



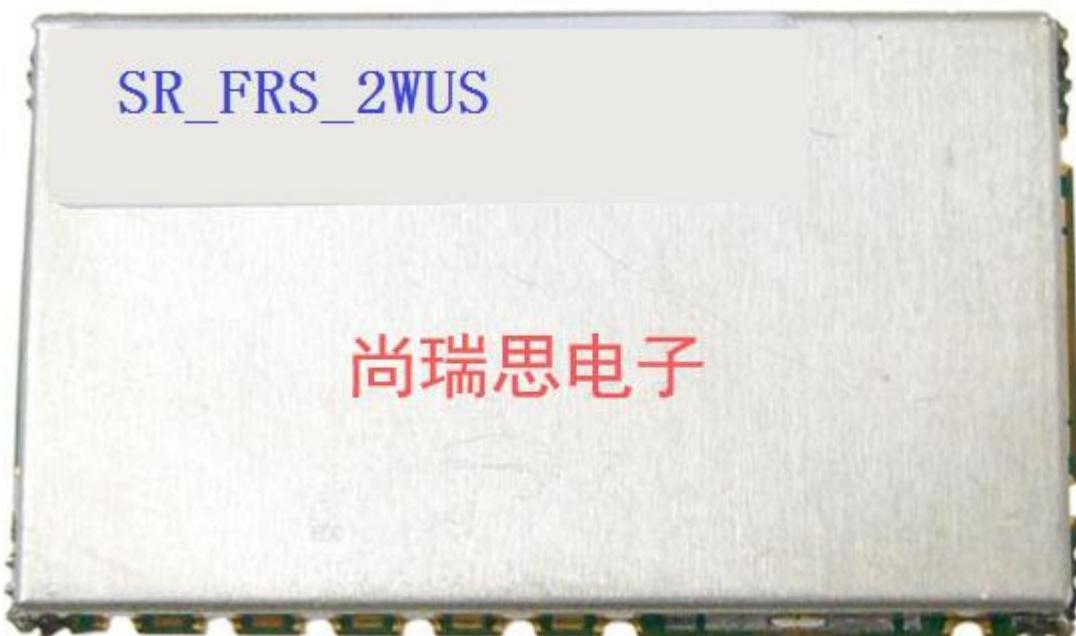
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SR_FRS_2WVS

Walkie Talkie Transceiver /Data transfer Module

UHF(136M-174M)

DATA SHEET
(V102)



DATE: 2017-01-01

Room A305, Bay area artificial intelligence Industrial Park,
Baoan District, Shenzhen City, Guangdong Province, China



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2. Product Outline

The SR_FRS_2WVS 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 with 2W output . In open area, it can come to performance of 4-6Km 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 70 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 136M~174MHZ;
- Frequency step: 5K/6.25K/12.5K/25K;
- RF Output Power: 2W/1W/0.5W
- voice encryption (scrambling): 8 type.
- Voice Compression- Expansion ;
- SMS Receive /Transformer, The space Baut : 1200;
- CTCSS (38 group) + CDCSS (83 group) ;
- Automatic elimination tail ;
- Volume adjustable (1-8) ;
- 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) ;

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- Power supply : DC 3.3~5.0V recommend 3.7-4.2V
- Ultra small size: 17*28.5*3.0mm
- Communication distance: more than 9 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

