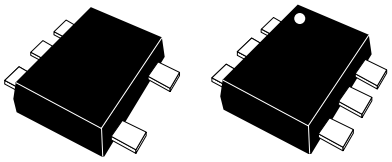
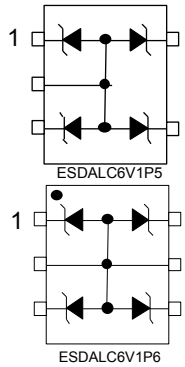
ESDALC6V1Px

Datasheet

Low capacitance Transil arrays for ESD protection



SOT-665 SOT-666IP



Product status link
ESDALC6V1Px

Features

- 4 unidirectional Transil functions
- Breakdown voltage V_{BR} = 6.1 V min
- Low leakage current < 100 nA
- Low diode capacitance (7.5 pF at 3 V)
- UL94, V0
- RoHS package
- Complies with the following standards
  - IEC 61000-4-2 (exceeds level 4)
    20 kV (air discharge)
    8 kV (contact discharge)
  - MIL STD 883E - Method 3015-7: class 3
    25 kV HBM (human body model)

Applications

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

- Computers
- Printers
- Communication systems
- Set-top boxes

Description

These devices are monolithic suppressors designed to protect components connected to data and transmission lines against ESD. They clamp the voltage just above the logic level supply for positive transients and to a diode drop below ground for negative transients.

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	IEC 61000-4-2: Contact discharge Air discharge	 8 20	kV
		MIL STD 883G - method 3015-7: Class3	25	
P_{PP}	Peak pulse power	8/20µs, T_j initial = T_{amb}	30	W
T_{stg}	Storage temperature range		-55 to +150	°C
T_j	Junction temperature range		-40 to +150	
T_L	Maximum lead temperature for soldering during 10 s		260	
T_{op}	Operating temperature range		-40 to +150	

Figure 1. 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

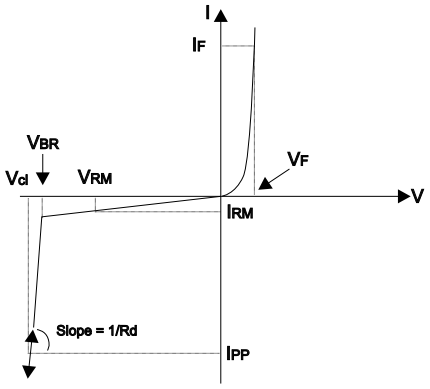


Table 2. Electrical characteristics (T_{amb} = 25 °C)

Order code	V_{BR} at I_R			I_{RM} at V_{RM}			R_d	αT	C
	Min.	Max.		Typ.	Max.		Typ.	Typ.	Typ. at 3 V
	V	V	mA	nA	µA	V	Ω	10^{-4}/°C	pF
ESDALC6V1P5	6.1	7.2	1	10	0.1	3	1.5	4.5	7.5
ESDALC6V1P6		8.0							

1.1 Characteristics (curves)

Figure 2. Peak pulse power dissipation versus initial junction temperature

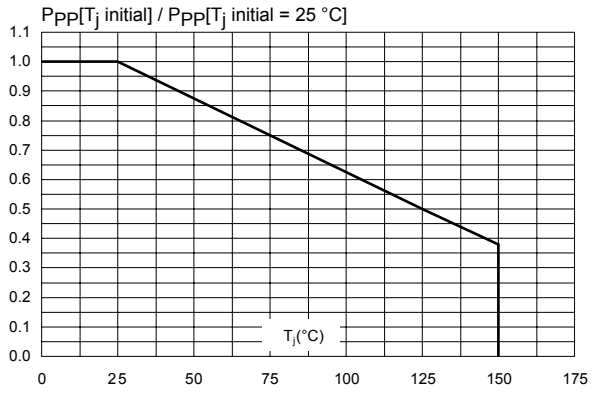


Figure 3. Peak pulse power versus exponential pulse duration (T_j initial = 25 °C)

