STM1066

Smart voltage supervisor

Features

- Operating voltage 2.7 V to 5.5 V
- Supply current of 1.5 µA (typ)
- Factory-trimmed voltage threshold from 3.2 V to 3.5 V in 50 mV increments
- ±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°C to +85°C

Flip chip
(6-bump)

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

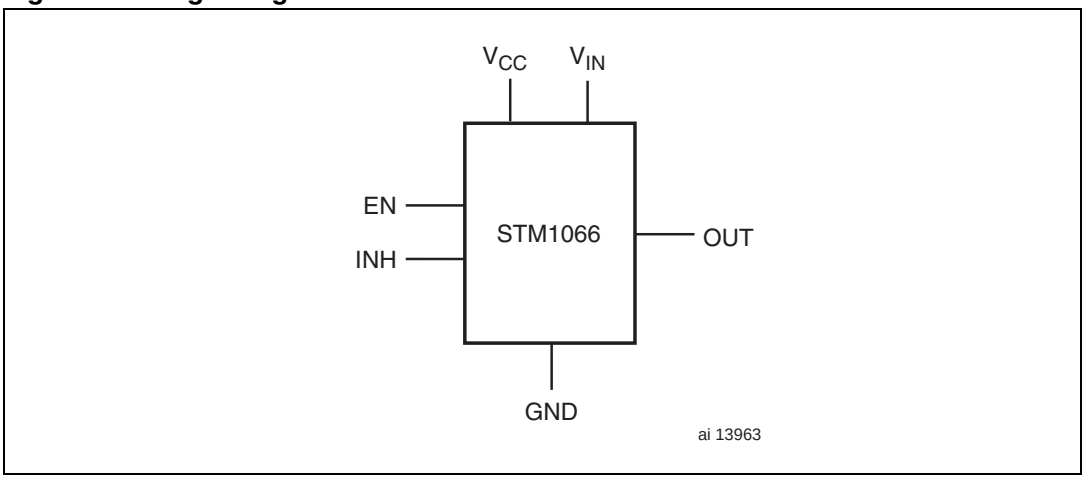


Table 1. Pin descriptions

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

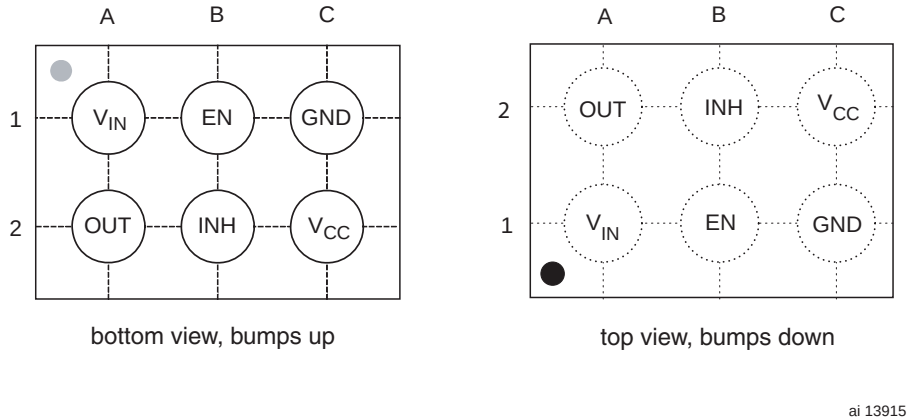


Figure 3. Block diagram

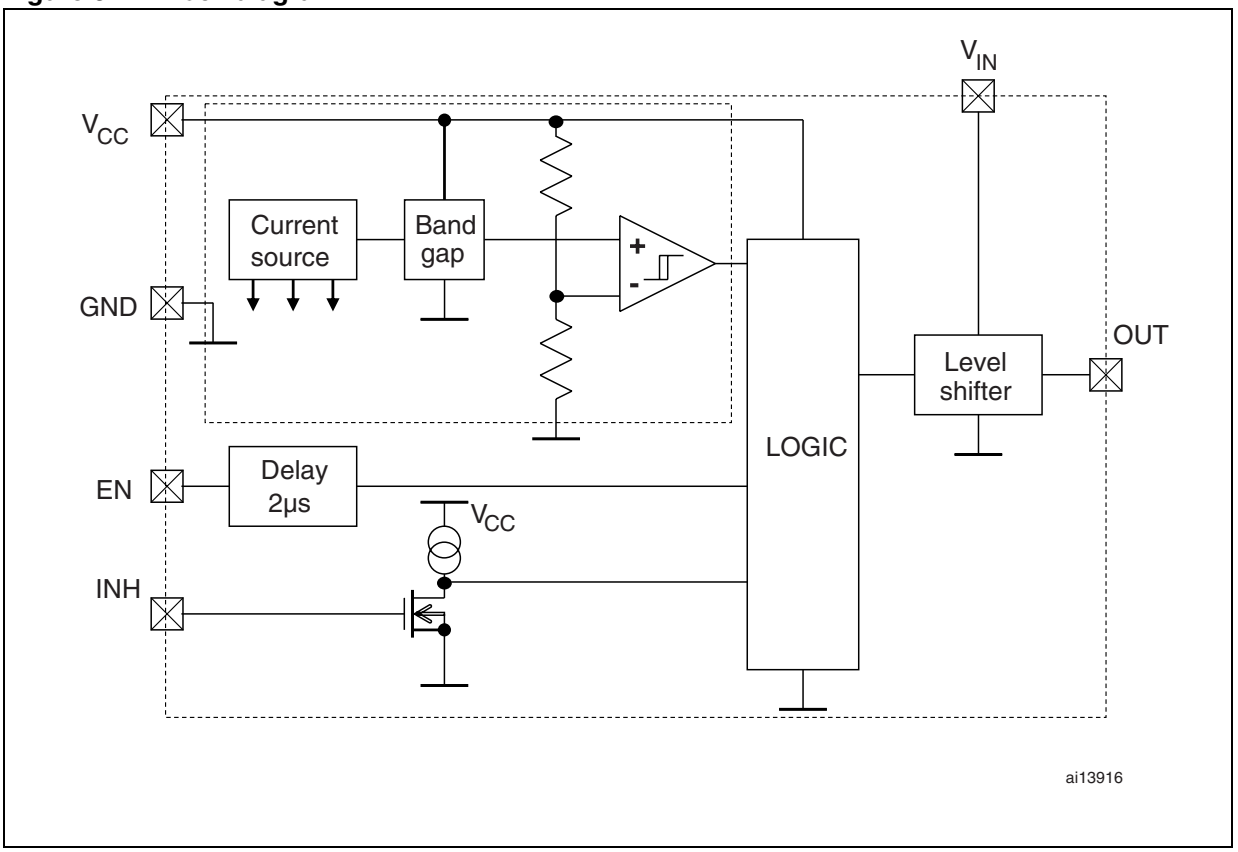
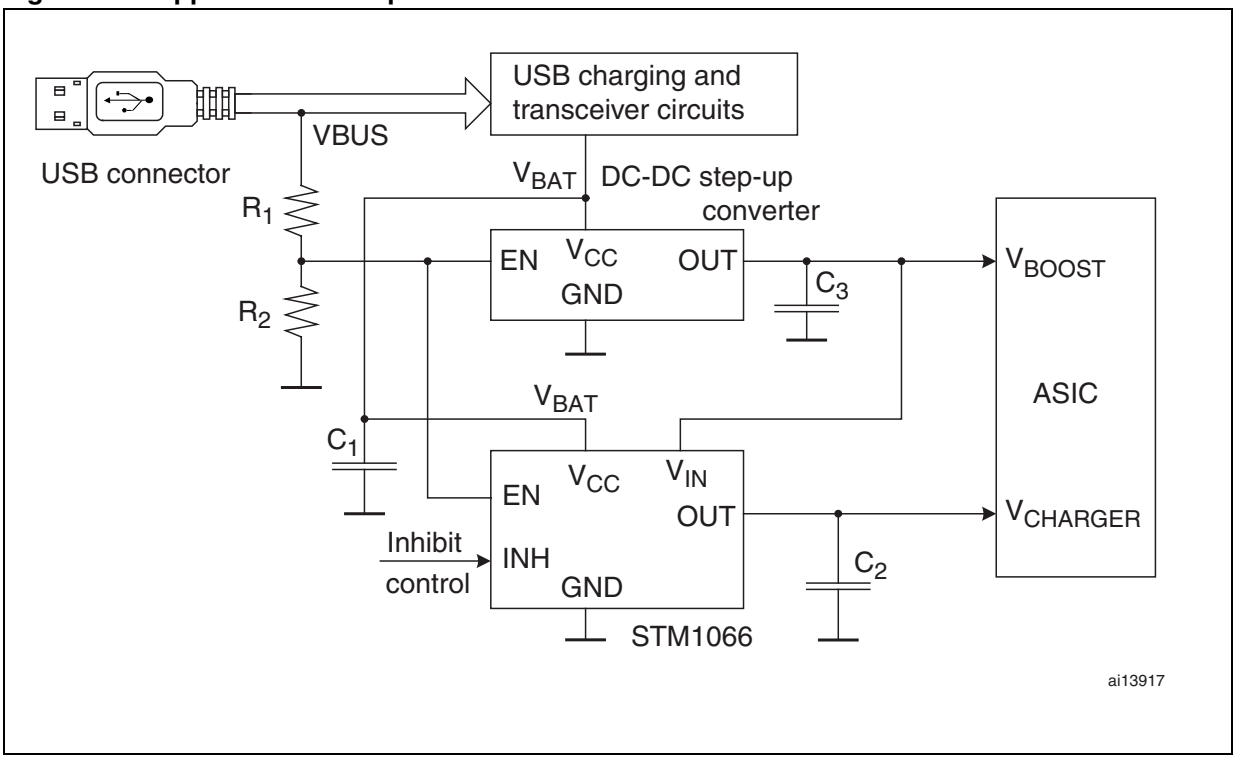


