

## ESD5682E12

### 2-Line, Uni-directional, Transient Voltage Suppressors

<http://www.sh-willsemi.com>

### Descriptions

The ESD5682E12 is a transient voltage suppressor designed to protect power interfaces. It is suitable to replace multiple discrete components in portable electronics.

The ESD5682E12 is specifically designed to protect USB port. TVS diode with higher surge capability is used to protect USB voltage bus pin.

The ESD5682E12 is available in SOT-23 package. Standard products are Pb-free and Halogen-free.

### Features

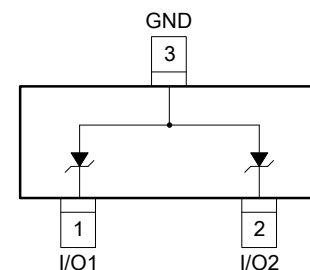
- Reverse stand-off voltage: 12V max
- Surge protection according to IEC61000-4-5  
8/20μs waveform: 18A
- ESD protection according to IEC61000-4-2  
Contact & Air discharge: ±30kV
- Low clamping voltage
- Solid-state silicon technology

### Applications

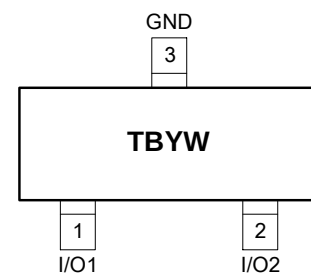
- Power supply protection
- Power management



**SOT-23 (Top View)**



**Circuit diagram**



TB = Device code  
YW = Data code

**Marking (Top View)**

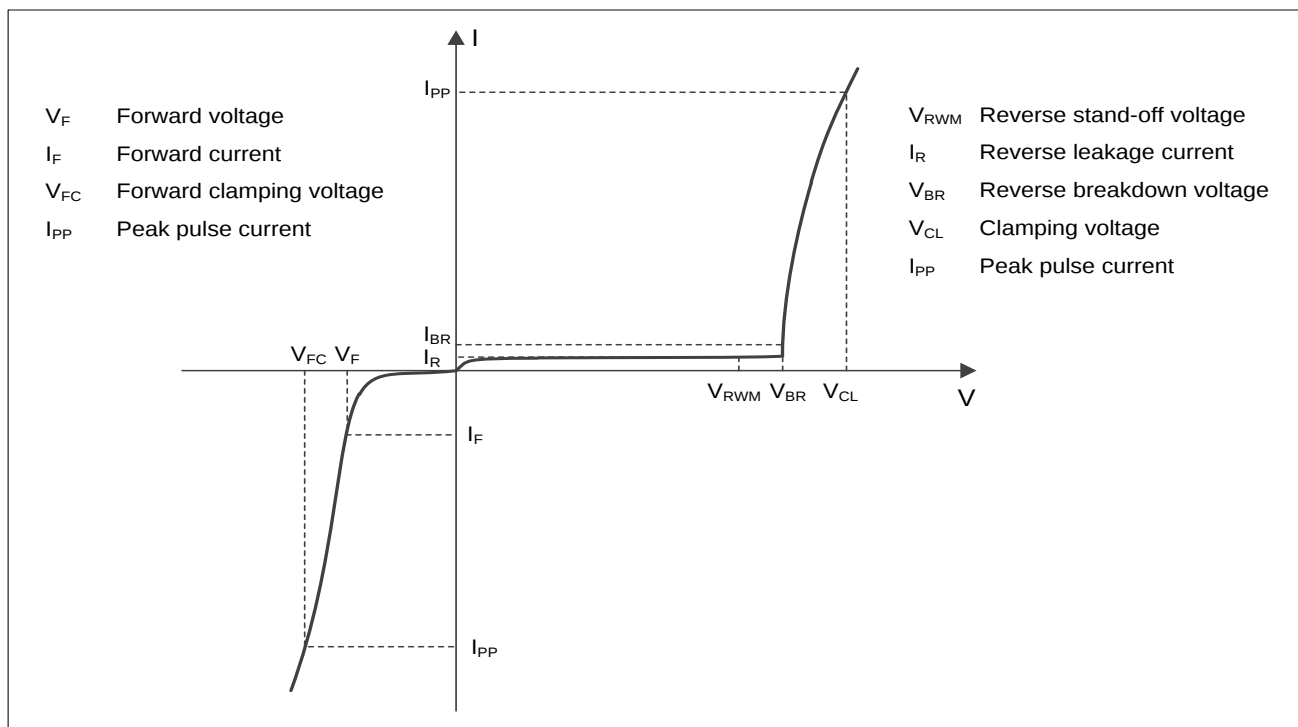
### Order information

| Device          | Package | Shipping       |
|-----------------|---------|----------------|
| ESD5682E12-2/TR | SOT-23  | 3000/Tape&Reel |

