

Features

- ESD protection for one line with bi-directional
- Provide transient protection for each line to
IEC 61000-4-2 (ESD) $\pm 30\text{kV}$ (air / contact)
IEC 61000-4-4 (EFT) 80A (5/50ns)
IEC 61000-4-5 (Lightning) 6.5A (8/20 μs)
- **High breakdown voltage** to provide over-voltage protection on USB Type-C CC/SBU pins
- Suitable for, **5V and below**, operating voltage applications
- **0201 small CSP package** saves board space
- Protect one I/O line or one power line
- Fast turn-on and low clamping voltage
- Solid-state silicon-avalanche and active circuit triggering technology
- **Green part**

Applications

- USB Type-C CC and SBU protection
- High speed data and control line protection
- Power line protection
- Handheld portable applications
- Peripherals
- Consumer electronics

Description

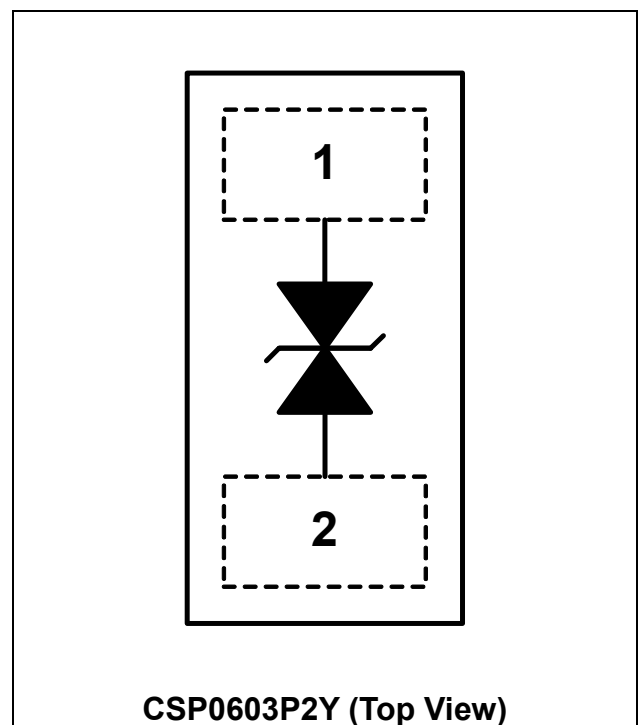
AZ5H45-01B is a design which includes a bi-directional ESD rated clamping cell to protect one power line, or one control line, or one high speed data line in an electronic system. The AZ5H45-01B has been specifically designed to protect sensitive components which are

connected to data and transmission lines from over-voltage caused by Electrostatic Discharging (ESD), Electrical Fast Transients (EFT), and Lightning.

AZ5H45-01B is a unique design which includes proprietary clamping cell in a single package. During transient conditions, the proprietary clamping cell prevents over-voltage on the power line or control/data lines, protecting any downstream components.

AZ5H45-01B may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 ($\pm 15\text{kV}$ air, $\pm 8\text{kV}$ contact discharge).

Circuit Diagram / Pin Configuration



Specifications

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$, unless otherwise specified)			
Parameter	Symbol	Rating	Unit
Peak Pulse Current ($t_p = 8/20\mu\text{s}$)	I_{PP}	6.5	A
Operating Voltage	V_{DC}	± 5.5	V
ESD per IEC 61000-4-2 (Air)	V_{ESD-1}	± 30	kV
ESD per IEC 61000-4-2 (Contact)	V_{ESD-2}	± 30	kV
Lead Soldering Temperature	T_{SOL}	260 (10 sec.)	$^\circ\text{C}$
Operating Temperature	T_{OP}	-55 to +125	$^\circ\text{C}$
Storage Temperature	T_{STO}	-55 to +150	$^\circ\text{C}$

