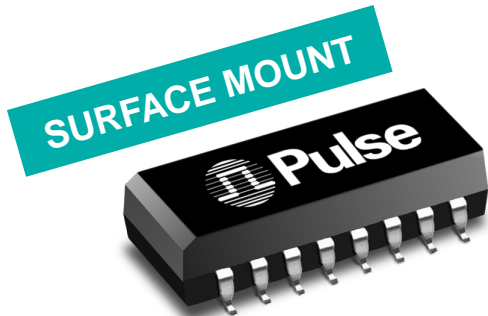






# SURFACE MOUNT 10BASE-T INTERFACE MODULES

Fully Integrated for Adapter, Hub, and Motherboard Applications



-  Available in enhanced or standard design versions
-  Low profile surface mount package
-  E2000 series part numbers designed for AMD, DEC, LSI, Motorola, and National transceivers
-  235°C peak infrared reflow temperature rating

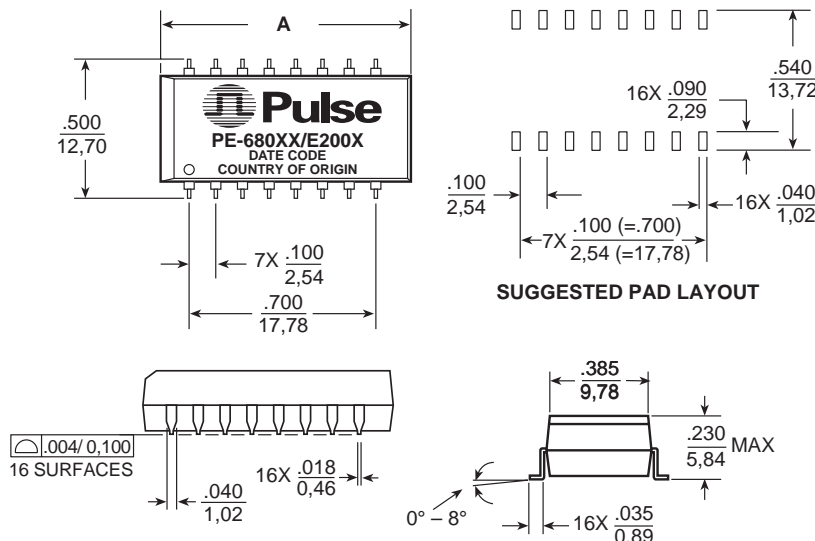
## Electrical Specifications @ 25°C — Operating Temperature 0°C to +70°C

| Part Number | Insertion Loss to 10 MHz (dB MAX) | Attenuation (XMIT) (dB MIN) |        |         | Return Loss 5 to 10MHz (dB MIN) |          | Crosstalk (dB MIN) | Common Mode Rejection (XMIT) (db MIN) |       |        |        |         | Hi-Pot (VRMS MIN) |
|-------------|-----------------------------------|-----------------------------|--------|---------|---------------------------------|----------|--------------------|---------------------------------------|-------|--------|--------|---------|-------------------|
|             |                                   | 30 MHz                      | 40 MHz | 100 MHz | 100 Ω                           | 98 ±13 Ω |                    | 5-10 MHz                              | 5 MHz | 10 MHz | 50 MHz | 100 MHz |                   |
| PE-68025*   | -6.0                              | -35                         | -35    | -35     | -18                             | -15      | -35                | -60                                   | -60   | -55    | -50    | -45     | 1500              |
| PE-68026*   | -1.0                              | -30                         | -35    | -35     | -18                             | -15      | -35                | -60                                   | -60   | -55    | -50    | -45     | 1500              |
| PE-68027*   | -6.5                              | -35                         | -35    | -35     | -18                             | -15      | -35                | -60                                   | -60   | -55    | -50    | -45     | 1500              |
| PE-68056    | -1.0                              | -30                         | -27    | -27     | -18                             | -15      | -30                | -40                                   | -30   | -50    | -45    | —       | 1500              |
| E2001       | -5.5                              | -30                         | -30    | -35     | -18                             | 15       | -30                | -35                                   | -30   | -55    | -50    | —       | 1500              |
| E2003       | -6.0                              | -30                         | -27    | -27     | -18                             | -15      | -35                | -40                                   | -35   | -45    | -30    | —       | 1500              |
| E2004       | -5.0                              | -30                         | -35    | -40     | -18                             | -15      | -25                | -35                                   | -30   | -55    | -50    | —       | 1500              |
| E2007       | -5.0                              | -30                         | -35    | -40     | -18                             | -15      | -25                | -35                                   | -30   | -55    | -50    | —       | 1500              |
| E2009       | -1.0                              | -30                         | -27    | -27     | -18                             | -15      | -35                | -40                                   | -35   | -45    | -45    | —       | 1500              |

