1 Channel Touch Detection IC

RH6016

SPECIFICATION

Revision 1.0 2022-10-20

Contents

1. General Description

RH6016 is 1 channel capacitive touch detection IC，which can take the place of mechanical switch or button.

RH6016 built in high precision regulator、POR、LVR、noise cancellation、automatic calibration，so RH6016 has excellent performance，high stability and high anti-interference，and it can cover a variety of applications.

RH6016 can work in many different modes through pin configuration. RH6016 is widely used in consumer electronics, smart home appliances, electronic toys, lighting control, and so on.

2. Features

- Operating voltage：2.4V～5.5V
- Operating current (@VDD=3V no load):
  10uA at low power mode
- Finish initial in 0.5s after power up
- Automatic calibration
- Built in LDO，POR and LVR
- Built in noise cancellation
- ***RH6016D***，NMOS open drain output
- ***RH6016C***，CMOS output
- Package：SOT23-6

3.Pin Description and Default Mode Setting

3.1 Pin Description

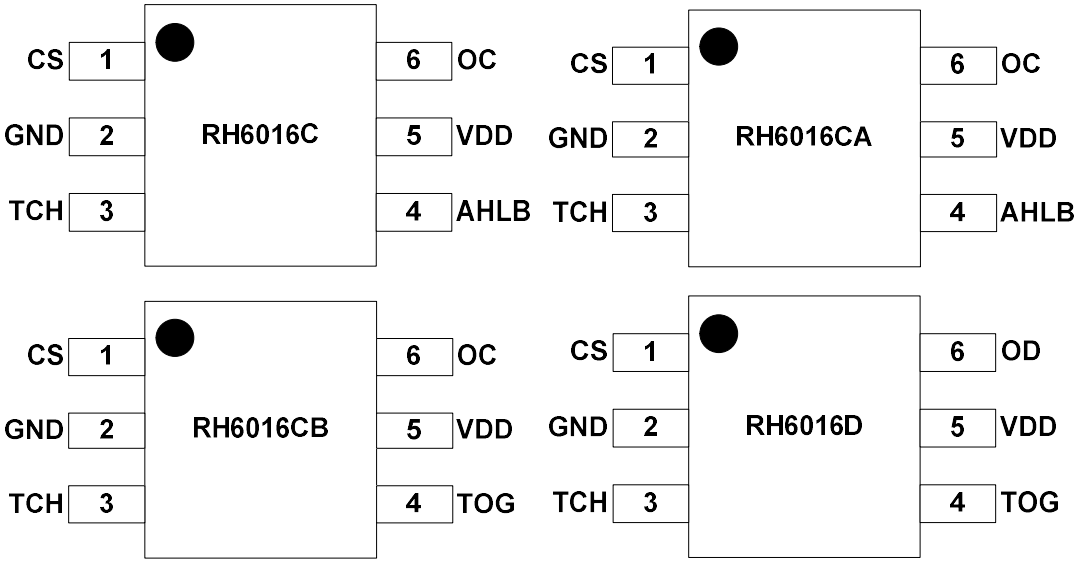


Figure 1. RH6016C/ RH6016CA(RH6016CE)/ RH6016CB/RH6016D(SOT23-6)

Table 1. Pin Description

PIN NAME	RH6016C	RH6016CA RH6016CE	RH6016CB	RH6016D	I/O	DESCRIPTION
VDD	5	5	5	5	P	Power
AHLB	4	4	-	-	I-P_L	Functional configuration
TOG	-	-	4	4	I-P_L	Functional configuration
GND	2	2	2	2	P	Ground
TCH	3	3	3	3	I/O	Touch channel
CS	1	1	1	1	I/O	Sampling capacitance
LPMB	-	-	-	-	I-P_H	Functional configuration
MOT1	-	-	-	-	I-P_H	Functional configuration
MOT2	-	-	-	-	I-P_H	Functional configuration
OD	-	-	-	6	OD	NMOS open drain output
OC	6	6	6	-	O	CMOS output

