



# Working Instruction, Electrical

Applicable for W980

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# 1 Read this first!

## CAUTION

***Keep all contact surfaces clean, no dirt or hand grease!***

***Attention! All repair action with Hot air station or BGA repair station around and on the opposite side of these components shall be performed with care, if the soldering joints temperature on these components will reach 220 degree than soldering of these components will be damaged.***

***Remove the Main Camera and Dome Sheet before you perform any repair action by using heating tools: Soldering Iron, Hot Air Station or BGA station!***

***Protect the phone from ESD damages whenever it has been opened by using:***

- ***ESD-wristband***
- ***ESD-gloves***

## 2 Lead-free soldering

**KEEP ALL CONTACT SURFACES CLEAN OF DIRT AND HAND GREASE!**

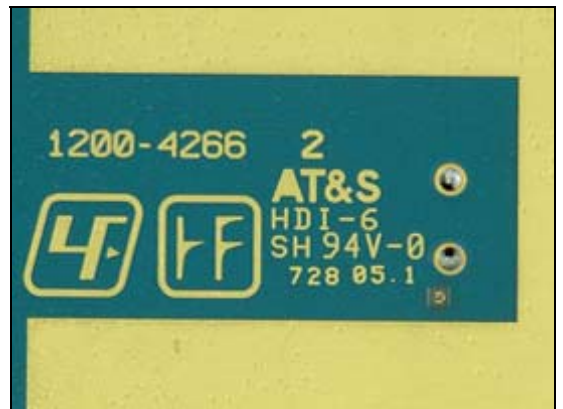
**THIS PRODUCT IS MANUFACTURED WITH LEAD-FREE SOLDER AND LEAD-FREE COMPONENTS!**

During electrical repair, it is critical to make sure that no lead is introduced.

This symbol indicates that the product is lead-free.



All lead-free PBA's will be marked with this symbol.



A lead-free work area must be set up completely separated from work areas that are used to make lead repairs. The lead-free work area must also be clearly labeled with the lead free symbol as shown in the adjacent picture. The items on this desk must remain lead-free. They must be adequately labeled to make their lead-free status clearly and easily recognized.



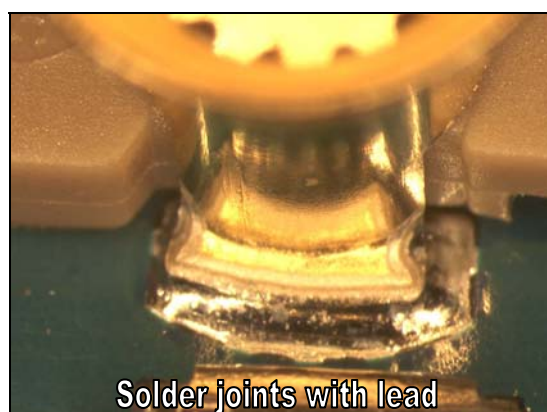
## Lead-free soldering *continued*

LFS (lead-free solder paste) characteristics:

- High melting point (typically 220°C)
- Low wettability
- High surface tension
- Difficult to spread
- Recommended tip temperature = 370°C

**WHEN SERVICING PBA'S THAT HAVE BEEN MANUFACTURED WITH LFS (LEAD-FREE SOLDER PASTE), LFS MUST BE USED. IF NOT, THERE IS A HIGH RISK FOR UNRELIABLE SOLDERING JOINTS.**

Lead-free solder joints are more difficult to inspect because they do not have shiny surfaces like leaded solder joints. Also, lead-free solder does not flow as well as leaded solder, so some of the solder pad areas may remain exposed.



### 3 Hot air gun temperature requirements

The air temperature shall not exceed 360°C. The temperature shall be measured 5 mm from the nozzle outlet.

If it's not possible to remove and/ or solder with 360°C a BGA Rework Station or another repair process shall be considered to ensure high process control.

Too high temperature can cause damage and cracks due to thermal stress on sensitive components, e.g. ceramic components like capacitors.

### 4 Soldering tip temperature requirements

The soldering tip temperature shall be minimum 310°C and maximum 370°C.

Too high temperature can cause damage and cracks due to thermal stress on sensitive components, e.g. ceramic components like capacitors.

## 5 BGA equipment reflow profiles

### 5.1 General

This document contains reflow profile recommendations for mobile phones and similar products.

They are just general recommendations and considerations have to be taken for every single product.

The solder paste is secondary but could also affect the parameters.

In this document one alloy is specified:

SnAgCu (Lead free) melting point 217°C

### 5.2 Temperature measurement

At least four probes should be used.

They should be placed on components with the highest and lowest thermal mass.

The probes shall be located in the beginning, in the middle and at the end of the board/panel.

It is recommended that the probes are soldered on the board, but glue and capton tape could also be used, if necessary.

At least one probe shall be placed in the air or on top of a component.

These values are strongly depending on the BGA replacement equipment.

Nozzle type will be chosen after the outer size of the actual component.

Make sure the nozzle does not affect any nearby placed components.

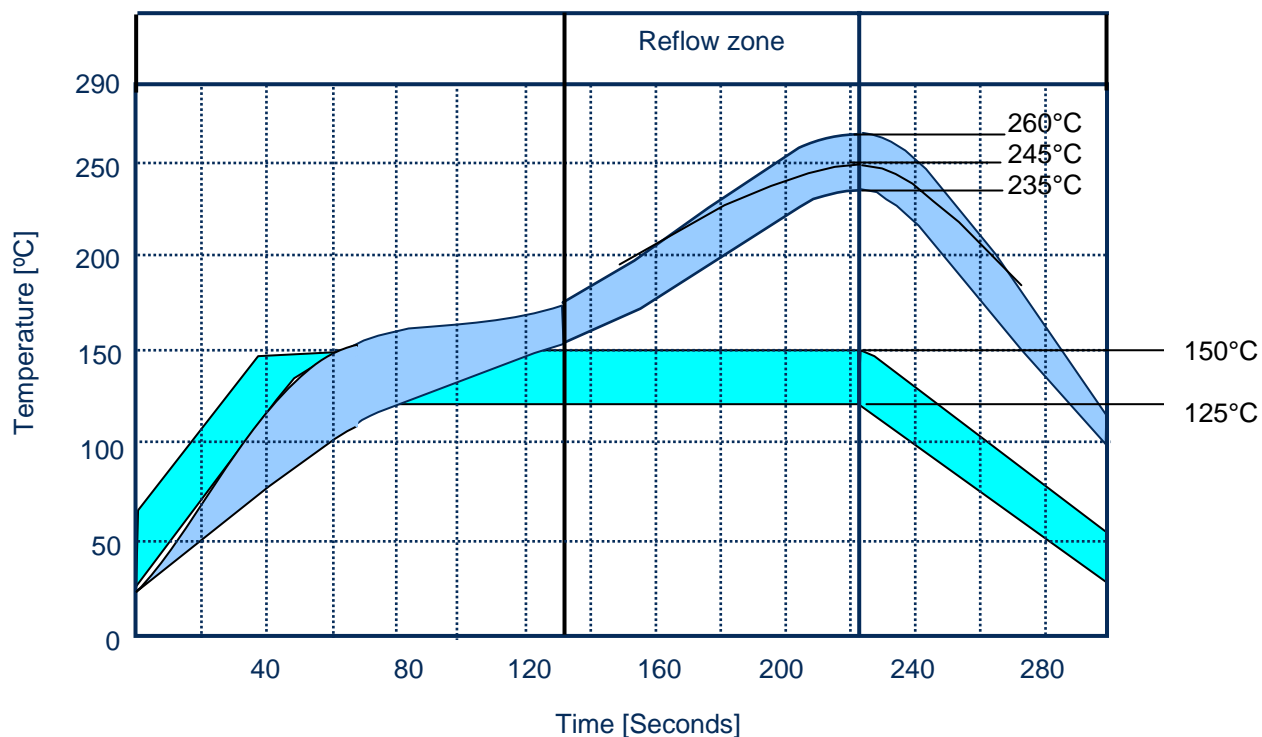
***These values are recommendations and may have to be changed depending on the type of equipment.***

