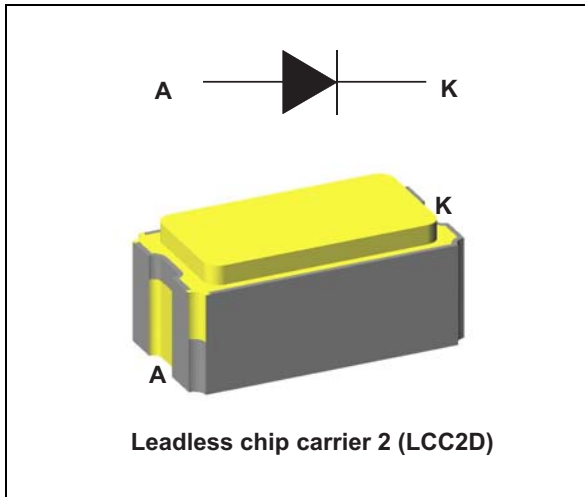


## Aerospace 0.3 A - 75 V switching diode

Datasheet - production data



### Description

Packaged in LCC2D this device intended for use in low voltage, high frequency inverters, free wheeling, polarity protection and other aerospace applications.

### Features

- Surface mount hermetic package
- High thermal conductivity materials
- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low forward voltage drop
- Target radiation qualification
  - 150 krad (Si) low dose rate
  - 3 Mrad (Si) high dose rate
- Package mass: 0.12 g

Table 1. Device summary<sup>(1)</sup>

| Order code | ESCC detailed specification | Quality level     | Lead finish | EPPL | $I_{F(AV)}$ | $V_{RRM}$ | $T_{j(max)}$ | $V_{F(max)}$ |
|------------|-----------------------------|-------------------|-------------|------|-------------|-----------|--------------|--------------|
| 1N6640UD1  |                             | Engineering model | Gold        |      | 0.3         | 75        | 175          | 1,06         |
| 1N6640U01D | 5101/027/07                 | ESCC              | Gold        | Yes  |             |           |              |              |
| 1N6640U02D | 5101/027/08                 | ESCC              | Solder dip  | Yes  |             |           |              |              |

1. Contact ST sales office for information about the specific conditions for products in die form.

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

| Symbol       | Parameter  | Value  | Unit   |
|--------------|--|--|--------|
| $V_{RRM}$    | Repetitive peak reverse voltage                  | 75   | V      |
| $I_{F(RMS)}$ | Forward rms current                              | 0.5  | A      |
| $I_{F(AV)}$  | Average forward rectified current <sup>(1)</sup> | 300  | mA     |
| $I_{FSM}$    | Forward surge current                            | $t_p = 8.3$ ms sinusoidal,<br>$t_{amb} \leq 25$ °C | 2<br>A |
| $T_{stg}$    | Storage temperature range                        | -65 to +175  | °C     |
| $T_j$        | Operating junction temperature range             | -65 to +175  | °C     |
| $T_{sol}$    | Maximum soldering temperature <sup>(2)</sup>     | 245  | °C     |

1. For all variants at  $T_c \geq +155$  °C per diode, derate linearly to 0 A at +175 °C.
2. Maximum duration 5 s. The same package must not be re-soldered until 3 minutes have elapsed.

**Table 3. Thermal resistance**

| Symbol        | Parameter                       | Value | Unit |
|---------------|---------------------------------|-------|------|
| $R_{th(j-c)}$ | Junction to case <sup>(1)</sup> | 60    | °C/W |
| $R_{th(j-a)}$ | Junction to ambient             | 280   |      |

1. Package mounted on infinite heatsink

**Table 4. Static electrical characteristics**

| Symbol         | Parameter         | Tests conditions |                | Min. | Typ. | Max. | Unit |
|----------------|-------------------|------------------|----------------|------|------|------|------|
| $V_{BR}^{(1)}$ | Breakdown voltage | $T_j = 25$ °C    | $I_R = 10$ μA  | 75   | -    | -    | V    |
| $I_R^{(1)}$    | Reverse current   | $T_j = 25$ °C    | $V_R = 50$ V   | -    | -    | 40   | nA   |
|                |                   | $T_j = 150$ °C   |                | -    | -    | 30   | μA   |
| $V_F^{(2)}$    | Forward voltage   | $T_j = 25$ °C    | $I_F = 1$ mA   | 540  | -    | 630  | mV   |
|                |                   | $T_j = 25$ °C    | $I_F = 50$ mA  | 760  | -    | 890  |      |
|                |                   | $T_j = 25$ °C    | $I_F = 100$ mA | 820  | -    | 980  |      |
|                |                   | $T_j = 25$ °C    | $I_F = 200$ mA | 870  | -    | 1100 |      |
|                |                   | $T_j = -55$ °C   | $I_F = 200$ mA | -    | -    | 1200 |      |

