

LL05BTCT0603-H

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Ultra Low Capacitance Bi-Directional Snap Back ESD Protection : 5.0V

Features

- Low capacitance: 0.16pF@0V (typ.) (I/O-I/O)
- Low clamping voltage.
- Protects one I/O line.
- Transient protection for high-speed data lines.
IEC 61000-4-2 (ESD) $\pm 12\text{kV}$ (Air), $\pm 10\text{kV}$ (Contact).
IEC 61000-4-5 (Lightning) 6A(8/20 μs).
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

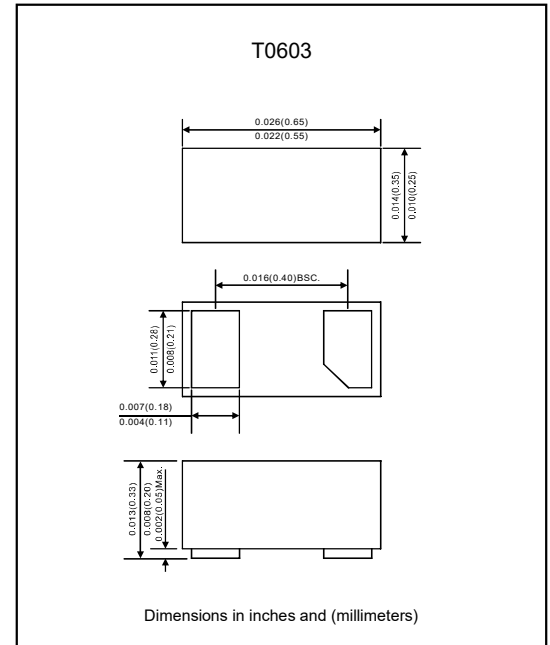
Applications

- Portable applications.
- Communication systems, computers and peripherals.
- High speed data lines: USB 2.0/4.0, thunderbolt, eSATA, display port etc.

Mechanical data

- Epoxy: UL94-V0 rated flame retardant.
- Case: Molded plastic, T0603.

Package outline



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

Parameter	Symbol	Value	Unit
Peak pulse power (8/20 μs)	P_{PK}	30	W
Peak pulse current (8/20 μs)	I_{PP}	6	A
ESD per IEC 61000-4-2 (Air)	V_{ESD}	± 12	kV
ESD per IEC 61000-4-2 (Contact)		± 10	
Operating temperature	T_J	+125	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150	$^\circ\text{C}$

