

# Thin-Film Directional Couplers



## CP0402 High Directivity LGA Termination

### GENERAL DESCRIPTION

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

The ITF High Directivity 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

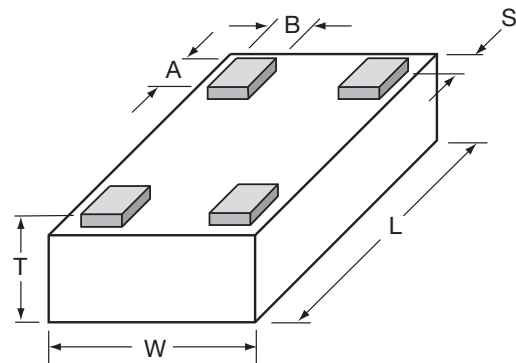
- Mobile Communications
- Satellite TV Receivers
- GPS
- Vehicle Location Systems
- Wireless LAN's

### 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)



L	1.00±0.05 (0.040±0.002)
W	0.58±0.04 (0.023±0.002)
T	0.35±0.05 (0.014±0.002)

A	0.20±0.05 (0.008±0.002)
B	0.18±0.05 (0.007±0.002)
S	0.05±0.05 (0.002±0.002)

### HOW TO ORDER

<b>CP</b> T	<b>0402</b> T	<b>X</b> T	<b>****</b> T	<b>X</b> T	<b>N</b> T	<b>TR</b> T
<b>Style</b>	<b>Size</b>	<b>Type</b>	<b>Frequency</b> (MHz)	<b>Sub Type</b>	<b>LGA Termination</b>	<b>Packaging Code</b>
Directional Coupler	0402				L = LGA Sn90, Pb10 **N = LGA Sn100	TR = Tape and Reel
					<b>**RoHS compliant</b>	

### QUALITY INSPECTION

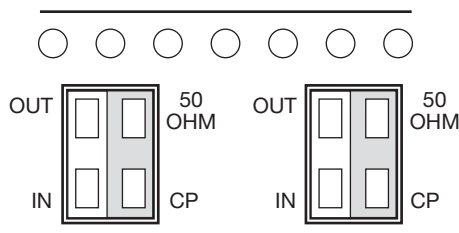
Finished parts are 100% tested for electrical parameters and visual characteristics. Each production lot is evaluated on a sample basis for:

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

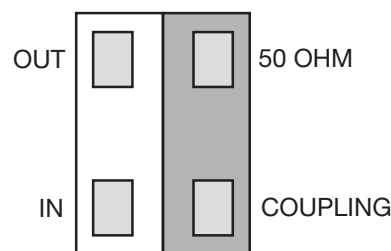
### TERMINATION

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

### ORIENTATION IN TAPE



### TERMINALS (Top View)



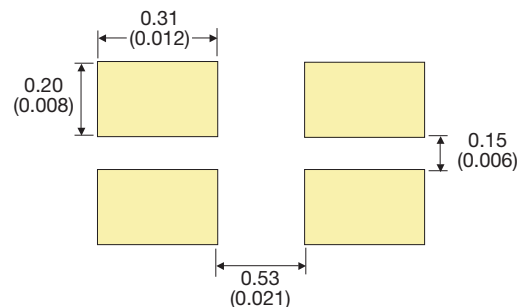
**Not RoHS Compliant**



For RoHS compliant products, please select correct termination style.

### Recommended Pad Layout Dimensions

mm (inches)

