

Apple

iPhone13 Pro Max TEARDOWN



<https://dc.watch.impress.co.jp/img/dcw/docs/1351/254/html/01.jpg.html>

iPhone12 ProMAX vs iPhone13 ProMAX Spec Table

	iPhone12 Pro MAX (US model)	iPhone13 Pro MAX (Japan model)
Manufacturer	Apple	Apple
Model Number	A2410	A2641
Product Release	2020.11.13	2021.09.24
Dimension	78.1 x 160.8 x 7.4mm	78.1 x 160.8 x 7.65mm
Weight	228g	238g
Display	6.7", 1284x 2778 pixel 458 ppi Super Retina XDR OLED Brightness(Max) : 800nit (Normal) Brightness(Max) : 1,200nit (HDR)	6.7" 1284x 2778 pixel 458ppi Super Retina XDR OLED (120Hz) Brightness(Max) : 1,000nit (Normal) Brightness(Max) : 1,200nit (HDR)
OS	iOS 14	iOS 15
CPU	Apple A14 Bionic, 6core CPU	Apple A15 Bionic, 6core CPU, Neural Engine
Memory	128GB 6GB RAM	128GByte
Camera	Front 12MP + SL 3D	Front 12MP + SL 3D, (depth/biometrics sensor)
	12 MP, f/1.6, 26mm (wide), 1.7µm, dual pixel PDAF, sensor-shift OIS 12 MP, f/2.2, 65mm (telephoto), 1/3.4", 1.0µm, PDAF, OIS, 2.5x optical zoom 12 MP, f/2.4, 13mm, 120° (ultrawide), 1/3.6" TOF 3D LiDAR scanner (depth)	12 MP, f/1.5, 26mm (wide), 1.9µm, dual pixel PDAF, sensor-shift OIS 12 MP, f/2.8, 77mm (telephoto), PDAF, OIS, 3x optical zoom 12 MP, f/1.8, 13mm, 120° (ultrawide), PDAF TOF 3D LiDAR scanner (depth)
Battery	Li-Ion 3687 mAh, non-removable (14.13 Wh)	Li-Ion 4373 mAh, non-removable (16.75 Wh)
Motion Sensor	Accelerometer, Gyroscope, Compass, Barometer	Accelerometer, Gyroscope, Compass, Barometer
Ambient Sensor	Proximity, Light, Biometric Sensor	Proximity, Light, Biometric Sensor
Security Sensor	Face ID	Face ID
Cellular	5G (sub-6 GHz) 600 (n71), 700 (n12/n28), 800 (n20), 850 (n5), 900 (n8), 1700 (n66), 1800 (n3), 1900 (n2/n25), 2100 (n1), 2600 (n7) , 2300 (n40), 2500 (n41), 2600 (n38), 3500 (n78), 3700 (n77), 4700 (n79) 4G FDD-LTE 600 (B71), 700 (B12/B13/B14/B17/B28/B29), 800 (B18/B19/B20), 850 (B5/B26), 900 (B8), 1500 (B11/B21/B32) , 1700 (B4/B66), 1800 (B3), 1900 (B2/B25), 2100 (B1), 2300 (B30), 2600 (B7) 4G TDD-LTE 1900 (B39), 2000 (B34), 2300 (B40), 2500 (B41), 2600 (B38), 3500 (B42), 3600 (B48), 5200 (B46) 3G WCDMA (UMTS/HSPA+/DC-HSDPA) (850, 900, 1,700/2,100, 1,900, 2,100MHz) 2G GSM (850, 900, 1,800, 1,900MHz)	5G sub-6 (BAND) MHz 600 (n71), 700 (n12/n28/ n29), 800 (n20), 850 (n5), 900 (n8), 1700 (n66), 1800 (n3), 1900 (n2/n25), 2100 (n1), 2300 (n30), 2600 (n7), 2300 (n40), 2500 (n41), 2600 (n38), 3500 (n78/n48), 3700 (n77), 4700 (n79) 4G FDD-LTE (BAND) MHz 600 (B71), 700 (B12/B13/B14/B17/B28/B29), 800 (B18/B19/B20), 850 (B5/B26), 900 (B8), 1500 (B11/B21/B32) , 1700 (B4/B66), 1800 (B3), 1900 (B2/B25), 2100 (B1), 2300 (B30), 2600 (B7) 4G TDD-LTE (BAND) MHz 1900 (B39), 2000 (B34), 2300 (B40), 2500 (B41), 2600 (B38), 3500 (B42), 3600 (B48), 5200 (B46) 3G CDMA EV-DO Rev. A (MHz) (800, 1,900) 3G WCDMA (UMTS/HSPA+/DC-HSDPA) (MHz) (850, 900, 1,700/1,900, 2,100) 2G GSM (MHz) (850, 900, 1,800, 1,900)
Connectivity	LTE 4x4 MIMO LAA Wi-Fi 6 (802.11ax) 2x2 MIMO Bluetooth 5.0 GPS A-GPS, GLONASS, GALILEO, BDS, QZSS USB Lightning, USB 2.0	LTE 4x4 MIMO LAA Wi-Fi 6 (802.11ax) 2x2 MIMO Bluetooth 5.0 GPS A-GPS, GLONASS, GALILEO, BDS, QZSS USB Lightning, USB 2.0
IPX	IP68	IP68