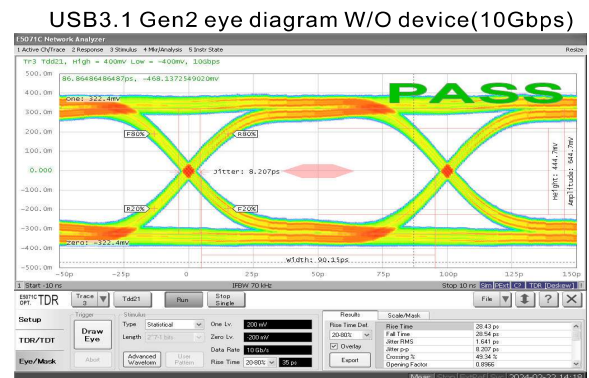
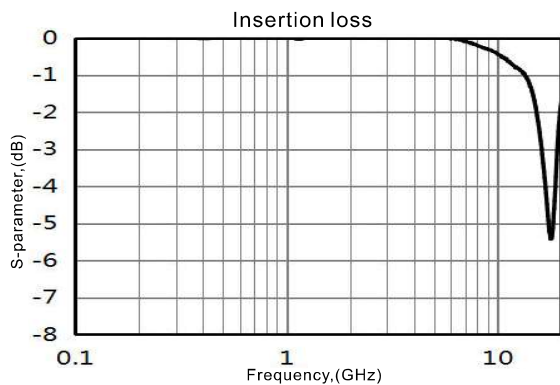
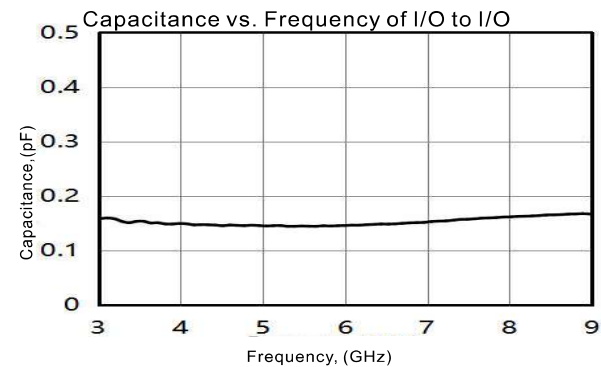
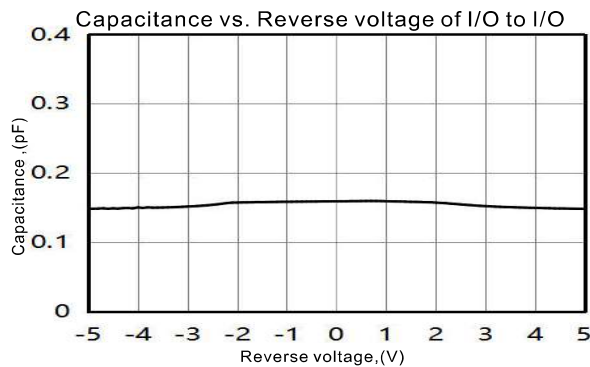
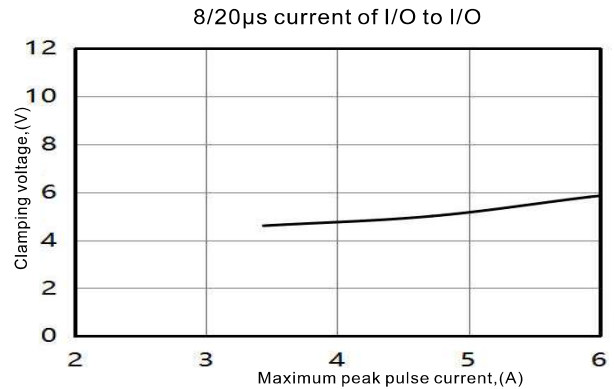
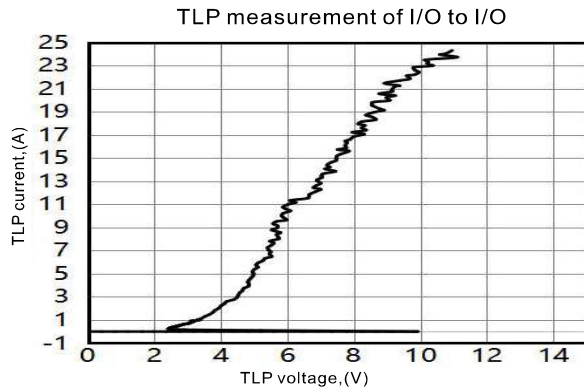
Electrical characteristics (at $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Reverse stand-off voltage		V_{RWM}			5	V
Reverse breakdown voltage	$I_T=1\text{mA}$	V_{BR}	8.5	9.4		V
Reverse leakage current	$V_{RWM}=5\text{V}$, $T=25^\circ\text{C}$	I_R		1	10	nA
Clamping voltage	$I_{PP}=6\text{A}$, $t_p=8/20\mu\text{s}$	V_C		6		V
Clamping voltage (Note 1)	$I_{PP}=8\text{A}$, $t_p=100\text{ns}$	V_C		6		V
	$I_{PP}=16\text{A}$, $t_p=100\text{ns}$			8		
Dynamic resistance (Note 1)	$I_{PP}=12\text{A}$, $t_p=100\text{ns}$	R_{dyn}		0.25		Ω
Parasitic capacitance	$V_R=0\text{V}$, $f=1.0\text{MHz}$	C_{ESD}		0.16		pF
	$V_R=0\text{V}$, $f=5.0\text{GHz}$			0.15		
Insertion loss	$f=10\text{GHz}$	α_{IL}		-0.43		dB

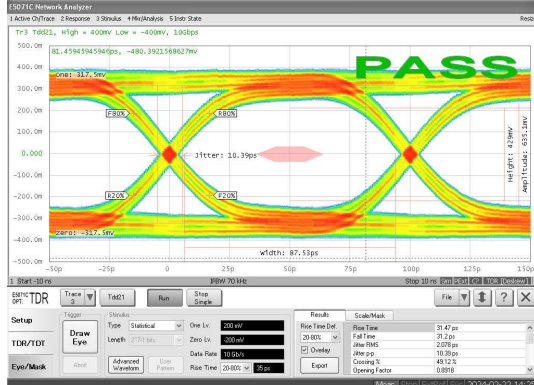
Note : 1. Measurements performed using a 100ns transmission line pulse (TLP) system.

