

# Thin-Film Directional Couplers



## CP0603 High Directivity LGA Termination

### GENERAL DESCRIPTION

#### ITF (Integrated Thin-Film) TECHNOLOGY

The ITF LGA Coupler is based on thin-film multilayer technology. The technology provides a miniature part with excellent high frequency performance and rugged construction for reliable automatic assembly. The ITF Coupler is offered in a variety of frequency bands compatible with various types of high frequency wireless systems.

### APPLICATIONS

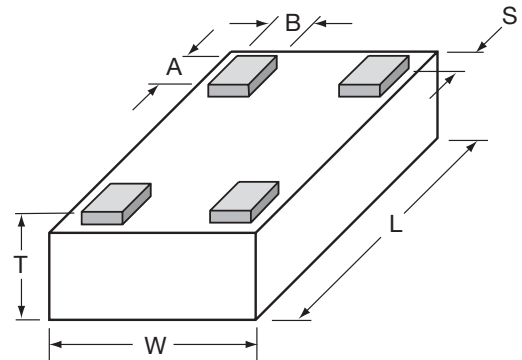
- Mobile Communications
- Satellite TV Receivers
- GPS
- Vehicle Location Systems
- Wireless LAN's

### FEATURES

- Inherent Low Profile
- Self Alignment during Reflow
- Excellent Solderability
- Low Parasitics
- Better Heat Dissipation
- Operating/Storage Temp -40°C to +85°C
- Power Rating 3W RF Cont

### DIMENSIONS: (Bottom View)

millimeters (inches)



|          |                            |          |                            |
|----------|----------------------------|----------|----------------------------|
| <b>L</b> | 1.60±0.10<br>(0.063±0.004) | <b>A</b> | 0.25±0.05<br>(0.010±0.002) |
| <b>W</b> | 0.84±0.10<br>(0.033±0.004) | <b>B</b> | 0.20±0.05<br>(0.008±0.002) |
| <b>T</b> | 0.60±0.10<br>(0.024±0.004) | <b>S</b> | 0.05±0.05<br>(0.002±0.002) |

### HOW TO ORDER

|                                                       |                                         |                              |                                               |                                  |                                                                                                       |                                                               |
|-------------------------------------------------------|-----------------------------------------|------------------------------|-----------------------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| <b>CP</b><br>T<br><b>Style</b><br>Directional Coupler | <b>0603</b><br>T<br><b>Size</b><br>0603 | <b>A</b><br>T<br><b>Type</b> | <b>****</b><br>T<br><b>Frequency</b><br>(MHz) | <b>X</b><br>T<br><b>Sub Type</b> | <b>N</b><br>T<br><b>Termination Code</b><br>L = LGA Sn90, Pb10<br>**N = LGA Sn100<br>**RoHS Compliant | <b>TR</b><br>T<br><b>Packaging Code</b><br>TR = Tape and Reel |
|-------------------------------------------------------|-----------------------------------------|------------------------------|-----------------------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|

### QUALITY INSPECTION

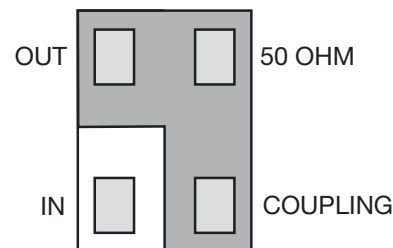
Finished parts are 100% tested for electrical parameters and visual characteristics. Each production lot is evaluated on a sample basis for:

- Static Humidity: 85°C, 85% RH, 160 hours
- Endurance: 125°C, I<sub>R</sub>, 4 hours

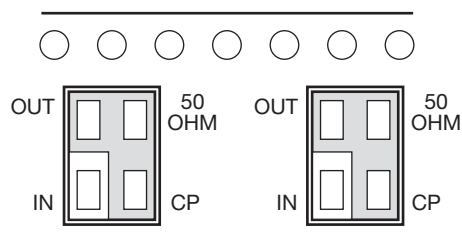
### TERMINATION

Sn90Pb10 or Lead-Free Sn100 Nickel/Solder coating compatible with automatic soldering technologies: reflow, wave soldering, vapor phase and manual.

