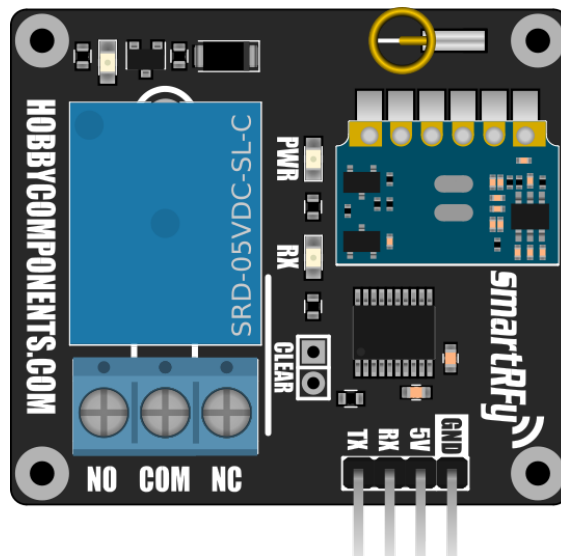


SmartRFy Relay Modules

Manual



**HCMODU0145,
HCMODU0146,
& HCMODU0147**

Revision 1.0.0

DISCLAIMER

SmartRFy modules are micro power short range devices (SRD) using the 433MHz frequency band. This frequency band is licensed exempt (within certain restrictions) in many countries including the UK, Europe, Asia, and the US. It is the end users responsibility to ensure that it is legal to operate devices in this frequency band within your own country before use.

As with all wireless devices, external factors such as range and interference may cause transmissions to be corrupted or blocked. Therefore these devices should not be used in applications where control or monitoring is a critical requirement.

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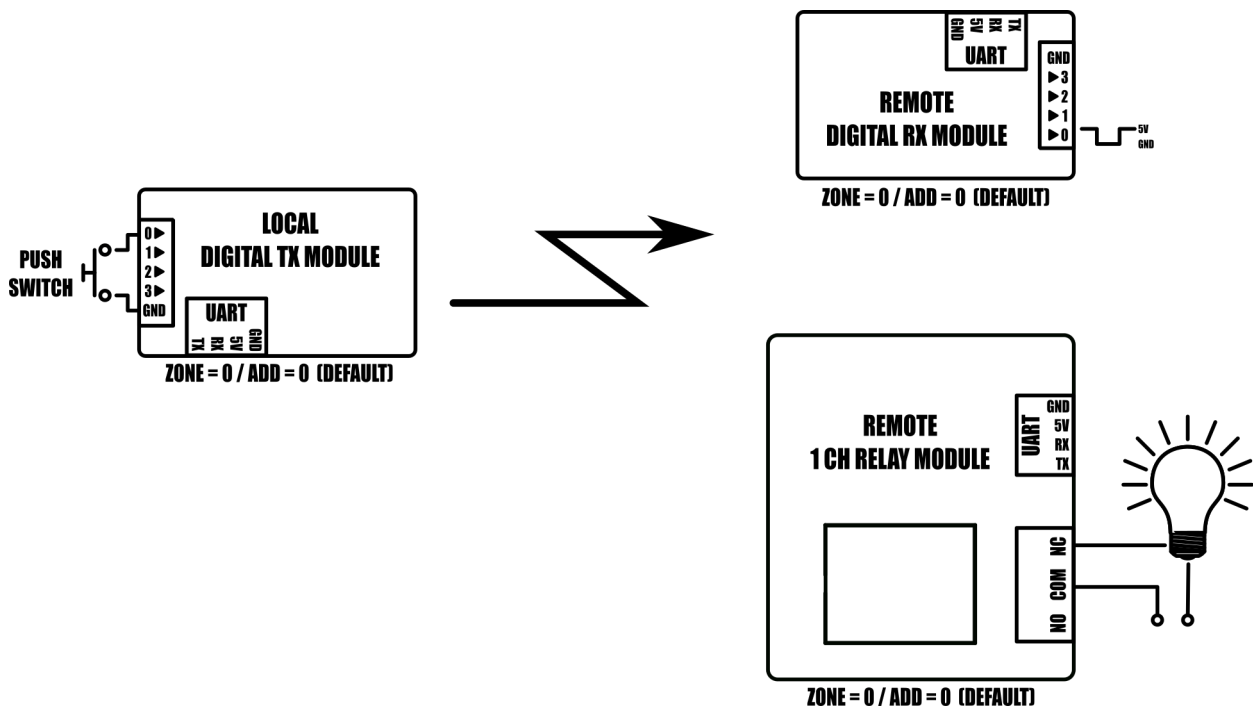
SmartRFy system overview

SmartRFy modules are a range of wireless modules that provide a simple low cost way of controlling and monitoring remote devices and sensors. They are designed to work at their basic level with no programming required. However, when reconfigured or controlled via their serial interface they can also provide more complex and even autonomous functions.

SmartRFy modules work by wirelessly communicating with one another using simple text based commands - for example, to turn on a remote relay a command such as RLY=1 can be sent, and to turn it back off RLY=0. These commands can be automatically sent from one module to another or can be sent by a user via a modules serial interface to manually control modules on the SmartRF network.

They are addressable and can grouped into one of 255 zones, with each zone capable of individually addressing 255 devices, giving a total of over 65,000 unique addresses. SmartRFy modules are designed to be both easy and flexible to use by providing three levels of control:

