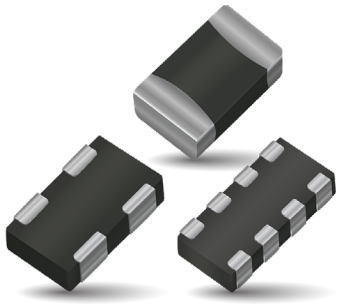
USB Series

Low Capacitance Multilayer Varistors



GENERAL DESCRIPTION

USB Series varistors are designed to protect the high speed data lines against ESD transients. They have very low capacitance and fast turn on times that make this series ideal for data and transmission lines with high data rates. The unique design enables these devices to meet the rigorous testing criteria of the **IEC 61000-4-2** standards. New and improved manufacturing process has created these USB series to be one of the best plated varistors in the market today.

GENERAL CHARACTERISTICS

- Operating Temperature: -55ºC to 125ºC
- Working Voltage: ≤ 18Vdc
- Case Size: 0402, 0603, 0405 2x array, 0612 4x array
- Typical Capaciatane: 3pF, 6pF, 10pF

FEATURES

- Zinc Oxide (ZnO) based ceramic semiconductor devices with non-linear voltage-current characteristics
- Bi-directional device, similar to back-to-back Zener diodes plus an EMC capacitor in parallel
- Entire structure made up of conductive ZnO grains surrounded by electrically insulating barriers, creating varistor-like behavior
- Electrical advantages over Zener diodes are repetitive strike capability, high in rush current capability, fast turn-on-time and EMI attenuation
- Protects against ESD to meet **IEC 61000-4-2** 15kV (air) and 8kV (contact)
- Low capacitance for high speed data lines
- Available in discrete and array packages (2 and 4 element)
- Low Clamping Voltage
- Low Operating Voltage
- Response time is < 1ns

TYPICAL APPLICATIONS

- USB BUS Lines/Firewire Data BUS Lines
- I/O BUS Lines
- 10/100/1000 Ethernet
- Transmission Lines
- Video Card Data Lines
- Handheld Devices
- Laptop Computers
- LCD Monitors and more

PART NUMBERING

USB — **Style**

0001 — **Case Size**
0001 = 0603 (Single)
0002 = 0405 (2-Element)
0004 = 0612 (4-Element)
0005 = 0402 (Single)
0006 = 0402 (Single)

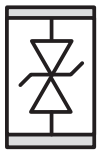
D — **Packaging Code (Reel Size)**
D = 7" (1,000 pcs.)
R = 7" (4,000 pcs.)
T = 13" (10,000 pcs.)
W = 7" (10,000 pcs. 0402 only)

P — **Termination**
P = Ni/Sn (Plated)

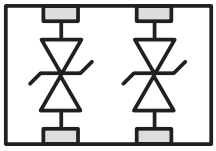
RoHS COMPLIANT

PINOUT CONFIGURATION

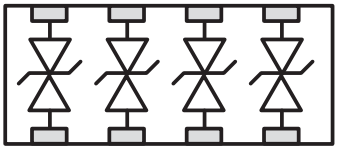
USB0001/0005/0006
0603 and 0402 (Single)



USB0002
0405 (Dual)



USB0004
0612
(Quad)



RATINGS

Air Discharge ESD	15kV
Contact Discharge ESD	8kV
Operating Temperature	–55°C to +125°C
Soldering Temperature	260°C

