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# BGS12AL7-4

SPDT RF Switch

## Data Sheet

Revision 1.3, 2009-06-24  
Preliminary

Industrial & Multimarket

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**BGS12AL7-4 SPDT RF Switch**
**Revision History: 2009-06-24, Revision 1.3**
**Previous Revision: 2008-10-08, V1.2**

Page	Subjects (major changes since last revision)
	Converted to the new IFX Template.
9	Extended Supply Voltage Range
10	Pin Description Pin 7
11	Electrical Specifications @ 100 MHz
12	Correct Return Loss and Isolation axis label
14	Update Board Pad (SMD) & Apertures, Tape and Reel Info

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Last Trademarks Update 2009-05-27

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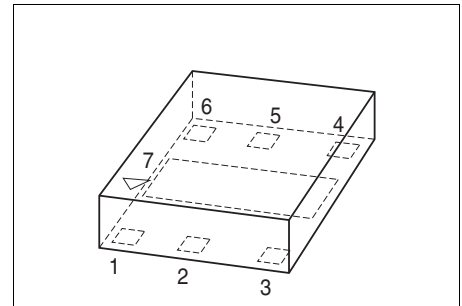
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## 1 Features

Main 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-7-6
- Lead and halogen free package (RoHS and WEEE compliant)



### Description

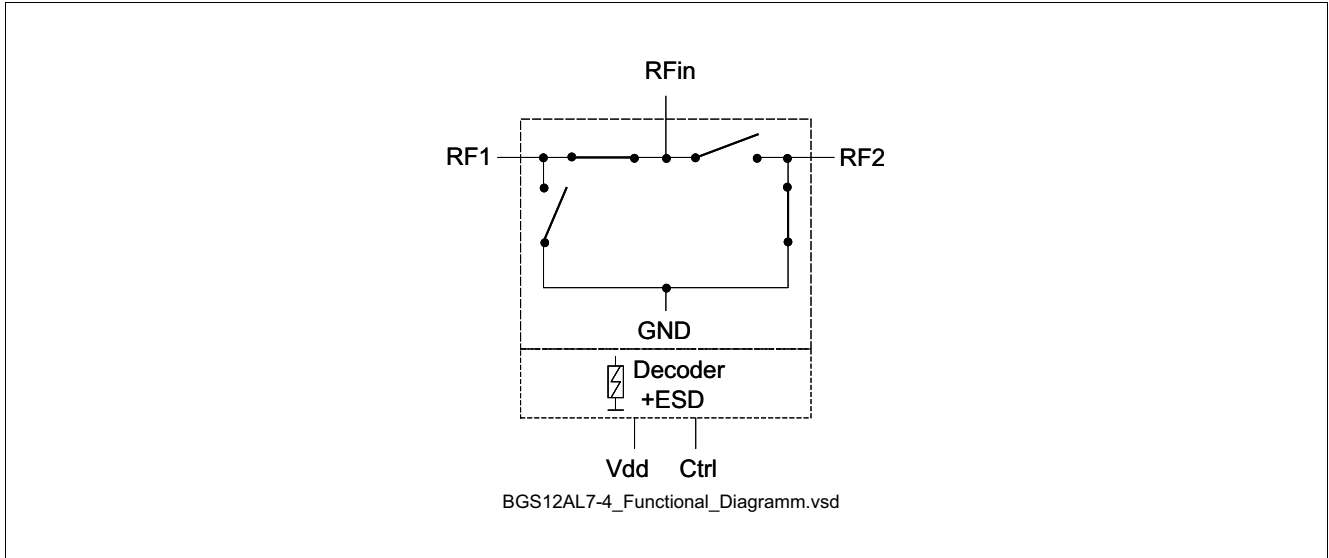
The BGS12AL7-4 General Purpose RF MOS switch is designed to cover a broad range of applications from 30 MHz to 3 GHz. The symmetric design of its single pole double throw configuration, as shown in [Figure 1](#) offers high design flexibility. This single supply chip integrates on-chip CMOS logic driven 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 0.4 dB in the 1 GHz and 0.5 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.

