



4-KEY Capacitive Touch Module

BMK52M134 User Guide

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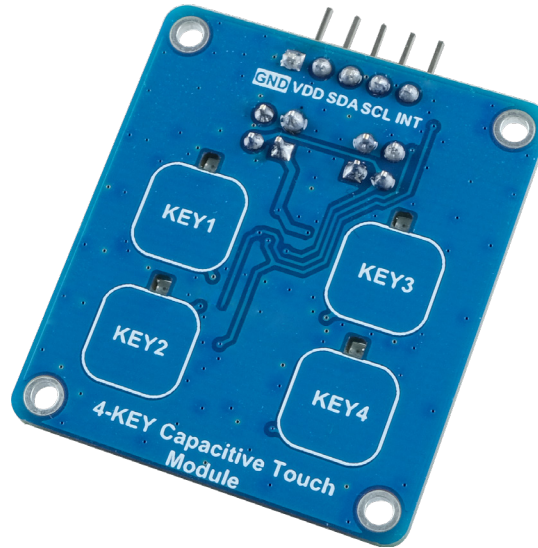
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Introduction

The Best Modules BMK52M134 is a 4-KEY capacitive touch module, which is developed using an MCU, the BS86C08C. Its principle is capacitive touch, using keys and 2×2 matrix layout. When a touch action occurs, the corresponding LED will be illuminated. The module has a power saving function, which will automatically enter standby detection mode when no touch action occurs for a while. The module can be cascaded and uses the I²C communication method through the BMDOM interface to obtain touch key values and other functions. The module is suitable for use in applications such as touch toys and electronic product human-machine control interface.

