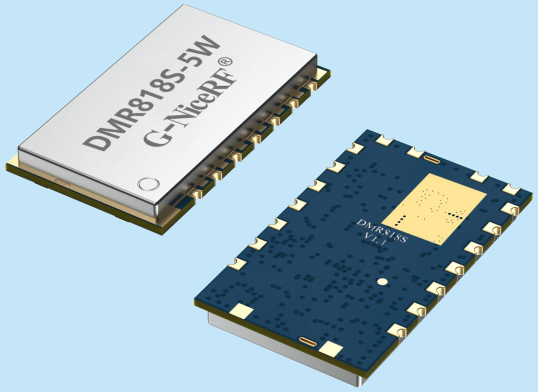
DMR818S-5W Digital Walkie Talkie Module

- Small size, 5W high power, same pinout and dimensions as DMR818S
- Dual time slots, independent transmit and receive frequencies
- 0.5PPM TCXO, ensuring frequency stability

Product Specification



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Note: Revision History

Revision	Date	Comment
V1.0	2025-4	First release
V1.1	2025-5	Format adjustment
V1.2	2025-5	Crystal Oscillator Parameter Adjustment
V1.3	2025-6	Crystal Oscillator Parameter Adjustment
V1.4	2025-6	Add Heat Dissipation Precautions

1. Descriptions

DMR818S-5W is a 2W long distance DMR walkie talkie module, it comes with built-in high performance micro-controller, digital mobile radio IC and RF power amplifier. All parameters (CTCSS, CDCSS, SQ, Predefined channels etc.) can be easily modified with protocol. With external power supply, speaker, and audio amplifier, 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. Additionally, Compared to the DMR818S module, the DMR818S-5W achieves a 5W transmission power increase while maintaining the same package size and pinout, further enhancing communication distance and coverage capability.

DMR818S-5W strictly uses lead-free process for production and testing, and meets RoHS and Reach standards.

➢ **DMR mode:**

- Message transmission and reception.
- Enhanced Encryption of Voice and Text Messages
- Various Voice Call Types
- Reminder for input calling, calling status checking
- Emergency alarm and radio monitor;Repeater
- Repeater Support:

