



Working Instruction, Electrical

Applicable for C702, C702a & C702c

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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 VGA Camera 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 Moisture Sensitivity and Component Baking

CAUTION!

THE C702 BOARD (PBA) ITSELF MUST BE BAKED BEFORE ANY REPAIR IS PERFORMED ON THE BOARD, WHEN USING HOT AIR SOLDERING STATION, BGA REPLACEMENT EQUIPMENT OR BOTTOM HEAT.

THE BOARD SHOULD BE BAKED AT 125 DEGREES CELCIUS FOR 4 HOURS.

Some components in this product are moisture sensitive and must be baked prior to use if they have been exposed to air.

Below is a brief description of moisture sensitivity levels, but repair centers should visit the JEDEC website for more details before reworking moisture sensitive components. Search for the most recent version of the IPC/JEDEC J-STD-033A standard online at <http://www.jedec.org/>

- | | |
|-----------------|--|
| LEVEL 1 | UNLIMITED FLOOR LIFE; does not require dry pack or re-baking. |
| LEVEL 2 | 1 YEAR FLOOR LIFE; $\leq 30^{\circ}$ C; 60% relative humidity (rh); shipped in dry pack; must be re-baked after being opened if floor life is exceeded. |
| LEVEL 2A | 4 WEEKS FLOOR LIFE; $\leq 30^{\circ}$ C; 60% rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded. |
| LEVEL 3 | 168 HOURS FLOOR LIFE; $\leq 30^{\circ}$ C; 60% rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded. |
| LEVEL 4 | 72 HOURS FLOOR LIFE; $\leq 30^{\circ}$ C; 60% rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded. |

Parts shipped from the Sony Ericsson Parts Warehouse are most likely NOT shipped in dry pack. This means the time elapsed between placing the order and receiving the parts must be considered as time exposed to the environment.

Different moisture sensitivity levels and exposure times create the need for different baking temperatures and times. More detailed information may be found in the most recent version of the IPC/JEDEC J-STD-033A standard. The standard is available online at <http://www.jedec.org/>.

3 Lead-free soldering

KEEP ALL CONTACT SURFACES CLEAN OF DIRT AND HAND GREASE!

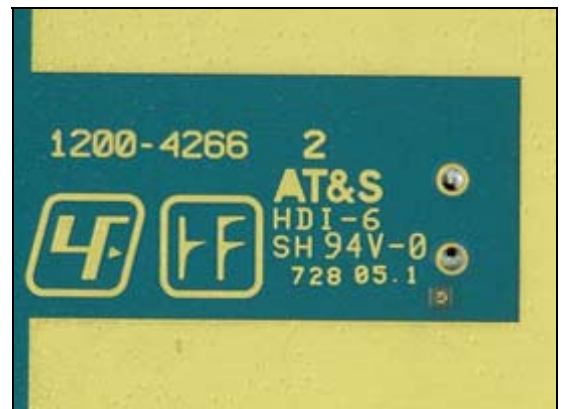
THIS PRODUCT IS MANUFACTURED WITH LEAD-FREE SOLDER AND LEAD-FREE COMPONENTS!

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.



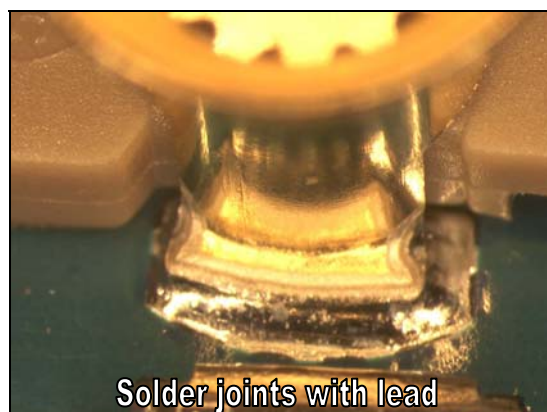
LFS (lead-free solder paste) characteristics:

- 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.





4 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.

5 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.

6 BGA equipment reflow profiles

6.1 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

6.2 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.

