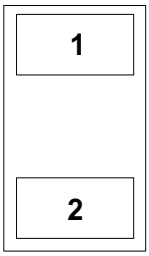
AQHVxx-01ETG-C

General Purpose ESD Protection

AUTOMOTIVE GRADE RoHS HF

Pinout



Functional Block Diagram

Description

The AQHVxx-01ETG-C series is designed to provide an option for very fast acting, high performance over-voltage protection components. This series is 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 AQHVxx-01ETG-C 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-C) of induced surge current (IEC 61000-4-5 2nd edition, tP=8/20µs) with very low clamping voltages.

Features & Benefits

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A 5/50ns)
- Lightning, IEC 61000-4-5 2nd Edition, 8A (8/20us) for AQHV12-C
- 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

Applications

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

Revised: JC. 11/29/21

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Absolute Maximum Ratings

Symbol	Parameter	Value	Units
P_{pk}	Peak Pulse Power (t_p=8/20µs)	200	W
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.

AQHV12-C Electrical Characteristics (T_{OP}=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R=1µA			12.0	V
Breakdown Voltage	V_{BR}	I_R=1mA	13.3			V
Reverse Leakage Current	I_{LEAK}	V_R=12V			1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd			19.0	V
		I_{PP}=8A, t_p=8/20µs, Fwd			25.0	V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.48		Ω
Peak Pulse Current	I_{pp}	t_p=8/20µs			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]	$C_{I/O-I/O}$	Reverse Bias=0V, f=1MHz			30	pF

AQHV15-C Electrical Characteristics (T_{OP}=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R=1µA			15.0	V
Breakdown Voltage	V_{BR}	I_R=1mA	16.7			V
Reverse Leakage Current	I_{LEAK}	V_R=15V			1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd			22.0	V
		I_{PP}=5A, t_p=8/20µs, Fwd			30.0	V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.43		Ω
Peak Pulse Current	I_{pp}	t_p=8/20µs			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]	$C_{I/O-I/O}$	Reverse Bias=0V, f=1MHz			24	pF

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

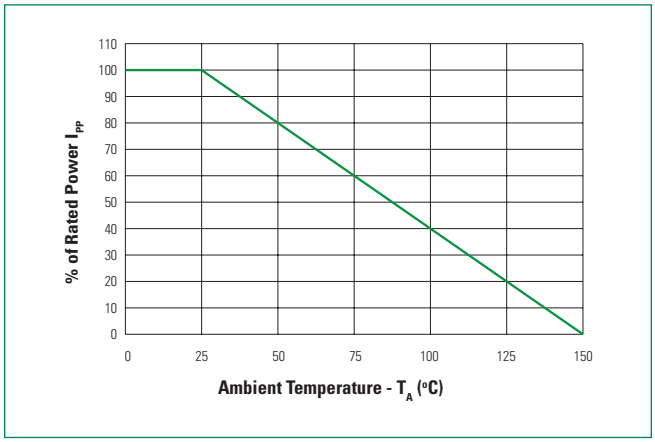
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R=1µA			24.0	V
Breakdown Voltage	V_{BR}	I_R=1mA	26.7			V
Reverse Leakage Current	I_{LEAK}	V_R=24V			1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd			36.0	V
		I_{PP}=3A, t_p=8/20µs, Fwd			50.0	V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.65		Ω
Peak Pulse Current	I_{pp}	t_p=8/20µs			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]	$C_{I/O-I/O}$	Reverse Bias=0V, f=1MHz			17	pF

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R=1µA			36.0	V
Breakdown Voltage	V_{BR}	I_R=1mA	40.0			V
Reverse Leakage Current	I_{LEAK}	V_R=36V			1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd			52.0	V
		I_{PP}=2A, t_p=8/20µs, Fwd			65.0	V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		1.33		Ω
Peak Pulse Current	I_{pp}	t_p=8/20µs			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]	$C_{I/O-I/O}$	Reverse Bias=0V, f=1MHz			13	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

