

LattePanda

Is it a PC, a Raspberry Pi competitor or an Arduino board? **Mike Bedford** put this unusual product through its paces in order to find out.

SPECS

OS: Ubuntu 16.04 LTS or Windows 10
CPU: Intel Cherry Trail Z8350, 1.8GHz, quad-core, 2MB cache, 64-bit, VT-x, AES
GPU: Intel HD Graphics
Mem: 2GB, 1,600MHz DDR3L
SSD: 32GB (plus microSD slot)
Display: HDMI (max 1080p), DSI
USB: 2x 2.0, 1x 3.0
Comms: 100Mbps Ethernet, Wi-Fi 802.11n 2.4GHz, Bluetooth 4.0
Arduino: ATmega32U4
GPIO: 20 Arduino, 6 gravity sensors, 6 Intel CPU
Size: 88 x 55mm, 55g

Since there are several similar products to the LattePanda, we need to spell out exactly what we are reviewing here. It's described as the LattePanda 2GB/32GB – that is, 2GB of RAM and 32GB of onboard flash storage. When we also point out that you'll often also see the phrase "Windows 10 Mini PC" tagged to the end of the name, you might think it's a strange product to review in *Linux Format*, but things aren't that simple.

Certainly, the LattePanda launched as a Windows 10-only product – unusual in the world of SBCs where Linux dominates – but Linux is now officially supported too. At this point we need to clarify things further by referring to the fact that even the 2GB/32GB board is available as two variants. Both versions have Windows 10 pre-installed in the boards' flash storage, but in one you get a Windows activation key and in the other you don't. Needless to say, since there's a price difference of almost £29 and you're not going to be using Windows – indeed, you'll be overwriting it – you should choose the non-activated version which has our quoted price. You might also like to take a look at the designer's website, www.lattepanda.com.

Lattes all round?

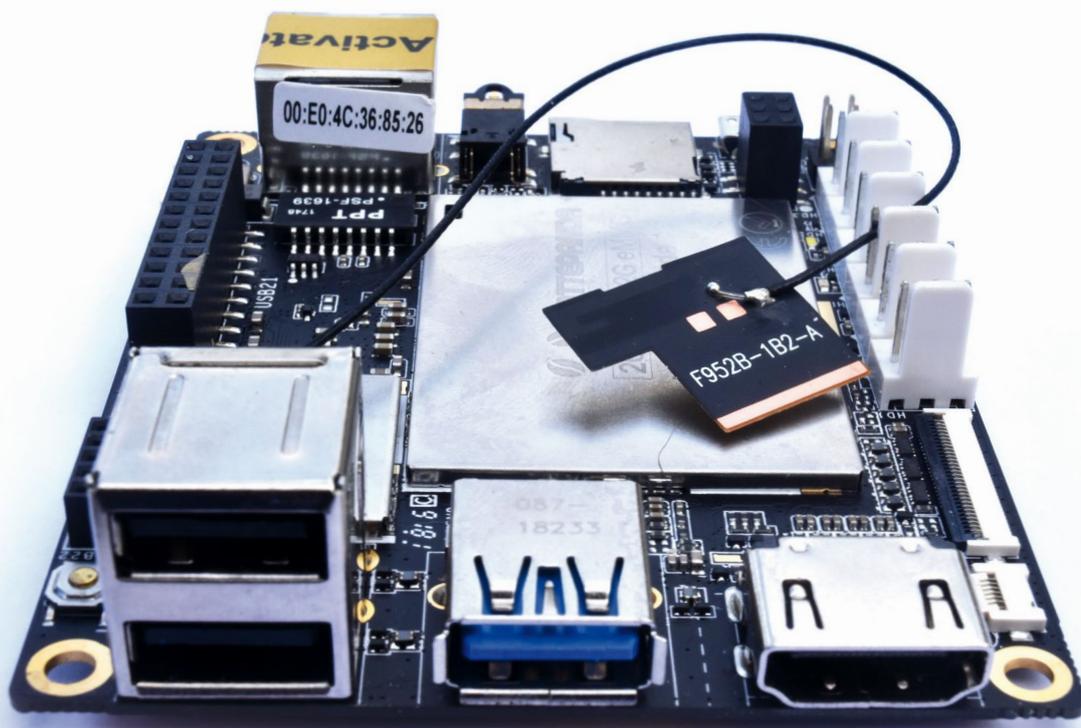
The LattePanda has a similar form factor to the Raspberry Pi, measuring the same lengthways and being just 12mm wider than the RPi 4. It has two full-sized USB 2.0 and one USB 3.0 ports, a full-sized HDMI socket, an Ethernet socket and a micro-USB socket for power.

