



# ESDA6V1S3 ESDA6V2S6

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

TRANSIL<sup>TM</sup> ARRAY  
FOR ESD PROTECTION

## APPLICATIONS

Where transient overvoltage protection in ESD sensitive equipment is required, such as :

- COMPUTERS
- PRINTERS
- COMMUNICATION SYSTEMS
- GSM HANDSETS AND ACCESSORIES
- OTHER TELEPHONE SETS

## FEATURES

- 18 UNIDIRECTIONAL TRANSIL<sup>TM</sup> FUNCTIONS
- LOW LEAKAGE CURRENT:  $I_R \text{ max.} < 2 \mu\text{A}$
- 200 W PEAK PULSE POWER (8/20  $\mu\text{s}$ )

## DESCRIPTION

The ESDA6xxSx is a monolithic voltage suppressor designed to protect components which are connected to data and transmission lines against ESD.

It clamps the voltage just above the logic level supply for positive transients, and to a diode drop below ground for negative transients.

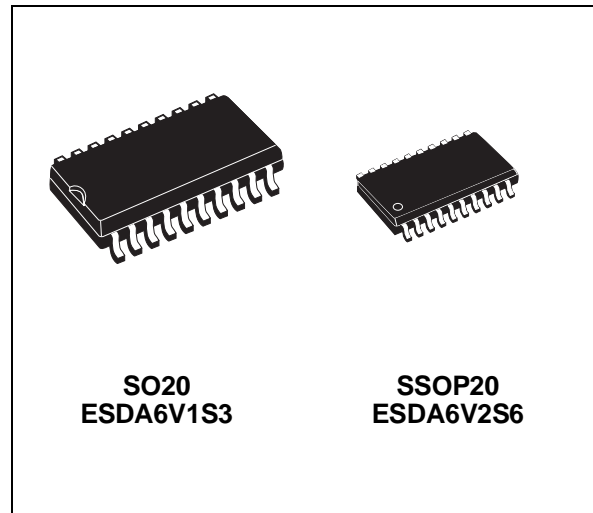
## BENEFITS

High ESD protection level : up to 25 kV  
High integration  
Suitable for high density boards

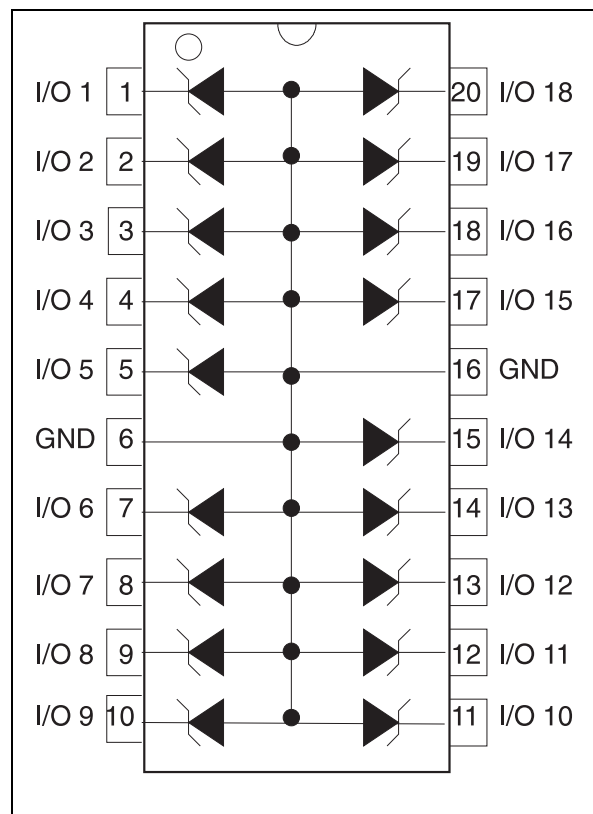
## COMPLIES WITH THE FOLLOWING STANDARDS :

IEC 1000-4-2 : level 4

MIL STD 883C-Method 3015-6 : class3  
(human body model)



