

### GENERAL DESCRIPTION

The SGM12213A is a single-pole/three-throw (SP3T) switch, which supports a wide operating frequency from 0.4GHz to 5.8GHz. The device provides low insertion loss and high isolation performance. These specifications make the device appropriate for 2G/3G/4G/5G applications, which need high power processing and high linearity.

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

The SGM12213A is available in a Green ULGA-1.1×1.1-9L package.

### APPLICATIONS

2G/3G/4G/5G Applications

### FEATURES

- **Operating Frequency Range: 0.4GHz to 5.8GHz**
- **Low Insertion Loss**
- **High Isolation**
- **MIPI RFFE V2.1 Interface Compatible**
- **Input 0.1dB Compression Point: 40dBm**
- **Capable of 1.8V Operation**
- **No External DC Blocking Capacitors Required**
- **The ID Pin to Control Two Devices on the Same RFFE Bus with Separate Product ID's**
- **Available in a Green ULGA-1.1×1.1-9L Package**

### BLOCK DIAGRAM

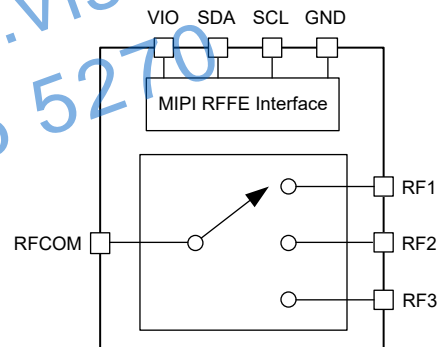


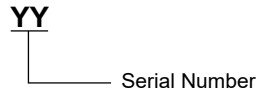
Figure 1. SGM12213A Block Diagram

**PACKAGE/ORDERING INFORMATION**

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM12213A	ULGA-1.1×1.1-9L	-40°C to +85°C	SGM12213AYULA9G/TR	2R	Tape and Reel, 3000

**MARKING INFORMATION**

NOTE: Fixed character for 2R.



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,  $V_{IO}$ .....2.5V
- SDA, SCL Control Voltage.....2.5V
- Maximum Power Handling.....
- .....40dBm (1:1 VSWR, +90°C, 25% DC)
- Junction Temperature.....+150°C
- Storage Temperature Range.....-55°C to +150°C
- Lead Temperature (Soldering, 10s).....+260°C
- ESD Susceptibility
- HBM.....1000V
- CDM.....2000V

**RECOMMENDED OPERATING CONDITIONS**

- Operating Temperature Range.....-40°C to +85°C
- Supply Voltage,  $V_{IO}$ .....1.65V to 1.95V
- SDA Logic Output Low Voltage.....0V to  $(0.2 \times V_{IO})$
- SDA Logic Output High Voltage..... $(0.8 \times V_{IO})$  to  $V_{IO}$
- SDA, SCL Logic High Current..... 0.1µA to 5µA

**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**

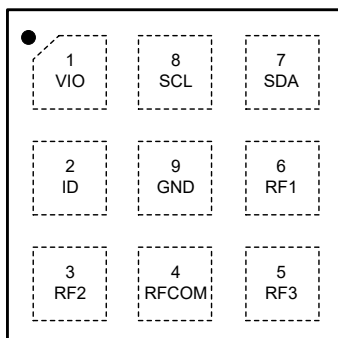
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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

(TOP VIEW)



ULGA-1.1×1.1-9L

## PIN DESCRIPTION

PIN	NAME	FUNCTION
1	VIO	Supply Voltage.
2	ID	Product ID.
3	RF2	RF Port 2.
4	RFCOM	RF Common Port.
5	RF3	RF Port 3.
6	RF1	RF Port 1.
7	SDA	RFFE Data Signal.
8	SCL	RFFE Clock Signal.
9	GND	Ground.

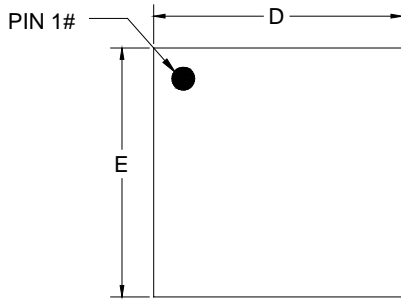
## ELECTRICAL CHARACTERISTICS

(T<sub>A</sub> = +25°C, V<sub>IO</sub> = 1.65V to 1.95V, typical values are at V<sub>IO</sub> = 1.8V, input and output resistance = 50Ω, SDA/SCL = 1.8V/0V, unless otherwise noted.)