**NOTE:** Part numbers indicated with an (\*) are enhanced performance parts. All TX turns ratios are 1:1, except the E2009 which is 1:√2. For the PE-680XX part series, the receive and transmit sides meet IEEE 802.3i 1993 specifications, while transmit side is enhanced for FCC/VDE Class B system emissions requirement. Specifications reflect filter sections. Additional attenuation is due to predistortion resistors.

## Mechanical

### PE-680XX, E200X



| Part Number | Dimension A |
|-------------|-------------|
| E200X       | 1.00/25,40  |
| PE-680XX    | .920/23,37  |

Weight .....2.5 grams  
Tape & Reel .....350/reel  
Tube .....20/tube

Dimensions: Inches  
mm  
Unless otherwise specified, all tolerances are ± .010  
0,25

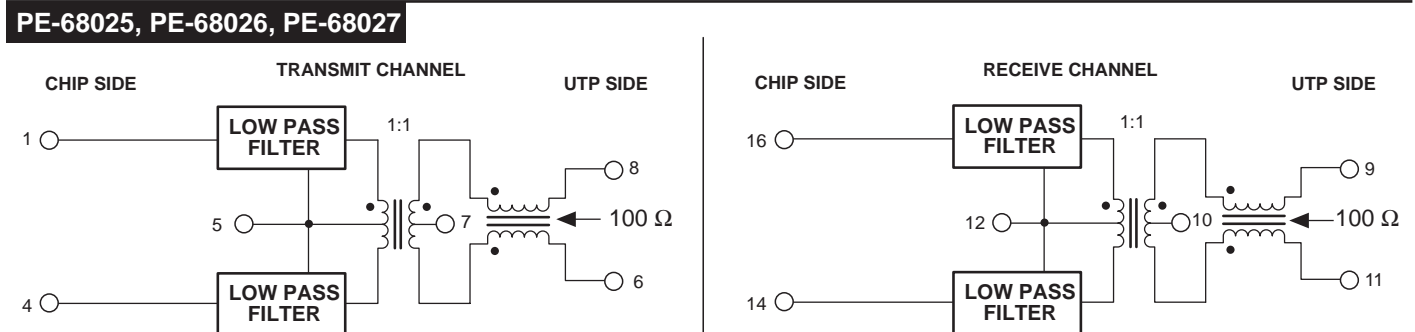
# SURFACE MOUNT 10BASE-T INTERFACE MODULES



