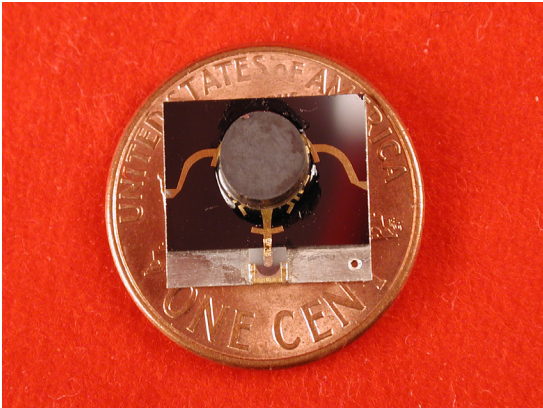


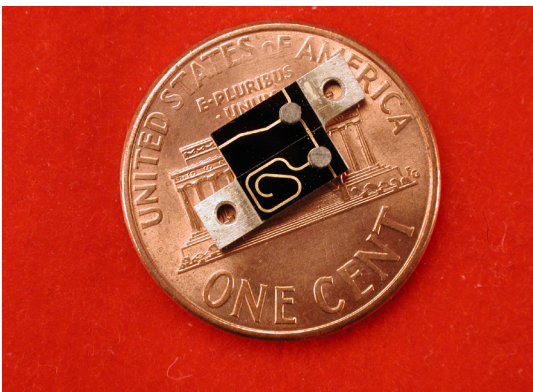
MICROSTRIP DROP-IN DEVICES



Microstrip Isolators and Circulators are relatively simple devices consisting of a thin film circuit deposited on a ferrite substrate (dielectric) and a magnet to circulate the signal. This is the complete substrate type device. The result is the least expensive and yet the most reliable device when compared to drop-in, coaxial and all other ferrite type devices. These are usually mounted with epoxy or soldered on a steel or invar surface.



As an alternate the substrate isolator can be mounted by Dorado on a steel carrier that can be attached to any surface by epoxy or with screw mounting holes (see drawings on the following pages).



These isolators can meet a wide range of environmental conditions including ground or airborne military specifications, stringent commercial requirements as well as the vigors of space applications. We also offer custom designs with a wide range of parameters, both electrical and mechanical, to meet our customer's specific requirements.

APPLICATION NOTES FOR MICROSTRIP DEVICES

Substrate type microstrip devices from DORADO use a single ferrite element with a circuit pattern on one face and a gold plated ground plane on the other. A permanent magnet structure is included on the ferrite substrate. DORADO devices are complete, self-contained and fully functional ferrite devices. They are designed to be directly compatible with a simple tab connection microstrip circuit. Our devices can also be used in strip transmission line applications in suitable mounting arrangements.

- **Features.**

- Small size, light weight
- Modest design allows for low unit cost
- Custom designs
- Wide range of standard products
- High Performance
- Single magnet design
- Lead free and ROHS compliant

- **Quality.**

- All products are 100% inspected to exceed MIL-STD-883E.

- **Frequency range.**

- Standard frequency range of 2.1 to 45GHz

- **Mechanical mounting.**

- Compatible with 50-ohm adjacent devices
- Substrate type microstrip devices should be mounted on a magnetic or nonmagnetic base. The type of base is indicated in the product's certificate. The surface of the base should be smooth (surface roughness should not exceed 0.4 micrometers).
- The gap between the ferrite device and the adjacent microstrip substrate to which it is to be connected must be tightly controlled. This becomes very critical at the higher frequencies. Coplanarity of the upper surfaces of the ferrite device and connecting MIC must also be controlled to avoid additional impedance discontinuities.
- It has been found that satisfactory operation is obtained with the device either thicker or thinner than the connecting MIC provided that the thickness ratio does not exceed 1.5.
- Connection tabs thickness should be 20 micrometers. The connection tabs width should be greater than 75% and should not exceed a 100% of the width of device's output (input) microstrip. The connection tabs length should not be more than twice the width of the device's output (input) microstrip.
- We recommend the parallel gap welding of the tab connections. Tab's material should be gold.
- The tabs must be tightly pressed to the microstrip and in no case lean over the microstrip's edges.
- Substrate type microstrip devices should be mounted on metal base with the minimum thickness of 1mm. Type of the base for all devices on substrate and some of devices on carrier indicated in product certificate.
- The minimum distance between the Microstrip Ferrite device and the metal screen should be 2.54mm. No additional magnetic shielding is required if the distance between two devices is kept to a minimum of 2.54 mm with face to face, back to back, or face to back. The minimum distance between two microstrip devices shoulder to shoulder is "0"mm.

- **Temperature range.**

- Standard temperature range -30 to 65°C, do not heat above 130°C.
- Electrical parameters perform at the standard operating temperature range.
- Other temperature ranges are available (Please contact DORADO).
- Maximum temperature during welding process is +350°C @ 25 microseconds

- **Magnetic fields and materials.**

- Devices typically exhibit a fringing magnetic field which is less than 1 gauss at the distance of 12.7 mm (0.5 inch). Electrical performance may be affected if device is mounted on or very close to magnetic material or exposed to strong magnetic fields from nearby magnetic devices that exceed the 1 gauss at 12.7 mm level.

- **Handling.**
 - Handle with care, using non-magnetic tools only
- **Environmental.**
 - Operated in waterproof equipment only
 - Humidity up to 80% non condensing is acceptable.
- **Thermal resistance.**
 - Must not be higher than $10^{-4} \text{ m}^2\text{K} / \text{W}$
- **Custom features.**
 - DORADO has the ability to provide a wide range of solutions to meet most applications.
- **Welding**
 - We recommend parallel gap impulse welding for connection of our standard thin film microstrip devices with PCB. We recommend using annealed gold tabs. Tabs thickness should be 20-25 micrometers. Width of the tabs shouldn't exceed the width of the input/output line of microstrip device. Width of the tabs should not be less than half of the width of the input/output line of microstrip device. Maximum temperature during welding process is $+350^{\circ}\text{C}$ @ 25 microseconds.
- **Soldering.**
 - Any solder material that does not contain Lead or Tin could be used for mounting of standard substrate type microstrip devices on the metal base. Temperature of the metal base should not exceed $+150^{\circ}\text{C}$ during 60 seconds. Maximum Storage Temperature for our standard microstrip devices is $+130^{\circ}\text{C}$.
 - It is our recommendation that the most suitable solder for microstrip devices is Indalloy#1 (In,Sn) which has a melting point of $+125^{\circ}\text{C}$ Appropriate fluxes to be used with this Indium solder alloy would be the Kester type 135 or 197.
- **Conductive Epoxy.**
 - Any type of conductive epoxy with polymerization temperature below 130°C may be used. These are available from Emerson & Comings, Chomerics Inc., Epoxy Technology Inc. The epoxy material itself should be prepared in accordance to the manufacturer's instructions.

