

### GENERAL DESCRIPTION

The SGM4553 is a 2-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 1.65V to 5.5V for A ports and 2.3V to 5.5V for B ports. The device provides a bidirectional translation function between the different voltage nodes (including 1.8V, 2.5V, 3.3V and 5V).

The SGM4553 has an output enable (OE) function, which controls the inputs and outputs states. When OE goes low, all I/Os enter into the high-impedance state. It is beneficial for reducing quiescent current consumption. When  $V_{CCA}$  is powered, OE has an internal pull-down current source.

The SGM4553 is available in Green SOT-23-8 and XTDFN-1.4×1-8L packages. It operates over an ambient temperature range of -40°C to +85°C.

### FEATURES

- **Power Supply Voltage Ranges ( $V_{CCA} \leq V_{CCB}$ )**
  - ◆ **A Ports: 1.65V to 5.5V**
  - ◆ **B Ports: 2.3V to 5.5V**
- **Direction-Control Signal is Not Required**
- **Data Rates**
  - ◆ **Push-Pull: 24Mbps**
  - ◆ **Open-Drain: 2Mbps**
- **Support  $V_{CCA}$  or  $V_{CCB}$  Isolation**
  - ◆ **When  $V_{CCA}$  or  $V_{CCB}$  is Low, Device Enters Power-Down Mode**
- **No Specific Power Sequences Required for  $V_{CCA}$  and  $V_{CCB}$**
- **Support Power-Down Mode**
- **-40°C to +85°C Operating Temperature Range**
- **Available in Green XTDFN-1.4×1-8L and SOT-23-8 Packages**

### APPLICATIONS

Universal Asynchronous Receiver/Transmitter  
 I<sup>2</sup>C/SMBus Interfaces  
 General Purpose I/O (GPIO)

### TYPICAL APPLICATION

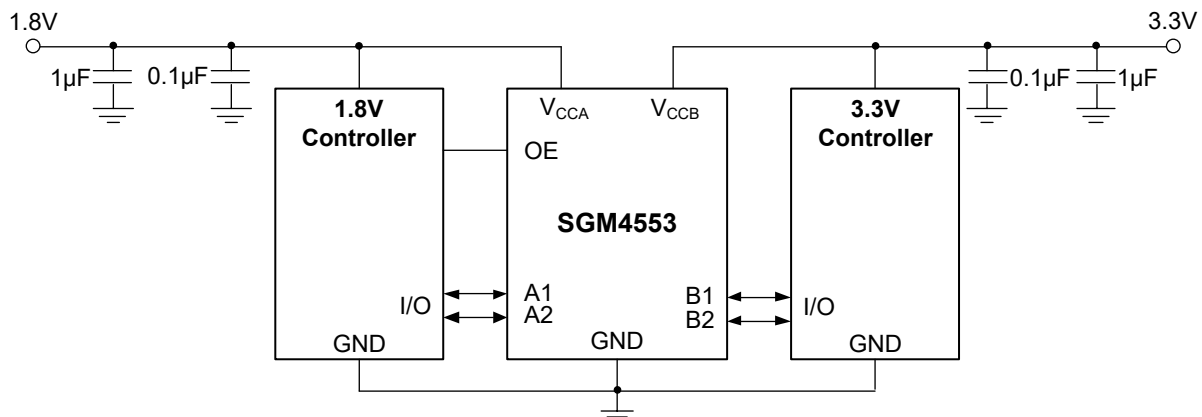


Figure 1. Typical Application Circuit

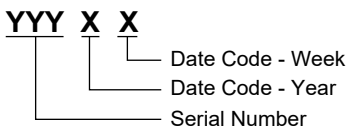
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM4553	SOT-23-8	-40°C to +85°C	SGM4553YN8G/TR	SLDXX	Tape and Reel, 3000
	XTDFN-1.4×1-8L	-40°C to +85°C	SGM4553YXD08G/TR	N2X	Tape and Reel, 5000

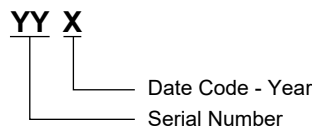
MARKING INFORMATION

NOTE: X = Date Code. XX = Date Code.

