ESDALC6-4N4

ESD array with low capacitance

Datasheet – production data

Features

- Stand-off voltage 7 V
- Very low capacitance: 9.5 pF
- Small package: 1.0 x 0.8 mm
- Very thin package: 0.40 mm max
- Low leakage current: 70 nA at 25 °C

Benefits

- High ESD protection level
- High integration
- suitable for high speed interface

Complies with the following standards

- IEC 61000-4-2:
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- MIL STD 883G- Method 3015-7: class3B:
  - >25 kV (human body model)

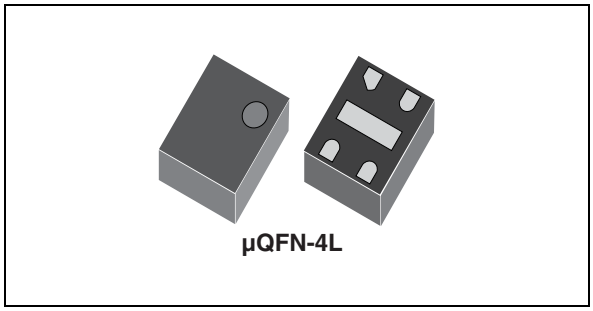
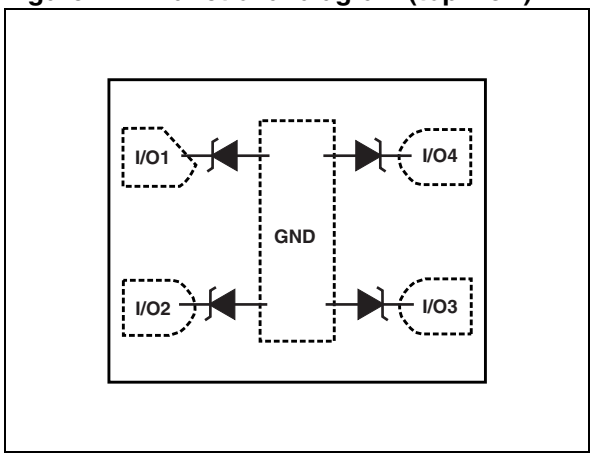


Figure 1. Functional diagram (top view)



Applications

Where transient overvoltage protection and electrical overstress protection in sensitive equipment is required, such as:

- Communication systems
- Cellular phone handsets and accessories
- Video equipment
- Portable equipment

Description

The ESDALC6-4N4 is monolithic array designed to protect up to 4 lines against ESD transients. It has been designed specifically for the protection of the high speed interface of integrated circuits in portable equipment and miniaturized electronics devices. The µQFN-4L package minimizes PCB space.

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{PP}	ESD IEC 61000-4-2, level 4 (contact discharge)		11	kV
P_{PP}	Peak pulse power dissipation (8/20 µs)(1)	T_j initial = T_{amb}	27	W
I_{pp}	Repetitive peak pulse current typical value (8/20 µs)		2.3	A
T_j	Maximum junction temperature		125	°C
T_{stg}	Storage temperature range		-55 + 150	°C

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

Figure 2. Electrical characteristics (definitions)

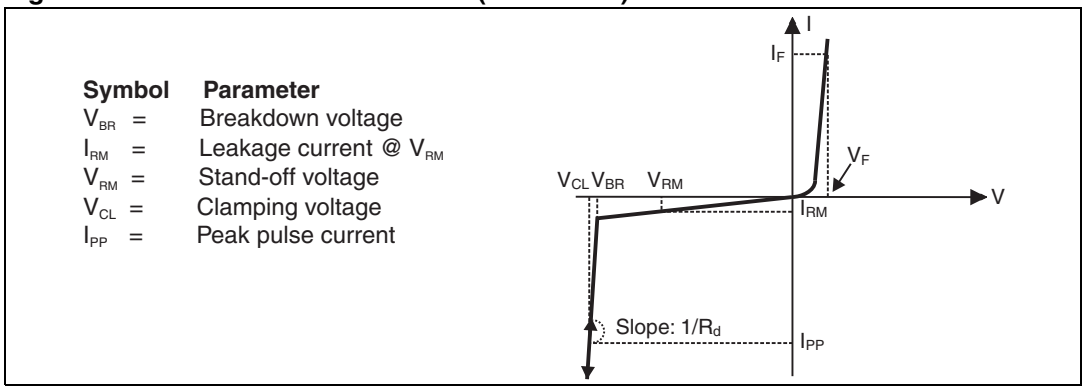


Table 2. Electrical characteristics (values, T_{amb} = 25 °C)

