

TVS Diodes for ESD Protection

Descriptions

Boarden ESD TVS are designed to protect voltage sensitive components from ESD. Excellent clamping capability, low leakage, and fast response time provide best in class protection on designs that are exposed to ESD. This series has been specifically designed to protect sensitive components which are connected to data and transmission lines from overvoltage caused by ESD (electrostatic discharge), and EFT (electrical fast transients).

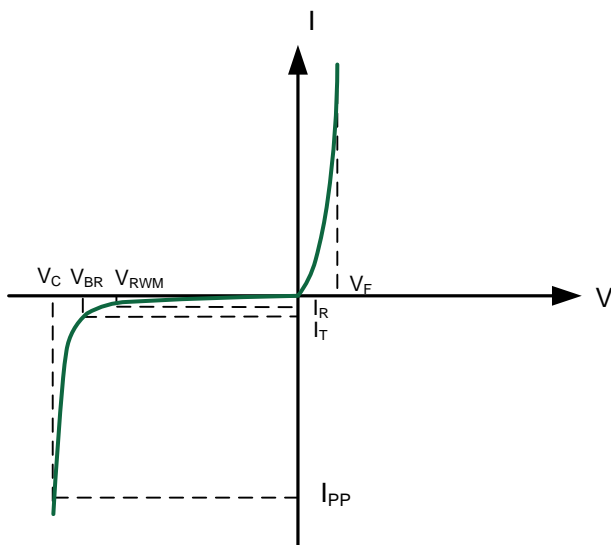
Features

- Stand-off voltage: 2.5 - 36V.
- Transient protection for each line according to IEC61000-4-2 (ESD): $\pm 8\text{kV}$ (contact), $\pm 15\text{kV}$ (air)
IEC61000-4-4 (EFT): 40A - 5/50ns
- Small factor for easy layout
- Capacitance: $C_J = 0.3\text{pF}$ min.
- Low leakage current: $I_R = 1\text{nA}$ min.
- Low clamping voltage.
- Solid-state silicon technology
- RoHS compliant

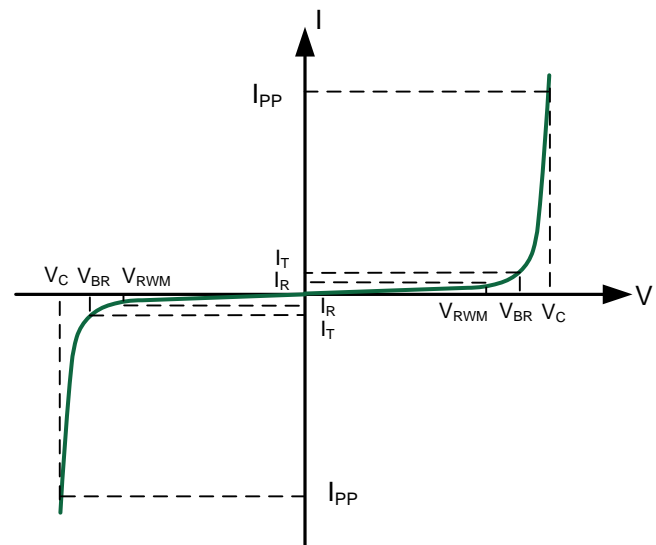
Applications

- USB 2.0 and USB 3.0
- HDMI 1.3 and HDMI 1.4
- SIM Card
- Cellular Handsets
- Mobile Wear
- Wireless Communication
- IEEE 1394
- Portable Electronics
- Notebooks

I-V Curve Characteristics



Uni-Directional TVS



Bi-Directional TVS

V_{RWM} - Reverse Stand-Off Voltage - Working Peak Reverse Voltage

V_{BR} - Breakdown Voltage - Maximum current that flows through the TVS at a specified test current (I_T)

I_T - Test Current - Test Current

V_C - Clamping Voltage - Peak voltage measured across the suppressor at a specified I_{ppm} (peak impulse current)

