

Apple iPhone SE 2 Teardown



Dimension 67.3 x 138.4 x 7.3mm, 148g
Display 4.7", 750 x 1334 dot, HD+, IPS LCD
OS iOS 13
CPU Apple A13 Bionic, 6-core, 2.65GHz
Memory 3GByte DRAM, 64GByte Flash Memory
Camera Front 7MP, Rear 12MP
Battery 3.82V, 1821mAh, Li-Ion Polymer
Running Time 3G unknown, 4G unknown, WiFi unknown


Motion Sensor Accelerometer, Gyroscope, Compass, Barometer
Ambient Sensor Proximity, Light
Biometric Sensor -
Security Sensor Fingerprint

Cellular 2G, 3G, 4G
Connectivity Wi-Fi (802.11a/b/g/n/ac/ax), Bluetooth 5.0, NFC, Qi
Location GPS, GLONASS

External Connection Lightning
External Memory -
Water/Dust Repellent IP67

Manufacturer	Apple
Model Name	iPhone SE 2
Model Number	A2296
Carrier	-
Product Release	2020.04.24
Assembled in	China
Retail Price	USD399.00
Document ID	

PRODUCT OVERVIEW



iPhone SE

Lots to love. Less to spend.

iPhone SE packs our most powerful chip into our most popular size at our most affordable price. It's just what you've been waiting for.

Starting at \$399.




iPhone 11 Pro called. It wants its chip back.

We put the brains of iPhone 11 Pro in the body of iPhone SE. A13 Bionic is the fastest chip ever in a smartphone, period. So everything feels fluid, whether you're launching apps, playing the latest games, or exploring new ways to work and play with augmented reality.



Brilliant 4.7" Retina HD display





Home sweet Home button.

Touch ID lets you securely unlock your iPhone and sign in to apps instantly. You can even use it with Apple Pay to grab a coffee, get a yoga app, or shop for sneakers online. All without reaching for your credit card.

Survives splashes, sashes, sprinkles, sprays, splatters, and spills.

iPhone SE is water resistant to 1 meter for 30 minutes.² It's not afraid of a little coffee, tea, or soda either. And dust? No worries.




Smile, you're in Portrait mode.

The advanced camera system with A13 Bionic brings you Portrait mode, which artfully blurs the background to put the focus on your subject — even when you're taking selfies.

Source: <https://www.apple.com/iphone-se/>

CELLULAR BAND & PRODUCT ID (assumption)

Cellular Frequencies (MHz)			
2G GSM	850, 900, 1800, 1900		
3G CDMA	800, 1900		
3G WCDMA	850, 900, 1700, 1900, 2100		
3G TD-SCDMA	-		
4G FDD-LTE	600 (B71), 700 (B12/B13/B14/B17/B29), 800 (B18/B19/B20), 850 (B5/B26), 900 (B8), 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)		
5G Sub 6	-		
5G millimeter wave	-		
5G Speed	-	Max Downlink: -	Max Uplink: -
LTE Category	16	Max Downlink: 1024Mbps	Max Uplink: 150Mbps



TEARDOWN

FPC#2



FPC#3



Center Panel

Rear Cover



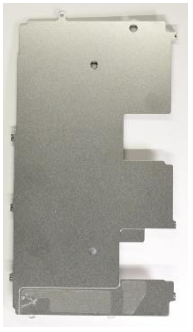
Speaker



Rear Camera

Touch Panel
Display

Display
Cover



PCB#1



Qi
Antenna



Li-Ion Polymer
Battery



Taptic
Engine



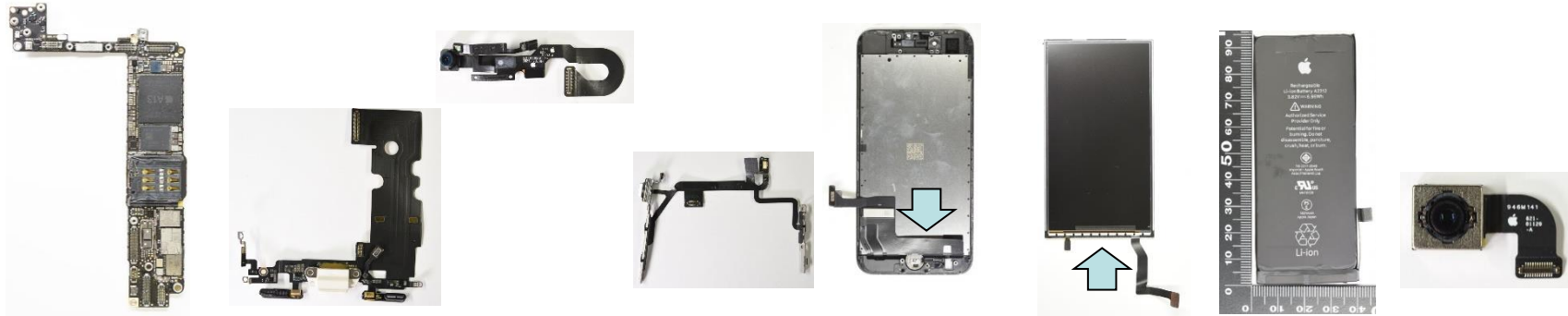
FPC#1

Speaker



PCB/FPC LISTINGS

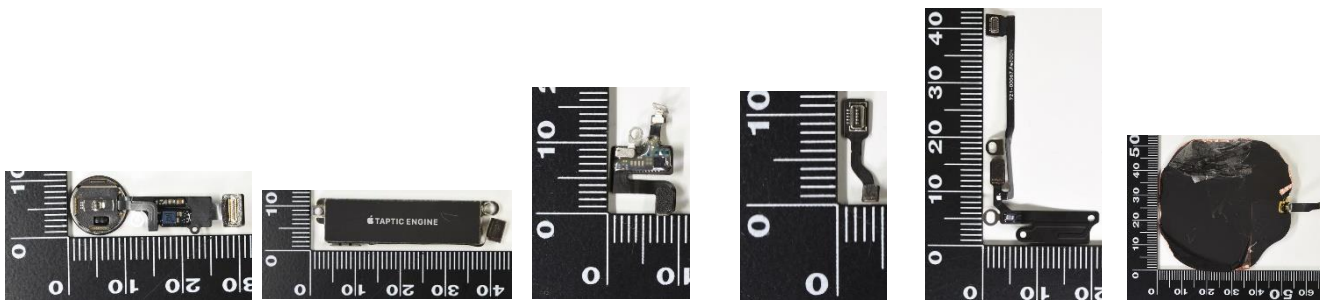
Unit: millimeter otherwise specified



	PCB#1	FPC#1	FPC#2	FPC#3	FPC#4	FPC#5	FPC#6	FPC#7
Function	Main Board	Lightning Microphone	Front Camera Light/Proximity Microphone	Volume/Power LED Flash Microphone	Display	Cable#3	Battery	Rear Camera
Manufacturer	unknown	unknown	Fm	unknown	MK	unknown	unknown	unknown
Dimension	55.8 x 94.6 x 0.59	62.1 x 64.8 x 0.16	54.6 x 18.5 x 0.14	66.3 x 54.2 x 0.18	75.6 x 39.3 x 0.19	66.6 x 41.8 x 0.09	44.2 x 27.1 x 0.40	21.9 x 13.8 x 0.18
Area (sq. mm)	3400	-	-	-	-	-	-	-
Layer	10	-	-	-	-	-	-	-
ZIF Connector #	0	-	-	-	-	-	-	-
B2B Connector #	10	2	1	1	1	2	1	1
Solder #	0	-	-	-	-	-	-	-
RF Socket #	0	1	-	-	-	-	-	-
Test Antenna #	2	-	-	-	-	-	-	-
Marking Photo								

