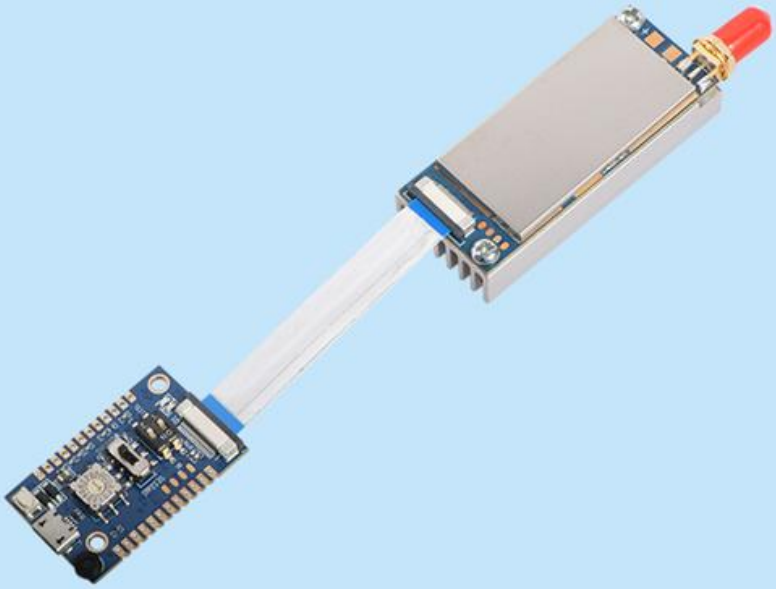
G-NiceRF®

DMR858S

5W All-In-One DMR Walkie Talkie Module
TIER II

Product Specification



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Catalogue

Note: Revision History

Revision	Date	Comment
V1.0	2023-02	First release
V1.1	2023-03	Update block diagram, add parameters

1. Description

DMR858S is an ALL-IN-ONE DMR 5W professional walkie talkie. It combined analog and DMR Tier II walkie talkie function. This product is compatible with DMR radio with Moto AMBE++ and all the analog walkie talkie in the market. DMR858S is easy to use , which embedded DSP processor , DMR encoder/decoder, RF / Audio Amplifier , PTT, Microphone, 16 Channel switch, Volume adjustment all on board. Just connected with power supply and speaker, it build a 5W professional DMR walkie talkie. DMR858S has long range and good voice quality. Special heat sinks are designed specially to guarantee long time talking.

