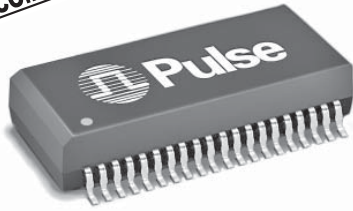






# 10BASE-T QUAND SMT TRANSFORMER MODULES



-  For RoHS part add suffix NL<sup>5</sup>
-  Peak solder temperature rating per Table 5-2 in IPC/ JEDEC J-STD-020C
-  Family of parts – common foot print and pinout with a choice of filtering for customized EMI performance
-  Space-efficient – 12 ports across 3.6 inches for optimal PCB layout

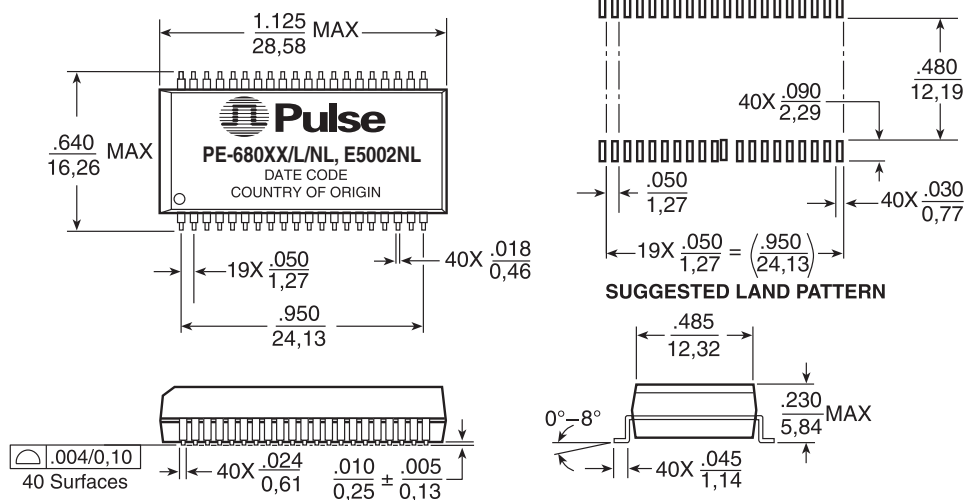
## Electrical Specifications @ 25°C — Operating Temperature 0°C to 70°C

Part Number	RoHS	Transformer Turns Ratio (±2%) Transmit	Sine Wave Inductance OCL (µH MIN) <sup>1</sup>	Interwinding Capacitance C <sub>ww</sub> (pF MAX) <sup>2</sup>	Leakage Inductance L <sub>L</sub> (µH MIN) <sup>1</sup>	Return Loss 5-10 MHz (db MIN)		Common Mode Rejection Transmit (dB MIN)					Hipot (Vrms MIN)
						100 Ω	98 ±13 Ω	5 MHz	10 MHz	50 MHz	100 MHz	200 MHz	
PE-68051 <sup>3</sup>	not available	1CT:1CT	100	—	—	-20	-15	-55	-50	-35	-25	-15	1500
PE-68062L	NL <sup>6, 7d</sup>	1CT:1.141CT	150	10	0.30	-20	-15	-60	-50	-30	-25	-20	1500
PE-68065L	not available	1CT:1.141CT	150	10	0.30	-20	-15	-60	-50	-30	-20	-15	1500
E5002 <sup>1</sup>	NL <sup>7d</sup>	1CT:2CT	180	10	0.30	-20	-15	-50	-40	-30	-20	-14	1500

1. OCL are measured at 20mVrms, 100KHz.
  2. C<sub>ww</sub> and L<sub>L</sub> are measured at 20mVrms, 100KHz.
  3. PE-68051 contains additional low pass filtering.
  4. For Tape & Reel packaging, add a suffix "T" to the end of the part number when ordering. e.g. E5002T.
  5. Add suffix NL for RoHS compliant parts, e.g: E5002 changes to E5002NL or E5002NLT (for Tape & Reel).
  6. Contact Pulse for RoHS compliant part availability.
  7. MSL=Moisture Sensitivity Level a=1 b=2 c=3 d=4.
- GENERAL SPECIFICATIONS:** U.S. Patent No. 5,015,981
- Insertion Loss:** Typically -0.5 dB maximum from 1 to 10 MHz PE-68051 typically is -1dB maximum.
- Crosstalk:** From 1 to 10 MHz is -35 dB minimum.