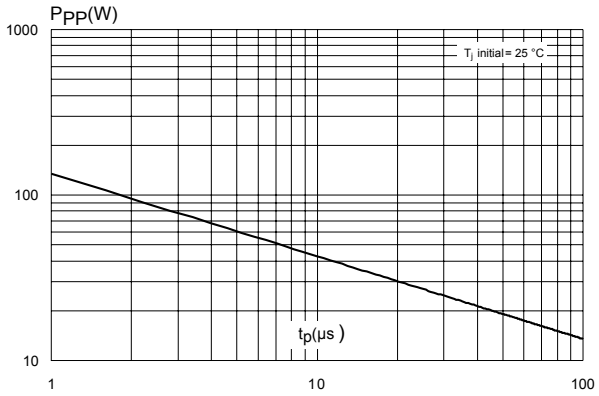


Figure 4. Clamping voltage versus peak pulse current rectangular waveform)

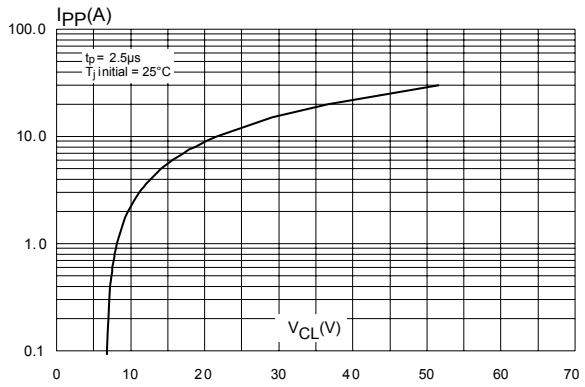


Figure 5. Forward voltage drop versus peak forward current

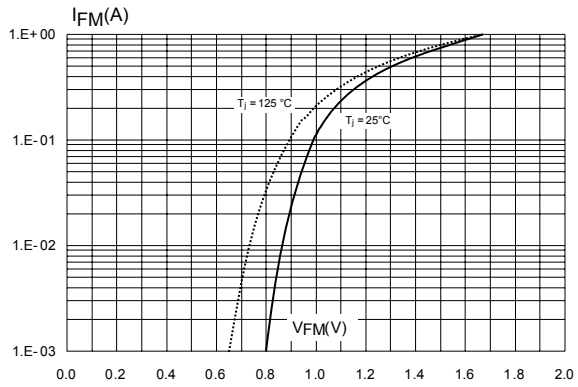


Figure 6. Junction capacitance versus reverse applied voltage

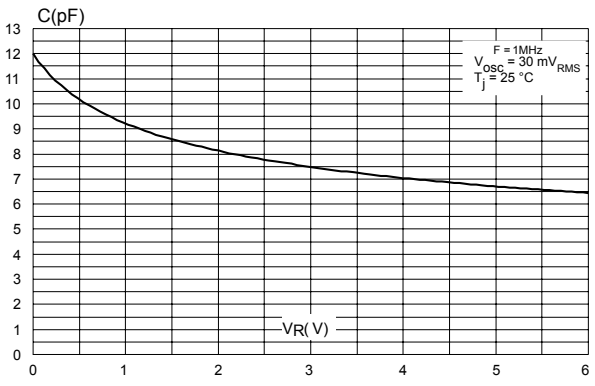


Figure 7. Relative variation of leakage current versus junction temperature

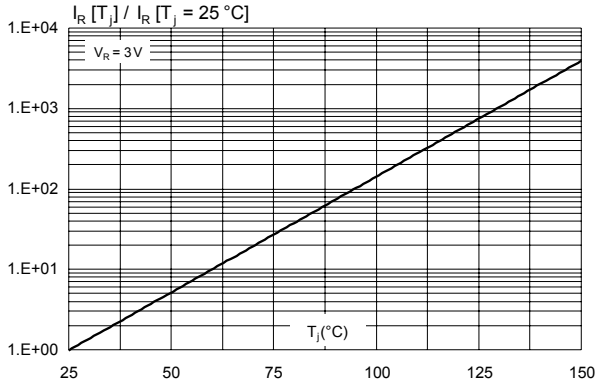


Figure 8. ESD response to IEC 61000-4-2 (+15 kV air discharge)

