ELECTRO - PHOTONICS

WAVES INTO THE FUTURE

MICROWAVE COMPONENTS CATALOG

WWW.ELECTRO-PHOTONICS.COM

Since 2009, Electro-Photonics LLC has been offering quality standard and custom products to satisfied customers in the US and around the world. Our customer base includes Fortune 500 companies, small businesses, and universities.

Electro-Photonics is a customer driven company with over 20 years of passive RF components design and manufacturing experience that focuses on as-promised delivery, and specializes in innovative custom designed high frequency components.

We are a recognized leader in signal distribution components featuring our Dragon line of 3 dB hybrid and directional couplers, power dividers, wire bondable passive components, test & measurement accessories, and coaxial products.

sales@electro-photonics.com www.electro-photonics.com

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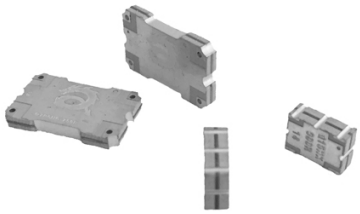
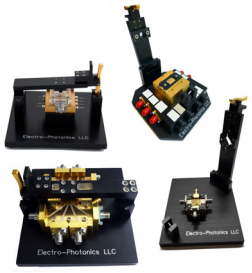
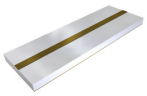
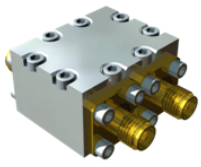






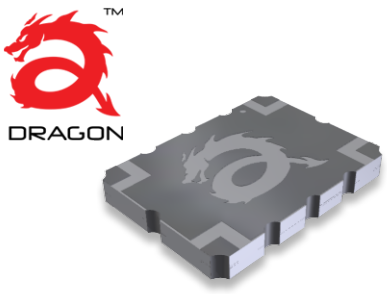


HYBRID COUPLERS

FEATURES

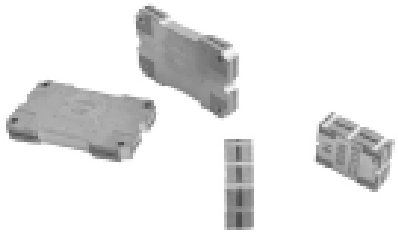
- Frequency Ranges from 380 MHz to 18GHz.
- Surface Mountable
- Small Footprints
- High Power Handling (up to 500 W)
- Low Insertion Loss
- Excellent Isolation and VSWR
- 90º Quadrature
- Multilayered PTFE or Ceramic Construction
- RoHS Compliant
- Optional Tape and Reel Packaging

DRAGON™ couplers are made for applications that require high isolation and low insertion loss. They are surface mountable and packaged in optional tape and reels. Couplers are RoHS compliant.



APPLICATIONS

- 4G, 5G Base Stations
- Satellite Communication
- Combiners and Splitters
- Duplexers
- Phase Shifter
- Mixers
- Modulators
- Signal Distribution



SMT 90° HYBRID COUPLERS

DRAGON™ SMT hybrid couplers have tight coupling, low insertion loss, and good phase tracking while being able to withstand high power and temperature extremes. Materials are dimensionally stable, and have excellent CTE match to PTFE based laminates, FR4 type and polyimide boards.

FREQ (MHz)	SIZE (in)	LOSS (dB)	VSWR	POWER (W)	PART NUMBER
380-520	.650 x .480	0.2	1.18	200	Q3XD-450R
470-860	.650 x .480	0.20	1.18	175	Q3XD-665R
800-1000	.560 x .350	0.12	1.15	175	Q3XG-900R
960-1215	.560 x .350	0.12	1.15	175	Q3XG-1088R
1000-2000	.560 x .350	0.18	1.18	85	Q3XG-1500R
1500-2200	.560 x .350	0.10	1.15	165	Q3XG-1850R
2000-4000	.560 X .350	0.22	1.18	50	Q3XG-3000R
2300-2700	.250 x .200	0.14	1.17	80	Q3XA-2500R
2700-3200	.250 x .200	0.14	1.20	20	Q3XA-2950R
3200-3800	.250 x .200	0.22	1.20	20	Q3XA-3500R
4000-6000	.250 x .200	0.20	1.25	20	Q3XA-5000R
1700-6000	.560 x .200	0.17	1.25	85	Q3XB-4000R
16000-17000	.175 x .175	1.00	1.60	50	Q3HF-16500