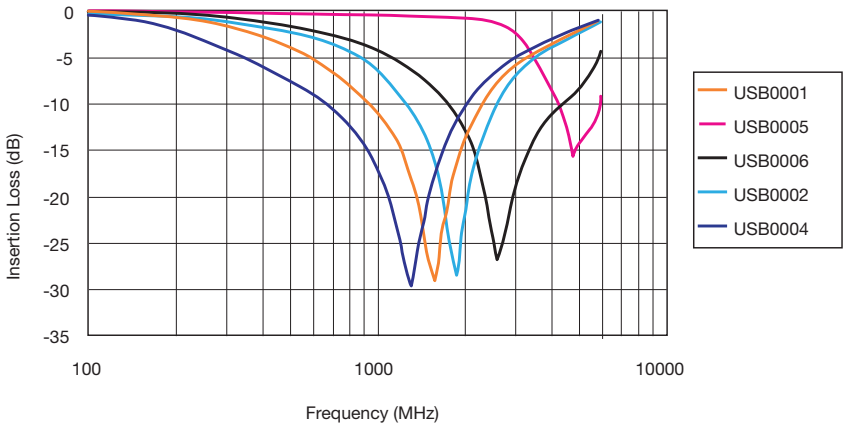
PERFORMANCE CHARACTERISTICS

AVX Part No.	V_W (DC)	V_W (AC)	V_B	I_L	E_T	I_P	Cap.	Case Size	Elements
USB0001_ _	≤18	≤14	120	2	0.015	4	10	0603	1
USB0002_ _	≤18	≤14	70	2	0.015	4	10	0405	2
USB0004_ _	≤18	≤14	100	2	0.015	4	10	0612	4
USB0005_ _	≤18	≤14	300	2	0.015	4	3	0402	1
USB0006_ _	≤18	≤14	65	2	0.015	4	6	0402	1

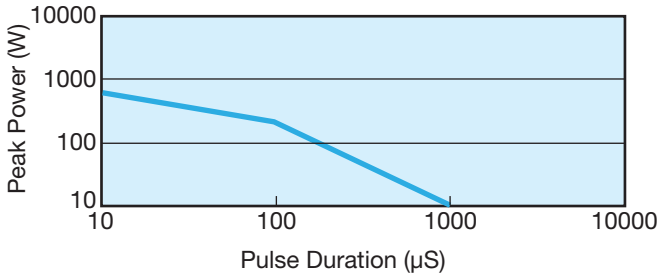
└ Termination Finish Code
└ Packaging Code

V_W (DC) DC Working Voltage (V)
V_W (AC) AC Working Voltage (V)
V_B Typical Breakdown Voltage (V @ 1mADC)
I_L Maximum Leakage Current at the Working Voltage (µA)
E_T Transient Energy Rating (J, 10x1000µS)
I_P Peak Current Rating (A, 8x20µS)
Cap Typical Capacitance (pF) @ 1 MHz and 0.5Vrms

USB TYPICAL S21 CHARACTERISTICS

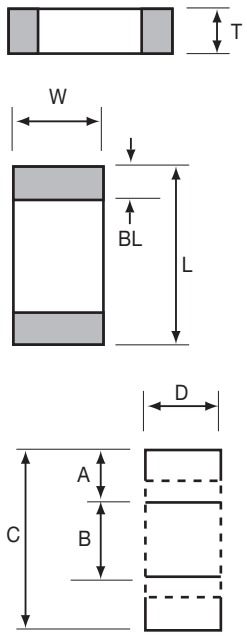


Typical Pulse Rating Curve

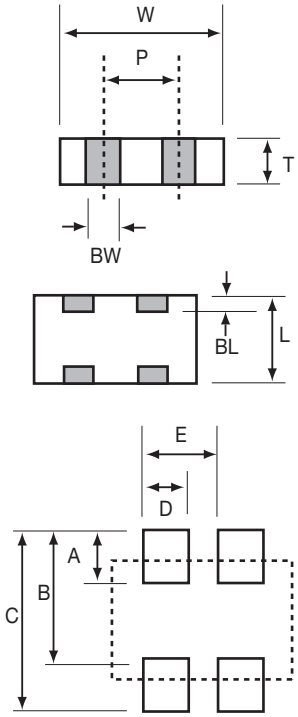


PHYSICAL DIMENSIONS AND PAD LAYOUT

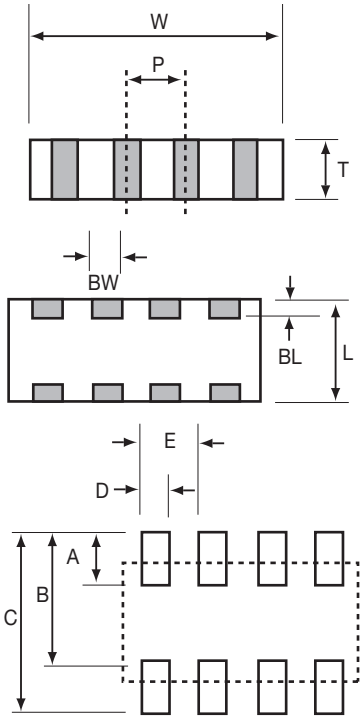
USB0001/5/6 (Single)



USB0002 (Dual)



USB0004 (Quad)



