

**AQHVxx-01LTG-C Series, 300W Discrete Bidirectional TVS Diode**  **AUTOMOTIVE GRADE**  **RoHS**  **HF**  **Pb**  **GREEN**



**Description**

This AQHVxx-01LTG-C series provides a highly effective ESD, EFT, and lightning surge protection component. It is ideally suited for power interfaces, passenger charging interfaces, LED lighting modules, and low speed I/Os.

Its rating of  $\pm 30$  kV ESD exceeds the maximum ESD rating requirements as defined in the IEC 61000-4-2 international standard without suffering any performance degradation. The AQHV12-C can withstand up to 10A of surge current as defined by IEC 61000-4-5 2<sup>nd</sup> edition providing low voltage clamping levels during lightning induced events.

**Pinout**

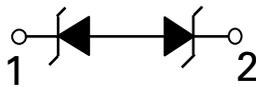


This component is bidirectional

**Features**

- ESD, IEC 61000-4-2,  $\pm 30$ kV contact,  $\pm 30$ kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 10A (8/20 as defined in IEC 61000-4-5 2<sup>nd</sup> edition) for AQHV12-C
- Low clamping voltage
- PPAP capable
- Low leakage current
- 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 <sub>pk</sub>	Peak Pulse Power (t <sub>p</sub> =8/20μs)	300	W
T <sub>OP</sub>	Operating Temperature	-40 to 150	°C
T <sub>STOR</sub>	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-C 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> =1μA			12	V
Breakdown Voltage	V <sub>BR</sub>	I <sub>R</sub> =1mA	13.3	15		V
Reverse Leakage Current	I <sub>LEAK</sub>	V <sub>R</sub> =12V		5	50	nA
Clamp Voltage <sup>1</sup>	V <sub>C</sub>	I <sub>PP</sub> =1A, t <sub>p</sub> =8/20μs, I/O to I/O		18	21	V
		I <sub>PP</sub> =10A, t <sub>p</sub> =8/20μs, I/O to I/O		27	30	V
Dynamic Resistance <sup>2</sup>	R <sub>DYN</sub>	TLP, t <sub>p</sub> =100ns, I/O to I/O		0.34		Ω
Peak Pulse Current <sup>1</sup>	I <sub>PP</sub>	t <sub>p</sub> =8/20μs			10	A
ESD Withstand Voltage <sup>1</sup>	V <sub>ESD</sub>	IEC 61000-4-2 (Contact Discharge)	±30			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance <sup>1</sup>	C <sub>I/O-I/O</sub>	Reverse Bias=0V, f=1MHz		27	30	pF

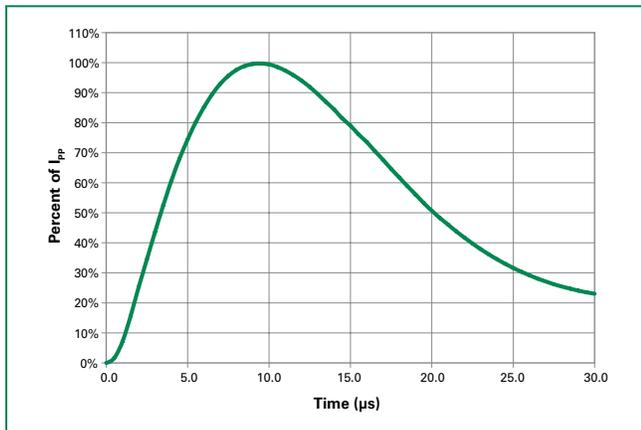
### AQHV15-C Electrical Characteristics (T<sub>OP</sub>=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V <sub>RWM</sub>	I <sub>R</sub> =1μA			15	V
Breakdown Voltage	V <sub>BR</sub>	I <sub>R</sub> =1mA	16.7	19.5		V
Reverse Leakage Current	I <sub>LEAK</sub>	V <sub>R</sub> =15V		5	50	nA
Clamp Voltage <sup>1</sup>	V <sub>C</sub>	I <sub>PP</sub> =1A, t <sub>p</sub> =8/20μs, I/O to I/O		23.5	27	V
		I <sub>PP</sub> =7A, t <sub>p</sub> =8/20μs, I/O to I/O		33.5	37	V
Dynamic Resistance <sup>2</sup>	R <sub>DYN</sub>	TLP, t <sub>p</sub> =100ns, I/O to I/O		0.36		Ω
Peak Pulse Current <sup>1</sup>	I <sub>PP</sub>	t <sub>p</sub> =8/20μs			7	A
ESD Withstand Voltage <sup>1</sup>	V <sub>ESD</sub>	IEC 61000-4-2 (Contact Discharge)	±30			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance <sup>1</sup>	C <sub>I/O-I/O</sub>	Reverse Bias=0V, f=1MHz		21	24	pF

