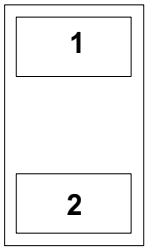
AQ1003-01ETG Series
General Purpose ESD Protection

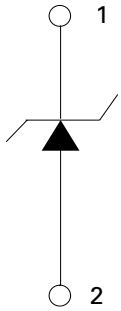
AUTOMOTIVE GRADE HF RoHS



Pinout



Functional Block Diagram



Description

This TVS diode is fabricated in a proprietary silicon avalanche technology that offers each I/O pin a high level of protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust TVS diodes can safely absorb repetitive ESD strikes at ±30kV (contact discharge, IEC 61000-4-2) without performance degradation. Additionally, the TVS diode can safely dissipate 7A of 8/20μs surge current (IEC 61000-4-5 2nd Edition) with very low clamping voltages.

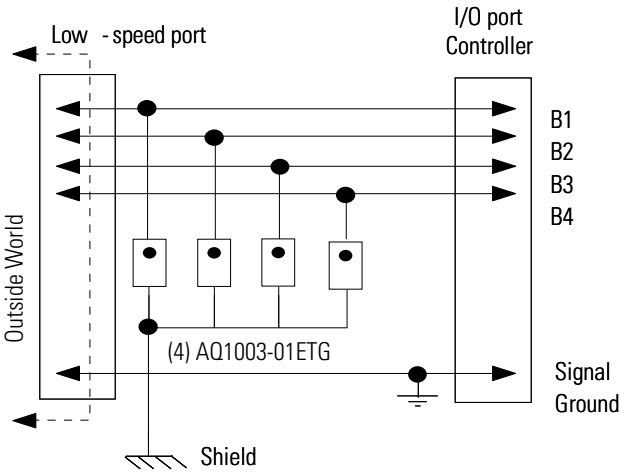
Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 7A (8/20μs as defined in IEC 61000-4-5 2nd edition)
- Low leakage current of 100nA (MAX) at 5V
- PPAP Capable
- Small SOD882 (JEDEC MO-236) package saves board space
- Fits solder footprint of industry standard 0402 (1005) components
- AEC-Q101 qualified
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level(MSL -1)
- ESD, ISO 10605, 330pF 330Ω, ±29kV contact, ±30kV air

Applications

- Mobile phones
- Smart phones
- PDAs
- Portable navigation components
- Digital cameras
- Portable medical components
- Automotive applications

Application Example



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
I_{PP}	Peak Pulse Current (t_p=8/20µs)	7.0	A
T_{OP}	Operating Temperature	-40 to 150	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

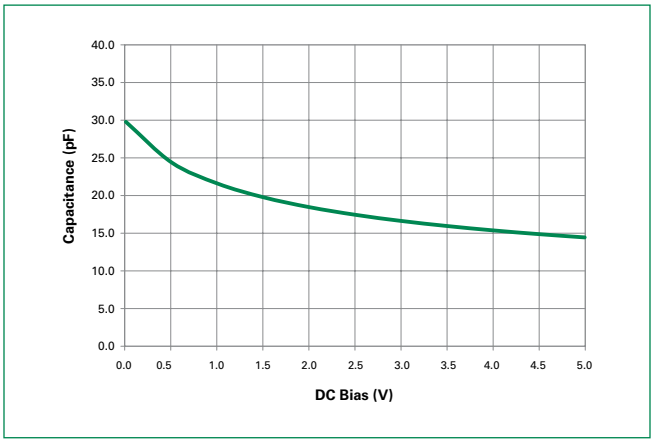
Caution: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics (T_{OP}=25°C)

