

MOD920

PLC Communication Controller Module

Datasheet



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1 Product overview

1.1 Briefs

MOD920 is communication controller module developed by Xingtera US. MOD920 is based on Xingtera's 3rd generation HD-PLC communication controller chipset – XT810/XT200. MOD920 can be used with any kind of differential transmission line media. Firmware and coupling circuit/filter is adjusted to get best performance for COAX and Twisted pair communication media. MOD920 is the first communication controller module ever available that fully comply with IEEE P1901 standard.

MOD920 can support multiple cables including COAX(video COAX or RF COAX), Twisted pair (CAT3/5/5e) and DC/AC power line. MOD920 has embedded self-adaption filter and communication controller, which guarantees best performance under different environment and different media.

MOD920 is based on wavelet OFDM (Orthogonal frequency division multiplexing) technology developed by Xingtera US. It has unique advantages below:

- 1. Use available bandwidth efficiently;
- 2. Very low power consumption;

3. The signal is orthogonal in both frequency domain and time domain, which provides very sharp side-band rejection. Wavelet OFDM is the only technology can pass Japan EMC regulation;

4. Strong anti-noise capability

MOD920 integrates leading LDPC-C FEC technology developed by Xingtera. The FEC has advantages of high coding gain and low power consumption.

MOD920 integrates AES-128 encryption. As a link-layer encryption, it is compatible with IPSec and other application layer encryption.

MOD920 supports Plug&Play, no complicated configuration requested.

MOD920 supports 10/100M Ethernet on client side to simplify connection with other devices.

1.2 Features

- Fully comply with IEEE P1901 standard
- The analog bandwidth is 2~28MHz, the maximum PHY rate is 240Mbps
- Support LDPC-C FEC with 128-bit AES
- Provide two pairing schemes
- Support 127 communication nodes
- Support 16 level QoS(quality of service), support scheduling based on MAC address, 802.1p or TCP port
- One 10/100M Ethernet on client side
- Ultra low power consumption design. The maximum power consumption is 1.5W and the standby power consumption is less than 0.3W
- DCDC power supply embedded. Only one 12V power supply is requested
- Working temperature is 0~70°
- Module size is 38*38mm



1.3 Applications

1.3.1 Surveillance IP camera Connection



Figure- 1 Surveillance IP camera Connection

Compared with other surveillance solutions:

	Analog system	Digital system based on CAT5 and Fiber	Digital system based on MOD920 module
Media	COAX, Twisted Pair	CAT5 and Fiber	COAX, Twisted pair and power line
Bandwidth	N/A	100Mbps	240Mbps
Resolution	D1	720P, 1080P, 4K	720P, 1080P, 4K
Span	<200m	<100m for CAT5	> 3000m for SVY75-5C COAX cable, and > 2500m for Twisted pair
Multiple nodes	N/A	N/A	Up to 20 720P video stream on one single cable
Delay jitter	Very low	High, unstable	Low
Encryption	N/A	Yes, but difficult to configure	Yes, It is easy to be use - Plug & Play
Installment	Easy	Difficult	Easy, like analog system
Installment Fee	Low	High	Low, Reuse COAX cable used by analog systems
Total cost	Low	High	Low

Table- 1 Comparison with other surveillance solutions application



1.3.2 In-car Entertainment and surveillance connection



Figure- 2 In-car Entertainment and surveillance connection application

Compared with other solutions:

bared with other solutions:				
	MOST	Digital system based on CAT5 cable	Digital system based on MOD920	
Media	Fiber	CAT5	24VDC power line	
PHY Rate	150Mbps	100Mbps	240Mbps	
Re-wire	Yes	Yes	No, Using existing power line	
Installment	Ring, complicated	Complicated	Easy	
Multiple nodes	Yes	N/A	Yes	
Latency jitter	Low	High, unstable	Low	
Encryption	N/A	Yes, but very difficult to configure	Yes, easy to be use - Plug & Play	
Easy to use	Neutral	Complicated	Easy	
Patent fee	High	None	None	
Installment cost	High	High	Very low	
Total cost	Very high	High	Low	

Table- 2 Comparison with other surveillance solutions application

1.4 Block Diagram and function description



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Figure- 5 Bottom View of the Module

1.4.1 SMPS DCDC regulators



Figure- 6 SMPS DCDC regulators



MOD920 integrates two DCDC power supplies. The module needs only one 12VDC power supply, the module generates 3.3V and 1.2V power supplies with integrated DCDC SMPS. The maximum drive capacity of DCDC regulators is listed below:

1. 3.3V – 1.5A

2. 1.2V – 1.8A

1.4.2 Line Driver Amplifier



Figure- 7 Line driver amplifier

MOD920 integrates line driver to simplify design. This amplifier is used to amplify OFDM signal and drive media like COAX and twisted pair. The line driver is powered with 12VDC.



1.4.3 Ethernet PHY interface



Figure- 8 Ethernet interface

XT810 is connected with Ethernet PHY chip via MII interface. The Ethernet PHY chip converts MII signals and data into 10/100BASE-T or 100BASE-FX signal. Please refer to reference design about how to connect Ethernet signal with transformer.

