SGM4562AQ
Automotive, 4-Bit Bidirectional Level-Shifter/Voltage Translator with Auto Direction Sensing

GENERAL DESCRIPTION

The SGM4562AQ is a 4-bit, non-inverting, bidirectional voltage-level translator which features two independent configurable power-supply lines. The A and B ports track the V_{CCA} supply and V_{CCB} supply respectively. The supply voltage ranges from 0.9V to 3.6V for both A and B ports. The device provides a bidirectional translation function among different voltage nodes (including 1V, 1.2V, 1.5V, 1.8V, 2.5V and 3.3V).

The device has an output enable (OE) function, which controls the inputs and outputs states. When OE is held low, all outputs enter the high-impedance state. A pull-down resistor can be used to keep OE connecting to GND. Thus, the high-impedance state is ensured. The OE input tracks the V_{CCA} supply.

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

The SGM4562AQ is available in Green TSSOP-14 and UTQFN-1.7×2-12L packages. It operates over an ambient temperature range of -40℃ to +125℃.

FEATURES

- **AEC-Q100 Qualified for Automotive Applications**
  Device Temperature Grade 1
  T_A = -40℃ to +125℃
- **V_{CCA} Supply Voltage Range: 0.9V to 3.6V**
- **V_{CCB} Supply Voltage Range: 0.9V to 3.6V**
- **Support V_{CCA} or V_{CCB} Isolation**
  - **When V_{CCA} or V_{CCB} is at GND, Device Enters High-Impedance State**
- **OE Input Tracks the V_{CCA} Supply**
- **Low Power Consumption: 5μA (MAX) (I_{CCA} or I_{CCB})**
- **Support Power-Down Mode**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green TSSOP-14 and UTQFN-1.7×2-12L Packages**

APPLICATIONS

Automotive Applications
Portable Equipment
Industrial Equipment
Medical Equipment
Telecommunications

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TYPICAL APPLICATION

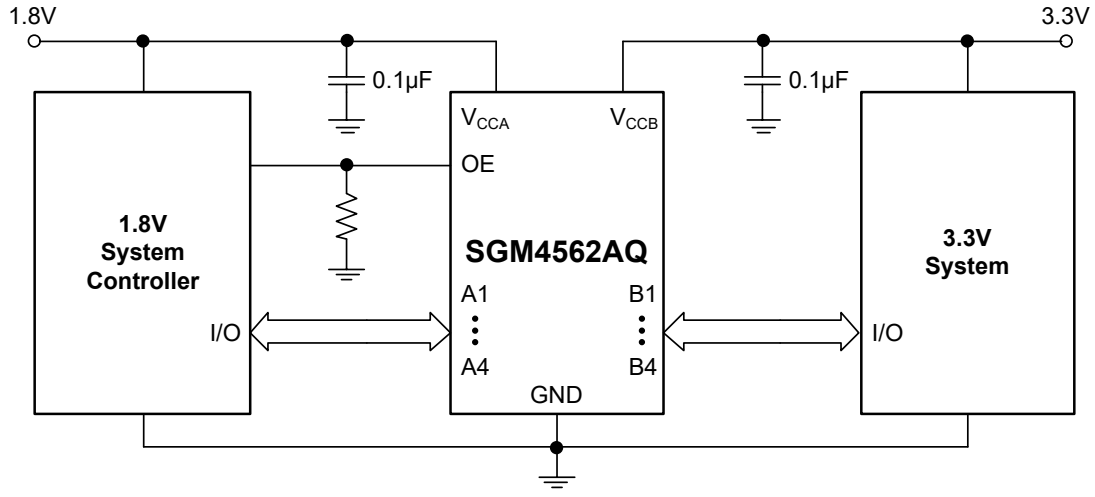


Figure 1. Typical Application Circuit

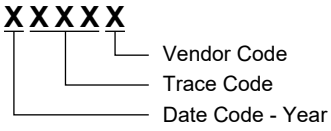
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE TOP MARKING	PACKING OPTION
SGM4562AQ	TSSOP-14	-40℃ to +125℃	SGM4562AQTS14G/TR	0P3 TS14 XXXXX	Tape and Reel, 4000
	UTQFN-1.7×2-12L	-40℃ to +125℃	SGM4562AQURF12G/TR	0P2 XXXX	Tape and Reel, 3000

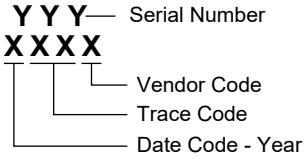
MARKING INFORMATION

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

TSSOP-14



UTQFN-1.7×2-12L



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_{CCA} ..... -0.5V to 4.6V
- V_{CCB} ..... -0.5V to 4.6V

