Non-contact Gesture Recognition Screen Development Guide

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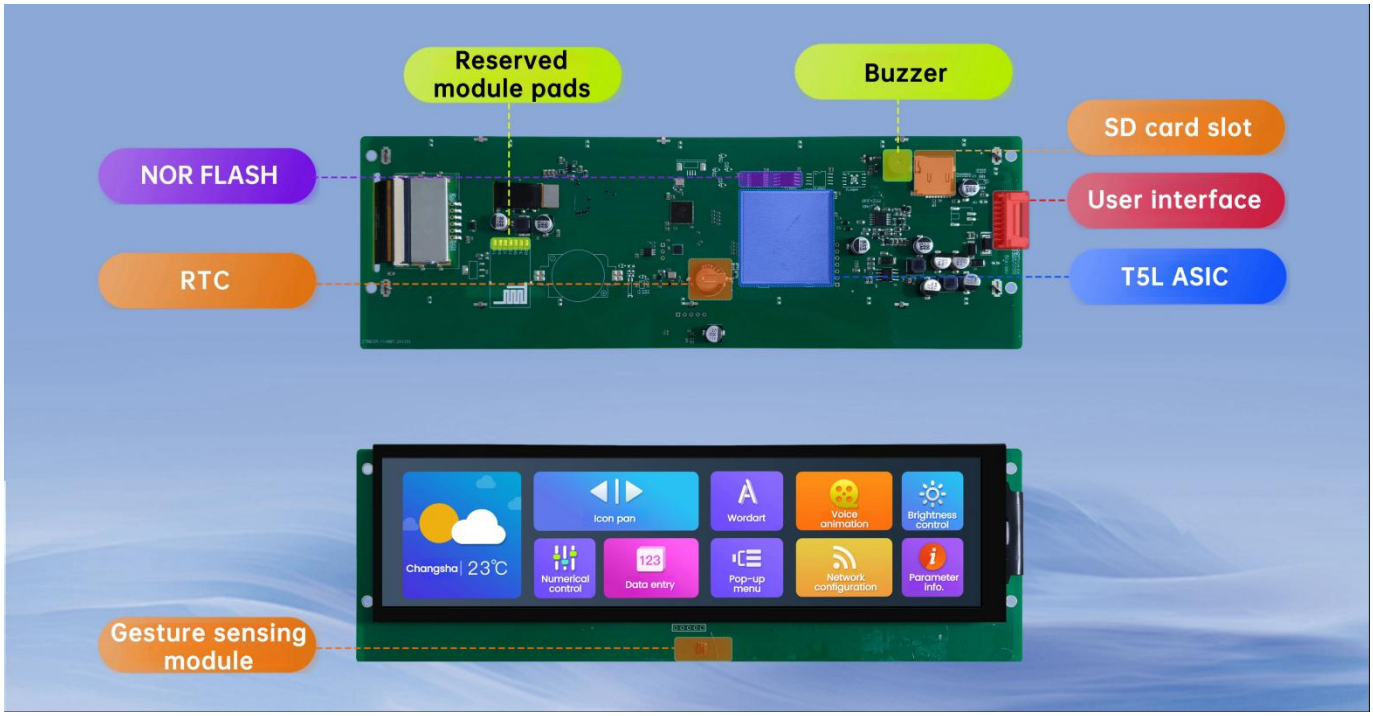
1. Scheme Overview

1.1 Scheme Introduction

The non-contact gesture recognition screen is a series of smart screen products with T5L ASIC as the main controller. On the basis of running the standard DGUS software, this series of products has added the function of non-contact gesture recognition based on infrared technology, allowing users to operate the screen actions through non-contact gestures. This can meet the application requirements of specific scenarios.



Hardware interface diagram

1.2 Scheme Features

(1) The gesture recognition function has strong anti-interference ability and low latency.

(2) Gesture operations are simple and rich in functions, supporting a variety of contactless gesture recognition actions: swipe up/down/left/right, single-click, and approach.

2. Data Communication Protocol

Table 1-1 Gesture Recognition Screen Selection Table

Model	Size	Resolution	LCD Type	Touch Type	Gesture Recognition	Operating Voltage(V)	Operating Temperature(℃)
DT420X240 422Z241102	8.88	480*1920	IPS	Capacitive touch	Infrared	9~36	-20~70

3. System Variable Interface

3.1 Function Description

The screen can be controlled by recognizing gestures. The gesture recognition function can be enabled or disabled through the variable address 0x0600. The gesture recognition information will also be written to the variable address 0x0604. Users can customize the smart screen functions by reading the gesture recognition information in the variable address 0x0604.

VP address	Length	Description	Description
0x0600	1 word	Gesture Recognition Function Enable	0: Gesture recognition is invalid Other values: Gesture recognition is valid
0x0601~0x0603	3 words	-	Reserved
0x0604	1 word	Gesture Recognition Information	0x0001: Upward 0x0002: Downward 0x0003: Leftward 0x0004: Rightward 0x0005: Approaching 0x0006: Single-click

3.2 Application Examples

When the module recognizes a valid gesture, the gesture information will be automatically uploaded through UART 2 in the following format:

UART Instruction	Description
5A A5 05 00 00 00 00 01	Upward
5A A5 05 00 00 00 00 02	Downward
5A A5 05 00 00 00 00 03	Leftward
5A A5 05 00 00 00 00 04	Rightward
5A A5 05 00 00 00 00 05	Approaching
5A A5 05 00 00 00 00 06	Single-click

For example, to achieve a single-click gesture function, send command: 5A A5 05 00 00 00 00 06.
After the user's MCU receives and parses the result as a single-click, the MCU can send the 82 commandto the gesture screen: 5A A5 0B 82 00 D4 5A A5 0004 XXXX YYYY, where the yellow-highlighted part represents the specific X,Y coordinate values.

