

Very low capacitance and low leakage current ESD protection

Datasheet – production data

Features

- 2 data-line protection
- Protects V_{BUS}
- Very low capacitance: 2.5 pF typ.
- Very low leakage current:
 - 10 nA at 3 V
 - 1 nA at 1 V
- RoHS compliant

Complies with the following standards:

- IEC 61000-4-2 level 4 and higher:
 - 30 kV (air discharge)
 - 15 kV (contact discharge)
- MIL STD883G-Method 3015-7
 - 25 kV (human body model)

Applications

- USB 2.0 ports up to 480 Mb/s (high speed)
- Compatible with USB 2.0
- Ethernet port: 10/100 Mb/s
- SIM card protection
- Video line protection
- Portable healthcare equipment

Description

The ESDALCL6-2SC6 is a monolithic application specific device dedicated to ESD protection of high speed interfaces, such as USB 2.0, ethernet links and video lines.

The very low line capacitance secures a high level of signal integrity without compromising in protecting sensitive chips against the most stringently characterized ESD strikes.

Its low leakage current makes it suitable for portable equipment.

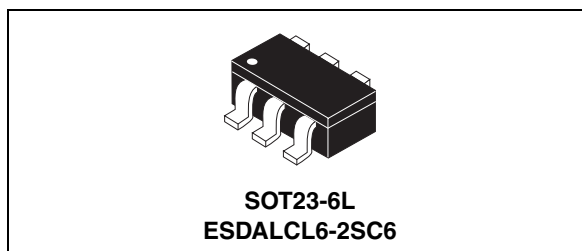
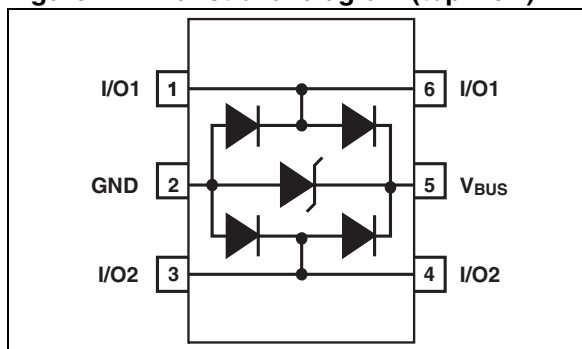


Figure 1. Functional diagram (top view)



1 Characteristics

Table 1. Absolute ratings

| Symbol | Parameter | | Value | Unit |
|------------------|---|---------------------------------|-------------|------|
| V _{PP} | Peak pulse voltage | IEC 61000-4-2 air discharge | 30 | kV |
| | | IEC 61000-4-2 contact discharge | 15 | |
| | | MIL STD883G-Method 3015-7 | 25 | |
| T _{stg} | Storage temperature range | | -55 to +150 | °C |
| T _j | Operating junction temperature range | | -40 to +125 | °C |
| T _L | Lead solder temperature (10 seconds duration) | | 260 | °C |

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

| Symbol | Parameter | Test conditions | Value | | | Unit |
|-----------------------|---|--|-------|-------|------|------|
| | | | Min. | Typ. | Max. | |
| V _{BR} | I _R = 1 mA | | 6 | | | V |
| I _{RM} | V _{RM} = 3 V, V _{CC} to GND | | | | 10 | nA |
| | V _{RM} = 1 V, V _{CC} to GND | | | | 1 | |
| V _F | Forward voltage | I _F = 10 mA | | | 1.1 | V |
| V _{CL} | Clamping voltage | I _{PP} = 1 A, 8/20 μs Any I/O pin to GND | | | 12 | V |
| | | I _{PP} = 5 A, 8/20 μs Any I/O pin to GND | | | 17 | V |
| C _{i/o-GND} | Capacitance between I/O and GND | V _R = 1.65 V | | 2.5 | 3.5 | pF |
| ΔC _{i/o-GND} | | | | 0.015 | | |
| C _{i/o-i/o} | Capacitance between I/O | V _R = 1.65 V | | 1.2 | 1.7 | pF |
| ΔC _{i/o-i/o} | | | | 0.04 | | |

Figure 2. Capacitance versus voltage (typical values)

