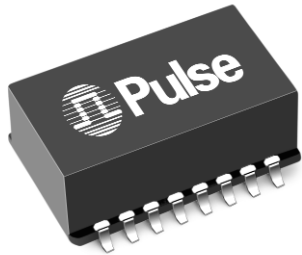







ISDN S-INTERFACE TRANSFORMERS

Surface Mount, Dual, 2000Vrms



-  Meets pulse waveform template of CCITT I.430 when recommended transformer and chip pair are used
-  Excellent longitudinal balance
-  2KVrms isolation voltage
-  Available in tape and reel, tray or tube packaging
-  Recognized by UL

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

| Part Number | Ratio ^A (±2%) | | OCL Pri ^B (mH MIN) | L _L Sec (μH MAX) | | Cw/w (pF MAX) | CD Pri (pF MAX) | | DCR Pri (Ω ±25%) | | DCR Sec (Ω ±25%) | | Δ Ibc ^C (mA MAX) | Package/Schematic |
|-------------|--------------------------|-------|-------------------------------|-----------------------------|------|---------------|-----------------|-----|------------------|-----|------------------|-----|-----------------------------|-------------------|
| | A | B | A & B | A | B | A & B | A | B | A | B | A | B | | |
| PE-65792 | 1:1 | 1:2 | 22 | 5 | 15 | 100 | 42 | 80 | 2.4 | 2.3 | 2.4 | 4.0 | 1 | SC-1 |
| PE-65793 | 1:1 | 1:1 | 22 | 5 | 5 | 100 | 42 | 42 | 2.4 | 2.4 | 2.4 | 2.4 | 1 | SC-1 |
| PE-65795 | 1:2 | 1:2 | 22 | 15 | 15 | 100 | 80 | 80 | 2.5 | 2.5 | 4.3 | 4.3 | 1 | SC-1 |
| PE-65798 | 1:2.5 | 1:2.5 | 22 | 8-40 | 8-40 | 100 | 110 | 110 | 2.5 | 2.5 | 5.8 | 5.8 | 1 | SC-1 |
| PE-65799 | 1:2 | 1:2 | 22 | 11 | 11 | 100 | 180 | 180 | 2.4 | 2.4 | 4.4 | 4.4 | 1 | SC-1 |

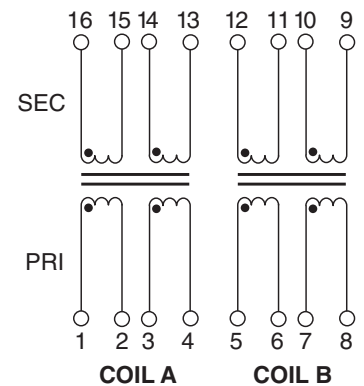
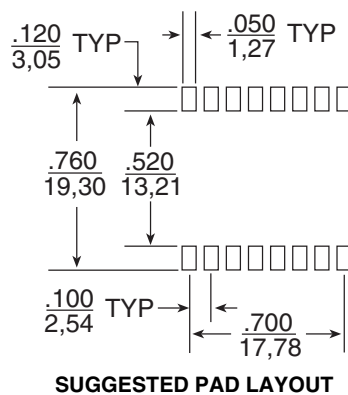
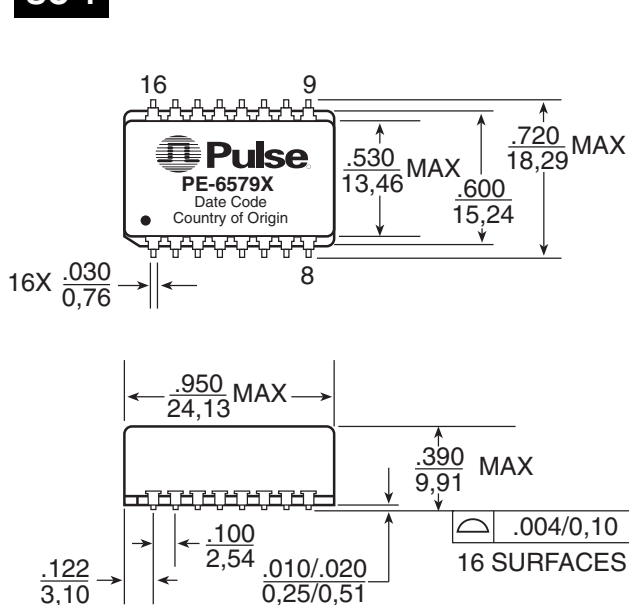
NOTE: For low profile version of products listed above, refer to data sheet T613.

