

**KRYTAR<sup>®</sup>**



***BROADBAND MICROWAVE COMPONENTS  
& TEST EQUIPMENT***

***[www.krytar.com](http://www.krytar.com)***

***1288 Anvilwood Avenue Sunnyvale, CA 94089 (408) 734-5999 FAX (408) 734-3017  
Toll Free 1 (877) 734-5999***



KRYTAR, founded by Thomas J. Russell in 1975, is a privately owned California corporation specializing in the manufacture of ultra broadband microwave components and test equipment for both commercial and military applications. The KRYTAR product line includes directional couplers, directional detectors, 3 dB hybrids, MLDD power dividers/combiners, detectors, terminations, coaxial adapters and a power meter. Our products cover the DC to 67.0 GHz frequency range.

The broadband design expertise at KRYTAR has created unique new designs. KRYTAR has applied these designs to consistently introduce technologically advanced products with superior electrical performance and ruggedness.

The corporation possesses all the electronic test equipment necessary for testing its products from DC to 67 GHz. Included in the test equipment is a Hewlett Packard 8510B Automatic Network Analyzer with 8515A (45 MHz - 26.5 GHz) and 8517A (45 MHz - 50.0 GHz) S-Parameter Test Sets and Agilent Technologies E8361A PNA Series Network Analyzer (10 MHz - 67 GHz).

The KRYTAR Quality Assurance Program is in accordance with MIL-I-45208 including a calibration system per MIL-STD-45662. To ensure reliability and performance, the quality assurance system controls all phases of manufacturing: purchasing, processes, assembling, testing and shipping.

KRYTAR has a commitment to technical excellence and customer satisfaction. These principles form the basis for the steady growth that has earned KRYTAR an enviable reputation in the microwave community.



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# KRYTAR SALES REPRESENTATIVES

## DOMESTIC

### **Arcadia Technical Sales**

PMB # 303  
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Chandler, AZ 85226  
TEL: (480) 940-6488  
FAX: (480) 940-4913  
EMAIL: sales@arcadiatech.com  
WEBSITE: www.arcadiatech.com

### **Brennan Associates**

3316 Kilmer Place  
Plant City, FL 33566  
TEL: (262) 206-0904  
FAX: (407) 294-4906  
EMAIL: don@brennanassoc.net  
WEBSITE: www.brennanassoc.net

### **Cain-Forlaw Company**

4660 West Jefferson Blvd.  
Suite 130  
Fort Wayne, IN 46804  
TEL: (260) 436-4466  
FAX: (260) 436-8995  
EMAIL: sales@cain-forlaw.com  
WEBSITE: www.cain-forlaw.com

### **Brennan Associates**

998 Seaboard Ave. NW  
Atlanta, GA 30318  
TEL: (706) 949-4343  
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### **Cain-Forlaw Company**

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WEBSITE: www.cain-forlaw.com

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WEBSITE: www.cain-forlaw.com

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Dallas, TX 75243  
TEL: (214) 863-0255 (cell)  
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WEBSITE: www.cain-forlaw.com

(CONTINUED)



# KRYTAR SALES REPRESENTATIVES

## DOMESTIC

### **CDB Evolution Inc.**

PO Box 1747  
West Babylon, NY 11704  
TEL: (631) 692-5200  
EMAIL: [cdbe@optonline.net](mailto:cdbe@optonline.net)  
WEBSITE: [www.cdb.li](http://www.cdb.li)

### **Krytar**

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WEBSITE: [www.krytar.com](http://www.krytar.com)

### **Frequency Sales Reps**

22 Cove Rd  
Lunenburg, MA 01462  
TEL: (978) 582-1133 office  
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EMAIL: [sommala@frequencysalesreps.com](mailto:sommala@frequencysalesreps.com)  
WEBSITE: [www.frequencysalesreps.com](http://www.frequencysalesreps.com)

### **Mid-Atlantic Microwave Sales**

3537 Spencerville Road  
Suite 2  
Burtonsville, MD 20866  
TEL: (301) 421-0266  
FAX: (301) 421-9140  
EMAIL: [info@mamsinc.net](mailto:info@mamsinc.net)  
WEBSITE: [www.mamsinc.net](http://www.mamsinc.net)

### **Jay Stone Associates**

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San Jose, CA 95131  
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### **The Thorson Company of Southern California**

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Signal Hill, CA 90755  
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WEBSITE: [www.thorsonsocal.com](http://www.thorsonsocal.com)

# KRYTAR SALES REPRESENTATIVES

## INTERNATIONAL

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PO Box 483  
Hudson Heights, QC J0P 1J0  
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TEL: (514) 238-5814  
EMAIL: [irving@rfmicro.com](mailto:irving@rfmicro.com)  
WEBSITE: [www.rfmicro.com](http://www.rfmicro.com)

### **FRANCE:**

**Elexo**  
20, Rue de Billancourt  
92100 Boulognei-Billancourt  
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TEL: (011) 33-1-4122-1000  
FAX: (011) 33-1-4122-1001  
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FAX: (973) 927-5370  
EMAIL: [elkay\\_usa@elkayintl.com](mailto:elkay_usa@elkayintl.com)  
WEBSITE: [www.elkayintl.com](http://www.elkayintl.com)

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TEL: +44 (0)1992-578231  
FAX: +44 (0)1992-576139  
EMAIL: [sales@tceltd.co.uk](mailto:sales@tceltd.co.uk)  
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### **ALL OTHER INTERNATIONAL:**

**Radar Systems Technology**  
480 San Antonio Road  
Suite 250  
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TEL: (650) 949-8041  
FAX: (650) 949-8082  
EMAIL: [sales@rst-radar.com](mailto:sales@rst-radar.com)  
WEBSITE: [www.rst-inc.com](http://www.rst-inc.com)



## ZERO BIAS SCHOTTKY DETECTORS



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### SPECIFICATIONS

MODEL	FREQUENCY RANGE	FREQUENCY RESPONSE	MAXIMUM VSWR	OUTPUT CONNECTOR	DIMENSIONS
<b>109A</b>	10 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	SMA Female	2.24 in. x 0.83 in. dia.
<b>109B</b>	10 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	BNC Female	2.51 in. x 0.83 in. dia.
<b>109S</b>	10 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	SMC Jack	2.33 in. x 0.83 in. dia.

**LOW LEVEL SENSITIVITY**

0.5 mV/μW

**OUTPUT CAPACITANCE**

30 pF

**MAXIMUM INPUT**

100 mW

**OPERATING TEMPERATURE**

-54° to +100° C

**OUTPUT POLARITY**

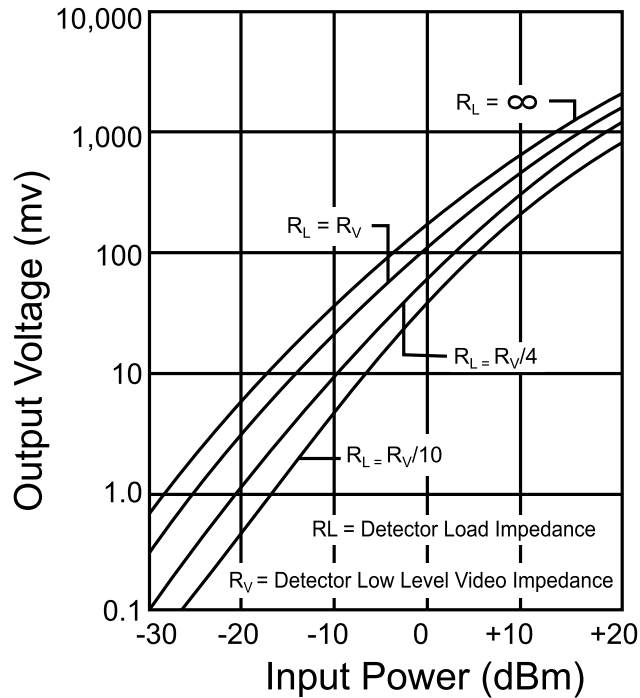
Negative

For positive output, add "P" to end of Model Number.

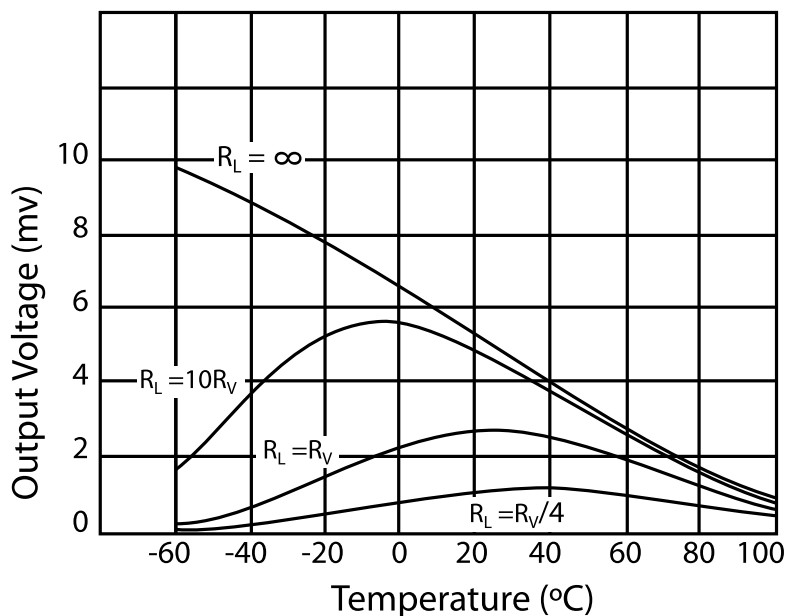
**INPUT CONNECTORS**

N Male

## TYPICAL OUTPUT VOLTAGE vs. INPUT POWER CURVES FOR VARIOUS $R_L/R_V$ RATIOS at $T_a=20^\circ\text{C}$



## TYPICAL LOW LEVEL ( $P_{in} \leq -20$ dBm) OUTPUT RESPONSE vs. TEMPERATURE CURVES FOR VARIOUS $R_L/R_V$ RATIOS



Curves are normalized to  $R_L = \infty$  and  $T_a = 20^\circ\text{C}$ ,  $R_V$  corresponds to the load that drops the open circuit output voltage in half (3dB) at  $20^\circ\text{C}$ .



# ZERO BIAS SCHOTTKY DETECTORS

## 10 MHz-20 GHz, 10 MHz-26.5 GHz AND 10 MHz-40 GHz

### DESIGNED FOR MIL ENVIRONMENTS



### SPECIFICATIONS

MODEL	FREQUENCY RANGE	FREQUENCY RESPONSE	MAXIMUM VSWR	OUTPUT CONNECTOR	DIMENSIONS
201A	10 MHz - 20 GHz	±0.5 dB	1.35	SMA Female	1.57 in. x 0.4 in. dia.
201B	10 MHz - 20 GHz	±0.5 dB	1.35	BNC Female	1.85 in. x 0.4 in. dia.
201S	10 MHz - 20 GHz	±0.5 dB	1.35	SMC Jack	1.45 in. x 0.4 in. dia.
202A	10 MHz - 26.5 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz	SMA Female	1.57 in. x 0.4 in. dia.
202B	10 MHz - 26.5 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz	BNC Female	1.85 in. x 0.4 in. dia.
202S	10 MHz - 26.5 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz	SMC Jack	1.45 in. x 0.4 in. dia.
203A 203AK	10 MHz - 40 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz ±1.5 dB to 40 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz 2.0 to 40 GHz	SMA Female	1.57 in. x 0.4 in. dia.
203B 203BK	10 MHz - 40 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz ±1.5 dB to 40 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz 2.0 to 40 GHz	BNC Female	1.85 in. x 0.4 in. dia.
203S 203SK	10 MHz - 40 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz ±1.5 dB to 40 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz 2.0 to 40 GHz	SMC Jack	1.45 in. x 0.4 in. dia.

**LOW LEVEL SENSITIVITY** 0.5 mV/μW  
**OUTPUT CAPACITANCE** 30 pF  
**MAXIMUM INPUT** 100 mW  
**OPERATING TEMPERATURE** -54° to +100° C

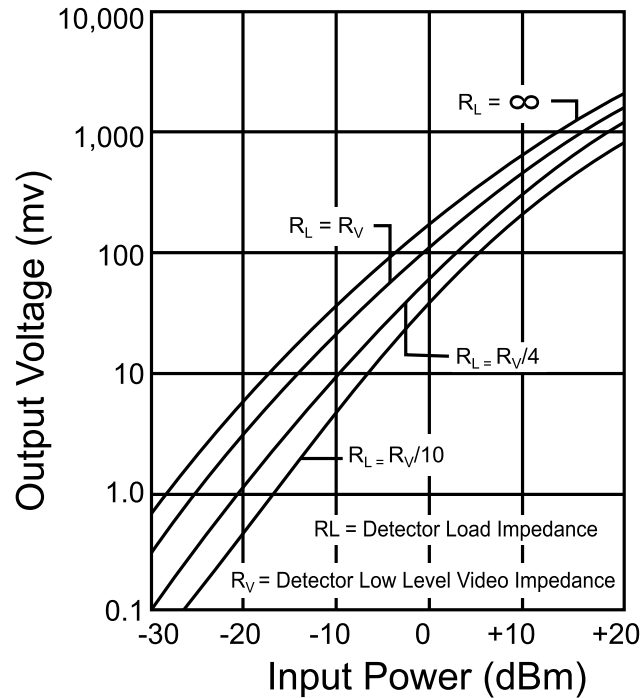
**OUTPUT POLARITY** Negative  
 For positive output, add "P" to end of Model Number.

**INPUT CONNECTOR**  
 Models 201A, 201B, 201S, 202A, 202B, 202S 3.5 mm Male  
 Models 203A, 203B, 203S 2.4 mm Male  
 Models 203AK, 203BK, 203SK 2.92 mm Male

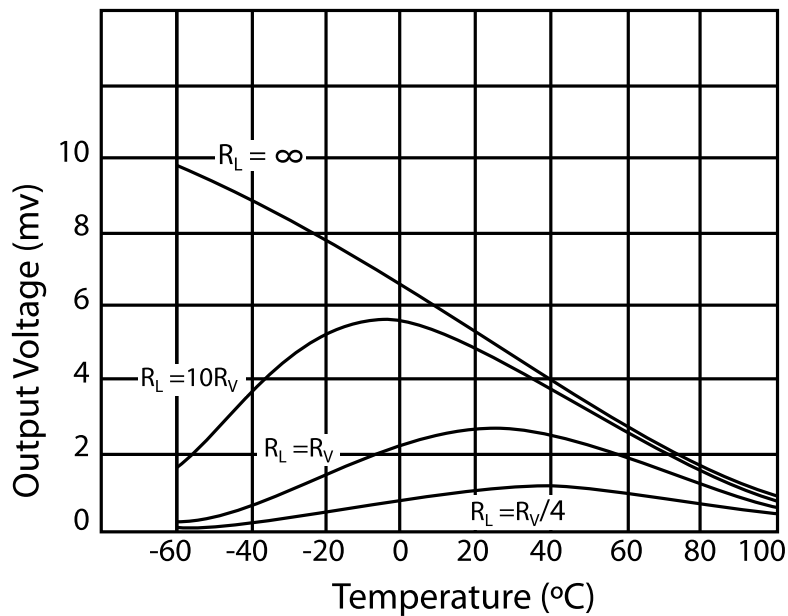


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## TYPICAL OUTPUT VOLTAGE vs. INPUT POWER CURVES FOR VARIOUS $R_L/R_V$ RATIOS at $T_a=20^\circ\text{C}$



## TYPICAL LOW LEVEL ( $P_{in} \leq -20 \text{ dBm}$ ) OUTPUT RESPONSE vs. TEMPERATURE CURVES FOR VARIOUS $R_L/R_V$ RATIOS



Curves are normalized to  $R_L = \infty$  and  $T_a = 20^\circ\text{C}$ ,  $R_V$  corresponds to the load that drops the open circuit output voltage in half (3dB) at  $20^\circ\text{C}$ .



### SPECIFICATIONS

MODEL	FREQUENCY RANGE	FREQUENCY RESPONSE	MAXIMUM VSWR	OUTPUT CONNECTOR	DIMENSIONS
<b>209A</b>	100 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	SMA Female	2.24 in. x 0.83 in. dia.
<b>209B</b>	100 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	BNC Female	2.51 in. x 0.83 in. dia.
<b>209S</b>	100 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	SMC Jack	2.33 in. x 0.83 in. dia.

**LOW LEVEL SENSITIVITY**

0.5 mV/μW

**OUTPUT CAPACITANCE**

3 pF

**MAXIMUM INPUT**

100 mW

**OPERATING TEMPERATURE**

-54° to +100° C

**OUTPUT POLARITY**

Negative

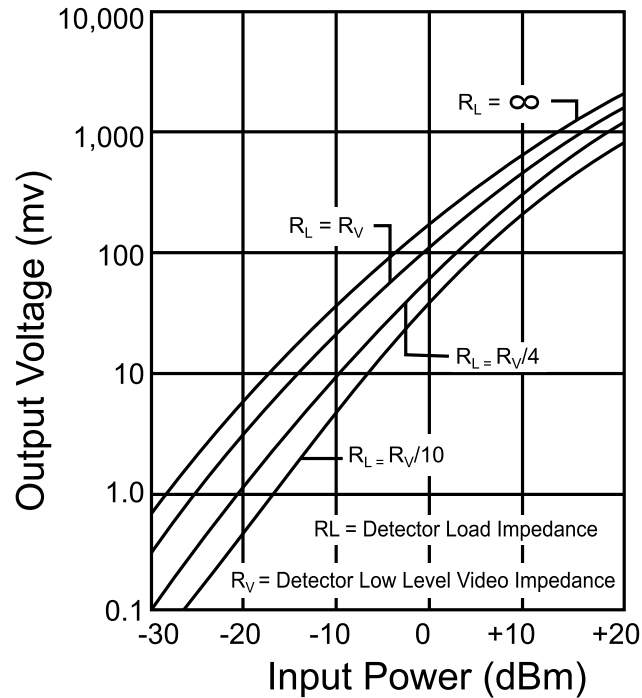
For positive output, add "P" to end of Model Number.

**INPUT CONNECTORS**

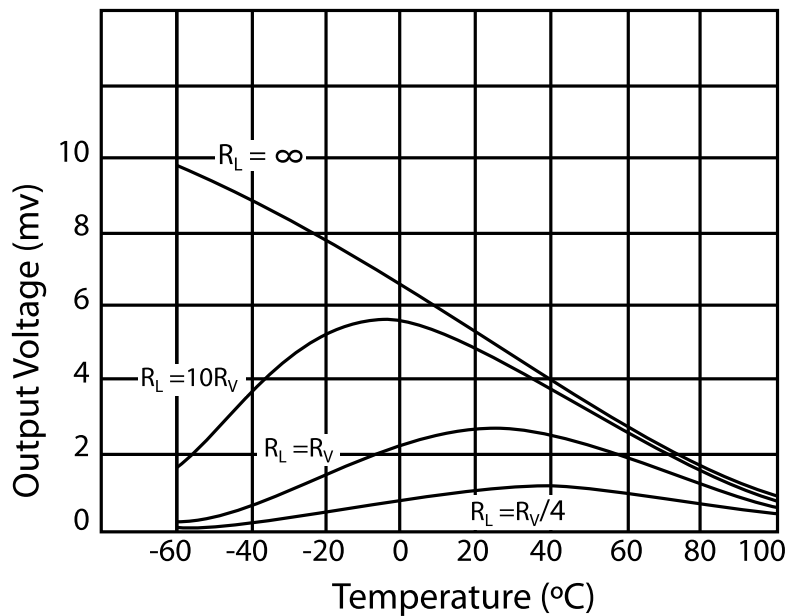
N Male



## TYPICAL OUTPUT VOLTAGE vs. INPUT POWER CURVES FOR VARIOUS $R_L/R_V$ RATIOS at $T_a=20^\circ\text{C}$



## TYPICAL LOW LEVEL ( $P_{in} \leq -20$ dBm) OUTPUT RESPONSE vs. TEMPERATURE CURVES FOR VARIOUS $R_L/R_V$ RATIOS



Curves are normalized to  $R_L = \infty$  and  $T_a = 20^\circ\text{C}$ ,  $R_V$  corresponds to the load that drops the open circuit output voltage in half (3dB) at  $20^\circ\text{C}$ .



# ZERO BIAS SCHOTTKY DETECTORS

## 100 MHz-20 GHz, 100 MHz-26.5 GHz AND 100 MHz-40 GHz

### DESIGNED FOR MIL ENVIRONMENTS



## SPECIFICATIONS

MODEL	FREQUENCY RANGE	FREQUENCY RESPONSE	MAXIMUM VSWR	OUTPUT CONNECTOR	DIMENSIONS
301A	100 MHz - 20 GHz	±0.5 dB	1.35	SMA Female	1.57 in. x 0.4 in. dia.
301B	100 MHz - 20 GHz	±0.5 dB	1.35	BNC Female	1.85 in. x 0.4 in. dia.
301S	100 MHz - 20 GHz	±0.5 dB	1.35	SMC Jack	1.45 in. x 0.4 in. dia.
302A	100 MHz - 26.5 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz	SMA Female	1.57 in. x 0.4 in. dia.
302B	100 MHz - 26.5 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz	BNC Female	1.85 in. x 0.4 in. dia.
302S	100 MHz - 26.5 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz	SMC Jack	1.45 in. x 0.4 in. dia.
303A 303AK	100 MHz - 40 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz ±1.5 dB to 40 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz 2.0 to 40 GHz	SMA Female	1.57 in. x 0.4 in. dia.
303B 303BK	100 MHz - 40 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz ±1.5 dB to 40 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz 2.0 to 40 GHz	BNC Female	1.85 in. x 0.4 in. dia.
303S 303SK	100 MHz - 40 GHz	±0.5 dB to 20 GHz ±0.8 dB to 26.5 GHz ±1.5 dB to 40 GHz	1.35 to 20 GHz 1.5 to 26.5 GHz 2.0 to 40 GHz	SMC Jack	1.45 in. x 0.4 in. dia.

**LOW LEVEL SENSITIVITY** 0.5 mV/μW  
**OUTPUT CAPACITANCE** 3.0 pF  
**MAXIMUM INPUT** 100 mW  
**OPERATING TEMPERATURE** -54° to +100° C

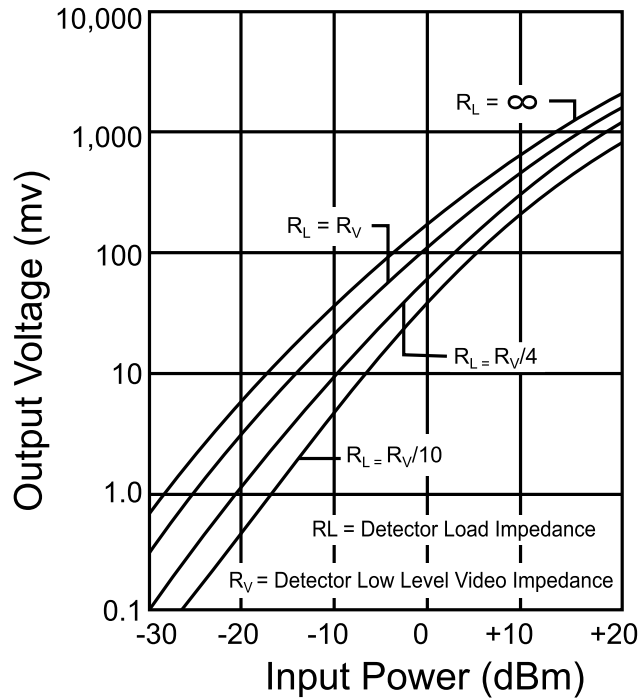
**OUTPUT POLARITY** Negative  
 For positive output, add "P" to end of Model Number.

**INPUT CONNECTOR**  
 Models 301A, 301B, 301S, 302A, 302B, 302S 3.5 mm Male  
 Models 303A, 303B, 303S 2.4 mm Male  
 Models 303AK, 303BK, 303SK 2.92 mm Male

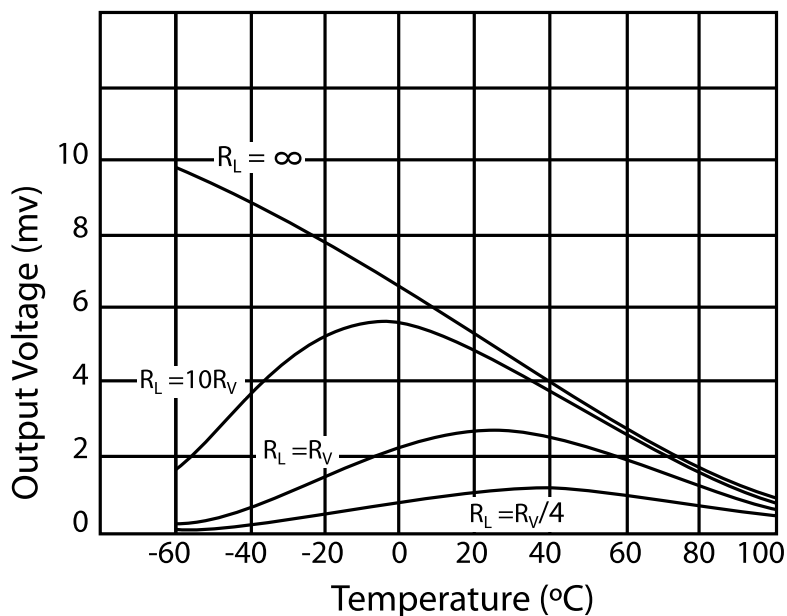


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## TYPICAL OUTPUT VOLTAGE vs. INPUT POWER CURVES FOR VARIOUS $R_L/R_V$ RATIOS at $T_a=20^\circ\text{C}$



## TYPICAL LOW LEVEL ( $P_{in} \leq -20$ dBm) OUTPUT RESPONSE vs. TEMPERATURE CURVES FOR VARIOUS $R_L/R_V$ RATIOS



Curves are normalized to  $R_L = \infty$  and  $T_a = 20^\circ\text{C}$ ,  $R_V$  corresponds to the load that drops the open circuit output voltage in half (3dB) at  $20^\circ\text{C}$ .



# PLANAR DOPED BARRIER DETECTORS



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# KRYTAR® PLANAR DOPED BARRIER DETECTORS

## MODELS 110A, 110B & 110S

### 10 MHz-18.5 GHz



## SPECIFICATIONS

MODEL	FREQUENCY RANGE	FREQUENCY RESPONSE	MAXIMUM VSWR	OUTPUT CONNECTOR	DIMENSIONS
110A	10 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	SMA Female	2.24 in. x 0.83 in. dia.
110B	10 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	BNC Female	2.51 in. x 0.83 in. dia.
110S	10 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	SMC Jack	2.33 in. x 0.83 in. dia.

**LOW LEVEL SENSITIVITY**

0.4 mV/μW

**OUTPUT CAPACITANCE**

30 pF

**MAXIMUM INPUT**

200 mW

**OPERATING TEMPERATURE**

-54° to +100° C

**OUTPUT POLARITY**

Negative

For positive output, add "P" to end of Model Number.

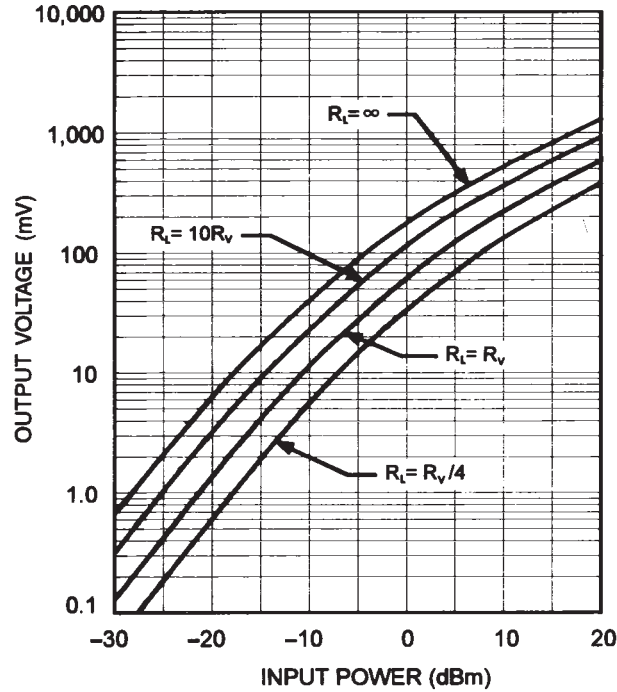
**INPUT CONNECTORS**

N Male

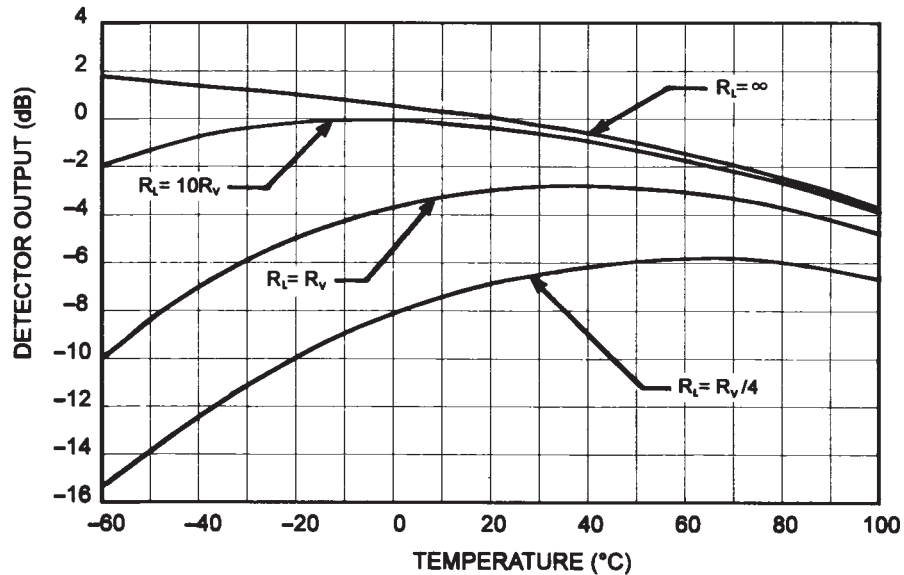


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## TYPICAL OUTPUT VOLTAGE vs. INPUT POWER CURVES FOR VARIOUS $R_L/R_V$ RATIOS at $T_a=20^\circ\text{C}$



## TYPICAL LOW LEVEL ( $P_{in} \leq -20$ dBm) OUTPUT RESPONSE vs. TEMPERATURE CURVES FOR VARIOUS $R_L/R_V$ RATIOS



Curves are normalized to  $R_L = \infty$  and  $T_a = 20^\circ\text{C}$ ,  $R_V$  corresponds to the load that drops the open circuit output voltage in half (3dB) at  $20^\circ\text{C}$ .



# KRYTAR<sup>®</sup> PLANAR DOPED BARRIER DETECTORS

## MODELS 210A, 210B & 210S

### 100 MHz-18.5 GHz



## SPECIFICATIONS

MODEL	FREQUENCY RANGE	FREQUENCY RESPONSE	MAXIMUM VSWR	OUTPUT CONNECTOR	DIMENSIONS
<b>210A</b>	100 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	SMA Female	2.24 in. x 0.83 in. dia.
<b>210B</b>	100 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	BNC Female	2.51 in. x 0.83 in. dia.
<b>210S</b>	100 MHz - 18.5 GHz	±0.3 dB to 12.4 GHz ±0.6 dB to 18.5 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.4 to 18.5 GHz	SMC Jack	2.33 in. x 0.83 in. dia.

**LOW LEVEL SENSITIVITY**

0.4 mV/μW

**OUTPUT CAPACITANCE**

3 pF

**MAXIMUM INPUT**

200 mW

**OPERATING TEMPERATURE**

-54° to +100° C

**OUTPUT POLARITY**

Negative

For positive output, add "P" to end of Model Number.

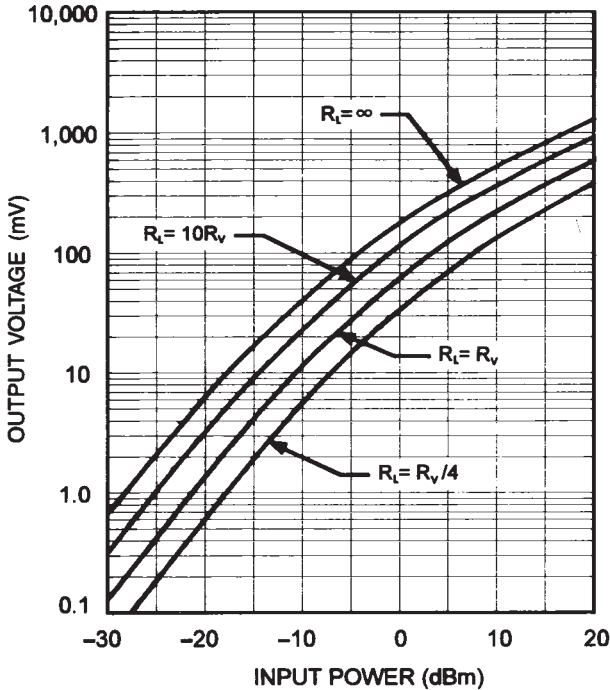
**INPUT CONNECTORS**

N Male

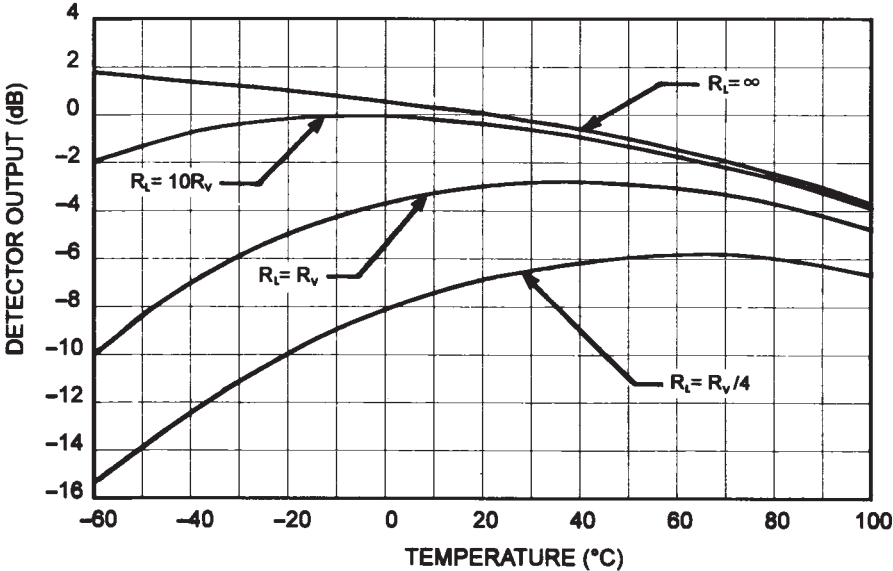


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# TYPICAL OUTPUT VOLTAGE vs. INPUT POWER CURVES FOR VARIOUS $R_L/R_V$ RATIOS at $T_a=20^\circ\text{C}$



# TYPICAL LOW LEVEL ( $P_{in} \leq -20 \text{ dBm}$ ) OUTPUT RESPONSE vs. TEMPERATURE CURVES FOR VARIOUS $R_L/R_V$ RATIOS



Curves are normalized to  $R_L = \infty$  and  $T_a = 20^\circ\text{C}$ ,  $R_V$  corresponds to the load that drops the open circuit output voltage in half (3dB) at  $20^\circ\text{C}$ .





# KRYTAR®

## PLANAR DOPED BARRIER DETECTORS

10 MHz-20 GHz, 10 MHz-26.5 GHz,  
10 MHz-40 GHz, AND 10 MHz-50 GHz



### SPECIFICATIONS

MODEL	FREQUENCY RANGE	FREQUENCY RESPONSE	MAXIMUM VSWR	OUTPUT CONNECTOR	DIMENSIONS
601A	10 MHz - 20 GHz	±0.3 dB	1.3	SMA Female	1.57 in. x 0.4 in. dia.
601B	10 MHz - 20 GHz	±0.3 dB	1.3	BNC Female	1.85 in. x 0.4 in. dia.
601S	10 MHz - 20 GHz	±0.3 dB	1.3	SMC Jack	1.45 in. x 0.4 in. dia.
602A	10 MHz - 26.5 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz	SMA Female	1.57 in. x 0.4 in. dia.
602B	10 MHz - 26.5 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz	BNC Female	1.85 in. x 0.4 in. dia.
602S	10 MHz - 26.5 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz	SMC Jack	1.45 in. x 0.4 in. dia.
603A 603AK	10 MHz - 40 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40 GHz	SMA Female	1.57 in. x 0.4 in. dia.
603B 603BK	10 MHz - 40 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40 GHz	BNC Female	1.85 in. x 0.4 in. dia.
603S 603SK	10 MHz - 40 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40 GHz	SMC Jack	1.45 in. x 0.4 in. dia.
604A	10 MHz - 50 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz ±3.0 dB to 50 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40GHz 2.8 to 50 GHz	SMA Female	1.57 in. x 0.4 in. dia.
604B	10 MHz - 50 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz ±3.0 dB to 50 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40GHz 2.8 to 50 GHz	BNC Female	1.85 in. x 0.4 in. dia.
604S	10 MHz - 50 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz ±3.0 dB to 50 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40GHz 2.8 to 50 GHz	SMC Female	1.45 in. x 0.4 in. dia.

**LOW LEVEL SENSITIVITY** 0.4 mV/μW  
**VIDEO IMPEDANCE** 0.8 - 7.5 KΩ  
**OUTPUT CAPACITANCE** 30 pF  
**MAXIMUM INPUT** 200 mW  
**OPERATING TEMPERATURE** -54° to +100° C

**OUTPUT POLARITY** Negative  
 For positive output, add "P" to end of Model Number.

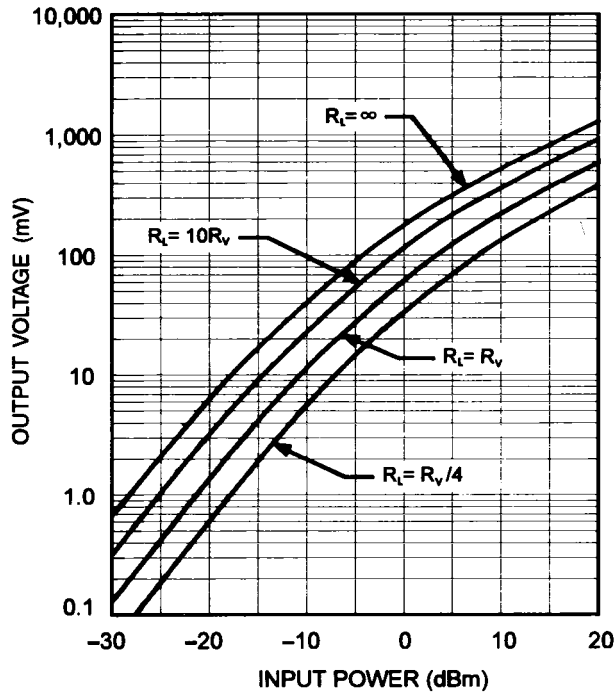
**INPUT CONNECTOR**  
 Models 601A, 601B, 601S, 602A, 602B, 602S 3.5 mm Male  
 Models 603A, 603B, 603S, 604A, 604B, 604S 2.4 mm Male  
 Models 603AK, 603BK, 603SK 2.92 mm Male



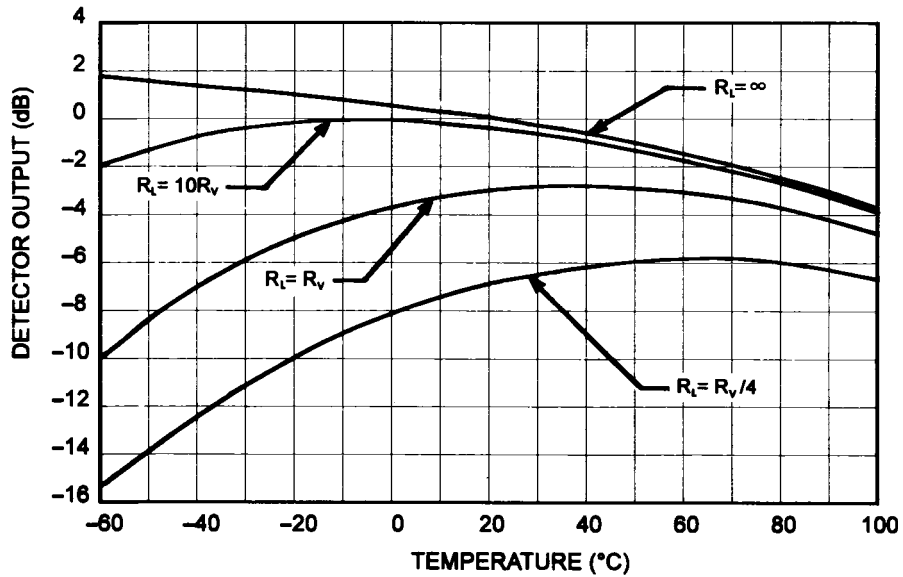
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# PLANAR DOPED BARRIER DETECTORS

## TYPICAL OUTPUT VOLTAGE vs. INPUT POWER CURVES FOR VARIOUS $R_L/R_V$ RATIOS at $T_a=20^\circ\text{C}$



## TYPICAL LOW LEVEL ( $P_{in} \leq -20$ dBm) OUTPUT RESPONSE vs. TEMPERATURE CURVES FOR VARIOUS $R_L/R_V$ RATIOS



Curves are normalized to  $R_L = \infty$  and  $T_a = 20^\circ\text{C}$ ,  $R_V$  corresponds to the load that drops the open circuit output voltage in half (3dB) at  $20^\circ\text{C}$ .



# KRYTAR®

## PLANAR DOPED BARRIER DETECTORS 100 MHz-20 GHz, 100 MHz-26.5 GHz, 100 MHz-40 GHz, AND 100 MHz-50 GHz



### SPECIFICATIONS

MODEL	FREQUENCY RANGE	FREQUENCY RESPONSE	MAXIMUM VSWR	OUTPUT CONNECTOR	DIMENSIONS
701A	100 MHz - 20 GHz	±0.3 dB	1.3	SMA Female	1.57 in. x 0.4 in. dia.
701B	100 MHz - 20 GHz	±0.3 dB	1.3	BNC Female	1.85 in. x 0.4 in. dia.
701S	100 MHz - 20 GHz	±0.3 dB	1.3	SMC Jack	1.45 in. x 0.4 in. dia.
702A	100 MHz - 26.5 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz	SMA Female	1.57 in. x 0.4 in. dia.
702B	100 MHz - 26.5 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz	BNC Female	1.85 in. x 0.4 in. dia.
702S	100 MHz - 26.5 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz	SMC Jack	1.45 in. x 0.4 in. dia.
703A 703AK	100 MHz - 40 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40 GHz	SMA Female	1.57 in. x 0.4 in. dia.
703B 703BK	100 MHz - 40 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40 GHz	BNC Female	1.85 in. x 0.4 in. dia.
703S 703SK	100 MHz - 40 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40 GHz	SMC Jack	1.45 in. x 0.4 in. dia.
704A	100 MHz - 50 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz ±3.0 dB to 50 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40GHz 2.8 to 50 GHz	SMA Female	1.57 in. x 0.4 in. dia.
704B	100 MHz - 50 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz ±3.0 dB to 50 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40GHz 2.8 to 50 GHz	BNC Female	1.85 in. x 0.4 in. dia.
704S	100 MHz - 50 GHz	±0.3 dB to 20 GHz ±0.6 dB to 26.5 GHz ±1.0 dB to 40 GHz ±3.0 dB to 50 GHz	1.3 to 20 GHz 1.4 to 26.5 GHz 1.7 to 40GHz 2.8 to 50 GHz	SMC Female	1.45 in. x 0.4 in. dia.

**LOW LEVEL SENSITIVITY**

0.4 mV/μW

**VIDEO IMPEDANCE**

0.8 - 7.5 KΩ

**OUTPUT CAPACITANCE**

3.0 pF

**MAXIMUM INPUT**

200 mW

**OPERATING TEMPERATURE**

-54° to +100° C

**OUTPUT POLARITY**

Negative

For positive output, add "P" to end of Model Number.

**INPUT CONNECTOR**

Models 701A, 701B, 701S, 702A, 702B, 702S 3.5 mm Male

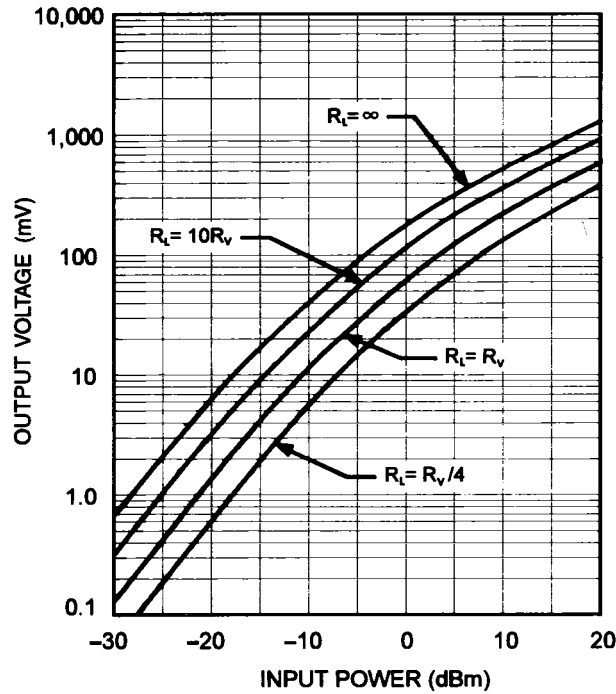
Models 703A, 703B, 703S, 704A, 704B, 704S 2.4 mm Male

Models 703AK, 703BK, 703SK 2.92 mm Male

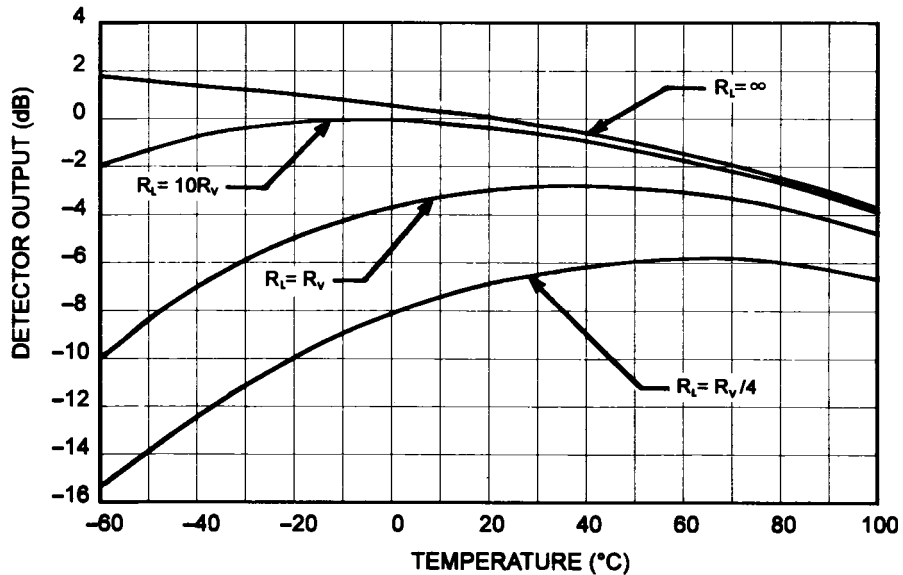
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# PLANAR DOPED BARRIER DETECTORS

## TYPICAL OUTPUT VOLTAGE vs. INPUT POWER CURVES FOR VARIOUS $R_L/R_V$ RATIOS at $T_a=20^\circ\text{C}$



## TYPICAL LOW LEVEL ( $P_{in} \leq -20$ dBm) OUTPUT RESPONSE vs. TEMPERATURE CURVES FOR VARIOUS $R_L/R_V$ RATIOS



Curves are normalized to  $R_L = \infty$  and  $T_a = 20^\circ\text{C}$ ,  $R_V$  corresponds to the load that drops the open circuit output voltage in half (3dB) at  $20^\circ\text{C}$ .



## DIRECTIONAL COUPLERS



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### SPECIFICATIONS

MODEL	FREQUENCY RANGE (GHz)	COUPLING (WITH RESPECT TO OUTPUT) (dB)	FREQUENCY SENSITIVITY (dB)	DIRECTIVITY (dB Min)	VSWR (Max)	INSERTION LOSS (dB Max)	SIZE*	CONNECTOR TYPE (FEMALE)	WEIGHT (OZ.)	
100308010	0.3-8.0	10 ± 1.0	± 1.2	20	1.18	1.3	AA	SMA	3.8	
100308016	0.3-8.0	16 ± 1.2	± 1.0	20	1.15	1.0	AA			
100308030	0.3-8.0	30 ± 0.7	± 1.2	20	1.15	0.85	AA			
100312410	0.3-12.4	10 ± 1.0	± 1.2	15	1.35	1.35	AA			
100312416	0.3-12.4	16 ± 1.2	± 1.0	15	1.30	1.20	AA			
100312430	0.3-12.4	30 ± 0.7	± 1.2	15	1.35	1.0	AA			
120406	4.0-12.4	06 ± 0.5	± 0.3	15	1.35	1.8	BB		SMA	1.0
120410	4.0-12.4	10 ± 0.5	± 0.3	15	1.35	0.9	BB			
120420	4.0-12.4	20 ± 1.0	± 0.3	15	1.35	0.5	BB			
120430	4.0-12.4	30 ± 1.0	± 0.3	15	1.35	0.5	BB			
120706	7.0-12.4	06 ± 0.5	± 0.3	15	1.35	1.8	BB			
120710	7.0-12.4	10 ± 0.5	± 0.3	15	1.35	0.9	BB			
120720	7.0-12.4	20 ± 1.0	± 0.3	15	1.35	0.5	BB			
120730	7.0-12.4	30 ± 1.0	± 0.3	15	1.35	0.5	BB			
181206	12.4-18.0	06 ± 0.5	± 0.3	15	1.35	1.9	BB			
181210	12.4-18.0	10 ± 0.5	± 0.3	15	1.35	1.0	BB			
181220	12.4-18.0	20 ± 1.0	± 0.3	15	1.35	0.6	BB	3.5 mm	1.1	
181230	12.4-18.0	30 ± 1.0	± 0.7	15	1.35	0.6	BB			
262206	18.0-26.5	06 ± 1.0	± 0.3	13	1.40	1.6	CC			
262210	18.0-26.5	10 ± 0.5	± 0.3	14	1.40	1.3	CC			
262220	18.0-26.5	20 ± 1.0	± 0.3	14	1.40	0.8	CC			
262230	18.0-26.5	30 ± 1.0	± 0.35	14	1.40	0.8	CC			
184010	18.0-40.0	10 ± 0.7	± 0.4	12	1.70	1.7	DD			2.4 mm (For 2.92 mm add "K" to end of Model #)
184020	18.0-40.0	20 ± 1.0	± 0.4	12	1.70	1.3	DD			
264006	26.5-40.0	06 ± 0.7	± 0.65	10	1.80	2.4	DD			
264010	26.5-40.0	10 ± 0.7	± 0.4	12	1.70	1.7	DD			
264020	26.5-40.0	20 ± 1.0	± 0.4	12	1.70	1.3	DD			

\* See Dimension Table On Next Page

Specifications Continued On Next Page

**OPERATING TEMPERATURE**

-54° to +85° C

**POWER RATING (input)**

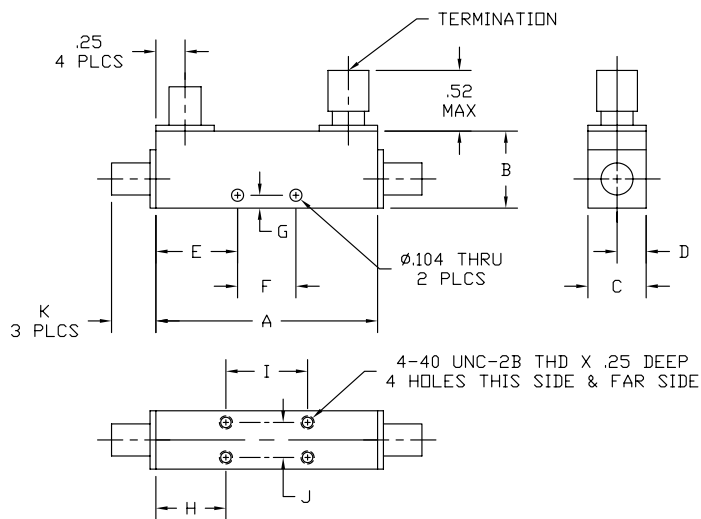
Average  
Peak

20 W  
3 KW

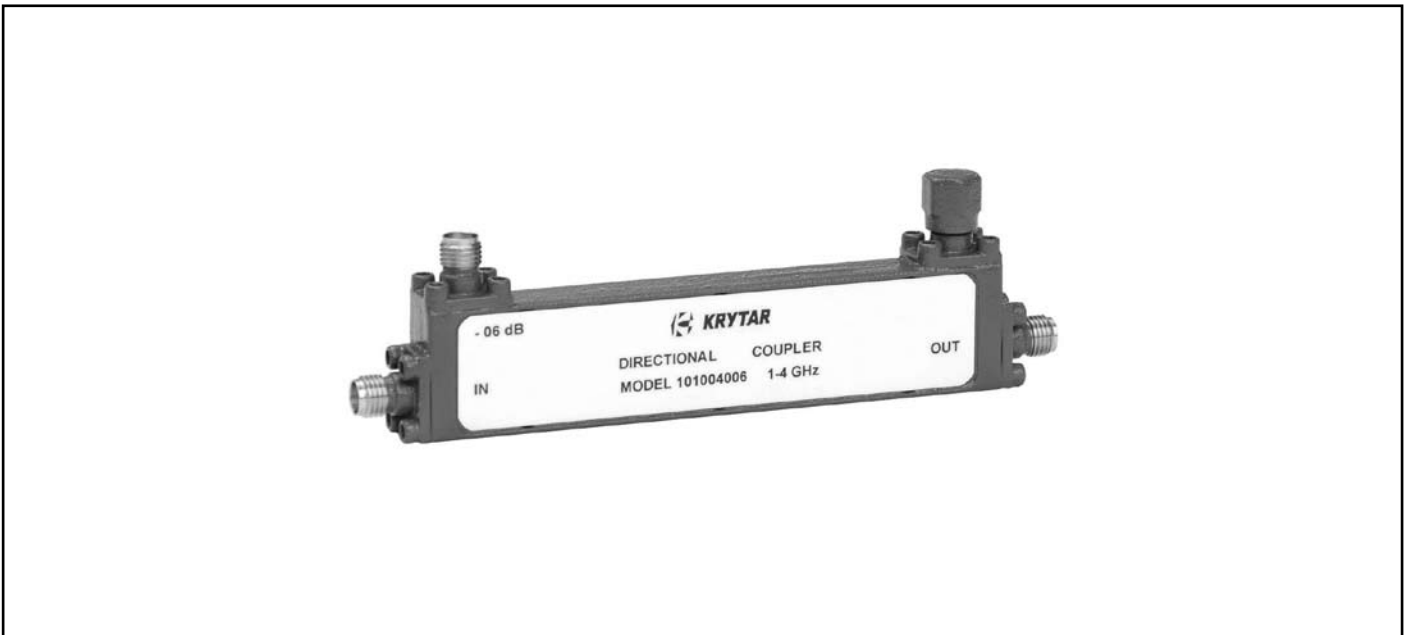
MODEL	FREQUENCY RANGE (GHz)	COUPLING (dB)	FREQUENCY SENSITIVITY (dB)	DIRECTIVITY (dB Min)	VSWR (Max)	INSERTION LOSS (dB Max)	SIZE	CONNECTOR TYPE (FEMALE)	WEIGHT (OZ.)
195010	18.0-50.0	10 ± 0.7	± 0.5	10	1.80	1.9	DD	2.4 mm	1.0
195020	18.0-50.0	20 ± 1.0	± 0.5	10	1.80	1.5	DD		
265010	26.5-50.0	10 ± 0.7	± 0.5	10	1.80	1.9	DD		
265020	26.5-50.0	20 ± 1.0	± 0.5	10	1.80	1.5	DD		

## DIMENSIONS9

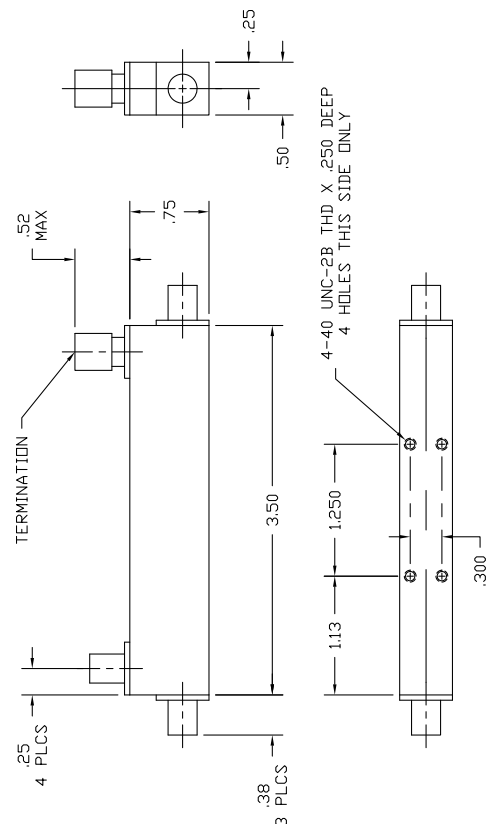
SIZE	A	B	C	D	E	F	G	H	I	J
AA	6.00	.73	.50	.25	-	-	-	1.80	2.400	.30
BB	1.40	.66	.40	.20	.45	.500	.11	-	-	-
CC	1.12	.64	.53	.26	.56	0	.09	-	-	-
DD	1.12	.62	.40	.20	.56	0	.09	-	-	-



