(m), 38 dB directivity
97NF50	10 MHz to 18 GHz, N(f), 35 dB directivity
97NF50-1	10 MHz to 18 GHz, N(f), 38 dB directivity
97S50	10 MHz to 18 GHz, WSMA(m), 35 dB directivity
97S50-1	10 MHz to 18 GHz, WSMA(m), 38 dB directivity
97SF50	10 MHz to 18 GHz, WSMA(f), 35 dB directivity
97SF50-1	10 MHz to 18 GHz, WSMA(f), 38 dB directivity
560-97A50	10 MHz to 18 GHz, GPC-7, 50 Ω, 36 dB directivity
560-97A50-1	10 MHz to 18 GHz, GPC-7, 50 Ω, 40 dB directivity
560-97N50	10 MHz to 18 GHz, N(m), 50 Ω, 35 dB directivity
560-97N50-1	10 MHz to 18 GHz, N(m), 50 Ω, 38 dB directivity
560-97NF50	10 MHz to 18 GHz, N(f), 50 Ω, 35 dB directivity
560-97NF50-1	10 MHz to 18 GHz, N(f), 50 Ω, 38 dB directivity

Model/Order No.	Name
	SWR Autotester
560-98S50	10 MHz-26.5 GHz, WSMA(m), 50 Ω, directivity = 37 dB (<18 GHz), 36 dB (18 GHz)
560-98S50-1	10 MHz-26.5 GHz, WSMA(m), 50 Ω, directivity = 40 dB (<18 GHz), 38 dB (18 GHz)
560-98SF50	10 MHz-26.5 GHz, WSMA(f), 50 Ω, directivity = 37 dB (<18 GHz), 36 dB (18 GHz)
560-98SF50-1	10 MHz-26.5 GHz, WSMA(f), 50 Ω, directivity = 40 dB (<18 GHz), 38 dB (18 GHz)
560-98K50	10 MHz-40 GHz, K(m), 50 Ω, directivity = 35 dB (<18 GHz), 32 dB (18 to 26.5 GHz), 30 dB (26.5 GHz)
560-98KF50	10 MHz-40 GHz, K(f), 50 Ω, directivity = 35 dB (<18 GHz), 32 dB (18 to 26.5 GHz), 30 dB (26.5 GHz)
560-98VA50	10 MHz-50 GHz, V(m), 50 Ω, directivity = 36 dB (<20 GHz), 30 dB (20 GHz)
560-98VFA50	10 MHz-50 GHz, V(f), 50 Ω, directivity = 36 dB (<20 GHz), 30 dB (20 GHz)
	Offset SWR Autotester
560-97A50-20	10 MHz to 18 GHz, GPC-7, 20 dB offset reference in bridge
560-98KF50-15	10 MHz to 40 GHz, K(f), 15 dB offset reference in bridge

SWR AUTOTESTERS

5400-6 Series 1 MHz to 3000 MHz



The 5400-6 Series SWR Autotesters integrate a high directivity bridge, a detector, a low reflection test port, a precision reference termination, and a connecting cable. They are used with the Model 56100A Scalar Network Analyzers and with Series 54100A Scalar Measurement Systems for making fixed-frequency and swept-frequency return loss (SWR) measurements. Return loss measurements are used over a wide range of radio and microwave frequencies to check the performance of systems, subsystems, and microwave components such as amplifiers, directional couplers, attenuators, filters, splitters, and terminations.

Features

- 40 dB directivity.
- 1 MHz to 3000 MHz range
- F, N, or BNC type test port connectors

Specifications

Models	Directivity (dB)	Accuracy ^①			Test Port Connection	Physical
5400-67FF75 ^{②③}	40	10-1000 MHz 0.010 ±0.01p ²			F (f)	Dimensions ^④ : 2.5 x 5.1 x 7.0 cm Weight: 255 g
5400-6B50B ^③ 5400-6BF50B ^③	40	1-1500 MHz 0.010 ±0.01p ²			BNC (m) BNC (f)	
5400-6B75B ^{③⑤} 5400-6BF75B ^{③⑤}	40	0.010 ±0.10p ²			BNC (m) BNC (f)	
5400-6N50 ^③ 5400-6NF50 ^③	40	1-1000 MHz 0.010 ±0.05p ²	1000-3000 MHz 0.010 ±0.05p ²	2000-3000 MHz 0.010 ±0.05p ²	Type N (m) Type N (f)	
5400-6N75 ^{③⑤} 5400-6NF75 ^{③⑤}	40	0.010 ±0.05p ²	0.010 ±0.05p ²	0.010 ±0.05p ²	Type N (m) Type N (f)	

All Models:

Input Port Impedance: 50Ω (Except as Noted)

Insertion Loss (from input to test port): 6.5 dB nominal

Detector Output Polarity: Negative

Output Time Constant: 2 ms

Maximum Power Input: 0.5 watts (+27 dBm)

Cable Length: 122 cm (4 ft.)

① Where p is the reflection coefficient being measured. Accuracy includes the effects of test port reflections and directivity.

② Input Connector: BNC Female

③ Input Connector: Type N Female

④ Plus connectors and cable

⑤ Impedance 75Ω

Temperature range: +25°C ±5°C

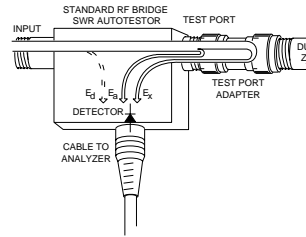
Ordering information

Please specify model/order number, name, and quantity when ordering.

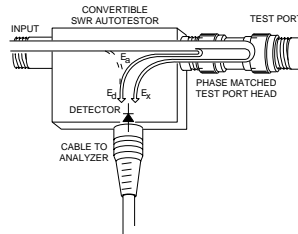
Model/Order No.	Name
	SWR Autotester
5400-6N50	1 to 3000 MHz, Type N(m), 50 Ω 40 dB Directivity
5400-6N75	1 to 3000 MHz, Type N(m), 75 Ω
5400-6NF50	1 to 3000 MHz, Type N(f), 50 Ω
5400-6NF75	1 to 3000 MHz, Type N(f), 75 Ω

CONVERTIBLE SWR AUTOTESTER

560-98C50A and Test Port Heads 10 MHz to 40 GHz



A test port adapter on a standard SWR Autotester or RF Bridge creates an error vector E_a in addition to directivity, E_d .



The directivity response of a Convertible SWR Autotester is tuned to cancel the vector reflection response of the phase-matched test port heads.

Convertible SWR Autotesters reduce capital equipment and maintenance costs. A single Convertible SWR Autotester accurately measures the Return Loss or SWR of devices with SMA, 3.5 mm, or K Connector®. Six interchangeable test port heads (male and female for each connector standard) are precision tuned to the Convertible SWR Autotester's internal bridge circuit.

The inexpensive test port heads save repair and calibration costs, because they are interchangeable. Repetitive connect/disconnect cycles will eventually wear out test port connectors — especially when excess torque is applied or the connector's mating surfaces are rotated against each other.

It is common practice today to avoid the subsequent maintenance cost by using adapters or "Connector Savers" on the test port of the directional device (RF Bridge, SWR Autotester, or Directional Coupler). Unfortunately, the adapters attached to a standard RF Bridge cause accuracy problems. Directional devices are tuned for optimum directivity at a specific phase reference point — this position is called the reference plane. Any test port adapter will degrade the effective directivity. The Convertible SWR Autotester's interchangeable test port heads eliminate the accuracy problem.

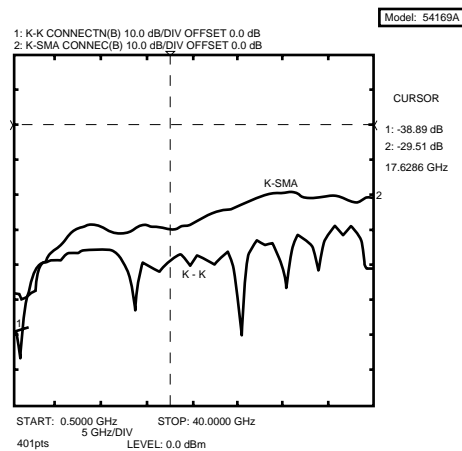
Adapter errors

In a standard RF bridge, measurement error increases when adapters or connector savers are used 1) to change the connector's sex and/or 2) to protect the test port from physical wear. The error effect is represented as a reduction to directivity. Effective Directivity is a measurement error term consisting of the directional device's directivity plus the SWR response of the test port adapter/connector saver.

Effective-Directivity is illustrated in the following illustration. The Directivity Error, E_d , is caused by deviations from ideal within the directional device. The adapter's SWR is represented by E_a . Both E_d and E_a cause errors in the measurement of DUT's return loss, E_x . This error problem is compounded by production practices which use poor quality adapters and neglect calibration/verification cycles.

Accuracy improvement

The Convertible SWR Autotester improves the accuracy of SMA device tests. It is common practice to test SMA devices with either 3.5 mm or K test ports. The 3.5 mm and K Connector® standards offer rugged, instrument grade connections, but they are not designed for proper impedance match to a device that has SMA connectors. SMA, K, and 3.5 mm connectors are mechanically compatible, but lack electrical compatibility. The resulting connector mismatch causes a 10 to 15 dB degradation in measurement directivity.



The Directivity of a K - K connector interface is far superior to a mismatched K - SMA connection

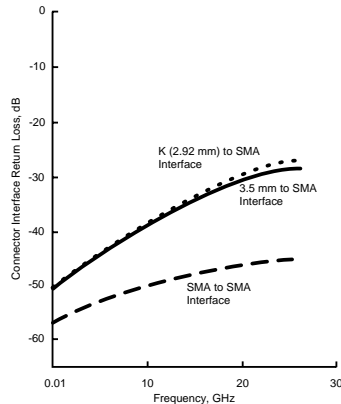
The above graph illustrates the degradation to directivity when a K Connector® test port is used to measure a precision SMA device. A 3.5 mm interface causes similar errors. The directivity was measured using the precision return loss mode on a 54100A Series Network Analyzer.

CONVERTIBLE SWR AUTOTESTER

560-98C50A and Test Port Heads 10 MHz to 40 GHz

K - SMA or 3.5 mm - SMA interfaces.

Electrically, the convertible SWR Autotester provides a nearly perfect 50 Ω interface when connected to SMA devices – resulting in a typical 10 dB improvement in effective directivity performance as compared to other SMA compatible connectors.



The Convertible SWR Autotester with SMA Test Port Head provides significantly better directivity performance than test components with either K (2.92 mm) or 3.5 mm test port connectors.

SMA connections to either K (2.92 mm) or 3.5 mm connectors are inherently capacitive. Both K and 3.5 mm connectors use air dielectric. The Teflon® or foam polyethylene dielectric common to SMA connectors have different dielectric constants than air. Thus, the coaxial dimensions of the center and outer conductors must also be different to maintain a 50 Ω transmission line impedance. Since the K and 3.5 mm connector standards specify flush pin depths, a non-50 Ω capacitance develops between their relatively thick outer conductors to the center pin of an SMA connected device.

Anritsu's 25S50 and 25SF50 SMA Test Port Heads include an inductive connection to SMA connectors by virtue of a slight air gap at the center pin interface. The air gap negates excess capacitance caused by the 50 Ω dimensional transition from the test port head's air dielectric to the SMA connector's Teflon® dielectric.

SMA connectors are not used as a precision instrumentation connector for three important reasons. First, the dielectric tends to expand and contract slightly with temperature and humidity conditions; thus, it is difficult to adhere to dimensional standards traceability (typically, precision air lines are used as primary or secondary reference standards) over a reasonable range of manufacturing floor conditions. Second, as an inexpensive connector type, many manufacturers have taken liberties in the specification of dimensions, tolerances, dielectric types and metallurgic content. A precision standard for SMA connector design is not recognized by the microwave industry. Finally, SMA designs suffer from reliability problems when subjected to multiple connections. Center pins can back out easily and the thin outer conductor wall is easily crushed when subjected to excessive torque.

The Convertible SWR Autotester solves these problems. Air dielectric is used to eliminate the temperature and humidity variations suffered by Teflon® and other dielectrics. Dimensional tolerances and metallic composition are clearly specified in the product design and center pin dimensions are phase matched. Air dielectric also allows use of thicker outer conductors, drastically decreasing potential deformation from excessive torque.

The Convertible SWR Autotester reduces maintenance costs without using error prone test port adapters or connector savers.

Accuracy for SMA device test is also improved because the test port head is properly compensated for operation with standard SMA connector dimensions.

Specifications

Frequency Range	0.01 to 40 GHz
Directivity	> 34 dB 0.01 to 20 GHz > 32 dB 20.0 to 26.5 GHz > 29 dB 26.5 to 40.0 GHz
Test Port Match	> 21 dB 0.01 to 20.0 GHz > 18 dB 20.0 to 40.0 GHz
Maximum Input Power	+ 27 dBm
Source Input to Test Port Isolation	7.0 dB to 9.0 dB nominal insertion loss, frequency dependent.
Impedance	50 Ω
Input Connector	K(f), 2.92 mm with ruggedized threads
Compatibility	The 560-98C50 is compatible with the 560, 560A, 561, 5400A, 56100A, 562, 54100A and 54000A analyzers.
Dimensions	Autotester: 7.3 cm x 5.3 cm x 2.3 cm Test Port Heads: 16 mm(L) x 9 mm (dia.)

Temperature range: +25°C \pm 5°C

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
560-98C50A*	Convertible SWR Autotester
	Open/Shorts
22K50	Male Open/Short, (Included with 560-98C50A purchase.)
22KF50	Female Open/Short, (Not included with 560-98C50A purchase.)
	Test Port Heads
25S50	Precision Matched WSMA male
25SF50	Precision Matched WSMA female
25L50	Precision Matched 3.5 mm male
25LF50	Precision Matched 3.5 mm female
25K50	Precision Matched K male
25KF50	Precision Matched K female
25SKF50	Precision Matched Set, WSMA male & female, K male & female
25SLF50	Precision Matched Set, WSMA male & female, 3.5 mm male & female, K Connector male & female

* The Convertible SWR Autotester must be used with a test head.

AIRLINES

18, 19 Series 2 to 40 GHz



18N50



18A50



19S50

The 18 and 19 Series Precision Airlines are the most accurate impedance standards available today, and they are the recognized traceability path for impedance at high frequencies. Anritsu airlines are a critical component when measuring accurate impedances, enabling measurements down to 1.006 SWR to 18 GHz, 1.01 SWR to 26.5 GHz, and 1.02 SWR to 40 GHz.