***The maximum temperature for any component must not exceed 260°C.***



## 5.3 Reflow profiles

### Sn/Ag/Cu (lead-free)



Ramp rate	< 3°C/sec
Ramp rate cooling	< 4°C/sec
Pre heating time	60-150 sec
Time above liquid	40-70 sec
Minimum temperature	230°C
Maximum temperature	245°C°
Maximum component temperature	260 °C
Time between 230 and 245	30 sec
Board temperature bottom side	160°C-185°C
Total time	Approx. 3-5min

\* The higher temperature in case the board has extremely high  $\Delta T$ .



## 5.4 REWORK BGA

Process for changing the modules is highly advanced rework and it **shall** only be carried out by well trained repair technicians/operators.

Every module **shall** have dedicated heat profiles that should be tested in every BGA reworking station individually with dedicated heat profiling board (complete SMT assembled PWB) with thermocouples.

Heat profile **shall** be done according solder paste manufacturers specification and it **shall** be according components maximum temperature.

### Target group

Target group for this document are repair process engineers which have understanding of following standards: IPC-A-610 D, IPC J-STD-001 D (preferably they are certified specialists).

### Heat Profile

Heat profile in this document always refers to the heat curve which is measured on the board with thermocouples and do not refer BGA rework stations setting which can vary depending on the machine type and individual machine.

Heat profile specifications are defined in the table 2-1 This profile differs from the SEMC mass production heat profile. Reason for this is that mass production oven heating and zone separation capability is considerably better than in BGA rework stations. In mass production oven there can be 10 separate zones that can be adjusted individually and heat capacity allows introducing soak zone and more controlled peak temperature than BGA rework machine. Soak zone in mass production oven is needed in order to have minimum delta T before reaching peak zone. This is needed to have as small delta T as possible when solder is above liquidus point. Soak zone is not possible to be introduced in BGA rework station. Soak zone is not needed either because purpose is only reflow one component and delta T is not issue in this process.

### Thermocouples

Type K thermocouples are most commonly used in the electronics industry. Type K thermocouples should be used when profiling the modules.

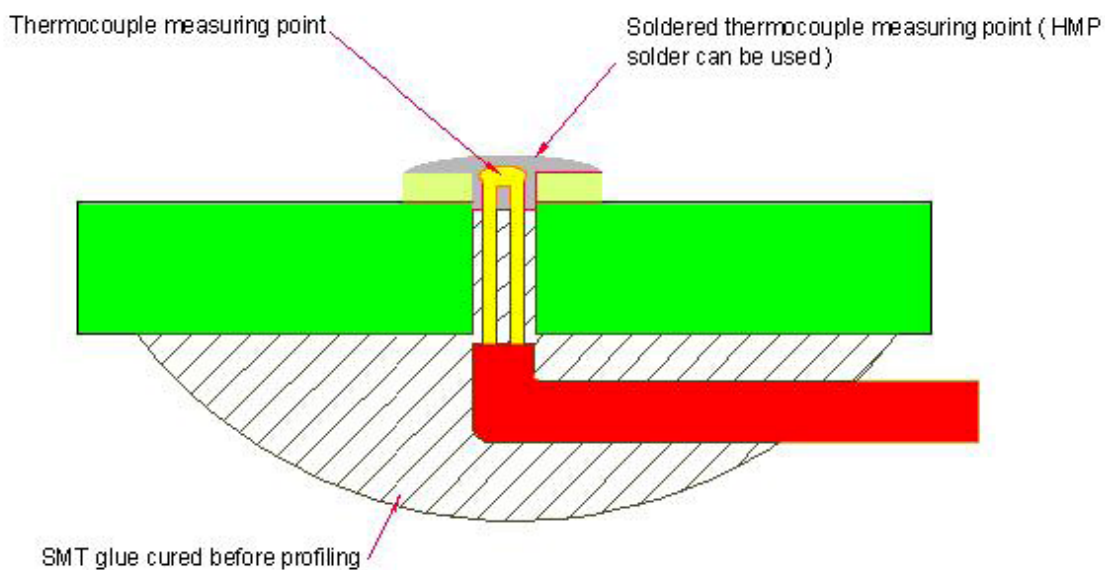
The method of attaching the thermocouple to the assembly to be profiled can be specific to the assembly and situation as well as preference of the user

Adhesives shall be used to secure the thermocouple to the assembly. This usually results in a positive physical connection of the thermocouple junction to the assembly. Drawbacks are the possibility of the adhesive failing during the heating process, removal at the conclusion of the profile. Caution should be taken to use the minimum amount of adhesive since adding thermal mass can affect the results of the profile. HMP (high melting point solder) solder that is preferred when attaching thermocouples in ordinary SMT components can be used to solder thermocouple tip to the pad but it dissolves to the lead free bump and do not have high melting point features when profiling is executed.



### Thermocouple attachment.

Primary thermocouple should be attached from back side of the board on the drilled hole (precision drill, drill bit 0,4mm) as **figure 2-2** illustrates. If pad on the board is small the hole should be drilled of center of the pad so it is possible to solder thermocouple tip on the pad. Thermocouples has are usually hard to solder due the poor wetting characteristics and additional flux and underside heating should be used during this operation.



**Figure 2-2**

### Process flow for module replacement

Heat module by using BGA rework machine and applicable heating profile and applicable nozzle for the module.

When profile reaches end of the peak zone (just before cooling) remove module by using dental hook.

Remove solder PWB pads by using soldering iron, gel flux, soldering wick. Underside heating unit is required when performing cleaning. This minimizes the possibility to lift pads of from the PWB.

