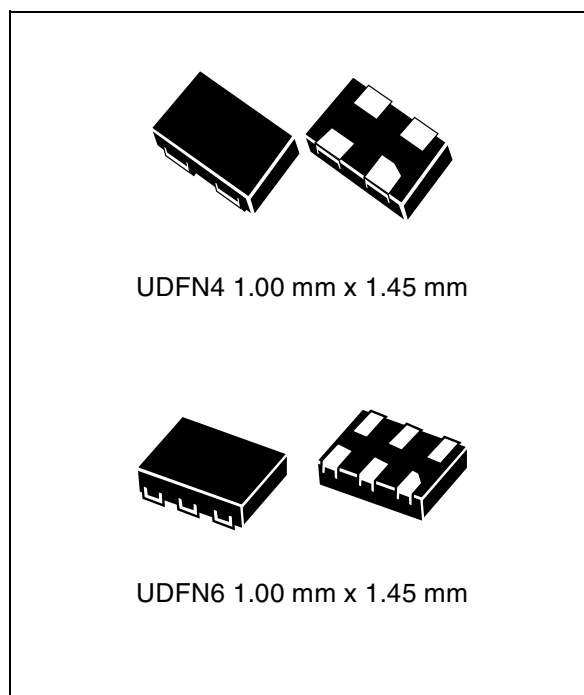


Features

- Operating voltage range 2 V to 5.5 V
- Low supply current 1 μ A
- Integrated 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.

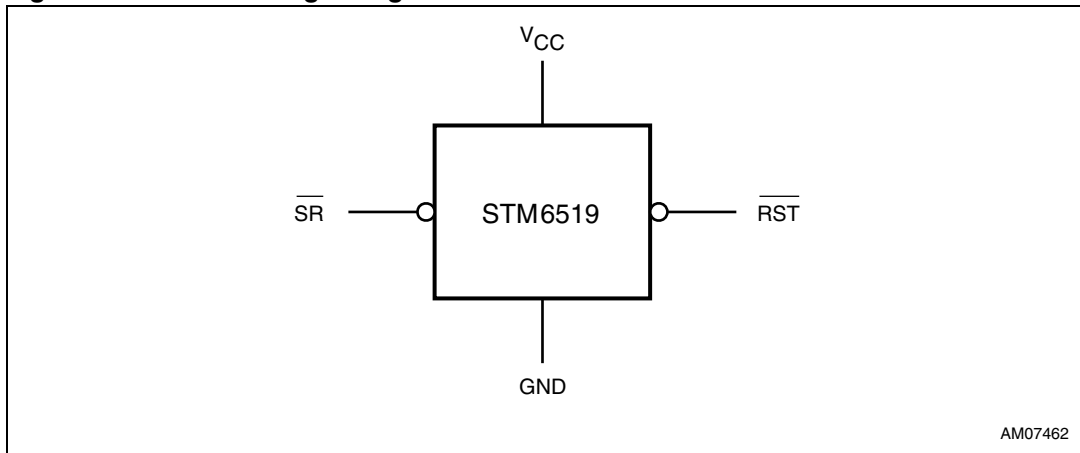
1.1 Test mode

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)

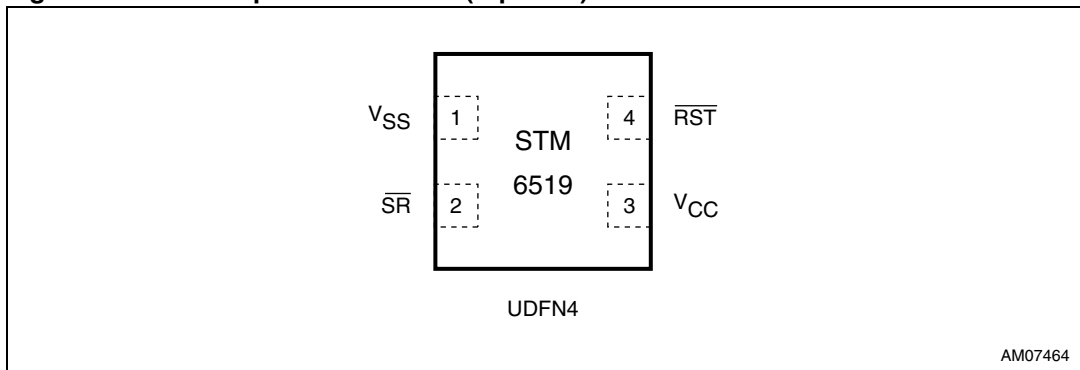
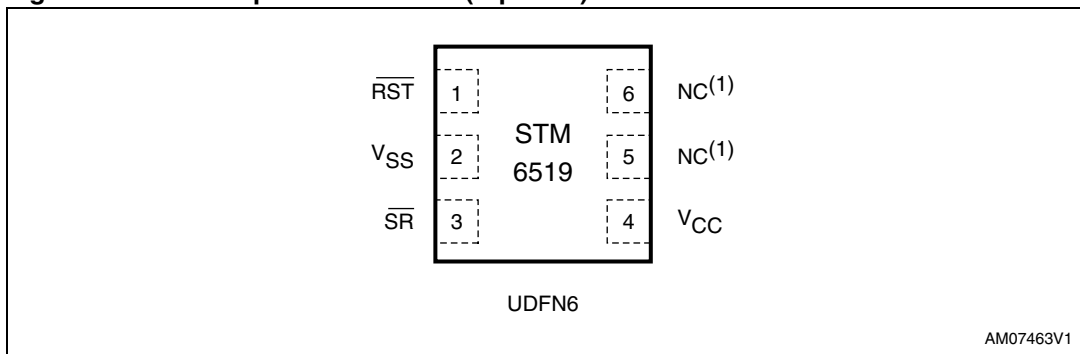


Figure 3. UDFN6 pin connections (top view)



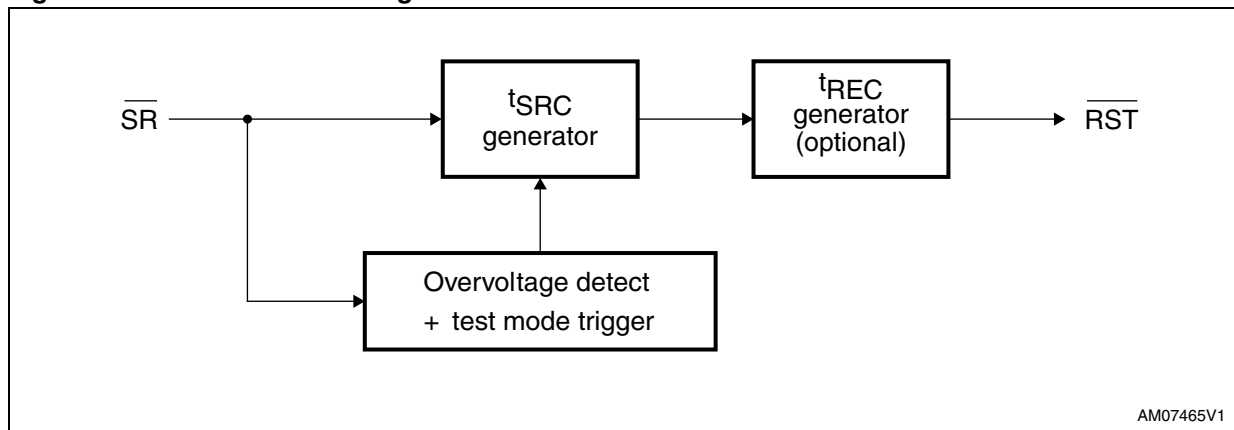
1. Not connected (not bonded); should be connected to V_{SS}.

