



Working Instruction, Electrical

Applicable for M600i

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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*

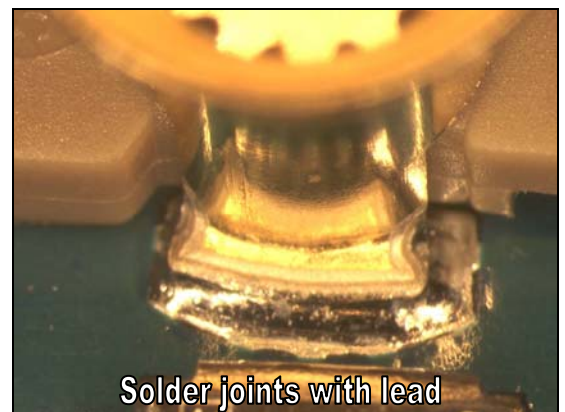
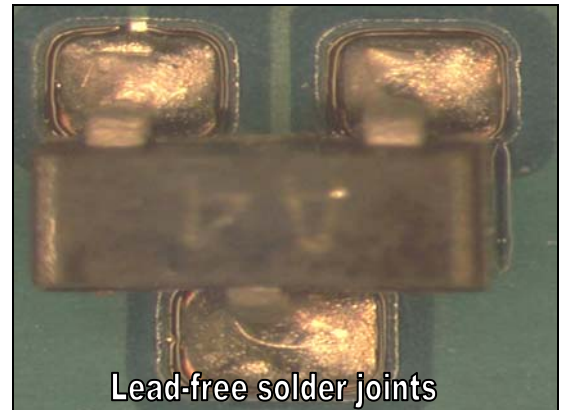
LFS (lead-free solder paste) characteristics:

- 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.





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.

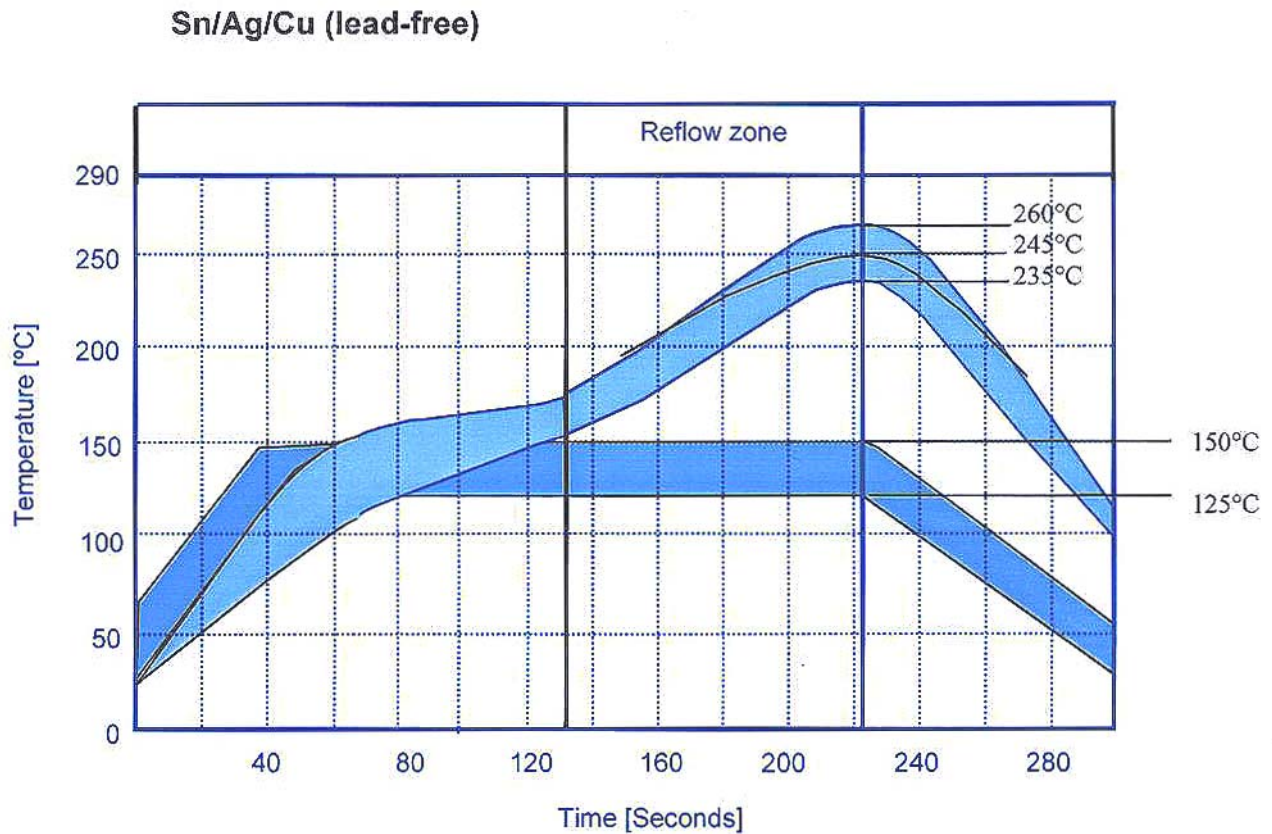
Make sure the nozzle does not affect any nearby placed components.

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



Preheat zone

Ramp rate	< 4°C/sec
Ramp rate	< 6°C/sec
Time above liquidus	60-150 sec
Minimum temperature	235°C
Maximum temperature	245°C or 260°C* for 10 sec
Bottom heat temperature	125°C-150°C
Total time	Approx. 4-7min

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

1.4 REWORK BGA

If rework is needed, then the packages can be removed or reworked using a “BGA” repair station.

The rework process involves the following steps:

- A) Component baking
 - 1) Component Removal
 - 2) Site Cleaning
 - 3) Solder Paste Application, (if component not pre bumped)
 - 4) Component Placement, and
 - 5) Component Attachment.

A) The first step describes pre-baking, how to handle the component before rework according to components are moisture-sensitive and are rated at various levels (MSL) see part list Electrical.

