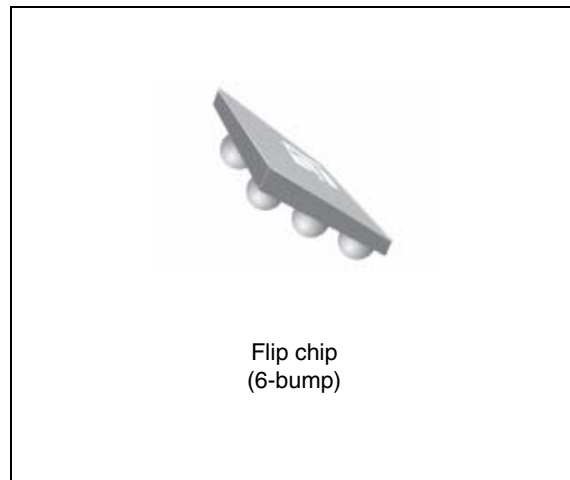


**Smart voltage supervisor****Features**

- Operating voltage 2.7 V to 5.5 V
- Supply current of 1.5  $\mu$ A (typ)
- Factory-trimmed voltage threshold from 3.2 V to 3.5 V in 50 mV increments
- $\pm$ 3% voltage threshold accuracy across temperature
- Enable and inhibit inputs (EN, INH)
- Power supply transient immunity
- Current limited output of 15 mA (max)
- Available in flip chip 6-bump package
- Operating temperature  $-30^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

**Applications**

- Portable devices
- Cell phones/smart phones
- PDA
- Palmtops
- Organizers
- Portable audio/video players
- Portable terminals

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# 1 Description

The STM1066 device monitors  $V_{CC}$ , and connects OUT to  $V_{IN}$  or GND, based on the  $V_{CC}$  level (above  $V_{TH+}$  or below  $V_{TH-}$ ) and the state of EN and INH inputs.

The device offers several voltage thresholds,  $V_{TH+}$  (see [Table 8](#)) and it is available in miniature flip chip 6-bump package.

**Figure 1. Logic diagram**

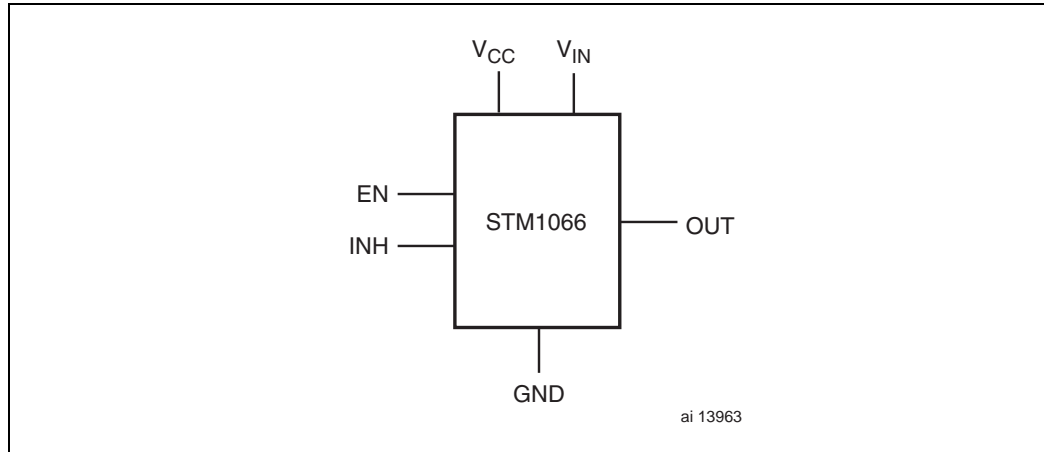


Table 1. Pin descriptions

Pin	Symbol	Function
1A	$V_{IN}$	Supply for output pin (OUT)
1B	EN	Enable from USB VBUS
1C	GND	Ground
2A	OUT	Output
2B	INH	Active high. Inhibits device
2C	$V_{CC}$	Chip supply