Product appearance



Box:
Since AC adapter and earphones are not enclosed since iPhoneSE2 ,
the box is very thin.



Phone (Top view)



Phone (Back side)

Teardown process

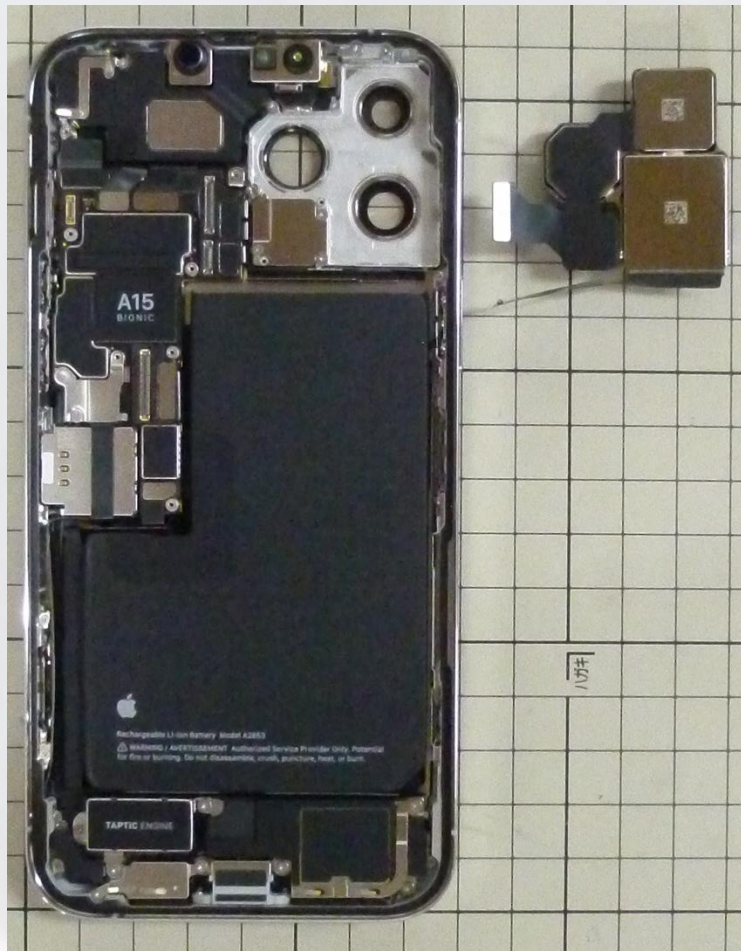


Taptic Engine Vibrator

Removed EL display

- Similar to the previous product, the black-based configuration, shield, and heat dissipation seal cover the parts, and the parts are almost invisible.
- Larger capacity battery is installed in the same L-shape as the previous model.
- It looks the size of the Taptic Engine Vibrator is smaller than the previous model.
- Implementation of the expected vapor chamber could not be confirmed at this time.

Teardown process



Removed the main camera module
(Detail analysis will be done later)



