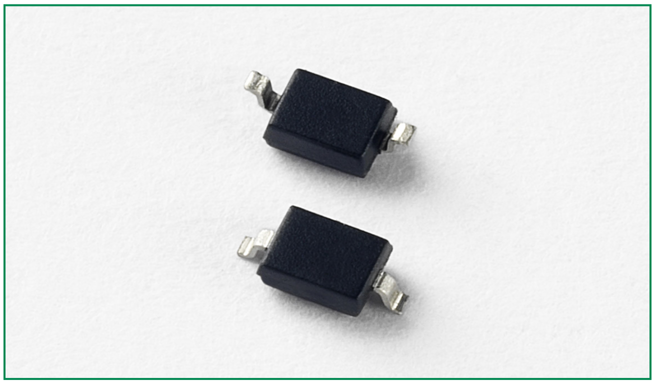
AQ3522-01FTG, 0.15pF 22kV Bidirectional TVS diode

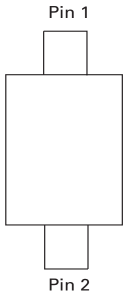
AUTOMOTIVE GRADE HF RoHS Pb GREEN



Description

The AQ3522-01FTG 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 and USB2.0.

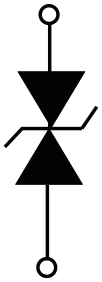
Pinout



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, ±20kV contact, ±20kV 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

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20μs)	2.5	A
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.

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 GND		15.5	18	V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		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]	$C_{I/O-GND}$	Reverse Bias=0V, f= 3 GHz		0.15		pF

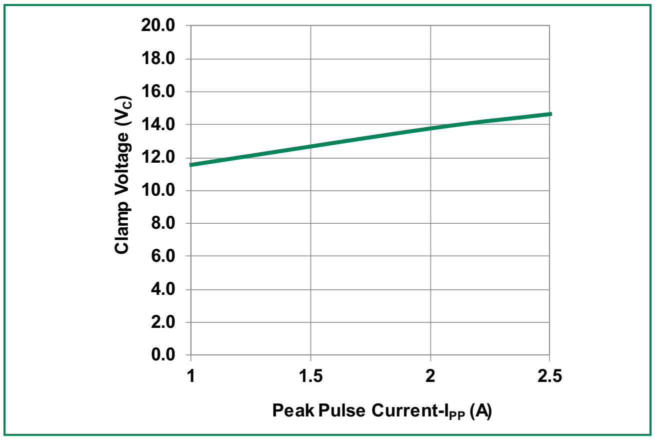
Note:

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

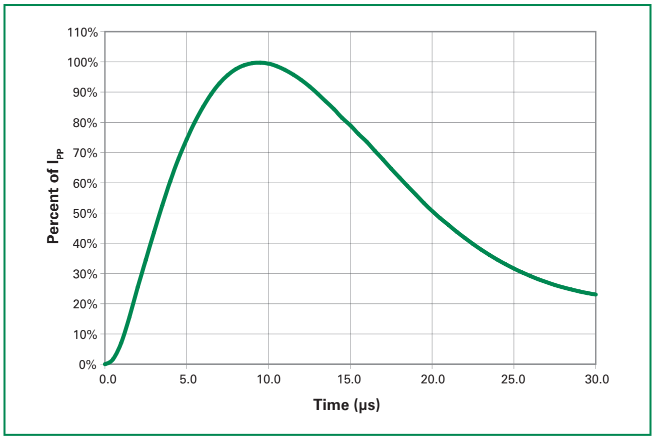
2. Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window t1=70ns to t2= 90ns.