SOT-23-8



XTDFN-1.4×1-8L



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<sub>CCA</sub> ..... -0.3V to 6V

V<sub>CCB</sub> ..... -0.3V to 6V

Input Voltage Range, V<sub>I</sub><sup>(1)</sup>

A Ports, B Ports, OE ..... -0.3V to 6V

Output Voltage Range for the High-Impedance or Power-Off State, V<sub>O</sub><sup>(1)</sup>

A Ports ..... -0.3V to 6V

B Ports ..... -0.3V to 6V

Output Voltage Range for the High or Low State, V<sub>O</sub><sup>(1)(2)</sup>

A Ports ..... -0.3V to V<sub>CCA</sub> + 0.3V

B Ports ..... -0.3V to V<sub>CCB</sub> + 0.3V

Input Clamp Current, I<sub>IK</sub> (V<sub>I</sub> < 0) ..... -50mA

Output Clamp Current, I<sub>OK</sub> (V<sub>O</sub> < 0) ..... -50mA

Continuous Output Current, I<sub>O</sub> ..... ±50mA

Continuous Current through V<sub>CCA</sub>, V<sub>CCB</sub>, or GND ..... ±100mA

Package Thermal Resistance @ T<sub>A</sub> = +25°C

SOT-23-8, θ<sub>JA</sub> ..... 240°C/W

XTDFN-1.4×1-8L, θ<sub>JA</sub> ..... 248°C/W

Junction Temperature ..... +150°C

Storage Temperature Range ..... -65°C to +150°C

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

ESD Susceptibility

HBM ..... 4000V

MM ..... 300V

NOTES:

- When the input and output current ratings are observed, the input and I/O negative voltage ratings may be exceeded.
- V<sub>CCA</sub> and V<sub>CCB</sub> values are shown in the recommended operating conditions in Electrical Characteristics section.

RECOMMENDED OPERATING CONDITIONS

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

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.

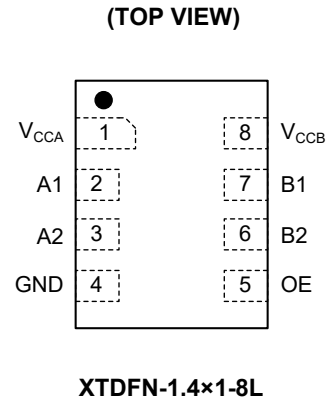
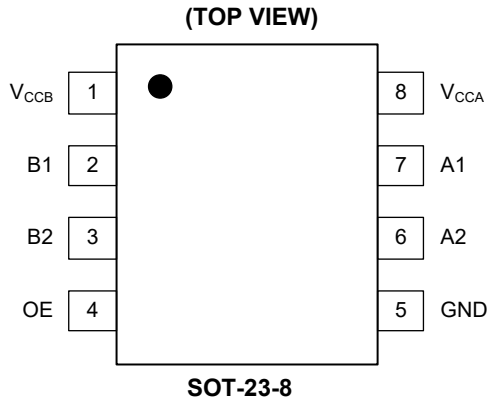
ESD SENSITIVITY CAUTION

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



PIN DESCRIPTION

PIN		NAME	FUNCTION
SOT-23-8	XTDFN-1.4x1-8L		
1	8	V <sub>CCB</sub>	Supply Voltage on B Ports. It can be operated from 2.3V to 5.5V.
2	7	B1	Channel 1 Input/Output B. It tracks the V <sub>CCB</sub> supply.
3	6	B2	Channel 2 Input/Output B. It tracks the V <sub>CCB</sub> supply.
4	5	OE	Output Enable Control Pin. Active high. When OE goes low, all outputs enter into the high-impedance state. It tracks the V <sub>CCA</sub> supply.
5	4	GND	Ground.
6	3	A2	Channel 2 Input/Output A. It tracks the V <sub>CCA</sub> supply.
7	2	A1	Channel 1 Input/Output A. It tracks the V <sub>CCA</sub> supply.
8	1	V <sub>CCA</sub>	Supply Voltage on A Ports. It can be operated from 1.65V to 5.5V, and V <sub>CCA</sub> is always ≤ V <sub>CCB</sub> .