2 Device overview

Table 1. Signal names

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

Figure 4. STM6519 block diagram



3 Pin descriptions

3.1 Power supply (V_{CC})

This pin is used to provide power to the Smart Reset device. A 0.1 μF 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 Power-up sequence

In normal mode, if different input side ($\overline{\text{SR}}$) and V_{CC} voltage domains are used, power-on sequence must avoid meeting the test mode entry condition to avoid inadvertent test mode entry: there should not be logic high present on the $\overline{\text{SR}}$ input before the V_{CC} power-up. However V_{CC} and $V(\overline{\text{SR}})$ rising at the same time is OK (e.g. if both are in the same voltage domain), the device will then safely start into normal operating mode, with $\overline{\text{RST}}$ output inactive (in High-Z mode for open-drain option).

3.3 Ground (V_{SS})

This is the ground pin for the device.

3.4 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_{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).

3.5 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_{REC} independent on Smart Reset input state.

3.6 $\overline{\text{RST}}$ output undervoltage behavior (for open-drain option)

High-Z on $\overline{\text{RST}}$ output below the specified operating voltage range is guaranteed at V_{CC} power-on or in case that valid V_{CC} dropped while the device was idle, i.e. while both output and input were inactive.

4 Typical application diagrams

Figure 5. Typical application diagram - input, output and STM6519 device in one voltage domain

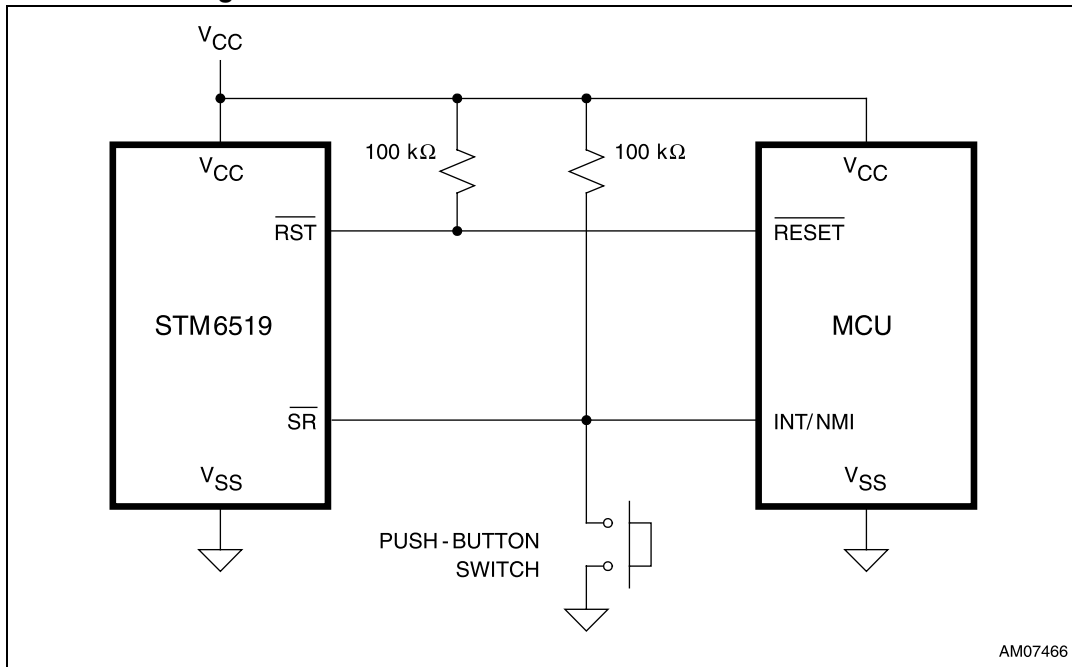
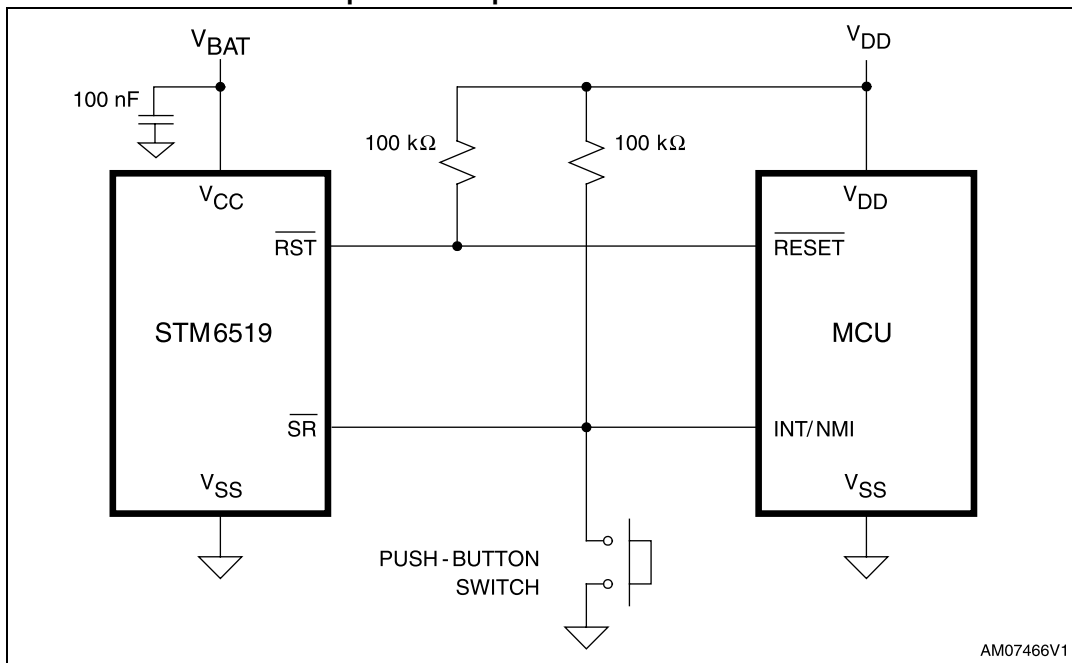
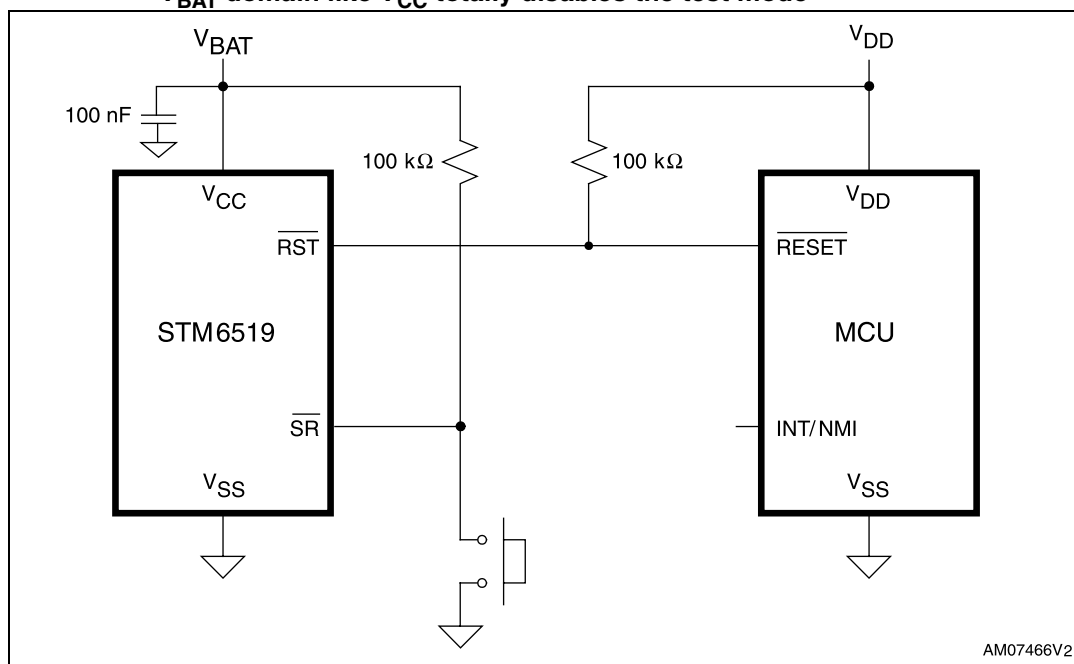


