TRP-C24 User's Manual

Introductions

The TRP-C24, an RS-485 isolated open collector output module, provides 16 digital outputs channels. Each channel features screw terminals for the convenience connection of field signals as well as LED to indicate channel status. The inside photocoupler design may entirely prevent your module and devices from the damage when irregularly high power voltage occur. TRP-C24 can be configured and conduct self-test by outside dip-switch without complicated setting and connection. Build-in a full set of command, watch-dog, auto reset function the module can be bi-directionally remote controlled by PC and operating at different baud rates with different data formats by RS485 protocol

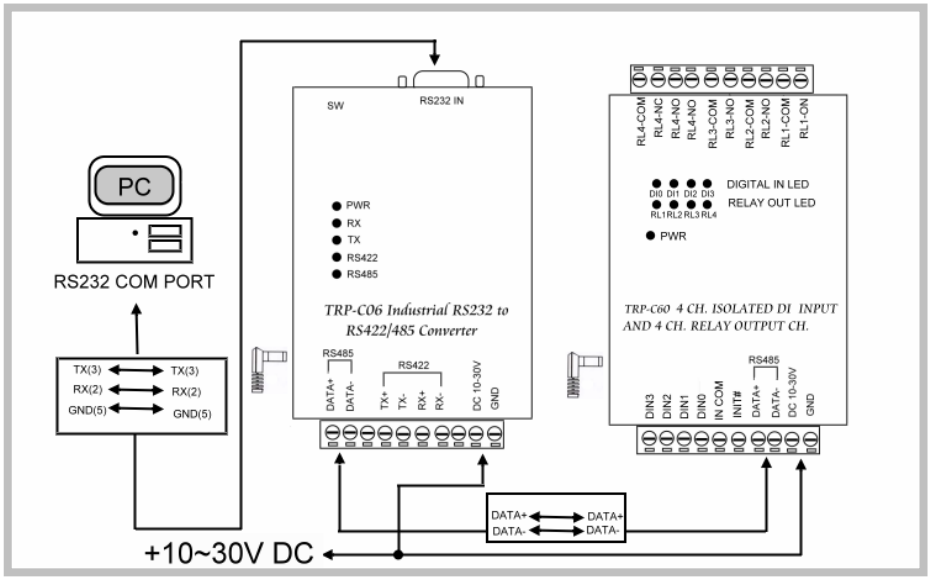
Features

- All communication's command are perform in ASCII.
- Programmable in virtually any high-level language.
- 16-CH isolated digital output (with common power).
- Baud Rate can be set from 1200 to 115.2K bps.
- High surge current suppressors varistor for RS485 interface.
- LED display to indicate output channels and 485 communication status.
- Dual Watchdog for hardware reset circuit and host operating status .
- External switch for hardware self-test and module's configuration.
- Digital output Isolation with power source (2500 Vrms).
- Support screw terminal and standard external DC power adaptor input.
- Power input from +10V to +30V DC.

Specification

- Output Channel: 16 channels isolated digital output(Open collector).
- Output isolation voltage : 2500Vrms
- Maximum loading voltage: + 30V
- Maximum loading current sink:100mA
- Distance : RS485 up to 4000ft. (1250meters)
- Baud-Rate: 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K (bps)
- Communication type : RS485 differential 2 half-duplex wires
- Format : Asynchronous data with any combination of bits, parity, stop
- RS-485 and input/output connector : Industrial plug-in screw terminal
- Power input : DC +10~30V
- Power consumption :2.1W
- Operating Temperature : -20 to 55℃
- Humidity : 10-90% non-condensing