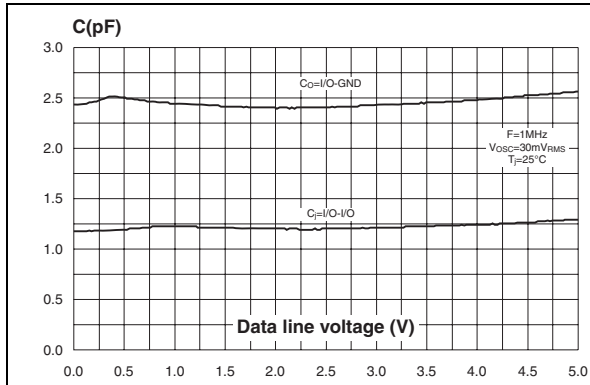


Figure 3. Line capacitance versus frequency (typical values)

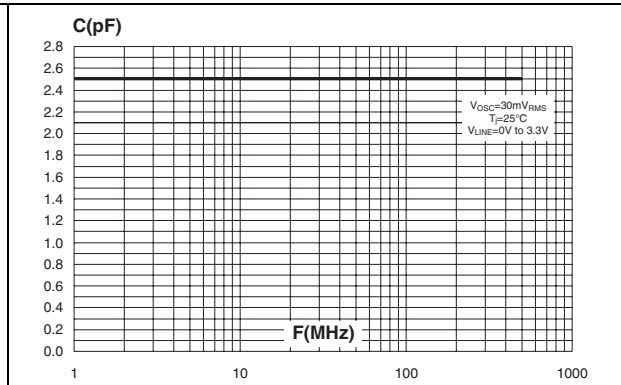


Figure 4. Leakage current versus junction temperature (typical values, $V_R = 1 V$)

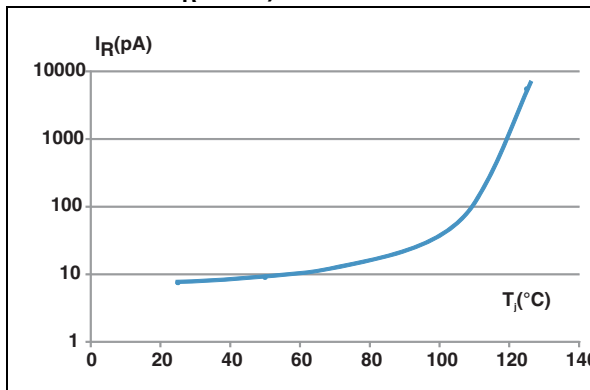


Figure 5. Leakage current versus reverse applied voltage (typical values)

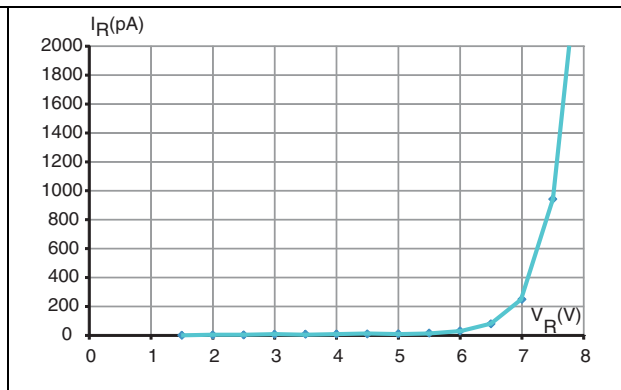


Figure 6. ESD response to IEC 61000-4-2 (+8 kV contact discharge)

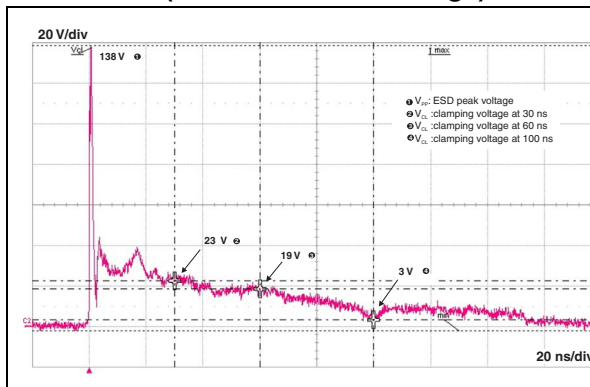


Figure 7. ESD response to IEC 6100-4-2 (-8 kV contact discharge)