### ELECTRICAL CHARACTERISTICS

( $V_{CCA} = 1.65V$  to  $5.5V$ ,  $V_{CCB} = 2.3V$  to  $5.5V$ , Full =  $-40^{\circ}C$  to  $+85^{\circ}C$ , typical values are at  $T_A = +25^{\circ}C$ , unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>Recommended Operating Conditions</b> <sup>(1)(2)</sup>							
Supply Voltage <sup>(3)</sup>		$V_{CCA}$		1.65		5.5	V
		$V_{CCB}$		2.3		5.5	
High-Level Input Voltage	A Port I/Os	$V_{IH}$	$V_{CCA} = 1.65V$ to $1.95V$ , $V_{CCB} = 2.3V$ to $5.5V$	$V_{CCI} - 0.2$		$V_{CCI}$	V
	B Port I/Os		$V_{CCA} = 2.3V$ to $5.5V$ , $V_{CCB} = 2.3V$ to $5.5V$	$V_{CCI} - 0.4$		$V_{CCI}$	
	OE Input			$V_{CCI} - 0.4$		$V_{CCI}$	
Low-Level Input Voltage	A Port I/Os	$V_{IL}$		0		0.15	V
	B Port I/Os			0		0.15	
	OE Input			0		$V_{CCA} \times 0.25$	
Input Transition Rise or Fall Rate		$\Delta t/\Delta V$	A port I/Os push-pull driving			10	ns/V
			B port I/Os push-pull driving			10	
			Control input			10	
<b>Electrical Characteristics</b>							
A Ports High Level Output Voltage		$V_{OHA}$	$I_{OH} = -20\mu A$ , $V_{IB} \geq V_{CCB} - 0.4V$	$V_{CCA} \times 0.7$			V
A Ports Low Level Output Voltage		$V_{OLA}$	$I_{OL} = 1mA$ , $V_{IB} \leq 0.15V$			0.4	
B Ports High Level Output Voltage		$V_{OHB}$	$I_{OH} = -20\mu A$ , $V_{IA} \geq V_{CCA} - 0.4V$	$V_{CCB} \times 0.7$			
B Ports Low Level Output Voltage		$V_{OLB}$	$I_{OL} = 1mA$ , $V_{IA} \leq 0.15V$			0.4	
Input Leakage Current	OE	$I_I$	$T_A = +25^{\circ}C$			$\pm 1$	$\mu A$
			$T_A = -40^{\circ}C$ to $+85^{\circ}C$			$\pm 1.5$	
Power Off Leakage Current	A Ports	$I_{OFF}$	$V_{CCA} = 0V$ , $V_{CCB} = 0V$ to $5.5V$	$T_A = +25^{\circ}C$		$\pm 0.5$	$\mu A$
				$T_A = -40^{\circ}C$ to $+85^{\circ}C$		$\pm 1$	
	B Ports		$V_{CCA} = 0V$ to $5.5V$ , $V_{CCB} = 0V$	$T_A = +25^{\circ}C$		$\pm 0.5$	
				$T_A = -40^{\circ}C$ to $+85^{\circ}C$		$\pm 1$	
3-State Output Leakage	A or B Ports	$I_{OZ}$	OE = 0V	$T_A = +25^{\circ}C$		$\pm 0.6$	$\mu A$
				$T_A = -40^{\circ}C$ to $+85^{\circ}C$		$\pm 1$	

#### NOTES:

- $V_{CCI}$  is the supply voltage associated with the input ports.
- $V_{CCO}$  is the supply voltage associated with the output ports.
- Ensure that  $V_{CCA} \leq V_{CCB}$  and  $V_{CCA}$  must not exceed 5.5V.

**ELECTRICAL CHARACTERISTICS (continued)**(V<sub>CCA</sub> = 1.65V to 5.5V, V<sub>CCB</sub> = 2.3V to 5.5V, Full = -40°C to +85°C, typical values are at T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Quiescent Supply Current	I <sub>CCA</sub>	V <sub>I</sub> = V <sub>O</sub> = OPEN, I <sub>O</sub> = 0A	V <sub>CCA</sub> = 1.65V to V <sub>CCB</sub> , V <sub>CCB</sub> = 2.3V to 5.5V			5.5	μA
			V <sub>CCA</sub> = 5.5V, V <sub>CCB</sub> = 0V			5.5	
			V <sub>CCA</sub> = 0V, V <sub>CCB</sub> = 5.5V			-1	
	I <sub>CCB</sub>	V <sub>I</sub> = V <sub>O</sub> = OPEN, I <sub>O</sub> = 0A	V <sub>CCA</sub> = 1.65V to V <sub>CCB</sub> , V <sub>CCB</sub> = 2.3V to 5.5V			15	μA
			V <sub>CCA</sub> = 5.5V, V <sub>CCB</sub> = 0V			-1	
			V <sub>CCA</sub> = 0V, V <sub>CCB</sub> = 5.5V			6	
I <sub>CCA</sub> + I <sub>CCB</sub>		V <sub>I</sub> = V <sub>O</sub> = OPEN, I <sub>O</sub> = 0A	V <sub>CCA</sub> = 1.65V to V <sub>CCB</sub> , V <sub>CCB</sub> = 2.3V to 5.5V			20	μA
I <sub>CCZA</sub>		V <sub>I</sub> = V <sub>CCI</sub> or 0V, I <sub>O</sub> = 0A, OE = 0V	V <sub>CCA</sub> = 1.65V to V <sub>CCB</sub> , V <sub>CCB</sub> = 2.3V to 5.5V			5.5	μA
I <sub>CCZB</sub>		V <sub>I</sub> = V <sub>CCI</sub> or 0V, I <sub>O</sub> = 0A, OE = 0V	V <sub>CCA</sub> = 1.65V to V <sub>CCB</sub> , V <sub>CCB</sub> = 2.3V to 5.5V			5.5	μA
OE Input Capacitance		C <sub>I</sub>	V <sub>CCA</sub> = 3.3V, V <sub>CCB</sub> = 3.3V		4		pF
Input/Output Capacitance	A Ports	C <sub>IO</sub>	V <sub>CCA</sub> = 3.3V, V <sub>CCB</sub> = 3.3V		5		pF
	B Ports				5		