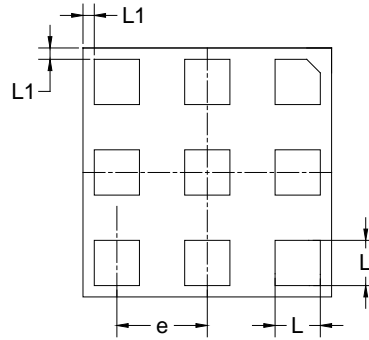
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>DC Characteristics</b>						
Supply Voltage	V <sub>IO</sub>		1.65	1.8	1.95	V
Supply Current	I <sub>VIO</sub>	Active mode		60	100	μA
		Low power mode		5	10	
Turn-On Time	t <sub>ON</sub>	50% V <sub>DD</sub> to 90% RF			30	μs
RF Path Switching Time	t <sub>SW</sub>	Switching CMD 50% SCL to 90%/10% RF		1	2	μs
Wake Up Time	t <sub>WK</sub>	End of low power state 50% SCL to 90% RF		10	15	μs
VIO Reset Time	t <sub>RST</sub>	VIO off to it starts to re-power up	10			μs
<b>RF Characteristics</b>						
Insertion Loss (RF1/RF2/RF3 to RFCOM)	IL	f <sub>0</sub> = 0.4GHz to 1.0GHz		0.34	0.52	dB
		f <sub>0</sub> = 1.0GHz to 2.0GHz		0.40	0.64	
		f <sub>0</sub> = 2.0GHz to 2.7GHz		0.48	0.73	
		f <sub>0</sub> = 3.0GHz to 3.8GHz		0.51	0.81	
		f <sub>0</sub> = 4.8GHz to 5.8GHz		0.64	1.09	
Isolation (RF1/RF2/RF3 to RFCOM)	ISO	f <sub>0</sub> = 0.4GHz to 1.0GHz	32	42		dB
		f <sub>0</sub> = 1.0GHz to 2.0GHz	25	35		
		f <sub>0</sub> = 2.0GHz to 2.7GHz	22	30		
		f <sub>0</sub> = 3.0GHz to 3.8GHz	17	25		
		f <sub>0</sub> = 4.8GHz to 5.8GHz	15	23		
2 <sup>nd</sup> Harmonics (RF1/RF2/RF3 to RFCOM)	2f <sub>0</sub>	f <sub>0</sub> = 900MHz, P <sub>IN</sub> = 26dBm		-101	-95	dBc
		f <sub>0</sub> = 900MHz, P <sub>IN</sub> = 35dBm		-90	-86	
		f <sub>0</sub> = 1900MHz, P <sub>IN</sub> = 32dBm		-93	-80	
3 <sup>rd</sup> Harmonics (RF1/RF2/RF3 to RFCOM)	3f <sub>0</sub>	f <sub>0</sub> = 900MHz, P <sub>IN</sub> = 26dBm		-96	-94	dBc
		f <sub>0</sub> = 900MHz, P <sub>IN</sub> = 35dBm		-80	-75	
		f <sub>0</sub> = 1900MHz, P <sub>IN</sub> = 32dBm		-93	-85	
Input Return Loss (RFCOM to RF1/RF2/RF3)	RL	f <sub>0</sub> = 0.4GHz to 2.7GHz		22		dB
		f <sub>0</sub> = 2.7GHz to 5.8GHz		17		
Input 0.1dB Compression Point (RFCOM to RF1/RF2/RF3)	P <sub>0.1dB</sub>	f <sub>0</sub> = 0.4GHz to 2.7GHz, CW		40		dBm
		f <sub>0</sub> = 3.0GHz to 5.8GHz, CW		38		
2 <sup>nd</sup> Order Intermodulation	IMD2	f <sub>0</sub> = 836.5MHz, P <sub>IN</sub> = 20dBm f <sub>1</sub> = 1718MHz, P <sub>IN</sub> = 20dBm		90		dBc
3 <sup>rd</sup> Order Intermodulation	IMD3	f <sub>0</sub> = 836.5MHz, P <sub>IN</sub> = 20dBm f <sub>1</sub> = 791.5MHz, P <sub>IN</sub> = 20dBm		88		dBc
		f <sub>0</sub> = 1760MHz, P <sub>IN</sub> = 20dBm f <sub>1</sub> = 1950MHz, P <sub>IN</sub> = 20dBm		88		
		f <sub>0</sub> = 2535MHz, P <sub>IN</sub> = 20dBm f <sub>1</sub> = 2415MHz, P <sub>IN</sub> = 20dBm		86		

