

## LCP3121

## Application Specific Discretes A.S.D.™

# OVERVOLTAGE AND OVERCURRENT PROTECTION FOR TELECOM LINE

#### **FEATURES AND BENEFITS**

- UNIDIRECTIONAL OVERVOLTAGE SUP-PRESSOR PROGRAMMABLE BY VOLTAGE AND CURRENT:
- PROGRAMMABLE BREAKDOWN VOLTAGE UP TO 100 V.
- PROGRAMMABLE CURRENT LIMITATION FROM 120 mA TO 600 mA.
- MULTI-LINE PROTECTION MODE : ONE DE-VICE CAN PROTECT SEVERAL LINES.
- HIGH SURGE CURRENT CAPABILITY:
   IPP = 100A for 10/1000 μs.

#### **DESCRIPTION**

Dedicated to the protection of sensitive telecom equipment, the LCP3121 provides protection which can be programmed by both voltage and current.

The breakdown voltage can be easily programmed by using an external zener diode.

The protection function programmed by the current is achieved with the use of a resistor between the gate and the cathode. The value of the resistor will determine the level of the desired current before the triggering of the device.

A multiple protection mode is also performed when using several diodes providing each line interface with an optimized protection level.

If desired, a bidirectional protection function can be achieved by the use of two LCP3121.

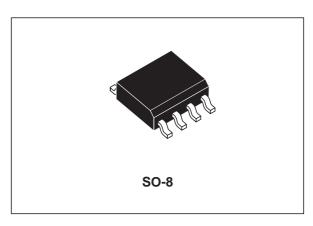
#### **COMPLIES WITH THE FOLLOWING STANDARDS:**

CCITT K20:	10/700μs	6kV
VDE 0433 :	5/310μs 10/700μs	150A 2kV
	5/310µs	50A
VDE 0878:	1.2/50µs	1.5kV
	1/20µs	40A
FCC part 68:	2/10μs	2.5kV
	2/10μs	200A (*)
BELLCORE		
TR-NWT-001089:	2/10µs	2.5kV
	2/10us	200A (*)

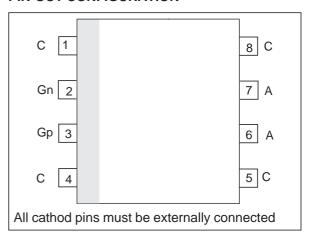
**BELLCORE TR-NWT-000974**: 10/1000μs 1kV 10/1000μs 100A

(\*) with series resistors or PTC.

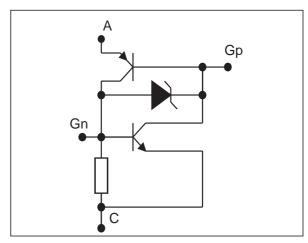
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#### **PIN-OUT CONFIGURATION**



#### **FUNCTIONAL DIAGRAM**



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## LCP3121

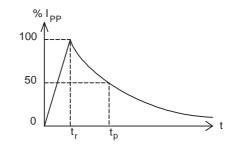
## ABSOLUTE MAXIMUM RATINGS ( Tamb = 25°C)

Symbol	Parameter	Value	Unit	
I <sub>PP</sub>	Peak pulse current (see note 1) 10/1000μs		100	Α
I <sub>TSM</sub>	Non repetitive surge peak on-state current $t_p = 10 \text{ms}$ $t = 1 \text{s}$		16 8	А
V <sub>AC</sub> V <sub>GA</sub>	Maximum voltage between A and C Maximum voltage between G (Gn or Gp) and A	100 80	V	
T <sub>stg</sub> T <sub>j</sub>	Storage temperature range Maximum junction temperature		- 40 to + 150 150	°C
TL	Maximum lead temperature for soldering during 10s		260	°C

Note 1 : Pulse waveform :

10/1000μs t<sub>r</sub>=10μs

t<sub>p</sub>=1000μs

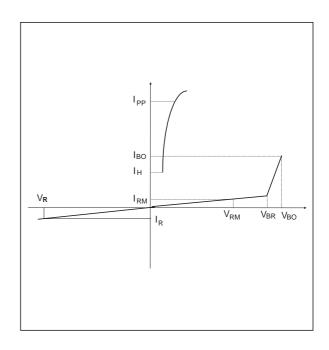


#### THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R <sub>th (j-a)</sub>	Junction to ambient	170	°C/W

## **ELECTRICAL CHARACTERISTICS** (T<sub>amb</sub> = 25°C)

Symbol	Parameter	
V <sub>RM</sub>	Stand-off voltage	
$V_{BR}$	Breakdown voltage	
V <sub>BO</sub>	Breakover voltage	
lΗ	Holding current	
I <sub>BO</sub>	Breakover current	
I <sub>RM</sub>	Leakage current at V <sub>RM</sub>	
I <sub>R</sub>	Leakage current at V <sub>R</sub>	
I <sub>PP</sub>	Peak pulse current	
V <sub>R</sub>	Continuous reverse voltage	
C <sub>off</sub>	Off-state capacitance	
V <sub>G</sub>	Gate voltage	
I <sub>GP</sub>	Gp triggering current	
I <sub>GN</sub>	Gn triggering current	



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## 1 - OPERATION WITHOUT GATE $(T_{amb} = 25 \text{ °C})$