Figure 4. Application hookup



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(1)	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 V

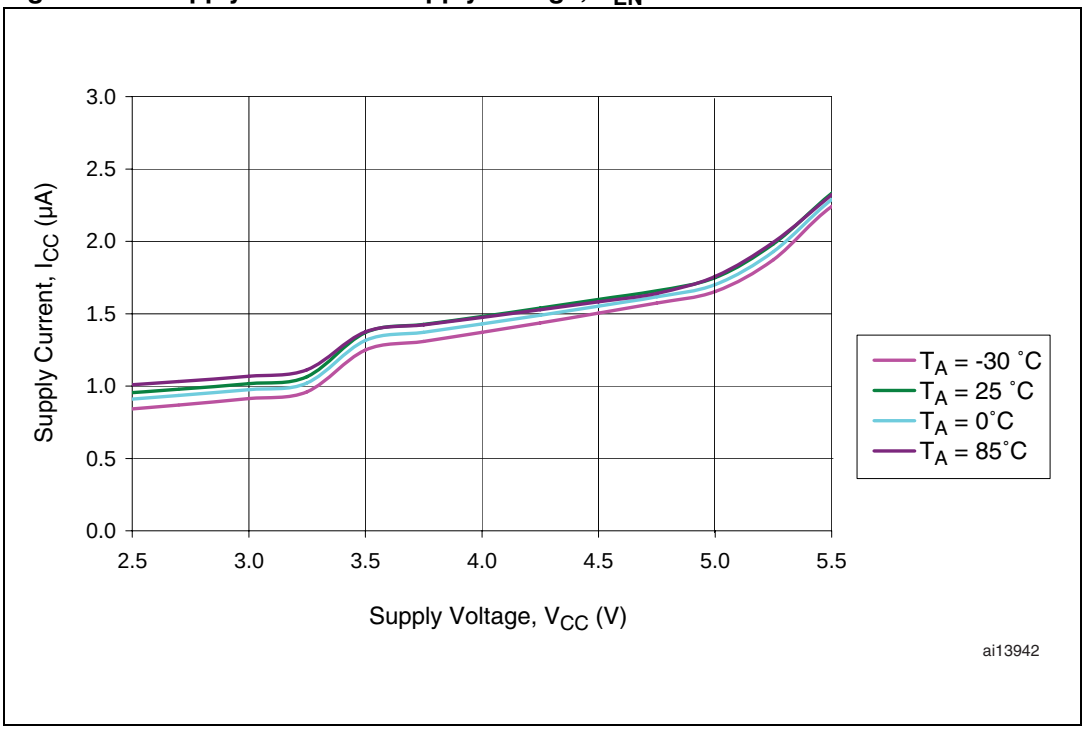


