

## **EASY(EZ)-SPEECH/MELODY**

### **General Description**

The RTS3100C series are micro-processor based and interrupt input driven controller. By easy-learning development tools, customer can have lots of flexibility in designing products with speech/melody playback, I/O control and LED indication.

### **Microcontroller Core Features**

- Operating voltage range : 2.4V to 5.0V@1MHz
- 128K bytes ROM (maximum): A single ROM contains all program codes, speech and melody notes
- 8 independent flags can store the programming state of the variables and add flexibility to programming.
- Stop mode minimize the power consumption .
- 8 Interrupt trigger sources from input pins. Both edge and level trigger types are supported.

### **Peripheral Features**

- Two sound channels: One for speech or melody and one for melody. One channel speech and one hannel melody or dual channels melody can be simultaneously played out through DAC output
- Supply 4-bit RTHPM
- 3, 6, 9, 12, 16, 20, 30 and 40 seconds speech capacities provided
- Speech sampling rate can be programmed to generate speech-melody or sound effect.
- One 8-bit timers: functions as timing melody rhythm, tempo, and speech duration or a general purpose timer.
- 13 I/O pads: 8 inputs, 4 outputs and 1 LED output

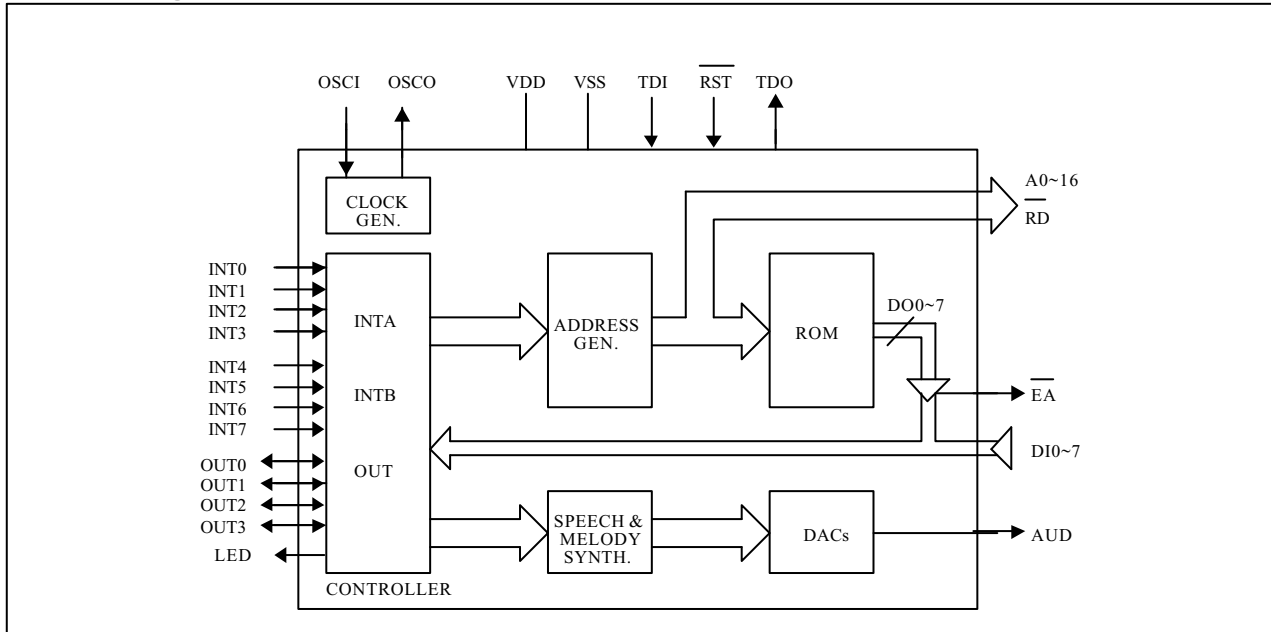
### **Special Microcontroller Features**

- Provide DAC audio output
- The programmable LED output pin can indicate at 2 Hz and 4 Hz

### **Application Field**

- Sound toy
- IR toy
- Toy with motor

## Block Diagram



- Clock Generator: generates the system frequency based on the resistor connected externally to adjust the speed of the system operation.
- The Controller is a micro-processor that can dispatch the program execution based on all the interrupt input signals.
- The Address Generator is used to translate the operand into a specific address to address the proper ROM code (data).
- The program, melody and speech data are stored in the ROM, in which the data length is 8-bit and the memory can be expanded up to 128K Bytes.
- External EPROM can be tied directly to the band-out chip for further developing.
- Digital to Analog Converters (DACs) need to be controlled smoothly for both turning ON and OFF to prevent from the unexpected noise. There are 2 DACs in total to drive the output (AUD); one for both melody 1 and speech, and the other one for melody 2. Thus, the previous DAC's driving capability will be twice in comparison to the latter one.

