

## Feature

- 100Base-TX IEEE 802.3u compatible
- Full and Half duplex with Auto-negotiation
- Fully integrated adaptive equalizers
- 125MHz clock generator and clock recovery
- Include transmit waveform shaping to reduce EMI and filter
- Include baseline wander correction
- Support one TX interface and one Fiber module interface(ECL interface).
- Support transmit, receive/link, full duplex LED
- Single 5 Voltage supply operation
- 128-pin PQFP

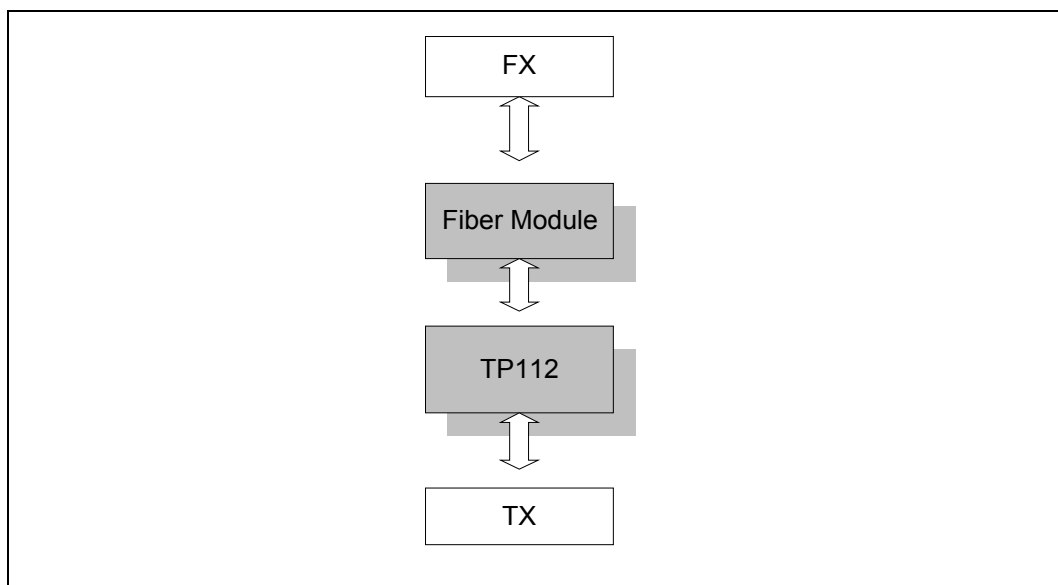
## General Description

The TP112 is a single chip media converter for 100Base-TX to 100Base-FX. The TP112 support one 100Base-TX port over CAT5 twisted pair cable and one ECL interface to connect with fiber module to apply in 100Base-TX/FX converter application. On the 100Base-TX side, The TP112 is directly connected to external transformers

