



Working Instruction, Electrical

Applicable for P990i

CONTENTS

| | |
|---|-----------|
| Lead-free soldering | 3 |
| 1 BGA equipment reflow profiles..... | 5 |
| 1.1 General..... | 5 |
| 1.2 Temperature Measurements | 5 |
| 1.3 Reflow Profiles | 6 |
| 1.4 REWORK BGA..... | 7 |
| 1.5 Process Flow BGA | 9 |
| 2 Replacement of components | 10 |
| 2.1 Level shifter D6000 | 11 |
| 2.2 2-INP AND GATE D2501 | 12 |
| 2.3 ASIC Wanda D2005..... | 13 |
| 2.4 USB OnTheGo D2663..... | 13 |
| 2.5 SN74LVC126 D2741 | 14 |
| 2.6 75ohm 0402 0,1A 0,8ohm Bead L1001-4 | 15 |
| 2.7 ASIC Vicennne A07 N2000 | 15 |
| 2.8 Microphone D5001 | 16 |
| 2.9 IRDA MODULE H2660..... | 16 |
| 2.10 ASIC TJATTE 2 N5010 | 17 |
| 2.11 Stereo headphone Amplifier N5500 | 18 |
| 2.12 WLAN MODULE N6000 | 18 |
| 2.13 1W OPAMP N5505 | 19 |
| 2.14 FM Stereo Chip N5502..... | 20 |
| 2.15 Side push switch S2820 | 20 |
| 2.16 Side switch key lock right S2821 | 21 |
| 2.17 Jog Dial S2822 | 21 |
| 2.18 Balun TX Low band W1300..... | 22 |
| 2.19 Balun TX High band W1301 | 22 |
| 2.20 Conn/Rf/External X1001 | 23 |
| 2.21 Connector Antenna X1010-12..... | 23 |
| 2.22 Sim reader X2100 | 24 |
| 2.23 MS Duo connector X2580 | 24 |
| 2.24 BtB Connector Video camera X2741 | 25 |
| 2.25 Connector Flash flex X2742 | 25 |
| 2.26 Zif Connector X2743 | 26 |
| 2.27 Battery contact pad X2821-2..... | 26 |
| 2.28 Mechanical antenna switch X3001, X6000 | 27 |
| 2.29 Battery connector X4000 | 27 |
| 2.30 ESD protection diode N2662..... | 28 |
| 2.31 Conn/Recpt/B-B/24 pin X2823 | 28 |
| 2.32 ASIC Tilde 6x6 N1100 | 29 |
| 2.33 Quad Band GSM PA N1300..... | 29 |
| 2.34 Ray/UMTS module N1400 | 30 |
| 2.35 Connector Loudspeaker X5500-1 | 30 |



| | | | |
|----------|-------------------------------|-------------|-----------|
| 2.36 | LDO | N2663 | 31 |
| 2.37 | 30 Pin BtB connector | X2740 | 31 |
| 2.38 | 12 PIN Connector | X2830 | 32 |
| 2.39 | RF SW/Dual Mode/Quad band | N1000 | 32 |
| 3 | Revision history | | 33 |

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*

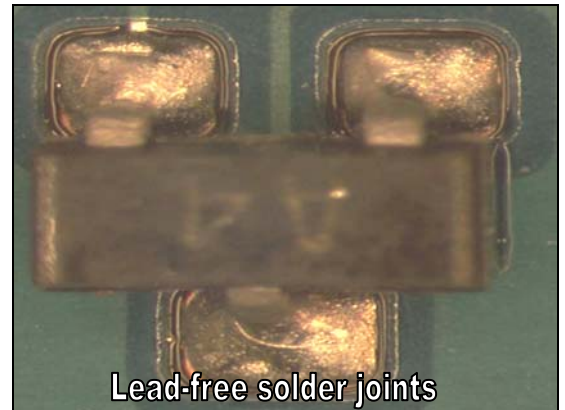
LFS (lead-free solder paste) characteristics:

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

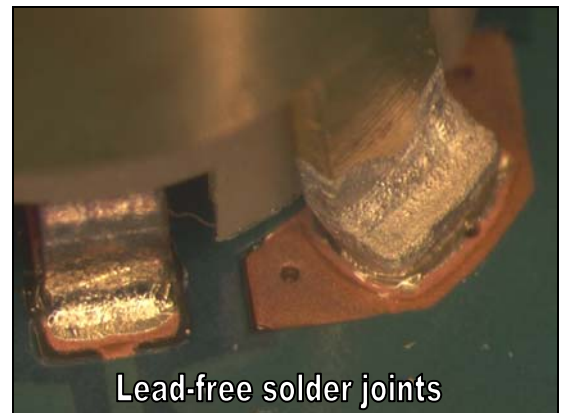
WHEN SERVICING PBA'S THAT HAVE BEEN MANUFACTURED WITH LFS (LEAD-FREE SOLDER PASTE), LFS MUST BE USED. IF NOT, THERE IS A HIGH RISK FOR UNRELIABLE SOLDERING JOINTS.

Lead-free solder joints are more difficult to inspect because they do not have shiny surfaces like leaded solder joints.

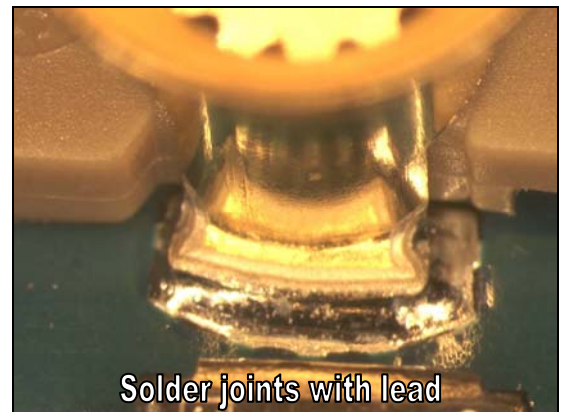
Also, lead-free solder does not flow as well as leaded solder, so some of the solder pad areas may remain exposed.



Lead-free solder joints



Lead-free solder joints



Solder joints with lead

1 BGA equipment reflow profiles

1.1 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

1.2 Temperature Measurements

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.

