

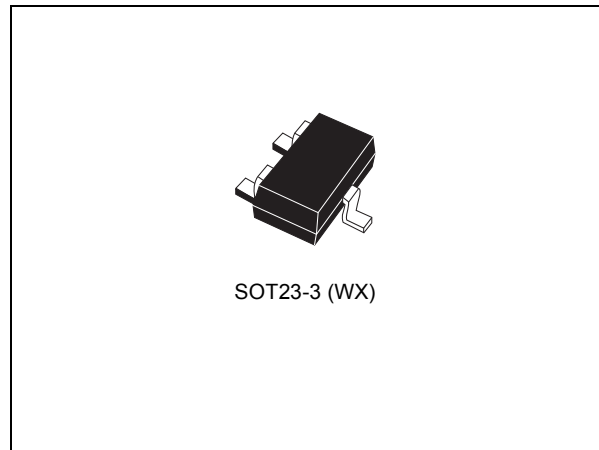


STM1810 STM1811 STM1812 STM1813 STM1815 STM1816 STM1817 STM1818

Low power reset circuit

Features

- Precision monitoring of 3 V , 3.3 V, and 5 V supply voltages
- Four output configurations:
 - Push-Pull, Active-High (STM1812,1817)
 - Push-Pull, Active-Low (STM1810,1815)
 - Open Drain, Active-Low (STM1811,1816)
 - Open Drain, Active-Low with Push-Button Detect (STM1813,1818)
- Reset pulse width - 100 ms (min)
- Low supply current - 4 μ A (typ)
- Guaranteed assertion down to $V_{CC} = 1.0$ V (0 °C to 105 °C)
- Factory-trimmed reset thresholds of 2.55 V, 2.88 V, 3.06 V, 4.37 V, and 4.62 V (typ)
- Power supply transient immunity
- Push-button/manual reset detect (STM1813/1818)



- Operating temperature: -40 °C to 105 °C
- ± 2.5 % reset threshold accuracy: (-40 °C to 105 °C)
- Available in the SOT23-3 package
- Fully compatible with DS181x and MXD181x products.

Table 1. Device summary

Order codes	5 V	3.3 V/ 3.0 V	Active-Low RESET (Push-Pull)	Active-Low RESET (Open Drain)	Active-High RESET (Push-Pull)	Active-Low RESET (Open Drain, Bidirectional, with \overline{MR} Detect)
STM1810L/M	✓		✓			
STM1811L/M	✓			✓ ⁽¹⁾		
STM1812L/M	✓				✓	
STM1813L/M	✓					✓
STM1815T/S/R		✓	✓			
STM1816T/S/R		✓		✓ ⁽¹⁾		
STM1817T/S/R		✓			✓	
STM1818T/S/R		✓				✓

1. Active-low RST with internal pull-up resistor.

1 Description

STM181x devices are low power reset devices used to monitor power supplies for microcontrollers. They perform a single function: asserting a reset signal whenever V_{CC} supply voltage drops below a preset value and keeping it asserted until V_{CC} has risen above the preset threshold for a minimum period of time (t_{rec}). They provide excellent circuit reliability without additional external components when used with +3.0 V / +3.3 V (STM1815–STM1818), and +5 V (STM1810–STM1813) power supply systems.

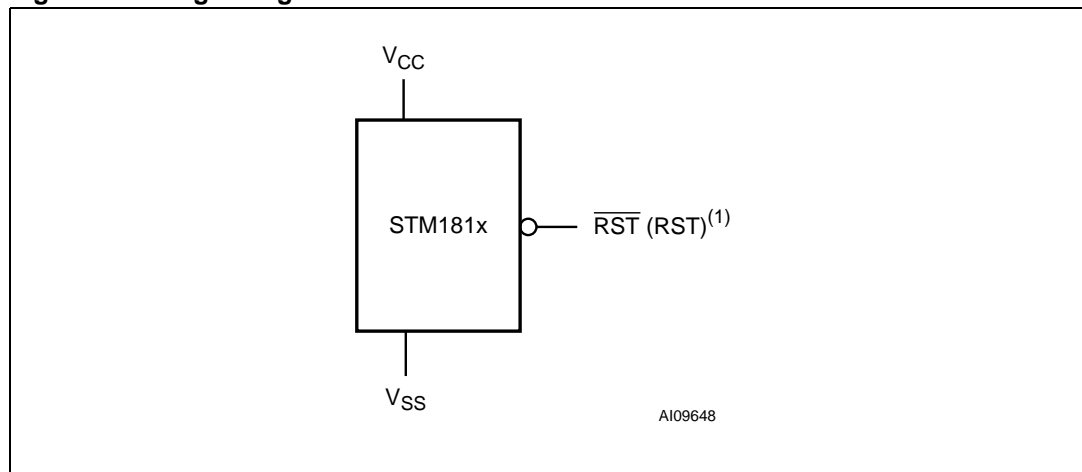
A precision voltage reference and comparator monitors the V_{CC} input for an out-of-tolerance condition. When an invalid V_{CC} condition occurs, the reset output (\overline{RST}) is forced low (or high in the case of RST) and remains asserted for t_{rec} after V_{CC} rises above the reset threshold. The STM1813/1818 also keep reset asserted for t_{rec} after the output is momentarily pulled to ground by an external push-button switch.

