
DRF1212D17C
17dBm Metering Concentrator Module

V1.02

Features

- 433Mhz ISM frequency band
- Robust MESH network
- Automatically network building
- Network notes plug and play
- 6 levels of routing, up to 1024 notes
- 5k bps FSK data rate
- 17dBm Max. output power
- Baud rate configurable
- Net ID configurable
- Address configurable
- Supply voltage 4.5~6.0V
- Network radiating distance > 2km

Application

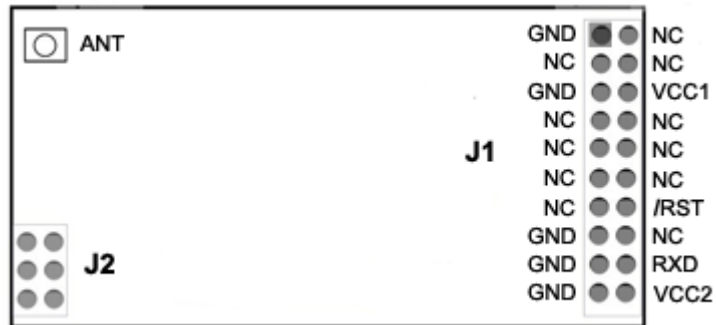
- Home automation
- Automatic meter reading
- Wireless data logger
- Wireless sensor network

DESCRIPTION

DRF1212D17C is a low-cost sub-1 GHz metering concentrator module designed for operations in the MESH network applications, especially for AMR (Automatic Metering Reading) application. The module adopts extra low power consumption RFIC SX1212 from Semtech and ARM7 processor. DRF1212D17C works at 36 MHz system frequency and supports complicated algorithm. It utilizes 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).

For a signal network, the concentrator module DRF1212D can support 1024 node modules. With different network ID several networks can coexist by Frequency-Division Multiplexing, which extends the network covering range significantly. By standard UART interface, DRF1212D17C communicates with the host (or server) through 11 commands. As to the use of commands, please refer to application document [NETWORK PROTOCOL \(NetPro1212.PDF\)](#) for more details.

PIN FUNCTIONS



Connector	PIN	Name	Function	Description
J1	6	VCC1	Power Output	+3.3V output; must be floated
	1,5,15,17,19	GND	Ground	Ground (0V)
	2,3,4,7,8,9,10,11,12,13	NC	---	Must be floated
	14	Reset	Input	Low→ effective
	20	VCC2	Power	+5V VCC
	18	RXD	Input	UART input
	19	TXD	Output	UART output
J2	1,2,3,4,5,6	GND	Ground	Ground (0V)

Table 1 DRF1212D17C Pin functions

ELECTRICAL SPECIFICATIONS

Symbol	Parameter (condition)	Min.	Typ.	Max.	Units
VCC	Supply Voltage	4.5		6.0	V
Temp	Operating temperature range	-20	25	70	°C
RH	Operating relative humidity	10		90	%
Freq	Frequency range	430		437	MHz
F _{DEV}	Modulation frequency deviation		67		KHz
Mod	Modulation type		FSK		
IDD	Receive mode			100	mA
	Transmit mode @ 17dBm			100	mA
	Sleep mode			5	uA
P _{out}	Output power			17	dBm
Sen	Receiving sensitivity @5K bps		-114		dBm
DR _{FSK}	FSK data rate		5		Kbps

DR _{IN}	UART data rate	9.6		115.2	Kbps
CH _{BW}	Channel spacing		300		kHz
T _{NET}	Networking time @ 200 nodes		20		Minutes
RL	Routing level		10		
N _{MAX}	Max. network nodes			1024	
Z _{ANT}	Antenna Impedance		50		

Table 2 DRF1212D17C Electrical Specifications

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Min.	Max.	Units
V _{CC}	Supply Voltage	-0.3	6	V
V _I	Input voltage	-0.3	5	V
V _O	Output voltage	-0.3	5	V
T _{ST}	Storage temperature	-55	125	°C

Table 3 DRF1212D17C Maximum Ratings

COMMAND TABLE

Num.	Command	Description
1	DELNET	Delete all network nodes
2	CMD	Host communicating with nodes
3	TST	Testing node module
4	RDNODE	Read nodes existing in the network
5	FREQ	Reading frequency
6	NETID	Read network ID
7	MTNET	Maintain network
8	STATUS	Inquiry maintaining status
9	RATE	Configure UART data rate
10	MRATE	Configure UART data rate of node module

