

## L-band Phase Shifter

### GaAs Monolithic Microwave IC in surface mount ceramic-metal package

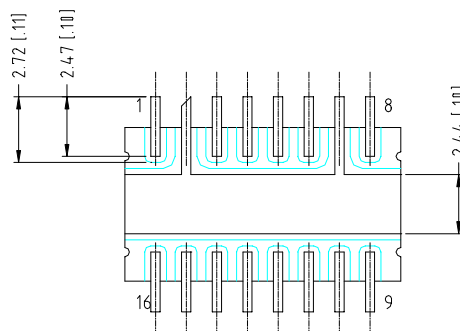
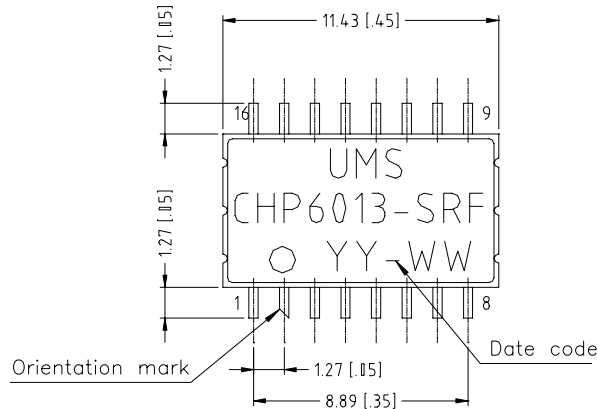
#### Description

The CHP6013 is a L-band monolithic 6-bit phase shifter. The circuit is manufactured with a standard 0.7 $\mu$ m MESFET process : via holes through the substrate, air bridges and electron beam gate lithography. It is supplied in surface mount ceramic-metal package

#### Main Features

- Frequency range : 1.2 to 1.4GHz
- 5.625° phase step
- 64 states
- 0/-6V control voltage
- Surface mount package
- dimension: 11.43 x 8.89 x 1.9 mm<sup>3</sup>

#### Surface mount ceramic-metal package :



## Electrical Characteristics

- Tamb = +25°C
- Test conditions: Pin ≤ 0dBm, Low level control voltage = -6V, High level control voltage = 0V
- Specifications for the main bit states: 0, 1, 2, 4, 8, 16, 32 and 63

Symbol	Parameter	Min	Max	Unit
Fop	Operating frequency range	1.2	1.4	GHz
AV	Amplitude variation		± 0.7	dB
PPE	Peak Phase Error		± 5	°
IL	Insertion loss		8.5	dB
ILm	Insertion loss match at state 0 unit to unit (1)		± 0.25	dB
Ipm	Insertion phase match at state 0 unit to unit (1)		± 7	°
VSWRin	Input VSWR		2:1	
VSWRout	Ouput VSWR		2:1	

(1) Average value defined by production lot.

ESD Protections : Electrostatic discharge sensitive device observe handling precautions !

### Peak Phase Error (PPE) definition:

$PPE(i) = \text{measured\_phase}(S21)@state(i) - \text{measured\_phase}(S21)@state(0) - \text{theoretical\_phase value}@state(i)$

(i) = 0, 1, 2, 4, 8, 16, 32, 63 = main bit states.

### Amplitude variation (AV) definition:

$AV(i) = \text{measured\_dB}(S21)@state(i) - \text{measured\_dB}(S21)@state(0)$

(i) = 0, 1, 2, 4, 8, 16, 32, 63 = main bit states.

## Absolute Maximum Ratings

Tamb = +25°C

Operation of this device above anyone of these paramaters may cause permanent damage.

Symbol	Parameter	Values	Unit
Vgi	Phase shifter control voltage	-7.5	V
Pin	Maximum peak input power overdrive (1)	+30	dBm
Top	Operating temperature range	-40 to +85	°C
Tstg	Storage temperature range	-55 to +125	°C

