ESDALC6V1Px

Low capacitance Transil™ arrays for ESD protection

Features

- 2 to 4 unidirectional Transil functions
- Breakdown voltage V_{BR} = 6.1 V min.
- Low leakage current < 100 nA
- Low capacitance (7.5 pF @ 3 V)
- Very small PCB area < 2.6 mm^2

Benefits

- High ESD protection level
- High integration

Complies with the following standards

- IEC 61000-4-2 level 4
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- MIL STD 883E-Method 3015-7: class3
  - 25 kV HBM (human body model)

Applications

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

- Computers
- Printers
- Communication systems
- Cellular phone handsets and acessories
- Wireline and wireless telephone sets
- Set-top boxes

Description

The ESDALC6V1Px are monolithic suppressors designed to protect components connected to data and transmission lines against ESD.

These devices clamp the voltage just above the logic level supply for positive transients and to a diode drop below ground for negative transients.

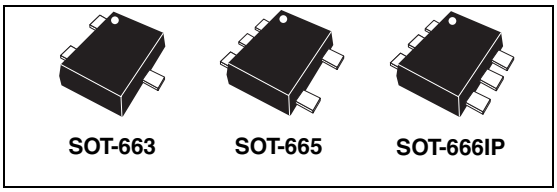


Figure 1. ESDALC6V1P3 functional diagram

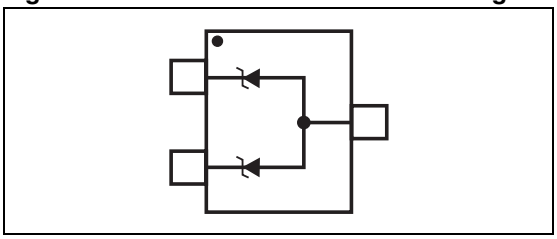


Figure 2. ESDALC6V1P5 functional diagram

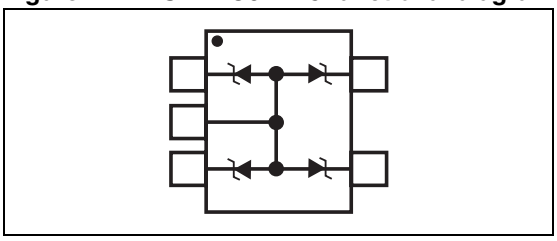
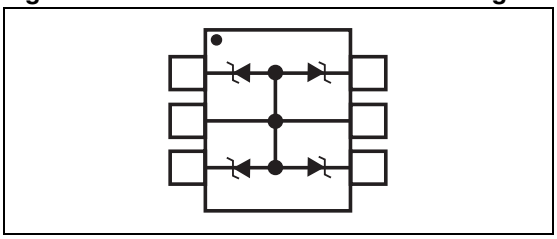


Figure 3. ESDALC6V1P6 functional diagram



TM: Transil is a trademark of STMicroelectronics

1 Characteristics

Table 1. Absolute ratings (T_{amb} = 25 °C)

Symbol	Parameter		Value	Unit
V_{PP}[1]	Peak pulse voltage	IEC 61000-4-2 contact discharge IEC 61000-4-2 air discharge	±8 ±15	kV
P_{PP}	Peak pulse power (8/20 µs)[1]	T_j initial = T_{amb}	30	W
T_j	Junction temperature		150	°C
T_{stg}	Storage temperature range		-55 to +150	°C
T_L	Maximum lead temperature for soldering during 10 s		260	°C
T_{op}	Operating temperature range		-40 to +150	°C

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

Figure 4. Electrical characteristics (definitions)

Symbol		Parameter
V_{BR}	=	Breakdown voltage
V_{CL}	=	Clamping voltage
I_{RM}	=	Leakage current
I_F	=	Forward current
I_{PP}	=	Peak pulse current
I_R	=	Breakdown current
V_F	=	Forward voltage drop
C	=	Capacitance
R_d	=	Dynamic impedance
αT	=	Voltage temperature