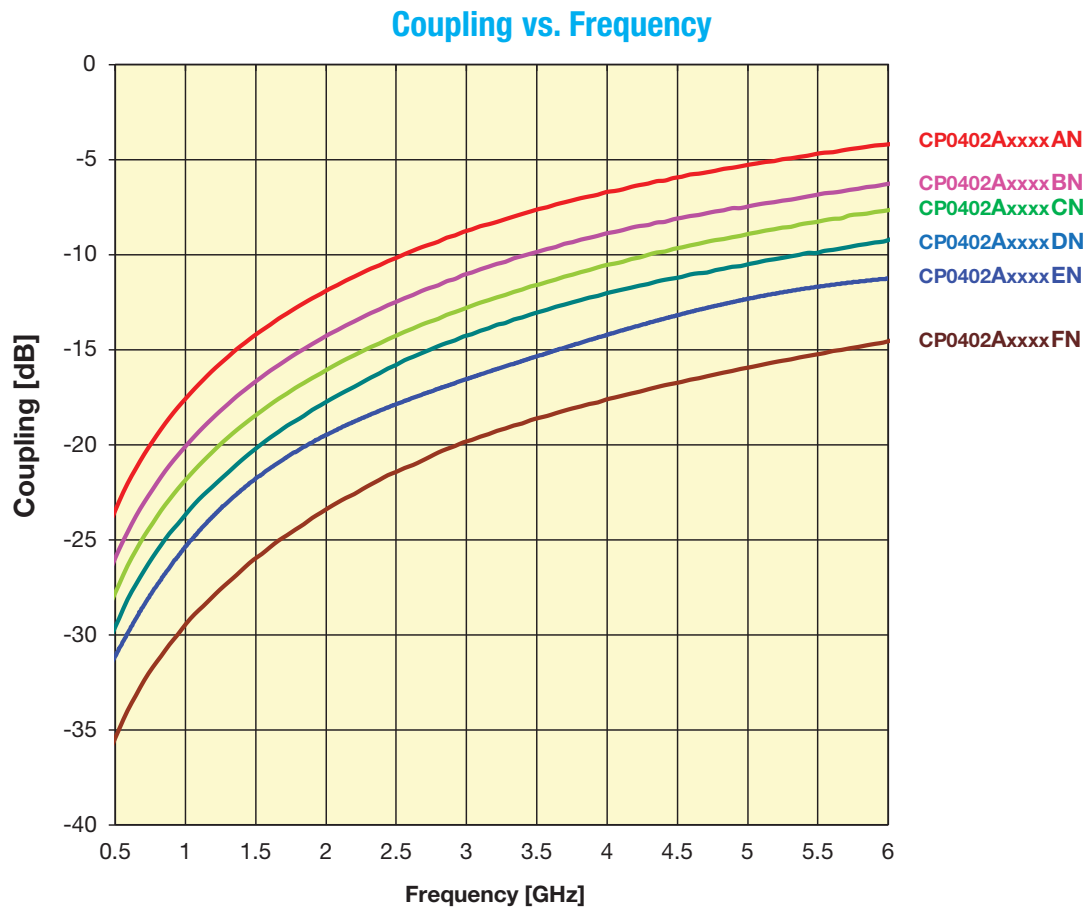


\*The recommended distance to the PCB Ground Plane is 0.254mm (0.010")



### CP0402 - TYPE SELECTION CHART

3



Intermediate coupling factors are readily available.  
Please contact factory.

# Thin-Film Directional Couplers

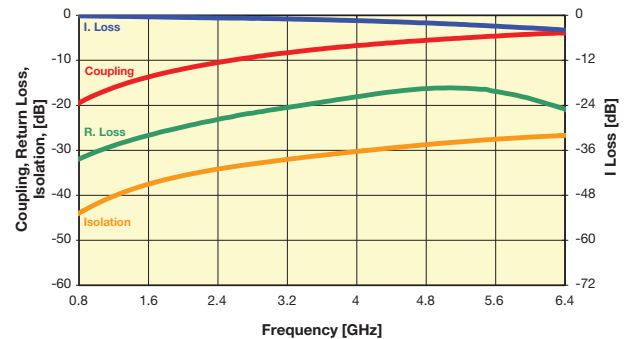


## CP0402 High Directivity LGA Termination

Coupler P/N CP0402AxxxxAN

Application	P/N Examples*	Frequency Band [MHz]	Coupling [dB]	I. Loss max. [dB]	Return Loss [dB]	Directivity [dB]
AMPS	CP0402A0836AN	824 - 849	19.10	0.25	32	21
	CP0402A0881AN	869 - 894	18.60	0.25	31	
GSM	CP0402A0902AN	890 - 915	18.50	0.25	31	
	CP0402A0947AN	935 - 960	18.00	0.25	31	
E-GSM	CP0402A0897AN	880 ÷ 915	18.50	0.25	31	
	CP0402A0942AN	925 ÷ 960	18.00	0.25	31	
PDC	CP0402A1441AN	1429 - 1453	14.50	0.40	28	
PCN	CP0402A1747AN	1710 - 1785	13.00	0.50	26	
	CP0402A1842AN	1805 - 1880	12.50	0.50	26	
PCS	CP0402A1880AN	1850 - 1910	12.30	0.50	25	
	CP0402A1960AN	1930 - 1990	12.00	0.50	25	
PHP	CP0402A1907AN	1895 - 1920	12.30	0.50	25	
DECT	CP0402A1890AN	1880 - 1900	12.30	0.50	25	
Wireless LAN	CP0402A2442AN	2400 - 2484	10.30	0.70	23	
WiFi	CP0402A3500AN	3450 - 3550	7.60	1.30	15	14
	CP0402A5000AN	4950 - 5050	5.00	1.50	15	13
	CP0402A5500AN	5450 - 5550	4.60	1.50	14	13
	CP0402A6000AN	5950 - 6050	4.00	1.50	14	13

