

WebChip™ Series Material

PSM2001ACD
WebChip™ Module
Datasheet



P&SDataCom

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1 Introduction

The PSM2001ACD is one member of the WebChip™ family of products. The module contains a network communication controller PS2000, an RS-232 transceiver, an RS-485 transceiver, and a standard Modem interface. The PSM2001ACD provides a convenient interface for users to develop various networking applications for intelligent devices. It uses a standard Serial Peripheral Interface (SPI) communication port to connect to the user MCU and conforms to the MCUnet™ protocol. The PSM2001ACD connects to a server gateway WebChipServer™ through any of the following: RS-232, RS-485 or standard Modem.

2 Features

- Single +5V power supply
- Each module has a unique ID
- Supports multiple communication modes
 - RS-232 mode: the module has a built-in interface, a MAX232 (from MAXIM), which performs the conversion between TTL/CMOS signals and RS-232 format
 - RS-485 mode: the module has a built-in interface that features transient voltage suppression and thermal shutdown; 128 transceivers can be connected to the bus at most.
 - Standard Modem mode: it provides an interface connection to the standard Modem
- Provides a standard SPI port that can be connected to various MCUs
- Easy to design networking MCU application system
- Supports any gateway software with the MCUap™ protocol
- Maximum operating current: 30mA

3 Typical Applications

- Intelligent Networking Consumer Products
- Building Control Systems
- Security Systems
- Utility Management Systems
- Remotely Monitored Industrial Control Equipments
- Computer Peripherals
- Remote Medical Monitoring Systems
- Transportation and Automotive Systems
- Communication Products

4 Block Diagram

The PSM2001ACD module block diagram is shown in the Figure 1. It consists of the following functional circuits.

- PS2000 network communication controller
- Interface circuits
 - RS-232 transceiver communicates with a network server or interfaces with a standard Modem in compliance with RS-232 standards
 - RS-485 transceiver communicates with a network server in compliance with RS-485 standards
- Status indicating LED
 - LED blinks indicating there is data being transferred; LED stops blinking to indicate no data is being transferred.

