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TVS Diode Arrays (SPA®Diodes)
Enhanced ESD Discrete TVS Series - AQ3522-01LTG

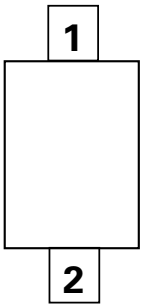
AQ3522-01LTG, 0.15pF 22kV bidirectional TVS diode

AUTOMOTIVE GRADE HF RoHS Pb GREEN

Description

The AQ3522 integrates ultra low capacitance diodes to provide protection for electronic equipment that may experience destructive electrostatic discharges (ESD). This robust component can safely absorb repetitive ESD strikes above the maximum level specified in the IEC 61000-4-2 international standard (Level 4, ±8kV contact discharge) without performance degradation. The extremely low loading capacitance also makes it ideal for protecting high speed signal pins such as V-By-One®, HDMI, USB3.0, USB2.0, and IEEE 1394.

Pinout



Features

- ESD, IEC 61000-4-2, ±22kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (t_P=5/50ns)
- Lightning, 2.5A (8/20µs as defined in IEC 61000-4-5 2nd edition)
- Low capacitance of 0.15pF (TYP) at 3GHz
- ESD, ISO 10605, 330pF 330Ω, ±21kV contact, ±23kV air
- Facilitates excellent signal integrity
- PPAP capable
- AEC-Q101 qualified
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)

Functional Block Diagram

Applications

- Ultra-high speed data lines
- USB 3.1, 3.0, 2.0
- HDMI 2.0, 1.4a, 1.3
- DisplayPort(TM)
- V-by-One®
- LVDS interfaces
- Automotive application
- Consumer, mobile and portable electronics
- Tablet PC and external storage with high speed interfaces
- Applications requiring high ESD performance in small packages

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Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20µs)	2.5	A
T_{OP}	Operating Temperature	-45 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.

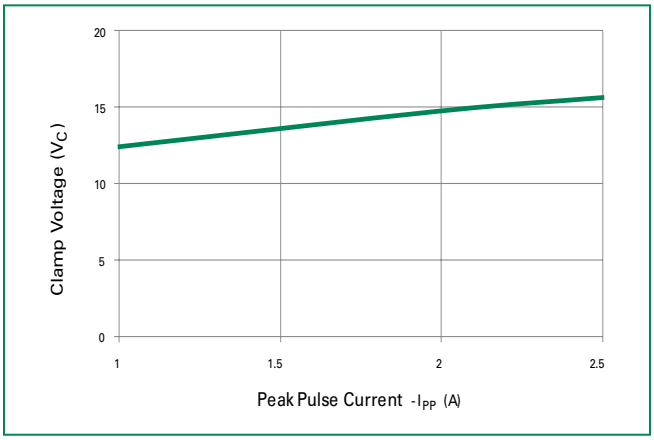
Electrical Characteristics - (T_{OP}=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R=1µA			5	V
Breakdown Voltage	V_{BR}	I_R=1mA	8.5	9.2		V
Reverse Leakage Current	I_{LEAK}	V_R=5V		0.02	0.1	µA
Clamp Voltage[1]	V_C	I_{PP}=2.5A, t_p=8/20µs, I/O to I/O		15.5	18	V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns, I/O to I/O		1.2		Ω
ESD Withstand Voltage[1]	V_{ESD}	IEC 61000-4-2 (Contact)	±22			kV
		IEC 61000-4-2 (Air)	±30			kV
Diode Capacitance[1,3]	$C_{I/O-I/O}$	Reverse Bias=0V, f= 3 GHz		0.15		pF

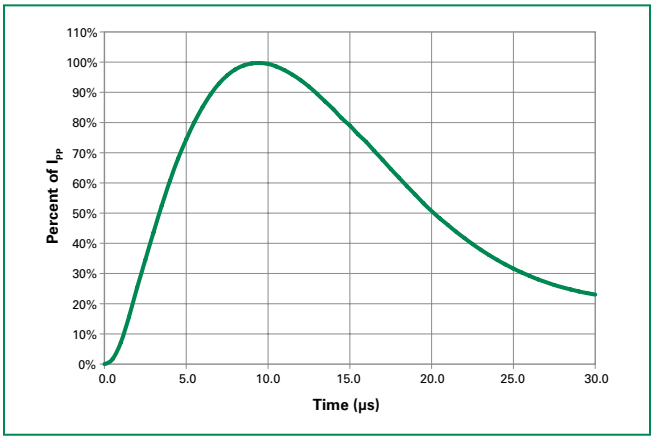
Note:

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.
3. Package sizes larger than 0201 can add parasitic capacitance, inductance and resistance.