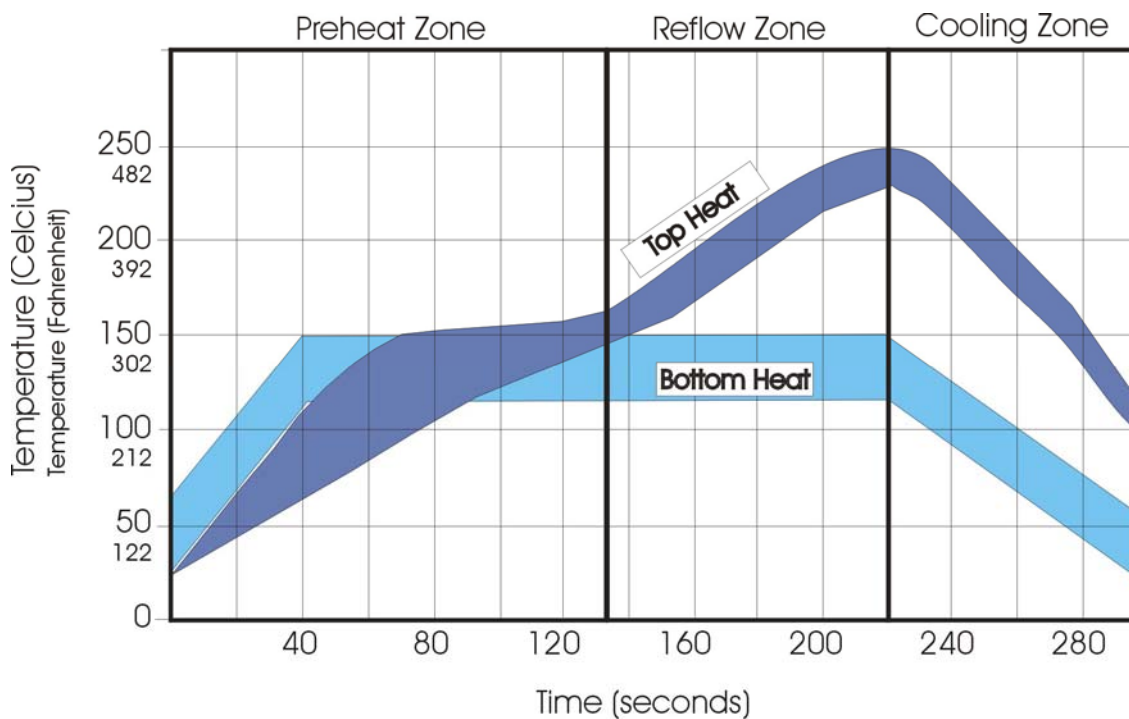
Make sure the nozzle does not affect any nearby placed components.

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 250° C.



1.3 Reflow Profiles



| | |
|-------------------------|---------------------|
| Ramp rate | < 3°C/sec |
| Ramp rate | < 6°C/sec |
| Time above liquidus | 40-100 sec |
| Minimum temperature | 230°C |
| Maximum temperature | 245°C°C* for 10 sec |
| Bottom heat temperature | 125°C-150°C |
| Total time | Approx. 3-5min |

table 2-1

1.4 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.

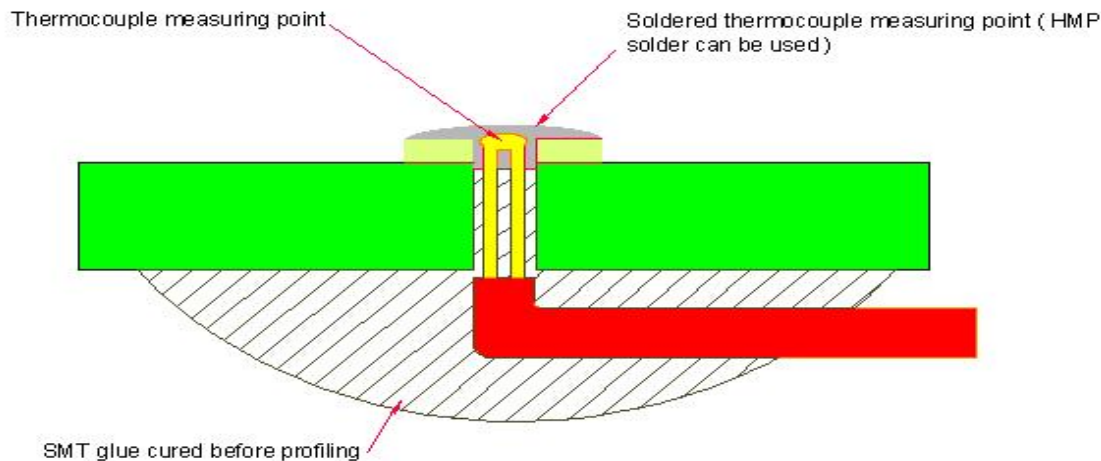


Figure 2-2

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

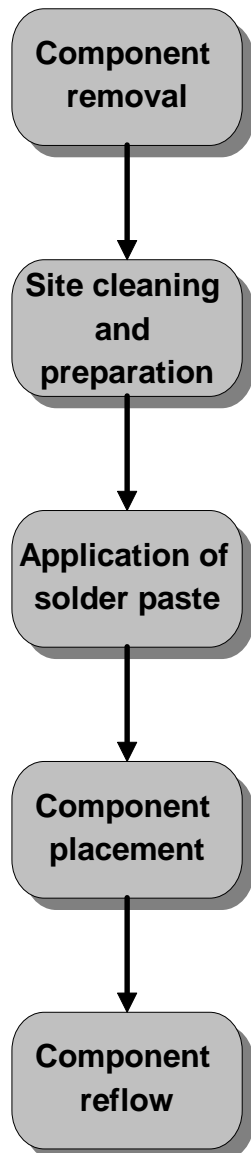
Place the module to the board by using BGA rework station.

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 and indicator. For more detailed investigations in problem situations dye and pried method and micro sectioning can be carried out.

1.5 Process Flow BGA



2 Replacement of components

EQUIPMENT

- Dentist hook
- Shield fence pliers NTZ 1125 37
- Hot air soldering equipment
- Soldering iron
- BGA repair equipment

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 3/00021-1/FEA 209 544/97*.

2.1 Level shifter

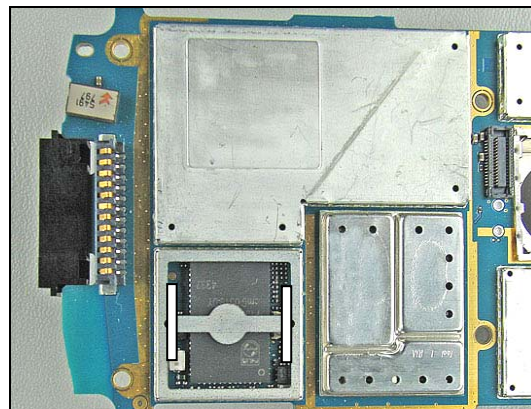
D6000

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

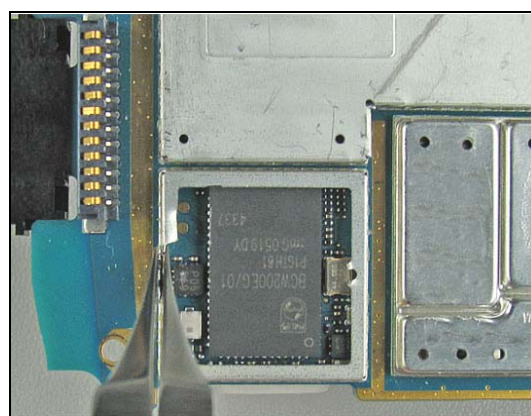
Remove the shield can lid.

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

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



Bend carefully the shield fence with a shield fence plier.



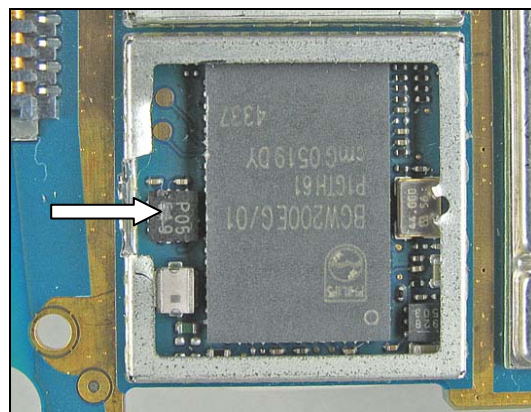
Replace the Level shifter.

Use BAG repair equipment.

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

Bend carefully back the shield fence.

