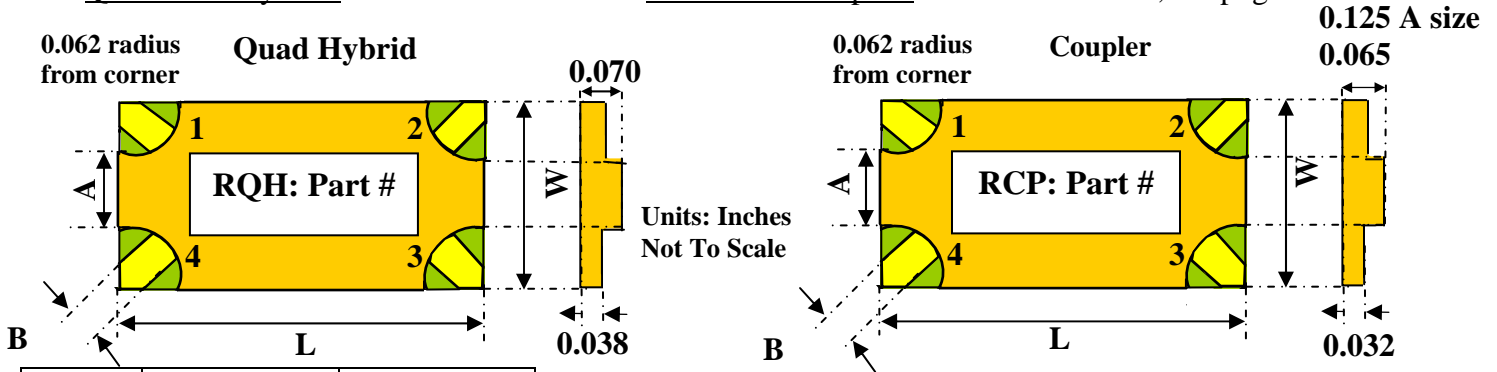


# RADITEK INC.

## QUADRATURE HYBRIDS AND DIRECTIONAL COUPLERS code-L

**0.8 to 18.0 GHz, Drop In Package.**

Quadrature Hybrids cover <0.8 Octave and Directional Couplers cover <1.0 Octave, G pkg > 5GHz



| Port # | Hybrid    | Coupler    |
|--------|-----------|------------|
| 1      | RF input  | RF Input   |
| 2      | Isolation | RF output  |
| 3      | -3dB-90°  | Isolation  |
| 4      | -3dB 0°   | Coupled RF |

Part Number Example:

**Quadrature Hybrid: RQH-(F1-F2) Frequency (GHz)-package letter F-di**

**Coupler: RCPL-(F1-F2) Frequency (GHz)-coupling factor-package letter F-di**

| Package | A   | B     | C     | D     | F     | G     | Units                      |
|---------|-----|-------|-------|-------|-------|-------|----------------------------|
| L       | 2.0 | 1.000 | 1.000 | 0.650 | 0.560 | 0.400 | Inches:<br>Not To<br>Scale |
| W       | 0.7 | 0.750 | 0.500 | 0.480 | 0.350 | 0.200 |                            |
| A       | tba |       | 0.35  | 0.330 | 0.025 | 0.052 |                            |
| B       | tba |       | 0.065 | 0.065 | 0.050 | 0.050 |                            |
| MOQ     | 14  | 25    | 30    | 40    | 90    | 180   | Pcs                        |

| COUPLING FACTORS |           |               |
|------------------|-----------|---------------|
| Coupling         | Isolation | Coupling loss |
| dB               | dB        |               |
| 6                | 22        | 1.2           |
| 10               | 25        | 0.46          |
| 15               | 30        | 0.14          |
| 20               | 35        | 0.04          |
| 30               | 39        | 0.004         |

Some Specification examples (See Cross Reference Sheets, others available):

