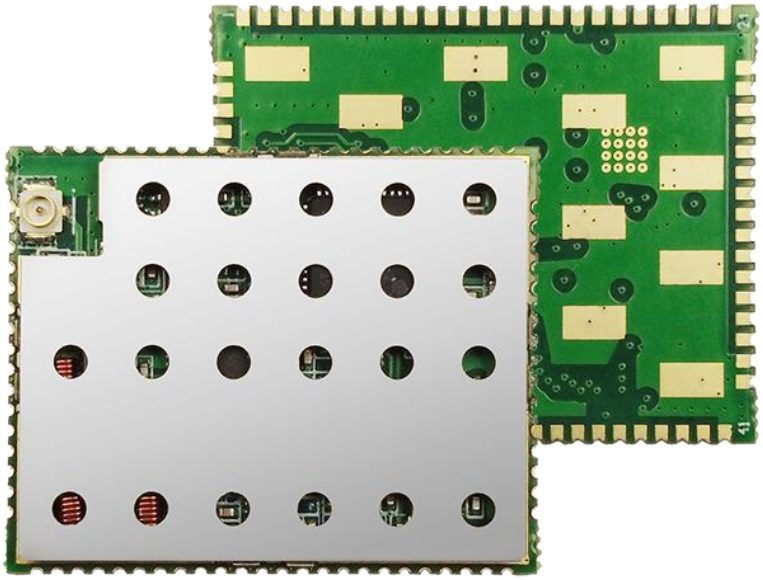
SingularXYZ



DM20-L Datalink Module

User Manual

V1.1, modified on 2023.1.11

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Your feedback on this manual will help us improve it with future revisions.

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Chapter 1 Introduction

1.1 Specifications

GENERAL

Frequency Range	410-470 MHz
Channel Spacing	12.5 kHz
Work Mode	Half-duplex
Frequency Stability	>1.5ppm
Air Baud Rate	1000bps/11000bps/12000bps/15000bps/18000bps
Serial Port Baud Rate	4800/9600/19200/38400/57600/115200bps
Power Supply	3.3 – 4V
Impedance	50ohm
Protocol Type	LoRa

RECEPTION PERFORMANCE

Receive sensitivity	Better than -118dBm@BER 10-3 ,11000bps
Co-channel interference rejection	>-12dB
Received power	0.25 W
Adjacent channel selectivity	>50dB@25KHz
Spurious immunity	>50dB

EMISSION PERFORMANCE

Transmit power	0.5W/1W/2W
RF Power stability	±1dB
Adjacent channel power	>50dB
Second harmonic	<-33dBm
Emission current	< 2A (2W)

