

## GENERAL DESCRIPTION

The SGM22003D2 is a 2.4GHz ISM Front-End Module (FEM) which integrates a fully matched 2.4GHz power amplifier (PA), a low noise amplifier (LNA), two SPDT T/R switches and a controller inside. It has 4 states which are RX mode, TX mode, LNA bypass mode and off mode with two control pins.

The high power and low noise figure performance make it suitable for Bluetooth, 802.15.4, Zigbee, and any other wireless applications in 2.4GHz ISM band.

The SGM22003D2 is available in a Green TLGA-3×3-16AL package.

## APPLICATIONS

- Wireless Sound and Audio Systems
- Home and Industrial Automation
- Wireless Sensor Networks
- IoT Applications

## FEATURES

- **Saturated Output Power:**  
**29dBm @  $V_{CC} = 3.3V$**   
**31.7dBm @  $V_{CC} = 5.0V$**
- **BT BDR Linear Output Power:**  
**21dBm @  $V_{CC} = 3.3V$**   
**21dBm @  $V_{CC} = 5.0V$**
- **BT EDR Linear Output Power:**  
**18dBm @  $V_{CC} = 3.3V$**   
**18dBm @  $V_{CC} = 5.0V$**
- **Low Standby Current: 0.5 $\mu$ A**
- **TX Current Consumption:**  
**350mA @  $P_{OUT} = 27dBm, V_{CC} = 3.3V$**   
**350mA @  $P_{OUT} = 27dBm, V_{CC} = 5.0V$**
- **RX Noise Figure: 1.8dB**
- **Input and Output Fully Matched to 50 $\Omega$**
- **Available in a Green TLGA-3×3-16AL Package**

## BLOCK DIAGRAM

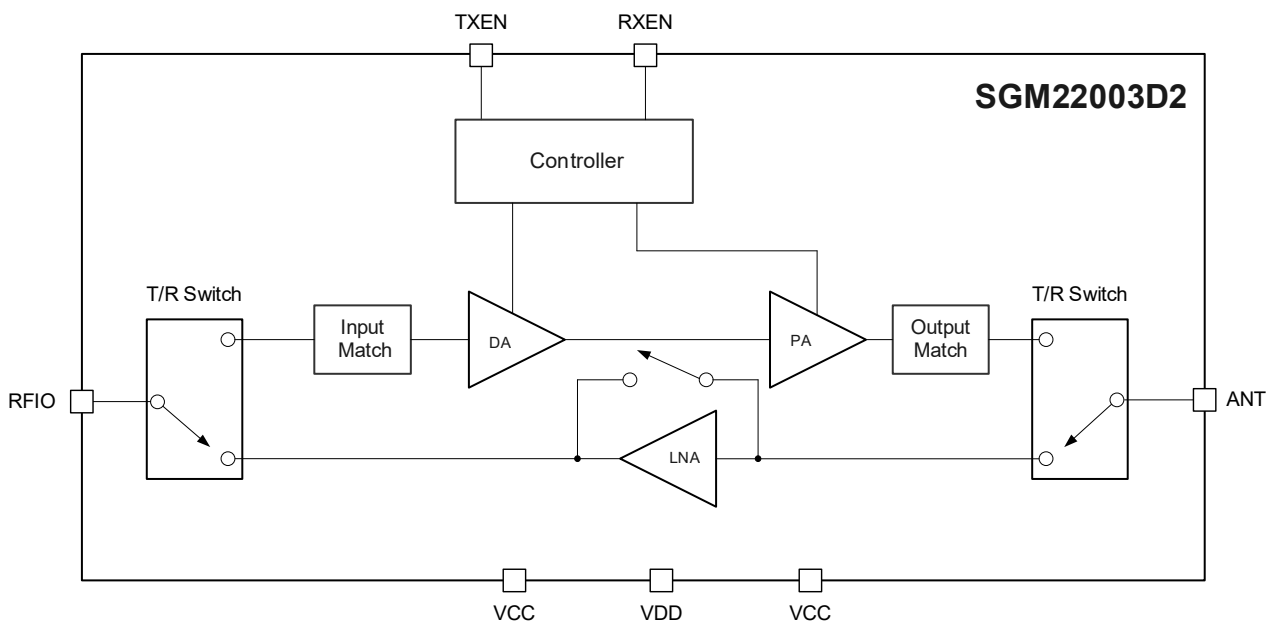


Figure 1. SGM22003D2 Block Diagram

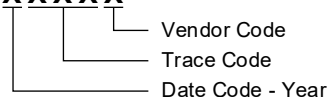
**PACKAGE/ORDERING INFORMATION**

| MODEL      | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER       | PACKAGE MARKING | PACKING OPTION         |
|------------|---------------------|-----------------------------|-----------------------|-----------------|------------------------|
| SGM22003D2 | TLGA-3×3-16AL       | -40°C to +85°C              | SGM22003D2YTLAO16G/TR | 1F1LAO<br>XXXXX | Tape and Reel,<br>4000 |