➢ **The digital intercom supports the following functions in DMR mode:**

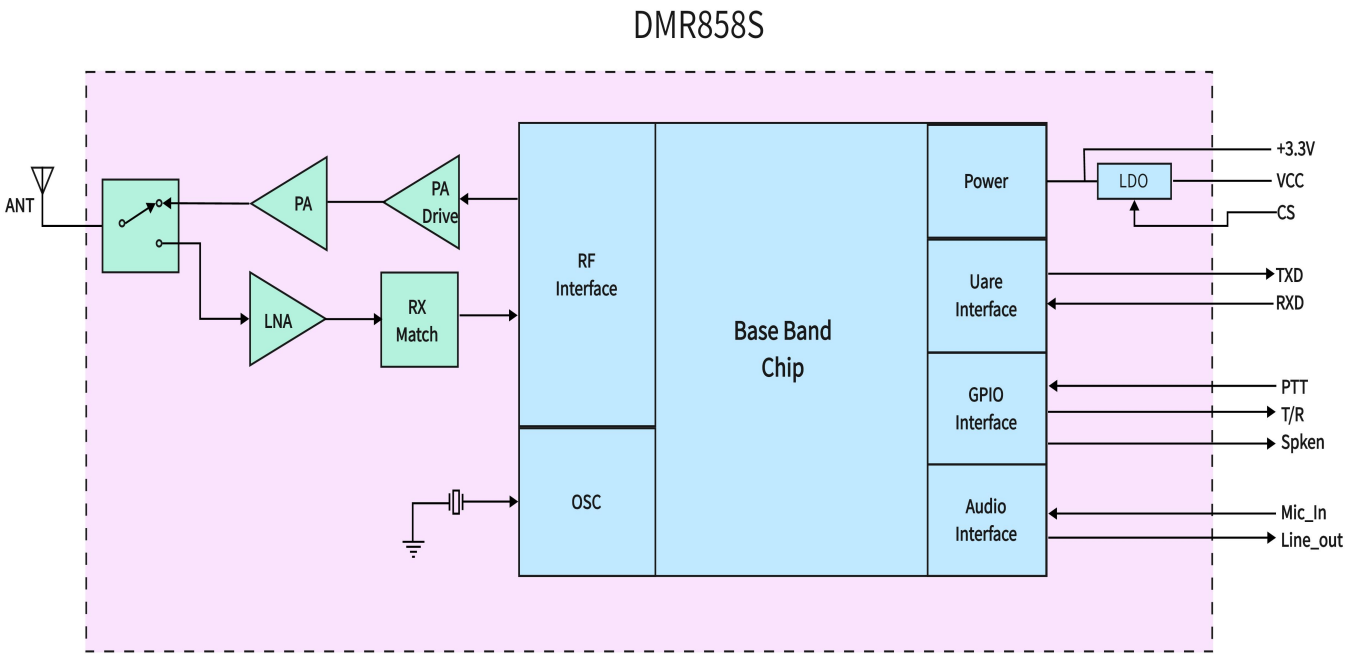
- SMS sending function, support pass-through and SMS application;
- Voice encryption function, SMS encryption function;
- Calling and called prompts.