Teardown process



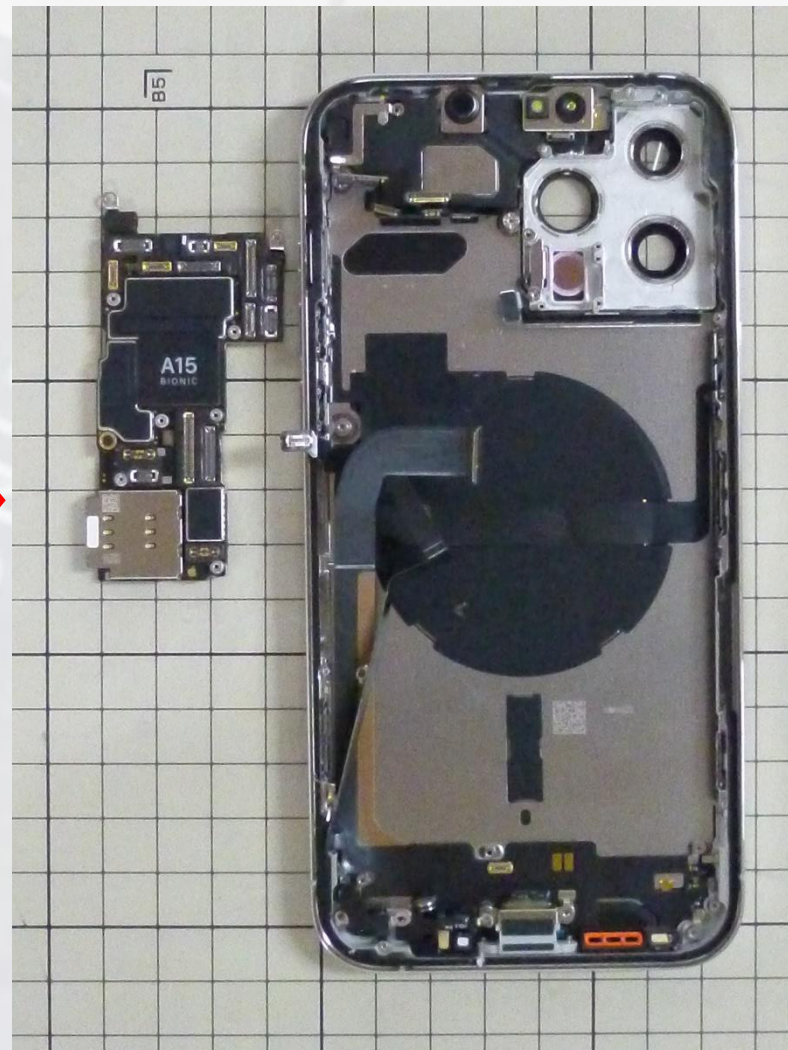
美国苹果公司监制 二次锂电池组 警告: 请勿拆解, 刺破, 挤压, 加热或投入火中, 严重鼓胀或浸水后禁止使用
 警告: 請勿拆解, 刺破, 擠壓, 加熱或投入火中 锂电池
 标称电压和额定容量/標稱電壓和額定容量/정격/
 Rating: 3.85V---4352mAh, 16.75Wh 型号/
 型號/모델명: A2653 执行标准: GB31241-2014
 Assembled in China 中国制造 11CP5/92/67
 制造商: 惠州市德赛电池有限公司 製造商: 惠州
 市德賽電池有限公司 充電限制電壓: 4.47V--- 제조업체:
 Huizhou Desay Battery Co., Ltd. 제조국: 중국 전화:
 080-333-4000 제품명: 전지

Huizhou Desay Battery Co.,Ltd.

Removed Li battery

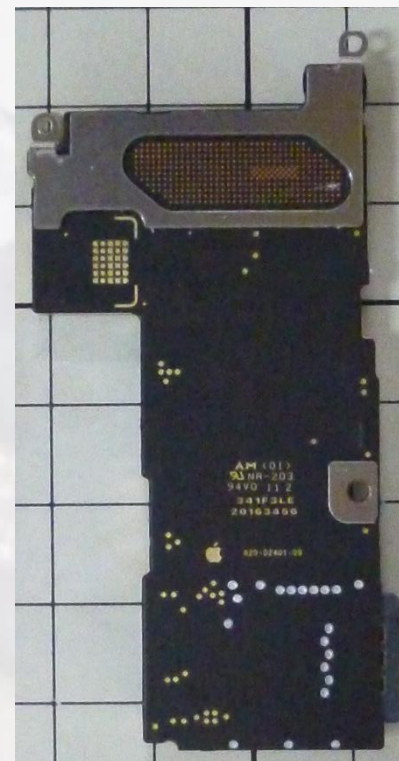
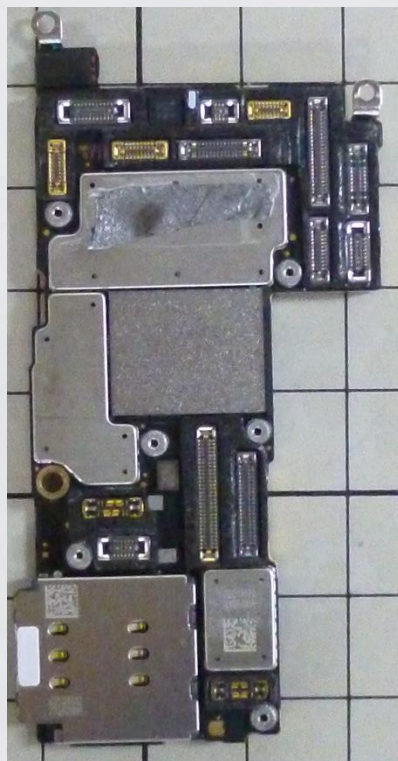
- Batteries with larger capacity (4373 mAh) are mounted in the same L shape as the previous model
- Battery size (90.5 x 66.5 x 4.68) volume = approx. 23,570 mm³
 * iPhone 12 ProMax (3687mAh) has a battery size (88.7 x 66.3 x 4.46) volume = about 22460mm³. The volume is almost the same.
- Battery capacity ⇒ 11.8% UP
- Battery volume ⇒ 0.049% UP