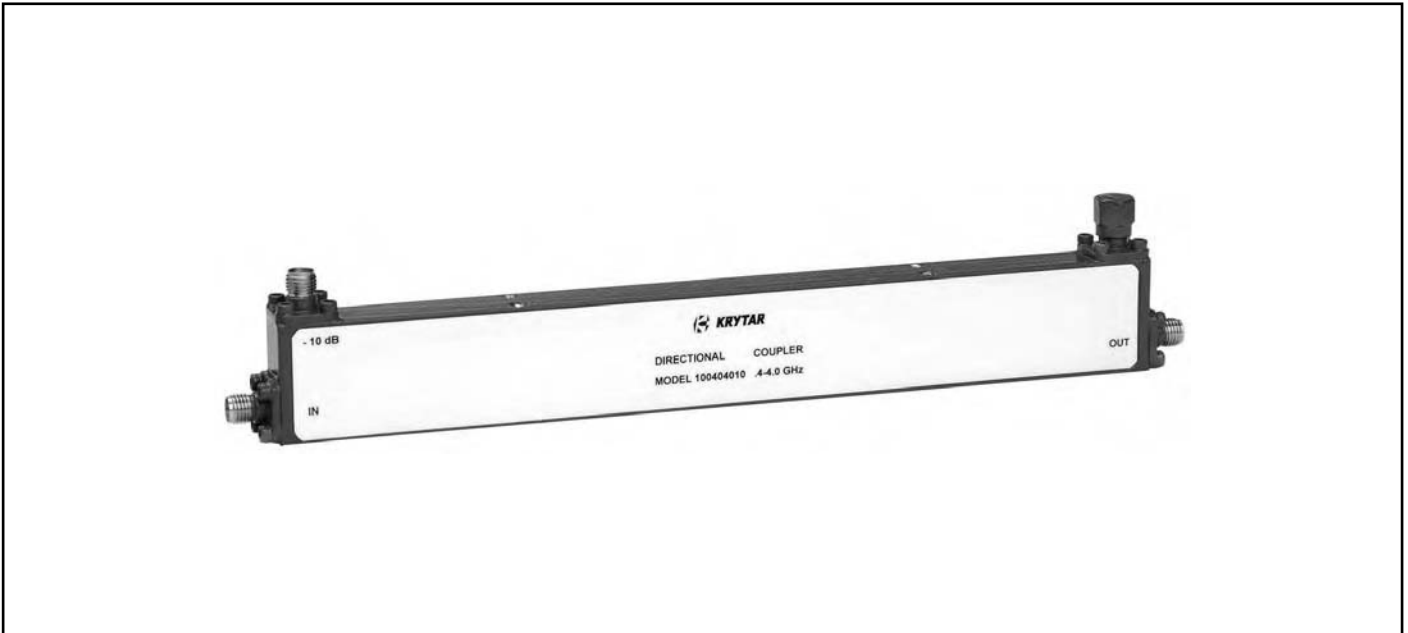
CONNECTOR TYPE	K
SMA MALE	0.50
SMA FEMALE	0.38
3.5 mm MALE	0.46
3.5 mm FEMALE	0.48
2.92 mm MALE	0.50
2.92 mm FEMALE	0.38
2.4 mm MALE	0.50
2.4 mm FEMALE	0.38

**1-4 GHz DIRECTIONAL COUPLER**

**SPECIFICATIONS**

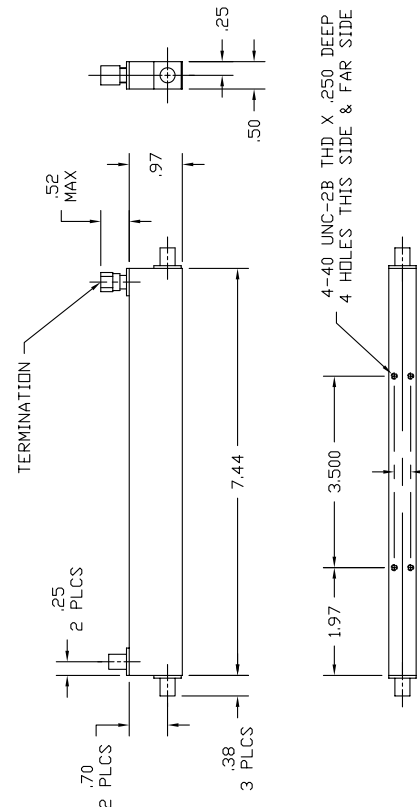
<b>FREQUENCY RANGE</b>		1-4 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	101004006	6 ± 0.5 dB
	101004010	10 ± 0.8 dB
	101004020	20 ± 0.5 dB
Frequency Sensitivity		± 0.5 dB
<b>DIRECTIVITY</b>		> 20 dB
<b>MAXIMUM VSWR</b> (any port)		1.2
<b>INSERTION LOSS</b>	101004006	< 1.3 dB
(includes coupled power)	101004010	< 1.0 dB
	101004020	< 0.8 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	N Female	
<b>WEIGHT</b> (ounces)		2.0
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**




**0.4-4.0 GHz DIRECTIONAL COUPLER**

**SPECIFICATIONS**

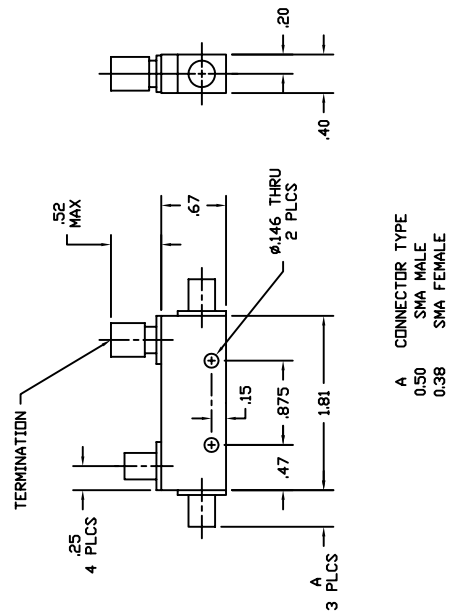
<b>FREQUENCY RANGE</b>		0.4-4.0 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	100404010	10 ± 0.5 dB
	100404020	20 ± 1.0 dB
Frequency Sensitivity		± 0.5 dB
<b>DIRECTIVITY</b>	100404010	> 16 dB
	100404020	> 20 dB
<b>MAXIMUM VSWR</b> (any port)		1.2
<b>INSERTION LOSS</b>	100404010	< 1.1 dB
(includes coupled power)	100404020	< 0.75 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	N Female	
<b>WEIGHT</b> (ounces)		5.9
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

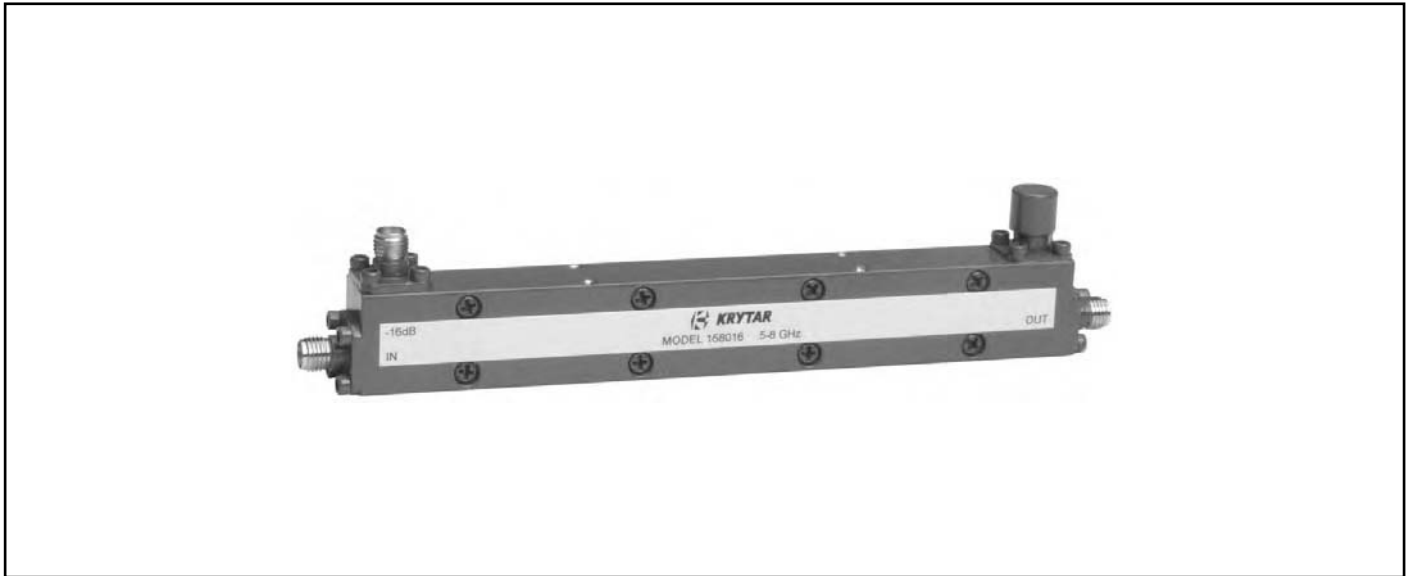
**DIMENSIONS**


**2-8 GHz DIRECTIONAL COUPLERS**

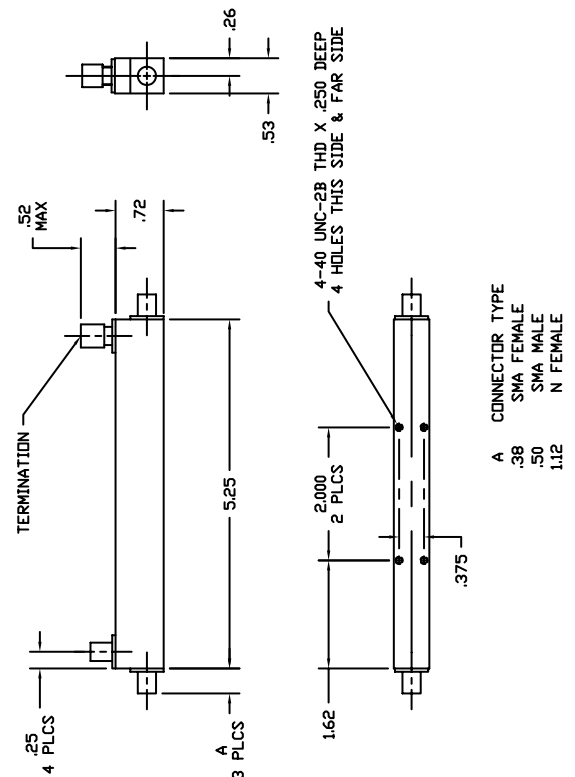
**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		2-8 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	102008006	6 ± 0.5 dB
	102008010	10 ± 0.5 dB
	102008020	20 ± 1.0 dB
Frequency Sensitivity		± 0.25 dB
<b>DIRECTIVITY</b>		> 20 dB
<b>MAXIMUM VSWR</b> (any port)		1.20
<b>INSERTION LOSS</b>	102008006	< 1.60 dB
(includes coupled power)	102008010	< 0.75 dB
	102008020	< 0.35 dB
<b>POWER RATING</b> (input)		
Average		50 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	SMA Male	
<b>WEIGHT</b> (ounces)		1.2
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**0.5-8.0 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

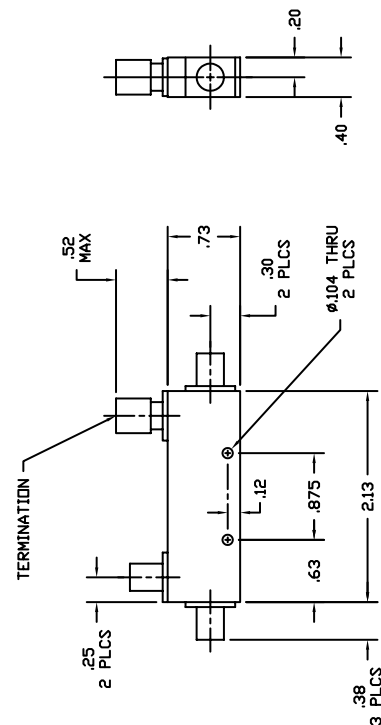
<b>FREQUENCY RANGE</b>	0.5-8.0 GHz	
<b>COUPLING</b> (with respect to output)		
Nominal	158006	6 ± 1.1 dB
	158010	10 ± 1.0 dB
	158016	16 ± 1.0 dB
	158020	20 ± 1.0 dB
Frequency Sensitivity		± 0.6 dB
<b>DIRECTIVITY</b>	> 15 dB	
<b>MAXIMUM VSWR</b> (any port)	1.35	
<b>INSERTION LOSS</b> (includes coupled power)		
	158006	< 1.70 dB
	158010	< 1.30 dB
	158016	< 0.85 dB
	158020	< 0.80 dB
<b>POWER RATING</b> (input)		
Average	20 W	
Peak	3 KW	
<b>STANDARD CONNECTORS</b>	SMA Female	
Optional:	SMA Male	
	N Female	
<b>WEIGHT</b> (ounces)		
N Female Connectors	5.7	
SMA Female Connectors	3.8	
<b>OPERATING TEMPERATURE</b>	-54° to +85° C	

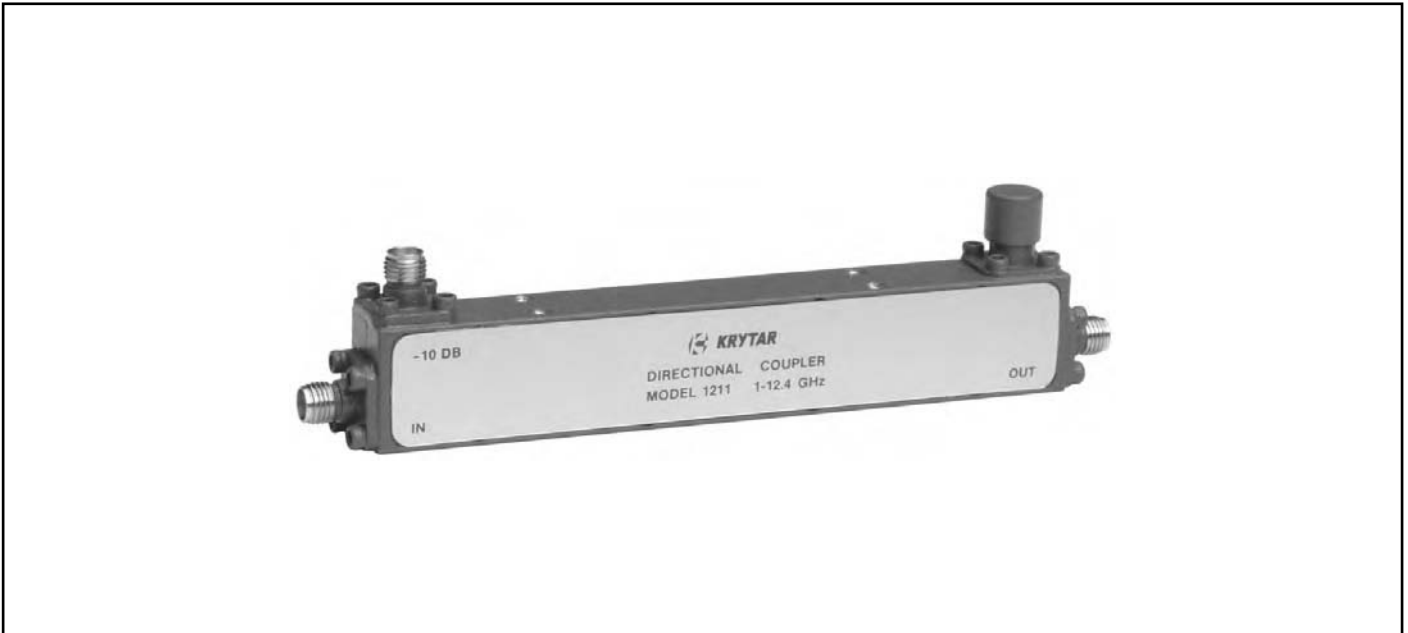
**DIMENSIONS**


**2.0-8.6 GHz DIRECTIONAL COUPLER**

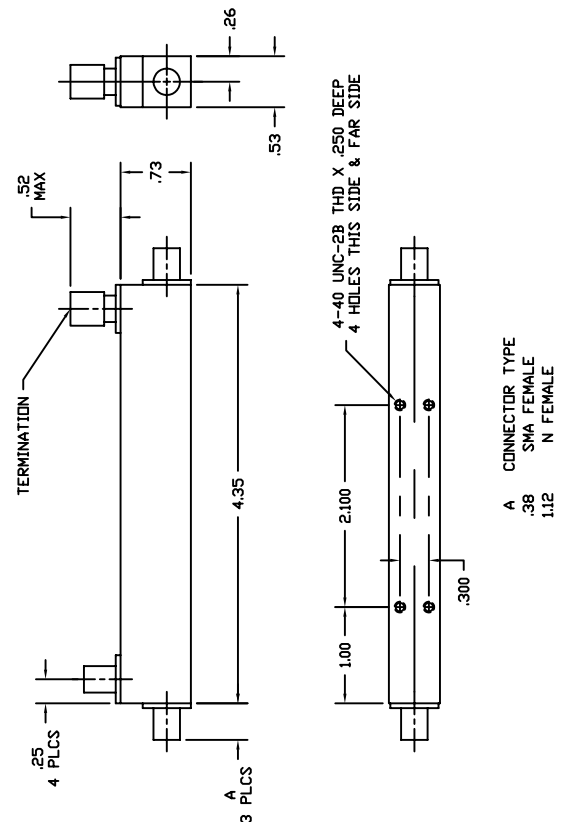
**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	2.0-8.6 GHz
<b>COUPLING</b> (with respect to output)	
Nominal	16 ± 1.0 dB
Frequency Sensitivity	± 0.25 dB
<b>DIRECTIVITY</b>	> 20 dB
<b>MAXIMUM VSWR</b> (any port)	1.3
<b>INSERTION LOSS</b> (includes coupled power)	< 0.5 dB
<b>POWER RATING</b> (input)	
Average	50 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT</b> (ounces)	1.2
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**1.0-12.4 GHz DIRECTIONAL COUPLER**

**SPECIFICATIONS**

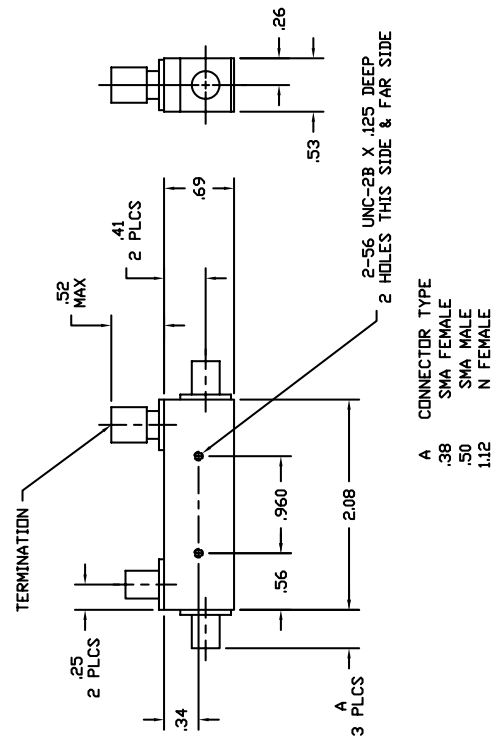
<b>FREQUENCY RANGE</b>	1.0-12.4 GHz
<b>COUPLING</b> (with respect to output)	
Nominal	10 ± 0.5 dB
Frequency Sensitivity	± 0.3 dB
<b>DIRECTIVITY</b>	> 18 dB, 1-8 GHz > 15 dB, 8-12.4 GHz
<b>MAXIMUM VSWR</b> (any port)	1.20, 1-8 GHz 1.35, 8-12.4 GHz
<b>INSERTION LOSS</b> (includes coupled power)	< 1.1 dB
<b>POWER RATING</b> (input)	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
Optional:	N Female
<b>WEIGHT</b> (ounces)	
N Female Connectors	4.9
SMA Female Connectors	3.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

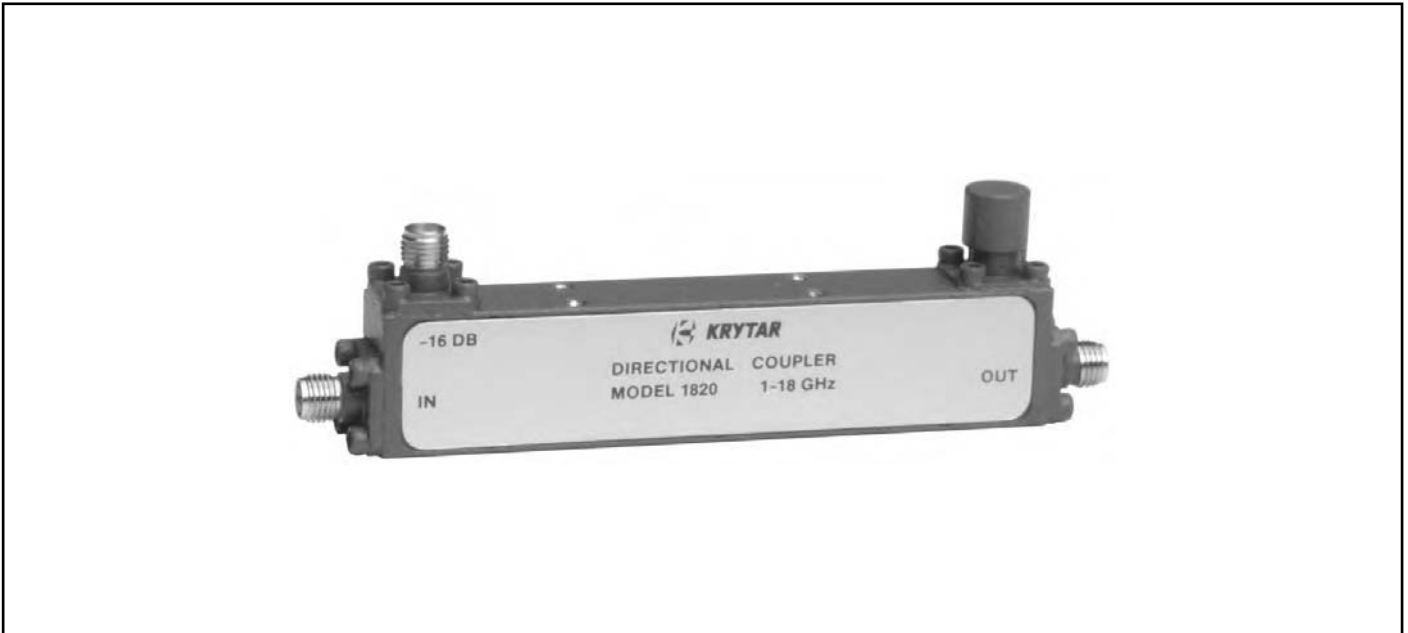
**DIMENSIONS**


**2-18 GHz DIRECTIONAL COUPLERS**

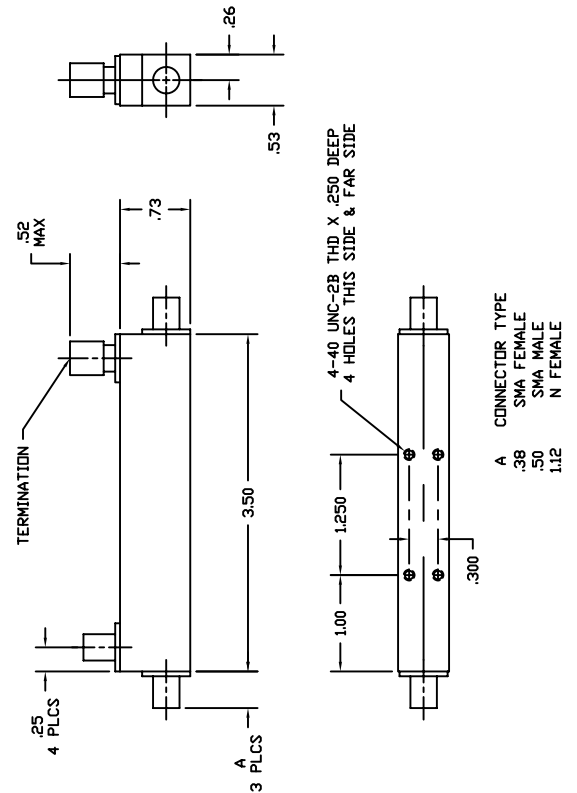
**SPECIFICATIONS**

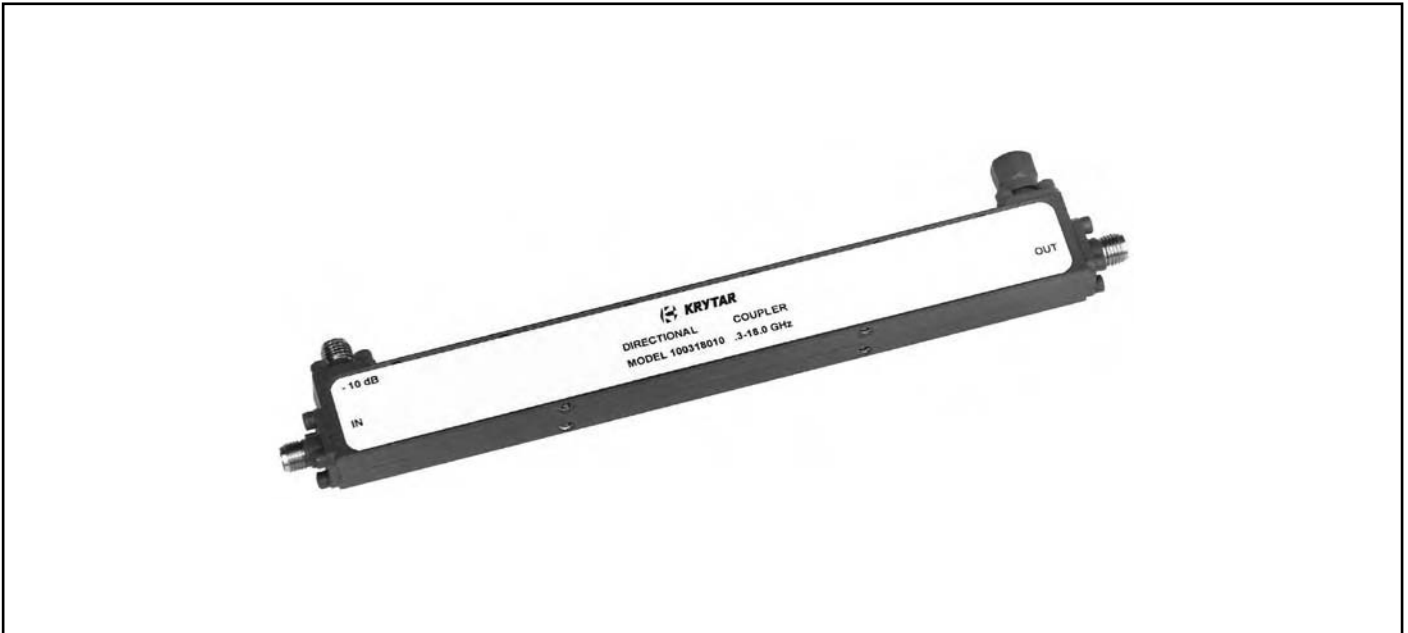
<b>FREQUENCY RANGE</b>		2-18 GHz
<b>DIRECTIVITY</b>		> 16 dB
<b>COUPLING</b> (with respect to output)		
Nominal	1815	6 ± 1.0 dB
	1822	10 ± 0.5 dB
	1818	16 ± 0.5 dB
	1824	20 ± 1.0 dB
Frequency Sensitivity		± 0.35 dB
<b>MAXIMUM VSWR</b> (any port)		1.30
<b>INSERTION LOSS</b>	1815	< 1.9 dB
(includes coupled power)	1822	< 1.1 dB
	1818	< 0.75 dB
	1824	< 0.7 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	SMA Male	
	N Female	
<b>WEIGHT</b> (ounces)		
N Female Connectors		3.6
SMA Female Connectors		1.7
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


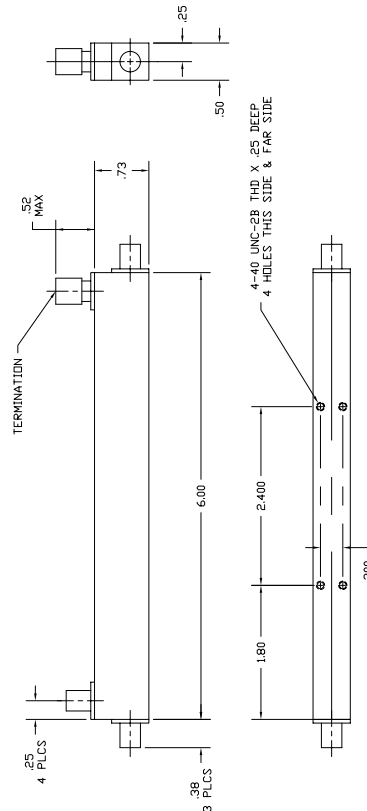
**1-18 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		1-18 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	1821	10 ± 0.5 dB
	1820	16 ± 0.5 dB
	180120	20 ± 1.0 dB
Frequency Sensitivity		± 0.3 dB, 1-12.4 GHz ± 0.4 dB, 1-18 GHz
<b>DIRECTIVITY</b>		> 16 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	1821	< 1.3 dB
(includes coupled power)	1820	< 0.9 dB
	180120	< 0.95 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	SMA Male	
	N Female	
<b>WEIGHT</b> (ounces)		
N Female Connectors		4.4
SMA Female Connectors		2.6
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**0.3-18.0 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		0.3-18.0 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	100318010	10 ± 1.0 dB
Frequency Sensitivity	100318030	30 ± 0.7 dB
		± 1.2 dB
<b>DIRECTIVITY</b>		> 12 dB
<b>MAXIMUM VSWR</b> (any port)		1.4
<b>INSERTION LOSS</b>	100318010	< 1.60 dB
(includes coupled power)	100318030	< 1.40 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	N Female	
<b>WEIGHT</b> (ounces)		3.8
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

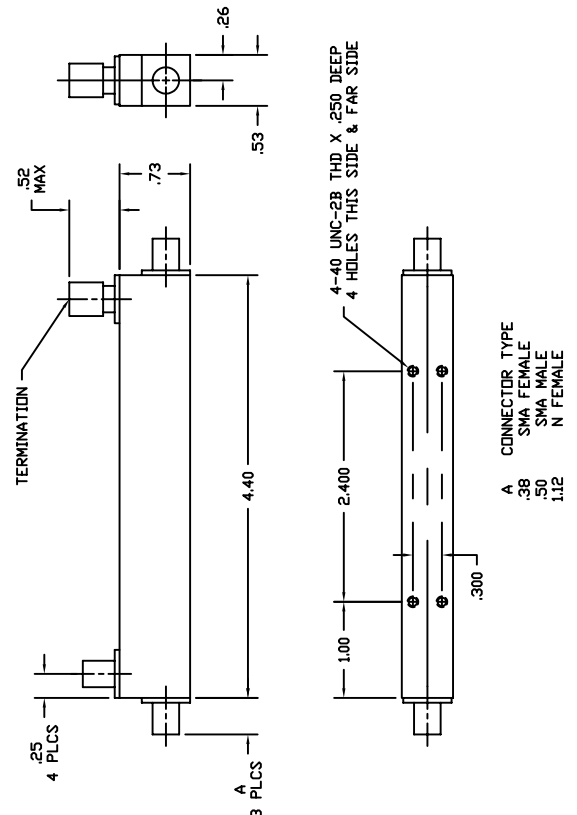
**DIMENSIONS**




**0.5-18.5 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		0.5-18.5 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	1851	10 ± 1.0 dB
Frequency Sensitivity	1850	16 ± 1.0 dB
		± 0.7 dB
<b>DIRECTIVITY</b>		> 15 dB, 0.5-12.4 GHz
		> 12 dB, 12.4-18.5 GHz
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	1851	< 1.5 dB
(includes coupled power)	1850	< 1.1 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	SMA Male	
	N Female	
<b>WEIGHT</b> (ounces)		
N Female Connectors		5.0
SMA Female Connectors		3.1
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**




# MODELS 104020006, 104020010 104020020 & 104020030

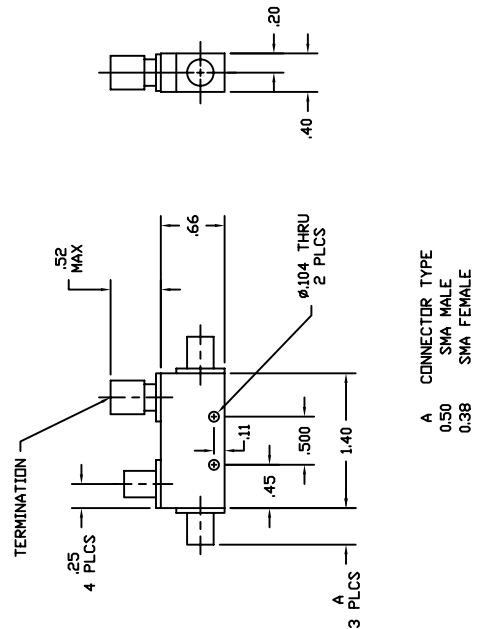
## 4-20 GHz DIRECTIONAL COUPLERS



### SPECIFICATIONS

<b>FREQUENCY RANGE</b>		4-20 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	104020006	6 ± 0.5 dB
	104020010	10 ± 0.5 dB
	104020020	20 ± 1.0 dB
Frequency Sensitivity		± 0.3 dB
Nominal	104020030	30 ± 1.0 dB
Frequency Sensitivity		± 0.7 dB
<b>DIRECTIVITY</b>		> 15 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	104020006	< 1.9 dB
(includes coupled power)	104020010	< 1.0 dB
	104020020	< 0.6 dB
	104020030	< 0.6 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	SMA Male	
<b>WEIGHT</b> (ounces)		1.0
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

### DIMENSIONS



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# MODELS 102020006, 102020010 102020016 & 102020020

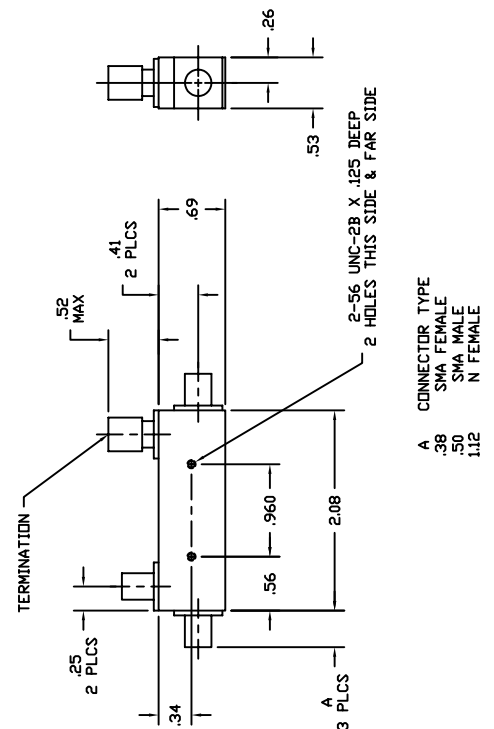
## 2-20 GHz DIRECTIONAL COUPLERS



### SPECIFICATIONS

<b>FREQUENCY RANGE</b>		2-20 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	102020006	$06 \pm 1.0$ dB
Frequency Sensitivity		$\pm 0.35$ dB
Nominal	102020010	$10 \pm 0.5$ dB
	102020016	$16 \pm 0.5$ dB
	102020020	$20 \pm 1.0$ dB
Frequency Sensitivity		$\pm 0.3$ dB
<b>DIRECTIVITY</b>		$> 16$ dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	102020006	$< 1.9$ dB
(includes coupled power)	102020010	$< 1.3$ dB
	102020016	$< 1.0$ dB
	102020020	$< 0.9$ dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	SMA Male	
	N Female	
<b>WEIGHT</b> (ounces)		1.7
<b>OPERATING TEMPERATURE</b>		$-54^{\circ}$ to $+85^{\circ}$ C

### DIMENSIONS

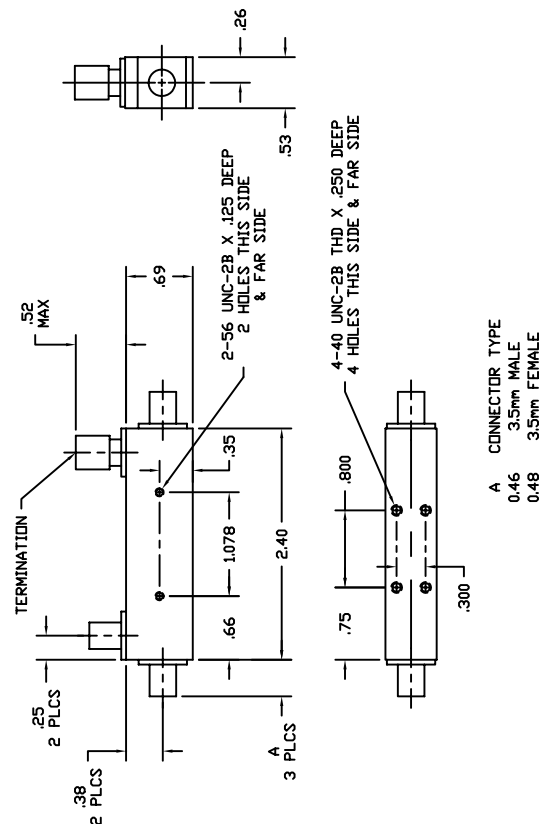


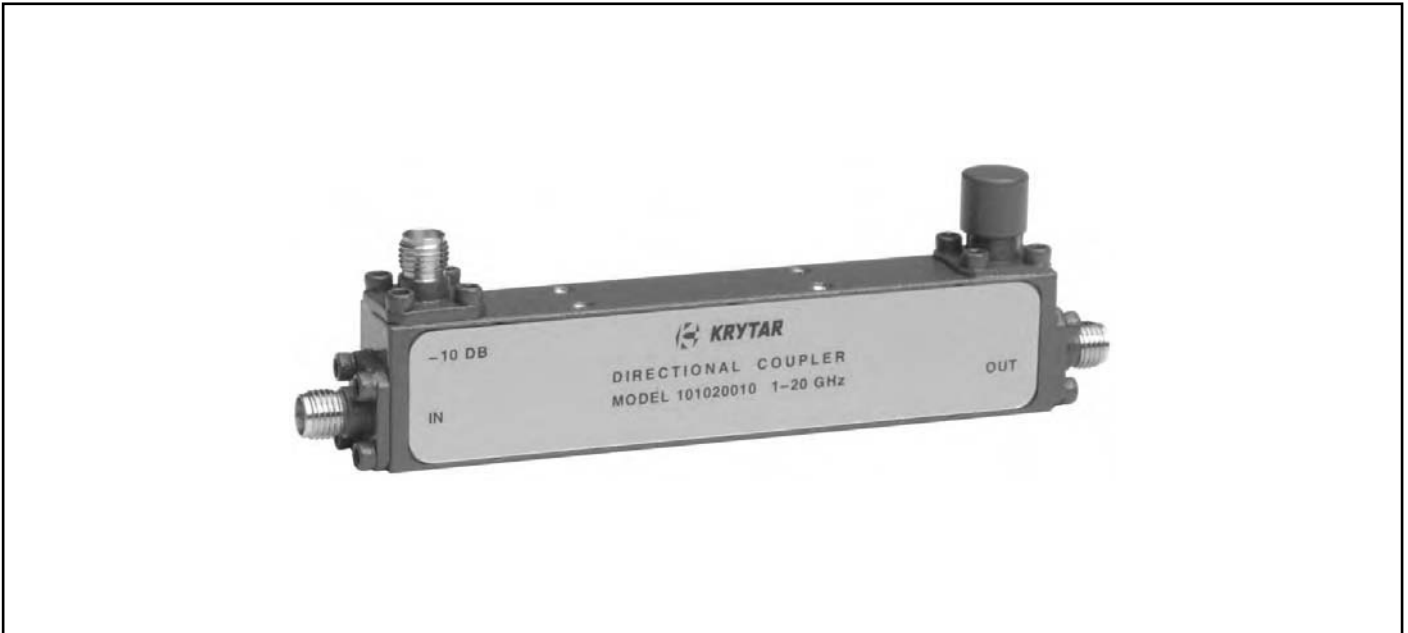
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**1.7-20 GHz DIRECTIONAL COUPLERS**

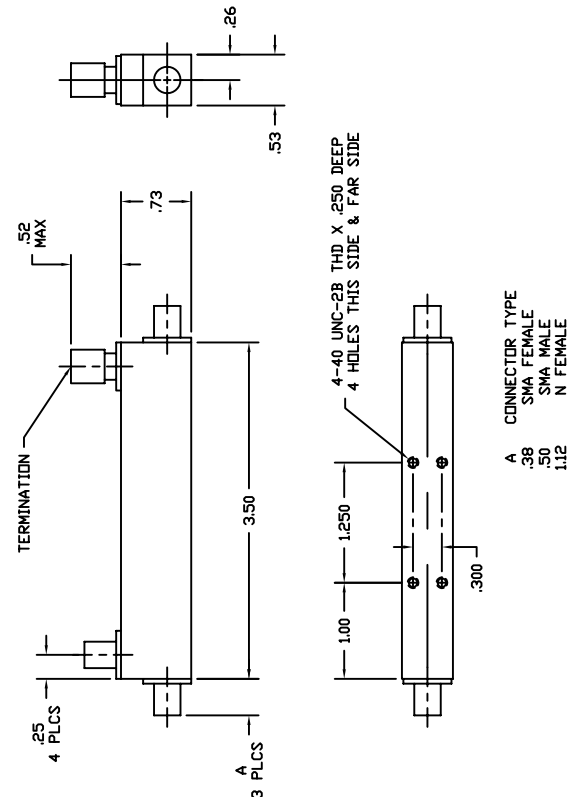
**SPECIFICATIONS**

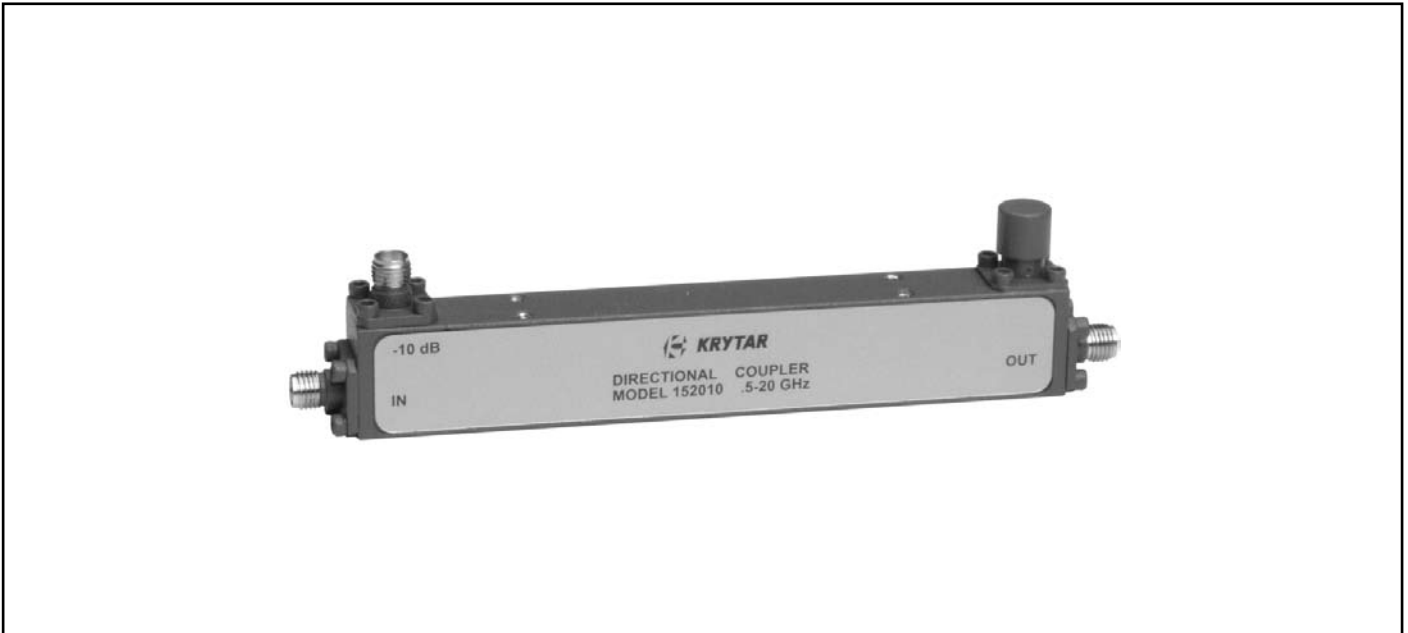
<b>FREQUENCY RANGE</b>	1.7-20 GHz
<b>COUPLING</b> (with respect to output)	
Nominal	16 ± 1 dB
Frequency Sensitivity	± 0.4 dB, 1.7-18 GHz ± 0.55 dB, 1.7-20 GHz
<b>DIRECTIVITY</b>	> 15 dB, 1.7-18 GHz > 13 dB, 18-20 GHz
<b>MAXIMUM VSWR</b> (any port)	1.35, 1.7-18 GHz 1.45, 18-20 GHz
<b>INSERTION LOSS</b> (includes coupled power)	< 0.8 dB, 1.7-18 GHz < 1.0 dB, 18-20 GHz
<b>POWER RATING</b> (input)	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	3.5mm Female
Optional:	3.5mm Male
<b>WEIGHT</b> (ounces)	1.9
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


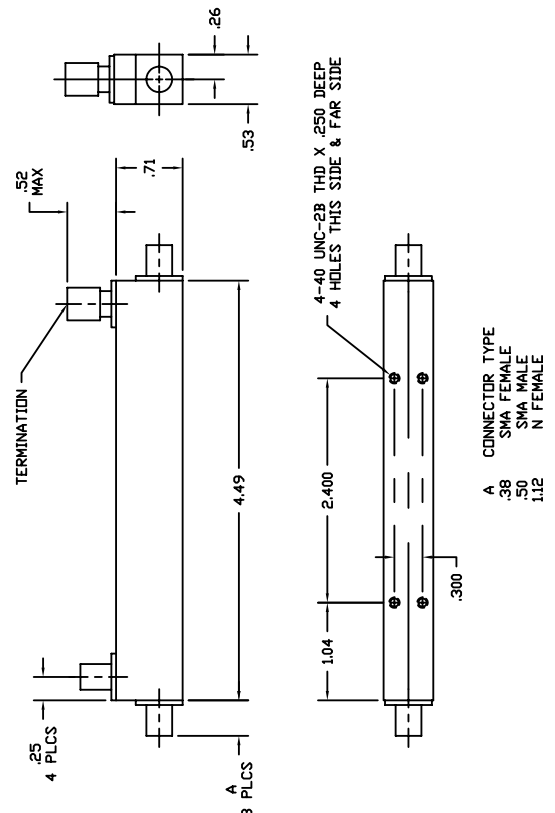
**1-20 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		1-20 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	101020010	10 ± 0.5 dB
	101020016	16 ± 0.5 dB
	101020020	20 ± 1.0 dB
Frequency Sensitivity		± 0.35 dB
<b>DIRECTIVITY</b>		> 16 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	101020010	< 1.4 dB
(includes coupled power)	101020016	< 1.1 dB
	101020020	< 1.0 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	SMA Male	
	N Female	
<b>WEIGHT</b> (ounces)		2.6
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**0.5-20.0 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

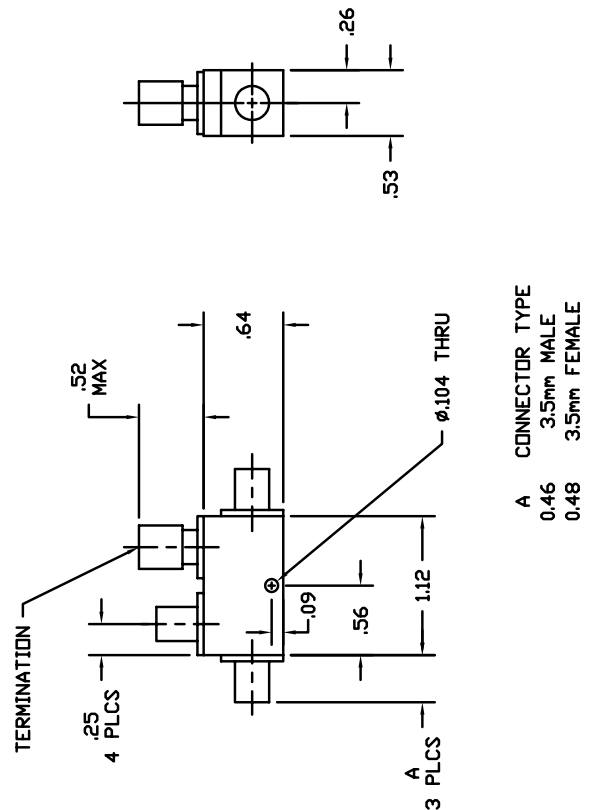
<b>FREQUENCY RANGE</b>		0.5-20.0 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	152010	10 ± 1.0 dB
	152013	13 ± 1.0 dB
	152020	20 ± 1.0 dB
Frequency Sensitivity		± 0.8 dB
<b>DIRECTIVITY</b>		> 15 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	152010	<1.65 dB
(includes coupled power)	152013	<1.40 dB
	152020	<1.20 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
Optional:	SMA Male	
	N Female	
<b>WEIGHT</b> (ounces)		
SMA Female Connectors		3.1
N Female Connectors		5.0
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**6.0-26.5 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

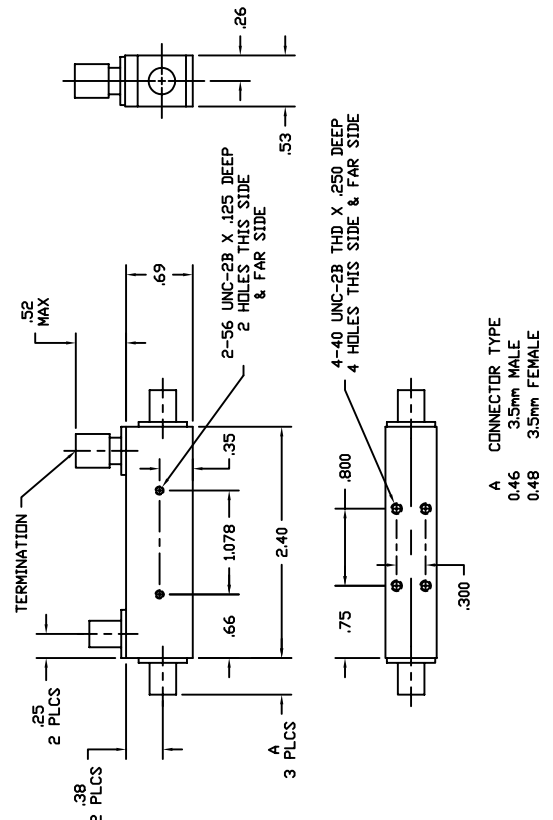
<b>FREQUENCY RANGE</b>		6.0-26.5 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	106026506	06 ± 1.0 dB
Frequency Sensitivity		± 0.5 dB
Nominal	106026510	10 ± 0.5 dB
	106026520	20 ± 1.0 dB
Frequency Sensitivity		± 0.3 dB
Nominal	106026530	30 ± 1.0 dB
Frequency Sensitivity		± 0.5 dB
<b>DIRECTIVITY</b>		
	106026506	> 14 dB
	106026510	> 13 dB
	106026520	> 14 dB
	106026530	> 14 dB
<b>MAXIMUM VSWR</b> (any port)		
	106026506	1.45
	106026510	1.40
	106026520	1.40
	106026530	1.45
<b>INSERTION LOSS</b> (includes coupled power)		
	106026506	< 1.6 dB
	106026510	< 1.3 dB
	106026520	< 0.8 dB
	106026530	< 0.7 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		3.5mm Female
Optional:	3.5mm Male	
<b>WEIGHT</b> (ounces)		1.1
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**1.7-26.5 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	1.7-26.5 GHz	
<b>COUPLING</b> (with respect to output)		
Nominal	2611	10 ± 1 dB
Frequency Sensitivity	2616	16 ± 1 dB
		± 0.4 dB, 1.7-18 GHz
		± 0.6 dB, 1.7-26.5 GHz
<b>DIRECTIVITY</b>		> 16 dB, 1.7-18 GHz
		> 14 dB, 18-26.5 GHz
<b>MAXIMUM VSWR</b> (any port)		1.35, 1.7-18 GHz
		1.45, 18-26.5 GHz
<b>INSERTION LOSS</b>	2611	< 1.5 dB
(includes coupled power)	2616	< 1.2 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>	3.5mm Female	
Optional:	3.5mm Male	
<b>WEIGHT</b> (ounces)	1.9	
<b>OPERATING TEMPERATURE</b>	-54° to +85° C	

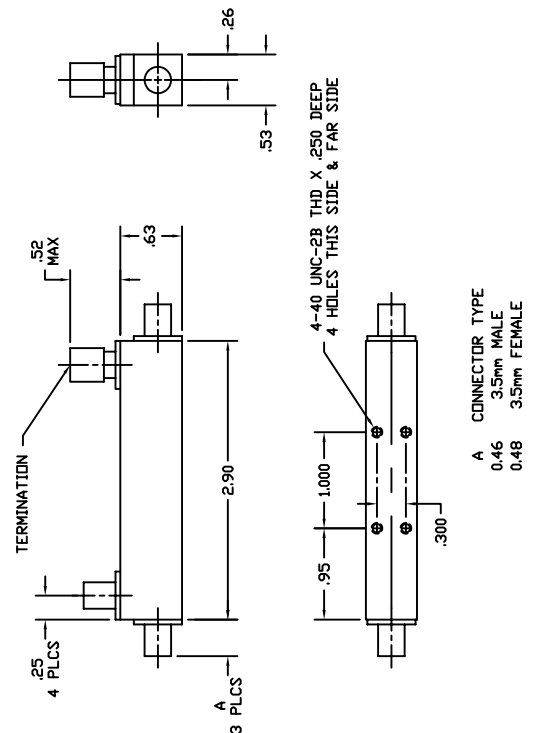
**DIMENSIONS**


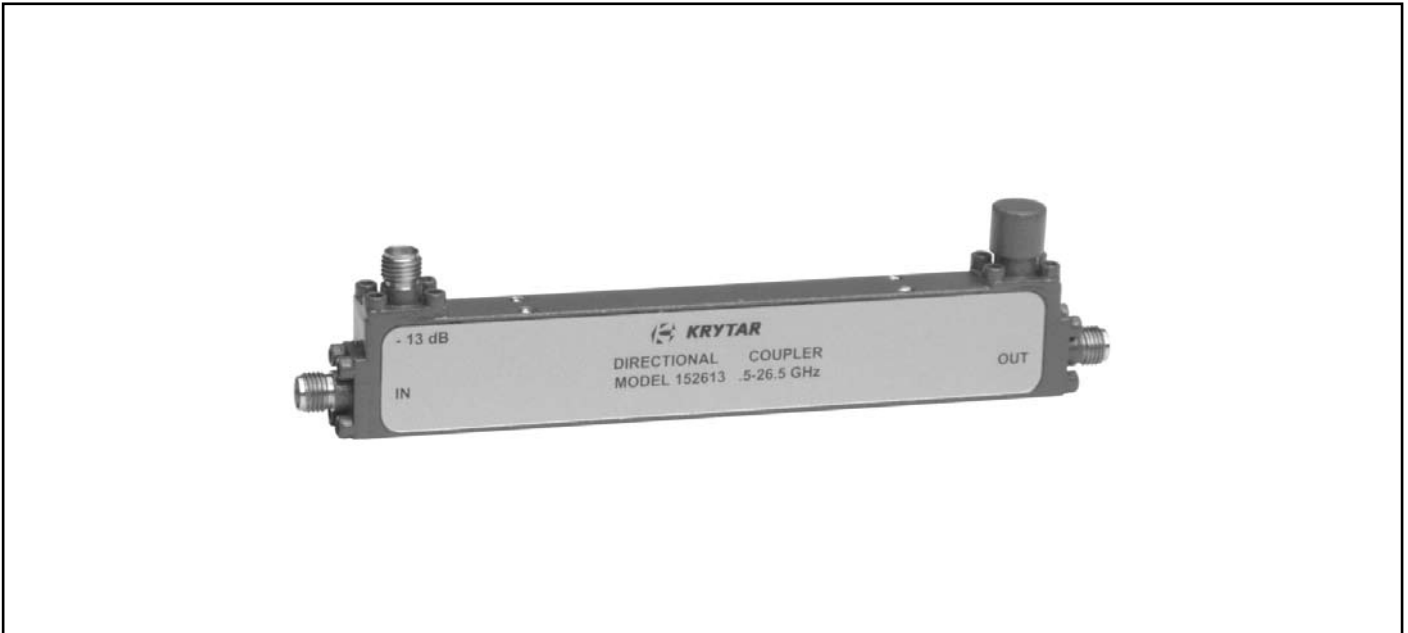


**1.0-26.5 GHz DIRECTIONAL COUPLERS**

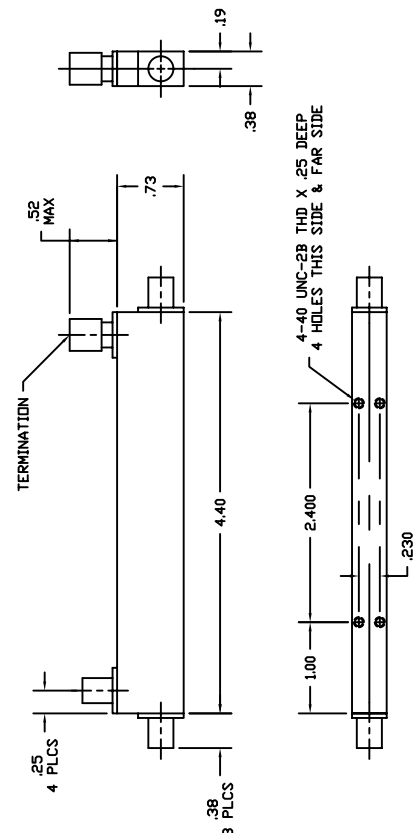
**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		1.0-26.5 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	2606	6 ± 1.0 dB
Frequency Sensitivity		± 0.7 dB
Nominal	2610	10 ± 1.0 dB
	2620	20 ± 1.0 dB
Frequency Sensitivity		± 0.5 dB
<b>DIRECTIVITY</b>	2606	> 13 dB
	2610	> 14 dB
	2620	> 14 dB
<b>MAXIMUM VSWR</b> (any port)	2606	1.50
	2610	1.40
	2620	1.40
<b>INSERTION LOSS</b> (includes coupled power)	2606	< 2.0 dB
	2610	< 1.6 dB
	2620	< 1.2 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		3.5mm Female
Optional:	3.5mm Male	
<b>WEIGHT</b> (ounces)		2.1
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**0.5-26.5 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	0.5-26.5 GHz	
<b>COUPLING</b> (with respect to output)		
Nominal	152610	10 ± 1.0 dB
	152613	13 ± 1.0 dB
Frequency Sensitivity		± 1.0 dB
Nominal	152616	16 ± 1.0 dB
Frequency Sensitivity		± 1.2 dB
Nominal	152620	20 ± 1.0 dB
Frequency Sensitivity		± 1.5 dB
<b>DIRECTIVITY</b>		> 13 dB
<b>MAXIMUM VSWR</b> (any port)		1.45
<b>INSERTION LOSS</b>	152610	< 1.5 dB
(includes coupled power)	152613	< 1.5 dB
	152616	< 1.4 dB
	152620	< 1.35 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
<b>WEIGHT</b> (ounces)		2.3
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**




