Working Instruction, Electrical

Applicable for W960

CONTENTS

1 Read this first!

CAUTION

• Before you start replacing any components, make sure you have read and fully understood the contents of section 2 and 3!
• Also make sure you have access to the mechanical Working Instruction and the equipment listed on the first page of section 4!
• Use Electrostatic Discharge (ESD) equipment to avoid damaging the PBA.
• Use gloves or finger cots to avoid contaminating the PBA with skin oil.

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 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.

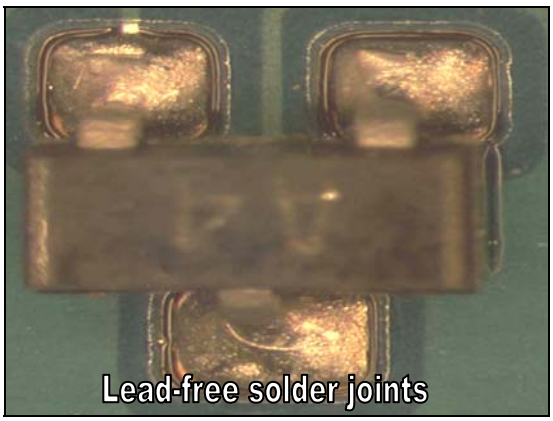
The items on this desk must remain lead-free.

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 = 360°C


Lead-free solder joints

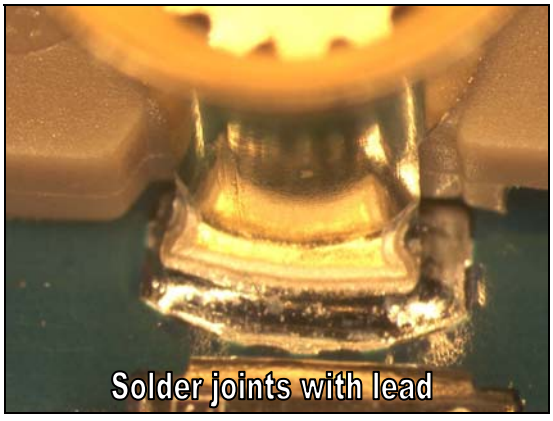
WHEN SERVICING PBA'S THAT HAVE BEEN MANUFACTURED WITH LFS (LEAD-FREE SOLDER PASTE), LFS MUST BE USED. IF NOT, THERE IS A HIGH RISK FOR UNRELIABLE SOLDERING JOINTS.


Solder joints with lead

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.


Lead-free solder joints


Solder joints with lead

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 360°C.

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

5 Bottom heat requirements

In the chapter 8 "Replacement of components" there are components which require to us a bottom heater during repair to pre-heat the board and to level out the ΔT on the PBA. It will also minimize thermal stress.

The temperature on the PBA surface shall not exceed 150°C to minimize inter-metallic growth and thermal stress on PWB.

6 BGA equipment reflow profiles

6.1 General

BGA Rework Station shall be able to control time, airflow and temperature to achieve controlled and stable reflow profile. It shall also have a temperature controlled bottom heater.

The profile shall be according to SEMC profiling specification below.
Profile parameters are illustrated in table 6.1.1.

Reflow profile in this document always refers to the reflow profile which is measured on the board/component with thermocouples and do not refer to the BGA Rework Stations setting which can vary depending on the machine type and individual machine. Verification of reflow profile shall be done on each set of equipment. Reference profile is showed in table 6.2

6.2 Temperature Measurements

One thermocouple shall be located in the middle of the component (Thermocouple # 1). It shall be drilled from bottom side and located at the ball. The hole shall be filled with glue. A slot could also be milled in the PWB to locate the thermocouple under the component. See picture 6.1.
The other thermocouple (Thermocouple # 2) should be attached in the center and on the top of the component body; it shall be attached with thin heat resistant tape or a thin layer of glue. Too thick layer of glue will isolate too much heat which could give uncertain measurements.

It's also recommended to place thermocouples on adjacent components to make sure that they are not over exposed to the heat.

Picture 6.1

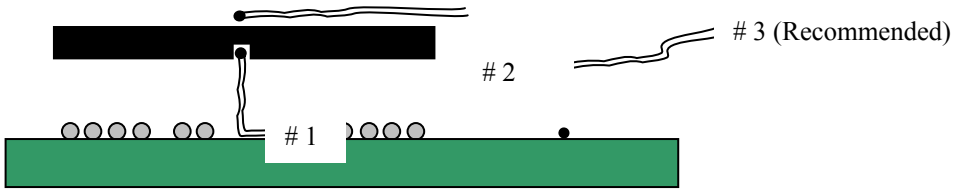
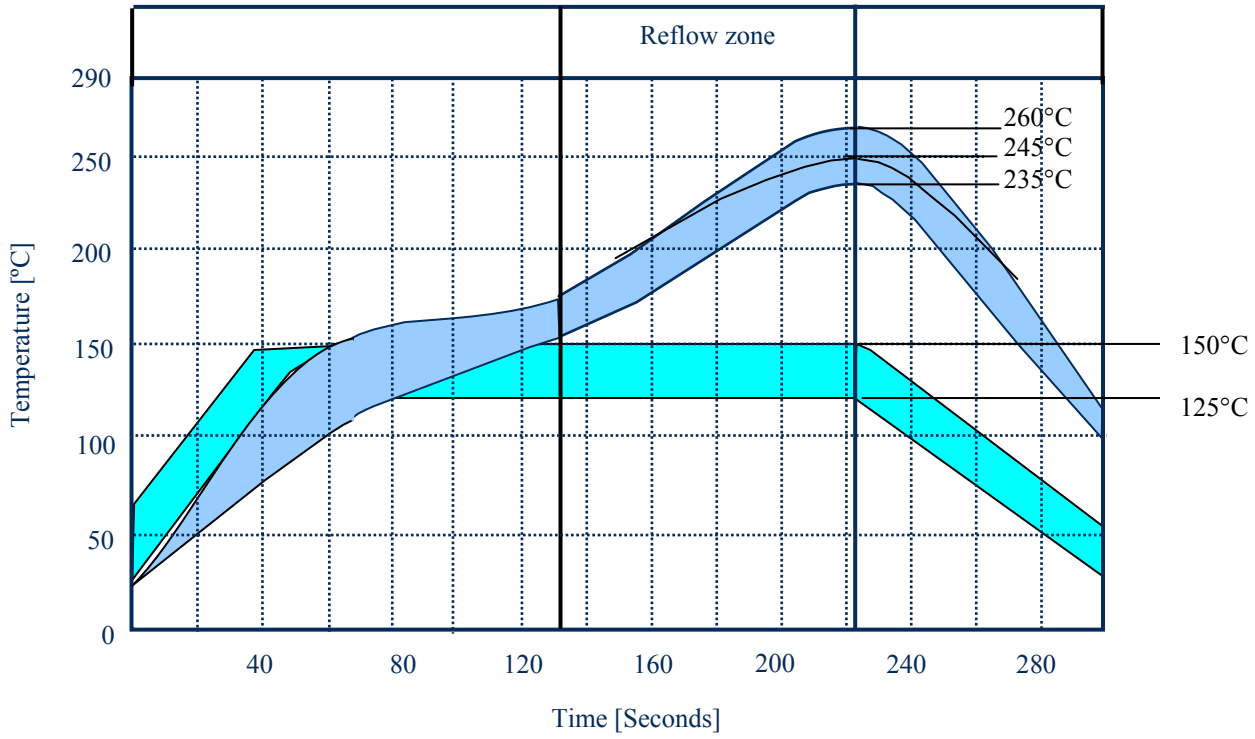


Table 6.1.1

Ramp rate	< 3°C/sec
Ramp rate cooling	< 6°C/sec
Time above liquidus	40-70 sec
Minimum temperature	235°C
Maximum component temperature	260 °C
Time above 235°C	10-40 sec
Recommended Total time	Approx. 3-5min

* The higher temperature in case the board has extremely high ΔT.

