

**AQHVxx-01ETG series 200W Unidirectional TVS Diode**    

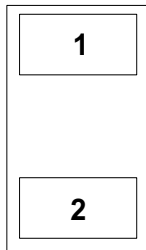


**Description**

The AQHVxx-01ETG series is designed to provide an option for very fast acting, high performance over-voltage protection components. This series is ideally suited for suited for power interfaces, passenger charging interfaces, and well as LED lighting modules, and low speed I/Os. It will protect sensitive equipment from damage due to electrostatic discharge (ESD) and other overvoltage transients.

The AQHVxx-01ETG series can safely absorb repetitive ESD strikes above the maximum level of the IEC 61000-4-2 international standard (Level 4, ±8kV contact discharge) without performance degradation and safely conduct up to 8A (AQHV12) of induced surge current (IEC 61000-4-5 2<sup>nd</sup> edition,  $t_p=8/20\mu s$ ) with very low clamping voltages.

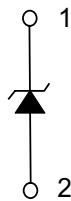
**Pinout**



**Features**

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 8A (8/20 as defined in IEC 61000-4-5 2<sup>nd</sup> edition) for AQHV12
- Low clamping voltage
- PPAP capable
- Low leakage current
- Small SOD882 packaging helps save board space
- AEC-Q101 qualified
- Moisture Sensitivity Level(MSL -1)
- Halogen free, lead free and RoHS compliant

**Functional Block Diagram**



**Applications**

- LED Lighting Modules
- Portable Instrumentation
- General Purpose I/O
- RS232 / RS485
- CAN and LIN Bus
- Automotive application

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 ( $t_p=8/20\mu s$ )	200	W
$T_{OP}$	Operating Temperature	-40 to 150	°C
$T_{STOR}$	Storage Temperature	-55 to 150	°C

Notes:

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.

### AQHV12 Electrical Characteristics ( $T_{OP}=25^\circ C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R \leq 1\mu A$			12.0	V
Breakdown Voltage	$V_{BR}$	$I_R = 1mA$	13.3			V
Leakage Current	$I_{LEAK}$	$V_R = 12V$			1.0	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s, Fwd$			19.0	V
		$I_{PP} = 8A, t_p = 8/20\mu s, Fwd$			25.0	V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p = 100ns, I/O$ to GND		0.37		$\Omega$
Peak Pulse Current	$I_{PP}$	$t_p = 8/20\mu s$			8.0	A
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 30$			kV
		IEC 61000-4-2 (Air Discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_{D-GND}$	Reverse Bias=0V, f=1MHz			60	pF

### AQHV15 Electrical Characteristics ( $T_{OP}=25^\circ C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R \leq 1\mu A$			15.0	V
Breakdown Voltage	$V_{BR}$	$I_R = 1mA$	16.7			V
Leakage Current	$I_{LEAK}$	$V_R = 15V$			1.0	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s, Fwd$			22.0	V
		$I_{PP} = 5A, t_p = 8/20\mu s, Fwd$			28.0	V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p = 100ns, I/O$ to GND		0.40		$\Omega$
Peak Pulse Current	$I_{PP}$	$t_p = 8/20\mu s$			5.0	A
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 30$			kV
		IEC 61000-4-2 (Air Discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_{I/O-GND}$	Reverse Bias=0V, f=1MHz			46	pF

### AQHV24 Electrical Characteristics (T<sub>OP</sub>=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V <sub>RWM</sub>	I <sub>R</sub> ≤ 1 μA			24.0	V
Breakdown Voltage	V <sub>BR</sub>	I <sub>R</sub> = 1mA	26.7			V
Leakage Current	I <sub>LEAK</sub>	V <sub>R</sub> = 24V			1.0	μA
Clamp Voltage <sup>1</sup>	V <sub>C</sub>	I <sub>PP</sub> = 1A, t <sub>p</sub> = 8/20μs, Fwd			36.0	V
		I <sub>PP</sub> = 3A, t <sub>p</sub> = 8/20μs, Fwd			50.0	V
Dynamic Resistance <sup>2</sup>	R <sub>DYN</sub>	TLP, t <sub>p</sub> = 100ns, I/O to GND		0.56		Ω
Peak Pulse Current	I <sub>PP</sub>	t <sub>p</sub> = 8/20μs			3.0	A
ESD Withstand Voltage <sup>1</sup>	V <sub>ESD</sub>	IEC 61000-4-2 (Contact Discharge)	±24			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance <sup>1</sup>	C <sub>I/O-GND</sub>	Reverse Bias = 0V, f = 1MHz			32	pF