PCB/FPC LISTINGS

Unit: millimeter otherwise specified

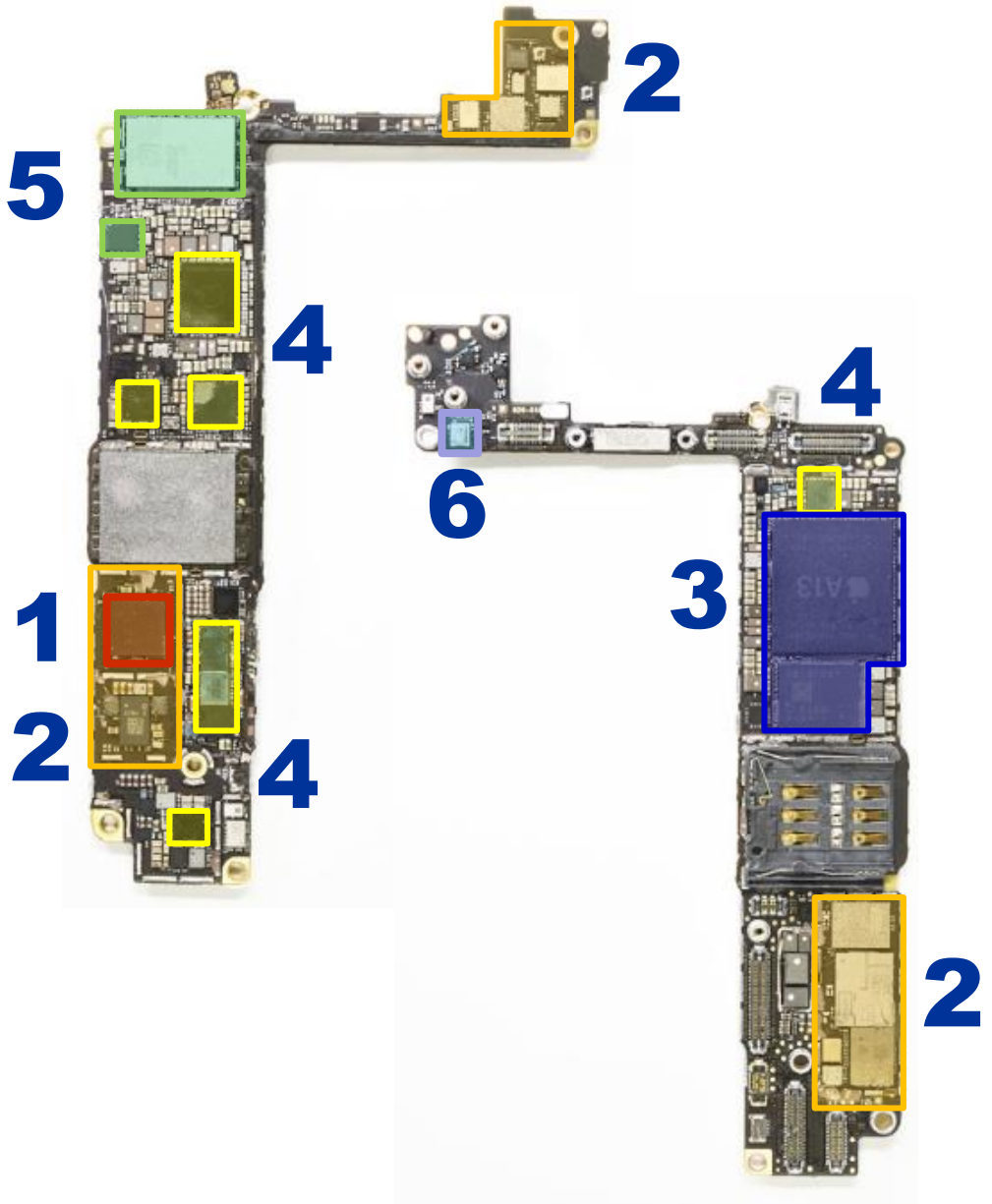


	FPC#8	FPC#9	FPC#10	FPC#11	FPC#12	FPC#13	-	-
Function	Fingerprint Sensor	Taptic Engine	Cable#1	Cable#2	NFC Antenna	Qi Antenna	-	-
Manufacturer	unknown	unknown	Fm	unknown	Fm	Fm	-	-
Dimension	29.0 x 10.5 x 0.09	40.2 x 4.1 x 0.10	9.4 x 15.4 x 0.16	4.0 x 11.8 x 0.25	21.3 x 41.7 x 0.28	73.6 x 53.0 x 0.33	-	-
Area (sq. mm)	-	-	-	-	-	-	-	-
Layer	-	-	-	-	-	-	-	-
ZIF Connector #	-	-	-	-	-	-	-	-
B2B Connector #	1	1	1	1	1	1	-	-
Solder #	-	-	-	-	-	-	-	-
RF Socket #	-	-	-	-	-	-	-	-
Test Antenna #	-	-	-	-	-	-	-	-
Marking Photo				-			-	-

FUNCTIONAL AREA: PCB#1

Unit: millimeter otherwise specified

PCB #1	
Manufacturer	unknown
Dimension	55.8 x 94.6 x 0.59
Approx. Area (sq. mm)	3400
1. RF Area	50 sq. mm (1.5%)
2. Front End Area	490 sq. mm (14.4%)
3. BB + AP Area	280 sq. mm (8.2%)
4. Audio + Power Area	270 sq. mm (7.9%)
5. Connectivity Area	110 sq. mm (3.2%)
6. Sensor Area	10 sq. mm (0.3%)



PCB#1 DISPLAY SIDE: CELLULAR

1 notch = 1mm

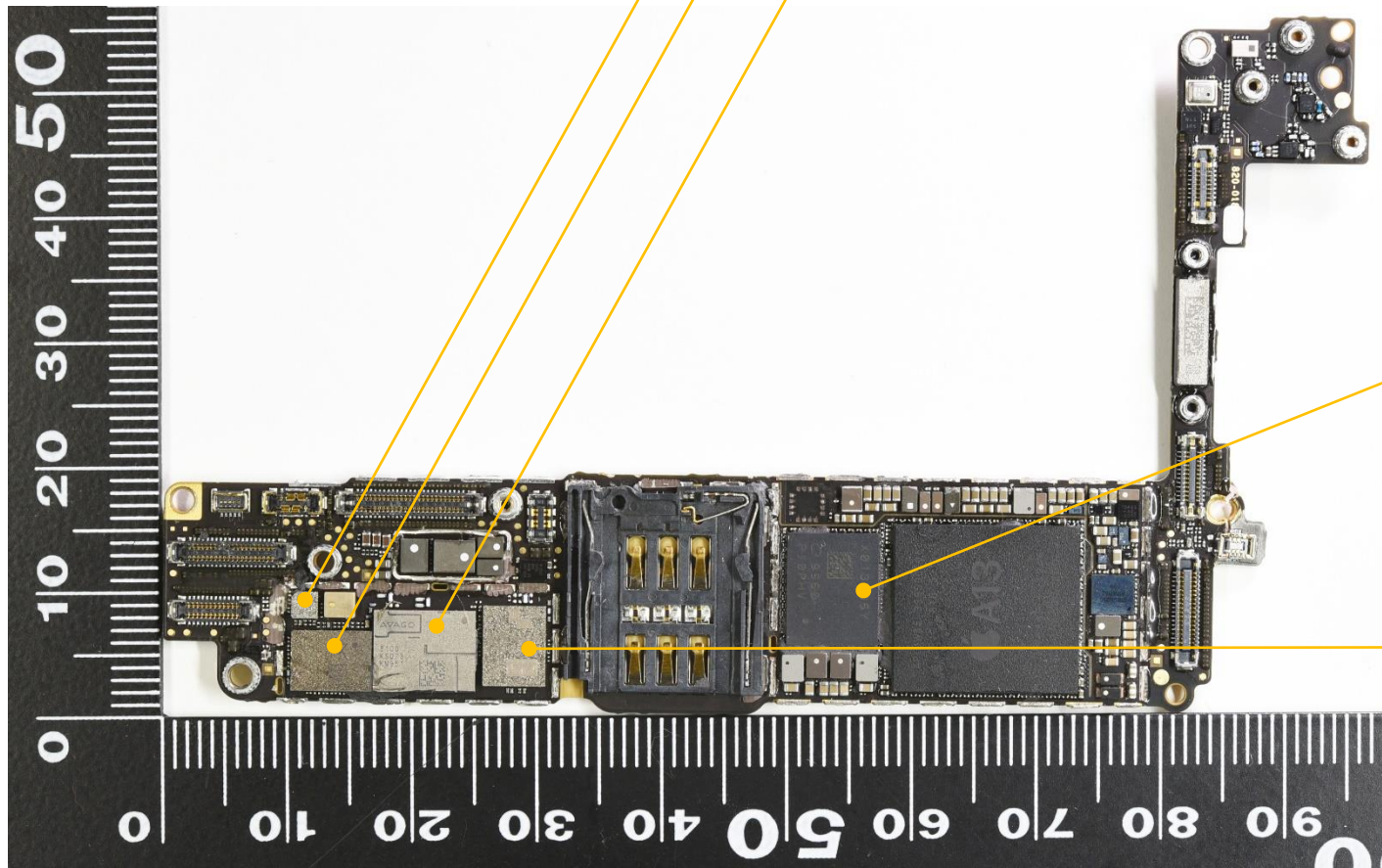
RF Switch (Skyworks)
S710 (assumption)

Multi-Mode/Multi-Band Power Amplifier (Skyworks)
SKY78201-25 (assumption)

Multi-Mode/Multi-Band Power Amplifier (Avago)
AFEM-8100 (assumption)

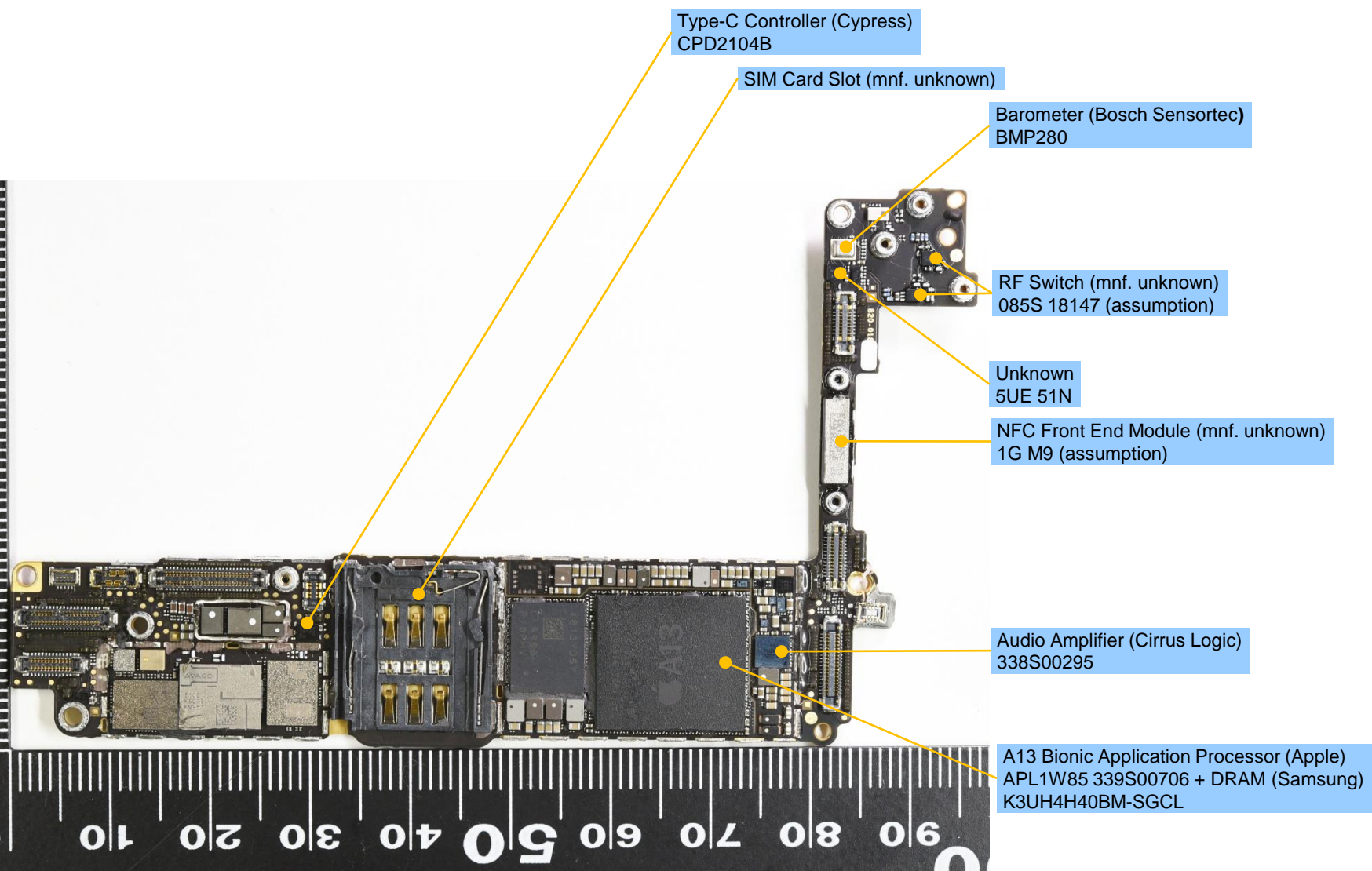
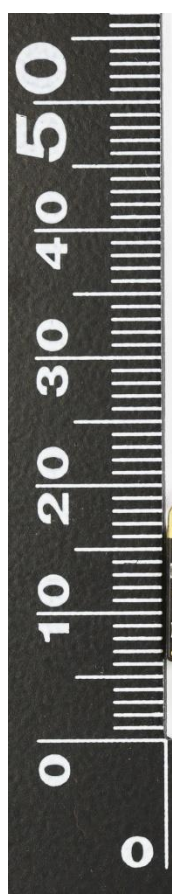
Baseband Processor (Intel)
PMB9960