Figure 2. 6-bump flip chip connections

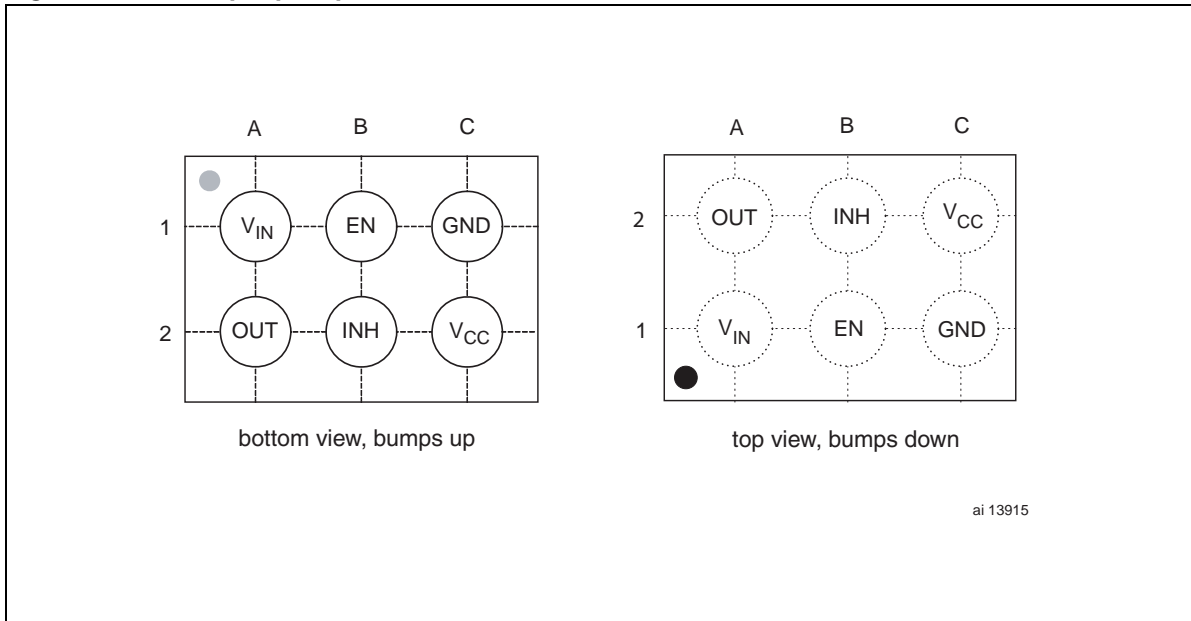
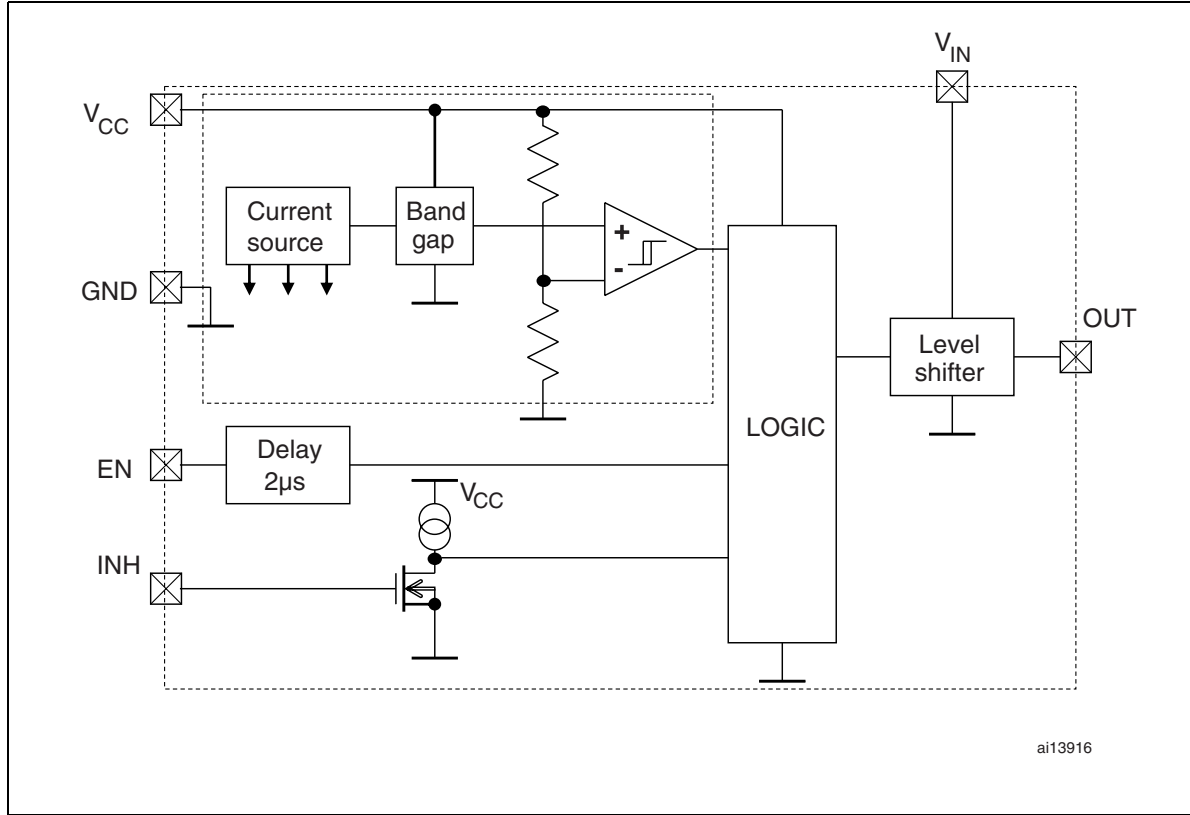
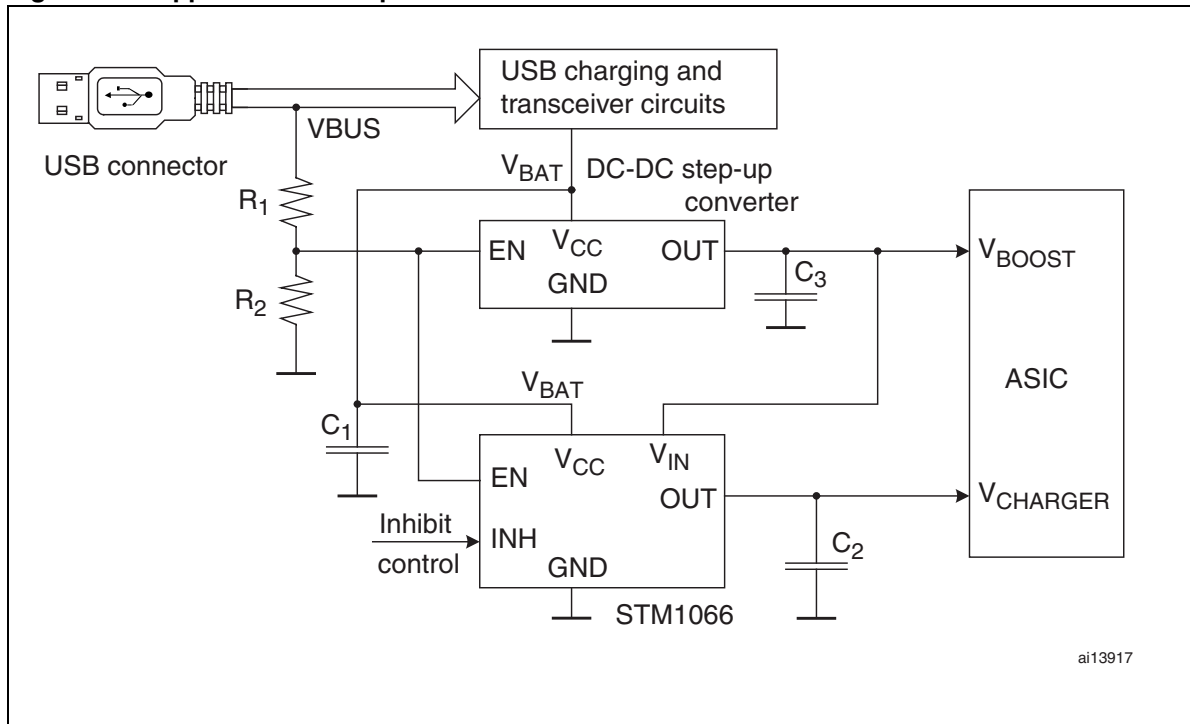