Power Derating Curve



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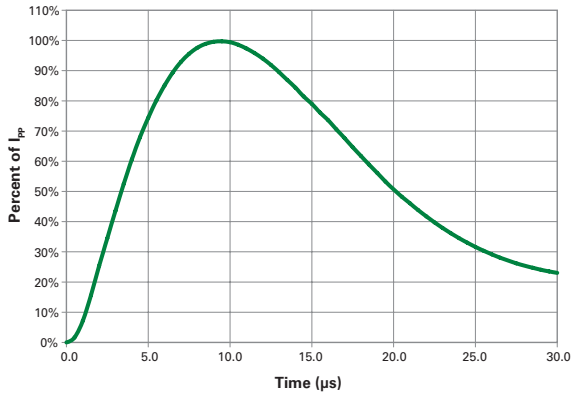
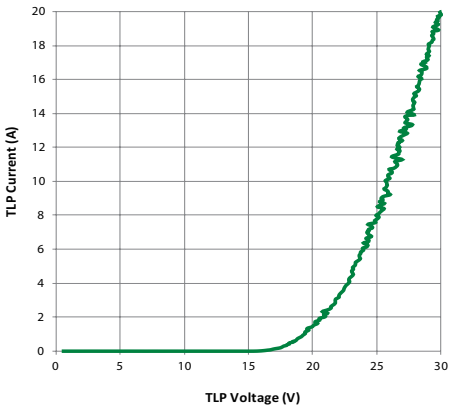
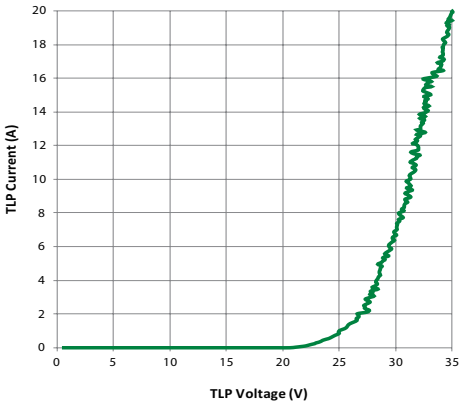
8/20µs Pulse Waveform



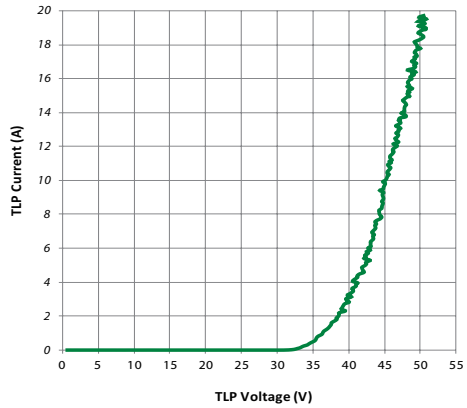
AQHV12-C Transmission Line Pulsing(TLP) Plot



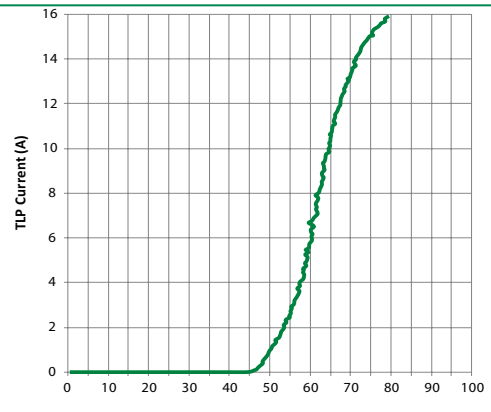
AQHV15-C Transmission Line Pulsing(TLP) Plot