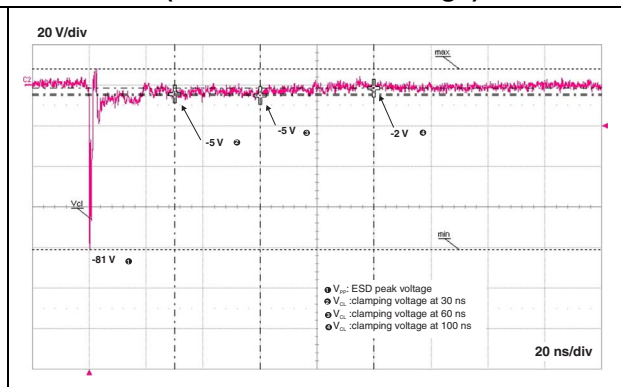


Figure 8. S21 attenuation measurement result

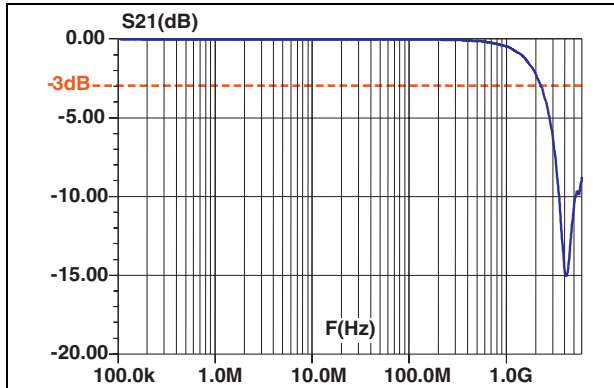
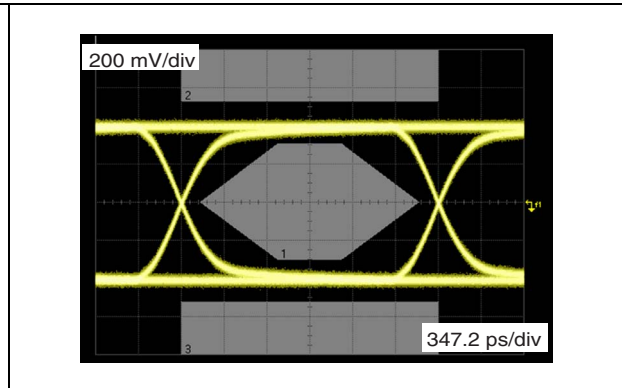
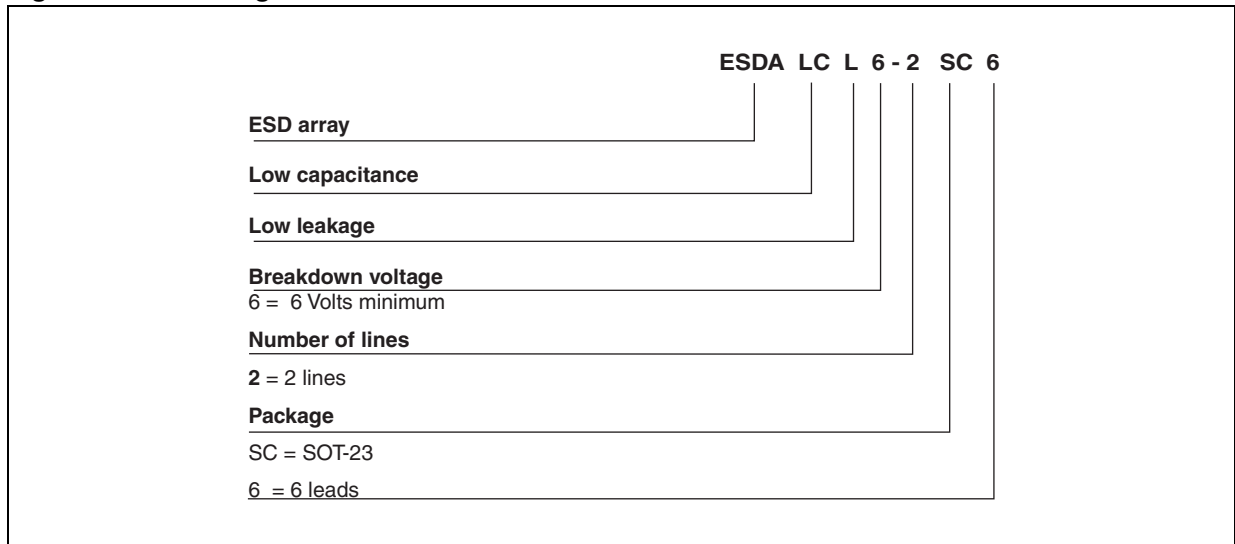