Teardown process



Removed main PCBs
Vaper chamber can not be seen

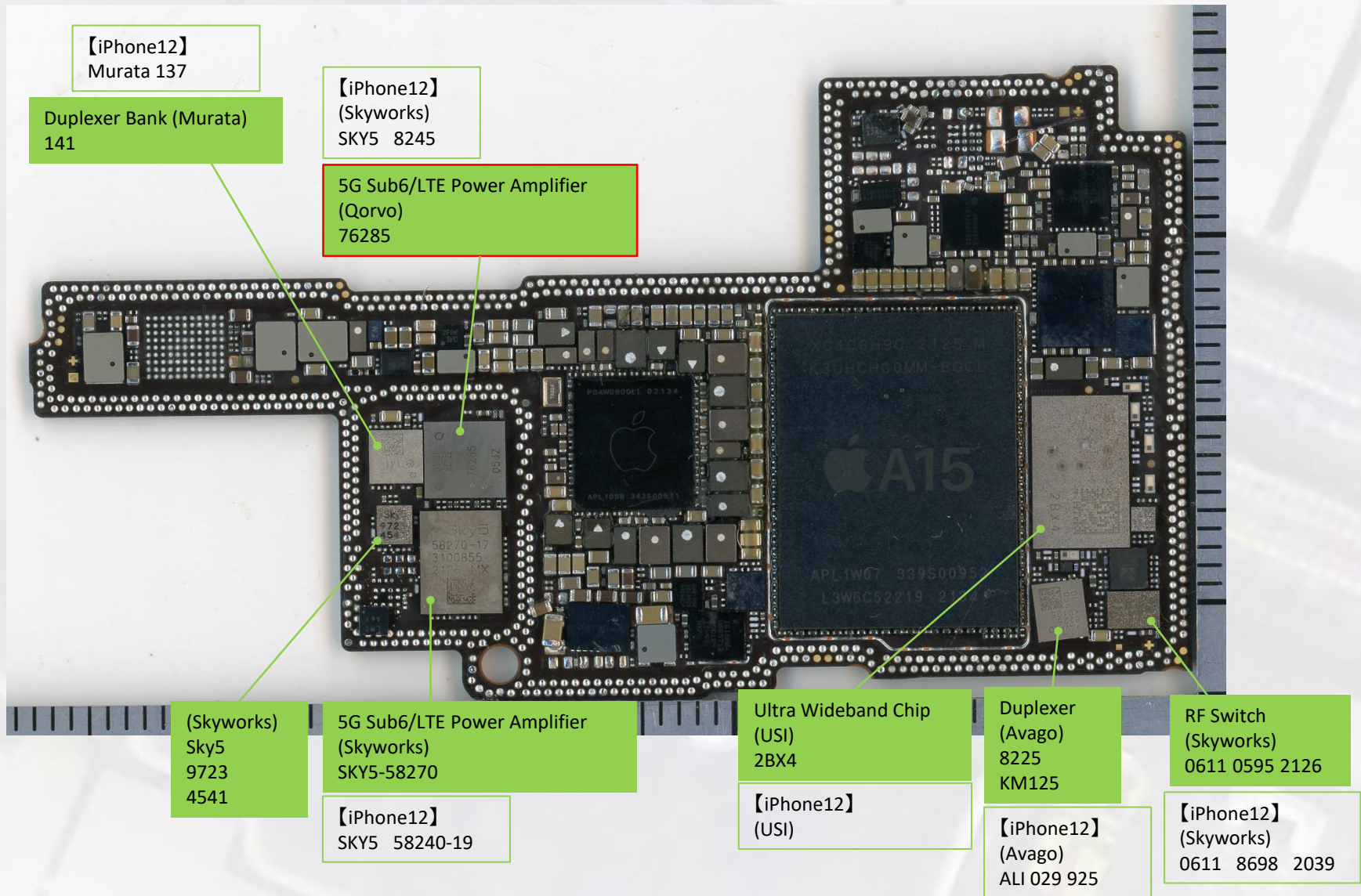
Component ~Main Bords~



PCB before remove shield metal panel (Top view and Bottom view)
It consists of two PCBs. There is no difference from the previous model.

