# RESEARCHING PROJECT

## " SOIL PH METER DESIGN "

## [WEEKLY REPORT ]

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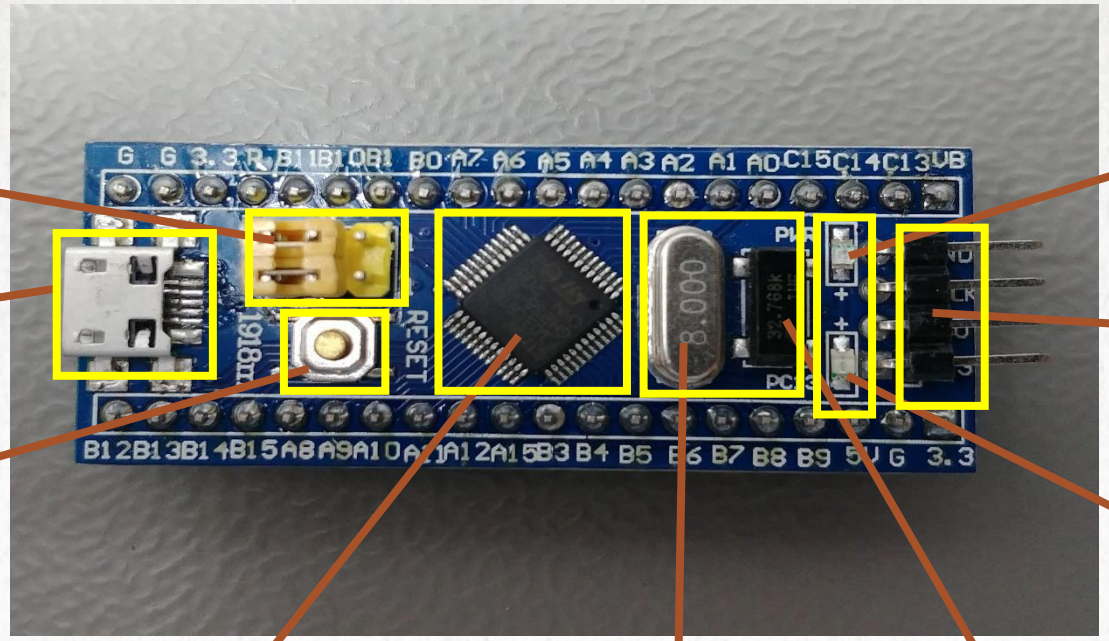
**BY: NHIM CHANRENGSEY**

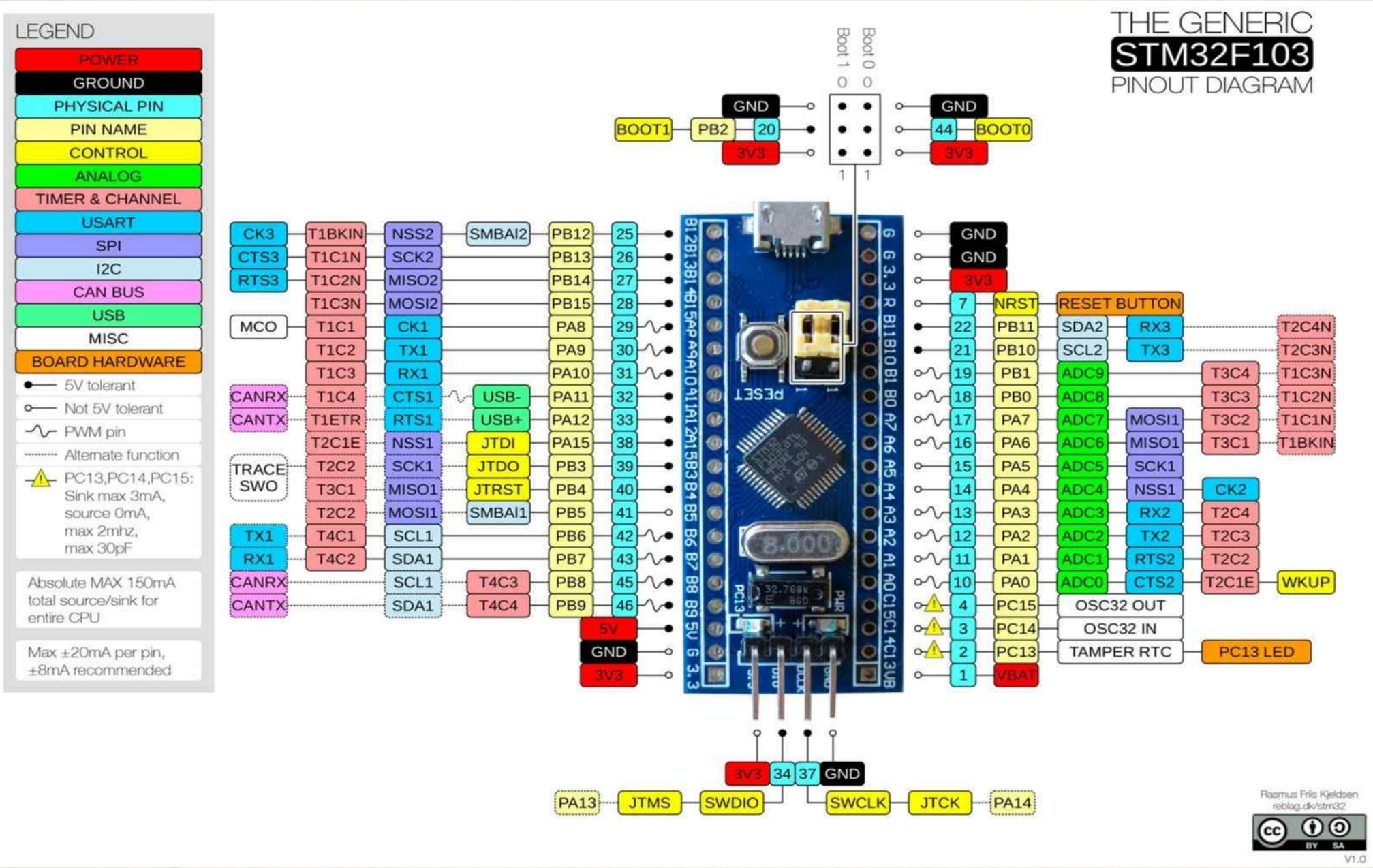
**2020-2021**

# OUTLINE

- STM32F103C8TX
- STM32CUBEide:
  - Configure
  - Use
- STM32F1 & Components
- DHT22 Communication
- DHT22’s Data Transmission

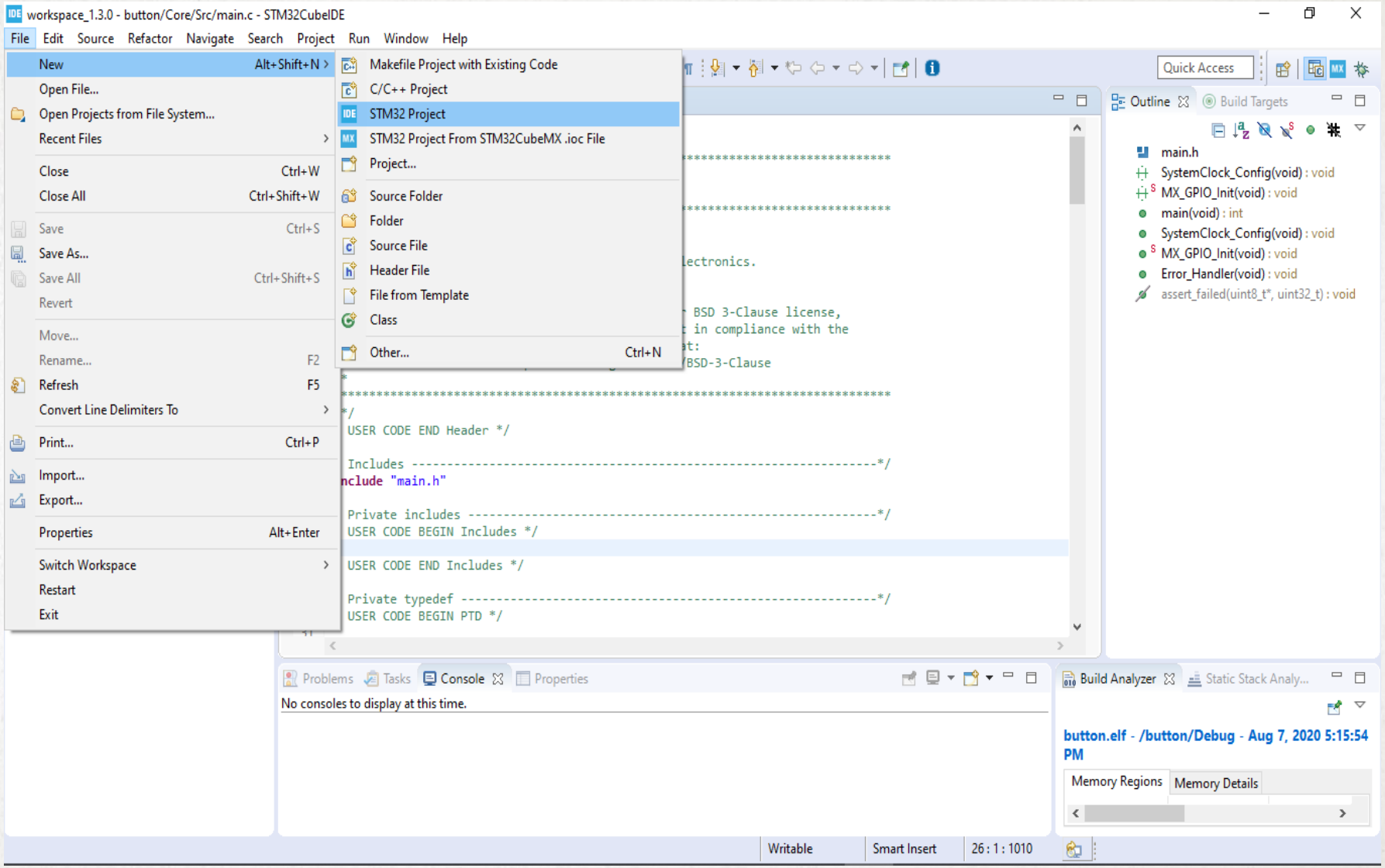
# ➢ STM32F103C8T6(Blue Pill)




LEGEND
POWER
GROUND
PHYSICAL PIN
PIN NAME
CONTROL
ANALOG
TIMER & CHANNEL
USART
SPI
I2C
CAN BUS
USB
MISC
BOARD HARDWARE
5V tolerant
Not 5V tolerant
PWM pin
Alternate function
PC13,PC14,PC15: Sink max 3mA, source 0mA, max 2mhz, max 30pF
Absolute MAX 150mA total source/sink for entire CPU
Max ±20mA per pin, ±8mA recommended
THE GENERIC
STM32F103
PINOUT DIAGRAM
Boot 1
Boot 0
GND
BOOT1
PB2
20
3V3
GND
44
BOOT0
3V3
CK3
CTS3
RTS3
MCO
CANRX
CANTX
TRACE SWO
TX1
RX1
CANRX
CANTX
T1BKIN
T1C1N
T1C2N
T1C3N
T1C1
T1C2
T1C3
T1C4
T1ETR
T2C1E
T2C2
T3C1
T2C2
T4C1
T4C2
NSS2
SCK2
MISO2
MOSI2
CK1
TX1
RX1
CTS1
RTS1
NSS1
SCK1
MISO1
MOSI1
SCL1
SDA1
SCL1
SDA1
SMBAI2
USB-
USB+
JTDI
JTDO
JTRST
SMBAI1
T4C3
T4C4
PB12
PB13
PB14
PB15
PA8
PA9
PA10
PA11
PA12
PA15
PB3
PB4
PB5
PB6
PB7
PB8
PB9
5V
GND
3V3
25
26
27
28
29
30
31
32
33
38
39
40
41
42
43
45
46
GND
GND
3V3
7
22
21
19
18
17
16
15
14
13
12
11
10
4
3
2
1
NRST
PB11
PB10
PB1
PB0
PA7
PA6
PA5
PA4
PA3
PA2
PA1
PA0
PC15
PC14
PC13
VBAT
RESET BUTTON
SDA2
SCL2
ADC9
ADC8
ADC7
ADC6
ADC5
ADC4
ADC3
ADC2
ADC1
ADC0
OSC32 OUT
OSC32 IN
TAMPER RTC
RX3
TX3
MOSI1
MISO1
SCK1
NSS1
RX2
TX2
RTS2
CTS2
T3C4
T3C3
T3C2
T3C1
CK2
T2C4
T2C3
T2C2
T2C1E
PC13 LED
T2C4N
T2C3N
T1C3N
T1C2N
T1C1N
T1BKIN
WKUP
3V3
34
37
GND
PA13
JTMS
SWDIO
SWCLK
JTCK
PA14
Rasmus Friis Kjeldsen
reblag.dk/stm32
V1.0

