

### GENERAL DESCRIPTION

The SGM72204A is a single-pole/four-throw (SP4T) antenna tuning switch. The device features low on-resistance and turn-off capacitance, high linearity, low insertion loss and high RF voltage handling capability, which has a very significant improvement effect on TRP and TIS.

The SGM72204A is a GPIO interface product based on SOI process, allowing customers to flexibly use its control interface to improve product performance.

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 SGM72204A is available in a Green UTQFN-1.1×1.5-10L package.

### APPLICATIONS

- Antenna Tuning
- Impedance Tuning
- GSM/WCDMA/LTE Band Switching

### FEATURES

- **Frequency Range: 0.1GHz to 2.7GHz**
- **Low On-Resistance: 1.0Ω (TYP)**
- **Low Turn-Off Capacitance: 130fF (TYP)**
- **Peak-Voltage Handling: 45V (TYP)**
- **RF Input Power: 43dBm**
- **Supply Range: 2.4V to 4.5V**
- **No External DC Blocking Capacitors Required**
- **Available in a Green UTQFN-1.1×1.5-10L Package**

### BLOCK DIAGRAM

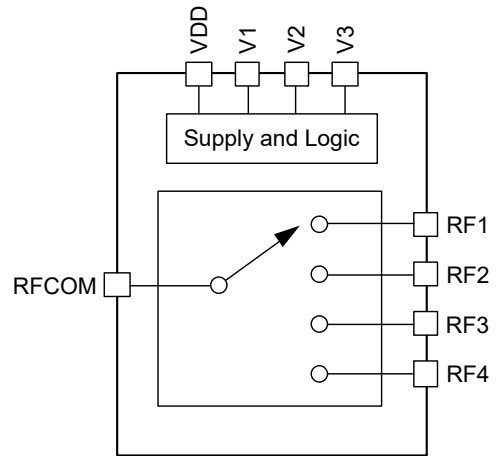


Figure 1. SGM72204A Block Diagram

**PACKAGE/ORDERING INFORMATION**

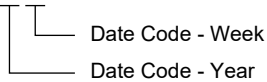
MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM72204A	UTQFN-1.1×1.5-10L	-40°C to +85°C	SGM72204AYURD10G/TR	L6 XX	Tape and Reel, 3000

**MARKING INFORMATION**

NOTE: XX = Date Code.

**YY** — Serial Number

**XX**



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,  $V_{DD}$ .....5V
- Control Voltage (V1, V2 and V3 Pins),  $V_{CTL}$ .....3V
- RF Input Power,  $P_{IN}$  .....43dBm
- Junction Temperature .....+150°C
- Storage Temperature Range .....-55°C to +150°C
- Lead Temperature (Soldering, 10s) .....+260°C
- ESD Susceptibility
- HBM..... 1000V

**RECOMMENDED OPERATING CONDITIONS**

- Operating Temperature Range .....-40°C to +85°C
- Operating Frequency Range..... 0.1GHz to 2.7GHz
- Supply Voltage,  $V_{DD}$ .....2.4V to 4.5V
- Control High Voltage,  $V_{CTL\_H}$ .....1.36V to 3V
- Control Low Voltage,  $V_{CTL\_L}$  .....0V 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.

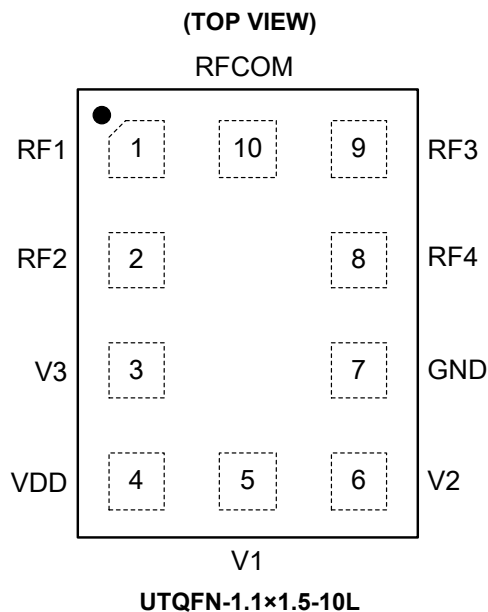
**ESD SENSITIVITY CAUTION**

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



## PIN DESCRIPTION

PIN	NAME	FUNCTION
1	RF1	RF Port 1.
2	RF2	RF Port 2.
3	V3	DC Control Voltage 3.
4	VDD	DC Power Supply.
5	V1	DC Control Voltage 1.
6	V2	DC Control Voltage 2.
7	GND	Ground.
8	RF4	RF Port 4.
9	RF3	RF Port 3.
10	RFCOM	RF Common Port.