1. Pulse test:  $t_p = 10$  ms,  $\delta < 2\%$
2. Pulse test:  $t_p = 680$  μs,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.74 \times I_{F(AV)} + 1.00 \times I_{F(RMS)}^2$$

Table 5. Dynamic characteristics

| Symbol   | Parameter                | Test conditions  | Min. | Typ. | Max. | Unit |
|----------|--------------------------|--|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $I_F = I_R = 10 \text{ mA}$  | -    | -    | 9    | ns   |
|          |                          | $I_F = 1 \text{ A}, V_f = 30 \text{ V}, dI/dt = -15 \text{ A}/\mu\text{s}$ |      |      | 20   |      |
| $V_{FP}$ | Forward recovery voltage | $I_{FM} = 200 \text{ mA}$  | -    | -    | 5    | V    |
| $t_{FR}$ | Forward recovery time    | $I_{FM} = 200 \text{ mA}$  | -    | -    | 20   | ns   |
| $C_j$    | Diode capacitance        | $V_R = 0 \text{ V}, V = 50 \text{ mV}, F = 1 \text{ MHz}$                  | -    | -    | 3    | pF   |

Figure 1. Forward voltage drop versus forward current (typical values)

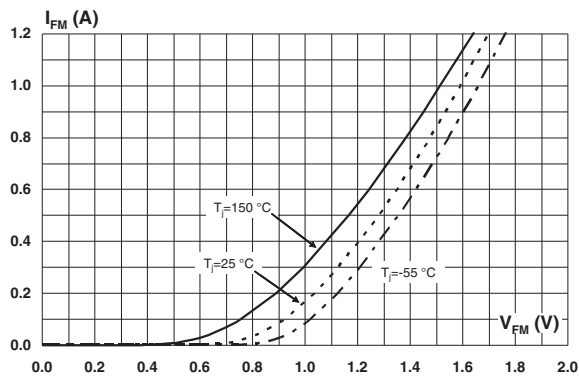


Figure 2. Forward voltage drop versus forward current (maximum values)

