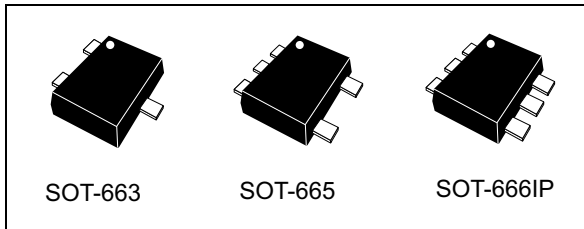


## Low capacitance Transil™ arrays for ESD protection

Datasheet – production data



### 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.

### Features

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

### Benefits

- High ESD protection level
- High integration

### Complies with the following standards:

- IEC 61000-4-2 (exceeds 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:

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

Figure 1. ESDALC6V1P3 functional diagram

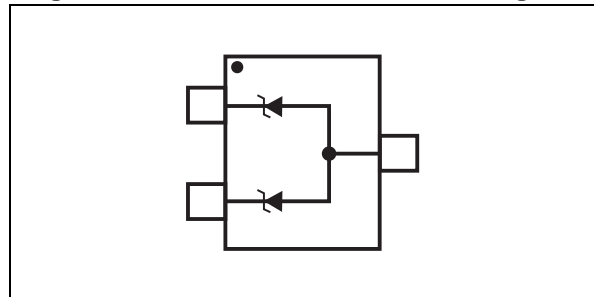


Figure 2. ESDALC6V1P5 functional diagram

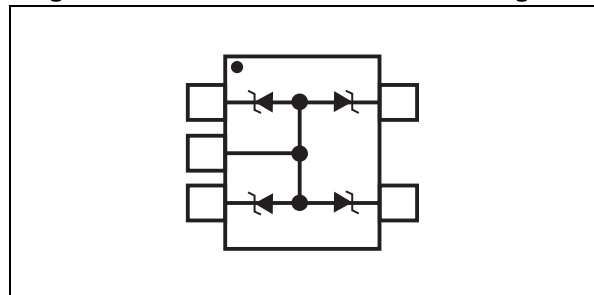
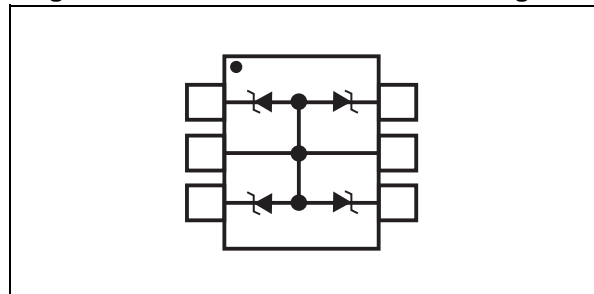


