LL05BT1006A-Q1

List

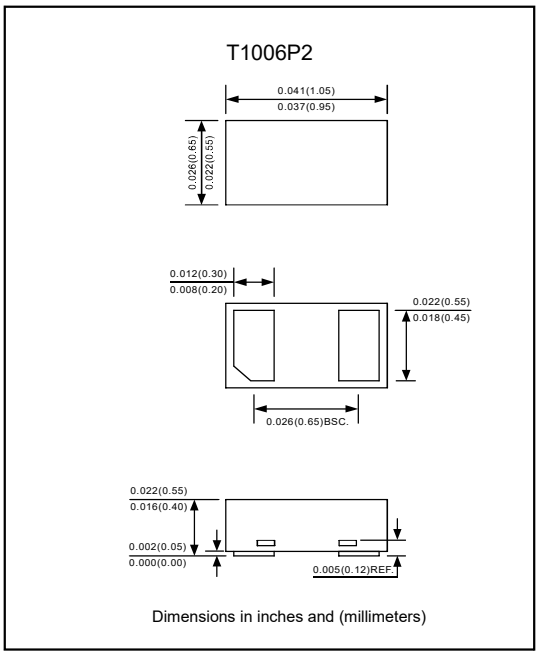
LL05BT1006A-Q1

Ultra Low Capacitance Bi-Directional TVS For ESD Protection 5.0V

Features

- Package optimized for high-speed lines.
- Protects one data, control or power line.
- Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge.
- Provide transient protection:
  IEC 61000-4-2 (ESD) ±25kV(Air), ±20kV(Contact).
  IEC 61000-4-4 (EFT) 40A (5/50ns).
  Cable discharge event (CDE).
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free parts, ex.LL05BT1006A-Q1-H,

Package outline



Dimensions in inches and (millimeters)

Applications

- Serial ATA.
- PCI Express.
- Desktops, servers, notebooks and cellular phones.
- MDDI ports, display ports, and digital visual interfaces (DVI).
- USB 2.0/3.0 Power and data line protection.
- HDMI 1.4/2.0.

Mechanical data

- Epoxy: UL94V-0 rated flame retardant.
- Case : Molded plastic, T1006P2.

Maximum ratings (At T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak pulse current (tp=8/20μs)	I_{PP}	4.5	A
ESD per IEC 61000-4-2 (Contact)	V_{ESD}	±20	kV
ESD per IEC 61000-4-2 (Air)		±25	
Operating temperature	T_{OPT}	+125	°C
Storage temperature	T_{STG}	-55 to +150	°C

Electrical characteristics (At T_A=25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Reverse stand-off voltage		V_{RWM}			5	V
Reverse leakage current	V_{RWM}=5.0V, Between I/O and I/O	I_R		0.01	0.1	μA
Trigger voltage	I_T=1mA, Between I/O and I/O	V_{BR}	7		9	V
Clamping voltage	I_{PP}=4.5A, t_p=8/20μs, Between I/O and I/O	V_C			15	V
Junction capacitance	V_R=0V, f=1.0MHz, Between I/O and I/O	C_{ESD}		0.3		pF

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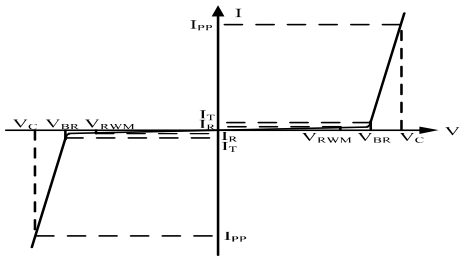
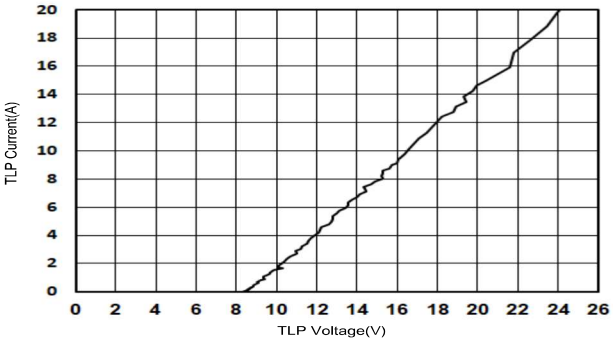
Rating and characteristic curves