(See Pages 4 and 5 for Table Notes)

Mechanical

Schematic

SC-1



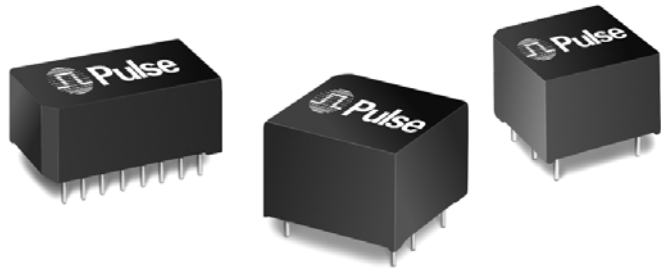
Dimensions: $\frac{\text{Inches}}{\text{mm}}$

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

See page 4 for packaging information.

ISDN S-INTERFACE TRANSFORMERS

Through Hole, Single, 2000Vrms



- Meets the pulse waveform template of CCITT I.430 when recommended transformer and chip pair are used
- Excellent longitudinal balance
- 2KVrms or higher voltage isolation
- Recognized by UL

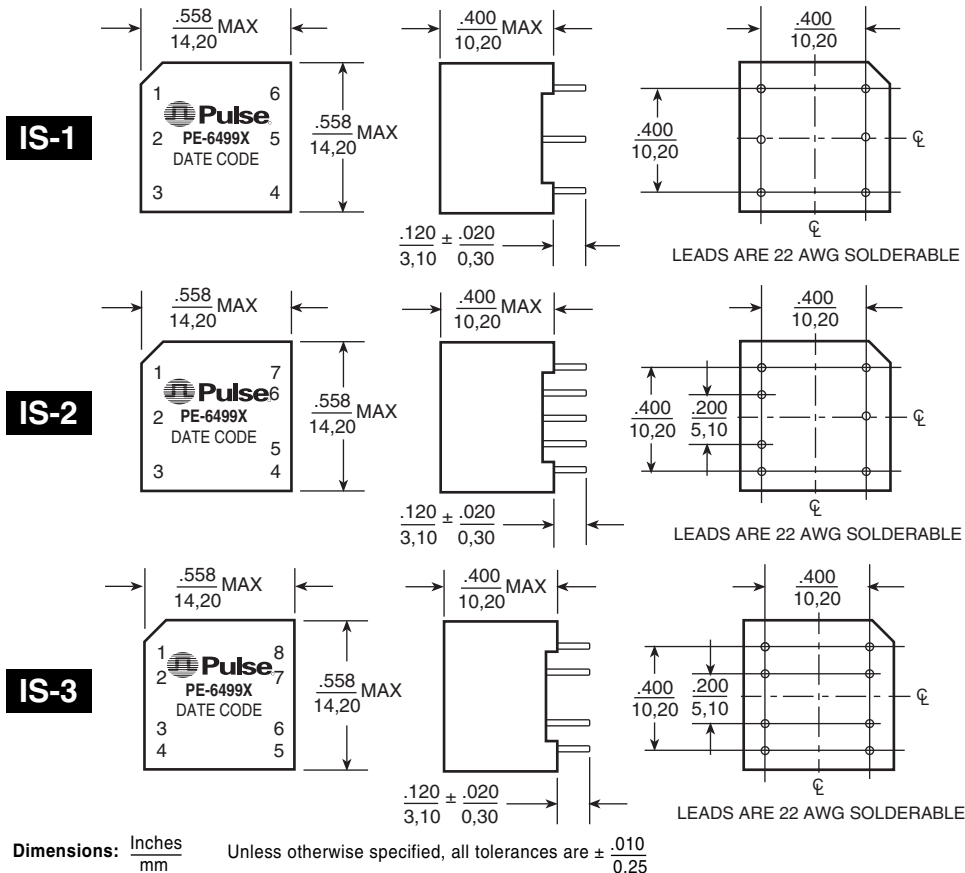
Electrical Specifications @ 25°C — Operating Temperature 0°C to 70°C

2KV ISOLATION, THROUGH HOLE, SINGLE TRANSFORMERS

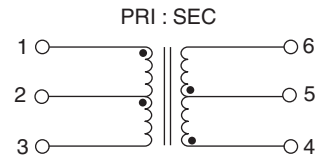
| Part Number | Ratio ^A (±2%) | OCL Pri (mH MIN) | L _L Sec (μH MAX) | C _{w/w} (pF MAX) | CD Pri (pF MAX) | DCR Pri (Ω ±25%) | DCR Sec (Ω ±25%) | Isolation (Vrms MIN) | Δ Ibc ^C (mA MAX) | Package/ Schematic |
|-------------|--------------------------|------------------|-----------------------------|---------------------------|-----------------|------------------|------------------|----------------------|-----------------------------|--------------------|
| PE-64993 | 1CT:1CT | 22 | 5 | 100 | 42 | 2.4 | 2.4 | 2000 | 1 | IS-1 |
| PE-64994 | 1CT:1.8CS | 22 | 15 | 100 | 160 | 2.5 | 4.2 | 2000 | 1 | IS-2 |
| PE-64995 | 1CT:2CT | 22 | 15 | 100 | 80 | 2.5 | 4.3 | 2000 | 1 | IS-1 |
| PE-64996 | 1CT:2.5CS | 22 | 30 | 100 | 150 | 2.5 | 5.8 | 2000 | 1 | IS-2 |
| PE-64998 | 1CS:2.5CS | 22 | 15-40 | 100 | 110 | 2.5 | 5.8 | 2000 | 1 | IS-3 |
| PE-64999 | 1CT:2CT | 22 | 11 | 100 | 180 | 2.4 | 4.4 | 2000 | 1 | IS-1 |

