

## Bidirectional Transil™ array for data line protection

### Features

- High surge capability Transil array:  
 $I_{PP} = 40 \text{ A}$  (8/20  $\mu\text{s}$ )
- Peak pulse power: 300 W (8/20  $\mu\text{s}$ )
- Up to 5 bidirectional Transil functions
- Low clamping factor ( $V_{CL} / V_{BR}$ ) at high current level
- Low leakage current
- ESD protection up to 15 kV

### Complies with the following standards

- IEC 61000-4-2 level 4
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- MIL STD 883G- Method 3015-7: class 3B
  - 25 kV (human body model)

### Applications

Differential data transmission line protection, such as:

- RS-232
- RS-423
- RS-422
- RS-485

### Description

Transil diode arrays provide high overvoltage protection by clamping action. Their instantaneous response to transient overvoltages makes them particularly suited to protect voltage sensitive devices such as MOS technology and low voltage supplied IC's.

The ITA series combines high surge capability against energetic pulses with high voltage performance against ESD.

TM: Transil is a trademark of STMicroelectronics

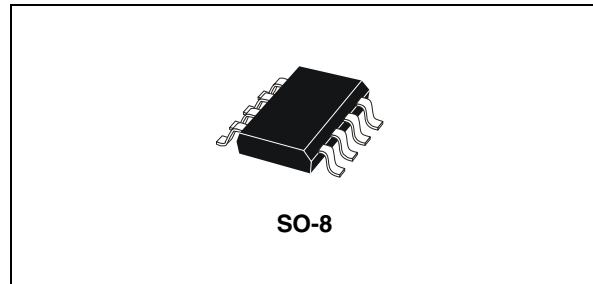
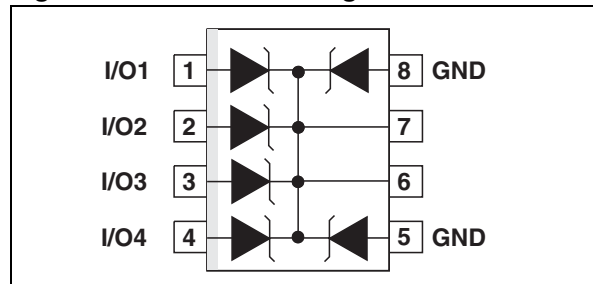


Figure 1. Functional diagram



# 1 Characteristics

**Table 1. Absolute ratings ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

| Symbol    | Parameter                                                           |                                 | Value       | Unit                 |
|-----------|---------------------------------------------------------------------|---------------------------------|-------------|----------------------|
| $P_{PP}$  | Peak pulse power (8/20 $\mu\text{s}$ ) <sup>(1)</sup>               | $T_j \text{ initial} = T_{amb}$ | 300         | W                    |
| $I_{PP}$  | Peak pulse current (8/20 $\mu\text{s}$ ) <sup>(1)</sup>             | $T_j \text{ initial} = T_{amb}$ | 40          | A                    |
| $I^2t$    | Wire $I^2t$ value <sup>(1)</sup>                                    |                                 | 0.6         | $\text{A}^2\text{s}$ |
| $T_j$     | Maximum operating junction temperature                              |                                 | 125         | $^{\circ}\text{C}$   |
| $T_{stg}$ | Storage temperature range                                           |                                 | -55 to +150 | $^{\circ}\text{C}$   |
| $T_L$     | Maximum lead temperature for soldering during 10 s at 5 mm for case |                                 | 260         | $^{\circ}\text{C}$   |

1. For surges greater than the specified maximum value, the I/O will first present a short-circuit and after an open circuit caused by the wire melting.