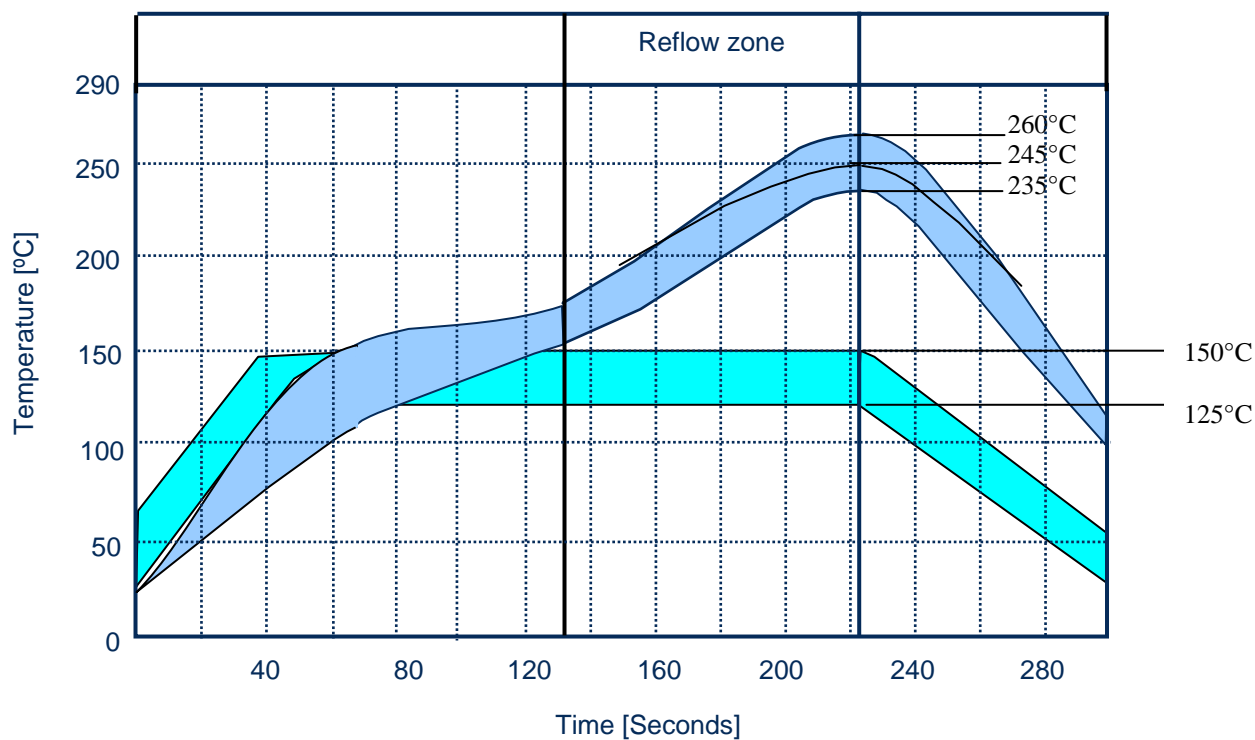
These values are recommendations and may have to be changed depending on the type of equipment.

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



6.3 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 ΔT .

6.4 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.

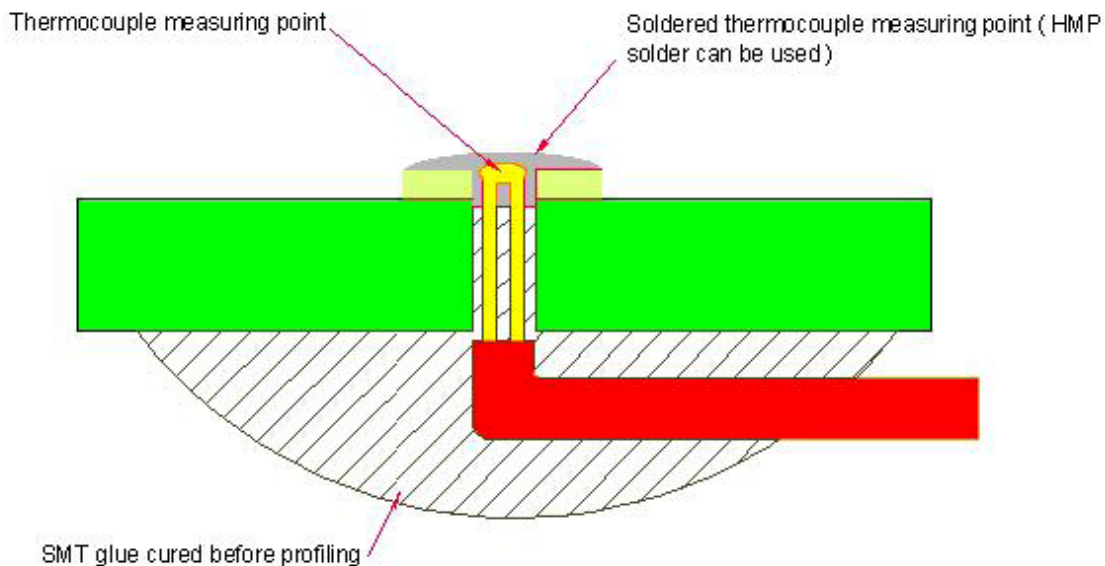


Figure 2-2

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

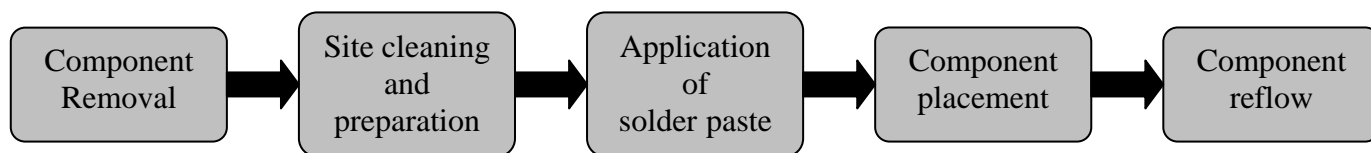
Place the module to the board by using BGA rework station.

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 pried method and micro sectioning can be carried out.

6.5 Process Flow BGA



7 Shield fence instruction

This instruction shows how to cut and bend the shield can fence to be able to replace components under the fence. Use a sharp-edged pliers to cut the fence.