Table 6.2



7 PoP Components Repair instruction

1. Scope of the work instruction

This document was created to help and guide the repair operators to replace the PoP components and to avoid mistakes and misunderstandings during the repair process and to avoid any damage to the final product.

2. Description

PoP component is a new type of BGA component which is made by two components, CPU on bottom and Memory soldered directly on the top of CPU, see picture below.

PoP component (Package-on-Package).

Fig 1: Cross-sectional view of the PoP stack.
Bottom package: CPU(Suzi/ Anja).
Top package: Memory NAND/SDRAM

Example of PoP components used in P1i is D2500, the PDA processor with memory.

3. Preparation

Before starting the repair action, be sure that:

- You have trained to use BGA rework station
- You have the necessary tools
- You have correct components (type and revision)
- You are ESD protected

4. Process instruction

4.1 Needed equipment and tools

- BGA rework station
- Adequate Reflow profile for component
- Adequate Nozzle
- Soldering iron
- Hot air station
- Tweezers
- De-soldering wick
- Flux

4.2 Process description

BGA rework station is using to solder and de solder PoP component. Be sure that correct soldering head (Nozzle) and correct temperature profile is used.

Soldering iron, hot air station, flux and de-soldering wick are used to remove the soldering rest of the PCB after the old component has been removed.

5. Work instruction

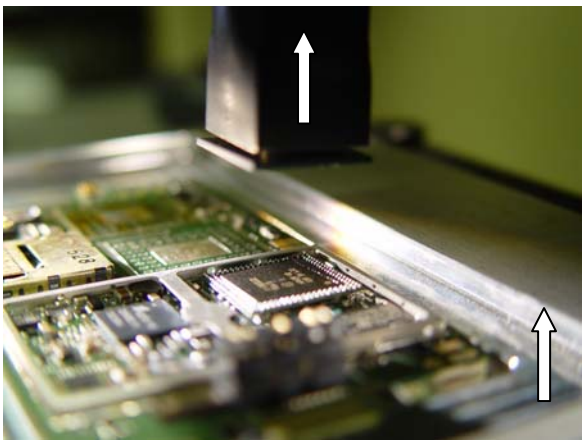
5.1 Removing

This instruction is showing how to remove the PoP component in one heating cycle.

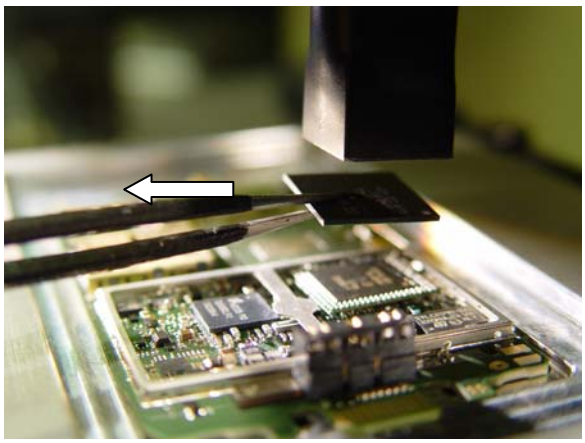
Equipment used **A**: Finetech CRS 10, Fine placer.
B: OKI, BGA station
Other similar BGA station can be use.

5.1A

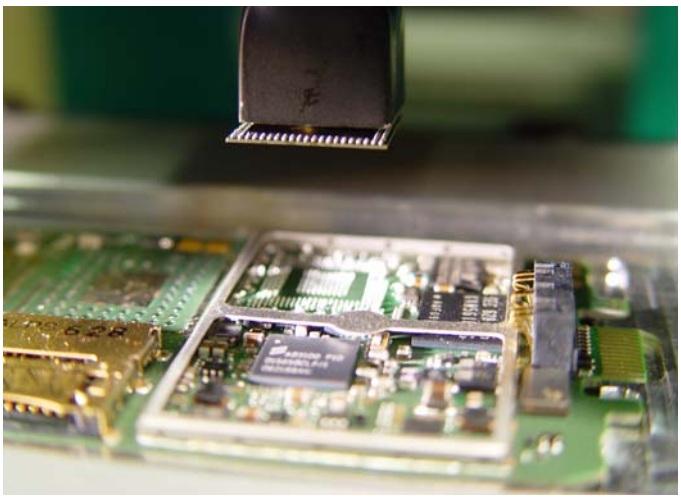
Put the board in the fixture, chose the right nozzle and temperature profile.
Align the nozzle to the component and start the de-soldering program.
When the temperature is coming to the melting point activate the vacuum, the memory will be removed from the CPU (***picture A1***), lift the nozzle for a few centimeters and remove the memory from the nozzle using tweezers (***picture A2***). Put the nozzle down again, readjust the distance to the CPU, and wait for a couple of seconds and remove the CPU component too (***picture A3***). Wait for the cooling down time, and remove the PCB from the fixture and go to next step.



Picture A1

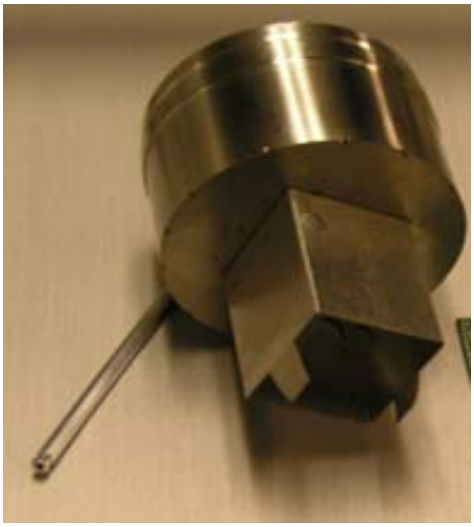


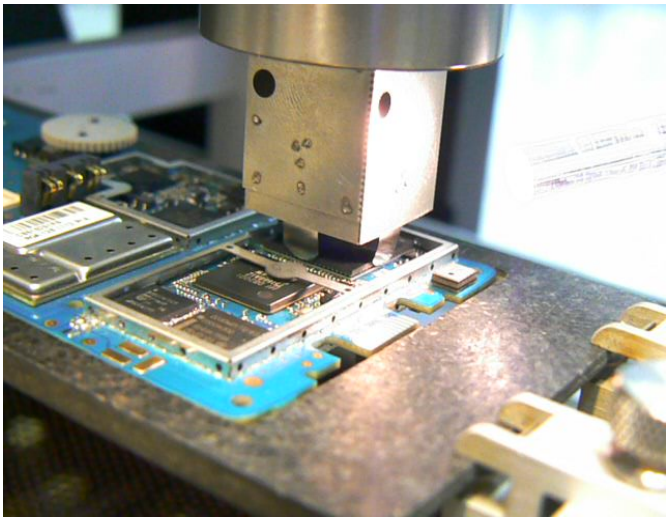
Picture A2



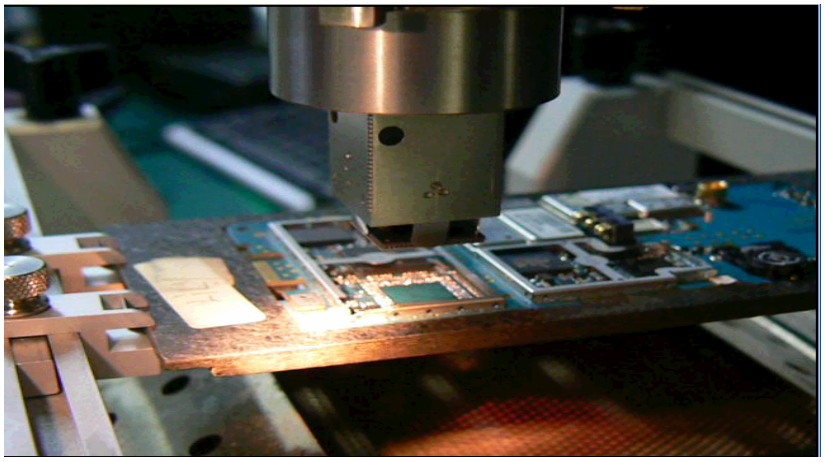
Picture A3

5.1B
Using a special designed nozzle with mechanical grips (picture B1) will be possible to remove only the top component (memory), ort both components in the same time (picture B2 and B3)





