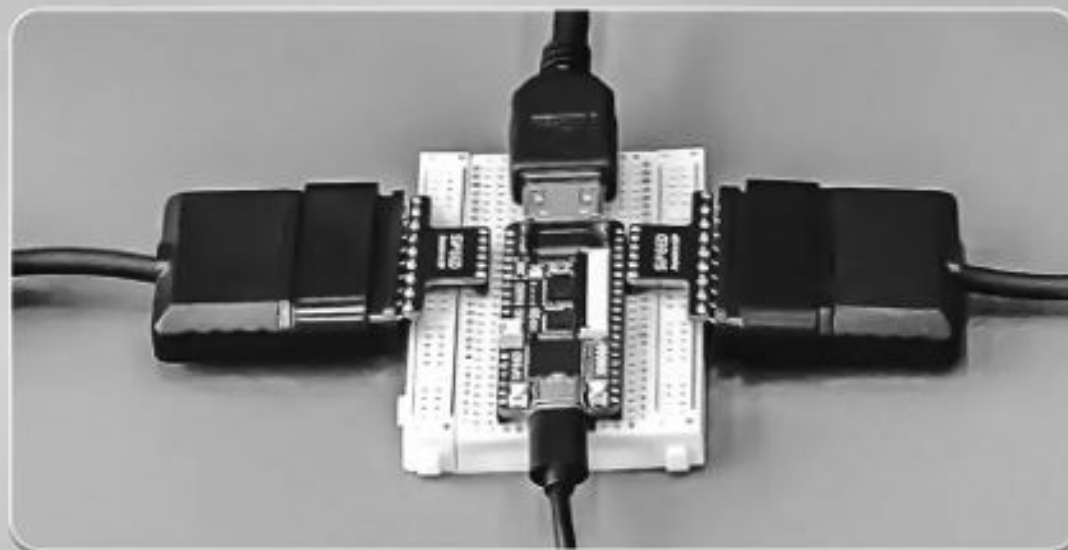


SiPEED

# Tang Nano 20K

Retro Game Emulator





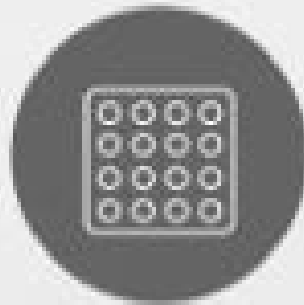
**Note: Require a microSD card to store game ROMs**

[From: Github@NovaTheSquirrel]

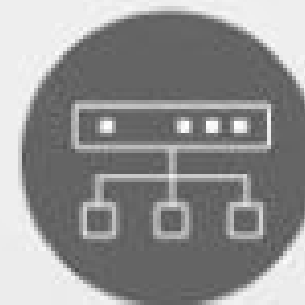
# FEATURES



Retro Game Emulator



Breadboard-Friendly



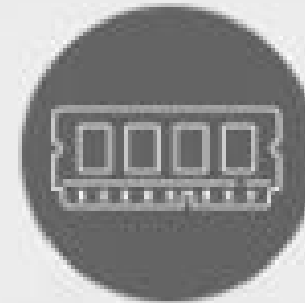
Mutiple video out



Risc-V Softcore



20K LUT4



64Mbit SDRAM

# INTRODUCTION



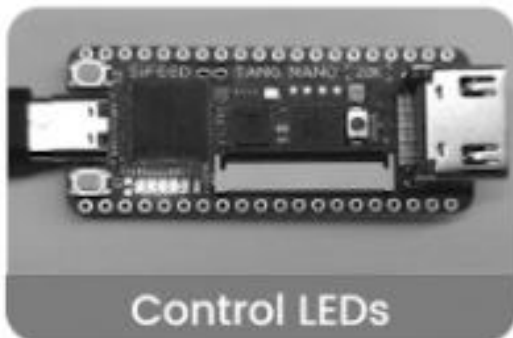
Tang Nano 20K is a new development board from the SIPEED Tang Nano series. It has the same number of logic units as Tang Primer 20K, but its size is compressed to the extreme of 5.5 x 2.3 cm!