### TERMINALS (Top View)

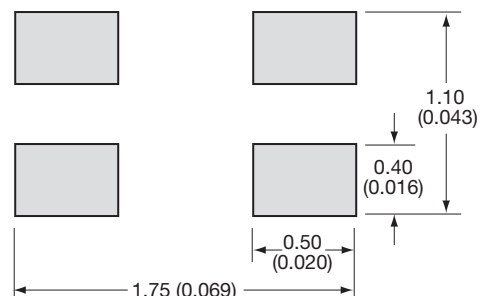


### ORIENTATION IN TAPE



### Recommended Pad Layout Dimensions

mm (inches)



\*The recommended distance to the PCB Ground Plane is 0.254mm (0.010")

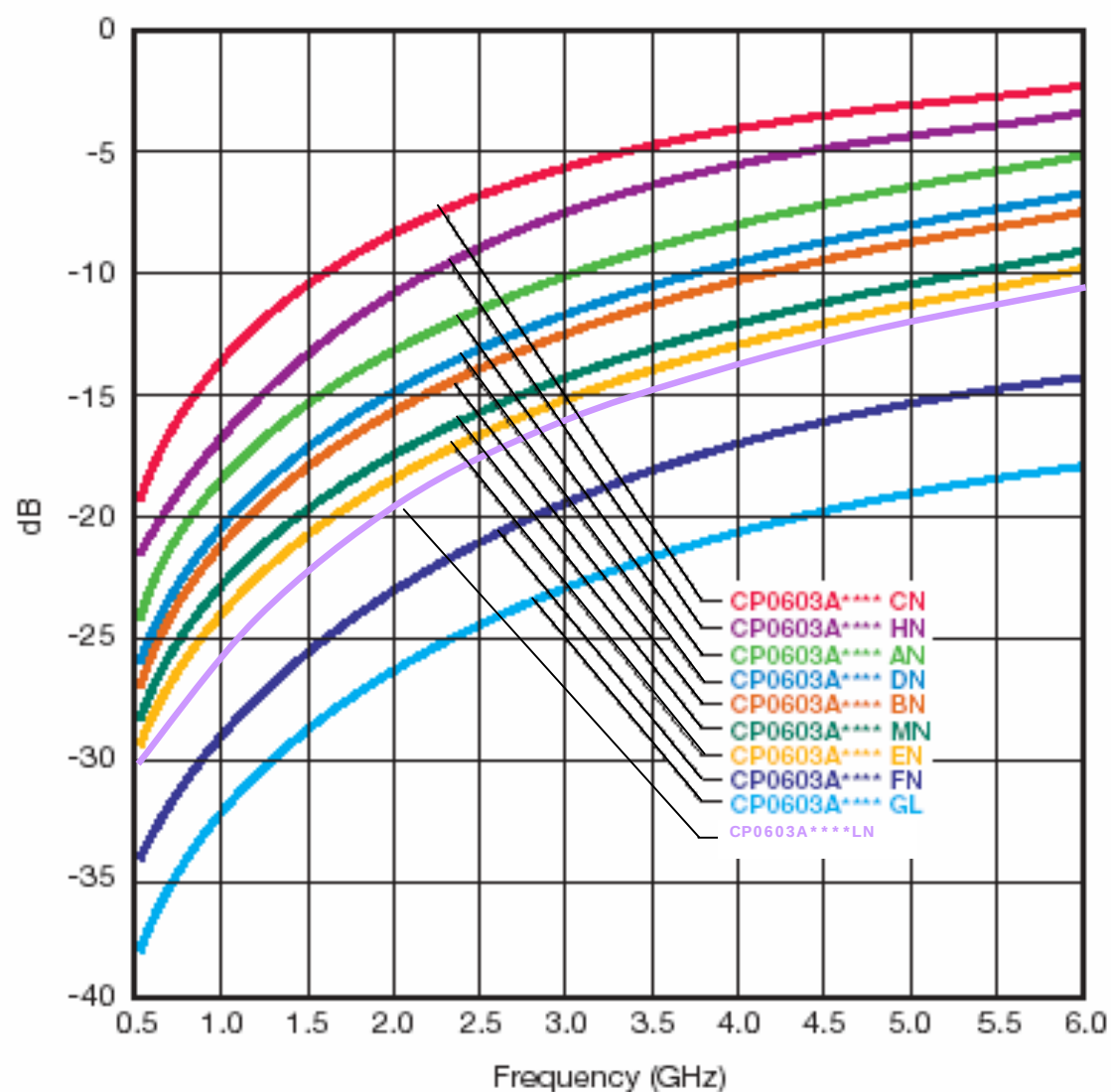
# Thin-Film Directional Couplers

CP0603 High Directivity LGA Termination



## COUPLER TYPE SELECTION GRAPH

### Coupling vs. Frequency



Intermediate coupling factors are readily available.  
Please contact factory.