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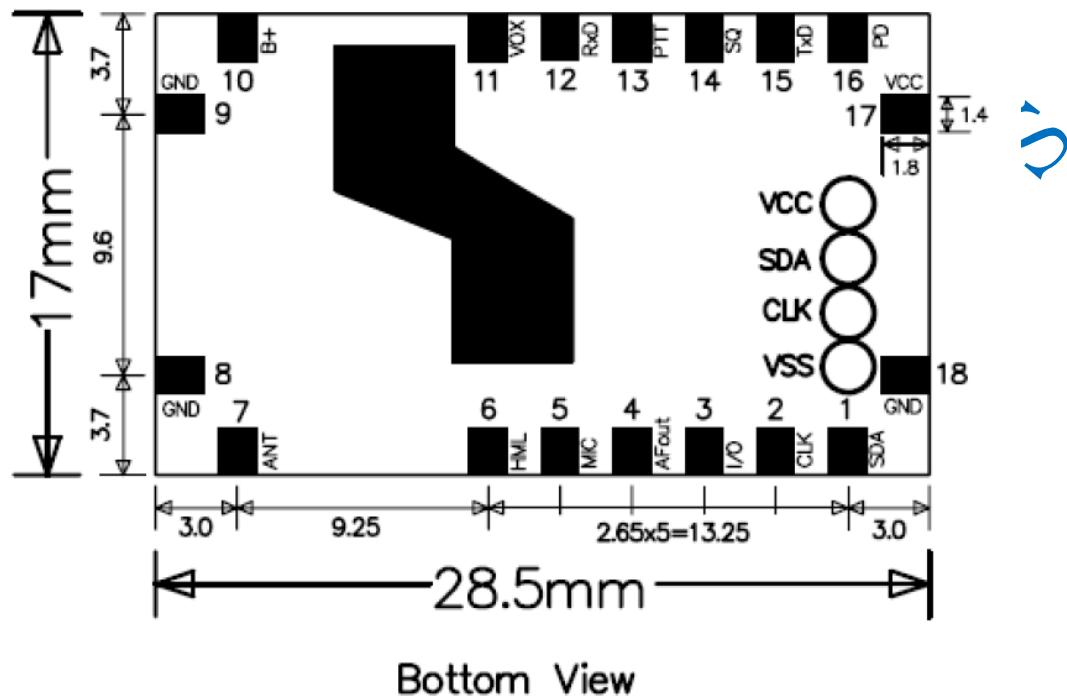
4. Module package

4.1 Module pin assignment for TOP VIEW.



顶视图 (Top View)

4.2 Module package size



Bottom View

Sunrise



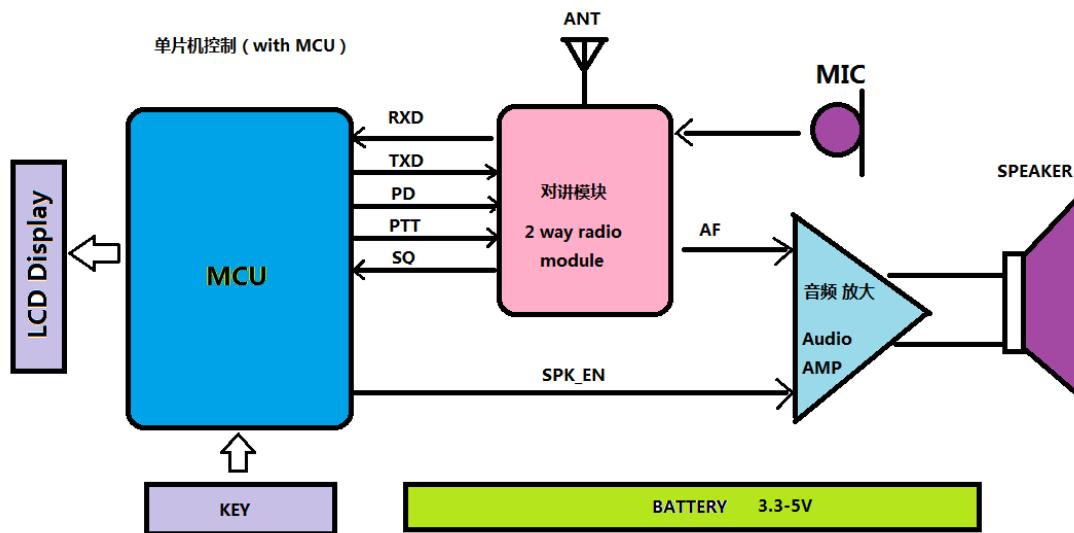
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4.3 Module pin assignment description