Clean PWB after solder removal by using isopropyl alcohol

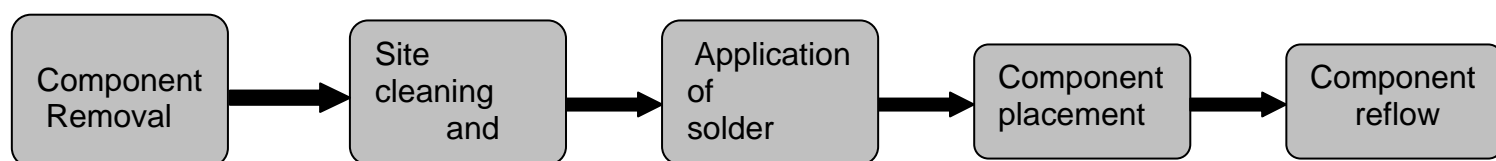
Apply gel flux to the PWB module area

Place the module to the board by using BGA rework station.

Reflow the module with BGA rework station by using applicable heat profile and nozzle.

**Inspection instructions for replacement of the module**

Inspection of the replaced module should be carried out according to IPC-610D BGA inspection guidelines. X-ray can be used as an indicator. For more detailed investigations in problem situations dye and prairie method and micro sectioning can be carried out.

**5.5 Process Flow BGA**

## 6 Replacement of components

### EQUIPMENT

- Dentist hook
- ESD-gloves (cotton gloves)
- ESD-wristband
- Soldering tool
- Hot air soldering station
- BGA replacement equipment
- Pair of tweezers
- Solder cleaning wiper (tin wick)
- Solder paste lead-free (SN 96% Ag 3.5% Cu 0.5%).
- Flux, RMA no-clean flux
- Cutting pliers

### MECHANICAL INSTRUCTIONS

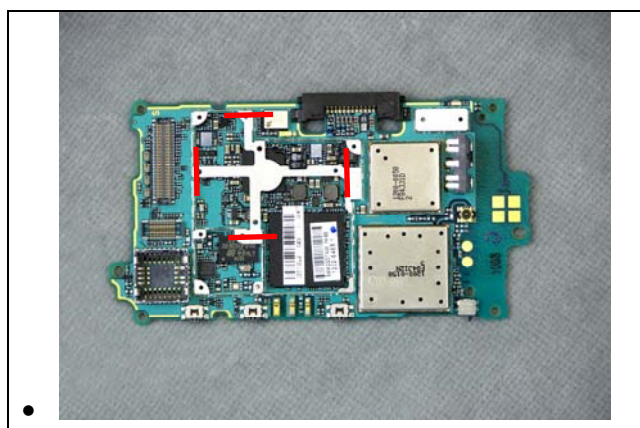
For all the following part replacements, disassemble and assemble the phone as described in *Working Instruction 1215-3894*.

#### 6.1 Shield can fence modification

The arrows and the red lines show where the frame should be cut to enable rework.

After rework the **height of the frame should not be affected**.

On a reworked unit when the lid is mounted, it **should not be visible that rework has been performed** on the shield frame.

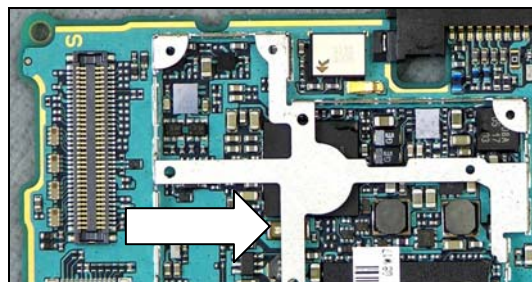


## 6.2 B2100

## Crystal 32,768 kHz

**SHIELD CAN MODIFICATION ACCORDING TO CHAPTER 6.1!**

Use Hot air soldering station to replace component

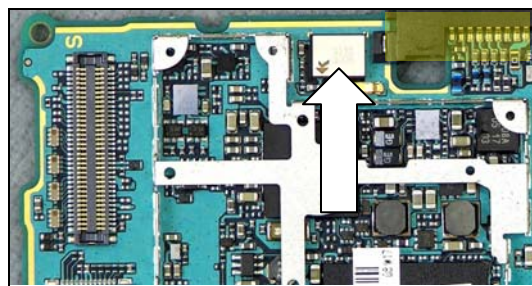


## 6.3 B3105

## Microphone

**PROTECT SYSTEM CONNECTOR WITH CAPTON TAPE!**

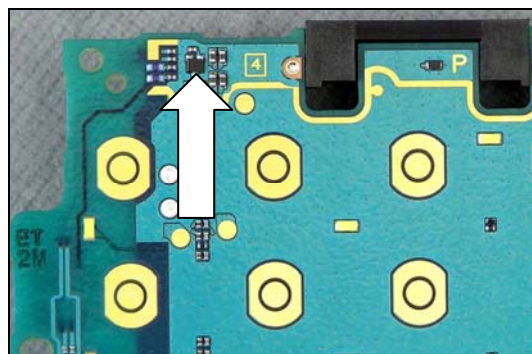
Use BGA replacement equipment



## 6.4 B4240

## IC

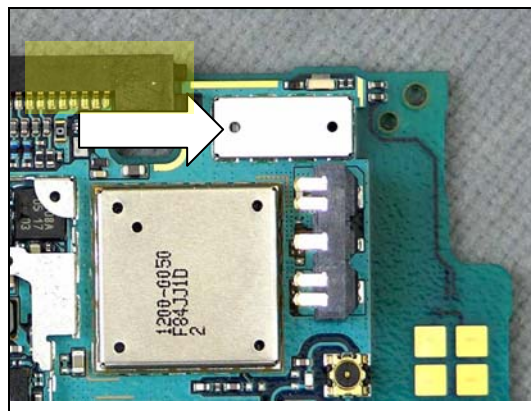
Use Hot air soldering station to replace component



## 6.5 E1401 DC/DCconverter

## Shield Can Fence Shield-B for

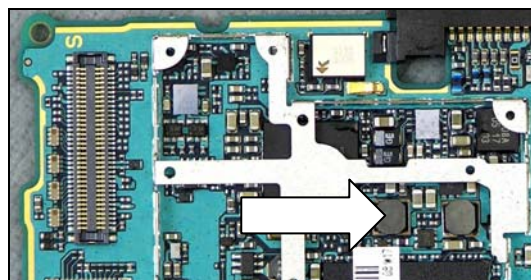
**PROTECT SYSTEM CONNECTOR WITH CAPTON TAPE!**  
Use BGA replacement equipment



## 6.6 L2200

## Ind WW 4.7 uH K3012

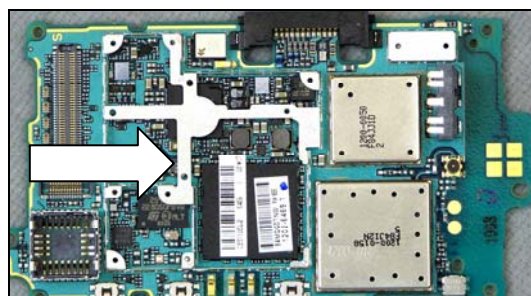
Use Hot air soldering station to replace component