Figure 3. Block diagram



ai13916

Figure 4. Application hookup



ai13917

## 2 Operation

The STM1066 connects or disconnects the output OUT, from the  $V_{IN}$  pin based on the logical combination of the enable input (EN), the inhibit input (INH), and the supply voltage level,  $V_{CC}$  (see [Table 2](#) or [Figure 11](#) for more details).

### 2.1 Output, OUT

If the enable input is in a logic high state and inhibit input is in a logic low state, the output will be connected to  $V_{IN}$  input as  $V_{CC}$  rises above the  $V_{TH+}$  voltage threshold. Otherwise, the output is connected to ground GND. The output is current limited (see [Table 5](#)).

### 2.2 Enable input, EN

A Logic low on the enable input disconnects the output from  $V_{IN}$  and disables the device, which enters a standby mode with very low current consumption (see [Table 5](#)).

### 2.3 Inhibit input, INH

A logic high on the inhibit input disconnects the output from  $V_{IN}$ .

**Table 2. Truth table**

$V_{CC}$	EN <sup>(1)</sup>	INH	OUT
< $V_{TH+}$ (rising edge) < $V_{TH-}$ (falling edge)	x	x	connected to GND
x	L	x	connected to GND
x	x	H	connected to GND
> $V_{TH+}$ (rising edge) > $V_{TH-}$ (falling edge)	H	L	connected to $V_{IN}$