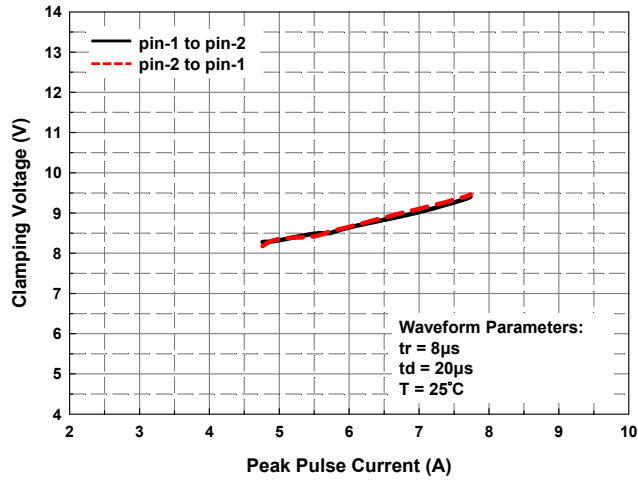
Electrical Characteristics						
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Reverse Stand-Off Voltage	V_{RWM}	$T = 25^\circ\text{C}$.	-5		5	V
Reverse Breakdown Voltage	V_{BV}	$I_{BV} = 1\text{mA}$, $T = 25^\circ\text{C}$.	32			V
Reverse Leakage Current	I_{Leak}	$V_R = \pm 28\text{V}$, $T = 25^\circ\text{C}$.			100	nA
Surge Clamping Voltage	$V_{CL-surge}$	$I_{PP} = 5\text{A}$, $t_p = 8/20\mu\text{s}$, $T = 25^\circ\text{C}$.		8.5		V
ESD Clamping Voltage (Note 1)	V_{CL-ESD}	IEC 61000-4-2 +8kV ($I_{TLP} = 16\text{A}$), contact mode, $T = 25^\circ\text{C}$.		10		V
ESD Dynamic Turn-on Resistance	$R_{dynamic}$	IEC 61000-4-2 0~+8kV, contact mode, $T = 25^\circ\text{C}$.		0.1		Ω
Channel Input Capacitance	C_{IN}	$V_R = 0\text{V}$, $f = 1\text{MHz}$, $T = 25^\circ\text{C}$.		2.5	3.5	pF

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

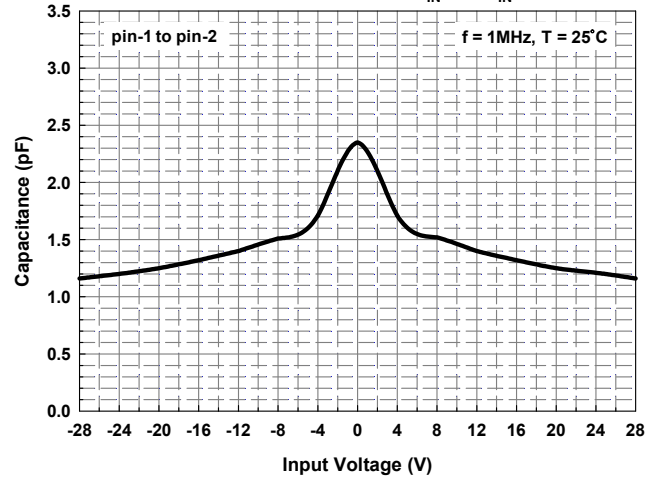
TLP conditions: $Z_0 = 50\Omega$, $t_p = 100\text{ns}$, $t_r = 1\text{ns}$.

Typical Characteristics

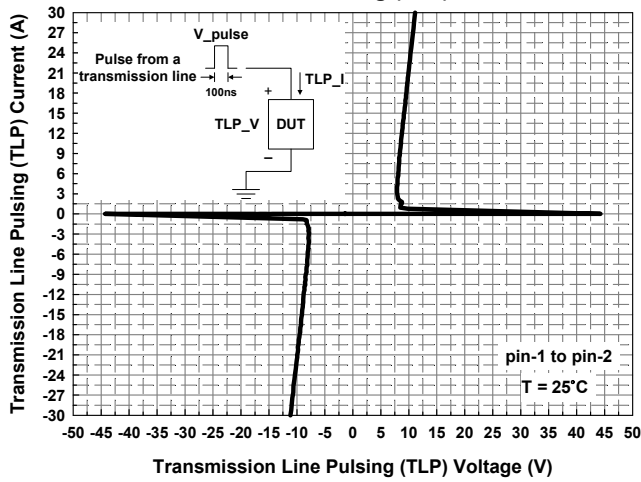
Clamping Voltage vs. Peak Pulse Current



Typical Variation of C_{IN} vs. V_{IN}



Transmission Line Pulsing (TLP) Measurement



Applications Information

The AZ5H45-01B is designed to protect one line against system ESD / EFT / Lightning pulses by clamping it to an acceptable reference.