## 6.7 L2210

## Ind WW 2,2 uH

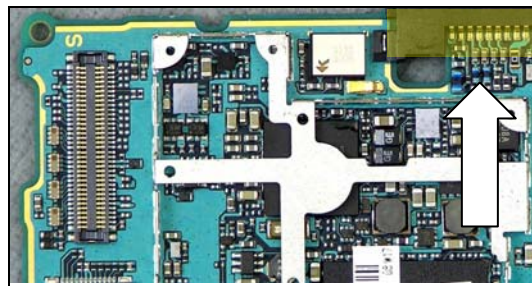
**SHIELD CAN MODIFICATION ACCORDING TO CHAPTER 6.1!**  
Use Hot air soldering station to replace component





## 6.8 L2401,L2402,L2403,L2404 Filter 0.0 Hz 0402

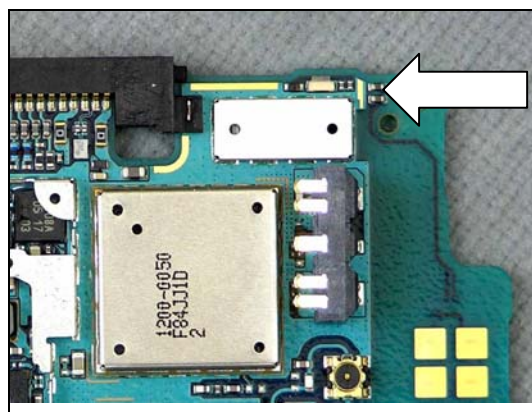
**PROTECT SYSTEM CONNECTOR WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



## 6.9 L3113,L3114 0.85ohm Bead

## Filter 600ohm 0402 0.3A

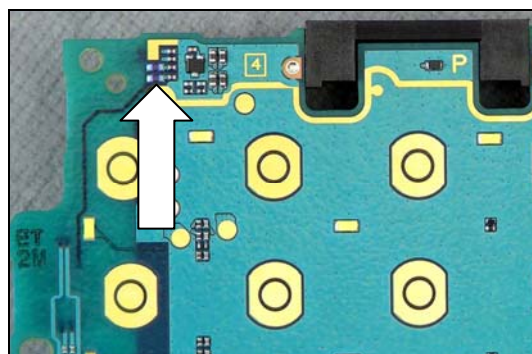
Use Hot air soldering station to replace component



## 6.10 L3115,L3116

## Inductor 68.0 nH $\pm 5\%$

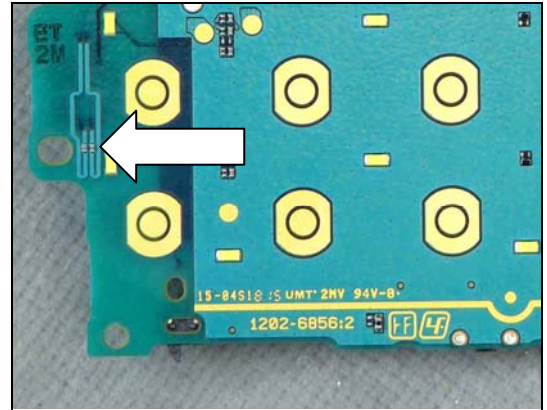
Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component



## 6.11 L3118,L3119

## Ind Chip 6.8 nH $\pm 3\%$

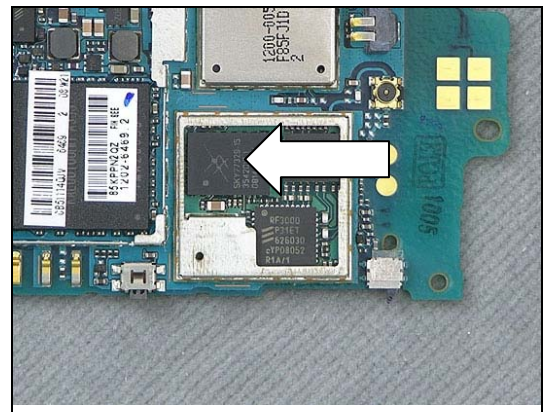
Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component



## 6.12 N1002

## Module GSM MCM 6x8

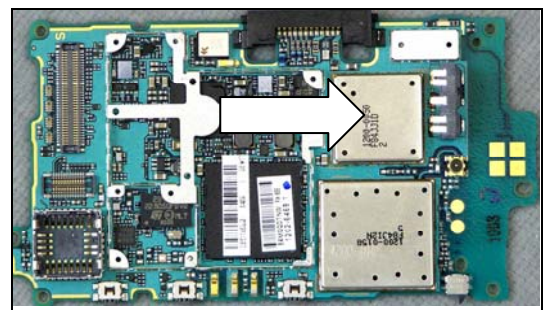
Use BGA replacement equipment



## 6.13 E1

## Shield Can Closed assembly

Standard mechanical repair use Front opening tool to remove and your fingers to install

