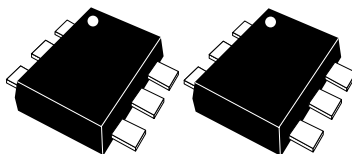
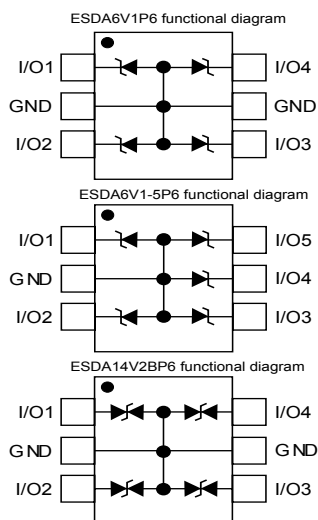


## 4 and 5 line ESD protection in SOT666



SOT-666IP

SOT-666



### Features

- 4 / 5 unidirectional (ESDA6V1P6 and ESDA6V1-5P6) and bidirectional (ESDA14V2BP6 and ESDA25-4BP6) Transil functions
- Breakdown voltage:
  - $V_{BR} = 6.1 \text{ V min.}, 14.2 \text{ V min. and } 25 \text{ V min.}$
- Low leakage current:
  - $< 500 \text{ nA}$  (ESDA6V1P6 / ESDA6V1-5P6)
  - $< 1 \mu\text{A}$  (ESDA14V2BP6 and ESDA25-4BP6)
- Very small PCB area  $< 2.6 \text{ mm}^2$
- Benefits:
  - High ESD protection level
  - High integration
  - Suitable for high density boards
- Complies with the standard IEC 61000-4-2 level 4:
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- Complies with MIL STD 883E - method 3015-7: Class3
  - 25 kV (human body model)

### Applications

Where ESD and EOS transient overvoltage protection in susceptible equipment is required, such as:

- Computers
- Servers
- Printers
- Communication systems and cellular phones
- Video equipment

These devices are particularly adapted to the protection of symmetrical signals.

### Description

The ESDAxxxP6 are monolithic arrays designed to protect up to 5 lines against ESD transients.

These devices are ideal where board space saving and reduced line capacitance are required.

Product status link

[ESDAxxxP6](#)

# 1 Characteristics

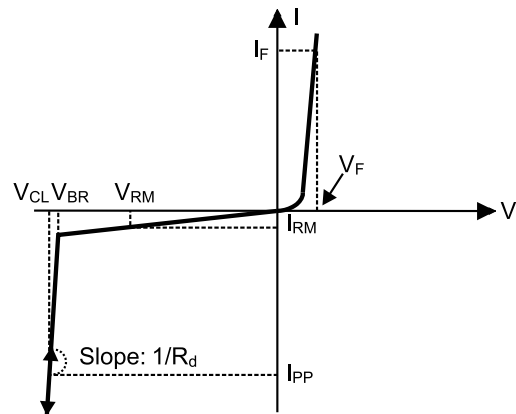
**Table 1. Absolute ratings ( $T_{amb} = 25\text{ °C}$ )**

Symbol	Parameter	Value	Unit	
$V_{PP}$	Peak pulse voltage	IEC 61000-4-2 level 4 standard:		
		Contact discharge	$\pm 15$	
		Air discharge	$\pm 8$	
		IEC 61000-4-2 level 4 standard for ESDA6V1-5P6:		
	Contact discharge	$\pm 20$	kV	
	Air discharge	$\pm 25$		
$P_{PP}$	Peak pulse power dissipation (8/20 $\mu\text{s}$ ) <sup>(1)</sup> , $T_j$ initial = $T_{amb}$	ESDA6V1P6 / ESDA6V1-5P6	150	W
		ESDA14V2BP6 / ESDA25-4BP6	50	
$T_{stg}$	Storage temperature range	-55 to +150	$^{\circ}\text{C}$	
$T_j$	Operating junction temperature range	-40 to +150	$^{\circ}\text{C}$	
$T_L$	Maximum lead temperature for soldering during 10 s at 5 mm for case	260	$^{\circ}\text{C}$	

1. for a surge greater than the maximum values, the diode will fail in short-circuit.

