BSTTD15-0618S

6-18GHz 5-bit CNC delay chip

Data Sheet

I. Product Introduction

BSTTD15-0618S is a high-performance GaAs MMIC 5-bit digitally controlled delay device chip with a frequency range of 6 to 18 GHz and delay options of 10 ps, 20 ps, 40 ps, 80 ps, and 160 ps. It features low insertion loss and high delay accuracy.

The chip uses on-chip through-hole metallization technology to ensure good grounding, without the need for additional grounding measures, and is simple and convenient to use.

The back side is metallized and suitable for eutectic sintering or conductive adhesive bonding.

II. Key Technical Indicators

- Frequency range: 6-18GHz
- Insertion loss: 2dB
- Input return loss: 18dB
- Output return loss: 20dB
- Delay bit number: 5 bits
- Delay range: 10ps-310ps
- Chip size: 3.5mm × 4.0mm × 0.1mm

III. Functional Block Diagram

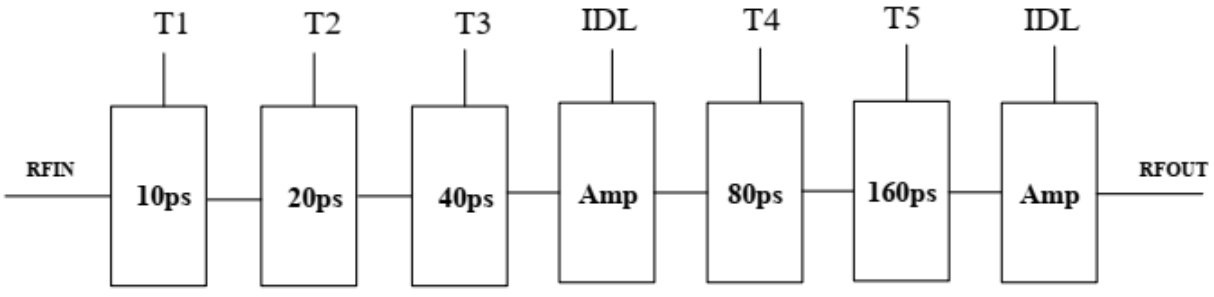

Figure 1.

IV. Electrical Performance Table (T_A = +25°C, T1~T5 = 0/+5V, V_{ss} = -5V, V_{DD} = +5V)

Table 1.

PARAMETER NAME		SYMBOL	MINIMUM	TYPICAL VALUES	MAXIMUM	UNIT
Frequency range		Freq	6	—	18	GHz
Insertion loss		IL	—	2	4.5	dB
Delay	10ps	TD	9.2	10	10.6	ps
	20ps		19.0	20	21.5	
	40ps		38.0	40	43.0	
	80ps		79.0	80	82.5	
	160ps		158.0	160	163.0	
	310ps		306.0	310	314.0	
Amplitude Modulation		Δ IL	-1.5	—	1.2	dB
Input return loss		RL_IN	15	18	—	dB
Output return loss		RL_OUT	18	20	—	dB
Quiescent operating current		IDQ	—	70	—	mA

V. Absolute Maximum Ratings

Table 2.

PARAMETER	LIMIT VALUE
T1~T5/IDL voltage range	0V ~ +6.5V
VDD voltage range	5 ± 2V
Operating temperature	-55℃ ~ +125℃
Storage temperature	-65℃ ~ +150℃

