Samsung Galaxy S4 LTE-A (SHV-E330L) Teardown

FEATURES:

- LTE Advanced
- Qualcomm MSM8974, 2.3GHz
- 5.0-inch Full HD Super AMOLD
- HSDPA at 150Mbps max.
- HSUPA at 50Mbps max.



Prepared for: SAMPLE

Manufacturer: Samsung
Model Number: SHV-E330L
Carrier: LG U+
Assembled in: unknown
Retail Price: KRW950,000
Product Release: 2013.09.01
Report Release: 2013.11.30
Document ID: 131130-1-1J
Revision: 1J

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SPECIFICATIONS

BASIC	Product Name	Galaxy S4, SHV-E330L		
	Manufacturer	Samsung		
	Minimum Size (mm)	136.6 x 69.8 x 7.9		
	Weight (g)	131		
BATTERY TIME	Standby (hours)	3.9G: LTE: 320	3G: WCDMA: unknown	2G: GSM: unknown
	Voice Call (minutes)	3.9G: LTE: 840	3G: WCDMA: unknown	2G: GSM: unknown
	Video Call (minutes)	n/a		
	Digital TV (minutes)	Unknown		
	Other: - (minutes)	n/a		
	Battery (size in mm)	Lithium Ion, 3.8V, 2600mAh (63.09 x 55.96 x 5.29)		
SYSTEM	OS	Android 4.2		
	CPU / ROM / RAM	CPU: Qualcomm MSM8974, quad core, 2.3GHz ROM: 32GByte RAM: 2048MByte		
DISPLAY	Main Display	5.0-inch, 16,777,216 colors, 1080 x 1920 dot, OLED		
	Sub Display	n/a		
COMMUNICATION	Protocol (MHz)	3.9G: LTE-A: 850, 2100 3G: WCDMA: 1900, 2100 3G: CDMA: n/a 2G: GSM: 900, 1800, 1900		
	HADPA/HSUPA (Mbps)	150.0 / 50.0		
	Wireless LAN	802.11a/b/g/n/ac		
	Bluetooth	4.0		
	GPS	Yes		
	Infrared	n/a		
	RFID/NFC	NFC		
CAMERA	Main Camera	13.0MP CMOS with auto focus, flash LED		
	Sub Camera	2.0MP CMOS		
SENSOR	Accelerometer	Yes		
	Digital Compass	Yes		
	Gyroscope	Yes		
	Barometer	Yes		
	Light Sensor	Yes		
	Proximity Sensor	Yes		
OTHER	HDMI	n/a		
	MicroSD (max capacity)	64GByte		
	Waterproof/Anti-shock	n/a		

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OUTLOOK / PRODUCT INFORMATION





OUTLOOK (from manual)





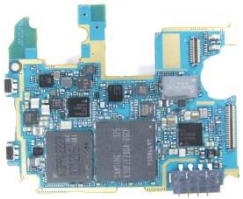
Touch Panel & AMOLED



Center Panel



PCB#1



PCB#2



Rear Panel



Rear Cover





PCB#3



Li-Ion Battery

INTERIOR



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PCB DEMENSION & MARKING

Unit: millimeter otherwise specified

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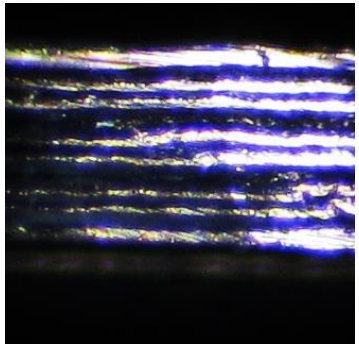
	PCB #1	PCB #2	PCB#3	-	-
Size	58.92 x 48.68 x 0.62	35.22 x 25.19 x n/a	50.63 x 13.44 x 0.40	-	-
Layer	10	n/a (FPC)	8	-	-
Connector (pin)	9	2	5	-	-
Connector (socket)	10	1	2	-	-
Connector (solder)	0	0	0	-	-
Connector (ACF)	0	0	0	-	-
Test Point	81	0	2	-	-









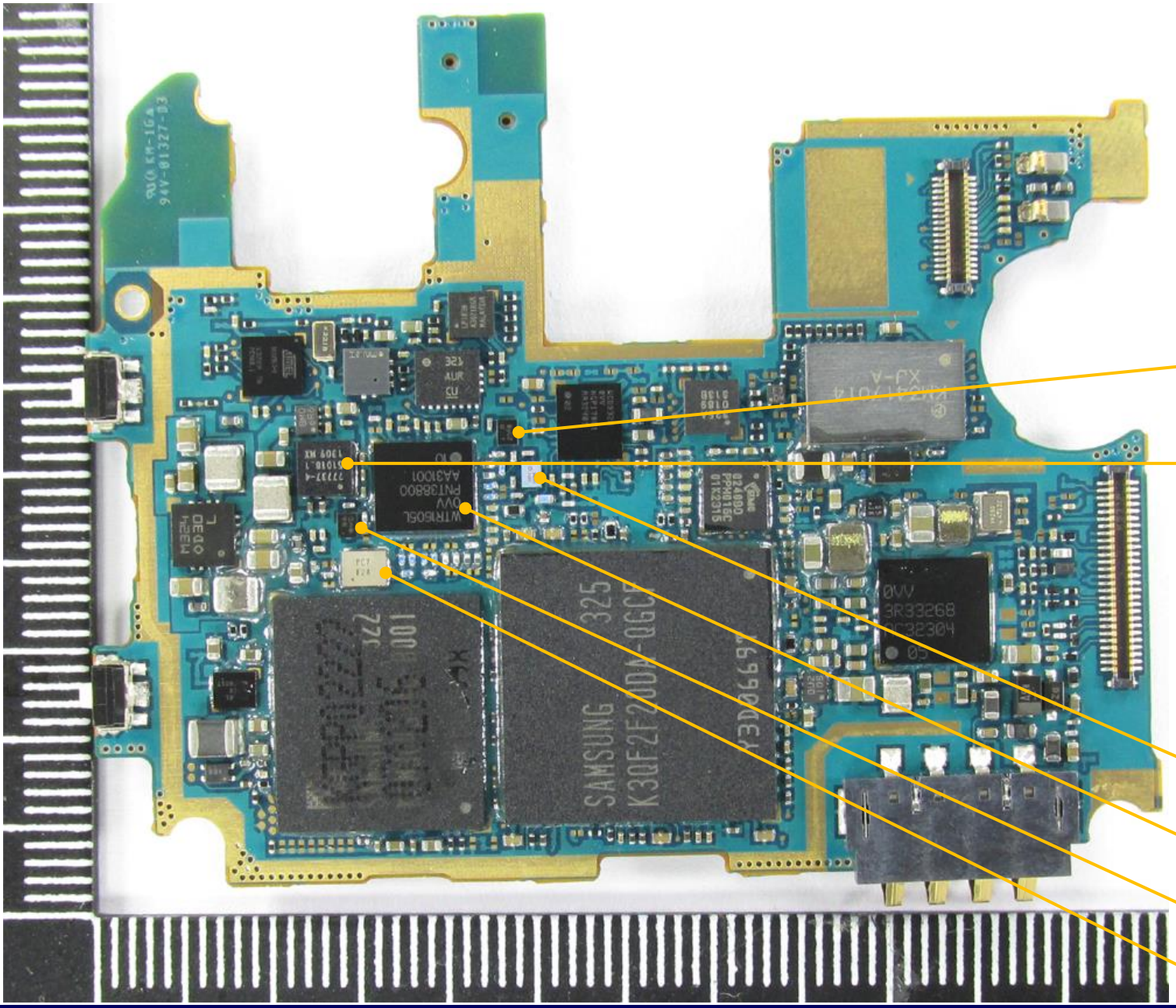


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PCB#1 DISPLAY SIDE: CELLULAR

1 notch = 1mm

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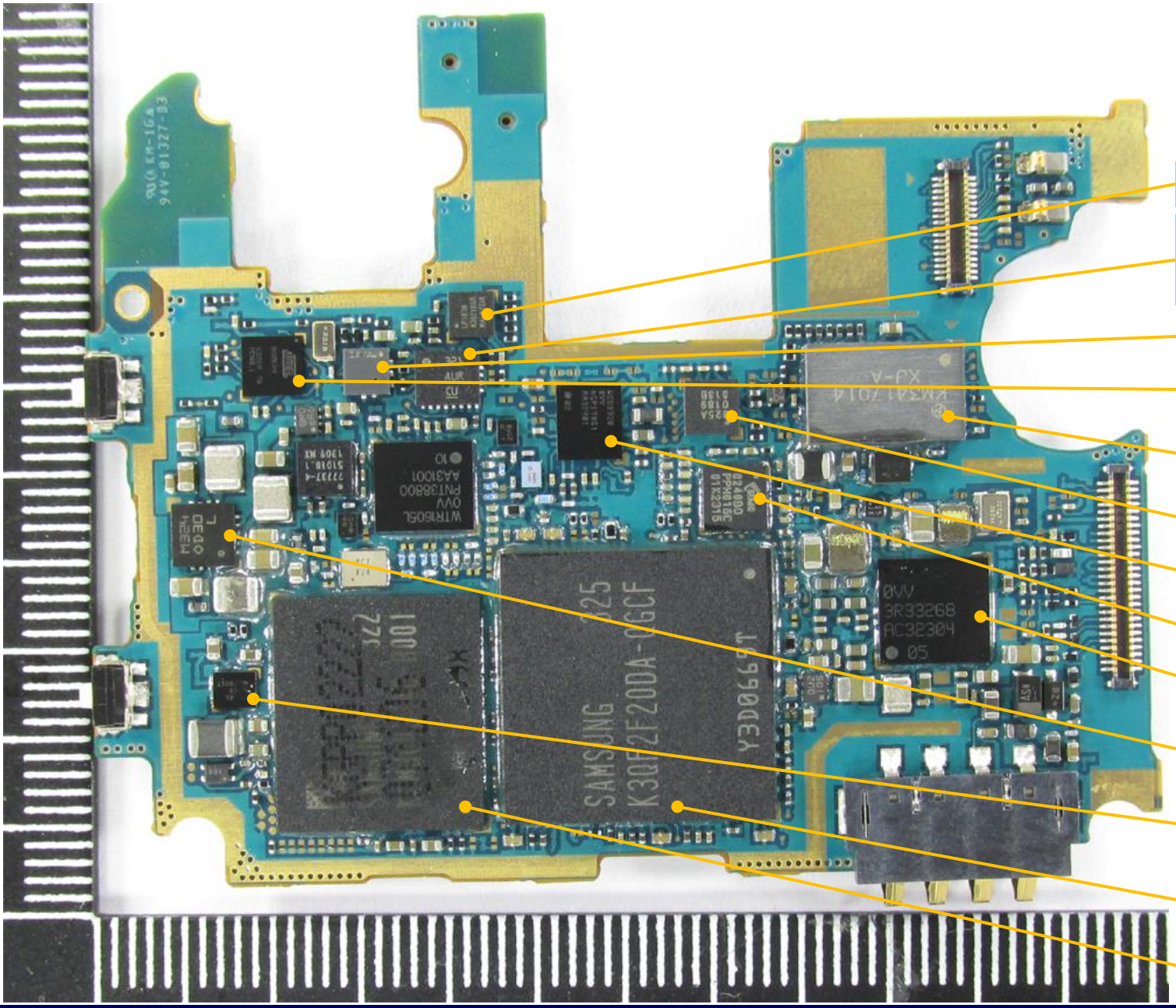