## LOGIC TRUTH TABLE

V1	V2	V3	ACTIVE PATH
0	0	1	All R <sub>ON</sub>
0	1	1	RF1 and RF2 to RFCOM
1	0	1	RF3 and RF4 to RFCOM
0	0	0	RF1 to RFCOM
0	1	0	RF2 to RFCOM
1	0	0	RF3 to RFCOM
1	1	0	RF4 to RFCOM
1	1	1	All Isolation

**ELECTRICAL CHARACTERISTICS**(V<sub>DD</sub> = 2.4V to 4.5V, T<sub>A</sub> = +25°C, P<sub>IN</sub> = 0dBm, 50Ω, typical values are at V<sub>DD</sub> = 2.8V, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>DC Characteristics</b>						
Supply Voltage	V <sub>DD</sub>		2.4	2.8	4.5	V
Supply Current	I <sub>DD</sub>			30	50	μA
Control Voltage	V <sub>CTL_H</sub>	High	1.36	1.8	3	V
	V <sub>CTL_L</sub>	Low	0		0.4	
Control Current	I <sub>CTL</sub>	V <sub>CTL</sub> = 1.8V		1.1	2.0	μA
Switching Time	t <sub>SW</sub>	50% of control voltage to 90% of RF power		4.5	10	μs
Turn-On Time	t <sub>ON</sub>	Time from V <sub>DD</sub> = 0V to part on and RF at 90%		15	25	μs
<b>RF Characteristics</b>						
Insertion Loss (RFCOM to All RF Ports)	IL	0.1GHz to 1.0GHz		0.20	0.81	dB
		1.0GHz to 2.0GHz		0.53	1.12	
		2.0GHz to 2.7GHz		1.05	1.42	
Isolation (RFCOM to All RF Ports)	ISO	0.1GHz to 1.0GHz	19	25		dB
		1.0GHz to 2.0GHz	13	20		
		2.0GHz to 2.7GHz	11	15		
Input Return Loss (RFCOM to All RF Ports)	RL	0.1GHz to 1.0GHz		21		dB
		1.0GHz to 2.0GHz		16		
		2.0GHz to 2.7GHz		11		
On-Resistance (RF1, RF2, RF3, RF4)	R <sub>ON</sub>	0.1GHz to 2.7GHz		1.0	1.15	Ω
Turn-Off Capacitance (RF1, RF2, RF3, RF4)	C <sub>OFF</sub>	0.1GHz to 2.7GHz		130	150	fF
Peak RF Operating Voltage	V <sub>PEAK</sub>	25% duty cycle, 0.1GHz to 2.7GHz		45		V
0.1dB Compression Point (RFCOM to All RF Ports)	P <sub>0.1dB</sub>	25% duty cycle, 0.1GHz to 2.7GHz		43		dBm
LTE/WCDMA LB Harmonics (RF1, RF2, RF3, RF4)	2f <sub>0</sub>	P <sub>IN</sub> = 26dBm, 698MHz to 915MHz		-85		dBm
	3f <sub>0</sub>	P <sub>IN</sub> = 26dBm, 698MHz to 915MHz		-90		dBm
LTE/WCDMA MB Harmonics (RF1, RF2, RF3, RF4)	2f <sub>0</sub>	P <sub>IN</sub> = 26dBm, 1710MHz to 1980MHz		-82		dBm
	3f <sub>0</sub>	P <sub>IN</sub> = 26dBm, 1710MHz to 1980MHz		-85		dBm
LTE/WCDMA HB Harmonics (RF1, RF2, RF3, RF4)	2f <sub>0</sub>	P <sub>IN</sub> = 26dBm, 2300MHz to 2690MHz		-85		dBm
	3f <sub>0</sub>	P <sub>IN</sub> = 26dBm, 2300MHz to 2690MHz		-90		dBm
GSM LB Harmonics (RF1, RF2, RF3, RF4)	2f <sub>0</sub>	P <sub>IN</sub> = 35dBm, 824MHz to 915MHz		-66		dBm
	3f <sub>0</sub>	P <sub>IN</sub> = 35dBm, 824MHz to 915MHz		-57		dBm
GSM HB Harmonics (RF1, RF2, RF3, RF4)	2f <sub>0</sub>	P <sub>IN</sub> = 33dBm, 1710MHz to 1910MHz		-76		dBm
	3f <sub>0</sub>	P <sub>IN</sub> = 33dBm, 1710MHz to 1910MHz		-66		dBm