(See Pages 4 and 5 for Table Notes)

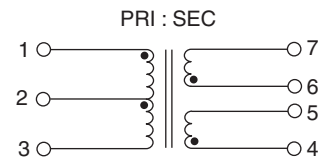
Mechanicals



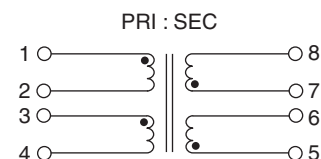
Schematics



See page 4 for packaging information.



See page 4 for packaging information.



See page 4 for packaging information.

ISDN S-INTERFACE TRANSFORMERS

Dual and Single Through Hole



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

| Part Number | COIL A | | | | COIL B | | | | Package/Schematic |
|-------------|--------------------|-------------------|--------------|----------------|--------------------|-------------------|--------------|----------------|-------------------|
| | Ratio ^A | Equivalent Single | Primary Pins | Secondary Pins | Ratio ^A | Equivalent Single | Primary Pins | Secondary Pins | |
| PE-65492 | 1:1 | PE-64993 | 1-4 | 16-13 | 1:2 | PE-64995 | 5-8 | 12-9 | ID-1 |
| PE-65493 | 1:1 | PE-64993 | 1-4 | 16-13 | 1:1 | PE-64993 | 5-8 | 12-9 | ID-1 |
| PE-65495 | 1:2 | PE-64995 | 1-4 | 16-13 | 1:2 | PE-64995 | 5-8 | 12-9 | ID-1 |
| PE-65498 | 1:2.5 | PE-64998 | 1-4 | 16-13 | 1:2.5 | PE-64998 | 5-8 | 12-9 | ID-1 |
| PE-65499 | 1:2 | PE-64999 | 1-4 | 16-13 | 1:2 | PE-64999 | 5-8 | 12-9 | ID-1 |

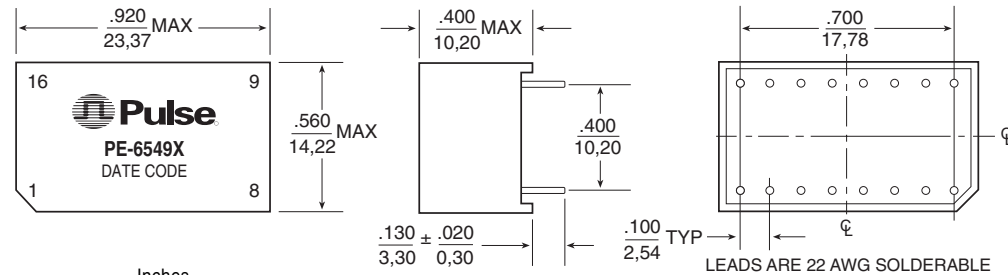
NOTE: Refer to the equivalent single part number for electrical specifications.

(See Pages 4 and 5 for Table Notes)

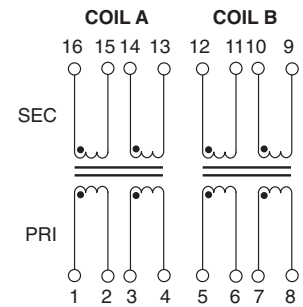
Mechanical

Schematic

ID-1



See page 4 for packaging information.



REINFORCED INSULATION!