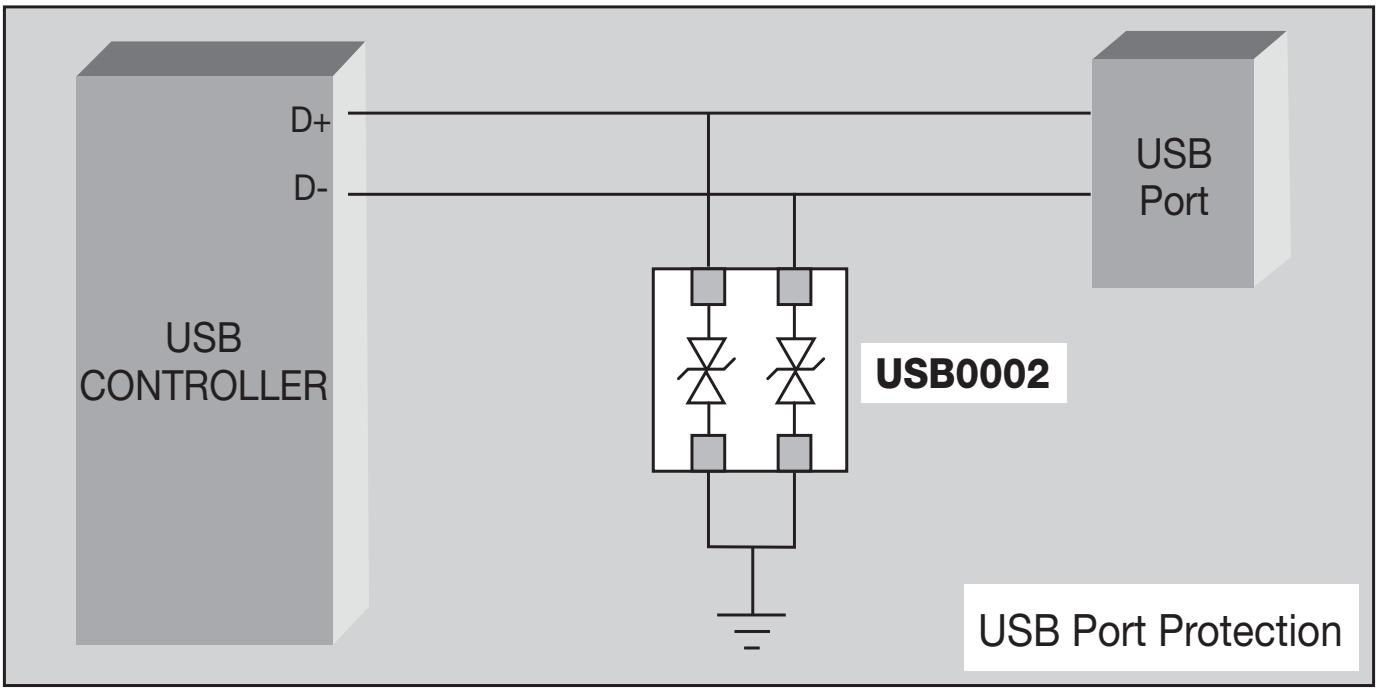
mm (inches)