Figure 6. Supply current vs. temperature, V_{EN} = 4 V

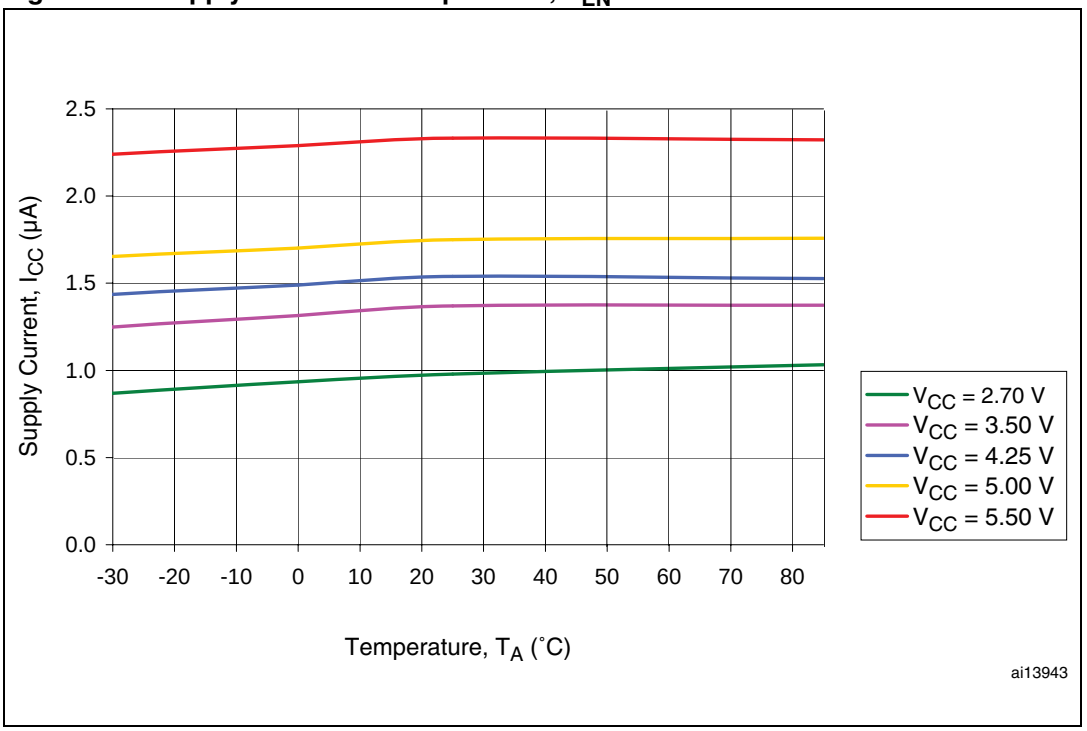


Figure 7. Supply current vs. supply voltage, V_{EN} = 0 V

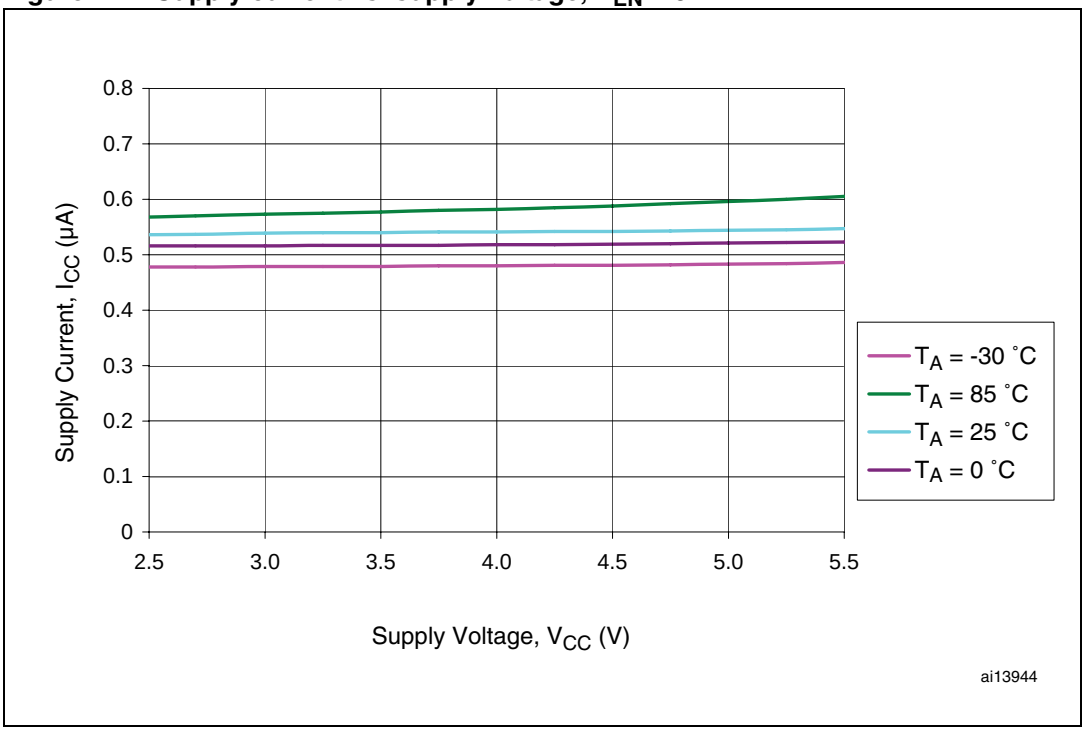


Figure 8. Supply current vs. temperature, V_{EN} = 0 V