# STM32CUBE IDE

- Configure



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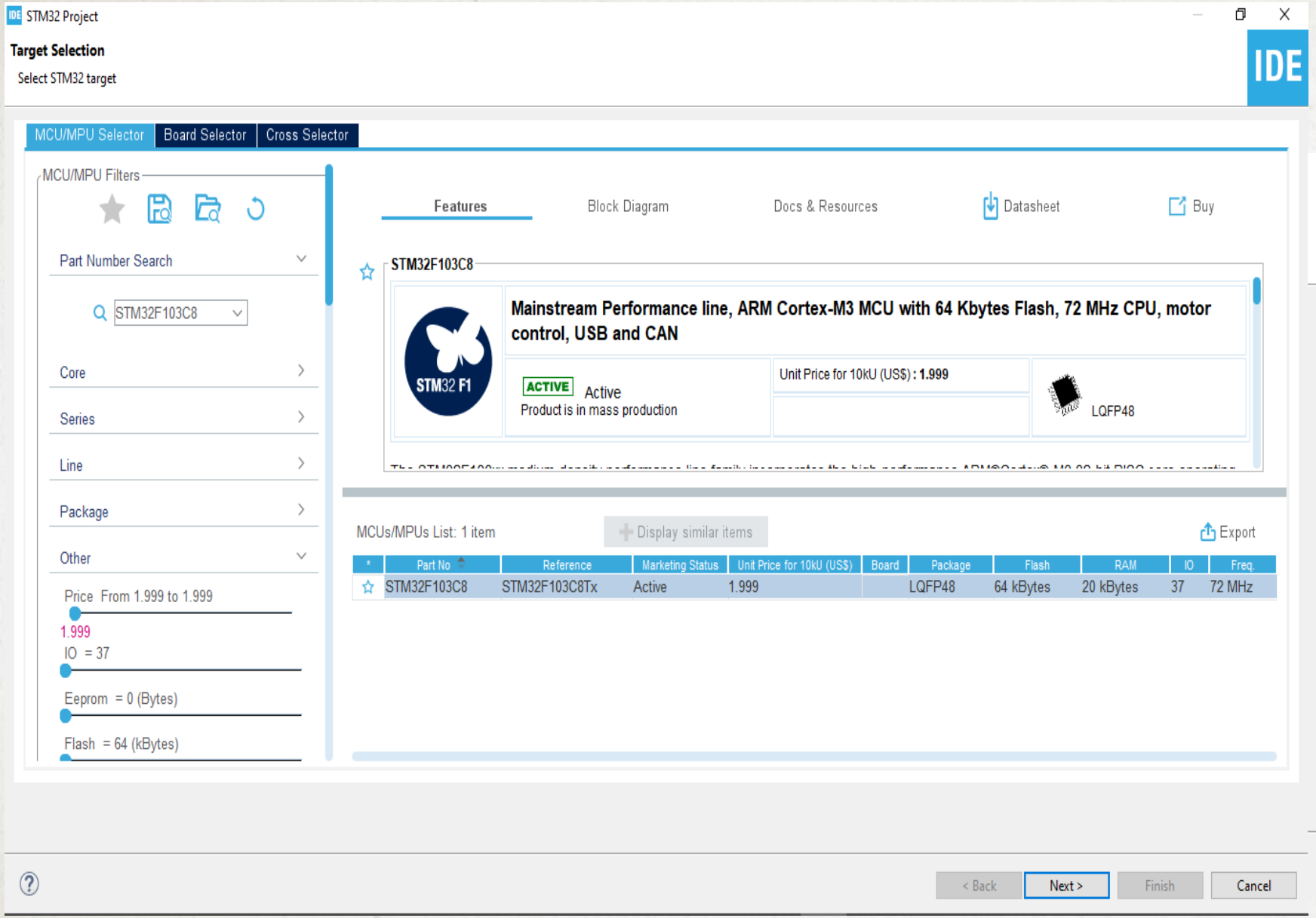


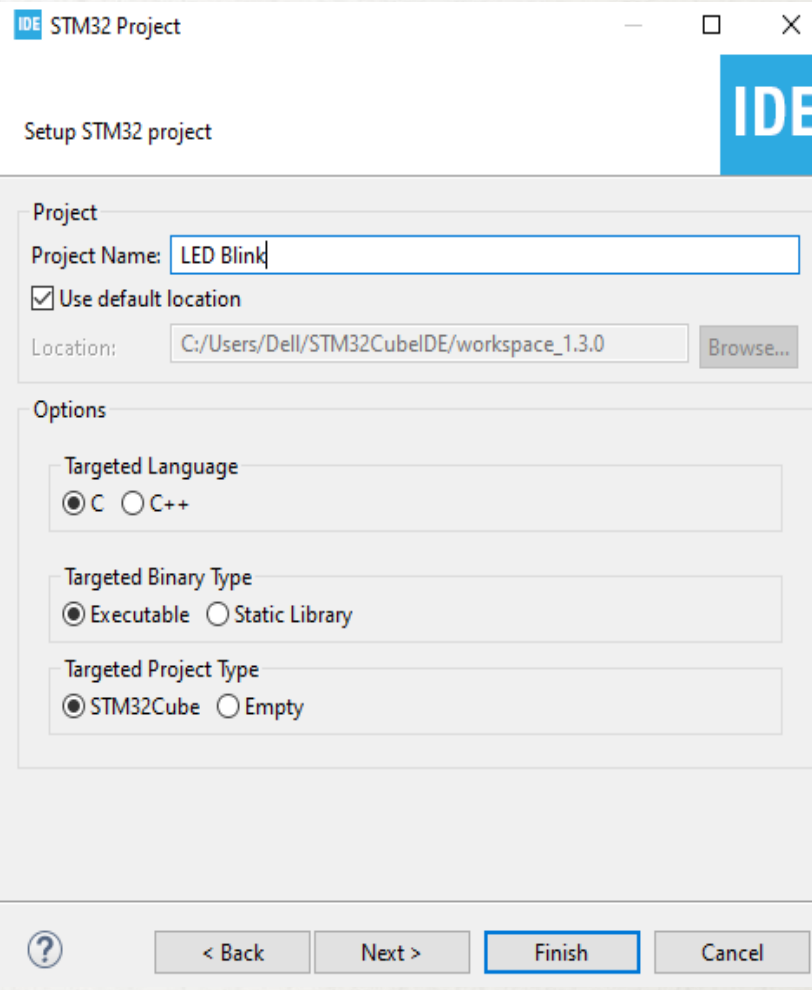

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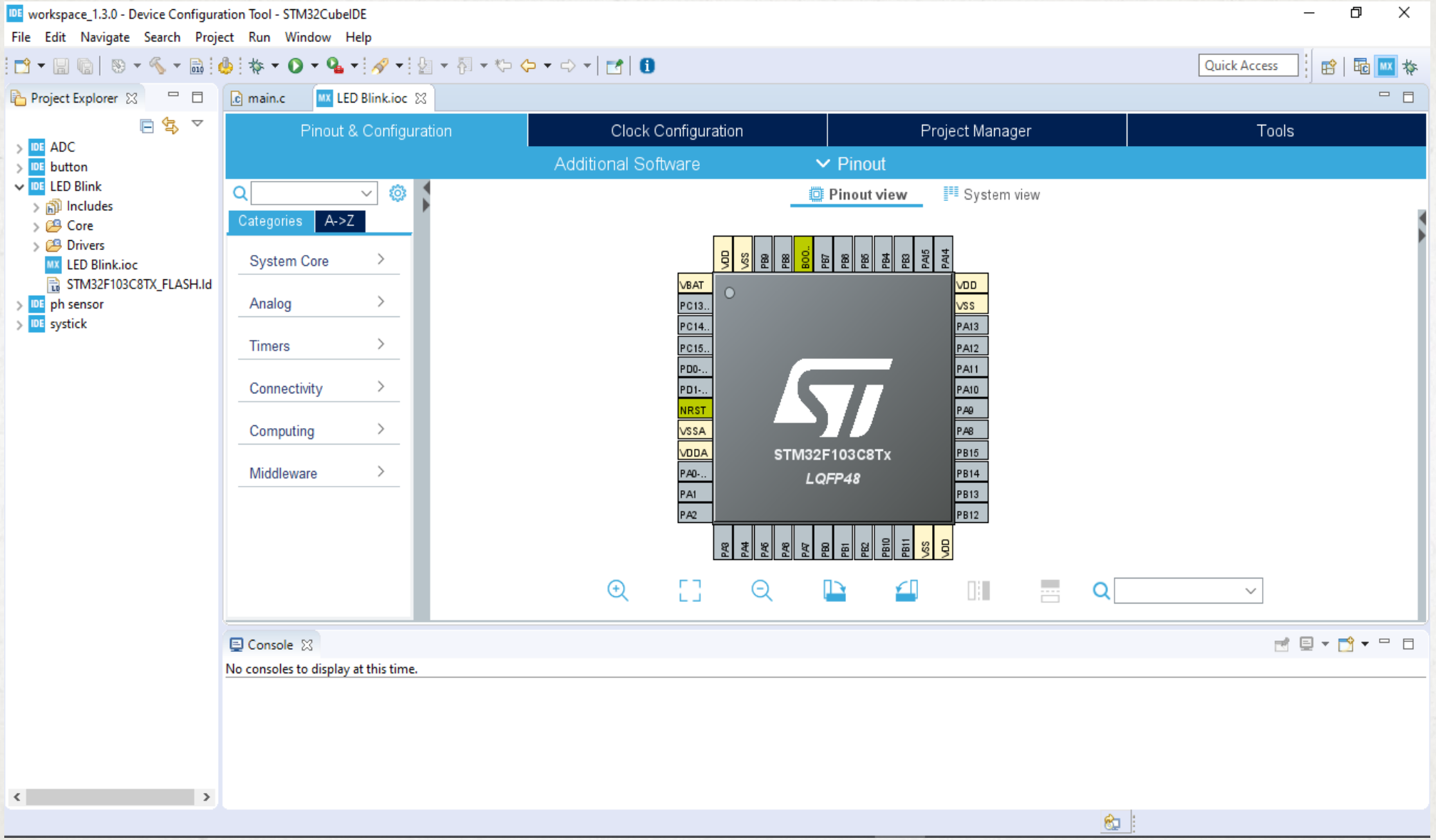

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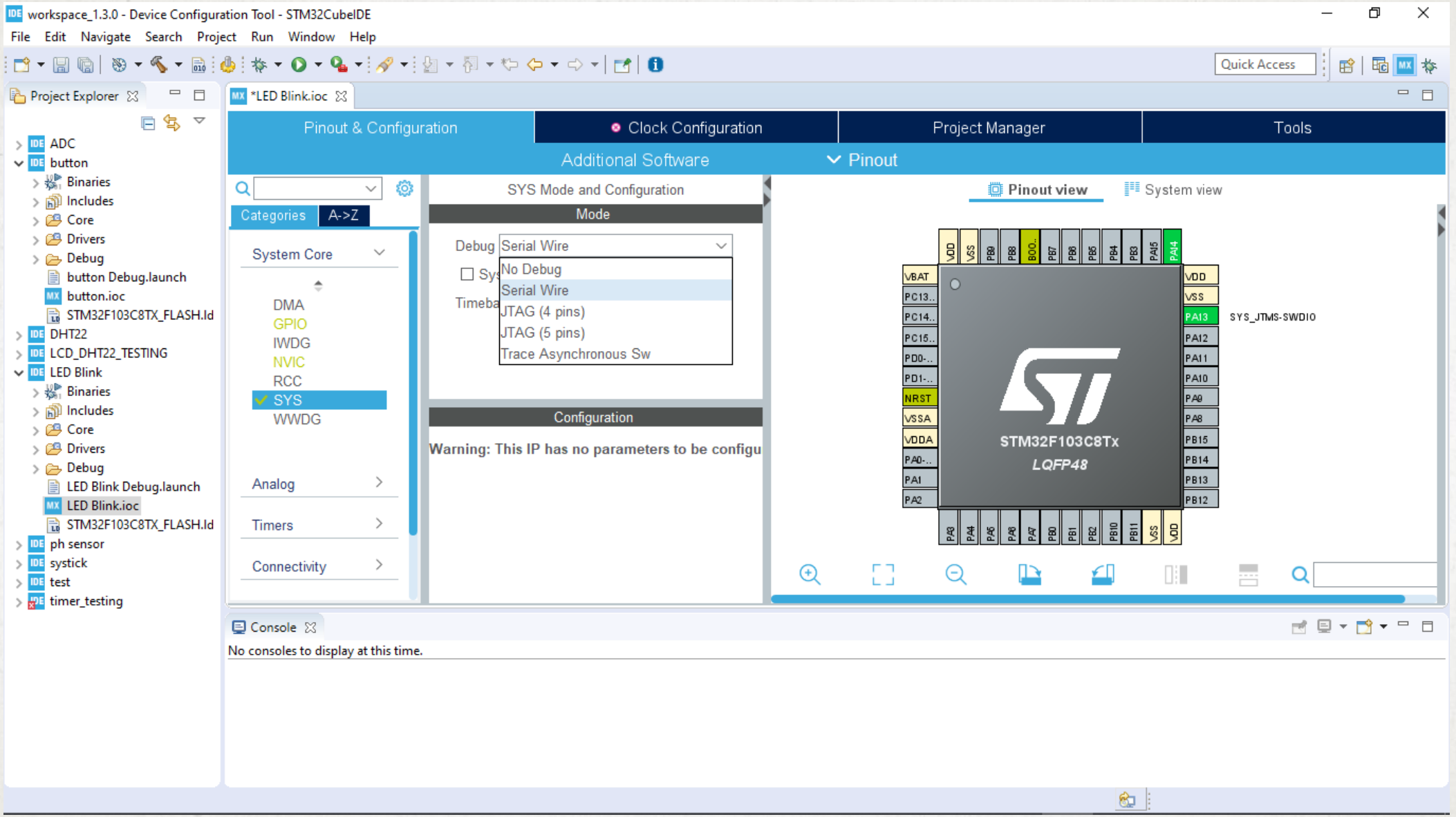