Multi-Mode/Multi-Band Power Amplifier
(Skyworks)
SKY78220-17 (assumption)

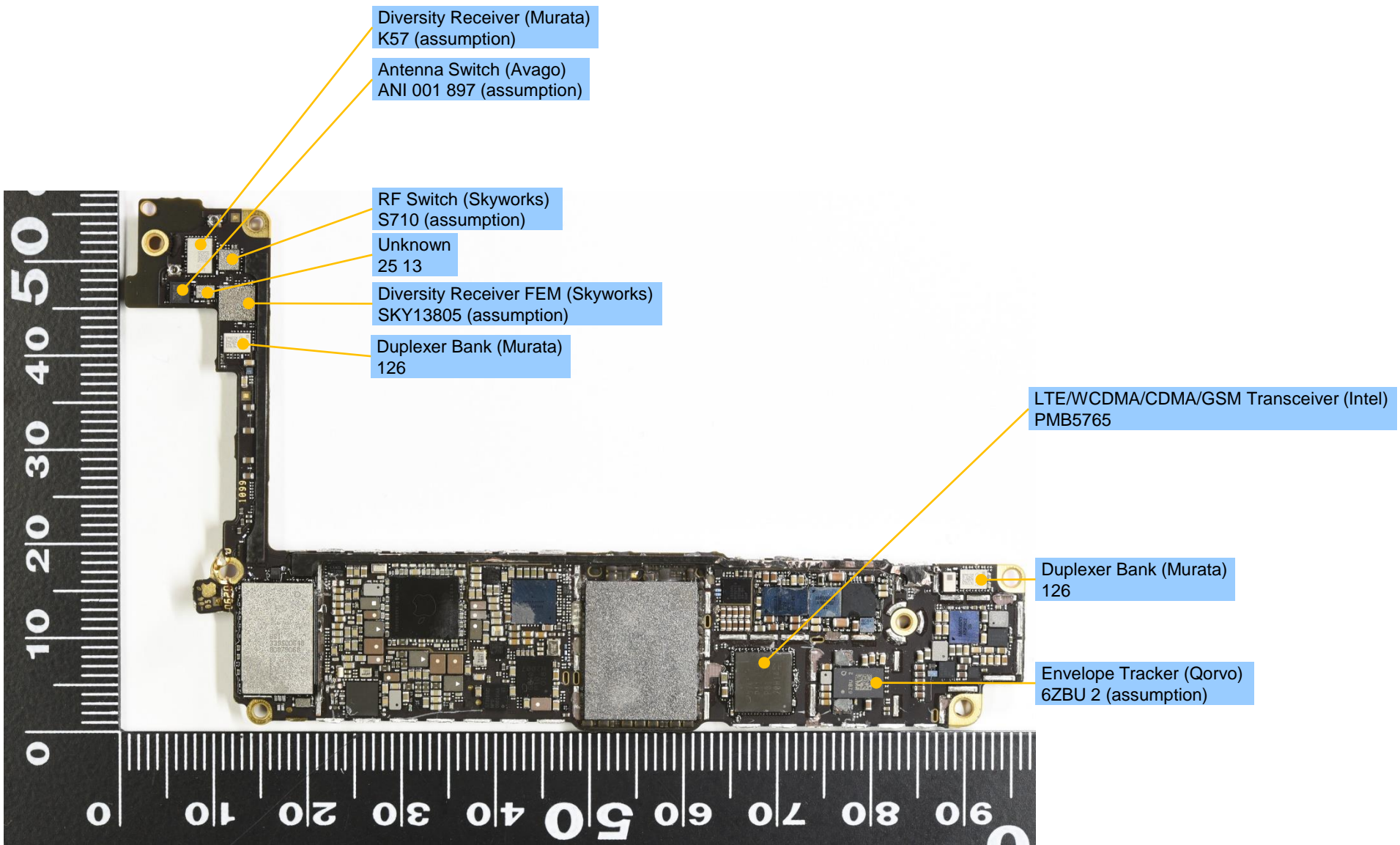


PCB#1 DISPLAY SIDE: KEY COMPONENTS

1 notch = 1mm

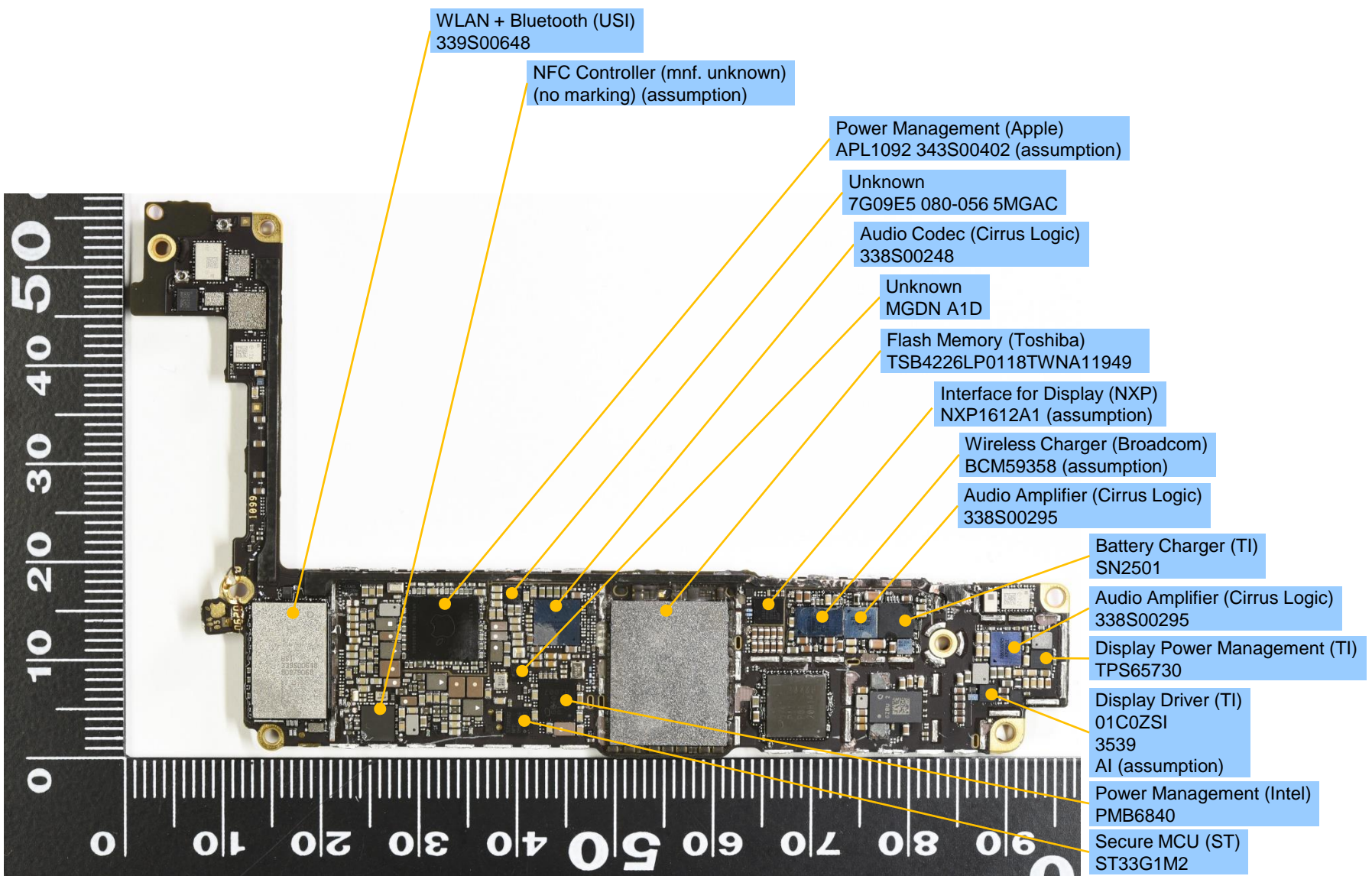


PCB#1 BATTERY SIDE: CELLULAR



PCB#1 BATTERY SIDE: KEY COMPONENTS

1 notch = 1mm



WLAN + Bluetooth (USI)
339S00648

NFC Controller (mnf. unknown)
(no marking) (assumption)

Power Management (Apple)
APL1092 343S00402 (assumption)

Unknown
7G09E5 080-056 5MGAC

Audio Codec (Cirrus Logic)
338S00248

Unknown
MGDN A1D

Flash Memory (Toshiba)
TSB4226LP0118TWNA11949

Interface for Display (NXP)
NXP1612A1 (assumption)

Wireless Charger (Broadcom)
BCM59358 (assumption)

Audio Amplifier (Cirrus Logic)
338S00295

Battery Charger (TI)
SN2501

Audio Amplifier (Cirrus Logic)
338S00295

Display Power Management (TI)
TPS65730

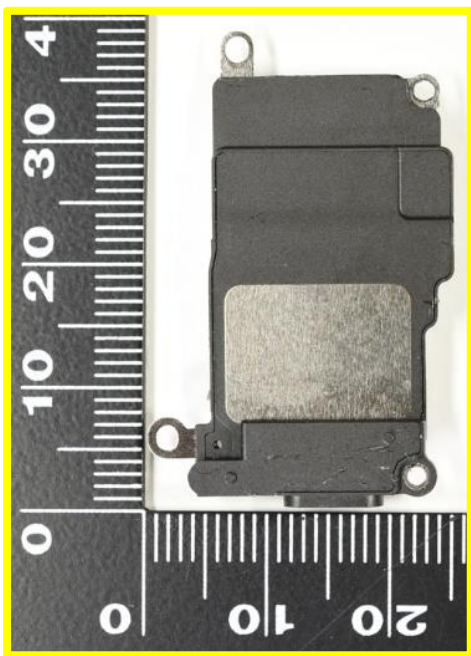
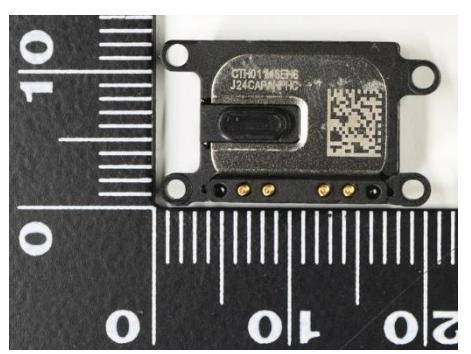
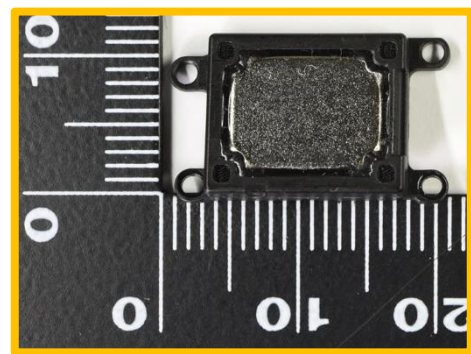
Display Driver (TI)
01C0ZSI
3539

