

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 μ s surge current (IEC 61000-4-5 2nd Edition) with very low clamping voltages.

Features & Benefits

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

Additional Information



Resources

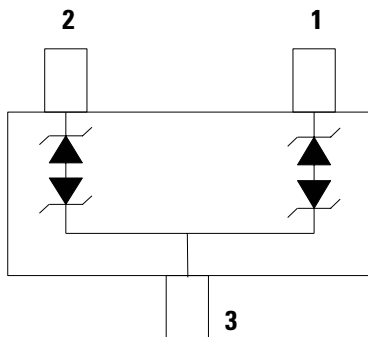


Accessories



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.

AQ24CANA Series

General Purpose ESD Protection

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

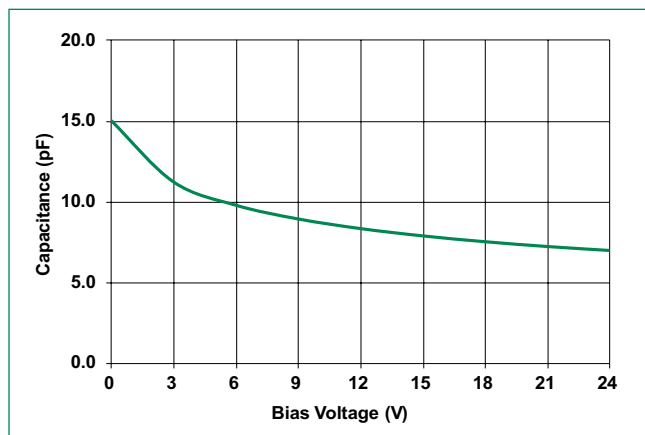
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	$I_R=1\mu A$, Pin 1 or Pin 2 to Pin 3	-	-	24	V
Breakdown Voltage	V_{BR}	$I_R=1mA$, Pin 1 or Pin 2 to Pin 3	26.7	28	-	V
Reverse Leakage Current	I_{LEAK}	$V_R=24V$	-	0.02	0.1	μA
Clamp Voltage ¹	V_C	$I_{PP}=1A$, $t_p=8/20\mu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

Note:

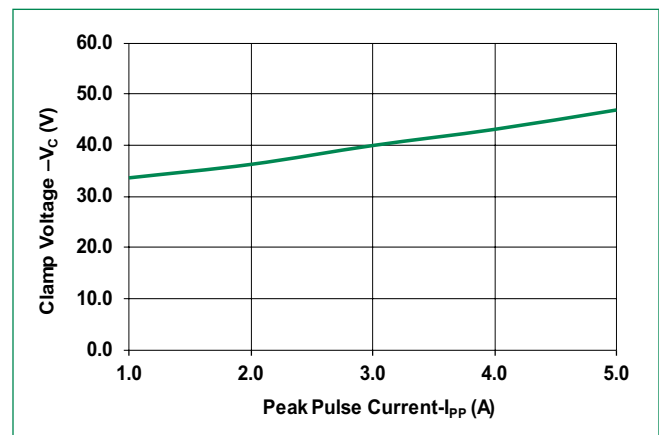
¹ Parameter is guaranteed by design and/or component characterization.

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 (Pin1 or Pin2 to Pin3)



