



MICROWAVE COMPONENTS CATALOG



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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.



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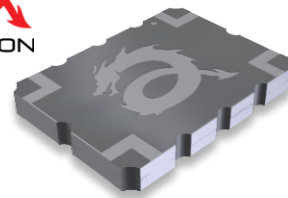


HYBRID COUPLERS

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
- 90° 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

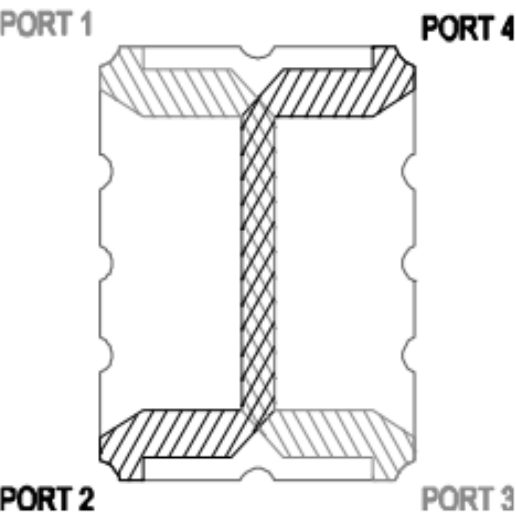


TABLE 1: SPLITTER CONFIGURATION*

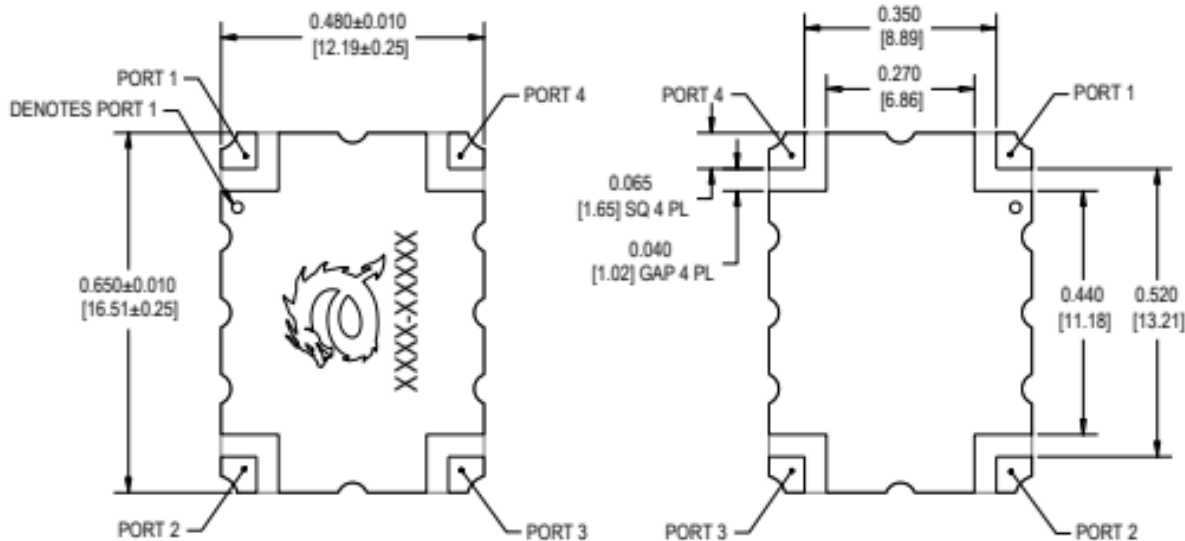
PORT 1	PORT 2	PORT 3	PORT 4
IN	ISO	-90°	0°
ISO	IN	0°	-90°
-90°	0°	IN	ISO
0°	-90°	ISO	IN

* 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.

