# FMC 4 路 1000 BASE\_T1 车载以太网模块 FL3113 用户手册

**Rev 1.0** 





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## 第一部分 FMC BASE\_T1 车载以太网模块说明介绍

黑金 FMC 千兆以太网模块 FL3113 为 4 路 1Gbps 或 100Mbps 的数据传 输速率的车载以太网通信接口模块。 FMC 模块的车载以太网芯片采用景略半导 体的汽车级以太网 GPHY 芯片 (JL3113A1-NA) 为用户提供网络通信服务,支 持 100/1000 Mbps 网络传输速率。4 路网络接口采用的 1000M Base-T1 接口 连接器跟外部网络连接和通信。

模块有一个标准的 LPC 的 FMC 接口,用于连接 FPGA 开发板, FMC 的连接器型号为: ASP\_134604\_01

FL3113 模块实物照片如下:



FL3113 模块实物图

### 1.1 FL3113 模块的参数说明

以下为 FL3113 1000BASE\_T1 车载以太网模块的详细参数:

- ▶ 千兆以太网芯片: 4 片 JL3113A1-NA
- ▶ 网络接口: 4 路 1000M Base-T1 接口;
- ▶ 以太网通信速率: 支持 100/1000 Mbps;
- ➤ 通信方式: RGMII;
- ▶ 配置接口: MDIO 接口;
- ▶ 工作温度: -40℃~85℃;

### 1.2 FL3113 模块的结构图



FL3113 1000BASE\_T1 车载以太网模块尺寸结构图

# 第二部分 模块功能说明

### 2.1 FL3113 模块原理框图

FL3113 模块的原理设计框图如下:



关于 JL3113A1-NA 的电路具体参考设计请参考 JL3113A1-NA 的芯片手册。

### 2.2 车载以太网芯片

以太网芯片采用景略公司的JL3113A1-NA以太网PHY芯片为用户提供网络通信服务,通过FMC 连接器连接到FPGA 或者 ZYNQ 开发板。JL3113A1-NA 芯片支持 100/1000 Mbps 网络传输速率,通过 RGMII 接口跟 FPGA 或者 ZYNQ 系统的 MAC 层进行数据通信。JL3113A1-NA 支持MDI 自适应,能够修改寄存器配置 100/1000 Mbps 网络传输速率和 Master/Slave 模式,支持 MDIO 总线进行 PHY 的寄存器管理。

景略公司的 JL3113A1-NA 以太网 PHY 芯片上电会检测一些特定的 IO 的电 平状态,从而确定自己的工作模式。表 2-2 描述了 GPHY 芯片上电之后的默认设 定信息。

配置 Pin 脚	说明	配置值
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PHYAD[1:0]	MDIO/MDC 模式的 PHY 地址	PHY Address 为 01
WAKE_IN	唤醒输入端口	唤醒
RESETn	复位信号	拉高
M_SEL[1:1]	网络传输速率和	1000BASE-T1,
	Master/Slave 配置	SLAVE 模式

表 3-2-1PHY 芯片默认配置值

当网络连接到千兆以太网时, ZYNQ 或者 FPGA 和 PHY 芯片 JL3113A1-NA 的数据传输时通过 RGMII 总线通信,传输时钟为 125Mhz,数据在时钟的上升沿 和下降样采样。

当网络连接到百兆以太网时, ZYNQ 或者 FPGA 和 PHY 芯片 JL3113A1-NA 的数据传输时通过 RMII 总线通信,传输时钟为 25Mhz。数据在时钟的上升沿和 下降样采样。

### 2.3 模块 FMC LPC 的引脚分配:

下面只列了网络芯片接口和电源的信号, GND 的信号没有列出, 具体用户可以参考原理图。

Pin Number	Signal Name	Description
C35	+12V	12V 电源输入
C37	+12V	12V 电源输入
D32	+3.3V	3.3V 电源输入
C34	GA0	EEPROM 地址位 0 位
D35	GA1	EEPROM 地址位 1 位
D11	PHY1_MDC	车载以太网 1MDIO 管理时钟
C10	PHY1_MDIO	车载以太网 1MDIO 管理数据
D12	PHY1_RSTN	车载以太网 1 复位信号
G6	PHY1_RXCK	车载以太网 1 RGMII 接收时钟
G7	PHY1_RXCTL	车载以太网 1 接收数据有效信号
G9	PHY1_RXD0	车载以太网 1 接收数据 Bit0
G10	PHY1_RXD1	车载以太网 1 接收数据 Bit1
G12	PHY1_RXD2	车载以太网 1 接收数据 Bit2
G13	PHY1_RXD3	车载以太网 1 接收数据 Bit3
G16	PHY1_TXCK	车载以太网 1 RGMII 发送时钟