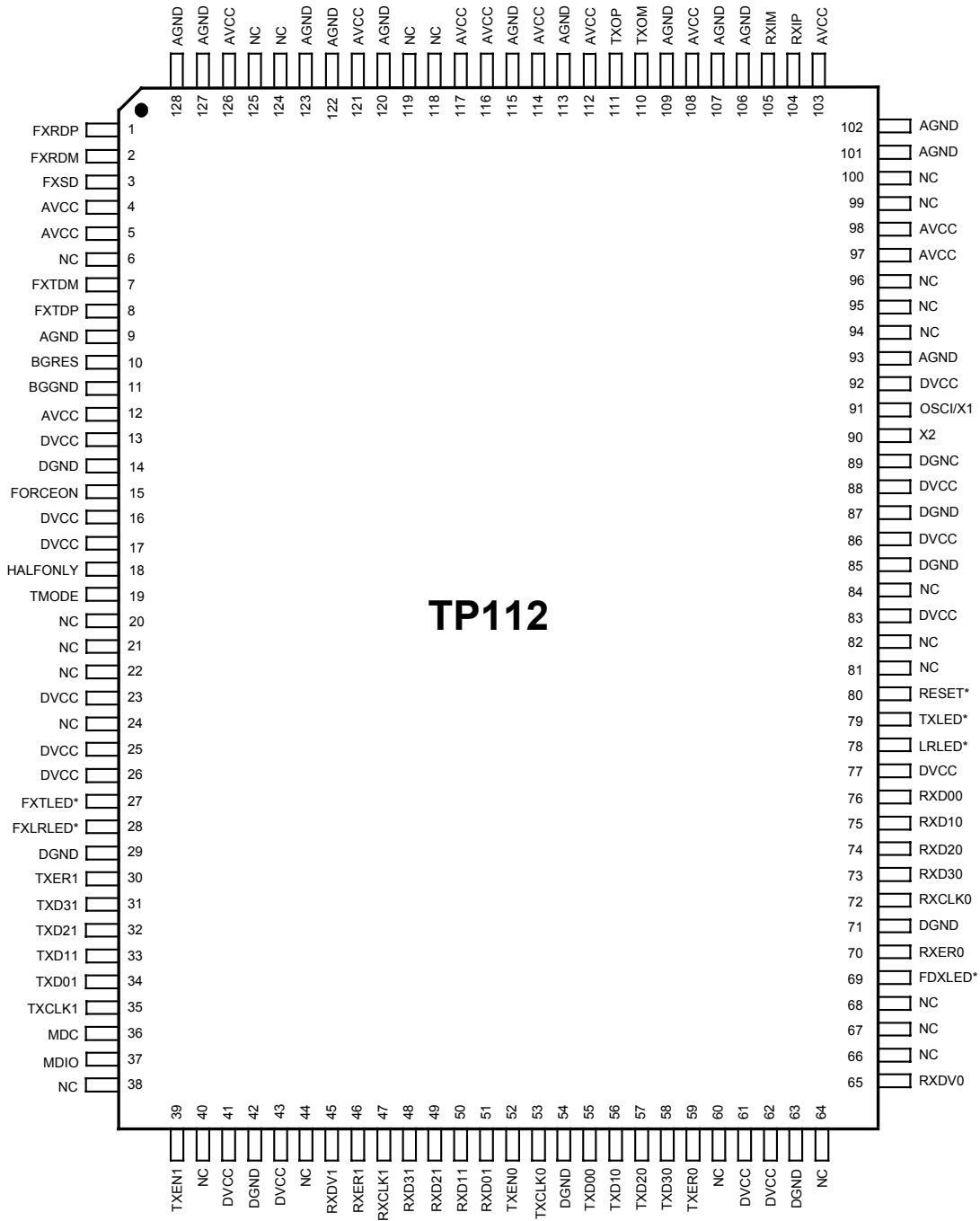
The chip performs data recovery, clock recovery, adaptive equalization, auto negotiation, and baseline wander correction function. The TP112 is compliant with the IEEE 802.3u standard.

## Typical Application

### ■ 100Base-TX to 100Base-FX Converter



PIN Assignments



## PIN Description

| TYPE | DESCRIPTION                    |
|------|--------------------------------|
| I    | Used as Input pin              |
| O    | Used as Output pin             |
| I/O  | Used as Input and Output pin   |
| O    | Used as Output with Open Drain |