# MODELS 110040010, 110040010K 110040020 & 110040020K

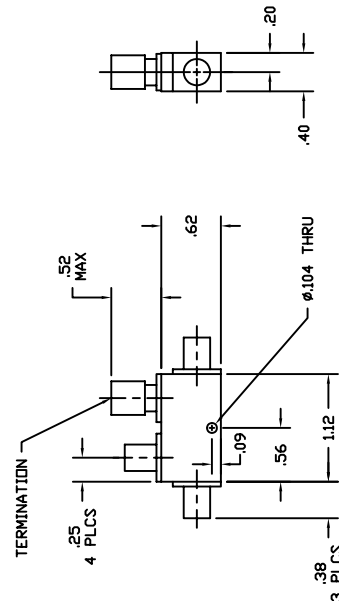
## 10-40 GHz DIRECTIONAL COUPLERS



### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	10-40 GHz
<b>COUPLING</b> (with respect to output)	
Nominal 110040010 & 110040010K	10 ± 0.7 dB
110040020 & 110040020K	20 ± 1.0 dB
Frequency Sensitivity	± 0.4 dB
<b>DIRECTIVITY</b>	> 10 dB
<b>MAXIMUM VSWR</b> (any port)	1.7
<b>INSERTION LOSS</b> (includes coupled power)	
110040010 & 110040010K	< 1.7 dB
110040020 & 110040020K	< 1.3 dB
<b>POWER RATING</b> (input)	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	
110040010 & 110040020	2.4 mm Female
110040010K & 110040020K	2.92 mm Female
<b>WEIGHT</b> (ounces)	1.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

### DIMENSIONS

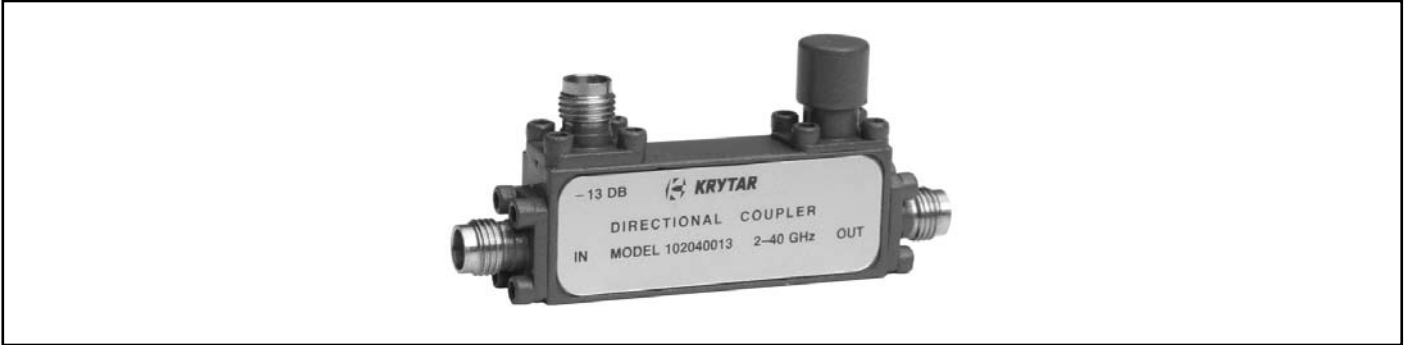


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**MODELS 102040006 & 102040006K**  
**102040010 & 102040010K**  
**102040013 & 102040013K**  
**102040016 & 102040016K**  
**102040020 & 102040020K**

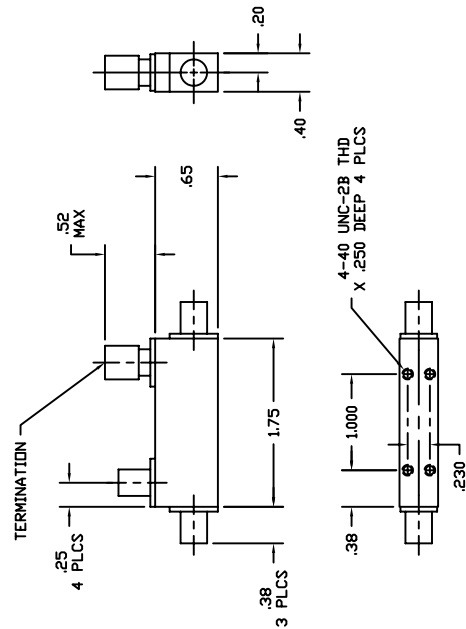
**2-40 GHz DIRECTIONAL COUPLER**



**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	2-40 GHz
<b>COUPLING</b> (with respect to output)	
Nominal 102040006 & 102040006K	06 ± 1.52 dB
Frequency Sensitivity	± 1.0 dB
Nominal 102040010 & 102040010K	10 ± 1.0 dB
102040013 & 102040013K	13 ± 1.0 dB
102040016 & 102040016K	16 ± 1.0 dB
102040020 & 102040020K	20 ± 1.0 dB
Frequency Sensitivity	± 0.4 dB, 2-20 GHz ± 0.7 dB, 2-40 GHz
<b>DIRECTIVITY</b>	> 15 dB, 2-20 GHz > 11 dB, 20-40 GHz
<b>MAXIMUM VSWR</b> (any port)	1.5, 2-20 GHz 1.7, 20-40 GHz
<b>INSERTION LOSS</b> (includes coupled power)	
102040006 & 102040006K	< 3.5 dB
102040010 & 102040010K	< 1.2 dB, 2-20 GHz < 1.8 dB, 20-40 GHz
102040013 & 102040013K	< 1.0 dB, 2-20 GHz < 1.7 dB, 20-40 GHz
102040016 & 102040016K	< 0.9 dB, 2-20 GHz < 1.6 dB, 20-40 GHz
102040020 & 102040020K	< 0.8 dB, 2-20 GHz < 1.5 dB, 20-40 GHz
<b>POWER RATING</b> (input)	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	
102040006/10/13/16/20	2.4 mm Female
102040006K/10K/13K/16K/20K	2.92 mm Female
<b>WEIGHT</b> (ounces)	1.2
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**



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**MODELS 101040006 & 101040006K  
101040010 & 101040010K  
101040013 & 101040013K  
101040020 & 101040020K**

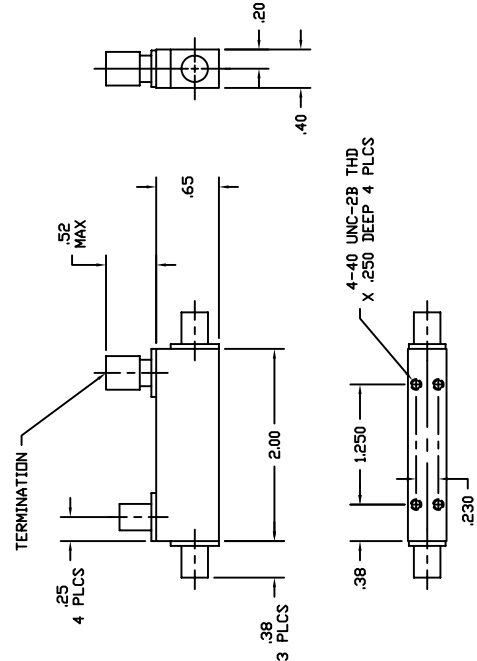
**1-40 GHz DIRECTIONAL COUPLER**



**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	1-40 GHz
<b>COUPLING</b> (with respect to output)	
Nominal 101040006 & 101040006K	6 ± 1.0 dB
Frequency Sensitivity	± 1.52 dB
Nominal 101040010 & 101040010K	10 ± 1.0 dB
101040013 & 101040013K	13 ± 1.0 dB
101040020 & 101040020K	20 ± 1.0 dB
Frequency Sensitivity	± 1.2 dB
<b>DIRECTIVITY</b>	> 14 dB, 1-20 GHz > 10 dB, 20-40 GHz
<b>MAXIMUM VSWR</b> (any port)	1.5, 1-20 GHz 1.7, 20-40 GHz
<b>INSERTION LOSS</b> (includes coupled power)	
101040006 & 101040006K	< 2.5 dB, 1-20 GHz < 3.5 dB, 20-40 GHz
101040010 & 101040010K	< 1.3 dB, 1-20 GHz < 2.0 dB, 20-40 GHz
101040013 & 101040013K	< 1.1 dB, 1-20 GHz < 1.8 dB, 20-40 GHz
101040020 & 101040020K	< 0.85 dB, 1-20 GHz < 1.5 dB, 20-40 GHz
<b>POWER RATING</b> (input)	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	
101040006/10/13/20	2.4 mm Female
101040006K/10K/13K/20K	2.92 mm Female
<b>WEIGHT</b> (ounces)	1.3
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**



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**MODELS 110046006, 110046006K  
110046010, 110046010K  
110046020, 110046020K**

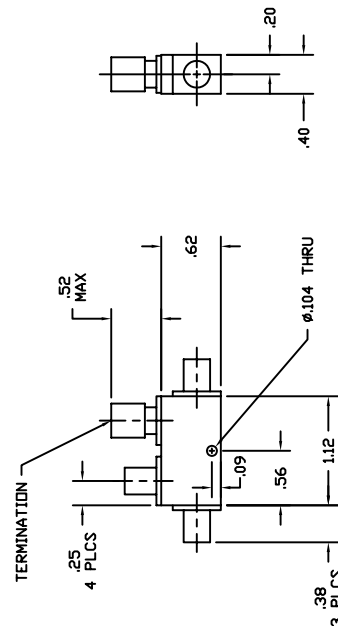
**10-46 GHz DIRECTIONAL COUPLERS**



**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	10-46 GHz
<b>COUPLING</b> (with respect to output)	
Nominal 110046006, 110046006K	6 ± 0.7 dB
Frequency Sensitivity	± 0.7 dB
Nominal 110046010, 110046010K	10 ± 0.7 dB
110046020, 110046020K	20 ± 1.0 dB
Frequency Sensitivity	± 0.5 dB
<b>DIRECTIVITY</b>	
110046006, 110046006K	> 8 dB
110046010, 110046010K	>10 dB
110046020, 110046020K	>10 dB
<b>MAXIMUM VSWR</b> (any port)	1.8
<b>INSERTION LOSS</b> (includes coupled power)	
110046006, 110046006K	< 2.4 dB
110046010, 110046010K	< 1.9 dB
110046020, 110046020K	< 1.5 dB
<b>POWER RATING</b> (input)	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	
110046006, 110046010 & 110046020	2.4 mm Female
110046006K, 110046010K & 110046020K	2.92 mm Female
<b>WEIGHT</b> (ounces)	1.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**

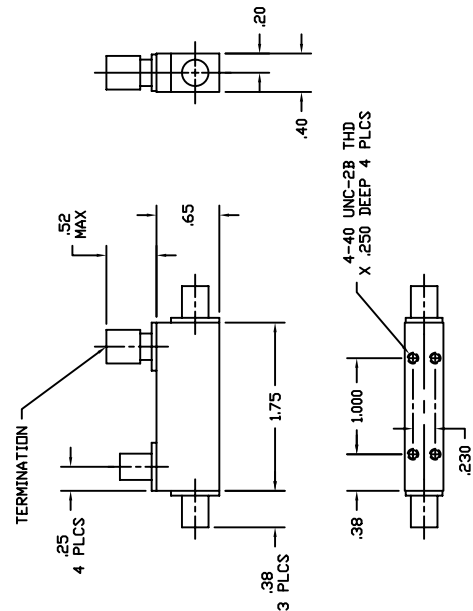


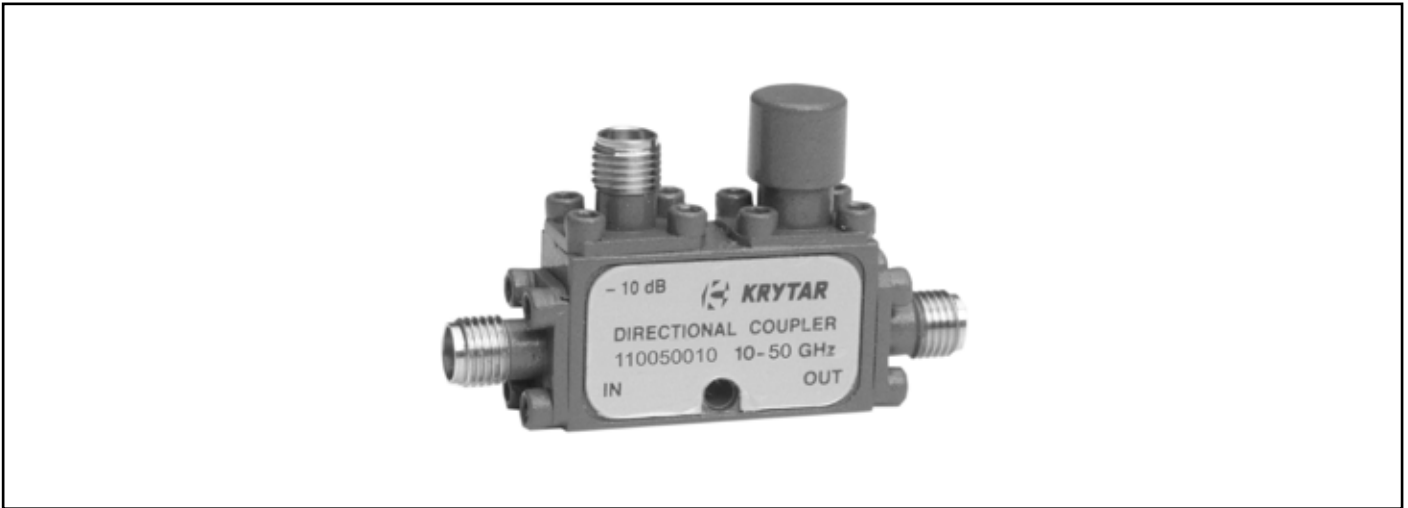
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**2-46 GHz DIRECTIONAL COUPLERS**

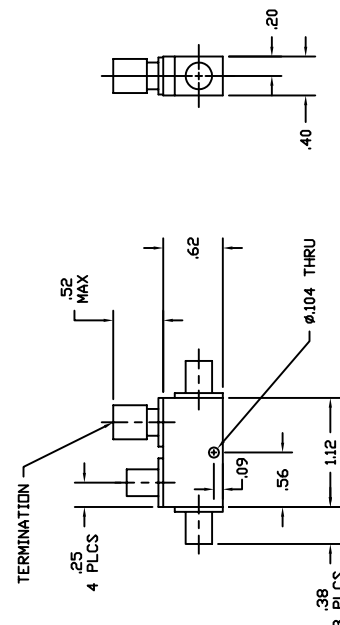
**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	2-46 GHz
<b>COUPLING</b> (with respect to output)	
Nominal	13 ± 1 dB
Frequency Sensitivity	± 0.6 dB, 2-26.5 GHz ± 0.8 dB, 2-46 GHz
<b>DIRECTIVITY</b>	> 13 dB, 2-26.5 GHz > 10 dB, 26.5-46 GHz
<b>MAXIMUM VSWR</b> (any port)	1.5, 2-26.5 GHz 1.8, 26.5-46 GHz
<b>INSERTION LOSS</b> (includes coupled power)	< 1.8 dB
<b>POWER RATING</b> (input)	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	2.4 mm Female
<b>WEIGHT</b> (ounces)	1.2
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**10-50 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	10-50 GHz
<b>COUPLING</b> (with respect to output)	
Nominal 110050006	6 ± 0.7 dB
Frequency Sensitivity	± 0.7 dB
Nominal 110050010	10 ± 0.7 dB
110050020	20 ± 1.0 dB
Frequency Sensitivity	± 0.5 dB
<b>DIRECTIVITY</b>	
110050006	> 8 dB
110050010, 110050020	> 10 dB
<b>MAXIMUM VSWR</b> (any port)	1.8
<b>INSERTION LOSS</b> (includes coupled power)	
110050006	< 2.4 dB
110050010	< 1.9 dB
110050020	< 1.5 dB
<b>POWER RATING</b> (input)	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	2.4 mm Female
<b>WEIGHT</b> (ounces)	1.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

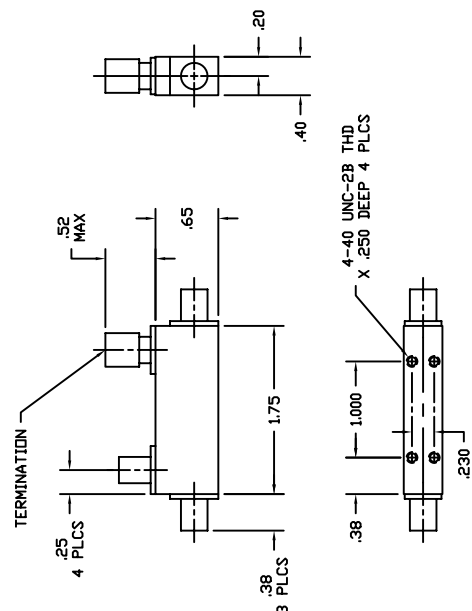
**DIMENSIONS**




**2-50 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

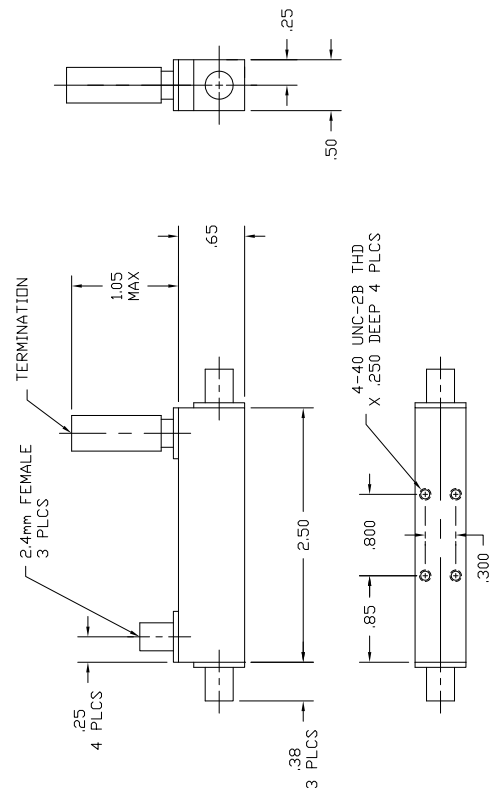
<b>FREQUENCY RANGE</b>		2-50 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	102050010	10 ± 1 dB
	102050013	13 ± 1 dB
	102050016	16 ± 1 dB
Frequency Sensitivity		± 0.6 dB, 2-26.5 GHz ± 0.8 dB, 2-50 GHz
Nominal	102050020	20 ± 1.2 dB
Frequency Sensitivity		± 0.65 dB, 2-26.5 GHz ± 1.25 dB, 2-50 GHz
<b>DIRECTIVITY</b>		> 13 dB, 2-26.5 GHz > 10 dB, 26.5-50 GHz
<b>MAXIMUM VSWR</b> (any port)		1.5, 2-26.5 GHz 1.8, 26.5-50 GHz
<b>INSERTION LOSS</b>	102050010	< 2.0 dB
(includes coupled power)	102050013	< 1.8 dB
	102050016	< 1.7 dB
	102050020	< 1.7 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		2.4 mm Female
<b>WEIGHT</b> (ounces)		1.2
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**1-50 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

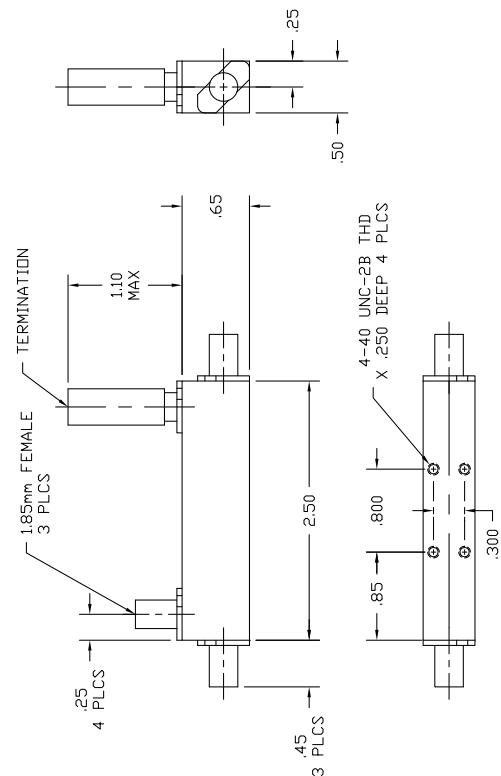
<b>FREQUENCY RANGE</b>	1-50 GHz
<b>COUPLING</b> (with respect to output)	
Nominal	13 ± 1.0 dB
Frequency Sensitivity	± 1.0 dB
<b>DIRECTIVITY</b>	> 10 dB
<b>MAXIMUM VSWR</b> (any port)	1.5, 1-26.5 GHz 1.8, 26.5-50 GHz
<b>INSERTION LOSS</b> (includes coupled power)	< 1.6 dB, 1-26.5 GHz < 2.9 dB, 26.5-50 GHz
<b>POWER RATING</b> (input)	
Average	20W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	2.4 mm Female
<b>WEIGHT</b> (ounces)	2.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**1-65 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

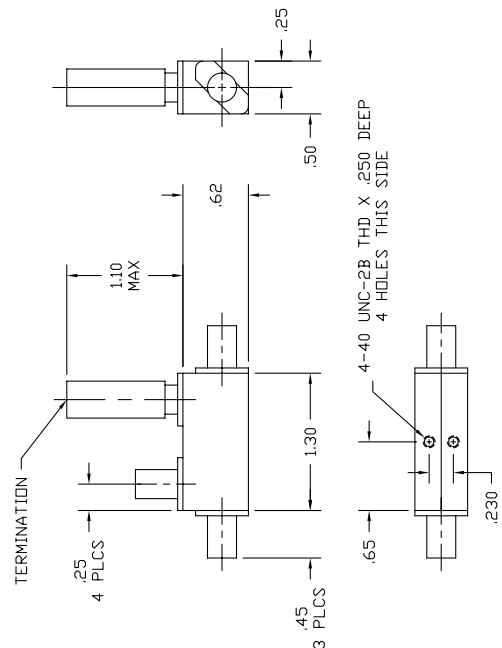
<b>FREQUENCY RANGE</b>	1-65 GHz
<b>COUPLING</b> (with respect to output)	
Nominal	13 ± 1.5 dB
Frequency Sensitivity	± 1.0 dB, 1-30 GHz ± 2.0 dB, 30-65 GHz
<b>DIRECTIVITY</b>	> 15 dB, 1-20 GHz > 10 dB, 20-30 GHz > 7.2 dB, 30-65 GHz
<b>MAXIMUM VSWR</b> (any port)	1.2, 1-30 GHz 1.9, 30-65 GHz
<b>INSERTION LOSS</b> (includes coupled power)	< 3.5 dB
<b>POWER RATING</b> (input)	
Average	20W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	1.85 mm Female
<b>WEIGHT</b> (ounces)	1.9
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**10-67 GHz DIRECTIONAL COUPLERS**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		10-67 GHz
<b>COUPLING</b> (with respect to output)		
Nominal	110067006	06 ± 2.5 dB
Frequency Sensitivity		± 0.75 dB, 10-50 GHz ± 1.50 dB, 10-67 GHz
Nominal	110067016	16 ± 1.1 dB
Frequency Sensitivity		± 2.0 dB
<b>DIRECTIVITY</b>	110067006	> 10 dB
	110067016	> 7.25 dB
<b>MAXIMUM VSWR</b> (any port)		
	110067006	
(Main Line)		1.8, 10-67 GHz
(Secondary Line)		1.8, 10-50 GHz 2.3, 50-67 GHz
	110067016	2.0
<b>INSERTION LOSS</b>	110067006	< 4.40 dB
(includes coupled power)	110067016	< 1.95 dB
<b>POWER RATING</b> (input)		
Average		20W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		1.85 mm Female
<b>WEIGHT</b> (ounces)		1.3
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

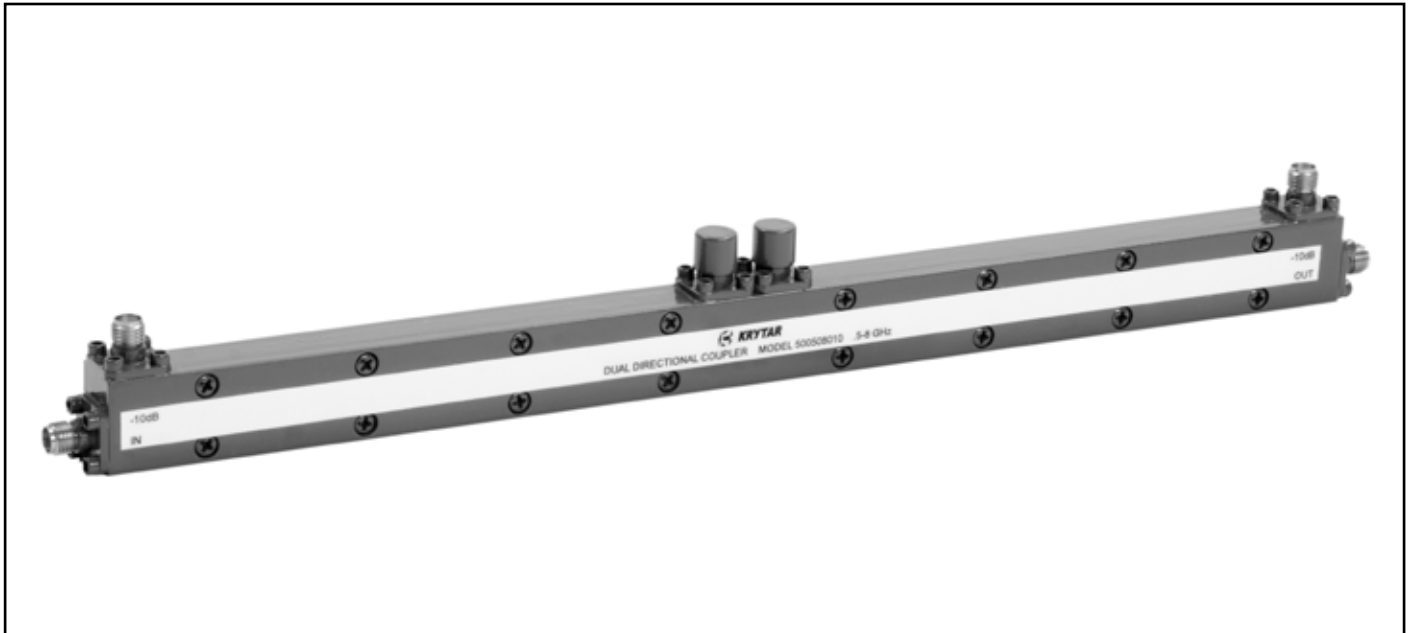
**DIMENSIONS**




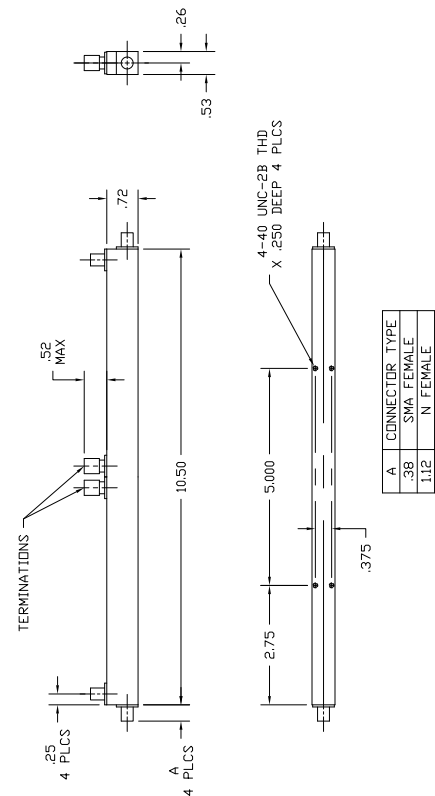
## DUAL-DIRECTIONAL COUPLERS

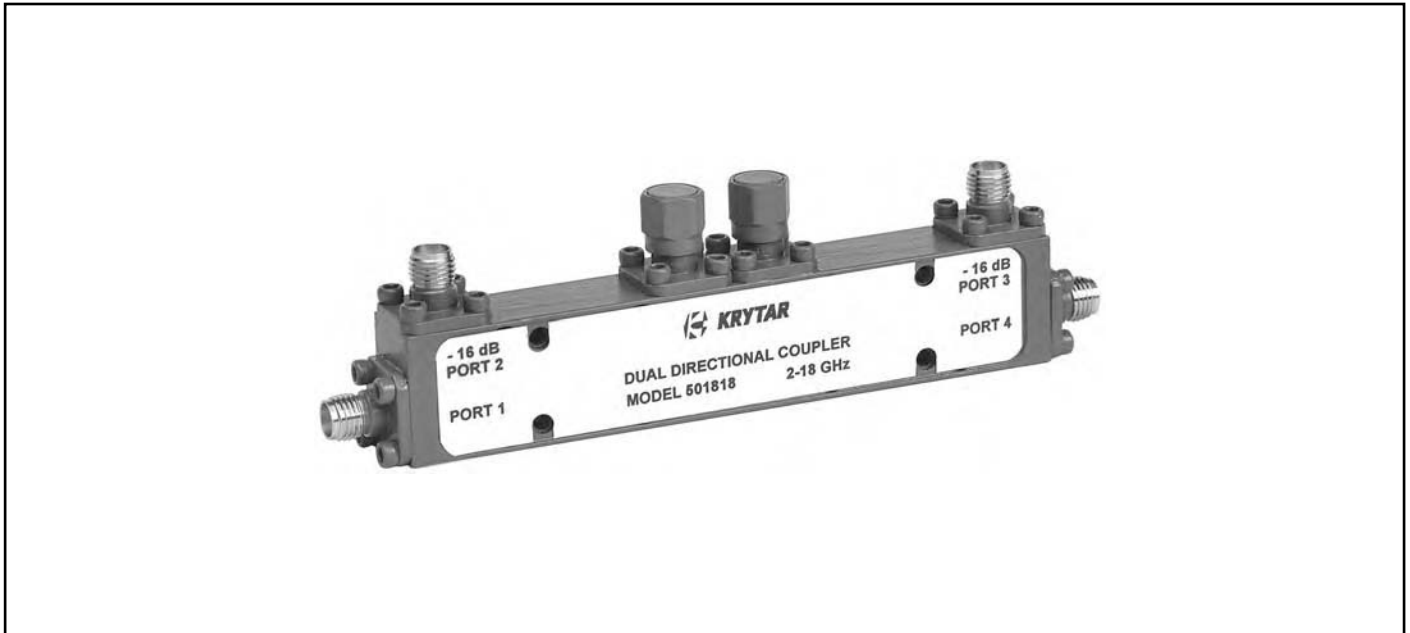


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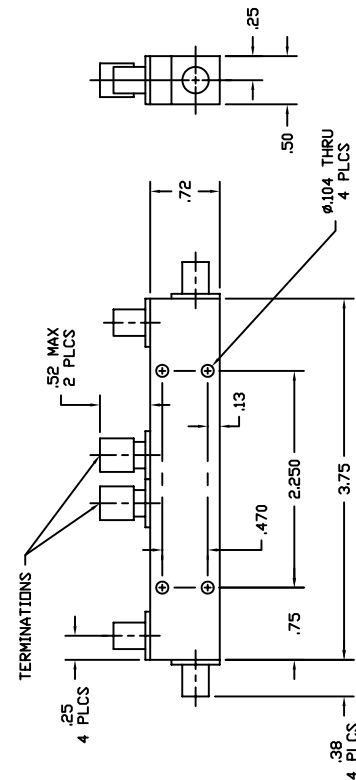
**0.5-8.0 GHz DUAL-DIRECTIONAL COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	0.5-8.0 GHz
<b>COUPLING</b>	
Nominal	10 ±1.0 dB
Frequency Sensitivity	± 0.6 dB
<b>DIRECTIVITY</b>	> 15 dB
<b>MAXIMUM VSWR</b>	1.35
<b>INSERTION LOSS</b>	< 2.3 dB
<b>POWER RATING (input)</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	7.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**2-18 GHz DUAL-DIRECTIONAL COUPLER**

**SPECIFICATIONS**

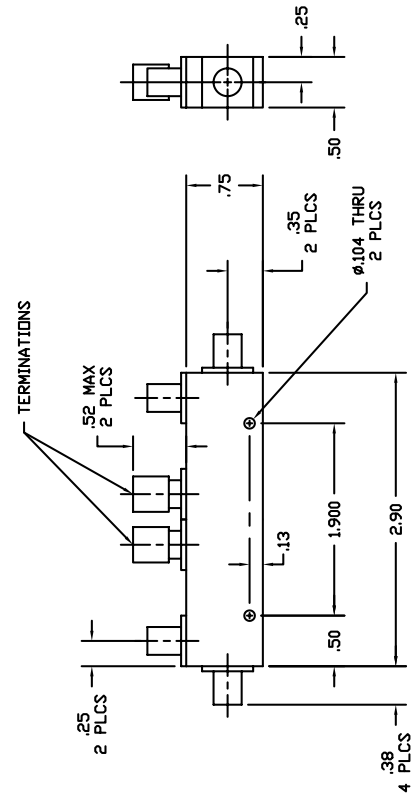
<b>FREQUENCY RANGE</b>		2-18 GHz
<b>COUPLING</b>		
Nominal	501822	10 ± 1.5 dB
Nominal	501818	16 ± 1.0 dB
Frequency Sensitivity		± 0.5 dB
<b>DIRECTIVITY</b>		> 15 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>		
	501822	< 2.0 dB
(includes coupled power)	501818	< 1.4 dB
<b>POWER RATING</b> (input)		
Average		20 W
Peak		3 KW
<b>STANDARD CONNECTORS</b>		SMA Female
<b>WEIGHT</b> (ounces)		3.2
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


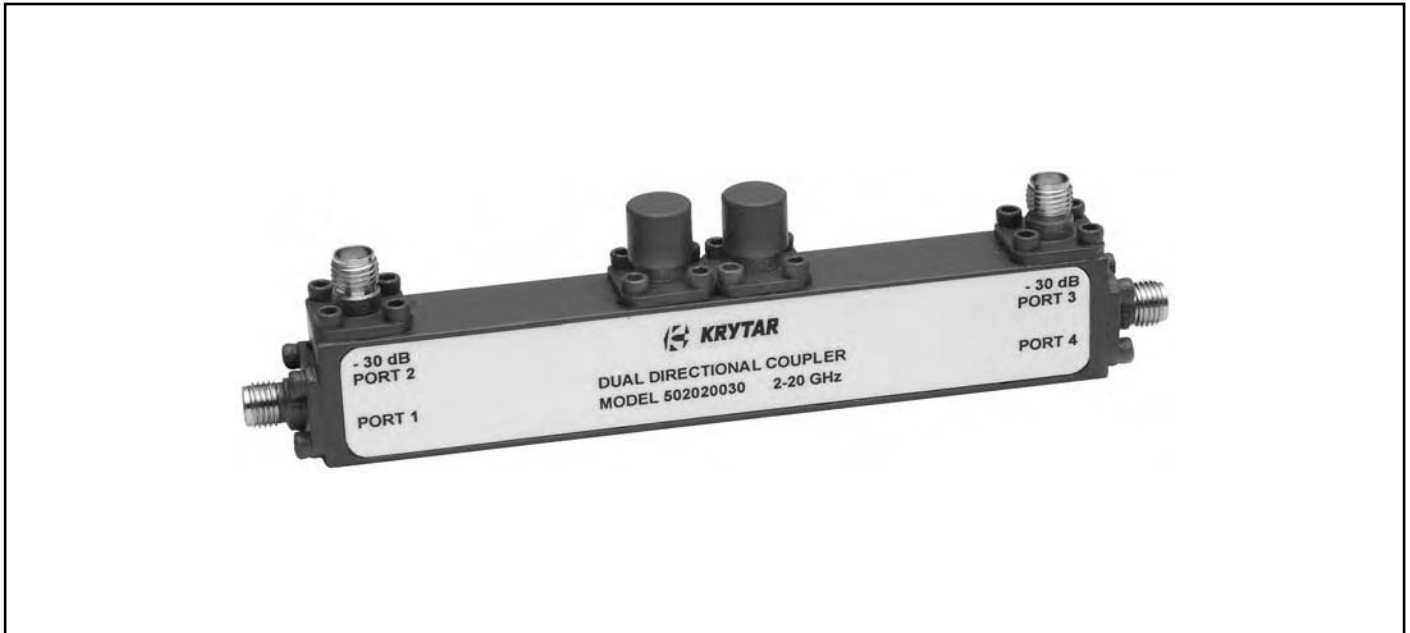
**4-20 GHz DUAL-DIRECTIONAL COUPLER**

**SPECIFICATIONS**

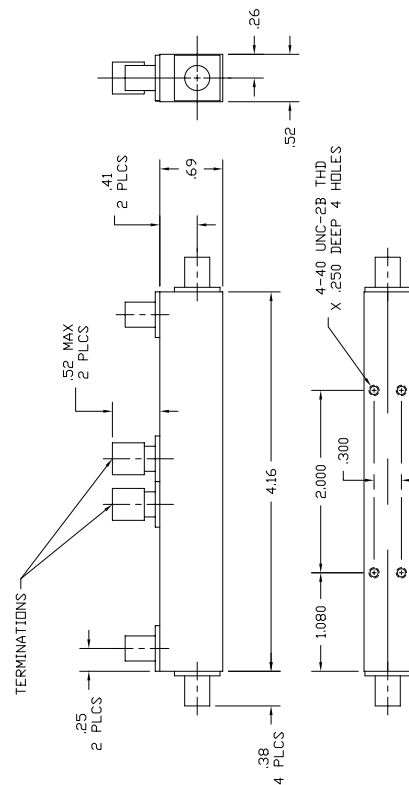
<b>FREQUENCY RANGE</b>	4-20 GHz
<b>COUPLING</b>	
Nominal	10 ± 1.25 dB
Frequency Sensitivity	± 0.8 dB
<b>DIRECTIVITY</b>	> 15 dB, 4-12.4 GHz > 12 dB, 12.4-20 GHz
<b>MAXIMUM VSWR</b> (any port)	1.4
<b>INSERTION LOSS</b> (includes coupled power)	< 2.0 dB
<b>POWER RATING</b> (input)	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT</b> (ounces)	2.5
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

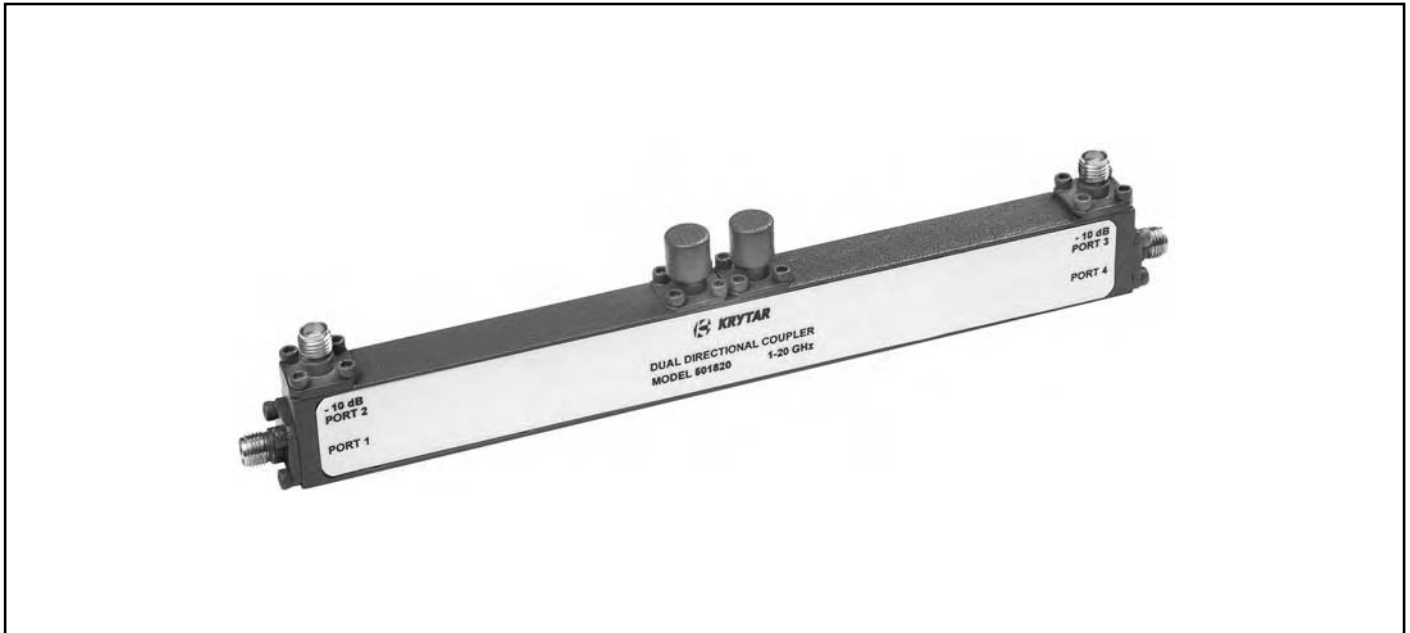
**DIMENSIONS**




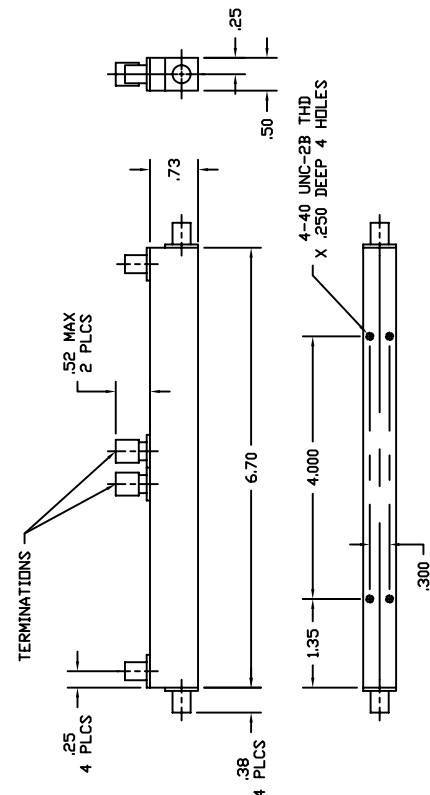
**2-20 GHz DUAL-DIRECTIONAL COUPLER**

**SPECIFICATIONS**

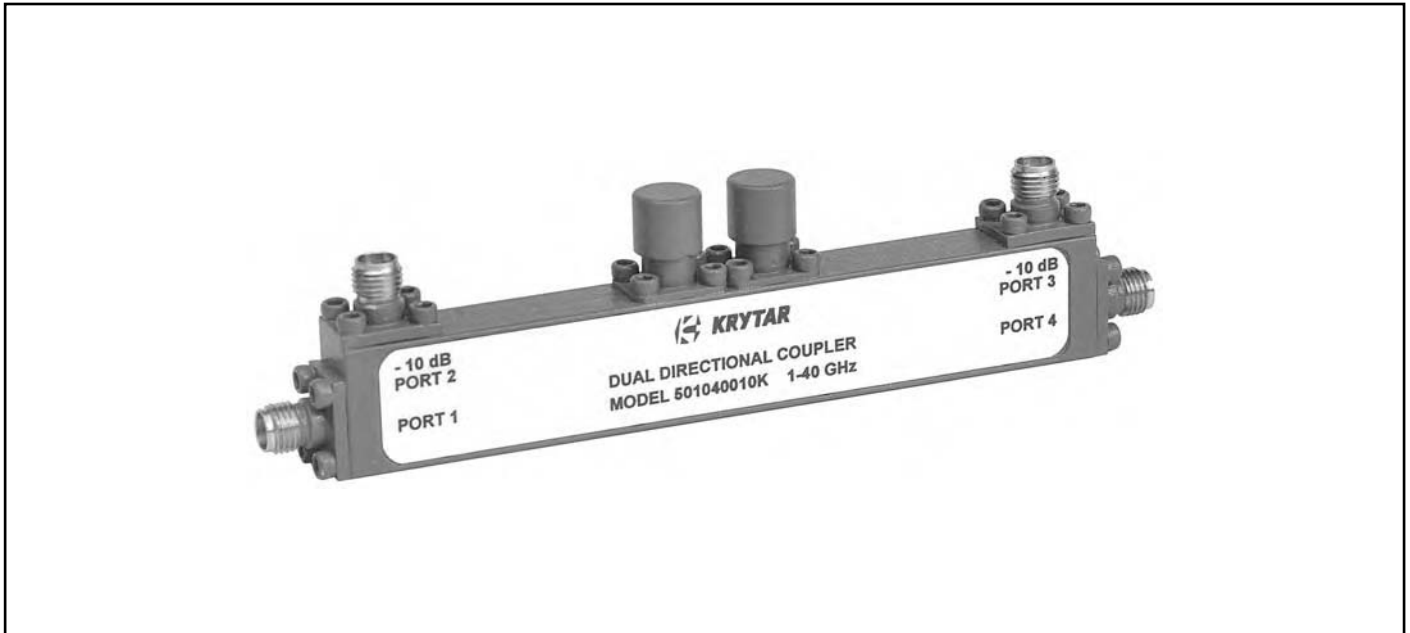
<b>FREQUENCY RANGE</b>	2-20 GHz
<b>COUPLING</b> (with respect to output)	
Nominal	30 ±1.0 dB
Frequency Sensitivity	± 0.8 dB
<b>DIRECTIVITY</b>	> 14 dB, 2-12.4 GHz > 12 dB, 12.4-20 GHz
<b>MAXIMUM VSWR</b> (any port)	1.4
<b>INSERTION LOSS</b> (includes coupled power)	< 1.3 dB
<b>POWER RATING</b> (input)	
Average	20W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT</b> (ounces)	3.2
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


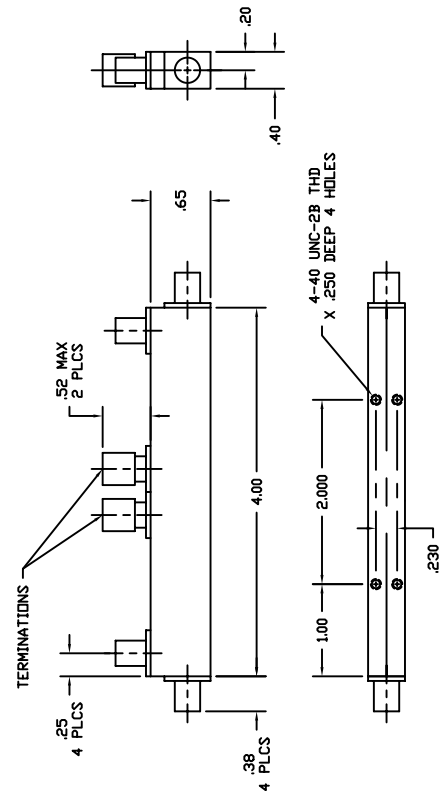
**1-20 GHz DUAL-DIRECTIONAL COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	1-20 GHz
<b>COUPLING</b>	
Nominal	10 ±1.0 dB
Frequency Sensitivity	± 0.5 dB
<b>DIRECTIVITY</b>	> 15 dB
<b>MAXIMUM VSWR (any port)</b>	1.4
<b>INSERTION LOSS</b> (includes coupled power)	< 2.8 dB
<b>POWER RATING (input)</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	4.6
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**1-40 GHz DUAL-DIRECTIONAL COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	1-40 GHz
<b>COUPLING</b>	
Nominal	10 ±1.5 dB
Frequency Sensitivity	± 2.0 dB
<b>DIRECTIVITY</b>	> 15 dB
<b>MAXIMUM VSWR (any port)</b>	1.5, 1-20 GHz 1.8, 20-40 GHz
<b>INSERTION LOSS</b> (includes coupled power)	< 2.2 dB, 1-20 GHz < 2.8 dB, 20-40 GHz
<b>POWER RATING (input)</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	
501040010	2.4 mm Female
501040010K	2.92 mm Female
<b>WEIGHT (ounces)</b>	2.3
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

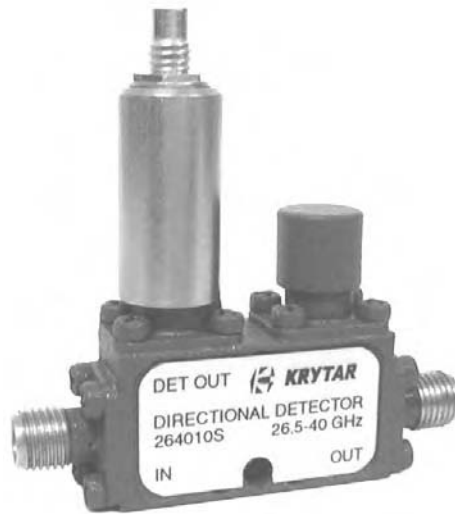
**DIMENSIONS**




## DIRECTIONAL DETECTORS



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### SPECIFICATIONS

MODEL	FREQUENCY RANGE (GHz)	LOW LEVEL SENSITIVITY ( $\mu\text{V}/\mu\text{W}$ ) (Min)	FREQUENCY SENSITIVITY (dB)	DIRECTIVITY (dB Min)	VSWR (Max)	INSERTION LOSS (dB Max)	POWER RATING (Input)	CONNECTOR TYPE (Female)
120410S	4.0-12.4	40	$\pm 0.4$	15	1.35	0.9	1W	SMA
120420S	4.0-12.4	4	$\pm 0.4$	15	1.35	0.5	10W	
120710S	7.0-12.4	40	$\pm 0.4$	15	1.35	0.9	1W	
120720S	7.0-12.4	4	$\pm 0.4$	15	1.35	0.5	10W	
181210S	12.4-18.0	40	$\pm 0.4$	15	1.35	1.0	1W	
181220S	12.4-18.0	4	$\pm 0.4$	15	1.35	0.6	10W	
262210S	18.0-26.5	40	$\pm 0.4$	14	1.40	1.3	1W	3.5 mm
262220S	18.0-26.5	4	$\pm 0.4$	12	1.70	1.7	10W	
184010S	18.0-40.0	40	$\pm 0.5$	12	1.70	1.3	1W	2.4 mm (For 2.92 mm add "K" to end of Model #)
184020S	18.0-40.0	4	$\pm 0.5$	12	1.70	1.3	10W	
264010S	26.5-40.0	40	$\pm 0.5$	12	1.70	1.7	1W	
264020S	26.5-40.0	4	$\pm 0.5$	12	1.70	1.3	10W	

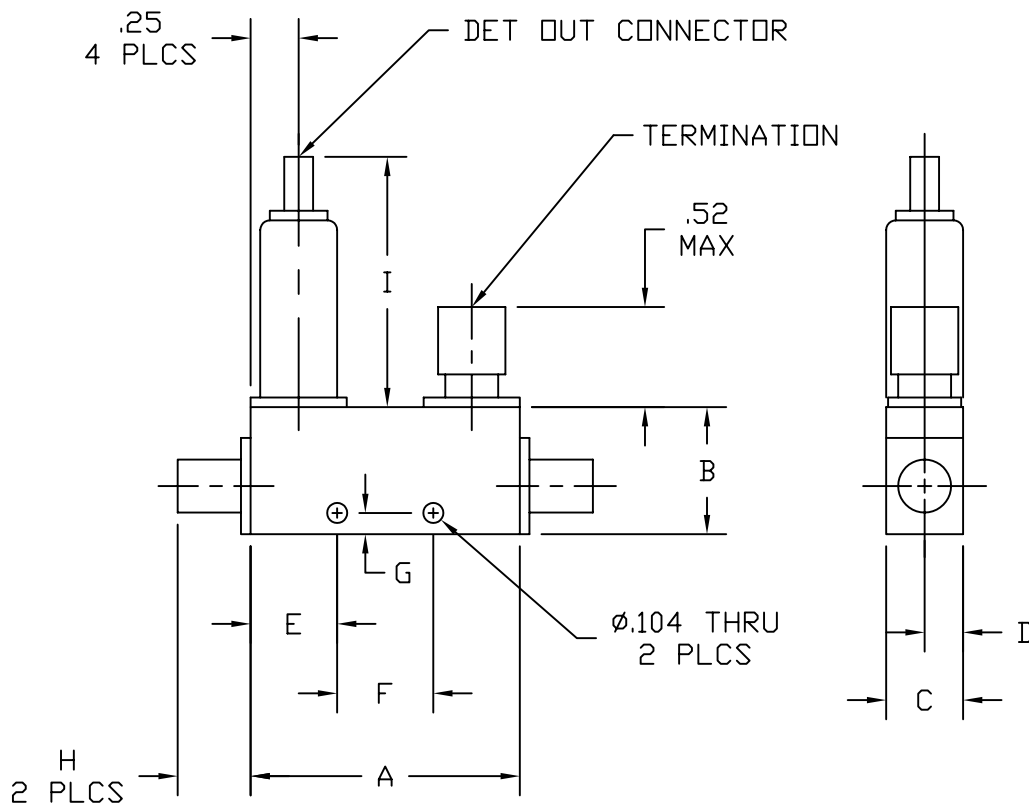
**OPERATING TEMPERATURE**

-54° to +85° C

**WEIGHT**

1.2 (OZ.)

