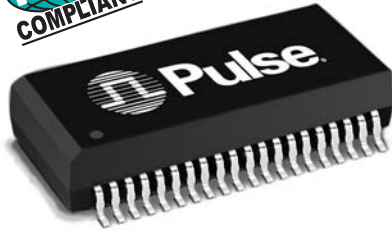


# 10BASE-T QUAND SMT TRANSFORMER MODULES



- 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 <sup>4</sup>	RoHS <sup>5</sup>	Transformer Turns Ratio (±2%)	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 MAX) <sup>2</sup>	Return Loss 5 to 10 MHz (dB MIN)		Common Mode Rejection TX (dB MIN)				Hipot (Vrms MIN)	
						100Ω	98 ±13Ω	5MHz	10MHz	50MHz	100MHz		200MHz
PE-68049L	not available	1CT:1CT	150	10	0.30	-20	-15	-60	-50	-35	-25	-20	1500
PE-68050L	NL <sup>7d</sup>	1CT:1CT	150	10	0.30	-20	-15	-60	-50	-35	-25	-20	1500
PE-68051 <sup>3</sup>	not available	1CT:1CT	100	—	—	-20	-15	-55	-50	-35	-25	-15	1500
PE-68062L	6, 7d	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>	CT:2CT	180	10	0.30	-20	-15	-50	-40	-30	-20	-14	1500
E5007	NL <sup>7d</sup>	1CT:1CT	150	10	0.30	-20	-15	-60	-50	-34	-25	-18	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.

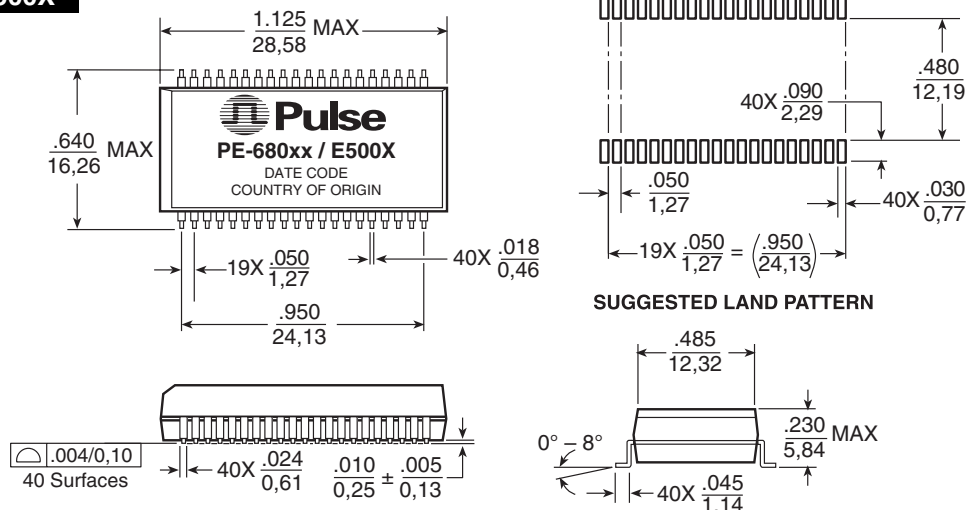
**GENERAL SPECIFICATIONS:** U.S. Patent No. 5,015,981

**Insertion Loss:** Typically -0.5dB maximum from 1 to 10MHz  
PE-68051 typically is -1dB maximum.

**Crosstalk:** From 1 to 10MHz is -35dB minimum.

## Mechanical

### PE-680XX/E500X



Dimensions: Inches  
mm

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

Weight . . . . . 4.0 grams

Tube . . . . . 15/tube

Tape & Reel . . . . . 250/reel

USA 858 674 8100 • UK 44 1483 401 700 • France 33 3 84 35 04 04 • Singapore 65 6287 8998 • Shanghai 86 21 32181071 • China 86 769 5538070 • Taiwan 886 2 26980228

# 10BASE-T QUAD 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 the transceiver chips available. 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-68050L**, **PE-68065L** and **E5007** contain 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-68049L**, **PE-68062L** and **E5002** 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 multipoint 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>.