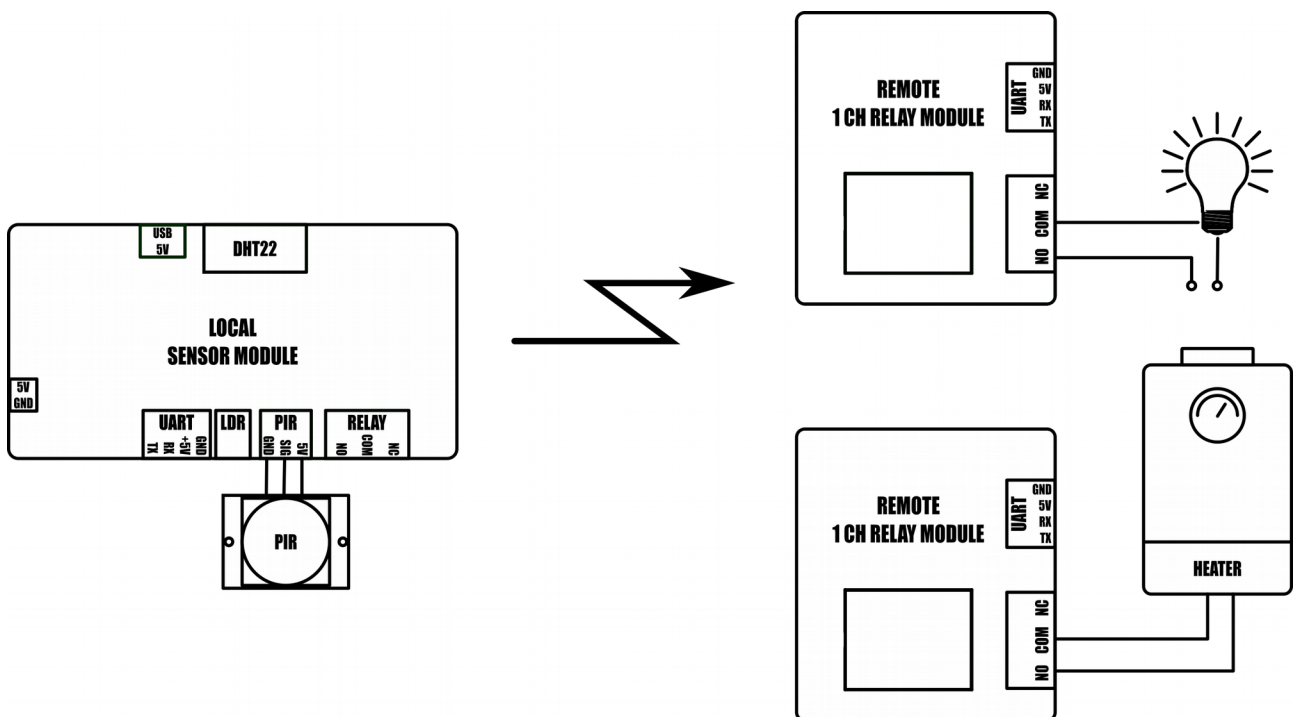
Zero configuration (out-of-the-box)



Example: Controlling a remote digital pin and light from a push switch.

With no configuration at all the SmartRFy range of modules allow basic functionality such as remotely switching relays, digital pins, or monitoring sensors, such as temperature, humidity, light, motion etc. All SmartRFy modules default to the same zone and address and so can respond to, or control, other modules without the need to modify any zone or address settings.

Serial port configuration

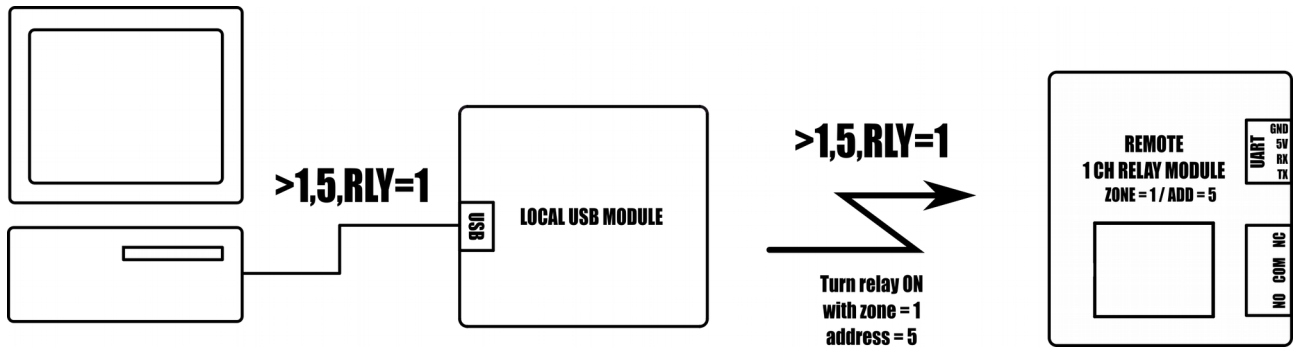


Example: Remote 1CH relay module configured to turn on light when local modules' PIR is triggered and second remote relay module is configured to control a heating device based on local modules' temperature sensor readings.

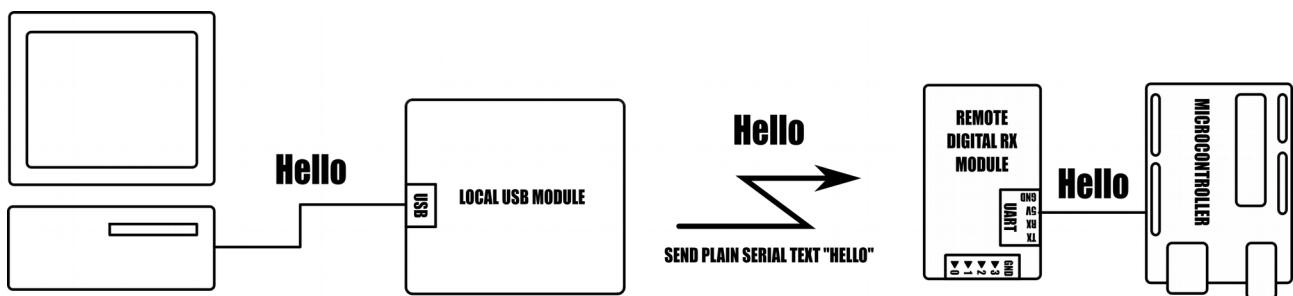
All smartRFy modules include a serial port which allows them to be re-configured using simple text based commands. These text commands allow changing of configuration settings and control of specific features of each module. Any setting changes are stored by the modules non-volatile memory and so are retained even when power is removed from the module. When reconfigured they are able to perform more complex functions and even some basic autonomous tasks. For example, a SmartRFy relay module can be reconfigured to control a heating system based on the temperature transmitted from a remote sensor or, turn on a flood light for a set amount of time when triggered by a remote

PIR – all without any additional hardware. Serial port configuration also allows a modules zone and address (all SmartRFy modules default to zone and address 0) to be changed. This provides the option for modules to be placed into groups, which will then only respond to other modules with a matching zone or address.

