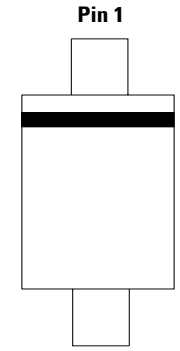
AQ4023 Series 1.3pF, 12A Discrete TVS Diode

AUTOMOTIVE GRADE | HF | RoHS | Pb | GREEN

Description

The AQ4023 Series integrates low capacitance steering diodes with one or two avalanche breakdown diodes for unidirectional or bidirectional protection, respectively, to protect against ESD and lightning induced surge events. These components can safely absorb up to 12A per IEC 61000-4-5 2nd edition (t_p=8/20µs) without performance degradation and a minimum ±30kV ESD per IEC 61000-4-2 International Standard. The low loading capacitance and high surge capability make it ideal for protecting telecommunication ports such as xDSL and other high voltage, high speed legacy interfaces.

Pinout

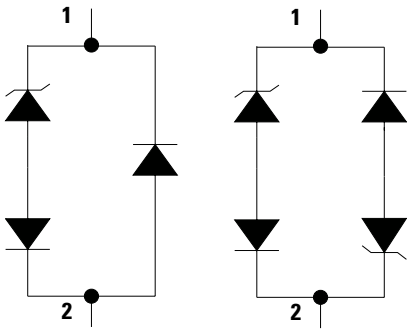


Cathode polarity for unidirectional only

Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5 2nd edition, 12A (t_P=8/20µs)
- Low capacitance of 1.3pF (@ V_R=0V)
- Low leakage current
- Unidirectional and bidirectional configuration
- Small SOD323 package fits 0805 footprints
- AEC-Q101 qualified
- Moisture Sensitivity Level(MSL -1)
- Halogen free, lead free and RoHS compliant

Functional Block Diagram



Unidirectional
AQ4023-01FTG

Bidirectional
AQ4023-01FTG-C

Applications

- xDSL Interfaces
- RS-232
- RS-485
- Power Ports
- Security Equipment
- Instrumentation
- Medical Equipment
- Computers and Peripherals
- CAN Bus protection
- Automotive applications

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.

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Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20µs)	12	A
P_{Pk}	Peak Pulse Power (t_p=8/20µs)	450	W
T_{OP}	Operating Temperature	-40 to 150	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

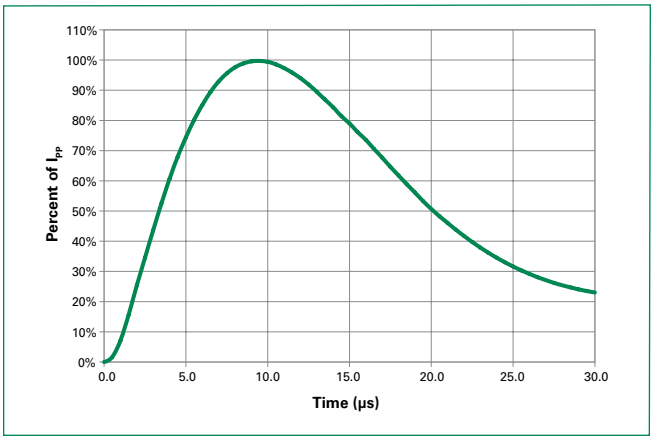
CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

