

GENERAL DESCRIPTION

The SGM4563 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 range is 1.2V to 5.5V for A ports and 1.65V to 5.5V for B ports. The device provides a bidirectional translation function between the different voltage nodes (including 1.2V, 1.5V, 1.8V, 2.5V, 3.3V and 5V).

The SGM4563 has an output enable (OE) function, which controls the outputs states. When OE goes low, all outputs enter into the high-impedance state. The OE should be connected to GND via a pull-down resistor, and the minimum resistor value is depended on the current source capability of the driver.

The SGM4563 features the OE input circuit which is referenced to V_{CCA} .

The direction of three channels is from A to B, and the other channel is from B to A, so SGM4563 is the ideal device to finish the level translation of SPI bus or UART interface.

The SGM4563 is available in Green SOIC-14 and UTQFN-1.8×1.8-12L packages. It operates over an ambient temperature range of -40°C to +85°C.

FEATURES

- **Power Supply Voltage Range ($V_{CCA} \leq V_{CCB}$)**
 - A Ports: 1.2V to 5.5V
 - B Ports: 1.65V to 5.5V
- **Support V_{CCA} or V_{CCB} Isolation**
 - When V_{CCA} or V_{CCB} is Low, Device Enters Power-Down Mode
- **The Direction of Channel 1, 2 and 3 is from A to B, The Direction of Channel 4 is from B to A**
- **OE Input Circuit Referenced to V_{CCA}**
- **Support Partial-Power-Down Function**
- **Support Push-Pull Output**
- **Low Power Consumption**
- **-40°C to +85°C Operating Temperature Range**
- **Available in Green SOIC-14 and UTQFN-1.8×1.8-12L Packages**

APPLICATIONS

Smart Phones
Portable Equipment
Universal Asynchronous Receiver/Transmitter
General Purpose I/O (GPIO)
SPI Bus

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM4563	SOIC-14	-40°C to +85°C	SGM4563YS14G/TR	SGM4563YS14 XXXXX	Tape and Reel, 2500
	UTQFN-1.8×1.8-12L	-40°C to +85°C	SGM4563YUQN12G/TR	4563 XXXX	Tape and Reel, 3000

NOTE: XXXX = Date Code. XXXXX = Date 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 Range

V_{CCA} -0.3V to 6V

V_{CCB} -0.3V to 6V

Input Voltage Range, V_I

A Ports -0.3V to 6V

B Port -0.3V to 6V

Output Voltage Range for the High-Impedance or Power-Off State, V_O

A Port -0.3V to 6V

B Ports -0.3V to 6V

Output Voltage Range for the High or Low State, $V_O^{(1)}$

A Port -0.3V to $V_{CCA} + 0.3V$

B Ports -0.3V to $V_{CCB} + 0.3V$

Input Clamp Current, I_{IK} ($V_I < 0$)

..... -50mA

Output Clamp Current, I_{OK} ($V_O < 0$)

..... -25mA

Continuous Output Current, I_O

..... $\pm 25mA$

Continuous Current through V_{CCA} , V_{CCB} , or GND

..... $\pm 100mA$

Junction Temperature

..... +150°C

Storage Temperature Range

..... -65°C to +150°C

Lead Temperature (Soldering, 10sec)

..... 260°C

ESD Susceptibility

HBM 4000V

MM 400V

NOTE:

1. V_{CCA} and V_{CCB} values are shown in the recommended operating conditions table.

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.

RECOMMENDED OPERATING CONDITIONS
(2, 3)

Supply Voltage Range

V_{CCA} 1.2V to 5.5V

V_{CCB} 1.65V to 5.5V

High-Level Input Voltage, V_{IH}

Data Inputs $V_{CCI} \times 0.85^{(4)}$ to V_{CCI}

OE Input $V_{CCA} \times 0.85$ to 5.5V

Low-Level Input Voltage, V_{IL}

Data Inputs 0V to $V_{CCI} \times 0.2^{(4)}$

OE Input 0V to $V_{CCA} \times 0.2$

Output Voltage Range for the High-Impedance or Power-Off State, V_O

A Port 0V to 5.5V

B Ports 0V to 5.5V

Operating Temperature Range

..... -40°C to +85°C

NOTES:

2. Ensure that the A side and B side of the unused data I/O pairs remain the same state, that is., both at V_{CCI} or both at GND.
3. Ensure that $V_{CCA} \leq V_{CCB}$ and V_{CCA} must not exceed 5.5V.
4. V_{CCI} is the supply voltage associated with the input ports.

