

**APC220N**  
**13dBm Metering Node Module**

**V2.0**

**Features**

- GFSK transceiver Module
- 470-510Mhz ISM frequency band
- 14.4k bps air data rate, fixed
- 13dBm Max. output power
- Serial baud rate configurable
- Net ID and Node ID configurable
- Address configurable
- Standby current < 5uA
- Supply voltage 3.5~5.5V

**Application**

- Home automation
- Automatic meter reading
- Wireless data logger
- Wireless sensor network

**DESCRIPTION**

APC220N is a low-cost sub-1 GHz transceiver module designed for operations in the MESH network applications, especially for AMR (Automatic Metering Reading) applications. It adopts high efficient looped interleaving EDAC (Error Detection and correction) coding with coding gain up to 3dB which keeps in advance in EDAC and coding efficiency over normal FEC (Forward Error Correction).

The address length of APC220N is 6 bytes. Combining with APC910M (concentrator), the network can be constructed to 1024 nodes with 10 levels of routing.

**PIN FUNCTIONS**

PIN	Name	Function	Description
1	GND	Ground	Ground (0V)
2	VCC	Power	Power supply
3	EN	Input	Enable pin (>1.6V);
4	RXD	Input	UART input, TTL level; pull-up resistor:47K Ohm
5	TXD	Output	UART output, TTL level
6	AUX	Output	Data In/out indication
7	SET	Input	Parameter setting pin; Low: effective
8	NC	---	No connection
9	NC	---	No connection

**Table 1 APC220N Pin functions**

**ELECTRICAL SPECIFICATIONS**

Symbol	Parameter (condition)	Min.	Typ.	Max.	Units
VCC	Supply Voltage	3.5		5.5	V
Temp	Operating temperature range	-30	25	85	°C
RH	Operating relative humidity	10		90	%
Freq	Frequency range	470		510	MHz
F <sub>DEV</sub>	Modulation deviation		28.8		KHz
Mod	Modulation type		GFSK		
IDD	Receive mode		28		mA
	Transmit mode @ 13dBm		40		mA
	Sleep mode			5	uA
P <sub>out</sub>	Output power			13	dBm
Sen	Receiving sensitivity @14.4K bps		-113		dBm
DR <sub>IN</sub>	Interface data rate	1.2		57.6	Kbps
T <sub>s</sub>	Switching time		5		us
CHBW	Channel spacing		200		kHz
Z <sub>ANT</sub>	Antenna Impedance		50		

**Table 2 APC220N Electrical Specifications**

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Min.	Max.	Units
VCC	Supply Voltage	-0.3	5.5	V
V <sub>I</sub>	Input voltage	-0.3	V <sub>cc</sub> +0.3	V
V <sub>O</sub>	Output voltage	-0.3	V <sub>cc</sub> +0.3	V
T <sub>ST</sub>	Storage temperature	-55	125	°C

**Table 3 APC220N Maximum Ratings**

**PARAMETERS SETTING**

Users can configure the parameters (frequency, data rate, output power, etc.) of RF modules by PC or MCU.

- ◆ **BY PC.** The interface of APC220N is UART/TTL. If connecting it to PC, users need to use a TTL-to-RS232 level converter to transform the different levels. Dorji Applied Technologies also provides converter board for configuration.

Firstly users need to connect converter board to PC by cable and open APPCON RF

software; then insert module into converter board. After that the status column of tool should display “Found Device”. Users then can read/write the module.