Product Name	Package	Chip	Marking
BGS12AL7-4	TSLP7-4	M4781	12



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**

## 2 Maximum Ratings

**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	–
<b>ESD Capability</b>						
Human Body Model IEC61340-3-1	$V_{ESD}$	–	–	1000	V	–
Machine Model IEC61340-3-2		–	–	100	V	–

**Table 2 Operation Ranges**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Ambient temperature	$T_A$	-30	–	85	°C	–
RF Frequency	$f$	0.03	–	3	GHz	–
Control voltage low	$V_{Ctrl}$	-0.3	–	0.3	V	–
Control voltage high	$V_{CtrlH}$	1.4	–	Vdd	V	–
Supply voltage <sup>1)</sup>	$V_{dd}$	2.4	–	3.6	V	–
Current consumption Vdd Pin (over temperature)	$I_{Vdd}$	80	–	350	μA	–
Current Consumption Vctrl Pin	$I_{Ctrl}$	–	–	30	μA	–
Power Range	$P_{in}$	–	–	–	dBm	–
(VSWR ∞: 1)		–	–	15		–
(VSWR 3: 1)		–	–	18		–
(VSWR 1: 1)		–	–	21		–

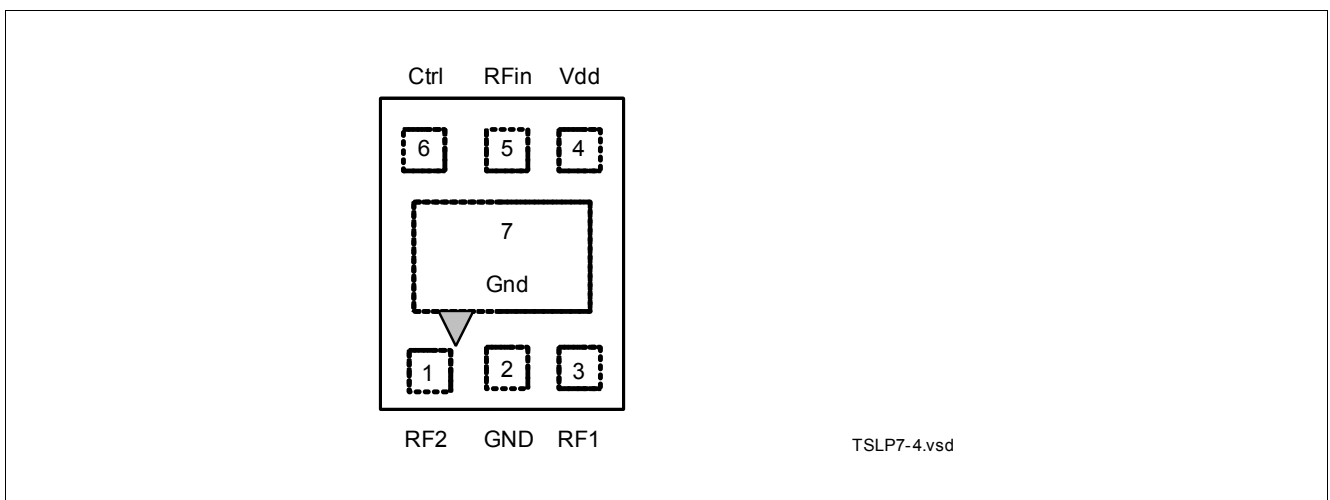
1) Supply voltage must be connected before Control Voltage

**Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.**

### 3 Pin Description

**Table 3 Pin Description**

Pin No.	Name	Pin Type	Buffer Type	Function
1	RF2	I/O		RF Port 2 Out
2	GND	GND		Ground
3	RF1	I/O		RF Port 1 Out
4	Vdd	PWR		Supply Voltage
5	RFIN	I/O		RF Port In
6	CTRL	I		Control Pin
7	NC	NC		It is recommended to connect Pin 7 to Ground



