SOT-23, BI-DIRECTIONAL, TVS DIODE ARRAY

PRODUCT DESCRIPTION

The UMDXXB series are Bi-directional Transient Voltage Suppressor Arrays that designed to protect components which are connected to data and transmission lines against electrostatic discharge(ESD), electrical fast transients(EFT), and lightning

All pins are rated to withstand 20kv ESD pulses using the IEC 61000-4-2 contact discharge method, which can meet the requirement of Level 4, “Human Body Model” for air and contact discharge.

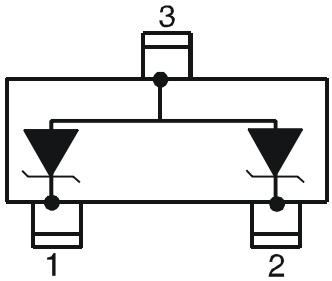
FEATURES

※ 500 Watts peak pulse power (tp=8/20μs)
※ Low clamping voltage
※ Protects one bidirectional or two unidirectional lines
※ Working voltages: 3V, 5V, 8V, 12V, 15V, 24V, 36V
※ ESD Protection > 40 kilovalts
※ Complies with
61000-4-2(ESD):Air-15kV, Contact-8kV
61000-4-4(EFT):40A-5/50ns
61000-4-5(Surge):24A, 8/20μs

APPLICATIONS

※ Cellular Handsets and Accessories
※ Portable Electronics
※ Control & Monitoring Systems
※ Servers, Notebooks, and Desktop PCs
※ Set-Top Box
※ Communication Systems

ELECTRICAL SCHEMATIC & PIN CONFIGURATION



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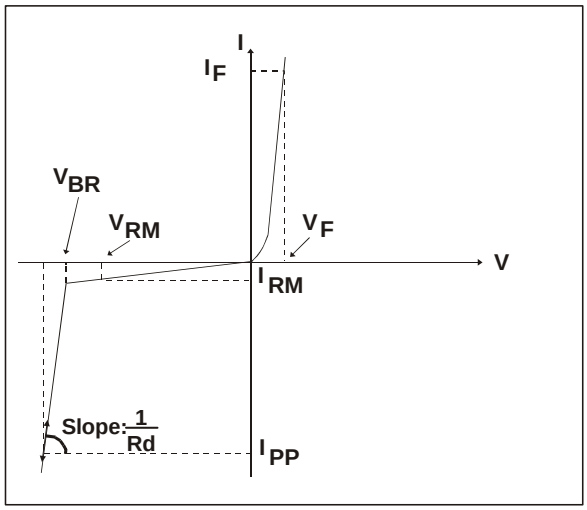
ELECTRICAL CHARACTERISTICS (Tamb = 25°C)

Symbol	Parameter
V_{RM}	Stand-off voltage
V_{BR}	Breakdown voltage
V_{CL}	Clamping voltage
I_{RM}	Leakage current
I_{PP}	Peak pulse current
αT	Voltage temperature coefficient
C	Capacitance
Rd	Dynamic resistance
V_F	Forward voltage drop



ABSOLUTE MAXIMUM RATING @ 25˚C

Rating	Symbol	Value	Units
Peak Pulse Power (t_p = 8/20μs)	P_{pp}	500	Watts
Operating Temperature	T_J	-55 to +150	°C
Storage Temperature	T_{STG}	-55 to +150	°C

ELECTRICAL CHARACTERISTICS

UMD03B	**Marking**	**03C**				
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RM}				3.3	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	4			V
Reverse Leakage Current	I_{RM}	V_{RM} = 3.3V, T=25°C			125	μA
Clamping Voltage	V_C	I_{PP} = 1A, t_P = 8/20μs			7	V
Clamping Voltage	V_C	I_{PP} = 43A, t_P = 8/20μs			10.9	V
Junction Capacitance	C_j	V_R = OV, f = 1MHz		300		pF

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ELECTRICAL CHARACTERISTICS

UMD05B	**Marking**	**05C**				
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RM}				5	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	6			V
Reverse Leakage Current	I_{RM}	V_{RM} = 5.0V, T=25°C			20	µA
Clamping Voltage	V_C	I_{PP} = 1A , t_P = 8/20µs			9.8	V
Clamping Voltage	V_C	I_{PP} = 42A , t_P = 8/20µs			13.5	V
Junction Capacitance	C_j	V_R = OV, f = 1MHz		210		pF