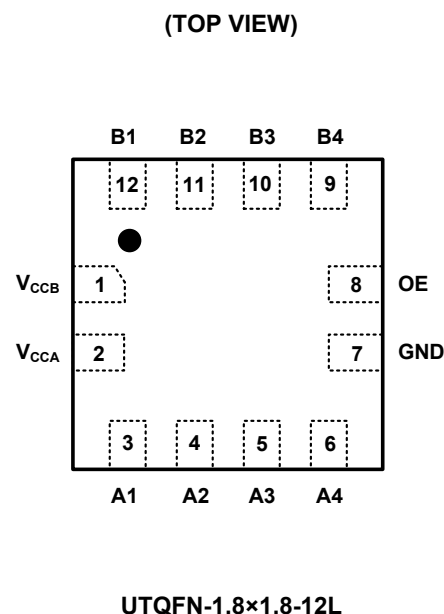
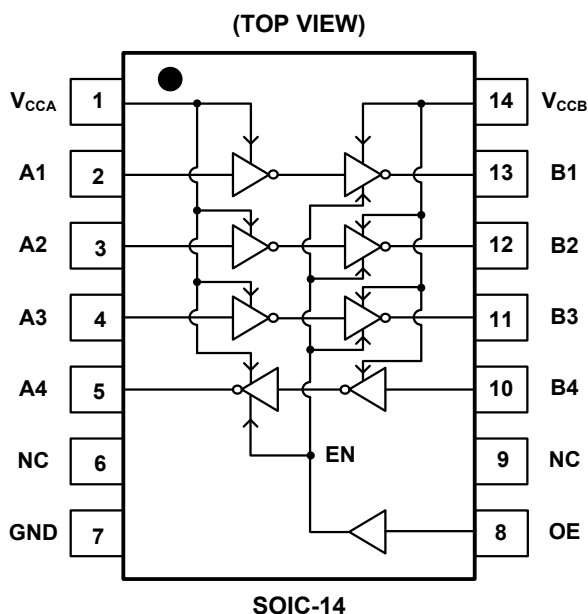
ESD SENSITIVITY CAUTION

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



PIN DESCRIPTION

PIN		NAME	FUNCTION
SOIC-14	UTQFN-1.8x1.8-12L		
1	2	V_{CCA}	Supply Voltage on A Ports. It can be operated from 1.2V to 5.5V, and V_{CCA} is always $\leq V_{CCB}$.
2	3	A1	Input 1. It tracks the V_{CCA} supply.
3	4	A2	Input 2. It tracks the V_{CCA} supply.
4	5	A3	Input 3. It tracks the V_{CCA} supply.
5	6	A4	Output of B4. It tracks the V_{CCA} supply.
6, 9	—	NC	No Connection. Not internally connected.
7	7	GND	Ground.
8	8	OE	Output Enable Control Pin. Active high. When OE goes low, all outputs enter into the high-impedance state. It tracks the V_{CCA} supply. OE is powered by V_{CCA} .
10	9	B4	Input. It tracks the V_{CCB} supply.
11	10	B3	Output of A3. It tracks the V_{CCB} supply.
12	11	B2	Output of A2. It tracks the V_{CCB} supply.
13	12	B1	Output of A1. It tracks the V_{CCB} supply.
14	1	V_{CCB}	Supply Voltage on B Ports. It can be operated from 1.65V to 5.5V.

ELECTRICAL CHARACTERISTICS

(Full = -40°C to +85°C, typical values are at T_A = +25°C, unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
A Port High-Level Output Voltage		V _{OHA}	I _{OH} = -0.5mA	V _{CCA} = 1.2V	+25°C		1.1		V
			I _{OH} = -1.5mA	V _{CCA} = 1.4V to 1.6V	Full	0.8 × V _{CCA}	0.9 × V _{CCA}		
			I _{OH} = -3mA	V _{CCA} = 1.65V to 1.95V					
			I _{OH} = -6mA	V _{CCA} = 2.3V to 2.7V					
			I _{OH} = -12mA	V _{CCA} = 3V to 3.6V					
			I _{OH} = -25mA	V _{CCA} = 4.5V to 5.5V					
A Port Low-Level Output Voltage		V _{OLA}	I _{OL} = 3mA	V _{CCA} = 1.2V	+25°C		0.25		V
			I _{OL} = 6mA	V _{CCA} = 1.4V to 1.6V	Full		0.25	0.45	
			I _{OL} = 8mA	V _{CCA} = 1.65V to 1.95V					
			I _{OL} = 10mA	V _{CCA} = 2.3V to 2.7V					
			I _{OL} = 12mA	V _{CCA} = 3V to 3.6V					
			I _{OL} = 15mA	V _{CCA} = 4.5V to 5.5V					
B Ports High-Level Output Voltage		V _{OHB}	I _{OH} = -3mA	V _{CCB} = 1.65V to 1.95V	Full	0.8 × V _{CCB}	0.9 × V _{CCB}		V
			I _{OH} = -6mA	V _{CCB} = 2.3V to 2.7V					
			I _{OH} = -12mA	V _{CCB} = 3V to 3.6V					
			I _{OH} = -25mA	V _{CCB} = 4.5V to 5.5V					
B Ports Low-Level Output Voltage		V _{OLB}	I _{OL} = 8mA	V _{CCB} = 1.65V to 1.95V	Full		0.25	0.45	V
			I _{OL} = 10mA	V _{CCB} = 2.3V to 2.7V					
			I _{OL} = 12mA	V _{CCB} = 3V to 3.6V					
			I _{OL} = 15mA	V _{CCB} = 4.5V to 5.5V					
Input Leakage Current	OE Input	I _I	OE = V _{CCA} or GND, V _{CCA} = 1.2V to 5.5V, V _{CCB} = 1.65V to 5.5V		+25°C			±1	μA
					Full			±1.5	
Power-Off Leakage Current	A Ports	I _{OFF}	V _I or V _O = 0V to 5.5V, V _{CCA} = 0V, V _{CCB} = 0V to 5.5V		+25°C			±0.5	μA
					Full			±1	
	B Ports		V _I or V _O = 0V to 5.5V, V _{CCA} = 0V to 5.5V, V _{CCB} = 0V		+25°C			±0.5	μA
					Full			±1	
3-State Output Leakage	A or B Ports	I _{OZ}	OE = GND, V _{CCA} = 1.2V to 5.5V, V _{CCB} = 1.65V to 5.5V		+25°C			±0.5	μA
					Full			±1	
Quiescent Supply Current ⁽¹⁾		I _{CCA}	V _I = V _{CCI} or GND, I _O = 0A, OE = V _{CCA}	V _{CCA} = 1.2V, V _{CCB} = 1.65V to 5.5V	+25°C		0.1		μA
				V _{CCA} = 1.4V to 5.5V, V _{CCB} = 1.65V to 5.5V	Full			5	
				V _{CCA} = 5.5V, V _{CCB} = 0V				5	
				V _{CCA} = 0V, V _{CCB} = 5.5V				-1	
		I _{CCB}	V _I = V _{CCI} or GND, I _O = 0A, OE = V _{CCA}	V _{CCA} = 1.2V, V _{CCB} = 1.65V to 5.5V	+25°C		1		μA
				V _{CCA} = 1.4V to 5.5V, V _{CCB} = 1.65V to 5.5V	Full			5	
				V _{CCA} = 5.5V, V _{CCB} = 0V				-1	
				V _{CCA} = 0V, V _{CCB} = 5.5V				5	