## FUNCTIONAL DIAGRAM



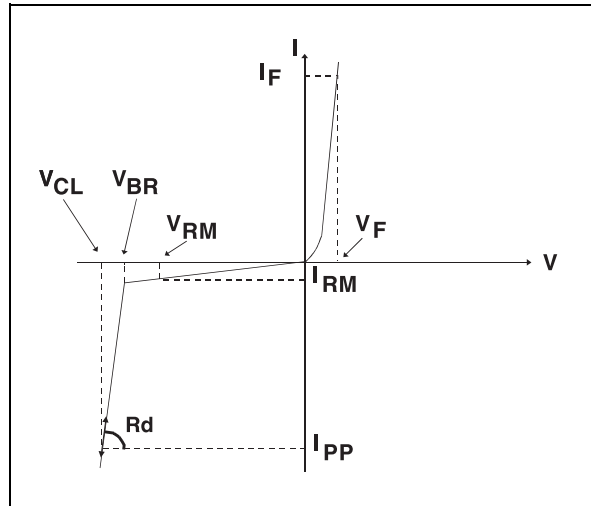
## ESDA6V1S3 / ESDA6V2S6

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

Symbol	Parameter	Value	Unit
$V_{PP}$	Electrostatic discharge MIL STD 883C - Method 3015-6	25	kV
$P_{PP}$	Peak pulse power (8/20 $\mu\text{s}$ )	200	W
$T_{stg}$ $T_j$	Storage temperature range Maximum junction temperature	- 55 to + 150 150	$^{\circ}\text{C}$ $^{\circ}\text{C}$
$T_L$	Maximum lead temperature for soldering during 10s	260	$^{\circ}\text{C}$

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

Symbol	Parameter
$V_{RM}$	Stand-off voltage
$V_{BR}$	Breakdown voltage
$V_{CL}$	Clamping voltage
$I_{RM}$	Leakage current
$I_{PP}$	Peak pulse current
$\alpha T$	Voltage temperature coefficient
$C$	Capacitance
$R_d$	Dynamic resistance
$V_F$	Forward voltage drop



Types	$V_{BR}$ @ $I_R$			$I_{RM}$ @ $V_{RM}$		$R_d$	$\alpha T$	$C$	$V_F$ @ $I_F$	
	min.	max.		max.		typ.	max.	typ.	max.	
	note1			note1		note 2	note 3	0V bias		
	V	V	mA	$\mu\text{A}$	V	$\Omega$	$10^{-4}/^{\circ}\text{C}$	pF	V	mA
ESDA6V1S3	6.1	7.2	1	2	5.25	0.5	6	120	1.25	200
ESDA6V2S6	6.2	7.2	1	2	5.25	0.5	6	100	1.25	200

**Note 1 :** Between any I/O pin and Ground

**Note 2 :** Square pulse,  $I_{PP} = 25\text{A}$  for ESDA6V1S3 and  $I_{PP} = 15\text{A}$  for ESDA6V2S6,  $t_p = 2.5\mu\text{s}$

**Note 3 :**  $\Delta V_{BR} = \alpha T * [T_{amb} - 25] * V_{BR}(25^{\circ}\text{C})$

## CALCULATION OF THE CLAMPING VOLTAGE

### USE OF THE DYNAMIC RESISTANCE

The ESDA family has been designed to clamp fast spikes like ESD. Generally the PCB designers need to calculate easily the clamping voltage  $V_{CL}$ . This is why we give the dynamic resistance in addition to the classical parameters. The voltage across the protection cell can be calculated with the following formula:

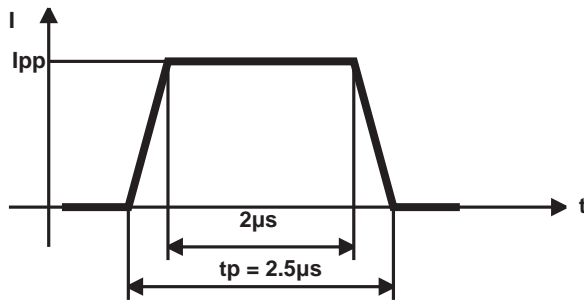
$$V_{CL} = V_{BR} + R_d I_{PP}$$

Where  $I_{PP}$  is the peak current through the ESDA cell.

As the value of the dynamic resistance remains stable for a surge duration lower than  $20\mu s$ , the  $2.5\mu s$  rectangular surge is well adapted. In addition both rise and fall times are optimized to avoid any parasitic phenomenon during the measurement of  $R_d$ .

