

AQ3041 Series 0.5pF 20kV Unidirectional Discrete TVS     



Description

The AQ3041 includes low capacitance rail to rail diodes with an additional Zener diode to provide protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust diodes can safely absorb repetitive ESD strikes above the maximum level specified in IEC 61000-4-2 international standard ($\pm 20\text{kV}$ contact discharge) without performance degradation. The low loading capacitance makes it ideal for protecting high speed data lines such as HDMI, DVI, USB2.0, USB3.0 and eSATA.

Pinout



Features

- ESD protection of $\pm 20\text{kV}$ contact discharge, $\pm 30\text{kV}$ air discharge, (IEC 61000-4-2)
- EFT protection, IEC 61000-4-4, 40A ($t_p=5/50\text{ns}$)
- Lightning Protection, IEC 61000-4-5 2nd edition, 3A ($t_p=8/20\mu\text{s}$)
- Low capacitance of 0.5pF @ $V_R=0\text{V}$
- Low leakage current of 0.1 μA at 5V
- Small SOD882 packaging helps save board space
- AEC-Q101 qualified
- Halogen free, lead free and RoHS compliant
- Moisture Sensitivity Level(MSL -1)

Functional Block Diagram



Life Support Note:

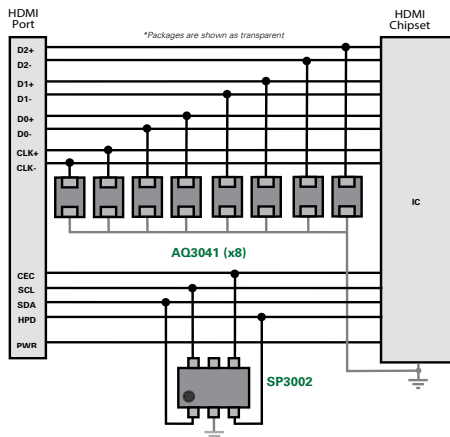
Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

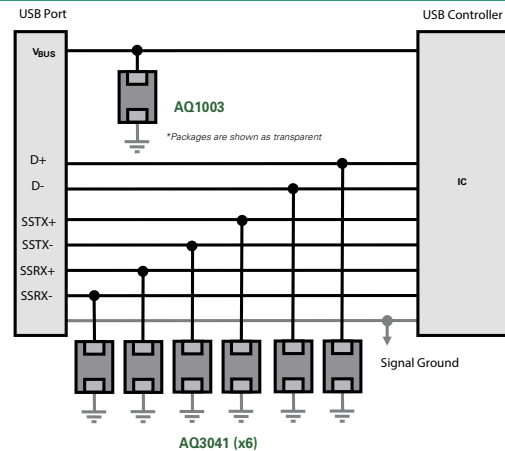
Applications

- Tablets
- Ultrabook
- eReader
- Smart Phones
- Digital Cameras
- MP3/ PMP
- Set Top Boxes
- Portable Medical
- Automotive Applications

HDMI Application Example



USB3.0 Application Example



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current ($t_p=8/20\mu s$)	3.0	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.

Thermal Information

Parameter	Rating	Units
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 30s)	260	°C

