UMW AQHV24-01LTG

1.Description

The AQHVxx-01LTG 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.

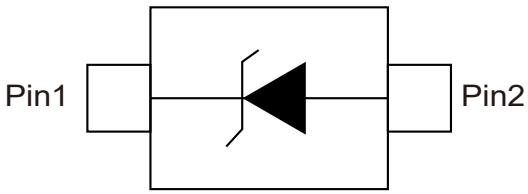
2.Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 10A (8/20μs as defined in IEC 61000 -4-5 2nd edition) for AQHV12
- Low clamping voltage
- Low leakage current

3.Applications

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

4.Pinning information



SOD-523

5.Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Peak Current (t_p=8/20μs)	P_{PK}	250	W
Junction Temperature	T_{OP}	-45 to 150	°C
Storage Temperature	T_{STOR}	-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.

6.1AQHV12 Electrical Characteristics (T_{OP}=25ºC)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse stand-off voltage	V_{RWM}	I_R=1μA			12	V
Breakdown Voltage	V_{BR}	I_R=1mA	13.3	14.3		V
Reverse Leakage Current	I_{LEAK}	V_R=12V		5	50	nA
Clamp Voltage [1]	V_C	I_{PP}=1A, t_p=8/20μs, I/O to GND		16.5	20	V
		I_{PP}=10A, t_p=8/20μs, I/O to GND		23.5	26	V
Dynamic Resistance [2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.22		Ω
Peak Pulse Current	I_{PP}	t_p=8/20μs			10	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		55.5	60	pF

6.2AQHV15 Electrical Characteristics (T_{OP}=25ºC)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse stand-off voltage	V_{RWM}	I_R=1μA			15	V
Breakdown Voltage	V_{BR}	I_R=1mA	16.7	18.7		V
Reverse Leakage Current	I_{LEAK}	V_R=15V		5	50	nA
Clamp Voltage [1]	V_C	I_{PP}=1A, t_p=8/20μs, I/O to GND		21.5	25	V
		I_{PP}=7A, t_p=8/20μs, I/O to GND		30	35	V
Dynamic Resistance [2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.25		Ω
Peak Pulse Current	I_{PP}	t_p=8/20μs			7	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		43	46	pF

6.3AQHV24 Electrical Characteristics (T_{OP}=25ºC)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse stand-off voltage	V_{RWM}	I_R=1μA			24	V
Breakdown Voltage	V_{BR}	I_R=1mA	26.7	28.7		V
Reverse Leakage Current	I_{LEAK}	V_R=24V		5	50	nA
Clamp Voltage [1]	V_C	I_{PP}=1A, t_p=8/20μs, I/O to GND		33	38	V
		I_{PP}=5A, t_p=8/20μs, I/O to GND		46.5	52	V
Dynamic Resistance [2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.35		Ω
Peak Pulse Current	I_{PP}	t_p=8/20μs			5	A
ESD Withstand Voltage [1]	V_{ESD}	IEC 61000-4-2 (Contact Discharge)	±25			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V, f=1MHz		30	32	pF

6.4AQHV36 Electrical Characteristics (T_{OP}=25ºC)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Reverse stand-off voltage	V_{RWM}	I_R=1μA			36	V
Breakdown Voltage	V_{BR}	I_R=1mA	40	42.4		V
Reverse Leakage Current	I_{LEAK}	V_R=36V		5	50	nA
Clamp Voltage [1]	V_C	I_{PP}=1A, t_p=8/20μs, I/O to GND		49.5	55	V
		I_{PP}=3A, t_p=8/20μs, I/O to GND		52.5	58	V
Dynamic Resistance [2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		1.15		Ω
Peak Pulse Current	I_{PP}	t_p=8/20μs			3	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		23	25	pF

Notes:

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

7.1Typical characteristic

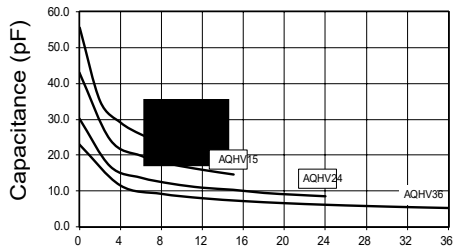


Figure 1: Capacitance vs. Reverse Bias

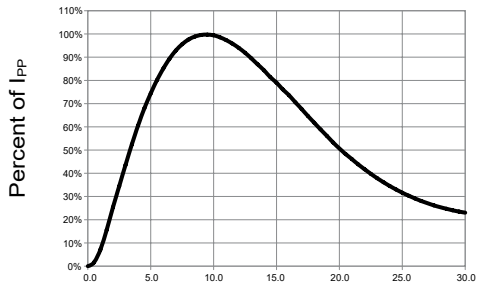


Figure 2: 8/20μs Pulse Waveform

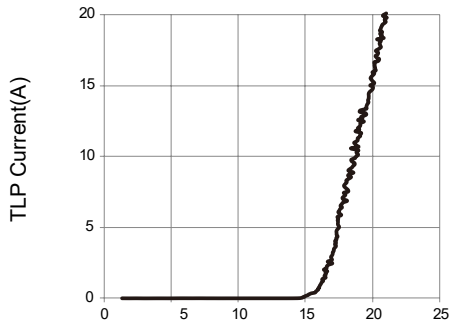


Figure 3: AQHV12 Positive Transmission Line Pulsing (TLP) Plot

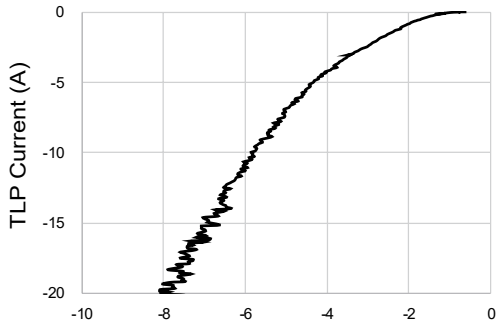


Figure 4: AQHV12 Negative Transmission Line Pulsing(TLP) Plot

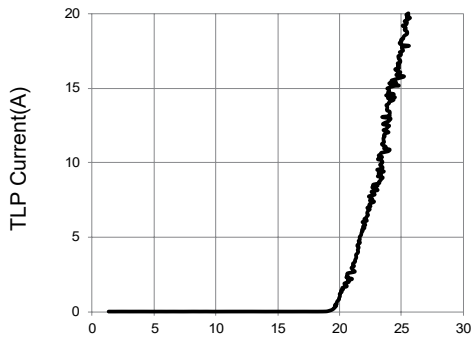


Figure 5: AQHV15 Positive Transmission Line Pulsing (TLP) Plot

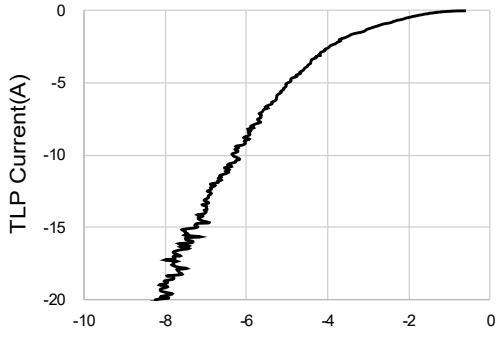


