

# **Operation Manual for DAC04 Board**

The function of kit DAC04 is to convert UART signal to USB signal and provides the interface for customers to configure the settings of modules through PC software tool MNET\_III\_Configuration\_tool and verify the basic function of MNET III network. This manual demonstrates how to use DAC04 in setting mode and communication mode for wireless mesh network modules DRF1110N.



Figure 1: USB Converter Board DAC04A



Figure 2: USB Converter Board DAC04B

## 1. PIN FUNCTION

PIN	COLOR	DAC04A	DAC04B	FUNCTION
1	Black	GND	GND	Ground
2	Red	+3.3V	+3.3V	Power
3		NC	NC	No connection
4	Blue	TX	TX	UART TX
5	Yellow	RX	RX	UART RX
6		NC	NC	No connection
7	Green	NC	GND	Ground

Table 1: DAC04 Pin Function

The 7<sup>th</sup> Pin of DRF1110N module is acted as input pin while DRF1110N module is powered



on. If the 7<sup>th</sup> is high, the module will work in normal mode; or else the module will be in configuration mode. For DAC04A board, the 7<sup>th</sup> pin is floated so the module will work in normal communication mode when it is connected PC through DAC04A. For configuring the parameters of DRF1110N module, the DAC04B must be used because the 7<sup>th</sup> pin is connected with Ground and the module will enter into setting mode. Users also can pull out the wire on 7<sup>th</sup> pin so that the function of DAC04B board will be the same as DAC04A board.

## 2. CONFIGURATION MODE

For the first use of DAC04 board, users need to install USB driver which can be downloaded from page (<u>http://www.dorji.com/pro/kits/demokits2.html</u>). After installing USB driver successfully, you can find driver information "Prolific USB-to-Serial Comm Port" under COM & LPT from device manager of windows operation system.

Before configuration, users need to run configuration tool first. The tool will monitor the com port and detect the plug and unplug of USB board. After DRF1110N is connected with DAC04B board in correct pin sequence, users then insert the USB board to computer.

ComPort: COM8 Read Write Open Module Information	Network ID: 0 Device Num: 0   ave Sleep-Wake Rate: 0 RF Baud Def: 500kbps ~   Sync Interval(s): 0 RF Baud Max: 500kbps ~   Start Freq(MHz): 433 RF Baud Min: 500kbps ~
Name: MNET AME DEFILION	Main CH Start Num: O RF Power: +10dBm 💌
Version: 1.2 RF Freq Band:43 Type: UNKNOWN RF Power Max:10	MHz Aux CH Interval: 1 Sleep Flow Ctrl Bm Aux CH Num: 1 Kepeat ACT Pin
Protocol Configuration UART Baud(bps): 2400 V HOST MART Start Bit: 0 V Bernor	Boot Time(ms): 1 Downlink Address Offset: 0
MART Parity Bit: Nope 💌 Addres	s Length (hyte): 16 Frame Length Offset: 0
UART Stop Bit: 1 - Bros	dcast Wildcard: 0 Frame Length Amendment: 0
Frame Mode: Binary - Mult	icast Wildcard: 0 Frame Start Sync Word: 0
Frame End Check: None 💌	Frame Stop Sync Word: 0
Handshake ACK Packet:	
Host Address Inquiry Cmd:	
Predefined Broadcast Cmd1:	
D 1 C 1 D 1 1 C 10	

#### Figure 3: COM Port Being Detected

After the configuration tool detects the insertion of module, users then can use Read/Write button to check or change parameters. The pictures below show the default parameters for root module and node module.