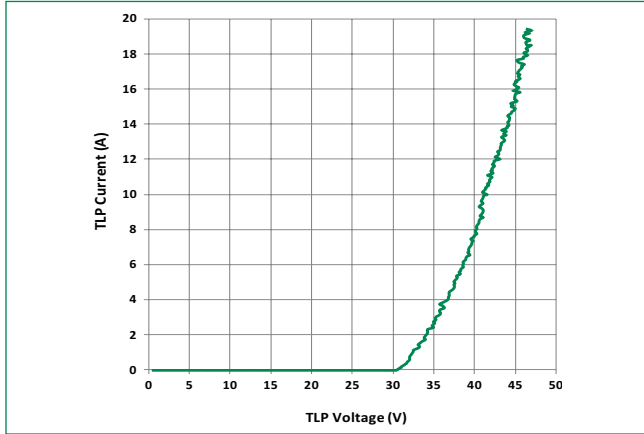
Clamping Voltage vs. Peak Pulse Current



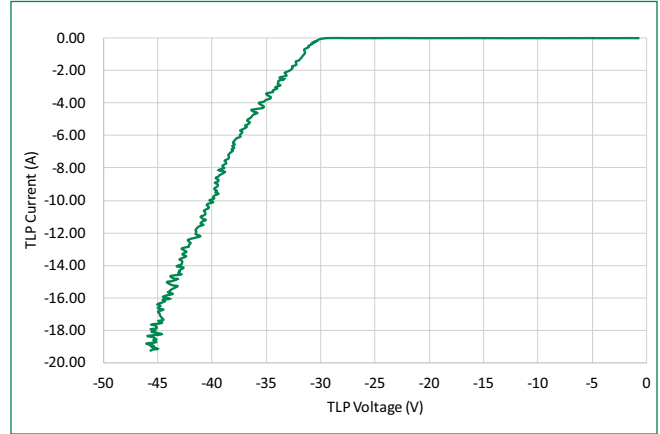
AQ24CANA Series

General Purpose ESD Protection

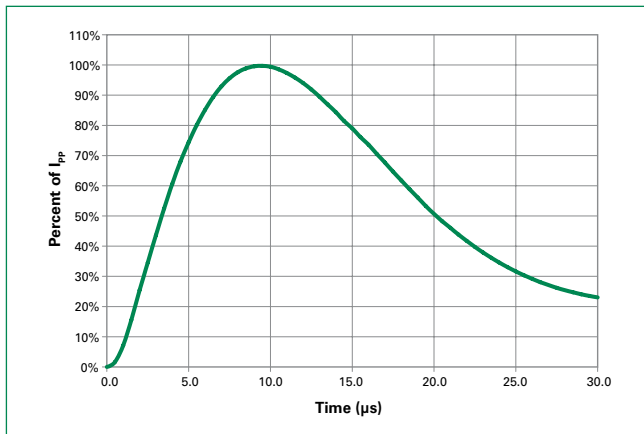
Positive Transmission Line Pulsing (TLP) Plot



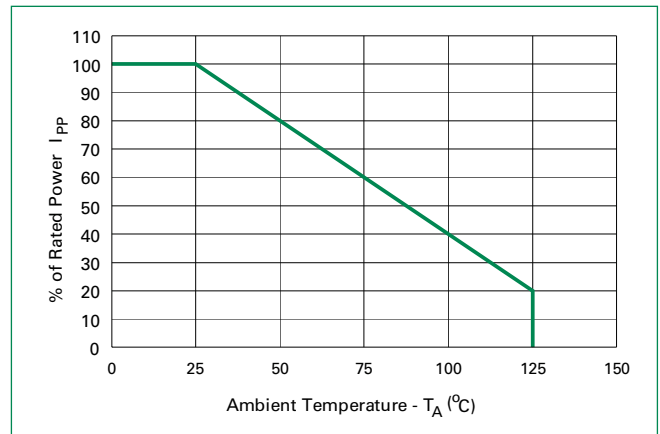
Negative Transmission Line Pulsing (TLP) Plot