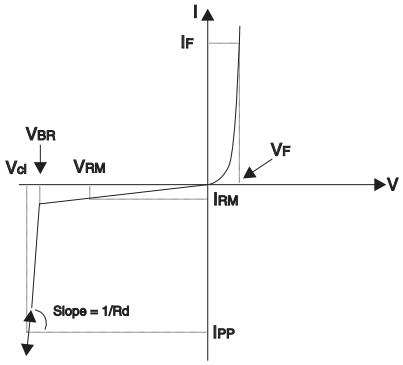


Table 2. Electrical characteristics (T_{amb} = 25 °C)

Order code	V_{BR}@ I_R			I_{RM} @ V_{RM}			R_d	αT	C
	min.	max.		typ.	max.		typ.	typ.	typ.@ 3V
	V	V	mA	nA	µA	V	Ω	10^{-4}/°C	pF
ESDALC6V1P3 ESDALC6V1P5 ESDALC6V1P6	6.1	7.2	1	10	0.1	3	1.5	4.5	7.5

Figure 5. Peak power dissipation versus initial junction temperature

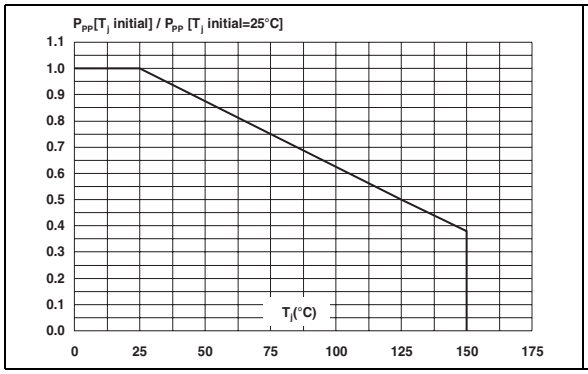


Figure 6. Peak pulse power versus exponential pulse duration (T_j initial = 25 °C)

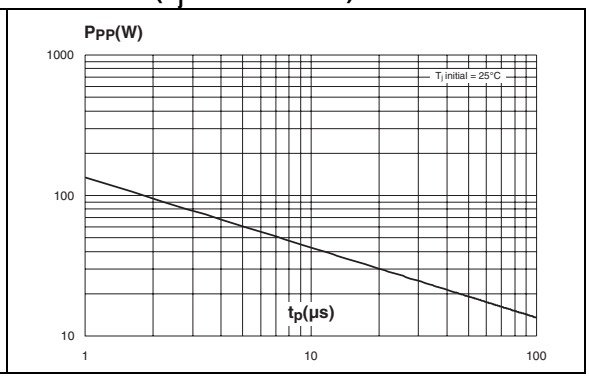


Figure 7. Clamping voltage versus peak pulse current (typical values, rectangular waveform)

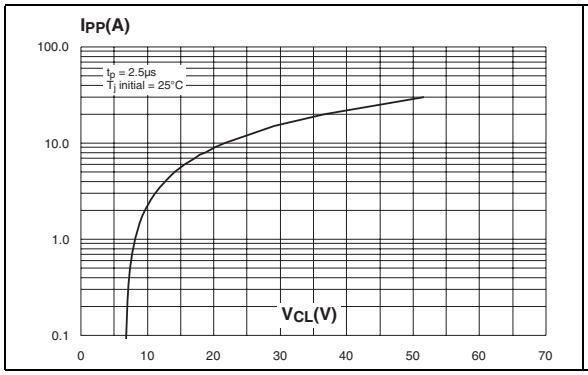


Figure 8. Forward voltage drop versus peak forward current (typical values)

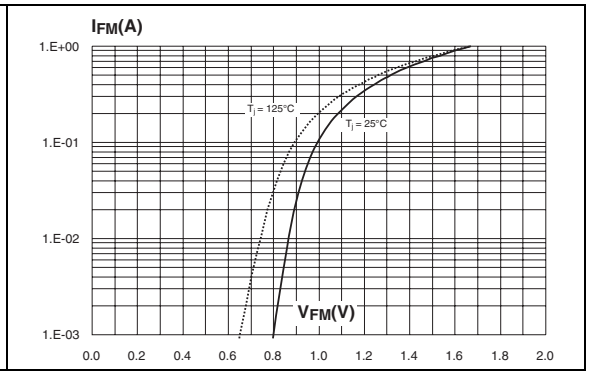


Figure 9. Junction capacitance versus reverse applied voltage (typical values)