AI (assumption)

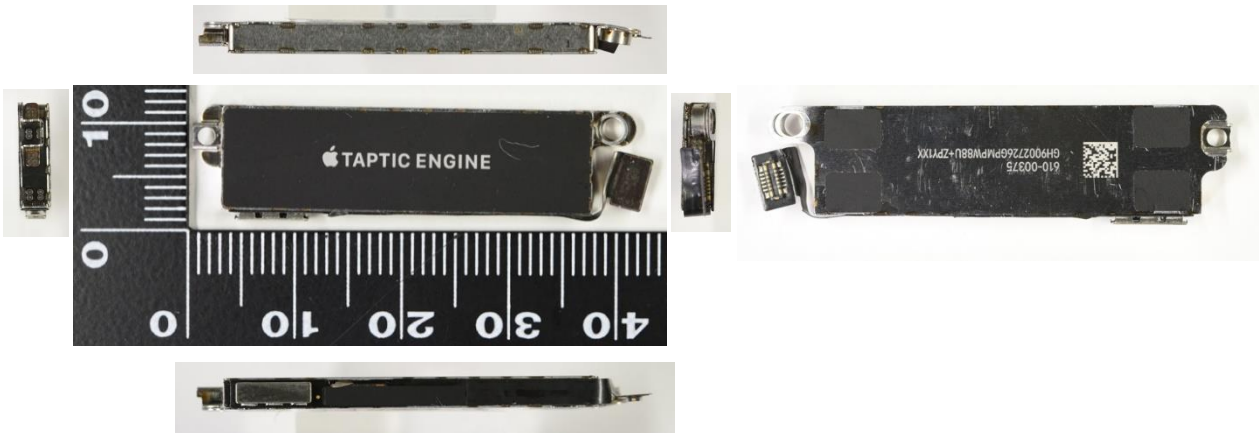
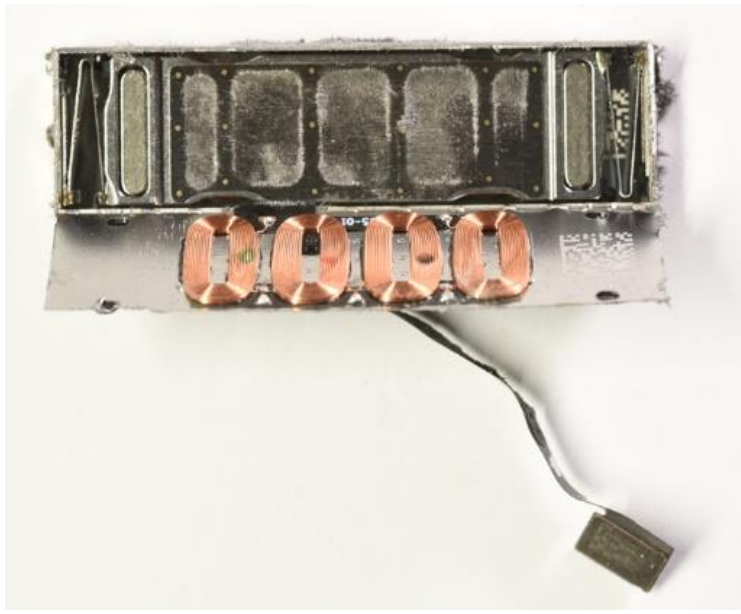
Power Management (Intel)
PMB6840

Secure MCU (ST)
ST33G1M2

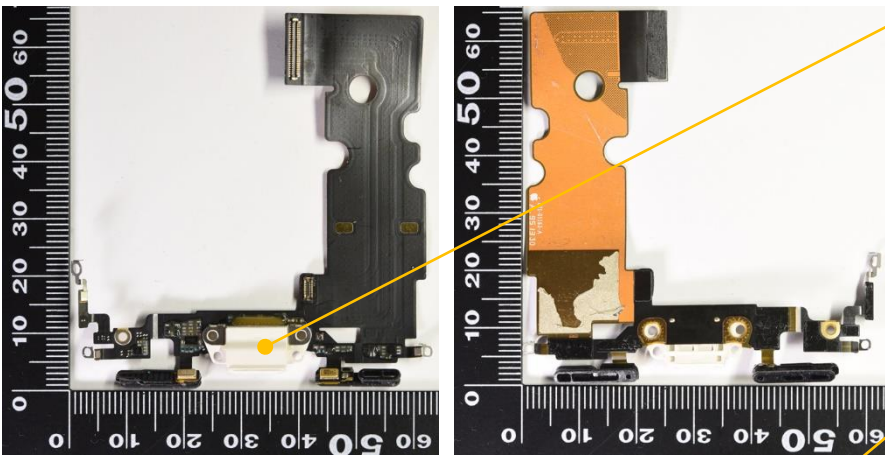
SPEAKER



1 notch = 1mm



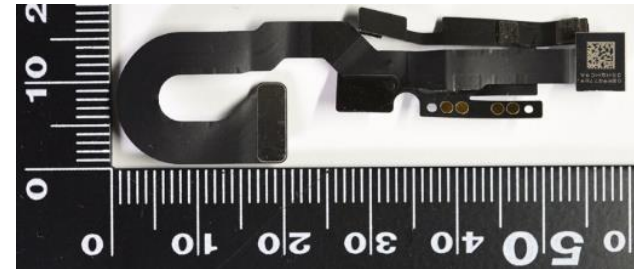
FPC#1: Lightning Connector, Microphone



Lightning Connector (mnf. unknown)

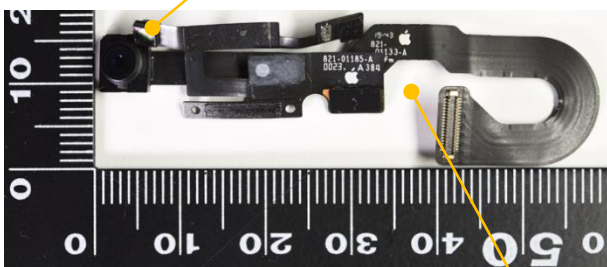
Light Sensor (mnf. unknown)

FPC#2: Front Camera, Microphone Light Sensor, Proximity Sensor



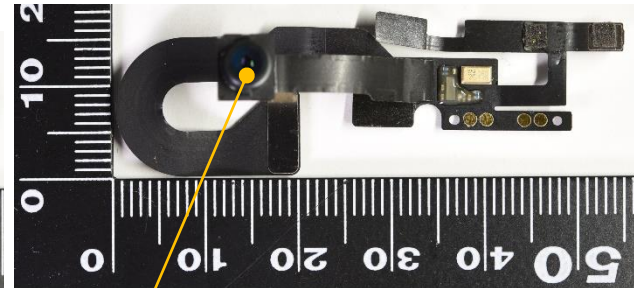
Light Sensor (mnf. unknown)

FPC#3: Volume/Power Button, LED Flash, Microphone



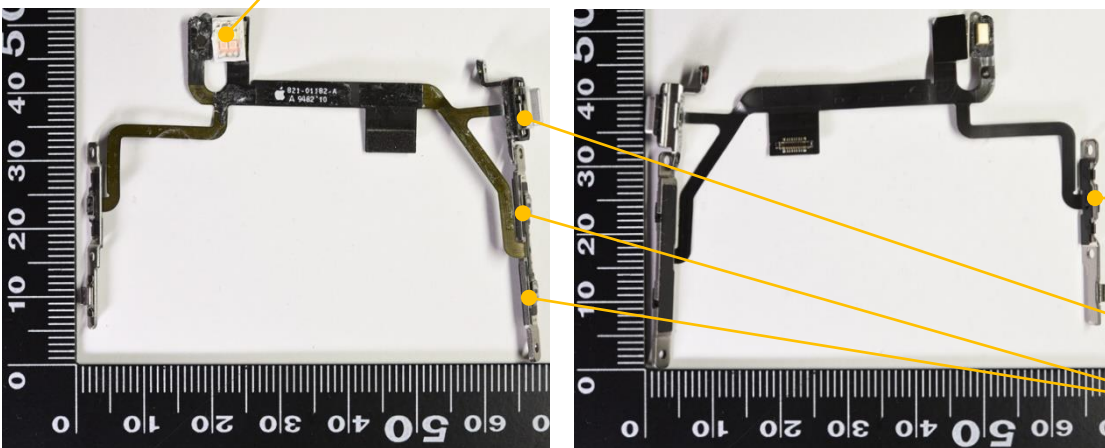
LED Flash (mnf. unknown)

Front Camera (mnf. unknown)



Proximity Sensor (mnf. unknown)

Side Button (mnf. unknown)

