Features

- ESD protection for one line with bi-directional
- Provide transient protection for the protected line to
  IEC 61000-4-2 (ESD) ±15kV (air) / ±9kV (contact)
  IEC 61000-4-5 (Lightning) 3A (8/20μs)
- **Ultra-low capacitance: 0.18pF typical**
- For low operating voltage applications: **1V and below**
- 0201 small MCSP package saves board space
- Fast turn-on and low clamping voltage
- Solid-state silicon-avalanche and active circuit triggering technology
- ***Green part***

Applications

- USB4 interface
- USB Type-C interface
- PCIe Gen4 and Gen5 interfaces
- Thunderbolt interface
- Handheld portable applications
- Consumer electronics

Description

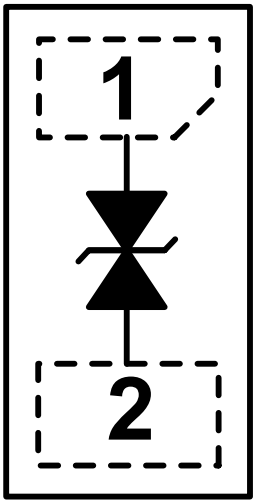
AZ5BFS-01M is a design which includes a bi-directional ESD rated clamping cell to protect high-speed data interfaces in an electronic system. The AZ5BFS-01M has been specifically designed to protect sensitive components which are connected to data and transmission lines from over-voltage caused by Electrostatic Discharging (ESD), Lightning and Cable Discharge Event (CDE).

AZ5BFS-01M is a unique design which includes proprietary clamping cell with ultra-low capacitance in a small package. During transient conditions, the proprietary clamping cell prevents over-voltage on the control/data lines, protecting any downstream components.

AZ5BFS-01M is bi-directional and may be used on lines where the signal swings above and below ground.

AZ5BFS-01M may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 (±15kV air, ±8kV contact discharge).

Circuit Diagram / Pin Configuration



MCSP0603P2YS (Top View)

Specifications

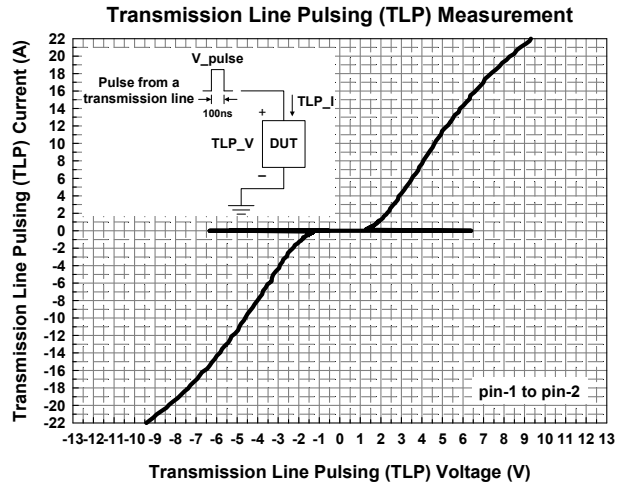
Absolute Maximum Ratings (T_A= 25°C, unless otherwise specified)			
Parameter	**Symbol**	**Rating**	**Unit**
Peak Pulse Current (t_p=8/20μs)	I_{pp}	3	A
Operating Voltage	V_{DC}	±1.1	V
ESD per IEC 61000-4-2 (Air)	V_{ESD-1}	±15	kV
ESD per IEC 61000-4-2 (Contact)	V_{ESD-2}	±9	kV
Lead Soldering Temperature	T_{SOL}	260 (10 sec.)	°C
Operating Temperature	T_{OP}	-55 to +85	°C
Storage Temperature	T_{STO}	-55 to +150	°C