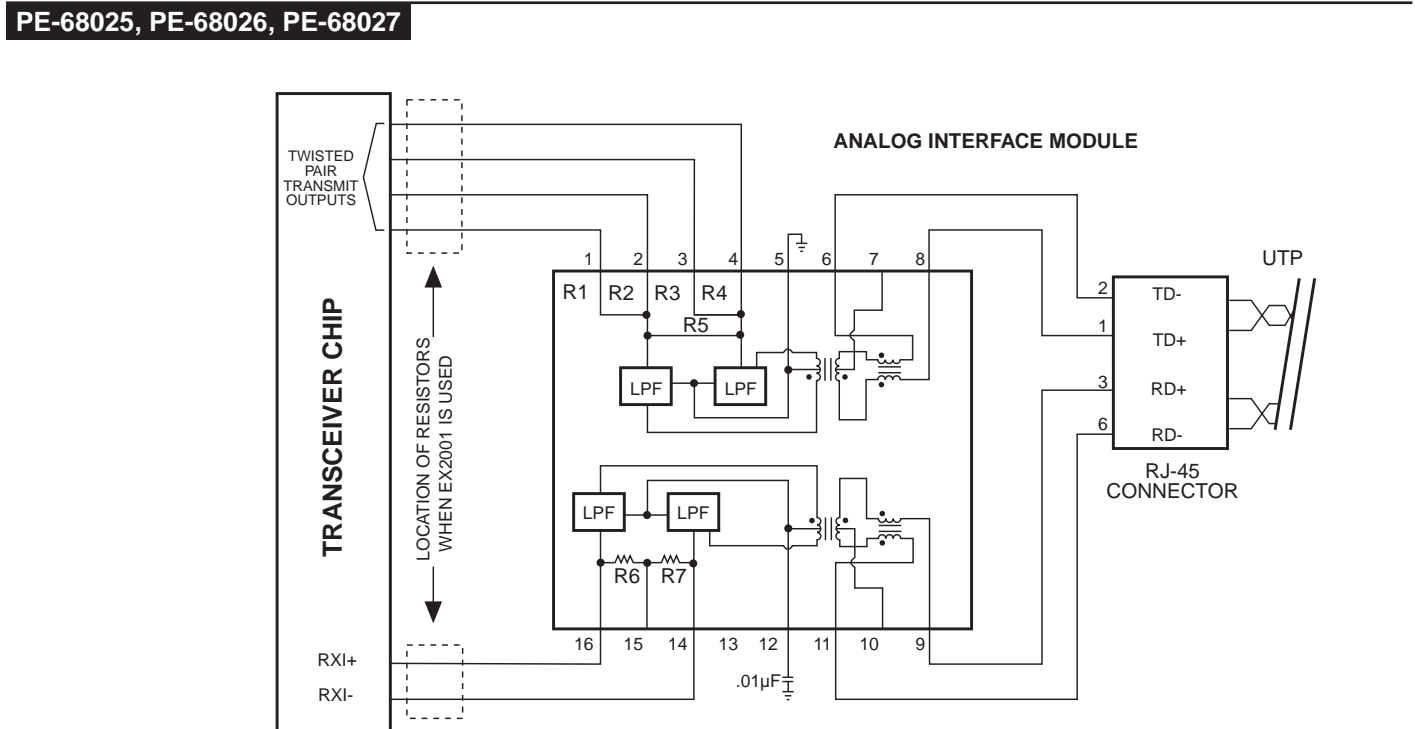
Fully Integrated for Adapter, Hub, and  
Motherboard Applications

| Resistor Values ( $\Omega$ ) |                 |                |                |                |                |      |               |               |
|------------------------------|-----------------|----------------|----------------|----------------|----------------|------|---------------|---------------|
| Part Number                  | IC Manufacturer | R1             | R2             | R3             | R4             | R5   | R6            | R7            |
| PE-68025                     | AMD             | TXD (+) = 61.9 | TXP (+) = 422  | TXD (-) = 61.9 | TXP (-) = 422  | 1.2k | RX (+) = 49.9 | RX (-) = 49.9 |
| PE-68026                     | Various         | N/A            | N/A            | N/A            | N/A            | N/A  | N/A           | N/A           |
| PE-68027                     | National        | TXOD (-) = 274 | TXO (+) = 66.5 | TXO (-) = 66.5 | TXOD (+) = 274 | 806  | RX (+) = 49.9 | RX (-) = 49.9 |