A beadless connector is used at the measurement end to provide a minimum reflection connection. The other end is beaded to keep the center conductor captive, thus fixing the reference plane at the beadless end.

Features

- Virtually lossless gold over silver plating
- Provide impedance traceability to NIST
- Enable measurements down to 1.006 SWR to 18 GHz, 1.01 SWR to 26.5 GHz, and 1.02 SWR to 40 GHz

Specifications

Model	Frequency range (GHz)	Test port connector	Beaded port connector	SWR (test port)	Dimensions L(cm) x dia(cm)
18A50	0.5 to 18	GPC-7	GPC-7	1.003	30 x 0.7
18N50 18NF50	0.5 to 18	N(m) N(f)	GPC-7	1.006	30 x 0.7
19S50 19SF50	0.8 to 26.5	WSMA(m) WSMA(f)	WSMA(m)	1.006 to 18 GHz 1.010 to 26.5 GHz	25 x 0.35
19K50 19KF50	0.8 to 40	K(m) K(f)	K(m)	1.020	15 x 0.29

Temperature range: +25°C ±5°C

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	Precision Air Line
18A50	0.5 to 18 GHz, 50 Ω, GPC-7
18N50	0.5 to 18 GHz, 50 Ω, N (m)
18NF50	0.5 to 18 GHz, 50 Ω, N (f)
19K50	0.8 to 40 GHz, 50 Ω, K(m)
19KF50	0.8 to 40 GHz, 50 Ω, K(f)
19S50	0.8 to 26.5 GHz, 50 Ω
19SF50	0.8 to 26.5 GHz, 50 Ω

OPEN/SHORTS

22 Series DC to 50 GHz



The 22 Series Open/Shorts are used on the test port of an SWR Autotester or SWR bridge to establish a full reflection reference for accurate SWR measurements. When used with scalar network analyzers, the open and short reflections over a swept frequency range can be automatically averaged to enhance measurement accuracy. All models consist of an open on one end and a short on the other.

Features

- Single gold-plated component providing full open and short reflections for accurate SWR measurements
- DC to 50 GHz frequency coverage
- GPC-7, Type N, WSMA, K Connectors® and V Connectors®
- 50 Ω or 75 Ω impedance

Specifications

Model	Frequency range (GHz)	Test port connector	Characteristic impedance (Ohms)	Dimensions L(cm) x dia(cm)
22N75 22NF75	DC to 2	N(m) N(f)	75	6.3 x 1.8 4.9 x 1.6
22N50 22NF50	DC to 18	N(m) N(f)	50	6.3 x 1.8 4.9 x 1.6
22A50	DC to 18	GPC-7	50	3.8 x 1.6
22S50 22SF50	DC to 26.5	WSMA(m) WSMA(f)	50	4.2 x 0.8 3.5 x 0.8
22K50 22KF50	DC to 40	K(m) K(f)	50	4.2 x 0.8 3.5 x 0.8
22V50 22VF50	DC to 50	V(m) V(f)	50	3.6 x 0.8 2.8 x 0.8

Temperature range: +25°C ±5°C

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	Open/Short
22N50	DC to 18 GHz, N(m), 50 Ω
22NF50	DC to 18 GHz, N(f), 50 Ω
22N75	DC to 3 GHz, N(m), 75 Ω
22NF75	DC to 3 GHz, N(f), 75 Ω
22A50	DC to 18 GHz, GPC-7 connector, 50 Ω
22K50	DC to 40 GHz, K(m), 50 Ω
22KF50	DC to 40 GHz, K(f), 50 Ω
22S50	DC to 26.5 GHz, WSMA(m), 50 Ω
22SF50	DC to 26.5 GHz, WSMA(f), 50 Ω
22V50	DC to 50 GHz, V(m), 50 Ω
22VF50	DC to 50 GHz, V(f), 50 Ω

OPEN/SHORTS/LOADS

OSL Series DC to 4 GHz



The OSL series open/short/load are used on the test port of the Site Master™ Series of handheld instruments to establish a reference for accurate measurement. When used with a Site Master, the open/short and load reflection over a swept frequency range can be automatically averaged to enhance measurement accuracy. OSL series Open/short/load comes in both N(Male) and N (Female) connector configuration and consist open on one end, short on other and Load on the tee section.

Features

- *Single Nickel Plated Component providing full open, short and load reflections for accurate measurements.*
- *DC to 4 GHz frequency coverage*
- *Type N(Male) and N(Female) connector configuration*
- *50 Ω Impedance*

Specifications

Model	Frequency range (GHz)	Test port connector	Characteristic impedance (Ohms)
OSLN50LF	DC to 4	N(m)	50
OSLNF50LF	DC to 4	N(f)	50

Temperature range: +25°C ±5°C

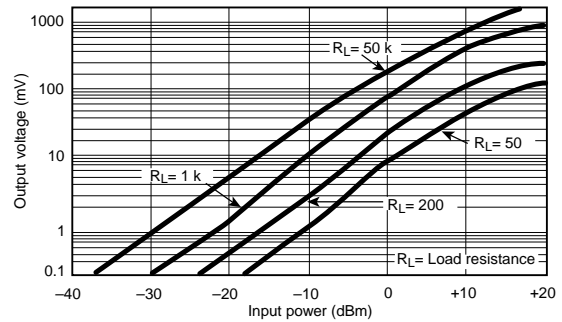
Ordering information

Please specify model/order number, name, and quantity when ordering.

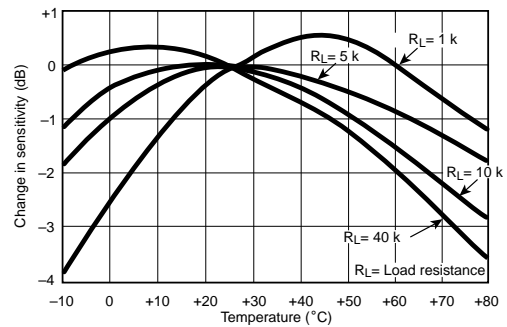
Model/Order No.	Name
	Open/Short/Load
OSLN50LF	DC to 4 GHz, N(m), 50 Ω
OSLNF50LF	DC to 4 GHz, N(f), 50 Ω

MICROWAVE DETECTORS

70, 75 Series 100 kHz to 50 GHz



Typical sensitivity



Typical sensitivity change

Within the 70 or 75 Series product lines, you will find a model that matches your needs for instrumentation, system, or OEM applications. By using the latest design and microelectronics production technologies, Anritsu low-barrier Schottky-diode detectors outperform others and offer significant cost savings. Input connector types include Type N, and K Connector® (compatible with SMA and 3.5 mm), and V Connector® (compatible with 2.4 mm). In addition to frequency coverage and price, these detectors are distinguished by their low SWR, flat frequency response, and close output-voltage tracking over a wide dynamic range.

Features

- Broadband coverage, 10 MHz to 50 GHz with a Single Detector
- K Connector® compatible with SMA and 3.5 mm
- V Connector® compatible with 2.4 mm
- Lowest SWR: 1.33 to 20 GHz, 1.5 to 40 GHz
- Flat Response: $\pm 0.5\text{ dB}$ to 20 GHz $\pm 1.5\text{ dB}$ to 40 GHz
- Best Value for Instrumentation, system, and OEM applications
- Low price and availability from stock

MICROWAVE DETECTORS

70, 75 Series 100 kHz to 50 GHz

Specifications

Model	Frequency range	Flatness (dB)	Connectors		Impedance (Ohms)	SWR (Maximum)	Low level sensitivity at -30 dBm (mV/μW)	High level sensitivity at +13 dBm (Volts, Min.)	Input maximum (mW)	Output capacitance (pF)
			In	Out						
70KA50	0.01 to 20 GHz	±0.6	K(m)	SMC(f)	50	1.33	0.6	1	100	30
70KC50	0.01 to 40 GHz	±0.5 to 20 GHz ±1.0 to 26.5 GHz ±1.5 to 40 GHz	K(m)	SMC(f)	50	1.33 to 20 GHz 1.50 to 26.5 GHz 1.90 to 40 GHz	0.4	1	100	30
75N50B	0.01 to 18 GHz	±0.3 to 12.4 GHz ±0.6 to 18 GHz	N(m)	BNC(f)	50	1.15 to 4.5 GHz 1.30 to 15 GHz 1.39 to 18 GHz	0.35	1	100	30
75KC50	0.01 to 40 GHz	±0.5 to 20 GHz ±1.0 to 26.5 GHz ±1.5 to 40 GHz	K(m)	BNC(f)	50	1.33 to 20 GHz 1.50 to 26.5 GHz 1.90 to 40 GHz	0.4	1	100	30
75VA50	0.01 to 50 GHz	±0.5 to 20 GHz ±1.0 to 26.5 GHz ±1.5 to 40 GHz ±3 to 50 GHz	V(m)	BNC(f)	50	1.33 to 20 GHz 1.50 to 26.5 GHz 1.90 to 40 GHz 2.1 to 50 GHz	0.4	1	100	30

Dimensions

Model	Dimensions L(cm) x dia(cm)
70KA50	4.6 x 1.0
70KC50	4.6 x 1.0
75N50B	6.4 x 1.8
75KC50	4.6 x 1.0
75VA50	4.6 x 1.0

Ordering information

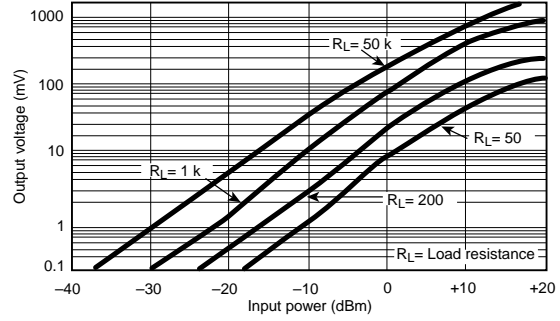
Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	Microwave Detector
70KA50	10 MHz to 20 GHz, K(m) input, SMC(f) output, 50 Ω
70KC50	10 MHz to 40 GHz, K(m) input, SMC(f) output, 50 Ω
75KC50	10 MHz to 40 GHz, K(m) input, BNC(f) output, 50 Ω
75N50B	10 MHz to 18.5 GHz, N(m) input, BNC(f) output, 50 Ω
75VA50	10 MHz to 50 GHz, V(m) input, BNC(f) output, 50 Ω
	Options
Option 2 (75KC50)	Matching frequency response of two detectors
Option 3 (75KC50)	Matching frequency response of three detectors

*Upper frequency limit (GHz): ≤8, ≤12.4, ≤18, ≤26.5, ≤40

**Frequency response tracking (dB): ±0.2, ±0.3, ±0.6, ±0.8, ±1.2

FIELD REPLACEMENT DIODE MODULE



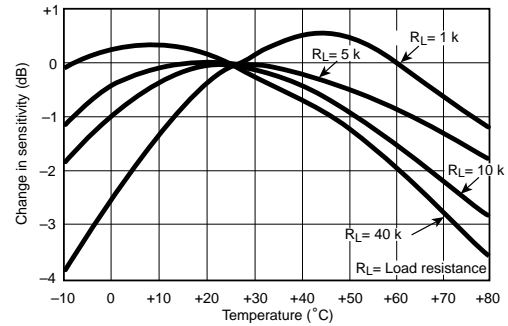
Typical sensitivity

Field replaceable diode modules provide field replacements for damaged diodes, virtually eliminating down time. To avoid all degradation in performance when a diode is replaced in the field, all replacement modules include the thin-film matching circuit. Performance after replacement cannot be distinguished from that of a new detector.

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	Diode module
10-108	71 & 73 Series
10-75	75A50
A16176	70K Series (≥ 20 GHz) and 75K Series (≥ 20 GHz)
A16177	70K Series (≤ 20 GHz) and 75K Series (≤ 20 GHz)
A18735	74N50B
B16132	75N50B



Typical sensitivity change

MICROWAVE DETECTORS

5400-71, 560-7 Series 1 MHz to 50 GHz



5400-71N50

The Anritsu 560-7 and 5400-71 Series RF Detectors are used with the Model 56100A Scalar Network Analyzer and with Series 54100A Scalar Measurement System for making coaxial transmission loss or gain and power measurements. They are also used with the Site Master® and Cable Mate® Series Personal SWR/RL and Fault Location Testers for making power measurements.

Features

- Zero-biased Schottky diodes
- -55 dBm to +16 dBm range

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	Microwave Detector
5400-71N50	1 to 3000 MHz, N(m), 50 Ω
5400-71N75	1 MHz to 3 GHz, N(m), 75 Ω
560-7A50	10 MHz to 18 GHz, GPC-7, 50 Ω
560-7K50	10 MHz to 40 GHz, K(m), 50 Ω
560-7N50B	10 MHz to 20 GHz, N(m), 50 Ω
560-7S50-2	10 MHz to 26.5 GHz, WSMA(m), 50 Ω
560-7S50B	10 MHz to 20 GHz, WSMA(m), 50 Ω
560-7VA50	10 MHz to 50 GHz, V(m), 50 Ω

Temperature range: 0°C to +70°C

Specifications*

Model	Frequency range	Impedance	Return loss	Input connector	Frequency response
560-7A50	0.01 to 18 GHz	50 Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz	GPC-7	±0.5 dB, 18 GHz
560-7N50B	0.01 to 20 GHz	50 Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <20 GHz	N(m)	±0.5 dB, <18 GHz ±1.25 dB, <20 GHz
560-7S50B	0.01 to 20 GHz	50 Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <20 GHz	WSMA(m)	±0.5 dB, <18 GHz ±1.25 dB, <20 GHz
560-7S50-2	0.01 to 26.5 GHz	50 Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <26.5 GHz	WSMA(m)	±0.5 dB, <18 GHz ±1.25 dB, <26.5 GHz
560-7K50	0.01 to 40 GHz	50 Ω	12 dB, <0.04 GHz 22 dB, <8 GHz 7 dB, <18 GHz 15 dB, <26.5 GHz 14 dB, <32 GHz 13 dB, <40 GHz	K(m)	±0.5 dB, <18 GHz ±1.25 dB, <26.5 GHz ±2.2 dB, <32 GHz ±2.5 dB, <40 GHz
560-7VA50	0.01 to 50 GHz	50 Ω	12 dB, <0.04 GHz 19 dB, <20 GHz 15 dB, <40 GHz 10 dB, <50 GHz	V(m)	±0.8 dB, <20 GHz ±2.5 dB, <40 GHz ±3.0 dB, <50 GHz
5400-71B50	0.001 to 1.5 GHz	50 Ω	20 dB	BNC(m)	±0.2 dB, <1.5 GHz
5400-71B75	0.001 to 1.5 GHz	75 Ω	20 dB	BNC(m)	±0.2 dB, <1.5 GHz
5400-71N50	0.001 to 3 GHz	50 Ω	26 dB	N(m)	±0.2 dB, <1 GHz ±0.3 dB, <3 GHz
5400-71N75	0.001 to 3 GHz	75 Ω	26 dB, <2 GHz 20 dB, <3 GHz	N(m)	±0.2 dB, <3 GHz ±0.3 dB, <3 GHz
5400-71N75L**	0.005 to 1.2 GHz	75 Ω	24 dB	N(m)	±0.2 dB, <1 GHz ±0.5 dB, <1.2 GHz

* The maximum input power is + 20 dBm for all microwave detectors with the exception of 5400-71N75L.