Input Voltage Range, V_I (1)
- A Ports ..... -0.5V to 4.6V
- B Ports ..... -0.5V to 4.6V

Output Voltage Range, V_O (1)
- High-Impedance State or Power-Off State
  - A Ports ..... -0.5V to 4.6V
  - B Ports ..... -0.5V to 4.6V
- High-State or Low-State
  - A Ports ..... -0.5V to V_{CCA} + 0.5V
  - B Ports ..... -0.5V to V_{CCB} + 0.5V

Input Clamp Current, I_{IK}, (V_I < 0) ..... -50mA

Output Clamp Current, I_{OK}, (V_O < 0) ..... -50mA

Package Thermal Resistance
- UTQFN-1.7×2-12L, θ_{JA} ..... 131.5℃/W
- UTQFN-1.7×2-12L, θ_{JB} ..... 65.3℃/W
- UTQFN-1.7×2-12L, θ_{JC} ..... 77.9℃/W
- TSSOP-14, θ_{JA} ..... 146.6℃/W
- TSSOP-14, θ_{JB} ..... 109.7℃/W
- TSSOP-14, θ_{JC} ..... 75.5℃/W

Junction Temperature (2) ..... +150℃

Storage Temperature Range ..... -65℃ to +150℃

Lead Temperature (Soldering, 10s) ..... +260℃

ESD Susceptibility (3) (4)

HBM ..... ±7000V

CDM ..... ±1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range
- V_{CCA} ..... 0.9V to 3.6V
- V_{CCB} ..... 0.9V to 3.6V

Input Transition Rise or Fall Rate, Δt/ΔV
- A Ports Inputs (V_{CCA} = 0.9V to 3.6V, V_{CCB} = 0.9V to 3.6V) ..... 40ns/V (MAX)
- B Ports Inputs (V_{CCA} = 0.9V to 3.6V, V_{CCB} = 0.9V to 3.6V) ..... 40ns/V (MAX)

Operating Temperature Range ..... -40℃ to +125℃

NOTES:

1. The minimum input and output voltage ratings may be exceeded if the input and output clamp current ratings are observed.

2. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

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

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

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

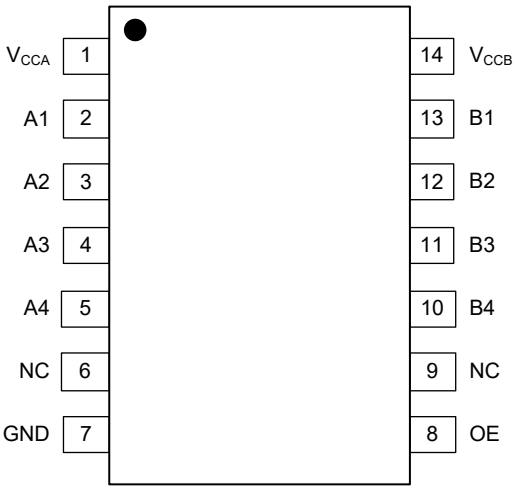
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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

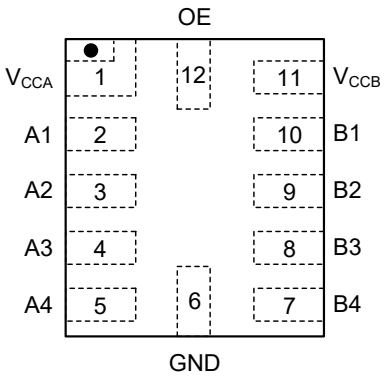
PIN CONFIGURATIONS

(TOP VIEW)



TSSOP-14

(TOP VIEW)