Table 4 DRF1212D17C Commands

APPLICATION

Dorji Applied Technologies utilizes its own communication protocol MNET which has been successfully applied into many AMR networks. The wireless network includes a concentrator (DRF1212D17C) and many node modules (DRF1212D10N). The address length of node module is 4 bytes. Meanwhile the network also has its unique 2 bytes net ID. In the same network, the net ID of the concentrator must be the same as the node modules'. The network adopts Host/Client mode. The read command only can be sent to nodes by the concentrator. The node module can upload data passively as soon as it receives command from the concentrator. The net protocol encapsulates the networking and maintaining functions so the users can inquiry the status of nodes and read data from meters through the concentrator without any attention to the operation of network.

The command format of MNET network is very simple and it can support 180 bytes transmit/receive. It supports SILENT mode which can be achieved in 30 seconds after commanding the concentrator. In this mode the concentrator and node modules in the same network will not transmit data automatically. Users can cancel the silent mode at any time. With this function users can activate the network at different time segments in order to read many networks at the same frequency. The MNET network adopts top-to-down networking mechanism and uses the RSSI to judge the quality of wireless link with which networking conditions can be determined. Each node module in the MNET network might have many routing paths. The node module supports many father nodes and it also can be used as father node so the MNET network can choose reasonable routing path automatically.

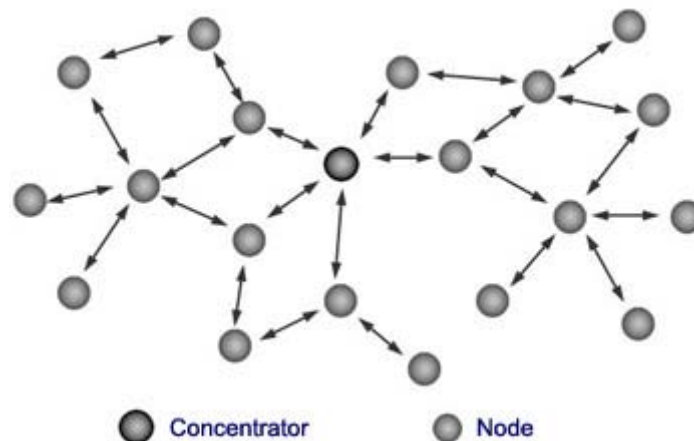


Figure 1: MNET Networking Demonstration

In an active MNET network the ID of a new node can be recognized and added into the network in a certain period when it locates in the covering range of network. As to a deleted node, its corresponding ID will be removed in 18~24 hours automatically. Please note that the recognition and removal of a node can be realized only in an activating network. In the SILENT mode the routing of network and the status of nodes are in freezing but users still can read the data of meters

through the concentrator.

The concentrator and node modules must be configured first before the MNET network is built. The configurable parameters of the concentrator include working frequency, net ID and UART data rate. As to the node modules, users can configure the working frequency, net ID and node ID.

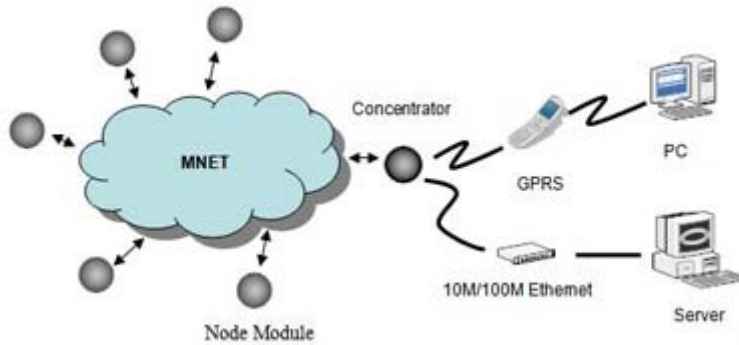


Figure 2: MNET Network Application

The MNET network can work at the same frequency in separated areas, which is similar to GSM network or AM/FM radio broadcasting in different cities. One system can have many MNET networks in different channels and the whole spectrum can be utilized in K (number) frequency multiplexing mode. The factors which affect the minimum distance (D) for frequency multiplexing are included but not confined to: the number of the same channel used by neighboring MNET networks, geographical features, active range of each network node, etc. The increasing of K will result in lengthening the frequency multiplexing distance D in order to reduce the co-channel interferences.