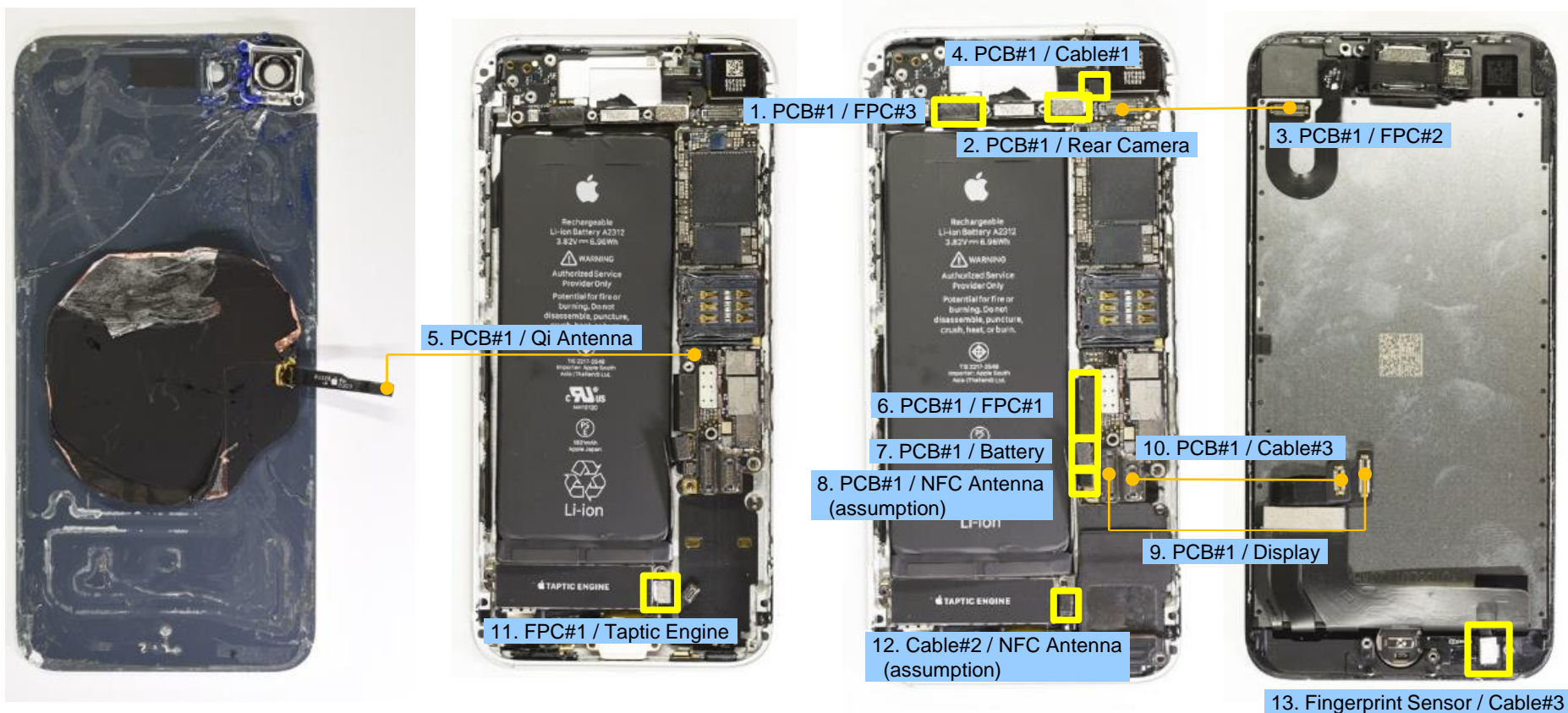


Ring/Silent Button (mnf. unknown)

Volume Button (mnf. unknown)

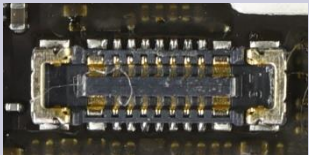
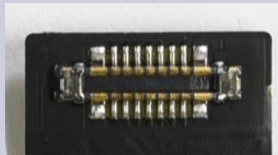
Ear Pods with Lightning Connector

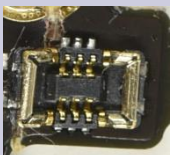
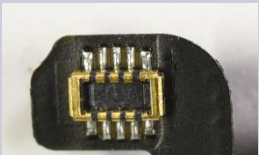






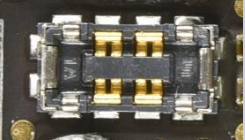
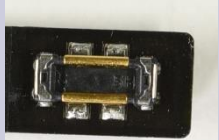
CONNECTOR DETAILS: B2B


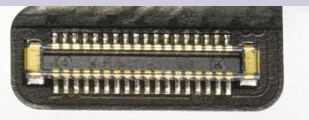
Unit: millimeter otherwise specified



1	PCB#1		FPC#3	
Image				
Mnf.	unknown			
Count	Pin #	14	Pitch	0.35
L x W x H	6.30 x 1.85 x 0.58		5.58 x 1.03 x 0.60	

4	PCB#1		Cable#1	
Image				
Mnf.	unknown			
Count	Pin #	6	Pitch	0.35
L x W x H	3.50 x 1.96 x 0.58		2.34 x 1.22 x 0.54	

2	PCB#1		Rear Camera	
Image				
Mnf.	unknown			
Count	Pin #	24	Pitch	0.35
L x W x H	6.75 x 1.86 x 0.60		6.01 x 1.03 x 0.59	



5	PCB#1		Qi Antenna	
Image				
Mnf.	unknown			
Count	Pin #	4	Pitch	-
L x W x H	3.76 x 1.98 x 0.58		3.10 x 1.17 x 0.53	

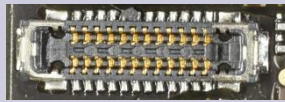
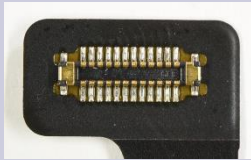
3	PCB#1		FPC#2	
Image				
Mnf.	unknown			
Count	Pin #	36	Pitch	0.35
L x W x H	9.22 x 1.84 x 0.62		8.12 x 1.21 x 0.67	

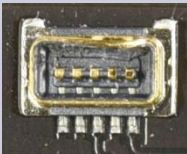

6	PCB#1		FPC#1	
Image				
Mnf.	unknown			
Count	Pin #	50	Pitch	0.35
L x W x H	11.69 x 1.86 x 0.62		10.62 x 1.06 x 0.61	



CONNECTOR DETAILS: B2B

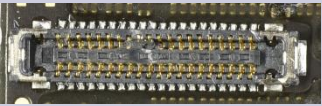

Unit: millimeter otherwise specified

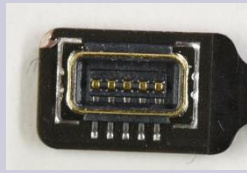
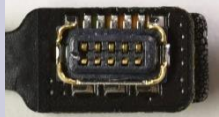
7	PCB#1		Battery	
Image				
Mnf.	unknown			
Count	Pin #	3	Pitch	-
L x W x H	4.98 x 1.94 x 0.62		4.57 x 1.12 x 0.54	

10	PCB#1		Cable#3	
Image				
Mnf.	unknown			
Count	Pin #	24	Pitch	0.35
L x W x H	7.04 x 1.74 x 0.62		5.89 x 1.01 x 0.55	

8	PCB#1		NFC Antenna	
Image				
Mnf.	unknown			
Count	Pin #	5	Pitch	0.35
L x W x H	3.07 x 1.53 x 0.58		1.60 x 2.92 x 0.54	


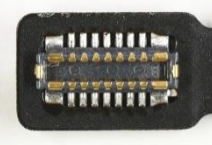
11	FPC#1		Taptic Engine	
Image				
Mnf.	unknown			
Count	Pin #	10	Pitch	0.35
L x W x H	4.17 x 1.74 x 0.73		3.47 x 1.31 x 0.51	

9	PCB#1		Display	
Image				
Mnf.	unknown			
Count	Pin #	40	Pitch	0.35
L x W x H	9.96 x 1.84 x 0.60		8.80 x 1.08 x 0.57	

12	Cable#2		NFC Antenna	
Image				
Mnf.	unknown			
Count	Pin #	5	Pitch	0.35
L x W x H	1.40 x 2.80 x 0.47		1.56 x 2.87 x 0.55	

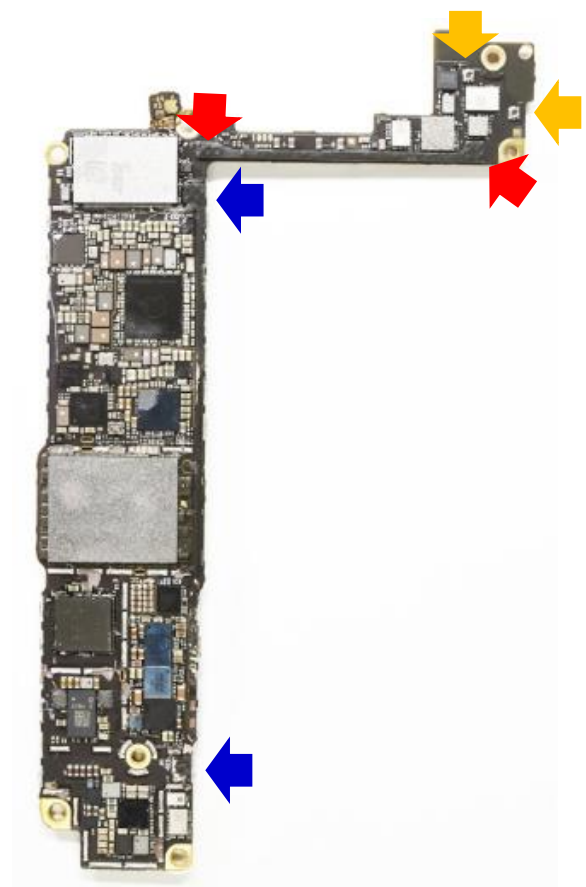
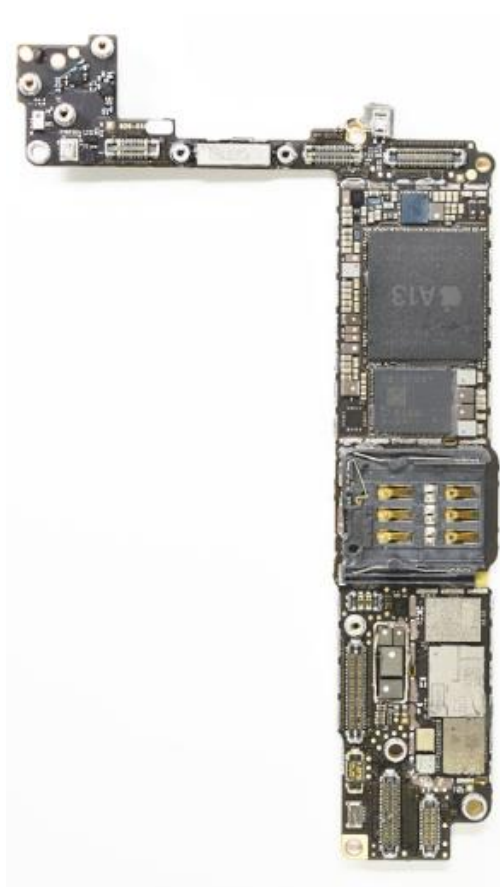
CONNECTOR DETAILS: B2B




Unit: millimeter otherwise specified

13	Fingerprint Sensor	Cable#3
Image		
Mnf.	unknown	
Count	Pin #	14
		Pitch
		0.35
L x W x H	4.92 x 1.74 x 0.60	4.20 x 1.06 x 0.50