I_{PP} - Peak Pulse Current - Maximum Reverse Peak Pulse Current

P_{PP} - Peak Pulse Power Dissipation - Max power dissipation

I_R - Reverse Leakage Current - Current measured at V_{RWM}

V_F - Forward Voltage - Drop for Uni-directional

Electrical Characteristics (TA=25°C unless otherwise noted)

Part Number	V _{RWM}	I _R	V _{BR}	V _{C@1A}	I _{PP}	Capacitance	P _{PP}	Package	Circuit Diagram
	(V)	@V _{RWM} (μA)	@1mA (V)	(8/20μs) (V)	@8/20μs (A)	@1MHz (pF)	(W)		
BTLC05V0201B	5.0	0.001	7.0	9	6	10	72	0201	02
BTUC05V0402B	5.0	0.001	7.0	15	2	0.3	46	0402	02
BTLC05V0402B	5.0	0.001	7.0	12	6	5	80	0402	02
BTSC05V0402B	5.0	0.001	7.5	8	4	17	100	0402	02
BTUC3V31006A	3.3	1.0	4.8	12	6	0.5	100	DFN1006	01
BTUC05V1006A	5.0	1.0	5.4	9.8	6	0.5	100	DFN1006	01
BTUC3V31006B	3.3	1.0	4.8	10	8	0.5	100	DFN1006	02
BTUC05V1006B	5.0	1.0	5.4	12.9	6	0.5	100	DFN1006	02
BTLC3V31006B	3.3	1.0	4.0	7	8	10	100	DFN1006	02
BTLC05V1006B	5.0	1.0	6.0	9.8	8	10	100	DFN1006	02
BTLC08V1006B	8.0	1.0	8.5	17.5	8	7.0	100	DFN1006	02
BTSC3V31006A	3.3	2.5	5.0	10.4	8	80	100	DFN1006	01
BTSC05V1006A	5.0	1.0	6.2	12.3	7	65	100	DFN1006	01
BTSC08V1006A	8.0	1.0	8.5	13.3	7.6	90	200	DFN1006	01
BTSC12V1006A	12.0	1.0	13.3	23.7	5.9	30	150	DFN1006	01
BTSC3V31006B	3.3	1.0	5.0	8.4	10	25	150	DFN1006	02
BTSC05V1006B	5.0	1.0	5.8	12.5	10	15	150	DFN1006	02
BTUC3V3D923A	3.3	1.0	4.8	12	6	0.5	100	SOD-923	01
BTUC05VD923A	5.0	1.0	5.4	9.8	7	0.5	100	SOD-923	01
BTUC3V3D923B	3.3	1.0	4.8	10	10	0.5	100	SOD-923	02
BTUC05VD923B	5.0	1.0	5.4	12.9	10	0.5	100	SOD-923	02
BTLC05VD923B	5.0	1.0	6.7	9.0	8	10	100	SOD-923	02
BTSC3V3D923A	3.3	2.5	5.0	10.4	9.8	80	100	SOD-923	01
BTSC05VD923A	5.0	1.0	6.2	12.3	8.7	65	100	SOD-923	01
BTSC12VD923A	12.0	1.0	13.5	23.7	5.9	30	100	SOD-923	01
BTSC3V3D923B	3.3	1.0	5.0	8.4	11.2	25	150	SOD-923	02
BTSC05VD923B	5.0	1.0	5.8	12.5	8.7	15	150	SOD-923	02
BTUC3V3D523A	3.3	1.0	5.0	9.5	8	0.5	100	SOD-523	01
BTUC05VD523A	5.0	1.0	5.4	9.8	8	0.5	100	SOD-523	01
BTLC05VD523B	5.0	1.0	6.0	9.8	10	10	100	SOD-523	02
BTSC02VD523A	2.0	6.0	4.0	6.5	11.0	145	120	SOD-523	02
BTSC3V3D523A	3.3	1.0	5.0	7.2	11.2	105	150	SOD-523	01
BTSC05VD523A	5.0	1.0	6.1	9.8	9.4	80	200	SOD-523	01
BTSC08VD523A	8.0	1.0	9.0	13.5	8.8	65	200	SOD-523	01
BTSC12VD523A	12.0	1.0	13.5	17	9.6	55	250	SOD-523	01
BTSC15VD523A	15.0	1.0	16.5	22	10	65	250	SOD-523	01