ELECTRICAL CHARACTERISTICS(Full = -40°C to +85°C, typical values are at T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Quiescent Supply Current ⁽¹⁾	I _{CCA} + I _{CCB}	V _I = V _{CCI} or GND, I _O = 0A, OE = V _{CCA}	V _{CCA} = 1.2V, V _{CCB} = 1.65V to 5.5V +25°C		1		μA
			V _{CCA} = 1.4V to 5.5V, V _{CCB} = 1.65V to 5.5V Full			10	
	I _{CCZA}	V _I = V _{CCI} or GND, I _O = 0A, OE = GND	V _{CCA} = 1.2V, V _{CCB} = 1.65V to 5.5V +25°C		0.1		μA
			V _{CCA} = 1.4V to 5.5V, V _{CCB} = 1.65V to 5.5V Full			5	
	I _{CCZB}	V _I = V _{CCI} or GND, I _O = 0A, OE = GND	V _{CCA} = 1.2V, V _{CCB} = 1.65V to 5.5V +25°C		0.1		μA
			V _{CCA} = 1.4V to 5.5V, V _{CCB} = 1.65V to 5.5V Full			5	
OE Input Capacitance	C _I	V _{CCA} = 1.2V to 5.5V, V _{CCB} = 1.65V to 5.5V	+25°C		5		pF
Input/Output Capacitance	A Ports	C _{IO}	V _{CCA} = 1.2V to 5.5V, V _{CCB} = 1.65V to 5.5V	+25°C	4		pF
	B Ports			+25°C	4		

NOTE:

1. V_{CCI} is the supply voltage associated with the input ports.

TIMING REQUIREMENTS

(T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	V _{CCB} = 1.8V	V _{CCB} = 2.5V	V _{CCB} = 3.3V	V _{CCB} = 5V	UNITS
		TYP	TYP	TYP	TYP	
(V _{CCA} = 1.2V)						
Data Rate		20	20	20	20	Mbps
Pulse Duration (Data Inputs)	t _W	50	50	50	50	ns
(V _{CCA} = 1.5V)						
Data Rate		40	40	40	40	Mbps
Pulse Duration (Data Inputs)	t _W	25	25	25	25	ns
(V _{CCA} = 1.8V)						
Data Rate		60	60	60	60	Mbps
Pulse Duration (Data Inputs)	t _W	17	17	17	17	ns
(V _{CCA} = 2.5V)						
Data Rate			100	100	100	Mbps
Pulse Duration (Data Inputs)	t _W		10	10	10	ns
(V _{CCA} = 3.3V)						
Data Rate				100	100	Mbps
Pulse Duration (Data Inputs)	t _W			10	10	ns
(V _{CCA} = 5V)						
Data Rate					100	Mbps
Pulse Duration (Data Inputs)	t _W				10	ns

SWITCHING CHARACTERISTICS

(V_{CCA} = 1.2V, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	V _{CCB} = 1.8V	V _{CCB} = 2.5V	V _{CCB} = 3.3V	V _{CCB} = 5V	UNITS
			TYP	TYP	TYP	TYP	
Propagation Delay	t _{PD}	A to B	23.7	19.3	18.2	18.2	ns
			27.5	26.2	27.4	29.6	
		B to A	43.3	42.7	31.0	41.2	
			20.2	17.6	12.3	17.0	
Enable Time	t _{EN}	OE to A	90	89	86	79	ns
			62	59	58	55	
		OE to B	50	45	44	46	
			73	71	72	72	
Disable Time	t _{DIS}	OE to A	1050	1040	1010	1040	ns
			510	510	520	530	
		OE to B	1090	1090	1100	1130	
			510	550	550	550	
Rise Time	t _{IA}	A Ports	12.5	13.1	10.8	10.7	ns
	t _{IB}	B Ports	3.2	2.1	1.6	1.4	ns
Fall Time	t _{IA}	A Ports	6.0	4.8	4.0	2.4	ns
	t _{IB}	B Ports	2.1	1.7	1.5	1.4	ns
Channel-to-Channel Skew	t _{SKO}		1	1	1	1	ns
Data Rate			20	20	20	20	Mbps