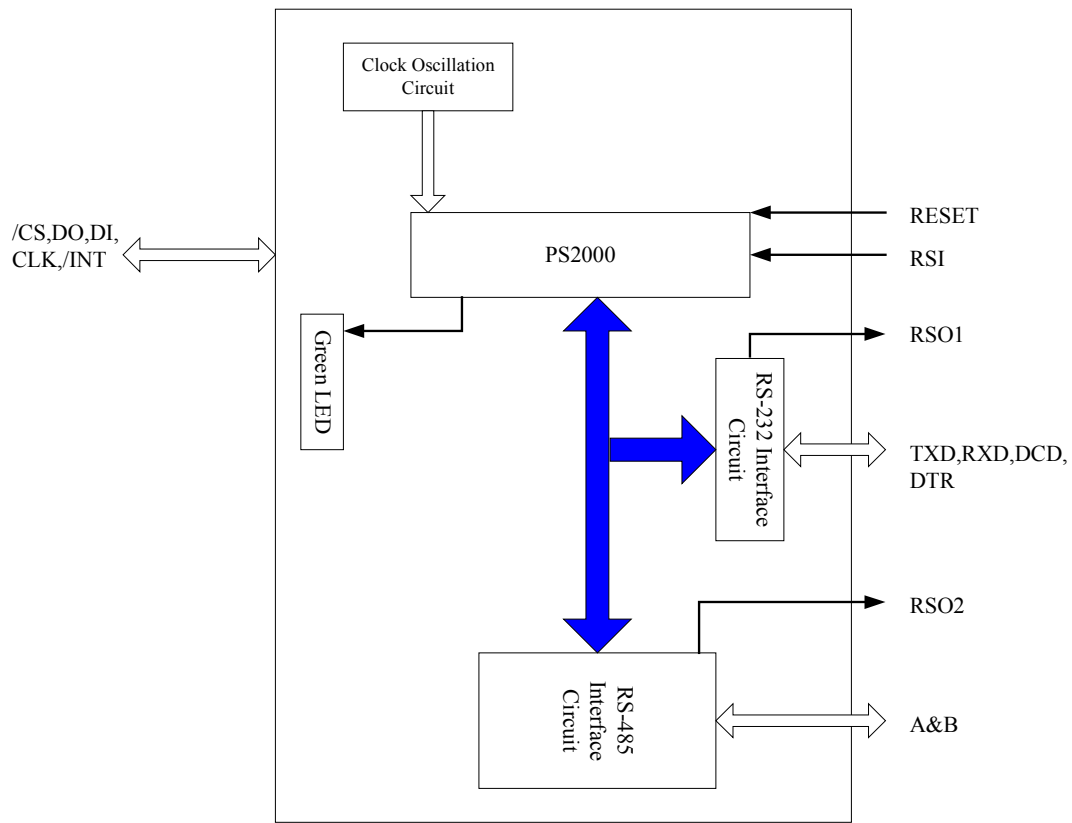


Figure 1 PSM2001ACD Block Diagram

5 Pin Configuration and Descriptions

5.1 Pin Configuration

PSM2001ACD pin configuration is shown in Figure 2.

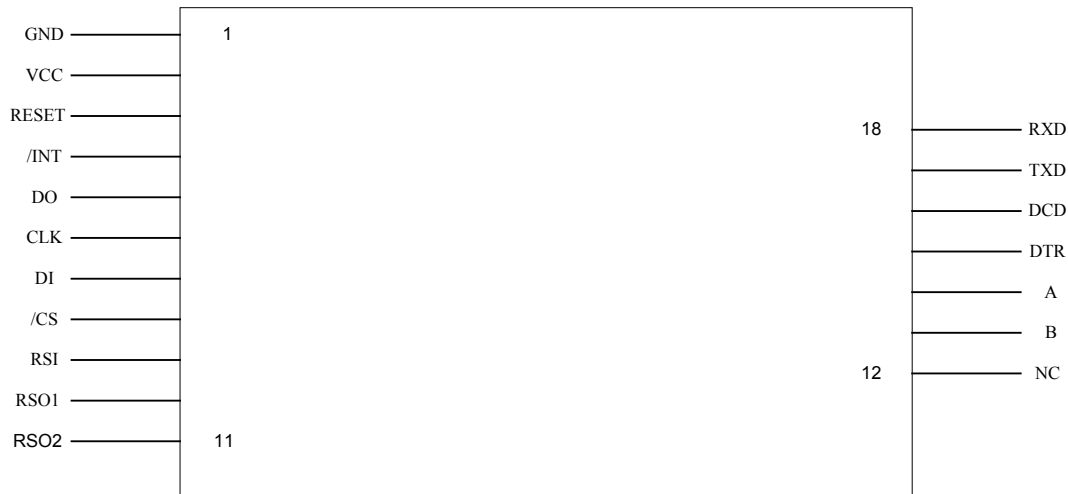


Figure 2 PSM2001ACD Pin Configuration

5.2 Pin Descriptions

The pin descriptions of PSM2001ACD are shown in the Table 1.

Table 1 Pin Descriptions

Name	Pin	I/O/P ^{note 1}	Description
GND	1	P	Ground
VCC	2	P	Power supply
RESET	3	I	High active reset input. To reset the module reliably, the high level of the pin must be held over 50 μ s at least.
/INT	4	O	PS2001ACD data exchange request signal output
DO	5	O	PS2001ACD SPI serial data output
CLK	6	I	PS2001ACD SPI serial clock input
DI	7	I	PS2001ACD SPI serial data input
/CS	8	I	PS2001ACD chip select input, it is low active
RSI	9	I	PS2001ACD serial data receiving pin ^{note 2}
RSO1	10	O	Serial data output of RS-232 receiver ^{note 2}
RSO2	11	O	Serial data output of RS-485 receiver ^{note 2}
NC	12		Reserved, unused
B	13	I/O	Terminal B of RS-485 interface circuit
A	14	I/O	Terminal A of RS-485 interface circuit
DTR	15	O	Data terminal ready output RS-232 level
DCD	16	I	Data carrier detect input RS-232 level
TXD	17	O	Receive data pin RS-232 level
RXD	18	I	Transmit data pin RS-232 level

NOTE 1: O=OUTPUT I/O=INPUT/OUTPUT I=INPUT P=POWER SUPPLY

NOTE 2: RSO1 PIN MUST BE CONNECTED TO THE RSI PIN DIRECTLY WHEN RS-232 COMMUNICATION MODE OR STANDARD MODEM COMMUNICATION MODE IS USED.