**Figure 2 Pin Configuration (top view)**

**Table 4 Truth Table**

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

## 4 Electrical Specifications

Test Conditions:

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

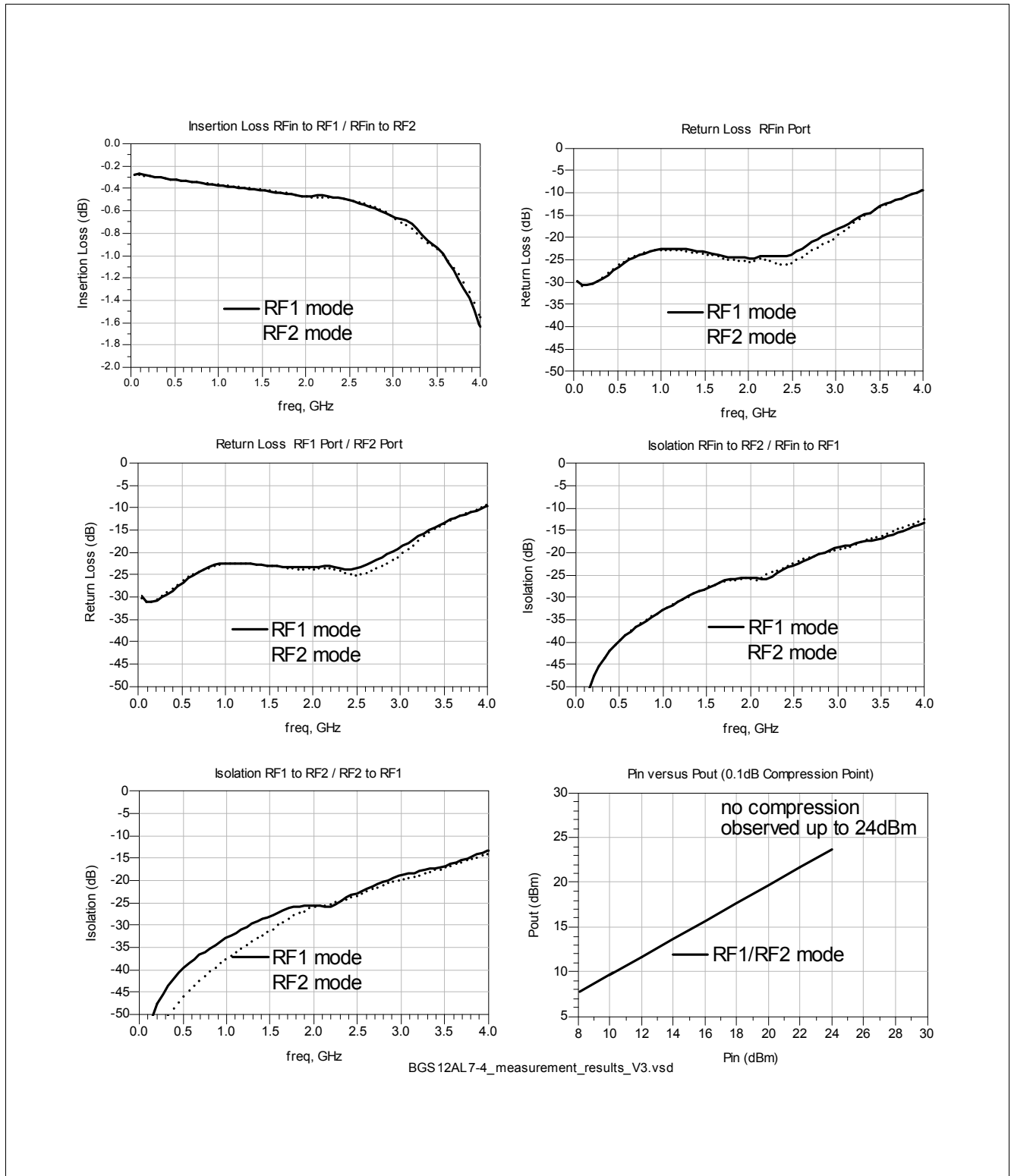
**Table 5 Electrical Characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Insertion Loss	$IL$	–	0.3 <sup>1)2)</sup>	–	dB	$f = 0.1 \text{ GHz TX}$ ,
		–	0.4 <sup>1)</sup>	–	dB	$f = 1 \text{ GHz TX}$ ,
		–	0.5 <sup>1)</sup>	–	dB	$f = 2 \text{ GHz TX}$ ,
Return Loss	$RL$	–	30 <sup>2)</sup>	–	dB	$f = 0.1 \text{ GHz}$
		15	22	–	dB	$f = 1 \text{ GHz}$
		13	22	–	dB	$f = 2 \text{ GHz}$
Isolation RFin - RF1	$ISO_{RFin-RF1}$	–	50 <sup>2)</sup>	–	dB	$f = 0.1 \text{ GHz}$
		22	32	–	dB	$f = 1 \text{ GHz}$
		18	25	–	dB	$f = 2 \text{ GHz}$
Isolation RFin - RF2	$ISO_{RFin-RF2}$	–	50 <sup>2)</sup>	–	dB	$f = 0.1 \text{ GHz}$
