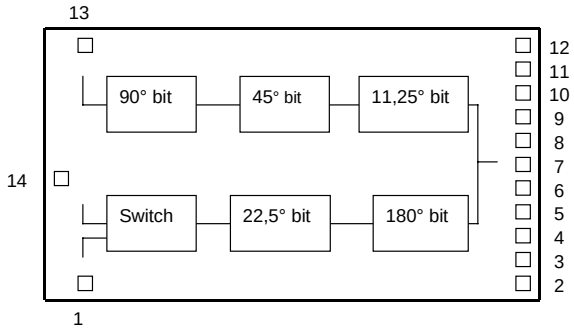
S-band Phase Shifter / Switch

GaAs Monolithic Microwave IC

Description

The CHP2085 is a S-band monolithic 5 bits phase shifter / switch.
The circuit is manufactured with a standard MESFET process : via holes through the substrate, air bridges and electron beam gate lithography.

It is supplied in chip form.



Main Features

- Frequency range : 2.7 to 3.4GHz
- 11.25° phase quantization
- 27dB switch isolation
- Chip size : 4,14 x 2,16 x 0,1mm

Pin Out

1- RFout2	8- B4
2- P2	9- H4
3- P1	10- BH1
4- H8	11- GND
5- B8	12- B9
6- B2	13- RFin
7- H9	14- RFout1

Main Characteristics

Tamb = +25°C

Symbol	Parameter	Min	Max	Unit
Fop	Operating frequency range	2.7	3.4	GHz
PHIpp	Phase shift precision peak to peak error		10	°
Il	Insertion loss		12	dB
Is	Isolation	27		dB

ESD Protections : Electrostatic discharge sensitive device observe handling precautions !

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Electrical Characteristics

Tamb = +25°C

Symbol	Parameter	Test Conditions	Min	Max	Unit
Fop	Operating frequency range		2.7	3.4	GHz
PHIpp	Phase shift precision peak to peak error	(1)		10	°
Il	Insertion loss	(1)		12	dB
Is	Isolation	(1)	27		dB
VSWRin	Input VSWR	(1)		2:1	
VSWRout	Ouput VSWR	(1)		2:1	
Pin1dB	Pulsed Input power at 1dB increase loss	(2)	23		dBm
Ips	Phase shifter current	(1)		5	mA

(1) Pin ≤ 0dBm, Low level control voltage = -4V, High level control voltage = 0V,
Vgi consistent with the Phase Schifter Control Interface table.
(2) These values are representative for pulsed on-wafer measurements

Absolute Maximum Ratings (1)

Tamb = +25°C

Symbol	Parameter	Values	Unit
Vgi	Phase shifter control voltage	-8.0	V
Vpi	Switch control voltage	-8.0	V
Pin	Maximum peak input power overdrive (2)	+25	dBm
Top	Operating temperature range	-40 to +85	°C
Tstg	Storage temperature range	-55 to +125	°C

(1) Operation of this device above anyone of these paramaters may cause permanent damage.
(2) Duration < 1s.
(1) Pin ≤ 0dBm

Switch Control Signal Interface

Switch command	Bond pads	
	P1	P2
Rfin to RFout2	Low level	High level
Rfin to RFout1	High level	Low level