THE RSO2 PIN MUST BE CONNECTED TO THE RSI PIN DIRECTLY WHEN RS-485 COMMUNICATION MODE IS USED.

6 Recommended Operating Conditions

The recommended operating conditions of the PSM2001ACD are shown in Table 2.

Table 2 Recommended Operating Conditions

		MIN	NOM	MAX	UNIT
Operating ambient temperature		0		+70	C°
Supply voltage		4.75	5	5.25	V
High level operating voltage, (/INT, DO, DI, CLK, /CS, RSI, RSO1, RSO2)		2			V
Low level operating voltage, (INT, DO, DI, CLK, CS, RSI, RSO1, RSO2)			0.8		V
RS-232 receiver's input voltage, (RXD, DCD)			±30		V
RS-485 high level output current	Driver		-60		mA
	Receiver		-8		mA
RS-485 low level output current	Driver		60		mA
	Receiver		4		mA

7 Application Notes

7.1 PSM2001ACD and User MCU Interface Method

As shown in Figure 3, the PSM2001ACD uses a standard SPI to connect to the user's MCU, and the communication protocol conforms to the MCUnet™ protocol. If the user's MCU doesn't have an SPI interface available, a common I/O port can be used to make up an SPI port. For detailed information on the interface methods between the PSM2001ACD and the user MCU, please refer to the PSM20XX Family WebChip™ Module User's Guide, the application note on Interfacing the PSM20XX Family to 8051 Type Microcontrollers, and the MCUnet™ Protocol.

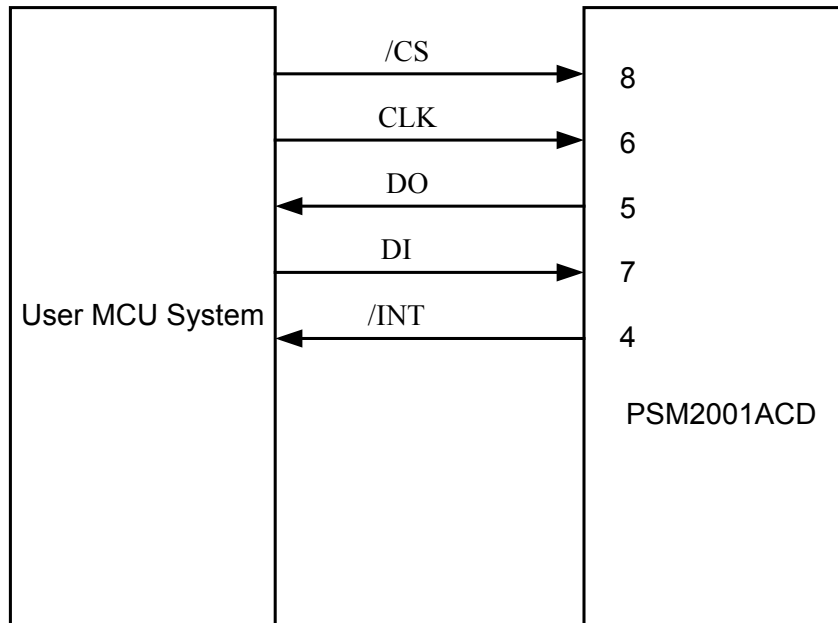


Figure 3 PSM2001ACD Connects to MCU Through a Standard SPI Interface

7.2 PSM2001ACD and User MCU Interface Timing

The communication process between the PSM2001ACD and the MCU includes two steps:

1. PSM2001ACD sends data to the MCU
2. PSM2001ACD receives data from the MCU

The process flow is shown in Figure 4.