There's a serial display connector for attaching a touch-screen LCD panel, but not a camera connector – although you could use a USB camera. It also supports Wi-Fi and Bluetooth 4.0. The GPIO connectors look markedly different from that of the RPi, though.

The main difference between the LattePanda and Raspberry Pi – and also the RPi's various competitors for that matter – is in its CPU. While nearly all SBCs are equipped with an Arm device of some sort, the LattePanda has a 64-bit Intel Cherry Trail Z8350, with four cores clocked at 1.8GHz, plus Intel HD graphics. A variant with 4GB is also available, so we're in the same region as the RPi 4. Oh, and while the LattePanda does have a microSD card slot, we shouldn't forget its 32GB of onboard storage, so it saves you £5-£10 compared to what you'd have to pay with most SBCs.

Real-world interfacing

If you want to use the LattePanda as the heart of a PC, or for similar software applications as a Raspberry Pi, then what we've seen so far is all you'll need to know. However, if you're interested in interfacing via the GPIO for experimentation or embedded applications, there are some caveats. The most unusual aspect of the LattePanda is that it doesn't have a Raspberry Pi-compatible GPIO but, instead, its interface to the outside world is Arduino-compatible (see box, opposite page). LattePanda is very unusual in offering Arduino compatibility on a board that runs Linux with an HDMI output. It does this by having an onboard ATmega32U4



It comes with Windows 10 pre-installed, but don't let that put you off!

coprocessor, the chip family used on Arduino boards, with which it communicates via a hidden USB port. As such, it's not too dissimilar – but a lot neater – than the typical setup of a PC with an external Arduino attached via a USB port. Specifically it's compatible with the Arduino Leonardo, which has 20 digital I/Os and 6 gravity and 6 Intel analogue inputs. However, the physical arrangement of the headers is different from Arduino boards, which means you'll only be able to fit Arduino shields (add-on boards) with a converter. We should also point out that, in addition to the Arduino GPIO, there is a header for the main CPU containing six GPIOs.

What's it do, then?

If you've never upgraded a PC from Windows to Linux and are a bit wary of doing that to a brand new SBC, our advice is simple: don't be afraid. The LattePanda website gives clear instructions and we had no issues whatsoever. In fact the only real difference between this and installing an operating system onto a board such as the Raspberry Pi is that you'll be writing it to onboard storage, via a USB stick, rather than to a microSD card. However, while some SBCs give you a choice of several flavours on Linux, there's currently just the one for the LattePanda: the now somewhat outdated Ubuntu 16.04 LTS.

A slight oddity is that when you apply power to the LattePanda, a couple of LEDs light up but it doesn't actually boot. Unlike most SBCs, it only boots when you subsequently push and release the onboard power button. This seems an unnecessary inconvenience, and it also precludes you from fitting it into a case, given the miniscule dimensions of the pushbutton and the fact that there's no header to which you can attach an external button. Apparently you can change the firmware to one that boots as soon as power is applied, but we didn't try that. Other than that niggle, start-up is quick, and you'll be at the login page in well under 30 seconds.

With a quick start-up under its belt, we were keen to learn more about the LattePanda's performance. After all, while four cores clocked at 1.8GHz might sound fast, it's pretty much impossible to make meaningful comparisons since most SBCs use Arm CPUs of some sort. *Sysbench* certainly has its critics but, as a quick and ready way of measuring processing power, it's useful because corresponding figures for other platforms are readily available – so we've used that.