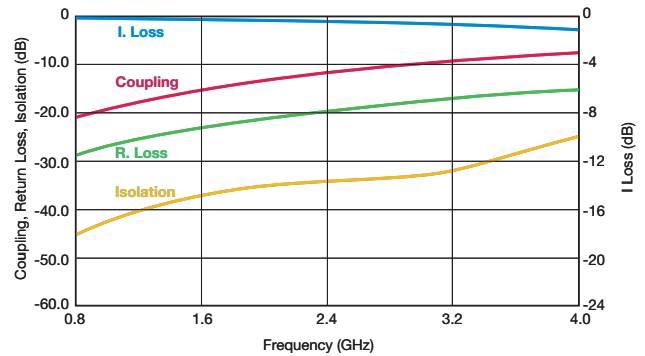


# Thin-Film Directional Couplers



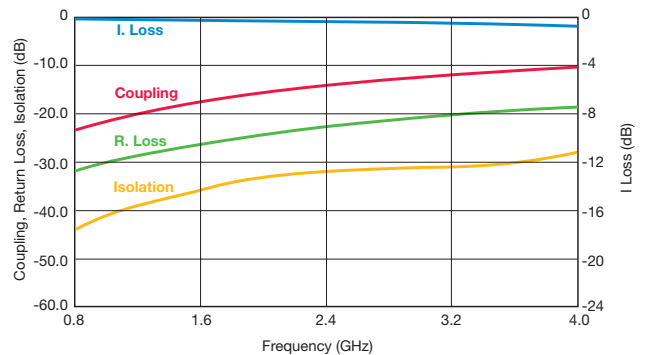
## CP0603 High Directivity LGA Type

| Application  | P/N Examples  | Frequency Band [MHz] | Coupling [dB] | I. Loss max. [dB] | Return Loss [dB] | Directivity [dB] |      |
|--------------|---------------|----------------------|---------------|-------------------|------------------|------------------|------|
| AMPS         | CP0603A0836AN | 824 - 849            | 20.0          | 0.25              | 28               | 22               |      |
|              | CP0603A0881AN | 869 - 894            | 19.7          |                   |                  |                  |      |
| GSM          | CP0603A0902AN | 890 - 915            | 19.4          |                   |                  |                  |      |
|              | CP0603A0947AN | 935 - 960            | 19.0          |                   | 27               |                  |      |
| E-GSM        | CP0603A0897AN | 880 - 915            | 19.4          |                   | 28               |                  |      |
|              | CP0603A0942AN | 925 - 960            | 19.0          | 27                |                  |                  |      |
| PDC          | CP0603A1441AN | 1429 - 1453          | 15.5          | 0.40              | 24               |                  |      |
| PCN          | CP0603A1747AN | 1710 - 1785          | 14.0          | 0.50              | 22               |                  |      |
|              | CP0603A1842AN | 1805 - 1880          | 13.5          |                   |                  |                  |      |
| PCS          | CP0603A1880AN | 1850 - 1910          | 13.2          |                   |                  |                  |      |
|              | CP0603A1960AN | 1930 - 1990          | 13.0          | 0.55              | 21               |                  |      |
| PHP          | CP0603A1907AN | 1895 - 1920          | 13.2          | 0.50              | 22               |                  |      |
| DECT         | CP0603A1890AN | 1880 - 1900          |               |                   |                  |                  |      |
| Wireless LAN | CP0603A2442AN | 2400 - 2484          |               |                   |                  | 11.5             | 0.75 |