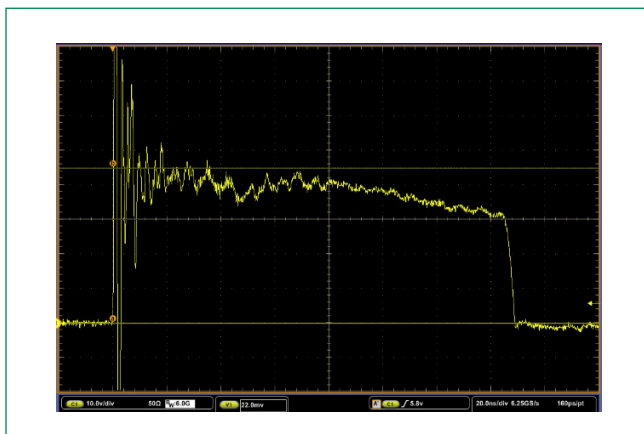
8/20µs Pulse Waveform



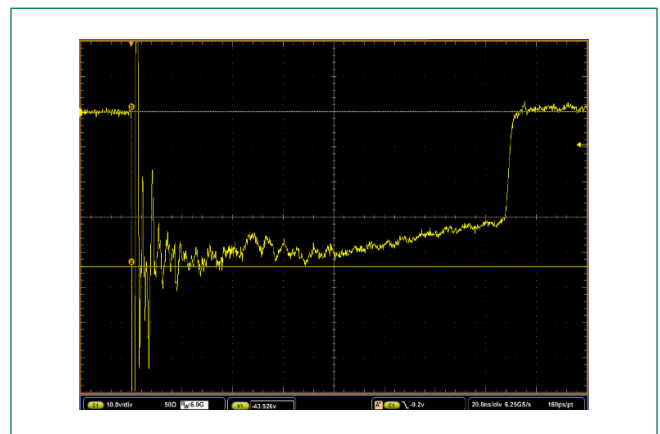
Power Derating Curve



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



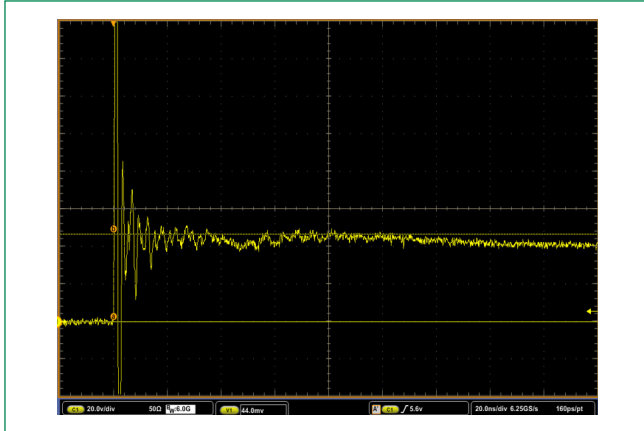
IEC 61000-4-2 -8kV Contact ESD Clamping Voltage



