DORJI
Applied Technologies

DRA818V
VHF Band Voice Transceiver Module   V1.30

Features:

- Frequency Range: 134~174MHz
- Tx/Rx frequency independent
- Channel space: 12.5/25KHz
- Configurable multi-channels
- Sensitivity: -122dBm
- Output power: +27/30dBm
- CTCSS / CDCSS codes
- 8 volume levels
- 8 squelch levels
- UART interface
- Temperature: -30°C ~+70°C
- TX current: 450/750mA
- Supply voltage: 3.3~4.5V

Applications

- Portable walkie-talkie
- Outdoor sports products
- Audio monitor system
- Building security system

DESCRIPTION

DRA818V is a type of compact wireless voice transceiver module based on RFIC RDA1846 and works in VHF band. It integrates high speed microcontroller, high performance wireless transceiver IC, high power PA, audio process and squelching circuits. It provides standard UART interface which users can easily configure appropriate parameters for different applications. Users can easily construct a walkie-talkie system by connecting microphone, audio PA and speaker.
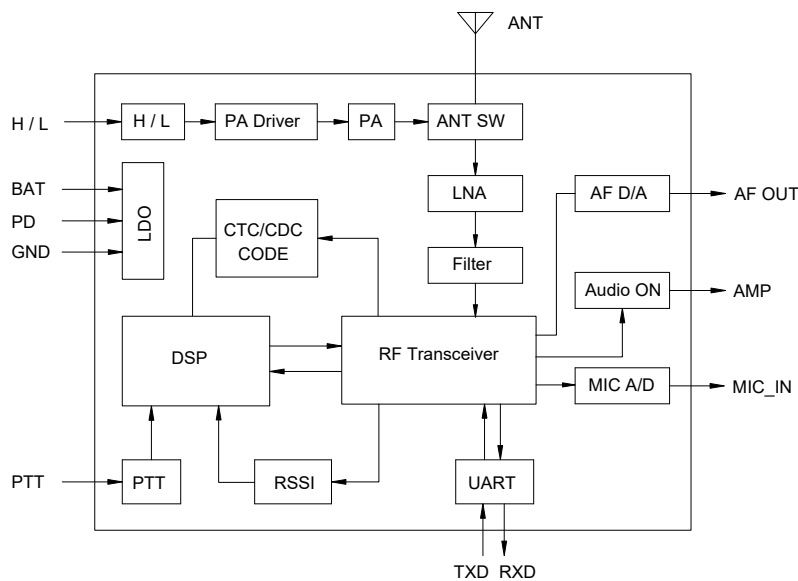

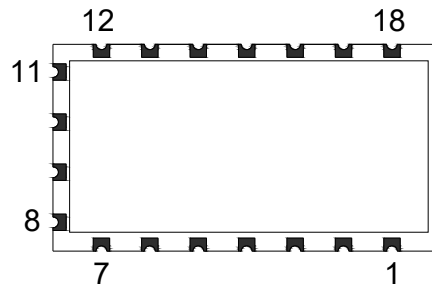**Figure 1:   DRA818V Functional Block**

PIN FUNCTIONS

Figure 2: DRA818V Pin Layout

PIN	Name	Function	Description
1	SQ	Output	Squelch detection.. Low→ Audio amplifier on
2	NC	---	No connection
3	AF_OUT	Output	Audio output pin.
4	NC	---	No connection
5	PTT	Input	Tx/Rx control pin: Low→TX; High→ RX
6	PD	Input	Power saving control pin: Low→sleep mode; High→normal mode
7	H/L	Input	RF Power Selection: Low→0.5W; **floated**→1W
8	VBAT	Power	Power supply
9	GND	Ground	Ground (0V)
10	GND	Ground	Ground (0V)
11	NC	---	No connection
12	ANT	---	Antenna port. 50 Ohm impedance
13	NC	---	No connection
14	NC	---	No connection
15	NC	---	No connection
16	RXD	Input	UART input, TTL level
17	TXD	Output	UART output, TTL level
18	MIC_IN	Input	MIC input