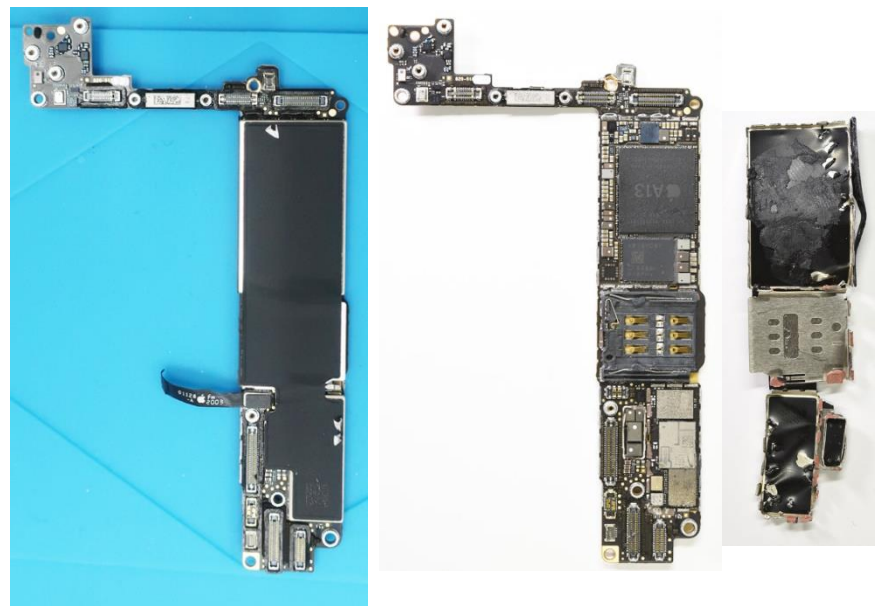
NOT EQUIPPED

CONNECTORS



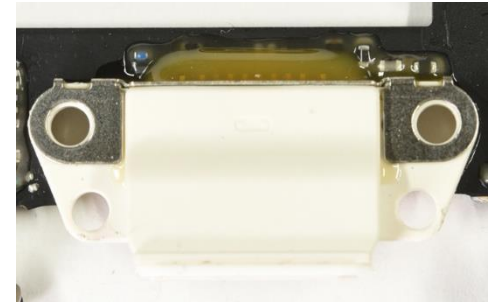
-  RF Socket + Cable
-  Test Antenna Port
-  Test Antenna Port

SIM Slot



Lightning Connector

Display Side



Gasket

Battery Side



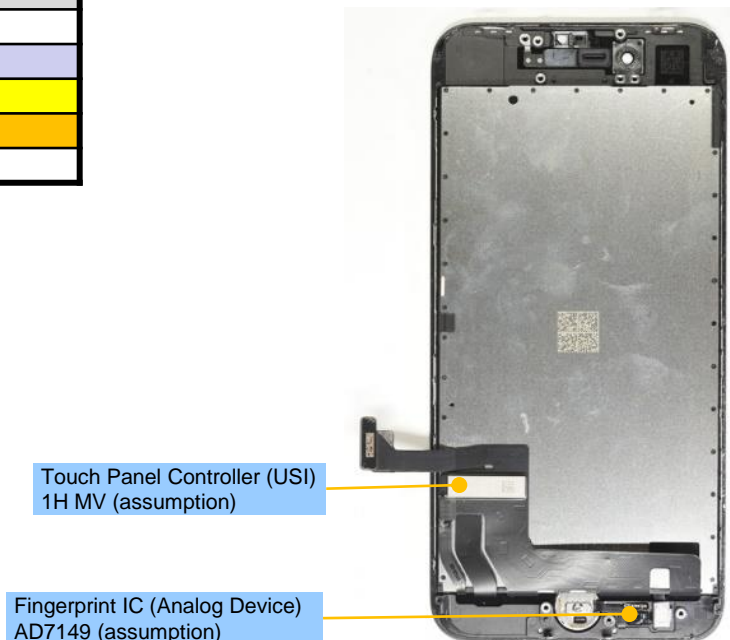
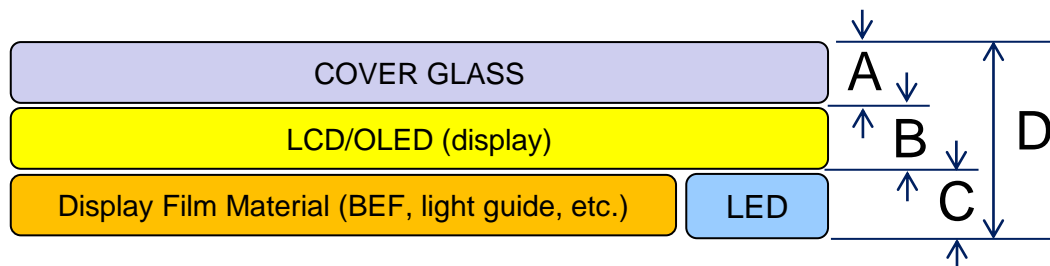
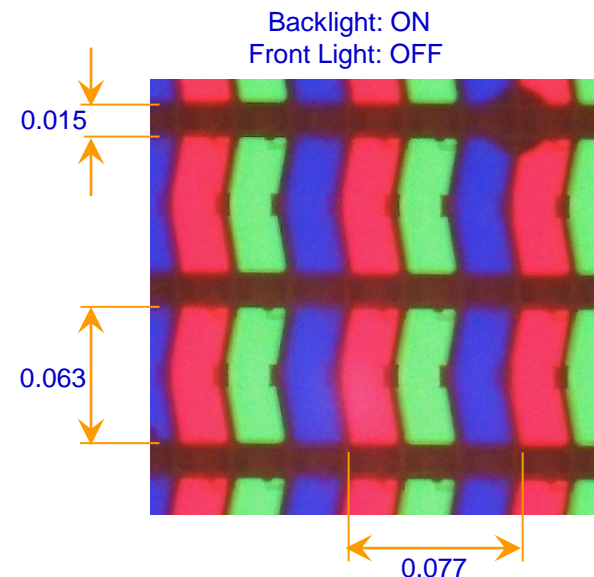
Lightning Connector	
Mnf.	unknown
Pin Number	8
Waterproof	IP67
Gasket	Yes

NOT EQUIPPED

MAIN DISPLAY DIMENSION & PIXEL

Unit: millimeter otherwise specified

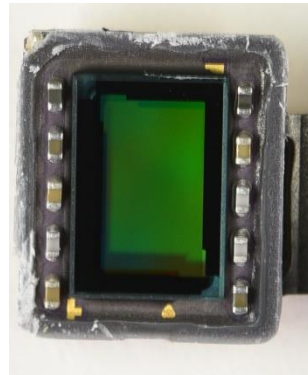
Display Module Size (width x height)		61.03 x 110.35
Display Marking (location)		FVQ0145E0DBMJQAE +J138LUY123WHA1J13 (bottom metal plate)
Display Panel Manufacturer		unknown
Display Diagonal Size (inch)		4.7
Display Mode (alignment)		IPS (stripe alignment)
Pixel Count (dot)		750 x 1334
Resolution (pixel per inch)		326
Display Component Presence	1a: LCD Top Polarizer	n/a (stack on touch panel)
	1b: LCD Panel	n/a (stack on touch panel)
	1c: LCD Lower Polarizer + Reflector	O
	2: Diffuser #1	-
	3: Brightness Enhancement Film #1	O
	4: Brightness Enhancement Film #2	O
	5: Diffuser #2	O
	6: Light Guide	O
	7: Reflector	O
Display Backlight LED Count (size)		12 (3.00 x 0.86 x 0.37)
Cover Glass Thickness (A)		0.89
Display Thickness (B)		0.59
Display Film Material (BEF, etc.) Thickness (C)		1.04
Display Unit Total Thickness (D)		2.52



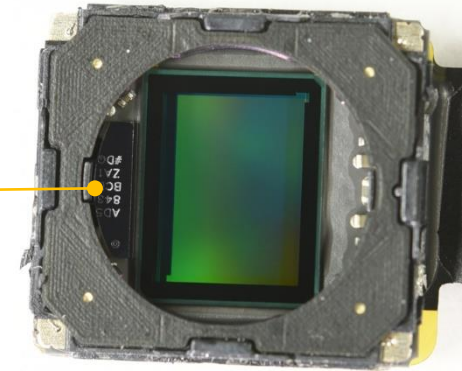
CAMERA

Unit: millimeter otherwise specified

FRONT CAMERA	
Pixel	7MP
Module Size	5.78 x 6.78 x 4.34
Module Marking	G8R947769 35HQHC9A
Sensor Diagonal Size	4.63
Sensor Manufacturer	unknown
Sensor Board Thickness	0.53



REAR CAMERA	
Pixel	12MP
Module Size	10.38 x 9.38 x 5.68
Module Marking	GCF006 67TKVM 7C023
Sensor Diagonal Size	6.30
Sensor Manufacturer	unknown
Sensor Board Thickness	0.74