It has a built-in low-latency 64Mbits SDRAM, which makes it easier to run NES emulator and softcore Linux system.

The onboard debugger is upgraded to USB2.0 HS interface, which has high-speed JTAG download, UART test, high-speed SPI reception, and precise configurable clock functions.

Compared with the previous Nano series FPGA chips, it is a huge upgrade. Maker design? Retro game Emulator? DIY development? Learn Verilog? RISC-V softcore? It can satisfy you all!

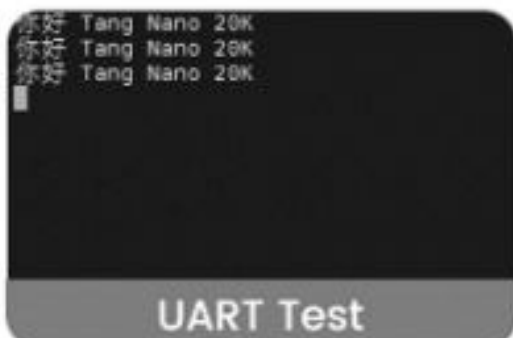
# Open source examples



Control LEDs



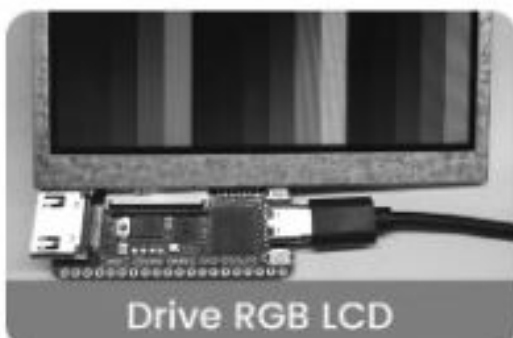
Control WS2812



UART Test



Display on Monitor



Drive RGB LCD



Drive Speaker



NES Emulator



LiteX



Linux

# IDE experience

Compared with other FPGA Integrated Development Environment, Gowin IDE install package is less than 200MB, and takes just about 500MB storage for installing, saves the disk space.