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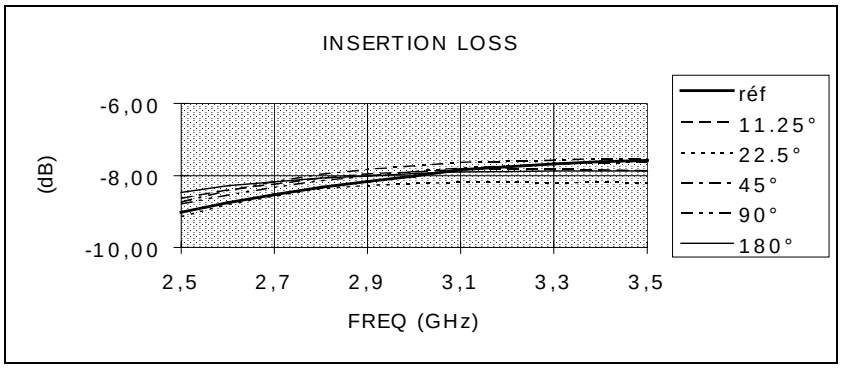
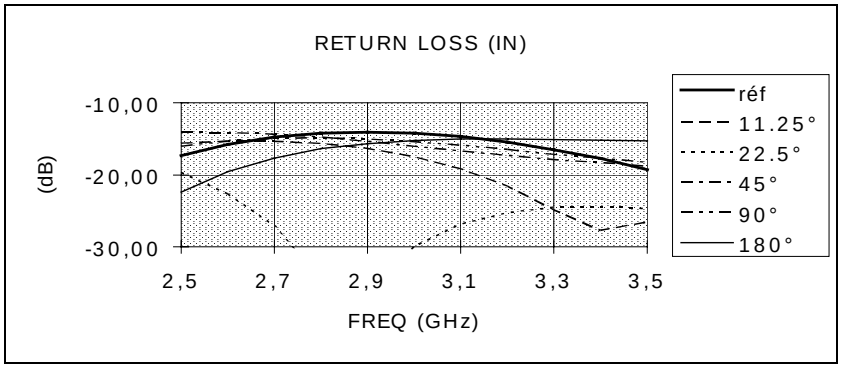
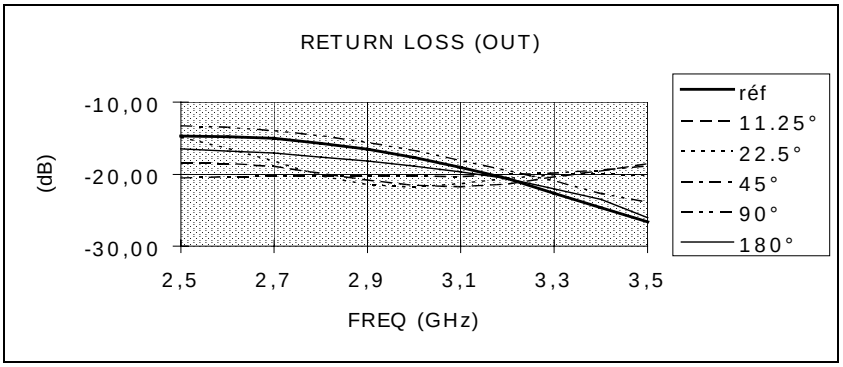
Typical Wafer [S] Parameters
RFin to RFout2 path







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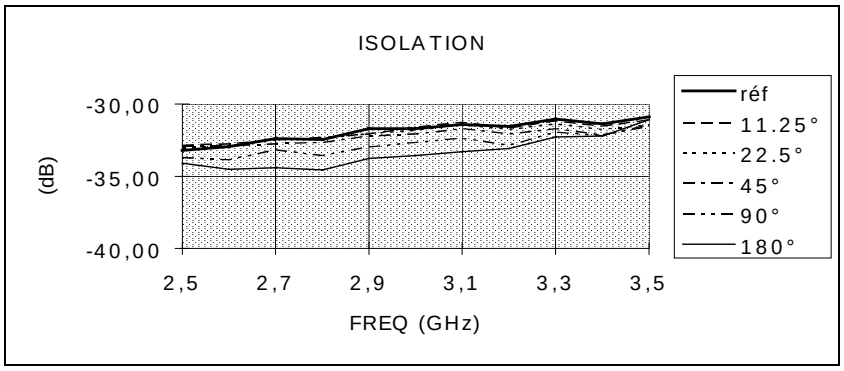
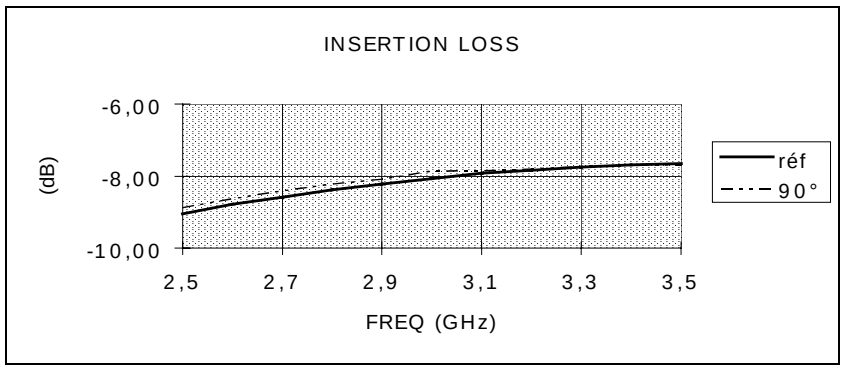
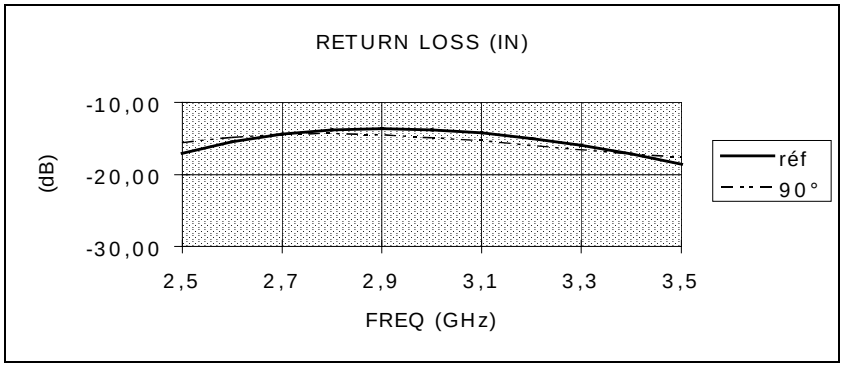
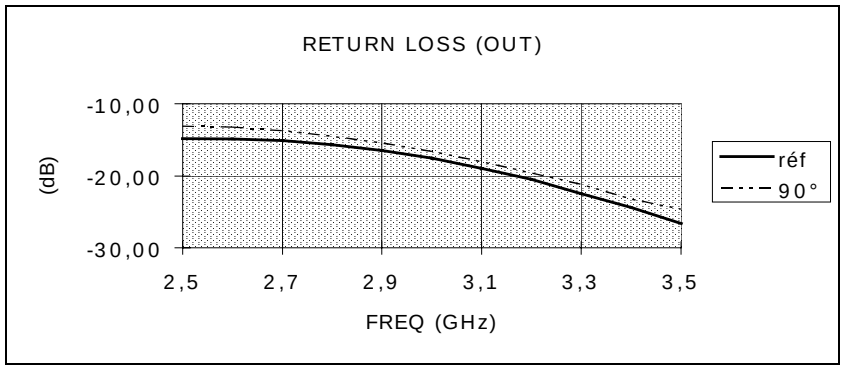
Typical Wafer [S] Parameters
RFin to RFout1 path









