

# **Individual Project Report:**

## **Samsung s22 series New Features/technologies**

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# 1 Introduction

## 1.1 Product evolution



**Fig.1 Samsung s series evolution(2010~2022)**

Since the release of the first-generation Galaxy S device in 2010, Samsung Electronics has released hardware and software that break through the existing framework every year in the past twelve years. Among them, the most talked-about representatives include large-screen smartphones with perfect immersion, the perfect combination of smartphones and stylus pens, injecting users with endless productivity and creativity, and the world's first dual-pixel camera technology. In addition, the Galaxy Note series, Galaxy Tab series, and diversified wearable devices including Galaxy Watch and Galaxy Buds are intertwined together to form a far-reaching Galaxy ecosystem, creating subversive changes for users' lifestyles.

In 2010, Samsung released the first Galaxy S-series phone with the slogan "Super Smart." The arrival of the Samsung Galaxy S represents the image of 20 years of hard work in the mobile industry. In the past 12 years, Samsung S series have become a famous and trusting smart phone. It release the s1 to s10 every per year. After the Galaxy S10, Samsung release the next generation mobile phone in 2020, but it will not be named S11. It will be named s20. Instead, the Galaxy S20 will be released directly, and the Galaxy S21 will be launched in January 2021. It means the future s series smart phone will be named related to the release years. This series is split from the Galaxy series, and the Galaxy Note series is the

flagship mobile device product line of Samsung Galaxy. Compared with the Note series, the outer frame is more rounded. However, since the Note series was merged into the S series, starting from 2022, the Ultra model of the S series will be changed to a square body appearance like the Note series, with an S pen attached.

## 1.2 New technology



**Fig.2 Samsung s22, s22plus and s22 Ultra**

The Samsung Galaxy S22 flagship series adopts a brand-new processor and design, with beautiful appearance and powerful performance. The Galaxy S22 Ultra in the S series is equipped with a built-in S Pen for the first time, which makes this flagship machine have powerful performance, the experience of using the mobile phone is smoother, and it can also write down inspiration at any time. Of course, the camera function, which has always been excellent, has been improved again in the Samsung Galaxy S22 flagship series. Not only does it have movie-level follow-focus video recording, but it can also record wonderful moments in dark places.