MODEL	A	B	C	D	E	F	G
120410S	1.40	.66	.40	.20	.45	.500	.11
120420S	1.40	.66	.40	.20	.45	.500	.11
120710S	1.40	.66	.40	.20	.45	.500	.11
120720S	1.40	.66	.40	.20	.45	.500	.11
181210S	1.40	.66	.40	.20	.45	.500	.11
181220S	1.40	.66	.40	.20	.45	.500	.11
262210S	1.12	.64	.53	.26	.56	0	.09
262220S	1.12	.64	.53	.26	.56	0	.09
184010S	1.12	.62	.40	.20	.56	0	.09
184020S	1.12	.62	.40	.20	.56	0	.09
264010S	1.12	.62	.40	.20	.56	0	.09
264020S	1.12	.62	.40	.20	.56	0	.09



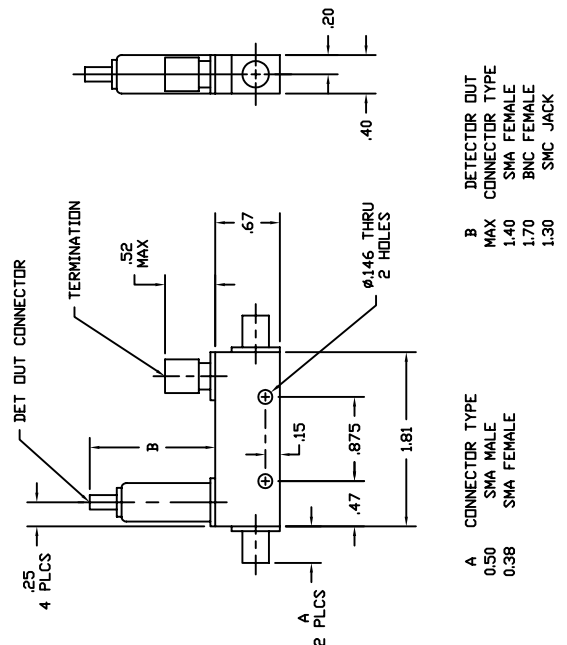
CONNECTOR TYPE	H
SMA MALE	0.50
SMA FEMALE	0.38
3.5 mm MALE	0.46
3.5 mm FEMALE	0.48
2.92 mm MALE	0.50
2.92 mm FEMALE	0.38
2.4 mm MALE	0.50
2.4 mm FEMALE	0.38

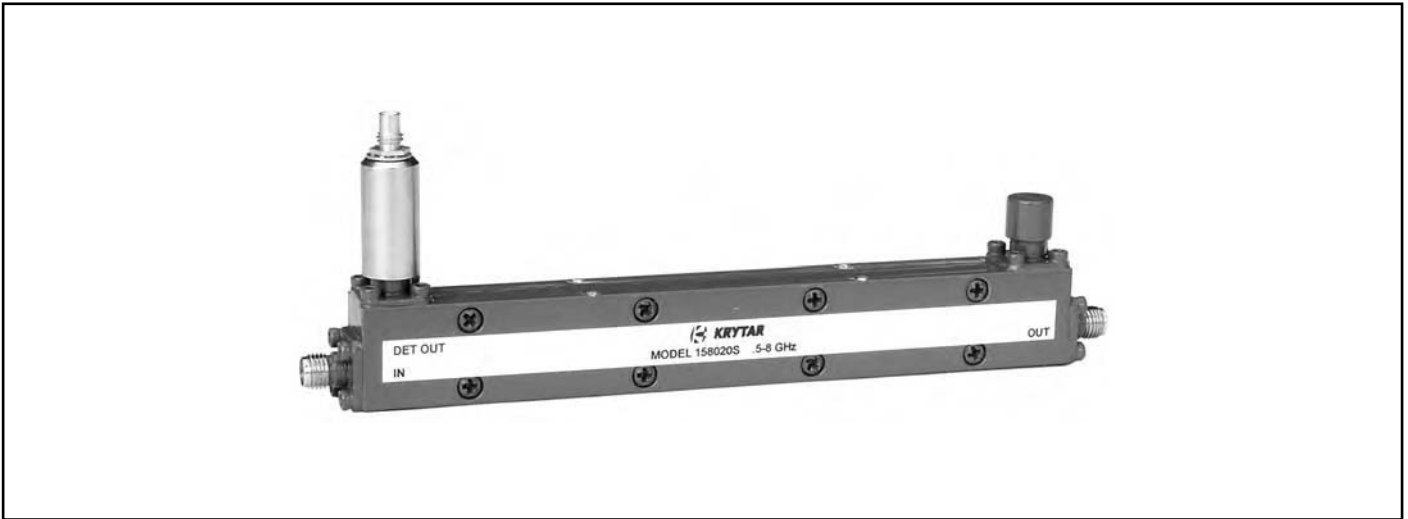
DETECTOR OUT CONNECTOR TYPE	I (MAX)
SMA FEMALE	1.40
BNC FEMALE	1.70
SMC JACK	1.30

**2-8 GHz DIRECTIONAL DETECTORS**

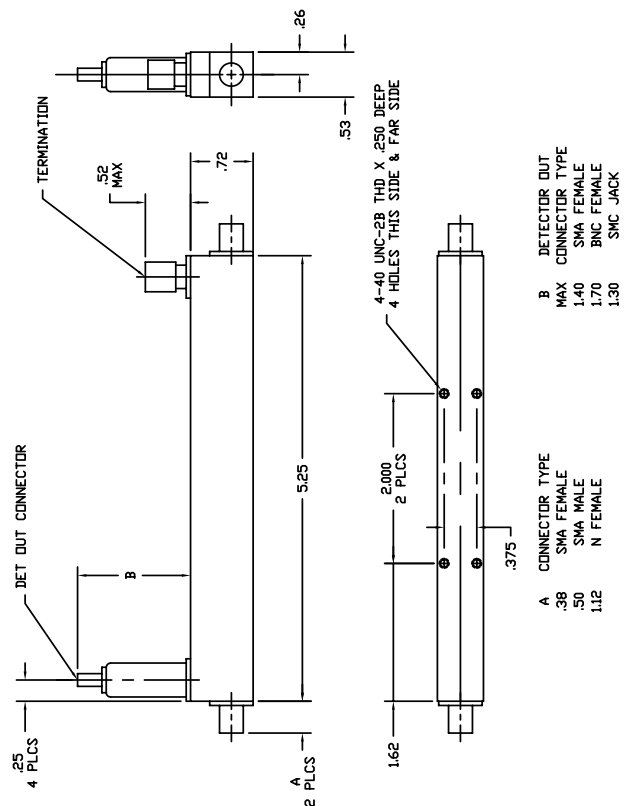
**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		2-8 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 0.3 dB
<b>DIRECTIVITY</b>		> 20 dB
<b>MAXIMUM VSWR</b> (any port)		1.20
<b>INSERTION LOSS</b>	202008006	< 1.60 dB
	202008010	< 0.75 dB
	202008020	< 0.35 dB
<b>LOW LEVEL SENSITIVITY</b>	202008006	> 100 $\mu\text{V}/\mu\text{W}$
	202008010	> 40 $\mu\text{V}/\mu\text{W}$
	202008020	> 4 $\mu\text{V}/\mu\text{W}$
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	202008006	0.4 W
	202008010	1.0 W
	202008020	10.0 W
<b>STANDARD CONNECTORS</b>		
RF		SMA Female
Optional:		SMA Male
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		1.9
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

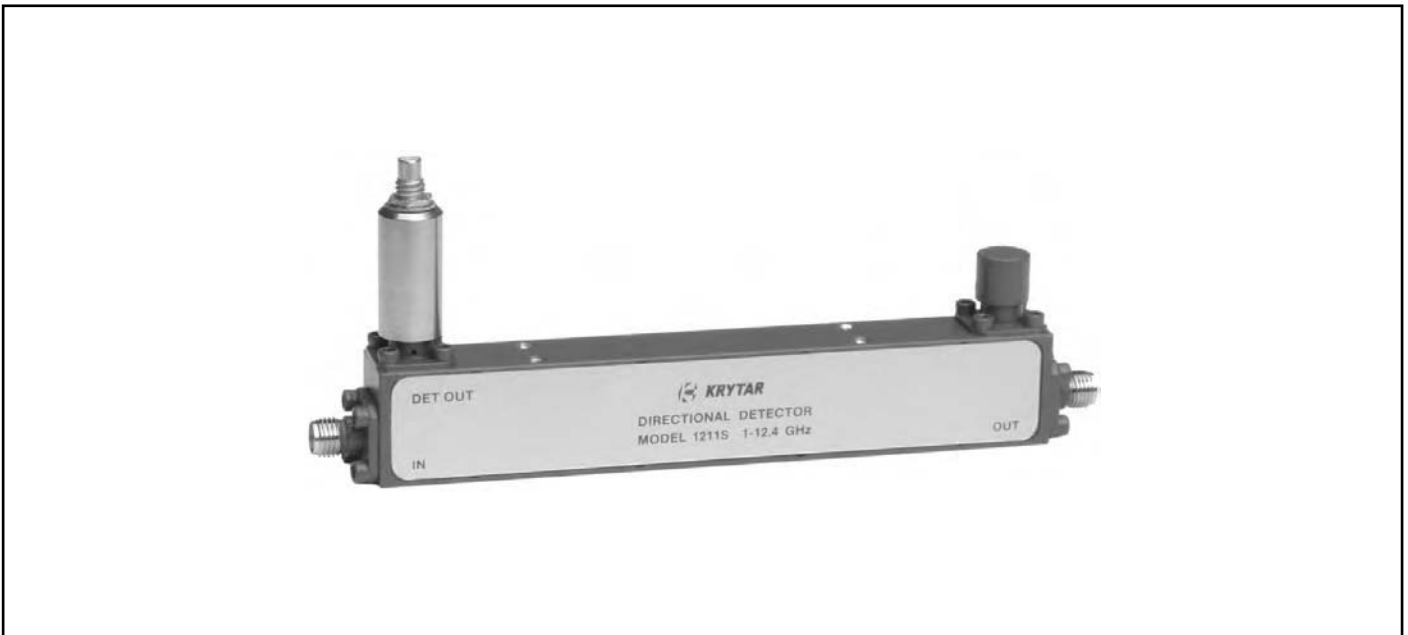
**DIMENSIONS**


**0.5-8.0 GHz DIRECTIONAL DETECTOR**

**SPECIFICATIONS**

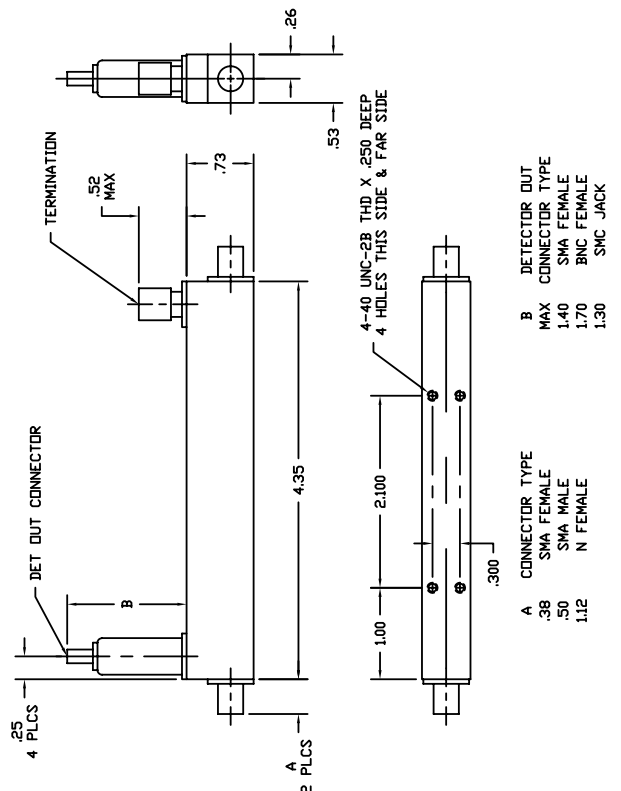
<b>FREQUENCY RANGE</b>		0.5-8.0 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)	158006S	± 0.8 dB
	158010S	± 0.8 dB
	158016S	± 0.6 dB
	158020S	± 0.6 dB
<b>DIRECTIVITY</b>		> 15 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	158006S	< 1.70 dB
	158010S	< 1.30 dB
	158016S	< 0.85 dB
	158020S	< 0.80 dB
<b>LOW LEVEL SENSITIVITY</b>	158006S	> 100 μV/μW
	158010S	> 40 μV/μW
	158016S	> 10 μV/μW
	158020S	> 4 μV/μW
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	158006S	.4 W
	158010S	1 W
	158016S	4 W
	158020S	10 W
<b>STANDARD CONNECTORS</b>		
RF		SMA Female
Optional:		SMA Male or N Female
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		4.1
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**




**1.0-12.4 GHz DIRECTIONAL DETECTOR**

**SPECIFICATIONS**

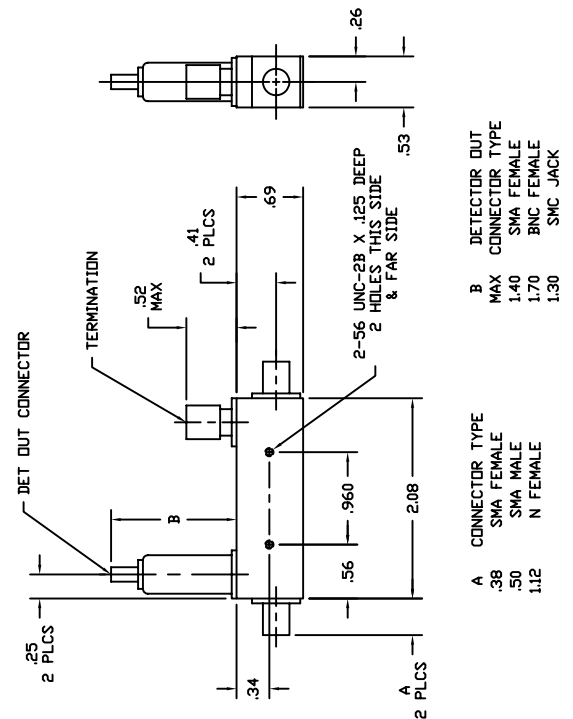
<b>FREQUENCY RANGE</b>	1.0-12.4 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)	± 0.4 dB
<b>DIRECTIVITY</b>	> 18 dB, 1-8 GHz > 15 dB, 8-12.4 GHz
<b>MAXIMUM VSWR</b> (any port)	1.20, 1-8 GHz 1.35, 8-12.4 GHz
<b>INSERTION LOSS</b>	< 1.1 dB
<b>LOW LEVEL SENSITIVITY</b>	> 40 µVµW
<b>DETECTOR OUTPUT POLARITY</b>	Negative
<b>POWER RATING</b> (input)	1 W
<b>STANDARD CONNECTORS</b>	
RF	SMA Female
Optional:	SMA Male or N Female
DET OUT	SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)	
N Female RF Connectors	5.6
SMA Female RF Connectors	3.7
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

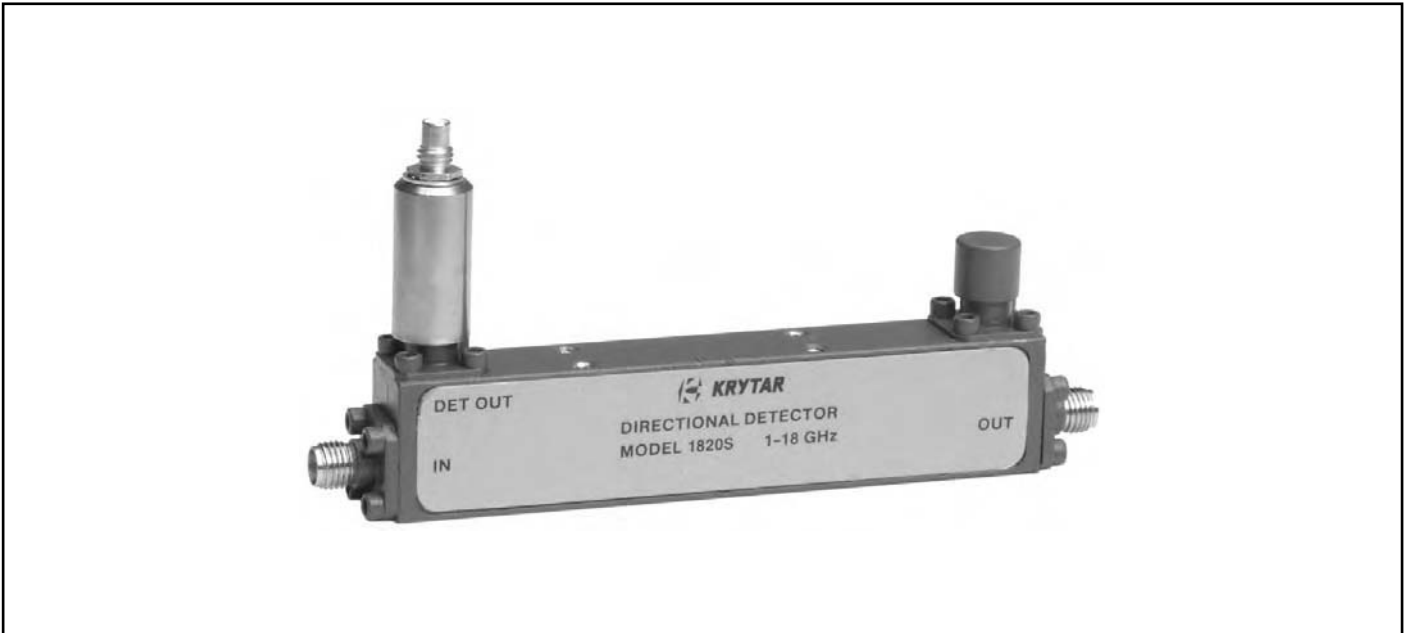
**DIMENSIONS**


**2-18 GHz DIRECTIONAL DETECTORS**

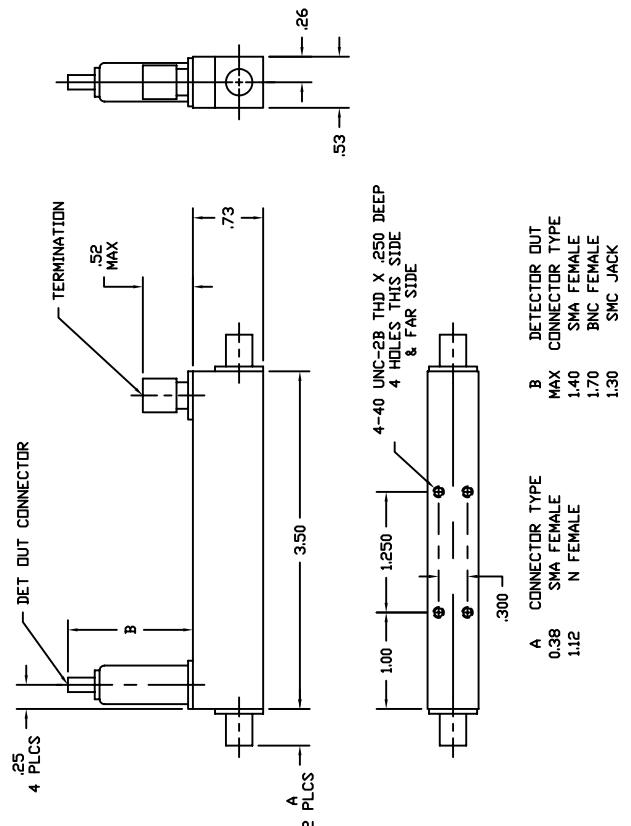
**SPECIFICATIONS**

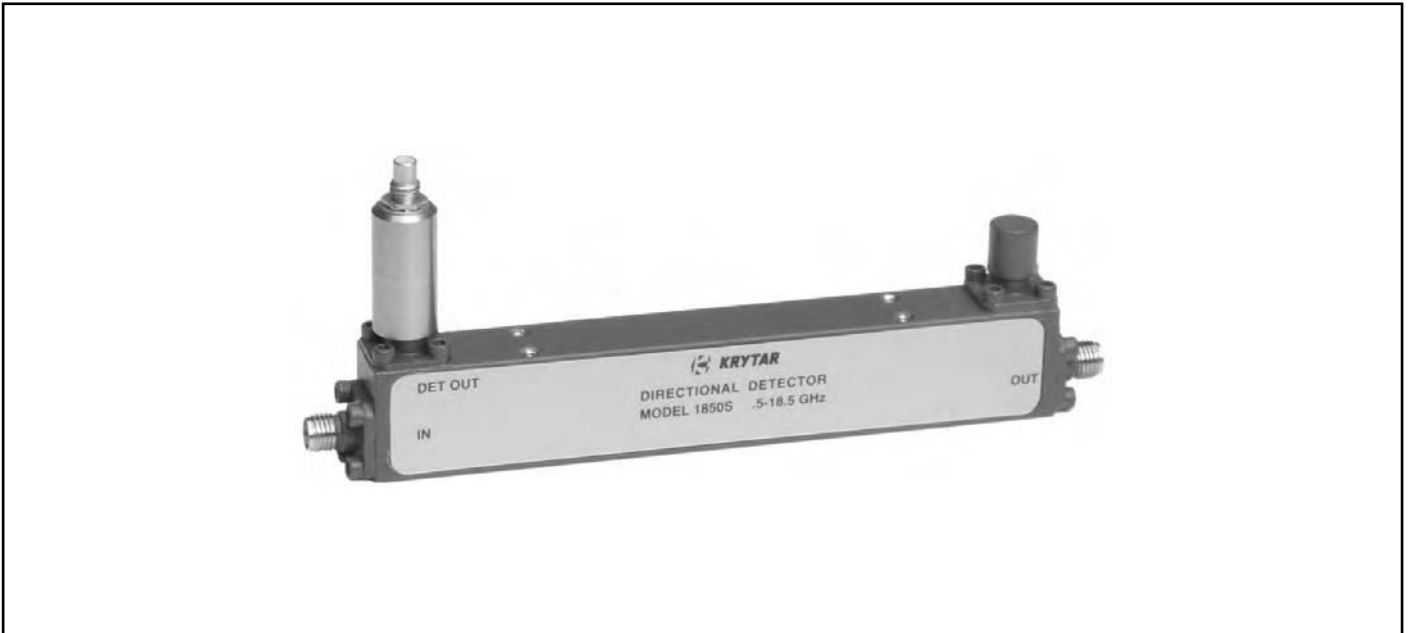
<b>FREQUENCY RANGE</b>		2-18 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 0.7 dB
<b>DIRECTIVITY</b>		> 16 dB
<b>MAXIMUM VSWR</b> (any port)		1.30
<b>INSERTION LOSS</b>	1815S	< 1.90 dB
	1822S	< 1.10 dB
	1818S	< 0.75 dB
	1824S	< 0.70 dB
<b>LOW LEVEL SENSITIVITY</b>	1815S	> 100 $\mu\text{V}/\mu\text{W}$
	1822S	> 40 $\mu\text{V}/\mu\text{W}$
	1818S	> 10 $\mu\text{V}/\mu\text{W}$
	1824S	> 4 $\mu\text{V}/\mu\text{W}$
<b>DETECTOR POLARITY</b>		Negative
<b>POWER RATING</b>	1815S	0.8 W
	1822S	1 W
	1818S	4 W
	1824S	10 W
<b>STANDARD CONNECTORS</b>		
RF		SMA Female
Optional:		SMA Male or N Female
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		
N Female RF Connectors		4.3
SMA Female RF Connectors		2.4
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


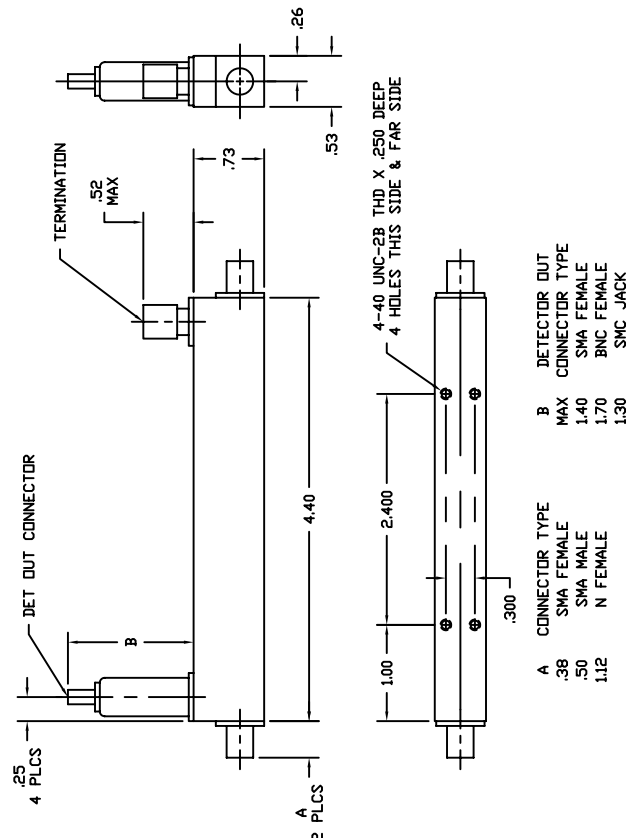
**1-18 GHz DIRECTIONAL DETECTORS**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		1-18 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 0.5 dB, 1-12.4 GHz ± 0.7 dB, 1-18 GHz
<b>DIRECTIVITY</b>		> 16 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	1821S 1820S	< 1.3 dB < 0.9 dB
<b>LOW LEVEL SENSITIVITY</b>	1821S 1820S	> 40 $\mu\text{V}/\mu\text{W}$ > 10 $\mu\text{V}/\mu\text{W}$
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	1821S 1820S	1 W 4 W
<b>STANDARD CONNECTORS</b>		
RF		SMA Female
Optional:		N Female
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		
N Female RF Connectors		4.6
SMA Female RF Connectors		3.2
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**0.5-18.5 GHz DIRECTIONAL DETECTORS**

**SPECIFICATIONS**

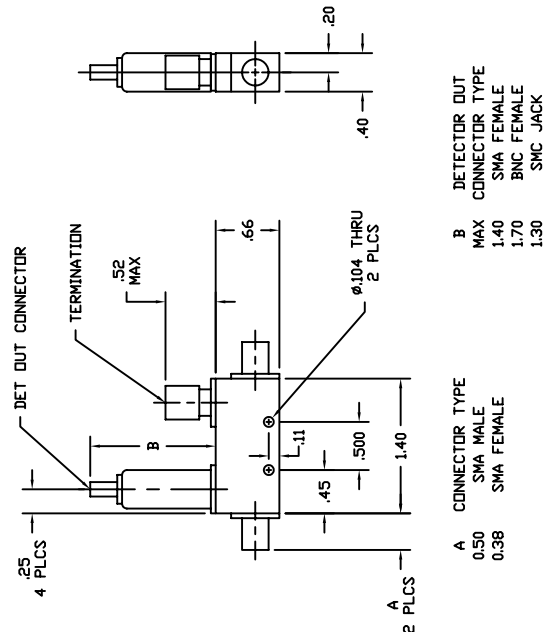
<b>FREQUENCY RANGE</b>		0.5-18.5 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 1.0 dB
<b>DIRECTIVITY</b>		> 15 dB, 0.5-12.4 GHz > 12 dB, 12.4-18.5 GHz
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	1851S 1850S	< 1.5 dB < 1.1 dB
<b>LOW LEVEL SENSITIVITY</b>	1851S 1850S	> 40 µV/µW > 10 µV/µW
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	1851S 1850S	1 W 4 W
<b>STANDARD CONNECTORS</b>		
RF		SMA Female
Optional:		SMA Male or N Female
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		
N Female RF Connectors		5.2
SMA Female RF Connectors		3.8
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**4-20 GHz DIRECTIONAL DETECTORS**

**SPECIFICATIONS**

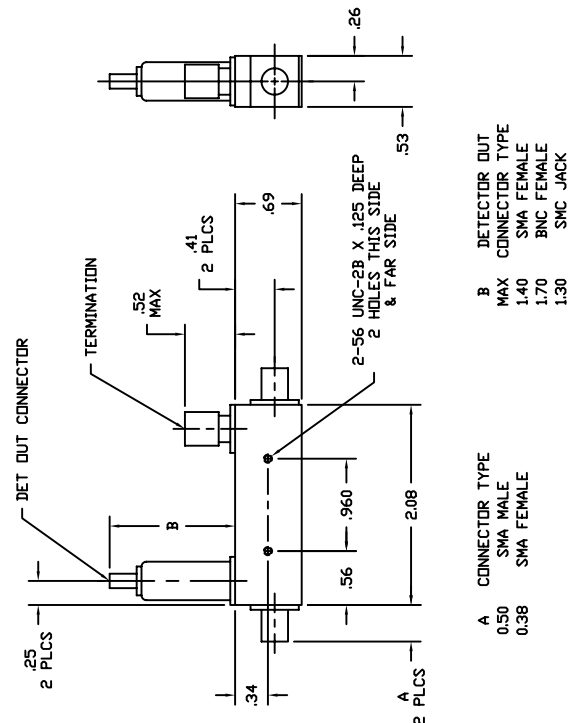
<b>FREQUENCY RANGE</b>		4-20 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 0.6 dB
<b>DIRECTIVITY</b>		> 15 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	204020006	< 1.9 dB
	204020010	< 1.0 dB
	204020020	< 0.6 dB
<b>LOW LEVEL SENSITIVITY</b>		
	204020006	> 100 $\mu\text{V}/\mu\text{W}$
	204020010	> 40 $\mu\text{V}/\mu\text{W}$
	204020020	> 4 $\mu\text{V}/\mu\text{W}$
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	204020006	0.4 W
	204020010	1 W
	204020020	10 W
<b>STANDARD CONNECTORS</b>		
RF		SMA Female
Optional:		SMA Male
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		1.5
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**2-20 GHz DIRECTIONAL DETECTORS**

**SPECIFICATIONS**

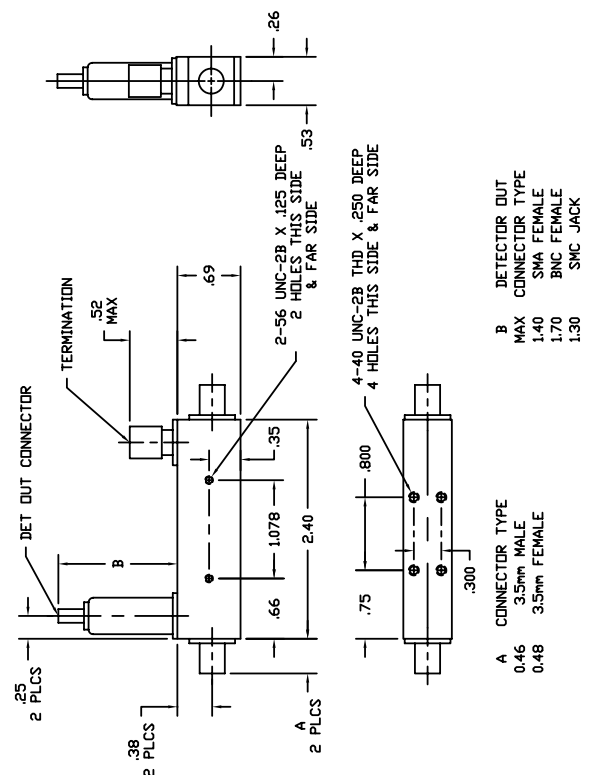
<b>FREQUENCY RANGE</b>		2-20 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 0.6 dB
<b>DIRECTIVITY</b>		> 16 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	202020010	< 1.3 dB
	202020016	< 1.0 dB
	202020020	< 0.9 dB
<b>LOW LEVEL SENSITIVITY</b>		
	202020010	> 40 µV/µW
	202020016	> 10 µV/µW
	202020020	> 4 µV/µW
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	202020010	1 W
	202020016	4 W
	202020020	10 W
<b>STANDARD CONNECTORS</b>		
RF		SMA Female
Optional:		SMA Male
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		2.4
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**1.7-20.0 GHz DIRECTIONAL DETECTOR**

**SPECIFICATIONS**

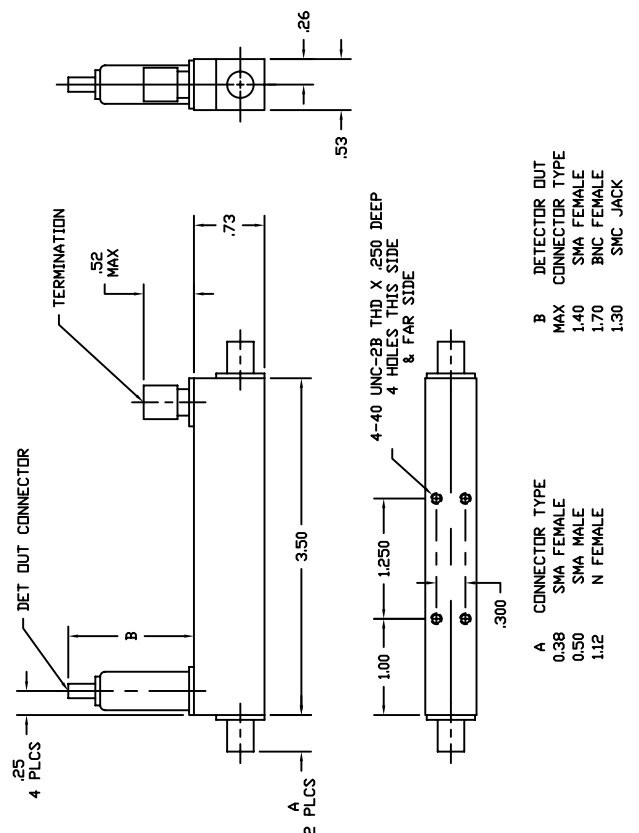
<b>FREQUENCY RANGE</b>	1.7-20.0 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)	± 0.7 dB, 1.7-18.0 GHz ± 0.9 dB, 18-20 GHz
<b>DIRECTIVITY</b>	> 15 dB, 1.7-18 GHz > 13 dB, 18-20 GHz
<b>MAXIMUM VSWR</b> (any port)	1.35, 1.7-18.0 GHz 1.45, 18-20 GHz
<b>INSERTION LOSS</b>	< 0.8 dB < 1.0 dB
<b>LOW LEVEL SENSITIVITY</b>	> 10 μV/μW
<b>DETECTOR OUTPUT POLARITY</b>	Negative
<b>POWER RATING</b> (input)	4 W
<b>STANDARD CONNECTORS</b>	
RF	3.5 Female
Optional:	3.5 Male
DET OUT	SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)	2.2
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


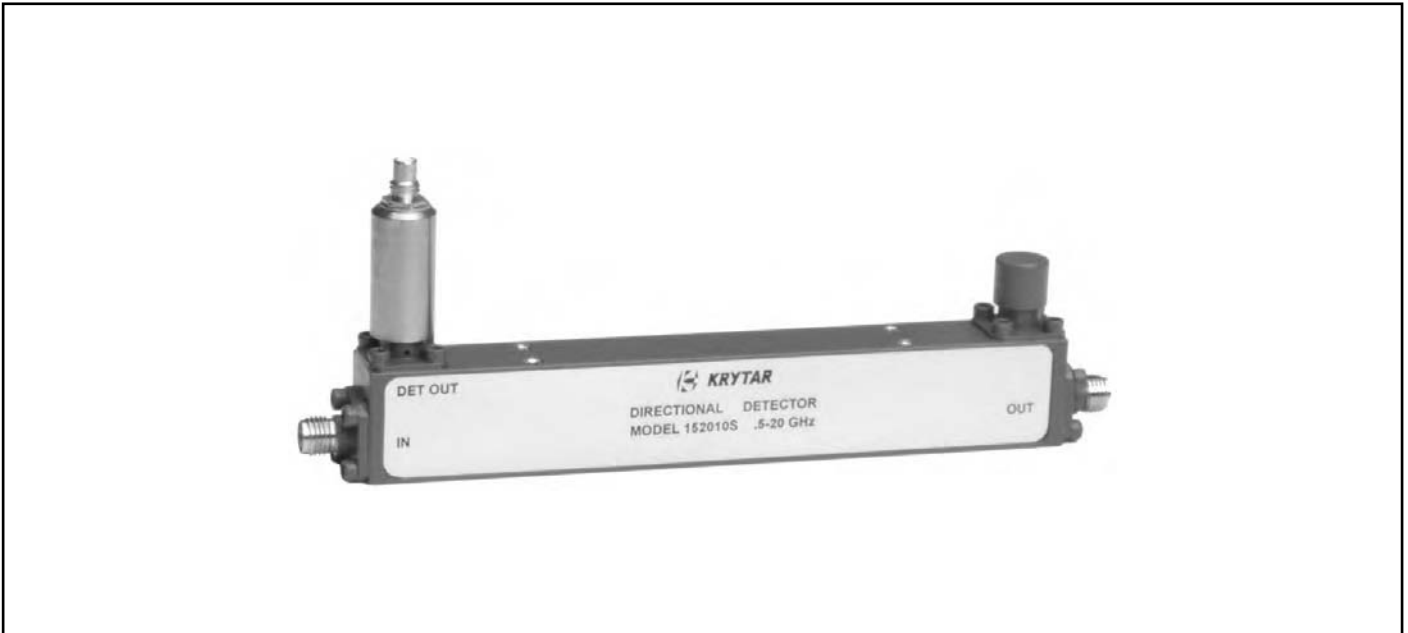
**1-20 GHz DIRECTIONAL DETECTORS**

**SPECIFICATIONS**

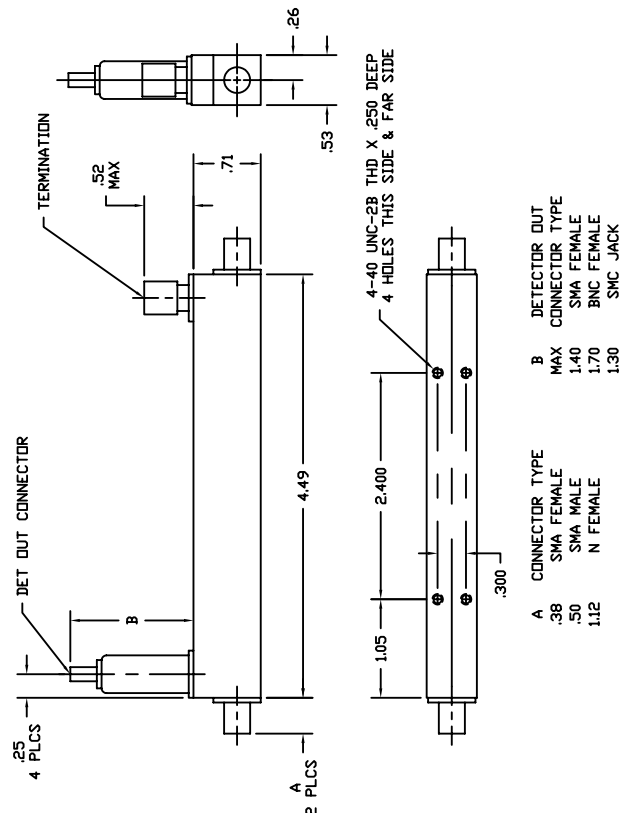
<b>FREQUENCY RANGE</b>		1-20 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 0.7 dB
<b>DIRECTIVITY</b>		> 16 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	201020010	< 1.4 dB
	201020016	< 1.1 dB
	201020020	< 1.0 dB
<b>LOW LEVEL SENSITIVITY</b>	201020010	> 40 µV/µW
	201020016	> 10 µV/µW
	201020020	> 4 µV/µW
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	201020010	1 W
	201020016	4 W
	201020020	10 W
<b>STANDARD CONNECTORS</b>		
RF		SMA Female
Optional:		SMA Male or N Female
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		3.0
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**




**0.5-20.0 GHz DIRECTIONAL DETECTORS**

**SPECIFICATIONS**

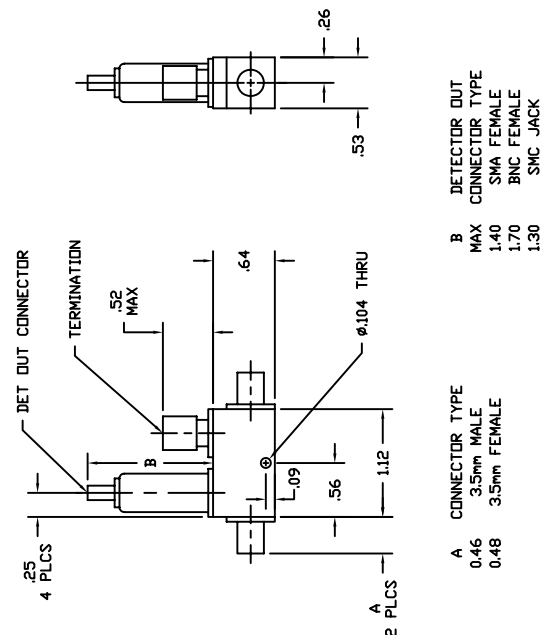
<b>FREQUENCY RANGE</b>		0.5-20.0 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 0.8 dB
<b>DIRECTIVITY</b>		> 15 dB
<b>MAXIMUM VSWR</b> (any port)		1.35
<b>INSERTION LOSS</b>	152010S	< 1.65 dB
	152013S	< 1.40 dB
<b>LOW LEVEL SENSITIVITY</b>	152010S	> 40 μV/μW
	152013S	> 20 μV/μW
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	152010S	1 W
	152013S	2 W
<b>STANDARD CONNECTORS</b>		
RF		SMA Female
Optional:		SMA Male or N Female
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		
SMA Female Connectors		3.8
N Female Connectors		5.7
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**6.0-26.5 GHz DIRECTIONAL DETECTORS**

**SPECIFICATIONS**

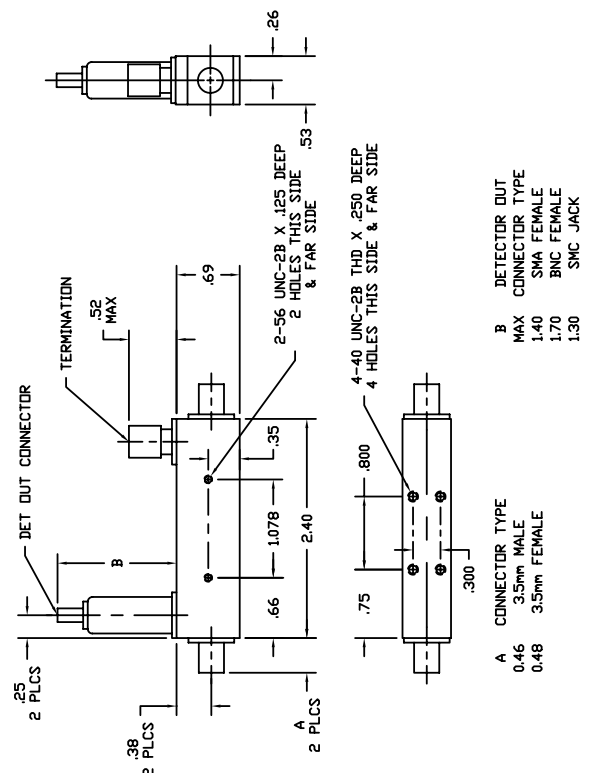
<b>FREQUENCY RANGE</b>		6.0-26.5 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)	206026510/20 206026530	± 0.8 dB ± 1.0 dB
<b>DIRECTIVITY</b>	206026510 206026520/30	> 13 dB > 14 dB
<b>MAXIMUM VSWR</b> (any port)	206026510/20 206026530	1.40 1.45
<b>INSERTION LOSS</b>	206026510 206026520 206026530	< 1.3 dB < 0.8 dB < 0.7 dB
<b>LOW LEVEL SENSITIVITY</b>	206026510 206026520 206026530	> 40 $\mu\text{V}/\mu\text{W}$ > 4 $\mu\text{V}/\mu\text{W}$ > 0.4 $\mu\text{V}/\mu\text{W}$
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	206026510 206026520 206026530	1 W 10 W 50 W
<b>STANDARD CONNECTORS</b>		
RF		3.5mm Female
Optional:		3.5mm Male
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		1.6
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**1.7-26.5 GHz DIRECTIONAL DETECTORS**

**SPECIFICATIONS**

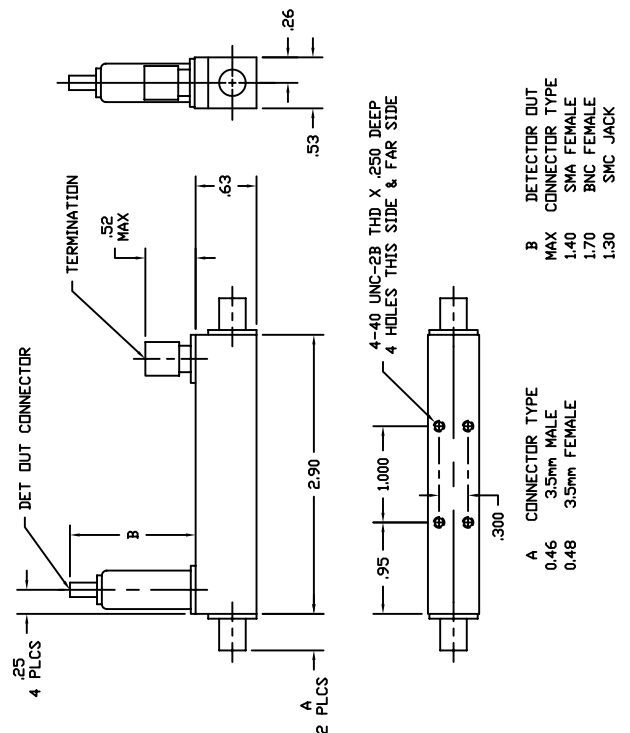
<b>FREQUENCY RANGE</b>		1.7-26.5 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 0.7 dB, 1.7-18 GHz ± 1.2 dB, 1.7-26.5 GHz
<b>DIRECTIVITY</b>		> 16 dB, 1.7-18 GHz > 14 dB, 18-26.5 GHz
<b>MAXIMUM VSWR</b> (any port)		1.35, 1.7-18 GHz 1.45, 18-26.5 GHz
<b>INSERTION LOSS</b>	2611S 2616S	< 1.5 dB < 1.2 dB
<b>LOW LEVEL SENSITIVITY</b>	2611S 2616S	> 40 µV/µW > 10 µV/µW
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	2611S 2616S	1 W 4 W
<b>STANDARD CONNECTORS</b>		RF 3.5mm Female Optional: 3.5mm Male DET OUT SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		2.6
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

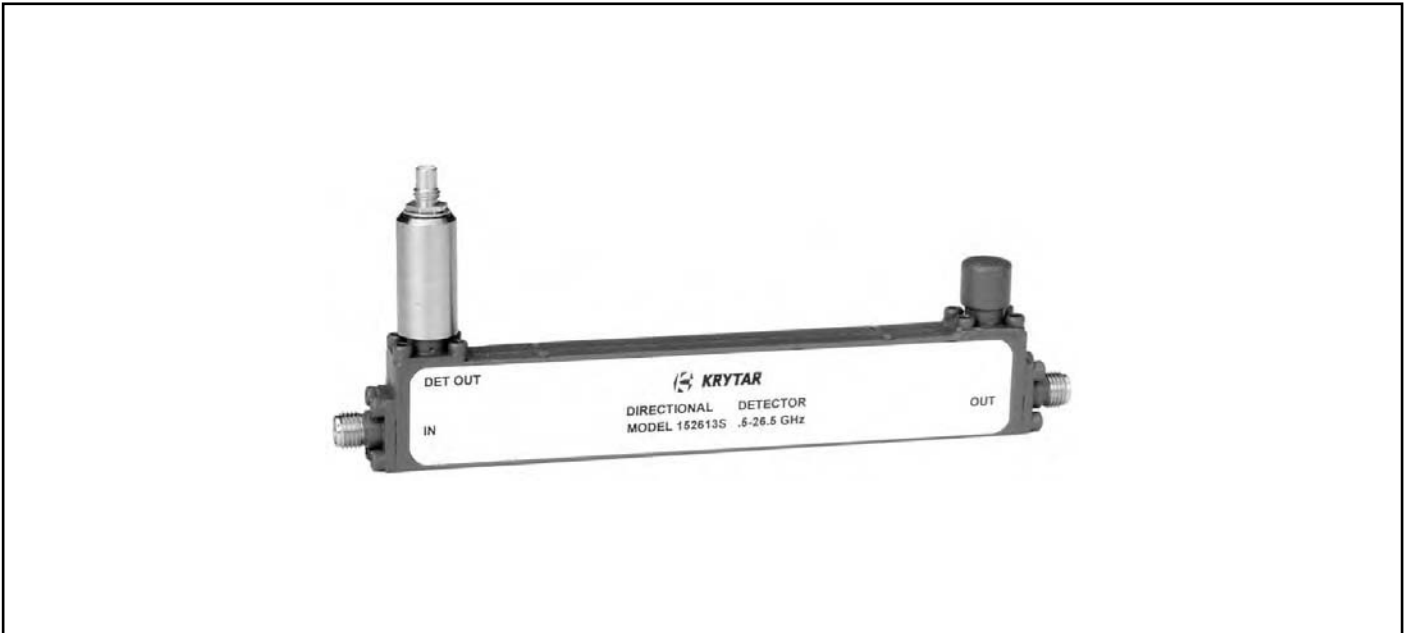
**DIMENSIONS**


**1.0-26.5 GHz DIRECTIONAL DETECTORS**

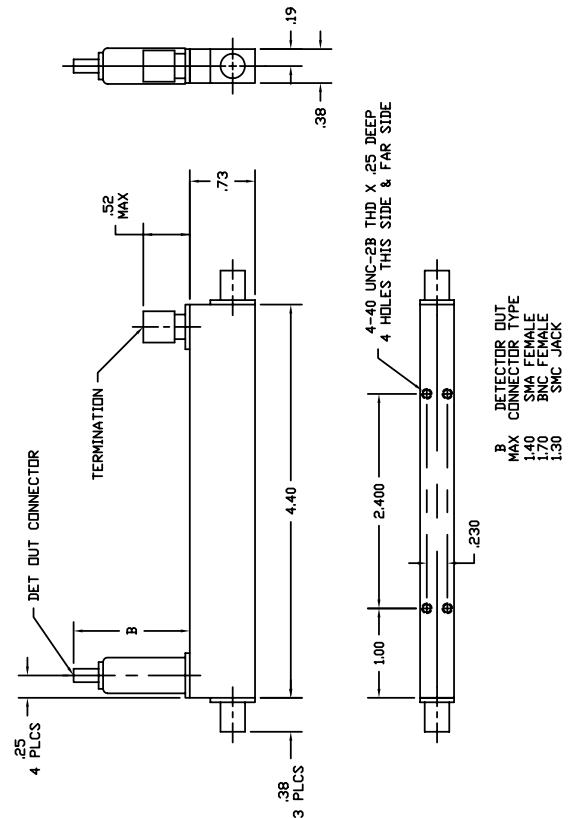
**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		1.0-26.5 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 1.0 dB
<b>DIRECTIVITY</b>		> 14 dB
<b>MAXIMUM VSWR</b> (any port)		1.40
<b>INSERTION LOSS</b>	2610S 2620S	< 1.6 dB < 1.2 dB
<b>LOW LEVEL SENSITIVITY</b>	2610S 2620S	> 40 µV/µW > 4 µV/µW
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	2610S 2620S	1 W 10 W
<b>STANDARD CONNECTORS</b>		
RF		3.5mm Female
Optional:		3.5mm Male
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		2.8
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

**DIMENSIONS**


**0.5-26.5 GHz DIRECTIONAL DETECTOR**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	0.5-26.5 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)	± 1.3 dB
<b>DIRECTIVITY</b>	> 13 dB
<b>MAXIMUM VSWR</b> (any port)	1.45
<b>INSERTION LOSS</b>	< 1.5 dB
<b>LOW LEVEL SENSITIVITY</b>	> 20 μV/μW
<b>DETECTOR OUTPUT POLARITY</b>	Negative
<b>POWER RATING</b> (input)	2 W
<b>STANDARD CONNECTORS</b>	
RF	SMA Female
DET OUT	SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)	2.6
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**




# MODELS 210040010, 210040010K 210040020 & 210040020K

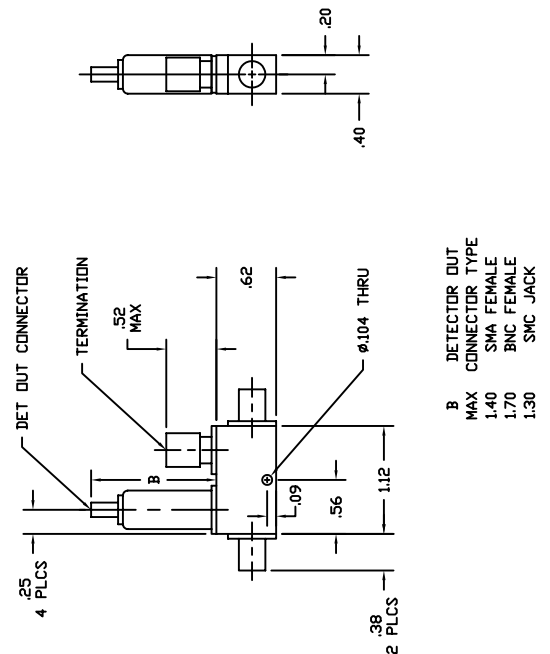
## 10-40 GHz DIRECTIONAL DETECTORS



### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	10-40 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)	± 0.9
<b>DIRECTIVITY</b>	> 10 dB
<b>MAXIMUM VSWR</b> (any port)	1.7
<b>INSERTION LOSS</b>	
210040010 & 210040010K	< 1.7 dB
210040020 & 210040020K	< 1.3 dB
<b>LOW LEVEL SENSITIVITY</b>	
210040010 & 210040010K	> 40 $\mu\text{V}/\mu\text{W}$
210040020 & 210040020K	> 4 $\mu\text{V}/\mu\text{W}$
<b>DETECTOR OUTPUT POLARITY</b>	Negative
<b>POWER RATING</b> (input)	
210040010 & 210040010K	1 W
210040020 & 210040020K	10 W
<b>STANDARD CONNECTORS</b>	
RF 210040010 & 210040020	2.4 mm Female
210040010K & 210040020K	2.92 mm Female
DET OUT	SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)	1.5
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

### DIMENSIONS



<b>B</b>	DETECTOR OUT
<b>MAX</b>	CONNECTOR TYPE
1.40	SMA FEMALE
1.70	BNC FEMALE
1.30	SMC JACK



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# MODELS 202040013, 202040013K 202040016 & 202040016K

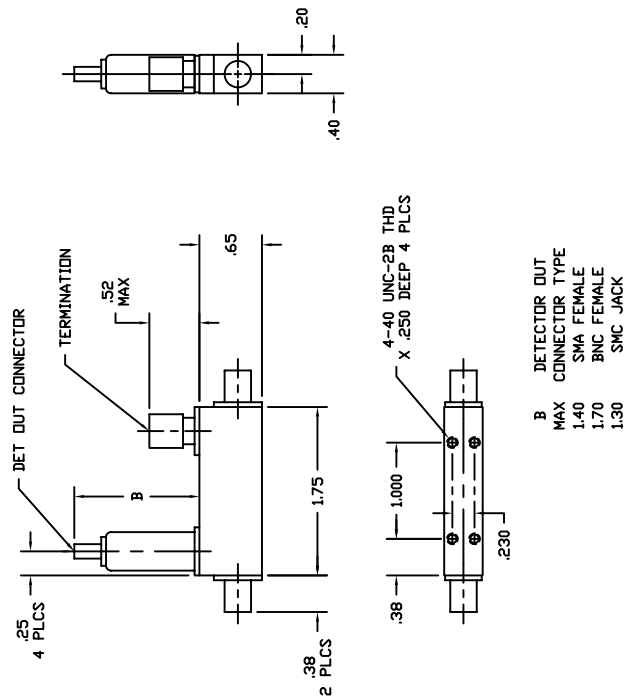
## 2-40 GHz DIRECTIONAL DETECTORS



### SPECIFICATIONS

<b>FREQUENCY RANGE</b>		2-40 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 0.7 dB, 2-20 GHz ± 1.4 dB, 2-40 GHz
<b>DIRECTIVITY</b>	202040013/K	> 15 dB, 2-20 GHz > 11 dB, 20-40 GHz
	202040016/K	> 15 dB, 2-20 GHz > 11 dB, 20-40 GHz
<b>MAXIMUM VSWR</b> (any port)		1.5, 2-20 GHz 1.7, 20-40 GHz
<b>INSERTION LOSS</b>	202040013/K	< 1.0 dB, 2-20 GHz < 1.7 dB, 20-40 GHz
	202040016/K	< 0.9 dB, 2-20 GHz < 1.6 dB, 20-40 GHz
<b>LOW LEVEL SENSITIVITY</b>	202040013/K	> 20 μV/μW
	202040016/K	> 10 μV/μW
<b>DETECTOR OUTPUT CAPACITANCE</b>		3 pF
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	202040013/K	2 W
	202040016/K	4W
<b>STANDARD CONNECTORS</b>		
RF	Model 202040013/16	2.4 mm Female
	Model 202040013K/16K	2.92 mm Female
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		1.8
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

### DIMENSIONS



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# MODELS 201040010, 201040010K 201040013 & 201040013K

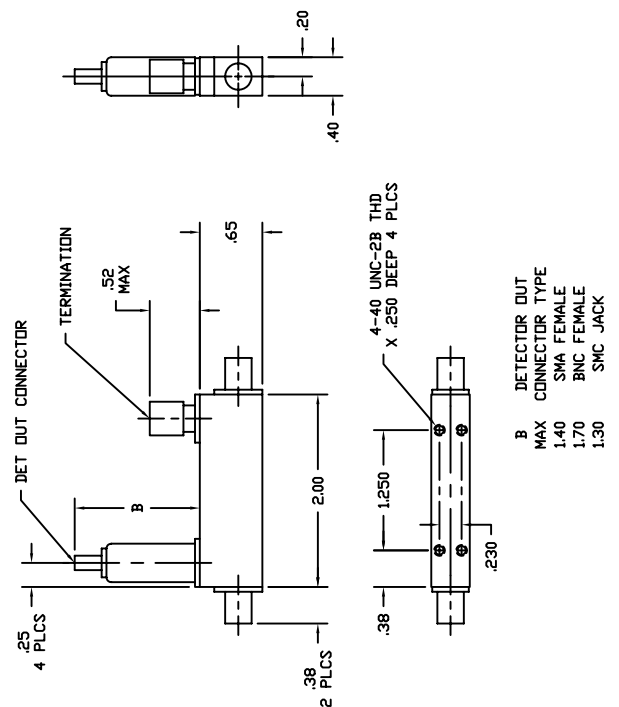
## 1-40 GHz DIRECTIONAL DETECTORS



### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	1-40 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)	± 1.7 dB
<b>DIRECTIVITY</b>	> 14 dB, 1-20 GHz > 10 dB, 20-40 GHz
<b>MAXIMUM VSWR</b> (any port)	1.5, 1-20 GHz 1.7, 20-40 GHz
<b>INSERTION LOSS</b>	
201040010 & 201040010K	< 1.3 dB, 1-20 GHz < 2.0 dB, 20-40 GHz
201040013 & 201040013K	< 1.1 dB, 1-20 GHz < 1.8 dB, 20-40 GHz
<b>LOW LEVEL SENSITIVITY</b>	
201040010 & 201040010K	> 40 µV/µW
201040013 & 201040013K	> 20 µV/µW
<b>DETECTOR OUTPUT CAPACITANCE</b>	3pF
<b>DETECTOR OUTPUT POLARITY</b>	Negative
<b>POWER RATING</b> (input)	
201040010 & 201040010K	1 W
201040013 & 201040013K	2 W
<b>STANDARD CONNECTORS</b>	
RF	201040010 & 201040013      2.4 mm Female 201040010K & 201040013K      2.92 mm Female
DET OUT	SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)	1.9
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