Picture B1
Picture B2



Picture B3

5.2 Soldering removal

The landing area has to be cleaned from old soldering and flux.

5.3 Inspection

Check under the microscope that are no damage happened to mask, pads or the surrounding components. Go to next step.

5.4 Assembly and re soldering

Put the board in the stations fixture, chose the adequate nozzle and reflow profile.

Check the component revision and mounting direction. Add flux on the board and on the CPU top pads.

Pick up the CPU and align it to the board and put it down.

Pick up the memory and align it to the CPU, and put the component on the top of the other component.

Start the reflow profile.

5.5 Inspection after repair

After soldering check the board to be sure that no other components are damaged or removed. Inspect component by X-ray and send the board to trouble shoot station for test.

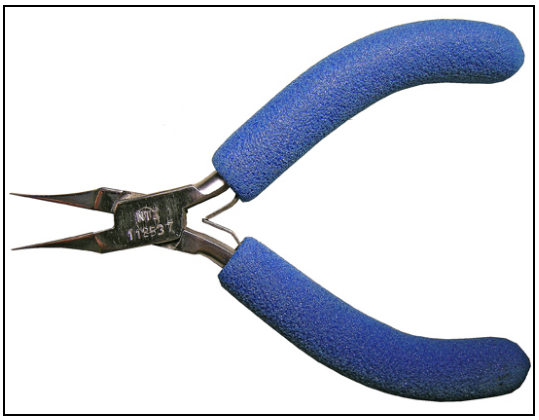
Each time PCB assemblies have been repaired it shall be marked with an indication on the PCB .

8 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.

Use Shield fence pliers NTZ 112 537 to bend the fence.



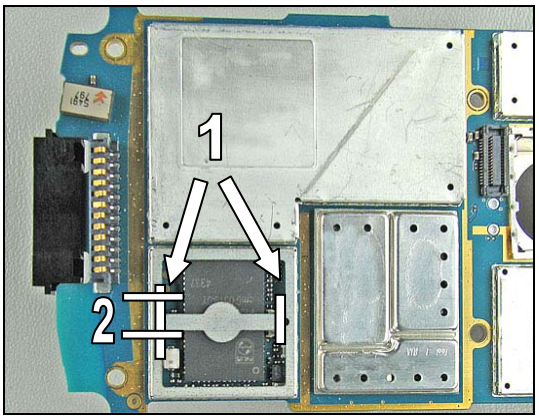
MAKE SURE THAT CUTTING PLIERS IS SHARP-EDGED TO PREVENT DAMAGING THE SHIELD CAN FENCE.

Remove the shield can lid, use a dentist hook.

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

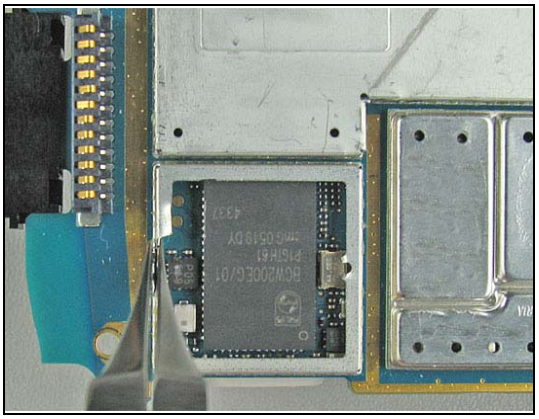
This pick up area is only used when machine mounting and there is no need to put it back again.

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



Carefully bend the shield fence with a shield fence plier.

Replace the components.

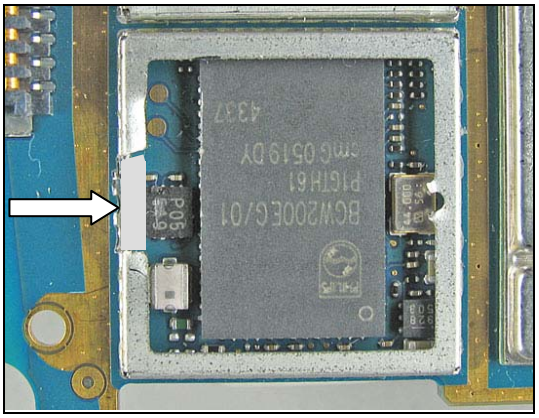


Replace the components.

Bend carefully back the shield fence.

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

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



9 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

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 1206-4797*.

9.1 B2000 Quartz/Crystal 32768Hz

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.

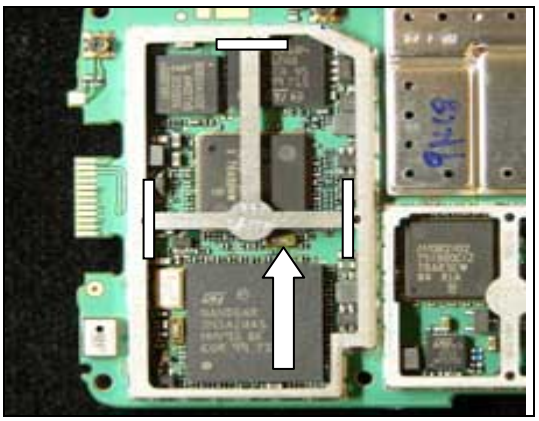
This pick up area doesn't have to be replaced.

Replace the Quartz/Crystal 32768Hz.

Use Hot air repair equipment.

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

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



9.2 B2500 Quartz/Crystal 32768MZ

Remove the shield can lid.

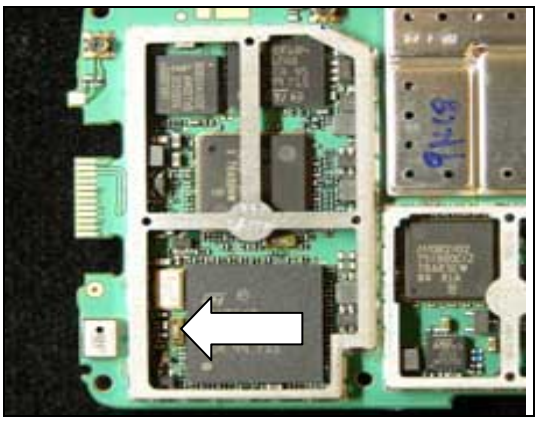
Use a dentist hook.

Replace the Quartz/Crystal 32768Hz.

Use Hot air repair equipment.