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



2.2 2-INP AND GATE

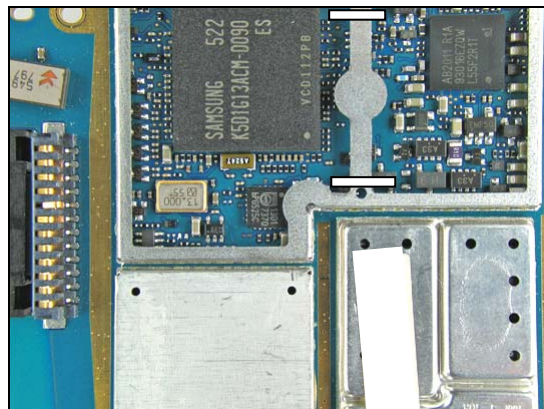
D2501

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

Remove the shield can lid.

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

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

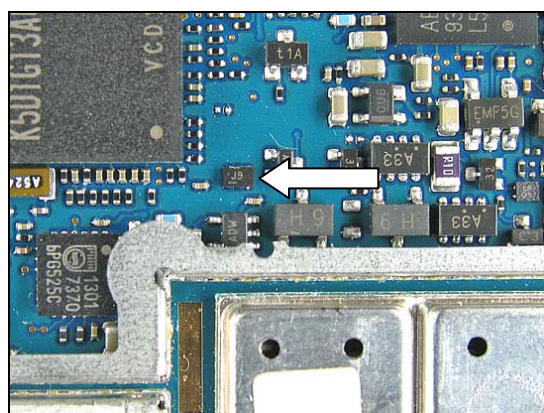


Replace the 2-INP AND GATE.

Use BGA repair equipment.

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

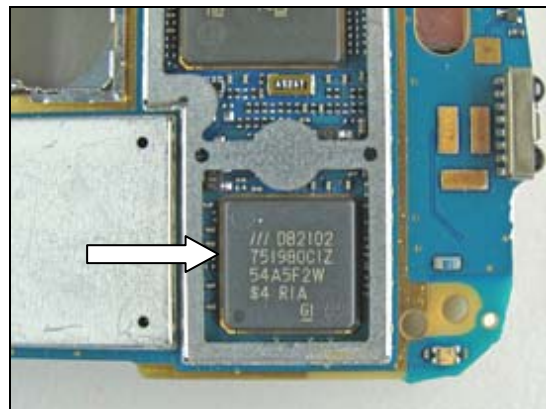
Press on all sides of the lid until you hear a "click" sound.



2.3 ASIC Wanda

D2005

Remove the shield can lid.
 Replace the ASIC Wanda.
 Use BGA repair equipment.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a "click" sound.

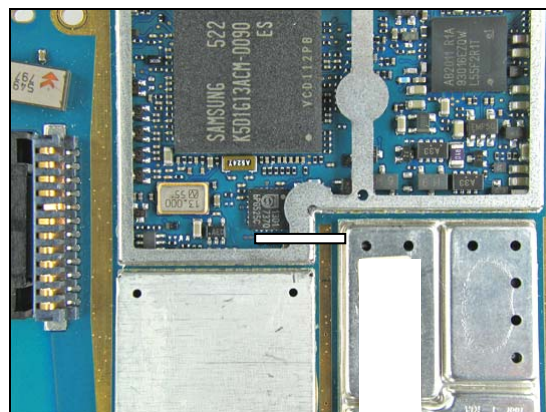


2.4 USB OnTheGo

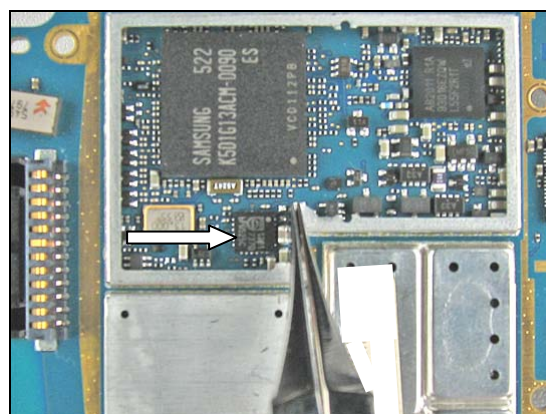
D2663

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

Remove the shield can lid.
 Cut the shield fence according to the white line with a cutting plier.



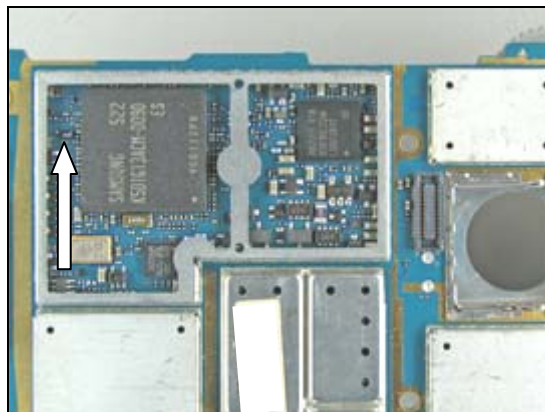
Bend carefully the shield fence with a shield fence plier.
 Replace USB module.
 Use BGA repair equipment.
 Bend carefully back the shield fence.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a "click" sound.



2.5 SN74LVC126

D2741

Remove the shield can lid.

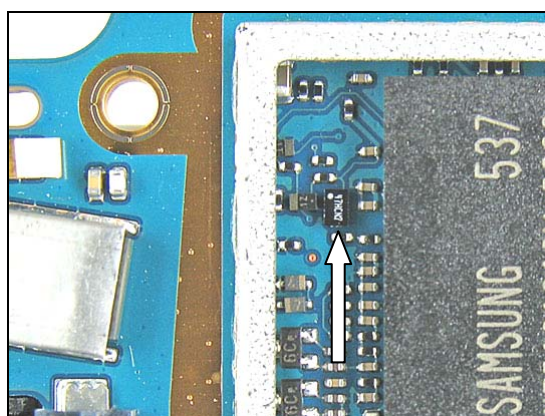


Replace the 2-INP AND GATE.

Use BGA repair equipment.

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

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



2.6 75ohm 0402 0,1A 0,8ohm Bead

L1001-4

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

Remove the shield can lid.

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

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

Bend carefully the shield fence with a shield fence plier.

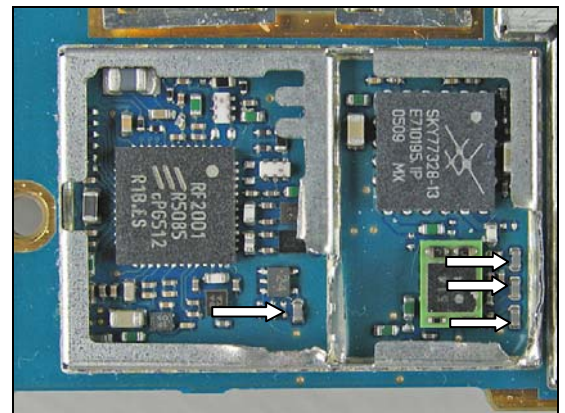
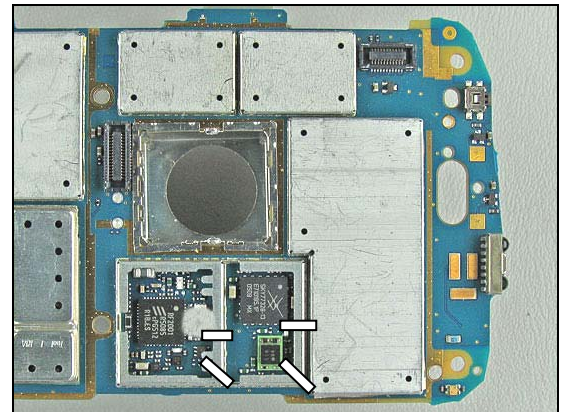
Replace the components.