Slave controlled



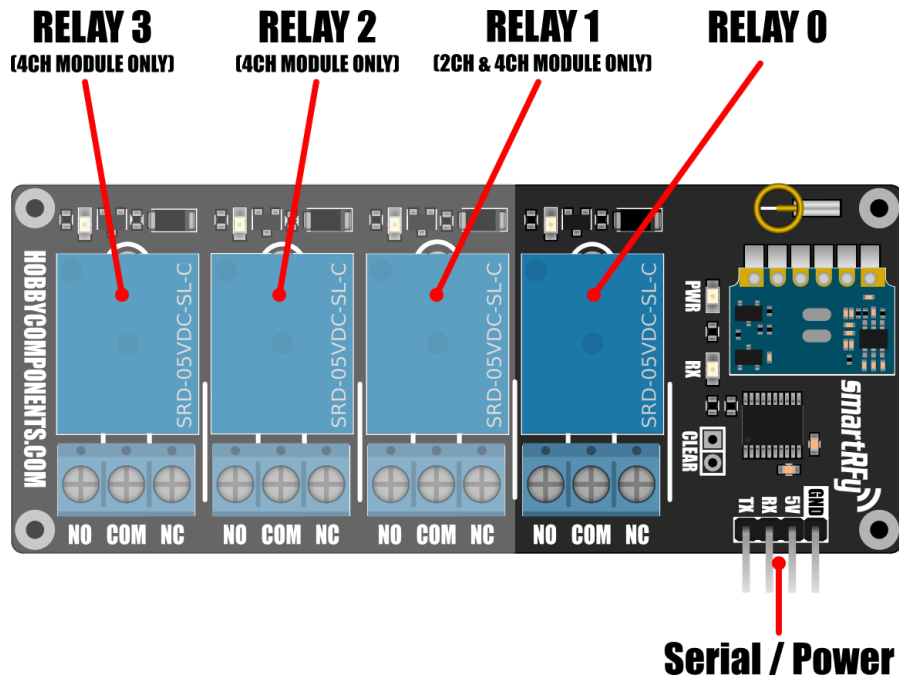
Example 1: Turning on a remote relay with zone = 1 and address = 5



Example 2: Send plain serial text “Hello” to a remote microcontroller

SmartRFy modules can also be controlled via their serial port by other devices such as microcontrollers or computer based automation software such as Node-RED. Using a SmartRFy module as a slave device (must be capable of transmitting/receiving) gives a master device the ability to monitor and control any other SmartRFy devices on the network, regardless of their zone and address. SmartRFy modules can even be used as a passive wireless serial port for passing non-SmartRFy data to other remotely connected devices.

SmartRFy relay modules



The SmartRFy relay modules are available in 1, 2, and 4 channel versions and give the ability to remotely switch electrical devices via other SmartRFy modules. For example, a SmartRFy relay module can be used to switch a floodlight when triggered by a PIR sensor connected to a remote SmartRFy digital TX module without requiring any configuration.

Out of the box the relays can be remotely controlled by the appropriate input pin of the 4 channel digital TX module (HCMODU0143) or the single channel switch module (HCMODUxxxxx). When reconfigured via the serial port these relay modules can be programmed to automatically respond to a greater range such as temperature, humidity, light etc.

Screw terminals provide convenient access to each relays normally open, closed, and common terminals. As with all SmartRFy modules, the relay modules also include a serial interface which can be used to reconfigure the device using simple text based commands, or can be used as a basic wireless serial port allowing it to receive serial data sent from other remote SmartRFy devices.

Features

- Available in 1 channel (HCMODU0045), 2 channel (HCMODU0046), and 4 channel (HCMODU0047) relay versions.
- Local and remote control via simple text based serial commands.
- Up to 255 zones and 255 addresses (default zone 0, address 0).
- Basic automation features (requires a USB to serial adaptor or microcontroller for configuration).
- Compatible with most microcontrollers featuring a serial UART interface.
- Wireless serial communication with 8 different baud rates (9600 default).
- Built in 1, 2, or 4 channel relays providing a set of NO/NC clean contacts accessed via a screw terminal header.
- Relays can be controlled remotely via serial commands, or other SmartRFy modules. The module can be set to automatically switch the relay based on temperature, humidity, light or motion and supports on/off, toggle, and timer modes.

Specification

Model number:	HCMODU0145, HCMODU0146, & HCMODU0147
Supply Voltage:	4.5 to 5.5V
Supply current min:	9.5mA (idle)
Supply current max:	1ch: 101mA (transmit + relay energised) 2ch: 181mA (transmit + all relays energised) 4ch: 341mA (transmit + all relays energised)
Operating frequency:	433MHz (OOK)
Operating range:	30 Meters (unobstructed)
Interfaces:	RF Tx and Rx, serial UART, and 1, 2, or 4 relay clean contacts
Relay contact rating (resistive load):	5A max at 28VDC or 240VAC

Module dimensions (WxDxH): 1ch: 45.5mm x 40.4mm x 19mm
 2ch: 62.5mm x 40.4mm x 19mm
 4ch: 136.5mm x 40.4mm x 19mm

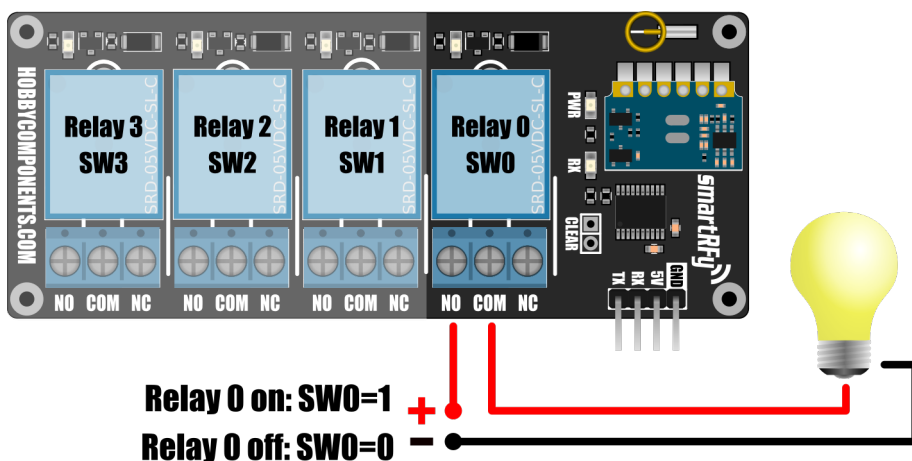
Relay Module Features

Power

Power can be applied to the module via the 5V and GND pins on the serial interface header. It can be powered using an external power supply ranging from 4.5 to 5.5V with a minimum current capacity of 120mA (1ch), 200mA (2ch), or 360mA (4ch).

Relay(s)

The relay modules include built-in relays to allow external electrical equipment to be remotely switched.



A screw terminal provides access to the relay(s) normally open (NO), common (COM) and normally closed (NC) contacts.

