



MDHKT-DMR90

wireless voice intercom and data transmission
module

DATA SHEET



1. Summary:

HKT-DMR90 standard digital intercom module, support simplex voice, confirmed/unconfirmed data SMS communication. This module has built-in high performance RF transceiver chip, RF power amplifier, DMR digital intercom chip. The external MCU can set the working parameters of the module and control the working state of the module through standard asynchronous serial communication. The module only needs external antenna, microphone and voice amplifier to form a complete DMR digital walkie-talkie.

Application:

Mini digital interphone

mobile digital intercom system

Building community security system

Outdoor sports products

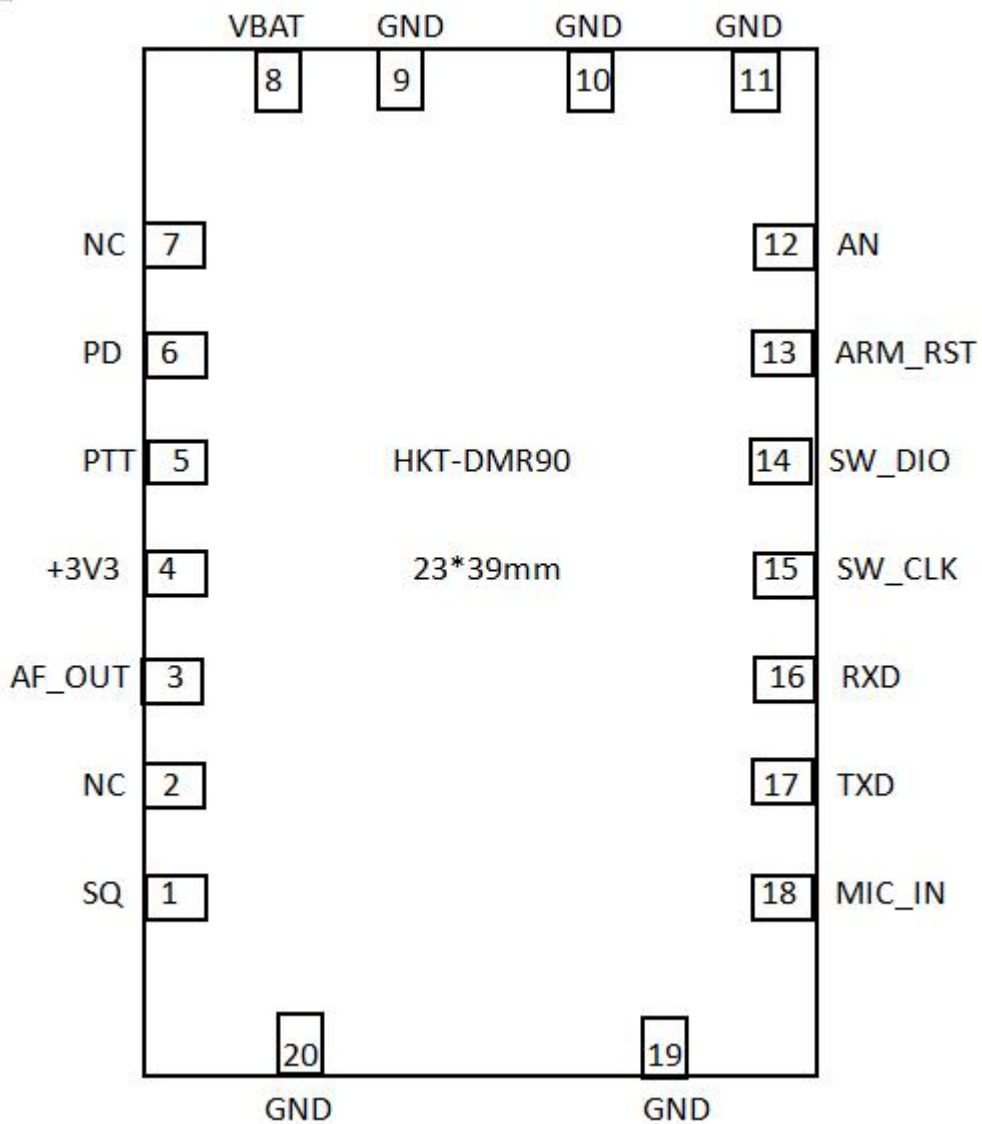


2. Characteristics:

- Frequency range: 400~470MHz
- Frequency space: 12.5kHz
- RF output power: High power 2W, low power 1W
- Supply voltage: 3.7V
- sensitivity: -120dBm
- Support the frequency configuration
- Support DMR protocol and compatible with traditional analog intercom mode
- Support the following operations on DMR mode
- Support group call, separate call and all call
- Support confirm message & unconfirm message communication support, support status messages
- Support calling/receiver detection
- support call reminder
- support remote monitoring
- Support emergency alarm
- support remote deactivating/activating
- support direct mode and relay mode on Voice and SMS application
- Support the following business on the simulation intercom mode
- Support CTCSS/CDCSS Tone Squelch
- Support monitoring

3. Dimensions and pins

The module board is shown in Figure 1, and its size is 23mm× 39mmX3.2mm. Pin definitions are shown in Table 1.