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

3kV REINFORCED INSULATION, THROUGH HOLE, SINGLE TRANSFORMERS

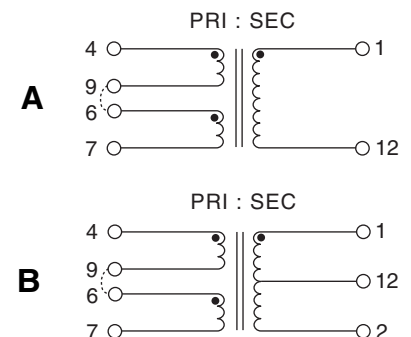
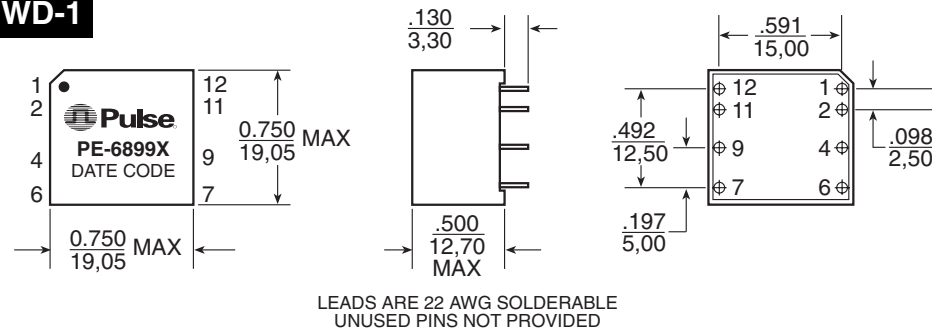
| Pulse Part Number | Ratio ^A ± 2% (Pri:Sec) | OCL Pri (mH MIN) | L _L Sec (μH MAX) | C _{w/w} (pF MAX) | C _D (pF MAX) | DCR (Ω ± 25%) | | Unbalanced I _{DC} ^C (mA MAX) | Package/Schematic |
|-------------------|-----------------------------------|------------------|-----------------------------|---------------------------|-------------------------|---------------|-----------|--|-------------------|
| | | | | | | Primary | Secondary | | |
| PE-68992 | 1CS:2CT | 22 | 15 | 60 | 80 | 3.0 | 5.5 | 5 | WD-1/B |
| PE-68993 | 1CS:1 | 22 | 5 | 40 | 40 | 2.8 | 2.7 | 5 | WD-1/A |
| PE-68995 | 1CS:2 | 22 | 15 | 60 | 80 | 3.0 | 5.5 | 5 | WD-1/A |
| PE-68998 | 1CS:2.5 | 22 | 8-40 | 60 | 110 | 3.0 | 7.0 | 5 | WD-1/A |
| PE-68999 | 1CS:2 | 22 | 11 | 50 | 110 | 2.8 | 5.5 | 5 | WD-1/A |

(See Pages 4 and 5 for Table Notes)

Mechanical

Schematic

WD-1



See page 4 for packaging information.

Dimensions: Inches / mm Unless otherwise specified, all tolerances are $\pm \frac{.010}{0,25}$

ISDN S-INTERFACE TRANSFORMERS



Transformer Selection and Packaging

| IC Manufacturer | IC Part Number | Dual Surface Mount | Single Through Hole, 2 KVrms | | Dual Through Hole | Single Through Hole, 3 KVrms | |
|-----------------------|--------------------|--------------------|------------------------------|----------|-------------------|------------------------------|----------|
| | | Trans & Rec | Transmit | Receive | Trans & Rec | Transmit | Receive |
| AMD | Am 79C30A/79C32A | PE-65799 | PE-64999 | PE-64999 | PE-65499 | PE-68999 | PE-68999 |
| AT&T/Lucent | T7250/7256/7259 | PE-65798 | PE-64998 | PE-64998 | PE-65498 | PE-68998 | PE-68998 |
| | T7903 | PE-65795 | PE-64995 | PE-64995 | PE-65495 | PE-68995 | PE-68995 |
| Mietec | MTC-2072 | PE-65795 | PE-64995 | PE-64995 | PE-65495 | PE-68995 | PE-68995 |
| Mitel | MT8930 | PE-65795 | PE-64995 | PE-64995 | PE-65495 | PE-68995 | PE-68995 |
| Motorola | MC145474/145475 | PE-65793 | PE-64993 | PE-64993 | PE-65493 | PE-68993 | PE-68993 |
| | MC145574 | PE-65798 | PE-64998 | PE-64998 | PE-65498 | PE-68998 | PE-68998 |
| National ^D | TP3420/3421 | PE-65795 | PE-64995 | PE-64995 | PE-65495 | PE-68995 | PE-68992 |
| SGS Thomson | ST5420, ST5421 | PE-65795 | PE-64995 | PE-64995 | PE-65495 | PE-68995 | PE-68995 |
| Siemens | PEB 2080/2081/2085 | PE-65795 | PE-64995 | PE-64995 | PE-65495 | PE-68995 | PE-68995 |
| | PSB 2186 | | | | | | |
| | PEB 2084/2086 | | | | | | |
| Yamaha | 7405B | PE-65795 | PE-64995 | PE-64995 | PE-65495 | PE-68995 | PE-68995 |

NOTES

- A. In this catalog, turns ratio is expressed as “primary:secondary”. The term “CT” designates a center tapped winding. The term “CS” designates a split center tap winding. A center tapped winding can be created by connecting two ends of a split center winding together on the printed circuit board. In ISDN-S applications, the primary winding is the line side transformer winding.
- B. The minimum primary inductance and the maximum distributed capacitance satisfy the transmitter output and receiver input impedance requirements of CCITT I.430 for both the TE and the NT. The maximum distributed capacitance allows sufficient margin for the capacitance of the IC and a protection diode network. It is consistent with the overall maximum value specified and the permitted length of the basic access TE cord.
- C. The maximum specified unbalanced DC current capability is based on 20 mH minimum primary OCL.
- D. National recommends a 1:2 receive transformer, but used as a 1:1 ratio by connecting only half the secondary winding. See National’s application note.
- E. PE-65950, PE-68613 and PE-65853 are recommended for use with Siemens PEB 2080/2085 and help in meeting the required longitudinal balance.
- F. Standard packaging for all chokes and transformers listed in this catalog is anti-static tubes. Optional anti-static tray packaging can be ordered for the surface mount SC-1 and LA-1 packages by adding an “R” suffix to the part number, (ie: PE-65795R). Optional tape and reel packaging can be ordered for all surface mount packages by adding a “T” suffix to the part number, (ie: PE-65795T).
- G. For PE-65854, OCL at -40°C is 27 µH minimum. For maximum performance use windings (1-8) and (2-7) as a pair and windings (3-6) and (4-5) as a pair.
- H. For transformers and choke modules, refer to data sheet **T632**.

