GXT310 High-precision Digital Temperature Sensor Optimized for Human Body Temperature Measurement

1 Features

- Optimized for human body temperature measurement
- Temperature measurement accuracy: ± 0.1 °C (+30°C to +45°C)
- Power supply voltage: 1. 6V ~ 5.5V
- Operating temperature: -55 °C ~ +150 °C
- Conversion current: 40μA
- Standby current: 0.5μA
- Resolution: 16-bit (0.0078125 °C)
- Communication interface: I^2C, SMBus

2 Applications

- Medical thermometer
- Wearable body temperature monitoring
- High-precision temperature probe

Chip packaging information

Product	Package	Chip packaging area
GXT310W	WLCSP (4)	0.73 mm × 0.73 mm
GXT310T	MCLGA (4)	3.00 mm × 3.00 mm
GXT310D	DFN (6)	2.00 mm × 2.00 mm

3 Description

The GXT310 is a low-cost and high-precision digital temperature sensor optimized for human body temperature measurement. It can achieve 16-bit (0.0078125 ℃) temperature output without any external temperature sensing unit. And it has a temperature measurement error of less than ±0.1℃ within the temperature range from 30℃ to 45℃.

The GXT310 supports two packaging forms: WLCSP-4 and MCLGA-4. The former is extremely small in size and is suitable for application scenarios with extremely limited space; the latter transfers heat quickly and is specially designed for human skin surface temperature measurement.

The GXT310 supports two-wire communication, can accommodate up to 8 slaves, being compatible with the I^2C or SMBus interfaces of most MCUs and SoCs.

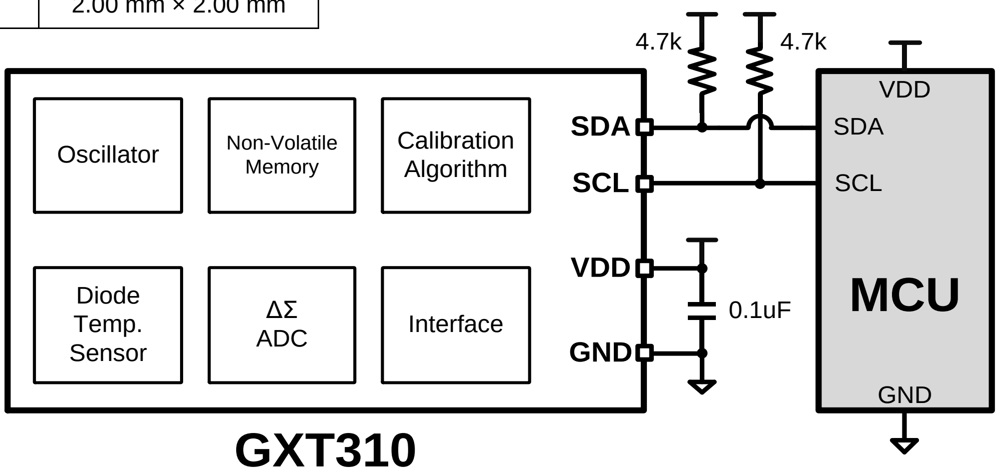
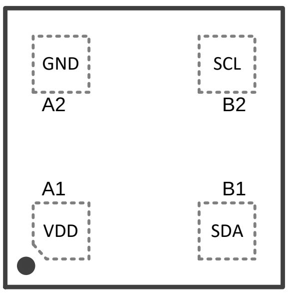


Table of Contents

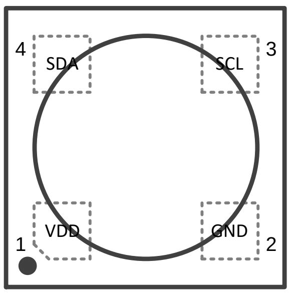
4 Pin Description

WLCSP



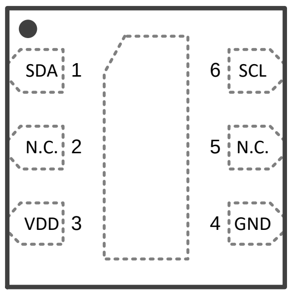
TOP VIEW

MCLGA



TOP VIEW

DFN



TOP VIEW

PIN				DESCRIPTION
NAME	WLCSP	MCLGA	DFN	
VDD	A1	1	3	Power pin, it is recommended to add a 0.1uF~10uF bypass ground capacitor.
GND	A2	2	4	Ground.
SCL	B2	3	6	Serial clock pin, requires 4.7k pull-up resistor.
SDA	B1	4	1	Serial data pin, requires 4.7k pull-up resistor.
NC	-	-	2, 5	No connection.

5 Specifications

5.1 Absolute Maximum Ratings

	MIN	MAX	UNIT
Pin Voltage	-0.5	6	V
Temperature Range	-5 5	15 0	°C
Junction Temperature		1 5 0	°C
Storage Temperature	-60	1 5 0	°C

Unless otherwise noted, the specifications in the above table apply within the atmospheric temperature range. Stresses beyond the range may cause permanent damage to the device.

5.2 Electrostatic Protection

		PROTECTION	UNIT
Electrostatic Discharge	Human Body Mode (HBM), per ANSI/ESDA/JEDEC JS-001	±4000	V
Latch-up Effect	Latch-Up, per JESD 78, Class IA	±200	mA

5.3 Electrical Characteristics

Unless Unless otherwise specified, electrical characteristics of devices at T_A = - 40˚C~+125˚C and V+ = 1.6 V ~ 5.5V. (Typical operating conditions are at + 25˚C and 3.3V)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage		1.6	3.3	5.5	V
Operating Temperature		-55		15 0	°C
Temperature Measurement Accuracy	+30°C to +45°C, 3.3 V		± 0.0 3125	± 0.1	°C
	+10°C to + 60 °C, 3.3V		± 0.1	± 0.3	°C
	-40°C to +125°C, 3.3V		± 0.3	± 0.5	°C
Supply Voltage Sensitivity	-40°C to +125°C			0.1	°C/V
Resolution			0.0078125		°C
			16		bits
Conversion Time			60	75	ms
Operating Current	Conversion period		40	80	μA
	Standby period		0.5	3	μA
Pull-up Resistor		0.5	4.7	10	kΩ
Communication Frequency	Quick mode	10		400	kHz
	High-speed mode	0.01		2.5	MHz
Timeout Reset Time			30		ms

6 Detailed Description

6.1 Temperature Output

The 15-bit (EM=0) or 16-bit (EM=1) digital output of each temperature measurement is held in a read-only temperature register, where 1 LSB = 0.0078125°C, and negative numbers are represented in two's complement form. When EM=0, the lowest bit of the temperature register always reads 0.

To retrieve the temperature output, reading of two bytes is required. The first byte is the most significant byte (MSB), followed immediately by byte 2 which is the least significant byte (LSB). The left-aligned upper 15 bits (EM=0) or 16 bits (EM=1) are used to indicate the temperature. If a temperature resolution of less than 1° C (EM=0) or 2° C (EM=1) is not required, the user can choose not to read byte 2.