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PCB#1 DISPLAY SIDE: KEY COMPONENTS

1 notch = 1mm

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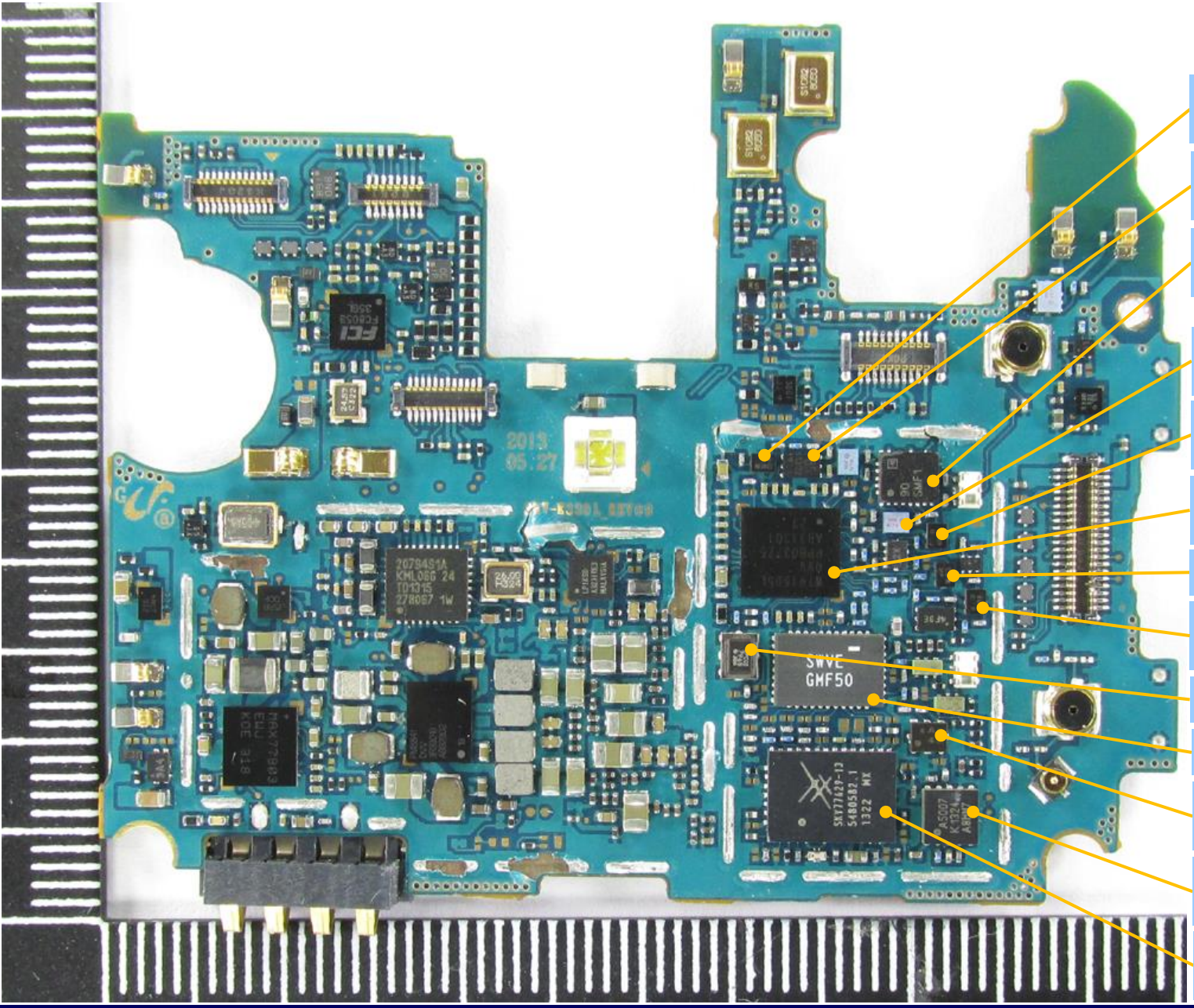
- FPGA (Lattice) LP1K36
- Gyroscope (Samsung) (assumption) 321 AUR CU
- Barometer (Bosch Sensortec) 326H
- MCU with 128kbit Flash (Atmel) UC128L5
- WLAN + Bluetooth (Murata) KM3417014 XJ-A
- Voice Processor (Audience) eS325
- Audio Codec (Qualcomm) WCD9320
- MHL Transmitter (Silicon Image) Sil8240
- Power Management (Qualcomm) PM8941
- Accelerometer (STM) M324 D30 L
- Envelope Tracker (Qualcomm) QFE1101
- MSM8974 Baseband/Application Processor (Qualcomm) + DRAM (Samsung) K3QF2F200A
- Flash Memory (Samsung) KLMBG4GEEAC

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PCB#1 BATTERY SIDE: CELLULAR

1 notch = 1mm

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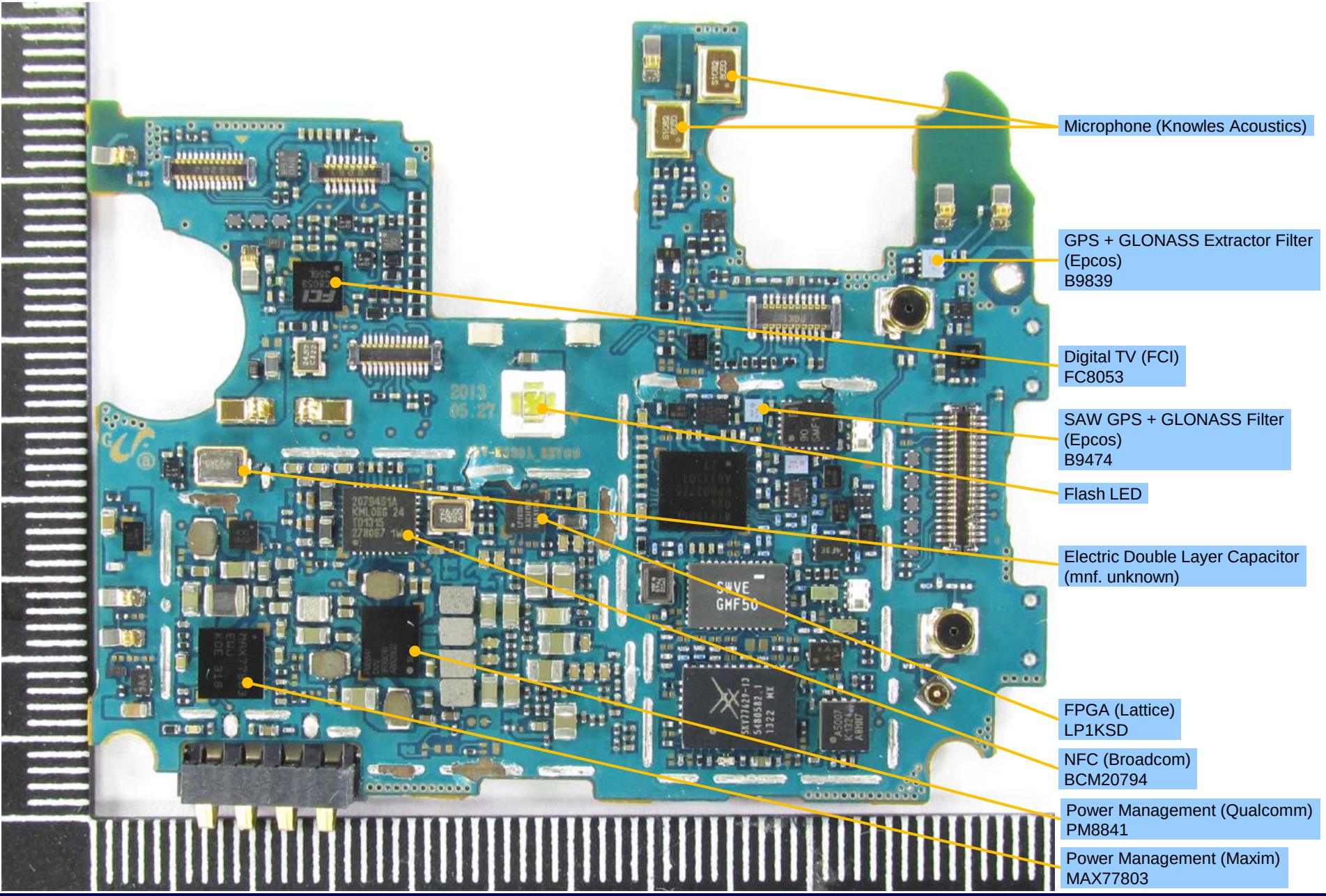


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PCB#1 BATTERY SIDE: KEY COMPONENTS

1 notch = 1mm

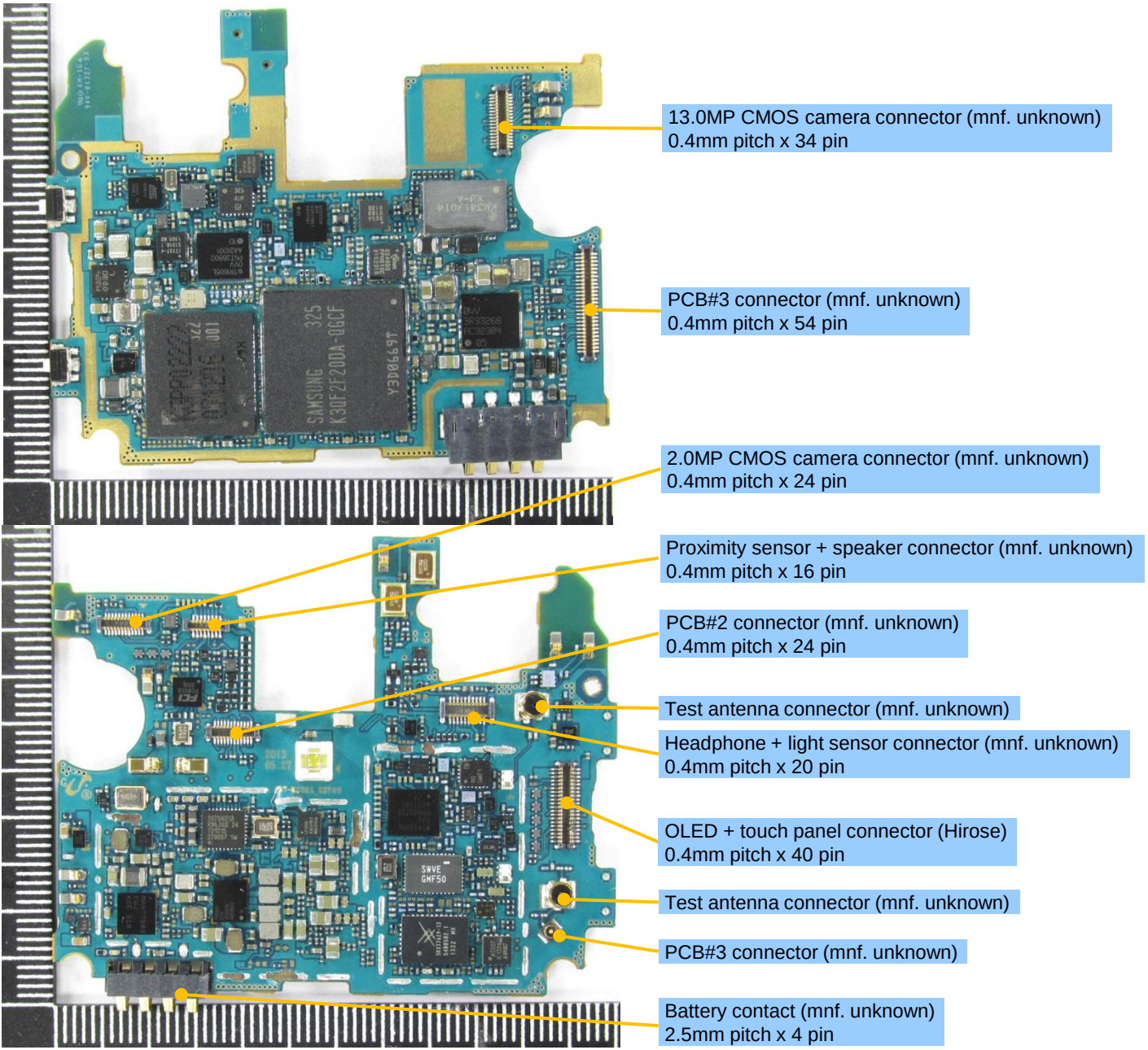
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PCB#1: CONNECTORS