Table 1: DRA818V Pin Functions

ELECTRICAL SPECIFICATIONS

Symbol	Parameter (condition)	Min.	Typ.	Max.	Units
VCC	Supply Voltage	3.3	4.5	5	V
Freq	Frequency range	134		174	MHz
Temp	Operating temperature range	-30	25	70	°C
I_{DD_R}	Current in receive mode @ Audio amplifier on		60		mA

	@ Audio amplifier off		55		mA
I_{DD_T} [t]	Current in transmit mode @ Low Power Mode		400	550	mA
	@ High Power Mode		700	750	
I_{DD_S}	Current in sleep mode		1		uA
CH_w	Channel Space @ Narrow band		12.5		kHz
	@ Wide band		25		kHz
T_{SW}	Tx/Rx switching time		150		mS
T_{IN}	Module initializing time		3	4	S
Z_{ANT}	Antenna Impedance		50		Ohm

Table 2: DRA818V Electrical Specifications

RADIO CHARACTERISTICS

Symbol	Parameter (condition)	Min.	Typ.	Max.	Units
Freq	Frequency range	134		174	MHz
Sen.	Receiver sensitivity @12dB SINAD		-122		dBm
Sen_{SQ}	Squelch function sensitivity		-120		dBm
SNR_R	S/N in receive mode @ 1.5KHz Fdev.	45	50		dB
ACS	Adjacent channel selection @ CH_w = 12.5 KHz	55	60		dB
IR	Inter-modulation rejection @ CH_w = 12.5 KHz	55	60		dB
SPR	Spurious emission rejection@ CH_w = 12.5 KHz	55	60		dB
AF_{ZOUT}	Audio output impedance		200		Ohm
AF_{AMP}	Audio signal amplitude @1KHz		700		mV
Pout	Output power @ Low Power Mode		26	27	dBm
	@ High Power Mode		29	31	
Fdev	Max. Frequency deviation @ Narrow band			2.5	KHz
	@ Wide band			5	
Sen_{MOD}	Modulation Sensitivity @1KHz at 2.5KHz Fdev.		10		mV
AF_{TD}	Audio modulation distortion@1KHz at 2.5KHz Fdev.		2	5	%
SNR_T	S/N in Transmit mode @1KHz at 2.5KHz Fdev.	38	40	45	dB
$Fdev\_c$	CTCSS frequency deviation	0.35	0.5	0.75	KHz

Table 3: DRA818V Radio Characteristics

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Min.	Max.	Units
VCC	Supply Voltage	3.3	5.5	V
V$_{IN}$	Input voltage	-0.3	VCC+0.3	V
I$_{IN}$	Input current	-10	10	mA
T$_{ST}$	Storage temperature	-40	90	°C

Table 4: DRA818V Maximum Ratings

PARAMETERS SETTING

Some parameters of DRA818V modules can be changed by following the commands in this section, which provide flexibility for designers to optimize related parameters to achieve the best performance. DRA818V modules use standard UART interface to communicate with microcontrollers or other hosts. The default data format is: 8 data bits, 1 stop bit, no parity and 9600 kbps data rate. All commands in ASCII codes start with "AT" and end with "<CR><LF>".

1. **Handshake Command**

   Description: It is used to check if the module works normally. DRA818V module will send back response information when it receives this command from the host. If the host doesn't receive any response from module after three times of continuously sending this command, it will restart the module.

   Format: AT+DMOCONNECT <CR><LF>
   Module response: +DMOCONNECT: 0 <CR><LF>

2. **Frequency Scanning Command**

   Description: It scans the wanted frequency.
   Format: S+Frequency <CR><LF>
   Module response: S=x <CR><LF>
                             x→ 0: there is signal in this frequency
                             x→ 1: there is no signal in this frequency
   E.g   Command: S+152.1250
              Response: S=0

3. **Group Setting Command**

   Description: This command is used to configure a group of module parameters.
   Format: AT+DMOSETGROUP=GBW,TFV, RFV,Tx_CTCSS,SQ,Rx_CTCSS<CR><LF>

