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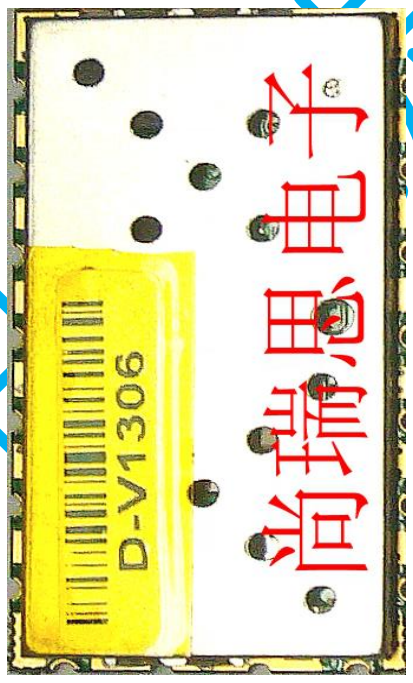
SR_FRS_1WV

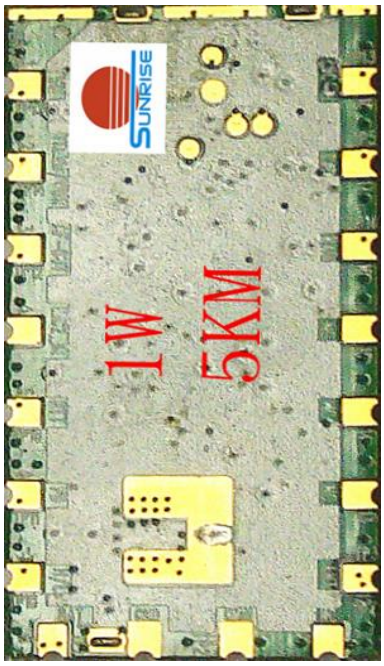
Walkie Talkie Transceiver /Data transfer Module

VHF(136M-174M)

DATA SHEET

(V101)





DATE: 2013-3-1

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

2. Product Outline

The SR_FRS_1W (VHF) is a low cost but high performance integrated walkit 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 with 1W output . In open area, it can come to performance of 3.5Km communication. 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 100 byte can be sent at one time; it is compliance with the standard UART transfer protocol;

Also the 1W VHF have the ability of transfer DTMF;

3. Product performance

- FM demodulation technique Based on digital signal processing technology;
- Frequency Range：VHF 136M～174MHZ;
- Frequency step：5K/6.25K/12.5K/25K;
- RF Output Power： 1W/0.5W
- 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
- Ultra small size：18 * 35 * 3.2MM;
- Communication distance：more than 3.5 KM in open area .

Applications:

portable intercom and paging systems;

wireless data transmission;

