# AX88772C/AX88772B USB to 100Base-TX/FX Ethernet with RMII Demo Boards
# Reference Schematic System Block

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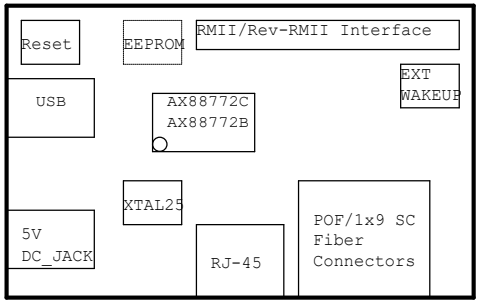


**Note:**
**1.Please refer to AX88772C/AX88772B USB-to-LAN Application Design Note for more AX88772C/AX88772B PCB layout design notes.**

**2.Please deliver us your AX88772C/AX88772B schematic and PCB layout file for further review.**

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| ASIX ELECTRONICS CORPORATION | | |
| Title: System Block | | |
| Size: B | Document Number: AX88772C/AX88772B USB to 100Base-TX/FX with RMII | Rev: 2.14 |
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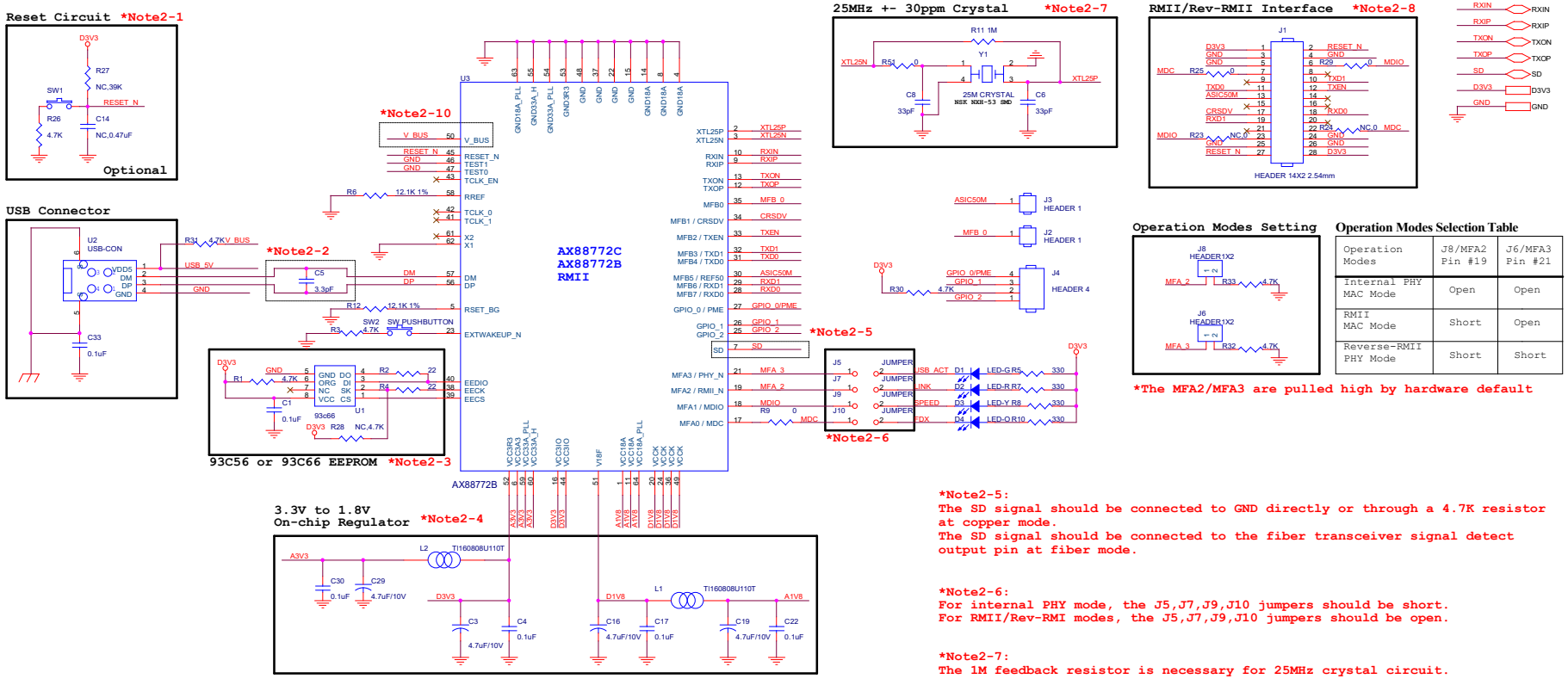


*Note2-1:
The RC reset circuit is optional for AX88772C/AX88772B applications. You can reserve the RC reset circuit on your AX88772C/AX88772B schematic to fine tune the reset timing if necessary.