Pin number	pin name	IO	Function description
1	SDA		Program only, user unused
2	CLK		Program only, user unused
3	I/O		Program only, user unused.
4	AF_OUT	OUT	Audio output
5	MIC	IN	Micphone input
6	HML	IN	Transmit power selection: GND: 0.5w NC: 2W 1.5V: 1W (unuseful)
7	ANT	IN/OUT	Antenna
8	GND	GND	GND
9	MIC_IN	IN	Microphone input;
10	B+	OUT	Module power supply
11	VOX	OUT	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
12	RXD	IN	UART_RXD
13	PTT	IN	PTT control 1: Receive; 0: Transmit
14	SQ	OUT	Squelch control 0: active
15	TXD	OUT	UART_TXD
16	PD	IN/OUT	Module power control: 1: Power on 0: Power off
17	VCC		+3V output
18	GND	GND	

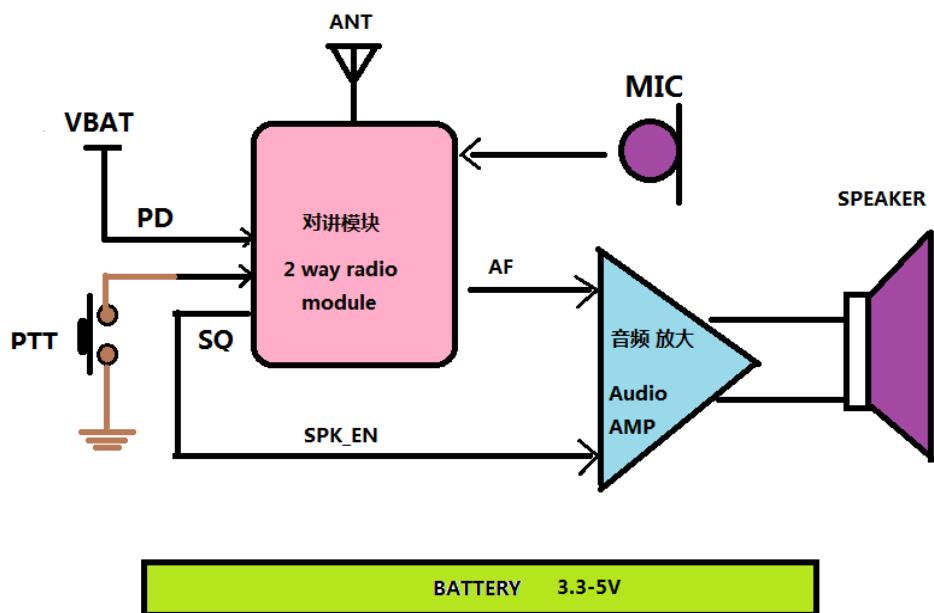
5. Typical application Block diagram

5.1 without MCU, it works alone



ELE

独立工作 (without 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	°C
	Internal Initialize Time when power on	136	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	°C
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 °C)

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	40	mA
Continuous Transmit	The transmitter is in normal work mode	Input 1KHz Modulated signal HI power MI power LO power	1200 700 350	MA MA MA
Receive Squelch power Save mode	The receiver is in power save state with standby condition.		15	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



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6.4 Overall electrical performance specifications

Frequency Range (MHz)	136-174
Channel spacing (KHz)	25 / 12.5KHZ
Antenna Impedance (Ω)	50
Operating temperature (°C)	-20~+55
Frequency Stability (ppm)	± 2.5

6.5 Receive Performance

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

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		



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6.6 Transmit Performance

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

Symbol	Description	Test condition	Min	Typical	Max	unit
Fout	Rf frequency range		136		174	MHz
Pout	Rf Transmit power		1700	2000	2100	MW
			800	1000	1200	
			350	150	500	
	Transmit current			1200	1300	MA
				750	850	
				350	136	
	Maximum modulation frequency deviation limit	Narrow bandwidth			2.5	KHZ
		Broadband			5.0	KHZ
	Modulation sensitivity	8 Level adjustable by software	5	7	12	MV
	Audio modulation distortion			1	3	%
	Modulation characteristics	300HZ		-13		DB
		500HZ	-5	-6	-9	DB
		1000HZ		0		DB
		3000HZ		3	6	DB
SNR	S/N		40	42	45	dB
	Carrier suppression				-60	dBc
	IM3 Suppression				-60	dBc
	Adjacent Channel Power	12.5KHz offset			-60	dBc
	Stray radiation				-36	dBc



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7. Comment:

