S10 / S10 MMI

S10 active / S10 active MMI

Repair Documentation

Level 2.5

V 4.4

Table of Contents:

1 Introduction

The product familiy S1x consists of S10 (GSM-900), S11 (GSM-1800) and S12 (GSM-1900). Two S10 versions exist:

1) The old type with part number S30880-S**1200**-Xxxx and
2) The new type with part number S30800-S**1220**-Xxxx

The partnumber can be found on the IMEI stickerof the handset.
The S10 is also available as a special outdoor version, the S10 active (S30880-S1200-**L**xxx or –**F**xxx). This phone has different display and RF/Control modules, even though many of the components are identical.

This manual is intended to help you carry out repairs on level 2.5, meaning limited component repairs. Failure highlights are documented and should be repaired in the local workshops.

It must be noted that all repairs have to be carried out in an environment set up according to the ESD (Electrostatic Discharge Sensitive Devices) regulations defined in international standards.

If you have any questions regarding the repair procedures or spare parts do not hesitate to contact our technical support team in Kamp-Lintfort, Germany:

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2 Antenna Spring

2.1 Affected Units

2.1.1 Type: **S10 old/new and S10 active**

2.1.2 Affected IMEIs / Date Codes: *All / All*

2.1.3 Affected SW-Versions: *All*

2.1.4 Fault Code for LSO reporting: 3ANS

2.2 Fault Description

2.2.1 Fault Symptoms for customers:

Customers experience a low Rx sensitivity of the hand-set, have problems registering to the network and making calls.

2.2.2 Fault Symptom on GSM-Tester:

The GSM-Tester will show a low Tx-Power only on the *internal* antenna (aerial coupler measurement!).

2.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

2.4 Repair Documentation

2.4.1 Description of procedure:

2.4.1.1 Diagnosis

Visually check the status of the antenna spring. Look for a bent contact or dry soldering joint.

2.4.1.2 Repair by component change

Use soldering iron to remove defective spring.

Resolder new spring afterwards.

2.4.1.3 Repair by SW-Booting

Not possible!

2.4.1.4 Test

Retest handset after repair.

2.4.2 List of needed material

2.4.2.1 Components

Antenna Spring
Part-Number: L36158-A11-C23

2.4.2.2 Jigs and Tools

Soldering Iron

2.4.2.3 Special Tools

None

2.4.2.4 Working materials

Desolder Wick / Braid
Solder

2.4.3 Drawings

Figure 1: S10 / S10 active Board Antenna Spring Side

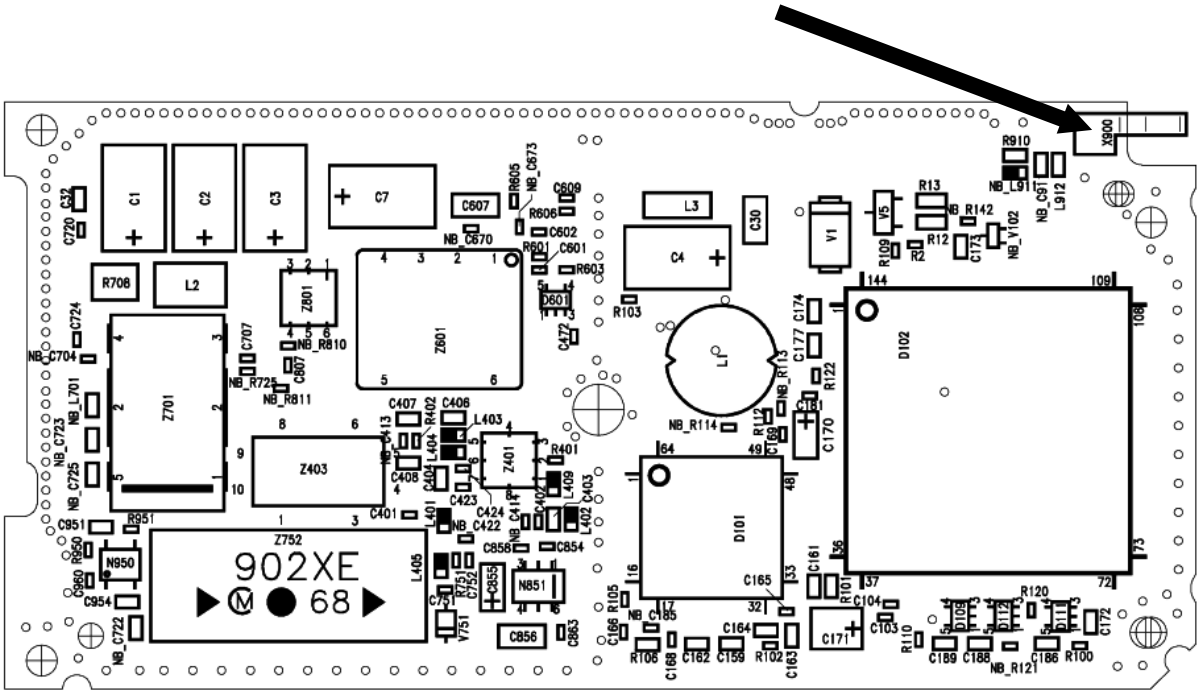
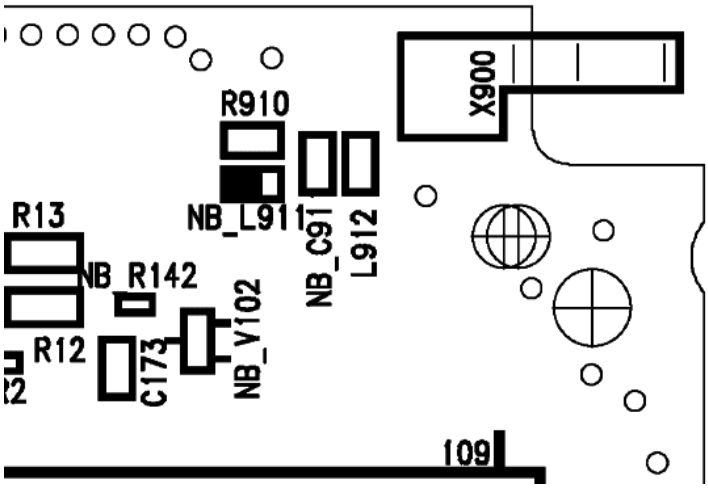


Figure 2: S10 / S10 active Antenna Spring (X900) Placement (Top View)



3 TCXO

3.1 Affected Units

3.1.1 Type: **S10 old/new and S10 active**

3.1.2 Affected IMEIs / Date Codes: *All / All*

3.1.3 Affected SW-Versions: *All*

3.1.4 Fault Code for LSO reporting: 3TCX

3.2 Fault Description

3.2.1 Fault Symptoms for customers:

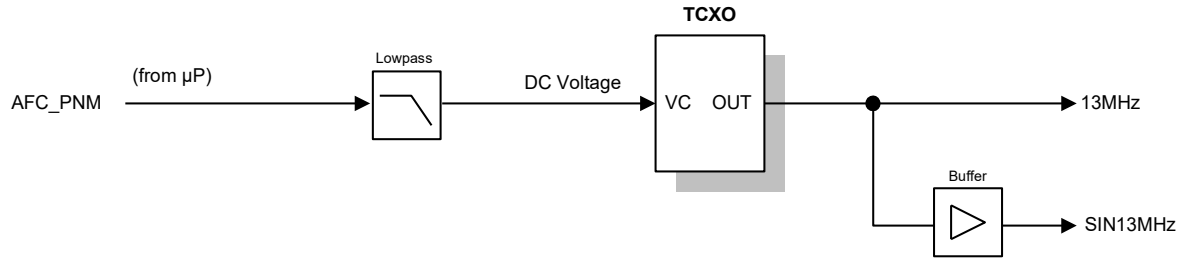
Network Search
Handset not logging into network

3.2.2 Fault Symptom on GSM-Tester:

Frequency error in synchronized mode >90 Hz

No location update possible

The TCXO (Temperature Compensated Crystal Oscillator) is responsible for generating the 13 MHz reference frequency of the handset.
If it is defective, the handset cannot synchronize to the base station anymore.



All other frequencies are derived from this 13MHz reference, its stability is vital for the handset function.

The TCXO output frequency is determined by a DC tuning voltage applied to its VC pin. The voltage comes from the microprocessor as a pulse number modulated digital signal.
A lowpass then converts this digital signal to a proportional DC voltage, which is then used to fine tune the TCXO output frequency.

3.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

3.4 Repair Documentation

3.4.1 Description of procedure:

3.4.1.1 Diagnosis

Check the output frequency of the TCXO using the level-2 testing program for S10.
Switch off the „CMD in Use“ option in the config file (S6xx.CFG or S611.INI depending on the version of the testsoftware) and restart the program. Start the S10 test, when the program says „Check power and phase of external antenna with your GSM-Tester“, switch the CMD to „LOCAL“ mode and enter the „MODULE TEST“.
On the CMD display you can see the frequency error of the handset. (Make sure that the CMD is on channel 124, power level 5!)

If the frequency error is higher than 2kHz, the TCXO has to be replaced.

3.4.1.2 Repair by component change

Use hot air blower to remove defective TCXO.
Avoid excessive heat!
Watch surrounding components!

Resolder new TCXO afterwards.

3.4.1.3 Repair by SW-Booting

Not possible!

3.4.1.4 Test

Retest handset after repair as described above.
The frequency error must now be < 2kHz.