| PIN NO.                    | LABEL                  | TYPE | DESCRIPTION   |
|----------------------------|------------------------|------|---|
| <b>Media Connections</b>   |                        |      |   |
| 104,105                    | RXIP,RXIM              | I    | <b>Receiver Pair</b><br>Differential data from external transformers RD± pair.  |
| 111,110                    | TXOP, TXOM             | O    | <b>Transmit Pair</b><br>Differential data to external transformers TD± pair.  |
| 1,2                        | FXRDP,FXRDM            | I    | <b>Fiber Receiver Data Pair</b><br>Used to receiver the data from the fiber transceiver module, need external pull high resistor and pull low resistor, depend on impedance match of the fiber transceiver module.  |
| 8,7                        | FXTDP,FXTDM            | O    | <b>Fiber Transmit Data Pair</b><br>It used as output the data into the fiber transceiver module, need external pull high resistor and pull low resistor, depend on impedance match of the fiber transceiver module. |
| 3                          | FXSD                   | I    | <b>Fiber Signal Detect</b><br>Used as an input pin from the Fiber transceiver module to indicate a valid signal quality had been detect.  |
| <b>MII Interface</b>       |                        |      |   |
| 59<br>30                   | TXER0<br>TXER1         | I    | <b>Transmit Error</b><br>Active high. When an error happened in the transmit data stream.   |
| 52<br>39                   | TXEN0<br>TXEN1         | I    | <b>Transmit Enable</b><br>Active high. Indicate 4B data valid on TXD[3:0]   |
| 53<br>35                   | TXCLK0<br>TXCLK1       | I/O  | <b>Transmit Clock</b><br>Output is 25MHz continuous clock.  |
| 58,57,56,55<br>31,32,33,34 | TXD[3:0]0<br>TXD[3:0]1 | I    | <b>Transmit Data Input</b><br>4B transmit data.   |
| 65<br>45                   | RXDV0<br>RXDV1         | O3s  | <b>Receive Data valid</b><br>Active high. Indicates that a received frame is in progress, and data on RXD pin is valid  |
| 70<br>46                   | RXER0<br>RXER1         | O    | <b>Receive Error</b><br>It Indicate that there's an error during a receive frame when high  |
| 72<br>47                   | RXCLK0<br>RXCLK1       | O    | <b>Receive Clock</b><br>25MHz output. The clock is recovered from the incoming data on the cable inputs   |
| 73,74,75,76<br>48,49,50,51 | RXD[3:0]0<br>RXD[3:0]1 | O    | <b>Receive Data Output</b><br>4B data output and synchronously to RXCLK.  |

## PIN Description (continued)

| PIN NO.                  | LABEL              | TYPE  | DESCRIPTION   |
|--------------------------|--------------------|-------|---|
| <b>Modes</b>             |                    |       |   |
| 36                       | MDC                | I     | <b>Management Data Clock</b><br>MII management data clock input, maximum clock rate is 2.5MHz   |
| 37                       | MDIO               | I/O   | <b>Management Data I/O</b><br>MII management data input/output  |
| 19                       | TMODE              | I     | <b>Test Mode</b><br>Active high. Set TP112 into test mode, and low for normal operation. There's an internal pull low resistor so default is normal operation                                       |
| 18                       | HALFONLY           | I/IPL | <b>Half Duplex Mode Only</b><br>1: half duplex<br>0: full duplex  |
| 15                       | FORCEON            | I/IPL | <b>Force Mode Enable</b><br>1: force mode enable<br>0: auto negotiation mode enable   |
| <b>LEDs</b>              |                    |       |   |
| 69                       | FDXLED*            | O     | <b>Full Duplex LED</b><br>Before link OK, this pin is tri-stated. After link OK this pin indicate current duplex operation for TP112. High for half duplex and low for full duplex                  |
| 78<br>28                 | LRLED*<br>FXLRLED* | O     | <b>Link/Receive LED</b><br>Active low. Indicates the link status of the port, driven low when link to the port is good. Output for 20mS clock while the TP112 is receiving data from external media |
| 79<br>27                 | TXLED*<br>FXTLED*  | O     | <b>Transmit LED</b><br>Active low. Indicates that data is being transmitting  |
| <b>Reset &amp; Clock</b> |                    |       |   |
| 80                       | RESET*             | I     | <b>Reset</b><br>Active low. Reset TP112, remain low at least 1us.   |
| 91                       | OSCI/X1            | I     | <b>Oscillator input or crystal input (25MHz±50ppm).</b>   |
| 90                       | X2                 | O     | Crystal output. Leave it unconnected (i.e., as a NC pin) when oscillator is used.   |
| <b>Current Reference</b> |                    |       |   |
| 10                       | BGRES              | I     | <b>Band Gap Resistor</b><br>A 6.2KOhm 1% resistor that supply 200uA reference current for receive   |
| 11                       | BGGND              | I     | <b>Band Gap Resistor Ground</b><br>Band gap resistor ground reference input   |