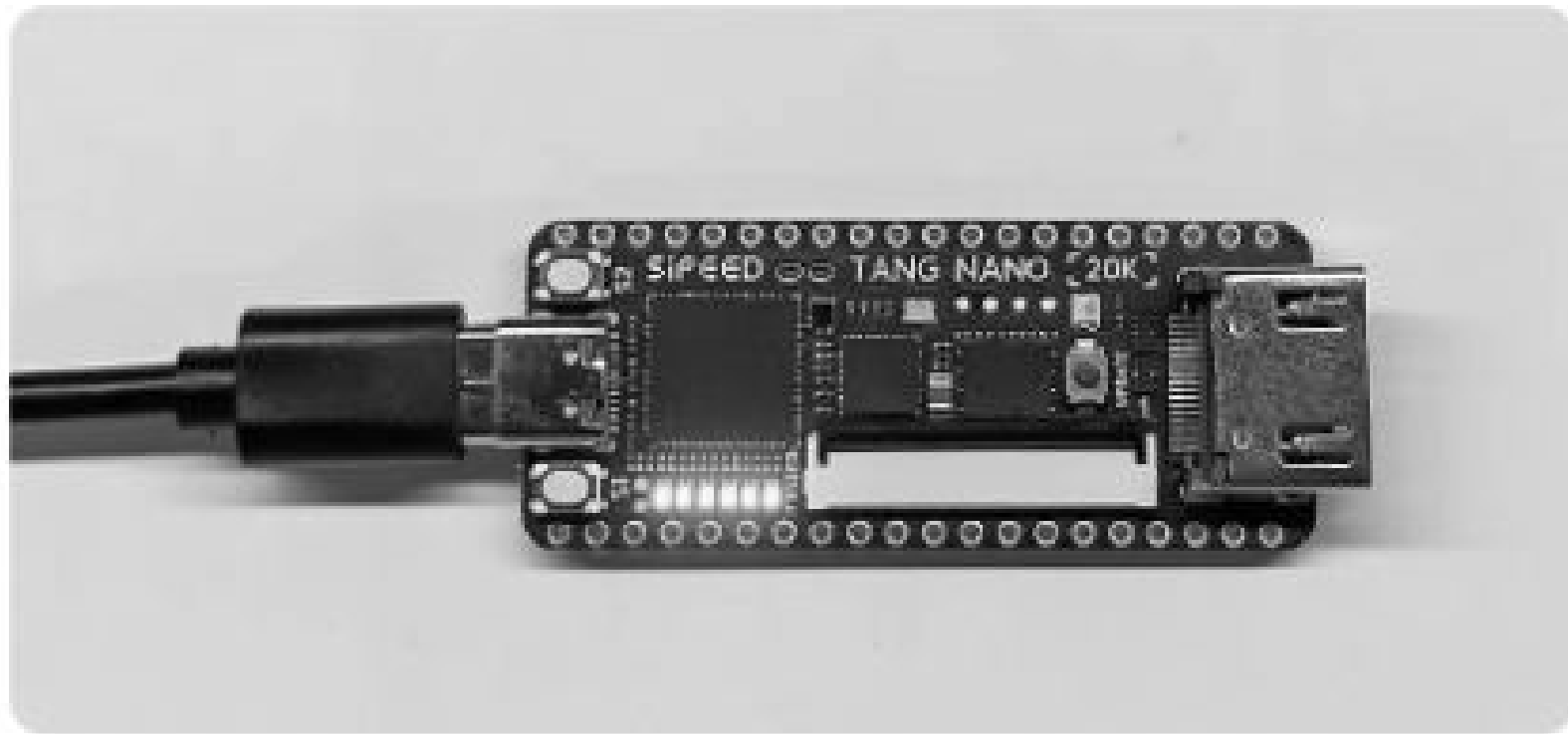
And the IDE is really easy to use. It contains only a few options for users, this does not overwhelm beginners.

Apart from these, GOWIN IDE is really fast and it can bring a pleasant experience of only 10 seconds to synthesize the program that you spent 5 minutes writing.



## Program Device

Tang Nano 20K contains onboard debugger, so it does not require extra debugger, but only one USB cable is OK when programming this device.