### DYNAMIC RESISTANCE MEASUREMENT

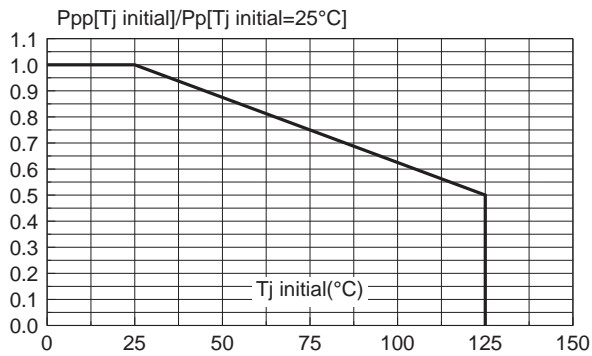
The short duration of the ESD has led us to prefer a more adapted test wave, as below defined, to the classical 8/20 $\mu s$  and 10/1000 $\mu s$  surges.



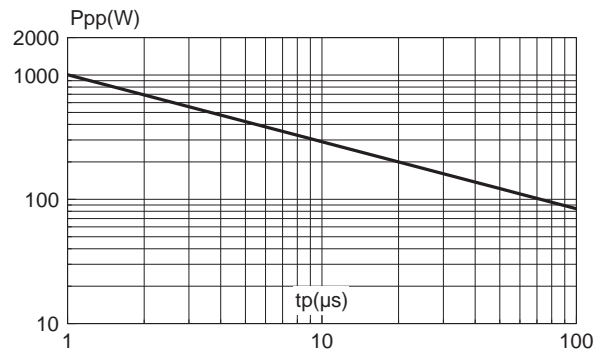
2.5 $\mu s$  duration measurement wave.

## ESDA6V1S3 / ESDA6V2S6

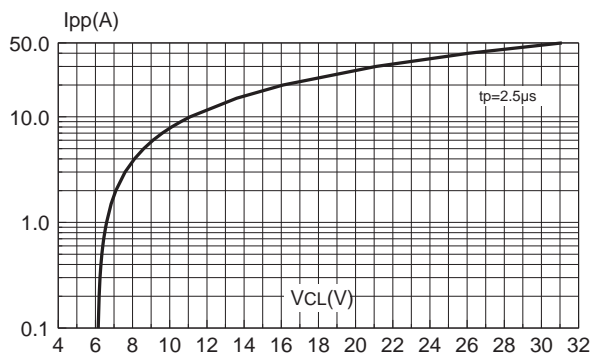
**Fig. 1** : Peak power dissipation versus initial junction temperature.



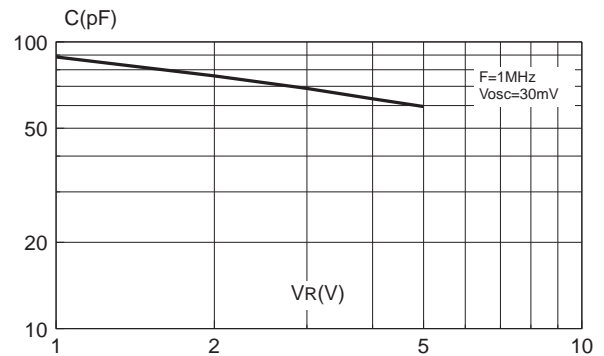
**Fig. 2** : Peak pulse power versus exponential pulse duration ( $T_j \text{ initial} = 25^\circ\text{C}$ ).



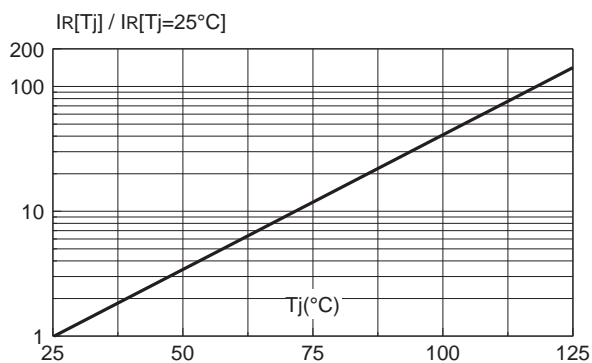
**Fig. 3** : Clamping voltage versus peak pulse current ( $T_j \text{ initial} = 25^\circ\text{C}$ ). Rectangular waveform  $t_p = 2.5 \mu\text{s}$ .