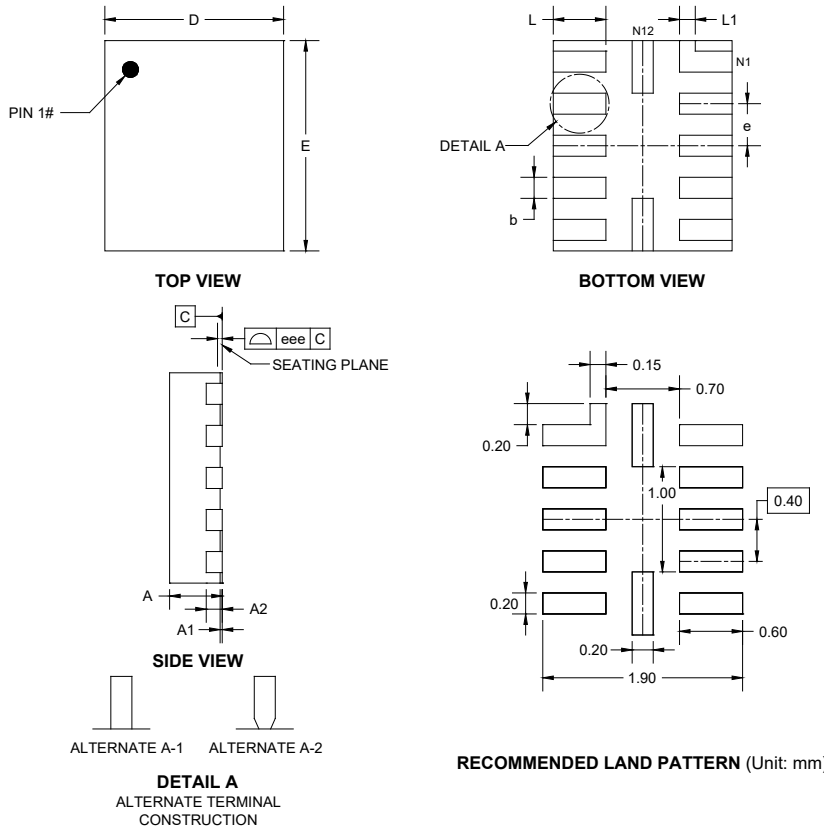
UTQFN-1.7×2-12L

PIN DESCRIPTION

PIN		NAME	FUNCTION
TSSOP-14	UTQFN-1.7×2-12L		
1	1	V_{CCA}	Supply Voltage on A Ports. It can be operated from 0.9V to 3.6V.
2, 3, 4, 5	2, 3, 4, 5	A1, A2, A3, A4	Data Inputs/Outputs. They track the V_{CCA} supply.
6, 9	—	NC	No Connection.
7	6	GND	Ground.
8	12	OE	Output Enable Input. When OE goes low, all outputs enter into 3-state mode. It tracks the V_{CCA} supply.
10, 11, 12, 13	7, 8, 9, 10	B4, B3, B2, B1	Data Inputs/Outputs. They track the V_{CCB} supply.
14	11	V_{CCB}	Supply Voltage on B Ports. It can be operated from 0.9V to 3.6V.

PACKAGE OUTLINE DIMENSIONS

UTQFN-1.7×2-12L

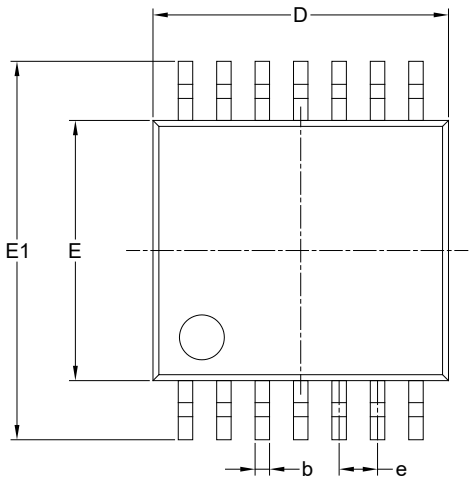


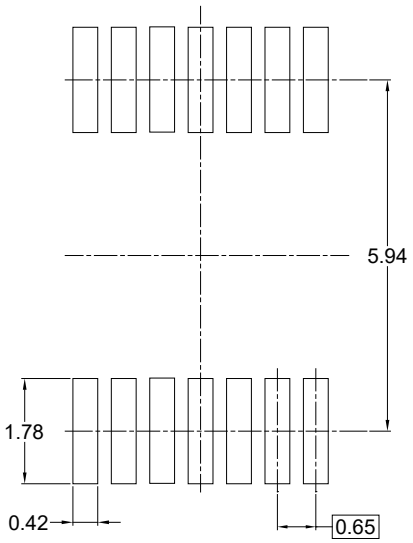
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.450	-	0.550
A1	0.000	-	0.050
A2		0.152 REF	
b	0.150	-	0.250
D	1.600	-	1.800
E	1.900	-	2.100
e		0.400 BSC	
L	0.450	-	0.550
L1		0.150 REF	
eee		0.080	

NOTE: This drawing is subject to change without notice.