VI. Test Curve

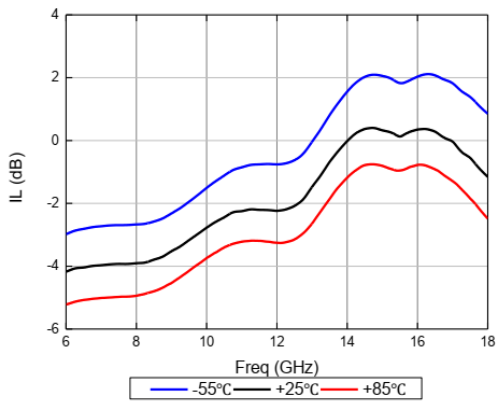

Figure 2. Insertion loss

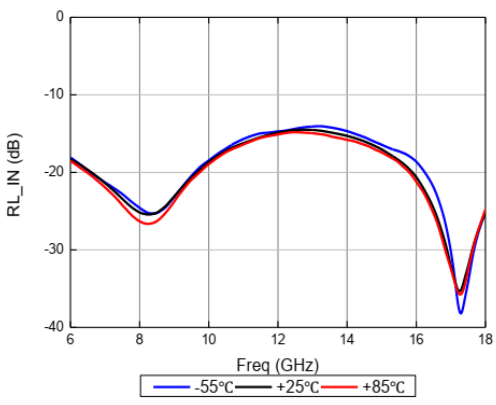

Figure 3. Input return loss

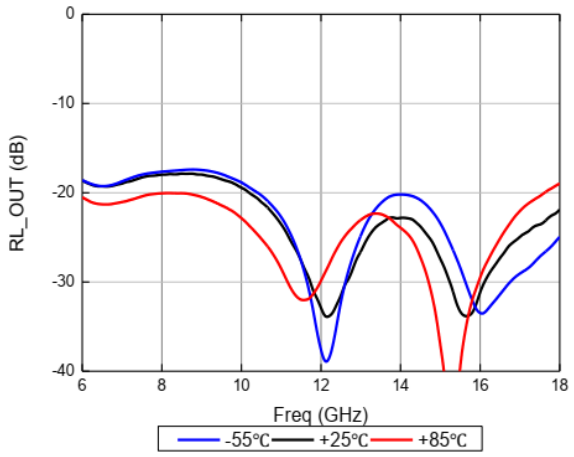

Figure 4. Output return loss

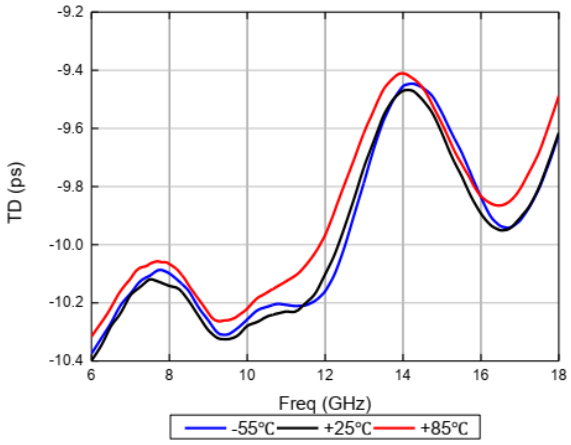

Figure 5. 10ps delay

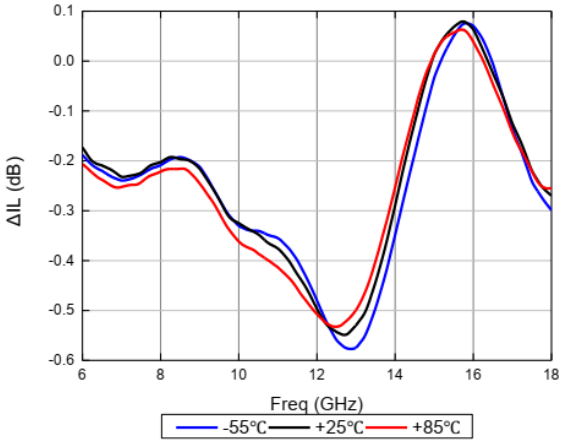

Figure 6. 10ps amplitude modulation

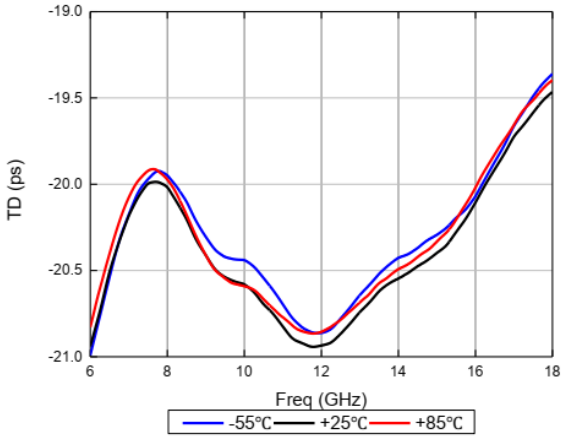

Figure 7. 120ps delay

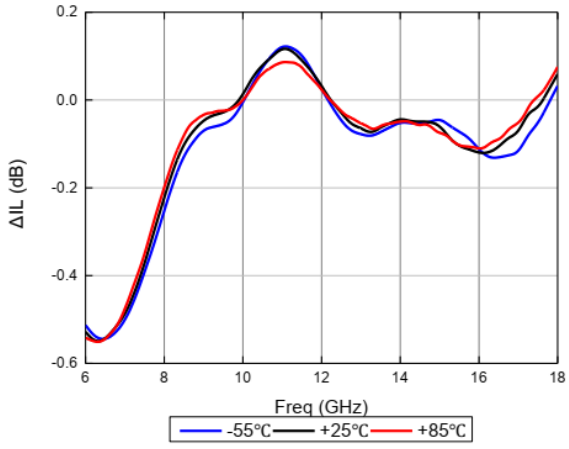

Figure 8. 20ps amplitude modulation

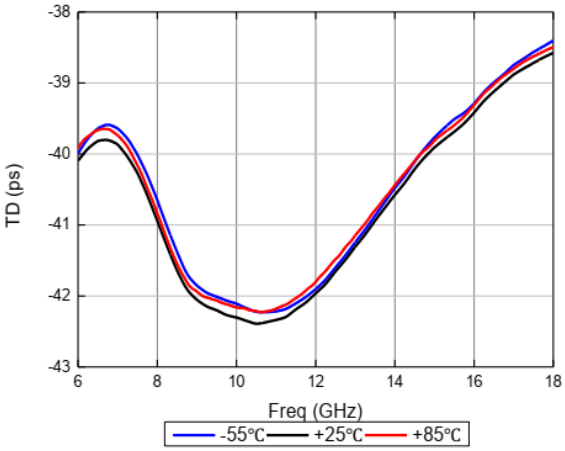

Figure 9. 40ps delay