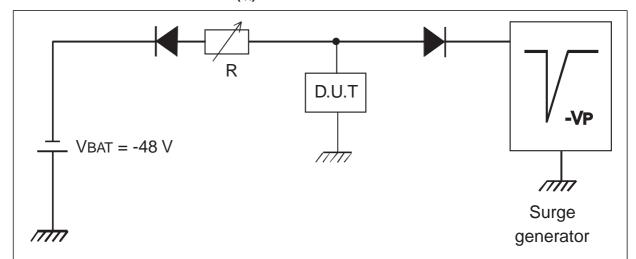
Sym- bol	Test conditions	Min.	Max.	Unit
I <sub>RM</sub>	$V_{RM} = 60V$ $V_{RM} = 90V$		5 8	μΑ
I <sub>R</sub>	at VR = 180V		50	μА
V <sub>BR</sub>	at 1mA	100		V
I <sub>BO</sub>		80	500	mA
$V_{BO}$	Measured at 50Hz		180	V
I <sub>H</sub>	See the functional test circuit	100		mA

## 2 - OPERATION WITH GATE (T<sub>amb</sub> = 25 °C)

Symbol	Test conditions	Min.	Max.	Unit
V <sub>G</sub>	I <sub>GATE</sub> = 200mA (for eigher Gn or Gp)	0.6	1.8	V
(note1)				
I <sub>GP</sub>	V <sub>Anode-cathode</sub> = 60V		180	mA
I <sub>GN</sub>	V <sub>Anode-cathode</sub> = 60V	80	200	mA

Note 1 :  $V_G = V_{GN}$ , measured between Gn and cathode  $V_G = V_{GP}$ , measured between Gp and anode

#### FUNCTIONAL HOLDING CURRENT (IH) TEST CIRCUIT: GO-NO GO TEST



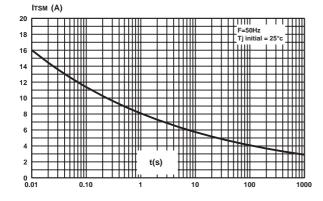
This is a GO-NO GO test which allows to confirm the holding current (I<sub>H</sub>) level in a functional test circuit.

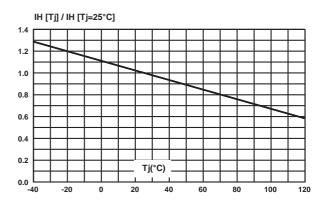
## TEST PROCEDURE:

- Adjust the current level at the I<sub>H</sub> value by short circuiting the D.U.T.
- Fire the D.U.T. with a surge current :  $I_{PP} = 10A$ ,  $10/1000\mu s$ .
- The D.U.T. will come back to the off-state within a duration of 50ms max.

**Fig. 1:** Maximum non repetitive surge peak-on-state current versus overload duration.

**Fig. 2:** Relative variation of holding current versus junction temperature (typical values).

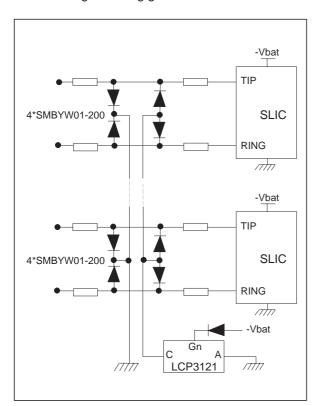




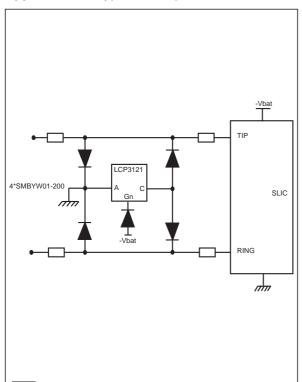
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#### **APPLICATION EXAMPLES**

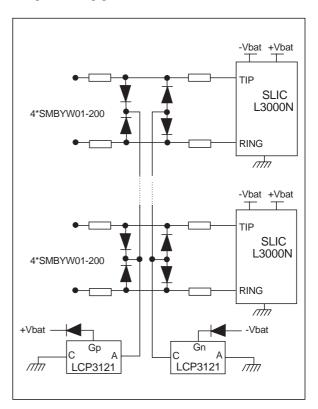
**Application 1:** Common protection for SLIC without integrated ring generator



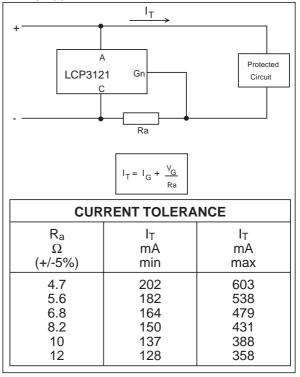
**Application 3:** Typical SLIC protection



**Application 2:** Common protection for SLIC with integrated ring generator

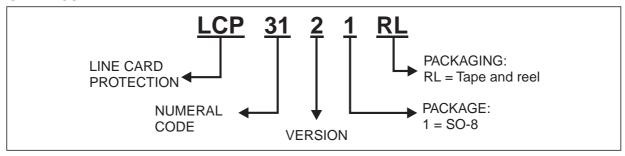


**Application 4:** Protection programmed by current for any application



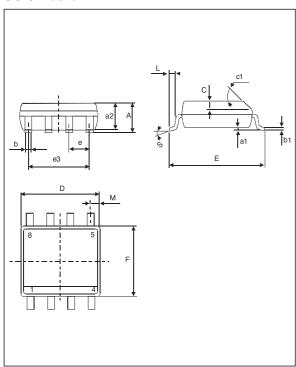
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#### **ORDER CODE**



## PACKAGE MECHANICAL DATA

SO-8 Plastic



	DIMENSIONS					
REF.	Millimetres Inches					
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
С		0.50			0.020	
c1			45°	(typ)		
D	4.8		5.0	0.189		0.197
Е	5.8		6.2	0.228		0.244
е		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.15		0.157
L	0.4		1.27	0.016		0.050
М			0.6			0.024
S	8° (max)					

#### **MARKING**

Package	Туре	Marking
SO-8	LCP3121	CP3121

Weight = 0.08 g

**Packaging:** Products supplied in anti-static tubes or tape and reel.

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