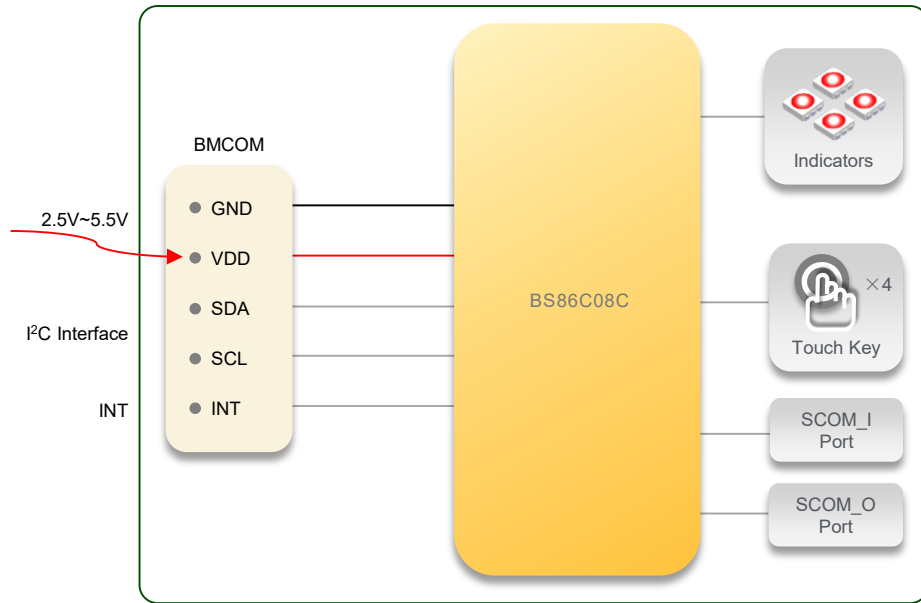


Features

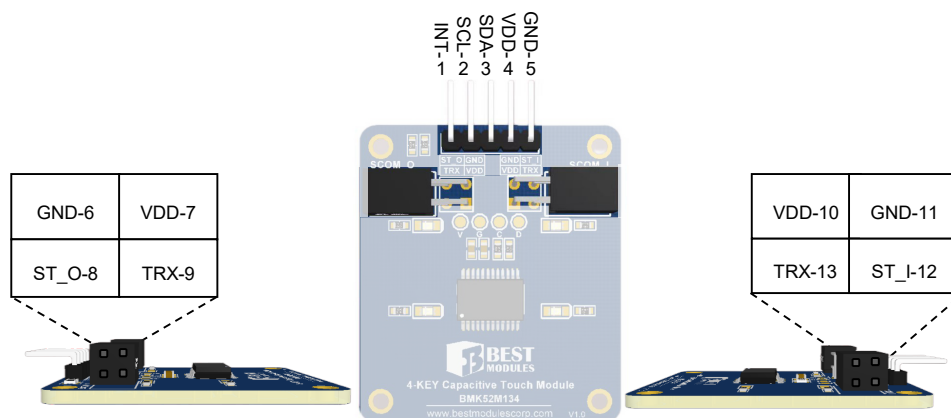
- Operating voltage: 2.5V ~5.5V
- Operating current:
 - ◆ 1.41mA @ 3.3V (No key is pressed)
 - ◆ 5.91mA @ 3.3V (All keys are pressed and all LEDs will be illuminated)
- Standby current: 0.02mA @ 3.3V
- MCU: BS86C08C
- Module characteristics:
 - ◆ On-board touch key×4, the corresponding LED is illuminated when a touch action occurs
 - ◆ 55-level adjustable touch key sensitivity (10~64), can be configured independently
 - ◆ Power saving function: The module will automatically enter the standby detection mode when no touch action occurs for 8s
- Cascade interface
 - ◆ SCOM_I×1 (GND, VDD, ST_I, TRX)
 - ◆ SCOM_O×1 (GND, VDD, ST_O, TRX)
 - ◆ Cascade maximum number: 4
- Communication interface:
 - ◆ BMDOM×1 (INT, SCL, SDA, VDD, GND)

- ◆ Communication method: I²C (Address: 0x71)
- Provides Arduino Library support
- Module size: 33.80mm×38.56mm×6.5mm

Block Diagram



Pin Description



BMCOM pins:

Pin	Function	Description
1	INT	Interrupt pin, the INT pin is pulled low when a key is pressed
2	SCL	I ² C clock line
3	SDA	I ² C data line
4	VDD	Positive power supply
5	GND	Negative power supply, ground

Cascade SCOM_O pins:

Pin	Function	Description
6	GND	Negative power supply, ground
7	VDD	Positive power supply
8	ST_O	Cascade status output pin
9	TRX	Cascade single-bus communication pin

Cascade SCOM_I pins:

Pin	Function	Description
10	VDD	Positive power supply
11	GND	Negative power supply, ground
12	ST_I	Cascade status input pin
13	TRX	Cascade single-bus communication pin

Technical Specifications

Recommended Operation Conditions

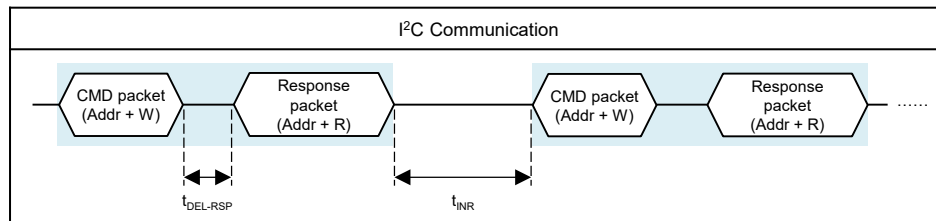
Ta=25°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _{DD}	Operating Voltage	—	2.5	—	5.5	V
I _{DD}	Operating Current	3.3V, all LEDs off	—	1.41	—	mA
		3.3V, all LEDs on	—	5.91	—	mA
I _{STB}	Standby Current	V _{DD} =3.3V	—	0.02	—	mA
	Cascade Number	—	1	—	4	

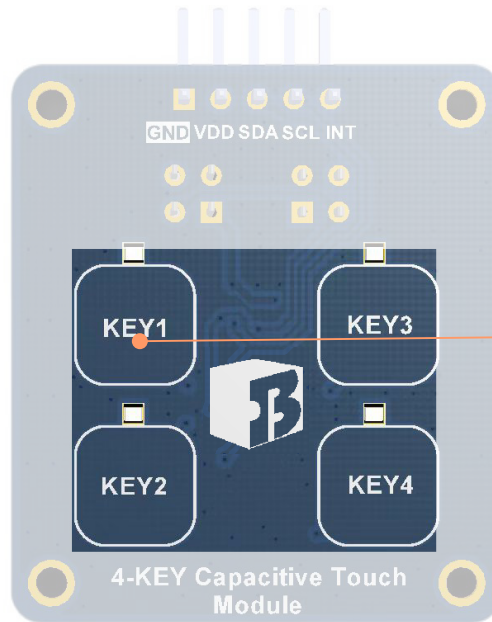
Timing Specification

Ta=25°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
t _{DEL-RSP}	Response Delay Time	V _{DD} =3.3V	1	—	—	ms
t _{INR}	Interval Time	V _{DD} =3.3V	15	—	—	ms