Figure 6. Typical application diagram - STM6519 device in a different voltage domain than input and output



1. Open-drain \overline{RST} output type and fixed \overline{SR} input logic threshold allows to use the device in different voltage domains. To prevent entering test mode by creating a condition $V(\overline{SR}) > V_{CC} + 1.1 \text{ V typ.}$, V_{CC} should be powered up before or together with voltage on the \overline{SR} input.

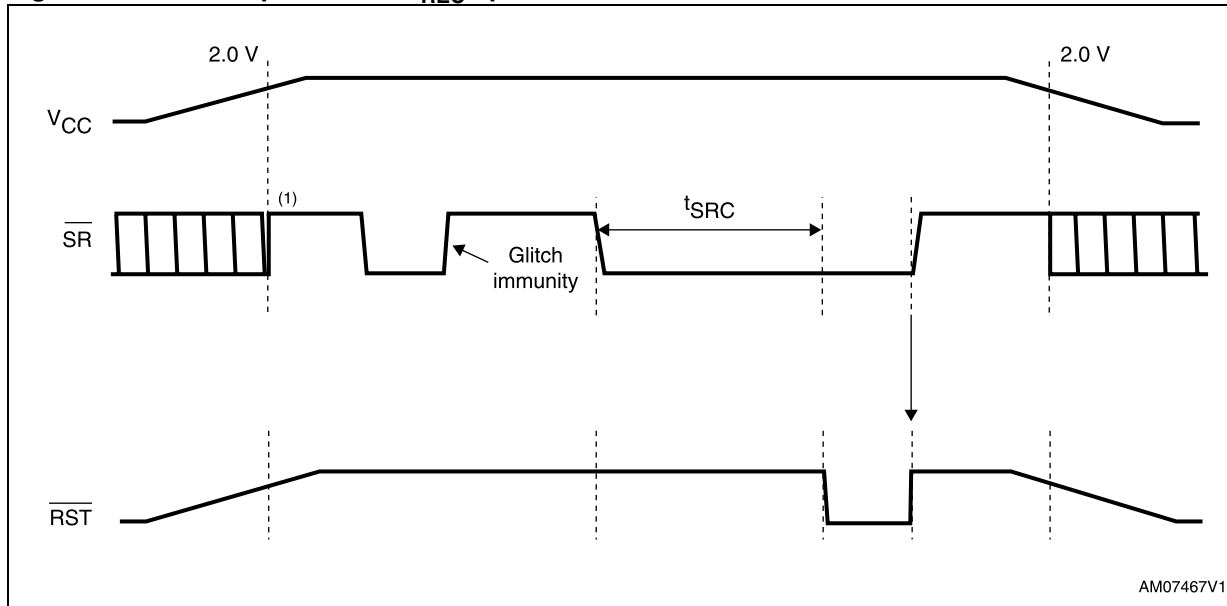
Figure 7. Typical application diagram in different voltage domains - \overline{SR} input in V_{BAT} domain like V_{CC} totally disables the test mode



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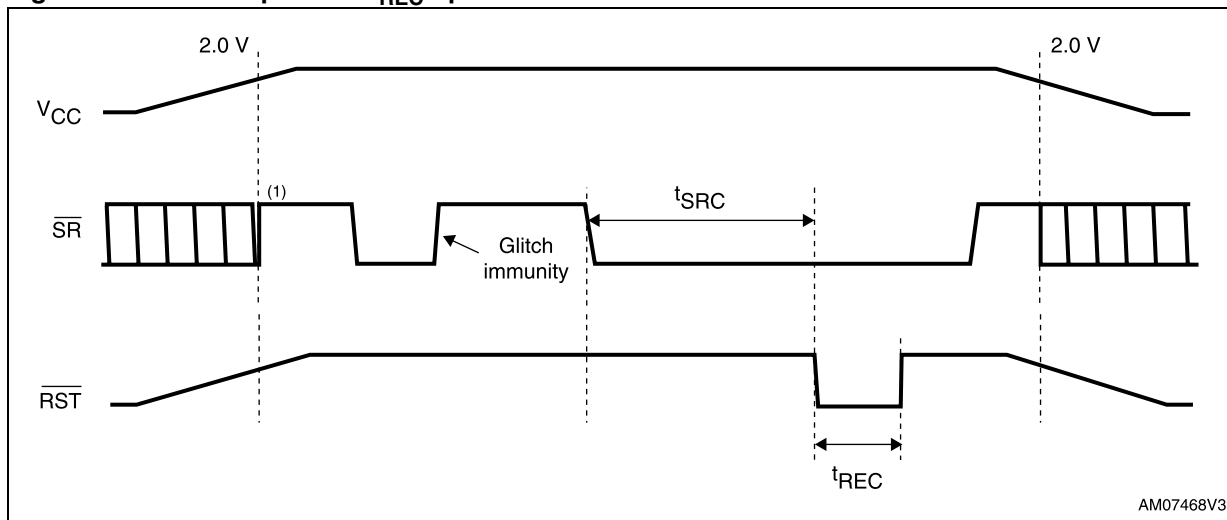
5 Timing diagrams