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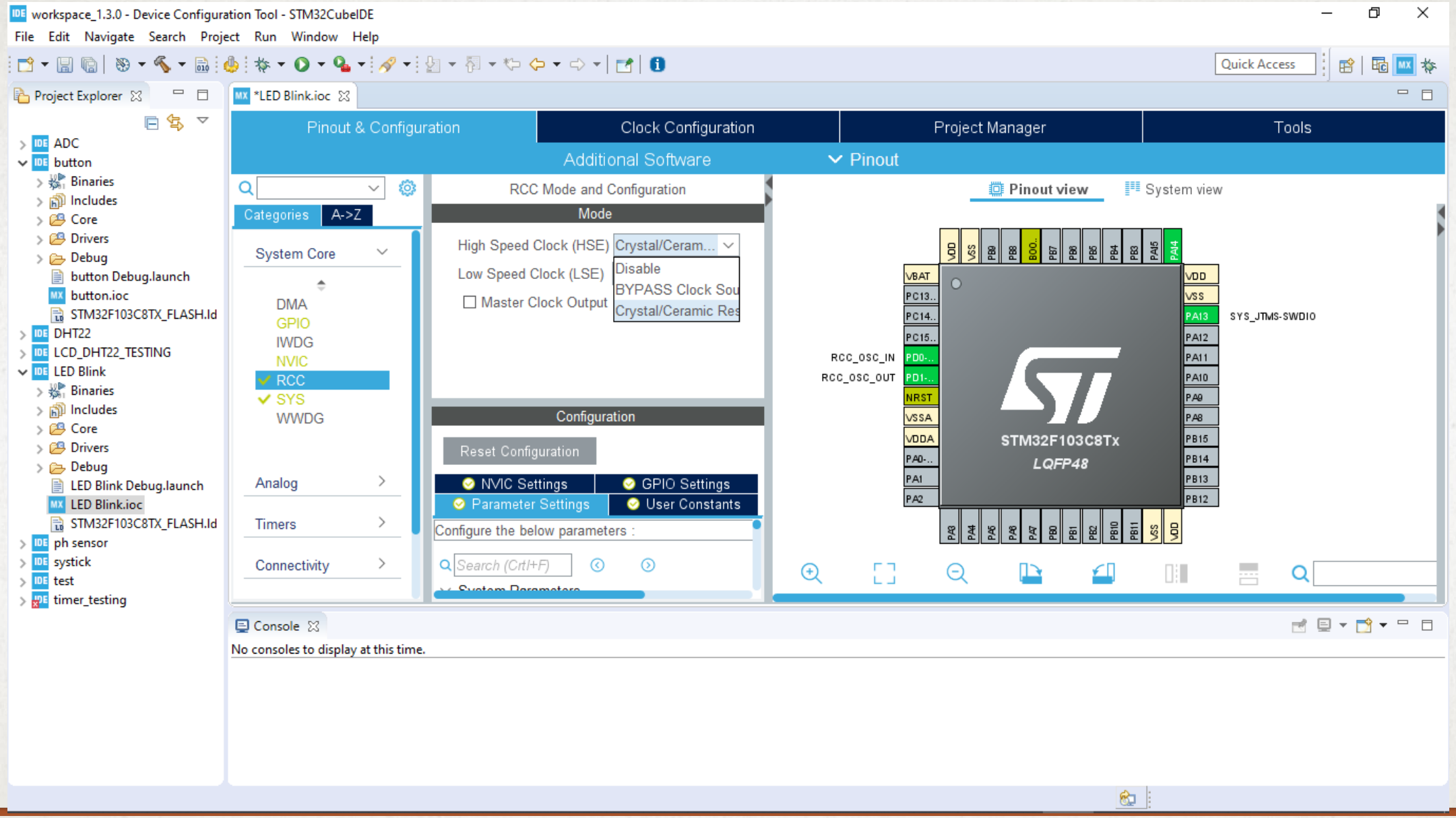

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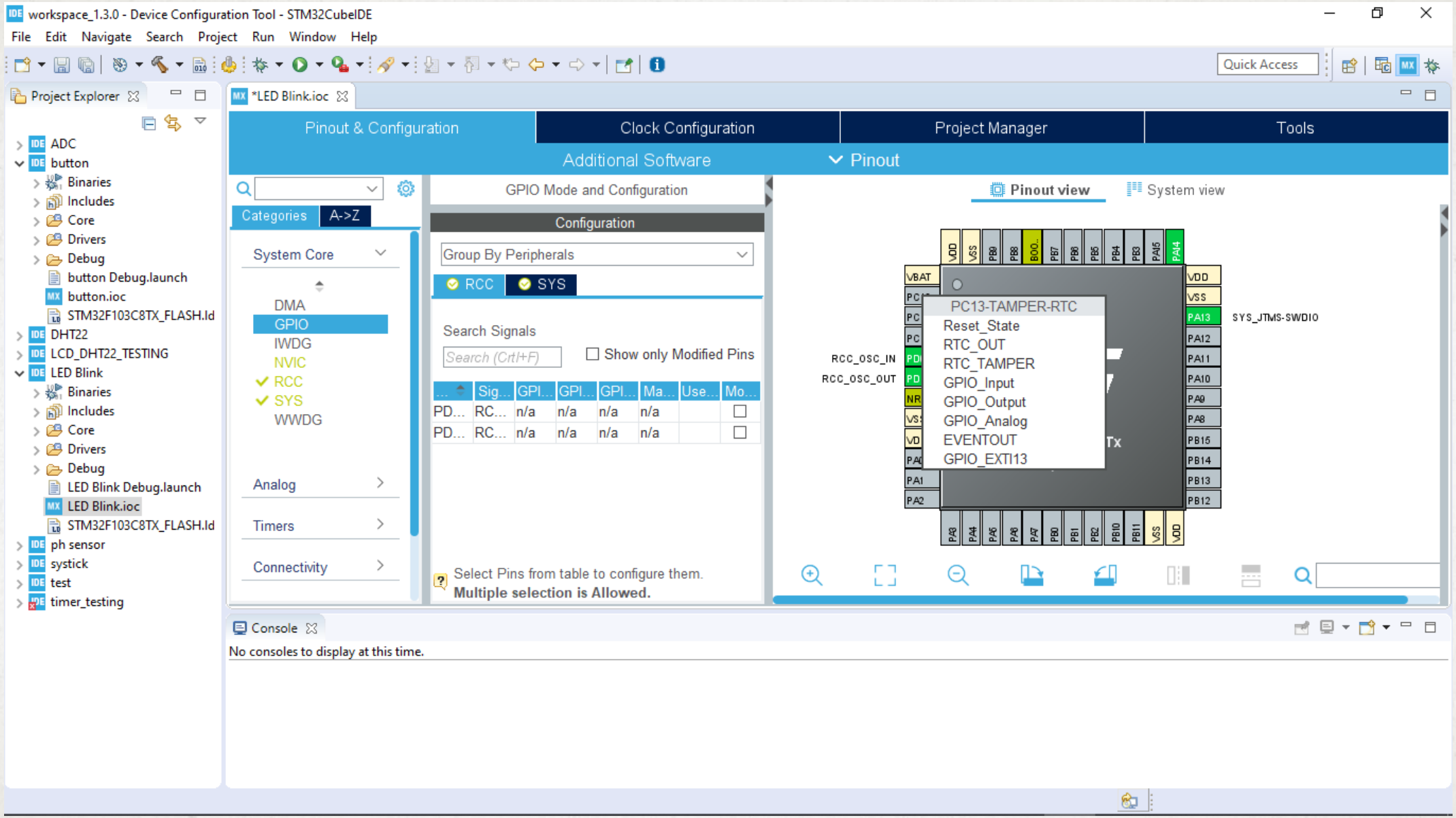

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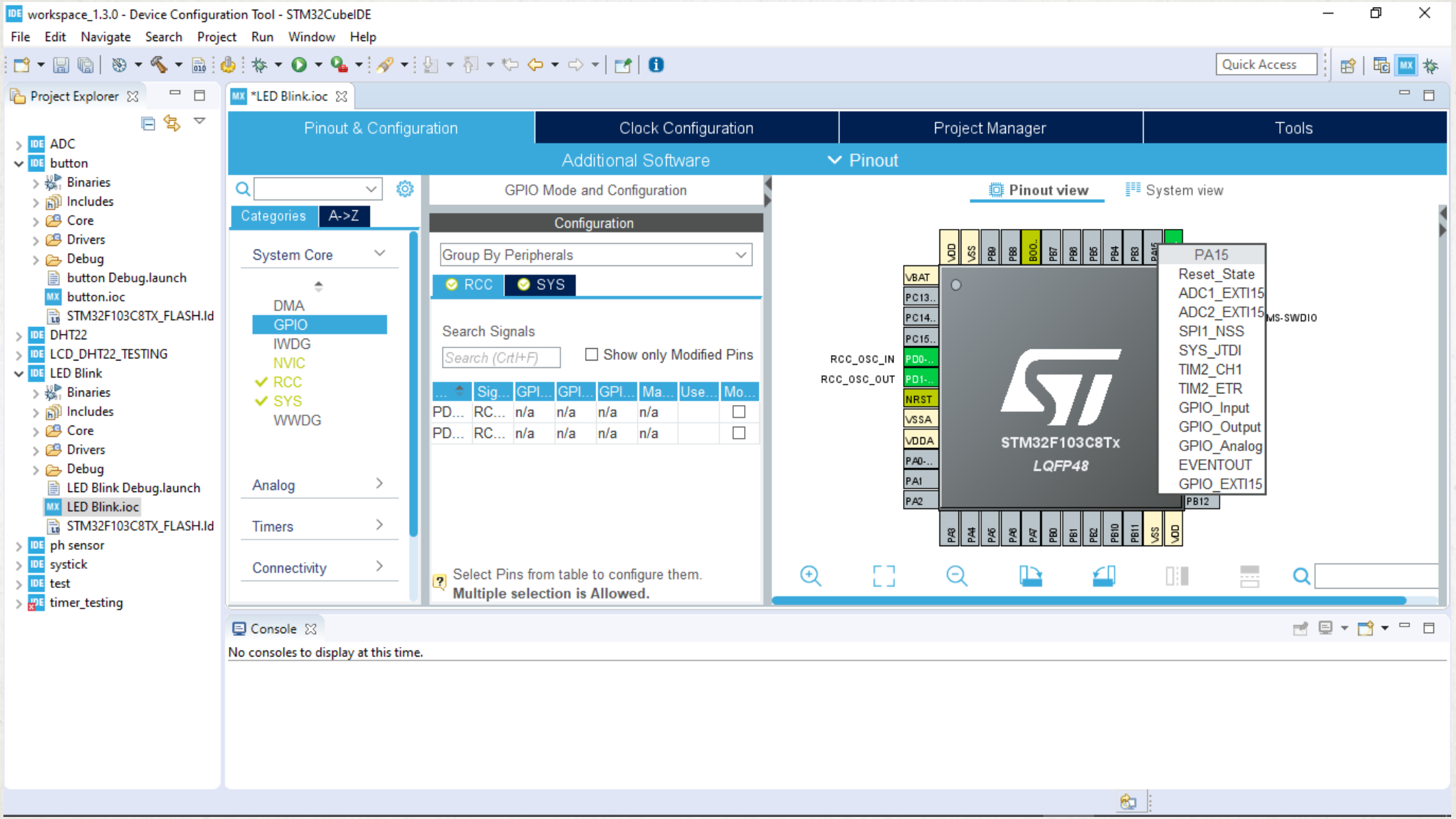

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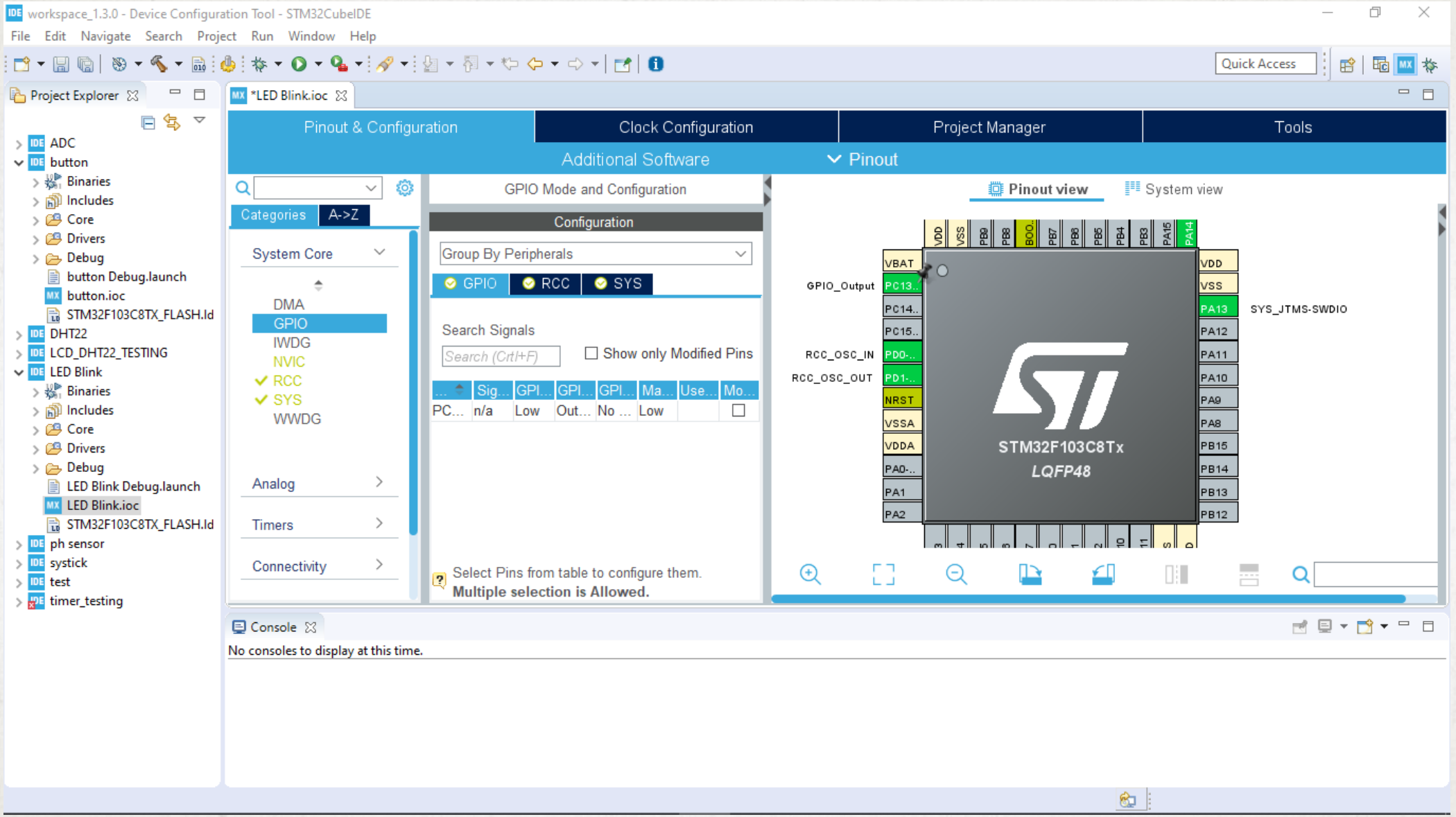

