

BSTPS25-0713C

7-13GHz 6-bit digitally controlled phase shifter chip

I. Product Introduction

BSTPS25-0713C is a high-performance GaAs six-bit digitally controlled phase shifter chip with a frequency range of 7~13GHz, an insertion loss of 6.2dB, basic phase shifts of 5.625°, 11.25°, 22.5°, 45°, 90°, 180°, a total phase shift of 354.375°, and a phase shift accuracy of 3°.

The chip adopts 0/+5V control, adopts 5 × 5mm surface mount leadless ceramic tube shell. The surface of the pin pad is gold-plated and is suitable for reflow soldering installation process.

II. Functional Block Diagram

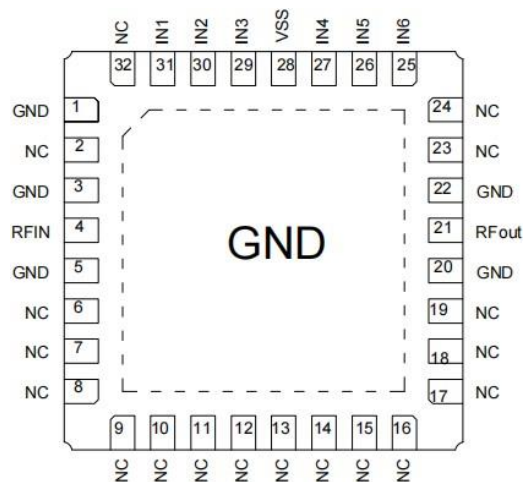


Figure 1

2.1. Key technical indicators

- | | |
|-------------------------|-------------------|
| • Frequency range: | 7-13GHz |
| • Insertion loss: | 6.2dB |
| • Phase shift accuracy: | 3° |
| • Input return loss: | 15dB |
| • Output return loss: | 15dB |
| • Chip size: | 5mm × 5mm × 1.2mm |

Table 1. Electrical performance table ($T_A = +25\text{ }^{\circ}\text{C}$, $V_{SS} = -5\text{V}$)

PARAMETER NAME	SYMBOL	MINIMUM	TYPICAL VALUE	MAXIMUM	UNIT
Frequency range	Freq	7	—	13	GHz
Insertion loss	IL	—	6.2	6.9	dB
Phase shift error	Phase_error	-10	—	+6	$^{\circ}$
Phase shift accuracy	Phase_RMS	—	3	5.7	$^{\circ}$
Phase shift additional attenuation	ATT_error	-0.7	—	+0.5	dB
Additional attenuation accuracy	ADD_ATT_RMS	—	0.2	0.35	dB
Input 1dB compression power	IP1dB	—	28	—	dBm
Switching time	T	—	—	40	ns
Input return loss	RL_IN	—	15	—	dB
Output return loss	RL_OUT	—	15	—	dB
Working current	I_{SS}	—	10	—	mA
Operating voltage	V_{SS}	-5	—	-7.5	V
Control voltage	V_C	0/+5			V

2.2. Absolute maximum ratings

Table 2

PARAMETER	VALUE
Control voltage range	0~+6V
Maximum input power	+30dBm
Storage temperature	-65 $^{\circ}\text{C}$ ~ +150 $^{\circ}\text{C}$
Operating temperature	-60 $^{\circ}\text{C}$ ~ +125 $^{\circ}\text{C}$