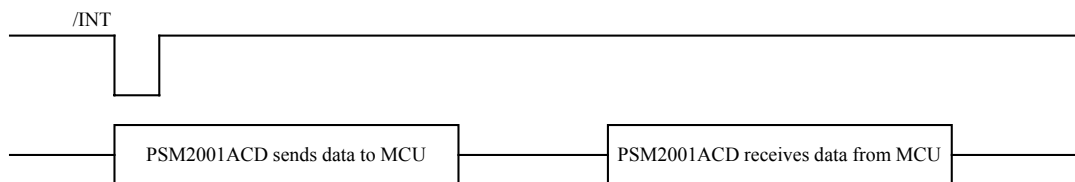


Figure 4 One Communication Process between PSM2001ACD and MCU

The communication timing between the PSM2001ACD and the MCU conforms to the following rules:

1. First, the PSM2001ACD sends an /INT signal to request a data exchange with the MCU; The following communication transaction will be controlled by the MCU; that is, the MCU sends chip select signal /CS and clock signal CLK;
2. Data will be transferred in byte form. The MSB is transferred first until the LSB is received.

3. Data is sampled on the falling edge of CLK and shifted on the rising edge.
4. When the PSM2001ACD doesn't exchange data with the MCU, the MCU must set /CS and CLK high.

The timing of the PSM2001ACD sending data to the MCU is shown in Figure 5.

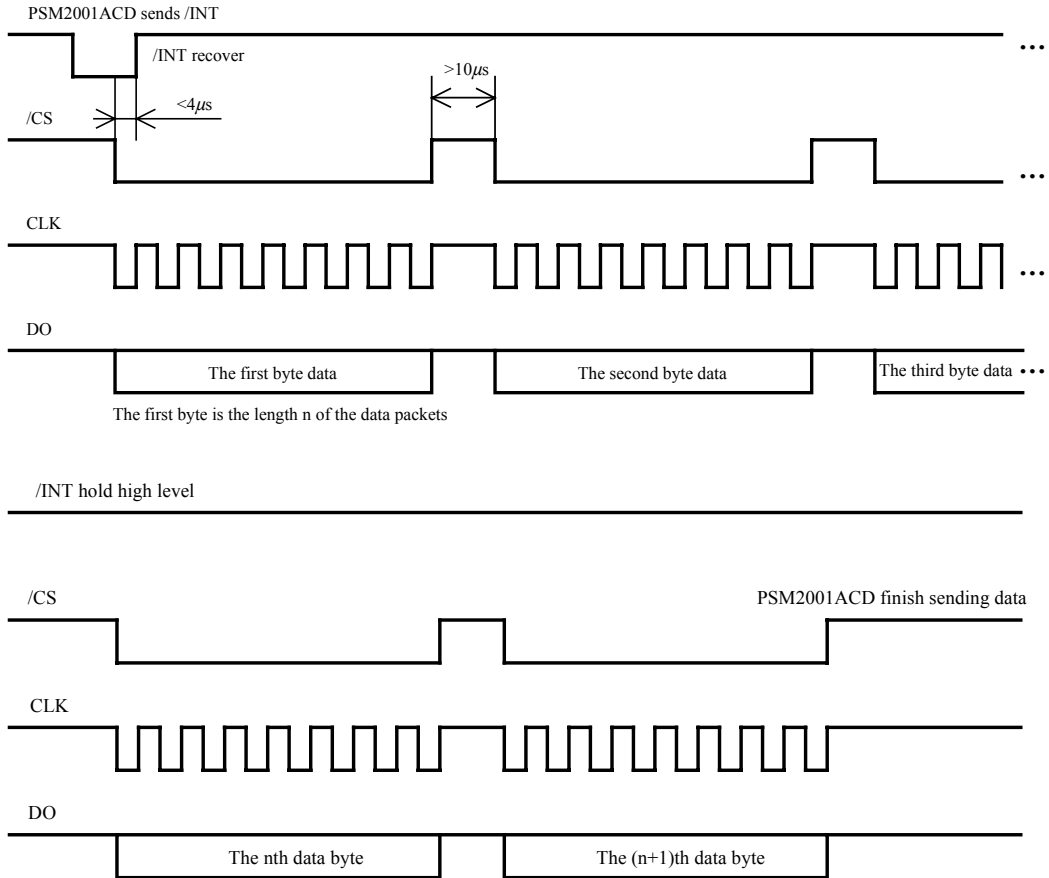


Figure 5 Timing of the PSM2001ACD Sending Data to the MCU

The enlarged CLK and DO timing is shown in Figure 6.