		22	32	–	dB	$f = 1 \text{ GHz}$
		18	25	–	dB	$f = 2 \text{ GHz}$
Isolation RF1 - RF2	$ISO_{RF1-RF2}$	–	50 <sup>2)</sup>	–	dB	$f = 0.1 \text{ GHz}$
		24	32	–	dB	$f = 1 \text{ GHz}$
		18	25	–	dB	$f = 2 \text{ GHz}$
Isolation RF ports - Vdd, Vctrl	$ISO_{RF-DC}$	25	30 <sup>2)</sup>	–	dB	$f = 1 \text{ GHz}$
		15	20 <sup>2)</sup>	–	dB	$f = 2 \text{ GHz}$
Harmonic Generation up to 12.75 GHz	$P_{Harm}$	–	-75 <sup>2)</sup>	-50	dBm	$f = 1 \text{ GHz}$
		–	-80 <sup>2)</sup>	-50	dBm	$f = 2 \text{ GHz}$
On Switching Time (10-90%) RF	$t_{on}$	–	3 <sup>2)</sup>	5	$\mu\text{s}$	$f = 1 \text{ GHz}$
Off Switching Time (10-90%) RF	$t_{off}$	–	0.5 <sup>2)</sup>	5	$\mu\text{s}$	$f = 1 \text{ GHz}$
Current Consumption at Vdd Pin	$I_{dd}$	–	120	–	$\mu\text{A}$	–
Input 0.1 dB compression	$P_{0.1dB}$	21 <sup>2)</sup>	–	–	dBm	$f = 1 \text{ GHz}$

