



Working Instruction, Electrical

Applicable for W850 and W830

CONTENTS

1	Read this first!	2
2	Lead-free soldering	3
3	BGA equipment reflow profiles	5
3.1	General	5
3.2	Temperature measurement	5
3.3	Reflow profiles	6
3.4	REWORK BGA	7
3.5	Process Flow BGA	9
4	Shield fence instruction	10
5	Replacement of components	11
5.1	N4202 Circuit/Asic Tjatte 3	12
5.2	C2278 – W850 Only EMI Filter	12
5.3	V2221, V2204 Voltage regulator diode	13
5.4	V2303, V4101 V2500, V2510, V2511, V2305, V2505	14
5.5	V3113, V3114 ESD protection diode	15
5.6	N2300 USB filter network	15
5.7	X2305 Memory stick reader	16
5.8	X2302 Sim reader	16
5.9	X1000 External antenna connector	17
5.10	V2202, 2203 P-channel mosfet	17
5.11	D2304 USB transceiver and Uart MUX	18
5.12	N2402 – W850 Only 1-bit level translator	19
5.13	N2200 LDO 1.3V	19
5.14	N2201 LDO 1.5V	20
5.15	N2400 Level shifter	20
5.16	X2200 Battery connector	21
5.17	N2000 ASIC Vincenne 2	21
5.18	D2001 – W850 Only ASIC Wanda	22
5.19	X2505 Camera socket	22
5.20	H2300 Irda	23
5.21	X3100 Led flash Pogopin	23
5.22	X2500 Connector 100 pin BtB	24
5.23	X2501 Connector Key board 20pin BtB	24
5.24	K2500 Photo interrupter	25
5.25	V3110 Led Red side fire	25
5.26	C2217 Backup Battery	26
5.27	A1300 – W850 Only Marlin Module	26
5.28	N1100 – W830 Only Dolphin3 Module	27
5.29	D1400 Bluetooth E-STLC2500C4	28
5.30	S2500, S2502, S2503 Side push switch	29
6	Revision history	30

1 Read this first!

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***



2 Lead-free soldering

KEEP ALL CONTACT SURFACES CLEAN OF DIRT AND HAND GREASE!

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

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

This symbol indicates that the product is lead-free.



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



A lead-free work area must be set up completely separated from work areas that are used to make lead repairs.

The lead-free work area must also be clearly labeled with the lead free symbol as shown in the adjacent picture.

The items on this desk must remain lead-free.

They must be adequately labeled to make their lead-free status clearly and easily recognized.





Lead-free soldering *continued*

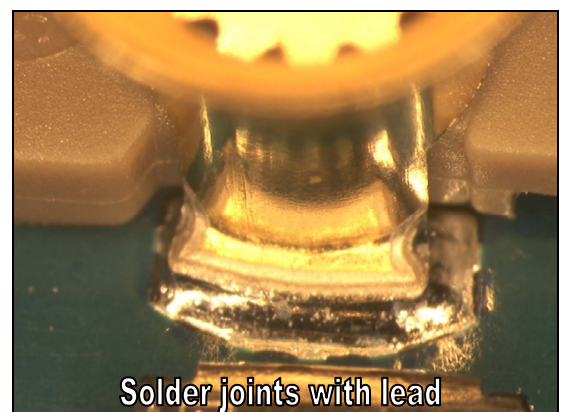
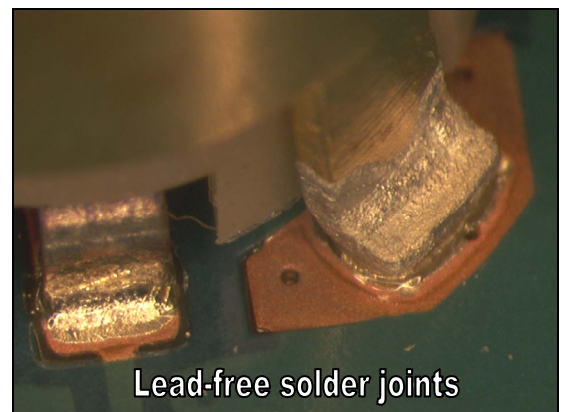
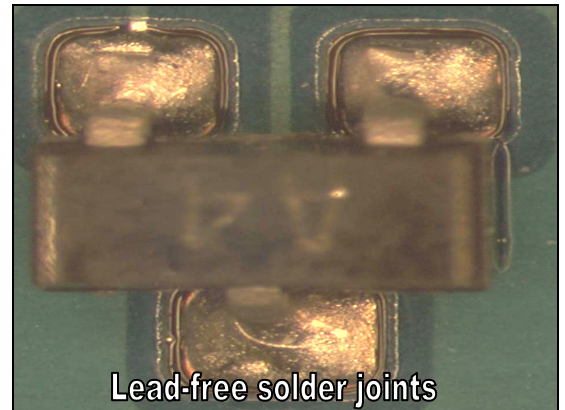
LFS (lead-free solder paste) characteristics:

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

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

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

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





3 BGA equipment reflow profiles

3.1 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

3.2 Temperature measurement

At least four probes should be used.

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

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

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

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

These values are strongly depending on the BGA replacement equipment.