STANDARD COUPLERS PIN CONFIGURATION AND MECHANICAL OUTLINES

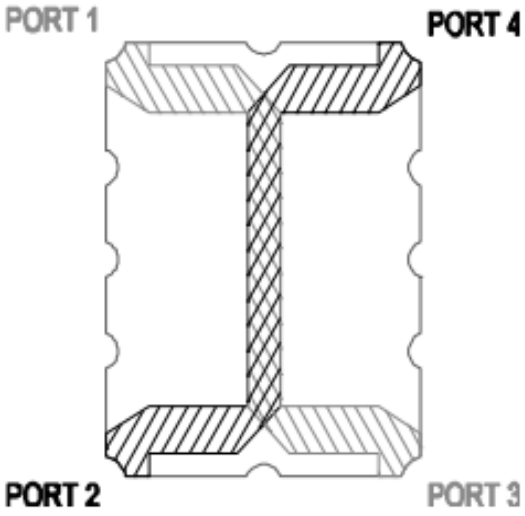


TABLE 1: SPLITTER CONFIGURATION*

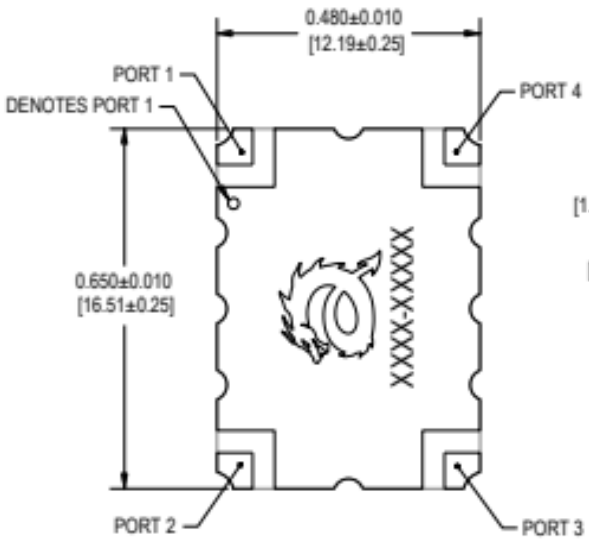
PORT 1	PORT 2	PORT 3	PORT 4
IN	ISO	-90°	0°
ISO	**IN**	0°	-90°
-90°	0°	**IN**	ISO
0°	-90°	ISO	**IN**

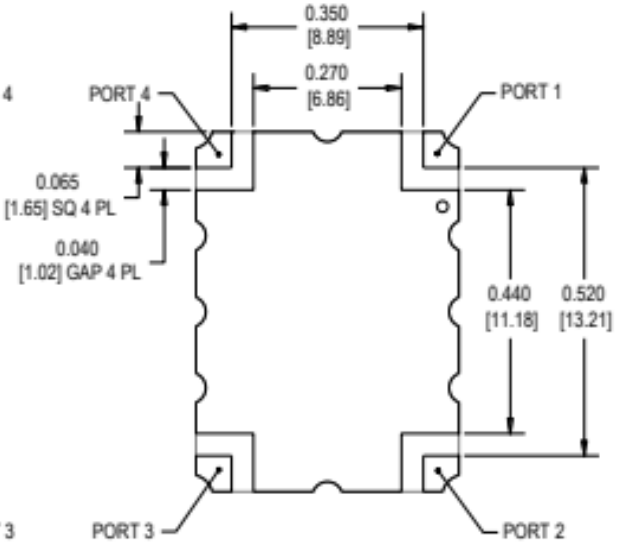
* Signals will split into -3dB amplitude in quadrature. A small fraction of the signal will appear at the isolated port due to non-ideal isolation.

TABLE 2: COMBINER CONFIGURATION†

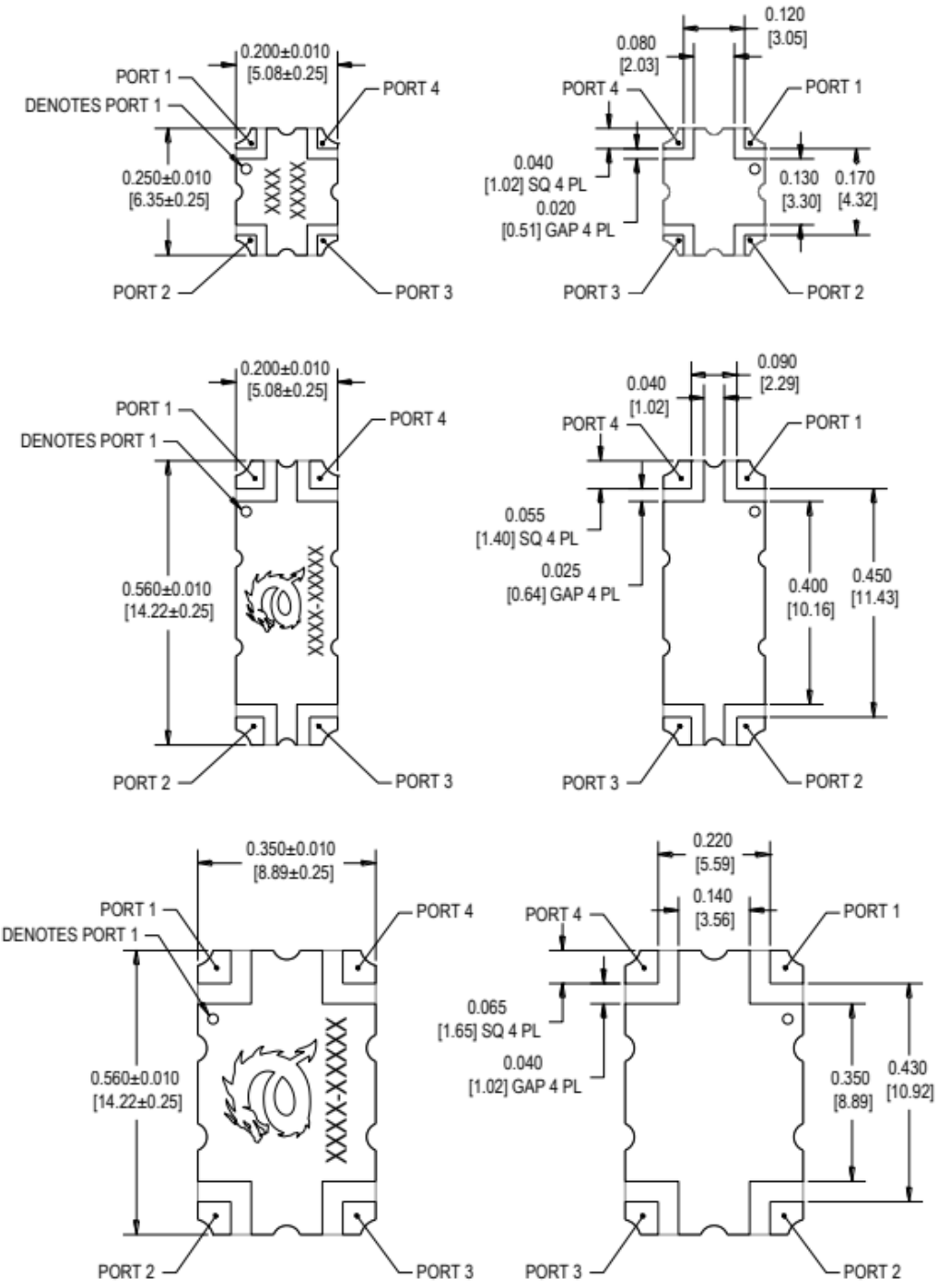
PORT 1	PORT 2	PORT 3	PORT 4
-90°	**0°**	ISO	OUT
0°	**-90°**	OUT	ISO
ISO	OUT	**-90°**	**0°**
OUT	ISO	**0°**	**-90°**