### AQHV36 Electrical Characteristics (T<sub>OP</sub>=25°C)

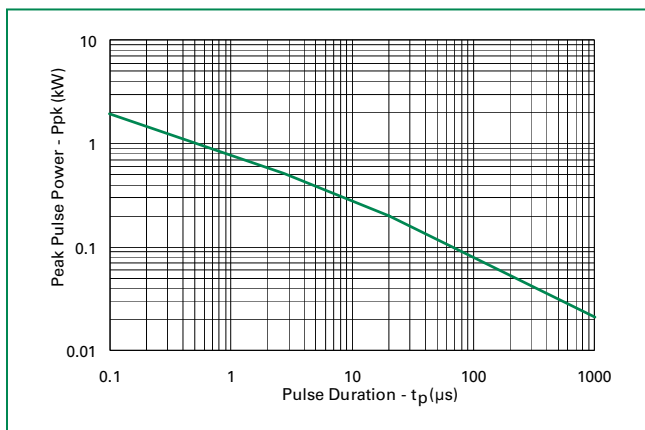
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V <sub>RWM</sub>	I <sub>R</sub> ≤ 1 μA			36.0	V
Breakdown Voltage	V <sub>BR</sub>	I <sub>R</sub> = 1mA	40.0			V
Leakage Current	I <sub>LEAK</sub>	V <sub>R</sub> = 36V			1.0	μA
Clamp Voltage <sup>1</sup>	V <sub>C</sub>	I <sub>PP</sub> = 1A, t <sub>p</sub> = 8/20μs, Fwd			52.0	V
		I <sub>PP</sub> = 2A, t <sub>p</sub> = 8/20μs, Fwd			60.0	V
Dynamic Resistance <sup>2</sup>	R <sub>DYN</sub>	TLP, t <sub>p</sub> = 100ns, I/O to GND		1.28		Ω
Peak Pulse Current	I <sub>PP</sub>	t <sub>p</sub> = 8/20μs			2.0	A
ESD Withstand Voltage <sup>1</sup>	V <sub>ESD</sub>	IEC 61000-4-2 (Contact Discharge)	±15			kV
		IEC 61000-4-2 (Air Discharge)	±20			kV
Diode Capacitance <sup>1</sup>	C <sub>I/O-GND</sub>	Reverse Bias = 0V, f = 1MHz			25	pF

Note:

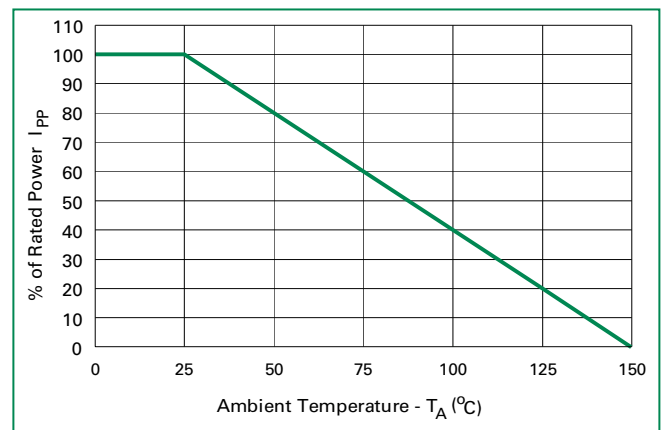
<sup>1</sup> Parameter is guaranteed by design and/or component characterization.

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

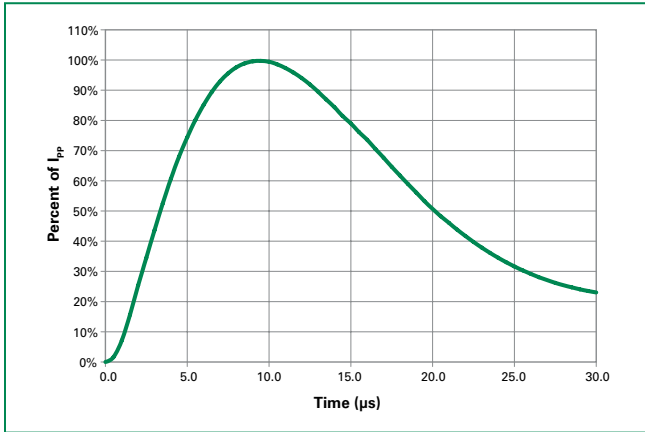
### Non-Repetitive Peak Pulse Power vs. Pulse Time