Symbol	Test conditions	Min.	Typ.	Max.	Unit
V_{BR}	I_R = 1 mA	6			V
I_{RM}	V_{RM} = 3 V			70	nA
V_{CL}	I_{pp} = 1 A, 8/20 µs			10	V
C	V_R = 0 V, F = 1 MHz, V_{osc} = 30 mV		9.5	11	pF

Figure 3. Peak pulse power versus initial junction temperature (typical values, 8/20 µs waveform)

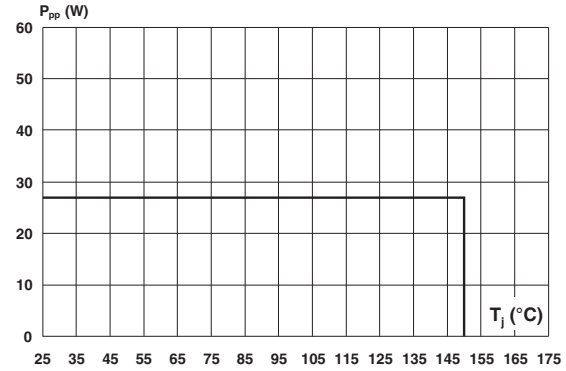


Figure 4. Peak pulse power versus exponential pulse duration (typical values)

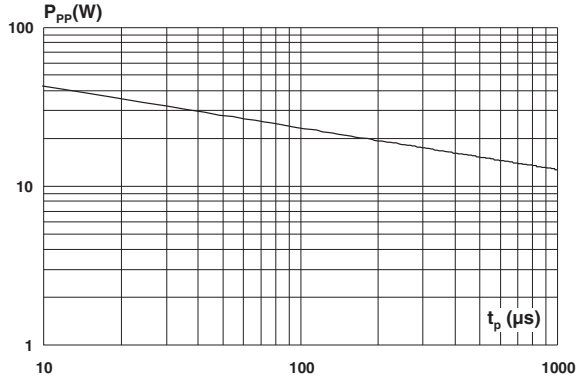


Figure 5. Clamping voltage versus peak pulse current (typical values, 8/20 µs waveform)

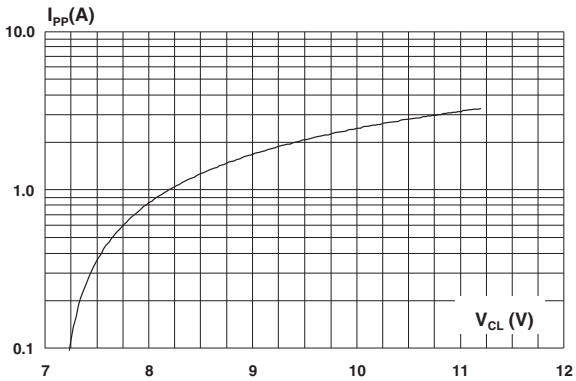


Figure 6. Forward voltage drop versus peak forward current (typical values)

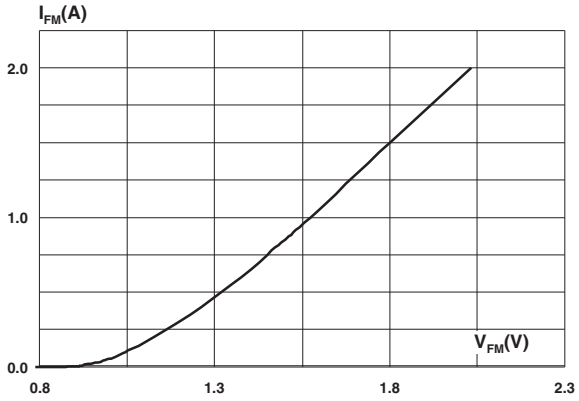


Figure 7. Junction capacitance versus reverse voltage applied (typical values)