1 notch = 1mm



13.0MP CMOS camera connector (mnf. unknown)
0.4mm pitch x 34 pin

PCB#3 connector (mnf. unknown)
0.4mm pitch x 54 pin

2.0MP CMOS camera connector (mnf. unknown)
0.4mm pitch x 24 pin

Proximity sensor + speaker connector (mnf. unknown)
0.4mm pitch x 16 pin

PCB#2 connector (mnf. unknown)
0.4mm pitch x 24 pin

Test antenna connector (mnf. unknown)

Headphone + light sensor connector (mnf. unknown)
0.4mm pitch x 20 pin

OLED + touch panel connector (Hirose)
0.4mm pitch x 40 pin

Test antenna connector (mnf. unknown)

PCB#3 connector (mnf. unknown)

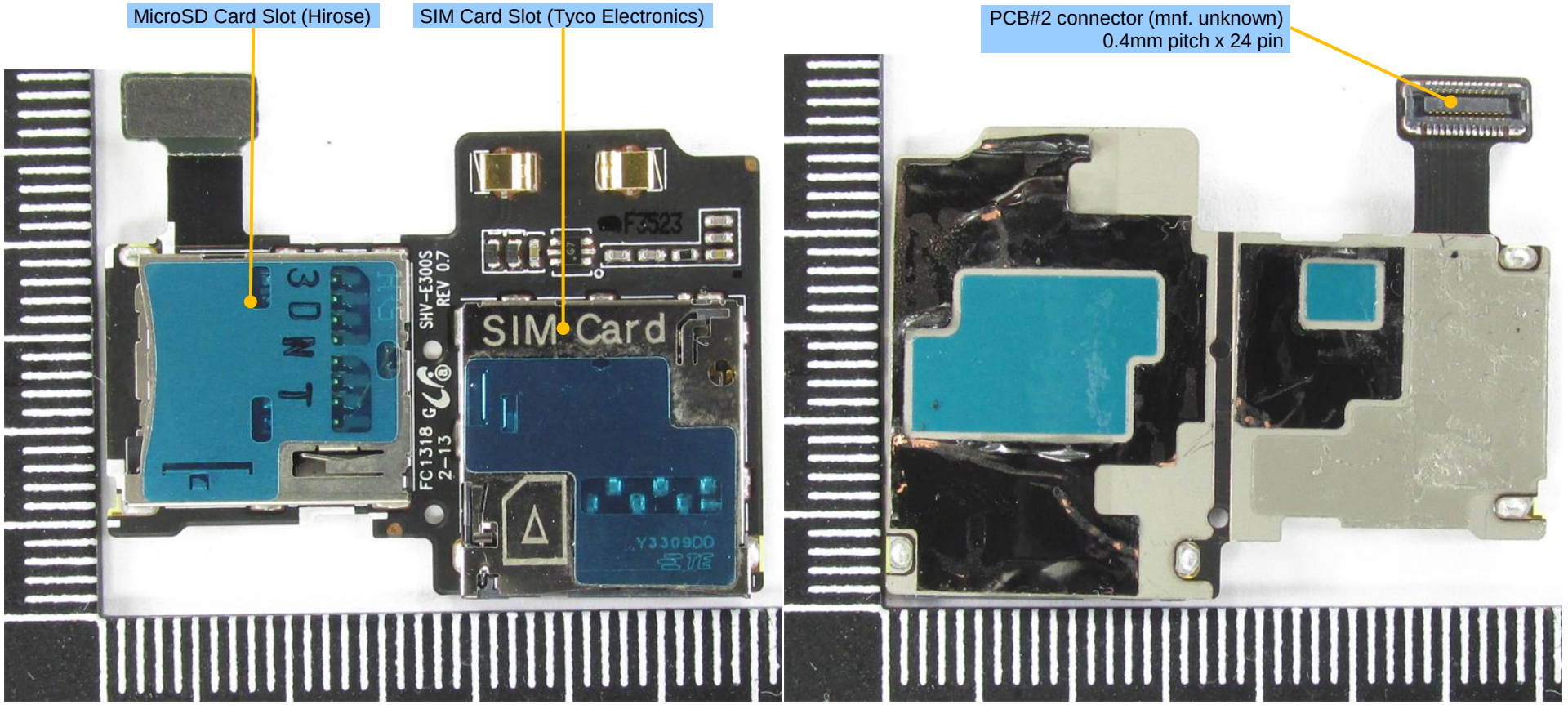
Battery contact (mnf. unknown)
2.5mm pitch x 4 pin

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PCB#2: KEY COMPONENTS

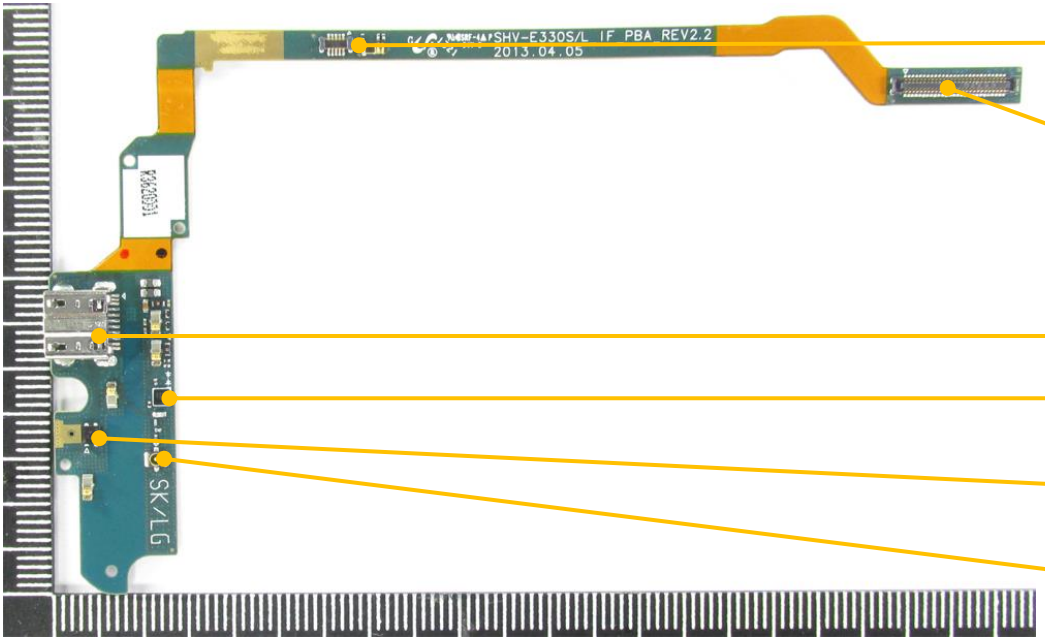
1 notch = 1mm

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PCB#3: KEY COMPONENTS

1 notch = 1mm



PCB#3 connector (mnf. unknown)
0.4mm pitch x 10 pin

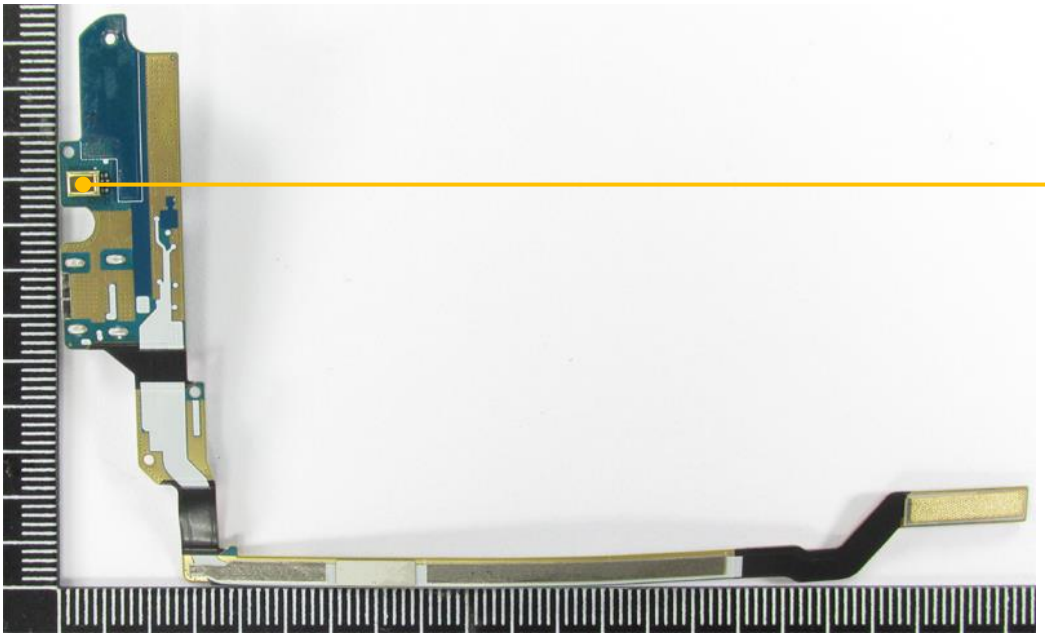
PCB#1 connector (mnf. unknown)
0.4mm pitch x 54 pin