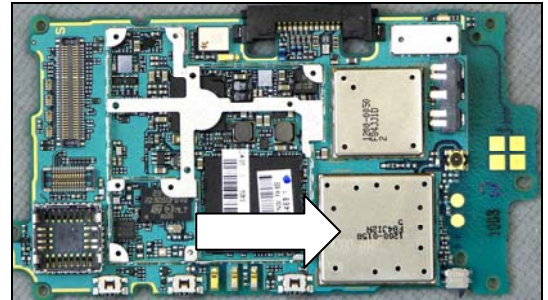




## 6.14 N1200

Use BGA replacement equipment

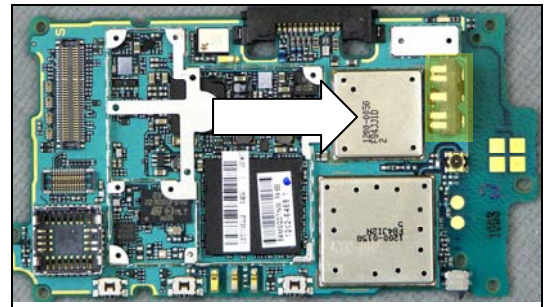
## RF-Module Thor Pre-bumped



## 6.15 N1210

**PROTECT BATTERY CONNECTOR WITH CAPTON TAPE!**  
Use BGA replacement equipment

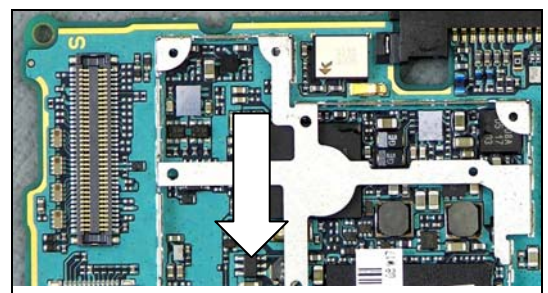
## RF-Module Squid Pre -bumped



## 6.16 N2202

Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component

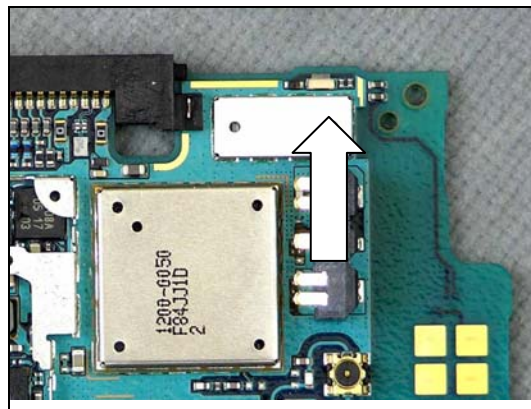
## IC Vreg MAX8640, 1.8V



## 6.17 N2205

## DC/DC Converter

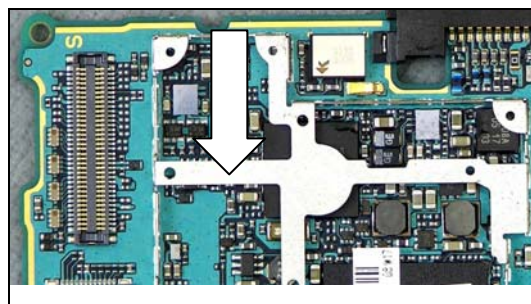
Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component



## 6.18 N2400

## 1-Bit Level Translator

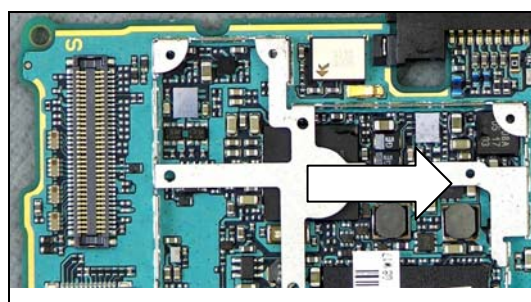
**SHIELD CAN MODIFICATION ACCORDING TO CHAPTER 6.1!**  
Use Hot air soldering station to replace component



## 6.19 N2402

## IC ESD Prot UDFN 6 2x2 mm

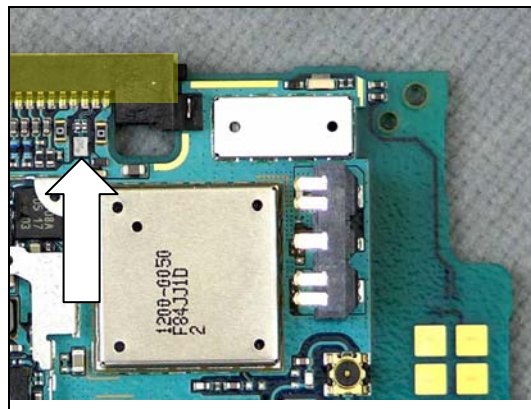
**SHIELD CAN MODIFICATION ACCORDING TO CHAPTER 6.1!**  
Use Hot air soldering station to replace component



## 6.20 N2424

## IC ESD Prot CS-5

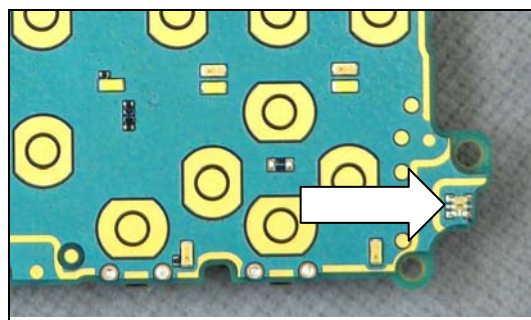
**PROTECT SYSTEM CONNECTOR WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



## 6.21 N2430

## Light Sensor

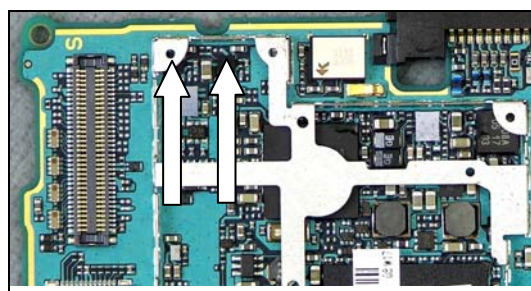
Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component



## 6.22 N3100,N3102

## IC Amp 9-Pin Flip-Chip

**SHIELD CAN MODIFICATION ACCORDING TO CHAPTER 6.1!**  
Use Hot air soldering station to replace component

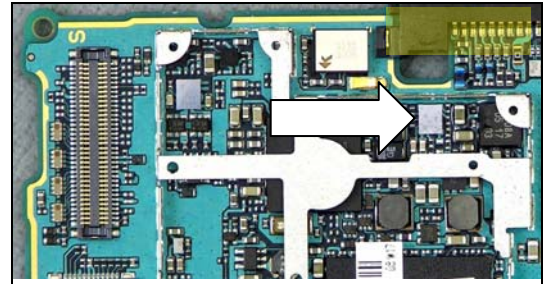




## 6.23 N3101

## ASIC Tjatte3 CSP20

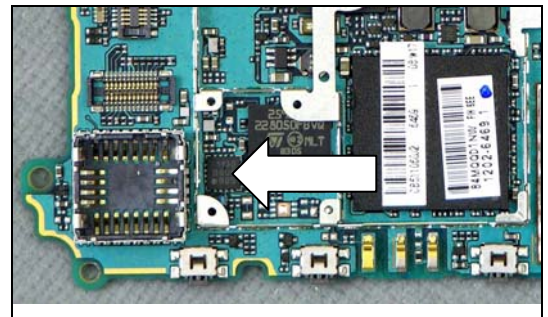
**PROTECT SYSTEM CONNECTOR WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



## 6.24 N3400

## IC Lin 20-Pin QFN 3x3x0,55

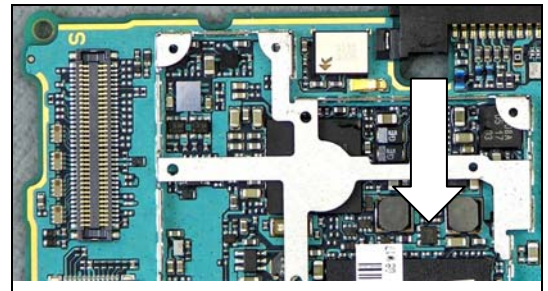
Use Hot air soldering station to replace component