## Absolute maximum ratings

| Parameter                                       | Symbol    | Rating   | Unit        |
|-------------------------------------------------|-----------|----------|-------------|
| Peak pulse power ( $t_p=8/20\mu s$ )            | Ppk       | 450      | W           |
| ESD according to IEC61000-4-2 air discharge     | $V_{ESD}$ | $\pm 30$ | kV          |
| ESD according to IEC61000-4-2 contact discharge |           | $\pm 30$ |             |
| Junction temperature                            | $T_J$     | 125      | $^{\circ}C$ |
| Operating temperature                           | $T_{OP}$  | -40~85   | $^{\circ}C$ |
| Lead temperature                                | $T_L$     | 260      | $^{\circ}C$ |
| Storage temperature                             | $T_{STG}$ | -55~150  | $^{\circ}C$ |

## Electrical characteristics ( $T_A = 25^{\circ}C$ , unless otherwise noted)



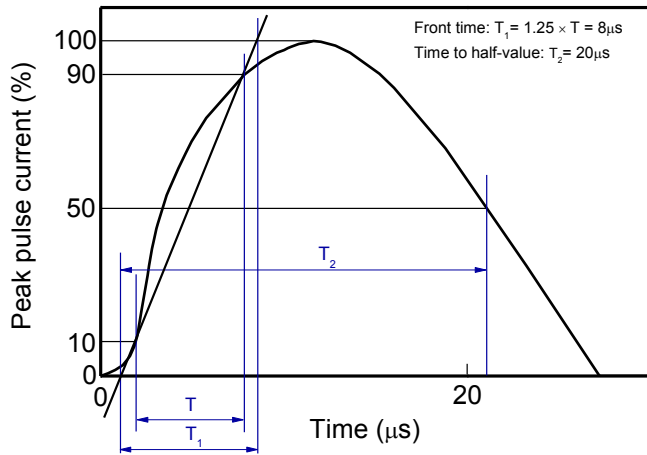
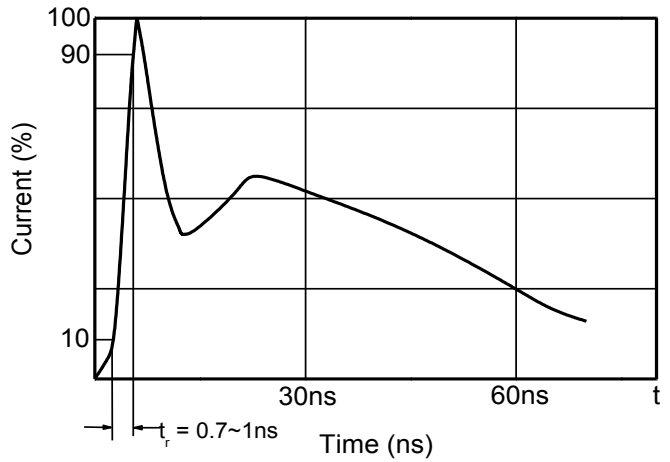
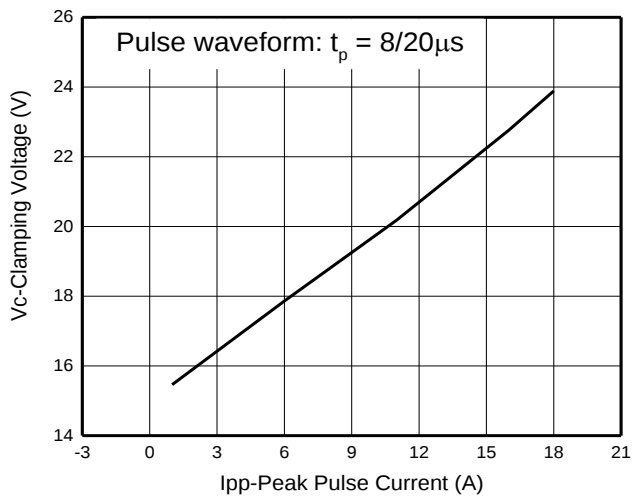
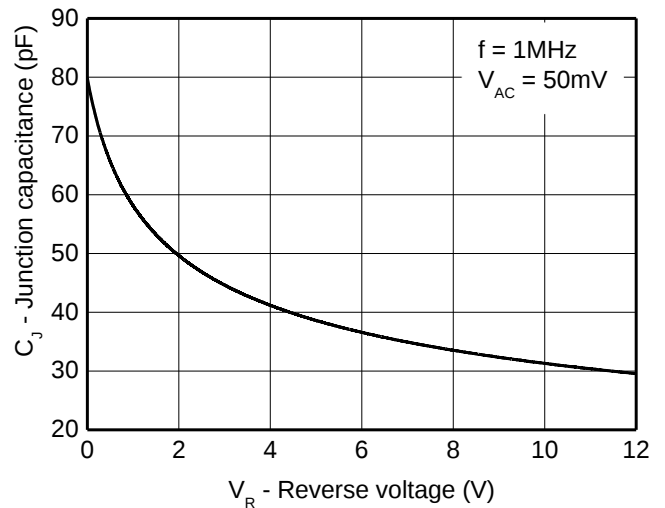
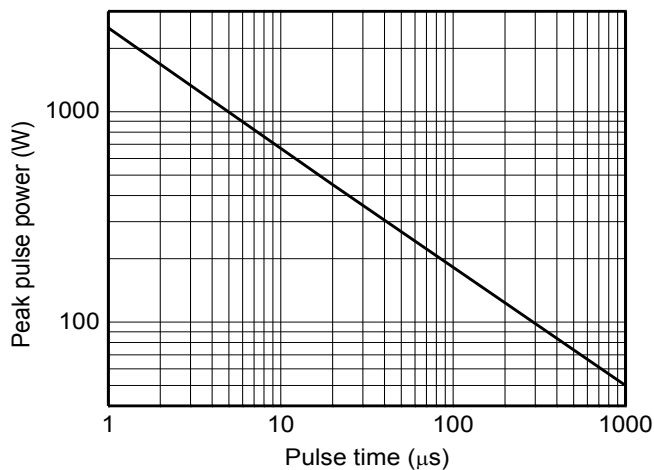
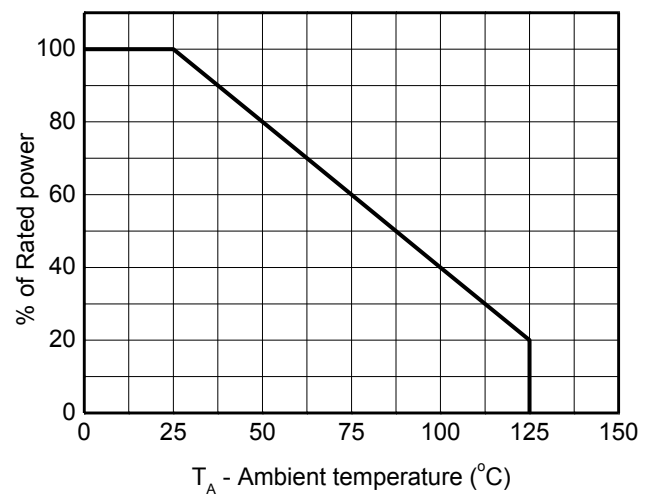
Definitions of electrical characteristics

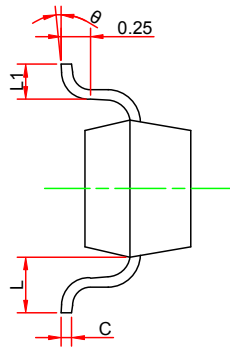
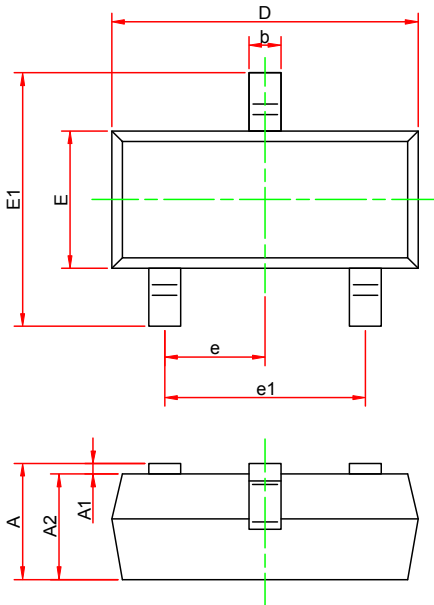
**Electrical characteristics ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)**

