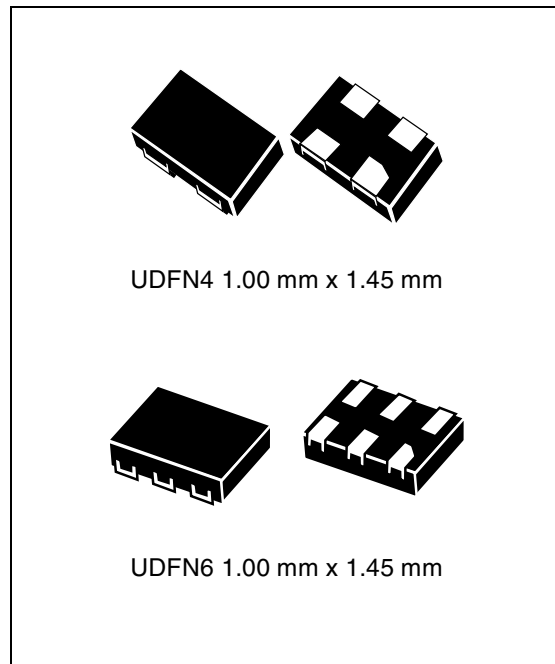


**4-pin Smart Reset™****Features**

- Operating voltage range 2 V to 5.5 V
- Low supply current 1  $\mu$ A
- Customer test mode
- Single Smart Reset™ push-button input with fixed extended reset setup delay ( $t_{SRC}$ ) from 0.5 s to 10 s in 0.5 s steps (typ.), option with internal input pull-up resistor
- Push-button controlled reset pulse duration
  - Option 1: fully push-button controlled, no fixed or minimum pulse width guaranteed
  - Option 2: defined output reset pulse duration ( $t_{REC}$ ), factory-programmed
- Single reset output
  - Active-low or active-high
  - Push-pull or open drain with optional pull-up resistor
- Fixed Smart Reset input logic voltage levels
- Operating temperature: -40 °C to +85 °C
- UDFN4 package 1.00 mm x 1.45 mm and UDFN6 package 1.00 mm x 1.45 mm
- ECOPACK®2 (RoHS compliant, Halogen-Free)

**Applications**

- Mobile phones, smartphones, PDAs
- e-books
- MP3 players
- Games
- Portable navigation devices
- Any application that requires delayed reset push-button response for improved system stability

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# 1 Description

The Smart Reset™ devices provide a useful feature which ensures that inadvertent short reset push-button closures do not cause system resets. This is done by implementing an extended Smart Reset input delay time ( $t_{SRC}$ ), which ensures a safe reset and eliminates the need for a specific dedicated reset button.

This reset configuration provides versatility and allows the application to distinguish between a software generated interrupt and a hard system reset. When the input push-button is connected to the microcontroller interrupt input, and is closed for a short time, the processor can only be interrupted. If the system still does not respond properly, continuing to keep the push-buttons closed for the extended setup time  $t_{SRC}$  causes a hard reset of the processor through the reset output.

The STM6519 has one Smart Reset input ( $\overline{SR}$ ) with preset delayed Smart Reset setup time ( $t_{SRC}$ ). The reset output ( $\overline{RST}$ ) is asserted after the Smart Reset input is held active for the selected  $t_{SRC}$  delay time. The  $\overline{RST}$  output remains asserted either until the  $\overline{SR}$  input goes to inactive logic level (i.e. neither fixed nor minimum reset pulse width is set) or the output reset pulse duration is fixed for  $t_{REC}$  (i.e. factory-programmed). The device fully operates over a broad  $V_{CC}$  range from 2.0 V to 5.5 V.

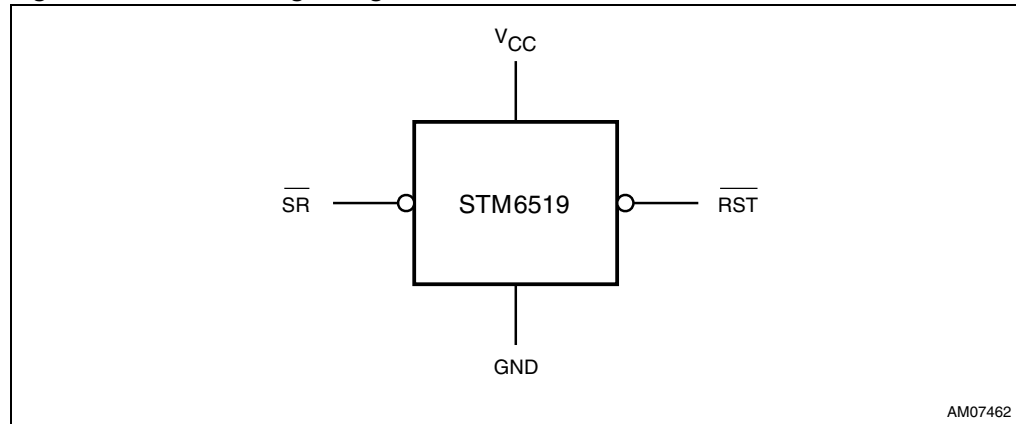
## 1.1 Test mode

After pulling  $\overline{SR}$  up to  $V_{TEST}$  ( $V_{CC} + 1.4$  V) or above, the counter starts to count the initial shortened  $t_{SRC-INI}$  (42 ms, typ.). After  $t_{SRC-INI}$  expires, the  $\overline{RST}$  output either goes down for  $t_{REC}$  (if  $t_{REC}$  option is used) or stays low as long as overvoltage on  $\overline{SR}$  is detected (if  $t_{REC}$  option is not used). This is feedback, and the user only knows that the device is locked in test mode. Each time the  $\overline{SR}$  input is connected to ground in test mode, a shortened  $t_{SRC-SHORT}$  ( $t_{SRC}/128$ ) is used instead of regular  $t_{SRC}$  (0.5 s - 10 s). In this way the device can be quickly tested without repeating test mode triggering. Return to normal mode is possible by performing a new startup of the device (i.e.  $V_{CC}$  goes to 0 V and back to its original state).

The advantages of this solution are its high glitch immunity, user feedback regarding entry into test mode, and testability within the full  $V_{CC}$  range.

## 1.2 Logic diagram

Figure 1. STM6519 logic diagram



## 1.3 Pin connections

Figure 2. UDFN4 pin connections (top view)

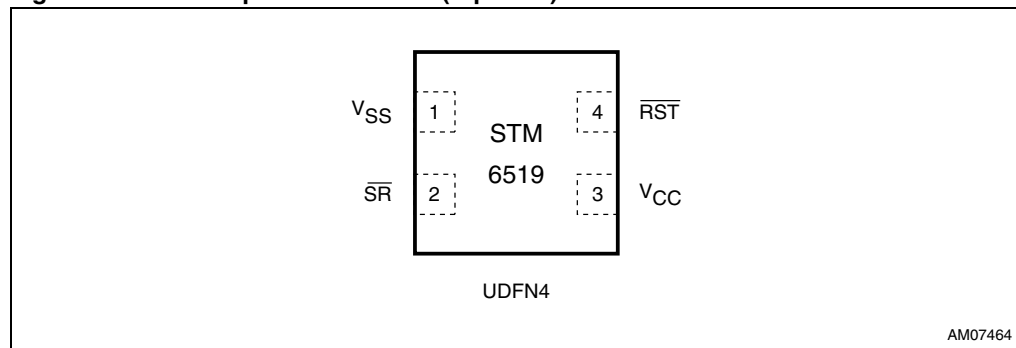
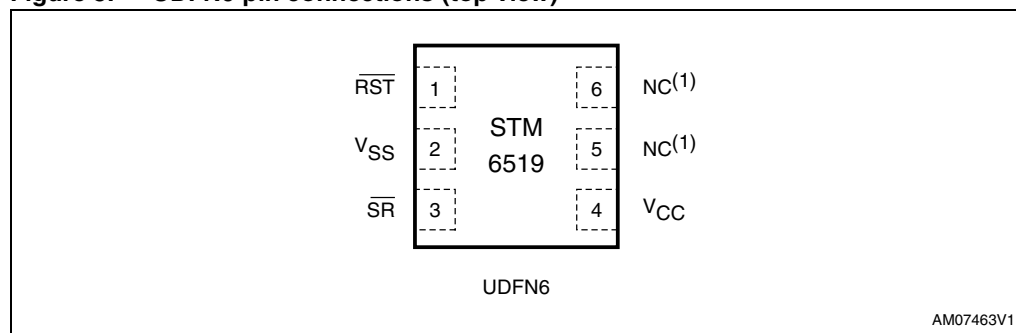