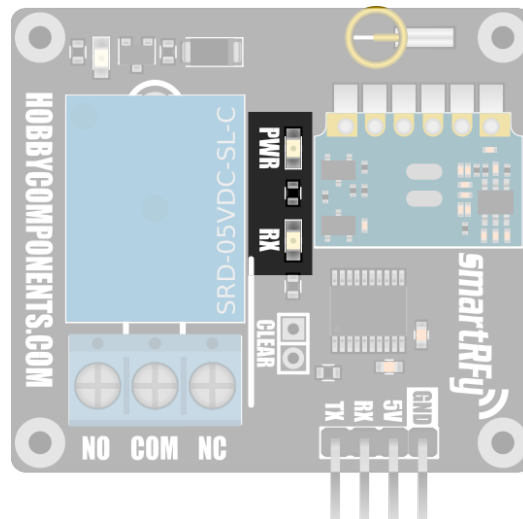
Each relay can be controlled using the SWx command where x is the relay number (0 to 3). The module will respond to this command being sent via its serial interface, or remotely from any other SmartRFy device set to the same zone and address. By default, setting the SWx command to 1 (e.g. SW0=1) will energise the relay, and setting it to 0 (e.g. SW0=0) will de-energise the relay.

The four relay switch commands (SW0, SW1, SW2, SW3) can also be renamed to any three letter command and the name to an existing device name (e.g. PIR, TMP, LDR etc.) they can be made to automatically respond to other devices set to the same zone and address.

The relays can also be configured to be energised for a set period of time (specified in seconds) using the SxO command (where x is the relay number 0 to 4), or set to a toggle (on/off) mode where its state will toggle when receiving an appropriate trigger command. For more information on how to configure the relays to automatically respond to certain conditions please see Appendix A: Relay examples.

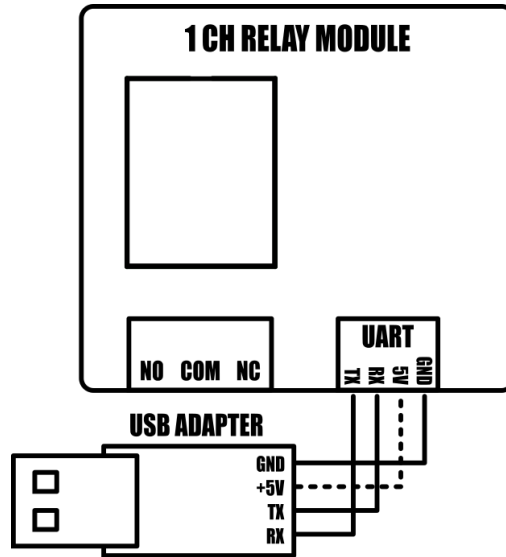
LEDs

The sensor module includes a 2 LEDs which indicate the current state of the module.



PWR LED (green)	Indicates the module is currently powered.
RX LED (amber)	Indicates the module is currently receiving data from another SmartRFy device with any zone or address.

Serial UART



Command interface feature

The module includes a full duplex serial UART interface which can be used for issuing local commands and settings directly to the module (local commands).

By default the serial interface will also output any received data from other SmartRFy modules no matter what their zone and address settings. The type of information that the serial interface outputs can be controlled using the verbose command (VBM).

Wireless serial port feature

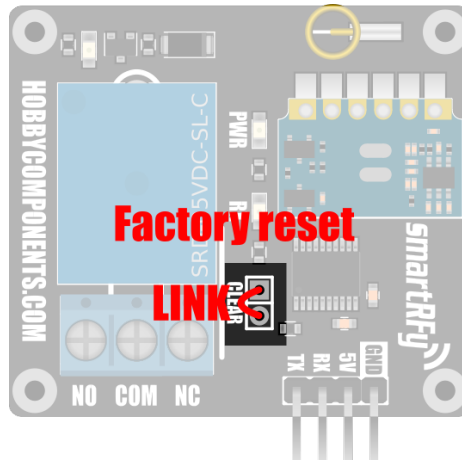
Additionally, the serial interface can also act as a passive wireless serial port for receiving non-SmartRFy related data from other devices connected to remote SmartRFy modules.

Default configuration settings

By default the serial interface is configured to 9600 baud, 8 data bits, no parity, and 1 stop bit. See the serial interface control section for more information on setting the baud rate, verbose mode, and issuing commands.

Note: Connecting the module to a PC via its serial port will require an additional USB to serial adapter (see Hobby Components items HCARDU0011 or HCMODU0076).

Clear (Factory Reset)



The module is capable of storing a number of user configuration settings in its non-volatile memory. This allows it to retain these settings even after power is removed. The two pads marked 'CLEAR' provide a means of restoring the module back to its original factory default settings. Should you wish to reset the module, connect power to the module whilst shorting the two pads together.

Alternatively the module can be restored back to factory default settings by issuing the factory reset (FTRE) command via the serial interface – see the SmartRFy commands section for more information.

SmartRFy commands

Command formats

SmartRFy modules are capable of responding to an array of text based commands sent via the serial interface. These commands can be either module configuration settings or commands to control the locally connected module or a remote module.

Command format requirements

- In all cases the command must always be terminated with a carriage return (ASCII code 13) and a line feed (ASCII code 10).
- The relay modules do not have transmit capability. Therefore commands can only be processed by the module itself (local commands) and cannot be transmitted to other modules (remote commands). To tell the module that you are issuing a local command, the command must be prefixed with an asterisk (*). For example *SW0=1 will cause relay 0 to be energised. Remote commands, i.e. commands prefixed with a greater than symbol (>) will be ignored.
- Commands must always be in uppercase and no part of the command should include white space characters, including spaces.
- Some commands require more than one parameter. In this case parameters should be separated by commas (,) with no spaces.
- Commands are always 4 characters in length. Commands that require one or more parameters will have an equals (=) as the last character (e.g. XXX=), and commands that are querying information will have a question mark (?) as the last character (e.g. XXX?).
- The device will respond to a successful local command with the response 'OK'. An unsuccessful command will be responded with an 'ERROR'. There is no response by the local device when issuing remote commands. All responses are terminated with a carriage return and line feed.
- No serial data sent to the local device, command or otherwise, may exceed 25 characters in length (including carriage return / linefeed termination).

Local command format

Prefix	Command	Optional parameter	Optional parameter	Optional parameter	Carriage return	Line feed
*	XXXX	<parameter 1>	,<parameter 2>	,<parameter n>	0x0D (\r)	0x0A (\n)

Example: *Setting and confirming the zone of the local device*

*ZON=1<CR><LF>

Sets the zone of the connected module to 1.

Response:

OK<CR><LF>

*ZON?<CR><LF>

Requests the current zone of the local device.