Module response: +DMOCONNECT: x<CR><LF>

- **GBW:**   Channels space. 0→12.5k; 1→25k
- **TFV:**   Transmit frequency. Range: 134.0000~174.0000MHz
- **RFV:**   Receive frequency. Range: 134.0000~174.0000MHz. The frequency should be the times of 12.5KHz or 25KHz.
- **Tx_CTCSS:**   CTCSS value in transmit
- **SQ:**   Squelch level (0~8). 0→ monitor mode which can't be used in scanning mode.
- **Rx_CTCSS:**   CTCSS value in receive
- **x:**   Configuration result. 0→ succeeded; 1→ data out of range.

E.g.   Command: AT+DMOSETGROUP=0,152.1250,152.1250,0012,4,0003<CR><LF>

Or   Command: AT+DMOSETGROUP=0,152.1250,152.1250,754N,4,445I<CR><LF>

Response: +DMOSETGROUP:0<CR><LF>

Notes: The Tx_CXCSS and Rx_CXCSS can be different values. 0000→ no coding; 0001~0038→ CTCSS; Alphanum→CDCSS (seeing table 6).

4.   Volume Command

Description: This command is used to adjust the volume of module.

Format: AT+DMOSETVOLUME=x <CR><LF>

Module response: + DMOSETVOLUME: X<CR><LF>

- x in command: Volume range (1~8).
- x in response: 0→ succeeded; 1→failed.

5.   SETFILTER Command

Description: This command is used to turn on/off Pre/de-emphasis, Highpass, Lowpass filter

Format: AT+ SETFILTER=PRE/DE-EMPH,Highpass,Lowpass <CR><LF>

Module response: + DMOSETFILTER: x<CR><LF>

- PRE/DE-EMPH=0→turn on; 1→turn off
- Highpass=0→turn on; 1→turn off\
- Lowpass=0→turn on; 1→turn off

E.g   AT+SETFILTER=0,0,0

Response: + DMOSETFILTER:0

From the field testing results, the RFIC on module should automatically filter the frequencies below 300Hz no mater Highpass filter is enabled or not so please pay attention to it if the applications need low frequency.

6. TAIL TONE Command

Description: This command is used to turn on/off the tail tone function

Format: AT+ SETFILTER=TAIL <CR><LF>

Module response: + DMOSETFILTER: x<CR><LF>

- TAIL=0➔close tail tone; 1➔open tail tone
- x in response=0➔ succeeded; 1➔failed

7. Read RSSI

Description: This command is used to read the RSSI value

Format: RSSI? <CR><LF>

Module response: RSSI=x<CR><LF>

- RSSI value range: 0~255

If the command is converted to HEX format, the corresponding value is:

0x52 0x53 0x53 0x49 0x3f 0x0d 0x0a

Code	Equivalent BIN	Equivalent HEX
023I	1100100000111000110111	640E37
025I	1010100000111101101011	540F6B
026I	0110100000110111010011	340DD3
031I	1001100000111111000101	4C0FC5
032I	0101100000110101111101	2C0D7D
043I	1100010000101101101101	620B6D
047I	1110010000110111111000	720DF8
051I	1001010000101010011111	4A0A9F
054I	0011010000100101111011	1A097B
065I	1010110000110001011101	560C5D
071I	1001110000110011110011	4E0CF3
072I	0101110000111001001011	2E0E4B
073I	1101110000101100111010	6E0B3A
074I	0011110000111100010111	1E0F17
114I	0011001000101111010110	190BD6
115I	1011001000111010100111	590EA7
116I	0111001000110000011111	390C1F
125I	1010101000111011110000	550EF0
131I	1001101000111001011110	4D0E5E
132I	0101101000110011100110	2D0CE6
134I	0011101000110110111010	1D0DBA
143I	1100011000101011110110	630AF6
152I	0101011000100110111100	2B09BC
155I	1011011000110110010001	5B0D91
156I	0111011000111100101001	3B0F29