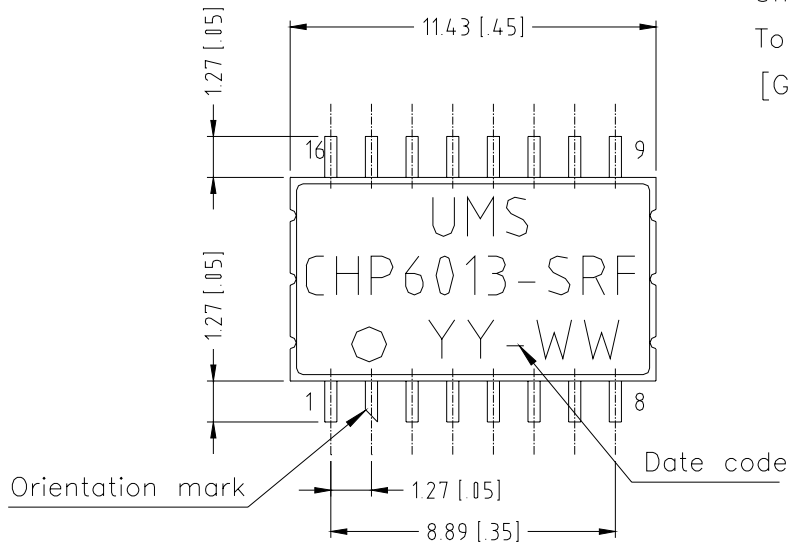
(1) Duration < 1s.

**Phase Shifter Control Interface**

The 6-bit phase shifter command is actuated by 12 voltage control leads.

BIT STATE	Theoretical phase state (°)	Control voltages (V)											
		B18	B90	B45	B22	B11	B5	H18	H90	H45	H22	H11	H5
0	0	0	0	0	0	0	0	-6	-6	-6	-6	-6	-6
1	5,625	0	0	0	0	0	-6	-6	-6	-6	-6	-6	0
2	11,25	0	0	0	0	-6	0	-6	-6	-6	-6	0	-6
3	16,875	0	0	0	0	-6	-6	-6	-6	-6	-6	0	0
4	22,5	0	0	0	-6	0	0	-6	-6	-6	0	-6	-6
5	28,125	0	0	0	-6	0	-6	-6	-6	-6	0	-6	0
6	33,75	0	0	0	-6	-6	0	-6	-6	-6	0	0	-6
7	39,375	0	0	0	-6	-6	-6	-6	-6	-6	0	0	0
8	45	0	0	-6	0	0	0	-6	-6	0	-6	-6	-6
9	50,625	0	0	-6	0	0	-6	-6	-6	0	-6	-6	0
10	56,25	0	0	-6	0	-6	0	-6	-6	0	-6	0	-6
11	61,875	0	0	-6	0	-6	-6	-6	-6	0	-6	0	0
12	67,5	0	0	-6	-6	0	0	-6	-6	0	0	-6	-6
13	73,125	0	0	-6	-6	0	-6	-6	-6	0	0	-6	0
14	78,75	0	0	-6	-6	-6	0	-6	-6	0	0	0	-6
15	84,375	0	0	-6	-6	-6	-6	-6	-6	0	0	0	0
16	90	0	-6	0	0	0	0	-6	0	-6	-6	-6	-6
17	95,625	0	-6	0	0	0	-6	-6	0	-6	-6	-6	0
18	101,25	0	-6	0	0	-6	0	-6	0	-6	-6	0	-6
19	106,875	0	-6	0	0	-6	-6	-6	0	-6	-6	0	0
20	112,5	0	-6	0	-6	0	0	-6	0	-6	0	-6	-6
21	118,125	0	-6	0	-6	0	-6	-6	0	-6	0	-6	0
22	123,75	0	-6	0	-6	-6	0	-6	0	-6	0	0	-6
23	129,375	0	-6	0	-6	-6	-6	-6	0	-6	0	0	0
24	135	0	-6	-6	0	0	0	-6	0	0	-6	-6	-6
25	140,625	0	-6	-6	0	0	-6	-6	0	0	-6	-6	0
26	146,25	0	-6	-6	0	-6	0	-6	0	0	-6	0	-6
27	151,875	0	-6	-6	0	-6	-6	-6	0	0	-6	0	0
28	157,5	0	-6	-6	-6	0	0	-6	0	0	0	-6	-6
30	168,75	0	-6	-6	-6	-6	0	-6	0	0	0	0	-6
31	174,375	0	-6	-6	-6	-6	-6	-6	0	0	0	0	0
32	180	-6	0	0	0	0	0	0	-6	-6	-6	-6	-6
33	185,625	-6	0	0	0	0	-6	0	-6	-6	-6	-6	0
34	191,25	-6	0	0	0	-6	0	0	-6	-6	-6	0	-6
35	196,875	-6	0	0	0	-6	-6	0	-6	-6	-6	0	0
36	202,5	-6	0	0	-6	0	0	0	-6	-6	0	-6	-6
37	208,125	-6	0	0	-6	0	-6	0	-6	-6	0	-6	0
38	213,75	-6	0	0	-6	-6	0	0	-6	-6	0	0	-6
39	219,375	-6	0	0	-6	-6	-6	0	-6	-6	0	0	0
40	225	-6	0	-6	0	0	0	0	-6	0	-6	-6	-6
41	230,625	-6	0	-6	0	0	-6	0	-6	0	-6	-6	0
42	236,25	-6	0	-6	0	-6	0	0	-6	0	-6	0	-6
43	241,875	-6	0	-6	0	-6	-6	0	-6	0	-6	0	0
44	247,5	-6	0	-6	-6	0	0	0	-6	0	0	-6	-6
45	253,125	-6	0	-6	-6	0	-6	0	-6	0	0	-6	0
46	258,75	-6	0	-6	-6	-6	0	0	-6	0	0	0	-6
47	264,375	-6	0	-6	-6	-6	-6	0	-6	0	0	0	0
48	270	-6	-6	0	0	0	0	0	0	-6	-6	-6	-6
49	275,625	-6	-6	0	0	0	-6	0	0	-6	-6	-6	0
50	281,25	-6	-6	0	0	-6	0	0	0	-6	-6	0	-6
51	286,875	-6	-6	0	0	-6	-6	0	0	-6	-6	0	0
52	292,5	-6	-6	0	-6	0	0	0	0	-6	0	-6	-6
53	298,125	-6	-6	0	-6	0	-6	0	0	-6	0	-6	0
54	303,75	-6	-6	0	-6	-6	0	0	0	-6	0	0	-6
55	309,375	-6	-6	0	-6	-6	-6	0	0	-6	0	0	0
56	315	-6	-6	-6	0	0	0	0	0	0	-6	-6	-6
57	320,625	-6	-6	-6	0	0	-6	0	0	0	-6	-6	0
58	326,25	-6	-6	-6	0	-6	0	0	0	0	-6	0	-6
59	331,875	-6	-6	-6	0	-6	-6	0	0	0	-6	0	0
60	337,5	-6	-6	-6	-6	0	0	0	0	0	0	-6	-6
61	343,125	-6	-6	-6	-6	0	-6	0	0	0	0	-6	0
62	348,75	-6	-6	-6	-6	-6	0	0	0	0	0	0	-6
63	354,375	-6	-6	-6	-6	-6	-6	0	0	0	0	0	0

