



# LCDP1511D

Application Specific Discretes  
A.S.D.<sup>TM</sup>

DUAL LINE PROGRAMMABLE TRANSIENT  
VOLTAGE SUPPRESSOR FOR SLIC PROTECTION

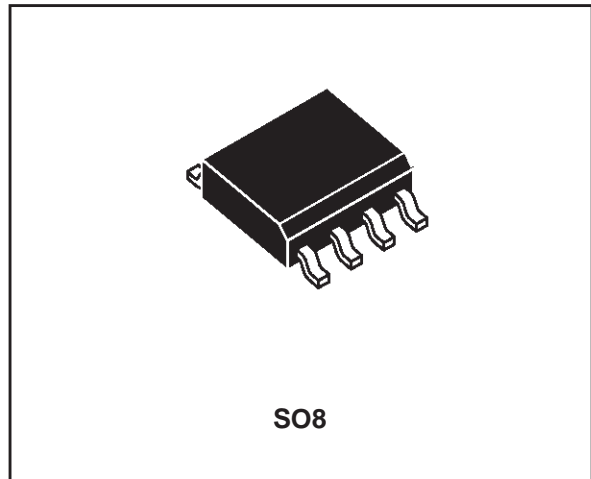
## FEATURES

- Dual line programmable transient suppressor
- Wide negative firing voltage range :  $V_{MGL} = -80V$
- Low dynamic switching voltages :  $V_{FP}$  and  $V_{DGL}$
- Low gate triggering current :  $I_{GT} = 5mA$  max
- Peak pulse current :  $I_{PP} = 15 A (10/1000 \mu s)$
- Holding current :  $I_H > 150 mA$

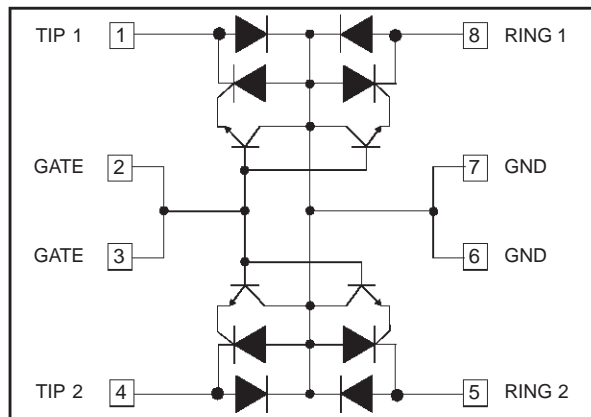
## DESCRIPTION

The LCDP1511D is a dual line protector which protects subscriber line interface circuits (SLIC) against transient overvoltages.

Positive overvoltages are clamped with diodes towards GND, while negative overvoltages are suppressed by thyristors connected to GND. The breakdown voltage of the thyristors is determined by the voltage applied to the gate, generally  $-V_{bat}$ .



## FUNCTIONAL DIAGRAM



COMPLIES WITH THE FOLLOWING STANDARDS:	Peak Surge Voltage (V)	Voltage Waveform ( $\mu s$ )	Current Waveform ( $\mu s$ )	Admissible $I_{pp}$ (A)	Necessary Resistor ( $\Omega$ )
ITU-T K20	1000	10/700	5/310	25	-
VDE0433	2000	10/700	5/310	25	40
VDE0878	1500	1.2/50	1/20	40	-
IEC1000-4-5	level 2	10/700	5/310	25	-
	level 2	1.2/50	8/20	25	-
FCC Part 68	1500	10/160	10/160	30	-
	800	10/560	10/560	20	5
BELLCORE NWT-001089-CORE	2500	2/10	2/10	70	25
	1000	10/1000	10/1000	15	45

## LCDP1511D

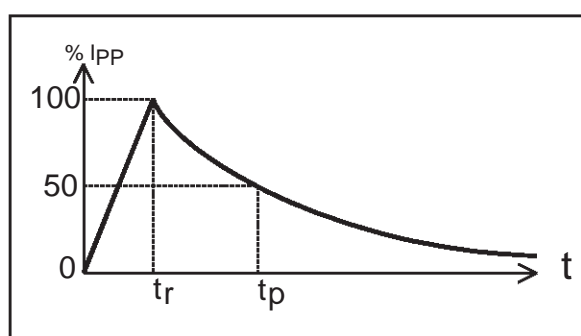
### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^{\circ}\text{C}$ ).