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

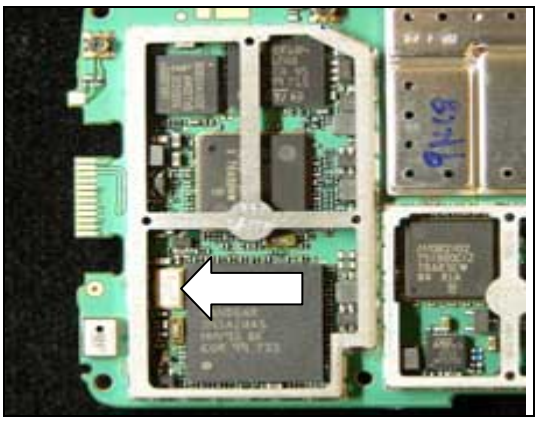
Press on all sides of the lid until you hear a "click" sound.



9.3 B2510

Crystal 13 MHz

Remove the shield can lid.
Use a dentist hook.
Replace the Crystal 13MHz.
Use BGA repair equipment.
Put back a **new** shield can lid.
Press on all sides of the lid until you hear a “click” sound.

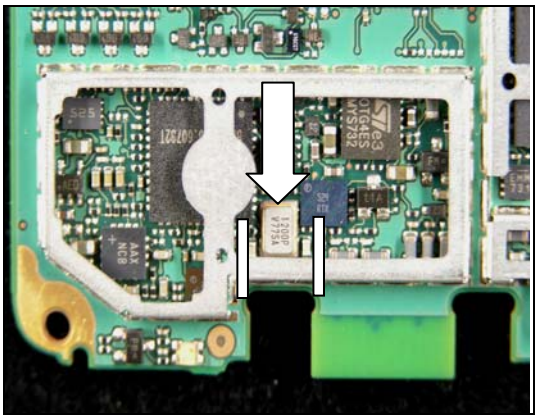


9.4 B2680

12.000 MHz Crystal osc

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

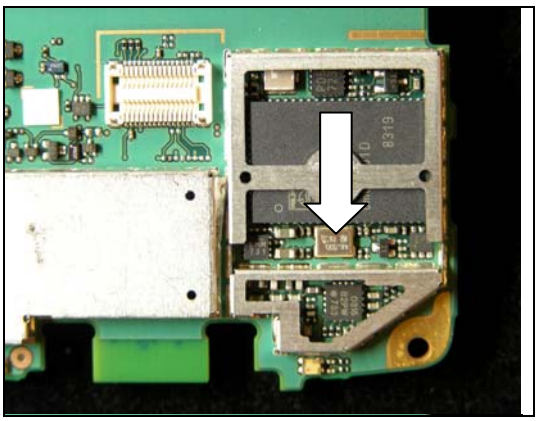
Remove the shield can lid, use a dentist hook.
Remove the pick up area according to the white lines with a cutting plier.
This pick up area doesn’t have to be replaced.
Replace the 12.000 MHz Crystal osc.
Use Hot air repair equipment.
Put back a **new** shield can lid.
Press on all sides of the lid until you hear a “click” sound.



9.5 B6000

Crystal 44 MHz

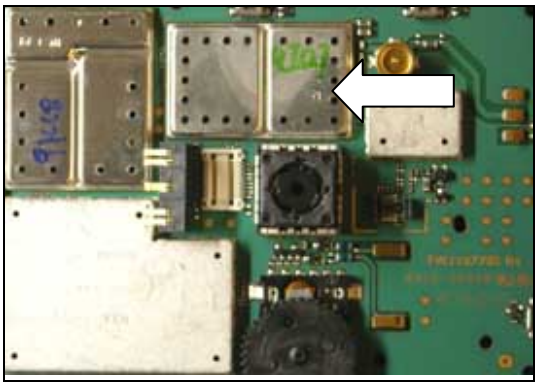
Remove the shield can lid.
Use a dentist hook.
Replace the Crystal 44 MHz.
Use Hot air repair equipment.
Put back a **new** shield can lid.
Press on all sides of the lid until you hear a “click” sound.



9.6 D1100

Marlin

Replace the Marlin.
Use BGA repair equipment.



9.7 D2005

Asic Wanda 10X10

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

Remove the shield can lid, use a dentist hook.

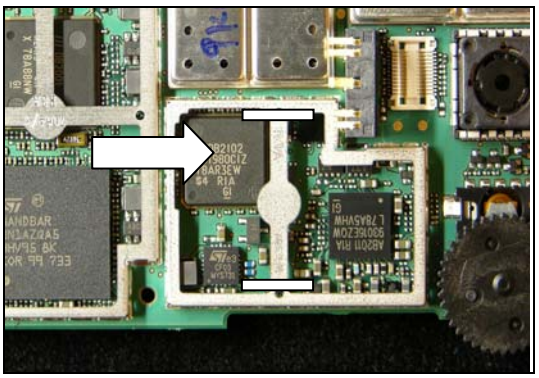
Remove the pick up area according to the white lines with a cutting plier.

This pick up area doesn't have to be replaced.

Replace the Asic Wanda.

Use BGA repair equipment.

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

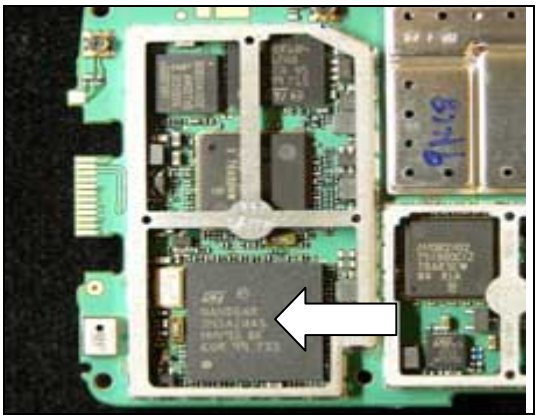


9.8 D2500

Suzi PoP

Use BGA repair equipment.

See chapter 4. PoP components repair instruction



9.9 D2501

2 - ind and gate

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.

This pick up area doesn't have to be replaced.

Replace the 2 – ind and gate.

Use Hot air repair equipment.

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

9.10 D2663

USB OTG Transceiver

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.

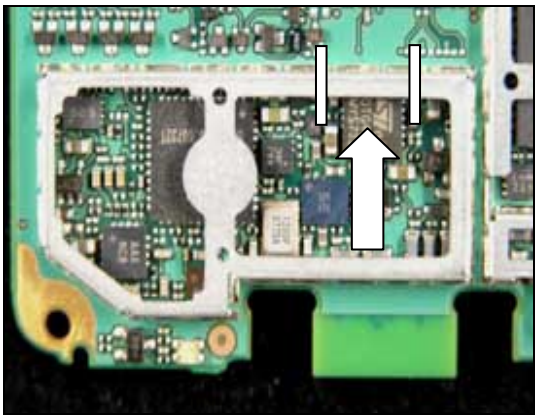
This pick up area doesn't have to be replaced.

Replace the USB OTG Transceiver.

Use BGA repair equipment.

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

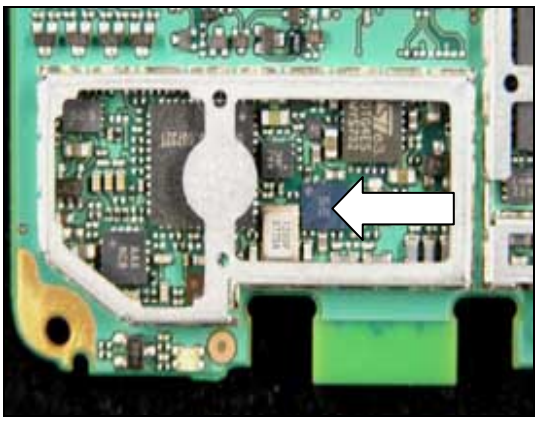
Press on all sides of the lid until you hear a "click" sound.