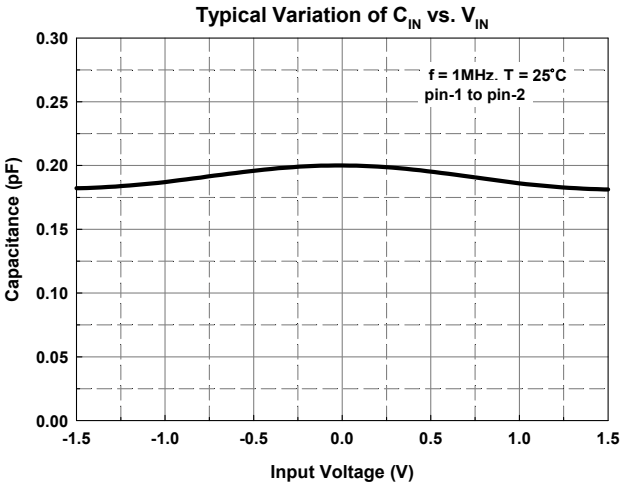
Electrical Characteristics						
Parameter	**Symbol**	**Condition**	**Min**	**Typ**	**Max**	**Unit**
Reverse Stand-Off Voltage	V_{RWM}	T=25 °C.	-1		1	V
Reverse Leakage Current	I_{Leak}	V_{RWM} = ±1V, T=25 °C.			500	nA
Reverse Breakdown Voltage	V_{BV}	I_{BV} = 10μA, T=25 °C.	2.2			V
ESD Clamping Voltage (Note 1)	V_{CL-ESD}	IEC 61000-4-2 +8kV (I_{TLP} = 16A), contact mode, T=25 °C.		6.5		V
ESD Dynamic Turn on Resistance	$R_{dynamic}$	IEC 61000-4-2 0~+8kV, contact mode, T=25 °C.		0.35		Ω
Channel Input Capacitance	C_{IN}	V_R = 1V, f = 1MHz, T=25 °C.		0.18		pF
Insertion Loss	I_L	f = 10GHz.		0.25		dB

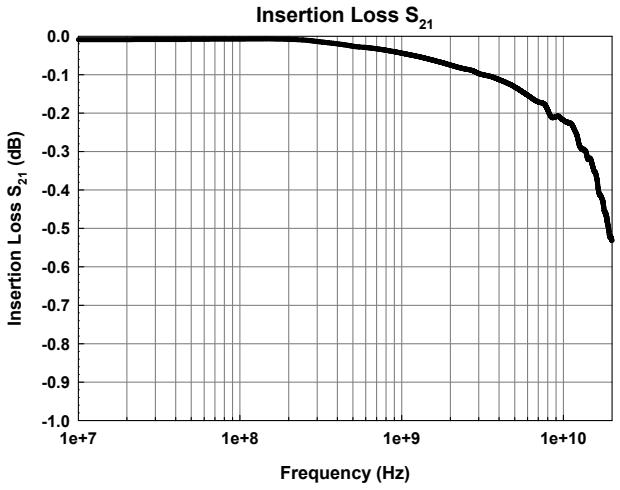
Note 1: ESD Clamping Voltage was measured by Transmission Line Pulsing (TLP) System.

TLP conditions: Z_0= 50Ω, t_p= 100ns, t_r= 1ns.

Typical Characteristics







Application Information

The AZ5BFS-01M is designed to protect one line against system ESD pulse by clamping it to an acceptable reference.

The usage of the AZ5BFS-01M is shown in Fig. 1. Protected line, such as data line or control line, is connected to pin 1. The pin 2 is connected to a ground plane on the board. In order to minimize parasitic inductance in the board traces, all path lengths connected to the pins of AZ5BFS-01M should be kept as short as possible.

In order to obtain enough suppression of ESD induced transient, a good circuit board is critical. Thus, the following guidelines are recommended:

- Minimize the path length between the protected lines and the AZ5BFS-01M.
- Place the AZ5BFS-01M near the input terminals or connectors to restrict transient coupling.
- The ESD current return path to ground should be kept as short as possible.
- Use ground planes whenever possible.
- NEVER route critical signals near board edges and near the lines which the ESD transient easily injects to.