Symbol	Parameter
V_{RWM}	Nominal reverse working voltage
I_R	Reverse leakage current@ V_{RWM}
V_{BR}	Reverse breakdown voltage@ I_T
I_T	Test current for reverse breakdown
V_C	Clamping voltage @ I_{PP}
I_{PP}	Peak pulse current
C_{ESD}	Parasitic capacitance
V_R	Reverse voltage
f	Small signal frequency

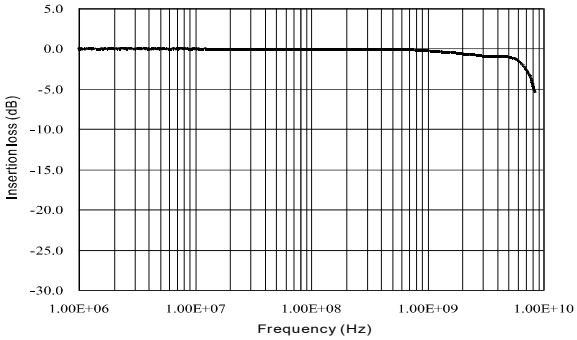


Bi-Directional TVS

TLP Measurement of I/O to I/O

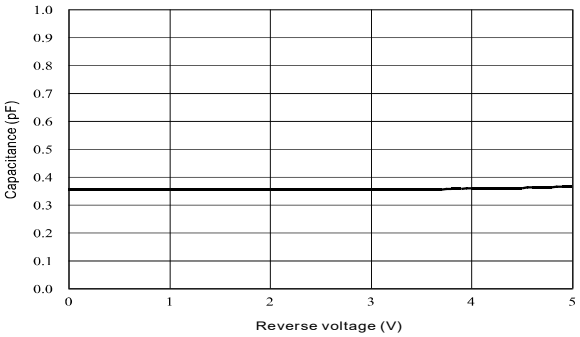


Insertion Loss S21 of I/O to I/O

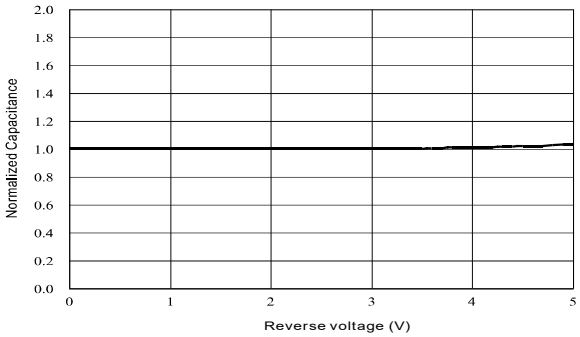


Capacitance vs. Voltage of I/O to I/O (f = 1MHz)

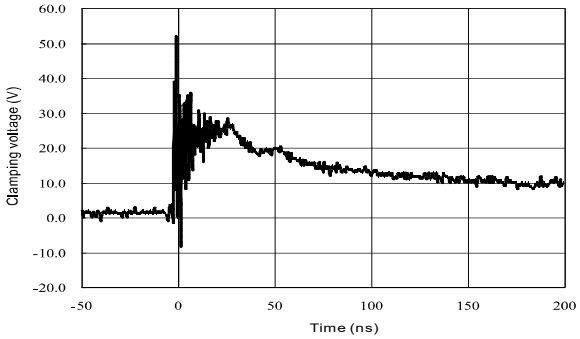
Capacitance vs. Reverse Voltage



Normalized Capacitance vs. Reverse Voltage



ESD Clamping of I/O to I/O
(+8kV Contact per IEC 61000-4-2)



