

BGS12AL7-4

SPDT RF Switch

Small Signal Discretes



Never stop thinking

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BGS12AL7-4

Revision History: 2008-05-26, V1.1

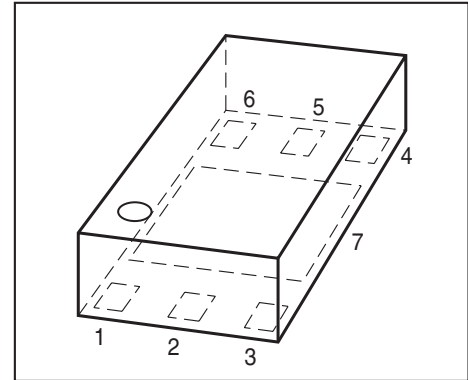
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BGS12AL7-4

Features

- Low insertion loss
- High port-to-port-isolation
- Low harmonic generation
- On-chip control logic
- High ESD robustness
- No external components required
- General purpose switch for applications up to 3 GHz
- Small leadless package TSLP-7-4
- Lead and halogen free package (RoHS and WEEE compliant)



Description

The BGS12AL7-4 General Purpose RF MOS switch is designed to cover a broad range of applications from 0.1 to 3 GHz. The symmetric design of its single pole double throw configuration, as shown in **Figure 1** offers high design flexibility. This single supply chip integrates on-chip CMOS logic driven by a simple, single-pin CMOS or TTL compatible control input signal. The 0.1 dB compression point exceeds the switch's maximum input power level of 21 dBm, resulting in linear performance at all signal levels. The RF switch has a very low insertion loss of 0.35 dB in the 1 GHz and 0.65 dB in the 2 GHz range.

Unlike GaAs technology, external DC blocking capacitors at the RF ports are only required if DC voltage is applied externally.

The BGS12AL7-4 RF switch is manufactured in Infineon's patented MOS technology, offering the performance of GaAs with the economy and integration of conventional CMOS including the inherent higher ESD robustness.

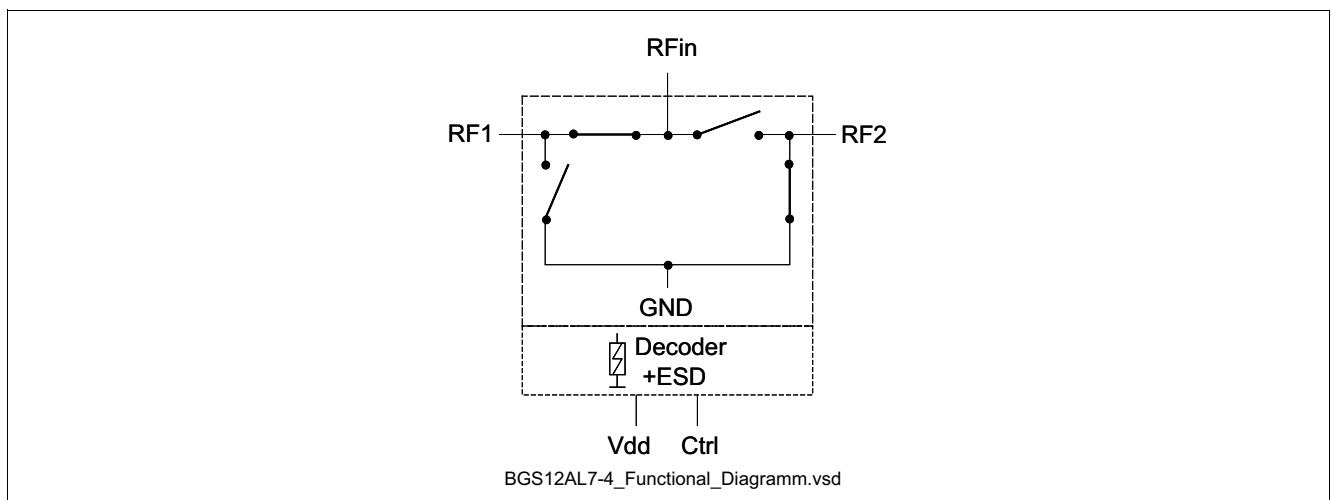


Figure 1 Functional Diagram

Type	Package	Marking	Chip
BGS12AL7-4	TSLP-7-4	12	M4781

Table 1 Maximum Ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Storage temperature range	T_{stg}	-65		150	°C	
DC Voltage at all pins to GND	V_{DC}			5	V	
RF power max. at all RF ports	P_{IN}			24	dBm	
ESD Capability						
Human Body- JEDEC JESD22-A114	V_{ESD}			1000	V	
Machine-Model JEDEC JESD22-A115				250		