Use Hot air soldering equipment.

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

Bend carefully back the shield fence.

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



2.7 ASIC Vicennne A07

N2000

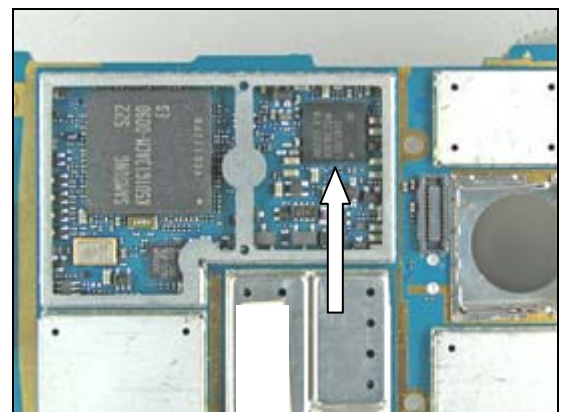
Remove the shield can lid.

Replace the ASIC Vicenne

Use BGA repair equipment.

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

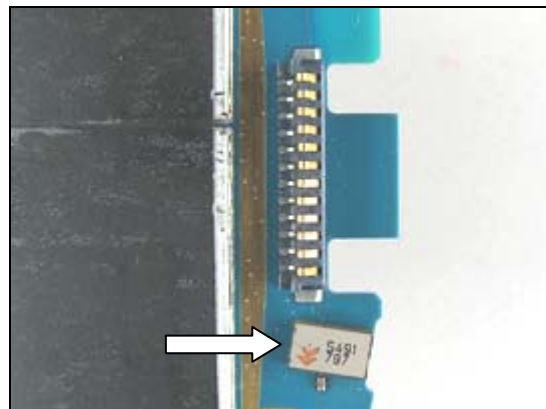
Press on all sides of the lid until you hear a "click" sound.



2.8 Microphone

D5001

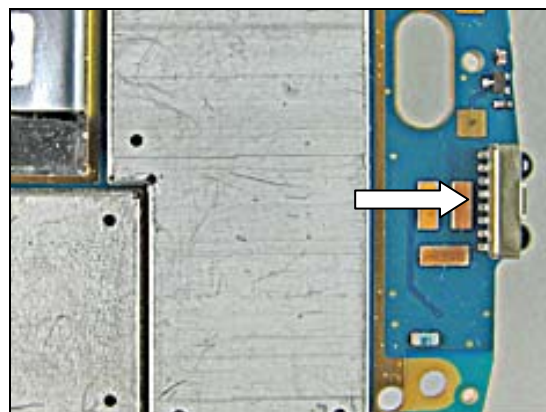
Replace the microphone.
Use BGA repair equipment.



2.9 IRDA MODULE

H2660

Replace the Irda module.
Use BGA repair equipment.



2.10 ASIC TJATTE 2

N5010

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

Remove the shield can lid.

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

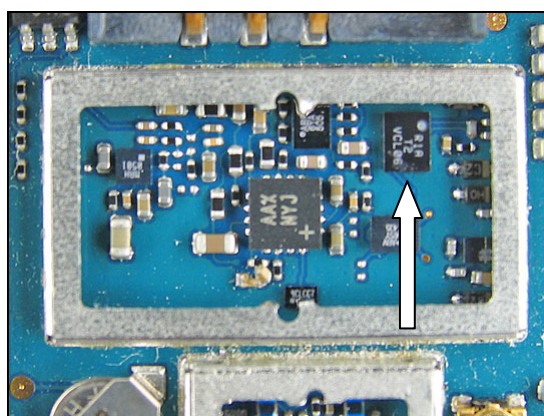
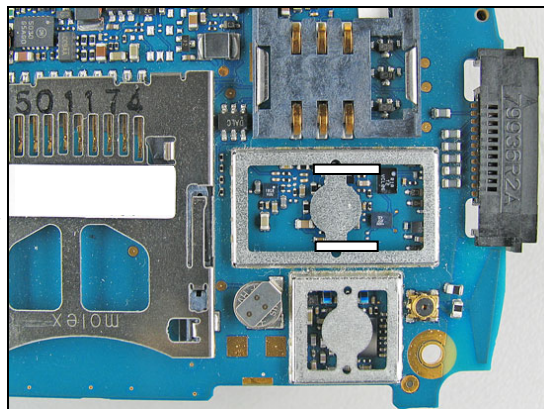
This pick up area doesn't have to be replaced.

Replace the ASIC Tjatte.

Use BGA repair equipment.

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

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



2.11 Stereo headphone Amplifier

N5500

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

Remove the shield can lid.

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

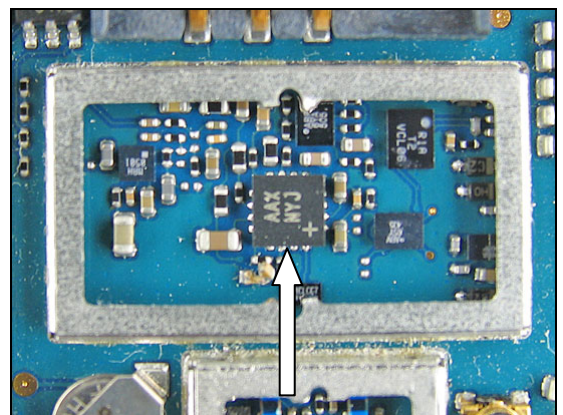
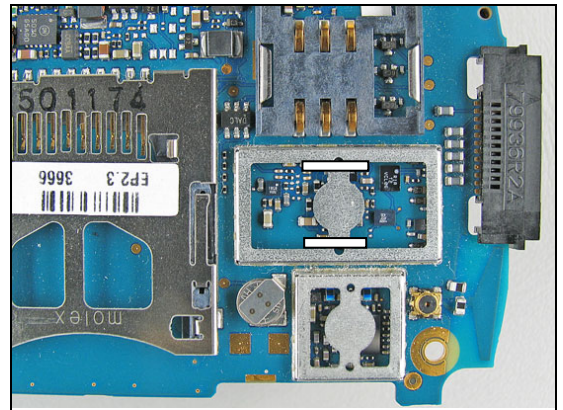
This pick up area doesn't have to be replaced.

Replace the Stereo headphone Amplifier.

Use BGA repair equipment.

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

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



2.12 WLAN MODULE

N6000

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

Remove the shield can lid.

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

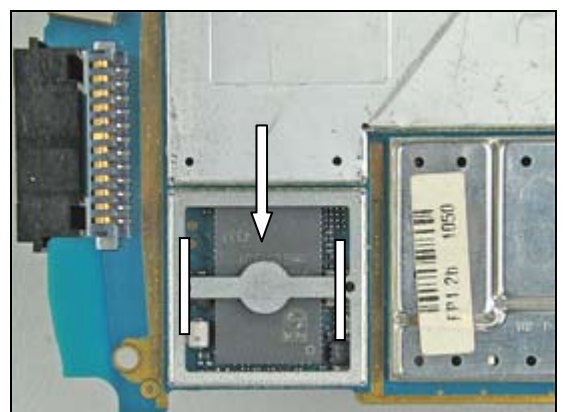
This pick up area doesn't have to be replaced.

Replace Wlan 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.



2.13 1W OPAMP

N5505

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

Remove the shield can lid.