SWITCHING CHARACTERISTICS (continued)

(V_{CCA} = 1.5V, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL		CONDITIONS	V _{CCB} = 1.8V	V _{CCB} = 2.5V	V _{CCB} = 3.3V	V _{CCB} = 5V	UNITS
				TYP	TYP	TYP	TYP	
Propagation Delay	t _{PD}	t _{PLH}	A to B	15.6	10.9	9.5	8.7	ns
		t _{PHL}		13.5	11.2	10.7	10.7	
		t _{PLH}	B to A	16.7	15.9	15.9	16.0	
		t _{PHL}		10.5	9.0	8.5	8.0	
Enable Time	t _{EN}	t _{PZH}	OE to A	38	38	37	35	ns
		t _{PZL}		35	31	30	28	
		t _{PZH}	OE to B	33	27	25	24	
		t _{PZL}		37	34	34	33	
Disable Time	t _{DIS}	t _{PHZ}	OE to A	1010	1020	1030	1020	ns
		t _{PLZ}		510	510	520	540	
		t _{PHZ}	OE to B	1080	1060	1100	1120	
		t _{PLZ}		510	540	530	530	
Rise Time	t _{rA}		A Ports	7.0	6.2	6.0	6.6	ns
	t _{rB}		B Ports	3.1	2.1	1.6	1.4	ns
Fall Time	t _{fA}		A Ports	3.1	2.3	2.0	2.5	ns
	t _{fB}		B Ports	2.3	1.7	1.5	1.4	ns
Channel-to-Channel Skew	t _{SKO}			0.5	0.5	0.5	0.5	ns
Data Rate				40	40	40	40	Mbps

SWITCHING CHARACTERISTICS (continued)

(V_{CCA} = 1.8V, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL		CONDITIONS	V _{CCB} = 1.8V	V _{CCB} = 2.5V	V _{CCB} = 3.3V	V _{CCB} = 5V	UNITS
				TYP	TYP	TYP	TYP	
Propagation Delay	t _{PD}	t _{PLH}	A to B	13.6	8.8	7.1	6.0	ns
		t _{PHL}		9.9	7.8	6.9	6.6	
		t _{PLH}	B to A	11.0	9.7	9.5	9.8	
		t _{PHL}		8.4	6.8	5.7	5.2	
Enable Time	t _{EN}	t _{PZH}	OE to A	26	26	26	25	ns
		t _{PZL}		29	24	23	22	
		t _{PZH}	OE to B	29	22	20	19	
		t _{PZL}		28	25	24	23	
Disable Time	t _{DIS}	t _{PHZ}	OE to A	1040	1030	1070	1060	ns
		t _{PLZ}		510	500	490	490	
		t _{PHZ}	OE to B	1030	1070	1110	1120	
		t _{PLZ}		510	520	530	530	
Rise Time	t _{rA}		A Ports	3.9	2.5	2.4	2.9	ns
	t _{rB}		B Ports	3.7	2.0	1.8	1.5	ns
Fall Time	t _{fA}		A Ports	2.2	2.0	1.8	2.2	ns
	t _{fB}		B Ports	2.1	1.8	1.6	1.6	ns
Channel-to-Channel Skew	t _{SKO}			0.5	0.5	0.5	0.5	ns
Data Rate				60	60	60	60	Mbps

SWITCHING CHARACTERISTICS (continued)

(V_{CCA} = 2.5V, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL		CONDITIONS	V _{CCB} = 2.5V	V _{CCB} = 3.3V	V _{CCB} = 5V	UNITS
				TYP	TYP	TYP	
Propagation Delay	t _{PD}	t _{PLH}	A to B	7.1	5.4	4.4	ns
		t _{PHL}		5.4	4.5	4.0	
		t _{PLH}	B to A	5.7	5.3	5.7	
		t _{PHL}		4.3	3.7	3.2	
Enable Time	t _{EN}	t _{PZH}	OE to A	19	18	18	ns
		t _{PZL}		20	19	17	
		t _{PZH}	OE to B	20	17	16	
		t _{PZL}		19	18	18	
Disable Time	t _{DIS}	t _{PHZ}	OE to A	1020	1010	1000	ns
		t _{PLZ}		540	530	520	
		t _{PHZ}	OE to B	1080	1100	1120	
		t _{PLZ}		540	530	530	
Rise Time	t _{rA}		A Ports	1.8	1.6	1.8	ns
	t _{rB}		B Ports	1.8	1.7	1.3	ns
Fall Time	t _{fA}		A Ports	1.5	1.5	1.6	ns
	t _{fB}		B Ports	1.8	1.4	1.4	ns
Channel-to-Channel Skew	t _{SKO}			0.5	0.5	0.5	ns
Data Rate				100	100	100	Mbps

SWITCHING CHARACTERISTICS (continued)

