

AQ24ETH-02HTG

24 V, 1.6 pF, 30 kV, SOT23-3L, Bidirectional TVS Diode, Low Capacitance ESD Protection

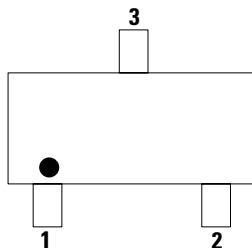


Web Resources

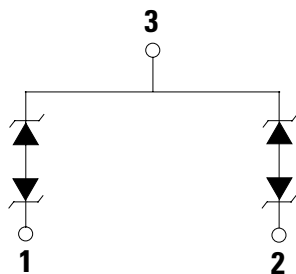


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Pinout



Functional Block Diagram



Description

The AQ24ETH-02HTG bidirectional TVS diode array utilizes a proprietary silicon avalanche technology to protect sensitive automotive electronics against ESD (electrostatic discharge) for compliance with OPEN Alliance 100/1000 BASE-T1 Ethernet and other high-speed data network applications.

Our robust AQ24ETH-02HTG bidirectional TVS diode array is designed to withstand the most challenging conditions. It can safely absorb repetitive 1000 times ESD strikes (OPEN Alliance specification) with ± 30 kV contact discharge as defined in ISO10605 (discharge storage capacitor $C = 150$ pF and discharge resistor $R = 330 \Omega$) without any performance degradation.

Features

- ESD, IEC 61000-4-2, ± 30 kV contact/air
- ESD, ISO10605 150 pF 330 Ω , ± 15 kV contact discharge at 1000 times (OPEN Alliance specification)
- ESD, ISO10605 330 pF 330 Ω , ± 30 kV contact/air
- EFT, IEC 61000-4-4, 40 A (5/50 ns)
- Maximum surge tolerance, IEC 61000-4-5 2nd edition, 3 A (8/20 μ s)
- Low leakage current of 0.1 μ A (max) at 24 V
- High trigger voltage of 100 V (min) at V_{t1}
- Halogen-free, lead-free, and RoHS-compliant
- Moisture sensitivity level (MSL-1)
- AEC-Q101-qualified and PPAP-capable

Applications

- OPEN Alliance 100/1000 BASE-T1 Ethernet
- High-speed data networks
- Low-Voltage Differential Signaling (LVDS)

Life Support Note:

It is 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
I_{PP}	Peak Current ($t_p = 8/20 \mu s$)	3	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.

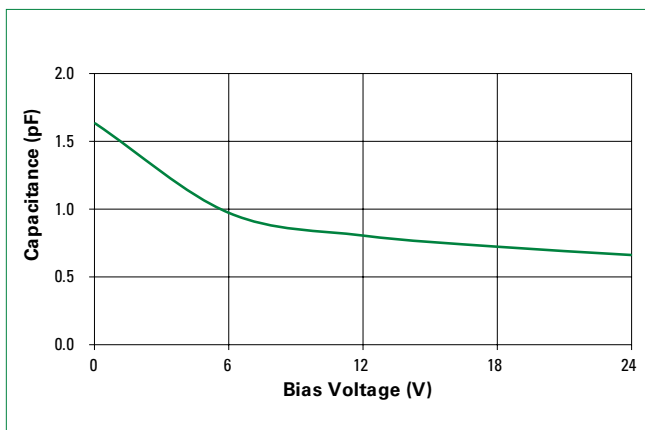
Electrical Characteristics ($T_{OP} = 25^\circ C$)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}		-	-	24	V
Trigger Voltage ²	V_{t1}		100	160	-	V
Holding Voltage ²	V_h		28	-	-	V
Reverse Leakage Current	I_{LEAK}	$V_R = 24 V$, I/O to GND	-	-	100	nA
Dynamic Resistance ²	R_{DYN}	TLP, $t_p = 100 ns$, I/O to GND	-	0.5	-	Ω
ESD Withstand Voltage	$V_{ESD}^{1,3}$	IEC 61000-4-2 (Contact Discharge)	± 30	-	-	kV
		IEC 61000-4-2 (Air Discharge)	± 30	-	-	kV
		ISO 10605 (Contact Discharge)	± 30	-	-	kV
		ISO 10605 (Air Discharge)	± 30	-	-	kV
	$V_{ESD}^{1,4}$	ISO10605 (Contact Discharge)	± 15	-	-	kV
Diode Capacitance ¹	C_{IO-GND}	Reverse Bias = 0 V, $f = 1 MHz$, I/O to GND	-	1.6	-	pF