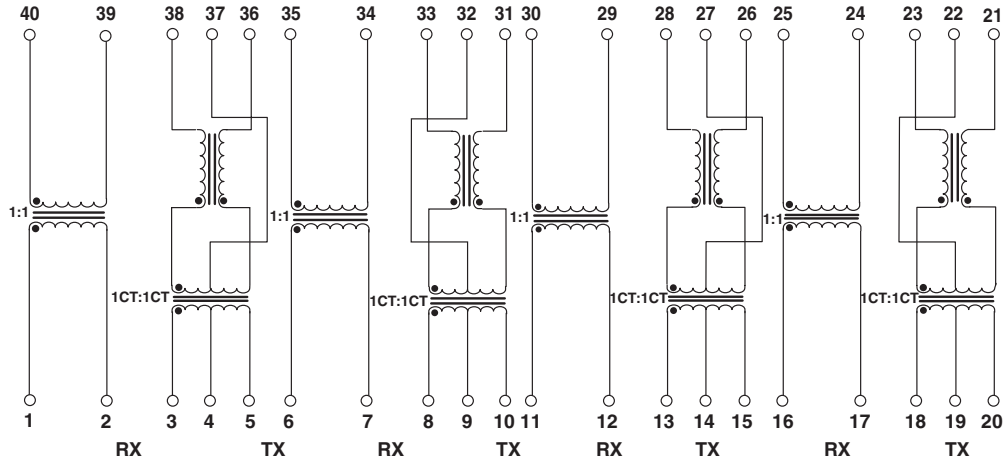
IC Manufacturers					
Pulse Part Number	AMD's QUIET™ QuEST™ eIMR™, eIMR+™	Crystal Semiconductor's CS8904	Level One's LXT901/944 and LXT 914	National Semiconductor's DP 83953	Texas Instrument's TNETE2004
PE-68049L	Yes				
PE-68050L	Yes				
PE-68051	Yes				
PE-68062L		Yes	Yes		Yes
PE-68065L		Yes	Yes		Yes
E5002				Yes	
E5007	Yes				

