SGM4523Q
Automotive, 5V, Bidirectional 4:1, 2-Channel Multiplexer with Injection Current Control

GENERAL DESCRIPTION

The SGM4523Q is a 4:1, 2-channel CMOS analog multiplexer with injection current control. The device has two control inputs that can be used as selecting one of the 4 channels (Sx) to connect to the common terminal (Dx). The multiplexer supports bidirectional signal transmission in the voltage range from GND to V_{DD}.

All logic inputs of the SGM4523Q are allowed to be equal to the power supply voltage and compatible with TTL and CMOS logic thresholds standards during normal operation of the power supply. Besides, all control inputs are also designed with fail-safe function. It allows the voltage of all control pins within the maximum absolute withstand voltage range to exceed the V_{DD} without damaging the device.

The injection current control function of the SGM4523Q allows signals on disabled signal channels to exceed the V_{DD} without affecting the enabled signal channel. In addition, all pins of the SGM4523Q except GND are not designed with internal diodes path to the V_{DD} pin, so as not to damage the components connected to the power pin and avoid injecting reverse current into the power supply.

The device is AEC-Q100 qualified (Automotive Electronics Council (AEC) standard Q100 Grade 1) and it is suitable for automotive applications.

The SGM4523Q is available in Green TSSOP-16 and TQFN-2.5×3.5-16AL packages. It operates over an operating temperature range of -40℃ to +125℃.

FEATURES

- **AEC-Q100 Qualified for Automotive Applications**
  Device Temperature Grade 1
  T_A = -40℃ to +125℃
- **V_{DD} Operation Range: 1.62V to 5.5V**
- **Injection Current Control**
- **Back-Powering Protection**
  No ESD Diodes between All Ports and V_{DD}
- **Bidirectional Signal Path**
- **Rail-to-Rail Operation**
- **Control Pin Fail-Safe Function**
- **Break-Before-Make Switching**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green TSSOP-16 and TQFN-2.5×3.5-16AL Packages**

APPLICATIONS

Automotive System
Battery Management Systems (BMS)
Signal Multiplexing and Demultiplexing
Diagnostics and Monitoring in Automotive
ADC and DAC System

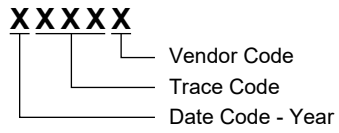
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE TOP MARKING	PACKING OPTION
SGM4523Q	TSSOP-16	-40℃ to +125℃	SGM4523QTS16G/TR	1YVTS16 XXXXX	Tape and Reel, 4000
	TQFN-2.5×3.5-16AL	-40℃ to +125℃	SGM4523QTVF16G/TR	1YZTVF XXXXX XX#XX	Tape and Reel, 8000

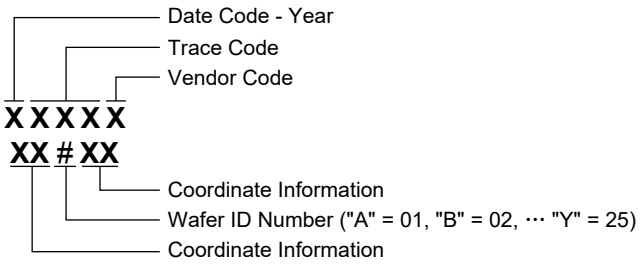
MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code. XX#XX = Coordinate Information and Wafer ID Number.

TSSOP-16



TQFN-2.5×3.5-16AL



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 Range, V_{DD} ..... -0.5V to 6V
Logic Control Input Pin Voltage ($\overline{EN}$, A0, A1), V_{SEL} or V_{EN} ..... -0.5V to 6V
Source or Drain Voltage, V_S or V_D ..... -0.5V to (V_{DD} + 0.5V)
Continuous Current through Switch (Sx, Dx Pins), I_S or $I_{D(CONT)}$, -40℃ to +125℃ ..... -50mA to 50mA
Continuous Current through GND, I_{GND} .... -100mA to 100mA
Package Thermal Resistance
TSSOP-16, θ_{JA} ..... 130.8℃/W
TSSOP-16, θ_{JB} ..... 88.2℃/W
TSSOP-16, θ_{JC} ..... 53.6℃/W
TQFN-2.5×3.5-16AL, θ_{JA} ..... 63.8℃/W
TQFN-2.5×3.5-16AL, θ_{JB} ..... 25.4℃/W
TQFN-2.5×3.5-16AL, $\theta_{JC(TOP)}$ ..... 51.3℃/W
TQFN-2.5×3.5-16AL, $\theta_{JC(BOT)}$ ..... 7.3℃/W
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility (1) (2)
HBM ..... ±4000V
CDM ..... ±1000V

NOTES:

1. For human body model (HBM), all pins comply with AEC-Q100-002 specification.

2. For charged device model (CDM), all pins comply with AEC-Q100-011 specification.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range, V_{DD} ..... 1.62V to 5.5V
Signal Path Input/Output Voltage, V_S or V_D ..... 0V to V_{DD}
Logic Control Input Pin Voltage ($\overline{EN}$, A0, A1), V_{SEL} or V_{EN} ..... 0V to 5.5V
Continuous Current through Switch (Sx, Dx Pins), I_S or $I_{D(CONT)}$, -40℃ to +125℃ ..... -50mA to 50mA
Current per Input into Source or Drain Pins when Signal Voltage Exceeds Recommended Operating Voltage, I_{OK} ..... -50mA to 50mA
Injected Current into Single Off Switch Input, I_{INJ} ..... -50mA to 50mA
Total Injected Current into All Off Switch Inputs Combined, I_{INJ_ALL} ..... -100mA to 100mA
Operating Ambient Temperature Range ..... -40℃ to +125℃

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

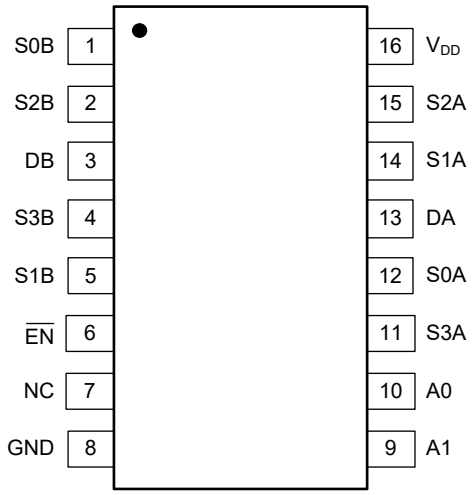
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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

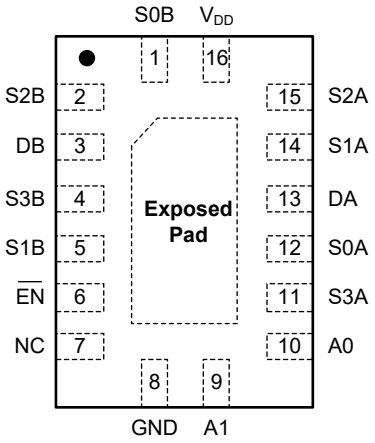
PIN CONFIGURATIONS

SGM4523Q (TOP VIEW)



TSSOP-16

SGM4523Q (TOP VIEW)



TQFN-2.5×3.5-16AL

PIN DESCRIPTION

PIN		NAME	FUNCTION
TSSOP-16	TQFN-2.5×3.5-16AL		
1	1	S0B	Source Pin 0 of Mux B. Signal input or output path.
2	2	S2B	Source Pin 2 of Mux B. Signal input or output path.
3	3	DB	Drain Pin (Common Terminal) of Mux B. Signal input or output path.
4	4	S3B	Source Pin 3 of Mux B. Signal input or output path.
5	5	S1B	Source Pin 1 of Mux B. Signal input or output path.
6	6	$\overline{EN}$	Enable Control Input Pin (Active Low). When $\overline{EN}$ is set to high, common terminal is disconnected to any other signal ports and the switch is turned off.
7	7	NC	No Connection.
8	8	GND	Ground Pin.
9	9	A1	Digital Address A1 Pin.
10	10	A0	Digital Address A0 Pin.
11	11	S3A	Source Pin 3 of Mux A. Signal input or output path.
12	12	S0A	Source Pin 0 of Mux A. Signal input or output path.
13	13	DA	Drain Pin (Common Terminal) of Mux A. Signal input or output path.
14	14	S1A	Source Pin 1 of Mux A. Signal input or output path.
15	15	S2A	Source Pin 2 of Mux A. Signal input or output path.
16	16	V_{DD}	Power Supply Pin. It is recommended to connect a 0.1μF to 10μF capacitor between V_{DD} and GND to get good power supply decoupling.
—	Exposed Pad	Exposed Pad	Exposed Pad. It can be connected to GND or be left floating.

