

◆ Feature

- 1.SMD type silicon based chip
- 2.Quick response time (<1ns)
- 3.Low leakage current and clamping voltage
- 4.Low capacitance can meet high speed single transient voltage protection
- 5.Protect multiple I/O lines and one V_{CC} line
- 6.Small package to save board space
- 7.Meet IEC 61000-4-2 standard Level 4 for ESD 15kV (Air), 8kV (Contact)
- 8.Solid-state silicon-avalanche technology
- 9.Lead free type



◆ How to Order

<u>TV</u>	<u>N</u>	<u>0402</u>	<u>01</u>	<u>AB1</u>
(1)	(2)	(3)	(4)	(5)

- (1) Series Type: TV-TVS Diode
- (2) Capacitance (C_p) Code : N = Normal : C_p > 20pF, L = Low : 1pF ≤ C_p ≤ 10pF, W = Ultra Low: C_p < 1pF, H = High : >50pF
- (3) Package Size Code: MSOP, SC70, ST23 – SOT23, S523 – SOD523, S323 – SOD323, S143 – ST143, TP38 – TSSOP38, QF16 – QFN16, 0402-EIA 0402, 0201-EIA 0201
- (4) Channel Code: 02-2 Channels, 01-1 Channel
- (5) Specialized Specification Code

◆ Application

- 1.Low Capacitance Product Applications for High-Speed Signal Lines such as HDMI, DVI, USB, IEEE1394 Port etc.
- 2.Applications for I/O Port (RS232, USB, PS2, VGA, Audio) on Mother Board and Notebook, Set-Top Box, MP3 Players, DVD Players, and Docking System etc.

◆ Specification

P/N	Package	Capacitance	V _B (Reverse Breakdown Voltage)	V _{RWM} (Reverse Stand-off Voltage)	Channel	Surge Clamping Voltage (I _{pp} =5A)	ESD Air/Contact	RoHS	Direction
Units		P ^F	Volts	Volts		Volts	kV(Max.)		
TVW ST23 04 AD0	SOT23-6L	0.55	6	5	4	-	19/12	Yes	-
TVW MSOP 04 AD0	MSOP-10L	0.55	6	5	4	-	19/12	Yes	-
TVL ST23 04 AD0	SOT23-6L	1	6.2	5	4	8	15/8	Yes	-
TVL S143 02 AC0	SOT143-4L	1.2	6.2	5	2	8.1	17/12	Yes	-
TVL SC70 04 AC0	SC70-6L	1.3	6	5	4	8.1	18/14	Yes	-
TVL QF16 04 AC0	QFN1616P6E	1.3	6	5	4	8.1	18/14	Yes	-
TVN S323 01 AB0	SOD323-2L	11.5	6.1	5	1	7	23/15	Yes	Bi-direction
TVN S523 01 AB0	SOD523-2L	11.5	6.1	5	1	7	22/15	Yes	Bi-direction
TVN ST23 02 AB0	SOT23-3L	12	6.1	5	2	7	22/15	Yes	-
TVN ST23 04 AB1	SOT23-5L	12	6.1	5	4	7	22/15	Yes	-
TVN QF16 05 AB0	QFN1616P6E	13	6	5	5	6.8	16/10	Yes	-
TVN SC70 04 AB0	SC70-5L	13	6	5	4	6.5	16/10	Yes	-
TVN S523 01 AA0	SOD523-2L	20	6.1	5	1	7	23/15	Yes	-
TVN ST23 02 AA0	SOT23-3L	90	6.1	5	2	7	23/17	Yes	-
TVL 0402 01 AB1 (NEW)	0402	6	10	6	1	14 (I _{pp} =1A)	15/8	Yes	Bi-direction
TVL 0201 01 AB0 (NEW)	0201	3	10	5	1	14 (I _{pp} =1A)	15/8	Yes	Bi-direction
TVN 0402 01 AB1 (NEW)	0402	50	10	5	1	12 (I _{pp} =1A)	15/8	Yes	Bi-direction
TVN 0201 01 AB0 (NEW)	0201	20	10	5	1	13 (I _{pp} =1A)	15/8	Yes	Bi-direction
TVH 0402 01 AB1 (NEW)	0402	60	6	5	1	10 (I _{pp} =1A)	15/8	Yes	Bi-direction

V_B – Measured voltage at any I/O pin to Ground at 1mA DC current. I_{pp} – Maximum peak current in 8/20μs waveform.

C_p – Device capacitance measured with zero volt bias at 1MHz.

◆ General Technical Data

Operating Temperature	-55 ~+85°C
Storage Temperature	-55 ~ +150°C
Response Time	<1 ns
Solderability	245 ± 5°C, 3 ± 1sec.