## 2 Samsung S22 series spec

Phone	Galaxy S22	Galaxy S22+	Galaxy S22 Ultra
<b>Chipset</b>	Snapdragon 8 Gen 1/Exynos 2200	Snapdragon 8 Gen 1/Exynos 2200	Snapdragon 8 Gen 1/Exynos 2200
<b>RAM</b>	8GB	8GB	8GB, <b>12GB</b>
<b>Storage</b>	128, 256GB	128, 256GB	128, 256, <b>512GB, 1TB</b>
<b>Display</b>	6.1" FHD+ Dynamic AMOLED 2x, 48~120Hz refresh rate, 240Hz refresh rate	6.6" FHD+ Dynamic AMOLED 2x, 48~120Hz refresh rate, 240Hz refresh rate	<b>6.8" QHD+ Dynamic AMOLED 2x LTPO, 1~120Hz refresh rate, 240Hz refresh rate</b>
<b>Battery</b>	3,700mAh, 25W fast charging, 15W wireless charging, Reverse wireless charging	4,500mAh, <b>45W fast charging</b> , 15W wireless charging, Reverse wireless charging	<b>5000mAh, 45W fast charging, 15W wireless charging, Reverse wireless charging</b>
<b>Rear Cameras</b>	50MP f/1.8 primary, Dual Pixel AF, OIS; 12MP f/2.2 ultra-wide (120° FoV); 10MP f/2.4 3x optical zoom sensor with OIS; 30x digital zoom	50MP f/1.8 primary, Dual Pixel AF, OIS; 12MP f/2.2 ultra-wide (120° FoV); 10MP f/2.4 3x optical zoom sensor with OIS; 30x digital zoom	<b>108MP f/1.8 primary, 0.8μm large pixels, OIS and PDAF; 12MP f/2.2 ultra-wide (120° FoV); 10MP f/2.4 3x optical zoom sensor with OIS; 10MP f/4.9 10x optical zoom with OIS; 100x digital zoom</b>
<b>Front Camera</b>	10MP f/2.2	10MP f/2.2	<b>40MP f/2.2 with autofocus</b>
<b>Connectivity</b>	5G, Wi-Fi 6, Bluetooth 5.2, NFC	5G, Wi-Fi 6E, Bluetooth 5.2, NFC, <b>ultra-wideband</b>	5G, Wi-Fi 6E, Bluetooth 5.2, NFC, <b>ultra-wideband</b>
<b>Dimensions</b>	70.6 x 146 x 7.6mm, 168g, IP68 certified	75.8 x 157.4 x 7.6mm, 196g, IP68 certified	163.3 x 77.9 x 8.9 mm, 229g, IP68 certified
<b>Software</b>	One UI 4.1/Android 12	One UI 4.1/Android 12	One UI 4.1/Android 12
<b>S Pen</b>	-	-	<b>Yes</b>
<b>Colors</b>	Phantom Black, Phantom White, Green, Pink Gold; <b>Online exclusive colors:</b> Graphite, Cream, Sky Blue, Violet	Phantom Black, Phantom White, Green, Pink Gold; <b>Online exclusive colors:</b> Graphite, Cream, Sky Blue, Violet	Phantom Black, Phantom White, Green, Burgundy; <b>Online exclusive colors:</b> Graphite, Sky Blue, Red
<b>Price</b>	Starting at \$800	Starting at \$1,000	Starting at \$1,200