AQHV24-C Transmission Line Pulsing(TLP) Plot



AQHV36-C Transmission Line Pulsing(TLP) Plot



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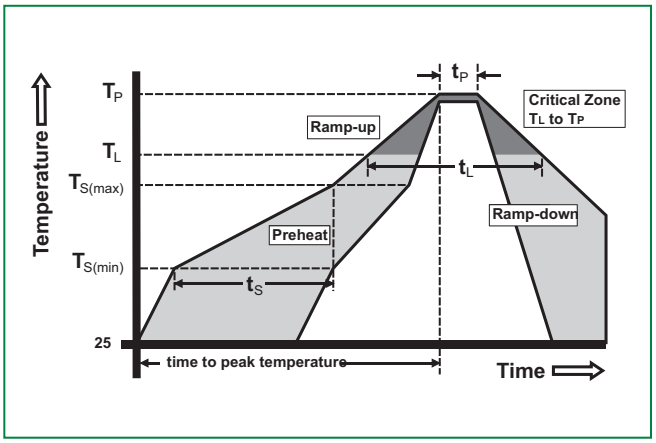
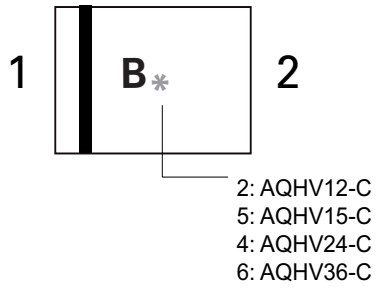
Soldering Parameters

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 – 120 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)		30 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		260°C



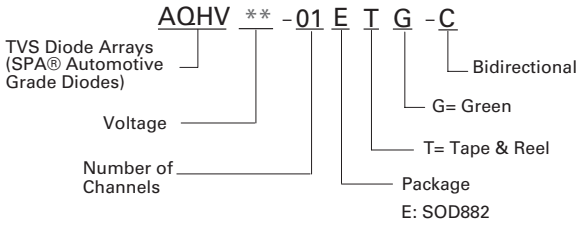
Part Marking System



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

Part Numbering System



Ordering Information

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

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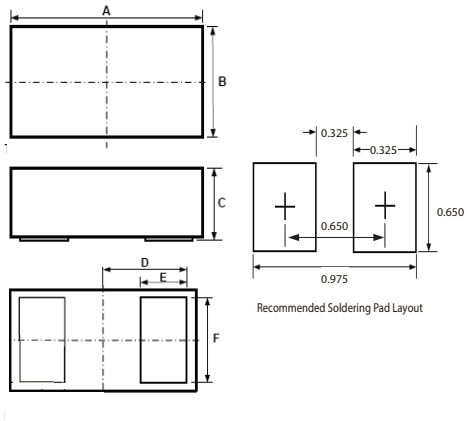
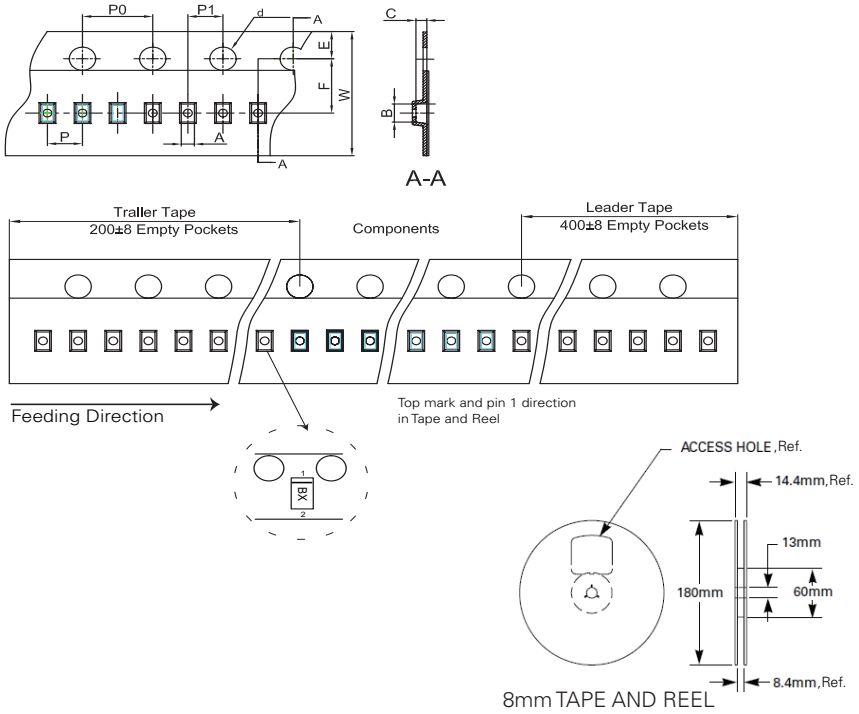
Package Dimensions — SOD882



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

Revised: JC. 11/29/21