Figure 3. ESDALC6V1P6 functional diagram



TM: Transil is a trademark of STMicroelectronics

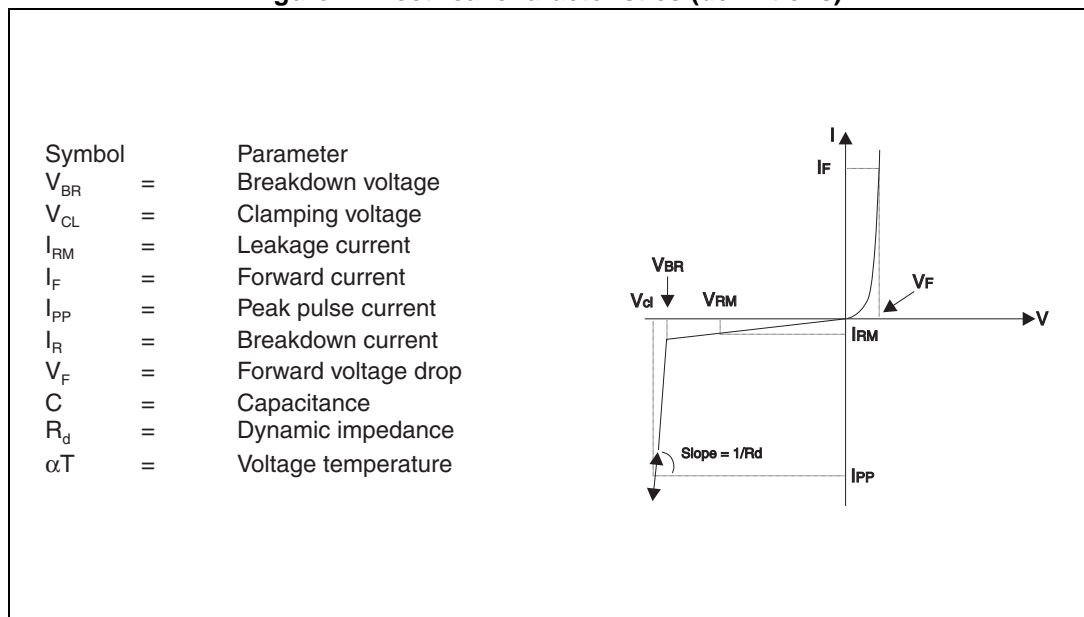
# 1 Characteristics

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

Symbol	Parameter		Value	Unit
$V_{PP}^{(1)}$	Electrostatic discharge capability	IEC 61000-4-2: Contact discharge	8	kV
		Air discharge	15	
		MIL STD 883G - method 3015-7: Class3	25	
$P_{PP}$	Peak pulse power dissipation (8/20 $\mu\text{s}$ ) <sup>(1)</sup>	$T_j$ initial = $T_{amb}$	30	W
$T_j$	Operating junction temperature		150	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature range		- 55 to + 150	$^{\circ}\text{C}$
$T_L$	Maximum lead temperature for soldering during 10 s		260	$^{\circ}\text{C}$
$T_{op}$	Operating temperature range		-40 to +150	$^{\circ}\text{C}$

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

**Figure 4. Electrical characteristics (definitions)**



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

Order code	$V_{BR}$ at $I_R$		$I_{RM}$ at $V_{RM}$			$R_d$	$\alpha T$	$C$	
	min.	max.	typ.	max.		typ.	typ.	typ.at 3V	
	V	V	mA	nA	$\mu\text{A}$	V	$\Omega$	$10^{-4}/^{\circ}\text{C}$	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

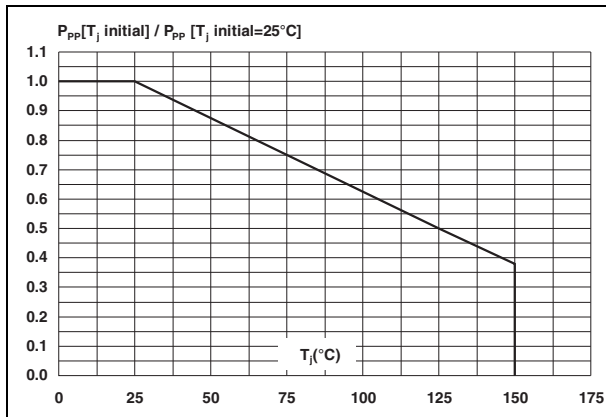


Figure 6. Peak pulse power versus exponential pulse duration (Tj initial = 25 °C)

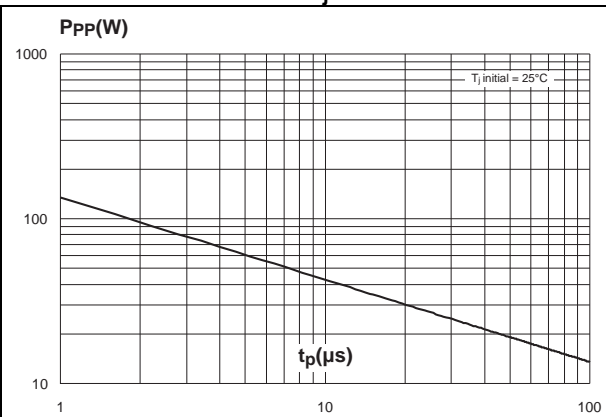


Figure 7. Clamping voltage versus peak pulse current (typical values, rectangular waveform)

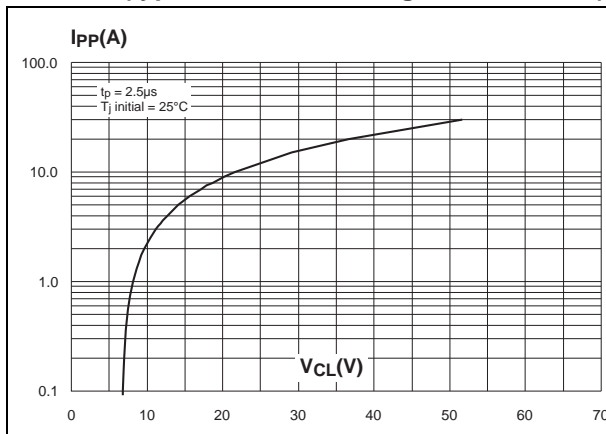


Figure 8. Forward voltage drop versus peak forward current (typical values)