Table 1. Temperature Data Format (15bit, EM=0)

Temperature (°C)	Digital Output (Binary)	Digital Output (Hex)
+ 150 .0000000	0111 1111 1111 1110	7FFE
+ 127.9 921875	0111 1111 1111 1110	7FFE
+ 125.0000000	0111 1101 0000 0000	7D00
+ 85.0000000	0101 0101 0000 0000	5500
+ 27.0000000	0001 1011 0000 0000	1B00
+ 0.0078125	0000 0000 0000 0010	000 2
+ 0.0000000	0000 0000 0000 0000	0000
- 0.0078125	1111 1111 1111 1110	FFFE
- 55.0000000	1100 1001 0000 0000	C900

Table 2. Temperature Data Format (16bit, EM= 1)

Temperature (°C)	Digital Output (Binary)	Digital Output (Hex)
+150 .0000000	0100 1011 0000 0000	4B00
+127.9 921875	0011 1111 1111 1111	3FFF
+125.0000000	0011 1110 1000 0000	3E80
+85.0000000	0010 1010 1000 0000	2A80
+27.0000000	0000 1101 1000 0000	0D80
+0.0078125	0000 0000 0000 0001	0001
+0.0000000	0000 0000 0000 0000	0000
-0.0078125	1111 1111 1111 1111	FFFF
-55.0000000	1110 0100 1000 0000	E480

Note: Tables 1 and 2 do not provide data formats for all temperatures.

6.2 Register Maps

The GXT310 internal register stack consists of four 16-bit registers, and the mapping relationship is shown in Table 3. The specific content of the register is shown in Tables 4~9.

Table 3. Register Stack and its Pointers

Pointer	Register	Attributes	Initial Value
0x00	Temperature	R	0x0000
0x01	Configuration	R/W	0x00C0
0x02	Low threshold	R/W	0x4B00
0x03	High threshold	R/W	0x5000

Note: R stands for read-only; R/W stands for read-write.

Table 4. Temperature Register (EM=0)

BIT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Binary	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1	T0	0
Temperature	sign	64	32	16	8	4	2	1	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}	-
Attributes	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

Note: R stands for read-only; R/W stands for read-write. Sign indicates the sign bit, 0=positive number, 1=negative number.

Table 5. Temperature Register (EM=1)

BIT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Binary	T15	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1	T0
Temperature	sign	128	64	32	16	8	4	2	1	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}
Attributes	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

Note: R stands for read-only; R/W stands for read-write. Sign indicates the sign bit, 0=positive number, 1=negative number.

Table 6. Configuration Register

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Binary	ALT	-	-	FQ1	FQ0	-	TM	SD	EM	-	-	TO	EC	CR1	CR0	OS
Default	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Attributes	R	R	R	R/W	R/W	R	R/W	R/W	R/W	R	R	R/W	R/W	R/W	R/W	R/W

Note: R stands for read-only; R/W stands for read-write. “-” represents a reserved bit.

Table 7. Configuration Register Content Description

PARAMETER	DESCRIPTION
ALT	Over-temperature alarm flag ALT=0: The temperature output sits between the high and low thresholds ALT=1: The temperature output exceeds the high and low thresholds
FQ	Error queue depth, i.e., the number of consecutive over-temperature events required to trigger the ALT. FQ=0x0: 1 time (default) FQ=0x1: 2 times FQ=0x2: 4 times FQ=0x3: 6 times
TM	Over-temperature alarm mode TM=0: Comparison mode (default) TM=1: Interrupt mode
SD	Shutdown mode control SD=0: Continuous conversion mode (default) SD=1: Shutdown mode
EM	Extended mode EM=0: The temperature output is 15 bits EM=1: The temperature output is 16 bits (default)
TO	Timeout reset function TO=0: Turn on the timeout reset function (default) TO=1: Turn off the timeout reset function
EC	Error check function EC=0: Turn off error checking function (default) EC=1: Turn on error checking function
CR	Temperature refresh rate CR=0x0: 0.25Hz (default) CR=0x1: 1.0Hz CR=0x2: 4.0Hz CR=0x3: 8.0Hz
OS	Single conversion status bit OS=0: Single conversion completed (default) OS=1: Single conversion in progress. Writing this bit to 1 in Shutdown mode will start a temperature conversion

Table 8. Low Threshold Register

BIT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
EM=0	L14	L13	L12	L11	L10	L9	L8	L7	L6	L5	L4	L3	L2	L1	L0	0
EM=1	L15	L14	L13	L12	L11	L10	L9	L8	L7	L6	L5	L4	L3	L2	L1	L0
Default	0	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0
Attributes	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

Note: R stands for read-only; R/W stands for read-write. “-” represents a reserved bit.

Table 9. High Threshold Register

BIT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
EM=0	H14	H13	H12	H11	H10	H9	H8	H7	H6	H5	H4	H3	H2	H1	H0	0
EM=1	H15	H14	H13	H12	H11	H10	H9	H8	H7	H6	H5	H4	H3	H2	H1	H0
Default	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Attributes	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

Note: R stands for read-only; R/W stands for read-write. “-” represents a reserved bit.

The high (low) threshold register has the same data format as the temperature register. Modifying the EM bit in the configuration register will only change the way the value of the high (low) threshold register is parsed (that is, using 15-bit temperature or 16-bit temperature), and does not perform any shift operations on the high (low) threshold register itself. Therefore, when the EM bit changes, the user needs to update the high (low) threshold register in a timely manner, otherwise, it may lead to errors in the over-temperature alarm function.

6.3 Operating Mode

6.3.1 Continuous Conversion

The GXT310 defaults to continuous conversion mode (SD=0) when power-on. In this mode, the GXT310 regularly samples the surface temperature of the chip, and the conversion result is stored in the temperature register, overwriting the previous result. The temperature conversion takes approximately 60ms, with a static current of 40uA (under typical conditions); after the conversion ends, it enters a idle state, with a static current of 2uA (under typical conditions). The duration of the idle state is determined by the temperature refresh rate, which is 0.25Hz by default (CR=0x0) for GXT310 upon power-on, meaning the temperature is refreshed once every 4 seconds, as shown in Figure 1. Lower refresh rates can achieve lower average power consumption.

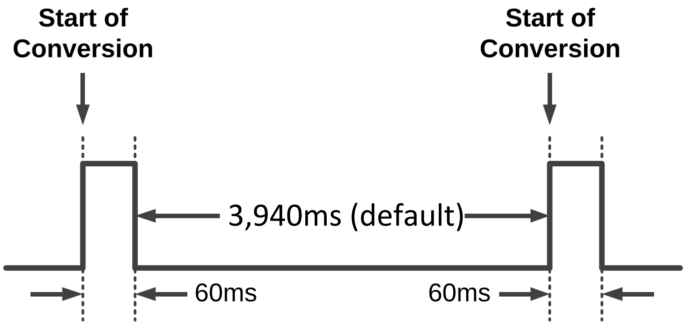


Figure 1. Temperature Refresh Rate

6.3.2 Shutdown Mode

Shutdown mode of the device allows the user to conserve power by shutting down all device circuitry except the serial interface, thereby reducing the quiescent current to less than 0.5μA (under typical conditions). Shutdown mode is initiated when writing SD=1, and the GXT310 will shut down after the current conversion is completed. The GX310 will re-enter continuous conversion mode when writing SD=0 to exit shutdown mode.