Figure 3. UDFN6 pin connections (top view)



1. Not connected (not bonded); should be connected to  $V_{SS}$ .

## 2 Device overview

Table 1. Signal names

| Pin number |       | Name                    | Type           | Description   |
|------------|-------|-------------------------|----------------|---|
| UDFN6      | UDFN4 |                         |                |   |
| 1          | 4     | $\overline{\text{RST}}$ | Output         | Reset output, active-low, open drain.   |
| 2          | 1     | $V_{\text{SS}}$         | Supply ground  | Ground  |
| 3          | 2     | $\overline{\text{SR}}$  | Input          | Smart Reset input, active-low.  |
| 4          | 3     | $V_{\text{CC}}$         | Supply voltage | Positive supply voltage for the device. A 0.1 $\mu\text{F}$ decoupling ceramic capacitor is recommended to be connected between $V_{\text{CC}}$ and $V_{\text{SS}}$ pins. |
| 5          | -     | NC                      | -              | Not connected (not bonded); should be connected to $V_{\text{SS}}$ .  |
| 6          | -     | NC                      | -              | Not connected (not bonded); should be connected to $V_{\text{SS}}$ .  |

## 3 Pin descriptions

### 3.1 Power supply ( $V_{CC}$ )

This pin is used to provide power to the Smart Reset device. A 0.1  $\mu\text{F}$  ceramic decoupling capacitor is recommended to be connected between the  $V_{CC}$  and  $V_{SS}$  pins, as close to the STM6519 device as possible.

### 3.2 Ground ( $V_{SS}$ )

This is the ground pin for the device.

### 3.3 Smart Reset input ( $\overline{\text{SR}}$ )

Push-button Smart Reset input, active-low with optional pull-up resistor.  $\overline{\text{SR}}$  input needs to be asserted for at least  $t_{\text{SRC}}$  to assert the reset output ( $\overline{\text{RST}}$ ).

By connecting a voltage higher than  $V_{CC} + 1.4\text{ V}$  to the  $\overline{\text{SR}}$  input the device enters test mode (see [Section 1: Description on page 5](#) for more information).

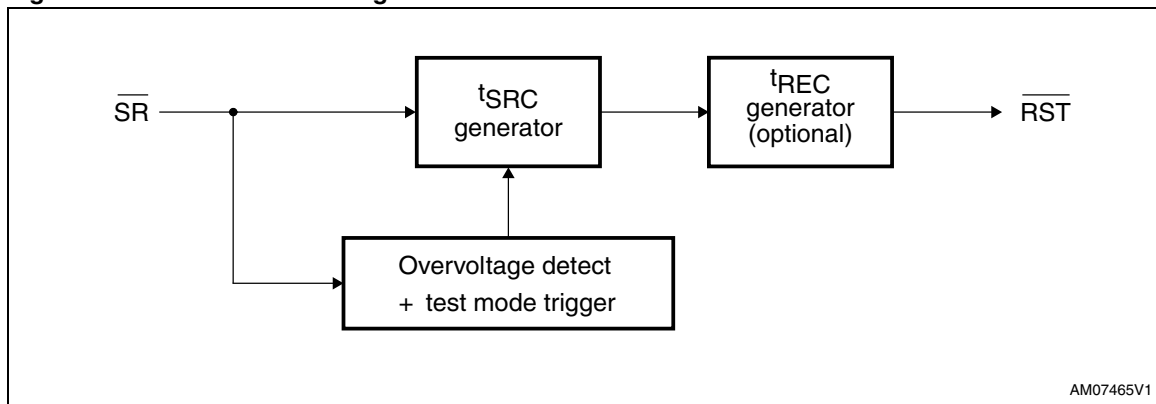
### 3.4 Reset output ( $\overline{\text{RST}}$ )

$\overline{\text{RST}}$  is active-low or active-high, open drain or push-pull reset output with optional internal pull-up resistor.

Output reset pulse width is optional as follows:

- Neither fixed nor minimum output reset pulse duration (releasing the push-button while reset output is active, causes the output to de-assert)
- Fixed, factory-programmed output reset pulse duration for  $t_{\text{REC}}$  independent on Smart Reset input state.