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**TIMING REQUIREMENTS**

(T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	V <sub>CCB</sub> = 2.5V	V <sub>CCB</sub> = 3.3V	V <sub>CCB</sub> = 5V	UNITS
			TYP	TYP	TYP	
<b>(V<sub>CCA</sub> = 1.8V)</b>						
Data Rate		Push-pull driving	21	22	24	Mbps
		Open-drain driving	2	2	2	
Pulse Duration (Data Inputs)	t <sub>w</sub>	Push-pull driving	47	45	41	ns
		Open-drain driving	500	500	500	
<b>(V<sub>CCA</sub> = 2.5V)</b>						
Data Rate		Push-pull driving	20	22	24	Mbps
		Open-drain driving	2	2	2	
Pulse Duration (Data Inputs)	t <sub>w</sub>	Push-pull driving	50	45	41	ns
		Open-drain driving	500	500	500	
<b>(V<sub>CCA</sub> = 3.3V)</b>						
Data Rate		Push-pull driving		23	24	Mbps
		Open-drain driving		2	2	
Pulse Duration (Data Inputs)	t <sub>w</sub>	Push-pull driving		43	41	ns
		Open-drain driving		500	500	
<b>(V<sub>CCA</sub> = 5V)</b>						
Data Rate		Push-pull driving			24	Mbps
		Open-drain driving			2	
Pulse Duration (Data Inputs)	t <sub>w</sub>	Push-pull driving			41	ns
		Open-drain driving			500	

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## SWITCHING CHARACTERISTICS

(V<sub>CCA</sub> = 1.8V, T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	V <sub>CCB</sub> = 2.5V	V <sub>CCB</sub> = 3.3V	V <sub>CCB</sub> = 5V	UNITS	
			TYP	TYP	TYP		
Propagation Delay	t <sub>PHL</sub>	A to B	Push-pull driving	2.4	3.0	4.3	ns
			Open-drain driving	26.0	26.3	26.7	
	t <sub>PLH</sub>		Push-pull driving	4.0	3.6	3.5	
			Open-drain driving	175	145	110	
	B to A	t <sub>PHL</sub>	Push-pull driving	2.0	1.9	2.1	ns
			Open-drain driving	26.0	26.1	26.2	
		t <sub>PLH</sub>	Push-pull driving	1.7	1.5	1.4	
			Open-drain driving	133	69	51	
Enable Time	t <sub>EN</sub> (t <sub>PZH</sub> & t <sub>PZL</sub> )	OE to A or B	24	20	18	ns	
Disable Time	t <sub>DIS</sub> (t <sub>PHZ</sub> & t <sub>PLZ</sub> )	OE to A or B	1200	1200	1200	ns	
Rise Time	t <sub>rA</sub>	A Ports	Push-pull driving	6.6	5.8	5.4	ns
			Open-drain driving	89	31	10	
	t <sub>rB</sub>	B Ports	Push-pull driving	5.6	4.6	3.9	ns
			Open-drain driving	128	98	58	
Fall Time	t <sub>fA</sub>	A Ports	Push-pull driving	2.9	2.7	2.6	ns
			Open-drain driving	1.9	1.7	1.6	
	t <sub>fB</sub>	B Ports	Push-pull driving	4.6	5.9	8.0	ns
			Open-drain driving	2.2	2.3	2.9	
Channel-to-Channel Skew	t <sub>SKO</sub>		0.5	0.5	0.5	ns	
Data Rate		Push-pull driving	21	22	24	Mbps	
		Open-drain driving	2	2	2		