TYPICAL APPLICATION CIRCUIT

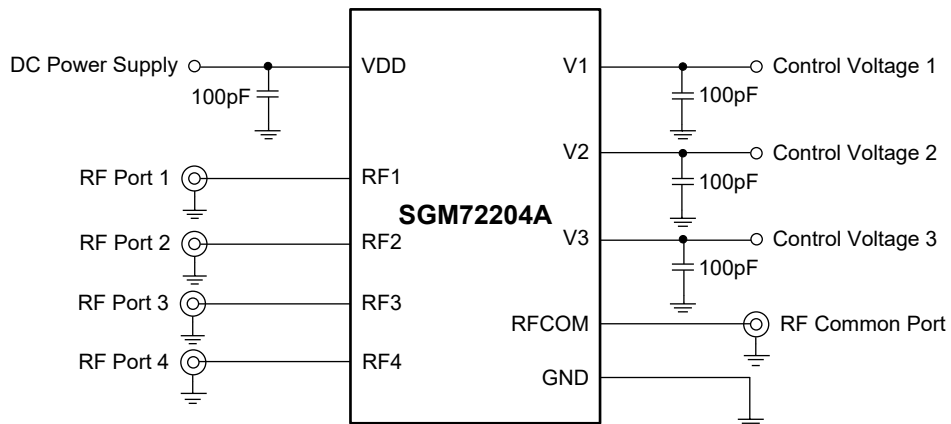


Figure 2. SGM72204A Typical Application Circuit

EVALUATION BOARD LAYOUT

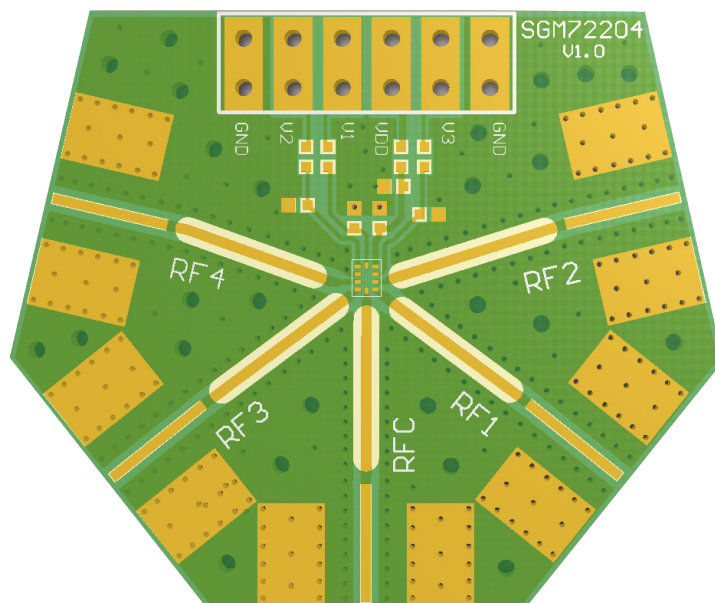


Figure 3. SGM72204A Evaluation Board Layout

**REVISION HISTORY**

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

<b>MARCH 2022 – REV.A.1 to REV.A.2</b>	<b>Page</b>
Update Package Outline Dimensions section .....	7

---

<b>MARCH 2022 – REV.A to REV.A.1</b>	<b>Page</b>
Update Evaluation Board Layout section .....	5

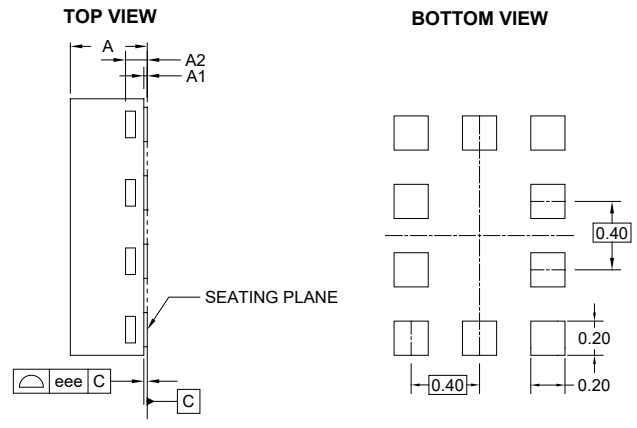
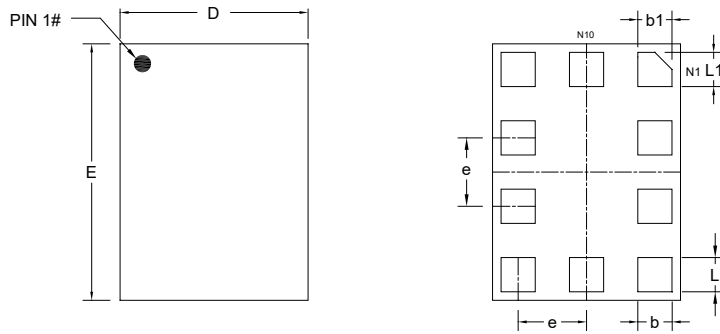
---

<b>Changes from Original (JANUARY 2022) to REV.A</b>	<b>Page</b>
Changed from product preview to production data .....	All

---

PACKAGE OUTLINE DIMENSIONS

UTQFN-1.1×1.5-10L



BOTTOM VIEW RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.400	-	0.500
A1	0.000	-	0.050
A2	0.127 REF		
D	1.000	-	1.200
E	1.400	-	1.600
b	0.150	-	0.250
b1	0.100	-	0.300
e	0.400 BSC		
L	0.150	-	0.250
L1	0.100	-	0.300
eee	0.050		

NOTE: This drawing is subject to change without notice.

# PACKAGE INFORMATION

## TAPE AND REEL INFORMATION

### REEL DIMENSIONS



### TAPE 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
UTQFN-1.1×1.5-10L	7"	9.5	1.23	1.63	0.62	4.0	4.0	2.0	8.0	Q1

000001



# PACKAGE INFORMATION

## 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