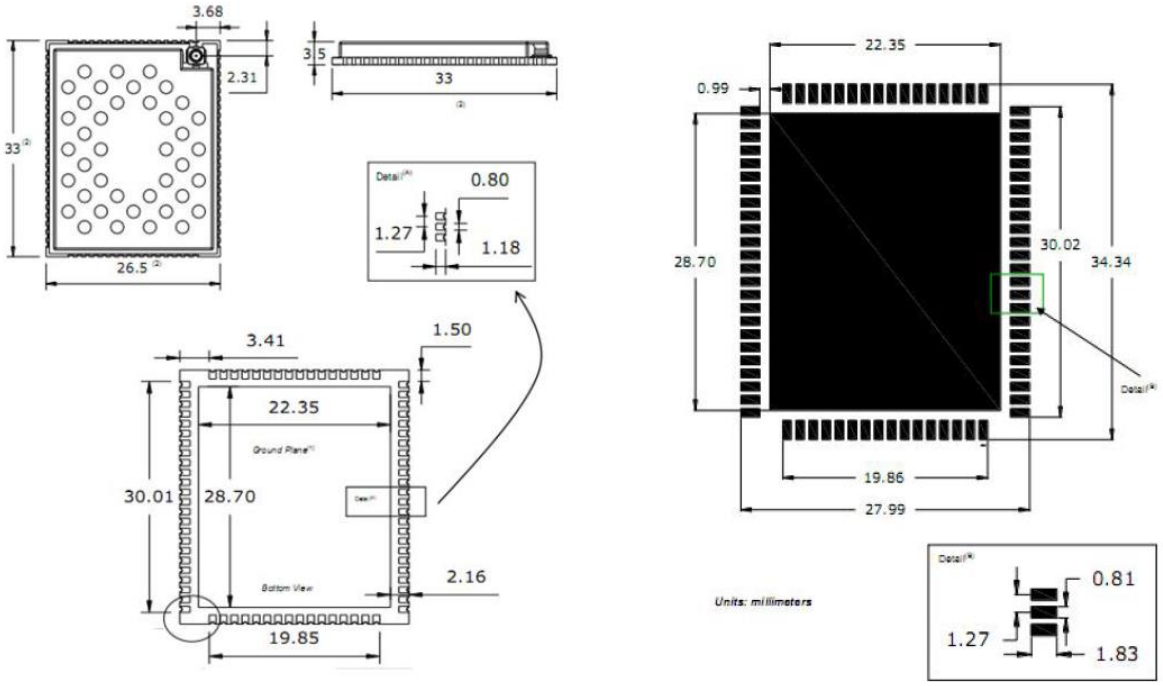
PHYSICAL & INTERFACE

I/O Interface	80-pin SMT, pin pitch 1.27mm
Antenna Interface	IPEX male connector
Size (with connector)	33×26.5×3.5mm
Weight	5 g

ENVIRONMENTAL

Operating temperature	-40℃ to +70℃
Storage temperature	-40℃ to +85℃

1.2 Dimensions



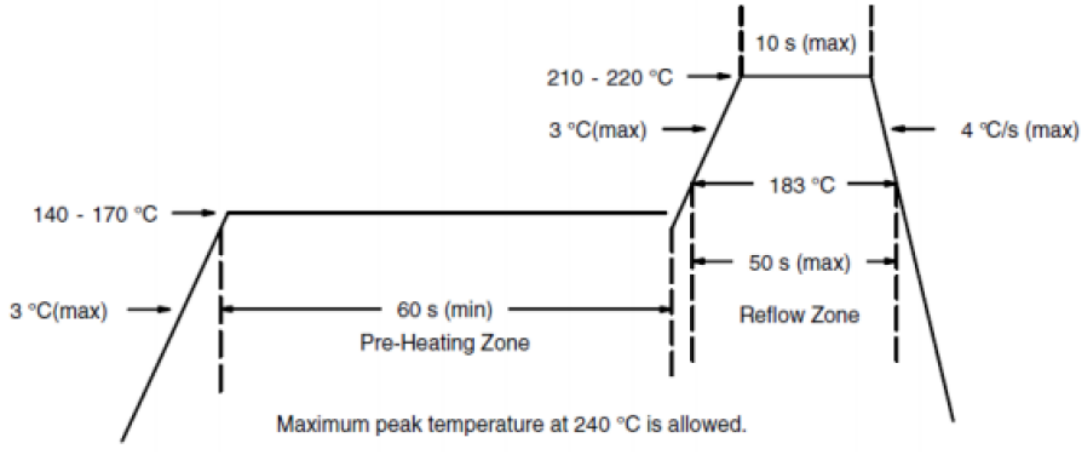
1.3 Pin Definition

Pin number	I/O	Pin definition
1	I/O	GND
2	NC	NC
3	I/O	NC (for R&D testing)
4	I/O	NC (for R&D testing)
5	I/O	NC (for R&D testing)
6	I/O	NC (for R&D testing)
7	NC	NC
8	NC	NC
9	NC	NC
10	I/O	I/O1(Reserved)
11	I/O	I/O2(Reserved)
12	I/O	I/O3(Reserved)
13	I/O	I/O4(Reserved)
14	NC	NC
15	NC	NC
16	NC	NC

17	I/O	GND
18	NC	NC
19	NC	NC
20	Output	I/O5(Reserved)
21	Output	I/O6(Reserved)
22	Output	I/O7(Reserved)
23	Output	LED_RX
24	Output	LED_TX
25	I/O	GND
26	I/O	GND
27	NC	NC
28	RX1	Serial port 1 input
29	TX1	Serial port 1 output
30	NC	NC
31	NC	NC
32	NC	NC
33	NC	NC
34	NC	NC
35	NC	NC
36	NC	NC
37	RX2	Serial port 2 input
38	TX2	Serial port 2 output
39	I/O	GND
40	I/O	GND
41	I/O	GND
42	NC	NC
43	NC	NC
44	NC	NC
45	Input	NRST reset pin
46	I/O	I/O8(Reserved)
47	NC	NC
48	NC	NC
49	NC	NC
50	NC	NC
51	NC	NC
52	NC	NC
53	NC	NC
54	NC	NC
55	NC	NC
56	NC	NC
57	NC	NC

58	NC	NC
59	NC	NC
60	NC	NC
61	NC	NC
62	Input	VCC
63	Input	VCC
64	Input	VCC
65	I/O	GND
66	I/O	GND
67	I/O	GND
68	NC	NC
69	NC	NC
70	NC	NC
71	NC	NC
72	NC	NC
73	NC	NC
74	NC	NC
75	NC	NC
76	NC	NC
77	NC	NC
78	I/O	GND
79	I/O	GND
80	I/O	GND

1.4 Welding Process Requirements



***Note**: For secondary assembly reflow soldering, we recommend that the module be placed in the final reflow process in the double-sided design application, and the module shielding cover should be placed upwards. We recommend the user a one-time reflow process. Please refer to*

the picture above for the furnace temperature curve.