## Schematics



## Typical Application Circuit



# SURFACE MOUNT 10BASE-T INTERFACE MODULES

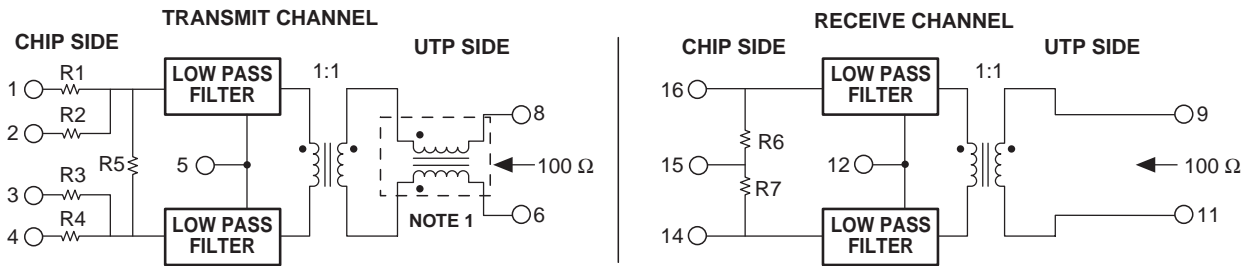


Fully Integrated for Adapter, Hub, and  
Motherboard Applications

| Resistor Values ( $\Omega$ ) |                 |       |       |      |       |       |      |      |
|------------------------------|-----------------|-------|-------|------|-------|-------|------|------|
| Part Number                  | IC Manufacturer | R1    | R2    | R3   | R4    | R5    | R6   | R7   |
| E2001                        | National        | 348.0 | 53.6  | 53.6 | 348.0 | 806   | 49.9 | 49.9 |
| E2003                        | AMD             | 61.9  | 422.0 | 61.9 | 422.0 | 1,210 | 49.9 | 49.9 |
| E2004                        | LSI             | 390.0 | 63.4  | 390  | 63.4  | N/A   | 49.9 | 49.9 |
| E2007                        | Motorola        | 39.0  | N/A   | 39   | N/A   | N/A   | 49.9 | 49.9 |

## Schematics

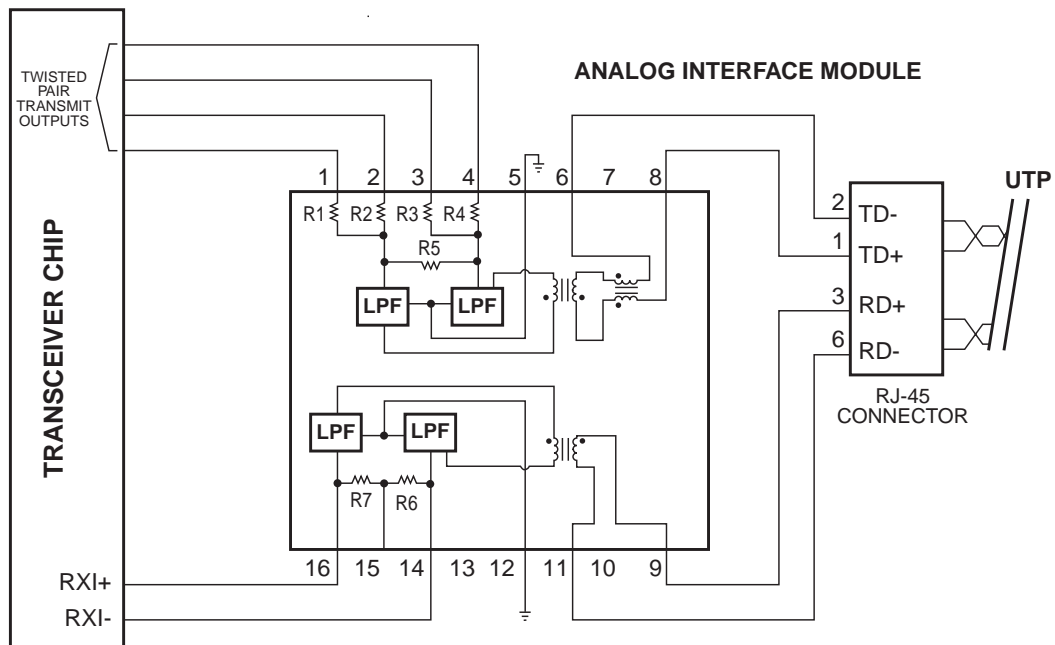
E2001, E2003, E2004, E2007



Note: Common Mode Choke on transmit channel for E2001, E2003, E2004.