Notes:

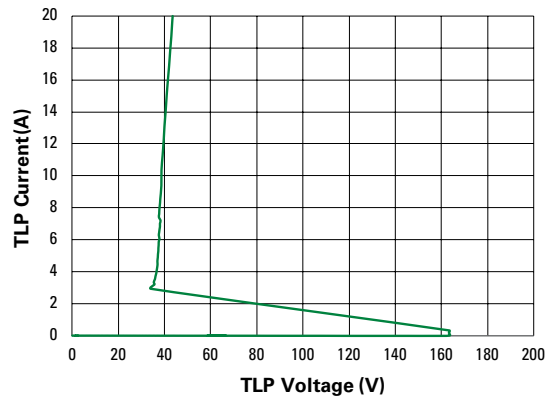
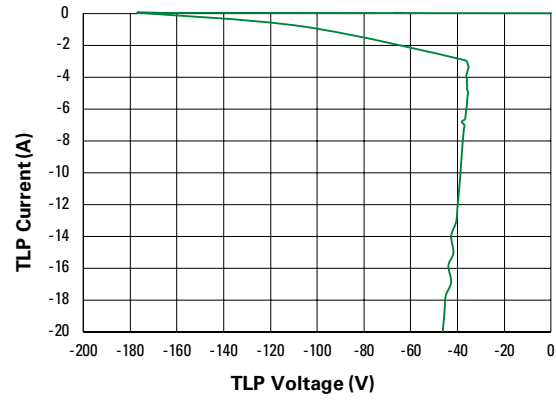
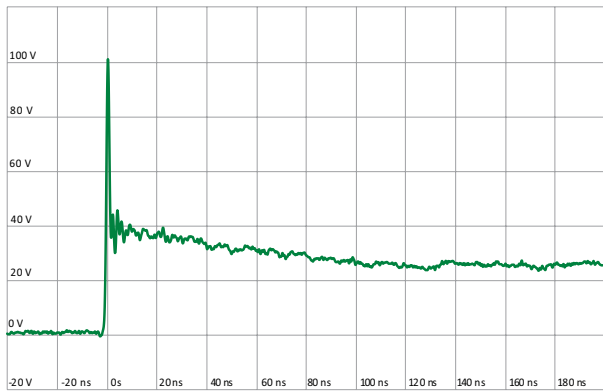
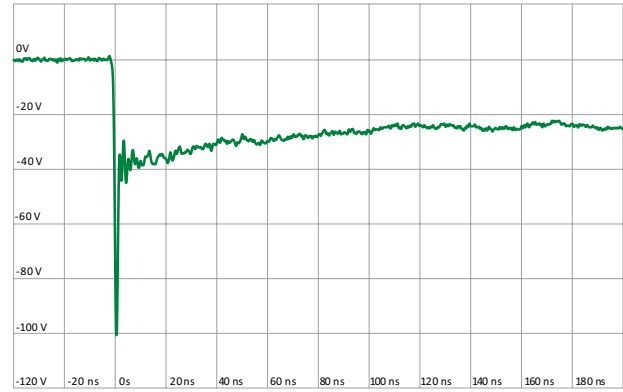
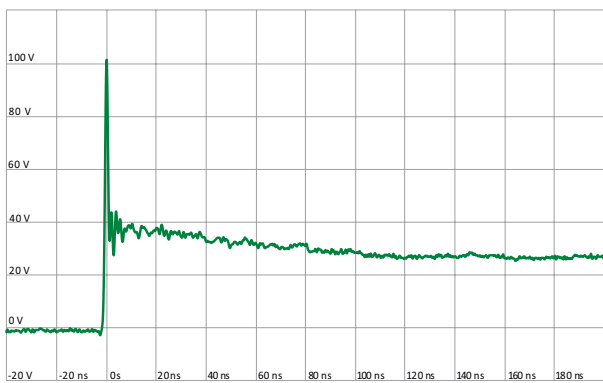
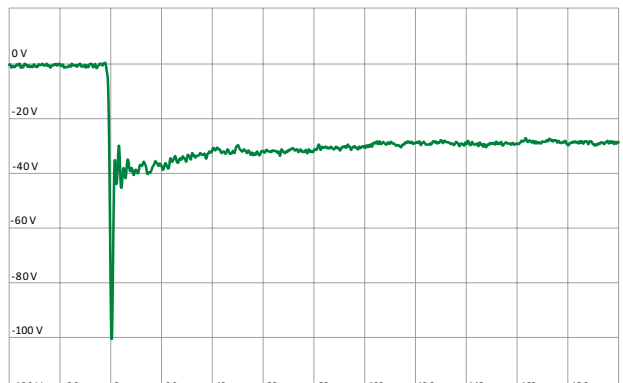
- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100 ns width, 0.2 ns rise time, and average window $t_1 = 70 ns$ to $t_2 = 90 ns$
- Device stressed with ten non-repetitive ESD pulses.
- Device stressed minimum number with >1000 contact discharges ESD pulses (OPEN Alliance specification)