## Mechanical

### PE-68051, PE-68062LNL, PE68065L, E5002NL



Dimensions:  $\frac{\text{Inches}}{\text{mm}}$

Unless otherwise specified, all tolerances are  $\pm \frac{.010}{0,25}$

Weight ..... 4.0 grams  
 Tube ..... 15/tube  
 Tape & Reel ..... 250/reel

# 10BASE-T QUAND SMT TRANSFORMER MODULES



## Application Notes

Pulse's 10BASE-T Quad SMT transformer modules are designed to interface with transceiver chips offered with internal wave shaping and filtering. Pulse developed the modules working closely with IC chip vendors for this "filter-on-chip" application such as: AMD, Crystal, Level One, National Semiconductor and Texas Instruments. The Pulse modules are available with varying turns ratios optimized for available transceiver chips. A cross-reference table listing chip vendor and part number by Pulse part number is illustrated below.

The Pulse modules offer different levels of electrical performance to meet all applications.

The Pulse PE-68065L contains transmit and receive isolation transformers to maintain signal integrity, suppress common mode noise, and supply equipment isolation per the IEEE 802.3 standard.

The Pulse PE-68062LNL and E5002NL provide transmit and receive isolation transformers as well as the high impedance common mode chokes. The common mode chokes are incorporated for added EMI suppression and are often necessary for FCC and CISPR 22 Class B certification.

The Pulse PE-68051 also provides transmit and receive transformers, transmit chokes and includes a low pass filter on each transmit path. This added transmit filtering when combined with the internal filtering of the IC improves the attenuation for designers striving to achieve compliance with the IEEE 802.3 standard.

In typical multiport applications, many channels are in close proximity. User compliance with FCC/CISPR 22 Class B requirements can be achieved

by applying rigorous design guidelines to suppress noise mechanisms. Attention to high-frequency signal paths, good PCB grounding techniques, and component placement are critical. Refer to the suggested layout on page 8.

All eight modules are encapsulated in a 40-pin surface mountable package. Mechanical features include:

1. **Lightweight** - approximately 4 grams for rapid pick-and-place.
2. **Compliant leads** - provide excellent solder joint reliability.
3. **Low profile** - under 6 mm to accommodate industry standard pick and place equipment capabilities.
4. **Compact form factor** - footprint allows the user to lay out four ports within the space of two double-stacked RJ-45 connectors or a total of 12 ports to a high density 50-pin connector.

Modules are packaged in tubes unless Tape & Reel is specified. Please add the suffix "T" such as PE-68049LT for Tape & Reel packaging, in increments of 250 pieces.

Pulse also offers a full line of 10Base-T filter modules, designed to IEEE specifications. We provide other pin-out configurations within this package. For more information, please contact one of the locations listed on the back page of this data sheet or check the Product Finder on the Pulse Web site at <http://www.pulseeng.com>.