## 6.25 N4200

## Trans N-ch FET

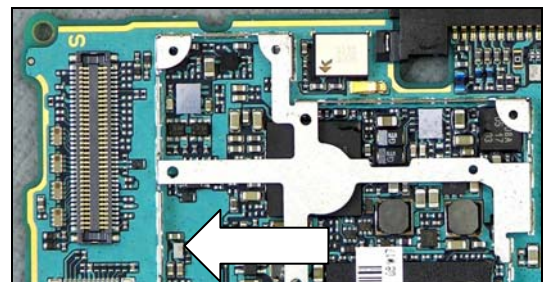
Use Hot air soldering station to replace component



## 6.26 N4310

## IC Vreg

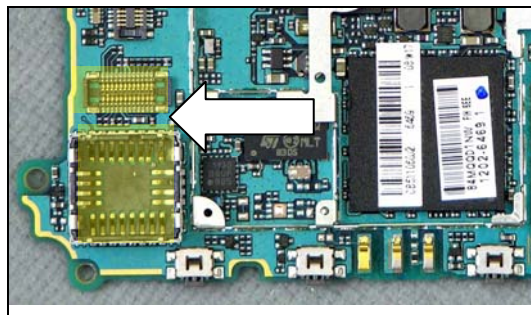
Use Hot air soldering station to replace component



## 6.27 N4311

## IC Vreg

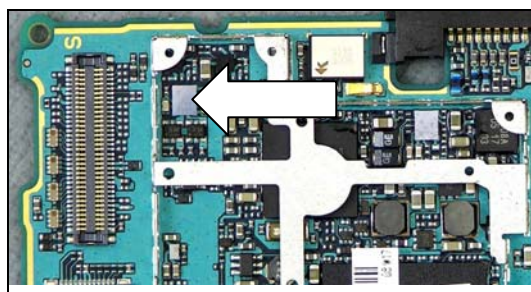
**PROTECT CAMERA SOCKET AND BTB WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



## 6.28 N4401

## IC

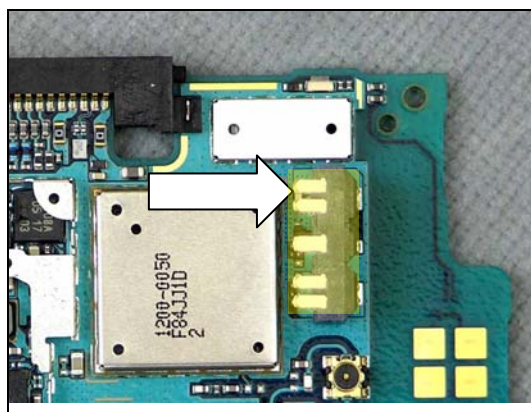
Use Hot air soldering station to replace component



## 6.29 R2200 mW K0402

## Resistor 25, mOhm +/-1% 125.0

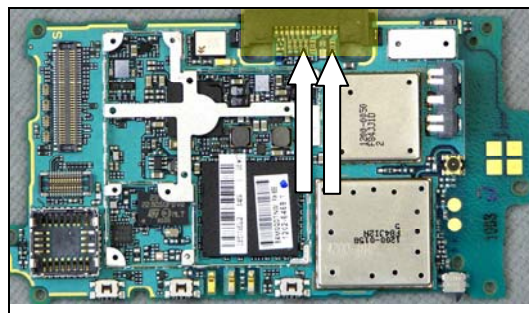
**PROTECT BATTERY CONNECTOR WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



### 6.30 R2417,R2418 K0603

### Resistor 0, Ohm +/-50m 63 mW

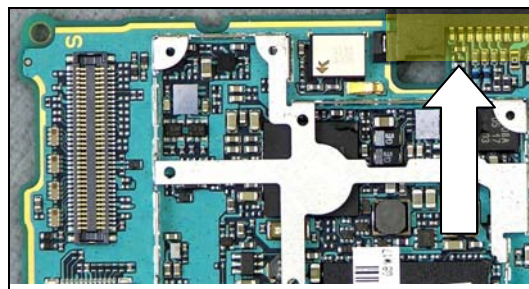
**PROTECT SYSTEM CONNECTOR WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



### 6.31 R2428

### Varistor

**PROTECT SYSTEM CONNECTOR WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component

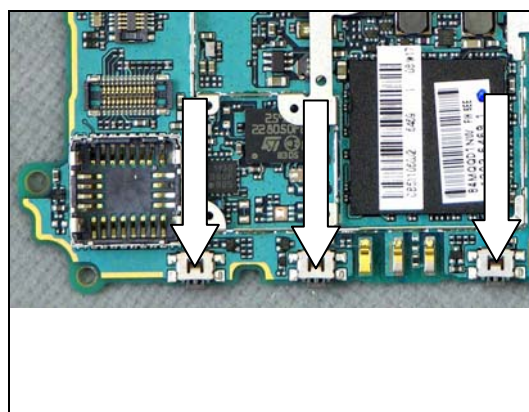


### 6.32 S2424,S2426,S2427

### Input Switch side push

Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component

**NOTE: USE AS LITTLE FLUX AS POSSIBLE TO PLACE THE NEW PART. MAKE SURE FLUX DOES NOT GET ON THE COMPONENT BODY. DO NOT CLEAN WITH ALCOHOL THE NEW MOUNTED SWITCH.**





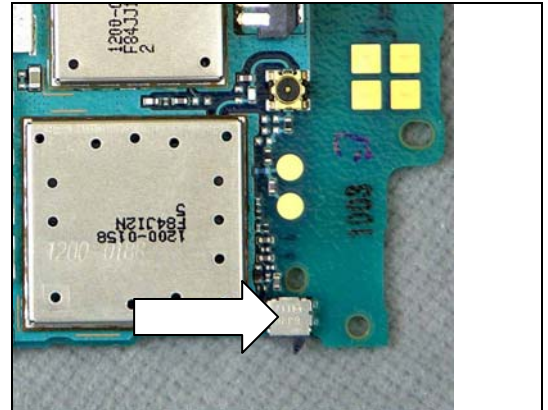
### 6.33 S2440

### Push Button Lock Switch

Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component

**NOTE: USE AS LITTLE FLUX AS POSSIBLE TO PLACE THE NEW**

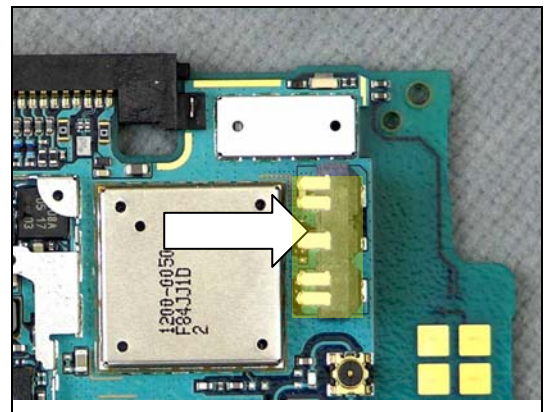
**PART. MAKE SURE FLUX DOES NOT GET ON THE COMPONENT BODY. DO NOT CLEAN WITH ALCOHOL THE NEW MOUNTED SWITCH.**