Port is symmetrical you can start at any port and go in any direction

Suitable correctly rated 50Ω termination to be applied to "Isolation / load port"

|                       | RQH              | RQH           | RQH           | RQH           | RCPL                 | RCPL                 | RCPL                 | RCPL                 | Units |
|-----------------------|------------------|---------------|---------------|---------------|----------------------|----------------------|----------------------|----------------------|-------|
| Frequency Coverage    | 0.8-6            | 6-8           | 8-12          | 12-18         | 0.8-6                | 6-8                  | 8-12                 | 12-18                | GHz   |
| Frequency Bandwidth   | 0.8<br>Octave    | 0.8<br>Octave | 0.8<br>Octave | 0.8<br>Octave | 1.0<br>Octave        | 1.0<br>Octave        | 1.0<br>Octave        | 1.0<br>Octave        | max   |
| Coupling factors      | 3                | 3             | 3             | 3             | 6, 10, 15,<br>20, 30 | 6, 10, 15,<br>20, 30 | 6, 10, 15,<br>20, 30 | 6, 10, 15,<br>20, 30 | dB    |
| Insertion loss F Pkg  | 0.25             | 0.4           | 0.5           | 0.6           | 0.25                 | 0.35                 | 0.45                 | 0.55                 | dB    |
| Insertion loss G Pkg  | NA               | 0.5           | 0.6           | 0.7           | NA                   | 0.45                 | 0.55                 | 0.65                 | dB    |
| Isolation             | 20               | 20            | 18            | 18            | 20 <sup>2</sup>      | 20 <sup>2</sup>      | 20 <sup>2</sup>      | 20 <sup>2</sup>      | dB    |
| VSWR                  | 1.20:1           | 1.25:1        | 1.30:1        | 1.40:1        | 1.20:1               | 1.20:1               | 1.25:1               | 1.35:1               |       |
| Amplitude balance     | 0.3              | 0.3           | 0.3           | 0.3           | 0.5                  | 0.5                  | 0.5                  | 0.5                  | ±dB   |
| Phase balance         | 3                | 3             | 3             | 3             | 3                    | 3                    | 3                    | 3                    | ±°    |
| Power rating          | 100 <sup>1</sup> | 50            | 40            | 30            | 100 <sup>1</sup>     | 75                   | 50                   | 30                   | watts |
| Power Peak            | 1000             | 1000          | 700           | 700           | 1000                 | 1000                 | 700                  | 700                  | watts |
| Operating Temperature | -55 to +85       | -55 to +85    | -55 to +85    | -55 to +85    | -55 to +85           | -55 to +85           | -55 to +85           | -55 to +85           | C     |
| Package               | F                | F/G           | F/G           | F/G           | F                    | F/G                  | F/G                  | F/G                  |       |

<sup>1</sup>Limited by load availability selected by the customer.  
Concern is at 4-6 GHz.

<sup>2</sup>Varies by coupling factor see table above right

**Minimum Order Quantity by Lot Size (See Package Chart)**

Will withstand solder reflow. Available in tape and reel (>2K Pcs).

Note: Narrow band versions available with improved spec

Drop-In Couplers, Hybrids 0.8-18 GHz-L

Specifications may be subject to change

03/13/07

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|   | RQH              | RQH              | RQH              | RQH              | RQH               | RQH              | RQH               | Units |
|---|------------------|------------------|------------------|------------------|-------------------|------------------|-------------------|-------|
| Frequency Coverage                                  | 1.3-2.7          | 2.6-5.5          | 2.0-4.0          | 4.0-6.0          | 2.7-3.5           | 5-10             | 7.1-8.5           | GHz   |
| Frequency Bandwidth                                 | 0.8 Octave       |                  |                  |                  | 0.8 Octave        |                  | 0.8 Octave        | max   |
| Coupling factors                                    | 3                | 3                | 3                | 3                | 3                 | 3                | 3                 | dB    |
| Insertion loss F Pkg<br><b>Insertion loss G Pkg</b> | 0.25             | 0.35             | 0.3              | 0.35             | 0.25<br><b>NA</b> | 0.4              | 0.4<br><b>0.5</b> | dB    |
| Isolation   | 20               | 20               | 20               | 20               | 20                | 20               | 20                | dB    |
| VSWR  | 1.20:1           | 1.20:1           | 1.20:1           | 1.20:1           | 1.20:1            | 1.20:1           | 1.25:1            |       |
| Amplitude balance                                   | 0.3              | 0.3              | 0.3              | 0.3              | 0.3               | 0.6              | 0.3               | ±dB   |
| Phase balance                                       | 3                | 3                | 3                | 3                | 3                 | 3                | 3                 | ±°    |
| Power rating  | 100 <sup>1</sup> | 100 <sup>1</sup> | 100 <sup>1</sup> | 100 <sup>1</sup> | 30                | 100 <sup>1</sup> | 30                | watts |
| Power Peak  | 1000             | 1000             | 1000             | 1000             |                   | 1000             |                   | watts |
| Operating Temperature                               | -55 to +85       | -55 to +85       | -55 to +85       | -55 to +85       | -55 to +85        | -55 to +85       | -55 to +85        | C     |
| Package   | F                | F                | F                | F                | F                 | F                | G                 |       |