Table 2 Operation Ranges

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Ambient temperature	T_A	-30		85	°C	
RF Frequency	f	0.1		3	GHz	
Control voltage low	V_{CtrlL}	-0.3		0.3	V	
Control voltage high	V_{CtrlH}	1.4		Vdd	V	
Supply voltage ¹⁾	V_{dd}	2.4		2.8	V	
Current consumption Vdd Pin (over temperature)	I_{Vdd}	80		350	μA	
Current Consumption Vctrl Pin	I_{Ctrl}			30	μA	
Power Range (VSWR ∞: 1)) (VSWR 3: 1) (VSWR 1: 1)	P_{in}			15 18 21	dBm	

1) Supply voltage must be connected before Control Voltage

Table 3 Pin description

Pin	Name	Description
1	RF2	RF Port 2 Out
2	GND	Ground
3	RF1	RF Port 1 Out
4	Vdd	Supply Voltage
5	RFIN	RF Port In
6	CTRL	Control Pin

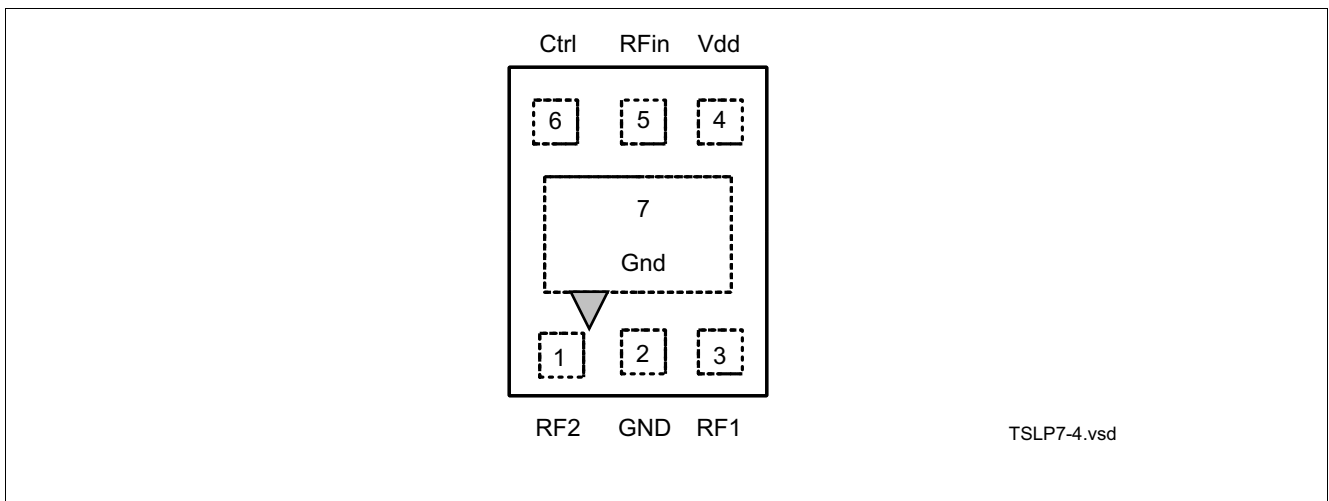


Figure 2 Pin Configuration (top view)