6.3.3 Single Conversion

When GXT310 is in shutdown mode, writing OS=1 can trigger a temperature conversion; once the conversion is completed, the GXT310 will automatically turn on shutdown mode again. If continuous temperature measurement is not required, this function can significantly save chip power consumption. It should be noted that if the GXT310 is in continuous conversion mode, writing OS=1 will have no effect and the OS bit will always be read as 0.

6.4 Alarm Mode

6.4.1 Comparison Mode

The GXT310 defaults to comparison mode (TM=0) when power-on. In this mode, if the temperature measurement result is equal to or exceeds the high threshold for a number of consecutive times, reaching the value defined by the FQ bit in the configuration register, then the over-temperature alarm flag ALT bit in the configuration register will be activated. The ALT bit remains active until the temperature measurement result is equal to or lower than the low threshold for a number of consecutive times, reaching the value defined by the FQ bit in the configuration register. The difference between the high and low thresholds appears as hysteresis in the comparator output, and the error queue defined by the FQ bit can effectively avoid false alarms caused by environmental disturbances.

6.4.2 Interrupt Mode

The GXT310 can be configured in interrupt mode (TM=1). In this mode, if the temperature measurement result is equal to or exceeds the high threshold for a number of consecutive times, reaching the value defined by the FQ bit in the configuration register, then the over-temperature alarm flag ALT bit in the configuration register will be activated. The ALT bit remains active until the user reads any register. After the ALT bit is cleared, the ALT bit will be activated again only when the temperature measurement result is equal to or lower than the low threshold for a number of consecutive times reaching the value defined by the FQ bit in the configuration register, and will remain activated until the next user read Take the occurrence of any register action. The cycle goes back and forth.

The working diagram of the two alarm modes is shown in Figure 2.

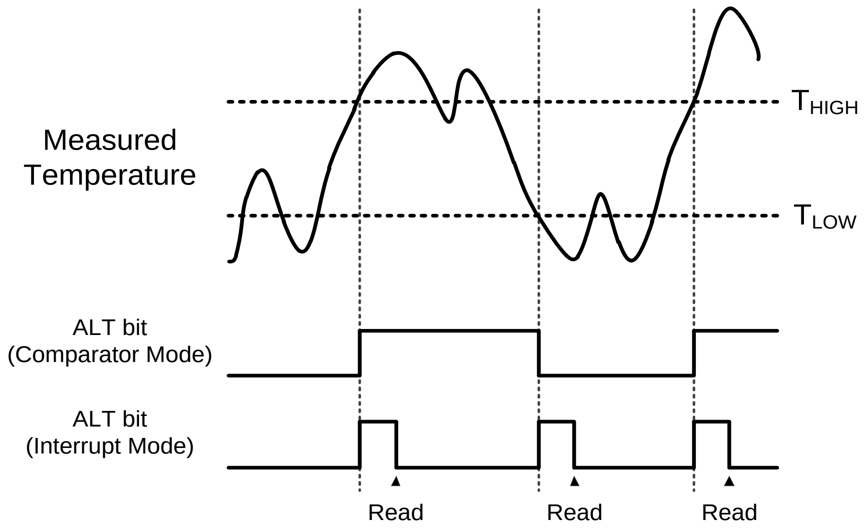


Figure 2. Working Diagram of Over-temperature Alarm

6.5 Serial Interface

6.5.1 Bus Overview

I^2C/SMBus is a two-wire serial communication interface that supports multiple masters and multiple slaves. Among them, the device that initiates communication is called the host, and the device controlled by the host is called the slave. The host is responsible for generating the serial clock (SCL) to control bus access and the generation of start and stop conditions (START/STOP).

Data transfer is in bytes, with 1 Ack bit appended every 8 clocks. During data transfer, SDA must remain stable while SCL is high because the falling edge of SDA during the high level of SCL is defined as the start condition (START); the rising edge of SDA is defined as the stop condition (STOP). These two represent the beginning and end of communication respectively. The standard I^2C/SMBus protocol stipulates a series of timing parameters, whose definition and range are shown in Figure 3 and Table 10 respectively.

Table 10. I2C/SMBus Timing Characteristics

SYMBOL	PARAMETER	STANDARD MODE		HIGH-SPEED MODE		UNIT
		MIN	MAX	MIN	MAX	
f	SCL clock frequency	10	400	10	2700	kHz
tSU:STA	Start condition: establishment time	0.6	-	0.26	-	us
tHD:STA	Start condition: hold time	0.6	-	0.26	-	us
tSU:STO	Stop condition: Setup time	0.6	-	0.26	-	us
tBUF	Idle time between start and stop conditions	1.3	-	0.5	-	us
tSU:DAT	SDA data: Setup time	0.1	-	0.05	-	us
tHD:DAT	SDA data: hold time	0	-	0	-	us
tHI	SCL clock: high level time	0.6	-	0.26	-	us
tLOW	SCL clock: low level time	1.3	-	0.5	-	us
tR	SDA/SCL bus rise time	-	300	-	120	ns
tF	SDA/SCL bus fall time	-	300	-	120	ns

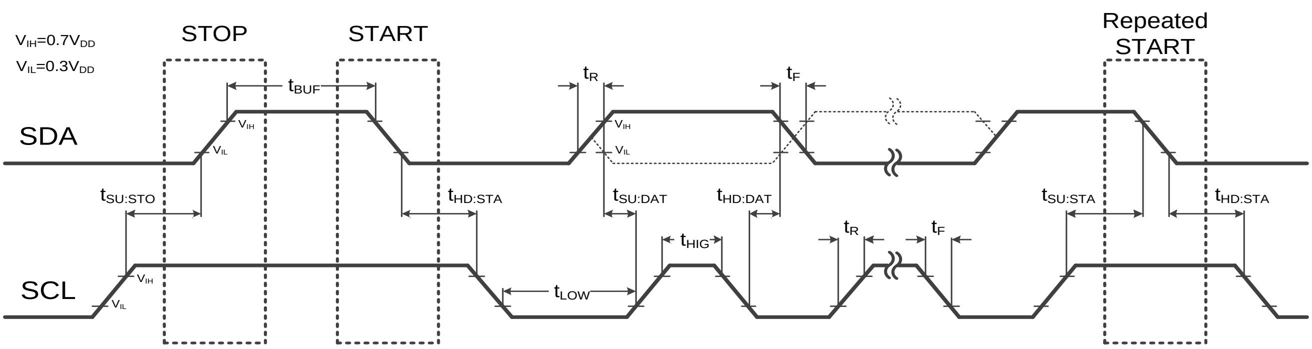


Figure 3. I^2C/SMBus Timing Definition

6.5.2 Slave Address

Table 11. Mapping Relationship between Product Number and Slave Address

Product Number	Slave Address (R/W)	Product Number	Slave Address (R/W)
GXT310X0	0x91 / 0x90	GXT310X4	0x99 / 0x98
GXT310X1	0x93 / 0x92	GXT310X5	0x9B / 0x9A
GXT310X2	0x95 / 0x94	GXT310X6	0x9D / 0x9C
GXT310X3	0x97 / 0x96	GXT310X7	0x9F / 0x9E

Note: The X in the product number represents the package information. (W=WLCSP; T=MCLGA)

6.5.3 Read and Write Operations

To communicate with the GXT310, the master must first address slave devices through an address byte. The address byte has seven address bits and a read-write (R/W) bit. The GXT310 uses product numbers to distinguish address bits. The specific mapping relationship is shown in Table 11. It supports up to 8 slaves being connected at the same time. The read and write flag bits are used to indicate the data transfer direction, 0b represents host writing; 1b represents host reading. Data transfer starts with the highest bit.

