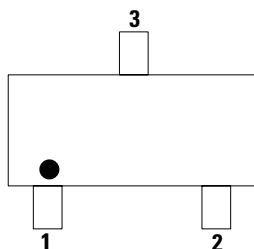


# AQ15CANA-02HTG

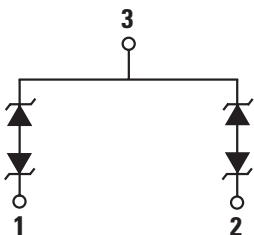
## 21pF, 9A Bidirectional TVS, General Purpose ESD Protection



### Pinout



### Functional Block Diagram



### Description

The AQ15CANA-02HTG bidirectional TVS is fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment.

The AQ15CANA-02HTG TVS can safely absorb repetitive ESD strikes of  $\pm 30\text{kV}$  (contact and air discharge as defined in IEC 61000-4-2) without any performance degradation. In addition, it can safely dissipate a 9A 8/20 $\mu\text{s}$  surge event as defined in IEC 61000-4-5, 2<sup>nd</sup> Edition.

### Features

- ESD, IEC 61000-4-2,  $\pm 30\text{kV}$  contact/air
- ESD, ISO 10605, 330pF 330 $\Omega$ ,  $\pm 30\text{kV}$  contact/air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Maximum surge tolerance, IEC 61000-4-5 2<sup>nd</sup> Edition, 9A (8/20 $\mu\text{s}$ )
- Halogen free, lead free and RoHS compliant
- Moisture Sensitivity Level (MSL-1)
- AEC-Q101 qualified and PPAP capable

### Applications

- Automotive
- ADAS Control Units
- Body Control Units
- CAN Bus
- Electronic Control Units
- Factory Automation
- Lighting Control (DALI)
- PowerTrain Control Units

#### 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.

# AQ15CANA-02HTG

## 21pF, 9A Bidirectional TVS, General Purpose ESD Protection

### Absolute Maximum Ratings

| Symbol     | Parameter                        | Value      | Units |
|------------|----------------------------------|------------|-------|
| $I_{PP}$   | Peak Current ( $t_p=8/20\mu s$ ) | 9          | A     |
| $T_{OP}$   | Operating Temperature            | -40 to 150 | °C    |
| $T_{STOR}$ | Storage Temperature              | -55 to 150 | °C    |

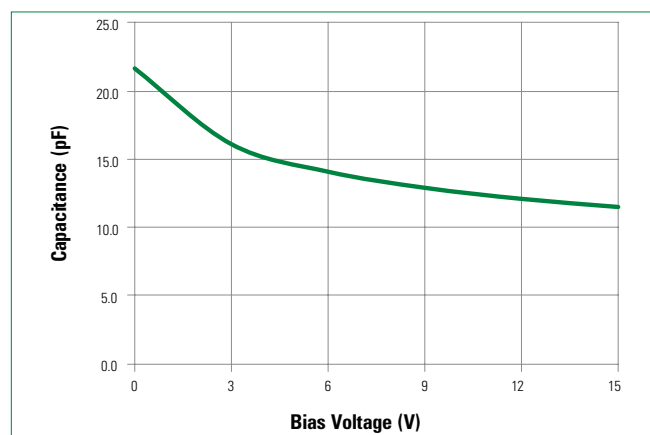
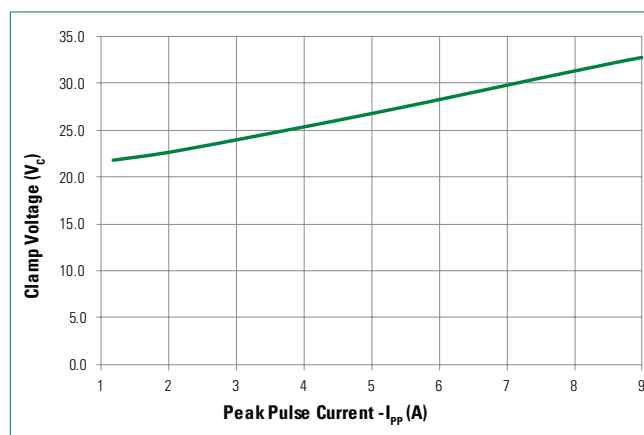
**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