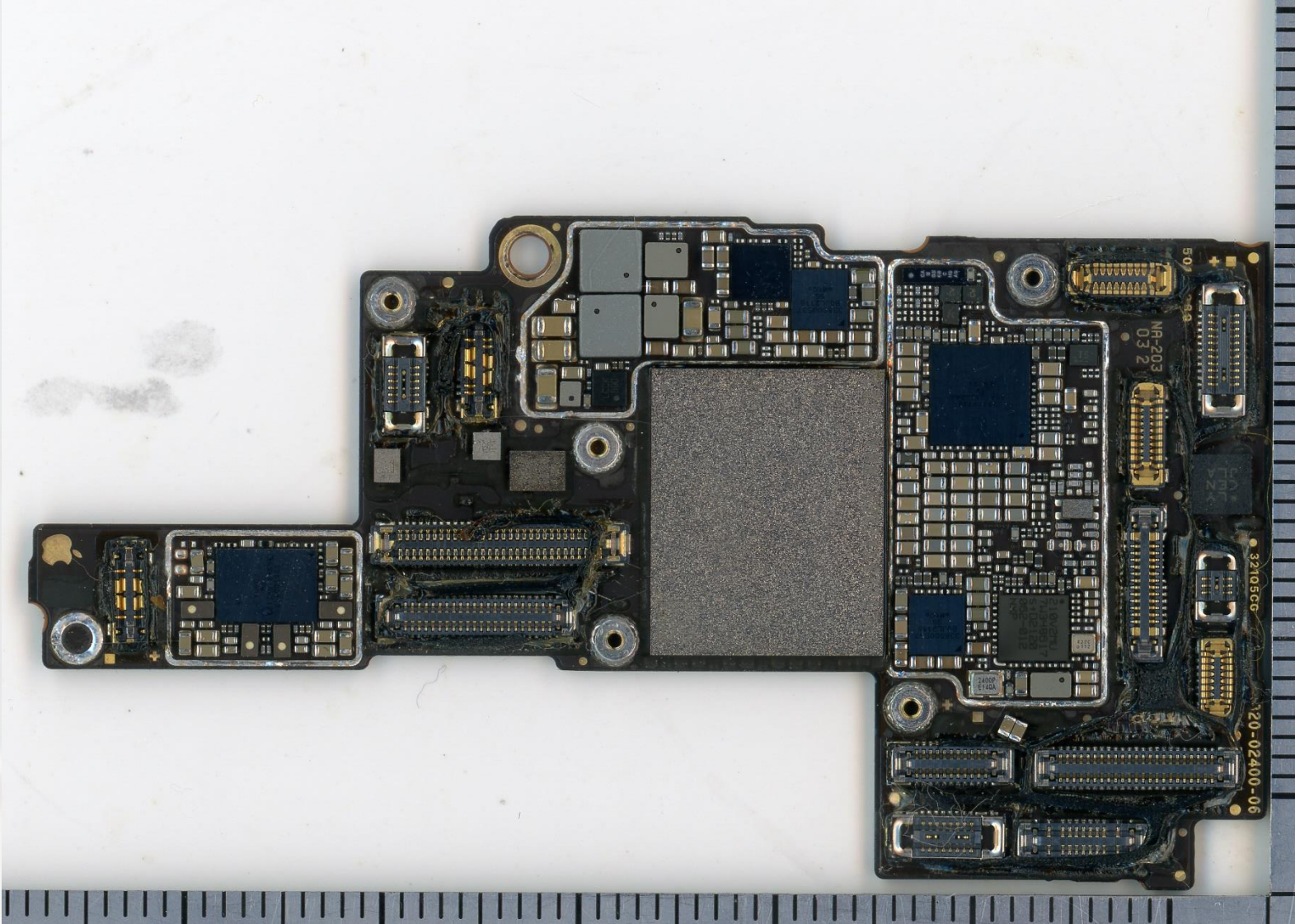
Component ~Processor Bord~

10 layers

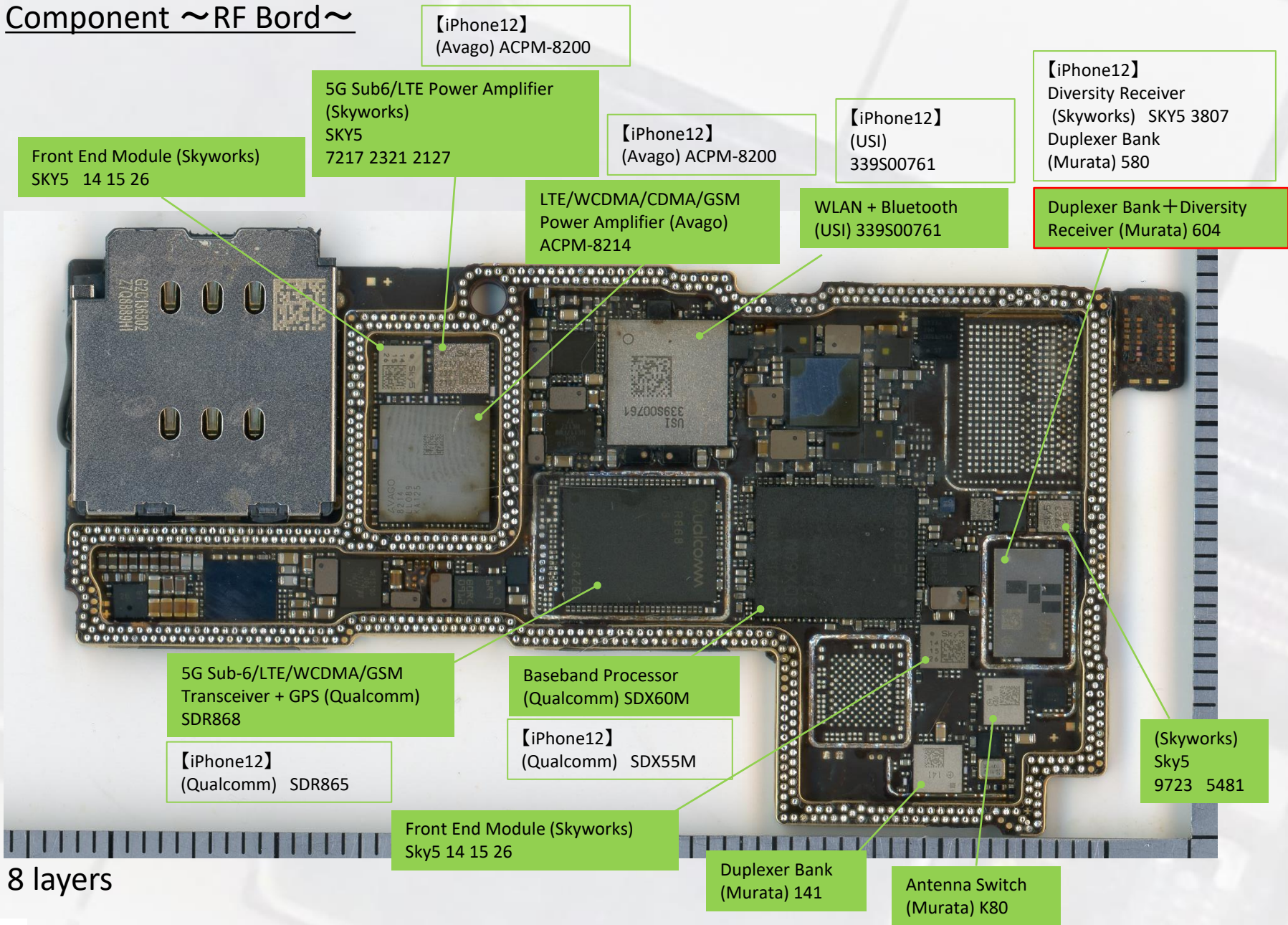


Component ~ Processor Bord ~

10 layers



Component ~RF Bord~



【iPhone12】
(Avago) ACPM-8200

5G Sub6/LTE Power Amplifier
(Skyworks)
SKY5
7217 2321 2127