### DIMENSIONS



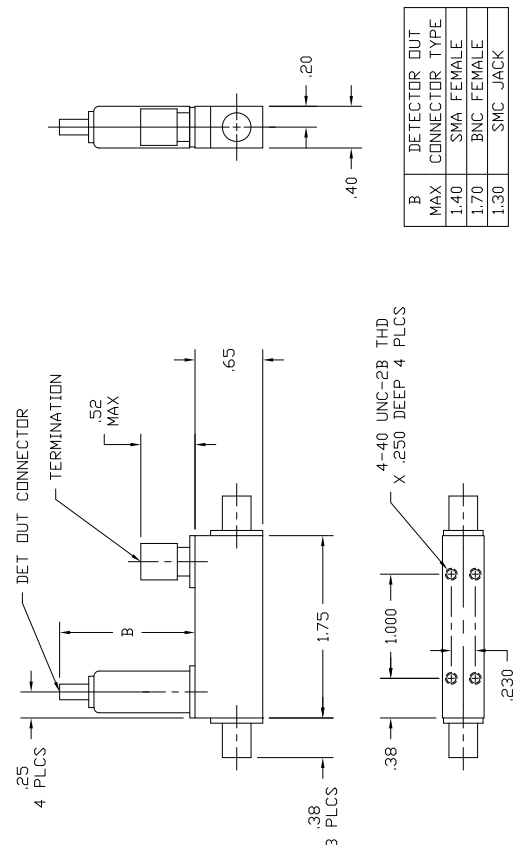
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**2-50 GHz DIRECTIONAL DETECTORS**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>		2-50 GHz
<b>FREQUENCY SENSITIVITY</b> (with respect to output)		± 3.3 dB
<b>DIRECTIVITY</b>		> 13 dB, 2-26.5 GHz > 10 dB, 26.5-50 GHz
<b>MAXIMUM VSWR</b> (any port)		1.50, 2-26.5 GHz 1.80, 26.5-50 GHz
<b>INSERTION LOSS</b>	202050010 202050013 202050016	< 2.00 dB < 1.80 dB < 1.70 dB
<b>LOW LEVEL SENSITIVITY</b>	202050010 202050013 202050016	> 40 $\mu\text{V}/\mu\text{W}$ > 20 $\mu\text{V}/\mu\text{W}$ > 10 $\mu\text{V}/\mu\text{W}$
<b>DETECTOR OUTPUT POLARITY</b>		Negative
<b>POWER RATING</b> (input)	202050010 202050013 202050016	1.0 W 2.0 W 4.0 W
<b>STANDARD CONNECTORS</b>		2.4 mm Female
DET OUT		SMA Female, BNC Female, or SMC Jack
<b>WEIGHT</b> (ounces)		1.6
<b>OPERATING TEMPERATURE</b>		-54° to +85° C

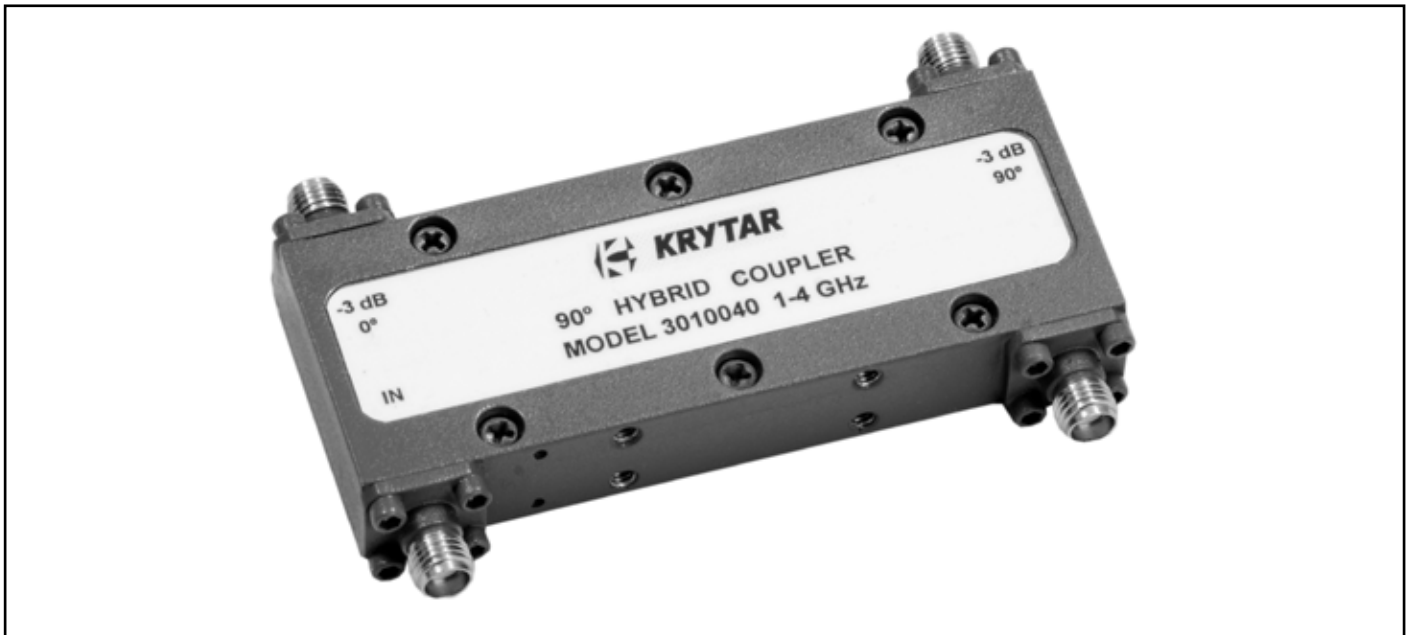
**DIMENSIONS**




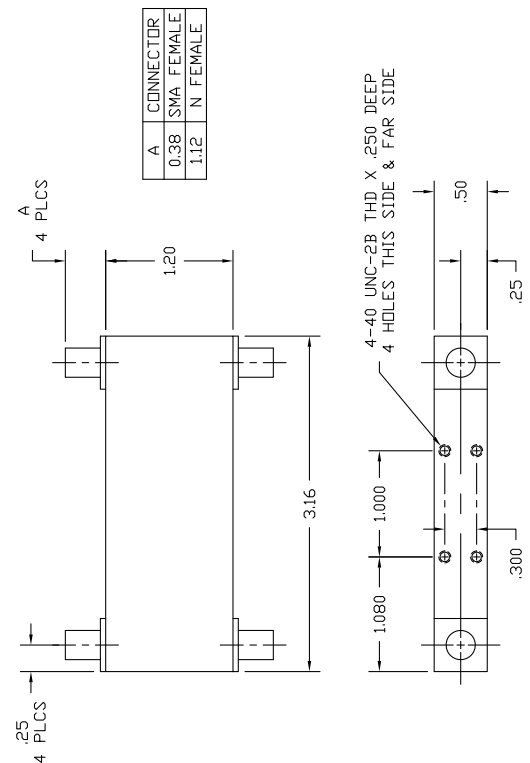
## 3 dB 90 DEGREE HYBRID COUPLERS

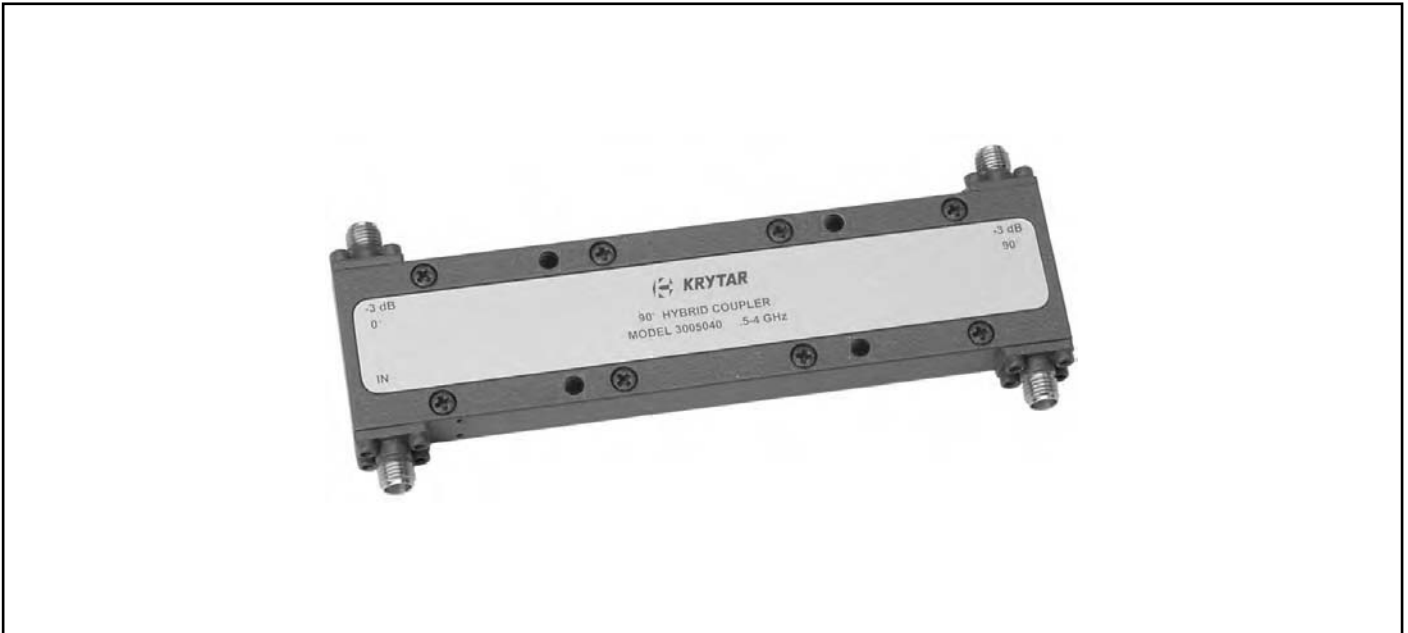


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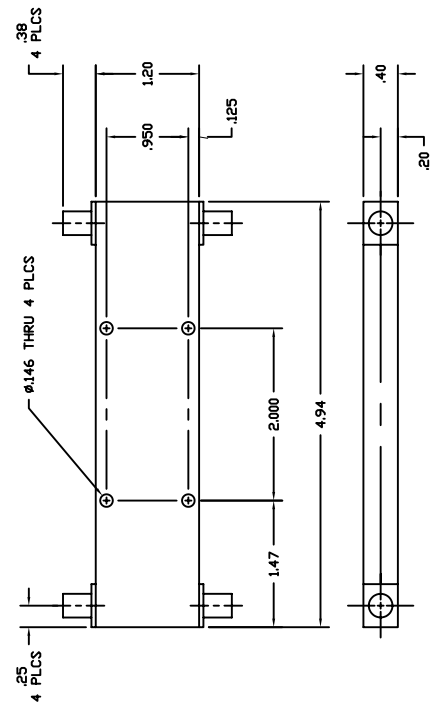
**1-4 GHz 90° HYBRID COUPLER**

**SPECIFICATIONS**

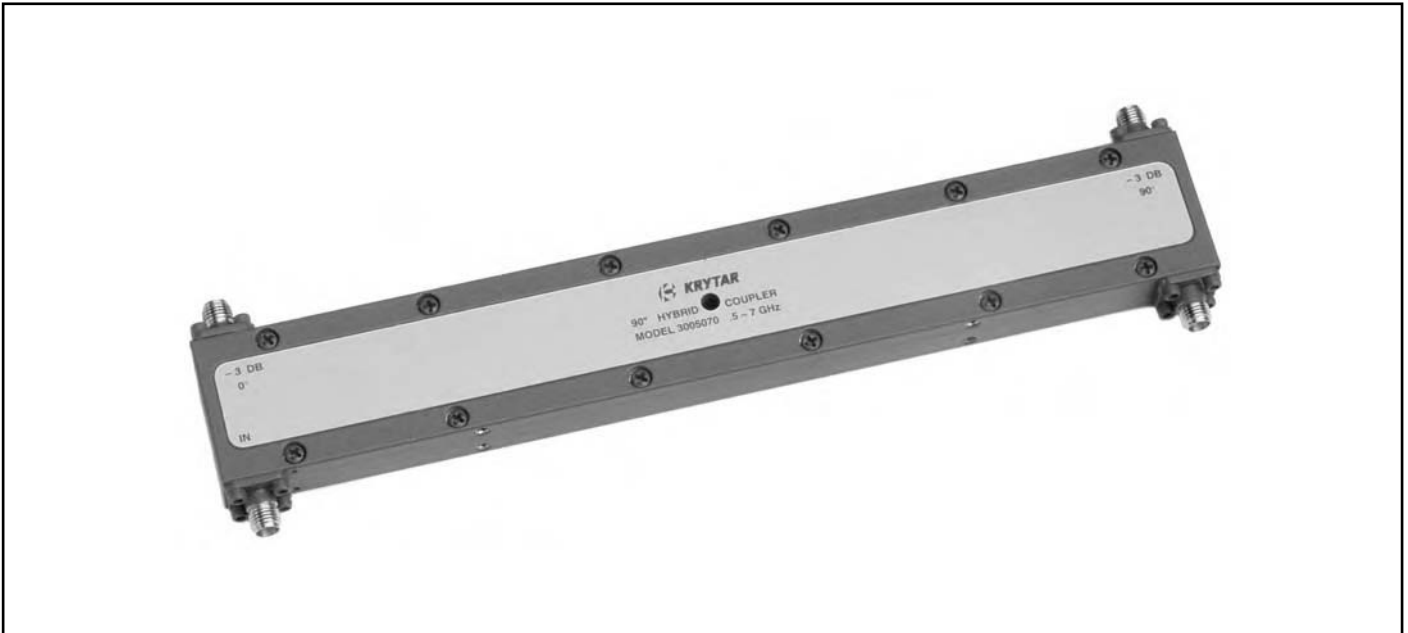
<b>FREQUENCY RANGE</b>	1-4 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.6 dB
<b>PHASE IMBALANCE</b>	± 6 Degrees
<b>ISOLATION</b>	> 17 dB
<b>MAXIMUM VSWR</b>	1.30
<b>INSERTION LOSS</b>	< 1.0 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	3.3
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**0.5-4.0 GHz 90° HYBRID COUPLER**

**SPECIFICATIONS**

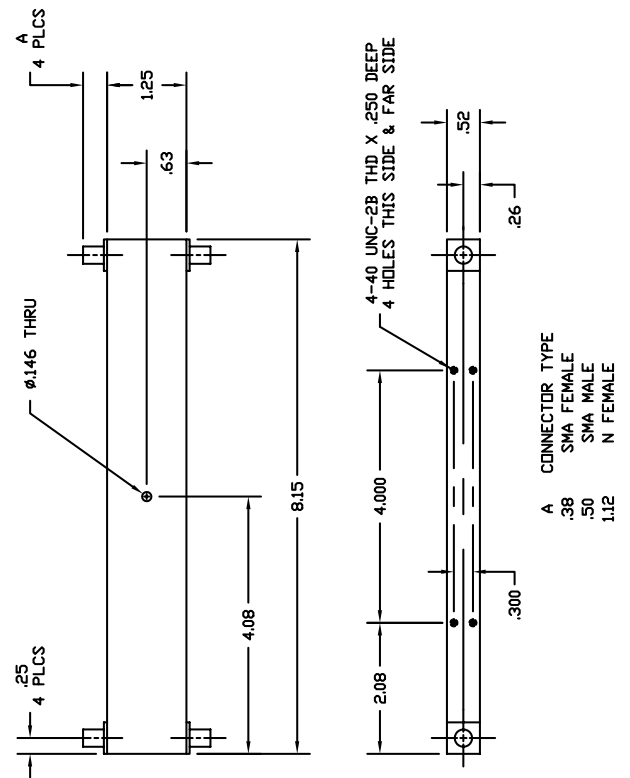
<b>FREQUENCY RANGE</b>	0.5-4.0 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.7 dB
<b>PHASE IMBALANCE</b>	± 5 Degrees
<b>ISOLATION</b>	> 18 dB
<b>MAXIMUM VSWR</b>	1.35
<b>INSERTION LOSS</b>	< 1.2 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	3.8
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**0.5-7.0 GHz 90° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	0.5-7.0 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.4 dB
<b>PHASE IMBALANCE *</b>	± 5 Degrees
<b>ISOLATION</b>	> 19 dB
<b>MAXIMUM VSWR</b>	1.3
<b>INSERTION LOSS</b>	< 1.3 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
Optional:	N Female
<b>WEIGHT (ounces)</b>	
SMA Female Connectors	8.3
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

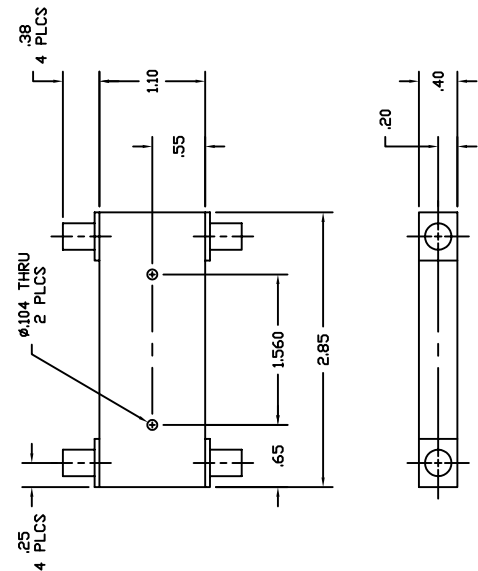
\* Units with a tighter phase imbalance specification can be supplied.

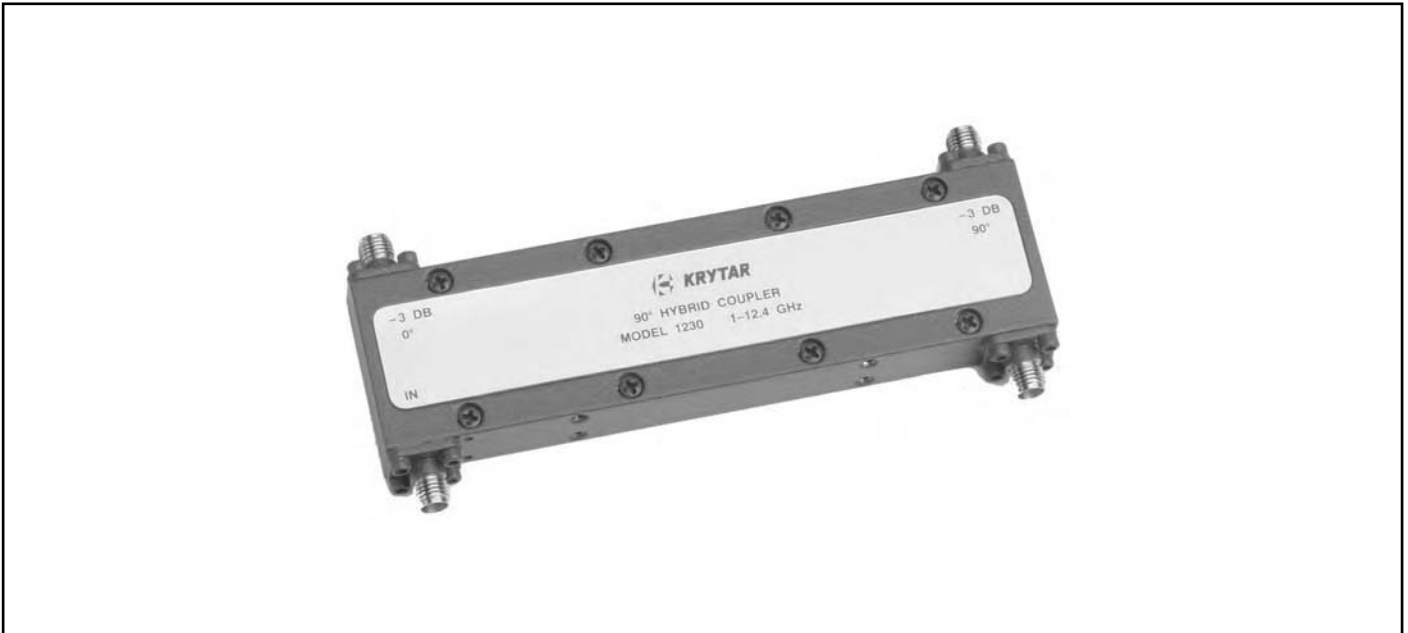
**DIMENSIONS**


**2-8 GHz 90° HYBRID COUPLER**

**SPECIFICATIONS**

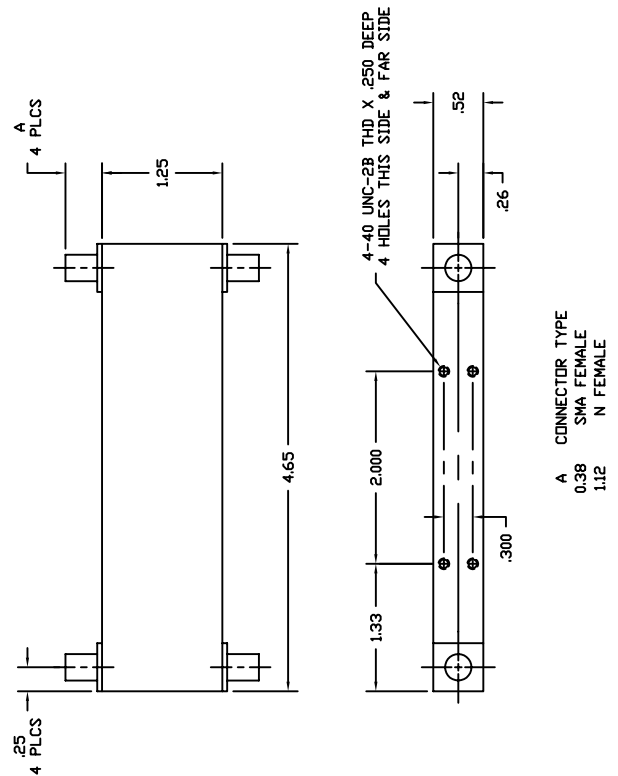
<b>FREQUENCY RANGE</b>	2-8 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.35 dB
<b>PHASE IMBALANCE</b>	± 3 Degrees
<b>ISOLATION</b>	> 19 dB
<b>MAXIMUM VSWR</b>	1.25
<b>INSERTION LOSS</b>	< 0.65 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	2.3
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**1.0-12.4 GHz 90° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	1.0-12.4 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.4 dB
<b>PHASE IMBALANCE *</b>	± 7 Degrees
<b>ISOLATION</b>	> 20 dB
<b>MAXIMUM VSWR</b>	1.30
<b>INSERTION LOSS</b>	< 1.4 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
Optional:	N Female
<b>WEIGHT (ounces)</b>	
SMA Female Connectors	5.2
N Female Connectors	7.7
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

\* Units with a tighter phase imbalance specification can be supplied.

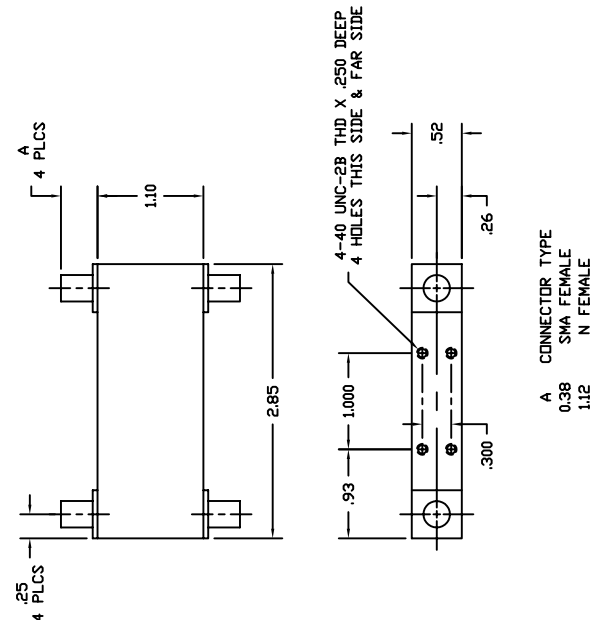
**DIMENSIONS**


**2-18 GHz 90° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	2-18 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.4 dB
<b>PHASE IMBALANCE *</b>	± 7 Degrees
<b>ISOLATION</b>	> 17 dB
<b>MAXIMUM VSWR</b>	1.35
<b>INSERTION LOSS</b>	< 1.4 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
Optional:	N Female
<b>WEIGHT (ounces)</b>	
SMA Female Connectors	3.0
N Female Connectors	5.5
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

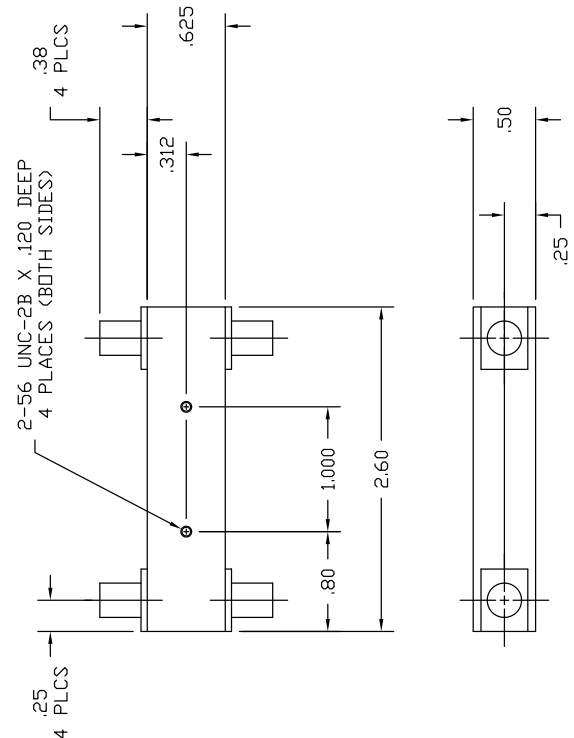
\* Units with a tighter phase imbalance specification can be supplied.

**DIMENSIONS**




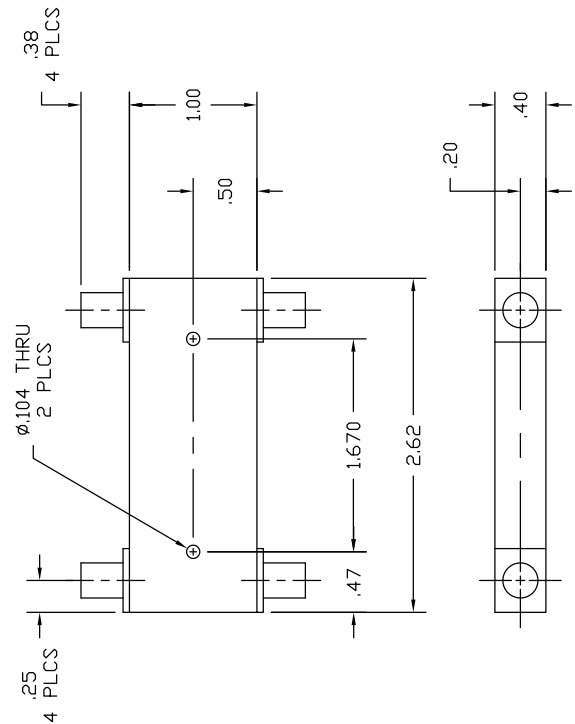

**SPECIFICATIONS**

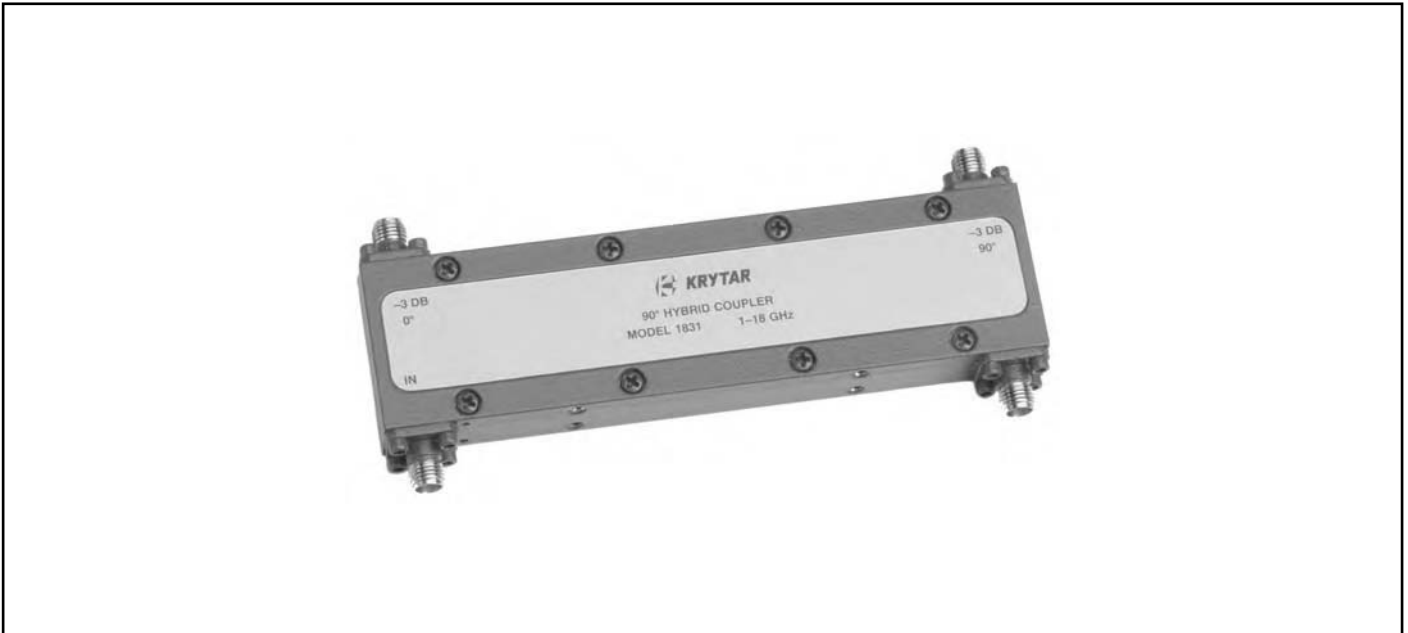
<b>FREQUENCY RANGE</b>	1.7-18.0 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 1.5 dB
<b>PHASE IMBALANCE</b>	± 10 Degrees
<b>ISOLATION</b>	> 15 dB
<b>MAXIMUM VSWR</b>	1.75
<b>INSERTION LOSS</b>	< 3.2 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	1.6
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**



**SPECIFICATIONS**

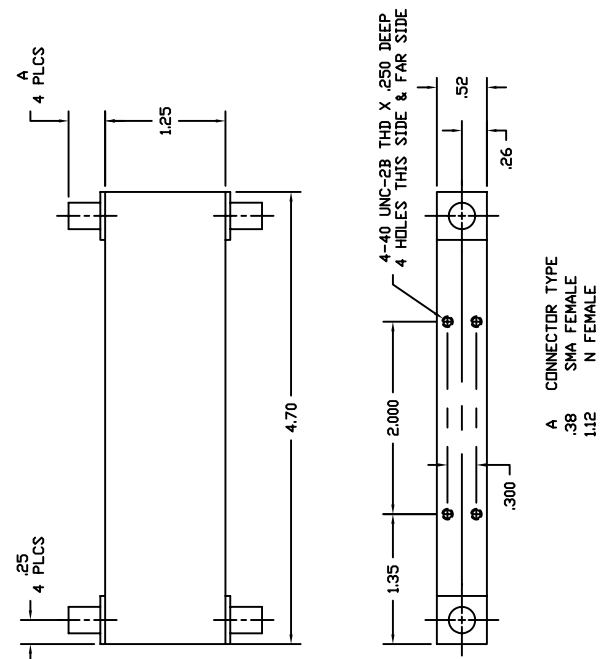
<b>FREQUENCY RANGE</b>	1.4-18.0 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 1.0 dB
<b>PHASE IMBALANCE</b>	± 10 Degrees
<b>ISOLATION</b>	> 12 dB
<b>MAXIMUM VSWR</b>	1.70
<b>INSERTION LOSS</b>	< 2.7 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	2.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**1-18 GHz 90° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	1-18 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.5 dB
<b>PHASE IMBALANCE *</b>	± 10 Degrees
<b>ISOLATION</b>	> 17 dB
<b>MAXIMUM VSWR</b>	1.35
<b>INSERTION LOSS</b>	< 2.0 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
Optional:	N Female
<b>WEIGHT (ounces)</b>	
SMA Female Connectors	5.2
N Female Connectors	7.7
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

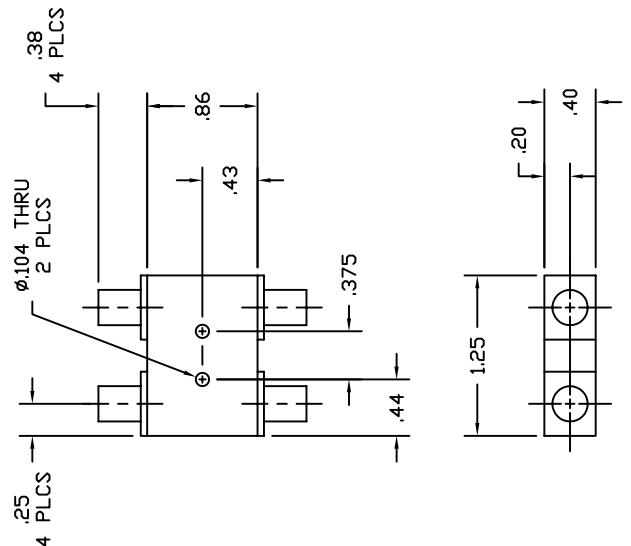
\* Units with a tighter phase imbalance specification can be supplied.

**DIMENSIONS**


**6-20 GHz 90° HYBRID COUPLER**

**SPECIFICATIONS**

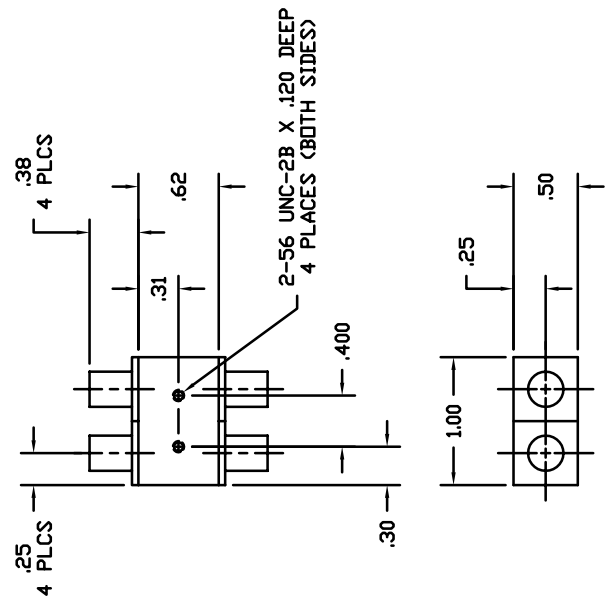
<b>FREQUENCY RANGE</b>	6-20 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.4 dB
<b>PHASE IMBALANCE</b>	± 5 Degrees
<b>ISOLATION</b>	> 14 dB
<b>MAXIMUM VSWR</b>	1.45
<b>INSERTION LOSS</b>	< 1.0 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	1.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**10.0-26.5 GHz 90° HYBRID COUPLER**

**SPECIFICATIONS**

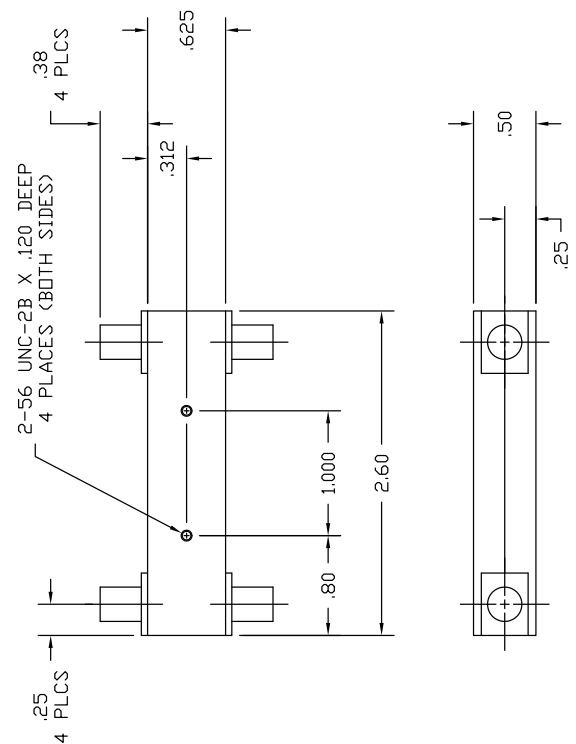
<b>FREQUENCY RANGE</b>	10.0-26.5 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.55 dB
<b>PHASE IMBALANCE</b>	± 7 Degrees
<b>ISOLATION</b>	> 15 dB
<b>MAXIMUM VSWR</b>	1.61
<b>INSERTION LOSS</b>	< 1.3 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	2.92mm Female
Optional:	SMA Female
<b>WEIGHT (ounces)</b>	0.8
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**1.7-26.5 GHz 90° HYBRID COUPLER**

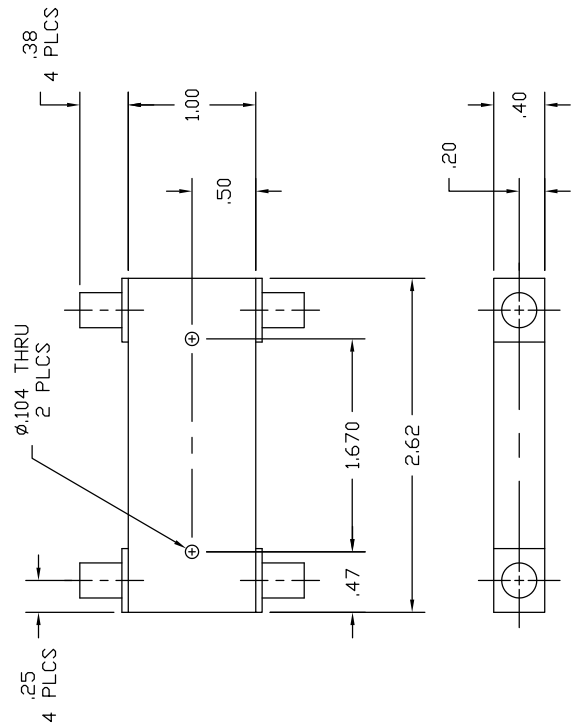
**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	1.7-26.5 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 1.5 dB
<b>PHASE IMBALANCE</b>	± 10 Degrees
<b>ISOLATION</b>	> 14 dB
<b>MAXIMUM VSWR</b>	1.85
<b>INSERTION LOSS</b>	< 3.4 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	1.6
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


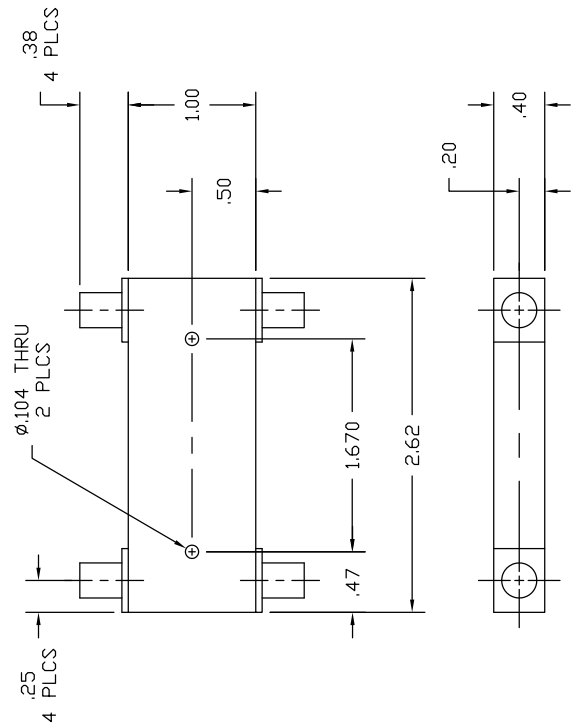

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	1.4-26.5 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 1.2 dB
<b>PHASE IMBALANCE</b>	± 12 Degrees
<b>ISOLATION</b>	> 12 dB
<b>MAXIMUM VSWR</b>	1.80
<b>INSERTION LOSS</b>	< 3.0 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	2.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**



**SPECIFICATIONS**

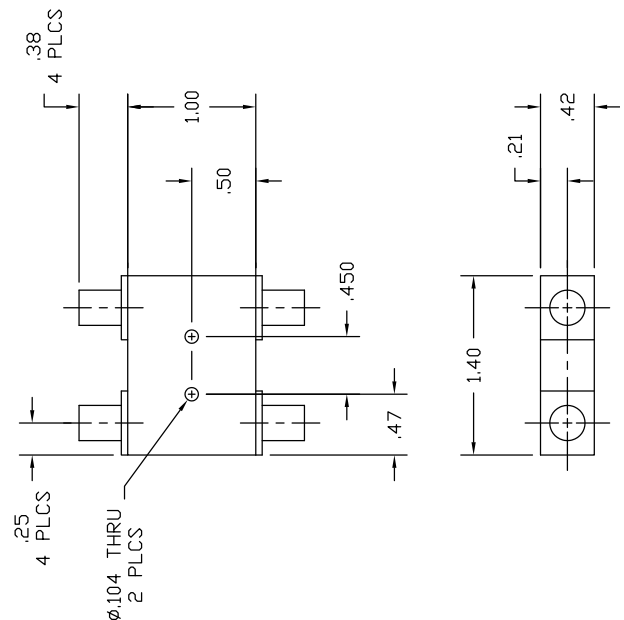
<b>FREQUENCY RANGE</b>	1.4-32.0 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 1.55 dB
<b>PHASE IMBALANCE</b>	± 12 Degrees
<b>ISOLATION</b>	> 12 dB
<b>MAXIMUM VSWR</b>	1.90
<b>INSERTION LOSS</b>	< 3.5 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	2.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**




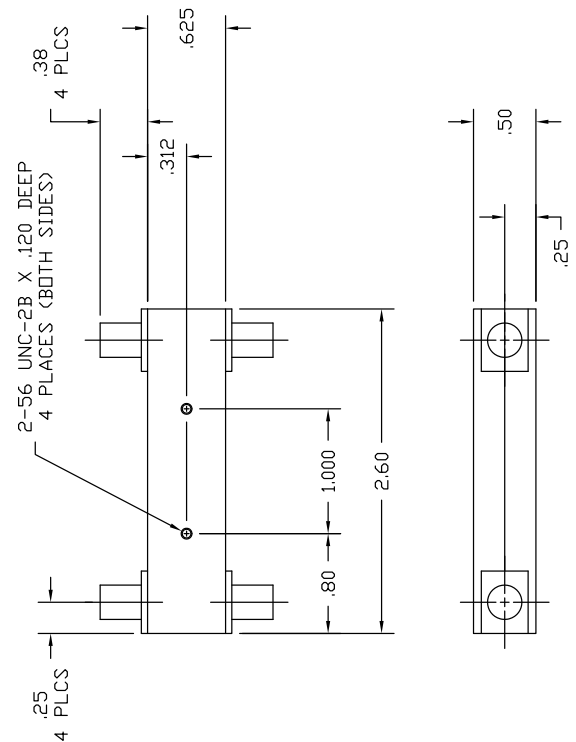

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	5-36 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 1.5 dB
<b>PHASE IMBALANCE</b>	± 15 Degrees
<b>ISOLATION</b>	> 11 dB
<b>MAXIMUM VSWR</b>	1.80
<b>INSERTION LOSS</b>	< 2.8 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	2.92 Female
<b>WEIGHT (ounces)</b>	1.2
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**



**SPECIFICATIONS**

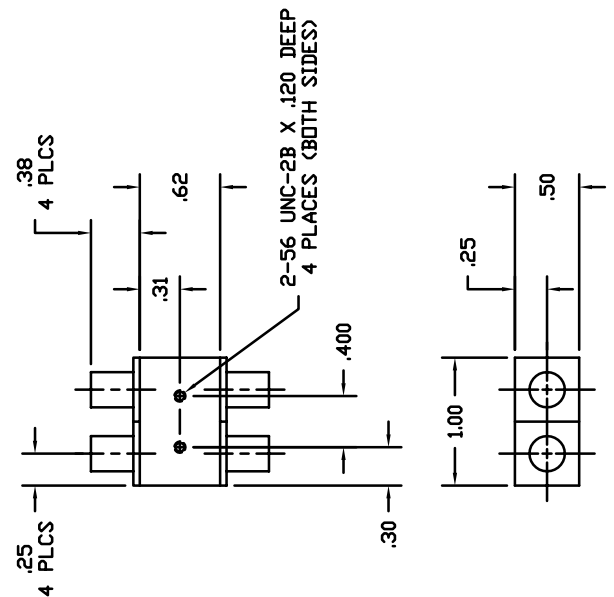
<b>FREQUENCY RANGE</b>	1.7-36.0 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 1.7 dB
<b>PHASE IMBALANCE</b>	± 12 Degrees
<b>ISOLATION</b>	> 12 dB
<b>MAXIMUM VSWR</b>	1.85
<b>INSERTION LOSS</b>	< 4.35 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	2.92 Female
<b>WEIGHT (ounces)</b>	1.6
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**


**10-40 GHz 90° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	10-40 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.7 dB
<b>PHASE IMBALANCE</b>	± 10 Degrees
<b>ISOLATION</b>	> 12 dB
<b>MAXIMUM VSWR</b>	1.80
<b>INSERTION LOSS</b>	< 2.0 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	
3100400	2.4 mm Female
3100400K	2.92 mm Female
<b>WEIGHT (ounces)</b>	
2.4mm Female	0.9
2.92mm Female	0.8
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**




## 3 dB 180 DEGREE HYBRID COUPLERS

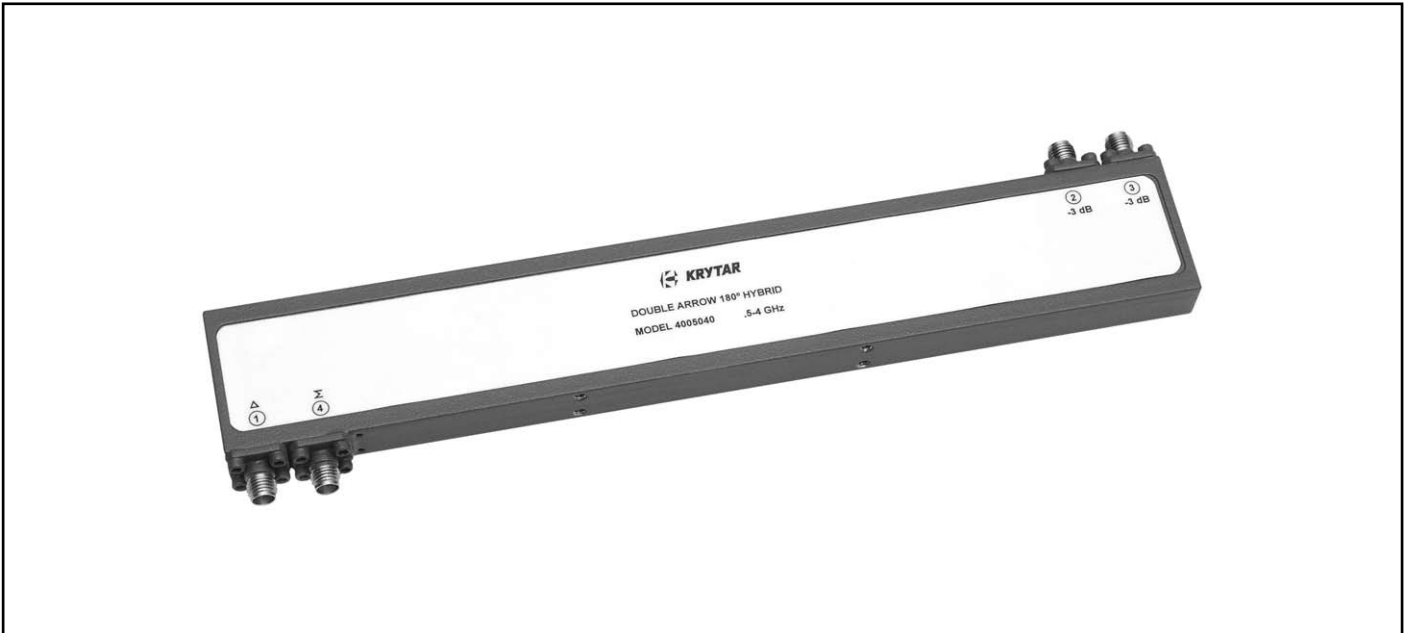


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**MODEL 4005040  
DOUBLE ARROW**

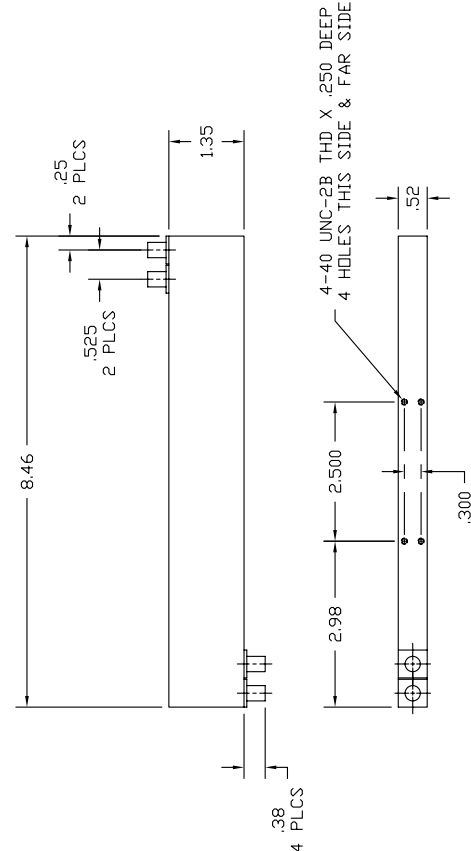
**0.5-4.0 GHz 180° HYBRID COUPLER**



**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	0.5-4.0 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.7 dB
<b>PHASE IMBALANCE</b>	± 15 Degrees
<b>ISOLATION</b>	> 14 dB
<b>MAXIMUM VSWR</b>	1.35
<b>INSERTION LOSS</b>	< 2.0 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	8.9
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**

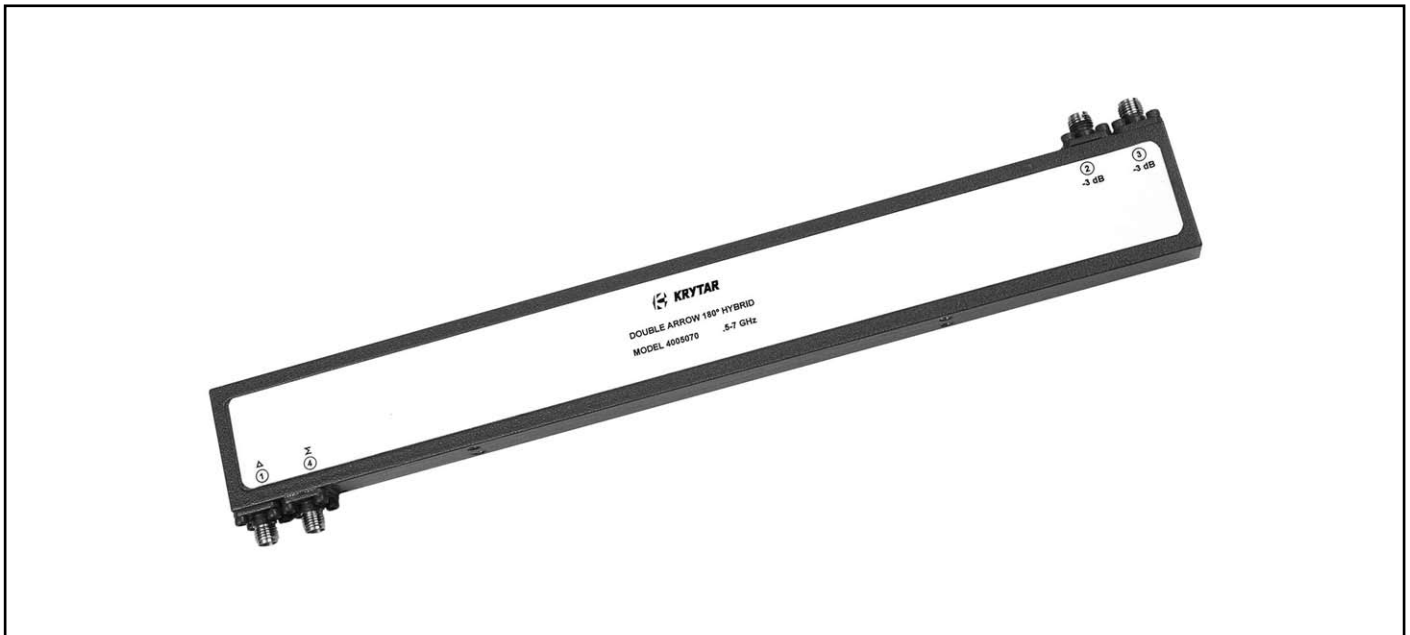


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**MODEL 4005070  
DOUBLE ARROW**

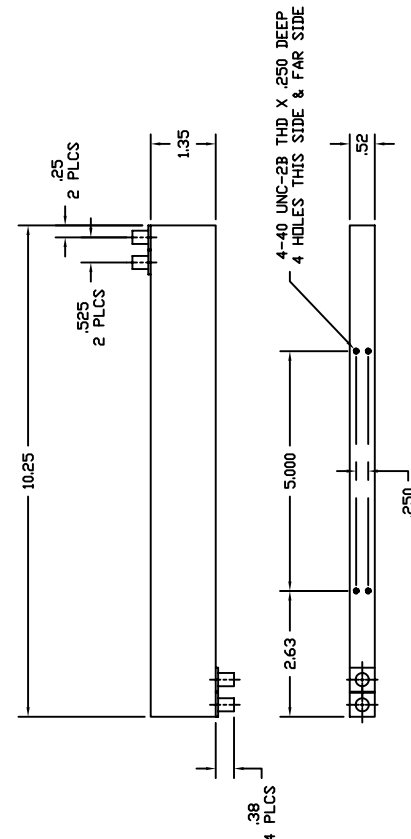
**0.5-7.0 GHz 180° HYBRID COUPLER**



**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	0.5-7.0 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.6 dB
<b>PHASE IMBALANCE</b>	± 10 Degrees
<b>ISOLATION</b>	> 16 dB
<b>MAXIMUM VSWR</b>	1.4
<b>INSERTION LOSS</b>	< 2.8 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	11.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**



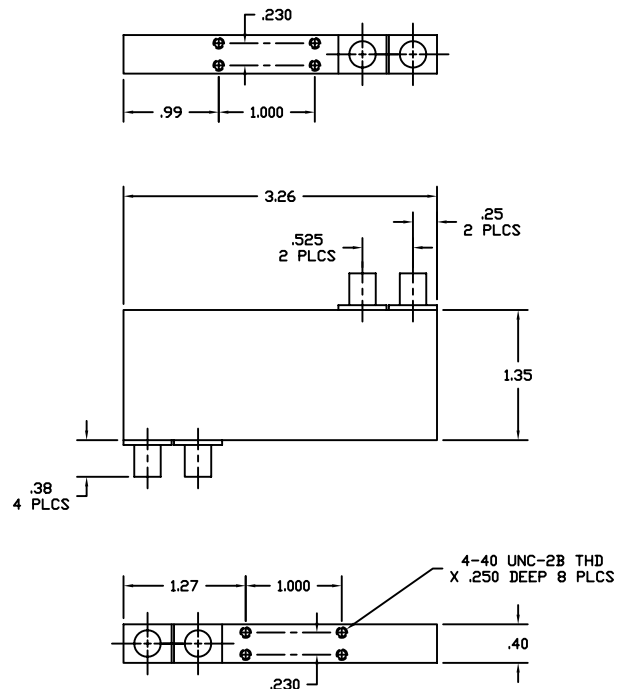
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**2-8 GHz 180° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	2-8 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.3 dB
<b>PHASE IMBALANCE *</b>	± 8 Degrees
<b>ISOLATION</b>	> 18 dB
<b>MAXIMUM VSWR</b>	1.4
<b>INSERTION LOSS</b>	< 1.1 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	3.0
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

\* Units with a tighter phase imbalance specification can be supplied.

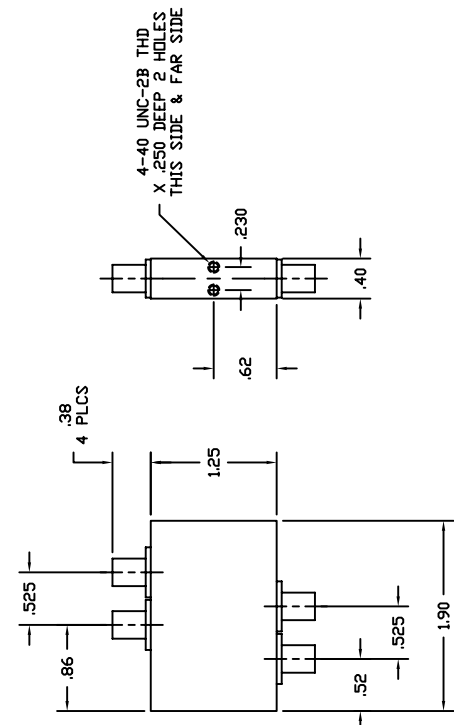
**DIMENSIONS**



**4.0-12.4 GHz 180° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	4.0-12.4 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.4 dB
<b>PHASE IMBALANCE *</b>	± 8 Degrees
<b>ISOLATION</b>	> 17 dB
<b>MAXIMUM VSWR</b>	1.6
<b>INSERTION LOSS</b>	< 0.9 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	1.8
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

\* Units with a tighter phase imbalance specification can be supplied.

**DIMENSIONS**


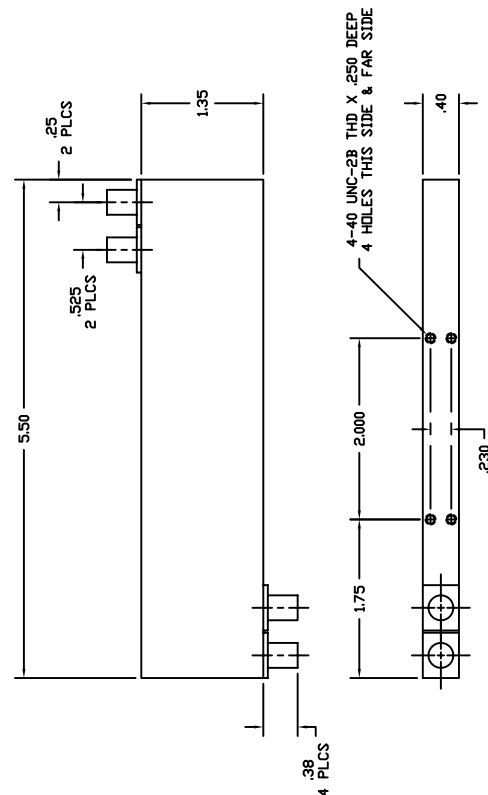



**1.0-12.4 GHz 180° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	1.0-12.4 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.4 dB
<b>PHASE IMBALANCE *</b>	± 10 Degrees
<b>ISOLATION</b>	> 17 dB
<b>MAXIMUM VSWR</b>	1.6
<b>INSERTION LOSS</b>	< 2.1 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	4.9
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

\* Units with a tighter phase imbalance specification can be supplied.