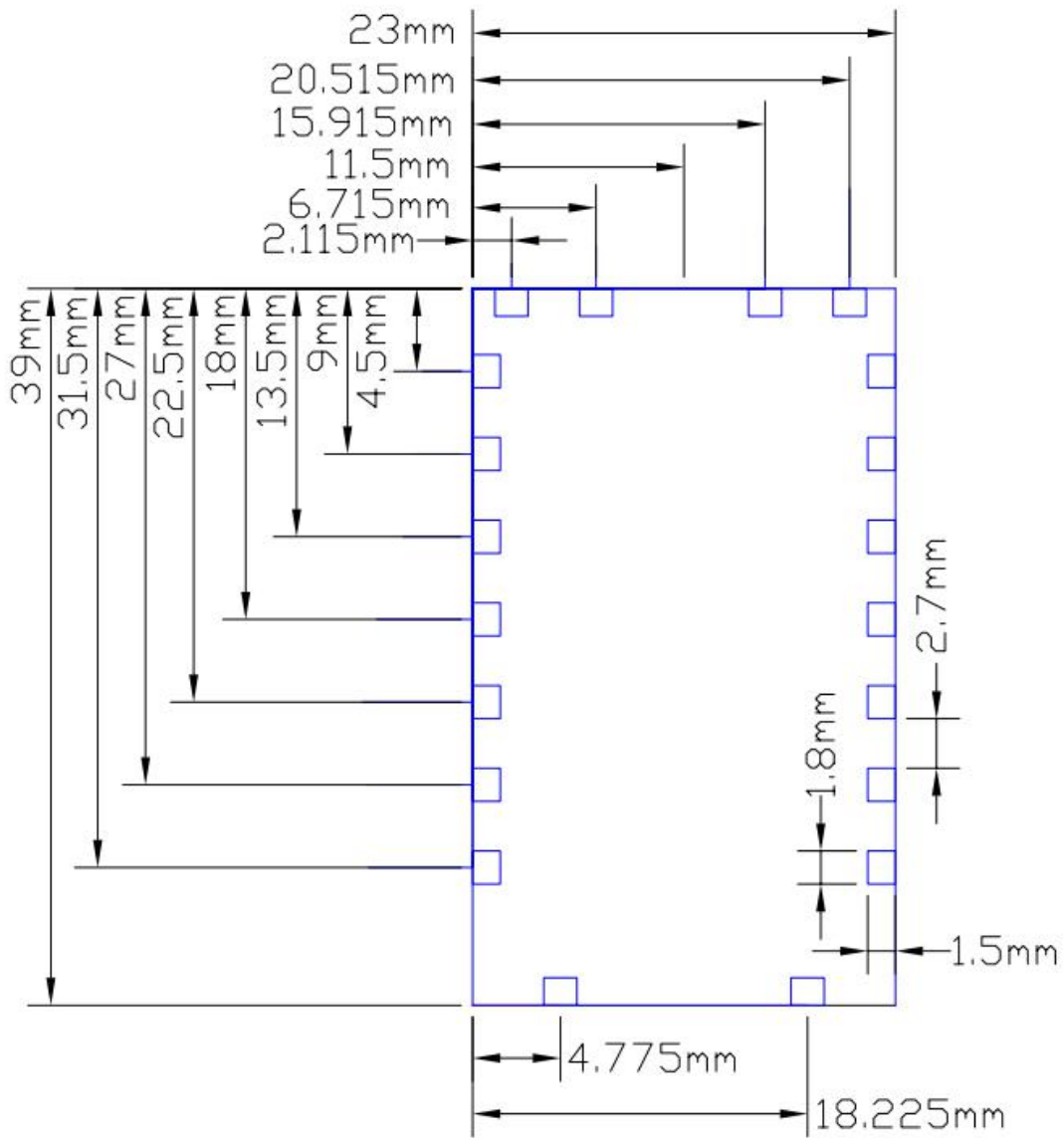