The STM1812 and STM1817 have an active-high, push-pull output. The STM1810 and STM1815 (push-pull) and STM1811, STM1813, STM1816, and STM1818 (Open Drain) have an active-low \overline{RST} output. The open drain devices (STM1811/STM1813/STM1816/STM1818) also have an internal pull-up resistor to V_{CC} . The STM1813 and STM1818 feature a debounced manual reset feature that asserts a reset if the \overline{RST} pin is pulled low for more than 1.5 μs . When used to initiate manual reset, \overline{RST} debounces signals from devices such as mechanical switches. For devices with this feature, the release of the external switch triggers the reset period.

The STM181x devices are guaranteed to output the correct logic state for V_{CC} down to 1.0 V (0 °C to +105 °C). They also provide a reset comparator designed to ignore fast transients on V_{CC} .

Reset thresholds are available between +2.55 V and +4.62 V. These small, low power devices are ideal for use in portable equipment. All are available in the space-saving 3-pin SOT23 package, and are specified from –40 °C to +105 °C. *Figure 4* shows a typical hardware hookup for STM181x devices to a Microcontroller.

Figure 2. Logic diagram



1. For STM1812, STM1817.

4 Maximum rating

Stressing the device above the rating listed in [Table 7](#) 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 the Operating sections 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 7. 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 $V_{CC} + 0.3$	V
V_{CC}	Supply Voltage	-0.3 to 7.0	V
I_O	Output Current	20	mA
P_D	Power Dissipation	320	mW

1. Reflow at peak temperature of 255 °C to 260 °C for < 30 seconds (total thermal budget not to exceed 180 °C for between 90 to 150 seconds).

5 DC and AC parameters

This section summarizes the operating measurement conditions, and the DC and AC characteristics of the device. The parameters in the DC and AC characteristics Tables that follow, are derived from tests performed under the measurement conditions summarized in [Table 8](#). Designers should check that the operating conditions in their circuit match the operating conditions when relying on the quoted parameters.

Table 8. Operating and AC measurement conditions

Parameter	STM1810 - 1818	Unit
V _{CC} Supply Voltage	1.0 to 5.5	V
Ambient Operating Temperature (T _A)	-40 to 105	°C
Input Rise and Fall Times	≤5	ns
Input Pulse Voltages	0.2 to 0.8 V _{CC}	V
Input and Output Timing Ref. Voltages	0.3 to 0.7 V _{CC}	V