† Combining signals are applied in quadrature with equal amplitude. Unequal amplitude signals will generate small signal appearing at the isolated port.





* Dimensions are *inches [millimeters]*. Actual part may differ; additional vias may be added and markings may vary.



SMA 90° HYBRID COUPLERS

A 90 degree hybrid coupler is a four-port device used to equally split an input signal into two signals with a 90 degree phase shift between them. The 90 degree hybrid coupler can also be used to combine two signals while maintaining high isolation between them.

SMA hybrid couplers have low insertion loss, VSWR, and high-power capability. These hybrid couplers are suitable for various applications such as signal splitting/combining, antenna beam-forming networks, RF amplifiers, test & measurement, and more.

FREQ (MHz)	SIZE (in)	VSWR	LOSS (dB)	POWER (W)	PART NUMBER
960-1215	1.60 x 1.10	1.2	0.28	85	Q3XG-1088R-SMA
1000-2000	1.60 x 1.10	1.2	0.20	65	Q3XG-1500R-SMA
2000-4000	1.60 x 1.10	1.2	0.35	30	Q3XG-3000R-SMA
1700-6000	1.60 x 1.10	1.4	0.50	50	Q3XB-4000R-SMA
2000-18000	1.85 x 1.39	1.5	1.20	20	Q3XP-10000R-SMA

DIRECTIONAL COUPLERS

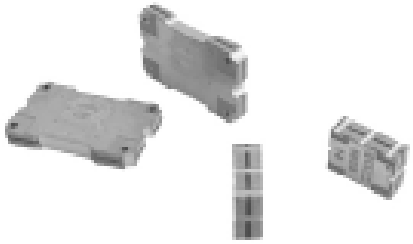
FEATURES

- Frequency Ranges from 500 MHz to 14GHz.
- Surface Mountable
- Small Footprints
- High Power Handling (up to 500 W)
- Low Insertion Loss
- Excellent Directivity and VSWR
- Multilayered PTFE Construction
- RoHS Compliant
- Optional Tape and Reel Packaging

DRAGON™ couplers are made for applications which require high isolation and low insertion loss. They are surface mountable and packaged in optional tape and reels. Couplers are RoHS compliant.

APPLICATIONS

- 4G, 5G Base Stations
- Amplifiers
- Power Monitoring
- Reflectometers



SMT DIRECTIONAL COUPLERS

DRAGON™ SMT directional couplers have low insertion loss, high power capability, high directivity, flat coupling in a small package. These directional couplers are wideband and suitable for various applications such as signal sampling, signal injection, source leveling, signal isolation, power monitoring, reflection measurement and more.

FREQ (MHz)	SIZE (in)	COUPLING (dB)	POWER (W)	PART NUMBER
700-1200	1.00 x .500	30	35	Q30HE-900R
960-1220	1.00 x .500	20	250	Q20HE-1090R
1800-2000	.283 x .197	10	50	Q10HK-1900R
1800-2200	.560 x .350	7.5	175	Q7P5HG-2100R
695-1000	.560 x .350	7.5	175	Q7P5HG-900R
800 -1000	.283 x .197	20	80	Q20HK-900R
800 -1000	.283 x .197	10	80	Q10HK-900R
800 -1000	.283 x .197	15	80	Q15HK-900R
1800-2000	.283 x .197	20	80	Q20HK-1900R
2100-2200	.283 x .197	20	80	Q20HK-2150R
7000-12000	.250 x .200	12	20	Q10HA-9500R
7000-12000	.250 x .200	22	20	Q20HA-9500R

SMA DIRECTIONAL COUPLERS

High performance connectorized directional couplers in a very small, compact package. Our directional couplers have low insertion loss, high power capability, high directivity, flat coupling in a small package.