9.11 D2665

Asic Elin (Knatte 3)

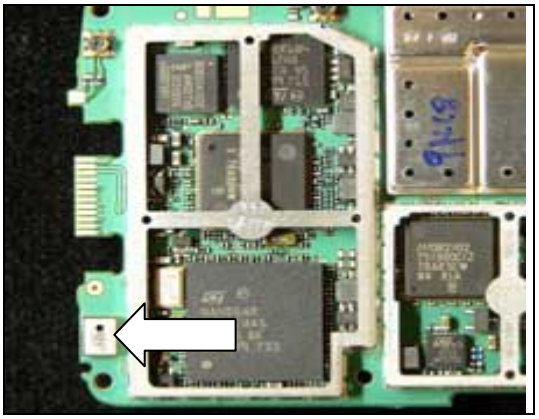
Remove the shield can lid.
Use a dentist hook.
Replace the Asic Elin (Knatte 3).
Use Hot air repair equipment.
Put back a **new** shield can lid.
Press on all sides of the lid until you hear a “click” sound.



9.12 D5001

Microphone

Replace the Microphone.
Use BGA repair equipment.



9.13 D6000

Level Shifter

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

Remove the shield can lid, use a dentist hook.

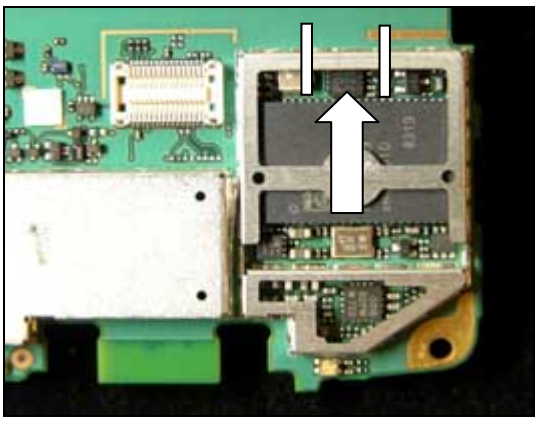
Remove the pick up area according to the white lines with a cutting plier.

This pick up area doesn't have to be replaced.

Replace the Level Shifter.

Use Hot air repair equipment.

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



9.14 N2000

Asic Vincenne2

Remove the shield can lid.

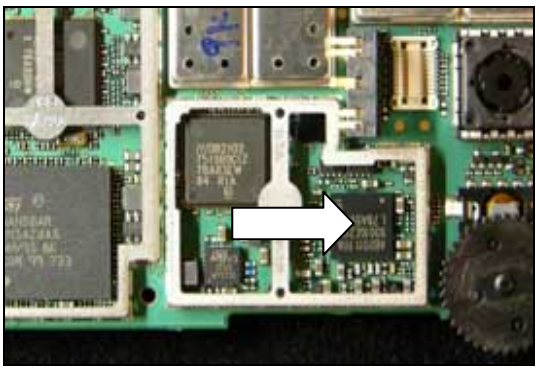
Use a dentist hook.

Replace the Asic Vincenne2.

Use BGA repair equipment.

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

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



9.15 N2662

ESD Protection for USB

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.

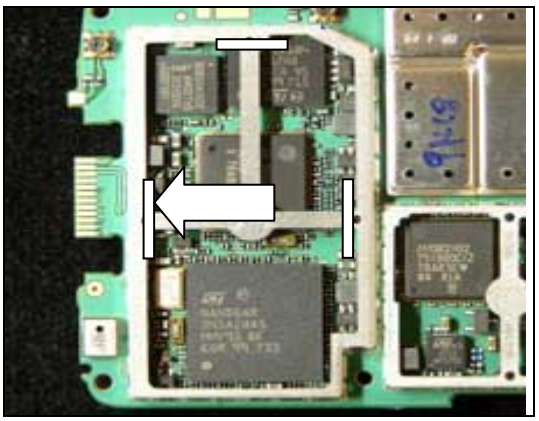
This pick up area doesn't have to be replaced.

Replace the ESD protection for USB.

Use Hot air repair equipment.

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

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



9.16 N3001

Bluetooth module

Remove the shield can lid.

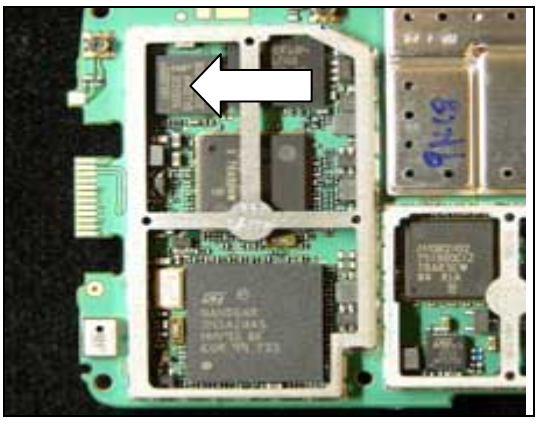
Use a dentist hook.

Replace the Bluetooth module.

Use BGA repair equipment.

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

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



9.17 N4021, N4040

Step-down DC/DC

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

Remove the shield can lid, use a dentist hook.

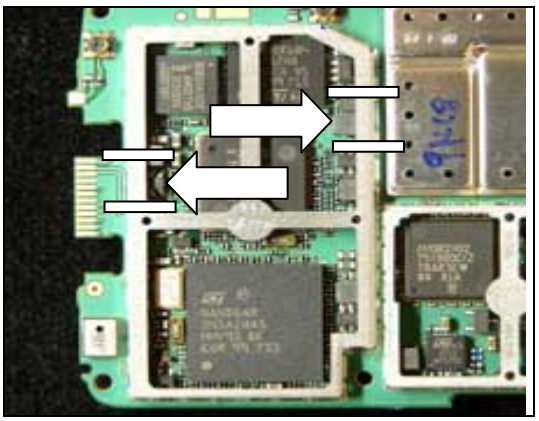
Remove the pick up area according to the white lines with a cutting plier.

This pick up area doesn't have to be replaced.

Replace the Step-down DC/DC Converter.

Use Hot air repair equipment.

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



9.18 N4030

2,8V 150mA Line regulator

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

Remove the shield can lid, use a dentist hook.

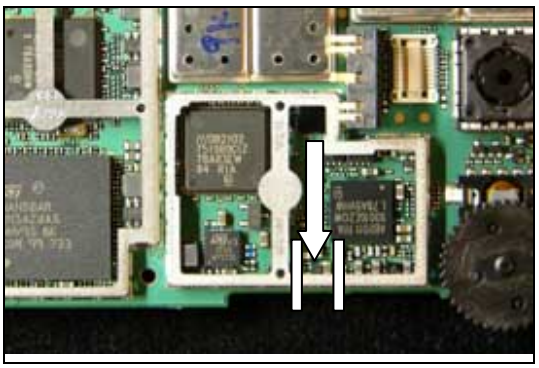
Remove the pick up area according to the white lines with a cutting plier.

This pick up area doesn't have to be replaced.

Replace the 2,8V 150mA Line Regulator.

Use Hot air repair equipment.

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



9.19 N4050 LDO 120mA Line regulator

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.