## SWITCHING CHARACTERISTICS (continued)

(V<sub>CCA</sub> = 2.5V, T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	V <sub>CCB</sub> = 2.5V	V <sub>CCB</sub> = 3.3V	V <sub>CCB</sub> = 5V	UNITS			
			TYP	TYP	TYP				
Propagation Delay	t <sub>PHL</sub>	A to B	Push-pull driving	2.7	3.3	4.8	ns		
			Open-drain driving	26.2	26.4	26.7			
			t <sub>PLH</sub>	A to B	Push-pull driving	2.6		2.4	2.3
					Open-drain driving	169		144	110
	t <sub>PHL</sub>	B to A	Push-pull driving	2.4	2.3	2.4	ns		
			Open-drain driving	26.3	26.4	26.5			
			t <sub>PLH</sub>	B to A	Push-pull driving	2.0		1.9	1.8
					Open-drain driving	165		118	55
Enable Time	t <sub>EN</sub> (t <sub>PZH</sub> & t <sub>PZL</sub> )	OE to A or B	23	19	16	ns			
Disable Time	t <sub>DIS</sub> (t <sub>PHZ</sub> & t <sub>PLZ</sub> )	OE to A or B	1200	1200	1200	ns			
Rise Time	t <sub>rA</sub>	A Ports	Push-pull driving	3.2	2.8	2.6	ns		
			Open-drain driving	120	70	10			
	t <sub>rB</sub>	B Ports	Push-pull driving	4.5	3.4	2.6	ns		
			Open-drain driving	122	96	62			
Fall Time	t <sub>fA</sub>	A Ports	Push-pull driving	4.9	5.0	4.8	ns		
			Open-drain driving	2.0	1.9	1.7			
	t <sub>fB</sub>	B Ports	Push-pull driving	4.8	6.1	8.3	ns		
			Open-drain driving	1.9	2.1	2.7			
Channel-to-Channel Skew	t <sub>SKO</sub>		0.5	0.5	0.5	ns			
Data Rate		Push-pull driving	20	22	24	Mbps			
		Open-drain driving	2	2	2				



**SWITCHING CHARACTERISTICS (continued)**

(V<sub>CCA</sub> = 3.3V, T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	V <sub>CCB</sub> = 3.3V	V <sub>CCB</sub> = 5V	UNITS		
			TYP	TYP			
Propagation Delay	t <sub>PHL</sub>	A to B	Push-pull driving	3.5	4.9	ns	
			Open-drain driving	26.3	26.7		
		t <sub>PLH</sub>	A to B	Push-pull driving	2.2		2.0
				Open-drain driving	133		104
	t <sub>PHL</sub>	B to A	Push-pull driving	3.0	3.2	ns	
			Open-drain driving	26.6	26.8		
		t <sub>PLH</sub>	B to A	Push-pull driving	1.8		1.7
				Open-drain driving	132		83
Enable Time	t <sub>EN</sub> (t <sub>PZH</sub> & t <sub>PZL</sub> )	OE to A or B	18	15	ns		
Disable Time	t <sub>DIS</sub> (t <sub>PHZ</sub> & t <sub>PLZ</sub> )	OE to A or B	1200	1200	ns		
Rise Time	t <sub>rA</sub>	A Ports	Push-pull driving	2.2	2.0	ns	
			Open-drain driving	87	36		
	t <sub>rB</sub>	B Ports	Push-pull driving	2.9	2.3	ns	
			Open-drain driving	87	56		
Fall Time	t <sub>fA</sub>	A Ports	Push-pull driving	6.2	5.8	ns	
			Open-drain driving	2.3	2.0		
	t <sub>fB</sub>	B Ports	Push-pull driving	6.5	8.2	ns	
			Open-drain driving	2.0	2.5		
Channel-to-Channel Skew	t <sub>SKO</sub>		0.5	0.5	ns		
Data Rate		Push-pull driving	23	24	Mbps		
		Open-drain driving	2	2			

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**SWITCHING CHARACTERISTICS (continued)**

(V<sub>CCA</sub> = 5V, T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		V <sub>CCB</sub> = 5V	UNITS	
				TYP		
Propagation Delay	t <sub>PHL</sub>	A to B	Push-pull driving	5.4	ns	
			Open-drain driving	26.7		
	t <sub>PLH</sub>		Push-pull driving	1.9		
			Open-drain driving	120		
	t <sub>PHL</sub>	B to A	Push-pull driving	5.6	ns	
			Open-drain driving	27.3		
			t <sub>PLH</sub>	Push-pull driving		1.7
				Open-drain driving		126
Enable Time	t <sub>EN</sub> (t <sub>PZH</sub> & t <sub>PZL</sub> )	OE to A or B		16	ns	
Disable Time	t <sub>DIS</sub> (t <sub>PHZ</sub> & t <sub>PLZ</sub> )	OE to A or B		1200	ns	
Rise Time	t <sub>rA</sub>	A Ports	Push-pull driving	1.8	ns	
			Open-drain driving	79		
	t <sub>rB</sub>	B Ports	Push-pull driving	2.2	ns	
			Open-drain driving	73		
Fall Time	t <sub>fA</sub>	A Ports	Push-pull driving	8.7	ns	
			Open-drain driving	2.7		
	t <sub>fB</sub>	B Ports	Push-pull driving	8.6	ns	
			Open-drain driving	2.4		
Channel-to-Channel Skew	t <sub>SKO</sub>			0.5	ns	
Data Rate			Push-pull driving	24	Mbps	
			Open-drain driving	2		