1.4.4 LED and configuration button interface

MOD920 uses LED interface to driver LED to show the working status of the module. MOD920 provides three LED signals:

- LAN_LED, the Ethernet connection indicator. When Ethernet is link-up, the signal is (active) low.
 When the module is transmitting or receiving through Ethernet, LAN_LED toggles with 250ms period
- 2, COAX_LED, the media side connection indicator. When the connection with remote device is established, this signal is high. This signal is standard LVTTL signal with enforced driving capability. It can be connected with other LVTTL signal or be used to drive

To establish the connection between master and End-point, MOD920 needs to finish the procedures below:

- 1. Select master and End-point. In one network, there is only one master and multiple end-points. Every End-point can be paired with one master. End-point can communicate with master and any other end-point which has been paired with the same master. Device cannot communicate with devices which have not been paired with the same master;
- 2. Reset end-point. To restart pairing, the end-point must be reset to factory default status;
- 3. Pair the master and end-point. During pairing, master will forward the communication setup like encryption, channel information and so on to the end-point. After pairing, end-point can communicate with any device which has been paired with the same master including the master itself.

MOD920 provides only one mode, slave mode, when link with other device, make sure the other device

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in master mode.

1.4.5 XT810/XT200 Communication Controller



Figure- 9 Core chipset

XT810 is the 3rd generation controller developed by Xingtera. It is the core of MOD920 module.

XT810 integrates Wavelet OFDM Modem. It maps Ethernet packets or UART frames into wavelet OFDM frames, and demap OFDM frames into Ethernet packets or UART frames on receiver side. XT810 integrates 125MHz ARM9 processor.

XT200 is high speed AFE (analog front end) device dedicated for OFDM system. The conversion ratio is 160MSPS (sample per second). The analog bandwidth is DC~40MHz.



2 Pin-out

2.1 Pin definitions

MOD920 module is connected with carrier board through pins below:



Figure- 10 Side-view of module pin-out

Totally there all 15 pins:



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Figure- 11 Pin definitions

2.2 Pin-out descriptions

Name	Function	Note
COAX+	the differential signal of media side. Since MOD920 works under	
COAX-	half-duplex mode, these signals are both output and input.	
TX-	TV (TV) and DV (DV) are differential signals of	
TX+	10/100PASE Transmitting and receiving signals. Please refer to	
RX-	reference design to connect these signals with transformer	
RX+	Tereferice design to connect these signals with transformer	
12V+	12VDC power supply input/output	
12V-	Ground	
GND	Ground	
LAN_LED	Ethernet link indication	
COAX_LED	Link status indication of media side	

Table- 3 Pin-out description



3 Parameters

3.1 Maximum range

Parameters	Symbols	Range	Unit
DC power supply	+12V	-0.3 to 13.5	V
Digital signal Input voltage	VI	-0.3 to 5.5V	V
Digital signal Output current	lo	-5.2/+15.9	mA
Input signal on media side	V _{i-media}	-10/+10	V
Power Consumption	PD	4500	mW
Storage Temperature	T _{stg}	-65 to 150	°C
Working Temperature	T _{op}	0 to 70	°C

Table- 4 Maximum range

3.2 Recommended working conditions

Parameters	Symbol	Recommended Range	Unit	
DC power supply	+12V	10.5 to 12	V	
Digital signal Input voltage	Vı	-0.3 to 3.6V	V	
Digital signal Output current	l _o	-8/+8	mA	
Input signal on media side	V _{i-media}	-6/+6	V	
Power Consumption	PD	1500	mW	
Storage Temperature	T _{stg}	-65 to 150	°C	
Working Temperature	T _{op}	0 to 70	°C	

 Table- 5 Recommended working conditions

3.3 Electronic Parameters

Parameters	Symbol	Test condition	Min.	Тур.	Max.	Unit
Input High Voltage	VIH		2.0		5.5	V
Input Low Voltage	VIL		-0.3		0.8	V
Input Threshold	VT		1.30	1.40	1.50	V
Input Leakage current	ILI	$V_{I} = V_{DDO} \text{ or } V_{SS}$			±10	μA
Pull-Up resistor	R _{IH}	$V_1 = V_{SS}$	4.5	4.7	4.9	kΩ
Pull-down resistor	R _{IL}	$V_{I} = V_{DDO} \text{ or } V_{SS}$	4.5	4.7	4.9	kΩ
Output High Voltage	V _{OH}		2.4		3.2	V
Output Low Voltage	V _{OL}				0.4	V
Output Leakage current	0	$V_{I} = V_{DDO} \text{ or } V_{SS}$			±10	
(@high-impedance)	ULI	$V_{O} = V_{DDO} \text{ or } V_{SS}$			ΞĪŪ	μΑ

Table- 6 Electronic parameters



Reference Design

Please refer to MOD920_RD.dsn

Packaging



Figure- 12 Module foot print

Ordering Information

Part Number: MOD920