III. Test curve ($T_A = +25\text{ }^{\circ}\text{C}$, $V_{SS} = -5\text{V}$)

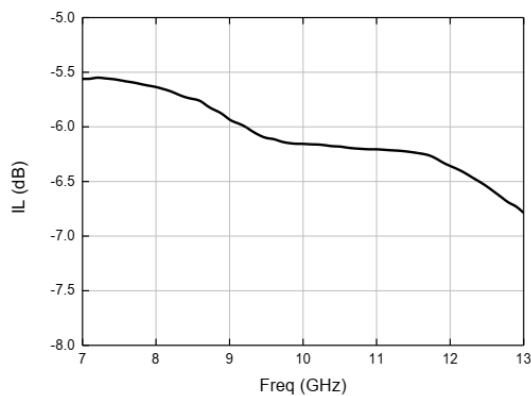


Figure 2. Insertion loss

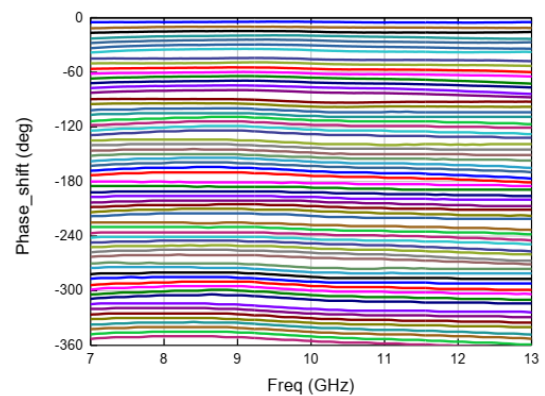


Figure 3. Phase shift amount

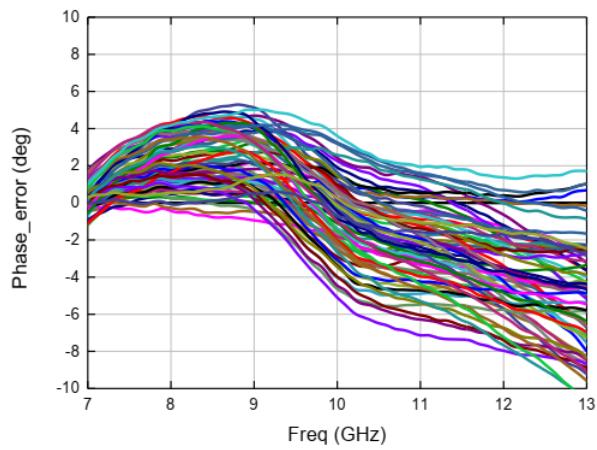


Figure 4. Phase shift error

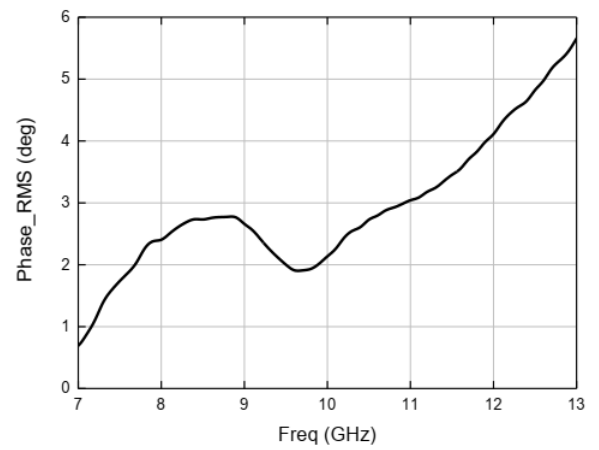


Figure 5. Phase shift accuracy

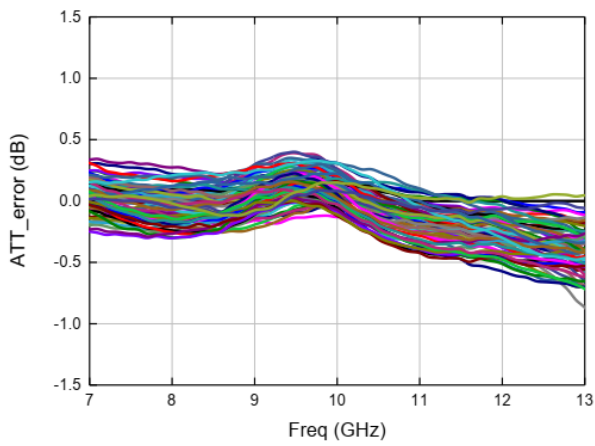


Figure 6. Phase shifting additional attenuation

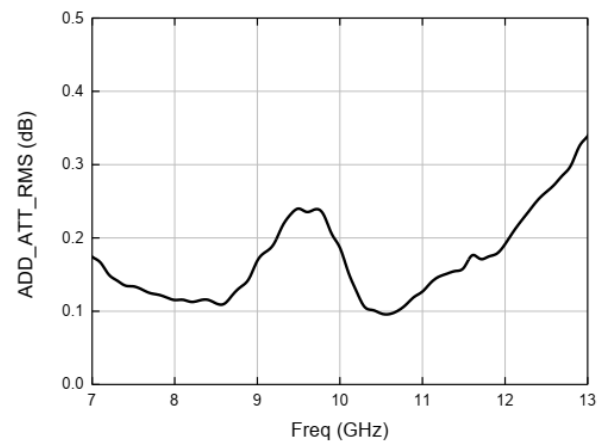


Figure 7. Additional attenuation accuracy

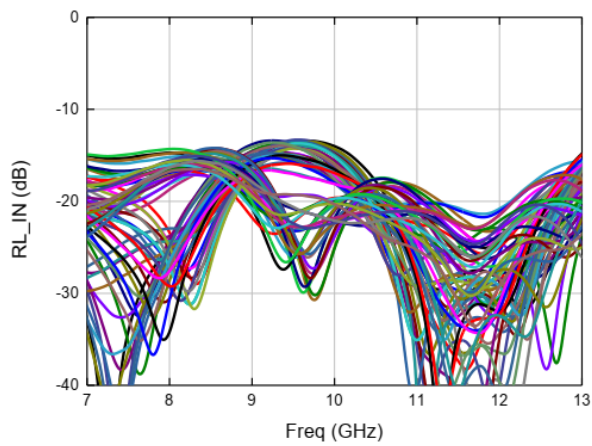


Figure 8. Input return loss

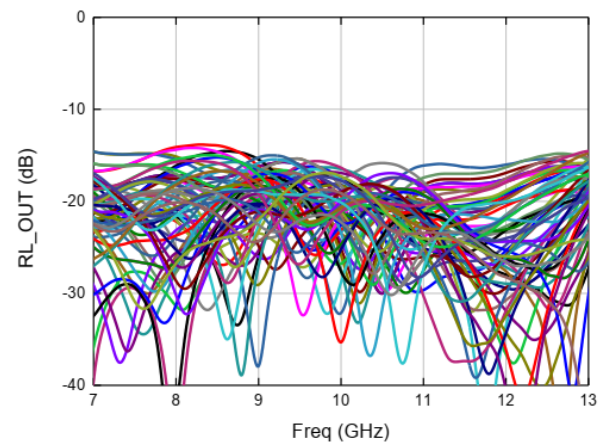


Figure 9. Output return loss

IV. Appearance structure (unit: mm)

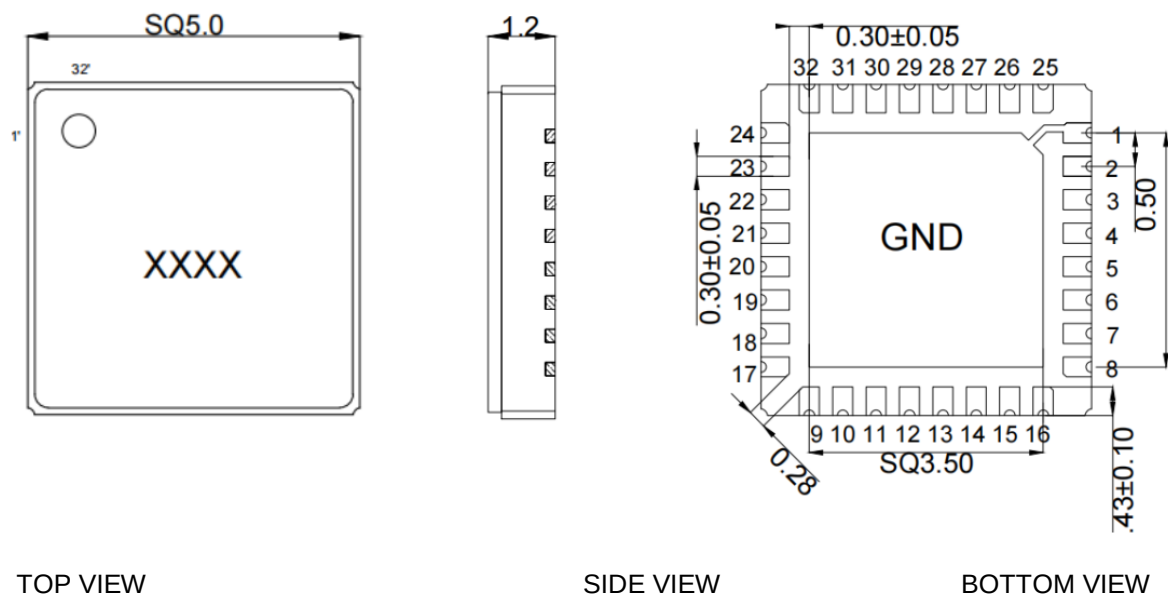


Figure 10

V. Pin Definition

SERIAL NUMBER	PORT NAME	DEFINITION	SIGNAL OR VOLTAGE
4	RFIN	RF signal input terminal	RF
21	RFOUT	RF signal output terminal	RF
29-31	IN3, IN2, IN1	Control Signal	0/+5V
25-27	IN6, IN5, IN4	Control Signal	0/+5V
28	V _{ss}	Supply voltage	-7.5V
1/3/5/20/22	GND	Grounding	/
other	NC	Floating, recommended to be grounded	/

5.1. Truth Table

PHASE SHIFT STATE	5.625°	11.25°	22.5°	45°	90°	180°
	IN1	IN2	IN3	IN4	IN5	IN6
Reference state	0	0	0	0	0	0
5.625°	1	0	0	0	0	0
11.25°	0	1	0	0	0	0
22.5°	0	0	1	0	0	0
45°	0	0	0	1	0	0
90°	0	0	0	0	1	0
180°	0	0	0	0	0	1

VI. Precautions

- Assemble and use in a clean environment;
- Sealing material: Ceramic material compliant with RoHS standards;
- Lead frame material: copper alloy;
- Lead surface plating: gold, gold layer thickness greater than 1.5 μ m;
- Maximum reflow peak temperature: 260°C;
- This product is an electrostatically sensitive device, please be careful to prevent static electricity during storage and use;
- Store in a dry, nitrogen environment;
- Do not attempt to clean the chip surface with dry or wet chemical methods.