Table 4 Truth Table

Ctrl 1	RF 1	RF 2
0	1	0
1	0	1

Electrical Specifications

- Termination port impedance: $Z_0 = 50 \Omega$
- Temperature range: $T = -30 \text{ }^\circ\text{C} \dots +85 \text{ }^\circ\text{C}$
- Supply Voltage: $V_{dd} = 2.8 \text{ V}$
- $P_{in} = 15 \text{ dBm}$
- Across operating range of control voltages: $V_{Ctrl} = 1.4 \dots 2.8 \text{ V}$

Table 5 Electrical Characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Insertion Loss	IL		0.4 ¹⁾		dB	$f = 1 \text{ GHz TX}$,
			0.5 ¹⁾		dB	$f = 2 \text{ GHz TX}$,
Return Loss	RL	15	22		dB	$f = 1 \text{ GHz}$
		15	22		dB	$f = 2 \text{ GHz}$
Isolation RFin - RF1	$ISO_{RFin-RF1}$	20	32		dB	$f = 1 \text{ GHz}$
		15	25		dB	$f = 2 \text{ GHz}$
Isolation RFin - RF2	$ISO_{RFin-RF2}$	20	32		dB	$f = 1 \text{ GHz}$
		15	25		dB	$f = 2 \text{ GHz}$
Isolation RF1 - RF2	$ISO_{RF1-RF2}$	24	32		dB	$f = 1 \text{ GHz}$
		15	25		dB	$f = 2 \text{ GHz}$
Isolation RF ports - Vdd, Vctrl	ISO_{RF-DC}	30	35		dB	$f = 1 \text{ GHz}$
		20	35		dB	$f = 2 \text{ GHz}$
Harmonic Generation up to 12.75 GHz	P_{Harm}		-75	-50	dBm	$f = 1 \text{ GHz}$
			-80	-50	dBm	$f = 2 \text{ GHz}$
On Switching Time (10-90%) RF	t_{on}			5	μs	$f = 1 \text{ GHz}$
Off Switching Time (10-90%) RF	t_{off}			5	μs	$f = 1 \text{ GHz}$
Current Consumption at Vdd Pin	I_{dd}		120		μA	
Input 0.1 dB compression	$P_{0.1dB}$	21			dBm	$f = 1 \text{ GHz}$

¹⁾@ $T_A = 25 \text{ }^\circ\text{C}$

Measurement Results (@ T = 25°C)