**Table 2. Electrical characteristics ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

| Symbol          | Parameter                       |
|-----------------|---------------------------------|
| V <sub>RM</sub> | Stand-off voltage               |
| V <sub>BR</sub> | Breakdown voltage               |
| V <sub>CL</sub> | Clamping voltage                |
| I <sub>RM</sub> | Leakage current                 |
| I <sub>PP</sub> | Peak pulse current              |
| αT              | Voltage temperature coefficient |
| C               | Capacitance                     |

| Order code | V <sub>BR</sub> @ I <sub>R</sub> |    | I <sub>RM</sub> @ V <sub>RM</sub> |    | V <sub>CL</sub> @ I <sub>PP</sub> |    | V <sub>CL</sub> @ I <sub>PP</sub> |    | αT                    | C           |
|------------|----------------------------------|----|-----------------------------------|----|-----------------------------------|----|-----------------------------------|----|-----------------------|-------------|
|            | min.<br>(1)                      |    | max.                              |    | 8/20 μs<br>(1)                    |    | max. 8/20 μs<br>(1)               |    | max.                  | max.<br>(2) |
|            | V                                | mA | μA                                | V  | V                                 | A  | V                                 | A  | 10 <sup>-4</sup> / °C | pF          |
| ITA6V5B1   | 6.5                              | 1  | 10                                | 5  | 10                                | 10 | 12                                | 25 | 4                     | 750         |
| ITA10B1    | 10                               | 1  | 4                                 | 8  | 15                                | 10 | 19                                | 25 | 8                     | 570         |
| ITA18B1    | 18                               | 1  | 4                                 | 15 | 25                                | 10 | 28                                | 25 | 9                     | 350         |
| ITA25B1    | 25                               | 1  | 4                                 | 24 | 33                                | 10 | 38                                | 25 | 12                    | 300         |

1. Between I/O pin and ground.  
 2. Between two input pins at 0 V Bias,  $F = 1\text{ MHz}$ .

Figure 2. Pulse waveform

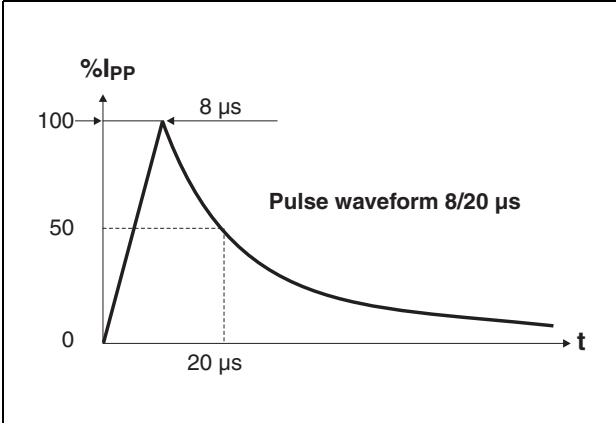


Figure 3. Typical peak pulse power versus exponential pulse duration

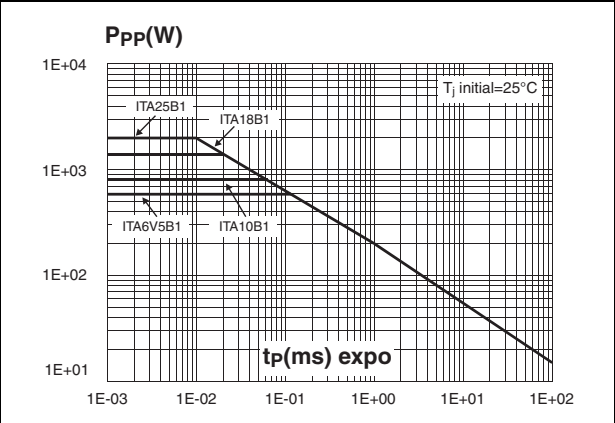


Figure 4. Clamping voltage versus peak pulse current (exponential waveform 8/20 μs)