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

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

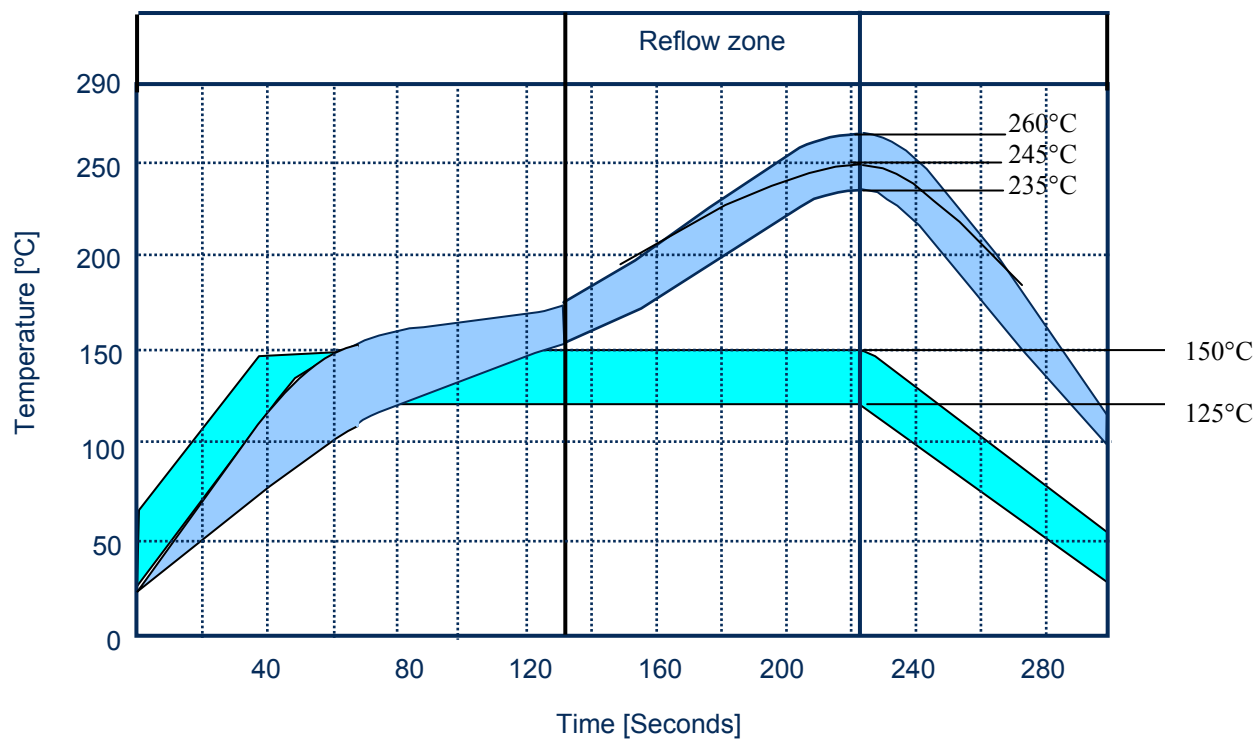
These values are recommendations and may have to be changed depending on the type of equipment.

The maximum temperature for any component must not exceed 250°C.



3.3 Reflow profiles

Sn/Ag/Cu (lead-free)



Ramp rate	< 4°C/sec
Ramp rate cooling zone	< 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. 4-7 min

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



3.4 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.

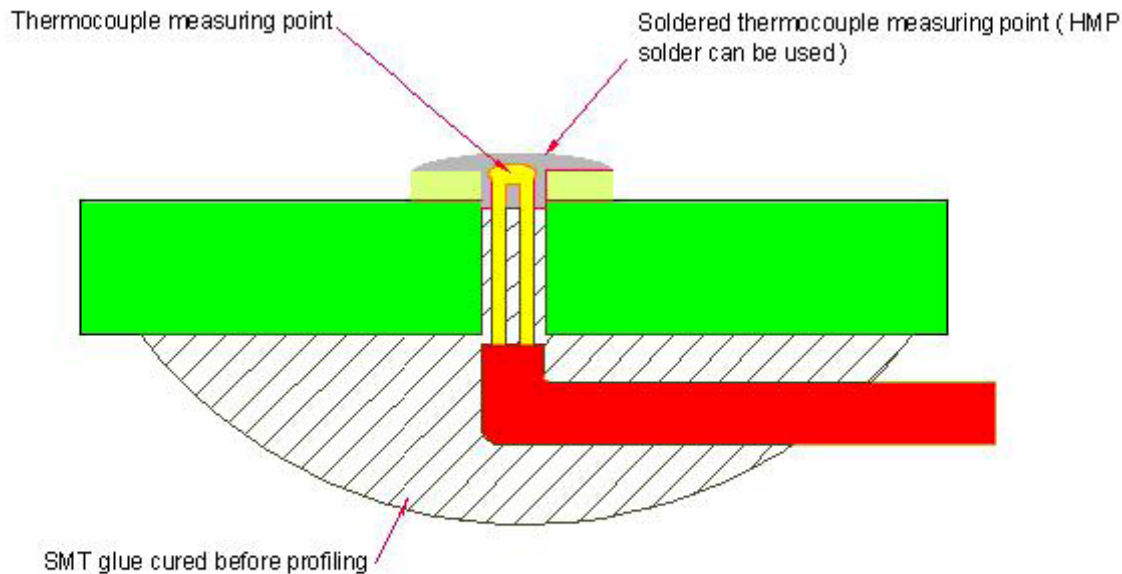


Figure 2-2

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.

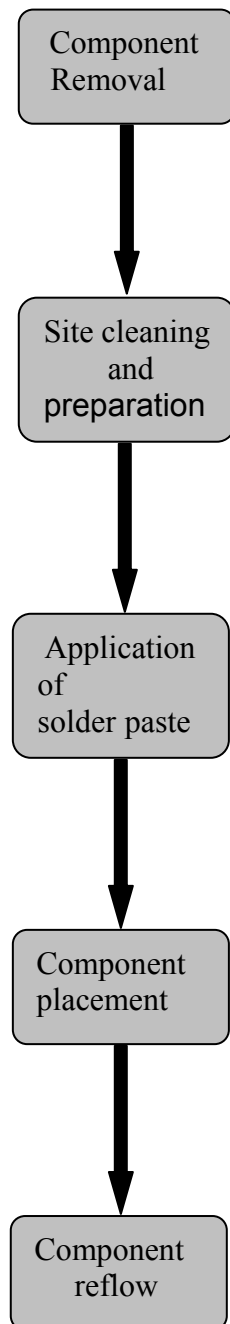
Reflow the module with BGA rework station by using applicable heat profile and nozzle.

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.



3.5 Process Flow BGA





4 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.



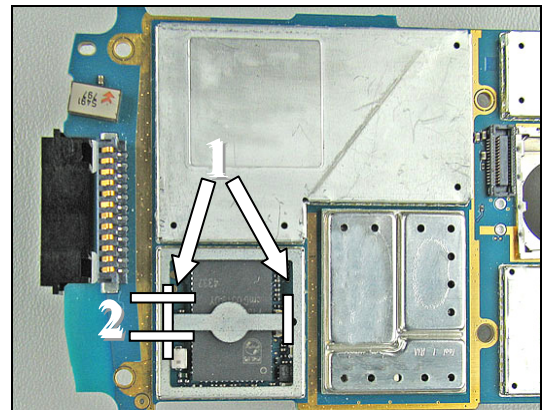
MAKE SURE THAT CUTTING PLIERS IS SHARP-EDGED TO PREVENT DAMAGING THE SHIELD CAN FENCE.

Remove the shield can lid, use a dentist hook.