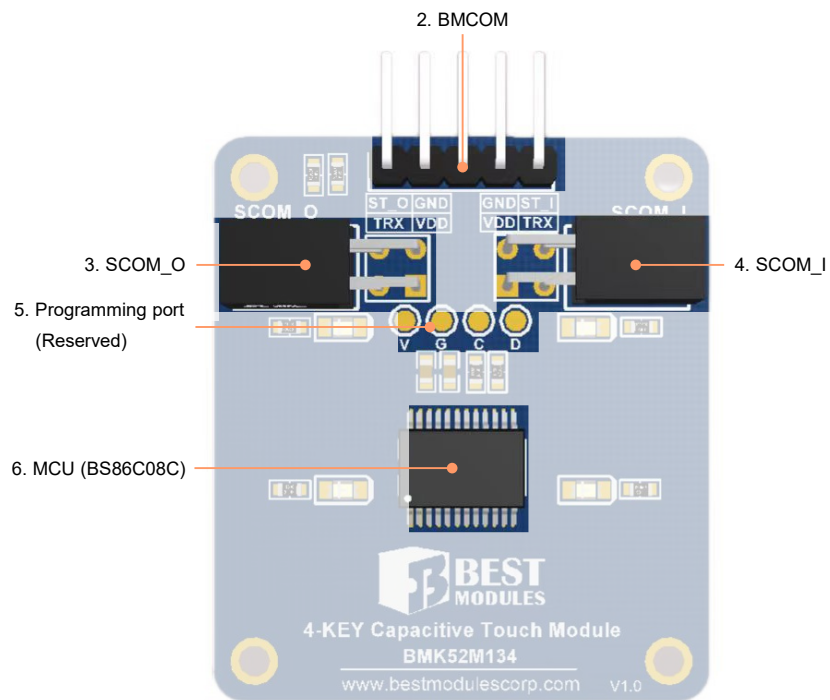


Hardware Overview



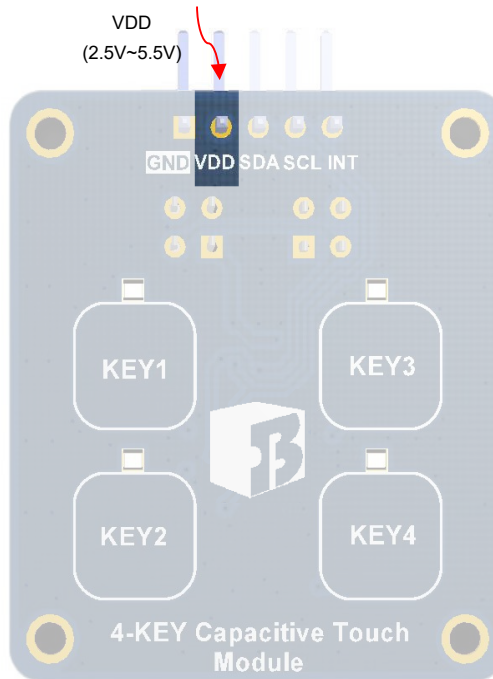
1. Touch keys & LED Indicators

PCBA Front View



PCBA Back View

Power Supply

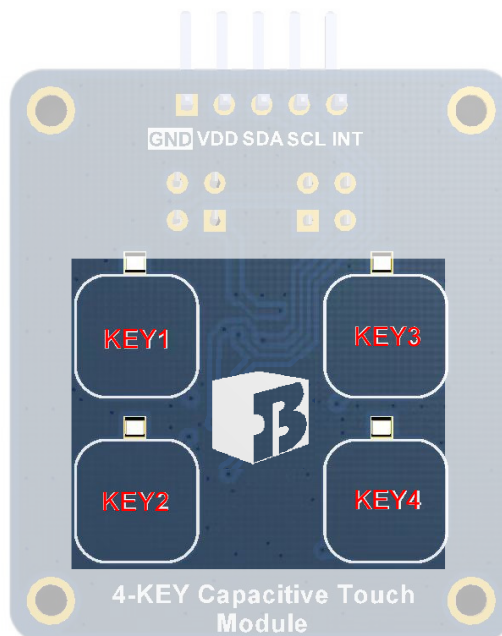


- BCOM pin: Provided by the VDD input, 2.5~5.5V

INT Pin

Module	INT Level
No touch action occurs	High level
Touch action occurs	Low level

Touch and LED Indicators



- When the module is powered on, it is in the normal operation state. If no touch action occurs for 8s, the module will enter the standby detection mode.
- KEY1~KEY4 touch keys correspond to LED1~LED4. When a touch action occurs, the corresponding LED will be illuminated.

