深圳市尚瑞思电子有限公司
ShenZhen Sunrise Electronics CO.,Ltd
TEL: 0755-23093179-801 FAX: 0755-23093179-816
www.sunrisedigit.com sales@sunrisedigit.com

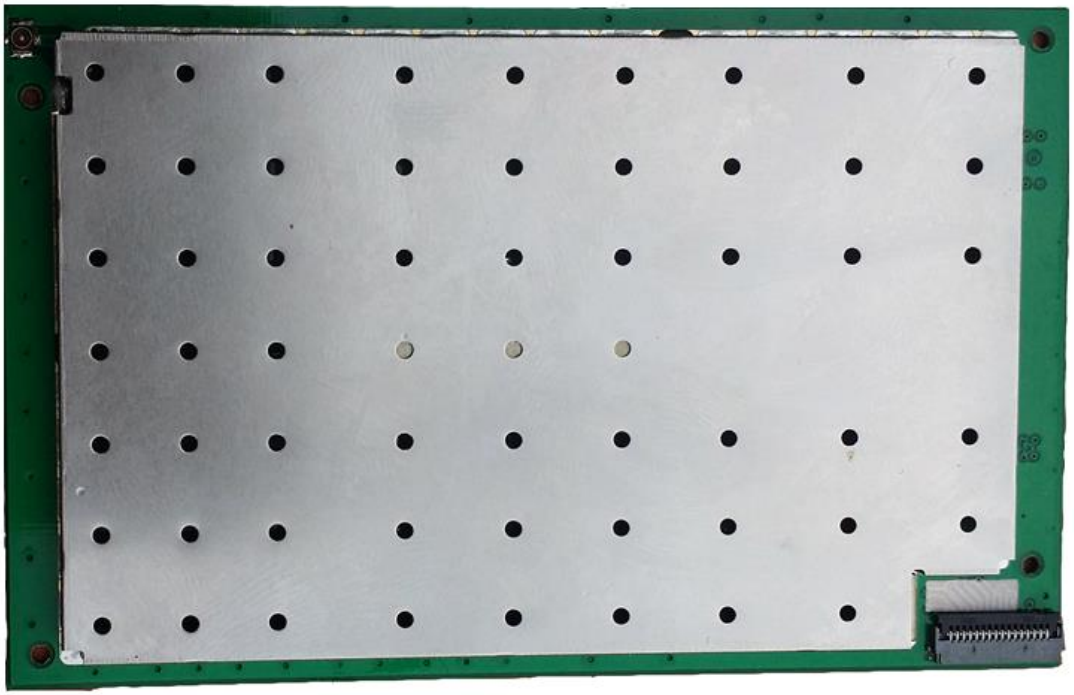
SR_FRS_4WU

Walkie Talkie Transceiver /Data transfer Module

VHF(400M-470M)

DATA SHEET

(V102)



Rm 505, 5/F, Meilan Int'l Business Center, #32 Xixiang Rd,
Baoan District, Shenzhen City, Guangdong Province, China

2. Product Outline

SR-FRS-4WU(UHF) is a low cost but high performance integrated walkie talkie module. With built-in high performance micro controller, narrow band rf transceiver and standard Uart interface, it can be easily used and succeed in all the walkie talkie function with good quality voice and long distance transmission. Users only need to connect external audio amplifiers, microphone or speaker with this module ,then it can work as a small walkie talkie .Simplified interface and ultra small size make this module into a wide range of applications, also can conveniently embed into various handheld devices to improve the comprehensive performance of end products.

Besides the excellent voice intercom, The more important feature is this module has the data/SMS transfer ability; up to 80 byte can be sent at one time; it is compliance with the standard UART transfer protocol;

3. Product performance

- FM demodulation technique Based on digital signal processing technology;
- Frequency Range：VHF 400M～470MHZ;
- Frequency step：5K/6.25K/12.5K/25K;
- RF Output Power： 4W/1W
- voice encryption (scrambling): 8 type.
- Voice Compression- Expansion ；
- SMS Receive /Transformer，The wireless Baut : 1200;
- CTCSS（38 group）+ CDCSS（83 group） ；
- Automatic elimination tail ；
- Volume adjustable（1-9）；
- Vox level adjustable（0-8）；
- SQ level adjustable（0-9）；
- MIC sensitivity level adjustable（1-8）
- The ultra low power dissipation in Sleep Mode（0.1uA）;
- Power supply ：DC 3.3～5.0V
- size：50 X 80 MM
- Communication distance：more than 9 KM at open area