UMD08B	**Marking**	**08C**				
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RM}				8	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	8.5			V
Reverse Leakage Current	I_{RM}	V_{RM} = 8.0V, T=25°C			10	µA
Clamping Voltage	V_C	I_{PP} = 1A , t_P = 8/20µs			13.4	V
Clamping Voltage	V_C	I_{PP} = 34A , t_P = 8/20µs			16.9	V
Junction Capacitance	C_j	V_R = OV, f = 1MHz		150		pF

UMD12B	**Marking**	**12C**				
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RM}				12	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	13.3			V
Reverse Leakage Current	I_{RM}	V_{RM} = 12.0V, T=25°C			2	µA
Clamping Voltage	V_C	I_{PP} = 1A , t_P = 8/20µs			19	V
Clamping Voltage	V_C	I_{PP} = 21A , t_P = 8/20µs			25.9	V
Junction Capacitance	C_j	V_R = OV, f = 1MHz		90		pF

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ELECTRICAL CHARACTERISTICS

UMD15B	**Marking**	**15C**				
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RM}				15	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	16.7			V
Reverse Leakage Current	I_{Rm}	V_{RM} = 15.0V, T=25°C			1	μA
Clamping Voltage	V_C	I_{PP} = 1A , t_P = 8/20μs			24	V
Clamping Voltage	V_C	I_{PP} = 17A , t_P = 8/20μs			30	V
Junction Capacitance	C_j	V_R = OV, f = 1MHz		60		$_p$F

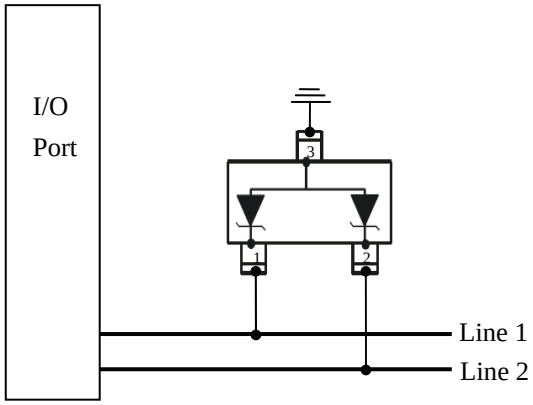
UMD24B	**Marking**	**24C**				
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RM}				24	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	26.7			V
Reverse Leakage Current	I_{RM}	V_{RM} = 24V, T=25°C			1	μA
Clamping Voltage	V_C	I_{PP} = 1A , t_P = 8/20μs			43	V
Clamping Voltage	V_C	I_{PP} = 12A , t_P = 8/20μs			49	V
Junction Capacitance	C_j	V_R = OV, f = 1MHz		63		$_p$F

UMD36B	**Marking**	**36C**				
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RM}				36	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	40			V
Reverse Leakage Current	I_{RM}	V_{RM} = 36V, T=25°C			1	μA
Clamping Voltage	V_C	I_{PP} = 1A , t_P = 8/20μs			51	V
Clamping Voltage	V_C	I_{PP} = 9A , t_P = 8/20μs			76.8	V
Junction Capacitance	C_j	V_R = OV, f = 1MHz		60		$_p$F

Applications Information

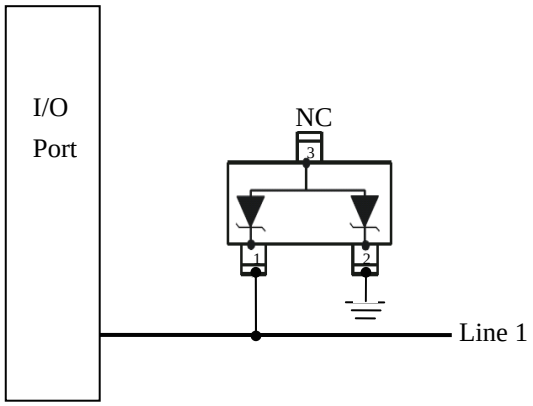
The UMDXXB provides up to 2 lines of protection in a common-mode Uni-Directional configuration.
Circuit connectivity is as follows:

- Line 1 is connected to Pin 1
- Line 2 is connected to Pin 2
- Pin 3 is connected to ground