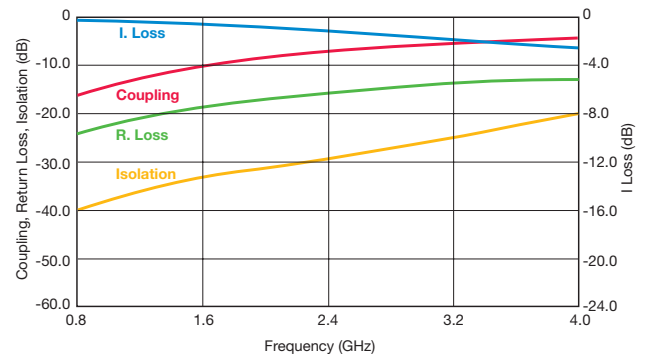


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| Application  | P/N Examples  | Frequency Band [MHz] | Coupling [dB] | I. Loss max. [dB] | Return Loss [dB] | Directivity [dB] |
|--------------|---------------|----------------------|---------------|-------------------|------------------|------------------|
| AMPS         | CP0603A0836BN | 824 - 849            | 23.0          | 0.20              | 31               | 20               |
|              | CP0603A0881BN | 869 - 894            | 22.7          |                   |                  |                  |
| GSM          | CP0603A0902BN | 890 - 915            | 22.5          |                   |                  |                  |
|              | CP0603A0947BN | 935 - 960            | 22.0          |                   |                  |                  |
| E-GSM        | CP0603A0897BN | 880 - 915            | 22.5          | 0.25              | 30               |                  |
|              | CP0603A0942BN | 925 - 960            | 22.0          |                   |                  |                  |
| PDC          | CP0603A1441BN | 1429 - 1453          | 18.5          |                   |                  |                  |
| PCN          | CP0603A1747BN | 1710 - 1785          | 17.0          |                   |                  |                  |
|              | CP0603A1842BN | 1805 - 1880          | 16.4          | 0.25              | 25               |                  |
| PCS          | CP0603A1880BN | 1850 - 1910          | 16.2          |                   |                  |                  |
|              | CP0603A1960BN | 1930 - 1990          | 16.0          | 0.35              | 24               |                  |
| PHP          | CP0603A1907BN | 1895 - 1920          | 16.1          |                   |                  |                  |
| DECT         | CP0603A1890BN | 1880 - 1900          | 16.2          | 0.35              | 25               |                  |
| Wireless LAN | CP0603A2442BN | 2400 - 2484          | 14.2          |                   |                  |                  |



| Application  | P/N Examples  | Frequency Band [MHz] | Coupling [dB] | I. Loss max. [dB] | Return Loss [dB] | Directivity [dB] |      |
|--------------|---------------|----------------------|---------------|-------------------|------------------|------------------|------|
| AMPS         | CP0603A0836CN | 824 - 849            | 15.2          | 0.35              | 23               | 23               |      |
|              | CP0603A0881CN | 869 - 894            | 15.0          |                   |                  |                  |      |
| GSM          | CP0603A0902CN | 890 - 915            | 14.7          | 0.40              | 22               |                  |      |
|              | CP0603A0947CN | 935 - 960            | 14.3          |                   |                  |                  |      |
| E-GSM        | CP0603A0897CN | 880 - 915            | 14.7          | 0.35              | 23               |                  |      |
|              | CP0603A0942CN | 925 - 960            | 14.3          |                   |                  |                  | 0.40 |
| PDC          | CP0603A1441CN | 1429 - 1453          | 11.0          | 0.70              | 19               |                  |      |
| PCN          | CP0603A1747CN | 1710 - 1785          | 9.5           | 0.80              | 18               |                  | 21   |
|              | CP0603A1842CN | 1805 - 1880          | 9.0           |                   |                  |                  |      |
| PCS          | CP0603A1880CN | 1850 - 1910          | 8.8           | 0.90              | 17               |                  |      |
|              | CP0603A1960CN | 1930 - 1990          | 8.5           |                   |                  | 1.00             |      |
| PHP          | CP0603A1907CN | 1895 - 1920          | 8.8           | 0.90              | 15               |                  |      |
| DECT         | CP0603A1890CN | 1880 - 1900          |               |                   |                  |                  |      |
| Wireless LAN | CP0603A2442CN | 2400 - 2484          | 7.0           | 1.40              | 15               |                  |      |

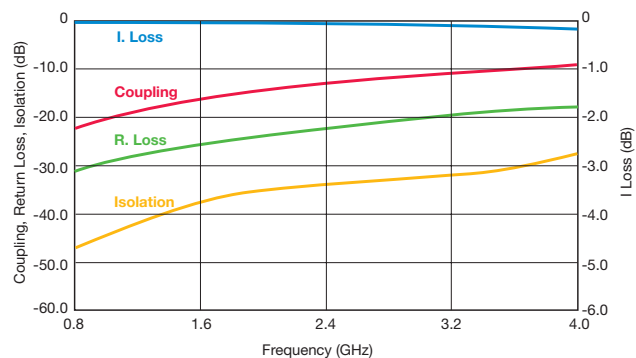


Important: Couplers can be used at any frequency within the indicated range.