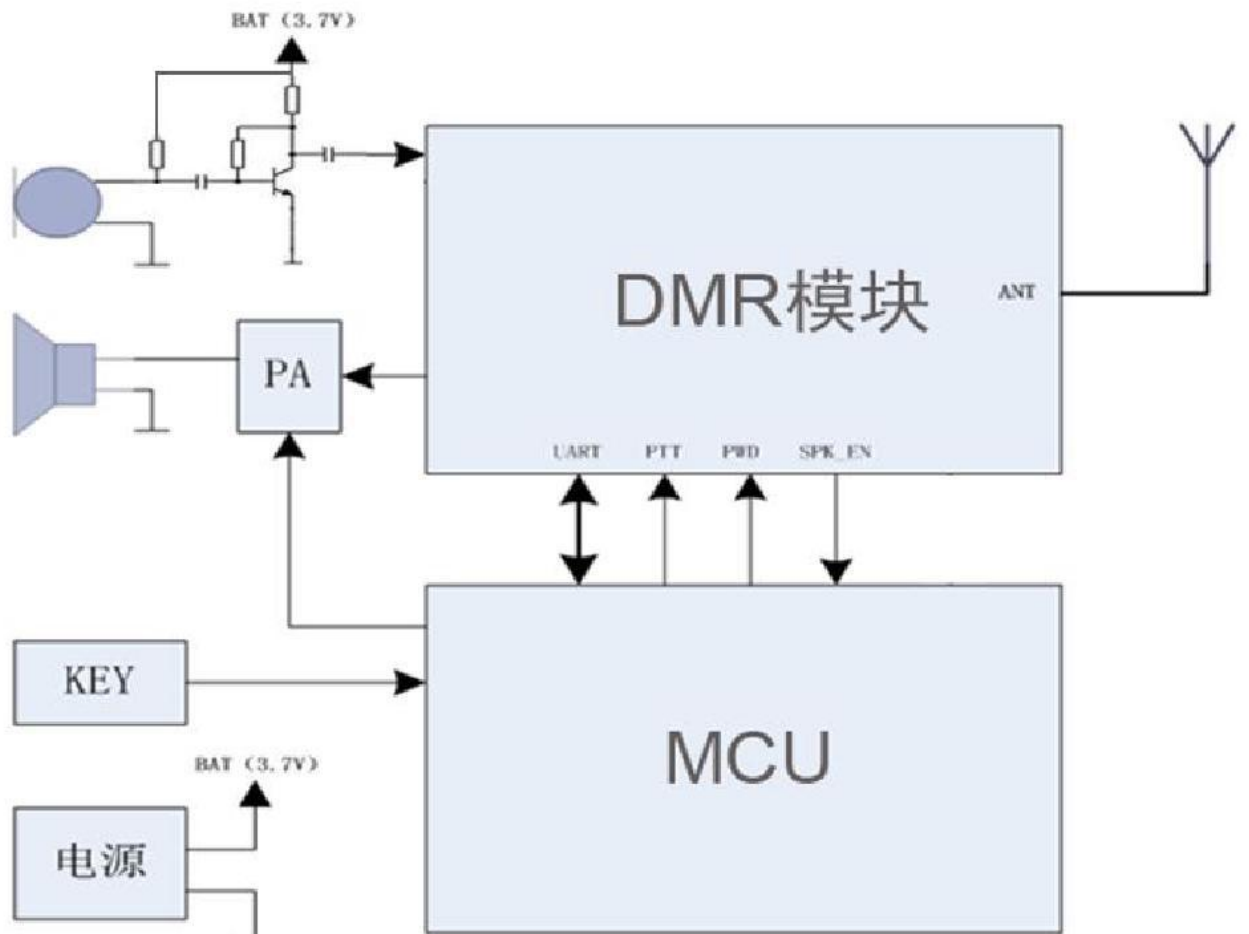