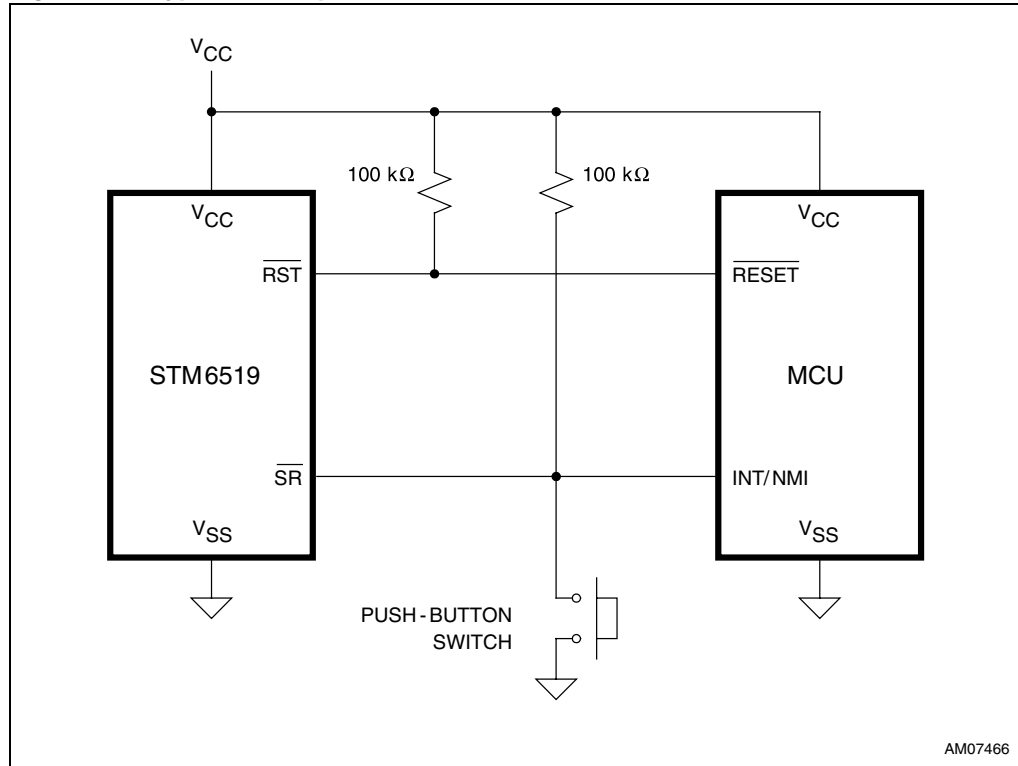
Figure 4. STM6519 block diagram





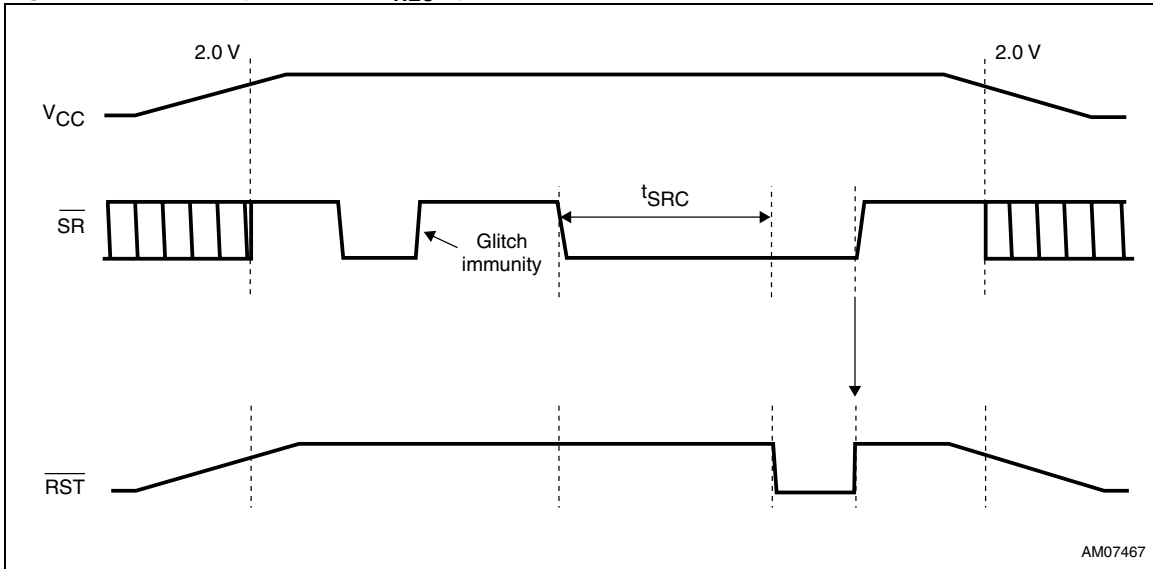
## 4 Typical application diagram

Figure 5. Typical hookup



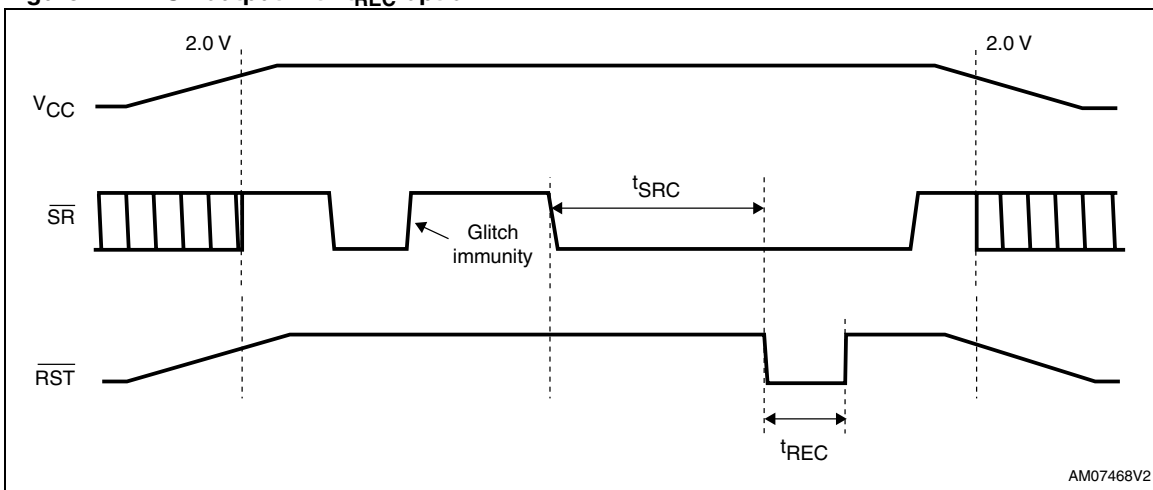
## 5 Timing diagram

Figure 6.  $\overline{\text{RST}}$  output without  $t_{\text{REC}}$  option



1. Functionality below  $V_{\text{CC}} = 2.0 \text{ V}$  is not guaranteed.

Figure 7.  $\overline{\text{RST}}$  output with  $t_{\text{REC}}$  option



1. Functionality below  $V_{\text{CC}} = 2.0 \text{ V}$  is not guaranteed.

## 6 Typical operating characteristics

Figure 8. Supply current ( $I_{CC}$ ) vs. temperature ( $T_A$ )

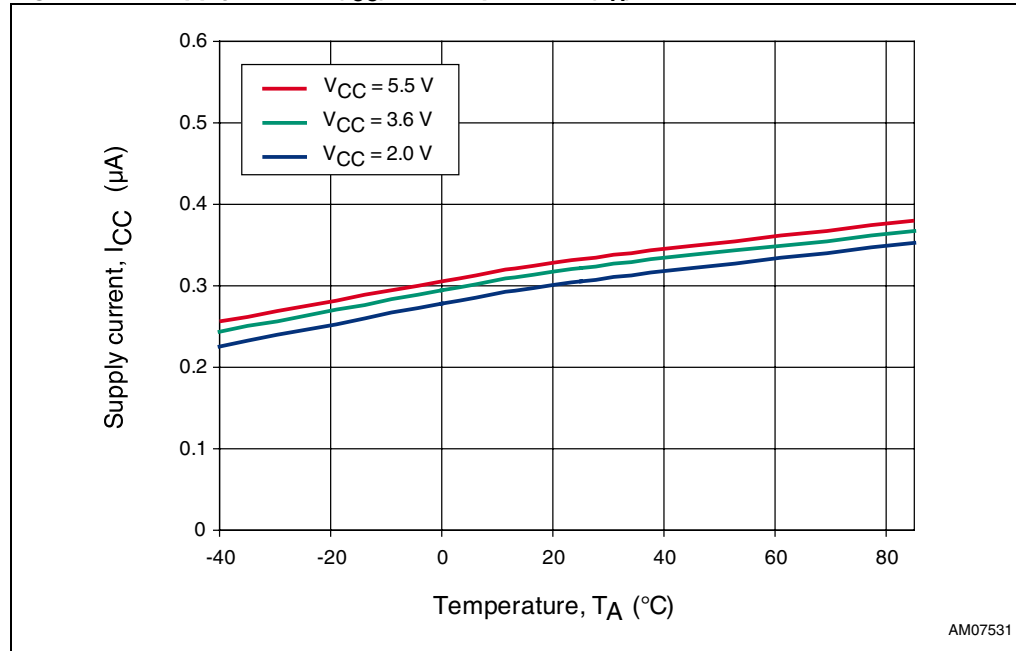


Figure 9. Smart Reset delay ( $t_{SRC}$ ) vs. temperature ( $T_A$ ),  $t_{SRC} = 4.0\text{ s}$  (typ.)