Figure 8. $\overline{\text{RST}}$ output without t_{REC} option



- 1. V_{CC} should be powered up before or together with voltage on the $\overline{\text{SR}}$ input to prevent entering test mode by creating a condition $V(\overline{\text{SR}}) > V_{\text{CC}} + 1.1 \text{ V typ.}$

Figure 9. $\overline{\text{RST}}$ output with t_{REC} option



- 1. V_{CC} should be powered up before or together with voltage on the $\overline{\text{SR}}$ input to prevent entering test mode by creating a condition $V(\overline{\text{SR}}) > V_{\text{CC}} + 1.1 \text{ V typ.}$

6 Typical operating characteristics

Figure 10. Supply current (I_{CC}) vs. temperature (T_A)

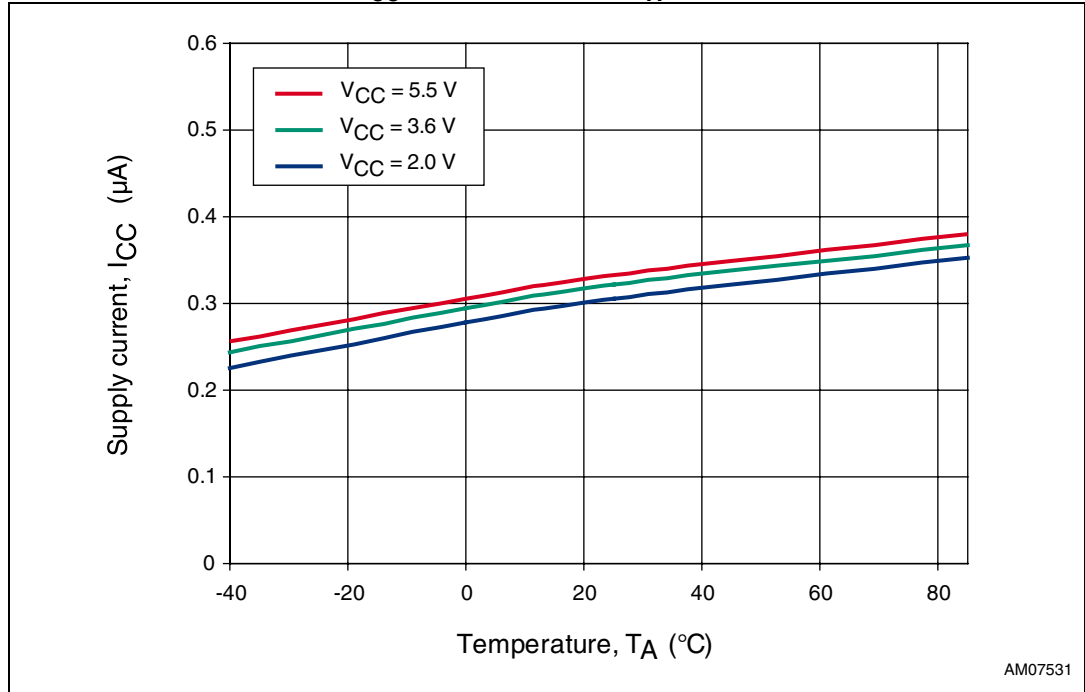


Figure 11. Smart Reset delay (t_{SRC}) vs. temperature (T_A), $t_{SRC} = 4.0 s$ (typ.)