Applications:

portable intercom and paging systems;

wireless data transmission;

mobile phones and other embedded in radio functions product 。

Portable walkie-talkie,

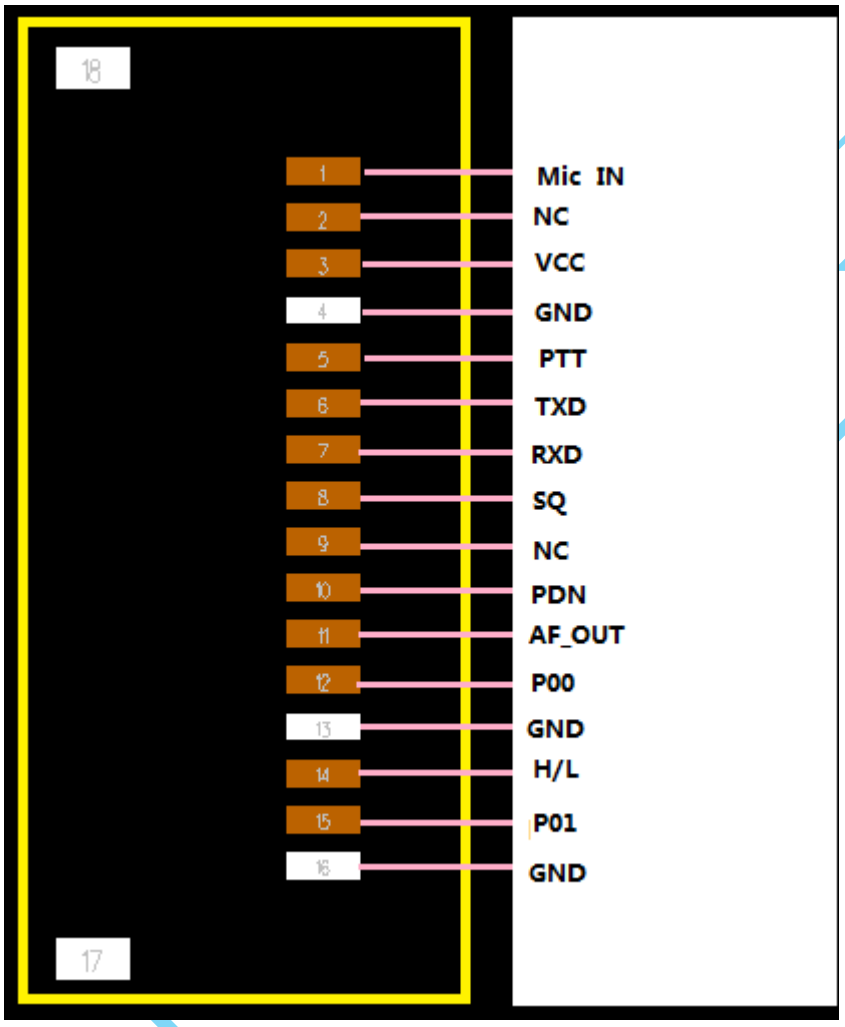
Outdoor sports equipment,

Building security,

Audio monitor system

4. Module Pin assignment

4.1 Module connector



HRSFH34SRJ0.5

The connector size:

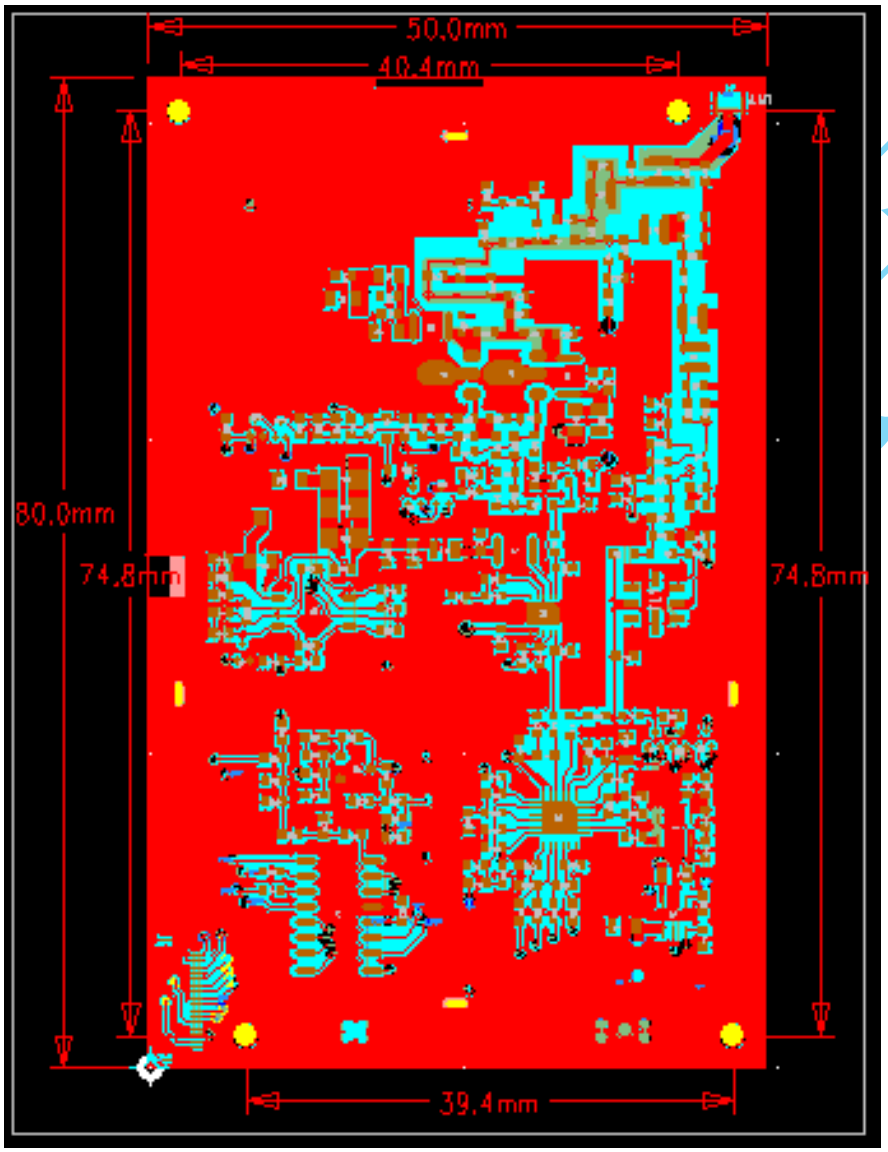
PAD width: 0.3 MM

PAD spacing: 0.2 MM

Please be noted:

here the 'VCC' in this connector is just for program , user unused. Keep no connect.