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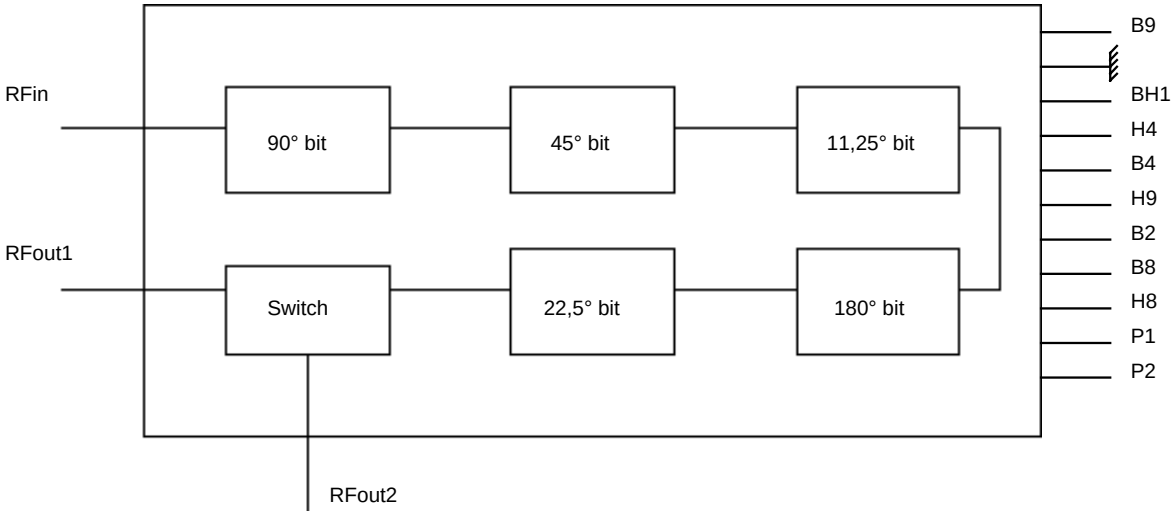
Phase Shifter Control Interface

The 5 bits phase shifter command is actuated by the 8 voltage control pads
State = 1 for Vgi = 0V (high level), State = 0 for Vgi = -5.5V (low level)

Nominal phase state °		Bond pads (1)							
		H8	B8	H9	B9	H4	B4	B2	BH1
0	(0)	1	0	1	0	1	0	0	0
11.25	(π/16)	1	0	1	0	1	0	0	1
22.50	(π/8)	1	0	1	0	1	0	1	0
33.75	(π/8 + π/16)	1	0	1	0	1	0	1	1
45	(π/4)	1	0	1	0	0	1	0	0
56.25	(π/4 + π/16)	1	0	1	0	0	1	0	1
67.50	(π/4 + π/8)	1	0	1	0	0	1	1	0
78.75	(π/4 + π/8 + π/16)	1	0	1	0	0	1	1	1
90	(π/2)	1	0	0	1	1	0	0	0
180	(π)	0	1	1	0	1	0	0	0
348.75	(π + π/2 + π/4 + π/8 + π/16)	0	1	0	1	0	1	1	1

(1) Terminology : B = Low pass, H = High pass, BH = Low/High pass
1 = 11°5, 2 = 22.5°, 4 = 45°, 9 = 90°, 8 = 180°

Simplified Schematic



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Chip Mechanical Data

Dimensions :	4140 ± 10µm x 2160 ± 10µm
Thickness :	100 ± 10µm
HF pads :	80µm
DC pads :	100µm

Ordering Information

Chip form : CHP2085-99F/00

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