

2W all-in-one DMR walkie talkie module

## Product Specification



## Catalogue

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### Note: Revision History

| Revision | Date    | Comment                                   |
|----------|---------|---|
| V1.0     | 2016-06 | First release                             |
| V1.1     | 2017-03 | Bandwidth updated                         |
| V1.2     | 2017-06 | Logo updated, modification of instruction |
|          |         |   |
|          |         |   |

## 1. Description

DMR828 is a 2W long distance all-in-one DMR walkie talkie module. Only need external power supply and speaker, it is easy to become a professional digital walkie talkie. Simplified interface and Ultra small size make this module widely used in various applications and conveniently embedded into various handheld device.

**Note:DMR828 has two vocoder versions:DMR828-NVOC & DMR828-AMBE**

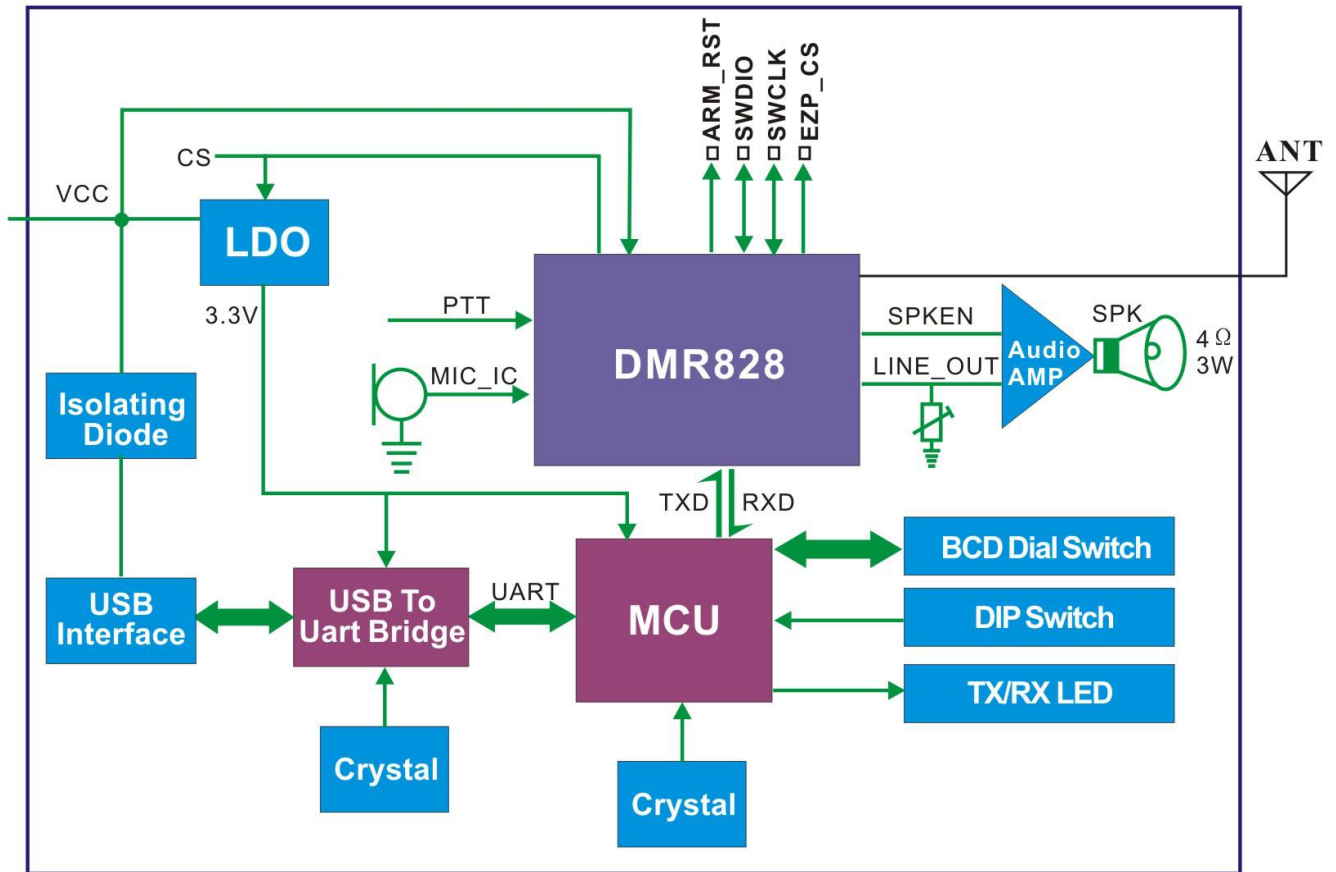
## 2. Features

- UHF band frequency: 400~470 MHz
- VHF band frequency: 134~174 MHz
- 350 band frequency: 320~390 MHz
- Distance up to 5Km
- Max power output to 2W, low power to 0.5W
- High Sensitivity:-124dBm
- Bit error rate down to 1% under -121dBm
- Independent frequency for Tx and Rx
- Analog Bandwidth: 12.5 / 25 KHz
- Digital Bandwidth: 6.25KHz
- Voice and text messages communication
- Reminder for input calling, calling status checking
- DMR /Analog walkie talkie
- Message transmission and reception
- Built-in EEPROM, data saved even powered off
- 1ppm TCXO crystal
- 51 CTCSS
- 166 CDCSS
- 9 adjustable volume
- Enhanced encryption of Voice and Text message