mobile phones and other embedded in radio functions product 。

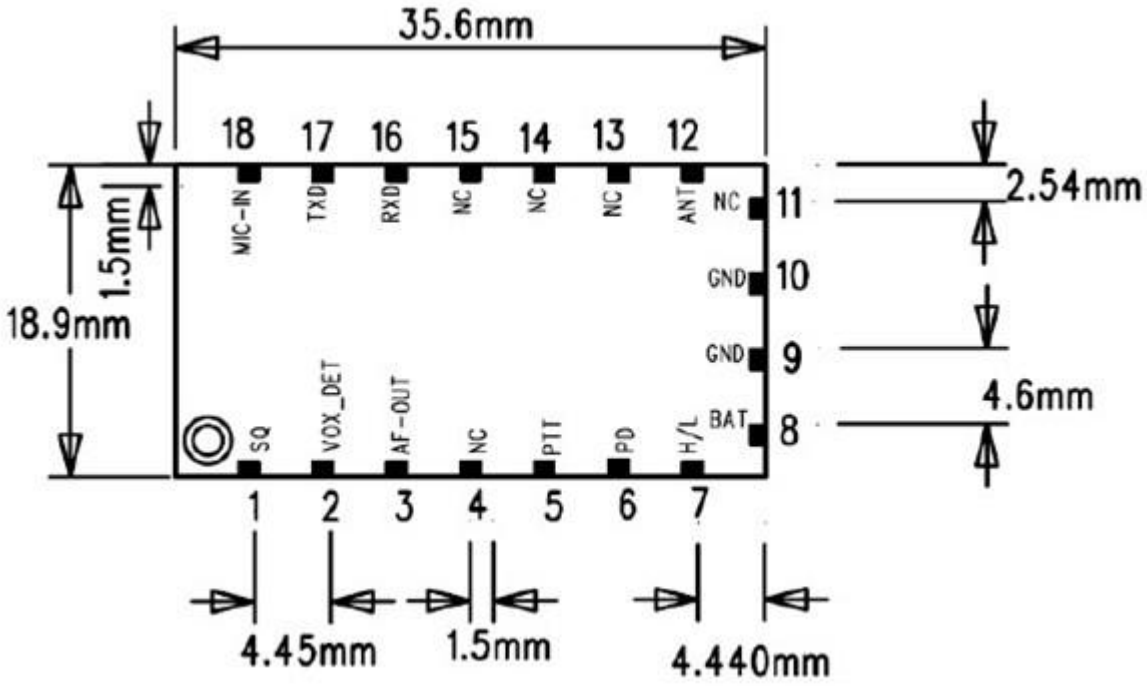
Portable walkie-talkie,

Outdoor sports equipment,

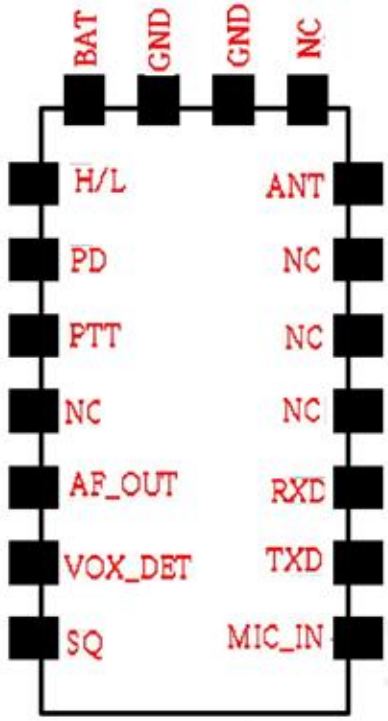
Building security,

Audio monitor system

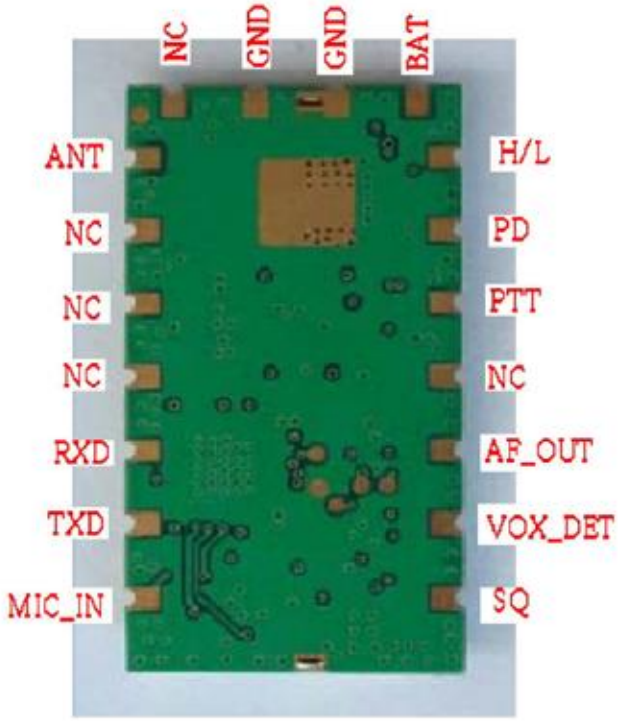
4. Module mechanical size



bottom view



FRS TOP View



FRS Bottom View

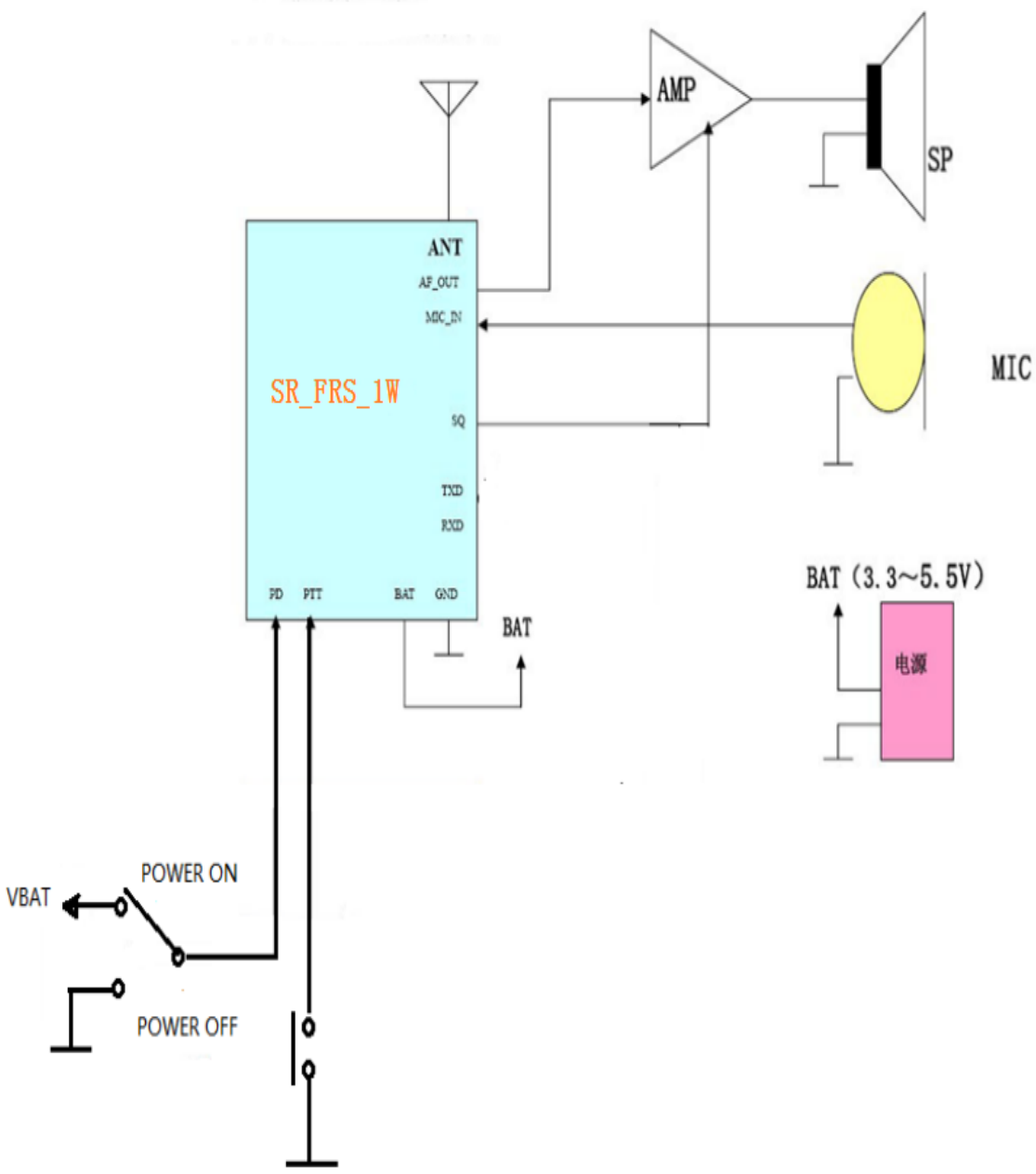
5. Module pin assignment

J1 pin name	Pin number	Function description
SQ	1	Squelch control 0: active
VOX_DET	2	1） with VOX mode，it is the VOX state indication； 0： Talk finished； 1： Talking； 2） without VOX，it is the transmitter state indication； 0： receive state 1： transmitter state
AF_OUT	3	Audio output
MIC1(NC)	4	NC
PTT	5	PTT control 1：Receive； 0：Transmit
PD	6	Sleep control，