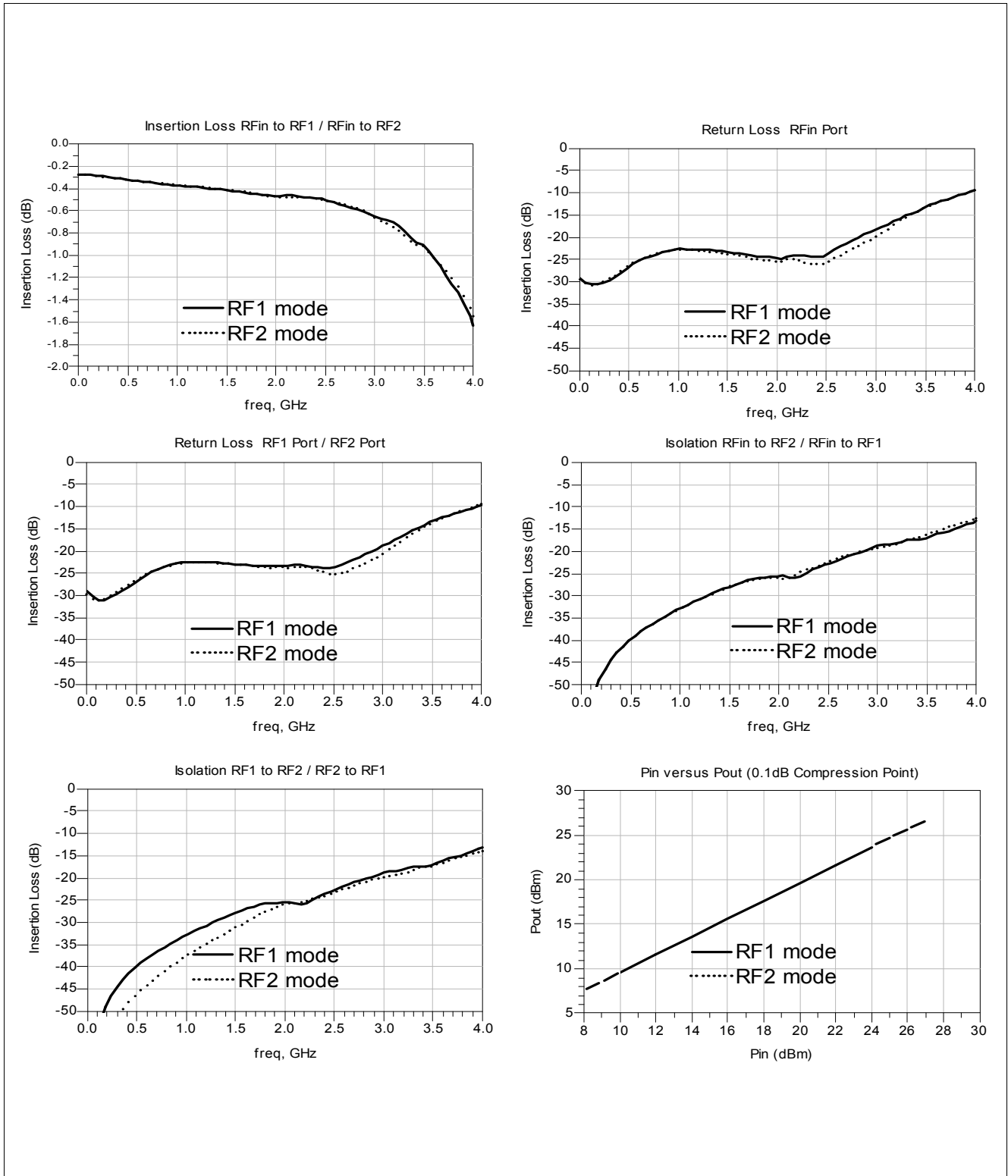


Figure 3 Measurement Results

Application Board

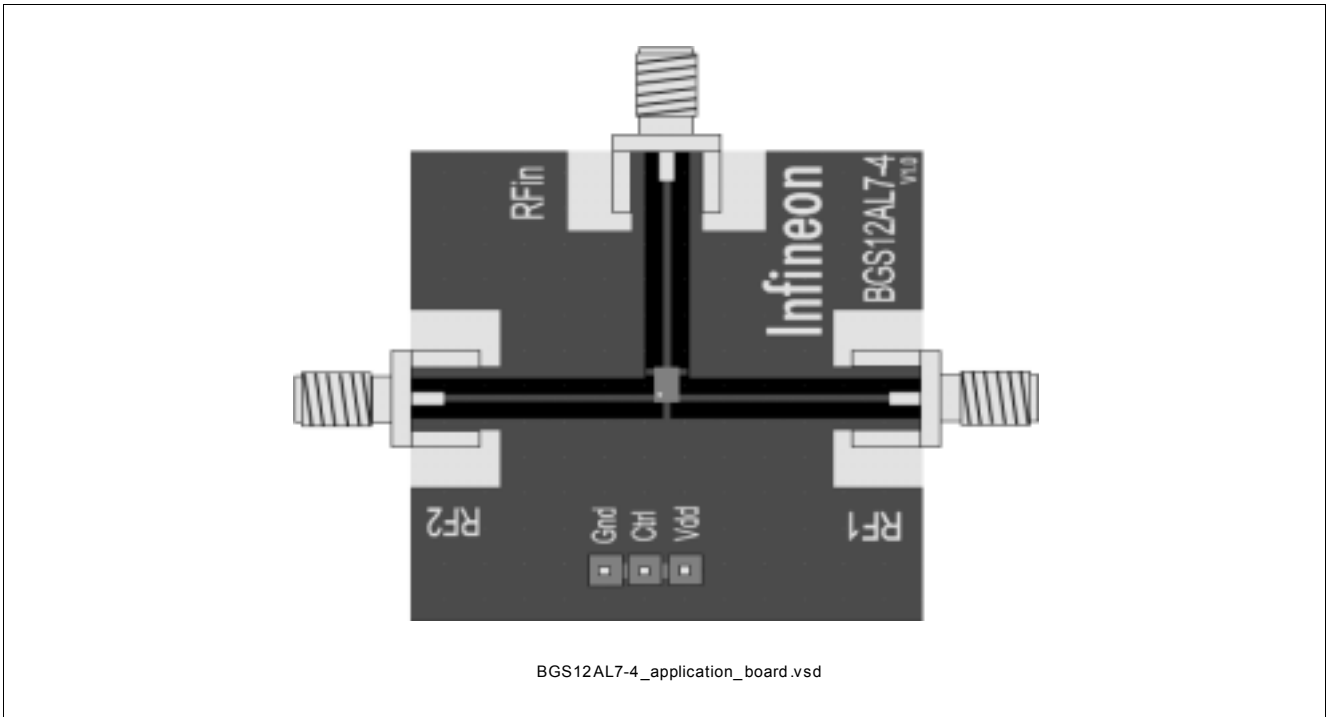


Figure 4 Application Board: No