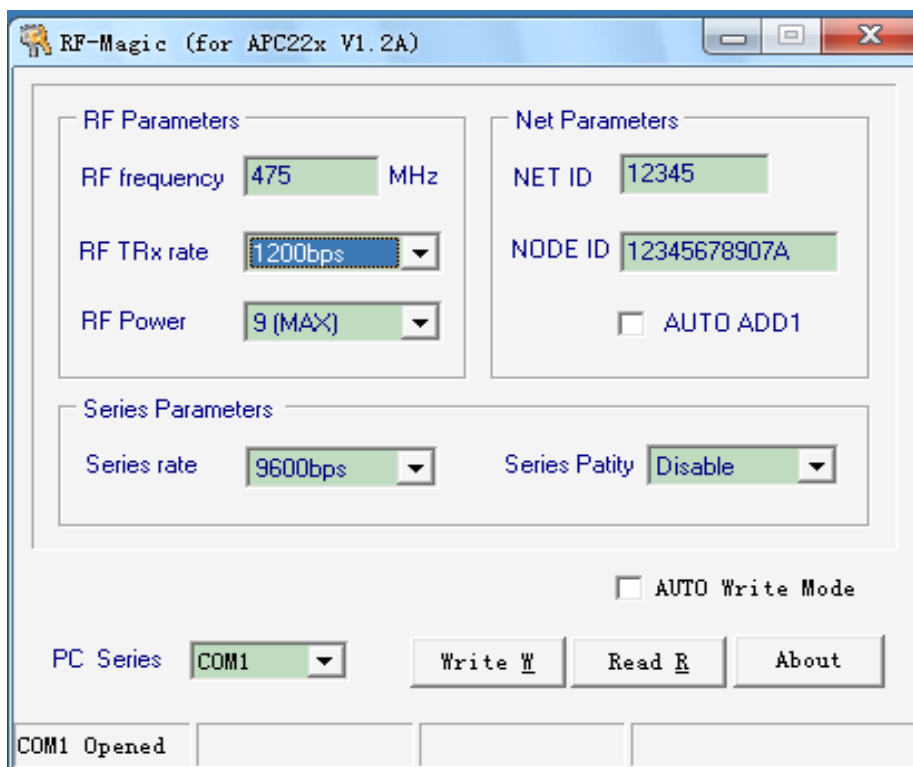


Figure 1: APPCON RF TOOL

- ◆ **BY MCU.** The module can work normally 50ms (T1) after powering on. When configuring the module, users need to switch the SET pin to low and the module then enters into setting mode after 1mS or more (T2). It will use 9600 bps (data rate) and no parity check as default format to communicate.

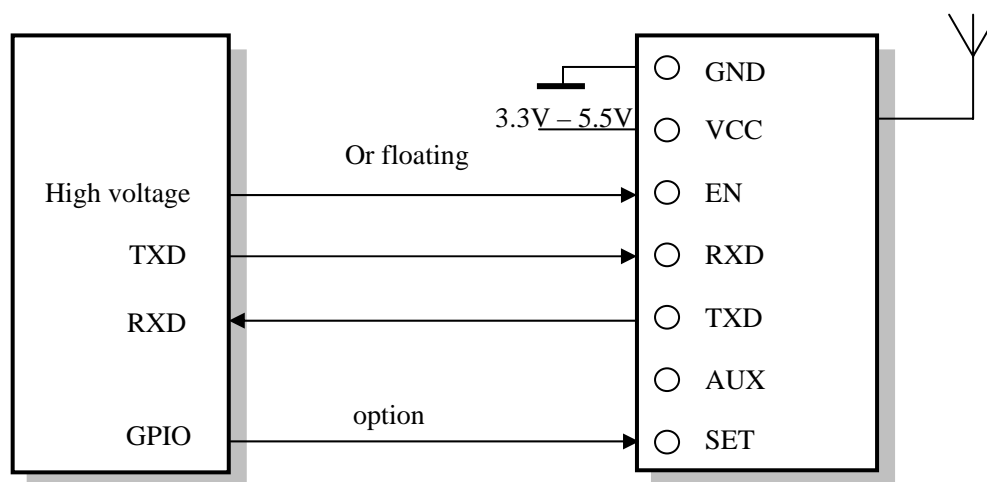
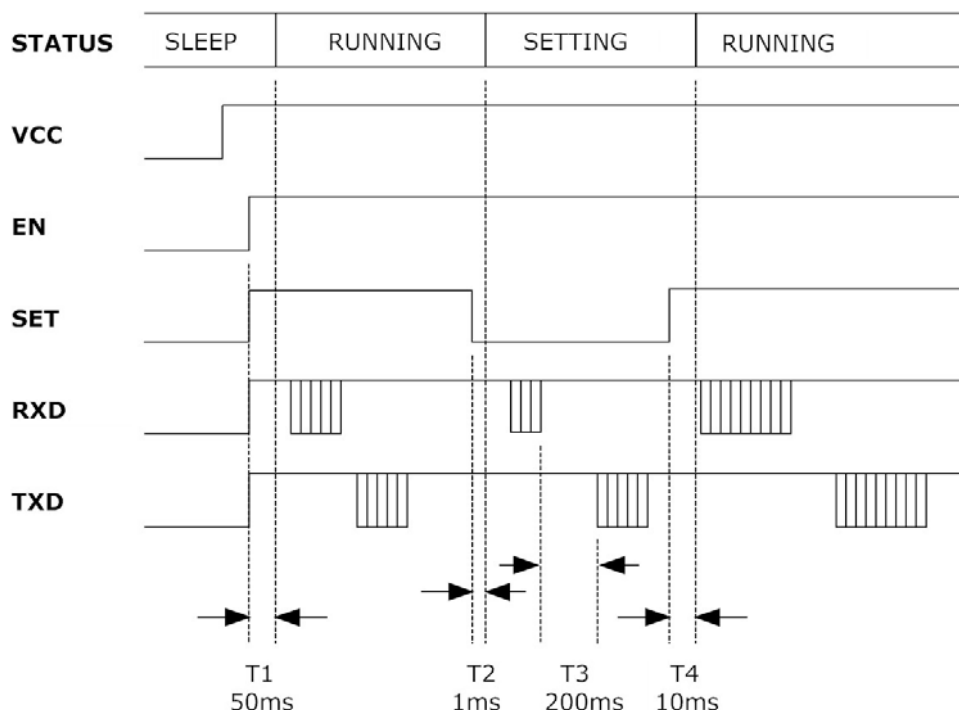


Figure 2: Connecting Diagram

When a command is sent to the module through the RXD pin, the module will send back response information by TXD pin in 200mS after it verifies the command is correct. When users check out the parameters are successfully set from the response information, the SET pin can be set to high and the module will work with the new settings in 10mS (T4).