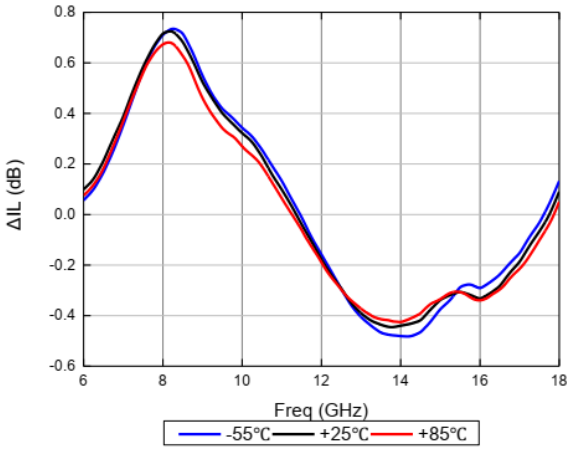

Figure 10. 40ps amplitude modulation

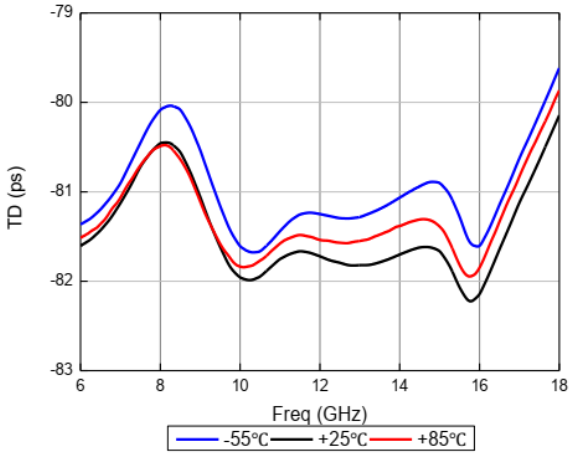

Figure 11. 80ps delay

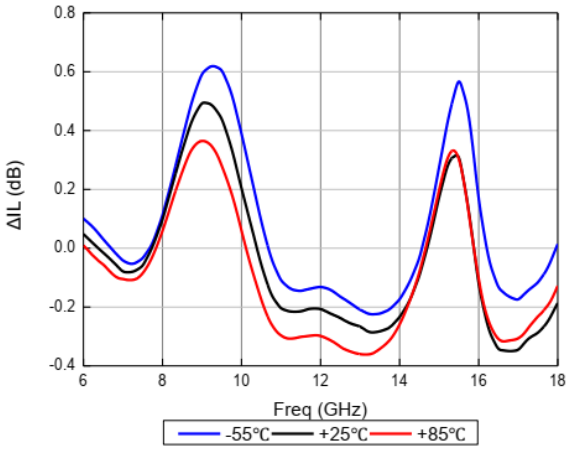

Figure 12. 80ps amplitude modulation

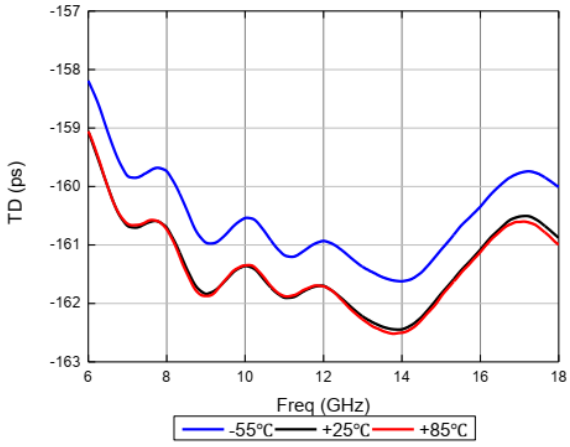

Figure 13. 160ps delay

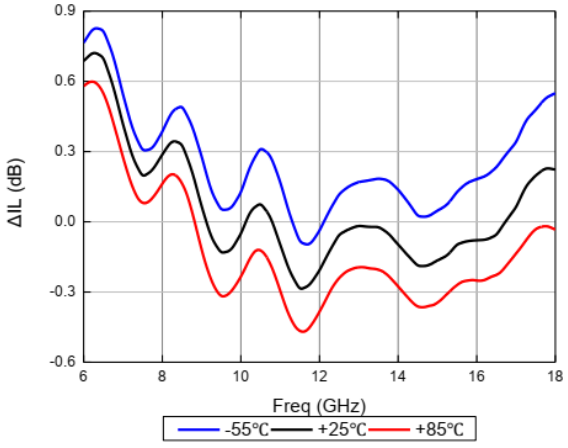

Figure 14. 160ps amplitude modulation

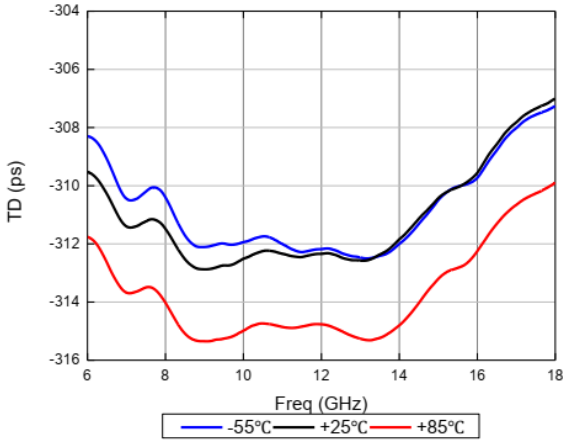

Figure 15. 310ps delay

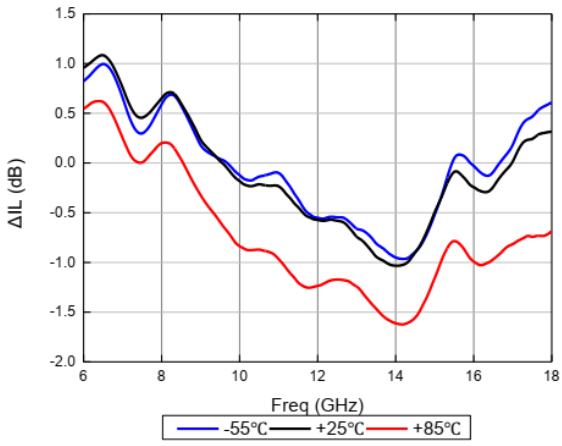

Figure 16. 310ps amplitude modulation

VII. Chip Port Diagram (unit: μm)

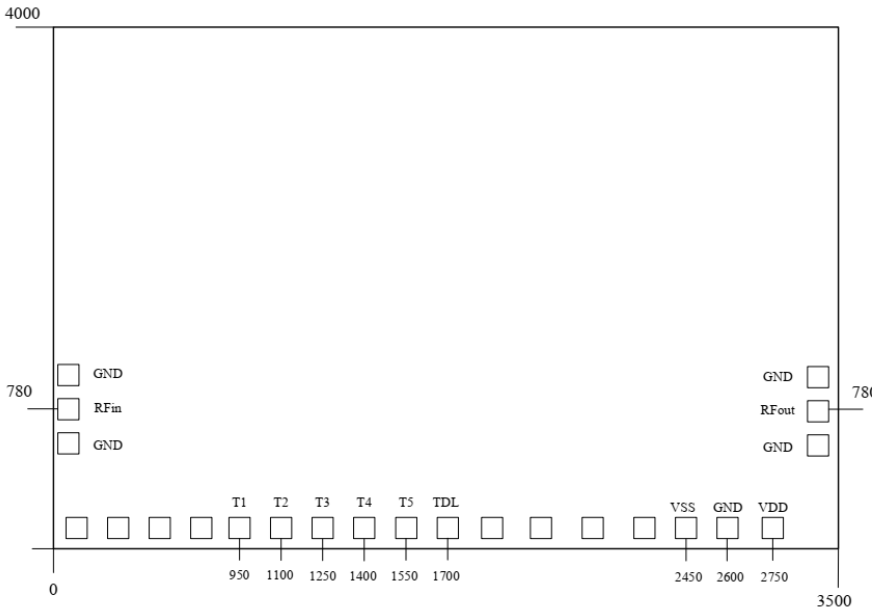

Figure 17.