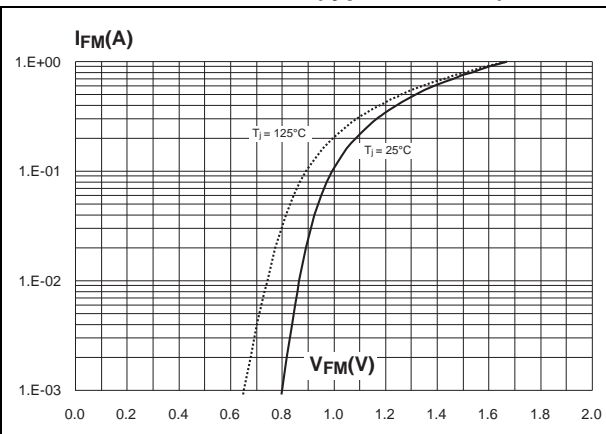


Figure 9. Junction capacitance versus reverse applied voltage (typical values)

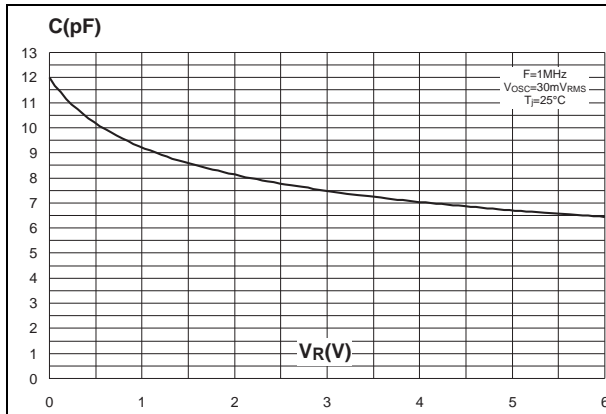


Figure 10. Relative variation of leakage current versus junction temperature (typical values)

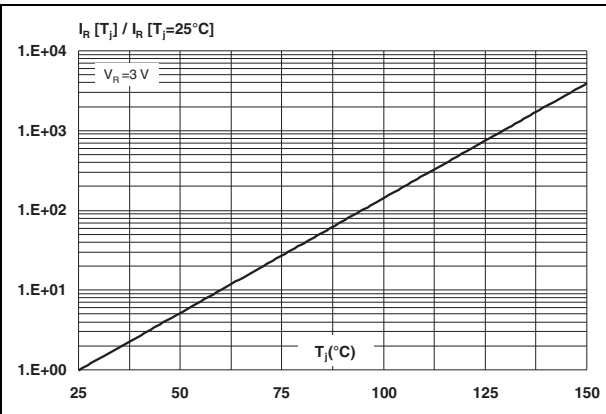


Figure 11. ESD response to IEC 61000-4-2 (air discharge 15 kV positive surge)