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

| Parameter                            | Symbol       | Test Conditions                            | Min      | Typ  | Max | Units    |
|--------------------------------------|--------------|--|----------|------|-----|----------|
| Reverse Standoff Voltage             | $V_{RWM}$    |  |          |      | 15  | V        |
| Breakdown Voltage                    | $V_{BR}$     | $I_R=1mA$ , I/O to GND                     | 16.7     |      |     | V        |
| Reverse Leakage Current              | $I_{LEAK}$   | $V_R=15V$ , I/O to GND                     |          |      | 0.1 | $\mu A$  |
| Clamp Voltage <sup>1</sup>           | $V_C$        | $I_{PP}=1A$ , $t_p=8/20\mu s$ , I/O to GND |          | 21.8 |     | V        |
|                                      |              | $I_{PP}=9A$ , $t_p=8/20\mu s$ , I/O to GND |          | 33.0 |     |          |
| Dynamic Resistance <sup>2</sup>      | $R_{DYN}$    | TLP; $t_p=100ns$ , I/O to GND              |          | 0.48 |     | $\Omega$ |
| ESD Withstand Voltage <sup>1,3</sup> | $V_{ESD}$    | IEC 61000-4-2 (Contact Discharge)          | $\pm 30$ |      |     | kV       |
|                                      |              | IEC 61000-4-2 (Air Discharge)              | $\pm 30$ |      |     | kV       |
|                                      |              | ISO 10605 (Contact Discharge)              | $\pm 30$ |      |     | kV       |
|                                      |              | ISO 10605 (Air Discharge)                  | $\pm 30$ |      |     | kV       |
| Diode Capacitance <sup>1</sup>       | $C_{IO-GND}$ | Reverse Bias=0V, $f=1MHz$ , I/O to GND     |          | 21   |     | pF       |

**Note:**

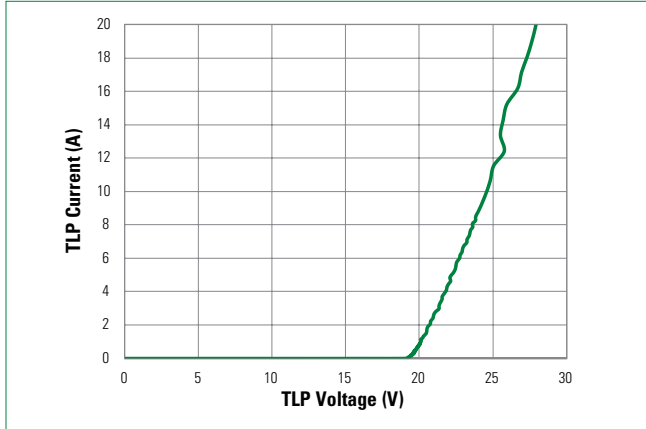
- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100ns width, 0.2ns rise time, and average window  $t_1=70ns$  to  $t_2=90ns$ .
- Device stressed with ten non-repetitive ESD pulses.

**Capacitance vs. Reverse Bias****Clamping Voltage vs  $I_{PP}$** 

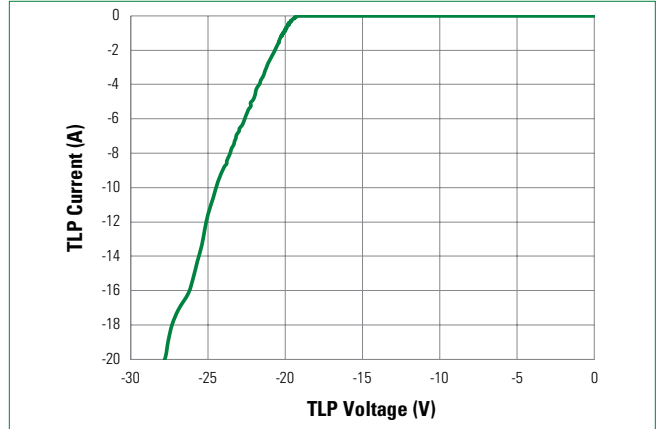
# AQ15CANA-02HTG

21pF, 9A Bidirectional TVS, General Purpose ESD Protection

Positive Transmission Line Pulsing (TLP) Plot



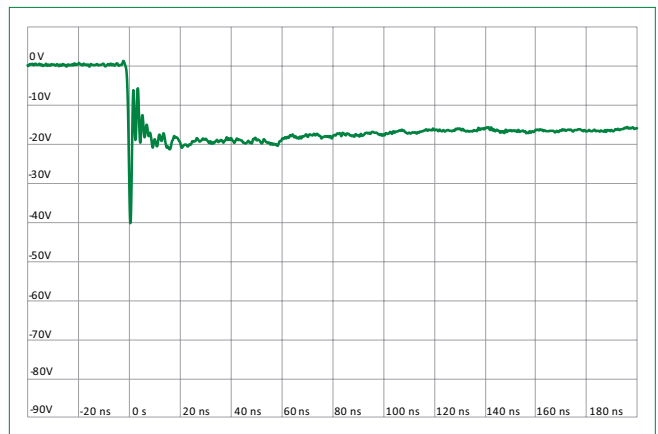
Negative Transmission Line Pulsing (TLP) Plot