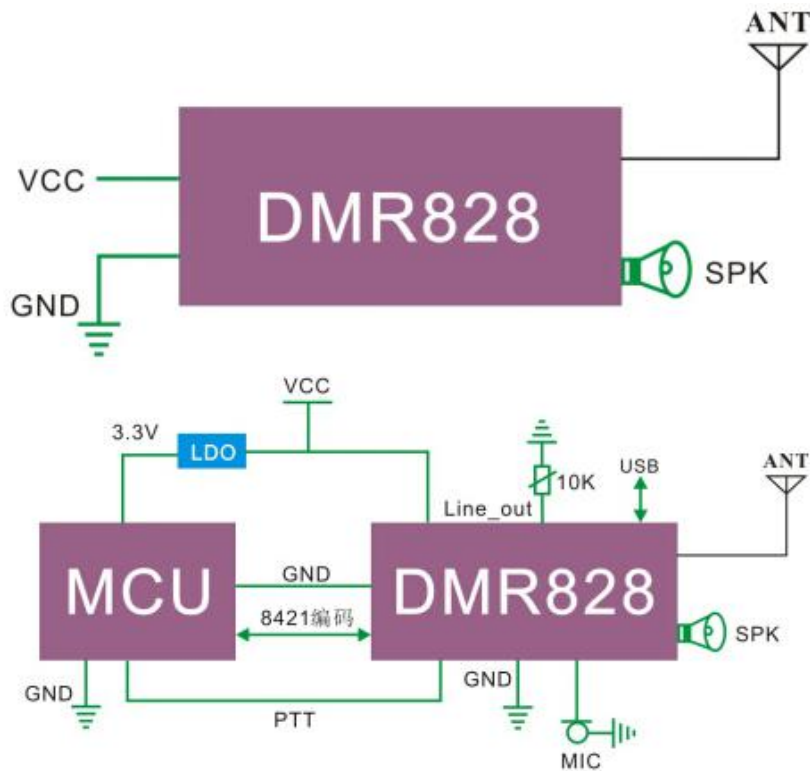
## 3. Application



### 4. Block Diagram



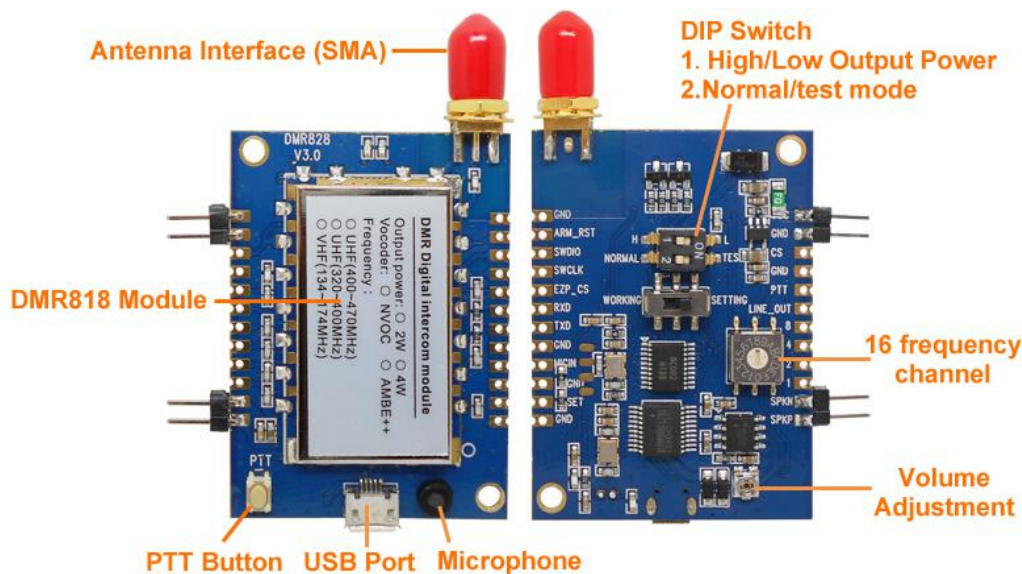
### 5. Typical Schematic Circuit



### 6. Electrical Characteristics

| Parameters                    | Test condition   | Min. | Typ.  | Max. | Unit. |
|-------------------------------|------------------|------|-------|------|-------|
| Voltage range                 |                  | 3.0  | 4.0   | 5.0  | V     |
| Operating Temperature         |                  | -20  | 25    | 60   | °C    |
| Frequency range               | @UHF             | 400  |       | 470  | MHz   |
|                               | @VHF             | 134  |       | 174  | MHz   |
|                               | @350             | 320  |       | 390  | MHz   |
| Uart baud rate                |                  |      | 9600  |      | bps   |
| <b>Current consumption</b>    |                  |      |       |      |       |
| Sleep current                 |                  |      | 75    |      | uA    |
| Rx current                    |                  |      | < 135 |      | mA    |
| Tx current (high power)       | @VCC=5.0V,2W     |      | < 1.1 |      | A     |
| Tx current (high power)       | @VCC=4.0V,1.5W   |      | < 950 |      | mA    |
| Tx current (low power)        | @VCC=4.0V, 27dBm |      | < 500 |      | mA    |
| Tx power (low power)          | @VCC=4.0V        |      | 1.5   |      | W     |
| Tx power (low power)          |                  |      | 500   |      | mW    |
| Mic input voltage             |                  |      | 0.1   | 1.6  | Vpp   |
| Sensitivity                   |                  |      | -124  |      | dBm   |
| Receiving BER(DMR modulation) | @ -121dBm        |      | 1     |      | %     |
| Audio output amplitude        |                  |      | 2     |      | V     |
| Audio Output impedance        |                  |      | 8     |      | KOhm  |

### 7. Interface specification



## 8. Functions descriptions

DMR828 has default 16 channels, CH0~CH7 in DMR mode, CH8~CHF in analog mode. All the parameters can be configured by serial instructions.