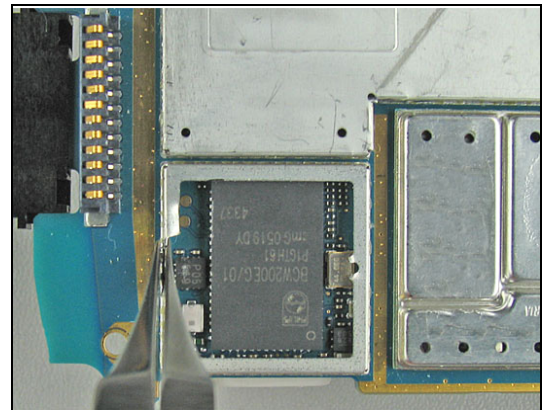
Remove the pick up area according to the white lines with a cutting plier. (1)

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

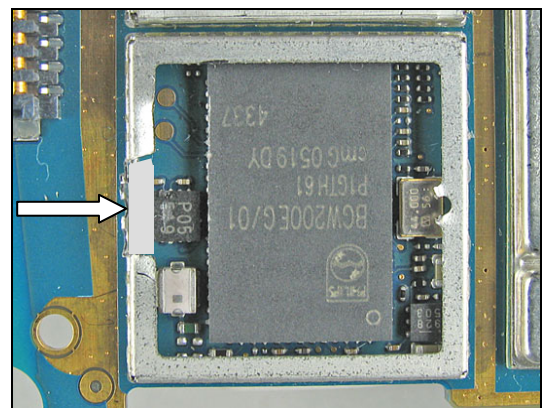
Cut the shield can fence according to the white lines with a cutting plier. (2)



Bend carefully 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.



5 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
- Shield fence pliers NTZ 112 537

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 209 544/104*.

5.1 N4202

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

Remove the shield can lid.

Use a dentist hook

Cut the fence according to the white lines.

Follow the shield fence instruction

Replace the Asic Tjatte 3.

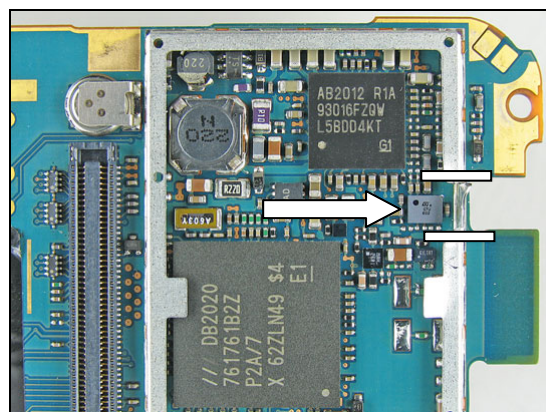
Use BGA repair equipment.

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.

Circuit/Asic Tjatte 3



5.2 C2278 – W850 Only

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

Remove the shield can lid.

Use a dentist hook

Cut the fence according to the white lines.

Follow the shield fence instruction

Replace the EMI filter.

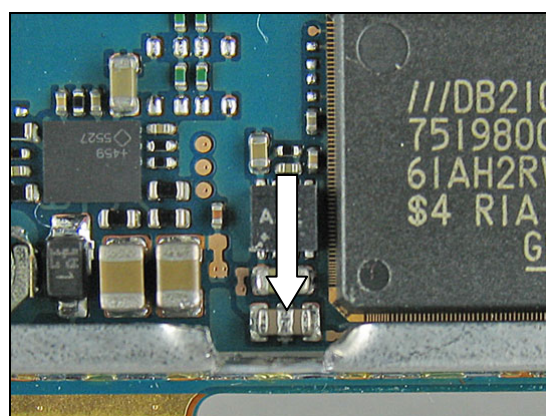
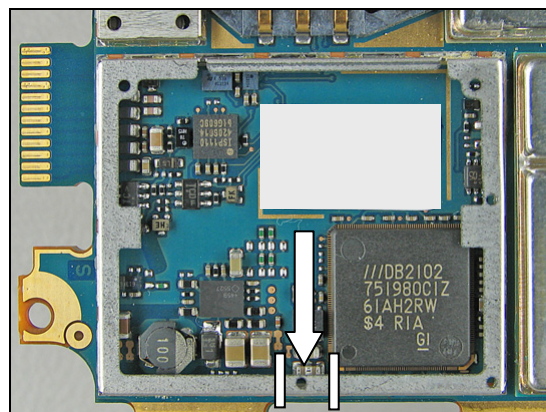
Use soldering iron.

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.

EMI Filter



Close-up picture on C2278.

BEND CAREFULLY BACK THE SHIELD FENCE.



5.3 V2221, V2204

Voltage regulator diode

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

Remove the shield can lid.

Use a dentist hook

Cut the fence according to the white lines.

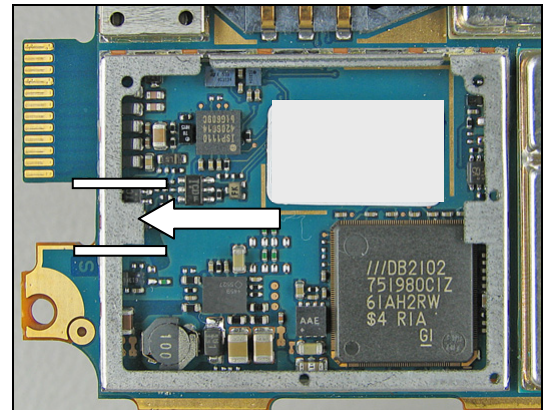
Follow the shield fence instruction

Replace the voltage regulator diode.

Use soldering iron or hot air equipment.

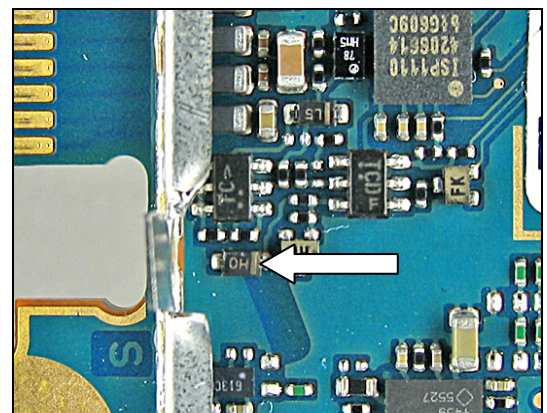
Put back a **new** shield can lid.

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



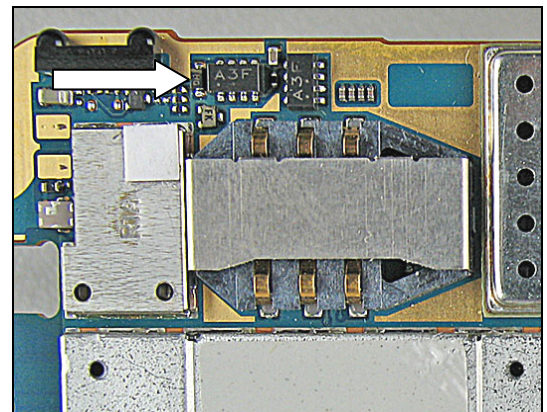
Close-up picture on V2221.