1) Component removal

The first step in removal of component is the reflow of solder joints. It is recommended to preheat the PCB to 150°C using a bottom heater. Heating of the top side of the component should be done using hot air while a special nozzle can be used for this purpose. Excessive airflow should also be avoided since this may cause shifting of adjacent components. Once the joints have reflowed, the vacuum lift-off can start. Because of their small size the vacuum pressure should be kept below 15 inch of Hg. This will prevent damage to the PCB solderland (“pad lift”). The temperature of the package should not exceed 260 °C during this rework process since damage can occur to either the package or the PCB. The temperature profile depends on the customer application.

2) Site Redress

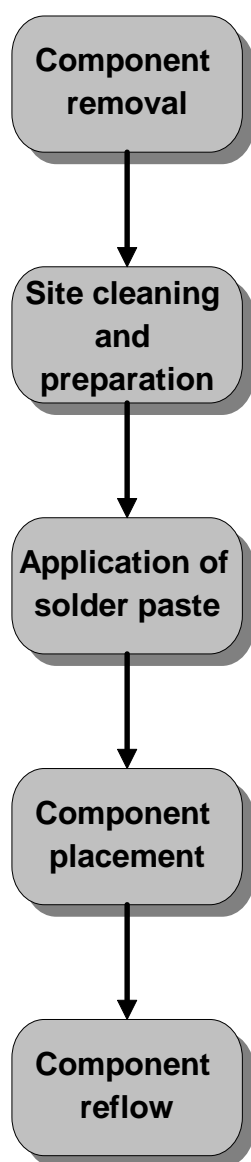
After the component is removed, the PCB solderland needs to be cleaned properly. It is best to use a combination of a blade-style conductive tool and desoldering braid. The width of the blade should be matched to the maximum width of the footprint and the blade temperature should be low enough not to cause any damage to the circuit board. Flux residues on the PCB can be removed using IsoPropyl Alcohol (IPA).

3) Solder Paste Application

It is recommended to re-apply solder by dispensing or stencil printing. The amount of solder applied on the terminals should be in the order of 0.08 mg. In case of dispensing, a gage 27 (0.2 mm opening) needle (e.g. white EFD needle) should be used with 0.3s-0.4s shot at 4 bar. For stencil printing a mini stencil of 0.1 mm thickness can be used if application allows room for it.

4) A BGA repair station has a vacuum pick up tool and usually some component alignment possibilities. A split-beam optical system should be used to align the component on the solder lands. This will form an image of leads overlaid on the mating footprint and aid in proper alignment. The placement machine should have the capability of allowing fine adjustments in X, Y, and rotational axes. Manual placement is not recommended, although the package allows 0.1-0.15 mm misplacement.

5) For re-soldering of the newly placed component the same profile of bottom and top heating should be applied as described in the step 1). The moisture sensitivity levels are determined following JEDEC JSTD-020C. The datasheet of the device states the actual MSL which might deviate from this guideline.

PROCESS FLOW

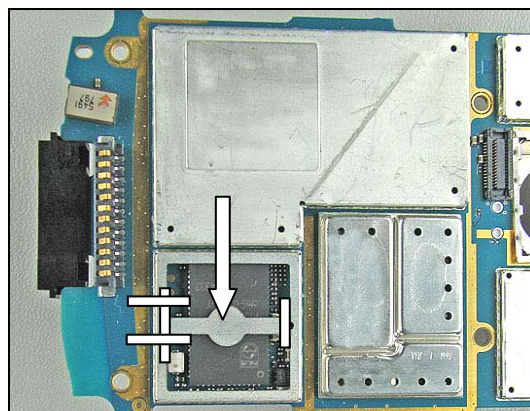
1.5 Shield fence instruction

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 1125 37 to bend the fence.

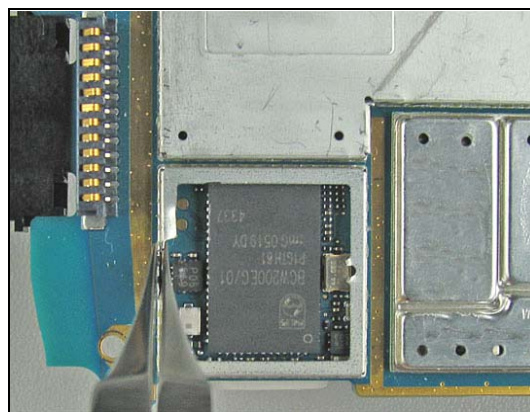


MAKE SURE THAT CUTTING PLIERS IS SHARP-EDGED TO PREVENT DAMAGING THE SHIELD CAN FENCE.

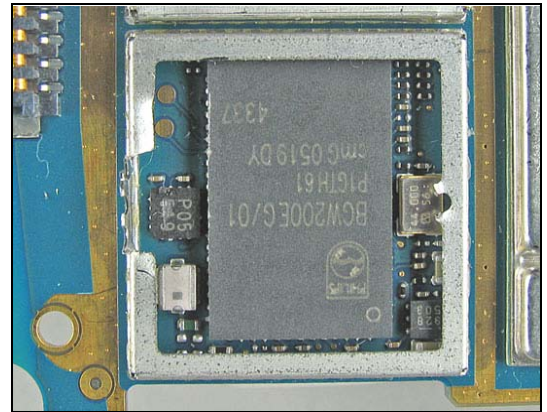
Remove the shield can lid, use a dentist hook.
Remove the pick up area according to the white lines with a cutting plier.
This pick up area doesn't have to be replaced.



Bend carefully the shield fence with a shield fence plier.
Replace the components.
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.



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.



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***

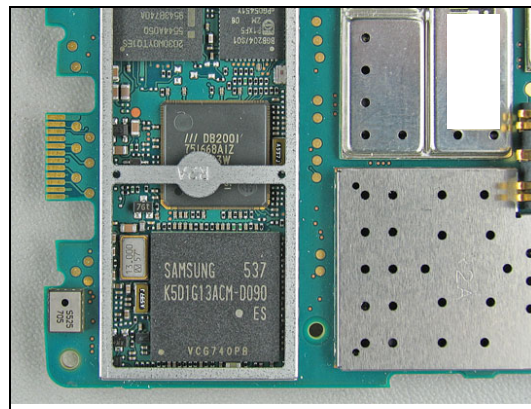
MECHANICAL INSTRUCTIONS

For all the following part replacements, disassemble and assemble the phone as described in *Working Instruction 3/00021-1/FEA 209 544/101*.