(V_{CCA} = 3.3V, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL		CONDITIONS	V _{CCB} = 3.3V	V _{CCB} = 5V	UNITS
				TYP	TYP	
Propagation Delay	t _{PD}	t _{PLH}	A to B	5.1	4.2	ns
		t _{PHL}		4.0	3.5	
		t _{PLH}	B to A	4.3	4.4	
		t _{PHL}		3.6	2.9	
Enable Time	t _{EN}	t _{PZH}	OE to A	16	16	ns
		t _{PZL}		17	16	
		t _{PZH}	OE to B	17	15	
		t _{PZL}		17	16	
Disable Time	t _{DIS}	t _{PHZ}	OE to A	1050	1040	ns
		t _{PLZ}		540	520	
		t _{PHZ}	OE to B	1090	1210	
		t _{PLZ}		530	520	
Rise Time	t _{rA}		A Ports	1.4	1.4	ns
	t _{rB}		B Ports	1.5	1.6	ns
Fall Time	t _{fA}		A Ports	1.5	1.5	ns
	t _{fB}		B Ports	1.4	1.7	ns
Channel-to-Channel Skew	t _{SKO}			0.5	0.5	ns
Data Rate				100	100	Mbps

SWITCHING CHARACTERISTICS (continued)

(V_{CCA} = 5V, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL		CONDITIONS	V _{CCB} = 5V	UNITS
				TYP	
Propagation Delay	t _{PD}	t _{PLH}	A to B	4.1	ns
		t _{PHL}		3.0	
		t _{PLH}	B to A	3.9	
		t _{PHL}		2.6	
Enable Time	t _{EN}	t _{PZH}	OE to A	14	ns
		t _{PZL}		15	
		t _{PZH}	OE to B	15	
		t _{PZL}		15	
Disable Time	t _{DIS}	t _{PHZ}	OE to A	1210	ns
		t _{PLZ}		510	
		t _{PHZ}	OE to B	1200	
		t _{PLZ}		530	
Rise Time	t _{rA}		A Ports	1.2	ns
	t _{rB}		B Ports	1.5	ns
Fall Time	t _{fA}		A Ports	1.3	ns
	t _{fB}		B Ports	1.4	ns
Channel-to-Channel Skew	t _{SKO}			0.5	ns
Data Rate				100	Mbps

OPERATING CHARACTERISTICS

(T_A = +25°C, unless otherwise noted.)

PARAMETER		CONDITIONS	V _{CCA}									UNITS
			1.2V	1.2V	1.5V	1.8V	2.5V	2.5V	3.3V	3.3V	5V	
			V _{CCB}									
			5V	1.8V	1.8V	1.8V	2.5V	5V	3.3V	5V	5V	
			TYP	TYP	TYP	TYP	TYP	TYP	TYP	TYP	TYP	
C _{PDA}	A Port Inputs, B Port Outputs	C _L = 0, f = 10MHz, t _r = t _f = 1ns, OE = V _{CCA} (Outputs Enabled)	0.6	0.5	0.6	0.6	0.8	0.8	1.1	1.1	1.8	pF
	B Port Input, A Port Output		5.1	5.1	5.4	6.4	8.8	6.3	10.5	8.4	12.9	
C _{PDB}	A Port Inputs, B Port Outputs		14.4	7.3	7.2	7.1	9.7	13.8	11.5	13.7	13.7	
	B Port Input, A Port Output		1.6	0.4	0.4	0.4	0.6	1.6	0.9	1.6	1.6	
C _{PDA}	A Port Inputs, B Port Outputs	C _L = 0, f = 10MHz, t _r = t _f = 1ns, OE = GND (Outputs Disabled)	0.014	0.005	0.036	0.015	0.016	0.004	0.009	0.004	0.009	pF
	B Port Input, A Port Output		0.013	0.005	0.042	0.014	0.018	0.004	0.009	0.004	0.010	
C _{PDB}	A Port Inputs, B Port Outputs		0.006	0.003	0.034	0.001	0.011	0.004	0.003	0.003	0.001	
	B Port Input, A Port Output		0.004	0.002	0.023	0.001	0.011	0.002	0.003	0.002	0.001	