### IC Manufacturers

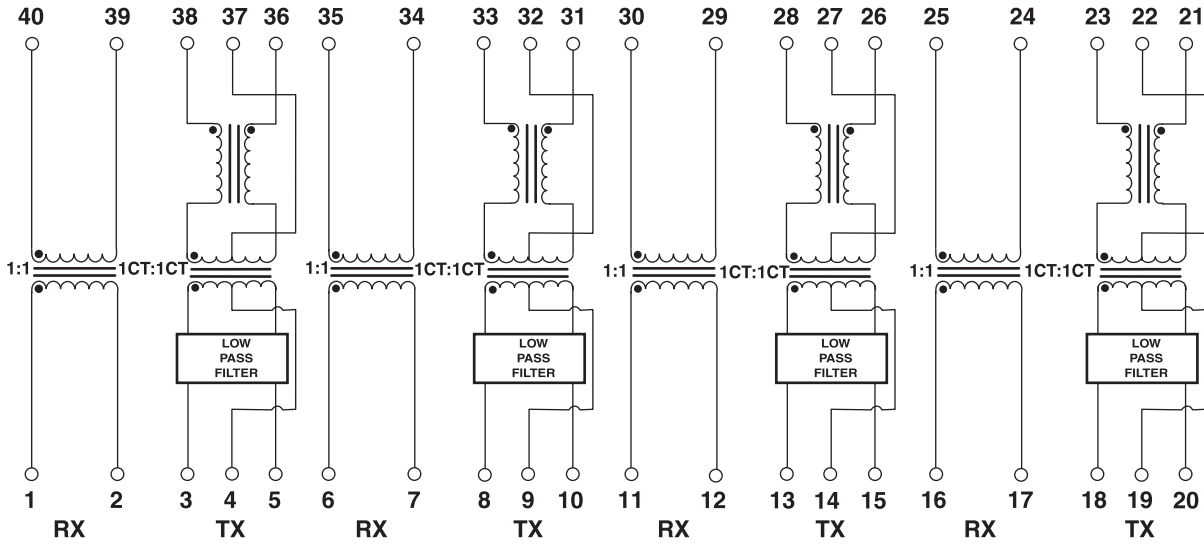
Pulse Part Number	AMD's QuIET™ QuEST™ eIMR™, eIMR+™	Crystal Semiconductor's CS8904	Level One's LXT901/944 and LXT 914	National Semiconductor's DP 83953	Texas Instrument's TNETE2004
PE-68051	Yes	—	—	—	—
PE-68062LNL	—	Yes	Yes	—	Yes
PE-68065L	—	Yes	Yes	—	Yes
E5002NL	—	—	—	Yes	—