I-P_L/ I-P_H ： CMOS input with pull-low/pull-high resister　　OD：Open drain output

O：CMOS output　　I/O：Input/Output

P：Power / Ground

3.2 Default Mode Setting

Table 2. Default Mode Setting

Configurable Options	*RH6016C*	*RH6016CA*	*RH6016CB*	*RH6016D*	*RH6016CE*
OC/OD Output active high/low	Configurable	Configurable	Active high	Active low	Configurable
Low power/Fast mode	Low power	Low power	Low power	Low power	Low power
Maximum Release Time	8s	Infinity	8s	8s	16s
Latch/Synchronous mode	Synchronous	Synchronous	Configurable	Configurable	Synchronous

Configurable：Detailed description please refer to section 5. functional description.

4.Ordering Information

Table 3. Ordering Information

MODEL	PACKAGE	PACKING/QUANTITY	MARKING
RH6016C	**SOT23-6**	Tape and Reel / 3000 units	RH6016C Axxxxx
RH6016CA	**SOT23-6**	Tape and Reel / 3000 units	RH6016CA Axxxxx
RH6016CB	**SOT23-6**	Tape and Reel / 3000 units	RH6016CB Axxxxx
RH6016D	**SOT23-6**	Tape and Reel / 3000 units	RH6016D Axxxxx
RH6016CE	**SOT23-6**	Tape and Reel / 3000 units	RH6016CE Axxxxx

5. Functional Description

RH6016 can work in many different modes through configuration pins (Table 4). These pins will be set default state when they are floating.

Table 4. CONFIGURATION PIN

CONFIGURATION PIN	MODE		DEFAULT
	1	0	
AHLB	Output active low	Output active high	**0**
LPMB	Low power mode	Fast mode	**1**
MOT2/MOT1	Maximum release time is 8s	Maximum release time is infinity，see Table 8	**1/1**
TOG	Latch Mode	Synchronous Mode	**0**

NOTE：“1” means the VDD voltage；“0” means the GND voltage.

5.1 Output Voltage Level (AHLB)

AHLB=0(Default)，pin OC output low voltage level after power on. Pin OC will output high voltage level once valid touch is detected;

AHLB=1，pin OC output high voltage level after power on. Pin OC will output low voltage level once valid touch is detected.

Table 5. Configuration Of Output Voltage Level

PIN	0(Default)	1
AHLB	Active High	Active Low

NOTE：1、If pin OD connect to VDD with pull-high resistor，output voltage level of pin OD also can be setted by pin AHLB，same as pin OC.

2、Pin OD of RH6016D output high-impedance state after power on. Once valid touch is detected，pin OD will output low voltage level.

5.2 Fast/Low Power Mode(LPMB)

LPMB=0，RH6016 work in fast mode all the time，and the maximum response time for touch is 128ms；

LPMB=1(Default)，RH6016 work in low power mode，and the maximum response time for touch is 194ms. And the current consumption in low power mode will less than in the fast mode. When RH6016 in fast mode and no valid touch is detected，RH6016 will enter low power mode after 10 seconds.

Table 6. Configuration Of Fast/Low Power Mode

PIN	0	1(Default)
LPMB	Fast Mode	Low Power Mode

5.3 Latch/Synchronous mode (TOG)

TOG=0(Default)，RH6016 work in synchronous mode. When valid touch is detected or remvoed，the output state of pin OC/OD will change synchronously.

TOG=1，RH6016 work in latch mode. When valid touch is detected，the output state of the OC/OD pin will change and latch, until next valid touch is detected.

Table 7．Configuration Of Latch/Synchronous Mode

PIN	0(Default)	1
TOG	Synchronous Mode	Latch Mode

5.4 Maximum Release Time (MOT2&MOT1)

Maximum release time：If valid touch is detected and keep for a long time which exceed Maximum release time，RH6016 will be reset and calibrated automatically，OC/OD pin will be released to initial state.