3.4.2 List of needed material

3.4.2.1 Components

Attention! The S10 and the S10 active/new use a different TCXO.
Watch partnumbers below:

TCXO	
S10 old:	L36145-G300-Y16
S10 new:	L36145-G300-Y17
S10 active:	L36145-G300-Y17

3.4.2.2 Jigs and Tools

Hot Air Blower
Soldering Iron

3.4.2.3 Special Tools

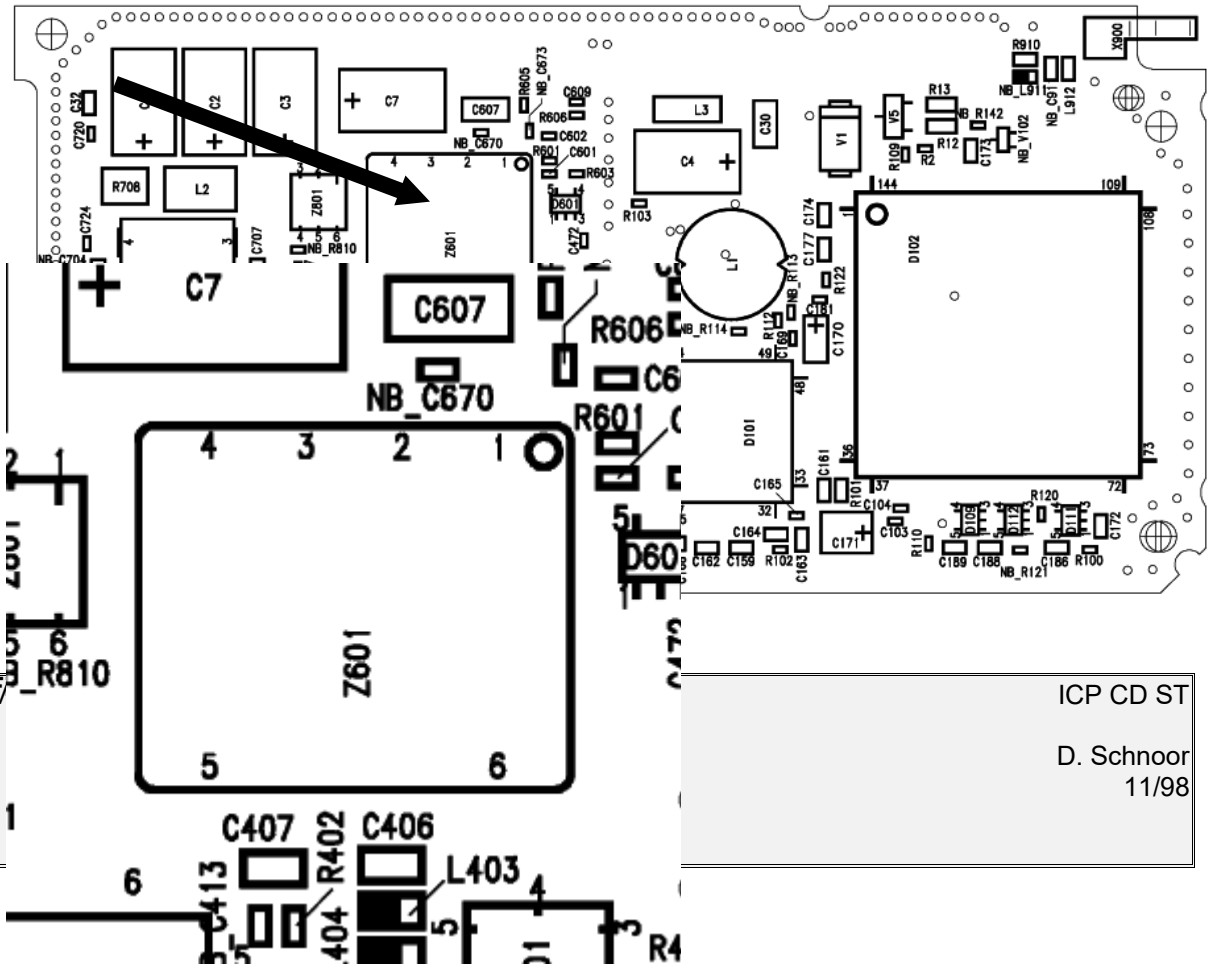
None

3.4.2.4 Working materials

Desolder Wick / Braid
Solder

3.4.3 Drawings

Figure 1: S10 Board TCXO Side



4 VCO

4.1 Affected Units

4.1.1 Type: **S10 old/new and S10 active**

4.1.2 Affected IMEIs / Date Codes: *All / All*

4.1.3 Affected SW-Versions: *All*

4.1.4 Fault Code for LSO reporting: 3VCO

4.2 Fault Description

4.2.1 Fault Symptoms for customers:

Network Search
Handset not logging into network
Dropped Calls

4.2.2 Fault Symptom on GSM-Tester:

Phase error in synchronized mode >5 deg rms
or >20 deg or >-20 deg peak.
No location update possible

The VCO (Voltage Controlled Oscillator) is responsible for generating RF frequencies of the handset.
If it is defective, the handset cannot synchronize to the base station any more.

4.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

4.4 Repair Documentation

4.4.1 Description of procedure:

4.4.1.1 Diagnosis

See symptoms above.

4.4.1.2 Repair by component change

Use hot air blower to remove defective VCO.
Avoid excessive heat!
Watch surrounding components!

Resolder new VCO afterwards.

4.4.1.3 Repair by SW-Booting

Not possible!

4.4.1.4 Test

Retest handset after repair as described above.
The phase error must now be in the defined range.

4.4.2 List of needed material

4.4.2.1 Components

VCO

Part-Number: L36851-Z2022-A11

4.4.2.2 Jigs and Tools

Hot Air Blower
Soldering Iron

4.4.2.3 Special Tools

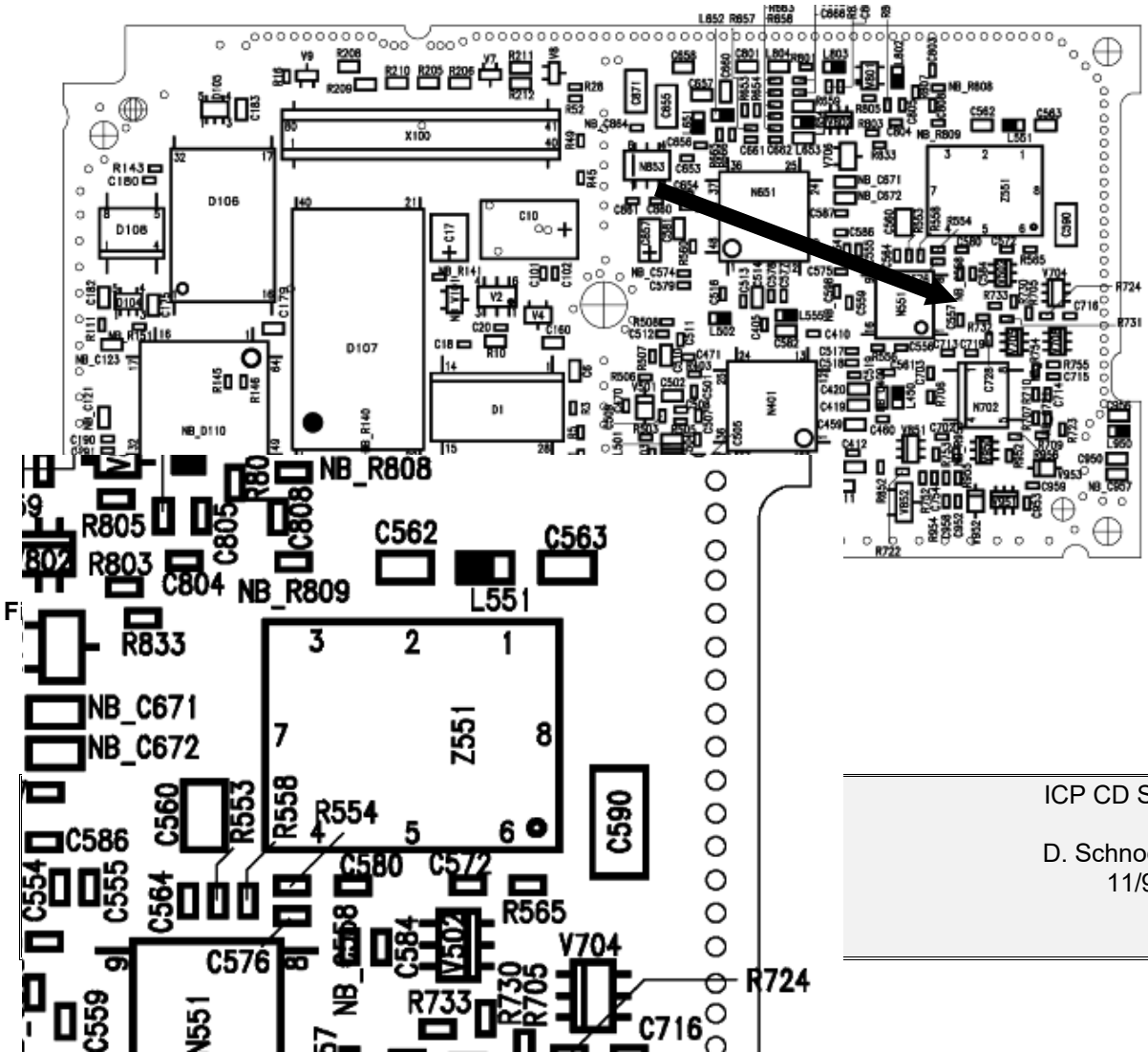
None

4.4.2.4 Working materials

Desolder Wick / Braid
Solder

4.4.3 Drawings

Figure 1: S10 Board VCO Side



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5 Fuse 1A

5.1 Affected Units

5.1.1 Type: **S10 old/new and S10 active MMI**

5.1.2 Affected IMEIs / Date Codes: *All / All*

5.1.3 Affected SW-Versions: *All*

5.1.4 Fault Code for LSO reporting: 3FU1

5.2 Fault Description

5.2.1 Fault Symptoms for customers:

Battery charging not possible

5.2.2 Fault Symptom on GSM-Tester:

This fault cannot be detected with a GSM-Tester

5.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

5.4 Repair Documentation

5.4.1 Description of procedure:

5.4.1.1 Diagnosis

Check the status of the fuse by measuring its resistance with a multimeter. The fuse is defective if the resitance higher than 10 ohms

5.4.1.2 Repair by component change

Use soldering iron to remove defective fuse.
Avoid excessive heat!
Watch surrounding components!

Resolder new fuse afterwards.

5.4.1.3 Repair by SW-Booting

Not possible!

5.4.1.4 Test

Retest handset after repair as described above.
The resistance must now be close to zero.

