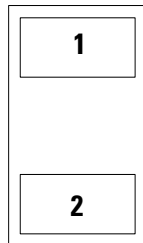


## AQ1003-01ETG Series - 30pF 30kV Unidirectional TVS

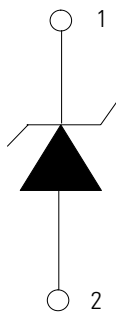
**AUTOMOTIVE GRADE** **HF** **RoHS** **PD** **GREEN**



### Pinout



### Functional Block Diagram



### Description

This TVS diode is fabricated in a proprietary silicon avalanche technology that offers each I/O pin a high level of protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust TVS diodes can safely absorb repetitive ESD strikes at  $\pm 30\text{kV}$  (contact discharge, IEC 61000-4-2) without performance degradation. Additionally, the TVS diode can safely dissipate 7A of 8/20 $\mu\text{s}$  surge current (IEC 61000-4-5 2<sup>nd</sup> Edition) with very low clamping voltages.

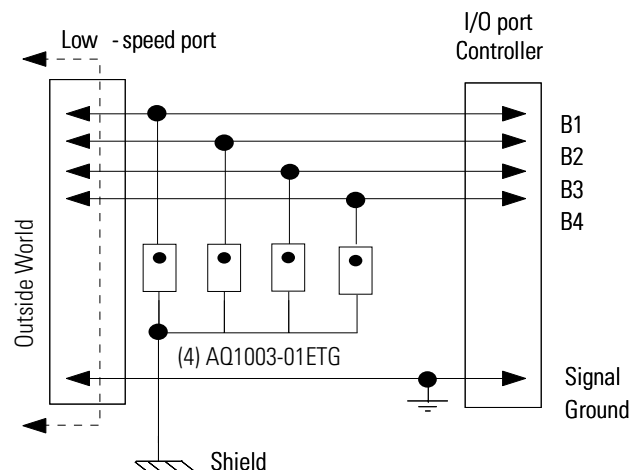
### Features

- ESD, IEC 61000-4-2,  $\pm 30\text{kV}$  contact,  $\pm 30\text{kV}$  air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 7A (8/20 $\mu\text{s}$  as defined in IEC 61000-4-5 2nd edition)
- Low leakage current of 100nA (MAX) at 5V
- PPAP Capable
- Small SOD882 (JEDEC MO-236) package saves board space
- Fits solder footprint of industry standard 0402 (1005) components
- AEC-Q101 qualified
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)
- ESD, ISO 10605, 330pF 330 $\Omega$ ,  $\pm 29\text{kV}$  contact,  $\pm 30\text{kV}$  air

### Applications

- Mobile phones
- Smart phones
- PDAs
- Portable navigation components
- Digital cameras
- Portable medical components
- Automotive applications

### Application Example



Life Support Note:

**Not Intended for Use in Life Support or Life Saving Applications**

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

## Absolute Maximum Ratings

| Symbol     | Parameter                              | Value      | Units |
|------------|----------------------------------------|------------|-------|
| $I_{PP}$   | Peak Pulse Current ( $t_p=8/20\mu s$ ) | 7.0        | A     |
| $T_{OP}$   | Operating Temperature                  | -40 to 150 | °C    |
| $T_{STOR}$ | Storage Temperature                    | -55 to 150 | °C    |

**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

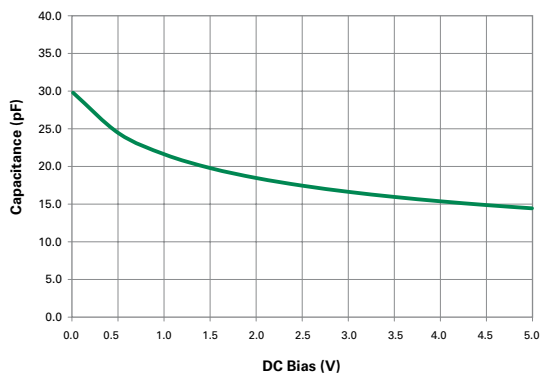
## Electrical Characteristics ( $T_{OP}=25^{\circ}C$ )

