

GENERAL DESCRIPTION

The SGM12033A is a three-pole/three-throw (3P3T) addressable 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.

The device has the ability to integrate serial control system compatible with RFFE standard. Internal driver and decoder for switch control signals are offered by the controller, which makes it flexible in RF path routing and bands 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 SGM12033A is available in a Green ULGA-2×2-16AL package.

APPLICATIONS

- Antenna Swapping
- 5G SRS Applications

FEATURES

- **Operating Frequency Range: 0.4GHz to 5.8GHz**
- **Low Insertion Loss**
- **Input 0.1dB Compression Point: 38dBm**
- **High Isolation**
- **MIPI RFFE V2.1 Interface Compatible**
- **No External DC Blocking Capacitors Required**
- **Available in a Green ULGA-2×2-16AL Package**

BLOCK DIAGRAM

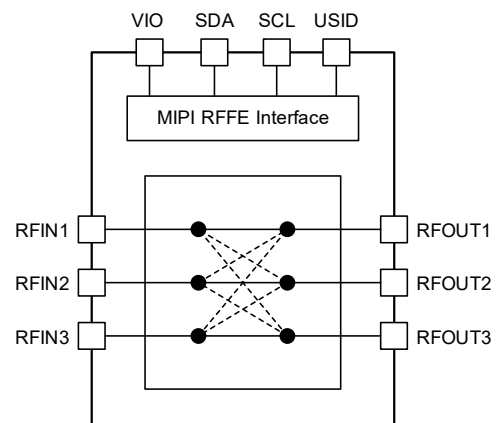


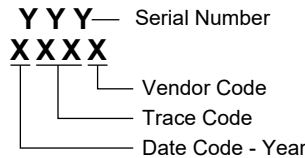
Figure 1. SGM12033A Block Diagram

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM12033A	ULGA-2x2-16AL	-40°C to +85°C	SGM12033AYULR16G/TR	GJN XXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXX = Date Code, Trace Code and Vendor Code.



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 and USID Control Voltage.....2.5V
- RF Input Power, P_{IN}38dBm
- Junction Temperature.....+150°C
- Storage Temperature Range.....-55°C to +150°C
- Lead Temperature (Soldering, 10s).....+260°C
- ESD Susceptibility
- HBM.....2000V
- CDM.....2000V

RECOMMENDED OPERATING CONDITIONS

- Operating Temperature Range.....-40°C to +85°C
- Operating Frequency Range.....0.4GHz to 5.8GHz
- Supply Voltage, V_{IO}1.65V to 1.95V
- SDA, SCL High Voltage.....(0.8 × V_{IO}) to V_{IO}
- SDA, SCL Low Voltage.....0V to (0.2 × V_{IO})
- USID Control Voltage.....0V to V_{IO}

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.

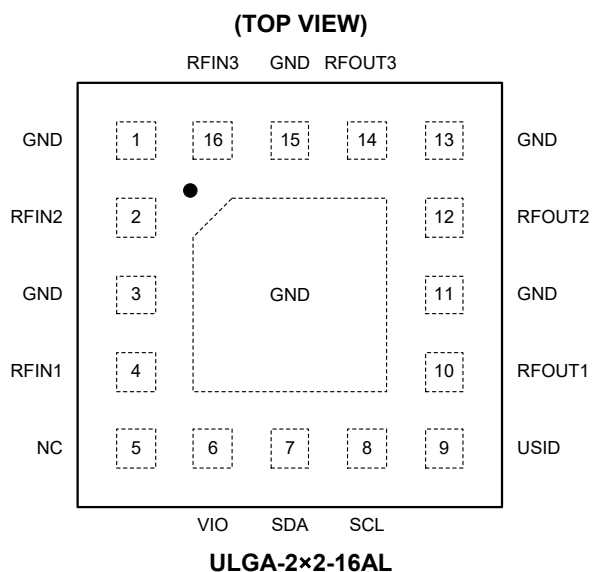
ESD SENSITIVITY CAUTION

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, 3, 11, 13, 15	GND	Ground.
2	RFIN2	RFIN Port 2.
4	RFIN1	RFIN Port 1.
5	NC	No Connection.
6	VIO	Supply Voltage.
7	SDA	RFFE Data Signal.
8	SCL	RFFE Clock Signal.
9	USID	RFFE USID Select Pin.
10	RFOUT1	RFOUT Port 1.
12	RFOUT2	RFOUT Port 2.
14	RFOUT3	RFOUT Port 3.
16	RFIN3	RFIN Port 3.
Exposed Pad	GND	Ground.