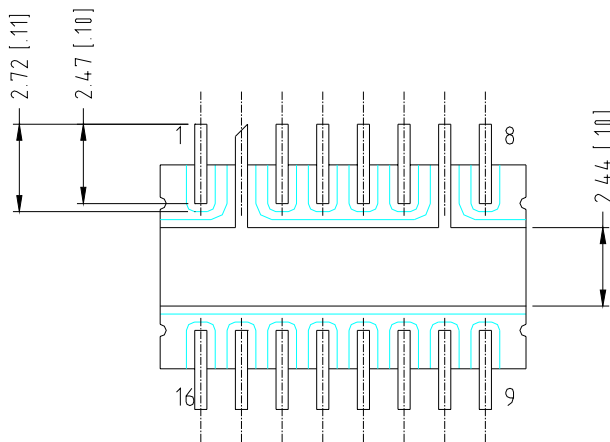
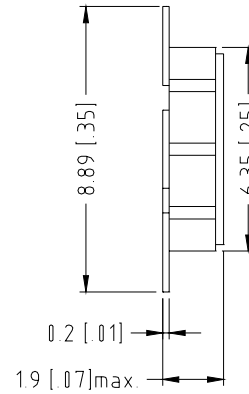
## Package information



Unit: mm[in]

Tolerance generale:  $\pm 0.13$

[General tolerance:  $\pm 0.05$ ]



Pin	Function	Pin	Function
1	RF in	9	H11
2	Gnd	10	B11
3	H22	11	H180
4	B22	12	B180
5	B5	13	B45
6	H5	14	H45
7	Gnd	15	H90
8	RF out	16	B90

## Ordering Information

Package form : CHP6013-SRF/23

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