Communication Wiring

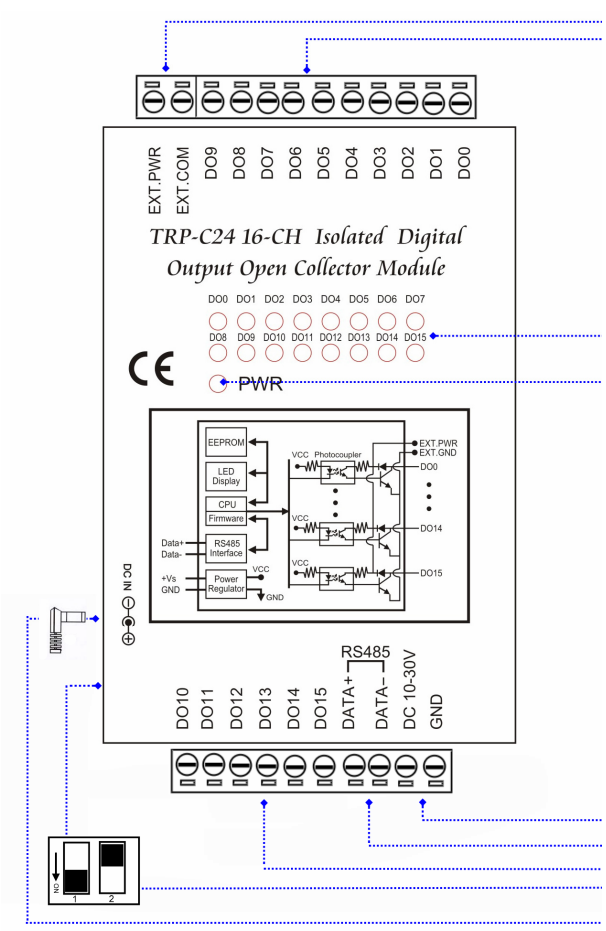


Warning: Don't connect external DC-Jack and screw terminal DC input at the same time!
Using the voltage +18 DC above when often high loading!

Pin Definitions

		EXT.PWR	External isolated voltage input Max. 30V DC
DO10	Digital Output CH 10	EXT.GND	Ground of external isolated Voltage input
DO11	Digital Output CH 11	DO9	Digital Output CH 9
DO12	Digital Output CH 12	DO8	Digital Output CH 8
DO13	Digital Output CH 13	DO7	Digital Output CH 7
DO14	Digital Output CH 14	DO6	Digital Output CH 6
DO15	Digital Output CH 15	DO5	Digital Output CH 5
DATA+	RS485 +	DO4	Digital Output CH 4
DATA-	RS485 -	DO3	Digital Output CH 3
DC 10-30V	Input Voltage DC +10-30V	DO2	Digital Output CH 2
GND	Input Voltage Ground	DO1	Digital Output CH 1
		DO0	Digital Output CH 0

Function Description



External Voltage Input Max. 30V DC for DO Isolation
DO0 ~DO9 channel output connector

DO0~DO15 channel status LED Indictor

Power or Watchdog /RS485 flow LED Indictor

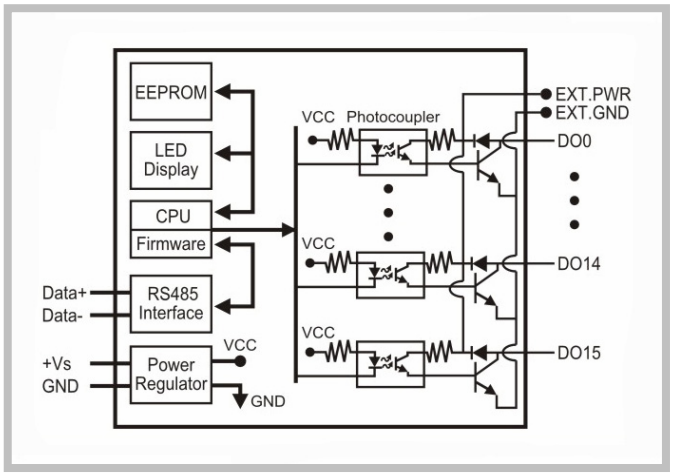
Power Input From +10~30V DC
RS485 interface
DO10~DO15 channel output connector
System configuration and hardware self-test switch
DC Voltage Input From +10V~30V

DC-jack connector (0.5*2.1 mm plug).

