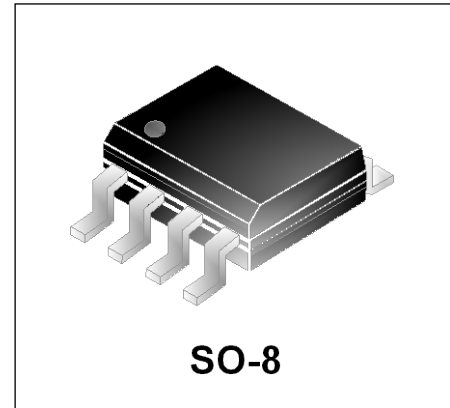


WS05-7MDA Thru WS24-7MDA

Transient Voltage Suppressor

Features

- Transient protection for data lines to
- Protects seven I/O lines
- Small SO-8 surface mount package
- Working voltages: 5V, 12V, 15V and 24V
- Low leakage current
- Low operating and clamping voltages
- Solid-state silicon avalanche technology



IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD) $\pm 15\text{kV}$ (air), $\pm 8\text{kV}$ (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 12A (8/20 μs)

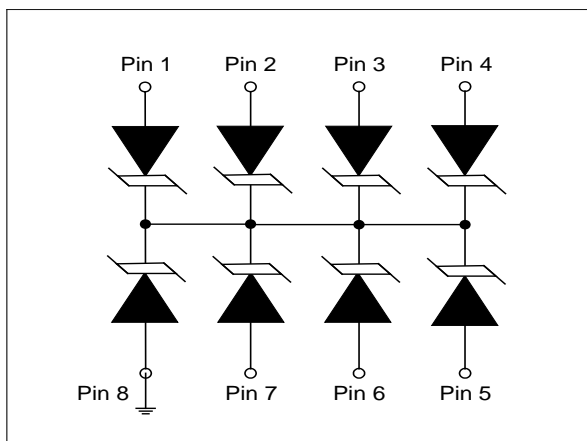
Mechanical Characteristics

- 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
- RoHS Compliant

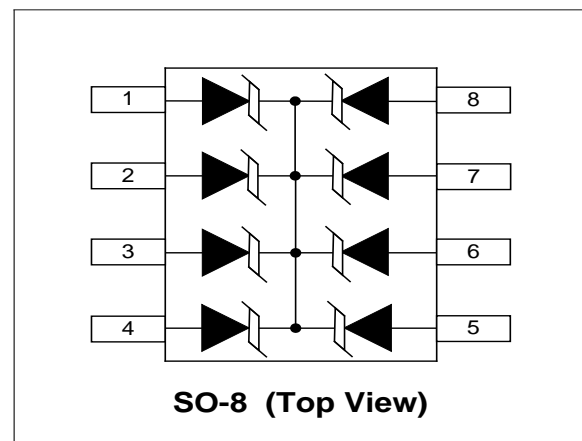
Applications

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

Circuit Diagram (Each Line Pair)



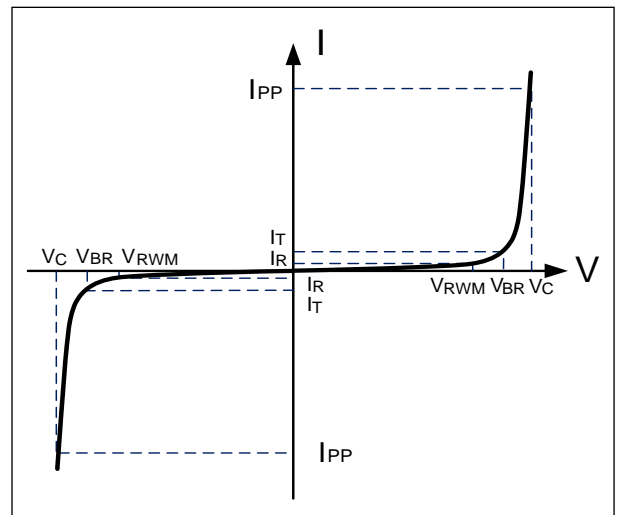
Schematic & PIN Configuration



Absolute Maximum Rating			
Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 8/20\mu s$)	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 Parameters (T=25°C)

Symbol	Parameter
I_{PP}	Maximum Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Working Peak Reverse Voltage
I_R	Maximum Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
I_F	Forward Current
V_F	Forward Voltage @ I_F



Electrical Characteristics

WS05-7MDA						
Parameter	Symbol	Conditions	Min	Typical	Max	Units
Reverse Stand-Off Voltage	V_{RWM}				5.0	V
Reverse Breakdown Voltage	V_{BR}	$I_T = 1mA$	6.0			V
Reverse Leakage Current	I_R	$V_{RWM} = 5V, T = 25^\circ C$			20	μA
Clamping Voltage	V_C	$I_{PP} = 1A, t_p = 8/20\mu s$			9.9	V
Maximum Peak Pulse Current	I_{PP}	$t_p = 8/20\mu s$			17	A
Junction Capacitance	C_j	Between I/O Pins and Ground $V_R = 0V, f = 1MHz$			350	pF

Electrical Characteristics(Cont.)