Table 8. Configuration Of Maximum Release Time

MOT1	MOT2	Function Description
0	0	**Maximum release time is infinity**
0	1	**Maximum release time** =16s
1	0	**Maximum release time is infinity**
1	1	**Maximum release time** =8s

6.Application Circuit

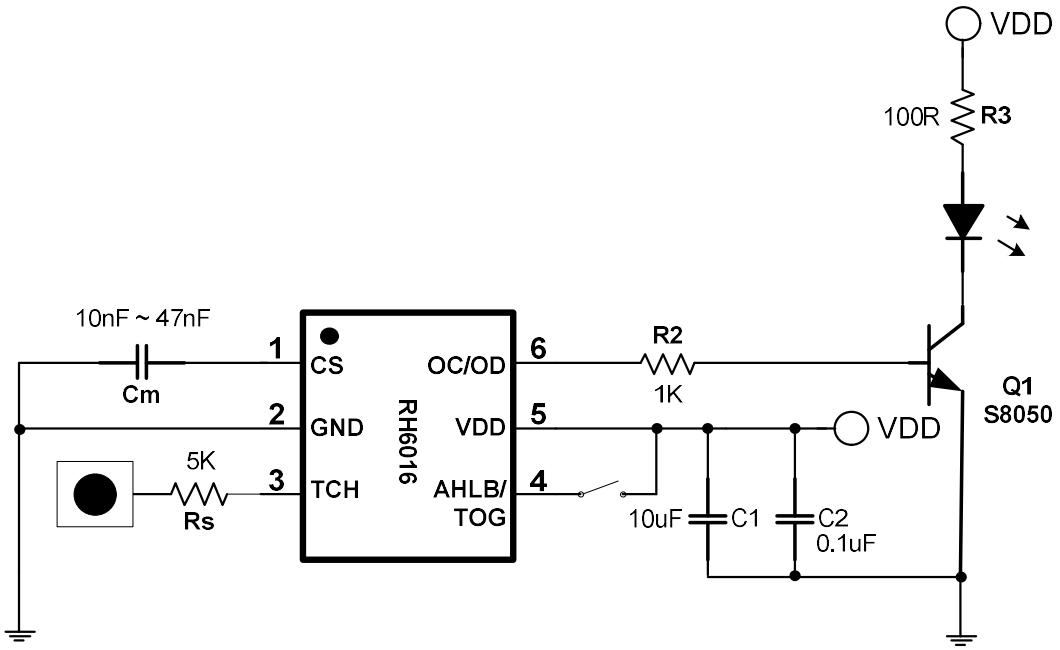


Figure 2. Application Circuit

7.Electrical Characteristics

7.1 Absolute Maximum Ratings

Table 9. Absolute Maximum Ratings

PARAMETER	SYMBOL	RANGE	UNIT
Supply Voltage	V_{DD}	-0.3～5.5	V
Input/Output Voltage	**VI / VO**	-0.5～VDD +0.5	V
Operating Temperature	T_{OPR}	-20 ~ 85	℃
Storage Temperature	T_{STG}	-40 ~ 125	℃
ESD (HBM)	V_{ESD}	>5000	V