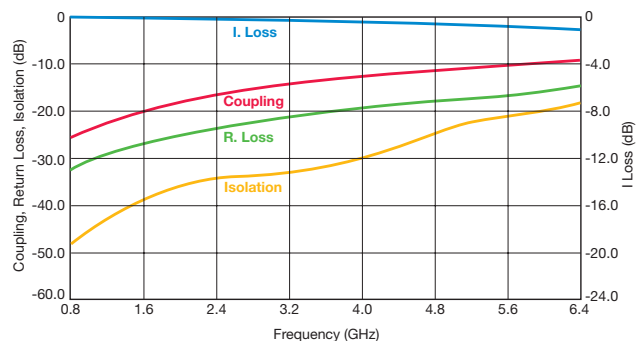
# Thin-Film Directional Couplers

## CP0603 High Directivity LGA Type

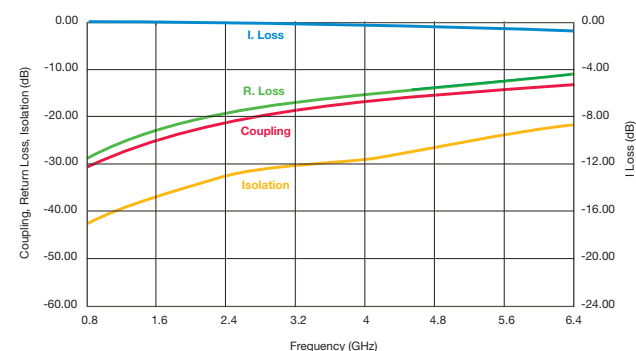
| Application  | P/N Examples  | Frequency Band [MHz] | Coupling [dB] | I. Loss max. [dB] | Return Loss [dB] | Directivity [dB] |    |
|--------------|---------------|----------------------|---------------|-------------------|------------------|------------------|----|
| AMPS         | CP0603A0836DN | 824 - 849            | 22.0          | 0.25              | 31               | 22               |    |
|              | CP0603A0881DN | 869 - 894            | 21.8          |                   |                  |                  |    |
| GSM          | CP0603A0902DN | 890 - 915            | 21.3          |                   | 0.30             |                  | 30 |
|              | CP0603A0947DN | 935 - 960            | 21.0          |                   |                  |                  |    |
| E-GSM        | CP0603A0897DN | 880 - 915            | 21.3          | 0.25              |                  | 27               | 21 |
|              | CP0603A0942DN | 925 - 960            | 21.0          | 0.30              |                  |                  |    |
| PDC          | CP0603A1441DN | 1429 - 1453          | 17.7          | 0.40              | 25               |                  |    |
| PCN          | CP0603A1747DN | 1710 - 1785          | 16.0          |                   | 24               |                  |    |
|              | CP0603A1842DN | 1805 - 1880          | 15.4          |                   |                  |                  |    |
| PCS          | CP0603A1880DN | 1850 - 1910          | 15.2          |                   | 15.0             |                  |    |
|              | CP0603A1960DN | 1930 - 1990          | 15.0          |                   |                  |                  |    |
| PHP          | CP0603A1907DN | 1895 - 1920          | 15.2          |                   | 0.55             | 22               |    |
| DECT         | CP0603A1890DN | 1880 - 1900          |               |                   |                  |                  |    |
| Wireless LAN | CP0603A2442DN | 2400 - 2484          | 13.3          |                   |                  |                  |    |