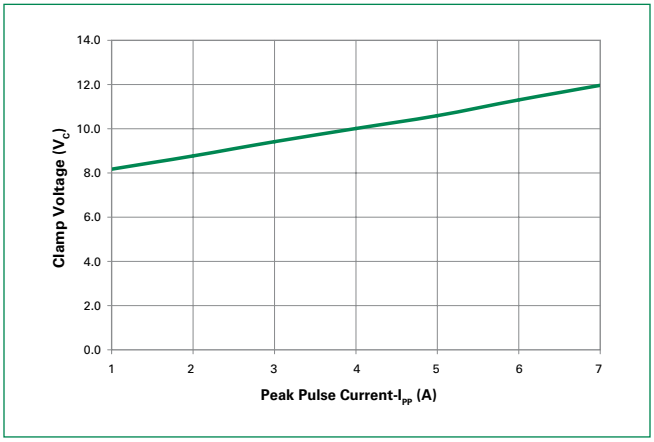
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Forward Voltage Drop	V_F	I_F = 10mA		0.8	1.2	V
Breakdown Voltage	V_{BR}	I_R=1mA	6.0	7.8	8.5	V
Reverse Standoff Voltage	V_{RWM}	I_R=1µA			5.0	V
Reverse Leakage Current	I_{LEAK}	V_R=5V			100	nA
Clamp Voltage[1]	V_C	I_{pp}=6A t_p=8/20µs		11.4		V
		I_{pp}=7A t_p=8/20µs		12.0		V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.25		Ω
ESD Voltage[1]	V_{ESD}	IEC 61000-4-2 (Contact Discharge)	±30			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V f=1MHz		30		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 t1=70ns to t2= 90ns

Capacitance vs. Reverse Bias



Clamping Voltage vs. I_{PP}



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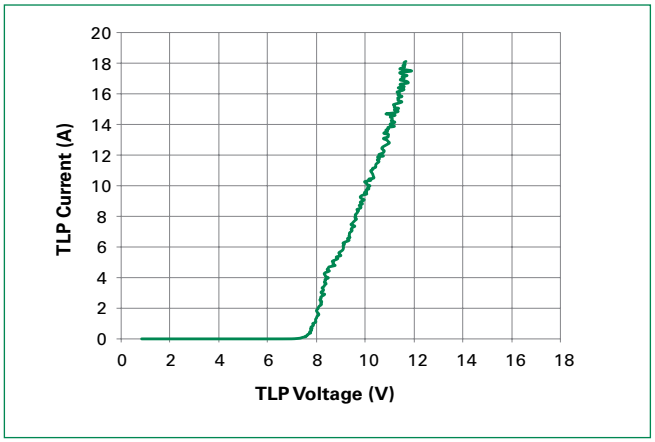
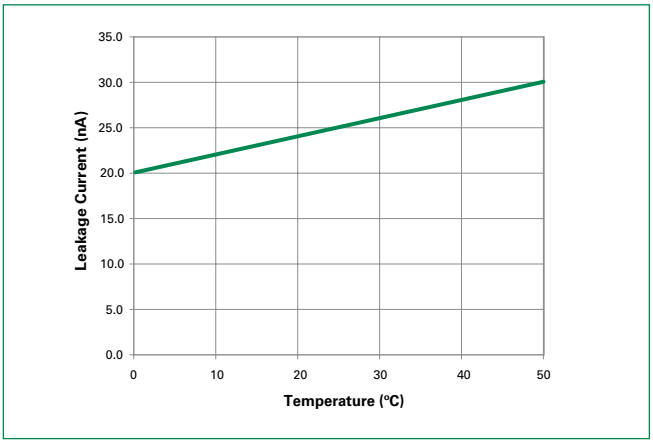
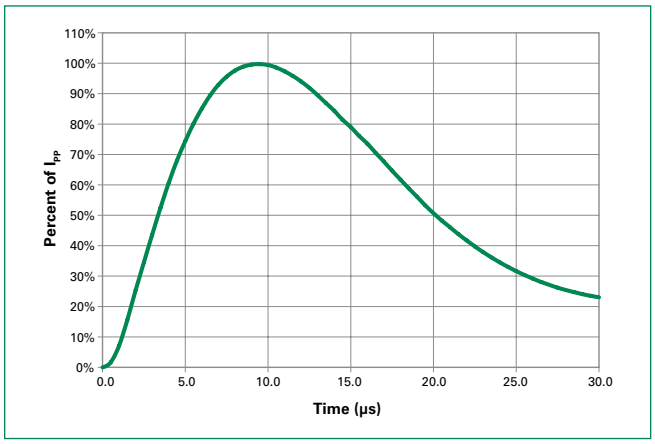
Transmission Line Pulsing(TLP) Plot