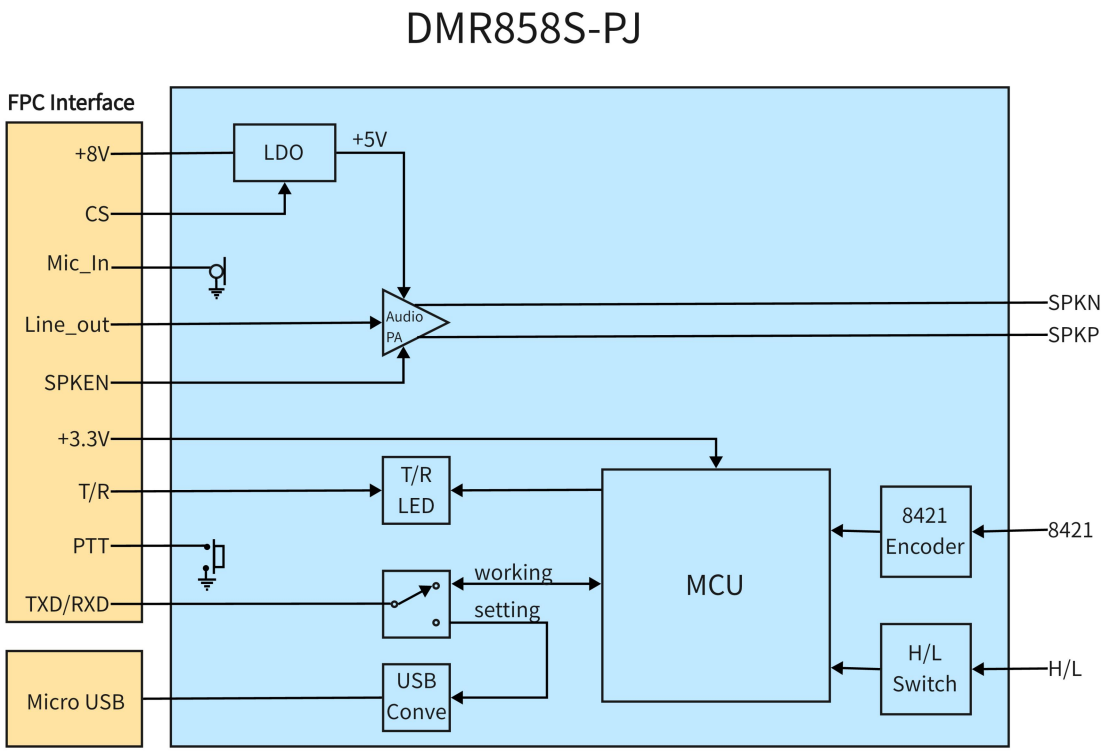
2. Feature

- UHF band frequency：400~470 MHz
  VHF band frequency：134~174MHz
  350 band frequency：320-400MHz
  (3 frequency bands are optional)
- 6~8 Km in open area
- Max power output to 5W, low power to 1W
- Sensitivity up to：-120dBm
- Less than 2% BER @ -117dBm
- TX/RX frequency set separately
- Bandwidth for analog:12.5 / 25 KHz
  Bandwidth for DMR:6.25KHz
- DMR / Analog walkie talkie
- SMS transmission and reception
- Built-in EEPROM, data saved even powered off
- Low power consumption in sleep mode
- DMR Tier II
- Tail sound elimination automatically
- Embedded design for handheld product