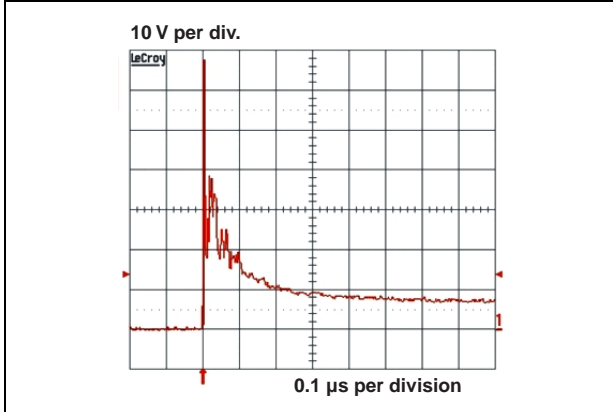


Figure 12. Analog crosstalk measurement

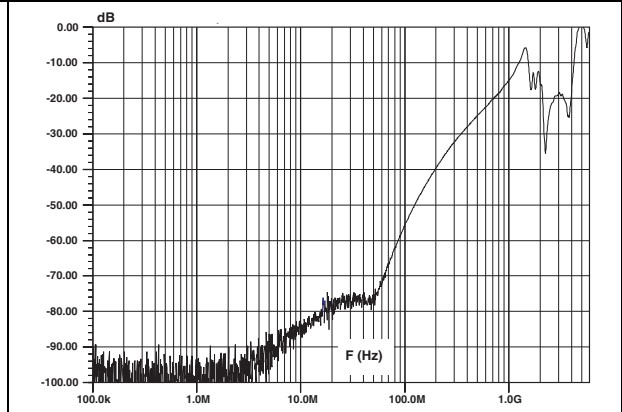
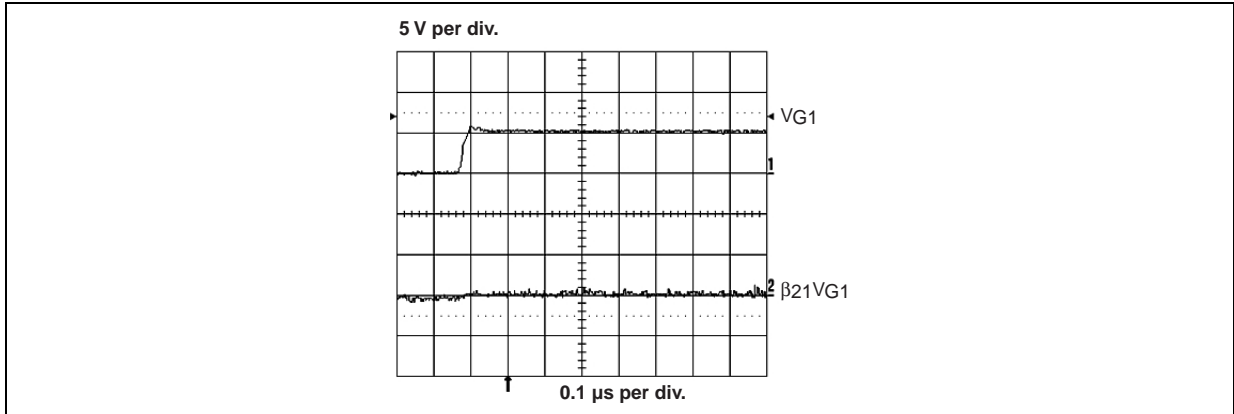