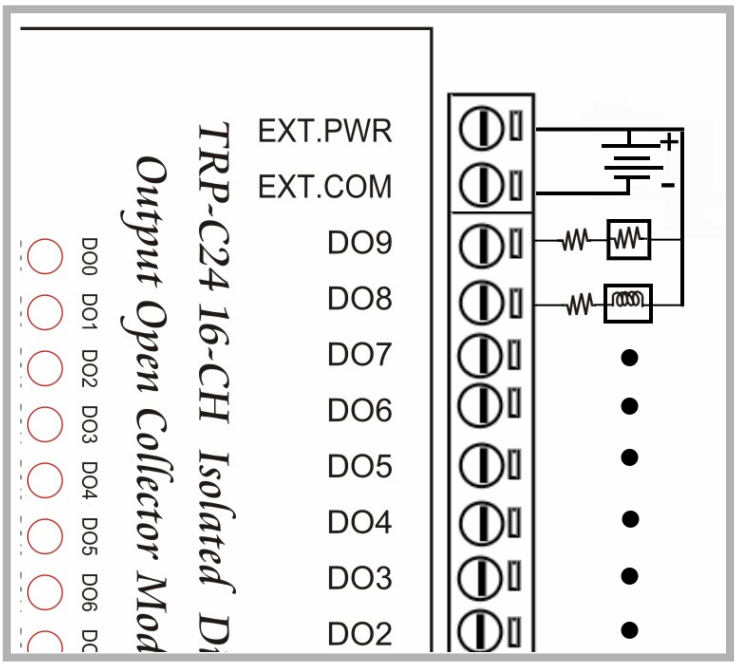
Use in RS485 interface along with bellowing TRP converter family

TRP-C06 :RS232 to RS422/485 optical isolated converter.
TRP-C07 :RS422/485 optical isolated repeater.
TRP-C06E :RS232 to RS422/485 converter.
TRP-C08 :USB to RS232/422/485 optical isolated converter.
TRP-C36 :TCP/IP to RS232/422/485 optical isolated converter.
TRP-C39 :Multi-mode fiber to RS232/422/485 optical isolated converter.

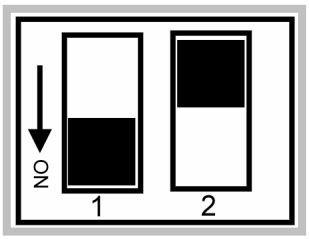
Block Diagram



Wire Connection For Digital Input



System Configuration Switch.1



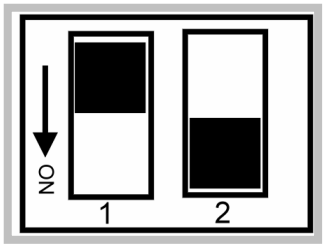
1.Power off the module, then adjust Switch.1 to ON.

2.Power on the module ,The module will be reset to ID=00, baud rate:9600, checksum: Disable!.

3. Send command to configure TRP-C24.

4.Power off the module, then adjust the Switch to OFF.

Self- test Switch.2



1.Power off the module , then adjust switch.2 to ON.

2.Power on the module , The module start self-testing, PWR and digital input LED start lighting one by one, power relay activating.

3.Power off the module to stop self-testing.

Command Description

Default setting:ID Address :01 Baud Rate:9600 DIO Mode Type :40 Checksum:Disable

Command Format :"Leading Code"+"ID Address"+"Command"+"CHK"+(cr) .

at :"Leading Code"+"ID Address"+"Data"+"CHK"+(cr) .

How To Calculate The Checksum

1.Calculate all characters of the command string to get the ASCII sum, except the character return.

2.Mask the sum of string with 0FFH.

Example :

Send the command is "$06M".

Sum of string is "$"+"0"+"6"+"M"="24H"+"30H"+" 4D"="A1H"……The checksum and [CHK]="A1".

Response string with checksum is :" A1 ".

Command List

Command List	Function Description	Page Index
%IDNNPPBBDD(CHK)(cr)	Set the module's configuration	See 7.1~7.3
#IDPPDD (CHK)(cr)	Digital Output Data	See 8.1
$ID6 (CHK)(cr)	Read digital input/output status	See 9.1
$ID2 (CHK)(cr)	Read the module's configuration	See 9.2
$IDRS (CHK)(cr)	Reset the module	See 10.1
$IDM (CHK)(cr)	Read the module's name	See 10.2
$IDF (CHK)(cr)	Read the module's firmware version	See 11.1
$ID5 (CHK)(cr)	Read reset status	See 11.2
~IDONN (CHK)(cr)	Change the module's name	See 12.1
~IDLEDA(CHK)(cr)	Set the module's LED operating mode	See 12.2
~IDWENN (CHK)(cr)	Enable watchdog and set the timeout value	See 13.1
~IDWD (CHK)(cr)	Disable watchdog	See 13.2
~IDWR (CHK)(cr)	Read watchdog timeout value	See 14.1
~**(CHK)(cr)	System stand by (Host ok!)	See 14.2
~ID4V (CHK)(cr)	Read power on/safe value	See 15.1
~ID5V (CHK)(cr)	Save existing digital output status to power on or safe mode	See 15.2
#**	Save existing digital input status	See 16.1
$ID4	Read synchronized data	See 16.2

Safe mode: Digital output when Watchdog enable.
Power on mode: Digital output when power on.
Watchdog: The watchdog is designed to monitor the module's output status to prevent the module from communication problem or system halt due to unexpected situation.
*User can save the module output value by using the command "ID5V" if the power is fails.