# 10BASE-T QUAND SMT TRANSFORMER MODULES

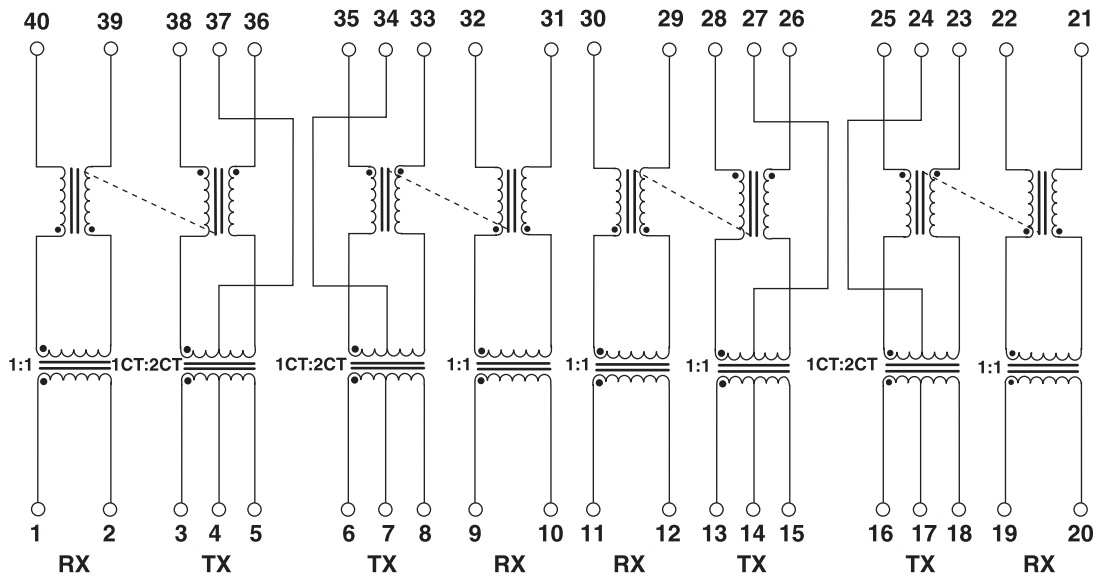


## Schematics

### PE-68051



### E5002NL

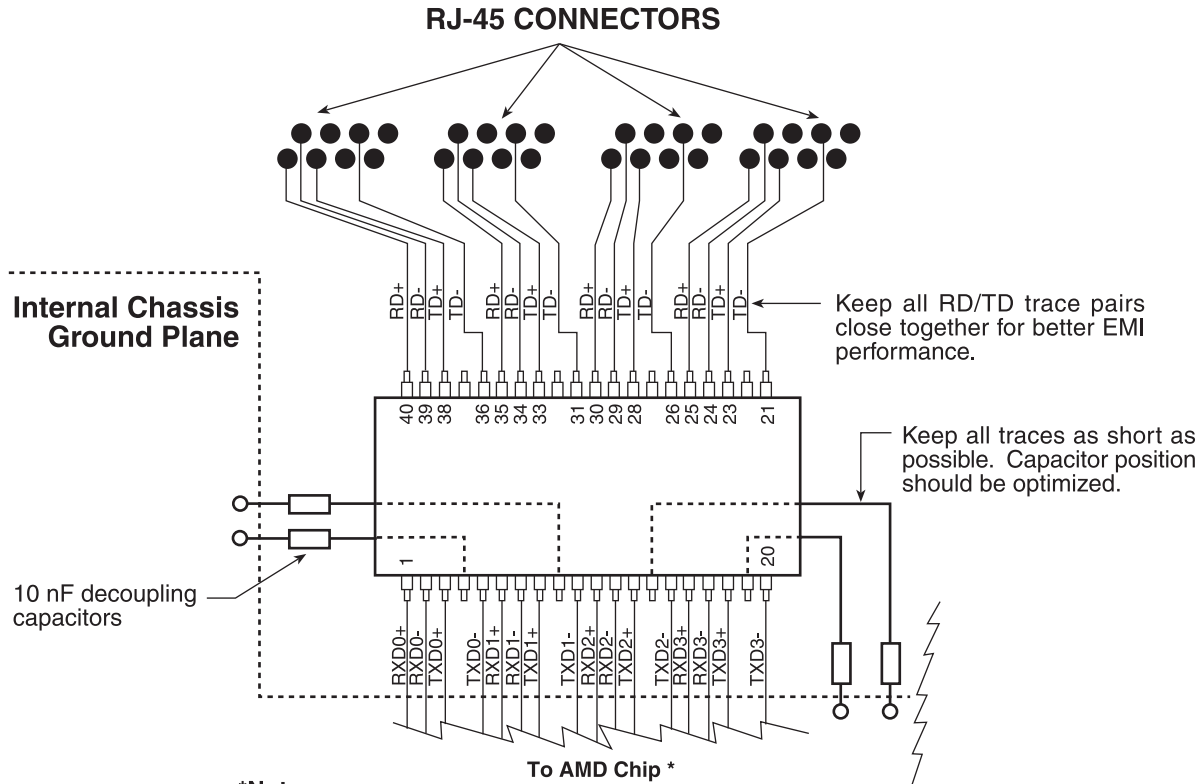


# 10BASE-T QUAND SMT TRANSFORMER MODULES

For AMD's QuIET™, QuEST™, eIMR™, and eIMR+™ Device Chipsets