**PIN Description** (continued)

| <b>PIN NO.</b>   | <b>LABEL</b> | <b>TYPE</b> | <b>DESCRIPTION</b>          |
|--|--------------|-------------|-----------------------------|
| <b>Power &amp; Ground</b>  |              |             |                             |
| 4,5,12,97,98,<br>103,108,112,<br>114,117,116<br>121,126  | AVCC         | I           | <b>Analog VCC</b><br>+5V    |
| 9,93,101,102,<br>106,107,109,<br>113,115,120,<br>122,123,127,<br>128                               | AGND         | I           | <b>Analog Ground</b><br>0V  |
| 13,16,17,23,<br>25,26,41,43,<br>61,62,77,83,<br>86,88,92,  | DVCC         | I           | <b>Digital VCC</b><br>+5V   |
| 14,29,<br>42,54,63,71,<br>85,87,89   | DGND         | I           | <b>Digital Ground</b><br>0V |
| 6,20,21,22,24,<br>38,40,44,60,64,<br>66,67,68,81,82,<br>84,94,95,96,<br>99,100,118,119,<br>124,125 | NC           |             | <b>No Connection</b>        |

## Absolute Maximum Rating

Supply Voltage ..... VCC –0.25 to VDD +0.25V  
 Storage Temperature ..... -65 to 150°C  
 Ambient Operating Temperature (Ta)..... 0 to 70°C

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. Functional operation under these conditions is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect product reliability.

## Electrical

### ■ Operating Conditions

| Parameter         | Sym. | Min. | Typ. | Max. | Unit | Conditions |
|-------------------|------|------|------|------|------|------------|
| Supply Voltage    | AVCC | 4.75 | 5    | 5.25 | V    |            |
|                   | DVCC | 4.75 | 5    | 5.25 | V    | VCC=5.0V   |
| Power Consumption | ICC  |      | TBD  |      | W    |            |

### ■ Input Clock

| Parameter           | Sym. | Min. | Typ. | Max. | Unit | Conditions |
|---------------------|------|------|------|------|------|------------|
| Frequency           |      |      | 25   |      | MHz  |            |
| Frequency Tolerance |      | -50  |      | +50  | PPM  |            |

### ■ I/O Electrical Characteristics

| Parameter           | Sym.                 | Min. | Typ. | Max. | Unit | Conditions                     |
|---------------------|----------------------|------|------|------|------|--------------------------------|
| Input Low Voltage   | I<br>V <sub>IL</sub> |      |      | 0.8  | V    |                                |
| Input High Voltage  | I<br>V <sub>IH</sub> | 2.0  |      |      | V    |                                |
| Output Low Voltage  | O<br>V <sub>OL</sub> |      |      | 0.4  | V    | I <sub>OH</sub> =4mA, VCC=5.0V |
| Output High voltage | O<br>V <sub>OH</sub> | 2.4  |      |      | V    | I <sub>OL</sub> =4mA, VCC=5.0V |

### ■ TX Transceiver Electrical Characteristics

| Parameter                        | Sym. | Min. | Typ. | Max. | Unit | Conditions |
|----------------------------------|------|------|------|------|------|------------|
| <b>Transmitter</b>               |      |      |      |      |      |            |
| Peak Differential Output Voltage | VP   | 0.95 | 1.0  | 1.05 | V    |            |
| Signal Amplitude Symmetry        | -    | 98   | 100  | 102  | %    |            |
| Signal Rise/Fall Time            | TRF  | 3    | 4    | 5    | ns   |            |
| Rise/Fall Time Symmetry          | TRFS |      |      | 0.5  | ns   |            |
| Duty Cycle Distortion            | -    |      |      | 0.5  | ns   |            |
| Overshoot                        | VO   |      |      | 5    | %    |            |