7.1 Set the module's configuration *Must adjust the system configuration Switch.1 to ON (See Page 5)

Command	%IDNNPPBBDD(CHK)(cr)	
Syntax Description	%	First leading code
	ID	Address of setting module 00-FF(HEX)
	NN	New address of setting from 00-FF(HEX)
	PP	The Digital I/O module type define to 40
	BB	Set new baud rate (See 7.2)
	DD	Data format (See 7.3)
	CHK	Checksum
	(cr)	Carriage return
Response	!ID(CHK) (cr)	Command valid
	?ID (CHK)(cr)	Command Invalid

7.2 Baud rate (BB) setting

Code number	03	04	05	06	07	08	09	0A
Baud rate	1200	2400	4800	9600	19200	38400	57600	115200

7.3 Data (DD) format setting

Bit	7	6	5	4	3	2	1	0
Function	0	Checksum 0:Disable 1:Enable	0	0	0	0	0	0

EX: Send command:"%0001400600".....If you turn on the system setting switch , the ID will be reset to "00".

New ID is "01",D I/O type is "40" ,Bard-Rate:9600 ,Checksum setting disable is "00", Response:"**!01**".

EX: Send command:%0003400540....New ID="03",Bard-Rate="4800",Checksum="Enable",Response:"**!03**".

*We offer the utility to guide you to configure the module ,the utility also with on-line RS485 modules scanning and searching function. You can find the utility in the CD which is bundled in TRP-C26 standard package. (See the page 17)

8.1 Digital output data

Command	#IDPPFD(CHK)(cr)	
Syntax description	#	First leading code
	ID	Address of setting module 00-FF(HEX)
	PP	D I/O type :0A or 00 low byte data D0-D7 (Multi-Channel) :0B high byte data D8-D15(Multi-Channel) :1L or AL: low byte data D0-D7 (Single-Channel) L=0-7 :BL : high byte dataD8-D15(Single-Channel) L=0-7
	DD	DD: Sent the data from 00~FF
	CHK	Checksum
	(cr)	Carriage return
Response	>(CHK)(cr)	Command valid
	!ID(CHK) (cr)	Parameter invalid (*Command data error !)
	?ID (CHK)(cr)	Command Invalid

*Multi-Channel mode (Output control for one BYTE)

EX: Send command :"#010A0F".....Data="0F":DO0~DO7="11110000".

Response:">"..... Command valid.

EX: Send command:"#010B26".....Data="26":DO8~DO15="01100100"

Response:">"..... Command valid.

EX: Send command:"#01000G"…Data="0G".....Data error!.

Response:"!01".....Parameter error! .

*Single-Channel mode(Output control for one BIT)

EX: Send command:"#011001"..... Data="01":DO0="1".

Response:">"..... Command valid.

Send command:"#011201"..... Data="01":DO2="1".

Response:">"..... Command valid.

Send command:#01B301……Data="00":DO11="1".

Response:">".....Command valid.

9.1 Read digital input/output status

Command	$ID6(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	6	Read digital output status
	CHK	Checksum
	(cr)	Carriage return
Response	!IDHHLL(CHK)(cr)	HH=DO15~DO8 status, LL=DO7-DO0 status
	?ID(CHK) (cr)	Command Invalid

EX: Send command:$016…….Read digital output status .

Response:"!01C345"…….DO15~DO8="11000011", DO7~DO0="01000101".

9.2 Read the module's configuration

Command	$ID2(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	2	Read configuration
	CHK	Checksum
	(cr)	Carriage return
Response	!IDPPBBDD(CHK)(cr)	Command valid PP: Digital I/O type=40 BB: Baud rate DD=Data format (See data format table) Module model: BIT 2~0="000" TRP-C28 "001" TRP-C24 "010" TRP-C26
	?ID(CHK)(cr)	Command Invalid

Data format table

Bit	7	6	5	4	3	2	1	0
Function	0	Checksum 0:Disable 1:Enable	0	0	0	0	0	0

EX: Send command:$012…Read configuration .