2.1 2-INP AND GATE

D2510

Remove the shield can lid, use a dentist hook.

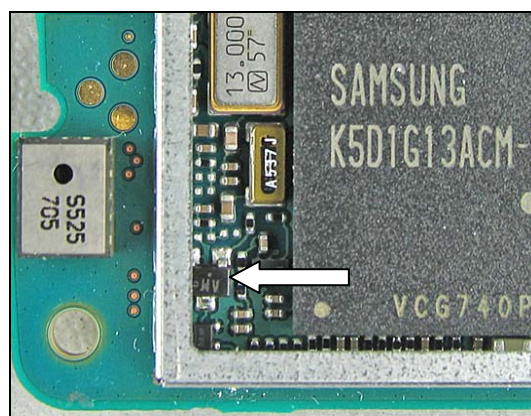


Replace the 2-INP AND GATE.

Use soldering iron.

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

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



2.2 USB OnTheGo Transciever

D2663

FOLLOW THE SHIELD FENCE INSTRUCTION.

Remove the shield can lid, use a dentist hook.

Cut the fence according to the white lines.

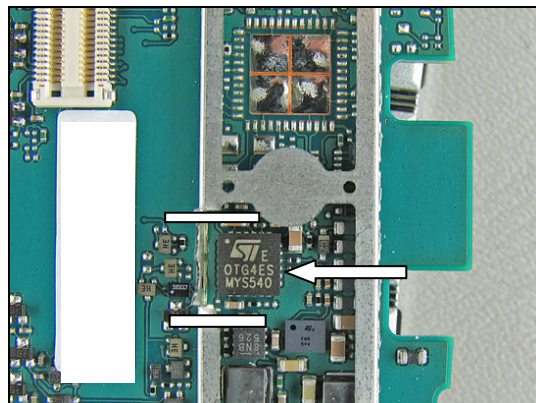
Follow the fence instruction

Replace the USB 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.

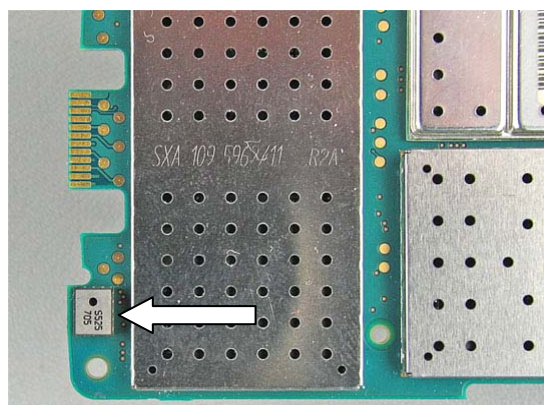


2.3 Microphone

D5001

Replace the microphone.

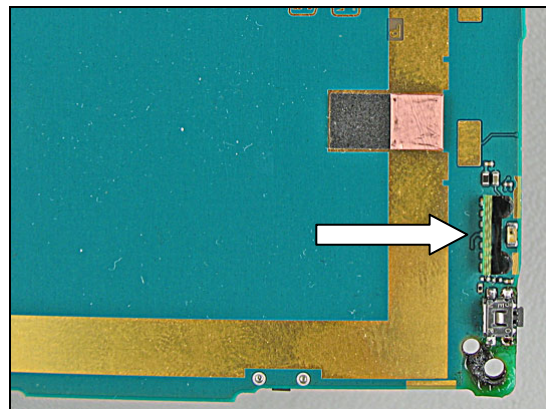
Use BGA repair equipment.



2.4 Irda Module

H2662

Replace the Irda module.
Use hot air equipment or soldering iron.

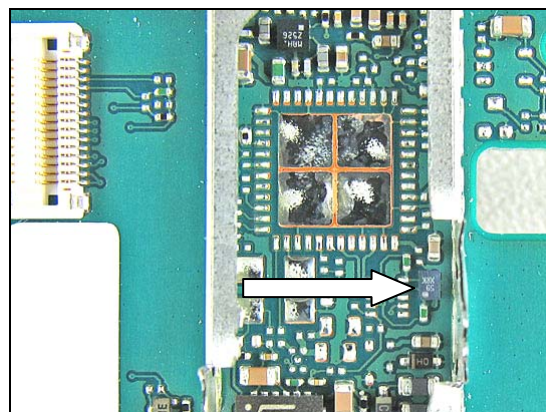


2.5 ESD/EMI protection

N2662

FOLLOW THE SHIELD FENCE INSTRUCTION.

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



2.6 Bluetooth module

N3001

FOLLOW THE SHIELD FENCE INSTRUCTION.

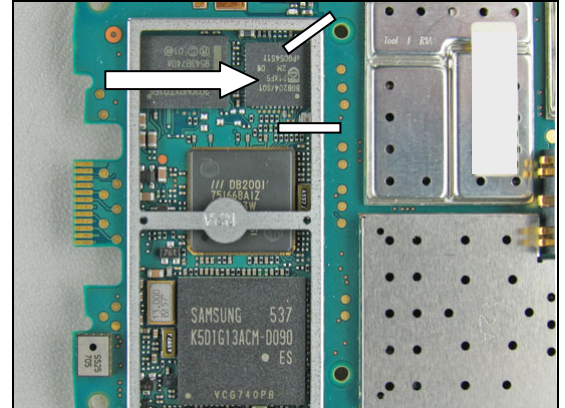
Remove the shield can lid, use a dentist hook.

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.



Rework Detail instructions.

2.7 Step down DC/DC converter

N4021, N4060

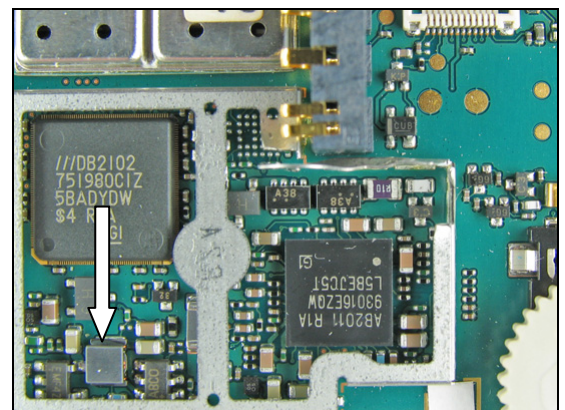
Remove the shield can lid, use a dentist hook.