| Parameter                        | Symbol    | Condition                                               | Min. | Typ. | Max. | Unit     |
|----------------------------------|-----------|---------------------------------------------------------|------|------|------|----------|
| Reverse stand-off voltage        | $V_{RWM}$ |                                                         |      |      | 12.0 | V        |
| Reverse leakage current          | $I_R$     | $V_{RWM} = 12\text{V}$                                  |      | 1    | 100  | nA       |
| Reverse breakdown voltage        | $V_{BR}$  | $I_{BR} = 1\text{mA}$                                   | 13.0 | 15.0 | 17.0 | V        |
| Forward voltage                  | $V_F$     | $I_F = 20\text{mA}$                                     | 0.45 |      | 1.25 | V        |
| Clamping voltage <sup>1)</sup>   | $V_{CL}$  | $I_{PP} = 16\text{A}$ , $t_p = 100\text{ns}$            |      | 18   |      | V        |
| Clamping voltage <sup>2)</sup>   | $V_{CL}$  | $V_{ESD} = 8\text{kV}$                                  |      | 19   |      | V        |
| Clamping voltage <sup>3)</sup>   | $V_{CL}$  | $I_{PP} = 1\text{A}$ , $t_p = 8/20\mu\text{s}$          |      |      | 17.5 | V        |
|                                  |           | $I_{PP} = 18\text{A}$ , $t_p = 8/20\mu\text{s}$         |      |      | 26.0 | V        |
| Dynamic resistance <sup>1)</sup> | $R_{DYN}$ |                                                         |      | 0.20 |      | $\Omega$ |
| Junction capacitance             | $C_J$     | $F=1\text{MHz}$ , $V_R=0\text{V}$<br>Any I/O pin to GND |      | 80   | 120  | pF       |
|                                  |           | $F=1\text{MHz}$ , $V_R=0\text{V}$<br>Between I/O pins   |      | 40   | 60   | pF       |

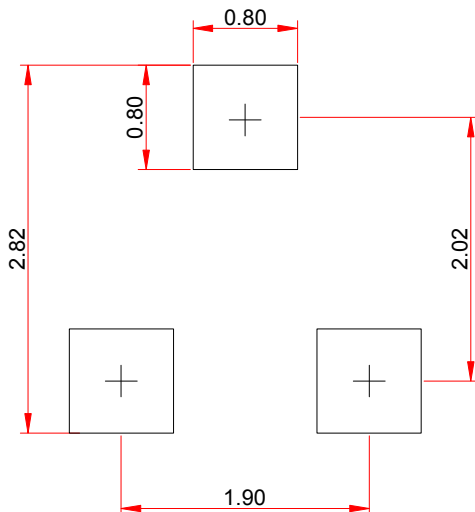
Notes:

- 1) TLP parameter:  $Z_0 = 50\Omega$ ,  $t_p = 100\text{ns}$ ,  $t_r = 2\text{ns}$ , averaging window from 60ns to 80ns.  $R_{DYN}$  is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.

**Typical characteristics ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)**

**8/20 $\mu\text{s}$  waveform per IEC61000-4-5**

**Contact discharge current waveform per IEC61000-4-2**

**Clamping voltage vs. Peak pulse current**

**Capacitance vs. Reverse voltage**

**Non-repetitive peak pulse power vs. Pulse time**

**Power derating vs. Ambient temperature**

**Package outline dimensions**
**SOT-23**


| Symbol   | Dimensions in millimeters |      |       |
|----------|---------------------------|------|-------|
|          | Min.                      | Typ. | Max.  |
| A        | 0.900                     | -    | 1.150 |
| A1       | 0.000                     | -    | 0.100 |
| A2       | 0.900                     | -    | 1.050 |
| b        | 0.300                     | -    | 0.500 |
| c        | 0.080                     | -    | 0.150 |
| D        | 2.800                     | -    | 3.000 |
| E        | 1.200                     | -    | 1.400 |
| E1       | 2.250                     | -    | 2.550 |
| e        | 0.950TYP                  |      |       |
| e1       | 1.800                     | -    | 2.000 |
| L        | 0.550REF                  |      |       |
| L1       | 0.300                     | -    | 0.500 |
| $\theta$ | 0°                        | -    | 8°    |

**Recommend land pattern (Unit: mm)**

**Notes:**

This recommended land pattern is for reference purposes only. Please consult your manufacturing group to ensure your PCB design guidelines are met.