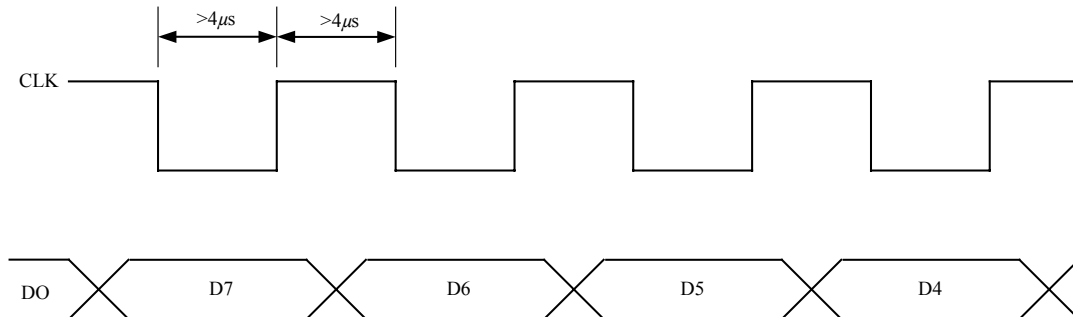


Figure 6 Enlarged CLK and DO Timing

The timing of PSM2001ACD receiving data from the MCU is shown in Figure 7.

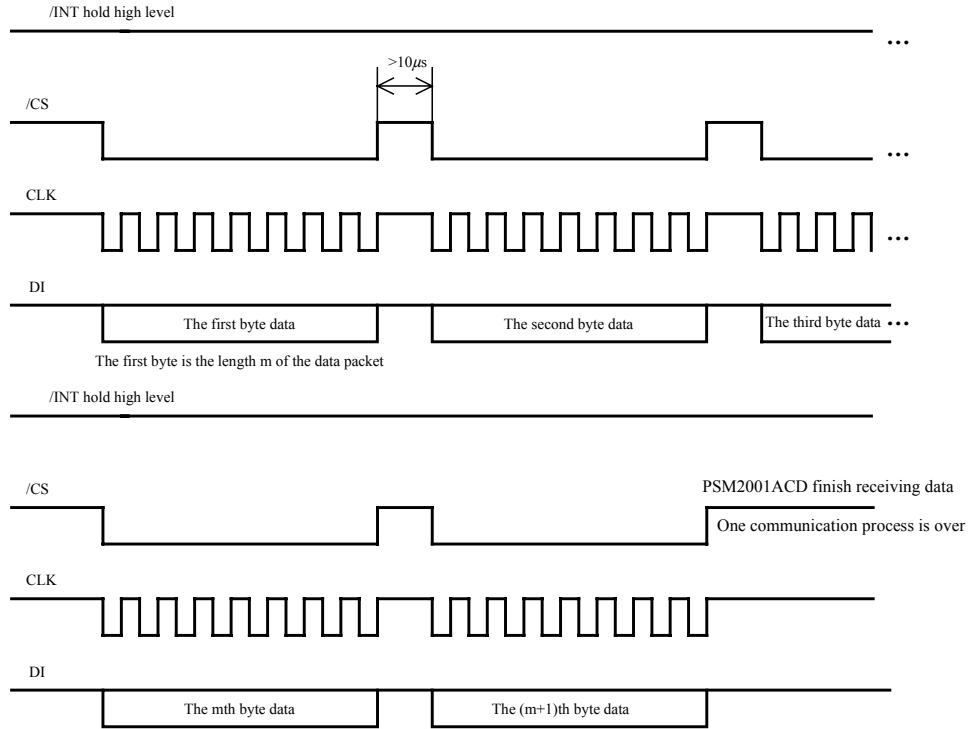


Figure 7 Timing of PSM2001ACD receiving data from the MCU

The enlarged CLK and DI timing is shown in Figure 8.

