

**AQ3045 Series 0.35pF 30kV Bidirectional Discrete TVS**



**Pinout**



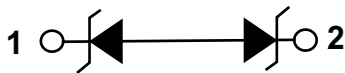
**Description**

The AQ3045 includes back-to-back TVS diodes fabricated in a proprietary silicon avalanche technology to provide protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust diodes can safely absorb repetitive ESD strikes up to the maximum level specified in IEC 61000-4-2 international standard ( $\pm 30\text{kV}$  contact discharge) without performance degradation. The back-to-back configuration provides symmetrical ESD protection for data lines and the low loading capacitance makes it ideal for protecting high speed data lines such as HDMI, USB2.0, USB3.0 and eSATA.

**Features**

- ESD protection of  $\pm 30\text{kV}$  contact discharge,  $\pm 30\text{kV}$  air discharge, (IEC 61000-4-2)
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning protection, IEC 61000-4-5 2<sup>nd</sup> edition, 3A ( $t_p=8/20\mu\text{s}$ )
- Low capacitance of  $0.35\text{pF}$  @  $V_R=0\text{V}$  (TYP)
- Low leakage current of  $100\text{nA}$  at  $5.3\text{V}$  (MAX)
- Small SOD882 packaging helps save board space
- Extremely low dynamic resistance ( $0.55 \Omega$  TYP)
- AEC-Q101 qualified
- Halogen free, lead free and RoHS compliant
- Moisture Sensitivity Level(MSL -1)

**Functional Block Diagram**



**Applications**

- USB 3.0/USB 2.0/MHL
- MIPI Camera and Display
- HDMI 2.0, DisplayPort 1.3, eSATA
- Set Top Boxes, Game Consoles
- Smart Phones
- External Storage
- Ultrabooks, Notebooks
- Tablets, eReaders
- High Speed Serial Interfaces
- Automotive Applications

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.

### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$P_{PK}$	Peak Pulse Power ( $t_p=8/20\mu s$ )	40	W
$I_{PP}$	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 ( $T_{OP}=25^\circ C$ )

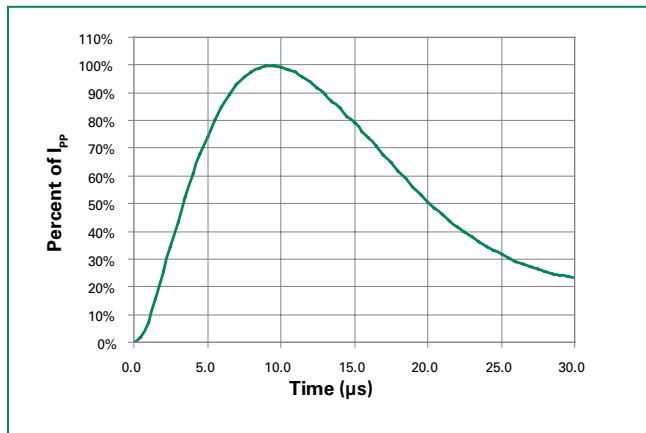
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$				5.3	V
Reverse Breakdown Voltage	$V_{BR}$	$I_R=1mA$	6.8	7.8	9.0	V
Reverse Leakage Current	$I_{LEAK}$	$V_R=5.3V$		<10	100	nA
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A, t_p=8/20\mu s, Fwd$			12.0	V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p=100ns, I/O$ to GND		0.55		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact)	$\pm 30$			kV
		IEC 61000-4-2 (Air)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_D$	Reverse Bias=0V		0.35	0.5	pF

Note:

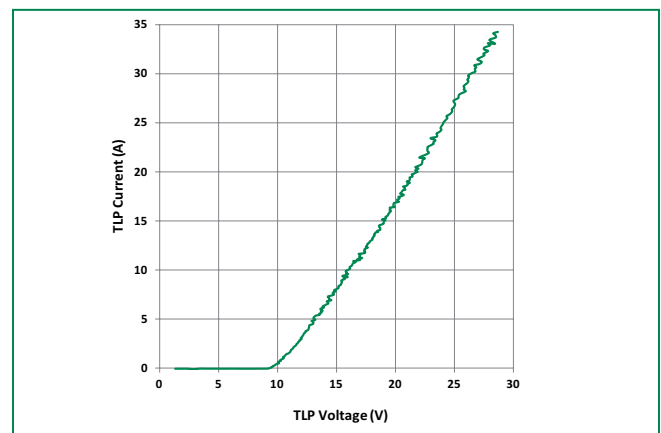
<sup>1</sup> Parameter is guaranteed by design and/or component characterization.

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

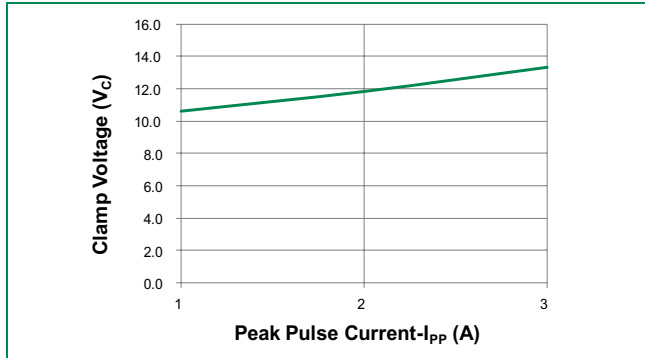
### 8/20 $\mu s$ Pulse Waveform



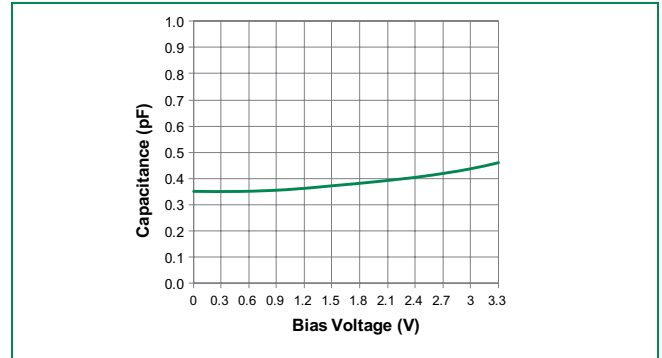
### Transmission Line Pulsing (TLP) Plot



