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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

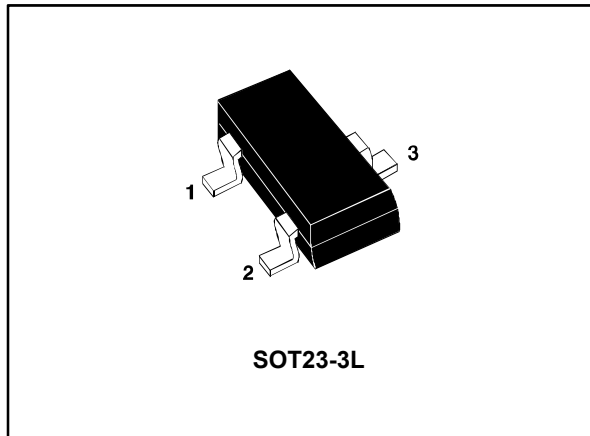
Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



## Dual Transil™ array for ESD protection

Datasheet - production data



### Features

- Unidirectional device
- Low leakage current ( $I_R$  max.  $< 20 \mu A$  at  $V_{BR}$ )
- 300 W peak pulse power (8/20  $\mu s$ )

### Benefits

- High ESD protection level: up to 30 kV
- High integration
- Suitable for high density boards

### Complies with the following standards

- IEC 61000-4-2 (exceeds level 4) :
  - 30 kV (air discharge)
  - 30 kV (contact discharge)

### Applications

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

- Entertainment
- Signal communications
- Connectivity
- Comfort and convenience

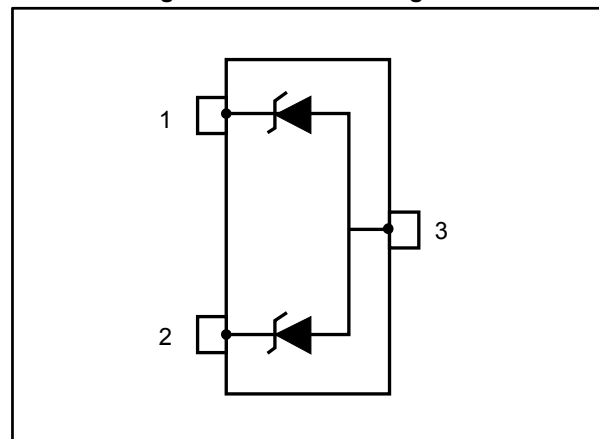
### Description

This device is a diode array designed to protect 1 line or 2 lines against ESD transients.

The device is ideal for applications where both reduced line capacitance and board space saving are required.

It can also be used as bidirectional suppressor by connecting only pin 1 and 2.

**Figure 1: Functional diagram**



# 1 Characteristics

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

| Symbol    | Parameter  |                                     | Value      | Unit               |
|-----------|--|-------------------------------------|------------|--------------------|
| $V_{pp}$  | Peak pulse voltage <sup>(1)</sup>                                    | IEC 61000-4-2:<br>Contact discharge | 30         | kV                 |
|           |  | Air discharge                       | 30         |                    |
| $P_{pp}$  | Peak pulse power (8/20 $\mu\text{s}$ )                               |                                     | 300        | W                  |
| $I_{pp}$  | Peak pulse current (8/20 $\mu\text{s}$ )                             | ESDA5V3L                            | 25         | A                  |
|           |  | ESDA6V1L                            | 18         |                    |
|           |  | ESDA14V2L                           | 14         |                    |
|           |  | ESDA25L                             | 7          |                    |
|           |  | ESDA37L                             | 6.3        |                    |
| $T_j$     | Operating junction temperature range                                 |                                     | -40 to 150 | $^{\circ}\text{C}$ |
| $T_{stg}$ | Storage junction temperature range                                   |                                     | -65 to 150 | $^{\circ}\text{C}$ |
| $T_L$     | Maximum lead temperature for soldering during 10 s at 5 mm from case |                                     | 260        | $^{\circ}\text{C}$ |

**Notes:**

<sup>(1)</sup>For a surge greater than the maximum values, the diode will fail in short-circuit.