In this part, we summarized the specification with Samsung s22 series in the Fig.3. The galaxy S22 and Galaxy S22 Plus have similar specification. Compared with s22, s22 plus supports 45w fast charge and Ultra-wide band connectivity technology. Other specifications are the same except that the s22 plus is equipped with a 6.6 FHD+Dynamic AMOLED screen.

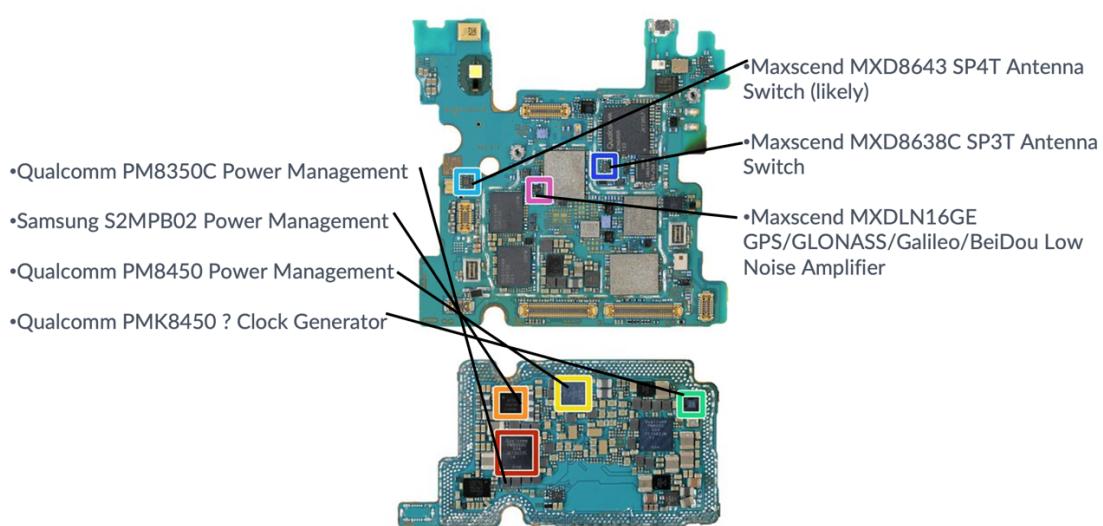
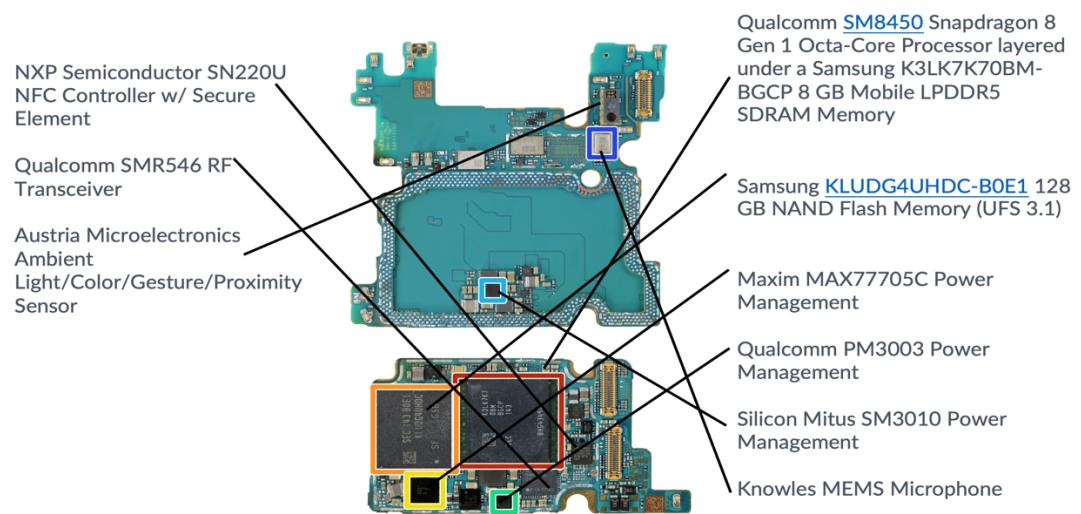
In terms of communication, S22 series use 5g communication, WIFI 6, Bluetooth 5.2 and s22 plus and s22ultra support the Ultra-wide band connectivity technology. Compared with the s22 and s22 plus mobile phones, s22 has improved a lot and has many new technologies, Including

The 6.8 inch QHD+Dynamic AMOLED screen with 1-120 Hz refresh rate, and 5000mAh battery capacity. In particular, this is the s22 ultra

equipped with Samsung's own S pen. This is also the first time galaxy s22 series equipped with the Samsung s-pen.

### 3 Samsung S22 series teardown

In this section, we teardown the Samsung Galaxy S22 .

