



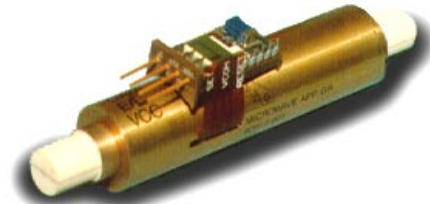
Dual-Mode Phase Shifters

Data Sheet

C-Band to Ka-Band • Efficient • Economical

MAG's Dual-Mode phase shifters are the only latching, reciprocal ferrite phase shifters successfully produced in large quantities, and are ideal for passive phased array antenna applications. These units, available in frequencies from C-Band to Ka-Band, allow Electronically Steerable Arrays (ESA's) to be deployed at reasonable cost with good power handling capabilities. One successful application is in the United States Air Force B-1B offensive radar system. MAG designed and built more than 130,000 units for this program.

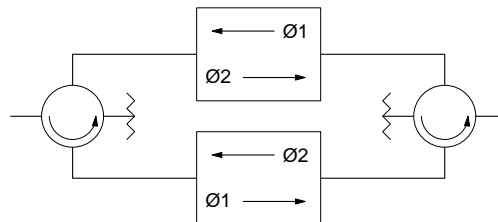
MAG's Dual-Mode phase shifters use a quadrantly symmetric ferrite rod so that circularly polarized energy will propagate through it without change of field distribution. The name "Dual-Mode" comes from the fact that the structure supports opposite-sense circularly polarized modes in the transmit and receive directions so that phase changes resulting from command state changes will be reciprocal. External latching yokes fitted to the ferrite rod provide a closed magnetic path for latching operation. Resistive films, incorporated in dielectric sections both ends of the rod, absorb undesired cross-polarized fields. See back of sheet for typical data at various frequency ranges.



Dual-Mode Phase Shifters

PARAMETER	FREQUENCY				
	C-BAND	XL-BAND	X-BAND	Ku-BAND	Ka-BAND
Percent Bandwidth	9	6	8	5	4
Insertion Loss	1.0 avg.	1.0 avg.	1.0 avg.	1.0 avg.	1.25 max.
(dB)					
Insertion Loss Modulation	±0.2	±0.2	±0.2	±0.2	±0.2
(dB)					
Maximum Return Loss	-15.0	-17.0	-13.98	-17.69	-15.56
(dB)					
Peak RF Power	250 min.	200 min.	1000 min.	28 min.	100 min.
(Watts)					
Average RF Power	10 min.	10 min.	6 min.	4 min.	4 min.
(Watts)					
RMS Phase Error	6	5	6	10	4
(Degrees)					
Reciprocity	±3	±3	±3	±3	±4
(Degrees)					
Switching Time	75	120	160	80	60
(Microseconds)					
Switching Rate	2000	526	2000	200	1000
(Hz)					
Size	4.3 x Ø .82	4.8 x Ø .64	3.8 x Ø .53	2.2 x Ø .35	2.2 x Ø .32
(Inches)					
Weight	3.0	2.4	1.4	0.4	0.3
(Ounces)					
Operating Temperature Range	-20 to 70	-10 to 65	20 to 85	-20 to 49	-25 to 55
(Degrees C)					

This diagram depicts a reciprocal device realized using nonreciprocal ferrite components.



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