## Pin Description

Pin No.	Pin Name	Pin No.	Pin Name
1	INT0	49	TDO
2	INT1	48	A0
3	INT2	47	A1
4	INT3	46	A2
5	INT4	45	A3
6	INT5	44	A4
7	INT6	43	A5
8	INT7	42	A6
9	DI0	41	A7
10	DI1	40	A8
11	-	39	VDD
12	DI2	38	$\overline{\text{RST}}$
13	DI3	37	TDI
14	OSCI	36	$\overline{\text{EA}}$
15	OSCO	35	$\overline{\text{RD}}$
16	VSS	34	OUT0
17	A9	33	OUT1
18	A10	32	OUT2
19	A11	31	OUT3
20	A12	30	DI4
21	A13	29	DI5
22	A14	28	DI6
23	A15	27	DI7
24	A16	26	AUD
		25	LED

- INT0 ~ INT7 are the interrupt input pins that will be mapped to the dedicated sector according to the corresponding pin name. These pins are applied with different priority according to the corresponding pin number when more than 2 pins inputting simultaneously.
- OUT0 ~ OUT3 are the general-purpose output signal to either generate the stop signal or to drive the LED device.
- The LED output signal has 3 programming modes: flash mode, DC mode (always ON) , or flash at different frequencies (2 or 4 Hz).
- The address generator generates the proper address to interface with the external EPROM.
- The  $\overline{RD}$  signal is normally tied to the  $\overline{OE}$  and  $\overline{CE}$  of EPROM. This signal can also be tied to  $\overline{EA}$  to isolate the internal data bus for reading the external EPROM data.
- The A0~16 bus can decode 128K Bytes of ROM space for maximum speech capacity.
- The DI0~7 will connect to the input data bus of external ROM.
- TDI will only be activated when testing is in progress. Pull down this pin can switch the INTA and OUT pins as the data bus to dump the internal test patterns.
- RST will be activated to initialize the whole system as a power ON RESET. This must be tied to VDD with a resistor internally.
- The OSCI & OSCO are designed to be connected with a resistor. The operational frequency ranges around 1 MHz.
- VDD can be applied to range from 2.2 to 5.0 V for proper operation.
- VSS is normally tied to the system Ground.

## Absolute Maximum Ratings

DC Supply Voltage.....	-0.5V to + 6.0V
Input/Output Voltage.....	GND -0.5V to VDD + 0.5V
Operating temperature.....	-10°C to 60°C
Storage Temperature.....	-25°C to 125°C

Comments\*  
Never allow a stress to exceed the values listed under "Absolute Maximum Ratings", otherwise the device would suffer from a permanent damage. Nor is a stress at the listed value be allowed to persist over a period, since an extended exposure to the absolute maximum rating condition may also affect the reliability of the device, if not causing a damage thereof.

### DC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Condition
DC Supply Voltage	VDD	2.4V	3.0V	5.0V	
Operating Current	I <sub>dd</sub>	-	1mA	-	Unload
Stand-by Current	I <sub>stb</sub>	-	1uA	-	Full load
Output Driving Current	I <sub>driving</sub>	-	6mA	-	V <sub>oh</sub> = 1.1V
Output Sinking Current	I <sub>sinking</sub>	-	6mA	-	V <sub>ol</sub> = 0.7V
LED Drivng Current	I <sub>driving</sub>	-	6mA	-	V <sub>oh</sub> = 1.1V
LED Sinking Current	I <sub>sinking</sub>	-	6mA	-	V <sub>ol</sub> = 0.7V
AUD Output Current (full scale)	I <sub>driving</sub>	-	3mA	-	V <sub>oh</sub> = 0.7V
Input Pull High Resistor	I <sub>in</sub>	-	1M Ohm	-	When input pin is connected to Ground
Oscillator Frequency Deviation Per Lot	i μF/F	-	-	i ±5%	

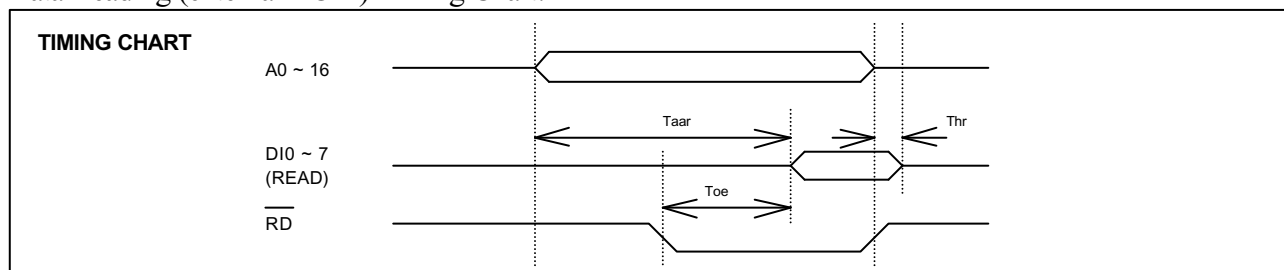
**Note:** This may require a flexible design to distinguish the input state and apply different resistance to it. This is concerning about both the power consumption and input noise immunity.