Figure 13. Digital crosstalk test measurement



## 2 Package information

- Epoxy meets UL94, V0
- Lead-free packages

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

Figure 14. SOT-663 dimension definitions

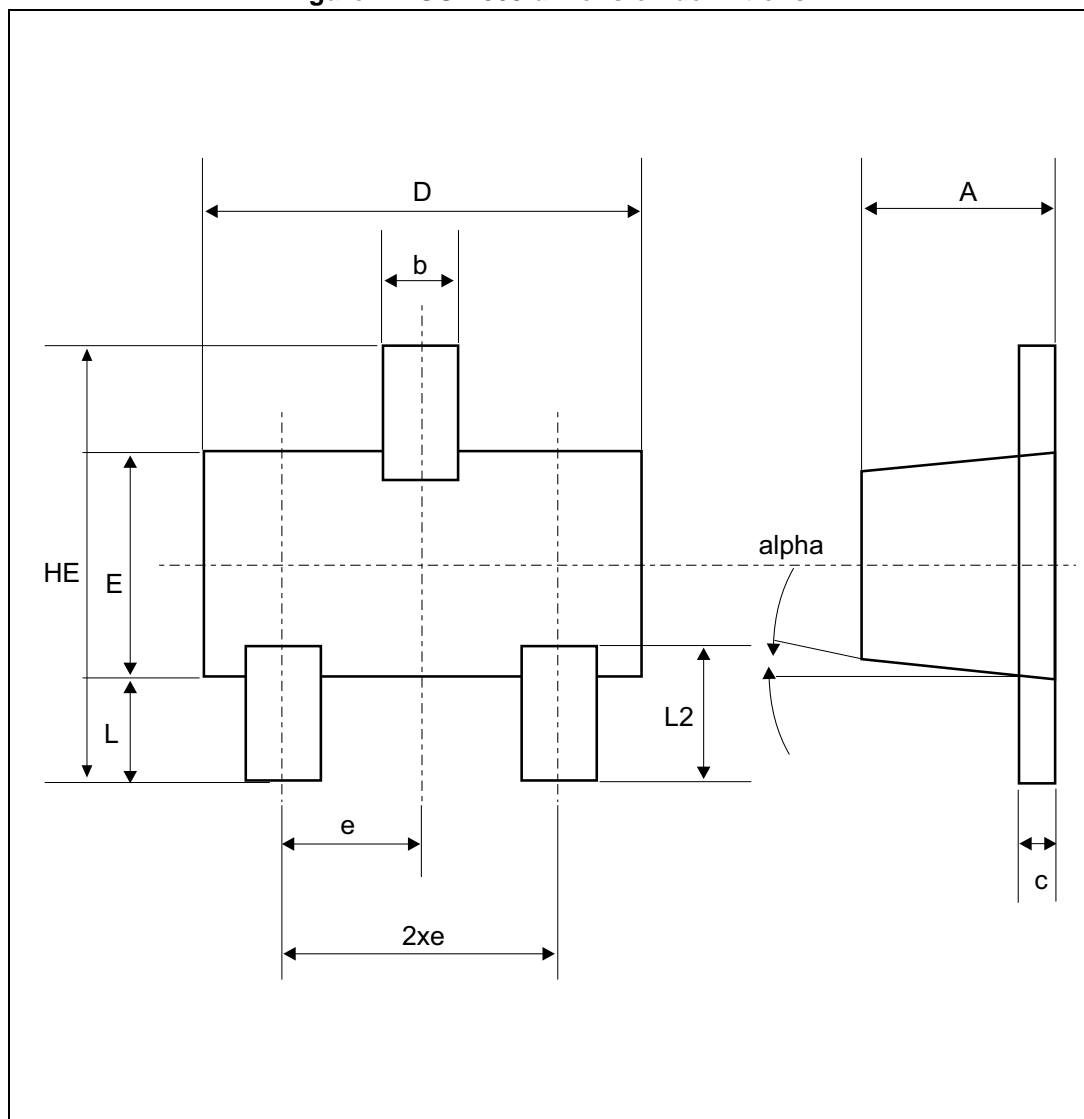


Table 3. SOT-663 dimension values

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
$\alpha$	4°		7°	4°		7°