Packaging Information

| Package ^F | Type | Part Weight | Parts/Tube | Parts/Tray | Parts/Reel | Reel Diameter | Tape Width | Pitch |
|----------------------|------|-------------|------------|------------|------------|---------------|------------|-------|
| LA-1 | SMT | 2.0 grams | 30 | 60 | 250 | 13 inches | 24 mm | 24 mm |
| PA-2 | SMT | 4.0 grams | 35 | – | 150 | 13 inches | 32 mm | 24 mm |
| SC-1 | SMT | 7.0 grams | 20 | 50 | 150 | 13 inches | 44 mm | 24 mm |
| SH-4 | SMT | 0.3 grams | 25 | – | 1500 | 13 inches | 24 mm | 12 mm |
| ID-1 | THT | 7.0 grams | 20 | – | – | – | – | – |
| IN-1 | THT | 2.5 grams | 35 | – | – | – | – | – |
| IS | THT | 4.0 grams | 35 | – | – | – | – | – |
| VC-1 | THT | 3.5 grams | 40 | – | – | – | – | – |
| WD-1 | THT | 9.0 grams | 25 | – | – | – | – | – |

(See Pages 4 and 5 for Table Notes)

ISDN S-INTERFACE TRANSFORMERS

Application Notes

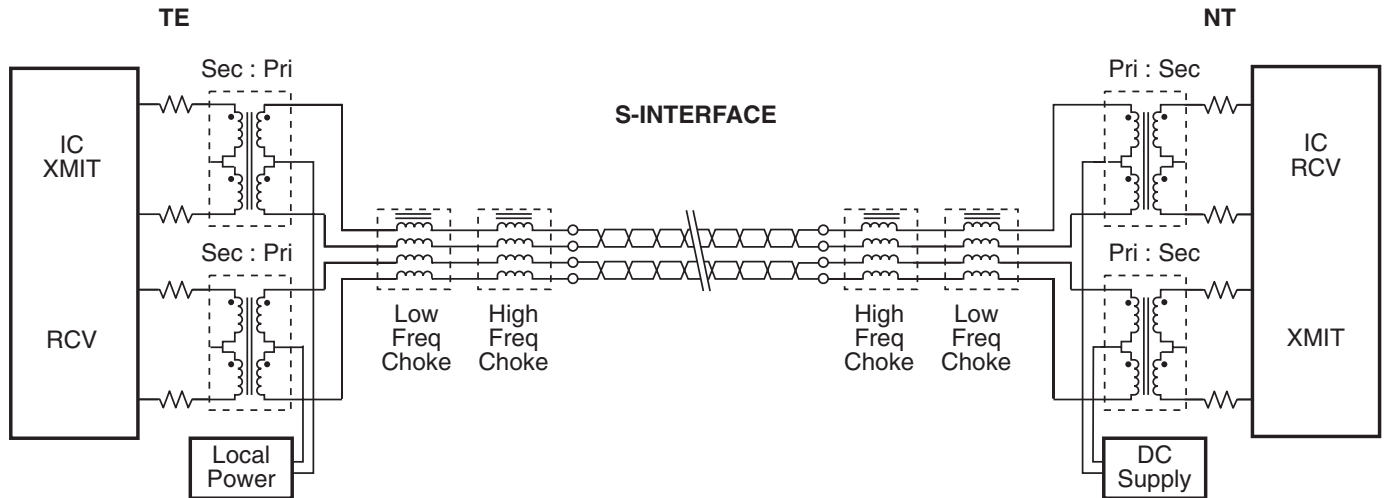


Figure 1. Typical ISDN S-Interface Application Circuit

1. General Information – The S-interface is the standardized four-wire digital telephone access point defined by the CCITT I-series recommendations for the Integrated Services Digital Network. This “basic rate access” accommodates two 64Kbps “B-channels” for information, one 16Kbps “D-channel” intended for signaling and control, and 48 Kbps for framing and other purposes, giving a total rate of 192Kbps. The CCITT physical layer recommends that the user network interface be transformer coupled. A typical application circuit is presented in **Figure 1**.

The transformer provides isolation for the line card or the terminal from the line. It is also a way to provide phantom power feeding to the terminal over the S-loop. Each end requires a transmit and a receive transformer. Chokes are used in some applications to reduce common mode noise (see note 5).