Table 1 Module pin definitions

Pin Numbers	Pin name	Pin category	Function description
1	SQ	DIO	Output horn control enabler
2	NC		
3	AF_OUT	AO	Audio output
4	+3.3V	POWER	Module programming port (externally connect to the test point or floating)
5	PTT	DI	Module transmit/receive control pin, 1=receive, 0=send
6	PD	DI	Module sleep enabled foot, 0=sleep
7	NC		
8	VBAT	POWER	Power supply
9	GND	GND	GND
10	GND	GND	GND
11	GND	GND	GND
12	ANT		Antenna connection
13	ARM-RST	DIO	Module programming port (externally connect to the test point or floating)
14	SWDIO	DIO	Module programming port (externally connect to the test point or floating)
15	SWCLK	DIO	Module programming port (externally connect to the test point or floating)
16	RXD	DI	Asynchronous serial port (receiving data port)
17	TXD	DO	Asynchronous serial port (transmission data port)
18	MIC_IN	AI	Audio input
19	GND	GND	GND
20	GND	GND	GND

4 Typical application circuit block diagram



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The block diagram of typical application circuits is shown in Figure 2. The module only need to connect an external MCU, audio amplifier, speaker and microphone to form the complete intercom or DMR(digital mobile radio) station .

When working, MCU can write serial port commands and configure PTT pin to control. When PTT pin is pulled low, THE DMR module starts to send signals.

Technical specifications:

● DC electrical parameters

Symbol	Description	Min	Typical	Max	unit
B+	Supply voltage	3.3	3.7	4.2	V
Tamb	environment temperature	-20	27	60	° C
	Power on module initialization time		6		s
	CMOS low level voltage	0		0.6	V
	CMOS high level voltage	2.4		3	V
	Data rate		38400		bps

Notes: VCC = 3V(Interface voltage)

● DC electrical parameters (the largest scope of work)

Symbol	Description	Min	Typical	Max	unit
VBAT	Supply voltage	3.3	4.2	5.0	V
Tamb	environment temperature	-30		85	° C
I _{IN}	I/O input current ⁽¹⁾	-5		5	mA
V _{IN}	I/O input voltage ⁽¹⁾	-0.3		3.3	V

● power consumption indicators

(test condition: VBAT = 4.0V , T_A = -25 to 85 ° C)

operating mode	Description	Test condition	Typical	unit	
continuous reception	Receiver on	--47dBm frequency modulation signal	110	mA	
continuous transmission	Transmitter on	Analog	High power:	1400	mA
			Low power:	1000	
		Digital	High Power:	800	mA
			Low power:	600	mA

Analog channel power saving	Standby current (1:1 power-saving mode)		mA	mA
Digital channel power saving	Standby current (1:1 power-saving mode)		mA	uA

● overall performance specifications

frequency range (MHz)	400-470
channel spacing (KHz)	25 / 12.5KHZ
antenna impedance(Ω)	50
operating temperature range (°C)	-20~+55
frequency stability (ppm)	±2.5

● Receiving characteristics

(Unless otherwise specified, the test conditions are VBAT = 4.0 V, TA = -25 to 85 ° C)

Symbol	parameter description	Test condition	Min	Typical	Max	Unit
f _{IN}	Rf input frequency range	Intercom frequency band	400		470	MHz
Sensitivity	Analog sensitivity	12dB Output voice message sonar ratio	-120	-122		dBm
	Digital sensitivity	5% error rate test	-120	-122		dBm
	Noise-opening sensitivity	software adjustable		-120		dBm
	Receiving SNR S/N	1.5 KHZ frequency deviation	52	55		dB
	adjacent channel selectivity	12.5KHz channel interval		60		dB
	intermodulation immunity	12.5KHz channel interval		60		dB
	Spurious response suppression	12.5KHz channel interval		60		dB
AF OUT	Audio output amplitude (effective value)	Fo=1KHz software adjustable		330		mV
	Audio output distortion	Fo=1KHz		1	3	%

audio frequency response	300HZ			5.4		
	500HZ			4		
	1KHZ			0		
	3000HZ			-11		

● transmission characteristics

(Unless otherwise specified, the test conditions are VBAT = 4.0 V, T_A = -25 to 85 ° C)

Symbol	parameter descriptor	Test condition	Min	Typical	Max	Unit
f _{OUT}	Rf output freq. range		400		470	MHz
P _{OUT}	Analog output power	H	1700	2000	2100	mW
		L	350	450	500	
	Digital output power	H	32	33	34	dBm
		L	29	30	31	
	Transmit power	H		1200	1400	mA
		L		350	400	
	Max. modulation frequency offset limit	Narrow band			2.5	KHZ
		Wide band			5.0	KHZ
	Modulation sensitivity		5	7	12	MV
	Audio modulation distortion			1	3	%
	modulation characteristic	300HZ	-13.4	-10.5	-9.5	DB
		500HZ	-5	-6	-3	DB
		1000HZ		0		DB
		3000HZ	6.5	+9.45	10.5	dB
SNR	SNR (Signal to Noise)		40	42	45	dB

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	Ratio)					
	Adjacent power	12.5KHz		-60		dBc
	spurious radiation			-36		dBc