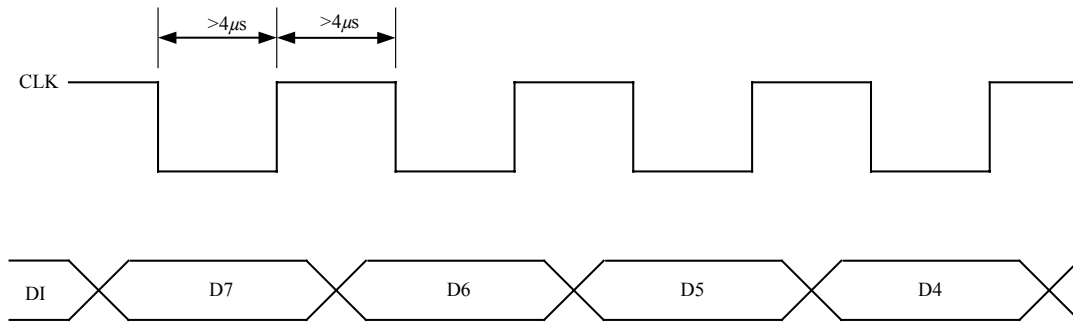


Figure 8 Enlarged CLK and DI Timing

7.3 PSM2001ACD and Server Gateway Interface Method and Configuration

PSM2001ACD conforms to the MCUap™ Protocol to interface with the server gateway. PSM2001ACD is able to interface with the gateway through any of the following three modes. The following describes the configuration and connection of these modes.

7.3.1 RS-232 Mode

As shown in Figure 9, the PSM2001ACD connects to the server gateway through the RS-232 connection mode. It should be noted that the RSO1 pin of PSM2001ACD must be connected directly to the RSI pin. RXD and TXD are the receiving pin and transmitting pin respectively. Other unused pins must be left open.

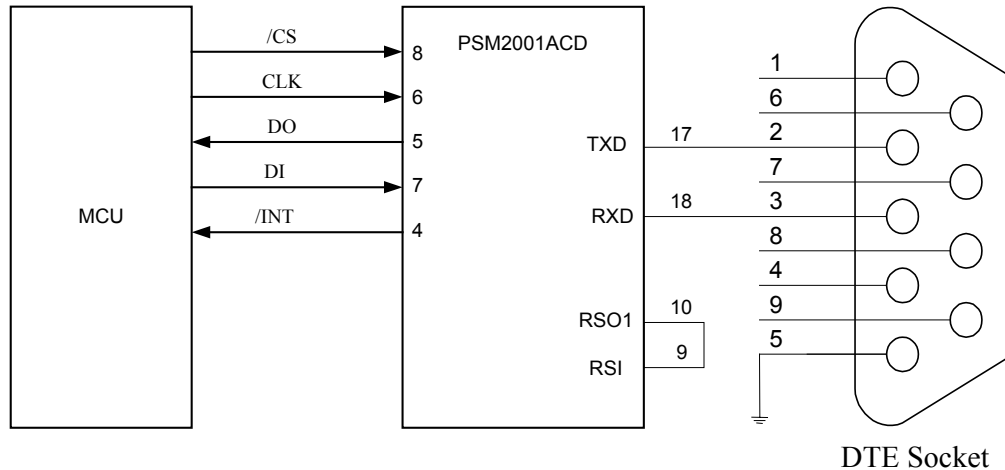


Figure 9 RS-232 Connection Mode

In the figure, DTE is the abbreviation for data terminal equipment.

7.3.2 RS-485 Mode

As shown in Figure 10, the PSM2001ACD connects to the server gateway through the RS-485 connection mode. It should be noted that the RSO2 pin of the PSM2001ACD must be connected to the RSI pin directly, and other unused pins must be left open.