Figure 2: Electrical characteristics (definitions)

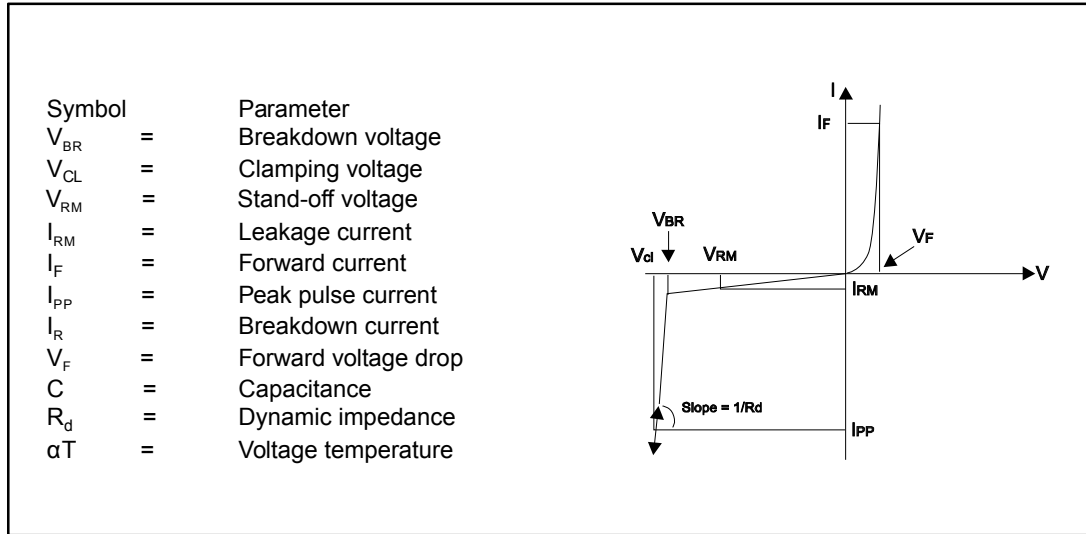


Table 2: Electrical characteristics ( $T_{amb} = 25\text{ °C}$ )