G15	PHY1_TXCTL	车载以太网 1 发送数据有效信号
H7	PHY1_TXD0	车载以太网 1 发送数据 Bit0
H8	PHY1_TXD1	车载以太网 1 发送数据 Bit1
H10	PHY1_TXD2	车载以太网 1 发送数据 Bit2
H11	PHY1_TXD3	车载以太网 1 发送数据 Bit3
C11	PHY1_WAKE	车载以太网 1 唤醒输入端口
D17	PHY2_MDC	车载以太网 2MDIO 管理时钟
D18	PHY2_MDIO	车载以太网 2MDIO 管理数据
C15	PHY2_RSTN	车载以太网 2 复位信号
D8	PHY2_RXCK	车载以太网 2 RGMII 接收时钟
D9	PHY2_RXCTL	车载以太网 2 接收数据有效信号
G19	PHY2_RXD0	车载以太网 2 接收数据 Bit0
D15	PHY2_RXD1	车载以太网 2 接收数据 Bit1
C18	PHY2_RXD2	车载以太网 2 接收数据 Bit2
D14	PHY2_RXD3	车载以太网 2 接收数据 Bit3
H14	PHY2_TXCK	车载以太网 2 RGMII 发送时钟
H13	PHY2_TXCTL	车载以太网 2 发送数据有效信号
H16	PHY2_TXD0	车载以太网 2 发送数据 Bit0
H17	PHY2_TXD1	车载以太网 2 发送数据 Bit1
H19	PHY2_TXD2	车载以太网 2 发送数据 Bit2
H20	PHY2_TXD3	车载以太网 2 发送数据 Bit3
C19	PHY2_WAKE	车载以太网 2 唤醒输入端口
H22	PHY3_MDC	车载以太网 3MDIO 管理时钟
G28	PHY3_MDIO	车载以太网 3MDIO 管理数据
D26	PHY3_RSTN	车载以太网 3 复位信号
D20	PHY3_RXCK	车载以太网 3 RGMII 接收时钟
D21	PHY3_RXCTL	车载以太网 3 接收数据有效信号
D23	PHY3_RXD0	车载以太网 3 接收数据 Bit0
D24	PHY3_RXD1	车载以太网 3 接收数据 Bit1
G24	PHY3_RXD2	车载以太网 3 接收数据 Bit2
G25	PHY3_RXD3	车载以太网 3 接收数据 Bit3
H23	РНҮ3_ТХСК	车载以太网 3 RGMII 发送时钟
G27	PHY3_TXCTL	车载以太网 3 发送数据有效信号
H25	PHY3_TXD0	车载以太网 3 发送数据 Bit0
H26	PHY3_TXD1	车载以太网 3 发送数据 Bit1
H28	PHY3_TXD2	车载以太网 3 发送数据 Bit2
H29	PHY3_TXD3	车载以太网 3 发送数据 Bit3
C23	PHY3_WAKE	车载以太网 3 唤醒输入端口
H31	PHY4_MDC	车载以太网 4MDIO 管理时钟
G34	PHY4_MDIO	车载以太网 4MDIO 管理数据
G37	PHY4_RSTN	车载以太网 4 复位信号
C22	PHY4_RXCK	车载以太网 4 RGMII 接收时钟
G31	PHY4_RXCTL	车载以太网 4 接收数据有效信号



C27	PHY4_RXD0	车载以太网 4 接收数据 Bit0
C26	PHY4_RXD1	车载以太网 4 接收数据 Bit1
D27	PHY4_RXD2	车载以太网 4 接收数据 Bit2
G30	PHY4_RXD3	车载以太网 4 接收数据 Bit3
H32	PHY4_TXCK	车载以太网 4 RGMII 发送时钟
G33	PHY4_TXCTL	车载以太网 4 发送数据有效信号
H34	PHY4_TXD0	车载以太网 4 发送数据 Bit0
H35	PHY4_TXD1	车载以太网 4 发送数据 Bit1
H37	PHY4_TXD2	车载以太网 4 发送数据 Bit2
H38	PHY4_TXD3	车载以太网 4 发送数据 Bit3
G36	PHY4_WAKE	车载以太网 4 唤醒输入端口
H4	REF_CLK	50MHz的参考时钟
C30	SCL	EEPROM 的 I2C 时钟
C31	SDA	EEPROM 的 I2C 数据
G39	VADJ	VADJ电源输入
H40	VADJ	VADJ电源输入

### 第三部分 硬件连接和测试

FL3113 模块和 FPGA 开发板的硬件连接很简单,只要把 FMC 接口跟开发板的 FMC 接口对插就可以,然后用螺丝固定。以下为黑金 Z7-P 开发板的和 FL3113 模块的硬件连接图:



### 3.1 测试过程

将 FL3113 资料中的测试 BOOT 文件放入 SD 卡中, 再将 SD 卡插入

# ALINX

Z7-P 子板中, 将 FL3113 子板扣入 Z7-P 扩展口, 板卡连接 12V 电源, 板卡上 电启动。

车载以太网转换器上电, RJ45 端通过网线接入交换机, BaseT1 端通过车载 以太网双绞线和 FL3113FMC 子版的 BaseT1 口连接。

PC 机通过命令运行窗口运行 iperf3.exe -s 命令开启服务端监听 C:\Users\Administrator\Desktop\iperf-3.1.3-win64>iperf3.exe -s ------Server listening on 5201

### 3.2 Slave 模式

车载以太网转换器拨码设置为 master 模式,板卡运行./mdio\_rw eth0 1f 1 0834 8000 命令将板卡设置为 slave 模式。

### 3.2.1 1000Mbps 网络传输速率

车载以太网转换器拨码设置为 1000M,板卡运行./mdio\_rw eth0 1f 1 0 40 命令将板卡以太 网速度设置为 1000M。然后 pingPC 机测试网络是否有丢包,运行如下命令测试网络速度。