** The input of the 5400-71N75L is designed to extend the damage level to 1W (+30 dBm).
Compression begins at 10 dBm <0.05 GHz, 15 dBm <1 GHz, or 20 dBm <1.2 GHz.

POWER SENSORS

MA2400A/B Series 10 MHz to 50 GHz



The MA2400A/B Series Power Sensors consist of MA247XA Series Power Sensors, MA246XA/B Series Power Sensors, MA248XA Series Universal Power Sensors, MA242XA/B Series Thermal Power Sensors, and MA244XA Series High Accuracy Power Sensors. These units are broadband microwave measurement components. All models except the MA246XA/B Series Power Sensors, are used with the ML2430A Series Power Meters. The MA246XA/B Series Power Sensors are used with the ML2400A Series Power Meter only.

Features

- 10 MHz to 50 GHz range
- N, K, and V type RF connectors
- 90 dB dynamic range provides stable power readings to -70 dBm
- MA244XA Series High Accuracy Power Sensors contain an additional matching circuit to improve return loss performance.
- MA242XA/B Series Thermal Power Sensors provide measuring speeds to 4 ms rise and fall times in addition to exceptional return loss performance
- MA246XB power sensors have fast 1 millisecond rise and fall times needed for CDMA measurements
- MA248XA Universal sensors measure average power of modulated signals such as W-CDMA, multi-tone, etc.
- All MA2481A/B Series Power Sensors contain internal EEPROMs for storage of calibration data as a function of frequency, power, and temperature. This allows the power meter to interpolate and correct readings automatically

Fast thermal sensors

Anritsu's thermal sensors provide excellent power measurement accuracy over 50 dB of dynamic range with more speed than any other thermal sensor available (see fig. 1). Thermal sensors use Seebeck elements where the combined effect of a thermal gradient and charge migration between dissimilar metals gives a true reading of average power on any incident waveform.

Anritsu thermal sensors have class-leading SWR and built in EEPROM with calibration factor and linearity correction data. This results in assured accuracy when measuring any signal. Anritsu's fast thermal power sensors improve sensor rise time and fall time to less than 4.0ms— an order of magnitude faster than previous thermal sensors. Settled power measurements are now 10 times faster; that means reduced test time.

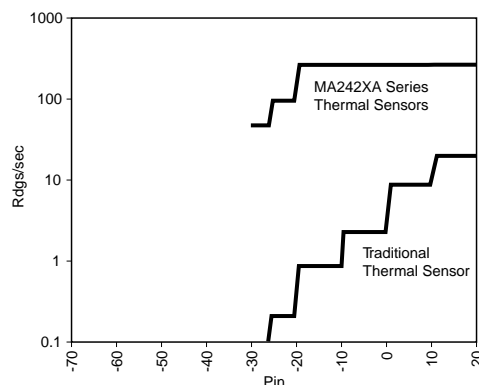


Fig. 1 Fast Thermal Sensors

Standard diode sensors

Diode sensors have greater speed, sensitivity and dynamic range than thermal sensors (see fig. 2). All Anritsu diode sensors use a dual diode architecture that gives improved sensitivity and dynamic range over single diode architectures. The MA2470A Series Power Sensors 90 dB dynamic range is both fast and accurate. Linearity is better than 1.8%, typically < 1.0% through 18 GHz.

MA2470A power sensors offer an ideal combination of speed and dynamic range for general purpose power measurements. A single sensor replaces the two sensors that were previously required with sensors limited to 50 dB dynamic range.

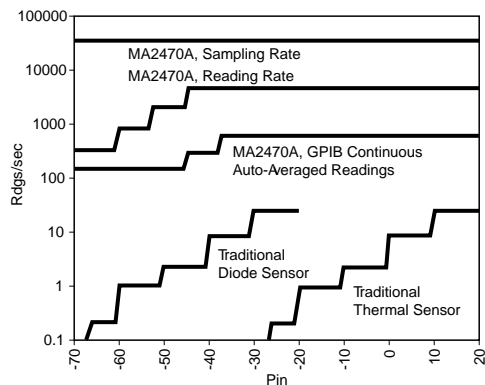


Fig. 2 Standard Diode Sensors

POWER SENSORS

MA2400A/B/C Series 10 MHz to 50 GHz

High accuracy diode sensors

The Anritsu MA2440A series high-accuracy diode sensors have a built in 3 dB attenuator to minimize input SWR. They are used where the best measurement accuracy is required over a large dynamic range, for example when measuring amplifiers. High accuracy diode sensors have a dynamic range of 87 dB compared to the 90 dB of standard diode sensors.

Fast diode sensors

The MA2460C fast diode sensors from Anritsu have a rise time of 0.6 μ s. This, together with a sensor video bandwidth of 1.25 MHz, makes them the ideal solution for power measurements on N-CDMA (IS-95) signals. The MA2460 sensors must be used with the ML2407/08A power meter. This combination of meter and sensor provides fast signal processing and sampling speeds. Average power, peak power and crest factor on N-CDMA signals can be measured and displayed. The MA2460 are dual diode sensors that deliver a greater-than 80 dB dynamic range, which makes them suitable for both open- and closed-loop power-control testing. The sensors internal AC detection circuitry gives a guaranteed noise floor of -60 dBm with typical performance to -70 dBm, even when measuring CDMA signals.

Pulses down to 1 μ s can also be captured and displayed, thanks to the sensor rise time of 0.6 μ s. In profile mode the ML2407A meter can be used to measure average power across narrow pulses, an increasingly common test method for amplifiers in digitally modulated systems.

Universal power sensors

The new MA2480A series Universal Power Sensors will measure any modulated or multi-tone signal, thanks to a patented sensor architecture with three diode pairs (see fig. 3). Universal power sensors deliver over 80 dB of dynamic range with speed and accuracy. Average power measurements on WCDMA signals can now be made without the need for special power meters. Universal sensors are also ideal for power measurements on other digitally modulated carriers such as HDTV, DAB or QAM modulated radio links.

Universal power sensors are also ideal for applications where multiple signals are present, such as intermodulation measurements and satellite multi carrier power loading measurements.

A unique additional capability of the Anritsu Universal power sensor is the ability to use it as a standard diode sensor for CW measurements. In this mode the fast response of diode sensors is maintained across the full dynamic range of the sensor, meaning that for the majority of users it is the only sensor that they will ever need – a truly Universal Power Sensor.

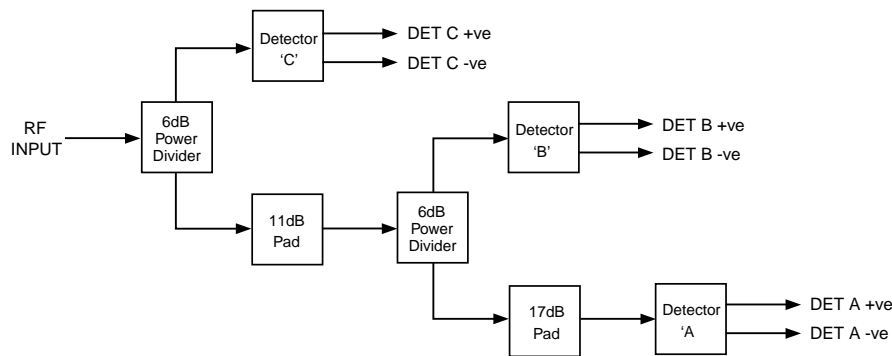


Fig. 3 Universal Power Sensor

POWER SENSORS

MA2400A/B Series 10 MHz to 50 GHz

Specifications

Model	Frequency range	Dynamic range (dBm)	SWR	Rise time ¹ (ms)	Sensor linearity	RF connector ²
Standard diode sensors						
MA2472A	10 MHz - 18 GHz	-70 to +20	<1.90; 10 - 50 MHz <1.17; 50 - 150 MHz <1.12; 0.15 - 2 GHz <1.22; 2 - 12.4 GHz <1.25; 12.4 - 18 GHz <1.35; 18 - 32 GHz <1.50; 32 - 40 GHz <1.63; 40 - 50 GHz	<0.004	1.8%, <18 GHz 2.5%, <40 GHz 3.5%, <50 GHz	N (m)
MA2473A	10 MHz - 32 GHz					K (m)
MA2474A	10 MHz - 40 GHz					K (m)
MA2475A	10 MHz - 50 GHz					V (m)
Fast thermal sensors						
MA2421B	0.1 MHz - 18 GHz	-30 to +20	<1.10; 0.1 MHz - 2 GHz <1.15; 2 - 12.4 GHz <1.20; 12.4 - 18 GHz	<4.0	1.3%, <18 GHz 1.5%, <40 GHz 1.8%, <50 GHz	N (m)
MA2422B	10 MHz - 18 GHz					N (m)
MA2423B	10 MHz - 32 GHz		K (m)			
MA2424B	10 MHz - 40 GHz		K (m)			
MA2425B	10 MHz - 50 GHz		V (m)			
High accuracy diode sensors						
MA2442A	10 MHz - 18 GHz	-67 to +20	<1.90; 10 - 50 MHz <1.17; 50 - 150 MHz <1.08; 0.15 - 2 GHz <1.16; 2 - 12.4 GHz <1.21; 12.4 - 18 GHz <1.29; 18 - 32 GHz <1.44; 32 - 40 GHz <1.50; 40 - 50 GHz	<0.004	1.8%, <18 GHz 2.5%, <40 GHz 3.5%, <50 GHz	N (m)
MA2444A	10 MHz - 40 GHz					K (m)
MA2445A	10 MHz - 50 GHz					V (m)
Fast diode sensors						
MA2468A ³	10 MHz - 6 GHz	-60 to +20	<1.17; 10 - 150 MHz <1.12; 0.15 - 2 GHz <1.22; 2 - 12.4 GHz <1.25; 12.4 - 18 GHz	<0.0006	1.8%	N (m)
MA2469B ³	10 MHz - 18 GHz					
Universal power sensors						
MA2481B	10 MHz - 6 GHz	-60 to +20	<1.17; 10 - 150 MHz <1.12; 0.15 - 2 GHz <1.22; 2 - 12.4 GHz <1.25; 12.4 - 18 GHz	<0.0004 (with option 1 only)	10 MHz to 6 GHz 3% -60 to +20 dBm 6 to 18 GHz 3% to 18 GHz 3.5% 0 to +20 GHz 3% (1.8% CW with option 1)	N (m)
MA2482A	10 MHz - 18 GHz					
MA2480/01	Adds fast CW mode to Universal Power Sensors for high speed measurements of CW signal plus TDMA and pulse measurements.					

1. 0.0 dBm, room temperature.

2. Each MA2400A/B series sensor incorporates precision RF connectors with hexagon coupling nut for attachment by industry standard torque wrench.

3. MA2460A/B Fast Diode Sensors must be used with ML2407/08A Power Meters for NCDMA and Fast Pulse measurements.

Temperature range: +25°C ±5°C

Ordering information

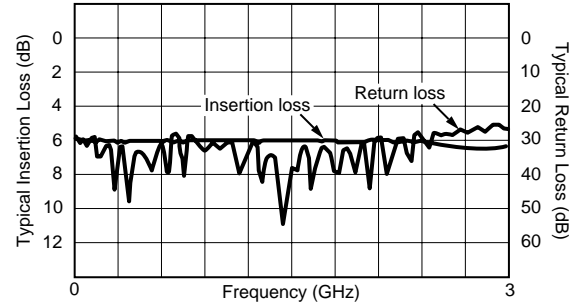
Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
	Thermal Sensor
MA2421A	0.1 MHz to 18 GHz
MA2422B	10 MHz to 18 GHz
MA2423B	10 MHz to 32 GHz
MA2424B	10 MHz to 40 GHz
MA2425B	10 MHz to 50 GHz
	High Accuracy Sensor
MA2442A	10 MHz to 18 GHz
MA2444A	10 MHz to 40 GHz
MA2445A	10 MHz to 50 GHz
	Fast Diode Sensor
MA2468A	10 MHz to 6 GHz
MA2469B	10 MHz to 18 GHz

Model/Order No.	Name
	Power Sensor
MA2472A	10 MHz to 18 GHz
MA2473A	10 MHz to 32 GHz
MA2474A	10 MHz to 40 GHz
MA2475A	10 MHz to 50 GHz
MA2481B	Universal Power Sensor, 10 MHz to 6 GHz
MA2482A	Universal Power Sensor, 10 MHz to 18 GHz
MA2480/01	Option 1, Universal Power Sensor CW Option
MA2400/98	Z540/Guide 25 Calibration
MA2400/99	Premium Calibration
MA2497A	Agilent (HP) Sensor adapter
MA2499B	Anritsu Sensor 10 to 12 pin Adapter

POWER DIVIDERS

11 Series DC to 3000 MHz



Insertion loss (typical) / return loss (typical)

These RF power dividers are symmetrical, three-resistor tee designs that can be used in applications where signals from DC to 3000 MHz must be accurately divided. They are available in 50 Ω or 75 Ω and provide excellent amplitude and phase tracking.