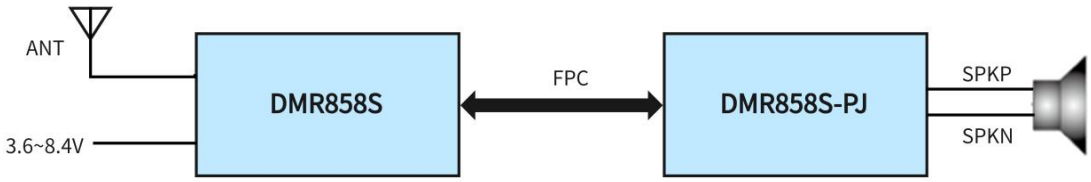
3. Applications

4. Block Diagram





5. Typ. Circuit

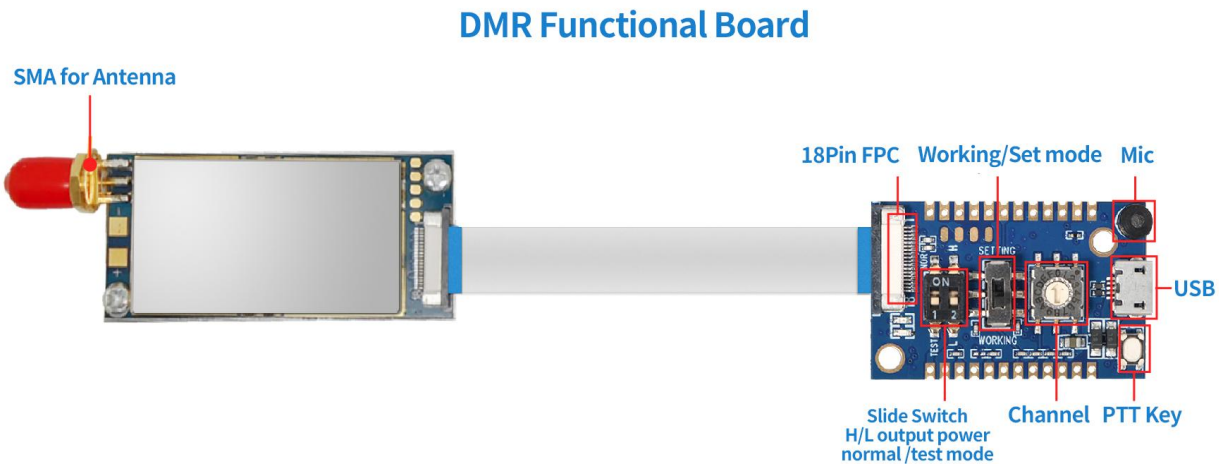


6. Electronical Characters

Parameters	Condition	Min	Typ	Max	Unit
Power Supply		3.6	4.0	8.4	V
Working temperature		-20	25	60	℃
Frequency Range	@UHF	400		470	MHz
	@VHF	134		174	MHz
	@350	320		400	MHz
Serial baud rate			57600		bps
Current Consumption					
Sleep current	@CS pulled low for 3 seconds		1		mA
RX Current			170		mA
TX current(High power)-DMR	@VCC=4.0V,2w		650		mA
	@VCC=8V,5w		1000		mA
TX current(Low power)-DMR	@VCC=4.0V,0.5w		400		mA
	@VCC=8.0V,1w		460		mA
TX current(High power)-Analog	@VCC=4.0V,2w		1200		mA
	@VCC=8V,5w		1600		mA
TX current(Low power)-Analog	@VCC=4.0V,0.5w		700		mA
	@VCC=8V,1w		800		mA
Analog Rx Parameters					
Rx sensitivity (Analog)	@12dB SINAD		-120		dBm
S/N	@1.5K deviation		40		dB
Adjacent channel selectivity	12.5KHz offset		62		dB
Inter modulation Rejection	12.5KHz offset		63		dB
Blocking immunity	Interference frequency interval>1M		88		dB
audio amplitude(line out)	F0=1KHz	0.2	130	460	mV
output impedance of audio(SPK)			8		Ohm
Audio distortion	F0=1KHz			5	%
Audio response	300Hz		8		dB
	500Hz		6		
	1KHz		0		
	2KHz		-6		
	3KHz		-12		

DMR Rx parameters					
BER（DMR Mode）	@ -117dBm		4		%
Adjacent channel selectivity （ACS)	Offset:+12.5kHz	60			dB
	Offset:-12.5kHz				