OIS Controller
(Analog Devices)
AD5844



TIMING DEVICE: PCB#1 BATTERY SIDE

Unit: millimeter otherwise specified



(F1) FORK-XTAL	
Mnf.	TXC
Marking	TAp19
Size	1.58 x 0.95 x 0.52



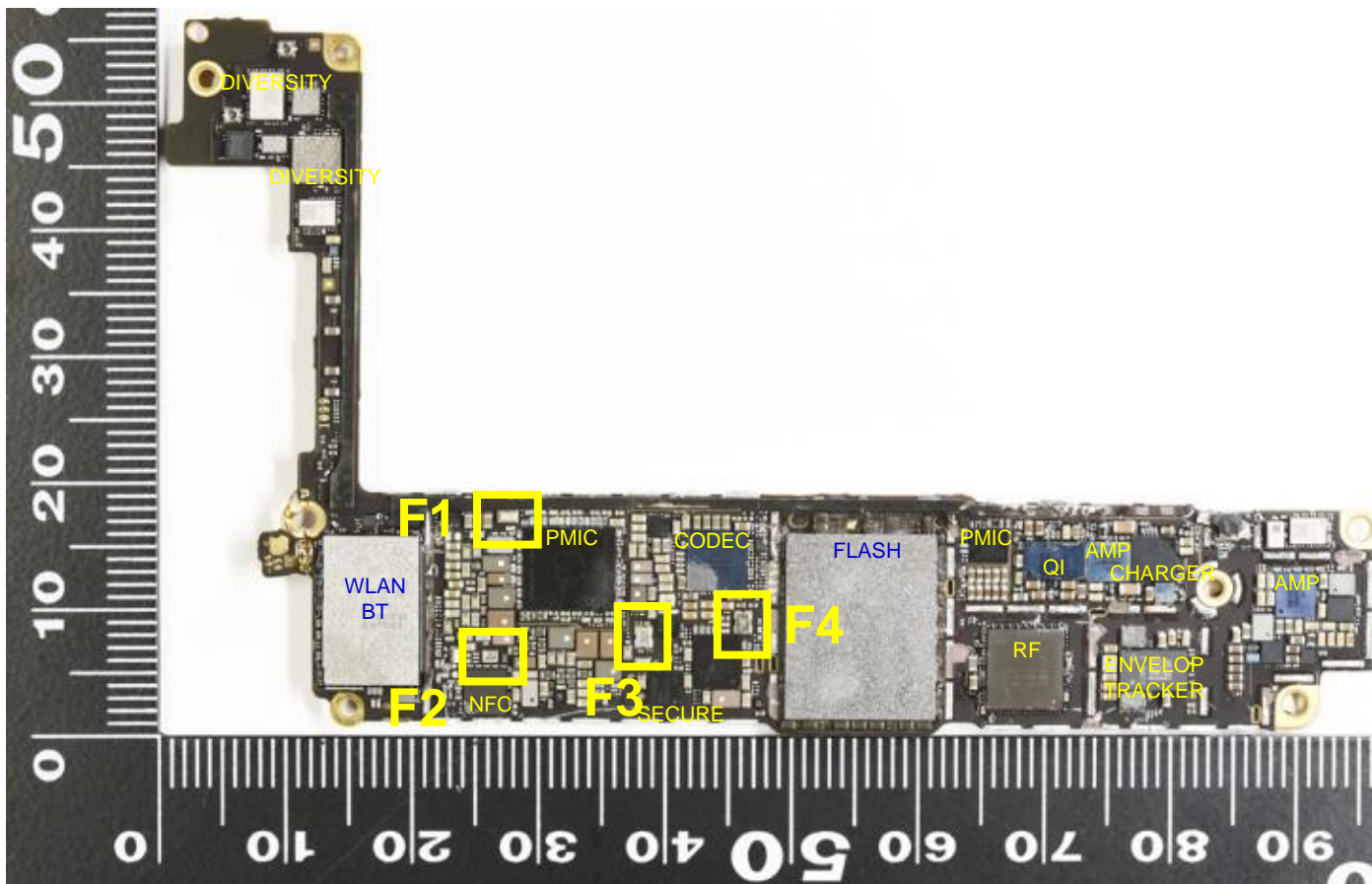
(F2) AT-XTAL	
Mnf.	TXC
Marking	T271 Mq6P
Size	1.16 x 0.92 x 0.42



(F3) AT-XTAL	
Mnf.	Epson
Marking	2400P E015A
Size	1.58 x 1.14 x 0.48

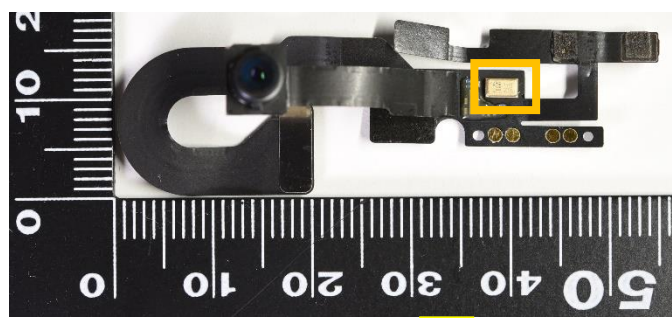


(F4) AT-XTAL + Thermistor (assumption)	
Mnf.	Kyocera
Marking	384C K010Z
Size	1.70 x 1.26 x 0.82

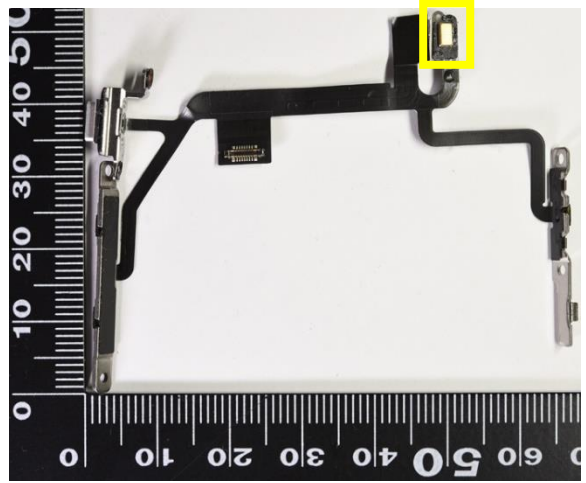


SILICON AUDIO (MICROPHONE)

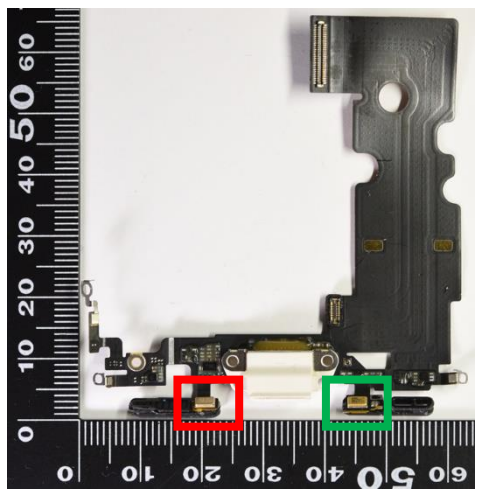
Unit: millimeter otherwise specified



Microphone	
Mnf.	Goertek
Marking	V 146 003 GWM1
Size	1.95 x 3.24 x 0.89



Microphone	
Mnf.	Knowles Acoustics
Marking	T 142 950 KSM1
Size	1.89 x 3.23 x 0.87



Microphone	
Mnf.	Goertek
Marking	T 182 004 GWM1
Size	1.97 x 3.37 x 0.90



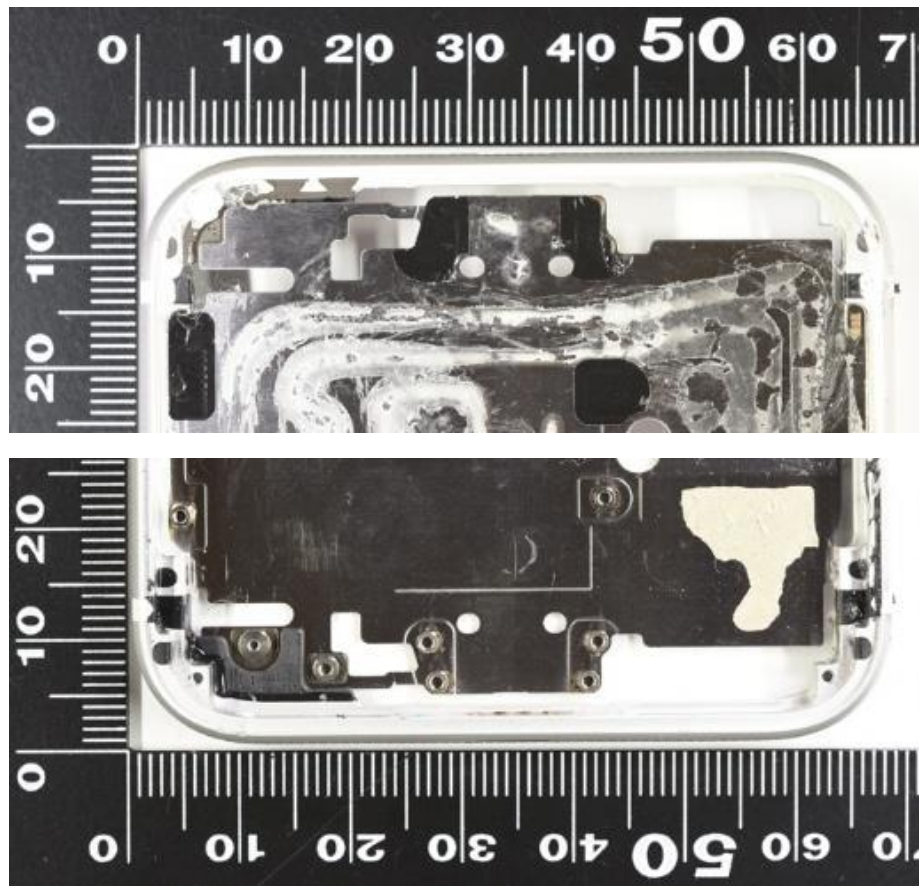
Microphone	
Mnf.	Knowles Acoustics
Marking	V 147 947 KSM1
Size	1.90 x 3.17 x 0.89

ANTENNA (assumption)

Unit: millimeter otherwise specified



CELLULAR #1



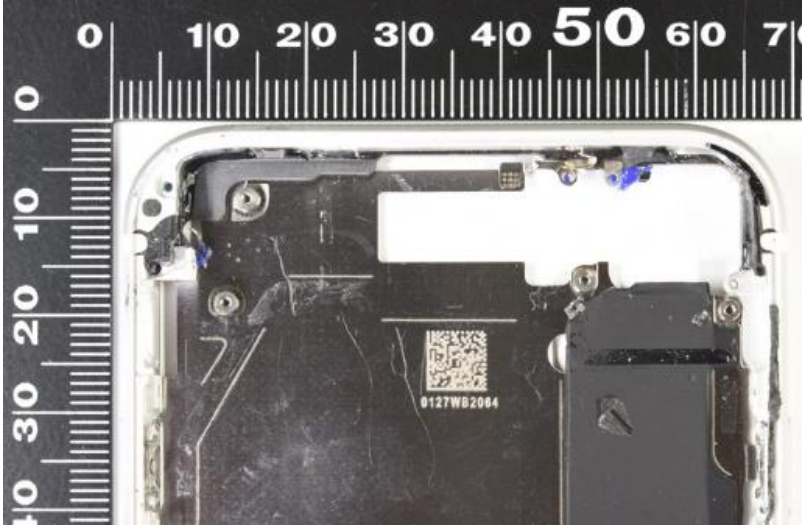
ANTENNAS BUILT-IN. DETAILS UNKNOWN

ANTENNA (assumption)

Unit: millimeter otherwise specified



CELLULAR #2/GPS, WLAN/Bluetooth



ANTENNAS BUILT-IN. DETAILS UNKNOWN

ANTENNA (assumption)