5.4.2 List of needed material

5.4.2.1 Components

Fuse
Part-Number: L36145-A820-Y7

5.4.2.2 Jigs and Tools

Soldering Iron

5.4.2.3 Special Tools

Multimeter

5.4.2.4 Working materials

Desolder Wick / Braid

Solder

5.4.3 Drawings

Figure 1: S10 / S10 active MMI Board 1A Fuse Side

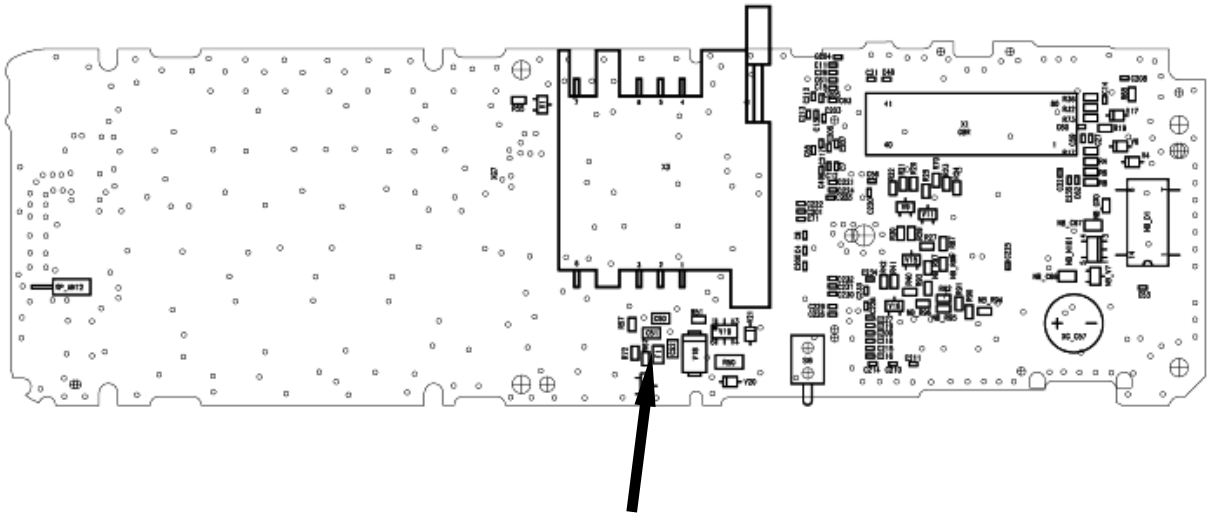
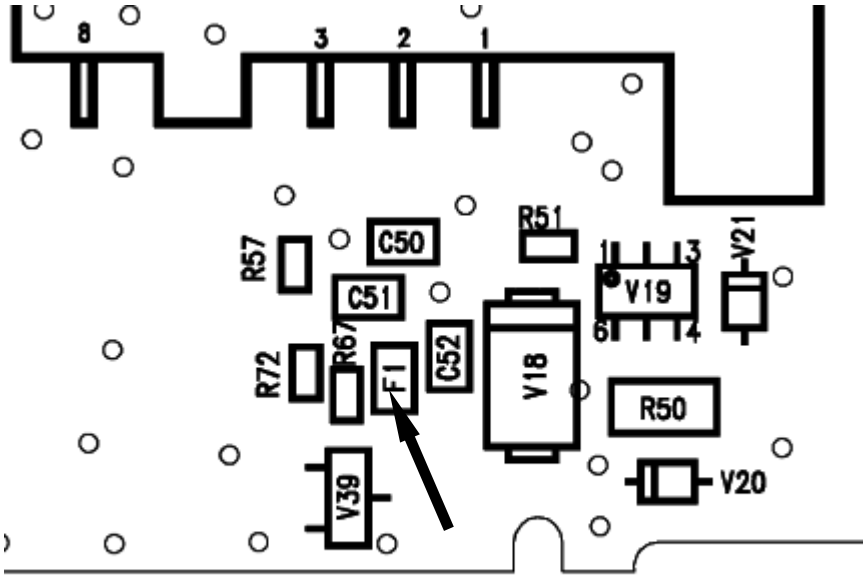


Figure 2: 1A Fuse (F1) Placement (Top View)



6 Fuse 0.25 A

6.1 Affected Units

6.1.1 Type: **S10 old/new and S10 active MMI**

6.1.2 Affected IMEIs / Date Codes: *All / All*

6.1.3 Affected SW-Versions: *All*

6.1.4 Fault Code for LSO reporting: 3FU2

6.2 Fault Description

6.2.1 Fault Symptoms for customers:

Supplying of external accessories through the handset's bottom connector is not possible

6.2.2 Fault Symptom on GSM-Tester:

This fault cannot be detected with a GSM-Tester

6.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

6.4 Repair Documentation

6.4.1 Description of procedure:

6.4.1.1 Diagnosis

Check the status of the fuse by measuring its resistance with a multimeter. The fuse is defective if the resitance higher than 10 ohms

6.4.1.2 Repair by component change

Use soldering iron to remove defective fuse.
Avoid excessive heat!
Watch surrounding components!

Resolder new fuse afterwards.

6.4.1.3 Repair by SW-Booting

Not possible!

6.4.1.4 Test

Retest handset after repair as described above.
The resistance must now be close to zero.

6.4.2 List of needed material

6.4.2.1 Components

Fuse
Part-Number: L36145-A820-Y10

6.4.2.2 Jigs and Tools

Soldering Iron

6.4.2.3 Special Tools

Multimeter

6.4.2.4 Working materials

Desolder Wick / Braid
Solder

6.4.3 Drawings

Figure 1: S10 / S10 active MMI Board 0.25A Fuse Side

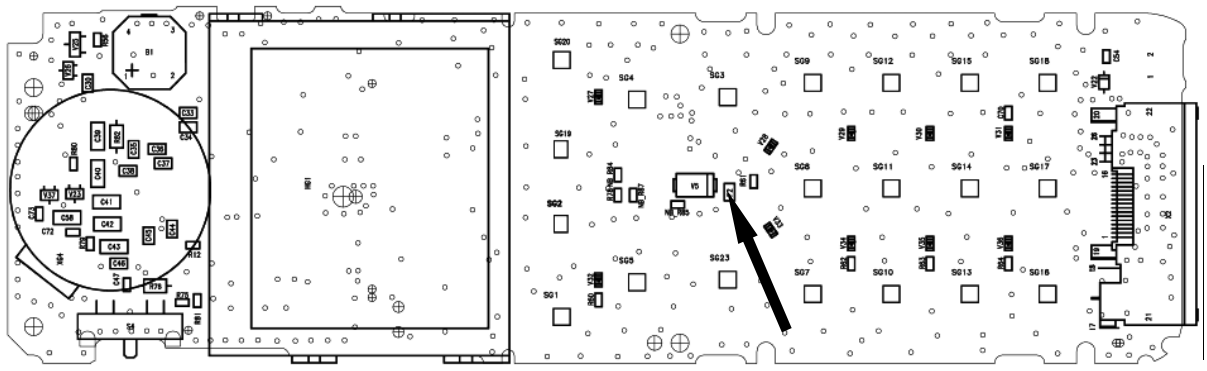
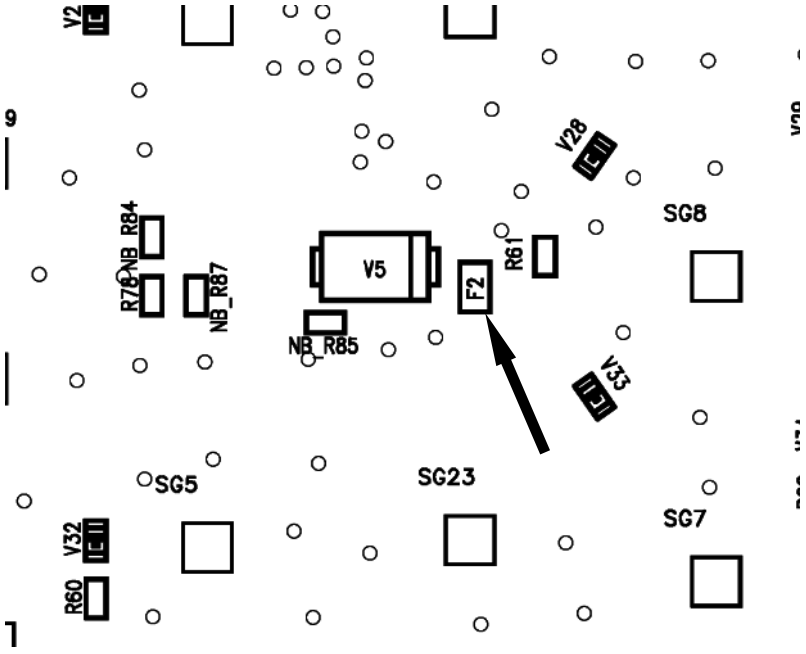


Figure 2: 0.25A Fuse (F2) Placement (Top View)



7 Molex Connector

7.1 Affected Units

7.1.1 Type: S10 old/new and S10 active MMI

7.1.2 Affected IMEIs / Date Codes: *All / All*

7.1.3 Affected SW-Versions: *All*

7.1.4 Fault Code for LSO reporting: 3MOC

7.2 Fault Description

7.2.1 Fault Symptoms for customers:

Charging or operation in a car kit not possible.

7.2.2 Fault Symptom on GSM-Tester:

Output power problems on the external antenna only.

7.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

7.4 Repair Documentation

7.4.1 Description of procedure:

7.4.1.1 Diagnosis

Visually check the bottom connector. Watch for dry joints.

7.4.1.2 Repair by component change

Use hot air blower to remove defective connector.
Avoid excessive heat!
Watch surrounding components!

Resolder new connector afterwards.
Make sure that you use just very little flux, otherwise the connector contacts can become dirty.

7.4.1.3 Repair by SW-Booting

Not possible!

7.4.1.4 Test

Retest handset after repair.