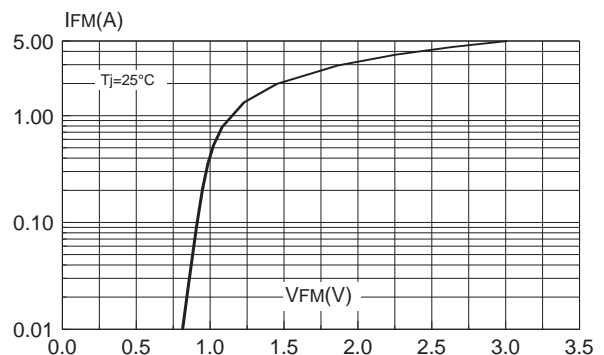
**Fig. 4** : Capacitance versus reverse applied voltage (typical values).



**Fig. 5** : Relative variation of leakage current versus junction temperature (typical values).

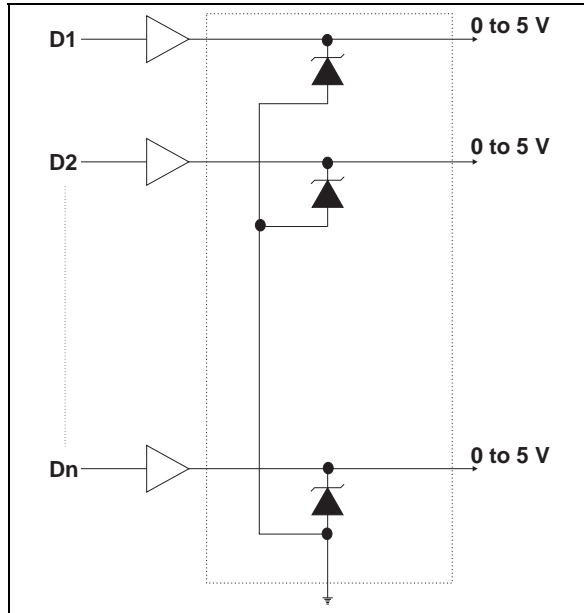
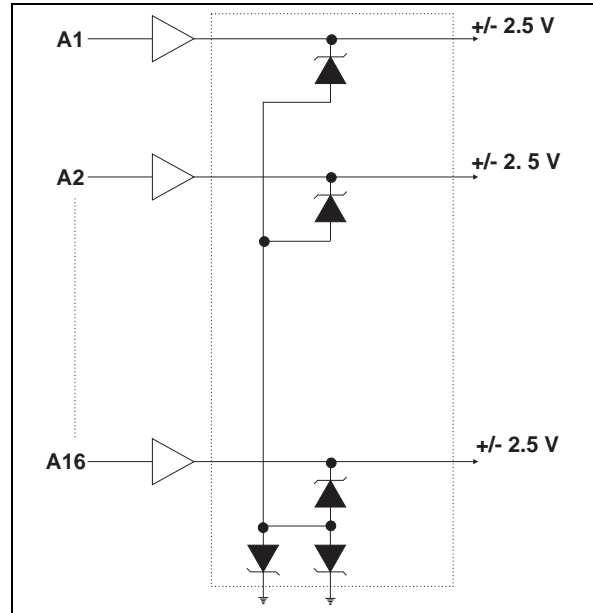


**Fig. 6** : Peak forward voltage drop versus peak forward current (typical values).



**APPLICATION EXAMPLE :****1 - Protection of logic-level signals.**

(ex : centronics junction)

**2 - Protection of symmetrical signals.****Note :** Capacitance value between any I/O pin and Ground is divided by 2.

Implementing its ASD<sup>TM</sup> technology, SGS-Thomson has developed a monolithic TRANSIL diode array, which is a reliable protection against electrostatic overloads for computer I/O ports, modems, GSM handsets and accessories or other similar systems with data outputs. The ESDAxxSx integrates 18 TRANSIL diodes in a compact package that can be easily mounted close to the circuitry to be protected, eliminating the assembly costs

associated with the use of discrete diodes, and also increasing system reliability.

Each TRANSIL has a breakdown voltage between 6.2V (minimum) and 7.2V (maximum). When the input voltage is lower than the breakdown voltage, the diodes present a high impedance to ground. For short overvoltage pulses, the fast-acting diodes provide an almost instantaneous response, clamping the voltage to a safe level.