| Parameter                       | Symbol        | Test Conditions                   | Min      | Typ  | Max | Units    |
|---------------------------------|---------------|-----------------------------------|----------|------|-----|----------|
| Forward Voltage Drop            | $V_F$         | $I_F = 10mA$                      |          | 0.8  | 1.2 | V        |
| Breakdown Voltage               | $V_{BR}$      | $I_R = 1mA$                       | 6.0      | 7.8  | 8.5 | V        |
| Reverse Standoff Voltage        | $V_{RWM}$     | $I_R = 1\mu A$                    |          |      | 5.0 | V        |
| Reverse Leakage Current         | $I_{LEAK}$    | $V_R = 5V$                        |          |      | 100 | nA       |
| Clamp Voltage <sup>1</sup>      | $V_C$         | $I_{PP} = 6A$ $t_p = 8/20\mu s$   |          | 11.4 |     | V        |
|                                 |               | $I_{PP} = 7A$ $t_p = 8/20\mu s$   |          | 12.0 |     | V        |
| Dynamic Resistance <sup>2</sup> | $R_{DYN}$     | TLP, $t_p = 100ns$ , I/O to GND   |          | 0.25 |     | $\Omega$ |
| ESD Voltage <sup>1</sup>        | $V_{ESD}$     | IEC 61000-4-2 (Contact Discharge) | $\pm 30$ |      |     | kV       |
|                                 |               | IEC 61000-4-2 (Air Discharge)     | $\pm 30$ |      |     | kV       |
| Diode Capacitance <sup>1</sup>  | $C_{I/O-GND}$ | Reverse Bias=0V $f=1MHz$          |          | 30   |     | pF       |

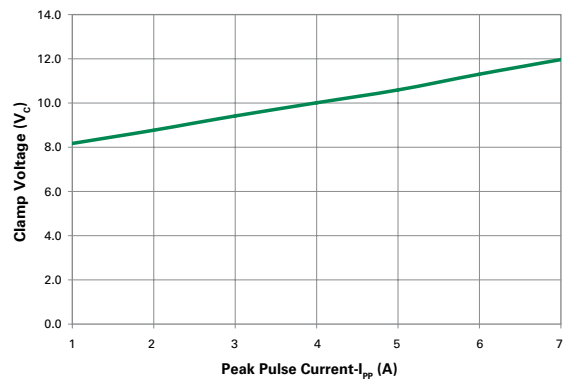
**Note:** 1 Parameter is guaranteed by design and/or component characterization.

