

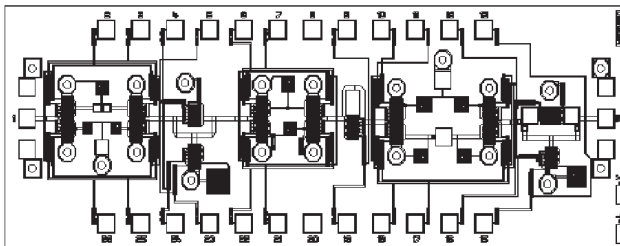
X-Band 6 Bit Phase Shifter

The **P35-4400-000-200** is a high performance Gallium Arsenide phase shifter. It provides 360° of phase control with six bits of resolution (5.6°, 11.25°, 22.5°, 45°, 90°, 180°). It is primarily intended for use in phased array radar applications. A pair of control lines uniquely addresses each bit of phase shift. When complimentary 0/-5V signals are applied to these lines the bit of phase shift is either added or turned off in accordance with the truth table below. The exception is the 5.6° bit, which is addressed by a single control line. The assembly of this part has been made more flexible by adding duplicate control pads to two sides of the die.

The die is fabricated using Bookham's 0.5µm gate length MESFET process (S20) and has been via'd for improved performance. It is fully protected using Silicon Nitride passivation for excellent performance and reliability.

Features

- Broadband 8-11GHz operation
- 5.6° phase quantization
- Flexible bonding requirements
- Through GaAs vias for improved performance
- Fast Switching Speed; 3ns typical



Electrical Performance

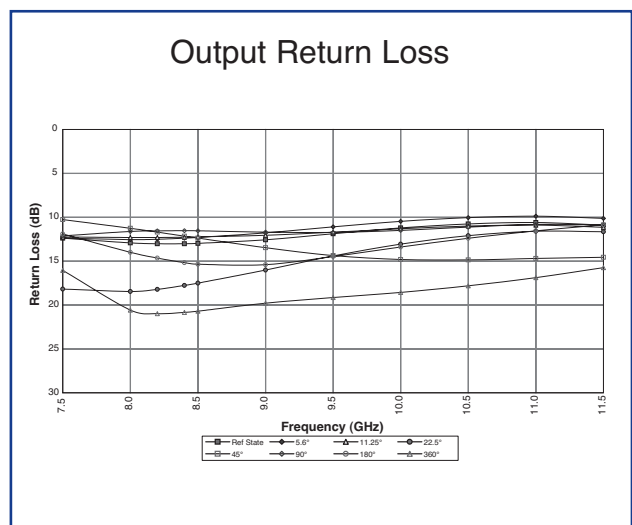
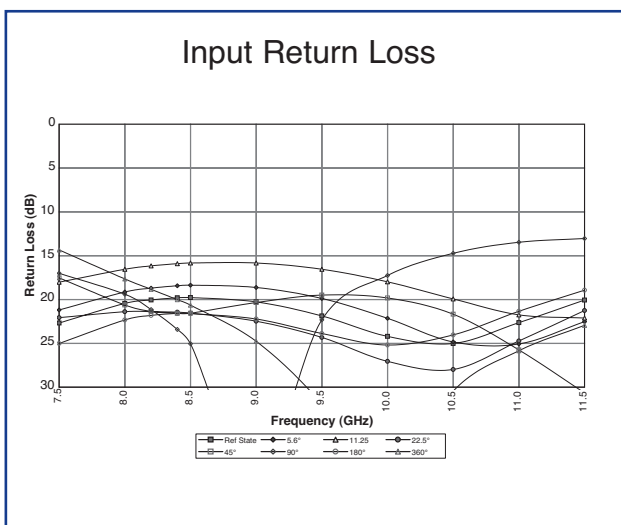
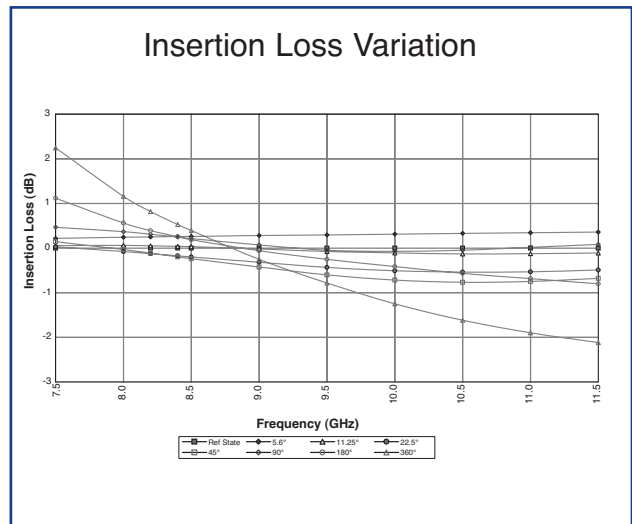
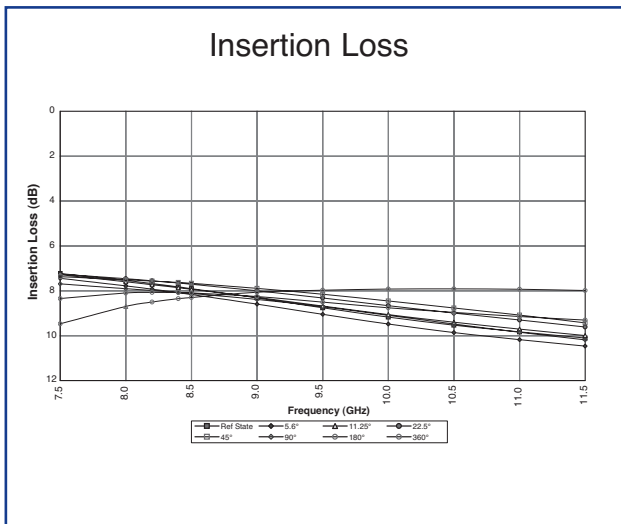
Ambient Temperature = 22±3°C, Zo = 50Ω, Control Voltage =0V/-5V, Cardinal States.