Response:"!01400641"……. DIO type=40,Baud-Rate=9600 (See 7.2) ,Data format=41 ,Checksum= Enable, Module model:1….TRP-C24 (See Data format table).

10.1 Reset the module

Command	$IDRS(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	RS	Reset the module
	CHK	Checksum
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK) (cr)	Command Invalid

EX: Send command:"$01RS"…….Reset TRP-C24.
Response:"!01 "…… ……..Have been reset.

*Reset will clear all digital output status.

10.2 Read the module's name

Command	$IDM(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	M	Reading module's name
	CHK	Checksum
	(cr)	Carriage return
Response	!IDNNNNNN(CHK)(cr)	NNNNNN :The chars from 1 –6 chars
	?ID(CHK)(cr)	Command Invalid

EX: Send command:$01M…Read the TRP-C24's name.

Response:"!01TRPC24"……. The module's name is "TRPC24".

11.1 Read the module's firmware version

Command	$IDF(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	F	Command for reading module's version
	CHK	Checksum
	(cr)	Carriage return
Response	!IDMODMMYY(CHK)(cr)	MOD :The module's model MM:Release Month YY :Release Year
	?ID(CHK)(cr)	Command Invalid

EX: Send command:$01F…Read the TRP-C24's version.

Response:"!01C240605"……. The TRP-C24's version date is "06/2005".

11.2 Read reset status

Command	$ID5(CHK)(cr)	
Syntax description	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	5	Command for reading reset status
	CHK	Checksum
	(cr)	Carriage return
Response	!IDS(CHK)(cr)	S =1 has been reset S=0 not been reset
	?ID(CHK)(cr)	Command Invalid

EX: Send command:$015…Read the TRP-C24's reset status .

Response:"!011"……. The TRP-C24 has been reset.

*If the module is system halt or detect abnormal voltage , the module will restart and reset the flag to "1" .

12.1 Change the module's name

Command	~IDONN(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	O	Command for rename TRP-C24's name
	NN	NN:TRP-C24's name, Max.6 characters
	CHK	Checksum
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

EX: Send command:"~01OTRYCOM"….. Change the TRP-C24's name become to "TRYCOM".

Response:"!01"……. . Command valid.

Then send the command "$01M"…read the TRP-C24's name.

Response:"!01TRYCOM"……. .The TRP-C24's name is "TRYCOM".

12.2 Set the module's LED operating mode

Command	~IDLEDA(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	LED	Set the module's LED operating mode
	A	A=0 Turn off all LEDS, when logic "1" ON A=1 Turn on all LEDS, when logic "1" OFF
	CHK	Checksum
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

EX: Send command:"~01LED0"….. Turn off all LED, when logic "1" ON.

Response:"!01"……. . Command valid.

13.1 Enable watchdog and set the timeout value

Command	~IDWENN(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	WE	Watchdog Enable
	NN	Set the watchdog time(NN:00-FF) One Unit=0.1 Sec FF: MAX. 25.5 Sec
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

EX: Send Command:"~01WEFF"….. Set the watchdog time for 25.5 Sec.

Response:"!01"……. . Command valid, When module count to 25.5 Sec the watchdog will into safe mode ,then PWR LED will flashing, before timeout if host send "~**", the watchdog will re-counted!.

*When the module is in safe mode , any digital output command are invalid , you will get the response "!IDWE" , which means the system is in safe mode, you can't change output status.

*Reset and power fail will not affect watchdog mode.

13.2 Disable watchdog

Command	~IDWD(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	WD	Disable watchdog
	(cr)	Carriage return
Response	!ID(CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

EX: Send Command:"~01WD"….. Watchdog disable!.
Response:"!01"……. . Command valid, System LED will stop flashing!.

