# TVS Diode Arrays (SPA® Diodes) Datasheet

# AQ1205-01ETG

**Bidirectional Discrete TVS Diode, General Purpose Surge Protection** 

AUTOMOTIVE GRADE HF RoHS 🕫



Note: This package image is for example and reference only. for detail package drawing, please refer to the package section in this datasheet.

### Pinout



### **Functional Block Diagram**



# **Description**

The AQ1205-01ETG bidirectional TVS is fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment. The AQ1205-01ETG TVS can safely absorb repetitive ESD strikes of  $\pm 30$  kV (contact and air discharge as defined in IEC 61000-4-2) without any performance degradation. In addition, it can safely dissipate a 7A 8/20µs surge event as defined in IEC 61000-4-5, 2nd Edition.

### **Features**

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A
  (5/50ns)
- Surge tolerance, IEC 61000-4-5, 2nd Edition, 7A (8/20µs)
- ESD, ISO 10605, 330pF 330Ω, ±30kV contact, ±30kV air

# **Applications**

- Switches / Buttons
- Test Equipment /
- Instrumentation
- Point-of-Sale Terminals
- Medical Equipment

- Low leakage current of 20nA (MAX) at 5V
- Halogen-free, lead-free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)
- AEC-Q101 Qualified and PPAP capable
- Notebooks / Desktops / Servers
- Computer Peripherals
- Battery
- Automotive

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 <sub>PP</sub>   | Peak Current (t <sub>p</sub> =8/20µs) | 7          | А     |
| Τ <sub>ορ</sub>   | Operating Temperature                 | -40 to 150 | °C    |
| T <sub>stor</sub> | Storage Temperature                   | -55 to 150 | °C    |

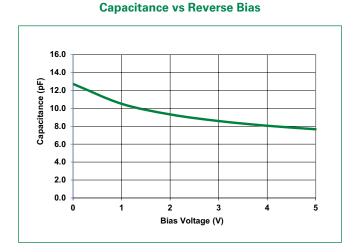
Caution: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

# Electrical Characteristics (T<sub>OP</sub>=25°C)

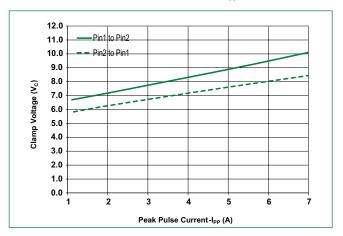
| Parameter                          | Symbol              | Test Conditions                             | Min | Тур  | Max | Units |
|------------------------------------|---------------------|---|-----|------|-----|-------|
| Reverse Standoff Voltage           | V <sub>RWM</sub>    | I <sub>R</sub> =1µA                         |     |      | 5   | V     |
| Breakdown Voltage                  | V <sub>BR</sub>     | I <sub>R</sub> =1mA                         | 5.3 | 5.5  |     | V     |
| Reverse Leakage Current            | I <sub>LEAK</sub>   | V <sub>R</sub> =5V                          |     | 1    | 20  | nA    |
| Clamp Voltage <sup>1</sup>         | V <sub>c</sub>      | Ι <sub>PP</sub> =7Α, t <sub>p</sub> =8/20μs |     | 10   |     | V     |
| Dynamic Resistance <sup>2</sup>    | R <sub>DYN</sub>    | TLP, t <sub>p</sub> =100ns                  |     | 0.17 |     | Ω     |
| ESD Withstand Voltage <sup>1</sup> | $V_{ESD}$           | IEC 61000-4-2 (Contact Discharge)           | ±30 |      |     | kV    |
|                                    |                     | IEC 61000-4-2 (Air Discharge)               | ±30 |      |     | kV    |
| Diode Capacitance <sup>1</sup>     | C <sub>IO-GND</sub> | Reverse Bias=5V, f=1MHz                     |     | 7    | 9   | pF    |

### Note:

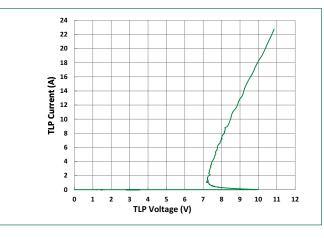
1. Parameter is guaranteed by design and/or component characterization. 2.Transmission Line Pulse (TLP) with 100ns width, 0.2ns rise time, and average window t1=70ns to t2= 90ns



### Clamping Voltage vs I



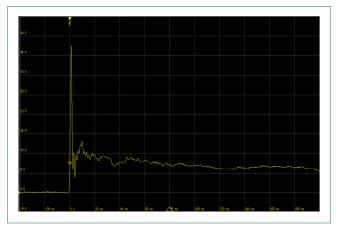
# AQ1205-01ETG Bidirectional Discrete TVS Diode, General Purpose Surge Protection



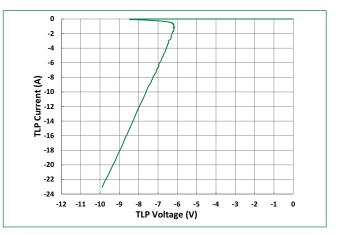
# Positive Transmission Line Pulsing (TLP) Plot



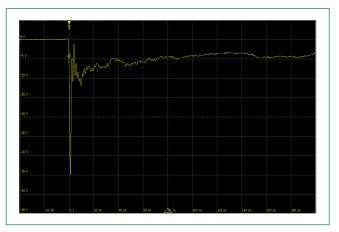
ISO 10605 Contact Discharge Plot at +8 kV