WAVEFORMS

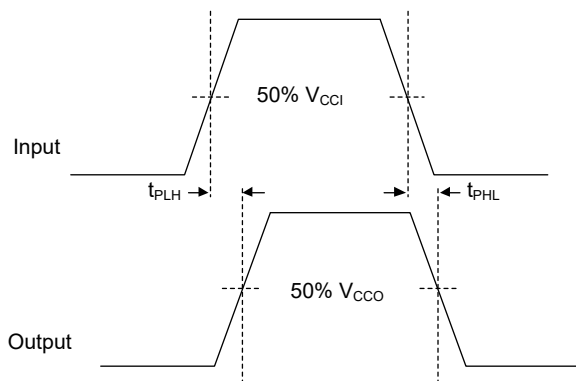


Figure 1. Propagation Delay

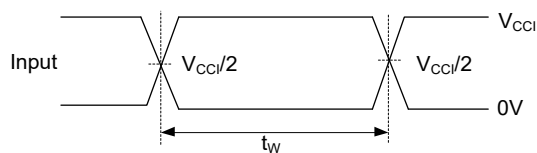


Figure 2. Pulse Duration

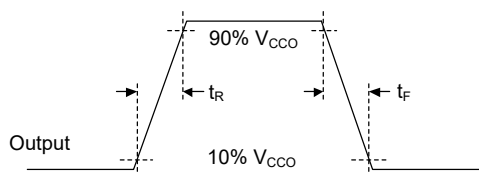
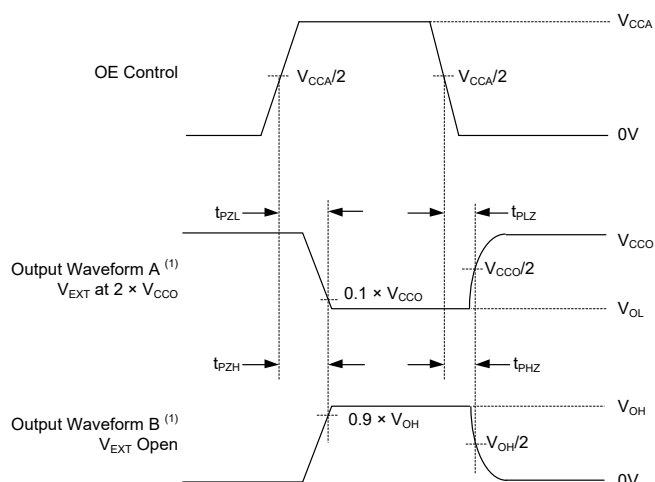


Figure 3. Rise Time and Fall Time of Data Output

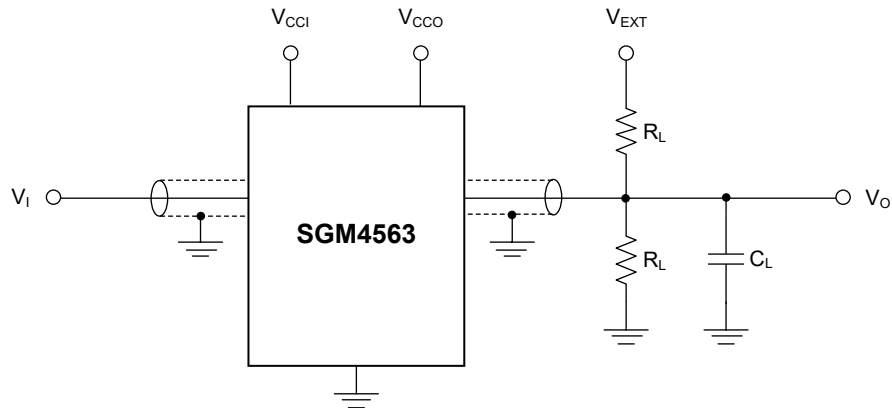


NOTE:

1. Waveform A indicates an output that is high except for OE is high. Waveform B indicates an output that is low except for OE is high.

Figure 4. Enable and Disable Times

TEST CIRCUIT



Definitions for test circuit:

R_L = Load resistance.

C_L = Load capacitance includes jig and probe capacitance.

V_{EXT} = External voltage for measuring switching times.

V_{CC1} = Supply voltage associated with the input.

V_{CC0} = Supply voltage associated with the output.

Figure 5. Test Circuit for Measuring Switching Times

APPLICATION INFORMATION

Applications

For the application of the SGM4563, it is often used in the voltage-level translation system.

Architecture

The SGM4563 architecture is shown in Figure 6, the direction of channel 1, 2 and 3 is from A to B, the direction of channel 4 is from B to A.

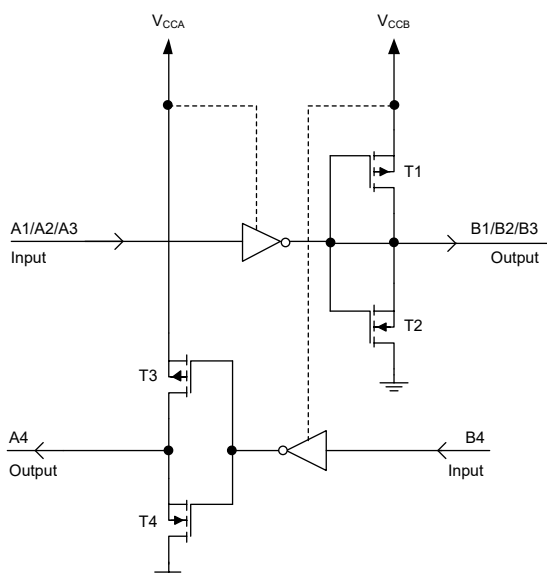


Figure 6. Architecture of SGM4563

Power-Up

For the application of the SGM4563, the V_{CCA} should be less than V_{CCB} . However, it does not matter if the power supply voltage is ramping, and the sequence of power-up for both V_{CCA} and V_{CCB} is not defined. The SGM4563 has a circuitry that disables all output ports when either V_{CC} is switched off ($V_{CCA}/V_{CCB} = 0V$).

Enable and Disable

The function of OE is used to disable SGM4563 by setting the transmitting I/O pins to high-impedance mode. The definition of disable time (t_{DIS}) is the time period between OE goes low and when all of the I/O pins are in high-impedance mode. The enable time (t_{EN}) is defined as the time period between OE goes to high position and the circuitry starts to operate.

