

AQHV Series 200W Discrete Unidirectional TVS Diode

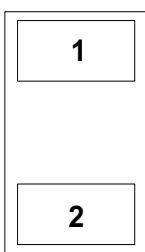


Description

The AQHV series is designed to provide an option for very fast acting, high performance over-voltage protection devices. Ideally 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 AQHV series can safely absorb repetitive ESD strikes above the maximum level of the IEC 61000-4-2 international standard (Level 4, $\pm 8\text{kV}$ contact discharge) without performance degradation and safely conduct up to 8A (AQHV12) of induced surge current (IEC 61000-4-5 2nd edition, $t_p=8/20\mu\text{s}$) with very low clamping voltages.

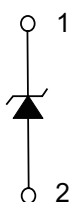
Pinout



Features

- ESD, IEC 61000-4-2, $\pm 30\text{kV}$ contact, $\pm 30\text{kV}$ air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 8A (8/20 as defined in IEC 61000-4-5 2nd 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.

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Revision: 02/14/18

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	μA
Clamp Voltage ¹	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 ²	R_{DYN}	TLP, $t_p = 100ns$, I/O to GND		0.37		Ω
Peak Pulse Current	I_{PP}	$t_p = 8/20\mu s$			8.0	A
ESD Withstand Voltage ¹	V_{ESD}	IEC 61000-4-2 (Contact Discharge)	± 30			kV
		IEC 61000-4-2 (Air Discharge)	± 30			kV
Diode Capacitance ¹	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	μA
Clamp Voltage ¹	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 ²	R_{DYN}	TLP, $t_p = 100ns$, I/O to GND		0.40		Ω
Peak Pulse Current	I_{PP}	$t_p = 8/20\mu s$			5.0	A
ESD Withstand 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			46	pF

AQHV24 Electrical Characteristics (T_{OP}=25°C)

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

AQHV36 Electrical Characteristics (T_{OP}=25°C)

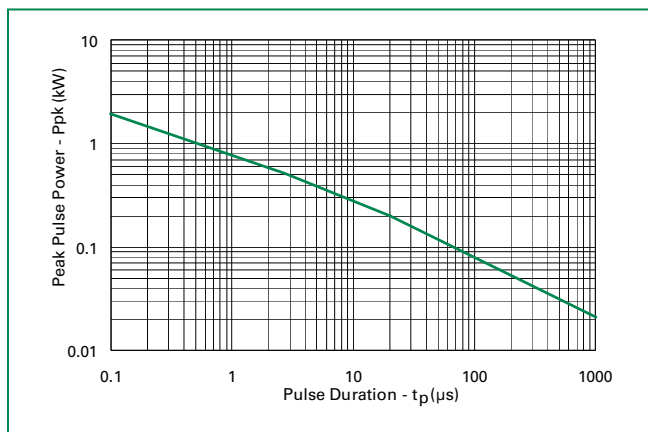
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V _{RWM}	I _R ≤ 1 μA			36.0	V
Breakdown Voltage	V _{BR}	I _R = 1 mA	40.0			V
Leakage Current	I _{LEAK}	V _R = 36 V			1.0	μA
Clamp Voltage ¹	V _C	I _{PP} = 1 A, t _p = 8/20 μs, Fwd			52.0	V
		I _{PP} = 2 A, t _p = 8/20 μs, Fwd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

Note:

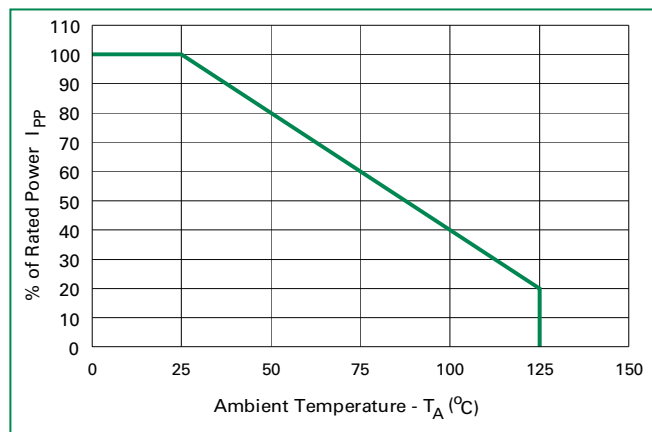
¹ Parameter is guaranteed by design and/or component characterization.