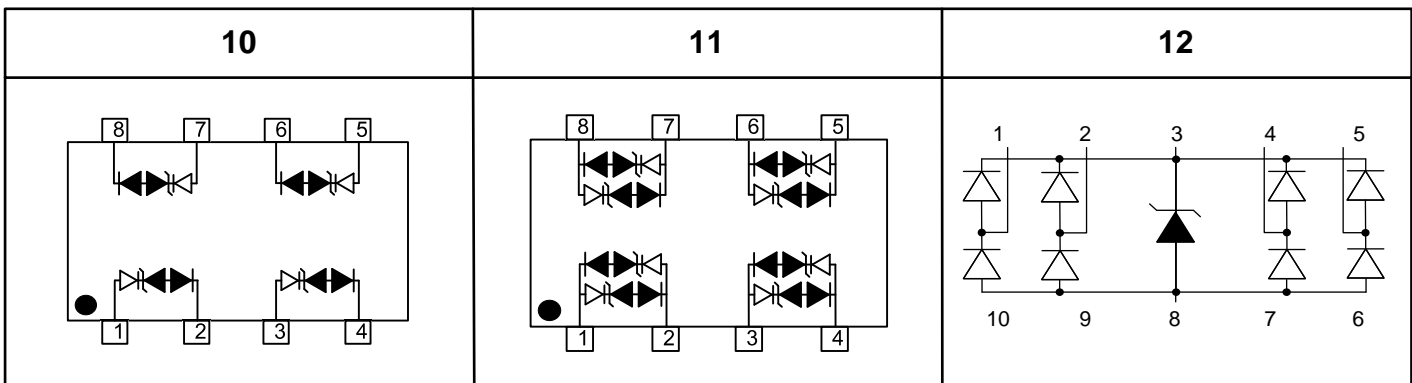
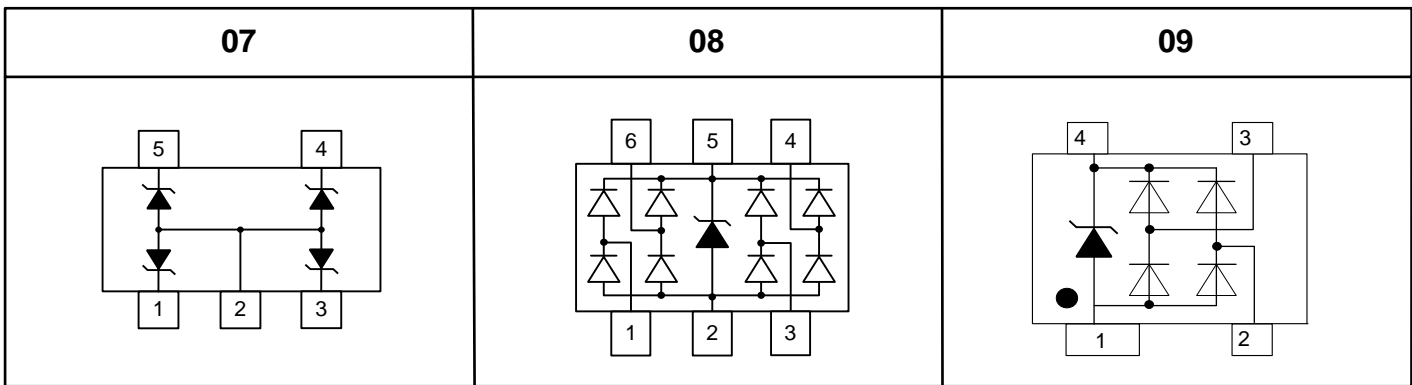
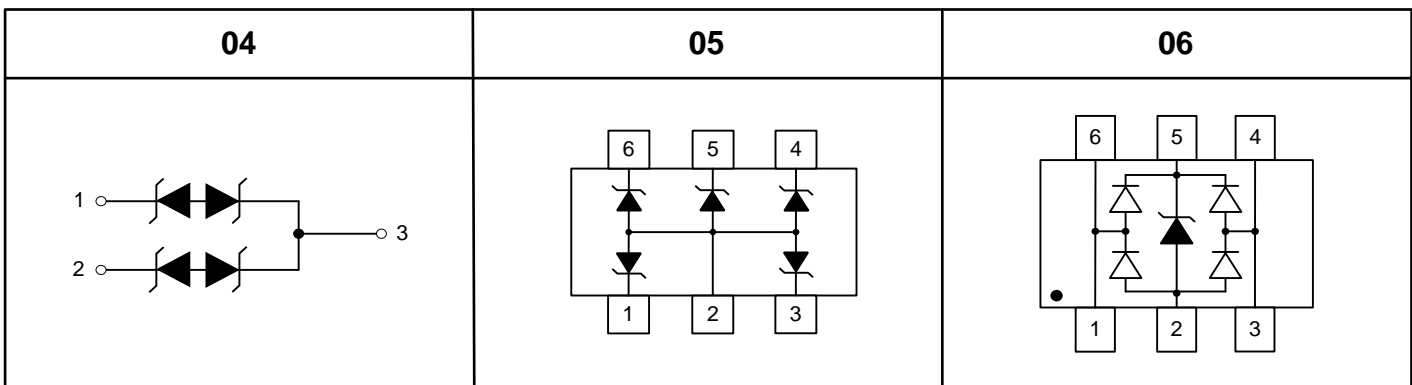