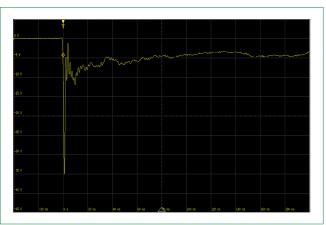
Negative Transmission Line Pulsing (TLP) Plot



### IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage



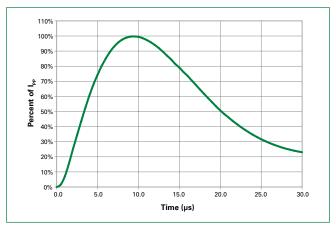
ISO 10605 Contact Discharge Plot at -8 kV





# AQ1205-01ETG

Bidirectional Discrete TVS Diode, General Purpose Surge Protection



## 8/20µs Pulse Waveform

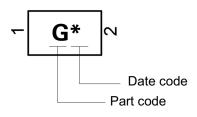
# **Soldering Parameters**

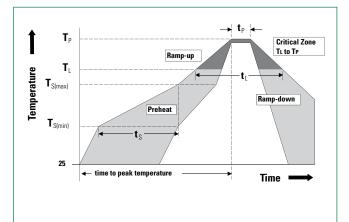
| Reflow Condition                                     |  | Pb – Free assembly      |  |  |
|--|--|-------------------------|--|--|
| Pre Heat   | - Temperature Min (T <sub>s(min)</sub> )   | 150°C                   |  |  |
|  | - Temperature Max (T <sub>s(max)</sub> )   | 200°C                   |  |  |
|  | -Time (min to max) (t <sub>s</sub> )       | 60 - 120 secs           |  |  |
| Average ram<br>peak                                  | p up rate (Liquidus) Temp ( $T_L$ ) to     | 3°C/second max          |  |  |
| T <sub>s(max)</sub> to T <sub>L</sub> - Ramp-up Rate |  | 3°C/second max          |  |  |
| Reflow   | - Temperature (T <sub>L</sub> ) (Liquidus) | 217°C                   |  |  |
|  | - Temperature (t <sub>L</sub> )            | 60 – 150 seconds        |  |  |
| Peak Temperature (T <sub>P</sub> )                   |  | 260 <sup>+0/-5</sup> °C |  |  |
| Time within 5°C of actual peak Temperature $(t_p)$   |  | 30 seconds              |  |  |
| Ramp-down Rate                                       |  | 6°C/second max          |  |  |
| Time 25°C to peak Temperature (T <sub>P</sub> )      |  | 8 minutes Max.          |  |  |
| Do not exceed  |  | 260°C                   |  |  |

## **Ordering Information**

| Part Number  | Package | Min. Order Qty. |  |  |
|--------------|---------|-----------------|--|--|
| AQ1205-01ETG | SOD882  | 10,000          |  |  |

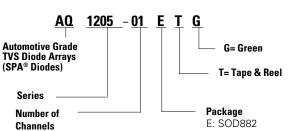
### **Part Marking System**





### **Product Characteristics**

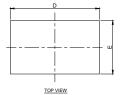
| Lead Plating       | Matte Tin  |  |  |
|--------------------|--|--|--|
| Lead material      | Copper Alloy   |  |  |
| Substrate Material | Silicon  |  |  |
| Body Material      | Molded Compound  |  |  |
| Flammability       | UL Recognized compound meeting flammability rating V-0 |  |  |

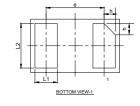


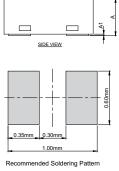
### Part Numbering System

Bidirectional Discrete TVS Diode, General Purpose Surge Protection

# Package Dimensions - SOD882



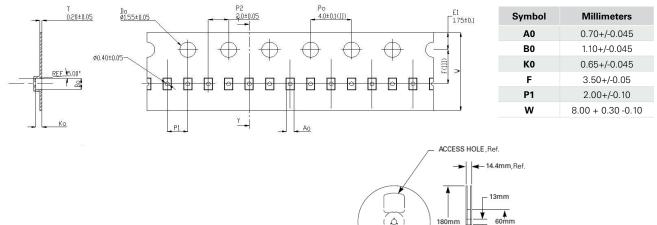


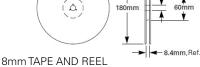


Drawing# : E03-B

|        | SOD882      |      |      |           |       |       |
|--------|-------------|------|------|-----------|-------|-------|
| Symbol | Millimeters |      |      | Inches    |       |       |
|        | Min         | Тур  | Max  | Min       | Тур   | Max   |
| Α      | 0.40        | 0.50 | 0.55 | 0.016     | 0.020 | 0.022 |
| A1     | 0.00        | 0.02 | 0.05 | 0.000     | 0.001 | 0.002 |
| L1     | 0.20        | 0.25 | 0.30 | 0.008     | 0.010 | 0.012 |
| L2     | 0.45        | 0.50 | 0.55 | 0.018     | 0.020 | 0.022 |
| D      | 0.95        | 1.00 | 1.05 | 0.037     | 0.039 | 0.041 |
| E      | 0.55        | 0.60 | 0.65 | 0.022     | 0.024 | 0.026 |
| е      | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| h      | 0.07        | 0.12 | 0.17 | 0.003     | 0.005 | 0.007 |

# Embossed Carrier Tape & Reel Specification - SOD882





Product Disclaimer: Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications in the expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse. "Littelfuse" includes Littelfuse, Inc., and all of its affiliate entities. http://www.littelfuse.com/disclaime-electronics.