	./iperf3 -c x	xx -t	10(xx)	〈为丨	PC 机 I	P)				
	./iperf3 -c x	xx -t	10 - R	(xxx )	为 PC 机	几 IP)				
		1	1 1 1			(00)				
roo	ot@petalinux:/mec	dia/sd	-mmcblk	1p1# .	/ipert3 -	-c 192.1	168.8.7	5 -t	10	
COT F	Al local 102 16	192.1	08.8./J	, port	5201	+ + a 105	160 0	75 8	ort 5201	
Γ τ	4] totat 192.100	0.0.21	Tranef	40990	Randwidt	to 192	Potr	Cund	011 3201	
È -	4] 0.00-1.00	600	11/1 M	Putos	052 Mb	ite/sec	neti 0	252	KRytes	
F	4] 1.00-2.00	sec	112 M	Bytes	941 Mb	its/sec	0	252	KRytes	
È	4] 2.00-3.00	Sec	112 M	Bytes	941 Mb	its/sec	e e	252	KBytes	
ř	4] 3.00-4.00	Sec	112 M	Bytes	942 Mb	its/sec	0	252	KBytes	
F	41 4 00-5 00	sec	112 M	Bytes	941 Mb	its/sec	6	252	KRytes	
F	41 5 00-6 00	sec	112 M	Bytes	942 Mh	its/sec	õ	263	KRytes	
ř	41 6 00-7 00	sec	112 M	Bytes	942 Mb	its/sec	Ä	263	KBytes	
ř	41 7 00-8 00	sec	112 M	Bytes	941 Mh	its/sec	Ä	263	KBytes	
ř	41 8.00-9.00	sec	112 M	Bytes	941 Mb	its/sec	Θ	263	KBytes	
ř	41 9.00-10.00	sec	112 M	Bytes	941 Mb	its/sec	Θ	263	KBytes	
2 -										
ГІ	Dl Interval		Transf	er	Bandwidt	th	Retr			
2	17 0 00 10 00	sec	1 10 6	Bytes	943 Mb	its/sec	Θ		ser	nder
	4 0.00-10.00	366	<b>T T C C</b>							
F	4] 0.00-10.00	sec	1.10 G	Bytes	942 Mb	its/sec			rec	ceiver
Ē	4] 0.00-10.00	sec	1.10 G	Bytes	942 Mb	its/sec			re	ceiver
L [ ipe	4] 0.00-10.00 4] 0.00-10.00 erf Done.	sec	1.10 G	Bytes	942 Mb	its/sec			re	ceiver
L [ ipe	4] 0.00-10.00 4] 0.00-10.00 erf Done.	sec	1.10 G	Bytes	942 Mb	its/sec			re	ceiver
L [ ipe	4] 0.00-10.00 4] 0.00-10.00 erf Done. t@petalinux:/media	sec	1.10 G	Bytes # ./ipe	942 Mb	its/sec	75 -t	10 -R	re	ceiver
L [ ipe roo Con	4] 0.00-10.00 4] 0.00-10.00 erf Done. (Operatinux:/media necting to host 11	sec sec a/sd-m 92.168	1.10 G 1.10 G mcblk1p1 .8.75, p	Býtes # ./ipe ort 520	942 Mbi rf3 -c 19	its/sec 2.168.8.	75 -t	10 -R	re	ceiver
L [ ipe roo Con Rev	4] 0.00-10.00 4] 0.00-10.00 erf Done. t@petalinux:/media necting to host 19 erse mode, remote 4] local 192.168.5	sec sec a/sd-m 92.168 host 8.213 (	ncblk1p1 .8.75, p 192.168. port 410	Býtes # ./ipe ort 520 8.75 is 02 conn	942 Mbi rf3 -c 19 sending ected to	192.168.8.	75 -t 8.75 po	10 -R rt 520	re(	ceiver
L ipe roo Con Rev [ [ I	4] 0.00-10.00 4] 0.00-10.00 erf Done. t@petalinux:/medii necting to host 19 erse mode, remote 4] local 192.168.8 D] Interval	sec sec a/sd-mi 92.168 host 8.213 p	ncblk1p1 .8.75, p 192.168. port 410 ransfer	Býtes # ./ipe ort 520 8.75 is 02 conn Ban	942 Mb rf3 -c 19 1 sending ected to dwidth	its/sec 2.168.8. 192.168.	75 -t 8.75 po	10 -R rt 520	ге( )1	ceiver
L ipe roo Con Rev [ I [ I	4] 0.00-10.00 4] 0.00-10.00 erf Done. topetalinux:/media necting to host 19 erse mode, remote 4] local 192.168.8 D] Interval 4] 0.00-1.00	sec sec 92.168 host 8.213 p sec	1.10 G 1.10 G mcblk1p1 .8.75, p 192.168. port 410 ransfer 112 MByt	Bytes # ./ipe ort 520 8.75 is 02 conn Ban es 94	942 Mbi rf3 -c 19 1 sending ected to dwidth 1 Mbits/s	its/sec 2.168.8. 192.168. ec	- 75 -t 8.75 po	10 -R rt 520	ге( )1	ceiver
L ipe roo Con Rev [ [ [ [	4] 0.00-10.00 4] 0.00-10.00 erf Done. tepetalinux:/media necting to host 11 erse mode, remote 4] local 192.168.6 D] Interval 4] 1.00-2.00 4] 1.00-2.00	sec sec 92.168 host 8.213 p sec sec	1.10 G 1.10 G mcblk1p1 .8.75, p 192.168. cort 410 ransfer 112 MByt 112 MByt	Bytes # ./ipe ort 520 8.75 is 02 con Ban es 94 es 94	942 Mbi 1 sending ected to dwidth 1 Mbits/s 1 Mbits/s	2.168.8. 192.168.	75 -t 8.75 po	10 -R rt 520	ге( 01	ceiver
L ipe roo Con Rev [ [ [ [ [ [	4] 0.00-10.00 4] 0.00-10.00 erf Done. t@petalinux:/media necting to host 10 erse mode, remote 4] local 192.168.0 0] Interval 4] 0.00-1.00 4] 2.00-3.00 4] 2.00-3.00 4] 3.00-4.00	sec sec 92.168 host 8.213 p sec sec sec sec	1.10 G 1.10 G ncblk1p1 .8.75, p 192.168. port 410 ransfer 112 MByt 112 MByt 112 MByt	Bytes # ./ipe ort 520 8.75 is 02 conn 8an es 94 es 94 es 94 es 94	942 Mb 1 sending ected to dwidth 1 Mbits/s 1 Mbits/s 1 Mbits/s	2.168.8. 192.168. ec ec ec ec	75 -t 8.75 po	10 -R rt 520	re(	ceiver
L ipe roo Con Rev [ I [ [ [	<pre>4] 0.00-10.00 4] 0.00-10.00 erf Done. t@petalinux:/media necting to host 11 erse mode, remote 4] local 192.168.4 0] Interval 4] 0.00-1.00 4] 1.00-2.00 4] 2.00-3.00 4] 3.00-4.00 4] 3.00-5.00 5</pre>	sec sec 92.168 host 8.213 p sec sec sec sec sec	1.10 G 1.10 G 1.10 G 8.75, p 192.168. port 410 ransfer 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt	Bytes # ./ipe ort 520 8.75 is 02 conn es 94 es 94 es 94 es 94	942 Mb <sup>+</sup> 942 Mb <sup>+</sup> sending ected to dwidth 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s	2.168.8. 192.168. ec ec ec ec ec	75 -t 8.75 po	10 -R rt 520	re(	ceiver
L ipe roon Con Rev L L L L L	4]       0.00-10.00         4]       0.00-10.00         erf Done.	sec sec a/sd-mr 92.168 host 8.213 p T sec sec sec sec sec sec sec	1.10 G 1.10 G 1.10 G ncblk1p1 .8.75, p 192.168. ransfer 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt	Bytes # ./ipe ort 520 8.75 is 02 conn es 94 es 94 es 94 es 94 es 94 es 94	942 Mb <sup>+</sup> sending ected to dwidth 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s	its/sec 2.168.8. 192.168. ec ec ec ec ec ec ec	75 -t 8.75 po	10 -R rt 520	re(	ceiver
L ipe roon Rev [ I [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [	<pre>4] 0.00-10.00 4] 0.00-10.00 erf Done. t@petalinux:/media necting to host 11 erse mode, remote 4] local 192.168.8 D] Interval 4] 0.00-1.00 4] 2.00-3.00 5] 2.00-3.00 5] 4] 4.00-5.00 5] 4] 4.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00 5] 5.00-6.00</pre>	a/sd-mm 92.168 92.168 8.213 J sec sec sec sec sec sec sec	1.10 G 1.10 G 1.10 G 1.10 G 1.10 G 1.10 G 1.2 NByt 1.2 MByt 1.2 MByt 1.2 MByt 1.2 MByt 1.2 MByt 1.2 MByt 1.2 MByt 1.2 MByt 1.2 MByt	Bytes # ./ipe ort 520 8.75 is 02 conn es 94 es 94 es 94 es 94 es 94 es 94 es 94	942 Mb 942 Mb 942 mb 1 sending ected to dwidth 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s	2.168.8. 192.168. ec ec ec ec ec ec ec ec	75 -t 8.75 po	10 -R rt 520	re(	ceiver