MICROSTRIP ISOLATORS ON CARRIERS (2.1 to 15.6GHz)

FREQ. RANGE (GHz)	MODEL NUMBER	BAND WIDTH (%)	INS. LOSS dB (MAX)	ISOLATION dB (MIN)	VSWR (MAX)	FORWARD POWER (W)	LOAD POWER (W)	OPERATING TEMP. RANGE	OUTLINE #
2.10-2.60	3IMS24-3	full	0.4	20	1.2	10	1	-30° to +70° C	4.10
3.20-3.60	3IMS34-1	full	0.4	20	1.2	10	2	-30° to +70° C	4.11
3.40-3.60	3IMS35-1	full	0.4	20	1.2	10	10	-30° to +70° C	4.11
3.40-4.20	3IMS40-1	full	0.5	20	1.25	10	2	-30° to +70° C	4.11
4.40-5.00	3IMS47-1	full	0.5	20	1.25	10	5	-30° to +70° C	TBD
5.60-6.80	3IMS61-7	full	0.5	20	1.25	10	1	-30° to +70° C	4.18
5.80-7.20	3IMS65-2	full	0.5	20	1.25	10	2	-30° to +70° C	4.12
5.80-7.20	3IMS61-5	full	0.5	20	1.25	10	5	-30° to +70° C	4.17
5.80-7.10	3IMS65-5	full	0.6	16	1.4	10	10	-10° to +70° C	4.16
6.30-8.00	3IMS71-1	full	0.5	20	1.25	10	2	-30° to +70° C	4.12
7.10-8.50	3IMS78-2	full	0.5	20	1.25	10	2	-30° to +70° C	4.12
7.10-8.50	3IMS77-3	full	0.5	20	1.25	10	1	-30° to +70° C	4.19
7.10-8.50	3IMS78-3	full	0.6	16	1.4	8	2	-10° to +70° C	4.16
8.40-10.70	3IMS95-1	full	0.5	18	1.3	10	2	-30° to +65° C	4.26
8.40-10.70	3IMS95-3	full	0.5	18	1.3	10	2	-30° to +65° C	4.13
9.50-10.50	4IMS10-6	full	0.5	20	1.25	10	2	-30° to +70° C	4.13
9.90-10.50	4IMS10-7	full	0.5	20	1.25	5	0.2	-30° to +70° C	4.15
10.00-11.00	4IMS10-4	full	0.5	20	1.25	5	0.25	-30° to +70° C	4.15
10.00-12.00	4IMS11-1	full	0.5	18	1.25	10	5	-30° to +65° C	4.13
10.00-12.00	4IMS11-8	full	0.6	20	1.3	5	1	-30° to +65° C	4.20
10.00-11.00	4IMS11-7B*	full	0.5	20	1.25	10	1	-30° to +65° C	TBD
10.00-11.80	4IMS11-6B*	full	0.6	18	1.3	10	10	-30° to +65° C	4.24
10.50-11.50	4IMS11-3	full	0.5	20	1.3	5	1	-30° to +65° C	4.20
12.00-13.00	4IMS12-2Y	full	0.5	18	1.35	10	2	-30° to +70° C	4.13
12.00-13.50	4IMS13-7	full	0.6	20	1.35	10	0.25	-30° to +70° C	4.20
13.70-14.70	4IMS14-6	full	0.6	20	1.35	10	1	-30° to +70° C	4.14
13.70-14.70	4IMS14-4	full	0.6	20	1.35	10	1	-30° to +70° C	4.22
14.00-14.50	4IMS14-8	full	0.6	20	1.3	10	1	-30° to +70° C	4.14
14.00-14.50	4IMS14-6A	full	0.6	18	1.3	10	2	-30° to +70° C	4.23
14.00-15.50	4IMS15-5	full	0.65	18	1.35	10	1	-30° to +70° C	4.14
14.00-15.60	4IMS15-7	full	0.6	20	1.3	10	1	-30° to +70° C	4.21
6.30-8.50	3IMS(xx)-1Y	18%	0.5	20	1.25	10	2	-30° to +70° C	4.12
6.30-8.50	3IMS(xx)-2Y	18%	0.5	20	1.25	10	2	-30° to +70° C	4.25

NOTES:

1. MODIFIED VERSIONS OF ALL DEVICES ARE AVAILABLE
2. (xx) IDENTIFIES THE CENTER FREQUENCY OF THE DEVICE IN GHz
3. MAX. TEMPERATURE - 130°C UNLESS A SPECIAL ORDER IS PLACED FOR A HIGHER STORAGE TEMPERATURE.
4. CIRCULATION IS CLOCKWISE, INPUT ON LEFT AND OUTPUT ON RIGHT (COUNTERCLOCKWISE IS OPTIONAL)
5. ITEMS MARKED WITH A " * " SHOULD BE MOUNTED ON A NON-MAGNETIC BASE
6. TABS ARE AVAILABLE BY SPECIAL ORDER FOR ALL MICROSTRIP DEVICES

MICROSTRIP ISOLATORS ON CARRIERS

(2.1 to 15.6GHz)

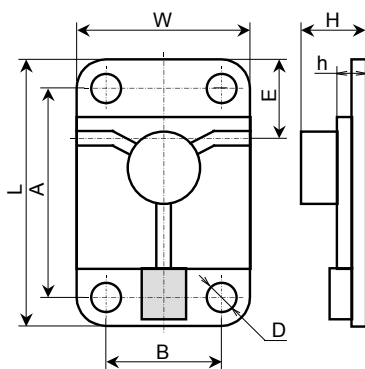


Fig. 19

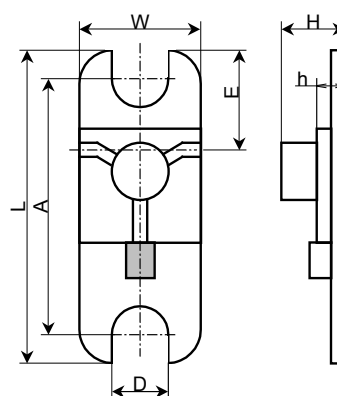


Fig. 20

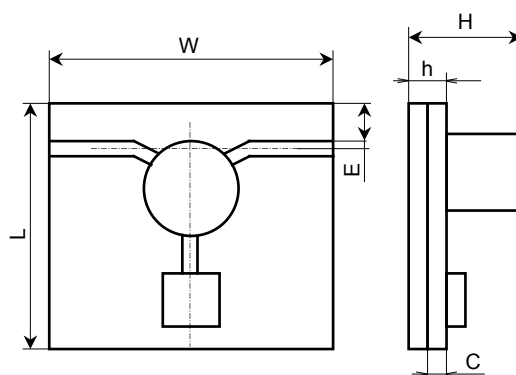


Fig. 21

OUTLINE #	DIMENSIONS, mm									
	W	L	H	h	C	A	B	E	D	Fig
4.10	20	30	6	2.2	1	25	15	10	2.5	19
4.11	15	25	6	2.2	1	20	10	9	2.5	19
4.12	12	20	5.5	1.85	0.635	15	7	6.5	2.5	19
4.13	7	19.5	5.5	1.65	0.635	15.5	-	6	2.5	20
4.14	7	19.5	5.5	1.52	0.5	15.5	-	6	2.5	20
4.15	7	6.1	4.5	1	0.635	-	-	1.5	-	21
4.16	12	10.67	3	0.635	0.38	-	-	5.335	-	21
4.17	12.8	17.8	5.5	1.85	0.635	15.2	8.6	5.59	1.6	19
4.18	12	23	6.3	1.85	1	20	-	6.5	2.5	20
4.19	10.2	17.2	5.14	1.65	0.635	14.43	7.43	6.19	1.7	19
4.20	7.1	13.2	5	1.65	0.635	10.4	4.3	4.95	1.7	19
4.21	7.1	13.2	4.6	1.5	0.5	10.4	4.3	4.64	1.7	19
4.22	8.89	12	5.25	1.77	0.5	9.5	6.35	4.45	1.6	19
4.23	7	16	5.5	1.65	0.5	12	-	6	2.5	20
4.24	8.38	7.37	3.8	0.64	0.38	-	-	3.68	-	21
4.25	9	13.7	5.14	1.65	0.635	11.2	6.35	4.45	1.8	19
4.26	9	19	5.5	1.65	0.635	14	-	7.5	2.5	20