| Application  | P/N Examples  | Frequency Band [MHz] | Coupling [dB] | I. Loss max. [dB] | Return Loss [dB] | Directivity [dB] |
|--------------|---------------|----------------------|---------------|-------------------|------------------|------------------|
| AMPS         | CP0603A0836EN | 824 - 849            | 25.8          | 0.20              | 32               | 21               |
|              | CP0603A0881EN | 869 - 894            | 25.3          |                   |                  |                  |
| GSM          | CP0603A0902EN | 890 - 915            | 25.0          |                   |                  |                  |
|              | CP0603A0947EN | 935 - 960            | 24.7          |                   |                  |                  |
| E-GSM        | CP0603A0897EN | 880 - 915            | 25.0          |                   | 32               |                  |
|              | CP0603A0942EN | 925 - 960            | 24.7          |                   |                  |                  |
| PDC          | CP0603A1441EN | 1429 - 1453          | 21.0          | 0.25              | 28               |                  |
| PCN          | CP0603A1747EN | 1710 - 1785          | 19.5          | 0.30              | 26               |                  |
|              | CP0603A1842EN | 1805 - 1880          | 19.0          |                   |                  |                  |
| PCS          | CP0603A1880EN | 1850 - 1910          | 18.8          |                   |                  |                  |
|              | CP0603A1960EN | 1930 - 1990          | 18.5          |                   |                  |                  |
| PHP          | CP0603A1907EN | 1895 - 1920          | 18.7          |                   |                  |                  |
| DECT         | CP0603A1890EN | 1880 - 1900          | 18.8          |                   |                  |                  |
| Wireless LAN | CP0603A2442EN | 2400 - 2484          | 17.0          | 0.40              | 24               |                  |



| Application  | P/N Examples  | Frequency Band [MHz] | Coupling [dB] | I. Loss max. [dB] | Return Loss [dB] | Directivity [dB] |
|--------------|---------------|----------------------|---------------|-------------------|------------------|------------------|
| AMPS         | CP0603A0836FN | 824 - 849            | 31.2          | 0.20              | 28               | 12               |
|              | CP0603A0881FN | 869 - 894            | 30.8          |                   |                  |                  |
| GSM          | CP0603A0902FN | 890 - 915            | 30.5          |                   | 27               |                  |
|              | CP0603A0947FN | 935 - 960            | 30.2          |                   |                  |                  |
| E-GSM        | CP0603A0897FN | 880 - 915            | 30.5          |                   | 23               |                  |
|              | CP0603A0942FN | 925 - 960            | 30.2          |                   |                  |                  |
| PDC          | CP0603A1441FN | 1429 - 1453          | 27.0          | 0.25              | 21               |                  |
| PCN          | CP0603A1747FN | 1710 - 1785          | 25.0          |                   | 20               |                  |
|              | CP0603A1842FN | 1805 - 1880          | 24.5          |                   |                  |                  |
| PCS          | CP0603A1880FN | 1850 - 1910          | 24.3          |                   | 21               |                  |
|              | CP0603A1960FN | 1930 - 1990          | 24.0          |                   |                  |                  |
| PHP          | CP0603A1907FN | 1895 - 1920          | 24.2          |                   | 20               |                  |
| DECT         | CP0603A1890FN | 1880 - 1900          | 21.5          | 20                |                  |                  |
| Wireless LAN | CP0603A2442FN | 2400 - 2484          | 21.5          |                   |                  |                  |



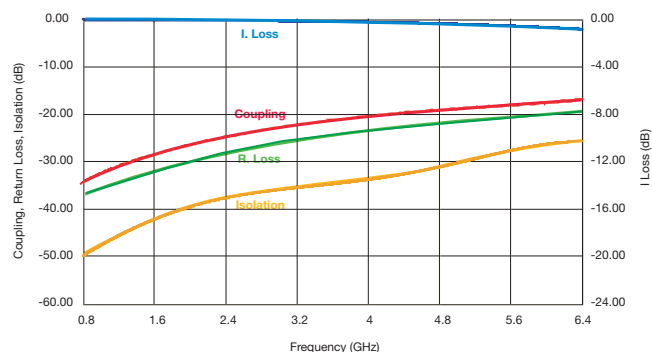
Important: Couplers can be used at any frequency within the indicated range.