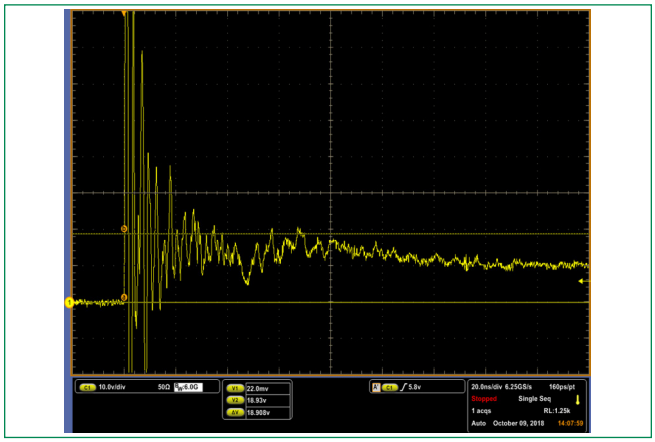
Leakage vs. Temperature



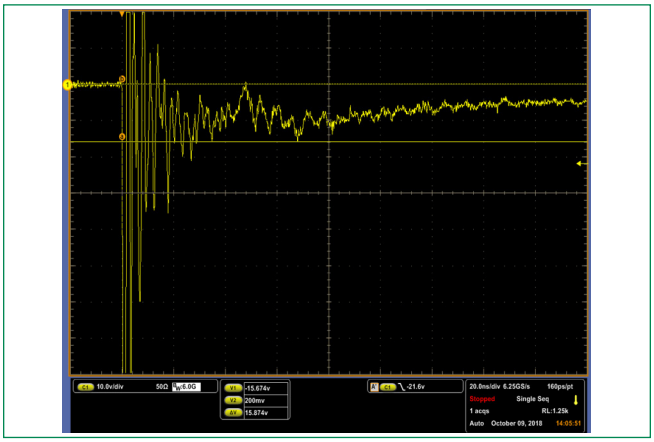
8/20µs Pulse Waveform



ISO10605 (C:330pF, R:330Ω) contact discharge plot at +8KV



ISO10605 (C:330pF, R:330Ω) contact discharge plot at -8KV



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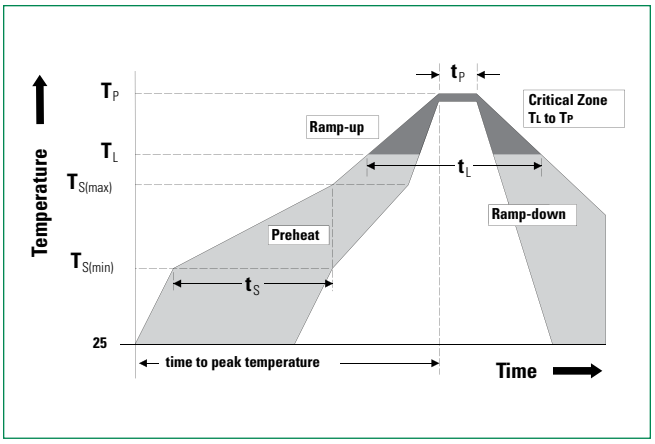
Soldering Parameters

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 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 Numbering System

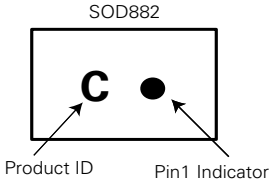
AQ 1003 - 01 E T G

- AQ 1003: Automotive Grade TVS Diode Arrays (SPA® Diodes) — Series
- 01: Number of Channels, -01 = 1 Channel
- E: Package, E: SOD882
- T: T= Tape & Reel
- G: G= Green