Replace the Step down DC/DC converter.

Use BGA repair equipment.

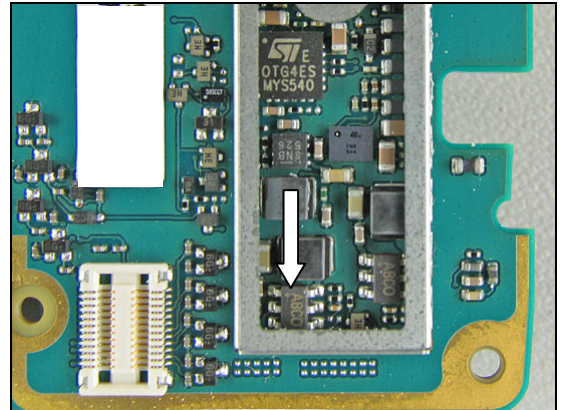
Put back a **new** shield can lid.

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



Continued

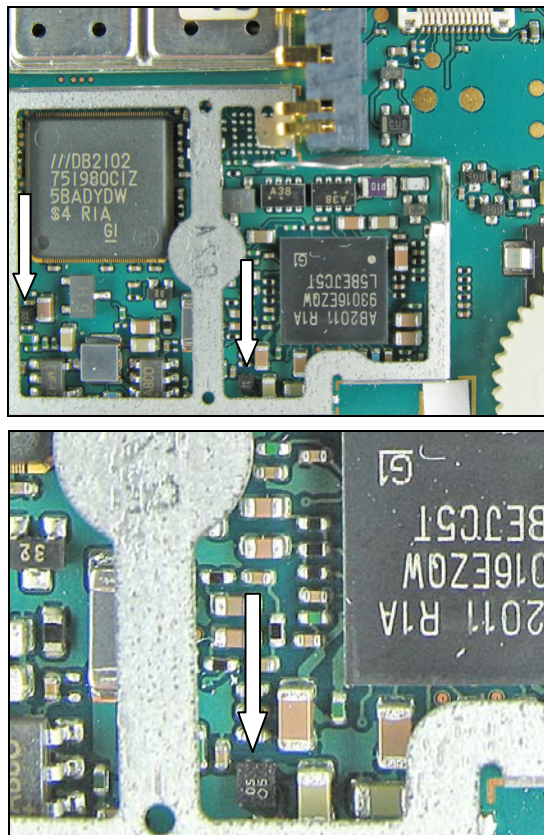
Remove the shield can lid, use a dentist hook.
Replace the Step down DC/DC converter.
Use BGA repair equipment.
Put back a **new** shield can lid.
Press on all sides of the lid until you hear a “click” sound.



2.8 Line regulator

N4030, N4110

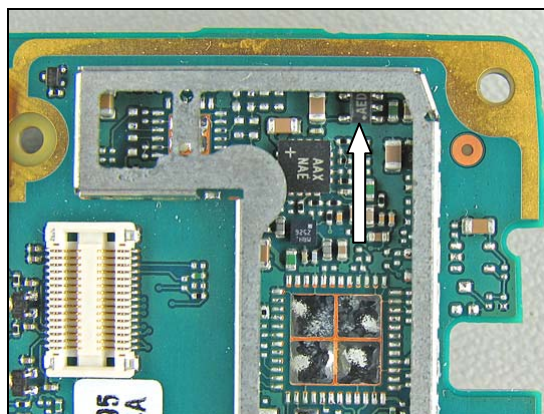
Replace the Line regulator.
 Use hot air equipment or a soldering iron.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.



2.9 LDO Linear regulator

N4050

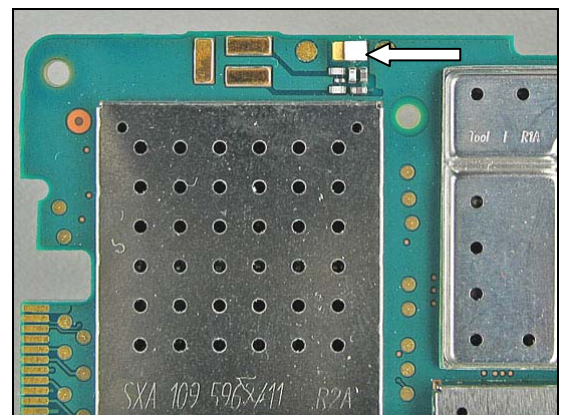
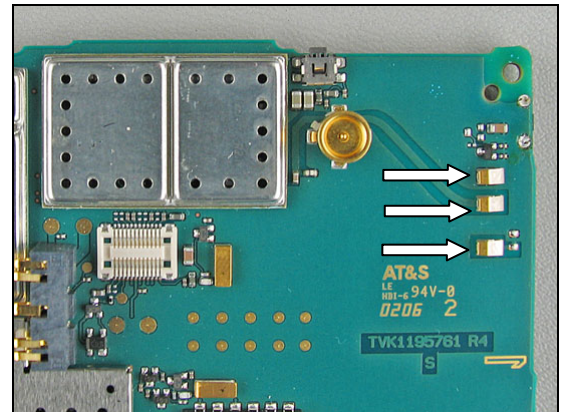
Replace the LDO regulator.
 Use hot air equipment or a soldering iron.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.



2.10 Shield Finger

X1010, X1011, X1012, X3002

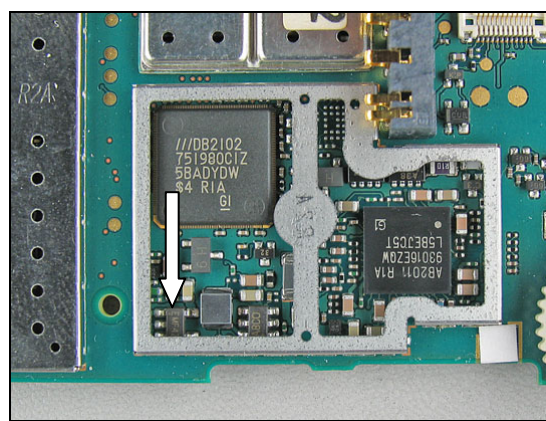
Replace Shield fingers.
Use soldering iron or hot air equipment.