Parameter	Conditions	Min	Typ	Max	Units
Insertion Loss1	8.0-9.0GHz	-	8	10	dB
	8.0-11.0GHz	-	9	12	dB
Insertion Loss Variation1	8.0-9.0GHz	-	1.3	2.0	dB
	8.0-11.0GHz	-	2.4	3.0	dB
Input Return Loss1	8.0-9.0GHz	12	15	-	dB
	8.0-11.0GHz	10	13	-	dB
Output Return Loss1	8.0-9.0GHz	10	12	-	dB
	8.0-11.0GHz	8	10	-	dB
Phase Shift Error Vs Setting1,2	8.0-9.0GHz	-	3°±4%	-	°
	8.0-11.0GHz	-	3°±6%	-	°

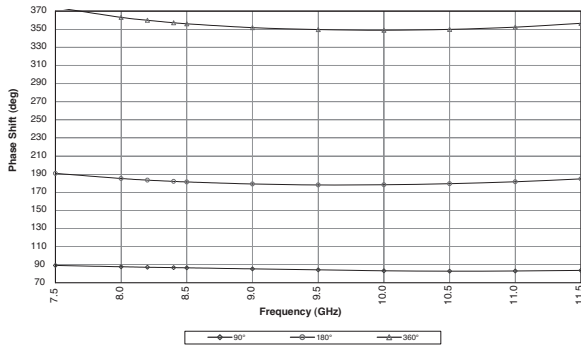
Notes

1. All Parameters measured on wafer.
2. Phase shift error Vs setting is Degrees ± a percentage of expected set phase shift

