

LL15BT1006A

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Ultra Low Capacitance TVS Diode For ESD Protection 15V

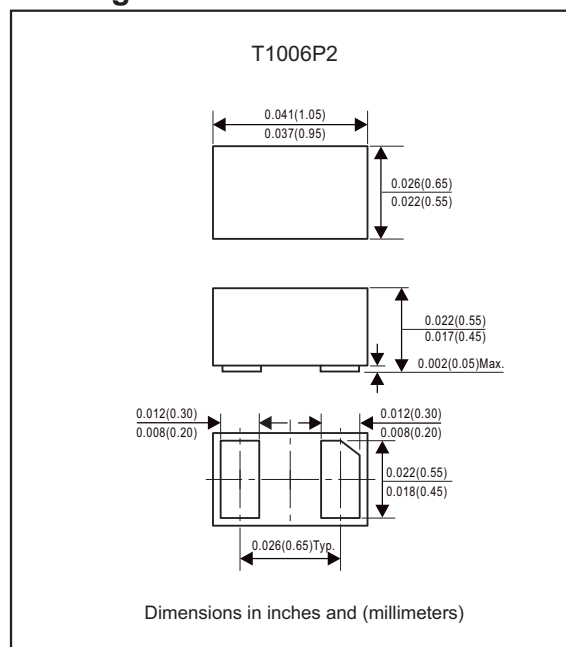
Features

- Bi-directional TVS
- Ultra low capacitance: 0.45pF typical
- Small body outline dimensions: 1.00mm x 0.60 mm (typ.)
- Low body height
- Low leakage
- Response time is typically < 1 ns
- Provide transient protection:
IEC 61000-4-2 (ESD) Contact $\pm 12\text{KV}/\text{Air } \pm 15\text{KV}$
IEC 61000-4-4 (EFT) 40A (5/50ns)
IEC 61000-4-5 (Surge) 3A(8/20us)
- We declare that the material of product compliance with RoHS requirements.
- Suffix "-H" indicates Halogen-free parts, ex.LL15BT1006A-H

Mechanical data

- Case : Molded plastic, T1006P2
- Mounting Position : Any
- Weight : Approximated 0.73 mg

Package outline



Maximum ratings (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power (According to IEC 61000-4-5)	PP	150	W
Peak Pulse Current (According to IEC 61000-4-5)	IPP	3	A
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	ESD	± 15 ± 12	KV
Operating junction temperature range	TJ	-55 to +125	$^\circ\text{C}$
Storage temperature range	TSTG	-55 to +150	$^\circ\text{C}$

Electrical characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit
Reverse Stand-Off Voltage		VRWM			15	V
Reverse Breakdown Voltage	IT=1mA	VBR	16.7			V
Reverse Leakage Current	VRWM=15V	IR			200	nA
Clamping Voltage (Note 1)	IPP=1A, TP=8/20us	VC		26.5	28	V
	IPP=3A, TP=8/20us			30	34	
Junction Capacitance	Between I/O Pin and GND, VR=0V, f=1MHz	CJ		0.45	0.65	pF

Note:

1. Non-repetitive current pulse 8/20 us exponential decay waveform according to IEC 61000-4-5.
2. TLP Settings: tp = 100ns, tr = 0.2ns, ITLP and VTLP averaging window: t1= 70ns to t2 = 90ns.
3. Dynamic resistance calculated from ITLP = 4A to ITLP = 16A using "Best Fit"

Rating and characteristic curves(LL15BT1006A)