ComPort: COM8 - Read Write Ope	n Save	Sleep Srma T	Network ID -Wake Rate	: 0	Device Num: RF Baud Def: RF Baud May:	1 •	
Module Information Name: MNET AMR DRF1110N		Start Main CH	Freq(MHz) Start Num	): 432.0000 RF m: 0	RF Baud Min: RF Power:	100kbps ▼ 1.2kbps ▼ +10dBm ▼	
Version: 1.4 RF Freq H Type: NODE RF Power	Aux CH Start Num: 2 Aux CH Interval: 2 Aux CH Num: 4 V Repeat ACT Pi						
Protocol Configuration UART Baud(bps): 115200 V UART Start Bit: 0 V UART Parity Bit: None V UART Stop Bit: 1 V Frame Mode: ASCII V Frame End Check: None V	HOST Boot T Response Time Address Lengt Broadcast W Multicast W	'ime (ms) : [1] :out (ms) : [1] :h (byte) : [6 /ildcard: [7] /ildcard: [1]	000 2	Downlink A Uplink A Frame Frame Len Frame St Frame S	ddress Offset ddress Offset Length Offset gth Amendment art Sync Word top Sync Word	: 1 : 255 : 255 : 126 : 13	
Handshake ACK Packet: Host Address Inquiry Cmd:							

Figure 4: Default Parameters for Node Module DRF1110N10N

witteress module configuration	The basic is contra		_
ComPort: COM8 💌	Network	: LD: U Device Num: 1	_
Read Write Open Sav	e Sleep-Wake R	ate: 0 RF Baud Def: 100kbps	-
	Sync Interval	(s): 0 RF Baud Max: 100kbps	-
Module Information	Start Freq (M	Hz): 432.0000 RF Baud Min: 1.2kbps	-
Name: MNET AME DEFILION	Main CH Start	Num: 0 RF Power: +10dBm	•
MAC: 30 30 30 30 30 36	Aux CH Start	Num: 2	
Version:1.4 RF Freq Band:433MH	z Aux CH Inter	val: 2   Sleep   Flow Ct:	r⊥
Type:ROOT RF Power Max:10dBm	Aux CH	Num: 4 🔻 🚩 Kepeat   ALI Fin	
UART Start Bit: 0	Timeout(ms): 100 Length(byte): 6 ast Wildcard: 70	Uplink Address Offset: 1 Frame Length Offset: 255 Frame Length Amendment: 255	
Frame Mode: ASCII 💌 Multic:	ast Wildcard: 102	Frame Start Sync Word: 126	
Frame End Check: Start 💌		Frame Stop Sync Word: 13	
Handshake ACK Packet: 7E 4F 4B	OD		
Host Address Inquiry Cmd:			
Predefined Broadcast Cmd1: 7E 46 46	46 46 46 46 52 44 44	OD	
		-	_

Figure 5: Default Parameters for Concentrator Module DRF1110N10C

DAC04

## 3. CONFIGURATION MODE

The basic function of network communication can be verified with default parameters except to set each node module with an unique MAC address. Users can use any popular serial port tool for testing. In this section SecureCRT<sup>®</sup> from VanDyke Software, Inc. will be used to demonstrate the communication between node module and root module.

When the module with USB board is connected to computer, the operation system will prompt which COM port is used. Or users can check the port information from the Device Manager. After that users can run SecureCRT software and click "File" from menu and choose "Quick Connect" from the drop-down list and make selection showed in the picture below:



Figure 6: Configuring SecureCRT Software

After choosing the right COM port and clicking "Connect" button, the software window will display the data format at the bottom of the software window.





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Ready		S	erial: COM	8, 115200	4, 1	26 Row	s, 52 Cols	VT100	d

Figure 7: Connecting the right COM port with data format

Connection	Advanced Emulation
Logon Actions Logon Actions Serial Emulation Emulation Emacs Mapped Keys Advanced Appearance Window Log File Printing X/Y/Zmodem	Advanced terminal options   Answerback:   Terminal type:   Display tab as:   Other   V Local echo   Strip 8th bit   Ignore window title change requests   Copy translates ANSI line-drawing characters   V Translate incoming CR to CR/LF   Send delay options   Line send delay: 5 milliseconds   Character send delay: 0 milliseconds

Figure 8: Advanced Emulation in Session Options



In order to better observe data flow and make communication manually between two modules, we also need open "Chat Window" from "View" in the menu. The final interface of software is showed as below:

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Figure 9: Final Interface of Tool

Because the shielding of SMA connector, users need to install SMA antenna for each module to enhance wireless signal. In order to avoid receive jam because of too strong signal, the distance between two neighbor nodes should be 1.5 meters at least. Certainly users also can reduce the output power to achieve closer distance. Now users can test the basic networking communication after each module is connected to computer correctly. The default frame start synchronization byte is '~' which corresponding value in hexadecimal is 0x7e. 'F' and 'f' are wildcards of broadcasting or multicasting address. The interval time of any two continuous characters should be less than 100ms; otherwise it will be regarded as the end of a data payload.