BEND CAREFULLY BACK THE SHIELD FENCE.



Replace the voltage regulator diode.

Use a soldering iron.



5.4 V2303, V4101 V2500, V2510, V2511, V2305, V2505

ESD protection diode

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

Remove the shield can lid.

Use a dentist hook

Cut the fence according to the white line.

Follow the shield fence instruction

Replace the ESD protect diode.

Use soldering iron.

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.

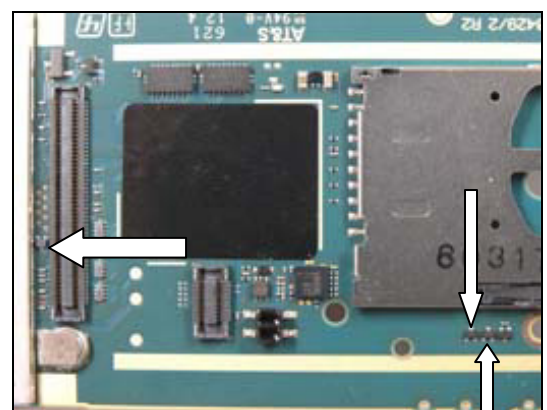
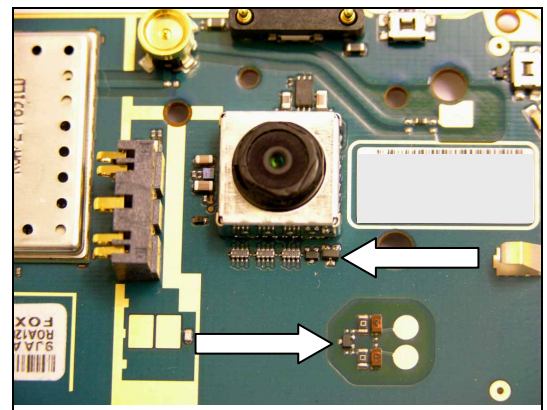
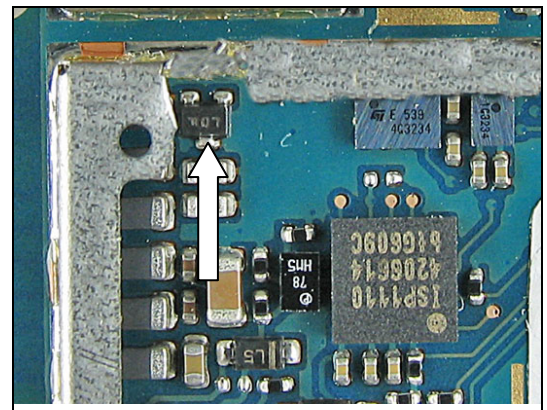
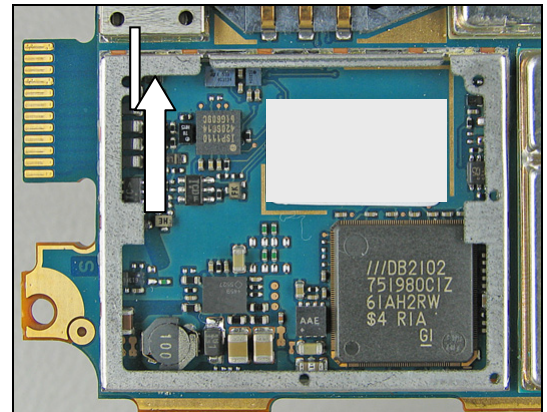
Close-up picture of V2303.

Replace the ESD protect diode.

Use soldering iron.

Replace the ESD protect diode.

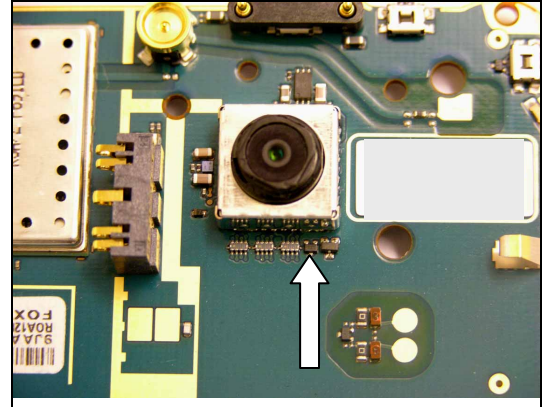
Use soldering iron.



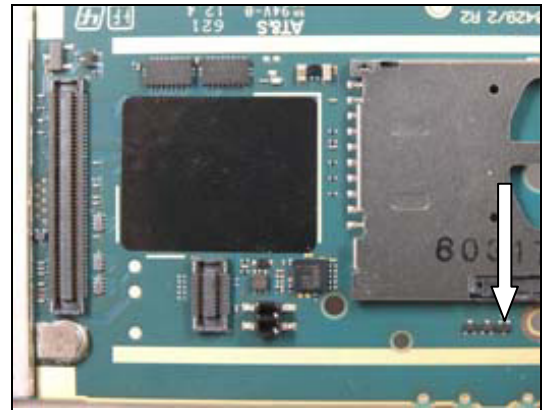
5.5 V3113, V3114

Replace the ESD protect diode, V3113.
Use soldering iron.

ESD protection diode



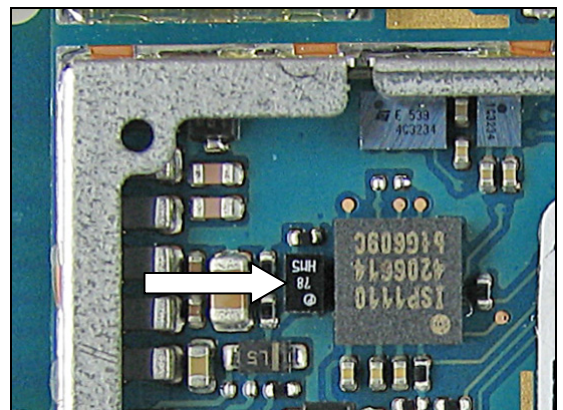
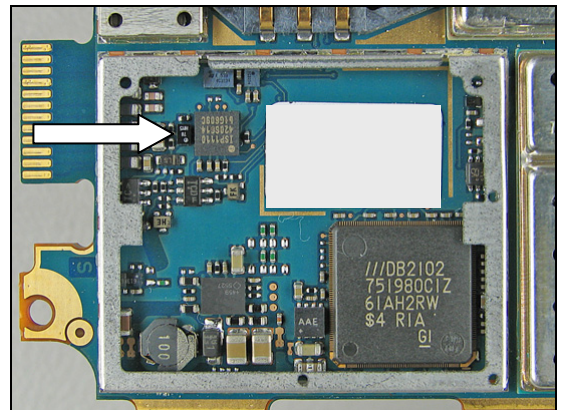
Replace the ESD protect diode, V3114.
Use soldering iron.