Micro USB Port

Antenna Switch (RFMD)
RF1119

Unknown sensor

PCB#1 connector



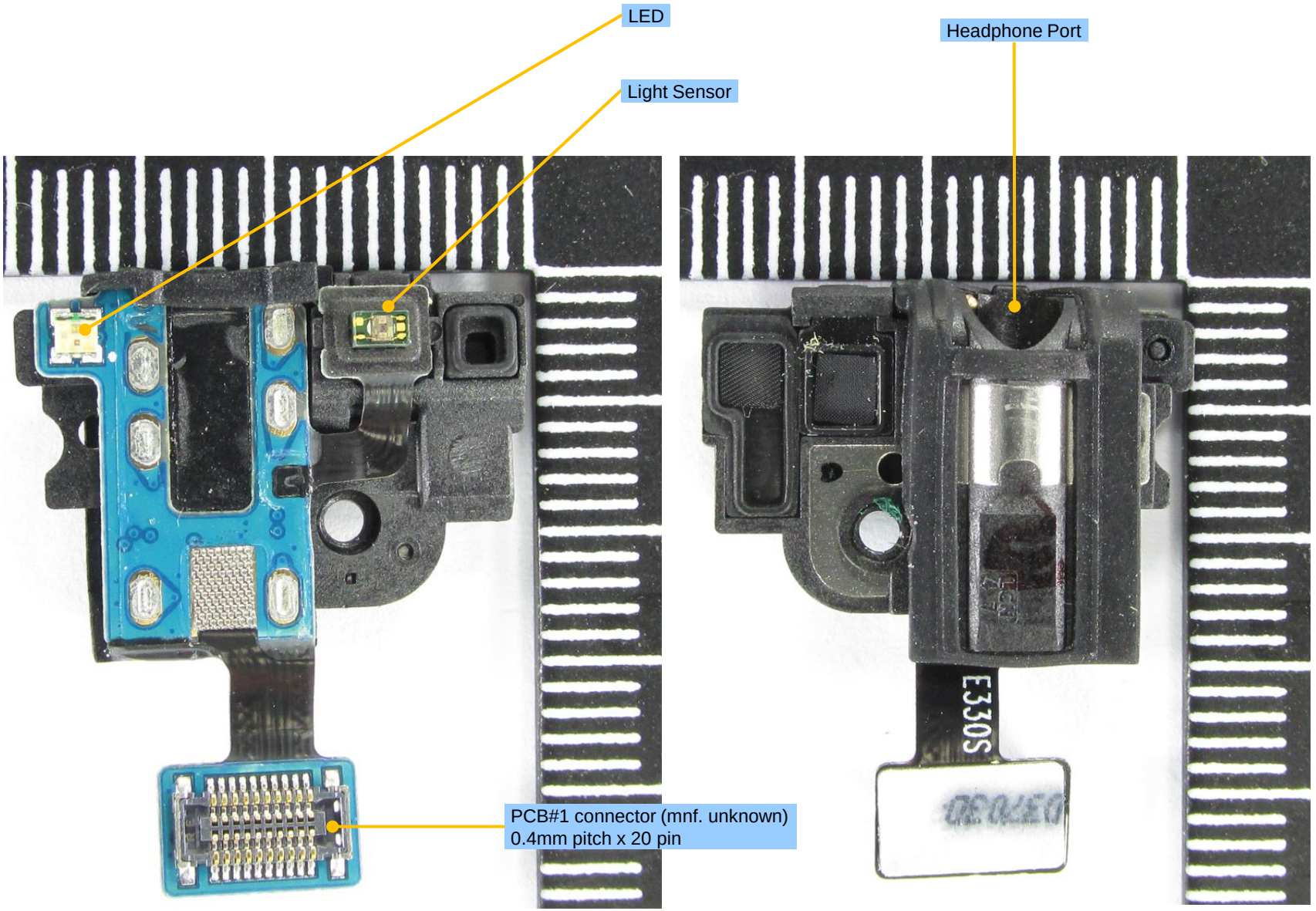
Microphone (Knowles Acoustics)

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OTHER: HEADPHONE + SENSOR

1 notch = 1mm

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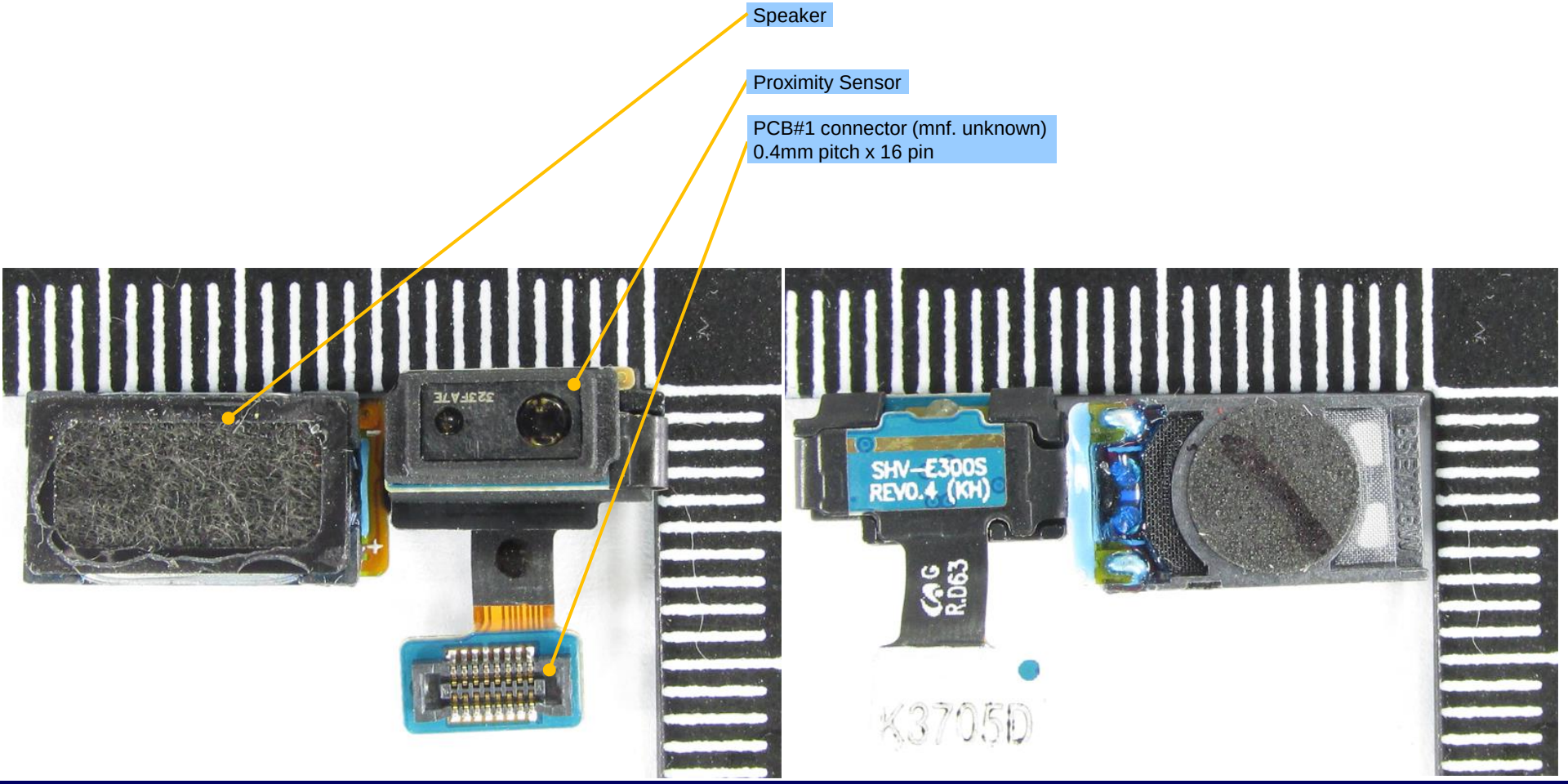


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OTHER: SPAKER + SENSOR

1 notch = 1mm

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MAIN DISPLAY DIMENSION

Unit: millimeter otherwise specified

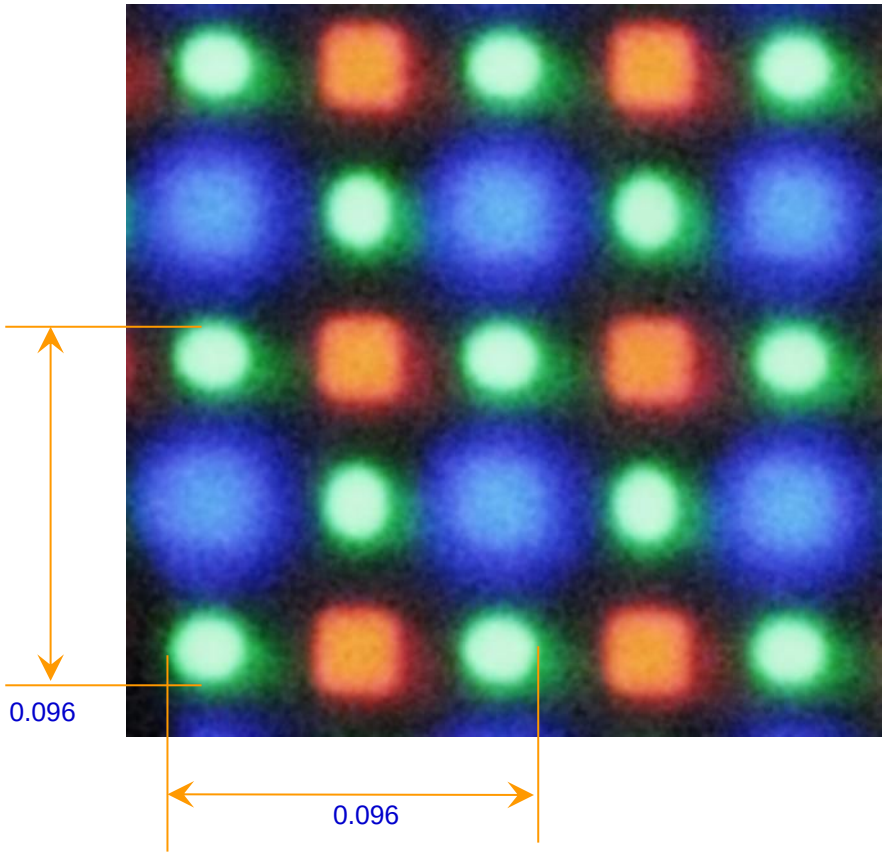
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Display Module Size		117.33 x 65.24 x n/a (stack on touch panel)
Display Marking (location)		n/a (OLED)
LCD Panel Manufacturer		Samsung
Display Diagonal Size (inch)		5.0
Display Mode (alignment)		Pen Tile
Pixel Count (dot)		1920 x 1080, Full HD
Resolution (pixel per inch)		441
Peripheral Margin (from reverse side)	Left	n/a (OLED)
	Top	n/a (OLED)
	Right	n/a (OLED)
	Bottom – up	n/a (OLED)
	Bottom – low	n/a (OLED)
Seal marking: Y/N (length in mm)		n/a (OLED)
Display Component Thickness	1a: LCD Top Polarizer	n/a (OLED)
	1b: LCD Panel	n/a (OLED)
	1c: LCD Lower Polarizer + Reflector	n/a (OLED)
	2. Diffuser	n/a (OLED)
	3: Collimator	n/a (OLED)
	4: Collimator	n/a (OLED)
	5: Diffuser	n/a (OLED)
	6: Light Guide	n/a (OLED)
	7: Reflector	n/a (OLED)
	Display Component Total Thickness (clearance)	n/a (OLED)
Display Backlight LED Count (size)		n/a (OLED)
Display Cable Width (mm) / Pin Pitch (mm) / Pin Count		n/a (socket) / n/a (socket) / 40