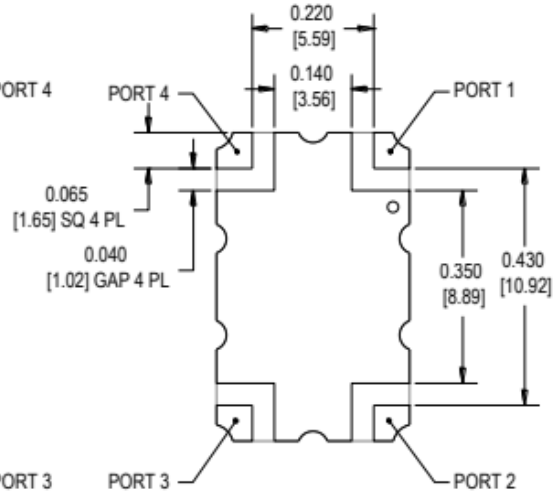
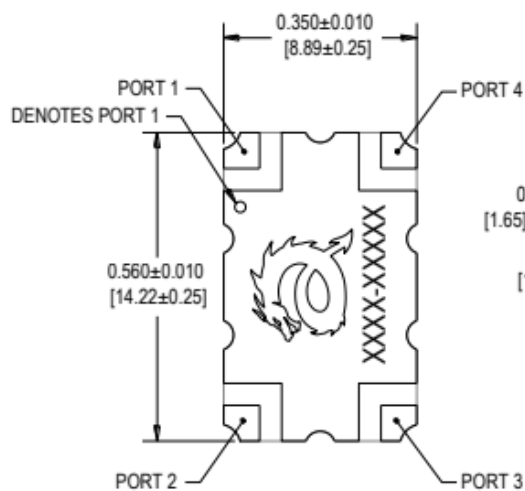
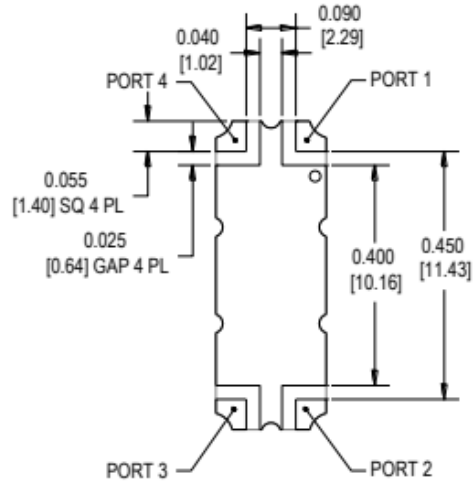
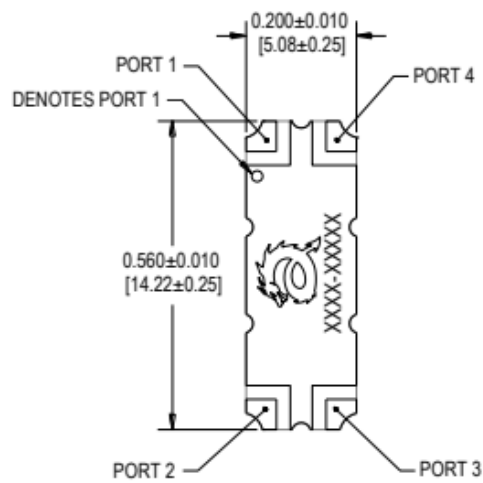
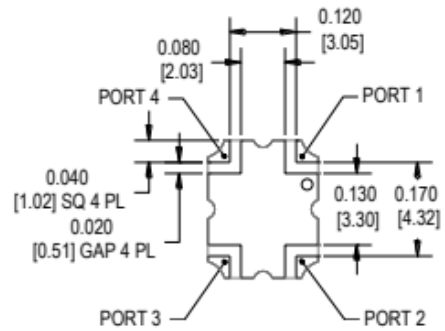
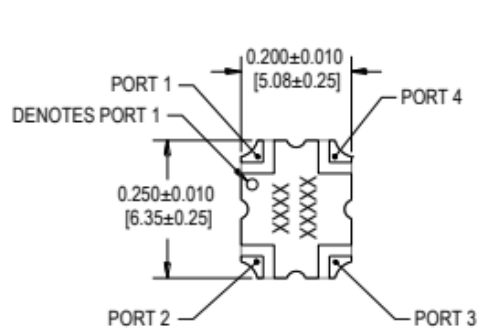
TABLE 2: COMBINER CONFIGURATION†