5.6 N2300

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

USB filter network

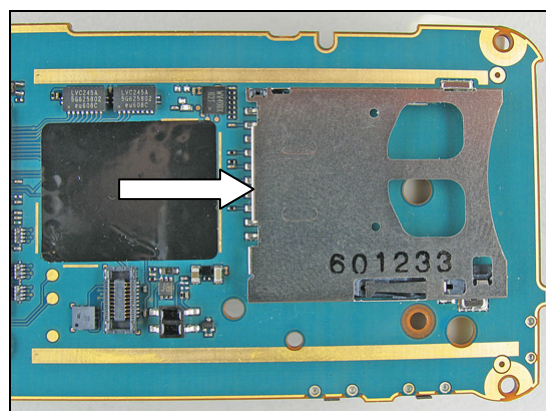


Close-up picture of N2300.

5.7 X2305

Replace the Memory stick reader.
Use BGA repair equipment.

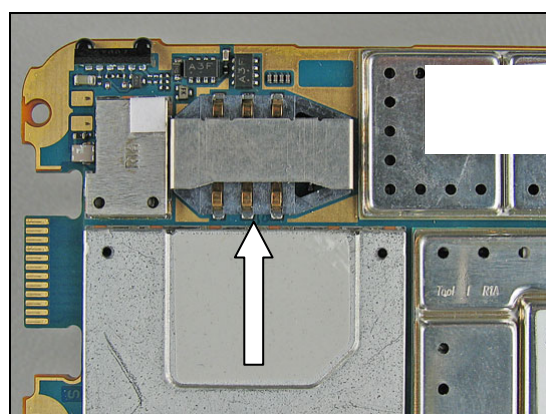
Memory stick reader



5.8 X2302

Replace the Sim card reader.
Use BGA repair equipment.

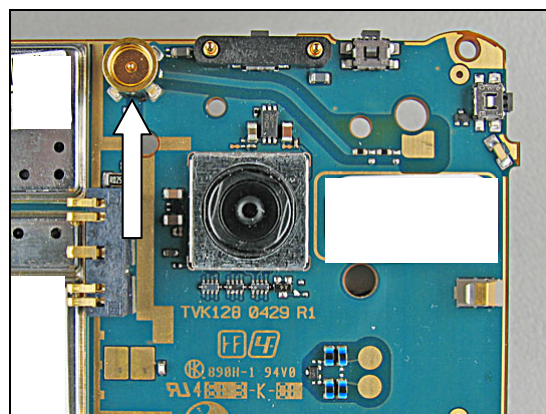
Sim reader



5.9 X1000

Replace the external antenna connector.
Use BGA repair equipment.

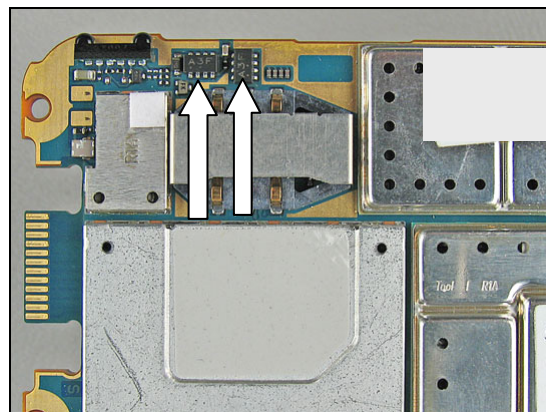
External antenna connector



5.10 V2202, 2203

Replace the P-channel mosfet modules.
Use a soldering iron.

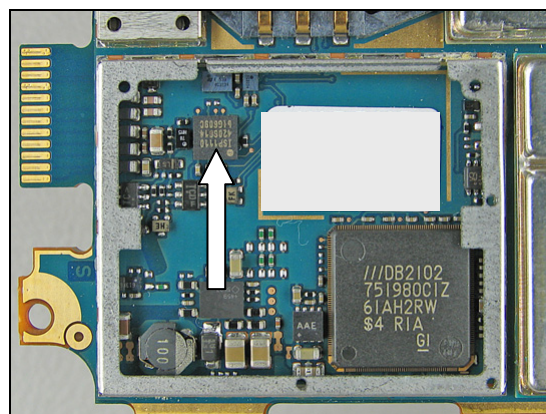
P-channel mosfet



5.11 D2304

USB transceiver and Uart MUX

Remove the shield can lid.
Use a dentist hook.
Replace 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.





5.12 N2402 – W850 Only

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

Remove the shield can lid.

Use a dentist hook

Cut the fence according to the white lines.

Follow the shield fence instruction

Replace the level translators.

Use BGA repair equipment.

BEND CAREFULLY BACK THE SHIELD FENCE.

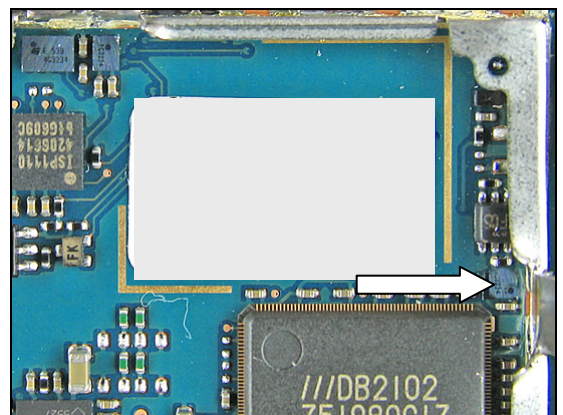
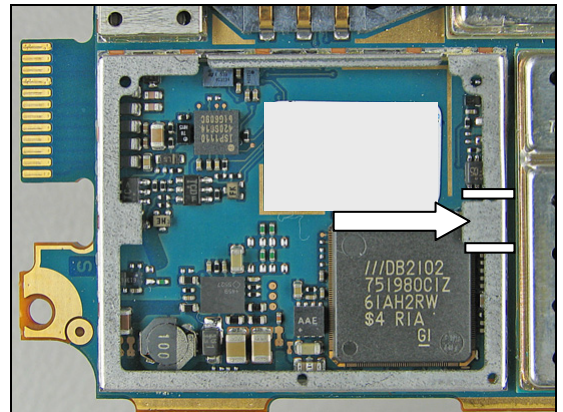
Put back a **new** shield can lid.

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

Close-up picture of N2402

BEND CAREFULLY BACK THE SHIELD FENCE.