Please keep in mind that users only can send command once when the SET pin is configured to low. If users want to revise the parameters after a successful setting, users must configure SET pin to high and then set it into low in order to reconfigure the module. After 100ms (T4), the module will work with the new parameters.



**Figure 3: Timing Sequence for Setting Parameters**

**Notes:** All of the parameters (such as Frequency, net ID, Address, etc.) can be set by PC tool. If the module is configured through MCU, only the frequency, net ID and address parameters can be changed.

The commands of DRF7020M13N are in ASCII format. The default configuring data rate is 9600 bps and no parity check is adopted. The command set include two commands: Read command and Write command.

- ◆ **Read command:** RD ✓  
*Response (from module):* PARA\_Freq\_NetID\_Address ✓
- ◆ **Write command:** WR\_Freq\_NetID\_Address ✓  
*Response (from module):* PARA\_Freq\_NetID\_Address ✓

Parameter	Length	Explanation
Freq.	3 Bytes	434MHz = 434000
Net ID	2 Bytes	00000~65535
Address	6 Bytes	0X000000000000 & 0xFFFFFFFFFFFF are reserved by system
DRIN	---	1.2k ~57.6k bps; available for PC tool
Parity	---	8E1/8N1/801; available for PC tool

**Table 4 APC220N Parameter Coding**

E.g. If the user wants to set the module work at Freq (434MHz), Net ID (12345) and Address (0X0123456789AB), the command could be written as below:

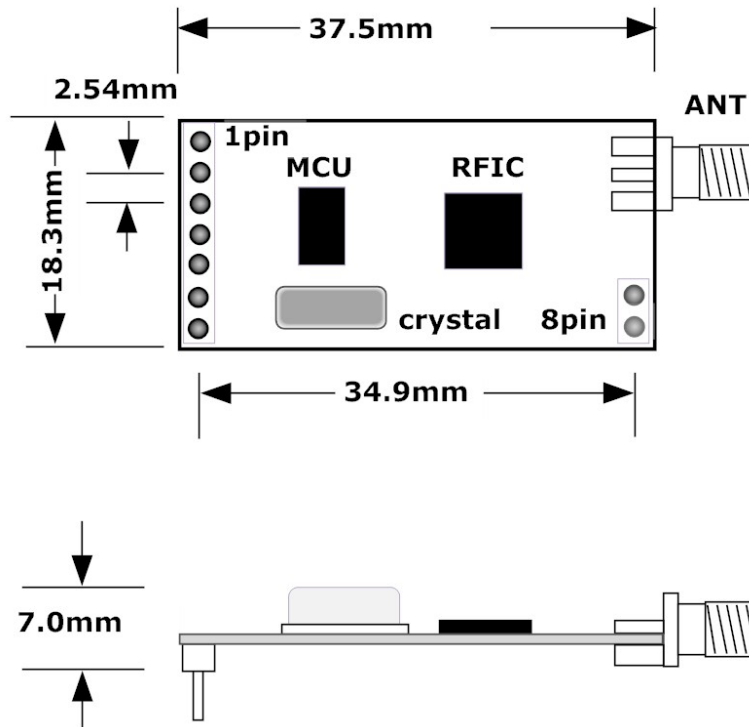
**Write Command:** WR\_434000\_12345\_0123456789AB✓

*Corresponding HEX code:* 0x57,0x52,0x20,0x34,0x33,0x34,0x30,0x30,0x30,0x20,  
0X31,0X32,0X33,0X34,0X35,0X20,0X30,0X31,0X32,0X33,  
0X34,0X35,0X36, 0X37,0X38,0X39,0X41,0X42, 0X0D, 0X0A

**Response:** PAPA\_434000\_12345\_0123456789AB✓

*Corresponding HEX code:* 0X50,0X41, 0X52,0X41,0x20,0x34,0x33,0x34,0x30,0x30,  
0x30,0x20, 0X31,0X32,0X33,0X34,0X35,0X20,0X30,  
0X31,0X32,0X33, 0X34,0X35,0X36, 0X37,0X38,0X39,  
0X41,0X42, 0X0D, 0X0A

**MECHANICAL DATA**



**Figure 4: Mechanical Dimensions**

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