ESDA6V1S3 / ESDA6V2S6

ORDER CODE

ESDA

6V1

S 3

RL

ESD ARRAY

V<sub>BR</sub> min

PACKAGING:  
RL = Tape and reel  
= Tube

PACKAGE :  
3 : SO20  
6 : SSOP20

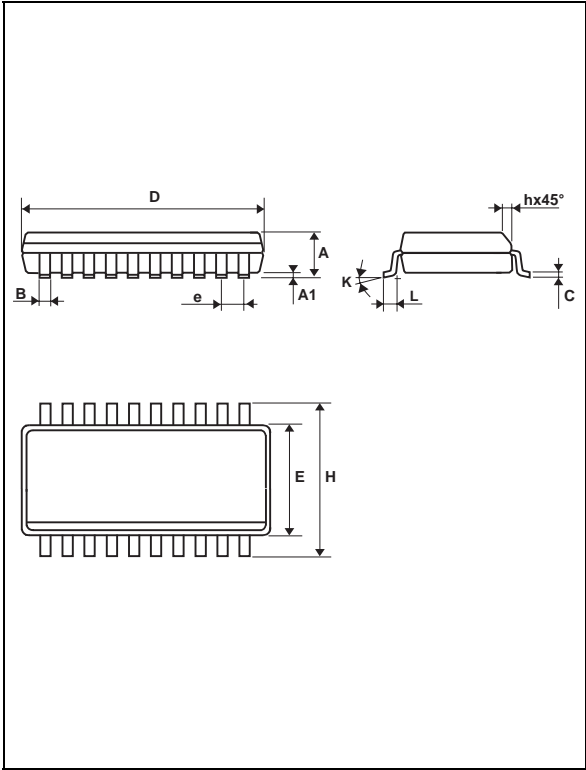
MARKING : Logo, date code

TYPE	MARKING
ESDA6V1S3	E6V1S3
ESDA6V2S6	ESDA6V2S6

Packaging : Preferred packaging is tape and reel.

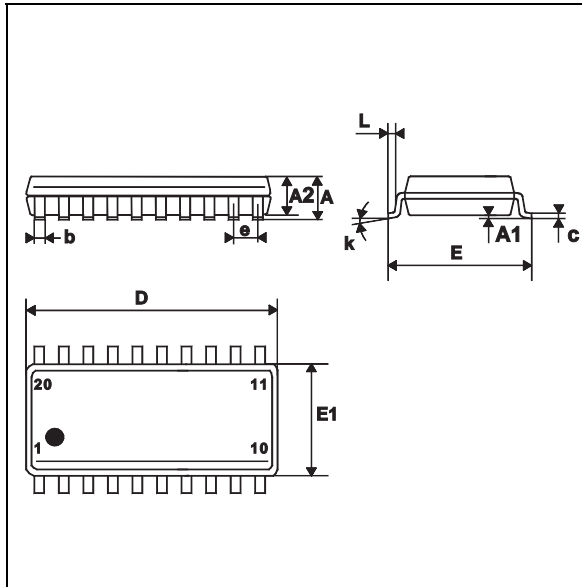
PACKAGE MECHANICAL DATA

SO20 (Plastic)



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.35		2.65	0.092		0.104
A1	0.10		0.20	0.004		0.008
B	0.33		0.51	0.013		0.020
C	0.23		0.32	0.009		0.013
D	12.6		13.0	0.484		0.512
E	7.40		7.60	0.291		0.299
e		1.27			0.050	
H	10.0		10.65	0.394		0.419
h	0.25		0.75	0.010		0.029
L	0.50		1.27	0.020		0.050
K	8° (max)					

Weight : 0.55g.

**PACKAGE MECHANICAL DATA**  
 SSOP20 (Plastic)


REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			2.00			0.079
A1			0.25			0.010
A2	1.51		2.00	0.059		0.079
b	0.25	0.30	0.35	0.010	0.012	0.014
c	0.10		0.35	0.004		0.014
D	7.05		8.05	0.278		0.317
E	7.60		8.70	0.299		0.343
E1	5.02	6.10	6.22	0.198	0.240	0.245
e		0.65			0.026	
k	0°		10°	0°		10°
L	0.25	0.50	0.80	0.010	0.020	0.031

**Weight** : 0.18g.

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

© 1998 STMicroelectronics - Printed in Italy - All rights reserved.

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - France - Germany - Italy - Japan - Korea - Malaysia - Malta - Mexico - Morocco -  
 The Netherlands - Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A.

<http://www.st.com>