

PROTECTION PRODUCTS
Description

μ Clamp[®] TVS diodes are designed to protect sensitive electronics from damage or latch-up due to ESD. They feature large cross-sectional area junctions for conducting high transient currents. They offer desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

μ Clamp[®]6514P is in a 10-pin SGP2510P8 package measuring 2.5 x 1.0mm with a nominal height of only 0.60mm. Leads are finished with lead-free NiPdAu. Each line features a minimum breakdown voltage of 65V. This device gives the designer flexibility to replace multiple single line devices in space constrained applications. Flow through package design simplifies PCB layout. uClamp6514P may be used to meet the ESD immunity requirements of IEC 61000-4-2. The combination of high ESD surge capability and innovative package design makes them ideal for use in applications such as LCD Televisions, monitors, and industrial equipment.

Features

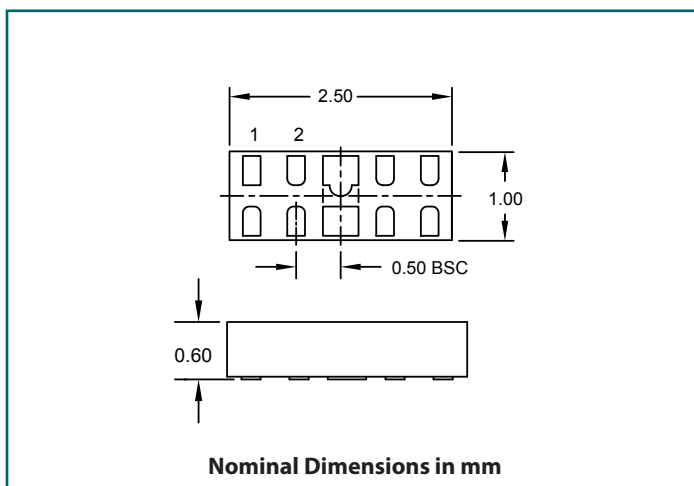
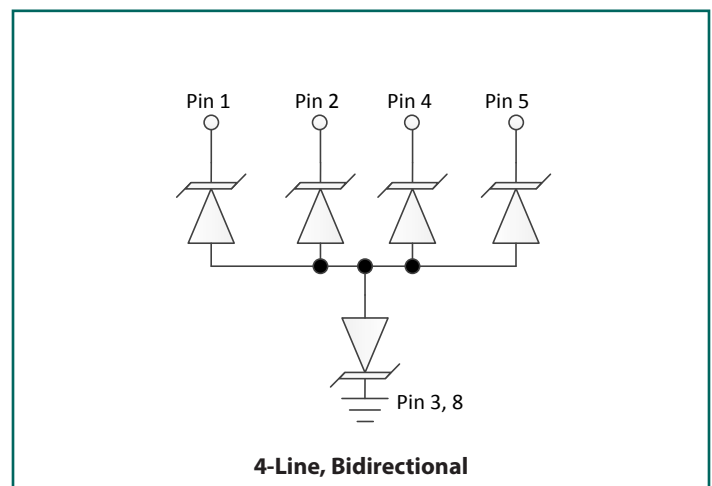
- High ESD Withstand Voltage
 - ♦ IEC 61000-4-2 (ESD) +/-8kV (contact)
- Protects up to Four VBus Lines
- Flow-Through Package
- Minimum Breakdown Voltage: 65V
- Low reverse current: <10nA typical (VR=60V)
- Solid-State Silicon-Avalanche Technology

Mechanical Characteristics

- SGP2510P8 Package
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Nominal Dimensions: 2.5 x 1.0 x 0.60 mm
- Lead Finish: NiPdAu
- Marking : Marking Code + Date Code
- Packaging : Tape and Reel

Applications

- Chip-On-Glass (COG) Panels
- VBus Protection
- LCD Televisions
- OLED Panels
- Set Top Box
- Industrial Equipment

