QUINSTAR TECHNOLOGY, INC.

Matched Hybrid Tees and Power Dividers

QJH

Characteristics

- Broadband Operation
- High Isolation
- Low Insertion Loss
- Low VSWR

Product Description

QuinStar Technology's **QJH** series of **matched hybrid tees (magic tees)** cover the frequency range of 18 to 170 GHz in nine waveguide bands. These four-port devices are used for balanced power-combining and/or dividing RF signals over a broad bandwidth. Matched hybrid Tee contains four ports: an H-plane port, an E-plane port and two co-linear ports, as shown in outline drawing. A signal entering the H-plane port will be equally to the two co-linear ports, but not to the E-plane port. The output signals coupled to the two co-linear ports are in phase. Similarly, a signal applied to the E-plane port will divide equally into the two co-linear ports. However, the output signal will be 180 degrees out of phase with each other. If two signals of equal amplitude are applied to the co-linear ports, the signals will be coupled to the E-and H-plane ports. The amount of power combined at the E and H-plane ports depends on the relative phase relationship between the two input signals as follows:

$P_H / P_E = [\cos(phi/2)/ \sin(phi/2)]^2$, where phi is the relative phase difference between the two input signals.

Hence, if the two signals are in phase, the total power will be combined at H-plane port. If the two signals are 180 degrees out of phase, the total power will appear at E-plane port. The isolation between the co-linear ports is greater than 20 dB, and between the E-plane and H-plane ports is greater than 30 dB.

Typical applications for these tees include power dividers/combiners, bridge circuits, balanced mixers, amplifiers, and instrumentation setups. QuinStar can provide custom 4- or 8-way power dividers by combining several hybrid tees (power dividers) into a single housing. It is also possible to configure the hybrid junctions to achieve unequal power split in 3, 5, 6 or 7 ports.

QuinStar Technology can also supply custom configurations ("folded tees") with output ports in different locations than in the standard product. Other power dividers (short slot hybrids and "rat-race" hybrids) are also available as special orders. If your application requires a unique power division scheme, please contact QuinStar with your requirements.

Specifications

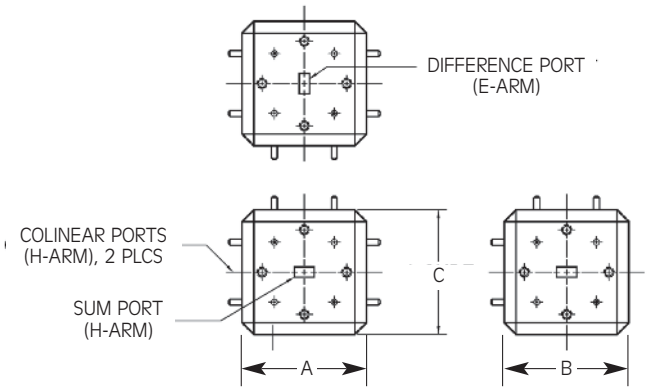
FREQUENCY BAND	K	Ka	Q	U	V	E	W	F	D
Frequency Range (GHz) [1]	18-26.5	26.5-40	33-50	40-60	50-75	60-90	75-110	90-140	110-170
Waveguide Size	WR-42	WR-28	WR-22	WR-19	WR-15	WR-12	WR-10	WR-8	WR-6
Insertion Loss (dB max)	0.5	0.5	0.7	0.8	1.0	1.0	1.0	1.2	1.2
VSWR, H-Plane (max)	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1
VSWR, E-Plane (max)	1.6:1	1.6:1	1.6:1	1.6:1	1.6:1	1.6:1	1.6:1	1.6:1	1.6:1
Balance (+/- dB typ)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Other waveguide sizes are available.

[1] Standard products meet full performance specifications over 80% of the waveguide band, with slightly degraded performance over the balance of the band. Narrow bandwidth versions (25% of waveguide band) with superior isolation and lower insertion loss are available.

Made in USA 24085 Garnier Street, Torrance, CA 90505 ❖ (310) 320-1111 Fax: (310) 320-9968 ❖ sales@quinstar.com ❖ www.quinstar.com

Outline Drawing/Mechanical Specifications



(round flange pattern shown)

FREQUENCY BAND	WAVEGUIDE SIZE	FLANGE PATTERN	DIMENSIONS (inches/mm)		
			A	B	C
K	WR-42	UG-595/U	1.25/31.8	1.25/31.8	0.89/22.6
Ka	WR-28	UG-599/U	1.00/25.4	1.00/25.4	1.00/25.4
Q	WR-22	UG-383/U	1.38/35.1	1.38/35.1	1.38/35.1
U	WR-19	UG-383/U	1.38/35.1	1.38/35.1	1.38/35.1
V	WR-15	UG-385/U	1.00/25.4	1.00/25.4	0.80/20.3
E	WR-12	UG-387/U	1.00/25.4	1.00/25.4	0.80/20.3
W	WR-10	UG-387/U	1.00/25.4	1.00/25.4	0.80/20.3
F	WR-8	UG-387/U	1.00/25.4	1.00/25.4	0.80/20.3
D	WR-6	UG-387/U	1.00/25.4	1.00/25.4	0.80/20.3

Ordering Information

Model Number **QJH -** **A B CD 00**

Please specify exact center frequency when ordering narrowband version.

waveguide band designator

K = K-band
A = Ka-band
Q = Q-band
U = U-band
V = V-band
E = E-band
W = W-band
F = F-band
D = D-band

frequency

Fullband: FB
Narrowband: center frequency rounded to nearest GHz
(A0 = 100 GHz, A1 = 101 GHz, B1 = 111 GHz, etc.)

version

U = upper 80% of waveguide band
L = lower 80% of waveguide band
N = narrowband
Z = custom

Made in USA
24085 Garnier Street, Torrance, CA 90505 ❖ (310) 320-1111 Fax: (310) 320-9968 ❖ sales@quinstar.com ❖ www.quinstar.com