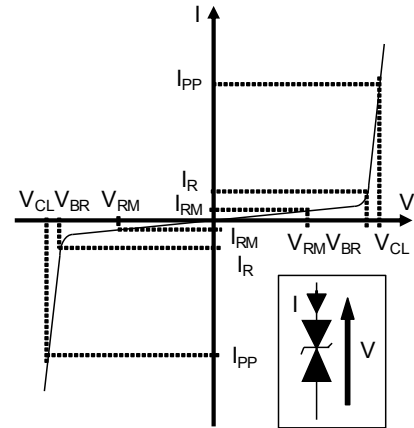
**Figure 1. Electrical characteristics (definitions)**

Symbol	Parameter
$V_{BR}$	Breakdown voltage
$I_{RM}$	Leakage current @ $V_{RM}$
$V_{RM}$	Stand-off voltage
$V_{CL}$	Clamping voltage
$I_{PP}$	Peak pulse current
$I_F$	Forward current
$V_F$	Forward voltage
$R_d$	Dynamic impedance
$C_{LINE}$	Line capacitance



**Figure 2. Electrical characteristics (definitions)**

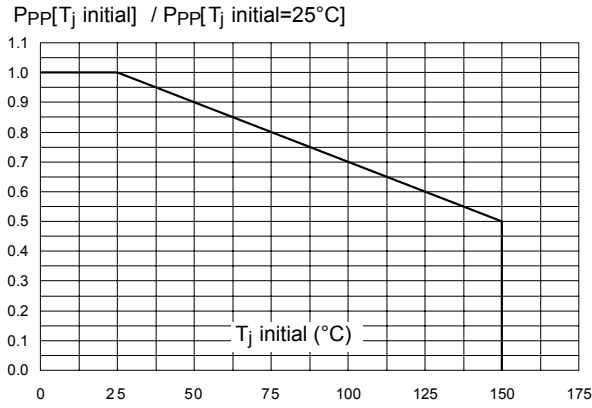
Symbol	=	Parameter
$V_{BR}$	=	Breakdown voltage
$V_{CL}$	=	Clamping voltage
$I_{RM}$	=	Leakage current @ $V_{RM}$
$V_{RM}$	=	Stand-off voltage
$I_{PP}$	=	Peak pulse current
$R_D$	=	Dynamic resistance
$I_R$	=	Breakdown current


**Table 2. Electrical characteristics - values ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

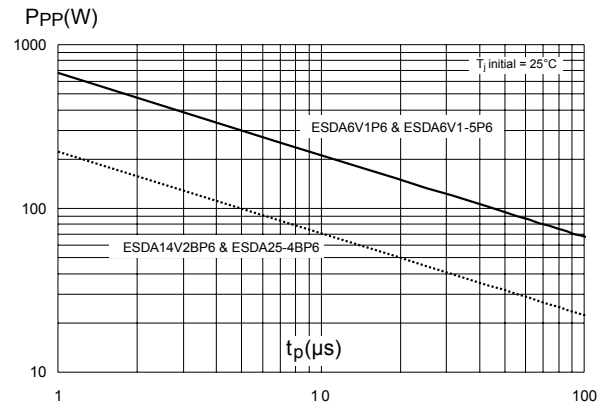
Order code	$V_{BR}$ at $I_R$		$I_{RM}$ at $V_{RM}$		$R_d$	$\alpha T$	$C_{line}$	
	Min.	Max.	Max.		Max.	Typ.	Typ. at 0 V	
	V	V	mA	$\mu\text{A}$	V	$10^{-4}/\text{C}$	pF	
ESDA6V1P6	6.1	7.2	1	0.5	3	1.5	4	70
ESDA6V1-5P6								
ESDA14V2BP6	14.2	18	1	1	12	1.5	5.8	25
ESDA25-4BP6	25	30	1	1	24	1.7	7.3	22