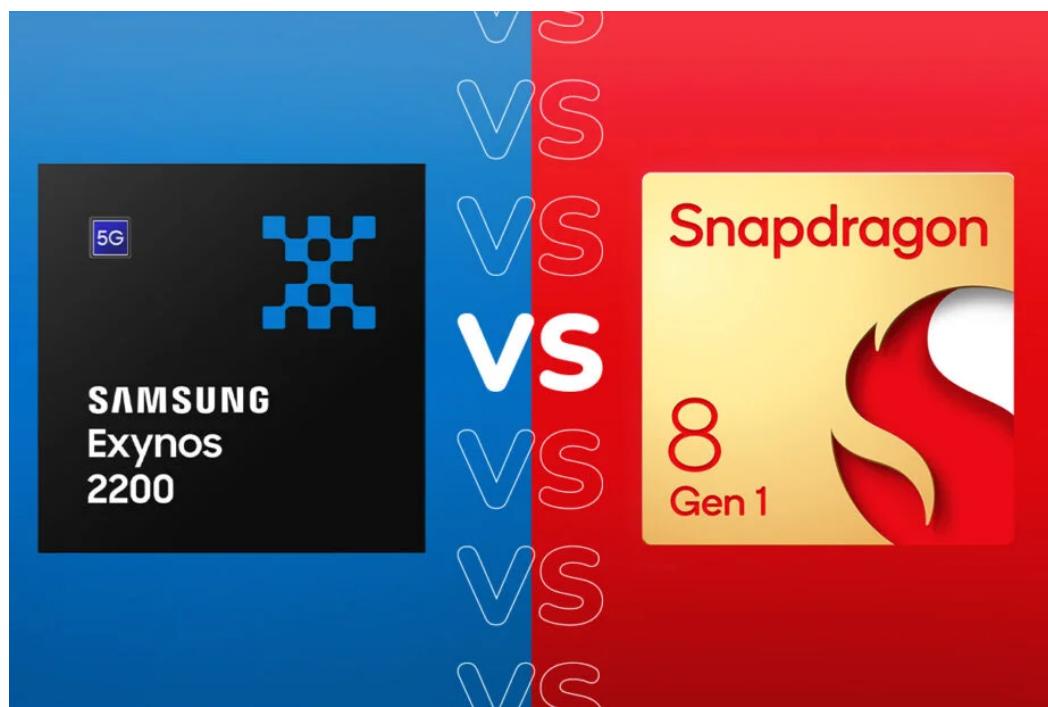


## 4 Samsung S22 series Technology analysis

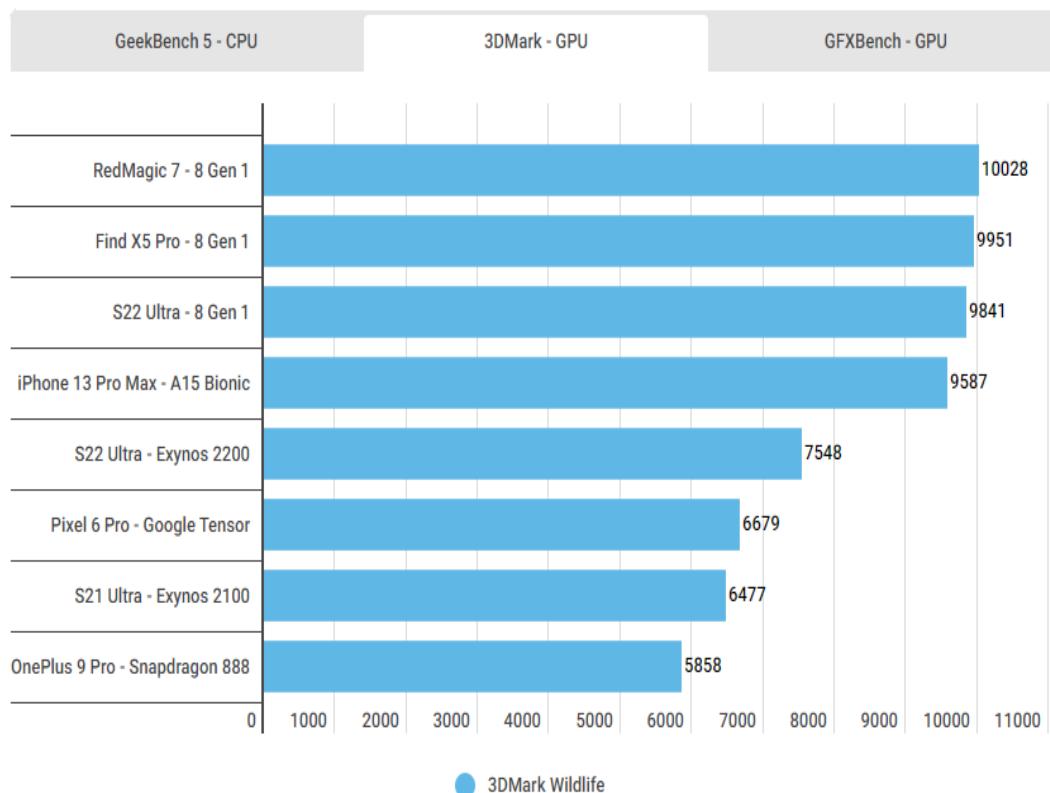
