ANALOG DIODE

PHASE SHIFTERS

CONTINUOUSLY VARIABLE — 0.1–18 GHz

SERIES PQ

GENERAL INFORMATION

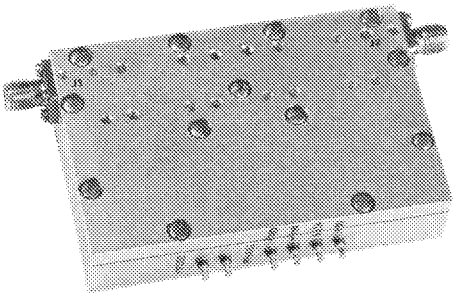
An analog phase shifter continuously changes the phase of a microwave signal by varying a D.C. voltage. Since the D.C. voltage applied to the diode is a reverse bias, the current drain is negligible (typically less than 10 microamps). A balanced stripline configuration keeps the VSWR and amplitude ripple to a minimum for all values of phase.

GENERAL SPECIFICATIONS

Frequency Coverage:	0.1 to 18.0 GHz
RF Impedance:	50 OHMS.
D.C. Voltage:	0 volts to +28 volts (standard), or 0 volts to –28 volts (optional) will vary the phase of any of the models over the minimum phase shift listed
RF Power:	10 mW peak or CW, operating. Destruct level is 1 W, CW, 100 W peak.
Temperature Information:	The units can be used over a –55°C to +85°C temperature range. However, the phase will change either ±5° or ±5%, whichever is greater. If temperature compensation is required, this can be done on request. With compensation, the variation can be held to ±1° or ±1%, whichever is greater, from –55°C to +85°C. The size remains the same. If compensation is desired, add a suffix T to the model number (e.g., PQ-17T).
Switching Speed:	Series PQ phase shifters can be driven from any phase value to any other value in 10 nanoseconds. With linearizers, the response time is 50 nanoseconds. With temperature compensation the response time is 100 nanoseconds.
Connectors:	SMA

Notes:

1. LINEARIZATION: For phase shifters with linearizers add a suffix L to the model number (e.g., PQ-23L). Linearity is ±2.0° for phase shifters for 150° or less, and ±4° for phase shifters between 150° and 360°. With linearization, DC voltages of ±15V at ±30mA are required. The control voltage is 0–10 volts. A control voltage of 0–5 volts can be supplied at no additional cost, by adding a suffix 5 to the model number (e.g. PQ-23L5). Linearity is measured at f_c.
2. PHASE FLATNESS: The phase shift varies with frequency at any voltage setting. This variation, referenced to 0° at 0 volts for each frequency, is approximately ±15% for octave models, ± 10% for models with 25% bandwidth, and ±7.5% for models with a 10% bandwidth.
3. A connector, (SMA Female) is available in place of the bias pin at no extra charge. This will be placed at the center of the surface marked F on the drawing. This is the 0.38 × A surface. If a SMA Female is desired, add suffix C to the model number (e.g., PQ-23C).
4. Monotonicity guaranteed for all models.



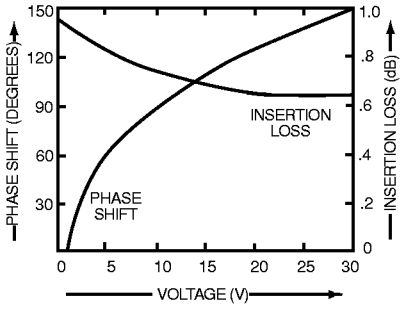


Fig. 1
Typical Phase & Insertion Loss vs. Voltage Curves for PQ-31

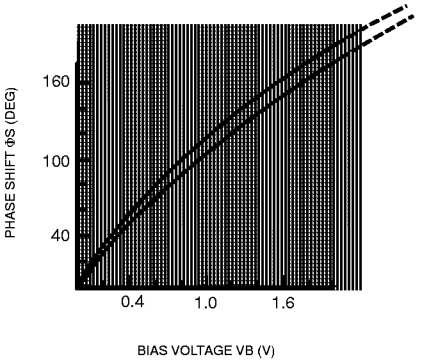


Fig. 2
Phase shift characteristic of PQ-45.