L ipe roo Con Rev L L L L L L L L L L L L L	<pre>4 ] 0.00-10.00 4 ] 0.00-10.00 erf Done. t@petalinux:/media necting to host 18 erse mode, remote 4 ] local 192.168.6 D ] Interval 4 ] 0.00-1.00 5 4 ] 2.00-3.00 5 4 ] 3.00-4.00 5 4 ] 5.00-6.00 5 4 ] 5.00-6.00 5 4 ] 6.00-7.00 5 4 ] 6.00-7.00 5 4 ] 6.00-7.00 5 4 ] 6.00-7.00 5 4 ] 6.00-7.00 5 4 ] 5.00-6.00 5 4 ] 6.00-7.00 5 4 ] 5.00-6.00 5 4 ] 5.00-6.00 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6</pre>	a/sd-mi 92.168 host 8.213 j sec sec sec sec sec sec sec sec	1.10 G 1.10 G 1.10 G 192.168. bort 410 ransfer 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt	Bytes # ./ipe ort 520 8.75 is 02 conn Ban es 94 es 94 es 94 es 94 es 94 es 94 es 94	942 Mb 1 sending ected to dwidth 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s	2.168.8. 192.168. ec ec ec ec ec ec ec ec ec	75 -t 8.75 po	10 -R rt 520	Ге( )1	ceiver
L ipe roo Con Con Con Con Con Con Con Con Con C	4] 0.00-10.00 4] 0.00-10.00 erf Done. tepetalinux:/media necting to host 11 erse mode, remote 4] local 192.168.6 D] Interval 4] 1.00-2.00 54] 1.00-2.00 54] 2.00-3.00 54] 4.00-5.00 54] 4.00-5.00 54] 5.00-6.00 54] 5.00-6.00 54] 5.00-8.00 54] 8.00-9.00 54] 9.00-10.00 55] 55 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56] 56 56]	a/sd-mi 92.168 host 8.213 j sec sec sec sec sec sec sec sec sec sec	1.10 G 1.10 G 1.10 G 1.10 G 1.2 MByt 1.2	Bytes # ./ipe ort 520 8.75 is 02 conn Ban es 94 es 94	942 Mb 942 Mb 1 sending ected to dwidth 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s	its/sec 2.168.8. 192.168. ec ec ec ec ec ec ec ec ec ec ec ec	75 -t 8.75 po	10 -R rt 520	Гес 01	ceiver
L ipe coo Coo Cov L L L L L L L L L L L L L L L L L L L	4] 0.00-10.00 4] 0.00-10.00 erf Done. t@petalinux:/media necting to host 10 erse mode, remote 4] local 192.168.0 D] Interval 4] 0.00-1.00 5] 2.00-3.00 5] 3.00-4.00 5] 3.00-6.00 5] 3.00-6.00 5] 5.00-6.00 5] 5.00-5.00 5] 5.00-5	a/sd-mm 92.168 host 8 8.213 J 8.213 J sec 5 sec	1.10 G 1.10 G mcblk1p1 .8.75, p 192.168. .oort 410 ransfer 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt 112 MByt	Bytes # ./ipe ort 520 8275 is 8275 is 8275 is 849 849 85 94 85 94 85 94 85 94 85 94 85 94 85 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 94 95 95 95 95 95 95 95 95 95 95	942 Mb <sup>+</sup> sending ected to dwidth 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s	2.168.8. 192.168.8. 192.168. ec ec ec ec ec ec ec ec ec ec ec ec ec	- 75 -t 8.75 po	10 -R rt 520	гес )1	ceiver
L [ roo C Rev [ [ I [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [	<pre>4 ] 0.00-10.00 4 ] 0.00-10.00 erf Done. t@petalinux:/media necting to host 13 erse mode, remote 4 ] local 192.168.1 D] Interval 4 ] 0.00-1.00 5 4 ] 2.00-3.00 5 4 ] 2.00-3.00 5 4 ] 2.00-3.00 5 4 ] 3.00-4.00 5 4 ] 5.00-6.00 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5</pre>	a/sd-mm 92.168 host 8.213 J sec sec sec sec sec sec sec sec sec sec	1.10 G 1.10 G mcblk1p1 .8.75, p 192.168. .0ort 410 ransfer 112 MByt 112 MByt	Bytes # ./ipe ort 520 8.75 is 02 conn es 94 es 94	942 Mb 942 Mb 1 sending ected to dwidth 1 Mbits/s 1 Mbits/s	tts/sec 2.168.8. 192.168. ec ec ec ec ec ec ec ec ec ec ec ec ec	75 -t 8.75 po	10 -R rt 520	Гес 01	ceiver
[ ipe roo Con Rev [ [ [ [ [ [ [ [ [ [ [ [ [	4] 0.00-10.00 4] 0.00-10.00 erf Done. tepetalinux:/media necting to host 11 erse mode, remote 4] local 192.168.4 D] Interval 4] 0.00-10.00 4] 2.00-3.00 5 4] 2.00-3.00 5 4] 2.00-3.00 5 4] 0.00-10.00 5 4] 8.00-9.00 5 5 5 6 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0.00-10.00 5 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1	a/sd-m 92.168 host 8.213 J sec sec sec sec sec sec sec sec sec sec	1.10 G 1.10 G mcblk1p1 8.75, p 192.168. sort 410 112 MByt 112 MByt 1	Bytes # ./ipe 07t 520 8.75 is 02 conn Ban Ban 85 94 es 94	942 Mb 1 sending ected to dwidth 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 2 Mbits/s 2 Mbits/s 3 Mbits/s 3 Mbits/s 3 Mbits/s 3 Mbits/s 3 Mbits/s 3 Mbits/s 3 Mbits/s	2.168.8. 192.168.8 ec ec ec ec ec ec ec ec ec ec ec ec ec	75 -t 8.75 po	10 -R rt 520	red 01	ceiver
[ roo Con Rev [ [ [ [ [ [ [ [ [ [ [ [ [ [	4] 0.00-10.00 4] 0.00-10.00 4] 0.00-10.00 erf Done. t@petalinux:/media mecting to host 10 erse mode, remote 4] 10cal 192.168.0 D] Interval 4] 0.00-1.100 54] 2.00-3.00 54] 2.00-3.00 54] 2.00-3.00 54] 2.00-3.00 54] 2.00-3.00 54] 3.00-4.00 54] 5.00-6.00 54] 8.00-9.00 54] 8.00-9.00 54] 8.00-9.00 54] 8.00-9.00 54] 9.00-10.00 54] 0.00-10.00 54] 0.00-10.00 54] 0.00-10.00 55] 45] 0.00-10.00 55] 55] 0.00-10.00 55] 55] 0.00-10.00 55] 55] 0.00-10.00 55] 55] 0.00-10.00 55] 55] 0.00-10.00 55] 0.00-10.00	a/sd-mm 92.168 host 8.213 J sec sec sec sec sec sec sec sec sec sec	1.10 G 1.10 G mcblk1p1 8.75, p 192.168. 00rt 410 ransfer 112 MByt 112 MByt 113 MByt 114 MByt 115 MByt 116 GByt 106 GByt	Bytes # ./ipe ort 520 8.75 is 02 conn Ban es 94 es	942 Mb 1 sending ected to dwidth 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 1 Mbits/s 2 Mbits/s 2 Mbits/s 2 Mbits/s 3 Mbits/s 3 Mbits/s 3 Mbits/s 3 Mbits/s 4 Mbits/s 4 Mbits/s 3 Mbits/s 4 Mbits/s 4 Mbits/s 4 Mbits/s 5 Mbit	2.168.8. 192.168.8 ec ec ec ec ec ec ec ec ec ec ec ec ec	75 -t 8.75 po	10 -R rt 520	Fed 01 sender eceiver	ceiver