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



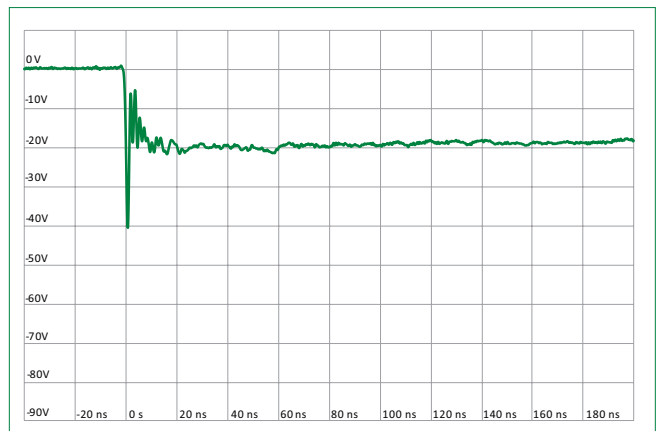
IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage



ISO10605 Contact Discharge Plot at +8 kV



ISO10605 Contact Discharge Plot at -8 kV

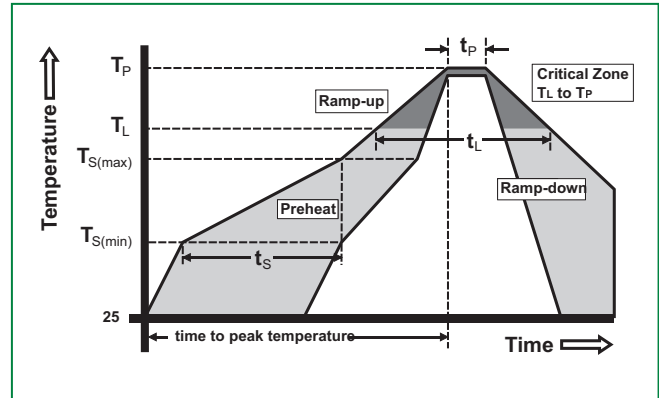


# AQ15CANA-02HTG

## 21pF, 9A Bidirectional TVS, General Purpose ESD Protection

### 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 – 120 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>   |                                    | 30 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                   |



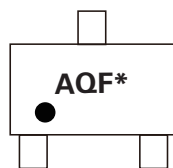
### Ordering Information

| Part Number    | Package  | Min. Order Qty. |
|----------------|----------|-----------------|
| AQ15CANA-02HTG | SOT23-3L | 3000            |

### Product Characteristics

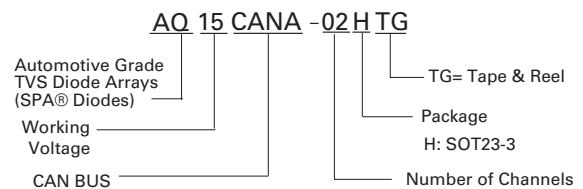
|                         |  |
|-------------------------|--|
| <b>Lead Plating</b>     | Matte Tin  |
| <b>Lead material</b>    | Copper Alloy   |
| <b>Lead Coplanarity</b> | 0.004 inches (0.102mm)                                 |
| <b>Body Material</b>    | Molded Compound  |
| <b>Flammability</b>     | UL Recognized compound meeting flammability rating V-0 |