VIII. Port Definition

Table 3.

LOGO	FUNCTION DEFINITION	SIGNAL OR VOLTAGE
RFIN	RF signal input terminal, no DC blocking capacitor	RF
RFOUT	RF signal output terminal, no DC blocking capacitor	RF
T1~T5/IDL	control signal	0/+5V
Vss	Negative power supply voltage	-5V
VDD	Positive power supply	+5V
GND	Grounding	/

IX. Suggested Assembly Drawing

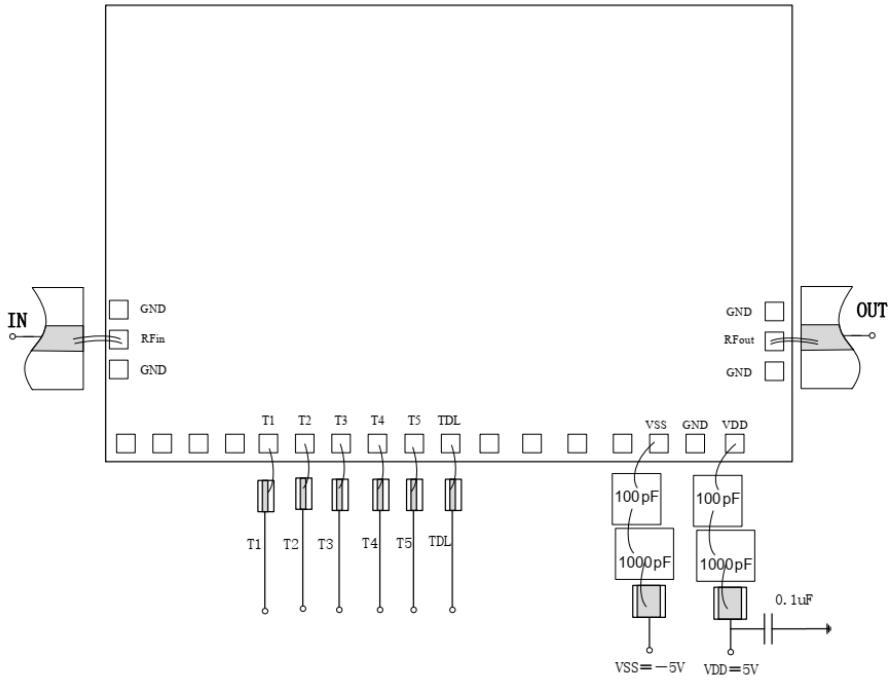

Figure 18.

X. Truth table

0 represents low level: 0V, 1 represents high level: +3~+5.5V

Table 4.

STATE	T1	T2	T3	T4	T5	IDL
Ground state	0	0	0	0	0	0
10ps	1	0	0	0	0	0
20ps	0	1	0	0	0	0
40ps	0	0	1	0	0	0
80ps	0	0	0	1	0	0
160ps	0	0	0	0	1	0
Isolation	-	-	-	-	-	1

XI. Precautions

- Assemble and use in a clean environment;
- GaAs material is very brittle and the chip surface is easily damaged (do not touch the surface), so you must be careful when using it;

- Use two bonding wires (25μm diameter gold wire) for input and output. Keep the bonding wires as short as possible and no longer than 500μm;
- The sintering temperature should not exceed 300°C, and the sintering time should be as short as possible, not exceeding 30 seconds;
- This product is an electrostatic 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.