The transformers described in this data sheet are matched to the transceivers offered by the major IC manufacturers listed. The use of a transformer-chip pair assures that all requirements of CCITT I.430 are met with respect to pulse waveform templates, impedance and longitudinal balance. In addition, the transformers provide the isolation voltages required by the regulatory agencies and are capable of passing surge voltage tests.

2. Longitudinal Balance for Transformers – The longitudinal conversion loss specification in I.430 includes a test setup that is intended for system evaluation, whether TE or NT. Such a test is performed with DC current present. The transformer plays an essential role in achieving the required balance. However, all other elements in the circuit should be also designed to provide the highest possible symmetry. These elements include the protection circuitry, series resistors, chip transmitter output and receiver input, as well as the cables used and the TE cord where applicable. A high level of transformer balance compensates for some circuit AC-unbalance, and assures compliance of the system with I.430 on longitudinal conversion loss (LCL) and signal balance. This is accomplished by a well AC-balanced winding configuration whereby the capacitive coupling between primary and secondary windings is evenly distributed. Also, both halves of the lineside winding are well balanced. The transformers meet the following LCL specifications:

- 10kHz to 300kHz: 60dB minimum
- 300kHz to 1MHz: Minimum value decreasing 20dB/decade.

(continued on next page)

ISDN S-INTERFACE TRANSFORMERS

Application Notes

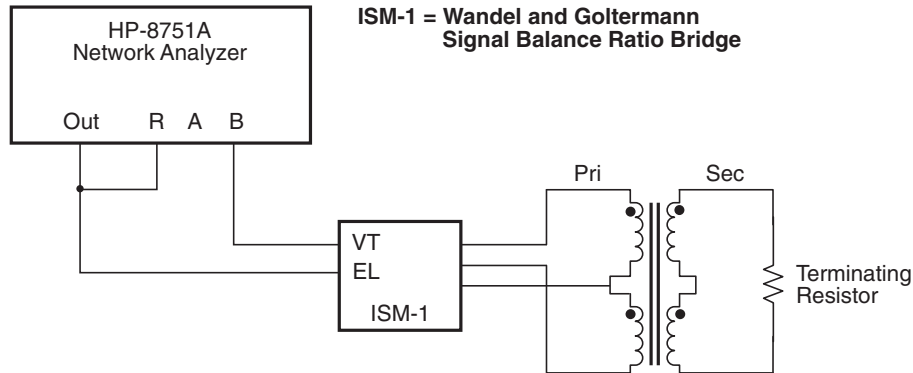


Figure 2. Longitudinal Balance Test Circuit

(continued from previous page)

A recommended test setup is shown in **Figure 2**. A high inductance “low frequency” common mode choke, such as PE-65950 or PE-65853, is recommended to improve balance, or to correct inherent unbalances of some circuits.

4. Impedance Requirements – The requirements for minimum impedance in the inactive and powered-down states are expressed by impedance templates for both transmitter and receiver in NT and TE. At the low frequency end of 1MHz, it is reasonable to assume that the impedance seen from the line is entirely capacitive. The maximum capacitance budget, derived from the templates, is somewhat different for the NT and the TE. Contributors to the total capacitance are: the chip output, the protection circuit, the transformer, common mode choke and any other element that may be present. In the TE case, there is also the maximum allowable TE cord impedance. Here the maximum budget is 800pF. As a rule, the capacitances should be kept as low as possible in the interface circuit design. With the specified transformer capacitances, it is possible to remain within budget and have a reasonable margin for measurement errors.

5. Common Mode Chokes – The “high frequency” 4-wire common mode chokes shown on pages 7 and 8 provide an effective means of compliance with national and international regulations on EMI. They are designed to be used in conjunction with either Pulse’s ISDN S-Interface or T1/CEPT transformers as shown in **Figure 1**. A high inductance “low frequency” common mode choke is recommended to improve balance, or to correct inherent unbalances of some ISDN S-Interface circuits.

6. Surge Voltage Capability for Transformers and Chokes

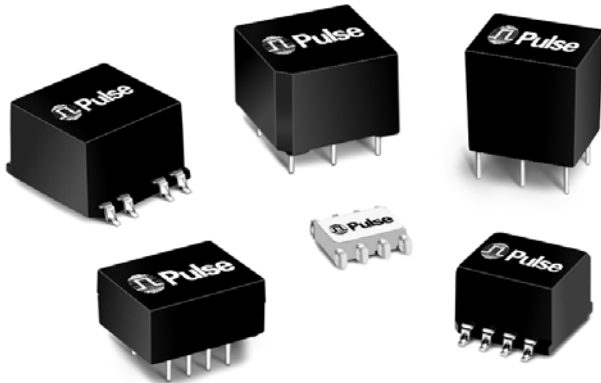
- Longitudinal Voltage Peak: 2,400V 10/700µsec
- Metallic Voltage Peak: 800V 10/560µsec

7. Behavior Under Fault Conditions – Telephony voltages may accidentally appear on the ISDN S-Interface line to the transformer. The transformer will withstand a DC current of 0.5 Amps for 15 minutes without permanent damage. Such current may be caused by the telephone central battery. The transformer will also survive ringing voltages. These are nominally 120V or 200V maximum at 20 to 60Hz, limited by 1500Ω resistive or 400 to 600Ω inductive limiting. These may cause peak currents.