MICROSTRIP ISOLATORS ON CARRIERS (16 to 43GHz)

FREQ. RANGE (GHz)	MODEL NUMBER	BAND WIDTH (%)	INS. LOSS db (MAX)	ISOLATION dB (MIN)	VSWR (MAX)	FORWARD POWER (W)	LOAD POWER (W)	OPERATING TEMP. RANGE	OUTLINE #
16.0-17.00	4IMS16-3Y	full	0.7	18	1.3	2	1	-30° to +70° C	5.22
16.60-17.70	4IMS17-1	full	0.8	20	1.35	2	1	-30° to +70° C	5.1
17.20-18.20	4IMS18-2	full	0.8	20	1.35	2	1	-30° to +70° C	5.1
17.30-18.00	4IMS18-4A	full	0.8	20	1.35	2	1	-30° to +70° C	5.18
17.70-19.70	4IMS19-1	full	0.8	20	1.35	2	1	-30° to +70° C	5.2
17.70-19.70	4IMS19-6	full	0.8	20	1.35	2	1	-30° to +70° C	5.16
17.70-19.70	4IMS19-1C	full	0.8	20	1.35	2	1	-30° to +70° C	5.17
17.70-19.70	4IMS19-8	full	0.8	20	1.35	2	1	-30° to +70° C	5.13
19.60-21.60	4IMS20-1	full	0.8	20	1.35	2	1	-30° to +70° C	5.10
21.20-23.60	4IMS22-1	full	0.9	20	1.35	2	1	-30° to +70° C	5.19
21.20-23.60	4IMS22-4	full	0.9	20	1.35	2	1	-30° to +70° C	5.9
21.20-23.60	4IMS22-7	full	0.9	20	1.35	2	1	-30° to +70° C	5.21
24.00-26.00	4IMS25-3	full	0.9	20	1.35	2	1	-30° to +70° C	5.3
24.20-26.20	4IMS25-3Y	full	0.9	20	1.35	2	1	-30° to +70° C	5.23
24.50-26.50	4IMS25-4	full	0.9	20	1.35	2	1	-30° to +70° C	5.9
25.20-27.20	4IMS26-2	full	0.9	20	1.35	2	1	-30° to +70° C	5.9
27.50-29.50	4IMS29-4	full	0.9	20	1.35	2	1	-30° to +70° C	5.14
27.00-30.00	4IMS28-1	full	0.9	18	1.35	2	1	-30° to +70° C	5.20
30.00-32.00	4IMS31-1	full	0.9	20	1.35	2	1	-30° to +70° C	5.20
32.00-34.00	4IMS33-3	full	0.9	20	1.35	2	1	-30° to +70° C	5.7
32.00-34.00	4IMS33-3Y	full	0.9	20	1.35	2	1	-30° to +70° C	5.23
33.00-35.00	4IMS34-3*	full	0.9	20	1.35	2	1	-30° to +70° C	5.5
34.00-36.00	4IMS35-1	full	0.9	20	1.35	2	1	-30° to +70° C	5.7
35.00-37.00	4IMS36-1	full	0.9	20	1.35	2	1	-30° to +70° C	5.7
36.00-38.00	4IMS37-2	full	0.9	20	1.35	2	1	-30° to +70° C	5.7
37.00-40.00	4IMS39-2	full	0.9	20	1.35	2	1	-30° to +70° C	5.9
37.00-40.00	4IMS38-2C*	full	0.9	20	1.35	2	1	-30° to +70° C	5.6
39.00-41.00	4IMS40-2	full	1	19	1.35	1	0.5	-10° to +50° C	5.8
41.00-43.00	4IMS42-5	full	1	19	1.35	1	0.5	-10° to +50° C	5.8
21.20-40.00	4IMS(xx)-4X	8	0.9	20	1.35	2	1	-30° to +70° C	5.9
26.00-32.00	4IMS(xx)-9X	7	0.9	20	1.35	2	1	-30° to +70° C	5.20
26.00-32.00	4IMS(xx)-8X	7	0.9	20	1.35	2	1	-30° to +70° C	5.14
26.00-32.00	4IMS(xx)-10X*	7	0.9	20	1.35	2	1	-30° to +70° C	5.24
32.00-37.00	4IMS(xx)-2X*	5	0.9	20	1.35	2	1	-30° to +70° C	5.5
32.00-37.00	4IMS(xx)-7X	5	0.9	20	1.35	2	1	-30° to +70° C	5.7
35.00-40.00	4IMS(xx)-3X*	8	0.9	20	1.35	2	1	-30° to +70° C	5.6
35.00-40.00	4IMS(xx)-5X	8	0.9	20	1.35	2	1	-30° to +70° C	5.8
39.20-43.00	4IMS(xx)-6X	5	1	19	1.35	1	0.5	-30° to +70° C	5.8

NOTES:

1. MODIFIED VERSIONS OF ALL DEVICES ARE AVAILABLE
2. (xx) IDENTIFIES THE CENTER FREQUENCY OF THE DEVICE IN GHz
3. MAX. TEMPERATURE - 130°C UNLESS A SPECIAL ORDER IS PLACED FOR A HIGHER STORAGE TEMPERATURE.
4. CIRCULATION IS CLOCKWISE, INPUT ON LEFT AND OUTPUT ON RIGHT (COUNTERCLOCKWISE IS OPTIONAL)
5. ITEMS MARKED WITH A " *" SHOULD BE MOUNTED ON A NON-MAGNETIC BASE
6. TABS ARE AVAILABLE BY SPECIAL ORDER FOR ALL MICROSTRIP DEVICES

MICROSTRIP ISOLATORS ON CARRIERS

(16 to 43GHz)