◆ Environmental Performance

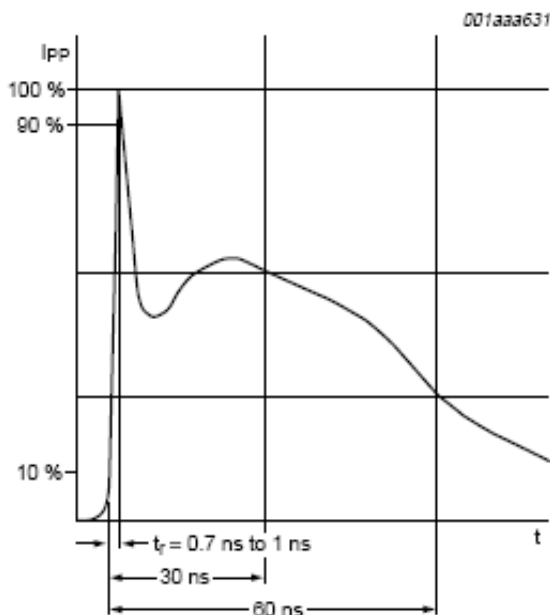
Item	Specifications	Test Condition
Bias Humidity	$I_L \leq 10 \mu A$	90%RH, 40°C, Working Voltage, 1000 hrs
Thermal Shock		-40°C to 85°C, 30 min. cycle, 5 cycles
Full Load Voltage		Working Voltage, 85°C, 1000 hrs
Solder Leach Resistance	(1) $I_L \leq 10 \mu A$ at Working Voltage (2) Solder Wetting Area $\geq 95\%$	260±5°C, 10±1 sec.

◆ Package

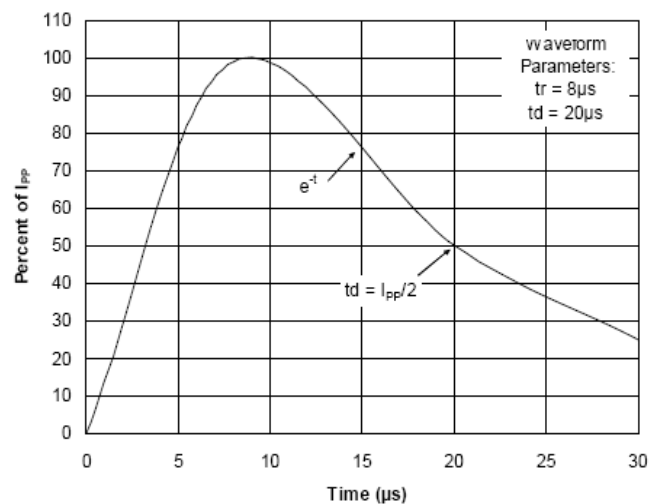
Package Size	SOT23	SOD523	SOD323
Standard Packing Quantity (pcs/reel)	3,000	4,000	3,000

SOT143	SC70	MSOP10	QFN	FBPA	0402	0201
3,000	3,000	3,000	3,000	3,000	10,000	15,000

◆ Typical Characteristics



ESD Pulse Waveform
according to IEC 61000-4-2

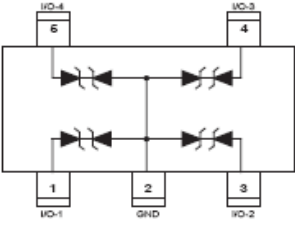
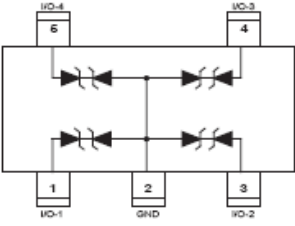
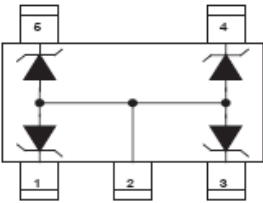
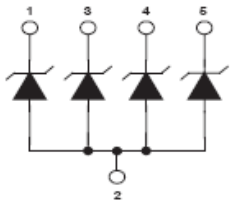
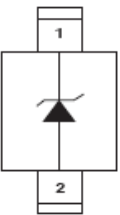
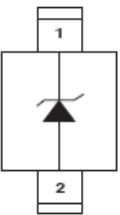








Surge (8/20 μ sec) Pulse Waveform

◆ Pin Configuration and Circuit Diagram

Part Number	Package	Pin Configuration	Circuit Diagram
TVW ST23 04 AD0	SOT23-6L		
TVL ST23 04 AD0			
TVW MSOP 04 AD0	MSOP-10L		
TVL S143 02 AC0	SOT143-4L		
TVL SC70 04 AC0	SC70-6L		
TVL QF16 04 AC0	QFN1616P6E		
TVN QF16 05 AB0			
TVN ST23 02 AB0	SOT23-3L		
TVN ST23 02 AA0			