1. Once the device is disabled by EN input, the  $V_{CC}$  must be above  $V_{TH+}$  to reconnect output to  $V_{IN}$ .



### 3 Typical operating characteristics

Figure 5. Supply current vs. supply voltage,  $V_{EN} = 4\text{ V}$

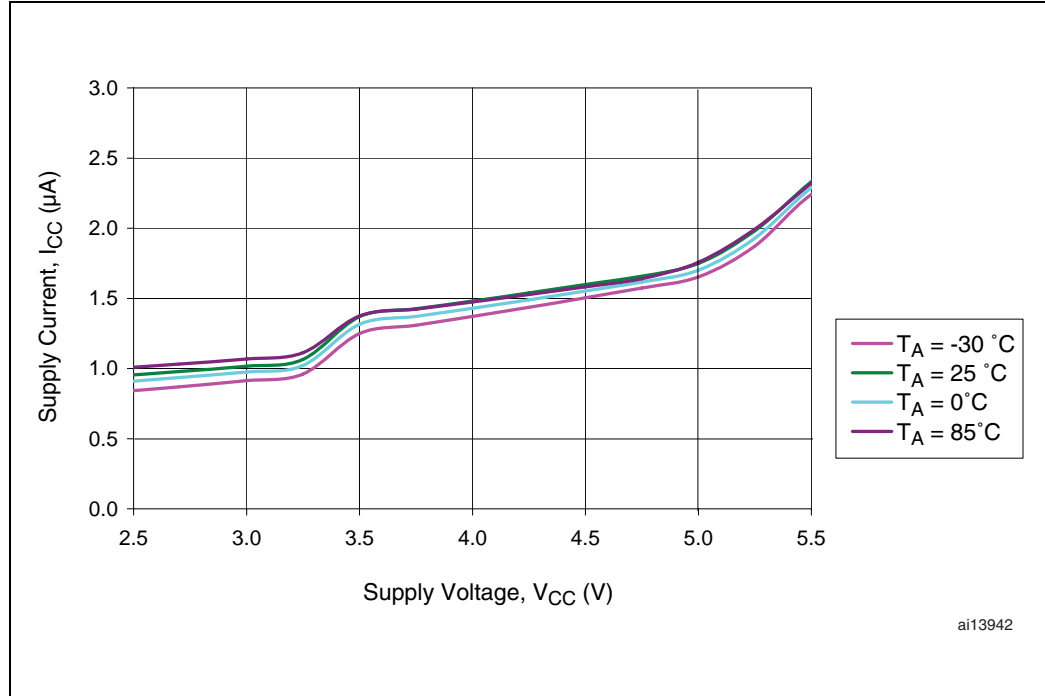


Figure 6. Supply current vs. temperature,  $V_{EN} = 4\text{ V}$

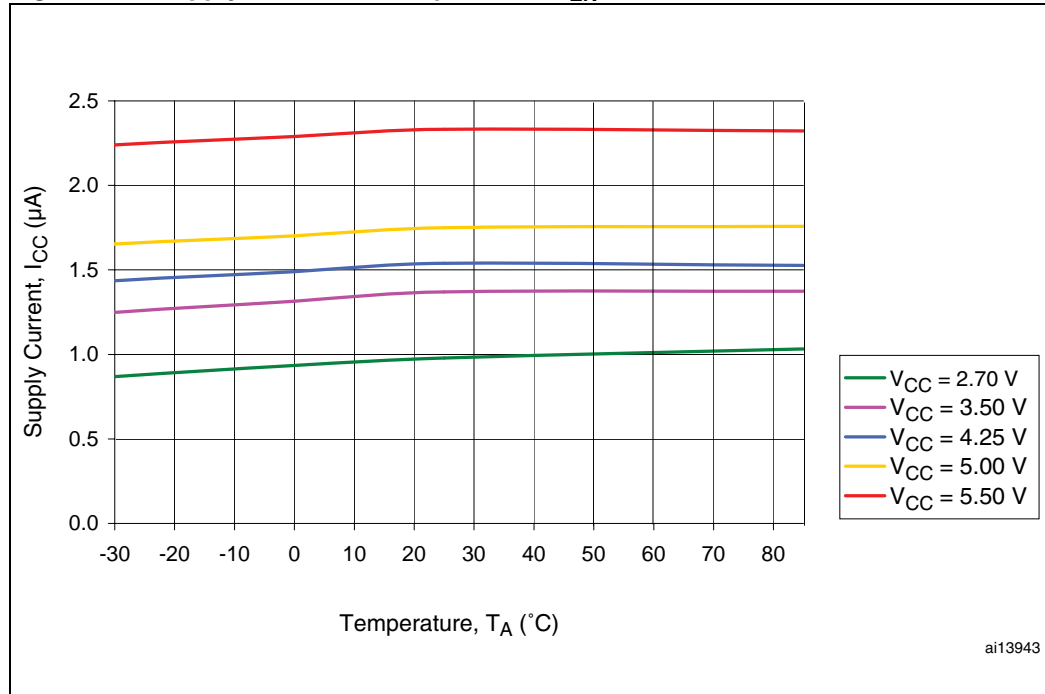