Figure 6: AQHV15 Negative Transmission Line Pulsing(TLP) Plot

7.2Typical characteristic

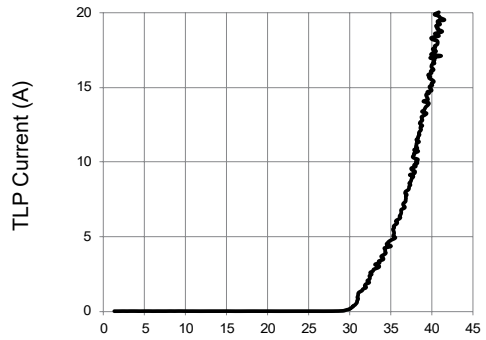


Figure 7: AQHV24 Positive Transmission Line Pulsing (TLP) Plot

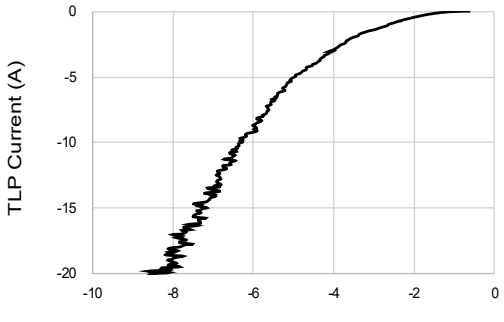


Figure 8: AQHV24 Negative Transmission Line Pulsing(TLP) Plot

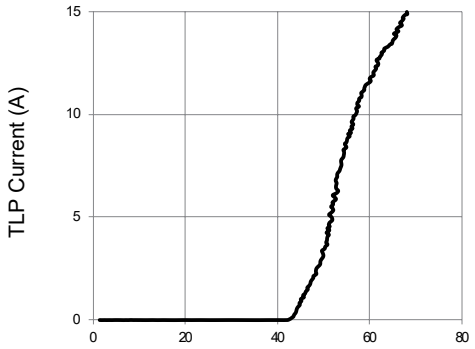


Figure 9: AQHV36 Positive Transmission Line Pulsing(TLP) Plot

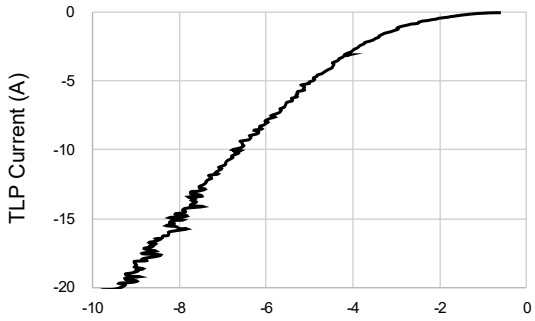


Figure 10: AQHV36 Negative Transmission Line Pulsing(TLP) Plot

7.3Typical characteristic

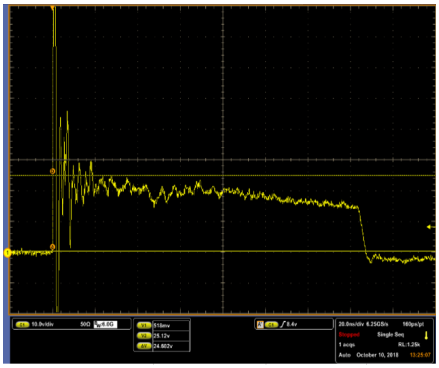


Figure 11: AQHV12 +8kV Contact ESD Clamping Voltage

