A07 Module Output Interface

01 PWM Proccessing value output

02 UART Auto output

03 UART Controlled output

The module has three output modes including PWM processing value output, UART auto output, UART controlled output which set by software. Choose different models to set the module to different output modes.

1. PWN Processing value

The PWM processing value output interface is simple and flexible, connected with digital or analog circuits to realize ranging applications.

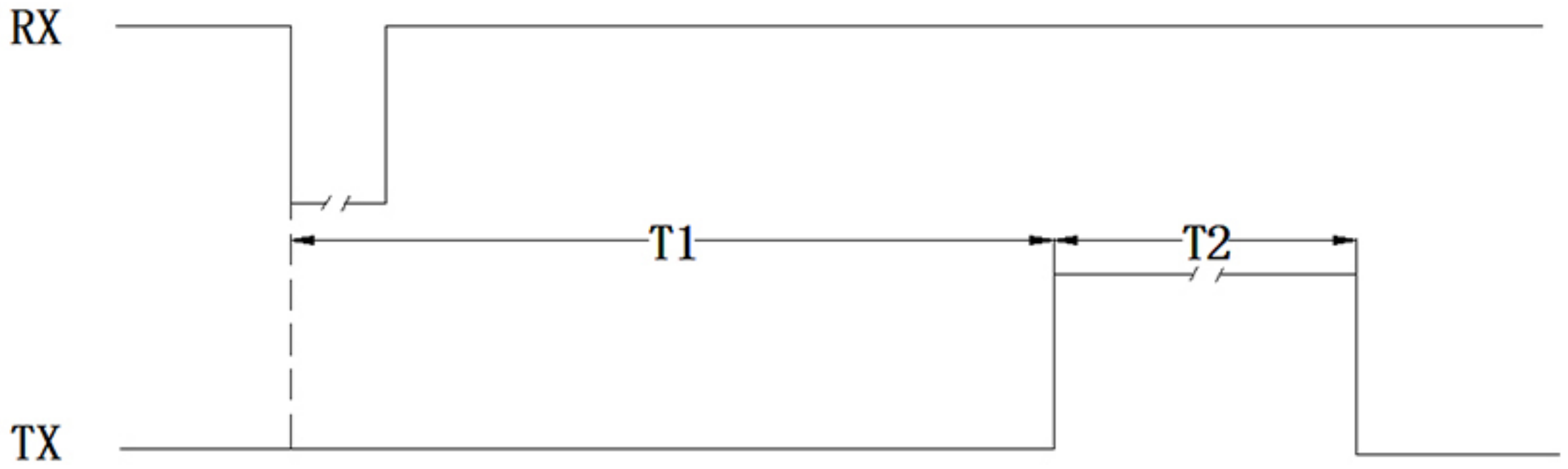
(1) Pin definition

Pin No.	Mark	Pin description	Remark
③	RX	Trigger input	
④	TX	PWM processing value output	

(2) Instruction

When Pin 3(RX) receives a falling edge pulse, the module will be awakened from sleep mode and start working, running 5-15 times detection. After the detection is completed, pin4(TX) will output a high-level pulse width signal, the high-level duration of pin4(TX) corresponds to the distance between the detection target and the module. The operating cycle must greater than 2.5s. Pin(TX) output a fixed pulse width if module does not detect an object.

(3) Timing Diagram



Remark: T1=0.9s～2.5s； T2=1.4ms～50ms （Timing of PWM High-level pulse width）

RX falling edge trigger pulse width is recommended to be between 10us～2ms

(4) Formula

Formula: S=T*V/2 (S is the distance value, T is duration time of PWM high-level pulse width, V is sound travel speed in the air)

Because of internal temperature compensation, V is directly calculated at speed of 348m/S at room temperature. The simplified formula is S= T/57.5 (unit of S in centimeters and us of time T)

For example: The duration time(T2)of PWM high-level pulse width is 10000us, the S= T/57.5=10000/57.5≈174(cm), means 174cm distance value.

2. UART Auto Output

UART auto output mode outputs measured distance value according to UART communication format, this mode does not require an external trigger signal. The working cycle of the module is 160ms for one automatic measurement. After 5~15 measurements are completed, pin(TX) will output the measured distance value. The response time is 0.9s~2.5s.(Work cycle and response time can be customized and developed according to customer needs)This output mode can reduce the user's single-chip I/O port usage, and at least one I/O port is required to achieve distance measurement.

(1) Pin Definition

Pin No.	Mark	Pin description	Remark
③	RX	N/A	
④	TX	UART output	

(2) UART Instruction

UART	Data Bit	Stop Bit	Parity Bit	Baud Rate
TTL level	8	1	NO	9600bps

(3) UART Output format

Data Frame	Description	Byte
Start Bit	0XFF 0XFF	1byte
Data_H	High8 distance value	1byte
Data_L	Low8 distance value	1byte
SUM	Parity sum	1byte

(4) Example of UART Output

Start Bit	Data_H	Data_L	SUM
0XFF	0X01	0XA1	0XA7

Remark: Parity sum only remain low8 value.
SUM =(Start Bit+ Data_H+ Data_L)&0x00FF
=(0XFF + 0X01 + 0XA1)&0x00FF
=0XA1
Distance value= Data_H*256+ Data_L=0X01A1
Converts to decimal equal to 417,Means current measurement distance value is 1953mm.