Figure 7. Supply current vs. supply voltage,  $V_{EN} = 0\text{ V}$

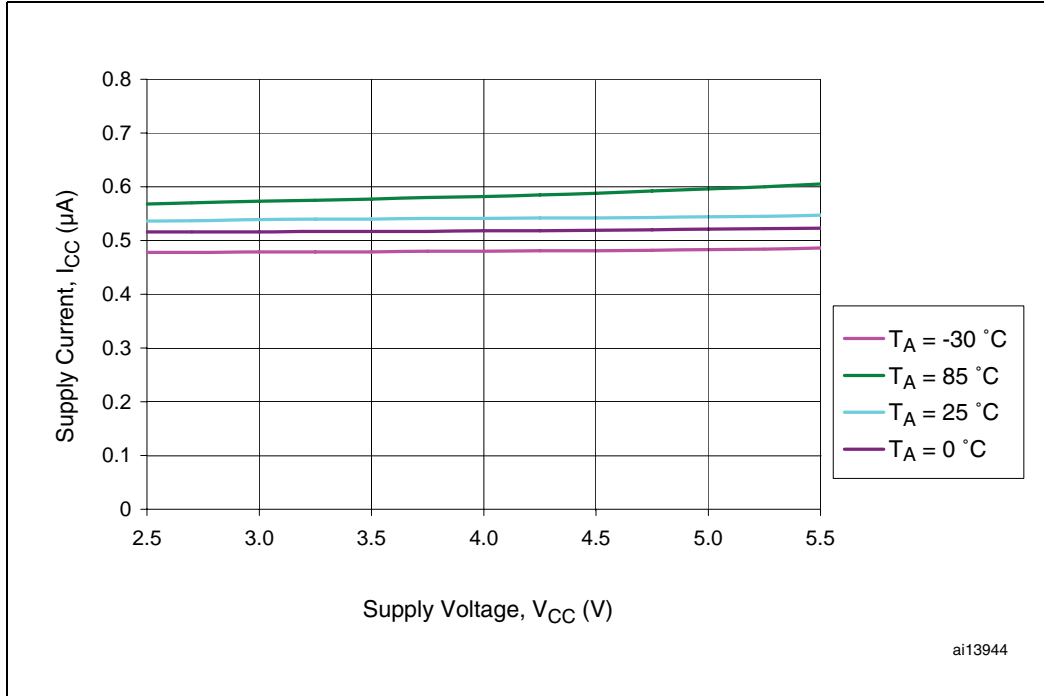


Figure 8. Supply current vs. temperature,  $V_{EN} = 0\text{ V}$

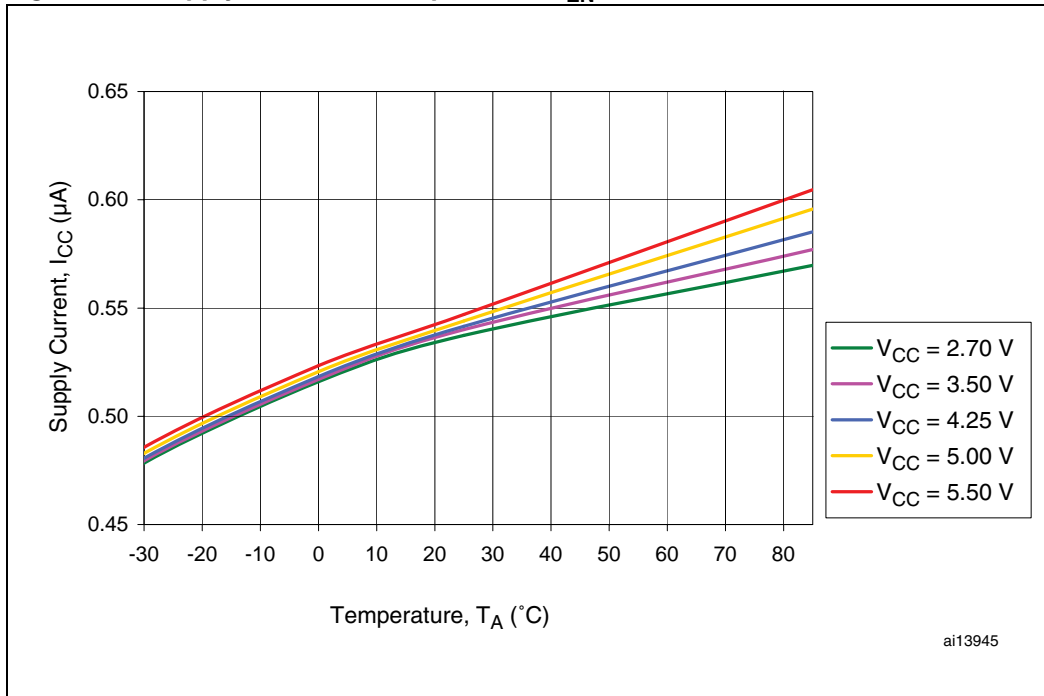


Figure 9. Rising voltage detector threshold vs. temperature

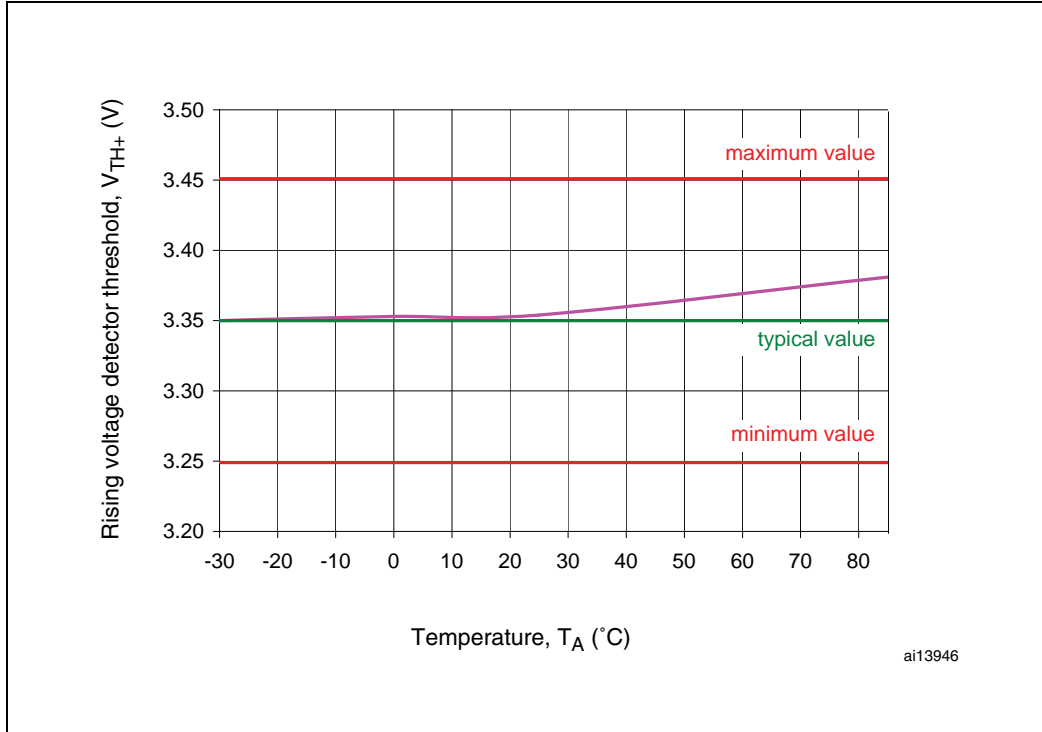
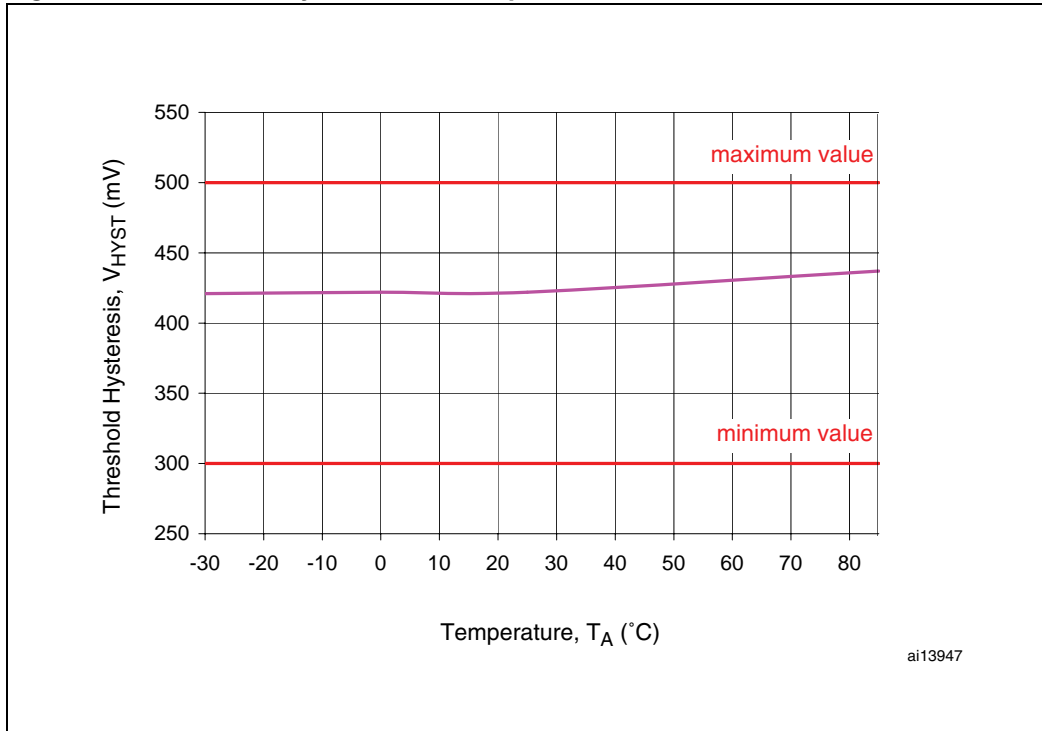