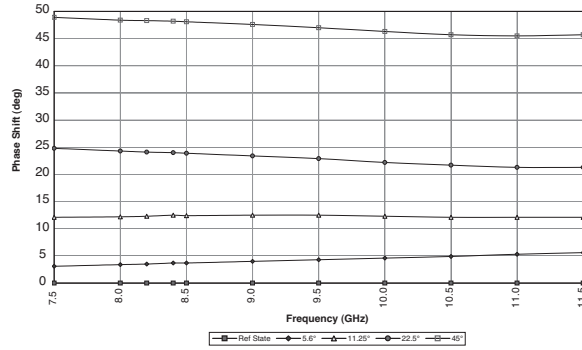
Typical RFOW Performance



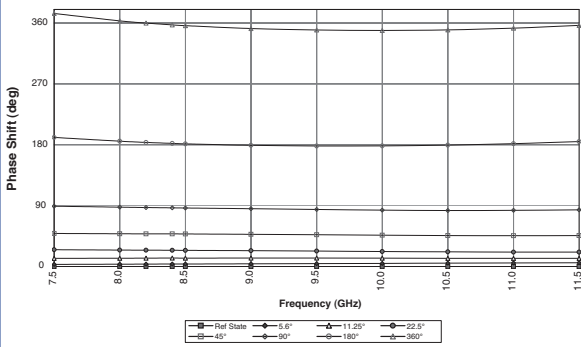
Phase Shift



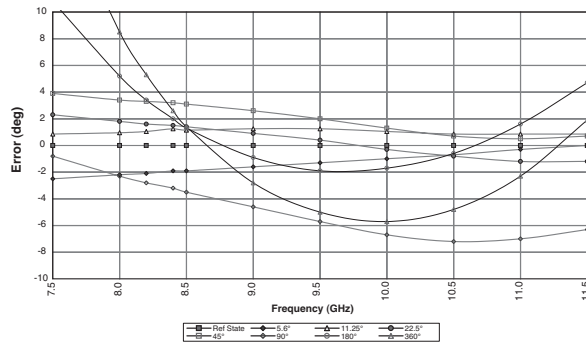
Phase Shift



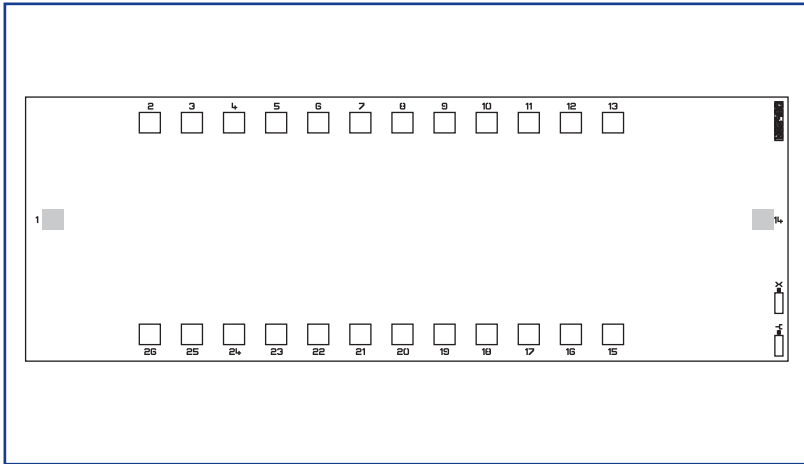
Phase Shift



Phase Shift Error

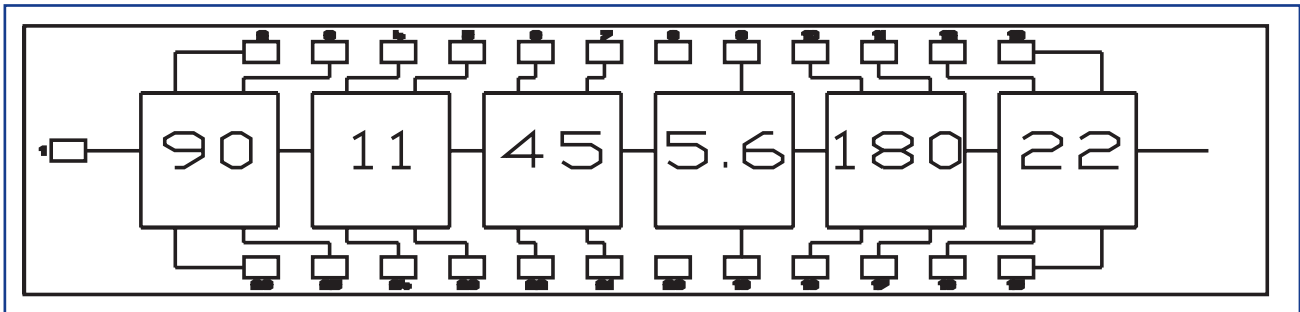


Chip Outline



Die size: 4.35 x 1.55mm
 RF bond pads (1 & 4): 120µm x 120µm
 All other bond pads: 120µm x 120µm
 Die Thickness: 200µm

Block Diagram



Pad Details

Pad	Label	Function	Pad	Label	Function
1	RF IN	RF Input	14	B5	NOT 90°
2	B5	NOT 90°	15	A5	90°
3	A5	90°	16	A2	11.25°
4	A2	11.25°	17	B2	NOT 11.25°
5	B2	NOT 11.25°	18	B4	NOT 45°
6	B4	NOT 45°	19	A4	45°
7	A4	45°	20	-	N/C
8	-	N/C	21	A1	5.6°
9	A1	5.6°	22	A6	180°
10	A6	180°	23	B6	NOT 180°
11	B6	NOT 180°	24	A3	22°
12	A3	22°	25	B3	NOT 22°
13	B3	NOT 22°	26	RF OUT	RF Output

Truth Table

Control Line											Phase Shift
5.6° Bit	11.25° Bit		22.5° Bit		45° Bit		90° Bit		180° Bit		
A1	A2	B2	A3	B3	A4	B4	A5	B5	A6	B6	
-5V	-5V	0V	-5V	0V	-5V	0V	-5V	0V	-5V	0V	Zero
0V	-5V	0V	-5V	0V	-5V	0V	-5V	0V	-5V	0V	5.6°
-5V	0V	-5V	-5V	0V	-5V	0V	-5V	0V	-5V	0V	11.25°
-5V	-5V	0V	0V	-5V	-5V	0V	-5V	0V	-5V	0V	22.5°
-5V	-5V	0V	-5V	0V	0V	-5V	-5V	0V	-5V	0V	45°
-5V	-5V	0V	-5V	0V	-5V	0V	0V	-5V	-5V	0V	90°
-5V	-5V	0V	-5V	0V	-5V	0V	-5V	0V	0V	-5V	180°

Ordering Information

P35-4400-000-200



Thinking RF solutions

MMICS

Bookham Technology plc
 Caswell
 Towcester
 Northamptonshire
 NN12 8EQ
 UK

• Tel: +44 (0) 1327 356 789

• Fax: +44 (0) 1327 356 698

rfsales@bookham.com**Important Notice**

Bookham Technology has a policy of continuous improvement. As a result certain parameters detailed on this flyer may be subject to change without notice. If you are interested in a particular product please request the product specification sheet, available from any RF sales representative.



22735