These directional couplers are wideband and suitable for various applications, such as signal sampling, signal injection, source leveling, signal isolation, power monitoring, reflection measurement and more.

FREQ (MHz)	SIZE (in)	POWER (W)	COUPLING (dB)	DIRECTIVITY (dB)	PART NUMBER
1500-2200	1.60 x 1.10	15	10 ± 0.5	20	Q10HK-1900R-SMA
7000-12000	1.69 x .67	50	30 ± 1	17	EPD9500-30-SMA

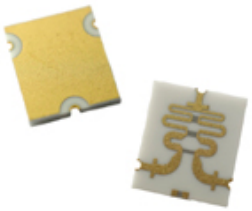
POWER DIVIDERS

ELECTRO-PHOTONICS LLC offers SMT and connectorized power dividers/combiners from 0.1 GHz to 18 GHz and up to 500W CW.

FEATURES

- Surface Mountable
- Small Footprints
- Low Insertion Loss
- Excellent Isolation and Low VSWR
- RoHS Compliant

DRAGON™ Wilkinson Power Dividers are in-phase devices capable of combining and dividing 2-way signals. These devices provide excellent isolation and VSWR in a small surface-mount package..



APPLICATIONS

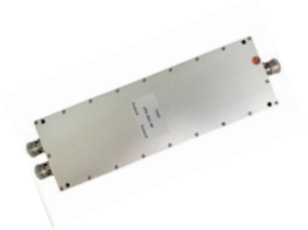
- 4G, 5G Base Stations
- Broadcast
- Antenna Feed Network
- Modulators
- Signal Distribution
- Combiners and Splitters

2 Way - SMT Power Dividers

FREQ (GHz)	SIZE (in)	POWER (W)	EXCESS LOSS* (dB)	PHASE BALACE (Deg)	ISOLATION Typical (dB)	INPUT RL (dB)	OUTPUT RL (dB)	AMPLITUDE BALANCE (dB)	PART NUMBER
6 - 18	.160 x .185	1	0.7	± 5	20	15	20	± 0.2	EP2D-1200R-M-001
0.7 - 1	.650 x .480	350	0.15	± 0.2	20	16	16	± 0.3	Y2D-900R

*Excess IL = (Common Port to Output Port IL) – 3dB

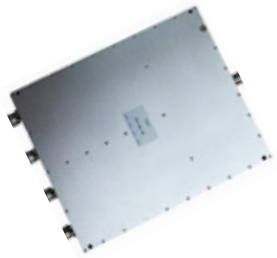
2 Way - Connectorized Power Dividers



FREQ (GHz)	SIZE (in) [mm]	POWER (W)	LOSS* (dB)	PHASE BALACE (Deg)	ISOLATION Typical (dB)	VSWR	AMPLITUDE BALANCE (dB)	PART NUMBER
1 - 18	3.386 x .945x .394 [86 x 24 x 10]	Forv. 10 Rev. 0.5	1.5	± 5°	16	1.5	± 0.5	EPD-2R-SF
2 - 18	1.378 x .945x .394 [35 x 24 x 10]	Forv. 10 Rev. 0.5	1	± 5°	18	1.4	± 0.5	EPD-2Q-SF
0.1 - 0.5	5.118 x 3.150x .551 [130 x 80 x 14]	Forv. 50 Rev. 10	0.6	± 3°	20	1.25	± 0.2	EPD-2A1-SF
0.1 - 0.5	10.236 x 3.228x 1.378 [260 x 82 x 35]	Forv. 400 Rev. 100	0.6	± 3°	28	1.25	± 0.2	EPD-2A1-DF
0.1 - 0.5	10.315 x 3.307x .915 [262 x 84 x 24]	Forv. 300 Rev. 100	0.6	± 3°	20	1.25	± 0.2	EPD-2A1-NF
4 - 8	1.00 x 1.00 x .370 [25.4 x 25.4 x 9.4]	Forv. 30 Rev. 1	0.5	± 2°	20	1.25	± 0.2	EPD-2L-SF

*Excess IL = (Common Port to Output Port IL) – 3dB

4 Way - Connectorized Power Dividers



FREQ (GHz)	SIZE (in) [mm]	POWER (W)	LOSS* (dB)	PHASE BALACE (Deg)	ISOLATION Typical (dB)	VSWR	AMPLITUDE BALANCE (dB)	PART NUMBER
0.1 -0.5	11.181 x 8.976x 1.378 [284 x 228 x 35]	Forv. 500 Rev. 100	0.6	± 3°	28	1.3	± 0.3	EPD-4A1-DF
0.1 -0.5	9.843 x 8.819x .915 [250 x 224 x 24]	Forv. 300 Rev. 100	0.8	± 3°	20	1.25	± 0.3	EPD-4A1-NF
4 - 8	1.750 x 2.000x .370 [44.45 x 50.8 x 9.4]	Forv. 30 Rev. 1	0.8	± 3°	18	1.30	± 0.3	EPD-4L-SF

*Excess IL = (Common Port to Output Port IL) – 3dB'

MICROWAVE FILTERS

Electro-Photonics LLC filters offer classical filter topologies yielding excellent performance in a small package. Standard filters are available from 300 MHz to 50 GHz.