**MARKING INFORMATION**

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

**XXXXX**



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

$V_{CC}$  ..... 6.0V

$V_{DD}$  ..... 4.0V

Control Voltage, TXEN ..... 3.6V

Control Voltage, RXEN ..... 3.6V

TX Input Power ..... 10dBm

RX Input Power ..... 10dBm

Package Thermal Resistance

TLGA-3×3-16AL,  $\theta_{JA}$  ..... 39.8°C/W

TLGA-3×3-16AL,  $\theta_{JB}$  ..... 8.2°C/W

TLGA-3×3-16AL,  $\theta_{JC(TOP)}$  ..... 54°C/W

TLGA-3×3-16AL,  $\theta_{JC(BOT)}$  ..... 8.9°C/W

Storage Temperature Range ..... -55°C to +150°C

Lead Temperature (Soldering, 10s) ..... +260°C

ESD Susceptibility <sup>(1) (2)</sup>

HBM ..... ±750V

CDM ..... ±2000V

**NOTES:**

1. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.
2. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

**RECOMMENDED OPERATING CONDITIONS**

Operating Temperature Range ..... -40°C to +85°C

Supply Voltage

$V_{CC}$  ..... 3.2V to 5.0V

$V_{DD}$  ..... 3.0V to 3.6V

Control Voltage High, TXEN<sub>IH</sub><sup>(1)</sup>, RXEN<sub>IH</sub> ..... 1.35V to  $V_{DD}$

Control Voltage Low, TXEN<sub>IL</sub>, RXEN<sub>IL</sub> ..... 0V to 0.45V

**NOTE:**

1. Guaranteed by design, not tested in production.

**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.

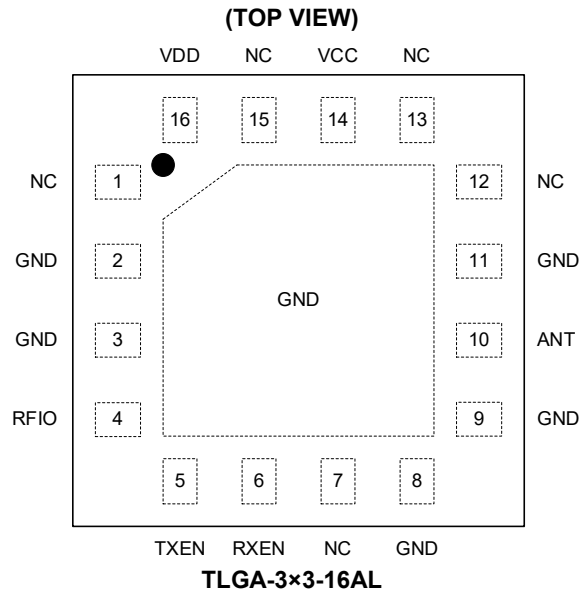
**ESD SENSITIVITY CAUTION**

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, 7, 12, 13, 15 | NC   | No Connection.                        |
| 2, 3, 8, 9, 11   | GND  | Ground.                               |
| 4                | RFIO | RF TX Input and RX Output Port.       |
| 5                | TXEN | Enable Pin for TX.                    |
| 6                | RXEN | Enable Pin for RX.                    |
| 10               | ANT  | Antenna Port.                         |
| 14               | VCC  | Supply Voltage for PA.                |
| 16               | VDD  | Supply Voltage for LNA and Controller |
| Exposed Pad      | GND  | Ground.                               |

NOTE: External VCC supply must connect pin1 VCC together with pin5 VCC in PCB layout. Don't leave pin1 or pin5 alone.

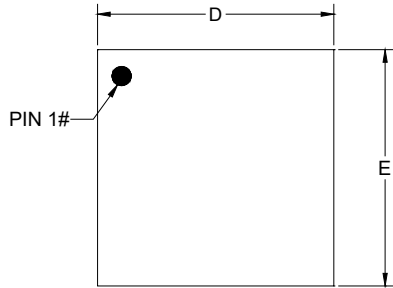
**CONTROL LOGIC**

| Mode       | TXEN | RXEN |
|------------|------|------|
| TX Mode    | 1    | 0    |
| RX Mode    | 0    | 1    |
| LNA Bypass | 1    | 1    |
| Off        | 0    | 0    |