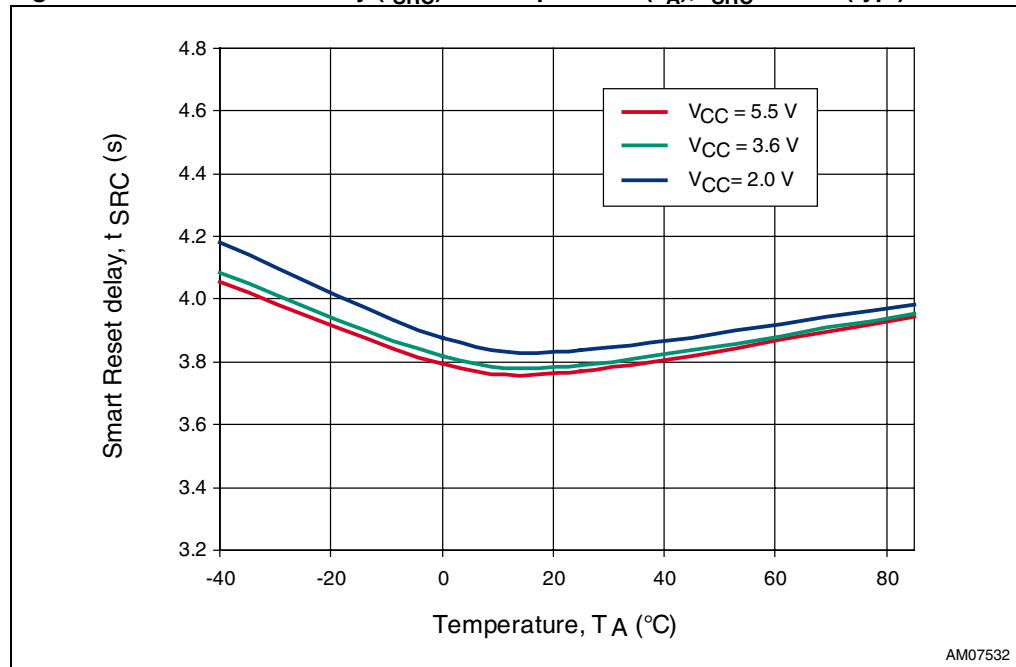


Figure 10. Test mode entry voltage ( $V_{TEST}$ ) vs. temperature ( $T_A$ )

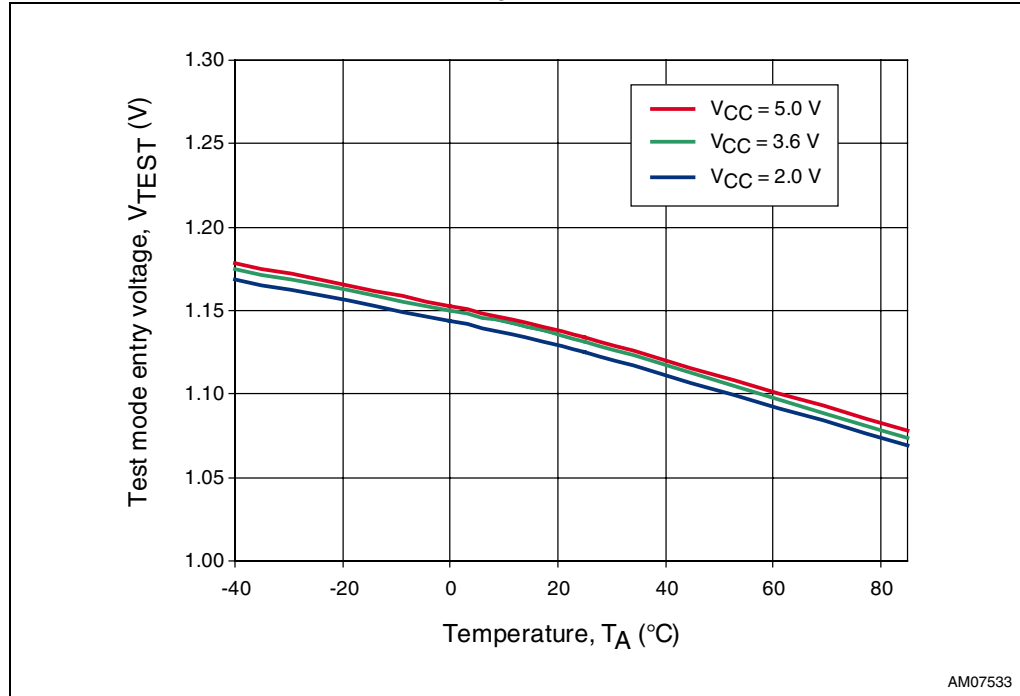
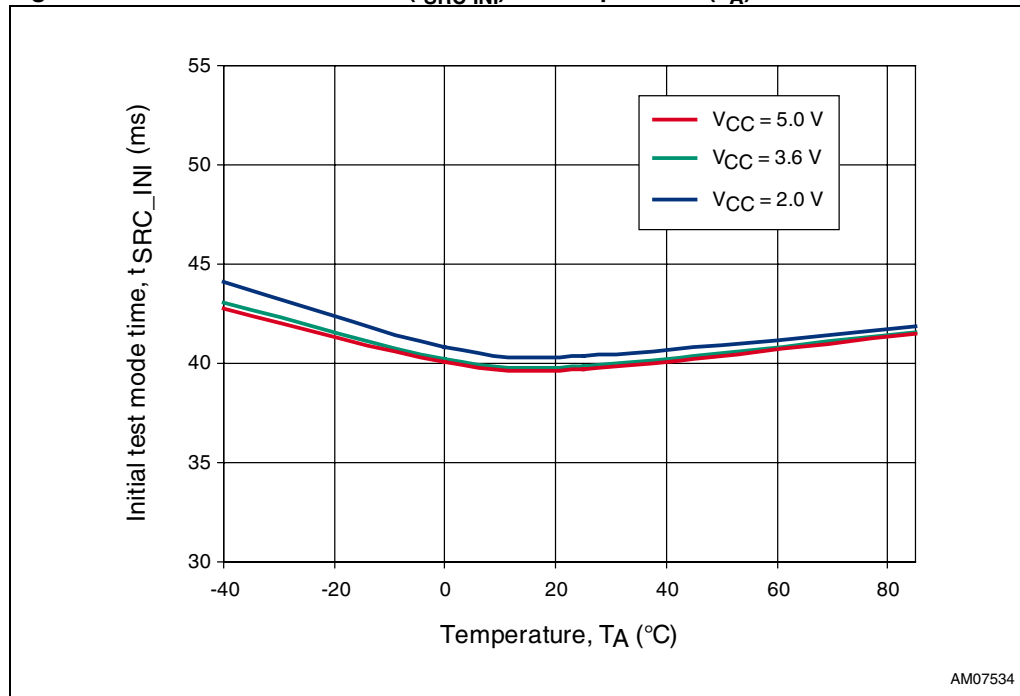


Figure 11. Initial test mode time ( $t_{SRC\_INI}$ ) vs. temperature ( $T_A$ )



## 7 Maximum ratings

Stressing the device above the rating listed in [Table 2: Absolute maximum ratings](#) may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in [Table 3: Operating and measurement conditions](#) of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Refer also to the STMicroelectronics™ SURE program and other relevant quality documents.

**Table 2. Absolute maximum ratings**

| Symbol                          | Parameter  | Value       | Unit |
|---------------------------------|--|-------------|------|
| T <sub>STG</sub>                | Storage temperature (V <sub>CC</sub> off)  | -55 to +150 | °C   |
| T <sub>SLD</sub> <sup>(1)</sup> | Lead solder temperature for 10 seconds   | 260         | °C   |
| V <sub>IO</sub>                 | Input or output voltage  | -0.3 to 5.5 | V    |
| V <sub>CC</sub>                 | Supply voltage   | -0.3 to 7   | V    |
| <b>ESD</b>                      |  |             |      |
| V <sub>HBM</sub>                | Electrostatic discharge protection, human body model (JEDEC22-A114-B level 2)        | 2           | kV   |
| V <sub>RCDM</sub>               | Electrostatic discharge protection, charged device model, all pins                   | 1           | kV   |
| V <sub>MM</sub>                 | Electrostatic discharge protection, machine model, all pins (JEDEC22-A115-A level A) | 200         | V    |
|                                 | Latch-up (V <sub>CC</sub> pin, $\overline{SR}$ reset input pin)                      | EIA/JESD78  |      |

1. Reflow at peak temperature of 260 °C. The time above 255 °C must not exceed 30 seconds.

## 8 DC and AC parameters

This section summarizes the operating measurement conditions, and the DC and AC characteristics of the device. The parameters in [Table 4: DC and AC characteristics](#) are derived from tests performed under the measurement conditions summarized in [Table 3: Operating and measurement conditions](#). Designers should check that the operating conditions in their circuit match the operating conditions when relying on the quoted parameters.