WAVEFORMS

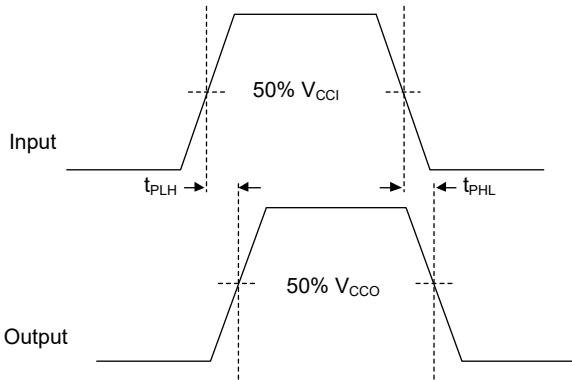


Figure 2. Propagation Delay

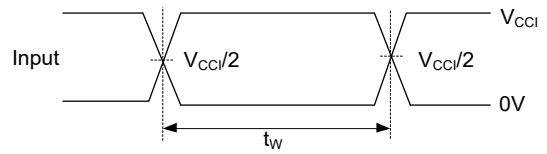


Figure 3. Pulse Duration

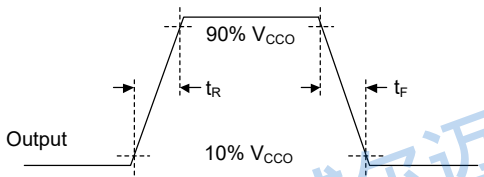
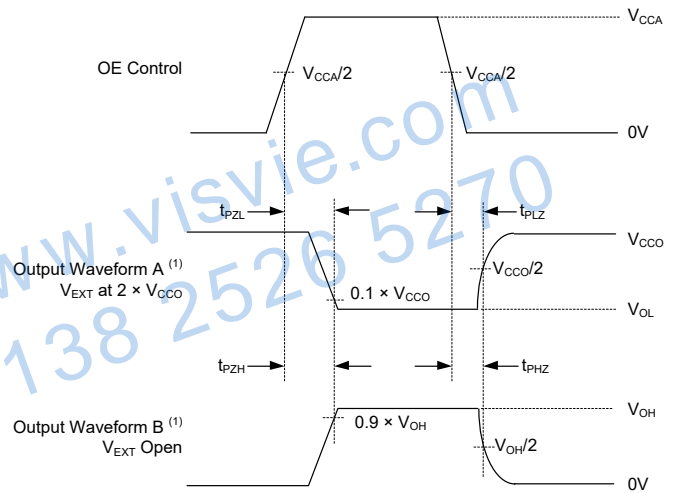


Figure 4. Rise Time and Fall Time of Data Output

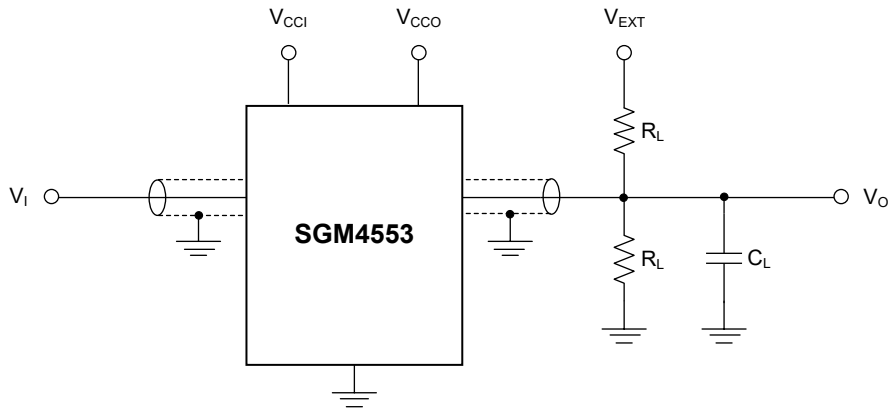


NOTE:

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 5. 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.

$V_{CCI}$  = Supply voltage associated with the input.

$V_{CCO}$  = Supply voltage associated with the output.

Figure 6. Test Circuit for Measuring Switching Times

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## APPLICATION INFORMATION

### Applications

The SGM4553 is a bridge between two digital systems with different power supplies as it can transmit the signal transparently. For the application of the SGM4553, the output driver is open-drain or push-pull to drive the I<sup>2</sup>C or one-wire bus. In addition, if a device with push-pull driver is connected to the I/O pin of the SGM4553, it will operate as normal.

