

# 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 8/20 $\mu$ s surge current (IEC 61000-4-5 2nd Edition) with very low clamping voltages.

### Features & Benefits

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

### Additional Information



Resources

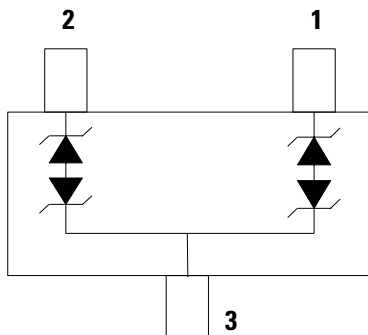


Accessories



Samples

### Pinout and Functional Block Diagram



### Applications

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

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.

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### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$P_{PK}$	Peak Pulse Power ( $t_p=8/20\mu s$ )	250	W
$I_{PP}$	Peak Pulse Current ( $t_p=8/20\mu s$ )	5.0	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 ( $T_{OP}=25^\circ C$ )

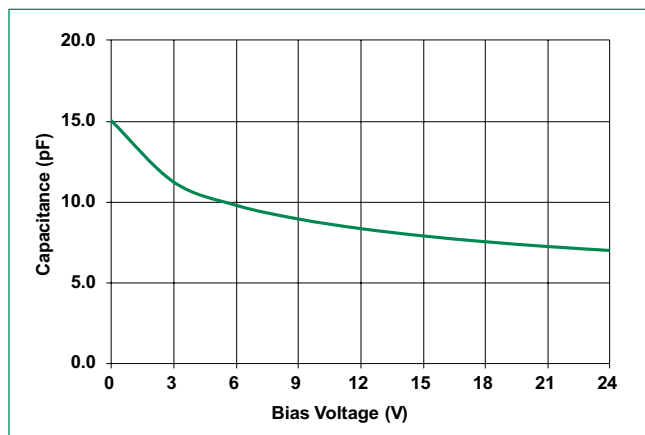
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R=1\mu A$ , Pin 1 or Pin 2 to Pin 3	-	-	24	V
Breakdown Voltage	$V_{BR}$	$I_R=1mA$ , Pin 1 or Pin 2 to Pin 3	26.7	28	-	V
Reverse Leakage Current	$I_{LEAK}$	$V_R=24V$	-	0.02	0.1	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A$ , $t_p=8/20\mu s$ , Pin 1 or Pin 2 to Pin 3	-	34	36	V
		$I_{PP}=5A$ , $t_p=8/20\mu s$ , Pin 1 or Pin 2 to Pin 3	-	47	50	V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p=100ns$ , Pin 1 or Pin 2 to Pin 3	-	0.7	-	$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 27$	-	-	kV
		IEC 61000-4-2 (Air Discharge)	$\pm 30$	-	-	kV
Diode Capacitance <sup>1</sup>	$C_{I/O-GND}$	Reverse Bias=0V, $f=1MHz$ ; Pin 1 or Pin 2 to Pin 3	-	15	17	pF

**Note:**

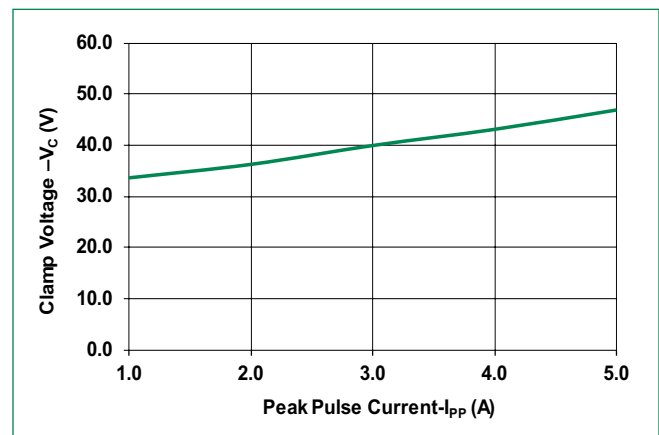
<sup>1</sup> Parameter is guaranteed by design and/or component characterization.