Inter modulation Rejection	Offset:+50/100kHz	63			dB
	Offset:-50/100kHz				
Blocking immunity	Offset:+/-1MHz	87			dB
	Offset:+/-5MHz				
Analog Tx Parameters					
Max Freq deviation	12.5KHz deviaton（N）		2.2	2.5	KHz
	25KHz deviation（W）		4.5	5	KHz
Sensitivity	deviation: 1.5KHz/2.5KHz	4	7	10	mV
Audio distortion	deviation: 1.5KHz/2.5KHz		1	5	%
Modulation characteristic	300Hz	-13	-11	-9	dB
	500Hz	-9	-6	-5	dB
	1KHz	-3	0	1	dB
	2KHz	3	6	7	dB
	3KHz	3	7	11	dB
CTCSS deviation		350	400	600	Hz
output power of adjacent channel	12.5KHz offset	-60	-63		dBc
SNA	1.5KHZ/2.5KHZ	38	40	50	dB
DMR Tx parameters					
frequency error			0.5		ppm
4FSK Tx BER				≤1×10-4	
output power of adjacent channel	+/-12.5kHz			≤-55	dB
output power of next adjacent channel	+/-25kHz			≤-65	dB

7. Interface specification



8. Functions descriptions

16 default channels are set before shipping. Channel 0 -7 for DMR channel, channel 8-15 are analog Walkie Talkie. All the parameters can be configured by serial instructions.

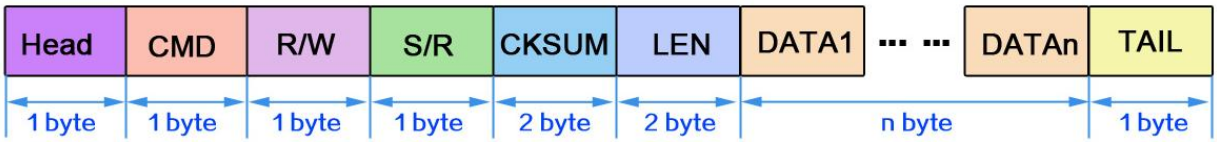
1) Parameter configuration

DMR858S offers standard serial port, users can configure and read out the relatedparameters by sending serial instructions. It has built-in memory, all configured parameters can be saved even power off. Meanwhile, DMR858S can be connected with computer via USB interface, users can configure the parameters with our PC software.