Response:

1<CR><LF>

Command quick lookup table

Generic commands

Description	Parameter(s)	Response
Get firmware version	None	Vx.x (C) HobbyComponents.com
Get zone number (default: 0)	None	Zone number (0 to 255)
Get address (default: 0)	None	Address (0 to 255)
Sets the timeout time for the serial interface (default: 2000ms)	<i>Time</i> : Timeout time in milliseconds (0 to 65535)	OK
Sets the BAUD rate for the serial interface	Baud: 0 = 1200 BAUD Baud: 1 = 2400 BAUD Baud: 2 = 4800 BAUD Baud: 3 = 9600 BAUD (default) Baud: 4 = 19200 BAUD Baud: 5 = 38400 BAUD Baud: 6 = 57600 BAUD Baud: 7 = 115200 BAUD	OK
Sets the number of times any Tx data will be retransmitted	<i>Resends</i> : Number of resends (0 to 5)	OK
Sets the verbose mode which specifies what received data is output to the serial interface (default: 0)	Mode: 0 = Both passive serial & commands from all zones and addresses Mode: 1 = Only passive serial data from all zones and addresses Mode: 2 = Only control from all zones and addresses Mode: 3 = Both passive serial & commands with matching zone and address Mode: 4 = Only passive serial data with matching zone and address Mode: 5 = Only commands with matching Zone and address	OK
Sets the devices zone number	<i>Zone</i> : Zone number (0 to 255)	OK
Sets the devices address	<i>Address</i> : Devices address (0 to 255)	OK
Turns on or off repeater mode (default: off)	<i>State</i> : Repeater state (0 = off, 1 = on) Note: Only available on modules with both RF Tx & Rx capability	OK
Performs a factory reset – all settings a restored to their default values	None	OK

Relay module specific commands

Command	Description	Parameter(s)	Response
SWx=State	Sets the state of relay x	x: The relay number (0 to 3). E.g. SW0 is relay 0 State: Floating point value which determines the state of the relay depending on T0H, T0L, M0H, & M0L settings. Default: 0 = relay off, 1 = relay on	OK
SxN=Name	Sets an alternative three letter command name the relay will respond to (default SWx)	x: The relay number (0 to 3). E.g. S0N is relay 0 Name: Three letter name of the alternate command	OK
SxO=Time	Sets the amount of time the relay will stay energised when triggered. The relay will automatically de-energise when time has elapsed	x: The relay number (0 to 3). E.g. S0O is relay 0 Time: Relay on time in seconds (0 to 65525). Default = 0 (disabled).	OK
TxH=Threshold	Sets the threshold value required to energise the relay (default: 1)	x: The relay number (0 to 3). E.g. T0H is relay 0 Threshold: A decimal number which sets the level required to energise the relay	OK
TxL=Threshold	Sets the threshold value required to de-energise the relay (default: 0)	x: The relay number (0 to 3). E.g. T0L is relay 0 Threshold: A decimal number which sets the level required to de-energise the relay	OK
MxH=Mode	Sets the test condition under which the relay will energise (default: =)	x: The relay number (0 to 3). E.g. M0H is relay 0 Mode: > The value passed by the SW0= command must be greater than the Threshold level set by the T0H= command Mode: = The value passed by the SW0= command must equal the Threshold level set by the T0H= command Mode: < The value passed by the SW0= command must be less than the Threshold level set by the T0H= command	OK
MxL=Mode	Sets the test condition under which the relay will de-energise (default: =)	x: The relay number (0 to 3). E.g. M0L is relay 0 Mode: > The value passed by the SW0= command must be greater than the Threshold level set by the T0H= command Mode: = The value passed by the SW0= command must equal the Threshold level set by the T0H= command Mode: < The value passed by the SW0= command must be less than the Threshold level set by the T0H= command	OK

Generic SmartRFy commands

Commands listed below are common to all SmartRFy modules, including the sensor module. Note that all commands must be preceded with a carriage return and line feed, but for clarity purposes this is omitted from the examples in this section.

Firmware version (FWV?)

Gets the firmware version of the module.

Example: *FWV?

Returns: Vx.x

(C) HobbyComponents.com

Where Vx.x is the version number

Get the modules zone (ZON?)

Gets the modules current zone number

Example: *ZON?

Returns: The current zone number as a decimal value (0 to 255)

Get the modules address (ADD?)

Gets the modules current address

Example: *ADD?

Returns: The current address as a decimal value (0 to 255)

Serial serial timeout time (STO=)

Sets the timeout time for the serial interface in milliseconds. Maximum timeout time is 65535ms (65.535 seconds). If a complete command (including CR + LF termination) is not received within this time the command will be ignored and an 'ERROR' will be returned.

Default: 2000 (2 seconds)

Example: *STO=1000

The above example will set the serial port timeout time to 1000ms (1 second).

Returns: OK

Set the baud rate (BUR=)

Sets the communication baud rate for the serial UART interface. There are 8 (0 to 7) possible settings for the baud rate:

0 = 1200 BAUD

1 = 2400 BAUD

2 = 4800 BAUD
3 = 9600 BAUD (default)
4 = 19200 BAUD
5 = 38400 BAUD
6 = 57600 BAUD
7 = 115200 BAUD

NOTE: This command sets the serial communication speed between the connected device and the SmartRFy module – it does not set the wireless RF communication speed between modules.

Default: 3

Example: *BUR=5

The above example will set the serial port baud rate to 38400 baud.

Returns: OK

Set number of transmit resends (TRS=)

Sets the number of times the module will automatically re-transmit data. Increasing the number of times data is retransmitted will reduce the chances of the data not being received due to interference but will also increase transmission times and network traffic. The number of resends can be set from 0 (no resends) to 5.

Default: 2

Example: *TRS=3

The above example will set the number of resends to 3. Therefore any data wirelessly transmitted by the module will be transmitted a total of 4 times.

Returns: OK

Set the serial verbose mode (VBM=)

Sets what type of data received by the module is automatically output to its serial port. There are 6 possible modes (0 to 5):

- 0 = Both passive serial and commands from all zones and addresses
- 1 = Only passive serial data from all zones and addresses
- 2 = Only control from all zones and addresses
- 3 = Both passive serial and commands with matching zone and address
- 4 = Only passive serial data with matching zone and address
- 5 = Only commands with matching zone and address

Default: 0

Example: *VBM=5

The above example will set the module to only output received commands that have been transmitted from a module with the same zone and address as itself.

Returns: OK

Set the modules zone number (ZON=)

Sets the modules zone number. The zone number can be between 0 and 255.