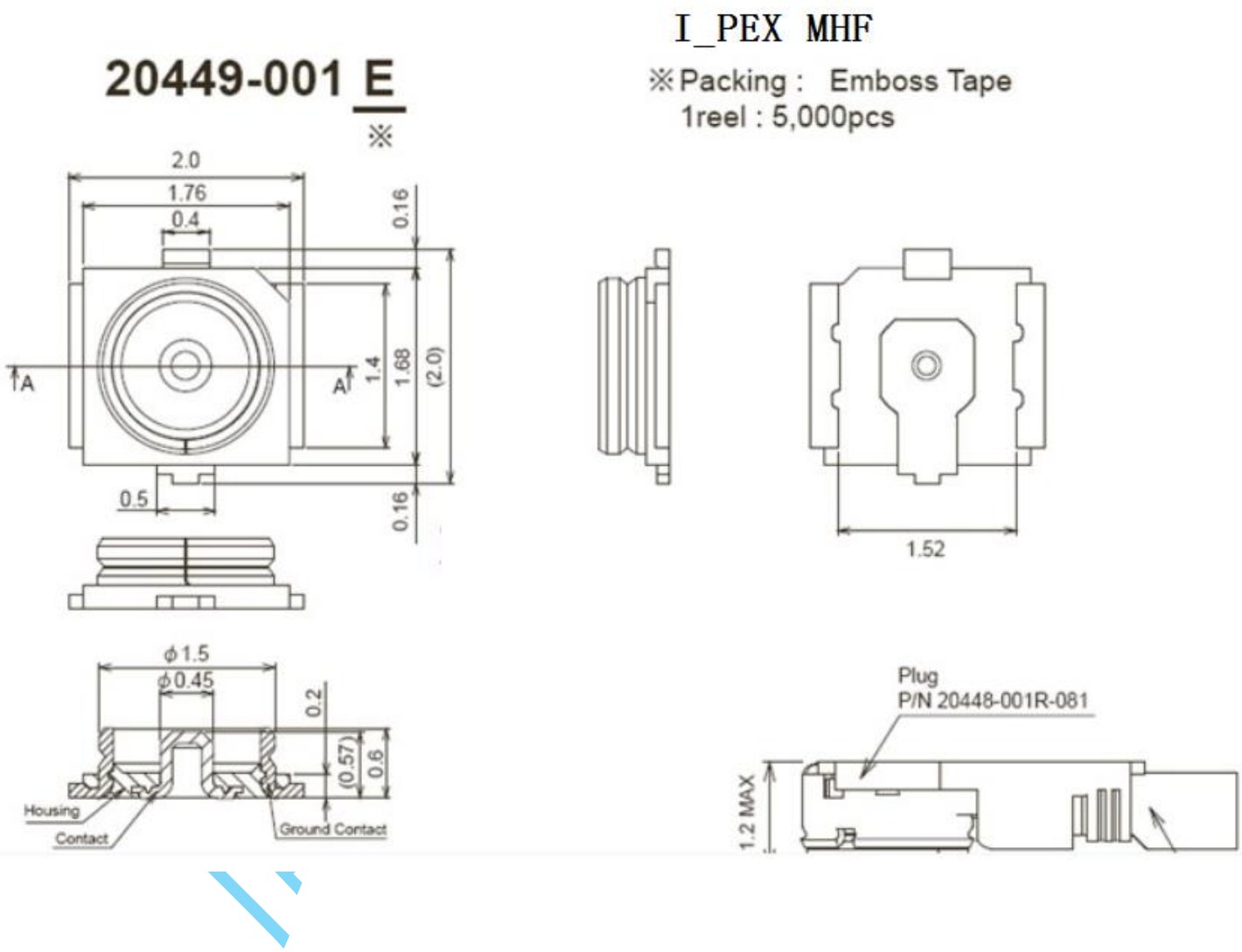
4.2 Module size:



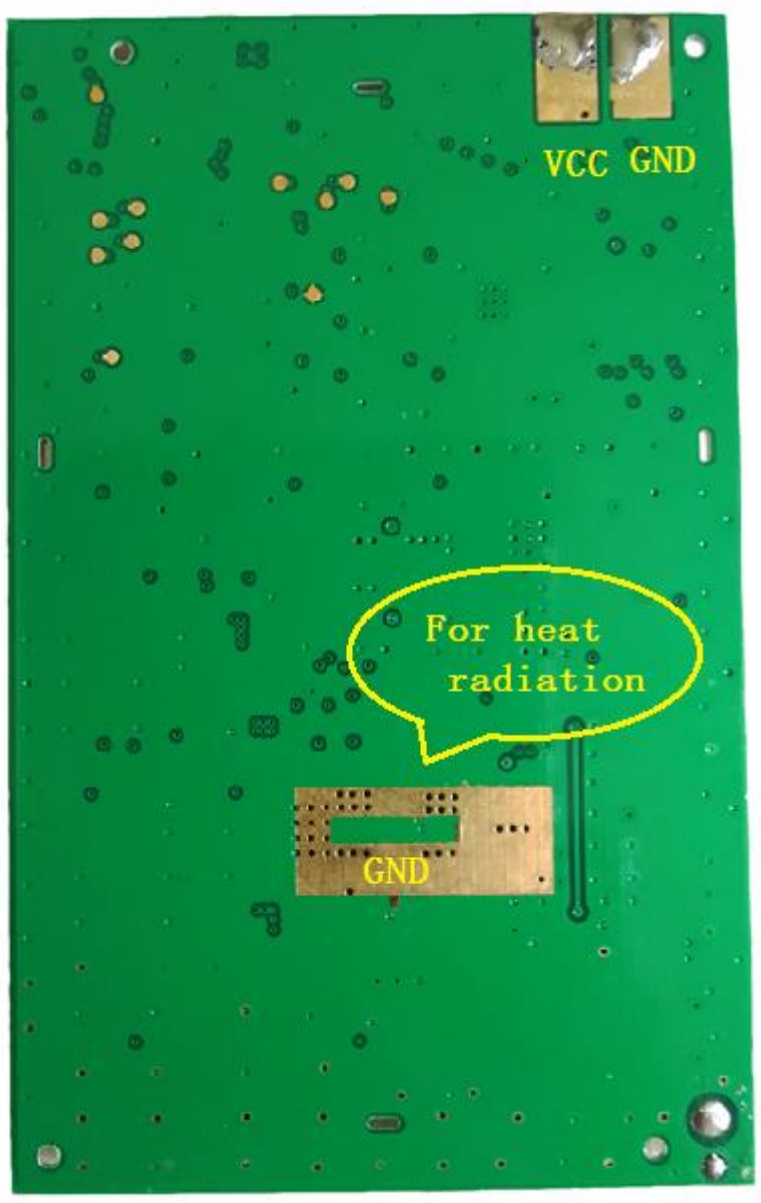
The module size: 50 X 80 MM

The location hole diameter : 1.8mm

4.3 ANT size


20449-001 E
※
I_PEX MHF
※Packing : Emboss Tape
1reel : 5,000pcs
2.0
1.76
0.4
0.16
A
A
1.4
1.68
(2.0)
0.5
0.16
1.52
φ1.5
φ0.45
0.2
(0.57)
0.6
Housing
Contact
Ground Contact
Plug
P/N 20448-001R-081
1.2 MAX

4.4 Module Power supply



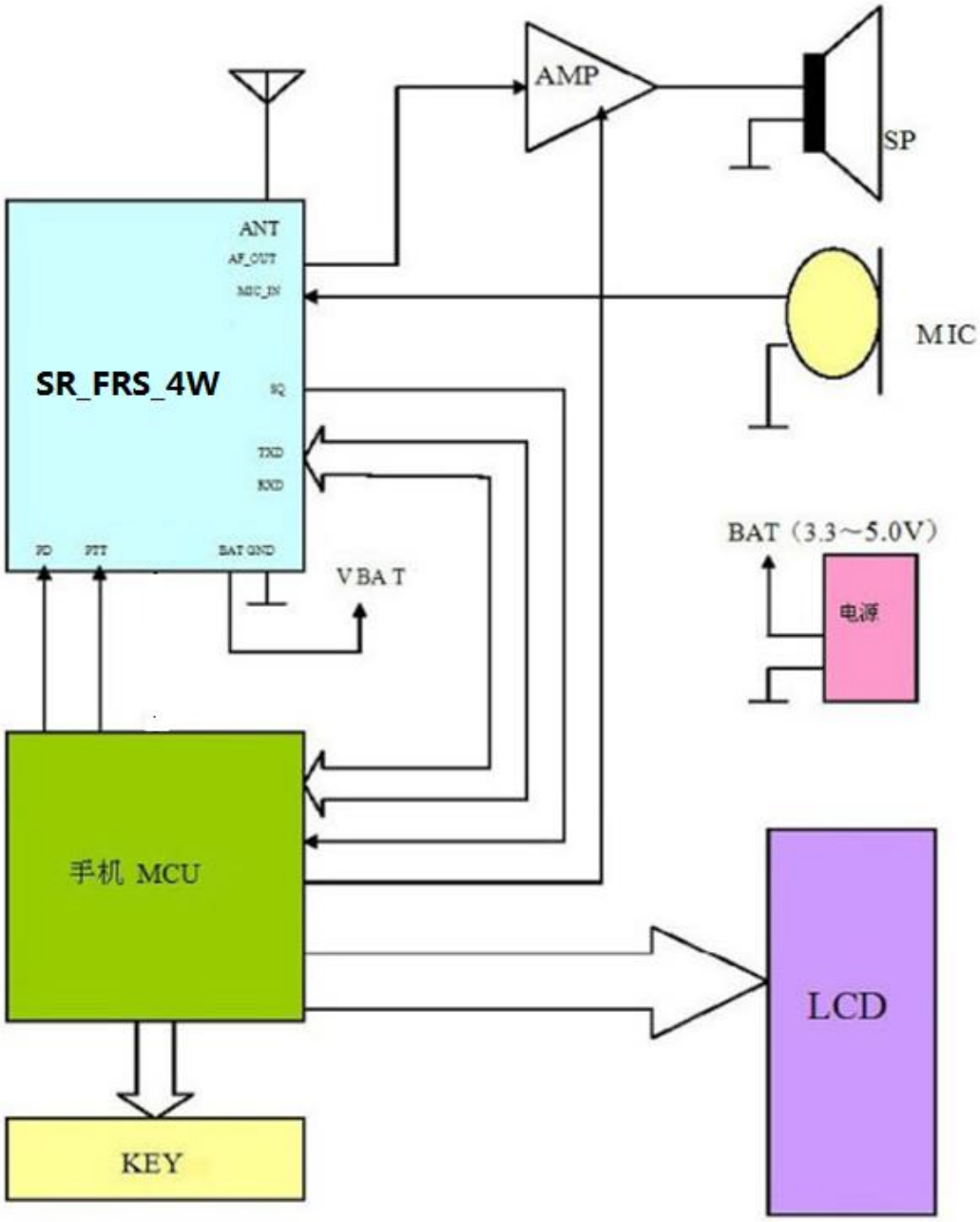
Please be noted:

the battery must be connected to the VCC/GND of the module back side.

4.4 Module pin function define

引脚名称	序号	功能描述
MIC_IN	1	MIC input
NC	2	NC
VCC	3	DC powe : 3.3-5V, recommend: 4V. For(Program use only), user unused
GND	4	GND
PTT	5	1: receive; 0: transmite
TXD	6	TXD for UART
RXD	7	RXD for UART
SQ	8	Squelch control 0: active 1: inactive
NC	9	NC
PDN	10	Module power enable， 0=SLEEP ； 1= Working; It must be set high level when working;
AF_OUT	11	Audio output
P00	12	Program port
GND	13	GND
H/L	14	RF Power select: NC: 4W 0: 1W It do not be connected to a high level.
P01	15	Program port
GND	16	GND

5. Typical application Block diagram


AMP
SP
ANT
AF_OUT
MIC_IN
SR_FRS_4W
MIC
RX
TXD
RXD
PD
PTT
BAT GND
VBAT
BAT（3.3～5.0V）
电源
手机 MCU
LCD
KEY

6. Electrical Characteristics

6.1 DC Electrical Characteristics (Recommended)

Symbol	Description	Min	Typical	Max	unit
VBAT	Power supply	3.3	3.7	4.2	V
Tamb	Ambient temperature	-20	27	60	℃
	Internal Initialize Time when power on	400	500		ms
	CMOS low level	0		0.6	V
	CMOS high level	2.4		3	V

Notes: VCC = 3V(for control port voltage)

6. 2 DC Electrical Characteristics (Maximum)

Symbol	description	Min	Typical	Max	unit
VBAT	Power supply	3.3	4.2	5.0	V
Tamb	Ambient temperature	-30		85	℃
I_{IN}	I/O input current	-5		5	mA
V_{IN}	I/O input voltage)	-0.3		3.3	V

6.3 Power Characteristics

(Test conditons: VBAT = 4.0V , T_A = -25 to 85 ℃)

Work mode	description	Test condition	Typical	unit
Continuous Receive	The receiver is in normal work mode	Input 450.050MHz,RF level -47dBm， AF=1KHz,MOD=1.5KHz	55	mA
Continuous Transmit	The transmitter is in normal work mode	Input 1KHz Modulated signal HI power LO power	 650 350	 MA MA
Receive Squelch power Save mode	The receiver is in power save state with standby condition.		12	mA
Deep sleep (PDN Is low)	Both the receiver and transmitter are all power off.	Within 500ms finish the power on process， switch to continuous receive/transmit mode。	0.1	uA