162I	010011100001001111101011	2709EB
165I	101011100001101111000110	570DC6
172I	010111100001111111010000	2F0FD0
174I	001111100001110100011000	1F0E8C
205I	101000010000110010111011	508CBB
223I	110010010001011100001011	648B8B
226I	011010010001000011011110	34886F
243I	110001010001110110100001	628ED1
244I	001001010001010111111100	128AFC
245I	101001010001111100011011	528F8D
251I	100101010001111001000011	4A8F23
261I	100011010001111011101100	468F74
263I	110011010001000101111101	6688BD
265I	101011010001001111000011	5689E1
271I	100111010001001010011110	4E894F
306I	011000110001111100110000	318F98
311I	100100110001101100011100	498D8E
315I	101100110001011000110110	598B1B
331I	100110110001011111100010	4D8BE2
343I	110001110001111010010100	638F4A
346I	011001110001100101011100	338CAE
351I	100101110001110101110000	4B8EB8
364I	001011110001101000010110	178D0B
365I	101011110001000011110100	57887A
371I	100111110001000110101000	4F88D4
411I	100100001001011011101111	484B77
412I	010100001001001110011110	2849CF
413I	110100001001100101111100	684CBE
423I	110010001001100111010010	644CE9
431I	100110001001101000110110	4C4D1B
432I	010110001001111101000110	2C4FA3
445I	101001001001000111011110	5248EF
464I	001011001001011111110010	164BF2
465I	101011001001110100000110	564E83
466I	011011001001100001110110	364C3B
503I	110000101001011000111100	614B1E
506I	011000101001000111110100	3148FA
516I	011100101001110110000010	394EC1
532I	010110101001110001110000	2D4E38
546I	011001101001011110011000	334BCC
565I	101011101001111000110000	574F18

606I	0110000110011001101101	30CCDD
612I	0101000110011000111011	28CC73
624I	0010100110011010111100	14CD78
627I	1110100110011111100000	74CFC0
631I	1001100110010001010011	4CC8A7
632I	0101100110010100001111	2CCA1F
654I	0011010110011100001100	1ACE19
662I	0100110110011110001001	26CF12
664I	0010110110011100100111	16CE4E
703I	1100001110011101010001	61CEA2
712I	0101001110011011110100	29CDE8
723I	1100101110010001100111	65C8CE
731I	1001101110010010011110	4DC93C
732I	0101101110010111000010	2DCB84
734I	0011101110010101101100	1DCAD8
743I	1100011110011011001010	63CD94
754I	0011011110011111000001	1BCF82

Table 5: DRA818V CDCSS

Notes: The N codes is the Bitwise-NOT of I codes. E.g. 023N=~023I= 0011011111 1000111001000
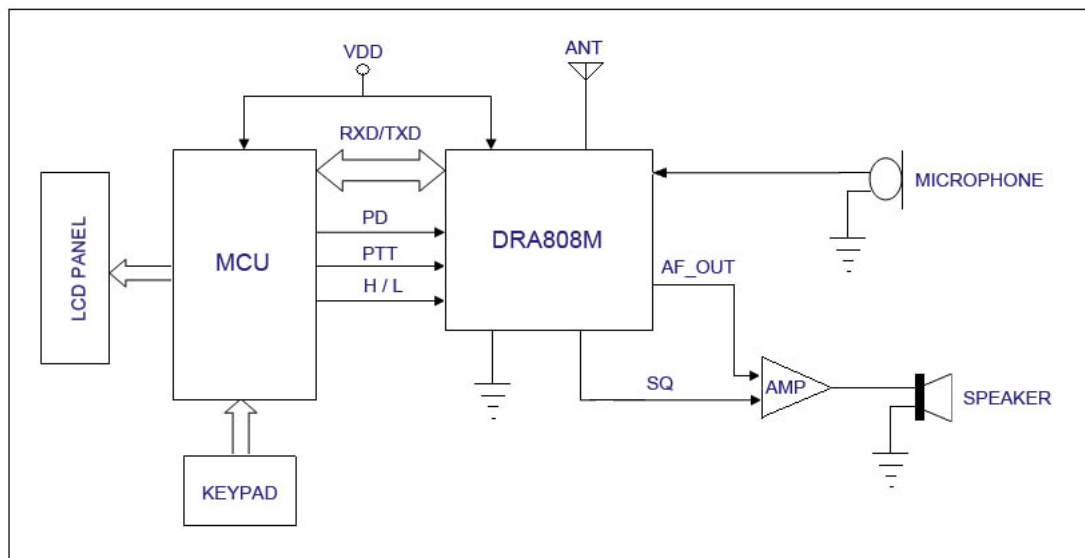
TYPICAL APPLICATION CIRCUIT