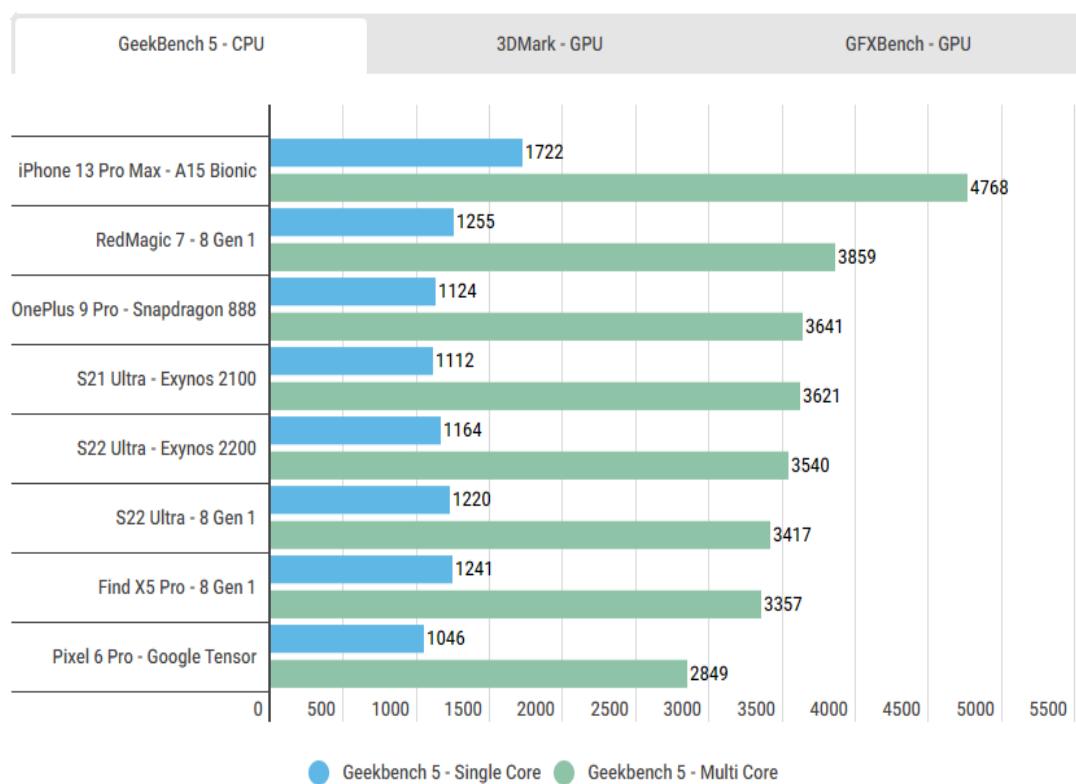
In this section, we discuss the technologies and application of the Samsung S22 series.

