

ISDN INTERFACE PROTECTION

INTRODUCTION

The choice of a suitable protection device for an ISDN line interface requires consideration of a parameter which is not critical in analogue line applications: the parasitic capacitance that the device introduces. Because of the high data rates used, parasitic capacitances must be minimized in order to ensure correct signal transmission. In particular, attention must be paid to the capacitance imbalance in the line which can cause considerable signal degradation. Such imbalance most frequently results from the presence of common-mode protection, in which the capacitance introduced between each line and earth is frequently unequal.

STMicroelectronics has developed a complete range of specific protection devices for ISDN applications: the "TRIBALANCED PROTECTION" TPIxx series.

These devices introduce only a minimum of capacitance imbalance (30pF), which does not affect the transmission performance of the line.

TRIBALANCED PROTECTION = TPIXX SERIES

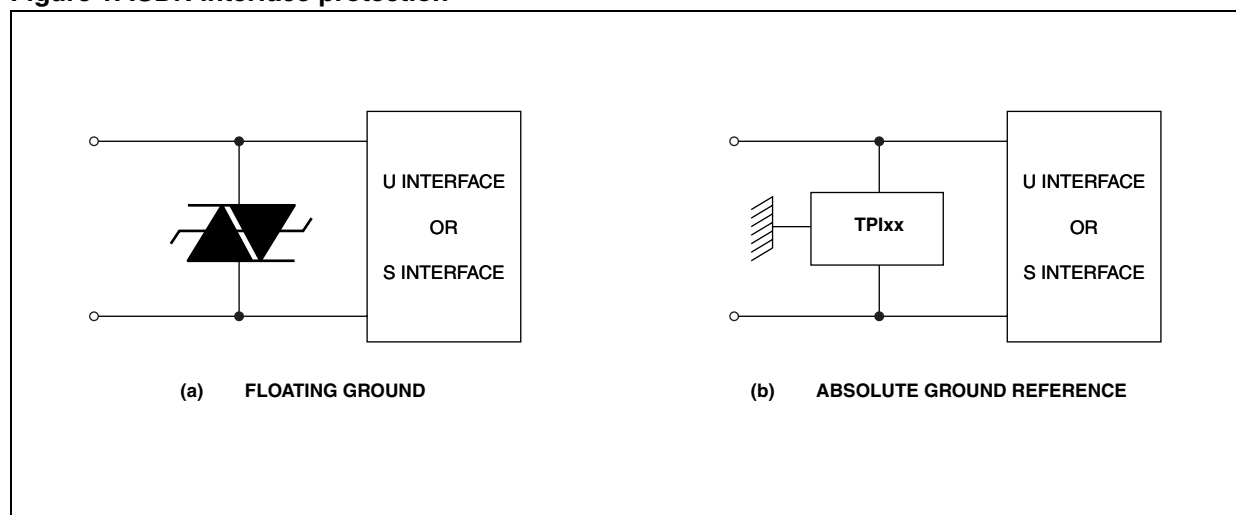
The use of TRIBALANCED protection is mandatory under the following conditions:

- The bias voltage on line A and line B is different (line A = GND, Line B = $-V_{bat}$)
- The protection is realized in common mode, as illustrated in Figure 1 (b).

In this case, two conditions must be satisfied:

1. Low capacitance from line to ground → No signal attenuation.
2. Good capacitance balance between line a and line b → Good longitudinal balance on the line.

Figure 1. ISDN interface protection



ISDN PROTECTION - PRODUCT RANGE

STMicroelectronics offers specific protection devices for ISDN interface protection. The product range is given in Table 1, which shows that this function is available with different package versions.