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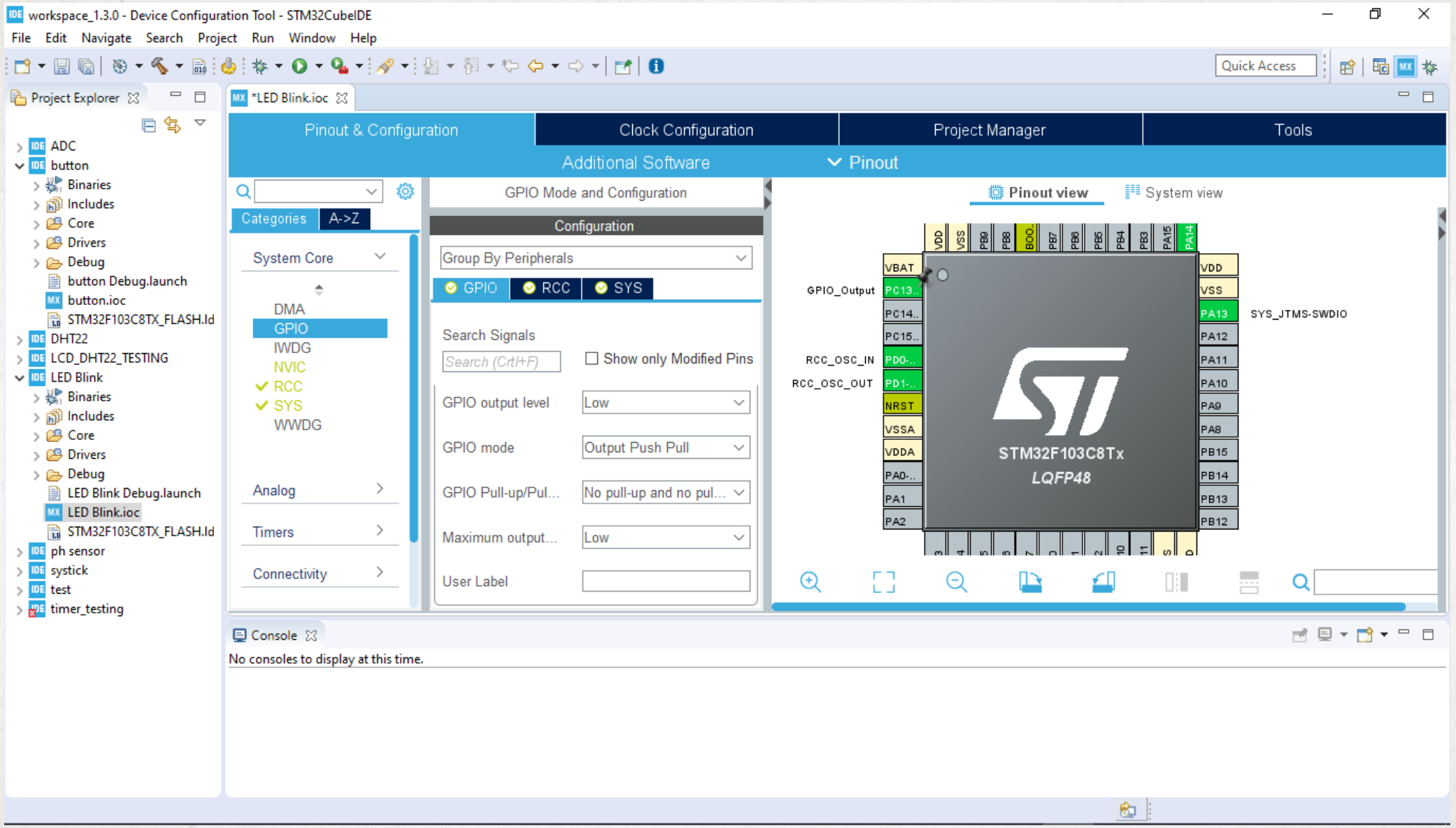

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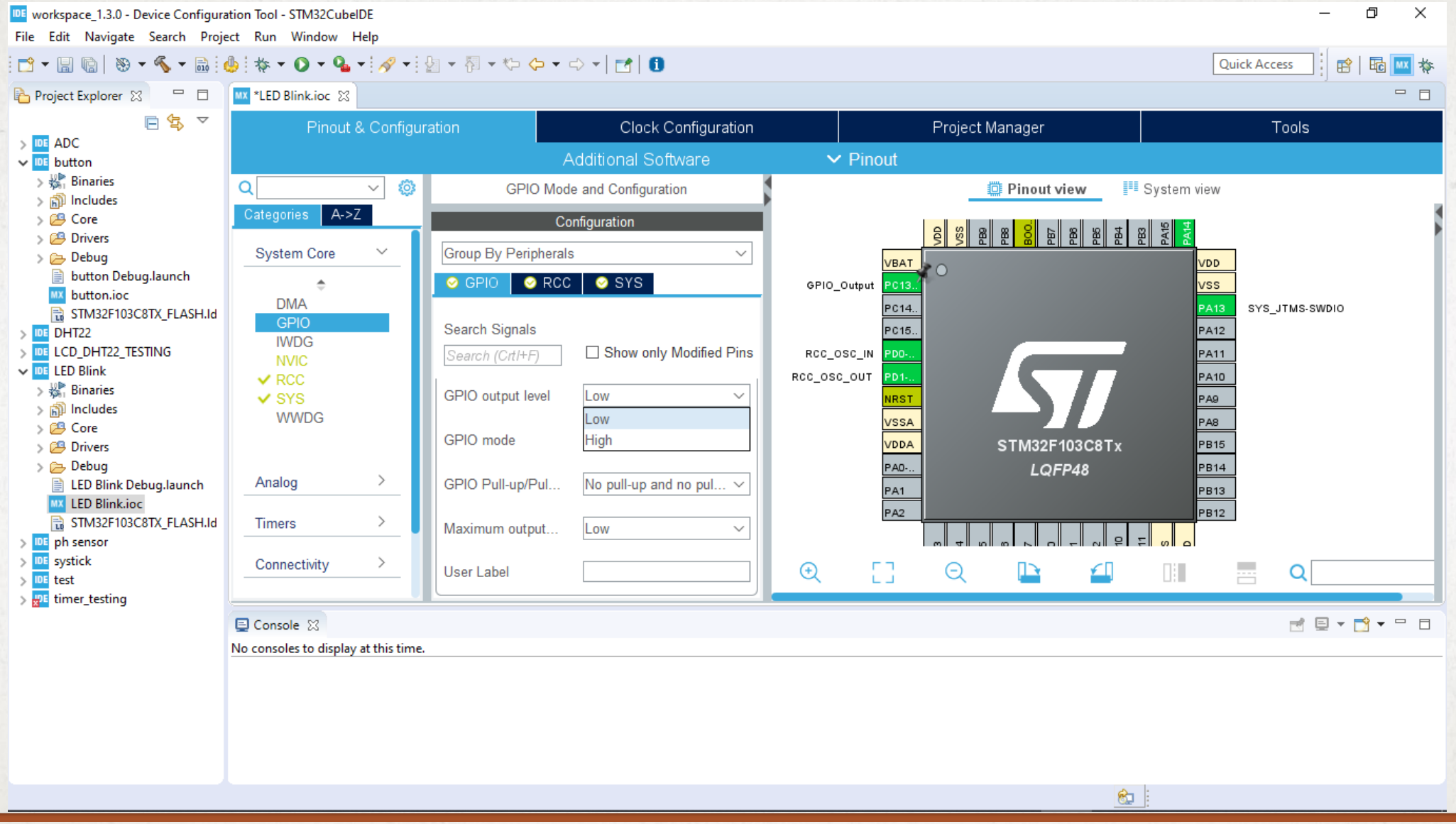

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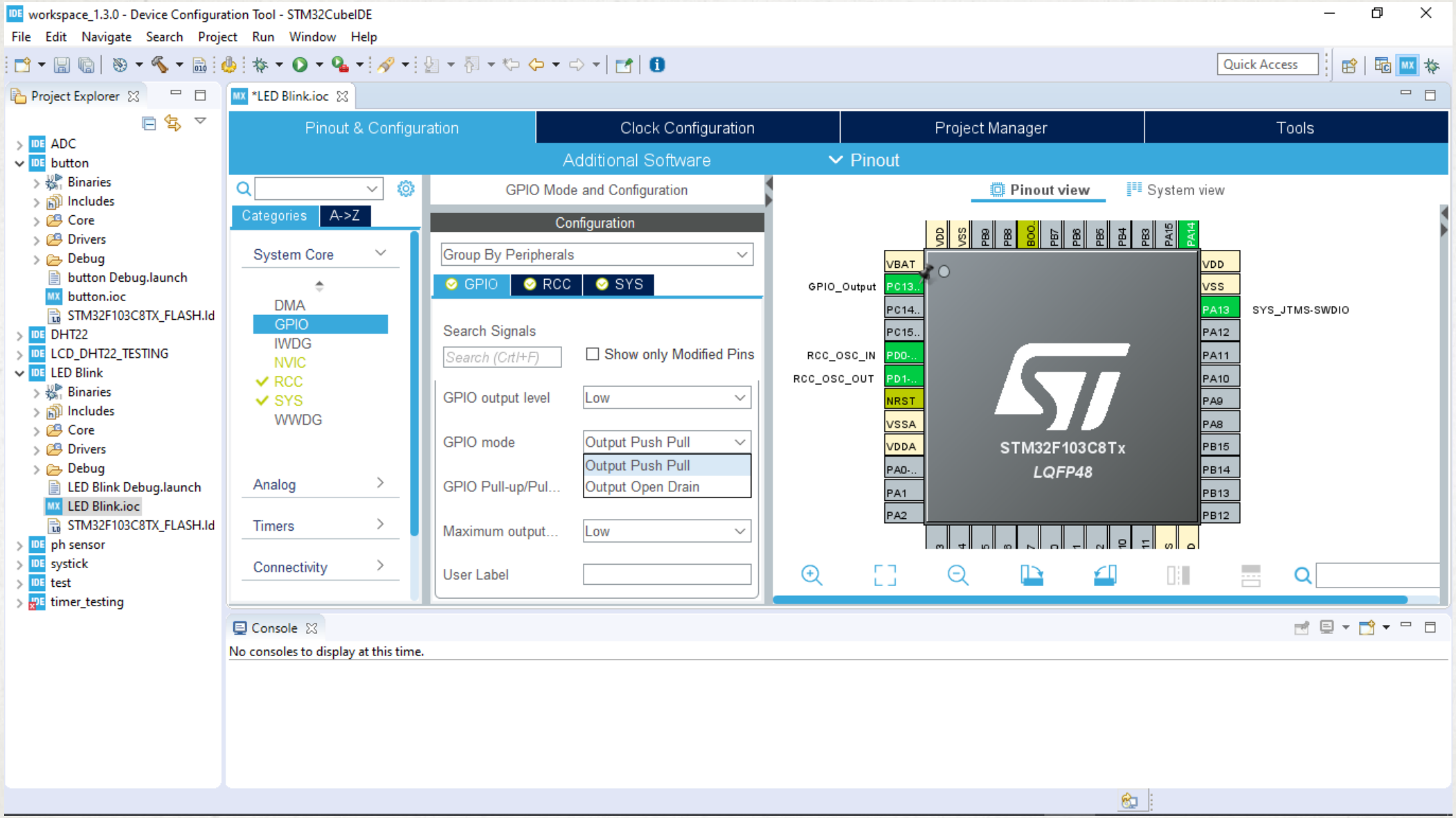