14.1 Read watchdog timeout value

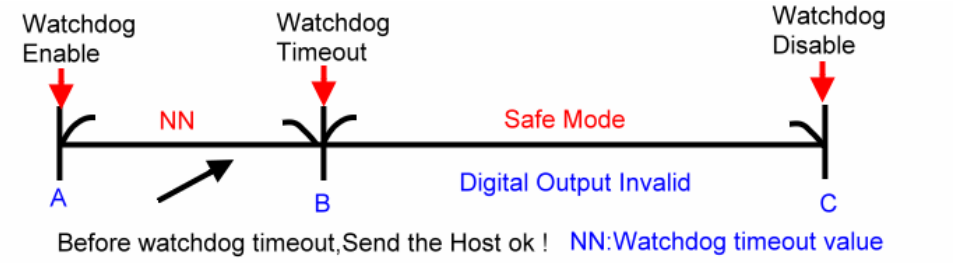
Command	~IDWR(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	WR	Read watchdog timeout value
	CHK	Checksum
	(cr)	Carriage return
Response	!IDWANN (CHK)(cr) !ID (CHK)(cr)	W: watchdog A=E: watchdog enable D: watchdog disable or safe mode NN: watchdog timeout value
	?ID(CHK)(cr)	Command Invalid

EX: Send Command:"~01WR"…. Read watchdog timeout value.

Response:" !01WD0F"……. . Command valid, set the watchdog timeout is "0F"..1.6 Sec.

14.2 System stand by (Host OK!)

Command	~**(CHK)(cr)	
Syntax description	~	First leading code
	**	Host ok!
	CHK	Checksum
	(cr)	Carriage return
Response		No Response



*If watchdog is in enable , send the "Host Ok!" before watchdog timeout (B) the watchdog will re-count, PWR LED will flashing after watchdog timeout.

15.1 Read power on/safe value

Command	~ID4V(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	4	Read power on/safe digital IO value
	V	V=P: Power On V=S: Safe value
	CHK	Checksum
	(cr)	Carriage return
Response	!IDHHLL (CHK)(cr)	HH:DO15~DO8 LL:DO7~DO0
	?ID(CHK)(cr)	Command Invalid

EX: Send Command:~014S…….Read safe mode digital output status.

.. Response:" !01080F"……. . Command valid, safe mode digital output status is "080F".

15.2 Save exiting digital output status to power on or safe mode

Command	~ID5V(CHK)(cr)	
Syntax description	~	First leading code
	ID	Address of setting module 00-FF(HEX)
	5	Save the current digital output is save or power on mode
	V	V=P Power On V=S Safe value
	(cr)	Carriage return
Response	!ID (CHK)(cr)	Command valid
	?ID(CHK)(cr)	Command Invalid

EX: Send Command:"#010A0F"…Digital output DO7~DO0= "0000 1111"

Response:" !01"……. . Command valid!

Then Send Command :" ~015P"….Set the digital output for power on ,.After power fail or reset , the module will load current .

16.1 Save existing digital input status

Command	#**(CHK)(cr)	
Syntax description	#	First leading code
	**	Save current digital IO status(All modules on line).
	CHK	Checksum
	(cr)	Carriage return
Response		No Response

EX: Send Command:"#**"……. Save current digital Iinput/output status of all modules on line.

16.2 Read synchronized data

Command	$ID4(CHK)(cr)	
Syntax descrption	$	First leading code
	ID	Address of setting module 00-FF(HEX)
	4	Read synchronized data
	CHK	Checksum
	(cr)	Carriage return
Response	!AHHLL00(CHK)(cr)	Command valid A=1:Have been send"#**" A=0:Have been read HH: DO15-DO8 output status LL: DO7-DO0 I output status
	?ID	Before send this command do not send the command "#**"

EX: Send Command:"#**"…….Save current digital IO status(All modules on line).

Then send command:"$014"…. Read synchronized data.

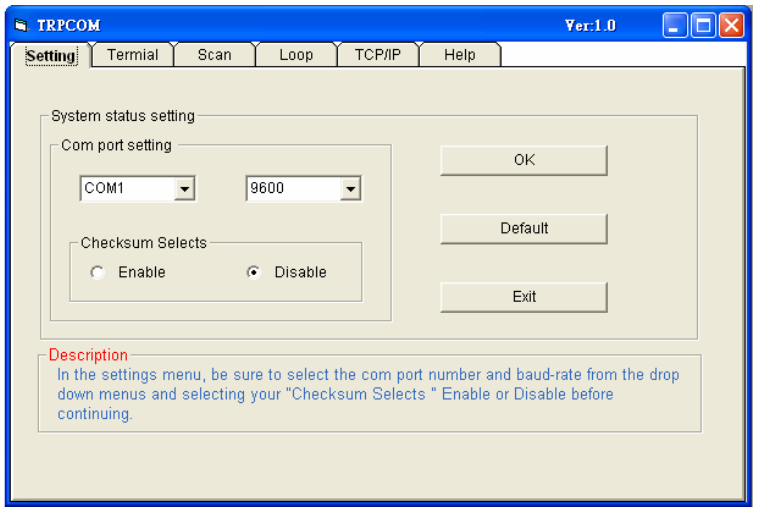
Response:"!1010E00"…."1":Have been send the "#**,the DO status valid is "010E"

*After Read synchronized data ,A value is"1", Read again become to "0".