**Clamping Voltage vs I<sub>pp</sub>**

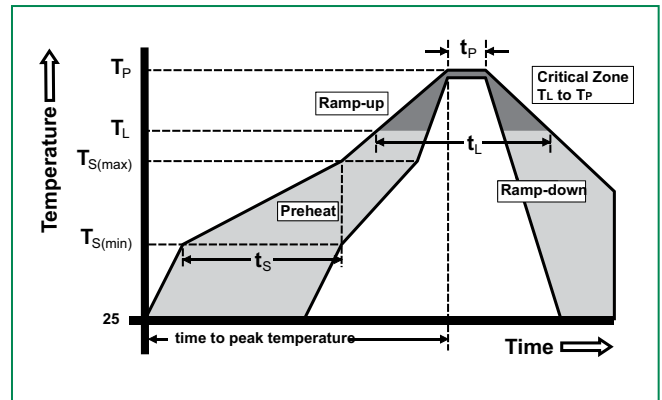


**Capacitance vs. Reverse Bias**

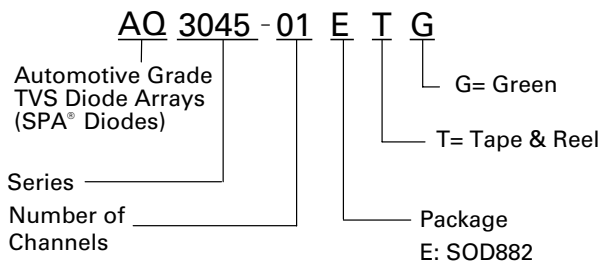


**Soldering Parameters**

Reflow Condition	Pb – Free assembly	
Pre Heat	- Temperature Min (T <sub>s(min)</sub> )	150°C
	- Temperature Max (T <sub>s(max)</sub> )	200°C
	- Time (min to max) (t <sub>s</sub> )	60 – 180 secs
Average ramp up rate (Liquidus) Temp (T <sub>L</sub> ) to peak	3°C/second max	
T <sub>s(max)</sub> to T <sub>L</sub> - Ramp-up Rate	3°C/second max	
Reflow	- Temperature (T <sub>L</sub> ) (Liquidus)	217°C
	- Temperature (t <sub>L</sub> )	60 – 150 seconds
Peak Temperature (T <sub>p</sub> )	260 <sup>+0/-5</sup> °C	
Time within 5°C of actual peak Temperature (t <sub>p</sub> )	20 – 40 seconds	
Ramp-down Rate	6°C/second max	
Time 25°C to peak Temperature (T <sub>p</sub> )	8 minutes Max.	
Do not exceed	260°C	



**Part Numbering System**

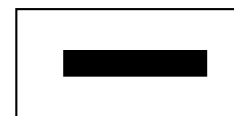


**Product Characteristics**

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

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

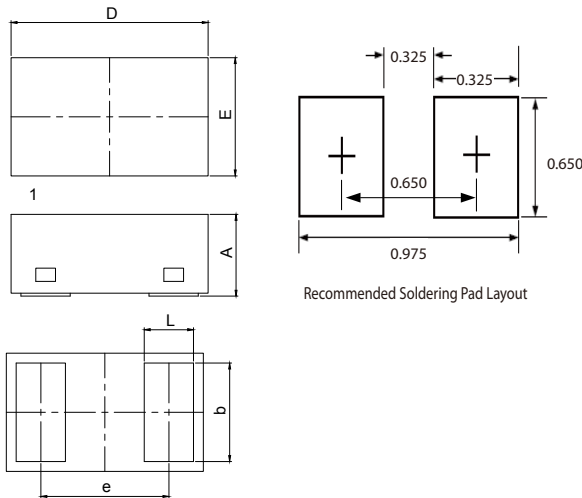
**Part Marking System**



**Ordering Information**

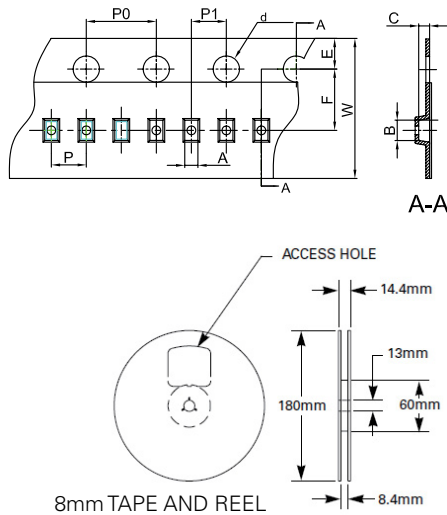
Part Number	Package	Marking	Min. Order Qty.	Packaging Option	P0/P1	Packaging Specification
AQ3045-01ETG	SOD882	-	10000	Tape & Reel – 8mm tape/7" reel	4mm/2mm	EIA RS-481

**Package Dimensions – SOD882**



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

**Embossed Carrier Tape & Reel Specification – SOD882**



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

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