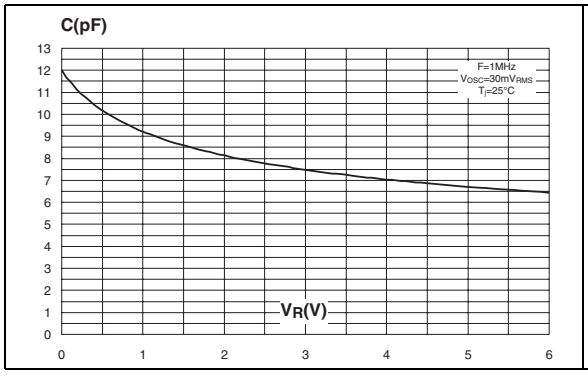


Figure 10. Relative variation of leakage current versus junction temperature (typical values)

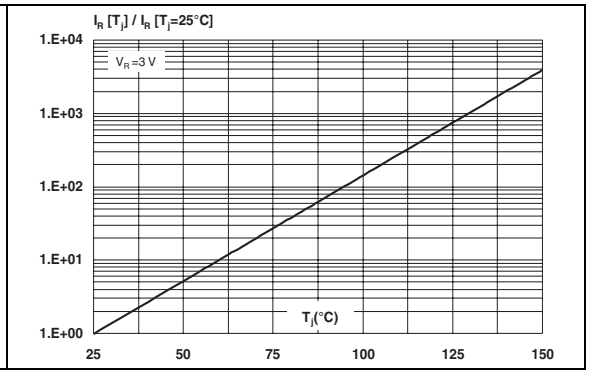


Figure 11. ESD response to IEC 61000-4-2 (air discharge 15 kV positive surge)