The usage of the AZ5H45-01B is shown in Fig. 1. Protected lines, such as data lines, control lines, or power lines, are connected to pin 1. The pin 2 should be 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 AZ5H45-01B should be kept as short as possible.

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

- Minimize the path length between the protected lines and the AZ5H45-01B.
- Place the AZ5H45-01B 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.

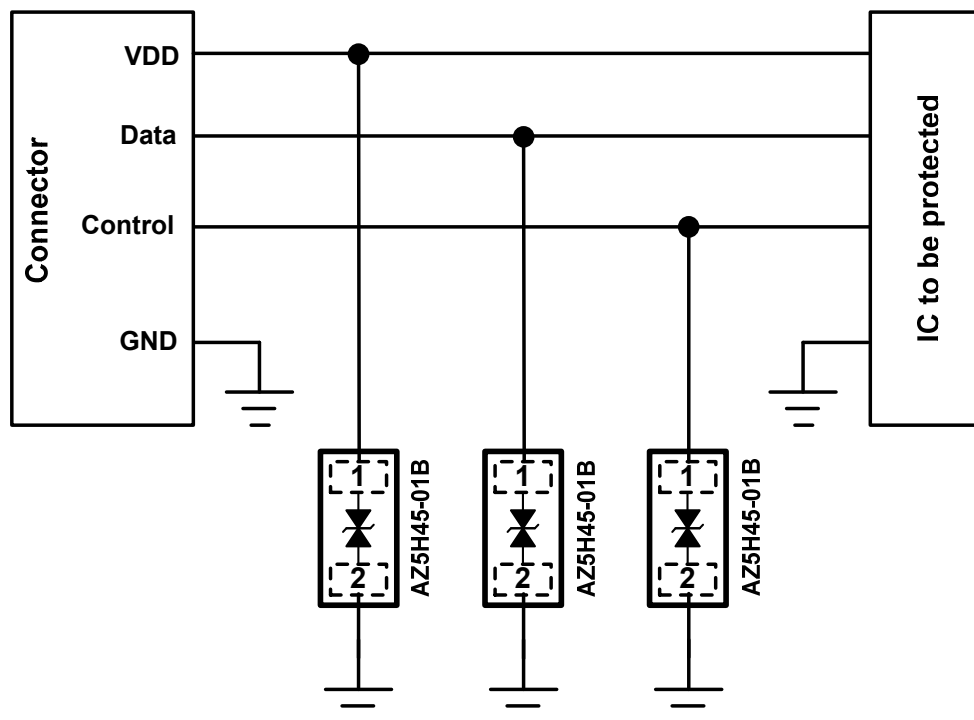
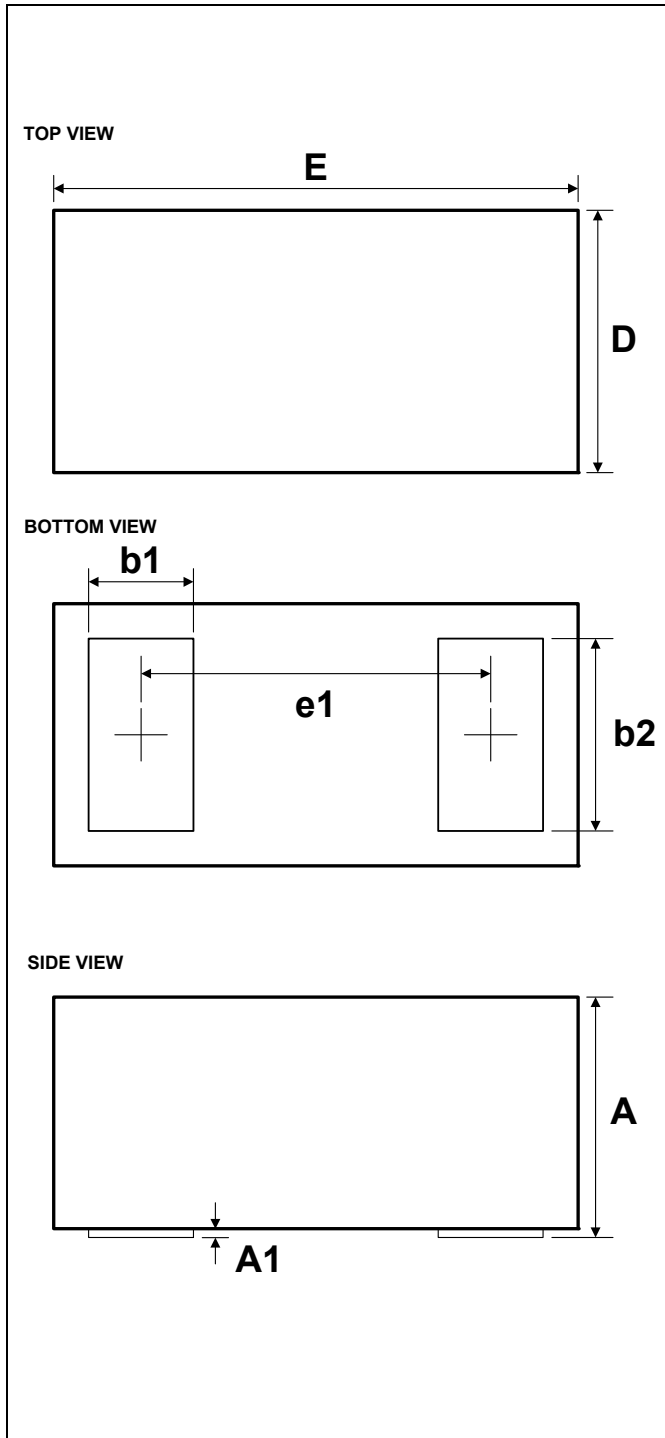