➢ **Analog mode:**

- CTCSS/CDCSS configurable
- Squelch levels configurable

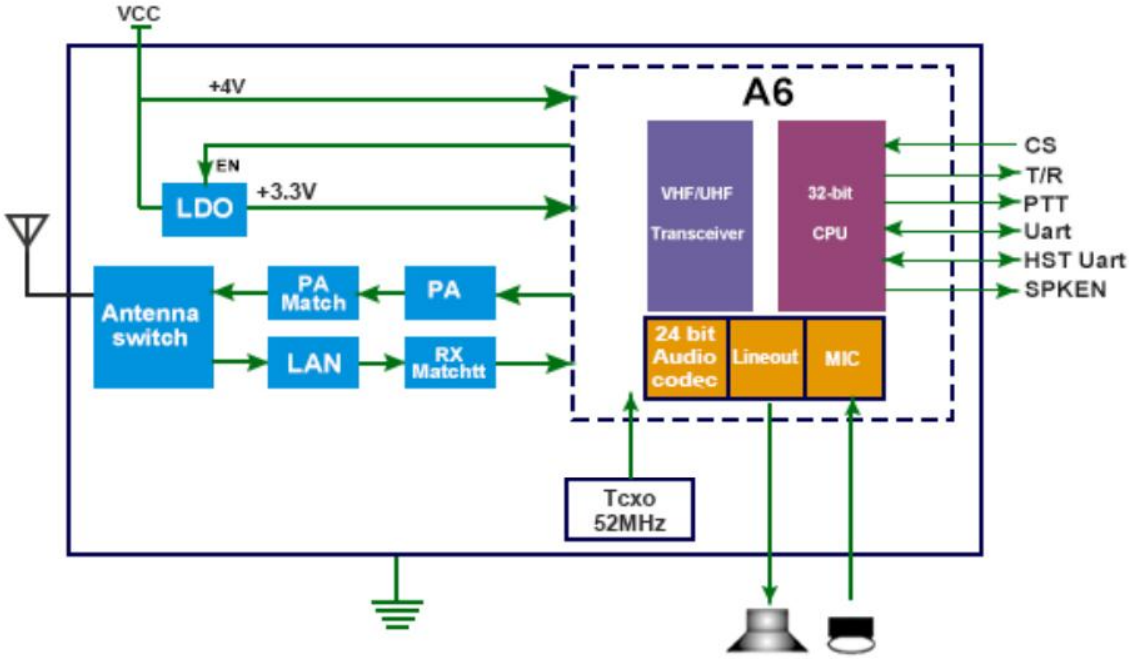
2. Features

- UHF band frequency: 400~470 MHz
  VHF band frequency: 134~174 MHz
  350 band frequency: 320~400 MHz
- Distance up to 7Km
- High power 5W,Low power 2W
- High Sensitivity: -122dBm
- Bit error rate down to 5% under -117dBm
- Built-in EEPROM, data saved even powered off
- 0.5ppm TCXO crystal
- Independent frequency for Tx and Rx.
- 9 adjustable volume
- Analog Bandwidth: 12.5 / 25 KHz
  Digital Bandwidth:6.25KHz
- Message transmission and reception
- DMR(Digital Mobile Radio)/Analog walkie talkie
- 166 CDCSS
- 50 CTCSS

3. Application

- DMR walkie talkie module
- Invisible intercom system
- Building security system
- Audio surveillance system

4. Block Diagram

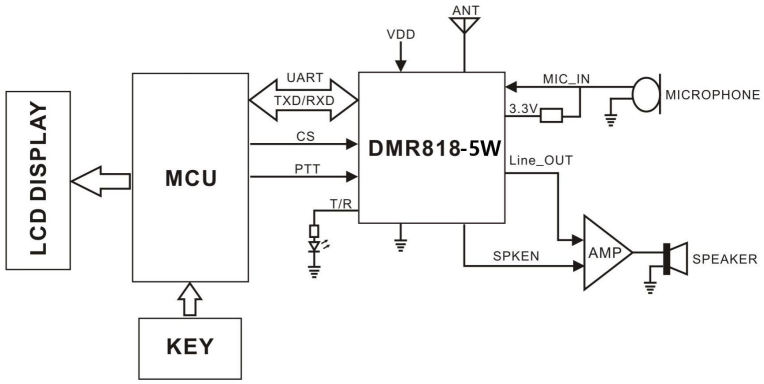


5. Electrical Characteristics

Parameters	Test condition	Min.	Typ.	Max	Unit
Voltage range		3.7	7.4	8.5	V
Operating Temperature		-20	25	60	℃
Frequency range	@UHF	400		470	MHz
	@VHF	134		174	MHz
	@350	320		400	MHz
Start time			2000		ms
Uart baud rate			57600		bps
Current Consumption					
Sleep current	CS pulled low for 3 seconds		< 55		uA
Rx current			<160		mA
Tx current （high power）	@VCC=8V, 5w analog		<1700		mA
	@VCC=8V, 5w digital		<1000		mA
Tx current （low power）	@VCC=8V, 2w analog		<1100		mA
	@VCC=8V, 2w digital		<700		mA
RF Parameters					

Tolerance of frequency			0.5	1.5	ppm
Modulation sensitivity	1.5KHz/2.5KHz frequency offset (N/W)	6	7	12	mv
Adjacent-channel power	@12.5K offset	-60	-62		dBm
Mic input voltage			0.1	1.6	Vpp
CTCSS modulation frequency offset		0.35	0.4	0.6	KHz
Modulation characteristics	300HZ	-13	-11	-9	dB
	500HZ	-9	-6	-5	dB
	1000HZ	-3	0	1	dB
	2000HZ	3	6	7	dB
	3000HZ	5	7	11	dB
Receive Parameters					
Sensitivity	Analog (12db SNR)		-120		dBm
Receiving BER(DMR modulation)	@ -117dBm		5		%
Audio output amplitude				500	mv
Audio Output impedance			30		KOhm
Adjacent channel selectivity	Offset:+12.5KHz	60			dB
	Offset:+12.5KHz				

6. Typical Schematic Circuit:



7. Voltage and Power Comparison Table (Digital Mode)

Operating Voltage (V)	Output Power (dBm)	Operating Current (mA)
3.7	27	468
4.0	31.7	580
4.5	32.8	654
5.0	33.5	675
5.5	34.2	714
6.0	35.0	752
6.5	35.7	793
7.0	36.2	830