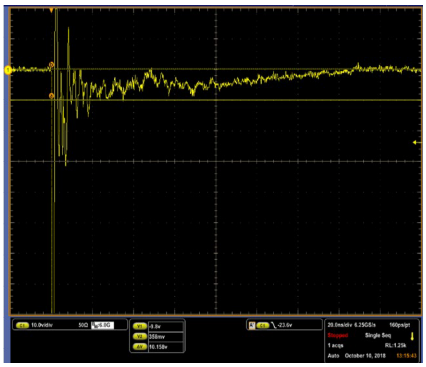


Figure 12: AQHV12 -8kV Contact ESD Clamping Voltage

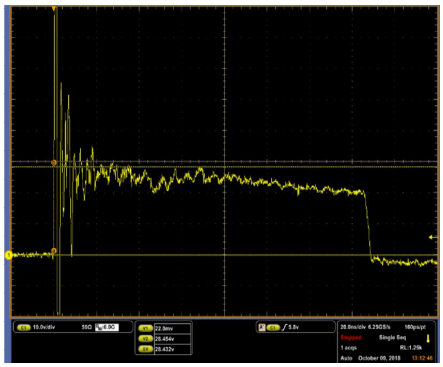


Figure 13: AQHV15 +8kV Contact ESD Clamping Voltage

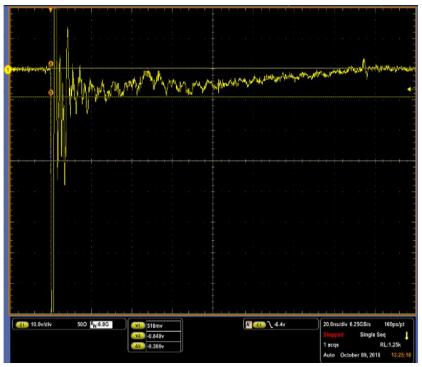


Figure 14: AQHV15 -8kV Contact ESD Clamping Voltage

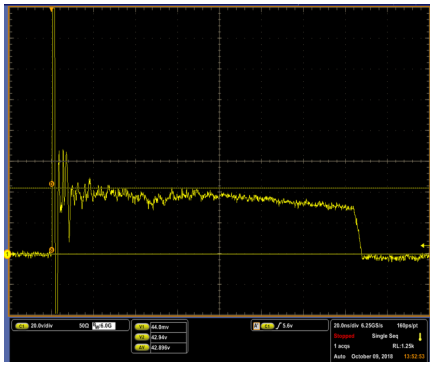


Figure 15: AQHV24 +8kV Contact ESD Clamping Voltage

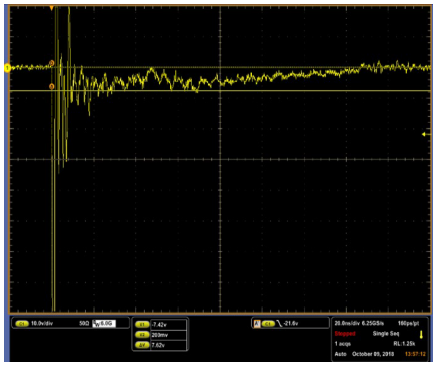


Figure 16: AQHV24 -8kV Contact ESD Clamping Voltage

7.4Typical characteristic

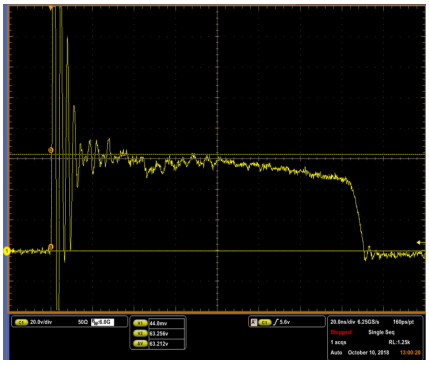
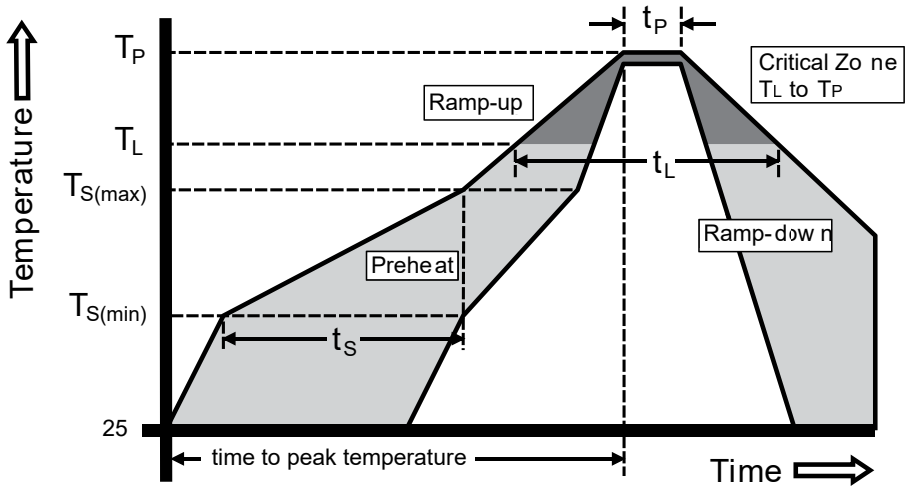