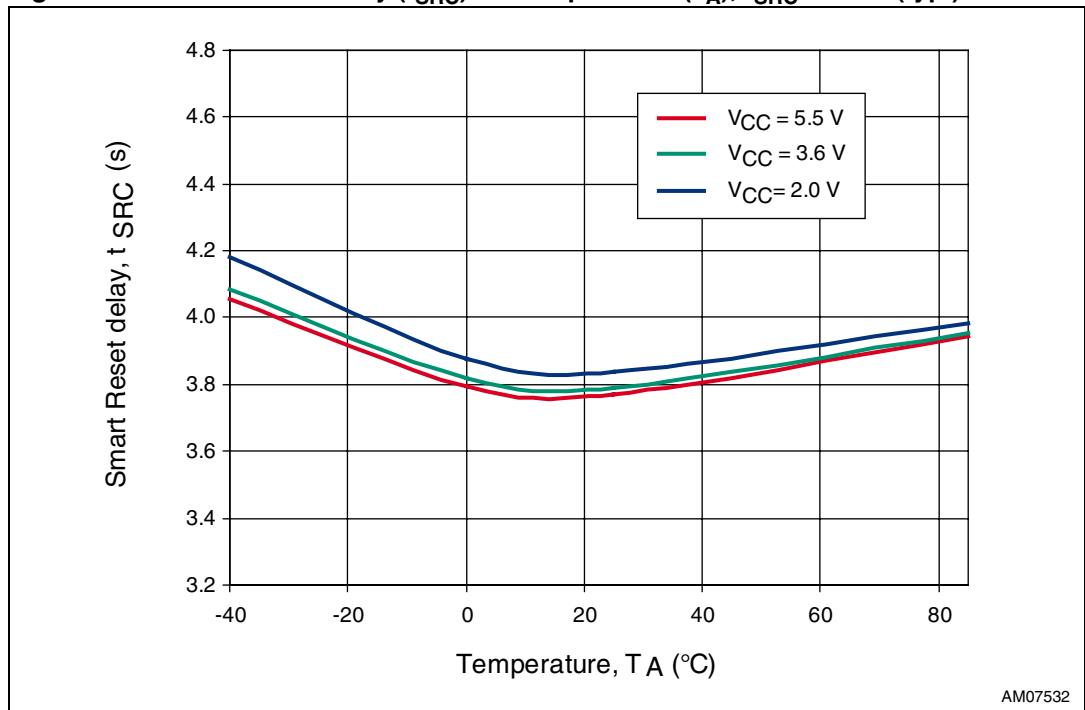
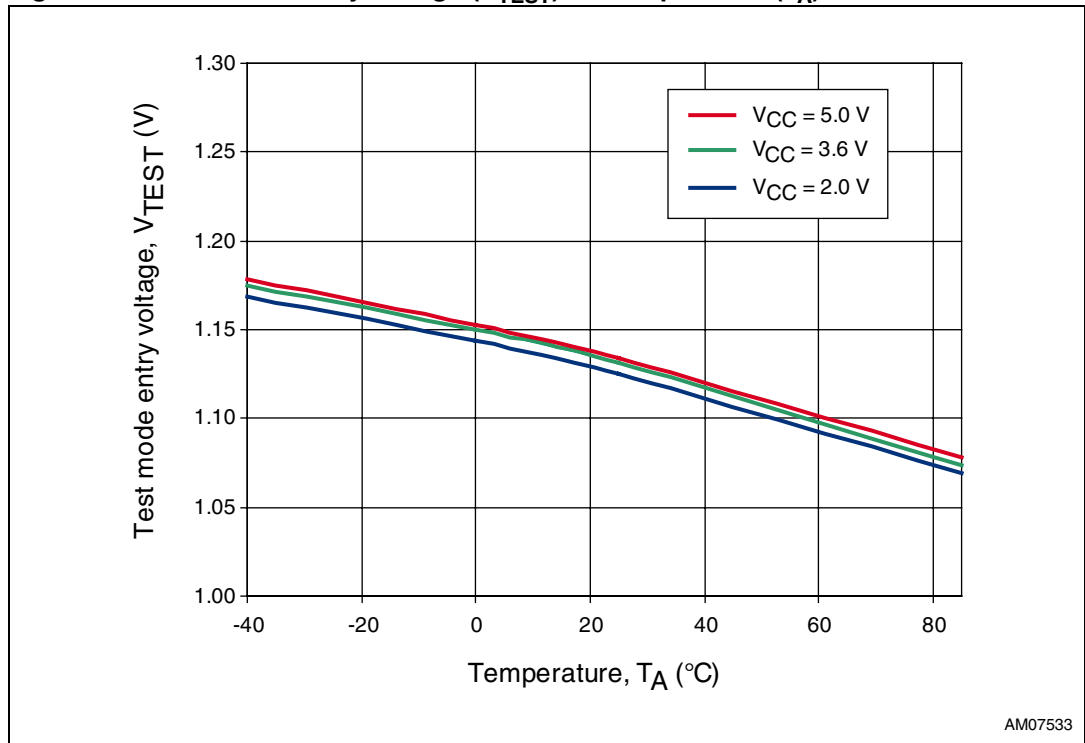
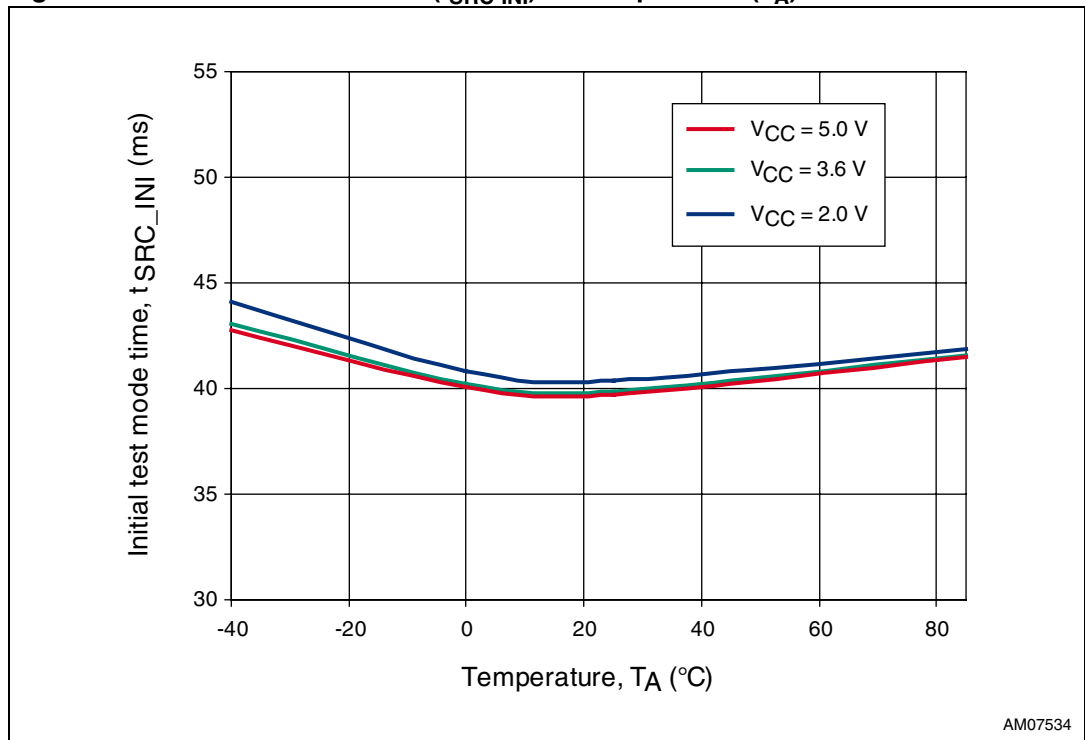


Figure 12. Test mode entry voltage (V_{TEST}) vs. temperature (T_A)



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Figure 13. Initial test mode time (t_{SRC_INI}) vs. temperature (T_A)



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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_{STG}	Storage temperature (V_{CC} off)	-55 to +150	°C
$T_{SLD}^{(1)}$	Lead solder temperature for 10 seconds	260	°C
V_{IO}	Input or output voltage	-0.3 to 5.5	V
V_{CC}	Supply voltage	-0.3 to 7	V
ESD			
V_{HBM}	Electrostatic discharge protection, human body model (JESD22-A114-B level 2)	2	kV
V_{RCDM}	Electrostatic discharge protection, charged device model, all pins	1	kV
V_{MM}	Electrostatic discharge protection, machine model, all pins (JESD22-A115-A level A)	200	V
	Latch-up (V_{CC} 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	≤ 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 ⁽¹⁾	Min.	Typ. ⁽²⁾	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	μA
V _{OL}	Reset output voltage low	V _{CC} ≥ 4.5 V, sinking 3.2 mA			0.3	V
		V _{CC} ≥ 3.3 V, sinking 2.5 mA			0.3	V
		V _{CC} ≥ 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		kΩ
I _{LO}	Output leakage current	V \overline{RST} = 5.5 V, open drain device option without output pull-up resistor	-0.1		0.1	μA
Smart Reset						
t _{SRC}	Smart Reset delay	T _A = -40 to +85 °C	0.8 x t _{SRC}	t _{SRC} ⁽³⁾	1.2 x t _{SRC}	s
		T _A = 25 °C	0.9 x t _{SRC}		1.1 x t _{SRC}	
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 SR	(device option)		65		kΩ
I _{LEAK}	\overline{SR} input leakage current	device option without input pull-up resistor	-0.1		0.1	μA
	Input glitch immunity			t _{SRC}		s
Test mode						
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

- Valid for ambient operating temperature T_A = -40 to +85 °C, V_{CC} = 2.0 to 5.5 V.
- Typical values are at 25 °C and V_{CC} = 3.3 V unless otherwise noted.
- Factory-programmable in the range of 0.5 s to 10 s typ. in 0.5 s steps.