### 4.1 Chipset- Qualcomm's Snapdragon 8 Gen 1 and Samsung's Exynos 2200

In this section, we will talk about the chip in Samsung galaxy S22 series. This time the Samsung s22 series has launched two chip versions according to the market in different regions. They are Qualcomm's Snapdragon 8 Gen 1 and Samsung's Exynos 2200. Both chips use the latest large, medium and small ArmV9 CPU cortex and the clock speeds are very similar.



We'll start our benchmarking by looking at some classic CPU and GPU metrics using GeekBench 5, 3DMark and GFXBench. We also compared the Samsung Galaxy S22 Ultra to other current and previous generation smartphones to show where the phone fits into the big picture.



**Fig.4**

In Fig.4, we can see there is not much difference between the new wafers in the CPU department. According to GeekBench 5, the Snapdragon 8 Gen 1 has the upper hand in single-core performance, but underperforms in multi-core performance. Perhaps more surprising is that neither seem to offer much of a CPU performance boost compared to the previous generation. While the Snapdragon 8 Gen 1 offers some additional single-core boost, its multi-core score worse than the Snapdragon 888 and Exynos 2100.

On the GPU side, we see the Snapdragon 8 Gen 1 with its Adreno 730 clearly ahead. In some cases, benchmark scores outperformed previous-generation models by as much as 70 percent on every test. Qualcomm's newest GPUs also appear to be closing the gap on Apple's GPU dominance. The Exynos 2200 and its new RDNA graphics don't appear to be quite as impressive, although they're still a notable improvement compared to previous-generation chipsets.

## 4.2 Chipset- Qualcomm's Snapdragon 8 Gen 1

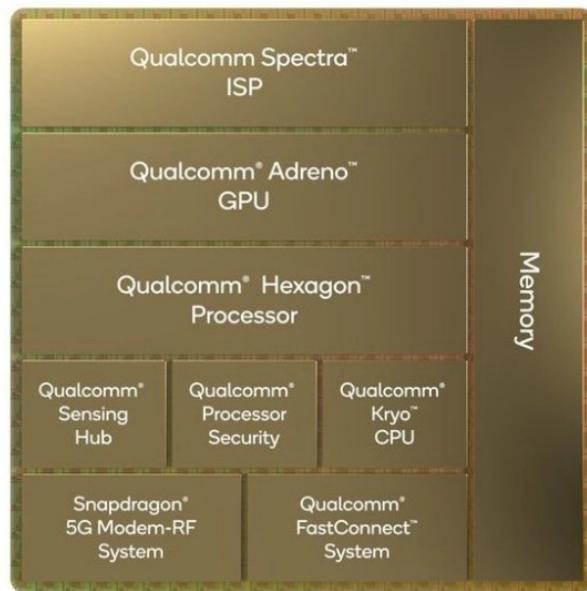
In this section, we are going to be talking about Qualcomm's Snapdragon 8 Gen 1 chip.



Fig.5

Qualcomm's Snapdragon 8 series has long been the mainstream SoC of choice for Android flagship phones from all brands. This time, the Snapdragon 8 Gen 1 uses Samsung's 4nm process, and adopts the Armv9 instruction set architecture design. The processor architecture uses a set of Cortex-X2 CPUs, with a maximum operating frequency of 3.0GHz. It is also designed with the Kryo CPU core, with 3 A set of Cortex-A710 CPUs and 4 sets of Cortex-A510 CPUs form a "1+3+4" set of core configurations. In addition, the 4th generation Adreno GPU is used to improve display computing performance.

Snapdragon 8 Gen 1 adopts the 7th generation Snapdragon AIE artificial intelligence engine, and configures the 3rd generation Sensing Hub design, which greatly improves the AI computing capability



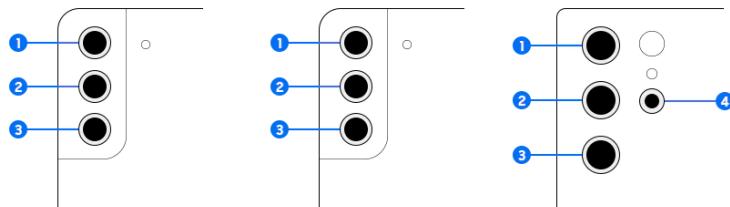
Qualcomm Spectra, Qualcomm Adreno, Qualcomm Hexagon, Qualcomm Sensing Hub, Qualcomm Processor Security, Qualcomm Kryo, Snapdragon and Qualcomm FastConnect are products of Qualcomm Technologies, Inc. and/or its subsidiaries.

**Fig.6**

In Fig.6, we can see Snapdragon 8 Gen 1 is also composed of ISP, DSP, GPU, CPU, and Sensing Hub in the artificial intelligence computing part.

## 4.3 Camera system

In this section, I will introduce the camera system of Samsung galaxy s22 series.