## 1.1 Characteristics (curves)

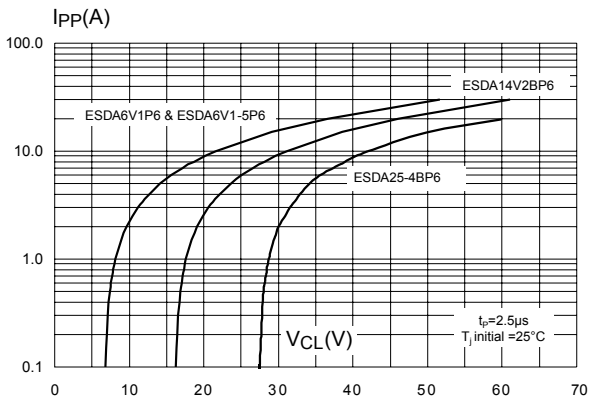
**Figure 3. Peak power dissipation versus initial junction temperature**



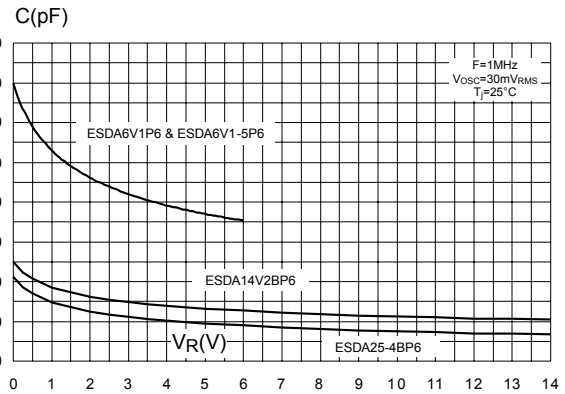
**Figure 4. Peak pulse power versus exponential pulse duration ( $T_j \text{ initial} = 25^\circ\text{C}$ )**



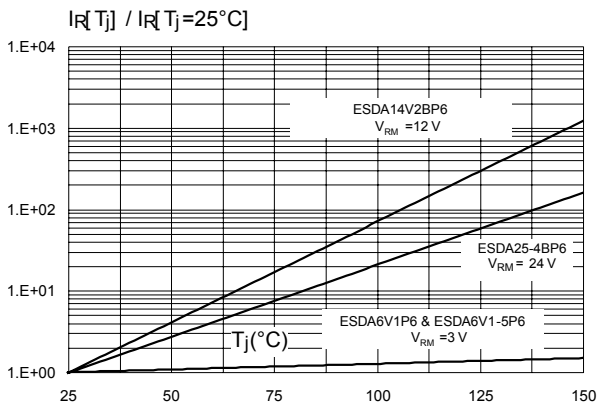
**Figure 5. Clamping voltage versus peak pulse current ( $T_j \text{ initial} = 25^\circ\text{C}$ , rectangular waveform,  $t_p = 2.5 \mu\text{s}$ )**



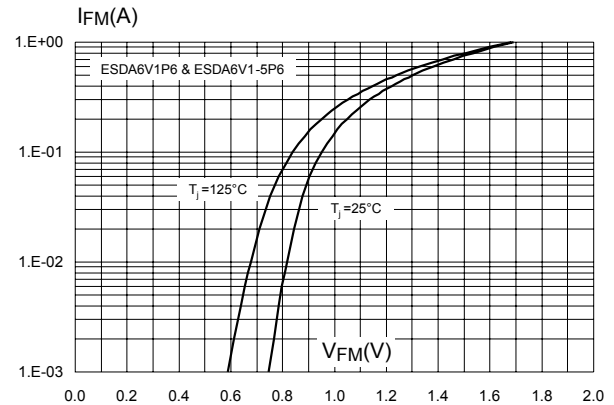
**Figure 6. Junction capacitance versus reverse applied voltage (typical values)**