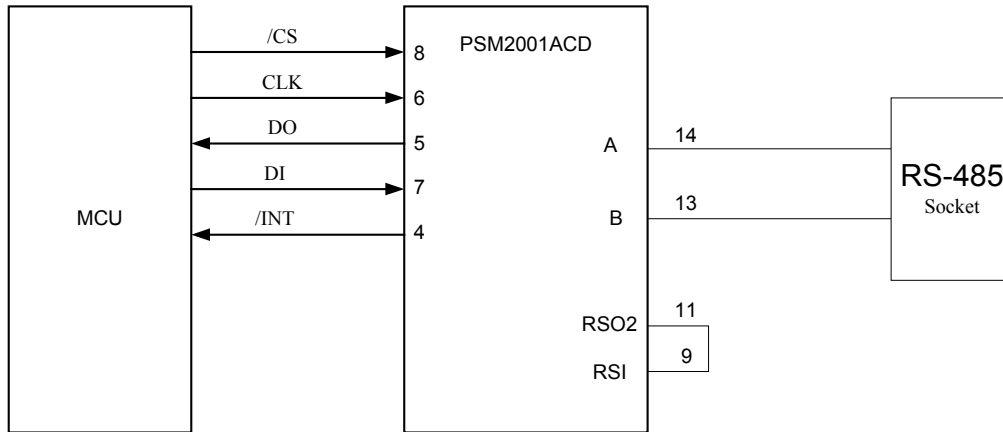


Figure 10 RS-485 Connection Mode

7.3.3 Standard Modem Mode

As shown in Figure 11, the PSM2001ACD connects to the server gateway through the standard Modem connection mode. It should be noted that the RSI pin of the PSM2001ACD must be directly connected to the RSO1 pin, and other unused pins must be left open. Pin 7 and 8 of DCE socket must be directly connected.

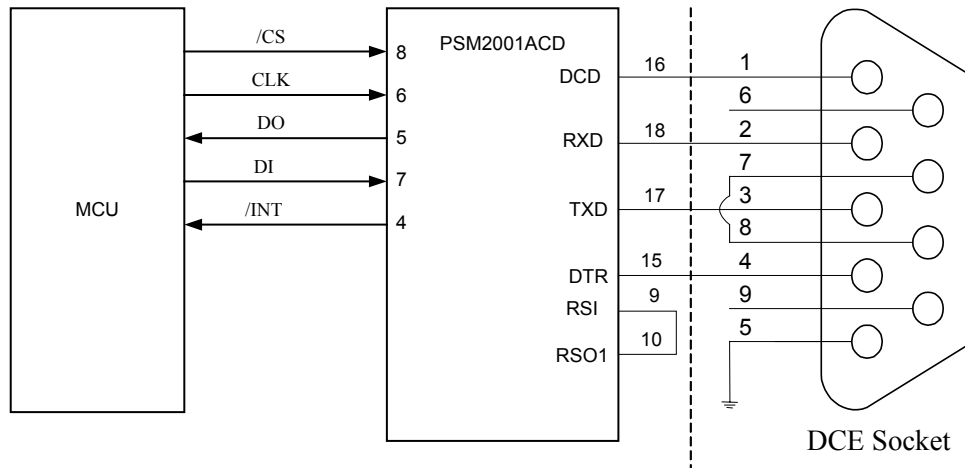


Figure 11 Standard Modem Connection Mode

In the figure, DCE is the abbreviation for data communication equipment.

7.4 ID Number in WebChip™ Products

Both the WebChip™ and the WebChip™ module PSM200XACD have an ID number that consists of 8 bytes. In addition to a parity code of one byte, the remaining 7 bytes have up to 7.2×10^{16} of coding capacity, which ensure that every WebChip™ product has a unique ID number. Therefore, users will also have a unique ID number when designing their own networking products with WebChip™ products. With the help of the ID number, users can communicate with the unique device anywhere in the world through the server gateway.

The ID number is usually printed on the bottom or side of the PSM200xACD.