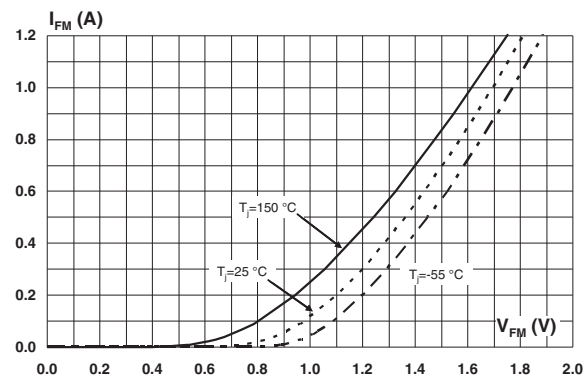


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

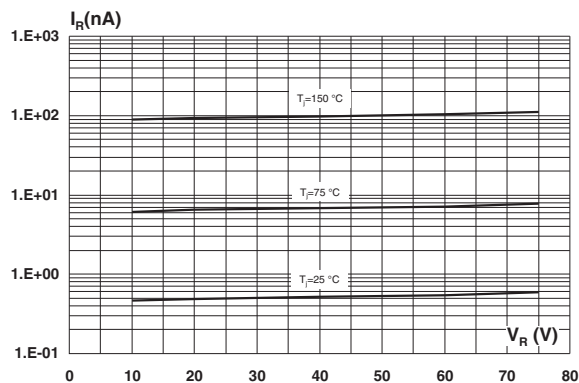


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration

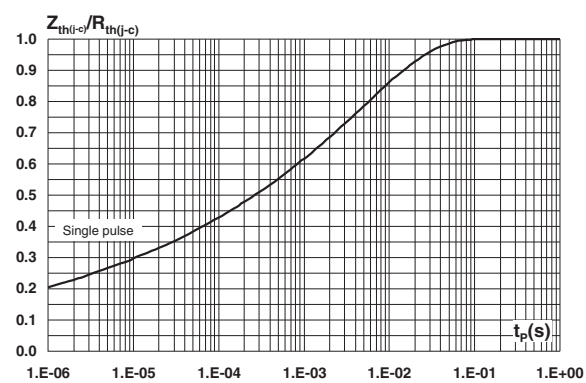
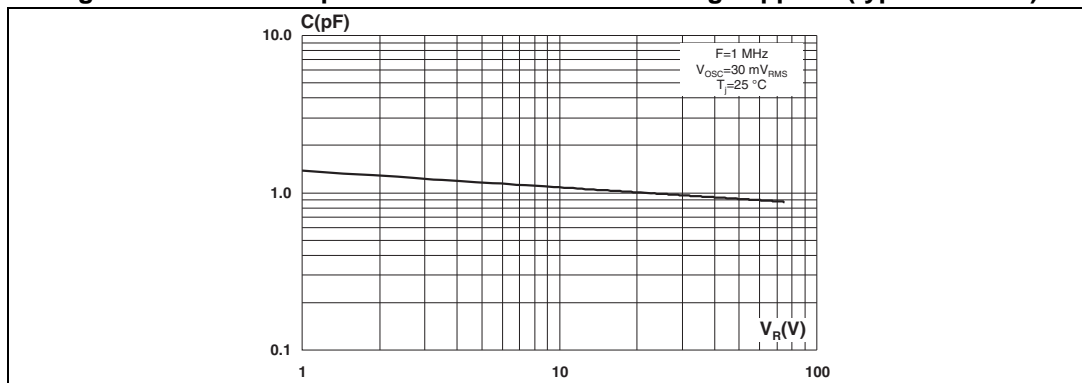