PACKAGE OUTLINE DIMENSIONS

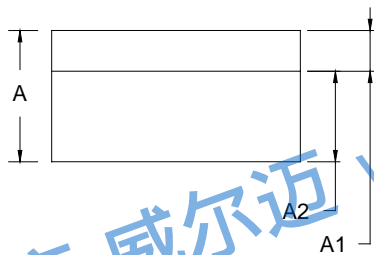
ULGA-1.1x1.1-9L



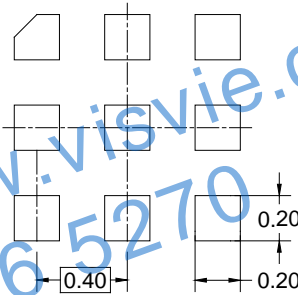
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

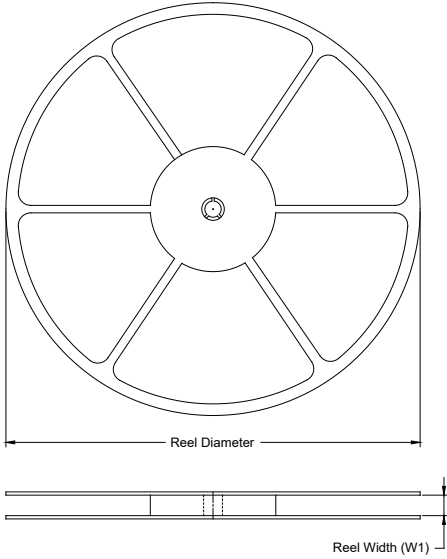
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Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.530	0.580	0.630
A1	0.150	0.180	0.210
A2	0.400 BSC		
D	1.000	1.100	1.200
E	1.000	1.100	1.200
e	0.400 BSC		
L	0.150	0.200	0.250
L1	0.050 REF		

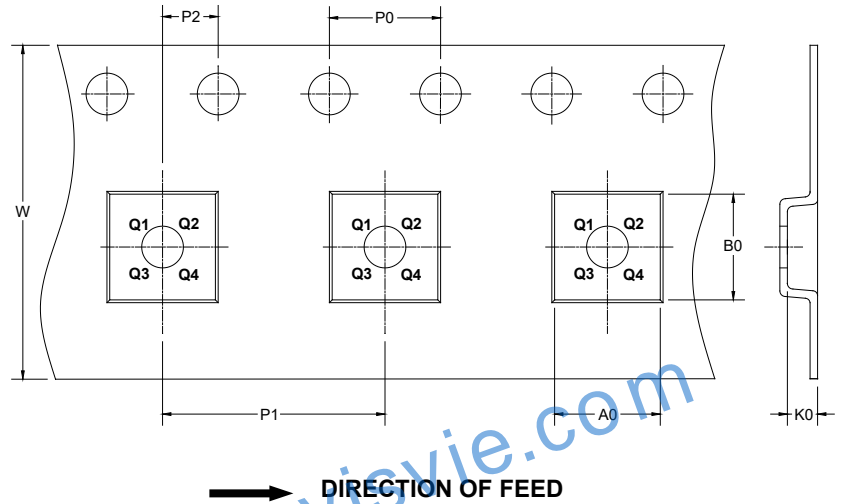
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



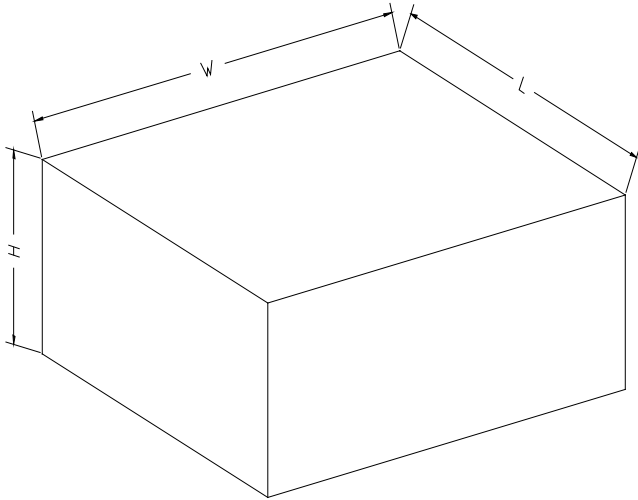
NOTE: The picture is only for reference. Please make the object as the standard.

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
ULGA-1,1x1,1-9L	7"	8.6	1.26	1.26	0.72	4.0	4.0	2.0	8.0	Q2

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**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

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