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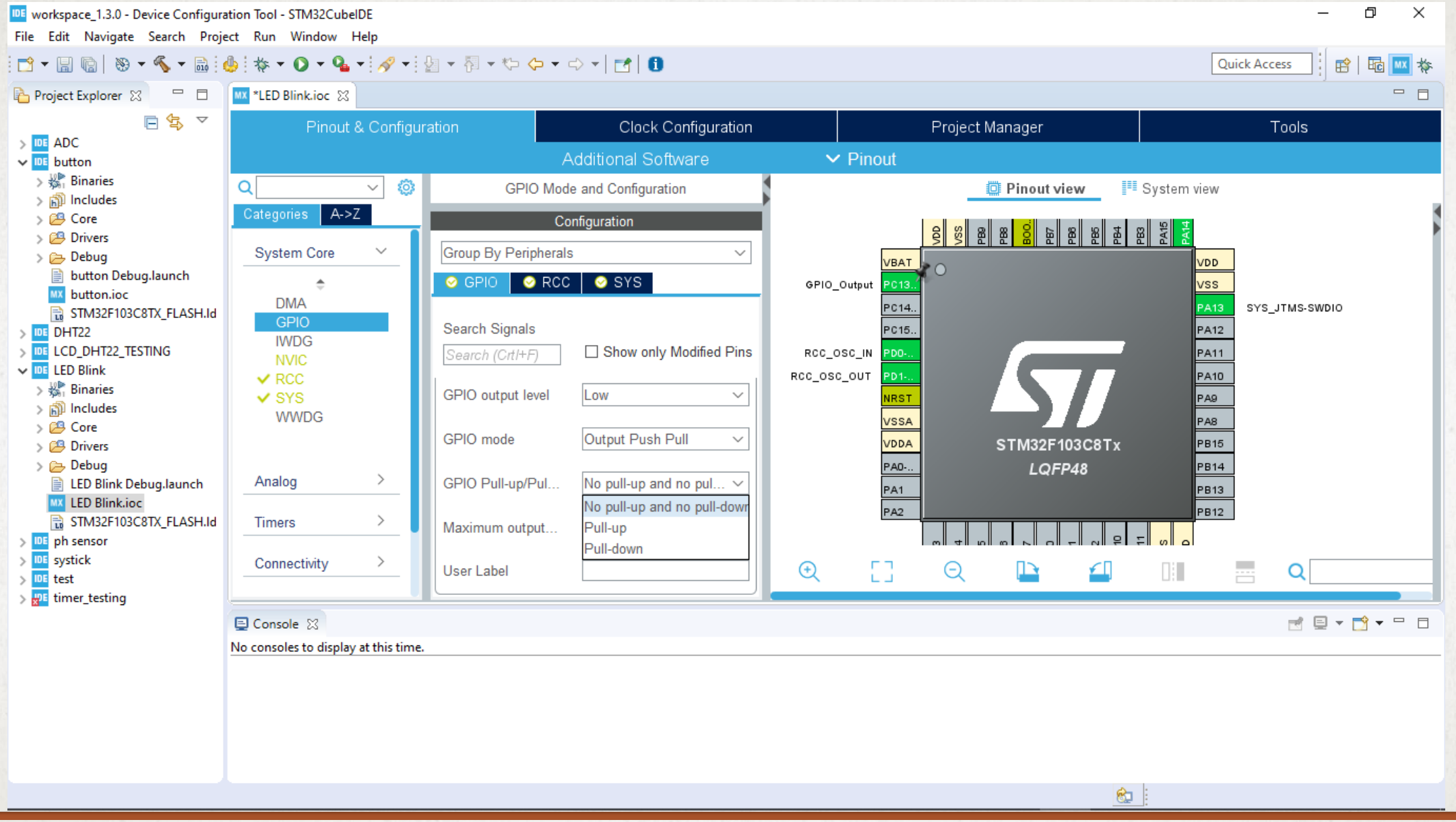

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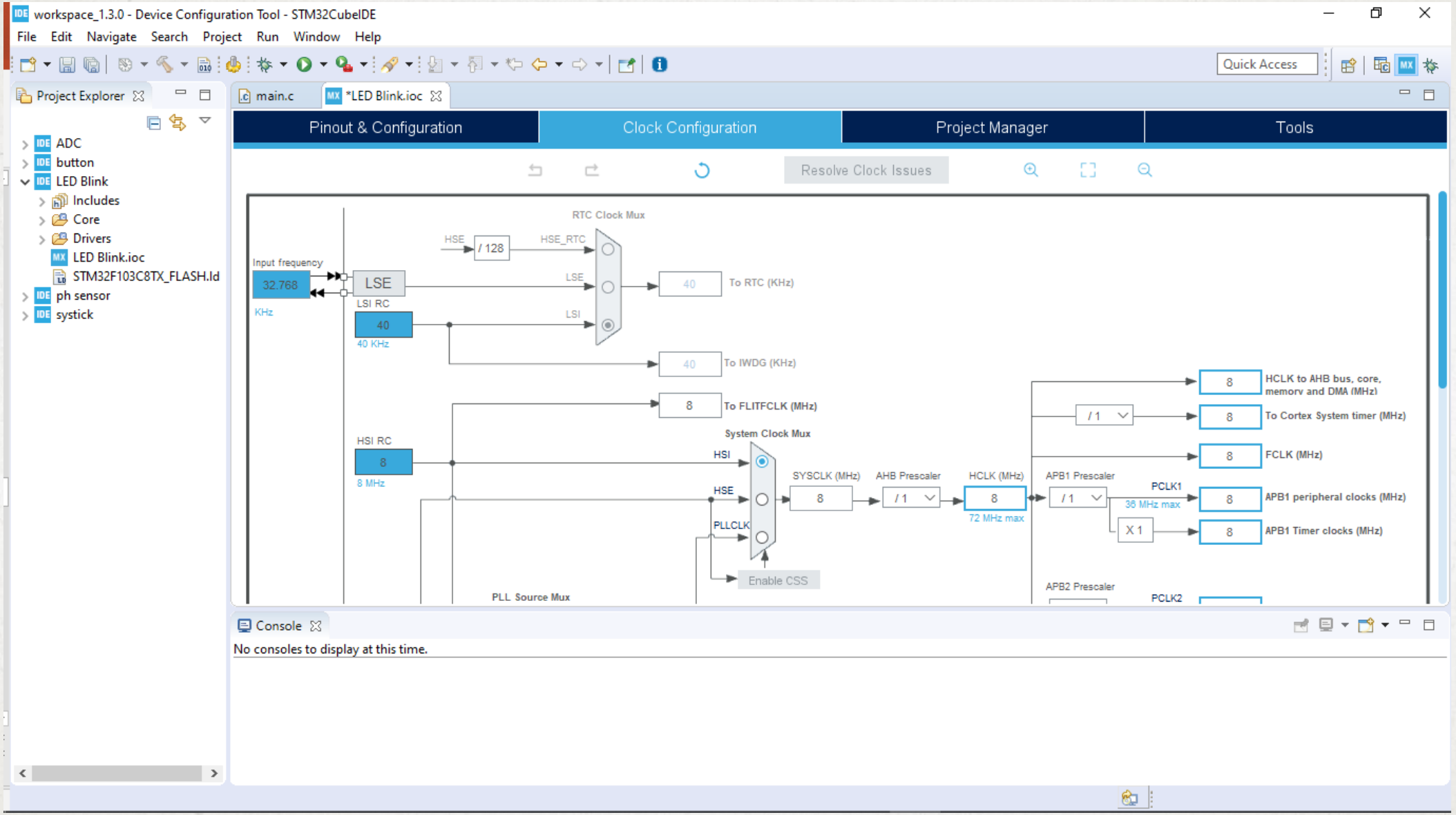

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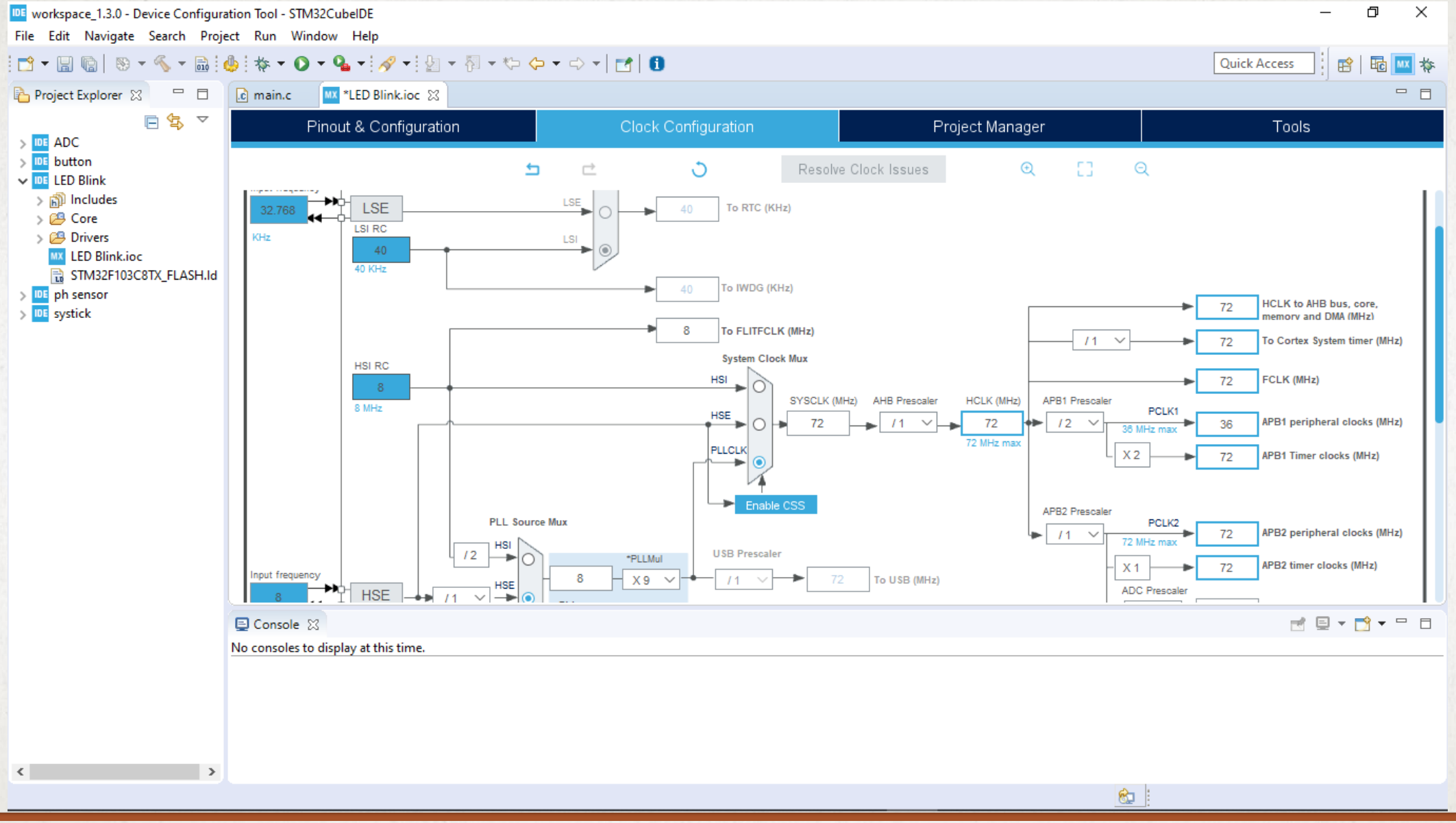

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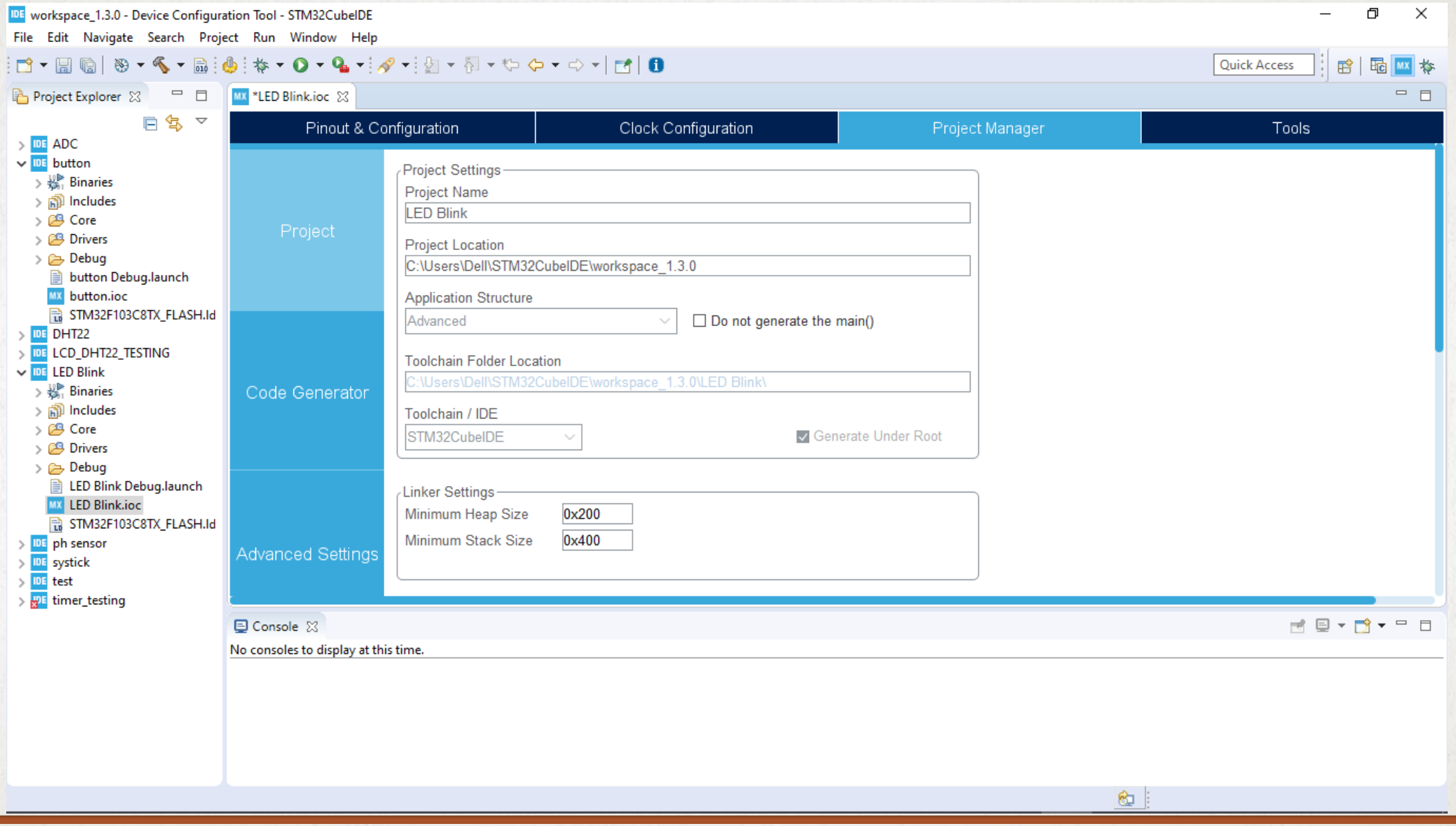