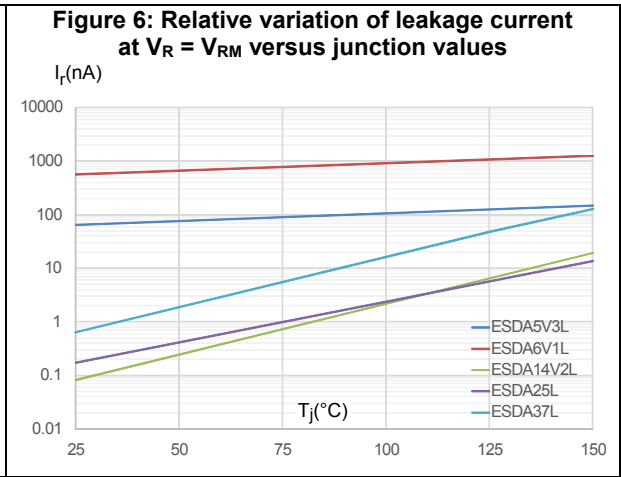
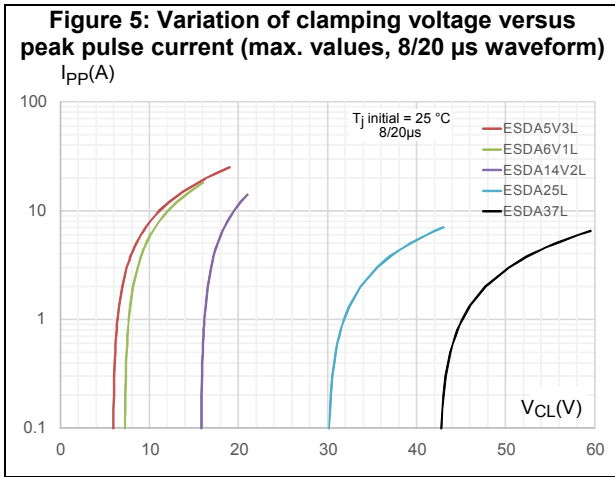
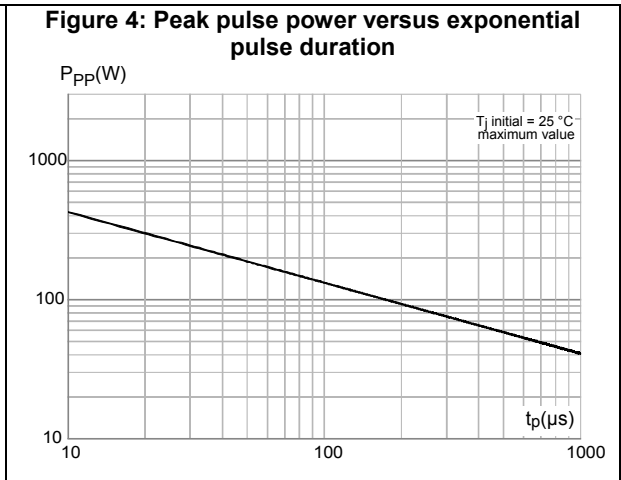
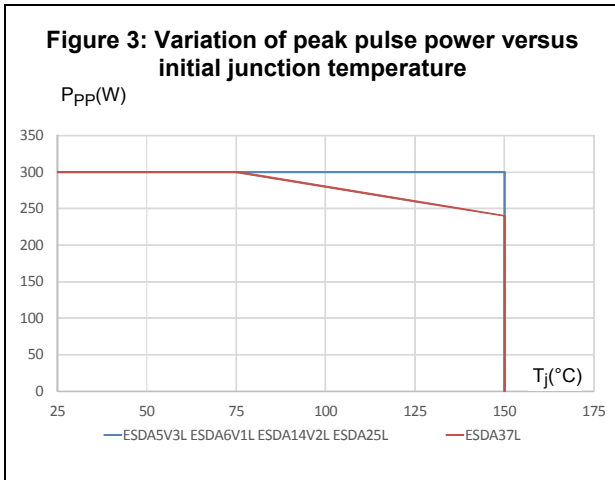
| Order code | $V_{BR}$ at $I_R$ |      |    | $I_{RM}$ at $V_{RM}$ |      |            | $R_d^{(1)}$         | $\alpha T^{(2)}$ | $C_{line}$ | $V_F$ at $I_F$ |  |
|------------|-------------------|------|----|----------------------|------|------------|---------------------|------------------|------------|----------------|--|
|            | Min.              | Max. |    | Max.                 |      | Typ.       | Max.                | Typ. at 0 V bias | Max.       |                |  |
|            | V                 | V    | mA | $\mu A$              | V    | m $\Omega$ | $10^{-4}/\text{°C}$ | pF               | V          | mA             |  |
| ESDA5V3L   | 5.3               | 5.9  | 1  | 2                    | 3    | 280        | 5                   | 220              | 1.25       | 200            |  |
| ESDA6V1L   | 6.1               | 7.2  | 1  | 20                   | 5.25 | 350        | 6                   | 140              | 1.25       | 200            |  |
| ESDA14V2L  | 14.2              | 15.8 | 1  | 5                    | 12   | 650        | 10                  | 90               | 1.25       | 200            |  |
| ESDA25L    | 25                | 30   | 1  | 1                    | 24   | 1000       | 10                  | 50               | 1.2        | 10             |  |
| ESDA37L    | 37                | 43.3 | 1  | 1                    | 36   | 2400       | 10                  | 48               | 0.9        | 10             |  |

**Notes:**

<sup>(1)</sup>Square pulse  $I_{pp} = 15\text{ A}$ ,  $t_p = 2.5\ \mu s$

<sup>(2)</sup> $\Delta V_{BR} = \alpha T \times (T_{amb} - 25\text{ °C}) \times V_{BR}(25\text{ °C})$

### 1.1 Characteristics (curves)



## 2 Application and design guidelines

Refer to STMicroelectronics application note:

- AN2689: Protection of automotive electronics from electrical hazards, guidelines for design and component selection.