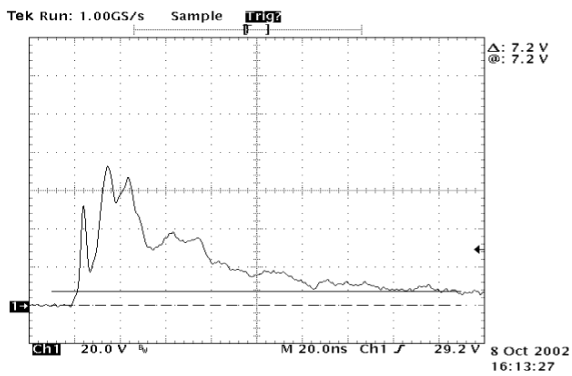
**Figure 7. Relative variation of leakage current versus junction temperature (typical values)**



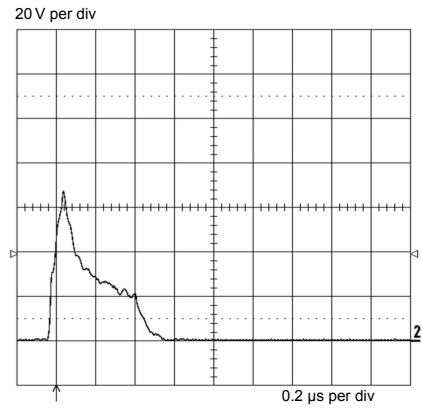
**Figure 8. Peak forward voltage drop versus peak forward current (typical values)**



**Figure 9. ESD response at  $V_{PP} = 15$  kV air discharge (ESDA6V1-5P6)**



**Figure 10. ESD response at  $V_{PP} = 15$  kV air discharge (ESDA25-4BP6)**

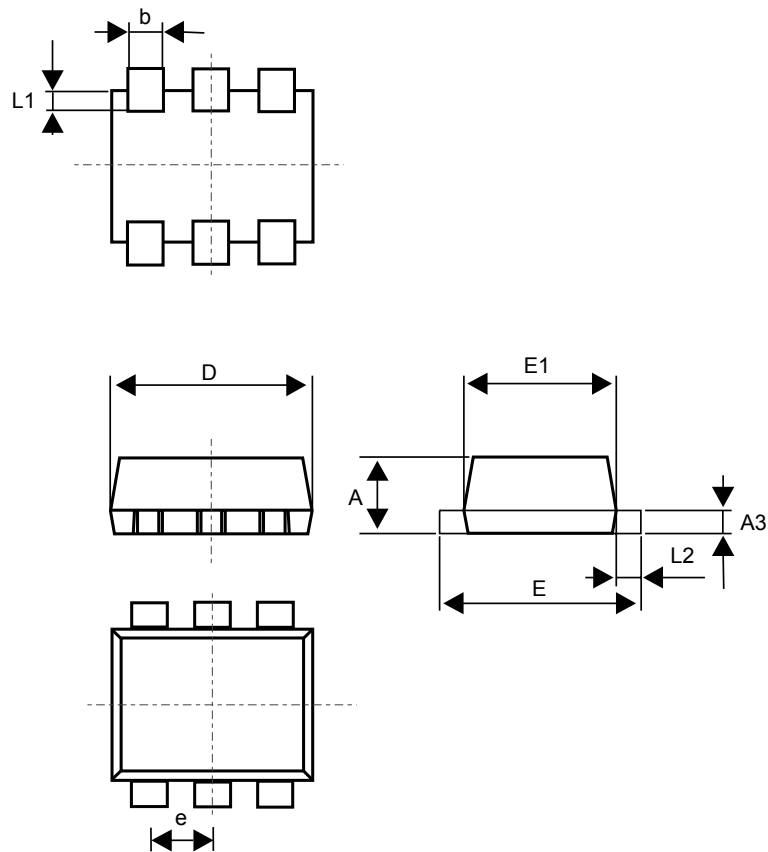


## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 SOT-666 package information