### 3.2.2 100Mbps 网络传输速率

车载以太网转换器拨码设置为 100M,板卡运行./mdio\_rw eth0 1f 1 0 2000 命令将板卡以太网速度设置为 100M,测试项以及测试命令同上

root(	<pre>@petalinux:/med</pre>	ia/sd	-mmcblk1p1# .	/iperf3 -c 192.16	8.8.75	-t 10	
Conne	ecting to host	192.1	58.8.75, port	5201			
[ 4]	] local 192.168	.8.21	3 port 40990	connected to 192.		75 port 5	201
[ ID]	] Interval		Transfer	Bandwidth	Retr	Cwnd	
[ 4]	0.00-1.00	sec	11.6 MBytes	97.6 Mbits/sec	Θ	70.7 KByt	es
[ 4]	1.00-2.00	sec	11.2 MBytes	94.1 Mbits/sec	Θ	70.7 KByt	es
L 4	2.00-3.00	sec	11.2 MBytes	94.1 Mbits/sec	Θ	70.7 KByt	es
[ 4	3.00-4.00	sec	11.2 MBytes	94.1 Mbits/sec	0	70.7 KByt	es
4	4.00-5.00	sec	11.2 MBytes	94.1 Mbits/sec	0	70.7 KByt	es
4	5.00-6.00	sec	11.2 MBytes	94.1 Mbits/sec	0	70.7 KByt	es
4	6.00-7.00	sec	11.2 MBytes	94.1 Mbits/sec	0	70.7 KByt	es
		sec	11.2 MBytes	94.1 Mbits/sec	0	70.7 KByt	es
		sec	11.2 MBytes	94.1 Mbits/sec	0	70.7 KByt	es
L 4.	] 9.00-10.00	sec	II.2 MBytes	94.1 MDLLS/Sec	U	70.7 KByL	es
Г ТО	l Interval		Transfer	Bandwidth	Retr		
r 4	0.00-10.00	sec	113 MBytes	94.5 Mbits/sec	0		sender
ř 4	0.00-10.00	sec	112 MBytes	94.2 Mbits/sec			receiver
-	A TRADER STRATES						
ipert	f Done.						
root@	etalinux:/med	ia/sd	-mmcblk1p1#	./iperf3 -c 192	.168.8	.75 -t :	10 -R
Connec	ting to host	192.1	68.8.75, por	t 5201			
Revers	e mode, remot	e hos	t 192.168.8.	75 is sendina			
F 41	local 192,168	.8.21	3 port 40994	connected to 19	92.168	.8.75 por	t 5201
Î IDÎ	Interval		Transfer	Bandwidth			
r 41	0.00-1.00	sec	11.2 MBvtes	94.1 Mbits/sec	0		
r 41	1.00-2.00	sec	11.2 MBytes	94.2 Mbits/sec			
r 41	2.00-3.00	sec	11.2 MBytes	94.2 Mbits/sec	2		
r 41	3.00-4.00	sec	11.2 MBytes	94.1 Mbits/sec	2		
r 41	4.00-5.00	sec	11.2 MBytes	94.1 Mbits/sec	2		
ř 41	5 00-6 00	sec	11 2 MBytes	94 1 Mhits/sec			
ř 41	6 00-7 00	Sec	11 2 MBytes	94 1 Mhits/sec			
7 41	7 00-8 00	sec	11 2 MBytes	94 1 Mhits/ser			
1 11	8 00-0 00	800	11.2 MBytes	04 1 Mbite/co			
	0.00-10.00	sec	11.2 MBytes	04.2 Mbite/co	-		
6 40	3.00-10.00	sec	11.2 hoyces	54.2 hb ct3/3et			
E TDJ	Interval		Transfer	Bandwidth	Ret	r	
1 41		8.90	116 MBytes	97 2 Mhite/cov	- 22		sender
	0.00-10.00	sec	112 MBytes	04 7 Mbite/co			racaivar
L 41	0.00-10.00	sec	115 hbytes	94.7 mb cts/sec			receiver
inarf	Dono						

