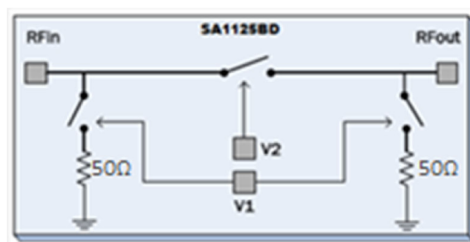


DC TO 25GHz GaAs SPST SWITCH

SA1125BD

The SA1125BD is an absorptive SPST GaAs microwave monolithic integrated circuit (MMIC) switch. It offers absorptive properties from both ports (50Ω terminations).

The SA1125BD is developed for broadband communications, instrumentation and electronic warfare.



KEY CHARACTERISTICS

- Low Insertion Loss: 1.5dB at 20GHz
- High Isolation: 43dB at 20GHz
- Excellent Return Loss
- 20ns Switching Speed
- GaAs pHEMT Technology

APPLICATIONS

- Broadband Communications
- Test Instrumentation
- Fibre Optics
- Military
- Aerospace

BARE DIE

1.91 mm x 1.11 mm x 0.10 mm

100% RoHS Compliant

Typical Performance

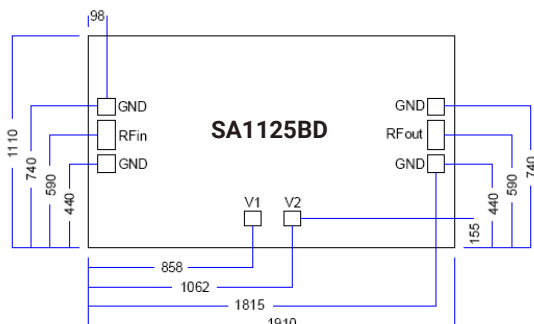
Parameter	Min	TYP	Max	Unit	Conditions
Operating Frequency			25	GHz	
Insertion Loss (1 GHz to 5 GHz)		1.0	1.6	dB	ON State
Insertion Loss (>5 GHz to 10 GHz)		1.3	1.8	dB	ON State
Insertion Loss (>10 GHz to 15 GHz)		1.4	2.0	dB	ON State
Insertion Loss (>15 GHz to 20 GHz)		1.5	2.3	dB	ON State
Insertion Loss (>20 GHz to 25 GHz)		1.6		dB	ON State
Isolation (1 GHz to 10 GHz)	42	50		dB	OFF State
Isolation (>10 GHz to 20 GHz)	36	43		dB	OFF State
Isolation (>20 GHz to 25 GHz)		43		dB	OFF State
Input Return Loss (1 GHz to 20 GHz)	13	17		dB	ON State
Output Return Loss (1 GHz to 20 GHz)	13	17		dB	ON State
Input Return Loss (1 GHz to 20 GHz)		15		dB	OFF State
Output Return Loss (1 GHz to 20 GHz)		15		dB	OFF State
OIP2		79		dBm	100 MHz spacing
OIP3	41	44		dBm	100 MHz spacing
Switching Speed		20		ns	50% control to 90% RF
Control Current		16	75	μ A	Sum of all control
Control Voltage	-3	-5	-8	V_{DC}	

Electrical Specifications, $T_A = +25^\circ\text{C}$, $V_{CTRL} = -5 V_{DC}$

Absolute Maximum Ratings¹

Parameter	Rating	Unit
Drain Bias Voltage (V_{CTRL})	-10	VDC
RF Input Port Power	+21	dBm
Storage Temperature	-40 to +150	$^\circ\text{C}$
Operating Temperature	-40 to +85	$^\circ\text{C}$

Die Layout



DC and GND bondpads are 88x88 μm .
RF bondpads are 88x150 μm .
All units are in μm .

Die Size (μm)	Die Thickness (μm)
1910 x 2110	100

Min. Bond Pad Pitch (μm)	Min. Bond Pad Opening ($\mu\text{m} \times \mu\text{m}$)
150	88x88

Pad Names and Description

Name	Description	Interface Schematic
RFIN	RF input. This pad is DC coupled and matched to 50Ω from DC to 20GHz. 50Ω microstrip transmission line recommended	
RFOUT	RF output. This pad is DC coupled and matched to 50Ω from DC to 20GHz. 50Ω transmission line on 0.127mm (5mil) thick alumina thin film substrate is recommended	
V1, V2	DC control pad for switch operation. Nominal operating voltage is -5V.	
GND	Provides ground path for probe measurements	

Truth Table

Control Line		RF Path
V1	V2	
High	Low	ON (Low Loss)
Low	High	OFF (high isolation)

High = -3V to -8V (-5 nominal), Low = 0, ±0.2V



Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EUDirective2002/95/EC (at time of this document revision).

The information in this publication is believed to be accurate and reliable. However, no responsibility is assumed by II-VI Compound Semiconductors Ltd for its use, nor for any infringement of patents, or other rights of third parties, resulting from its use. No license is granted by implication or otherwise under any patent or patent rights of II-VI Compound Semiconductors Ltd. II-VI Compound Semiconductors Ltd reserves the right to change component circuitry, recommended application circuitry and specifications at any time without prior notice.

Preferred Assembly Instructions

GaAs devices are fragile and should be handled with great care. Specially designed collets should be used where possible.

The back of the die is metallized and the recommended mounting method is by the use of conductive epoxy. Epoxy should be applied to the attachment surface uniformly and sparingly to avoid encroachment of epoxy on to the top face of the die and ideally should not exceed half the chip height. For automated dispense Ablestick LMISR4 is recommended. For manual dispense Ablestick 84-1 LMI or 84-1 LMIT are recommended. These should be cured at a temperature of 150°C for one hour in an oven especially set aside for epoxy curing only. If possible, the curing oven should be flushed with dry nitrogen. The gold-tin (80% Au 20% Sn) eutectic die attach has a melting point of approximately 280°C but the absolute temperature being used depends on the leadframe material used and the particular application. The time at maximum temperature should be kept to a minimum.

This part has gold (Au) bond pads requiring the use of gold (99.99% pure) bondwire. It is recommended that 25µm diameter gold wire be used. Recommended lead bond technique is thermocompression wedge bonding with 0.001" (25µm) diameter wire. Bond force, time, stage temperature, and ultrasonics are all critical parameters and the settings are dependent on the setup and application being used. Ultrasonic or thermosonic bonding is not recommended.

Bonds should be made from the die first and then to the mounting substrate or package. The physical length of the bond-wires should be minimized especially when making RF or ground connections.

Handling Precautions

To avoid damage to the devices, care should be exercised during handling. Proper Electrostatic Discharge (ESD) precautions should be observed at all stages of storage, handling, assembly, and testing.



ESD/MSL Rating

These devices should be treated as Class 1A (250V – 500V) using the human body model as defined in JEDEC Standard No. JS-001 and subsequent revisions of this standard. Further information on ESD control measures can be found in MIL-STD-1686 and MIL-HDBK-263. This is an unpackaged part and therefore no MSL rating applies.

Reliability

An MTTF in excess of 4 million hours at a channel temperature of 150°C is achieved for the process used to manufacture this device.

Disclaimers

This product is not designed for use in any space based or life sustaining/supporting equipment.

Ordering Information

DELIVERY QUANTITY	DELIVERY QUANTITY
Full Pack (100)	SA1125BD - 100
Small Quantity (25)	SA1125BD - 025
Sample Quantity (3)	SA1125BD - 003