

Descriptions

The LP1PP06CXXP01 series are designed to protect sensitive electronics from damage or latch-up due to ESD. They are designed to replace 0201 size multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers, and other portable electronics. It features large cross-sectional area junctions for conducting high transient currents. This device offers desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

LP1PP06CXXP01 series features extremely good ESD protection characteristics highlighted by low typical dynamic resistance, low peak ESD clamping voltage, and high ESD withstand voltage ($\pm 15\text{kV}$ contact per IEC 61000-4-2). Low maximum capacitance (5pF at $V_R=0\text{V}$) minimizes loading on sensitive circuits. Each device will protect one data line. LP1PP0603CXXP01 measures $0.6 \times 0.3 \text{ mm}$ with a nominal height of only 0.25mm. The small package gives the designer the flexibility to protect single lines in applications where arrays are not practical. The combination of small size and high ESD surge capability makes them ideal for use in portable applications such as cellular phones, digital cameras, and tablet PC's.

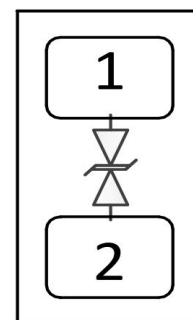
Features

- ◆ High ESD withstand Voltage: $\pm 15\text{kV}$ (Contact) and $\pm 17\text{kV}$ (Air) per IEC 61000-4-2
- ◆ Ultra-small package
- ◆ Protects one data line
- ◆ Low ESD clamping voltage
- ◆ Working voltage: 3.3V/5V
- ◆ Low capacitance: 15pF Maximum
- ◆ Lower leakage current
- ◆ Solid-state silicon-avalanche technology
- ◆ Pb-Free, Halogen Free, RoHS/WEEE compliant
- ◆ Nominal Dimensions: $0.6 \times 0.3 \times 0.25 \text{ mm}$
- ◆ Marking code: f
- ◆ Packaging: Tape and Reel

Applications

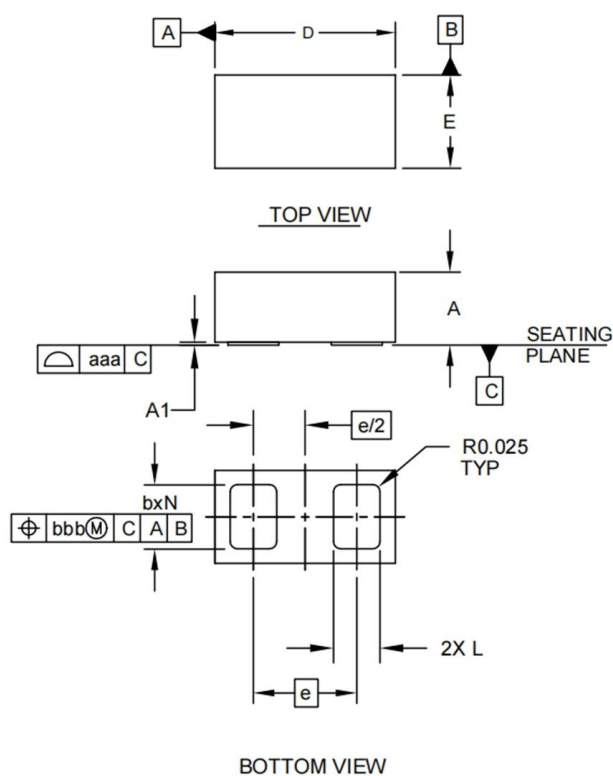
- ◆ Cellular Handsets & Accessories
- ◆ Peripherals
- ◆ Portable Instrumentation
- ◆ Notebook Computers
- ◆ Tablet PC

Schematic



Dimension(SLP0603P2X3F Unit:mm)

Symbol	Dimension	
	Millimeters	
	Min.	Max.
A	0.235	0.265
A1	0.000	0.050
b	0.200	0.240
D	0.580	0.620
E	0.280	0.320
e	0.355 BSC	
L	0.140	0.180
N	2	
aaa	0.08	
bbb	0.10	



Maximum Rating and Characteristics at 25°C ambient temperature unless otherwise Noted.