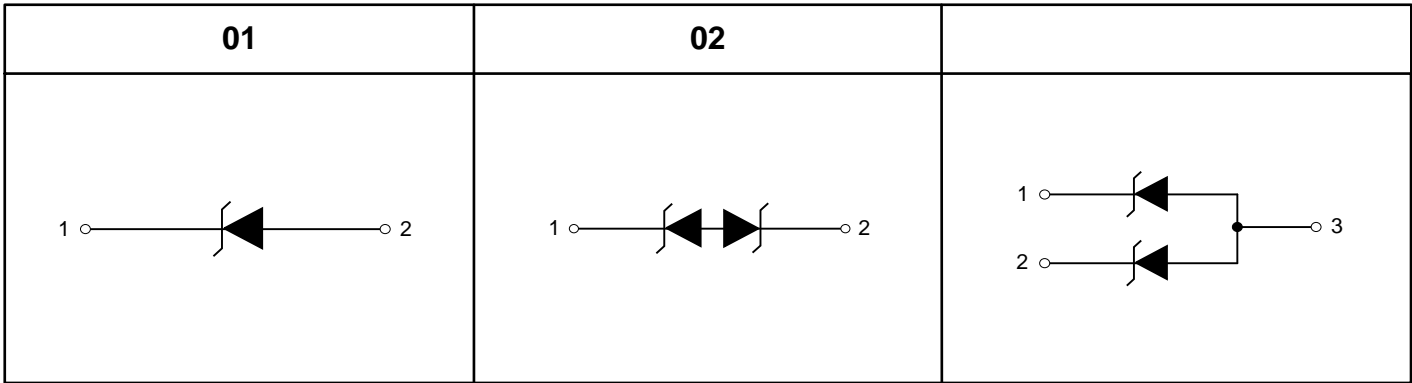
Electrical Characteristics (TA=25°C unless otherwise noted)

