

LL05BT0603B

List

List.....	1
Package outline.....	2
Features.....	2
Applications.....	2
Mechanical data.....	2
Maximum ratings	2
Electrical characteristics.....	3
Rating and characteristic curves.....	4
Pinning information.....	5
Marking Code.....	5
Suggested solder pad layout.....	5
Package Information.....	6
Reel packing.....	6
Suggested thermal profiles for soldering processes.....	7

LL05BT0603B

15W Surface Mount TVS Bi-Directional For ESD Protection-5.0V

Features

- Package optimized for high-speed lines.
- Ultra-small package (0.6mm x 0.3mm x 0.3mm).
- Protects one data, control or power line.
- Low capacitance : 0.13pF (Typical).
- Low leakage current : 0.1 μ A @V_{RWM} (Max.).
- Low clamping voltage.
- Provide transient protection :
IEC 61000-4-2 (ESD) $\pm$ 17KV(Air), $\pm$ 8KV(Contact).
- IEC 61000-4-4 (EFT) 40A (5/50ns) Cable discharge event (CDE).
- Each I/O pin can withstand over 1000 ESD Strikes for $\pm$ 8KV contact discharge.
- We declare that the material of product compliance with RoHS requirements.
- Suffix "-H" indicates Halogen-free parts, ex.LL05BT0603B-H

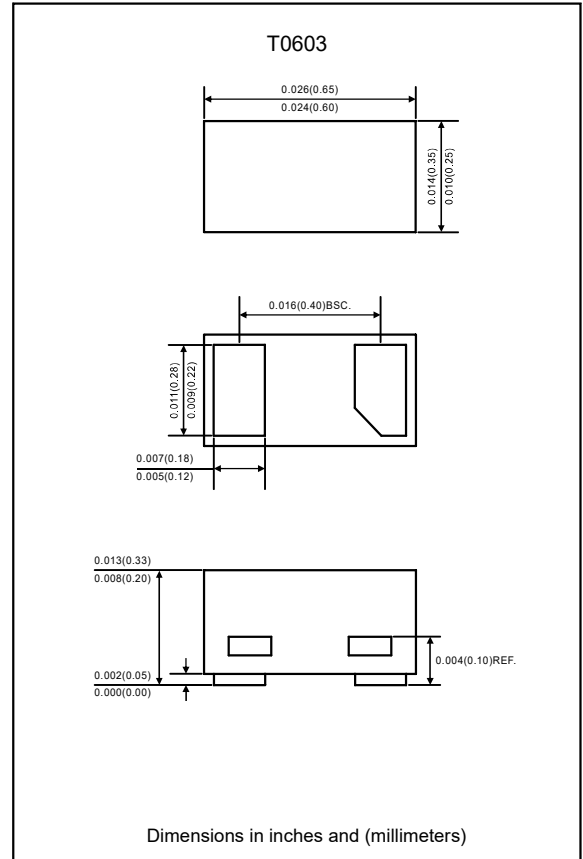
Applications

- Serial ATA.
- PCI Express.
- USB 2.0/3.0/3.1 Power and data line protection.
- HDMI 1.4/2.0.

Mechanical data

- T0603 package
- Molding compound flammability rating : UL94V-0
- Packaging : Tape and reel per EIA 481
- RoHS Compliant
- Weight : Approximated 1 mg

Package outline



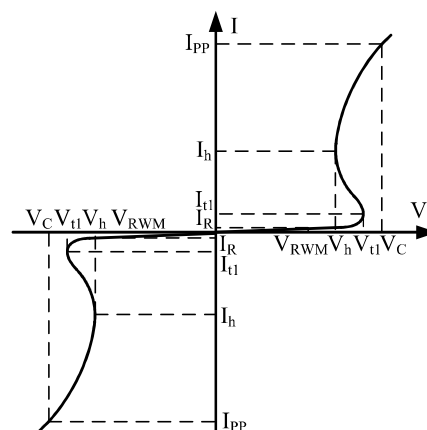
Maximum ratings (at T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak pulse power (tp=8/20 μ s)	P _{PP}	15	W
Peak pulse current (tp=8/20 μ s)	I _{PP}	3	A
ESD per IEC 61000-4-2 (Contact)	V _{ESD}	$\pm$ 8	KV
ESD per IEC 61000-4-2 (Air)		$\pm$ 17	
Operating temperature	T _{OPT}	+125	°C
Storage temperature	T _{STG}	-55 to +150	°C