NFC



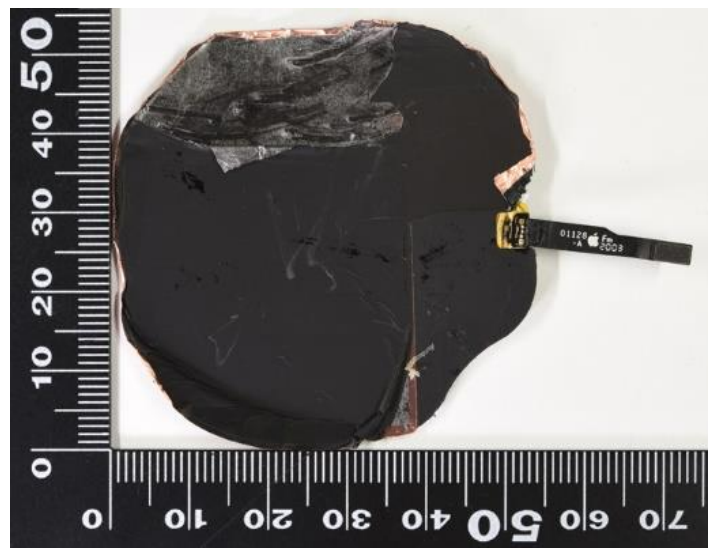
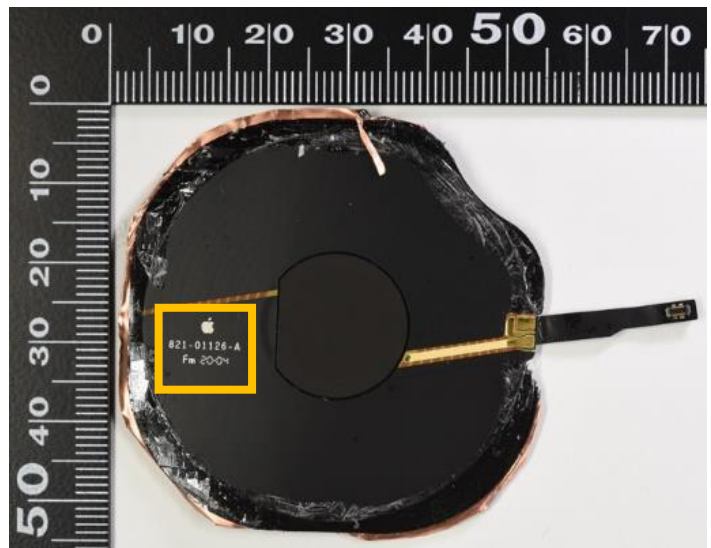
ANTENNAS BUILT-IN. DETAILS UNKNOWN

ANTENNA (assumption)

Unit: millimeter otherwise specified

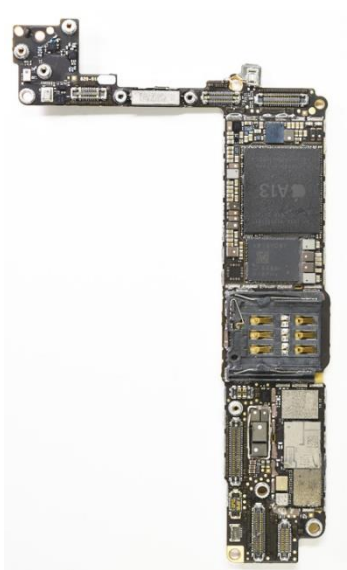


Qi

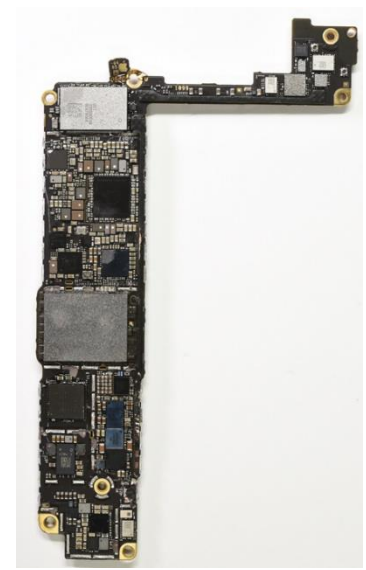
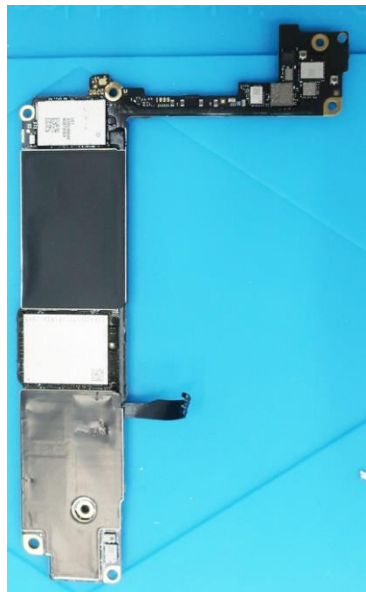


ANTENNAS BUILT-IN. DETAILS UNKNOWN

PCB#1 Display Side



PCB#1 Battery Side



POWER SOURCE: BATTERY

Unit: millimeter otherwise specified



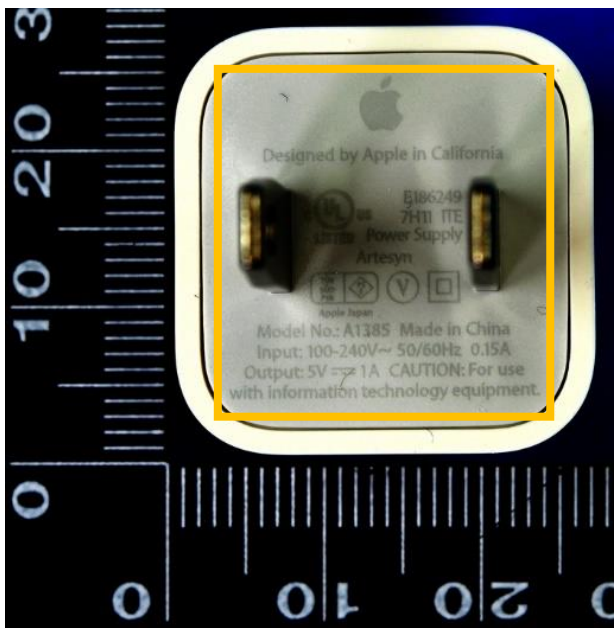
Battery placement by double-sided tape



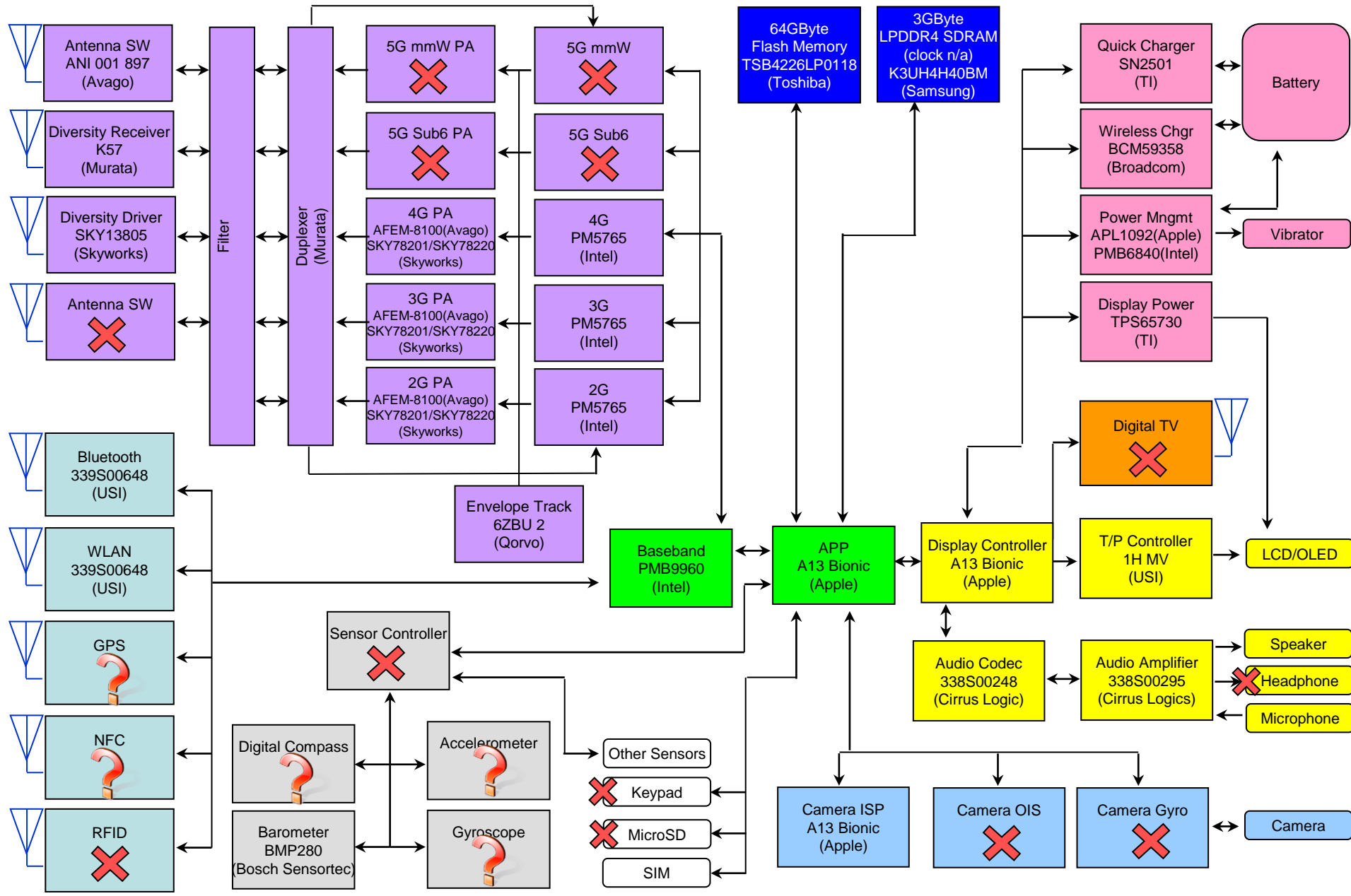
Battery	
Type	Lithium Ion Polymer
Mnf.	Huizhou Desay Battery
Size (mm)	38.15 x 93.21 x 2.88
Voltage	3.82V
Capacity	1821mAh
Watt	7.03Wh

POWER SOURCE: AC ADAPTER

Unit: millimeter otherwise specified



BLOCK DIAGRAM (with assumption)



SERVICES

- TEARDOWN: on cellular phone, smartphone, tablet, laptop PC, digital still camera, LCD TV, and other mobile equipments.
- BILL OF MATERIALS: all-component-cost breakdown into more than 100 categories.
- MARKET REPORT: based on requests.
- SEMINAR: based on requests. Free seminars offered to regular subscribers every quarter.
- INTELLECTUAL PROPERTY: old phones available since 1996 up to date. Most of them are functional.

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