Figure 21. AC testing input/output waveforms

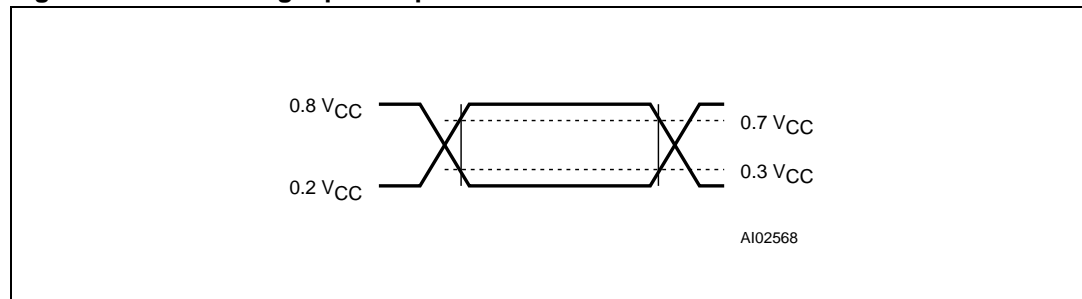


Table 9. DC and AC characteristics

Sym	Alter-native	Description	Test Condition ⁽¹⁾	Min	Typ	Max	Unit
V _{CC}		Operating Voltage	T _A = 0 to +105 °C	1.0		5.5	V
			T _A = -40 to +105 °C	1.2		5.5	V
I _{CC}		V _{CC} Supply Current	V _{CC} = 3.6 V, No load		4	10	µA
			V _{CC} = 5.5 V, No load		9	16	µA
V _{IH}		Input High Voltage	STM1813/1818 only	0.7 V _{CC}			V
V _{IL}		Input Low Voltage	STM1813/1818 only			0.4	V
V _{OH}		Output High Voltage	0 < I _{OH} < 500 µA	V _{CC} - 0.5	V _{CC} - 0.1		V
I _{OH}		$\overline{\text{RST}}$ Output Source Current	V _{CC} ≥ V _{RST} (max), Reset not asserted (STM1810/STM1815)		350		µA
		RST Output Source Current	V _{CC} ≤ V _{RST} (min), Reset asserted (STM1812/STM1817)		350		µA
I _{OL}		$\overline{\text{RST}}$ Output Sink Current	V _{CC} ≥ 2.7 V, Reset asserted, V _{OUT} = 0.4 V (STM1810/1811/1813/1815/1816/1818)	10			mA
		RST Output Sink Current	V _{CC} ≥ 2.7 V, Reset not asserted, V _{OUT} = 0.4 V, (STM1812/1817)	10			mA
C _{OUT}		Output Capacitance ⁽²⁾				10	pF
Reset Thresholds							
V _{RST}		Reset Threshold	STM181xL	25 °C		4.62	V
				-40 to 105 °C	4.50		4.75
			STM181xM	25 °C		4.37	V
				-40 to 105 °C	4.25		4.49
			STM181xT	25 °C		3.06	V
				-40 to 105 °C	2.98		3.15
			STM181xS	25 °C		2.88	V
				-40 to 105 °C	2.80		2.97
STM181xR	25 °C		2.55	V			
	-40 to 105 °C	2.47		2.64	V		
t _{RD}		V _{CC} to $\overline{\text{RST}}$ Delay	V _{CC} = (V _{TH} + 100 mV) falling to (V _{TH} - 200 mV)		2	5	µs
	t _{rec}	$\overline{\text{RST}}$ Pulse Width	V _{CC} Rising	100	150	200	ms
Push-Button Reset Detect (STM1813, STM1818)							
t _{PB}		Push-button Detect to $\overline{\text{RST}}$	STM1813/1818	1.5			µs
t _{PBRST}		Push-button $\overline{\text{RST}}$ Time-out	From Rising Edge	100	150	200	ms
		Internal Pull-up Resistance	STM1811/1816	3.5	5.5	7.5	kΩ
			STM1813/1818	3.1	5.5	7.5	kΩ

1. Valid for Ambient Operating Temperature: T_A = -40 °C to 105 °C; V_{CC} = 1.2 V to 5.5 V (except where noted).

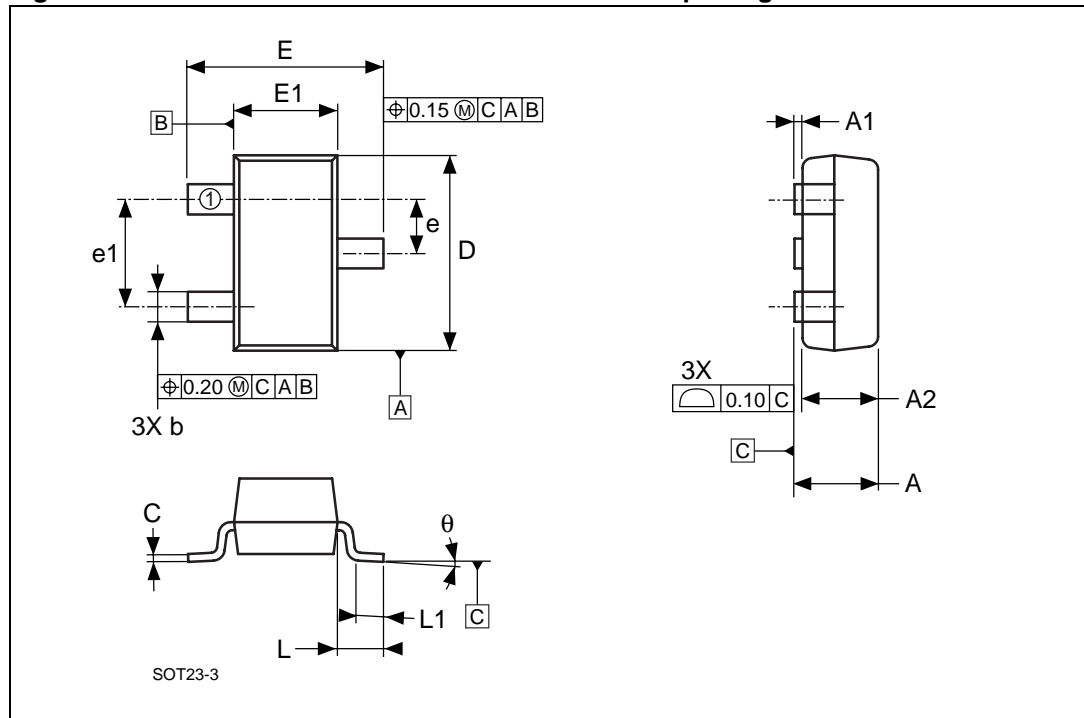
2. The STM1811/1813/1816/1818 have an internal pull-up resistor which may sink 1 mA of current.