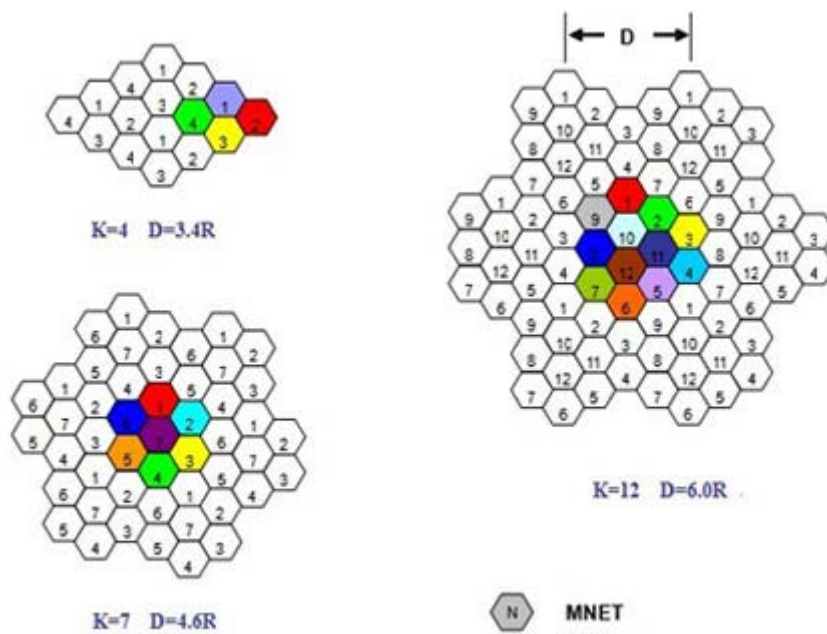


Figure 3: MNET Frequency Multiplexing Mode

For the same mechanism, MNET also can work in time multiplexing mode by taking advantage of its SILENT function. The minimum distance (D) for time multiplexing will be decided by the equation: $D = \sqrt{3KR}$

MECHANICAL DATA

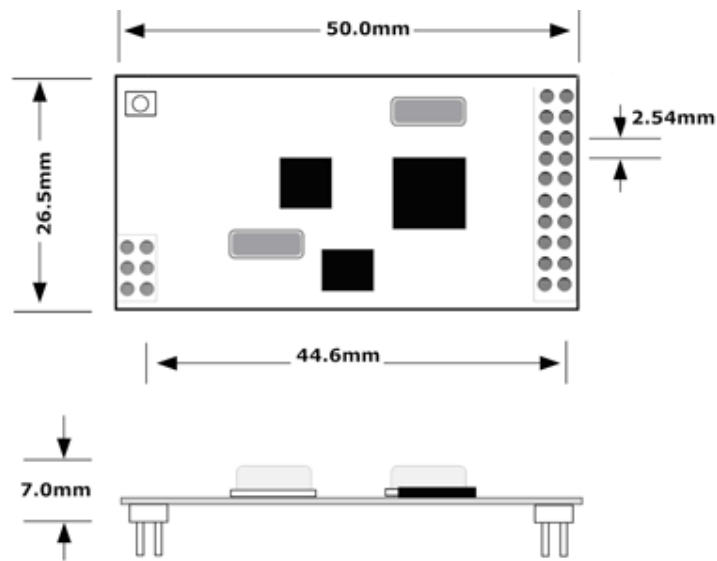


Figure 4: Mechanical Dimensions

ORDERING INFORMATION

DRF 1212 D 17 C— 043 D

- ① ② ③ ④ ⑤ ⑥ ⑦

Num	Symbol	Meaning
①	Category	RF FSK module
②	IC Type	SX1212
③	Module Type	Data transmission
④	Power	17dBm output power
⑤	Module Function	Network concentrator module
⑥	Freq. Band	043: 433MHz
⑦	ANT Interface	DIP package with U.FL connector

Table 5 Ordering information

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