

Lead-Free Assembly and Soldering Photo CD-ROM

This CD-ROM provides the process or quality engineer with a supply of photographs which may be used in company inspection documents or presentations. The photographs can also be used in marketing and advertising material or in technical articles. They may be simply pasted into any Word or PowerPoint document for in house company use. Photographs are provided in either .Tiff or .jpg file format. There are another ten CDs of images on different subjects available at www.bobwillis.co.uk

The photographs are either conventional photographs, x-rays and microsections for surface mount or conventional joints as well as solder paste print, components and solder joints. Both satisfactory and rejects are covered.

The images are not all one resolution and are a mixture of high and low.

This CD contains separate folders for some specific images:

Main folder

A range of different images, the wave solder joints are either Sn/Ag/Cu or Sn/Cu all the reflow joints are Sn/Ag/Cu.

Lead-Free Mini Disk

Contains x-ray images of the one of the first mini disks with lead free joints produced from Japan.

SnZiBi

These are a range of photographs taken on trials conducted with tin/zinc/bismuth alloy Reflowing in air.

SDSRS

This folder contains images of SnAgCu joints produced on a line set-up for Simultaneous Double Sided Reflow Soldering. The process allows the soldering of both sides of the printed board in one operation including through hole components with intrusive reflow.

Lead-Free Sections

These are all sections taken from boards soldered with either tin/silver/copper paste or bar solder.

The main folder contains the following:

- 01 Reflow of poor quality paste Sn/Ag/Cu
- 02 J lead joint Sn/Ag/Cu
- 03 J lead joint Sn/Ag/Cu
- 04 J lead joint Sn/Ag/Cu
- 05 Reflow of Sn/Ag/Cu paste
- 06 J lead joint Sn/Ag/Cu
- 07 Slump test of paste, limited slump
- 08 J lead joint Sn/Ag/Cu, surface flux cracks
- 09 Gull wing joints Sn/Ag/Cu
- 010 Gull wing joints Sn/Ag/Cu
- 011 J lead joint Sn/Ag/Cu
- 012 Reflow of poor paste Sn/Ag/Cu
- 013 J lead joint Sn/Ag/Cu
- 014 Paste deposit on through hole pads
- 015 BGA paste print with Sn/Ag/Cu
- 016 PIHR lead-free paste after reflow
- 017 Paste deposits after reflow Sn/Ag/Cu
- 018 Paste print on 0.050"
- 019 Image 15 above after reflow
- 020 As above
- 021 Reflow of through hole joints
- 022 Paste print above prior to reflow
- 023 BGA paste print Sn/Ag/Cu
- 024 As above
- 025 PIHR of paste deposit
- 026 Gull wind lead after reflow
- 027 SO89 after reflow
- 028 Incomplete reflow of through hole
- 029 0201 paste print on Sn/Ag/Cu
- 030 As above
- 031 As above
- 032 Displaced paste deposit on pads
- 033 Misplaced 0201 capacitor
- 034 0201 chip resistor
- 035 Misplaced 0201 capacitor
- 036 Misplaced 0201 capacitor

037 0201 chip resistor
038 Minor misplacement of 0201 resistor
039 Displaced paste deposit during placement
040 Displaced paste deposit during placement
041 Displaced paste deposit during placement
042 Displaced paste deposit during placement
043 Misplaced chip capacitor
044 Minor misplacement of capacitor
045 Displaced paste deposits
046 Displaced paste deposits
047 0201 paste deposits
048 0201 paste deposits
049 Minor component misplacement
050 Lifted 0201 capacitor
051 Lifted 0201 capacitor with solder bead
052 Chip resistor incomplete reflow
053 0201 Chip capacitor incomplete reflow
054 0201 Chip resistor incomplete reflow
055 0201 capacitor incomplete reflow
056 Satisfactory reflow 0201 capacitor
057 Incomplete reflow of paste
058 Lifted 0201 capacitor incomplete reflow
059 0201 resistor satisfactory reflow
060 0201 capacitor satisfactory reflow
061 Satisfactory 0201 resistor reflow
062 0201 resistor reflowed on edge due to misplacement
063 0201 capacitor satisfactory reflow
064 0201 capacitor satisfactory reflow
065 0201 resistor satisfactory reflow
066 0201 capacitor satisfactory reflow
067 0201 resistor satisfactory reflow
068 Chip capacitor after placement
069 Chip capacitor after placement
070 Chip capacitor after placement

073 X-ray image of CSP joints
074 X-ray image of BGA joints, incorrect profile
076 X-ray as above on CSP
077 X-ray as above
078 BGA as above
079 BGA with wetting indicator and incorrect profile used
080 BGA with wetting indicator and satisfactory joints
081 Satisfactory joints

Lead-Free Sections Folder

All the images shown in this section were produced with Sn/Ag/Cu unless otherwise stated. The sections show both wave and reflow joints, all the through hole joints were wave soldered. The metalised terminations on the components were not lead-free.