Figure 11. SOT-666 package outline

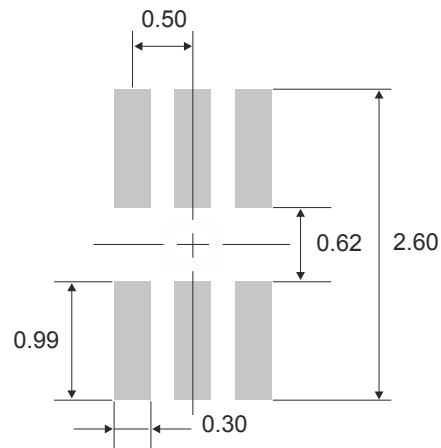


**Table 3. SOT-666 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.45		0.62	0.018		0.025
A3	0.08		0.18	0.003		0.007
b	0.17		0.34	0.007		0.013
D	1.50		1.70	0.059		0.067
E	1.50		1.70	0.059		0.067
E1	1.10		1.30	0.043		0.051
e		0.50			0.020	
L1		0.19			0.007	
L2	0.10		0.30	0.004		0.012

1. Value in inches are converted from mm and rounded to 4 decimal digits

**Figure 12. Footprint recommendations, dimensions in mm**



## 2.2 SOT-666IP package information

Figure 13. SOT-666IP package outline

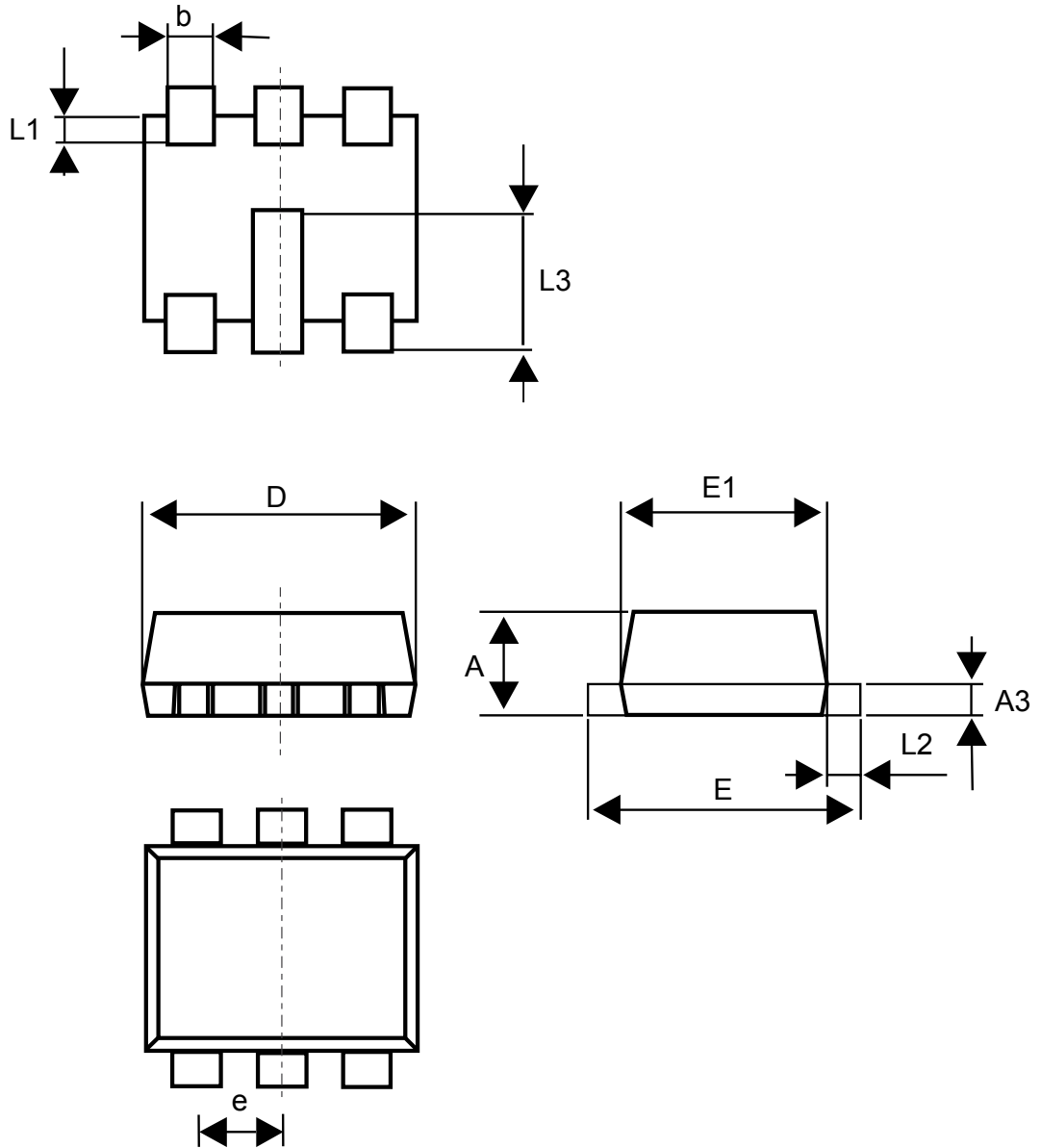
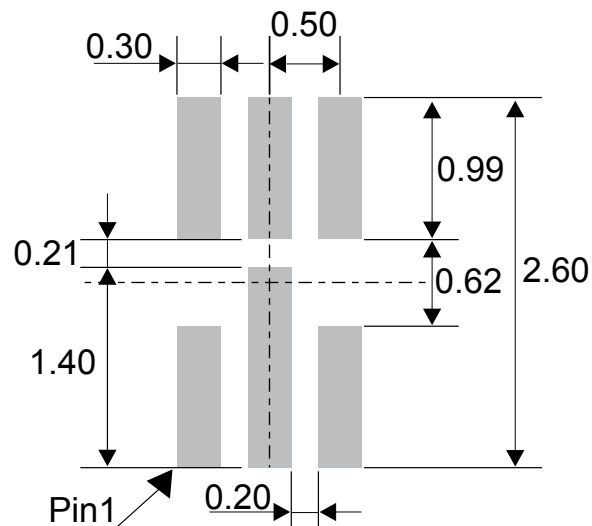




Table 4. SOT-666IP package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.45		0.62	0.018		0.025
A3	0.08		0.18	0.003		0.007
b	0.17		0.34	0.007		0.013
D	1.50		1.70	0.059		0.067
E	1.50		1.70	0.059		0.067
E1	1.10		1.30	0.043		0.051
e		0.50			0.020	
L1		0.19			0.007	
L2	0.10		0.30	0.004		0.012
L3		0.60			0.024	

Figure 14. Footprint recommendations, dimensions in mm



### 3 Ordering information

**Table 5. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
ESDA6V1P6	B	SOT-666IP	2.9 mg	3000	Tape and reel
ESDA6V1-5P6	C				
ESDA14V2BP6	A	SOT-666			
ESDA25-4BP6	V				

## Revision history

**Table 6. Document revision history**

Date	Version	Changes
07-Feb-2006	1	ESDA6V1P6, ESDA6V1-5P6 and ESDA14V2BP6: datasheets merged. ECOPACK statement added. Some curves combined.
26-Jun-2006	2	Reformatted to current standards. Modified package information to show both SOT-666 and SOT-666IP.
22-May-2007	3	Added product ESDA25-4BP6.
25-Sep-2019	4	Updated <a href="#">Table 1</a> and title description.
22-Jun-2020	5	Updated <a href="#">Table 2</a> .
26-Aug-2022	6	Updated <a href="#">Table 2</a> .

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