*Note2-2:
The C5 cap between the DP and DM pins is used to filter the common-mode noise and should be placed as close as pin #57 and #56.

*Note2-3:
The AX88772C/AX88772B supports 16-bit mode 93C56/93C66 EEPROM. The R1 resistor is mounted to set the ATMEL AT93C66A EEPROM to 16-bit mode.
You can pull high the EECK signal to force AX88772C/AX88772B at USB Full Speed mode if necessary.

*Note2-4:
AX88772C/AX88772B on-chip 3.3V to 1.8V regulator is a low dropout regulator (LDO), which requires some large external compensating capacitors on its input (pin #52) and output (pin #51) pins.
The C3, C4, C16 and C17 capacitors are the compensating capacitors for the on-chip regulator and should be as close as pin #51 and #52. The analog powers and digital powers should be isolated with a Ferrite Bead (L1, L2).
The VCC3R3 trace should be wider than 40mil for good power regulation.
The V18F trace should be wider than 20mil for good power regulation.

*Note2-5:
The SD signal should be connected to GND directly or through a 4.7K resistor at copper mode.
The SD signal should be connected to the fiber transceiver signal detect output pin at fiber mode.

*Note2-6:
For internal PHY mode, the J5,J7,J9,J10 jumpers should be short.
For RMII/Rev-RMI modes, the J5,J7,J9,J10 jumpers should be open.

*Note2-7:
The 1M feedback resistor is necessary for 25MHz crystal circuit.
The reference 25MHz crystal is the NSK NXH-53 SMD 25MHz crystal with CL 20pF and ESR max. 70 Ohm. The 25MHz clock signals should be within 25MHz +- 50ppm.
Please reserve the R51 0 Ohm resistor on 25MHz crystal circuit for fine tuning the 25MHz crystal circuit if necessary.

*Note2-8:
Please set the MFA2 and MFA3 signals to enable the RMII or Rev-RMII interface.
Please refer to above "Operation Modes Selection Table" for details.

*Note2-9:
All power pins should be implemented with a by-pass capacitor, and the by-pass capacitors should be as close as the power pins.
The C31/C45 capacitors and C42 capacitor should be 10uF and 1uF respectively for USB-IF compliant test.
The J12 DC 5V Power Jack is optional to provide the 5V power source to AX88772C/AX88772B and external devices on AX88772B Self-power application.
You can use J11 to select a proper power source of AX88772C/AX88772B application.

*Note2-10:
For self-power applications, please refer to below suggestions to design the V_BUS signal circuit,
(1)While the USB interface was connected to USB host/hub controller, the V_BUS signal MUST be pulled high to set AX88772C/AX88772B at normal operation stage.
(2)While the USB interface was disconnected from USB host/hub controller, the V_BUS signal MUST be pulled down to set AX88772C/AX88772B at reset stage.