### Architecture

The SGM4553 can switch the direction of the transmission for port A and port B automatically without any external control.

There is no need to add an external direction control for the application of the SGM4553. Also, each I/O pin can be an input or output of the voltage translator.

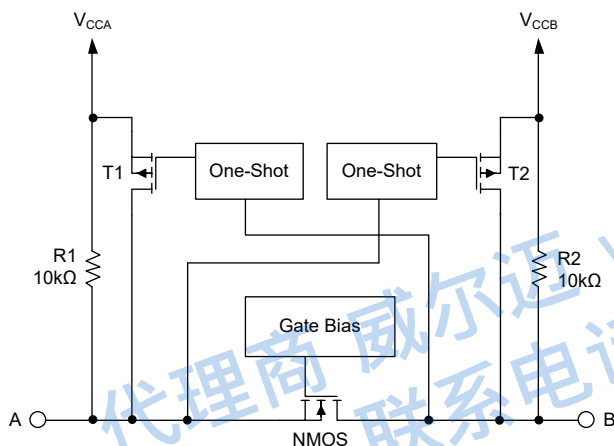


Figure 7. Architecture of an SGM4553 Cell

The explanation of two main parts of the internal circuit for the SGM4553 is shown as below:

- There is an NMOS between port A and port B to switch on or off the transmission.
- The one-shot accelerator can be used to accelerate the rising edges of the signal for port A and port B automatically.

### Input Driver Requirements

The falling time of port A and port B and  $t_{PHL}$  depend on the output impedance of the connected device. The values of parameters which are  $t_{fA}$ ,  $t_{fB}$ ,  $t_{PHL}$  and data rates are specified when the resistance of external driver is less than 50Ω.

### Power-Up

For the application of the SGM4553, 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.

### Output Load Considerations

To decrease the extend of capacitive loading and ensure the proper triggering of O.S., the trace in PCB should be as short as possible. Also, to ensure that the round-trip reflection delay is smaller than the time period of one-shot, the users should also decrease the length of trace, which means that the signal integrity is guaranteed because of the low impedance for the reflection. The period of on-state for the O.S. part is 30ns. In addition, for the one-shot circuit, it can support lumped capacitive load. In addition, the one-shot circuit has the time-out function, which aims to handle the extremely heavy capacitive load. For the function of O.S. part of the SGM4553, it can optimize the trade-off between the capability of load driving, maximum bit-rate and dynamic supply current. The length of PCB trace and output connectors will be considered as the capacitive load of the device, which may result in the retriggering of O.S., contention of bus and the oscillations of the output.

### Enable and Disable

The function of OE is used to disable SGM4553 by setting the transmitting I/O pins to high-impedance mode. The pull-down current source is integrated inside OE once it is powered by  $V_{CCA}$ . 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 one-shot part starts to operate.

### Pull-Up or Pull-Down Resistors on I/O Lines

For the I/O pin of A and B side, there is a 10kΩ pull-up resistor to provide a high position for each I/O pin. However, if a smaller pull-up resistor is required, the users can add an external resistor which is parallel with the 10kΩ resistor. Also, the value of  $V_{OL}$  can be affected by the added external resistor. In addition, if the user wants to disable the device, the OE pin can be simply set to low position.

**REVISION HISTORY**

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

<b>JUNE 2018 – REV.A.1 to REV.A.2</b>	<b>Page</b>
Updated Marking Information section.....	2
<hr/>	
<b>MAY 2018 – REV.A to REV.A.1</b>	<b>Page</b>
Added Package Thermal Resistance.....	2
<hr/>	
<b>Changes from Original (JUNE 2014) to REV.A</b>	<b>Page</b>
Changed from product preview to production data.....	All

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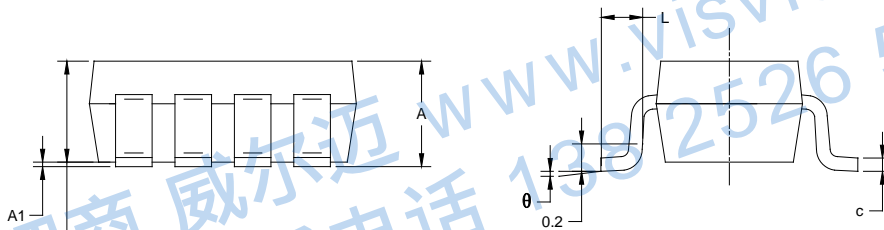
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PACKAGE OUTLINE DIMENSIONS

SOT-23-8



RECOMMENDED LAND PATTERN (Unit: mm)