Symbol	Parameter	Value	Unit
$I_{PP}$	Peak pulse current (see note1)	10/1000 $\mu\text{s}$ 5/310 $\mu\text{s}$ 2/10 $\mu\text{s}$	A
$I_{FSM}$	Non repetitive surge peak on-state current (see note2)	$t_p = 10\text{ms}$ $t_p = 1\text{s}$	A
$V_{MLG}$ $V_{MGL}$	Maximum voltage LINE/GND Maximum voltage GATE/LINE	80 80	V
$T_{stg}$	Storage temperature range	- 55 to + 150	$^{\circ}\text{C}$
$T_L$	Lead temperature for soldering during 10s	260	$^{\circ}\text{C}$

**Note 1:** Pulse waveform

10/ 1000 $\mu\text{s}$	$t_r = 10 \mu\text{s}$	$t_p = 1000 \mu\text{s}$
5/ 310 $\mu\text{s}$	$t_r = 5 \mu\text{s}$	$t_p = 310 \mu\text{s}$
2/ 10 $\mu\text{s}$	$t_r = 2 \mu\text{s}$	$t_p = 10 \mu\text{s}$

**Note 2 :** Maximum current flowing through the 4 wires together.

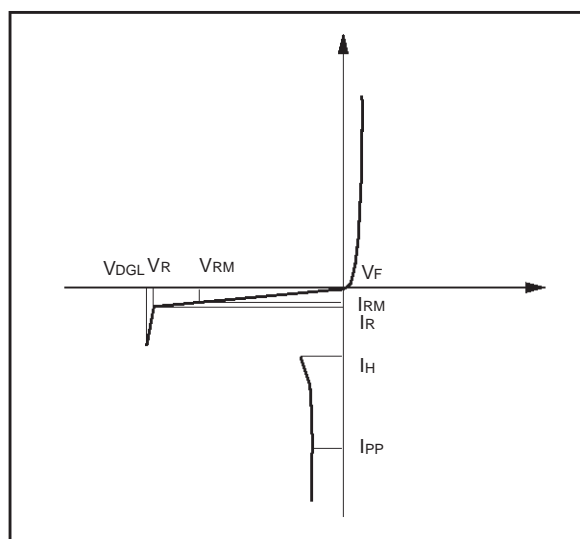


### THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction to ambient	170	$^{\circ}\text{C/W}$

### ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25^{\circ}\text{C}$ )

Symbol	Parameter
$I_{GT}$	Gate triggering current
$I_H$	Holding current
$I_{RM}$	Reverse leakage current LINE / GND
$I_{RG}$	Reverse leakage current GATE / LINE
$V_{RM}$	Reverse voltage LINE / GND
$V_{GT}$	Gate triggering voltage
$V_F$	Forward drop voltage LINE / GND
$V_{FP}$	Peak forward voltage
$V_{DGL}$	Dynamic switching voltage GATE / LINE
$V_{GATE}$	GATE / GND voltage
$V_{RG}$	Reverse voltage GATE / LINE
$C$	Capacitance LINE / GND



**PARAMETERS RELATED TO THE DIODE LINE / GND ( $T_{amb} = 25^{\circ}\text{C}$ )**

Symbol	Test conditions	Max	Unit												
$V_F$	Square pulse : $t_p = 500\mu\text{s}$ $I_F = 1\text{A}$	2	V												
$V_{FP}$ (note 1)	<table border="0"> <tr> <td>10/700<math>\mu\text{s}</math></td> <td>1kV</td> <td><math>R_p = 60\Omega</math></td> <td><math>I_{PP} = 10\text{A}</math></td> </tr> <tr> <td>1.2/50<math>\mu\text{s}</math></td> <td>1.5kV</td> <td><math>R_p = 60\Omega</math></td> <td><math>I_{PP} = 15\text{A}</math></td> </tr> <tr> <td>2/10<math>\mu\text{s}</math></td> <td>2.5kV</td> <td><math>R_p = 245\Omega</math></td> <td><math>I_{PP} = 10\text{A}</math></td> </tr> </table>	10/700 $\mu\text{s}$	1kV	$R_p = 60\Omega$	$I_{PP} = 10\text{A}$	1.2/50 $\mu\text{s}$	1.5kV	$R_p = 60\Omega$	$I_{PP} = 15\text{A}$	2/10 $\mu\text{s}$	2.5kV	$R_p = 245\Omega$	$I_{PP} = 10\text{A}$	5 10 20	V
10/700 $\mu\text{s}$	1kV	$R_p = 60\Omega$	$I_{PP} = 10\text{A}$												
1.2/50 $\mu\text{s}$	1.5kV	$R_p = 60\Omega$	$I_{PP} = 15\text{A}$												
2/10 $\mu\text{s}$	2.5kV	$R_p = 245\Omega$	$I_{PP} = 10\text{A}$												