**Table 3. Operating and measurement conditions**

| Symbol     | Parameter                                  | Value               | Unit |
|------------|--|---------------------|------|
| $V_{CC}$   | Supply voltage                             | 2.0 to 5.5          | V    |
| $T_A$      | Ambient operating temperature              | -40 to +85          | °C   |
| $t_R, t_F$ | Input rise and fall times                  | $\leq 5$            | ns   |
|            | Input pulse voltages                       | 0.2 to 0.8 $V_{CC}$ | V    |
|            | Input and output timing reference voltages | 0.3 to 0.7 $V_{CC}$ | V    |

Table 4. DC and AC characteristics

| Symbol             | Parameter  | Test conditions <sup>(1)</sup>   | Min.                 | Typ. <sup>(2)</sup> | Max.                 | Unit      |
|--------------------|--|--|----------------------|---------------------|----------------------|-----------|
| $V_{CC}$           | Supply voltage                                       |  | 2.0                  |                     | 5.5                  | V         |
| $I_{CC}$           | Supply current                                       | $\overline{SR} = V_{CC}$ , $t_{REC}$ and $t_{SRC}$ counter is not running              |                      | 0.4                 | 1.0                  | $\mu A$   |
| $V_{OL}$           | Reset output voltage low                             | $V_{CC} \geq 4.5$ V, sinking 3.2 mA  |                      |                     | 0.3                  | V         |
|                    |  | $V_{CC} \geq 3.3$ V, sinking 2.5 mA  |                      |                     | 0.3                  | V         |
|                    |  | $V_{CC} \geq 2.0$ V, sinking 1 mA  |                      |                     | 0.3                  | V         |
| $t_{REC}$          | Reset timeout delay, factory-programmed              | (device option)  | 0.85                 | 1.28                | 1.71                 | ms        |
|                    |  |  | 66                   | 100                 | 134                  | ms        |
|                    |  |  | 140                  | 210                 | 280                  | ms        |
|                    |  |  | 240                  | 360                 | 480                  | ms        |
| $R_{PUO}$          | Internal output pull-up resistor on $\overline{RST}$ | (device option)  |                      | 65                  |                      | $k\Omega$ |
| $I_{LO}$           | Output leakage current                               | $V_{\overline{RST}} = 5.5$ V, open drain device option without output pull-up resistor | -0.1                 |                     | 0.1                  | $\mu A$   |
| <b>Smart Reset</b> |  |  |                      |                     |                      |           |
| $t_{SRC}$          | Smart Reset delay                                    |  | $0.8 \times t_{SRC}$ | $t_{SRC}^{(3)}$     | $1.2 \times t_{SRC}$ | s         |
| $V_{IL}$           | $\overline{SR}$ input voltage low                    |  | $V_{SS} - 0.3$       |                     | 0.3                  | V         |
| $V_{IH}$           | $\overline{SR}$ input voltage high                   |  | 0.85                 |                     | 5.5                  | V         |
| $R_{PUI}$          | Internal input pull-up resistor on $\overline{SR}$   | (device option)  |                      | 65                  |                      | $k\Omega$ |
| $I_{LEAK}$         | $\overline{SR}$ input leakage current                | device option without input pull-up resistor   | -0.1                 |                     | 0.1                  | $\mu A$   |
|                    | Input glitch immunity                                |  |                      | $t_{SRC}$           |                      | s         |
| <b>Test mode</b>   |  |  |                      |                     |                      |           |
| $V_{TEST}$         | Test mode entry voltage                              |  | $V_{CC} + 0.9$       | $V_{CC} + 1.1$      | $V_{CC} + 1.4$       | V         |
| $t_{SRC-INI}$      | Initial test mode time                               |  | 28                   | 42                  | 56                   | ms        |
| $t_{SRC-SHORT}$    | Shortened Smart Reset delay                          |  |                      | $t_{SRC} / 128$     |                      | ms        |

1. Valid for ambient operating temperature  $T_A = -40$  to  $+85$  °C,  $V_{CC} = 2.0$  to  $5.5$  V.

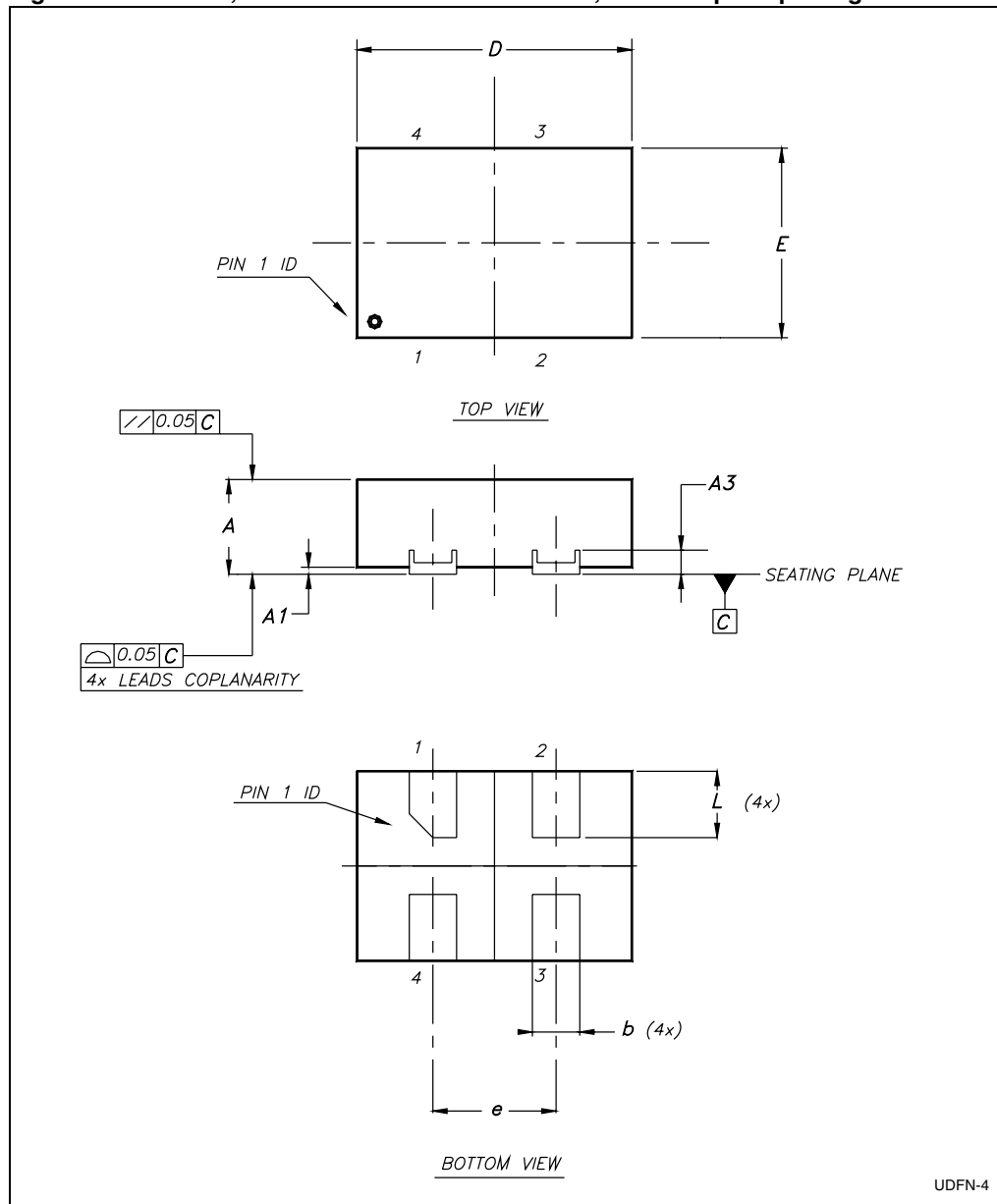
2. Typical values are at  $25$  °C and  $V_{CC} = 3.3$  V unless otherwise noted.