Nominal Dimensions

Schematic


Absolute Maximum Ratings

Rating	Symbol	Value	Units
Peak Pulse Power	P_{PK}	240	W
Peak Pulse Current (tp = 8/20μs)	I_{PP}	2	A
ESD per IEC 61000-4-2 (Contact) ⁽¹⁾	V_{ESD}	±8	kV
Operating Temperature	T_J	-25 to +85	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics (T=25°C unless otherwise specified)

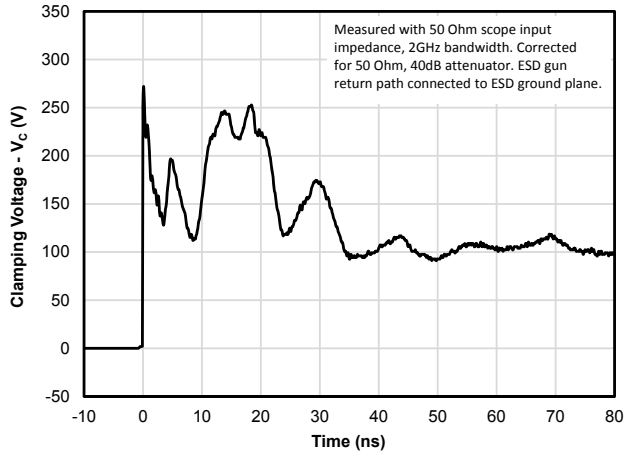
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units	
Reverse Stand-Off Voltage	V_{RWM}	Pins 1, 2, 4, and 5 to Pins 3 & 8	-25°C to 85°C		60	V	
Reverse Breakdown Voltage	V_{BR}	$I_{BR} = 1\text{mA}$ Pins 1, 2, 4, and 5 to Pins 3 & 8	-25°C to 85°C	65	75	85	V
Reverse Leakage Current	I_R	$V_{RWM} = 60\text{V}$ Pins 1, 2, 4, and 5 to Pins 3 & 8	T = 25°C		<10	100	nA
			T = 85°C		<10	150	nA
Clamping Voltage ²	V_C	$I_{PP} = 2\text{A}$, tp = 8/20μs Pins 1, 2, 4, and 5 to Pins 3 & 8		105	120	V	
Junction Capacitance	C_J	$V_R = 0\text{V}$, f = 1MHz Pins 1, 2, 4, and 5 to Pins 3 & 8	T = 25°C	8.5	10.5	pF	

Notes:

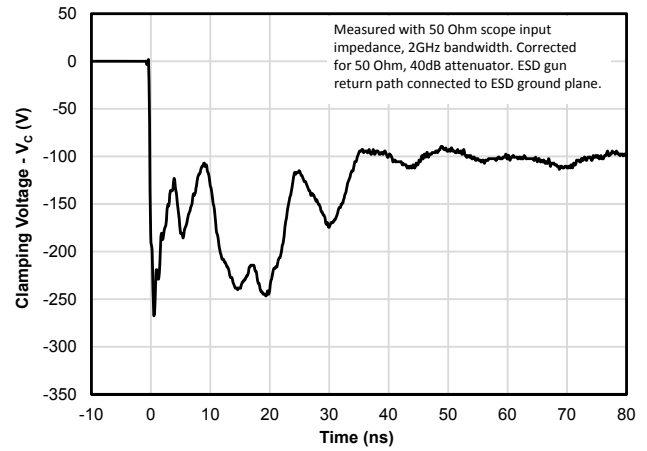
- (1) Measured with a 40dB attenuator, 50 Ohm scope input impedance, 2GHz bandwidth. ESD gun return path connected to Ground Reference Plane (GRP)
- (2) Measured using a 1.2/50us voltage, 8/20us current combination waveform. Clamping is defined as the peak voltage across the device after the device snaps back to a conducting state.
- (3) Transmission Line Pulse Test (TLP) Settings: tp = 100ns, tr = 0.2ns, I_{TLP} and V_{TLP} averaging window: $t_1 = 70\text{ns}$ to $t_2 = 90\text{ns}$.
- (4) Dynamic resistance calculated from $I_{TLP} = 4\text{A}$ to $I_{TLP} = 16\text{A}$