### 3.3 Master 模式

车载以太网转换器拨码设置为 slave 模式,板卡运行./mdio\_rw eth0 1f 1 0834 c000 命令将板卡设置为 master 模式。

### 3.3.1 1000Mbps 网络传输速率

车载以太网转换器拨码设置为 1000M,板卡运行./mdio\_rw eth0 1f 1 0 40 命令将板卡以太网速度设置为 1000M,测试项以及测试命令同上



					5004				
Conne	cting to host	192.1	68.8.3	75, port	5201				
[ 4]	local 192.168	.8.21	3 port	40968	connec	ted to 192	.168.8	.75 p	ort 5201
[ ID]	Interval		Trans	sfer	Bandy	vidth	Retr	Cwnd	
[ 4]	0.00-1.00	sec	114	MBytes	955	Mbits/sec	Θ	280	KBytes
[ 4]	1.00-2.00	sec	112	MBytes	942	Mbits/sec	Θ	280	KBytes
[ 4]	2.00-3.00	sec	112	MBytes	942	Mbits/sec	1	250	KBytes
[ 4]	3.00-4.00	sec	112	MBytes	941	Mbits/sec	Θ	252	KBytes
[ 4]	4.00-5.00	sec	112	MBytes	941	Mbits/sec	Θ	262	KBytes
[ 4]	5.00-6.00	sec	112	MBytes	941	Mbits/sec	Θ	262	KBytes
[ 4]	6.00-7.00	sec	112	MBytes	941	Mbits/sec	Θ	262	KBytes
[ 4]	7.00-8.00	sec	112	MBytes	942	Mbits/sec	Θ	291	KBytes
[ 4]	8.00-9.00	sec	112	MBytes	942	Mbits/sec	Θ	315	KBytes
[ 4]	9.00-10.00	sec	112	MBytes	942	Mbits/sec	Θ	331	KBytes
					 dl:		0.44		
	Intervat	1444	Trans	Couter	Bandy	Mhite (area	Ketr		
4	0.00-10.00	sec	1.10	GBytes	943	Mbits/sec	1		sender
4	0.00-10.00	sec	1.10	GBytes	942	Mbits/sec			receiver
iperf root@	Done. petalinux:/med	dia/se	d-mmcb	lk1p1#	./iper	f3 -c 192.		75 -	t 10 -R
iperf root@ Conne Rever [ 4]	Done. petalinux:/meo cting to host se mode, remot local 192.168	dia/so 192. te hos 3.8.2	d-mmcb 168.8. st 192 13 por	lk1p1# 75, por .168.8. t 40972	./iper t 5201 75 is conne	f3 -c 192. sending	168.8.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever 4] ID]	Done. petalinux:/mec cting to host se mode, remot local 192.168 Interval	dia/so 192. te hos 3.8.2	d-mmcb 168.8. st 192 13 por Tran	lk1p1# 75, por .168.8. t 40972 sfer	./iper t 5201 75 is conne Banc	f3 -c 192. sending ected to 19 width	168.8. 2.168.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever 4] ID] 4]	Done. petalinux:/mec cting to host se mode, remot local 192.168 Interval 0.00-1.00	dia/so 192. te hos 3.8.2 sec	d-mmcb 168.8. st 192 13 por Tran 112	lk1p1# 75, por .168.8. t 40972 sfer MBytes	./iper t 5201 75 is Conne Banc 940	f3 -c 192. sending ected to 19 width Mbits/sec	168.8. 2.168.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever 4] ID 4] 4]	Done. petalinux:/meo cting to host se mode, remot local 192.160 Interval 0.00-1.00 1.00-2.00	dia/se 192. te hos 3.8.2 sec sec	d-mmcb 168.8. st 192 13 por Tran 112 112	lkip1# 75, por .168.8. t 40972 sfer MBytes MBytes	./iper t 5201 75 is Conne Banc 940 941	f3 -c 192. sending width Mbits/sec Mbits/sec	168.8. 2.168.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever [ 4] [ 10] 4] 4]	Done. petalinux:/mec cting to host se mode, remoi local 192.160 Interval 0.00-1.00 1.00-2.00 2.00-3.00	dia/se 192. te hos 3.8.2 sec sec sec	d-mmcb 168.8. st 192 13 por Tran 112 112 112	lkipi# 75, por .168.8. t 40972 sfer MBytes MBytes MBytes	./iper t 5201 75 is Conne Banc 940 941 941	f3 -c 192. sending width ) Mbits/sec Mbits/sec Mbits/sec	168.8. 2.168.	75 - 8.75	t 10 -R port 5201
iperf conte conne lever ID 4 4 4 4	Done. petalinux:/mec cting to host se mode, remod local 192.168 Interval 0.00-1.00 1.00-2.00 2.00-3.00 3.00-4.00	dia/se 192. te hos 3.8.2 sec sec sec sec sec	d-mmcb 168.8. st 192 13 por Tran 112 112 112 112	lk1p1# 75, por .168.8. t 40972 sfer MBytes MBytes MBytes MBytes	./iper t 5201 75 is Conne Banc 941 941 941 941	f3 -c 192. sending width Moits/sec Mbits/sec Mbits/sec	168.8. 2.168.	75 - 8.75	t 10 -R port 5201
iperf conne Conne Rever [ 4] [ 4] [ 4] [ 4] [ 4] [ 4]	Done. petalinux:/med cting to host se mode, remot local 192.168 Interval 0.00-1.00 1.00-2.00 2.00-3.00 3.00-4.00 4.00-5.00	dia/so 192.: te hos 3.8.2: sec sec sec sec sec	d-mmcb 168.8. st 192 13 por Tran 112 112 112 112 112	lk1p1# 75, por .168.8. t 40972 sfer MBytes MBytes MBytes MBytes MBytes	./iper t 5201 75 is Conne Banc 941 941 941 941	f3 -c 192. sending cted to 19 Width ) Mbits/sec Mbits/sec Mbits/sec Mbits/sec	168.8. 2.168.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever [ 4] [ 4] [ 4] [ 4] [ 4] [ 4] [ 4]	Done. petalinux:/mec cting to host se mode, remol local 192.160 Interval 0.00-1.00 1.00-2.00 2.00-3.00 3.00-4.00 4.00-5.00	dia/se 192. te hos 3.8.2 sec sec sec sec sec sec	d-mmcb 168.8. st 192 13 por Tran 112 112 112 112 112 112	lk1p1# 75, por .168.8. t 40972 sfer MBytes MBytes MBytes MBytes MBytes	./iper t 5201 75 is Conne 940 941 941 941 941 941	f3 -c 192. sending cted to 19 width ) Mbits/sec . Mbits/sec . Mbits/sec . Mbits/sec . Mbits/sec	168.8. 2.168.