### AC Electrical Characteristics

Parameter	Symbol	Min.	Typ.
Address to read valid	T <sub>AAR</sub>	-	350ns
Read strobe to data valid	T <sub>OE</sub>	-	150ns
Data hold time to read strobe or address invalid	T <sub>HR</sub>	0	-

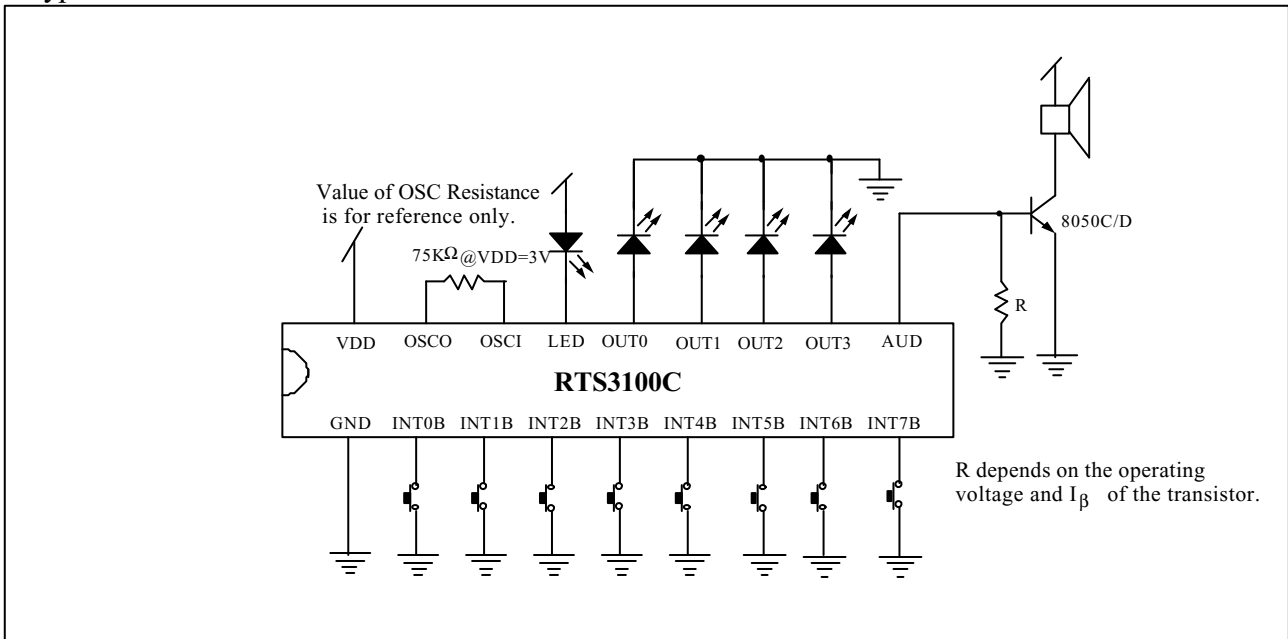
### Timing Diagram

Data Reading (external ROM) Timing Chart:

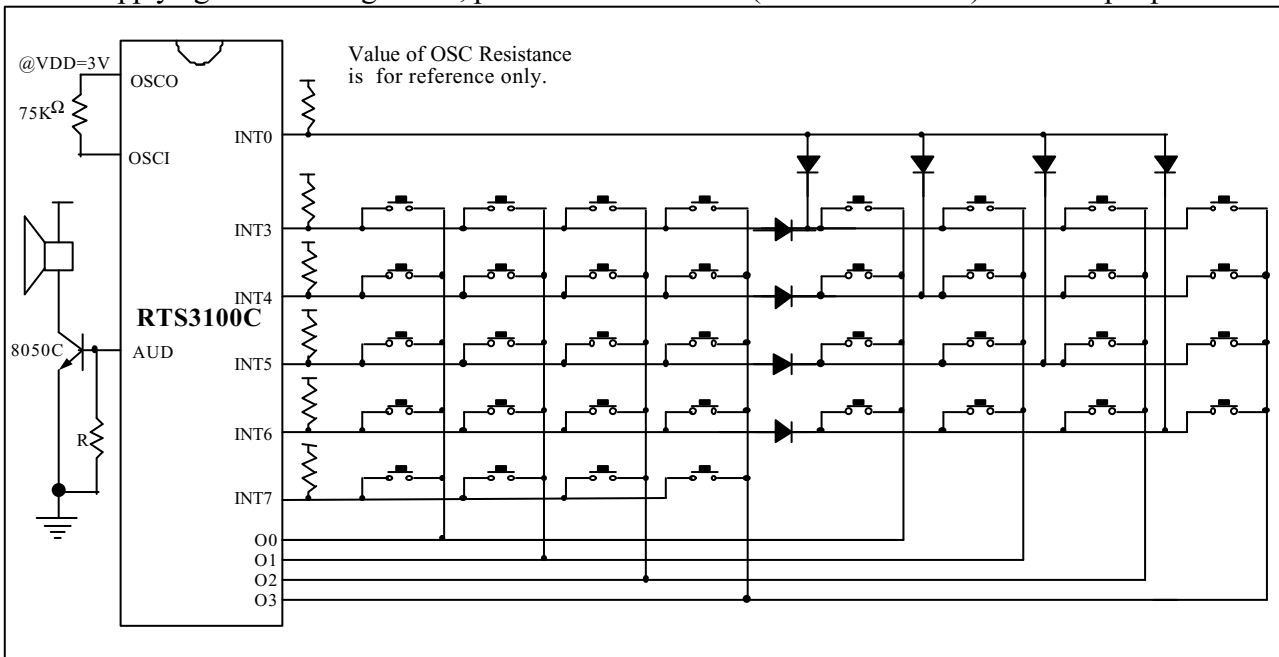


**Application Circuit(For reference only)**

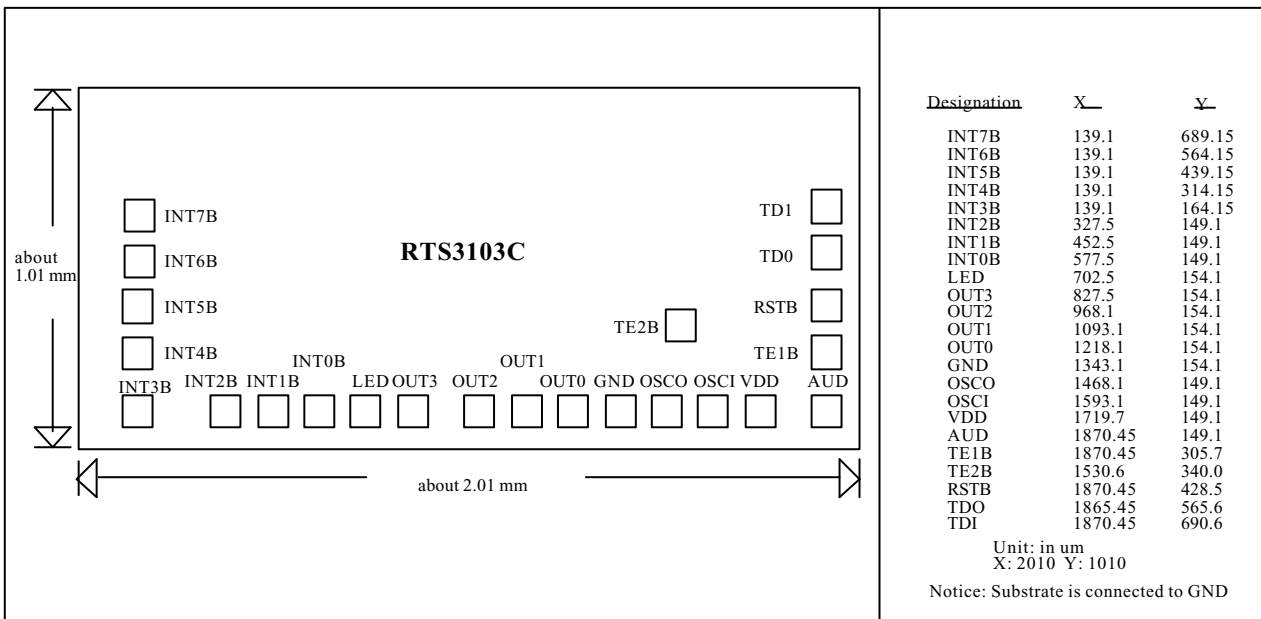
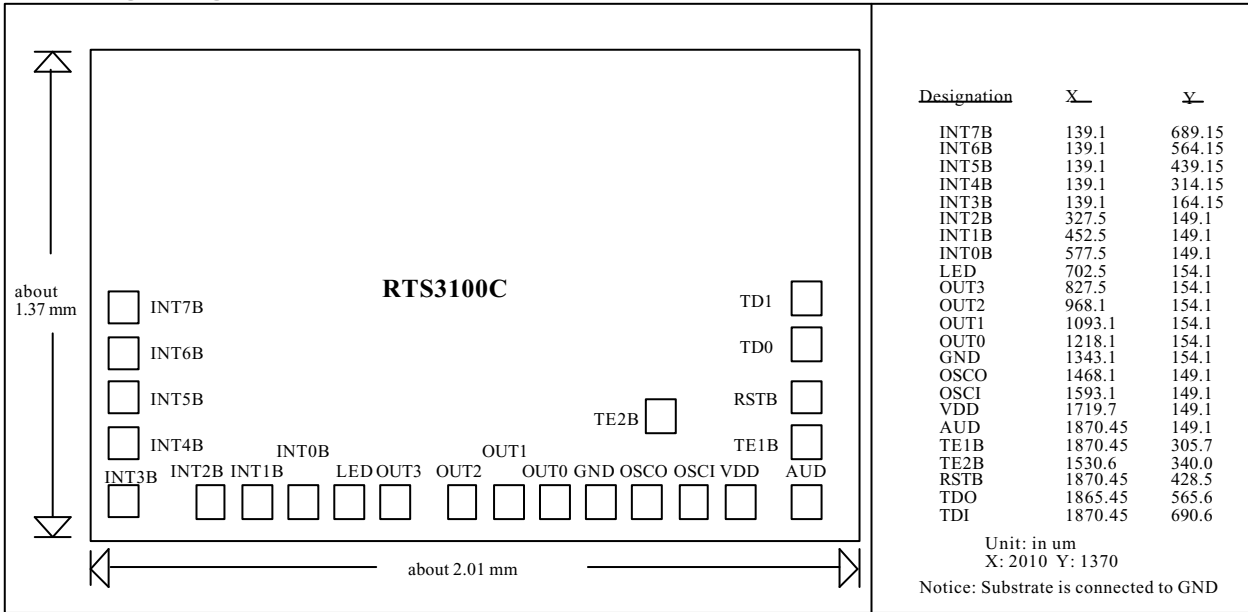
1. Typical