note 1 : see test circuit for  $V_{FP}$ ,  $R_p$  is the protection resistor located on the line card

**PARAMETERS RELATED TO THE PROTECTION THYRISTOR ( $T_{amb} = 25^{\circ}\text{C}$ )**

Symbol	Test conditions	Min	Max	Unit												
$I_{GT}$	$V_{GND/LINE} = -48\text{V}$		5	mA												
$I_H$	$V_{GATE} = -48\text{V}$ (see note 2)	150		mA												
$V_{GT}$	at $I_{GT}$		2.5	V												
$I_{RG}$	$V_{RG} = -75\text{V}$		5	$\mu\text{A}$												
$V_{DGL}$	$V_{GATE} = -48\text{V}$ (see note 3) <table border="0"> <tr> <td>10/700<math>\mu\text{s}</math></td> <td>1kV</td> <td><math>R_p = 60\Omega</math></td> <td><math>I_{PP} = 10\text{A}</math></td> </tr> <tr> <td>1.2/50<math>\mu\text{s}</math></td> <td>1.5kV</td> <td><math>R_p = 60\Omega</math></td> <td><math>I_{PP} = 15\text{A}</math></td> </tr> <tr> <td>2/10<math>\mu\text{s}</math></td> <td>2.5kV</td> <td><math>R_p = 245\Omega</math></td> <td><math>I_{PP} = 10\text{A}</math></td> </tr> </table>	10/700 $\mu\text{s}$	1kV	$R_p = 60\Omega$	$I_{PP} = 10\text{A}$	1.2/50 $\mu\text{s}$	1.5kV	$R_p = 60\Omega$	$I_{PP} = 15\text{A}$	2/10 $\mu\text{s}$	2.5kV	$R_p = 245\Omega$	$I_{PP} = 10\text{A}$		7 15 20	V
10/700 $\mu\text{s}$	1kV	$R_p = 60\Omega$	$I_{PP} = 10\text{A}$													
1.2/50 $\mu\text{s}$	1.5kV	$R_p = 60\Omega$	$I_{PP} = 15\text{A}$													
2/10 $\mu\text{s}$	2.5kV	$R_p = 245\Omega$	$I_{PP} = 10\text{A}$													

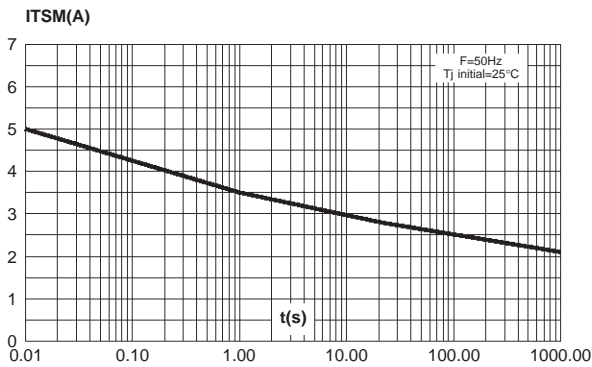
note 2 : see functional holding current test circuit

note 3 : See test circuit for  $V_{DGL}$   
The oscillations with a time duration lower than 50ns are not taken into account