Rating	Symbol	Value	Unit
ESD per IEC 61000-4-2 (Air)	V _{ESD}	± 17	kV
ESD per IEC 61000-4-2 (Contact)		± 15	
Operating Temperature	T _J	-40 to +125	°C
Storage Temperature	T _{STG}	-55 to +150	°C

Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)**LP1PP06C3.3P01**

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Unit
Peak Pulse Current	I_{PP}	$t_p = 8/20\mu\text{s}$			4	A
Peak Pulse Power	P_{PP}	$t_p = 8/20\mu\text{s}$		40		W
Reverse Stand-Off Voltage	V_{RWM}	Pin 1 to 2 or Pin 2 to 1			3.3	V
Breakdown Voltage	V_{BR}	$I_t=50\mu\text{A}$ Pin 1 to 2 or Pin 2 to 1	3.7	4.0	4.7	V
Reverse Leakage	I_R	$V_{RWM}=3.3\text{V}$ Pin 1 to 2 or Pin 2 to 1		1	50	μA
Clamping Voltage	V_C	$I_{PP}=4\text{A}, t_p=8/20\mu\text{s}$			8.5	V
ESD Clamping Voltage	V_C	$I_{PP}=4\text{A}, t_p=0.2/100\text{ns}$		6.5		V
		$I_{PP}=16\text{A}, t_p=0.2/100\text{ns}$		10.5		V
Junction Capacitance	C_J	$V_R=0\text{V}, f=1\text{MHz}$ I/O pin to GND		12	15	pF

Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)**LP1PP06C05P01**

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Unit
Peak Pulse Current	I_{PP}	$t_p = 8/20\mu\text{s}$			2.5	A
Peak Pulse Power	P_{PP}	$t_p = 8/20\mu\text{s}$		30		W
Reverse Stand-Off Voltage	V_{RWM}	Pin 1 to 2 or Pin 2 to 1			5	V
Breakdown Voltage	V_{BR}	$I_t=1\text{mA}$ Pin 1 to 2 or Pin 2 to 1	6.5	8.5	10.5	V
Reverse Leakage	I_R	$V_{RWM}=5\text{V}$ Pin 1 to 2 or Pin2 to 1		5	20	μA
Clamping Voltage	V_C	$I_{PP}=2.5\text{A}, t_p=8/20\mu\text{s}$			12	V
ESD Clamping Voltage	V_C	$I_{PP}=4\text{A}, t_p=0.2/100\text{ns}$		8		V
		$I_{PP}=16\text{A}, t_p=0.2/100\text{ns}$		9.8		V
Junction Capacitance	C_J	$V_R=0\text{V}, f=1\text{MHz}$ I/O pin to GND		12	15	pF

Ratings and Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted)

Figure 1. ESD Clamping(8kV Contact per IEC 61000-4-2)

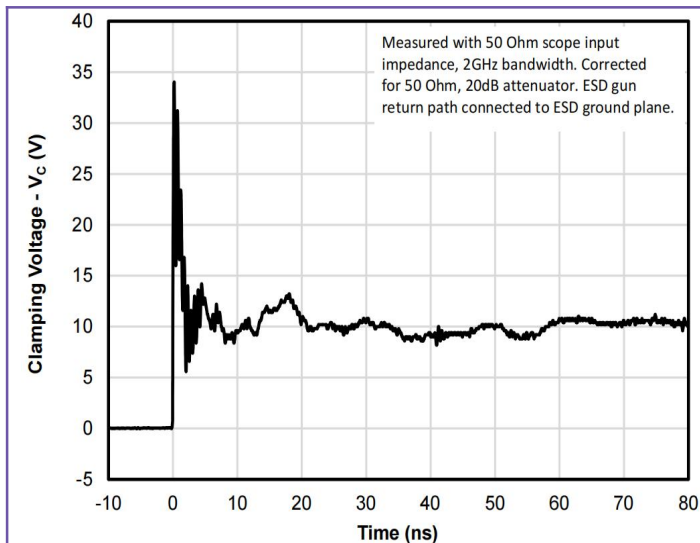


Figure 2. ESD Clamping(-8kV Contact per IEC 61000-4-2)