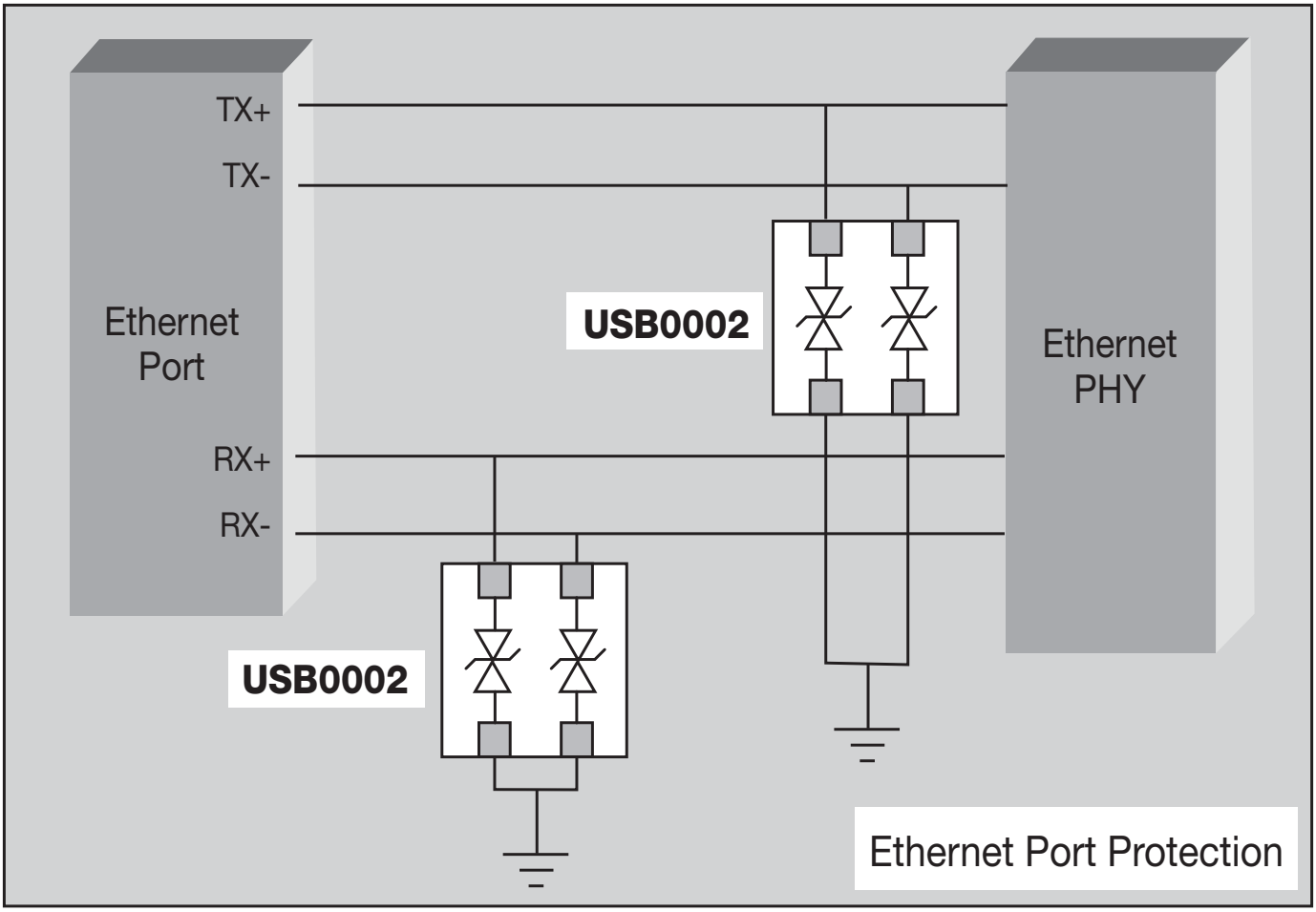
L	W	T	BW	BL	P
USB0001					
1.60±.15 (0.063±0.006)	0.80±0.15 (0.032±0.006)	0.90 Max (0.035 Max.)	N/A	0.35±0.15 (0.014±0.006)	N/A
USB0002					
1.00±0.15 (0.039±0.006)	1.37±0.15 (0.054±0.006)	0.66 Max (0.026 Max.)	0.36±0.10 (0.014±0.004)	0.20±0.10 (0.008±0.004)	0.64 REF (0.025 REF)
USB0004					
1.60±0.20 (0.063±0.008)	3.20±0.20 (0.126±0.008)	1.22 Max (0.048 Max.)	0.41±0.10 (0.016±0.004)	0.18+0.25/−0.08 (0.007+.01/−.003)	0.76 REF (0.030 REF)
USB0005 / USB0006					
1.0±0.10 (0.040±0.004)	0.50±0.10 (0.020±0.004)	0.60 Max (0.024 Max.)	N/A	0.25±0.15 (0.010±0.006)	N/A

mm (inches)

A	B	C	D	E
USB0001				
0.89 (0.035)	0.76 (0.030)	2.54 (0.100)	0.76 (0.030)	N/A
USB0002				
0.46 (0.018)	0.74 (0.029)	1.20 (0.047)	0.30 (0.012)	0.64 (0.025)
USB0004				
0.89 (0.035)	1.65 (0.065)	2.54 (0.100)	0.46 (0.018)	0.76 (0.030)
USB0005 / USB0006				
0.61 (0.024)	0.51 (0.020)	1.70 (0.067)	0.51 (0.020)	N/A

APPLICATIONS





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Authorized Distributor

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AVX:
USB0001DP USB0005WP USB0006WP USB0002DP USB0002RP USB0003DP USB0003TP USB0002TP USB0004RP USB0004DP