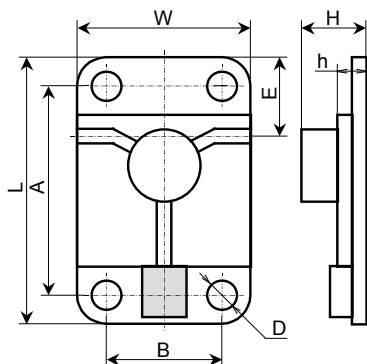


Fig. 23

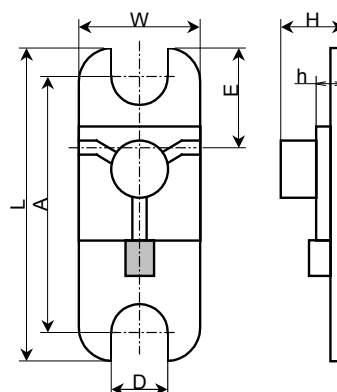


Fig. 24

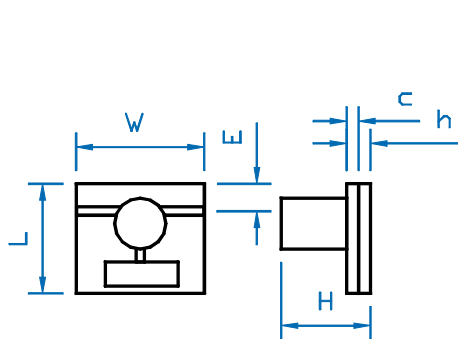


Fig. 26

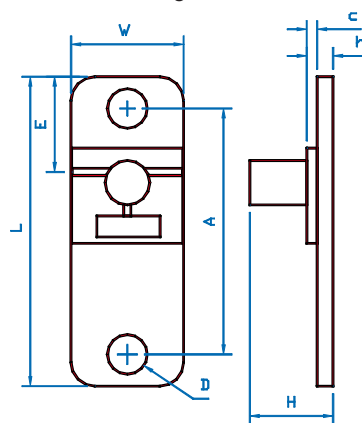


Fig. 27

OUTLINE #	DIMENSIONS, mm									
	W	L	H	h	C	A	B	E	D	Fig
5.1	8.89	12	5	1.77	0.5	9.5	6.35	4.45	1.6	23
5.2	7	19.5	5.5	1.4	0.38	15.5	-	6	2.5	24
5.3	6	12.19	5	1.4	0.25	9.15	3.3	4.67	1.7	23
5.5	3.38	6.5	3.5	0.7	0.2	-	-	1	-	26
5.6	5	5.5	3.5	0.45	0.2	-	-	1.35	-	26
5.7	3.38	14	4.5	1.14	0.2	11	-	4.75	1.75	24
5.8	5	11	4.5	1.2	0.2	8	-	4.1	2	27
5.9	5	16.5	5	1.6	0.38	12.5	-	6.1	2.5	24
5.10	6	17.5	4.3	1.5	0.38	13.5	-	6.15	2.5	24
5.13	6	12.19	5	1.53	0.38	9.15	3.3	4.12	1.7	23
5.14	5	11	4.3	1.25	0.25	8	-	4.1	2	27
5.16	7.1	13.2	4.6	1.4	0.38	10.4	4.3	4.62	1.7	23
5.17	7.1	12.2	4.8	1.5	0.38	9.14	3.3	4.18	1.7	23
5.18	7	19.5	5.5	1.65	0.38	15.5	-	6	2.5	24
5.19	6	12.19	5	1.53	0.38	9.15	3.3	4.67	1.7	23
5.20	6	12.19	5	1.4	0.25	9.15	3.3	4.6	1.7	23
5.21	7.1	12.2	4.8	1.5	0.38	9.14	3.3	4.68	1.7	23
5.22	7	7	4.5	1	0.5	-	-	1.5	-	26
5.23	6	5	4.5	1.25	0.25	-	-	1	-	26
5.24	5	5.5	3.5	0.75	0.25	-	-	1.25	-	26

MICROSTRIP ISOLATORS ON SUBSTRATE (2.1 to 45GHz)

FREQ. RANGE (GHz)	MODEL NUMBER	BAND WIDTH (%)	INS. LOSS db (MAX)	ISOLATION dB (MIN)	VSWR (MAX)	FORWARD POWER (W)	LOAD POWER (W)	OPERATING TEMP. RANGE	OUTLINE #
2.10-2.60	3IMM24-4	full	0.4	20	1.2	5	0.25	-10° to +50° C	6.1
3.40-4.20	3IMM38-2	full	0.4	20	1.25	5	0.25	-10° to +50° C	6.2
3.70-4.50	3IMM39-1	full	0.4	20	1.25	5	0.25	-10° to +50° C	6.2
4.30-5.10	3IMM47-1	full	0.5	20	1.25	5	0.25	-10° to +50° C	TBD
5.80-7.20	3IMM65-1	full	0.5	20	1.25	5	0.25	-30° to +70° C	6.4
5.80-7.10	3IMM65-2*	full	0.6	16	1.4	5	1	-10° to +70° C	6.20
6.30-8.00	3IMM71-1	full	0.5	20	1.25	5	0.25	-30° to +70° C	6.5
6.30-8.00	3IMM71-2	full	0.5	20	1.25	5	0.25	-30° to +70° C	6.21
7.10-8.50	3IMM78-1	full	0.5	20	1.25	5	0.25	-30° to +70° C	6.5
7.10-8.50	3IMM78-4A*	full	0.6	16	1.4	5	1	-10° to +70° C	6.20
8.40-10.70	3IMM95-3	full	0.5	18	1.3	5	0.25	-30° to +65° C	6.6
9.00-11.00	4IMM10-6	full	0.5	20	1.25	5	0.25	-30° to +65° C	6.6
9.80-10.20	4IMM10-5*	full	0.5	20	1.25	5	0.25	-30° to +65° C	6.7
10.00-12.00	4IMM11-5	full	0.6	19	1.3	5	0.25	-30° to +65° C	6.8
12.00-13.50	4IMM13-3Y	full	0.6	20	1.3	5	0.25	-30° to +70° C	6.9
13.70-14.70	4IMM14-6	full	0.6	20	1.3	5	0.25	-30° to +70° C	6.9
14.00-14.50	4IMM14-1	full	0.6	20	1.3	5	0.25	-30° to +70° C	6.9
14.00-15.60	4IMM15-5	full	0.6	19	1.3	5	0.25	-30° to +65° C	6.9
14.50-15.40	4IMM15-1	full	0.7	18	1.35	5	0.25	-30° to +70° C	6.9
15.50-17.50	4IMM16-1	full	0.6	20	1.3	2	0.25	-10° to +50° C	6.9
17.20-18.20	4IMM18-3*	full	0.8	20	1.3	2	1	-30° to +70° C	6.10
17.20-18.30	4IMM18-3Y*	full	0.8	20	1.3	2	1	-30° to +70° C	6.35
17.70-19.70	4IMM19-1C*	full	0.8	20	1.3	2	1	-30° to +70° C	6.11
17.70-19.70	4IMM19-2*	full	0.8	20	1.3	2	1	-30° to +70° C	6.34
18.40-21.30	4IMM20-1*	full	0.9	18	1.35	2	1	-30° to +70° C	6.11
21.20-23.60	4IMM22-1*	full	0.9	20	1.3	2	1	-30° to +70° C	6.12
21.20-23.60	4IMM22-5*	full	0.9	20	1.3	2	1	-30° to +70° C	6.24
24.00-26.00	4IMM25-3	full	0.9	20	1.3	2	1	-30° to +70° C	6.13
24.50-26.50	4IMM25-2	full	0.9	20	1.3	2	1	-30° to +70° C	6.25
25.27-26.98	4IMM26-5	full	0.9	20	1.3	2	1	-30° to +70° C	6.25
26.50-31.50	4IMM29-8	full	1	17	1.4	2	1	-10° to +50° C	6.14
26.50-31.50	4IMM29-9	full	1	17	1.4	2	1	-10° to +50° C	6.26
27.35-31.76	4IMM29-1	full	1	18	1.35	2	1	-30° to +70° C	6.14
27.50-29.50	4IMM28-5	full	0.9	20	1.3	2	1	-30° to +70° C	6.32
28.00-30.00	4IMM29-6	full	0.9	20	1.3	2	1	-30° to +70° C	6.14
30.00-32.00	4IMM31-5	full	0.9	20	1.3	2	1	-30° to +70° C	6.14
31.50-33.50	4IMM32-3	full	0.9	20	1.3	2	1	-30° to +70° C	6.14
33.50-36.50	4IMM35-8	full	1	18	1.35	2	1	-30° to +70° C	6.15
34.00-36.00	4IMM35-9	full	0.9	20	1.3	2	1	-30° to +70° C	6.29
34.00-36.00	4IMM35-1A	full	0.9	20	1.3	2	1	-30° to +70° C	6.15
34.50-35.50	4IMM35-1	full	0.9	20	1.3	2	1	-30° to +70° C	6.15
35.00-37.00	4IMM36-3	full	0.9	20	1.3	2	1	-30° to +70° C	6.15
36.00-38.00	4IMM37-1	full	0.9	20	1.3	2	1	-30° to +70° C	6.16
37.00-40.00	4IMM39-2	full	0.9	20	1.35	2	1	-30° to +70° C	6.15
39.00-41.00	4IMM40-1	full	1.1	18	1.35	1	0.5	-10° to +50° C	6.15
40.50-42.50	4IMM41-2	full	1.1	18	1.4	1	0.5	-10° to +50° C	6.15
43.00-45.00	4IMM44-3	full	1.1	18	1.4	1	0.5	-10° to +50° C	6.15