# 10BASE-T QUAND SMT TRANSFORMER MODULES

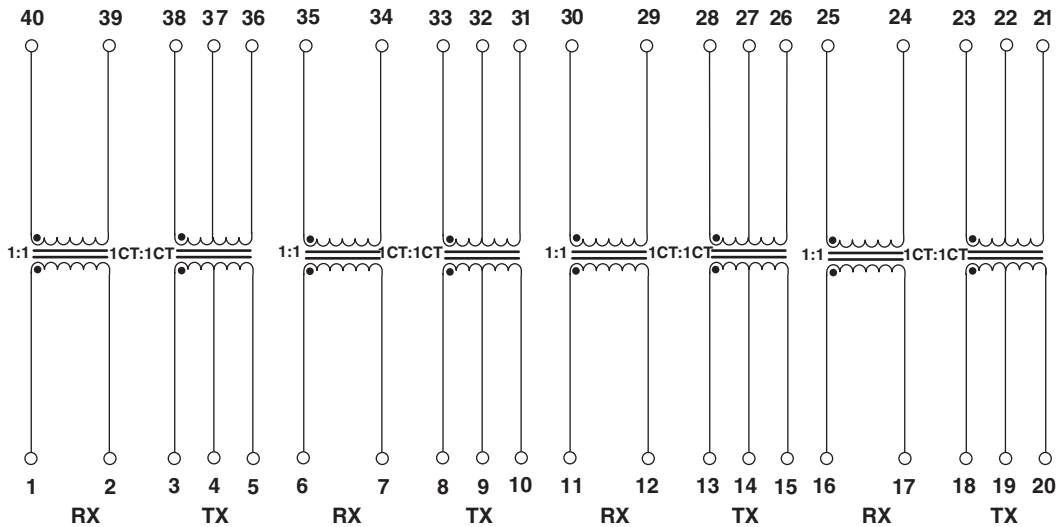


## Schematics

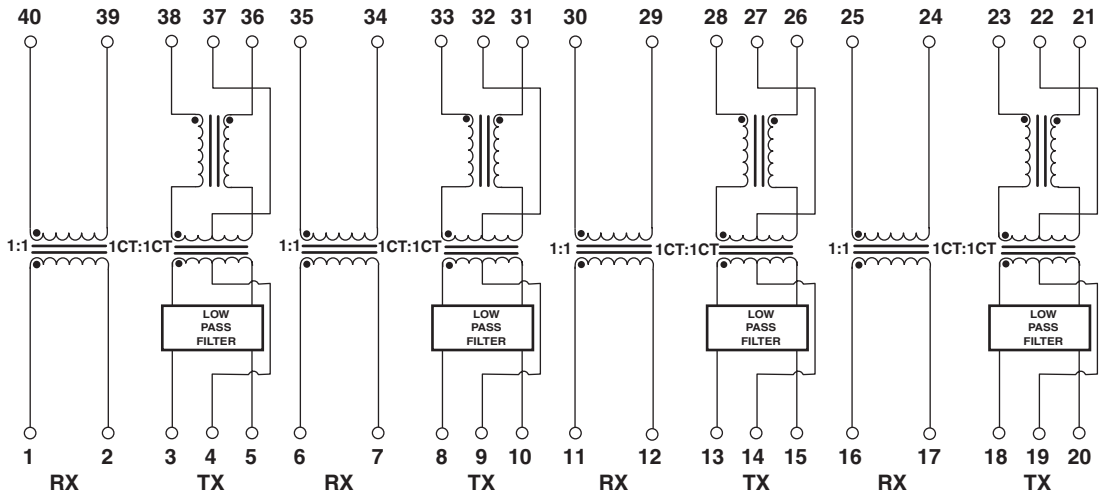
**PE-68049L**



**PE-68050L**



**PE-68051**



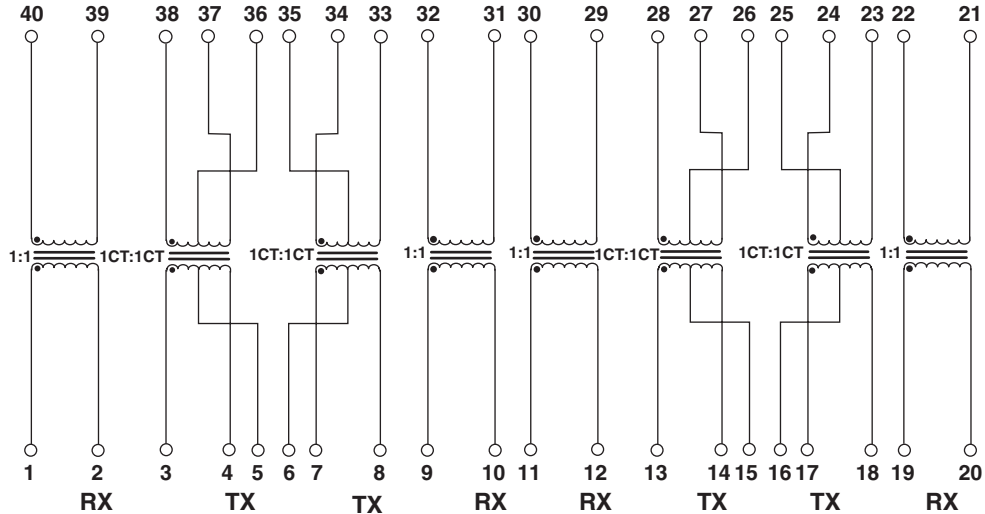
# 10BASE-T QUAND SMT TRANSFORMER MODULES