7.4.2 List of needed material

7.4.2.1 Components

Molex Connector
Part-Number: L36334-Z93-C244

7.4.2.2 Jigs and Tools

Hot Air Blower
Soldering Iron

7.4.2.3 Special Tools

None

7.4.2.4 Working materials

Desolder Wick / Braid
Solder
Flux

7.4.3 Drawings

Figure 1: S10 / S10 active MMI Board Bottom Connector Side

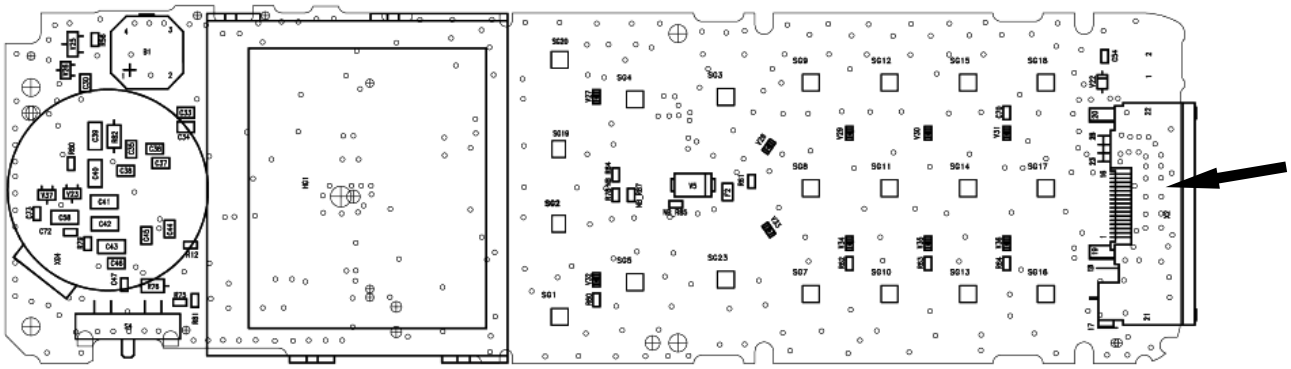
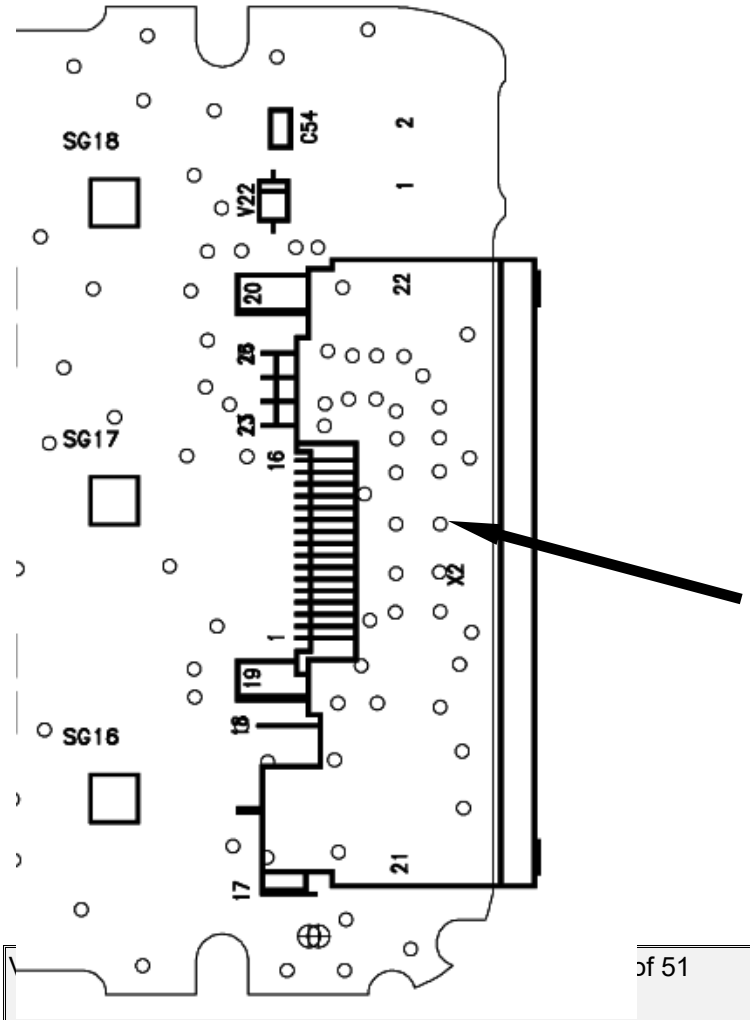


Figure 2: Bottom Connector Placement (Top View)



8 Ringer

8.1 Affected Units

8.1.1 Type: **S10 old/new and S10 active MMI**

8.1.2 Affected IMEIs / Date Codes: *All / All*

8.1.3 Affected SW-Versions: *All*

8.1.4 Fault Code for LSO reporting: 3RIN

8.2 Fault Description

8.2.1 Fault Symptoms for customers:

No ringer tone audible or ringer tone distorted.

8.2.2 Fault Symptom on GSM-Tester:

Ringer check fails.

8.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

8.4 Repair Documentation

8.4.1 Description of procedure:

8.4.1.1 Diagnosis

Check ringer functionality either manually with testing program.

8.4.1.2 Repair by component change

Use hot air blower remove defective ringer.
Avoid excessive heat!
Watch surrounding components, especially the display window!
To protect the display, you can also desolder the ringer with solder wick.

Resolder new ringer afterwards.
Watch placement of ringer!

8.4.1.3 Repair by SW-Booting

Not possible!

8.4.1.4 Test

Retest handset after repair.

8.4.2 List of needed material

8.4.2.1 Components

Ringer
Part-Number: L36178-Z2-C15

8.4.2.2 Jigs and Tools

Hot Air Blower
Soldering Iron

8.4.2.3 Special Tools

None

8.4.2.4 Working materials

Desolder Wick / Braid
Solder

8.4.3 Drawings

Figure 1: S10 / S10 active MMI Board Ringer Side

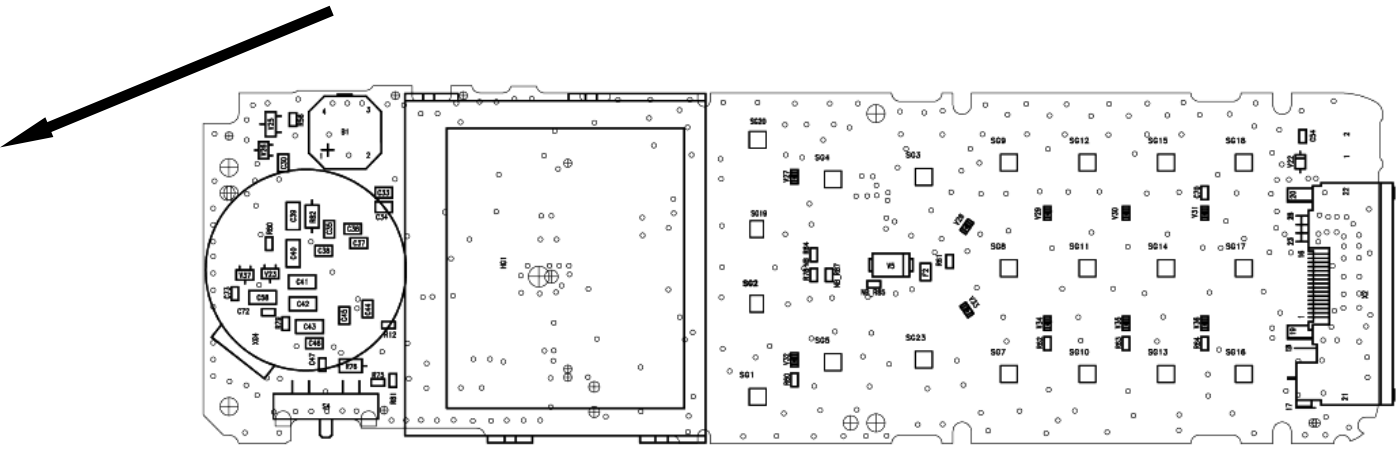
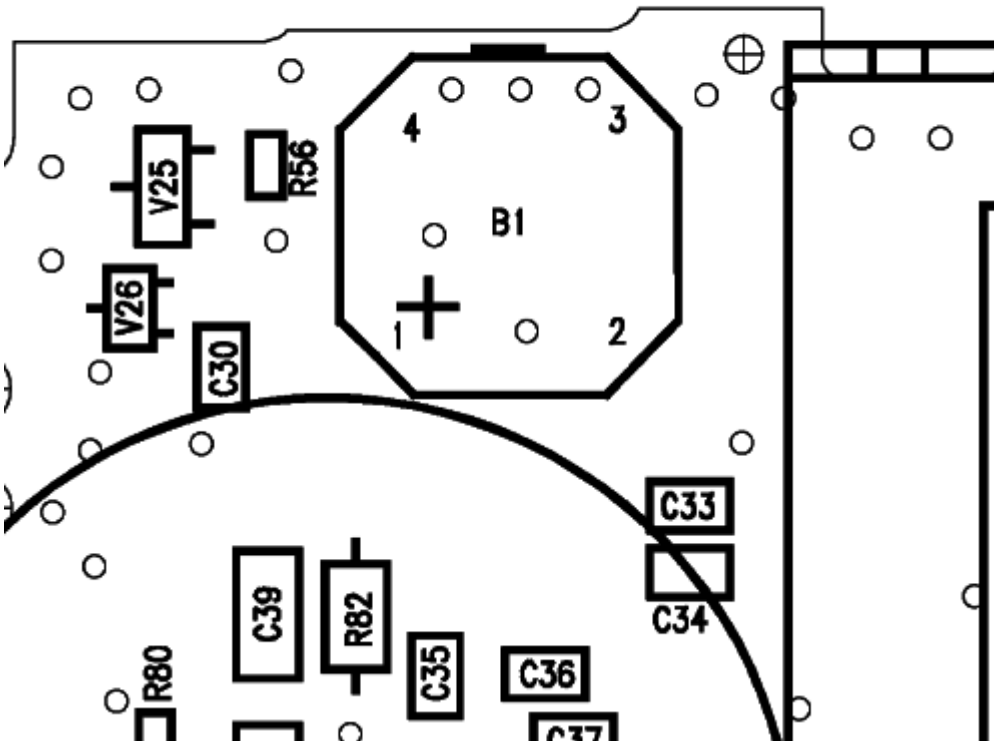


Figure 2: Ringer (B1) Placement (Top View)



9 Cardreader

9.1 Affected Units

9.1.1 Type: S10 old/new and S10 active MMI

9.1.2 Affected IMEIs / Date Codes: *All / All*

9.1.3 Affected SW-Versions: *All*

9.1.4 Fault Code for LSO reporting: 3REA

9.2 Fault Description

9.2.1 Fault Symptoms for customers:

Sim card is not accepted or properly read by the handset.
Sim card ejection mechanism may be damaged.