MICROSTRIP ISOLATORS ON SUBSTRATE (2.1 to 45GHz)

FREQ. RANGE (GHz)	MODEL NUMBER	BAND WIDTH (%)	INS. LOSS db (MAX)	ISOLATION dB (MIN)	VSWR (MAX)	FORWARD POWER (W)	LOAD POWER (W)	OPERATING TEMP. RANGE	OUTLINE #
6.30-8.60	3IMM(XX)-1X	18	0.5	20	1.25	5	0.25	-30° to +70° C	6.5
6.30-8.60	3IMM(XX)-2X	18	0.5	20	1.25	5	0.25	-30° to +70° C	6.21
6.30-8.60	3IMM(XX)-7X	18	0.6	16	1.4	10	1	-30° to +70° C	6.20
23.50-34.00	4IMM(XX)-3X	7	0.9	20	1.3	2	1	-30° to +70° C	6.14
31.00-40.00	4IMM(XX)-4X	7	0.9	20	1.3	2	1	-30° to +70° C	6.15
31.00-40.00	4IMM(XX)-5X	7	0.9	20	1.3	2	1	-30° to +70° C	6.16

NOTES:

1. MODIFIED VERSIONS OF ALL DEVICES ARE AVAILABLE
2. ALL DEVICES SHOULD BE MOUNTED ON A STEEL (OR KOVAR) BASE EXCEPT ITEMS MARKED WITH A “*”
3. MAX. TEMPERATURE - 130°C UNLESS A SPECIAL ORDER IS PLACED FOR A HIGHER STORAGE TEMPERATURE.
5. CIRCULATION IS CLOCKWISE, INPUT ON LEFT AND OUTPUT ON RIGHT (COUNTERCLOCKWISE IS OPTIONAL)
6. TABS ARE AVAILABLE BY SPECIAL ORDER FOR ALL MICROSTRIP DEVICES

OUTLINE #	DIMENSIONS, mm				
	W	L	H	C	E
6.1	20	25	5	1	5.00
6.2	15	20	5	1	4
6.4	12	11	5	0.635	2
6.5	10	9	5	0.635	2.5
6.6	7	10	5.5	0.635	1.5
6.7	6.35	6.35	5	0.635	1.5
6.8	7	6	4.5	0.635	1.5
6.9	7	7	4.5	0.5	1.5
6.10	8.82	6.3	4	0.38	1.575
6.11	6	6	4	0.38	1
6.12	6	6	4	0.38	1.5
6.13	6	6	4	0.25	1.5
6.14	6	5	4	0.25	1
6.15	3.33	6.5	4	0.2	1
6.16	5	5	4	0.2	1.1
6.17	3.33	5	4	0.12	1.1
6.18	2	7	2.7	0.12	1.62
6.19	1	7	2.7	0.11	-
6.20	12	10.67	3.5	0.635	5.335
6.21	12	8	5	0.635	1.5
6.24	5	7	4	0.38	1.35
6.25	5	7	4	0.25	1.35
6.26	5	5	4	0.25	1
6.27	4.5	9	4	0.25	1.5
6.29	5	6	4	0.2	1.5
6.28	3.33	8.5	4	0.2	1
6.30	6	5	4	0.2	1
6.31	7	7	4	0.38	1.5
6.32	6	6	4	0.25	1
6.33	4.5	9	4	0.2	1.5
6.34	7	6	4	0.38	1
6.35	6.2	6.2	4	0.38	1.5

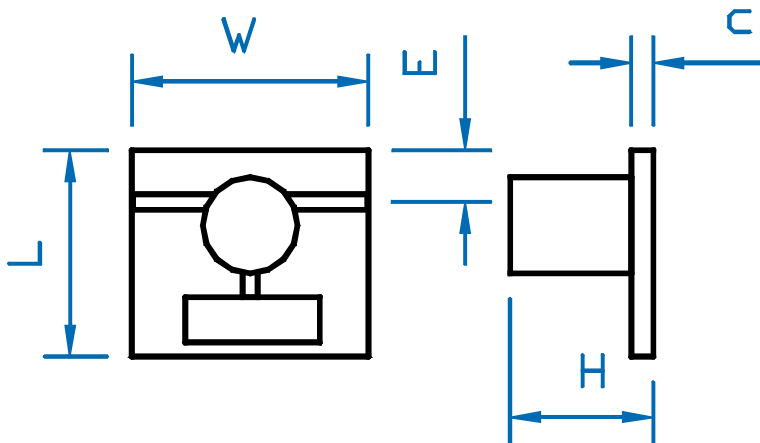


Fig. 28

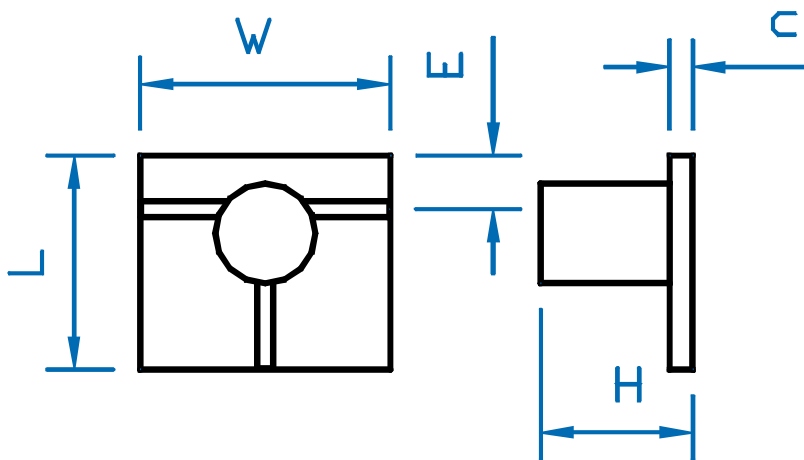
MICROSTRIP CIRCULATORS ON SUBSTRATE (2.4 to 42.5GHz)