Capacitance vs. Reverse Bias



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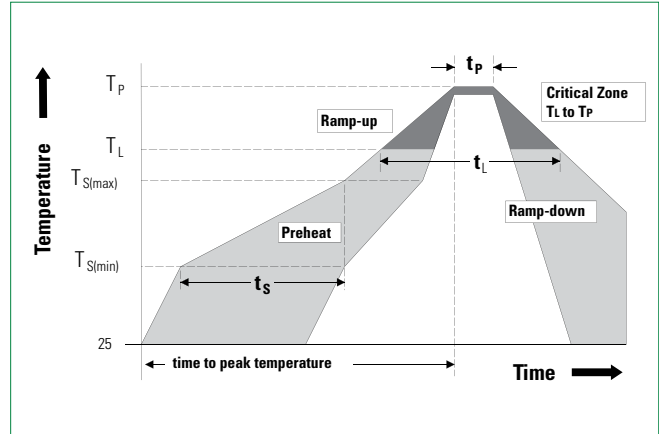
Positive Transmission Line Pulsing (TLP) Plot**Negative Transmission Line Pulsing (TLP) Plot****IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage****IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage****ISO10605 Contact Discharge Plot at +8 kV****ISO10605 Contact Discharge Plot at -8 kV**

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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 seconds
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



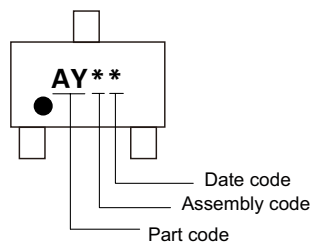
Ordering Information

Part Number	Package	Min. Order Qty.
AQ24ETH-02HTG	SOT23-3L	3000

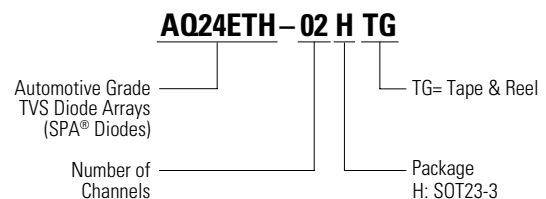
Product Characteristics

Lead Plating	Matte tin
Lead Material	Copper alloy
Lead Coplanarity	0.004 inches (0.102 mm)
Body Material	Molded compound
Flammability	UL recognized compound meeting flammability rating V-0

