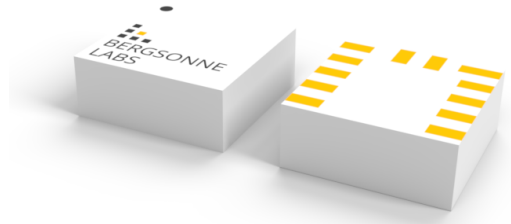




# Core.ST.L4.1

USB-programmable Cortex-M4

The USB-programmable Core.ST.L4.1 (formerly Core.U.1) is based on the 80-MHz 32-bit Cortex-M4 STM32L422 with 128KB flash, 40KB SRAM, and a CoreMark score of 273.55. The exposed pads provide a user-configurable combination of two fast-mode-plus I2C ports, one SPI port, three 12-bit ADCs, multiple timers, USART, an onboard comparator, and capacitive-touch input. A programmable onboard LED provides a convenient status indicator. If more I/O is needed, consider the larger Core.ST.L4.2 in a T48-22 package.



| Overview   |  |
|------------|--|
| Revision   | a  |
| Package    | T44-12   |
| Power      | 1.71-3.6V (minimum of 3.0V for USB communications) |
| Component  | STM32L422TB  |
| Interfaces | I2C, SPI, USB, USART                               |

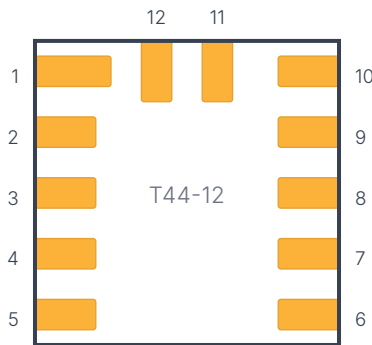
## Onboard Features

|            |   |
|------------|---|
| Status LED | Red · PA8 · (active-high)                             |
| Clock      | 16 MHz HSI16 · 4 MHz MSI · 48 MHz HSI48 — boots HSI16 |

## Configuration

|                          |  |
|--------------------------|--|
| GPIO pad configuration   | EXTI · Pull · Speed · Direction · Output default   |
| Pad function assignments | 9 pads — see Pad Assignments   |
| Clock configuration      | Low (8MHz, MSI) · Medium (16MHz, MSI) (default) · High (48MHz, MSI) · Max (80MHz, HSI16 + PLL)   |
| Programming methods      | USB DFU · USART1 · USART2 · USART3 · I <sup>2</sup> C1 · I <sup>2</sup> C3 · SPI1                |
| Interfaces               | USB · I <sup>2</sup> C1 · I <sup>2</sup> C3 · SPI1 · USART1 (enable / role / speed configurable) |

## Pad Assignments



(top view)

| PAD | TYPE    | FUNCTION | NOTE |
|-----|---------|----------|------|
| 1   | power   | GND      |      |
| 2   | digital | A7       |      |