REVISION HISTORY

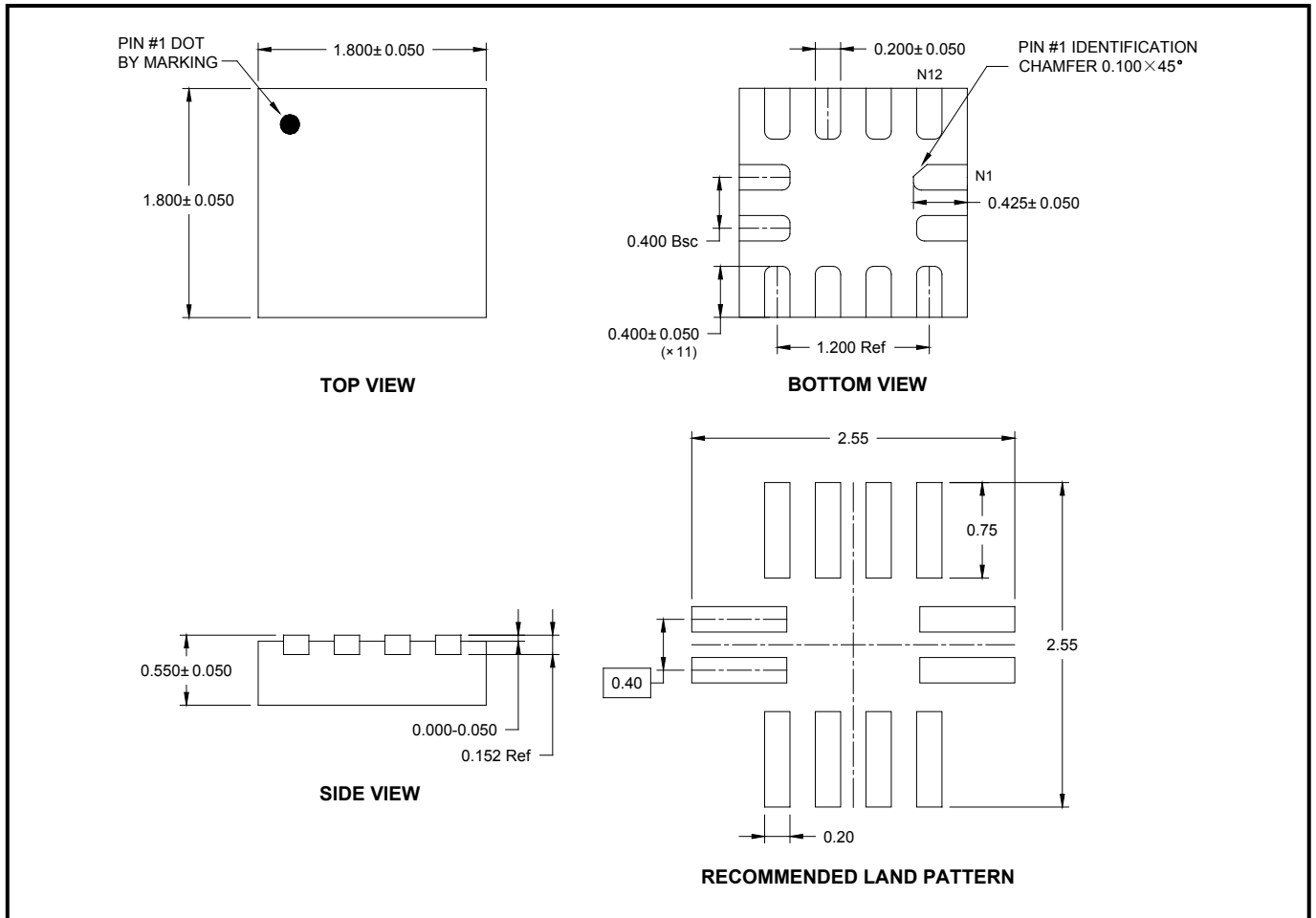
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (JUNE 2015) to REV.A