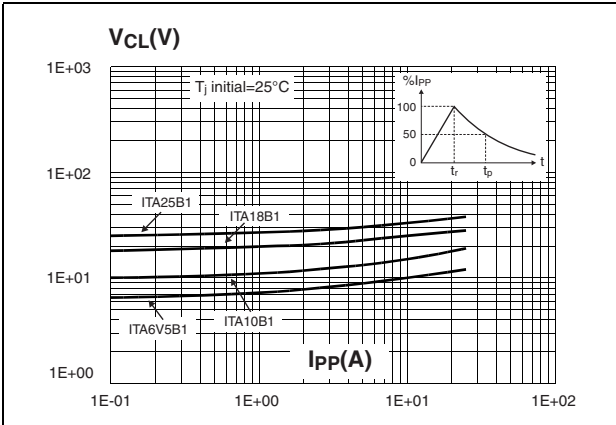


Figure 5. Peak current  $I_{DC}$  inducing open circuit of the wire for one input/output versus pulse duration (typical values)

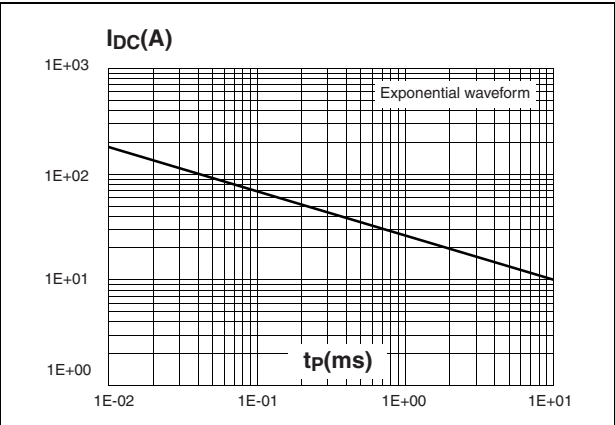


Figure 6. Junction capacitance versus reverse applied voltage for one input/output (typical values)

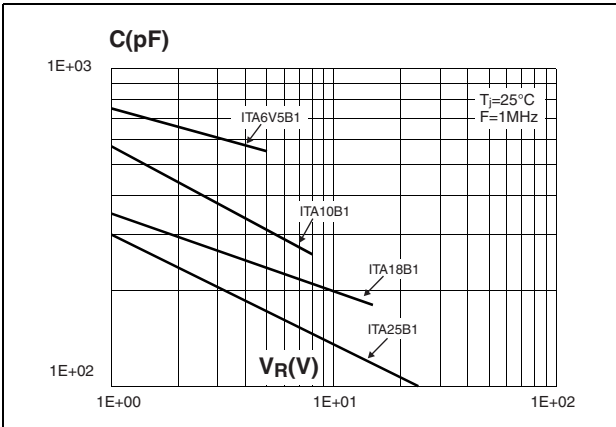
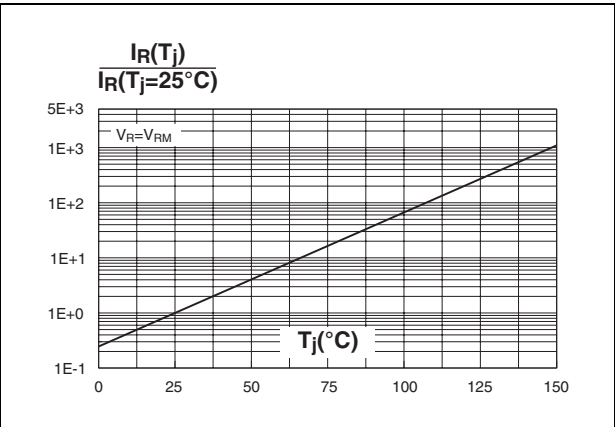