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



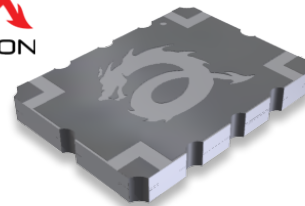


DIRECTIONAL COUPLERS

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





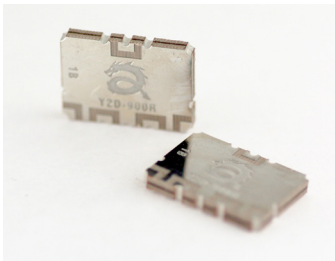
POWER DIVIDERS

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

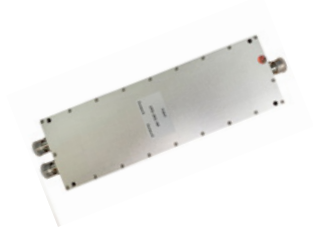
2 Way - SMT Power Dividers

FREQ (GHz)	SIZE (in)	POWER (W)	EXCESS LOSS* (dB)	PHASE BALANCE (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

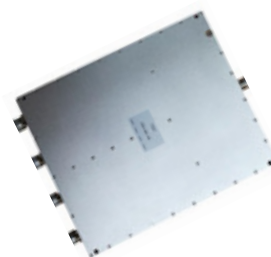


2 Way - Connectorized Power Dividers



FREQ (GHz)	SIZE (in) [mm]	POWER (W)	LOSS* (dB)	PHASE BALANCE (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	$\pm 5^\circ$	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	$\pm 5^\circ$	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	$\pm 3^\circ$	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	$\pm 3^\circ$	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	$\pm 3^\circ$	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	$\pm 2^\circ$	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 BALANCE (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	$\pm 3^\circ$	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	$\pm 3^\circ$	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	$\pm 3^\circ$	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

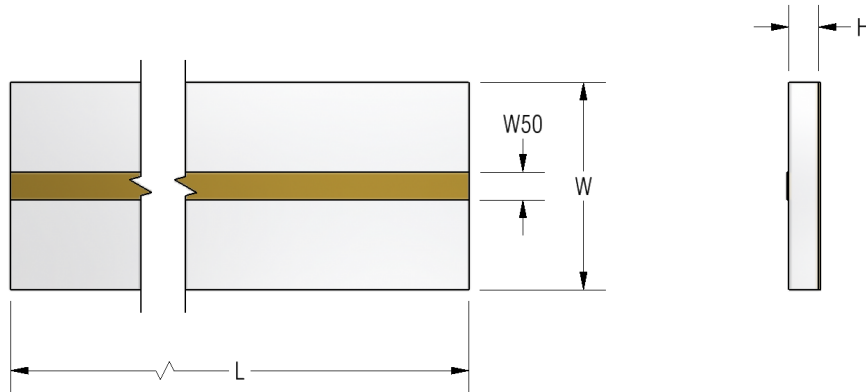


TRANSMISSION LINES

Electro-Photonics LLC offers 50 Ohm RF & Microwave microstrip t-line design kits on Alumina (Al_2O_3) and Quartz (SiO_2) 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.

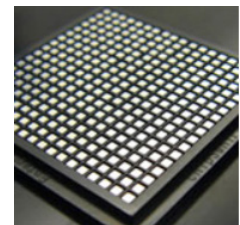
Custom kits are available upon request.



Designer's Kit Part Number	Description
TL99-KIT	Material: Alumina (Al_2O_3) 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 (SiO_2) 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.



ProbePads DC-26.5GHz

DC - 26.5GHz, CPWG to microstrip transition/adaptor 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





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