Part Marking System



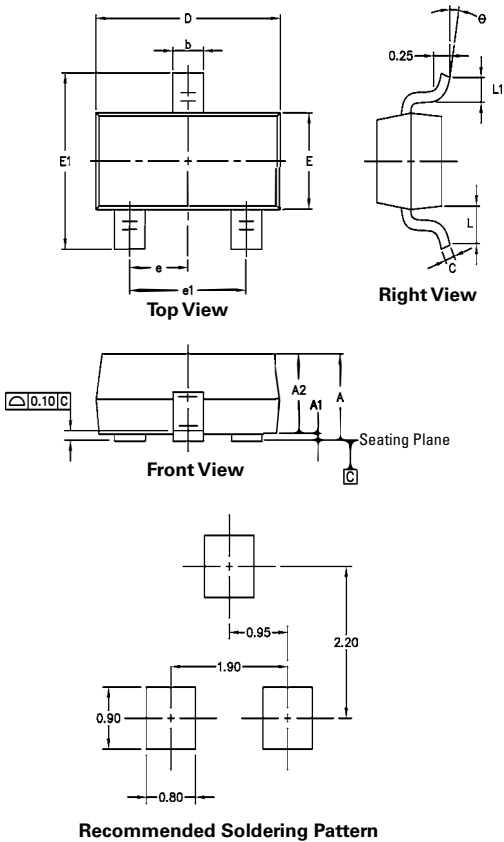
Part Numbering System



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Package Dimensions - SOT23-3

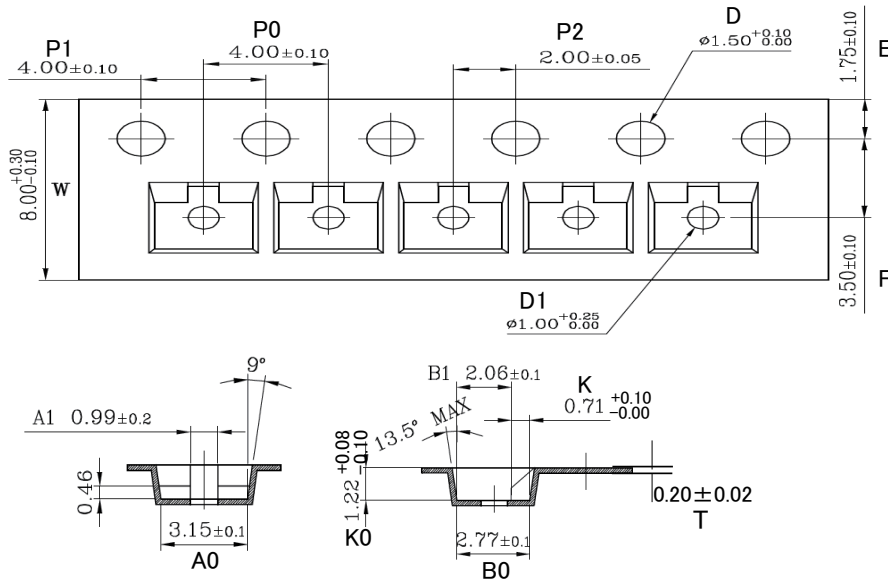


Package	SOT23-3			
Pins	3			
JEDEC	TO-236			
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.880	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.880	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
C	0.080	0.200	0.003	0.008
D	2.800	3.040	0.110	0.120
E	1.200	1.400	0.047	0.055
E1	2.100	2.640	0.083	0.104
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
θ	0°	8°	0°	8°

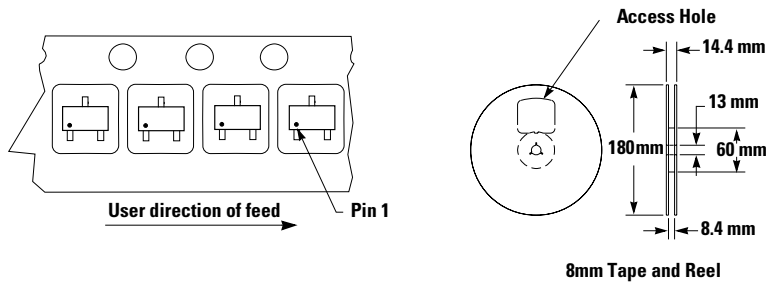
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Embossed Carrier Tape & Reel Specification — SOT23-3



Symbol	Millimeters	
	Min	Max
A0	3.05	3.25
A1	0.79	1.19
B0	2.67	2.87
B1	1.96	2.16
D	1.50	1.60
D1	1.00	1.25
F	3.40	3.60
E	1.65	1.85
W	7.90	8.30
P0	3.90	4.10
P1	3.90	4.10
P2	1.95	2.05
K	0.71	0.81
K0	1.12	1.30
T	0.18	0.22



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