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

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



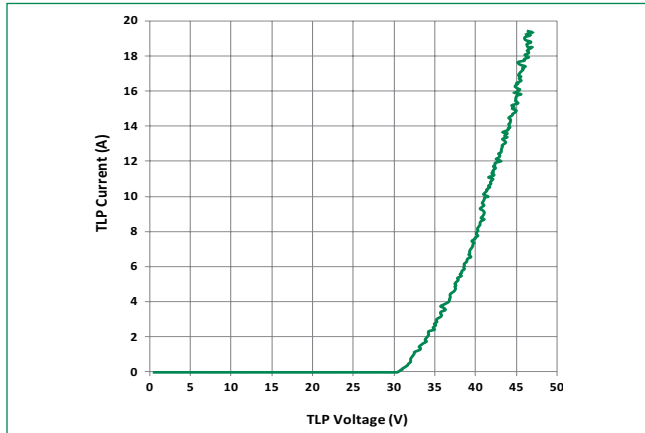
#### Clamping Voltage vs. Peak Pulse Current



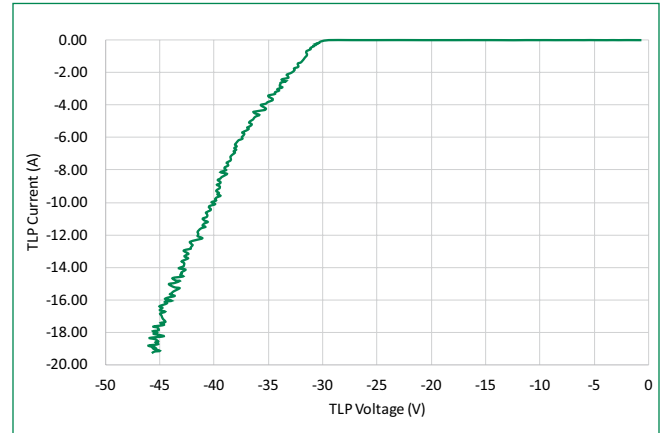
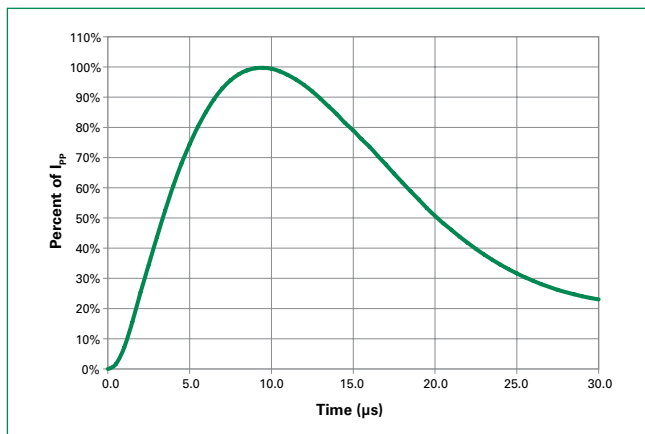
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## General Purpose ESD Protection

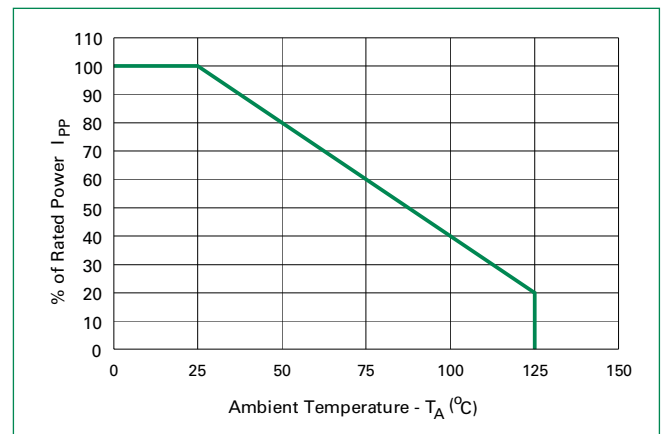
Positive Transmission Line Pulsing (TLP) Plot



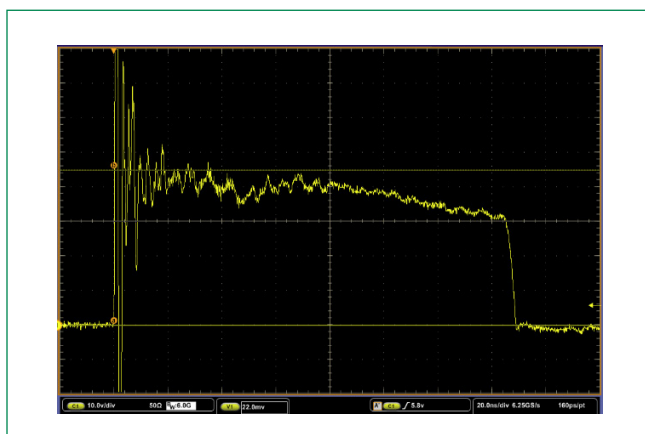
Negative Transmission Line Pulsing (TLP) Plot