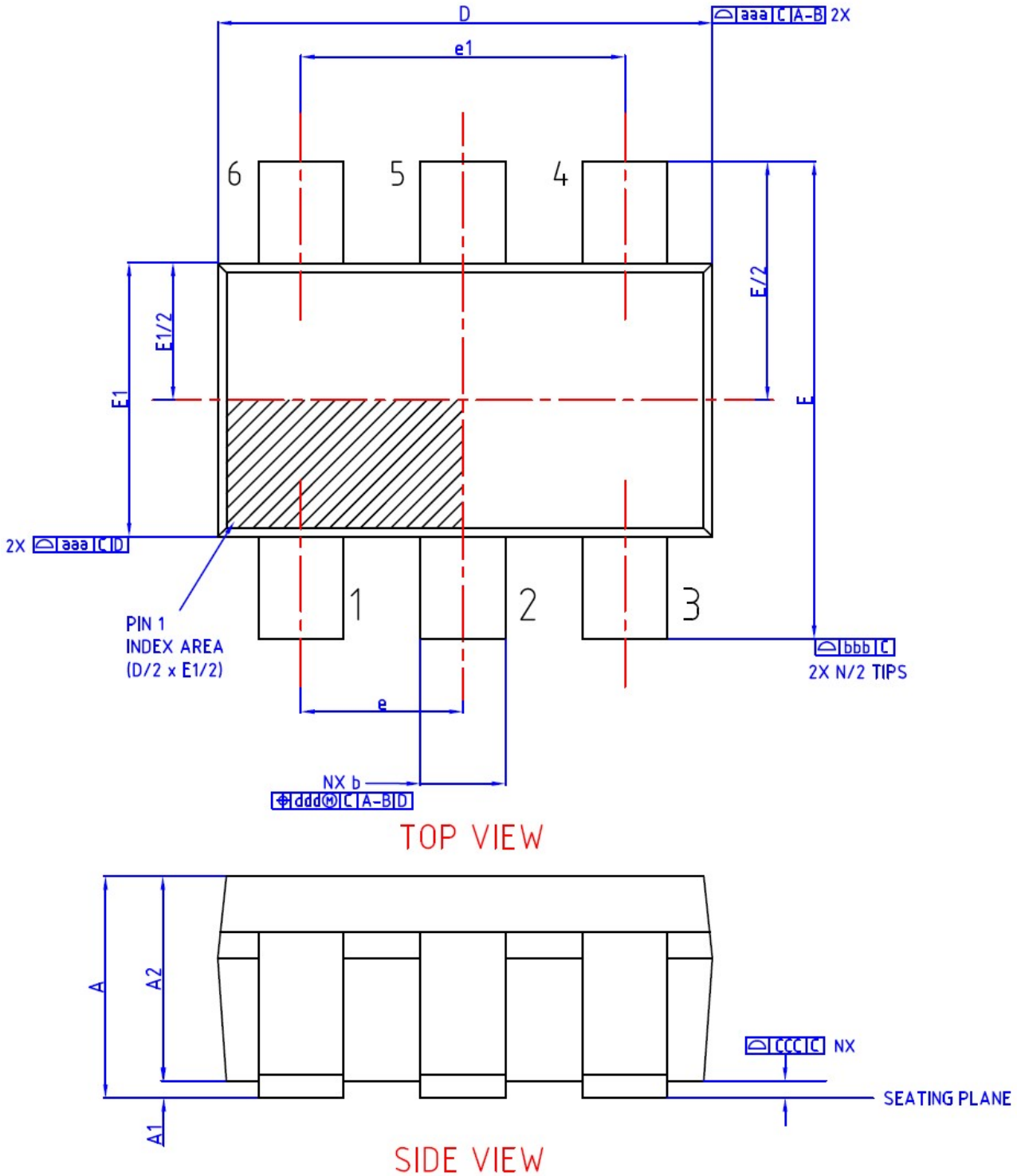
7.2 DC Characteristics

Table 10. Electrical Characteristics

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V_{DD}		2.4	3.0	5.5	V
Operating Current	I_{DD}	VDD=3V (Low power mode)		10		uA
OC Output Drive Current	I_{OL}	V_{OL}=0.3VDD		20		mA
	I_{OH}	V_{OH}=0.7VDD		10		mA
OD Output Drive Current	I_{OL}	V_{OL}=0.3VDD		30		mA
Response Time	T_{RE}	Fast mode			128	ms
		Low power mode (Only 1st touch) (NOTE)			194	ms
V_{DD}=3.0V,operating temperature is 25℃, output without load(unless otherwise specified).						

NOTE：In low power mode, when a valid touch action is detected, the chip moves from low power mode to fast mode. Therefore, in low power mode only the 1st touch responsive needs 194ms, subsequent touch response time is 128ms.