1-bit level translator



5.13 N2200

LDO 1.3V

Remove the shield can lid.

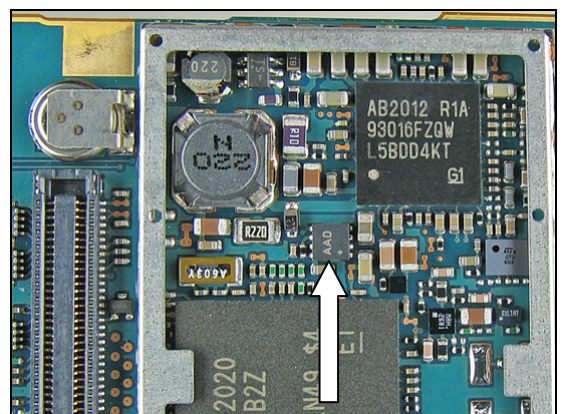
Use a dentist hook.

Replace the LDO 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.

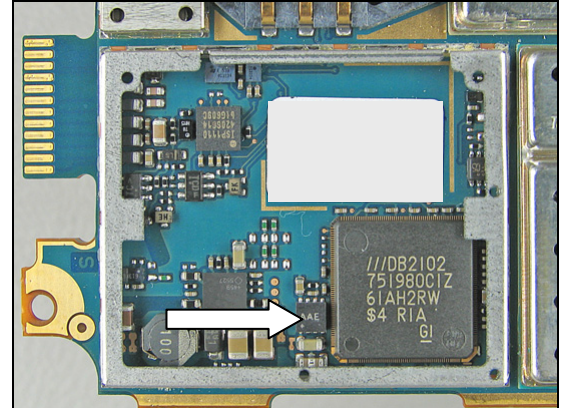




5.14 N2201

LDO 1.5V

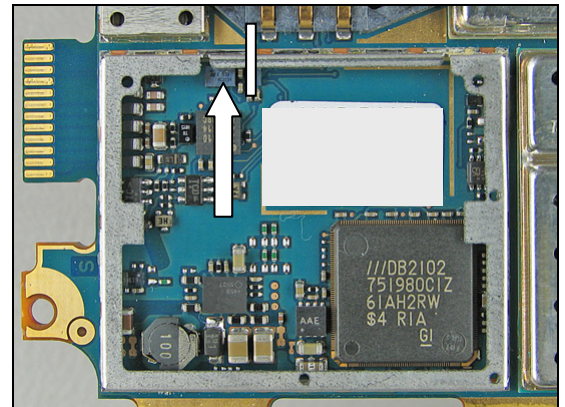
Remove the shield can lid.
Use a dentist hook.
Replace LDO module.
Use BGA repair equipment.
Put back a **new** shield can lid.
Press on all sides of the lid until you hear a “click” sound.



5.15 N2400

Level shifter

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)
Cut the fence according to the white line.
Follow the shield fence instruction
Replace the Level shifter.
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.

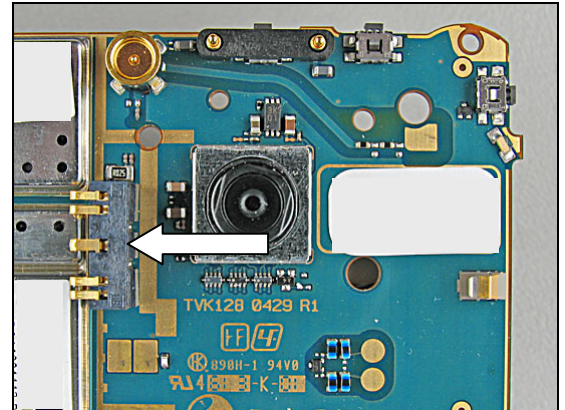




5.16 X2200

Battery connector

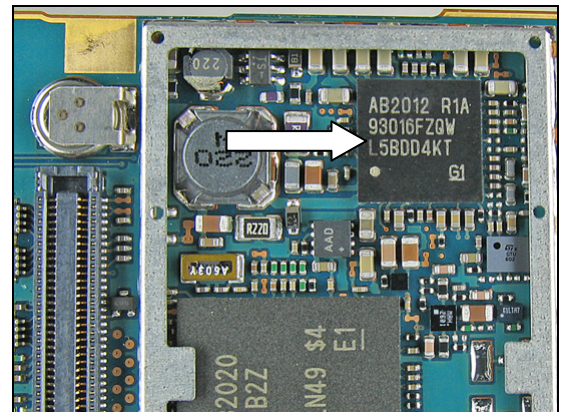
Replace the battery connector.
Use BGA repair equipment.



5.17 N2000

ASIC Vincenne 2

Remove the shield can lid.
Use a dentist hook.
Replace the Asic Vincenne 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.





5.18 D2001 – W850 Only

FOLLOW THE SHIELD FENCE INSTRUCTION. (4)

Remove the shield can lid.

Use a dentist hook

Cut the fence according to the white lines.

Follow the shield fence instruction

Replace the Asic Wanda.

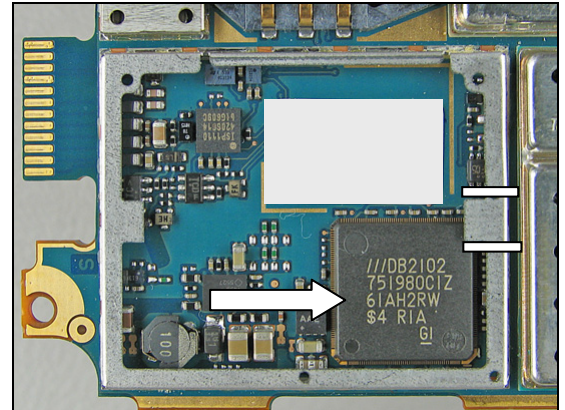
Use BGA repair equipment.

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.

ASIC Wanda

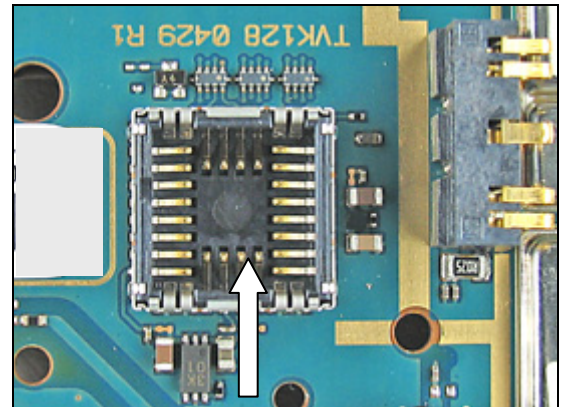


5.19 X2505

Camera socket

Replace the camera socket.