3. Factory-programmable in the range of  $0.5$  s to  $10$  s typ. in  $0.5$  s steps.

## 9 Package

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 specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

**Figure 12. UDFN4, 1.00 mm x 1.45 mm x 0.50 mm, 0.65 mm pitch package outline**



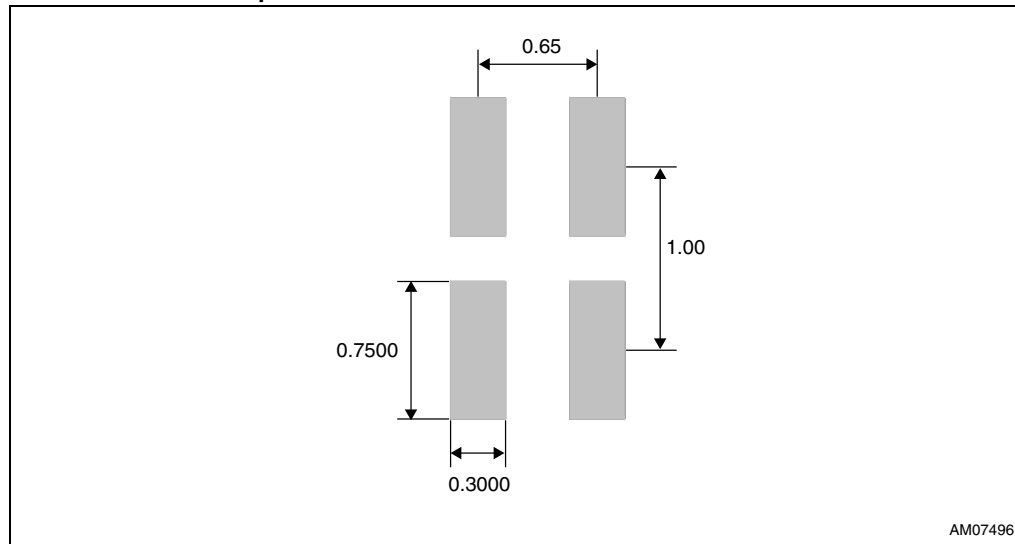


**Table 5. UDFN4, 1.00 mm x 1.45 mm x 0.50 mm, 0.65 mm pitch package mechanical data**

| Symbol    | Dimensions |       |      |          |       |       | Note <sup>(1)</sup> |
|-----------|------------|-------|------|----------|-------|-------|---------------------|
|           | (mm)       |       |      | (inches) |       |       |                     |
|           | Min.       | Typ.  | Max. | Min.     | Typ.  | Max.  |                     |
| <b>A</b>  | 0.50       | 0.55  | 0.60 | 0.020    | 0.022 | 0.024 |                     |
| <b>A1</b> | 0.00       | 0.02  | 0.05 | 0.000    | 0.001 | 0.002 |                     |
| <b>A3</b> |            | 0.127 |      |          | 0.005 |       |                     |
| <b>b</b>  | 0.20       | 0.25  | 0.30 | 0.008    | 0.010 | 0.012 |                     |
| <b>D</b>  | 1.40       | 1.45  | 1.50 | 0.055    | 0.057 | 0.059 |                     |
| <b>E</b>  | 0.95       | 1.0   | 1.05 | 0.037    | 0.039 | 0.041 |                     |
| <b>e</b>  |            | 0.65  |      |          | 0.026 |       |                     |
| <b>L</b>  | 0.30       | 0.35  | 0.40 | 0.012    | 0.014 | 0.016 |                     |
| <b>N</b>  |            | 4     |      |          | 4     |       |                     |

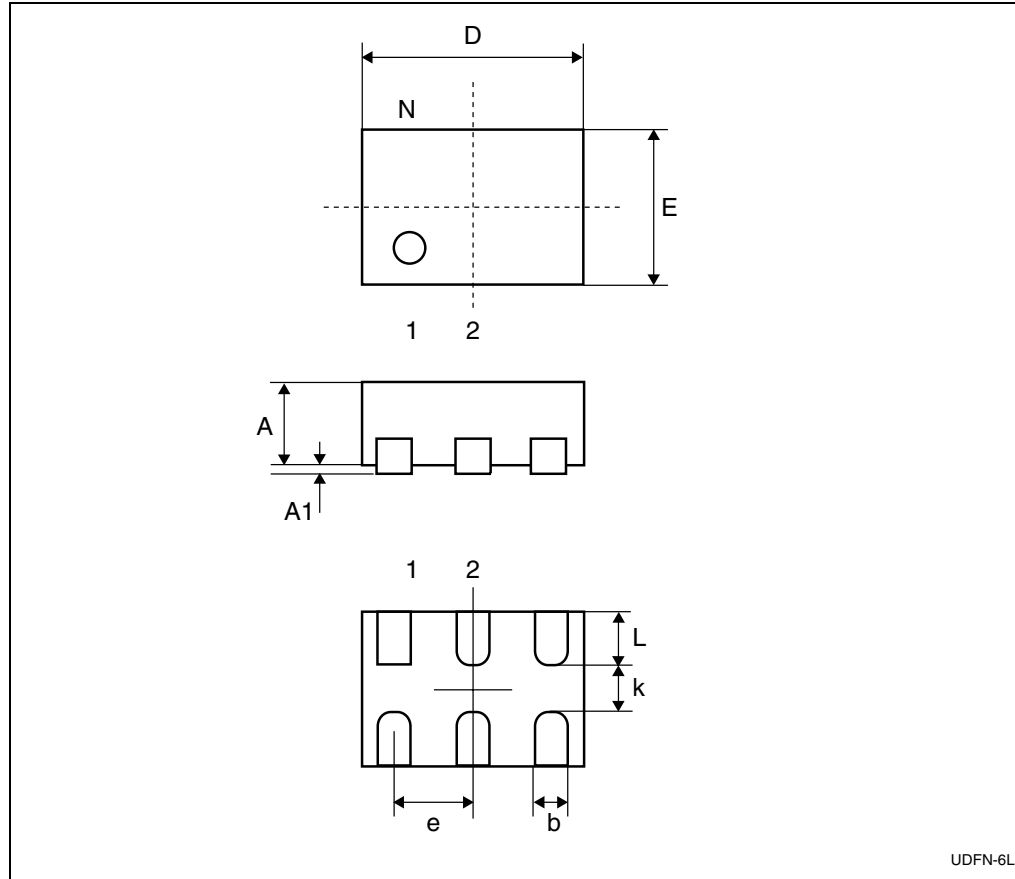
1. Controlling dimension: millimeters.

