

# ISDN S-INTERFACE TRANSFORMERS

## Surface Mount, Single, 1.5 and 3 KVRms



**NEW!**



- Meets the pulse waveform template of CCITT I.430, using recommended transformer and chip pair
- 3 KV, reinforced to IEC950 and certified by BABT and AUSTEL
- Compact SMT transfer-molded package with 1.5 KV and 3 KV compatible footprints
- Options for Terminal, Line Card and NT Box Applications

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

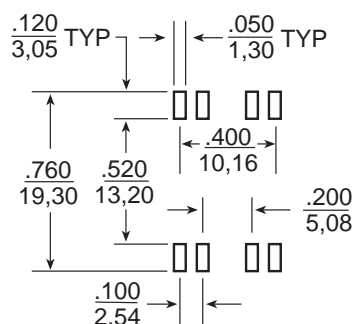
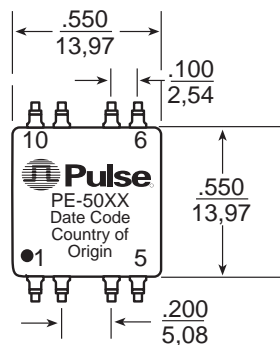
Part Number	Ratio Pri:Sec (± 2%)	OCL Pri (mH MIN)	LL Sec (μH MAX)	Cw/w (pF MAX)	CD Pri (pF MAX)	DCR Pri (Ω MAX)	DCR Sec (Ω MAX)	Δ Ibc (mA MAX)	Isolation Voltage (Vrms MIN)	Primary Pins	Package / Schematic
T5020	1:2	22	5	120	180	2.5	5.2	3	1500	1-10, 5-6	VAL 1/B
T5021	1:1	22	5	120	180	2.5	2.5	3	1500	1-10, 5-6	VAL 1/C
T5022	1:2.5	22	10	150	180	2.5	6	3	1500	1-10, 5-6	VAL 1/C
T5023	1:2	22	5	120	180	2.5	5	3	1500	1-10, 5-6	VAL 1/C
T5033	1:2	22	15	120	180	1.3	3.0	3	1500	6-7,9-10	VAL 1/A
T5024	1:2	22	15	45	100	1.3	3.0	3	3000	6-7, 9-10	VAL 2/A
T5025	1:1	22	15	45	100	1.3	1.3	3	3000	6-7, 9-10	VAL 2/A
T5026	1:2.5	22	15	45	100	1.3	3.5	3	3000	6-7, 9-10	VAL 2/A
T5036	1:2	22	15	45	100	1.3	3.0	5	3000	6-7,9-10	VAL 2/A

Note: See table for package heights (1 and 2).

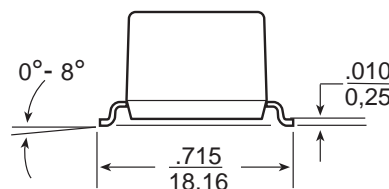
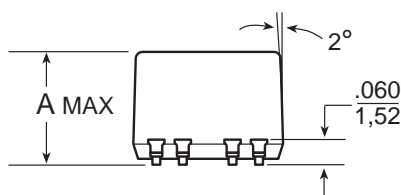
### Mechanical

### Schematic

**VAL**

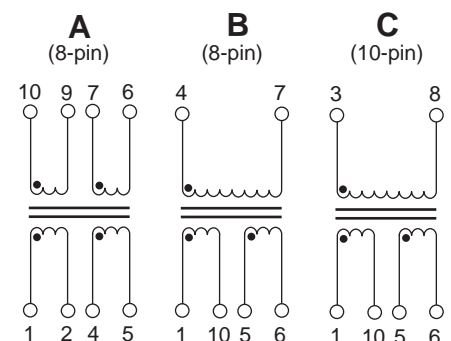


SUGGESTED PAD LAYOUT



Dimensions: Inches  
mm

Unless otherwise specified, all tolerances are ± .010  
0,25



Package Type	Package Height (A MAX)
VAL 1	.394/10,00 MAX
VAL 2	.429/10,88 MAX

NOTE: Optional tape and reel packaging can be ordered by adding a "T" suffix to the part number (ie:T5020T).