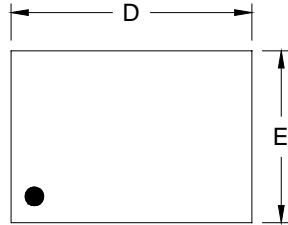
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Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.650 BSC		0.026 BSC	
e1	0.975 BSC		0.038 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

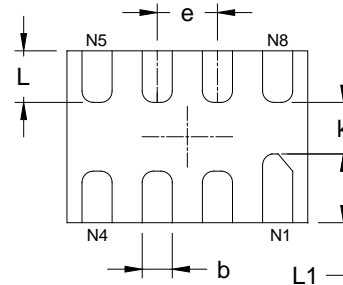
NOTES:  
1. Body dimensions do not include mode flash or protrusion.  
2. This drawing is subject to change without notice.

PACKAGE OUTLINE DIMENSIONS

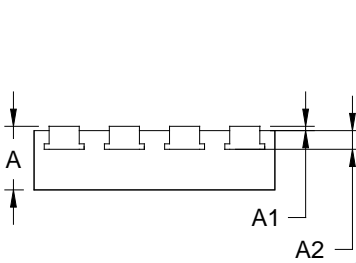
XTDFN-1.4x1-8L



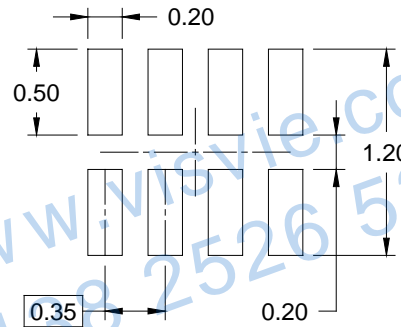
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

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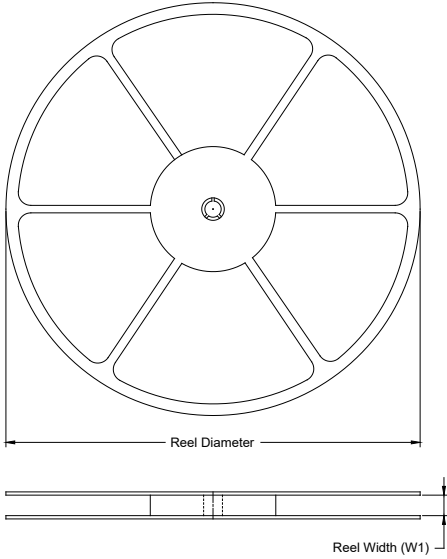
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.340	0.400	0.013	0.016
A1	0.000	0.050	0.000	0.002
A2	0.110 REF		0.004 REF	
D	1.350	1.450	0.053	0.057
E	0.950	1.050	0.037	0.041
k	0.200 MIN		0.008 MIN	
b	0.150	0.200	0.006	0.008
e	0.350 TYP		0.014 TYP	
L	0.250	0.350	0.010	0.014
L1	0.350	0.450	0.014	0.018

NOTE: This drawing is subject to change without notice.

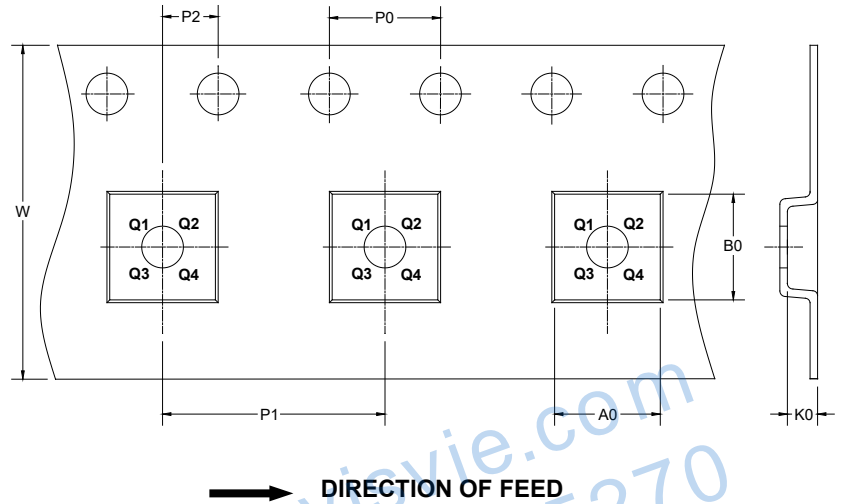


TAPE AND REEL INFORMATION

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
SOT-23-8	7"	9.5	3.17	3.23	1.37	4.0	4.0	2.0	8.0	Q3
XTDFN-1.4×1-8L	7"	9.5	1.15	1.60	0.50	4.0	4.0	2.0	8.0	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

DD0002