- 01 Microsection through gull wing joint
- 02 As above
- 03 Section through gull wing lead
- 04 Section through J lead
- 05 Section through a J lead termination
- 06 As above
- 07 Wave solder joint on chip resistor
- 08 Wave soldered joint on resistor
- 09 Wave soldered joint on chip resistor
- 010 As above
- 011 BGA with voids in joint
- 012 BGA with voids in joint
- 013 BGA with voids in joint
- 014 BGA with voids in joint
- 015 J lead termination
- 016 Gull wing joint
- 017 Gull wing joint with void
- 018 BGA joint on silver finish pad
- 019 Gull wing lead termination
- 020 J lead termination joint
- 021 J lead termination joint
- 022 As above with void
- 023 As above
- 024 Gull wing joint reflowed
- 025 Through hole wave solder joint tearing
- 026 As above
- 027 As above
- 028 As above
- 029 PTH Solder joint lifting
- 030 PTH Solder joint lifting
- 031 PTH Solder joint lifting
- 032 Through hole solder joint
- 033 Selective area solder joint lift
- 034 Selective area solder joint lift
- 035 PTH Solder joint lifting
- 036 Through hole solder joint

037 Through hole joint tearing
038 PTH Solder joint lifting
039 PTH Solder pad lifting
040 PTH Solder pad lifting
041 PTH Solder pad lifting
042 PTH Solder pad lifting
043 Through hole joint tearing
044 PTH Solder joint lifting
045 Through hole joint tearing
046 Through hole joint tearing
047 Through hole joint tearing plus joint lift
048 Section through PTH
049 Section through PTH
050 BGA Solder joints
051 As above
052 As above with voids
053 J lead termination
054 J lead termination
055 J lead termination
056 Chip resistor wave solder joint
057 BGA terminations
058 BGA terminations
059 Gull wing joint wave soldered
060 Reflow of J lead termination
061 SEM view of PTH joint lift
062 SEM PTH solder joint lifting
063 SEM PTH solder joint lifting
064 SEM PTH pad lifting
065 PTH solder joint lifting
066 PTH solder joint tearing
067 PTH solder joint lifting
068 PTH solder joint tearing

SDSRS Folder
X-Rays

All the images shown in this section were produced with Sn/Ag/Cu unless other wise stated. The x-rays are of reflow joints both through hole (PIHR) and surface mount. The metalised terminations on the components were not lead-free. These boards were soldered using the Simultaneous Double Sided Reflow Soldering process. For further information on the SDSRS process visit and download it at www.bobwillis.co.uk

01 Image showing both CSP and gull wing
02 CSP joints
03 Chip component with paste articles in adhesive
04 MELF chip solder joints
05 MELF solder joints
06 QFP gull wing and chip joints with paste in adhesive
07 BGA and chip component joints with paste in adhesive
08 Pin in hole reflow joints
09 As above
010 Gull wing joints with paste in adhesive
011 Gull wing joints with paste in adhesive
012 Gull wing joints
013 Incomplete joints on BGA
014 BGA joints
015 BGA joints
016 MELF joints
017 MELF and SOIC gull wing leads
018 Chip component joints
019 QFP with gull wing joints
020 Chip and MELF joints
021 CSP and gull wing terminations
022 Gull wing terminations on SOIC
023 Chip and gull wing terminations
024 SOT23 and chip terminations
025 Chip terminations with solder balls
026 BGA joints
027 BGA joints
028 BGA joints
029 BGA joints
030 BGA joints
031 BGA joints
032 BGA joints
033 CSP and gull wing solder joints
034 CSP and gull wing solder joints
035 CSP and gull wing joints
036 Gull wing solder joints
037 CSP and gull wing terminations
038 SOT23 joints
039 Chip component joints
040 PIHR joints incomplete reflow
041 BGA joints poor reflow

042 BGA joints poor reflow
043 BGA joints poor reflow
044 BGA joints poor reflow
045 Chip component terminations with solder balling
046 CSP terminations
047 CSP joints
048 MELF component terminations
049 QFP gull wing terminations
050 Through hole reflow without pins and incomplete reflow
051 Stencil used for through hole reflow
052-68 X-rays showing through hole reflow joints with fillet lifting

SDSRS Folder
Microsections

All the images shown in this section were produced with Sn/Ag/Cu unless otherwise stated. The micro sections are reflow joints both through hole (PIHR) and surface mount. The metalised terminations on the components are not lead-free. These boards were soldered using the Simultaneous Double Sided Reflow Soldering process. For further information on the SDSRS process visit and download it at www.bobwillis.co.uk alternatively there is an interactive CD ROM on the complete process.