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MAIN DISPLAY DETAIL: PIXEL

Unit: millimeter otherwise specified



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MAIN DISPLAY DETAIL: PERIPHERAL



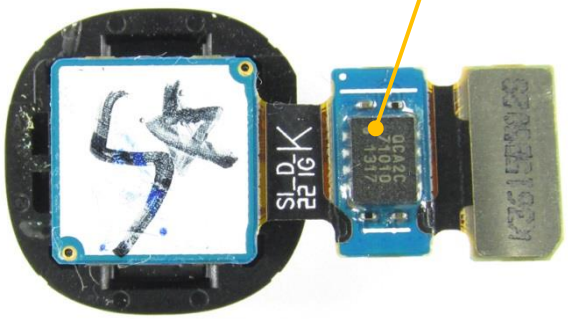
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13.0MP CMOS CAMERA

Unit: millimeter otherwise specified

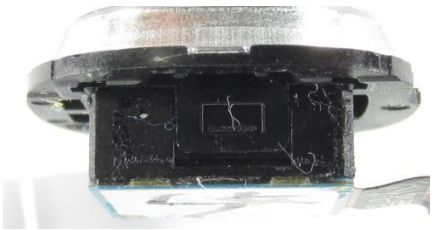
Camera Module Size:	9.72 x 9.73 x 6.67
Camera Module Marking:	TD605AL01K
Sensor Diagonal Size:	5.54
Sensor Manufacturer:	Sony
Sensor Board Thickness:	0.33

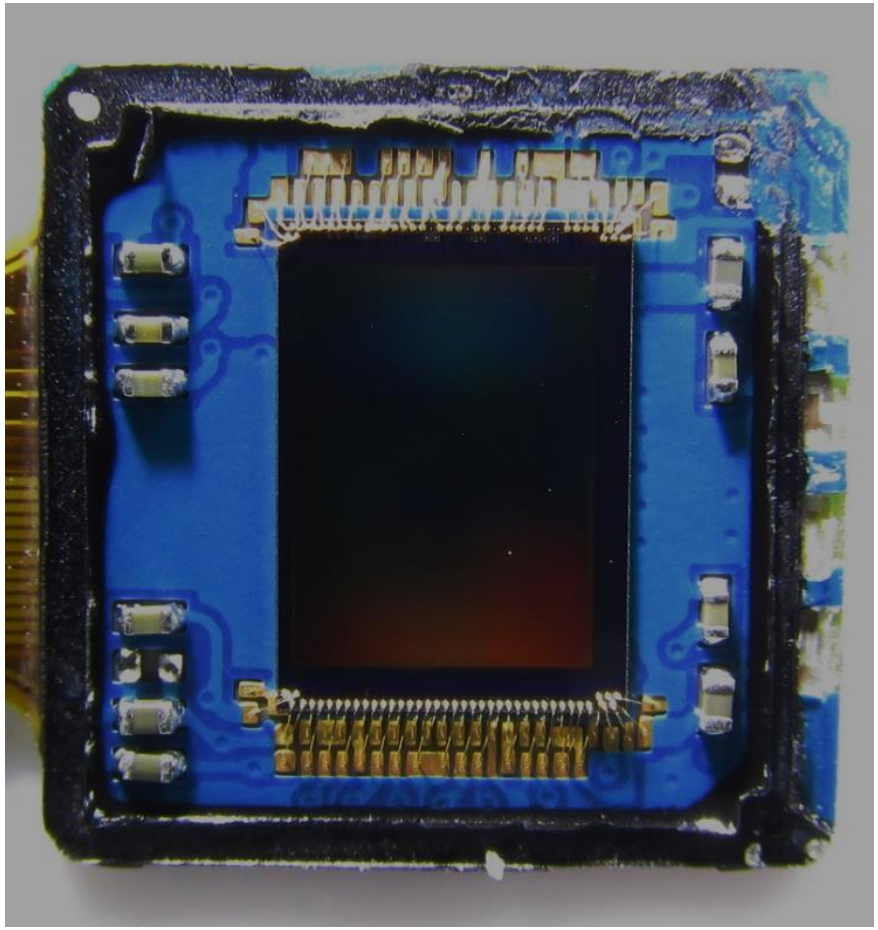












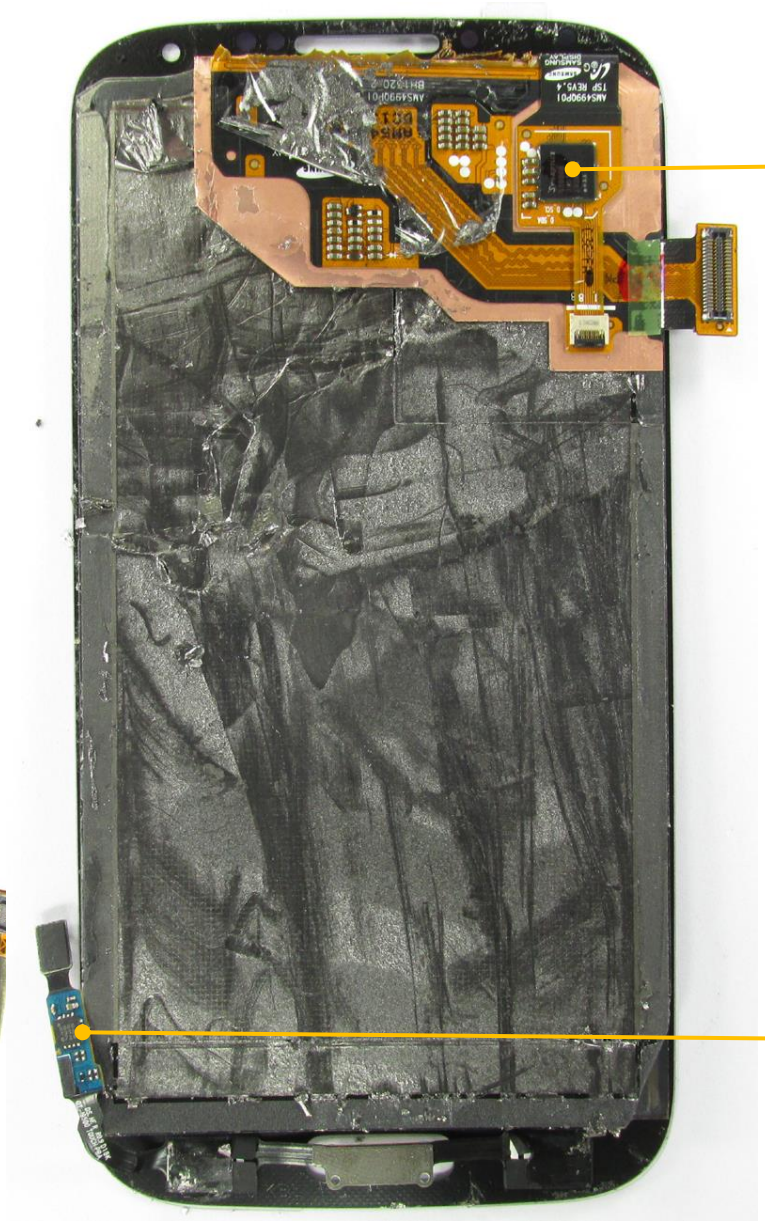
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TOUCH PANEL

Unit: millimeter otherwise specified

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Touch Panel Controller (Synaptics)
S5000B

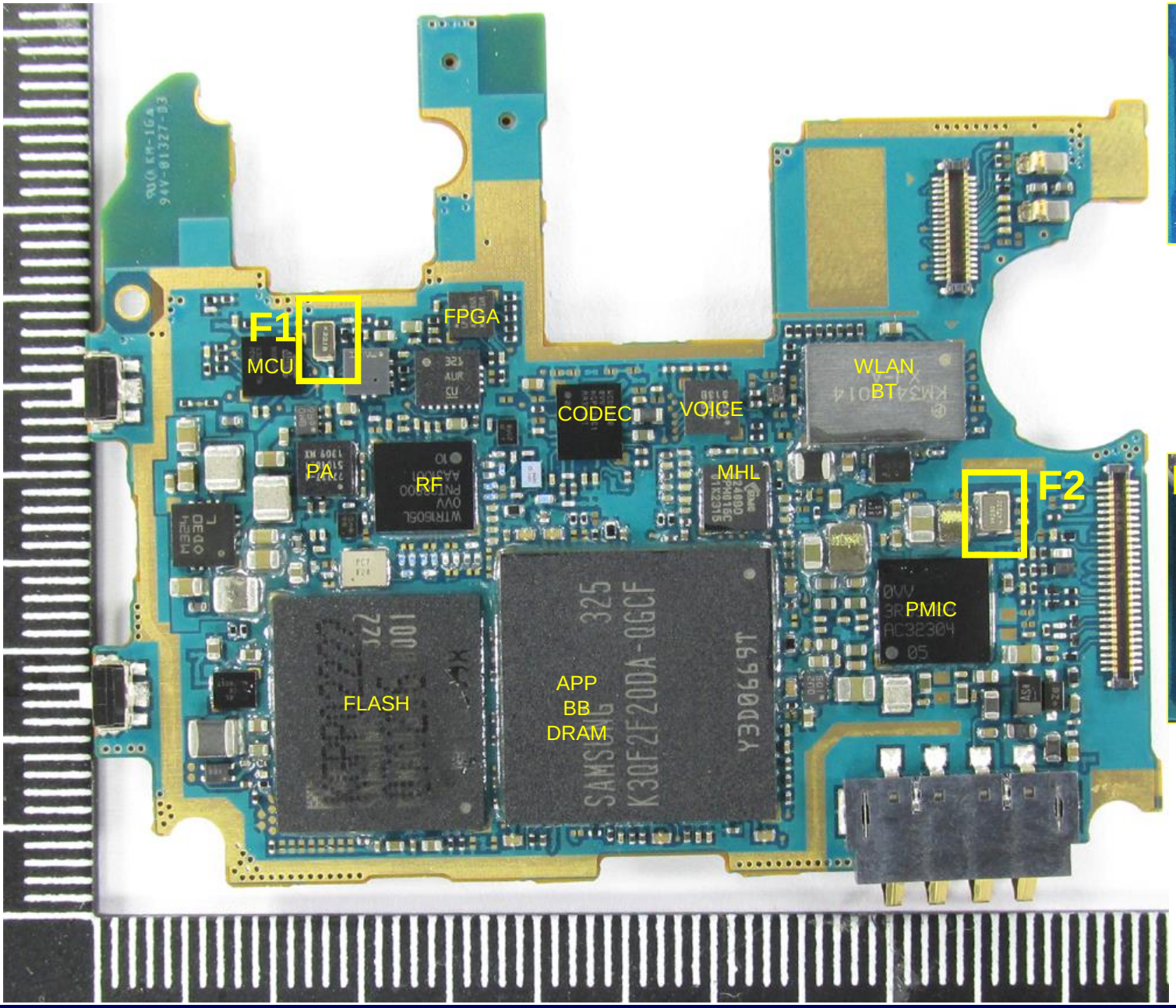
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1319
6728

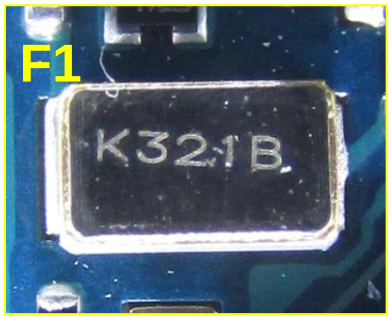
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QUARTZ: PCB#1 DISPLAY SIDE