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

GBW=12.5KHZHZ,

TFV=150.050MHZ,

RFV=150.050MHZ,

CTCSS=00, (For both Transfer and receive)

SQ=3,

Voice encryption : OFF

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

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UART communication protocol
VER01

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1 Outline

SR-FRS-2WVS 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:



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AT+DMOXXX

The module response command format:

+DMOXXX

2.2 The control command list

2.2.1 AT+DMOGRP (Group setting command)

Description	Bandwidth, frequency, CTCSS, SQ setting command;		
Command	AT+DMOGRP=RFV,TFV,RXCT,TXCT,Flag,Flag1		
Example	Host Command	AT+DMOGRP=150.02500,150.02500,RR,TT,0,0 (enter)	
	Module Response command	+DMOGRP:0	Success
comment	<p>TFV: Transmit frequency: UHF: 136.0000M-174.0000M HZ (It should be the integer multiple of 6.25K or 5K)</p> <p>RFV: Receive frequency: UHF: 136.0000M-174.0000M HZ (It should be the integer multiple of 6.25K or 5K)</p> <p>RXCT : CTCSS/CDCSS , for receive coding (HEX code) TXCT : CTCSS/CDCSS , for transmit coding (HEX code) 2bytes,(HEX code); RXCT lower 4 bit is for decimal part , if no setting then filled with “FF FF” Eg: CTCSS: 67.7 HZ D0D1 = 0X77 0X06 CDCSS: D023N D0D1 = 2380 D023N D0D1 = 4482 D023N D0D1 = 23C0 D023N D0D1 = 51C2</p>		



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FLAG : (ASCII format)

Bit0 : busy locking / 0:OFF 1:ON

Bit1: band setting / 0: Wide 1:Narrow

FLAG = bit1 * 2 + bit0

FLAG 1: (ASCII format)

Bit0 : HI/LO transmit power/ 0: 2W

1: 0.5W

Bit1: Middle transmit power / 0: 2W/0.5W

1: 1w

FLAG1 = bit1 * 2 + bit0

1. 1) Command explanation:

Important notice: for “AT+DMOGRP=RFV,TFV,RXCT,TXCT,Flag,Flag1”, All the command is TEXT format, while the RXCT,TXCT is HEX format.

Eg. Frequency : 150.02500 CTCSS : 67.0 (HEX coding: 70 06)

A) If input the command by HEX

41 54 2B 44 4D 4F 47 52 50 3D 31 35 30 2E 30 32 35 30 30 2C 31 35 30 2E 30 32
A T + D M O G R P = 1 5 0 . 0 2 5 0 0 , 1 5 0 . 0 2
35 30 30 2C 70 06 2C 70 06 2C 30 2C 30 0D 0A
5 0 0 , R R , T T , 0 , 0 (Enter)

Find the R R T T position , instead with 70 06

B) If input the command by TEXT,

1) Input the command by TEXT

AT+DMOGRP=150.02500, 150.02500, RR, TT, 0, 0 (Enter)

2) Change all the TEXT to HEX format:

41 54 2B 44 4D 4F 47 52 50 3D 31 35 30 2E 30 32 35 30 30 2C 31 35 30
2E 30 32 35 30 30 2C 52 52 2C 54 54 2C 30 2C 30 0D 0A
R R T T

3) Find the R R, T T position, then instead the HEX with correct
CTC/CDC coding., then send the command.

41 54 2B 44 4D 4F 47 52 50 3D 31 35 30 2E 30 32 35 30 30 2C 31 35 30 2E
30 32 35 30 30 2C 70 06 2C 70 06 2C 30 2C 30 0D 0A
R R T T



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2. Comment for CTCSS /CDCSS setting:

A) for analog CTCSS setting

67.0 67.0 →06 70→ D0 D1= 70 06
250.3 250.3 →25 03→ D0 D1= 03 25

B) for digital CDCSS setting

For Positive CDCSS code: MSB of D1 is 8;

Eg: D023N 023→8023→ D0 D1=23 80
 D244N 244→8244→ D0 D1=44 82

For Negative CDCSS code: MSB of D1 is C;

Eg: D023I 023→C023→ D0 D1=23 C0
 D251I 251→C251→ D0 D1=51 C2

3) FLAG /FLAG1 Setting

BIT1 BIT0 is BCD code;