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### Transformer Selection Guide

IC Manufacturer	IC Part Number	Pulse Part Number Transmit & Receive 1.5 KV*	Pulse Part Number Transmit & Receive 3 KV*
AMD	AM 79C30A	T5020/T5023/T5033	T5024/T5036
Lucent	T7250/ T7252/ T7256	T5022	T5026
	T7259/ T7903/ T7234	T5020/T5023/T5033	T5024/T5036
Mietec	MTC-2072	T5020/T5023/T5033	T5024/T5036
Mitel	MT8930	T5020/T5023/T5033	T5024/T5036
Motorola	MC145474/ 145475	T5021	T5025
	MC145574	T5022	T5026
National	TP3420 / 3421	T5020/T5023/T5033	T5024/T5036
NEC	D98201	T5020/T5023/T5033	T5024/T5036
Siemens	PEB 2080/ 2081 / 2085	T5020/T5023/T5033	T5024/T5036
	PEB 2084/ 2086 / PSB 2186		
	PEB 8091/ 8191		
SGS Thomson	ST5420/ 5421	T5020/T5023/T5033	T5024/T5036
VLSI	VN580060	T5020/T5023/T5033	T5024/T5036
Yamaha	YM 7405B	T5020/T5023/T5033	T5024/T5036

\*NOTE: Choice of Transformer depends upon application:

#### 1.5KV Options:

T5020 AND T5023 offer 8 and 10 pin variations  
T5033 has compatible footprint to 3 KV transformers

#### 3KV Options:

T5024 is suitable for Terminal and Line Card Applications  
T5036 is suitable for NT Applications due to 5mA  $\Delta I_{dc}$

### Packaging Information

Package	Part Weight	Parts/Tube	Parts/Reel	Reel Diameter	Tape Width	Pitch
VAL1	4.7 grams	35	150	13"	32 mm	24 mm
VAL2	5.0 grams	35	150	13"	32 mm	24 mm

### SMT Common Mode Chokes

Part Number	Number of Lines	Inductance	Peak Common Mode Attenuation	Application	Isolation Voltage (MAX)	DCR ( $\Omega$ MAX)	Data Sheet
<b>LOW FREQUENCY CHOKES</b>							
PE-65853	4-Line	4.7 mH $\pm 30\%$	1 MHz	Improve Balance	500 Vrms	1.20	G002
<b>HIGH FREQUENCY CHOKES</b>							
PE-65854	4-Line	47 $\mu$ H Min	30 MHz	EMI Reduction	500 Vrms	0.38	G002
PE-65857	4-Line	22.5 $\mu$ H Min	50 MHz	EMI Reduction	500 Vrms	0.22	G002
PE-68624	2-Line	47 $\mu$ H Min	30 MHz	EMI Reduction	500 Vrms	0.40	G002

#### NOTE:

The "High Frequency" 4-wire common mode chokes provide an effective means of compliance with national and international regulations on EMI. They are designed to be used in conjunction with Pulse's ISDN S-Interface transformers. A high inductance "Low Frequency" common mode choke is recommended to improve balance or to correct inherent unbalances of some ISDN S-Interface circuits.