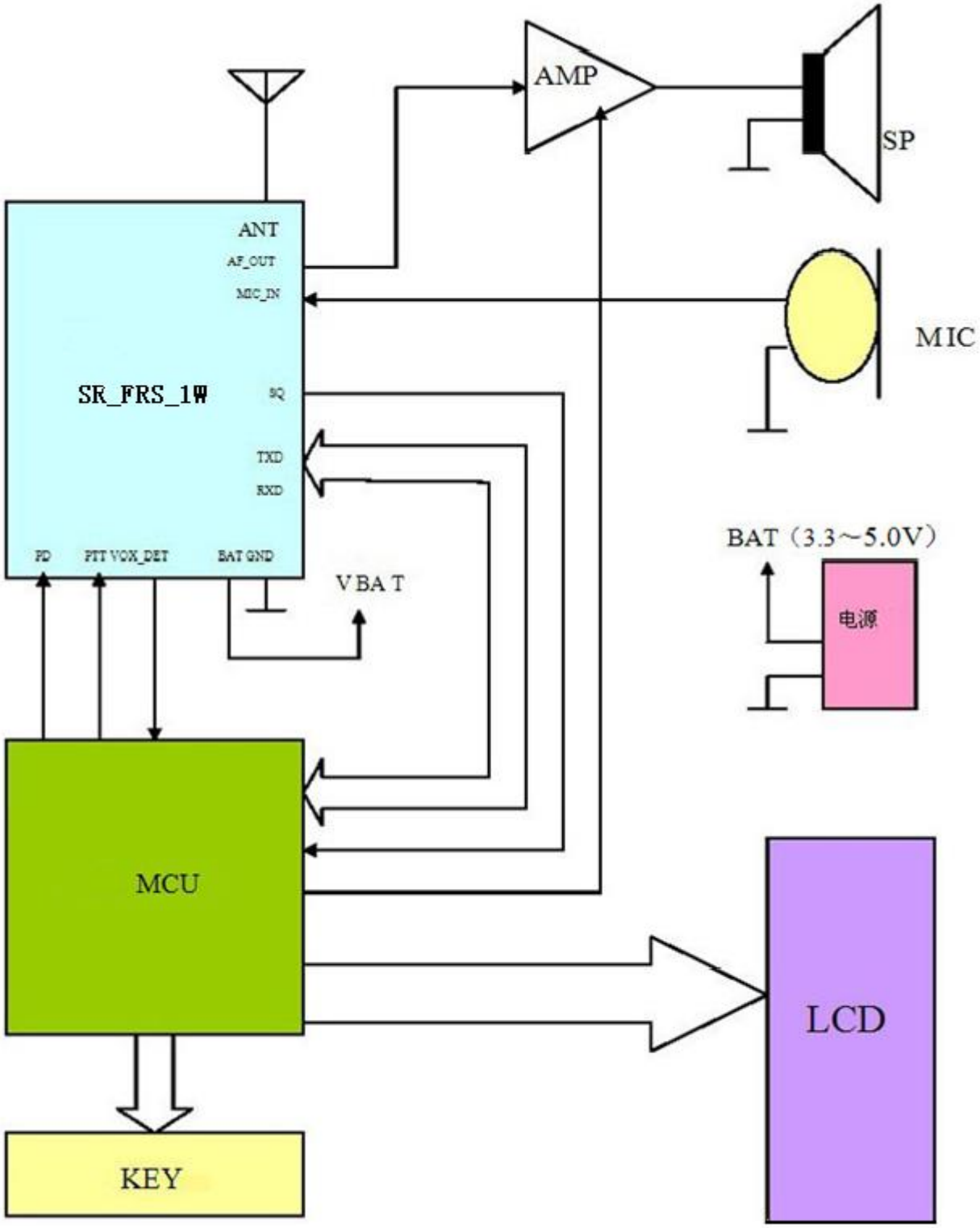
		0： into sleep state 1： Running
H/L	7	RF transmit power selection； 0： 0.5W; NC： 1W; Note: if you want a 1w power ,just leave this pin NC, it can't be pull high.
BAT	8	Power supply: DC 3.3V - 5V
GND	9	GND
GND	10	GND
NC	11	NC
ANT	12	Rf Antenna input;
NC	13	NC
NC	14	NC
NC	15	NC
RXD	16	UART - Rxd
TXD	17	UART - Txd
MIC_IN	18	Microphone input;