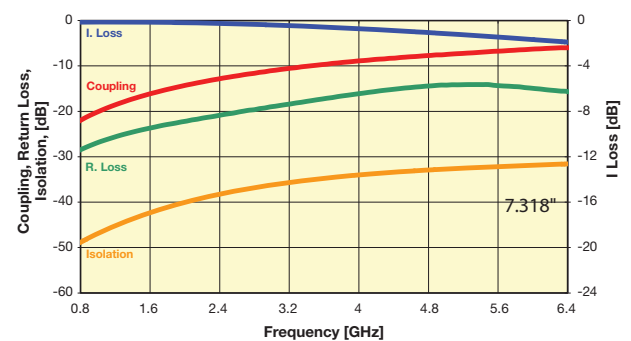
CP0402AxxxxANTR



Coupler P/N CP0402AxxxxBN

Application	P/N Examples	Frequency Band [MHz]	Coupling [dB]	I. Loss max. [dB]	Return Loss [dB]	Directivity [dB]
AMPS	CP0402A0836BN	824 - 849	22.00	0.20	28	27
	CP0402A0881BN	869 - 894	21.70	0.20	28	
GSM	CP0402A0902BN	890 - 915	21.50	0.20	28	
	CP0402A0947BN	935 - 960	21.00	0.25	27	
E-GSM	CP0402A0897BN	880 ÷ 915	21.50	0.20	28	
	CP0402A0942BN	925 ÷ 960	21.00	0.25	27	
PDC	CP0402A1441BN	1429 - 1453	17.50	0.25	24	
PCN	CP0402A1747BN	1710 - 1785	16.00	0.30	23	
	CP0402A1842BN	1805 - 1880	15.50	0.35	23	
PCS	CP0402A1880BN	1850 - 1910	15.50	0.35	23	
	CP0402A1960BN	1930 - 1990	15.00	0.35	22	
PHP	CP0402A1907BN	1895 - 1920	15.50	0.35	23	
DECT	CP0402A1890BN	1880 - 1900	15.50	0.35	23	
Wireless LAN	CP0402A2442BN	2400 - 2484	13.30	0.40	21	
WiFi	CP0402A3500BN	3450 - 3550	9.40	0.80	18	14
	CP0402A5000BN	4950 - 5050	7.40	1.20	14	13
	CP0402A5500BN	5450 - 5550	6.70	1.60	14	13
	CP0402A6000BN	5950 - 6050	6.10	2.00	14	13