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

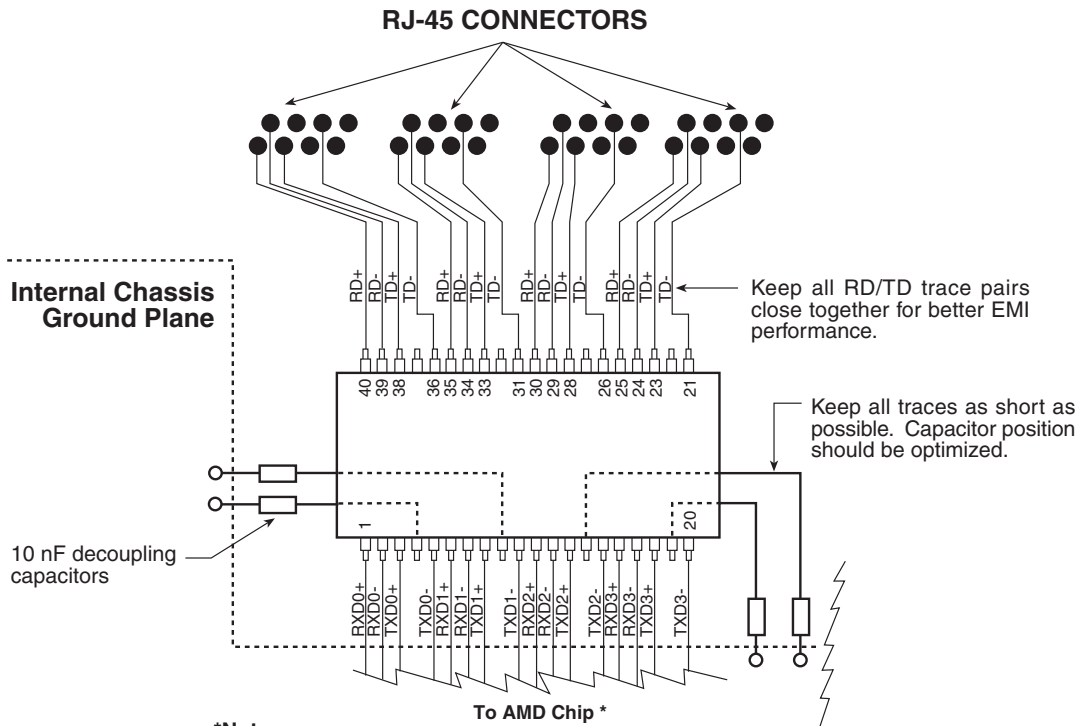


## Schematics (continued)

E5007



## Recommended Layout



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

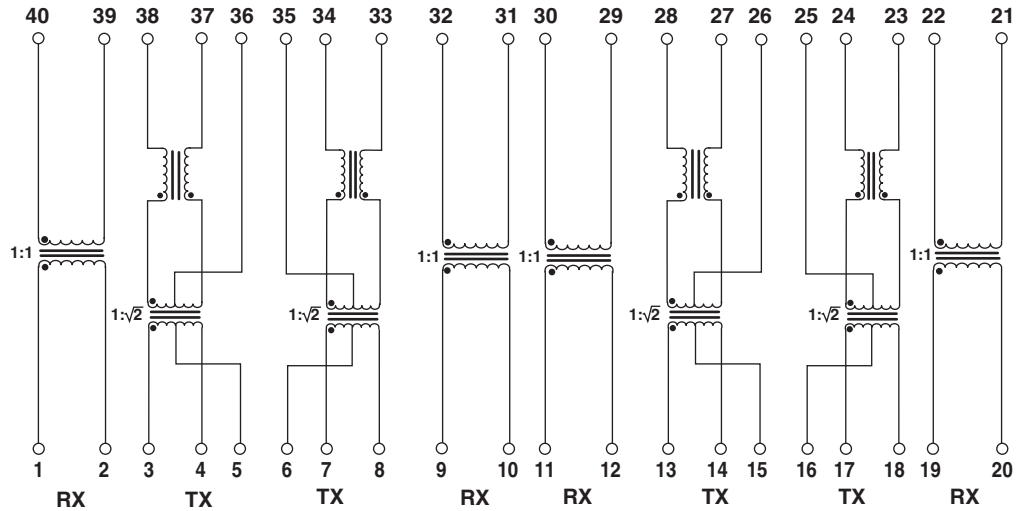
# 10BASE-T QUAD SMT TRANSFORMER MODULES

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

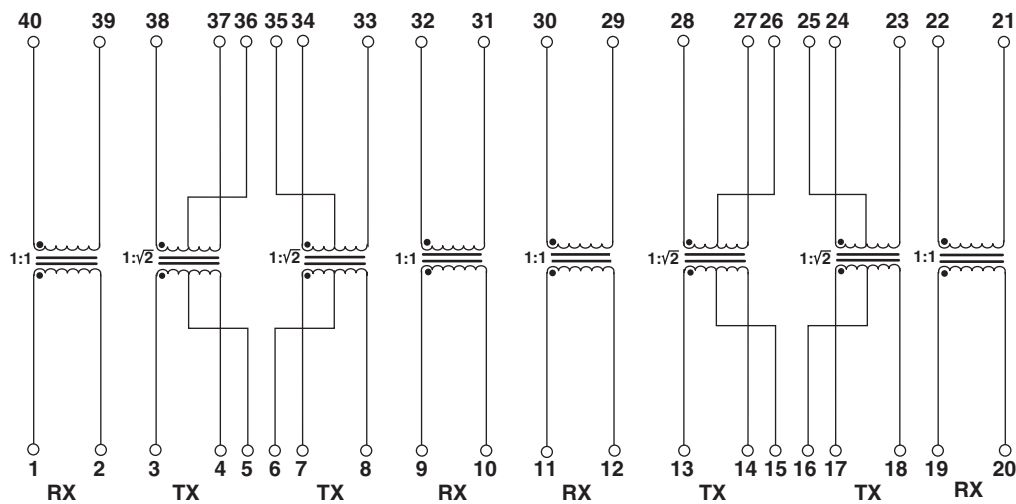