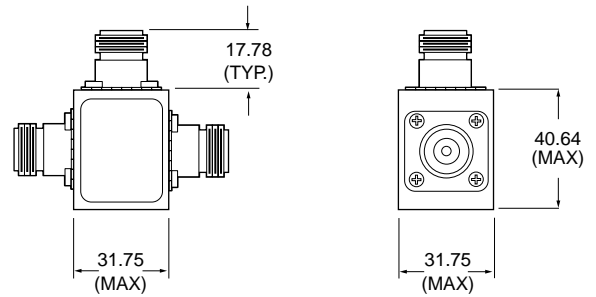
Features

- DC to 3000 MHz frequency range
- Excellent amplitude and phase tracking
- 50 Ω or 75 Ω

Specifications

Model	Frequency range (MHz)	SWR	Insertion loss (dB, max.)	Impedance (Ohms)	Connectors	
					Input	Output
11N50B 11N75B	DC to 3000	<1.25	7	50 75	N(f)	N(f)

Maximum Input Power: 1 Watt
 Temperature range: 0°C to +70°C



Dimensions in millimeters

11N50B, 11N75B outline

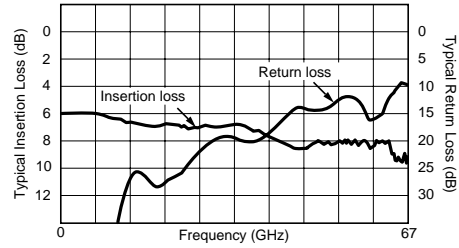
Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
11N50B	Power Divider, 1 MHz to 3 GHz, 50 Ω
11N75B	Power Divider, 1 MHz to 3 GHz, 75 Ω

POWER DIVIDERS

K240, V240 Series DC to 65 GHz



Insertion loss (typical) /return loss (typical) for V240C

These microwave power dividers are symmetrical, three-resistor tee designs that can be used in applications where signals from DC to 65 GHz must be accurately divided or combined. K Connector® is compatible with 3.5 mm and SMA; V Connector® is compatible with 2.4 mm. All models have exceptional amplitude and phase tracking characteristics.

Features

- DC to 65 GHz frequency range
- K Connector® compatibility with SMA/3.5 mm
- V Connector® compatibility with 2.4 mm
- Excellent amplitude and phase tracking

Specifications

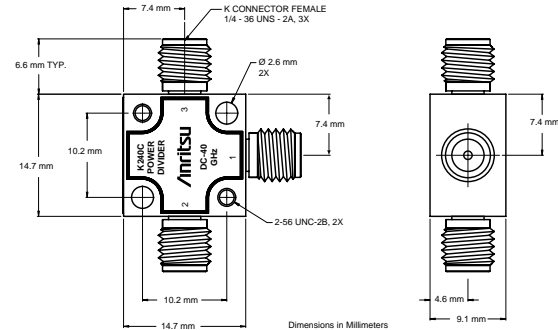
Model	Frequency range (GHz)	Impedance (Ohms)	Connectors
K240B	DC to 26.5	50	K(f)
K240C	DC to 40	50	K(f)
V240C	DC to 65	50	V(f)

Frequency range (GHz)	Tracking of outputs		Insertion loss (dB max.)	SWR
	Amplitude	Phase		
DC to 6	±0.3 dB	±2°	7	1.22
6 to 18	±0.3 dB	±3°	7.5	1.44
18 to 26.5	±0.6 dB	±4°	8	1.58
26.5 to 40	±0.6 dB	±6°	8.5	1.79
40 to 65	±1.8 dB	±18°	10	3.11

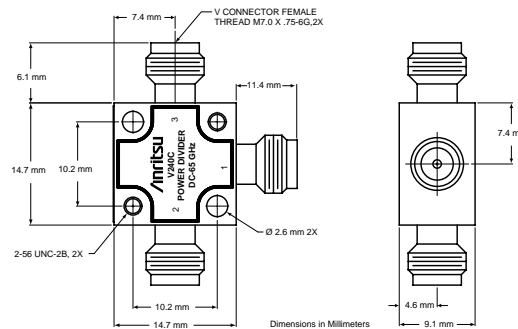
Maximum Input Power: 1W

Temperature range: 0°C to +70°C

Weight: 43g



K240B, K240C outline



V240C outline

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
K240B	Precision Power Divider, DC to 26.5 GHz
K240C	Precision Power Divider, DC to 40 GHz
V240C	Precision Power Divider, DC to 65 GHz

POWER SPLITTERS

K241, V241 Series, DC to 65 GHz



K241C



V241C

These microwave power splitters are symmetrical, two-resistor designs that can be used in applications where signals from DC to 65 GHz must be accurately divided for ratio measurements. They provide excellent flatness and effective output SWR. K Connectors® are compatible with 3.5 mm and SMA; V Connectors® are compatible with 2.4 mm.

Features

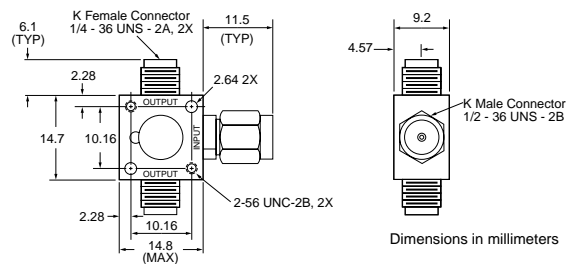
- DC to 65 GHz frequency range
- K Connector® compatibility with SMA/3.5 mm
- V Connector® compatibility with 2.4 mm
- Excellent flatness and effective output SWR

Specifications

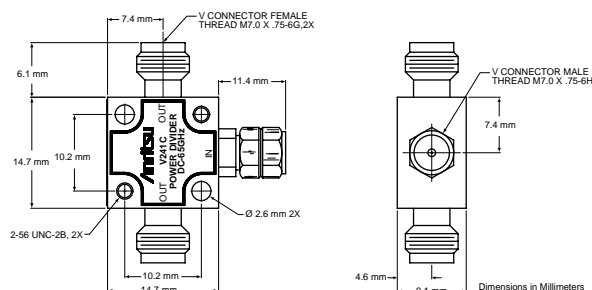
Model	Frequency range (GHz)	Impedance (Ohms)	Connectors	
			Input	Output
K241B	DC to 26.5	50	K(m)	K(f)
K241C	DC to 40	50	K(m)	K(f)
V241C	DC to 65	50	V(m)	V(f)

Model	Frequency range (GHz)	Flatness (dB)	Input SWR	Effective output SWR	Insertion loss (dB)
K241B	DC to 26.5	2.0	1.45	1.45	7.5
K241C	DC to 26.5	2.0	1.45	1.45	7.5
	26.5 to 40	2.0	1.93	1.70	8.5
V241C	DC to 18	2.0	2.11	2.00	8.5
	18 to 40	2.0	2.33	2.30	9.5
	40 to 65	2.0	2.62	2.60	10.5

Maximum Input Power: 1W
 Temperature range: 0°C to +70°C
 Weight: 43g



K241B, K241C Outline



V241C Outline

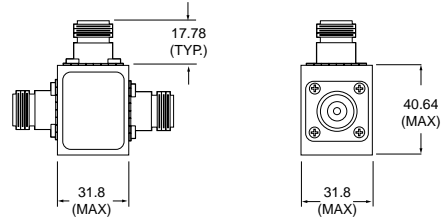
Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
K241B	Precision Power Splitter, DC to 26.5 GHz
K241C	Precision Power Splitter, DC to 40 GHz
V241C	Precision Power Splitter, DC to 65 GHz

POWER SPLITTERS

N241 Series, DC to 3000 MHz



N241A50, N241A75 outline

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
N241A50	Power Splitter, DC to 3000 MHz, 50 Ω
N241A75	Power Splitter, DC to 3000 MHz, 75 Ω

These RF power splitters are symmetrical, two resistor designs that can be used in applications where signals from DC to 3000 MHz must be accurately divided for ratio measurements. They are available in 50 Ω or 75 Ω and provide excellent flatness and effective output SWR.

Features

- DC to 3000 MHz frequency range
- Excellent flatness and effective output SWR
- 50 Ω or 75 Ω

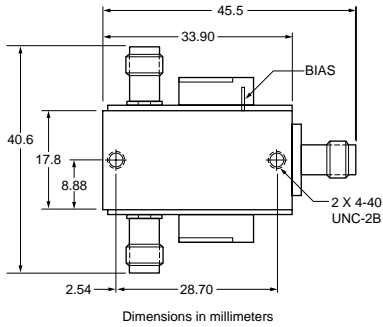
Specifications

Model	N241A50	N241A75
Frequency range	DC to 3000 MHz	DC to 3000 MHz
Input SWR	1.3	1.4
Effective output SWR	1.3	1.4
Insertion loss	7.5 dB	7.5 dB
Flatness	±1.5 dB	±1.5 dB
Impedance	50 Ohms	75 Ohms
Connectors	Input: N(f) Output: N(f)	Input: N(f) Output: N(f)

Maximum Input Power: 1 W
 Temperature range: 0°C to +70°C

SPDT SWITCH

DC to 65 GHz



SC4734, SC6135 outline

Coaxial 65 GHz microwave SPDT switch
Short voltage pulse driven.

Features

- *Switching Speed: 20 msec max*
- *Operating Voltage: 20 to 30V*
- *Duty Cycle: 20 msec min*

Specifications*

Model	Frequency range	Connectors		Insertion loss (dB)	Return loss (dB)	Isolation (dB)
		in	out			
SC4734	DC to 60 GHz	V(f)	V(f), V(f)	1.5 ≤40 GHz 3.0 >40 GHz	10 ≤40 GHz 6 >40 GHz	29 ≤40 GHz 26 >40 GHz
SC6135	DC to 65 GHz	V(f)	V(f), V(f)	1.5 ≤40 GHz 3.0 >40 GHz	10 ≤40 GHz 6 >40 GHz	29 ≤40 GHz 26 >40 GHz

Temperature range: 0°C to +70°C

*Call 1-800-ANRITSU for detailed information

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
SC4734	SPDT Switch, DC to 60 GHz
SC6135	SPDT Switch, DC to 65 GHz

BIAS TEE

K250 100 MHz to 40 GHz, V250 100 MHz to 60 GHz



K250

These bias tees are designed for applications where both DC and RF signals must be applied to a device under test. They are particularly suited for active device measurements. DC voltages of up to 30 volts at 0.5 amps may be applied to test devices with negligible effect on RF performance. Low RF throughline loss (<1 dB) and low return loss ensure negligible effect on measurements up to 60 GHz. An RF input DC block isolates the input port from the applied bias voltage.

Features

- Broadband, 0.1 to 60 GHz coverage
- Low SWR, low insertion loss
- K Connector® and V Connector® availability

Specifications

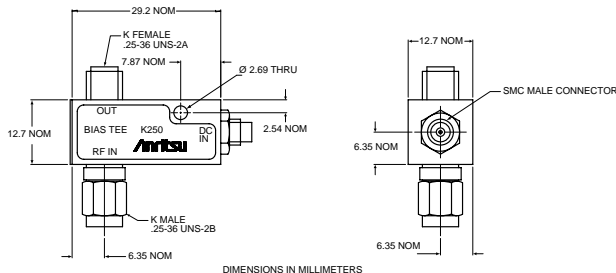
Model	K250	V250
Frequency range	0.1 to 40 GHz ¹	0.1 to 60 GHz ¹
Insertion loss	1.2 dB typ.	2.2 dB typ.
Return loss	15 dB min. to 20 GHz 10 dB min. to 40 GHz	13 dB min. to 20 GHz 9 dB min. to 40 GHz 8 dB min. to 60 GHz
RF power	1W max.	1W max.
DC voltage	30V max.	30V max.
DC current	0.5A	0.5A
DC port isolation	20 dB at 0.1 GHz 40 dB above 0.5 GHz	20 dB at 0.1 GHz 40 dB above 0.5 GHz
RF connectors	Input: K(m) Output: K(f)	Input: V(m) Output: V(f)
DC connectors	SMC(m)	SMC(m)

1. Usable between 0.04 and 0.1 GHz with degraded performance.

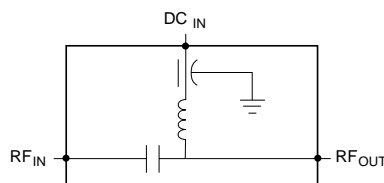
Temperature range: 0°C to +70°C

Specifications

Temperature	0 to 60°C
Mounting position	Any
Weight	57g



Outline drawing (K and V models)



Schematic diagram (K and V models)

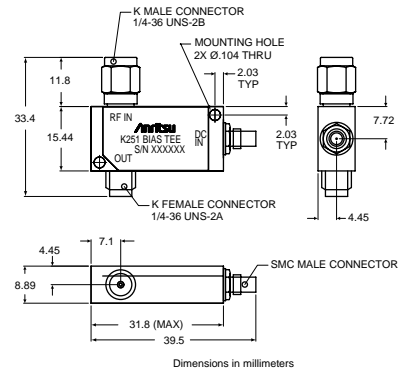
Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
K250	Precision Bias Tee, 100 MHz to 40 GHz
V250	Precision Bias Tee, 100 MHz to 60 GHz

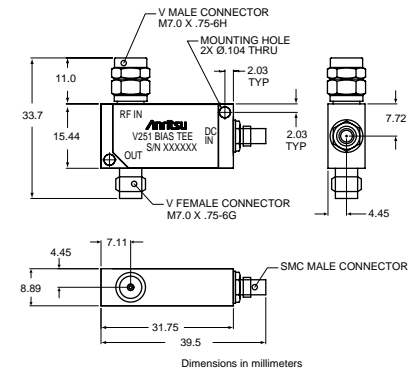
ULTRA-WIDEBAND BIAS TEES

K251 50 kHz to 40 GHz, V251 100 kHz to 65 GHz



K251 outline drawing

These ultra-wide bandwidth bias tees have been optimized for optical communications and other high-speed pulse, data or microwave applications. Designed to simultaneously apply both DC and RF drive signals to a device via a single input port, these bias tees feature fast rise times, excellent low frequency response, minimum insertion loss and flat group delay. Precision K Connector® and V Connector® interfaces assure excellent impedance match across the wide bandwidths available. A one year warranty is provided. Adapters are available to convert between K and V Connectors - See page 21 of this catalog for details.