8/20 $\mu$ s Pulse Waveform

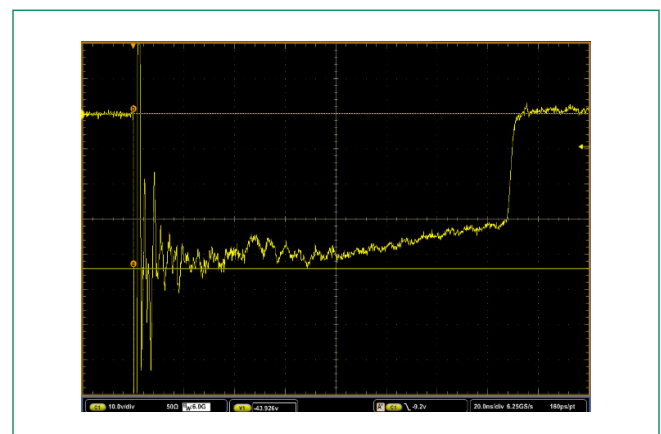
Power Derating Curve



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



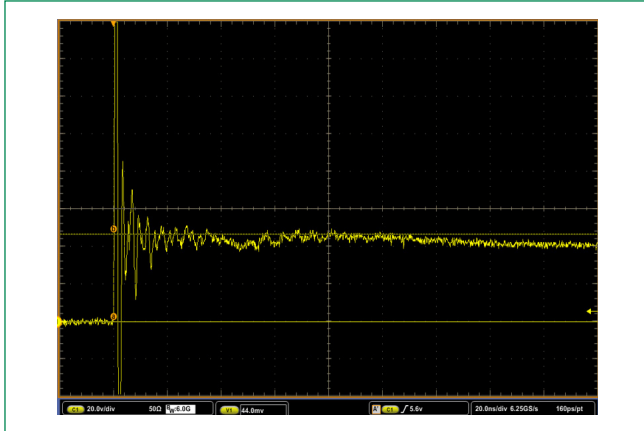
IEC 61000-4-2 -8kV Contact ESD Clamping Voltage



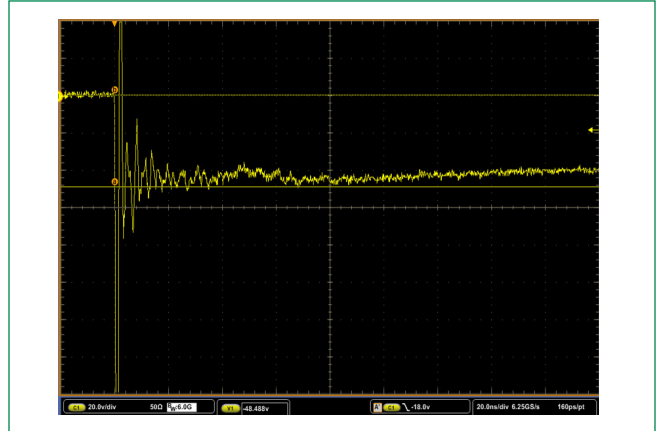
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ISO 10605 (C:330pF, R:330Ω)  
contact discharge plot at +8kV

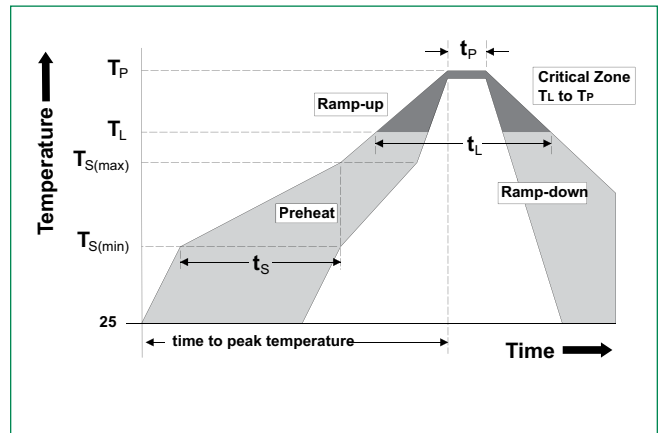


ISO 10605 (C:330pF, R:330Ω)  
contact discharge plot at -8kV

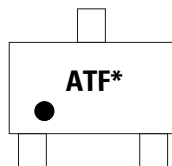


## Soldering Parameters

<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 – 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