# Thin-Film Directional Couplers



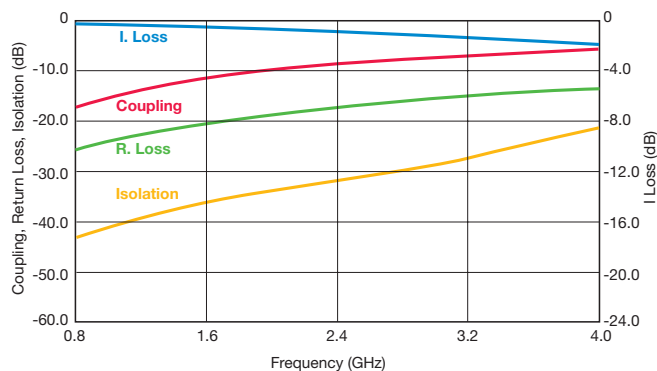
## CP0603 High Directivity LGA Type

| Application  | P/N Examples                   | Frequency Band [MHz]       | Coupling [dB] | I. Loss max. [dB] | Return Loss [dB] | Directivity [dB] |
|--------------|--------------------------------|----------------------------|---------------|-------------------|------------------|------------------|
| AMPS         | CP0603A0836GN<br>CP0603A0881GN | 824 - 849<br>869 - 894     | 34.2<br>33.8  | 0.20              | 39               | 13               |
| GSM          | CP0603A0902GN<br>CP0603A0947GN | 890 - 915<br>935 - 960     | 33.6<br>33.2  |                   | 38               |                  |
| E-GSM        | CP0603A0897GN<br>CP0603A0942GN | 880 - 915<br>925 - 960     | 33.6<br>33.2  |                   | 39<br>38         |                  |
| PDC          | CP0603A1441GN                  | 1429 - 1453                | 30.0          | 0.25              | 34               |                  |
| PCN          | CP0603A1747GN<br>CP0603A1842GN | 1710 - 1785<br>1805 - 1880 | 28.5<br>28.0  |                   | 32               |                  |
| PCS          | CP0603A1880GN<br>CP0603A1960GN | 1850 - 1910<br>1930 - 1990 | 27.7<br>27.5  |                   | 31               |                  |
| PHP          | CP0603A1907GN                  | 1895 - 1920                | 27.6          |                   | 32               |                  |
| DECT         | CP0603A1890GN                  | 1880 - 1900                | 27.7          |                   | 31               |                  |
| Wireless LAN | CP0603A2442GN                  | 2400 - 2484                | 25.5          |                   | 31               |                  |

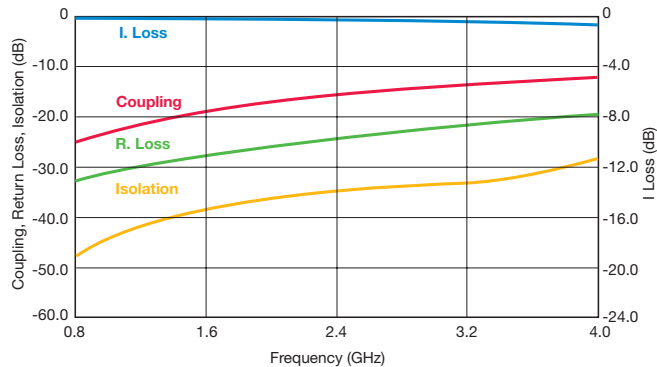


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| Application  | P/N Examples                   | Frequency Band [MHz]       | Coupling [dB] | I. Loss max. [dB] | Return Loss [dB] | Directivity [dB] |
|--------------|--------------------------------|----------------------------|---------------|-------------------|------------------|------------------|
| AMPS         | CP0603A0836HN<br>CP0603A0881HN | 824 - 849<br>869 - 894     | 17.3<br>17.0  | 0.30              | 26               | 26               |
| GSM          | CP0603A0902HN<br>CP0603A0947HN | 890 - 915<br>935 - 960     | 16.7<br>16.3  |                   | 25               |                  |
| E-GSM        | CP0603A0897HN<br>CP0603A0942HN | 880 - 915<br>925 - 960     | 17.0<br>16.3  | 0.35              | 25               |                  |
| PDC          | CP0603A1441HN                  | 1429 - 1453                | 13.0          | 0.55              | 22               |                  |
| PCN          | CP0603A1747HN<br>CP0603A1842HN | 1710 - 1785<br>1805 - 1880 | 11.4<br>11.0  | 0.75              | 20               | 24               |
| PCS          | CP0603A1880HN<br>CP0603A1960HN | 1850 - 1910<br>1930 - 1990 | 10.8<br>10.5  |                   | 19               |                  |
| PHP          | CP0603A1907HN                  | 1895 - 1920                | 10.7          |                   | 19               |                  |
| DECT         | CP0603A1890HN                  | 1880 - 1900                | 10.8          |                   | 19               |                  |
| Wireless LAN | CP0603A2442HN                  | 2400 - 2484                | 8.8           | 1.00              | 17               |                  |