V251 outline drawing

Features

- Ideal for Optical Communications Applications
- Low Insertion Loss
- Risetime: <5 ps typical (V251), <7 ps typical (K251)

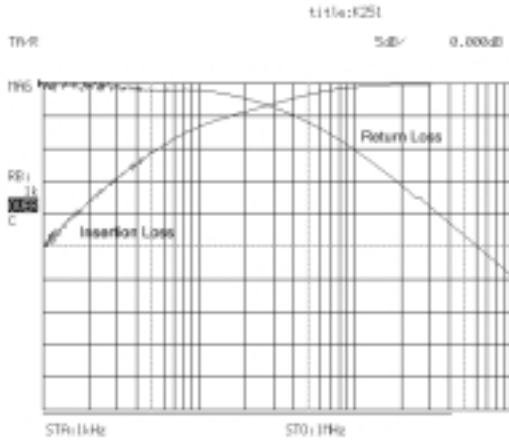
Specifications

Model	Frequency range 3dB BW	Insertion loss	Return loss	Rise time	Group delay	Max DC current	Max DC voltage	Max RF power	Connectors
K251	50 kHz to 40 GHz	<2 dB typical	See Plot	< 7 ps typical	110 ± 2 ps typical	100 mA	16VDC	1 W	RF In: K(m) RF Out: K(f) Bias: SMC(m)
V251	100 kHz to 65 GHz	< 2.5 dB typical	See Plot	< 5 ps typical	113 ± 2 ps typical	100 mA	16VDC	1 W	RF In: V(m) RF Out: V(f) Bias: SMC(m)

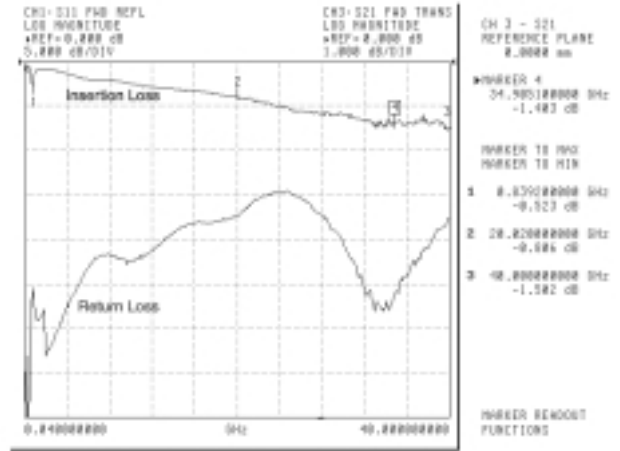
Specifications apply over the full DC Bias current range and over the temperature range of 0°C to +70°C.

ULTRA-WIDEBAND BIAS TEES

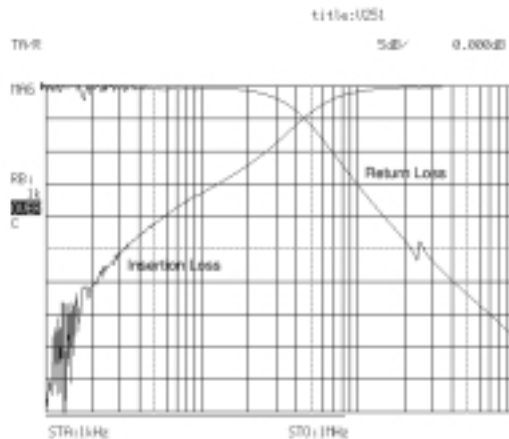
K251 50 kHz to 40 GHz, V251 100 kHz to 65 GHz



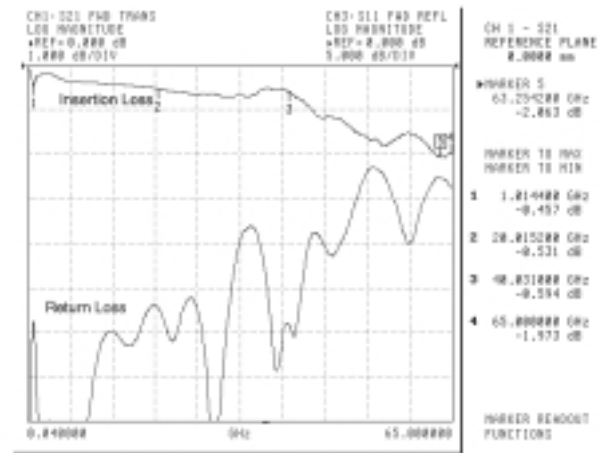
Typical Low Frequency Insertion Loss and Return Loss measured on K251 over the range of 1kHz to 1 MHz.



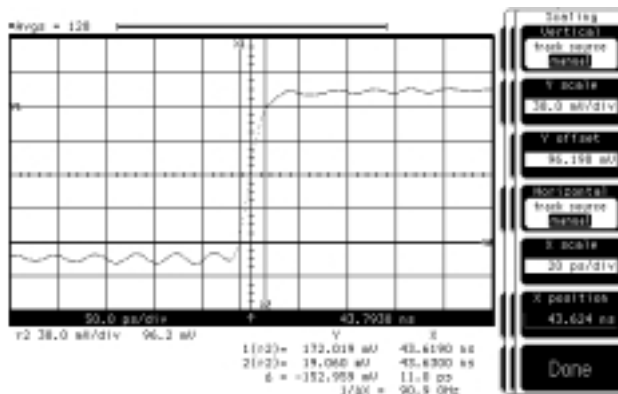
Typical Frequency Insertion Loss and Return Loss measured on K251 over the range of 40 MHz to 40 GHz.



Typical Low Frequency Insertion Loss measured on V251 over the range of 1 kHz to 1 MHz.



Insertion Loss and Return Loss measured on V251 over the range of 40 MHz to 65 GHz.



Typical Uncorrected Pulse Response for V251. Absolute risetime for the Bias Tee is derived from this measured data by applying the RSS method to compensate for the risetime of the input pulse.

$$\sqrt{T_{BT}^2 + T_{PG}^2} = T_{meas.}$$

$T_{meas.}$ = uncorrected risetime
 T_{BT} = absolute Bias Tee risetime
 T_{PG} = risetime of input pulse

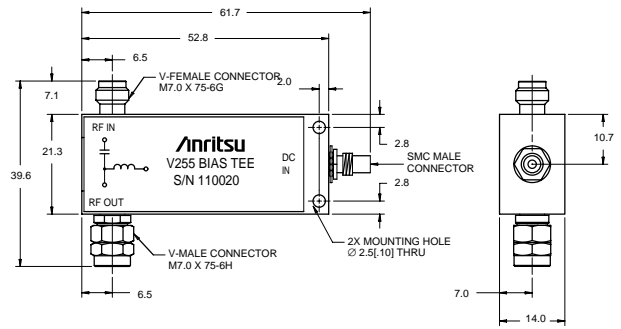
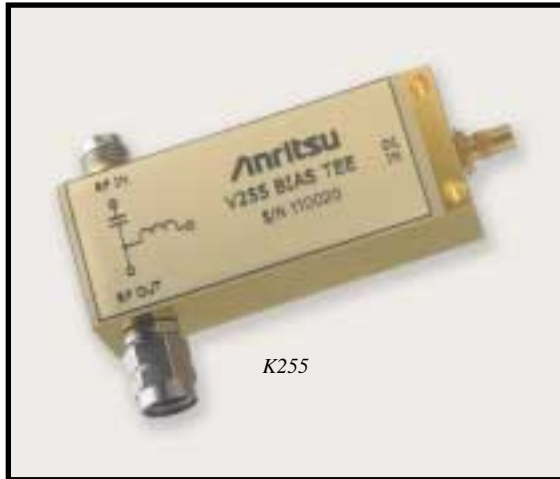
Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
K251	Precision Bias Tee, 50 kHz to 40 GHz
V251	Precision Bias Tee, 100 kHz to 65 GHz

ULTRA-WIDEBAND BIAS TEES

V255 50 kHz to 65 GHz



V255 outline drawing

The V255 Gen II Ultra Wideband Bias Tee is designed to meet the high electrical performance requirement of passive components in optical communication networks. Given a broader bandwidth of 50 kHz to 65 GHz, with low insertion losses and very good return loss, makes it ideal to use in 40 Gbps systems to bias optical modulators and broad band data drivers. It's fast rise time and flat group delay performance allows extremely accurate measurements within a laboratory environment. The V255 Bias Tee comes with a standard V Connector® that assures excellent impedance match across the available wide bandwidth. The DC signal can be applied or extracted from the bias tee through an SMC connector at the third port. As with our other bias tees, the V255 also has a one-year warranty.

Features • Ideal for Optical Communication applications.

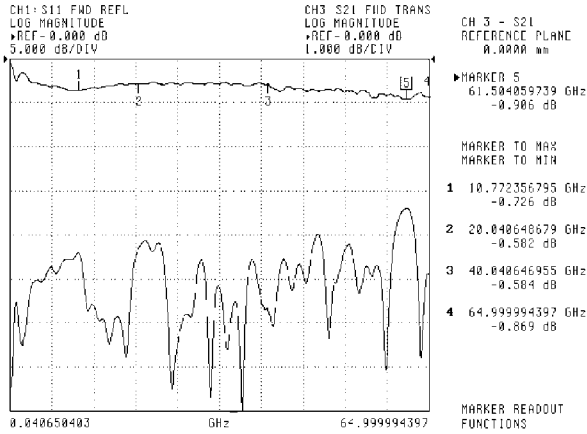
- Very low Insertion Loss
- Rise Time 3 ps typical
- High Current Capacity
- High Isolation between Input Port and DC Port

Specifications

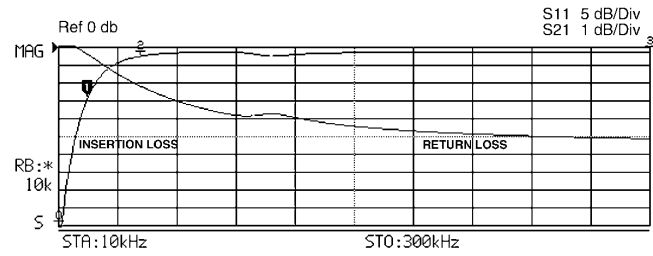
Model	Frequency range	Insertion loss	Return loss	Rise time	Group delay	Max DC current	Max DC voltage	Min. Isolation	Operating temperature
V255	50 kHz to 65 GHz 30 kHz to 65 GHz typical	1.2 dB to 65 GHz typical	<-15 dB to 65 GHz typical	3 ps typical	125 ± 2 ps typical	400 mA	16 VDC	-50 dBm	0°C to 80°C

ULTRA-WIDEBAND BIAS TEES

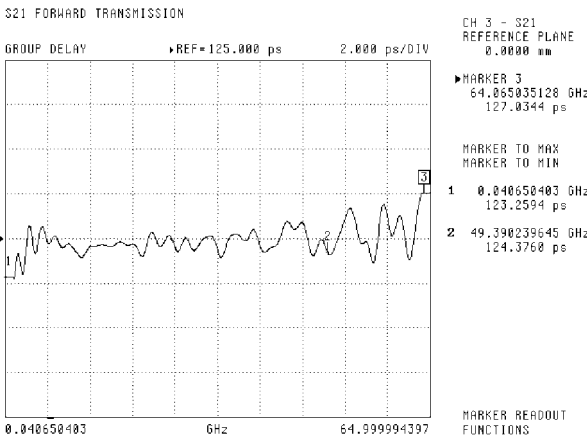
V255 50 kHz to 65 GHz



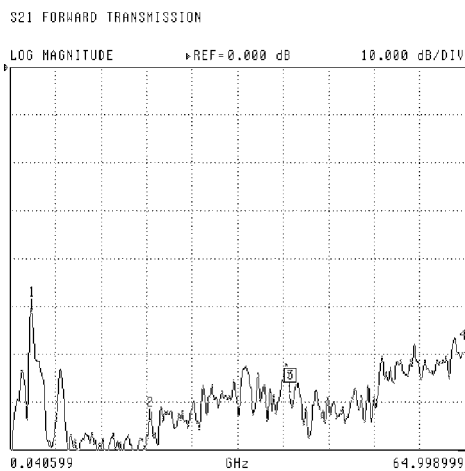
Typical High Frequency Insertion Loss and Return Loss measured on V255 over the range of 40 MHz to 65 GHz using Anritsu 37397C VNA



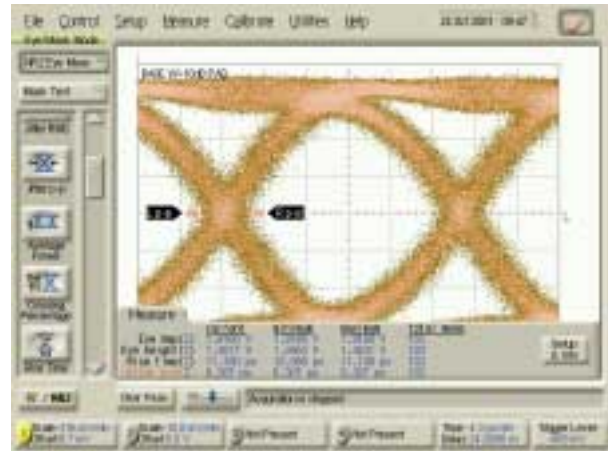
Typical Low Frequency Insertion Loss and Return Loss measured on V255 Bias Tee over the range of 10 kHz to 300 kHz



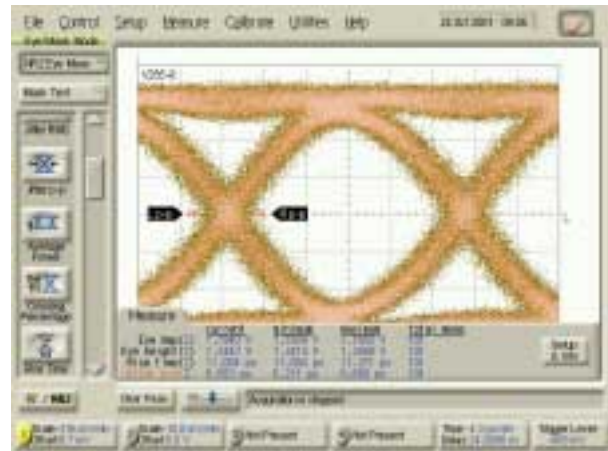
Typical Group Delay Performance measured on V255 using Anritsu 37397C VNA



Typical Isolation between Data I/P and DC Port using Anritsu 37397C VNA



Input Test Signal to V255 2.0 V NRZ Input Signal using Anritsu 43G ME7750A BERT



V255 Output Response to 2.0V NRZ Input Signal using Anritsu 43G ME7750A BERT

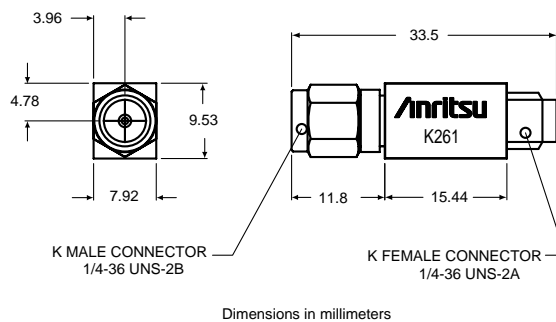
Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
V255	Gen II Wideband Bias Tee, 50 kHz to 65 GHz

PRECISION DC BLOCKS

K261, 10 kHz to 40 GHz, V261 50 kHz to 65 GHz

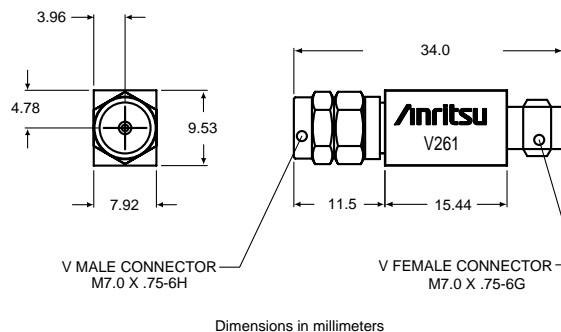


K261 outline drawing

These ultra-wide bandwidth DC Blocks have been optimized for optical communications and other high-speed pulse, data or microwave applications. Designed to apply AC drive signals to a device while eliminating any DC components, these DC Blocks feature wide bandwidth, excellent low frequency response, minimum insertion loss and flat group delay. Precision K Connector® and V Connector® interfaces assure excellent impedance match across the wide bandwidths available. A one year warranty is provided.