8. Flammability – Materials used in the products are recognized UL94-VO. Products meet the requirements of IEC 695-2-2 (Needle Flame Test).

ISDN S-INTERFACE TRANSFORMERS

Common Mode Chokes for Telecom Applications



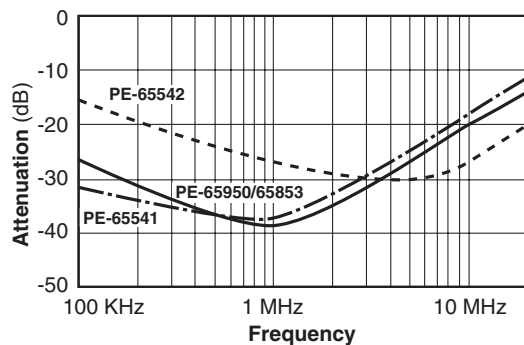
- Designed for 4-wire links, ISDN-S/T and T1/E1/CEPT
- High frequency chokes for EMI reduction
- Low frequency chokes improve longitudinal balance in ISDN-S/T links
- Surface mount and through hole models available

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

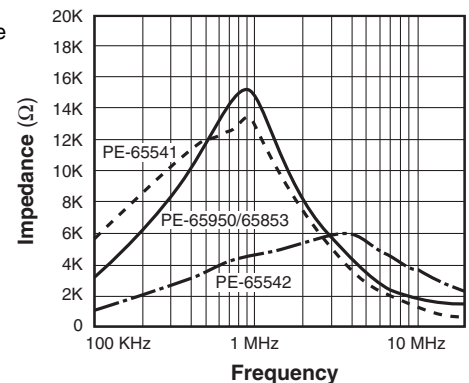
| Part Number | OCL Pri | L _L Sec (μH MAX) | C _{w/w} (pF MAX) | DCR (Ω MAX) | Isolation (Vrms MIN) | Package/ Schematic |
|-----------------------|-------------|-----------------------------|---------------------------|-------------|----------------------|-------------------------|
| LOW FREQUENCY | | | | | | |
| PE-65541 | 6.0 mH MIN | 35 | 25 | 1.40 | 1,500 | IS-4/1C (Through Hole) |
| PE-65542 | 1.0 mH MIN | 10 | 10 | 0.70 | 1,500 | IS-4/1C (Through Hole) |
| PE-65853 ^E | 4.7 mH ±30% | 1 | 60 | 1.20 | 500 | PA-2/5C (Surface Mount) |
| PE-65950 ^E | 4.7 mH ±30% | 1 | 50 | 1.00 | 500 | IS-4/1C (Through Hole) |
| PE-68613 ^E | 4.7 mH ±30% | 1 | 60 | 1.00 | 500 | VC-1/5C (Through Hole) |
| HIGH FREQUENCY | | | | | | |
| PE-65554 | 24.0 μH MIN | .20 | 15 | 0.30 | 500 | IN-1/C (Through Hole) |
| PE-65555 | 8.0 μH MIN | .20 | 10 | 0.25 | 500 | IN-1/C (Through Hole) |
| PE-65854 ^F | 47.0 μH MIN | .18 | 20 | 0.40 | 500 | SH-4/C (Surface Mount) |
| PE-65857 | 22.5 μH MIN | .23 | 17 | 0.30 | 500 | LA-1/C (Surface Mount) |

NOTE: For additional Common Mode Chokes, refer to data sheet G002.

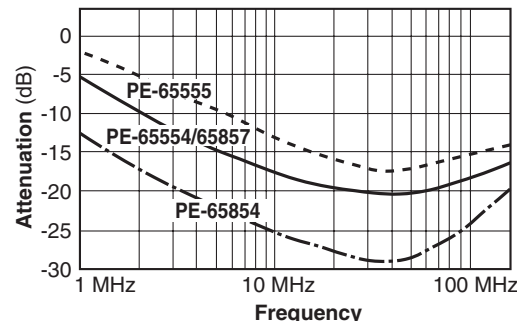
Typical common mode attenuation for low frequency common mode chokes based on a 100 Ω system.



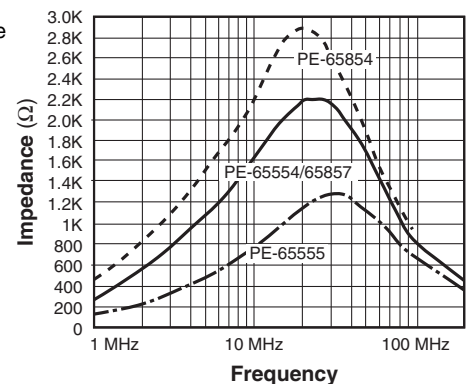
Typical impedance for low frequency common mode chokes based on a 100 Ω system.