Part Number	V _{RWM}	I _R	V _{BR}	V _{C@1A}	I _{PP}	Capacitance	P _{PP}	Package	Circuit Diagram
	(V)	@V _{RWM} (μA)	@1mA (V)	(8/20μs) (V)	@8/20μs (A)	@1MHz (pF)	(W)		
BTSC05VD523B	5.0	1.0	5.6	9.8	9.0	15	150	SOD-523	02
BTUC02VD323B	2.0	10	3.3	6.0	21	0.8	200	SOD-323	02
BTUC3V3D323B	3.0	20	4.0	7.6	28	0.4	350	SOD-323	02
BTUC05VD323B	5.0	5.0	6.0	9.8	24	0.4	350	SOD-323	02
BTUC08VD323B	8.0	2.0	8.5	13.4	18	0.4	350	SOD-323	02
BTUC12VD323B	12.0	1.0	13.3	19	14	0.4	350	SOD-323	02
BTUC15VD323B	15.0	1.0	16.7	24	10	0.4	350	SOD-323	02
BTUC24VD323B	24.0	1.0	26.7	43	6	0.4	350	SOD-323	02
BTLC02VD323B	2.0	5.0	3.3	6.0	18	2.0	200	SOD-323	02
BTLC3V3D323B	3.0	25	4.0	7.5	30	2.0	350	SOD-323	02
BTLC05VD323B	5.0	5.0	6.0	9.8	20	3	350	SOD-323	02
BTLC08VD323B	8.0	1.0	8.5	15.6	15	3	350	SOD-323	02
BTLC12VD323B	12.0	1.0	13.3	28.3	15.6	3	350	SOD-323	02
BTLC15VD323B	15.0	1.0	16.7	32.3	12	3	350	SOD-323	02
BTLC24VD323B	24.0	1.0	26.7	56.5	8.8	3	350	SOD-323	02
BTSC3V3D323A	3.3	40	4.0	6.5	45	500	500	SOD-323	01
BTSC05VD323A	5.0	10	6.0	9.8	35	350	500	SOD-323	01
BTSC12VD323A	12.0	1.0	13.3	19	18	150	500	SOD-323	01
BTSC15VD323A	15.0	1.0	16.7	24	15	100	500	SOD-323	01
BTSC24VD323A	24.0	1.0	26.7	43	8	90	500	SOD-323	01
BTSC36VD323A	36.0	1.0	40	60	5	75	500	SOD-323	01
BTSC3V3D323B	3.0	40	4.0	7.5	40	450	500	SOD-323	02
BTSC05VD323B	5.0	10	6.0	9.8	35	200	500	SOD-323	02
BTSC12VD323B	12.0	1.0	13.3	19	18	100	500	SOD-323	02
BTSC15VD323B	15.0	1.0	16.7	24	15	75	500	SOD-323	02
BTSC18VD323B	18.0	1.0	20.0	29	12	60	500	SOD-323	02
BTSC24VD323B	24.0	1.0	26.7	40	8	50	500	SOD-323	02
BTSC36VD323B	36.0	1.0	40.0	60	3	35	300	SOD-323	02
BTUC05VT883M	5.0	5.0	6.0	9.8	2	0.9	50	SOT-883	03
BTLC05VT883M	5.0	1.0	5.4	9.8	4	1.5	80	SOT-883	03
BTSC05VT883M	5.0	1.0	6.0	11	8	40	100	SOT-883	03
BTLC05VT883B	5.0	1.0	5.5	9.8	4	3.5	80	SOT-883	04
BTUC05VT323M	5.0	1.0	6.0	9.8	20	0.8	350	SOT-23	03
BTLC05VT323M	5.0	1.0	6.0	9.8	25	1.5	350	SOT-23	03
BTLC08VT323M	8.0	1.0	8.5	13.4	20	1.5	350	SOT-23	03
BTLC12VT323M	12.0	1.0	13.3	19.0	15.6	1.5	350	SOT-23	03