FLAG = BIT1 * 2 + BIT0

FLAG1 = BIT1 * 2 + BIT0

Eg:

1) FLAG:

Bit1 = 1; bit0 = 0

The BCD of FLAG is 2 + 0 = 2; FLAG = 2;

2) FLAG:

Bit1 = 1; bit0 = 1

The BCD of FLAG is 2 + 1 = 3; FLAG = 3;

2) FLAG:

Bit1 = 0; bit0 = 1

The BCD of FLAG is 0 + 1 = 1; FLAG = 1;



2.2.3 AT+DMOSAV (Auto power save command)

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

Comment:

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+DMOVER (Inquiry module version command)

Description	Inquiry the module software version	
command	AT+DMOVERQ	
Example	Host command	AT+DMOVER(Enter)
	Module Response command	+DMOVER: V0.1
comment	The response of module is the module software version.	

2.2.5 AT+DMOVOL (Volume setting command)

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



2.2.6 AT+DMOVOX (Acoustic control command)

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

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+DMOFUN (extension function setting)

Description	Microphone sensitivity & Voice scram setting command	
Command	AT+DMQFUN=SQL, MICLVL, TOT, SCRAMLVL ,COMP	
Example	Host command	AT+DMOFUN=3,1,0,0,0(enter)
	Module response command	+DMOFUN: 0 Success +DMOFUN: 1 Failure
Comment	<p>MICLVL: Mic sensitivity level (1-8), default value is 6 ; The lever is more big ,and the sensitivity is more high;</p> <p>SQ: Squelch level: (0~9, 0: Monitor mode)</p> <p>MICLVL: Mic sensitivity level: (0~7)</p> <p>TOT: Transmit timer limit (0~15 minute , 0: means OFF)</p> <p>SCRAMLVL: voice scram (0~7, 0: means OFF)</p> <p>COMP: Compress and extend setting: 0: OFF. 1: ON</p>	



2.2.8 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(enter) (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	<p>[Message Lenth]: the message length (Max 60 Bytes), it is HEX code, only one Byte.</p> <p>XXX: is the message contents.</p>	

Tips:

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

That is : (AT+DMOSAV =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;

AT+DMOMES=12ABCDEFABCDEF

The length number 12 would be treated as 31 32



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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;
2. Host response to Module command is not must.



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Appendix:

1. CTCSS 列表

CH	FREQ.	CH	FREQ.	CH	FREQ.
1	67.0	13	103.5	26	162.2
		14	107.2	27	167.9
2	71.9	15	110.9	28	173.8
3	74.4	16	114.8	29	179.9
4	77.0	17	118.8	30	186.2
5	79.7	18	123.0	31	192.8
6	82.5	19	127.3	32	203.5
7	85.4	20	131.8	33	210.7
8	88.5	21	136.5	34	218.1
9	91.5	22	141.3	35	225.7
10	94.8	23	146.2	36	233.6
11	97.4	24	151.4	37	241.8
12	100.0	25	156.7	38	250.3

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2. DCS 列表

CH	CODE	CH	CODE	CH	CODE	CH	CODE	CH	CODE
39	N023	58	N132	77	N265	96	N464	115	N712
40	N025	59	N134	78	N271	97	N465	116	N723
41	N026	60	N143	79	N306	98	N466	117	N731
42	N031	61	N152	80	N311	99	N503	118	N732
43	N032	62	N155	81	N315	100	N506	119	N734
44	N043	63	N156	82	N331	101	N516	120	N743
45	N047	64	N162	83	N343	102	N532	121	N754
46	N051	65	N165	84	N346	103	N546		
47	N054	66	N172	85	N351	104	N565		
48	N065	67	N174	86	N364	105	N606		
49	N071	68	N205	87	N365	106	N612		
50	N072	69	N223	88	N371	107	N624		
51	N073	70	N226	89	N411	108	N627		
52	N074	71	N243	90	N412	109	N631		
53	N114	72	N244	91	N413	110	N632		
54	N115	73	N245	92	N423	111	N654		
55	N116	74	N251	93	N431	112	N662		
56	N125	75	N261	94	N432	113	N664		
57	N131	76	N263	95	N445	114	N703		