|                       | RQH        | RCPL             | RCPL             | RCPL                    | RCPL       | RQH        | RQH        | Units |
|-----------------------|------------|------------------|------------------|-------------------------|------------|------------|------------|-------|
| Frequency Coverage    | 4-8        | 0.45-2.5         | 0.4-3.0          | 0.8-2.0                 | 4-8        | 2-6        | 5-6        | GHz   |
| Frequency Bandwidth   |            |                  |                  | Full                    |            | Full       | Full       | max   |
| Coupling factors      | 3          | 20               | 10, 20, 30       | 6                       | 10         | 3          | 3          | dB    |
| Insertion loss        | 0.4        | 0.5              | 0.5              | 0.3                     | 0.6        | 0.8        | 0.35       | dB    |
| Isolation             | 19         | 29               | 19, 29, 39       | 22                      | 22         | 18         | 20         | dB    |
| VSWR                  | 1.35:1     | 1.25:1           | 1.25:1           | 1.2:1 max<br>1.17:1 typ | 1.35:1     | 1.30:1     | 1.20:1     |       |
| Amplitude balance     | 0.6        | 0.5              | 0.5              | 0.3                     | 0.5        | 0.6        | 0.5        | ±dB   |
| Phase balance         | 3          | 3                | 3                | 3                       |            | 3          | 3          | ±°    |
| Power rating          | 50         | 100 <sup>1</sup> | 100 <sup>1</sup> | 100 <sup>1</sup>        | 50         | 40         | 75         | watts |
| Power Peak            | 700        | 1000             | 1000             | 1000                    | 700        | 700        | 700        | watts |
| Operating Temperature | -55 to +85 | -55 to +85       | -55 to +85       | -55 to +85              | -55 to +85 | -55 to +85 | -55 to +85 | C     |
| Package               | F          | A                | A                | F                       | F          | A          | F          |       |

**Drop-In Couplers, Hybrids 0.8-18 GHz-L** **Specifications may be subject to change**

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|                       | RCPL       | RCPL           | RCPL       | RCPL              | RCPL            | Units |
|-----------------------|------------|----------------|------------|-------------------|-----------------|-------|
| Frequency Coverage    | 2-4        | 2-6            | 2-8        | 5.85-6.425        | 6.5-8.5         | GHz   |
| Frequency Bandwidth   |            |                |            |                   |                 | max   |
| Coupling factors      | 20         | 6±1.<br>20±1.5 | 14±1.5     | 6, 10, 15, 20, 30 | 15,20           | dB    |
| Insertion Loss        | 0.3        | 0.3            | 0.5        | 0.3               | 0.45            | dB    |
| Isolation             | 29         | 35             | 29         | 20 <sup>2</sup>   | 20 <sup>2</sup> | dB    |
| VSWR                  | 1.25:1     | 1.20:1         | 1.25:1     | 1.20:1            | 1.25:1          |       |
| Amplitude balance     | 0.5        | 0.5            | 0.5        | 0.5               | 0.5             | ±dB   |
| Phase balance         | 3          | 3              | 3          | 3                 | 3               | ±°    |
| Power rating          | 75         | 50             | 20         | 100 <sup>1</sup>  | 50              | watts |
| Power Peak            | 700        | 700            | 700        | 1000              | 700             | watts |
| Operating Temperature | -55 to +85 | -55 to +85     | -55 to +85 | -55 to +85        | -55 to +85      | C     |
| Package               | D          | D              | C          | F                 | F BOK           |       |