2) Brief of 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 0x01busy 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**
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
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**
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
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 TIER	current channel	**yes**
0xF0	Restore default parameters	**all**	**yes**
0xF2	Software reset	**all**	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

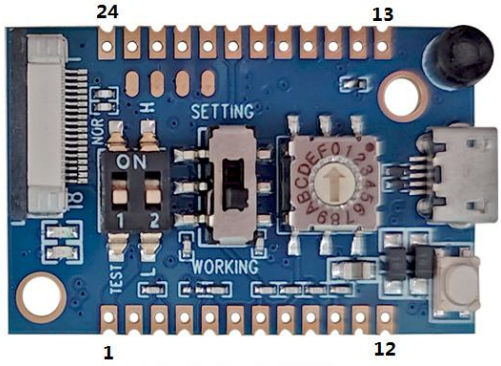
Antennas are very important for RF communication，DMR858S requires the antennas with 50Ω impedance. We suggest using antennas listed on our website to get better performance.

10. Pin Assignment

➢ **DMR858S Functional Board**

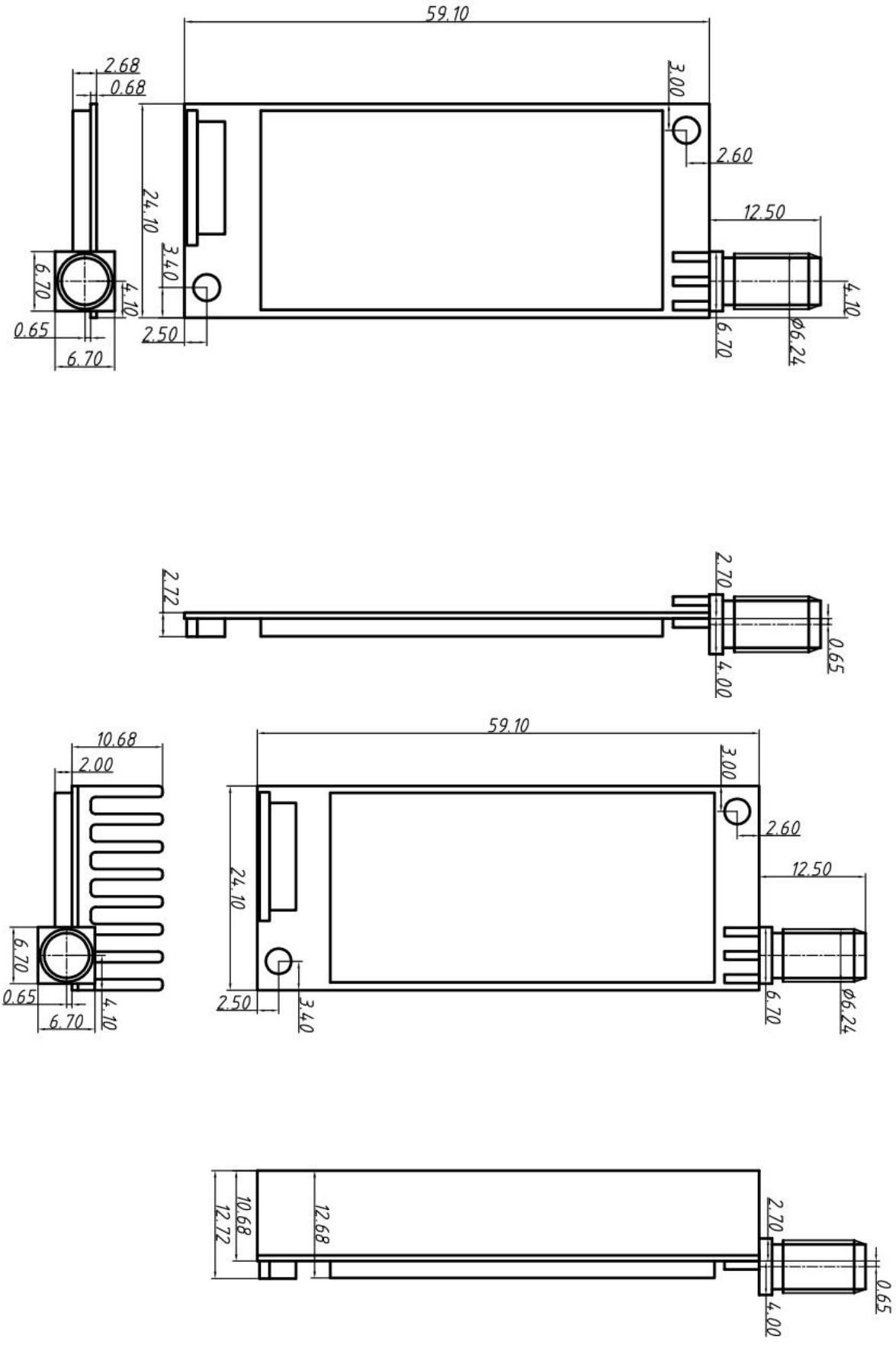
Pin No	Definition	I/O	Description
1,2,4	GND		Ground
3	MIC_IN	I	Microphone input
5	UART-RX	I	Connected with UART-TX of external device
6	UART-TX	O	Connected with UART-RX of external device
7,13	GND		Ground
8	CS	I	Sleep: 0 ; working: 1 (high level or leave open)
9	PTT	I	TX: 0, RX: 1
10	LINE_OUT	O	Line out for voice
11	T/R	O	TX/RX indicator, 1: TX , 0: RX
12	SPKEN	O	Valid signal indicator, 1: signal valid, 0: No valid signal received. This pin can be used to drive ecternal voice amplifier. 1: on, 0:off
14,15	+3.3 V		3.3V output，maximum 50mA loading
16,17,18,19	+VCC		VCC (3.3V-9V)
20	GND		Ground