9.2.2 Fault Symptom on GSM-Tester:

When testing with a test-simcard the above symptoms will come up.

9.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

9.4 Repair Documentation

9.4.1 Description of procedure:

9.4.1.1 Diagnosis

Check cardreader functionality with sim card.
Attention: Watch for dry joints (especially pin 7!) or mechanical damage.

9.4.1.2 Repair by component change

Resolder dry joints.

If the cardreader is mechanically damaged use solder wick to remove defective component.
Avoid excessive heat!
Watch surrounding components!!

Resolder new cardreader afterwards.

9.4.1.3 Repair by SW-Booting

Not possible!

9.4.1.4 Test

Retest handset after repair.

9.4.2 List of needed material

9.4.2.1 Components

Cardreader
Part-Number: L36334-Z95-C994

9.4.2.2 Jigs and Tools

Soldering Iron

9.4.2.3 Special Tools

None

9.4.2.4 Working materials

Desolder Wick / Braid
Solder

9.4.3 Drawings

Figure 1: S10 MMI Board Cardreader Side

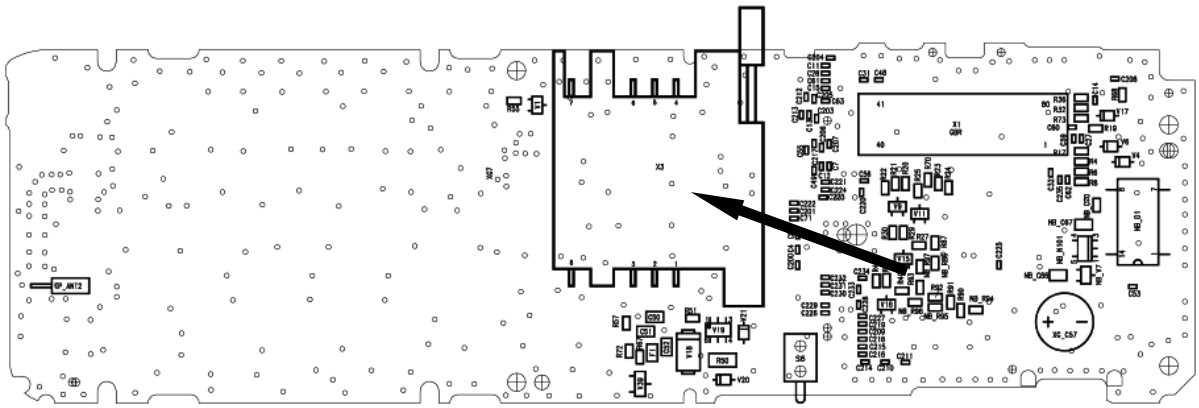
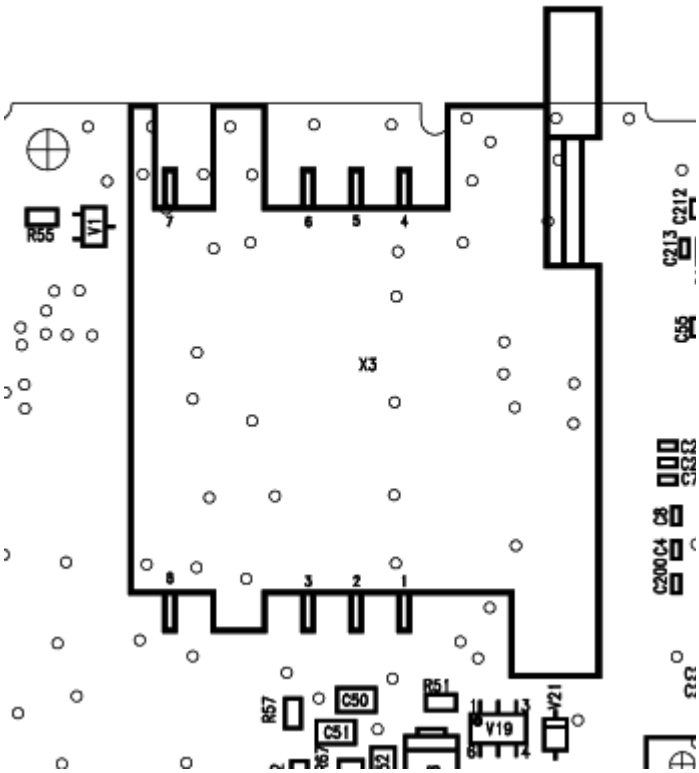


Figure 2: Cardreader Placement (Top View)



10 Volumeslider

10.1 Affected Units

10.1.1 Type: **S10 old/new and S10 active MMI**

10.1.2 Affected IMEIs / Date Codes: *All / All*

10.1.3 Affected SW-Versions: *All*

10.1.4 Fault Code for LSO reporting: 3VSL

10.2 Fault Description

10.2.1 Fault Symptoms for customers:

The volume slider does not work properly.

10.2.2 Fault Symptom on GSM-Tester:

During the keyboard test, the volume slider fails.

10.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

10.4 Repair Documentation

10.4.1 Description of procedure:

10.4.1.1 Diagnosis

Check volumeslider functionality either manually or with the testing program.
Watch for dry joints or mechanical damage.

10.4.1.2 Repair by component change

Use solder wick to remove defective slider.
Avoid excessive heat!
Watch surrounding components!!

Resolder new volumeslider afterwards.

10.4.1.3 Repair by SW-Booting

Not possible!

10.4.1.4 Test

Retest handset after repair.

10.4.2 List of needed material

10.4.2.1 Components

Volumeslider
Part-Number: L36315-Z77-C186

10.4.2.2 Jigs and Tools

Soldering Iron

10.4.2.3 Special Tools

None

10.4.2.4 Working materials

Desolder Wick / Braid
Solder

10.4.3 Drawings

Figure 1: S10 / S10 active MMI Board Volumeslider Side

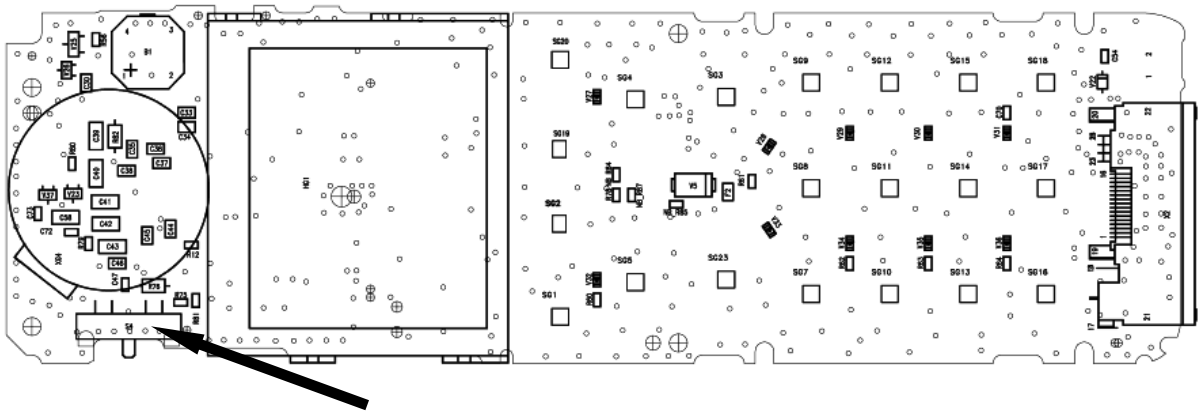
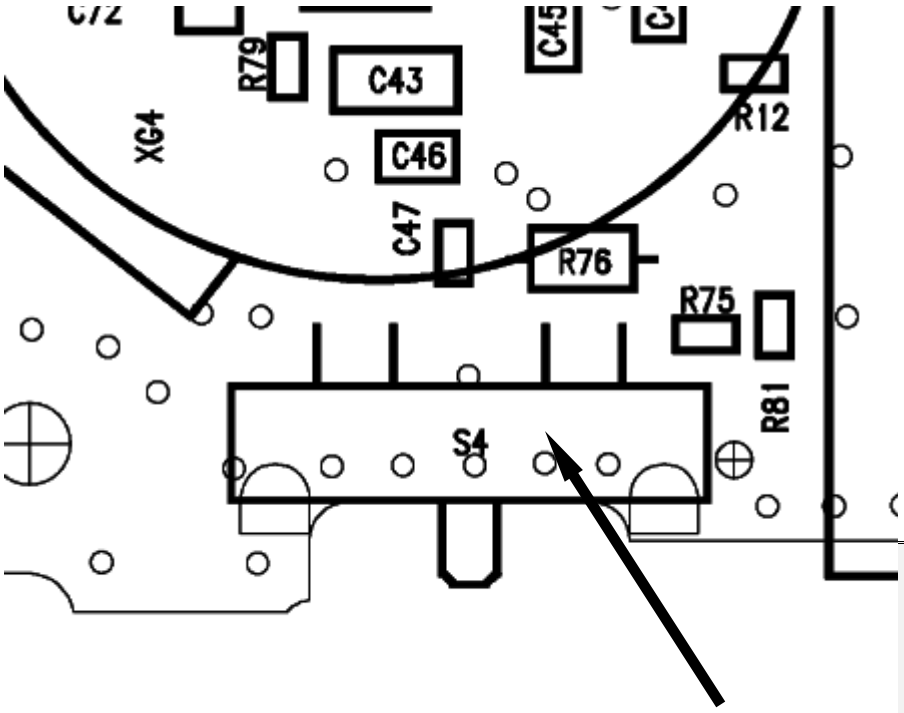


Figure 2: Volumeslider Placement (Top View)



11 Memoswitch

11.1 Affected Units

11.1.1 Type: **S10 old/new and S10 active MMI**

11.1.2 Affected IMEIs / Date Codes: *All / All*

11.1.3 Affected SW-Versions: *All*

11.1.4 Fault Code for LSO reporting: 3MSW

11.2 Fault Description

11.2.1 Fault Symptoms for customers:

The memoswitch does not work properly.