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

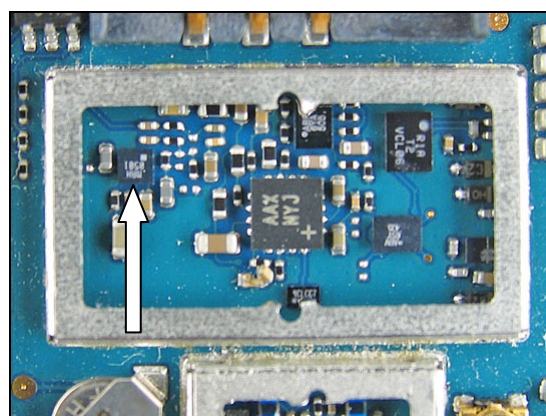
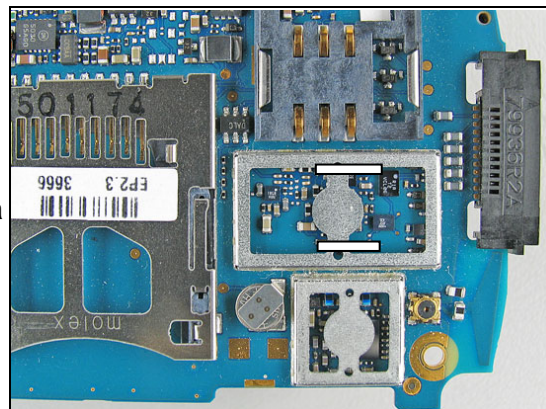
This pick up area doesn't have to be replaced.

Replace the 1W OPAMP.

Use BGA repair equipment.

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

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



2.14 FM Stereo Chip

N5502

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

Remove the shield can lid.

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

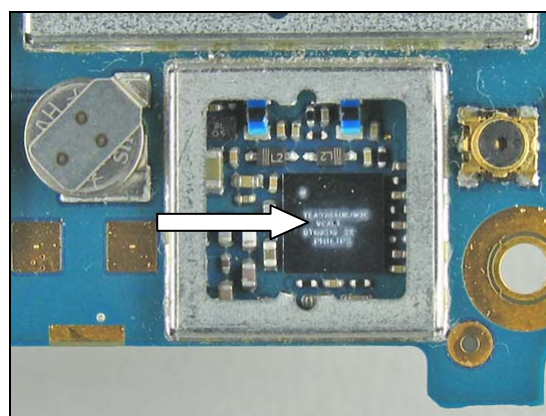
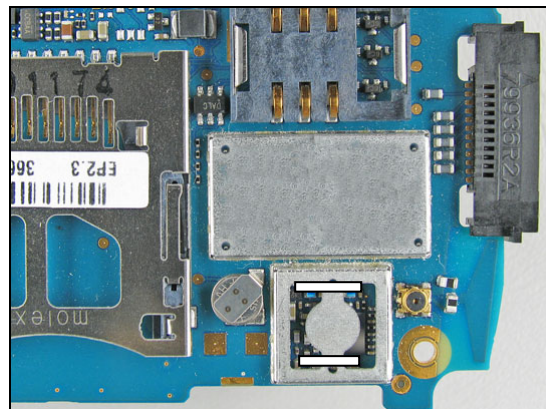
This pick up area doesn't have to be replaced.

Replace FM stereo chip 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.

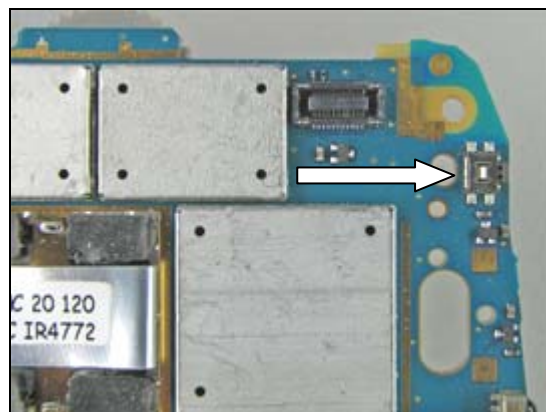


2.15 Side push switch

S2820

Replace Side push switch.

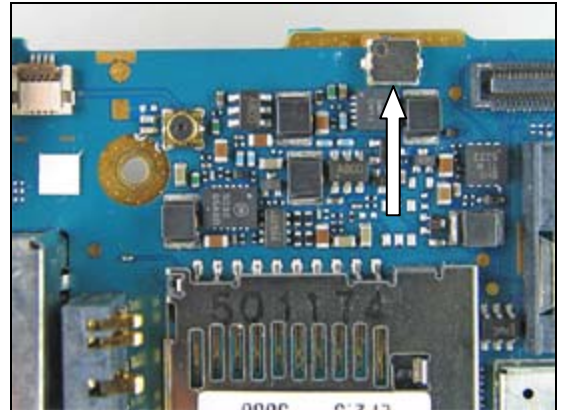
Use hot air soldering equipment.



2.16 Side switch key lock right

S2821

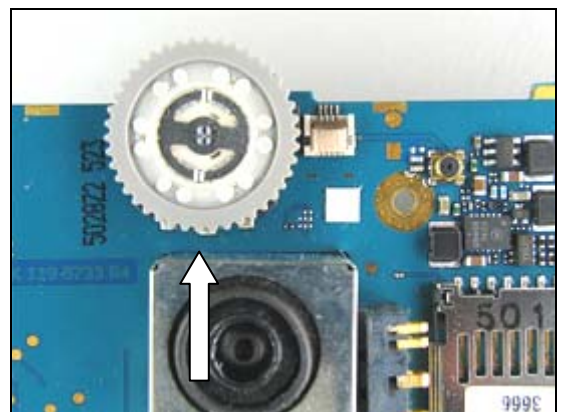
Replace Side switch key.
Use a soldering iron.



2.17 Jog Dial

S2822

Replace Jog dial.
Use soldering iron equipment.



2.18 Balun TX Low band

W1300

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

Remove the shield can lid.

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

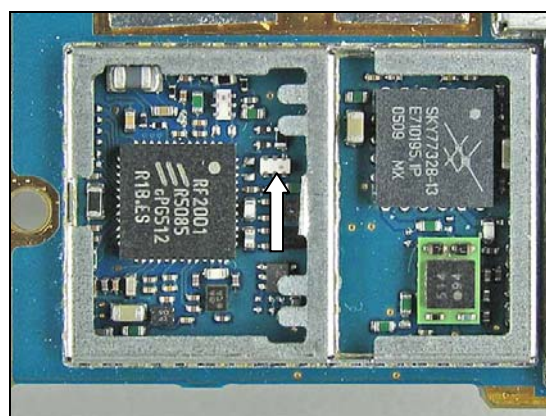
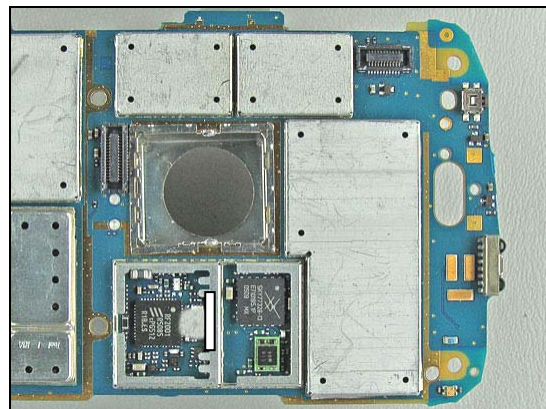
This pick up area doesn't have to be replaced.

Replace Balun low band 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.