Front End Module (Skyworks)
SKY5 14 15 26

【iPhone12】
(Avago) ACPM-8200

【iPhone12】
(USI)
339S00761

【iPhone12】
Diversity Receiver
(Skyworks) SKY5 3807
Duplexer Bank
(Murata) 580

LTE/WCDMA/CDMA/GSM
Power Amplifier (Avago)
ACPM-8214

WLAN + Bluetooth
(USI) 339S00761

Duplexer Bank + Diversity
Receiver (Murata) 604

5G Sub-6/LTE/WCDMA/GSM
Transceiver + GPS (Qualcomm)
SDR868

Baseband Processor
(Qualcomm) SDX60M

【iPhone12】
(Qualcomm) SDR865

【iPhone12】
(Qualcomm) SDX55M

(Skyworks)
Sky5
9723 5481

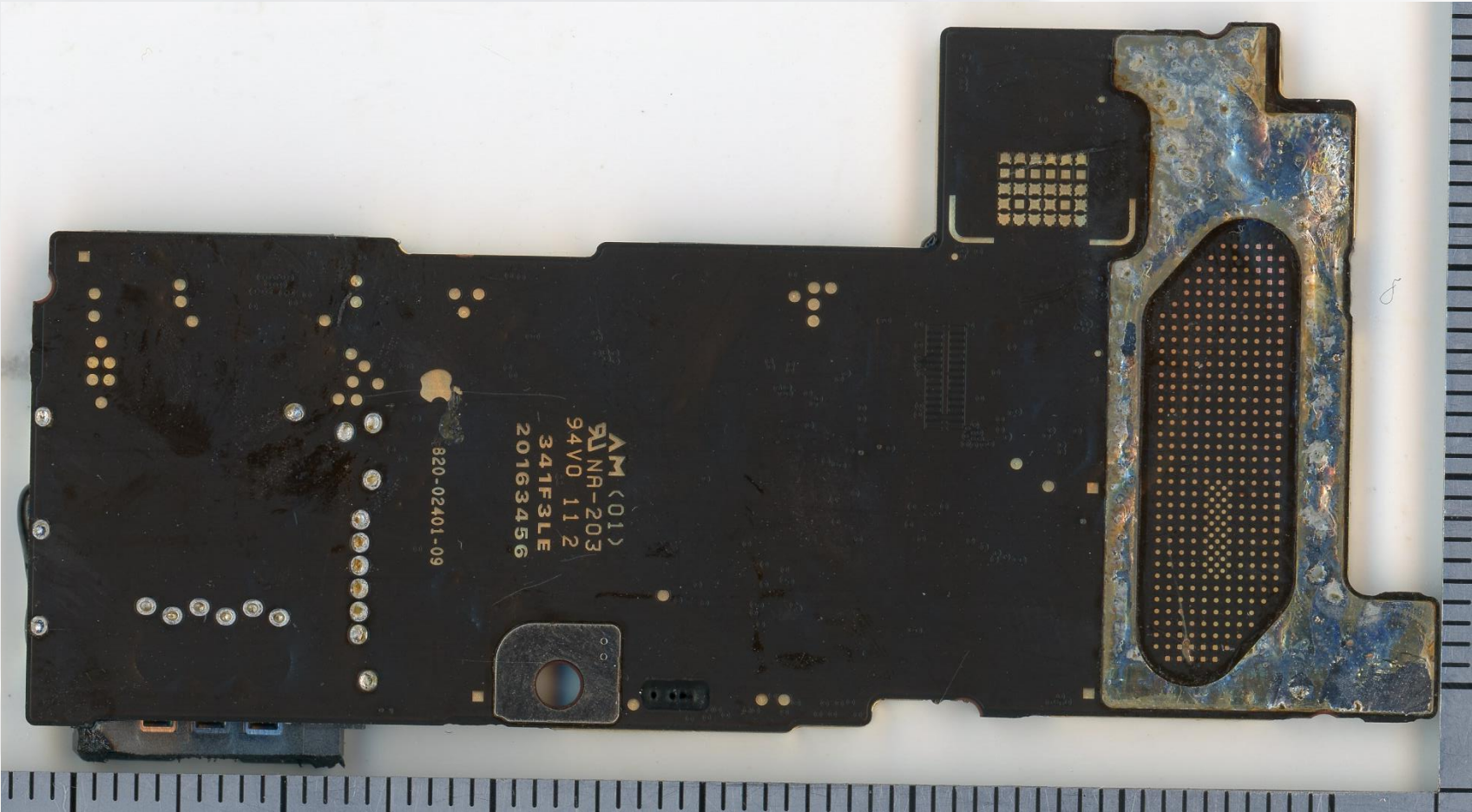
Front End Module (Skyworks)
Sky5 14 15 26