LL05BT0603B**Electrical characteristics** (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Reverse stand-off voltage		V_{RWM}		4.0	5.0	V
Reverse leakage current	$V_{RWM}=5.0\text{V}$	I_R			0.1	μA
Trigger voltage	$I_{t1}=100\mu\text{A}$	V_{t1}	6.5		8.5	V
Holding voltage	$I_h=30\text{mA}$	V_h		2.4		V
Clamping voltage @ I_{pp}	$I_{pp}=1\text{A}, t_p=8/20\mu\text{s}$	V_c			4.0	V
	$I_{pp}=3\text{A}, t_p=8/20\mu\text{s}$				5.0	
Junction capacitance	$V_R=0\text{V}, f=1\text{MHz}$	C_d		0.13		pF

Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{t1}	Trigger Voltage
I_{t1}	Trigger Current @ V_{t1}
V_h	Holding Voltage
I_h	Holding Current @ V_h
V_c	Clamping Voltage @ I_{pp}
I_{pp}	Maximum Peak Pulse Current
C_d	Diode Capacitance

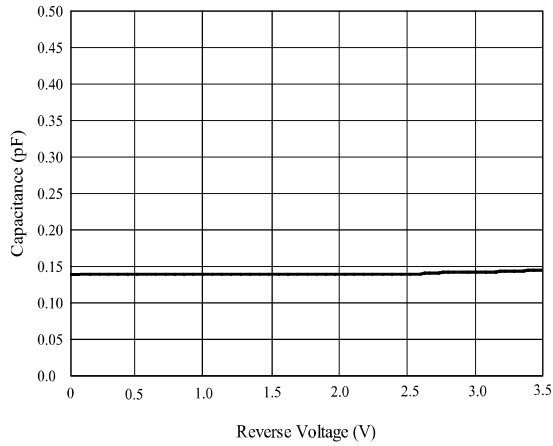


Bi-Directional TVS

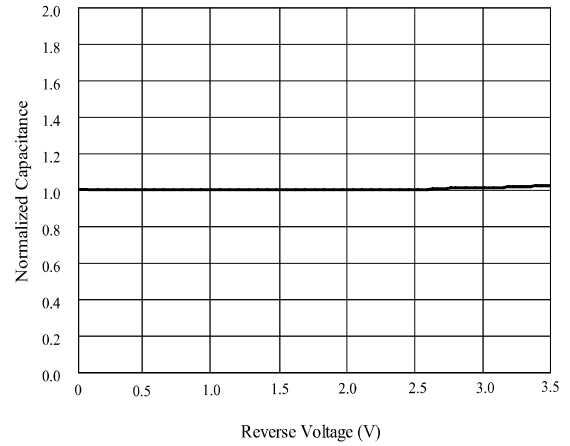
Rating and characteristic curves(LL05BT0603B)