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Rating and characteristic curves



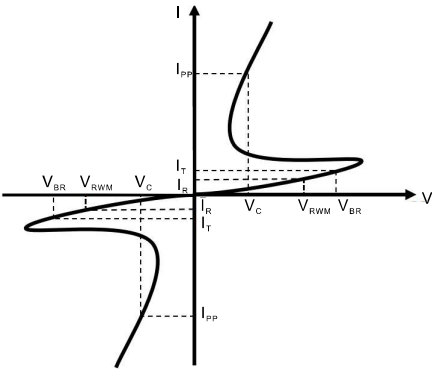
USB3.1 Gen2 eye diagram W/I device(10Gbps)



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Rating and characteristic curves

Symbol	Parameter
V_{RWM}	Normalized 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}	Maximum peak pulse current
C_{ESD}	Parasitic capacitance
R_{dyn}	Dynamic resistance
α_{IL}	Insertion loss



Bi-directional TVS

Pinning information

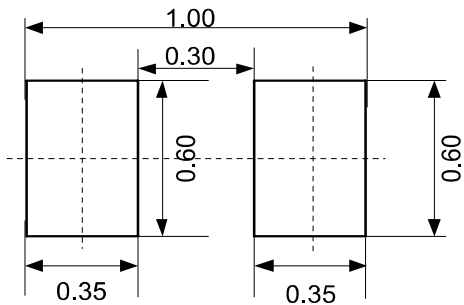
Pin	Simplified outline	Symbol
Bi-directional	Top view Bottom view	

Marking

Type number	Marking code
LL05BTCT0603-H	SX

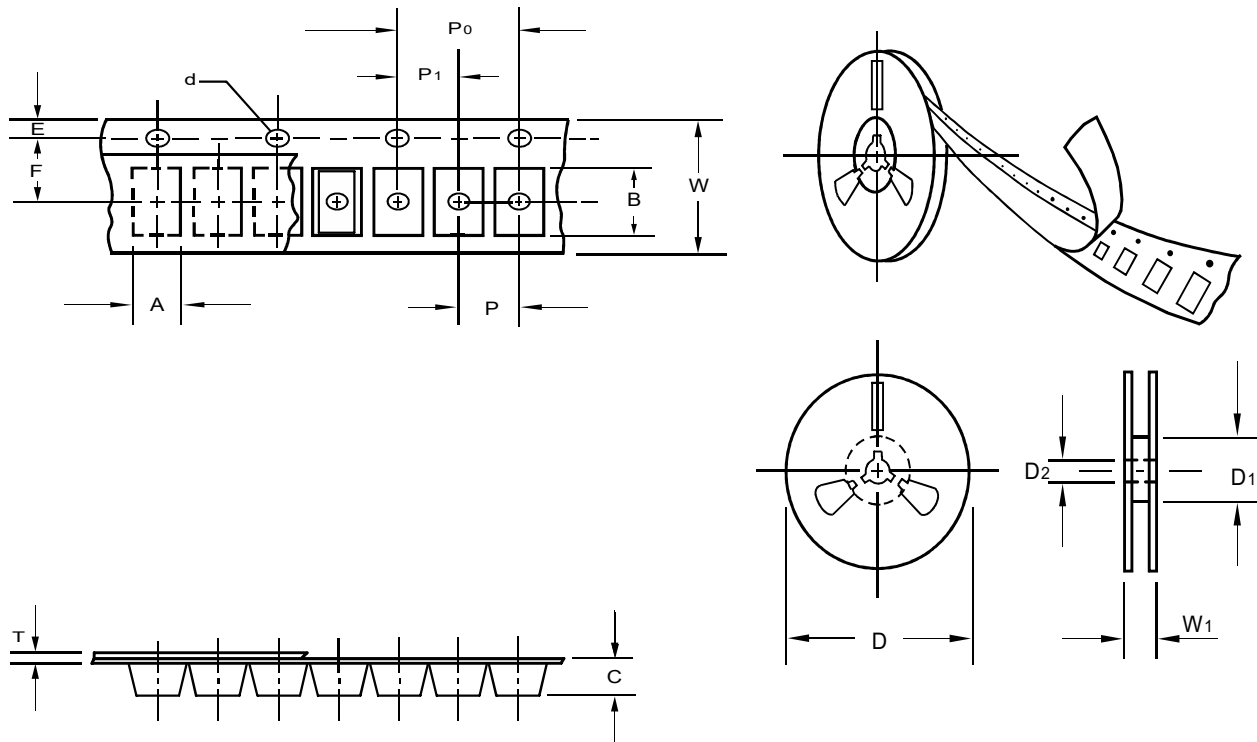
**"S" is part number, fixed.
"X" is the internal code.