Product Characteristics

Lead Plating	Pre-Plated Frame
Lead Material	Copper Alloy
Substrate material	Silicon
Body Material	Molded Compound
Flammability	UL Recognized compound meeting flammability rating V-0

Part Marking System



Ordering Information

Part Number	Package	Min. Order Qty.
AQ1003-01ETG	SOD882	10000

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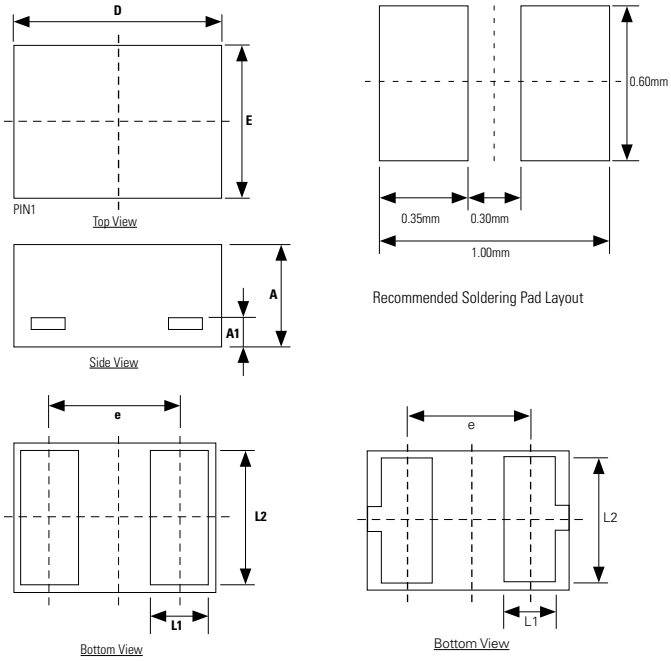
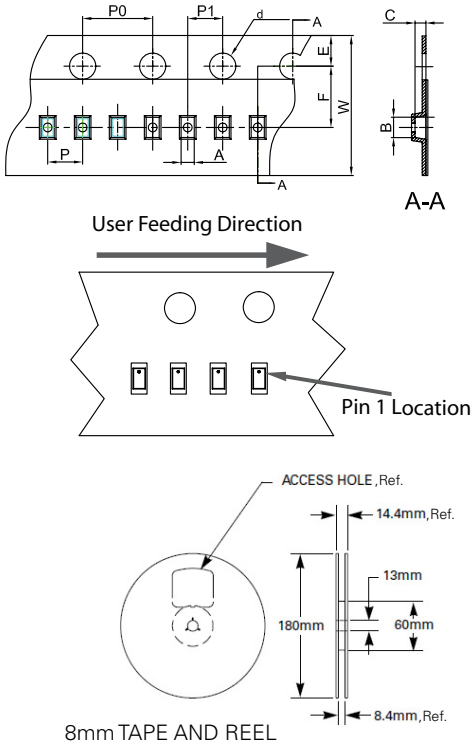
Package Dimensions — SOD882



Symbol	DIMENSIONS (mm)		
	Min.	Nor.	Max.
A	0.36	0.45	0.55
A1		0.127 REF	
L1	0.20	0.25	0.30
L2	0.45	0.50	0.55
D	0.93	1.00	1.07
E	0.53	0.60	0.67
e		0.65 BSC	
h	0.07	0.12	0.17

Embossed Carrier Tape & Reel Specification — SOD882



Symbol	Millimetres		Inches	
	Min	Max	Min	Max
A	0.65	0.70	0.026	0.028
B	1.10	1.20	0.043	0.047
C	0.50	0.60	0.020	0.024
dØ	1.40	1.60	0.055	0.063
E	1.65	1.85	0.065	0.073
F	3.40	3.60	0.134	0.142
P0	3.90	4.10	0.154	0.161
P	1.90	2.10	0.075	0.083
P1	1.90	2.10	0.075	0.083
W	7.90	8.10	0.311	0.319

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