2.19 Balun TX High band

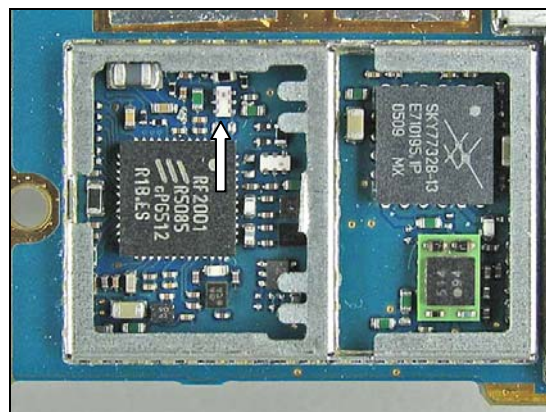
W1301

Replace Balun high band module.

Use BGA repair equipment.

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

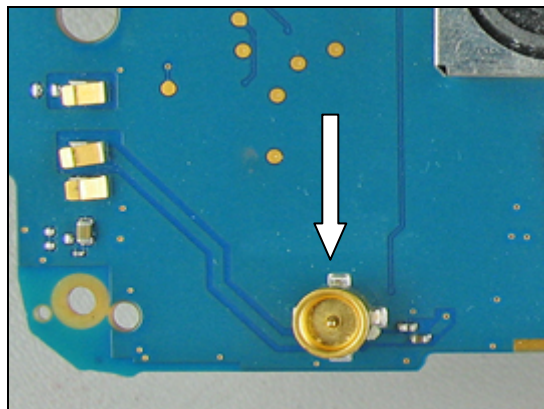
Press on all sides of the lid until you hear a "click" sound.



2.20 Conn/Rf/External

X1001

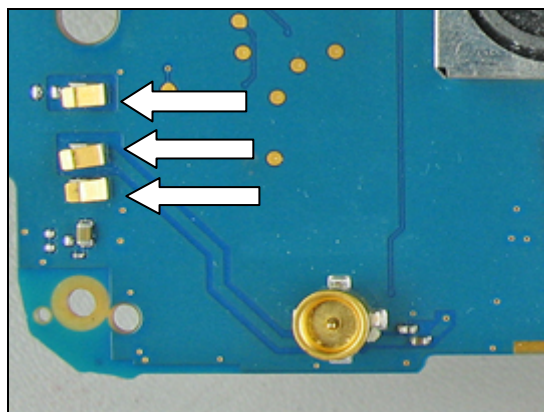
Replace the RF/External connector.
Use BGA repair equipment.



2.21 Connector Antenna

X1010-12

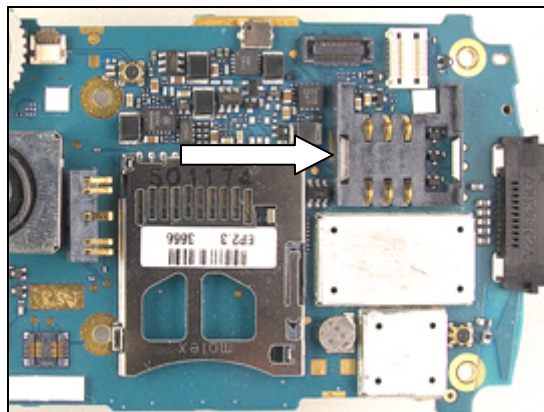
Replace the Antenna connectors.
Use soldering iron or hot air repair equipment.



2.22 Sim reader

X2100

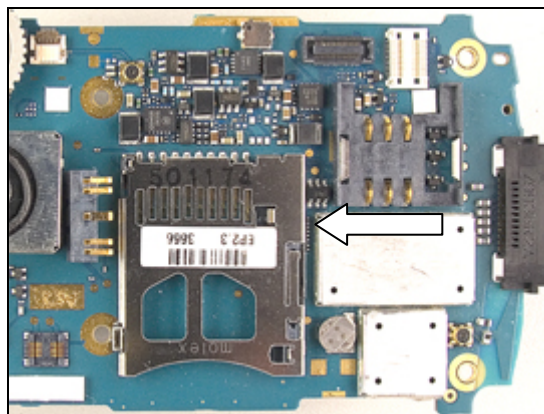
Replace the Sim reader connector.
Use BGA repair equipment.



2.23 MS Duo connector

X2580

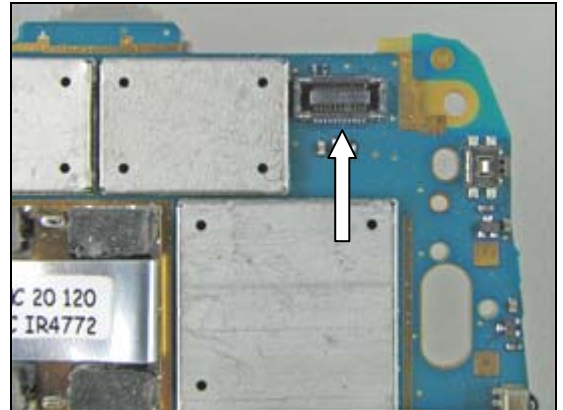
Replace the MS Duo connector.
Use BGA repair equipment.



2.24 BtB Connector Video camera

X2741

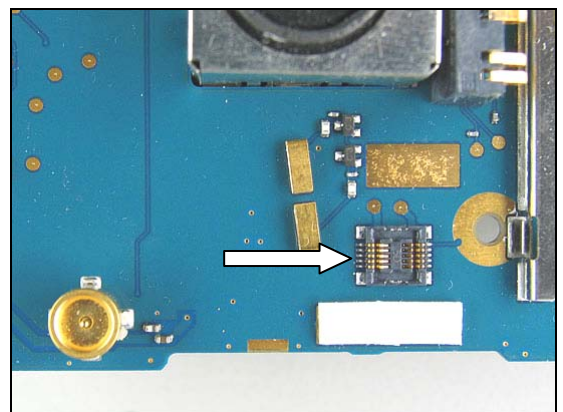
Replace the Video camera connector.
Use BGA repair equipment.



2.25 Connector Flash flex

X2742

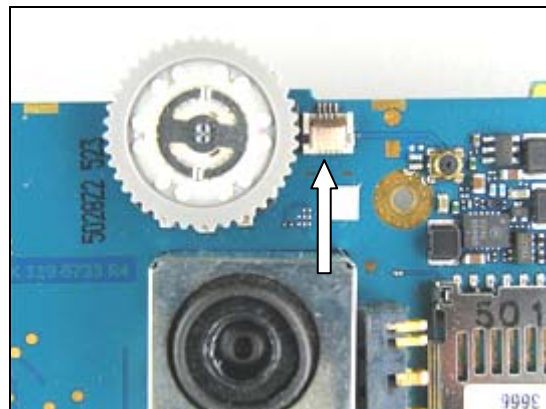
Replace the Flash flex connector.
Use BGA repair equipment.



2.26 Zif Connector

X2743

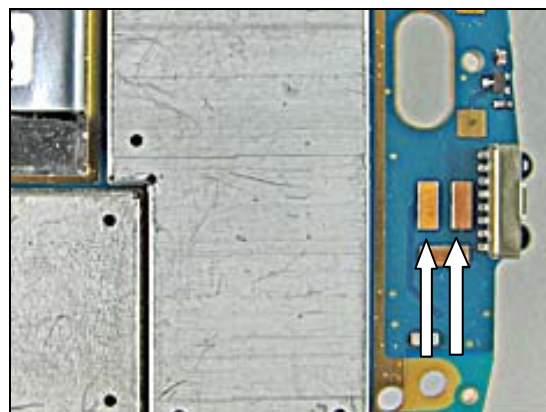
Replace the Zif connector.
Use soldering iron equipment.