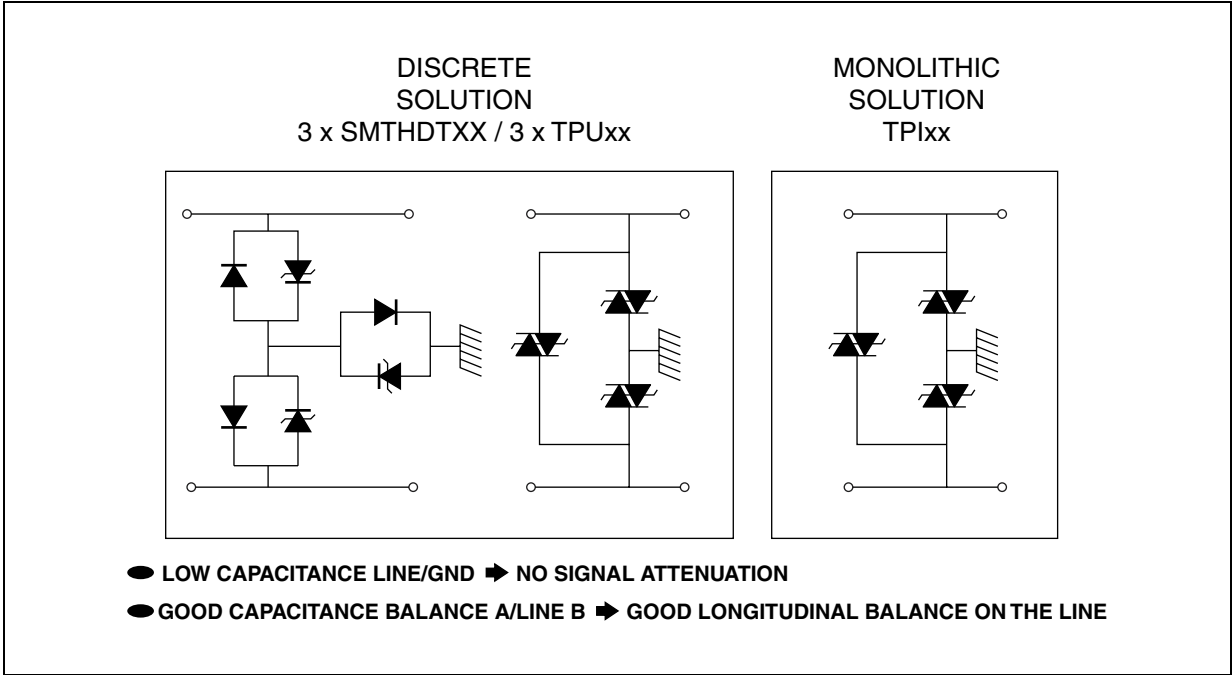
Discrete and monolithic versions are available, in order to provide a wide choice of cost/performance compromises.

Depending on the solution chosen, different recommendations apply with regard to the optimum configuration to use. Figure 2 illustrates the typical application schematic for TRIBALANCED PROTECTION. When the discrete solution is used, three components per line are necessary.

Table 1. Tribalanced protection - product range

DISCRETE SOLUTION (3 devices per line)	MONOLITHIC DEVICES
SOD15 / CB429	SO8 / DIL8
HIGH SURGE CAPABILITY 75A 10/1000 msec	MEDIUM SURGE CAPABILITY 30A 10/1000 msec
SMTHDT58 / TPU58 SMTHDT80 / TPU80 SMTHDT120 / TPU120	TPI8011P / TPI8012P TPI12011P / TPI12012P

Figure 2. Tribalanced protection - functional schematic



APPLICATION SCHEMATICS

Figure 3 and 4 illustrate the use of tribalanced protection in a u-interface and an s-interface respectively. In each case there is the choice of a discrete solution (SMTHDTxx or TPUxx) where a high surge capability is required, or a single-chip solution for low cost (TPIxx). Thus cost and performance can be traded in a variety of combinations. All of these components are innovative and ideal for use in high-speed transmission lines.