The GXT310 uses a pointer register to indicate the name of the register operated by the current read and write process. The pointer register is the second byte of the host write operation. Each write operation to the GXT310 needs to be written to the pointer register, as shown in Figure 4. The two data bytes immediately following the pointer byte represent the data to be written to the specified register. The host read operation needs to modify the pointer register first, and then send (repeatedly) the start condition and the slave address byte (R/W=1) to change the data transmission direction, thereby allowing the GXT310 to send the target register selected by the pointer to the bus. The data is shown in Figure 5.

6.5.4 Error Check

The GXT310 supports communication data error check function, which is turned on or off controlled by the EC bit in the configuration register. When the function is turned on, each read and write operation will be accompanied by an additional CRC-8 check byte. The checked data includes all bytes from the start condition to the stop condition (excluding the check byte itself). The generator polynomial is: $G(x) = x^8 + x^2 + x^1 + 1$. The specific timing sequence is shown in Figures 6 and 7.

(1) Take reading the initial power-on value of the low threshold register as an example:

START + 0x90 + 0x02 + Re-START + 0x91 + 0x4B+ 0x00 + ECB + STOP

ECB = CRC8 (0x90, 0x02, 0x91, 0x4B, 0x00) = 0x87

(2) Take writing the configuration register as an example:

START + 0x90 + 0x01 + 0x00 + 0x08 + ECB + STOP

ECB = CRC8 (0x90, 0x01, 0x00, 0x08) = 0x05

Note: If EC=1 when writing the configuration register, the write operation must be accompanied by the correct check byte, otherwise the write operation will be invalid.

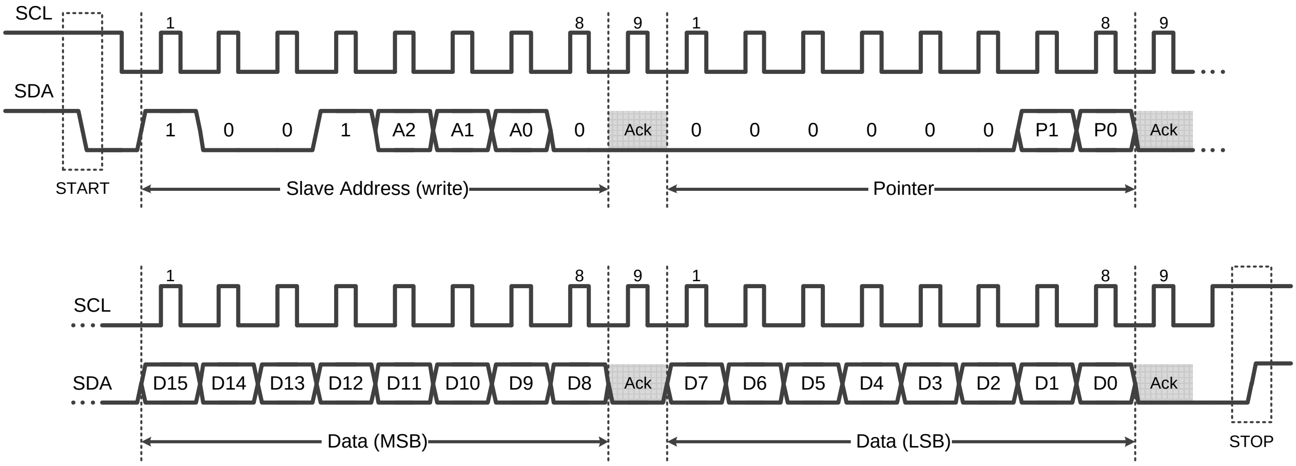


Figure 4. Write Operation Timing Diagram (EC=0)

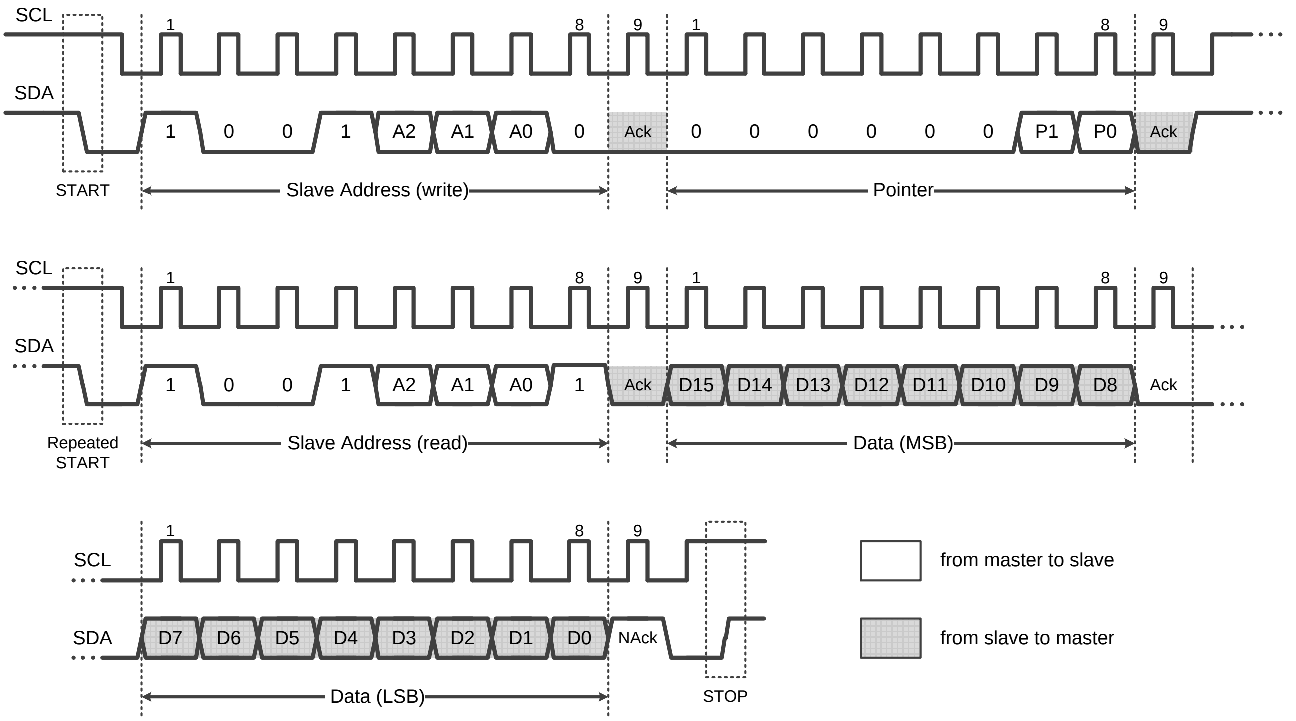


Figure 5. Read Operation Timing Diagram (EC=0)