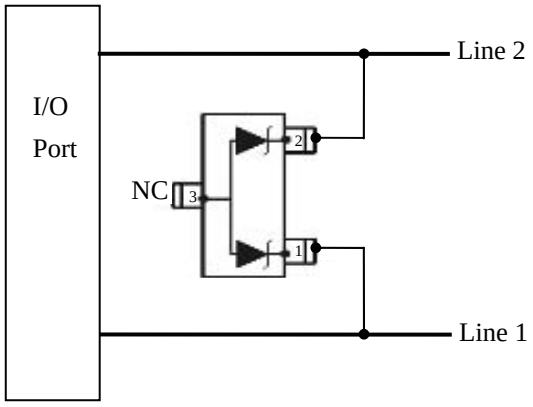
The UMDXXB provides single line protection in a common-mode Bi-Directional configuration.
Circuit connectivity is as follows:

- Line 1 is connected to Pin 1
- Pin 2 is connected to ground
- Pin 3 is not connected



The UMDXXB provides single line pair protection in a differential-mode Bi-Directional configuration.
Circuit connectivity is as follows:

- Line 1 is connected to Pin 1
- Line 2 is connected to Pin 2
- Pin 3 is not connected



Applications Information

Device Connection Options

The UMDXXB is designed to protect one bidirectional or two unidirectional data or I/O lines operating at 5 to 36 volts. Connection options are as follows:

- Bidirectional: Pin 1 is connected to the data line and pin 2 is connected to ground (Since the device is symmetrical, these connections may be reversed). The ground connection should be made directly to a ground plane. The path length should be kept as short as possible to minimize parasitic inductance. Pin 3 is not connected.
- Unidirectional: Data lines are connected to pin 1 and pin 2. Pin 3 is connected to ground. For best results, this pin should be connected directly to a ground plane on the board. The path length should be kept as short as possible to minimize parasitic inductance.

Circuit Board Layout Recommendations for Suppression of ESD.

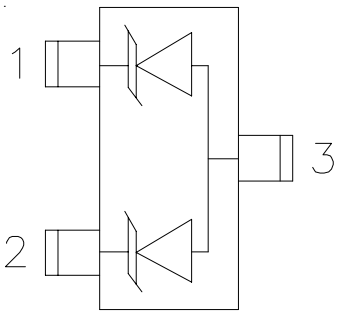
Good circuit board layout is critical for the suppression of fast rise-time transients such as ESD. The following guidelines are recommended (Refer to application note SI99-01 for more detailed information):

- 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.

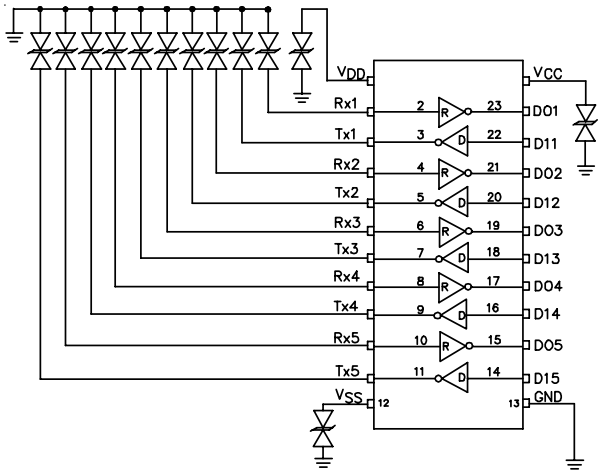
Matte Tin Lead Finish

Matte tin has become the industry standard lead-free replacement for SnPb lead finishes. A matte tin finish is composed of 100% tin solder with large grains. Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. In addition, unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation of the solder joint.

Device Schematic & Pin Configuration



RS-232 Transceiver Protection Example



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1. ESD protection by the UMDXXB

Electrostatic discharge (ESD) is a major cause of failure in electronic systems.