### Part Marking System



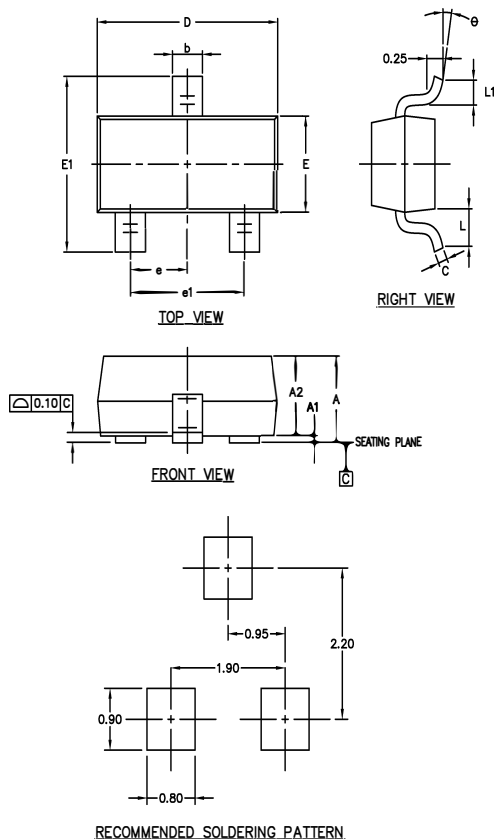
**AQ**=Part code  
**F**=Assembly code  
**\***=Date code

### Part Numbering System

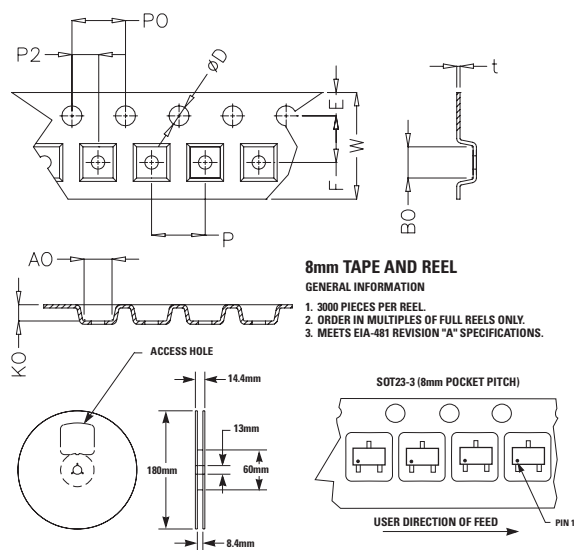


**AQ15CANA-02HTG**

21pF, 9A Bidirectional TVS, General Purpose ESD Protection

**Package Dimensions - SOT23-3**

| Package  | SOT23-3     |       |           |       |
|----------|-------------|-------|-----------|-------|
| Pins     | 3           |       |           |       |
| Symbol   | Millimeters |       | Inches    |       |
|          | Min         | Max   | Min       | Max   |
| A        | 0.890       | 1.150 | 0.035     | 0.045 |
| A1       | 0.000       | 0.100 | 0.000     | 0.004 |
| A2       | 0.880       | 1.050 | 0.035     | 0.041 |
| b        | 0.300       | 0.510 | 0.012     | 0.020 |
| C        | 0.080       | 0.200 | 0.003     | 0.008 |
| D        | 2.800       | 3.040 | 0.110     | 0.120 |
| E        | 1.200       | 1.400 | 0.047     | 0.055 |
| E1       | 2.100       | 2.640 | 0.083     | 0.104 |
| e        | 0.950 TYP   |       | 0.037 TYP |       |
| e1       | 1.780       | 2.050 | 0.070     | 0.081 |
| L        | 0.550 REF   |       | 0.022 REF |       |
| L1       | 0.300       | 0.550 | 0.012     | 0.022 |
| $\theta$ | 0°          | 8°    | 0°        | 8°    |

**Embossed Carrier Tape & Reel Specification — SOT23-3**

**8mm TAPE AND REEL**  
**GENERAL INFORMATION**  
 1. 3000 PIECES PER REEL.  
 2. ORDER IN MULTIPLES OF FULL REELS ONLY.  
 3. MEETS EIA-481 REVISION "A" SPECIFICATIONS.

| Symbol | Millimeters |      | Inches |       |
|--------|-------------|------|--------|-------|
|        | Min         | Max  | Min    | Max   |
| E      | 1.65        | 1.85 | 0.065  | 0.073 |
| F      | 3.40        | 3.60 | 0.134  | 0.142 |
| P2     | 1.90        | 2.10 | 0.075  | 0.083 |
| D      | 1.40        | 1.60 | 0.055  | 0.063 |
| P0     | 3.90        | 4.10 | 0.154  | 0.161 |
| W      | 7.70        | 8.30 | 0.303  | 0.327 |
| P      | 3.90        | 4.10 | 0.154  | 0.161 |
| A0     | 3.05        | 3.25 | 0.120  | 0.128 |
| B0     | 2.67        | 2.87 | 0.105  | 0.113 |
| K0     | 1.12        | 1.32 | 0.044  | 0.052 |
| t      | 0.18        | 0.24 | 0.007  | 0.009 |

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