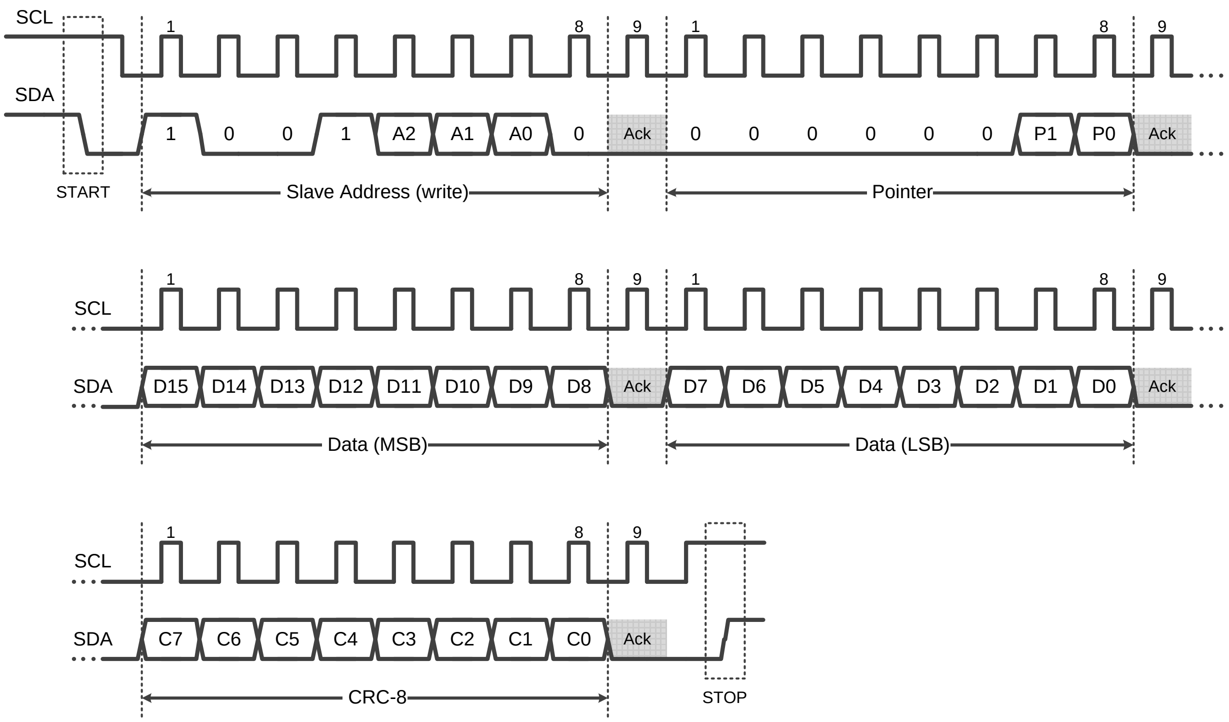


Figure 6. Write Operation Timing Diagram (EC=1)

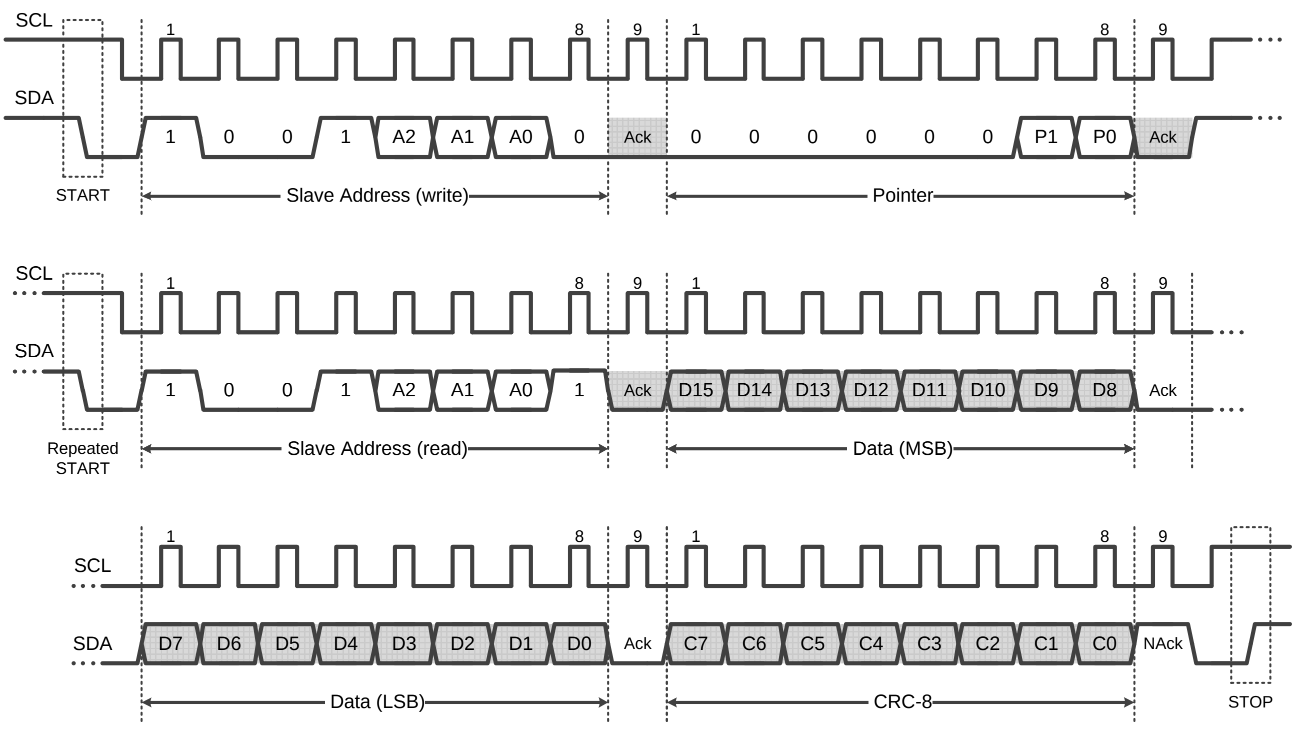


Figure 7. Read Operation Timing Diagram (EC=1)

6.5.5 Timeout Reset

The GXT310 features timeout reset function, which is turned on or off controlled by the TO bit in the configuration register. When the function is turned on, if SDA or SCL remains low for more than 30ms (typical) between the start condition and the stop condition, the GXT310 will automatically reset its serial interface, release the SDA bus and wait for the next communication to start. This function can effectively avoid bus deadlock and improve system stability; however, it will limit the minimum SCL clock frequency to no less than 10kHz.