FUNCTIONAL BLOCK DIAGRAM

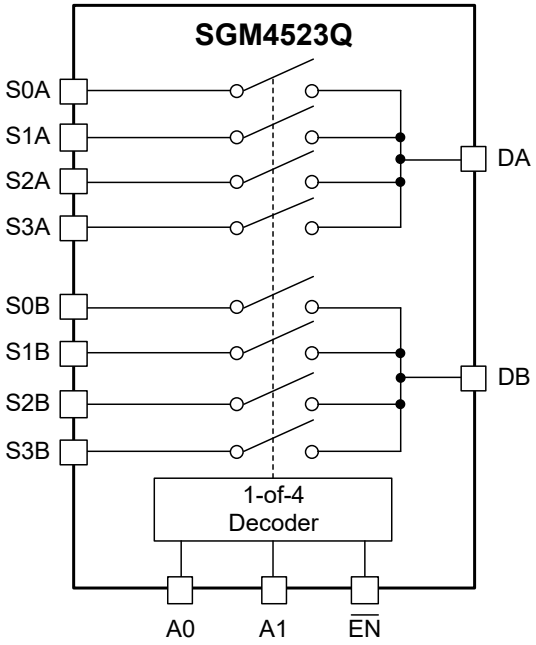


Figure 1. Block Diagram

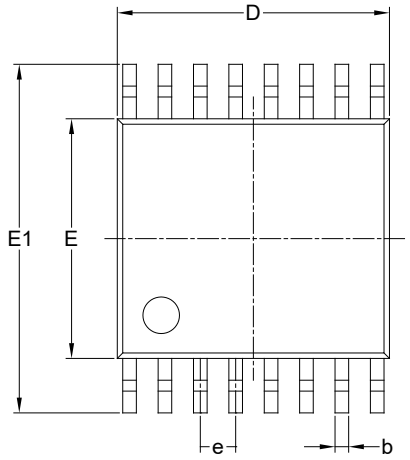
FUNCTION TABLE

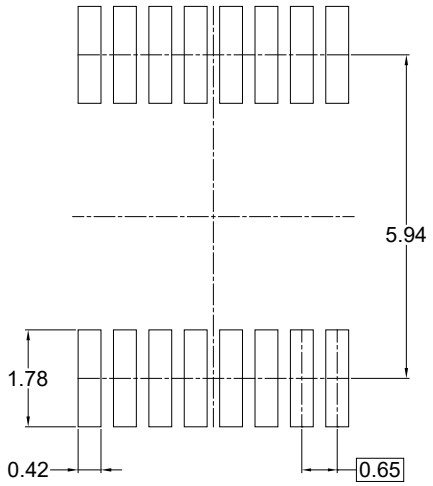
$\overline{EN}$	SELECT INPUTS		SELECTED SIGNAL PATH CONNECTED TO DRAIN (D) PIN
	A1	A0	
0	0	0	S0A to DA S0B to DB
0	0	1	S1A to DA S1B to DB
0	1	0	S2A to DA S2B to DB
0	1	1	S3A to DA S3B to DB
1	***X***	***X***	All Channels are OFF

NOTE: ***X*** = Don't care.

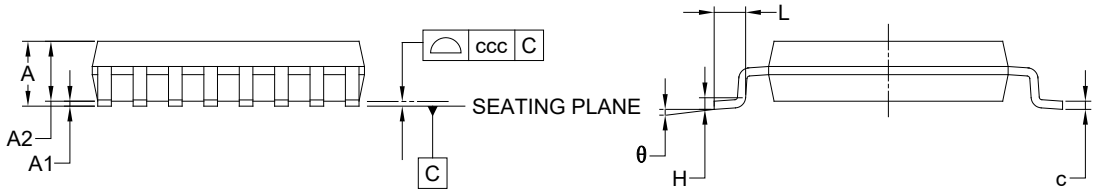
PACKAGE OUTLINE DIMENSIONS

TSSOP-16





RECOMMENDED LAND PATTERN (Unit: mm)

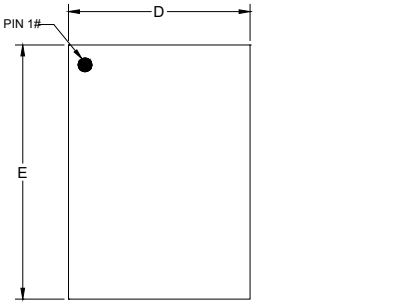


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.200
A1	0.050	-	0.150
A2	0.800	-	1.050
b	0.190	-	0.300
c	0.090	-	0.200
D	4.860	-	5.100
E	4.300	-	4.500
E1	6.200	-	6.600
e	0.650 BSC		
L	0.450	-	0.750
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

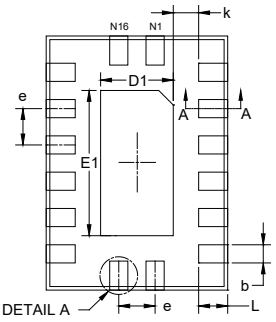
NOTES:
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-153.