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| ASIX ELECTRONICS CORPORATION | | | |
| Title: AX88772C_AX88772B | | | |
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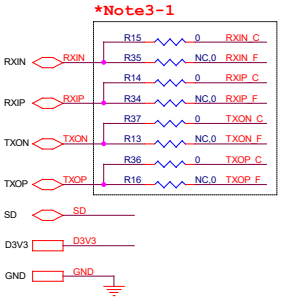
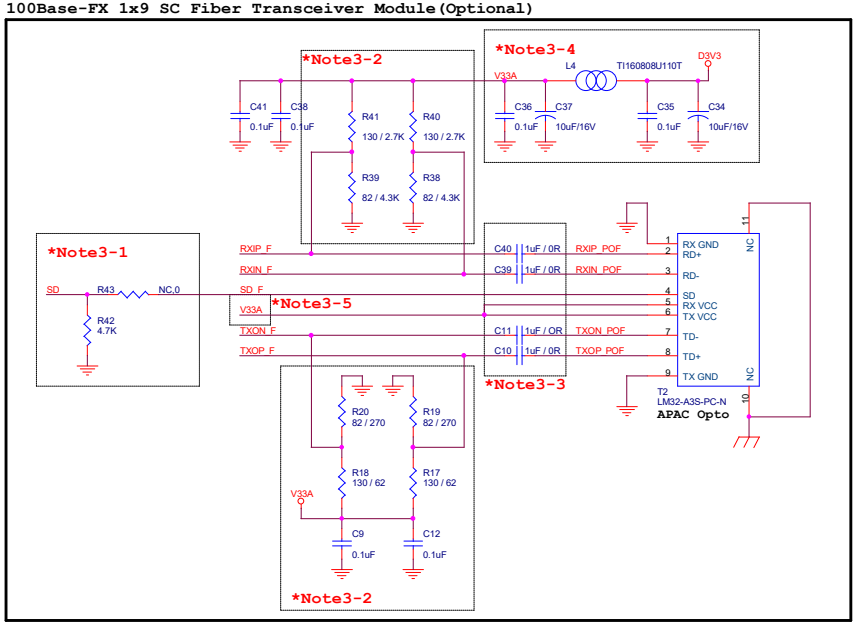
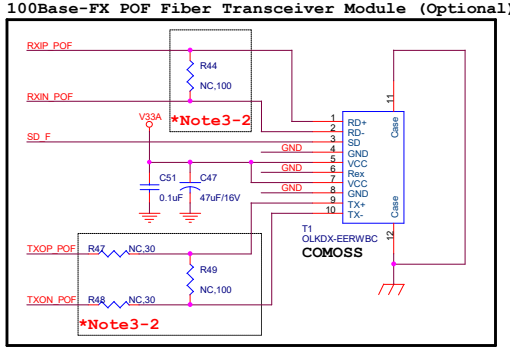
| Date: Thursday, December 23, 2021 | Sheet 2 of 4 | | |



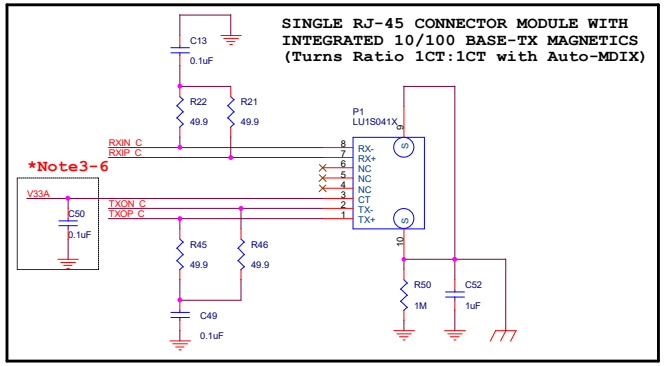

## 100Base-FX 1x9 SC Fiber Transceiver Module(Optional)



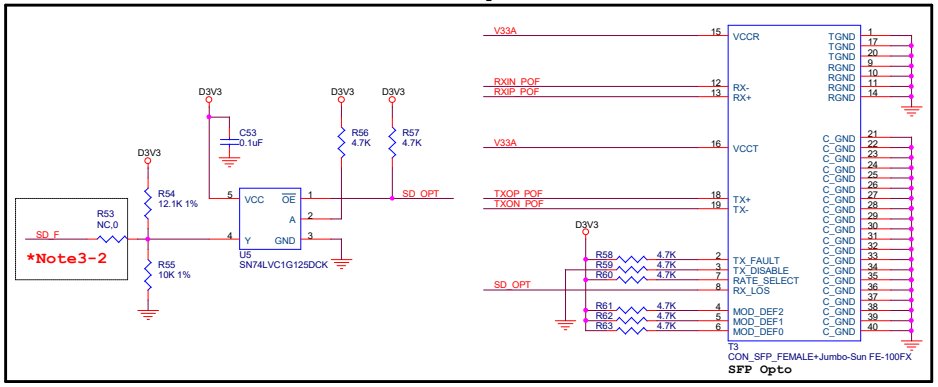

## 100Base-FX POF Fiber Transceiver Module (Optional)




## RJ-45 Connector + Tranformer (Copper) (Default Mode)
## (Turns Ratio 1CT:1CT, with auto-MDIX)




## 100Base-FX 1x20 SFP Fiber Transceiver Module (Optional)




### Copper and Fiber Mode Setting Table *Note3-1

| Mode | R15 | R35 | R14 | R34 | R37 | R13 | R36 | R16 | R42 | R43 |
|---|---|---|---|---|---|---|---|---|---|---|
| Copper | 0 | NC | 0 | NC | 0 | NC | 0 | NC | 4.7K | NC |
| Fiber | NC | 0 | NC | 0 | NC | 0 | NC | 0 | NC | 0 |