Figure1. Peak Pulse Power vs. Pulse Time

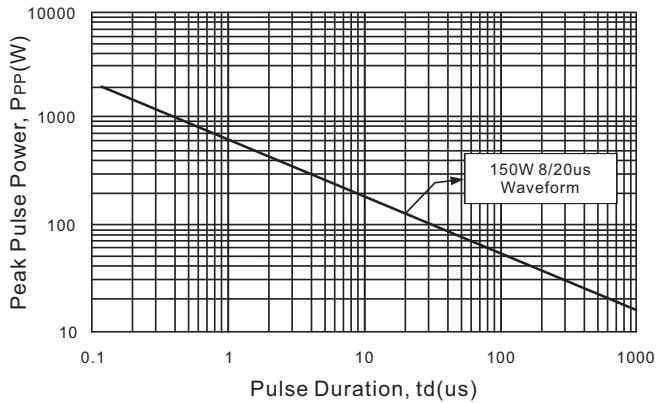


Figure2. Power Derating Curve

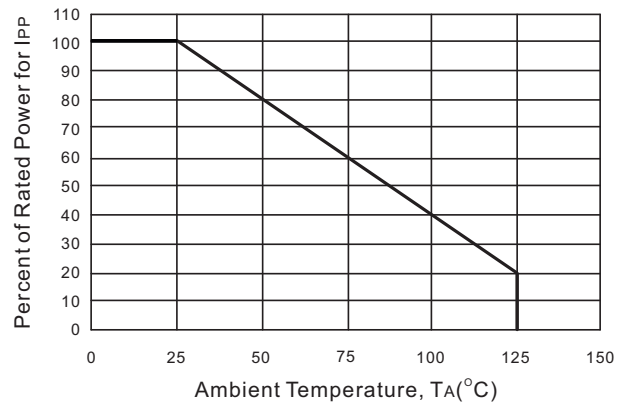


Figure3. Clamping Voltage vs. Peak Pulse Current

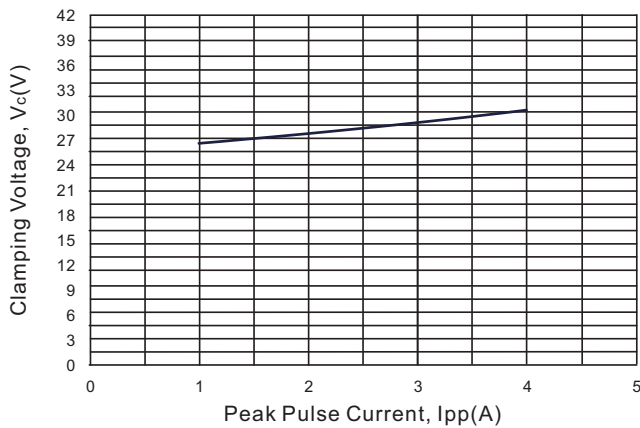


Figure4. Normalized Junction Capacitance vs. Reverse Voltage

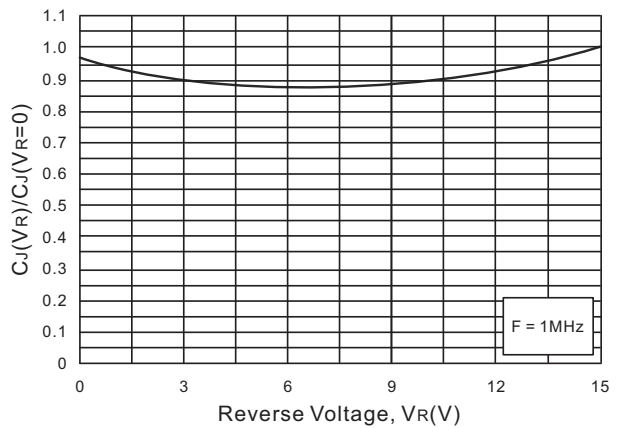
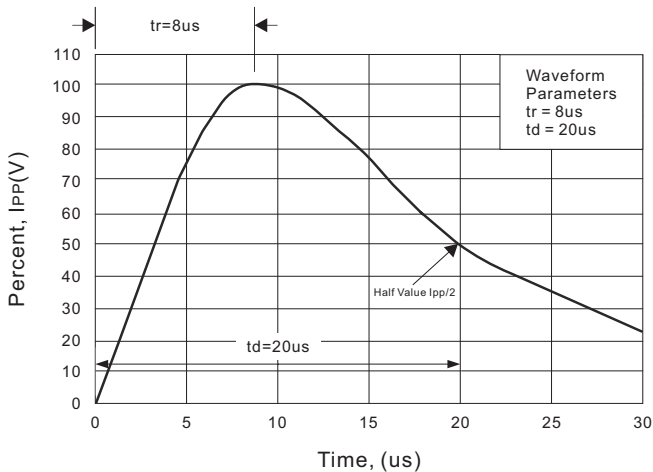


