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Waveguide Directional Couplers, 8.2 to 40 GHz, 752 Series

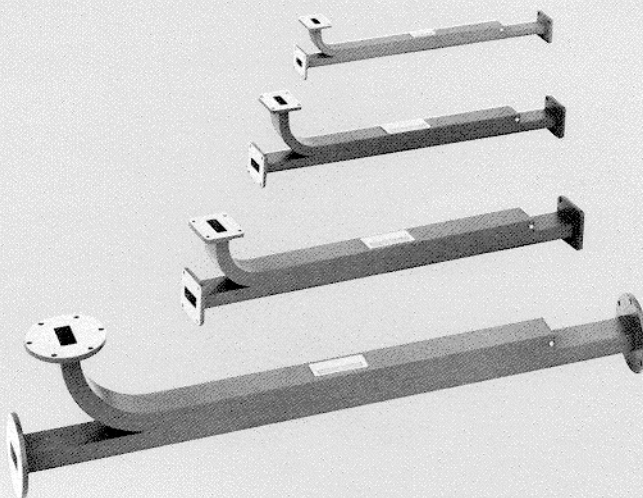
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FEATURES

- High Coupling Accuracy
- Excellent Directivity
- Low SWR

APPLICATIONS

- Measure Reflection Coefficient (SWR)
- Mix Two Signals
- Monitor Power
- Isolate Signal Source or Wavemeter



DESCRIPTION

High directivity makes the Model 752 particularly well suited for measuring very small reflections and for rapidly adjusting transmission line flatness over the entire waveguide frequency range.

Each coupler has an overall directivity of better than 40 dB (see Figure 1), very low reflections, and a smooth coupling variation vs. frequency (see Figure 2). Performance characteristics are unaffected by humidity, temperature, or time, making these units especially useful as standards of microwave attenuation. Coupling factors are 3, 10, and 20 dB; mean coupling accuracy is ± 0.4 dB (± 0.7 dB for K- and R-bands), and coupling variation vs. frequency is ± 0.5 dB (± 0.6 dB for R752D). Each coupler is supplied with coupling factor data at five frequencies across the band.

Used together and connected back-to-back, the directional couplers are most useful with the HP 8350 or 8340 Series sweepers in broadband reflection and SWR measurements. One directional coupler samples power traveling to the load, while the other samples power reflected from the load. Used with two HP 424A Crystal Detectors, measurements of SWR versus frequency can be made easily. The detected output of the forward coupler is used to level the sweeper, and the detected output of the reverse coupler is presented on an oscilloscope calibrated in SWR.* When used with unlevelled sweepers, the output of both couplers can be applied to the HP 8510 Network Analyzer or the HP 8756 or 8757 Scalar Network Analyzers to display reflection coefficient directly.

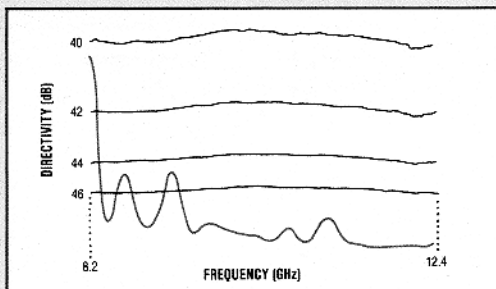


Figure 1. Directivity of an X752C. All couplers are tested over their full band for directivity.

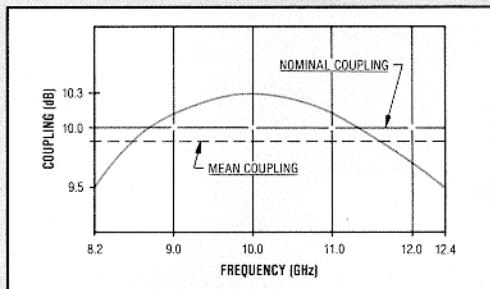


Figure 2. Typical Coupling Characteristic of Model X752C.

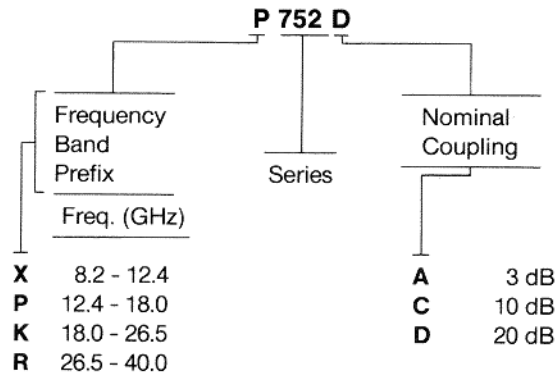
*See Application Note 183, High Frequency Swept Measurements.

A Matched "Hybrid Tee" With Low SWR

Since the 3-dB coupler has the high directivity of the 10- and 20-dB couplers, it can usually be used in place of hybrid tees. The 3-dB multi-hole coupler, unlike the hybrid tee, is a matched device, having an output SWR (either arm) of 1.15 or less over a waveguide frequency range.