11.2.2 Fault Symptom on GSM-Tester:

During the keyboard test, the memobutton fails.

11.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional

☐ ..... Not Yet Defined

11.4 Repair Documentation

11.4.1 Description of procedure:

11.4.1.1 Diagnosis

Check memoswitch functionality either manually or with the testing program.
Watch for dry joints or mechanical damage.

11.4.1.2 Repair by component change

Use solder wick or hot air to remove defective switch.
Avoid excessive heat!
Watch surrounding components!!

Resolder new memoswitch afterwards.

11.4.1.3 Repair by SW-Booting

Not possible!

11.4.1.4 Test

Retest handset after repair.

11.4.2 List of needed material

11.4.2.1 Components

Attention! The S10 and the S10 new/active use a different type of memoswitch. Watch part numbers below!

Memoswitch
S10 old Part-Number: L36315-Z77-C185
S10 new Part-Number: L36315-Z77-C192
S10 active: Part-Number: L36315-Z77-C192

11.4.2.2 Jigs and Tools

Soldering Iron
Hot Air

11.4.2.3 Special Tools

None

11.4.2.4 Working materials

Desolder Wick / Braid
Solder

11.4.3 Drawings

Figure 1: S10 / S10 active MMI Board Memoswitch Side

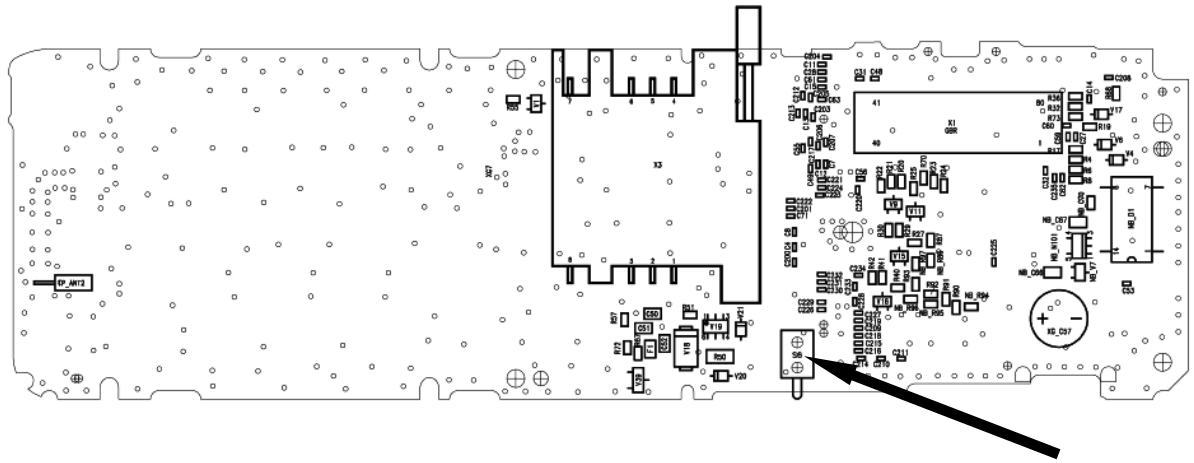
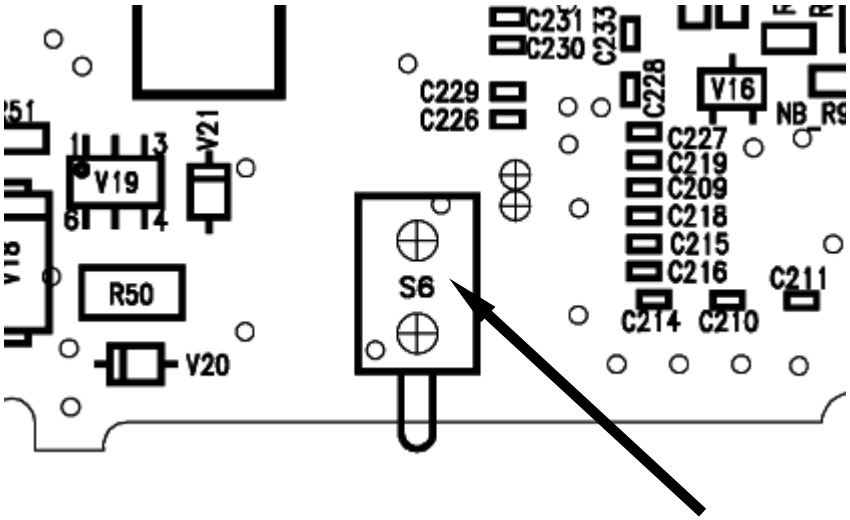


Figure 2: Memoswitch (S6) Placement (Top View)



12 Antennaswitch

12.1 Affected Units

12.1.1 Type: **S10 old/new and S10 active**

12.1.2 Affected IMEIs / Date Codes: *All / All*

12.1.3 Affected SW-Versions: *All*

12.1.4 Fault Code for LSO reporting: 3ASW

12.2 Fault Description

12.2.1 Fault Symptoms for customers:

No Rx sensitivity and no location update possible.

12.2.2 Fault Symptom on GSM-Tester:

Handset fails with low Tx power on both or either antenna.
No location update possible.

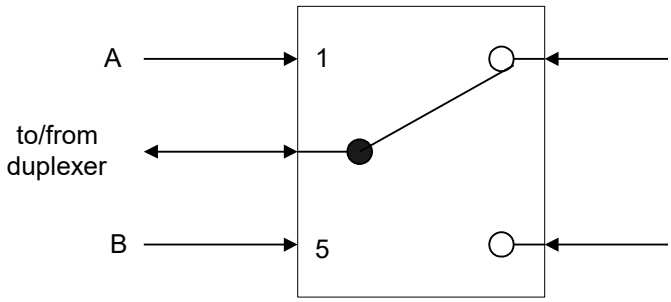
12.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

12.4 Repair Documentation

12.4.1 Description of procedure:

12.4.1.1 Diagnosis



The antennaswitch is used to switch the Rx and Tx path between the internal an external antenna of the handset

The switched path is determined by two digital inputs A and B (pins 1 and 5).

A	B	Switched path
1	0	External antenna
0	1	Internal antenna

Check antennaswitch functionality either manually or with the testing program.
Watch for dry joints.

Use an ohmmeter to check the status of the switch:

Pin 5 against ground must be around 50 kOhms.
Pin 1 against ground must be around 1 kOhm.

If any of these resistances are significantly lower (for example pin 5 around 17 Ohms) the antennaswitch is defective and has to be replaced.

12.4.1.2 Repair by component change

Use solder wick or hot air to remove defective switch.
Avoid excessive heat!
Watch surrounding components!!

Resolder new antennaswitch afterwards.

12.4.1.3 Repair by SW-Booting

Not possible!

12.4.1.4 Test

Retest handset after repair.

12.4.2 List of needed material

12.4.2.1 Components

Antennaswitch
Part-Number: L36810-U6011-D670

12.4.2.2 Jigs and Tools

Soldering Iron
Hot Air Blower

12.4.2.3 Special Tools

None

12.4.2.4 Working materials

Desolder Wick / Braid
Solder

12.4.3 Drawings

Figure 1: S10 / S10 active Board Antennaswitch Side

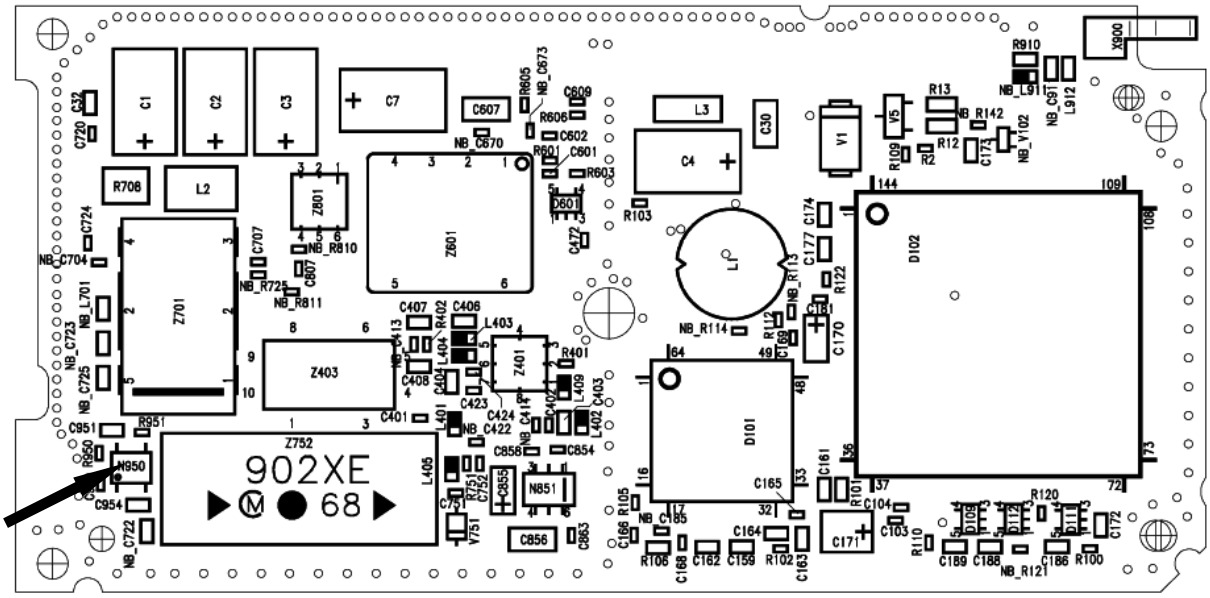
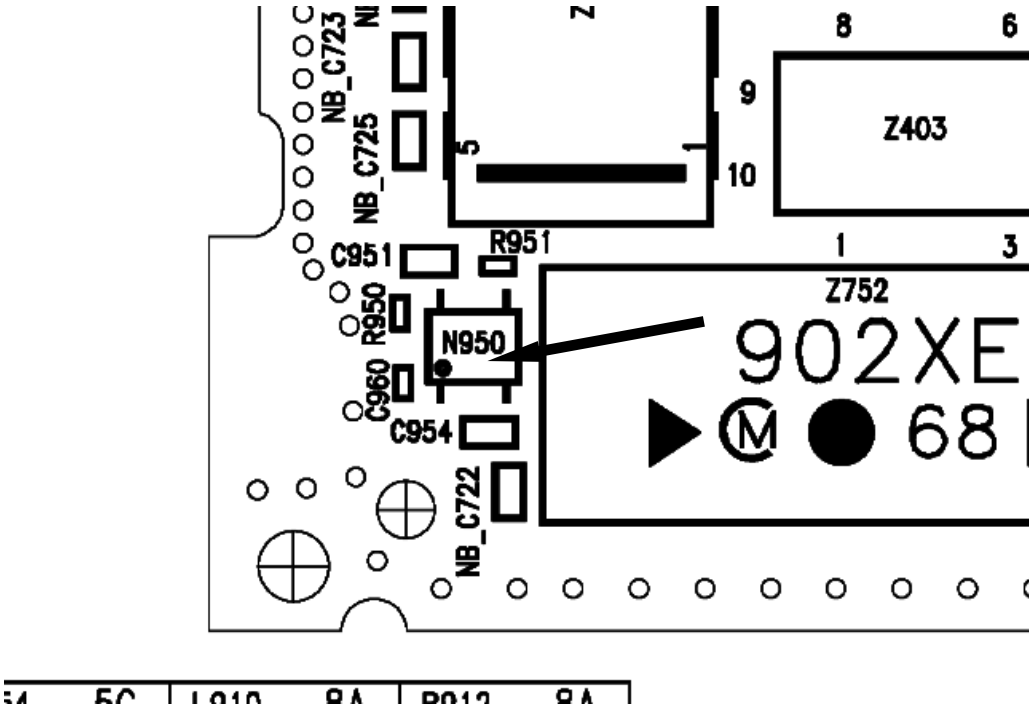