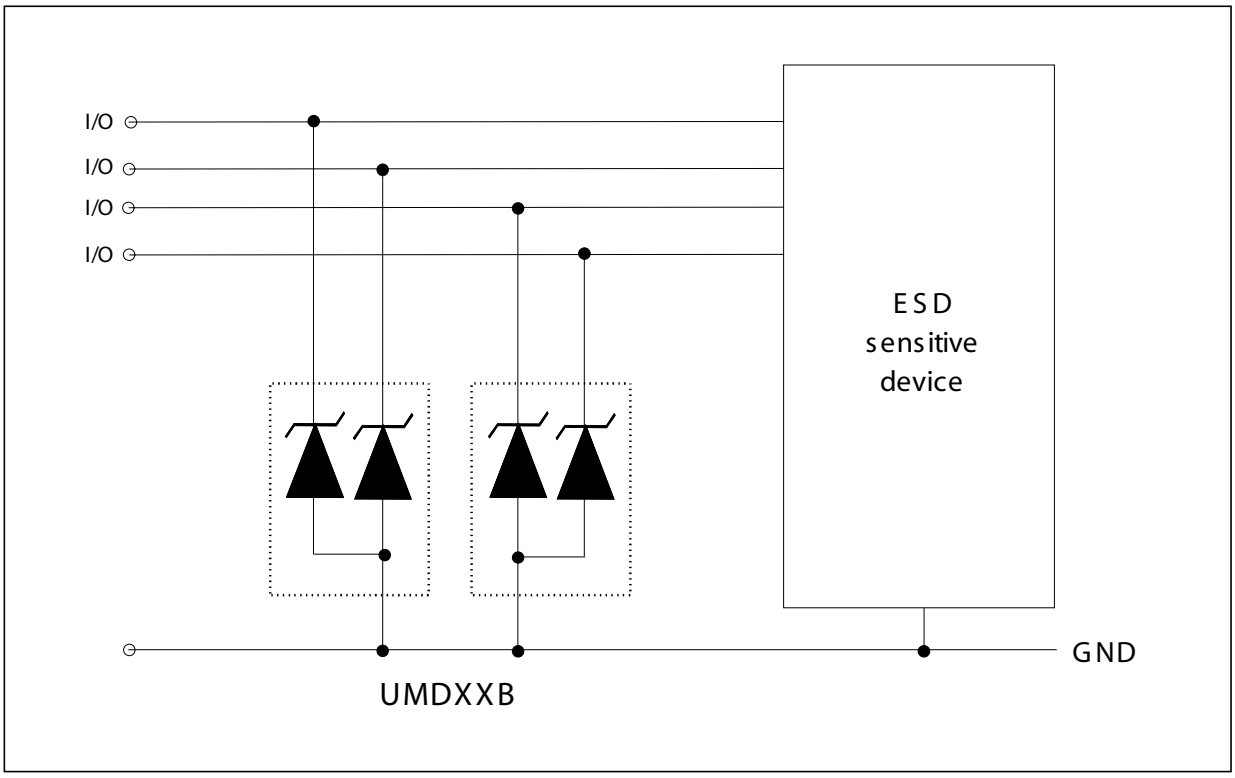
Transient Voltage Suppressors (TVS) are an ideal choice for ESD protection. They are capable of clamping the incoming transient to a low enough level such that damage to the protected semiconductor is prevented.

Surface mount TVS arrays offer the best choice for minimal lead inductance.

They serve as parallel protection elements, connected between the signal line to ground. As the transient rises above the operating voltage of the device, the TVS array becomes a low impedance path diverting the transient current to ground.

The UMDXXB array is the ideal board level protection of ESD sensitive semiconductor components.

The tiny SOT23 package allows design flexibility in the design of high density boards where the space saving is at a premium. This enables to shorten the routing and contributes to hardening againt ESD.



2. Circuit Board Layout

Circuit board layout is a critical design step in the suppression of ESD induced transients. The following guidelines are recommended :

- The UMDXXB should be placed as close as possible to the input terminals or connectors.
- The path length between the ESD suppressor and the protected line should be minimized
- All conductive loops, including power and ground loops should be minimized
- The ESD transient return path to ground should be kept as short as possible.
- Ground planes should be used whenever possible.