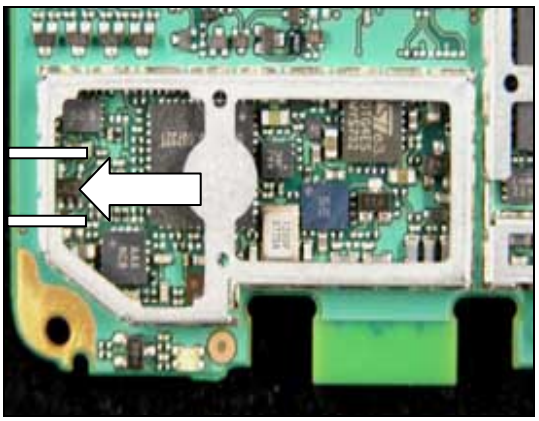
This pick up area doesn't have to be replaced.

Replace the LDO 120mA Line regulator.

Use Hot air repair equipment.

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

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



9.20 N4070 LED Driver

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

Remove the shield can lid, use a dentist hook.

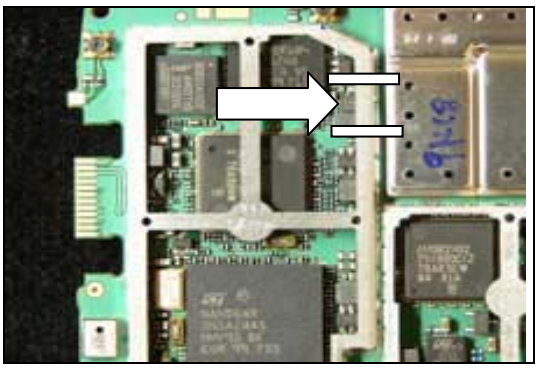
Remove the pick up area according to the white lines with a cutting plier.

This pick up area doesn't have to be replaced.

Replace the LED Driver.

Use Hot air repair equipment.

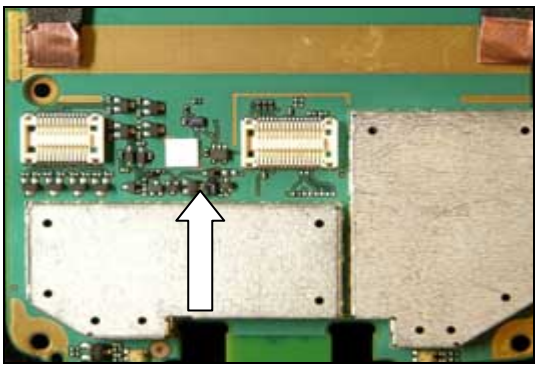
Put back a **new** shield can lid.



9.21 N4071

Single Gate

Replace the Single Gate.
Use Hot air repair equipment.

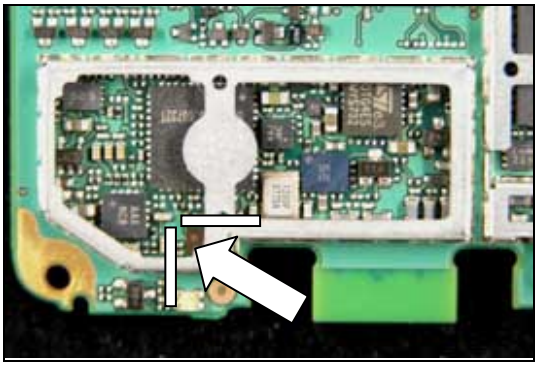


9.22 N5010

Asic Tjatte3

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.
This pick up area doesn't have to be replaced.
Replace the Asic Tjatte3.
Use Hot air repair equipment.
Put back a **new** shield can lid.



9.23 N5500 Stereo Headphone Ampl.

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

Remove the shield can lid, use a dentist hook.

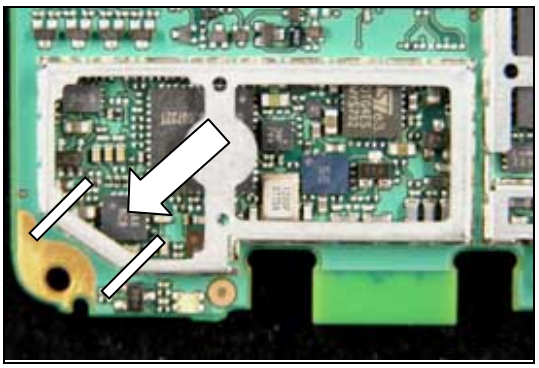
Remove the pick up area according to the white lines with a cutting plier.

This pick up area doesn't have to be replaced.

Replace the Stereo Headphone Amplifier.

Use Hot air repair equipment.

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



9.24 N5505 Audio Amplifier

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

Remove the shield can lid, use a dentist hook.

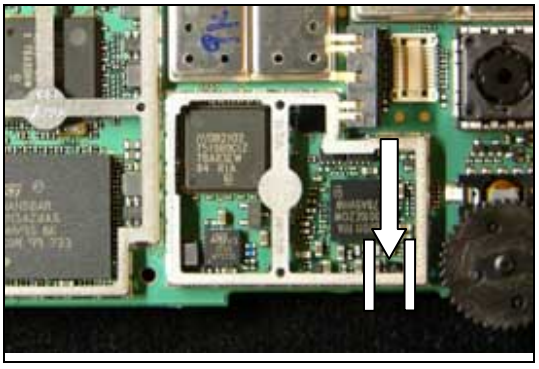
Remove the pick up area according to the white lines with a cutting plier.

This pick up area doesn't have to be replaced.

Replace the Audio Amplifier.

Use BGA repair equipment.

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



9.25 N5508 FM-radio w RDS

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

Remove the shield can lid, use a dentist hook.

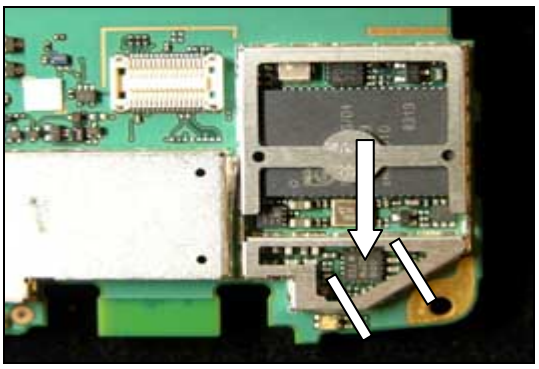
Remove the pick up area according to the white lines with a cutting plier.

This pick up area doesn't have to be replaced.

Replace the FM-radio w RDS.

Use Hot air repair equipment.

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



9.26 N6000 W-Lan Module 802.11b

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

Remove the shield can lid, use a dentist hook.

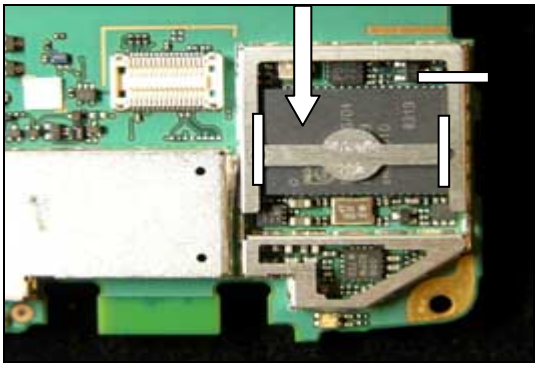
Remove the pick up area according to the white lines with a cutting plier.

This pick up area doesn't have to be replaced.

Replace the W-LAN Module 802.11b.

Use BGA repair equipment.

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



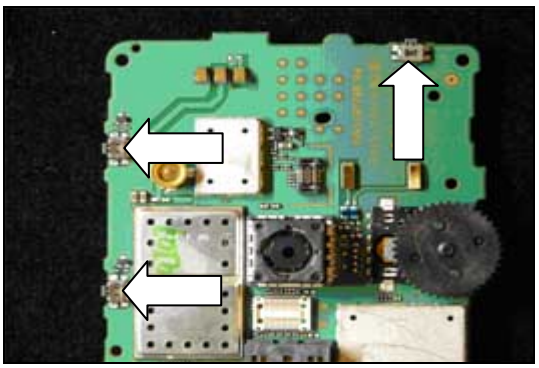
9.27 S2125, S2821, S2822

Side Push Switch

Remove Side key switches.
Use Hot air device.