external Components necessary

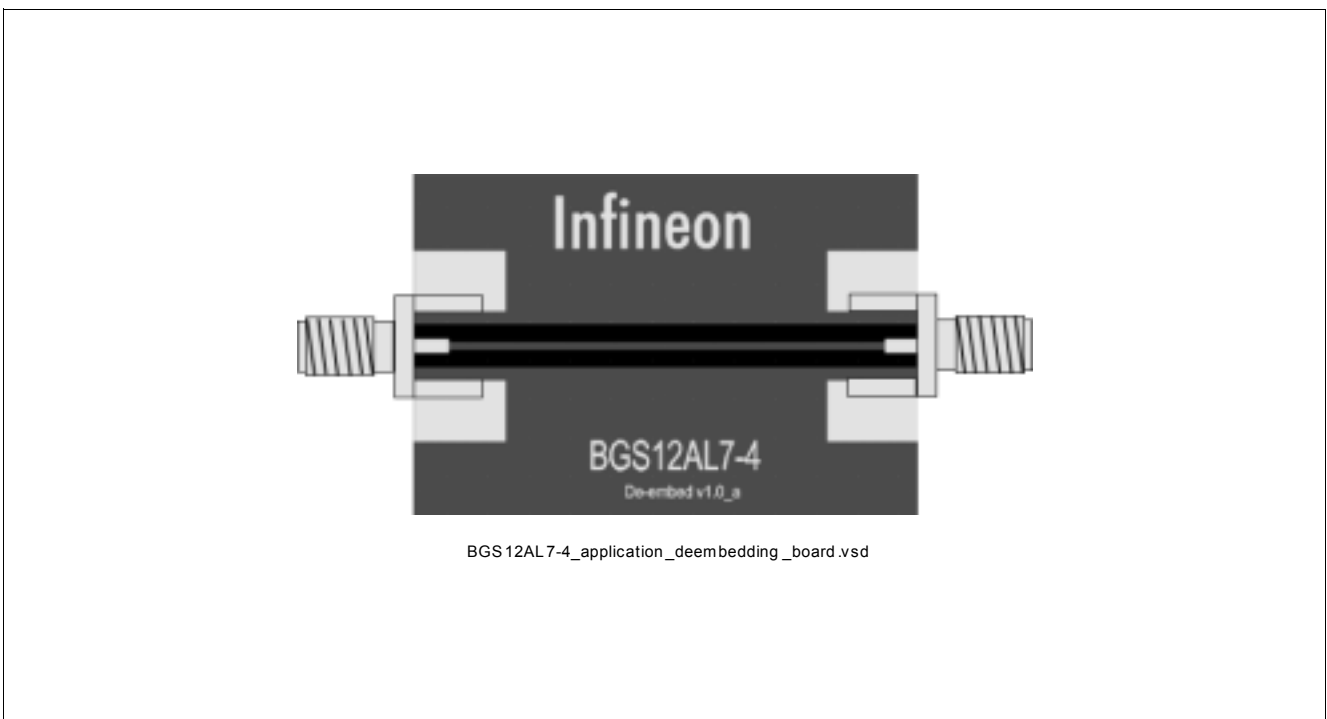


Figure 5 Application Deembedding Board

Package Outlines

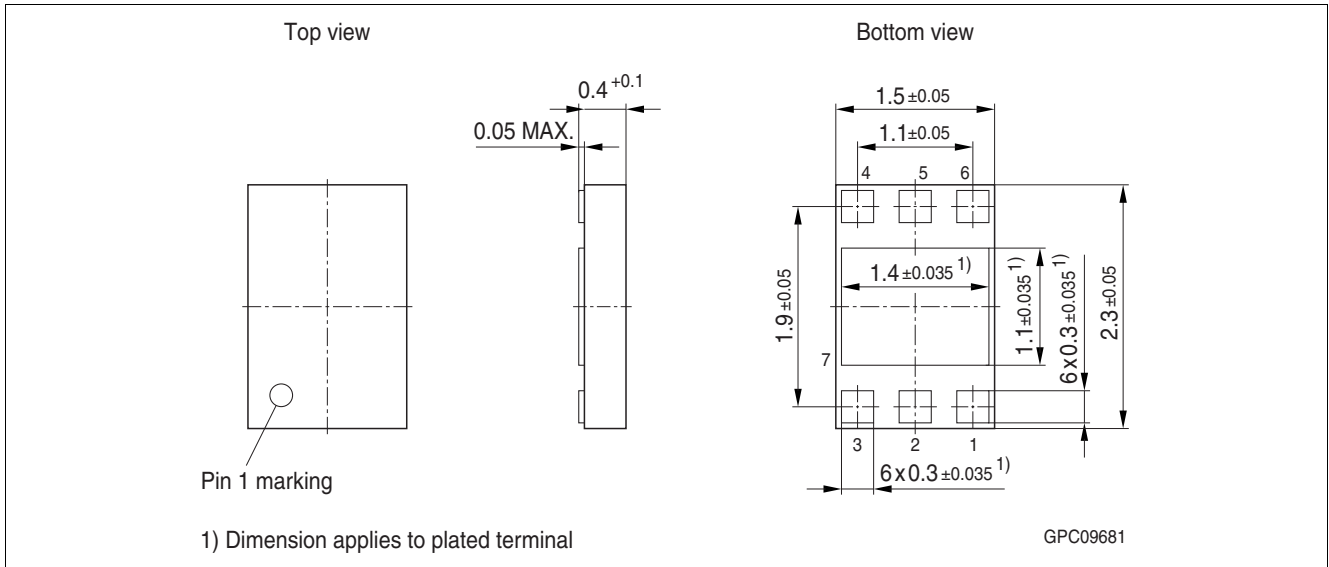