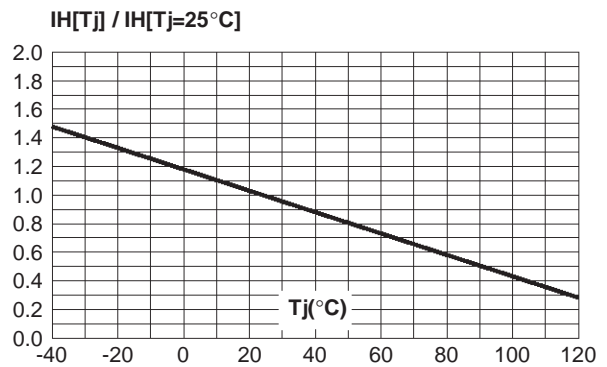
**PARAMETERS RELATED TO LINE / GND ( $T_{amb} = 25^{\circ}\text{C}$ )**

Symbol	Test conditions	Max	Unit
$I_{RM}$	$V_{GATE/LINE} = -1\text{V}$ $V_{RM} = -75\text{V}$	5	$\mu\text{A}$
C	$V_R = -3\text{V}$ $F = 1\text{MHz}$ $V_R = -48\text{V}$ $F = 1\text{MHz}$	200 100	pF

**Fig. 1:** Surge peakcurrent versus overload duration.



**Fig. 2:** Relative variation of holding current versus junction temperature.



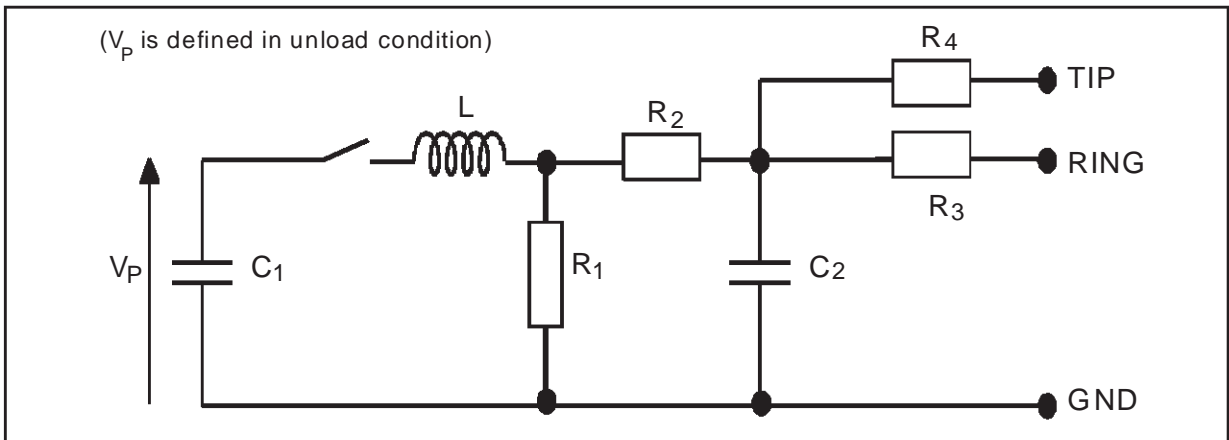
**FUNCTIONAL HOLDING CURRENT ( $I_H$ ) TEST CIRCUIT : GO-NO GO TEST**

This is a GO-NO GO test which allows to confirm the holding current ( $I_H$ ) level in a functional test circuit.