6.4 Overall electrical performance specifications

Frequency Range（MHz）	400-470
Channel spacing（KHz）	25 / 12.5KHZ
Antenna Impedance (Ω)	50
Operating temperature （℃）	-20～+55
Frequency Stability （ppm）	±2.5

6.5 Receive Performance

(unless special comment，Test condition VBAT = 4.0 V, TA = -25 ℃)

Symbol	description	Test condition	Min	Typical	Max	unit
f_{IN}	Rf frequency range	UHF	400		470	MHz
Sensitivity	Reference sensitivity	12dB S/N for Audio output	-120	-122		dBm
	Squelch Sensitivity	Adjustable by software		-120		
	Received SNR	1.5KHZ Deviation	52	55		
	Adjacent Channel Selectivity	12.5KHz Deviation	52	55		dB
	Intermodulation Immunity	12.5KHz Channel spacing	52	55		
	Spurious response rejection	12.5KHz Channel spacing	52	55		dB
AF OUT	Audio Output (RMS)	Fo=1KHz Adjustable by software		150	150	MV
	Audio output distortion	Fo=1KHz		1	3	%
	Audio response	300HZ 500HZ 1KHZ 3000HZ		+4.5 +5.5 0 -13		

6.6 Transmit Performance

(unless special comment，Test condition VBAT = 4.0 V, TA = -25 ℃)

Symbol	Description	Test condition	Min	Typical	Max	unit
Fout	Rf frequency range		400		470	MHz
Pout	Rf Transmit power Hi Lo		 2.8 0.8	 3.5 1	 4 1.2	 W
	Transmit current Hi Lo			 1800 550	 2200 900	 MA
	Maximum modulation frequency deviation limit	Narrow bandwidth Broadband			2.5 5.0	KHZ KHZ
	Modulation sensitivity	8 Level adjustable by software	5	7	12	MV
	Audio modulation distortion			1	3	%
	Modulation characteristics	300HZ 500HZ 1000HZ 3000HZ	 -5 3	-13 -6 0 6	 -9 9	DB DB DB DB
SNR	S/N		40	42	45	dB
	Carrier suppression			-60		dBc
	IM3 Suppression			-60		dBc
	Adjacent Channel Power	12.5KHz offset		-65		dBc
	Stray radiation			-36		dBc

深圳市尚瑞思电子有限公司
ShenZhen Sunrise Electronics CO.,Ltd
TEL: 0755-23093179-801 FAX: 0755-23093179-816
www.sunrisedigit.com sales@sunrisedigit.com

UART communication protocol

1 Outline

SR-FRS-1W(VHF) module has a standard AT command interface, it is easily to communicate with and control the module;The AT command involved all the inquiry and control to the module, You may select the command to use as needed.

1.1 AT command type

1) Command without parameter：

AT＋<command>, eg.: AT+DMOCONNECT

2) Command with parameter：

AT＋<command>=<par1>,<par2>,<par3>…

3) Response command format are as below :

<CR><LF><command string><CR><LF>

<CR> Enter，0x0D

<LF> Newline，0x0A。

1.2 AT Command format

All the AT command started with “AT”, And ended with<CR>。

The UART port default setting are as below:

- 8 bit data,
- 1 bit stop,
- without parity ,
- CTS/RTS,
- 9600 baut

AT command response format：

<CR><LF><command string><CR><LF>

2 The communication command format

2.1 The command frame format define

The communication format are as AT instruction。

All data are as **ASCII** code, except the Length of SMS are **Hex** code.

The control command format：

AT+DMOXXX

The module response command format:

+DMOXXX

3. Command list

3.1 AT+DMOGRP

Description	Group parameter setting: Frequency, ctcss ,.etc setting	
Command	AT+DMOGRP=RFV，TFV，RXCXCSS，TXCXCSS,Flag,Flag1	
Example	command	AT+DMOGRP=450.02500,450.02500,1,1,0,0
	feedback	+DMOGRP:0 Success +DMOGRP:1 Fail
comment	RFV：receive frequency: UHF:400.00000-470.00000MHZ （It should be the integer multiple of 6.25K or 5K ）	
	TFV：Transmit frequency: UHF:400M – 470M HZ （It should be the integer multiple of 6.25K or 5K ）	
	RXCXCSS ： receive CTCSS/CDCSS （00-155）	