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

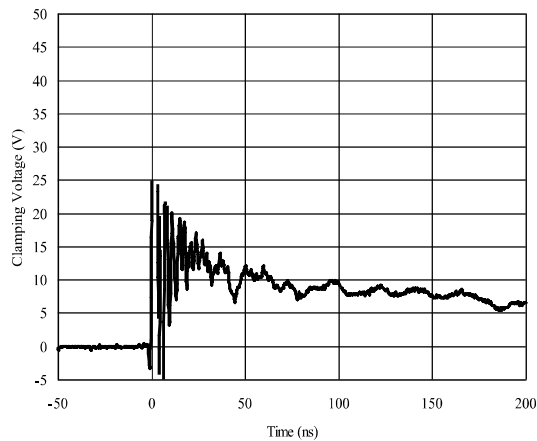
Capacitance vs. Reverse Voltage



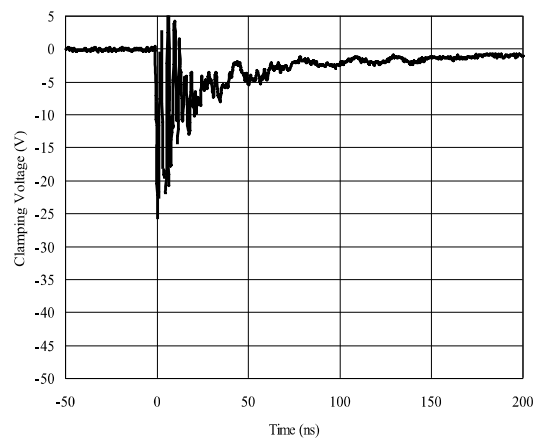
Normalized Capacitance vs. Reverse Voltage



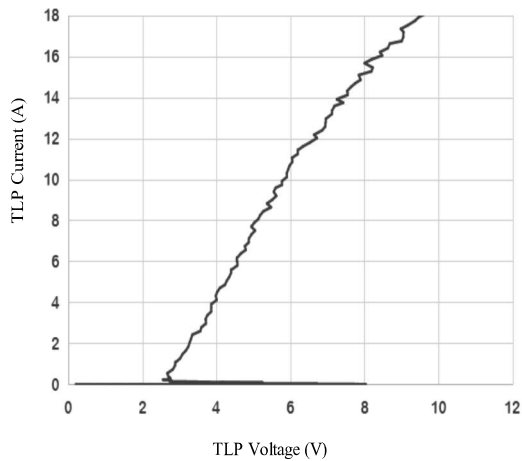
ESD Clamping of I/O to GND (+8kV Contact per IEC 61000-4-2)



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

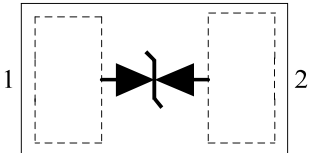


TLP Measurement of I/O to I/O

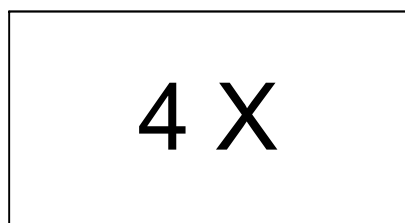


LL05BT0603B

Pinning information

Type Number	Simplified outline	Circuit Diagram
LL05BT0603B		

Marking code



Or

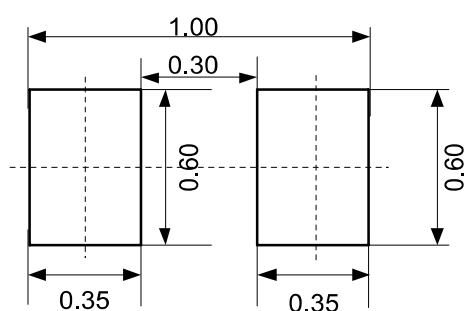
**Note:**

- (1) "4" is part number, fixed.
- (2) "X" is the internal code.

Note:

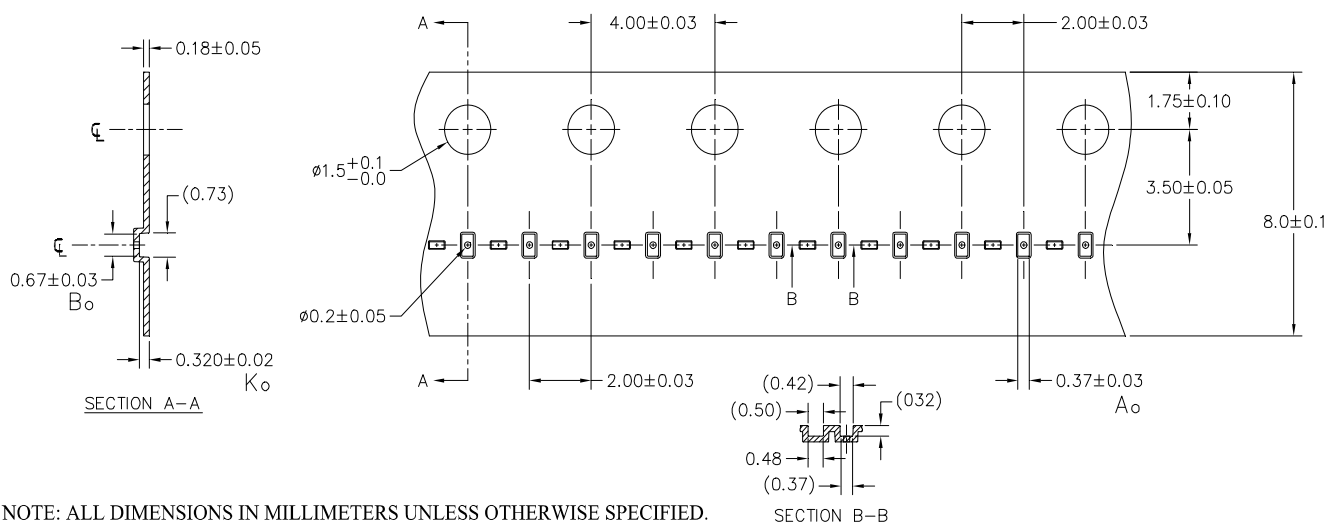
- (1) "A" is part number, fixed.
- (2) "X" is the internal code.

Suggested solder pad layout



LL05BT0603B

Packing information



A0	B0	K0
0.37 +/-0.03	0.67 +/-0.03	0.32 +/-0.02 mm

Note: All dimensions in mm unless otherwise specified

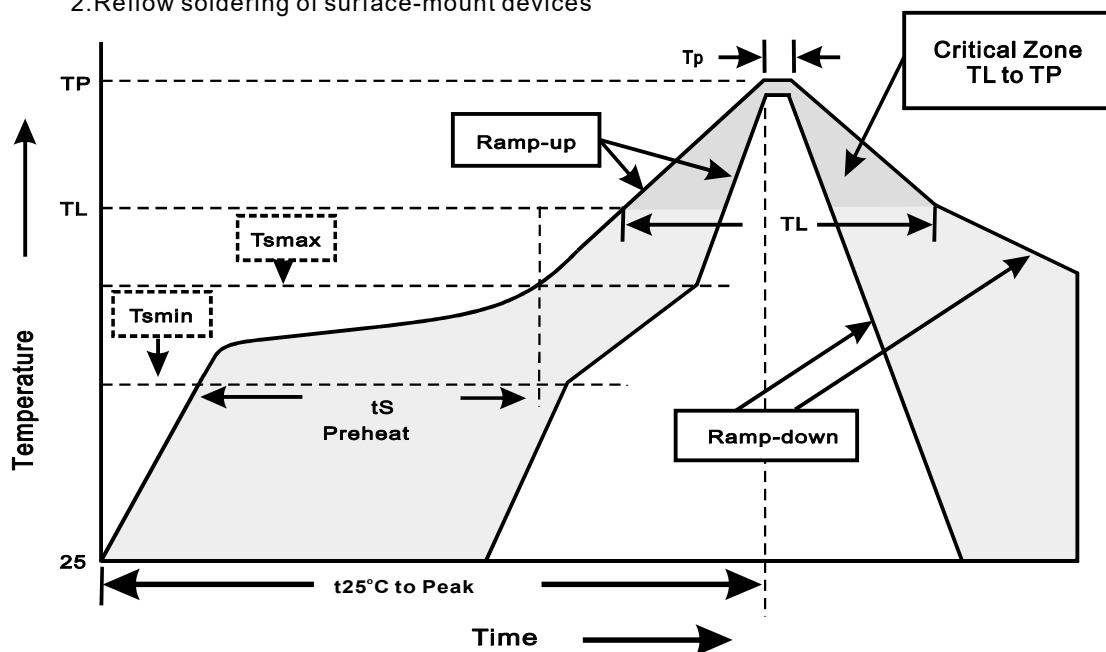
Reel packing

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)
T0603	7"	10,000	4.0	100,000	183*123*183	178	382*257*387	800,000	2.6

LL05BT0603B

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 _{min}) -Temperature Max(T _{max}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{max} 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