Install new Side key switches.
Use Soldering Iron

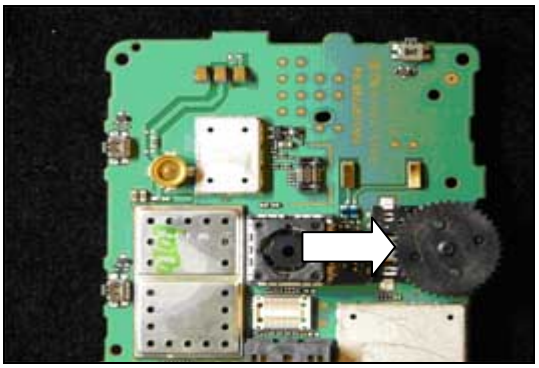
NOTE: Use as little flux as possible to place the new part. Make sure flux does not get on the component body.



9.28 S2820

Jog Dial

Replace the Jog dial.
Use soldering iron.



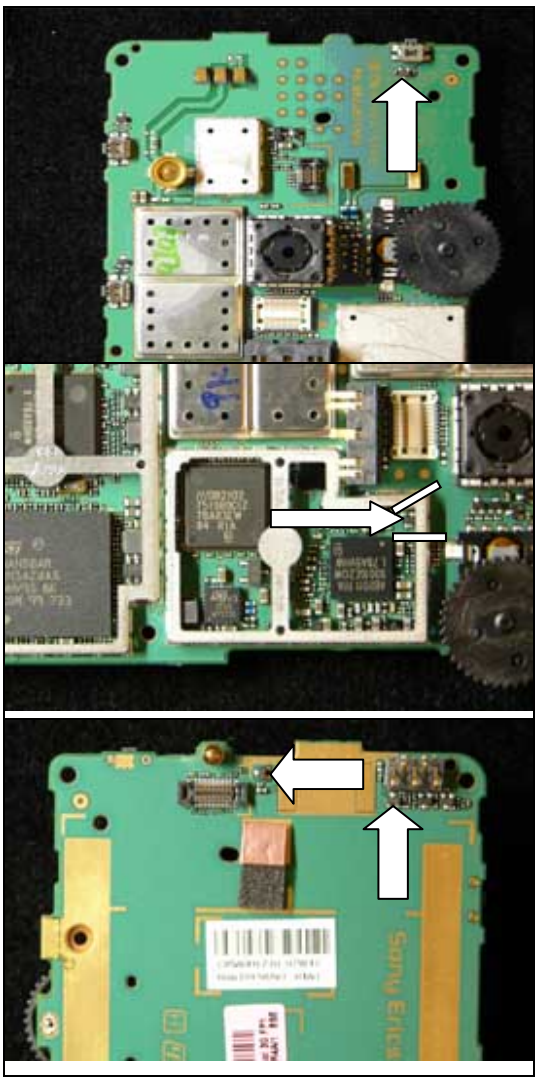
9.29 V2125, V4001, V5000, V5001 Diode, SSM Series

Replace the V2125 Diode, SSM Series.
Use Hot air repair equipment.

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.
This pick up area doesn't have to be replaced.
Replace the V4001 Diode, SSM Series.
Use Hot air repair equipment.
Put back a **new** shield can lid.

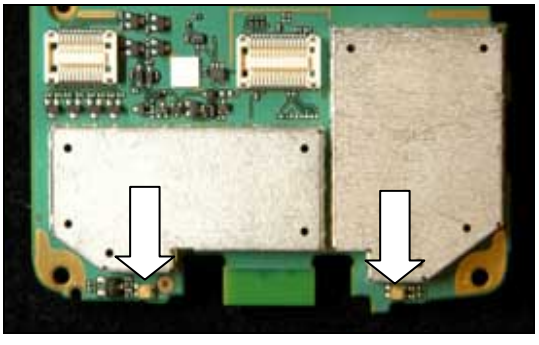
Replace the V5000 and V5001 Diode, SSM Series.
Use Hot air repair equipment.



9.30 V2181, V2191 Dual Red/Green SMD

Remove Dual Red/Green SMD.
Use Hot air device.

Install new Dual Red/Green SMD.
Use Soldering Iron



9.31 V2663

ESD Protector 5,6V

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

Remove the shield can lid, use a dentist hook.

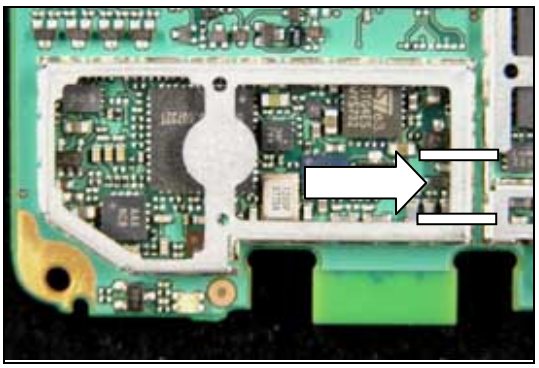
Remove the pick up area according to the white lines with a cutting plier.

This pick up area doesn't have to be replaced.

Replace the ESD Protector 5,6V.

Use Hot air repair equipment.

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



9.32 V4004

Diode, Shottky

Remove the shield can lid.

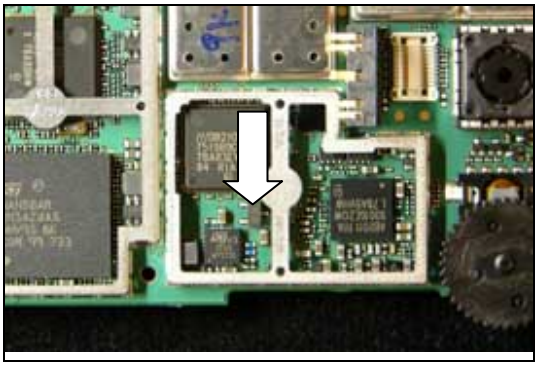
Use a dentist hook.

Replace the Diode, Shottky.

Use Hot air repair equipment.

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

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

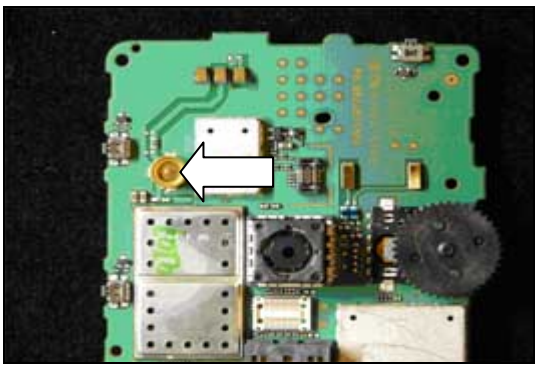


9.33 X1001

External RF Connector

Remove External RF Connector.
Use Hot air device.