9 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. ECOPACK is an ST trademark.

Figure 14. UDFN4, 1.00 mm x 1.45 mm x 0.50 mm, 0.65 mm pitch package outline

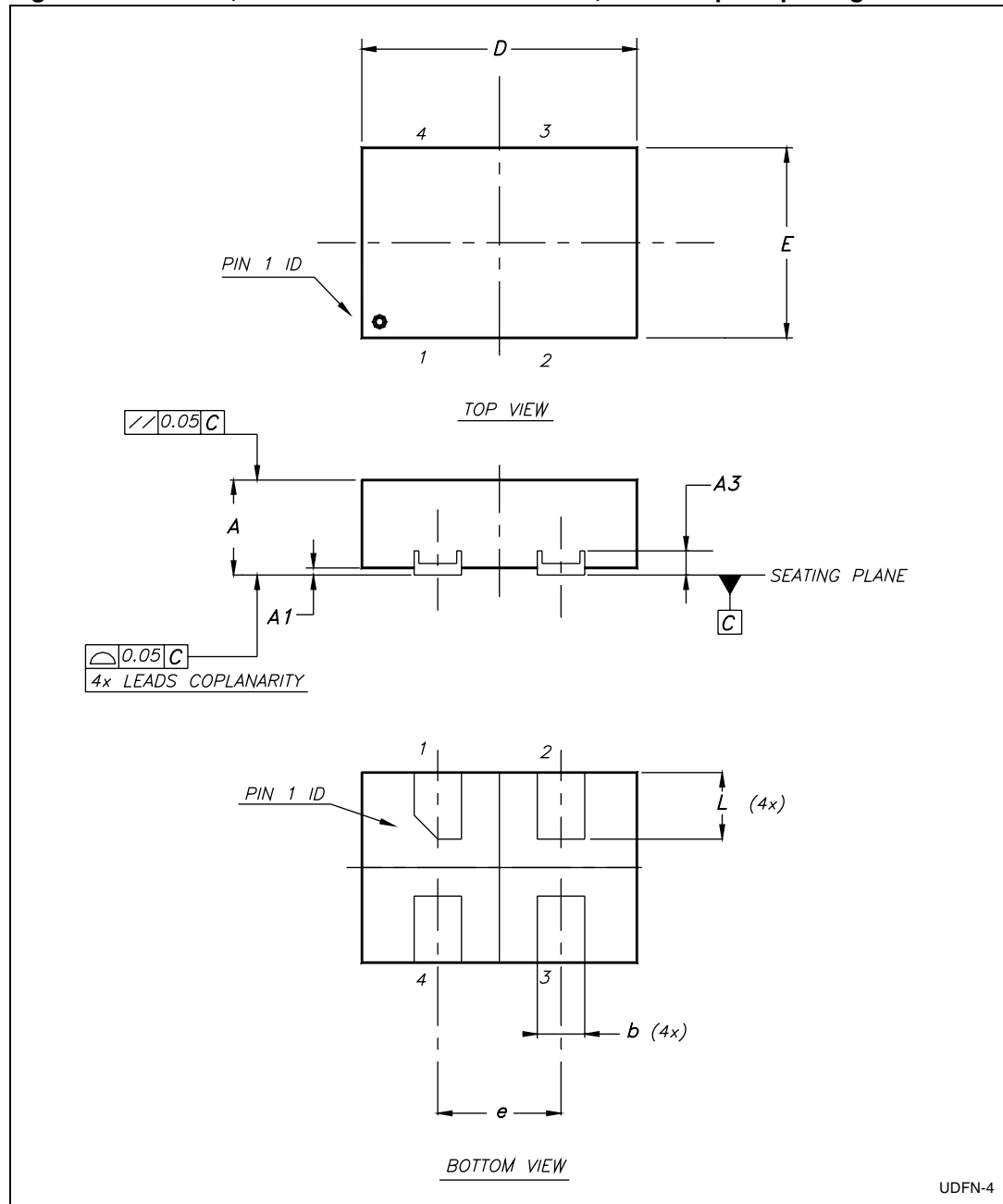
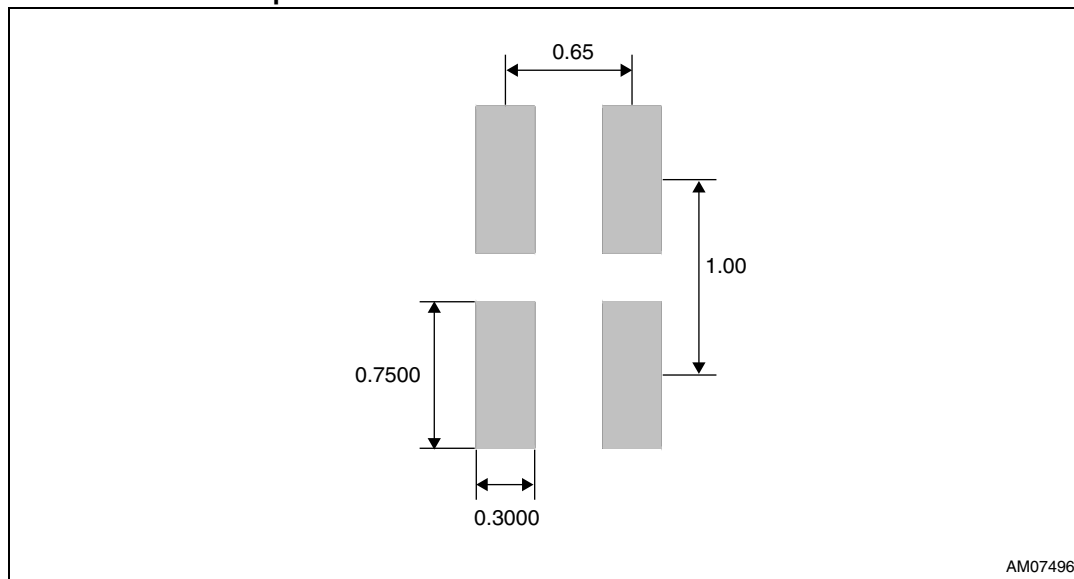


Table 5. UDFN4, 1.00 mm x 1.45 mm x 0.50 mm, 0.65 mm pitch package mechanical data