### 1) Parameter configuration

DMR828 Module offers standard serial port, users can configure and read the related parameters by sending serial instructions. Module has built-in memory, all configured parameters can be saved even power off. Meanwhile, we offer PC software to customers free of charge. DMR828 can be connected with computer via USB cable or UART interface, in this way, users can configure the parameters on PC software or their own device. The connection as shown in the figure below:



**Walkie Talkie Module  
TTL Interface Diagram**

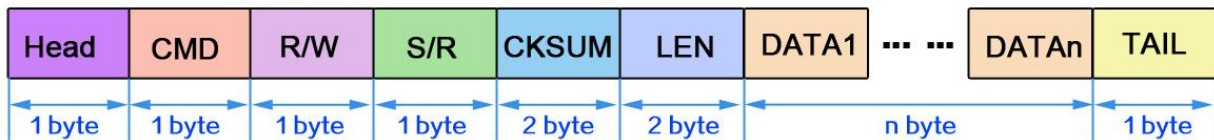
- a) Install the USB Driver and PC software in computer.
- b) Connect the DMR828 module with computer via a specialized USB cable
- c) Pull the switch to setting.
- d) Module has been into setting Module at this time, show as above.

### 2) Brief of Serial Communication Protocol

All the parameters of DMR818 can be configured using Serial Communication Protocol.

#### MSB for the command.

Format as below:



The definition of protocol as below:

| Offset | Flag | Length | Comment       | Detail   |
|--------|------|--------|---------------|--|
| 0      | Head | 1      | Packet header | 0x68   |
| 1      | CMD  | 1      | command       | 0x01~0x28: parameter function refer to table 1 |

|      |       |     |                       |   |
|------|-------|-----|-----------------------|---|
| 2    | R/W   | 1   | Read /write operation | 0x00: reading ;<br>0x01: writing ;<br>(external CPU TX is writing, external CPU RX is reading)<br>0x02: initiative sending  |
| 3    | S/R   | 1   | Setting/Responding    | setting:<br>0x01: start<br>answering:<br>0x00 Done<br>0x01 busy or fail ( <b>note 2</b> )<br>0x02 No channel or channel errors ( <b>note 3</b> )<br>0x07 module killed<br>0x09 check error<br>note: message, voice refer to below corresponding specification |
| 4、 5 | CKSUM | 2   | Checksum              | Checksum for all the packet   |
| 6、 7 | LEN   | 2   | Data length           | DATA length, no information, LEN is 0   |
| 8    | DATA  | len | Data info             |   |
|      | TAIL  | 1   | Tail of packet        | 0x10  |

**Note 1: CMD as below:**

| CMD  | Function                          | Message available for All channels or current channel | Message save when Power off (yes / no) |
|------|-----------------------------------|---|--|
| 0x01 | Channel change                    |   | yes                                    |
| 0x02 | Receive volume                    | All   | yes                                    |
| 0x03 | scanning                          | current channel                                       | no                                     |
| 0x04 | Transceiver status checking       | current channel                                       | no                                     |
| 0x05 | Signal strength value             | current channel                                       | no                                     |
| 0x06 | Various call modes (Call Type)    | current channel                                       | no                                     |
| 0x07 | Message mode setting and transmit | current channel                                       | no                                     |
| 0x09 | Emergency alarm                   | current channel                                       | no                                     |
| 0x0a | Enhancements                      | current channel                                       | no                                     |
| 0x0b | Mic Gain configuration            | All   | yes                                    |
| 0x0c | Power-saving mode configuration   | All   | yes                                    |
| 0x0d | Transceiver frequency             | current channel                                       | yes                                    |
| 0x0e | Repeater/off-web                  | current channel                                       | no                                     |
| 0x10 | Receive/call type, number output  | current channel                                       | no                                     |
| 0x11 | Read received data                | current channel                                       | no                                     |
| 0x12 | SQ setting                        | current channel                                       | yes                                    |

|      |                               |                 |     |
|------|-------------------------------|-----------------|-----|
| 0x13 | Mode of CTCSS/CDCSS           | current channel | yes |
| 0x14 | CTCSS/CDCSS                   | current channel | yes |
| 0x15 | Monitor switch                | current channel | no  |
| 0x16 | Bit Error rates               |                 | no  |
| 0x17 | High/low power                | current channel | yes |
| 0x18 | Contact person                | current channel | no  |
| 0x19 | Encryption switch             | current channel | no  |
| 0x1a | Completed initialization      |                 | no  |
| 0x22 | Transmit contacts information | current channel | no  |
| 0x23 | Testing message               | current channel | no  |
| 0x24 | ID reading                    | all             | no  |
| 0x25 | Firmware Version reading      | all             | no  |
| 0x26 | Check contacts list           | all             | no  |
| 0x27 | Checking scan status          | current channel | no  |
| 0x28 | Checking encryption status    | current channel | no  |