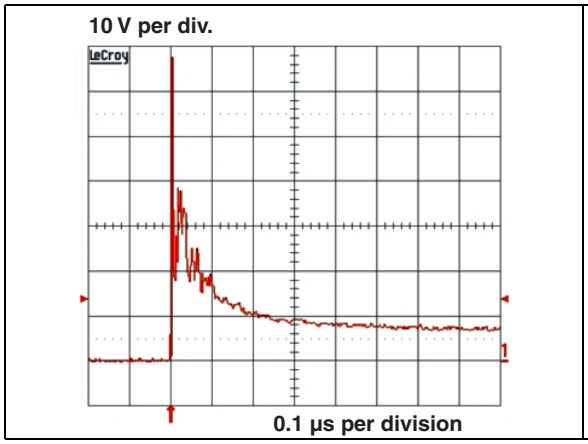


Figure 12. Analog crosstalk measurement

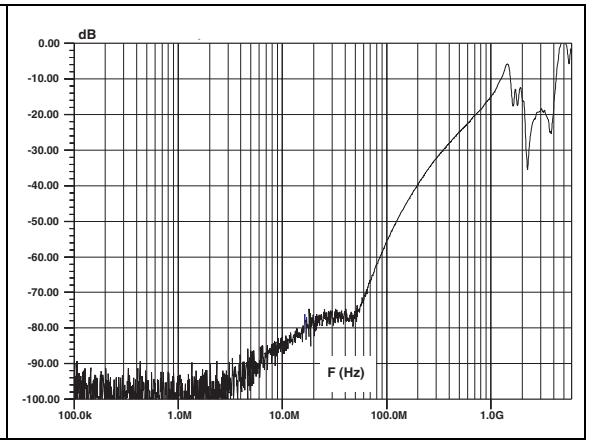
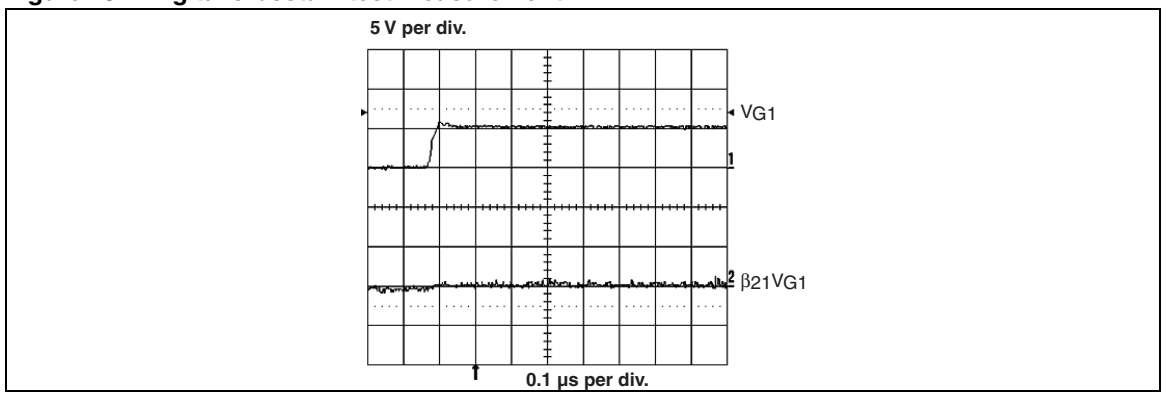
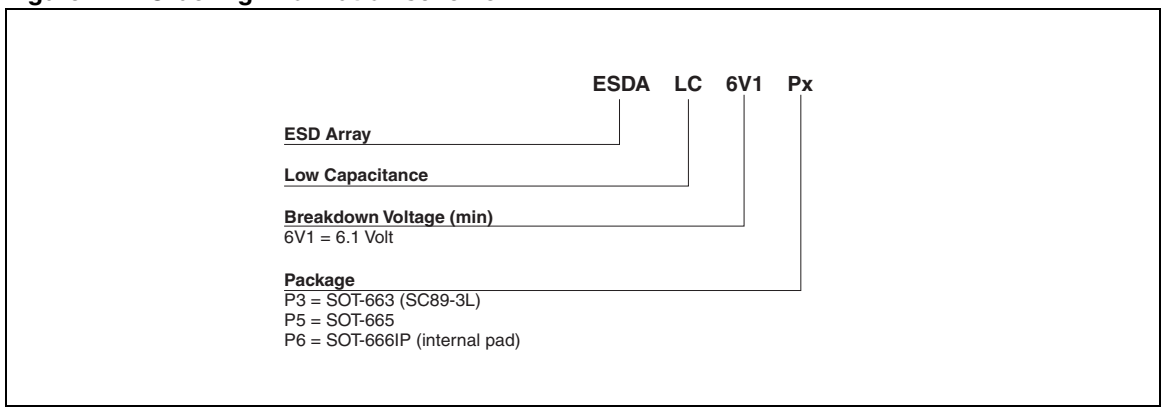


Figure 13. Digital crosstalk test measurement



2 Ordering information scheme

Figure 14. Ordering information scheme

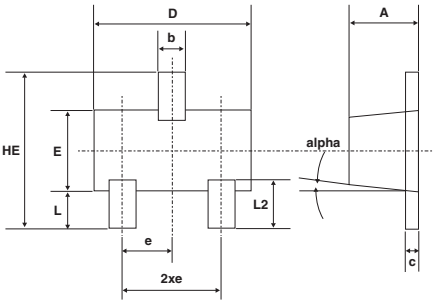


3 Package information

- Epoxy meets UL94, V0
- Lead-free package

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. ECOPACK® is an ST trademark.

Table 3. SOT-663 dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.60	0.70	0.80	0.024	0.028	0.031
D	1.40	1.60	1.80	0.055	0.063	0.071
E	0.75	0.85	0.95	0.030	0.033	0.037
HE	1.50	1.60	1.70	0.059	0.063	0.067
L		0.39			0.015	
L2	0.40	0.47	0.50	0.016	0.018	0.020
c	0.08	0.13	0.18	0.003	0.005	0.007
b	0.22	0.27	0.37	0.009	0.011	0.015
e		0.50			0.020	
2xe	0.90	1.00	1.10	0.035	0.040	0.043
α	4°		7°	4°		7°

Figure 15. SOT-663 footprint (dimensions in mm)