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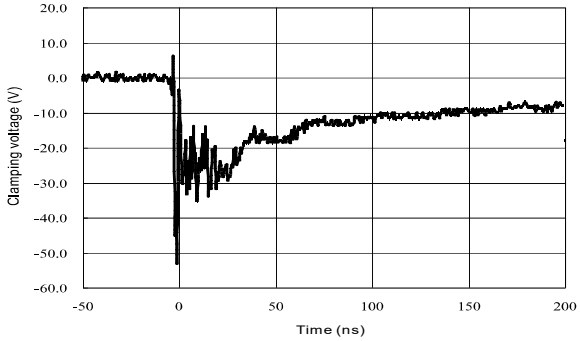

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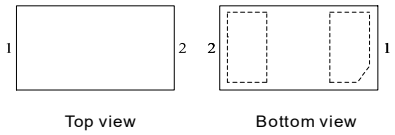
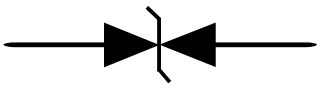
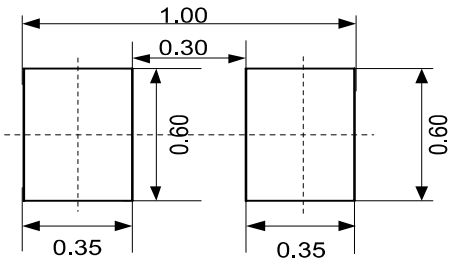
Pinning information

Pin	Simplified outline	Symbol
Bi-directional		

Marking

Type number	Marking code
LL05BT1006A-Q1	XS or S

Suggested solder pad layout



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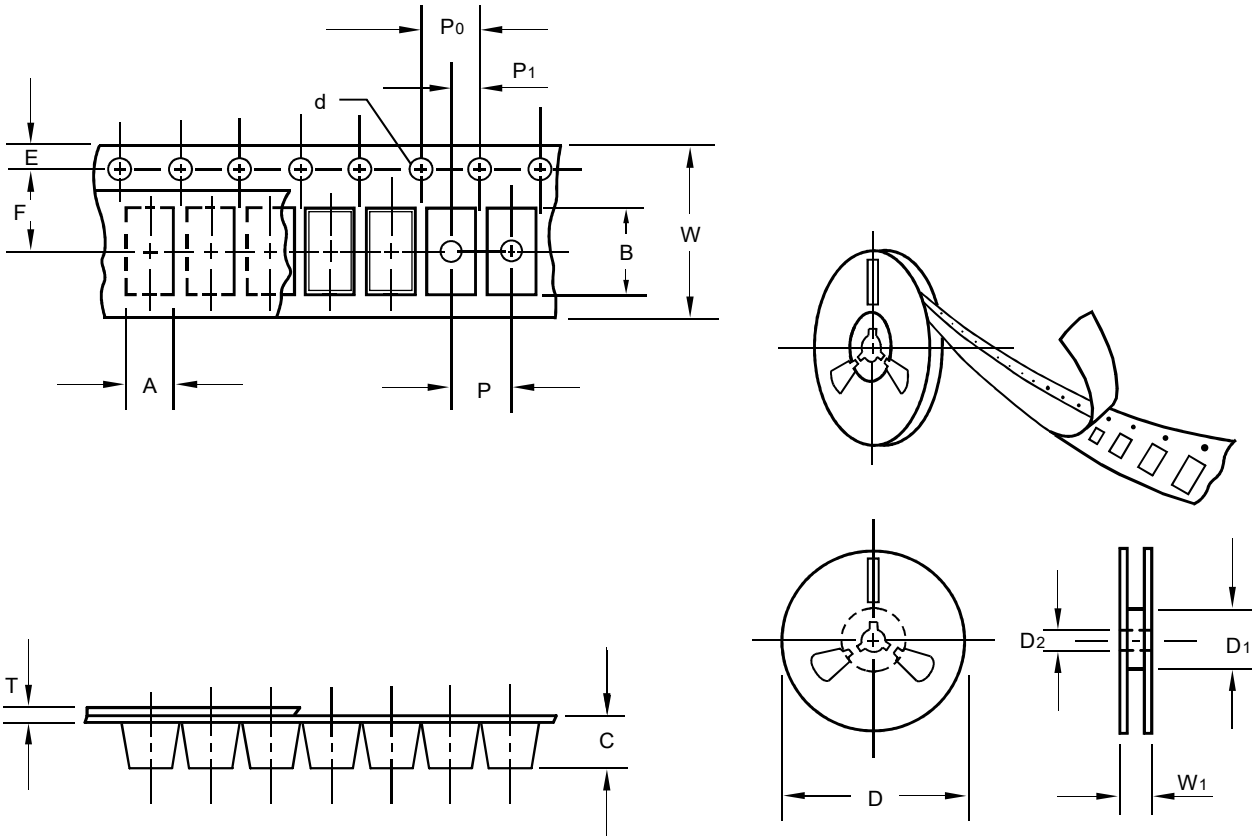
Packing information