0xD4	Touch screen operation simulation	4	0xD4: 0x5AA5,perform a touch screen simulation operation once, and clear it after the CPU finishes the operation. 0xD5: Pressing mode, 0x0001 = press down, 0x0002 = release, 0x0003 = continuous press, 0x0004 = click (press down + lift up). 0xD6: The x-coordinate of the pressing position. 0xD7: The y-coordinate of the pressing position. After simulating pressing modes 0x0001 and 0x0003, there must be a simulated lifting mode of 0x0002. When the configured touch function is running, x = 0xAA: KH, y = 0xA5: KL will directly return the key values KH.KL to the configured touch. For example, when entering variables in the configured mode, the coordinates (0xAAF0, 0xA5F0) will cause the input to end immediately. When the Touch file 13 has a key control function, an x coordinate=0xFF: Key Code, y coordinate=0x0001 will trigger the corresponding key control function.

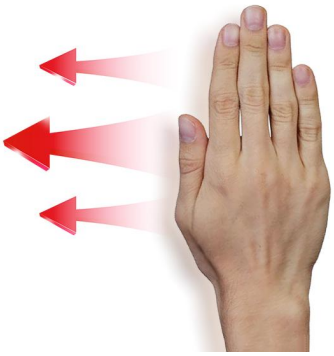
4. Gesture Recognition Operation Commands

This series of products supports 6 types of non-contact gesture recognition:

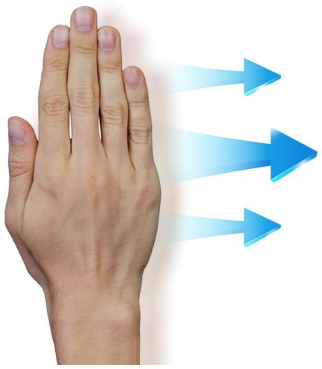
(1) Swipe Up: Used for upward adjustment, which can be used to increase parameters.

(2) Swipe Down: Used for downward adjustment, which can be used to decrease parameters.

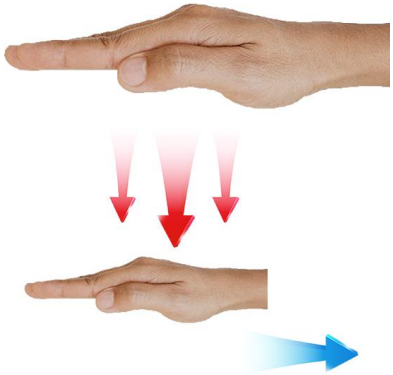
(3) Swipe Left: Used for turning the page to the left by swiping left.



(4) Swipe Right: Used for turning the page to the right by swiping right.



(5) Approach: Place the palm facing down and approach the screen, then swipe out in any direction. This can make the screen exit the current page.



(6) Single-click: Pat the palm downward and then lift it upward away from the screen. This can be used to select the current option.

5. Serial Port Protocol

This series of products uses the DWIN 82/83 protocol. The baud rate and CRC check can be configured through the CFG file. The default settings for UART2 are 115200, 8N1, means baud rate of 115200bps, 8 data bits, no check bit, and 1 stop bit.

5.1 Communication Data Frame

Data Block	1	2	3	4	5
Definition	Frame Header	Data Length	Command	Data	CRC Check (Optional)
Data Length	2	1	1	N	2
Description	0x5AA5	Includes command, data, and check	0x82/0x83		
Example (Without Check)	0x5AA5	04	83	00 10 04	
Example (With Check)	0x5AA5	06	83	00 10 04	25 A3

5.2 Interface Command Description

Command	Data	Description	Response
0x82	Variable space first address (0x0000-0xFFFF)+data to be written	Write data to variable space at the specified address	None
0x83	Variable space first address (0x0000-0xFFFF)+read data in byte length (0x01-0x7D)	Read data of the specified length starting from the specified address	Variable space first address+variable data in word length+read variable data

5.3 Command Examples

(1). Gesture Recognition Enable

82/83 command: 5A A5 05 82 0600 0000

Command meaning: Frame header Command length 82 (Write data) System variable address Command content

Description: Disable the gesture recognition function.

(2). Obtain Gesture Information

82/83 command: 5A A5 04 83 0604 01

Command meaning: Frame header Command length 83 (Read data) System variable address Read 1-word length data

Returned command: 5A A5 04 83 0604 0001

Command meaning: Frame header Command length 83 (Read data) System variable address Command content

Description: The upward-swipe gesture can be used to increase parameters.

6. Common Questions

1. Why doesn't the approaching gesture work?

The definition of the approaching gesture is "approach from the front of the sensor and then pull out from the side". There are two possible reasons why the approaching gesture does not work: one is that there is no approaching process, and the other is that the distance is not close enough.

2. Regarding the connection between gesture recognitions, is it supported to swipe from directly above?For example, after swiping left, can the next action still be swiping left with the hand passing above the sensor?

It is not supported. It is not recommended that the connection between gestures pass above the sensor.

3. Can customers customize gesture commands?

Yes, they can. However, the user OS kernel program is not open to the public. Customers can obtain the non - standard gesture recognition OS kernel through sales. Then, combined with the content of "3.2 Application Examples", they can re-define gesture commands through the MCU by themselves, or they can directly customize the OS kernel.

7. Revision Records

Version	Revise Date	Content	Editor
1.0	2025-03-11	First Edition	Xu Ying

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