**Figure 13. Footprint recommendation for UDFN4, 1.00 mm x 1.45mm x 0.50 mm, 0.65 mm pitch**



AM07496

Figure 14. UDFN6, 1.00 mm x 1.45 mm x 0.50 mm, 0.50 mm pitch package outline



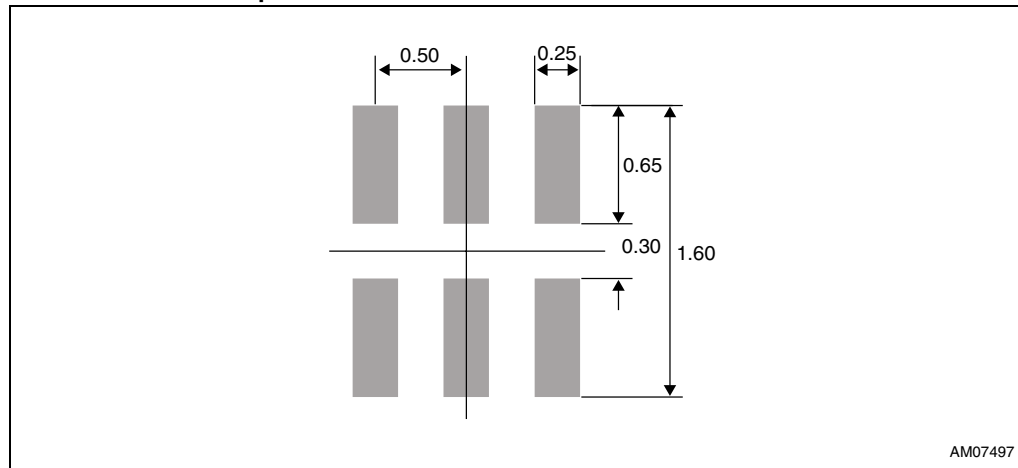
UDFN-6L

Table 6. UDFN6, 1.00 mm x 1.45 mm x 0.50 mm, 0.50 mm pitch package mechanical data

| Symbol    | Dimensions |      |      |          |        |        | Note <sup>(1)</sup> |
|-----------|------------|------|------|----------|--------|--------|---------------------|
|           | (mm)       |      |      | (inches) |        |        |                     |
|           | Min.       | Typ. | Max. | Min.     | Typ.   | Max.   |                     |
| <b>A</b>  | 0.50       | 0.55 | 0.60 | 0.0197   | 0.0217 | 0.0236 |                     |
| <b>A1</b> | 0.00       | 0.02 | 0.05 | 0.000    | 0.0008 | 0.0020 |                     |
| <b>b</b>  | 0.18       | 0.25 | 0.30 | 0.0071   | 0.0098 | 0.0118 |                     |
| <b>D</b>  | 1.40       | 1.45 | 1.50 | 0.0551   | 0.0571 | 0.0591 |                     |
| <b>E</b>  | 0.95       | 1.00 | 1.05 | 0.0374   | 0.0394 | 0.0413 |                     |
| <b>e</b>  | 0.45       | 0.50 | 0.55 | 0.0177   | 0.0197 | 0.0217 |                     |
| <b>k</b>  | 0.20       |      |      | 0.0079   |        |        |                     |
| <b>L</b>  | 0.30       | 0.35 | 0.40 | 0.0118   | 0.0138 | 0.0157 |                     |

1. Package outline exclusive of any mold flashes dimensions and metal burrs.

Figure 15. Footprint recommendation for UDFN6 1.00 mm x 1.45 mm x 0.50 mm,  
0.50 mm pitch



# 10 Tape and reel information

Figure 16. Carrier tape

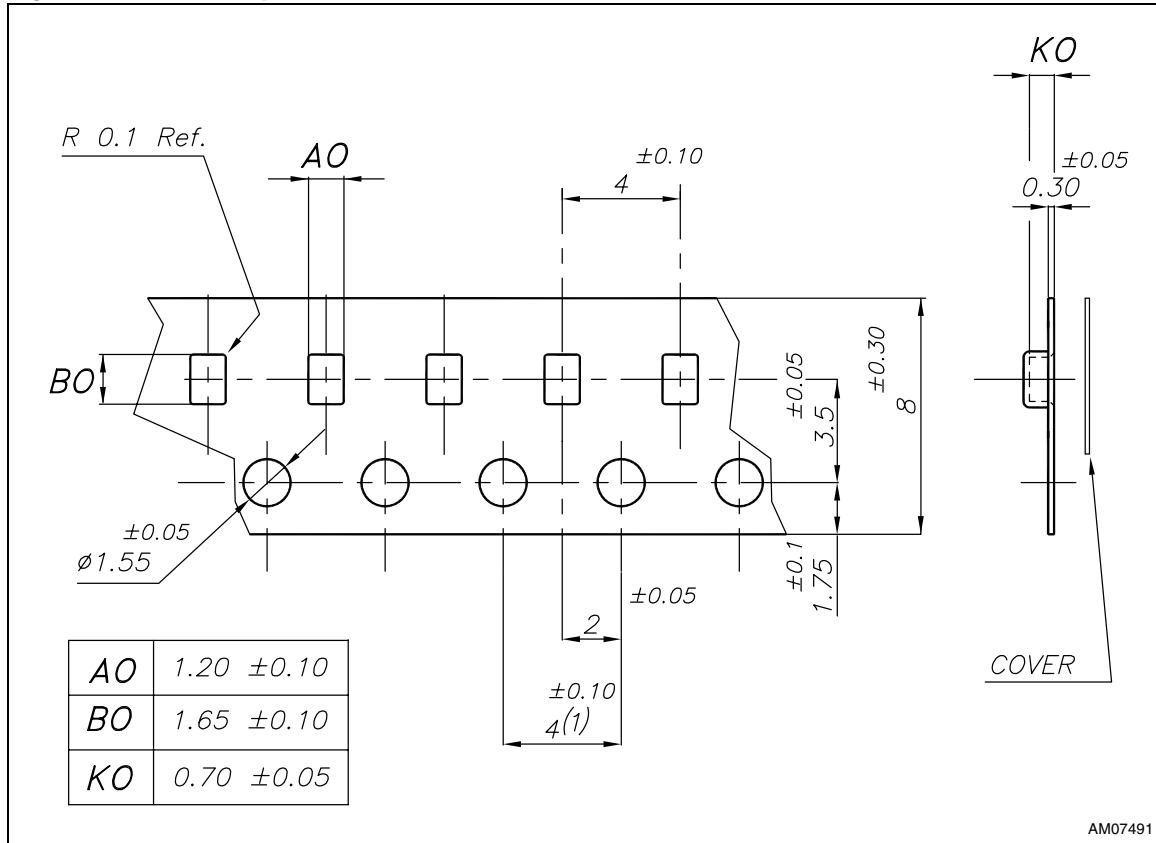
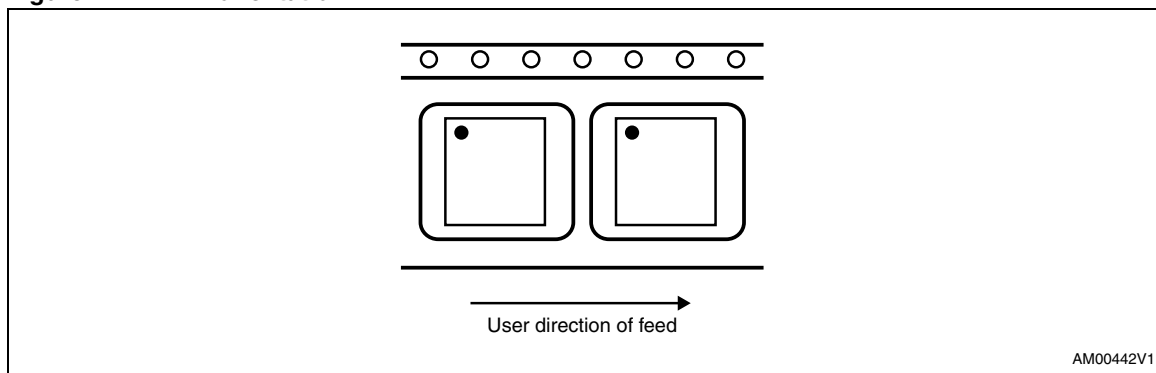