PACKAGE OUTLINE DIMENSIONS

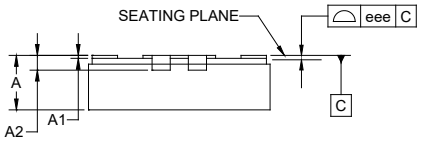
TQFN-2.5×3.5-16AL



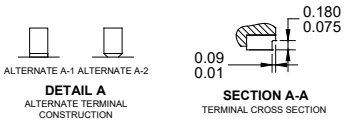
TOP VIEW

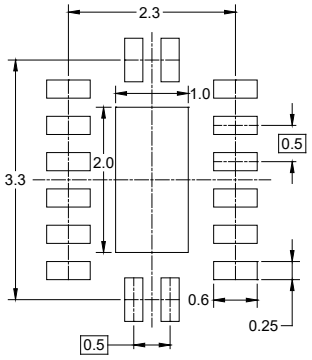


BOTTOM VIEW



SIDE VIEW





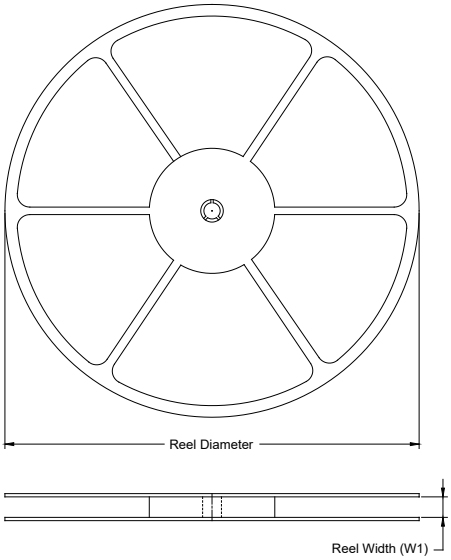
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.700	-	0.800
A1	0.000	-	0.050
A2	0.203 REF		
b	0.200	-	0.300
D	2.400	-	2.600
D1	0.900	-	1.100
E	3.400	-	3.600
E1	1.900	-	2.100
e	0.500 BSC		
k	0.350 REF		
L	0.300	-	0.500
eee	0.080		

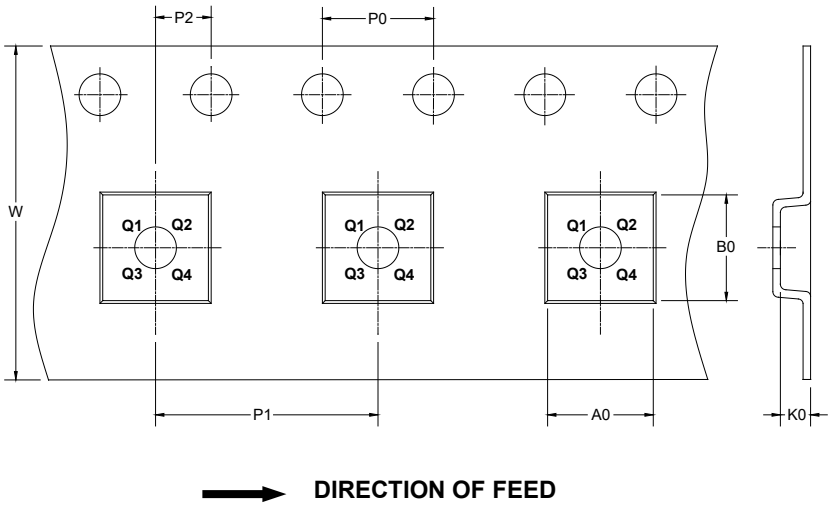
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



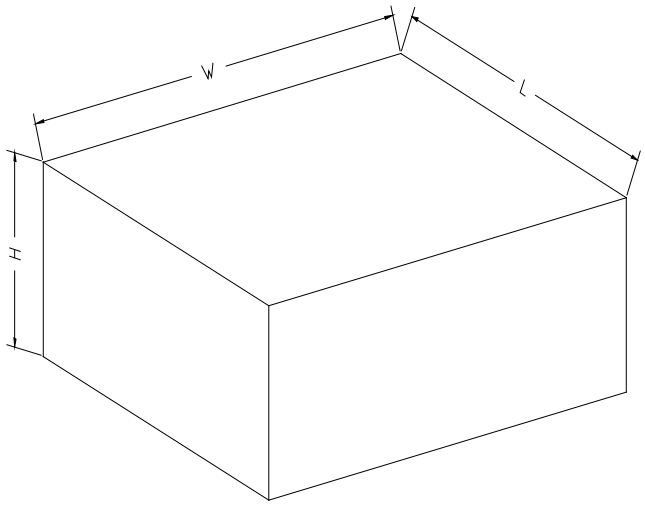
NOTE: The picture is only for reference. Please make the object as the standard.

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
TSSOP-16	13"	12.4	6.80	5.40	1.50	4.0	8.0	2.0	12.0	Q1
TQFN-2.5×3.5-16AL	13"	12.4	2.80	3.80	1.13	4.0	4.0	2.0	12.0	Q1

DD0001

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