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever 4] 4] 4] 4] 4] 4] 4] 4] 4] 4]	Done. petalinux:/mec cting to host se mode, remod local 192.168 Interval 0.00-1.00 1.00-2.00 2.00-3.00 3.00-4.00 4.00-5.00 5.00-6.00 6.00-7.00	dia/se 192. te hos 3.8.2 sec sec sec sec sec sec sec	d-mmcb 168.8. st 192 13 por Tran 112 112 112 112 112 112 112 112	lk1p1# 75, por .168.8. t 40972 sfer MBytes MBytes MBytes MBytes MBytes MBytes	./iper t 5201 75 is conne 940 941 941 941 941 941 941	f3 -c 192. sending ccted to 19 width Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec	168.8. 2.168.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever [ 4] [ 4] [ 4] [ 4] [ 4] [ 4] [ 4] [ 4]	Done. petalinux:/mec cting to host se mode, remod local 192.168 Interval 0.00-1.00 1.00-2.00 2.00-3.00 3.00-4.00 4.00-5.00 5.00-6.00 6.00-7.00 7.00-8.00	dia/se 192. te hos 3.8.23 sec sec sec sec sec sec sec sec sec	d-mmcb 168.8. st 192 13 por Tran 112 112 112 112 112 112 112 112	lkip1# 75, por .168.8. t 40972 sfer MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes	./iper t 5201 75 is conne 940 941 941 941 941 941 941 941 941	f3 -c 192. sending ccted to 19 width Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec	168.8.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever [ 4] [ 4] [ 4] [ 4] [ 4] [ 4] [ 4] [ 4]	Done. petalinux:/mec ting to host se mode, remol local 192.168 Interval 0.00-1.00 1.00-2.00 2.00-3.00 3.00-4.00 4.00-5.00 5.00-6.00 6.00-7.00 7.00-8.00 8.00-9.00	dia/se 192. te hos 3.8.2 sec sec sec sec sec sec sec sec sec sec	d-mmcb 168.8. st 192 13 por Tran 112 112 112 112 112 112 112 112 112	lkip1# 75, por .168.8. t 40972 Isfer MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes	./iper t 5201 75 is conne Banc 941 941 941 941 941 941 941 941 941 941	f3 -c 192. sending scted to 19 width ) Mbits/sec . Mbits/sec . Mbits/sec . Mbits/sec . Mbits/sec . Mbits/sec	168.8.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever 10] 41 41 41 41 41 41 41 41 41 41 41 41 41	Done. petalinux:/mec ting to host se mode, remol local 192.160 Interval 0.00-1.00 1.00-2.00 2.00-3.00 3.00-4.00 4.00-5.00 5.00-6.00 6.00-7.00 7.00-8.00 8.00-9.00 9.00-10.00	dia/sc 192. te hos 3.8.2 sec sec sec sec sec sec sec sec sec sec	d-mmcb 168.8. st 192 13 por Tran 112 112 112 112 112 112 112 112 112	lkip1# 75, por .163.8. t 40972 sfer MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes	./iper t 5201 75 is Conne Banc 941 941 941 941 941 941 941 941 941	f3 -c 192. sending width ) Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec	168.8.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever [ 4] [ 4] [ 4] [ 4] [ 4] [ 4] [ 4] [ 4]	Done. petalinux:/mec cting to host se mode, remod local 192.168 Interval 0.00-1.00 1.00-2.00 2.00-3.00 3.00-4.00 4.00-5.00 5.00-6.00 6.00-7.00 7.00-8.00 8.00-9.00 9.00-10.00	dia/sc 192. te hos 3.8.23 sec sec sec sec sec sec sec sec sec sec	d-mmcb 168.8 st 192 13 por Tran 112 112 112 112 112 112 112 112 112	lk1p1# 75, por .168.8. t 40972 isfer MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes	./iper t 5201 75 is conne 941 941 941 941 941 941 941 941 941	f3 -c 192. sending width Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec	168.8.	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever [ 4] [ 4] [ 4] [ 4] [ 4] [ 4] [ 4] [ 4]	Done. petalinux:/mec cting to host se mode, remol local 192.168 Interval 0.00-1.00 1.00-2.00 2.00-3.00 3.00-4.00 4.00-5.00 5.00-6.00 6.00-7.00 7.00-8.00 8.00-9.00 9.00-10.00 Interval	dia/sc 192.2 te hos sec sec sec sec sec sec sec sec sec se	d-mmcb 168.8. st 192 13 por Tran 112 112 112 112 112 112 112 112 112	lkip1# 75, por .168.8. t 40972 isfer MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes	./iper t 5201 75 is conne 941 941 941 941 941 941 941 941 941 941	f3 -c 192. sending cted to 19 width Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec	168.8. 2.168. Retr	75 - 8.75	t 10 -R port 5201
iperf root@ Conne Rever 4] 4] 4] 4] 4] 4] 4] 4] 4] 4] 4] 4] 4]	Done. petalinux:/mec ting to host se mode, remol local 192.168 Interval 0.00-1.00 1.00-2.00 2.00-3.00 3.00-4.00 4.00-5.00 5.00-6.00 6.00-7.00 7.00-8.00 8.00-9.00 9.00-10.00 0.00-10.00	dia/sc 192.2 te hos 3.8.22 sec sec sec sec sec sec sec sec sec sec	d-mmcb 168.8. st 192 13 por Tran 112 112 112 112 112 112 112 112 112 11	lkip1# 75, por .168.8. t 40972 sfer MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes MBytes	./iper t 5201 75 is Conne 941 941 941 941 941 941 941 941  Banc 942	f3 -c 192. sending scted to 19 width ) Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec Mbits/sec	168.8. 2.168. Retr 9	75 - 8.75	t 10 -R port 5201 sender