2 Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t_1=70ns$  to  $t_2=90ns$

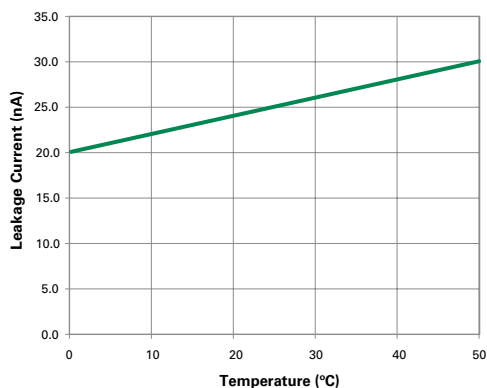
## Capacitance vs. Reverse Bias



## Clamping Voltage vs. $I_{PP}$



## Leakage vs. Temperature



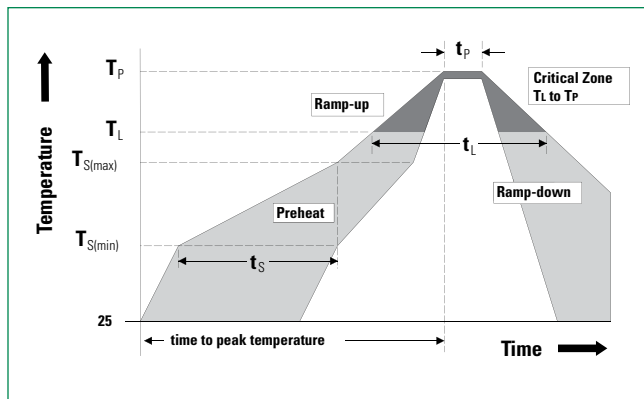
| Time (μs) | Percent of $I_{sp}$ |
|-----------|---------------------|
| 0.0       | 0%                  |
| 2.5       | 40%                 |
| 5.0       | 75%                 |
| 7.5       | 95%                 |
| 10.0      | 100%                |
| 12.5      | 95%                 |
| 15.0      | 85%                 |
| 17.5      | 75%                 |
| 20.0      | 65%                 |
| 22.5      | 55%                 |
| 25.0      | 45%                 |
| 27.5      | 35%                 |
| 30.0      | 22%                 |

**ISO10605 (C:330pF, R:330Ω) contact discharge plot at -8KV**

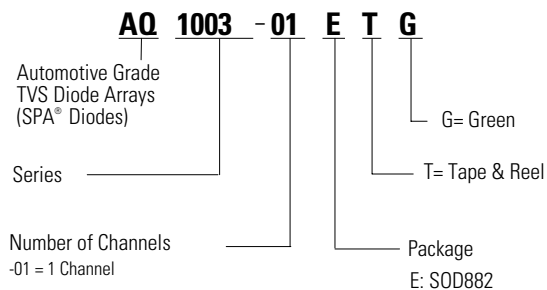


## Soldering Parameters

|                                                                        |                                    |                         |
|------------------------------------------------------------------------|------------------------------------|-------------------------|
| <b>Reflow Condition</b>                                                |                                    | Pb – Free assembly      |
| <b>Pre Heat</b>                                                        | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|                                                                        | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|                                                                        | - Time (min to max) ( $t_s$ )      | 60 – 180 secs           |
| <b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b> |                                    | 3°C/second max          |
| <b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>      |                                    | 3°C/second max          |
| <b>Reflow</b>                                                          | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|                                                                        | - Temperature ( $t_L$ )            | 60 – 150 seconds        |
| <b>Peak Temperature (<math>T_p</math>)</b>                             |                                    | 260 <sup>+0/-5</sup> °C |
| <b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>   |                                    | 20 – 40 seconds         |
| <b>Ramp-down Rate</b>                                                  |                                    | 6°C/second max          |
| <b>Time 25°C to peak Temperature (<math>T_p</math>)</b>                |                                    | 8 minutes Max.          |
| <b>Do not exceed</b>                                                   |                                    | 260°C                   |



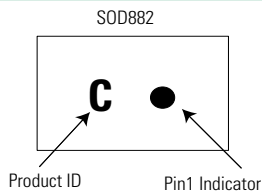
## Part Numbering System



## Product Characteristics

|                           |                                                        |
|---------------------------|--------------------------------------------------------|
| <b>Lead Plating</b>       | Pre-Plated Frame                                       |
| <b>Lead Material</b>      | Copper Alloy                                           |
| <b>Substrate material</b> | Silicon                                                |
| <b>Body Material</b>      | Molded Compound                                        |
| <b>Flammability</b>       | UL Recognized compound meeting flammability rating V-0 |