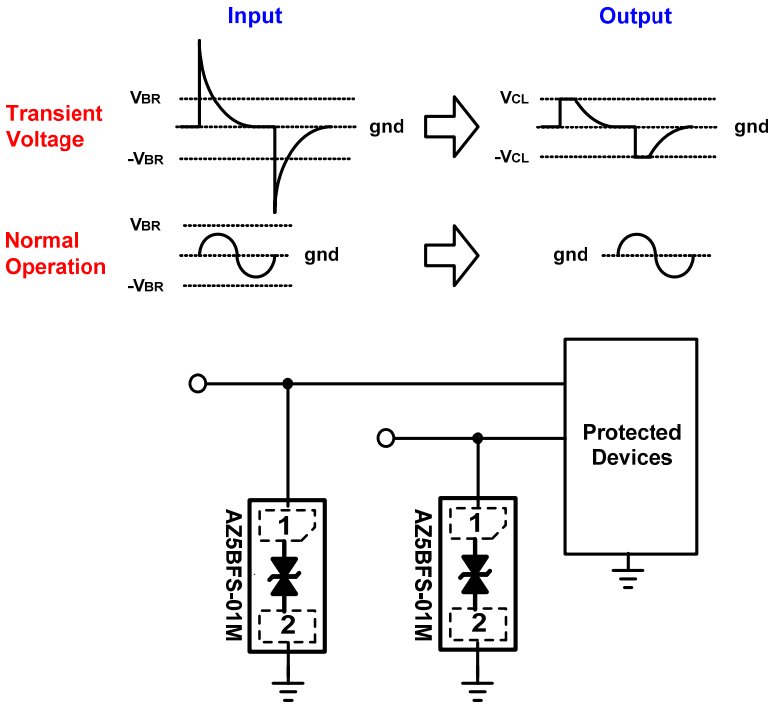
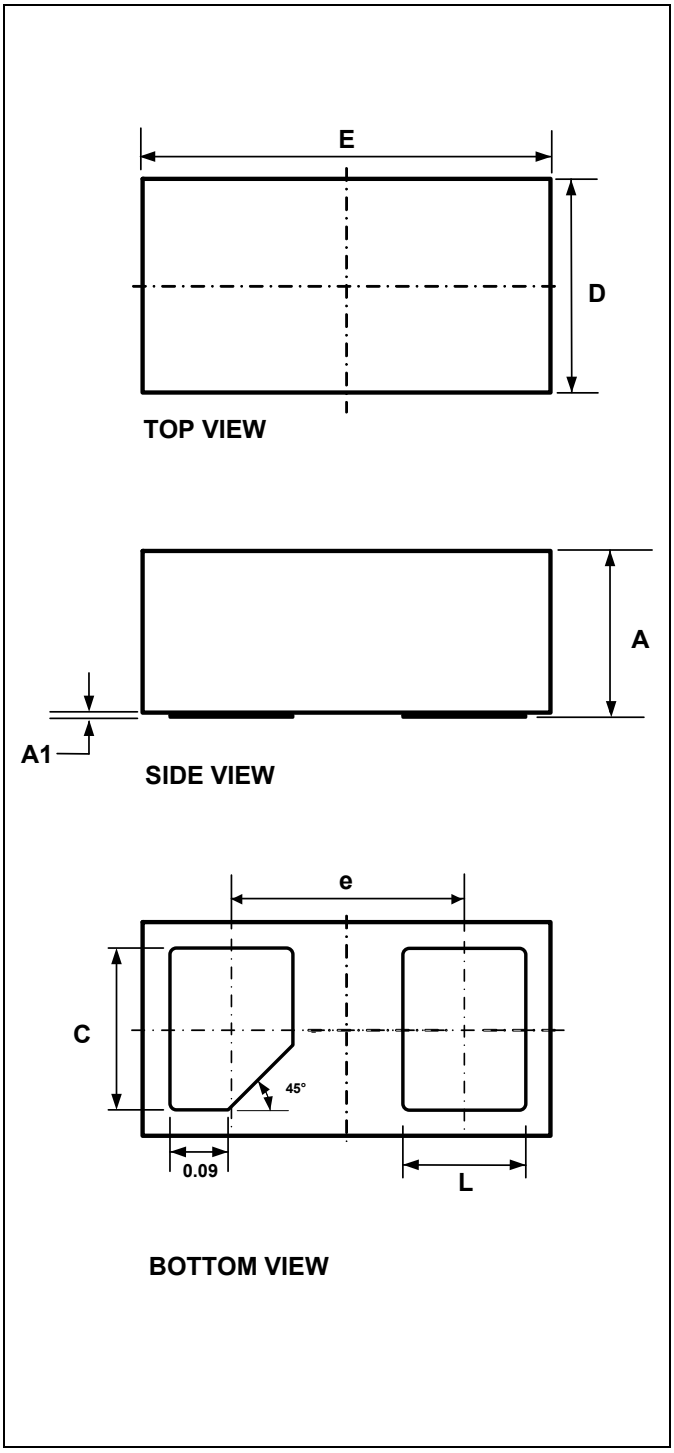