Register_0 TRUTH TABLE

Table 1. Register_0 Truth Table

State	Mode	Register_0 Bits							
		D7	D6	D5	D4	D3	D2	D1	D0
1	RFIN1 Isolation	x	x	x	x	x	0	0	0
2	RFIN1 to RFOUT1	x	x	x	x	x	0	0	1
3	RFIN1 to RFOUT2	x	x	x	x	x	0	1	0
4	RFIN1 to RFOUT3	x	x	x	x	x	0	1	1
5	RFIN2 Isolation	x	x	0	0	0	x	x	x
6	RFIN2 to RFOUT1	x	x	0	0	1	x	x	x
7	RFIN2 to RFOUT2	x	x	0	1	0	x	x	x
8	RFIN2 to RFOUT3	x	x	0	1	1	x	x	x

Register_1 TRUTH TABLE

Table 2. Register_1 Truth Table

State	Mode	Register_1 Bits							
		D7	D6	D5	D4	D3	D2	D1	D0
1	RFIN3 Isolation	x	x	x	x	x	0	0	0
2	RFIN3 to RFOUT1	x	x	x	x	x	0	0	1
3	RFIN3 to RFOUT2	x	x	x	x	x	0	1	0
4	RFIN3 to RFOUT3	x	x	x	x	x	0	1	1

NOTE: x = Either 0 or 1.