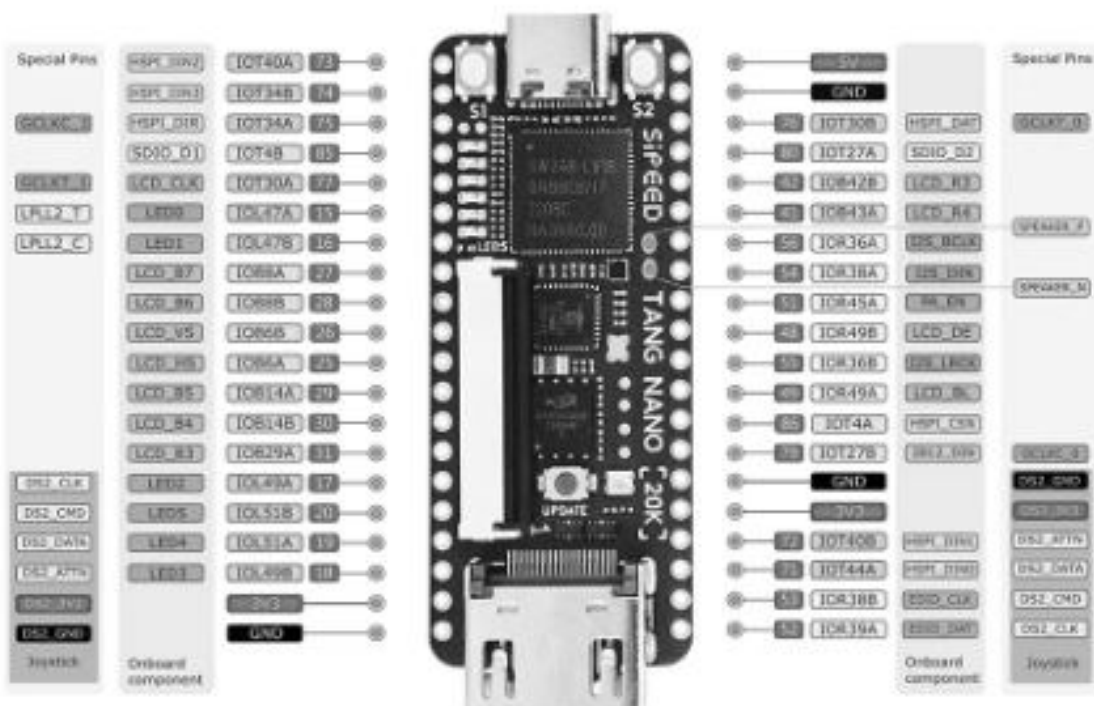
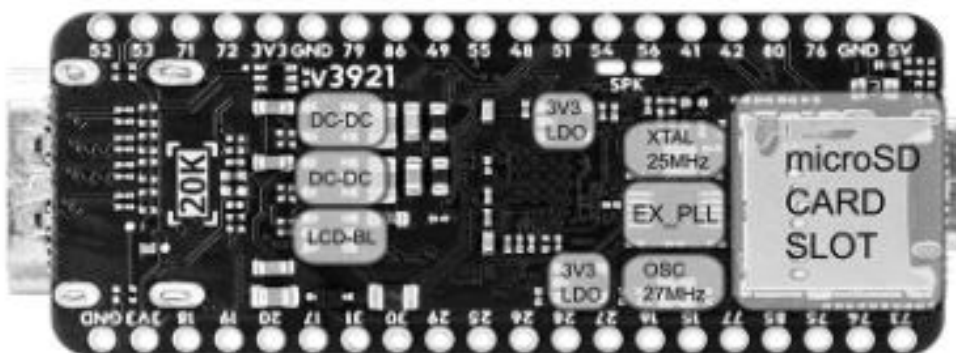
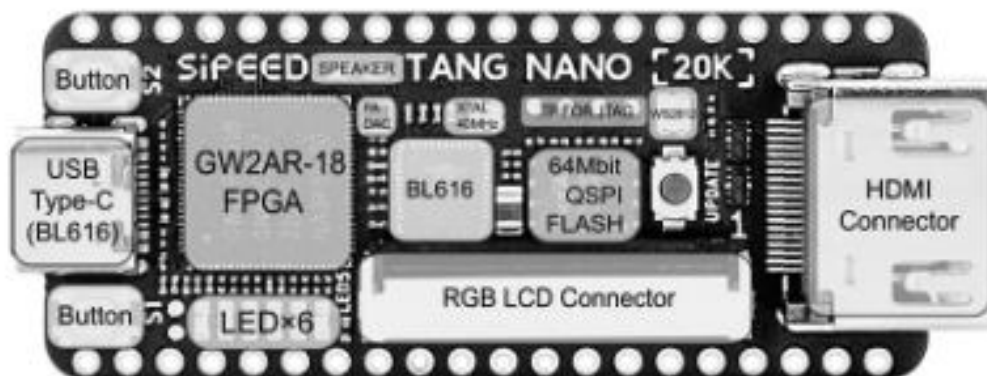
# COMPARED

...