Clamping voltage vs. I_{PP} for 8/20µs waveshape



8/20µs Pulse Waveform



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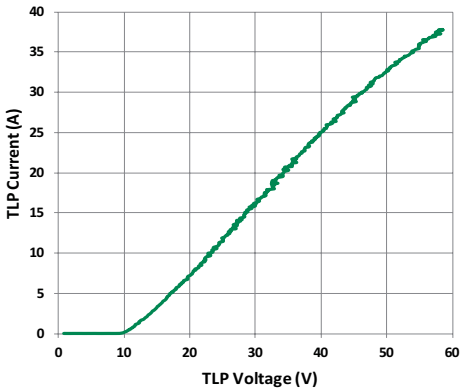
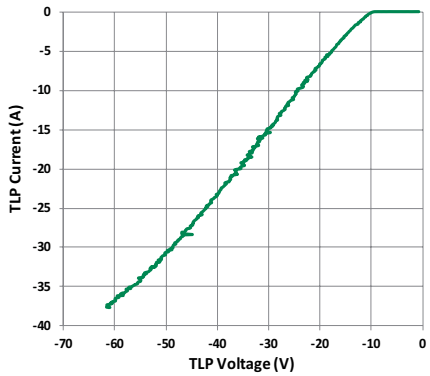
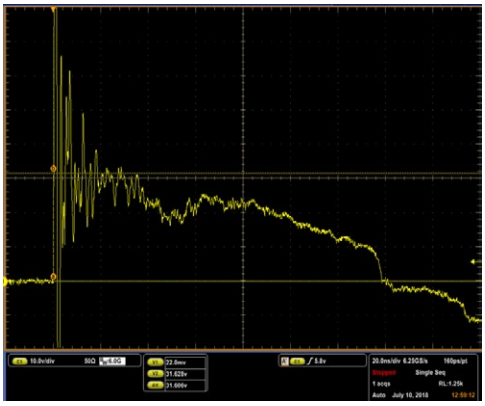
Positive Transmission Line Pulsing (TLP) Plot



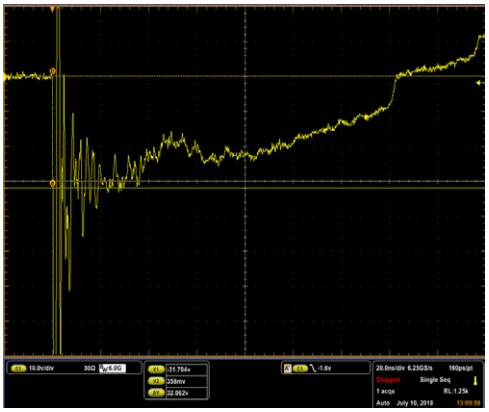
Negative Transmission Line Pulsing (TLP) Plot



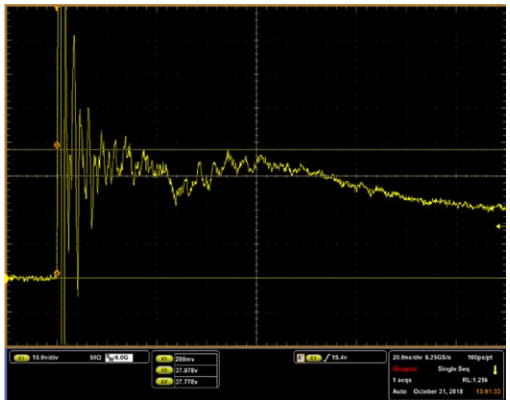
IEC 61000–4–2 +8 kV Contact ESD Clamping Voltage



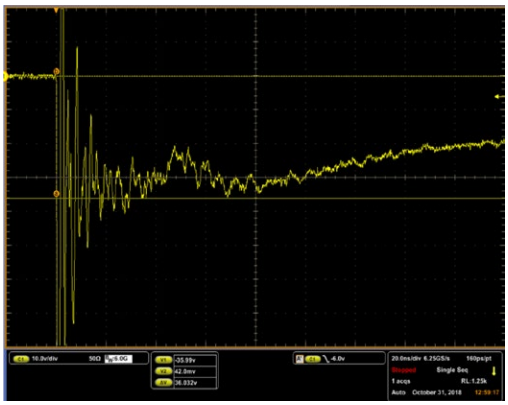
IEC 61000–4–2 -8 kV Contact ESD Clamping Voltage