Figure 10. Threshold hysteresis vs. temperature



## 4 Maximum ratings

Stressing the device above the rating listed in the “Absolute maximum ratings” table 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 3. Absolute maximum ratings**

Symbol	Parameter	Min	Typ	Max	Unit	Remarks
$V_{CC}$	Input supply voltage	-0.2		+7.0	V	
$V_{IN}$	Output source voltage	-0.2		+7.0	V	Independent of $V_{CC}$
$V_{EN}$	VBUS input	-0.2		$V_{CC} + 0.3$	V	Series 1M external resistor for protection
$V_{OUT}$	Output pin	-0.3		$V_{IN} + 0.3$	V	
$V_{INH}$	Inhibit pin	-0.3		$V_{CC} + 0.3$	V	
$T_A$	Operating ambient temperature	-30		+85	°C	
	Storage temperature	-45		+150	°C	
	Electrostatic protection	-100		+100	V	Machine model
		-2000		+2000	V	Human body model
	Electrostatic protection	-500		+500	V	Charged device model

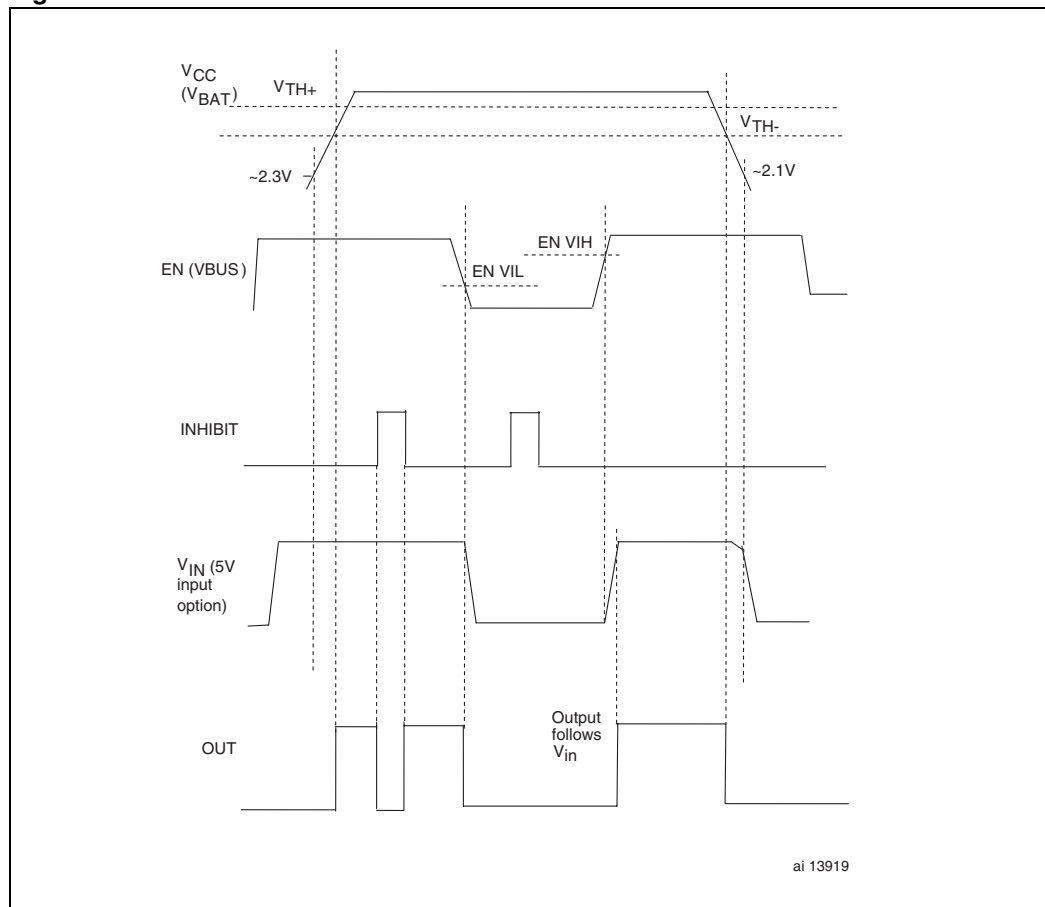
## 5 DC and AC characteristics

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 4: Operating and AC measurement conditions](#). Designers should check that the operating conditions in their circuit match the operating conditions when relying on the quoted parameters.

**Table 4. Operating and AC measurement conditions**

Parameter	Condition	Unit
$V_{CC}$ supply voltage	2.7 to 5.5	V
Ambient operating temperature ( $T_A$ )	-30 to 85	°C
Input rise and fall times	$\leq 5$	ns

**Figure 11. Waveforms**



**Note:**  $V_{IN}$  assumed to be from 1.6 V to 5.5 V. No  $V_{IN}$  means no signal on OUT pin. If there is no  $V_{CC}$  then there will be no  $V_{IN}$ .