Kit Model			
Kit Model	Tang Nano 20K	Tang Primer 20K Dock	Tang Nano 9K
Main Chip	GW2AR-LV18	GW2A-LV18	GW1NR-LV9
LUT	20736	20736	8640
Block RAM	828Kbit+41Kbit	828Kbit	468Kbit+17Kbit
18 x 18 Multiplier	48	48	20
PLLs	2	4	2
SDRAM	64Mbit with 32bit width	1Gbit DDR3 with 16bit width	×
PSRAM	×	×	64Mbit with 16bit width
External Flash	64Mbit QSPI NOR	32Mbit SPI NOR	32Mbit QSPI NOR
Internal Flash	×	×	608Kbit
Audio DAC	√	√	×
SD Card	microSD	microSD	microSD
LCD	Support RGB LCD	Support RGB LCD Support SPI LCD	Support RGB LCD Support SPI LCD
WS2812	√	√	×
Ethernet	×	√	×
Camera	×	Default OV5640	×
HDMI	√	√	√
Accurate Clock	√	×	×
Onboard Debugger	USB to JTAG & UART USB to SPI	USB to JTAG & UART	USB to JTAG & UART



# FUNCTION ANNOTATION



# INFORMATION



## Documents and use guide webpage

[wiki.sipeed.com](http://wiki.sipeed.com)



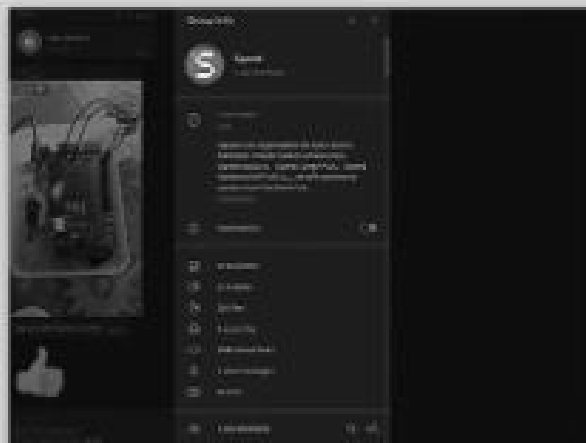
## Online technical exchange forum

[reddit.com/r/GowinFPGA/](https://reddit.com/r/GowinFPGA/)



## Online chat group

<https://t.me/sipeed>



## Official datasheet and IP core

<https://www.gowinsemi.com/en/support/>



# INFORMATION



Documents: [wiki.sipeed.com/nano20k](http://wiki.sipeed.com/nano20k)

Examples: [github.com/sipeed/TangNano-20K-example](https://github.com/sipeed/TangNano-20K-example)

Gowin IP Core: [www.gowinsemi.com/en/support/](http://www.gowinsemi.com/en/support/)

Forum: [reddit.com/r/GowinFPGA/](https://reddit.com/r/GowinFPGA/)

Online Group: [t.me/sipeed](https://t.me/sipeed)

Business email: [support@sipeed.com](mailto:support@sipeed.com)

## Attention:

1. Use Educational edition IDE version  $\geq$  1.9.8.11, otherwise the chip on Tang Nano 20K is not in the Educational IDE.
2. The FPGA chip on Tang Nano 20K is GW2AR-LV18QN88C8/I7. Select the QN88 chip package in the IDE.
3. Do not use JTAG, MODE, or DONE these pins which are used for configuring FPGA. If you really need to use these pins, please check the GOWIN manuals.
4. Avoid static electricity hitting the PCBA. Release the static electricity from the handle before touching the PCBA.
5. The working voltage of each GPIO has been marked in the schematic diagram. Do not let the actual working voltage of GPIO exceed the rated value, otherwise it will cause permanent damage to the PCBA.
6. Ensure that the FPC soft cables are properly inserted into the interface without deviation.
7. During the power-on process, avoid any liquid or metal from touching the welding pad of the components on the PCBA. Otherwise, short circuit causes the PCBA burned.
8. Please connect the FPC according to the picture below.