FREQ. RANGE (GHz)	MODEL NUMBER	BAND WIDTH (%)	INS. LOSS db (MAX)	ISOLATION dB (MIN)	VSWR (MAX)	FORWARD POWER (W)	OPERATING TEMP. RANGE	OUTLINE #
2.40-2.80	3CMM26-3Y	full	0.5	20	1.22	5	-10° to +50° C	7.1
4.20-5.20	3CMM48-3	full	0.5	20	1.22	5	-10° to +50° C	7.3
5.20-5.80	3CMM55-3	full	0.5	20	1.22	5	-10° to +50° C	7.2
5.80-7.20	3CMM65-2	full	0.5	20	1.22	5	-30° to +70° C	7.4
5.80-7.20	3CMM65-3	full	0.5	20	1.22	5	-30° to +70° C	7.19
6.30-8.00	3CMM71-1	full	0.6	20	1.22	5	-30° to +70° C	7.5
6.30-8.00	3CMM71-5	full	0.6	20	1.22	5	-30° to +70° C	7.21
7.10-8.50	3CMM78-1	full	0.6	20	1.22	5	-30° to +70° C	7.6
7.10-8.50	3CMM78-3	full	0.6	20	1.22	5	-30° to +70° C	7.5
8.40-10.70	3CMM95-1	full	0.6	18	1.3	5	-30° to +65° C	7.7
8.50-10.50	3CMM95-2	full	0.6	20	1.22	5	-30° to +65° C	7.7
9.50-10.50	4CMM10-2	full	0.6	20	1.22	5	-30° to +65° C	7.7
10.00-12.00	4CMM11-3	full	0.6	20	1.25	5	-30° to +65° C	7.8
11.70-14.50	4CMM10-3Y	full	0.6	18	1.3	5	-30° to +70° C	7.9
13.70-14.70	4CMM14-6	full	0.6	20	1.3	5	-30° to +70° C	7.9
14.00-14.50	4CMM14-1	full	0.6	20	1.3	5	-30° to +70° C	7.9
14.50-15.40	4CMM15-1	full	0.65	18	1.35	5	-30° to +70° C	7.9
15.50-17.50	4CMM16-1	full	0.6	18	1.35	2	-10° to +50° C	7.10
17.70-19.70	4CMM19-1*	full	0.9	19	1.25	2	-30° to +70° C	7.11
19.00-21.20	4CMM20-2*	full	0.9	19	1.25	2	-30° to +70° C	7.11
21.20-23.60	4CMM22-1*	full	0.9	19	1.25	2	-30° to +70° C	7.12
24.00-25.50	4CMM25-2	full	0.9	19	1.25	2	-30° to +70° C	7.13
25.20-27.00	4CMM26-2	full	0.9	19	1.3	2	-30° to +70° C	7.14
27.00-29.00	4CMM28-5	full	0.9	18	1.35	2	-30° to +70° C	7.13
30.00-32.00	4CMM31-1	full	0.9	19	1.25	2	-30° to +70° C	7.13
32.00-34.00	4CMM33-1	full	0.9	19	1.25	2	-30° to +70° C	7.15
34.00-36.00	4CMM35-1	full	0.9	19	1.25	2	-30° to +70° C	7.15
35.00-37.00	4CMM36-4	full	0.9	19	1.25	2	-30° to +70° C	7.15
36.00-38.00	4CMM38-2	full	0.9	19	1.25	2	-30° to +70° C	7.15
36.00-38.00	4CMM37-1	full	0.9	19	1.25	2	-30° to +70° C	7.18
37.00-40.00	4CMM39-2	full	0.9	18	1.3	2	-30° to +70° C	7.15
39.00-41.00	4CMM40-1	full	1	18	1.35	1	-10° to +50° C	7.15
40.50-42.50	4CMM41-2	full	1	17	1.4	1	-10° to +50° C	7.16

MICROSTRIP CIRCULATORS ON SUBSTRATE (2.4 to 42.5GHz)

FREQ. RANGE (GHz)	MODEL NUMBER	BAND WIDTH (%)	INS. LOSS db (MAX)	ISOLATION dB (MIN)	VSWR (MAX)	FORWARD POWER (W)	OPERATING TEMP. RANGE	OUTLINE #
6.3-8.6	3CMM(XX)-1x	18	0.6	20	1.22	10	-30° to +70° C	7.5
6.3-8.6	3CMM(XX)-2x	18	0.6	20	1.22	10	-30° to +70° C	7.6
6.3-8.6	3CMM(XX)-6x	18	0.6	20	1.22	10	-30° to +70° C	7.20
6.3-8.6	3CMM(XX)-3x	18	0.6	20	1.22	10	-30° to +70° C	7.21
25.2-28.0	4CMM(XX)-4x	5	0.9	19	1.25	2	-30° to +70° C	7.14
34.0-40.0	4CMM(XX)-5x	8	0.9	19	1.25	2	-30° to +70° C	7.15

OUTLINE #	W, mm	L, mm	H, mm	C, mm	E, mm
7.1	20	20	5	1	5
7.2	12	12	4.5	1	2.54
7.3	15	15	5	1	2.5
7.4	12	8.5	5	1	1.5
7.5	12	8	4.5	0.635	1.5
7.6	10	9	4.5	0.635	1.5
7.7	7	7	4.5	0.635	1.5
7.8	7	6	4.5	0.635	1.5
7.9	7	7	4.5	0.5	1.5
7.10	7	6	4	0.38	1.5
7.11	6	6	4	0.38	1
7.12	6	6	4	0.38	1.5
7.13	6	5	4	0.25	1
7.14	5	5	4	0.25	1.35
7.15	5	5	4	0.2	1
7.16	4.5	4.5	3.5	0.2	1.5
7.17	2	3	2.5	0.12	1.62
7.18	6	5	4	0.2	1.5
7.19	12.7	8	4.5	0.635	1.588
7.20	12	9	4.5	0.635	2.5
7.21	10.15	8	4.5	0.635	1.5



NOTES:

1. MODIFIED VERSIONS OF ALL DEVICES ARE AVAILABLE
2. ALL DEVICES SHOULD BE MOUNTED ON A STEEL (OR KOVAR) BASE EXCEPT ITEMS MARKED WITH A “*”
3. MAX. TEMPERATURE - 130°C UNLESS A SPECIAL ORDER IS PLACED FOR A HIGHER STORAGE TEMPERATURE.
4. CIRCULATION IS CLOCKWISE, INPUT ON LEFT AND OUTPUT ON RIGHT (COUNTERCLOCKWISE IS OPTIONAL)
6. TABS ARE AVAILABLE BY SPECIAL ORDER FOR ALL MICROSTRIP DEVICES

MICROSTRIP CIRCULATORS ON CARRIERS (2.1 to 40GHz)