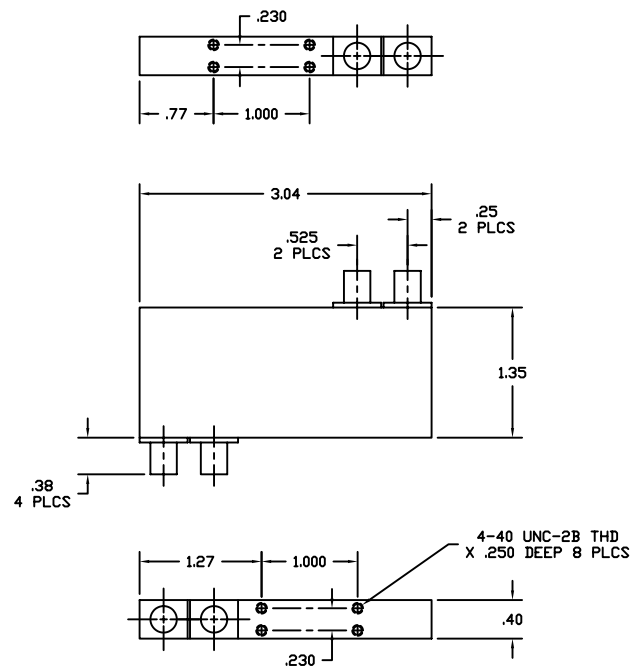
**DIMENSIONS**



**2-18 GHz 180° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	2-18 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.6 dB
<b>PHASE IMBALANCE *</b>	± 14 Degrees
<b>ISOLATION</b>	> 15 dB
<b>MAXIMUM VSWR</b>	1.7
<b>INSERTION LOSS</b>	< 2.0 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	2.8
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

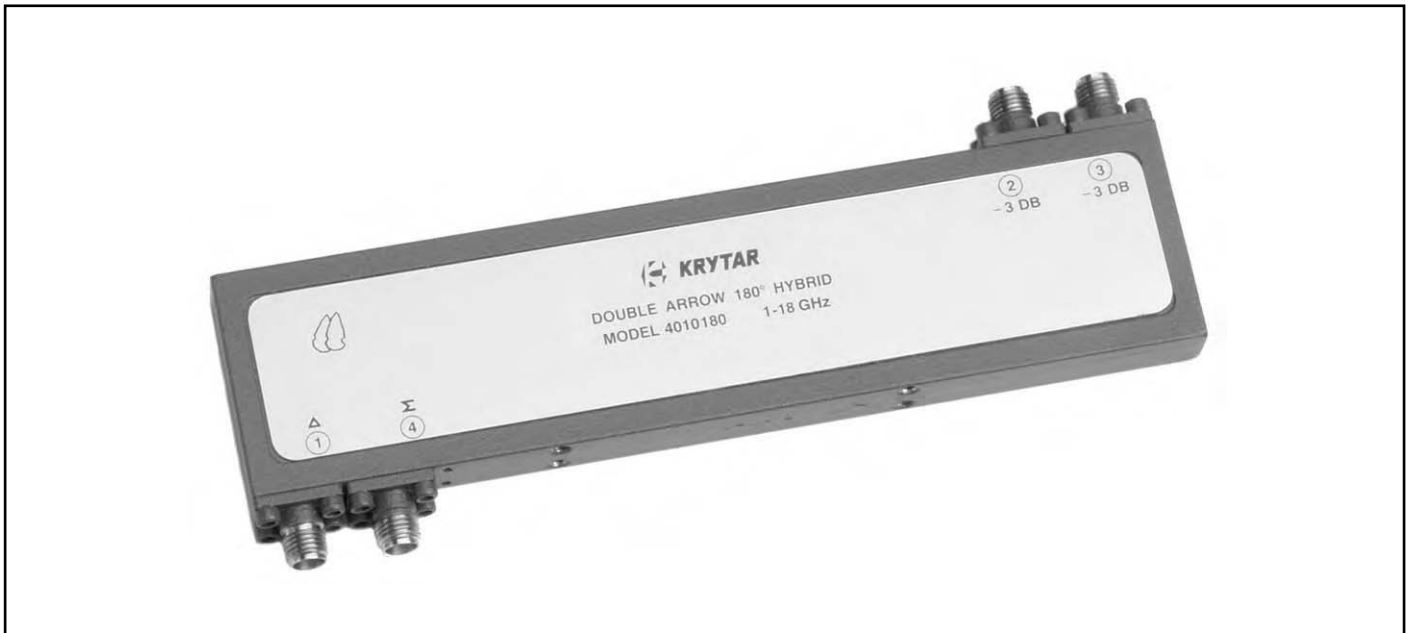
\* Units with a tighter phase imbalance specification can be supplied.

**DIMENSIONS**




**MODEL 4010180  
DOUBLE ARROW**

**1-18 GHz 180° HYBRID COUPLER**

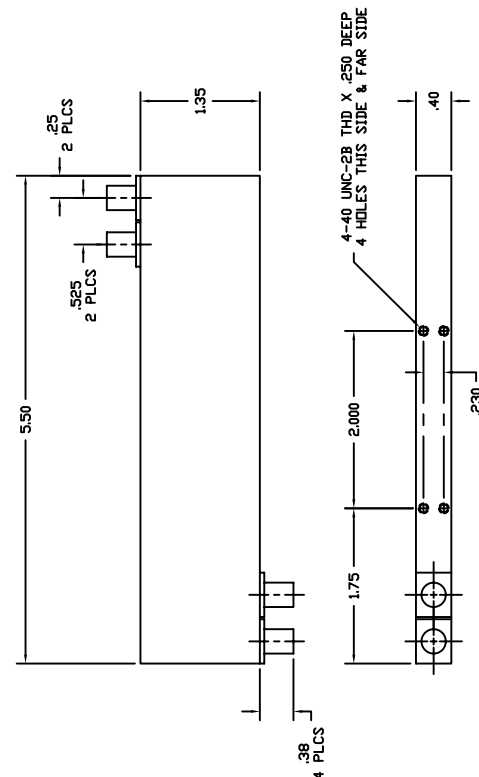


**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	1-18 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.6 dB
<b>PHASE IMBALANCE *</b>	± 12 Degrees
<b>ISOLATION</b>	> 15 dB
<b>MAXIMUM VSWR</b>	1.7
<b>INSERTION LOSS</b>	< 2.9 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	4.9
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

\* Units with a tighter phase imbalance specification can be supplied.

**DIMENSIONS**



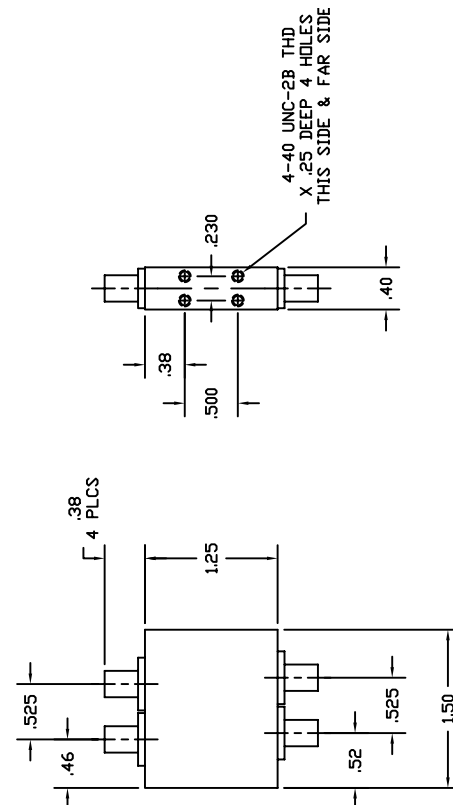
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**6-20 GHz 180° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	6-20 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.6 dB
<b>PHASE IMBALANCE *</b>	± 10 Degrees
<b>ISOLATION</b>	> 15 dB
<b>MAXIMUM VSWR</b>	1.7
<b>INSERTION LOSS</b>	< 1.2 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	1.5
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

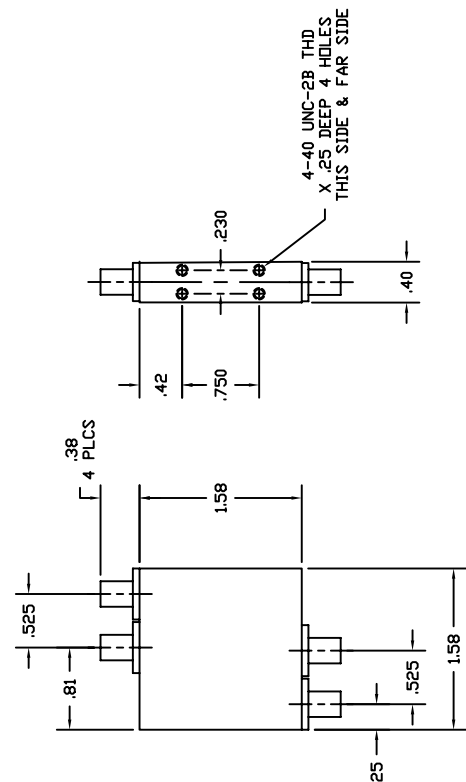
\* Units with a tighter phase imbalance specification can be supplied.

**DIMENSIONS**



**6.0-26.5 GHz 180° HYBRID COUPLER**

**SPECIFICATIONS**

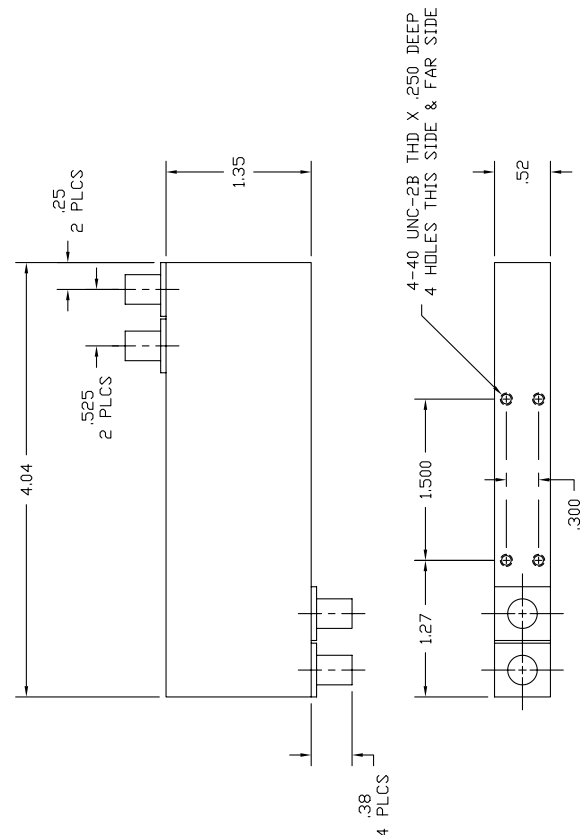
<b>FREQUENCY RANGE</b>	6.0-26.5 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 0.7 dB
<b>PHASE IMBALANCE</b>	± 12 Degrees
<b>ISOLATION</b>	> 14 dB
<b>MAXIMUM VSWR</b>	1.7
<b>INSERTION LOSS</b>	< 1.6 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	2.4
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**



**1.0-26.5 GHz 180° HYBRID COUPLER**

**SPECIFICATIONS**

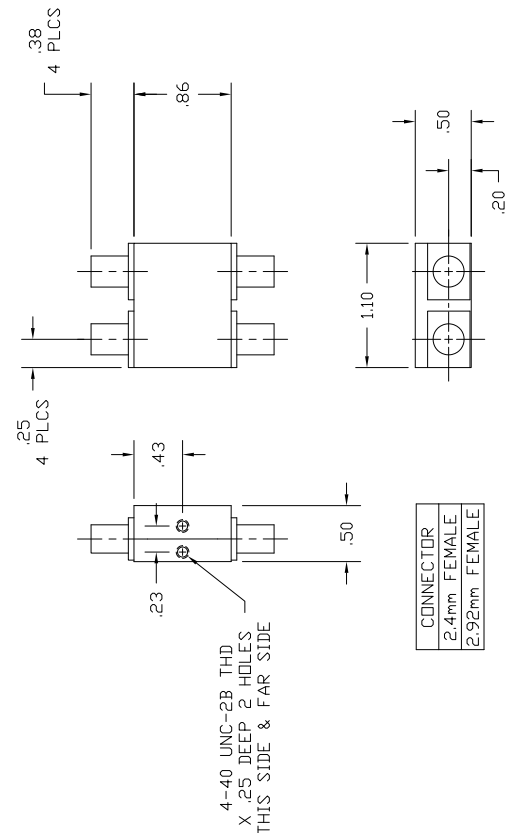
<b>FREQUENCY RANGE</b>	1.0-26.5 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 1.0 dB, 1-20 GHz ± 1.5 dB, 20-26.5 GHz
<b>PHASE IMBALANCE</b>	± 16 Degrees
<b>ISOLATION</b>	> 15 dB
<b>MAXIMUM VSWR</b>	1.80, 1-20 GHz 1.95, 20-26.5 GHz
<b>INSERTION LOSS</b>	3.0 dB, 1-20 GHz 3.6 dB, 20-26.5 GHz
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	SMA Female
<b>WEIGHT (ounces)</b>	4.6
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**



**10-40 GHz 180° HYBRID COUPLER**

**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	10-40 GHz
<b>COUPLING</b>	3 dB
<b>AMPLITUDE IMBALANCE</b>	± 1.0 dB
<b>PHASE IMBALANCE</b>	± 12 Degrees
<b>ISOLATION</b>	> 15 dB
<b>MAXIMUM VSWR</b>	1.8
<b>INSERTION LOSS</b>	< 1.7 dB
<b>POWER RATING</b>	
Average	20 W
Peak	3 KW
<b>STANDARD CONNECTORS</b>	
4100400	2.4 mm Female
4100400K	2.92 mm Female
<b>WEIGHT (ounces)</b>	1.2
<b>OPERATING TEMPERATURE</b>	-54° to +85° C

**DIMENSIONS**




## COAXIAL TERMINATIONS



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# KRYTAR®

## PRECISION COAXIAL TERMINATIONS DC-20 GHz, DC-26.5 GHz, DC-40 GHz, DC-50 GHz & DC-67 GHz



### FEATURING

PASSIVATED STAINLESS STEEL BODY, CENTER CONTACT IS GOLD PLATED HEAT TREATED BeCu

EXTREMELY RUGGED MECHANICAL DESIGN

MODEL NO. AND SERIAL NO. PERMANENTLY INSCRIBED ON END OF STEEL HOUSING

### SPECIFICATIONS

MODEL	FREQUENCY RANGE	MAXIMUM VSWR	CONNECTORS	DIMENSIONS
T1M	DC-20 GHz	1.05	3.5mm Male	0.80 in. x 0.36 in. dia.
T1F	DC-20 GHz	1.07	3.5mm Female	0.73 in. x 0.36 in. dia.
T2M	DC-26.5 GHz	1.06, DC-20 GHz 1.09, 20-26.5 GHz	3.5mm Male	0.80 in. x 0.36 in. dia.
T2F	DC-26.5 GHz	1.08, DC-20 GHz 1.11, 20-26.5 GHz	3.5mm Female	0.73 in. x 0.36 in. dia.
T3M	DC-40 GHz	1.06, DC-8 GHz 1.15, 8-26.5 GHz 1.20, 26.5-40 GHz	2.4mm Male	0.84 in. x 0.36 in. dia.
T3MK	DC-40 GHz	1.06, DC-8 GHz 1.15, 8-26.5 GHz 1.20, 26.5-40 GHz	2.92mm Male	0.85 in. x 0.36 in. dia.
T3FK	DC-40 GHz	1.06, DC-8 GHz 1.15, 8-26.5 GHz 1.20, 26.5-40 GHz	2.92mm Female	0.80 in. x 0.36 in. dia.
T4M	DC-50 GHz	1.06, DC-8 GHz 1.15, 8-26.5 GHz 1.20, 26.5-40 GHz 1.25, 40-50 GHz	2.4mm Male	0.84 in. x 0.36 in. dia.
T5M	DC-67 GHz	1.20, DC-40 GHz 1.43, 40-67 GHz	2.4mm Male	0.84 in. x 0.36 in. dia.

MAXIMUM POWER 0.5 Watt

IMPEDANCE 50 ±1 Ohm

OPERATING TEMPERATURE -65°C to +125°C



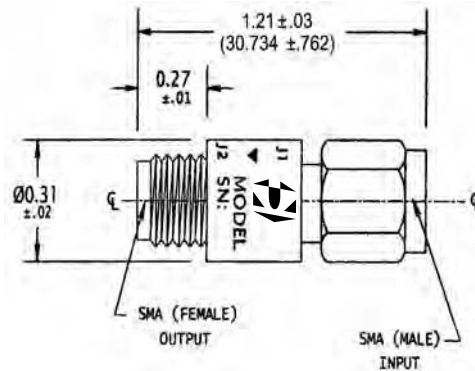
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## BROADBAND PLANAR TUNNEL DIODE DETECTORS



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**DETECTOR OUTLINE DRAWINGS**

## SPECIFICATIONS

MODEL	FREQUENCY RANGE (GHz)	VOLTAGE SENSITIVITY mV/μW TYPICAL	TSS (-dBm) TYP	VSWR TYPICAL	FLATNESS (±dB MAX.)	VIDEO CAPACITANCE (pF)
KDT0120	0.1 - 2.0	0.8	51	2.00	0.75	470
KDT0140	0.1 - 4.0	0.8	51	2.20	0.75	470
KDT0112	0.1 - 12.4	0.8	50	2.50	1.00	470
KDT0518	0.5- 18.5	0.5	50	3.50	1.00	100
KDT1018	1.0 - 18.0	0.4	47	3.50	1.00	50
KDT2018	2.0 - 18.0	0.5	47	3.50	1.00	20
KDT6018	6.0 - 18.0	0.7	47	3.00	0.75	10
KDT8018	8.0 - 18.0	0.7	47	3.00	0.75	10

## FEATURES

No Bias  
Extremely Low Video Output Resistance (125 Ω Typical)  
Extremely Fast Pulse Response (5 ns Risetime Typical)  
High Reliability Hermetically Sealed Modules

Maximum Input Power: 50mW CW  
Operating Temperature Range: -55° to +90°C  
Storage Temperature Range: -65° to +125°C  
Specification @ 25°C and -20 dBm Input Power

Negative output polarity is standard. Add P to end of model number for positive polarity. Example: KDT2018P



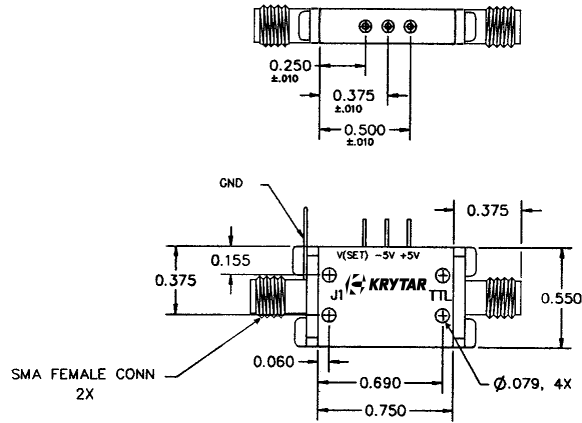
## BROADBAND THRESHOLD DETECTORS





# KRYTAR®

# BROADBAND THRESHOLD DETECTORS 100 MHz-18 GHz



Dimensions in Inches

## SPECIFICATIONS

MODEL	FREQUENCY RANGE (GHz)	VSWR TYPICAL	THRESHOLD VARIATION (±dB Max.)
KTH0120	0.1 - 2.0	2.00	0.75
KTH0140	0.1 - 4.0	2.60	0.75
KTH0112	0.1 - 12.4	2.70	1.00
KTH0518	0.5 - 18.5	3.50	1.00
KTH2018	2.0 - 18.0	3.00	1.00
KTH6018	6.0 - 18.0	3.00	0.75
KTH8018	8.0 - 18.0	3.00	0.75

## FEATURES

High Reliability Hermetically Sealed Modules

Dynamic Range: -20 to -10 dBm

TTL: Logic Output

Minimum Pulse Width: 50 nsec Typical

Temperature Stability: 1.0 dB Typical, 3 dB above Threshold Setting

Threshold Setting: Internal Fixed or External Voltage

DC Power (No Load): ±5 VDC @ 100mA Max

Maximum Input Power: 100mW CW

Operating Temperature Range: -55 to 90°C

Storage Temperature Range: -65 to 125°C

Specification @ 25°C



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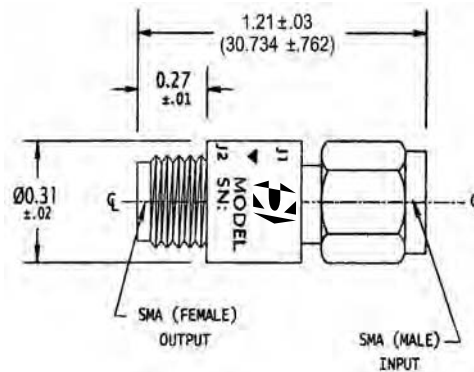
# BROADBAND PIN-PIN & PIN SCHOTTKY DIODE LIMITERS





# KRYTAR®

## BROADBAND PIN-PIN DIODE LIMITERS SERIES KPL (PASSIVE) 500 MHz-18 GHz



LIMITER OUTLINE DRAWINGS

### SPECIFICATIONS

MODEL	FREQUENCY RANGE (GHz)	INSERTION LOSS (dB)	VSWR (TYPICAL)	MAXIMUM LEAKAGE POWER (dBm)	
				PEAK	CW
KPL0520	0.5 - 2.0	0.5	1.40	+23.0	+20.0
KPL0140	0.5 - 4.0	0.6	1.40	+23.0	+20.0
KPL2018	2.0 - 18.0	2.5	2.20	+23.0	+19.0
KPL6018	6.0 - 18.0	2.2	2.00	+20.0	+19.0
KPL8018	8.0 - 18.0	2.2	2.00	+20.0	+19.0

### FEATURES

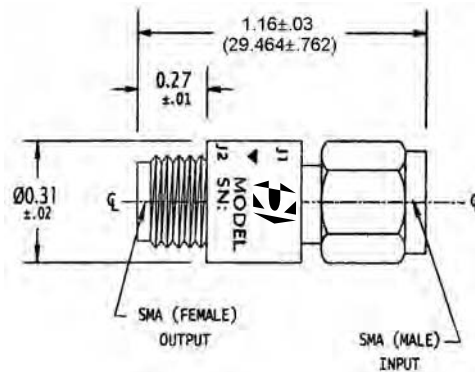
Power Handling: 1 Watt CW and 100 Watts Peak  
 (1 µsec Pulse Width, 0.1% Duty Cycle,  
 Derated to 20% @ 125°C)  
 Internal DC Return  
 Fast Recovery Time (10 to 20 nsec Typical)  
 Limiting Threshold above +9 dBm Typical

### ENVIRONMENTAL RATINGS

Operating Temperature Range: -55 to +90°C  
 Storage Temperature Range: -65 to +125°C  
 Shock: 50 G, 11 msec  
 Vibration: 20 G, 100 to 2000 Hz  
 Specification @ 25°C and -10 dBm Input Power



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**LIMITER OUTLINE DRAWINGS**

## SPECIFICATIONS

MODEL	FREQUENCY RANGE (GHz)	INSERTION LOSS (dB)	VSWR (TYPICAL)	MAXIMUM LEAKAGE POWER (dBm)	
				PEAK	CW
<b>KSL0520</b>	0.5 - 2.0	0.6	1.50	+20.0	+16.0
<b>KSL0140</b>	0.5 - 4.0	0.8	1.50	+20.0	+16.0
<b>KSL2018</b>	2.0 - 18.0	2.5	2.20	+20.0	+16.0
<b>KSL6018</b>	6.0 - 18.0	2.5	2.20	+19.0	+15.0
<b>KSL8018</b>	8.0 - 18.0	2.5	2.20	+19.0	+15.0

## FEATURES

Power Handling: 1 Watt CW and 100 Watts Peak  
 (1 µsec Pulse Width, 0.1% Duty Cycle,  
 Derated to 20% @ 125°C)  
 Internal DC Block  
 200 µsec Recovery Time  
 Limiting Threshold above +6 dBm Typical

### ENVIRONMENTAL RATINGS

Operating Temperature Range: -55 to +90°C  
 Storage Temperature Range: -65 to +125°C  
 Shock: 50 G, 11 msec  
 Vibration: 20 G, 100 to 2000 Hz  
 Specification @ 25°C and -10 dBm Input Power





# POWER DIVIDERS



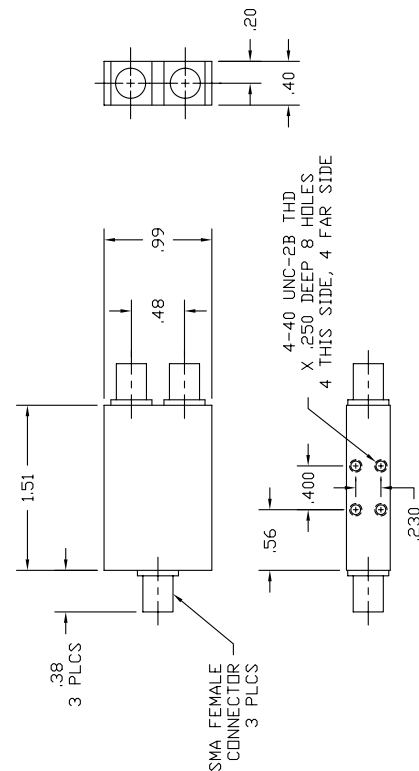
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### SPECIFICATIONS

FREQUENCY RANGE	2-8 GHz
MAXIMUM VSWR	1.45
INSERTION LOSS	< 0.8 dB
ISOLATION	> 19.5 dB
MAXIMUM AMPLITUDE TRACKING	± 0.25 dB
MAXIMUM PHASE TRACKING	± 5°
WEIGHT (ounces)	1.1
STANDARD CONNECTORS	SMA Female

### DIMENSIONS





**KRYTAR**<sup>®</sup>

**MODELS 6005180, 6010180 & 6020180  
MLDD 2-WAY POWER DIVIDERS  
0.5-18.0, 1.0-18.0 & 2.0-18.0 GHz**



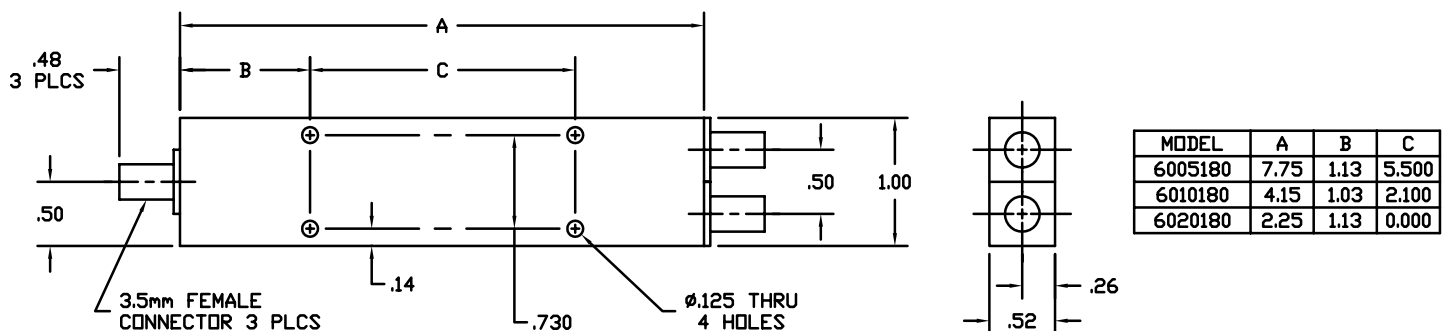
**MLDD** signifies Matched-line Directional Divider, a new class of microwave directional devices invented and patented by Tom Russell.

**SPECIFICATIONS**

FREQUENCY RANGE (GHz)	MODEL	BAND SEGMENTS	VSWR	INSERTION LOSS (dB)	ISOLATION (dB)	MAXIMUM AMPLITUDE TRACKING (dB)	MAXIMUM PHASE TRACKING (deg.)	WEIGHT (ounces)
0.5 - 18.0	6005180	0.5 - 18.0	1.45	1.5	> 19	0.3	6	7
1.0 - 18.0	6010180	1.0 - 18.0	1.45	1.2	> 19	0.3	6	4
2.0 - 18.0	6020180	2.0 - 18.0	1.45	1.1	> 19	0.3	6	2

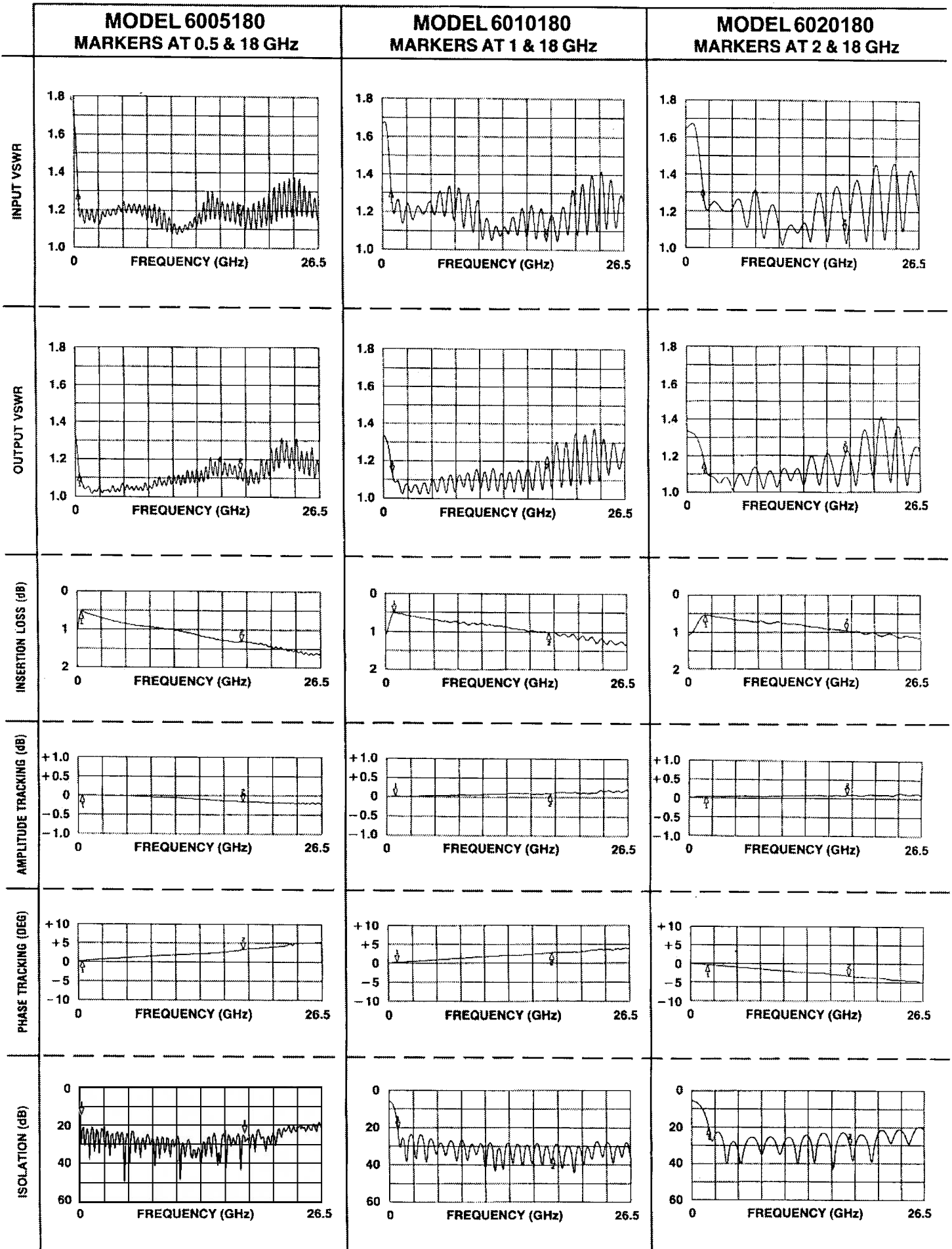
Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's. Units with tighter amplitude and phase tracking specifications can be supplied.

**DIMENSIONS**



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# TYPICAL PERFORMANCE CURVES





**KRYTAR**<sup>®</sup>

**MODELS 6005265, 6010265 & 6020265  
MLDD 2-WAY POWER DIVIDERS  
0.5-26.5, 1.0-26.5 & 2.0-26.5 GHz**



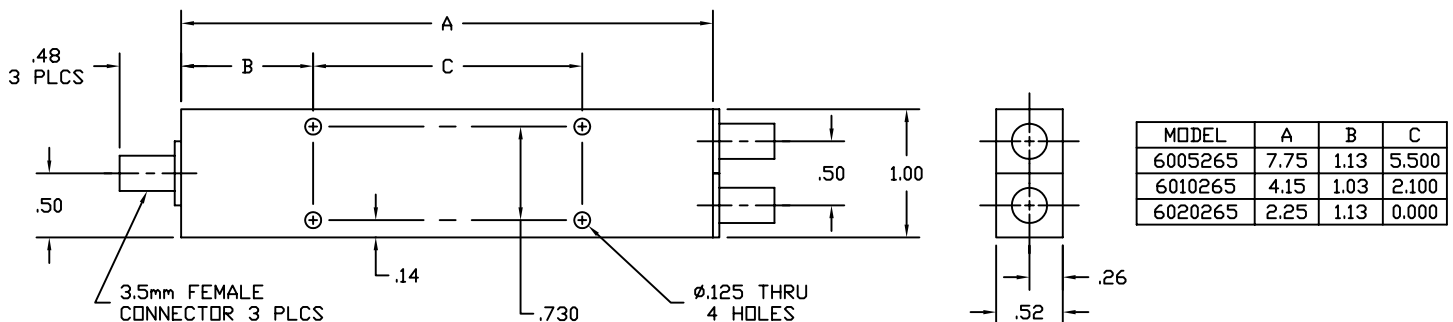
**MLDD** signifies Matched-line Directional Divider, a new class of microwave directional devices invented and patented by Tom Russell.

**SPECIFICATIONS**

FREQUENCY RANGE (GHz)	MODEL	BAND SEGMENTS	VSWR	INSERTION LOSS (dB)	ISOLATION (dB)	MAXIMUM AMPLITUDE TRACKING (dB)	MAXIMUM PHASE TRACKING (deg.)	WEIGHT (ounces)
0.5 - 26.5	6005265	0.5 - 18	1.45	1.5	> 19	0.3	6	7
		18 - 26.5	1.60	1.9	> 19	0.5	10	
1.0 - 26.5	6010265	1.0 - 18	1.45	1.2	> 19	0.3	6	4
		18 - 26.5	1.60	1.6	> 21	0.5	10	
2.0 - 26.5	6020265	2.0 - 18	1.45	1.1	> 19	0.3	6	2
		18 - 26.5	1.60	1.4	> 18	0.5	10	

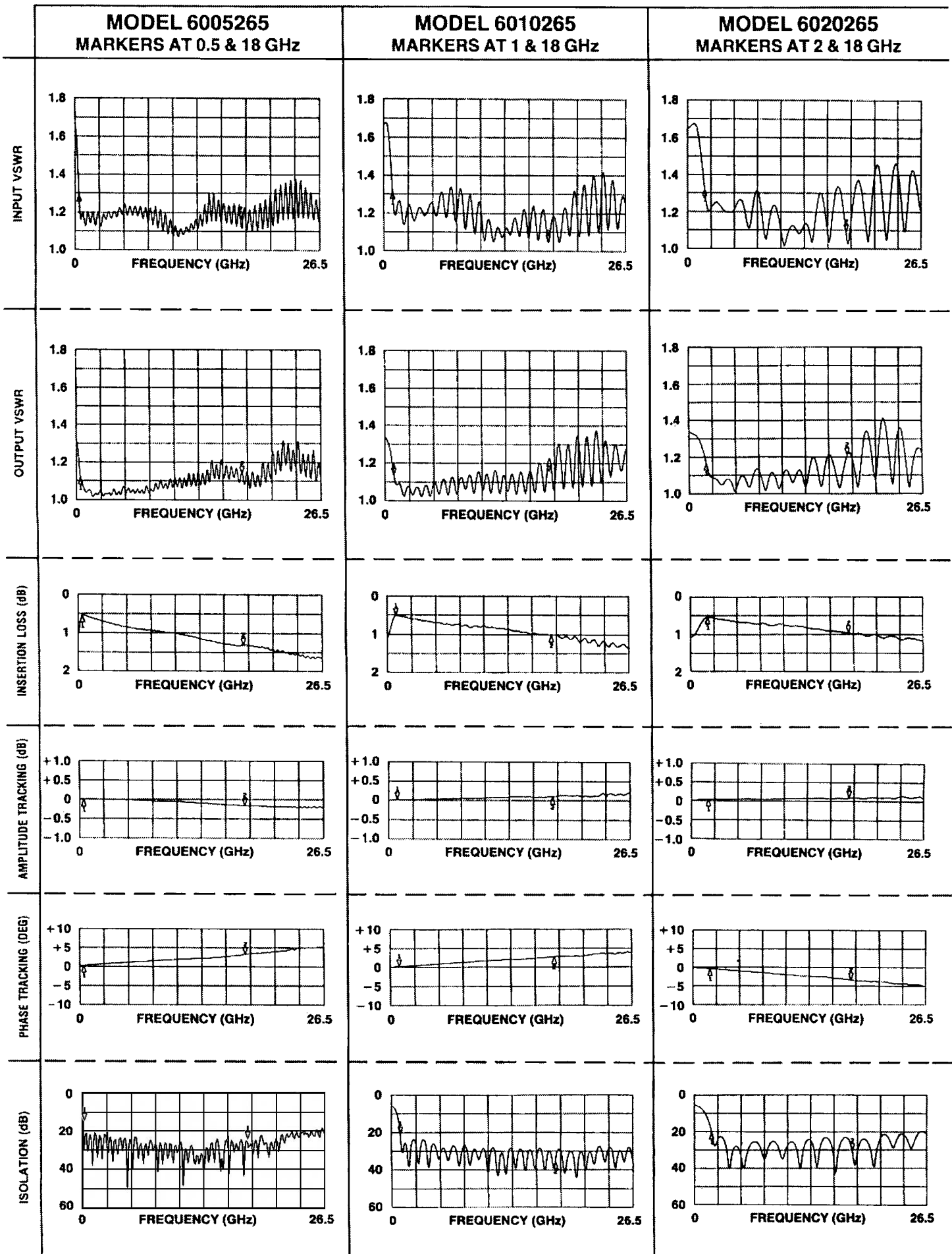
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**DIMENSIONS**



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# TYPICAL PERFORMANCE CURVES



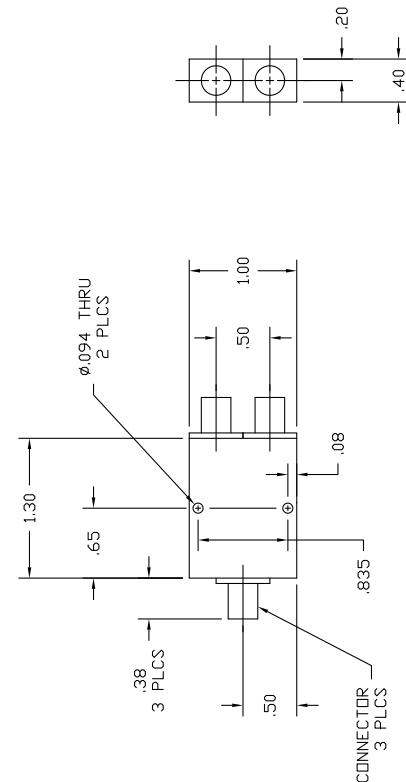


### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	26.5-40 GHz
<b>MAXIMUM VSWR</b>	1.90
<b>INSERTION LOSS</b>	< 1.9 dB
<b>ISOLATION</b>	> 14.5 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.38 dB
<b>MAXIMUM PHASE TRACKING</b>	± 8°
<b>WEIGHT (ounces)</b>	1.1
<b>STANDARD CONNECTORS</b>	
6265400	2.4 mm Female
6265400K	2.92 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively.  
Input power rating is 10 watts with 2:1 load VSWR's.

### DIMENSIONS



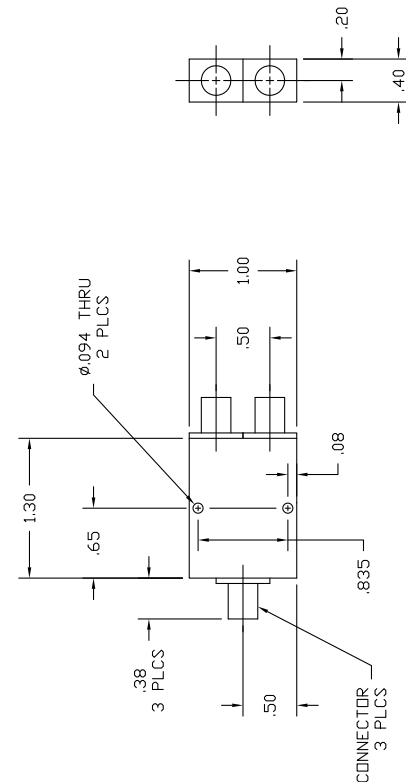


### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	18-40 GHz
<b>MAXIMUM INPUT VSWR</b>	1.9
<b>MAXIMUM OUTPUT VSWR</b>	2.1
<b>INSERTION LOSS</b>	< 2.1 dB
<b>ISOLATION</b>	> 14 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.5 dB
<b>MAXIMUM PHASE TRACKING</b>	± 8°
<b>WEIGHT (ounces)</b>	1.1
<b>STANDARD CONNECTORS</b>	2.4 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

### DIMENSIONS





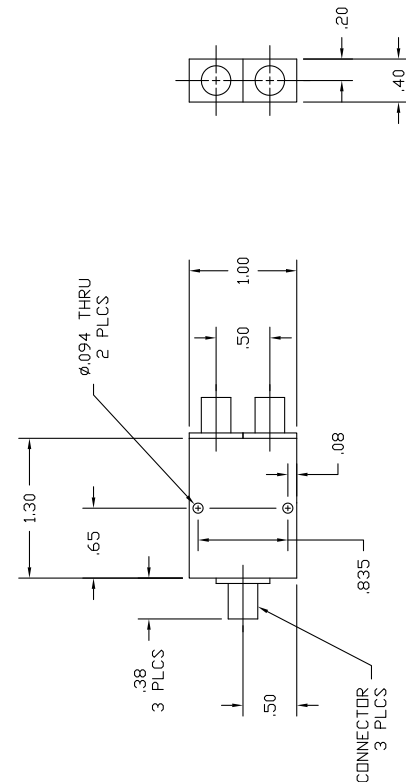


### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	18-40 GHz
<b>MAXIMUM VSWR</b>	1.90
<b>INSERTION LOSS</b>	< 1.9 dB
<b>ISOLATION</b>	> 14.5 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.5 dB
<b>MAXIMUM PHASE TRACKING</b>	± 8°
<b>WEIGHT (ounces)</b>	1.1
<b>STANDARD CONNECTORS</b>	2.92 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

### DIMENSIONS



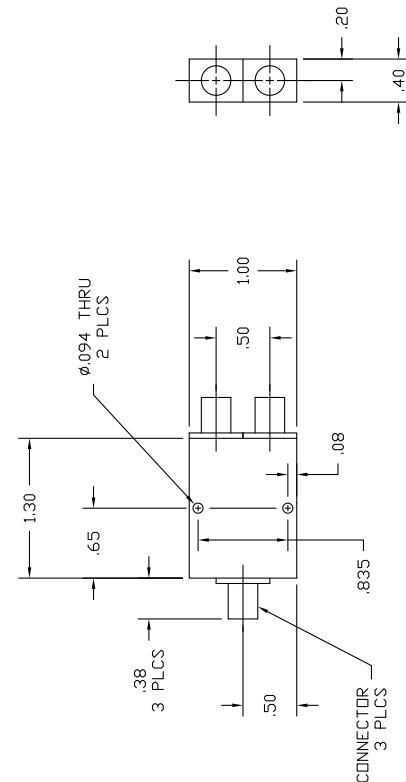


### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	10-40 GHz
<b>MAXIMUM INPUT VSWR</b>	1.9
<b>MAXIMUM OUTPUT VSWR</b>	2.1
<b>INSERTION LOSS</b>	< 2.1 dB
<b>ISOLATION</b>	> 14 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.5 dB
<b>MAXIMUM PHASE TRACKING</b>	± 8°
<b>WEIGHT (ounces)</b>	1.1
<b>STANDARD CONNECTORS</b>	2.4 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

### DIMENSIONS



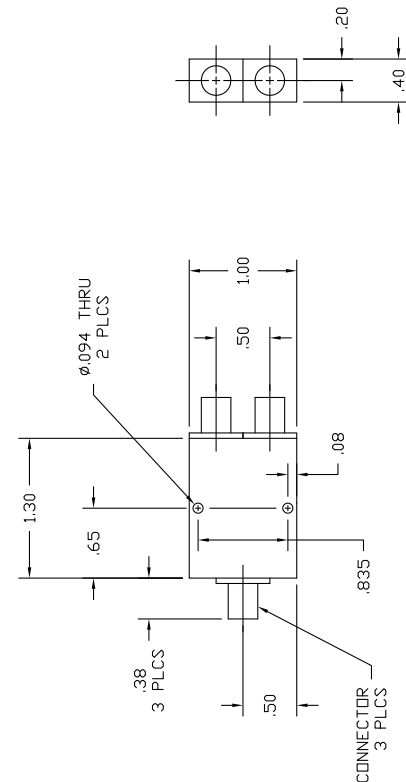


### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	10-40 GHz
<b>MAXIMUM VSWR</b>	1.90
<b>INSERTION LOSS</b>	< 1.9 dB
<b>ISOLATION</b>	> 14.5 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.5 dB
<b>MAXIMUM PHASE TRACKING</b>	± 8°
<b>WEIGHT (ounces)</b>	1.1
<b>STANDARD CONNECTORS</b>	2.92 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

### DIMENSIONS



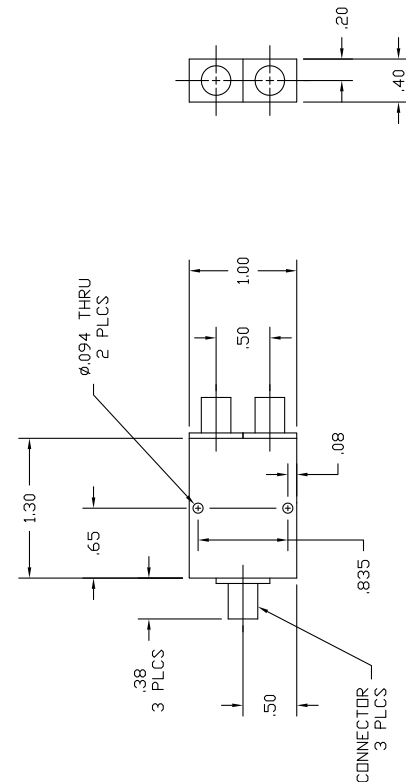


### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	6-40 GHz
<b>MAXIMUM INPUT VSWR</b>	1.9
<b>MAXIMUM OUTPUT VSWR</b>	2.1
<b>INSERTION LOSS</b>	< 2.1 dB
<b>ISOLATION</b>	> 14 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.5 dB
<b>MAXIMUM PHASE TRACKING</b>	± 8°
<b>WEIGHT (ounces)</b>	1.1
<b>STANDARD CONNECTORS</b>	2.4 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

### DIMENSIONS



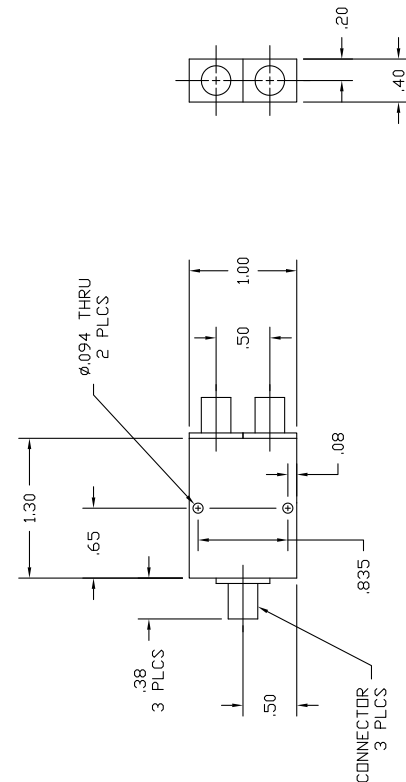


### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	6-40 GHz
<b>MAXIMUM VSWR</b>	1.90
<b>INSERTION LOSS</b>	< 1.9 dB
<b>ISOLATION</b>	> 14.5 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.5 dB
<b>MAXIMUM PHASE TRACKING</b>	± 8°
<b>WEIGHT (ounces)</b>	1.1
<b>STANDARD CONNECTORS</b>	2.92 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

### DIMENSIONS



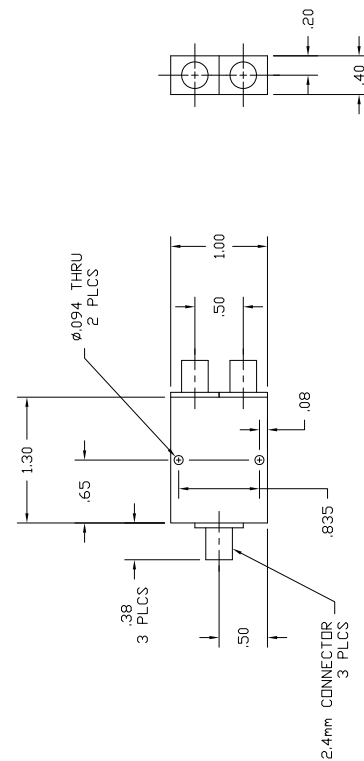


### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	3-40 GHz
<b>MAXIMUM INPUT VSWR</b>	1.9
<b>MAXIMUM OUTPUT VSWR</b>	2.1
<b>INSERTION LOSS</b>	< 2.1 dB
<b>ISOLATION</b>	> 14 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.5 dB
<b>MAXIMUM PHASE TRACKING</b>	± 8°
<b>WEIGHT (ounces)</b>	1.1
<b>STANDARD CONNECTORS</b>	2.4 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

### DIMENSIONS



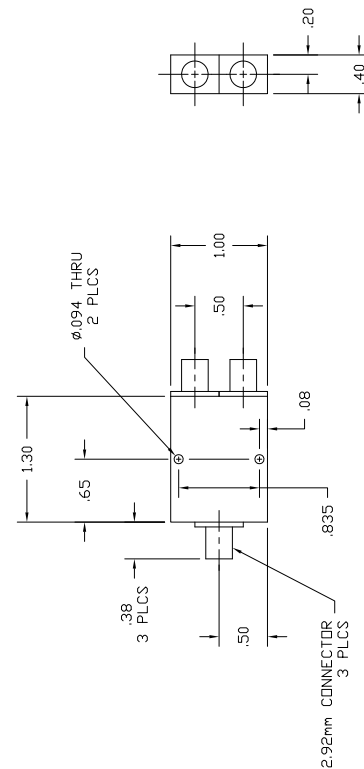


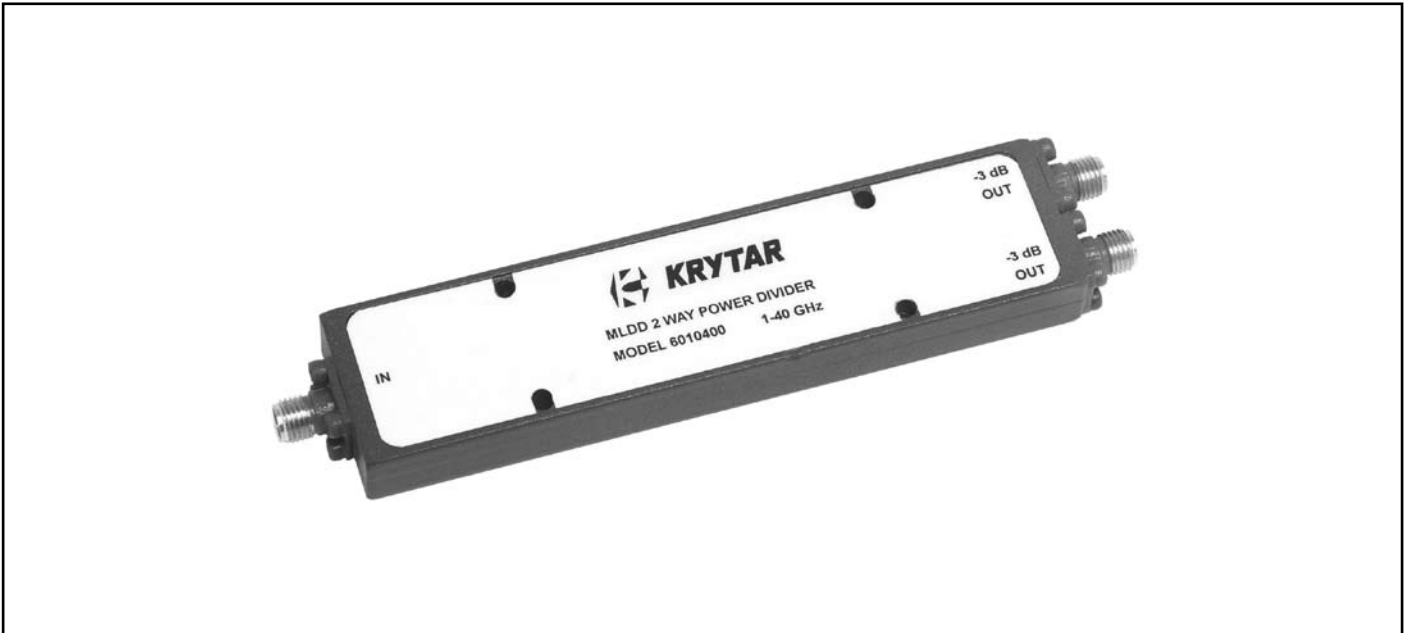
### SPECIFICATIONS

FREQUENCY RANGE	3-40 GHz
MAXIMUM VSWR	1.9
INSERTION LOSS	< 1.9 dB
ISOLATION	> 14.5 dB
MAXIMUM AMPLITUDE TRACKING	± 0.5 dB
MAXIMUM PHASE TRACKING	± 8°
WEIGHT (ounces)	1.1
STANDARD CONNECTORS	2.92 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively.  
Input power rating is 10 watts with 2:1 load VSWR's.

### DIMENSIONS



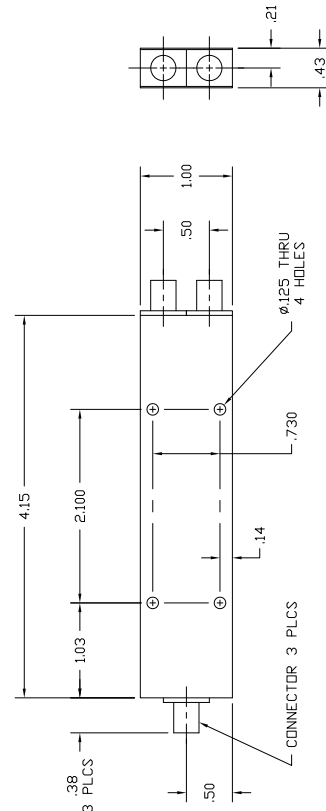


### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	1-40 GHz
<b>MAXIMUM INPUT VSWR</b>	1.65, 1-20 GHz 1.85, 20-40 GHz
<b>MAXIMUM OUTPUT VSWR</b>	1.50, 1-20 GHz 1.70, 20-40 GHz
<b>INSERTION LOSS</b>	< 2.5 dB
<b>ISOLATION</b>	> 14 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.60 dB
<b>MAXIMUM PHASE TRACKING</b>	± 7°, 1-20 GHz ± 14°, 20-40 GHz
<b>WEIGHT (ounces)</b>	3.0
<b>STANDARD CONNECTORS</b>	
6010400	2.4 mm Female
6010400K	2.92 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively.  
Input power rating is 10 watts with 2:1 load VSWR's.

### DIMENSIONS





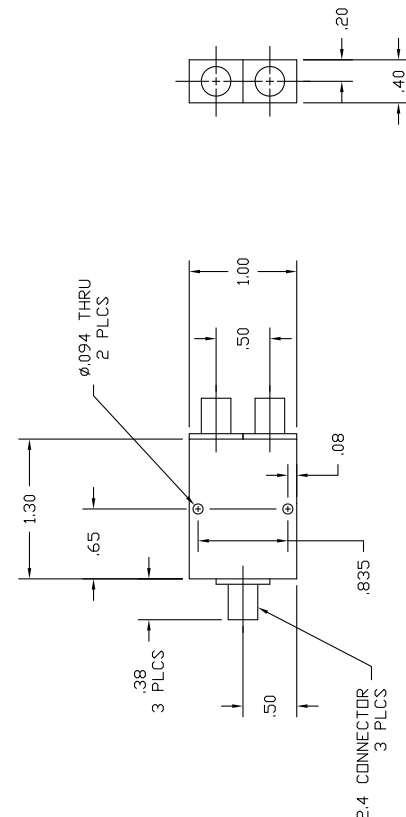


### SPECIFICATIONS

<b>FREQUENCY RANGE</b>	3-45 GHz
<b>MAXIMUM INPUT VSWR</b>	2.3, 3-45 GHz
<b>MAXIMUM OUTPUT VSWR</b>	1.8, 3-36 GHz 2.5, 36-45 GHz
<b>INSERTION LOSS (MAX.)</b>	2.1 dB, 3-36 GHz 2.8 dB, 36-45 GHz
<b>ISOLATION</b>	> 14 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.50 dB, 3-36 GHz ± 0.70 dB, 36-45 GHz
<b>MAXIMUM PHASE TRACKING</b>	± 10°, 3-36 GHz ± 14°, 36-45 GHz
<b>WEIGHT (ounces)</b>	1.1
<b>STANDARD CONNECTORS</b>	2.4 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively.  
 Input power rating is 10 watts with 2:1 load VSWR's.