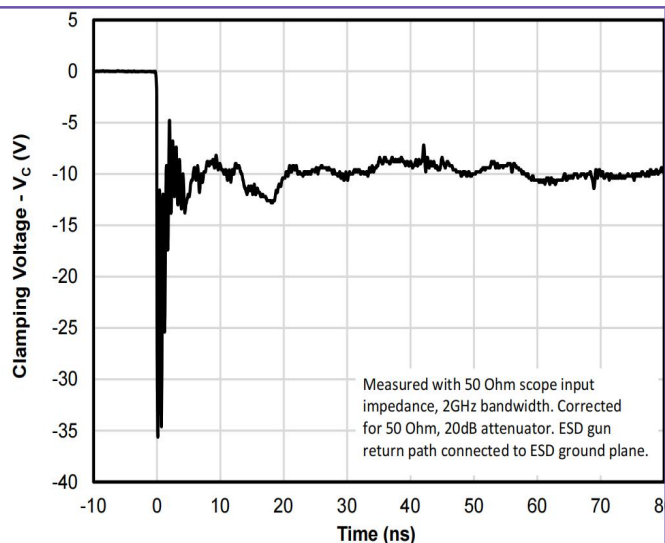


Figure 3. Clamping Voltage vs. Peak Pulse Current

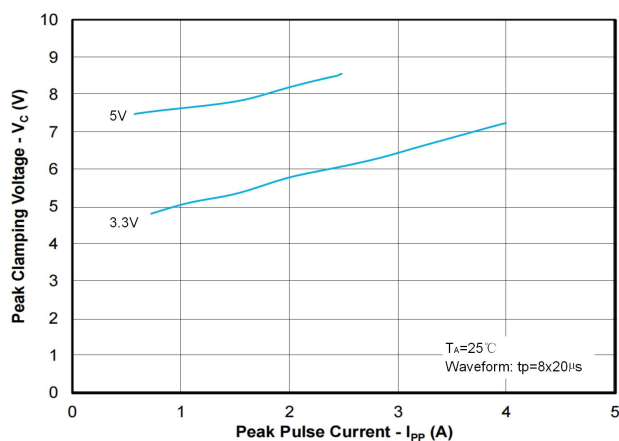
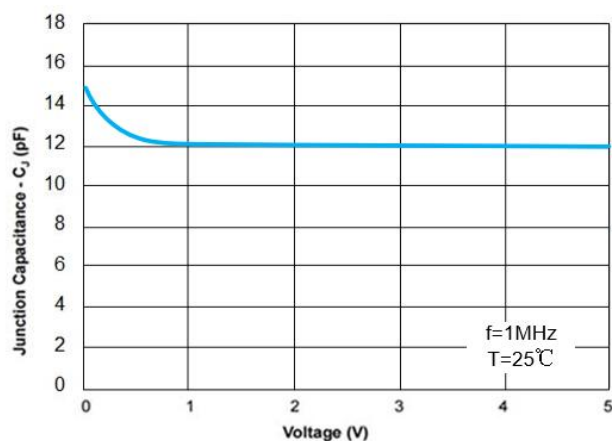
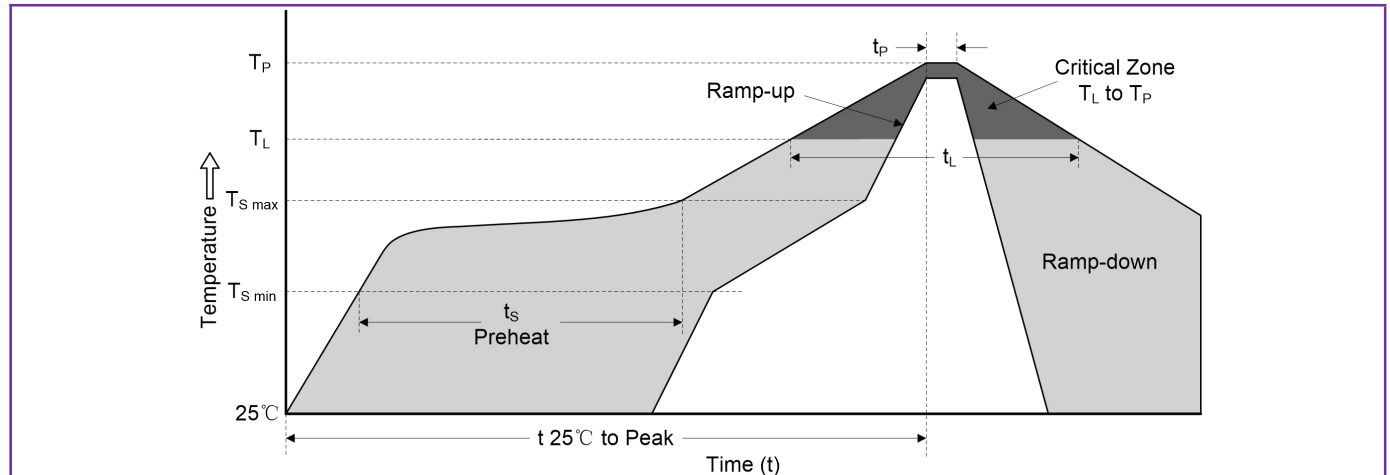


Figure 4. Junction Capacitance vs. Reverse Voltage



Reflow Soldering Parameters



Reflow Condition		Lead-free Assembly
Pre heat	-Temperature Min ($T_{S\ min}$)	150°C
	-Temperature Max ($T_{S\ max}$)	200°C
	-Time (min to max) (t_s)	60-180 seconds
Average ramp-up rate (T_L to T_P)		3°C/second max.
$T_{S\ max}$ to T_L -Ramp-up Rate		3°C/second max.
Reflow	-Temperature (T_L) (Liquidus)	217°C
	-Time (min to max) (t_s)	60-150 seconds
Peak Temperature (T_P)		260(+0/-5)°C
Time within 5°C of actual Peak Temperature (t_p)		20-40 seconds
Ramp-down Rate		6°C/second max.
Time 25°C to Peak Temperature(T_p)		8 minutes max.
Do not exceed		260°C