If the default parameters ("Repeat" option is checked in Basic RF Configuration block and are not changed, the root module will broadcast "~FFFFFRDD\r" at the interval of 2 seconds after power-on. The picture below shows the default settings of root module. The "Address Length" is 6 bytes; "Frame Start Sync Word" is "126" in decimal (or 7E in hexadecimal) which means the ASCII character is "~"; "Broadcast Wildcard" is "70" (corresponding ASCII character is "F") and "Frame Stop Sync Word" is "13" (corresponding ASCII character is "\r").



Protocol Config	uration	_					
UART Baud(bps):	115200	•	HOST Boot Time(ms):	1000	_	Downlink Address Offset:	1
UART Start Bit:	0	•	Response Timeout (ms):	100		Uplink Address Offset:	1
UART Parity Bit:	None	•	Address Length(byte):	6		Frame Length Offset:	255
UART Stop Bit:	1	•	Broadcast Wildcard:	70		Frame Length Amendment:	255
Frame Mode:	ASCII	•	Multicast Wildcard:	102		Frame Start Sync Word:	126
Frame End Check:	None	•				Frame Stop Sync Word:	13
Handshake A	CK Pack	et:					
Host Address In	quiry C	md:					
Predefined Broad	icast Cm	d1 :	TE 46 46 46 46 46 46 5	52 44	44 OD		
Predefined Broad	cast Cn	42:	7E 66 66 66 66 66 66 5	2 44	44 OD		

Figure 10: Data Package Analysis

The "Predefined Broadcast Cmd1" defines the content of broadcasting package. The value "7E 46 46 46 46 46 46 52 44 44 0D" in hexadecimal refers to "~FFFFFRDD\r" in ASCII characters.

When the node module receives the broadcast package, it will remove the "Frame Start Sync Word" and "Frame Stop Sync Word" automatically and transfer the data "RDD" to the host (Here DAC04 USB board with PC) through UART interface. The SecureCRT tool on node module side will print the "RDD" periodically in the content window.

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Figure 11: Node Module in Broadcast



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Figure 12: Root Module & One Node Module in Broadcast

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Figure 13: Root Module & Two Node Modules in Broadcast

Users can turn off the "Repeat" broadcast function of root module by inputting command "ATCO" (referring command section in DRF1110N datasheet) and the root module will respond with "ATOK" after it receives the command successfully. Users then input "~000006WWW.DORJI.COM" into the text window of SecureCRT tool and confirm it by carriage return key. When the root module recognizes the data package from SecureCRT is correct, it will respond to SecureCRT with "OK\r". When the node module receives this data package successfully through wireless link, it will display "WWW.DORJI.COM" in the window.



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Figure 14: Root Module in Unicast Downlink

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Figure 15: Node Module in Unicast Downlink

The node module also can send data to Root module. User can type "Test Unicast Uplink" in SecureCRT text window and confirm it. The root module will display the MAC address of node module following the text information "Test Unicast Uplink".



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Figure 16: Root Module in Unicast Uplink

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Figure 17: Node Module in Unicast Uplink

This document only verifies the basic function of network module DRF1110N. Users can make more complicated testing by combining with configuration tool MNET\_III\_Configuration\_tool.



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Fax.: 0086-755-28156133	appliances, devices or other products where
Email: sales@dorji.com	malfunction of these products might result in personal
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	applications do so at their own risk and agree to fully
	indemnify Dorji Industrial Group for any damages
	resulting from improper use.