Features

- Ideal for Optical Communications and high speed Pulse Applications
- <1.0 dB Insertion Loss (K261)
- Risetime: <5 ps (V261), <7 ps (K261)



V261 outline drawing

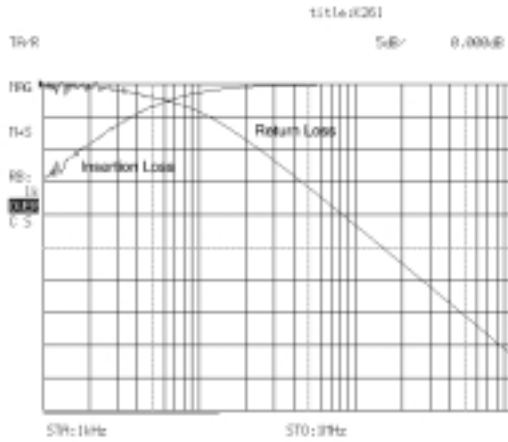
Specifications

Model	Frequency range 3 dB BW	Insertion loss	Return loss	Rise time	Group delay	Max DC voltage	Max RF power	Connectors
K261	10 kHz to 40 GHz	<1.0 dB typical	See Plot	< 7 ps typical	110 ±1 ps typical	16VDC	1 W	RF In: K(m) RF Out: K(f)
V261	50 kHz to 65 GHz	< 2.0 dB typical	See Plot	< 5 ps typical	113 ±1 ps typical	16VDC	1 W	RF In: V(m) RF Out: V(f)

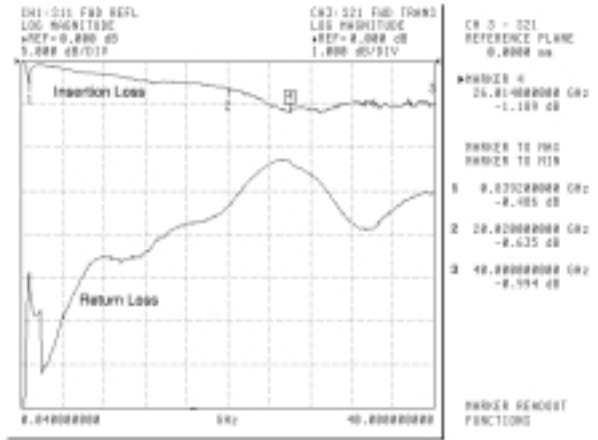
Specifications apply over the temperature range of 0°C to +70°C.

PRECISION DC BLOCKS

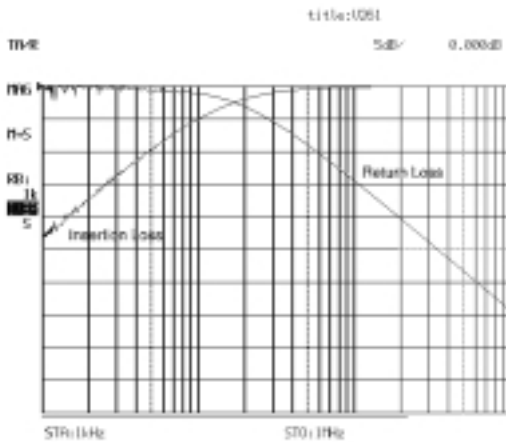
K261, 10 kHz to 40 GHz, V261 50 kHz to 65 GHz



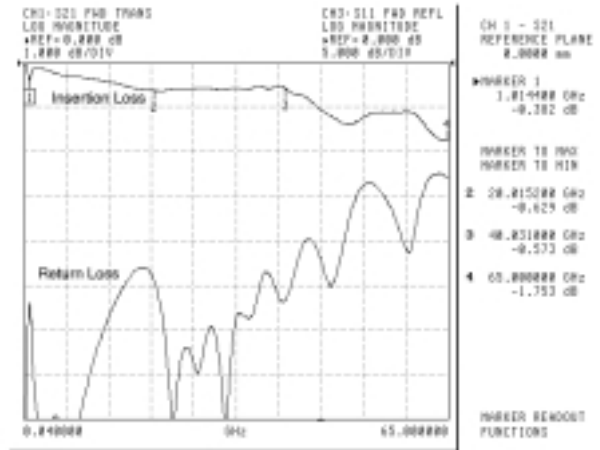
Typical Low Frequency Insertion Loss measured on K261 over the range of 1 kHz to 1 MHz.



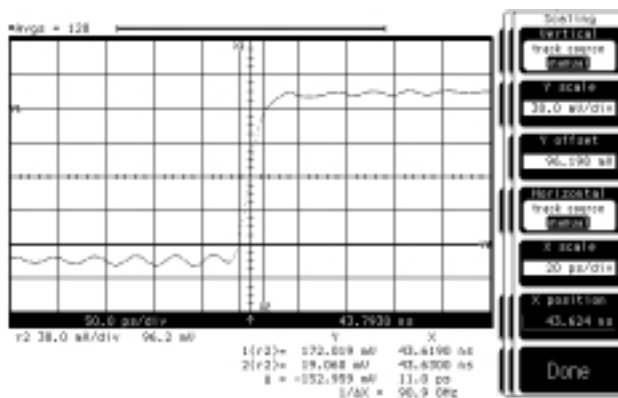
Insertion Loss and Return Loss measured on K261 over the range of 40 MHz to 40 GHz.



Typical Low Frequency Insertion Loss measured on V261 over the range of 1 kHz to 1 MHz.



Insertion Loss and Return Loss measured on V261 over the range of 40 MHz to 65 GHz.



Typical Uncorrected Pulse Response for V261. Absolute risetime for the DC Blocks is derived from this measured data by applying the RSS method to compensate for the risetime of the input pulse.

$$\sqrt{T_{BT}^2 + T_{PG}^2} = T_{meas.}$$

$T_{meas.}$ = uncorrected risetime
 T_{BT} = absolute Bias Tee risetime
 T_{PG} = risetime of input pulse

Ordering information

Please specify model/order number, name, and quantity when ordering.

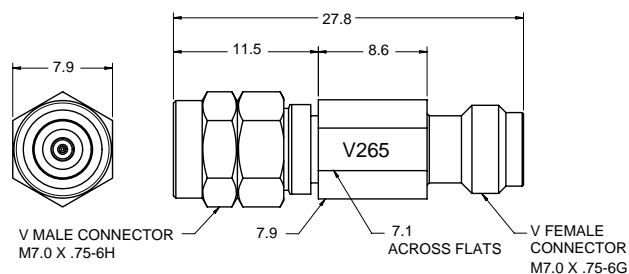
Model/Order No.	Name
K261	Precision DC Block, 50 kHz to 40 GHz
V261	Precision DC Block, 100 kHz to 65 GHz

DC BLOCKS

V265, 50 kHz to 65 GHz



V265



The V265 DC Block has been designed and optimized for optical communications and other high speed pulse, data or microwave applications. Based on the coaxial resilient connection – which is the same as on our V255 Gen II Bias Tee – it provides excellent low frequency response with very low losses and flat group delay over the temperature of operation. Designed to apply AC drive signals to a device while eliminating any DC voltage or current components, the V265 DC Block can be used in isolating DC leakage between two electrical components. The DC block comes with a standard V Connector® and assures excellent impedance match across the wide bandwidth available. A one-year warranty is provided.

Features

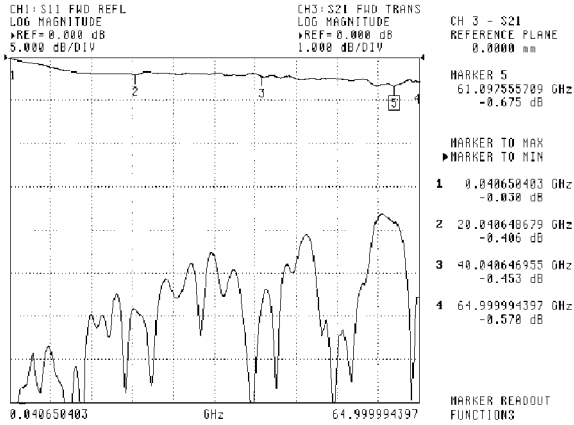
- *Ideal for Optical Communication applications.*
- *Low Insertion Loss*
- *Rise Time 3 ps typical*

Specifications

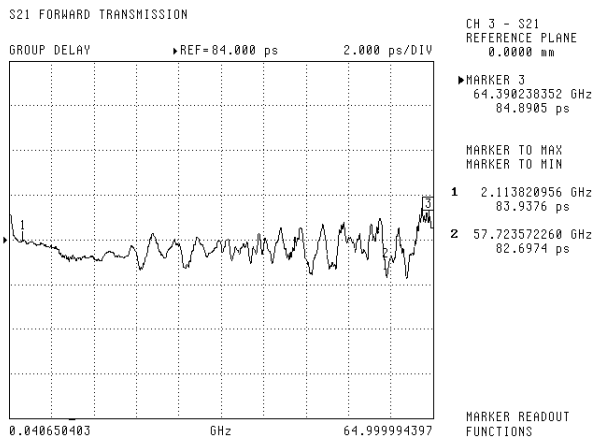
Model	Frequency range	Insertion loss	Return loss	Rise time	Group delay	Max DC voltage	Max RF power	Connectors	Operating temperature
V265	50 kHz to 65 GHz 30 kHz to 65 GHz typical	<0.7 dB to 65 GHz typical	<-15 dB to 65 GHz typical	3 ps typical	84 ±2 ps typical	16 VDC	1 W	RF In: V(f) RF Out: V(m)	0°C to 80°C

PRECISION DC BLOCKS

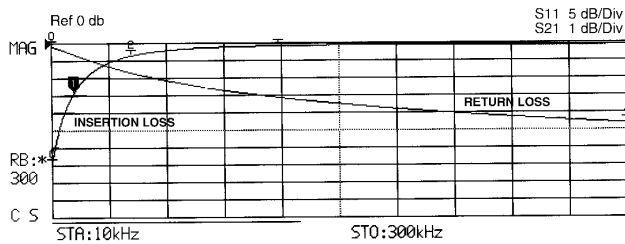
V265, 50 kHz to 65 GHz



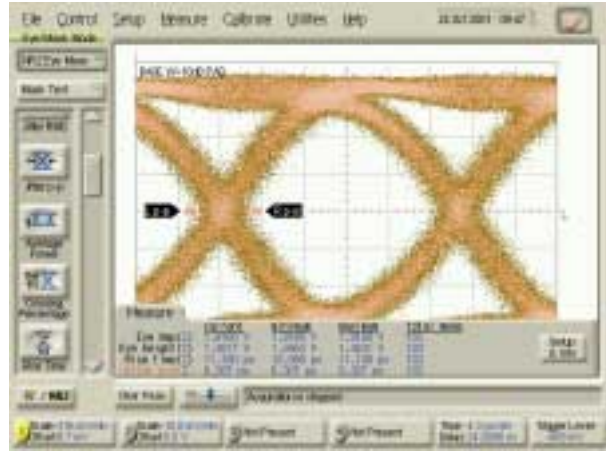
Typical High Frequency Insertion Loss and Return Loss measured on V265 over the range of 40 MHz to 65GHz using Anritsu 37397C VNA



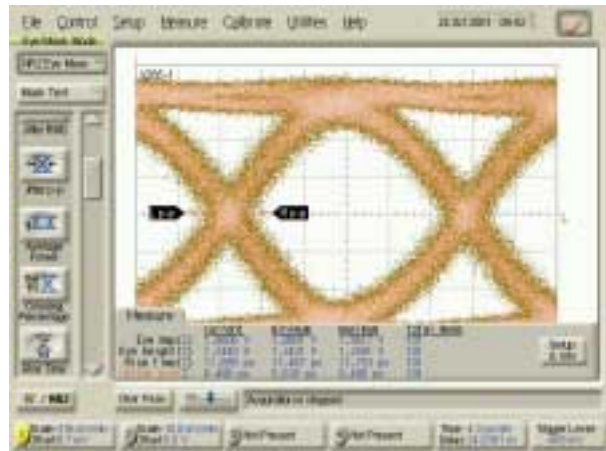
Typical Group Delay Performance measured on V265 using Anritsu 37397C VNA



Typical Low Frequency Insertion Loss and Return Loss measured on V265 Bias Tee over the range of 10 kHz to 300 kHz using Anritsu MS4630B Network Analyzer



Input Test Signal to V265 2.0 V NRZ Input Signal using Anritsu 43G ME7750A BERT



V265 Output Response to 2.0V NRZ Input Signal using Anritsu 43G ME7750A BERT

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
V265	DC Block, 50 kHz to 65 GHz

UNIVERSAL TEST FIXTURES

3680 Series DC to 60 GHz



The 3680 series provide an accurate, repeatable solution for measuring microstrip and Coplanar substrate devices. Input and output connections are made to the substrate device by two spring-loaded jaws that include coax-to-microstrip/Coplanar launchers. The jaws accommodate substrates up to 50 mm long (100 mm for 3680-20) and substrates with line offsets of up to 12.7 mm (25 mm for 3680-20). The 3680 series includes three models: the 3680-20 covers DC to 20 GHz with APC-3.5™ connectors, the 3680K covers DC to 40 GHz with Anritsu's K Connector®, and the 3680V covers DC to 60 GHz with Anritsu's V Connector®.