Figure 9. USB2.0 eye diagram



2 Ordering information scheme

Figure 10. Ordering information scheme



3 Package information

- Epoxy meets UL94, V0
- Lead-free packages

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. SOT23-6L dimensions

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.90 | | 1.45 | 0.035 | | 0.057 |
| A1 | 0 | | 0.15 | 0 | | 0.006 |
| A2 | 0.90 | | 1.30 | 0.035 | | 0.051 |
| b | 0.30 | | 0.50 | 0.012 | | 0.020 |
| c | 0.09 | | 0.20 | 0.004 | | 0.008 |
| D | 2.80 | | 3.05 | 0.11 | | 0.118 |
| E | 1.50 | | 1.75 | 0.059 | | 0.069 |
| e | | 0.95 | | | 0.037 | |
| H | 2.60 | | 3.00 | 0.102 | | 0.118 |
| L | 0.30 | | 0.60 | 0.012 | | 0.024 |
| θ | 0° | | 10° | 0° | | 10° |

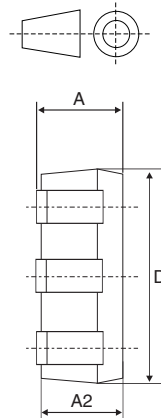
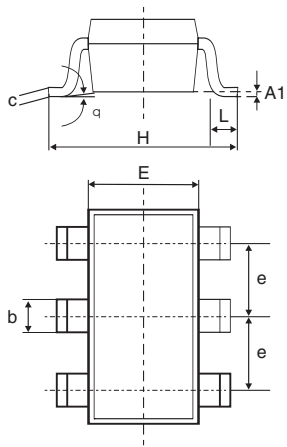
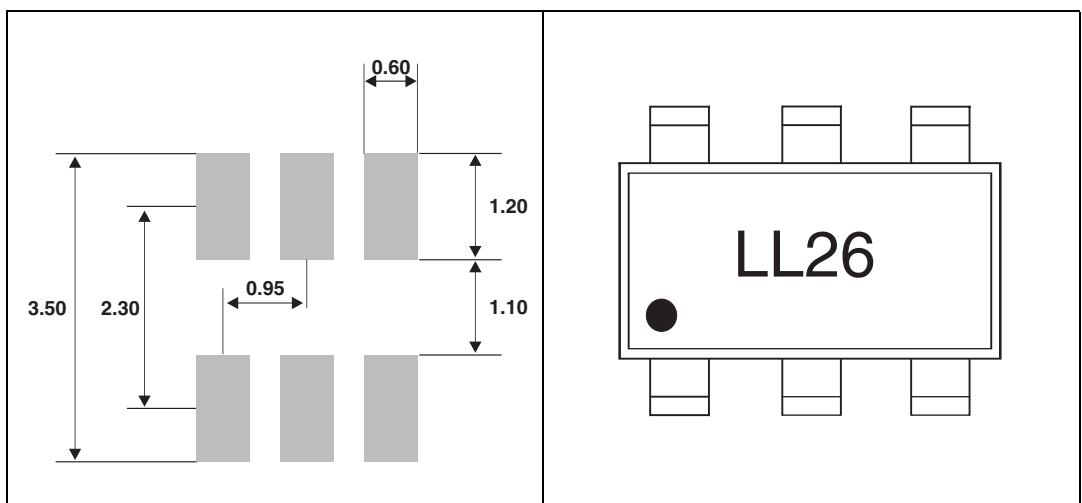


Figure 11. SOT23-6L footprint dimensions in mm

Figure 12. SOT23-6L marking



4 Ordering information

Table 4. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|---------|----------|---------|----------|---------------|
| ESDALCL6-2SC6 | LL26 | SOT23-6L | 16.7 mg | 3000 | Tape and reel |

5 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|-------------|----------|--------------|
| 31-Oct-2012 | 1 | First issue. |

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