WS12-7MDA						
Parameter	Symbol	Conditions	Min	Typical	Max	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	$V_{RWM}=5V, T=25^{\circ}C$			1	μA
Clamping Voltage	V_C	$I_{PP}=1A, t_p=8/20\mu s$			19	V
Maximum PeakPulse Current	I_{PP}	$t_p=8/20\mu s$			12	A
Junction Capacitance	C_j	Between I/O Pins and Ground $V_R = 0V, f = 1MHz$			120	pF
WS15-7MDA						
Parameter	Symbol	Conditions	Min	Typical	Max	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	$V_{RWM}=5V, T=25^{\circ}C$			1	μA
Clamping Voltage	V_C	$I_{PP}=1A, t_p=8/20\mu s$			24	V
Maximum PeakPulse Current	I_{PP}	$t_p=8/20\mu s$			10	A
Junction Capacitance	C_j	Between I/O Pins and Ground $V_R = 0V, f = 1MHz$			75	pF
WS24-7MDA						
Parameter	Symbol	Conditions	Min	Typical	Max	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	$V_{RWM}=5V, T=25^{\circ}C$			1	μA
Clamping Voltage	V_C	$I_{PP}=1A, t_p=8/20\mu s$			43	V
Maximum PeakPulse Current	I_{PP}	$t_p=8/20\mu s$			5	A
Junction Capacitance	C_j	Between I/O Pins and Ground $V_R = 0V, f = 1MHz$			50	pF

Typical Characteristics

Figure 1: Non Repetitive Peak Pulse Power vs. Pulse Time

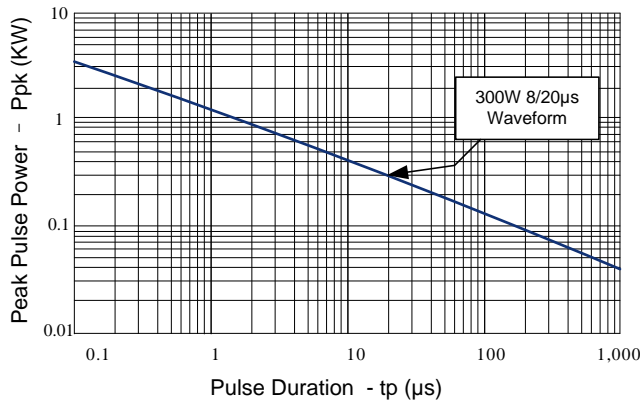


Figure 2: Power Derating Curve

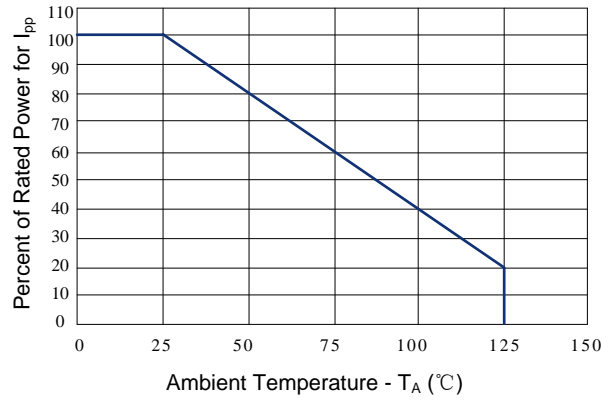


Figure 3: Pulse Waveform

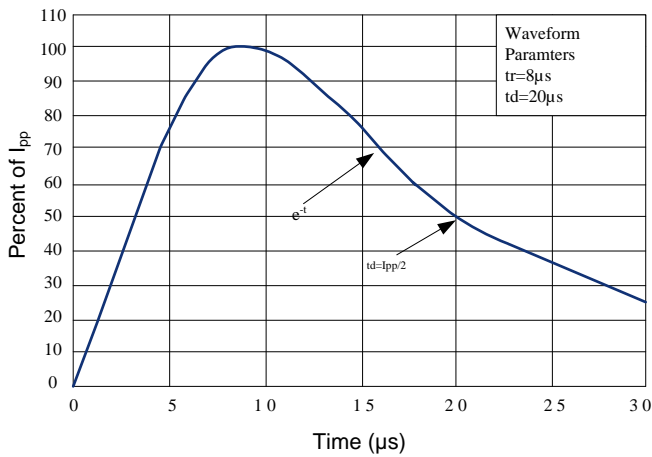


Figure 4: ESD Pulse Waveform (IEC 61000-4-2)