Module disassembly: It is recommended that the customer place the module under the opposite surface of the main board during hardware design (for example, if the radio module is placed on the TOP side of the main board, the projection area of the BOTTOM side of the main board module should keep the surface flat to facilitate contact with the radiator). First, it is convenient for heat conduction during installation ; Second, it is easy to disassemble with a hot table to assist heating and disassembly. Under standard sea level altitude and standard atmospheric pressure, the temperature of the hot table surface is 220°C and the solder paste can be disassembled after good contact. Please handle it with care when the solder paste melts. It is forbidden to disassemble the hot air gun and hot air cylinder, so as not to cause false soldering of internal components.

Since the instantaneous operating current of high-power transmission can reach about 1.7A, we recommend that the power supply be designed with a configuration of 3.6V and a current not lower than 2A. We recommend a 3.60V, 3A power supply with a ripple of about 100MV. Pay attention to place five ceramic capacitors of 100UF, X5R, and X7R materials with a withstand voltage of not less than 6.3V on the motherboard near the power pins 62, 63, and 64 of the module, such as SAMSUMG CL32A107MQVNNE, to reduce the power supply voltage drop at the moment of sending signals. For example, if it is found that the module has been restarting after being powered on, use an oscilloscope to check whether the fluctuation of the power supply voltage is below 2.50V, and the module will reset and restart if it is lower than 2.50V.

Chapter 2 AT Commands

2.1 Working frequency configuration

Command:

ATP0=<CH> <TX> <RX>

Parameter	Value	Description
CH	00 – 63	Frequency channel
TX	410.0000 – 470.0000	Transmitting frequency
RX	410.0000 – 470.0000	Receiving frequency

***Note**: Channel spacing of DM20 is 12.5 kHz and there are 64 channels editable of DM20.*

Example:

ATP0=00 456.0500 457.0500

ATP0=03 458.0500 459.0500

ATP0=10 450.0500 451.0500

ATP0=63 452.0500 453.0500

2.2 Working frequency query

Command:

ATP0?

Example:

ATP0?

```
Channel Number   Tx Frequency        Rx Frequency        DIR
--------------   ------------        ------------        ---
    00           456.0500MHz         457.0500MHz         TX/RX

    03           458.0500MHz         459.0500MHz         TX/RX

    04           456.0500MHz         457.0500MHz         TX/RX

    10           450.0500MHz         451.0500MHz         TX/RX

    63           452.0500MHz         453.0500MHz         TX/RX

Response OK!
```

2.3 Working parameters query

Command:

AT&V

Example:

AT&V

```
Response OK!
Release Version:C20.22.00  2022-03-12
SN:20200606001
S101=2  Operating_Mode:RX
S102=5  Serial_Baud_Rate:115200bps
S103=1  Wireless_Link_Rate:11000bps
S108=L  Out_Power:0.5W
S131=02 Current Tx Frequency:456.0500MHz
S132=02 Current Rx Frequency:455.0500MHz
S186=6  Protocol_Selection:CCS
```

2.4 Save current working parameters

Command:

AT&W

2.5 Working mode configuration

Command:

ATS101=<value>

Parameter	Value	Description
value	0, 2	0 – TX Mode 2 – RX Mode

Example:

ATS101=0

2.6 Serial baud rate configuration

Command:

ATS102=<value>

Parameter	Value	Description
value	0 – 5	0 – 4800 bps 1 – 9600 bps 2 – 19200 bps 3 – 38400 bps 4 – 57600 bps 5 – 115200 bps

Example:

ATS102=1

2.7 Air baud rate configuration

Command:

ATS103=<value>

Parameter	Value	Description
value	0 – 4	0 – 1000 bps 1 – 11000 bps 2 – 12000 bps 3 – 15000 bps 4 – 18000 bps

Example:

ATS103=4

2.8 Transmit power configuration

Command:

ATS108=<value>

Parameter	Value	Description
value	H, M, L	H – 2W M – 1W L – 0.5W

Example:

ATS108=H

2.9 Current transmitting channel configuration

Command:

ATS131=<value>

Parameter	Value	Description
value	00 – 63	Current transmitting channel

Note: *You can refer to* ***chapter 2.1*** *to configure the specific frequency of each channel.*

Example:

ATS131=1

2.10 Current receiving channel configuration

Command:

ATS132=<value>

Parameter	Value	Description

value	00 – 63	Current receiving channel

Note: *You can refer to* ***chapter 2.1*** *to configure the specific frequency of each channel.*

Example:

ATS132=1