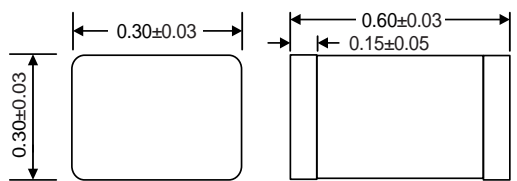
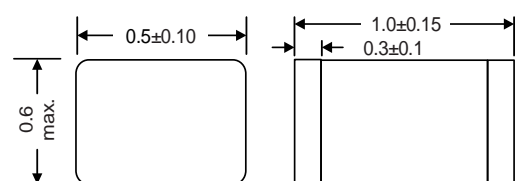
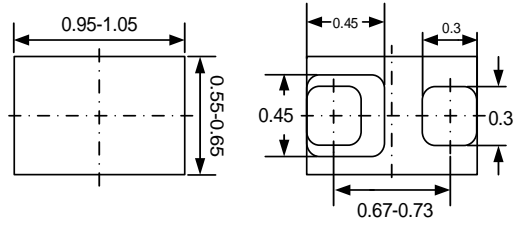
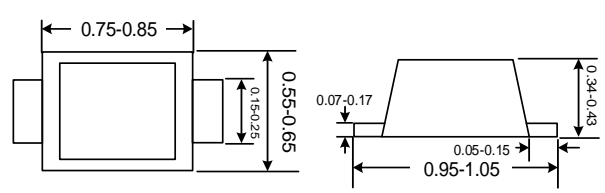
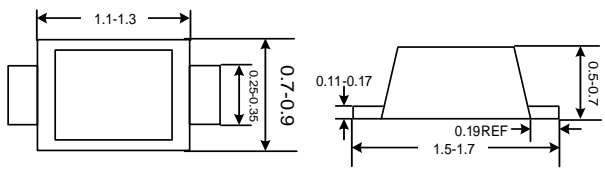
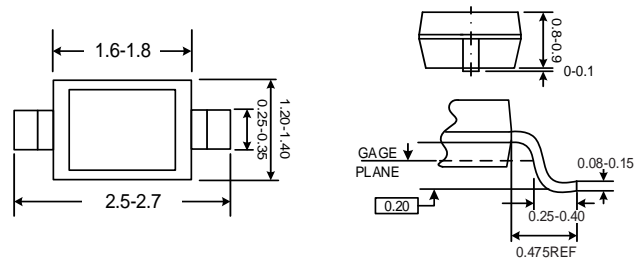
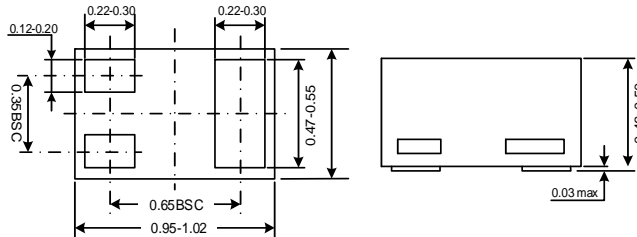
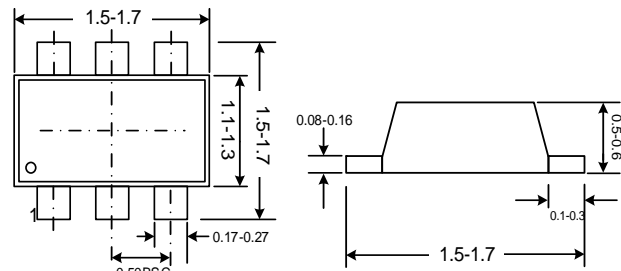
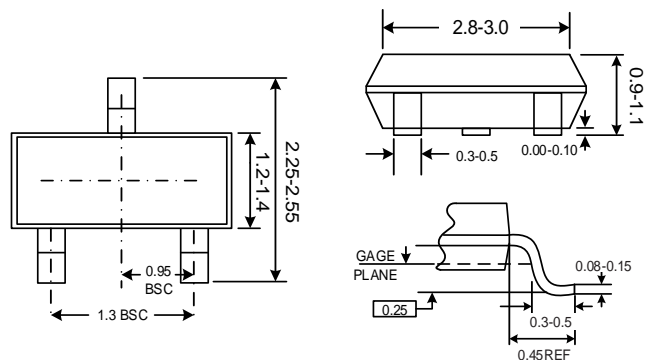
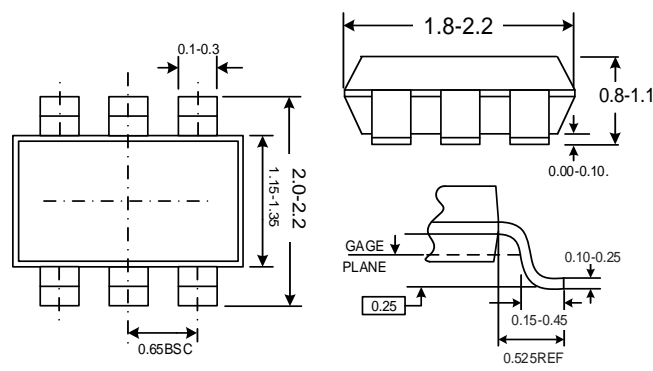
Electrical Characteristics (TA=25°C unless otherwise noted)