Typical Characteristics

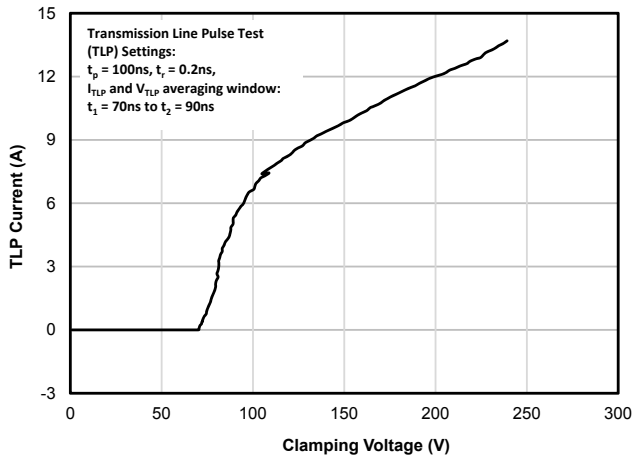
ESD Clamping (+8kV Contact per IEC 61000-4-2)



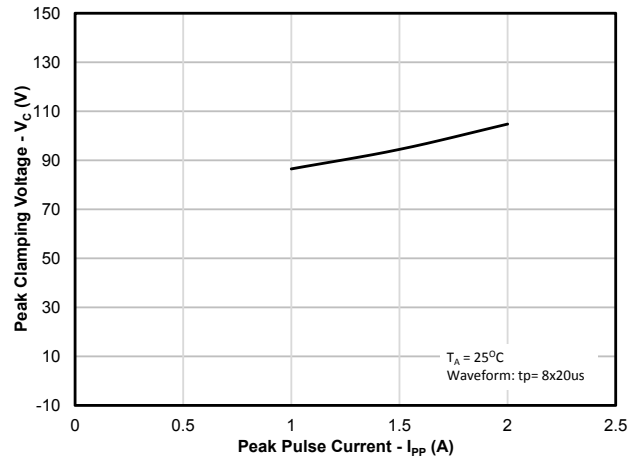
ESD Clamping (-8kV Contact per IEC 61000-4-2)