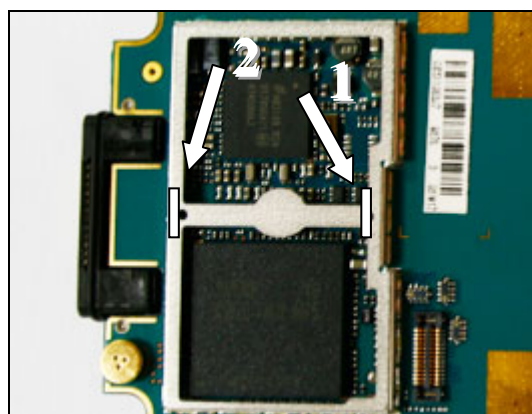
MAKE SURE THAT CUTTING PLIERS IS SHARP-EDGED TO PREVENT DAMAGING THE SHIELD CAN FENCE.

Remove the shield can lid, use a dentist hook.

Remove the pick up area according to the white lines with a cutting plier. (1)

This pick up area is only used when machine mounting and there is no need to put it back again.

Cut the shield can fence according to the white lines with a cutting plier. (2)



8 Replacement of components

EQUIPMENT

- Dentist hook
- Shield fence pliers NTZ 112 537
- Hot air soldering equipment
- Soldering iron
- BGA repair equipment
- Pair of tweezers
- Soldering cleaning wiper (tin wick)
- Solder paste lead-free (SN 96% AG 3.5% Cu 0.5 %)
- Flux, RMA no-clean flux
- Cutting pliers

CAUTION

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

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

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

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

MECHANICAL INSTRUCTIONS

For all the following part replacements, disassemble and assemble the phone as described in *Working Instruction 1213-5329*

8.1 N3101

IC Amp

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

Remove the shield can lid. Use a dentist hook.

Cut the fence according to the white lines.

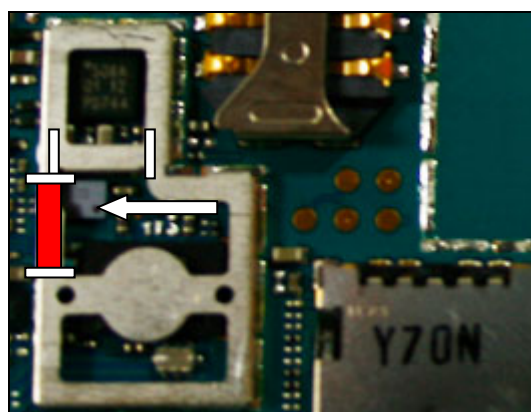
Gently bend the Shield Fence with the Shield fence pliers at the red mark.

Follow the shield fence instruction.

Replace the IC Amp with BGA equipment.

Put back a **new** shield can lid.

Press on all sides of the lid until you hear a "click" sound.

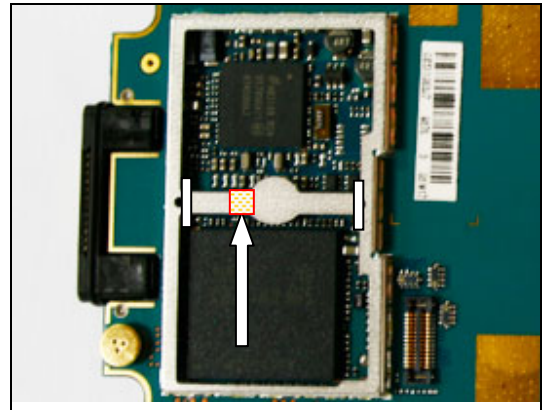


8.2 N2400

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

Remove the shield can lid. Use a dentist hook.
 Cut the fence according to the white lines.
 Follow the shield fence instruction.
 Replace the Translator with BGA equipment.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.

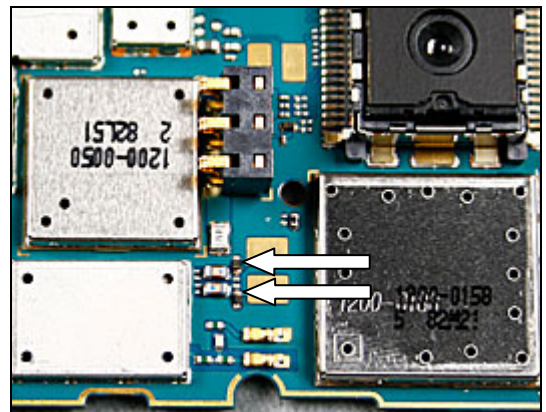
1-Bit Level Translator



8.3 V3105, V3106

Replace the Diode with Soldering Iron.

Diode Protection

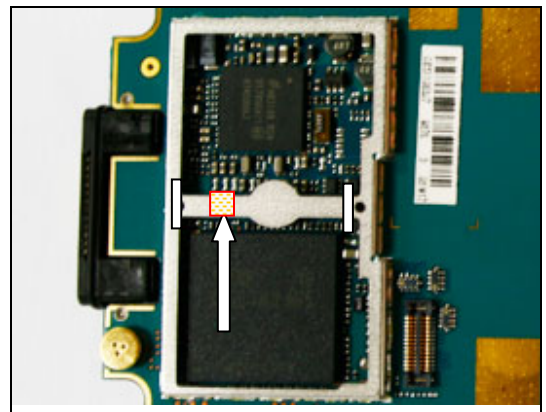


8.4 V4205

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

Remove the shield can lid. Use a dentist hook.
 Cut the fence according to the white lines.
 Follow the shield fence instruction.
 Remove the Transistor with Hot air soldering equipment.
 Mount the new component with Soldering Iron.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.