7.5	36.8	870
8.0	37.3	910
8.5	37.7	970

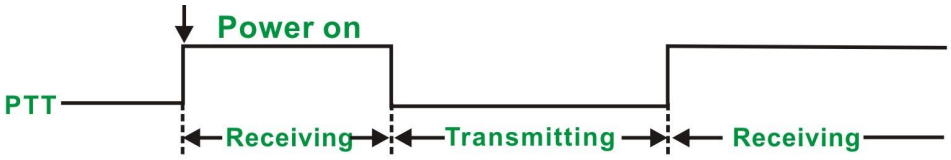
8. Functions descriptions:

DMR818S-5W has default 16 channels, CH1~CH8 in DMR mode, CH9~CH16 in analog mode. All the parameters can be configured by serial instructions. For details, please check “DMR818S communication protocol”.

1) Voice transmission

“PTT” pin is used to control the voice transmission. Pull low to enable voice transmission; High to end transmission.

Timing operation:



Note: Serial instructions can also be used to enable voice transmission and ending. For details, please check “DMR818S communication protocol”

2) Voice receiving

After power on, DMR818S-5W will enter into receiving mode automatically. It will return back to receiving mode after voice transmission ended.

For details of receiving process, please check “DMR818S communication protocol”.

3) Sleep function

The module can switch work and sleep mode through CS pin. When the CS pin is high, it is the working mode, and when the CS pin is low, it is the sleep mode. In sleep mode, all peripherals of the module are turned off and cannot communicate and respond to serial commands.

Note: CS pin is low level by default, in sleep mode, the user needs to give high level externally to make the module work.

After the CS pin level changes, the state needs 3 seconds to switch.

4) Switch of Audio amplifier

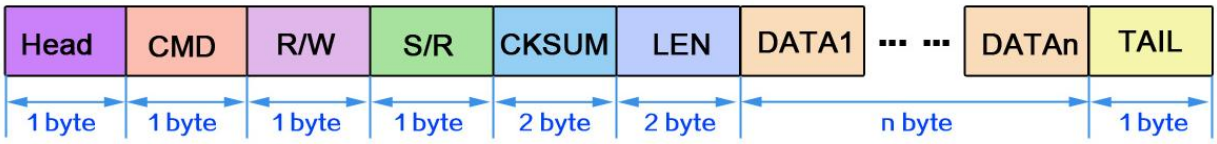
Pin “SPK_EN” is used to control external audio amplifier. When playing voice, SPK_EN in high level, low level when other status. The timing of SPK_EN as blow:

9. Brief of Serial Communication Protocol

All the parameters of DMR818S-5W 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 ； 0x01：writing ； (external CPU TX is writing， external CPU RX is reading) 0x02：initiative sending
3	S/R	1	Setting/Responding	setting： 0x01：start answering： 0x00 Done 0x01 busy or fail（**note 2**） 0x02 No channel or channel errors （**note 3**） 0x07 module killed 0x09 check error 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
0x28	Checking encryption status	current channel	no

0x29	Set up a contact to receive group calls	current channel	**yes**
0x30	Delete group call contact	current channel	**yes**
0x1B	Set the phone number	current channel	**yes**
0x31	Set native color code	current channel	**yes**
0x32	Set analog bandwidth	current channel	**yes**
0x33	Set time slot	current channel	**yes**
0xF0	Restore default parameters	**all**	**yes**
0xF2	Software reset	**all**	no

Note 2: When DMR818S-5Wis transmitting, receiving, and configuring, it will show 0x01 to tell setting fail for busy.

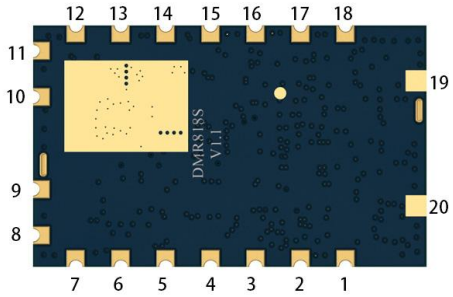
Note 3: It show 0x02 for below condition:

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.