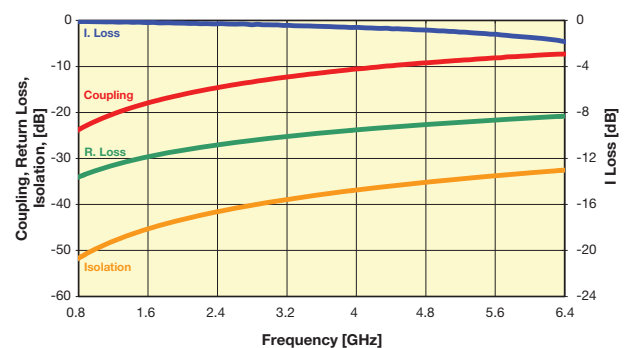
CP0402AxxxxBNTR



Coupler P/N CP0402AxxxxCN

Application	P/N Examples	Frequency Band [MHz]	Coupling [dB]	I. Loss max. [dB]	Return Loss [dB]	Directivity [dB]
AMPS	CP0402A0836CN	824 - 849	23.60	0.20	33	22
	CP0402A0881CN	869 - 894	23.00	0.20	33	
GSM	CP0402A0902CN	890 - 915	23.00	0.20	26	
	CP0402A0947CN	935 - 960	22.50	0.20	33	
E-GSM	CP0402A0897CN	880 ÷ 915	23.00	0.20	25	
	CP0402A0942CN	925 ÷ 960	22.50	0.20	32	
PDC	CP0402A1441CN	1429 - 1453	19.00	0.25	31	
PCN	CP0402A1747CN	1710 - 1785	17.20	0.25	30	
	CP0402A1842CN	1805 - 1880	17.00	0.25	30	
PCS	CP0402A1880CN	1850 - 1910	16.80	0.25	30	
	CP0402A1960CN	1930 - 1990	16.50	0.25	29	
PHP	CP0402A1907CN	1895 - 1920	16.80	0.25	29	
DECT	CP0402A1890CN	1880 - 1900	16.80	0.25	30	
Wireless LAN	CP0402A2442CN	2400 - 2484	14.70	0.45	28	
WiFi	CP0402A3500CN	3450 - 3550	10.97	0.67	23	17
	CP0402A5000CN	4950 - 5050	8.00	1.00	21	16
	CP0402A5500CN	5450 - 5550	7.50	1.10	21	15
	CP0402A6000CN	5950 - 6050	7.10	1.30	23	15

CP0402AxxxxCNTR



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



# Thin-Film Directional Couplers

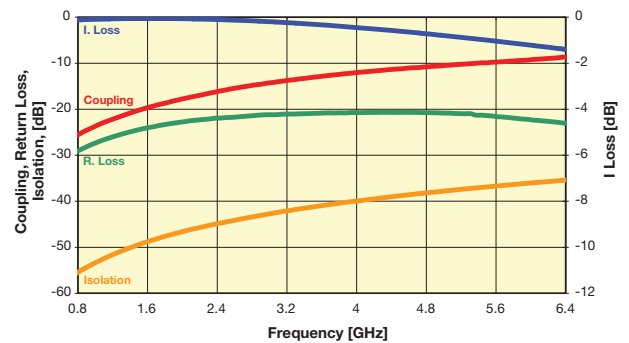


## CP0402 High Directivity LGA Termination

Coupler P/N CP0402AxxxxDN

Application	P/N Examples*	Frequency Band [MHz]	Coupling [dB]	I. Loss max. [dB]	Return Loss [dB]	Directivity [dB]
AMPS	CP0402A0836DN	824 - 849	25.20	0.20	29	20
	CP0402A0881DN	869 - 894	24.80	0.20	28	
GSM	CP0402A0902DN	890 - 915	24.70	0.20	28	
	CP0402A0947DN	935 - 960	24.10	0.20	28	
E-GSM	CP0402A0897DN	880 ÷ 915	24.70	0.20	28	
	CP0402A0942DN	925 ÷ 960	24.10	0.20	28	
PDC	CP0402A1441DN	1429 - 1453	20.50	0.20	25	18
PCN	CP0402A1747DN	1710 - 1785	19.00	0.20	24	
	CP0402A1842DN	1805 - 1880	18.50	0.25	23	
PCS	CP0402A1880DN	1850 - 1910	18.20	0.25	23	
	CP0402A1960DN	1930 - 1990	18.00	0.25	23	
PHP	CP0402A1907DN	1895 - 1920	18.10	0.25	23	
DECT	CP0402A1890DN	1880 - 1900	18.20	0.25	23	
Wireless LAN	CP0402A2442DN	2400 - 2484	16.00	0.35	22	17
WiFi	CP0402A3500DN	3450 - 3550	12.50	0.46	21	
	CP0402A5000DN	4950 - 5050	10.00	0.65	21	
	CP0402A5500DN	5450 - 5550	9.60	0.76	20	
	CP0402A6000DN	5950 - 6050	9.10	0.84	20	