**Note 2:** When module is transmitting, receiving, and configuring, it will show 0x01 to tell setting fail for busy.

**Note 3:** It show 0x02 for below condition:

**3.1:** When change to non-exist channel;

**3.2:** It all happen when configure DMR settings in analogy channel( such as: message, special functions) ,

**3.3 :** Configure analog parameters in DMR channel.

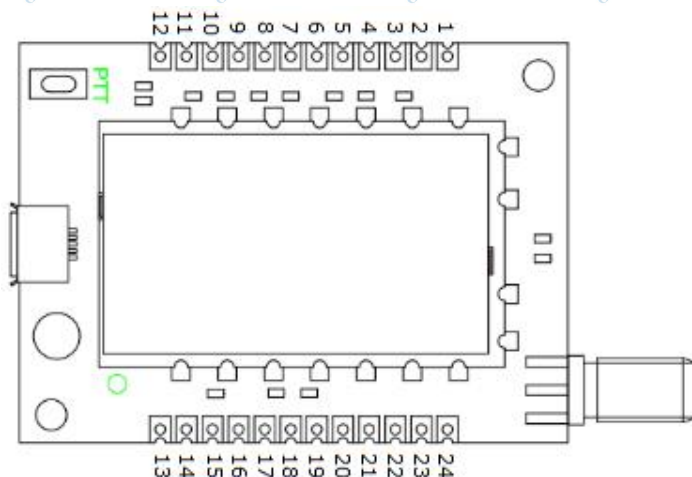
## 9. Accessories

The antenna is very important for RF communication, Its performance will affect the Communication, The module requires the antenna with 50Ω impedance. Universal antennas are Rod antenna, sucker antenna and telescopic antenna, User can choose the right antenna according to their application. We advise to use antennas listed on our website to get better performance.





## 10. Pin Assignment



| Pin NO.     | Pin name | Description  |
|-------------|----------|--|
| 1           | VCC      | Positive supply  |
| 2,4         | GND      | Ground   |
| 3           | CS       | Leave Open or high level for normal working, pull low to enter sleeping mode   |
| 5           | PTT      | Module Input, Transmitting/receiving control, pull low to force the module to enter TX state; pull high for Rx state   |
| 6           | LINE_OUT | Audio output without amplified   |
| 7           | 8        | 16 Channels, Code 8421, 8th, default output "1"  |
| 8           | 4        | 16 Channels, Code 8421, 2th, default output "1"  |
| 9           | 2        | 16 Channels, Code 8421, 2nd, default output "1"  |
| 10          | 1        | 16 Channels, Code 8421, 1st, default output "1"  |
| 11          | SPKN     | Audio output, connect to speaker 8Ω 2W   |
| 12          | SPKP     | Audio output, connect to speaker 8Ω 2W   |
| 13,15,17,24 | GND      | Ground   |
| 14          | SET      | Configuration mode enable (low to enter into the setting mode, leave open or connect high level to exit setting mode) Valid when CS Pin is high or leave open. |
| 16          | MIC_IN   | Microphone or line in  |
| 18          | UART-TX  | TXD of the module and connect to external RXD  |
| 19          | UART-RX  | RXD of the module and connect to external TXD  |
| 20          | EZP_CS   | Reserved   |
| 21          | SWCLK    | Reserved   |
| 22          | SWDIO    | Reserved   |
| 23          | ARM_RST  | Reserved   |

### 11. Mechanism Dimension