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

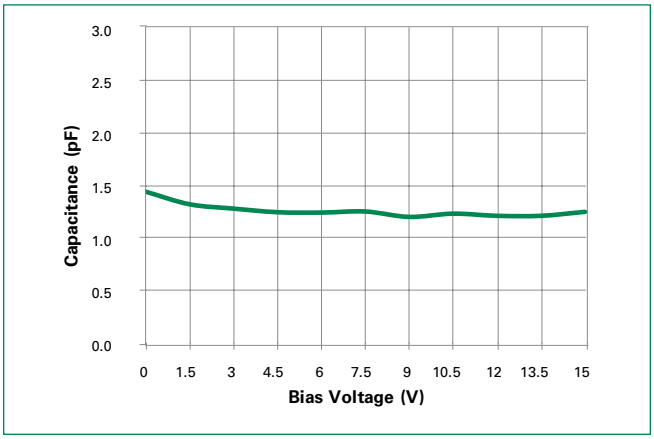
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R≤1µA with Pin 1 to Pin 2	-	-	15	V
Breakdown Voltage	V_{BD}	I_t=1mA with Pin 1 to Pin 2	16	-	-	V
Leakage Current	I_{LEAK}	V_R=15V with Pin 1 to Pin 2	-	-	0.1	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd	-	23	-	V
		I_{PP}=2A, t_p=8/20µs, Fwd	-	24	-	V
		I_{PP}=10A, t_p=8/20µs, Fwd	-	35	-	V
		I_{PP}=12A, t_p=8/20µs, Fwd	-	37.5	-	V
Dynamic Resistance[2]	R_{DYN}	TLP t_p=100ns, Pin 1 to Pin 2	-	0.55	-	Ω
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_D	Reverse Bias=0V, f=1MHz, Pin 1 to Pin 2	-	1.3	2	pF

Note:
1. Parameter is guaranteed by design and/or component characterization.
2. Transmission Line Pulse (TLP) test setting : Std.TDR(50Ω),tp=100ns, tr=0.2ns ITLP and VTLP averaging window: start 1=70ns to end t2=80ns

8/20µs Pulse Waveform



Capacitance vs. Reverse Bias (Pin 1 to Pin 2)



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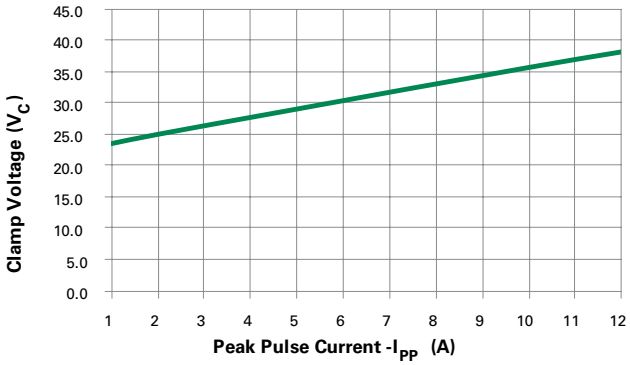
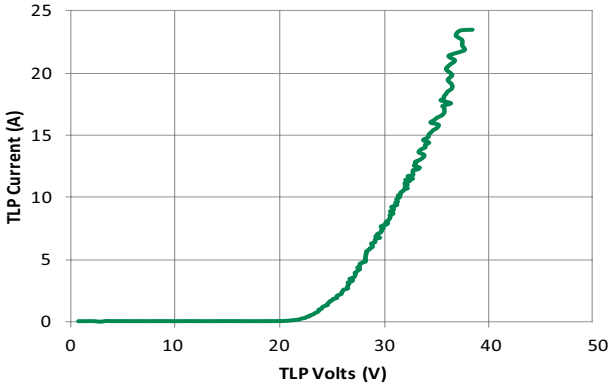
TVS Diode Arrays (SPA® Diodes)
Lightning Surge Protection- AQ4023 Series

Clamping Voltage vs. Peak Pulse Current (Pin 1 to Pin 2)

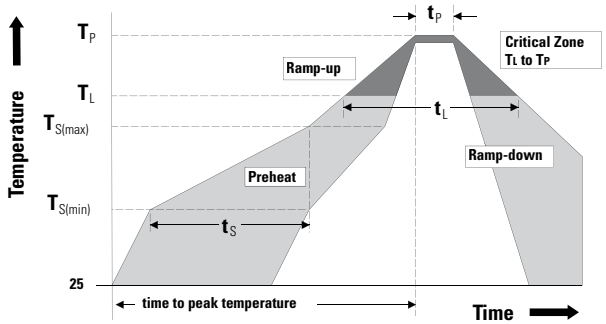


Transmission Line Pulsing (TLP) Plot (Pin 1 to Pin2)