unit:mm

Item	Symbol	Tolerance	T1006P2
Carrier width	A	0.1	0.70
Carrier length	B	0.1	1.15
Carrier depth	C	0.1	0.55
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	55.00
Feed hole diameter	D_2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	2.00
Sprocket hole pitch	P_0	0.1	4.00
Embossment center	P_1	0.1	2.00
Overall tape thickness	T	0.1	0.20
Tape width	W	0.3	8.00
Reel width	W_1	1.0	9.50

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

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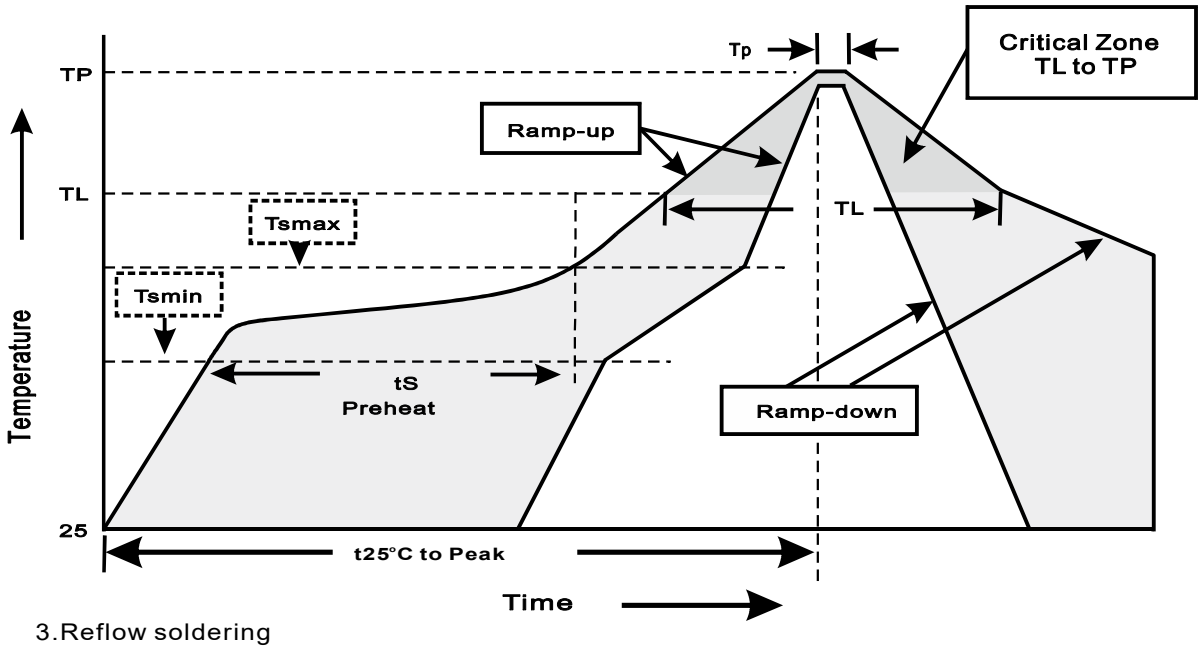
Reel packing

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)
T1006P2	7"	10,000	4.0	100,000	183*123*183	178	382*257*387	800,000

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(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(t_s)	 150°C 200°C 60~120sec
Tsmax 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