|          |                |                          |   |
|----------|----------------|--------------------------|---|
|          | digital        | I2C3.CLK                 |   |
|          | digital        | SPI1.MOSI                |   |
|          | analog         | ADC12                    |   |
|          | timer          | TIM1.1N                  |   |
| <b>3</b> | <b>digital</b> | <b>A1</b>                |   |
|          | digital        | I2C1.SMBA                | optional SMBus alert                                    |
|          | digital        | SPI1.CLK                 |   |
|          | analog         | ADC6                     |   |
|          | timer          | TIM2.2                   |   |
|          | timer          | TIM15.1N                 |   |
|          | other          | COMP1.+                  |   |
| <b>4</b> | <b>digital</b> | <b>B6</b>                |   |
|          | digital        | I2C1.CLK                 |   |
|          | timer          | TIM16.1N                 |   |
|          | timer          | LPTIM1.ETR               | external trigger  |
|          | digital        | USART1.TX                |   |
|          | other          | G2.IO3                   |   |
| <b>5</b> | <b>digital</b> | <b>B7</b>                |   |
|          | digital        | I2C1.DAT                 |   |
|          | timer          | LPTIM1.2                 |   |
|          | digital        | USART1.RX                |   |
|          | other          | G2.IO4                   |   |
| <b>6</b> | <b>digital</b> | <b>A12</b>               |   |
|          | digital        | SPI1.MOSI                |   |
|          | timer          | TIM1.ETR                 | external trigger  |
|          | digital        | USART1.RTS_DE            | RS232 ready-to-send / RS485 driver-enable               |
|          | digital        | USB.DP                   |   |
| <b>7</b> | <b>digital</b> | <b>A11</b>               |   |
|          | digital        | SPI1.MISO                |   |
|          | timer          | TIM1.4                   |   |
|          | timer          | TIM1.BKIN2               | break input to disable PWM output                       |
|          | timer          | TIM1.BKIN2_COM           | break input to disable PWM output based on COMP1 output |
|          | digital        | USART1.CTS <sup>P1</sup> | RS232 clear-to-send                                     |
|          | other          | COMP1.OUT                |   |
|          | digital        | USB.DM                   |   |
| <b>8</b> | <b>digital</b> | <b>B4</b>                |   |
|          | digital        | I2C3.DAT                 |   |
|          | digital        | SPI1.MISO                |   |
|          | digital        | USART1.CTS               | RS232 clear-to-send                                     |
|          | other          | G2.IO1                   |   |
| <b>9</b> | <b>digital</b> | <b>A4</b>                |   |
|          | digital        | SPI1.CS                  |   |



|    |         |            |   |
|----|---------|------------|---|
|    | timer   | LPTIM2.OUT | break input to disable PWM output   |
|    | other   | COMP1.-    |   |
| 10 | power   | V+         | 1.71-3.6V (>=3.3V for USB)  |
| 11 | system  | BOOT0      | internal pull-down defaults to run mode, hold high during reset to enter bootloader |
|    | digital | H3         |   |
| 12 | system  | NRST       | active-low reset with internal pull-up  |

## Interfaces

### I2C1

I2C

Mode **master, slave**  
 Max Clock **1MHz**  
 Address **programmable**  
 Format **7-bit addr**

| FUNCTION  | REQ | PAD(S) |
|-----------|-----|--------|
| I2C1.CLK  | Yes | 4      |
| I2C1.DAT  | Yes | 5      |
| I2C1.SMBA | No  | 3      |

### I2C3

I2C

Mode **master, slave**  
 Max Clock **1MHz**  
 Address **programmable**  
 Format **7-bit addr**

| FUNCTION | REQ | PAD(S) |
|----------|-----|--------|
| I2C3.CLK | Yes | 2      |
| I2C3.DAT | Yes | 8      |

### SPI1

SPI

Mode **master, slave**  
 Max Clock **40Mhz (master), 20MHz (slave)**

| FUNCTION  | REQ | PAD(S) |
|-----------|-----|--------|
| SPI1.CLK  | Yes | 3      |
| SPI1.MISO | No  | 7, 8   |
| SPI1.CS   | No  | 9      |
| SPI1.MOSI | No  | 2, 6   |

### USB

USB

| FUNCTION | REQ | PAD(S) |
|----------|-----|--------|
| USB.DP   | Yes | 6      |
| USB.DM   | Yes | 7      |

### USART1

USART

| FUNCTION      | REQ | PAD(S) |
|---------------|-----|--------|
| USART1.TX     | Yes | 4      |
| USART1.RX     | Yes | 5      |
| USART1.RTS_DE | No  | 6      |
| USART1.CTS    | No  | 7, 8   |

## Application Notes

### Bootloading

When the chip is blank, it will default into the bootloader when connected over USB. Once there is code in the program space, you need to hold the BOOT0 pin low during reset (either power-on or via the NRST pin) to enter the bootloader.

### LED

The onboard LED is connected to PA8 in an active-high configuration.