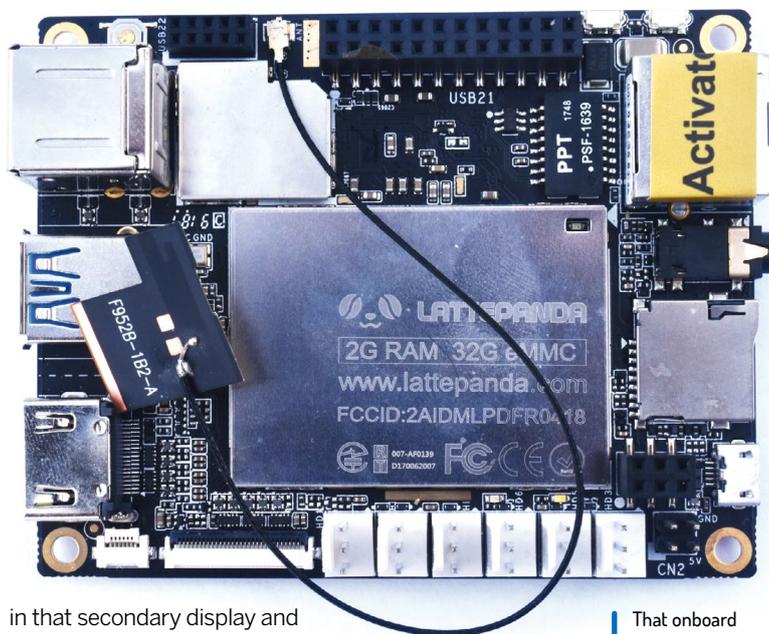
The CPU test uses an application for calculating prime numbers and we configured it to find all up to a value of 20,000, because this is a commonly used test. Running on all cores, it completed in 35 seconds. For comparison, quoted figures for the Raspberry Pi 3 B+ and Raspberry Pi 4 are in the region of 82-94 seconds (the exact time depending on the temperature and hence the clock speed) and around 63 seconds respectively. That's about 1.8 and 3.7 times faster than the latest and greatest RPi and its predecessor.

Turning to the Arduino functionality, while the necessary Arduino IDE software is pre-installed if you stick with Windows, this is not the case if you upgrade it with the supported Ubuntu image. Having to install it yourself would be only a minor irritation, but we have to report that getting it to work wasn't as straightforward as we'd expected, taking us over half a day of detective work. First, Ubuntu is configured with two monitors and, unless you disable the secondary one, the Arduino IDE displays

» UNDERSTANDING ARDUINO

Arduino boards are quite unlike most other SBCs because they don't run an operating system or drive a display. This is because they're intended for embedded applications – a piece of equipment where the user might not be aware that a computer is buried inside, working in the background – where these are would be an unnecessary overhead. The result is that they can use very cheap processors to good effect.

For example, the ATmega32U4 that's used in the Arduino Leonardo, and also in the LattePanda to provide compatibility, has an 8-bit architecture and is clocked at just 16MHz. As a microcontroller it also has its own memory and flash storage on chip and these are also extremely modest: just 2.5KB and 32KB, respectively. Because of this, software is usually developed on a separate PC and uploaded to the Arduino. The LattePanda is probably unique, therefore, in offering Arduino compatibility while also running an operating system.



in that secondary display and you can't see it on your main display. Second, when we tried to download software to the Arduino coprocessor, it reported that permission was denied to use the necessary comms port. Only when we resolved the issue with permissions did it work correctly.

Hopefully these issues will be addressed with more comprehensive instructions regarding upgrading LattePanda to Ubuntu – indeed, they might even have been already, as you read this. **LXF**

That onboard storage accounts for some cost.

VERDICT

SUPPLIER: Farnell
WEB: <https://uk.farnell.com>
PRICE: £86.51

FEATURES	8/10	EASE OF USE	7/10
PERFORMANCE	8/10	VALUE	7/10

Despite costing more than twice as much as the Raspberry Pi 4, it offers an attractive set of alternative features.

» **Rating 8/10**