SMDA05C-7 THRU SMDA24C-7
Bidirectional TVS Array for Protection of Seven Lines

PROTECTION PRODUCTS

Description

The SMDAxxC-7 series of transient voltage suppressors are designed to protect components which are connected to data and transmission lines from voltage surges caused by ESD (electrostatic discharge), EFT (electrical fast transients), and lightning.

TVS diodes are characterized by their high surge capability, low operating and clamping voltages, and fast response time. This makes them ideal for use as board level protection of sensitive semiconductor components. The SMDAxxC-7 is designed to provide transient suppression on multiple data lines and I/O ports. The low profile SO-8 design allows the user to protect up to seven data and I/O lines with one package.

The SMDAxxC-7 TVS diode array will meet the surge requirements of IEC 61000-4-2 (Formerly IEC 801-2), Level 4, "Human Body Model" for air and contact discharge.

Features

- Transient protection for data lines to
  IEC 61000-4-2 (ESD) 15kV (air), 8kV (contact)
  IEC 61000-4-4 (EFT) 40A (5/50ns)
  IEC 61000-4-5 (Lightning) 12A (8/20µs)
- Small SO-8 surface mount package
- Protects seven I/O lines
- Working voltages: 5V, 12V, 15V and 24V
- Low leakage current
- Low operating and clamping voltages
- Solid-state silicon avalanche technology

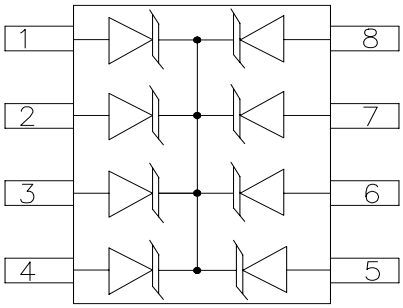
Mechanical Characteristics

- JEDEC SO-8 package
- Molding compound flammability rating: UL 94V-0
- Marking : Part number, date code, logo
- Packaging : Tube or Tape and Reel per EIA 481

Applications

- RS-232 & RS-422 Data Lines
- Microprocessor Based Equipment
- LAN/WAN Equipment
- Notebooks, Desktops, & Servers
- Instrumentation
- Peripherals
- Set Top Box
- Serial and Parallel Ports

Schematic & PIN Configuration



SO-8 (Top View)

Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20μs)	P_{pk}	300	Watts
Lead Soldering Temperature	T_L	260 (10 sec.)	°C
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics

SMDA05C-7

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				5	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	6			V
Reverse Leakage Current	I_R	V_{RWM} = 5V, T=25°C			20	μA
Clamping Voltage	V_C	I_{PP} = 1A, tp = 8/20μs			9.8	V
Maximum Peak Pulse Current	I_{PP}	tp = 8/20μs			17	A
Junction Capacitance	C_j	Between I/O Pins and Gnd V_R = 0V, f = 1MHz			350	pF

SMDA12C-7

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	13.3			V
Reverse Leakage Current	I_R	V_{RWM} = 12V, T=25°C			1	μA
Clamping Voltage	V_C	I_{PP} = 1A, tp = 8/20μs			19	V
Maximum Peak Pulse Current	I_{PP}	tp = 8/20μs			12	A
Junction Capacitance	C_j	Between I/O Pins and Gnd V_R = 0V, f = 1MHz			120	pF

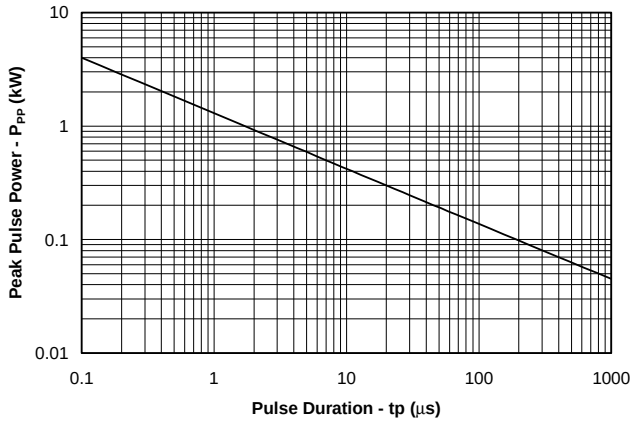
Electrical Characteristics *(Continued)*