6.5.6 General-call Reset

The GXT310 will respond to the general-call address, 0x00). If the second byte after the general-call address is a reset command (0x06), the GXT310 will respond to this byte and reset the internal register file to the initial power-on state. The specific timing is shown in Figure 8.

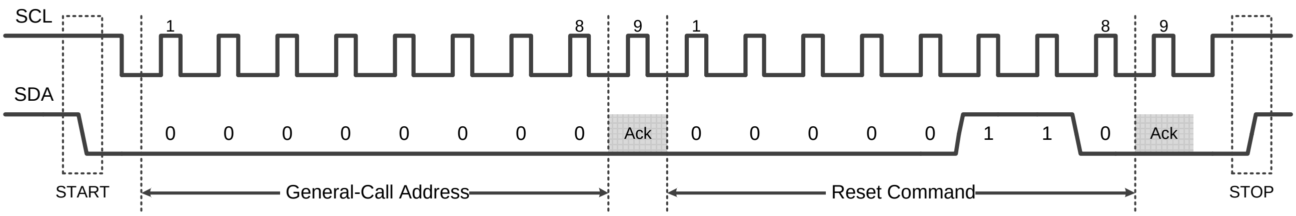


Figure 8. General-call Reset Timing Diagram

6.5.7 High-speed Mode

The GXT310 supports serial interface in operating at frequencies above 400kHz. The host sends a high-speed mode code (0000 1xxxb) after the start condition. The GXT310 will not respond to this byte, but will switch the input and output filters of the SDA and SCL pins to high-speed mode, allowing the bus to transmit data at up to 2.7MHz. The GXT310 will continue to operate in high-speed mode until a stop condition occurs on the bus. Once a stop condition is received, the GXT310 switches the input and output filters back to standard mode. The specific timing is shown in Figure 9. (Take write operation as an example)

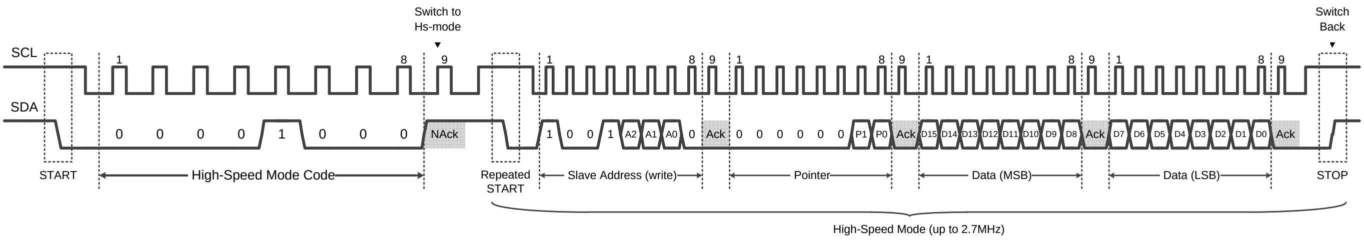


Figure 9. High-speed Mode Timing Diagram (Taking write operation as an example)

7 Application

Note

The following contents are the precautions for GXT310 in practical applications recommended by Beijing Galaxy-CAS Technology Co.,Ltd. which does not guarantee the accuracy or completeness. Customers are responsible for determining suitability of components for their purposes and should validate and test their design implementation to confirm system functionality.

7.1 Power Supply Suggestions

The average power consumption of the GXT310 is extremely low (less than 3uA under default conditions), so an RC filter circuit can be added to the power pin to further reduce the impact of power supply noise. As shown in Figure 10, the resistance must be less than 1kΩ, the capacitance must be more than 0.1uF, and the power supply pin voltage cannot be less than 1.6V.

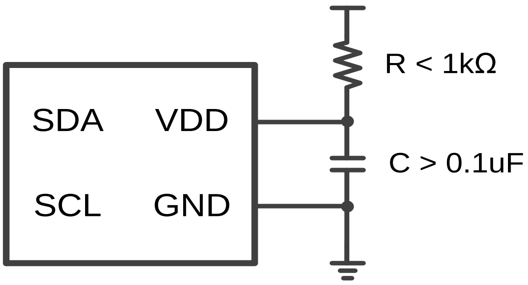


Figure 10. Power Supply Noise Suppression Technology

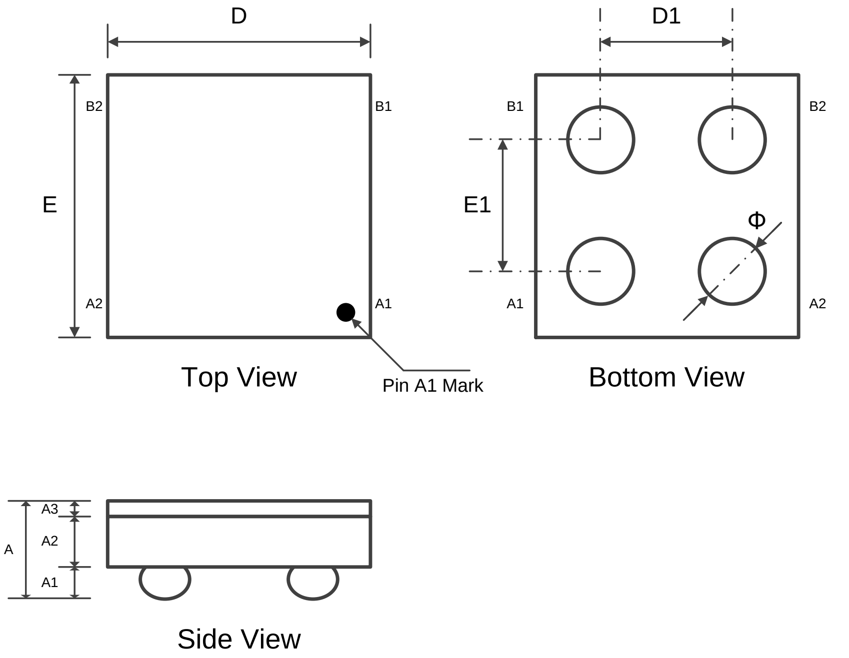
7.2 Layout Suggestions

The GXT310 should be kept as far away from noise sources as high-speed digital buses, coil components, and wireless antennas. Beijing Galaxy-CAS Technology Co.,Ltd. recommends placing a low ESR ceramic capacitor between the power pin and the ground pin to filter out power supply noise. This capacitor needs to be as close as possible to the power pin, and the recommended value is 0.1uF. Under severe noise environments, Beijing Galaxy-CAS Technology Co.,Ltd. recommends using multiple different capacitance values in parallel, such as 1uF+0.1uF+0.01uF, etc., to filter out digital noise in multiple frequency ranges.

The GXT310 should be as close as possible to the heat source being monitored, and use an appropriate layout to achieve good thermal coupling to ensure that temperature changes are captured in the shortest time interval. The average power consumption of GXT310 is extremely low (less than 9uW under default conditions), and self-heating due to power consumption is negligible.