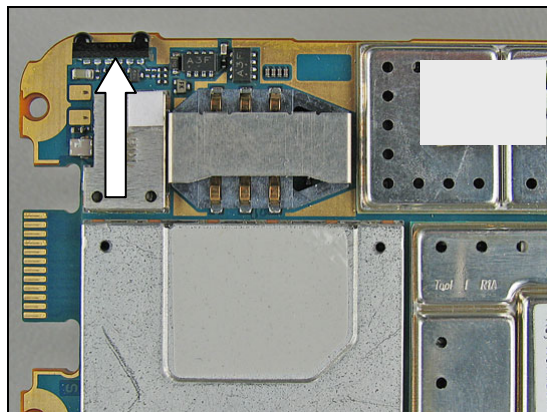
Use BGA repair equipment.



5.20 H2300

Irda

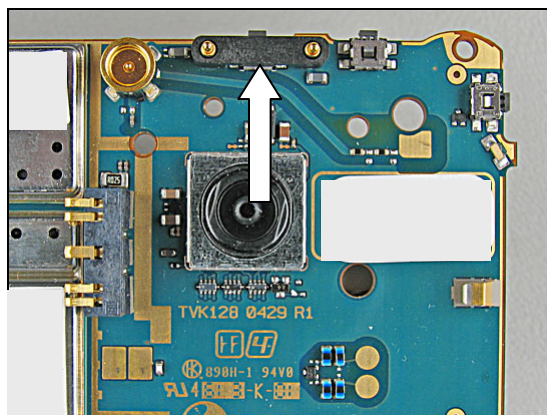
Replace the IrDA module.
Use BGA repair equipment.



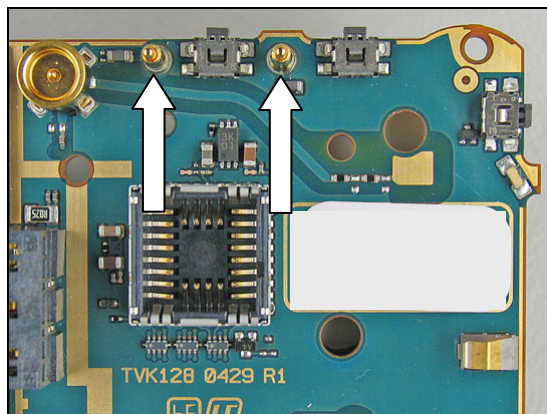
5.21 X3100

Led flash Pogopin

Remove the Led flash connector.
Use a plier or your fingers.



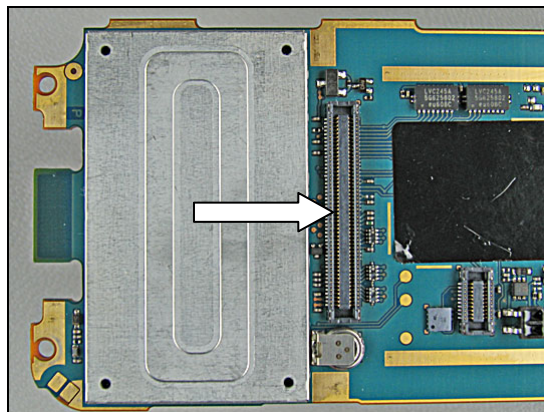
Replace the Led – Flash Pogopin.
Use a soldering iron.



5.22 X2500

Replace the 100 pin BtB connector.
Use soldering iron.

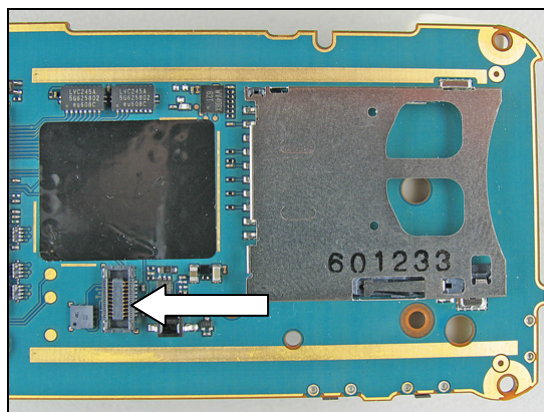
Connector 100 pin BtB



5.23 X2501

Replace the Key board 20pin BtB connector.
Use soldering iron.

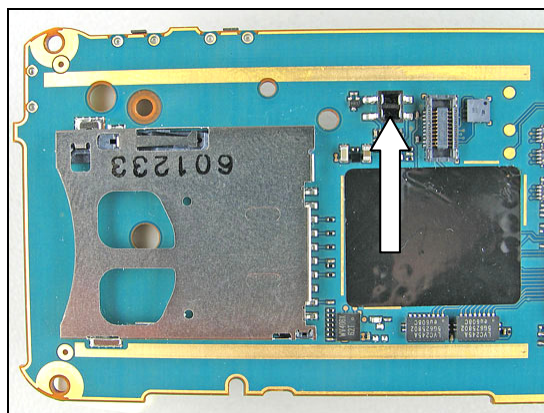
Connector Key board 20pin BtB



5.24 K2500

Replace the Photo interrupter.
Use a soldering iron.

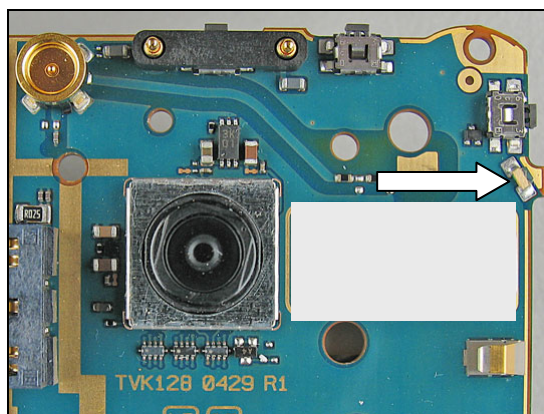
Photo interrupter



5.25 V3110

Replace the Led red side fire.
Use a soldering iron.

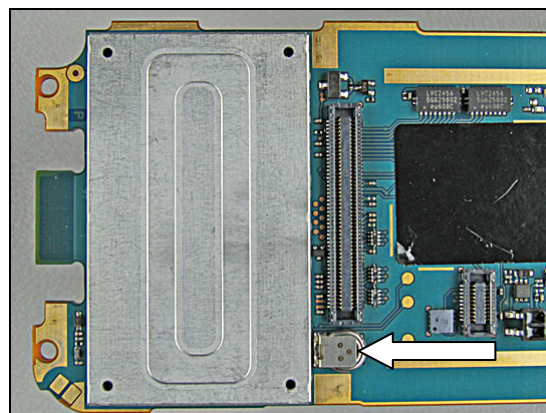
Led Red side fire



5.26 C2217

Replace the Backup battery.
Use a soldering iron.