SMDA15C-7						
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RWM}				15	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	16.7			V
Reverse Leakage Current	I_R	V_{RWM} = 15V, T=25°C			1	µA
Clamping Voltage	V_C	I_{PP} = 1A, tp = 8/20µs			24	V
Maximum Peak Pulse Current	I_{PP}	tp = 8/20µs			10	A
Junction Capacitance	C_j	Between I/O Pins and Gnd V_R = 0V, f = 1MHz			75	pF

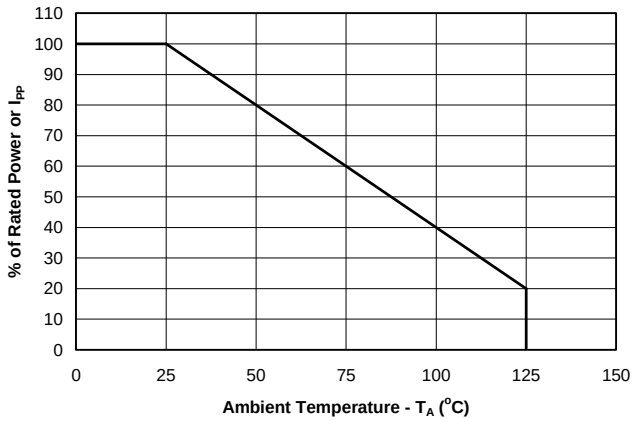
SMDA24C-7						
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RWM}				24	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	26.7			V
Reverse Leakage Current	I_R	V_{RWM} = 24V, T=25°C			1	µA
Clamping Voltage	V_C	I_{PP} = 1A, tp = 8/20µs			43	V
Maximum Peak Pulse Current	I_{PP}	tp = 8/20µs			5	A
Junction Capacitance	C_j	Between I/O Pins and Gnd V_R = 0V, f = 1MHz			50	pF

Typical Characteristics

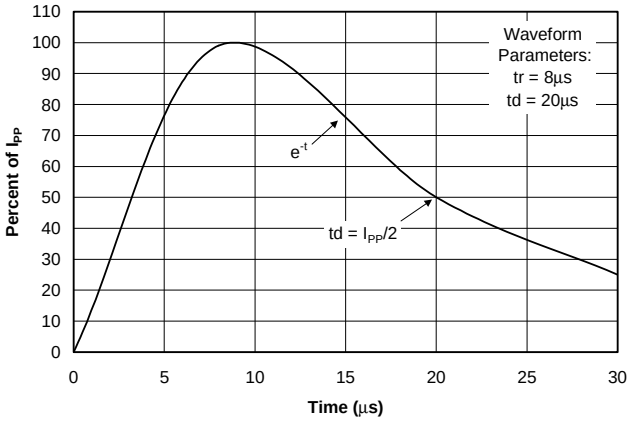
Non-Repetitive Peak Pulse Power vs. Pulse Time



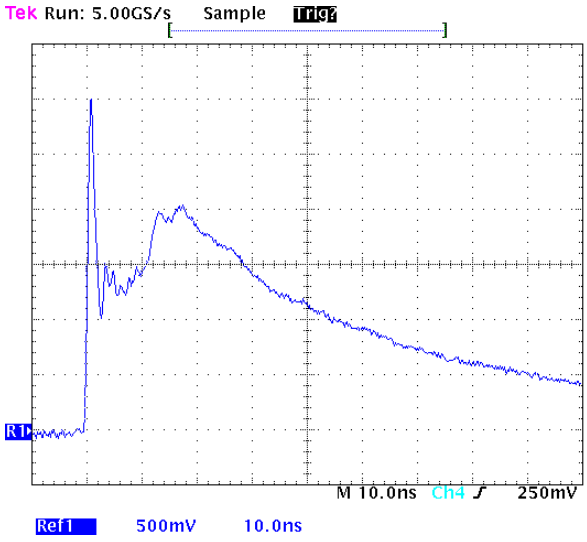
Power Derating Curve



Pulse Waveform



ESD Pulse Waveform (IEC 61000-4-2)