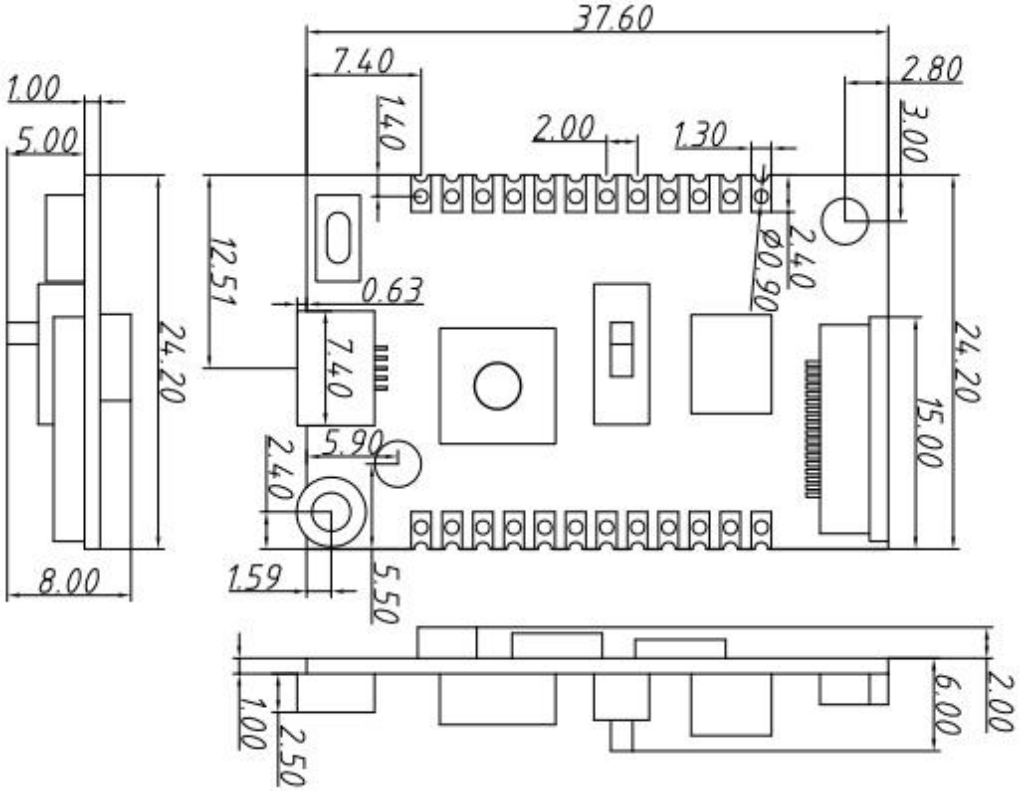
➢ **DMR858S-PJ (Control Board)**

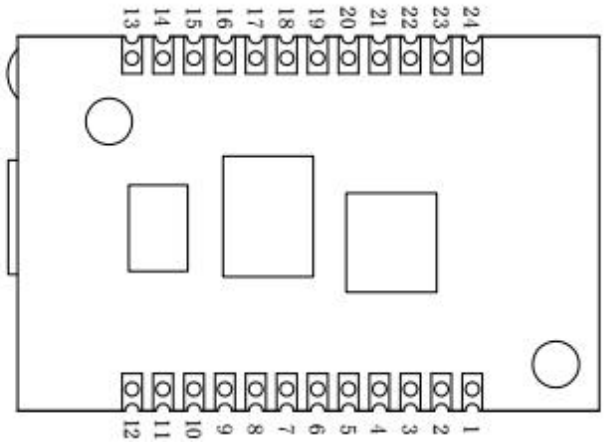


Pin No.	Definition	I/O	Description
1	VCC		VDD (connected to Pin 19 of function board)
2、4	GND		Ground
3	CS	I	Connect to CS of the function board
5	PTT	I	Connect to PTT of the function board
6	LINE_OUT	O	Connect to Line Out of the function board
7	8	I	Frequency channel selection,(16 channels), The frequency channlel can be selected either by the onboard rotary switch or these pads input. Turn to channel 0 or remove the rotary switch if user want to control the channel with these pads.
			8 :the maximum bit,
			4: the 3rd bit,
			2: the 2nd bit;
			1: the least bit for example :
			8421 encoding:
			0000: channel 0,
			0001: channel 1
			0010: channel 2
8	4		0011 :channel 3
9	2		…
10	1		1111 : channel 15
11	SPKN	o	Connected with Speaker: 8 Ohm 2W
12	SPKP	o	
13,15,17	GND		Ground
14	SET	I	Setting mode (0: setting mode , 1: normal mode)
16	MIC_IN	I	Connect to Mic_IN of the function board
18	TXD	O	Connect to TXD/RXD of the function board
19	RXD	T	
20	+3.3V		3.3V output，maximum 50mA loading
21	SPKEN		Connect to SPKEN of the function board
22	NC		NC
23	H/L	I	Output power control, 0: low, 1: high
24	GND		Ground

11. Mechanical Dimensions（Unit：mm）




37.60
7.40
2.80
1.00
5.00
1.40
2.00
1.30
3.00
12.51
0.63
Ø0.90
2.40
24.20
7.40
24.20
15.00
5.90
2.40
8.00
1.59
5.50
2.00
6.00
1.00
2.50


13 14 15 16 17 18 19 20 21 22 23 24
12 11 10 9 8 7 6 5 4 3 2 1