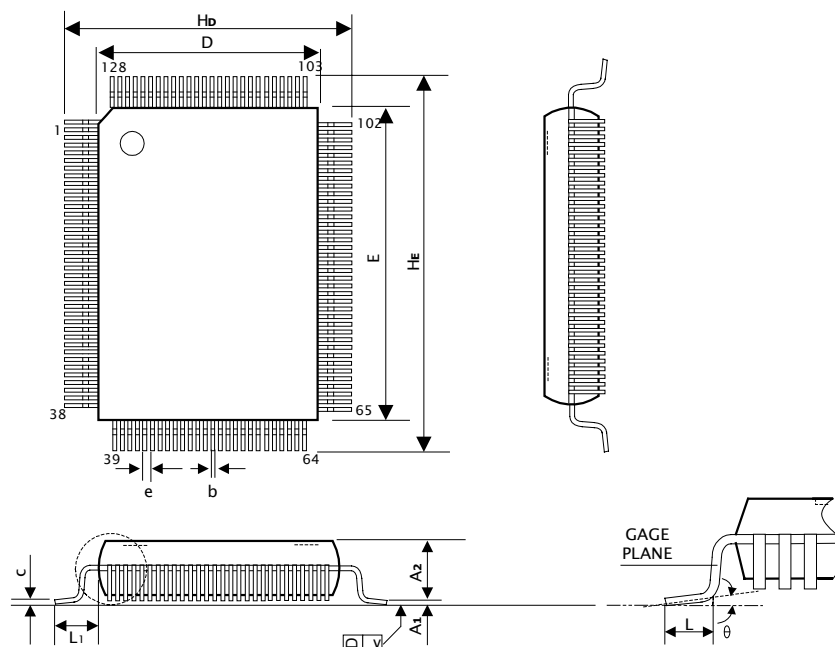
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**Order Information**

| <b>Part No.</b> | <b>PIN</b>   | <b>Notice</b> |
|-----------------|--------------|---------------|
| TP112           | 128 PIN PQFP | -             |

**Package Detail**  
**QFP 128L Outline Dimensions**

Unit: Inches/mm



| Symbol         | Dimensions In Inches |       |       | Dimensions In mm |       |       |
|----------------|----------------------|-------|-------|------------------|-------|-------|
|                | Min.                 | Nom.  | Max.  | Min.             | Nom.  | Max.  |
| A1             | 0.010                | 0.014 | 0.018 | 0.25             | 0.35  | 0.45  |
| A2             | 0.107                | 0.112 | 0.117 | 2.73             | 2.85  | 2.97  |
| b              | 0.007                | 0.009 | 0.011 | 0.17             | 0.22  | 0.27  |
| c              | 0.004                | 0.006 | 0.008 | 0.09             | 0.15  | 0.20  |
| Hb             | 0.669                | 0.677 | 0.685 | 17.00            | 17.20 | 17.40 |
| D              | 0.547                | 0.551 | 0.555 | 13.90            | 14.00 | 14.10 |
| HE             | 0.906                | 0.913 | 0.921 | 23.00            | 23.20 | 23.40 |
| E              | 0.783                | 0.787 | 0.791 | 19.90            | 20.00 | 20.10 |
| e              | -                    | 0.020 | -     | -                | 0.50  | -     |
| L              | 0.025                | 0.035 | 0.041 | 0.65             | 0.88  | 1.03  |
| L <sub>1</sub> | -                    | 0.063 | -     | -                | 1.60  | -     |
| y              | -                    | -     | 0.004 | -                | -     | 0.10  |
| θ              | 0°                   | -     | 12°   | 0°               | -     | 12°   |

**Note:**

1. Dimension D & E do not include mold protrusion.
2. Dimension B does not include dambar protrusion.  
 Total in excess of the B dimension at maximum material condition.  
 Dambar cannot be located on the lower radius of the foot.