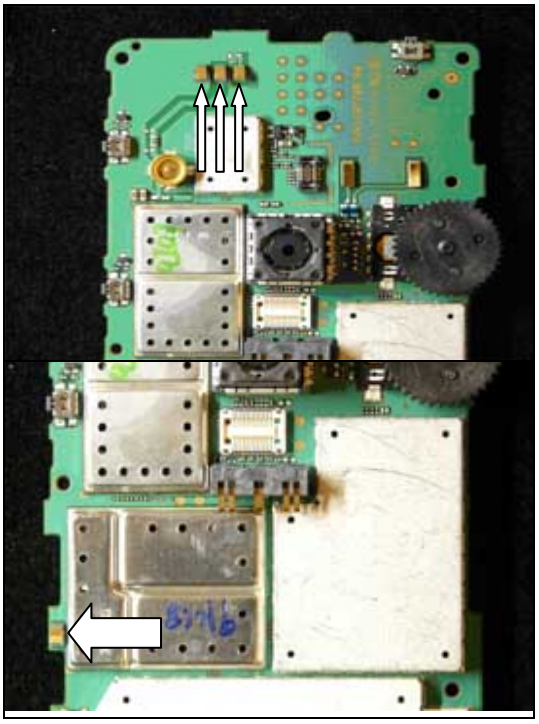
Install new External RF Connector.
Use Soldering Iron



9.34 X1010, X1011, X1012, X6001

Internal antenna connector

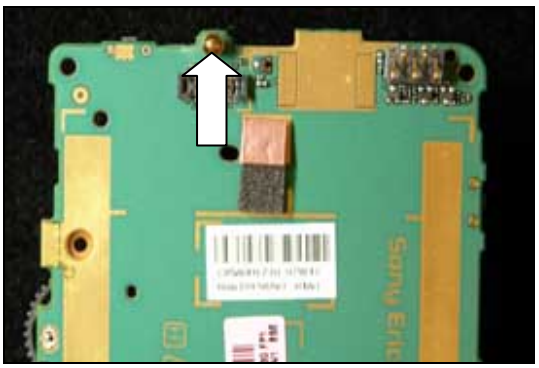
Replace the Internal antenna connector.
Use Hot air repair Equipment.



9.35 X1021

Connector

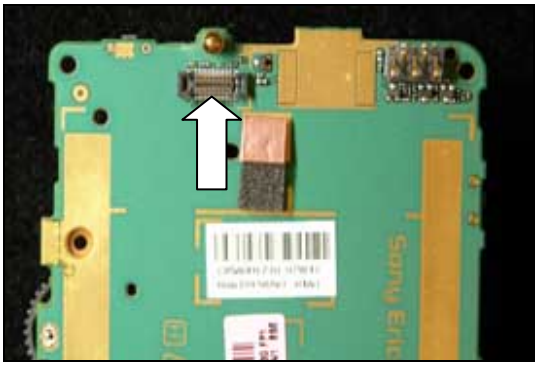
Replace the Connector.
Use Hot air repair equipment.



9.36 X2741

Connector 22pin BtB

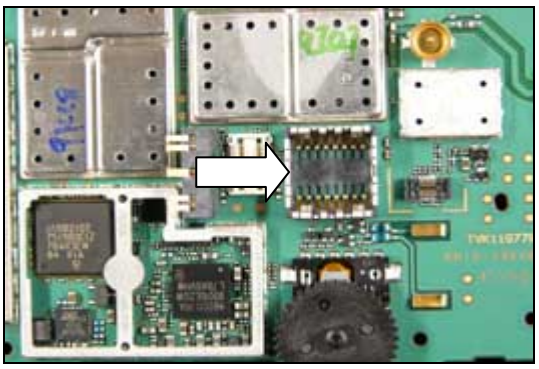
Replace the Connector 22pin BtB.
Use Hot air repair equipment.



9.37 X2743

Camera Socket

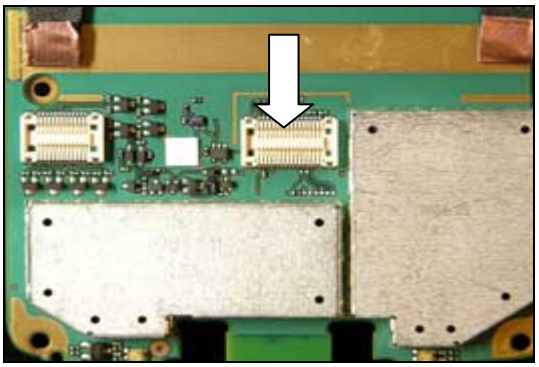
Replace the Camera Socket.
Use Hot air repair equipment.



9.38 X2820

Display Connector

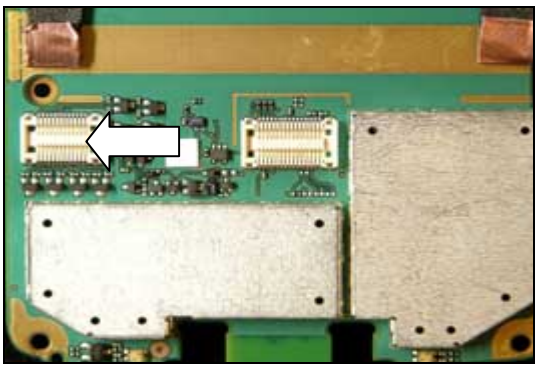
Replace the Display Connector.
Use Hot air repair equipment.



9.39 X2821

Keyboard Connector

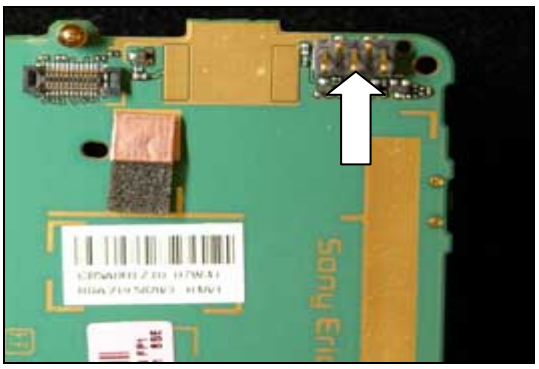
Replace the Keyboard Connector.
Use Hot air repair equipment.



9.40 X2825

Spring Connector, 5 Pins

Replace the Spring Connector, 5 pins.
Use Hot air repair equipment.

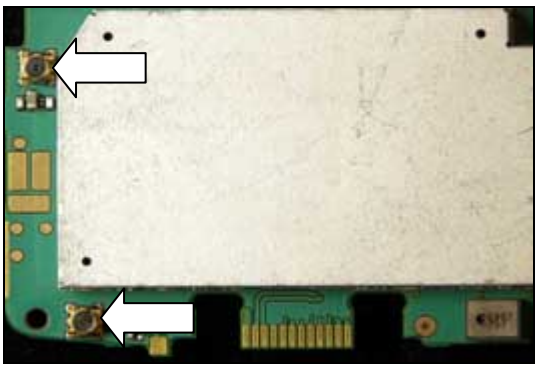


9.41 X3001, X6000

Antenna Switch

Remove Antenna Switch.
Use Hot air device.

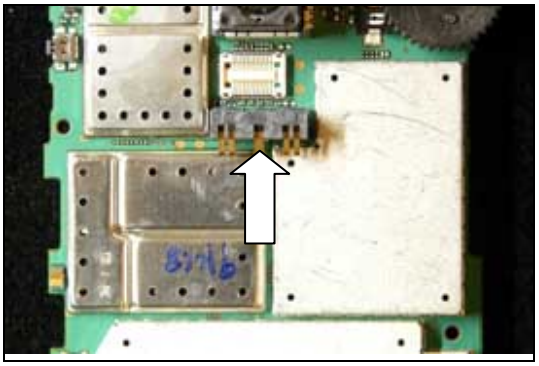
Install new Antenna Switch
Use Soldering Iron



9.42 X4000

Battery Connector

Replace the Battery connector.
Use BGA repair equipment.



10 Revision history

Rev.	Date	Changes / Comments
1	2007-11-29	Initial release