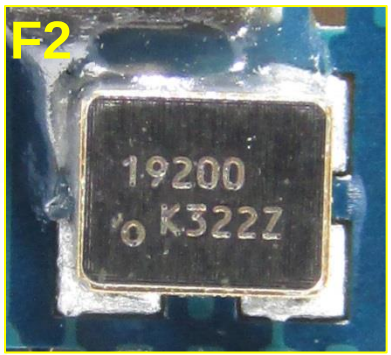
Unit: millimeter otherwise specified

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(F1) Fork XTAL (Kyocera)
K321B
2.05 x 1.19 x 0.76



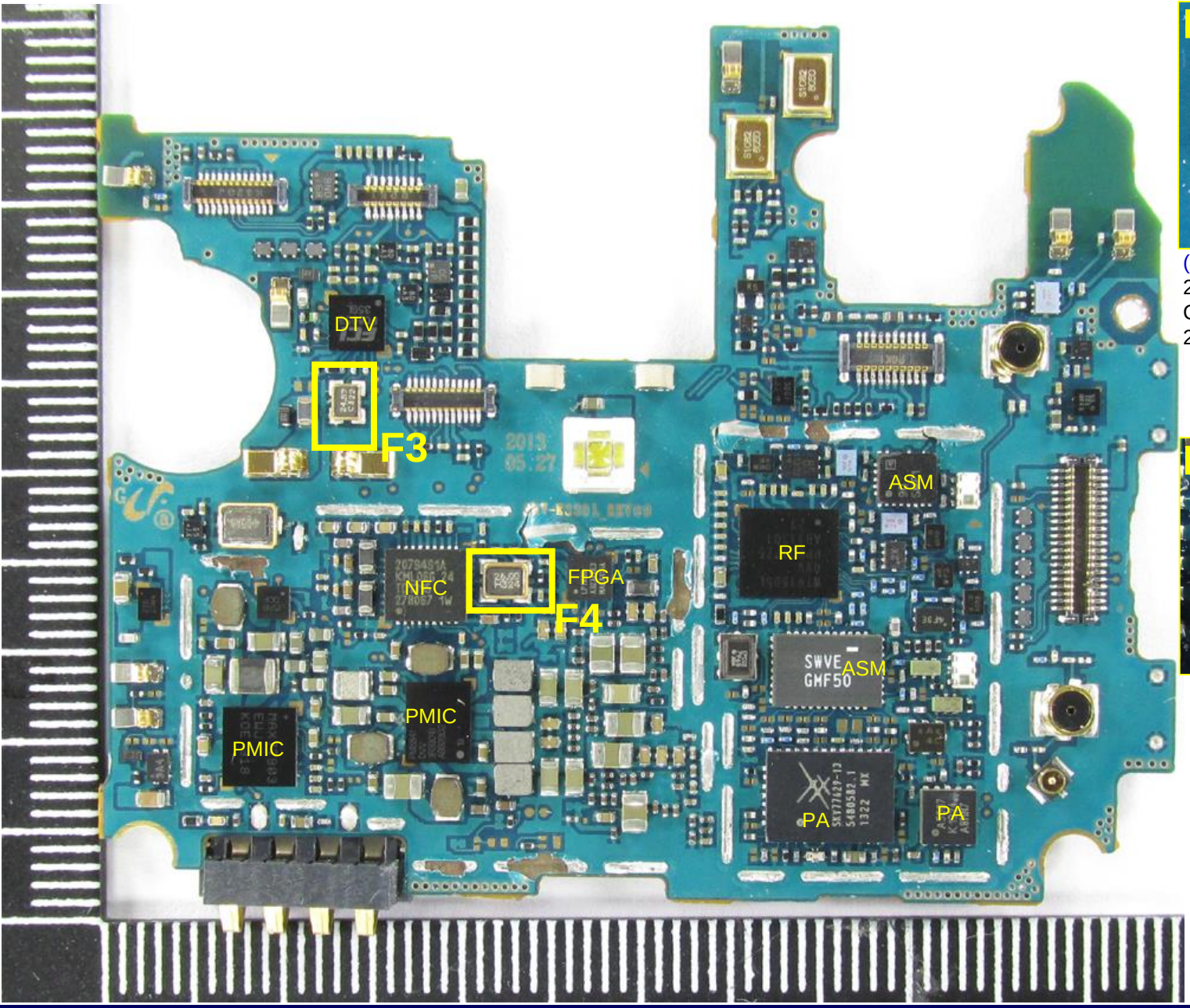
(F2) AT-XTAL with Thermistor (Kyocera)
19200
K322Z
2.06 x 1.61 x 1.05

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QUARTZ: PCB#1 BATTERY SIDE

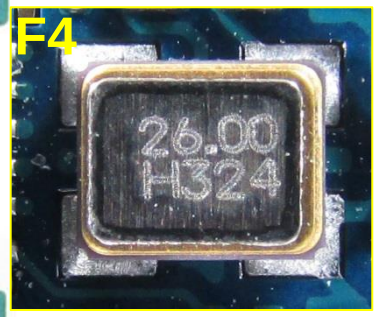
Unit: millimeter otherwise specified

Fomalhaut Techno Solutions





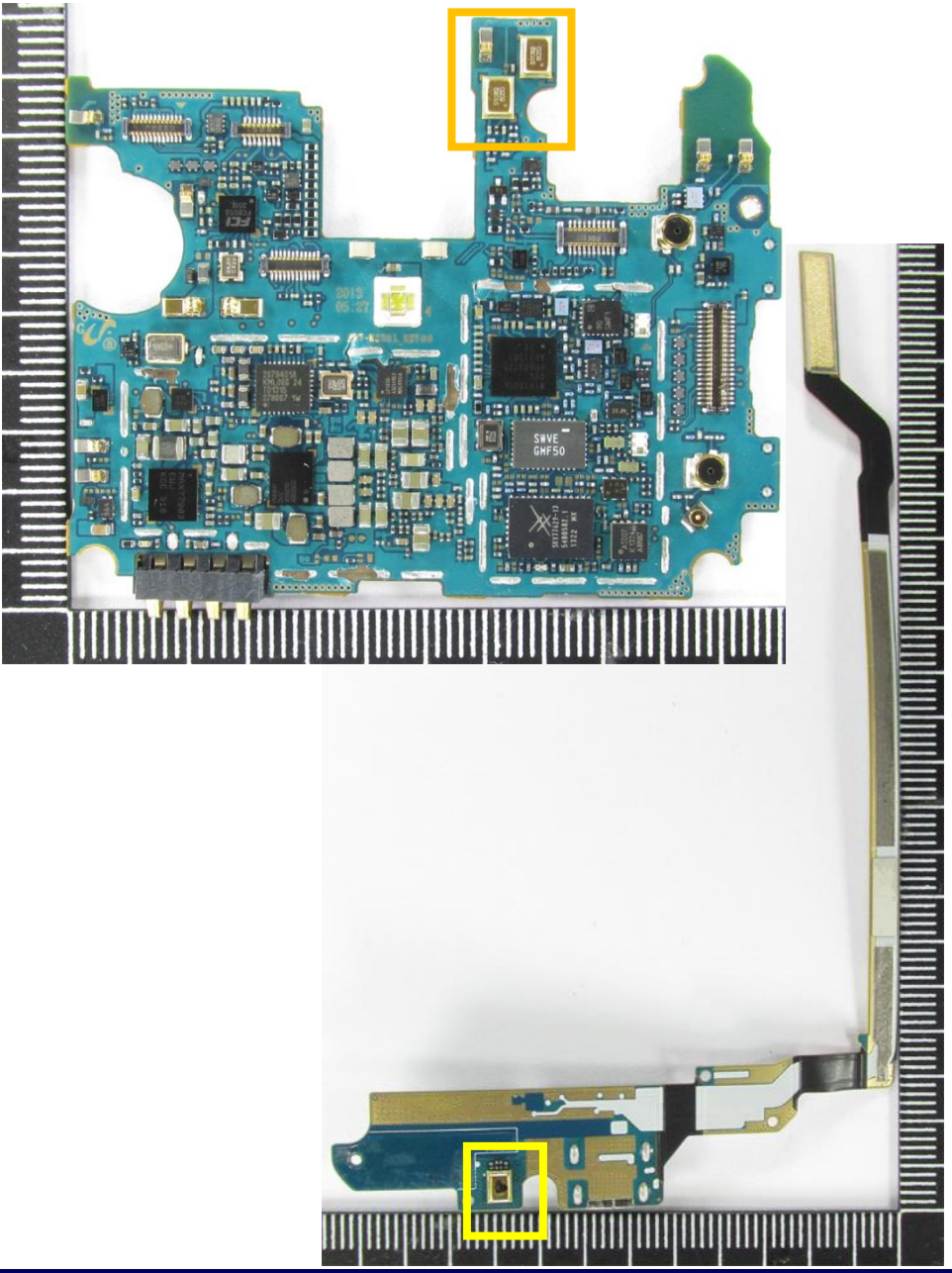
(F3) AT-XTAL (SEMCO)
24.57
C322
2.00 x 1.63 x 0.54

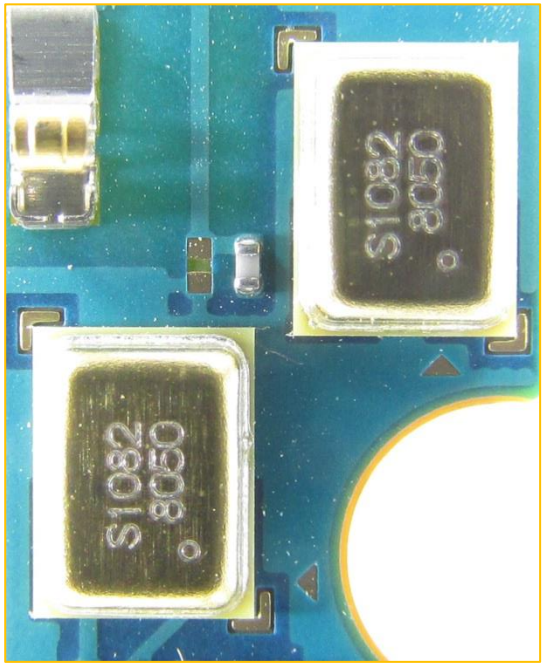


(F4) AT-XTAL (SEMCO)
26.00
H324
2.30 x 1.99 x 0.56

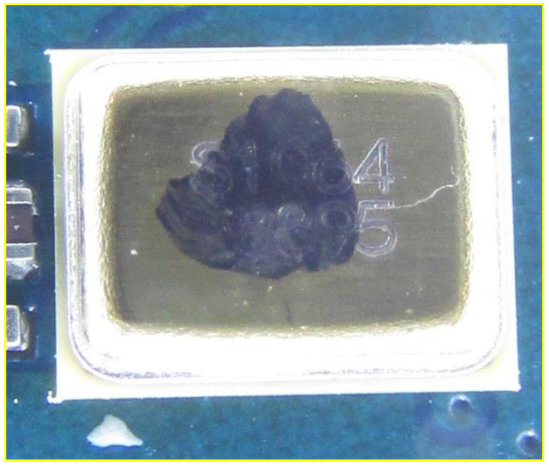
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SILICON AUDIO (PIEZO MICROPHONE)