2.27 Battery contact pad

X2821-2

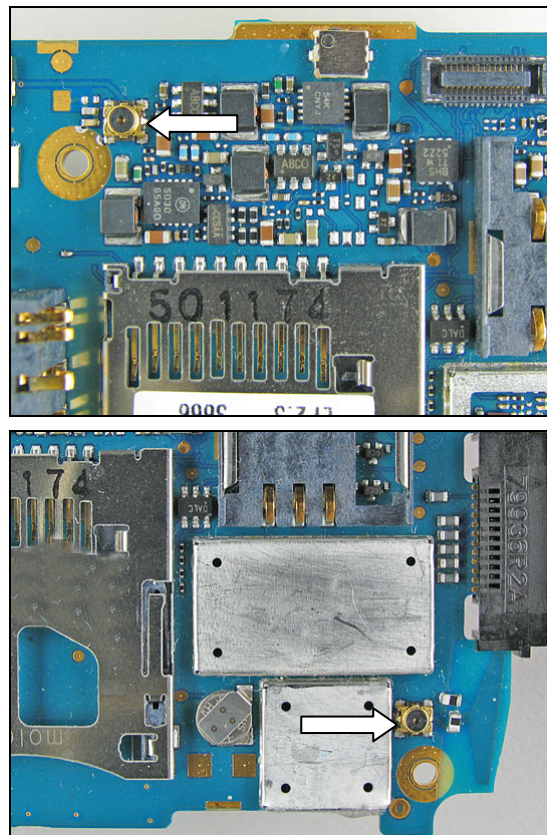
Replace battery contact pad.
Use hot air soldering equipment.



2.28 Mechanical antenna switch

X3001, X6000

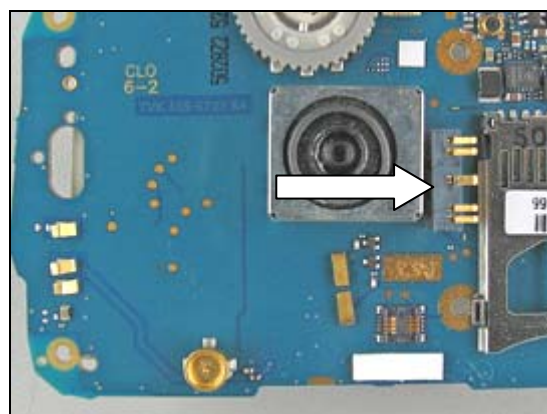
Replace the Mechanical antenna switches.
Use a soldering iron.



2.29 Battery connector

X4000

Replace the battery connector.
Use BGA repair equipment.



2.30 ESD protection diode

N2662

Remove the shield can lid.

Cut the shield fence according to the white line with a cutting plier.

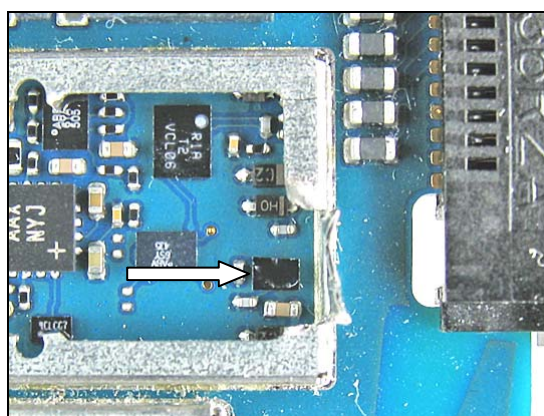
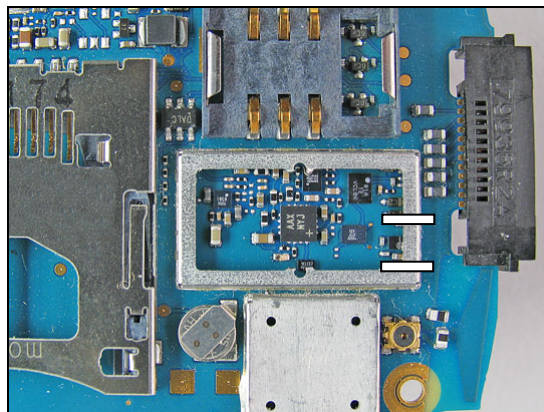
Bend carefully the shield fence with a shield fence plier.

Replace ESD diode.

Use BGA repair equipment.

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

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

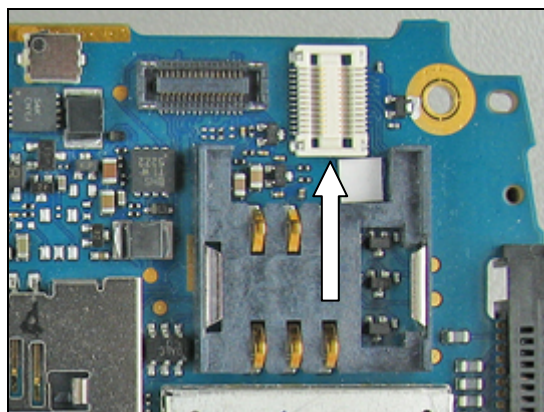


2.31 Conn/Recpt/B-B/24 pin

X2823

Replace the battery connector.

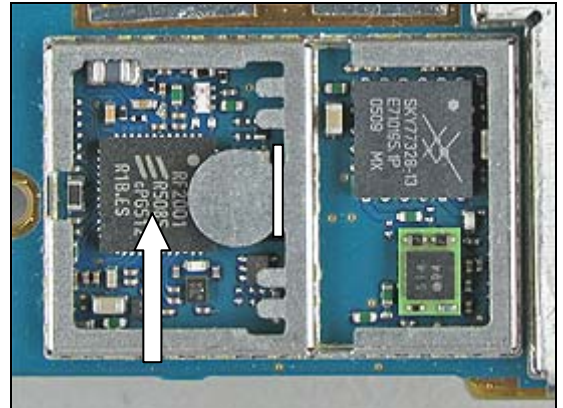
Use BGA repair equipment.



2.32 ASIC Tilde 6x6

N1100

Replace the ASIC Tilde
 Use BGA repair equipment.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.

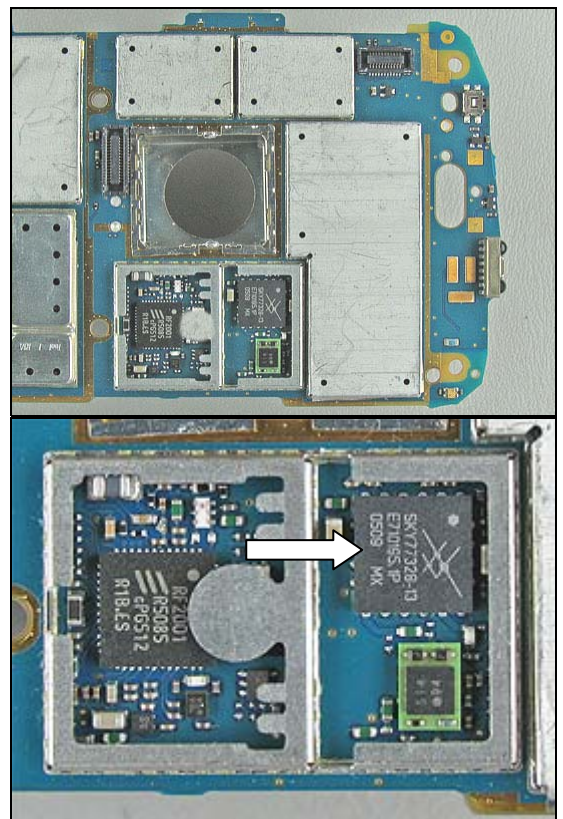


2.33 Quad Band GSM PA

N1300

Remove the shield can lid.