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

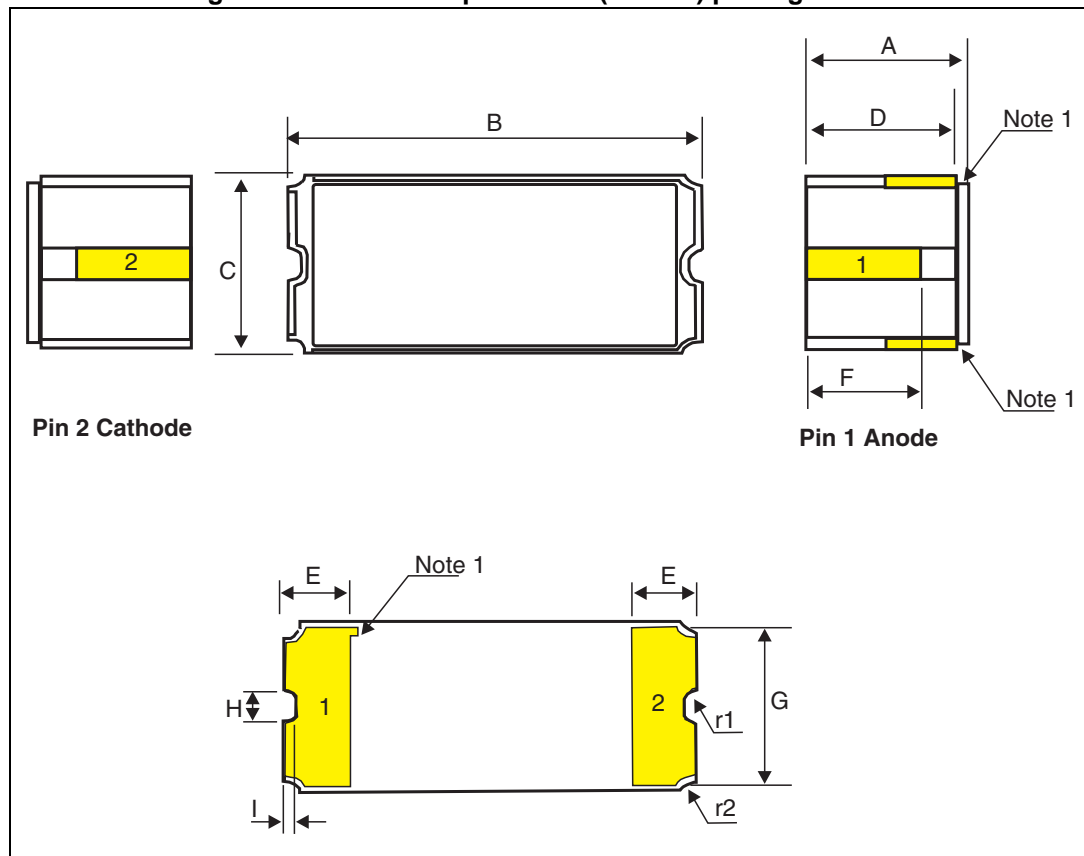


## 2 Package information

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.

### 2.1 Leadless chip carrier 2 (LCC2D) package information

Figure 6. Leadless chip carrier 2 (LCC2D) package outline



1. The anode is identified by metalization in two top internal angles and the index mark.

Table 6. Leadless chip carrier 2 (LCC2D) package mechanical data

| Ref.             | Dimensions  |      |      |        |       |       |
|------------------|-------------|------|------|--------|-------|-------|
|                  | Millimeters |      |      | Inches |       |       |
|                  | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A <sup>(1)</sup> | 1.86        | 2.03 | 2.20 | 0.073  | 0.080 | 0.087 |
| B                | 4.44        | 4.57 | 4.77 | 0.175  | 0.180 | 0.188 |
| C                | 1.84        | 1.97 | 2.10 | 0.072  | 0.078 | 0.083 |
| D                | 1.53        | 1.70 | 1.87 | 0.060  | 0.067 | 0.074 |
| E                | 0.48        | -    | 0.71 | 0.019  | -     | 0.028 |
| F                | -           | 1.3  | -    | -      | 0.051 | -     |
| G                | -           | 1.67 | -    | -      | 0.066 | -     |
| H                | -           | 0.37 | -    | -      | 0.015 | -     |
| I                | -           | 0.15 | -    | -      | 0.006 | -     |
| r1               | -           | 0.15 | -    | -      | 0.006 | -     |
| r2               | -           | 0.20 | -    | -      | 0.008 | -     |

1. Measurement prior to solder coating the mounting pads on bottom of package

### 3 Ordering information

Table 7. Ordering information<sup>(1)</sup>

| Order code | ESCC detailed specification | Package | Lead finish | Marking <sup>(2)</sup> | EPPL | Mass   | Packing     |
|------------|-----------------------------|---------|-------------|------------------------|------|--------|-------------|
| 1N6640UD1  | -                           | LCC2D   | Gold        | 1N6640UD1              | -    | 0.12 g | Waffle pack |
| 1N6640U01D | 5101/027/07                 |         | Gold        | 510102707              | Y    |        |             |
| 1N6640U02D | 5101/027/08                 |         | Solder dip  | 510102708              | Y    |        |             |

1. Contact ST sales office for information about the specific conditions for products in die form.

2. Specific marking only. The full marking includes in addition:

For the engineering models: ST logo, date code, country of origin (FR).

For ESCC flight parts: ST logo, date code, country of origin (FR), ESA logo, serial number of the part within the assembly lot.

### 4 Other information

#### 4.1 Date code

Date code is structured as describe below:

- EM xyywwz
- ESCC flight yywwz

Where:

- x (EM only): 3, assembly location Rennes (France)
- yy: last two digits year
- ww: week digits
- z: lot index in the week

#### 4.2 Documentation

In [Table 8](#) is a summary of the documentation provided with each type of products.

Table 8. Documentation provided with each type of products

| Quality level     | Documentation              |
|-------------------|----------------------------|
| Engineering model |                            |
| ESCC flight       | Certificate of conformance |

## 5 Revision history

**Table 9. Document revision history**

| Date        | Revision | Changes  |
|-------------|----------|--|
| 26-Mar-2010 | 1        | First issue.   |
| 23-Sep-2011 | 2        | Updated order codes in Table 1 Table 7.                              |
| 8-Nov-2013  | 3        | Updated Table 1, Table 5 and Table 7 and inserted Other information. |
| 04-Dec-2015 | 4        | Updated <a href="#">Table 7</a> and reformatted to current standard. |



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