### Fiber Mode Component Table *Note3-2

| Component | R17 | R18 | R19 | R20 | R40 | R41 | R38 | R39 | R44 | R49 | R47 | R48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COMOSS POF | 62 | 62 | 270 | 270 | 2.7K | 2.7K | 4.3K | 4.3K | 100 | 100 | 30 | 30 |
| APAC Opto 1x9 SC | 130 | 130 | 82 | 82 | 130 | 130 | 82 | 82 | NC | NC | NC | NC |
| SFP Opto 1x20 | 130 | 130 | 82 | 82 | 130 | 130 | 82 | 82 | NC | NC | NC | NC |

| Component | C10 | C11 | C39 | C40 | R53 |
|---|---|---|---|---|---|
| COMOSS POF | 1uF | 1uF | 1uF | 1uF | NC |
| APAC Opto 1x9 SC | 0 | 0 | 0 | 0 | NC |
| SFP Opto 1x20 | 0 | 0 | 0 | 0 | 0 |

*Note3-3

***Note3-1:**
The AX88772B supports both copper mode and fiber mode. Please refer to above "Copper and Fiber Mode Setting Table" to implement your AX88772B application for copper mode or fiber mode.

***Note3-2:**
The R17~R20, R38~R41, R44, R47~R49, R53 resistors should be set different values for APAC Opto 1x9 SC / SFP Opto 1x20 / COMOSS POF Fiber transceiver module. Please refer to above "Fiber Mode Component Table" and contact the Fiber transceiver vendor support guys for detailed Fiber transceiver related cicruit.

***Note3-3:**
The C10, C11, C39, C40 will be mounted 0 Ohm resistors for APAC Opto 1x9 SC / SFP Opto 1x20 Fiber transceiver module.
The C10, C11, C39, C40 will be mounted 1uF capacitors for COMOSS POF Fiber transceiver module.
Please refer to above "Fiber Mode Component Table" and contact the Fiber transceiver vendor support guys for detailed Fiber transceiver related cicruit.

***Note3-4:**
You can implement a separate V33A power plane to provide a pure 3.3V analog power source for the copper/fiber connectors.

***Note3-5:**
The V33A power source of APAC Opto 1x9 SC Fiber transceiver is near to L4 so it can share the C36 and C37 capacitors with L4.

***Note3-6:**
The CT pin of Ethernet magnetic should be connected to analog 3.3V VCC.

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| ASIX ELECTRONICS CORPORATION | | |
| Title: RJ45/POF Fiber/1x9 SC Fiber Connectors | | |
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| Date: Thursday, December 23, 2021 | Sheet 3 of 4 | |

## Revision History

| Revision | Date | Comment |
|---|---|---|
| V1.00 | 2010/06/21 | Initial release. |
| V1.01 | 2010/06/24 | 1.Changed D5 to 1N4148.<br>2.Changed C47 to 47uF/16V. |
| V1.02 | 2011/08/10 | 1.Updated F.B. L1/L2/L3/L4 to Tl160808U110T. |
| V2.00 | 2013/04/09 | 1.Modified to support AX88772C.<br>2.Modified 25MHz crystal circuit.<br>3.Added Note2-10 for the VBUS circuit design note. |
| V2.10 | 2015/06/01 | 1.Changed T2 part to APAC Opto LM32-A3S-PC-N. |
| V2.11 | 2017/06/26 | 1.Corrected some notes descriptions in Page 3. |
| V2.12 | 2018/06/13 | 1.Corrected some notes descriptions in Page 2. |
| V2.13 | 2018/11/06 | 1.Added 100Base-FX 1x20 SFP Fiber Transceiver Module |
| V2.14 | 2021/12/23 | 1.Added Note3-6 in Page 3. |