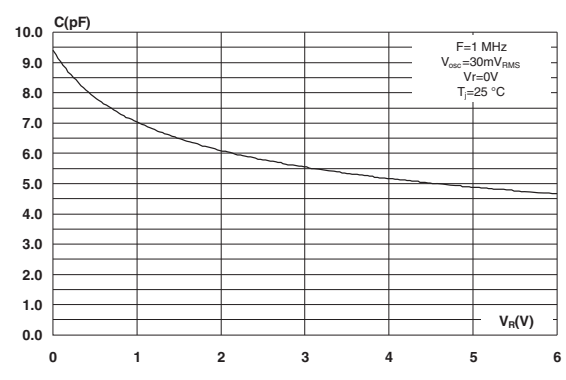


Figure 8. Leakage current versus junction temperature (typical values)

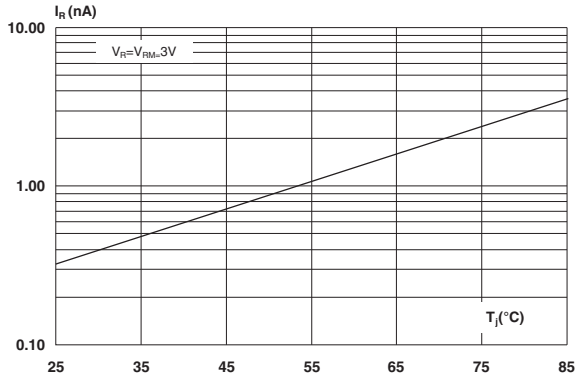


Figure 9. ESD response to IEC 6100-4-2 (+8 kV contact discharge) on each channel

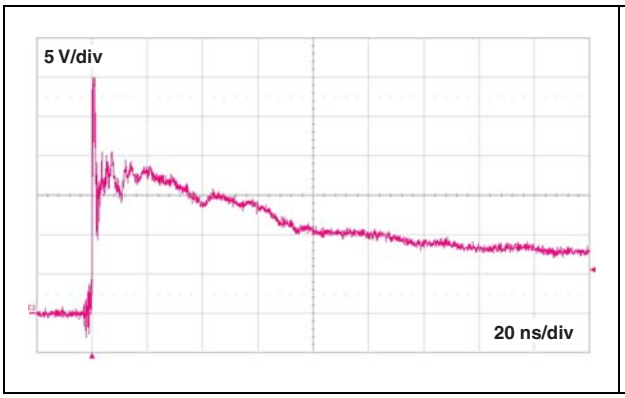


Figure 10. ESD response to IEC 6100-4-2 (-8 kV contact discharge) on each channel