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

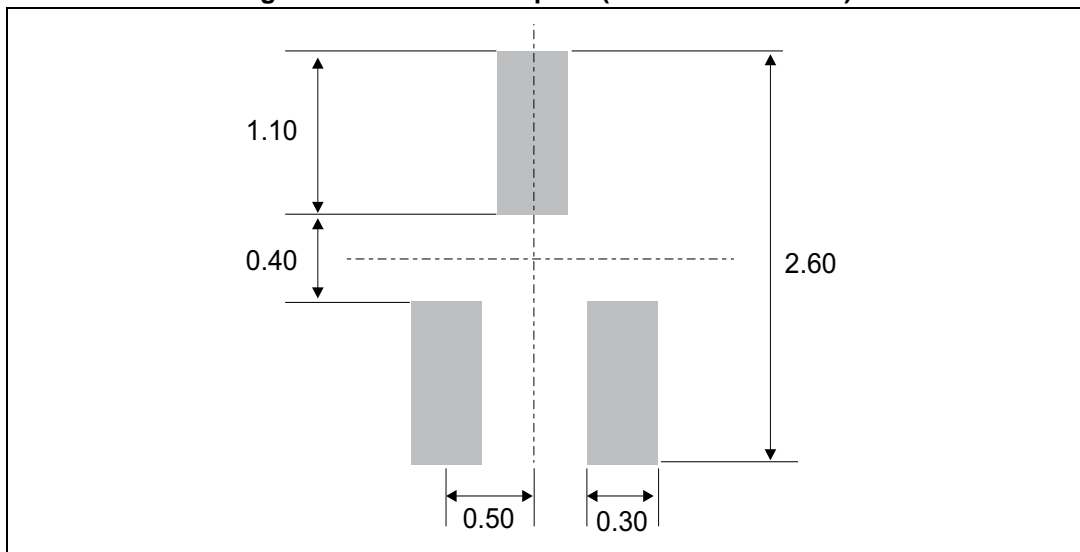


Figure 16. SOT-665 dimension definitions

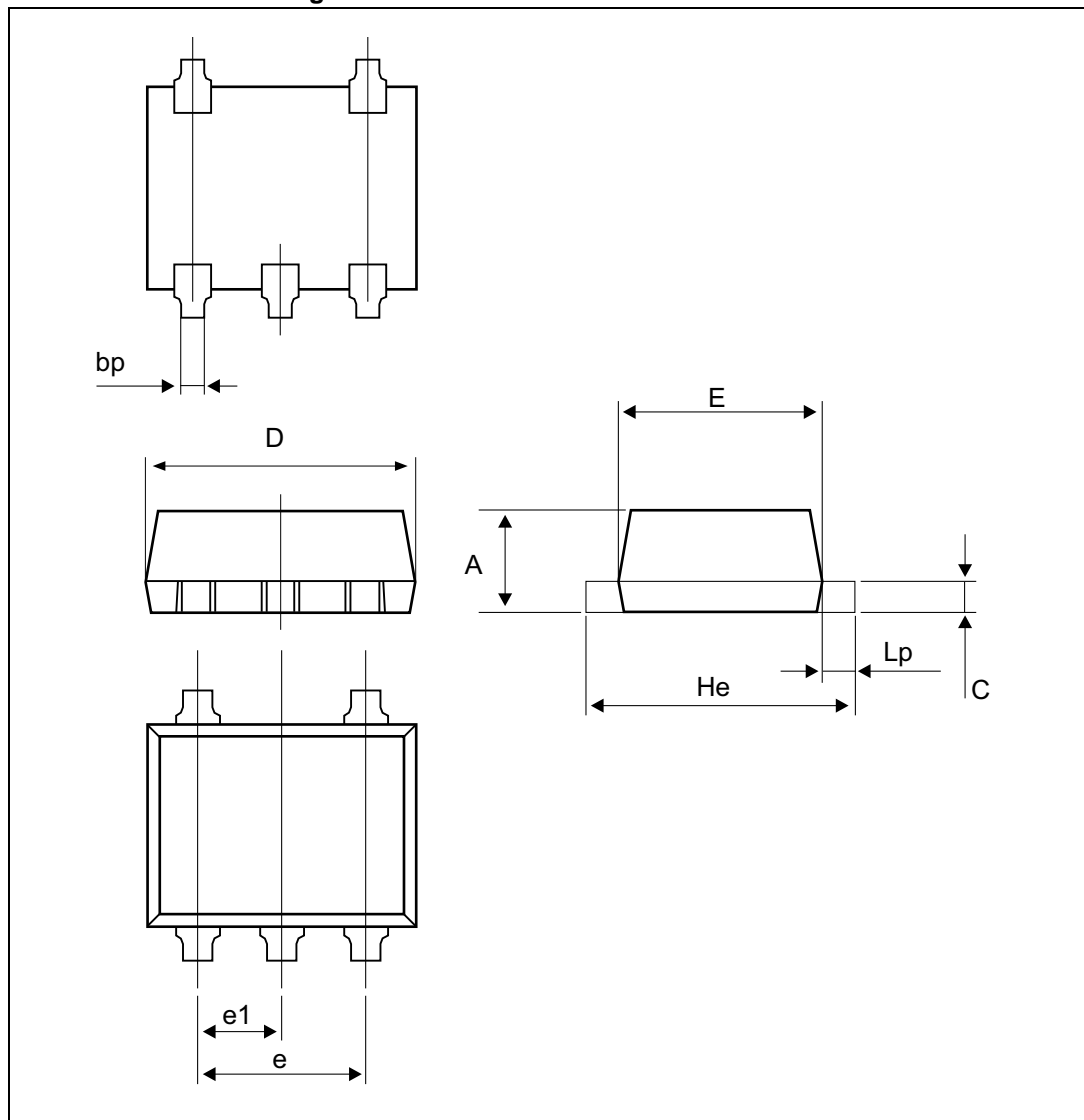


Table 4. SOT-665 dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	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 17. SOT-665 footprint (dimensions in mm)