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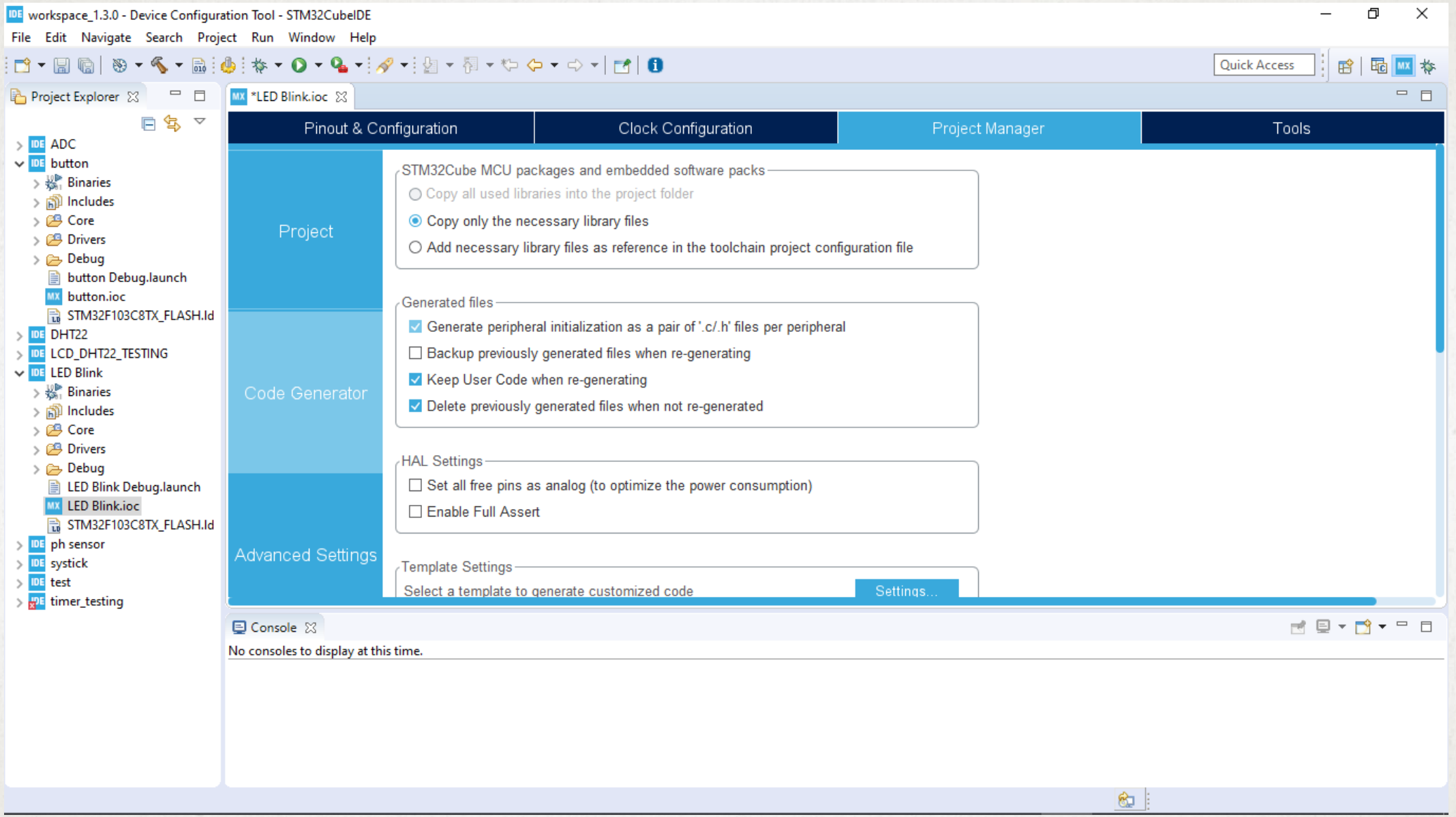

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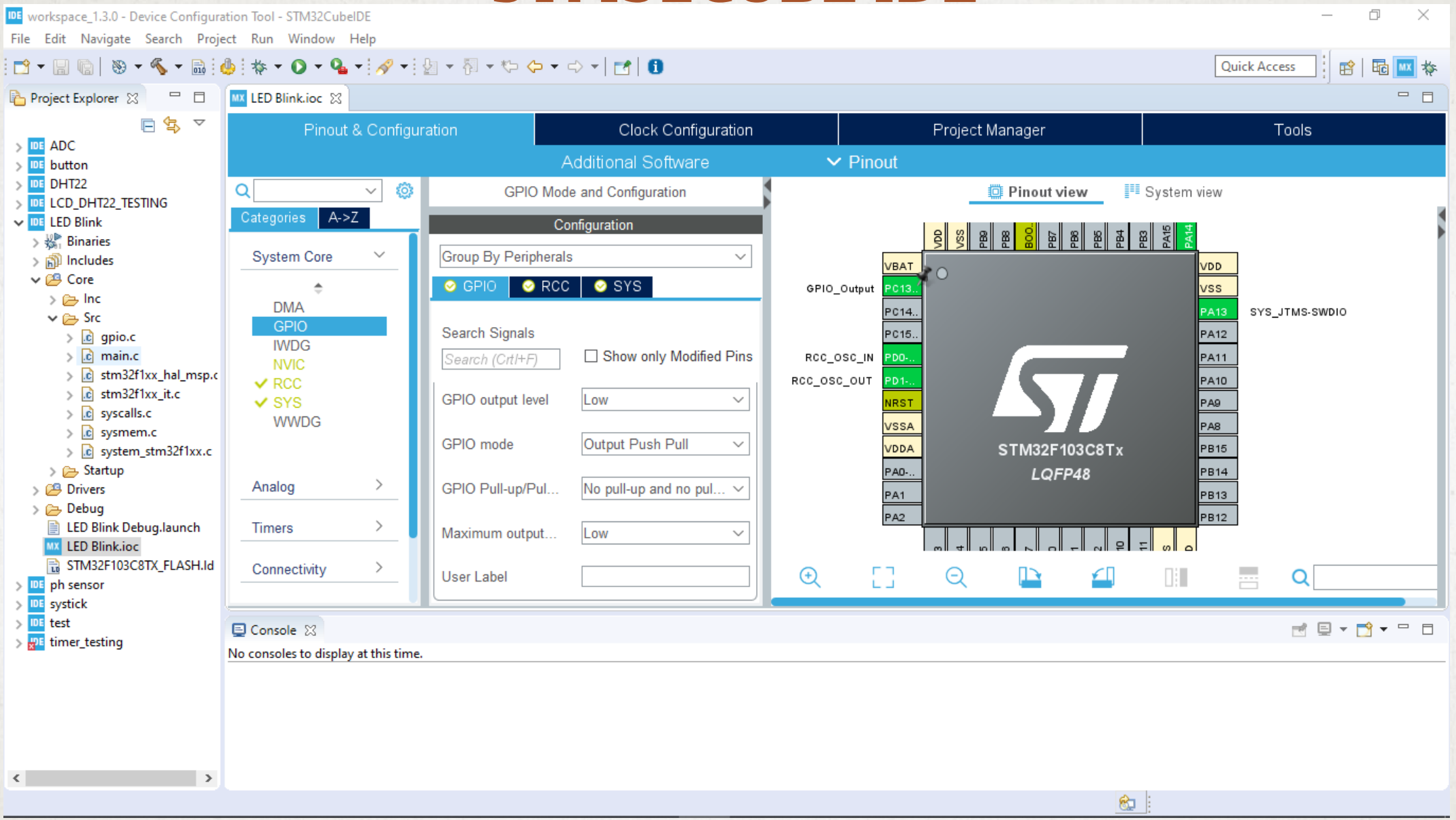

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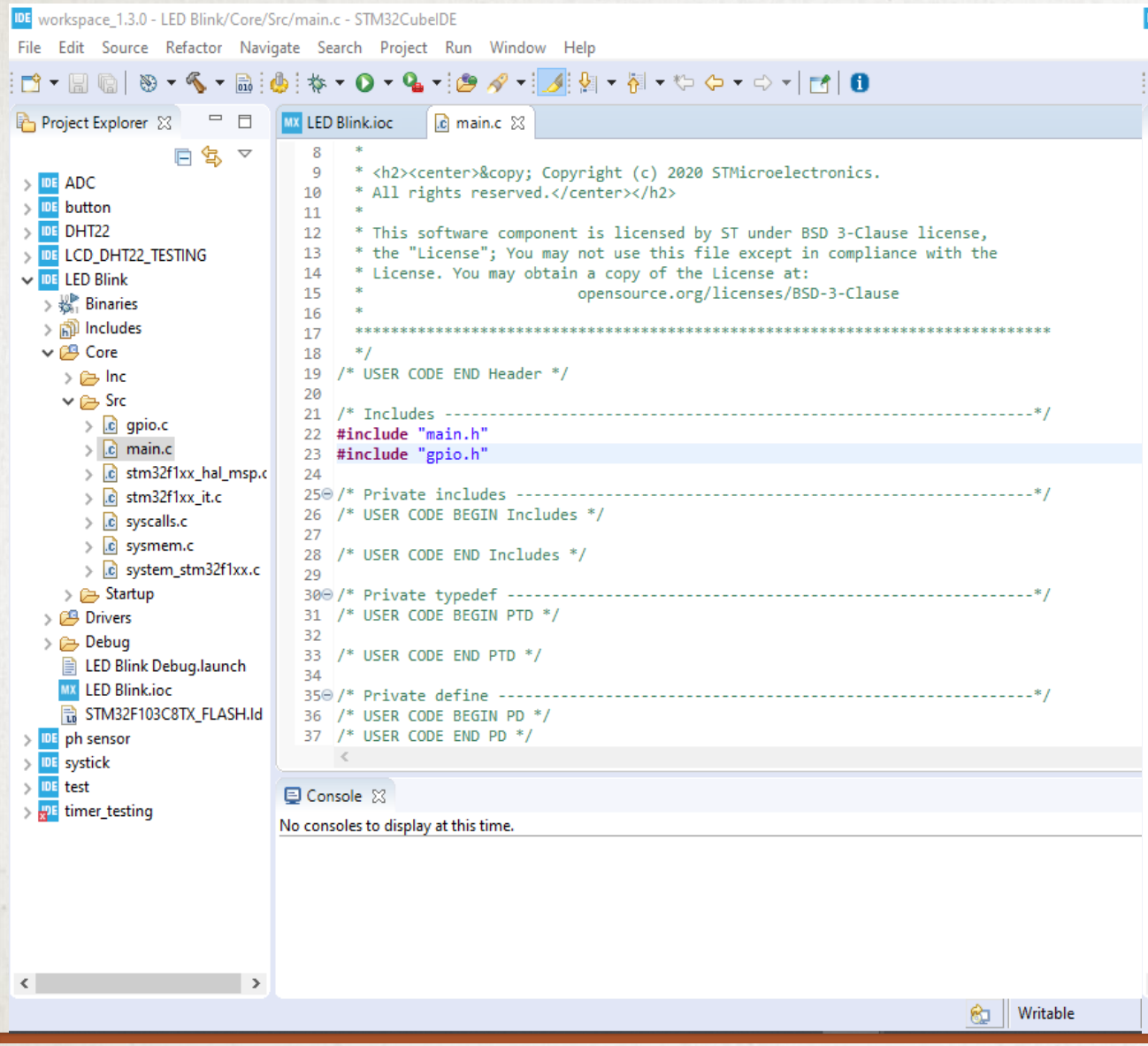