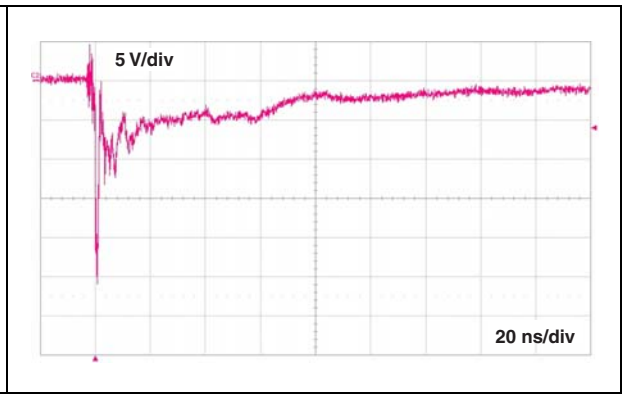


Figure 11. S21 attenuation measurement

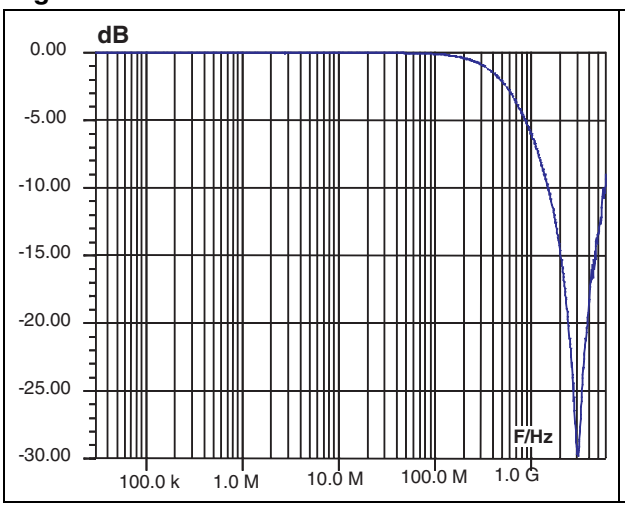
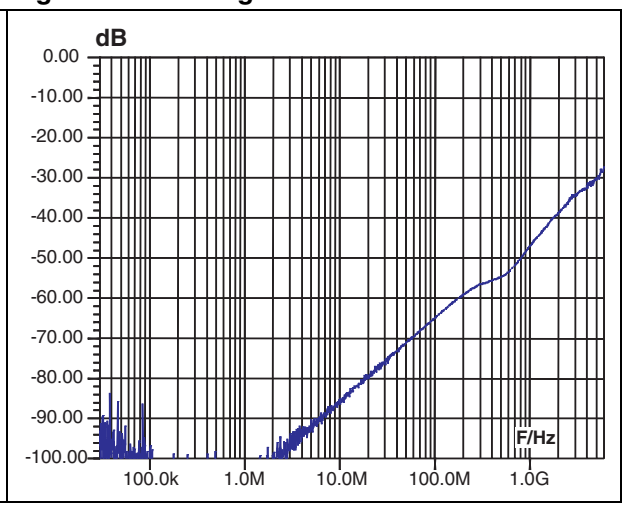
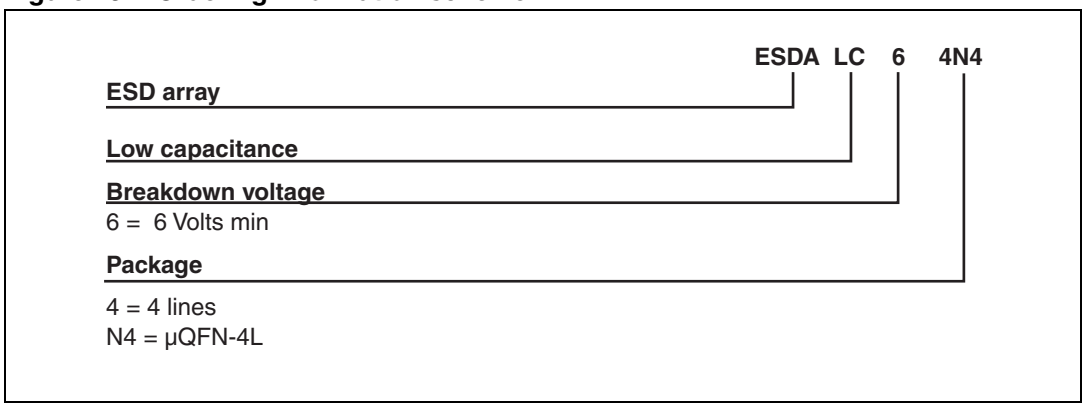


Figure 12. Analog crosstalk measurement



2 Ordering information scheme

Figure 13. Ordering information scheme

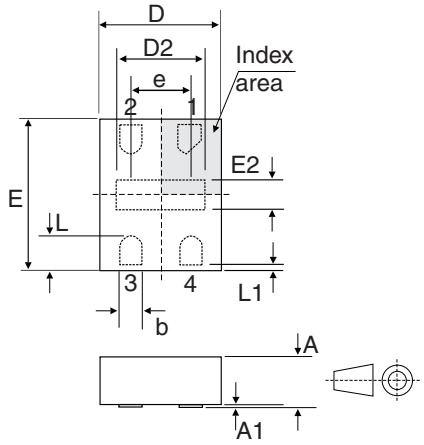


3 Package information

- 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. µQFN-4L dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.31	0.38	0.40	0.012	0.015	0.016
A1	0.00	0.02	0.05	0.00	0.0008	0.002
b	0.10	0.15	0.20	0.004	0.006	0.008
D	0.70	0.80	0.90	0.028	0.031	0.035
D2	0.50	0.58	0.65	0.020	0.023	0.026
e	0.35	0.40	0.45	0.014	0.016	0.018
E	0.90	1.00	1.10	0.035	0.039	0.043
E2	0.15	0.20	0.25	0.006	0.008	0.010
L	0.18	0.23	0.28	0.007	0.009	0.011
L1	0.00	--	0.05	0.00	--	0.002