1) @TA= 25 °C

2) Not measured in production, verified by design

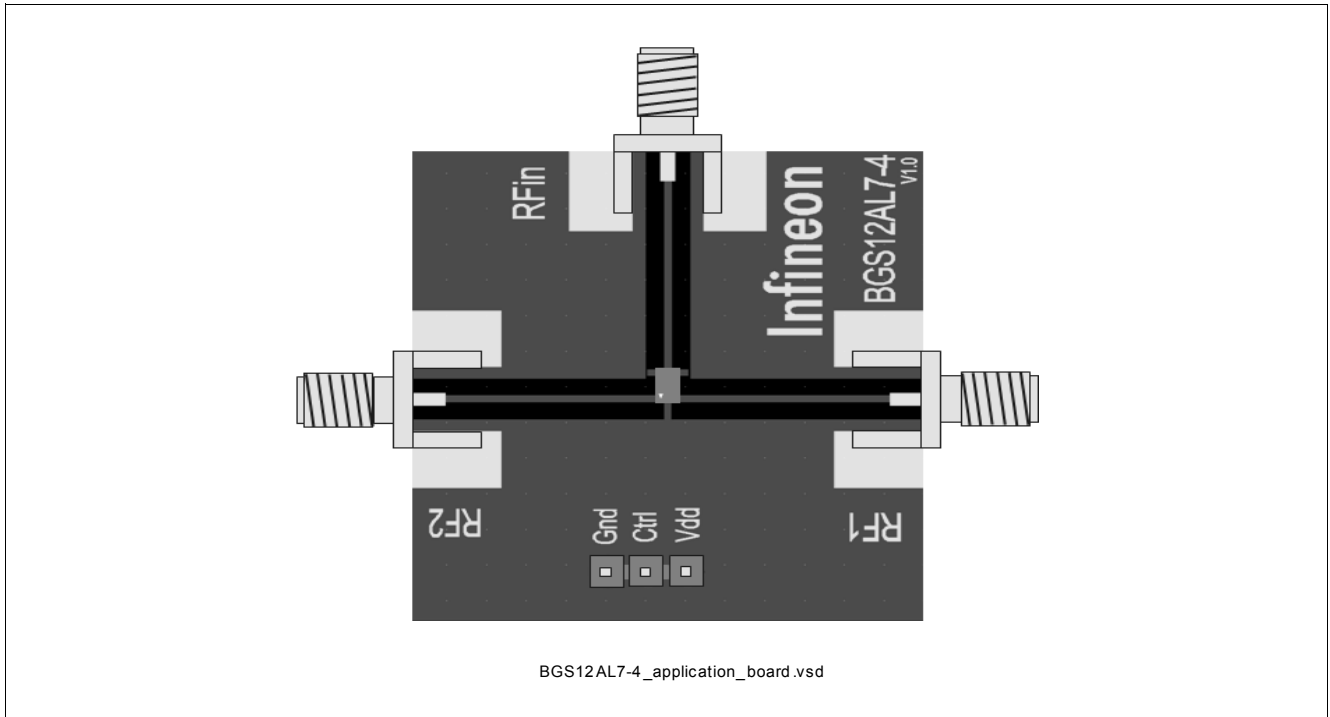