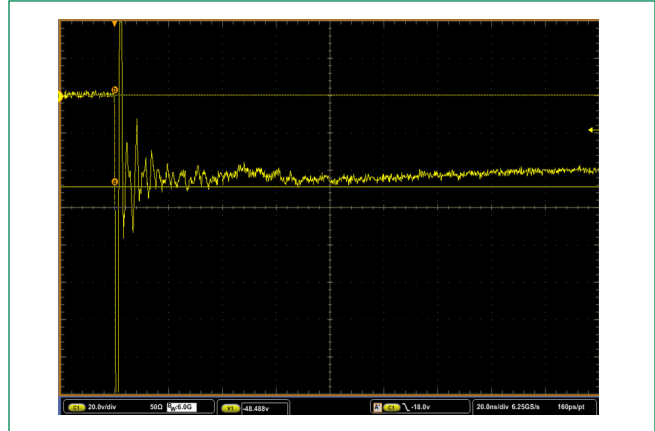
AQ24CANA Series

General Purpose ESD Protection

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

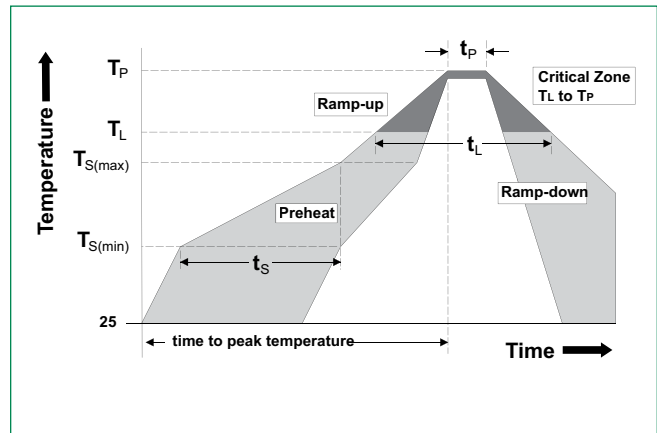


ISO 10605 (C:330pF, R:330Ω)
contact discharge plot at -8kV

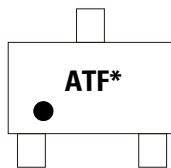


Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 120 secs
Average ramp up rate (Liquidus) Temp (T_L) to peak		3°C/second max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_p)		260 ^{+0/-5} °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_p)		8 minutes Max.
Do not exceed		260°C



Part Marking System



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

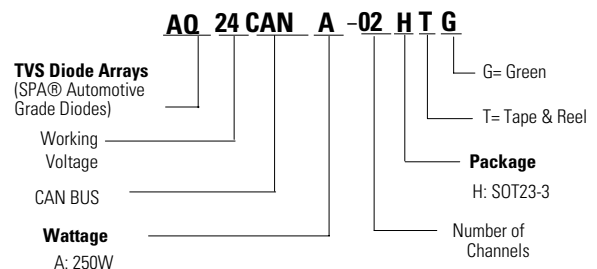
Ordering Information

Part Number	Package	Min. Order Qty.
AQ24CANA-02HTG	SOT23-3	3000

Product Characteristics

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

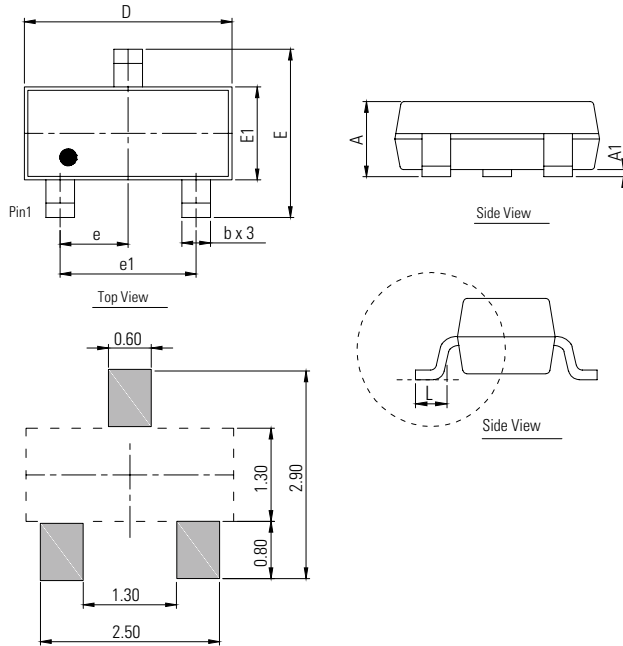
Part Numbering System



AQ24CANA Series

General Purpose ESD Protection

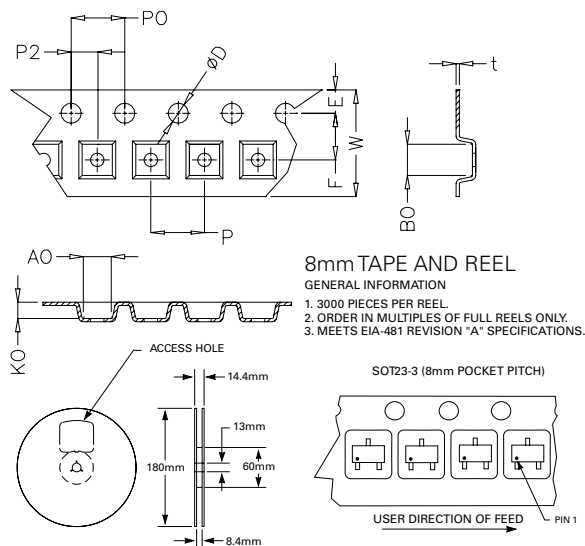
Package Dimensions – SOT23-3



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

Disclaimer Notice - Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, life-saving, 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 not 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/disclaimer-electronics>