3. UART Controlled Output

UART controlled mode outputs measured distance value according to UART communication format.When pin(RX) receives a falling edge pulse, the module will perform 5-15 measurements, measured distance value output through pin(TX) after completed. This output mode can control the measurement cycle and reduce power consumption. It is recommended to use with battery power supply.

(1) Pin Definition

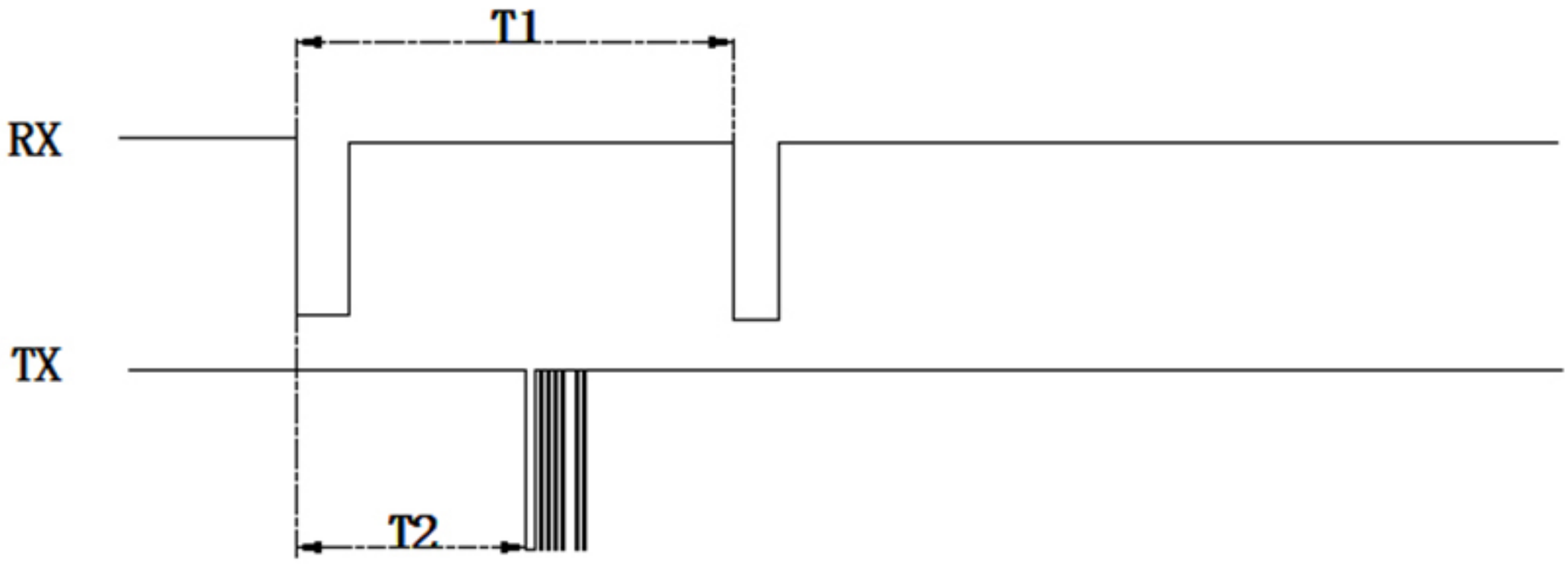
Pin No.	Mark	Pin description	Remark
③	RX	Trigger signal input	
④	TX	UART output	

(2) UART Instruction

Pin(RX) receive a falling edge pulse, the module will perform 5-15 distance detection. After the detection is completed, Pin(TX) will output a TTL level. The operating cycle of must be greater than 2.5s.

UART	Data Bit	Stop Bit	Parity Bit	Baud Rate
TTL level	8	1		9600bps

(3) Timing Diagram



Remark: T1 ＞2.5s； T2=0.9～2.5s

Suggest timing between 10us and 2ms of RX falling edge pulse width

(4) UART output format

Data Frame	Description	Byte
Start Bit	0XFF 0XFF	1byte
Data_H	High8 distance value	1byte
Data_L	Low8 distance value	1byte
SUM	Parity sum	1byte

(5) Example of UART Output

Start Bit	Data_H	Data_L	SUM
0XFF	0X07	0XA1	0XA1

Remark: Parity sum only remain low8 value.

SUM =(Start Bit+ Data_H+ Data_L)&0x00FF

=(0XFF + 0X01 + 0XA1)&0x00FF

=0XA1

Distance Value= Data_H*256+ Data_L=0X01A1

Converts to decimal equal to 417, means current measurement distance value is 417cm.