Transistor



8.5 V2420, V2421

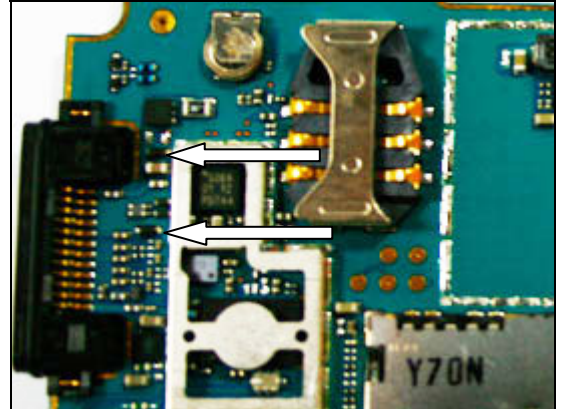
Zener Diode voltage regulator 15V

PROTECT THE MICROPHONE AND SYSTEM CONNECTOR WITH CAPTON TAPE

REMOVE THE BLACK SIM TAPE& GASKET

Replace the Zener Diode Voltage regulators with Soldering Iron.

PUT BACK A NEW BLACK SIM TAPE& GASKET



8.6 V2202

Trans V; Dual_PMOSFET

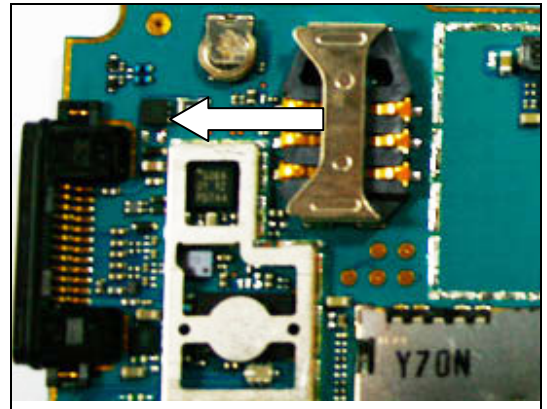
PROTECT THE MICROPHONE AND SYSTEM CONNECTOR WITH CAPTON TAPE

REMOVE THE BLACK SIM TAPE& GASKET

Replace the Trans V Dual PMOSFET with Hot air soldering equipment.

Place a new component with Soldering Iron.

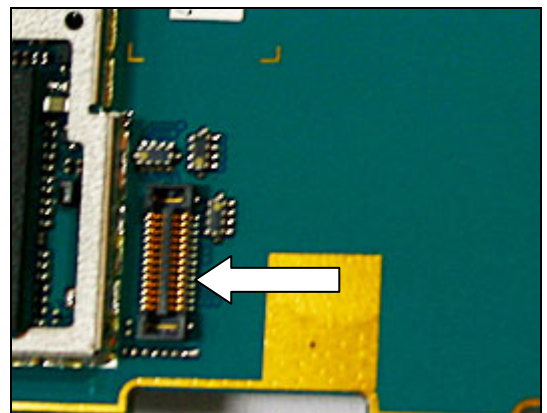
PUT BACK A NEW BLACK SIM TAPE& GASKET



8.7 X4202

LCD Connector

Replace the LCD Connector with BGA equipment.



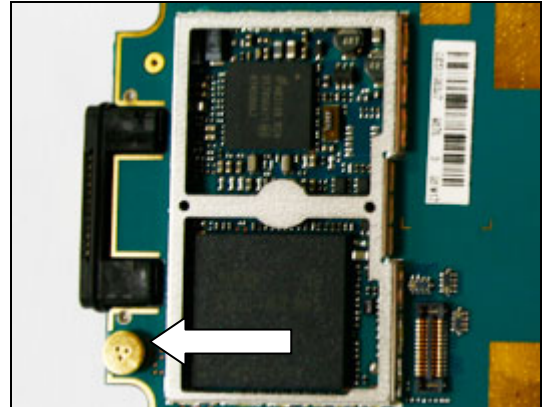
8.8 B3100

PROTECT THE SYSTEM CONNECTOR WITH CAPTON TAPE!
PROTECT THE NEW MICROPHONE WITH CAPTON TAPE
REMOVE THE BLACK SIM TAPE& GASKET

Replace the Microphone with BGA equipment.

PUT BACK A NEW BLACK SIM TAPE& GASKET

Microphone



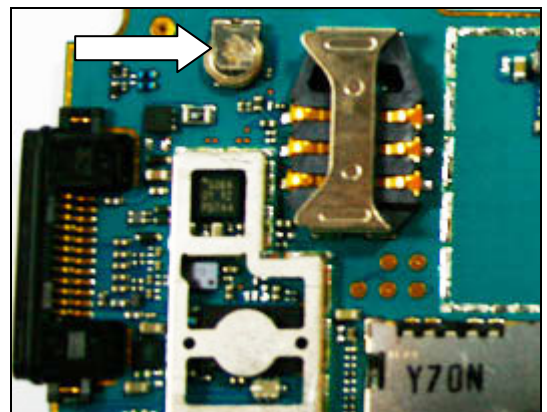
8.9 C2217

PROTECT THE SYSTEM CONNECTOR WITH CAPTON TAPE!
PROTECT THE SIM CARD READER WITH CAPTON TAPE
REMOVE THE BLACK SIM TAPE& GASKET

Replace the Capacitor with BGA repair equipment.