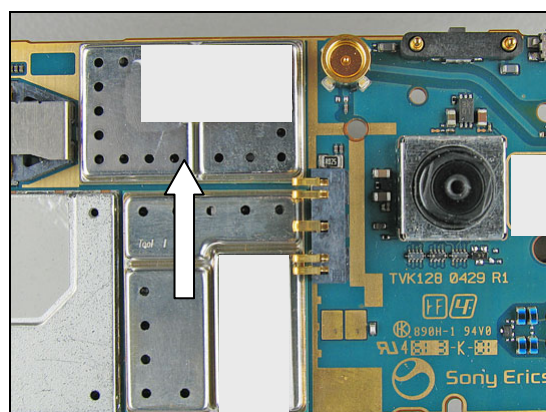
Backup Battery



5.27 A1300 – W850 Only

Replace the Marlin module.
Use BGA repair equipment.

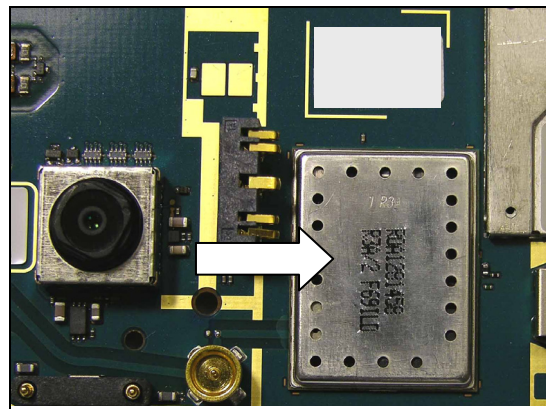
Marlin Module



5.28 N1100 – **W830 Only**

Dolphin3 Module

Replace the Dolphin3 module.
Use BGA repair equipment.



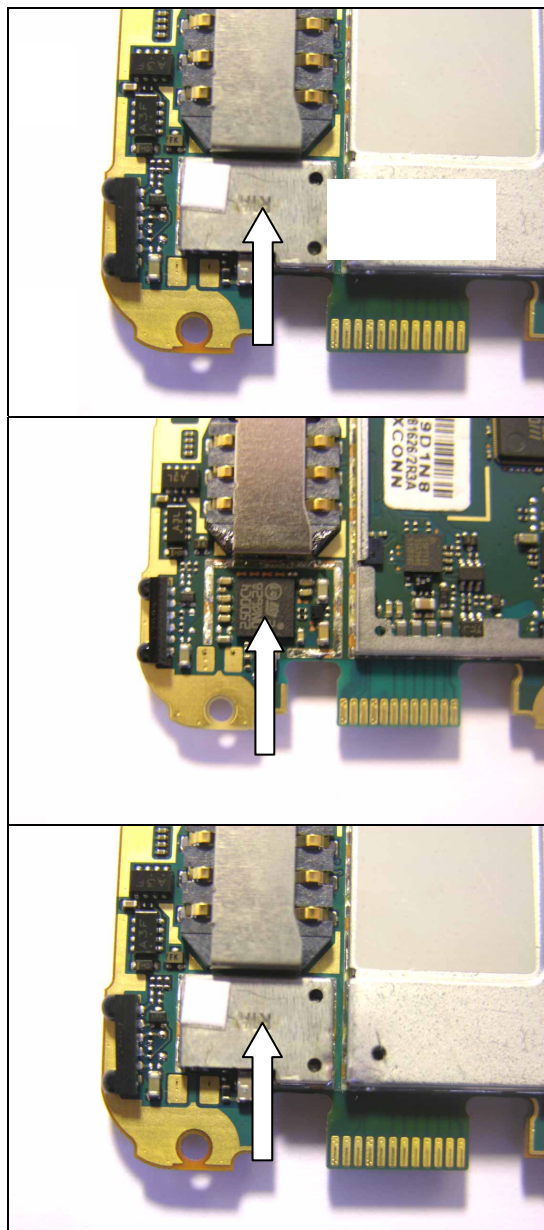
5.29 D1400

Remove the Shield Can BT.
Use Hot Air.

Replace Bluetooth E-STLC2500C4.
Use BGA repair equipment.

Replace a new Shield Can BT.
Use Hot Air.

Bluetooth E-STLC2500C4

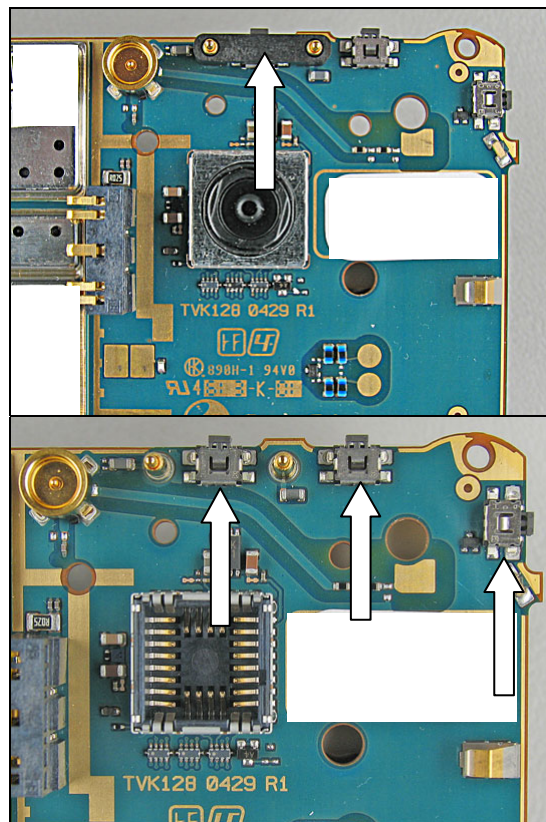


5.30 S2500, S2502, S2503

Remove the Led flash connector.
Use a plier or your fingers.

Replace Side key switches.
Use a soldering iron.
Put back the Led flash connector.

Side push switch



6 Revision history

Rev.	Date	Changes / Comments
A	2006-09-20	Initial release
B	2006-09-25	Deleted components
C	2006-10-13	Deleted components V3113, V3114
D	2006-11-10	Added support for W830
E	2006-12-04	No changes made on the content
F	2007-02-14	Added Ray, Marlin and Dolphin3
G	2007-02-19	Due to system problem. No changes made on content
H	2007-03-20	Removed Ray