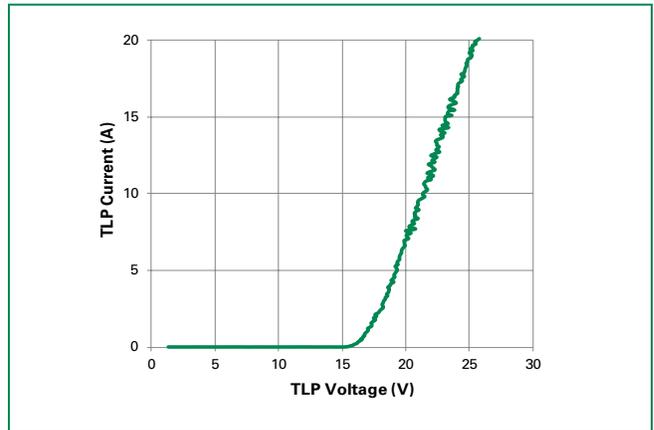
**AQHV24-C Electrical Characteristics (T<sub>OP</sub>=25°C)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V <sub>RWM</sub>	I <sub>R</sub> =1μA			24.0	V
Breakdown Voltage	V <sub>BR</sub>	I <sub>R</sub> =1mA	26.7	29.5		V
Reverse Leakage Current	I <sub>LEAK</sub>	V <sub>R</sub> =24V		5	50	nA
Clamp Voltage <sup>1</sup>	V <sub>C</sub>	I <sub>PP</sub> =1A, t <sub>p</sub> =8/20μs, I/O to I/O		35.5	40	V
		I <sub>PP</sub> =5A, t <sub>p</sub> =8/20μs, I/O to I/O		49.5	55	V
Dynamic Resistance <sup>2</sup>	R <sub>DYN</sub>	TLP, t <sub>p</sub> =100ns, I/O to I/O		0.52		Ω
Peak Pulse Current <sup>1</sup>	I <sub>PP</sub>	t <sub>p</sub> =8/20μs			5.0	A
ESD Withstand Voltage <sup>1</sup>	V <sub>ESD</sub>	IEC 61000-4-2 (Contact Discharge)	±25			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance <sup>1</sup>	C <sub>I/O-I/O</sub>	Reverse Bias=0V, f=1MHz		15	17	pF

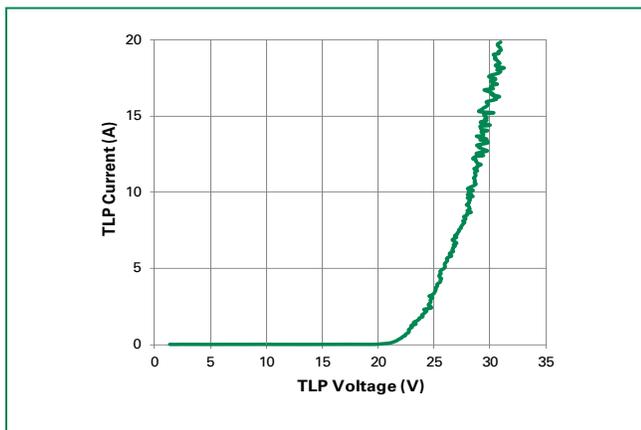
**8/20μs Pulse Waveform**



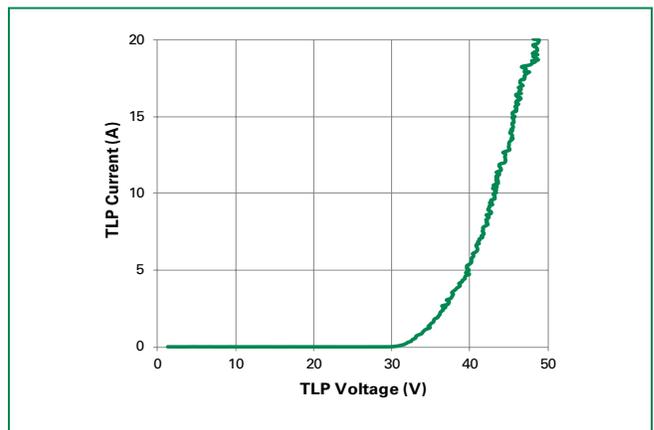
**AQHV12-C Transmission Line Pulsing(TLP) Plot**