Note that zone 255 is a special zone number. Setting the module to this zone number means that it will treat received data from any zone as if it were in the same zone as itself. Therefore this zone number can be used when you wish the module to respond to commands from modules in multiple zones. Additionally, when transmitting data with a zone of 255 all modules within range will respond to the data as if it is in the same zone as itself. Therefore this zone number can also be used when you require the module to control multiple remote modules in different zones.

Default: 0

Example: *ZON=2

The above example will set the modules zone number to 2.

Returns: OK

Set the modules address (ADD=)

Sets the modules address. The address can be between 0 and 255.

Note that address 255 is a special address. Setting the module to this address means that it will treat received data from any address as if it were the same address as itself. Therefore, this address can be used when you wish the module to respond to commands from modules with different addresses. Additionally, when transmitting data with an address of 255 all modules within range will respond to the data as if it has the same address as itself. Therefore this address can also be used when you require the module to control multiple remote modules with different addresses.

Default: 0

Example: *ADD=5

The above example will set the modules address to 5.

Returns: OK

Turn on/off repeater mode (TRP=)

Turns repeater mode on or off. When turned on the module will retransmit any data it receives regardless of its zone and address. This mode can be used when a remote module is outside the range of a module that needs to communicate with it, but the repeating module is within range of both modules. Setting repeater mode to 1 will turn on repeater mode and setting it to 0 will turn it off.

Note:

- This mode is only supported by SmartRFy modules with both RF receive and transmit capabilities.
- Turning on repeater mode will double network traffic for any modules within range.

Default: 0 (off)

Example: *TRP=1

The above example will turn on repeater mode.

Returns: OK

Factory reset (FTRE)

Performs a factory reset of the module. All module settings will be restored to their factory defaults.

Example: *FTRE

The above example will restore all settings to their defaults.

Returns: OK

SmartRFy relay module commands

Commands below are specific to the SmartRFy relay modules and can be used to configure parameters relating to the hardware features of these modules.

Set the state of the relay (SWx=)

Sets the state of one of the modules' relays. This command can be used to energise (turn on) or de-energise (turn off) the relay. To specify which relay the command is intended for substitute x for the relay number (0 to 3). For example SW0= for relay 0, SW1= for relay 1, etc.

Default: 0 = off / 1 = on

Examples:

Via modules serial port: *SW0=1

Via remote module (assumes default zone/add = 0): >0,0,SW0=1

The above example will energise relay 0.

Returns: OK

Set an alternative relay name (SxN=)

Sets an alternative 3 letter command name which the relay will respond to. Setting an alternative command name allows a relay to be controlled by other devices such as temperature sensors, PIR's, switches etc. (Also see relay commands SxO, TxH, TxL, MxH, MxL, and Appendix A for more options and examples of configuring the relay). To specify which relay the command is intended for substitute x for the relay number (0 to 3). For example S0N= for relay 0, S1N= for relay 1, etc.

Default: SW0 for relay 0

SW1 for relay 1 (2 and 4 channel relay modules only)

SW2 for relay 2 (4 channel relay module only)

SW3 for relay 3 (4 channel relay module only)

Example: *S0N=ABC

The modules relay 0 will now respond to a command in the format of ABC=xxxx

Returns: OK

Set the relay on time (SxO=)

Sets the amount of time in seconds that the relay will energise for. Setting the relay on time to 0 (default) will disable the relay on timer (for that particular relay) and the relay will not de-energise unless it receives a command to do so. Setting the relay on time to anything between 1 and 65535 will cause the relay to stay energised until that amount of time, in seconds, has elapsed. To specify which relay the command is intended for substitute x for the relay number (0 to 3). For example S0O= for relay 0, S1O= for relay 1, etc.

Default: 0 (disabled)

Example: *S0O=60

In the above example the modules' relay 0 will automatically de-energise after 60 seconds from receiving a command to energise it.

Returns: OK

Set the threshold value to energise the relay (TxH=)

Sets the threshold value which will be used to determine if the relay should be energised when a SWx= command is received. The relay high threshold can be a positive or negative decimal number. The module will compare this value with the value received from an SWx command and together with the relay high mode (MxH) determine if the relay should be energised. (Also see relay commands SxO, TxH, TxL, MxH, MxL, and Appendix A for more options and examples of configuring the relays). To specify which relay the command is intended for substitute x for the relay number (0 to 3). For example T0H= for relay 0, T1H= for relay 1, etc.

Default: 1

Example: *T0H=100

In the above example relay 0 will energise if the module receives the relay command SW0=100 (assuming M0H is set to default).

Returns: OK

Set the threshold value to de-energise the relay (TxL=)

Sets the threshold value which will be used to determine if the relay should be de-energised when a SWx= command is received. The relay high threshold can be a positive or negative decimal number. The module will compare this value with the value received from an SWx command and together with the relay low mode (MxL) determine if the relay should be de-energised. (Also see relay commands SxO, TxH, TxL, MxH, MxL, and Appendix A for more options and examples of configuring the relays). To specify which relay the command is intended for substitute x for the relay number (0 to 3). For example T0L= for relay 0, T1L= for relay 1, etc.

Default: 0

Example: *T0L=-50

In the above example relay 0 will de-energise if the module receives the relay command SW0=-50 (assuming M0L is set to default).

Returns: OK

Set the test condition for energising the relay (MxH=)

Sets the threshold condition used to determine if the relay should energise. When a relay command (SWx) is received its parameter value is tested against the appropriate relay threshold high (TxH) value, and this threshold condition to determine if the relay should be energised. To specify which relay the command is intended for substitute x for the relay

number (0 to 3). For example M0H= for relay 0, M1H= for relay 1, etc. The MxH threshold condition can be set to one of three values:

MxH=< Relay is energised if value received by SWx command is *less than* the relay threshold high (TxH) parameter.

MxH== Relay is energised if value received by SWx command is *equal to* the relay threshold high (TxH) parameter.

MxH=> Relay is energised if value received by SWx command *greater than* the relay threshold high (TxH) parameter.

Default: =

Example: *M0H=>

In the above example relay 0 will energise if the module receives the relay command SW0 with a value greater than the current relay threshold high (T0H) level.

Returns: OK

Set the test condition for de-energising the relay (RML=)

Sets the threshold condition used to determine if the relay should de-energise. When a relay command (SWx) is received its parameter value is tested against the appropriate relay threshold low (TxL) value, and this threshold condition to determine if the relay should be energised. To specify which relay the command is intended for substitute x for the relay number (0 to 3). For example M0L= for relay 0, M1L= for relay 1, etc. The MxL threshold condition can be set to one of three values:

MxL=< Relay is de-energised if value received by SWx command is *less than* the relay threshold low (TxL) parameter.