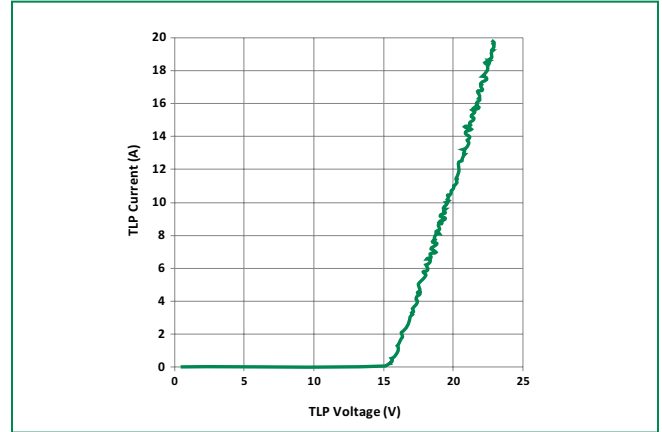
### Power Derating Curve



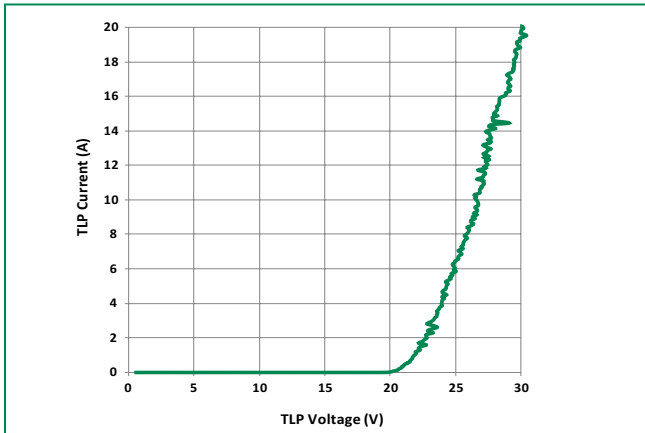
**8/20 $\mu$ s Pulse Waveform**



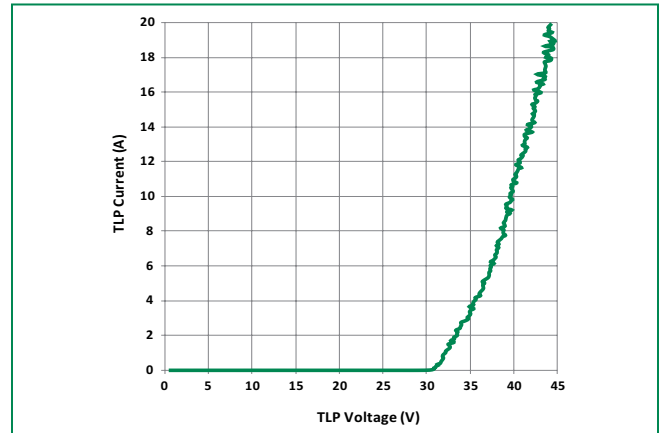
**AQHV12 Transmission Line Pulsing(TLP) Plot**



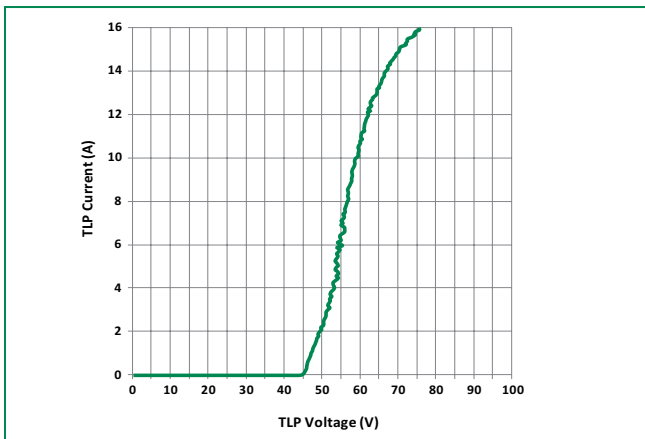
**AQHV15 Transmission Line Pulsing(TLP) Plot**



**AQHV24 Transmission Line Pulsing(TLP) Plot**

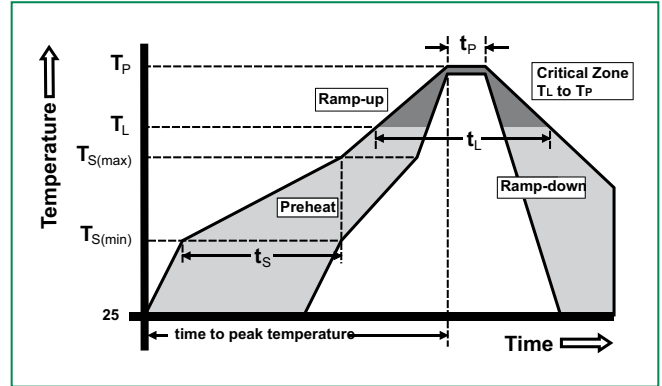


**AQHV36 Transmission Line Pulsing(TLP) Plot**

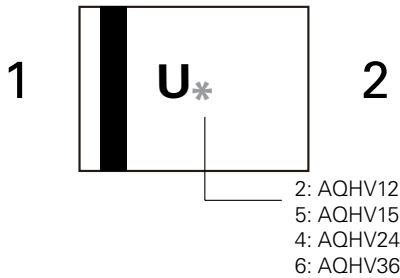


**Soldering Parameters**

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 <sup>+0/-5</sup> °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