Figure 17. Pin 1 orientation



## 11 Part numbering

**Table 7. Ordering information scheme**

| Example:   | STM6519   | A | H | A | R | UB | 6 | F |
|--|---|---|---|---|---|----|---|---|
| <b>Device type</b>   | STM6519   |   |   |   |   |    |   |   |
| <b>Reset (<math>V_{CC}</math> monitoring threshold) voltage <math>V_{RST}</math></b> | A = no $V_{CC}$ monitoring feature  |   |   |   |   |    |   |   |
| <b>Smart Reset setup delay (<math>t_{SRC}</math>)<sup>(1)</sup></b>                  | C = factory programmable $t_{SRC} = 1.5$ s (typ.)<br>H = factory programmable $t_{SRC} = 4.0$ s (typ.)<br>L = factory programmable $t_{SRC} = 6.0$ s (typ.)<br>P = factory programmable $t_{SRC} = 7.5$ s (typ.)<br>U = factory programmable $t_{SRC} = 10.0$ s (typ.)      |   |   |   |   |    |   |   |
| <b>Inputs, outputs type<sup>(2)</sup></b>  | A = active-low $\overline{SR}$ input with no pull-up,<br>active-low open drain $\overline{RST}$ output with no pull-up<br>B = active-low $\overline{SR}$ input with pull-up,<br>active-low open drain $\overline{RST}$ output with no pull-up                               |   |   |   |   |    |   |   |
| <b>Reset timeout period (<math>t_{REC}</math>)</b>                                   | A = factory programmable $t_{REC} = 210$ ms (typ.)<br>B = factory programmable $t_{REC} = 360$ ms (typ.)<br>E = factory programmable $t_{REC} = 1.28$ ms (typ.)<br>F = factory programmable $t_{REC} = 100$ ms (typ.)<br>R = push-button controlled (no defined $t_{REC}$ ) |   |   |   |   |    |   |   |
| <b>Package</b>   | UC = UDFN-4L<br>UB = UDFN-6L  |   |   |   |   |    |   |   |
| <b>Temperature range</b>   | 6 = -40 °C to +85 °C  |   |   |   |   |    |   |   |
| <b>Shipping method</b>   | F = tape and reel   |   |   |   |   |    |   |   |

- Smart Reset delay ( $t_{SRC}$ ) is available from 0.5 s to 10 s in 0.5 s steps (typ.). Minimum order quantities may apply. Contact local sales office for availability.
- Push-pull reset output type also available (active-low or active-high).  $\overline{SR}$  input and open drain reset output available with optional pull-up resistor. Minimum order quantities may apply. Contact local sales office for availability.

## 12 Package marking information

Table 8. Package marking

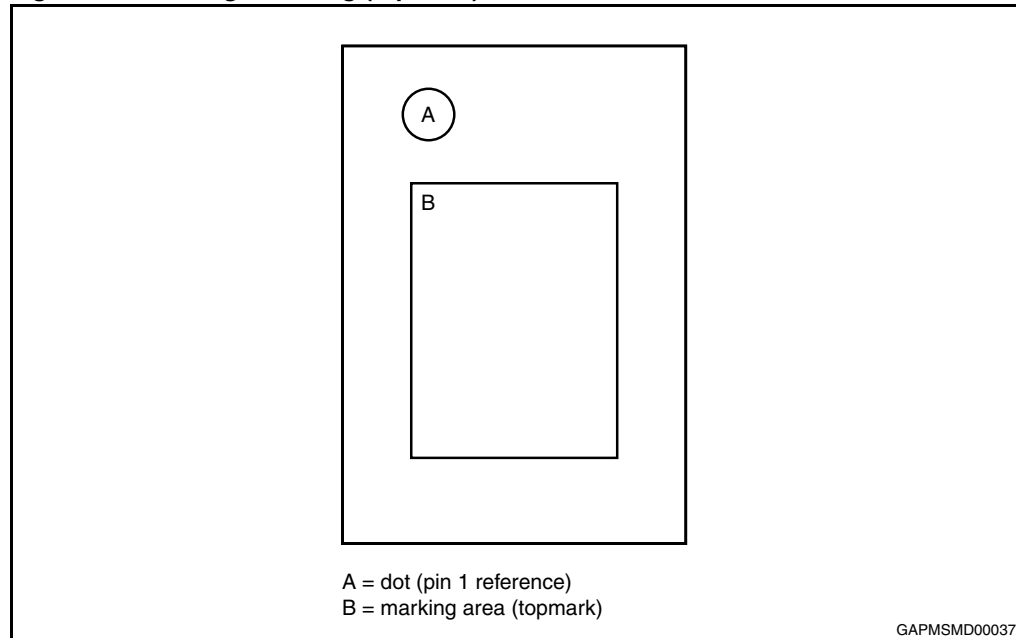
| Part number     | $t_{SRC}$<br>(s) | Smart Reset<br>inputs <sup>(1)</sup> | Output<br>type <sup>(2)</sup> | $t_{REC}$<br>option <sup>(3)</sup> | Package | Topmark |
|-----------------|------------------|--------------------------------------|-------------------------------|------------------------------------|---------|---------|
| STM6519AHARUC6F | 4.0              | AL                                   | OD, AL                        | No $t_{REC}$                       | UDFN4   | HA      |
| STM6519ALARUC6F | 6.0              | AL                                   | OD, AL                        | No $t_{REC}$                       | UDFN4   | LA      |
| STM6519APARUC6F | 7.5              | AL                                   | OD, AL                        | No $t_{REC}$                       | UDFN4   | PA      |
| STM6519AUARUC6F | 10.0             | AL                                   | OD, AL                        | No $t_{REC}$                       | UDFN4   | UA      |
| STM6519ACARUB6F | 1.5              | AL                                   | OD, AL                        | No $t_{REC}$                       | UDFN6   | CA      |
| STM6519AHARUB6F | 4.0              | AL                                   | OD, AL                        | No $t_{REC}$                       | UDFN6   | HA      |
| STM6519ALARUB6F | 6.0              | AL                                   | OD, AL                        | No $t_{REC}$                       | UDFN6   | LA      |
| STM6519APAAUB6F | 7.5              | AL                                   | OD, AL                        | 210 ms                             | UDFN6   | PB      |
| STM6519APARUB6F | 7.5              | AL                                   | OD, AL                        | No $t_{REC}$                       | UDFN6   | PA      |
| STM6519APBBUB6F | 7.5              | AL + pull-up                         | OD, AL                        | 360 ms                             | UDFN6   | PC      |
| STM6519AUARUB6F | 10.0             | AL                                   | OD, AL                        | No $t_{REC}$                       | UDFN6   | UA      |

1. AL = active-low.

2. OD = open drain, AL = active-low.

3. No  $t_{REC}$  = push-button controlled reset pulse width, any other value represents typical value of  $t_{REC}$ .

Figure 18. Package marking (top view)



## 13 Revision history

Table 9. Document revision history

| Date        | Revision | Changes  |
|-------------|----------|--|
| 12-Aug-2011 | 1        | Initial release.   |
| 22-Sep-2011 | 2        | Updated <a href="#">Figure 4</a> , <a href="#">Table 4</a> , <a href="#">Table 7</a> and <a href="#">Table 8</a> . |
| 07-Oct-2011 | 3        | Removed label "Preliminary data".  |
| 27-Oct-2011 | 4        | Updated <a href="#">Figure 3</a> and <a href="#">Table 1</a> .   |

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