DIGITALLY CONTROLLED ANALOG
PHASE SHIFTERS
8, 10, OR 12 BITS

SERIES QQ

GENERAL INFORMATION

KDI/Triangle Corp. digitally controlled phase shifters vary the phase of a microwave signal in response to a TTL compatible logic input signal. The unit consists of an analog phase shifter, Series PQ, plus a digital to analog converter. (See Figure 1)

A balanced stripline configuration keeps the VSWR and amplitude change to a minimum for all values of phase.

Standard units operate with 8 bits allowing 256 discrete values of phase. If 10 bits are required add –10 to Model No. (e.g., QQ-12-10). If 12 bits are required add –12 to Model No. (e.g., QQ-12-12).
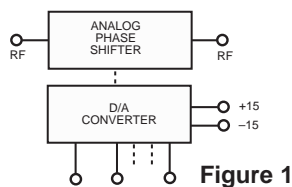

Figure 1

GENERAL SPECIFICATIONS

Frequency Coverage:	0.1 to 18.0 GHz
RF Impedance:	50 OHMS.
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. Compensation increases the cost by 10%. The size remains the same. If compensation is desired, add a suffix T to the model number, e.g. (QQ-17T).
Connectors:	SMA. Mating multipin connector is supplied with each unit; ITT Cannon DA-15S or equiv.

Notes:

1. The voltages required are ±15 volts at 50 mA.
2. Switching speed of all models is 200 nanosec. Higher speeds on request. For 12 bits speed is 2 microsec.
3. Monotonicity is guaranteed for all models.
4. Phase Flatness: The phase shift varies with frequency at any voltage setting. This variation, referred to 0° at logic 0 for each frequency, is approximately ±15% for octave models, ±10% for models with 25% bandwidth, and ±7.5% for models with a 10% bandwidth.
5. In order to determine the step size (least significant bit) of any phase shifter, divide the listed value of phase shift by the number of steps.

# Bits	# Steps
8	256
10	1024
12	4096

POWER LOGIC PIN CONNECTIONS

PIN*	FUNCTION
1–12	Logic Inputs
13	+15 VDC
14	–15 VDC
15	GND

*PIN 1 is least significant bit
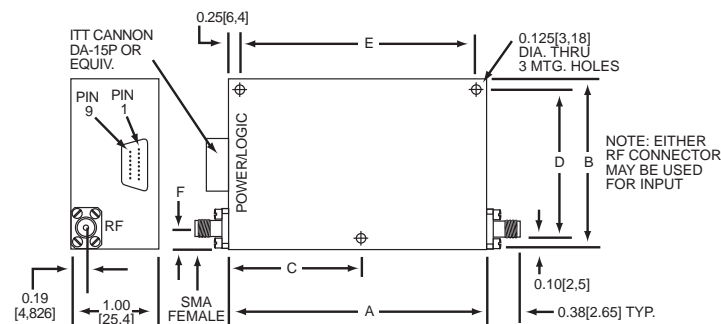
ELECTRICAL PERFORMANCE

Model No.	Frequency Range GHz	Phase Shift Note 4 Minimum Degrees	Insertion Loss Maximum dB	Amplitude Ripple Maximum ±dB	VSWR Maximum	Out-line
QQ-12	0.1–0.2	45	0.6	0.15	1.35	4
QQ-16	0.25–0.5	45	0.6	0.15	1.35	4
QQ-17	0.25–0.5	360	4.5	1.25	1.70	2
QQ-27	0.5–1.0	180	3.0	0.40	1.50	1
QQ-28	0.5–1.0	360	4.5	1.25	1.75	5
QQ-34	1.0–2.0	360	4.5	1.50	1.80	5
QQ-44	2.0–4.0	180	3.0	0.50	1.60	6
QQ-45	2.0–4.0	360	5.0	1.50	1.90	3
QQ-49	2.2–2.3	180	2.0	0.30	1.50	6
QQ-60	4.0–8.0	360	8.0	1.50	1.90	1
QQ-65	6.0–18.0	180	12.0	2.0	2.5	4
QQ-66	7.0–12.4	360	12.0	2.0	2.20	1
QQ-72	8.0–12.4	60	2.0	0.25	1.75	4
QQ-73	8.0–10.0	180	4.5	1.0	1.75	4
QQ-74	8.0–18.0	360	17.0	3.5	2.50	1
QQ-94	16.0–17.0	45	2.0	0.20	1.65	4

MECHANICAL OUTLINES

Outline	A in [mm]	B in [mm]	C in [mm]	D in [mm]	E in [mm]	F in [mm]
1	5.00 [127,0]	2.00 [50,8]	N/A 4 holes	1.800 [45,7]	4.500 [114,3]	0.50 [12,7]
2	7.75 [196,9]	2.50 [63,5]	N/A 4 holes	2.300 [58,42]	7.250 [184,15]	0.75 [19,1]
3	6.50 [165,1]	2.00 [50,8]	N/A 4 holes	1.800 [45,7]	6.000 [152,4]	0.25 [6,4]
4	3.00 [76,2]	2.00 [50,8]	1.50 [38,1]	1.800 [45,7]	2.500 [63,5]	0.30 [7,6]
5	7.75 [196,9]	2.50 [63,5]	N/A 4 holes	2.300 [58,42]	7.250 [184,15]	0.25 [6,4]
6	5.00 [127,0]	2.00 [50,8]	N/A 4 holes	1.800 [45,7]	4.500 [114,3]	0.25 [6,4]

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

AEROFLEX
KDI-INTEGRATED PRODUCTS
8-10-07