Camera	Galaxy S22	Galaxy S22+	Galaxy S22 Ultra
Front - Wide	10MP F2.2 [Dual Pixel AF], FOV 80°, 1/3.24", 1.22µm	10MP F2.2 [Dual Pixel AF], FOV 80°, 1/3.24", 1.22µm	40MP F2.2 [PDAF], FOV 80°, 1/2.8", 0.7µm
① Rear - Ultra Wide	12MP F2.2 [FF], FOV 120°, 1/2.55", 1.4µm	12MP F2.2 [FF], FOV 120°, 1/2.55", 1.4µm	12MP F2.2 [Dual Pixel AF], FOV 120°, 1/2.55", 1.4µm
② Rear - Wide angle	50MP F1.8 [Dual Pixel AF], OIS, FOV 85°, 1/1.56", 1.0µm with Adaptive Pixel	50MP F1.8 [Dual Pixel AF], OIS, FOV 85°, 1/1.56", 1.0µm with Adaptive Pixel	108MP F1.8 [PDAF], OIS, FOV 85°, 1/1.33", 0.8µm with Adaptive Pixel
③ Rear - Telephoto 1	10MP F2.4 [3x, PDAF], OIS FOV 36°, 1/3.94", 1.0µm	10MP F2.4 [3x, PDAF], OIS FOV 36°, 1/3.94", 1.0µm	10MP F2.4 [3x, Dual Pixel AF], OIS, FOV 36°, 1/3.52", 1.12µm
④ Rear - Telephoto 2	-	-	10MP F4.9 [10x, Dual Pixel AF], OIS, FOV 11°, 1/3.52", 1.12µm
Rear - Space Zoom	3x Optical Zoom Super Resolution Zoom up to 30x	3x Optical Zoom Super Resolution Zoom up to 30x	3x,10x Dual Optical Zoom Super Resolution Zoom up to 100x

Compared with the previous generation Samsung galaxy s21 series, the most obvious improvement of S22 is the camera system.

The S22 and S22+ also use a 50-megapixel triple-lens configuration that supports 3x optical zoom. The top-of-the-line S22 Ultra uses a 108-megapixel quad-lens that also provides 3x optical and 10x optical zoom. The whole series introduces night portrait photography mode for the first time, which can enhance the details of facial images even in dark places; supports pet portrait mode, the optimization of hair edges is good, and the capture experience is quite good.

This time, the protagonist S22 ultra has a main lens of 108 million pixels, with a large aperture of f/1.8 and a 2.4µm pixel photosensitive element, emphasizing the amount of light and light sensitivity during night shooting, which can improve the effect of night shooting ; The ultra-wide-angle lens is maintained as a 12-megapixel f/2.2 lens; the two telephoto

lenses are also equipped with a 10-megapixel f/2.4 three-fold optical zoom lens and a 10-megapixel f/4.9 ten-fold optical zoom lens, which can shoot The farthest 100 times zoom shooting effect.



**S22 Ultra**



**iPhone 13 Pro**



**S22 Ultra**



**iPhone 13 Pro**



**S22 Ultra**



**iPhone 13 Pro**

In this tree picture, we compare Samsung S22 Ultra with the iPhone 13 Pro. The camera performance of the two phones is similar. It is worth noting that the shadow details of the s22 ultra in the third photo are richer than those of the Iphone 13.