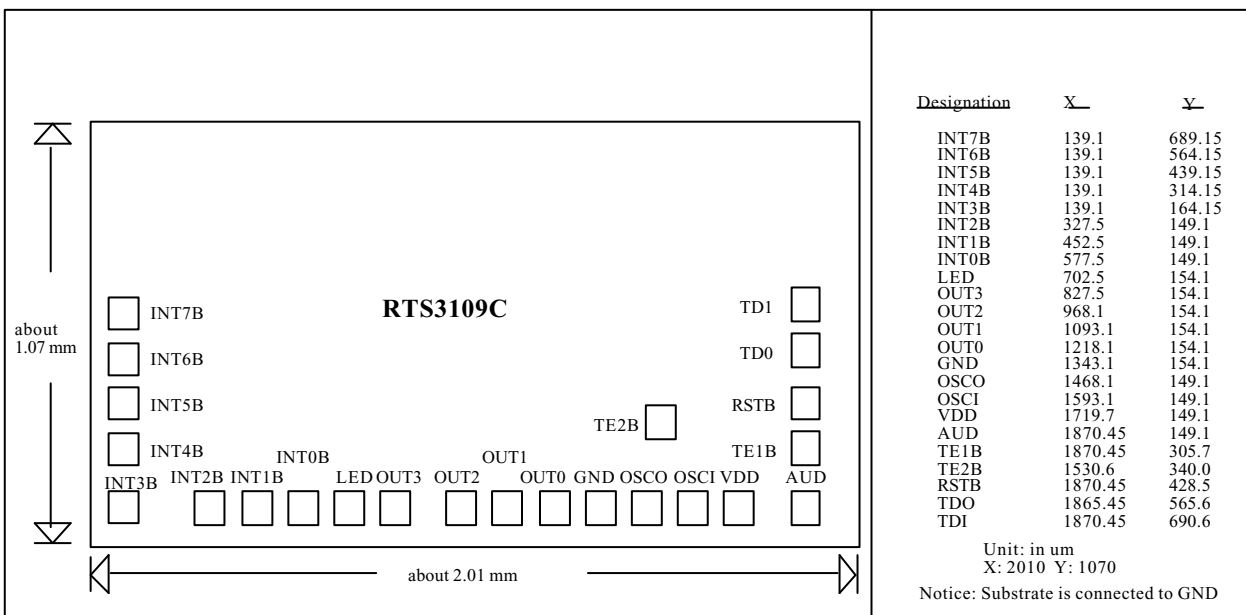
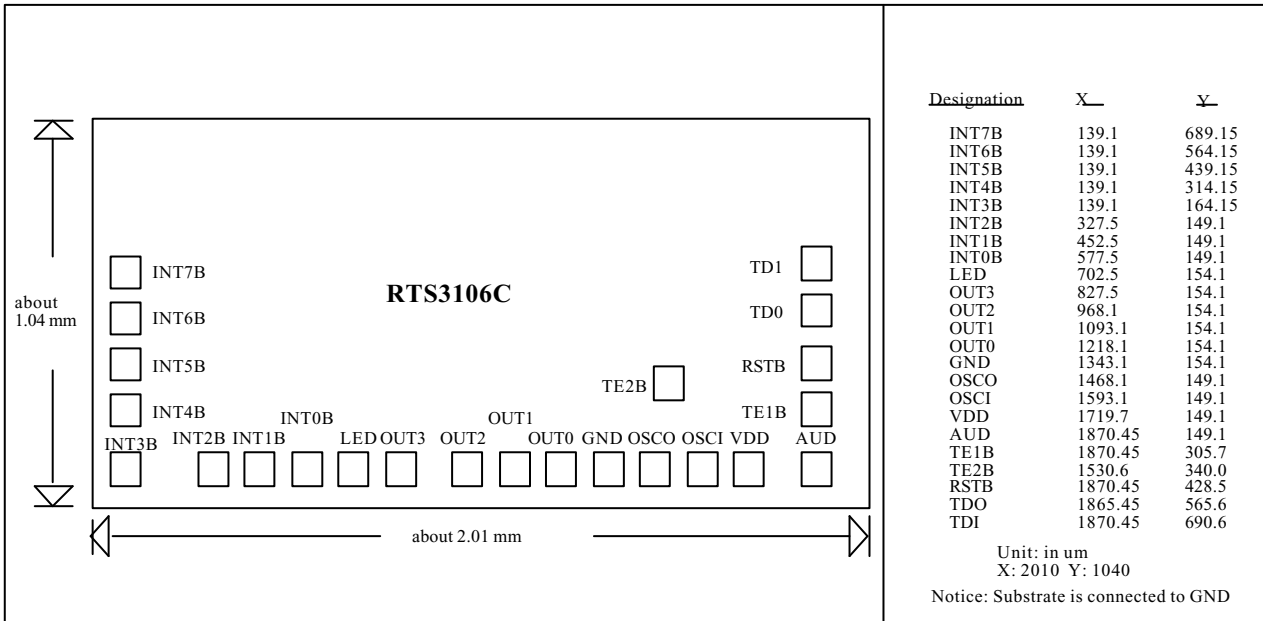