FREQ. RANGE (GHz)	MODEL NUMBER	BAND WIDTH (%)	INS. LOSS db (MAX)	ISOLATION dB (MIN)	VSWR (MAX)	FORWARD POWER (W)	OPERATING TEMP. RANGE	OUTLINE #
2.10-2.50	3CMS23-4	full	0.4	20	1.22	5	-10° to +50° C	8.4
2.60-3.00	3CMS26-1	full	0.4	20	1.22	5	-10° to +50° C	8.4
3.00-3.50	3CMS26-1	full	0.4	20	1.22	5	-10° to +50° C	8.4
3.60-4.20	3CMS39-1	full	0.5	20	1.3	5	-10° to +50° C	8.6
5.00-5.90	3CMS54-1	full	0.5	20	1.3	5	-10° to +50° C	TBD
5.80-7.20	3CMS65-1	full	0.55	18	1.3	5	-30° to +70° C	8.7
6.30-8.00	3CMS71-1	full	0.55	18	1.3	5	-30° to +70° C	8.7
7.10-8.50	3CMS78-2	full	0.55	18	1.3	5	-30° to +70° C	8.7
8.40-10.70	3CMS95-1	full	0.6	18	1.3	5	-30° to +65° C	8.8
8.50-10.50	4CMS10-3Y	full	0.6	18	1.3	5	-30° to +65° C	8.17
10.00-12.00	4CMS11-1	full	0.5	18	1.3	5	-10° to +50° C	8.9
11.70-14.50	4CMS12-3Y	full	0.6	18	1.3	5	-30° to +70° C	8.18
13.50-14.50	4CMS14-3	full	0.6	18	1.3	5	-30° to +70° C	8.11
14.00-14.50	4CMS14-2	full	0.6	18	1.3	5	-30° to +70° C	8.11
14.00-15.50	4CMS15-5	full	0.7	18	1.35	5	-30° to +70° C	8.11
17.70-19.70	4CMS19-1	full	0.8	18	1.35	2	-30° to +70° C	8.12
21.20-23.60	4CMS22-1	full	0.9	18	1.35	2	-30° to +70° C	8.13
22.50-25.00	4CMS24-3Y	full	0.9	18	1.35	2	-30° to +70° C	8.19
24.00-25.5	4CMS25-3Y	full	0.9	18	1.35	2	-30° to +70° C	8.14
27.50-28.50	4CMS28-3Y	full	0.9	18	1.35	2	-30° to +70° C	8.14
29.00-31.50	4CMS29-1	full	0.9	18	1.35	2	-30° to +70° C	8.14
30.00-35.00	4CMS33-3Y	full	1	17	1.35	2	-30° to +70° C	8.20
34.00-36.00	4CMS35-1	full	0.9	18	1.35	2	-30° to +70° C	8.15
34.40-38.60	4CMS36-1	full	1	17	1.4	2	-10° to +50° C	8.16
35.00-37.00	4CMS36-2	full	0.9	18	1.35	2	-30° to +70° C	8.15
36.00-38.00	4CMS37-1	full	0.9	18	1.35	2	-30° to +70° C	8.15
37.00-40.00	4CMS39-3	full	0.9	18	1.35	2	-30° to +70° C	8.15
5.70-7.40	4CMS(xx)-3X	18	0.5	20	1.22	10	-30° to +70° C	8.7
34.00-40.00	4CMS(xx)-1X	5	0.9	18	1.35	2	-30° to +70° C	8.15
34.00-40.00	4CMS(xx)-2X	5	0.9	18	1.35	2	-30° to +70° C	8.16

NOTES:

1. MODIFIED VERSIONS OF ALL DEVICES ARE AVAILABLE
2. (xx) IDENTIFIES THE CENTER FREQUENCY OF THE DEVICE IN GHz
3. MAX. TEMPERATURE - 130°C UNLESS A SPECIAL ORDER IS PLACED FOR A HIGHER STORAGE TEMPERATURE.
4. CIRCULATION IS CLOCKWISE, COUNTERCLOCKWISE IS OPTIONAL.
5. TABS ARE AVAILABLE BY SPECIAL ORDER FOR ALL MICROSTRIP DEVICES

MICROSTRIP CIRCULATORS ON CARRIERS

(2.1 to 40GHz)

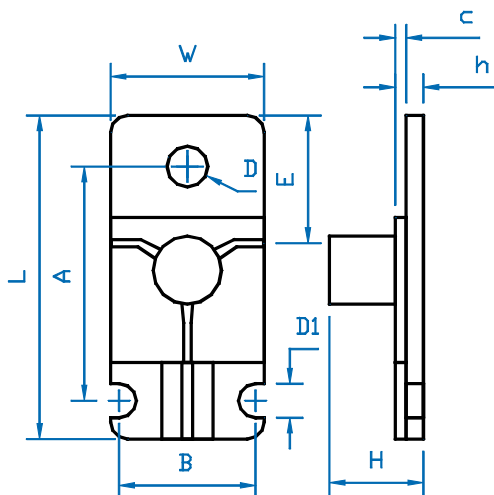


Fig. 31

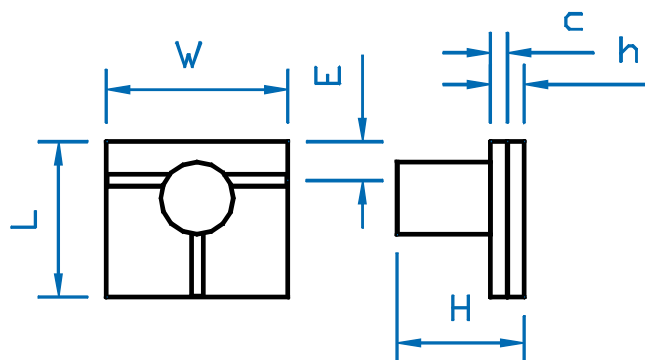


Fig. 33

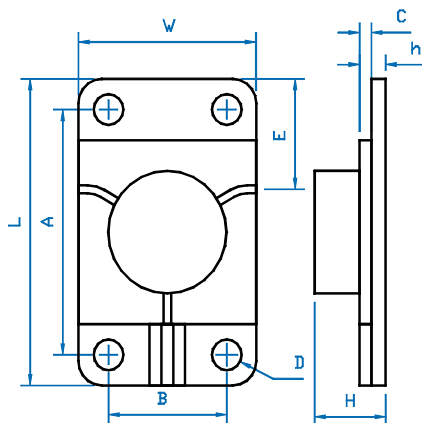


Fig. 34

OUTLINE #	DIMENSIONS, mm										Fig
	W	L	H	h	C	A	B	E	D1	D2	
8.4	20	30	6.5	2.2	1	25	15	10	2.5	-	34
8.6	15	25	6	2.2	1	20	10	9	2.5	-	34
8.7	12	20	5.5	1.85	0.635	15	7	6.5	2.5	-	34
8.8	9	19	5.5	1.65	0.635	13.75	8	7.5	2.4	2	31
8.9	7.1	20	5.5	-	-	-	-	-	-	-	31
8.10	7	15.5	5.5	1.64	0.635	11	6	6.5	2.5	2	31
8.11	7	15.5	5.5	1.5	0.5	11	6	6.5	2.5	2	31
8.12	6	12.19	5.5	1.65	0.38	9.14	5.05	4.67	1.8	2	31
8.13	6	12.19	5.5	1.65	0.38	9.14	5.05	5.17	1.8	2	31
8.14	6	12.19	5.5	1.52	0.25	9.14	5.05	4.67	1.8	2	31
8.15	5	12.19	4.5	1.2	0.2	9.2	4.83	4.67	1.8	1.8	31
8.16	5	5.5	4	0.7	0.2	-	-	1.5	-	-	33
8.17	7	7	5	1.64	0.635	-	-	1.5	-	-	33
8.18	7	7	5	1.5	0.5	-	-	1.5	-	-	33
8.19	5	5	3.8	1.25	0.25	-	-	1	-	-	33
8.20	5	5	3.8	1.2	0.2	-	-	1	-	-	33