2.11 LDO Voltage regulator

Remove the shield can lid, use a dentist hook.
 Replace LDO Voltage regulator.
 Use soldering iron.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.

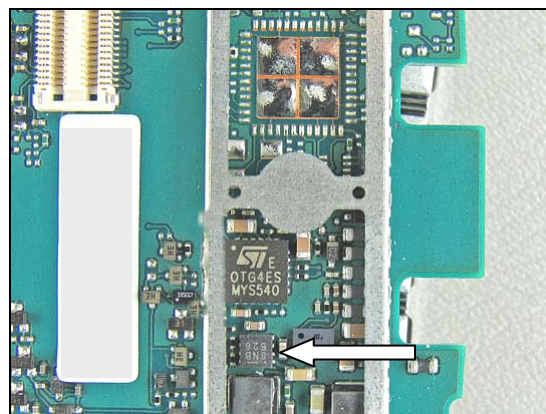
N4055



2.12 Led driver

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

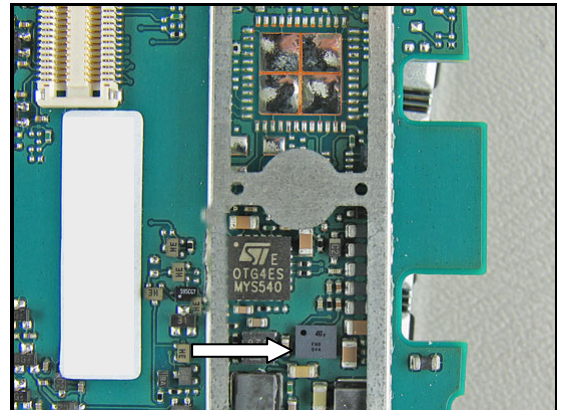
N4070



2.13 ASIC Tjatte 2

N5010

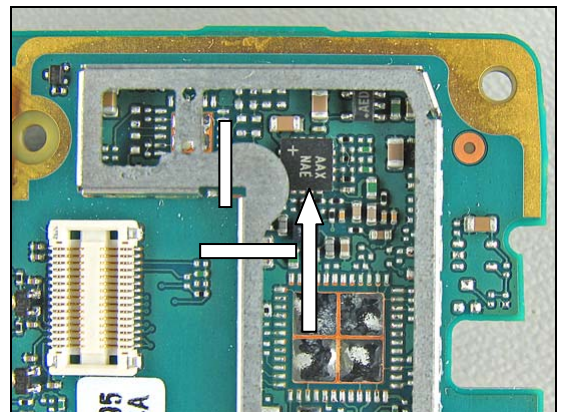
Remove the shield can lid, use a dentist hook.
 Replace the ASIC Tjatte 2.
 Use BGA repair equipment.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.



2.14 Stereo Headphone Amplifier

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

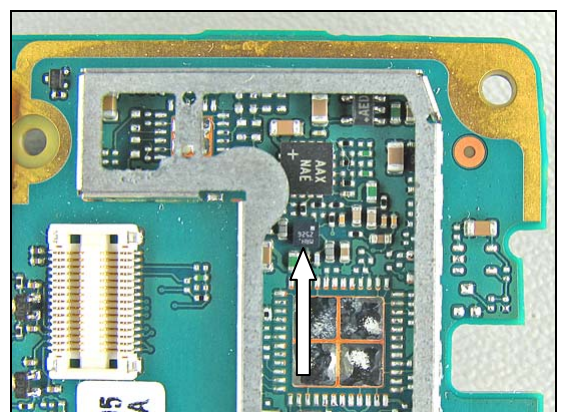
N5500



2.15 1W OPAMP

Remove the shield can lid, use a dentist hook.
 Replace the 1W OPAMP component.
 Use BGA repair equipment.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.

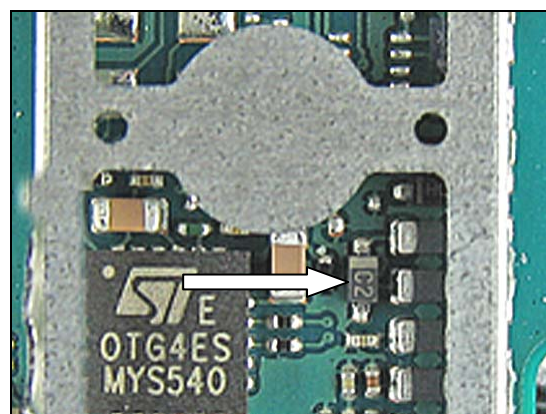
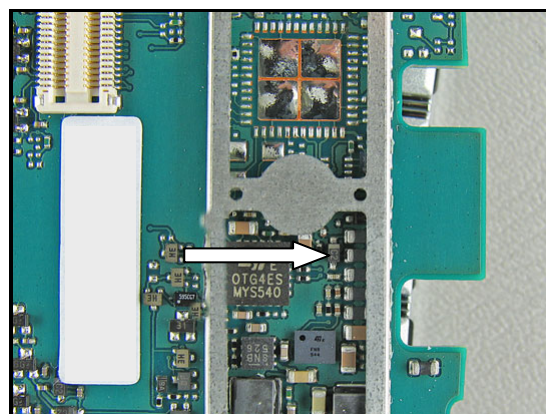
N5505



2.16 ESD Protector

V2672

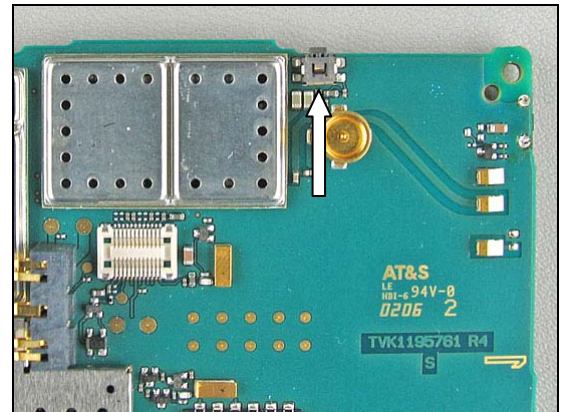
Remove the shield can lid, use a dentist hook.
 Replace the ESD protector.
 Use soldering iron.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.



