

# SGM11124F High Linearity SP4T RF Switch

### **GENERAL DESCRIPTION**

The SGM11124F is a single-pole/four-throw (SP4T) antenna switch, which supports from 0.1GHz to 6GHz. The device features low insertion loss and high isolation, which makes it suitable for high linearity receiving application. It also has the advantage of high linearity performance. The SGM11124F is not subject to cellular interference and is applied to multi-mode and multi-band LTE mobile phones.

The SGM11124F has the ability to integrate SP4T RF switch and GPIO controller on an SOI chip. Internal driver and decoder for switch control signals are offered by the GPIO controller, which makes it flexible in RF path band and routing selection.

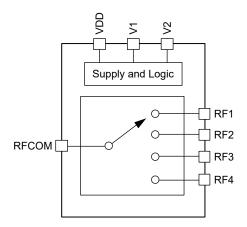
No external DC blocking capacitors required on the RF paths as long as no external DC voltage is applied, which can save PCB area and cost.

The SGM11124F is available in a Green ULGA-1.1×1.1-9L package.

# FEATURES

- Supply Voltage Range: 2.4V to 3V
- GPIO Controller
- Operating Frequency Range: 0.1GHz to 6GHz
- Advanced Silicon-On-Insulator (SOI) Process
- Low Insertion Loss: 0.4dB (TYP) at 2.7GHz
- High Isolation: 18dB (MIN) at 2.7GHz
- No External DC Blocking Capacitors Required
- Available in a Green ULGA-1.1×1.1-9L Package

## **BLOCK DIAGRAM**



#### Figure 1. SGM11124F Block Diagram

### APPLICATIONS

3G/4G/5G Rx and Diversity Applications

### **PACKAGE/ORDERING INFORMATION**

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM11124F	ULGA-1.1×1.1-9L	-40°C to +85°C	SGM11124FYULA9G/TR	ZS	Tape and Reel, 3000

#### MARKING INFORMATION

NOTE: Fixed character for ZS.

YΥ

Serial Number

Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

#### **ABSOLUTE MAXIMUM RATINGS**

Supply Voltage, V <sub>DD</sub>	3.3V
Control Voltage (V1 and V2 Pins), VctL	3V
RF Input Power, P <sub>IN</sub>	27dBm
Junction Temperature	+150°C
Storage Temperature Range55°C to	+150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility	
НВМ	.1000V

#### **RECOMMENDED OPERATING CONDITIONS**

Operating Temperature Range	40°C to +85°C
Operating Frequency Range	0.1GHz to 6GHz
Supply Voltage, V <sub>DD</sub>	2.4V to 3V
Control High Voltage, V <sub>CTL_H</sub>	1.35V to 3V
Control Low Voltage, V <sub>CTL_L</sub>	0 V to 0.4V

#### **OVERSTRESS CAUTION**

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

#### **ESD SENSITIVITY CAUTION**

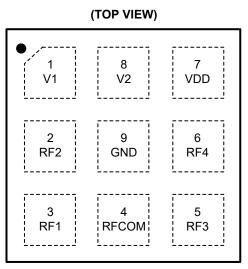
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

#### DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.



# **PIN CONFIGURATION**



ULGA-1.1×1.1-9L

## **PIN DESCRIPTION**

PIN	NAME	FUNCTION
1	V1	DC Control Voltage 1.
2	RF2	RF Port 2.
3	RF1	RF Port 1.
4	RFCOM	RF Common Port.
5	RF3	RF Port 3.
6	RF4	RF Port 4.
7	VDD	DC Power Supply.
8	V2	DC Control Voltage 2.
9	GND	Ground.

## LOGIC TRUTH TABLE

VDD	V1	V2	ACTIVE PATH
н	L	н	RFCOM to RF1
н	н	L	RFCOM to RF2
Н	Н	Н	RFCOM to RF3
н	L	L	RFCOM to RF4



# **ELECTRICAL CHARACTERISTICS**

(	V <sub>DD</sub> = 2.4V to 3V, T <sub>A</sub> = +25°C	$P_{\rm IN} = 0 dBm 500$	typical values are at \	Vpp = 2.8V unless	otherwise noted )
	$v_{DD} - 2.7 v_{10} 0 v_{10} - 120 0$	$, 1   _{N} = 000111, 0032$	, typical values are at v	$v_{DD} = 2.0 v$ , unicos	