Fig. 1

Mechanical Details

MCSP0603P2YS

Package Diagrams

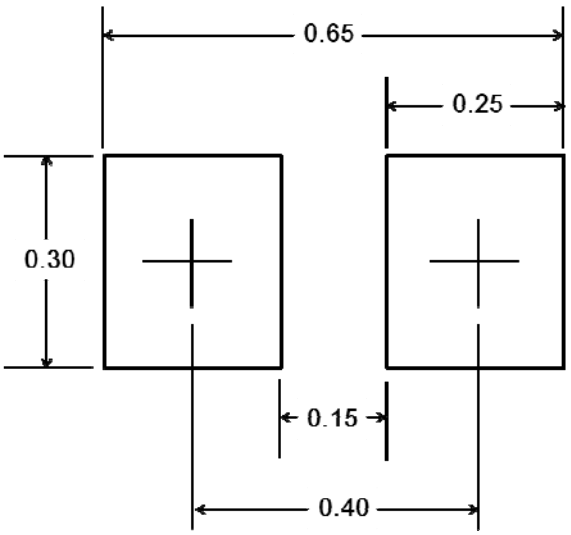


Package Dimensions

SYMBOL	MILLIMETERS		
	MIN.	NOM.	MAX.
E	0.615	0.630	0.645
D	0.315	0.330	0.345
A	0.235	0.250	0.265
A1	0.005	0.015	0.050
L	0.170	0.190	0.210
C	0.230	0.250	0.270
e	0.360 BSC		

Land Layout

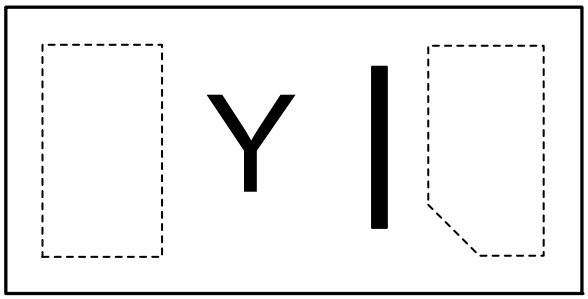
Unit: mm



Notes:

This LAND LAYOUT is for reference purposes only. Please consult your manufacturing partners to ensure your company's PCB design guidelines are met.

Marking Code



Y= Device Code

Part Number	Marking Code
AZ5BFS-01M.R7G (Green Part)	Y

Note : Green means Pb-free, RoHS, and Halogen free compliant.

Ordering Information

PN#	Material	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZ5BFS-01M.R7G	Green	T/R	7 inch	15,000/reel	4 reels = 60,000/box	6 boxes = 360,000/carton

Revision History

Revision	Modification Description
Revision 2024/06/25	Preliminary Release.
Revision 2025/02/11	Formal Release.