Figure 14. Footprint dimensions (in mm)

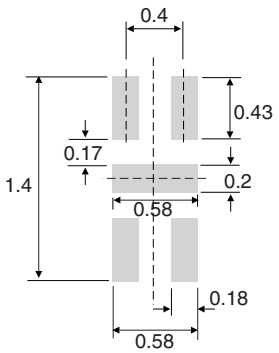
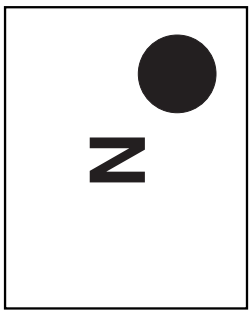
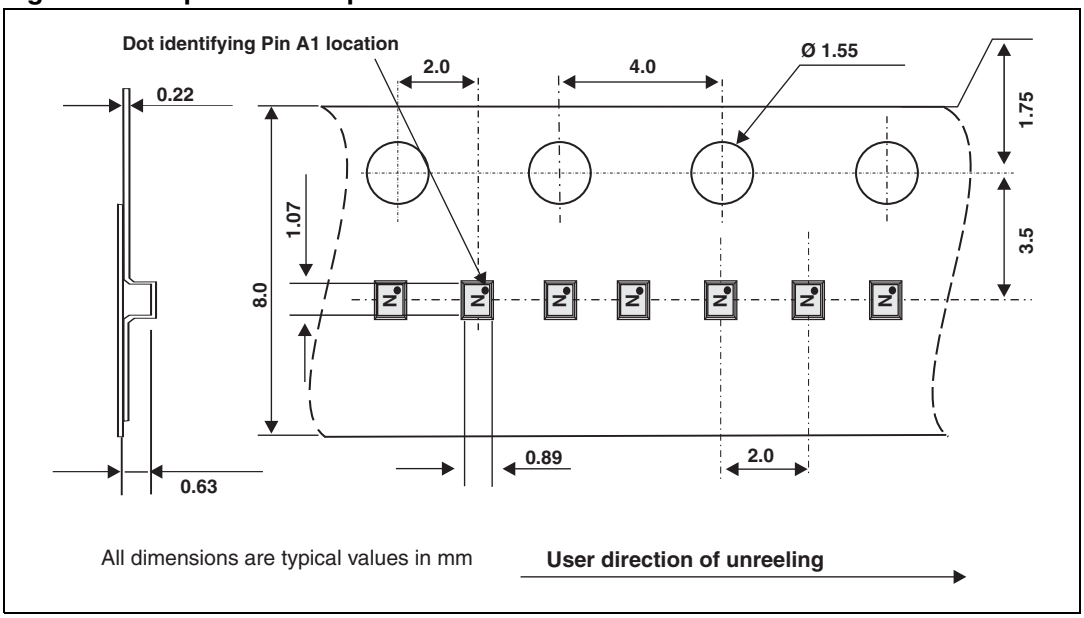


Figure 15. Marking



Note: Product marking may be rotated by multiples of 90° for assembly plant differentiation. In no case should this product marking be used to orient the component for its placement on a PCB. Only pin 1 mark is to be used for this purpose.