Figure5. 8/20us Pulse Waveform



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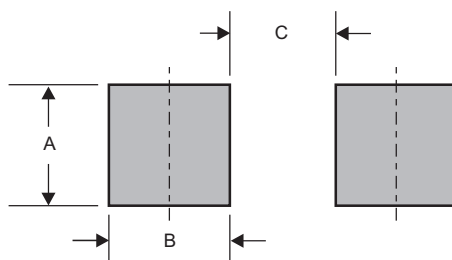
Pinning information

Pin	Simplified outline	Symbol
Bi-Directional		

Marking

Type number	Marking code
LL15BT1006A	ZZ

Suggested solder pad layout

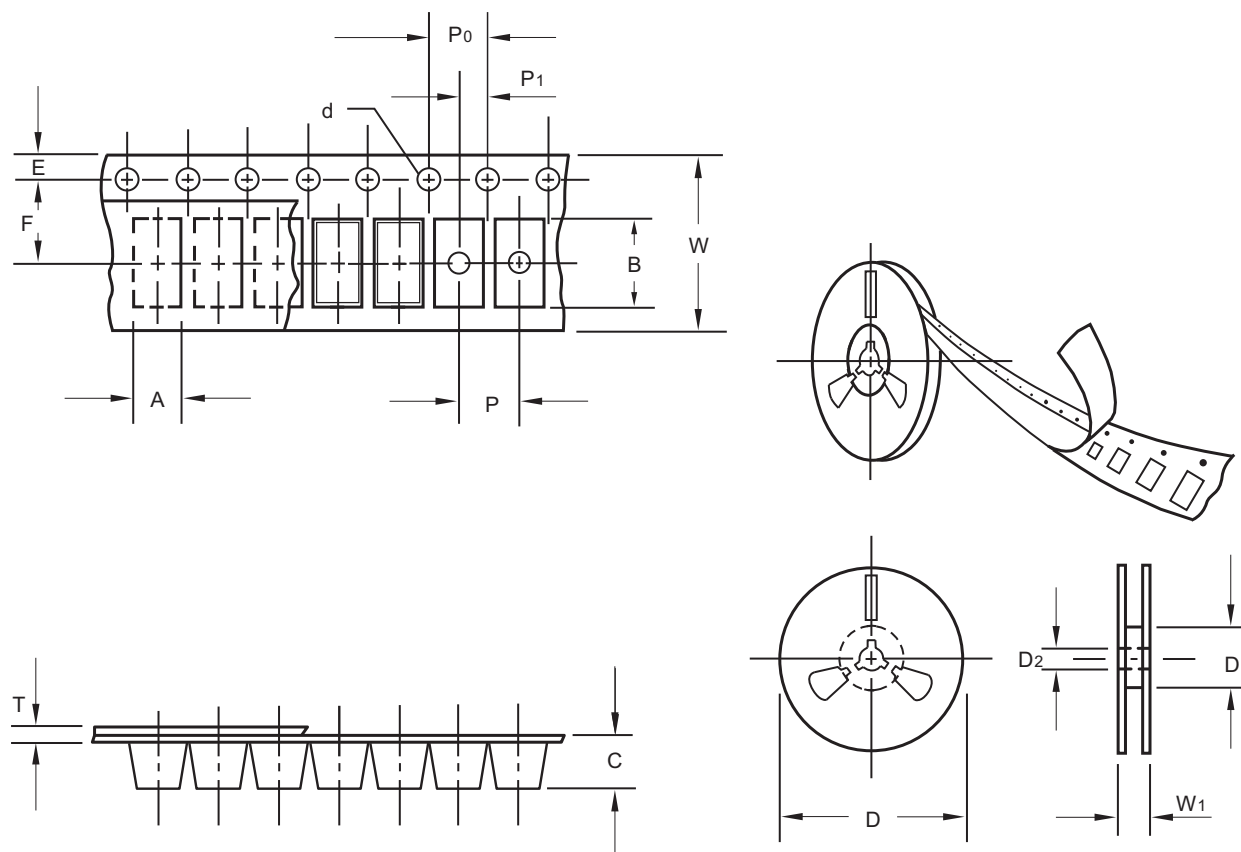


Dimensions in inches and (millimeters)

PACKAGE	A	B	C
T1006P2	0.024 (0.60)	0.014 (0.35)	0.012 (0.30)