IEC 61000-4-2 Discharge Parameters

Level	First Peak Current (A)	Peak Current at 30 ns (A)	Peak Current at 60 ns (A)	Test Voltage (Contact Discharge) (kV)	Test Voltage (Air Discharge) (kV)
1	7.5	4	8	2	2
2	15	8	4	4	4
3	22.5	12	6	6	8
4	30	16	8	8	15

Applications Information

Device Connection for Protection of Seven Data Lines

The SMDAxxC-7 is designed to protect up to 7 data or I/O lines. They are bidirectional devices and may be used on lines where the signal polarities are above and below ground.

The SMDAxxC-7 TVS arrays employ a monolithic structure. Therefore, the working voltage (V_{RWM}) and breakdown voltage (V_{BR}) specifications apply to the differential voltage between any two data line pins. For example, the SMDA24C-7 is designed for a maximum voltage excursion of +/-12V between any two data lines.

The device is connected as follows:

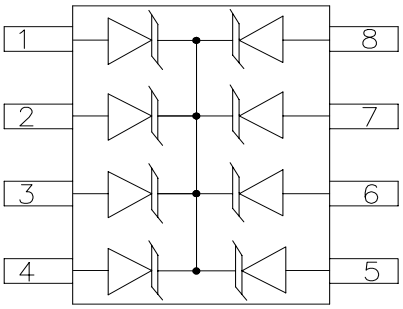
- Pins 1, 2, 3, 4, 5, 6 and 7 are connected to the lines that are to be protected. Pin 8 is connected to ground. The ground connections should be made directly to the ground plane for best results. The path length is kept as short as possible to reduce the effects of parasitic inductance in the board traces.

Circuit Board Layout Recommendations for Suppression of ESD.

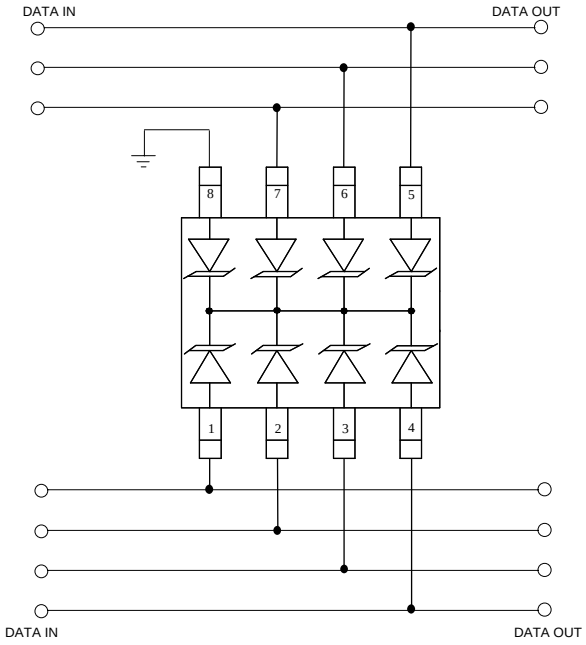
Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

- Place the TVS near the input terminals or connectors to restrict transient coupling.
- Minimize the path length between the TVS and the protected line.
- Minimize all conductive loops including power and ground loops.
- The ESD transient return path to ground should be kept as short as possible.
- Never run critical signals near board edges.
- Use ground planes whenever possible.