Suggested solder pad layout



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Packing information



unit:mm

Item	Symbol	Tolerance	DFN0603 (T0603)
Carrier width	A	0.1	0.37
Carrier length	B	0.1	0.67
Carrier depth	C	0.1	0.32
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.0
7" Reel inner diameter	D1	min	60.0
Feed hole diameter	D2	0.5	13.5
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.5
Punch hole pitch	P	0.1	2.0
Sprocket hole pitch	P0	0.1	4.0
Embossment center	P1	0.1	2.0
Overall tape thickness	T	0.1	0.18
Tape width	W	0.3	8.0

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

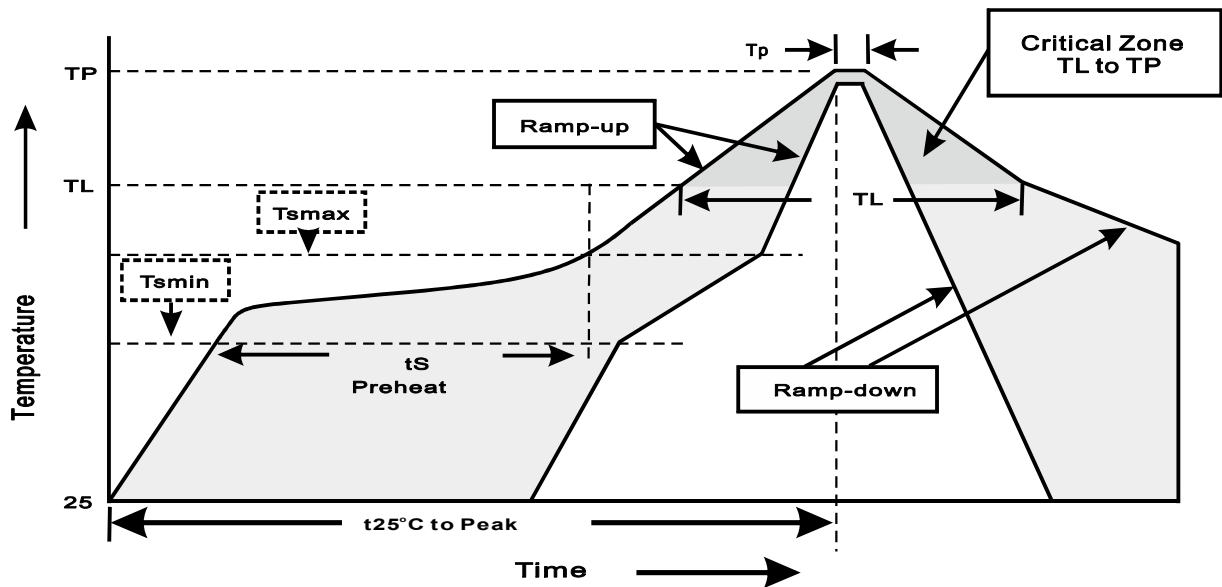
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Reel packing

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)
DFN0603 (T0603)	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(T_{smin}) -Temperature Max(T_{smax}) -Time(min to max)(t_s)	150°C 200°C 60~120sec
T_{smax} 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