

Not all 120Hz smartphone screens are the same, this is why

90Hz and 120Hz panels are the latest trend in the smartphone market, but don't be fooled by the words marketing gimmicky.

Not all 120Hz phones have the same screen quality, features, and battery life. There are many things that make a great screen, not just the frame rate in the specs sheet.

And if you don't know, there are already some phones that are equipped with a high-frequency scanning screen, but this mode has been turned off right from the factory, or placed under certain restrictions in exchange for battery life. Google and Samsung are examples. In addition, there are questions that need to be answered about the quality of 120Hz monitors, as they are quickly appearing in the mid-range segment. Will such displays really compare to those 120Hz screens on flagship devices?

120Hz is not a guarantee for quality

While 90Hz and 120Hz monitors help move in certain applications and elements of the user interface (UI) look smoother, a higher refresh rate is not an indication of screen quality. . Color accuracy, brightness correction, and white balance are all independent of the refresh rate and have a greater impact on the quality of most displayed content. While 120Hz may look smoother, photos and videos may still look pale or oversaturated if the screen itself is poorly calibrated.

For that reason, different display models from different manufacturers will look quite different, even though they may have the same refresh rate. For example, low-cost monitors are more likely to experience noticeable problems during use, as well as poor color calibration. Be careful with low-cost phones equipped with high refresh frequency panels, as they can be a "blessing" to distract consumers from other issues. On the other hand, high-end flagship phone screens can have better color calibration than usual, which is why you should still pay attention to traditional display quality standards. refresh rate.

Traditional 60Hz monitors can still look better than 120Hz panels, at least in terms of color accuracy. This is especially true when comparing high-end 60Hz panels with cheap 120Hz monitors. Overall quality is definitely more important than the slightly smoother feel on the user interface. Moreover, just because a screen is advertised as 90Hz or 120Hz does not mean that the majority of applications and content will actually take advantage of it.



Android apps, content, and itself are important

Not only does the screen quality differ between devices - so does the amount of content that supports high refresh rates. What does it mean to own a phone with a 120Hz screen but never use it? This is a basic issue to consider when exploring monitors with high refresh rates.

The frame rate of an application or game depends not only on the hardware but also on how the application is programmed to render, and how Android works. Google has published information regarding how high refresh rate monitors work with content in Android. The first point to note is that the frame rate is limited by the rendering time, which is controlled by Android Choreographer. 120Hz monitors only have 8.3ms between frames, in which the GPU has to draw the frames. Some apps and games render at the monitor's refresh rate, so they can work at full frame rate. However, other applications simply take too long to build, or use custom rendering tools with lower update rates, so they simply cannot reach 120Hz. Instead, Games can stop at 90, 60, 45, or even 30fps.

The key thing to draw here is that: a phone with a 120Hz screen does not mean that every application will run at 120Hz. Phones with higher processing power are more likely to achieve high frame rates with lower latency, though some applications may be optimized for specific platforms.

The situation is more complicated when using many applications and UI elements at the same time. Google says 120Hz monitors will watch fine 24, 30, 45 and 60fps content without flicker, because 120 is divisible by these frequencies. Playing a 24fps video on a 120Hz screen avoids the 3: 2 downgrade algorithm required by a 60Hz monitor. However, conflicts can occur between software, for example, video has a low frame rate, while UI has a high frame rate. That's when Android has to jump in and choose a frame rate, which can lead to flicker and / or drop to 60Hz standard frequency.

In Android 11 there is a new API `setFrameRate`, which helps to find the optimal frame rate for many applications running at the same time. However, current devices still have to live with conflict. In short, applications and games can affect refresh rates, but the final decision rests with the platform. Let's hope next year's Android 11 phones will handle content with mixed refresh rates better than current models.

In general, making sure every application achieves very high frame rates is very difficult. Instead, Android will actively convert the frame rate to best suit the application you are choosing. But even so, it still depends on the

manufacturers that designed their devices.



Display processors are the differentiating factors

If you find everything still understandable, then read on: devices can also add their own display processing layer to upscale or eliminate flickering beyond the standard Android framework. Here, processing power is important, because some effects can use a lot of power. Independent display processors (DPUs) can perform these tasks much more efficiently. But you will need one more processor inside your smartphone.

Qualcomm Snapdragon processors are equipped with display and effects processors from the Adreno GPU series. These processors handle video decoding and rendering, and the application processor can run additional display processing software. For example, Pixelworks, a company specializing in display enhancement technology, took advantage of Snapdragon 865 to run Soft Iris calibration program and features such as tone-mapping and converting SDR to HDR on OnePlus 8 models. Other SoCs have their own DPUs, but mid- or low-end chips don't have the hardware to run more advanced features efficiently. For example, the Snapdragon 765G only supports 120Hz on the FHD + screen, while the 865 can "handle" 144Hz at QHD + resolution.

Complex display features will run more efficiently on independent processors. These include the Pixelworks' Iris5 and Arm's Mali-D77 or Arm's D71, although they possess different capabilities. For example, Iris 5 has the ability to upscale MEMC video frame rates and eliminate camera shake. Upscale and interpolation of videos, games, and other applications can help improve smoothness even when the default application is running at low frame rates. Advanced display processors not only bring new features, but also improve power consumption - a very important factor when using 120Hz monitors that drink batteries like water.



Not all 120Hz monitors are the same

Certainly everyone wants a monitor with a high frame rate, but there are many other things that contribute to overall display quality, not just hertz numbers. Standard image quality criteria still apply, and a monitor that supports 90 or 120Hz does not mean they will have excellent color or brightness. Still, 120Hz panels can look great, especially if your phone has software and hardware power to support advanced calibration and color mapping features.

In addition, you should also research whether there are other display features that come with the device. A standalone processor with advanced features can give you smoother content while ensuring all-day battery life, instead of an under-average 120Hz experience. And don't forget that future new apps, along with Android 11, will give you more opportunities to enjoy higher refresh rates.

That's why not all 120Hz smartphones are the same.

You finished reading the article "**Not all 120Hz smartphone screens are the same, this is why**" edited by the [TipsMake](#) team. We hope this article has provided you with many useful tech tips and tricks. You can search for similar articles on tips and guides. Thank you for reading and for following us regularly.