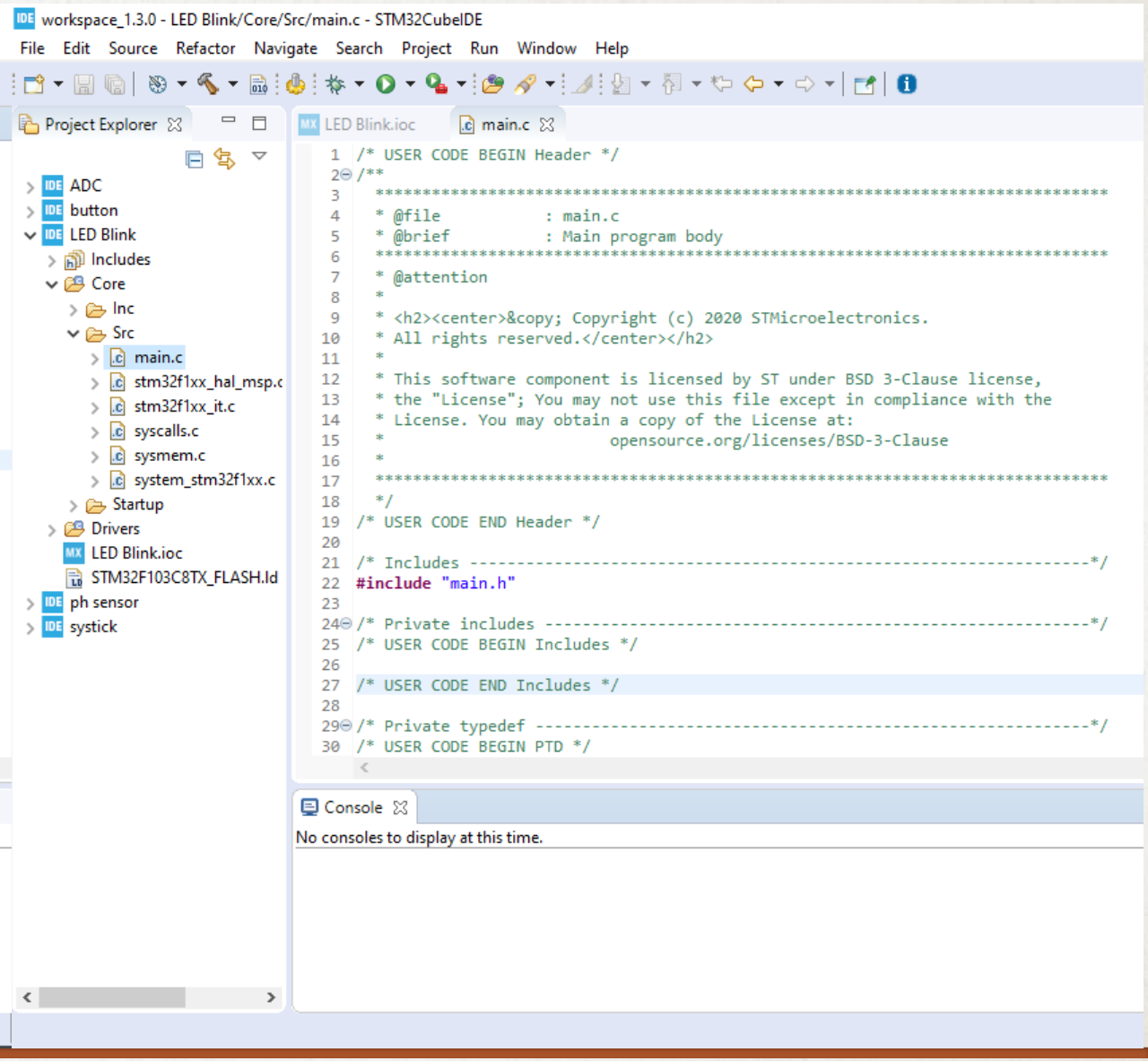

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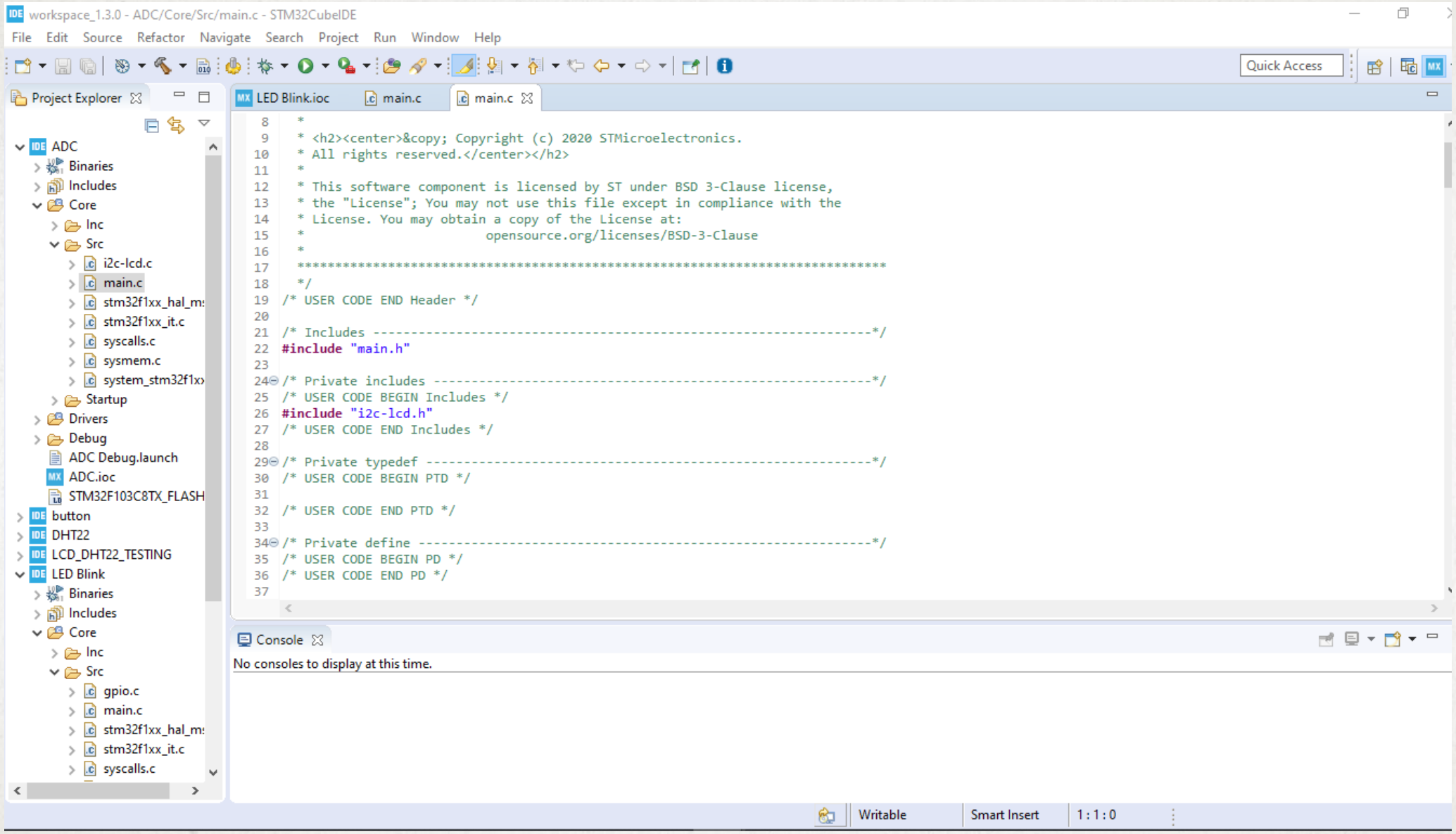

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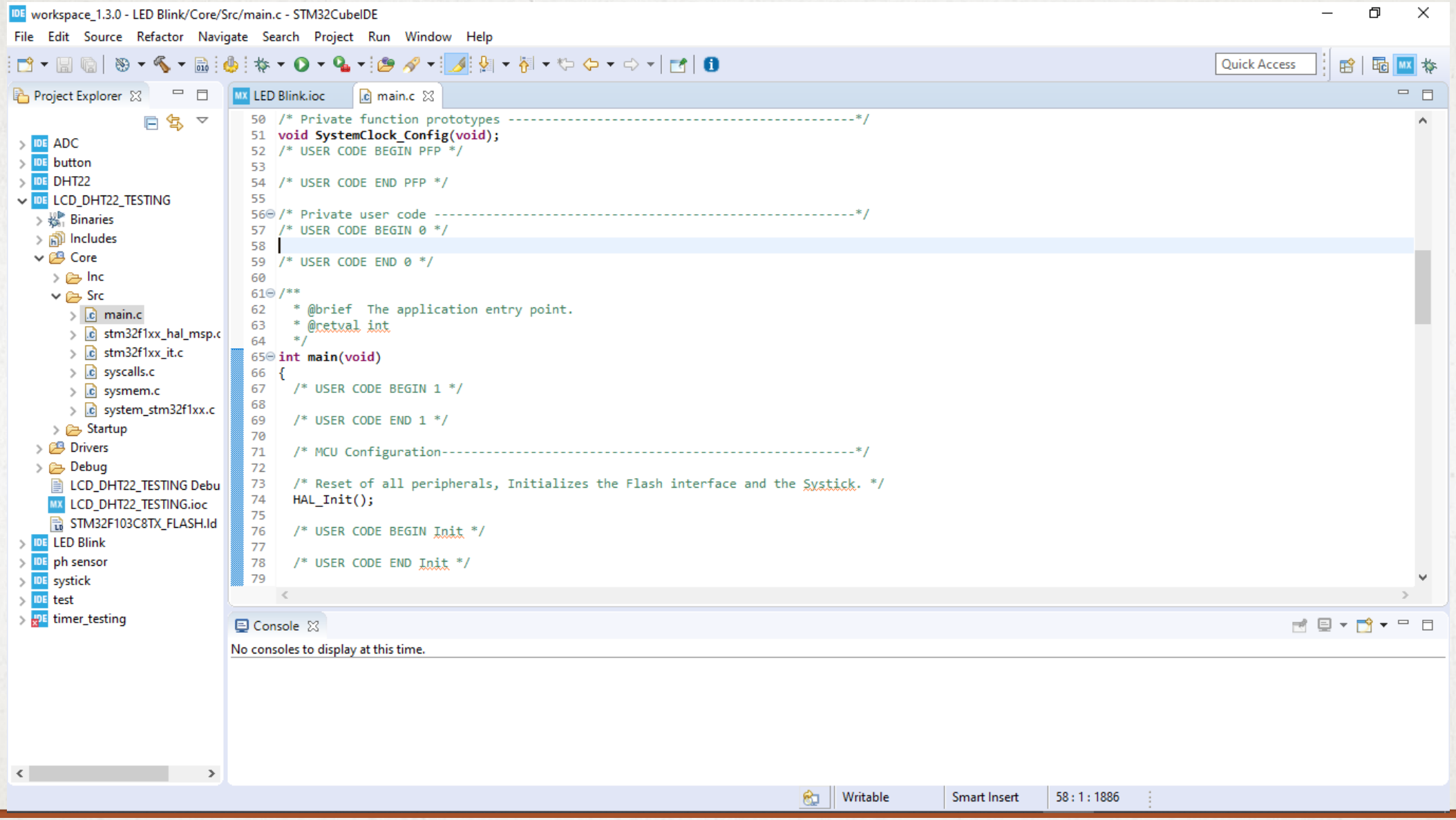

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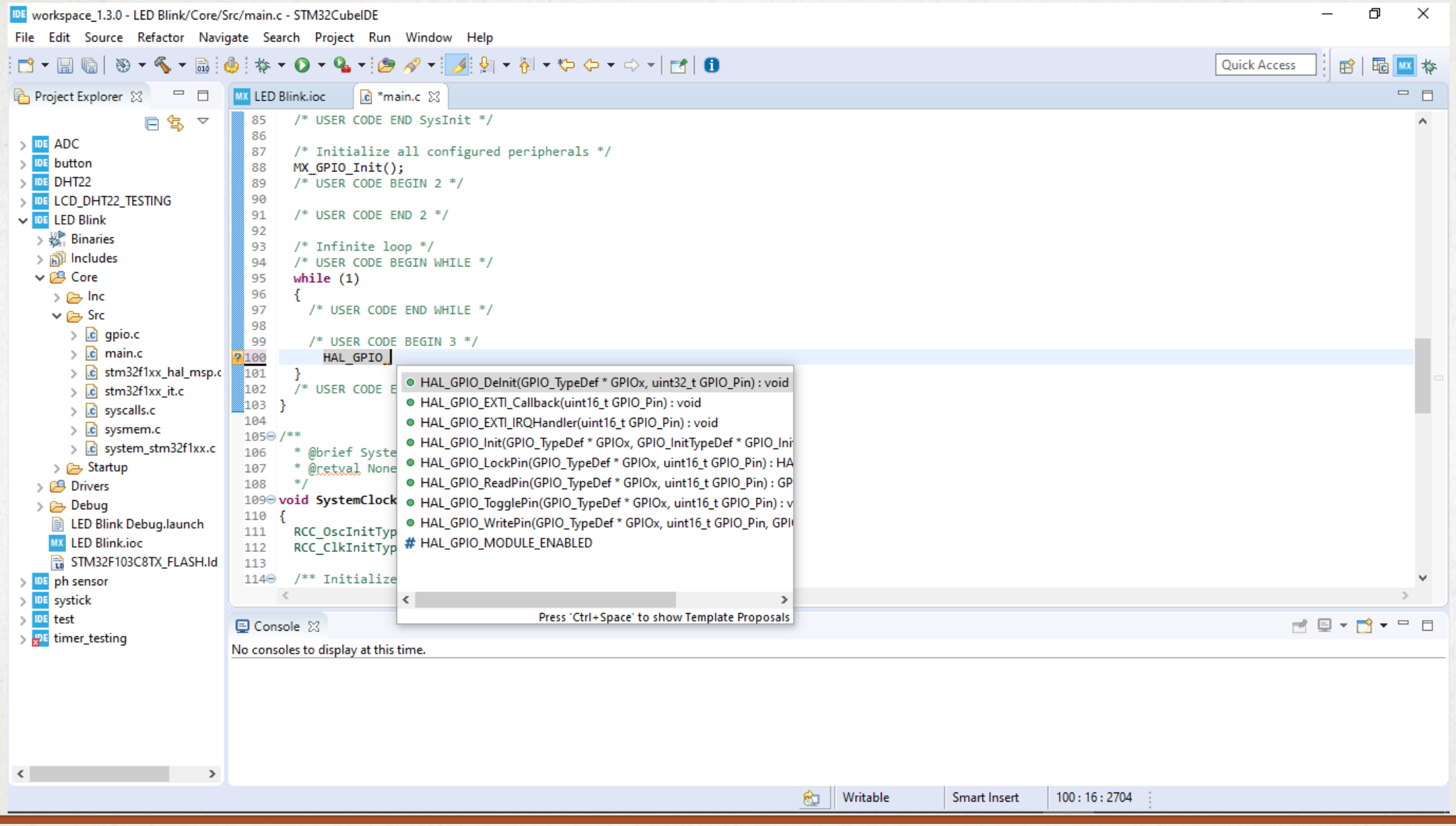