01 BGA incomplete reflow of paste
02 BGA incomplete reflow of paste
03 Section taken through a BGA joint
04 Section taken through a BGA joint
05 Voiding in SDSRS joint
06 Open joint due to component stand off height
07 BGA joint
08 BGA joint with void
09 BGA joint with void
010 BGA joint with void
011 BGA joint with void
012 BGA joint with void
013 BGA joint
014 BGA with elongated joint
015 BGA with elongated joint
016 BGA with incomplete paste reflow
017 BGA joint with voids
018 BGA with incomplete reflow

019 PIHR joint with fillet lifting
020 PIHR joint with fillet lifting
021 PIHR joint with fillet lifting
022 PIHR joint with pad lifting
023 Section with minor voiding
024 Section with minor voiding
025 Section with minor voiding
026 Section with minor voiding
027 solder joint with solder ball in adhesive
028
029 PIHR joint with voids
030 PIHR joint with voids
031 PIHR joint with voids and fillet lift
032 PIHR joint with voids and fillet lift
033 PIHR joint with voids and fillet lift
034 PIHR joint with voids and fillet lift
035 PIHR joint with minor pad lift
036 PIHR joint with voids and fillet lift
037
038 Solder joint on chip resistor
039 Chip resistor and adhesive
040 Chip resistor joint with voids
041 Chip resistor joint
042 solder joint
043 solder joint
044 BGA incomplete reflow of paste
045 Gull wing joint
046 BGA joint
047 Open BGA joint
048 BGA joint with minor voiding
049 Gull wing joint
050 BGA joint
051 Lifted/elongated gull wing lead
052 Lifted/elongated gull wing lead
053 Chip resistor joint with voiding
054 Lifted/elongated gull wing leads
055 Lifted/elongated gull wing joint with voids
056 Lifted/elongated gull wing leads
057 Lifted/elongated gull wing leads
058 Lifted/elongated gull wing joints
059 BGA incomplete reflow of paste
060 BGA incomplete reflow of paste
061 BGA joint with voids

062 BGA joint with voiding
063 BGA joint with voiding
064 BGA with open joint
065 BGA incomplete reflow of paste
066 PIHR joint with voids and pad lifting
067 PIHR joint with void and joint tearing
068 PIHR joint with fillet lifting
069 PIHR joint with voids and fillet lifting
070 PIHR joint with voids and fillet lifting
071 PIHR joint with voids and fillet lifting
072 PIHR joint with voids and pad lifting
073 PIHR joint with voids and fillet lifting
074 PIHR joint with voids and fillet lifting
075 PIHR joint with voids and pad lifting
076 PIHR joint solder fillet lifting

SnZiBi Folder

All the images shown in this section were produced with Sn/Zi/Bi unless otherwise stated. The images are mainly associated with reflow joints both through hole (PIHR) and surface mount. The metalised terminations on the components are not lead-free.

01 Solder paste push out after connector assembly
02 Board bow due to incorrect PCB dimensions
03 As above
04 Solder paste being printed
05 Solder paste being printed
06 Through hole fill with paste
07 Solder paste print over through holes
08 Print into tooling holes
09 Solder paste print over through holes
010 Solder paste print deposit
011 Through hole fill with paste
012 Through hole fill with paste
013 Through hole fill with paste
014 Through hole fill with paste
015 Solder paste print deposit
016 Through hole paste fill
017 Solder paste push out after connector assembly
018 Solder paste push out after connector assembly
019 Solder paste push out after connector assembly

020 Solder paste print deposit
021 Solder paste print deposit
022 Solder paste deposit over through holes
023 Print into tooling holes
024 Through hole fill with paste
025 Through hole fill with paste
026 Through hole fill with paste
027 Through hole fill with paste
028 Through hole fill with paste
029 Print test pattern
030 Print test pattern
031 Surface mount print
032 Surface mount print
033 Surface mount print
034 Print test pattern
035 Surface mount print
036 Surface mount print
037 Solder paste particles
038 Solder paste particles
039 Solder paste particles
040 PIHR connector hold-down pins
041 PIHR connector hold-down pins
042 PIHR connector hold-down pins
043 PIHR connector hold-down pins
044 PIHR connector pin
045 PIHR connector pin
046 PIHR connector pins top side
047 PIHR connector pins
048 PIHR connector pin
049 0201 paste print

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