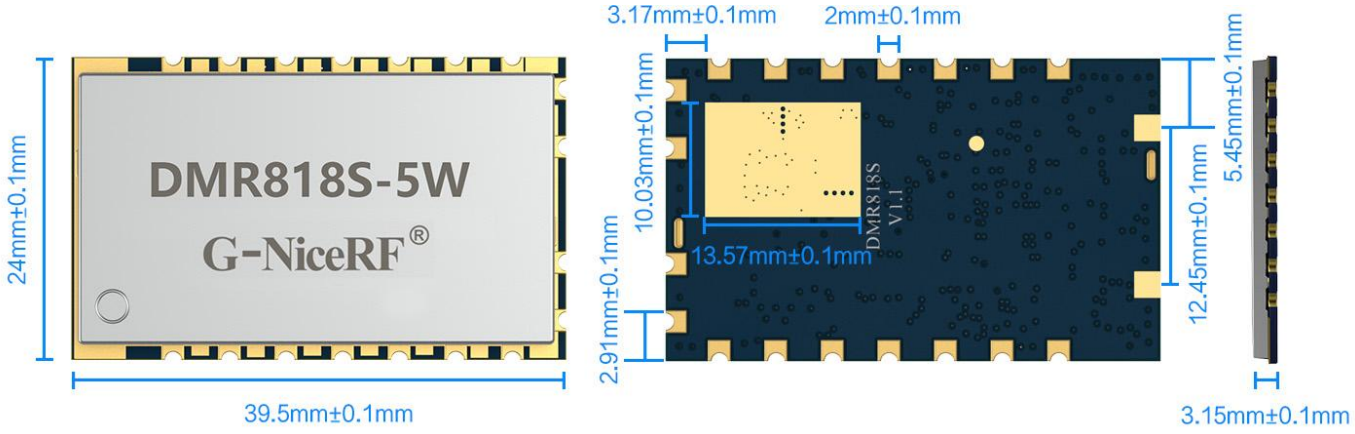
10. Pin Assignment



Pin NO.	Pin name	I/O	Level standard	Description
1	MIC_IN	I		Microphone Signal Input
2	UART-TX	O	0-3.3V	Transmit
3	UART-RX	I	0-3.3V	receive
4, 12	NC			
5	HST_TXD	O	0-3.3V	Transmit data pin (for upgrading program)
6	HST_RXD	I	0-3.3V	Receive data pin (for upgrading program)
7	ANT			RF Input/Output Pin connect 50 ohm antenna
8, 9, 10	GND	-		Ground

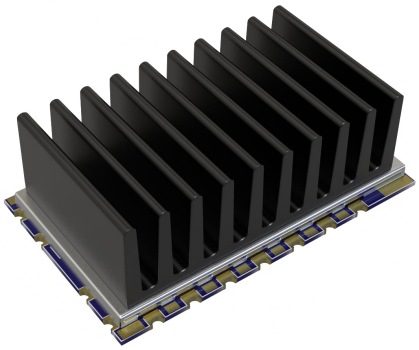
11	VCC	-	0-8V	Power Supply Positive
13	CS	I	0-5V	Module Sleep Enable Pin, "0" for sleep, "1" for working state
14	PTT	I	0-3.3V	Transmit/Receive Control Pin, "0" for transmit, "1" for receive, default receive mode (this pin cannot be pulled low during power-up, it must be pulled low after power-on reset is complete)
15	+3.3V	-		3.3V output，connect to 50mA
16	LINE_OUT	O		Audio output
17	T/R	O	0-3.3V	Module Transmit/Receive Status Indicator Pin, outputs high level in transmit state, low level in receive state
18	SPKEN	O	0-3.3V	Receive Signal Indicator Pin (can be externally connected to control audio amplifier), high level is active, default is low level
19, 20	GND	-		Ground

11. Mechanism Dimension(Unit:mm)



12. Heat Dissipation Precautions （optional）

This module is a high-power module. Considering the cooling requirements in different application scenarios, we can provide an optional heatsink, which users may choose to use according to their specific operating environment.



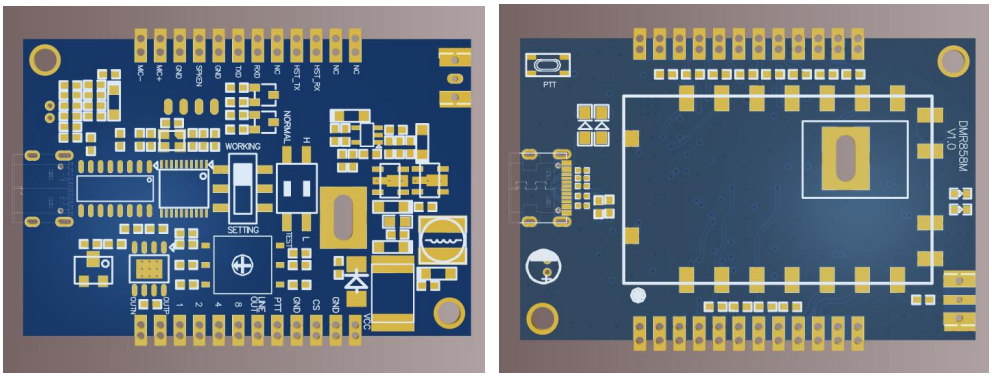
The table below shows the temperature rise data with the standard heat sink.