### 6.34 V2200

### Zener diode

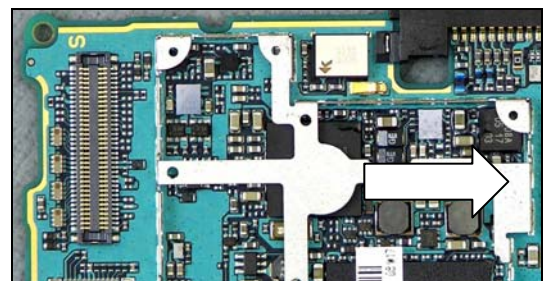
**PROTECT BATTERY CONNECTOR WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



### 6.35 V2202

### Trans P-ch FET

**SHIELD CAN MODIFICATION ACCORDING TO CHAPTER 6.1!**  
Use Hot air soldering station to replace component

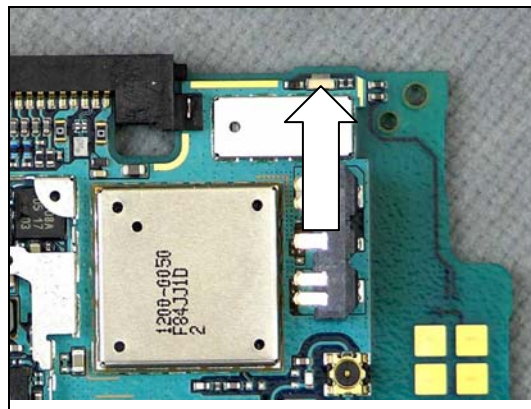




## 6.36 V2220

## Led Red

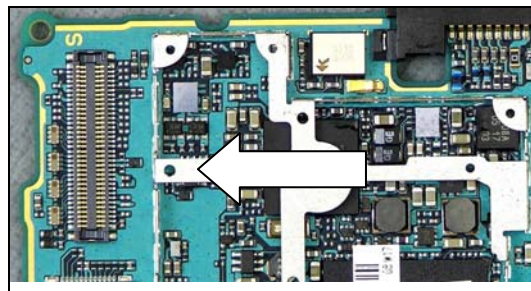
Use Hot air soldering station to replace component



## 6.37 V2405 N P 20 V (D S)

## Tran MOSFET Complementary

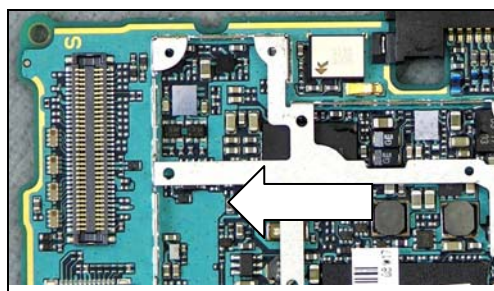
**SHIELD CAN MODIFICATION ACCORDING TO CHAPTER 6.1!**  
Use Hot air soldering station to replace component



## 6.38 V2406 PLANAR BYX101225

## TRANS V NPN-EPITAXIAL

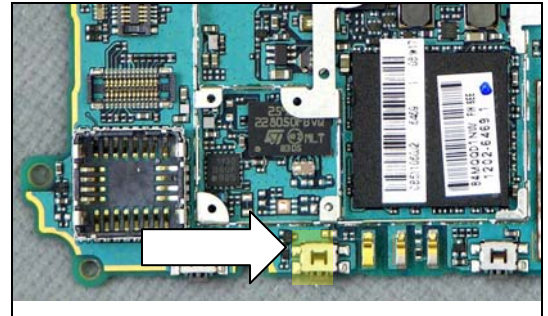
**SHIELD CAN MODIFICATION ACCORDING TO CHAPTER 6.1!**  
Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component



### 6.39 V2408

### Switching Diode

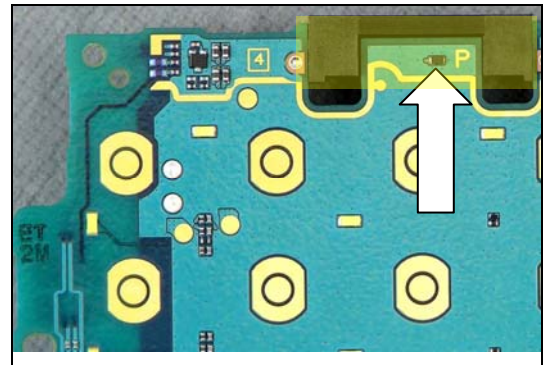
**PROTECT INPUT SWITCH SIDE PUSH WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



### 6.40 V2420,V2421

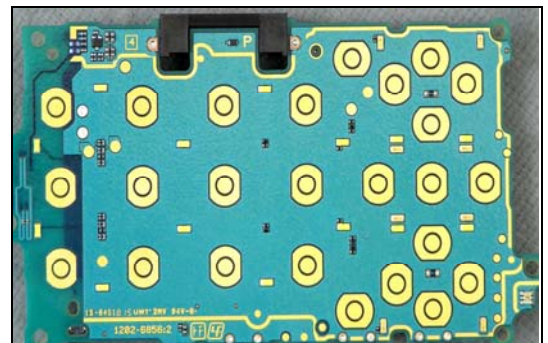
### Zenner Diode, 15V

**PROTECT SYSTEM CONNECTOR WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



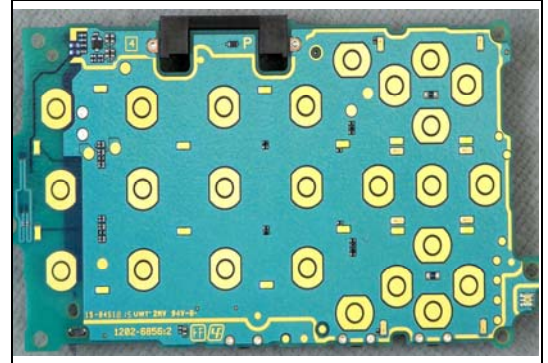
### 6.41 V2441, V2442, V2443, V2444, V2445, V2446, V2447, V2448, V2450,V2451, V2455, V2459, V2460, V2463 LED White

Use Hot air soldering station to replace component



## 6.42 V2453, V2454, V2457, V2458, V2461, V2462, V2465, V2466 LED Orange

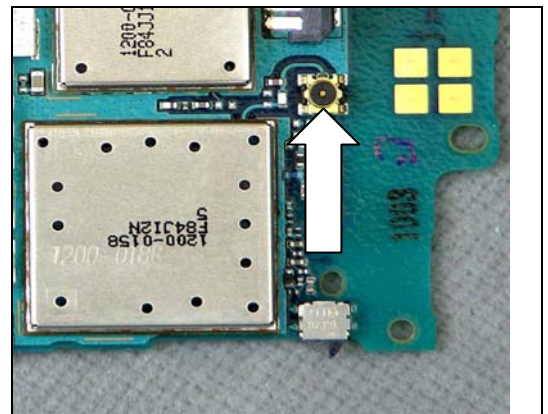
Use Hot air soldering station to replace component