2. When applying the following circuit, please connect resistor (300K Ohm ~ 1M) to each input pins.

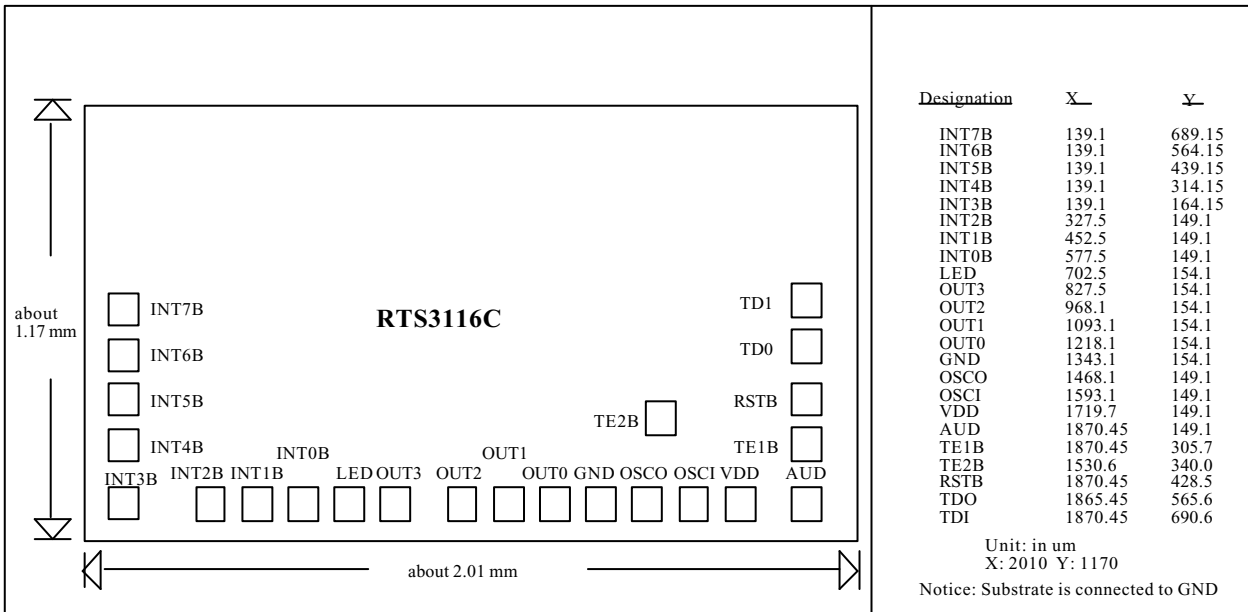
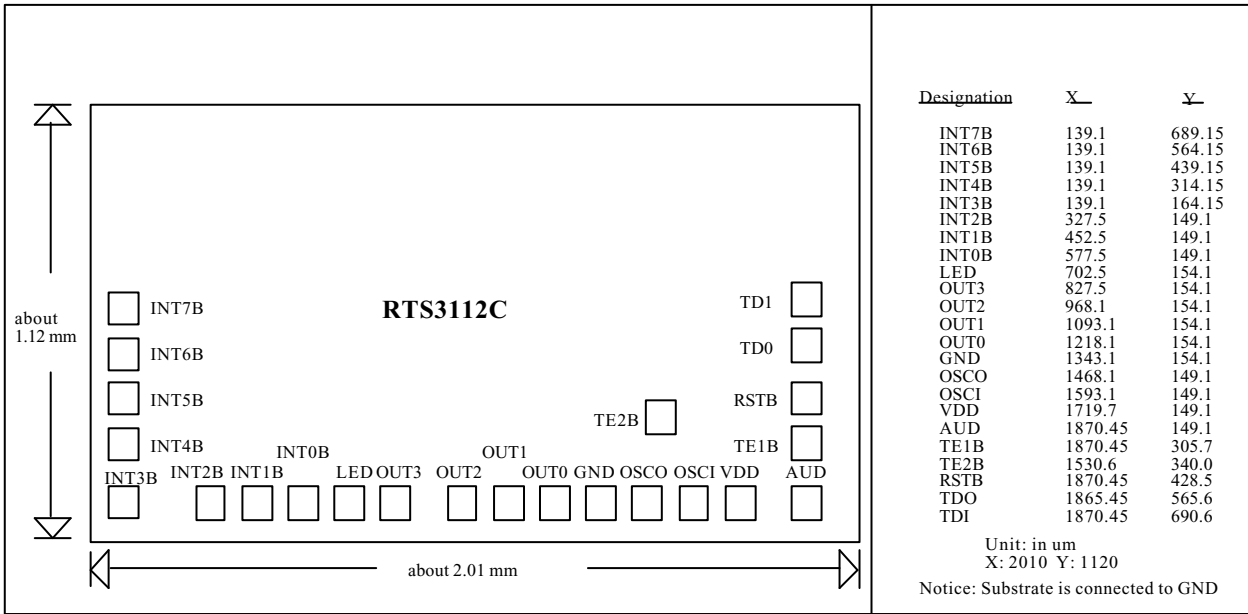