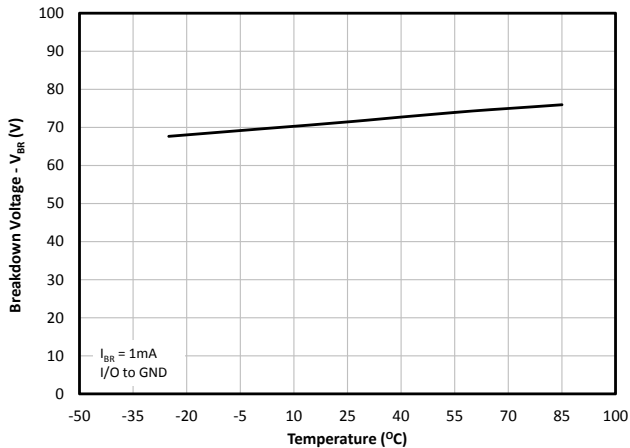
TLP IV Curve



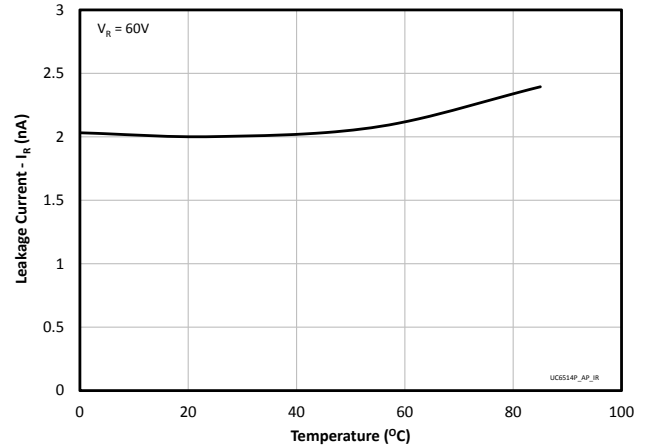
Clamping Voltage vs. Peak Pulse Current



Breakdown Voltage vs. Temperature



Reverse Leakage Current (IR) vs. Temperature



Application Information

VBus Protection of Chip-On-Glass (COG) Displays

LCD displays are often supplied as a module with a built-in driver circuitry mounted on a PCB at the rear of the module. This mechanically strengthens the display module, but it also increases the thickness (of the display module) and raises the manufacturing cost. Chip-On-Glass (COG) modules integrate the circuit driving the display mounts directly on the display glass, thus reducing the overall thickness of the module. The advantages of COG technology make it an attractive option for commercial, automotive, and industrial applications. Power is supplied to the modules from a PMIC on the control. These voltage bus lines are susceptible to ESD/EOS events and require external protection devices.

Protection Solutions