PUT BACK A NEW BLACK SIM TAPE& GASKET

0,07F 3.3V Capacitor



8.10 B2101

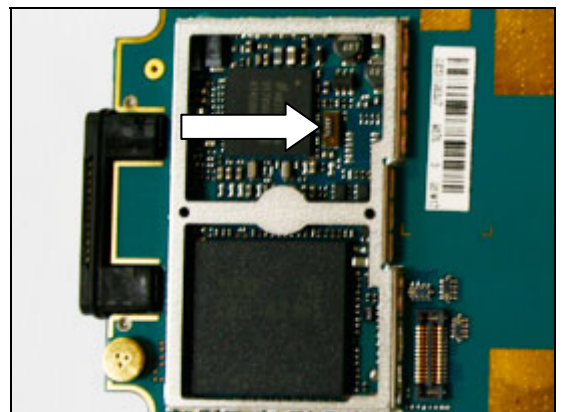
Remove the shield can lid. Use a dentist hook.

Replace the Crystal with BGA repair equipment.

Put back a **new** shield can lid.

Press on all sides of the lid until you hear a "click" sound.

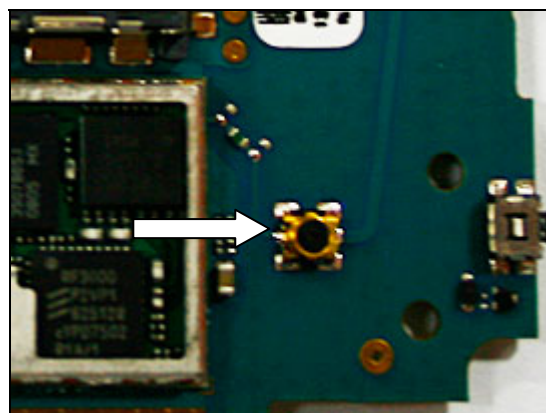
Crystal



8.11 X1200

Replace the RF connector with BGA equipment.

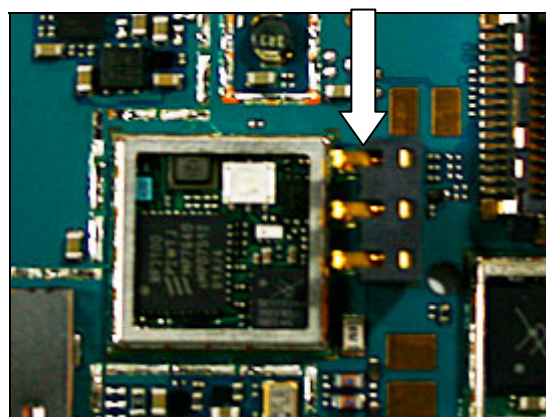
Connector, RF Test



8.12 X2200

PROTECT THE MAIN CAMERA SOCKET WITH CAPTON TAPE
Replace the Battery connector with BGA repair equipment.

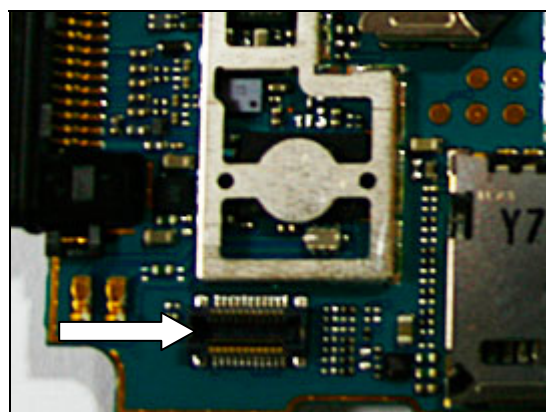
Battery Connector



8.13 X2402

Remove the Keyboard connector with BGA equipment.

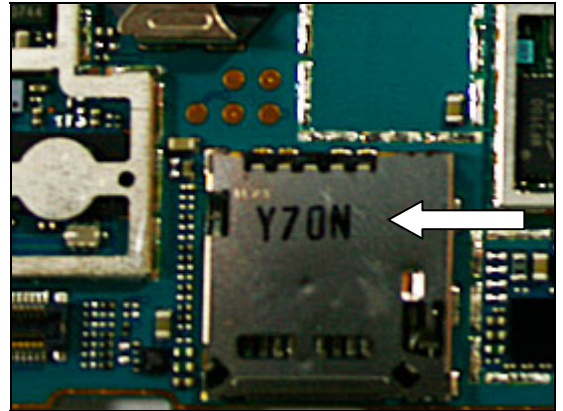
Con X Keyboard connector



8.14 X2490

Replace the MS Holder with BGA repair equipment.