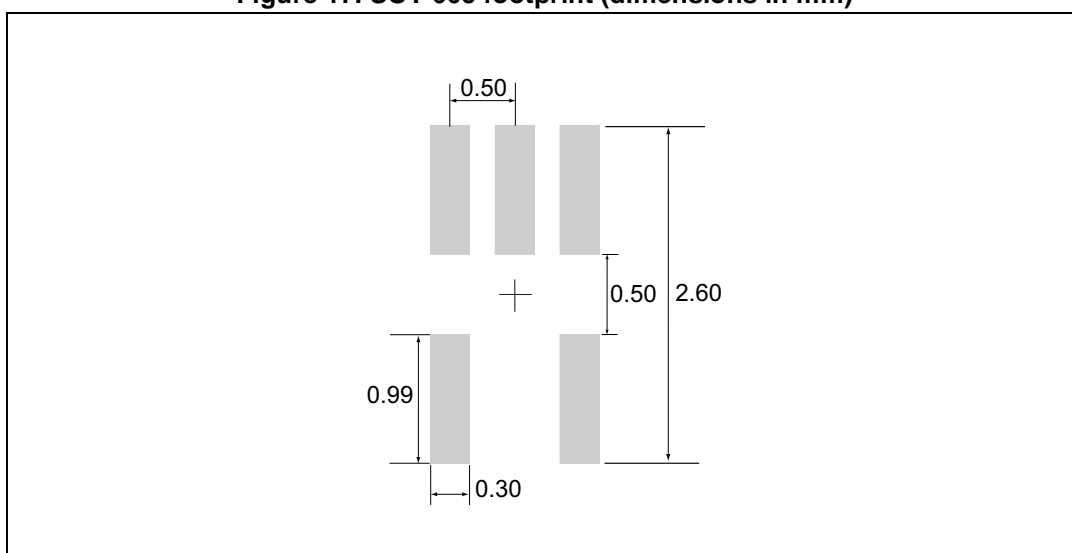




Figure 18. SOT-666IP dimension definitions

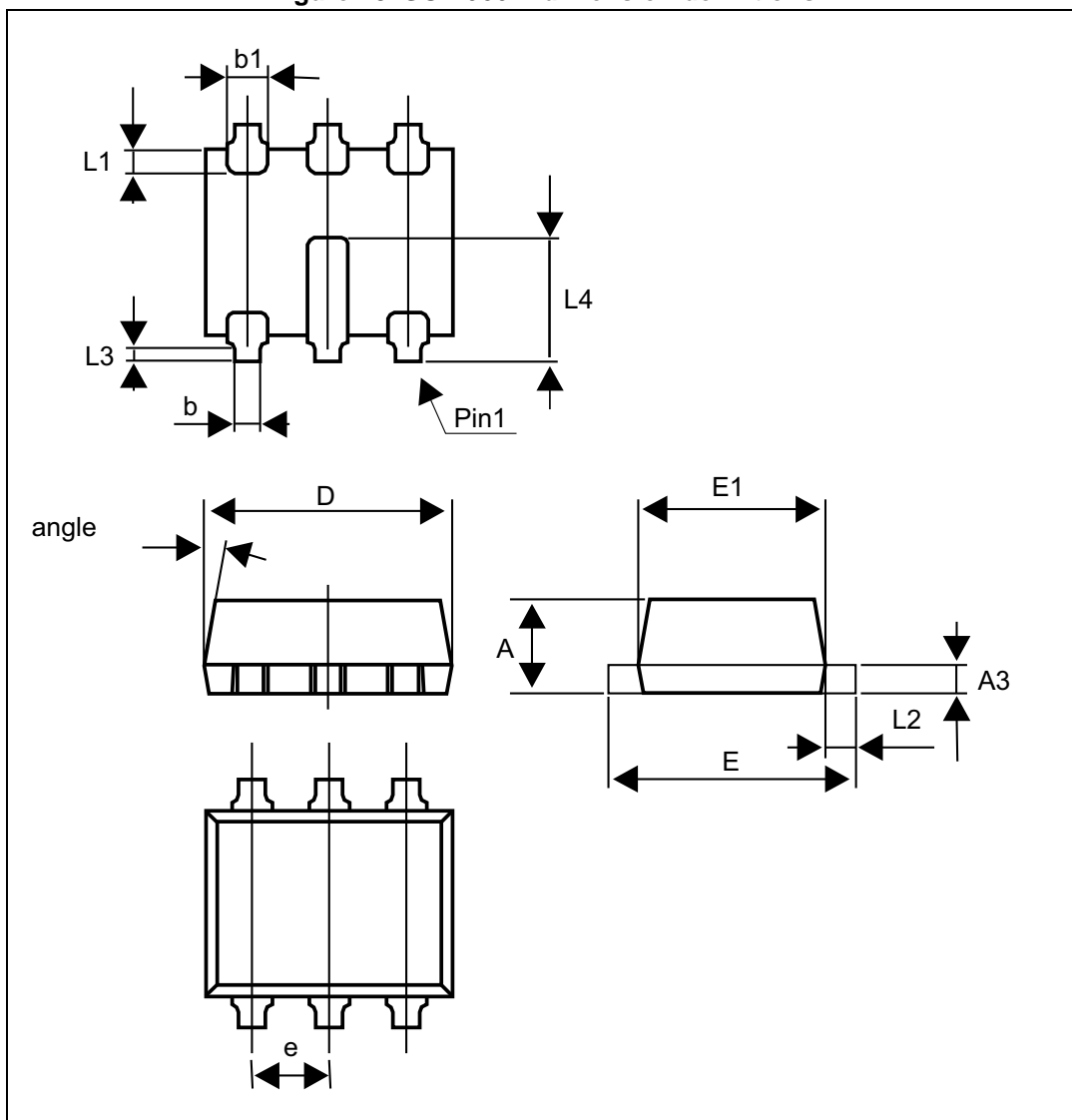
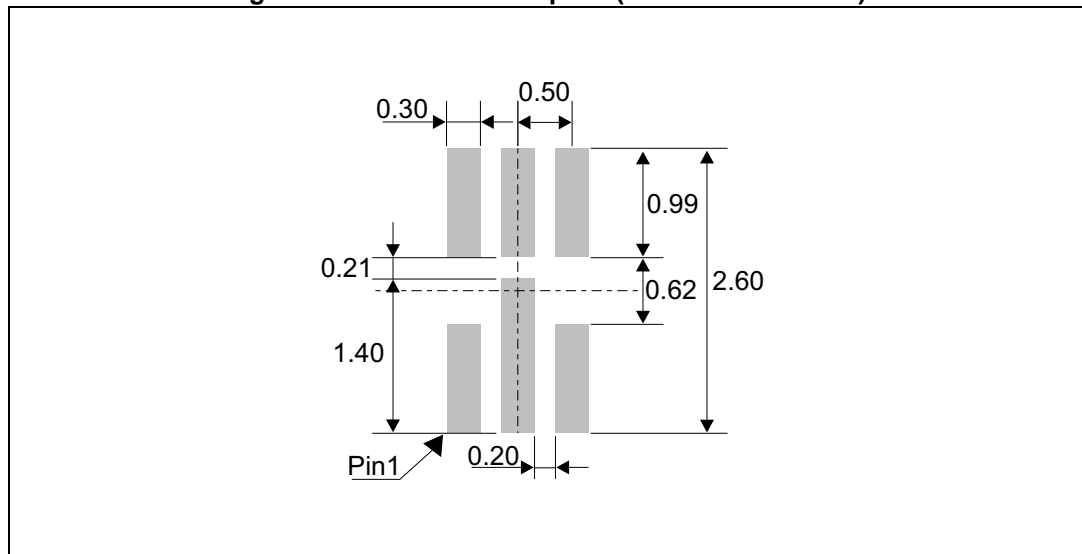