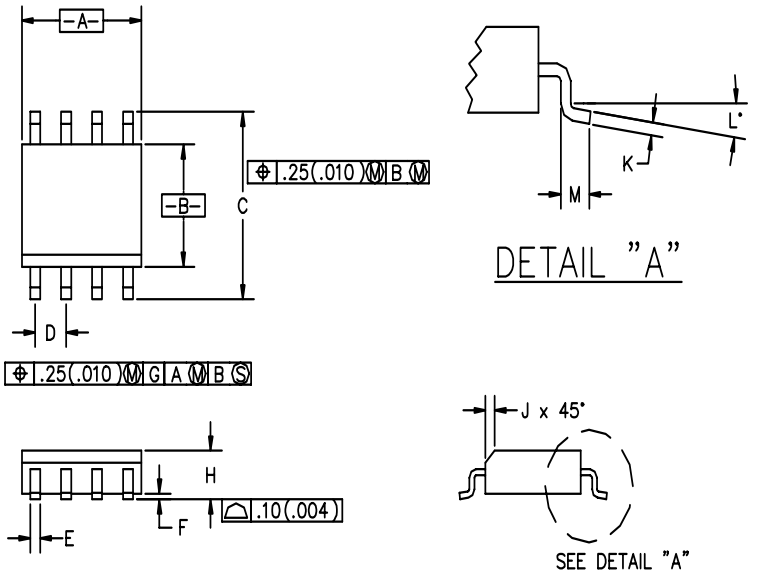
Circuit Diagram



Connection Diagram

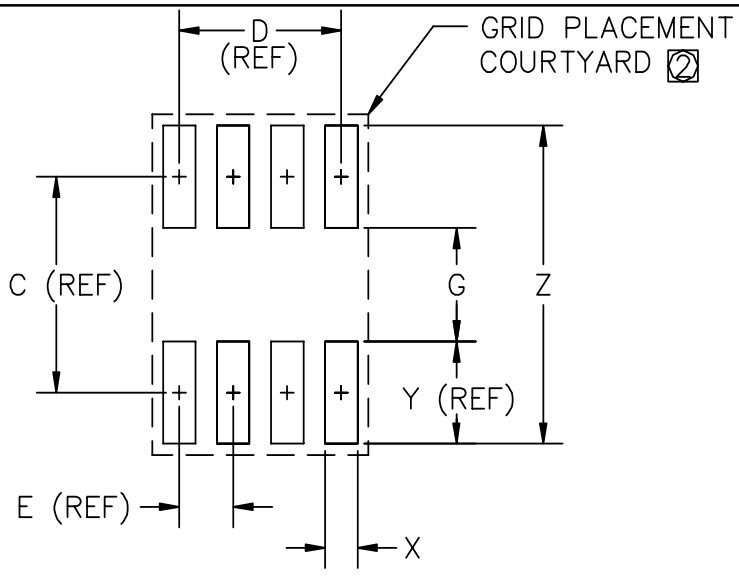


Outline Drawing - SO-8



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.188	.197	4.80	5.00	
B	.149	.158	3.80	4.00	
C	.228	.244	5.80	6.20	
D	.050 BSC		1.27 BSC		
E	.013	.020	0.33	0.51	
F	.004	.010	0.10	0.25	
H	.053	.069	1.35	1.75	
J	.011	.019	0.28	0.48	
K	.007	.010	.19	.25	
L	0°	8°	0°	8°	
M	.016	.050	0.40	1.27	

Land Pattern - SO-8



DIMENSIONS (1)					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
C	–	.19	–	5.00	–
D	–	.15	–	3.81	–
E	–	.05	–	1.27	–
G	.10	.11	2.60	2.80	–
X	.02	.03	.60	.80	–
Y	–	.09	–	2.40	–
Z	–	.29	7.20	7.40	–

(2) GRID PLACEMENT COURTYARD IS 12x16 ELEMENTS (6 mm X 8mm) IN ACCORDANCE WITH THE INTERNATIONAL GRID DETAILED IN IEC PUBLICATION 97.

(1) CONTROLLING DIMENSION: MILLIMETERS

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Ordering Information

Part Number	Working Voltage	Qty per Reel	Reel Size
SMDA05C-7.TB	5V	500	7 Inch
SMDA05C-7.TE	5V	2,500	13 Inch
SMDA12C-7.TB	12V	500	7 Inch
SMDA12C-7.TE	12V	2,500	13 Inch
SMDA15C-7.TB	15V	500	7 Inch
SMDA15C-7.TE	15V	2,500	13 Inch
SMDA24C-7.TB	24V	500	7 Inch
SMDA24C-7.TE	24V	2,500	13 Inch

Note:
(1) No suffix indicates tube pack.

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