Features

- DC to 60 GHz coverage
- Microstrip and coplanar measurement capability
- Accommodates offset and right-angle test devices
- Calibration/verification kits (optional)
- Substrate measurement capability

Specifications

3680 series Universal Test Fixture	Substrate types supported	Microstrip or coplanar waveguide
	Overall size	10 x 12.7 x 6.4 cm
	Substrate length	0.5 cm min. 5 cm max. [10 cm with 3680-20]
	Maximum substrate width	No limit
	Substrate thickness	0.012 cm min. 0.19 cm max.
	Maximum line offset	±1.2 cm [±2.5 cm with 3680-20]
	Input and output connectors	3680-20: APC-3.5™ female 3680K: K Connector® female 3680V: V Connector® female
36802 MMIC Attachment	Substrate thickness	0.0 cm, 0.038 cm, 0.064 cm
	Minimum test substrate length	1.5 mm
	Maximum test substrate length	1.17 cm with standard block
	Maximum line offset	±1.2 cm
36801 Right Angle Launcher	Distance from in-line connector, axial	Minimum: 1 cm Maximum: 4 cm
	Distance from in-line connector, offset	Minimum: 0.0 cm Maximum: 2 cm

Electrical

Model	Universal Test Fixture			Right-Angle Launcher		MMIC Attachment
	3680-20	3680K	3680V	36801K	36801V	36802
Frequency range (GHz)	DC to 20	DC to 40	DC to 60	DC to 40	DC to 60	DC to 60
Return loss (dB)						
DC to 20 GHz	>17	>17	>17	>16	>16	>12
20 to 40 GHz		>14	>14	>12	>12	>8
40 to 60 GHz			>8		>7	>6
Repeatability (dB)						
DC to 20 GHz	<±0.10	<±0.10	<±0.10	<±0.15	<±0.15	<±0.20
20 to 40 GHz		<±0.20	<±0.20	<±0.25	<±0.25	<±0.40
40 to 60 GHz			<±0.30		<±0.40	<±0.60

Temperature range: -20° to 70°C

Ordering information

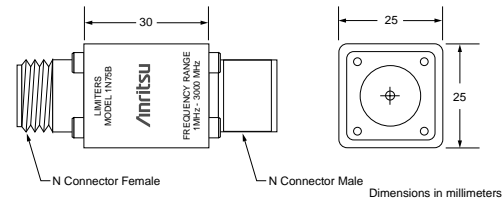
Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
	Main frame
3680-20	Universal Test Fixture (20 GHz)
3680K	Universal Test Fixture (40 GHz)
3680V	Universal Test Fixture (60 GHz)
	Accessories
36801K	Right-Angle Launcher (40 GHz)
36801V	Right-Angle Launcher (60 GHz)
36802	MMIC Attachment
36803	Bias Probe
36805-10M	10 mil launchers ¹
36805-15M	15 mil launchers ¹
36805-25M	25 mil launchers ¹
	Calibration/verification kits
36804B-10M	10 mil microstrip cal/verif. kit, DC to 60 GHz
36804B-15M	15 mil microstrip cal/verif. kit, DC to 30 GHz
36804B-25M	25 mil microstrip cal/verif. kit, DC to 20 GHz
36804B-25C	25 mil coplanar waveguide cal/verif. kit, DC to 20 GHz

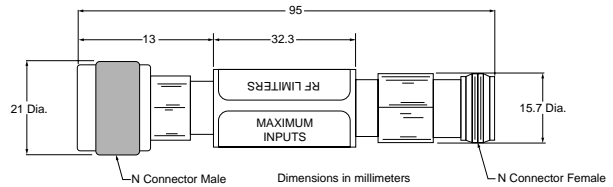
1. 36805 series includes (4) substrate launchers for the 36802 MMIC attachment

LIMITERS

1 Series 1 MHz to 26.5 GHz



1N50B and 1N75B Limiters Outline



1N50C and 1N75C Limiters Outline

Broadband microwave limiter features

- High power protection: Up to 5 Watts
- Very fast turn-on time: 10 ns max.
- Broad frequency range: 0.01 to 26.5 GHz
- Low insertion loss: 2.7 dB to 20 GHz
- Excellent return loss: 11 dB at 20 GHz
- Single side limiting

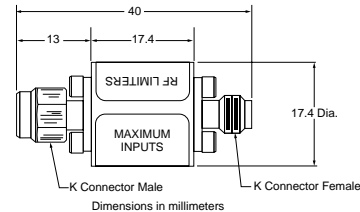
Specifications

Model	1K50B	1K50A	1N50C	1N75C	1N50B	1N75B
Frequency range	0.01 to 26.5 GHz	0.01 to 20 GHz	0.01 to 18 GHz	0.01 to 3 GHz	0.01 to 3 GHz	0.01 to 3 GHz
Max. input power	3 Watts	5 Watts	5 Watts	5 Watts	1.5 Watts	1.5 Watts
Min. return loss (at 0 dBm input)	10 dB	14 dB, ≤12 GHz 11 dB, >12 GHz	14 dB, ≤12 GHz 11 dB, >12 GHz	15 dB	19 dB	19 dB
Max. insertion loss (at 0 dBm input)	3.9 dB	2.7 dB	2.9 dB	1.1 dB	1.3 dB	1.3 dB
Max. turn-on time	10 ns	10 ns	10 ns	10 ns	10 ns	10 ns
Input connector	K(m)	K(m)	N(m)	75 Ω N(m)	N(m)	75 Ω N(m)
Output connector	K(f)	K(f)	N(f)	75 Ω N(f)	N(f)	75 Ω N(f)
Input/output coupling	DC	DC	DC	DC	AC	AC

Limiting Level: Limiter begins compressing at approximately +10 dBm. In compression, output level increases by 0.25 to 0.5 dB for each 1 dB increase at the input. Output power at 5W input at 500 MHz is 21 dBm max.

Dimensions: 1N50B and 1N75B 3.8 cm x 2.5 cm x 2.5 cm

Temperature range: 0°C to +70°C



1K50A and 1K50B Limiters Outline

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
	Limiter
1N50B	N(m) to N(f), 50 Ω, 1 MHz to 3 GHz
1N75B	N(m) to N(f), 75 Ω, 1 MHz to 3 GHz
1N50C	N(m) to N(f), 50 Ω, 10 MHz to 20 GHz
1N75C	N(m) to N(f), 75 Ω, 10 MHz to 3 GHz
1K50A	K(m) to K(f), 50 Ω, 10 MHz to 20 GHz
1K50B	K(m) to K(f), 50 Ω, 10 MHz to 26.5 GHz

MATCHING PADS

12 Series DC to 3000 MHz



RF matching pad and impedance adapter features

- DC to 3000 MHz frequency range
- Matching pad matches 50 Ω to 75 Ω or 75 Ω to 50 Ω circuits
- Impedance adapter converts 50 Ω to 75 Ω with <3 dB loss

The 12N50-75B matching pad is a two-resistor design that matches 50 Ω to 75 Ω or 75 Ω to 50 Ω circuits.

The 12N75B impedance adapter is a one-resistor design that converts 50 Ω to 75 Ω with less than 3 dB loss.

Specifications

Model	Frequency range (MHz)	SWR	Insertion loss (dB)	Connectors
12N50-75B	DC to 3000	1.25	7.5 max.	N(m) 50Ω to N(f) 75Ω
12N75B	DC to 3000	1.25	3.0 max.	N(m) 50Ω to N(m) 75Ω

Temperature range: 0°C to +70°C

Dimensions: 3.8 cm x 2.5 cm x 2.5 cm

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
12N50-75B	Matching Pad, DC to 3000 MHz
12N75B	Minimum Loss Adapter, DC to 3000 MHz

VNA AND VNMS CALIBRATION KITS



3753LF

The Anritsu Calibration Kits contain all the precision components and tools required to calibrate your VNA or VNMS for 12-term error-corrected measurements in the connector style of your choice. Components are included for calibrating male and female test ports as required. The kits support calibration with opens, shorts, and broadband loads. Option 1 adds sliding terminations and a pin depth gauge where required.

The following kits are for use with 37XXX Lightning VNAs.
3650 SMA/3.5 mm Calibration Kit consisting of:

- 34ASF50-2 Female Adapter (2)
- 33KFKF50 Female-Female Adapter (2)*
- 33SS50 Male-Male Adapter*
- 28S50-2 B Male Termination (2)
- 28SF50-2 Broadband Female Termination (2)
- 33SSF50-Male-Female Adapter (2)*
- 24S50 Male Open
- 23SF50 Female Open
- 23S50 Male Short
- 23SF50 Female Short
- 34AS50-2 Male Adapter (2)
- Connector Thumb Wheel (4)
- 01-201 Torque Wrench
- 01-210 Reference Flat
- 01-222 Pin Depth Gauge
- 01-223 Pin Depth Gauge
- Calibration coefficients diskette

Option 1

Adds the following:

- 01-212 Female Flush Short
- 01-211 Male Flush Short
- 17SF50 Female Sliding Termination
- 7S50 Male Sliding Termination

3651 GPC-7 Calibration Kit consisting of:

- 28A50-2 Broadband Termination (2)
- 24A50 Open
- 23A50 Short
- 01-200 Torque Wrench
- 01-221 Collet Extractor Tool and 4 Collets
- Calibration coefficients diskette



3651, Option 1

Option 1

Adds the following:

- 17A50 Sliding Termination
- 01-210 Reference Flat
- 01-220 Pin Depth Gauge

3652 K Connector® Calibration Kit consisting of:

- 34AKF50-2 Female Adapter (2)
- 33FKF50 Female-Female Adapter (2)*
- 33KK50 Male-Male Adapter*
- 28K50-2 Male Termination (2)
- 28KF50-2 broadband Female termination (2)
- 33KKF50-Male-Female Adapter (2)*
- 24K50 Male Open
- 23KF50 Female Open
- 23K50 Male Short
- 23KF50 Female Short
- 34AK50-2 Male Adapter (2)
- 01-201 Torque Wrench
- 01-210 Reference Flat
- 01-222 Pin Depth Gauge
- 01-223 Pin Depth Gauge
- Calibration coefficients diskette
- Connector thumb wheel (4)

Option 1

Adds the following:

- 17KF50 Female Sliding Termination
- 17K50 Male Sliding Termination
- 01-212 Female Flush Short
- 01-211 Male Flush Short

3653 Type N Calibration Kit consisting of:

- 23NF50 Female Short
- 23N50 Male Short
- 24NF50 Female Open
- 24N50 Male Open
- 28N50-2 Broadband Male Termination (2)
- 28NF50-2B Broadband Female Termination (2)
- 34AN50-2 Male Adapter (2)
- 34ANF50-2 Female Adapter (2)
- 01-213 Reference Gauge
- 01-224 Pin Depth Gauge
- Calibration coefficients diskette

VNA AND VNMS CALIBRATION KITS

3654BV Connector® Calibration Kit consisting of:

- 23V50B-5.1 Male Short 5.1mm
- 23VF50B-5.1 Female Short 5.1mm
- 24V50B Male Open
- 24VF50B Female Open
- 28V50B Male Broadband Termination (2)
- 28VF50B Female Broadband Termination (2)
- 17VF50B Female Sliding Termination
- 17V50B Male Sliding Termination
- 33VV50 Male-Male Adapter*
- 33VVF50 Female-Female Adapter (2)*
- 33VVF50 Male-Female Adapter (2)*
- Calibration coefficients diskette
- Connector thumb wheel (4)
- 01-201 Torque Wrench
- 01-210 Reference Flat
- 01-322 Pin Depth Gauge
- 01-323 Female Adapter for pin gauge
- 01-204 Adapter Wrench
- 01-312 Male Flush Short
- 01-311 Female Flush Short

3655 Waveguide Calibration Kit

The 3655 Calibration Kit contains all of the precision components and tools required to calibrate your VNA for 12-term error-corrected measurements of test devices with the appropriate waveguide designation. Components are included for calibrating both module ports. The kit supports calibration with offset shorts and broadband loads. Option 1 adds a sliding termination.

Consisting of:

- Short, Flush (2)
- Offsets, 1/8 and 3/8 Wavelength
- Terminations, Fixed (2)
- Test Port Sections (2)

Option 1

Adds the following:

- Sliding Termination

3750 SMA/3.5 mm Calibration Kit consisting of:

- 23LF50 Female Short
- 23L50 Male Short
- 24LF50 Female Open
- 24L50 Male Open
- 28L50 Male Termination (2)
- 28LF50 Female Termination (2)
- Calibration coefficients diskette

3751 GPC-7 Calibration Kit consisting of:

- 23A50 Short
- 24A50 Open
- 28A50 Termination (2)
- Calibration coefficients diskette

Option 1

Adds the following:

- 28A50LF 3rd Termination

3753 Type N Calibration Kit consisting of:

- 23NF50 Female Short
- 24NF50 Female Open
- 24N50 Male Open
- 28NF50 Female Termination (2)
- 28N50 Male Termination (2)
- 23N50 Male Short
- Calibration coefficients diskette

The following kits are for use with MS462XX Scorpion VNAs.

3750LF SMA/3.5 mm 6 GHz Calibration Kit consisting of:

- 23LF50 Female Short
- 23L50 Male Short
- 24LF50 Female Open
- 24L50 Male Open
- 28L50LF Male Termination (2)
- 28LF50LF Female Termination (2)
- Calibration coefficients diskette

3751LF GPC-7 6 GHz Calibration Kit consisting of:

- 23A50 Short
- 24A50 Open
- 28A50LF Termination (2)
- Calibration coefficients diskette

Option 1

Adds the following:

- 28A50LF 3rd Termination

3753LF Type N 6 GHz Calibration Kit consisting of:

- 23NF50 Female Short
- 24NF50 Female Open
- 24N50 Male Open
- 28NF50LF Female Termination (2)
- 28N50LF Male Termination (2)
- 23N50 Male Short
- Calibration coefficients diskette

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
	Calibration kits
3650	SMA/3.5 mm calibration kit
Option 1	Adds sliding terminations
3651	GPC-7 calibration kit
Option 1	Adds sliding terminations
3652	K Connector® calibration kit
Option 1	Adds sliding terminations
3653	Type N calibration kit
3654B	V Connector® calibration kit with sliding terminations
3655	Waveguide calibration kit
Option 1	Adds sliding terminations
3750	SMA/3.5 mm 8.6 GHz calibration kit
3750LF	SMA/3.5 mm 6 GHz calibration kit
3751	GPC-7 8.6 GHz calibration kit
3751LF	GPC-7 6 GHz calibration kit
3753	Type N 8.6 GHz calibration kit
3753LF	Type N 6 GHz calibration kit
3753-75	75 Ohm Type N 3 GHz calibration kit

* Phase Equal Adapters

VNA AND VNMS VERIFICATION KITS



3669B

The Anritsu Verification Kits contain precision components with characteristics that are traceable to NIST. Used primarily by the metrology laboratory, these components provide the most dependable means of determining the system accuracy of your VNA. A disk containing factory measured test data for all components is supplied for comparison with customer-measured data.