# ISDN S-INTERFACE TRANSFORMERS

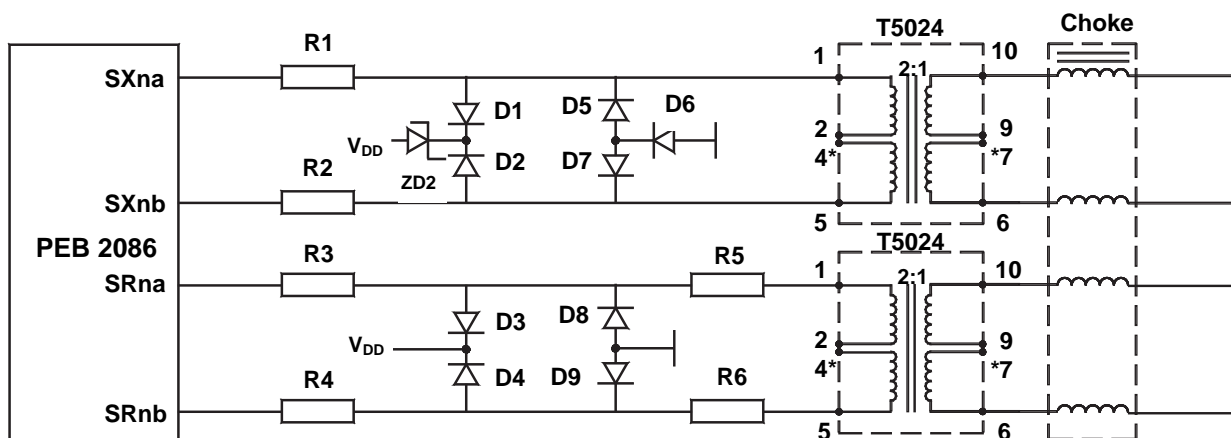
## Surface Mount, Single, 1.5 and 3 KVRms



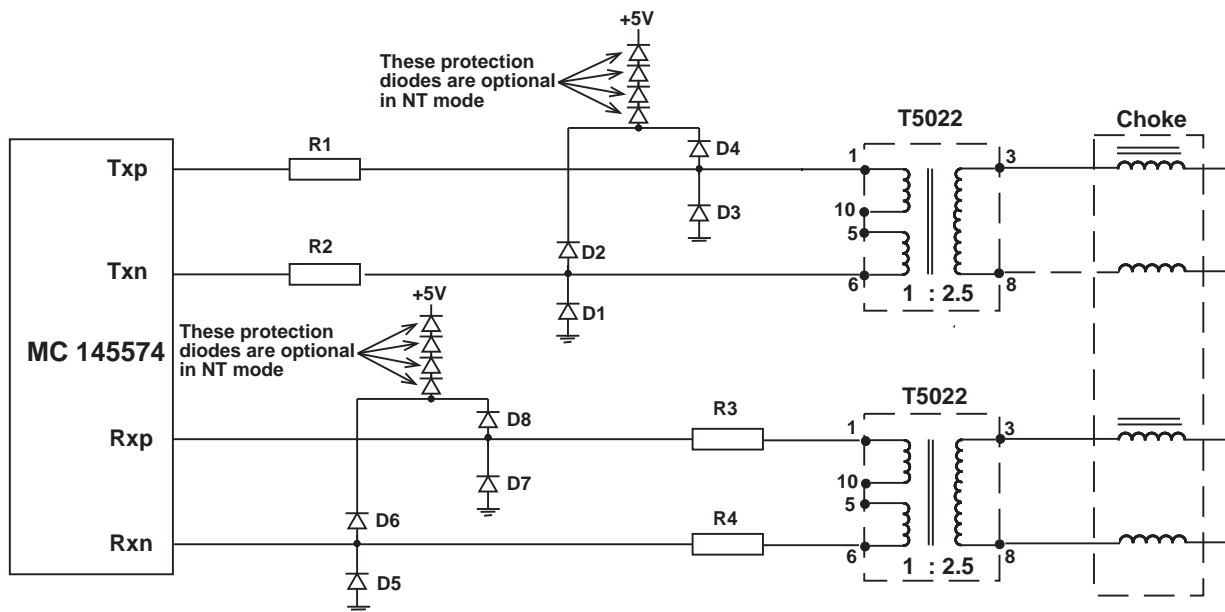
### Application Notes

The S-Interface is the standardized four wire digital telephone access point defined by the CCITT I-Series recommendations for the Integrated Service Digital Network. This "basic rate access" accommodates two 64 Kbps "B-channels" for information, one 16 Kbps "D-channel" intended for signaling and con-

trol, and 48 Kbps for framing and other purposes, giving a total rate of 192 Kbps. The CCITT physical layer recommends that the user network interface be transformer coupled as shown in our typical application notes.