Table 5. DC and AC characteristics

Sym	Parameter	Test condition <sup>(1)</sup>	Min	Typ	Max	Unit
V <sub>CC</sub>	Supply voltage		2.7		5.5	V
I <sub>CC</sub>	Supply current into V <sub>CC</sub> pin	V <sub>EN</sub> = 0 V		0.6	1	μA
		V <sub>EN</sub> = 4 V		1.5	15	μA
I <sub>CC</sub> + I <sub>IN</sub>	Current into V <sub>CC</sub> + V <sub>IN</sub> pins	V <sub>EN</sub> = 0 V			5	μA
		V <sub>EN</sub> = 4 V			15	μA
V <sub>TH+</sub>	Rising voltage detector threshold (see <a href="#">Table 7 on page 17</a> for detailed listing)		-3%	V <sub>TH+</sub>	+3%	V
V <sub>HYST</sub>	Threshold hysteresis		0.3		0.5	V
V <sub>TH-</sub>	Falling voltage detector threshold			V <sub>TH+</sub> - V <sub>HYST</sub>		V
t <sub>PD-FALL</sub> <sup>(2)</sup>	V <sub>CC</sub> falling to OUT delay	V <sub>CC</sub> falling from (V <sub>TH-</sub> + 100 mV) to (V <sub>TH-</sub> - 100 mV) at 10 mV/μs		30		μs
t <sub>PD-RISE</sub> <sup>(2)</sup>	V <sub>CC</sub> rising to OUT delay	V <sub>CC</sub> rising from (V <sub>TH+</sub> - 100 mV) to (V <sub>TH+</sub> + 100 mV) at 10m V/μs		70		μs
V <sub>IN</sub>	Voltage on V <sub>IN</sub> pin Supply for output pin	Allows 2.5 V rail, V <sub>BAT</sub> or +5 V	2.4		5.5	V
<b>Output pin, OUT<sup>(3)</sup></b>						
V <sub>OUT-OH</sub>	Output high voltage, see <a href="#">Figure 11</a>	I <sub>SOURCE</sub> = 5 mA	V <sub>IN</sub> - 0.2		V <sub>IN</sub>	V
V <sub>OUT-OL</sub>	Output low voltage	I <sub>SINK</sub> = 10 mA			0.3	V
I <sub>OUT</sub>	Output current		5		15	mA
<b>Enable input, EN</b>						
V <sub>EN-IH</sub>	When VBUS is valid		1.2			V
V <sub>EN-IL</sub>	When VBUS is not valid				0.4	V
I <sub>EN-IN</sub>	Enable input current				0.1	μA
	EN glitch immunity			1		μs
<b>Inhibit input, INH</b>						
V <sub>INH-IH</sub>	Inhibit logic high		1.2			V
V <sub>INH-IL</sub>	Inhibit logic low				0.4	V
V <sub>INH-IN</sub>	Inhibit input current				0.1	μA
	INH glitch immunity			1		μs

1. Valid for ambient operating temperature: T<sub>A</sub> = -30°C to +85°C; V<sub>CC</sub> = 2.7 V to 5.5 V (except where noted).

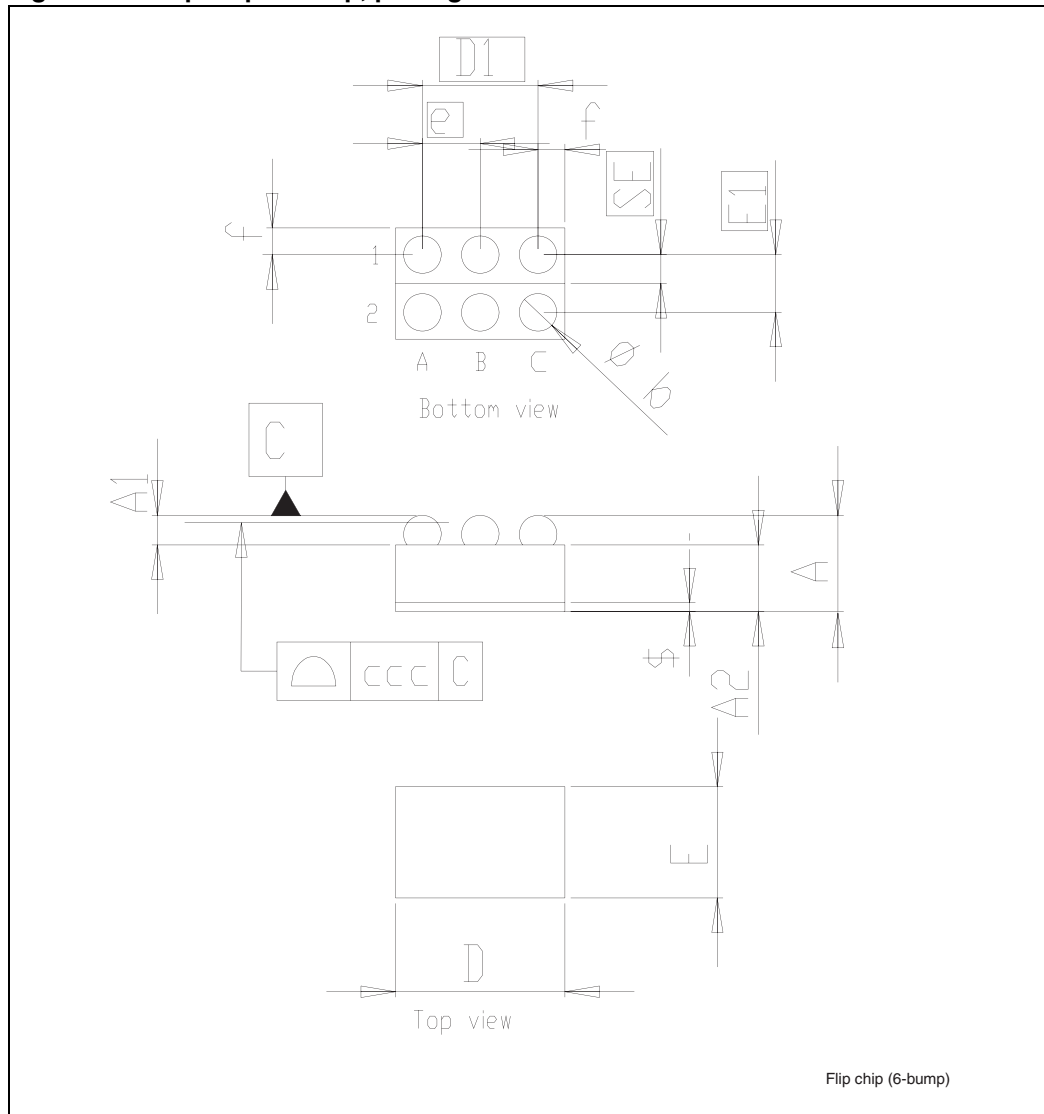
2. Guaranteed by design.