**TEST PROCEDURE :**

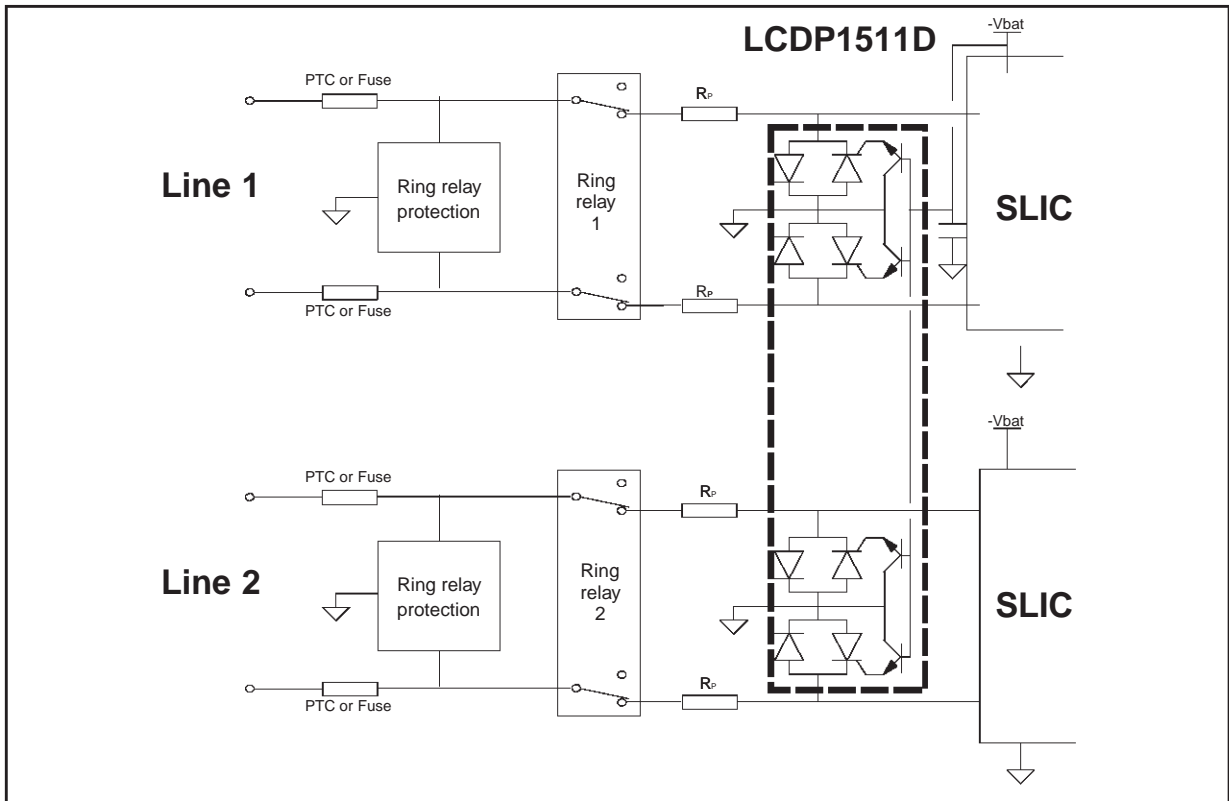
- Adjust the current level at the  $I_H$  value by short circuiting the D.U.T.
- Fire the D.U.T. with a surge current :  $I_{PP} = 15A, 10/1000\mu s$ .
- The D.U.T. will come back to the off-state within a duration of 50ms max.