Microphone (Knowles Acoustics)
S1082
8050



Microphone (Knowles Acoustics)
S1064
8895

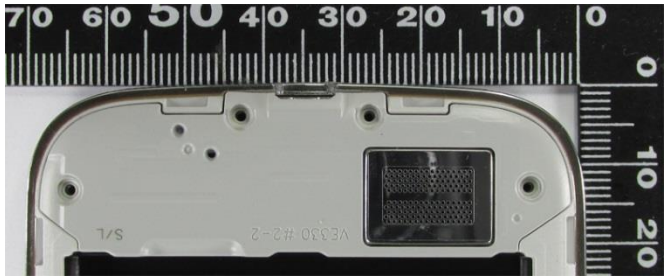
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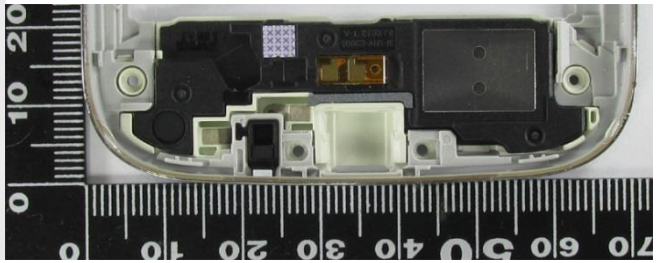
ANTENNA

Unit: millimeter otherwise specified



CELLULAR #1





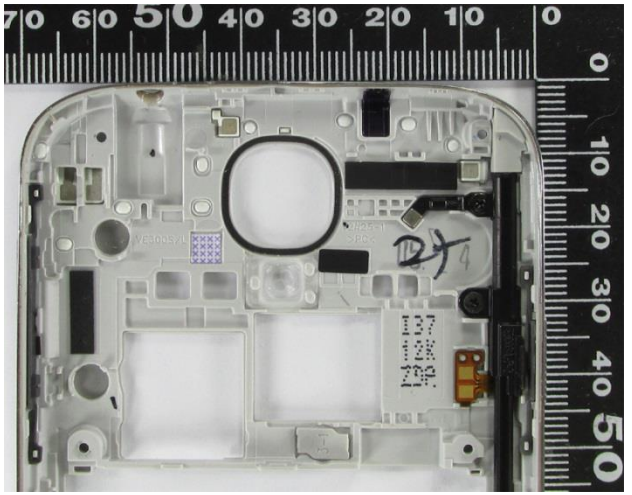
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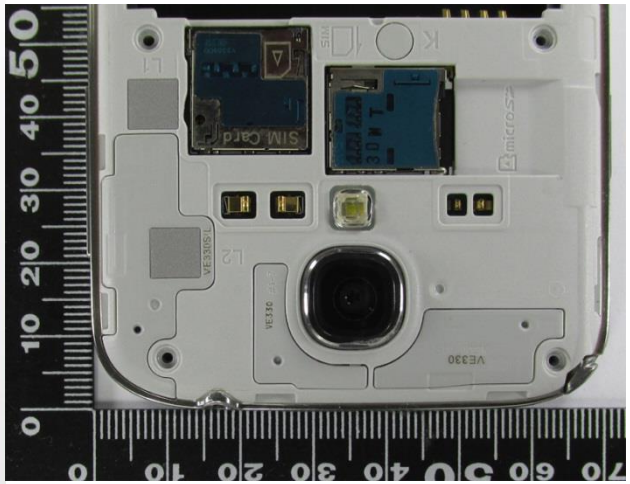
ANTENNA

Unit: millimeter otherwise specified



CELLULAR #2/WLAN/BT/GPS





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ANTENNA

Unit: millimeter otherwise specified

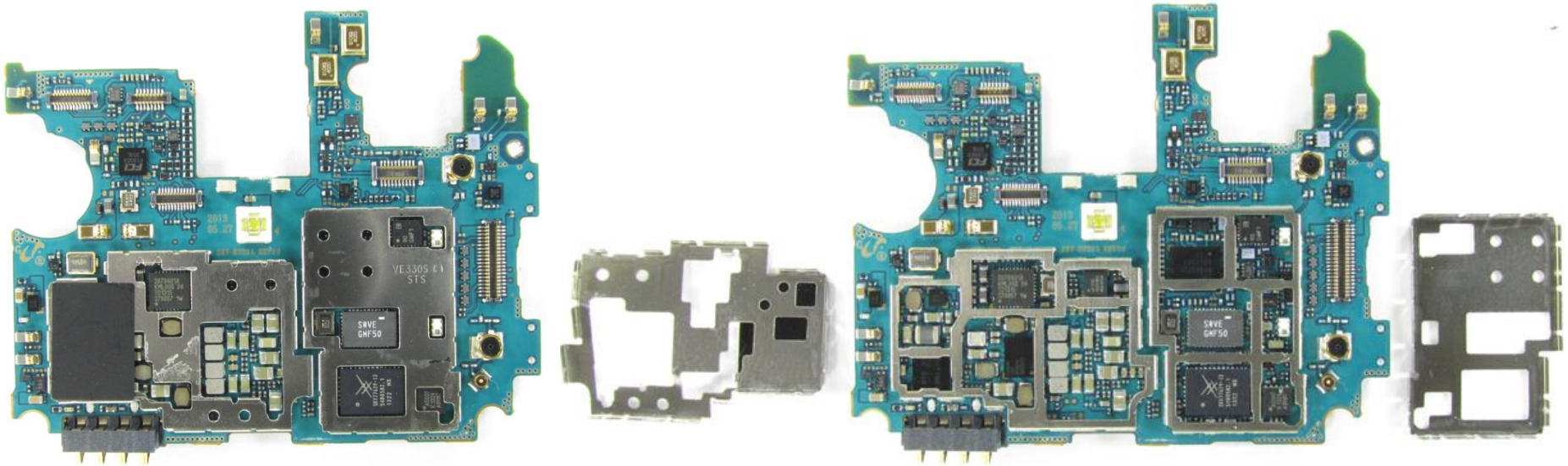


DTV



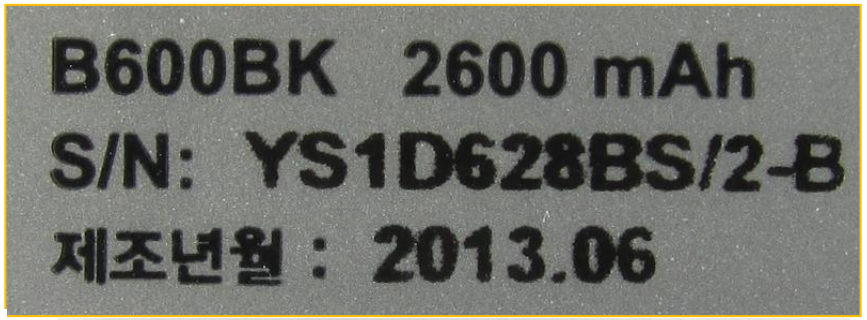
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PCB EMI



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POWER SOURCE: BATTERY







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POWER SOURCE: AC ADAPTER















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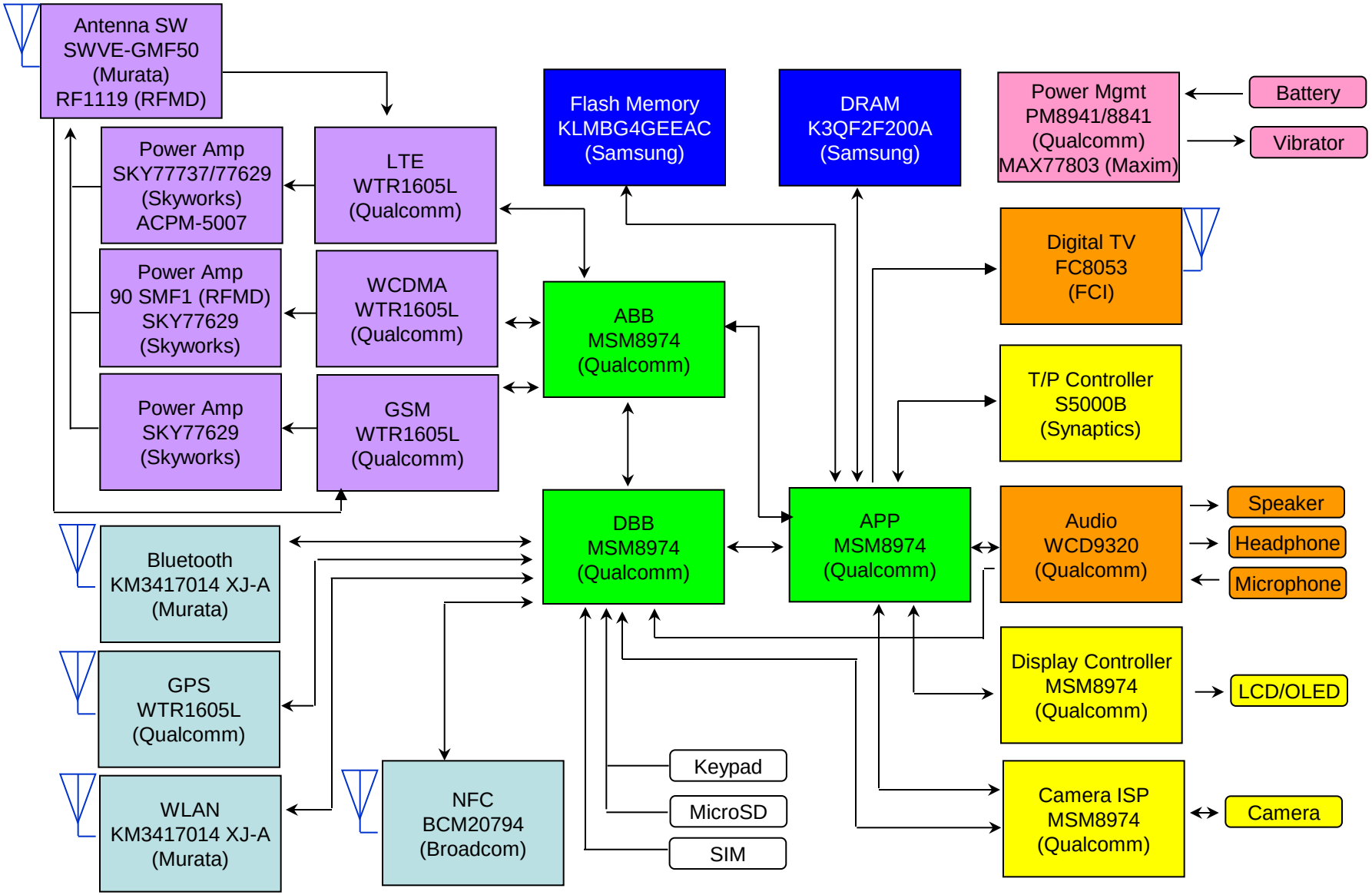
OTHER: SECOND BATTERY BOX