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

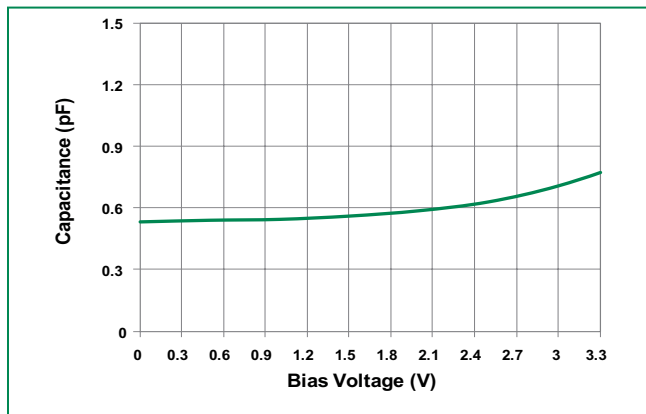
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}				5	V
Reverse Leakage Current	I_{LEAK}	$V_R=5V$ with 1pin at GND		0.1	0.5	μA
Clamp Voltage ¹	V_C	$I_{PP}=1A, t_p=8/20\mu s, Fwd$		9.2		V
		$I_{PP}=2A, t_p=8/20\mu s, Fwd$		10.0		V
ESD Withstand Voltage ¹	V_{ESD}	IEC 61000-4-2 (Contact)	± 20			kV
		IEC 61000-4-2 (Air)	± 30			kV
Dynamic Resistance ²	R_{DYN}	TLP, $t_p=100ns, I/O$ to GND		0.3		Ω
Diode Capacitance ¹	$C_{I/O-I/O}$	Reverse Bias=0V, $f=1$ MHz		0.5		pF

Note:

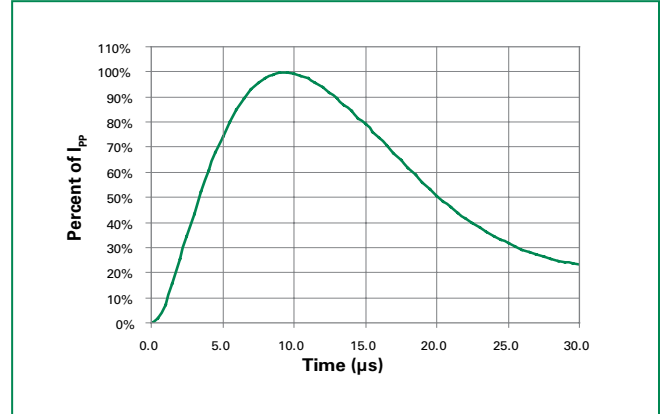
¹ Parameter is guaranteed by design and/or component characterization.

² Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window $t1=70ns$ to $t2=90ns$

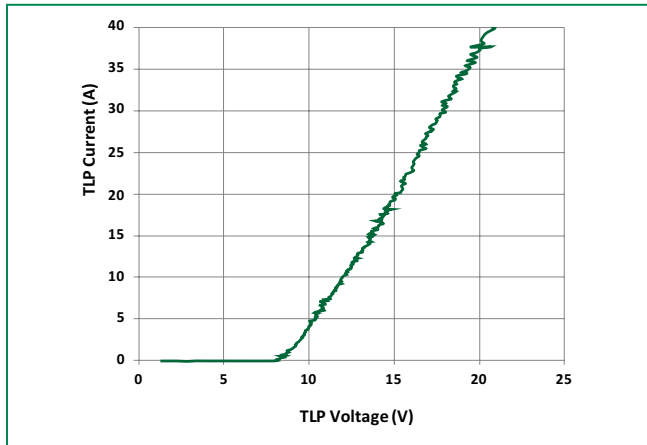
Normalized Capacitance vs. Reverse Voltage