Figure 1 below is a simplified block diagram of an LCD panel circuit. The driver ICs are located on the TFT array substrate. This array is connected to a source board

which supplies power and data via a flex circuit. The timing controller or T-Con board supplies the VBus power to the source board from an on-board PMIC. uClamp6514P (2 each) are located on the source board near the flex circuit. An example of how to route the traces is shown in Figure 2. VBus lines from the PMIC are routed through each device entering at pins 1, 2, 4, and 5 and exiting at pins 10, 9, 7, and 6 respectively. Each trace should run under the device and connect the pins together. For example, the trace for VBus 1 would enter at pin 1 and exit at pin 10 and so on. Ground connection is made at the center tabs (pins 3, and 8).

Design Verification

Verification of the ESD design is always recommended. In this case, ESD contact discharges are applied at the source board on the VBus traces. An IEC 61000-4-2 compliant waveform is recommended.

Figure 1 - COG Protection Solution

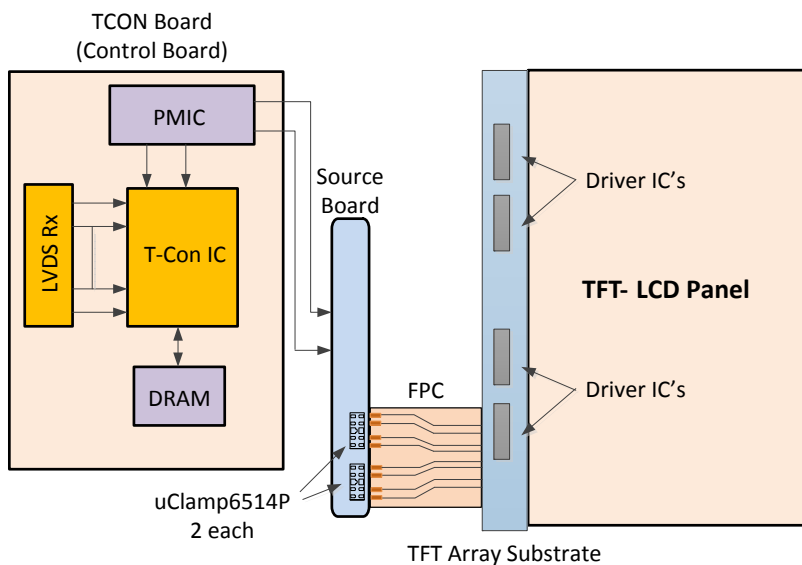
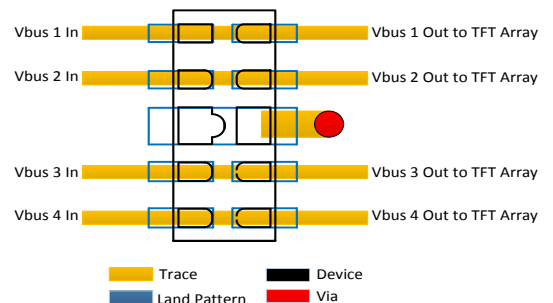
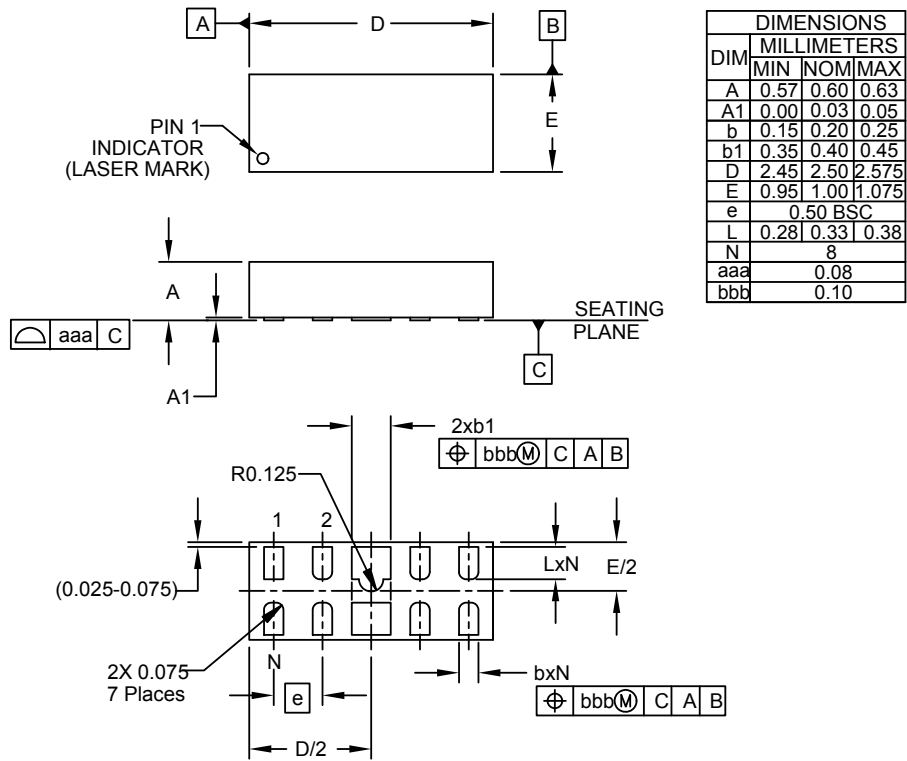