3. For V<sub>CC</sub> below V<sub>TH-</sub>, the output remains low down to V<sub>CC</sub> = 1 V. Below V<sub>CC</sub> = 1 V the voltage V<sub>IN</sub> must be less than V<sub>OUT-OL</sub> (max.) to guarantee output low voltage less than 0.3 V.

## 6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK<sup>®</sup> 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](http://www.st.com).

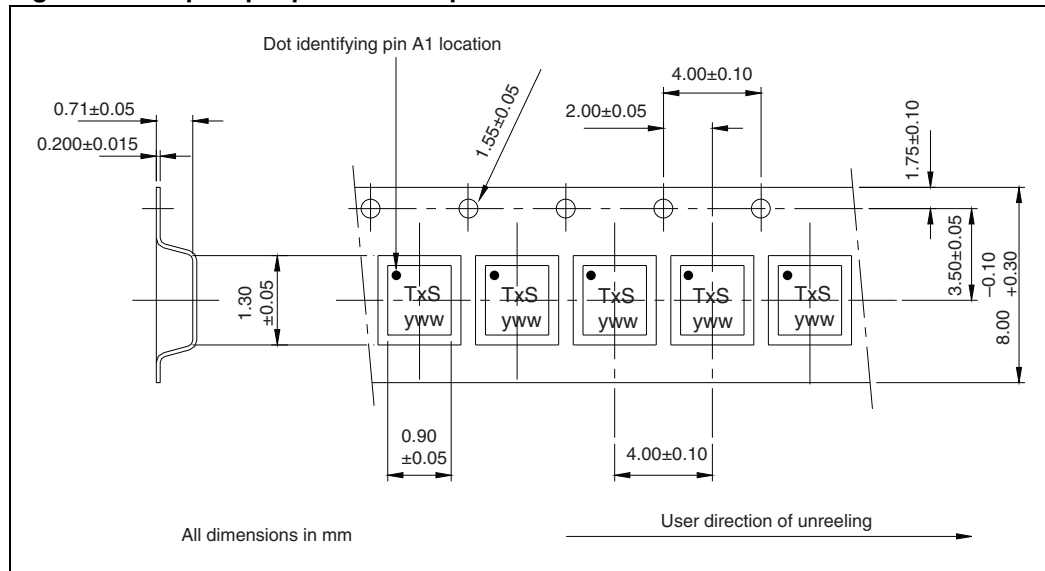
**Figure 12. Flip chip 6-bump, package mechanical outline**



**Table 6. Flip chip 6-bump, package mechanical data**

Symbol	mm			inches		
	Min	Typ	Max	Min	Typ	Max
A	0.54	0.60	0.66	0.021	0.024	0.026
A1	0.170	0.205	0.240	0.007	0.008	0.009
A2		0.395			0.015	
b	0.215	0.255	0.295	0.008	0.010	0.012
D	1.17	1.20	1.23	0.046	0.047	0.048
D1		0.80			0.031	
e	0.36	0.40	0.44	0.014	0.016	0.017
E	0.77	0.80	0.83	0.030	0.031	0.033
E1	0.36	0.40	0.44	0.014	0.016	0.017
SE	0.18	0.20	0.22	0.007	0.008	0.009
f		0.20			0.008	
ccc		0.05			0.002	
\$	0.035	0.045	0.050	0.001	0.002	0.002

**Figure 13. Flip chip tape and reel specifications**





## 7 Part numbering

**Table 7. Ordering information scheme**

Example:	STM1066	C35	F3	8	F
<b>Device type</b>	STM1066				
STM1066					
<b>Threshold voltage (3.2 V to 3.5 V in 50 mV increments)</b>		C35			
C20: 3.20 V <sup>(1)</sup>					
C25: 3.25 V <sup>(1)</sup>					
C30: 3.30 V <sup>(1)</sup>					
C35: 3.35 V					
C40: 3.40 V <sup>(1)</sup>					
C45: 3.45 V <sup>(1)</sup>					
C50: 3.50 V <sup>(1)</sup>					
<b>Package</b>			F3		
F3: Flip chip, lead-free, pitch = 400 µm, bump = 250 µm					
<b>Temperature</b>				8	
8: -30°C to 85°C					
<b>Shipping method</b>					F
F = ECOPACK <sup>®</sup> package, tape & reel					

1. Contact local ST sales office for availability.

## 8 Package marking information

**Table 8. Factory-trimmed thresholds with marking description**

Part number	Rising voltage detector threshold $V_{TH+}$ at ambient temperature $T_A$ from $-30$ to $+85^\circ\text{C}$			Topside marking <sup>(1)</sup>
	Min (-3%)	Typ	Max (+3%)	
STM1066C20F38F	3.104	3.20	3.296	TAS yww
STM1066C25F38F	3.152	3.25	3.348	TBS yww
STM1066C30F38F	3.201	3.30	3.399	TCS yww
STM1066C35F38F	3.249	3.35	3.451	TDS yww
STM1066C40F38F	3.298	3.40	3.502	TES yww
STM1066C45F38F	3.346	3.45	3.554	TFS yww
STM1066C50F38F	3.395	3.50	3.605	TGS yww

1. Where "y" = assembly year (0 to 9) and "ww" = assembly work week (01 to 52).

## 9 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
06-Sep-2007	1	Initial release.
03-Jan-2008	2	Updated cover page, <a href="#">Section 1</a> , <a href="#">Figure 2</a> , <a href="#">11</a> , <a href="#">13</a> , and <a href="#">Table 4</a> ; added <a href="#">Figure 1: Logic diagram</a> ; minor text and presentation changes.
26-Mar-2008	3	Updated <a href="#">Table 5</a> , <a href="#">6</a> .
09-Apr-2008	4	Document status upgraded to full datasheet; updated <a href="#">Figure 12</a> .

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