TYPICAL CHARACTERISTICS

FIGURE 1
PEAK PULSE POWER VS PULSE TIME

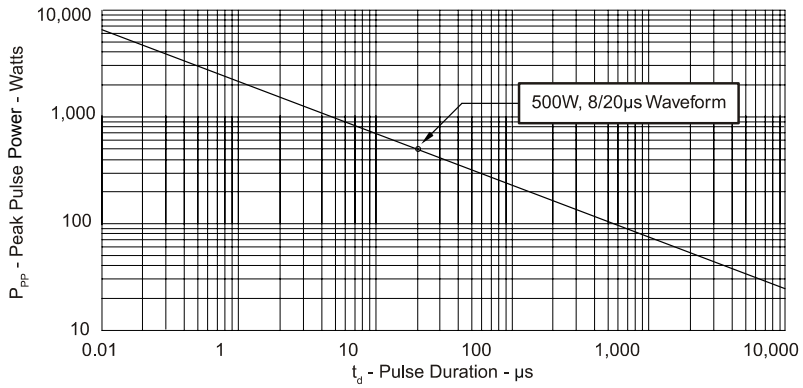


FIGURE 2
PULSE WAVE FORM

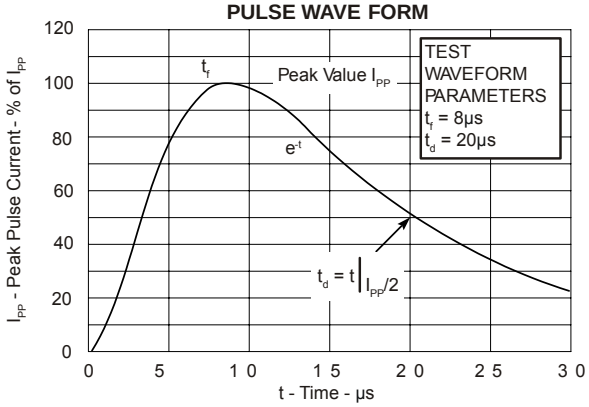
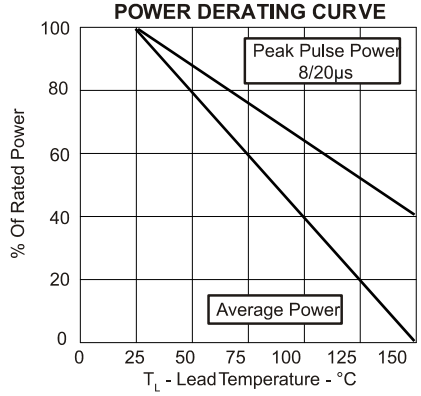
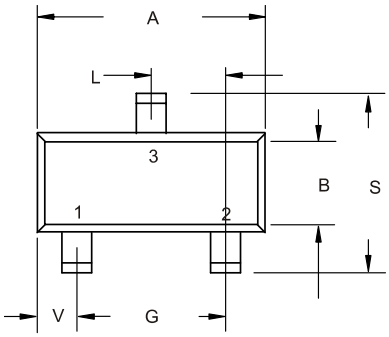


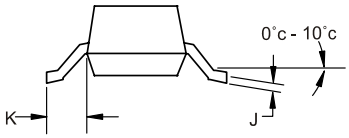
FIGURE 3
POWER DERATING CURVE

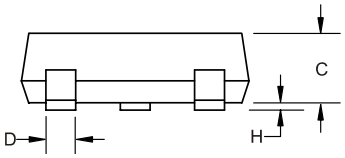


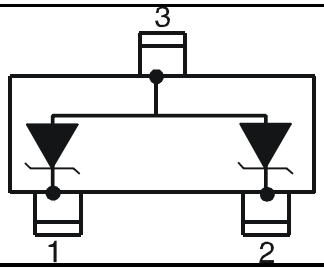
PACKAGE OUTLINE & DIMENSIONS

PACKAGE OUTLINE





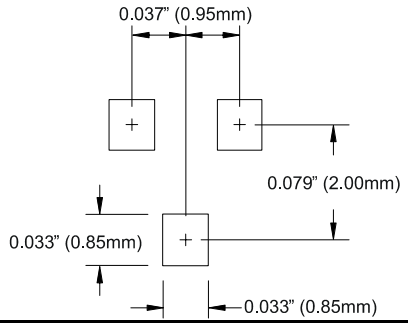




PACKAGE DIMENSIONS

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.80	3.04	0.1102	0.1197
B	1.20	1.40	0.0472	0.0551
C	0.89	1.11	0.0350	0.0440
D	0.37	0.50	0.0150	0.0200
G	1.78	2.04	0.0701	0.0807
H	0.013	0.100	0.0005	0.0040
J	0.085	0.177	0.0034	0.0070
K	0.45	0.60	0.0180	0.0236
L	0.89	1.02	0.0350	0.0401
S	2.10	2.50	0.0830	0.0984
V	0.45	0.60	0.0177	0.0236

MOUNTING PAD



NOTES

1. Dimensioning and tolerances per ANSI Y14.5M, 1985.
2. Controlling Dimension: Inches
3. Pin 3 is the cathode (Unidirectional Only).

ORDERING INFORMATION

Ordering Part Number	Package	T & P	Polarity
UMD03B ~ UMD36B	SOT - 23	EIA - 481	Bi-Directional

TAPE & REEL SPECIFICATIONS

Ordering Part Number	Diode Size (in mm)	Qty Per Reel
UMD03B ~ UMD36B	2.92mm± 0.12 x 2.30 ± 0.2	3000 pcs/Reel