We can design and build custom smt filters with standard or high dielectric substrates.

BANDPASS

PASSBAND FREQUENCY (MHz)	CENTER FREQUENCY (MHz)	STOPBAND FREQUENCY (MHz)	LOSS (dB)	VSWR	POWER (W)	CONNECTORS	PART NUMBER
990 – 1010	1000	≥30 dB @ DC-900 ≥30 dB @ 1100 - 3000	≤ 0.5	1.3	20	SMA - (F)	FBP-CAV-100-SMF
2000-10000	6000	≥60 dB @ DC-1.4 GHz ≥50 dB @ 10.9 –11.3GHz ≥55dB @ 11.3-15.4GHz ≥30dB @ 15.4-16.9GHz ≥55dB @ 16.9-19.5GHz	≤ 1.5	1.6	5	SMA - (F)	FBP-SST-6000-SMF
3400 – 3600	3500	≥50 dB @ DC-3200 ≥50 dB @ 3800-6000	≤ 1.5	1.3	10	Type N - (F)	FBP-CAV-3500-NMF
8200-11400	9800	≥30 dB @ DC - 6.9GHz ≥30 dB @ 12.45 –17GHz	≤ 1.0	≤ 1.5	5	SMA – (F)	FBP-INT-9800-SMF
26000-31500	28750	≥45 dB @ 24.25 GHz ≥45 dB @ 33.25 GHz ≥70 dB @ 23.25 GHz ≥70 dB @ 34.25 GHz	≤ 2.5	≤ 2.0	10	K (2.92mm) - (F)	FBP-INT-2875-KFF
37000-42000	39500	≥60 dB @ 35.4 GHz ≥55 dB @ 43.6 GHz	≤ 1.8	≤ 1.5	5	K (2.9mm) - (M) input K (2.9mm) - (F) output	FBP-CAV-3950-KMF
40000-46000	43000	≥45 dB @ 34.5 GHz ≥45 dB @ 50 GHz	≤ 1.7	≤ 1.5	5	2.4MM - (F)	FBP-CML-4300-24FF

RF AND MICROWAVE TEST FIXTURES

Electro-Photonics LLC has extensive experience with test fixtures for a wide range of RF and Microwave passive and active components. We design custom test fixtures for even the most technically challenging high frequency applications. Our high performance test fixtures utilize the latest RF materials and high frequency technology, resulting in repeatable and accurate testing.

FREQ (GHz)	USAGE	RF PORTS	DC PINS	PART NUMBER
DC - 2 GHz	The FRFS-A0800 is a high performance production type fixture for testing RF Micro Devices amplifier P/N RF2186.	2	8	FRFS-A0800
DC - 150 MHz	The FRFS-0353-2 is a production type fixture for testing Epcos saw filter P/N B4959.	4	0	FRFS-0353-2
DC - 4 GHz	The FRFS-MSA0836 is a production type fixture for testing Avago amplifier P/N MSA-0836.	2	0	FRFS-MSA0836
DC - 10 GHz	The FRFS-BCR122-001 is a high performance RF/Microwave production type fixture for testing Coilcraft BCR-122 ruggedized conical inductor.	2	0	FRFS-BCR122-001
DC -3	The FRFS-TSSOP8-001 is a high performance RF/Microwave production type fixture for testing for testing various devices in standard TSSOP–8 package.	6	1	FRFS-TSSOP8-001
DC -6	The FRFS-MSA0670 is a high performance RF/Microwave production type fixture for testing Avago amplifier P/N MSA-0670. T	2	1	FRFS-MSA0670-001
DC - 4 GHz	The FRFS-FLAT PACK-3PIN-001 is a high performance RF/Microwave production type fixture for testing for testing devices in a flat pack package.	2	1	FRFS-FLAT PACK-3PIN-001
DC - 13 GHz	The FRFS-48BGA is a high performance RF/Microwave production type fixture for testing for testing various devices in a 48-pin ball grid array (BGA) package.	5	4	FRFS-48BGA

RF & MICROWAVE EVALUATION BOARDS

ELECTRO-PHOTONICS LLC offers RF & Microwave evaluation boards for testing various passive and active components. We use our extensive RF & Microwave design experience, combined with carefully selected materials, to create RF & Microwave eval boards with excellent performance.