Figure 2: Antennaswitch (N950) Placement (Top View)



S10 old/new and S10 active

13 Coil

13.1 Affected Units

13.1.1 Type :

13.1.2 Affected IMEIs / Date Codes: *All / All*

13.1.3 Affected SW-Versions: *All*

13.1.4 Fault Code for LSO reporting: 3COI

13.2 Fault Description

13.2.1 Fault Symptoms for customers:

Loud humming noise in loudspeaker.

13.2.2 Fault Symptom on GSM-Tester:

Handset fails with loud humming noise in echo loop.

13.3 Priority:

☐ ..... Mandatory
☒ ..... Repair
☐ ..... Optional
☐ ..... Not Yet Defined

13.4 Repair Documentation

13.4.1 Description of procedure:

13.4.1.1 Diagnosis

The coil is used in the step up converter which is generating a 6.0 V supply voltage for the power amplifier out of the 2.8V battery voltage.
If the coil is mechanically damaged (broken) it produces heavy interference with the acoustical elements of the S10 resulting in a loud humming noise in the earpiece.

A broken coil can easily be diagnosed by trying to move it with two fingers. If it moves, the core is broken and the coil has to be replaced.

13.4.1.2 Repair by component change

Use hot air to remove defective coil.
Avoid excessive heat!
Watch surrounding components!!

Resolder new coil afterwards

13.4.1.3 Repair by SW-Booting

Not possible!

13.4.1.4 Test

Retest handset after repair, by checking the audio quality with the echo loop of the testprogram.

13.4.2 List of needed material

13.4.2.1 Components

The S10 and the S10 active use different types of coils!

Part-Number S10 old:	L36151-F5273-M2
Part-Number S10 new:	L36151-F5273-M3
Part-Number S10 active:	L36151-F5273-M3

13.4.2.2 Jigs and Tools

Soldering Iron
Hot Air Blower

13.4.2.3 Special Tools

None

13.4.2.4 Working materials

Desolder Wick / Braid
Solder

13.4.3 Drawings

Figure 1: S10 / S10 active Board Coil (L1) Side

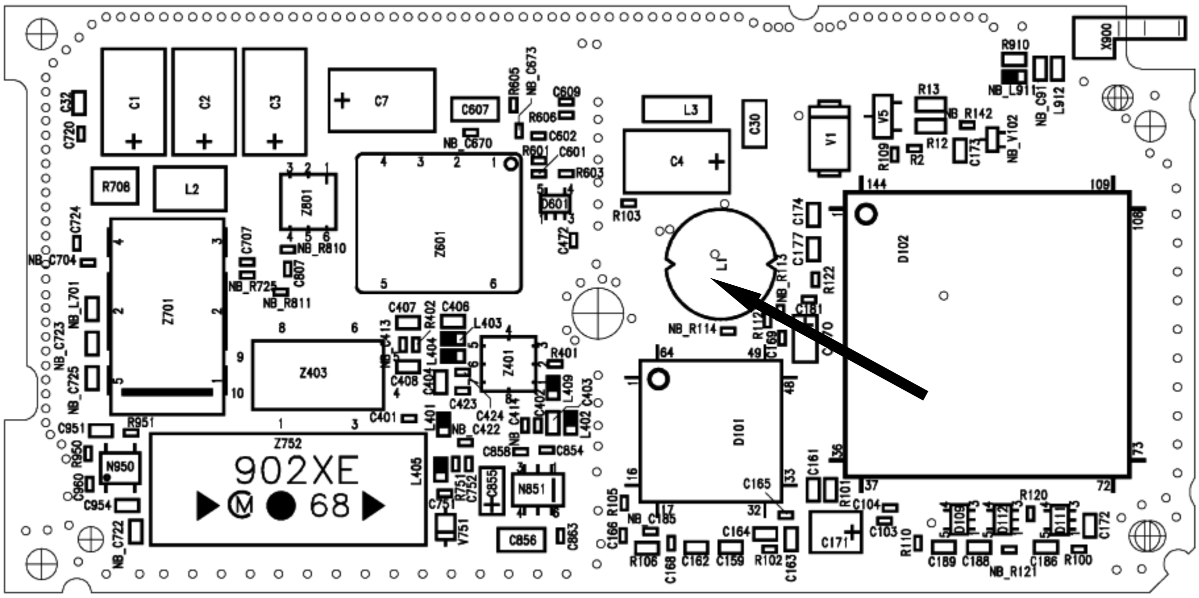
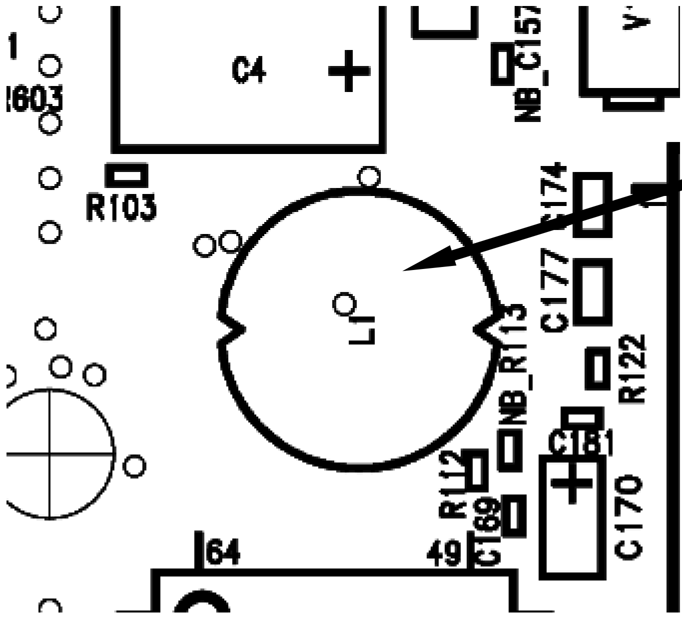


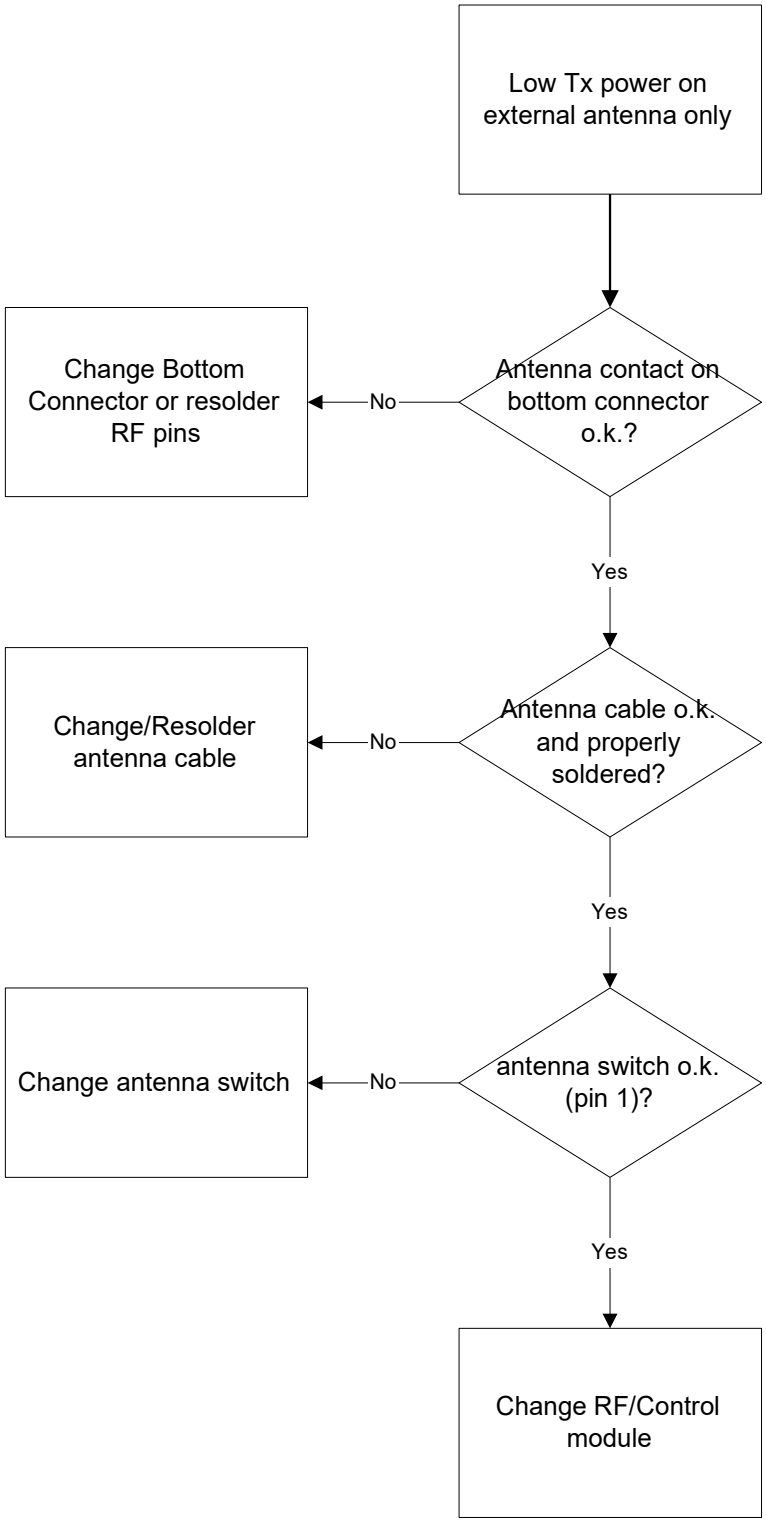
Figure 2: Coil (L1) Placement (Top View)