Figure 7. Relative variation of leakage current versus junction temperature



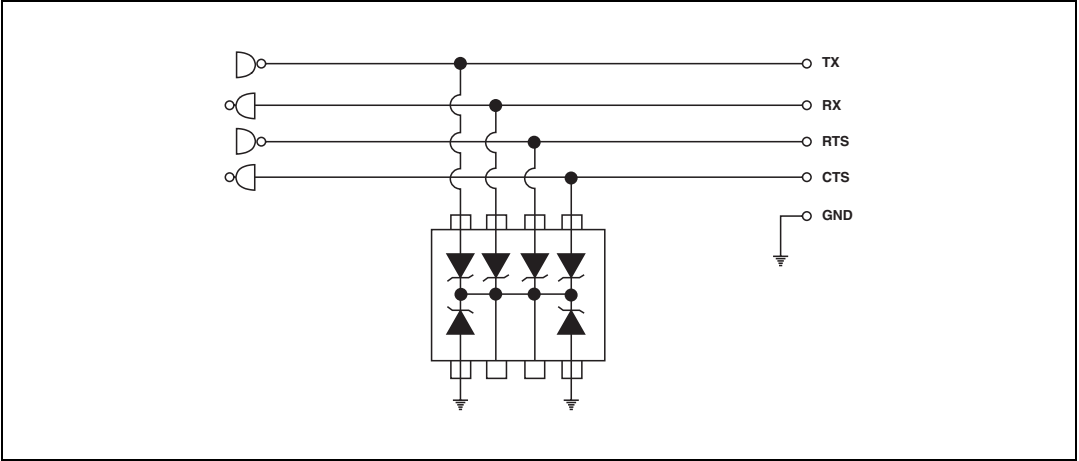
## 2 Application information

This monolithic Transil Array is based on 6 unidirectional Transils with a common cathode and can be configured to offer up to 5 bidirectional functions. This imposes a maximum differential voltage between 2 input pins (see [Table 3](#)).

Table 3. Maximum differential voltages

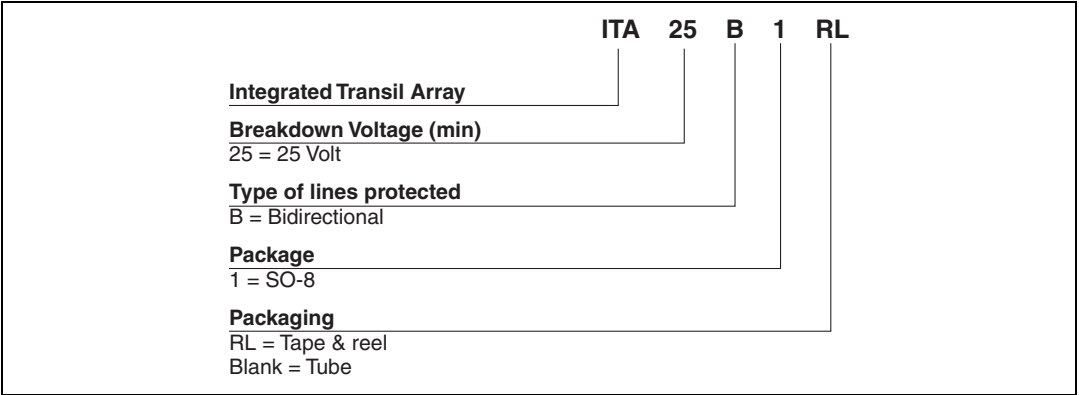
| Order code | Maximum differential voltage between two input pins at 25 °C |
|------------|--------------------------------------------------------------|
| ITA6V5B1   | ± 3.5 V                                                      |
| ITA10B1    | ± 5.0 V                                                      |
| ITA18B1    | ± 9.0 V                                                      |
| ITA25B1    | ± 12.5 V                                                     |

Figure 8. RS-232 junction (typical application)