FREQ (GHz)	USAGE	LOSS (dB)	VSWR	CONNECTORS	PART NUMBER
DC-10	Evaluation board for quick characterization of standard 0402 inductors, capacitors, and resistors.	1	1.35	SMA (F)	722-0004-01-E02
DC – 14	Evaluation board with thru line for quick testing and de-embedding of many passive component manufacturers' chips.	0.7	1.20	SMA (F)	722-0002-02-E01
DC - 8	Evaluation board with thru line for quick testing and de-embedding of many passive component manufacturers' chips.	0.7	1.20	SMA (F)	722-0002-01-E01
DC – 12.4	Evaluation board for testing a 3-port device up to .050 x .050 in size with DC feed line for biasing, and a thru line for de-embedding.	0.7	1.20	SMA (F)	722-0005-01-E01
DC – 12.4	Evaluation board for testing a 3-port device up to .050 x .050 in size with DC feed line for biasing, and a thru line for de-embedding.	0.7	1.2	SMA (F)	722-0005-02-E01
DC – 12.4	Evaluation board for testing a 3-port device up to .050 x .050 in size with DC feed line for biasing, and a thru line for de-embedding.	0.7	1.2	SMA (F)	722-0005-03-E01
DC – 14	Evaluation board for SMD .250 x .200 couplers.	0.7	1.2	SMA (F)	722-0006-01-E01
DC – 14	Evaluation board for SMD .560 x .200 couplers	0.7	1.2	SMA (F)	722-0006-02-E01
DC – 14	Evaluation board for SMD .560 x .350 couplers	0.7	1.2	SMA (F)	722-0006-03-E01
DC – 14	Evaluation board for SMD .560 x .480 couplers	0.7	1.2	SMA (F)	722-0006-04-E01

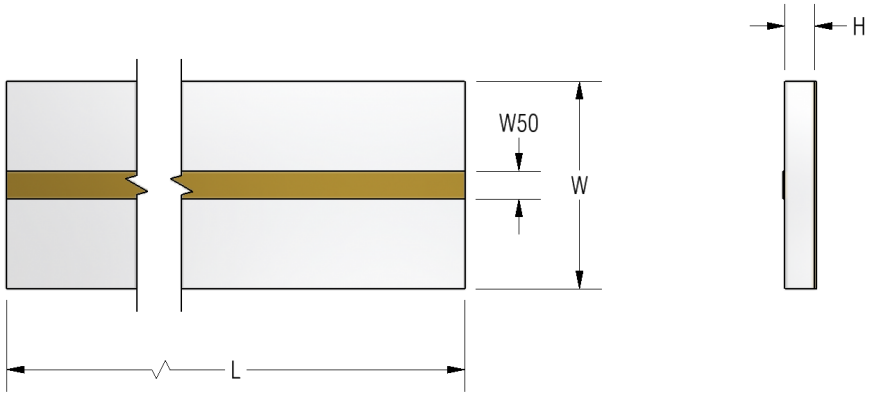
FREQ (GHz)	USAGE	LOSS (dB)	VSWR	CONNECTORS	PART NUMBER
DC – 14	Evaluation board for SMD 1.000 x .500 couplers.	0.7	1.2	SMA (F)	722-0006-05-E01
DC – 14	Evaluation board for SMD 1.000 x 1.000 couplers.	0.7	1.2	SMA (F)	722-0006-06-E01
DC – 14	Evaluation board for SMD 0.283 x 0.197 inch directional couplers.	0.7	1.2	SMA (F)	722-0006-07-E01
DC – 6	Evaluation board for SMD 1.00 x 0.50 couplers. Board material TACONIC RF-60.	0.5	1.25	SMA (F)	722-0006-08-E01
DC – 6	Evaluation board for SMD 1.00 x 0.50 couplers. Board material TACONIC RF-60.	0.5	1.25	SMA (F)	722-0006-09-E01

TRANSMISSION LINES

Electro-Photonics LLC offers 50 Ohm RF & Microwave microstrip t-line design kits on Alumina (Al2O3) and Quartz (SiO2) for chip and wire applications.

Each design kit includes 80 pieces of microstrip lines with thicknesses of 5 mil, 10 mil, 15 mil, and 20 mil and lengths of 50 mil, 100 mil, 150 mil, and 250 mil with +/- 1 mil tolerances.

Custom kits are available upon request.



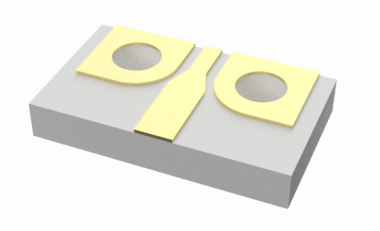
Designer's Kit Part Number	Description
TL99-KIT	Material: Alumina (Al2O3) 99.6% Thicknesses: 0.005, 0.010, 0.015, 0.020 in. Lengths: 0.050, 0.100, 0.150, 0.250 in. Qty: 5 of each Thickness/Lengths (80 pcs Total)
TLQZ-KIT	Material: Quartz (SiO2) Thicknesses: 0.005, 0.010, 0.015, 0.020 in. Lengths: 0.050, 0.100, 0.150, 0.250 in. Qty: 5 of each Thickness/Lengths (80 pcs Total)

All kits are 100% visual inspected and are shipped in waffle packs.

In addition to our kits, we offer transmission lines in various custom sizes.

TEST AND MEASUREMENT ACCESSORIES

ProbePads DC-26.5GHz



DC - 26.5GHz, CPWG to microstrip transition/adapter for on-wafer microwave measurements, microwave integrated circuits and device characterization.

- Wire bondable Au contacts
- Eutectic, epoxy, or solder die attach
- 99.6% Alumina
- Thin-film process

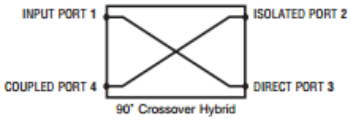
RF Package with SMA Connectors

This precision machined RF package has excellent RF performance to 6GHz.