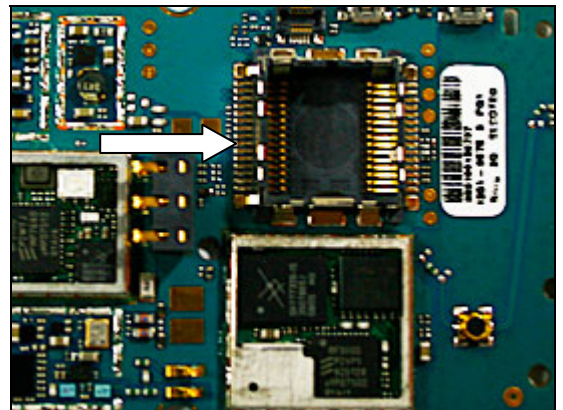
MS-Micro Pico holder



8.15 X4301

PROTECT THE BATTERY CONNECTOR WITH CAPTON TAPE!
Replace the Main camera socket with BGA repair equipment.

Camera Holder

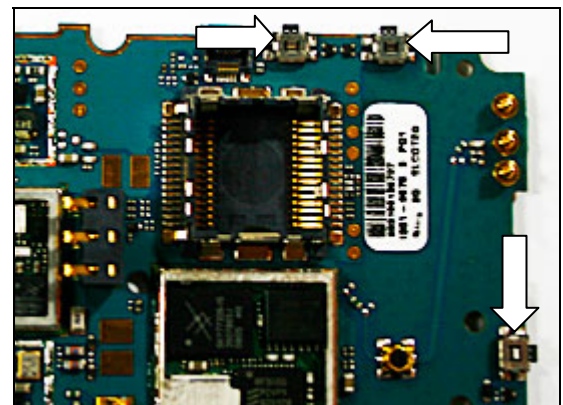


8.16 S2502, S2503, S2504

Remove Side key switches with Hot air soldering equipment.
Install new Side key switches with Soldering Iron.

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.

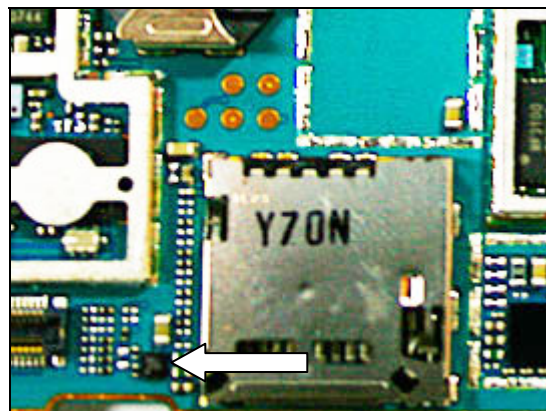
Side push switch



8.17 N3100

PROTECT THE M2 CARD READER WITH CAPTON TAPE
Replace the Audio PA with BGA equipment.

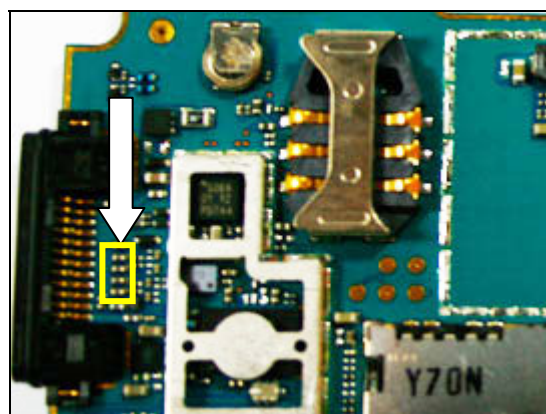
Audio PA



8.18 L2401, L2402, L2403, L2404

REMOVE THE BLACK SIM TAPE& GASKET
PROTECT THE SYSTEM CONNECTOR WITH CAPTON TAPE
Replace the Filters with Hot air soldering equipment.
PUT BACK THE BLACK SIM TAPE& GASKET

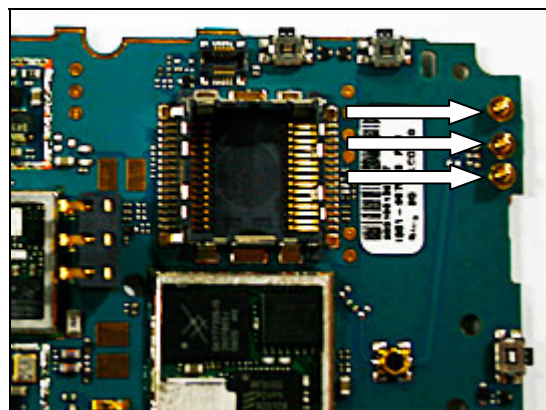
Filter 0.0Hz 0402



8.19 X1201, X1202, X1203

Replace the POGP Pins with Hot air soldering equipment.

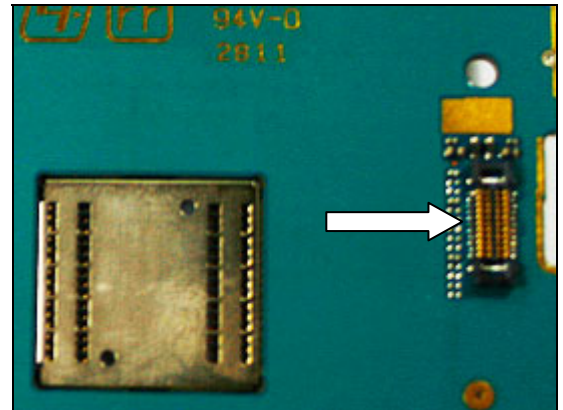
POGO Pin (For Antenna)



8.20 X4300

Replace the Keyboard connector with BGA equipment.