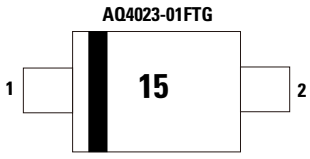


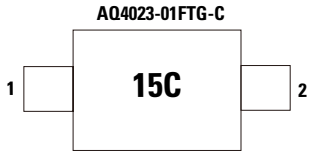
Soldering Parameters

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 Marking System





Ordering Information

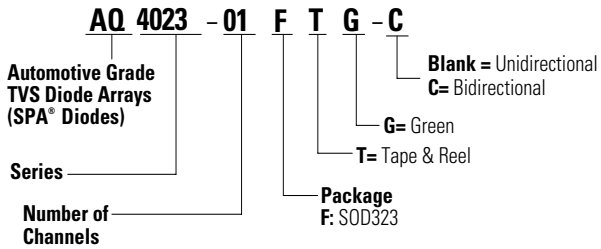
Part Number	Package	Marking	Min. Order Qty.
AQ4023-01FTG	SOD323	15	3000
AQ4023-01FTG-C	SOD323	15C	3000

Product Characteristics

Lead Plating	Matte tin
Lead Material	Copper Alloy
Lead Coplanarity	0.0004 inches (0.102mm)
Substrate material	Silicon
Body Material	Molded Compound
Flammability	UL Recognized compound meeting flammability rating V-0

Notes :
1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.

Part Numbering System



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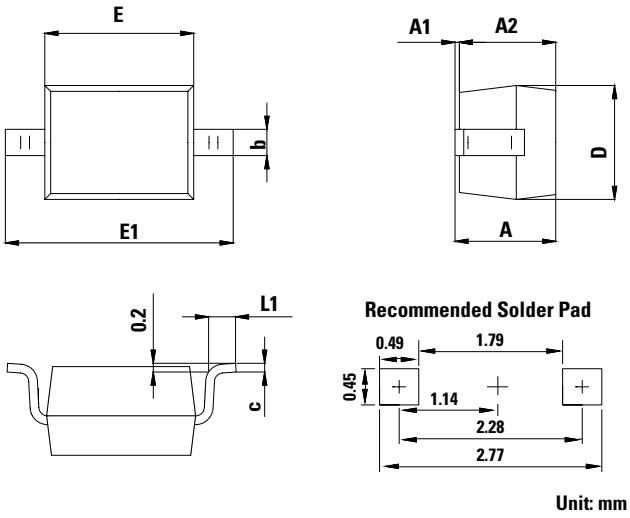
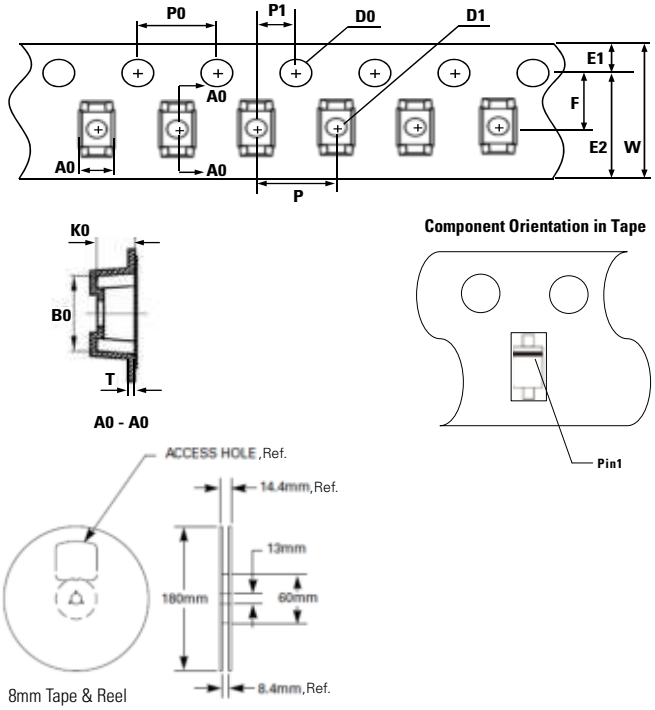
Package Dimensions -SOD323



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



8mm Tape & Reel

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

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