8/20 μs Pulse Waveform

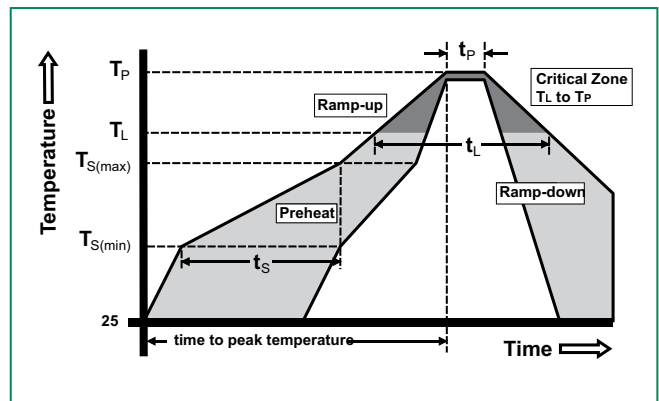


Transmission Line Pulsing (TLP) Plot

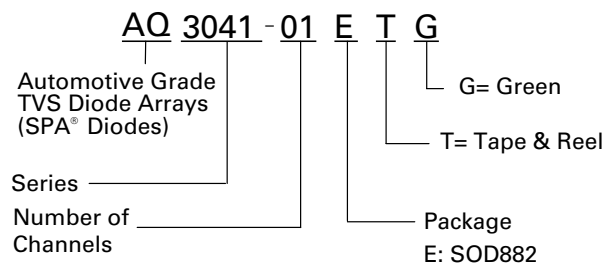


Soldering Parameters

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 – 180 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)	20 – 40 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



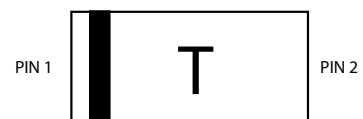
Product Characteristics

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

Notes :

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Bto is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
5. Package surface matte finish VDI 11-13.

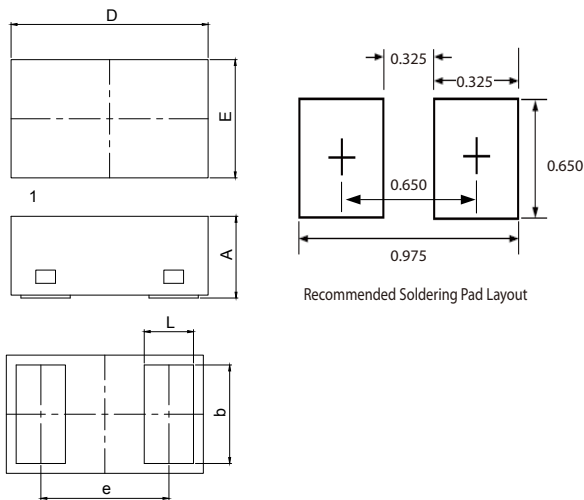
Part Marking System



Ordering Information

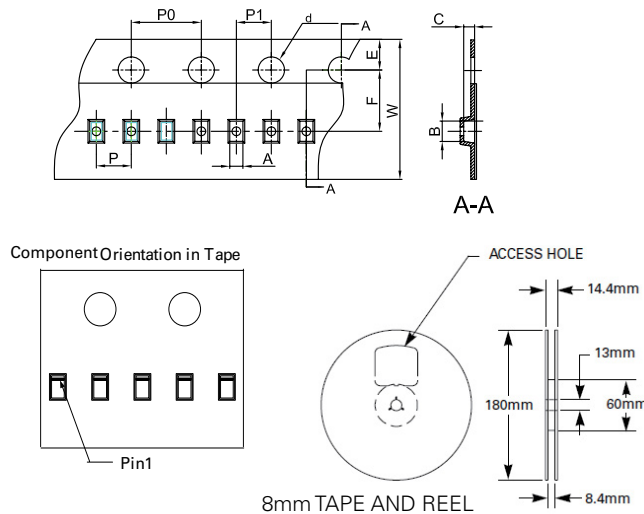
Part Number	Package	Marking	Min. Order Qty.	Packaging Option	P0/P1	Packaging Specification
AQ3041-01ETG	SOD882	T	10000	Tape & Reel – 8mm tape/7" reel	4mm/2mm	EIA RS-481

Package Dimensions – SOD882



Symbol	Package	SOD882			
	JEDEC	MO-236			
		Millimeters		Inches	
	Min	Max	Min	Max	
A	0.36	0.42	0.014	0.017	
b	0.45	0.55	0.018	0.022	
L	0.20	0.30	0.008	0.012	
e	0.65		0.026		
D	0.93	1.07	0.037	0.042	
E	0.53	0.67	0.021	0.026	

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

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at <http://www.littelfuse.com/disclaimer-electronics>.