6. Typical application Block diagram

6.1 without MCU, it works alone



6.2 Works with MCU



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 150.050MHz,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）	136-174
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	136		174	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		136		174	MHz
Pout	Rf Transmit power Hi Lo		 800 400	 1000 500	 1200 600	MW
	Transmit current Hi Lo			 700 350	 750 450	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

7. UART communication protocol

SR-FRS-1W (VHF)module has the AT instruction interface, the AT instruction can be used to communicate with or control the module；the AT instruction covered all the inquiry and control command; For detail please refer our company 《SR-FRS-1W (VHF) UARTt communication protocol》

8. Comment：

1、 The default parameter for this module after power on are as bellow:

GBW=12.5KHZHZ，

TFV=150.050MHZ,

RFV=150.050MHZ，

CTCSS=01， (For both Transfer and receive)

SQ=3,

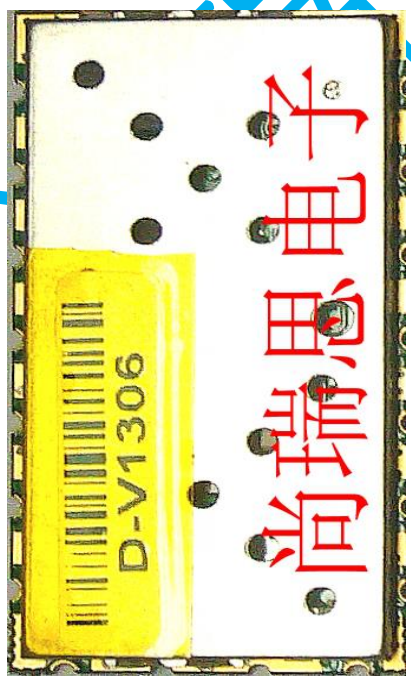
Scramble: OFF

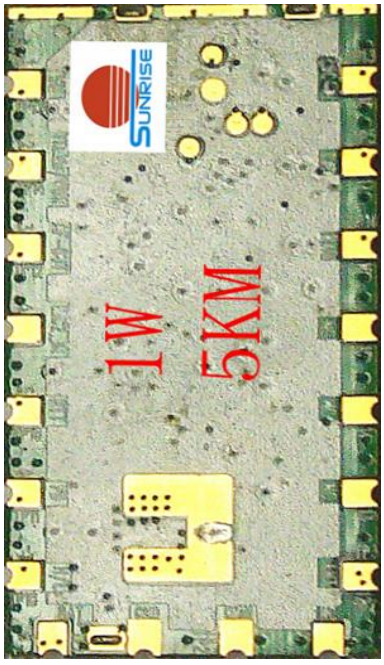
2、 The PTT pin cann't be pulled to Lo when in data transfer mode.