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Packing information



unit:mm

Item	Symbol	Tolerance	T1006P2
Carrier width	A	0.1	0.70
Carrier length	B	0.1	1.12
Carrier depth	C	0.1	0.48
Sprocket hole	d	0.1	1.50
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	50.00
Feed hole diameter	D2	0.2	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	9.50

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

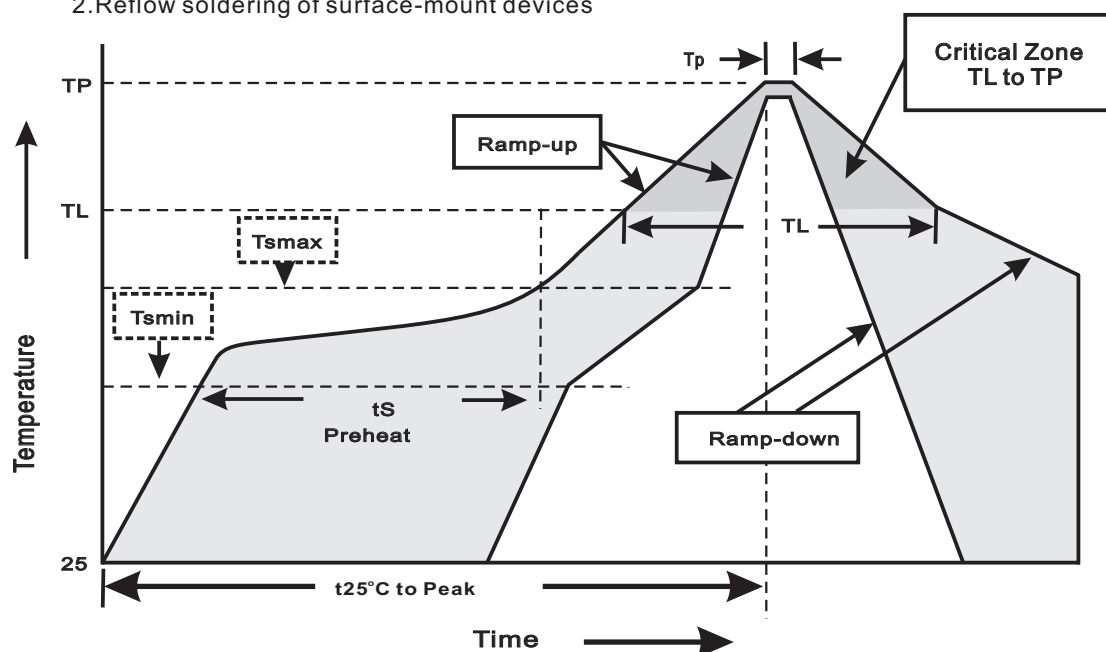
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Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
T1006P2	7"	10,000	4.0	100,000	183*123*183	178	382*257*387	800,000	15.0

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T _L to T _P)	<3°C/sec
Preheat -Temperature Min(T _{smmin}) -Temperature Max(T _{smmax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smmax} to T _L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T _L) -Time(t _L)	217°C 60~260sec
Peak Temperature(T _P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t _P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

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High reliability test capabilities

Item Test	Conditions	Reference
1. Solder Resistance	at $260 \pm 5^{\circ}\text{C}$ for $10 \pm 2\text{sec.}$	MIL-STD-750D METHOD-2031
2. Solderability	at $245 \pm 5^{\circ}\text{C}$ for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	$V_{\text{BR}} = V_{\text{BR Min}} * 80\%$ at $T_J = 125^{\circ}\text{C}$ for 168 hrs.	MIL-STD-750D METHOD-1038
4. Pressure Cooker	$15P_{\text{SIG}}$ at $T_A = 121^{\circ}\text{C}$ for 4 hrs.	JESD22-A102
5. Temperature Cycling	-55°C to $+125^{\circ}\text{C}$ dwelled for 30 min. and transferred for 5min. total 10 cycles.	MIL-STD-750D METHOD-1051
6. Humidity	at $T_A = 85^{\circ}\text{C}$, RH=85% for 1000hrs.	MIL-STD-750D METHOD-1021
7. High Temperature Storage Life	at 150°C for 1000 hrs.	MIL-STD-750D METHOD-1031