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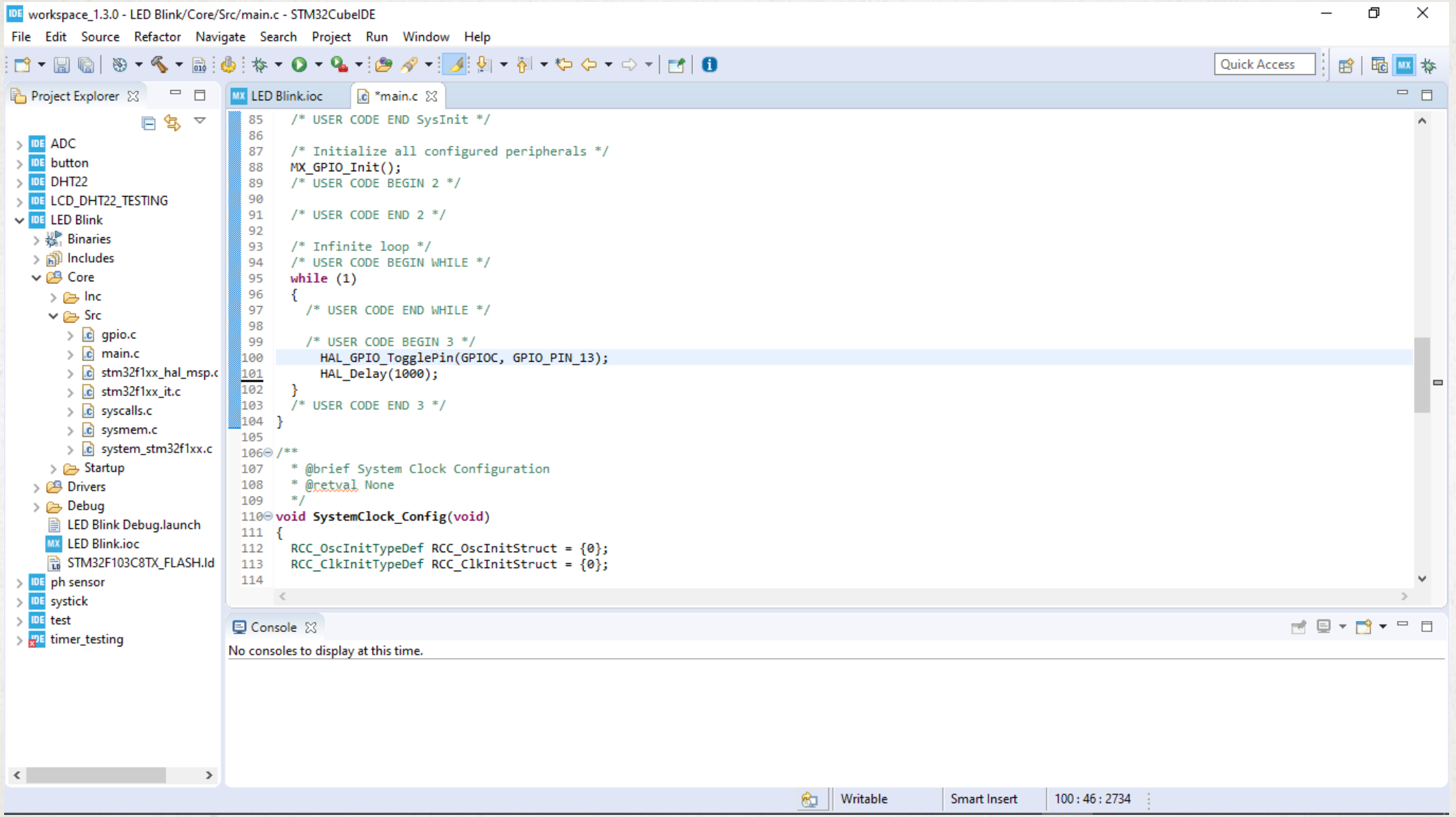
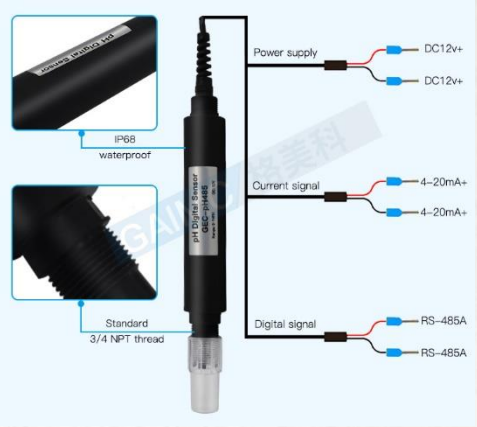


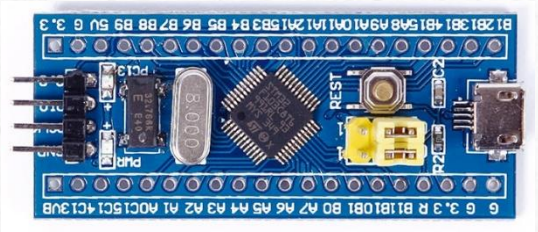
# STM32F1 MCU & COMPONENTS

1. GPIO to set pin I/O
2. TIMER to set *µs or ns and PMW*
3. Communication:
   - ADC
   - UART
   - I²C
   - SPI

ADC (Analog)




RS485 to UART (UART)



Micro-Controller

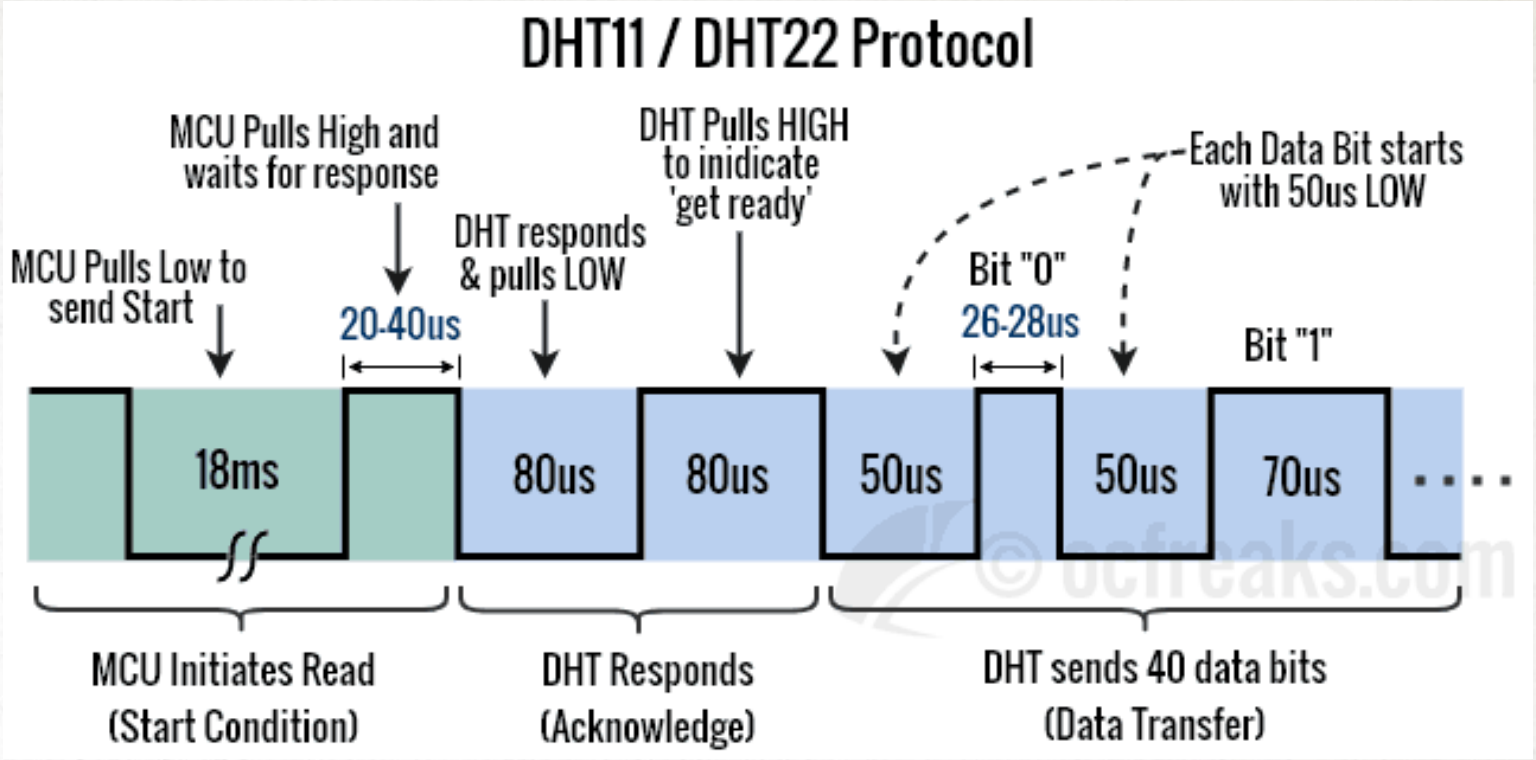
I²C

Single-bus

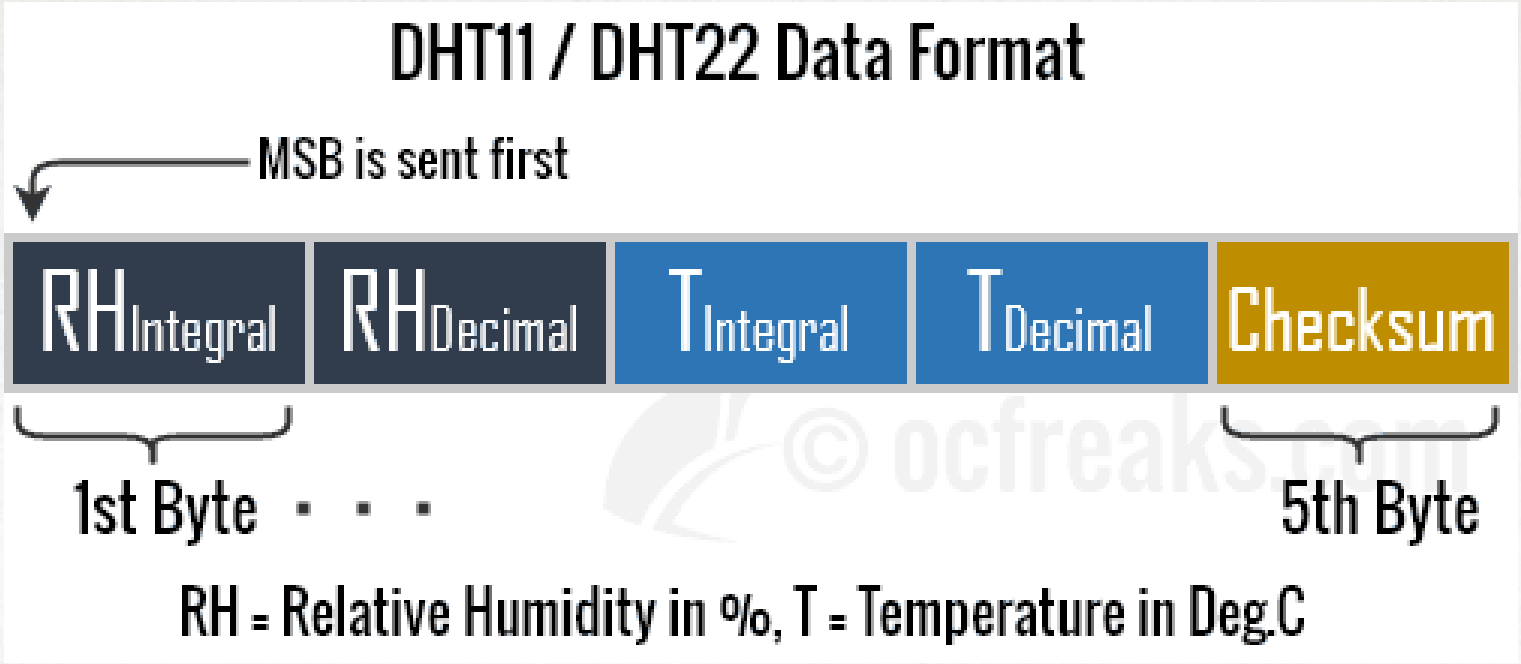
# DHT22 COMMUNICATION

There are 3 steps to make communication MCU with DHT22:

1. MCU send out start signal to DHT22:
   - Set the (data) pin as output
   - Pull the pin low and wait 1-18ms
   - Pull the pin high and wait 20-40$\mu s$
   - Release the pin by setting it as input
2. DHT22 send responds signal :
   - Wait for 40 us
   - Check if the pin is low, then wait 80 $\mu s$ this will totally delay 120$\mu s$ and the pin should be high now.
   - If the pin is high then response is OK
   - Then wait for the pin to low.
3. DHT22 send data to MCU:
   - Wait for the pin to high
   - Wait for the 40 $\mu s$. if the pin is still high after 40 $\mu s$ so, bit is '1' because the length of '0' bit is 26-28$\mu s$.
   - Write the respective values to the variable.



# DHT22'S DATA TRANSMISSION




- DHT22 will send 40 bits of data as follows:

DATA = 8 bit integral RH data+8 bit decimal RH data+ 8 bit integral T data+8 bit decimal T data + 8 bit checksum. If the transmission data is right, checksum should be the last 8 bit.

- Each bit's transmission begin with low-voltage-level that last 50 $\mu s$
- If the length of high-voltage is around 26-28 $\mu s$, the bit is '0'
- If the length of high-voltage is around 70$\mu s$, then the bit is '1'

# THANK YOU