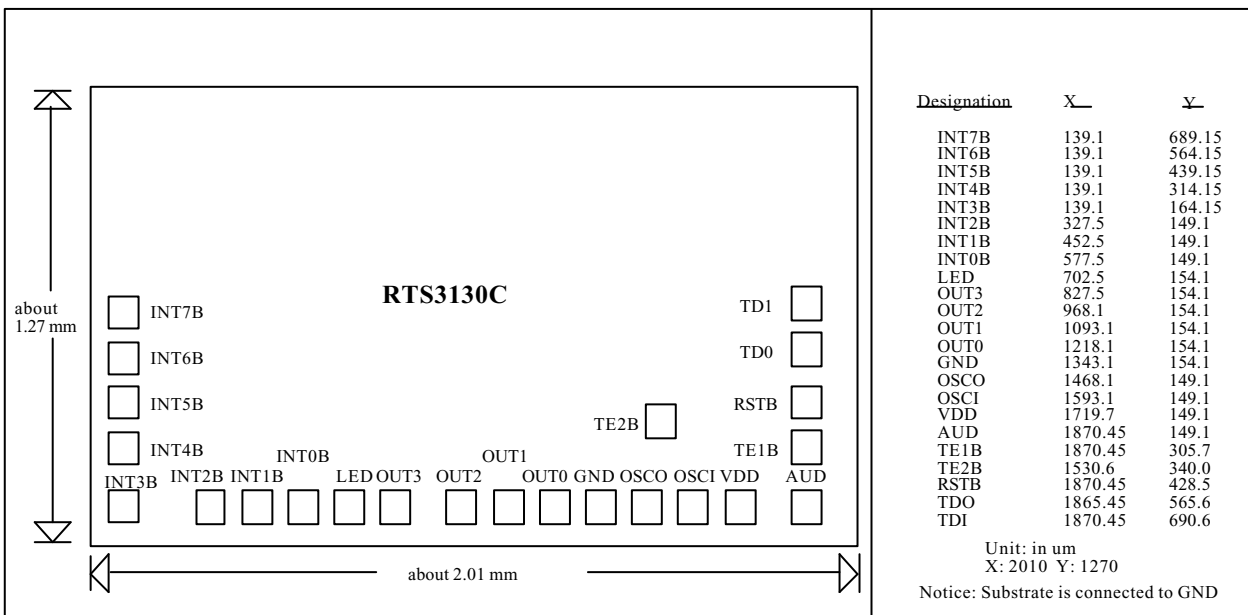
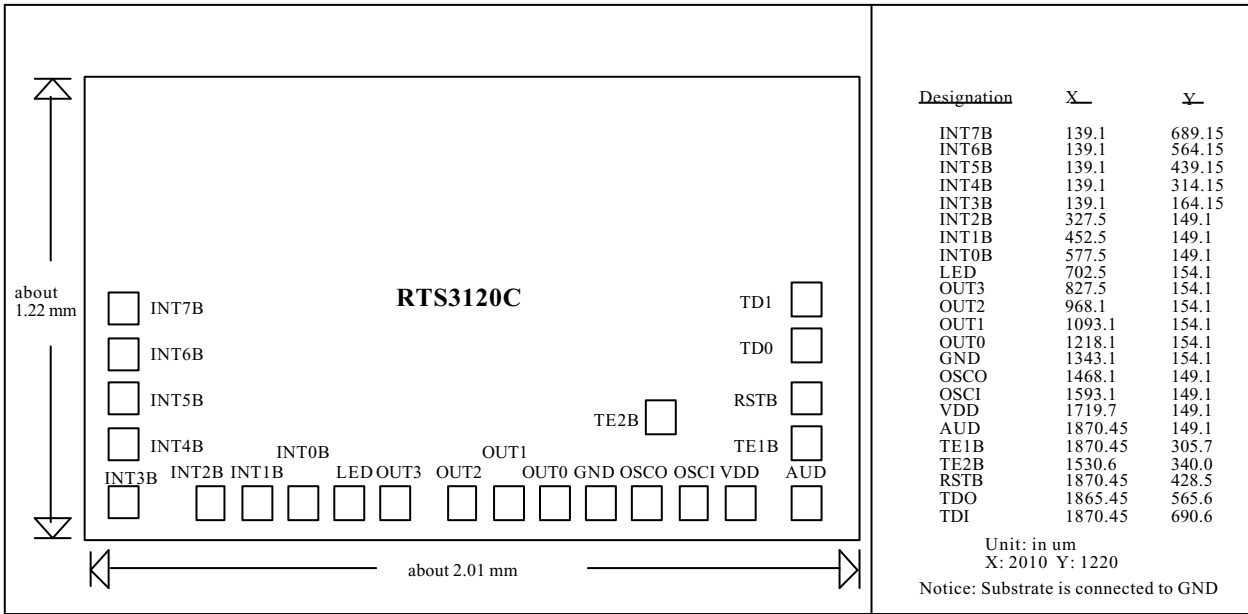
**Bonding Diagram**