### 3 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](http://www.st.com). ECOPACK® is an ST trademark.

- Epoxy meets UL 94,V0
- Lead-free package

#### 3.1 SOT23-3L mechanical data

Figure 7: SOT23-3L package outline

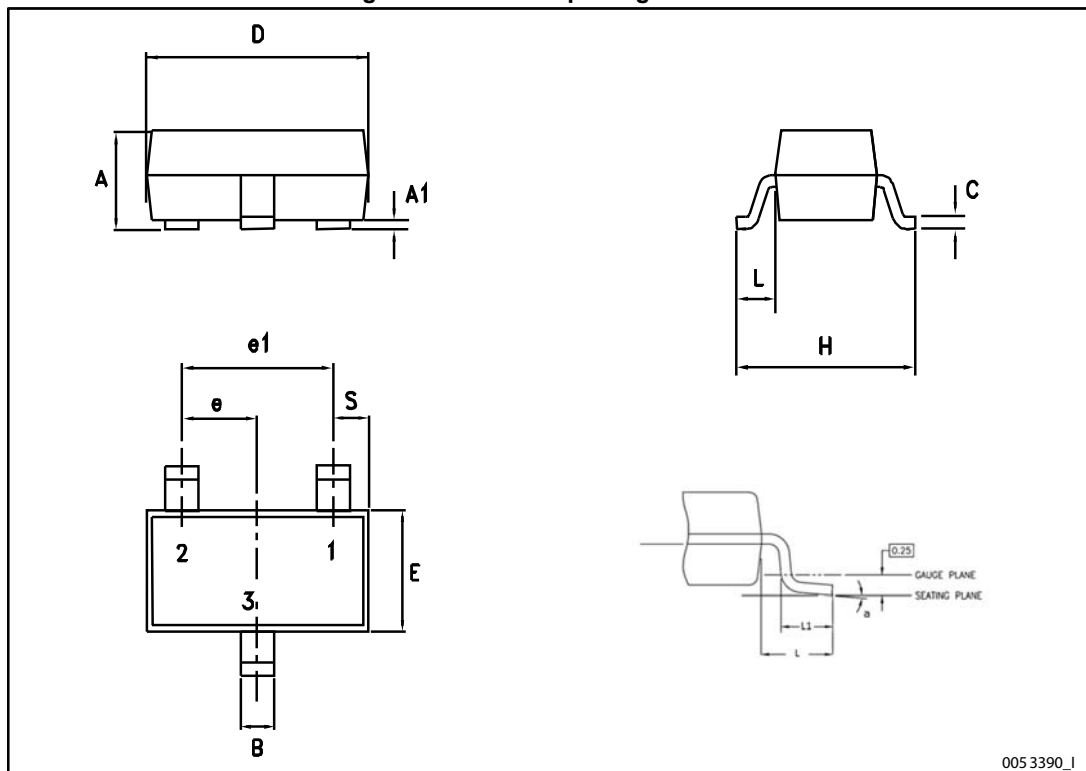
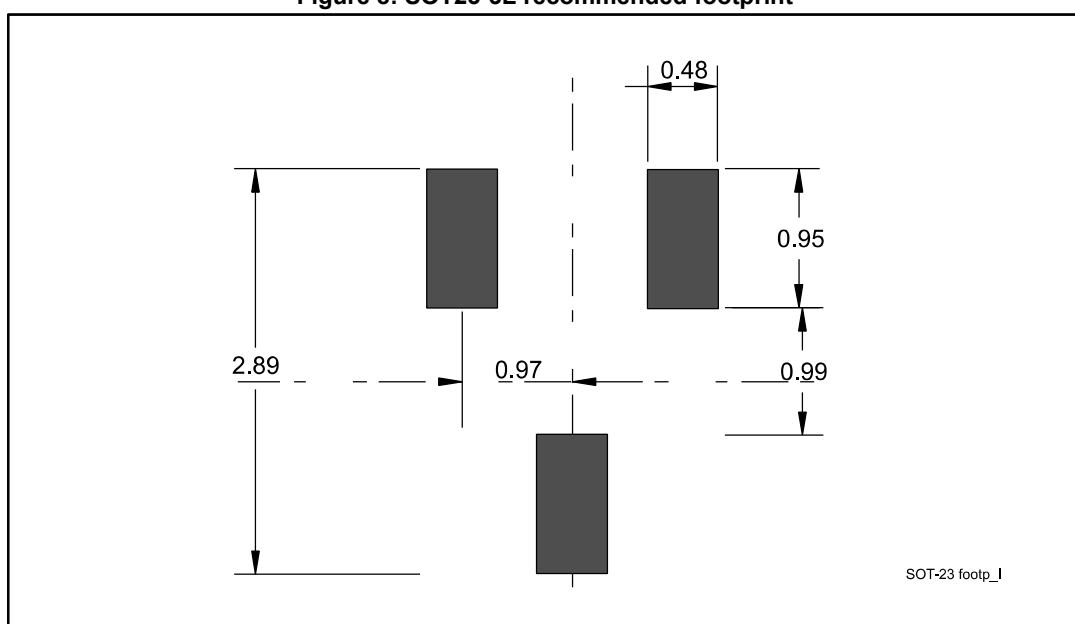