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
DC Specifications	•			•		•	
Supply Voltage	V <sub>DD</sub>		2.4	2.8	3	V	
Supply Current	I <sub>DD</sub>			32	65	μA	
Control Voltage	V <sub>CTL_H</sub>	High	1.35	1.8	3	V	
Control Voltage	V <sub>CTL_L</sub>	Low	0		0.4	v	
Control Current	I <sub>CTL</sub>	V <sub>CTL</sub> = 0V		3	7	μA	
Switching Time	t <sub>sw</sub>	50% of control voltage to 90% of RF power		1	2	μs	
Turn-On Time	t <sub>on</sub>	Time from $V_{DD}$ = 0V to part on and RF at 90%		5	10	μs	
RF Specifications							
Insertion Loss (RFCOM to All RF Ports)		0.1GHz to 1.0GHz		0.20	0.41		
	F Ports) IL	1.0GHz to 2.0GHz		0.30	0.65	dB	
		2.0GHz to 2.7GHz		0.40	1.01		
		2.7GHz to 5.0GHz		0.75	1.07		
		5.0GHz to 6.0GHz		0.85	1.32		
		0.1GHz to 1.0GHz	29	35			
		1.0GHz to 2.0GHz	19	30		dB	
Isolation (RFCOM to All RF Ports)	ISO	2.0GHz to 2.7GHz	18	25			
		2.7GHz to 5.0GHz	12	16			
		5.0GHz to 6.0GHz	11	15			
		0.1GHz to 1.0GHz		25			
		1.0GHz to 2.0GHz		24			
Input Return Loss (RFCOM to All RF Ports)	RL	2.0GHz to 2.7GHz		23		dB	
		2.7GHz to 5.0GHz		20			
		5.0GHz to 6.0GHz		19			
0.1dB Compression Point (RFCOM to All RF Ports)	P <sub>0.1dB</sub>	0.1GHz to 6GHz		27		dBm	



# **TYPICAL APPLICATION CIRCUIT**

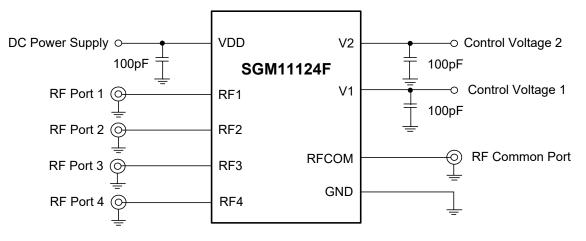


Figure 2. SGM11124F Typical Application Circuit

## **EVALUATION BOARD LAYOUT**

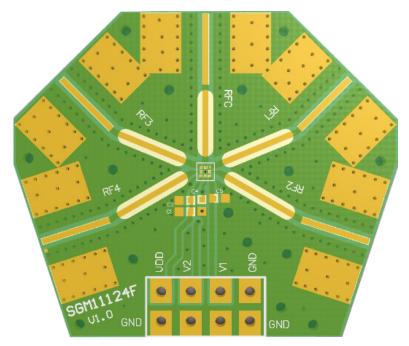


Figure 3. SGM11124F Evaluation Board Layout

### **REVISION HISTORY**

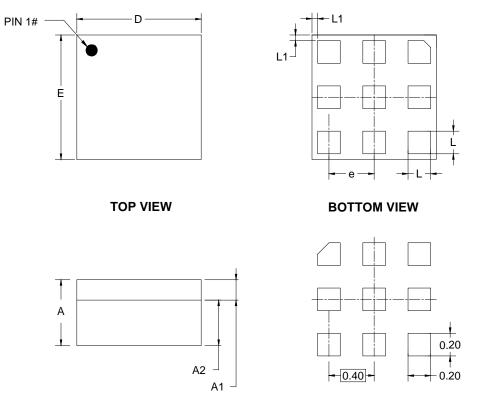
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (MARCH 2022) to REV.A	Page
Changed from product preview to production data	All



# PACKAGE OUTLINE DIMENSIONS

# ULGA-1.1×1.1-9L



SIDE VIEW

RECOMMENDED LAND PATTERN (Unit: mm)

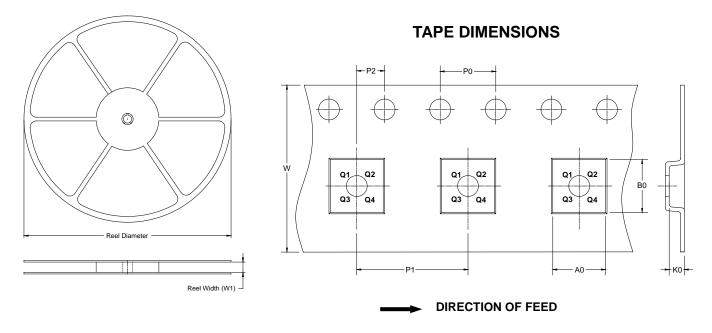
Symbol	Dimensions In Millimeters						
	MIN	MOD	МАХ				
A	0.530	0.580	0.630				
A1	0.150	0.180	0.210				
A2	0.400 BSC						
D	1.000	1.200					
E	1.000	1.100	1.200				
е	0.400 BSC						
L	0.150	0.200	0.250				
L1	0.050 REF						

NOTE: This drawing is subject to change without notice.



# TAPE AND REEL INFORMATION

#### **REEL DIMENSIONS**



NOTE: The picture is only for reference. Please make the object as the standard.

#### KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
ULGA-1.1×1.1-9L	7″	8.6	1.26	1.26	0.72	4.0	4.0	2.0	8.0	Q2

#### **CARTON BOX DIMENSIONS**



NOTE: The picture is only for reference. Please make the object as the standard.

#### **KEY PARAMETER LIST OF CARTON BOX**

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton	
7" (Option)	368	227	224	8	
7"	442	410	224	18	DD0002