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

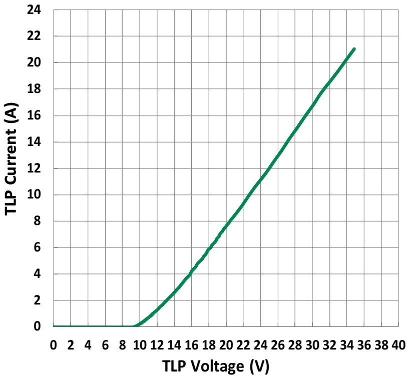
Clamping voltage vs. I_{PP} for 8/20μs waveshape



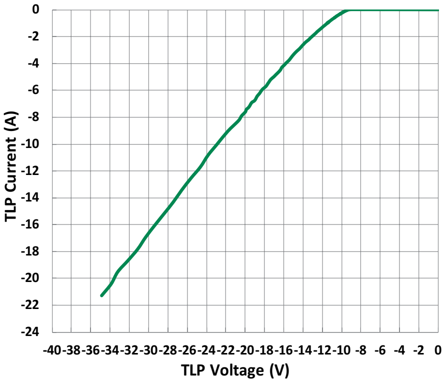
8/20μs Pulse Waveform



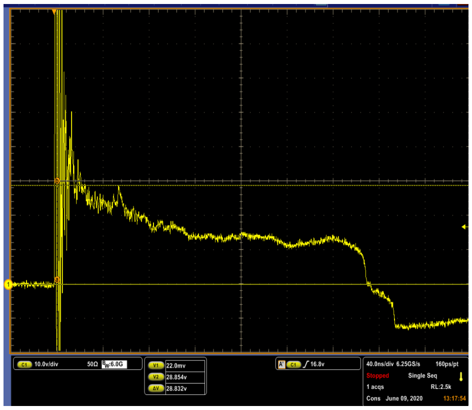
Positive Transmission Line Pulsing (TLP) Plot



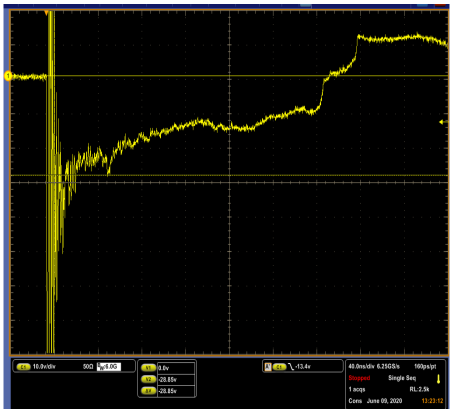
Negative Transmission Line Pulsing (TLP) Plot



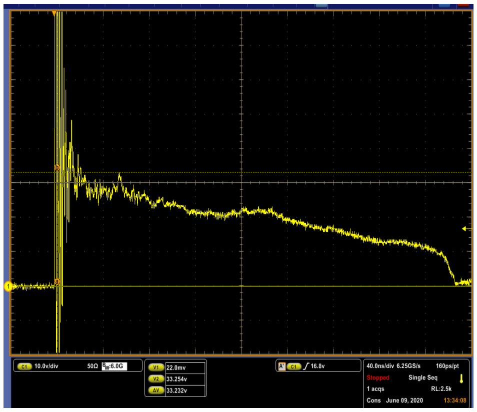
IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage



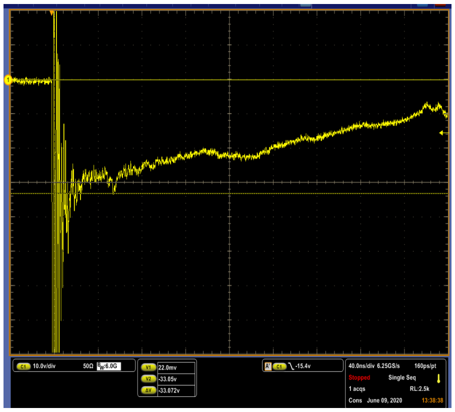
IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage



ISO10605 (C:330pF, R:330Ω) contact discharge plot at +8 kV

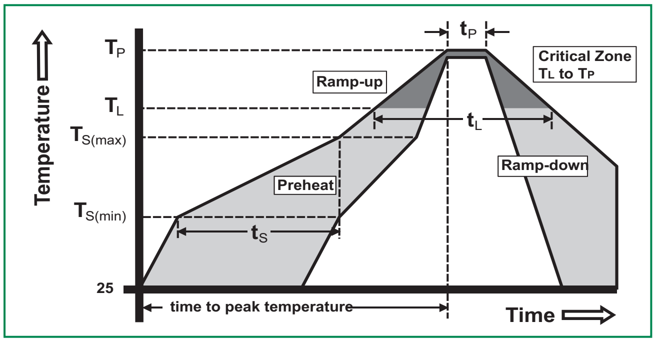


ISO10605 (C:330pF, R:330Ω) contact discharge plot at -8 kV

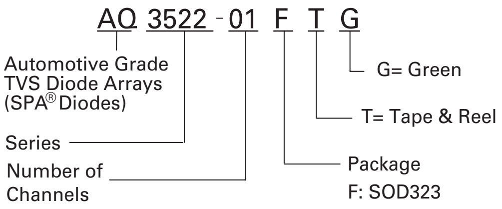


Soldering Parameters

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



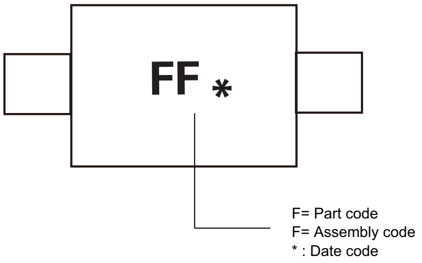
Part Numbering System



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

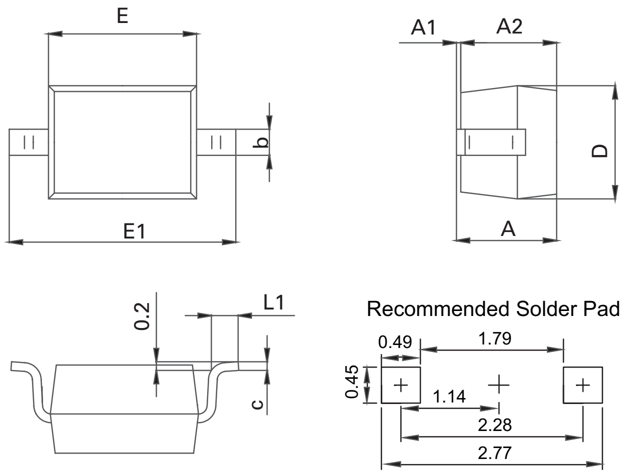
Part Marking System



Ordering Information

Part Number	Package	Min. Order Qty.
AQ3522-01FTG	SOD323	3000

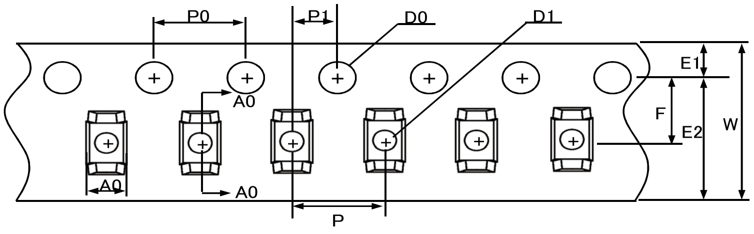
Package Dimensions -SOD323

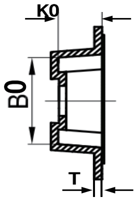


Unit: mm

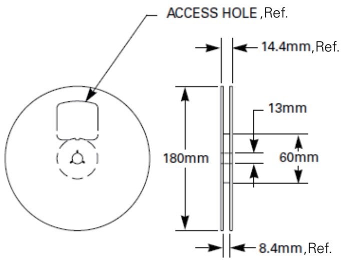
Symbol	SOD323			
	Millimeters		Inches	
	Min	Max	Min	Max
A	0.80	1.00	0.031	0.039
A1	0.00	0.10	0.000	0.004
A2	0.80	0.90	0.031	0.035
b	0.25	0.35	0.010	0.014
c	0.08	0.15	0.003	0.006
D	1.20	1.40	0.047	0.055
E	1.60	1.80	0.063	0.071
E1	2.50	2.70	0.098	0.106
L1	0.25	0.40	0.010	0.016

Embossed Carrier Tape & Reel Specification — SOD323





A0–A0



Symbol	Millimeters
A0	1.46+/-0.10
B0	2.90+/-0.10
W	8.0+0.3/-0.10
D0	1.50+0.10
D1	0.45min/1.15max
E1	1.75+/-0.10
E2	-
F	3.50+/-0.10
P0	4.00+/-0.10
P	4.00+/-0.10
P1	2.00+/-0.05
K0	1.25+/-0.10
T	0.254+/-0.02