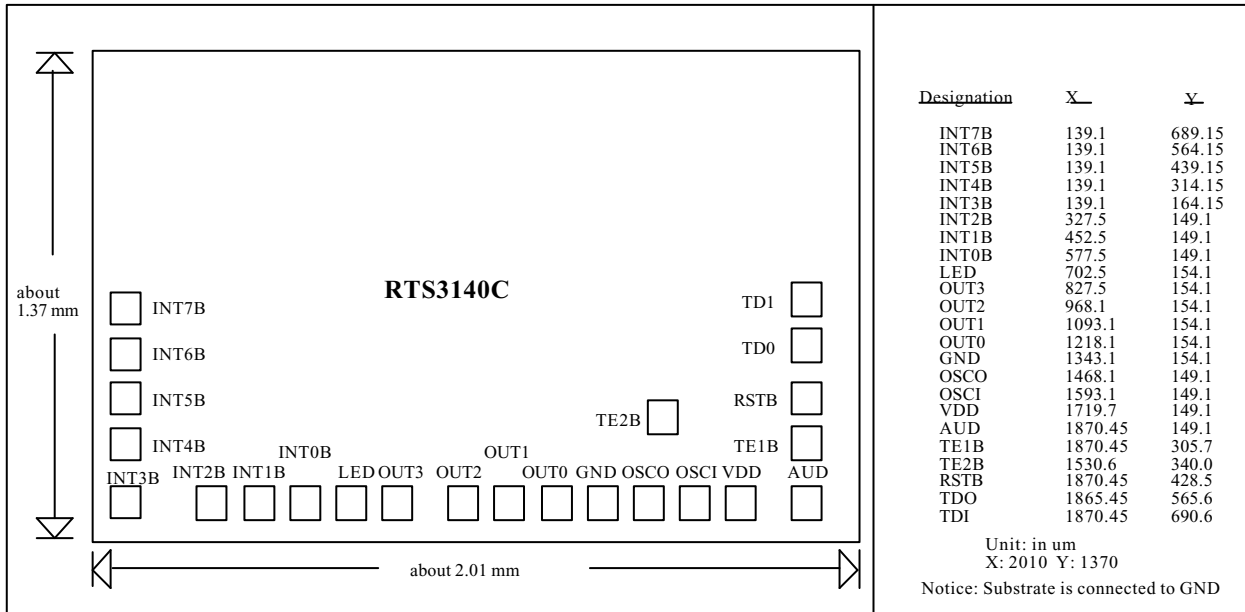












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