## Part Marking System



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

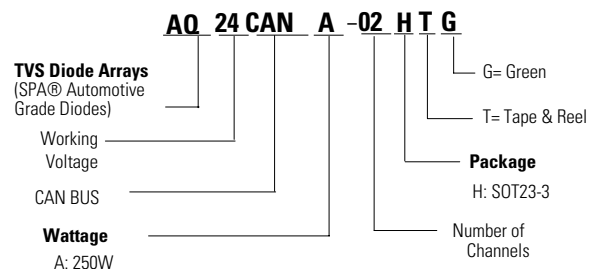
## Ordering Information

Part Number	Package	Min. Order Qty.
AQ24CANA-02HTG	SOT23-3	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>Substrate Material</b>	Silicon
<b>Body Material</b>	Molded Compound
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0

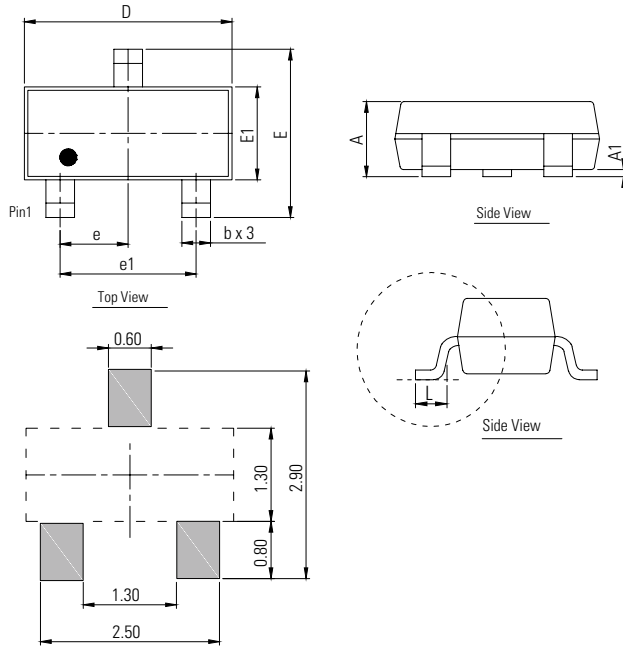
## Part Numbering System



# AQ24CANA Series

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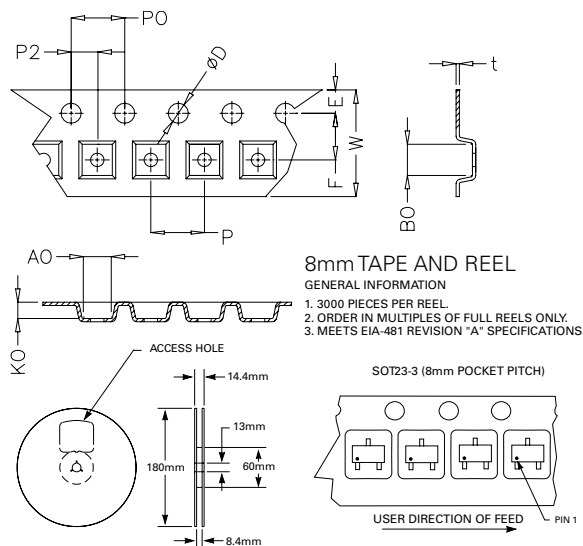
### Package Dimensions – SOT23-3



Recommended soldering pad layout (unit :mm)  
Drawing# : H01-B

Package	SOT23-3					
Pins	3					
JEDEC	TO-236					
Symbol	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.90	1.00	1.11	0.035	0.039	0.044
A1	0.013	-	0.1	0.001	-	0.004
b	0.37	0.44	0.51	0.015	0.017	0.020
D	2.80	2.95	3.04	0.110	0.116	0.120
E	2.10	2.40	2.64	0.083	0.094	0.104
E1	1.20	1.30	1.40	0.047	0.051	0.055
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	0.45	0.55	0.012	0.018	0.022

### Embossed Carrier Tape & Reel Specification – SOT23-3



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	0.22	0.24	0.009	0.009

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