## Schematics

PE-68062L



PE-68065L

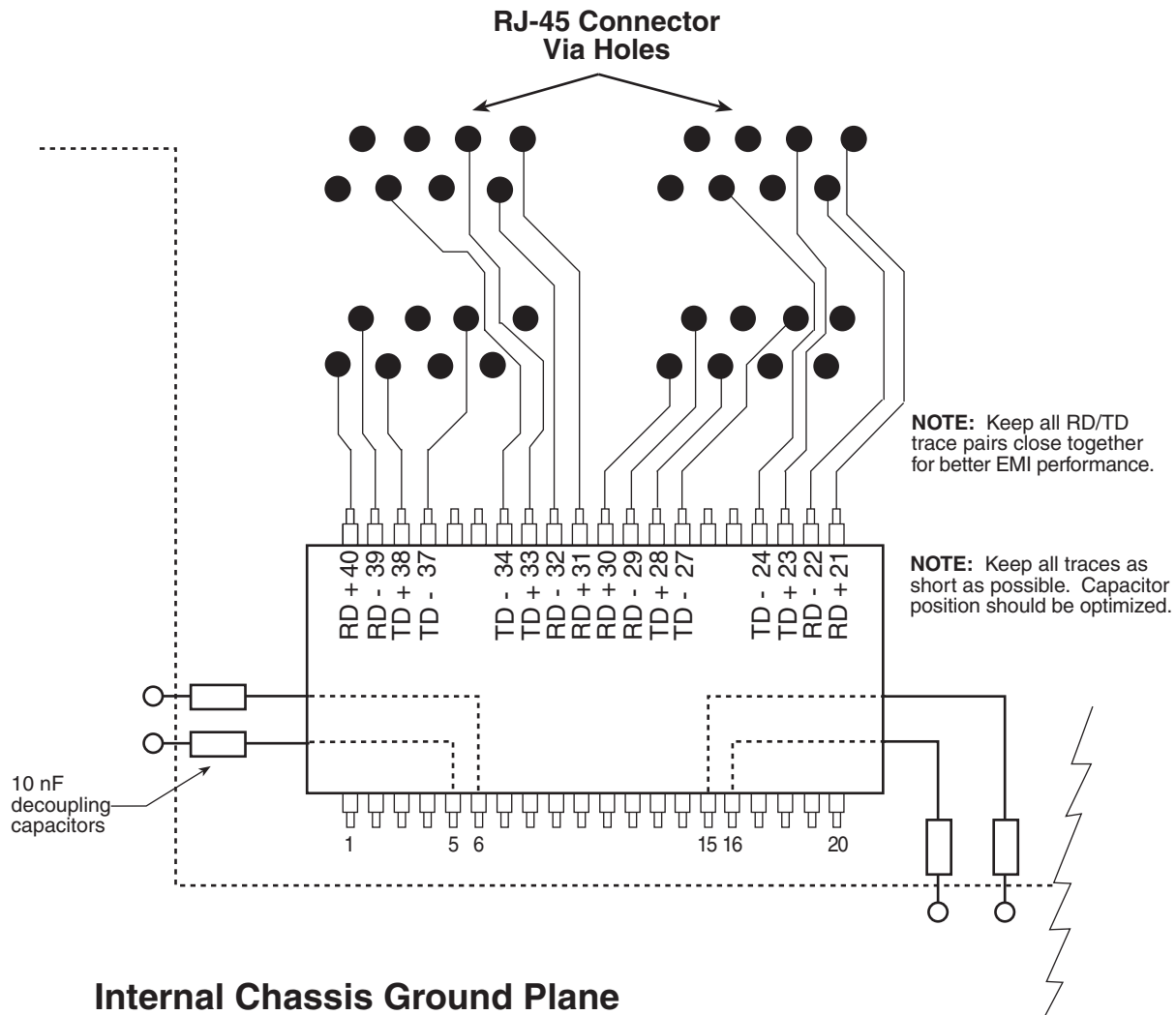


# 10BASE-T QUAD SMT TRANSFORMER MODULES

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



## Recommended Layout for Multi-Port Hubs with Double-Stacked RJ-45s



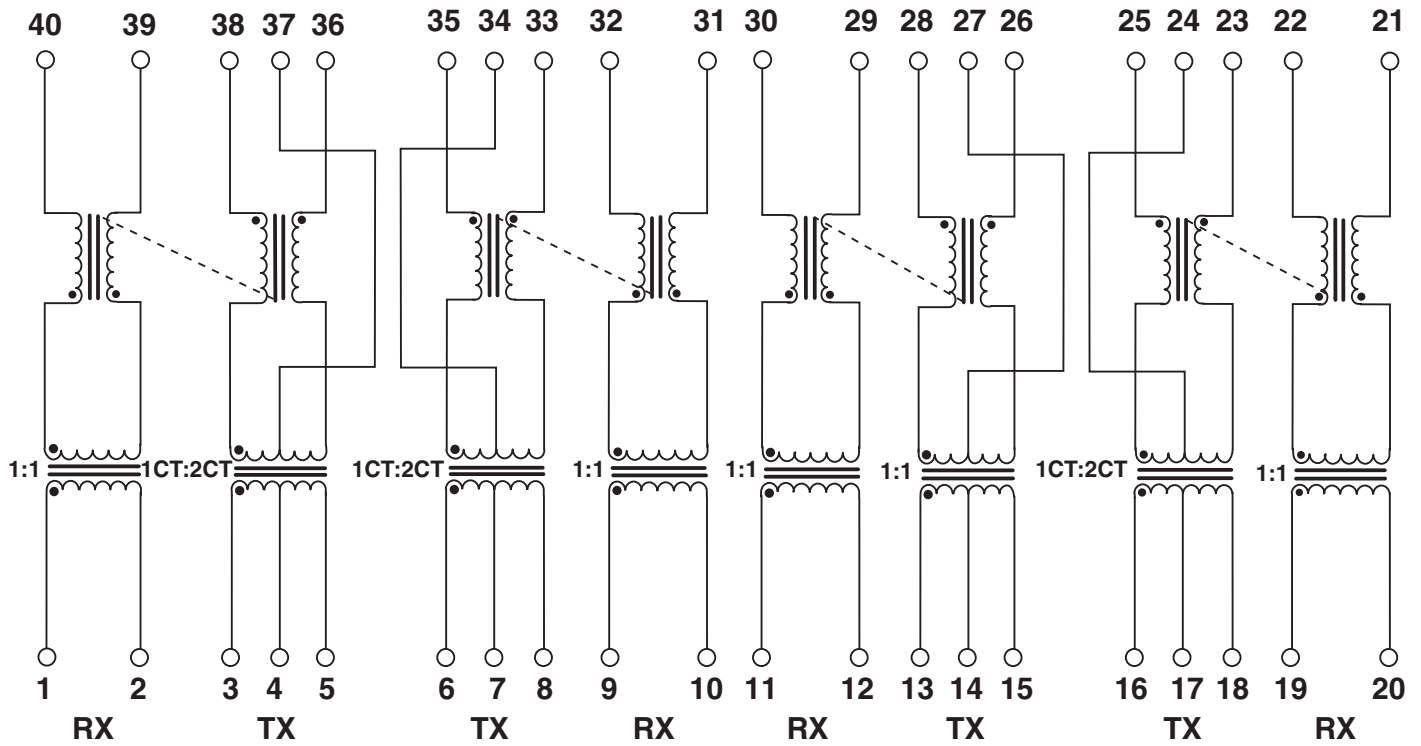
# 10BASE-T QUAD SMT TRANSFORMER MODULES

For Use with National Semiconductor's  