KEY	Corresponding LED	LED Status
Key1~KEY4	LED1~LED4	LED on when touch action occurs, otherwise LED off

Communication Interface

- I²C address: 0x71
- I²C address format:

MSB							LSB
A6	A5	A4	A3	A2	A1	A0	R/W
1	1	1	0	0	0	1	

Slave address (0x71)

Note: R/W=1: Read direction
 =0: Write direction

- I²C communication speed: ≤400kHz
- Communication logic reference voltage: 2.5V~5.5V
- Module SCL/SDA pin with an internal 2.2kΩ pull-up resistor

Communication Protocol

There are two instruction frame formats, known as parameter set instruction frame and parameter obtain instruction frame.

Parameter Set Instruction Frame

• **Master → Slave**

Start	Addr+W	MID	ID	LEN	CMD	Data	Checksum	Stop
1-bit	1-byte	0x71	1-byte	1-byte	1-byte	N-byte	1-byte	1-bit

• **Slave → Master**

Start	Addr+R	MID	ID	LEN	Status	Checksum	Stop
1-bit	1-byte	0x71	1-byte	1-byte	1-byte	1-byte	1-bit

Frame content introduction:

- ◆ Start: Start bit signal
- ◆ Addr+W: I²C address write
- ◆ Addr+R: I²C address read
- ◆ MID: Module type ID, the MID of the different type module is different. For this module, MID=0x71
- ◆ ID: It is automatically assigned when the same modules are cascaded
 - ID=N: Cascade Nth module (1≤N≤4)
 - ID=0: Broadcast command that acts on all cascade modules
- ◆ LEN: MID, ID, LEN, CMD/Status, Data and CheckSum byte length
- ◆ CMD: Command code, each command code corresponds to a different function
- ◆ Status: Command execution
 - 0x00: Command sent successful
 - 0x40: CheckSum error
 - 0x80: Instruction is not supported
 - 0xA0: Cascade slaves do not respond
- ◆ Data: Data
- ◆ CheckSum: CheckSum=MID+ID+LEN+CMD/Status+Data
- ◆ Stop: Stop bit signal

Parameter Obtain Instruction Frame

• **Master → Slave**

Start	Addr+W	MID	ID	LEN	CMD	Checksum	Stop
1-bit	1-byte	0x71	1-byte	1-byte	1-byte	1-byte	1-bit

• **Slave → Master**

Start	Addr+R	MID	ID	LEN	Status	Data	Checksum	Stop
1-bit	1-byte	0x71	1-byte	1-byte	1-byte	N-byte	1-byte	1-bit

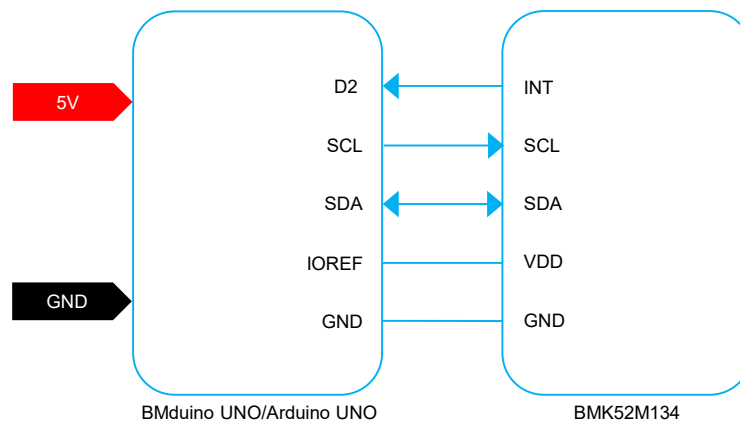
Parameter Set Instruction Set

No.	Function Description	CMD	ID	Data	Note
1	Set the key trigger threshold for all cascade modules	0x03	0	D ₁ : Threshold, range: 10~64 The smaller the key trigger threshold, the higher the sensitivity	
	Set the key trigger threshold for the N th module		N		
2	Set the sleep mode state for all cascade modules	0x05	0	D ₁ : Sleep mode 0x00: Disable 0x01: Enable	
	Set the sleep mode state for the N th module		N		