How to use the utility for windows

The TRPCOM utility can help you to test the module's data transmit and receive ,digital input and output communication status .

Figure 1



1.The "Setting" function is for user to initiate the software to set the Com Port from 1 to 8 and setting the Baud-Rate from 1200 to 19200,Checksum Enable or Disable. …*See Figure 1*

**The Module Factory Setting is "9600" and "ID"*

Is 01 ,Checksum is Disable.

Figure 2

2.The "Terminal" function is for user to input command, user can control all of module's digital input/output status or wait to get module response status …*See Figure 2*

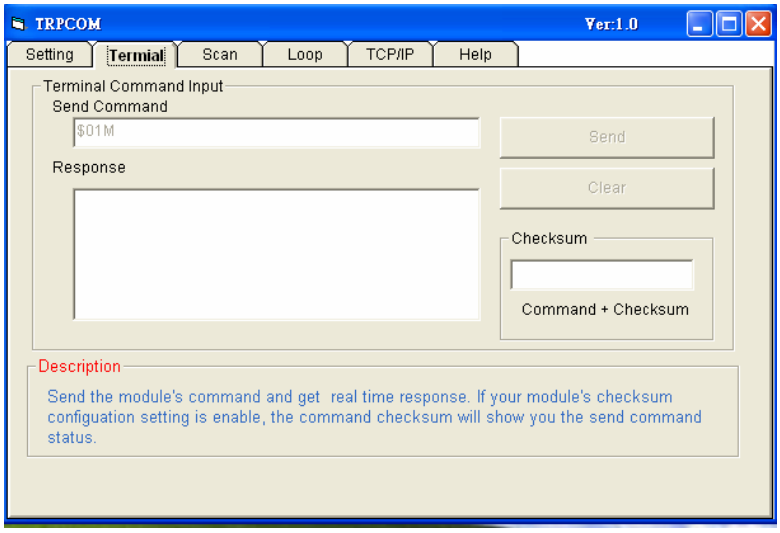
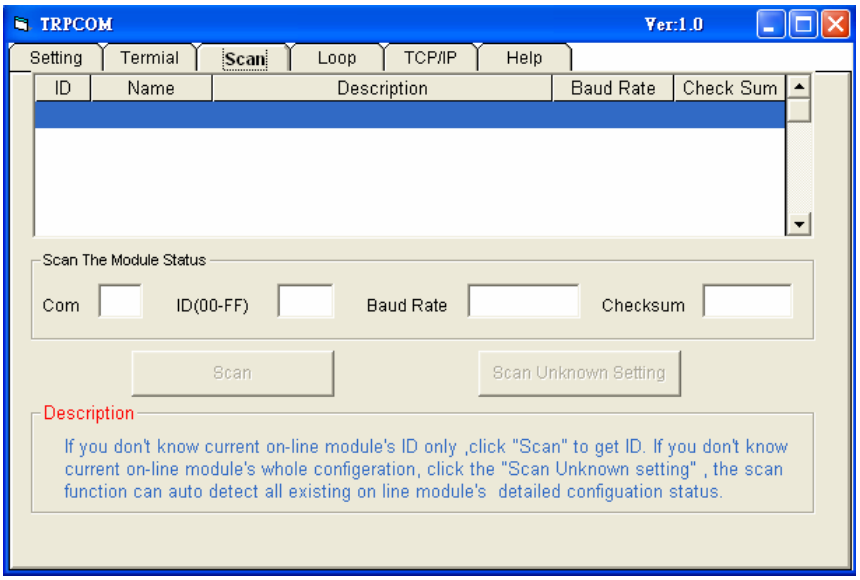


Figure 3



If you don't know the Baud-rate, ID or,Checksum you may select "Scan" to find the module's setting.