Duplexer Bank
(Murata) 141

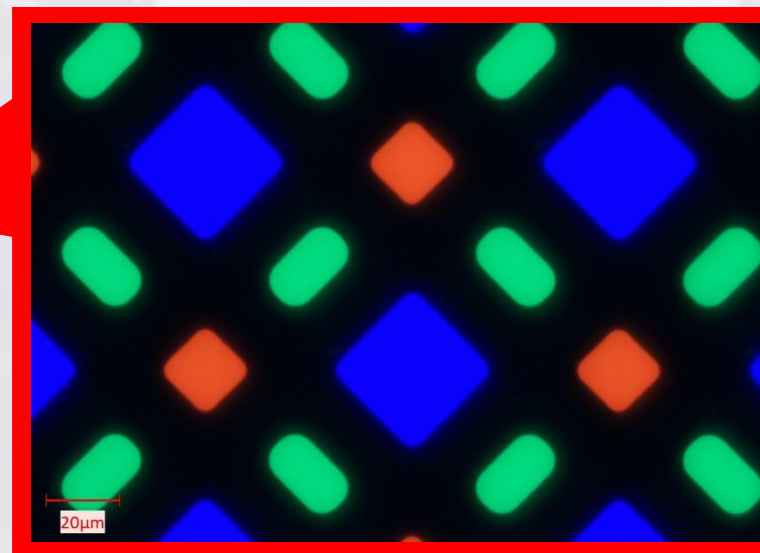
Antenna Switch
(Murata) K80

8 layers

Component ~RF Bord~



KEY COMPONENTS ~ Organic Light Emitting Diode Display ~



KEY COMPONENTS ~ Main Cameras ~

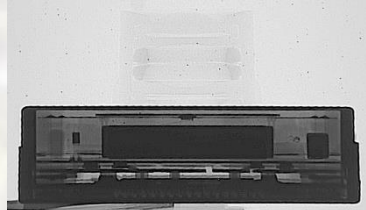
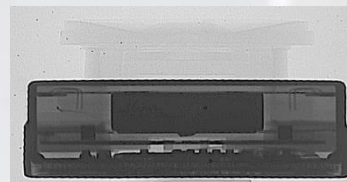
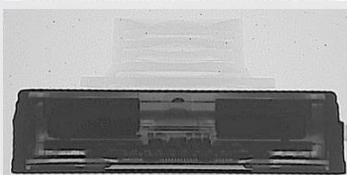
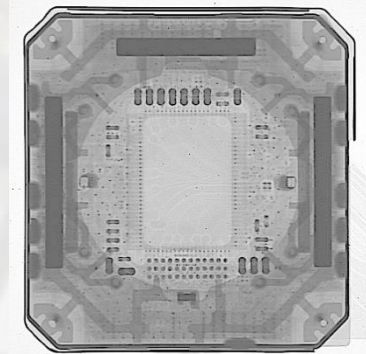
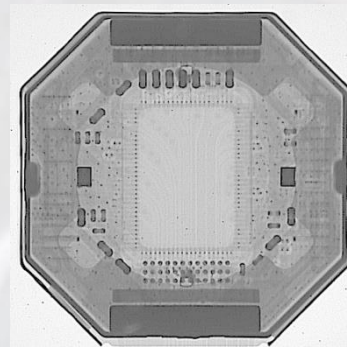
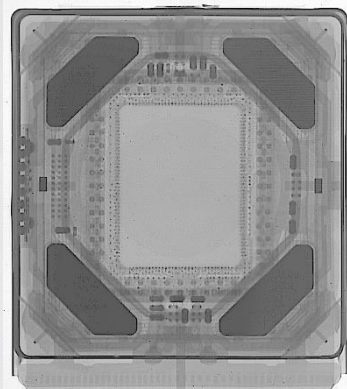
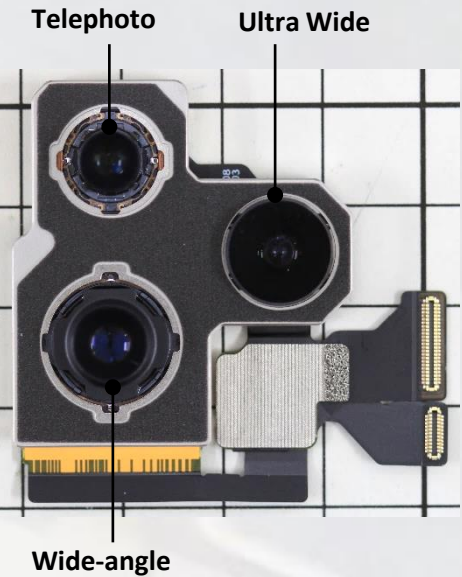
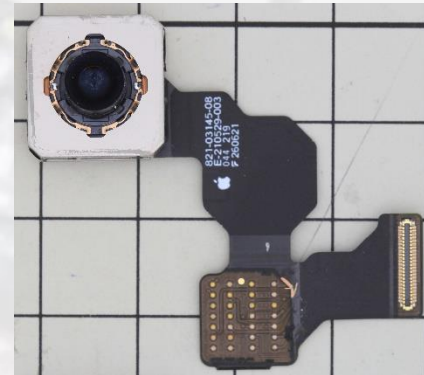
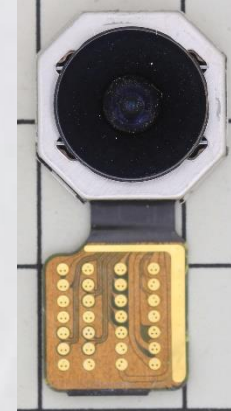
- An image stabilization mechanism is added to the ultra-wide-angle camera.
- The number of lenses in the ultra-wide-angle camera is changed from 5 to 6.



Wide-angle module
12 MP
f/1.5 aperture
Sensor-shift optical image stabilization (OIS)
Autofocus with 100% Focus Pixels
Seven-element lens

Ultra Wide module
12 MP
f/1.8 aperture
Six-element lens
Macro photography

Telephoto module
12 MP
f/2.8 aperture
Six-element lens



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Report No.	Report title	Release data (tentative)
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2	RF ICs X-ray images report	2021. Oct. 30
3	A15 processor package structure analysis	TBD