2.17 Side push key switch

S2820, S2821

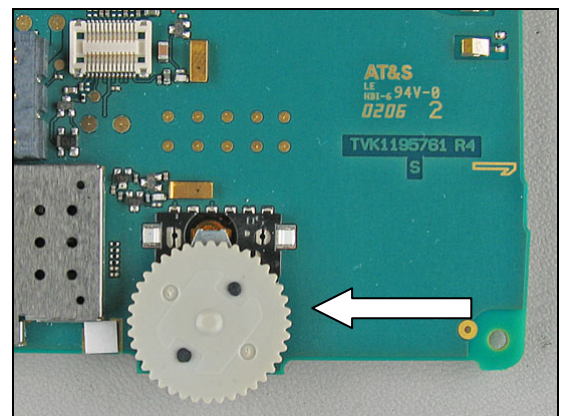
Replace the Side push switch.
Use soldering iron or hot air repair equipment.



2.18 Jog Dial

S2823

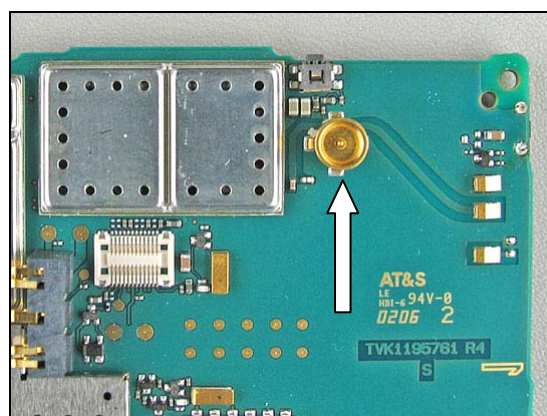
Replace the Jog Dial.
Use soldering iron.
Use a desoldering braid to remove the lead.



2.19 External Antenna Connector

X1001

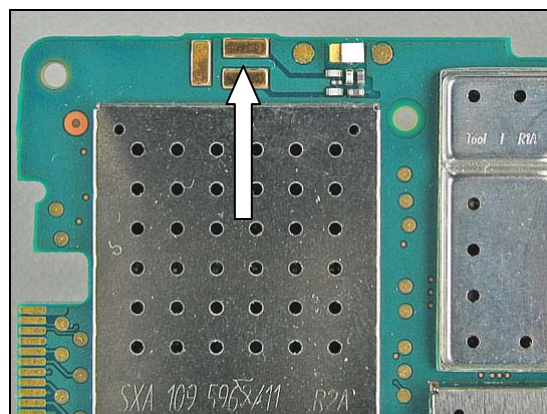
Replace the External Antenna connector.
Use BGA repair equipment.



2.20 Battery contact pad

X2821

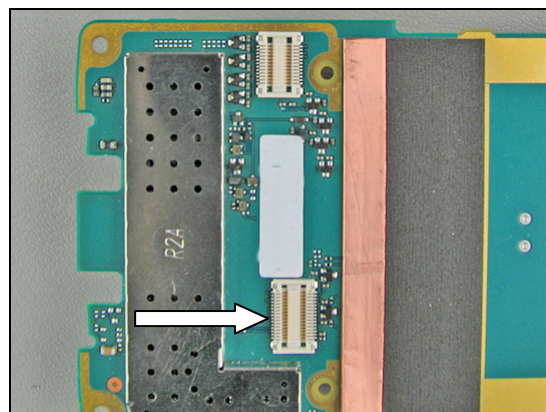
Replace the Battery contact pad.
Use hot air equipment.



2.21 LCD 30Pins B-B

X2824

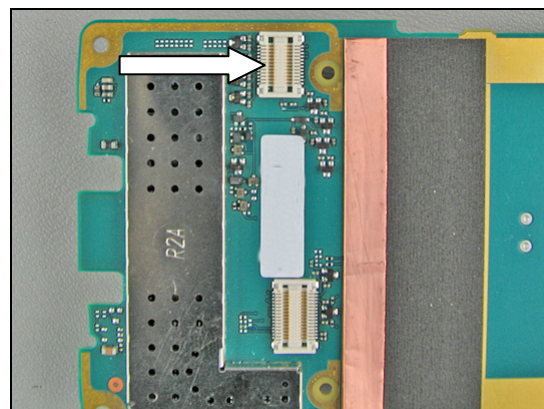
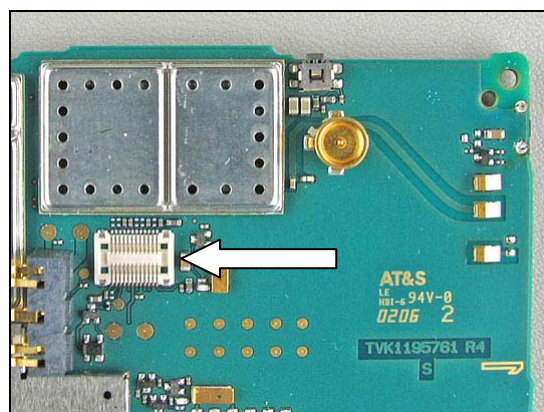
Replace the B-B 30 24pin connector.
Use soldering iron.



2.22 Connector B-B 24 Pin

X2823, X5502

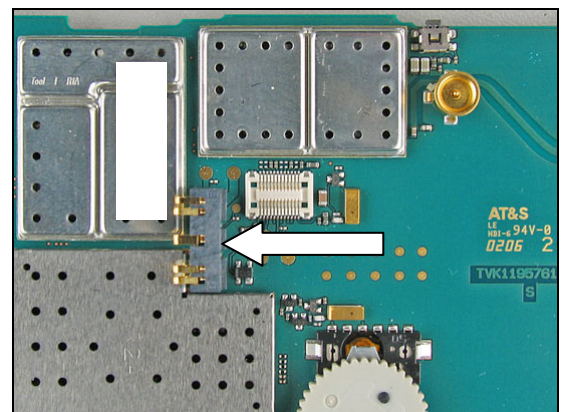
Replace the B-B 24pin connector.
Use soldering iron equipment.