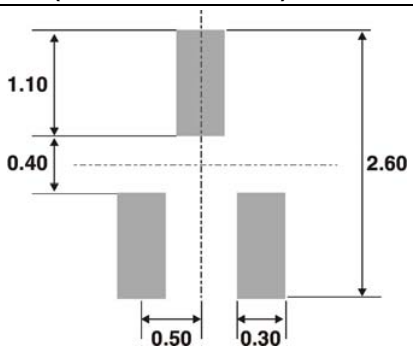
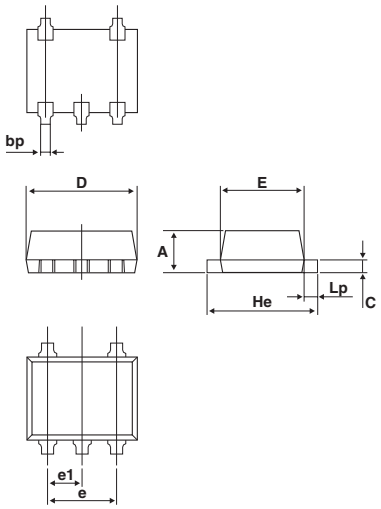


Table 4. SOT-665 dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.50	0.60	0.020	0.024
BP	0.17	0.27	0.007	0.011
C	0.08	0.18	0.003	0.007
D	1.50	1.70	0.060	0.067
E	1.10	1.30	0.043	0.051
e	1.00		0.040	
e1	0.50		0.020	
He	1.50	1.70	0.059	0.067
Lp	0.10	0.30	0.004	0.012

Figure 16. SOT-665 footprint (dimensions in mm)

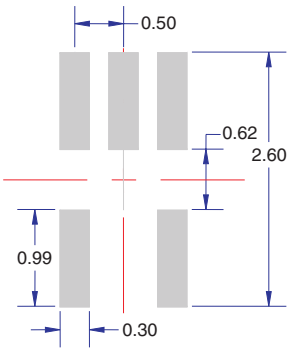
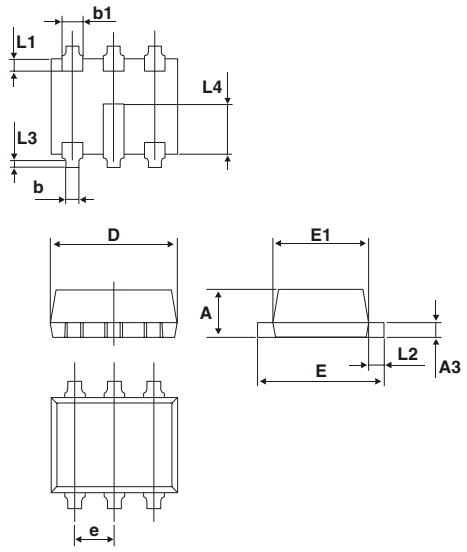
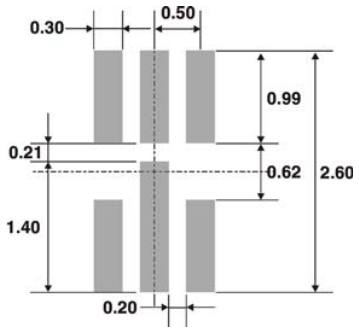


Table 5. SOT-666IP dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.45		0.60	0.018		0.024
A3	0.08		0.18	0.003		0.007
b	0.17		0.34	0.007		0.013
b1	0.19	0.27	0.34	0.007	0.011	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		0.10			0.004	
L4		0.60			0.024	

Figure 17. SOT-666IP footprint (dimensions in mm)



4 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
ESDALC6V1P3	A2	SOT-663	2.9 mg	3000	Tape and reel
ESDALC6V1P5	A1	SOT-665	2.9 mg	3000	Tape and reel
ESDALC6V1P6	D	SOT-666IP	2.9 mg	3000	Tape and reel

5 Revision history

Table 7. Document revision history

Date	Revision	Changes
16-Aug-2006	1	ESDALC6V1P3, ESDALC6V1P5, and ESDALC6V1P6 merged and reformatted to current standards.
23-Aug-2006	2	Table 1 on page 2: Temperature range upgraded to T_j max = 150 °C
11-Oct-2006	3	Added values for V_{PP} in Table 1.
23-Apr-2008	4	Reformatted to current standards. Added I_{RM} typical value in *Table 2*. Update minimum dimension for L2 of SOT-663 in *Table 3*.
15-Jan-2010	5	Updated *Figure 16: SOT-665 footprint (dimensions in mm)*.

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