RIC IIA™



## Schematics (continued)

E5002

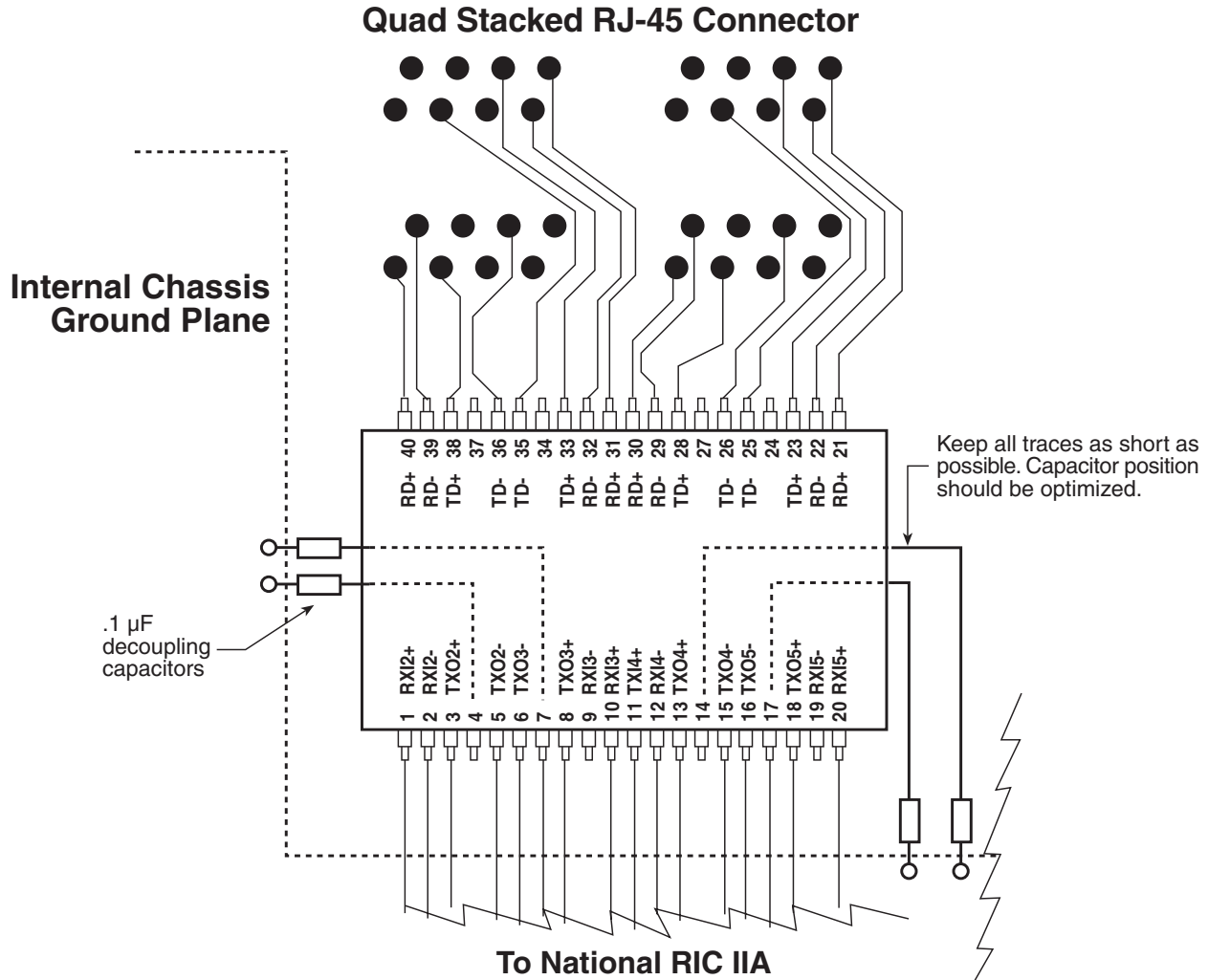


# 10BASE-T QUAD SMT TRANSFORMER MODULES

For Use with National Semiconductor's  
RIC IIA™



## Recommended Layout



### For More Information:

Pulse Worldwide Headquarters	Pulse Northern Europe	Pulse Southern Europe	Pulse China Headquarters	Pulse North China	Pulse South Asia	Pulse North Asia
12220 World Trade Drive San Diego, CA 92128 U.S.A. <a href="http://www.pulseeng.com">www.pulseeng.com</a> TEL: 858 674 8100 FAX: 858 674 8262	3 Huxley Road Surrey Research Park Guildford, Surrey GU2 5RE United Kingdom TEL: 44 1483 401700 FAX: 44 1483 401701	Zone Industrielle F-39270 Orgelet France TEL: 33 3 84 35 04 04 FAX: 33 3 84 25 46 41	No. 1 Industrial District Changan, Dongguan China TEL: 86 769 5538070 FAX: 86 769 5538870	Room 1002 No. 819 Nanjing West Rd Shanghai China TEL: 86 21 32181071 FAX: 86 21 32181396	150 Kampong Ampat #07-01/02 KA Centre Singapore 368324 TEL: 65 6287 8998 FAX: 65 6280 0080	3F-4, No. 81, Sec. 1 Hsin Tai Wu Road Hsi-Chih Taipei Hsien Taiwan TEL: 886 2 26980228 FAX: 886 2 26980948

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