Part Number	V _{RWM}	I _R	V _{BR}	V _{C@1A}	I _{PP}	Capacitance	P _{PP}	Package	Circuit Diagram
	(V)	@V _{RWM} (μA)	@1mA (V)	(8/20μs) (V)	@8/20μs (A)	@1MHz (pF)	(W)		
BTLC15VT323M	15.0	1.0	16.7	24	10	1.5	350	SOT-23	03
BTLC15VT323M	15.0	1.0	16.7	24	10	1.5	350	SOT-23	03
BTLC24VT323M	24.0	1.0	26.7	43	8	1.5	350	SOT-23	03
BTLC36VT323M	36.0	1.0	40	60	5	1.5	350	SOT-23	03
BTSC3V3T323M	3.3	20	4.0	7.0	30	400	300	SOT-23	03
BTSC05VT323M	5.0	1.0	6.0	9.8	25	220	300	SOT-23	03
BTSC08VT323M	8.0	1.0	8.5	13.4	20	190	300	SOT-23	03
BTSC12VT323M	12.0	1.0	13.3	19.0	15.6	90	300	SOT-23	03
BTSC15VT323M	15.0	1.0	16.7	24	10	60	300	SOT-23	03
BTSC24VT323M	24.0	1.0	25	43	8	50	300	SOT-23	03
BTSC36VT323M	36.0	1.0	40	60	5	50	300	SOT-23	03
BTSC3V3T323B	3.3	10	4.0	8.0	35	135	350	SOT-23	04
BTSC05VT323B	5.0	1.0	6.0	9.8	30	45	350	SOT-23	04
BTSC12VT323B	12.0	1.0	13.3	19	16	16	350	SOT-23	04
BTSC15VT323B	15.0	1.0	16.7	24	10	15	350	SOT-23	04
BTSC24VT323B	24.0	1.0	26.7	43	8	11	350	SOT-23	04
BTUC05VT563MF	5.0	1.0	6.0	9.8	3	0.9	50	SOT-563	06
BTUC05VT563MS	5.0	1.0	6.0	15.5	8	0.9	150	SOT-563	08
BTSC05VT563M	5.0	0.1	6.0	9.5	9	17	125	SOT-563	05
BTUC05VT363M	5.0	1.0	6.0	15.5	8	0.9	150	SOT-363	08
BTLC05VT363M	5.0	1.0	6.4	9.8	2.5	10	25	SOT-363	05
BTSC05VT363M	5.0	1.0	6.1	9.8	10	50	100	SOT-363	05
BTSC12VT363M	12.0	1.0	13.3	19	2.5	50	50	SOT-363	05
BTLC05VT353M	5.0	1.0	6.4	9.8	1.6	9.5	20	SOT-353	07
BTSC05VT353M	5.0	1.0	6.1	9.8	12	90	150	SOT-353	07
BTLC12VT353M	12.0	1.0	13.3	19	2.5	10	25	SOT-353	07
BTSC12VT353M	12.0	1.0	13.3	19	5	50	150	SOT-353	07
BTUC05VT143M	5.0	1.0	6.0	15.5	5	0.9	125	SOT-143	09
BTLC05VT143M	5.0	5.0	6.0	10.2	25	3	500	SOT-143	09
BTUC05VT236M	5.0	1.0	6.0	15.5	6	0.8	150	SOT23-6	08
BTLC05VT236M	5.0	1.0	6.0	12	24	3.5	500	SOT23-6	08
BTUC05V2510N	5.0	1.0	6.0	15.5	5	0.3	150	DFN2510	12
SLVU2.8-4	2.8	1.0	3.0	6.5	13	3	400	SOP-8	10
SLVU2.8-8	2.8	1.0	3.0	6.5	16	8	600	SOP-8	11