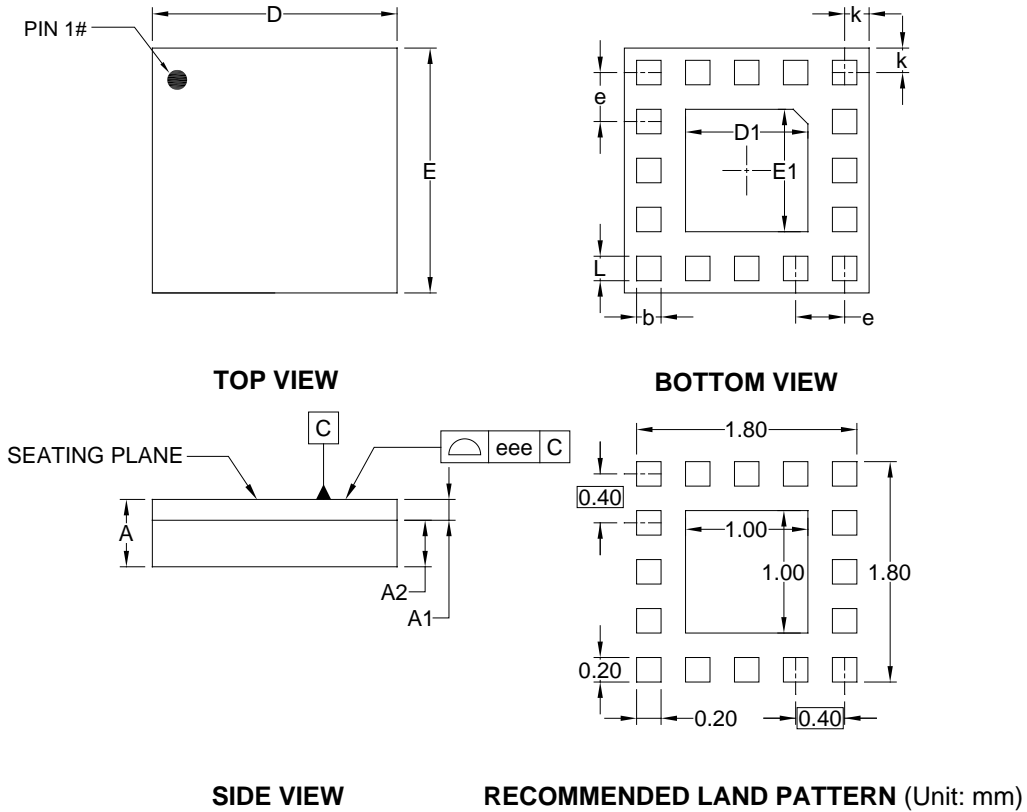
ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{IO} = 1.65V to 1.95V, typical values are at V_{IO} = 1.8V, V_{IH} = 1.8V, V_{IL} = 0V, P_{IN} = 0dBm, VSWR = 1:1, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC Characteristics						
Supply Voltage	V _{IO}		1.65	1.8	1.95	V
Supply Current	I _{VIO}			100	160	μA
Turn-On Time	t _{ON}	50% V _{DD} to 90% RF			10	μs
RF Path Switching Time (One on Path to Another)	t _{SW}	Switching CMD 50% SCL to 90%/10% RF		0.5	2.2	μs
Wake Up Time	t _{WK}	End of low power state 50% SCL to 90% RF			10	μs
VIO Reset Time	t _{RST}	V _{IO} off to it starts to re-power up	10			μs
RF Characteristics						
Insertion Loss (RFINx to RFOUTx)	IL	f ₀ = 0.4GHz to 1.0GHz		0.65	0.90	dB
		f ₀ = 1.0GHz to 2.0GHz		0.67	1.00	
		f ₀ = 2.0GHz to 2.7GHz		0.72	1.10	
		f ₀ = 3.0GHz to 3.8GHz		0.78	1.20	
		f ₀ = 4.8GHz to 5.8GHz		1.04	1.60	
Isolation (RFINx to RFOUTx)	ISO	f ₀ = 0.4GHz to 1.0GHz	35	49		dB
		f ₀ = 1.0GHz to 2.0GHz	30	44		
		f ₀ = 2.0GHz to 2.7GHz	26	41		
		f ₀ = 3.0GHz to 3.8GHz	20	37		
		f ₀ = 4.8GHz to 5.8GHz	17	31		
Input Return Loss (RFINx to RFOUTx)	RL	f ₀ = 0.4GHz to 1.0GHz		26		dB
		f ₀ = 1.0GHz to 2.0GHz		22		
		f ₀ = 2.0GHz to 2.7GHz		21		
		f ₀ = 3.0GHz to 3.8GHz		18		
		f ₀ = 4.8GHz to 5.8GHz		10		
Input 0.1dB Compression Point (RFINx to RFOUTx)	P _{0.1dB}	f ₀ = 0.4GHz to 2.7GHz, CW		38		dBm
		f ₀ = 3.0GHz to 5.8GHz, CW		36		
2 nd Harmonic	2f ₀	f ₀ = 900MHz at 35dBm		-51		dBm
3 rd Harmonic	3f ₀			-41		dBm
2 nd Harmonic	2f ₀	f ₀ = 1900MHz at 33dBm		-63		dBm
3 rd Harmonic	3f ₀			-59		dBm
2 nd Harmonic	2f ₀	f ₀ = 950MHz at 25dBm		-72		dBm
3 rd Harmonic	3f ₀			-65		dBm

PACKAGE OUTLINE DIMENSIONS

ULGA-2x2-16AL



Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.510	0.550	0.590
A1	0.170 REF		
A2	0.380 REF		
b	0.150	0.200	0.250
D	1.950	2.000	2.050
E	1.950	2.000	2.050
D1	0.900	1.000	1.100
E1	0.900	1.000	1.100
e	0.400 BSC		
L	0.150	0.200	0.250
k	0.200 TYP		
eee	-	0.080	-

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
ULGA-2×2-16AL	7"	9.5	2.25	2.25	0.75	4.0	4.0	2.0	8.0	Q2

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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

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