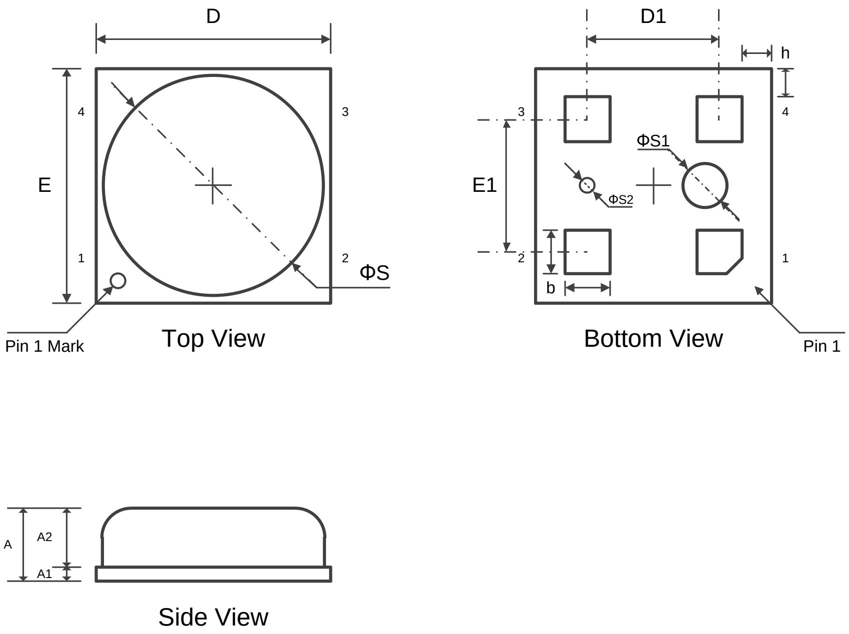
8 Package Information

8.1 WLCSP-4



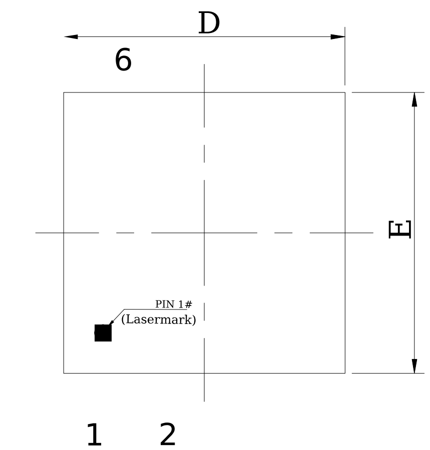
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.5	0.54	0.58
A1	0.16	0.18	0.20
A2	0.30	0.32	0.34
A3	0.04	0.04	0.04
D	0.70	0.73	0.76
E	0.70	0.73	0.76
Φ	0.22	0.235	0.25
D1	0.4 (BSC)		
E1	0.4 (BSC)		

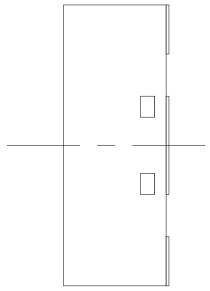
8.2 MCLGA-4



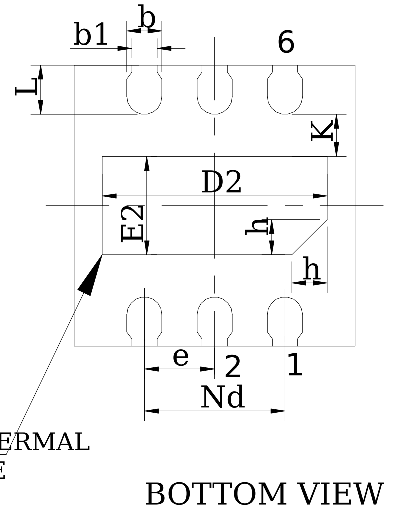
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.20	0.25	0.30
A2	0.70	0.75	0.80
D	2.90	3.00	3.10
E	2.90	3.00	3.10
D1	1.80 (BSC)		
E1	1.80 (BSC)		
b	0.55	0.60	0.65
h	0.25	0.30	0.35
ΦS	2.70	2.80	2.90
ΦS1	0.55	0.60	0.65
ΦS2	0.15	0.20	0.25