| Application  | P/N Examples                   | Frequency Band [MHz]       | Coupling [dB] | I. Loss max. [dB] | Return Loss [dB] | Directivity [dB] |
|--------------|--------------------------------|----------------------------|---------------|-------------------|------------------|------------------|
| AMPS         | CP0603A0836MN<br>CP0603A0881MN | 824 - 849<br>869 - 894     | 24.2<br>23.8  | 0.20              | 33               | 23               |
| GSM          | CP0603A0902MN<br>CP0603A0947MN | 890 - 915<br>935 - 960     | 23.4<br>23.2  |                   | 32               |                  |
| E-GSM        | CP0603A0897MN<br>CP0603A0942MN | 880 - 915<br>925 - 960     | 23.4<br>23.2  |                   | 32               |                  |
| PDC          | CP0603A1441MN                  | 1429 - 1453                | 20.0          | 0.25              | 28               | 20               |
| PCN          | CP0603A1747MN<br>CP0603A1842MN | 1710 - 1785<br>1805 - 1880 | 18.4<br>18.0  |                   | 27               |                  |
| PCS          | CP0603A1880MN<br>CP0603A1960MN | 1850 - 1910<br>1930 - 1990 | 17.8<br>17.5  |                   | 26               |                  |
| PHP          | CP0603A1907MN                  | 1895 - 1920                | 17.7          |                   | 26               |                  |
| DECT         | CP0603A1890MN                  | 1880 - 1900                | 17.8          | 0.35              | 24               |                  |
| Wireless LAN | CP0603A2442MN                  | 2400 - 2484                | 15.6          |                   | 24               |                  |



Important: Couplers can be used at any frequency within the indicated range.

# Thin-Film Directional Couplers

## CP0402 / CP0603 High Directivity Couplers Test Jigs

### GENERAL DESCRIPTION

These jigs are designed for testing the CP0402 and CP0603 High Directivity Couplers using a Vector Network Analyzer.

They consist of a dielectric substrate, having 50Ω microstrips as conducting lines and a bottom ground plane located at a distance of 0.254mm (0.010") from the microstrips.

The substrate used is Neltec's NH9338ST0254C1BC.

The connectors are SMA type (female), 'Johnson Components Inc.' Product P/N: 142-0701-841.

Both a measurement jig and a calibration jig are provided.

The calibration jig is designed for a full 2-port calibration, and consists of an open line, short line and through line. LOAD calibration can be done by a 50Ω SMA termination.

### MEASUREMENT PROCEDURE

When measuring a component, it can be either soldered or pressed using a non-metallic stick until all four ports touch the appropriate pads. Set the VNA to the relevant frequency band. Connect the VNA using a 10dB attenuator on the jig

terminal connected to port 2. Follow the VNA's instruction manual and use the [calibration jig](#) to perform a full 2-Port calibration in the required bandwidths.

#### Place the coupler on the [measurement jig](#) as follows:

Input (Coupler) → Connector 1 (Jig)      Termination (Coupler) → Connector 3 (Jig)  
Output (Coupler) → Connector 2 (Jig)      Coupling (Coupler) → Connector 4 (Jig)

#### To measure I. Loss connect:

Connector 1 (Jig) → Port 1 (VNA)      Connector 3 (Jig) → 50Ω  
Connector 2 (Jig) → Port 2 (VNA)      Connector 4 (Jig) → 50Ω

#### To measure R. Loss and Coupling connect:

Connector 1 (Jig) → Port 1 (VNA)      Connector 3 (Jig) → 50Ω  
Connector 2 (Jig) → 50Ω      Connector 4 (Jig) → Port 2 (VNA)

#### To measure Isolation connect:

Connector 1 (Jig) → 50Ω      Connector 3 (Jig) → 50Ω  
Connector 2 (Jig) → Port 1 (VNA)      Connector 4 (Jig) → Port 2 (VNA)