6 Package mechanical

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97.

The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

Figure 22. SOT23-3 – 3-lead small outline transistor package outline



1. Drawing is not to scale.

Table 10. SOT23-3 – 3-lead small outline transistor package mechanical data

Symbol	mm			inches		
	Typ	Min	Max	Typ	Min	Max
A		0.89	1.12		0.035	0.044
A1		0.01	0.10		0.001	0.004
A2		0.88	1.02		0.035	0.042
b		0.30	0.50		0.012	0.020
C		0.08	0.20		0.003	0.008
D		2.80	3.04		0.110	0.120
E		2.10	2.64		0.083	0.104
E1		1.20	1.40		0.047	0.055
e		0.89	1.03		0.035	0.041
e1		1.78	2.05		0.070	0.081
L	0.54			0.021		
L1		0.40	0.60		0.016	0.024
Q		0 °	8 °		0 °	8 °
N		3			3	

7 Part numbering

Table 11. Ordering information scheme

Example:	STM1810	L	WX	7	F
Device Type					
STM181x					
Reset Threshold Voltage					
STM1810 - 1813:					
L = $V_{RST} = 4.50\text{ V to }4.75\text{ V (4.62 V typ)}$					
M = $V_{RST} = 4.25\text{ V to }4.49\text{ V (4.37 V typ)}$					
STM1815 - 1818:					
T = $V_{RST} = 2.98\text{ V to }3.15\text{ V (3.06 V typ)}$					
S = $V_{RST} = 2.80\text{ V to }2.97\text{ V (2.88 V typ)}$					
R = $V_{RST} = 2.47\text{ V to }2.64\text{ V (2.55 V typ)}$					
Package					
WX = SOT23-3					
Temperature Range					
7 = $-40\text{ to }105\text{ }^{\circ}\text{C}$					
Shipping Method					
F = ECOPACK Package, Tape & Reel					

Note: Contact the local ST sales office for availability.

For other options, or for more information on any aspect of this device, please contact the ST Sales Office nearest you.

Table 12. Marking description

Part Number	Reset Threshold	Output	Topside Marking ⁽¹⁾
STM1810L	4.62 V	Push-pull \overline{RST}	9AAx
STM1810M	4.37 V	Push-pull \overline{RST}	9ABx
STM1811L	4.62 V	Open Drain \overline{RST}	9AHx
STM1811M	4.37 V	Open Drain \overline{RST}	9AJx
STM1812L	4.62 V	Push-pull RST	9AQx
STM1812M	4.37 V	Push-pull RST	9ARx
STM1813L	4.62 V	Open Drain \overline{RST}	9AXx
STM1813M	4.37 V	Open Drain \overline{RST}	9AYx
STM1815T	3.06 V	Push-pull \overline{RST}	9BGx
STM1815S	2.88 V	Push-pull \overline{RST}	9BHx
STM1815R	2.55 V	Push-pull \overline{RST}	9BJx
STM1816T	3.06 V	Open Drain \overline{RST}	9BPx
STM1816S	2.88 V	Open Drain \overline{RST}	9BQx
STM1816R	2.55 V	Open Drain \overline{RST}	9BRx
STM1817T	3.06 V	Push-pull RST	9BWx
STM1817S	2.88 V	Push-pull RST	9BXx
STM1817R	2.55 V	Push-pull RST	9BYx
STM1818T	3.06 V	Open Drain \overline{RST}	9CDx
STM1818S	2.88 V	Open Drain \overline{RST}	9CEx
STM1818R	2.55 V	Open Drain \overline{RST}	9CFx

1. x = letter assigned to indicate assembly work week (i.e., A = WW01 and WW02, B = WW03 and WW04, C = WW05 and WW06..., Z = WW51, WW52, and WW53).