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Demo board for SR_FRS_2WVS

1. FRS_DEMO_A



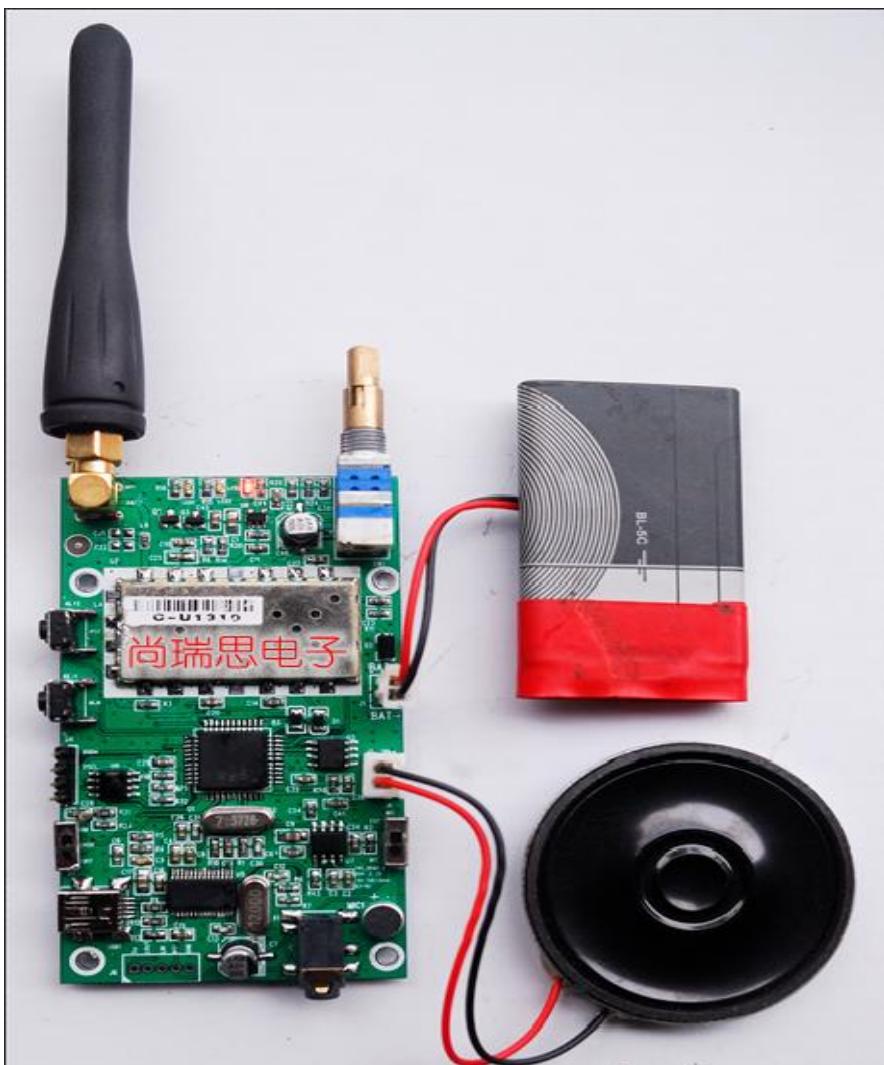
- 1) The demo board is for SR_FRS_1W /SR_FRS_2W module demonstration;
- 2) It can be used for either UHF or VHF module demo.
- 3) It work alone without MCU;
- 4) It built in RS232 convert circuit, it is easy for user to connect the test board with the PC for parameter setting, or Data transfer demo;
- 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.

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2. FRS_DEMO_B



- 1) Can be used for SR-FRS-1W U/V , SR_FRS_0W5 ,SR_FRS_2W module demonstration;
- 2) It can support both UHF (136M-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;

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-
- 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.

3. FRS_DEMO_D



- 1) The demo board can be used for SR_FRS_0W5, SR_FRS_1W, SR_FRS_350, 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) Voice intercom demo
- 10) Auto scan demo
- 11) Sms Demo
- 12) Monitor;
- 13) Many interface for the user;
- 14) Li battery charge;