## 6.43 X1200

### Conn 6p

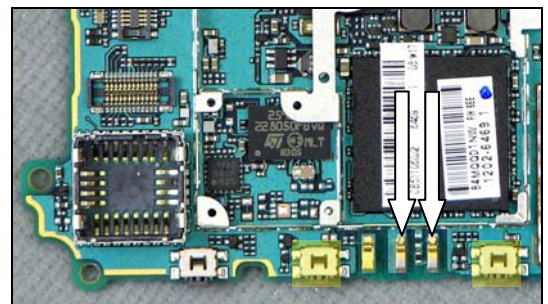
Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component



## 6.44 X1402,X1403

### Contact spring

**PROTECT INPUT SWITCH SIDE PUSH WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component

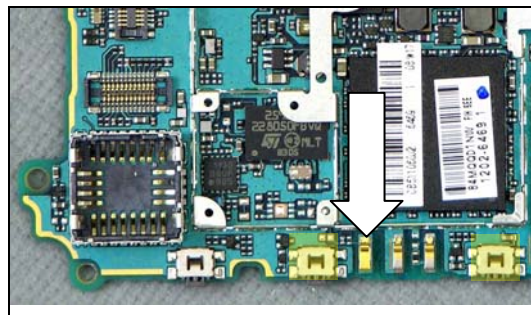




## 6.45 X1404,X1405

## Conn Leaf Spring

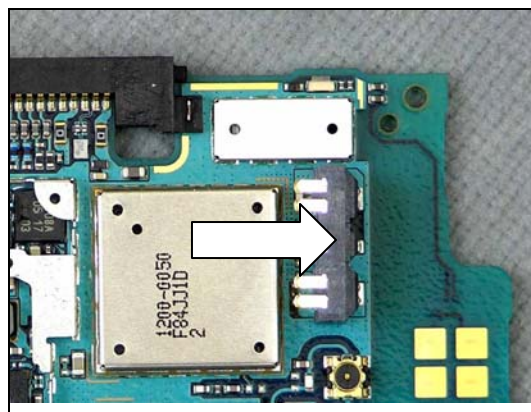
**PROTECT INPUT SWITCH SIDE PUSH WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



## 6.46 X2200

## Conn Other Plug 5p

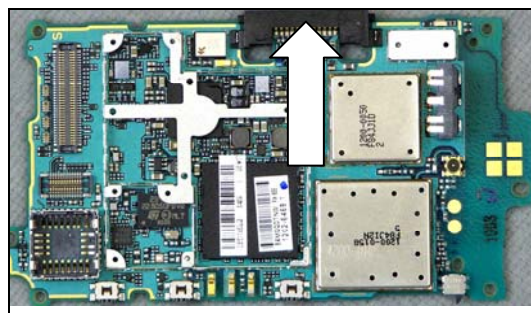
Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component



## 6.47 X2400

## Conn I/O Receptacle 12p -j

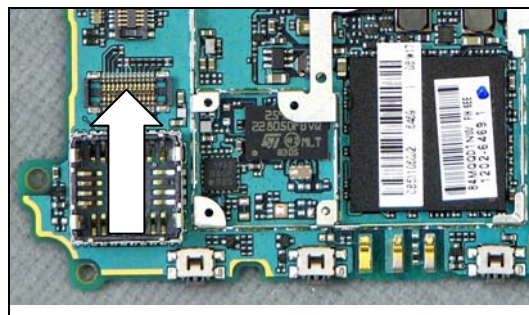
Use Hot air soldering station to remove component  
Use Soldering tool to mount the new component



## 6.48 X2410 Socket, 24 pins

## CONN/RECPT/B-B, PB-4,

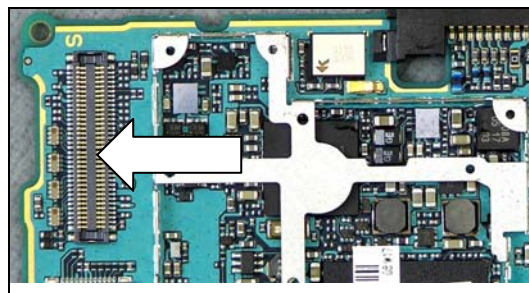
Use Hot air soldering station to replace component



## 6.49 X4200

## LCM Connector

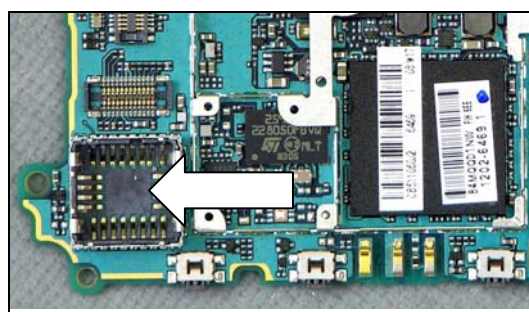
Use BGA replacement equipment



## 6.50 X4301

## Conn Camera Socket 0p EP3

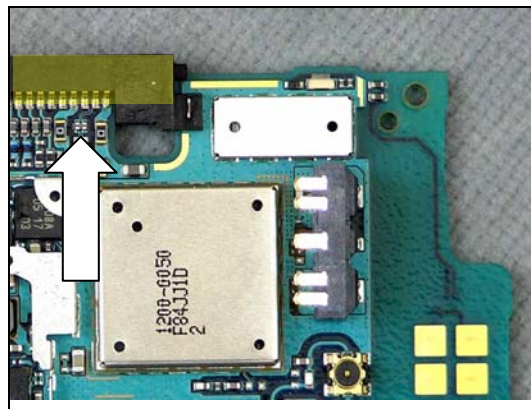
Use BGA replacement equipment



## 6.51 Z2450

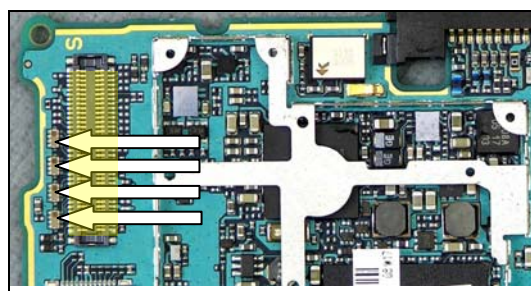
## Filter 0.0 K1005

**PROTECT SYSTEM CONNECTOR WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



## 6.52 Z4200,Z4201,Z4202,Z4203 Filter 400.0 MHz KNA16400

**PROTECT LCM CONNECTOR WITH CAPTON TAPE!**  
Use Hot air soldering station to replace component



## 7 Revision history

Rev.	Date	Changes / Comments
1	2008-07-28	Initial release