Test Temperature: 30°C Power: 5W Frequency: 425MHz

Operating Mode	Heat Sink Temperature (°C)	Operating Time (Minutes)
Digital Mode	30-63	3
Analog Mode	30-60	1

If the user does not add an additional heat sink, it is recommended that the module's continuous operating time should not exceed 1 minute.

The following image shows the reference design of our product. The module PCB is packaged, with pad slots cut, and solder is applied from the backside of the PCB. This design better transfers the heat to the other PCB, and then the heat is conducted to the casing through a copper ingot.



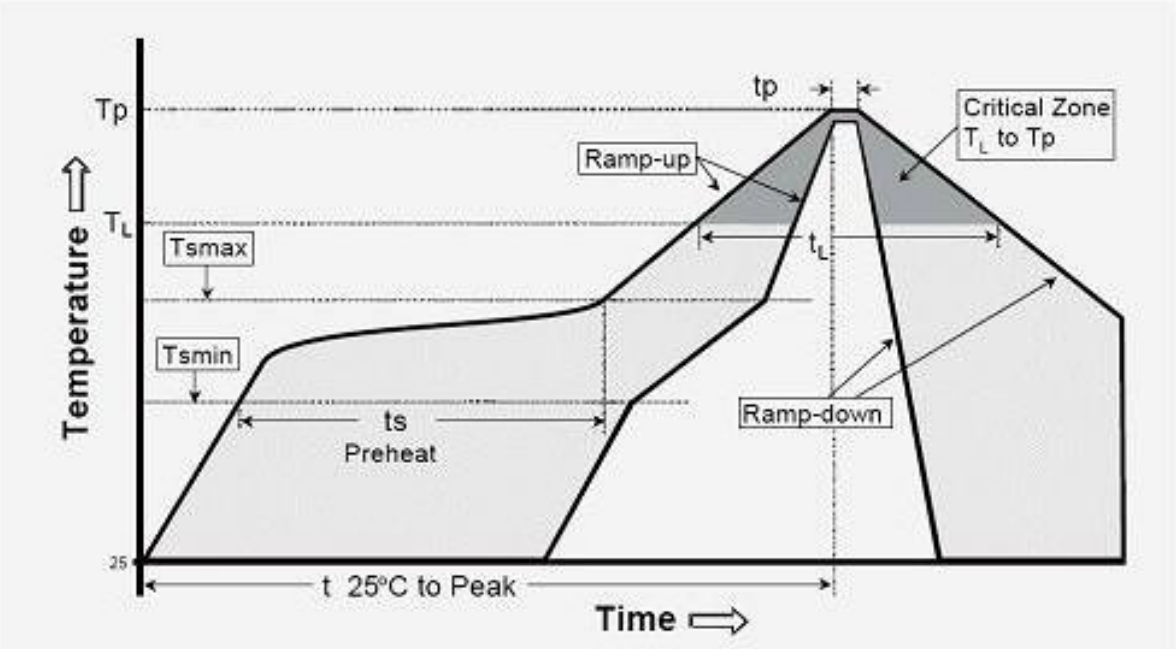
13. Accessories

1) Antenna

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.

Appendix：SMD Reflow Chart

We recommend you should obey the IPC related standards in setting the reflow profile:



IPC/JEDEC J-STD-020B the condition for lead-free reflow soldering	big size components （thickness >=2.5mm）
The ramp-up rate (Tl to Tp)	3℃/s (max.)
preheat temperature - Temperature minimum (Tsmin) - Temperature maximum (Tsmax) - preheat time (ts)	 150℃ 200℃ 60~180s
Average ramp-up rate(Tsmax to Tp)	3℃/s (Max.)
- Liquidous temperature(TL)	217℃
- Time at liquidous(tL)	60~150 second
peak temperature(Tp)	245+/-5℃