Application Brief

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Instructions for 90 Sn -10 Pb Solder Measurements

1. Overview

Values obtained for the Sn composition ratio by measuring 9:1 solder at a thickness less than 5 microns are high at 2 to 3%. This application brief explains the cause and offers a solution.

2. Problem Analysis

Measuring the Sn composition ratio high occurs when a collimator 0.2 mm or larger is used. The problem does not appear when a smaller collimator, less than 0.1 mm, is used. When 9:1 solder has a thickness of 5 microns or less, the Pb component at traces of less than 0.5 micron cannot be determined. This effect is assumed without the ability to accurately detect trace Pb, because the Sn component is over estimated.

We measured an 0.8 micron Pb standard foil and compared differences under various conditions of measurement. Figure 1 is an image of the peak and background levels of Pb.

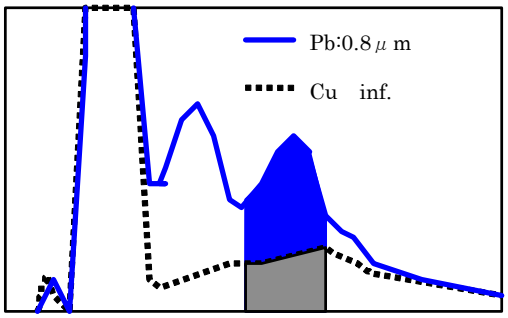

Figure 1 Image of the peak and background levels of Pb

Table 1 Pb Peak / Background

	Collimator Size	Current (uA)	Pb Intensity (cps)	Background Intensity (cps)	Peak/Background ratio
Condition 1	0.2 mm	1000	626.8	140.0	3.48
Condition 2	0.2 mm	500	311.0	47.2	5.59
Condition 3	0.2 mm	200	127.1	10.2	11.5
Condition 4	0.1 mm	1000	128.2	12.7	9.08
Condition 5	0.1 mm	500	62.7	6.9	8.09

Table 1 clearly shows a worsening trend in the peak/background ratio as the size of collimator and the current increase. As shown by conditions 1 and 2, a low peak/background ratio results in higher Sn measurement readings. These results suggest that the optimum set of conditions is either 3 or 4.

3. Recommended Measurement Conditions

From these results, we recommend the following measurement conditions for measuring 9:1 solder with a thickness less than 5 microns.

3.1 When using collimator size 0.1 mm:

Changing measuring conditions not required.

3.2 When using collimator size 0.2 mm:

Manually change the current to 200 uA in the measurement conditions window then create the calibration curve.

4. Conclusion

As shown in Table 1, improving the peak/background ratio of Pb decreases the fluorescence X-ray intensity. Consequently, measurement time must be increased by 5 times to improve measurement value reproducibility (with a 0.2 mm, 1000 uA measurement).