◆ Pin Configuration and Circuit Diagram

Part Number	Package	Pin Configuration	Circuit Diagram
TVN ST23 04 AB1	SOT23-5L		
TVN SC70 04 AB0	SC70-5L		
TVN S323 01 AB0	SOD323-2L		
TVN S523 01 AB0 TVN S523 01 AA0	SOD323-2L		
TVL 0402 01 AB1 TVN 0402 01 AB1 TVH 0402 01 AB1	0402		
TVL 0201 01 AB0 TVN 0201 01 AB0	0201		

◆ Package Dimension Unit: mm

Package	Length		Width		Thickness	
	Min.	Max.	Min.	Max.	Min.	Max.
MSOP-10L	2.9	3.1	2.9	3.1	0.81	1.12
SC70-5L	1.9	2.1	1.15	1.35	0.9	1.1
SC70-6L	1.9	2.1	1.15	1.35	0.9	1.1
QFN1616P6E	1.55	1.65	1.55	1.65	0.5	0.6
SOD323-2L	1.56	1.76	1.2	1.4	0.8	1.1
SOD523-2L	1.1	1.3	0.7	0.9	0.5	0.7
SOT143-4L	2.8	3.04	1.2	1.4	0.95	1.17
SOT23-6L	2.84	3	1.5	1.7	0.95	1.45
SOT23-3L	2.84	3	1.2	1.4	0.95	1.17
SOT23-5L	2.84	3	1.5	1.7	0.95	1.45
0402	1.00	1.20	0.4	0.6	0.4	0.6
0201	0.55	0.65	0.25	0.35	0.25	0.35

◆ Application Block Diagrams

Application Block Diagrams

Data Rate (Mbit/sec)		0	0.03	0.13	2	12	25	125	320	400	430	800	5,000	10,000	
Interface (I/O port)			Audio	RS232	IEEE1284	USB 1.1	RS485	Ethernet	LCDs	IEEE1394a	USB 2.0	IEEE1394b	HDMI 1.2	HDMI 1.3	
Capacitance															
Rated Voltage															
Suggest Spec.															
0.2pF	~12V	EGA Series													
0.5pF	~18V	MLVG DR5V18													
1.0pF	~18V	MLVG 1R0V18													
3.0pF	~18V	MLVG 3R0TV18													
5.0pF	~9V	MLVG 5R0QV09													
10pF	~5.5V	MLVG 100NW05													
22pF	~5.5V	MLVG 220NW05													
110pF	~28V	MLVS K20													
110pF	~18V	MLVS K14													
130pF	~14V	MLVS K11													
190pF	~9V	MLVS M07													
300pF	~5.5V	MLVS M04													
0.55pF	~6V	TVM MSOP 04 AD0													
1pF	~6.2V	TVM ST23 04 AD0													
1.2pF	~6.2V	TVL S143 02 AC0													
1.3pF	~6V	TVL SC70 04 AC0													
7pF	~6V	TVL QF16 04 AC0													
8pF	~6V	TVN SC70 05 AB0													
11.5pF	~6.1V	TVN SS23 01 AB0													
12pF	~6.1V	TVN SS23 01 AB0													
13pF	~6V	TVN ST23 02 AB0													
20pF	~6.1V	TVN QF16 05 AB0													
90pF	~6.1V	TVN SS23 01 AA0													
		TVN ST23 02 AA0													
Typical System Application		DC Power Bus	Speaker	Serial Port (com)	Parallel Port(LPT)	Mouse	Control System	Network Hardware	TFT Display	Digital Video Recorder	Digital Still Camera	Digital Video Recorder	Set Top Box	Set Top Box	
		Keypad	Microphone	Keyboard	Printer	Keyboard	Hub	Hub	Router	Hard Disk Drive	Scanner	Desktop	Scanner	Projector	Projector
		Buttons	Audio Headset	Mouse	Scanner	Hub	Hub	Router	Webswitch	Video Editing System	Hard Disk Drive	Laptop	Scanner	Projector	Projector
						PDA	Control System	Router	Cable Modem	Scanner	Desktop	Laptop	Scanner	Projector	Projector
						Digital Camera	Hub	Router	Webswitch	Scanner	Desktop	Laptop	Scanner	Projector	Projector
						Digital Camera	Hub	Router	Cable Modem	Scanner	Desktop	Laptop	Scanner	Projector	Projector
						PDA	Hub	Router	Cable Modem	Scanner	Desktop	Laptop	Scanner	Projector	Projector
						Digital Camera	Hub	Router	Cable Modem	Scanner	Desktop	Laptop	Scanner	Projector	Projector
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