2.23 Battery connector

Replace the Battery connector.
Use BGA repair equipment.

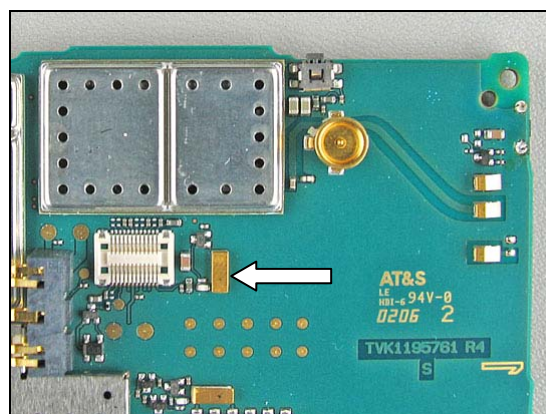
X4000



2.24 Spring clip

Replace the spring clip.
Use hot air repair equipment.

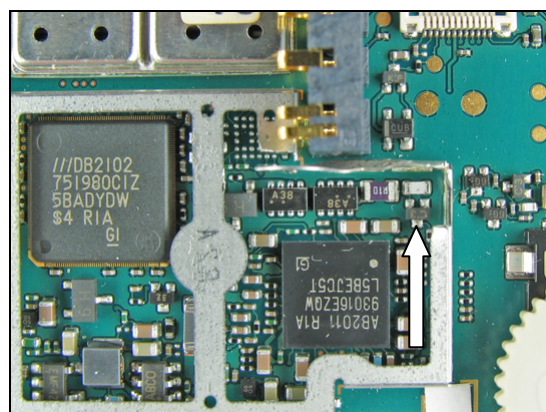
X5500



2.25 Diode 40V

Remove the shield can lid, use a dentist hook.
Replace the diode.
Use hot air equipment or a soldering iron.
Put back a **new** shield can lid.
Press on all sides of the lid until you hear a “click” sound.

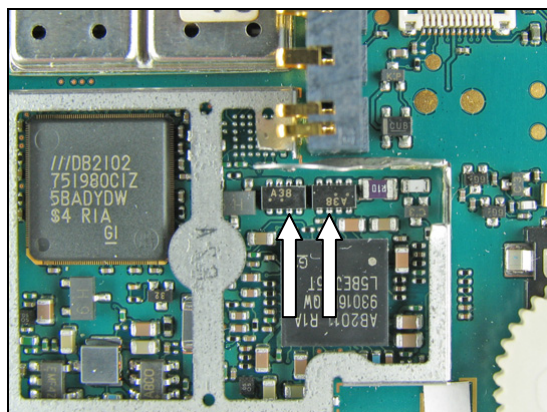
V4001



2.26 P-Channel Mosfet

Replace the P-Channel Mosfet components.
 Use hot air equipment or a soldering iron.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.

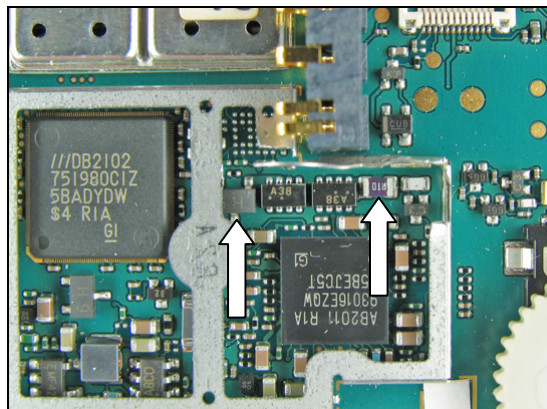
V4002, V4005



2.27 Diode Shottky

Replace the Shottky diodes.
 Use hot air equipment or a soldering iron.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.

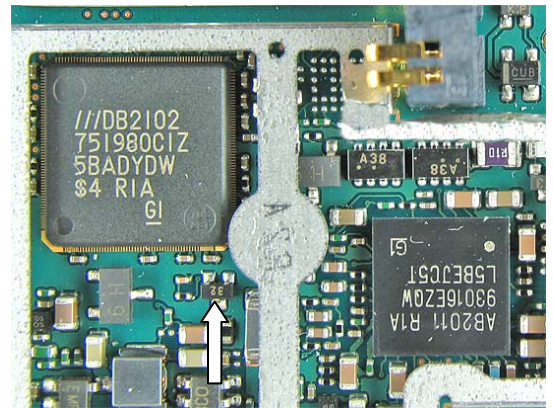
V4004, V4006



2.28 NPN DIG

V4003

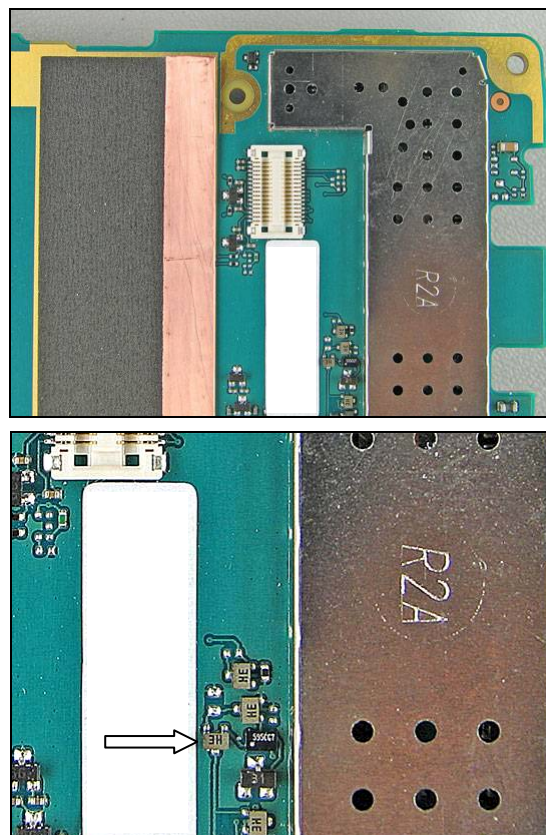
Remove the shield can lid, use a dentist hook.
Replace the NPN DIG component.
Use hot air equipment or a soldering iron.
Put back a **new** shield can lid.
Press on all sides of the lid until you hear a “click” sound.