The following kits are for use with 37XXX Lightning VNAs.

3663 Type N Verification Kit consisting of:

- 42N-50, 50 dB Attenuator
- 18N50-10, 10 cm Airline
- 42N20, 20 dB Attenuator
- 18N50-10B, 10 cm Stepped Impedance Airline (Beatty standard)
- Verification kit disks

3665 Waveguide Verification Kit consisting of:

- Straight section
- Pin set
- Mismatch section
- Ball driver
- 50 dB Attenuator
- 20 dB Attenuator
- Verification kit disks

3666 SMA/3.5 mm Verification Kit consisting of:

- 19S50-7, 7.5 cm Airline
- 19SF50-7B, 7.5 cm Stepped Impedance Airline (Beatty standard)
- 42S-50, 50 dB Attenuator
- 42S-20, 20 dB Attenuator
- Verification kit disks

3667 GPC-7 Verification Kit consisting of:

- 42A-50, 50 dB Attenuator
- 18A50-10, 10 cm Air line
- 42A-20, 20 dB Attenuator
- 18A50-10B, 10 cm Stepped Impedance Airline (Beatty standard)
- Verification kit disks

3668 K Connector® Verification Kit consisting of:

- 19K50-7, 7.5 cm Airline
- 42K-50, 50 dB Attenuator
- 42K-20, 20 dB Attenuator
- 18K50-7B, 7.5 cm Stepped Impedance Airline (Beatty standard)
- Verification kit disks

3669B V Connector® Verification Kit consisting of:

- 42V-40, 40 dB Attenuator
- 42V-20, 20 dB Attenuator
- 19V50-5, 5 cm Airline
- 18V50-5B, 5 cm Stepped Impedance Airline (Beatty standard)
- Verification kit disks

The following kits are for use with MS462XX Scorpion VNAs.

3663LF Type N 6 GHz Verification Kit consisting of:

- 42N-50, 50 dB Attenuator
- 42N20, 20 dB Attenuator
- 42NOP-20 N Mismatch attenuator
- Verification kit disks

3666LF SMA/3.5 mm 6 GHz Verification Kit consisting of:

- 42L-50, 50 dB Attenuator
- 42L-20, 20 dB Attenuator
- 42LOP-20 SMA/3.5 mm Mismatch Attenuator
- Verification kit disks

3667LF GPC-7 6 GHz Verification Kit consisting of:

- 42A-50, 50 dB Attenuator
- 42A-20, 20 dB Attenuator
- 42AOP-20 GPC-7 Mismatch Attenuator
- Verification kit disks

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
	Verification kits
3663	Type N verification kit
3665	Waveguide verification kit
3666	SMA/3.5 mm verification kit
3667	GPC-7 verification kit
3668	K Connector® verification kit
3669B	V Connector® verification kit
3663LF	Type N 6 GHz verification kit
3666LF	SMA/3.5 mm 6 GHz verification kit
3667LF	GPC-7 6 GHz verification kit

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4522K	Step Attenuator, DC to 26.5 GHz, 110 dB	36	97NF50-1	Autotester, N(f), 0.01 to 18 GHz, High directivity	38
4612K	Step Attenuator, DC to 40 GHz, 70 dB	36	97S50	Autotester, WSMA(m), 0.01 to 18 GHz	38
4622K	Step Attenuator, DC to 40 GHz, 110 dB	36	97S50-1	Autotester, WSMA(m), 0.01 to 18 GHz, High Directivity	38
5400-6N50	Autotester, 1 to 3000 MHz, N(m), 50 Ω	40	97SF50	Autotester, WSMA(f), 0.01 to 18 GHz	38
5400-6N75	Autotester, 1 to 3000 MHz, N(m), 75 Ω	40	97SF50-1	Autotester, WSMA(m), 0.01 to 18 GHz, High Directivity	38
5400-6NF50	Autotester, 1 to 3000 MHz, N(f), 50 Ω	40	A16176	Diode Module, (>=20 GHz)	48
5400-6NF75	Autotester, 1 to 3000 MHz, N(f), 75 Ω	40	A16177	Diode Module, (<= 20 GHz)	48
5400-71B50	Microwave Detector, 10 MHz to 1.5 GHz, BNC(m), 50 Ω	49	A18735	Diode Module, 74N50B	48
5400-71B75	Microwave Detector, 10 MHz to 1.5 GHz, BNC(m), 75 Ω	49	B16132	Diode Module, 75N50B	48
5400-71N50	Microwave Detector, 1 MHz to 3 GHz, N(m), 50 Ω	49	K100	Glass Beads for K102, K103, and K104 connectors (package of 5)	7
5400-71N75	Microwave Detector, 1 MHz to 3 GHz, N(m), 75 Ω	49	K100B	High Hermeticity Glass Beads for K102, K103, and K104 connectors (package of 5)	7
5400-71N75L	Microwave Detector, 5 MHz to 1.2 GHz, N(m), 75 Ω	49	K101F	K Female In-Line Cable Connector, DC-40 GHz for 3.00 mm K118 cable	7
560-7A50	Microwave Detector, 10 MHz to 18 GHz, GPC-7, 50 Ω	49	K101M	K Male In-Line Cable Connector, DC-40 GHz for 3.00 mm K118 cable	7
560-7K50	Microwave Detector, 10 MHz to 40 GHz, K(m), 50 Ω	49	K101M-085	K Male In-Line Cable Connector, DC-40 GHz for 2.18 mm V085 cable	7
560-7N50B	Microwave Detector, 10 MHz to 20 GHz, N(m), 50 Ω	49	K102F	K Female Sparkplug Launcher Connector, DC-40 GHz	7
560-7S50-2	Microwave Detector, 10 MHz to 26.5 GHz, WSMA(m), 50 Ω	49	K102M	K Male Sparkplug Launcher Connector, DC-40 GHz	7
560-7S50B	Microwave Detector, 10 MHz to 20 GHz, WSMA(m), 50 Ω	49	K103F	K Female Flange Launcher, two-hole, DC-40 GHz	7
560-7VA50	Microwave Detector, 10 MHz to 50 GHz, V(m), 50 Ω	49	K103M	K Male Flange Launcher, two-hole, DC-40 GHz	7
560-98C50A	Convertible Autotester, 10 MHz to 40 GHz	42	K104F	K Female Flange Launcher, four-hole, DC-40 GHz	8
560-97A50	Autotester, 10 MHz to 18 GHz, GPC-7, 36 dB directivity	38	K104M	K Male Flange Launcher, two-hole, DC-40 GHz	8
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560-97N50	Autotester, 10 MHz to 18 GHz, N(m), 35 dB directivity	38	K110-3	Stress relief Contact, Microstrip	6
560-97N50-1	Autotester, 10 MHz to 18 GHz, N(m), 38 dB directivity	38	K118	1.5 m length of 3.00 mm semi-rigid cable for K101 series connector	6
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560-97NF50-1	Autotester, 10 MHz to 18 GHz, N(f), 38 dB directivity	38	K120FF	Semi-rigid Cable, K(f) to K(f), DC to 40 GHz	18
560-98K50	Autotester, 10 MHz to 40 GHz, K(m), 35 dB directivity	39	K120MF	Semi-rigid Cable, K(m) to K(f), DC to 40 GHz	18
560-98KF50	Autotester, 10 MHz to 40 GHz, K(f), 35 dB directivity	39	K202F	Combination of K100, K102F, and K110-1	8
560-98KF50-15	Offset Autotester, 10 MHz to 40 GHz, K(f), 15 dB	39	K202FB	Combination of K100B, K102F, and K110-1	8
560-98S50	Autotester, 10 MHz to 26.5 GHz, WSMA(m), 37 dB directivity	39	K220B	Adapter, K(m) to K(m)	21
560-98S50-1	Autotester, 10 MHz to 26.5 GHz, WSMA(m), 40 dB directivity	39	K222B	Adapter, K(f) to K(f)	21
560-98SF50	Autotester, 10 MHz to 26.5 GHz, WSMA(f), 37 dB directivity	39	K224B	Adapter, K(f) to K(m)	21
560-98SF50-1	Autotester, 10 MHz to 26.5 GHz, WSMA(f), 40 dB directivity	39	K230B	Panel Mount Adapter, K(m) to K(m)	22
560-98VA50	Autotester, 10 MHz to 50 GHz, V(m), 36 dB directivity	39	K232B	Panel Mount Adapter, K(f) to K(f)	22
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70KC50	Detector, K(m), 0.01 to 40 GHz	47	K241C	Power Splitter, K, DC to 40 GHz	55
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POWER CONVERSION TABLE

Power (dBm)	P (mW)	Volts ms into 50 Ω	Volts Peak	Volts Peak to Peak
-60	0.0000100	0.000224	0.000316	0.00063
-59	0.0000126	0.000251	0.000355	0.00071
-58	0.0000158	0.000282	0.000398	0.00080
-57	0.0000200	0.000316	0.000447	0.00089
-56	0.0000251	0.000354	0.000501	0.00100
-55	0.0000316	0.000398	0.000562	0.00112
-54	0.0000398	0.000446	0.000631	0.00126
-53	0.0000501	0.000501	0.000708	0.00142
-52	0.0000631	0.000562	0.000794	0.00159
-51	0.0000794	0.000630	0.000891	0.00178
-50	0.0000100	0.000707	0.001000	0.00200
-49	0.0000126	0.000793	0.001122	0.00224
-48	0.0000158	0.000890	0.001259	0.00252
-47	0.0000200	0.00100	0.001413	0.00283
-46	0.0000251	0.00112	0.001585	0.00317
-45	0.0000316	0.00126	0.001778	0.00356
-44	0.0000398	0.00141	0.001995	0.00399
-43	0.0000501	0.00158	0.002239	0.00448
-42	0.0000631	0.00178	0.002512	0.00502
-41	0.0000794	0.00199	0.002818	0.00564
-40	0.0000100	0.00224	0.003162	0.00632
-39	0.0000126	0.00251	0.003548	0.00710
-38	0.0000158	0.00282	0.003981	0.00796
-37	0.0000200	0.00316	0.004467	0.00893
-36	0.0000251	0.00354	0.005012	0.0100
-35	0.0000316	0.00398	0.005623	0.0112
-34	0.0000398	0.00446	0.006310	0.0126
-33	0.0000501	0.00501	0.007079	0.0142
-32	0.0000631	0.00562	0.007943	0.0159
-31	0.0000794	0.00630	0.008913	0.0178
-30	0.0010	0.00707	0.010000	0.0200
-29	0.0013	0.00793	0.011220	0.0224
-28	0.0016	0.00890	0.012589	0.0252
27	0.0020	0.00999	0.014125	0.0283
-26	0.0025	0.01121	0.015849	0.0317
-25	0.0032	0.01257	0.017783	0.0356
-24	0.0040	0.01411	0.019953	0.0399
-23	0.0050	0.01583	0.022387	0.0448
-22	0.0063	0.01776	0.025119	0.0502
-21	0.0079	0.01993	0.028184	0.0564
-20	0.0100	0.02236	0.031623	0.0632
-19	0.0126	0.02509	0.035481	0.0710
-18	0.0158	0.02815	0.039811	0.0796
-17	0.0200	0.03159	0.044668	0.0893
-16	0.0251	0.03544	0.050119	0.1002
-15	0.0316	0.03976	0.056234	0.1125
-14	0.0398	0.04462	0.063096	0.1262
-13	0.0501	0.05006	0.070795	0.1416
-12	0.0631	0.05617	0.079433	0.1589
-11	0.0794	0.06302	0.089125	0.1783
-10	0.1000	0.07071	0.100000	0.2000

Power (dBm)	P (mW)	Volts ms into 50 Ω	Volts Peak	Volts Peak to Peak
-9	0.1259	0.07934	0.112	0.2244
-8	0.1585	0.08902	0.126	0.2518
-7	0.1995	0.09988	0.141	0.2825
-6	0.2512	0.11207	0.158	0.3170
-5	0.3162	0.12574	0.178	0.3557
-4	0.3981	0.14109	0.200	0.3991
-3	0.5012	0.15830	0.224	0.4477
-2	0.6310	0.17762	0.251	0.5024
-1	0.7943	0.19929	0.282	0.5637
0	1.0000	0.22361	0.316	0.6325
1	1.259	0.25089	0.355	0.7096
2	1.585	0.28150	0.398	0.7962
3	1.995	0.31585	0.447	0.8934
4	2.512	0.35439	0.501	1.0024
5	3.162	0.39764	0.562	1.1247
6	3.981	0.44615	0.631	1.2619
7	5.012	0.50059	0.708	1.4159
8	6.310	0.56167	0.794	1.5887
9	7.943	0.63021	0.891	1.7825
10	10.000	0.70711	1.000	2.0000
11	12.589	0.79339	1.122	2.2440
12	15.849	0.89019	1.259	2.5179
13	19.953	0.99881	1.413	2.8251
14	25.119	1.12069	1.585	3.1698
15	31.623	1.25743	1.778	3.5566
16	39.811	1.41086	1.995	3.9905
17	50.119	1.58301	2.239	4.4774
18	63.096	1.77617	2.512	5.0238
19	79.433	1.99290	2.818	5.6368
20	100.000	2.23607	3.162	6.3246
21	125.893	2.50891	3.548	7.0963
22	158.489	2.81504	3.981	7.9621
23	199.526	3.15853	4.467	8.9337
24	251.189	3.54393	5.012	10.0237
25	316.228	3.97635	5.623	11.2468
26	398.107	4.46154	6.310	12.6191
27	501.187	5.00593	7.079	14.1589
28	630.957	5.61675	7.943	15.8866
29	794.328	6.30210	8.913	17.8250
30	1000.000	7.07107	10.000	20.0000
31	1258.925	7.93387	11.220	22.4404
32	1584.893	8.90195	12.589	25.1785
33	1995.262	9.98815	14.125	28.2508
34	2511.886	11.20689	15.849	31.6979
35	3162.278	12.57433	17.783	35.5656
36	3981.072	14.10864	19.953	39.9052
37	5011.872	15.83015	22.387	44.7744
38	6309.573	17.76172	25.119	50.2377
39	7943.282	19.92898	28.184	56.3677
40	10000.000	22.36068	31.623	63.2456
41	12589.254	25.08910	35.481	70.9627

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