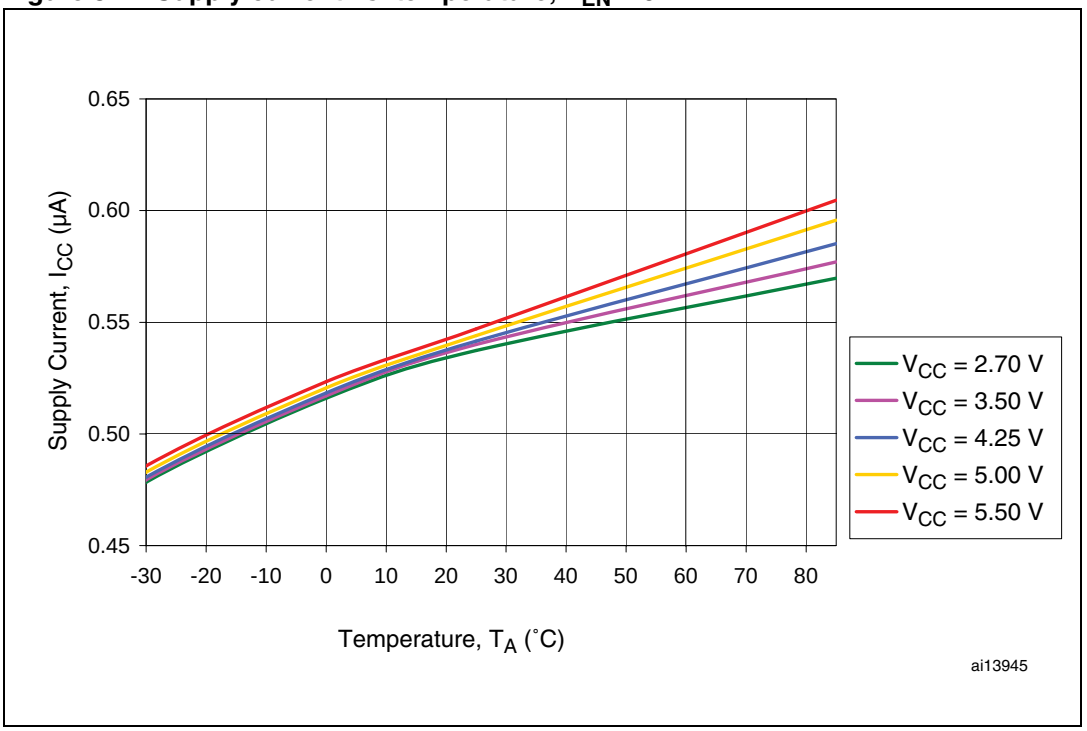


Figure 9. Rising voltage detector threshold vs. temperature

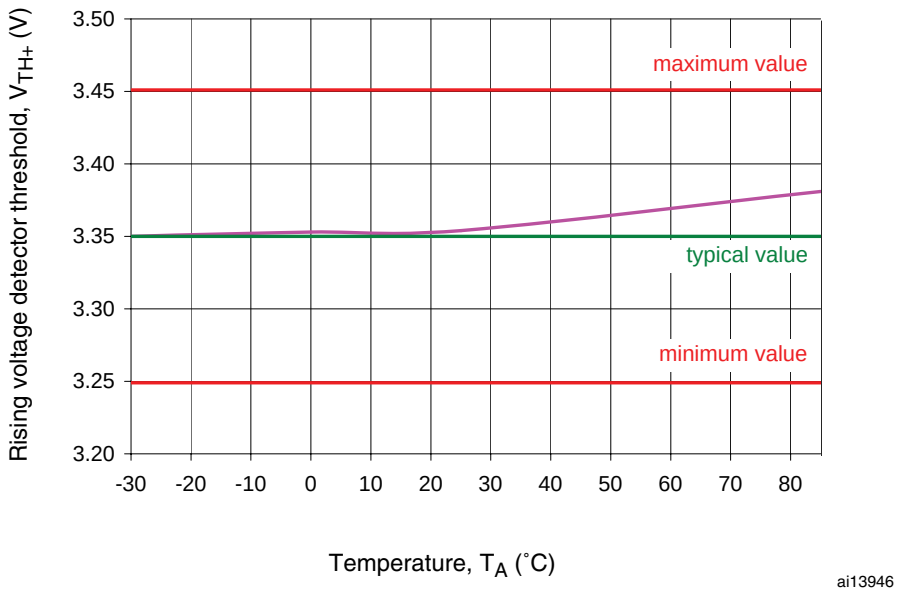
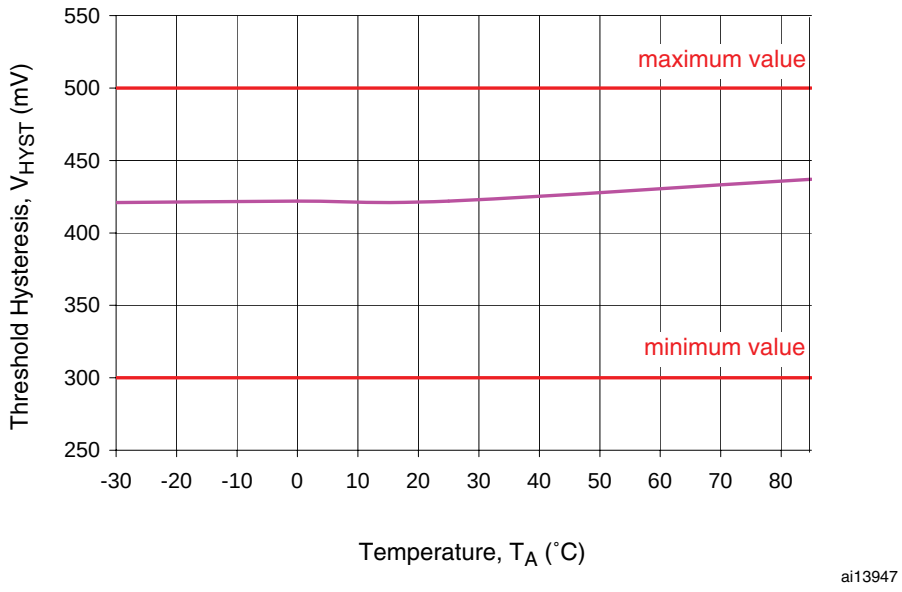