8 Troubleshooting

Number	Troubles	Troubleshooting
1	After connecting to the supply, the status indicator of PSM2001ACD doesn't turn on	<ol style="list-style-type: none"> 1. Check if the hardware connection is correct 2. Check if the PSM2001ACD is initialized by user's program correctly
2	After connecting to the supply, the status indicator of PSM2001ACD turns on, but the PSM2001ACD doesn't work in RS-232 mode normally	<ol style="list-style-type: none"> 1. Check if the TXD of the PSM2001ACD is connected to pin 2 of DTE, the RXD of the PSM2001ACD is connected to pin 3 of DTE, and pin 5 of DTE is connected to GND 2. Check if the baud rate of the PSM2001ACD is the same as that of serial port of the PC 3. Check if the serial port of the PC is connected correctly 4. Check if pin 9 of the PSM2001ACD is connected to pin 10 of the PSM2001ACD directly 5. Check if the ID of the access device configured by the gateway software is the same as that of the module labeled on the board
3	After connecting to the supply, the status indicator of PSM2001ACD turns on, but the PSM2001ACD doesn't work in RS-485 mode normally	<ol style="list-style-type: none"> 1. Check if the serial port of the PC in which the WebChipServer™ software is programmed has a RS-232 to RS-485 connector 2. Check if the ID of the access device configured by the gateway software is the same as that of the module labeled on the board 3. Check if the PSM2001ACD is initialized by the user's program correctly 4. Check if terminal A and B of RS-485 are connected correctly 5. Check if pin 9 of PSM2001ACD is connected to pin 11 of the PSM2001ACD directly 6. Check if the baud rate of the PSM2001ACD is the same as that of serial port of the PC
4	After connecting to the supply, the status indicator of PSM2001ACD turns on, but the PSM2001ACD doesn't work in Modem mode normally	<ol style="list-style-type: none"> 1. Check if pin 9 of PSM2001ACD is connected to pin 10 of the PSM2001ACD directly 2. Check if there is dial tone on the telephone line 3. Check if user's program has a valid telephone number

9 Dimensions

Please see the Figure 12.

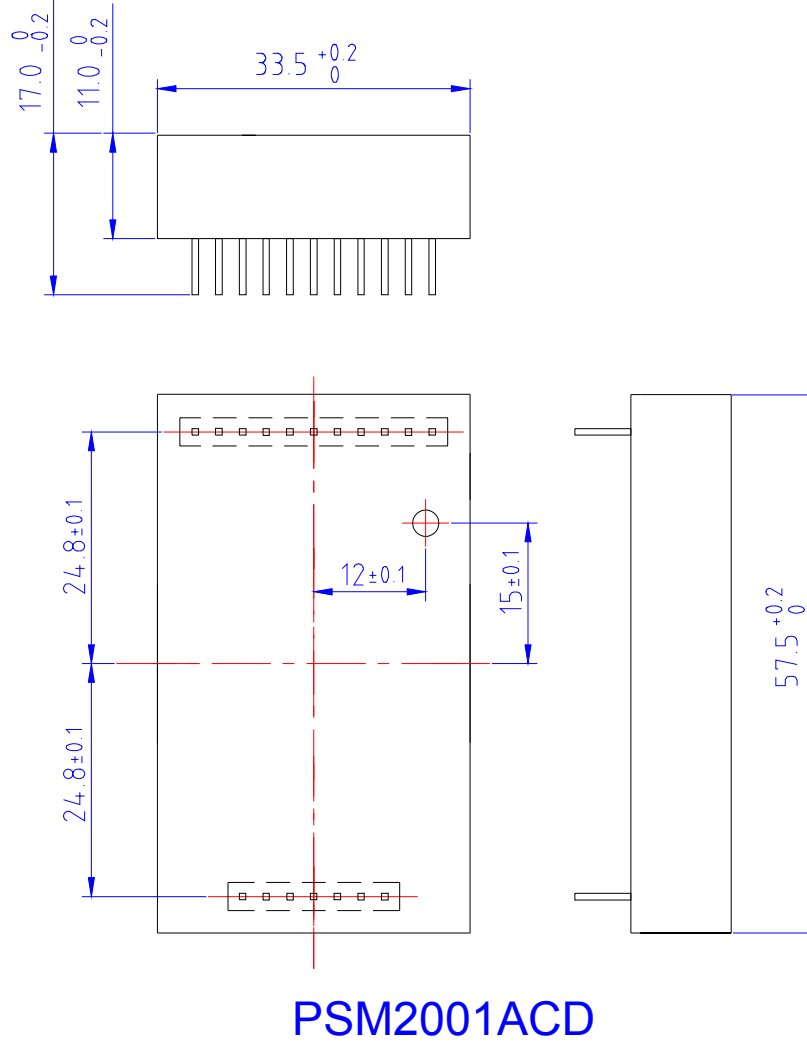


Figure 12 Dimensions of PSM2001ACD (unit: mm)