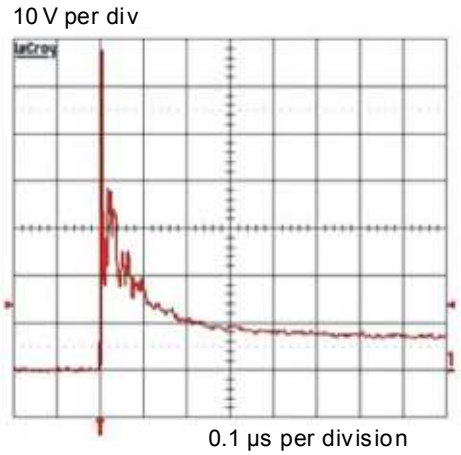


Figure 9. Analog crosstalk

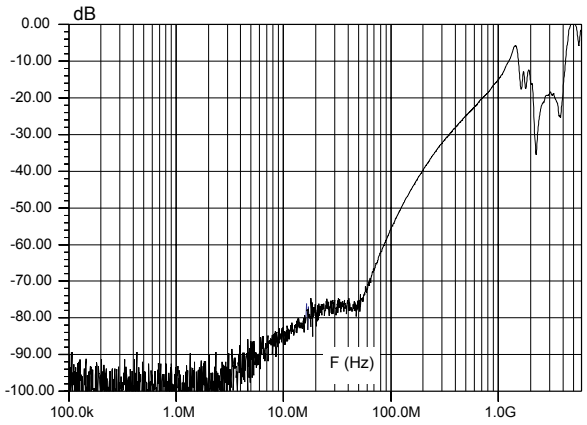
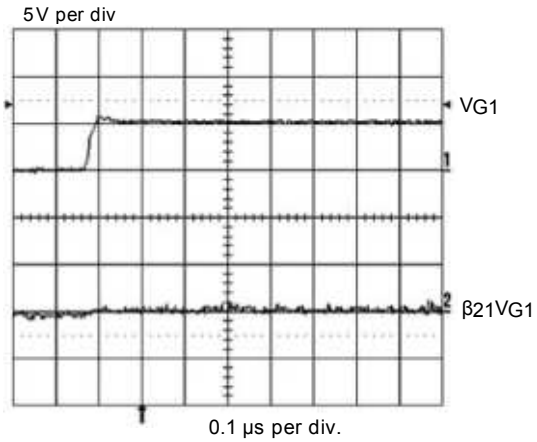


Figure 10. Digital crosstalk test



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. ECOPACK is an ST trademark.

2.1 SOT-665 package information

Figure 11. **SOT-665 package outline**

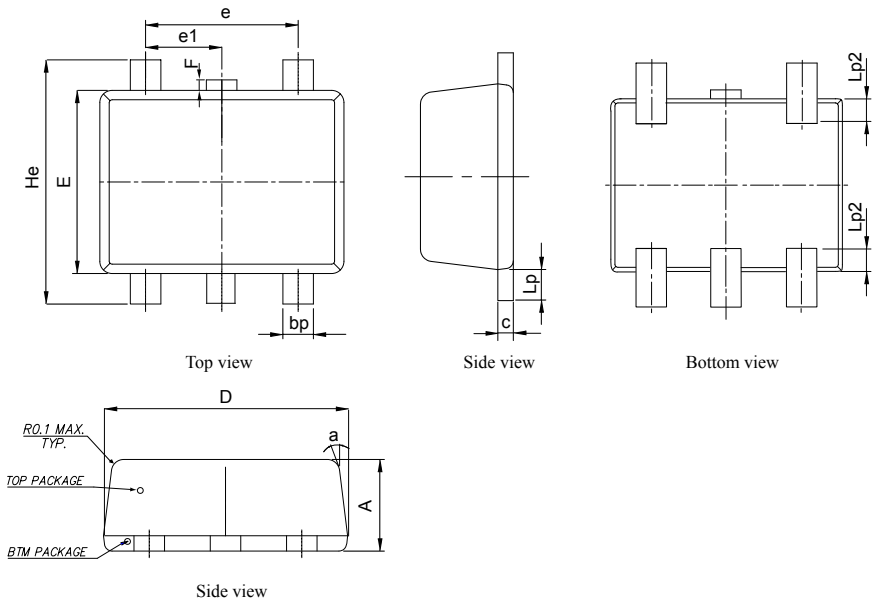


Table 3. **SOT-665 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.50		0.62	0.019		0.025
bp	0.17	0.20	0.34	0.006	0.008	0.014
C	0.08		0.18	0.003		0.008
D	1.50		1.70	0.059		0.067
E	1.10		1.30	0.043		0.052
e1		0.50			0.020	
e		1.00			0.039	
F	0.00		0.10	0.000		0.004
He	1.50		1.70	0.059		0.067
Lp	0.10		0.30	0.003		0.012
Lp2		0.15			0.006	