SR-FRS-1WV

Wireless Transmit_Receive & Data Transfer module
VHF(136M-174M)
UART communication protocol

VER101





Date: 2014-10-1

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

2.2 The control command list

2.2.1 AT+DMOCONNECT (shake hand command)

Description	The shake hand command is used for verify whether if the module runs normally ： if the host can't get the module response up to 3 times, Host should power off the module, then power on again.	
Command	AT+DMOCONNECT	
Example	Host Command	**AT+DMOCONNECT**
	Module Response command	**+DMOCONNECT:0** Success **+DMOCONNECT:1** Failure

2.2.2 AT+DMOSETGROUP (Group setting command)

Description	Bandwidth, frequency, CTCSS, SQ setting command;	
Command	AT+DMOSETGROUP=GBW，TFV，RFV，RXCXCSS，SQ,TXCXCSS,FLAG	
Example	Host Command	**AT+DMOSETGROUP=0,150.0250,150.0250,1,2,1,0**
	Module Response command	**+DMOSETGROUP:0** Success **+DMOSETGROUP:1** Failure
comment	**GBW：Bandwidth and DTMF transfer switch。** Bit0 0: Narrow 1: Band Bit1 0: Disable DTMF 1: Enable DTMF	
	TFV： Transmit frequency: VHF: 136M – 174M HZ （It should be the integer multiple of 6.25K or 5K ）	
	RFV： Receive frequency： VHF: 136M – 174M HZ （It should be the integer multiple of 6.25K or 5K ）	

	RXCXCSS ： CTCSS/CDCSS ， （00-121） for receive **TXCXCSS** ： CTCSS/CDCSS ， （00-121） for transmit 00： no coding 01-38： CTCSS （analog ） 39-121：CDCSS （digital ）
	FLAG ： Bit0（Transmit Busy lock） 0，OFF 1，ON Bit1（Compression Expansion control） 0，OFF 1，ON Bit2（Transmit Power select） 0，High 1，Low
	SQ： 0-8 ； Squelch level （0：Monitor mode）

2.2.3 AT+DMOAUTOPOWCONTR (Auto power save command)

Description	Module auto power save setting	
Command	AT+DMOAUTOPOWCONTR=X	
Example	Host command	AT+DMOAUTOPOWCONTR=0
	Module Response command	+DMOAUTOPOWCONTR:**0** Success +DMOAUTOPOWCONTR:**1** Failure
comment	X: 0 Enable power save （default） 1 Disable power save	

Tips：

1. When for message sending/Data transfer application，Please disable power save for fast transmit and receive。
2. When for VOX application, Please disable power save.

2.2.4 AT+DMOVERQ (Inquiry module version command)

Description	Inquiry the module software version	
command	AT+DMOVERQ	
Example	Host command	AT+DMOVERQ
	Module Response command	+DMOVERQ：V1.0
comment	The response of module is the module software version.	

2.2.5 AT+DMOSETVOLUME (Volume setting command)

Description	Volume setting	
Command	AT+DMOSETVOLUME=X	
Example	Host command	AT+DMOSETVOLUME=1
	Module response command	+ DMOSETVOLUME：**0** Success + DMOSETVOLUME：**1** Failure
Comment	X： 1-9 （default: 8）	

2.2.6 AT+DMOSETVOX (Acoustic control command)

Description	Acoustic control setting	
Command	AT+DMOSETVOX=X	
Example	Host command	AT+DMOSETVOX=6
	Module response command	+ DMOSETVOX：**0** Success + DMOSETVOX：**1** Failure
Comment	X：Acoustic control level (0-8) （0: Means VOX OFF, default value）； LEVEL1=12MV LEVLE5=7MV LEVEL8=5MV	

Tips:

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

2.2.7 AT+DMOSETMIC (Microphone sensitivity & Voice scram setting command)

Description	Microphone sensitivity & Voice scram setting command	
Command	AT+DMOSETMIC=MICLVL, SCRAMLVL,**TOT**	
Example	Host command	AT+DMOSETMIC=1,0,**0**
	Module response command	+ DMOSETMIC：0 Success + DMOSETMIC：1 Failure
Comment	MICLVL：Mic sensitivity level (1-8), default value is 6 ; The lever is more big ,and the sensitivity is more high;	
	SCRAMLVL：Voice scram (0-8.) 0 : Disable voice scram (default : 0) 1-8: It means 8 different encryption mode;	
	TOT： transmit time limit 0: Without limit; 1-9: The transmit time limit to be 1-9 minutes; Default: 3 minutes;	

2.2.8 For Data transfer, Please be noted that there are two different function version for this command:

1）Short message transfer/Data transfer ；

2）DTMF；

The two data transfer mode do not exists at the same time; only one supported in the module.