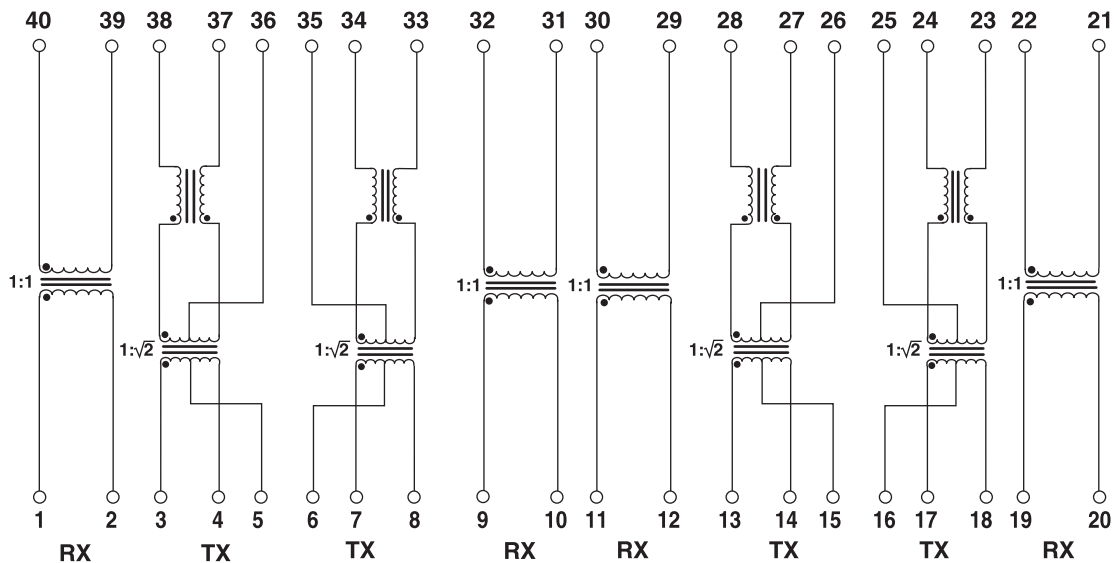


## Recommended Layout



**\*Note:**  
 QuIET™ (Am 79C988), QuEST™ (Am79C989), eIMR™ (Am 79C984A), or  
 eIMR+™ (Am 79C985). See AMD application notes for more detailed information.