KEY: Inches[Millimeters] .XX ±.03 .XXX ±.010 [.X ±0.8 .XX ±0.25]

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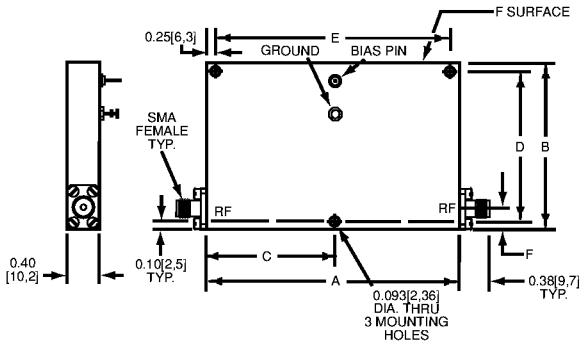
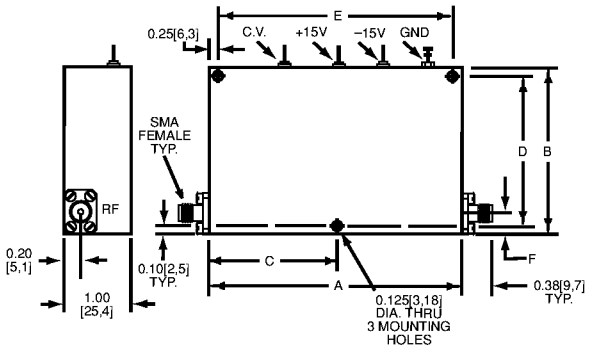


OUTLINE WITHOUT LINEARIZER



OUTLINE WITH LINEARIZER

ELECTRICAL PERFORMANCE

Model No.*	Frequency Range GHz	Phase Shift Note 2 Minimum Degrees	Insertion Loss Maximum dβ	Amplitude Ripple Maximum ± dβ	VSWR Maximum	Outline No Linearizer	With Linearizer
PQ-12	0.1–0.2	50	0.6	0.15	1.35	1	1
PQ-14	0.2–0.4	50	0.6	0.15	1.35	1	1
PQ-17	0.25–0.5	360	4.5	1.25	1.70	10	10
PQ-27	0.5–1.0	180	3.0	0.4	1.50	3	3
PQ-28	0.5–1.0	360	4.5	1.25	1.75	4	4
PQ-31	0.95–1.25	120	1.2	0.15	1.40	1	1
PQ-33	1.0–2.0	60	0.8	0.15	1.50	2	6
PQ-34	1.0–2.0	360	4.5	1.5	1.80	8	4
PQ-39	1.7–2.4	15	0.7	0.05	1.40	2	6
PQ-44	2.0–4.0	180	3.0	0.50	1.60	3	3
PQ-45	2.0–4.0	360	5.0	1.5	1.90	5	5
PQ-49	2.2–2.3	180	2.0	0.30	1.50	3	3
PQ-59	4.0–8.0	40	1.2	0.25	1.60	2	6
PQ-60	4.0–8.0	360	8.0	1.5	1.90	9	9
PQ-65	6.0–18.0	180	12.0	2.0	2.5	7	7
PQ-66	7.0–12.4	360	12.0	2.0	2.20	9	9
PQ-72	8.0–12.4	60	2.0	0.50	1.75	2	6
PQ-73	8.0–10.0	180	5.0	1.0	1.75	7	7
PQ-74	8.0–18.0	360	17.0	3.5	2.50	9	9
PQ-94	16.0–17.0	50	2.0	0.20	1.65	2	6

***OPTIONS: (Add to Model No.)**

T = Temp. Comp.
L = Linearization
C = βias Connector — SMA
5 = 0 to 5 Volts Control Voltage for Linearized Models.

MECHANICAL OUTLINES

Out-line	A in [mm]	β in [mm]	C in [mm]	D in [mm]	E in [mm]	F in [mm]
1	2.75 [69,91]	2.25 [57,15]	1.38 [35,05]	2.050 [52,07]	2.250 [57,15]	0.53 [13,46]
2	1.25 [31,75]	2.00 [50,8]	0.63 [16,0]	1.800 [45,7]	0.750 [19,1]	0.25 [6,4]
3	5.00 [127,0]	2.00 [50,8]	N/A 4 holes	1.800 [45,7]	4.500 [114,3]	0.25 [6,4]
4	7.75 [196,8]	2.50 [63,5]	N/A 4 holes	2.300 [58,42]	7.250 [184,15]	0.25 [6,4]
5	6.50 [165,1]	2.00 [50,8]	N/A 4 holes	1.800 [45,7]	6.000 [152,4]	0.25 [6,4]
6	2.00 [50,8]	2.00 [50,8]	1.00 [25,4]	1.800 [45,7]	1.500 [38,1]	0.25 [6,4]
7	3.00 [76,2]	2.00 [50,8]	1.50 [38,1]	1.800 [45,7]	2.500 [63,5]	0.25 [6,4]
8	6.50 [165,1]	2.50 [63,5]	N/A 4 holes	2.300 [58,42]	6.000 [152,4]	0.25 [6,4]
9	5.00 [127,0]	2.00 [50,8]	N/A 4 holes	1.800 [45,7]	4.500 [114,3]	0.50 [12,7]
10	7.75 [196,8]	2.50 [63,5]	N/A 4 holes	2.300 [58,42]	7.250 [184,15]	0.75 [19,1]

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ISO 9001 REGISTERED FIRM

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