	TXCXCSS ： transmit CTCSS/CDCSS（00-155） 00： without coding 01-50： CTCSS； 51-155：CDCSS
	Flag： Bit0 Transmit Busy lock（0：off 1：on） Bit1 Bandwidth （0：width 1：narrow） Bit2 Transmit Power （0：HI 1：LO）
	Flag1： Bit0 receiver digital CTCSS phase （0：positive 1：reverse） Bit1 receiver digital CTCSS phase 0：positive 1：reverse） Bit2 Band filter （ 0：OFF 1：ON ）

3.2 AT+DMOSAV

Description	auto power save setting	
format	AT+DMOSAV=X	
Example	Command	AT+DMOSAV=0
	feedback	+DMOSAV:0 success +DMOSAV:1 fail
comment	X: 0 : enable power save 1 : disable power save (default)	

3.3 AT+DMOVOL

Description	Audio output volume setting	
Command	**AT+DMOVOL =X**	
Example	Host command	AT+DMOVOL=8
	Module response command	+DMOVOL：**0** Success +DMOVOL：**1** fail
Comment	X： 1-9 （default: 8）	

3.4 AT+DMOVOX

Description	VOX level setting	
Command	**AT+DMOVOX=X**	
Example	command	AT+DMOVOX=6
	feedback	+ DMOVOX：**0** Success + DMOVOX：**1** fail
Comment	X： 0-8 （0 ： OFF）default value 1-8 vox sensitivity setting LEVEL1=12MV LEVLE5=7MV LEVEL8=5MV	

Tips:

1) The number is more big, the sensitivity is more high;
2) When VOX ON, the Auto power off should be disabled,
that is : AT+DMOAUTOPOWCONTR=1;

3.5 AT+DMOFUN

Description	Function setting	
Format	**AT+DMOFUN=SQL，MICLVL, TOT，SCRAMLVL ,COMP**	
Sample	command	AT+DMOFUN =3,1,0,0,0

	feedback	+ DMOFUN：**0** Success + DMOFUN：**1** fail
Comment	SQL： Squalunch level setting 0-8 （0：Monitor）	
	MICLVL： Mic sensitivity setting 1-8	
	TOT： transmit timer limit 0~9 （Minute） , 0： OFF 3: default	
	SCRAMLVL：Voice scram 0-7 0： OFF	
	COMP: Compression Expansion control 0： OFF 1： ON	

3.6 AT+DMOMES

Description	Short message sending	
Format	**AT+DMOMES=[Message Length]XXX**	
Sample	Host to module	AT+DMOMES=【0x7】 ABCDEFG (41 54 2B 44 4D 4F 4D 45 53 3D 07 41 42 43 44 45 46 47 0D 0A)
	Module feedback	+ DMOMES:0 success + DMOMES:1 fail
Comment	[Message Length]：message length (Max 80 characters)，it is **HEX** format，Only one BYTE， it can't be TEXT Format 。	
	XXX：Message contents.	

Tips：

1. For fast transmit and receive SMS， Please disable Auto power off;

   That is : (AT+DMOAUTOPOWCONTR=1);

2. [Message Lenth] is HEX code.

   If send the command from PC, Please be noted that , once type the command by "**TEXT**", the

[Message Lenth] would be treated as one or two bytes, it caused the wrong message be sent. So, it is necessary to modify the message length into one byte by hand under the "HEX" mode before send the message.

For example: AT+DMOMES=7ABCDEFG

The length number 7 would be treated as 37;

3.7 +DMOMES

Description	Received Short message is sent to HOST	
Format	**+DMOMES=[Message Lenth]XXX**	
Sample	Module to HOST	+DMOMES =【】ABCDEFG (2B 44 4D 4F 4D 45 53 3D **07** 41 42 43 44 45 46 47 0D 0A)
	HOST send feedback to Module	AT+DMOMES：**0** success AT+DMOMES：**1** fail Comment: it is not must.
Comment	[Message Lenth]：message length (Max: 80)，**it is HEX format**	
	XXX：message contents.	

Tips:

1. If the message length is Odd number, a "space" should be added behind the last character of message;