## 3 Ordering information scheme

Figure 9. Ordering information scheme



# 4 Package information

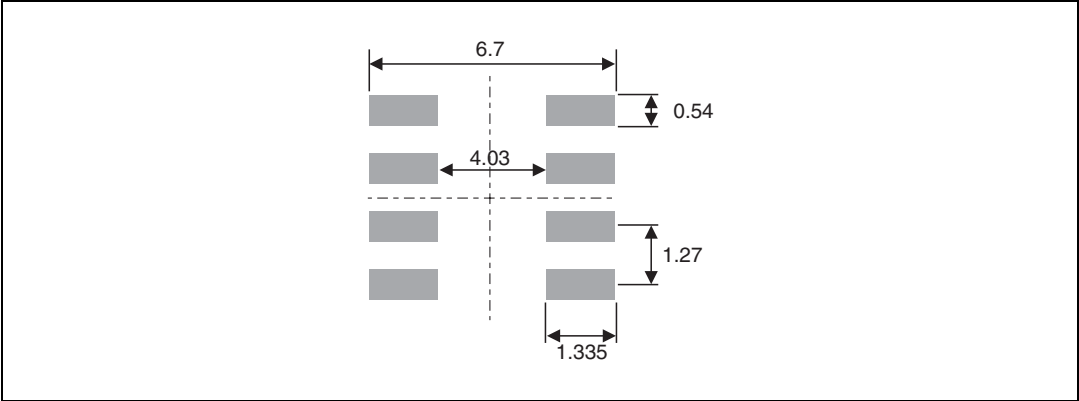
- Epoxy meets UL94, V0

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com).

**Table 4. SO-8 dimensions**

| Ref. | Dimensions  |      |      |        |       |       |
|------|-------------|------|------|--------|-------|-------|
|      | Millimeters |      |      | Inches |       |       |
|      | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A    |             |      | 1.75 |        |       | 0.069 |
| A1   | 0.1         |      | 0.25 | 0.004  |       | 0.010 |
| A2   | 1.25        |      |      | 0.049  |       |       |
| b    | 0.28        |      | 0.48 | 0.011  |       | 0.019 |
| C    | 0.17        |      | 0.23 | 0.007  |       | 0.009 |
| D    | 4.80        | 4.90 | 5.00 | 0.189  | 0.193 | 0.197 |
| E    | 5.80        | 6.00 | 6.20 | 0.228  | 0.236 | 0.244 |
| E1   | 3.80        | 3.90 | 4.00 | 0.150  | 0.154 | 0.157 |
| e    |             | 1.27 |      |        | 0.050 |       |
| h    | 0.25        |      | 0.50 | 0.010  |       | 0.020 |
| L    | 0.40        |      | 1.27 | 0.016  |       | 0.050 |
| L1   |             | 1.04 |      |        | 0.041 |       |
| k°   | 0           |      | 8    | 0      |       | 8     |
| ccc  |             |      | 0.10 |        |       | 0.004 |

**Figure 10. SO-8 footprint (dimensions in mm)**



## 5 Ordering Information

**Table 5. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|------------|---------|---------|--------|----------|---------------|
| ITA6V5B1   | 6V5B1   | SO-8    | 0.08 g | 2000     | Ammopack      |
| ITA6V5B1RL | 6V5B1   |         |        | 2500     | Tape and reel |
| ITA10B1    | 10B1    |         |        | 2000     | Ammopack      |
| ITA18B1    | 18B1    |         |        | 2000     | Ammopack      |
| ITA18B1RL  | 18B1    |         |        | 2500     | Tape and reel |
| ITA25B1    | 25B1    |         |        | 2000     | Ammopack      |
| ITA25B1RL  | 25B1    |         |        | 2500     | Tape and reel |
|            |         |         |        |          |               |

## 6 Revision history

**Table 6. Document revision history**

| Date        | Revision | Description of changes                                                                                                                  |
|-------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 13-Dec-2004 | 1        | First issue.                                                                                                                            |
| 15-Nov-2007 | 2        | Reformatted to current standards.<br>SO-8 package dimensions update.<br>Updated pulse waveform parameters in <a href="#">Figure 2</a> . |

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