Ordering Information

When ordering a coupler, the complete model number as shown in the example at right must be specified. Example: if a 20 dB coupler that operates in the frequency range of 12.4 GHz to 18 GHz is desired, the model number P752D must be ordered.



SPECIFICATIONS

Frequency Band ¹ (Prefix)	Frequency (GHz)	Fits Waveguide Size		Mean Coupling Accuracy ²	Coupling Variation ³	Directivity ⁴	SWR ^{4,5} Main Guide		Average Power Aux Guide Load (W)
		Nominal OD mm (in.)	EIA				752A	752C/D	
X	8.2 - 12.4	25.4 x 12.7 (1.0 x 0.5)	WR 90	±0.4 dB	≤±0.5 dB	≥40 dB	≤1.1	≤1.05	1
P	12.4 - 18.0	17.8 x 9.9 (0.7 x 0.39)	WR 62	↓	↓	↓	↓	↓	1
K†	18.0 - 26.5	12.7 x 6.4 (0.5 x 0.25)	WR 42	±0.7	↓	↓	↓	↓	0.5
R†	26.5 - 40.0	9.1 x 5.6 (0.36 x 0.22)	WR 28	±0.7	↓	↓	↓	↓	0.5

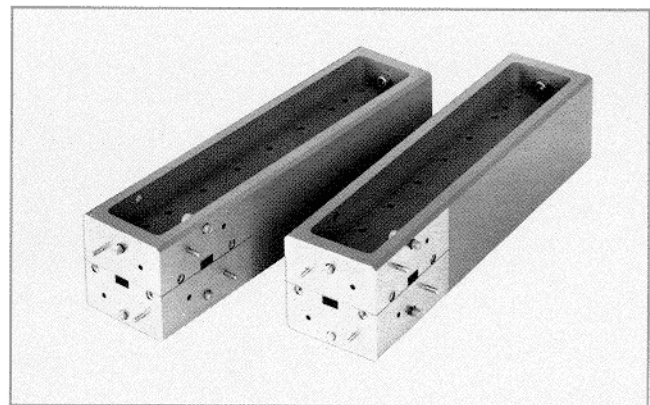
Frequency Band ¹ (Prefix)	Length						Weight			
	752		752C		752D		Net		Shipping	
	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(kg)	(lb)	(kg)	(lb)
X	424	16 ¹¹ / ₁₆	399	15 ¹¹ / ₁₆	399	15 ¹¹ / ₁₆	0.8	1 ³ / ₄	1.4	3
P	349	13 ³ / ₄	311	12 ¹ / ₄	311	12 ¹ / ₄	0.34	3/4	0.9	2
K†	270	10 ⁵ / ₈	252	9 ¹⁵ / ₁₆	252	9 ¹⁵ / ₁₆	0.23	1/2	0.45	1
R†	295	11 ⁵ / ₈	219	8 ⁵ / ₈	222	8 ²³ / ₃₂	0.11	1/4	0.45	1

¹Letter suffix indicates nominal coupling. "A" for 3 dB, "C" for 10 dB, "D" for 20 dB (example: P-band, 3-dB coupling, Model P752A).
²Mean coupling is the average of the maximum and minimum coupling values in the rated frequency range.
³±0.6 dB for R752D.
⁴Swept-frequency tested.
⁵Auxiliary arm SWR is 1.15 except for P, K and R band, for which it is 1.2.
†Circular flange adapters available: HP 11515A for K-band (UG-425) HP 11516A for R-band (UG-381)

HP Waveguide Couplers and Accessories up to 60 GHz

HP now has a full line of millimeter wave test equipment and measurement accessories including quality waveguide couplers in the Q-band (33 to 50 GHz) and U-band (40 to 60 GHz) frequency ranges. The Q and U752A/B/D are split block design couplers that feature exceptionally high directivity of at least 36 dB, low SWR of 1.1 or better and a smooth coupling variation of no more than ± 0.7 dB.

To learn more about the Q and U-band couplers, ask your HP sales representative for the Q and U752 Data Sheet (lit. no. 5953-6494). And before you set up your millimeter wave measurement system, look at HP's extensive line of millimeter wave test equipment and measurement accessories by asking your sales representative for the Millimeter-Wave Instrumentation brochure (lit. no. 5954-1527).



HP's Q752 (33 to 50 GHz) and U752 (40 to 60 GHz) Waveguide Couplers

For more information, call your local HP sales office listed in the telephone directory white pages. Ask for the Electronic Instruments Department. Or write to Hewlett-Packard: **U.S.A.** — P.O. Box 10301, Palo Alto, CA 94303-0890. **Europe** — P.O. Box 999, 1180 AZ Amstelveen, the Netherlands. **Canada** — 6877 Goreway Drive, Mississauga, L4V 1M8, Ontario. **Japan** — Yokogawa-Hewlett-Packard Ltd., 3-29-21, Takaido-Higashi, Suginami-ku, Tokyo 168. Elsewhere in the world, write to Hewlett-Packard Intercontinental, 3495 Deer Creek Road, Palo Alto, CA 94303-0890.

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