## 5 Measurement Results



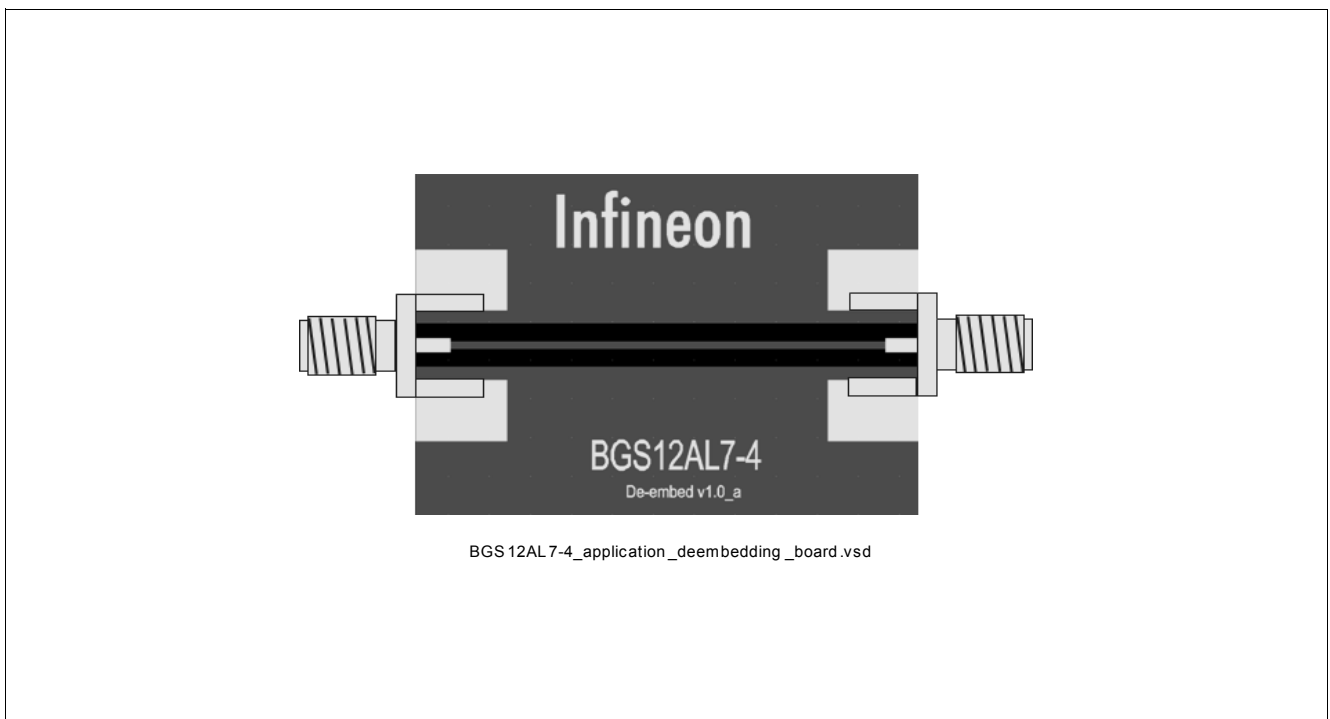
**Figure 3 Measurement Results (@ T = 25°C)**