Figure 16. Tape and reel specifications



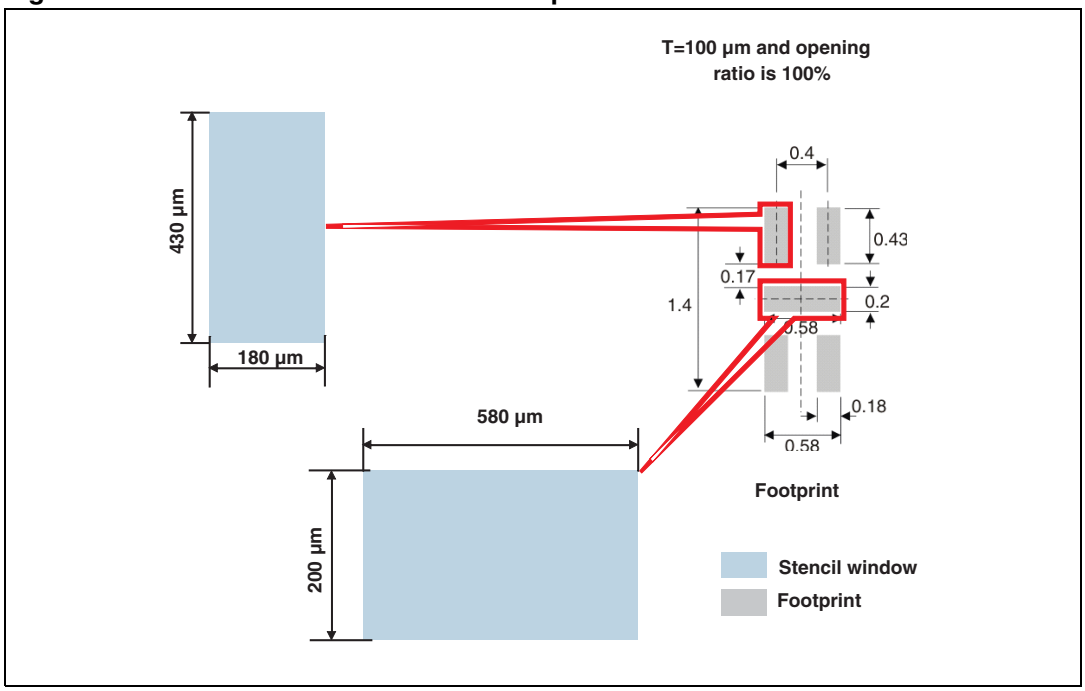
4 Recommendation on PCB assembly

4.1 Stencil opening design

Reference design

- Stencil opening thickness: 100 µm
- Stencil opening for leads: Opening to footprint ratio is 100%.

Figure 17. Recommended stencil window position



4.2 Solder paste

1. Halide-free flux qualification ROL0 according to ANSI/J-STD-004.
2. “No clean” solder paste is recommended.
3. Offers a high tack force to resist component movement during high speed.
4. Solder paste with fine particles: powder particle size is 20-45 µm.

4.3 Placement

1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering.
3. Standard tolerance of ± 0.05 mm is recommended.

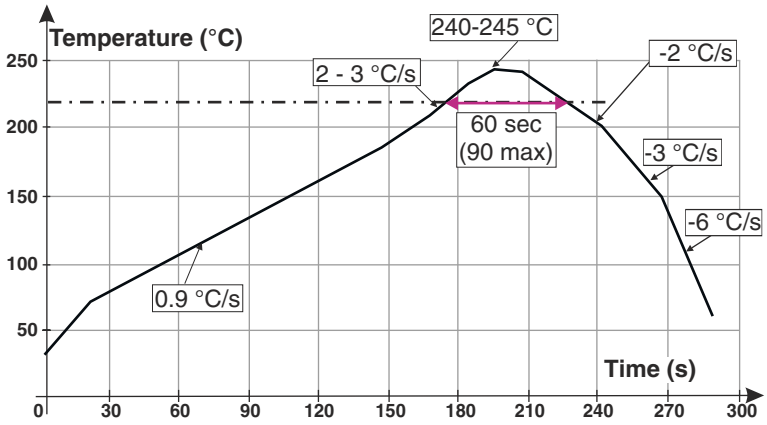
4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out solder paste and cause solder joints to short. Too low placement force can lead to insufficient contact between package and solder paste that could cause open solder joints or badly centered packages.
5. To improve the package placement accuracy, a bottom side optical control should be performed with a high resolution tool.
6. For assembly, a perfect supporting of the PCB (all the more on flexible PCB) is recommended during solder paste printing, pick and place and reflow soldering by using optimized tools.

4.4 PCB design preference

1. To control the solder paste amount, the closed via is recommended instead of open vias.
2. The position of tracks and open vias in the solder area should be well balanced. The symmetrical layout is recommended, in case any tilt phenomena caused by asymmetrical solder paste amount due to the solder flow away.

4.5 Reflow profile

Figure 18. ST ECOPACK® recommended soldering reflow profile for PCB mounting



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

5 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
ESDALC6-4N4	N(1)	µQFN-4L	1.17 mg	10000	Tape and reel

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

6 Revision history

Table 5. Document revision history

Date	Revision	Changes
06-Sep-2011	1	Initial release.
25-Sep-2012	2	Updated ECOPACK statement.

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