### 3.3.2 100Mbps 网络传输速率

车载以太网转换器拨码设置为 100M,板卡运行./mdio\_rw eth0 1f 1 0 2000 命令将板卡以太网速度设置为 100M,测试项以及测试命令同上



root@	petalinux:/med	ia/sc	l-mmcblk1p1#	./iperf3 -c 192.	168.8.7	5 -t 10
Conne	cting to host	192.1	68.8.75, por	t 5201		
[ 4]	local 192,168	.8.21	3 port 40982	connected to 19	2.168.8	.75 port 5201
[ ID]	Interval		Transfer	Bandwidth	Retr	Cwnd
[ 4]	0.00-1.00	sec	11.6 MBytes	97.5 Mbits/sec	Θ	67.9 KBytes
[ 4]	1.00-2.00	sec	11.2 MBytes	94.1 Mbits/sec	0	67.9 KBytes
[ 4]	2.00-3.00	sec	11.2 MBytes	94.1 Mbits/sec	Θ	67.9 KBytes
[ 4]	3.00-4.00	sec	11.2 MBytes	94.1 Mbits/sec	0	67.9 KBytes
[ 4]	4.00-5.00	sec	11.2 MBytes	94.1 Mbits/sec	Θ	67.9 KBytes
[ 4]	5.00-6.00	sec	11.2 MBytes	94.1 Mbits/sec	Θ	67.9 KBytes
[ 4]	6.00-7.00	sec	11.2 MBytes	94.1 Mbits/sec	Θ	67.9 KBytes
[ 4]	7.00-8.00	sec	11.2 MBytes	94.1 Mbits/sec	Ø	67.9 KBytes
4]	8.00-9.00	sec	11.2 MBytes	94.1 Mbits/sec	Θ	67.9 KBytes
4]	9.00-10.00	sec	11.2 MBytes	94.1 Mbits/sec	0	67.9 KBytes
ID]	Interval		Transfer	Bandwidth	Retr	
4	0.00-10.00	sec	113 MBytes	94.5 Mbits/sec	0	s ende r
4	0.00-10.00	sec	112 MBytes	94.2 Mbits/sec		receiver
root@	petalinux:/med	ia/sd	-mmcblk1p1# .	/iperf3 -c 192.1	68.8.75	-t 10 -R
Conne	cting to host	192.1	68.8.75, port	5201		
Rever	se mode, remot	e hos	t 192.168.8.7	5 is sending		
4	local 192.168	.8.21	3_port_40986	connected to 192	.168.8.	75 port 5201
L ID	Interval		Transfer	Bandwidth		
L 41	0.00-1.00	sec	11.2 MBytes	94.1 Mbits/sec		
L 4	1.00-2.00	sec	11.2 MBytes	94.1 Mbits/sec		
L 41	2.00-3.00	sec	11.2 MBytes	94.1 Mbits/sec		
4	3.00-4.00	sec	11.2 MBytes	94.1 Mbits/sec		
4	4.00-5.00	sec	11.2 MBytes	94.1 Mbits/sec		
4	5.00-6.00	sec	11.2 MBytes	94.2 Mbits/sec		
4	6.00-7.00	sec	11.2 MBytes	94.1 Mbits/sec		
L 4]	7.00-8.00	sec	11.2 MBytes	94.1 Mbits/sec		
[ 4]	8.00-9.00	sec	11.2 MBytes	94.1 Mbits/sec		
[ 4]	9.00-10.00	sec	11.2 MBytes	94.2 Mbits/sec		
[ ID]	Interval		Transfer	Bandwidth	Retr	
[ 4]	0.00-10.00	sec	116 MBytes	97.3 Mbits/sec	31	sender
[ 4]	0.00-10.00	sec	113 MBytes	94.7 Mbits/sec		receiver
N						

### 3.4 测试结果

### 3.4.1 丢包率

	100M 模式	1000M 模式
Master 模式	无丢包	无丢包
Slave 模式	无丢包	无丢包

### 3.4.2 网络速率

	100M 模式	1000M 模式
Master 模式	94.5Mbit/s	943Mbit/s
Slave 模式	94.5Mbit/s	943Mbit/s