	Page
Changed from product preview to production data.....	All

PACKAGE OUTLINE DIMENSIONS

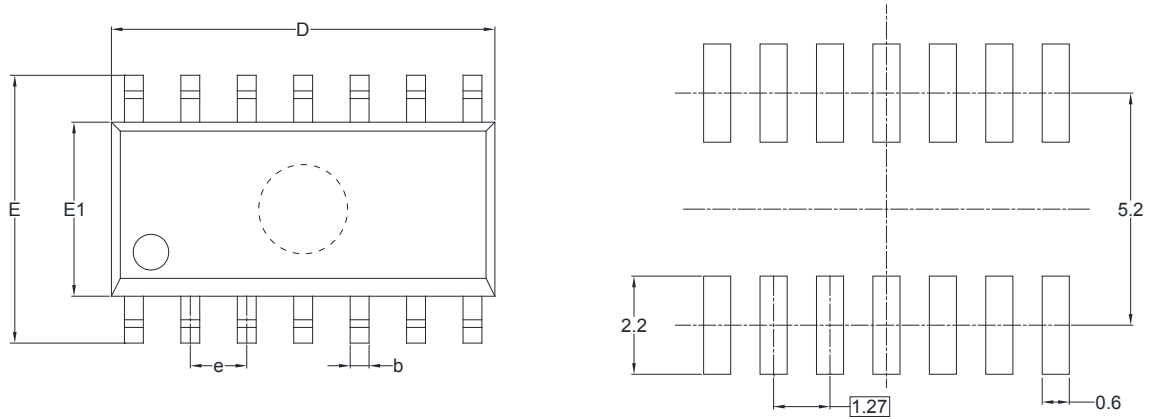
UTQFN-1.8×1.8-12L



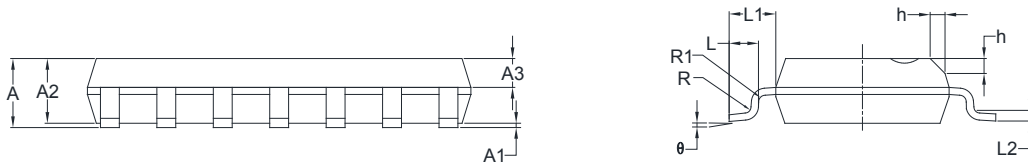
NOTE: All linear dimensions are in millimeters.

PACKAGE OUTLINE DIMENSIONS

SOIC-14



RECOMMENDED LAND PATTERN (Unit: mm)

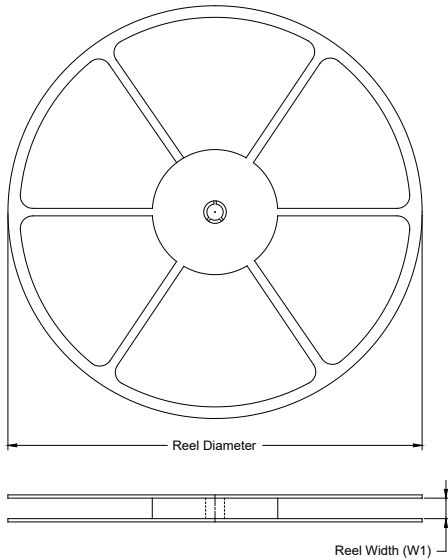


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	1.65	0.049	0.065
A3	0.55	0.75	0.022	0.030
b	0.36	0.49	0.014	0.019
D	8.53	8.73	0.336	0.344
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
L	0.45	0.80	0.018	0.032
L1	1.04 REF		0.040 REF	
L2	0.25 BSC		0.01 BSC	
R	0.07		0.003	
R1	0.07		0.003	
h	0.30	0.50	0.012	0.020
θ	0°	8°	0°	8°

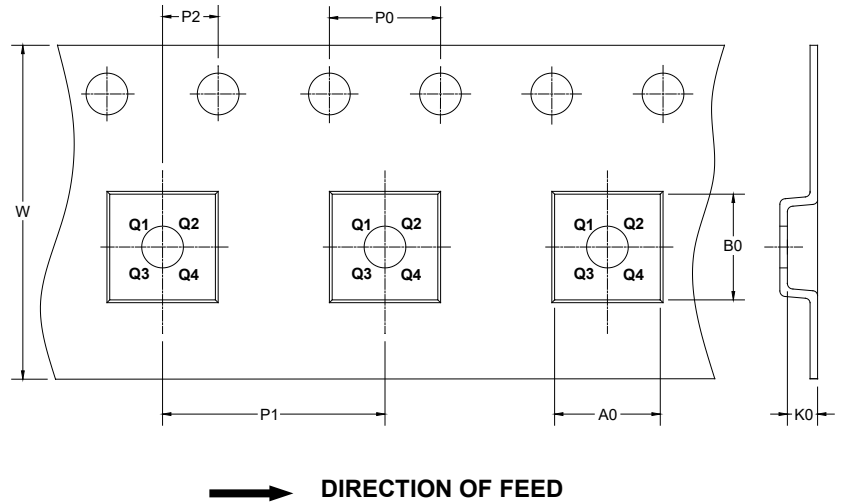
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

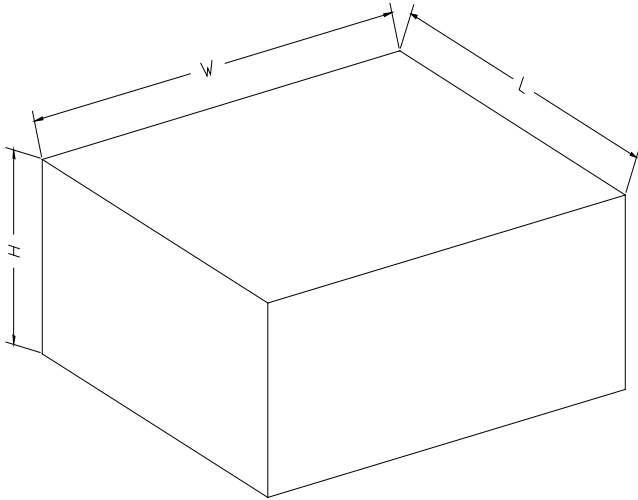
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
UTQFN-1.8×1.8-12L	7"	9.0	2.10	2.10	0.80	4.0	4.0	2.0	8.0	Q1
SOIC-14	13"	16.4	6.60	9.30	2.10	4.0	8.0	2.0	16.0	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
7" (Option)	368	227	224	8
7"	442	410	224	18
13"	386	280	370	5

DD0002