Typical common mode attenuation for high frequency common mode chokes based on a 100 Ω system.



Typical impedance for high frequency common mode chokes based on a 100 Ω system.



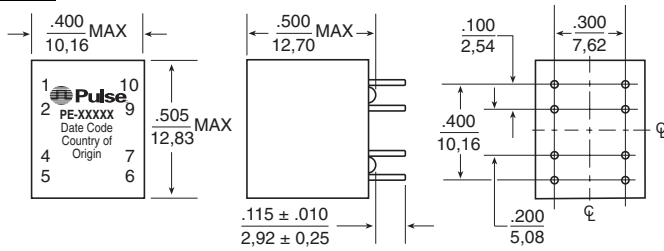
ISDN S-INTERFACE TRANSFORMERS

Common Mode Chokes for Telecom Applications



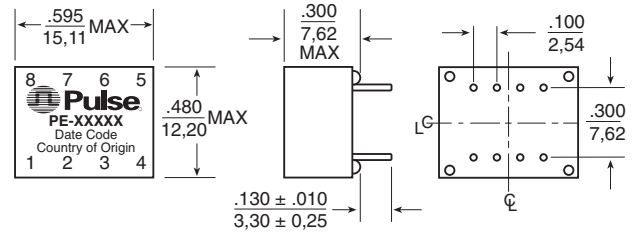
Mechanicals

VC-1



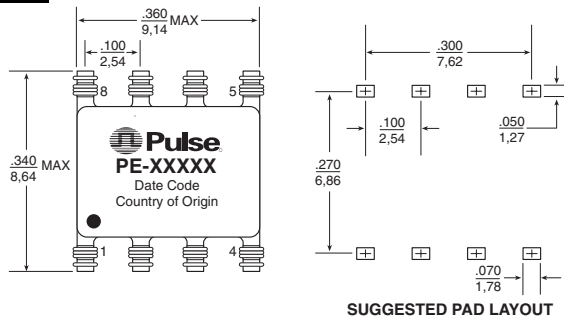
See page 4 for packaging information.

IN-1



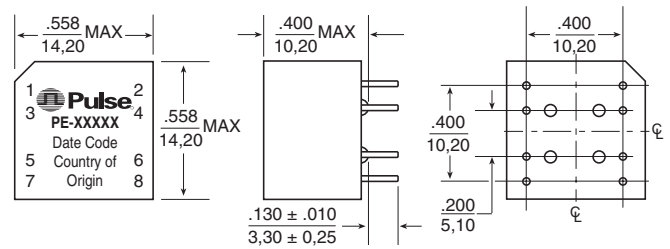
See page 4 for packaging information.

SH-4



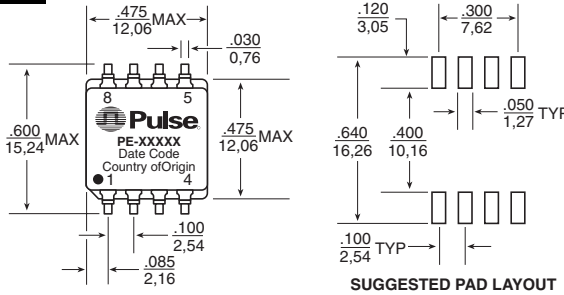
See page 4 for packaging information.

IS-4



See page 4 for packaging information.

LA-1

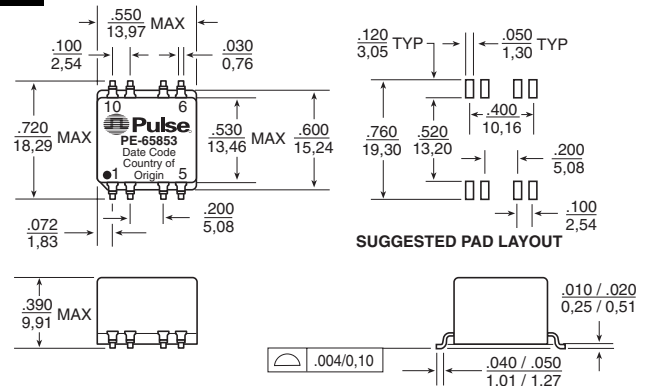


Dimensions: $\frac{\text{Inches}}{\text{mm}}$

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

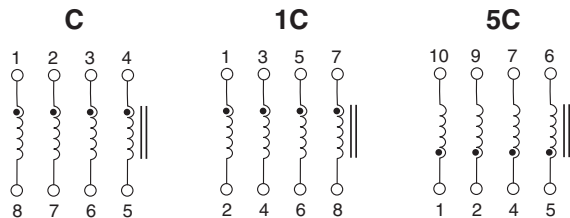
See page 4 for packaging information.

PA-2



See page 4 for packaging information.

Schematics



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T604.D (1/06)

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