ESD ISO10605 +8 kV Contact ESD Clamping Voltage



ESD ISO10605 -8 kV Contact ESD Clamping Voltage



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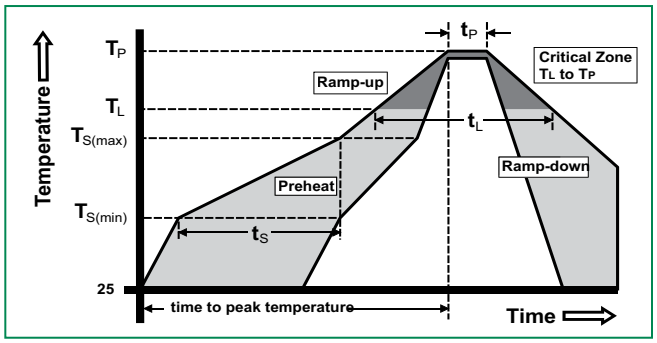
Soldering Parameters

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 – 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

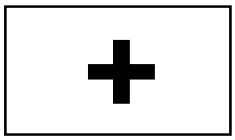


Part Numbering System

AQ 3522 - 01 L T G

- AQ: Automotive Grade TVS Diode Arrays (SPA® Diodes)
- 3522: Series
- 01: Number of Channels
- L: Package L: SOD523
- T: T= Tape & Reel
- G: G= Green

Part Marking System



Product Characteristics

Lead Plating	Matte Tin
Lead Material	Copper Alloy
Lead Coplanarity	0.004 inches(0.102mm)
Substrate Material	Silicon
Body Material	Molded Compound
Flammability	UL Recognized compound meeting flammability rating V-0

Ordering Information

Part Number	Package	Min. Order Qty.
AQ3522-01LTG	SOD523	5000

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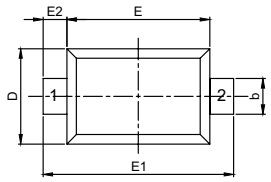
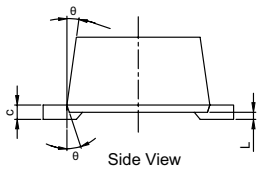
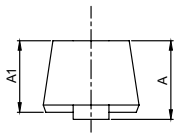
Package Dimensions — SOD-523



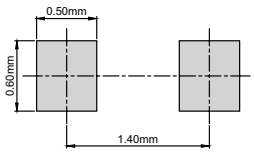
Top View



Side View



Side View

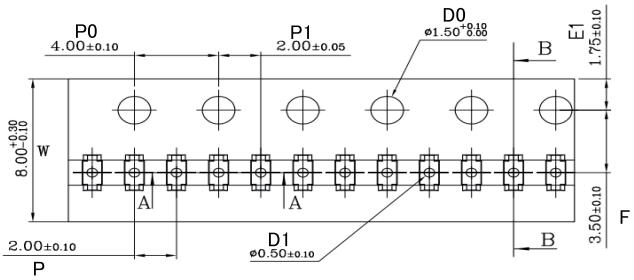


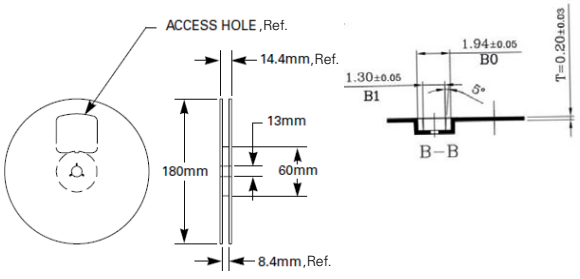
Recommended Soldering pad layout

Drawing#: L01-B

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

Embossed Carrier Tape & Reel Specification — SOD-523





8mm TAPE AND REEL

Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A0	0.91	1.01	0.036	0.040
B0	1.89	1.99	0.074	0.078
D0	1.50	1.60	0.059	0.063
D1	0.40	0.60	0.016	0.024
E1	1.65	1.85	0.065	0.073
F	3.40	3.60	0.134	0.142
P0	3.90	4.10	0.154	0.161
P	1.90	2.10	0.075	0.083
P1	1.95	2.05	0.077	0.081
K0	0.68	0.78	0.027	0.031
T	0.17	0.23	0.007	0.009
W	7.90	8.30	0.311	0.327

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