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

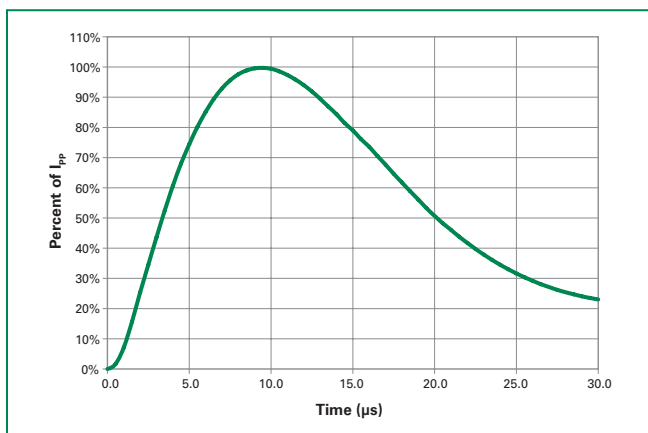
Non-Repetitive Peak Pulse Power vs. Pulse Time



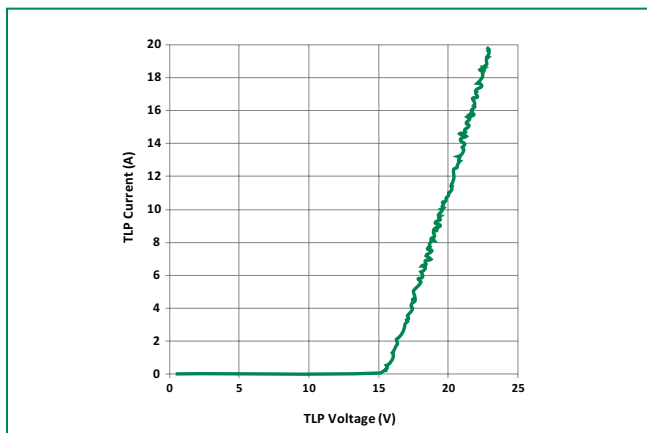
Power Derating Curve



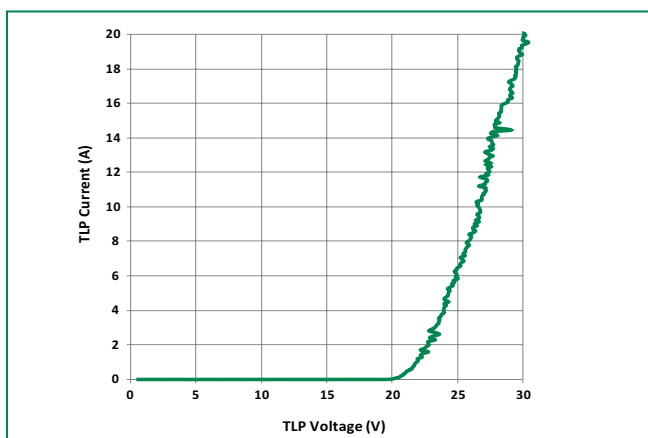
8/20μs Pulse Waveform



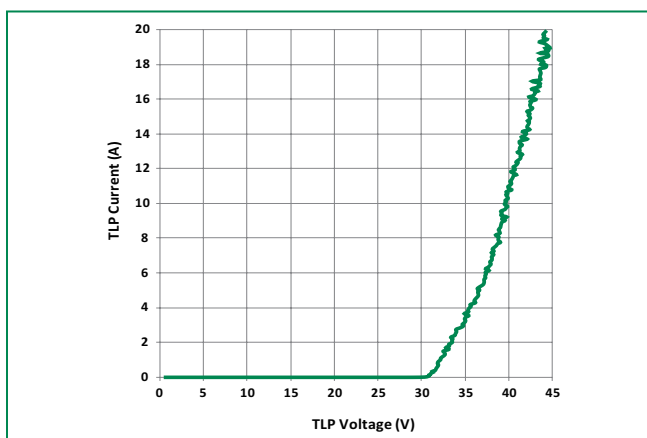
AQHV12 Transmission Line Pulsing(TLP) Plot



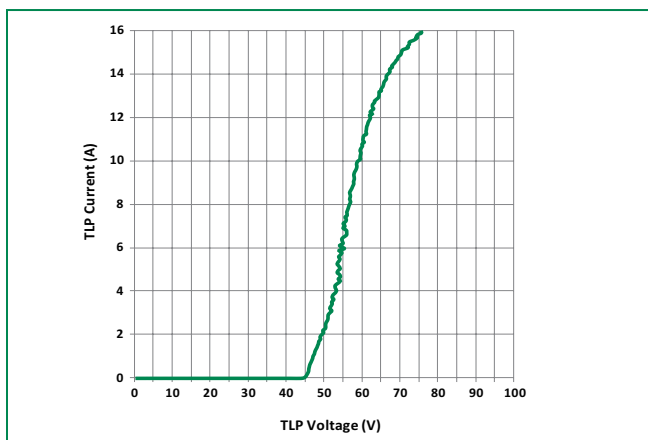
AQHV15 Transmission Line Pulsing(TLP) Plot