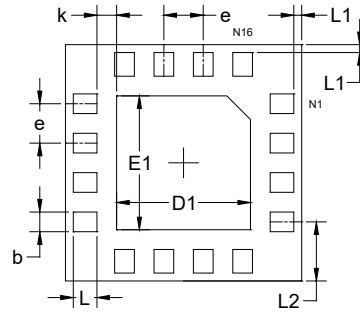
# PACKAGE INFORMATION

## PACKAGE OUTLINE DIMENSIONS

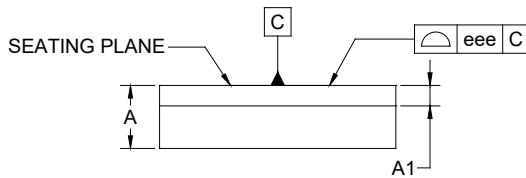
### TLGA-3×3-16AL



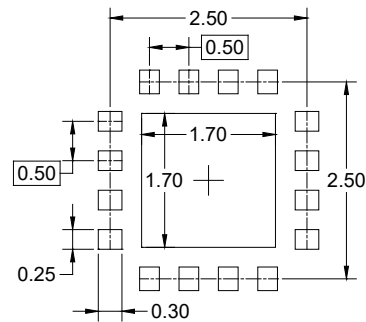
TOP VIEW



BOTTOM VIEW



SIDE VIEW



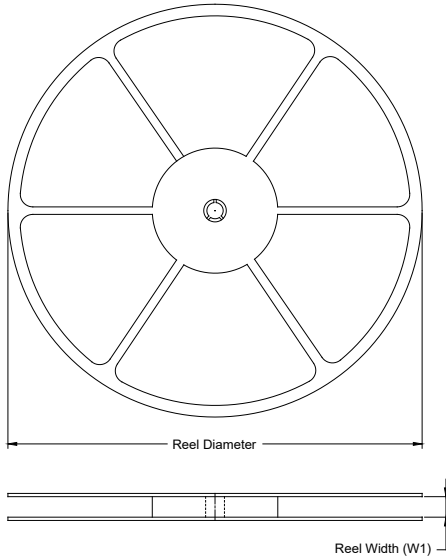
RECOMMENDED LAND PATTERN (Unit: mm)

| Symbol | Dimensions In Millimeters |     |       |
|--------|---------------------------|-----|-------|
|        | MIN                       | NOM | MAX   |
| A      | 0.750                     | -   | 0.850 |
| A1     | 0.260 REF                 |     |       |
| b      | 0.200                     | -   | 0.300 |
| D      | 2.900                     | -   | 3.100 |
| E      | 2.900                     | -   | 3.100 |
| D1     | 1.600                     | -   | 1.800 |
| E1     | 1.600                     | -   | 1.800 |
| e      | 0.500 BSC                 |     |       |
| k      | 0.250 REF                 |     |       |
| L      | 0.250                     | -   | 0.350 |
| L1     | 0.100 REF                 |     |       |
| L2     | 0.750 REF                 |     |       |
| eee    | 0.100                     |     |       |

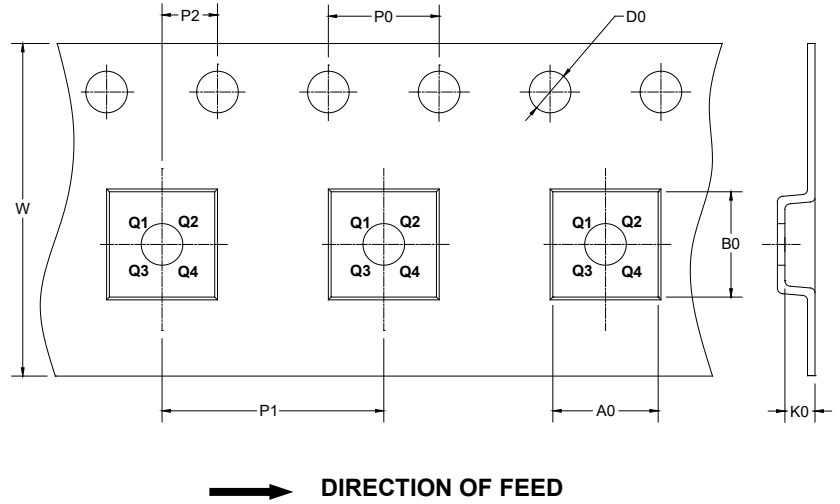
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

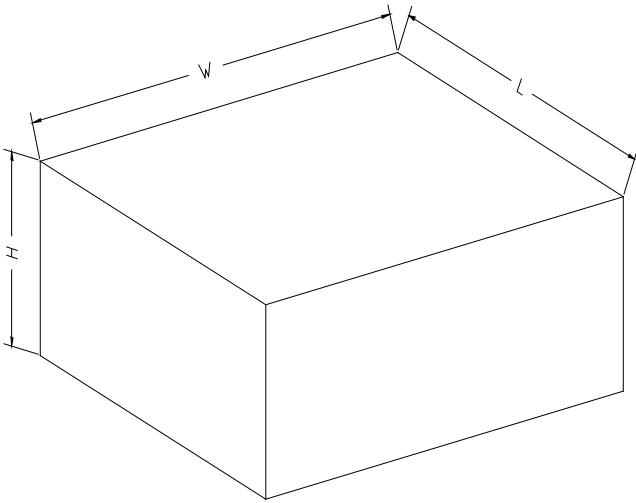
KEY PARAMETER LIST OF TAPE AND REEL

| Package Type  | Reel Diameter | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | D0 (mm) | P0 (mm) | P1 (mm) | P2 (mm) | W (mm) | Pin1 Quadrant |
|---------------|---------------|--------------------|---------|---------|---------|---------|---------|---------|---------|--------|---------------|
| TLGA-3×3-16AL | 13"           | 12.4               | 3.30    | 3.30    | 1.10    | 1.50    | 4.0     | 8.0     | 2.0     | 12.0   | Q1            |

DD0001

# 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 |
|-----------|-------------|------------|-------------|--------------|
| 13"       | 386         | 280        | 370         | 5            |

DD0002