Figure 10. Threshold hysteresis vs. temperature



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

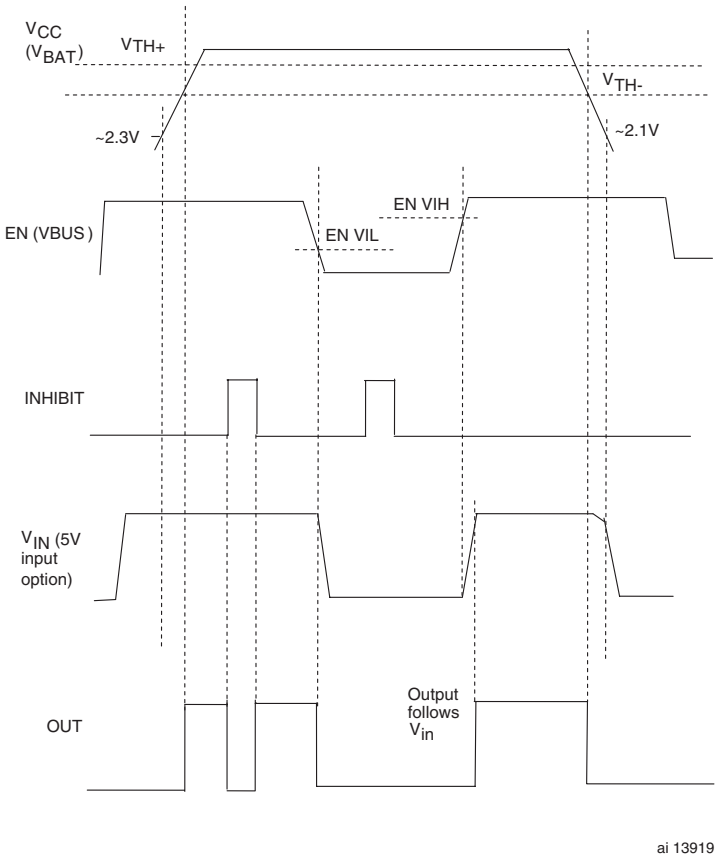
5 DC and AC characteristics

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	≤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

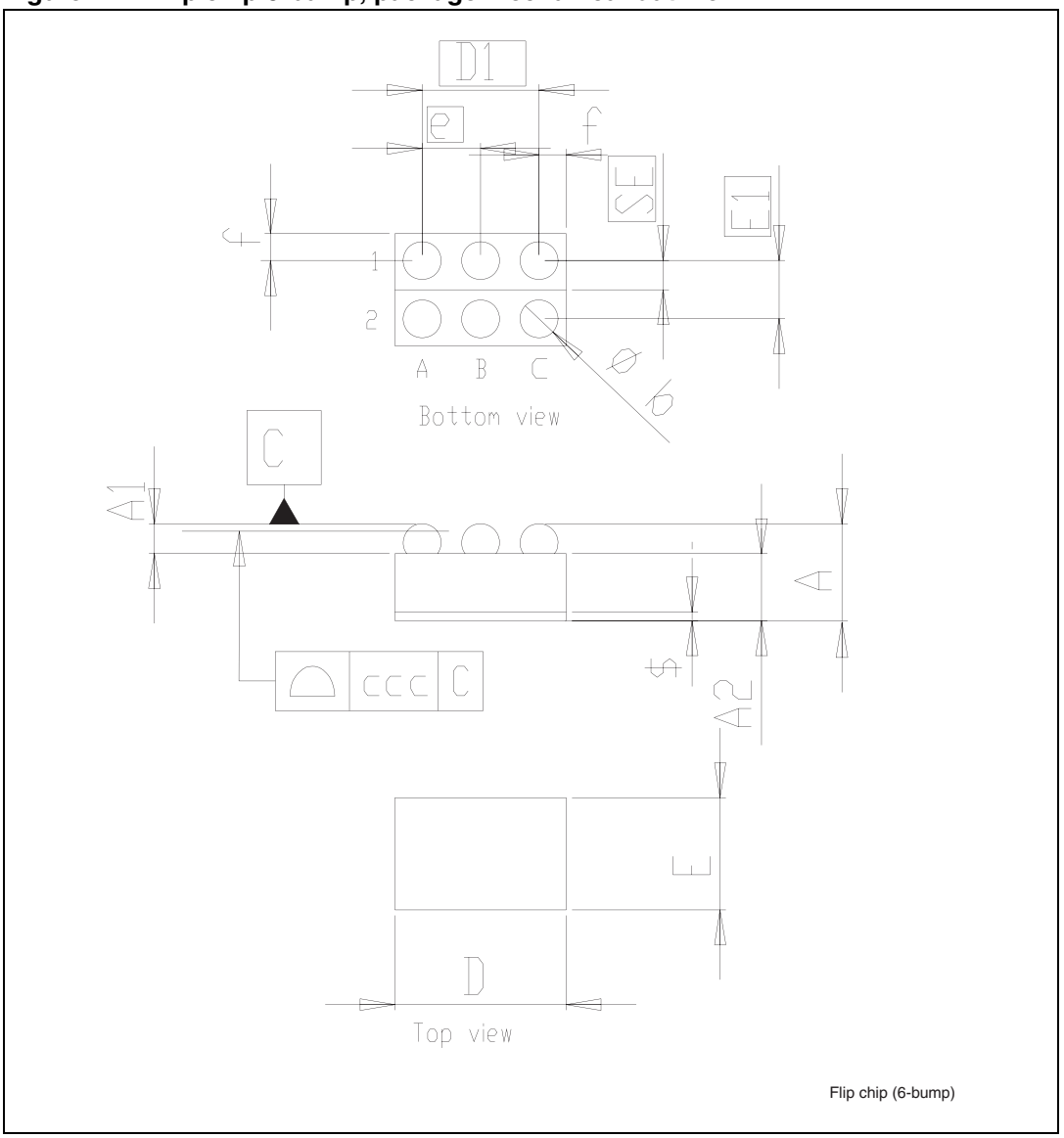
Sym	Parameter	Test condition(1)	Min	Typ	Max	Unit
V_{CC}	Supply voltage		2.7		5.5	V
I_{CC}	Supply current into V_{CC} pin	V_{EN} = 0 V		0.6	1	µA
		V_{EN} = 4 V		1.5	15	µA
I_{CC} +I_{IN}	Current into V_{CC} + V_{IN} pins	V_{EN} = 0 V			5	µA
		V_{EN} = 4 V			15	µA
V_{TH+}	Rising voltage detector threshold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