8.Package Information(SOT23-6)



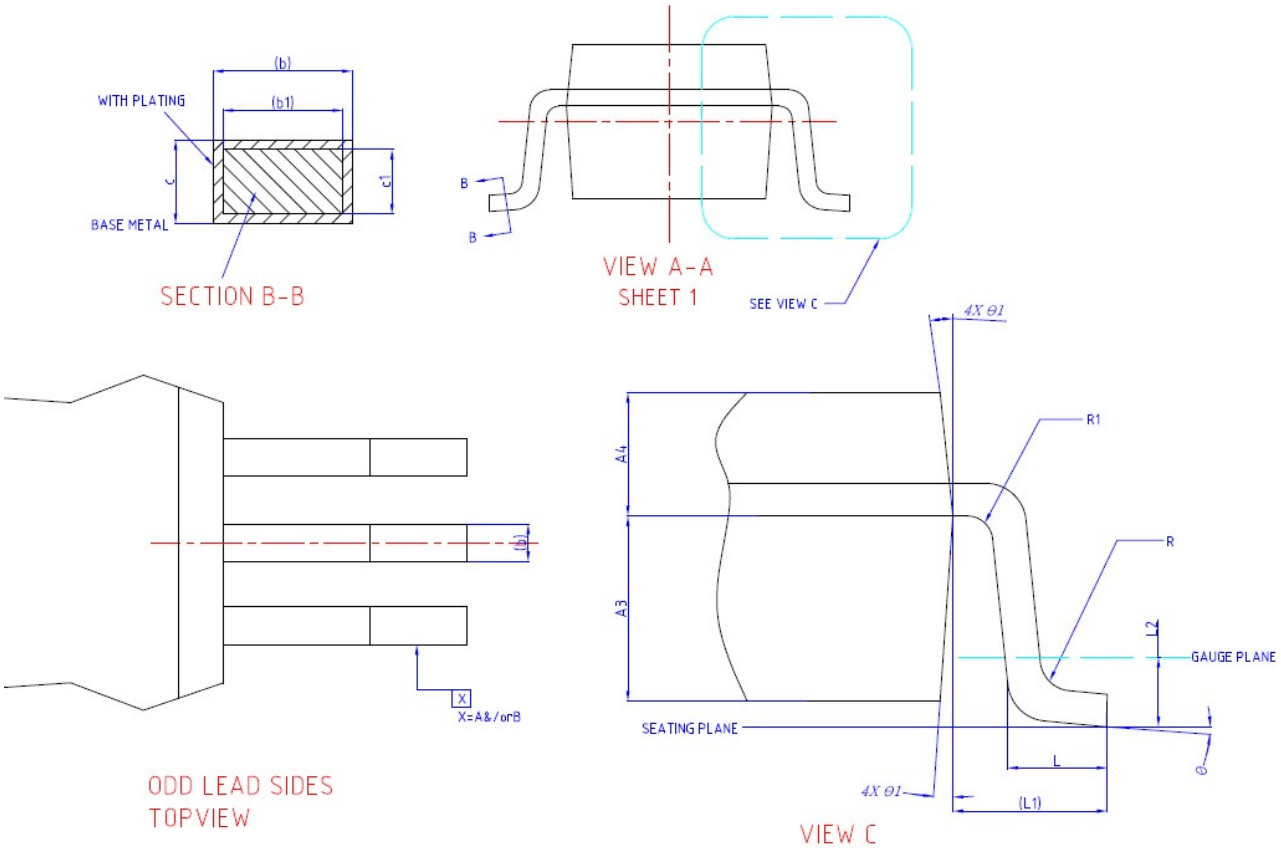


Figure 3. SOT23-6 Package

Table 11. SOT23-6 Package Dimensions

SYMBOL	UNIT(mm)			SYMBOL	UNIT(mm)		
	MIN	TYP	MAX		MIN	TYP	MAX
A	0.90	1.30	1.40	**e**	0.95BSC		
A1	0.050	0.100	0.150	**e1**	1.90BSC		
A2	0.90	1.20	1.25	**E**	2.60	2.80	3.00
A3	0.783BSC			**E1**	1.50	1.60	1.70
A4	0.417BSC			**L**	0.30	0.45	0.60
b	0.30	0.35	0.50	**L1**	0.60REF		
b1	0.30	0.40	0.45	**L2**	0.25BSC		
c	0.08	0.152	0.220	**θ**	0°	4°	8°
c1	0.08	0.13	0.20	**θ1**	5°	10°	15°
D	2.80	2.90	3.00				

NOTE： Please note that the specification is subject to change without notice.