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

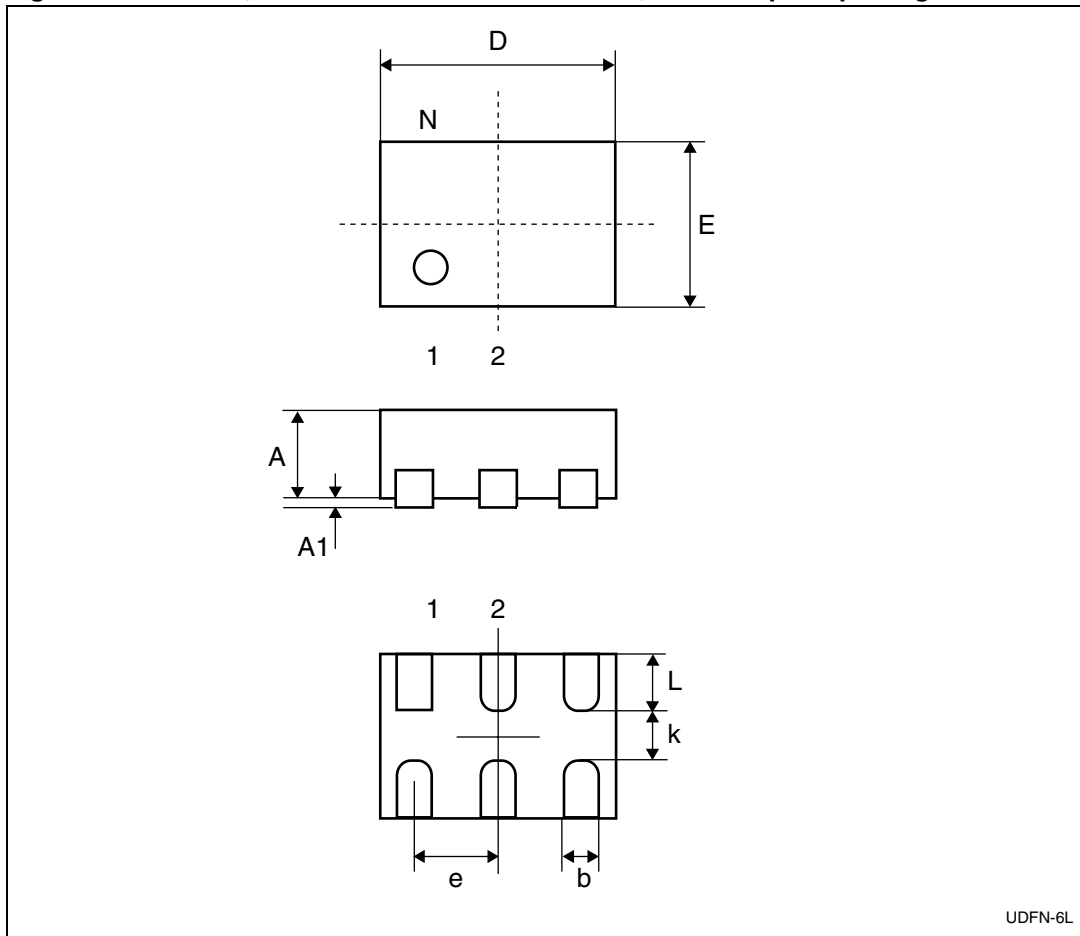
1. Controlling dimension: millimeters.

Figure 15. Footprint recommendation for UDFN4, 1.00 mm x 1.45 mm x 0.50 mm, 0.65 mm pitch



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Figure 16. UDFN6, 1.00 mm x 1.45 mm x 0.50 mm, 0.50 mm pitch package outline



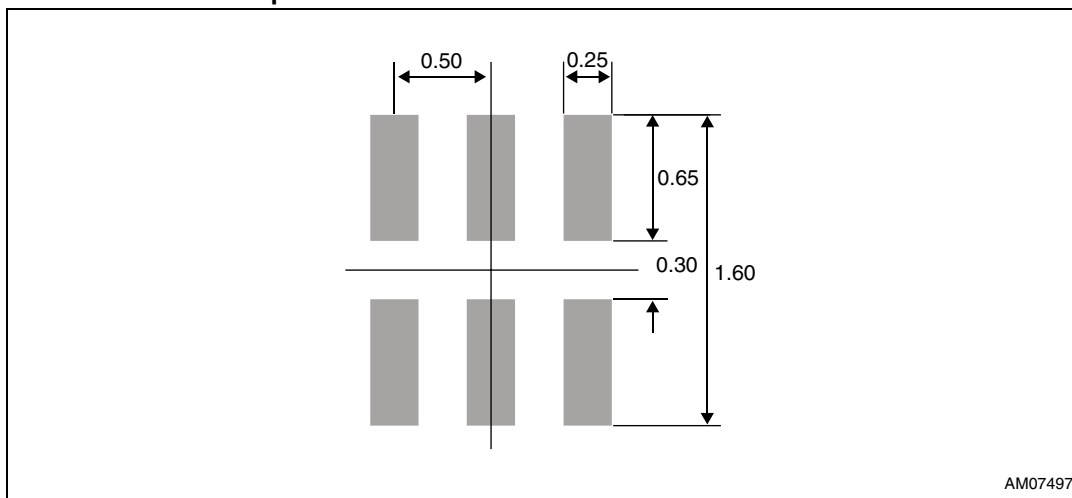
UDFN-6L

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

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

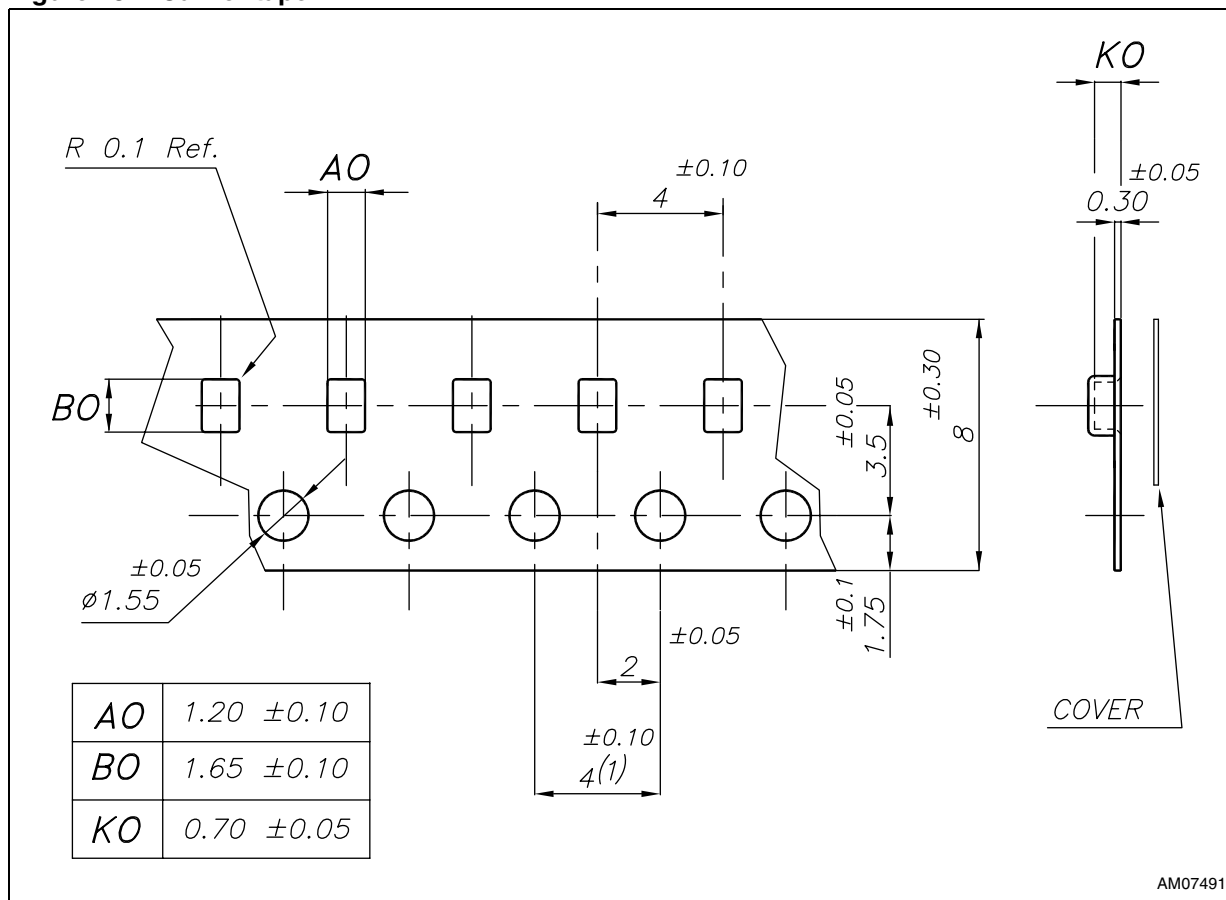
1. Package outline exclusive of any mold flashes dimensions and metal burrs.