1. Valid for ambient operating temperature: T_A = –30°C to +85°C; V_{CC} = 2.7 V to 5.5 V (except where noted).
2. Guaranteed by design.
3. For V_{CC} below V_{TH-}, the output remains low down to V_{CC} = 1 V. Below V_{CC} = 1 V the voltage V_{IN} must be less than V_{OUT-OL} (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® 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 12. Flip chip 6-bump, package mechanical outline

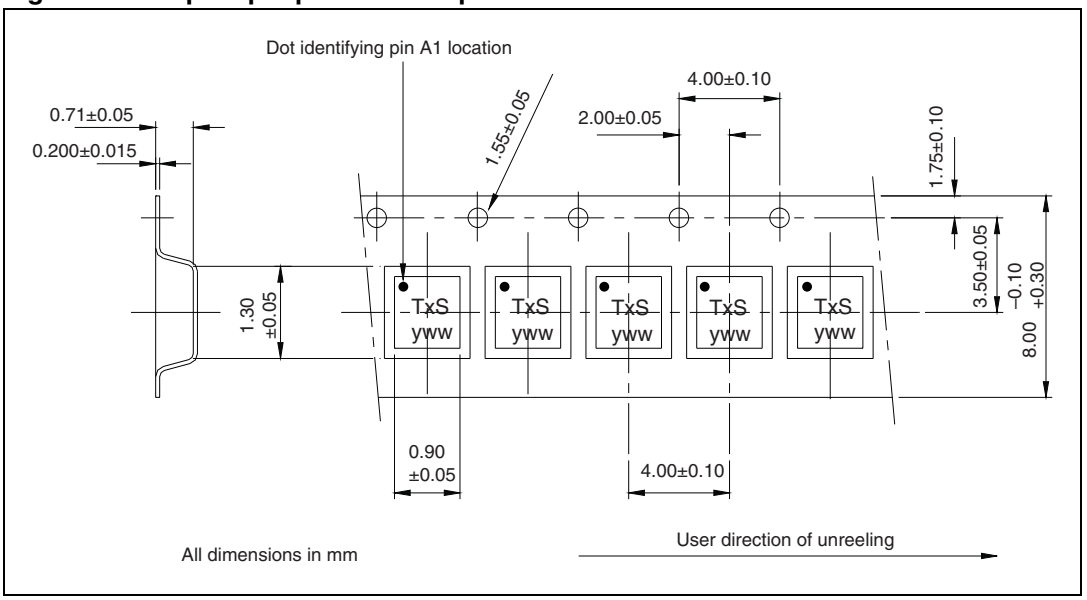


Flip chip (6-bump)

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

Device type

STM1066

Threshold voltage (3.2 V to 3.5 V in 50 mV increments)

C20: 3.20 V(1)

C25: 3.25 V(1)

C30: 3.30 V(1)

C35: 3.35 V

C40: 3.40 V(1)

C45: 3.45 V(1)

C50: 3.50 V(1)

Package

F3: Flip chip, lead-free, pitch = 400 µm, bump = 250 µm

Temperature

8: –30°C to 85°C

Shipping method

F = ECOPACK® 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°C			Topside marking(1)
	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, *Section 1*, *Figure 2*, *11*, *13*, and *Table 4*; added *Figure 1: Logic diagram*; minor text and presentation changes.
26-Mar-2008	3	Updated *Table 5*, *6*.
09-Apr-2008	4	Document status upgraded to full datasheet; updated *Figure 12*.

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