Table 3: SOT23-3L mechanical data

| Dim. | mm    |      |      |
|------|-------|------|------|
|      | Min.  | Typ. | Max. |
| A    | 0.89  |      | 1.40 |
| A1   | 0     |      | 0.10 |
| B    | 0.30  |      | 0.51 |
| C    | 0.085 |      | 0.18 |
| D    | 2.75  |      | 3.04 |
| e    | 0.85  |      | 1.05 |
| e1   | 1.70  |      | 2.10 |
| E    | 1.20  |      | 1.75 |
| H    | 2.10  |      | 3.00 |
| L    |       | 0.60 |      |
| S    | 0.35  |      | 0.65 |
| L1   | 0.25  |      | 0.55 |
| a    | 0°    |      | 8°   |

Figure 8: SOT23-3L recommended footprint



Dimensions are in mm.

## 4 Recommendation on PCB assembly

### 4.1 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. Use solder paste with fine particles: powder particle size 20-45  $\mu\text{m}$ .

### 4.2 Placement

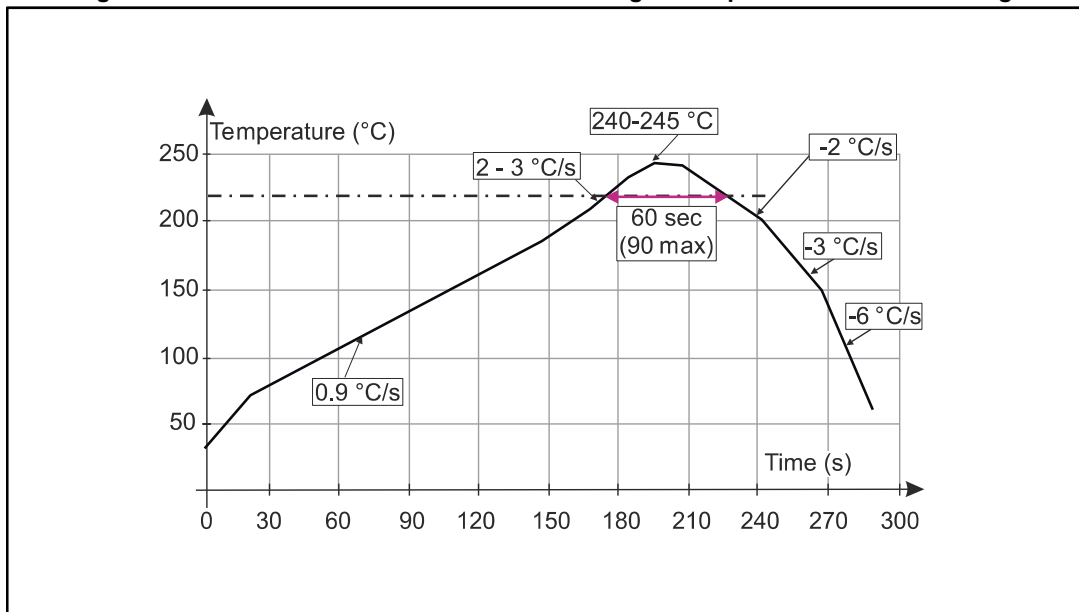
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of  $\pm 0.05$  mm is recommended.
4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out 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.