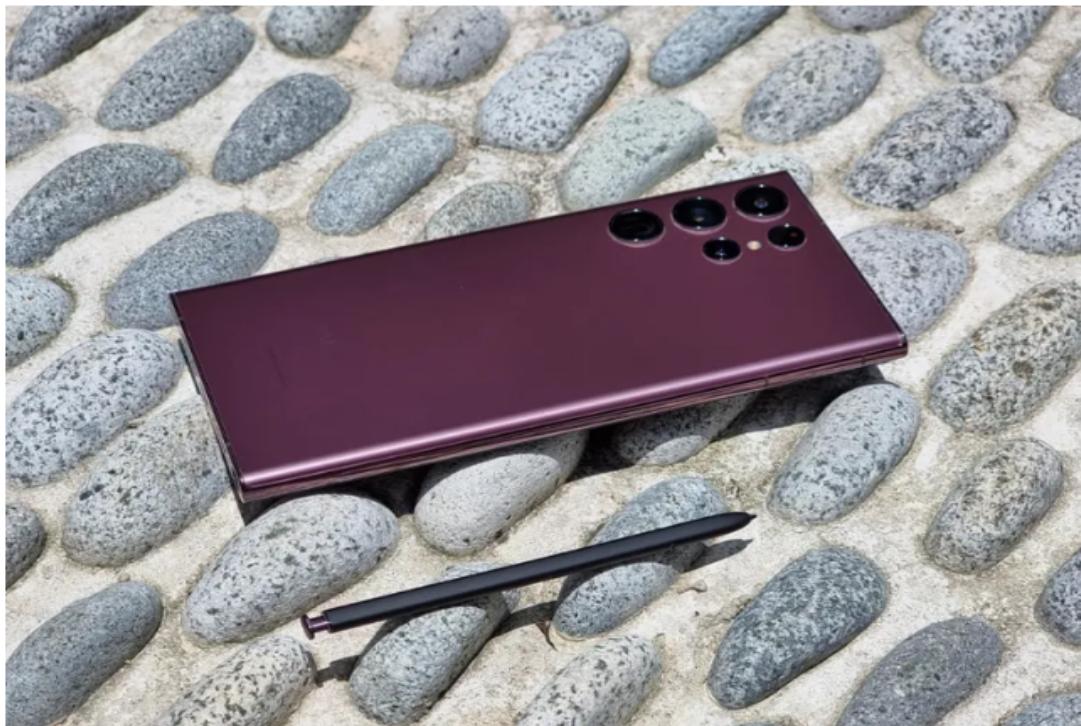
#### 4.4 S-pen

In this section, we will introduce the S22 Ultra s-pen.



Samsung's S-pen can be said to be quite famous. In the previous Note series, S-pen was used as a considerable purchase point. After the Note series announced the discontinuation of production, Samsung also transplanted S-pen to the new S22 ultra.

And there is an S-Pen slot on the S22 Ultra, which is closer to the usage of the Note series in the past, and it is tailored according to the characteristics of the S22 Ultra. The delay time is shortened from 9ms to 2.8ms. The advanced AI coordinate prediction technology can predict the user's writing Position, plus multi-touch algorithm to predict multi-point coordinates, further reduces latency. The internal Wacom components have been improved, increasing the data transmission rate from 360 sets to 480 sets per second. There are more handwriting-to-text functions than before, from 76 types in the past to 88 types, and the conversion accuracy has also been improved.



# **5 Industry analysis**

## **5.1 S.W.O.T**

### **■ Strength**

- 1.** Samsung ecosystem
- 2.** Stronghold in the Asian Markets
- 3.** Camera performance
- 4.** S-pen

### **■ Weakness**

1. No major breakthrough
2. Decline in Smartphone Sales

### **■ Opportunity**

1. Android system
2. Introduce Innovative Products

### **■ Threat**

1. iPhone 14/14pro
2. Google Pixel 7/7Pro

## 6 Conclusion

The ultra in this Samsung s22 series can be said to be responsible for this year's android smartphone.

S Pen: At present, there is no mobile phone that can match the smooth feel of the S Pen. In this era of youth, whether you are running a handwritten account or need instant note support for work, S-pen can be a helpful partner.

Better night shot than iphone. The S22 Ultra is more meticulous in the processing of low light sources, with just the right exposure and color retention, allowing users who like night shots to have more flexibility. And 10x optical zoom brings a very good telephoto effect

5000 mAh large battery, 25W or 45W ultra-fast flash charge. Brings a strong battery life.

# Reference

Samsung Galaxy S22 benchmarked: Snapdragon 8 Gen 1 vs Exynos 2200 (androidauthority.com)

<https://www.samsung.com/uk/support/mobile-devices/check-out-the-new-camera-functions-of-the-galaxy-s22-series/>

<https://www.youtube.com/watch?v=pR6Q7Tk0Ak&t=1s>

[https://www.sogi.com.tw/articles/qualcomm\\_snapdragon\\_8\\_gen\\_1/6257054](https://www.sogi.com.tw/articles/qualcomm_snapdragon_8_gen_1/6257054)