- High Performance up to 6GHz
- Low Loss
- VSWR 1.2:1
- Precision SMA connector

90° Hybrid Couplers Performance Parameters

90° Hybrid Couplers



90° Crossover Hybrid

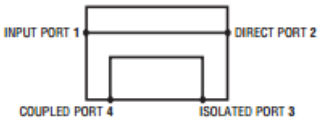
PORT	1	2	3	4
1	IN	ISO	-90°	0°
2	ISO	IN	0°	-90°
3	-90°	0°	IN	ISO
4	0°	-90°	ISO	IN

Performance Parameters

VSWR	$VSWR = \frac{V_{max}}{V_{min}}$
Return Loss	$\text{Return Loss (dB)} = 20 \bullet \text{Log}\left(\frac{VSWR+1}{VSWR-1}\right)$
Insertion Loss	$\text{Insertion Loss (dB)} = 10 \bullet \text{Log}\left(\frac{P_{in}}{P_{coupled} + P_{direct}}\right)$
Isolation	$\text{Isolation (dB)} = 10 \bullet \text{Log}\left(\frac{P_{in}}{P_{isolated}}\right)$
Phase Balance	$\text{Phase Balance (°)} = \pm\frac{\lvert Phase_{coupled} - Phase_{direct}\rvert}{2}$
Amplitude Balance	$\text{Amplitude Balance (dB)} = 10 \bullet \text{Log}\left(\frac{P_{coupled}}{\frac{P_{coupled} + P_{direct}}{2}}\right)$
	$\text{Amplitude Balance (dB)} = 10 \bullet \text{Log}\left(\frac{P_{direct}}{\frac{P_{direct} + P_{coupled}}{2}}\right)$

Directional Couplers Performance Parameters

Directional Couplers



Directional Coupler

Performance Parameters

Coupling Ratio	$\text{Coupling Ratio (dB)} = 10 \bullet \text{Log}\left(\frac{P_{coupled}}{P_{in}}\right)$
VSWR	$VSWR = \frac{V_{max}}{V_{min}}$
Return Loss	$\text{Return Loss (dB)} = 20 \bullet \text{Log}\left(\frac{VSWR+1}{VSWR-1}\right)$
Insertion Loss	$\text{Insertion Loss (dB)} = 10 \bullet \text{Log}\left(\frac{P_{in}}{P_{coupled} + P_{direct}}\right)$
Transmission Loss	$\text{Transmission Loss (dB)} = 10 \bullet \text{Log}\left(\frac{P_{in}}{P_{direct}}\right)$
Directivity	$\text{Directivity (dB)} = 10 \bullet \text{Log}\left(\frac{P_{coupled}}{P_{isolated}}\right)$
Frequency Sensitivity	$[C_{max}(dB) - C_{mean}(dB)]$ / $[C_{min}(dB) - C_{mean}(dB)]$

The Effect of VSWR on Transmitted Power

VSWR	Return Loss (dB)	Trans. Loss (dB)	Volt. Refl. Coeff.	Power Trans. (%)	Power Refl. (%)
1.00	∞	.000	.00	100.0	.0
1.01	46.1	.000	.00	100.0	.0
1.02	40.1	.000	.01	100.0	.0
1.03	36.6	.001	.01	100.0	.0
1.04	34.2	.002	.02	100.0	.0
1.05	32.3	.003	.02	99.9	.1
1.06	30.4	.004	.03	99.9	.1
1.07	29.4	.005	.03	99.9	.1
1.08	28.3	.006	.04	99.9	.1
1.09	27.3	.008	.04	99.8	.2
1.10	26.4	.010	.05	99.8	.2
1.11	25.7	.012	.05	99.7	.3
1.12	24.9	.014	.06	99.7	.3
1.13	24.3	.016	.06	99.6	.4
1.14	23.7	.019	.07	99.6	.4
1.15	23.1	.021	.07	99.5	.5
1.16	22.6	.024	.07	99.5	.5
1.17	22.1	.027	.08	99.4	.6
1.18	21.7	.030	.08	99.3	.7
1.19	21.2	.033	.09	99.2	.8
1.20	20.8	.036	.09	99.2	.8
1.21	20.4	.039	.10	99.1	.9
1.22	20.1	.043	.10	99.0	1.0
1.23	19.7	.046	.10	98.9	1.1
1.24	19.4	.050	.11	98.9	1.1
1.25	19.1	.054	.11	98.8	1.2
1.26	18.8	.058	.12	98.7	1.3
1.27	18.5	.062	.12	98.6	1.4
1.28	18.2	.065	.12	98.5	1.5
1.29	17.9	.070	.13	98.4	1.6
1.30	17.7	.075	.13	98.3	1.7