**Figure 1:** Typical S-Interface Application Circuit for Siemens: PEB 2086\*



**Figure 2:** Typical S-Interface Application Circuit for Motorola: MC 145574\*

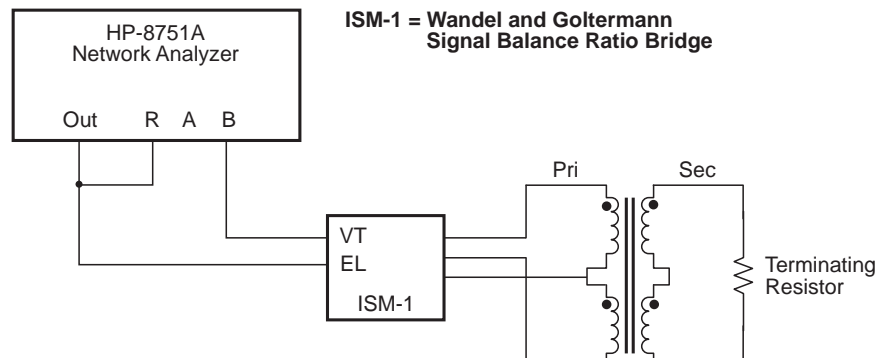
**\*NOTE:** Refer to Silicon Vendors Application Notes for more details on power supply connection and specific component values.

# ISDN S-INTERFACE TRANSFORMERS

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### Longitudinal Balance Test Circuit



ISM-1 = Wandel and Goltermann  
Signal Balance Ratio Bridge

### Safety Standards Recognition

The following regulatory organizations, both national and international, have issued standards relevant to the safety of equipment that is connected to the telecom network:

- IEC950** – International Standard
- EN60950** – European Standard
- UL1950** – American Standard
- AS3260** – Australian Standard (Austel)

All these documents are close derivatives of the IEC950, with any national deviations spelled out in the respective national standards.

Four levels of insulation are considered: operational, basic, supplementary and reinforced. It is the type of equipment, its use and application (including the working voltage), which determine the level of insulation to be applied.

Pulse's transformers **T5024**, **T5025** and **T5026** comply with the reinforced insulation requirements of IEC950 and have been certified by BABT (certificate number CRC30) and Austel (certificate number E726609). **T5036** Certificate Pending.

### Flammability

Materials used in the products are recognized UL 94-VO. Products meet IEC 695-2-2 requirements (needle flame test).

### Longitudinal Balance for Transformers

The longitudinal conversion loss specification in I.430 includes a test setup which 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 also be 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:

**10 KHz to 300 KHz** : 54 dB minimum

**300 KHz to 1 MHz**: Minimum value decreasing from 54 dB at 20 dB / decade

### Definition of Terms

**Ratio** – This is the turns ratio, expressed as “Primary: Secondary”. The term “CT” designates center-tapped winding.

**OCL** – Open circuit inductance, measured 20 KHz, 100 mV.

**L<sub>L Sec</sub>** – Leakage inductance measured across the secondary with the respective primary winding short circuited.

**C<sub>ww</sub>** – Winding capacitance, formed by the primary and secondary wire. These wires form the “plates” of this capacitor. Measured at 100 KHz, 20 mV.

**CD Pri** – This is the distributed capacitance.

**DCR** – This is the resistance of the windings when measured in DC conditions.

**ΔI<sub>bc</sub>** – The maximum specified unbalanced DC current capability of the device.

The minimum primary inductance and the maximum distributed capacitance satisfy the transmitter output and receiver input impedance requirements of CCITT I.430 for both TE and 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.

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