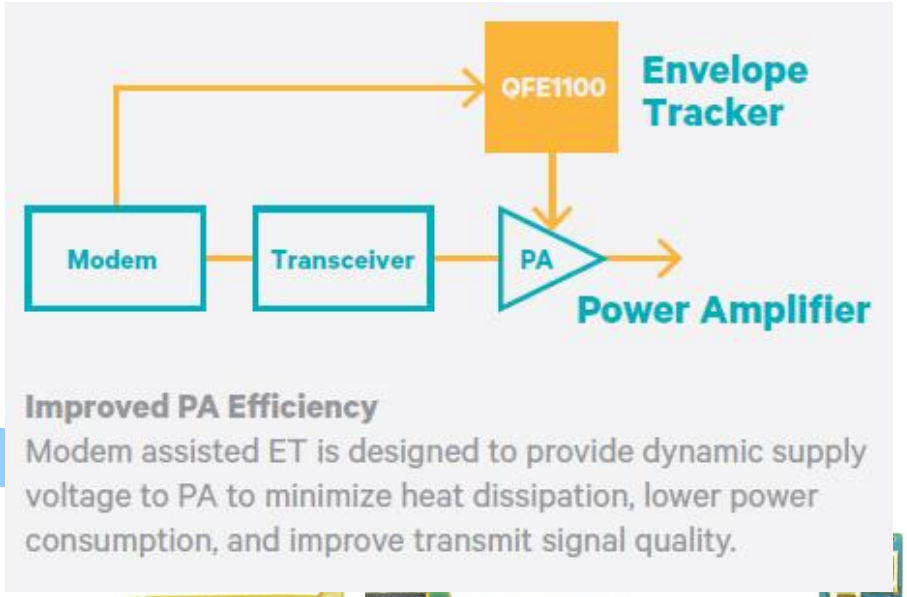
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BLOCK DIAGRAM (with assumption)

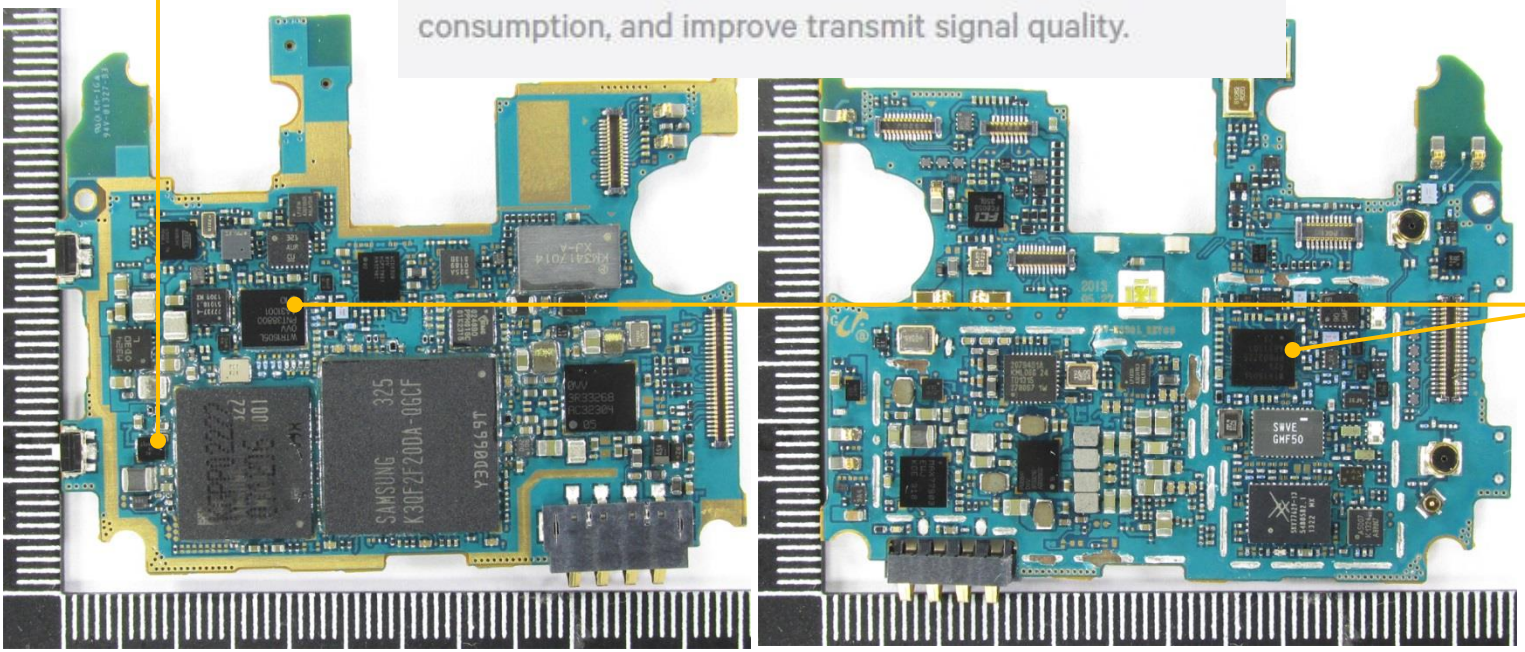


TECHNICAL NOTE

UNIQUE/POSITIVE	First LTE-A	Twin RF IC (WTR1605L).
NEGATIVE	-	-
OTHER	Envelope Tracker	Second phone with Qualcomm envelop tracker QFE1101 which supervises RF power amplifiers.



Envelope Tracker (Qualcomm) QFE11101



Twin RFIC (Qualcomm WTR1605L)

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KEY COMPONENT LIST

Unit: millimeter otherwise specified

Fomalhaut Techno Solutions

CATEGORY	FUNCTION	MARKING	SIZE	MNF	REMARK
CELLULAR	WCDMA TRANSCEIVER	WTR1605L 0VV PPB037Z5 AB31301 12	5.44 X 4.91 X 0.65	QUALCOMM	TWO UNITS
	CDMA TRANSCEIVER	-	-	-	
	LTE TRANSCEIVER	WTR1605L 0VV PPB037Z5 AB31301 12	5.44 X 4.91 X 0.65	QUALCOMM	TWO UNITS
	WiMAX TRANSCEIVER	-	-	-	
	GSM TRANSCEIVER	WTR1605L 0VV PPB037Z5 AB31301 12	5.44 X 4.91 X 0.65	QUALCOMM	TWO UNITS
	WCDMA POWER AMPLIFIER	(LOGO) 90 SMF1	3.24 X 2.81 X 0.98	RFMD	ASSUMPTION
	WCDMA POWER AMPLIFIER	(LOGO) SKY77629 5480582.1 1322 MX	7.01 X 5.02 X 0.84	SKYWORKS	
	CDMA POWER AMPLIFIER	-	-	-	
	LTE POWER AMPLIFIER	(LOGO) SKY77629 5480582.1 1322 MX	7.01 X 5.02 X 0.84	SKYWORKS	
	LTE POWER AMPLIFIER	A5007 K 1324 ABHN7	3.02 X 3.02 X 0.76	AVAGO	
	WiMAX POWER AMPLIFIER	-	-	-	
	GSM POWER AMPLIFIER	(LOGO) SKY77629 5480582.1 1322 MX	7.01 X 5.02 X 0.84	SKYWORKS	

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KEY COMPONENT LIST

Unit: millimeter otherwise specified

CATEGORY	FUNCTION	MARKING	SIZE	MNF	REMARK
WIRELESS COMM	DIGITAL TV	FCI FC8053 35GL	3.11 X 3.11 X 0.25	FCI	
	WLAN	(LOGO) KM3417014 XJ-A	8.72 X 5.50 X 1.49	MURATA	
	BLUETOOTH	(LOGO) KM3417014 XJ-A	8.72 X 5.50 X 1.49	MURATA	
	GPS	WTR1605L 0VV PPB037Z5 AB31301 12	5.44 X 4.91 X 0.65	QUALCOMM	TWO UNITS
	RFID	-	-	-	
	NFC	20791S1A KML06G 24 TD1315 278067 1W	4.49 X 4.01 X 0.95	BROADCOM	
	INFRARED PORT/CTRL	-	-	-	

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KEY COMPONENT LIST

Unit: millimeter otherwise specified

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CATEGORY	FUNCTION	MARKING	SIZE	MNF	REMARK
CONTROLLER	ANALOG BASEBAND	UNKNOWN	UNKNOWN	QUALCOMM	MSM8974, DRAM POP
	DIGITAL BASEBAND	UNKNOWN	UNKNOWN	QUALCOMM	MSM8974, DRAM POP
	APPLICATION PROCESSOR	UNKNOWN	UNKNOWN	QUALCOMM	MSM8974, DRAM POP
	IMAGE PROCESSOR	UNKNOWN	UNKNOWN	QUALCOMM	MSM8974, DRAM POP
	AUDIO PROCESSOR	WCD9320 0VV NGP178G1 AA32401	4.24 X 3.62 X 0.32	QUALCOMM	
	USB CONTROLLER	UNKNOWN	UNKNOWN	UNKNOWN	
	POWER MANAGEMENT	PM8841 0VV 3R33016 AB32302 19	4.24 X 3.62 X 0.62	QUALCOMM	
	POWER MANAGEMENT	PM8914 0VV 3R33268 AC32304 05	6.19 X 5.96 X 0.72	QUALCOMM	
	POWER MANAGEMENT	+ MAX77803 EWJ KOE 318	4.40 X 4.10 X 0.67	MAXIM	
	BATTERY MANAGEMENT	UNKNOWN	UNKNOWN	QUALCOMM	
	DISPLAY CONTROLLER	UNKNOWN	UNKNOWN	QUALCOMM	MSM8974, DRAM POP
	LED CONTROLLER/DRIVER	UNKNOWN	UNKNOWN	UNKNOWN	

KEY COMPONENT LIST

Unit: millimeter otherwise specified

CATEGORY	FUNCTION	MARKING	SIZE	MNF	REMARK
AUDIO	MICROPHONE	S1082 8050	3.39 X 2.67 X 1.05	KNOWLES ACOUSTICS	2 UNITS
	MICROPHONE	S1064 8895	3.38 X 2.70 X 1.23	KNOWLES ACOUSTICS	
	SPEAKER	N/A	N/A	UNKNOWN	BUILT-IN
	SPEAKER	N/A	13.06 X 7.01 X 2.99	UNKNOWN	
MOTOR	VIBRATOR	N/A	D: 3.00 H: 3.89	UNKNOWN	
SENSOR	ACCELEROMETER	M324 D30 L	3.72 X 3.54 X 0.57	STM	
	E-COMPASS	UNKNOWN	UNKNOWN	UNKNOWN	NOT FOUND
	GYROSCOPE	321 AUR CU	3.58 X 3.04 X 1.03	SAMSUNG	ASSUMPTION
	BAROMETER	326H	2.57 X 2.53 X 0.87	BOSCH SENSORTEC	
	TOUCH PANEL	Synaptics S5000B 3201 AW2A091 +XX	6.39 X 6.14 X 0.51	SYNAPTICS	
MEMORY	DRAM	SAMSUNG 325 K3QF2F20DA-QGCF Y3D0669T	15.15 X 15.10X 1.08	SAMSUNG	APP/BB POP
	FLASH MEMORY	SAMSUNG 322 KLMBG4GEAB-B001 HMD8399X	13.14 X 11.39 X 0.85	SAMSUNG	

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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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