The Effect of VSWR on Transmitted Power *(continued)*

VSWR	Return Loss (dB)	Trans. Loss (dB)	Volt. Refl. Coeff.	Power Trans. (%)	Power Refl. (%)
1.32	17.2	.083	.14	98.1	1.9
1.34	16.8	.093	.15	97.9	2.1
1.36	16.3	.102	.15	97.7	2.3
1.38	15.9	.112	.16	97.5	2.5
1.40	15.6	.122	.17	97.2	2.8
1.42	15.2	.133	.17	97.0	3.0
1.44	14.9	.144	.18	96.7	3.3
1.46	14.6	.155	.19	96.5	3.5
1.48	14.3	.166	.19	96.3	3.7
1.50	14.0	.177	.20	96.0	4.0
1.52	13.7	.189	.21	95.7	4.3
1.54	13.4	.201	.21	95.5	4.5
1.56	13.2	.213	.22	95.2	4.8
1.58	13.0	.225	.22	94.9	5.1
1.60	12.7	.238	.23	94.7	5.3
1.62	12.5	.250	.24	94.4	5.6
1.64	12.3	.263	.24	94.1	5.9
1.66	12.1	.276	.25	93.8	6.2
1.68	11.9	.289	.25	93.6	6.4
1.70	11.7	.302	.26	93.3	6.7
1.72	11.5	.315	.26	93.0	7.0
1.74	11.4	.329	.27	92.7	7.3
1.76	11.2	.342	.28	92.4	7.6
1.78	11.0	.356	.28	92.1	7.9
1.80	10.9	.370	.29	91.8	8.2
1.82	10.7	.384	.29	91.5	8.5
1.84	10.6	.398	.30	91.3	8.7
1.86	10.4	.412	.30	91.0	9.0
1.88	10.3	.426	.31	90.7	9.3
1.90	10.2	.440	.31	90.4	9.6
1.92	10.0	.454	.32	90.1	9.9

Power Conversion Table

dBm	Watts	dBm	Watts	dBm	Watts
30.0	1.00	36.8	4.79	43.6	22.91
30.2	1.05	37.0	5.01	43.8	23.99
30.4	1.10	37.2	5.25	44.0	25.12
30.6	1.15	37.4	5.50	44.2	26.30
30.8	1.20	37.6	5.75	44.4	27.54
31.0	1.26	37.8	6.03	44.6	28.84
31.2	1.32	38.0	6.31	44.8	30.20
31.4	1.38	38.2	6.61	45.0	31.62
31.6	1.45	38.4	6.92	45.2	33.11
31.8	1.51	38.6	7.24	45.4	34.67
32.0	1.58	38.8	7.59	45.6	36.31
32.2	1.66	39.0	7.94	45.8	38.02
32.4	1.74	39.2	8.32	46.0	39.81
32.6	1.82	39.4	8.71	46.2	41.69
32.8	1.91	39.6	9.12	46.4	43.65
33.0	2.00	39.8	9.55	46.6	45.71
33.2	2.09	40.0	10.00	46.8	47.86
33.4	2.19	40.2	10.47	47.0	50.12
33.6	2.29	40.4	10.96	47.2	52.48
33.8	2.40	40.6	11.48	47.4	54.95
34.0	2.51	40.8	12.02	47.6	57.54
34.2	2.63	41.0	12.59	47.8	60.26
34.4	2.75	41.2	13.18	48.0	63.10
34.6	2.88	41.4	13.80	48.2	66.07
34.8	3.02	41.6	14.45	48.4	69.18
35.0	3.16	41.8	15.14	48.6	72.44
35.2	3.31	42.0	15.85	48.8	75.86
35.4	3.47	42.2	16.60	49.0	79.43
35.6	3.63	42.4	17.38	49.2	83.18
35.8	3.80	42.6	18.20	49.4	87.10
36.0	3.98	42.8	19.05	49.6	91.20
36.2	4.17	43.0	19.95	49.8	95.50
36.4	4.37	43.2	20.89	50.0	100.00
36.6	4.57	43.4	21.88	50.2	105.00

Power Conversion Table

dBm	Watts	dBm	Watts	dBm	Watts
50.4	110	57.0	501	63.6	2291
50.6	115	57.2	525	63.8	2399
50.8	120	57.4	550	64.0	2512
51.0	126	57.6	575	64.2	2630
51.2	132	57.8	603	64.4	2754
51.4	138	58.0	631	64.6	2884
51.6	145	58.2	661	64.8	3020
51.8	151	58.4	692	65.0	3162
52.0	158	58.6	724	65.2	3311
52.2	166	58.8	759	65.4	3467
52.4	174	59.0	794	65.6	3631
52.6	182	59.2	832	65.8	3802
52.8	191	59.4	871	66.0	3981
53.0	200	59.6	912	66.2	4169
53.2	209	59.8	955	66.4	4365
53.4	219	60.0	1000	66.6	4571
53.6	229	60.2	1047	66.8	4786
53.8	240	60.4	1096	67.0	5012
54.0	251	60.6	1148	67.2	5248
54.2	263	60.8	1202	67.4	5495
54.4	275	61.0	1259	67.6	5754
54.6	288	61.2	1318	67.8	6026
54.8	302	61.4	1380	68.0	6310
55.0	316	61.6	1445	68.2	6607
55.2	331	61.8	1514	68.4	6918
55.4	347	62.0	1585	68.6	7244
55.6	363	62.2	1660	68.8	7586
55.8	380	62.4	1738	69.0	7943
56.0	398	62.6	1820	69.2	8318
56.2	417	62.8	1905	69.4	8710
56.4	437	63.0	1995	69.6	9120
56.6	457	63.2	2089	69.8	9550
56.8	479	63.4	2188	70.0	10000

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