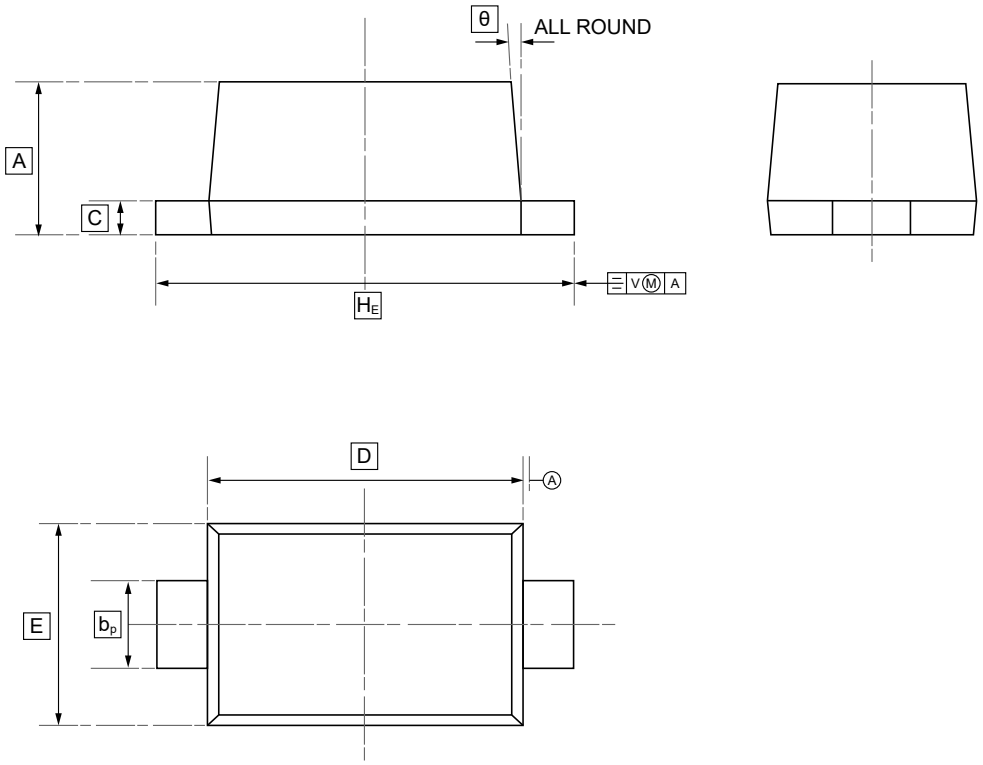
Figure 17: AQHV36 +8kV Contact ESD Clamping Voltage	Figure 18: AQHV36 -8kV Contact ESD Clamping Voltage

8.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 (Liquid us Temp (T_L) to peak)		3°C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature(T_L) (Liquidus)	217°C
	-Temperature(T_L)	60-150 secs.
Peak Temp (T_p)		+260 $^{+0/-5}$ °C
Time within 5°C of actual Peak Temp (T_p)		20-40 seconds
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp (T_p)		8 min. Max
Do not exceed		260°C



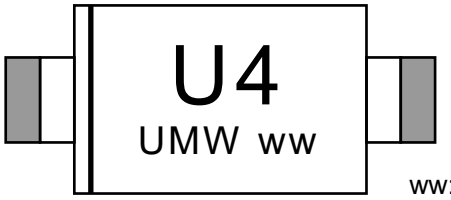
9.SOD-523 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	b_p	C	D	E	H_E	θ
Min	0.58	0.3	0.100	1.15	0.75	1.5	5°
Max	0.68	0.4	0.135	1.25	0.85	1.7	

10.Ordering information



ww: Batch Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW AQHV12-01LTG	U2	SOD-523	3000	Tape and reel
UMW AQHV15-01LTG	U5	SOD-523	3000	Tape and reel
UMW AQHV24-01LTG	U4	SOD-523	3000	Tape and reel
UMW AQHV36-01LTG	U6	SOD-523	3000	Tape and reel

11.Disclaimer

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