Table 5. SOT-666IP dimension values

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 19. SOT-666IP footprint (dimensions in mm)



### 3 Ordering information

Figure 20. Ordering information scheme

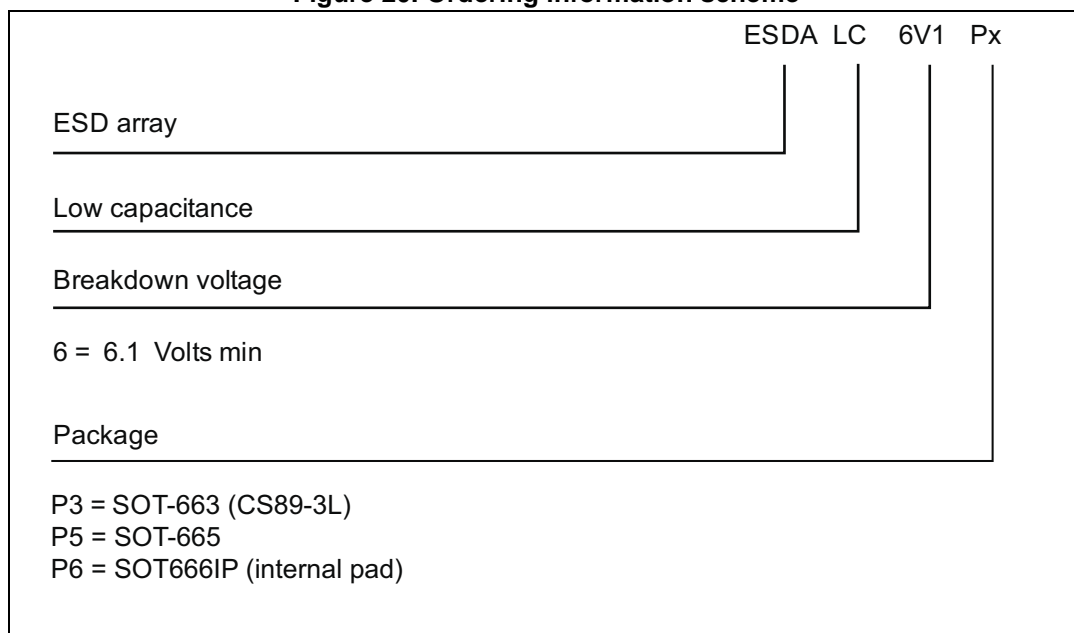


Table 6. Ordering information

Order code	Marking <sup>(1)</sup>	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

1. The marking can be rotated by multiples of 90° to differentiate assembly location

## 4 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 $T_j \text{ max} = 150 \text{ }^\circ\text{C}$
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 <a href="#">Table 2</a> . Update minimum dimension for L2 of SOT-663 in <a href="#">Table 3</a> .
15-Jan-2010	5	Updated <a href="#">Figure 17: SOT-665 footprint (dimensions in mm)</a> .
03-Dec-2014	6	Updated SOT-666IP dimension definitions and reformatted to current standard.

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