**Application Board**



**Figure 4 Application Board: No External Components Necessary**



**Figure 5 Deembedding Board**

## 6 Package Outlines

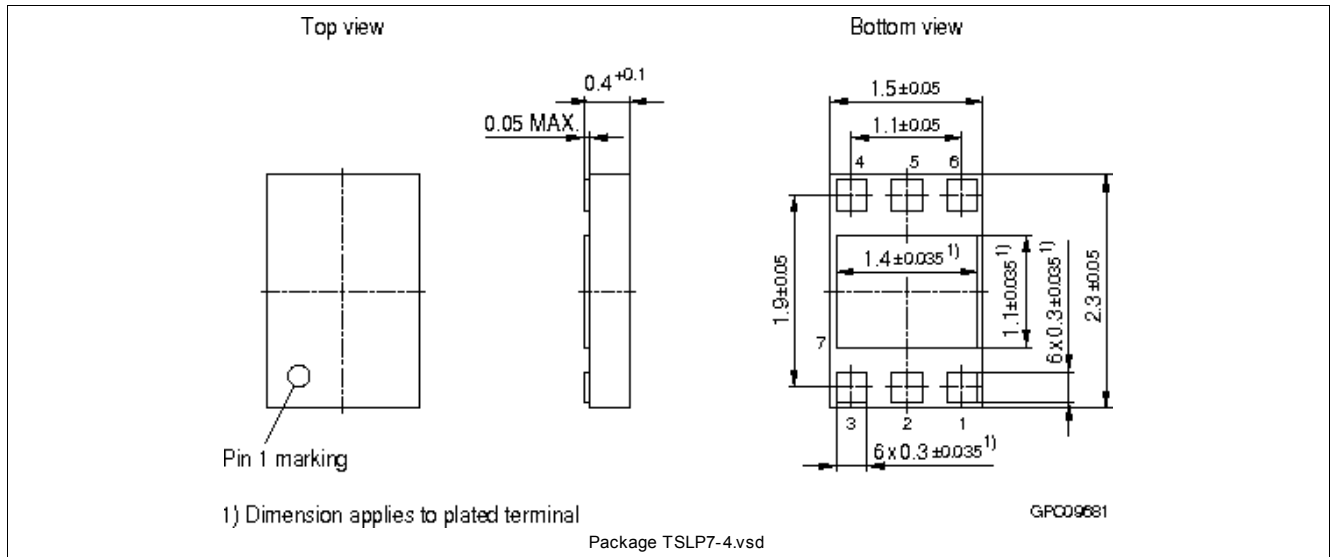


Figure 6 Package TSLP7-4

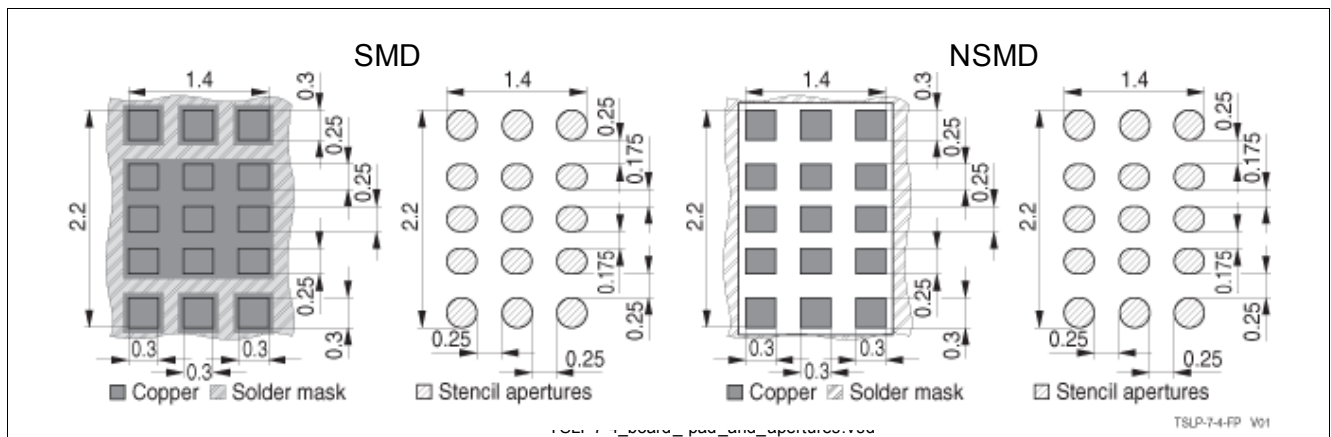


Figure 7 Board Pad (SMD) & Apertures

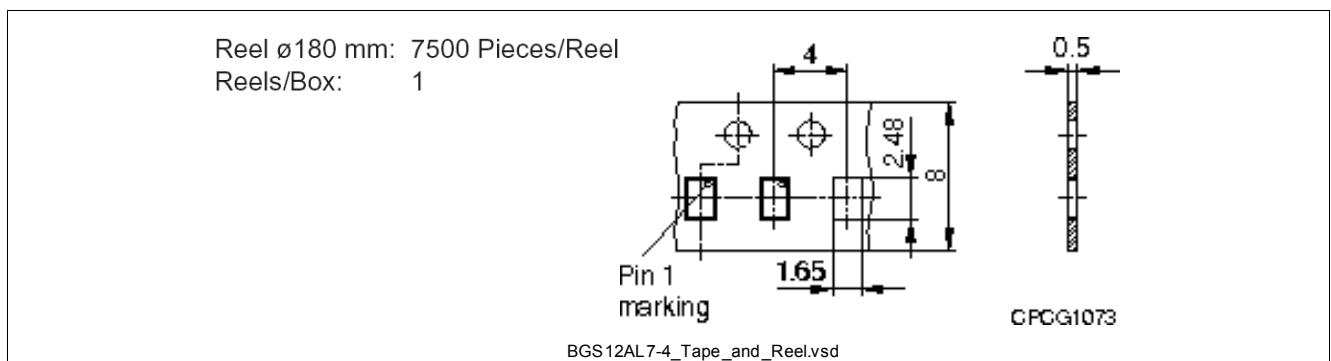


Figure 8 Tape and Reel

Dimensions in mm

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