DUAL JUNCTION MICROSTRIP CIRCULATOR (3.1 to 39.5GHz)

FREQUENCY (GHz)	MODEL NUMBER	BAND WIDTH %	INSERTION LOSS (dB)		ISOLATION (dB)			VSWR	OUTLINE #
			1-2	3-1	2-1	1-3	3-2		
3.1 – 3.5	3CMD34-1	full	0.4	0.8	20	33	20	1.25	9.1
8.5 – 10.5	4CMD(xx)-1X	10	0.5	0.9	20	33	20	1.25	9.2
8.5 – 10.5	4CMD(xx)-2X	10	0.5	0.9	20	33	20	1.25	9.3
8.5 – 10.5	4CMD(xx)-3X	10	0.5	0.9	20	33	20	1.25	9.4
25.27 – 26.98	4CMD26-1	full	1	2	20	33	20	1.3	9.5
37.0 – 39.5	4CMD38-1	full	1	2	20	33	20	1.3	9.6

NOTES:

1. MODIFIED VERSIONS OF ALL DEVICES ARE AVAILABLE OVER FREQUENCY RANGE OF 3.0 TO 40.0 GHz
2. OPERATING TEMPERATURE RANGE IS -30° to +70° C
3. MAX. TEMPERATURE - 130°C UNLESS A SPECIAL ORDER IS PLACED FOR A HIGHER STORAGE TEMPERATURE.
4. ITEMS MARKED WITH A “*” SHOULD BE MOUNTED ON A NON-MAGNETIC BASE
5. AVERAGE POWER: 1 WATT
6. LOAD POWER UP TO 20W
7. ALL DIMENSIONS ARE IN mm.
8. (xx) IDENTIFIES THE CENTER FREQUENCY OF THE DEVICE IN GHz

OUTLINE #	DIMENSIONS, mm												Fig.
	W	L	A	B	C	D	E	E1	h	J	H (max)	G	
9.1	30.0	25.0	20.0	25.00	1.00	2.5	7.5	-	2.00	-	6.0	16.00	D1
9.2	9.4	12.7	-	-	0.50	-	3.0	6	1.00	-	3.0	6.35	D2
9.3	9.4	12.7	-	-	0.50	-	3.0	6	1.00	-	3.0	6.35	D3
9.4	9.4	14.0	-	-	0.50	1.6	3.0	6	1.50	3.4	3.8	6.35	D4
9.5	10.0	13.0	10.0	7.06	0.25	M1.4	5.5	-	1.25	3.0	4.5	2.50	D5
9.6	6.0	6.0	9.0	3.06	0.20	M1.4	5.0	-	1.20	3.0	4.5	1.00	D5

DUAL JUNCTION MICROSTRIP CIRCULATOR (3.1 to 39.5GHz)

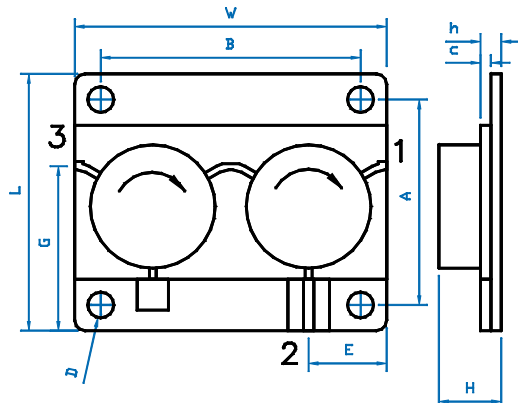


Fig. D1

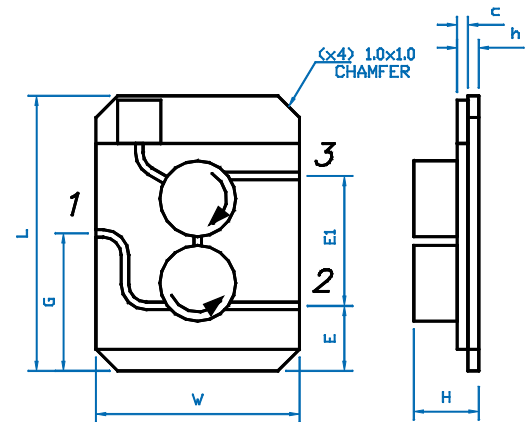


Fig. D2

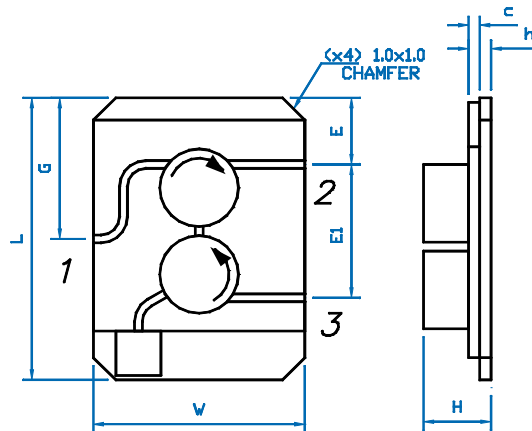


Fig. D3

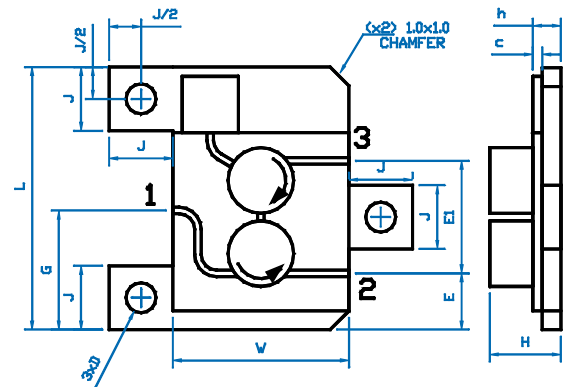


Fig. D4

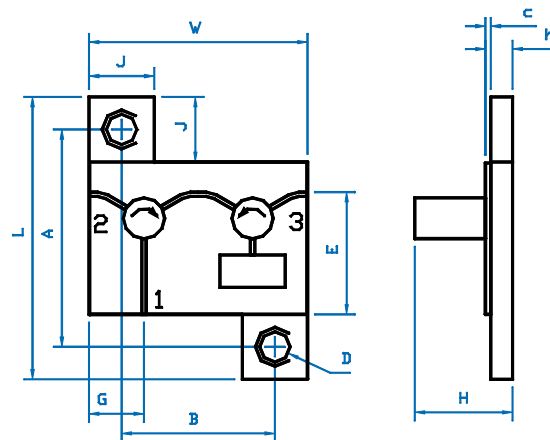


Fig. D5