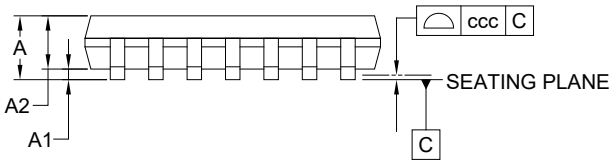
PACKAGE OUTLINE DIMENSIONS

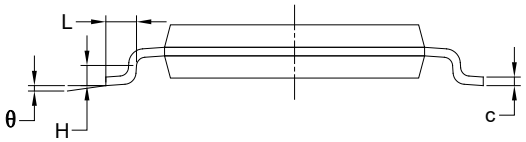
TSSOP-14





RECOMMENDED LAND PATTERN (Unit: mm)



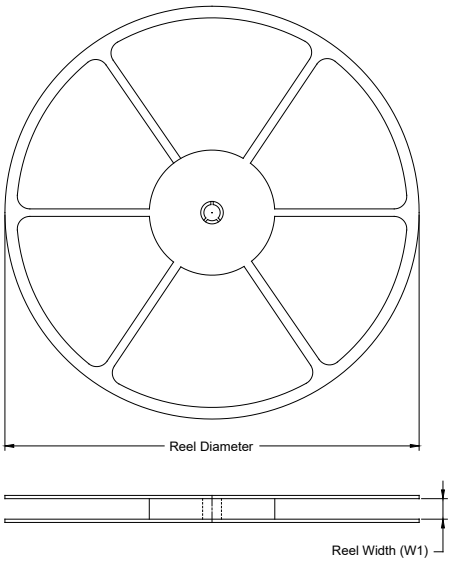


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.200
A1	0.050	-	0.150
A2	0.800	-	1.050
b	0.190	-	0.300
c	0.090	-	0.200
D	4.860	-	5.100
E	4.300	-	4.500
E1	6.200	-	6.600
e	0.650 BSC		
L	0.450	-	0.750
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

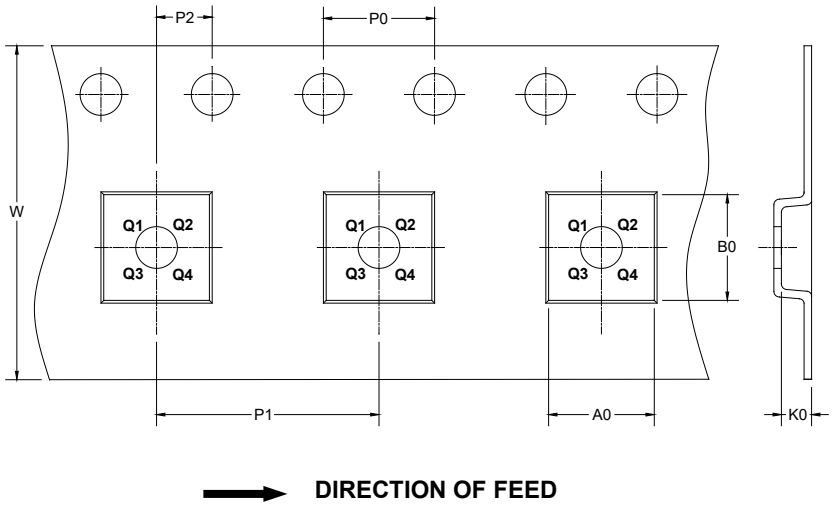
NOTES:
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-153.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



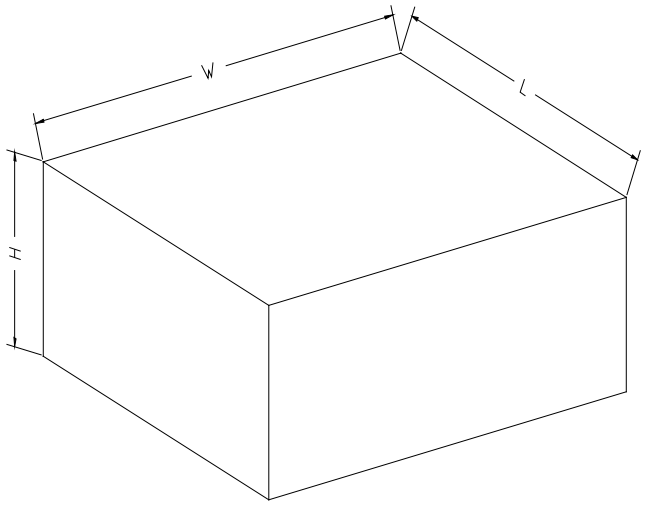
NOTE: The picture is only for reference. Please make the object as the standard.

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-1.7×2-12L	7″	9.5	1.90	2.30	0.75	4.0	4.0	2.0	8.0	Q1
TSSOP-14	13″	12.4	6.80	5.40	1.50	4.0	8.0	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
7″ (Option)	368	227	224	8
7″	442	410	224	18
13″	386	280	370	5

DD0002