AQHV24 Transmission Line Pulsing(TLP) Plot

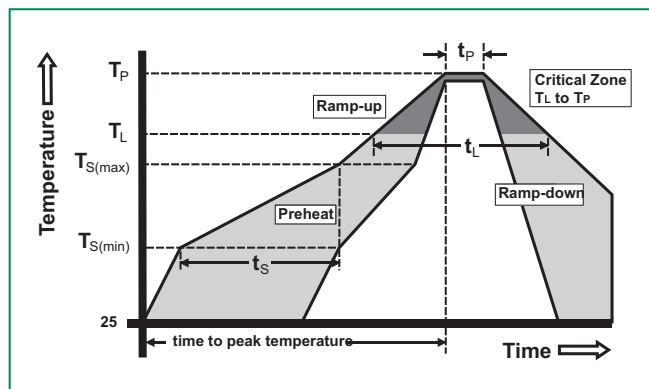


AQHV36 Transmission Line Pulsing(TLP) Plot

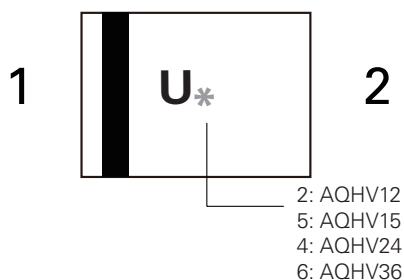


Soldering Parameters

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 ^{+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 Marking System

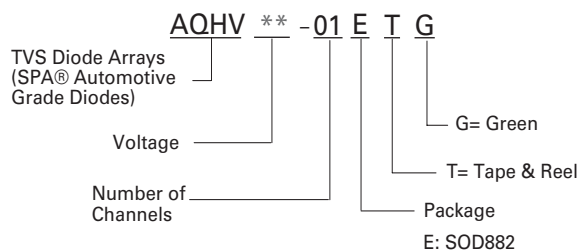


Product Characteristics

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

Notes :
1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.

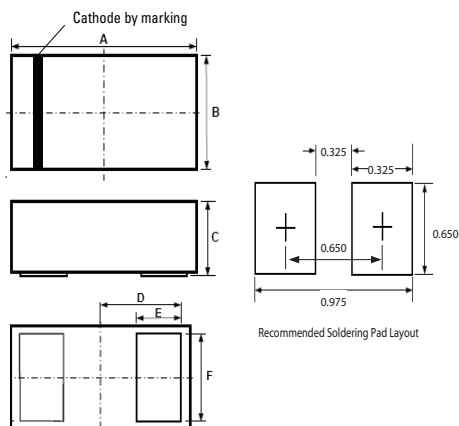
Part Numbering System



Ordering Information

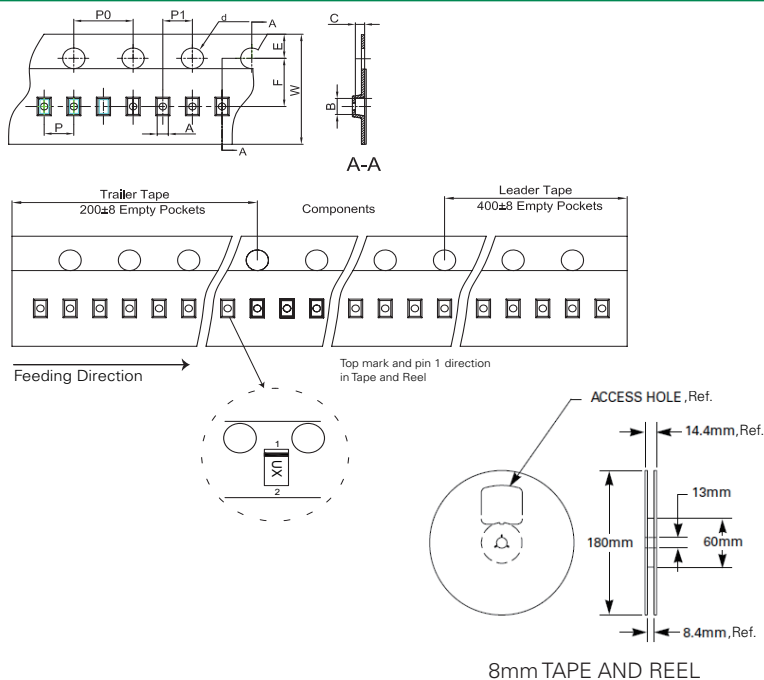
Part Number	Package	Marking	Min. Order Qty.
AQHV12-01ETG	SOD882	U2	10000
AQHV15-01ETG		U5	
AQHV24-01ETG		U4	
AQHV36-01ETG		U6	

Package Dimensions — SOD882



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

Embossed Carrier Tape & Reel Specification



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

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