Parameter Obtain Instruction Set

No.	Function Description	CMD	ID	Response Data	Note
1	Obtain the cascade module number	0x01	0	D ₁ : Cascade module number	
2	Obtain the key status of all cascade modules	0x02	0	D ₁ ~D _N : The key state of the 1~N modules (Bit0~Bit3 corresponds to KEY1~KEY4) Bit=0: No key is pressed Bit=1: A key is pressed	
3	Obtain the key trigger threshold for the N th module	0x04	N	D ₁ : The key trigger threshold	
4	Obtain the sleep state of the N th module	0x06	N	D ₁ : Module: 0x00: Disable 0x01: Enable	

Application Circuit

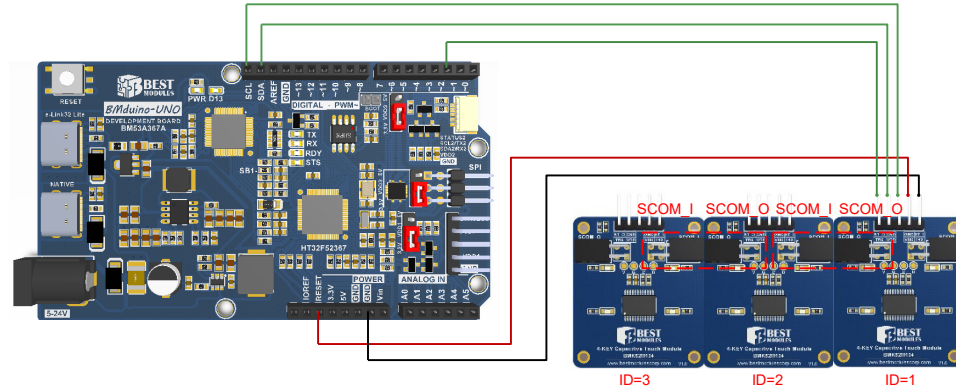


Connection Diagram

Multi-board Cascade

This module can be cascaded up to 4, the corresponding ID=1~4. Multiple modules are cascaded using a 2.54mm, double-row, 2P and male-to-male DuPont line or pin headers in series. The former module SCOM_O interface should be connected to the latter module SCOM_I interface.

Take the case of 3 modules cascading as an example.

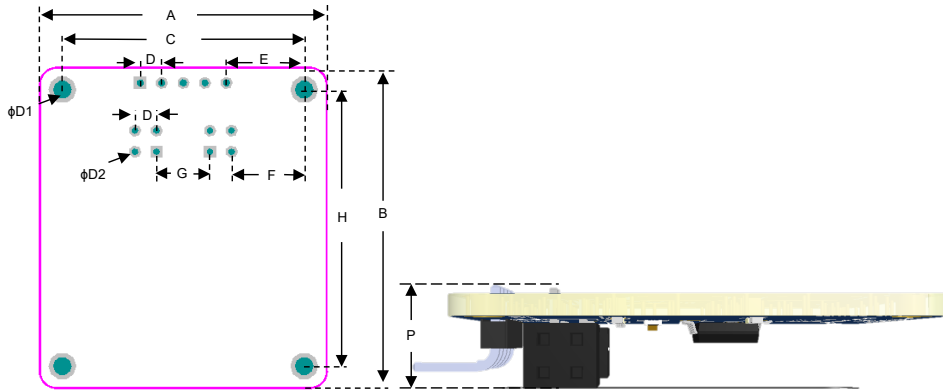


Cascade Diagram

Note:

1. The module ID is only assigned once when the overall modules are initially powered on, it should be ensured that the cascade module connection is completed before power-on, otherwise it will affect the module ID assignment. Modules cannot be plugged and plugged during use.
2. When cascading multiple modules, the SCOM_I and SCOM_O interfaces should be connected. The module that is connected to the host has an ID of 1. This module SCOM_O interface should be connected to the next module SCOM_I interface. When connecting two modules, pay attention to the connection to ensure that there is no wrong connection.
3. ID=0 is a broadcast command that acts on all cascade modules, refer to the Communication Protocol section for details.

Dimensions



Dimension Information

Symbol	Unit	mm	inch
A		33.80	1.33
B		38.56	1.52
C		28.50	1.12
D		2.54	0.1
E		9.16	0.36
F		8.56	0.34
G		6.30	0.25
H		32.26	1.31
D1		2.20	0.0866
D2		1.50	0.059
P		6.5	0.256

Dimension List

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