VGA Camera Socket



8.21 D2404

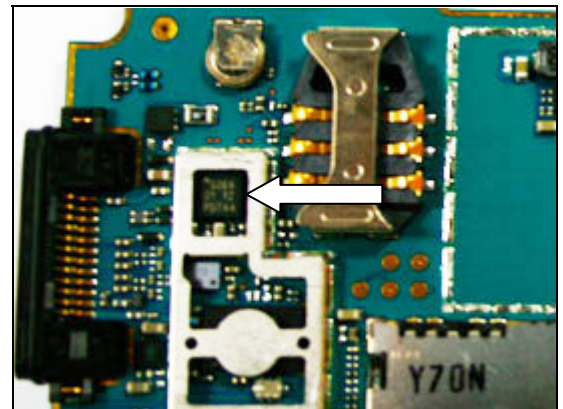
PROTECT THE SYSTEM CONNECTOR AND SIM HOLDER WITH CAPTON TAPE

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

Remove the shield can lid. Use a dentist hook.
Follow the shield fence instruction.

Replace the IC IF with BGA repair equipment.

IC IF



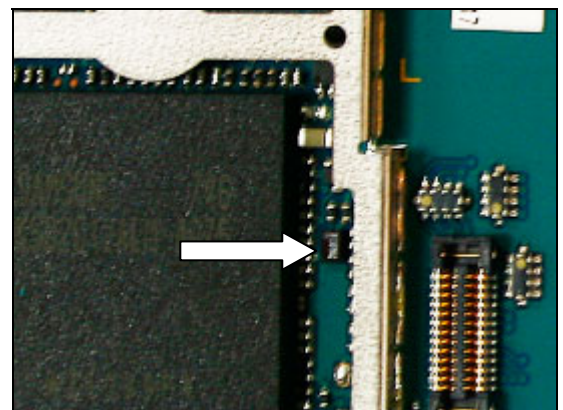
8.22 D2105

PROTECT THE LCD CONNECTOR WITH CAPTON TAPE

Remove the shield can lid. Use a dentist hook.
Replace the Thor Module with BGA repair equipment.

Put back a **new** shield can lid.
Press on all sides of the lid until you hear a "click" sound.

IC Single bus buffer gate



8.23 N1400

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

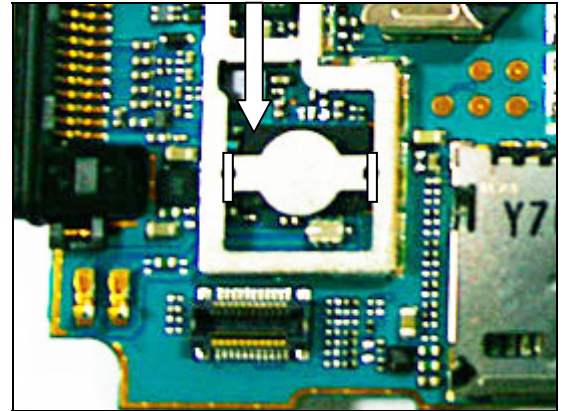
Remove the shield can lid. Use a dentist hook.
Cut the fence according to the white lines.
Follow the shield fence instruction.

Replace the Module Bluetooth + FM with BGA repair equipment.

Put back a **new** shield can lid.

Press on all sides of the lid until you hear a "click" sound.

Module Bluetooth + FM



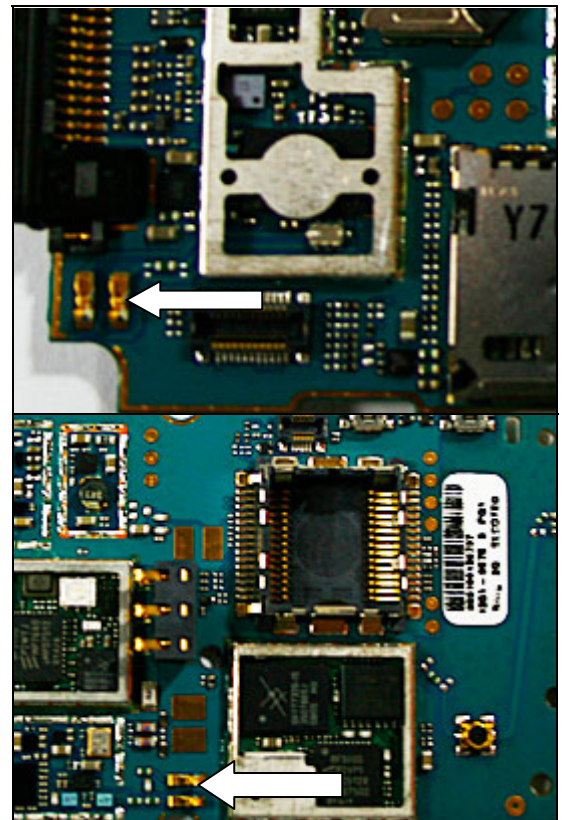
8.24 X1301, X1302, X1430, X1431

DO NOT CONTAMINATE THE TOP OF THE PIN CONNECTORS WITH FLUX OR SOLDER!

PROTECT THE SYSTEM CONNECTOR WITH CAPTON TAPE

Replace Antenna pin connector with Hot air soldering equipment.