Circuit diagram

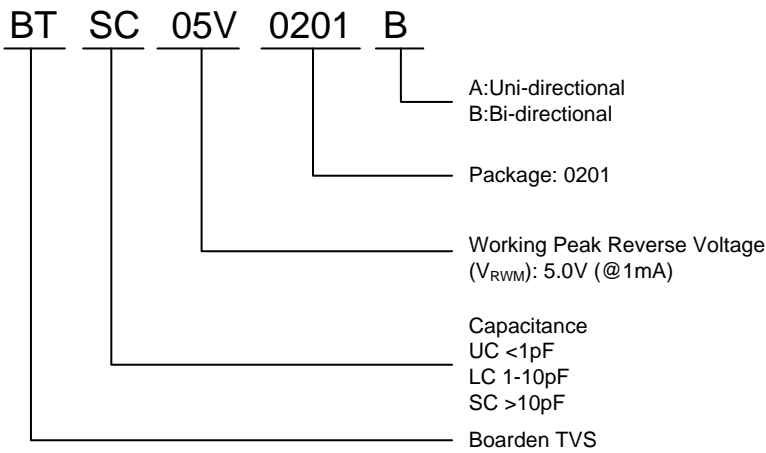


Package Dimension (mm)

 <p>0201</p>	 <p>0402</p>
 <p>DFN1006</p>	 <p>SOD-923</p>
 <p>SOD-523</p>	 <p>SOD-323</p>
 <p>SOT-883</p>	 <p>SOT-563</p>
 <p>SOT-23</p>	 <p>SOT-363</p>

Package Dimension (mm)

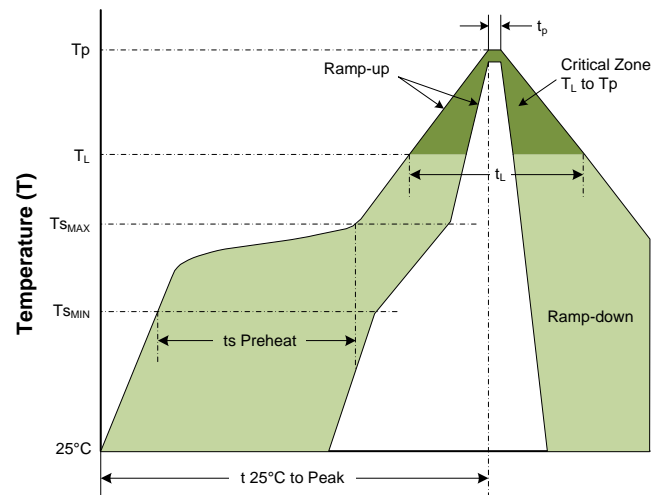
			<p>SOT-353</p>
			<p>SOT-143</p>
			<p>SOT23-6</p>
			<p>DFN2510</p>
			<p>SOP-8</p>

Part Numbering System

Order information

Package	Quantity	Reel Size
0201	15000	7 Inch
0402	10000	7 Inch
DFN1006	10000	7 Inch
SOD923	3000	7 Inch
SOD523	3000	7 Inch
SOD323	3000	7 Inch
SOT883	10000	7 Inch
SOT23	3000	7 Inch
SOT563	3000	7 Inch
SOT363	3000	7 Inch
SOT353	3000	7 Inch
SOT143	3000	7 Inch
SOT23-6	3000	7 Inch
DFN2510	3000	7 Inch
SOP-8	2500	7 Inch

Soldering Parameters

Profile Feature	Lead-Free Assembly
Average Ramp-up Rate ($T_{S_{MAX}}$ to T_p) Average Ramp-down Rate (T_p to T_L)	3°C/second max. 6°C/second max.
Preheat • Temperature Min ($T_{S_{MIN}}$) • Temperature Max ($T_{S_{MAX}}$) • Time (t_s Preheat)	150°C 200°C 60-180 seconds
Time maintained above: • Temperature (T_L) • Time (t_L)	217°C 60-150 seconds
Peak/Classification Temperature • Temperature (T_p)	260 ^{+0/-5} °C
Time within 5°C of actual Peak Time (t_p)	20-40 seconds
Time 25°C to peak Temperature	8 minutes max
Do not exceed	280 °C



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