Fig. 1

Mechanical Details

CSP0603P2Y

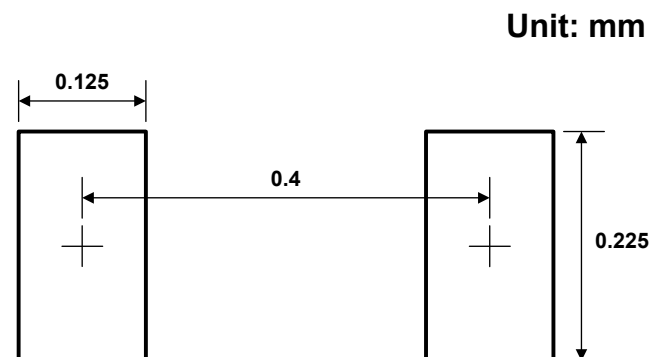
PACKAGE DIAGRAMS



PACKAGE DIMENSIONS

Symbol	Millimeters		
	MIN.	TYP.	MAX.
D	0.275	0.300	0.325
E	0.575	0.600	0.625
A	0.256	0.276	0.296
A1	0.008	0.011	0.014
e1	0.400 BSC.		
b2	0.210	0.220	0.230
b1	0.110	0.120	0.130

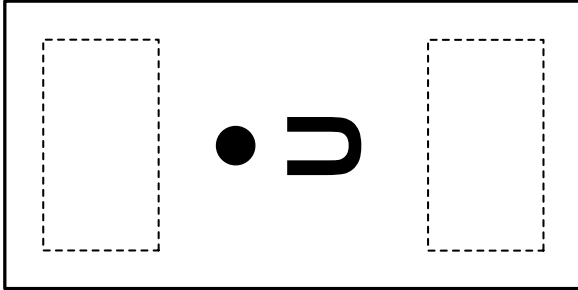
Land Layout



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



Part Number	Marking Code
AZ5H45-01B.R7G (Green Part)	U

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

U = Device Code

Ordering Information

PN#	Material	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZ5H45-01B.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 2024/07/31	Preliminary Release.
Revision 2024/11/15	Formal Release.