AQ24CANA Series
General Purpose ESD Protection

Description
The AQ24CANA TVS Diode Array is designed to protect automotive Controller Area Network (CAN) lines from damage due to electrostatic discharge (ESD), electrical fast transient (EFT), and other overvoltage transients. The AQ24CANA can absorb repetitive ESD strikes above the maximum level specified in IEC 61000-4-2 international standard without performance degradation and safely dissipate 5A of 8/20µs surge current (IEC 61000-4-5 2nd Edition) with very low clamping voltages.

Features & Benefits
- ESD, IEC 61000-4-2, ±27kV contact, ±30kV air
- EFT, IEC 61000-4-4, 50A (5/50ns)
- Lightning, 5A (8/20µs as defined in IEC 61000-4-5 2nd Edition)
- PPAP capable
- Low clamping voltage
- Low leakage current
- ESD, ISO 10605, 330pF 330Ω, ±27kV contact, ±30kV air
- AEC-Q101 qualified
- Halogen-Free, Lead-Free and RoHS-Compliant
- Moisture Sensitivity Level (MSL -1)

Applications
- Automotive Applications
- CAN Bus
- Electronic Control Units
- Body Control Units
- ADAS Control Units
- PowerTrain Control Units
- Telematics and Connectivity
- LED Lighting Control

Pinout and Functional Block Diagram
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.

### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPk</td>
<td>Peak Pulse Power ((t_p=8/20\mu s))</td>
<td>250</td>
<td>W</td>
</tr>
<tr>
<td>IPP</td>
<td>Peak Pulse Current ((t_p=8/20\mu s))</td>
<td>5.0</td>
<td>A</td>
</tr>
<tr>
<td>TOp</td>
<td>Operating Temperature</td>
<td>-40 to 150</td>
<td>°C</td>
</tr>
<tr>
<td>TSTOR</td>
<td>Storage Temperature</td>
<td>-55 to 150</td>
<td>°C</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse Standoff Voltage</td>
<td>(V_{RPM})</td>
<td>(I_{R}=1\mu A, \text{Pin 1 or Pin 2 to Pin 3})</td>
<td>-</td>
<td>-</td>
<td>24</td>
<td>V</td>
</tr>
<tr>
<td>Breakdown Voltage</td>
<td>(V_{BR})</td>
<td>(I_{R}=1mA, \text{Pin 1 or Pin 2 to Pin 3})</td>
<td>26.7</td>
<td>28</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>(I_{LEAK})</td>
<td>(V_{R}=24V)</td>
<td>-</td>
<td>0.02</td>
<td>0.1</td>
<td>μA</td>
</tr>
<tr>
<td>Clamp Voltage (^1)</td>
<td>(V_{C})</td>
<td>(I_{R}=1mA, t_p=8/20\mu s, \text{Pin 1 or Pin 2 to Pin 3})</td>
<td>-</td>
<td>34</td>
<td>36</td>
<td>V</td>
</tr>
<tr>
<td>Dynamic Resistance (^2)</td>
<td>(R_{DYN})</td>
<td>TLP (t_p=100ns, \text{Pin 1 or Pin 2 to Pin 3})</td>
<td>-</td>
<td>47</td>
<td>50</td>
<td>V</td>
</tr>
<tr>
<td>ESD Withstand Voltage (^1)</td>
<td>(V_{ESD})</td>
<td>IEC 61000-4-2 (Contact Discharge)</td>
<td>±27</td>
<td>-</td>
<td>-</td>
<td>kV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IEC 61000-4-2 (Air Discharge)</td>
<td>±30</td>
<td>-</td>
<td>-</td>
<td>kV</td>
</tr>
<tr>
<td>Diode Capacitance (^1)</td>
<td>(C_{IO-GND})</td>
<td>Reverse Bias=0V, (f=1MHz); Pin 1 or Pin 2 to Pin 3</td>
<td>-</td>
<td>15</td>
<td>17</td>
<td>pF</td>
</tr>
</tbody>
</table>

**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 \(t_1=70\text{ns} to t_2=90\text{ns}\)

### Capacitance vs. Reverse Bias (Pin1 or Pin2 to Pin3)

![Capacitance vs. Reverse Bias Graph]

### Clamping Voltage vs. Peak Pulse Current

![Clamping Voltage vs. Peak Pulse Current Graph]
**AQ24CANA Series**

**General Purpose ESD Protection**

**Positive Transmission Line Pulsing (TLP) Plot**

**Negative Transmission Line Pulsing (TLP) Plot**

**8/20μs Pulse Waveform**

**Power Derating Curve**

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

**IEC 61000-4-2 -8kV Contact ESD Clamping Voltage**
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Product Characteristics

- **Lead Plating**: Matte Tin
- **Lead Material**: Copper Alloy
- **Lead Coplanarity**: 0.004 inches (0.102mm)
- **Substrate Material**: Silicon
- **Body Material**: Molded Compound
- **Flammability**: UL Recognized compound meeting flammability rating V-0

**Soldering Parameters**

- **Reflow Condition**: Pb – Free assembly
- **Pre Heat**
  - Temperature Min ($T_{Q(min)}$): 150°C
  - Temperature Max ($T_{Q(max)}$): 200°C
  - Time (min to max) ($t_T$): 60 – 120 secs
- **Average ramp up rate (Liquidus) Temp ($T_{L}$) to peak**: 3°C/second max
- **$T_{S(max)}$ to $T_{S(min)}$ - Ramp-up Rate**: 3°C/second max
- **Reflow**
  - Temperature ($T_r$) (Liquidus): 217°C
  - Temperature ($T_r$): 60 – 150 seconds
- **Peak Temperature ($T_{P}$)**: 260°C
- **Time within 5°C of actual peak Temperature ($T_r$)**: 30 seconds
- **Ramp-down Rate**: 6°C/second max
- **Time 25°C to peak Temperature ($T_{P}$)**: 8 minutes Max.
- **Do not exceed**: 260°C

**Part Marking System**

- **ATF***: AT = Part code
  - F = Assembly code
  - * = Date code

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Min. Order Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ24CANA-02HTG</td>
<td>SOT23-3</td>
<td>3000</td>
</tr>
</tbody>
</table>

**Product Information**

- **ISO 10605 (C:330pF, R:330Ω)**
  - Contact discharge plot at +8kV
  - Contact discharge plot at -8kV

**Part Numbering System**

- **TVS Diode Arrays (SPA® Automotive Grade Diodes)**
  - Working Voltage
  - CAN BUS
  - Wattage: 250W

- **Package**
  - H: SOT23-3
  - T: Tape & Reel
  - G: Green

Specifications are subject to change without notice.
Revised: GD. 06/08/21
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**Package Dimensions — SOT23-3**

![Package Dimensions Diagram]

Recommended soldering pad layout (unit :mm)

Drawing #: H01-B

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

![Embossed Carrier Tape & Reel Specification Diagram]

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