## Typical Application Circuit

E2001, E2003, E2004, E2007



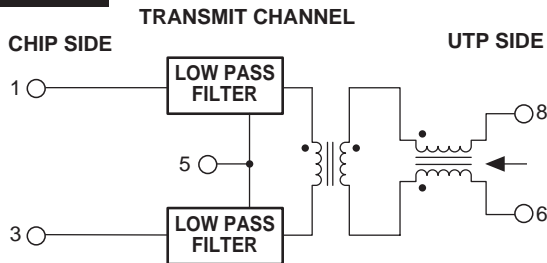
# SURFACE MOUNT 10BASE-T INTERFACE MODULES



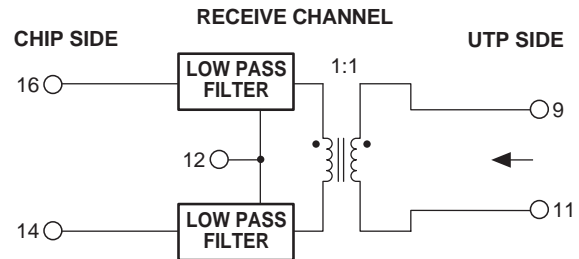
## Fully Integrated for Adapter, Hub, and Motherboard Applications

### Schematics

E2009, PE-68056



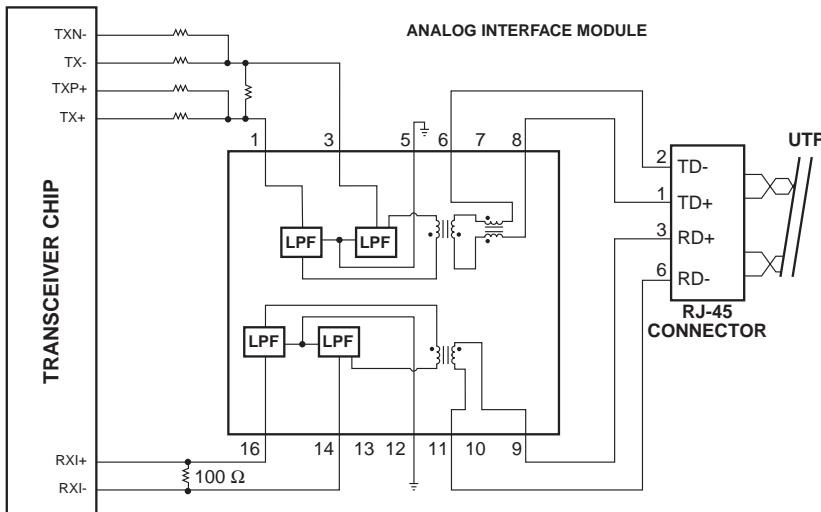
Turns Ratio for Transmit: PE-68056 is 1:1; E2009 is 1:  $\sqrt{2}$ .



**NOTE:** The PE-68056 is designed for use with most transceivers requiring a turns ratio of 1:1 on transmit. The E2009 is designed for use with DEC and most other transceivers requiring a turns ratio of 1:  $\sqrt{2}$  on transmit.

### Typical Application Circuit

E2009, PE-68056



**NOTE:** Resistors are NOT included in module.

### Application Notes

Each module in this application contains low pass filters, isolation transformers, and common mode chokes. These components provide impedance matching, equipment isolation, and EMI suppression to comply with IEEE 802.3 requirements. The E2001, E2003, E2004, E2007, PE-68025, and PE-68027 also provide the necessary data and pre-emphasis resistors recommended by most transceiver manufacturers.

User compliance with FCC/CSPR Class B requirements can be achieved by applying rigorous design guidelines to suppress noise mechanisms. Attention to high frequency signal paths, proper PCB grounding techniques, and component placement are critical. Pins 5 and 12, when grounded, provide noise return paths. For PE-68025, PE-68026, and PE-68027, one of these pins (typically pin 12) must be decoupled with a bypass capacitor. The E2001, E2003, E2004, E2007, E2009, and PE-68056 *do not require* the bypass capacitor, and pins 5 and 12 may be connected directly to ground.

Recommended module orientation with respect to the RJ-45 connector is illustrated in each application circuit. Output pins 6 through 11 should be routed with short, matched traces to the connector for optimum EMI performance.

Surface mount devices manufactured by Pulse are designed to meet all published specifications after exposure to surface mount soldering temperatures. The products in this data sheet are transfer molded in I.C. style packaging, making them robust enough to withstand convection and infrared reflow solder temperatures up to 235°C. In addition, compliant leads provide excellent solder-joint reliability with a coplanarity of  $\pm 0.02$ " (0.05 mm).

Modules are shipped in tubes unless Tape & Reel is specified. Please add the suffix "T" (i.e. PE-68025T) for Tape & Reel orders in increments of 350 pieces.

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