**TEST CIRCUIT FOR  $V_{FP}$  AND  $V_{DGL}$  PARAMETERS**

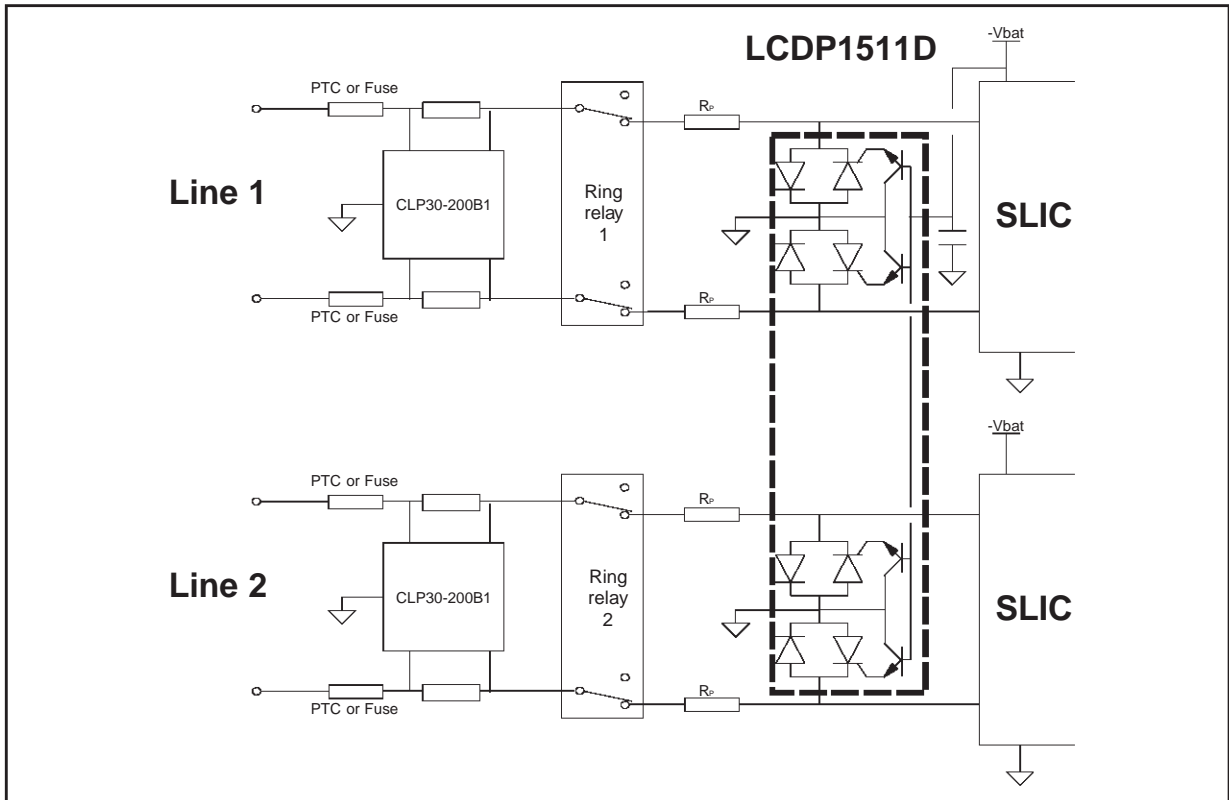


Pulse ( $\mu s$ )		$V_p$ (V)	$C_1$ ( $\mu F$ )	$C_2$ (nF)	$L$ ( $\mu H$ )	$R_1$ ( $\Omega$ )	$R_2$ ( $\Omega$ )	$R_3$ ( $\Omega$ )	$R_4$ ( $\Omega$ )	$I_{PP}$ (A)	$R_p$ ( $\Omega$ )
$t_r$	$t_p$										
10	700	1000	20	200	0	50	15	25	25	10	60
1.2	50	1500	1	33	0	76	13	25	25	15	60
2	10	2500	10	0	1.1	1.3	0	3	3	10	245

**APPLICATION CIRCUIT: PABX line protection**

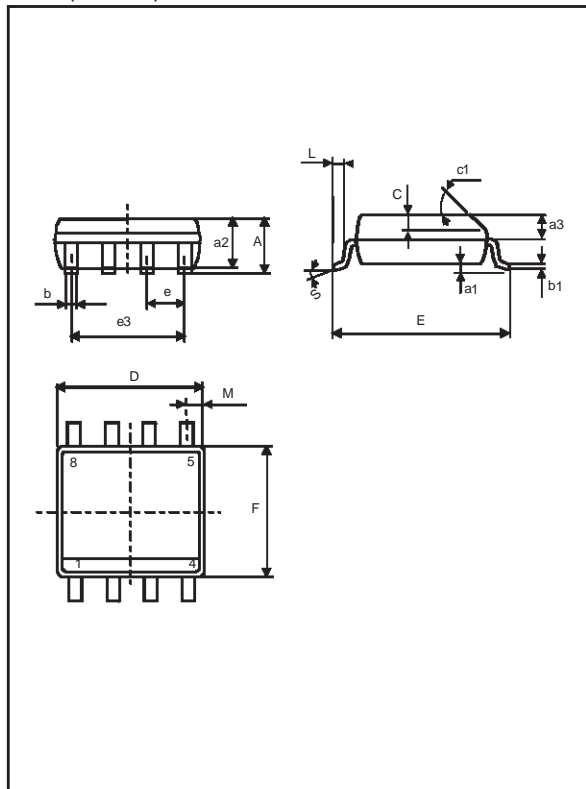


**APPLICATION CIRCUIT: Line Card protection**



## LCDP1511D

### PACKAGE MECHANICAL DATA SO8 (Plastic)



REF.	DIMENSIONS					
	Millimetres			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25	0.50	0.50	0.010		0.020
c1	45° (typ)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		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
M			0.6			0.024
S	8° (max)					

Ordre code	Marking	Package	Weight	Base qty	Delivery mode
LCDP1511D	LCDP15	SO8	0.077 g	100	Tube
LCDP1511DRL	LCDP15	SO8	0.077 g	2500	Tape & reel

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

© 1999 STMicroelectronics - Printed in Italy - All rights reserved.

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia  
Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - U.S.A.

<http://www.st.com>