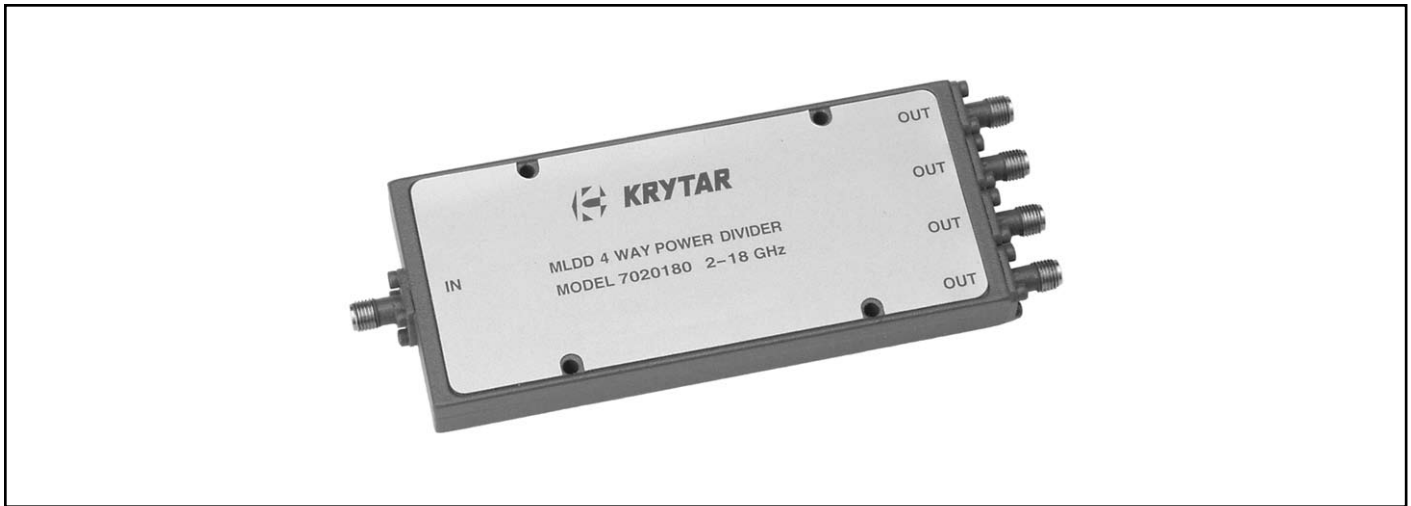
### DIMENSIONS





**KRYTAR**<sup>®</sup>

**MODELS 7005180, 7010180 & 7020180  
MLDD 4-WAY POWER DIVIDERS  
0.5-18.0, 1.0-18.0 & 2.0-18.0 GHz**



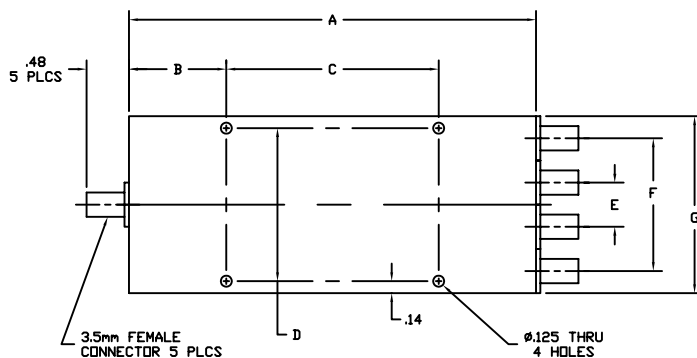
**MLDD** signifies Matched-line Directional Divider, a new class of microwave directional devices invented and patented by Tom Russell.

**SPECIFICATIONS**

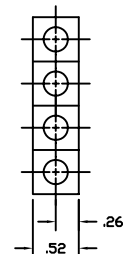
FREQUENCY RANGE (GHz)	MODEL	INPUT VSWR	OUTPUT VSWR	INSERTION LOSS (dB)	ISOLATION (dB)	MAXIMUM AMPLITUDE TRACKING (dB)	MAXIMUM PHASE TRACKING (deg.)	WEIGHT (ounces)
0.5 - 18.0	7005180	1.7	1.5	4.0	> 16	1.0	10	17
1.0 - 18.0	7010180	1.7	1.5	3.0	> 16	0.8	10	10
2.0 - 18.0	7020180	1.7	1.5	2.0	> 16	0.6	10	8

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

**DIMENSIONS**



MODEL	A	B	C	D	E	F	G
7005180	8.00	1.25	5.500	2.330	1.10	2.10	2.60
7010180	4.50	1.10	2.300	2.330	1.10	2.10	2.60
7020180	4.60	1.10	2.400	1.730	0.50	1.50	2.00

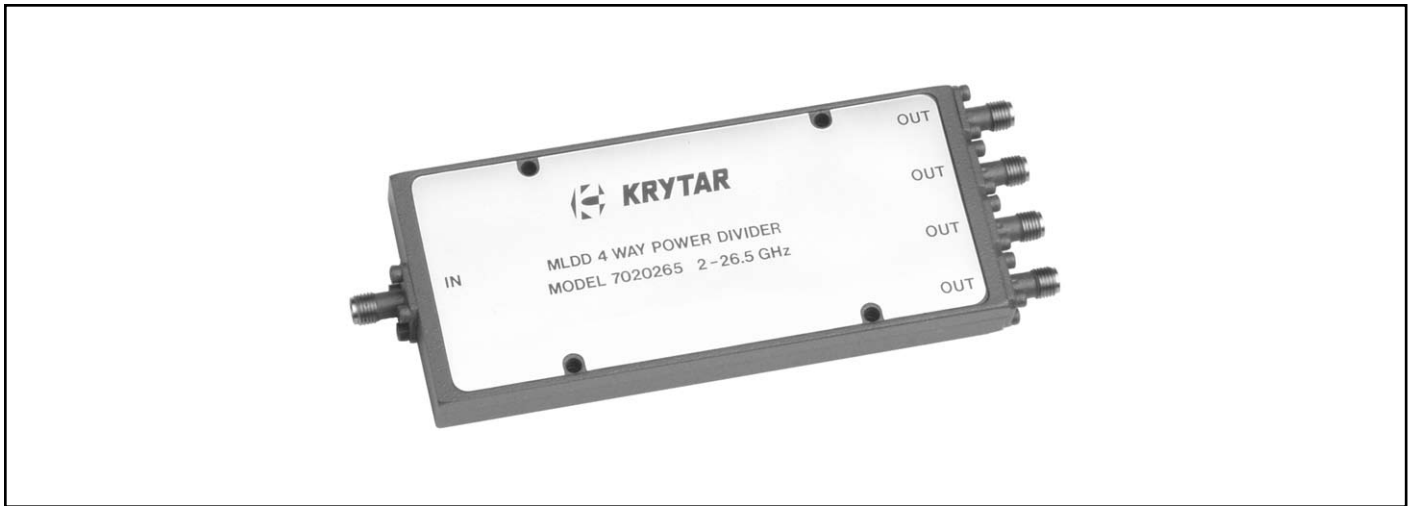


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**KRYTAR**<sup>®</sup>

**MODELS 7005265, 7010265 & 7020265  
MLDD 4-WAY POWER DIVIDERS  
0.5-26.5, 1.0-26.5 & 2.0-26.5 GHz**



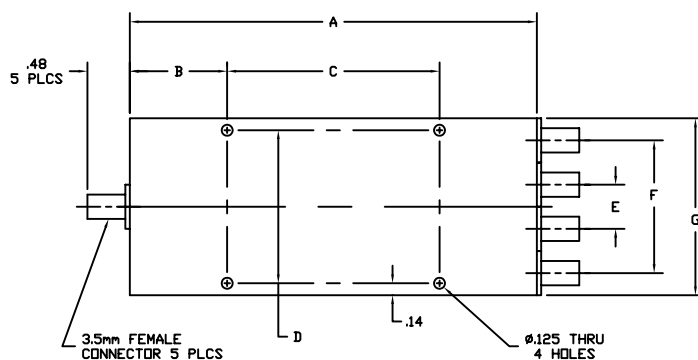
**MLDD** signifies Matched-line Directional Divider, a new class of microwave directional devices invented and patented by Tom Russell.

**SPECIFICATIONS**

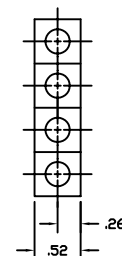
FREQUENCY RANGE (GHz)	MODEL	INPUT VSWR	OUTPUT VSWR	INSERTION LOSS (dB)	ISOLATION (dB)	MAXIMUM AMPLITUDE TRACKING (dB)	MAXIMUM PHASE TRACKING (deg.)	WEIGHT (ounces)
0.5 - 26.5	7005265	1.8	1.7	4.3	> 16	1.2	15	17
1.0 - 26.5	7010265	1.9	1.7	3.3	> 16	1.0	15	10
2.0 - 26.5	7020265	1.9	1.7	2.3	> 16	1.0	15	8

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

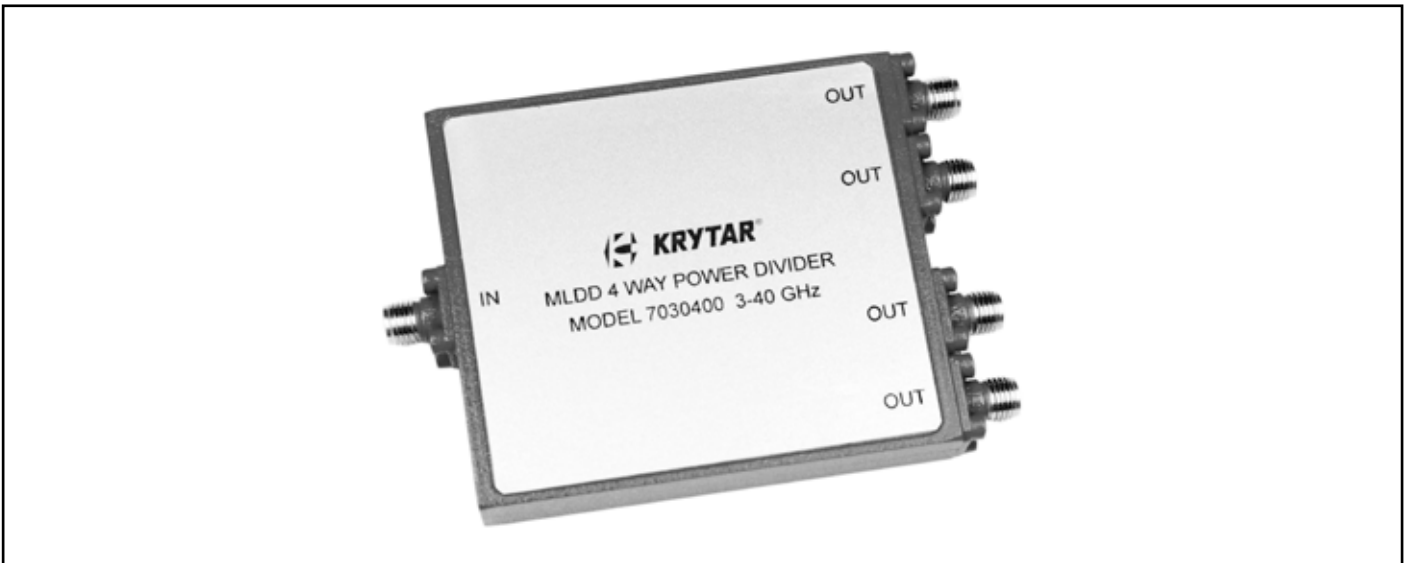
**DIMENSIONS**



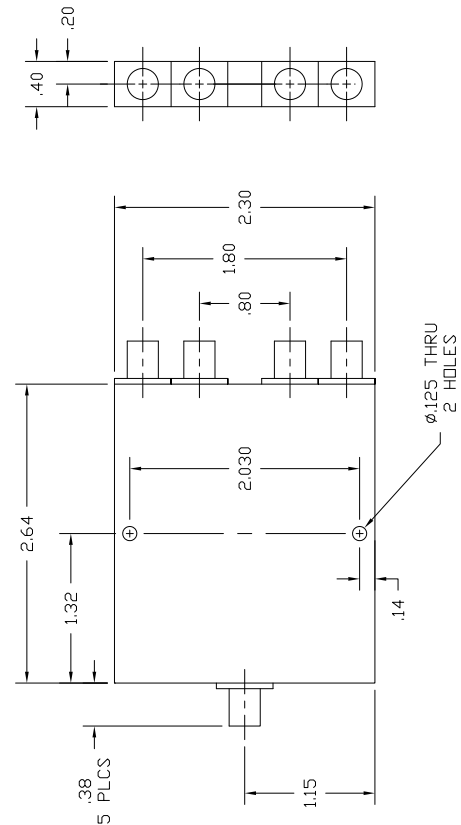
MODEL	A	B	C	D	E	F	G
7005265	8.00	1.25	5.500	2.330	1.10	2.10	2.60
7010265	4.50	1.10	2.300	2.330	1.10	2.10	2.60
7020265	4.60	1.10	2.400	1.730	0.50	1.50	2.00



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**SPECIFICATIONS**

<b>FREQUENCY RANGE</b>	3-40 GHz
<b>MAXIMUM INPUT VSWR</b>	1.9, 3-32 GHz 2.5, 32-40 GHz
<b>MAXIMUM OUTPUT VSWR</b>	1.70, 3-32 GHz 2.0, 32-40 GHz
<b>INSERTION LOSS</b>	< 3.0 dB, 3-32 GHz < 3.6 dB, 32-40 GHz
<b>ISOLATION</b>	> 13 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 0.5 dB
<b>MAXIMUM PHASE TRACKING</b>	± 11°, 3-32 GHz ± 15°, 32-40 GHz
<b>WEIGHT (ounces)</b>	4.1
<b>STANDARD CONNECTORS</b>	
7030400	2.4 mm Female
7030400K	2.92 mm Female

**DIMENSIONS**


Amplitude and Phase Tracking are the ratio of one output to the other in dB or degrees respectively. Input Power Rating is 10 watts with 2:1 load VSWR's.

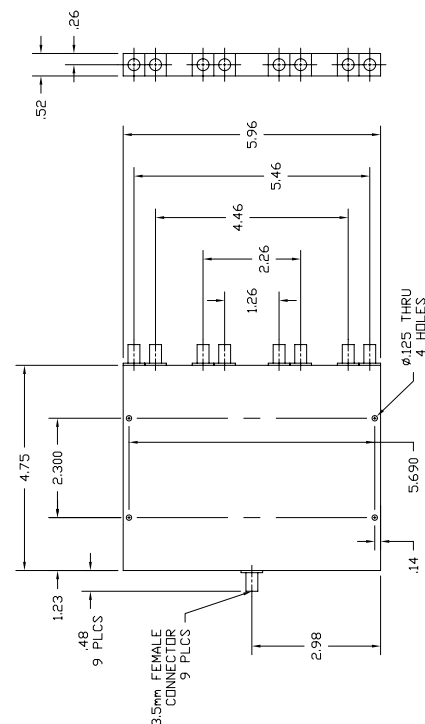


## SPECIFICATIONS

<b>FREQUENCY RANGE</b>	1-18 GHz
<b>MAXIMUM VSWR</b>	
INPUT	2.10
OUTPUT	1.75
<b>INSERTION LOSS (MAX)</b>	5.5 dB
<b>ISOLATION</b>	> 17 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 1.0 dB
<b>MAXIMUM PHASE TRACKING</b>	± 15°
<b>WEIGHT</b>	1 lb. 6.5 oz.
<b>STANDARD CONNECTORS</b>	3.5 mm Female

Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

## DIMENSIONS



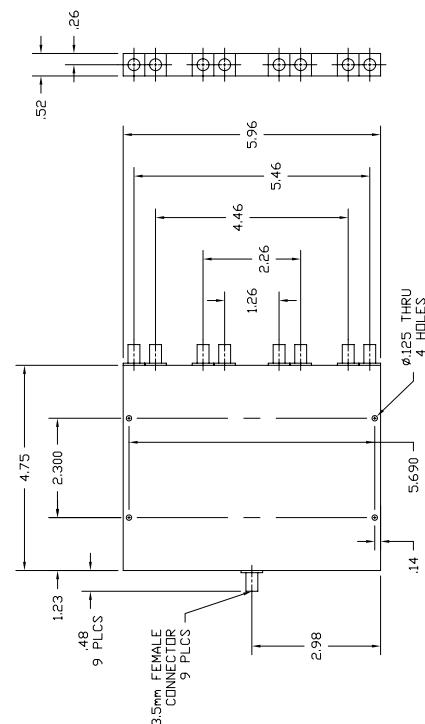


## SPECIFICATIONS

<b>FREQUENCY RANGE</b>	2-18 GHz
<b>MAXIMUM VSWR</b>	
<b>INPUT</b>	2.00
<b>OUTPUT</b>	1.75
<b>INSERTION LOSS (MAX)</b>	5.5 dB
<b>ISOLATION</b>	> 17 dB
<b>MAXIMUM AMPLITUDE TRACKING</b>	± 1.0 dB
<b>MAXIMUM PHASE TRACKING</b>	± 15°
<b>WEIGHT</b>	1 lb. 6.5 oz.
<b>STANDARD CONNECTORS</b>	3.5 mm Female

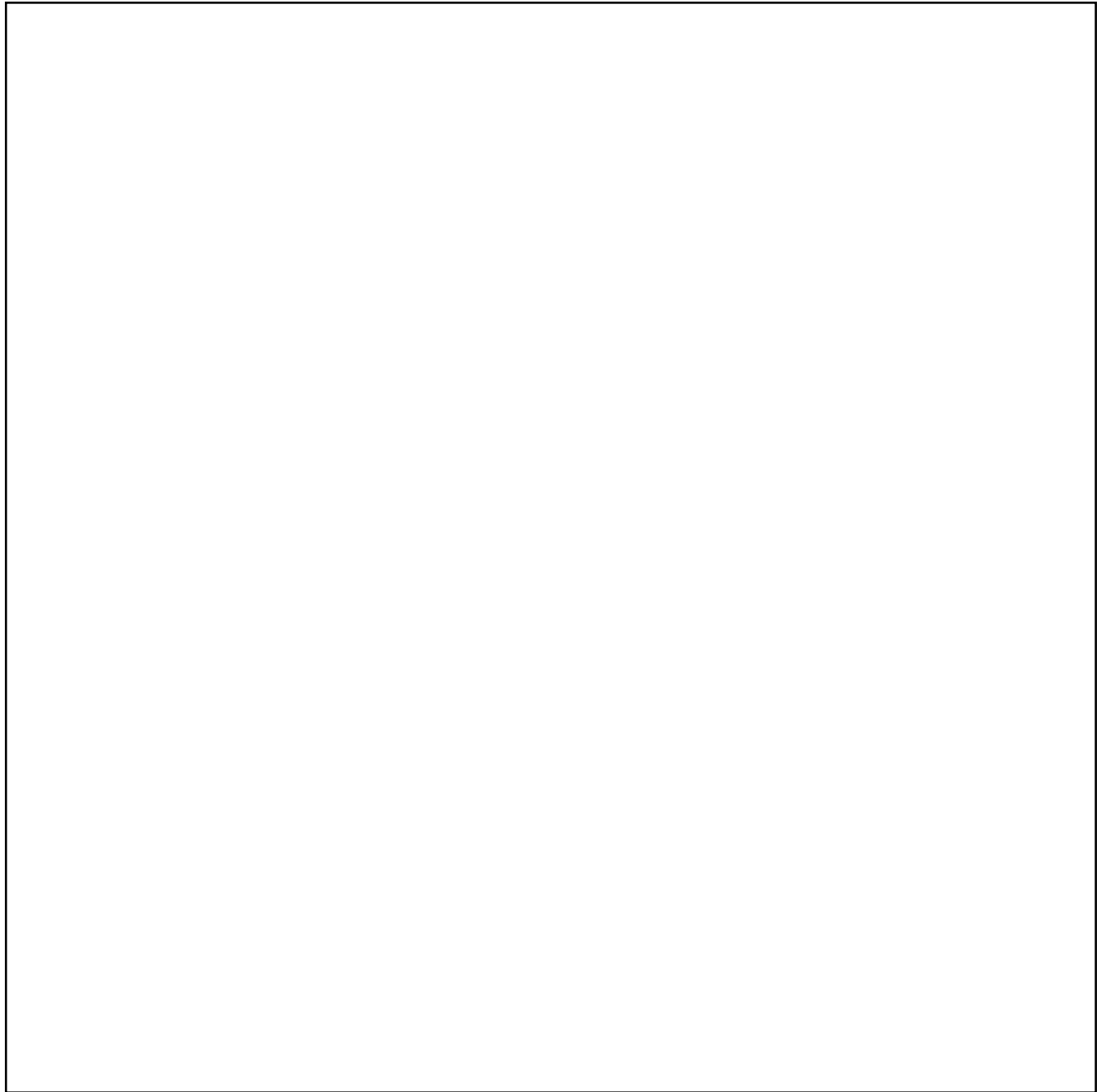
Amplitude and phase tracking are the ratio of one output to the other in dB or degrees respectively. Input power rating is 10 watts with 2:1 load VSWR's.

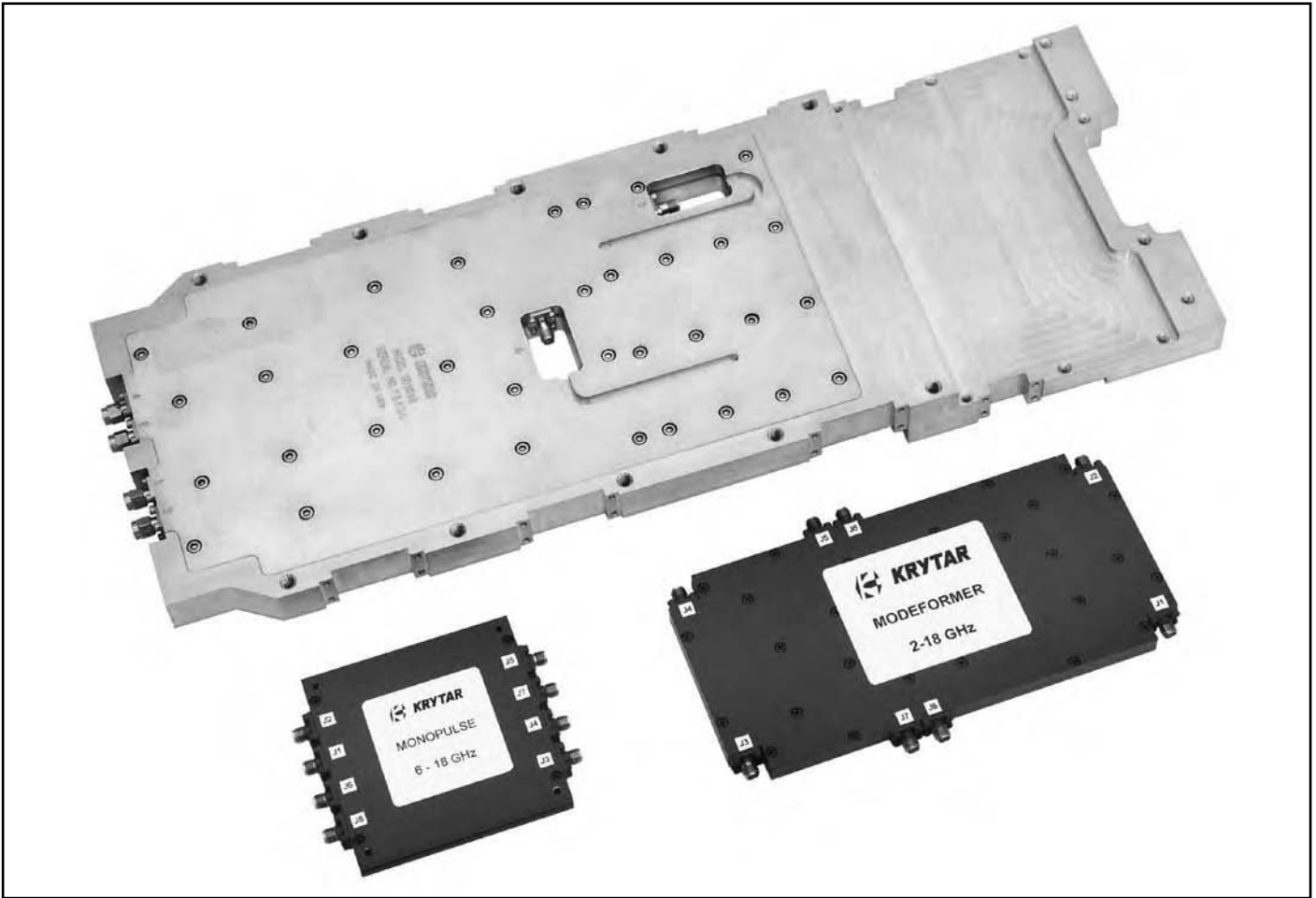
## DIMENSIONS





## Custom Design Subsystems





### MODEFORMER MODEL 8020180

#### TRUTH TABLE PORT to PORT PHASE RELATIONSHIP

PORT	5	6	7	8
1	1	1	1	1
2	1	1	-1	-1
3	1	-1	-1	1
4	1	-1	1	-1

Custom Designs available, as shown in picture.



## COAXIAL ADAPTERS





## SPECIFICATIONS

### ALL MODELS

FREQUENCY RANGE	MAXIMUM VSWR
DC-18 GHz	1.10
18-27 GHz	1.15
INSERTION LOSS = $0.030 \cdot \sqrt{f(\text{GHz})}$ dB	

### APPLICATION:

- DC to 27.0 GHz High Performance

### FEATURES:

- Low VSWR
- Equal Electrical Length
- Performance Consistency Unit to Unit
- Temperature Rating -55° to +165°C

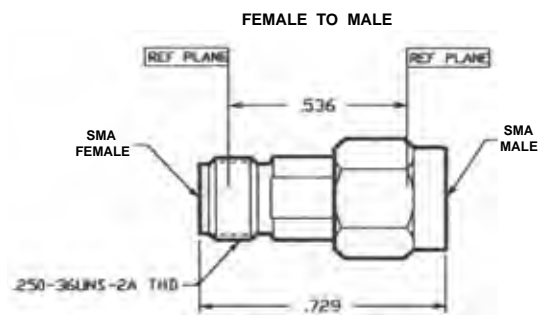
### INTERFACE:

- Per MIL-STD-348A,

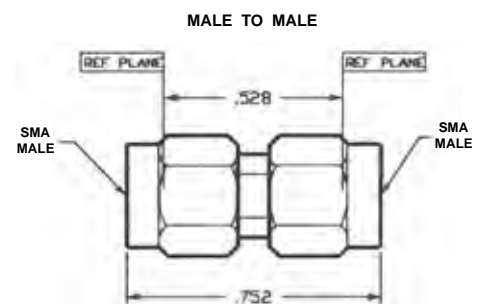
### CONSTRUCTION:

- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper, Gold
- Mechanical Integrity: Rigid High Temperature Capture

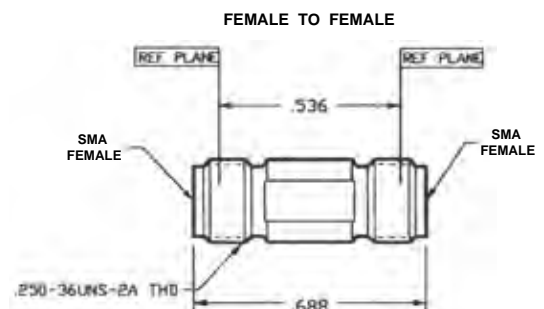
## DIMENSIONS



**MODEL 1030**



**MODEL 1031**



**MODEL 1032**



## SPECIFICATIONS

### ALL MODELS

FREQUENCY RANGE	MAXIMUM VSWR
DC-27 GHz	1.10
27-40 GHz	1.15
INSERTION LOSS = $0.030 \cdot \sqrt{f(\text{GHz})}$ dB	

### APPLICATION:

- DC to 40.0 GHz High Performance

### FEATURES:

- Low VSWR
- Equal Electrical Length
- Performance Consistency Unit to Unit
- Temperature Rating -55° to +135°C

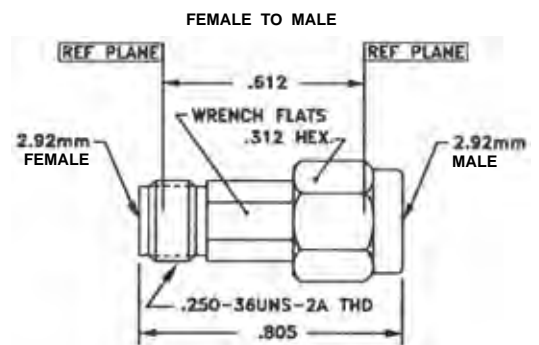
### INTERFACE:

- Per MIL-STD-348A,

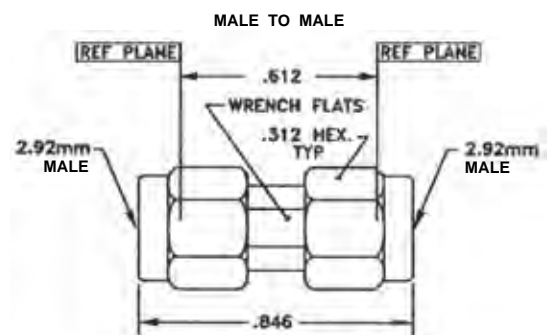
### CONSTRUCTION:

- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper, Gold
- Mechanical Integrity: Rigid High Temperature Capture

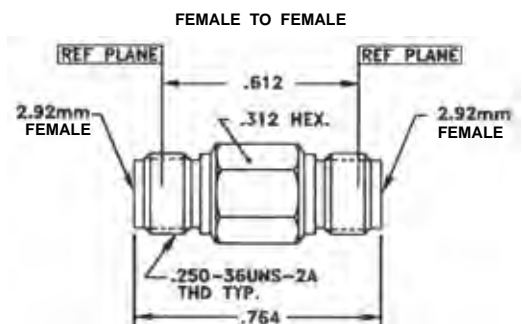
## DIMENSIONS



**MODEL 2030**



**MODEL 2031**



**MODEL 2032**



## SPECIFICATIONS

### ALL MODELS

FREQUENCY RANGE	MAXIMUM VSWR
DC-27 GHz	1.10
27-40 GHz	1.15
40-50 GHz	1.20
<b>INSERTION LOSS = <math>0.035\sqrt{f(\text{GHz})}</math> dB</b>	

### APPLICATION:

- DC to 50.0 GHz High Performance

### FEATURES:

- Low VSWR
- Minimum VSWR Contribution When Used as Connector Savers
- Equal Electrical Length
- Performance Consistency Unit to Unit
- Temperature Rating -55° to +135°C

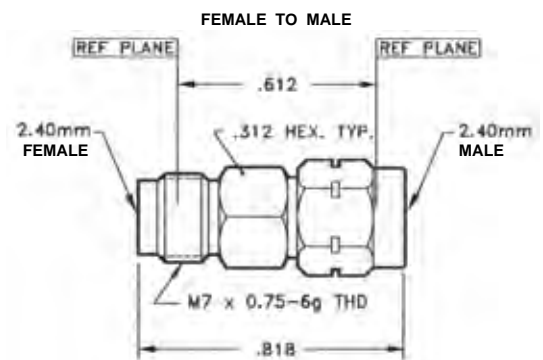
### INTERFACE:

- Per MIL-STD-348A,

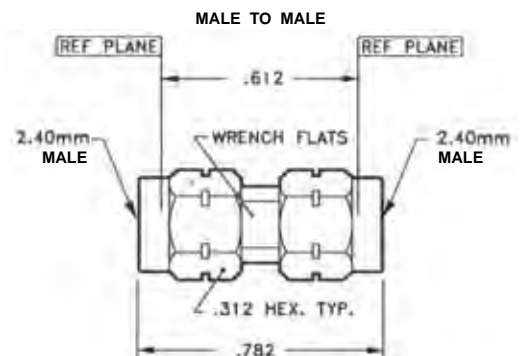
### CONSTRUCTION:

- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper, Gold
- Mechanical Integrity: Rigid High Temperature Capture

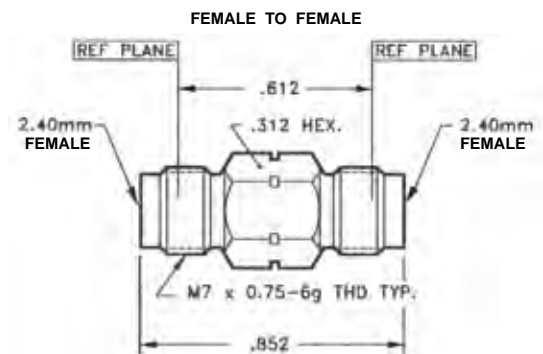
## DIMENSIONS



**MODEL 3030**



**MODEL 3031**



**MODEL 3032**



## SPECIFICATIONS

### ALL MODELS

FREQUENCY RANGE	MAXIMUM VSWR
DC-18 GHz	1.10
18-40 GHz	1.15
40-50 GHz	1.18
50-67 GHz	1.25

FREQUENCY RANGE	MAXIMUM INSERTION LOSS
DC-7 GHz	.040 * $\sqrt{f}$ GHz
7-67 GHz	.035 * $\sqrt{f}$ GHz

#### APPLICATION:

- DC to 67.0 GHz High Performance

#### FEATURES:

- Low VSWR
- Low Insertion Loss
- Equal Electrical Length
- Temperature Rating -55° to +165°C
- RF Leakage: < -100 dB

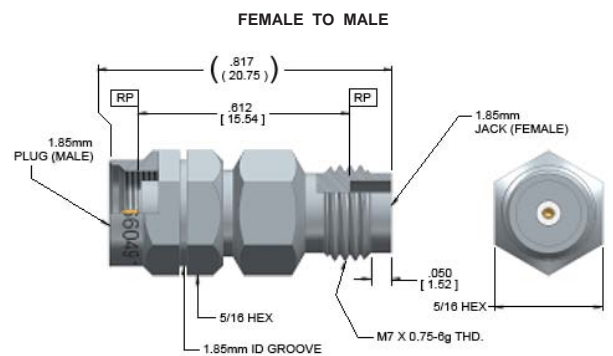
#### INTERFACE:

- Per MIL-STD-348A

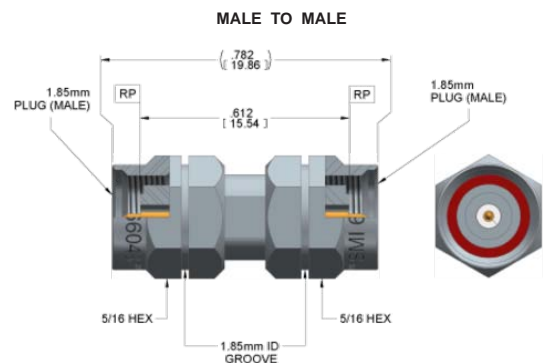
#### CONSTRUCTION:

- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper, Gold
- Center Contact Capture: Ultem 1000 Per ASTM D5205 and KEL-F Per ASTM D1430

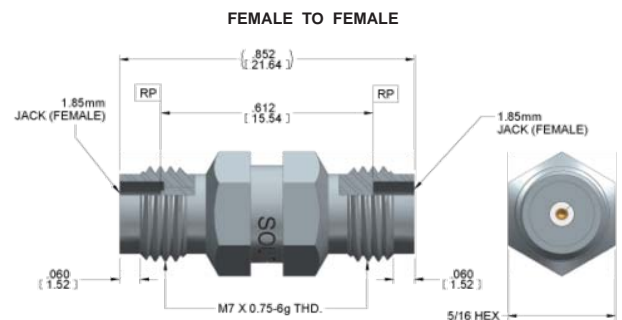
## DIMENSIONS



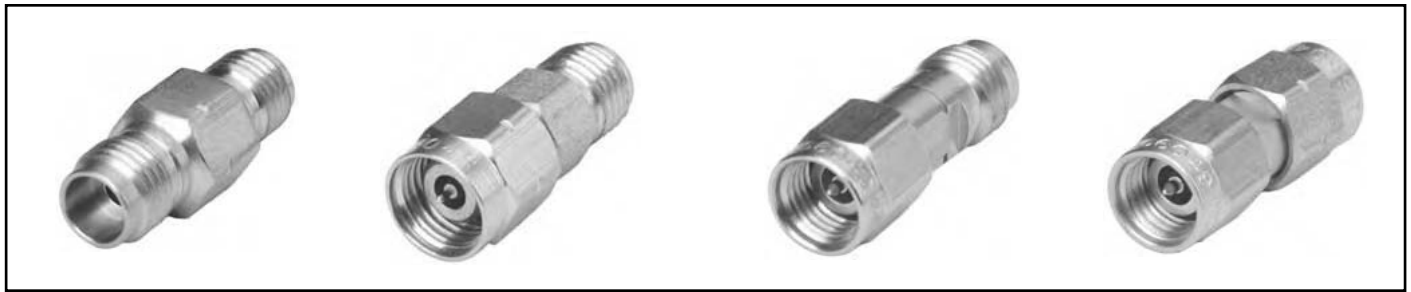
**MODEL 4030**



**MODEL 4031**



**MODEL 4032**



## SPECIFICATIONS

### ALL MODELS

FREQUENCY RANGE	MAXIMUM VSWR
DC-18 GHz	1.10
18-40 GHz	1.15
<b>INSERTION LOSS = <math>0.030\sqrt{f(\text{GHz})}</math> dB</b>	

### APPLICATION:

- DC to 40.0 GHz High Performance

### FEATURES:

- Low VSWR
- Equal Electrical Length
- Performance Consistency Unit to Unit
- Temperature Rating -55° to +135°C

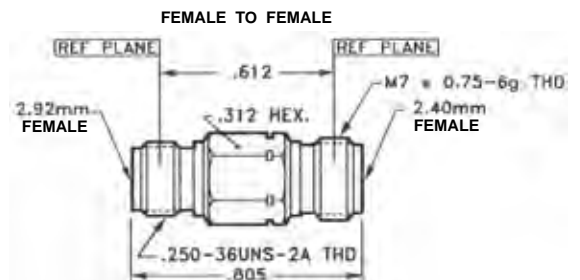
### INTERFACE:

- Per MIL-STD-348A,

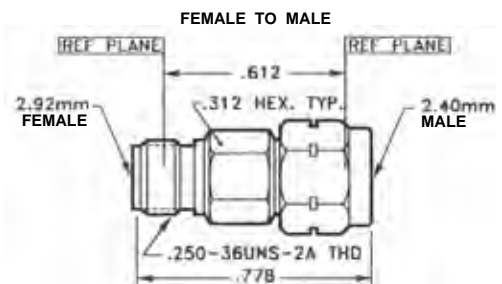
### CONSTRUCTION:

- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper, Gold
- Mechanical Integrity: Rigid High Temperature Capture

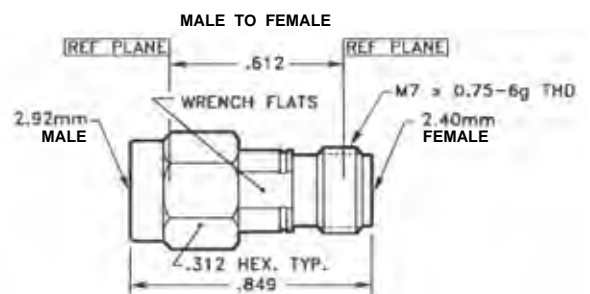
## DIMENSIONS



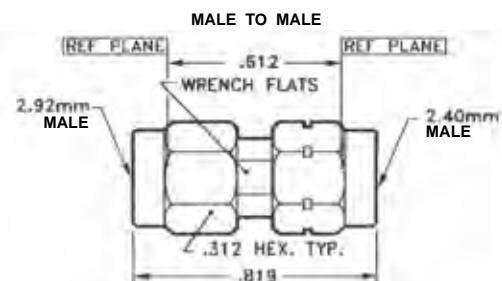
**MODEL 5010**



**MODEL 5020**



**MODEL 5030**



**MODEL 5040**



# POWER METER & POWER SENSORS



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The Krytar Model 9000B is a low cost, high performance CW power meter using a diode based power sensor. The power meter can measure power levels from -39 to +20 dBm and cover frequencies from 100 kHz to 40 GHz. With bench and field service applications in mind, the power meter was designed to be completely portable. The power meter can be used for swept measurement.

**The power meter is designed to offer these features:**

- Excellent measurement speed at all power levels
- Auto zero and dB Relative Mode
- Completely portable operating on internal rechargeable batteries that offer greater than 12 hours of operation and includes an internal fast battery charger
- Built in 50 MHz, 0 dBm reference oscillator
- V/dB output port for:
  - A) Swept scalar measurement system
  - B) Auxiliary display and bus readings when used with a DVM



**The 9000B power meter with a 9500A Series power sensor offers the user exceptional measurement speed and accuracy at an affordable price.**



## SPECIFICATIONS

### Model 9000B Power Meter

<b>Frequency range</b>	100 kHz to 40 GHz
<b>Power range (CW power)</b>	-30 to +20 dBm, usable to -39 dBm
<b>Ranging</b>	Auto-ranging, 2 ranges
<b>Linearity</b>	±0.05 dB @ 25° C ±0.1 dB, 10° to 40° C
<b>Accuracy, power reference</b>	50 MHz, 0 dBm ±0.05 @ 25° C (NIST traceable) ±0.1, 10° to 40° C
<b>Sensor zero</b>	Auto zero
<b>Digital 3 3/4 Display</b>	-39.99 to +39.99 dBm (0.01 dB steps) 3 readings/sec.
<b>dB/Volts output port</b>	0.1 Volts/dB, -4.0 to +4.0 V, 0.02 dB steps < 1 ms R/F time > 1 kHz 3 dB BW
<b>Temperature:</b> Operating Storage	+10° to +40° C -20° to +70° C
<b>Power requirement</b>	115 VAC, ±10%, 10 W 230 VAC, ±5% optional +10 to +24 VDC, 500mA
<b>Internal batteries and charger</b>	> 12 hours of operation. Charging time approx. 4.5 hrs.
<b>Dimensions</b>	3 5/8" H x 8 5/16" W x 11 1/2" D
<b>Weight</b>	4.8 lbs.

## OPTIONS

<b>Opt. 002</b>	RS-232 serial port
<b>Opt. 003</b>	IEEE-488 interface bus (not available with RS-232 option)
<b>Opt. 101</b>	Rack mount kit, single instrument
<b>Opt. 102</b>	Rack mount kit, dual instrument

## ACCESSORIES

<b>Opt. 501</b>	Padded carrying case with accessory pouch
<b>Opt. 502</b>	Automobile 12V power adapter with cord



## SPECIFICATIONS

### 9500A Series Diode Power Sensor

MODEL	Frequency Range	Maximum VSWR	Maximum Input	Power Linearity @ 25° C	Connector	Weight (oz)
9510A	100 kHz to 4 GHz	1.20	21 dBm	-20 to +20 dBm (±0.02 dBm) -30 to -20 dBm (±0.03 dBm) -40 to -30 dBm (±0.25 dBm)  10°C to 40°C add ±.15 dB	N male	7.5
9511A	100 kHz to 4 GHz	1.20			3.5 mm male	6.5
9515A	100 kHz to 12.4 GHz	1.20 to 4 GHz 1.30 to 12.4 GHz			N male	7.5
9516A	100 kHz to 12.4 GHz	1.20 to 4 GHz 1.30 to 12.4 GHz			3.5 mm male	6.5
9517A	100 kHz to 18 GHz	1.20 to 4 GHz 1.30 to 12.4 GHz 1.35 to 18 GHz			N male	7.5
9520A	100 kHz to 20 GHz	1.20 to 4 GHz 1.30 to 12.4 GHz 1.35 to 20 GHz			3.5 mm male	6.5
9530A	100 kHz to 26.5 GHz	1.20 to 4 GHz 1.30 to 12.4 GHz 1.35 to 20 GHz 1.50 to 26.5 GHz			3.5 mm male	6.5
9540A	100 kHz to 40 GHz	1.20 to 4 GHz 1.30 to 12.4 GHz 1.35 to 20 GHz 1.50 to 26.5 GHz 2.00 to 40 GHz			2.92 mm male	6.5



# **APPLICATIONS IDEAS**

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**Application Idea #1 - Microwave or RF Amplifier Test Setup**

**Application Idea #2 - External Leveling Loop for a Microwave Signal Generator**

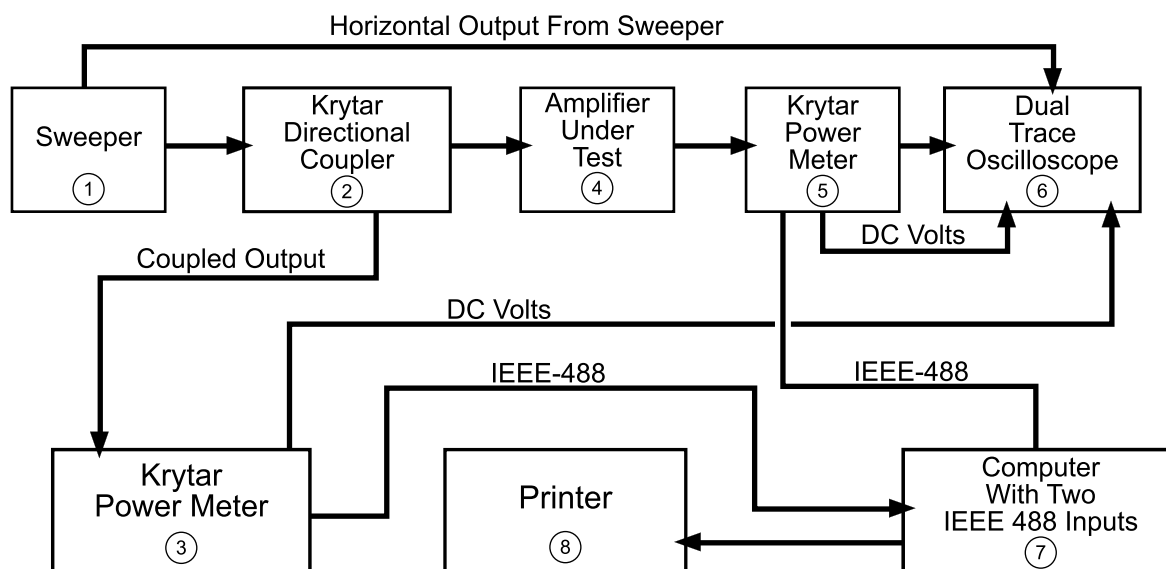
**Application Idea #3 - Inexpensive Scalar Measurement of a Band Pass Filter or Other Passive Device or Component**

**Application Idea #4 - Detector Risetime vs. Performance**

**Application Idea #5 - Term Definitions Testing Typical Applications**

# KRYTAR APPLICATIONS IDEA #1

## Microwave or RF Amplifier Test Setup



### EQUIPMENT REQUIRED

1. Microwave Sweep Generator with minimum sweep bandwidth of 1.0- to 26.5 GHz
2. Krytar Directional Coupler, Model 2620 with bandwidth of 1.0 to 26.5 GHz
3. Krytar Model 9000B Power Meter with 9530A Power Sensor and IEEE-488 Interface Option
4. Amplifier Under Test. Bandwidth may be anywhere between 1.0 to 26.5 GHz
5. Krytar Model 9000B Power Meter with 9530A Power Sensor and IEEE-488 Interface Option
6. Dual Trace X-Y Oscilloscope with horizontal sweep input
7. Computer that will accept IEEE-488 measurements from each of two power meters
8. Printer

### WHAT DOES IT MEASURE?

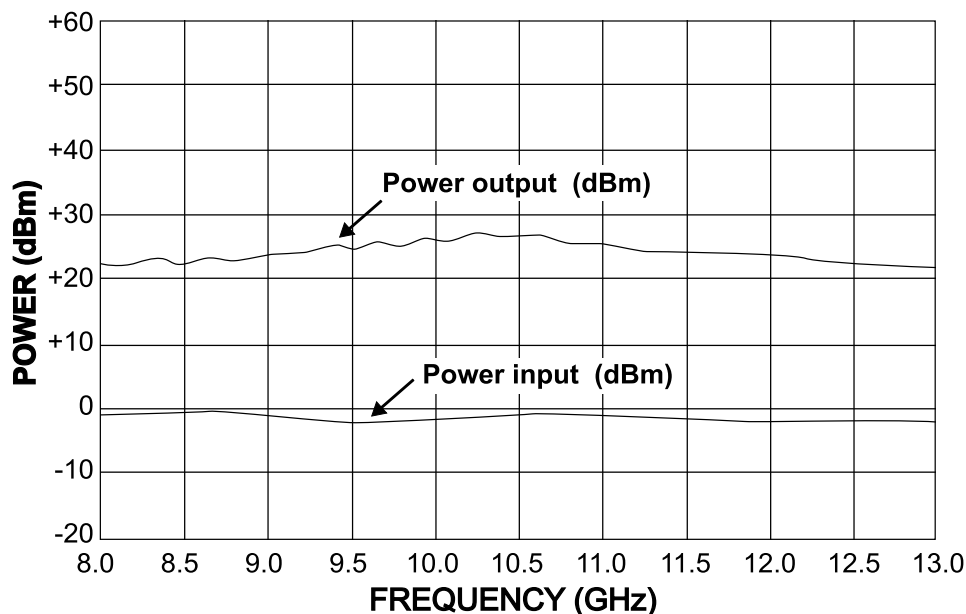
1. CW and Swept Power Input to the Amplifier Under Test. Accurate CW Power Input may be read directly from the digital display of the Power Meter. Swept Power Input is displayed on the Oscilloscope.
2. CW and Swept Power Output from the Amplifier Under Test. Accurate CW Power Output may be read directly from the digital display of the Power Meter. Swept Power Output is displayed on the Oscilloscope.
3. Gain may be calculated (Power Output minus Power Input).
4. Swept gain flatness (Power Output Curve) is displayed on the Oscilloscope.
5. CW Output Power at 1 dB can be derived (Point where CW Output Power is 1 dB less than CW Input Power as Input Power is increased).
6. CW Saturated Output Power can be derived (The point at which the CW Output Power does not increase when Input Power continues to be increased).
7. P1dB and Psat may also be read directly from the oscilloscope by comparing swept Output Power versus swept Input Power.

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## MICROWAVE & RF AMPLIFIER POWER INPUT VS. POWER OUTPUT



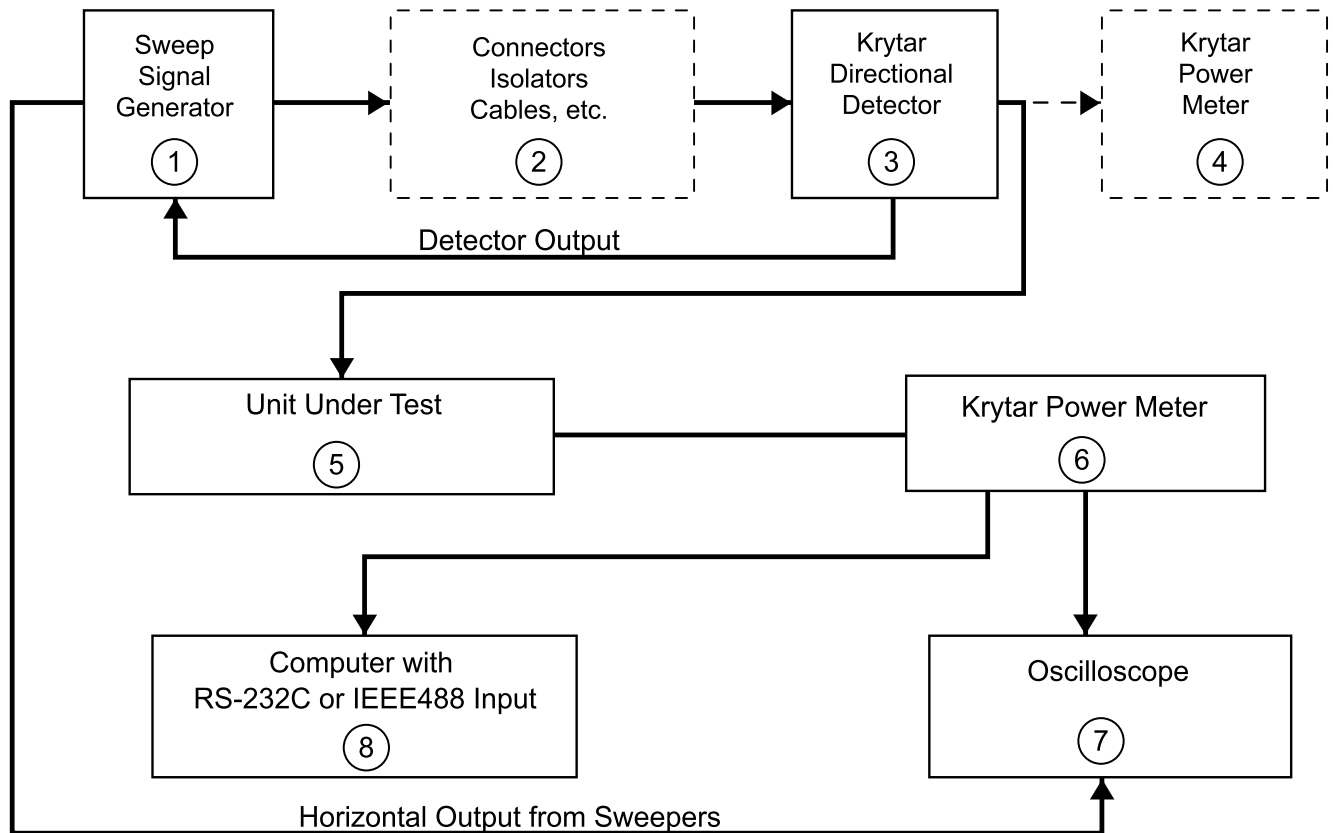
- The sweeper generates a microwave frequency of 1.0 to 26.5 GHz with a leveled power output of up to +10 dBm. The power goes through the coupler to the Amplifier Under Test. 20 dB of the power is coupled to a Krytar Power Meter. The meter can read a CW Power Range of -30 to +20 dBm and is usable to -39 dBm. See Krytar Data Sheet (located on Krytar Website [www.Krytar.com](http://www.Krytar.com)) for full specifications. The Krytar Power Meter is able to measure swept power at a 100 ms sweep rate. A 200 ms sweep rate is suggested for this measurement.
- The Power Meter has a DC voltage output of -2 to +3 Volts which is equivalent to an input power of -30 dBm to +20 dBm. This output is connected to the first trace of an X-Y dual trace Oscilloscope. The power may also be sent from the Power Meter thru an IEEE-488 interface or RS232C Serial port to a computer. The horizontal sweep output from the sweeper is connected to the oscilloscope. The calibrated swept frequency from the sweeper is displayed on the oscilloscope. This allows measurement of Amplifier Power Input to the Amplifier Under Test to be displayed (as a function of frequency) on the oscilloscope. The CW power may be read directly from the Power Meter Display.
- The Amplifier Under Test receives power from the sweeper. The output power from the Amplifier goes directly into a Krytar Power Meter. Power output of -30dBm to +20 dBm measured by the meter is also converted to -3 to +2 Volts DC and connected to the second trace of the Oscilloscope. Swept power output (as a function of frequency) from the Amplifier Under Test may then be read directly from the oscilloscope. The CW Power Output may be read directly from the Power Meter. If the power output from the Amplifier Under Test is greater than +20 dBm, a Pad or Step Attenuator may be used to reduce maximum power from the amplifier to less than +20 dBm. The output power may also be routed from the Power Meter to the input of a computer via an IEEE-488 interface or an RS-232C Serial Port.
- Any anomalies of the swept power input or power output over the frequency of interest will be displayed on the oscilloscope. The sweeper may then be set on the exact frequency of the anomaly and an accurate CW output power may be read directly from the digital display of the Power Meter at that frequency.

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## External Leveling Loop for a Microwave Signal Generator



### Equipment Required

- (1) Sweep Signal Generator capable of supplying leveled output power. The Sweep Signal Generator must have an external leveling loop capability and a frequency bandwidth required for testing Unit Under Test.
- (2) Amplifier, Connectors, Isolators, Cables, or Other Components Used in a Typical Test Setup
- (3) **Krytar Directional Detector** selected for proper frequency bandwidth for testing Unit Under Test.
- (4) **Krytar Power Meter** Selected for Frequency Bandwidth for testing Unit Under Test
- (5) Unit Under Test
- (6) **Krytar Power Meter** Selected for Frequency Bandwidth for testing Unit Under Test
- (7) Oscilloscope for Displaying Output of Unit Under Test
- (8) Computer Capable of Accepting Data via RS232C or IEEE-488

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## HOW IT WORKS

The power from the signal generator is leveled at the output connector of the signal generator. In general, additional components as used between the output connector of the Sweep Signal Generator and the Unit Under Test (i.e. Cable Assemblies, Isolators, etc..). These components introduce insertion loss. The power at the end of the test string of these components needs to be measured to assure that the proper amount of power is being supplied to the Unit Under Test. If the power is not of the correct value, the Sweep Signal Generator output power must be adjusted until the correct power is obtained. If the insertion loss (caused by the test string of components) is great enough, the Sweep Signal Generator may not be able to provide adequate leveled power required to test the Unit Under Test. An amplifier may be needed to boost the power to an adequate level.