Figure 12. Footprint recommendations, dimensions in mm

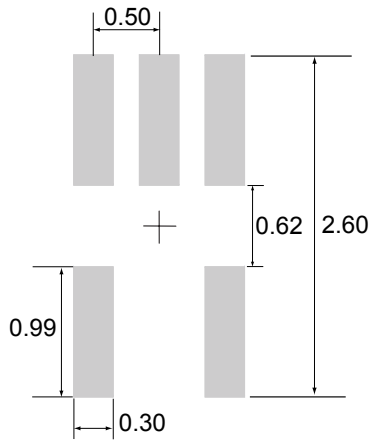


Figure 13. Marking layout (refer to ordering information table for marking)

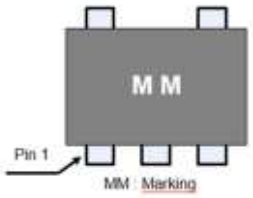
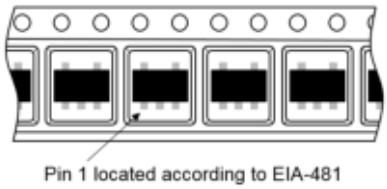


Figure 14. Package orientation in reel



Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Figure 15. Tape and reel orientation

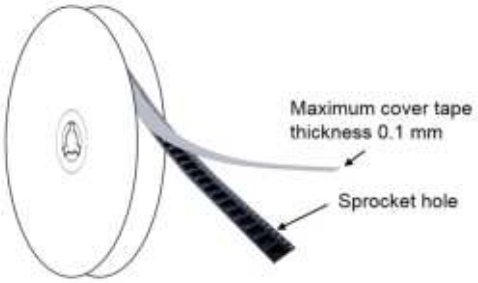


Figure 16. Reel dimensions (mm)

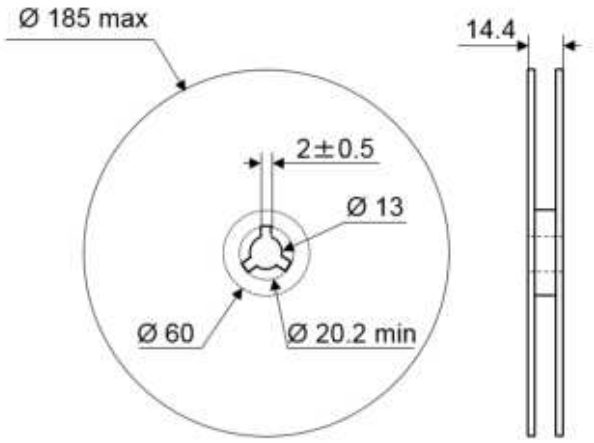


Figure 17. Inner box dimensions (mm)

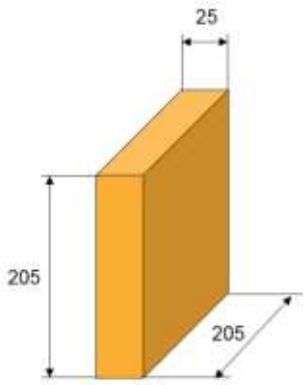
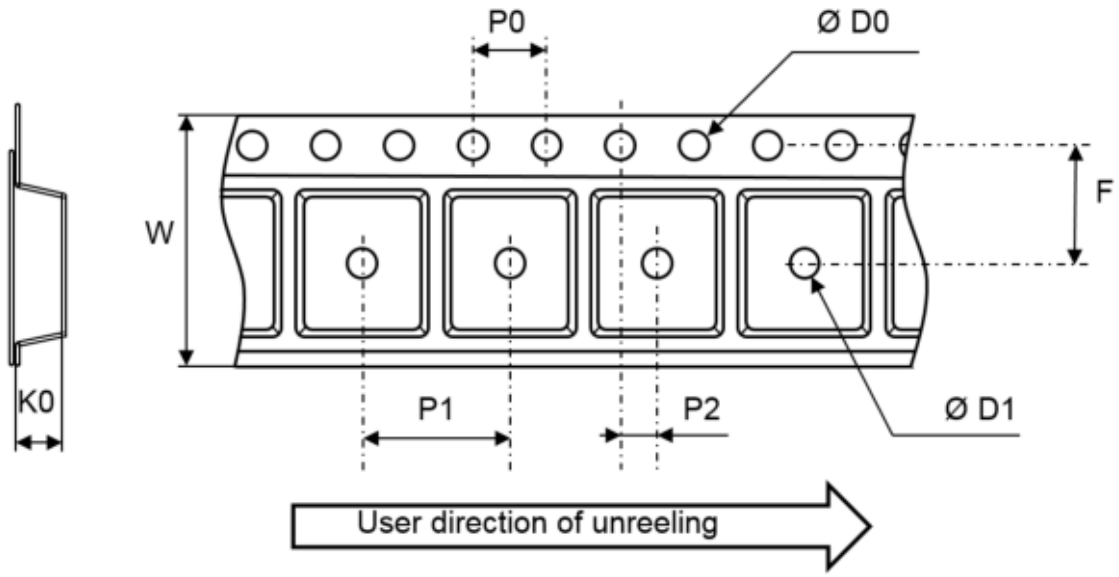