Figure 6 Package TSLP-7-4

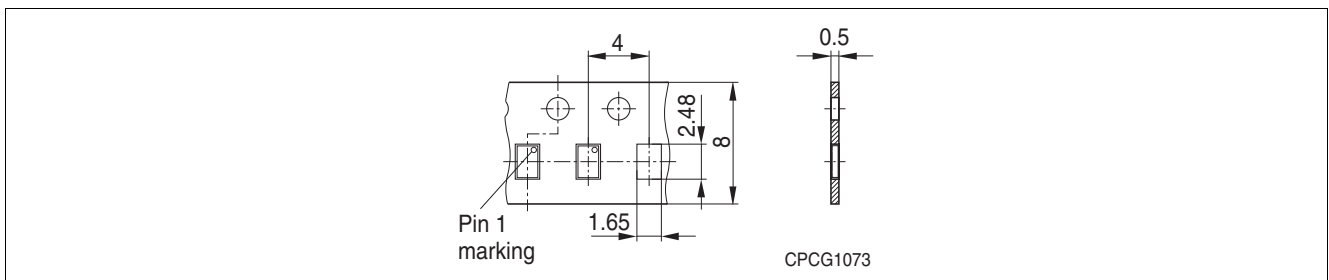


Figure 7 Tape Info

Dimensions in mm

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