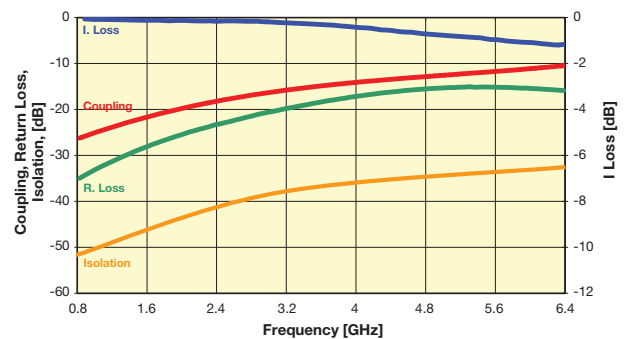
CP0402AxxxxDNTR



Coupler P/N CP0402AxxxxEN

Application	P/N Examples	Frequency Band [MHz]	Coupling [dB]	I. Loss max. [dB]	Return Loss [dB]	Directivity [dB]
AMPS	CP0402A0836EN	824 - 849	27.20	0.20	35	25
	CP0402A0881EN	869 - 894	26.80	0.20	34	
GSM	CP0402A0902EN	890 - 915	26.50	0.20	34	
	CP0402A0947EN	935 - 960	26.00	0.20	34	
E-GSM	CP0402A0897EN	880 ÷ 915	26.50	0.20	34	
	CP0402A0942EN	925 ÷ 960	26.00	0.20	34	
PDC	CP0402A1441EN	1429 - 1453	22.30	0.25	29	23
PCN	CP0402A1747EN	1710 - 1785	20.50	0.25	27	
	CP0402A1842EN	1805 - 1880	20.30	0.25	26	
PCS	CP0402A1880EN	1850 - 1910	20.00	0.25	26	
	CP0402A1960EN	1930 - 1990	20.00	0.25	26	
PHP	CP0402A1907EN	1895 - 1920	20.00	0.25	26	
DECT	CP0402A1890EN	1880 - 1900	20.00	0.25	26	
Wireless LAN	CP0402A2442EN	2400 - 2484	18.00	0.35	23	16
WiFi	CP0402A3500EN	3450 - 3550	15.00	0.37	20	
	CP0402A5000EN	4950 - 5050	12.50	0.50	18	
	CP0402A5500EN	5450 - 5550	11.50	0.65	16	
	CP0402A6000EN	5950 - 6050	11.10	0.70	15	

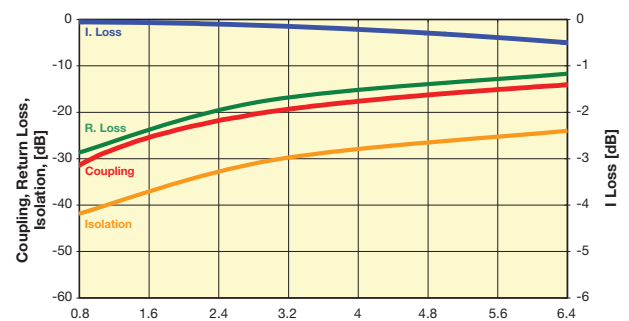
CP0402AxxxxENTR



Coupler P/N CP0402AxxxxFN

Application	P/N Examples	Frequency Band [MHz]	Coupling [dB]	I. Loss max. [dB]	Return Loss [dB]	Directivity [dB]
AMPS	CP0402A0836FN	824 - 849	31.00	0.20	29.10	11
	CP0402A0881FN	869 - 894	30.70	0.20	28.60	
GSM	CP0402A0902FN	890 - 915	30.60	0.20	28.50	
	CP0402A0947FN	935 - 960	30.00	0.20	28.10	
E-GSM	CP0402A0897FN	880 ÷ 915	30.60	0.20	28.50	
	CP0402A0942FN	925 ÷ 960	30.00	0.20	28.10	
PDC	CP0402A1441FN	1429 - 1453	26.50	0.20	25.00	9
PCN	CP0402A1747FN	1710 - 1785	25.00	0.20	23.80	
	CP0402A1842FN	1805 - 1880	24.50	0.20	23.60	
PCS	CP0402A1880FN	1850 - 1910	24.20	0.20	23.50	
	CP0402A1960FN	1930 - 1990	24.00	0.20	23.30	
PHP	CP0402A1907FN	1895 - 1920	24.20	0.20	23.40	
DECT	CP0402A1890FN	1880 - 1900	24.20	0.20	23.50	
Wireless LAN	CP0402A2442FN	2400 - 2484	22.00	0.25	22.60	8
WiFi	CP0402A3500FN	3450 - 3550	18.00	0.27	22.00	
	CP0402A5000FN	4950 - 5050	15.70	0.30	23.01	
	CP0402A5500FN	5450 - 5550	15.20	0.30	20.36	
	CP0402A6000FN	5950 - 6050	14.50	0.30	18.94	

CP0402AxxxxFNTR



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)