1. The output connector of the Sweep Signal Generator is connected to the input connector of the string of test components.
2. The output of the test string of components is connected to the input connector of the thru port of a **Krytar Directional Detector**. The output port of the thru line of the directional detector is connected to a Krytar Power Meter. The output power from the Sweep Signal Generator is adjusted until the correct amount of power is read on the **Krytar Power Meter Display** for testing the Unit Under Test. The test setup is now calibrated to begin testing. Remove the Krytar Power Meter and connect the output connector from the thru port of the **Krytar Directional Detector** to the Unit Under Test.
3. Connect the DC Output Voltage from the Detector (an integral part of the Directional Detector) to the External Leveling Connector located on the Sweep Signal Generator. The Sweep Signal Generator Leveling Loop will level power at the output connector of the directional detector.
4. Connect the output of the Unit Under Test to the Krytar Power Meter (the same Power Meter used to calibrate the power at the output connector of the Directional Detector may be used).
5. The **Krytar Power Meter** provides a DC Voltage of -3 Volts DC to +2 Volts DC which is equivalent to -30 dBm to +20 dBm. This voltage is connected to an Oscilloscope. The Oscilloscope can be calibrated to display the swept output from the Unit Under Test as a function of frequency.
6. The **Krytar Power Meter** (furnished with optional RS232C or IEEE-488 interface) may then be connected to a Computer that is capable of accepting RS232C or IEEE-088 data. Data can be stored by the computer. Using Excel or other spreadsheet programs, complete test reports can be made.

**HINT: Krytar components and Power Meters are available with various frequency bandwidths up to 40 GHz.** Choose a frequency bandwidth that will cover all your needs. Then, you may use the same test set for all measurements.

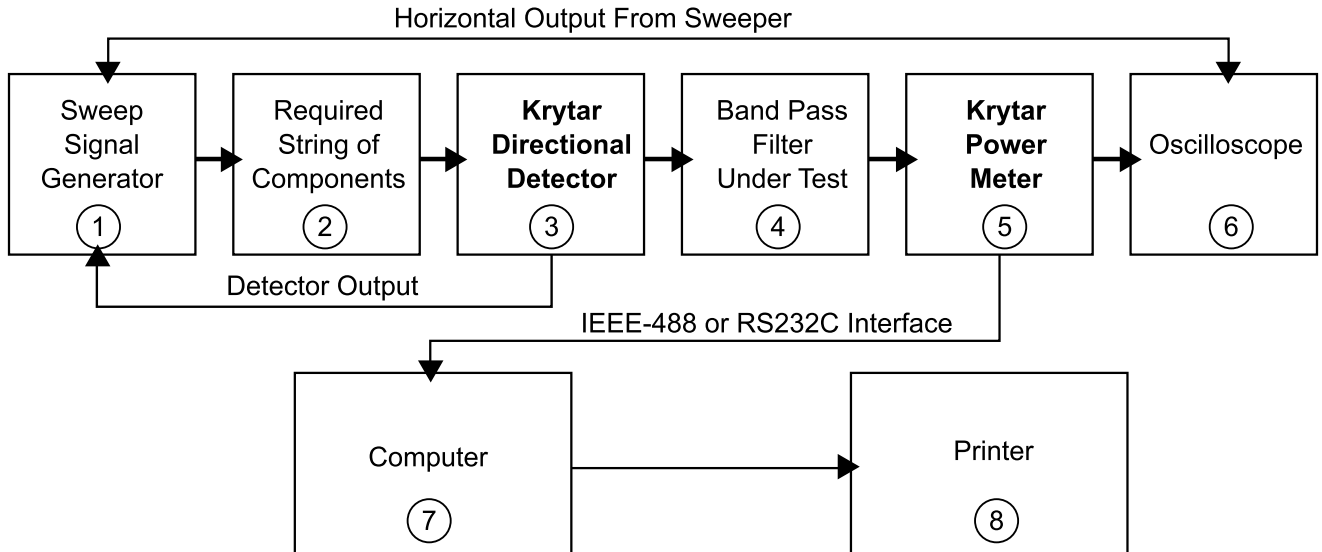
**VISIT THE KRYTAR WEBSITE: [www.krytar.com](http://www.krytar.com).** Specifications for all components and instruments are listed. We would be happy to discuss your specific needs. Give us a call, send us an E-Mail or FAX with your application or questions.

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## Inexpensive Scalar Measurement of a Band Pass Filter Or other Passive Device or Component



### EQUIPMENT REQUIRED

1. Sweep Signal Generator: Select a Sweep Signal Generator capable of a frequency bandwidth that is much greater than the operating frequency of the Filter Under Test.
2. Required “String of Components” such as isolator, cable assemblies, etc.
3. **Krytar Directional Detector**
4. Filter Under Test: The above test setup will also measure all types of filters (Band Pass, High Pass, Low Pass, Band Reject). Other Passive Devices or Components may also be measured (i.e. Attenuators, Step Attenuators, Pads, Insertion loss of Cable Assemblies, etc.).
5. **Krytar Power Meter with Power Sensor**: Choose the Power Sensor with a frequency bandwidth much greater than the Filter Under Test. **Krytar Power Sensors** are available with bandwidths from 100 KHz to 40 GHz.
6. Oscilloscope, The Oscilloscope should be capable of accepting a voltage input of -3.9 to +2 Volts DC (Equivalent to Power Measurement from the **Krytar Power Meter** of -39 dBm to +20 dBm}. The Oscilloscope should also be capable of accepting the Horizontal Output from the Sweep Signal Generator.
7. Computer with IEEE-488 or RS232C Interface
8. Printer

### WHAT DOES IT MEASURE

1. C W and Swept Power from the output of the Band Pass Filter
2. Minimum pass band insertion loss of the Band Pass Filter
3. Frequency at which minimum insertion loss is measured.
4. 3 dB bandwidth of the Band Pass Filter
5. Both lower and upper stopband attenuation of the Band Pass Filter
6. Frequency point at which “Return Band” or “Spurious Bands” occur as well as the attenuation value of the Band Pass Filter at these frequencies.

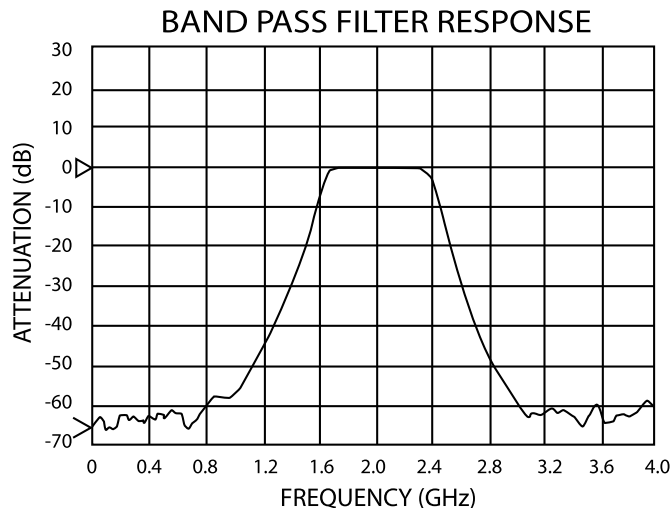
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## Inexpensive Scaler Measurement of a Band Pass Filter



1. Set the leveled output power from the sweep signal generator to its maximum (usually between +12 to +20 dBm). Maximum dynamic range for the **Krytar Power Meter** is -39 to +20 dBm. Note that if +20 dBm is supplied to the band pass filter, stopband attenuation of 59 dB can be measured.
2. Many test setups have one or more components (Isolators, connectors, cable assemblies, etc.) connected between the output connector of the sweep signal generator and the Unit Under Test. These components introduce insertion loss.
3. Remember, the power output from the sweep signal generator is leveled at the output connector. Any components added between the output connector of the sweep signal generator and the Unit Under Test will attenuate the power to the unit under test. The output from the “Test String of Components” is connected to the input of **Krytar Directional Detector**. The output from the **Krytar Directional Detector** is connected to the Band Pass Filter being tested. The DC voltage from the Directional Detector is connected to the “External Leveling” connector of the sweep signal generator. This will level the power at the output of the Krytar Directional Detector (Note that the detected output is referenced to the output of the directional detector). If the sweep signal generator is unable to furnish adequate leveled output power to the band pass filter, an amplifier will need to be added to the test string of components. A **Krytar Power Meter** may be connected to the output connector of the Directional Detector to assure adequate power is furnished to the Band Pass Filter. The Power Meter is then removed and the Band Pass Filter is connected to the output connector of the Directional Detector.
4. The output from the Band Pass Filter is connected to the **Krytar Power Meter**. CW Power is measured and displayed on the Power Meter.
5. The **Krytar Power Meter** supplies a DC Voltage of -3.9 Volts to +2 Volts which is equivalent to -39 to +20 dBm of power.
6. The DC voltage from the **Krytar Power Meter** is connected to an Oscilloscope. The DC Voltage is shown on the Oscilloscope as a calibrated attenuation (0 to -59 dB). The horizontal Output connector from the sweep signal generator is connected to the horizontal input of the oscilloscope. The oscilloscope trace then be calibrated to show frequency as generated by the sweep signal generator. The oscilloscope will then display attenuation versus frequency of the Band Pass Filter being tested.
7. The **Krytar Power Meter** may be ordered with an IEEE-488 or RS232C interface. All readings from the Power Meter may be stored on a computer. A report may be generated using a spread sheet program like Microsoft Excel or equivalent. The report then may be printed on a printer.

**See the attenuation curve (above) of a typical Band Pass Filter measured using this test setup. This test setup may be used to measure other passive devices such a Band Reject, High Pass, Low Pass and Stop Band Filters as well as fixed attenuators, pads, step attenuators, insertion loss of cable assemblies, etc.**

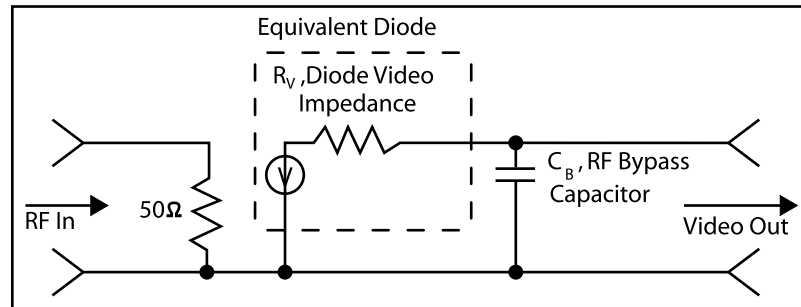
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## Detector Risetime vs. RF Performance

Risetime of a detector, in many applications, is very important. Risetime is a function of the value of the Video Impedance, RF Bypass Capacitance and Load Resistance. See Figure 1, below, for an Equivalent Circuit of Krytar Detectors



$$R_v \text{ (diode video impedance)}$$

$$C_B \text{ (RF bypass capacitor) =}$$

$$T_R \text{ (10 to 90\% risetime)} = 2.2 \frac{(R_{LOAD})(R_V)}{R_{LOAD} + R_V} (C_B + C_{LOAD})$$

Figure 1: Equivalent Circuit for Krytar Detectors

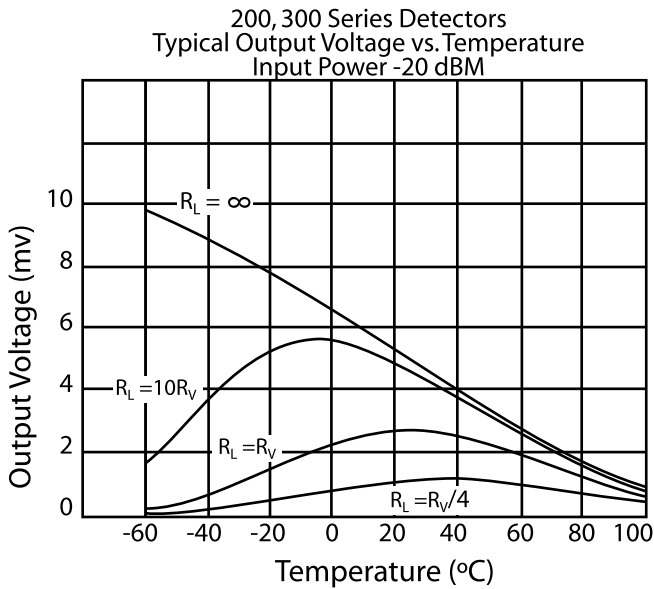
Video Impedance is partially controlled by the type detector diode used to manufacture the detector. For example, the Planar Doped Detector Video Impedance is typically between 0.8 to 3.0 K ohms. The Zero Biased Schottky Detector is typically between 2.0 to 3.0 K ohms.

The Video Bypass Capacitance Value is chosen to set the low frequency performance of the detector. For example, 3.0 pF is chosen for fastest risetime. This establishes the lowest operating frequency at 100 MHz. A value of 30 pF establishes the lowest operating frequency at 10 MHz. The higher value of Video Bypass Capacitance causes a longer risetime. Krytar standard detectors have a output capacitance of either 3.0 pF or 30 pF. The user must then decide whether low operating frequency or risetime is more important for his application and choose the appropriate detector.

Load resistance seen by the detector also affects risetime. High Load Resistance will yield longer risetime, but will result in higher Video (DC) output voltage. If risetime is the most important parameter, the lowest Load Resistance capable of yielding an adequate Video (DC) output voltage from the detector should be chosen. The user should review temperature performance as shown in figures 2 and 4 to be sure that DC Output Voltage is adequate for the operating temperature range of the specific application. If risetime is not important and Video (DC) Output Voltage is critical, then a high Load Resistance should be chosen. See figures 3 and 5 for typical output voltage vs. input power curves for various  $R_L/R_V$  ratios for both the Planar Doped Barrier and Zero Bias Schottky Detectors.

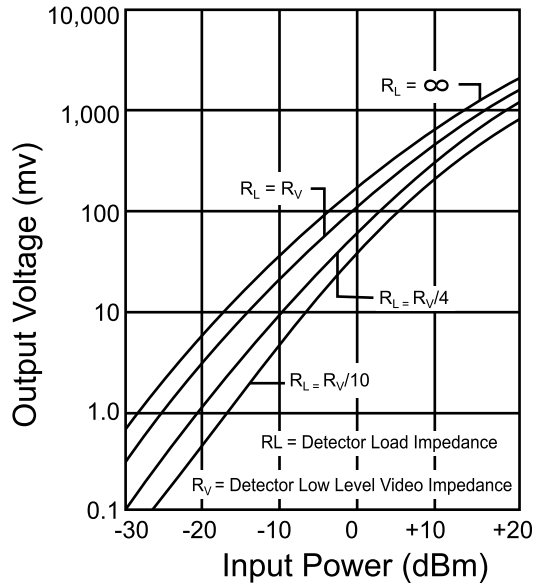
VISIT KRYTAR WEBSITE: [www.krytar.com](http://www.krytar.com) for specifications on all Krytar Detectors

## Detector Risetime vs. RF Performance Planar Doped Barrier vs. Zero Bias Schottky Detectors



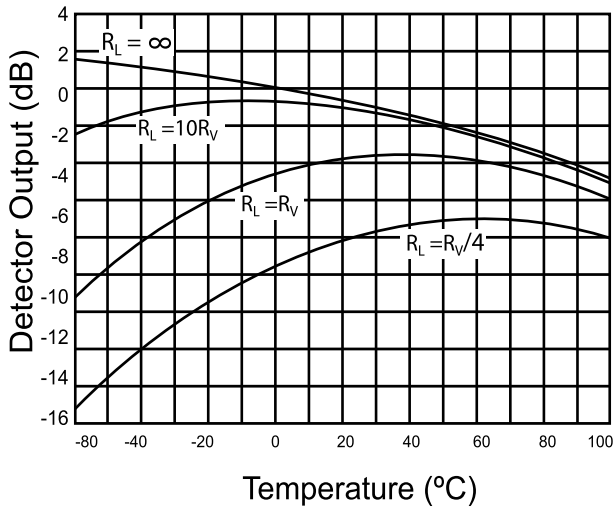
**Zero Bias Schottky Detectors.**  
Typical Low Level ( $P_{in} = -20$  dBm) Output Response vs. Temperature Curves For Various  $R_L/R_V$  Ratios

Figure 2



**Zero Bias Schottky Detectors.**  
Typical Output Voltage vs. Input Power Curves for Various  $R_L/R_V$  Ratios  $T_a = 20$  Degrees C

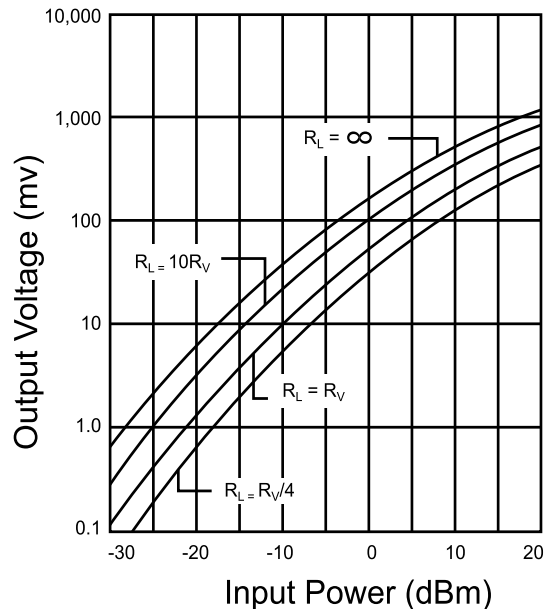
Figure 3



Curves are normalized to  $R_L = \infty$  and  $T_a = 20^\circ\text{C}$ .  $R_V$  corresponds to the load that drops the open circuit output voltage in half (3dB) at  $20^\circ\text{C}$ .

**Planar Doped Barrier Detectors.**  
Typical Low Level ( $P_{in} = -20$  dBm) Output Response vs. Temperature Curves For Various  $R_L/R_V$  Ratios

Figure 4



**Planar Doped Barrier Detectors.**  
Typical Output Voltage vs. Input Power Curves for Various  $R_L/R_V$  Ratios  $T_a = 20$  Degrees C

Figure 5

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# KRYTAR APPLICATIONS IDEA #5

## KRYTAR DIRECTIONAL COUPLERS

### 0.5 TO 50 GHz

#### Term Definitions Testing Typical Applications

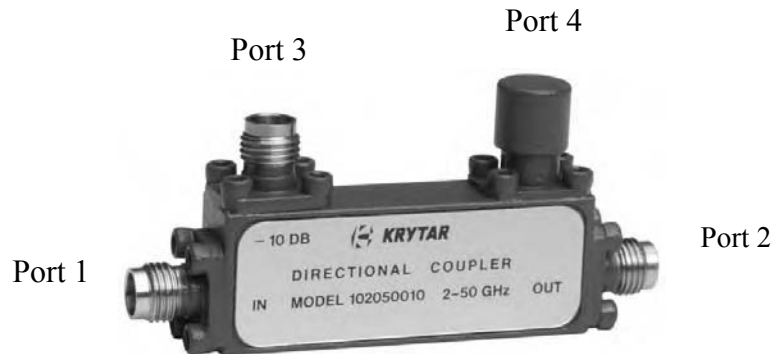


Figure 1

**1. Directional Coupler.** Components that allow two microwave circuits to be combined into one integrated system in one direction with the two completely isolated from each other in the opposite direction. See Figure 1 above.

Krytar directional couplers have 4 ports. Port 1 is the input and port 2 is the output of the main line or thru line. This is the path of lowest insertion loss. Port 3 is the coupled power output. The fourth port is terminated with a precision microwave termination. Couplers usually have two separate circuits. The first is a mainline circuit and the second is a coupled circuit. When microwave power is applied to the mainline circuit (Ports 1 and 2) a certain amount of energy will be “coupled” to the coupled circuit (port 3). In general, the closer the circuits are together, the more power will be applied to the coupled circuit from the main line circuit.

#### 2. Term Definition as applied to Krytar Directional Couplers.

**A. Frequency Range (GHz):** The frequency bandwidth in GHz over which a particular model will perform while meeting all its specification limits. Currently available Krytar directional coupler designs operate over the frequency area beginning at 0.5 GHz up to 50 GHz. Current standard frequency bandwidths are listed on Krytar data sheets. Special frequency bandwidths can be designed. Higher frequencies (up to 65 GHz) are available with special engineering.

**B. Coupling (port 3) with respect to output (Port 2):** This means that the power (dB) coupled from the mainline or thru line in Krytar directional couplers is with reference to the output (Port 2) Krytar directional couplers are generally very broad band (multi octaves of frequency). Many models are used in applications for internal leveling of power (signal generators for example) as well as for external leveling (See Krytar Application Idea #2 for an example of an external leveling loop for signal generators). For example, the power output from a broadband signal generator is usually the output (port 2) power from a directional coupler. If the power were referenced to the input, the coupled power from the input port would be used to level the power output of the signal generator. In that example, the power output from the signal generator would not be correct. The insertion loss of the mainline or thru line would need to be deducted to obtain the correct amount of power.

# KRYTAR APPLICATIONS IDEA #5

## KRYTAR DIRECTIONAL COUPLERS

PAGE 2 OF 4

Some standard values of coupling for Krytar directional couplers are 6 dB, 10 dB, 13 dB, 16 dB and 20 dB. Special coupling values are available upon request. Please note that the tolerance for setting the coupling value is specified from +/-0.3 dB to as much as +/- 1.0 dB. For example, if the nominal coupling value on a specific model is 10 dB and the tolerance is +/- 0.5 dB, the absolute coupling value could vary from unit to unit from 9.5 dB to 10.5 dB.

Coupling in Krytar directional couplers is defined as:

$$\text{Coupling} = -10 \text{ Log Power at } \left( \frac{\text{Port 3}}{\text{Port 2}} \right)$$

**C. Frequency Sensitivity:** Once the absolute coupling value has been determined (see 2B above), an additional variation in coupling value occurs - The absolute coupling value varies as a function of frequency. This is called frequency sensitivity. Krytar directional couplers have frequency sensitivity tolerances of +/-0.3 dB for narrow band models to +/- 1.2 dB for the broadest of the broad band models. The user should calculate absolute minimum and maximum coupling values to be expected using the following formula.

$$\text{Total coupling window} = \text{Frequency Sensitivity tolerance} + \text{Coupling Tolerance}$$

Krytar directional couplers are usually better than catalog specifications, both for sensitivity and coupling tolerances. However, catalog specifications should be used for calculations on new applications.

**D. Directivity:** Port 4 (Isolated Port) is not completely isolated in Krytar directional couplers as there are no perfect terminations. A small amount of power will be present at the isolated port. If power out of port 4 (isolated port) is 20 dB below the power out of the coupled port, the directional coupler directivity is 20 dB. Directivity is defined as follows:

$$\text{Directivity (dB)} = -10 \text{Log} \left( \frac{P_4}{P_3} \right)$$

Where power is incident to port 2. P4 and P3 is the power at ports 4 and 3.

**E. Isolation:** Isolation is not normally specified on Krytar data sheets. Krytar feels that it is important to distinguish the difference of isolation and directivity. Isolation also measures the small amount of power present at port 4 (isolated port).

$$\text{Isolation (dB)} = -20 \text{Log} \left( \frac{P_4}{P_2} \right)$$

P4 and P2 are power levels measured at Port 4 and Port 2 respectively.

$$\text{Isolation (dB)} = \text{Coupling (dB)} + \text{Directivity (dB)}$$

Note that a 20 dB directional coupler with 15 dB directivity would have an isolation of 35 dB. Krytar data sheets specify directivity.

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# KRYTAR APPLICATIONS IDEA #5

## KRYTAR DIRECTIONAL COUPLERS

**F. VSWR:** (Voltage Standing Wave Ratio) or Return Loss: VSWR or Return Loss is caused by mismatches and discontinuities within the circuits of Krytar directional couplers. A mismatch on either port 1 (Input port) or port 4 (Terminated port) will reduce directivity by an amount equal to return loss (in dB) of the mismatch. This permits measurement of Return Loss. Note that measurement of accurate Return Loss requires very high directivity (typically 30 to 40 dB).

Krytar can select directivity on some models over narrow frequency range to be in the 20 to 25 dB area. This would be sufficient for some “go”, “no go” applications. For example: A directional coupler with a directivity of 25 dB and a return loss of 21 dB on Port 1 (Input Port) permits measurement of a device under test connected to Port 1 with an accuracy of +/- 0.8 dB. Better accuracy may be achieved with higher directivity. The equation for calculating return loss is shown below. A graph showing calculations for this equation are displayed in figure 2 below.

$$\text{Return Loss (dB)} = -10 \log \left( \frac{\text{VSWR} - 1}{\text{VSWR} + 1} \right)$$

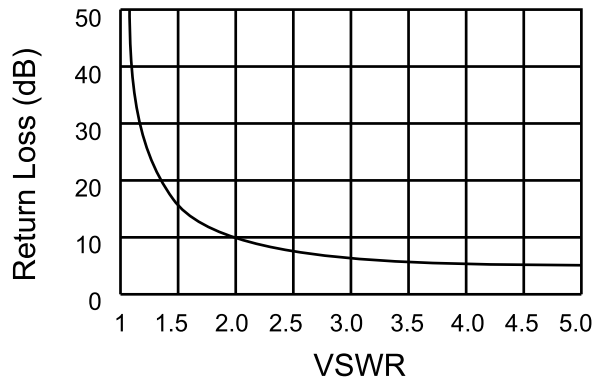


Figure 2

**G. Insertion Loss:** Krytar Insertion loss includes coupled power. In a coupler with no dissipation, the thru or main line loss (Port 1 to Port 2) caused by the power coupled to Port 3 (Coupled Port) is:

$$\text{Insertion Loss (dB)} = 10 \log \left( 1 - \frac{P_3}{P_1} \right)$$

Dissipation in the circuit will raise the insertion loss by the power dissipation in dB. Insertion loss vs coupling (dB) for a coupler with no dissipation is shown in figure 3 below.

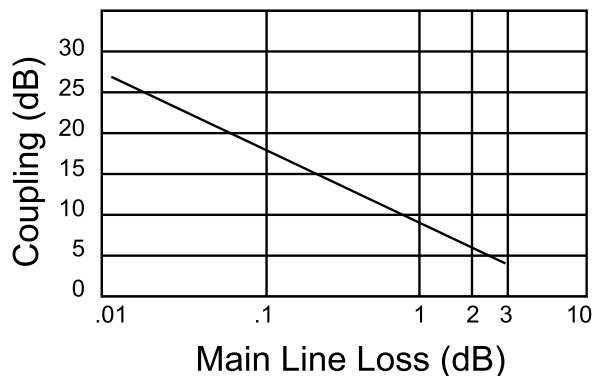


Figure 3

# KRYTAR APPLICATIONS IDEA #5

## KRYTAR DIRECTIONAL COUPLERS

PAGE 4 OF 4

- 1. Power Leveling:** Power leveling is the ability to hold power output constant as a function of frequency. Broad band signal generators usually use Yig Oscillators (By varying dc current to a Yig Oscillator, the frequency of the oscillator will change as a function of the current input to the oscillator). To achieve very broad band frequency and power output, one or more Yig Oscillators may be used. Power output from each of the Yig oscillators will vary as frequency is changed. A Krytar broadband directional coupler along with a Krytar broad band RF & Microwave Detector is used to sample the output power of the Yig Oscillator. The coupled output power from the Yig Oscillator is converted to a video (dc) voltage by a Krytar broad band detector. This voltage is supplied to an internal leveling amplifier to Level the output power from the Yig Oscillator. The power output from the signal generator is leveled by this method. The leveled power output from signal generators is usually port 2 of a directional coupler. This is an example why Krytar chooses to measure coupled power (Port 3) referenced to the Output (Port 2). Krytar directional couplers, detectors or directional detectors are also used in external leveling loops in many test setup (See Krytar application idea #2).
- 2. Frequency Measurement:** Many times, a constant monitoring of frequency is necessary from the output of microwave transmitters, systems or special test setups. A directional coupler is connected to the output of the system or instrument. A small amount of power and frequency is coupled from the main line and connected to a frequency meter. This provides a constant measurement of frequency.
- 3. Power Monitor & Control:** Power output from microwave transmitters may degrade as a function of time. A directional coupler may be used to couple a small amount of power from the main line. The power from the coupled port is then connected to a Power Meter where power can be constantly monitored. The power from the coupled port could be connected to a detector. The dc output voltage from the detector could be used in a feedback circuit to assure power output is constant - or - the voltage could be used to trigger shut down of the transmitter if the power is either too high or too low. The voltage could also be used to sound an alarm or trigger a computer to record data as long as the power was out of its operating window. If the transmitter is located in a remote location, the voltage could cause a telephone call to be made to a repair person to advise the transmitter was not performing to specifications.
- 4. Testing of Components or Systems:** The directional coupler is used in many different testing applications where power or frequency needs to be monitored, leveled, alarmed or controlled.

NOTE: Please visit **Krytar** website: [www.krytar.com](http://www.krytar.com). A complete catalog, outline drawings and the latest applications ideas are available for all products manufactured by Krytar.

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# **TECHNICAL NOTES**

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**Technical Note #4 - Krytar Directional Detector. Samples 2 to 40 GHz**

**Technical Note #5 - Precision Coaxial Terminations DC to 50 GHz**

**Technical Note #6 - Krytar Microwave Detectors 10 MHz to 40 GHz testing and term definition**

**Technical Note #7 - Krytar 180 Degree Hybrids testing and term definition**



# KRYTAR DIRECTIONAL COUPLER

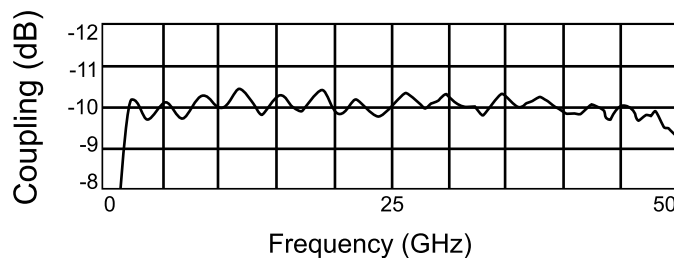
## 2 – 50 GHz



**As coaxial systems reach higher frequencies, it becomes critical to sample and level signals over broad instantaneous bandwidths.**

Krytar Model 102050010 is a 10-dB stripline directional coupler that uses a patented, nonuniform tapered line. The coupler is designed with offset coupled striplines used in a three layer construction, with coupled lines etched on opposite sides of a thin center board that is in turn sandwiched between two dielectric boards of equal thickness.

The design was accomplished with Krytar's proprietary CAD program and features State-of-the-art flat Microwave performance. The coupler's frequency sensitivity or coupling flatness is  $\pm 0.6$  dB, 2-26.5 GHz and  $\pm 0.8$  dB, 2-50 GHz. Note that coupling is measured with respect to the output (See Figure 1 for a plot of coupling characteristics of the model 102050010). The frequency response is measured with a Vector Analyzer. Connectors are 2.4 mm Female.



(Figure 1) Coupling characteristics of Krytar Model 102050010

Model 102050010 offers low insertion loss of 2.0 dB Maximum even at 50 GHz. Directivity is 13 dB, 2-26.5 GHz and 10 dB, 26.5-50 GHz. VSWR is 1.5:1, 2-26.5 GHz and 1.8:1, 26.5-50 GHz. Krytar offers the same coupler design with a 13 dB coupling value which delivers an even lower insertion loss of 1.8 dB Maximum.

Krytar is currently engineering a 1.0-65 GHz, 10 dB directional coupler. Please call for an update on status or check Krytar Website [www.krytar.com](http://www.krytar.com) from time to time to check progress. Applications include Power monitoring in broadband EW systems, test setups and signal leveling in test systems and signal generators.

Krytar offers a standard line of Broadband Directional Couplers with various frequency bandwidths from 0.5 to 50 GHz.

Data sheets with complete electrical specifications and dimensions are available at Krytar Website [www.krytar.com](http://www.krytar.com).

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# KRYTAR 3 dB 90 DEGREE HYBRIDS COVERS 0.5 TO 40 GHz



A broad line of 3 dB hybrids from Krytar features broad bandwidths together with tight amplitude imbalances and phase imbalance specifications. ( See table 1 for detailed specifications of currently available models). Visit Krytar Website [www.krytar.com](http://www.krytar.com) for detailed data sheets on all models.

**Table 1: 3 dB 90 Degree Hybrid Couplers**

Frequency Range (GHz)	Model	Amplitude Imbalance (dB)	Phase Imbalance (Degrees)	Isolation (dB Min)	Maximum VSWR	Insertion Loss (dB Max)
0.5 - 7	3005070	± 0.4	± 5	19	1.3	1.3
2 - 8	3020080	± 0.35	± 3	19	1.25	0.65
1 - 12.4	1230	± 0.4	± 7	20	1.30	1.4
2 - 18	1830	± 0.4	± 7	17	1.35	1.4
1 - 18	1831	± 0.5	± 10	17	1.35	2.0
6 - 20	3060200	± 0.4	± 5	14	1.4	1.0
10 - 40	3100400	± 0.75	± 10	13	1.8	1.8

\* Units with a tighter phase imbalance can be supplied Standard Connectors: SMA Female

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# KRYTAR 3 dB 90 DEGREE HYBRIDS - Continued

90 degree hybrids are used in circuits requiring a balanced division of power into two transmission lines with 90 degree separation of phase. Applications include signal splitters, combiners, balanced mixers, image-rejection mixers, phase shifters, diplexers, switches and antenna feed networks.

The increasing use of broadband microwave systems has created a need for broadband 90 degree hybrids with tight output amplitude and phase tracking. All models use a three layer stripline construction. Coupled lines are etched on opposite sides of a thin coupler board sandwiched between two equal thickness dielectric boards. The tight 3 dB coupling is realized by using a non-uniform tapered line design synthesized with a CAD program developed at Krytar.

Typical amplitude and phase imbalance performance is shown in figure 3 for model 3100400 which covers 10 – 40 GHz. The identical 8.34 dB couplers are realized using a non-uniform tapered line design. These curves are of the 90 degree out port with respect to the zero degree out port. The data were taken with an automatic network analyzer. Figure 1 is phase and amplitude for model 1230 and Figure 2 is phase and amplitude for model 1830.

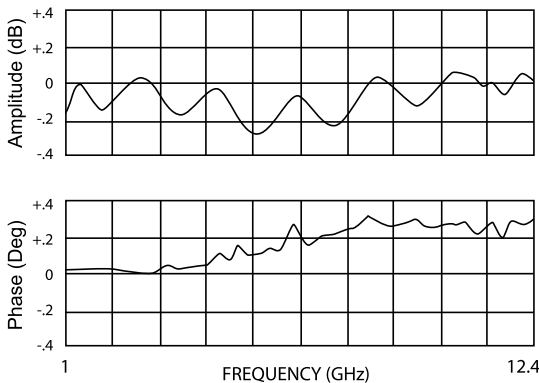


Figure 1: Typical Model 1230 amplitude and phase imbalance

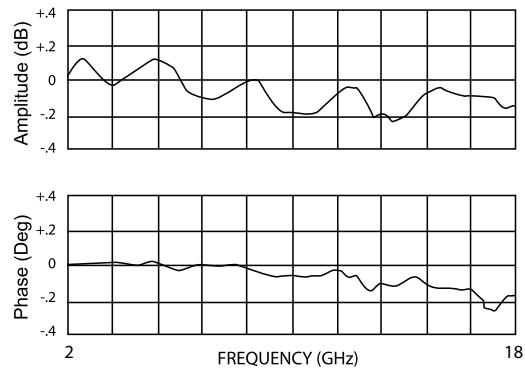


Figure 2: Typical Model 1830 amplitude and phase imbalance.

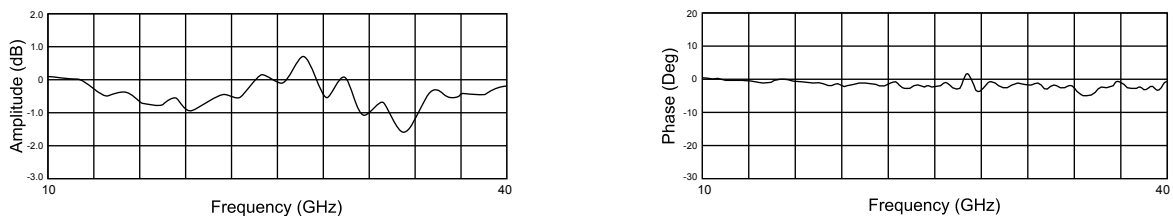


Figure 3: Typical model 3100400 amplitude and phase imbalance

# KRYTAR 180 DEGREE HYBRIDS CONTROL SIGNALS FROM 1 TO 26.5 GHz



Hybrid Couplers perform many functions, including splitting and combining signals in amplifiers, switching circuits, and antenna beam-forming networks. Krytar Hybrid Couplers deliver this versatility from 1 to 26.5 GHz with excellent phase and amplitude matching.

Hybrids are four-port components, with dual input and output ports. A signal applied to the sum ( $\Sigma$ ) input port produces two output signals of matched amplitude and phase. Each output level of a Krytar 180 degree hybrid is 3 dB lower (less the insertion loss through the hybrid) than the input level. Signals applied to the difference ( $\Delta$ ) input port produce two equal-amplitude output signals that are 180 degrees out of phase with each other. This characteristic makes such hybrid circuits ideal for reducing noise in amplifiers via feedback combining techniques or for merging multiple signals from arrays. (See table 1 for complete specifications of Krytar 180 degree hybrid couplers).

**Table 1: 3 dB 180 Degree Hybrid Couplers**

Model	Frequency Range (GHz)	Coupling (dB)	Amplitude Imbalance (dB)	Phase Imbalance (Degrees)	Isolation (dB Min)	Maximum VSWR	Insertion Loss (dB Max)
4020080	2 - 8	3	± 0.3	± 8	18	1.4	1.1
4040124	4 - 12.4	3	± 0.4	± 8	17	1.6	0.9
4010124	1 - 12.4	3	± 0.4	± 10	17	1.6	2.1
4020180	2 - 18	3	± 0.6	± 14	15	1.7	2.0
4010180	1 - 18	3	± 0.6	± 12	15	1.7	2.9
4060200	6 - 20	3	± 0.6	± 10	15	1.7	1.2
4060265	6 - 26.5	3	± 0.7	± 12	14	1.7	1.6

# KRYTAR 180 DEGREE HYBRIDS CONTROL SIGNALS FROM 1 TO 26.5 GHz

The hybrids were designed with a double arrow construction technique in which two stripline, 8.34-dB asymmetric, tapered-line directional couplers are cascaded. Meandering transmission lines on each side of the hybrid maintain the even 180 degree phase relationship between channels at all frequencies. Fabrication of the double-arrow hybrids requires an asymmetric coupler with completely overlapped lines at its coupled end (where the lines cross) that form an instantaneous transition from high coupling to no coupling. The hybrids are realized with a three-layer stripline configuration. Coupled lines are etched on opposite sides of a thin coupler circuit board, sandwiched between a pair of equal thickness Duroid boards.

Systems such as antenna beam-forming networks can be designed more efficiently with 180 degree hybrids. The double-arrow configuration of Krytar 180 degree hybrids yields very broadband Phase and Amplitude imbalance (Figure 1) performance and permits design of broadband beam-forming networks (Figure 2) with low parts count. for a typical EW beam forming network housed in a single, compact enclosure. Krytar works with individual companies to design these networks for special applications.

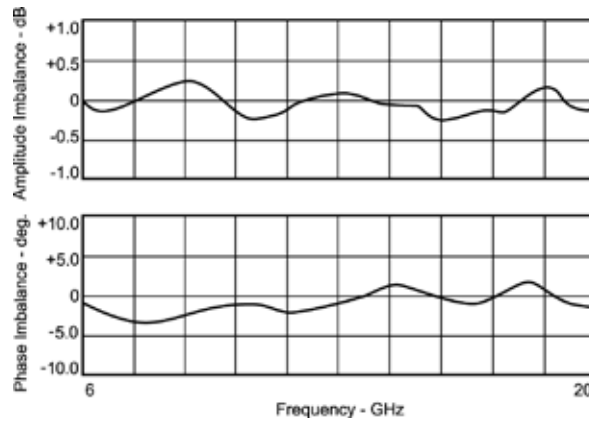


Figure 1: Phase and amplitude imbalance for the model 4060200 hybrid were measured from 6 to 20 GHz with an automatic vector network analyzer.

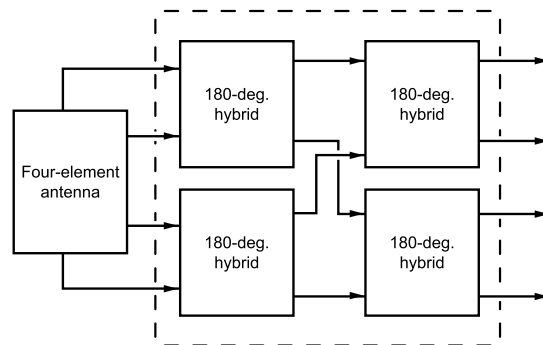


Figure 2: Beam Forming Network

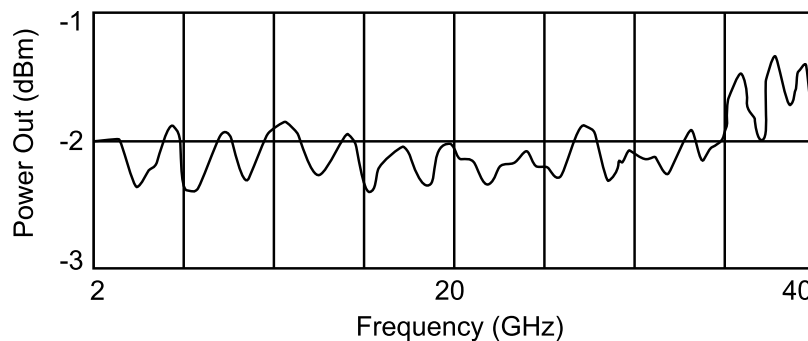
# KRYTAR DIRECTIONAL DETECTOR SAMPLES 2 TO 40 GHZ



## Stripline techniques enable two components to give flat response from 2 to 40 GHz.

Krytar Model 202040013 is a directional detector consisting of a low VSWR zero bias Schottky detector mounted directly on the housing of the model 102040013 directional coupler. Elimination of the RF connector between the detector and the coupler saves space, minimizes frequency response ripple normally caused by coupler/detector impedance mismatches, and improves the overall ruggedness of the design. This design may be used in both Military and Commercial applications.

The detector circuitry is housed inside a coaxial detector module. The detector module is the same as used in Krytar’s State-of-the-art 100 MHz to 40 GHz zero bias Schottky detectors. The Model 202040013 directional detector was specifically designed to provide fast pulse response with an output capacitance of only 3 pF. This and a typical detector video impedance of 3.0 K Ohms give a typical unloaded output pulse rise time of under 20 ns. The frequency response of the directional detector is  $\pm 0.8$  dB from 2 to 20 GHz and  $\pm 2.5$  dB from 2 to 40 GHz (Figure 1). Frequency response data were obtained using a Scalar Analyzer and Krytar Model 9000B Power Meter



(Figure 1) Frequency Response of Model 202040013 Directional Detector

The 40 GHz directional detector is ideal for a wide variety of applications, including power monitoring in broadband EW systems, test setups, signal leveling in test systems and signal generators. Connectors are 2.4mm or 2.92mm Female. Krytar offers Directional Detectors from 0.5 to 40 GHz in various bandwidths. Visit Krytar Website [www.krytar.com](http://www.krytar.com) for detailed data sheets on all models.

# PRECISION COAXIAL TERMINATIONS

## DC TO 50 GHz



**Krytar** has designed an extremely rugged mechanical line of precision 50 Ohm Coaxial Terminations that operate from DC to 50 GHz. The design offers reliable, long wear and excellent repeatability. Some of these terminations have been in use at Krytar since 1988. Many have been used to make thousands of measurements and are still within their specifications. See figure 1 for a listing of specifications for each of the models currently offered.

Frequency Range	Model	Maximum VSWR	Connectors	Dimensions
DC-20 GHz	T1M	1.05	3.5mm M	0.78" x 0.36"
DC-20 GHz	T1F	1.07	3.5mm F	0.73" x 0.35"
DC-26.5 GHz	T2M	1.06 to 20 GHz 1.09 to 26.5 GHz	3.5mm M	0.78" x 0.36"
DC-26.5 GHz	T2F	1.08 to 20 GHz 1.11 to 26.5 GHz	3.5mm F	0.73" x 0.36"
DC-40 GHz	T3M	1.2	2.4mm M	0.84" x 0.36"
DC-50GHz	T4M	1.25	2.4 mmM	0.84" x 0.36"

Figure 1 Specifications for Krytar Terminations

In addition to being extremely rugged, VSWR for these terminations is very low at the operating frequency band of each of the models listed. See Figure 2 for plot of VSWR vs Frequency for Krytar Model T4M which performs over the DC to 50 GHz frequency range. VSWR measurements are made with the Agilent 8510 network analyzer.

# PRECISION COAXIAL TERMINATIONS

## DC TO 50 GHz

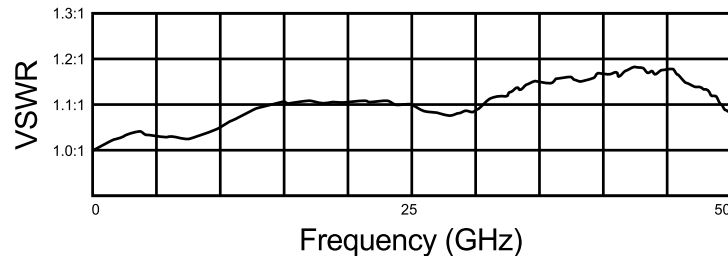


Figure 2: VSWR vs Frequency, Krytar T4M Termination

A termination fails for two reasons. The first is that its center contact may be insufficiently anchored. Some contacts are press-fitted into place. Others are glued or screwed on. The second kind of failure results from the way contact is made with the resistor. Tubular resistors are generally used and some rely on butting up against the center conductor.

The krytar terminations use a bead that is 0.34" long for the male and 0.19" long for the female. These dimensions provide solid axial support for center conductors. The bead and center conductor are captivated by an epoxy post going through the outer conductor bead and around a groove in the center conductor. Captivation is solid which typically requires a force of 15 to 20 pounds to break it loose.

Contact to the coaxial rod resistor is made with spring-loaded gold plated beryllium copper fingers. This allows for temperature expansion differences between the ceramic rod resistor and metal housing, resulting in a -65 to +125 degree C operating temperature range.

The termination design has been subjected to thermal shock testing per MIL-202, Method 107, Test Condition B. Five cycles of thermal shock throughout the -65 to +125 degree C temperature range was performed without any significant change in VSWR.

Each termination has the model and serial number permanently laser-inscribed on its metal cap which provides permanent traceability.

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# KRYTAR MICROWAVE DETECTORS

## 10 MHz – 40 GHz

### TESTING AND TERM DEFINITION



Krytar manufactures microwave detectors using zero bias silicon schottky diodes and planar doped detector diodes. Testing and Term definition for performance of the two types are identical.

### OPERATING FREQUENCY

Krytar tests operation performance of detectors using an Automatic Network Analyzer which currently has the ability to measure performance of Krytar Detectors to 40 GHz. Krytar offers two types of Detectors. 200 Series Zero Bias Schottky Detectors have a video bypass capacitance of 30 pF and operate from 10 MHz to 40 GHz. 300 Series Zero Bias Schottky Detectors have a video bypass capacitance of 3.0 pF and operate from 100 MHz to 40 GHz. 700 Series Planar Doped Barrier Detectors have a Video Bypass Capacitance of 3 pF and operate from 100 MHz to 40 GHz. 600 Series Planar Doped Barrier Detectors have a video bypass capacitance of 30 pF and operate from 10 MHz to 40 GHz. Note that a Video Bypass Capacitance of 3.0 pF will yield a risetime of less than 20 nanoseconds. 30 pF Video Bypass Capacitance will yield a longer risetime. (See Krytar Applications Idea #4 for additional details).

### TANGENTIAL SENSITIVITY.

Krytar manufactures detectors from schottky diodes which typically have a tangential sensitivity (TSS) of  $-57$  dBm usually measured using an amplifier with a video bandwidth of 1.0 KHz and a Noise Figure of 3 dB. The amplifier presents an Impedance of 100 K ohms or more to the diode. TSS of a detector using these diodes produces an RF signal level that yields an 8 dB video output voltage to noise ratio. Krytar Detectors use additional circuitry to provide state-of-the-art flat frequency response and very low VSWR. This drops the TSS of the Krytar Detector to approximately  $-46$  dBm. Generally, Krytar detectors are comfortably used to detect signals of  $-40$  dBm to  $+20$  dBm.

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# KRYTAR MICROWAVE DETECTORS

## SQUARE LAW

The term “Square Law” indicates that the output voltage from the detector is proportional to input power. Krytar Detectors provide square law output from TSS to approximately  $-15$  dBm input.

## LOW LEVEL SENSIVITY

Low level sensitivity of a Krytar Detector is measured using an input power level of  $-20$  dBm. DC voltage output from the detector is measured into an open circuit. The measurement is made at a frequency of 2.0 GHz. Minimum low level sensitivity specification for Zero Bias Schottky Detectors is 0.5 millivolts per microwatt ( $0.5\text{mV}/\mu\text{W}$ ) and 0.4 millivolts per microwatt ( $0.4\text{mV}/\mu\text{W}$ ) for Planar Doped Barrier Detectors.

## FREQUENCY RESPONSE

Frequency Response of a Krytar Detector is the deviation in output voltage (measured in dB) as a function of frequency into an open circuit impedance with a constant input power of  $-16$  dBm.

## MAXIMUM VSWR

VSWR is the ratio of maximum voltage to minimum voltage in standing wave pattern. VSWR can cover the range from 1 to infinity. Krytar uses special matching circuits to assure the State-Of-The-Art VSWR flatness as a function of operating frequency.

## MAXIMUM INPUT POWER

Maximum Input Power is the power level (dBm) that may be applied to the input of the detector and still perform to all specifications. Maximum input power is measured at 25 degrees C. Maximum power input to Krytar Zero Bias Schottky Detectors is  $+20$  dBm but may survive up to 1 watt for less than 1 minute. Maximum Power Input for Planar Doped Detectors is  $+23$  dBm. These detectors may also survive up to 1 watt for less than 1 minute.

## OUTPUT POLARITY

DC output voltage polarity is negative. In special cases, Krytar may be able to supply positive output polarity.

## OUTPUT CAPACITANCE

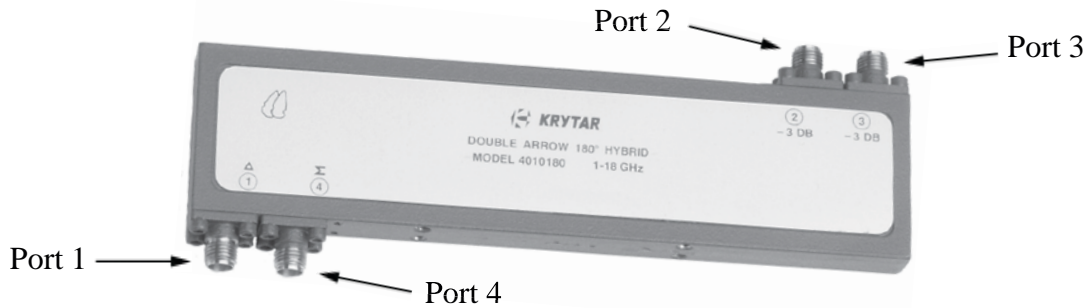
Krytar offers Detectors with a choice of either 30 pF or 3 pF output capacitance. An output capacitance of 3.0 pF yields a risetime of less than 20 ns with an operating frequency of 100 MHz to 40 GHz. An output capacitance of 30 pF is available with an operating frequency of 10 MHz to 40 GHz, but risetime will be longer than the 3.0 pF unit. (See Krytar Applications Idea #4 for a complete discussion).

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# KRYTAR 180 DEGREE HYBRIDS TESTING AND TERM DEFINITION



When a signal is applied to port 1, the output signal will appear on ports 2 and 3. Ports 2 and 3 are 180 degrees out of phase with each other.

When a signal is applied to port 4, the output signal will appear on ports 2 and port 3. Ports 2 and 3 are in phase with each other.

## AMPLITUDE IMBALANCE MEASUREMENT

The specification for Amplitude Imbalance for Model 4010180 is  $\pm 0.6$  dB. Krytar measures amplitude imbalance from output port 3 to port 2 (0.0 dB reference) with a vector analyzer. (See Figure 1). Note maximum deviation from the zero reference is approximately -0.6 db which appears at approximately 7.5 GHz. Because there is no corresponding positive peak at the specific frequency of 7.5 GHz, the allowable total deviation at that specific frequency would then be 1.2 dB. The definition for amplitude imbalance of Krytar Model 4010180 3 dB 180 degree hybrid is: 1.2 dB maximum from the 0.0 dB reference at any specific frequency point within the frequency band of 1.0 to 18.0 GHz.:

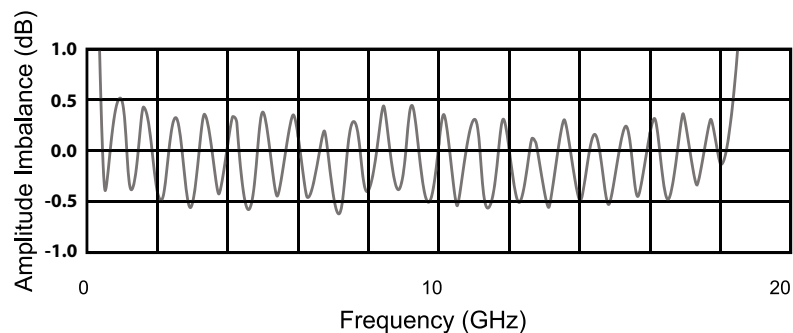


Figure 1: Amplitude Imbalance for Model 4010180 Hybrid

## INSERTION LOSS MEASUREMENT

The specification for Insertion Loss for Model 4010180 is 2.9 dB maximum. The insertion loss is measured from Port 1 to Port 2 and for Port 1 to Port 3 using a vector analyzer (see figure 2). Insertion loss from Port 2 is superimposed on Insertion loss of Port 3. Note that maximum insertion loss over the entire frequency band is approximately 1.83 dB.

## KRYTAR 180 DEGREE HYBRIDS TESTING AND TERM DEFINITION

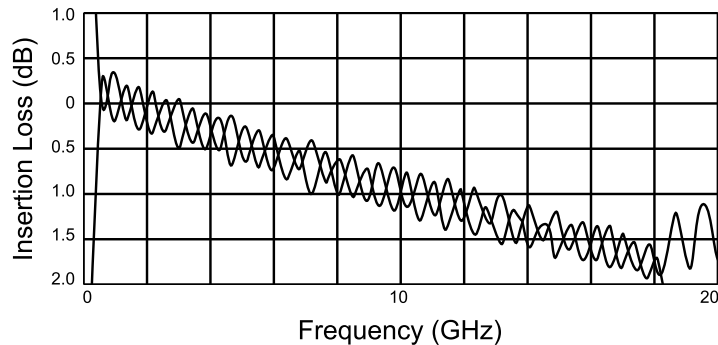


Figure 2: Insertion Loss of Model 4010180 Hybrid

### PHASE IMBALANCE MEASUREMENT

The specification for phase imbalance for Model 4010180 is  $\pm 12$  degrees. The measurement is made using a Vector Network Analyzer. Phase imbalance is defined as the difference between phase of port 3 to port 2 over the operating frequency bandwidth of the Hybrid. Note that phase imbalance is approximately 12 degrees (See Figure 3).

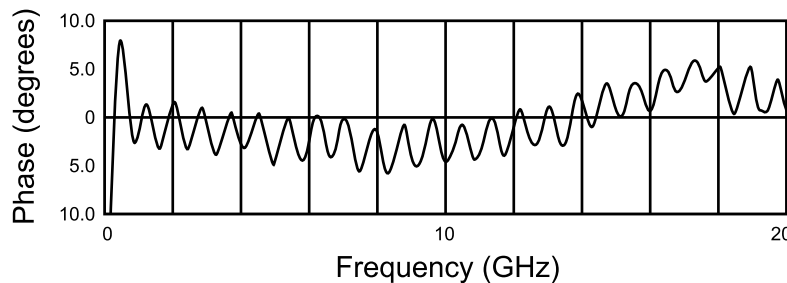


Figure 3 Phase Imbalance of Model 4010180 Hybrid

### ISOLATION

Isolation (dB) is measured between port 3 and port 2.

### VSWR

Voltage Standing Wave Ratio is the mismatch that occurs when measuring Port 2 or port 3 into an impedance of 50 ohms.

### COUPLING

Coupling is the power in dB coupled from the main line (Port 1) to Port 2 and from Port 1 to Port 3. For 3 dB Hybrids, the coupled power would be 3 db less the insertion loss of the main line (Port 1). The power would be split equally between ports 2 and port 3.

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## WARRANTY

Krytar, Inc. warrants each product of its manufacture to be free from any defect in material and workmanship for a period of one year after delivery to the original purchaser.

The limit of liability under this warranty shall be to repair or replace any product, or part thereof, which proves to be defective after inspection by Krytar. This warranty shall not apply to any Krytar product that has been disassembled, modified, physically or electrically damaged or any product that has been subjected to conditions exceeding the applicable specifications or ratings.

Krytar, Inc. shall not be liable for any direct or consequential injury, loss or damage incurred through the use, or the inability to use, any Krytar product.

Krytar, Inc. reserves the right to make design changes to any Krytar product without incurring any obligations to make the same changes to previously purchased units.

This warranty is the full extent of obligation and liability assumed by Krytar, Inc. with respect to any and all Krytar products. Krytar neither makes, nor authorizes any person to make, any other guarantee or warranty concerning Krytar products.