2.29 Transistor NPN

V4073

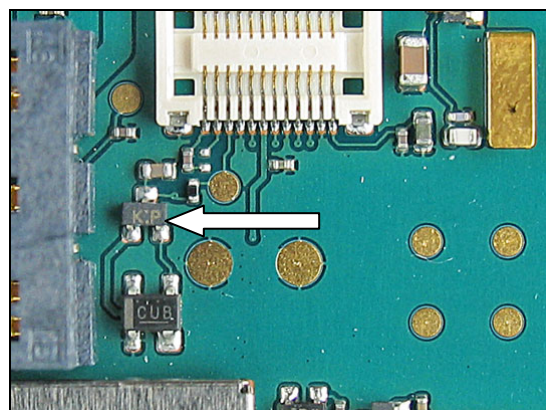
Replace the Transistor NPN.
Use hot air soldering equipment or soldering iron.



2.30 NFET SS 20V

V4090

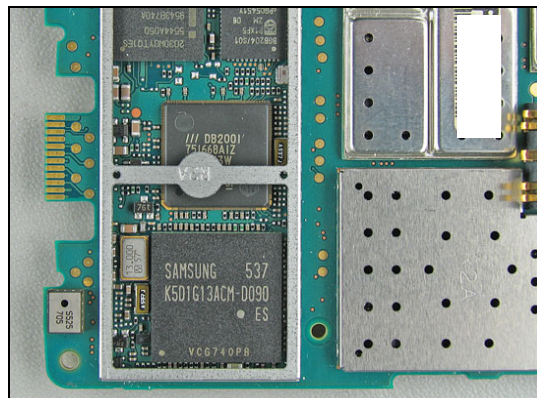
Replace the loudspeaker connectors.
Use hot air soldering equipment or soldering iron.



2.31 Crystal 32768HZ

B2000, B2500

Remove the shield can lid, use a dentist hook.

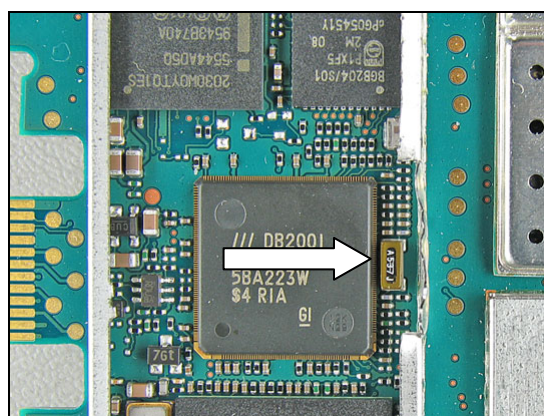


Replace the Crystal 32768HZ.

Use hot air equipment.

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

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



2.32 Crystal 13MHZ

B2510

Remove the shield can lid, use a dentist hook.

Replace the Crystal 13MHZ.

Use BGA repair equipment.

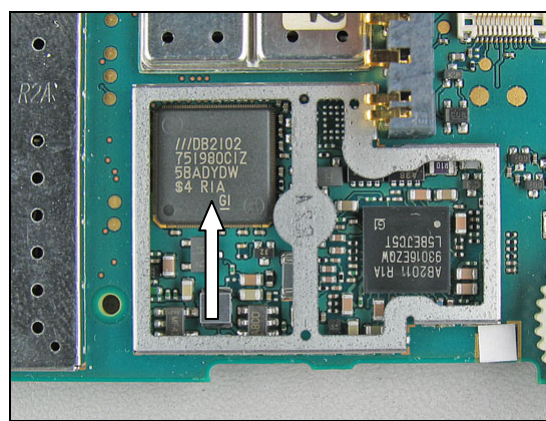
Put back a **new** shield can lid.

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



2.33 ASIC Wanda

Remove shield can lid.
Replace the ASIC Wanda module.
Use BGA repair equipment.

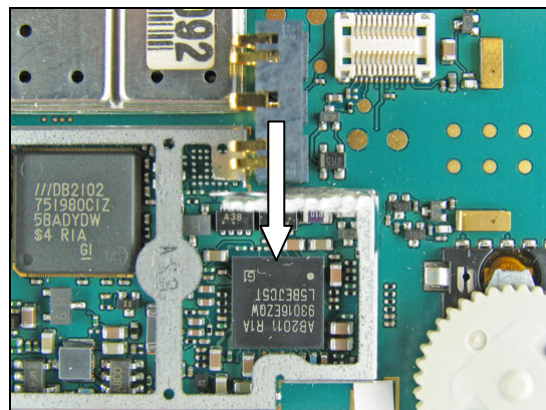
D2005

2.34 ASIC Vincenne2

N2000

FOLLOW THE SHIELD FENCE INSTRUCTION.

Remove the shield can lid, use a dentist hook.
 Cut the fence according to the white lines.
 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.

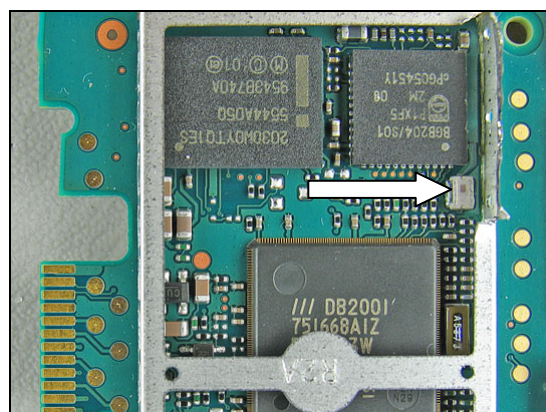


2.35 Bandpass filter 2450 MHZ

FOLLOW THE SHIELD FENCE INSTRUCTION.

Remove the shieldcan lid.
 Cut the fence according to the white lines.
 Replace the Bandpass filter.
 Use hot air equipment or a soldering iron.
 Put back a **new** shield can lid.
 Press on all sides of the lid until you hear a “click” sound.

Z3001



3 Revision history

Rev.	Date	Changes / Comments
A	2006-05-24	1 st preliminary version
B	2006-05-31	Added Rework BGA info,, Removed N4057 and N4071