MxL== Relay is de-energised if value received by SWx command is *equal to* the relay threshold low (TxL) parameter.

MxL=> Relay is de-energised if value received by SWx command *greater than* the relay threshold low (TxL) parameter.

Default: =

Example: *M0L=<

In the above example relay 0 will de-energise if the module receives the relay command SW0 with a value less than the current relay threshold low (T0L) level.

Returns: OK

Appendix A: Example relay modes

By default the modules relay(s) will respond to SW0 (for relay 0), SW1 (for relay 1), SW2 (for relay 2), or SW3 (for relay 3) commands to turn the relay on (energise) or off (de-energise). For example:

*SW0=1 will energise relay 0.

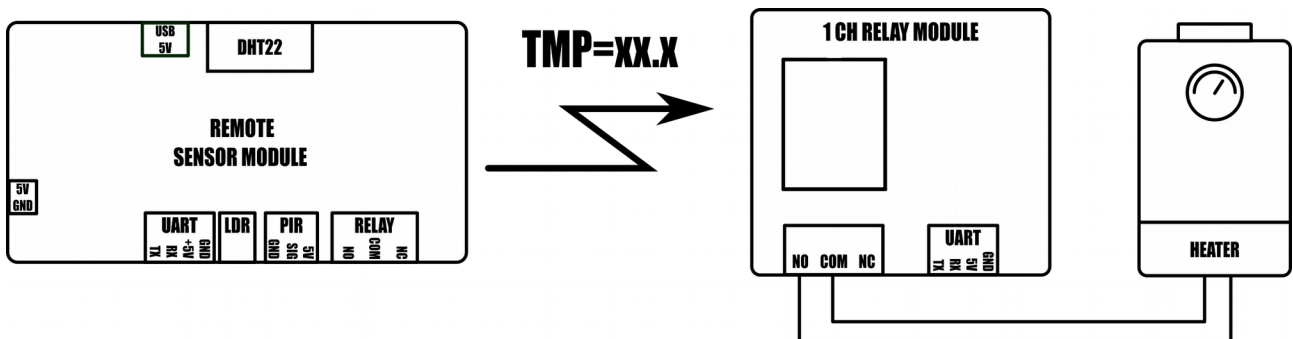
*SW0=0 will de-energise relay 0.

However, the relay(s) can be programmed to listen to any command that passes a value as a parameter and energise or de-energise based on pre-defined conditions. By altering the parameters SxN, SxO, TxH, TxL, MxH, and MxL (where x is the relay number) the relays can be configured to operate in one of 3 modes: Threshold mode, timer mode, and toggle mode. These three modes are explained below.

Threshold mode

In threshold mode a relay can be programmed to automatically energise or de-energise when a value goes above or below a predefined pair of thresholds.

Example: Controlling the temperature of a room based on the temperature readings of a remote SmartRFy sensor module



Change the following settings via the modules serial interface (see serial UART section for information about interfacing to the modules serial interface):

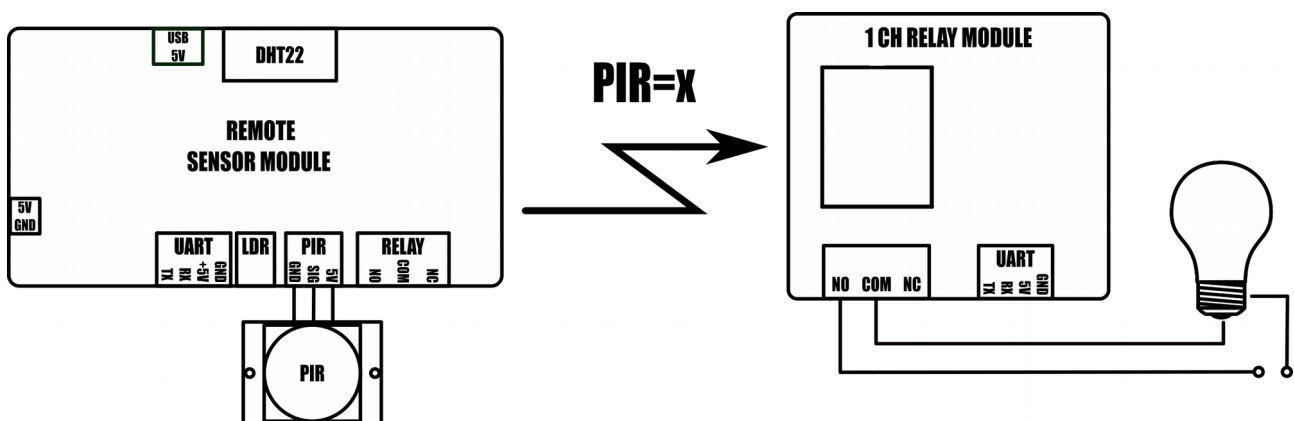
- *S0O=0 (default)
- *S0N=TMP (relay 0 will now listen to a temperature sensor)
- *T0H=20.5 (relay 0 high threshold is now set to 20.5)
- *T0L=23.5 (relay 0 low threshold is now set to 23.5)
- *M0H=< (relay 0 will now energise when value from temperature sensor is less than T0H)
- *M0L=> (relay 0 will now de-energise when value from temperature sensor is greater than T0L)

Once the above settings have been changed, relay 0 will now automatically turn on a heater when the temperature sensed by the remote sensor modules temperature sensor falls below 20.5oC and will turn the heater off when the temperature goes above 23.5oC. Note that the relay modules zone and address must match that of the remote sensor.

Timer mode

Timer mode allows the option of configuring the relay(s) to remain energised for a specified amount of time, in seconds, whenever a command to energise the relay is received. The relay will then automatically de-energise after that amount of time has elapsed. Timer mode is enabled by setting the relay on time (RLO) to a value other than 0.