Figure 18. **Tape and reel outline**



Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Table 4. **Tape and reel mechanical data**

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
D0	1.5	1.55	1.6
D1	1		
F	3.45	3.5	3.55
K0	0.64	0.69	0.73
P0	3.9	4	4.1
P1	3.9	4	4.1
P2	1.95	2	2.05
W	7.9	8	8.3

2.2 SOT-666IP package information

Figure 19. **SOT-666IP package outline**

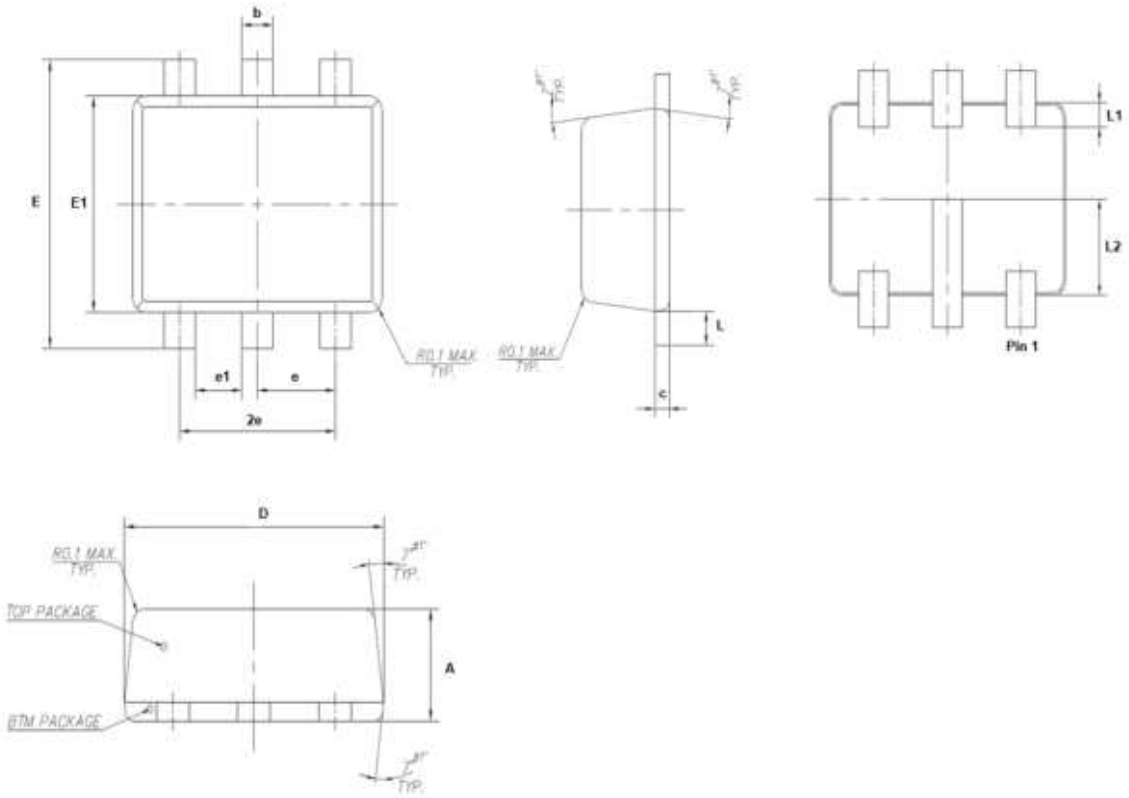


Table 5. **SOT-666IP package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.50	0.60	0.62	0.019	0.024	0.025
b	0.17	0.20	0.34	0.006	0.008	0.014
c	0.08	0.15	0.18	0.003	0.006	0.008
D	1.50	1.60	1.70	0.059	0.063	0.067
E	1.50	1.60	1.70	0.059	0.063	0.067
e	0.45	0.50	0.55	0.017	0.020	0.022
E1	1.10	1.20	1.30	0.043	0.047	0.052
e1		0.25			0.10	
L	0.10	0.20	0.30	0.003	0.008	0.012
L1	0.05	0.15	0.25	0.001	0.006	0.010
L2	0.50	0.60	0.70	0.019	0.024	0.028