Figure 3:   DRA818V Application Circuit
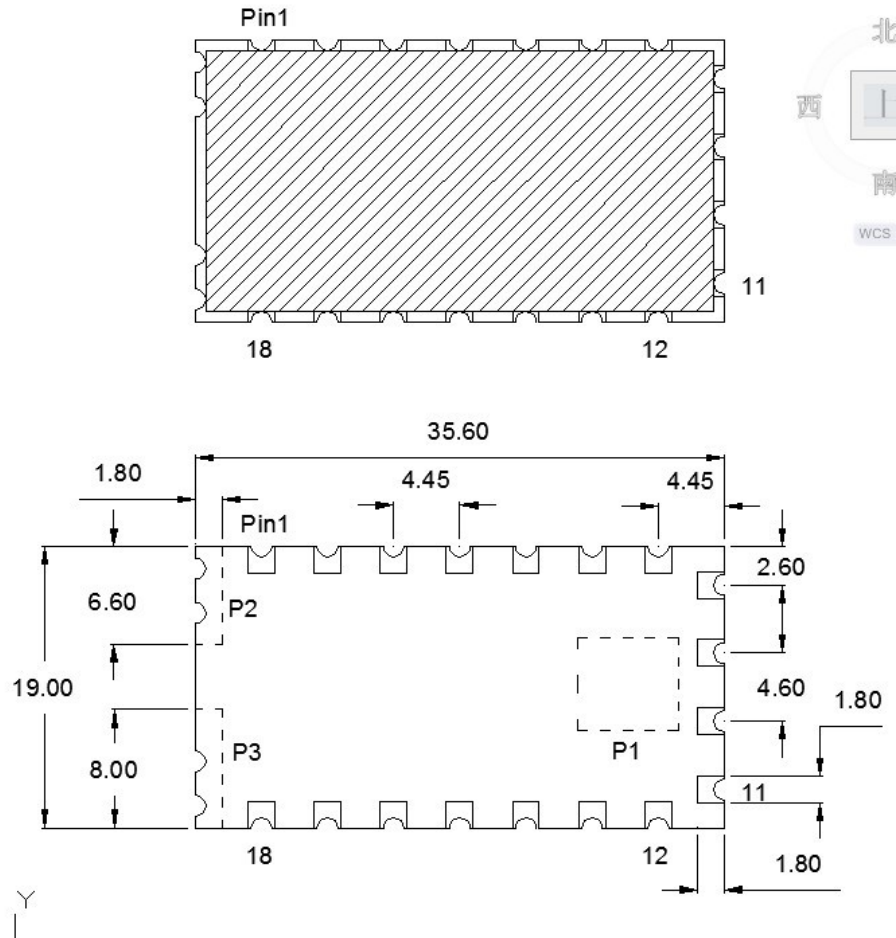
MECHANICAL DATA

Unit:mm

Figure 4:   DRA818V Mechanical Dimension

ORDERING INFORMATION

DRA818V and DRA818U are based on RDA1846. Comparing to DRA808M based on RDA1845, CDCSS and audio control AT command are added, which provides more flexibility for the users who need to process audio signal more precisely. DRA818U is the UHF band version of DRA818V.

Part Name	Frequency Range	RFIC	Dimension
DRA808M	400~470MHz	RDA1845	Compatible
DRA818U	400~470MHz	RDA1846	Compatible
DRA818V	134~174MHz	RDA1846	Compatible

Table 6: Ordering Information

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