### PE-68062LNL



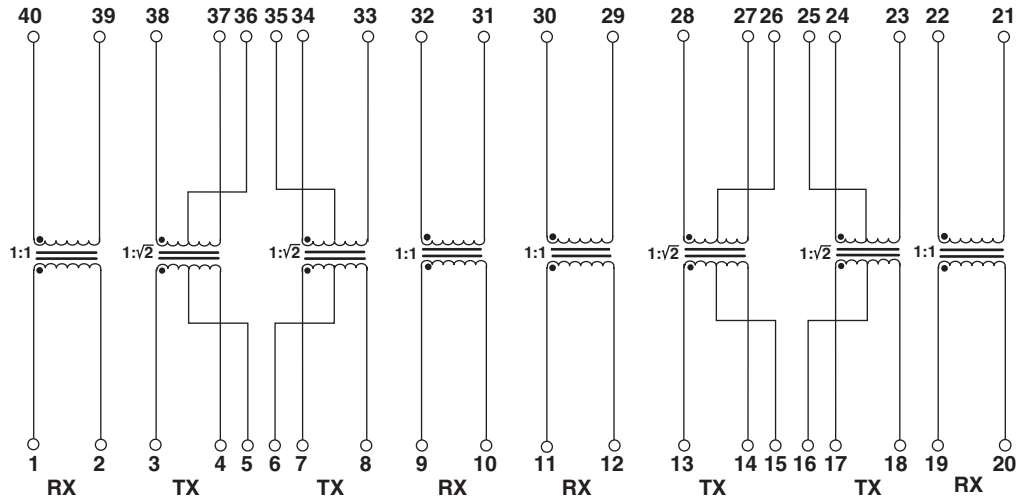
# 10BASE-T QUAD SMT TRANSFORMER MODULES

Designed for Level One, Texas Instruments, and Crystal Multiport ICs

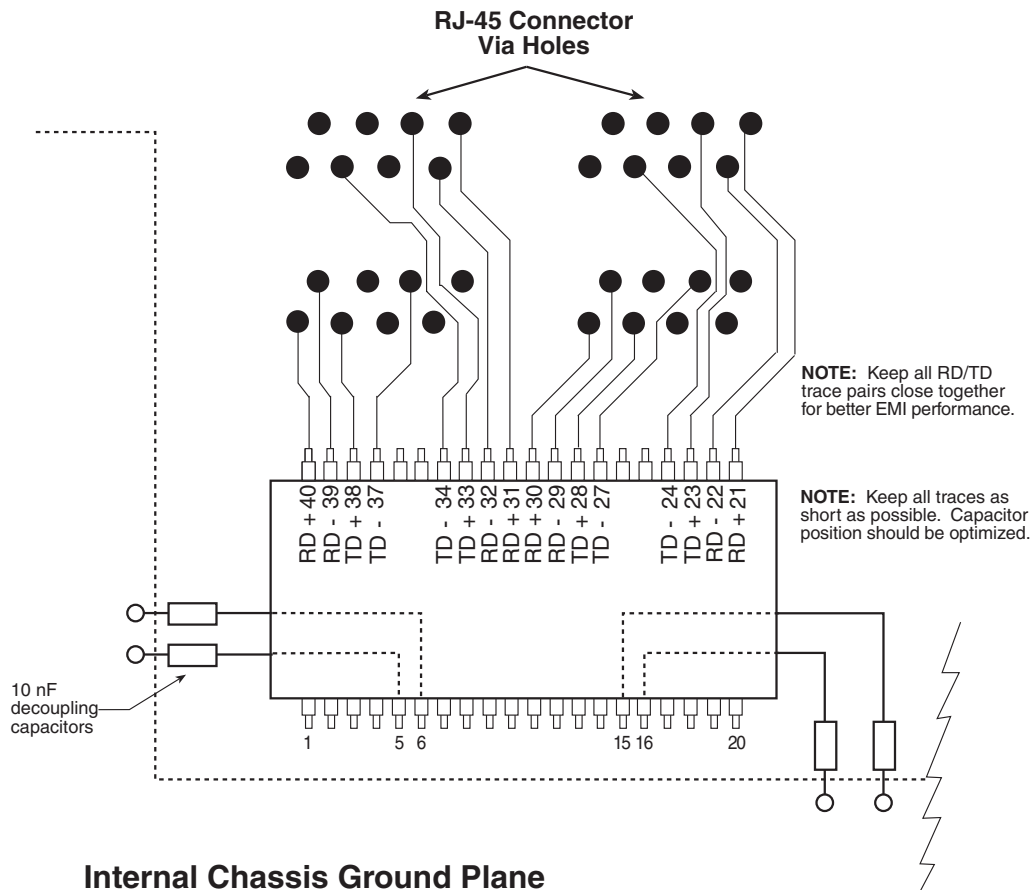


## Schematics

PE-68065L



## Recommended Layout for Multi-port Hubs with Double-stacked RJ-45s

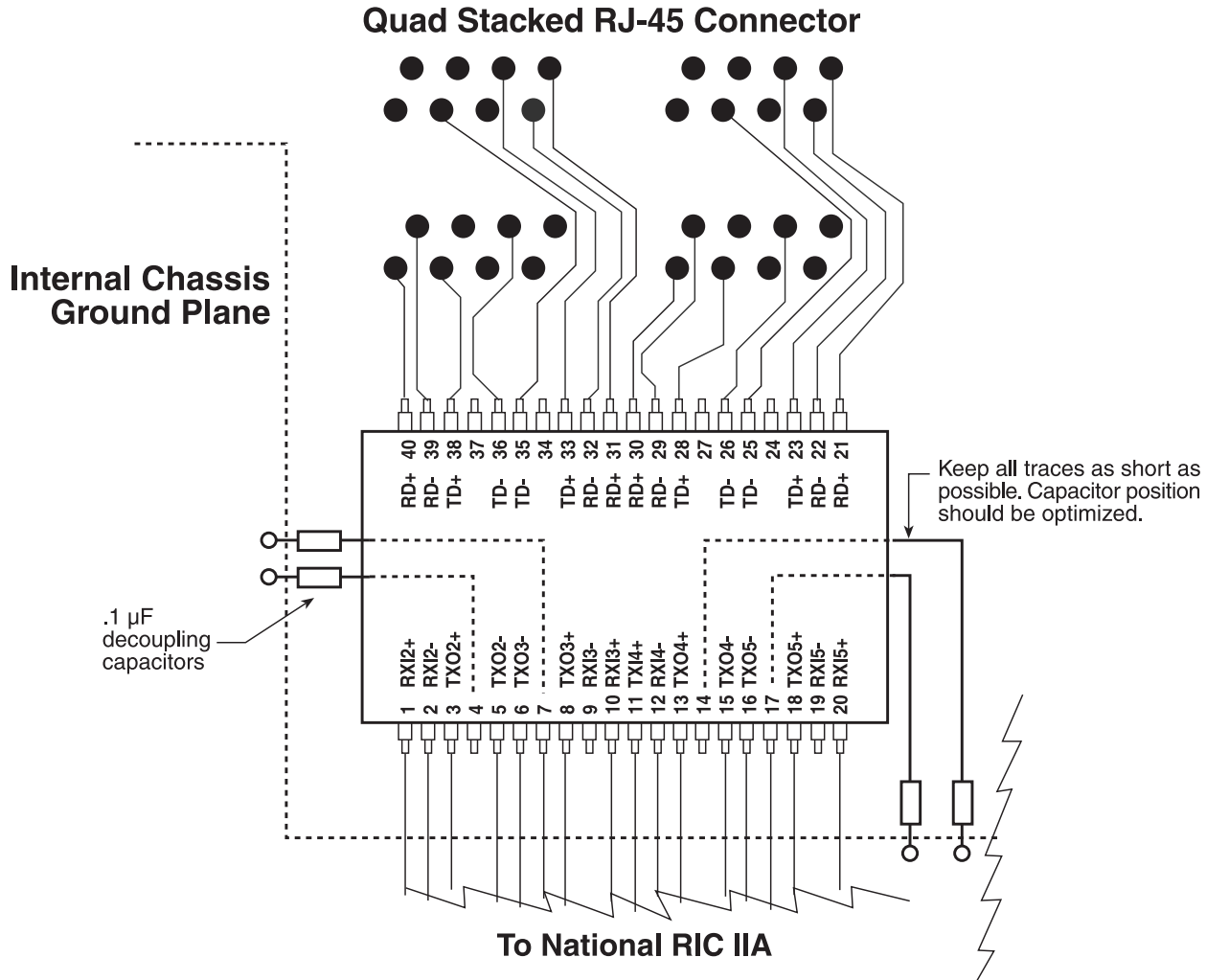


# 10BASE-T QUAD SMT TRANSFORMER MODULES

For Use with National Semiconductor's  
RIC IIA™



## Recommended Layout



### For More Information:

#### Pulse Worldwide Headquarters

12220 World Trade Dr.  
San Diego, CA 92128  
U.S.A.

[www.pulseeng.com](http://www.pulseeng.com)

Tel: 858 674 8100  
Fax: 858 674 8262

#### Pulse Europe

Einsteinstrasse 1  
D-71083 Herrenberg  
Germany

Tel: 49 7032 7806 0

Fax: 49 7032 7806 135

#### Pulse China Headquarters

B402, Shenzhen Academy of  
Aerospace Technology Bldg.  
10th Kejinan Rd.  
High-Tech Zone  
Nanshan District  
Shenzen, PR China 518057

TEL: 86 755 33966678  
FAX: 86 755 33966700

#### Pulse North China

Room 1503  
XinYin Building  
No. 888 YiShan Rd.  
Shanghai 200233  
China

Tel: 86 21 54643211/2  
Fax: 86 21 54643210

#### Pulse South Asia

135 Joo Seng Rd.  
#03-02  
PM Industrial Bldg.  
Singapore 368363

TEL: 65 6287 8998  
FAX: 65 6280 0080

#### Pulse North Asia

No. 26, Kao Ching Rd.  
Yang Mei Chen  
Taoyuan Hsien  
Taiwan  
R. O. C.

Tel: 886 3 4643715  
Fax: 886 3 4641911

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