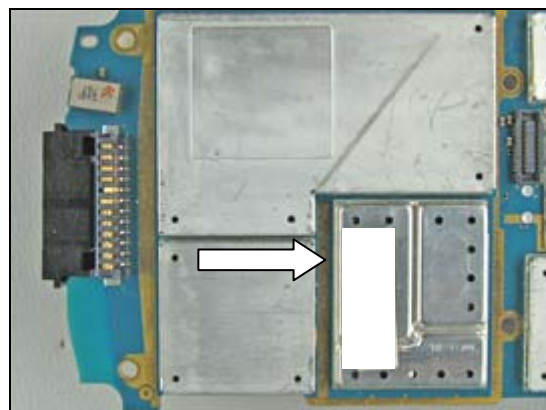
Replace the Quad band GSM PA
 Use BGA repair equipment.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.



2.34 Ray/UMTS module

N1400

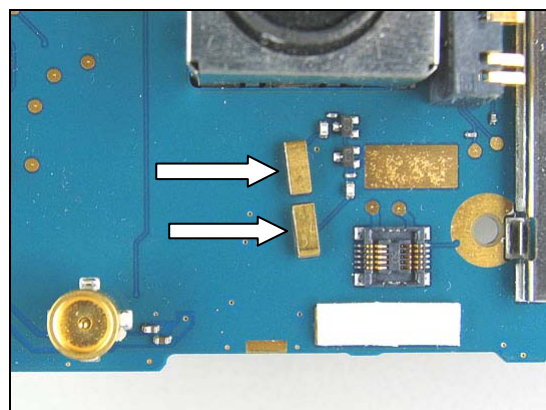
Replace the Ray/UMTS module.
Use BGA repair equipment.



2.35 Connector Loudspeaker

X5500-1

Replace the loudspeaker connectors.
Use hot air soldering equipment.



2.36 LDO

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

Remove the shield can lid.

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

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

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

Bend carefully the shield fence with a shield fence plier

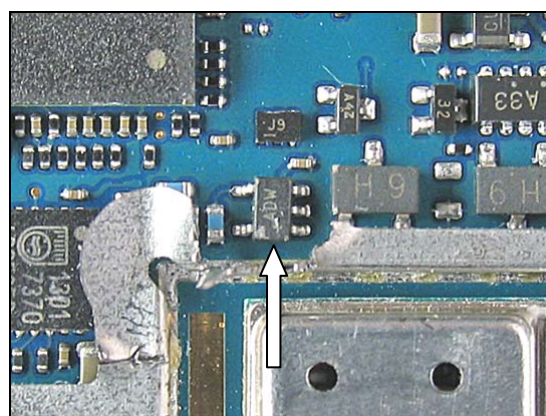
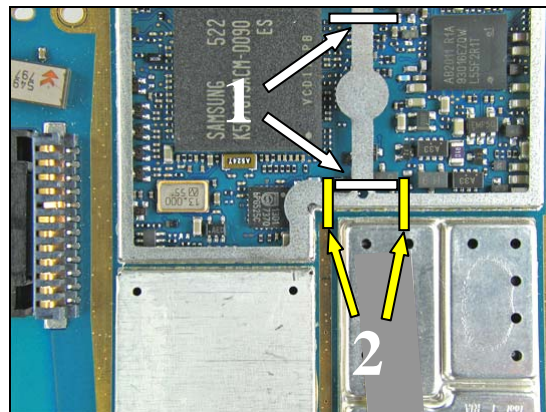
Replace LDO.

Use BGA repair equipment.

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

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

N2663

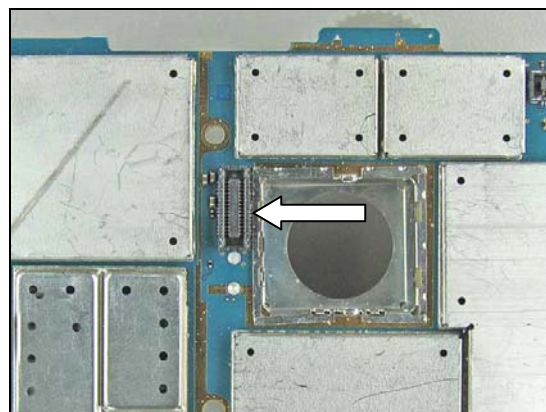


2.37 30 Pin BtB connector

X2740

Replace the 30 Pin BtB connector.

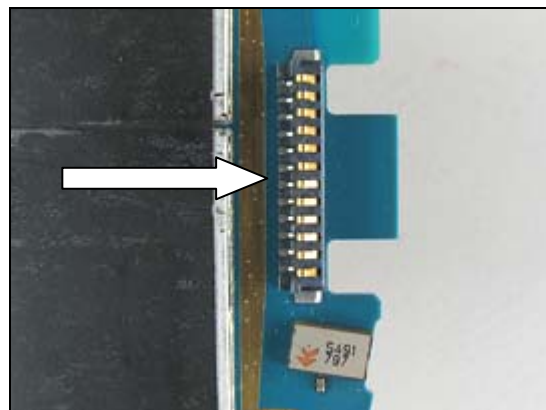
Use BGA repair equipment.



2.38 12 PIN Connector

X2830

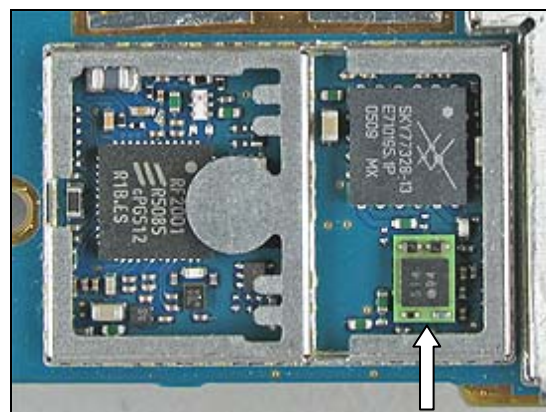
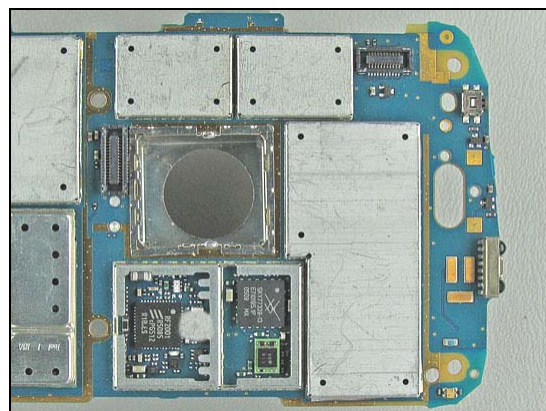
Replace the 12 pins connector.
Use BGA repair equipment.



2.39 RF SW/Dual Mode/Quad band

N1000

Replace the Dual mode/quad band 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.



3 Revision history

| Rev. | Date | Changes / Comments |
|------|------------|--------------------|
| A | 2006-07-20 | Initial release |