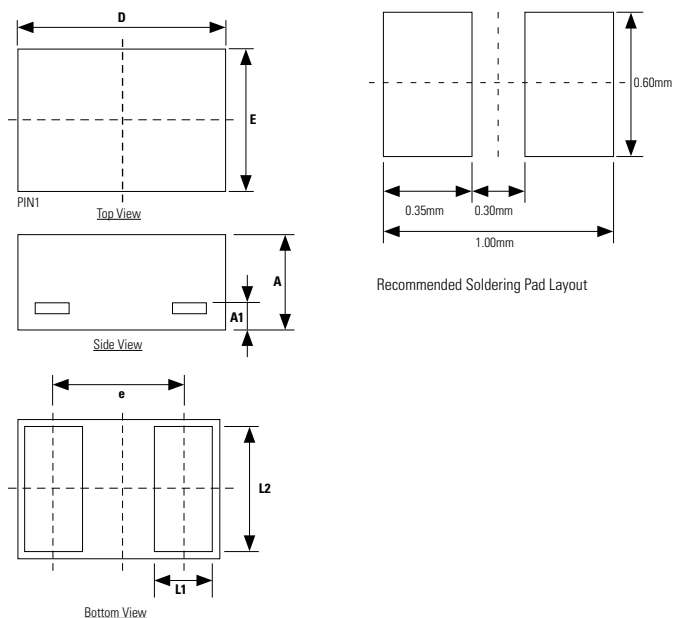
## Part Marking System



## Ordering Information

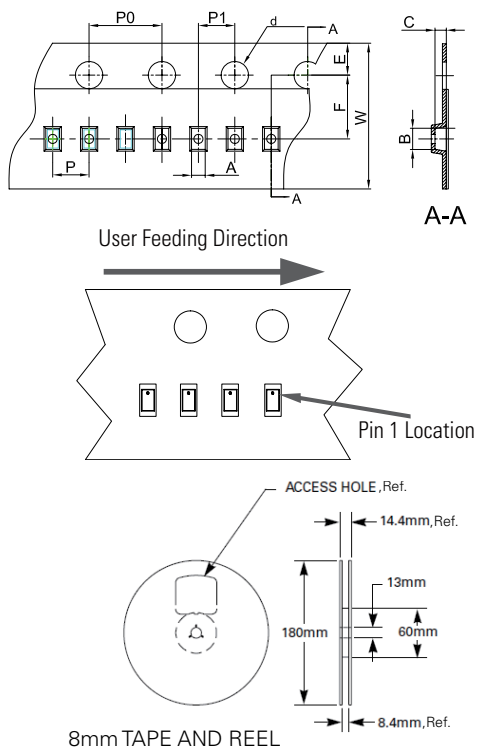
| Part Number  | Package | Min. Order Qty. |
|--------------|---------|-----------------|
| AQ1003-01ETG | SOD882  | 10000           |

## Package Dimensions — SOD882



| Symbol    | DIMENSIONS (mm) |      |      |
|-----------|-----------------|------|------|
|           | Min.            | Nor. | Max. |
| <b>A</b>  | 0.36            | 0.39 | 0.42 |
| <b>A1</b> | 0.127 REF       |      |      |
| <b>L1</b> | 0.20            | 0.25 | 0.30 |
| <b>L2</b> | 0.45            | 0.50 | 0.55 |
| <b>D</b>  | 0.93            | 1.00 | 1.07 |
| <b>E</b>  | 0.53            | 0.60 | 0.67 |
| <b>e</b>  | 0.65 BSC        |      |      |

## Embossed Carrier Tape & Reel Specification — SOD882



| Symbol    | Millimetres |      | Inches |       |
|-----------|-------------|------|--------|-------|
|           | Min         | Max  | Min    | Max   |
| <b>A</b>  | 0.65        | 0.70 | 0.026  | 0.028 |
| <b>B</b>  | 1.10        | 1.20 | 0.043  | 0.047 |
| <b>C</b>  | 0.50        | 0.60 | 0.020  | 0.024 |
| <b>dØ</b> | 1.40        | 1.60 | 0.055  | 0.063 |
| <b>E</b>  | 1.65        | 1.85 | 0.065  | 0.073 |
| <b>F</b>  | 3.40        | 3.60 | 0.134  | 0.142 |
| <b>P0</b> | 3.90        | 4.10 | 0.154  | 0.161 |
| <b>P</b>  | 1.90        | 2.10 | 0.075  | 0.083 |
| <b>P1</b> | 1.90        | 2.10 | 0.075  | 0.083 |
| <b>W</b>  | 7.90        | 8.10 | 0.311  | 0.319 |

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