Figure 2 - uClamp6514P Trace Routing



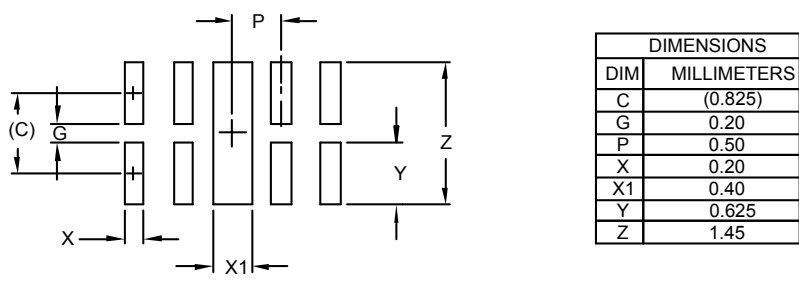
Outline Drawing - SGP2510P8



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.57	0.60	0.63
A1	0.00	0.03	0.05
b	0.15	0.20	0.25
b1	0.35	0.40	0.45
D	2.45	2.50	2.575
E	0.95	1.00	1.075
e	0.50 BSC		
L	0.28	0.33	0.38
N	8		
aaa	0.08		
bbb	0.10		

NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).

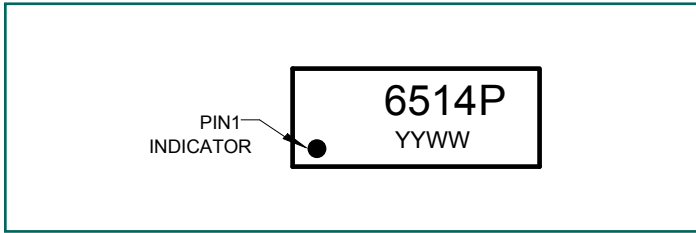
Land Pattern - SGP2510P8



DIM	MILLIMETERS
C	(0.825)
G	0.20
P	0.50
X	0.20
X1	0.40
Y	0.625
Z	1.45

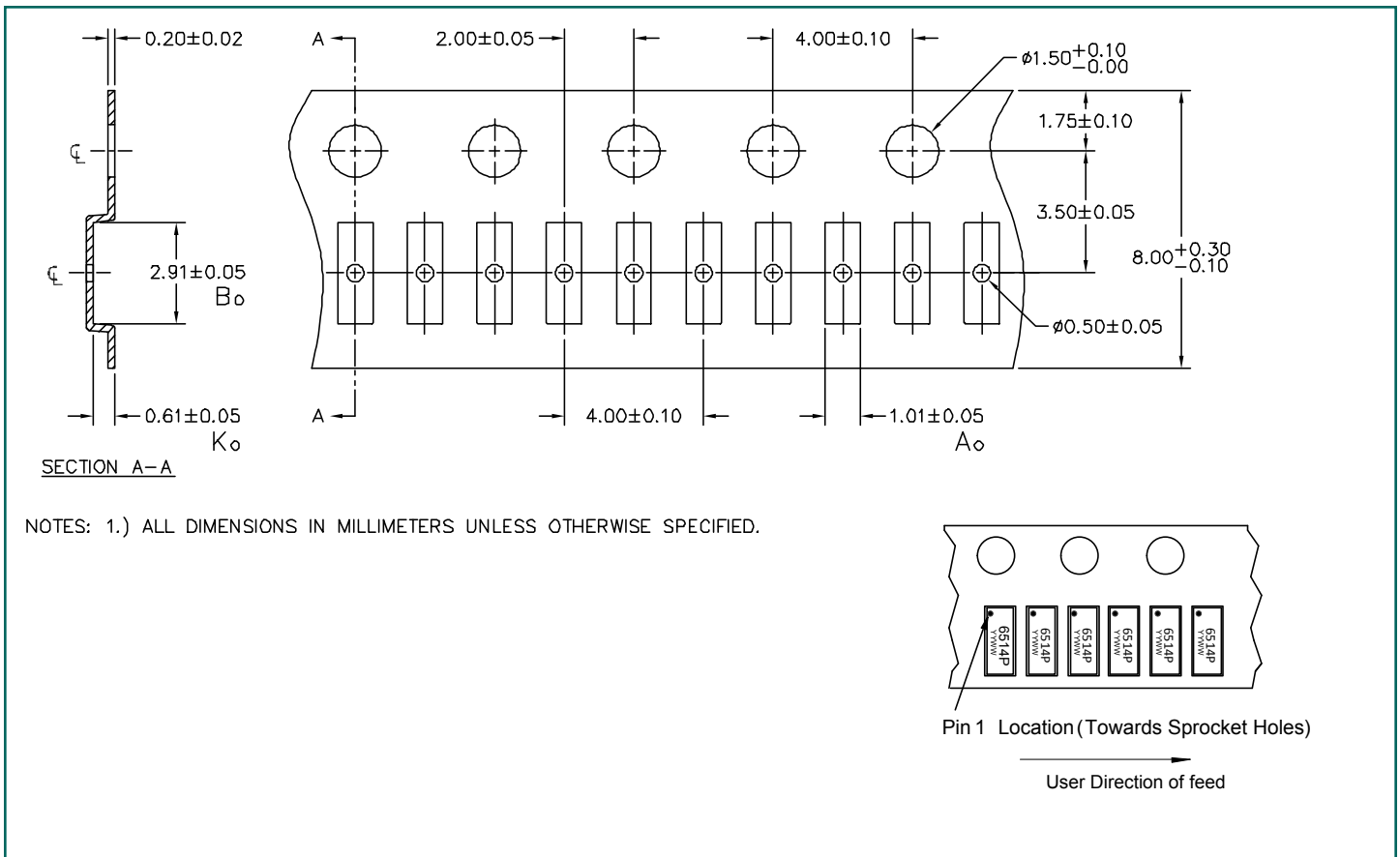
NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

Marking Code



Notes: YYWW = Alphanumeric Date Code

Tape and Reel Specification



Ordering Information

Part Number	Qty per Reel	Reel Size
uClamp6514P.TNT	10000	7 Inch
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