8.3 DFN - 6

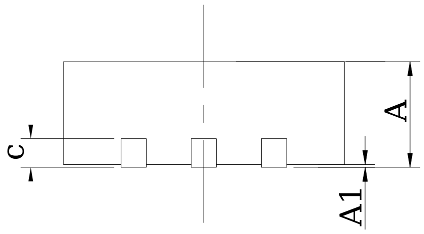




TOP VIEW



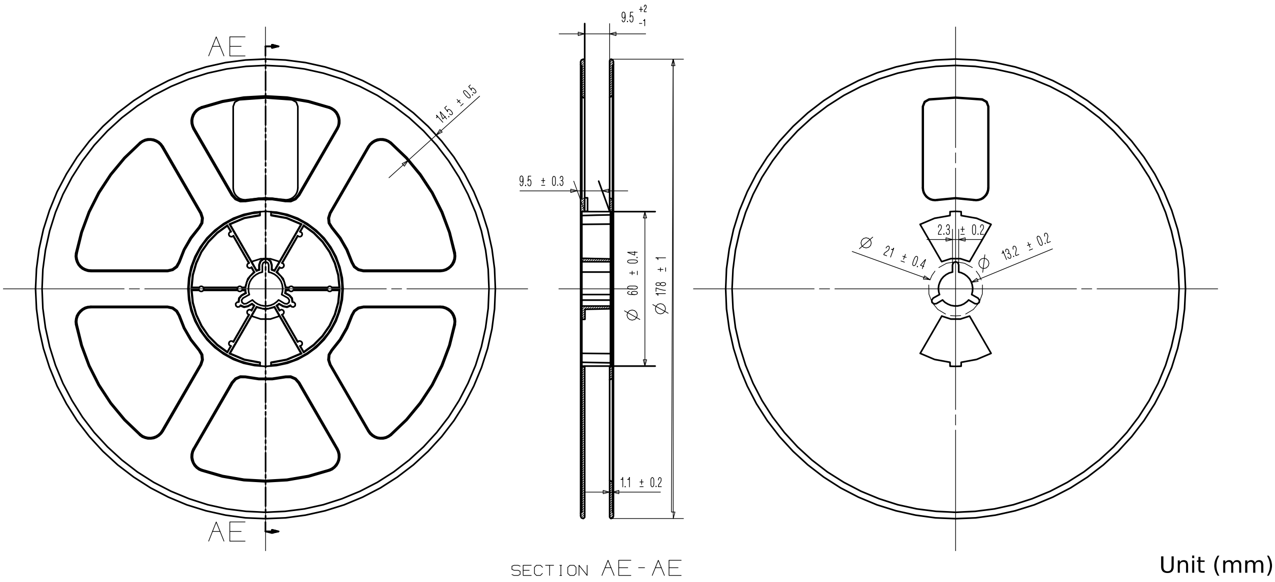
BOTTOM VIEW

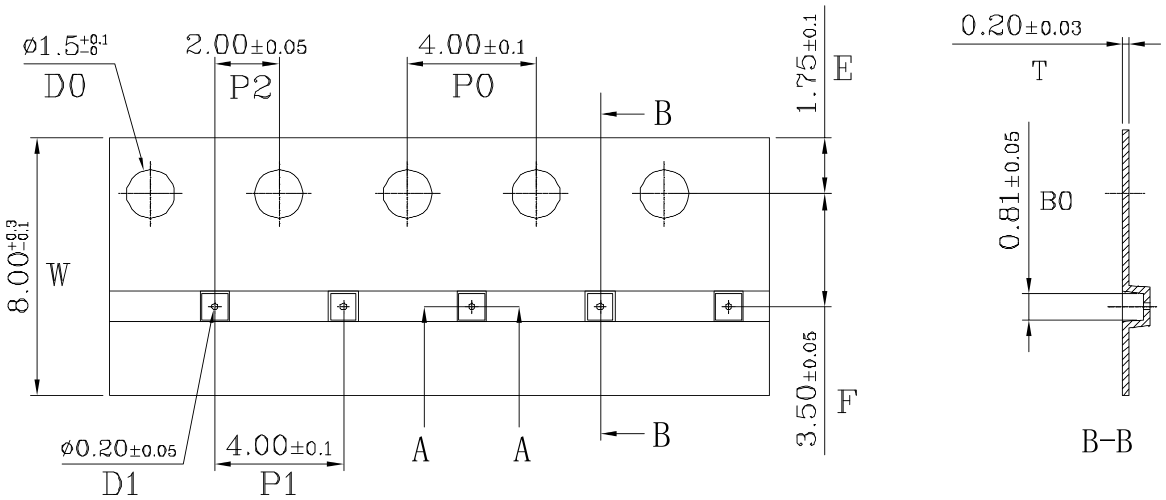


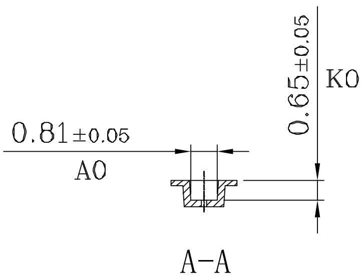
SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
b	0.20	0.25	0.30
b1	0.18REF		
c	0203REF		
D	1.90	2.00	2.10
D2	1.50	1.60	1.70
Nd	1.00BSC		
E	1.90	2.00	2.10
E2	0.60	0.70	0.80
e	0.50BSC		
K	0.30REF		
L	0.30	0.35	0.40
h	0.20	0.25	0.30

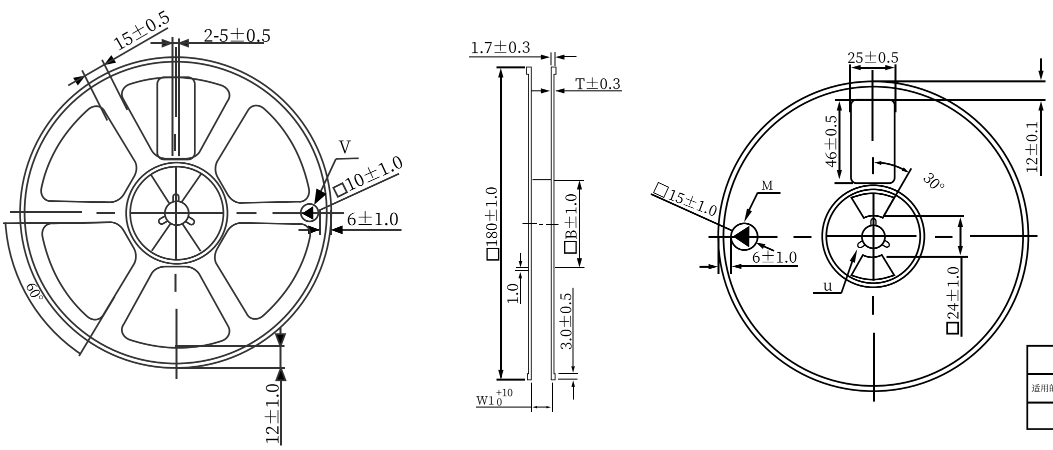
8.4 Tape & Reel (WLCSP-4)



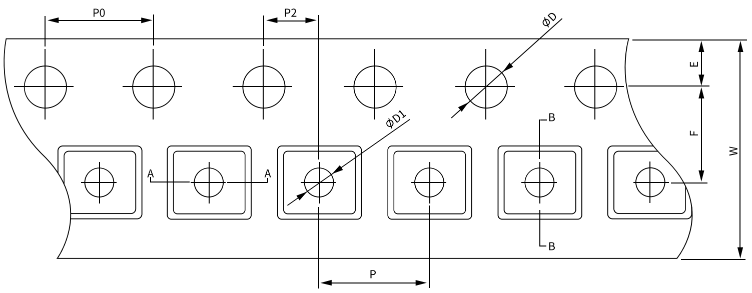


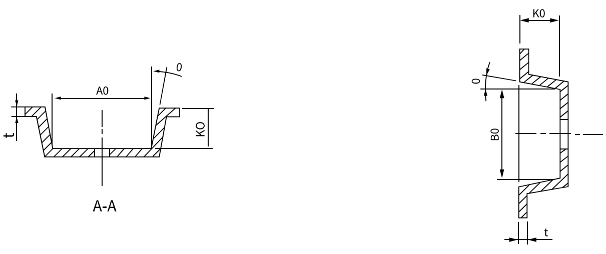


8.5 Tape &Reel (DFN-6)



圆盘基本尺寸(mm)			
适用的载带宽度	B	W1	T
8	54.4	8.6	1.5





共同尺寸

外观	尺寸(mm)
E	1.75±0.10
F	3.50±0.05
P2	2.00±0.05
D	1.50±0.10
D1	$1.00^{+0.25}_{0}$
P0	4.00±0.10
10P0	40.00±0.20

口袋尺寸

外观	尺寸(mm)
W	$8.00^{+0.3}_{-0.1}$
P	4.00±0.10
A0	2.13±0.05
B0	2.13±0.05
K0	0.88±0.05
t	0.254±0.02
0	5° MAX

9 Ordering Information

Order Number	Product Model	Package Information	Standard Quantity	Note
GXT310Tx - Tr	GXT310Tx	MCLGA (4)	490	tray
GXT310Wx-T&R	GXT310Wx	WLCSP (4)	3000	tape and reel
GTX310Dx-T&R	GXT310Dx	DFN (6)	4000	tape and reel

The x in the order number and product model represents the slave address, ranging from 0 to 7.

10 Revision History

Version	Date	Modified Content	Changed Pages
V0.0	2023-5	The first edition	-
V1.0	2023-6	Added packaging information and ordering information	16~18
V1.1	2023-9	Added DFN-6 package	1, 17, 19~20