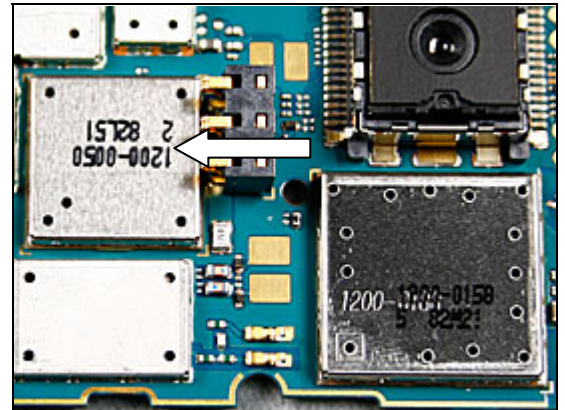
Antenna pin connectors



8.25 N1210

PROTECT THE BATTERY CONNECTOR WITH CAPTON TAPE
Replace the Squid module with BGA repair equipment.

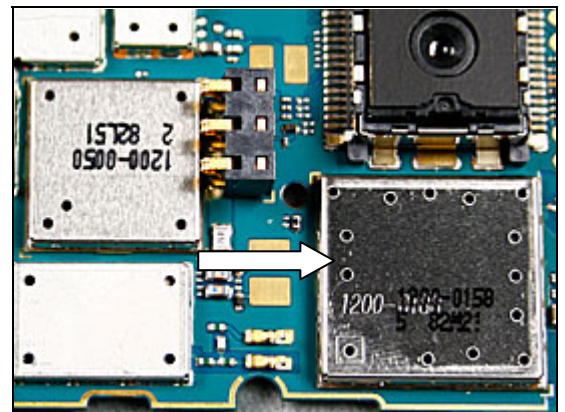
Mod Radio GSM Squid



8.26 N1200

PROTECT THE BATTERY CONNECTOR AND MAIN CAMERA SOCKET WITH CAPTON TAPE
Replace the Thor Module with BGA repair equipment.

Module Radio EDGE Thor GSM/EDGE



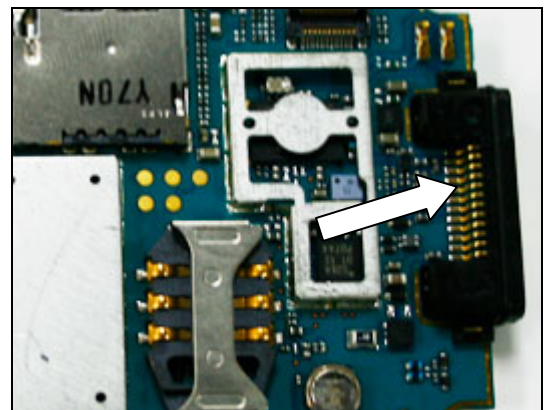
8.27 X2300

REMOVE THE BLACK SIM TAPE& GASKET

Replace the System Connector with BGA equipment.

PUT BACK THE BLACK SIM TAPE& GASKET

System Connector

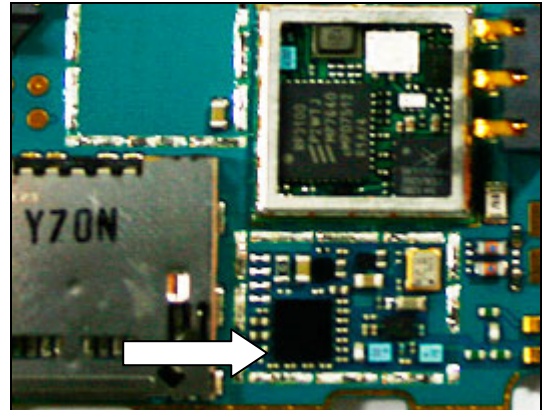


8.28 N1430

Remove the Shield Can (E1001) with BGA Station.
Remove the IC A-GPS Hammerhead 2 with BGA equipment.

Mount back the Shield Can with BGA Station.

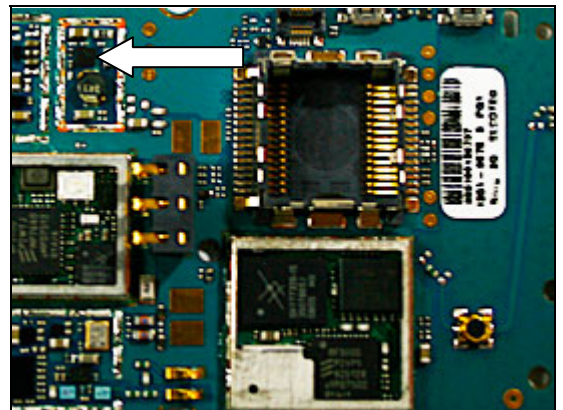
IC A-GPS Hammerhead 2



8.29 N2205

Remove the Shield Can (E1003) with BGA Station.
Replace the IC Vreg with BGA equipment.
Mount back the Shield Can with BGA Station.

IC Vreg



9 Revision history

Rev.	Date	Changes / Comments
1	2008-05-22	Initial release
2	2008-06-10	N2205, N1430 deleted
3	2008-06-27	Put N2205, N1430 back according to Additional Soldering Process
4	2008-07-01	No Change
5	2008-11-11	Added chapter 2 Moisture Sensitivity and Component Baking