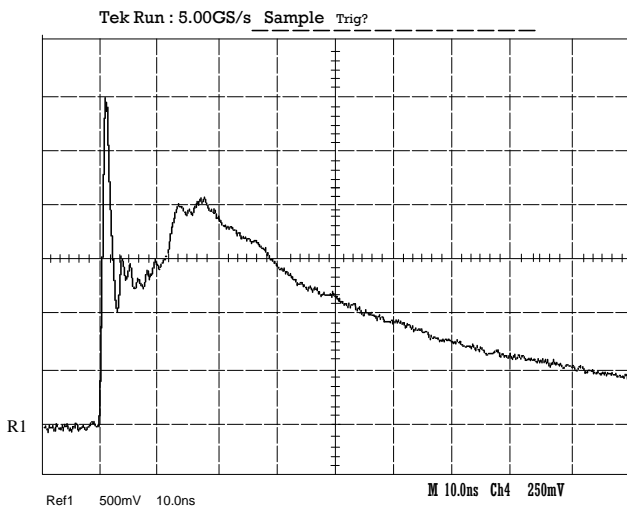


Figure 5: ESD Discharge Parameters Per IEC 61000-4-2

Level	First Peak Current (A)	Peak Current at 30ns (A)	Peak Current at 60ns (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

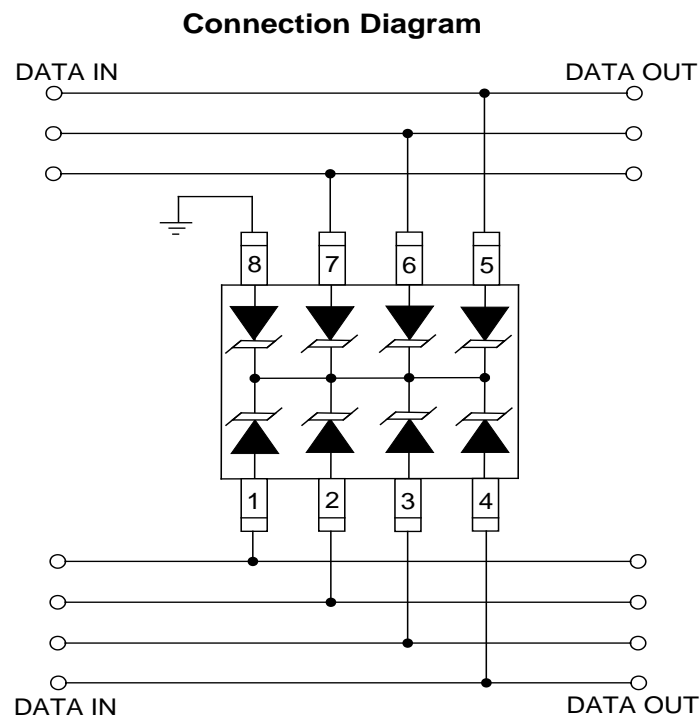
Device Connection for Protection of Seven Data Lines

The Wxx-7MDA 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 Wxx-7MDA 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 W12-7MDA is designed for a maximum voltage excursion of $\pm 6V$ 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.

Outline Drawing – SO-8

PACKAGE OUTLINE

NOTES:

- Controlling Dimensions Are In Millimeters (Angles In Degrees).
- Datums [A-] And [B-] To Be Determined At Datum Plane [H-].
- Dimensions "E1" And "D" Do Not Include Mold Flash, Protrusions Or Gate Burrs.
- Reference JEDEC STD MS-012, VARITION AA.

SO-8

DIMENSIONS

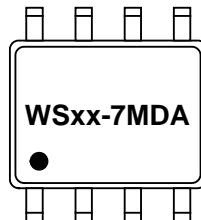
DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.053	-	.069	1.35	-	1.75
A1	.004	-	.010	0.10	-	0.25
A2	.049	-	.065	1.25	-	1.65
b	.012	-	.020	0.31	-	0.51
c	.007	-	.010	0.17	-	0.25
D	.189	.193	.197	4.80	4.90	5.00
E1	.150	.154	.157	3.80	3.90	4.00
E	.236BSC			6.00BSC		
e	.050 BSC			1.27 BSC		
h	.010	-	.020	0.25	-	0.50
L	.016	.028	.041	0.40	0.72	1.04
θ1	0°	-	8°	0°	-	8°
L1	(0.041)			(1.04)		
N	8			8		
aaa	.004			0.10		
bbb	.010			0.25		
ccc	.008			0.20		

DIMENSIONS		
DIM	INCHES	MILLIMETERS
C	(.205)	(5.20)
G	.118	3.00
P	.050	1.27
X	.024	0.60
Y	.087	2.20
Z	.291	7.40

Notes

- This Land Pattern Is For Reference Purposes Only. Consult Your Manufacturing Group To Ensure Your Company's Manufacturing Guidelines Are Met.

Marking Codes



XX=Reverse Stand-Off Voltage