|                       | RCPL       | RCPL       | RCPL       | RCPL       | RCPL       | RCPL       | Units |
|-----------------------|------------|------------|------------|------------|------------|------------|-------|
| Frequency Coverage    | 5-11       | 6-18       | 8-12       | 8-12       | 9-11       | 4-8        | GHz   |
| Frequency Bandwidth   |            |            |            |            |            |            | max   |
| Coupling factors      | 15         | 20±1.5     | 20         | 3/6        | 20         | 10         | dB    |
| Insertion Loss        | 0.5        | 0.4        | 0.4        | 0.4        | 0.45       | 0.6        | dB    |
| Isolation             | 20         | 33         | 29         | 19         | 35         | 22         | dB    |
| VSWR                  | 1.35:1     | 1.35:1     | 1.3        | 1.3        | 1.20:1     | 1.35:1     |       |
| Amplitude balance     | 0.5        | 0.3        | 0.5        | 0.5        | 0.5        | 0.5        | ±dB   |
| Phase balance         | 3          | 3          | 3          | 3          | 2          |            | ±°    |
| Power rating          | 75         | 50         | 50         | 50         | 1          | 50         | watts |
| Power Peak            | 1000       | 1000       | 700        | 700        | tba        | 700        | watts |
| Operating Temperature | -55 to +85 | -55 to +85 | -55 to +85 | -55 to +85 | -55 to +85 | -55 to +85 | C     |
| Package               | D          | F          | F / G      | F / G      | G          | F          |       |

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#### Pin / Port designators

These are symmetrical, therefore any pin can be designated the input port

| Port # | Hybrid    |           |           |           |
|--------|-----------|-----------|-----------|-----------|
| 1      | RF input  | Load port | -3dB-90°  | -3dB 0°   |
| 2      | Load port | RF input  | -3dB 0°   | -3dB-90°  |
| 3      | -3dB-90°  | -3dB 0°   | RF input  | Load port |
| 4      | -3dB 0°   | -3dB-90°  | Load port | RF input  |

| Port # | Coupler    |            |            |            |
|--------|------------|------------|------------|------------|
| 1      | RF input   | RF output  | Load port  | Coupled RF |
| 2      | RF output  | RF input   | Coupled RF | Load port  |
| 3      | Load port  | Coupled RF | RF input   | RF output  |
| 4      | Coupled RF | Load port  | RF output  | RF input   |

Load port = Isolated

#### Installation instructions

1. RADITEK **hybrid/coupler** above 6 GHz must have a Microstrip interface for optimum performance. As such they are not fully surface mount per se.
2. Apply silver epoxy or solder to ensure a good ground. (heating the unit as necessary (Hotplate or Reflow))
3. The actual application requires a flush Microstrip interface with the adjacent Microstrip circuit, with minimum gap between the **hybrid/coupler** and interface Microstrip ground plane.
4. Apply solder to well grounded (with vias or wrap arounds) adjacent circuit board, as shown. Solder small tabs as shown to each of the four traces, tab should be thin tinned copper and be the same width as the Microstripline.
5. Circuit board Microstrip width must match the **hybrid/coupler** width and be well matched to 50 Ohm, for optimum performance. It is preferable to laser cut the circuit board, to a precise cutout matching the size of the **hybrid/coupler** and gaps or misalignment will degrade performance.
6. A test fixture can be fabricated out of a block of brass or Aluminum, with SMA connectors with flush tabs can be carefully soldered to the four traces.  
and good ground continuity for the bottom ground planes

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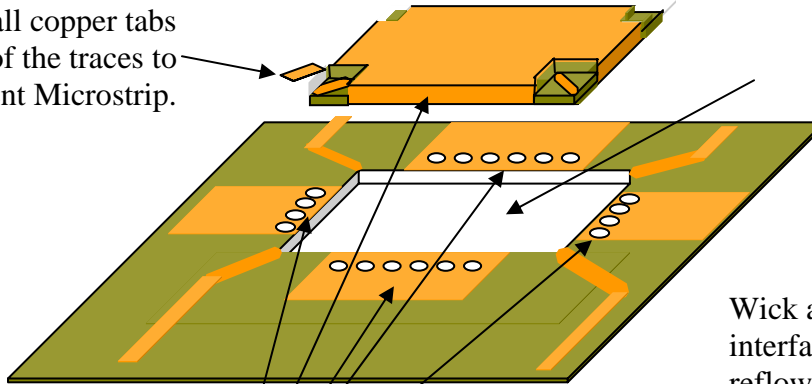
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If possible:  
Apply silver epoxy or  
solder

Solder small copper tabs  
over each of the traces to  
the adjacent Microstrip.



Wick away any excess solder, on the  
interface tabs. This part cannot be  
reflowed it needs a special  
installation, due to the soldering of  
the small tabs into place.

Solder along any wrap around  
grounds on the hybrid/coupler.  
This is essential for best performance.