Example: Controlling an outside light via a PIR connected to a remote SmartRFy sensor module



Change the following settings via the modules serial interface (see serial uart section for information about interfacing to the modules serial interface):

*S0O=60 (de-energise relay 0 after 60 seconds)
*S0N=PIR (relay 0 will now listen to the remote PIR sensor)
*T0H=1 (default)
*T0L=0 (default)
*M0H== (default)
*M0L== (default)

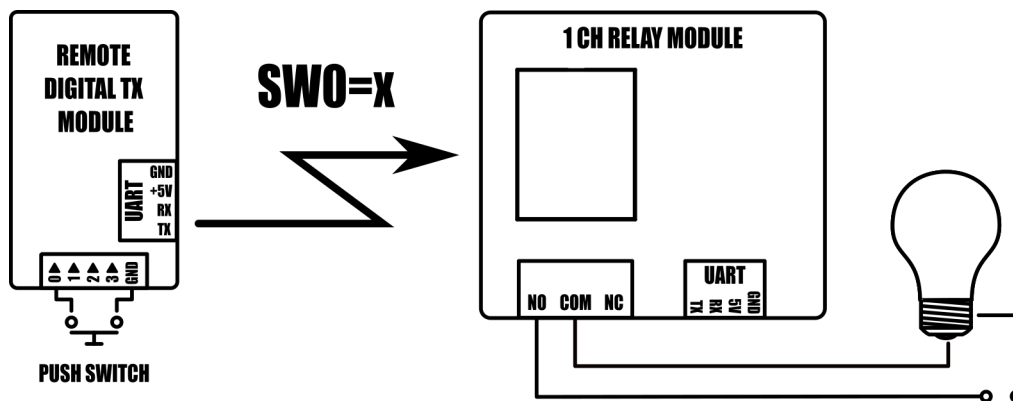
Once the above settings have been changed, relay 0 will now energise when the PIR command PIR=1 is received from the remote sensor module. The relay will remain energised for 60 seconds and then will automatically de-energise. If a subsequent RLY=1 command is received whilst the relay is energised the timer will be reset and the relay will remain energised for a further 60 seconds. Note that the relay modules zone and address must match that of the remote sensor module.

In timer mode a command to de-energise the relay will be ignored and the relay will only de-energise once the on time has elapsed.

Toggle mode

In toggle mode the relay(s) can be configured to toggle their state whenever a valid trigger command is received. This mode is enabled by setting the relay high and low thresholds (TxH & TxL) to the same value and relay modes (MxH & MxL) to '='.

Example: Turning a light on or off with a single push button connected to a remote SmartRFy digital Tx module



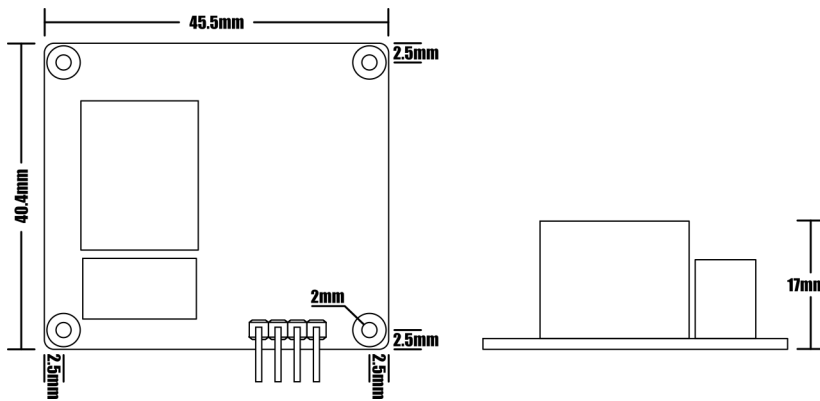
Change the following settings via the modules serial interface (see Serial UART section for information about interfacing to the modules serial interface):

- *S0O=0 Toggle mode off (default)
- *S0N=SW0 The relay will now listen to switch SW0 (default)
- *T0H=0 Trigger when SW0=0
- *T0L=0 Set to same value as T0H
- *M0H== (default)
- *M0L== (default)

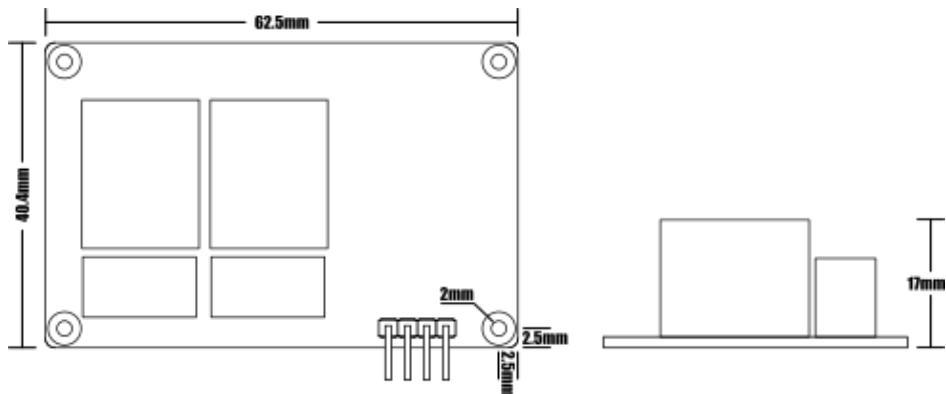
Once the above settings have been changed relay 0 will toggle its state whenever the push button on the remote module is pressed.

Dimensions

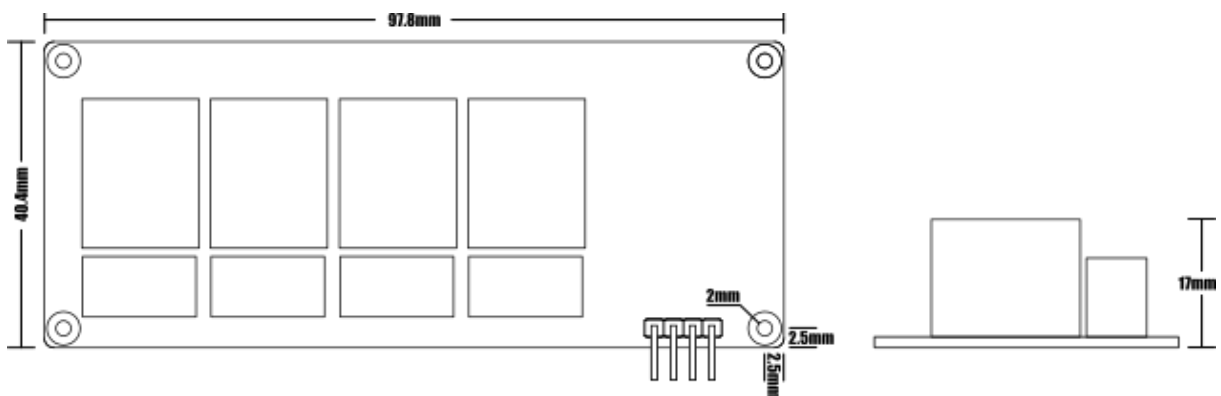
1 channel relay module



2 channel relay module



4 channel relay module



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