### 4.3 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. A symmetrical layout is recommended, to avoid any tilt phenomena caused by asymmetrical solder paste due to solder flow away.

### 4.4 Reflow profile

Figure 9: ST ECOPACK® recommended soldering reflow profile for PCB mounting



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

## 5 Ordering information

Figure 10: Ordering information scheme

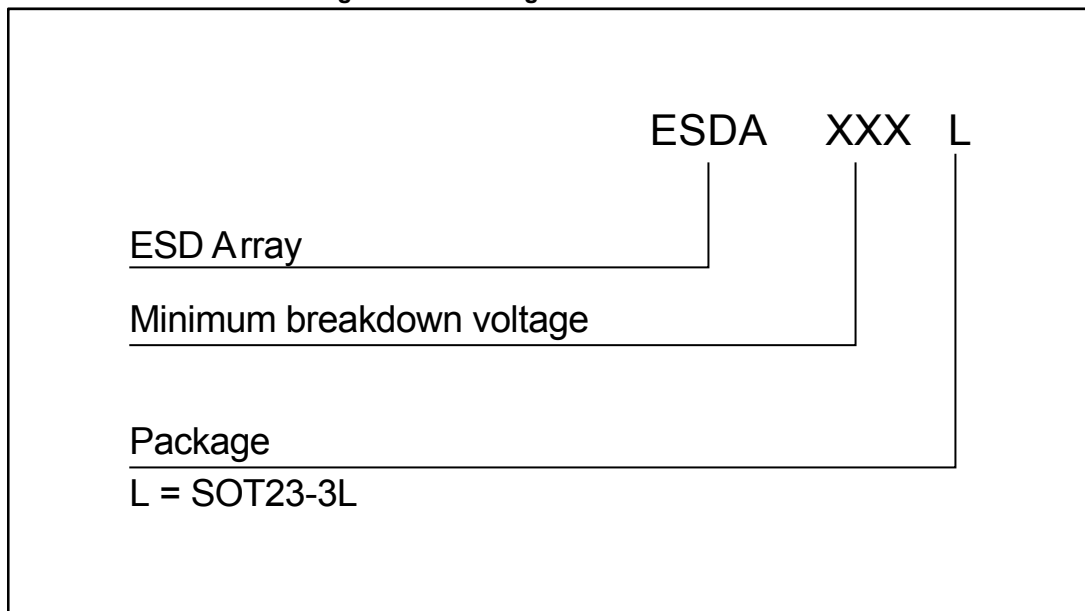


Table 3: Ordering information

| Order code | Marking <sup>(1)</sup> | Package  | Weight | Base qty. | Delivery mode |
|------------|------------------------|----------|--------|-----------|---------------|
| ESDA5V3L   | EL53                   | SOT23-3L | 8.7 mg | 3000      | Tape and reel |
| ESDA6V1L   | EL61                   |          |        |           |               |
| ESDA14V2L  | EL15                   |          |        |           |               |
| ESDA25L    | EL25                   |          |        |           |               |
| ESDA37L    | EL37                   |          | 9.8 mg |           |               |

**Notes:**

<sup>(1)</sup>The marking can be rotated by multiples of 90° to differentiate assembly location.

## 6 Revision history

Table 4: Document revision history

| Date        | Revision | Changes                            |
|-------------|----------|------------------------------------|
| 31-Jul-2012 | 4        | First issue.                       |
| 20-Jul-2017 | 5        | Added ESDA37L package information. |

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