Figure 17. Footprint recommendation for UDFN6 1.00 mm x 1.45 mm x 0.50 mm, 0.50 mm pitch



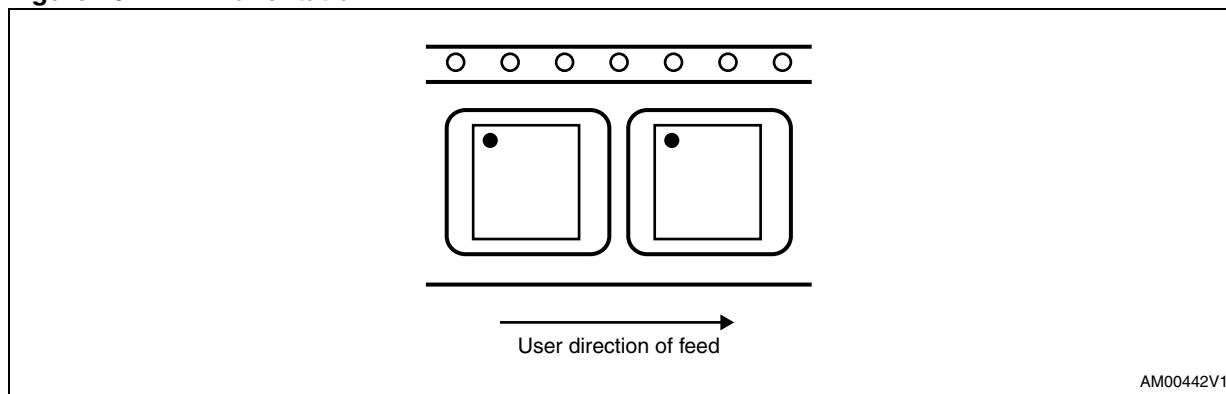
10 Tape and reel information

Figure 18. Carrier tape



1. 10-sprocket hole pitch cumulative tolerance ± 0.20 .

Figure 19. Pin 1 orientation



11 Part numbering

Table 7. Ordering information scheme

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

1. 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.
2. 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.



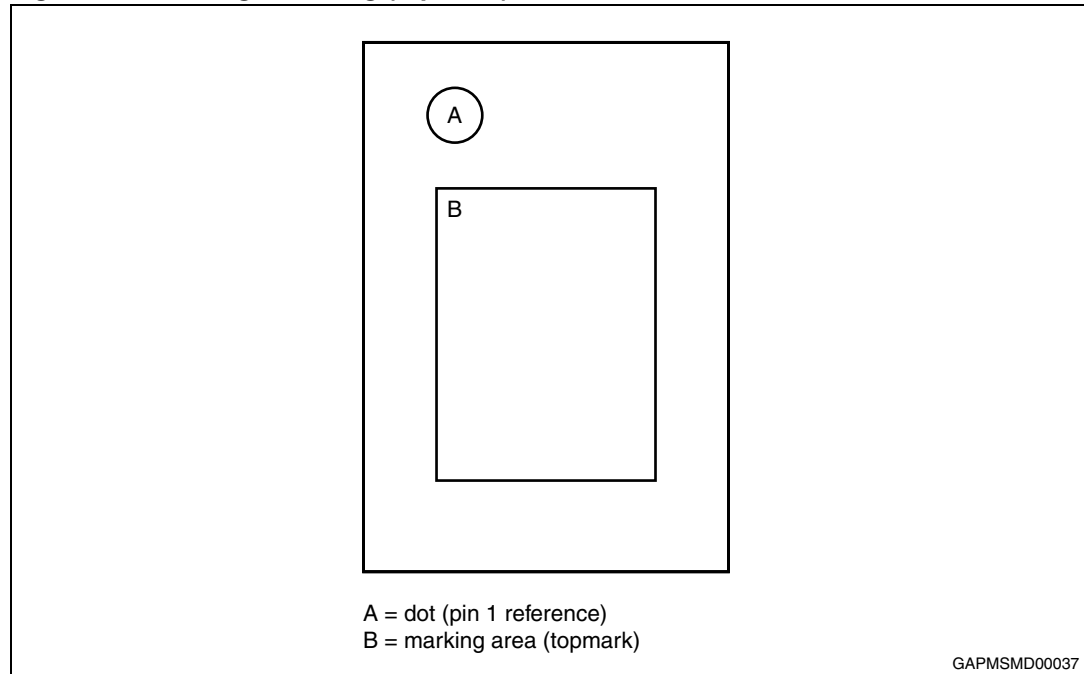
12 Package marking information

Table 8. Package marking

Part number	t _{SRC} (s)	Smart Reset inputs ⁽¹⁾	Output type ⁽²⁾	t _{REC} option ⁽³⁾	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 20. 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 Figure 5 , Table 4 , Table 7 and Table 8 .
07-Oct-2011	3	Removed label "Preliminary data".
27-Oct-2011	4	Updated Figure 3 and Table 1 .
13-Jun-2012	5	Updated Features , Table 4 , title of Section 9 .
17-Jan-2013	6	Moved Figure 4 below Table 1 . Added Section 3.2 , Section 3.6 , Figure 6 and Figure 7 . Updated title of Figure 5 . Updated Figure 8 and Figure 9 (added notes and minor modifications).

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