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

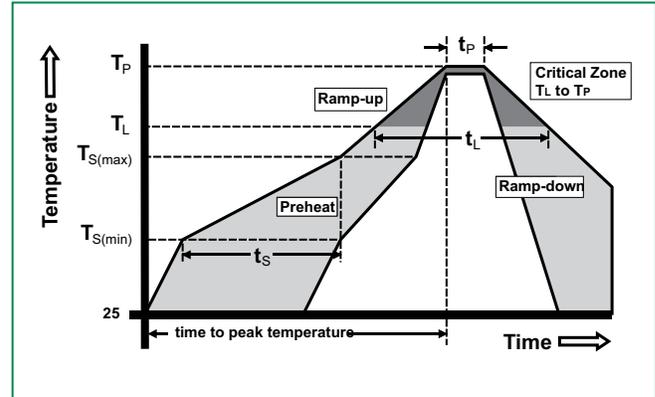


**AQHV24-C Transmission Line Pulsing(TLP) Plot**



### Soldering Parameters

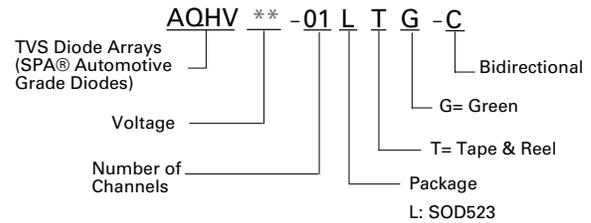
Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus) Temp ( $T_L$ ) to peak		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	- 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



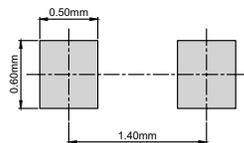
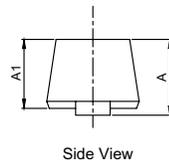
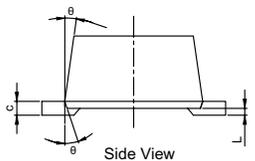
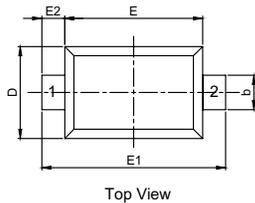
### Product Characteristics

<b>Lead Plating</b>	Matte Tin
<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



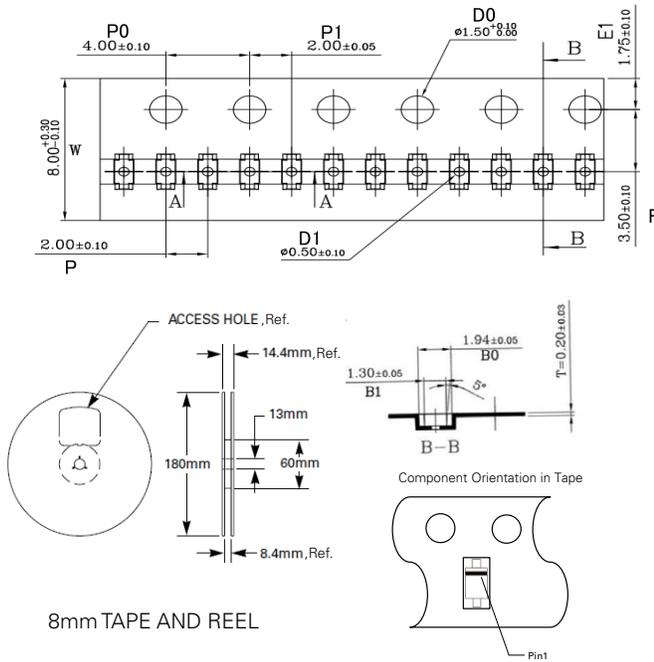
### Package Dimensions — SOD-523



Drawing#: L01-B

Symbol	Millimeters		Inches	
	Min	Max	Min	Max
<b>A</b>	0.51	0.77	0.020	0.030
<b>A1</b>	0.50	0.70	0.020	0.028
<b>b</b>	0.25	0.35	0.010	0.014
<b>c</b>	0.08	0.15	0.003	0.006
<b>D</b>	0.70	0.90	0.028	0.035
<b>E</b>	1.10	1.30	0.043	0.051
<b>E1</b>	1.50	1.70	0.059	0.067
<b>E2</b>	0.20 REF		0.001 REF	
<b>L</b>	0.01	0.07	0.000	0.003
<b>theta</b>	7° REF		7° REF	

**Embossed Carrier Tape & Reel Specification – SOD-523**



8mm TAPE AND REEL

Symbol	Millimeters		Inches	
	Min	Max	Min	Max
<b>A0</b>	0.91	1.01	0.036	0.040
<b>B0</b>	1.89	1.99	0.074	0.078
<b>D0</b>	1.50	1.60	0.059	0.063
<b>D1</b>	0.40	0.60	0.016	0.024
<b>E1</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>	1.95	2.05	0.077	0.081
<b>K0</b>	0.68	0.78	0.027	0.031
<b>T</b>	0.17	0.23	0.007	0.009
<b>W</b>	7.90	8.30	0.311	0.327

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