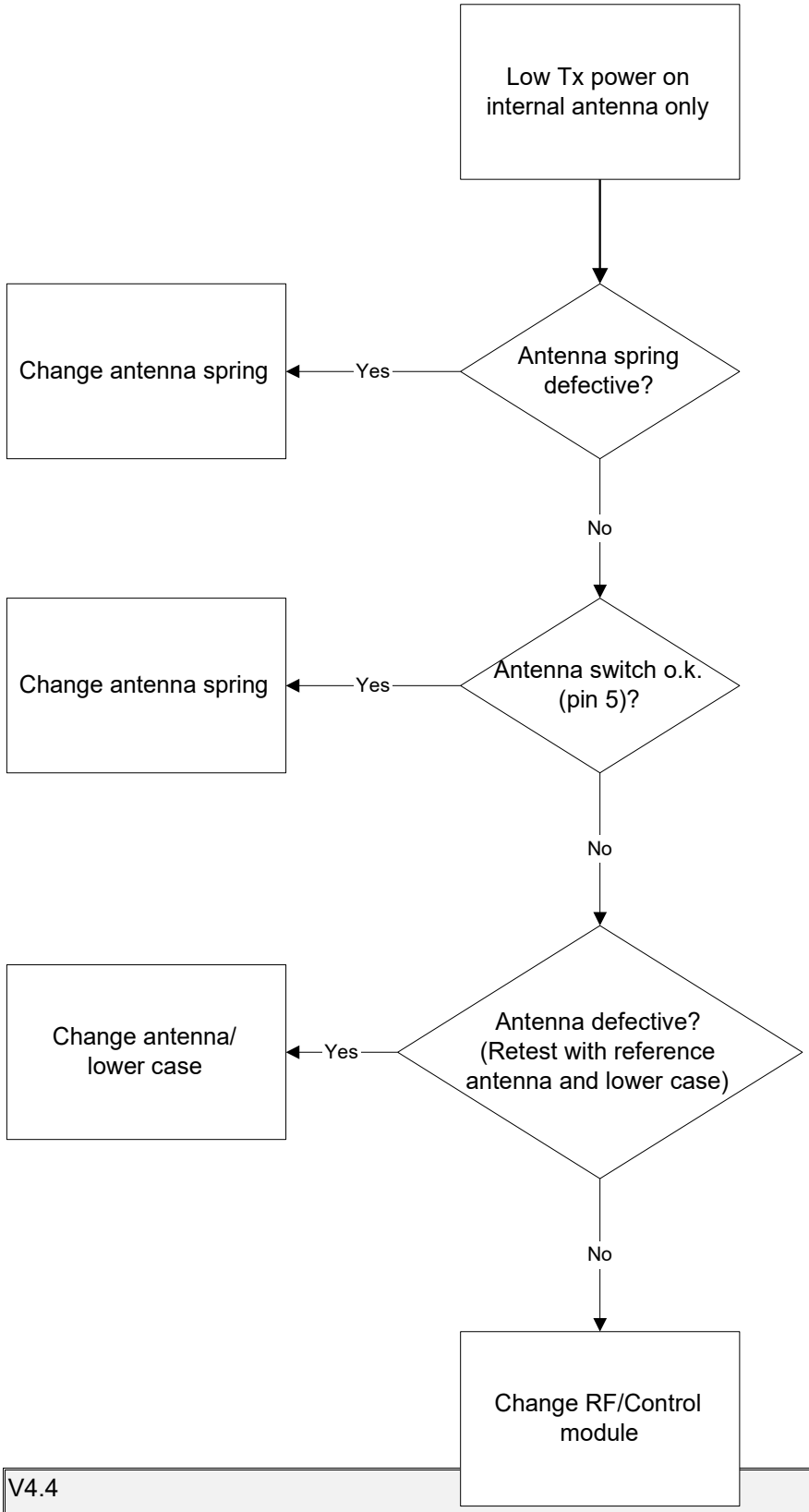


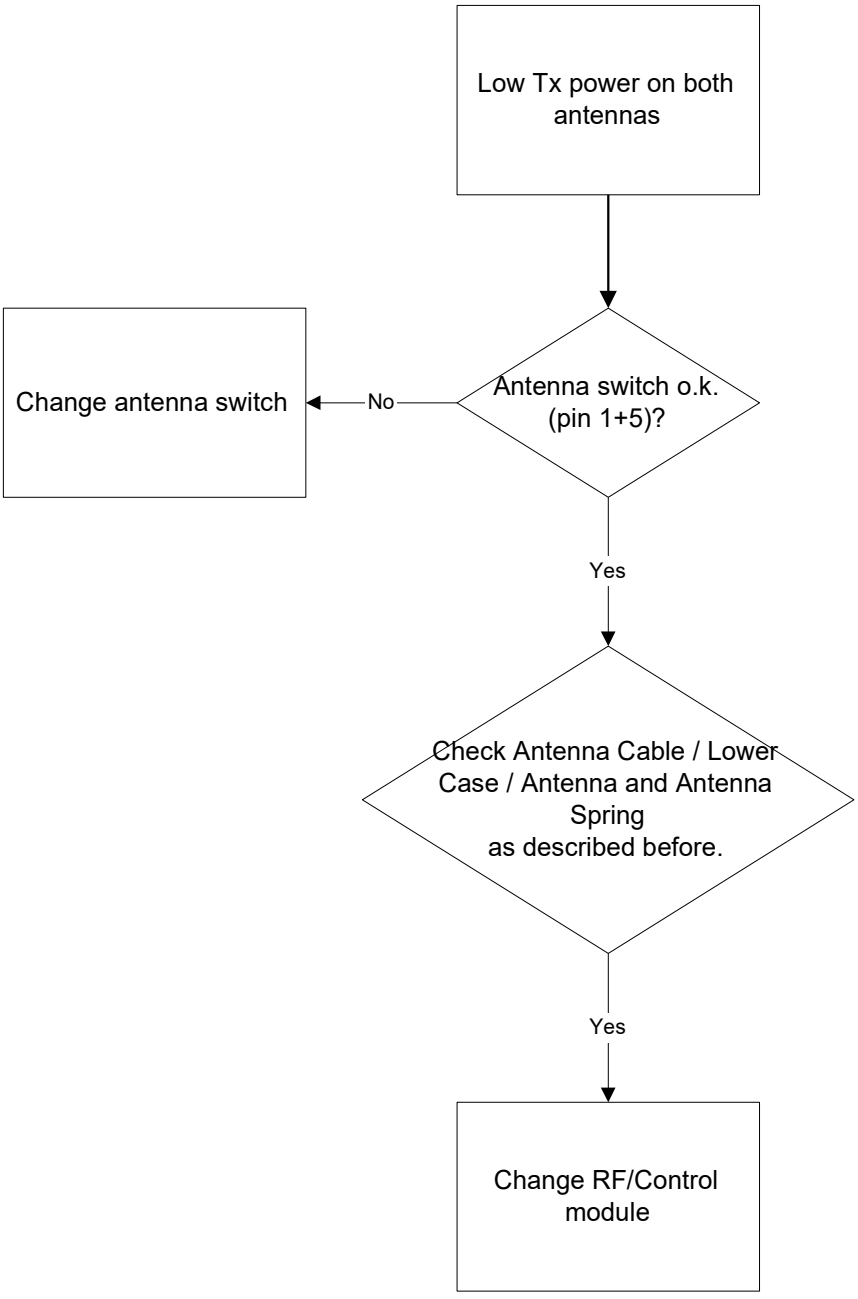
14 ANNEX / FLOWCHARTS

14.1 Tx power problems

If you experience a low output power on either antenna (internal/external) please follow the flowchart below.
For more information about the described components please refer to the respective chapters.


Low Tx power on external antenna only
Antenna contact on bottom connector o.k.?
No
Change Bottom Connector or resolder RF pins
Yes
Antenna cable o.k. and properly soldered?
No
Change/Resolder antenna cable
Yes
antenna switch o.k. (pin 1)?
No
Change antenna switch
Yes
Change RF/Control module


Low Tx power on internal antenna only
Antenna spring defective?
Yes
Change antenna spring
No
Antenna switch o.k. (pin 5)?
Yes
Change antenna spring
No
Antenna defective? (Retest with reference antenna and lower case)
Yes
Change antenna/ lower case
No
Change RF/Control module



Remark: If the Tx power problem is on both antennas, it is most likely a Power Amplifier problem which cannot be fixed locally.