Figure 3. Central office / PABX - U-Interface protection

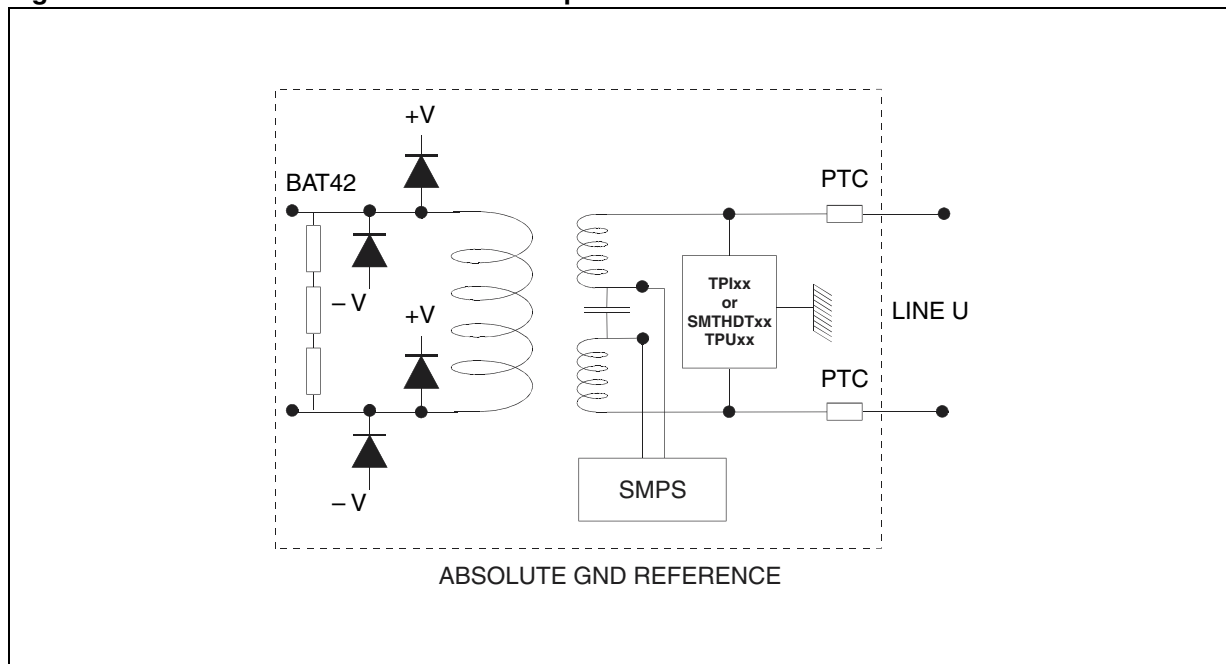
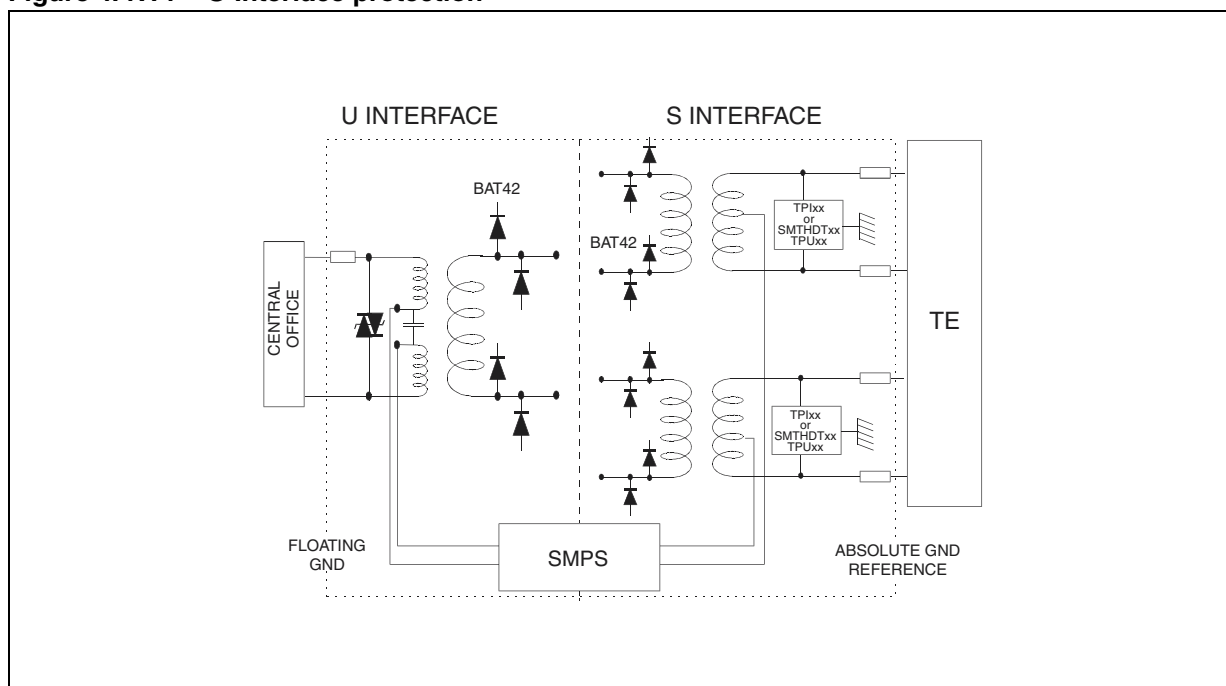


Figure 4. NT1 = S-Interface protection



CONCLUSION

Due to the sensitivity of ISDN to capacitance imbalance on the lines, tribalanced protection has to be used where common-mode protection of lines with different bias voltages is required. ST offers a wide range of devices designed specifically for ISDN protection, enabling this requirement to be satisfied.

AN585 APPLICATION NOTE

REVISION HISTORY

Table 2. Revision History

Date	Revision	Description of Changes
March-1993	1	First Issue
16-Apr-2004	2	Stylesheet update. No content change.

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