1) AT+DMOMES (Short message sending / Data transfer command)

Description	Host send message or data to module for transmit	
Command	AT+DMOMES=[Message Lenth]XXX	
Example	Host command	AT+DMOMES=7ABCDEFG (41 54 2B 44 4D 4F 4D 45 53 3D 07 41 42 43 44 45 46 47 0D 0A)

	Module response command	+ DMOMES:0 Success + DMOMES:1 Failure
Comment	[Message Lenth]: the message length (Max 100 Bytes)，it is HEX code, only one Byte.	
	XXX：is the 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;

2) AT+DMOSETDTMF (DTMF command)

Description	DTMF setting command	
Command	AT+DMOSETDTMF=xxxxxxx	
Example	Host command	AT+DMOSETDTMF=123456
	Module response command	+ DMOSETDTMF：0 Setting success + DMOSETDTMF：1 Setting failure
Comment	XXXXXXX: is DTMF number（16 DTMF），（0~9，A~F）	

2.2.9 +DMOMES (The module received the message and automatically send to HOST)

Description	The module received the message and automatically send to HOST	
Command	+DMOMES=[Message Lenth]XXX	
Example	Module send the message to Host	+DMOMES =7ABCDEFG (2B 44 4D 4F 4D 45 53 3D 07 41 42 43 44 45 46 47 0D 0A)
	Host response to Module	AT+DMOMES：**0** Success AT+DMOMES：**1** Failure
Comment	[Message Lenth]：is the message length(Max 100 bytes)，**HEX** code。	
	XXX：is the message contents.	

Tips:

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

Appendix:

Demo board for SR_FRS_1W (UHF / VHF)

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1. FRS_DEMO_A

1） The demo board is only for SR_FRS_1W module demonstration;
2） It can be used for either UHF or VHF demo.
3） It work alone without MCU；
4）It built in RS232 convert circuit, it is easy for user to connect the test board with the PC for parameter setting, or Data transfer demo;
5) It has the speaker Mic jack; Just through the speaker Mic you may implement the voice intercom; (it must use the speaker Mic we provided)
6) Power polarity protection;
7) Only one default frequency could be used.
8) **the demo board is subject to change without prior notice.**

2. FRS_DEMO_B

1） Can be used for SR-FRS-1W and SR_FRS_0W5 module demonstration;
2） It can support both UHF（400M-480M） and VHF(136M-174M)；
3） Power ON/OFF, Volume adjust, Channel adjust 3 in 1 switch；
4） 16 Channels can be selected;
5） Enable or Disable VOX is easy by VOX switch control; The VOX sensitivity can be set via the PC；
6） Voice broadcast the channel number; Chinese/ English can be selected；
7） Monitor ON/OFF by [MON]key;
8） Voice intercom demo；
9） Data /SMS transfer demo；
10) Provide user interface: SQ,LINE_IN, LINE_OUT,PTT,GND;
11) Restore to be the factory setting;
12) USB interface for parameter setting by connect the demo board to the PC.

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13) the demo board is subject to change without prior notice.

3. FRS_DEMO_D

1） The demo board can be used for SR_FRS_0W5, SR_FRS_1W, SR_FRS_2W module demonstration;

2） It support both UHF and VHF;

3） LCD with 128X64 pix;

4） Encode switch with press switch make the operation is more easy;

5） All parameter can be set by the demo board itself or via the PC;

6） Both Tx frequency and Rx frequency can be set alone;

7） Both Tx CTCSS and Rx CTCSS can be set alone;

8） 100 channels;

9） Auto scan;

10） Monitor;

11） Many interface for the user;

12) Li battery charge;

13) the demo board is subject to change without prior notice.