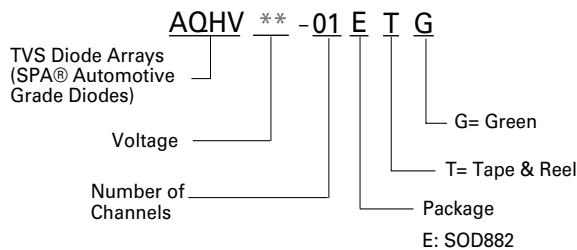
**Part Marking System**



**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 Compound
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0

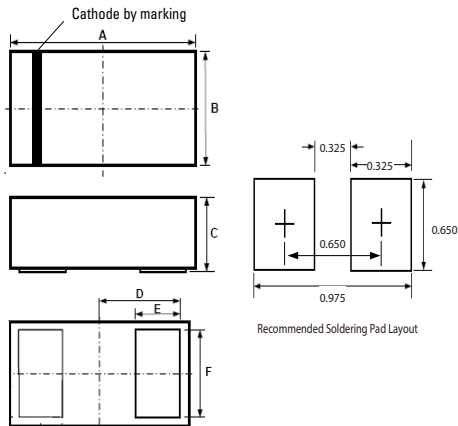
**Part Numbering System**



**Ordering Information**

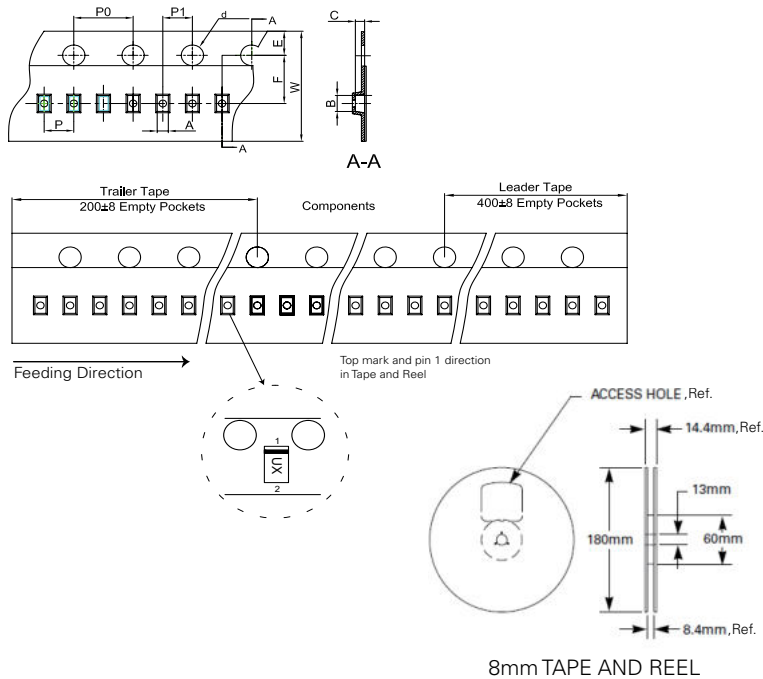
Part Number	Package	Min. Order Qty.
AQHV12-01ETG	SOD882	10000
AQHV15-01ETG		
AQHV24-01ETG		
AQHV36-01ETG		

**Package Dimensions — SOD882**



Symbol	Package	SOD882				
	JEDEC	MO-236				
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
<b>A</b>	0.90	1.00	1.10	0.037	0.039	0.041
<b>B</b>	0.50	0.60	0.70	0.022	0.024	0.026
<b>C</b>	0.40	0.50	0.60	0.016	0.020	0.024
<b>D</b>	0.45			0.018		
<b>E</b>	0.20	0.25	0.35	0.008	0.010	0.012
<b>F</b>	0.45	0.50	0.55	0.018	0.020	0.022

**Embossed Carrier Tape & Reel Specification**



Symbol	Millimeters
<b>A</b>	0.70+/-0.045
<b>B</b>	1.10+/-0.045
<b>C</b>	0.65+/-0.045
<b>d</b>	1.55+/-0.10
<b>E</b>	1.75+/-0.05
<b>F</b>	3.50+/-0.05
<b>P</b>	2.00+/-0.10
<b>P0</b>	4.00+/-0.10
<b>P1</b>	2.00+/-0.10
<b>W</b>	8.00 + 0.30 -0.10

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