Figure 20. **Footprint recommendations, dimensions in mm**

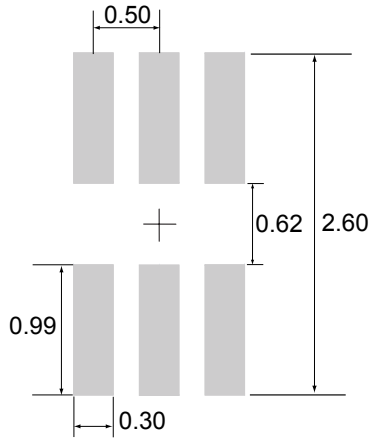


Figure 21. **Marking layout (refer to ordering information table for marking)**

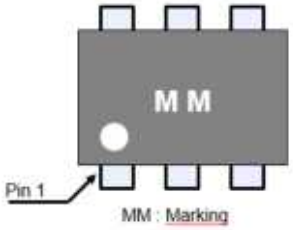
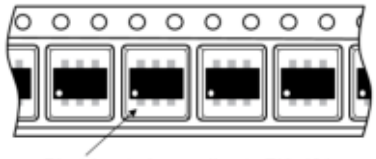


Figure 22. **Package orientation in reel**



Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Figure 23. **Tape and reel orientation**

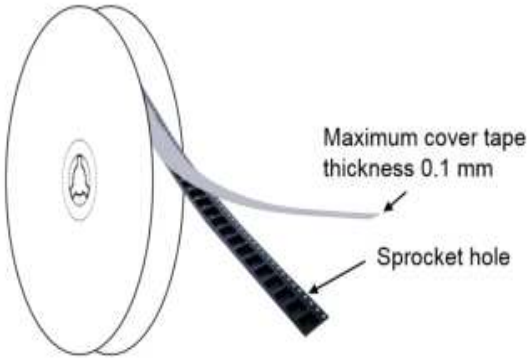


Figure 24. **Reel dimensions (mm)**

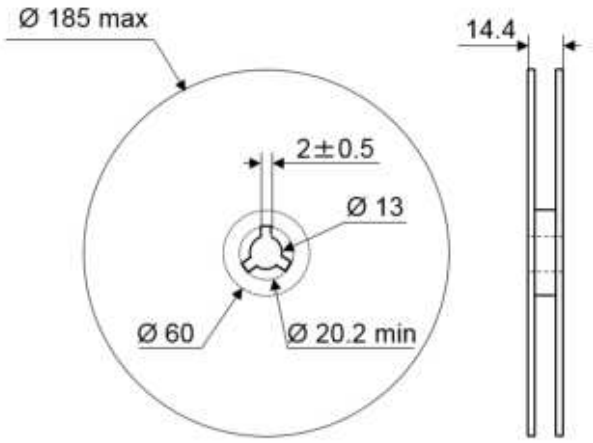


Figure 25. **Inner box dimensions (mm)**

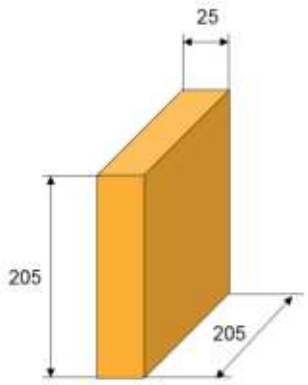
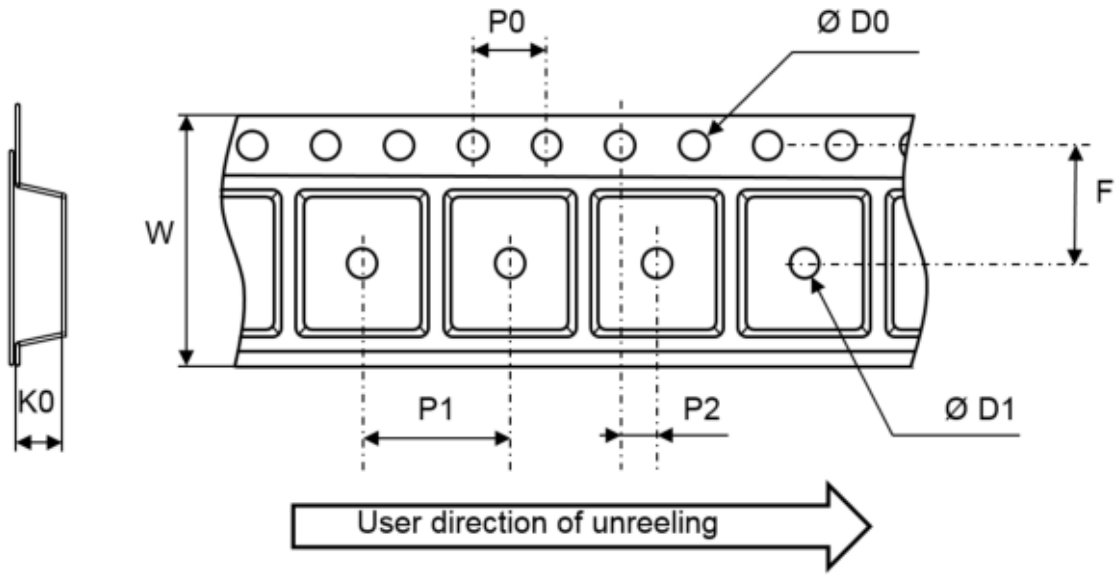


Figure 26. **Tape and reel outline**



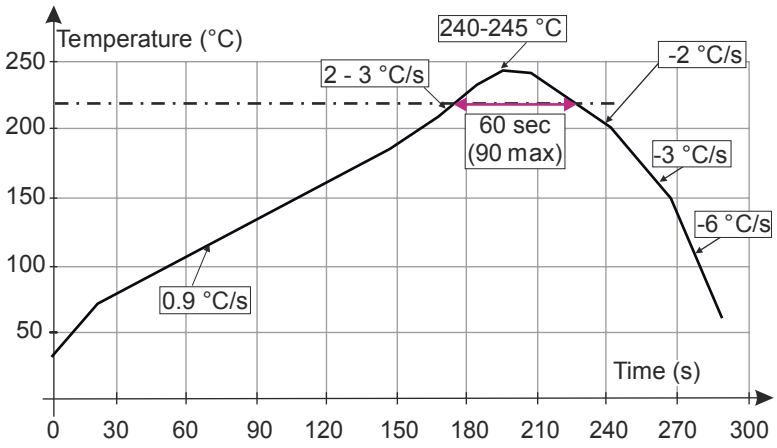
Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Table 6. **Tape and reel mechanical data**

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
D0	1.5	1.55	1.6
D1	1		
F	3.45	3.5	3.55
K0	0.64	0.69	0.73
P0	3.9	4	4.1
P1	3.9	4	4.1
P2	1.95	2	2.05
W	7.9	8	8.3

2.3 Reflow profile

Figure 27. **ST ECOPACK® recommended soldering reflow profile for PCB mounting**



Note: Minimize air convection currents in the reflow oven to avoid component movement.

Note: Maximum soldering profile corresponds to the latest IPC/JEDEC J-STD-020.

3 Ordering information

Figure 28. **Ordering information scheme**

Table 7. **Ordering information**

Order code	Marking[1]	Package	Weight	Base qty.	Delivery mode
ESDALC6V1P5	A1	SOT-665	3.53 mg	3000	Tape and reel
ESDALC6V1P6	D	SOT-666IP	3.0 mg		

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

Revision history

Table 8. 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 17: SOT-665 footprint (dimensions in mm).*
03-Dec-2014	6	Updated SOT-666IP dimension definitions and reformatted to current standard.
17-Mar-2017	7	Removed SOT-663 package. Updated Table 1. Absolute maximum ratings (Tamb = 25 °C). Updated Table 3. SOT-665 package mechanical data and Table 4. SOT-666IP package mechanical data.
03-Aug-2017	8	Updated Section 2.1 SOT-665 package information.
26-Mar-2018	9	Updated Table 3. SOT-665 package mechanical data. Updated cover page.
13-May-2019	10	Updated Section Features, Section Applications, Table 1, Table 2 and Section 2 .

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