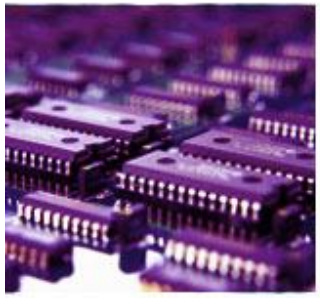

Structure Analysis Report

——OMAP5432 Cross Section

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Table of Contents

Introduction

This cross section analysis report of OMAP5432 processor consists of the following sections:

- Structure Analysis of Metal Layers
- 6T SRAM Cell
- 8T SRAM Cell

Device Summary

Items	Contents
Part Number	OMAP 5432
Manufacture	Texas Instruments
Package Marking	TI; X5432AAAN; 32ZCN09; $N; G1;
Package Type	754-ball PBGA
Die Markings	TPS65632AA0; TI; 2012
Die Size	9.1×8.8 mm^2
Process	
Process Type	CMOS
Number of Metal Levels	9
Number of Poly Levels	1
Transistor Gate Length	28 nm

List of Figures

1.0 Die Overview

Description

1.1 Package Photo

1.2 Die Photo

Description

Imaging

An optical microscope is used to image overview of the device.

Sample Preparation

A sample is decapped in order to examine the die and markings.

The results of this analysis are presented in this section.

Results of Analysis

Package Photo is shown in Figure 1.1 and 1.2.

Die Photo: Whole die photograph of the device is shown in Figure 1.3.

Die Size is 9.1 mm × 8.8 mm with a die area of 80.08 mm^2.

1.1 Package Photo

Package Marking
TI; X5432AAAN; 32ZCN09; $N; G1;

Figure 1.1 Package Top View

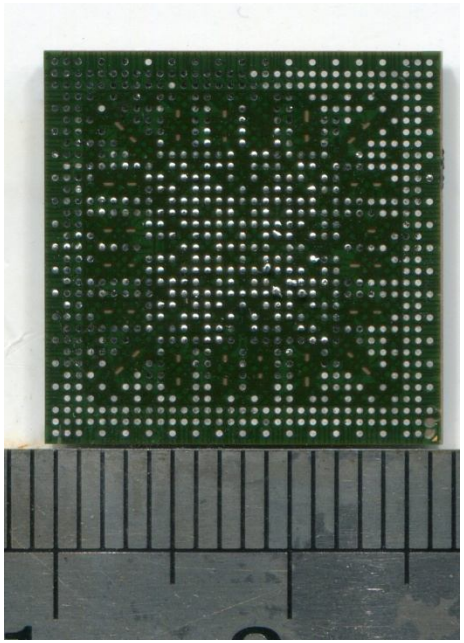

Figure 1.2 Package Back View

1.2 Die Photo

Die Size
X: 9.1 mm Y: 8.8 mm

Figure 1.3 Die Photo

2.0 General Structure Analysis

Description

2.1 Metal Layers Measurement Table
2.2 Via Measurement Table
2.3 Structure Analysis of Metal Layers
2.4 Thickness of Metal8-9 Layers
2.5 Thickness of Metal1-7 Layers

Description

Imaging

An optical microscope is used to image overview of the device. A Scanning Electron Micr oscope (SEM) is used to image cross section of the device. An Energy Dispersive X-Ray Spectroscopy (EDX) is used to measure the elements contained.

Sample Preparation

High precision cross-section technique is used in this part. Prior to SEM analysis, the sample is chemically treated to either delineate different dielectric layers or to delineate P-type and N-type regions within the silicon substrate. After a specimen is delayered to the desired layer, a thin layer of Pt is sputter coated on the surface to be imaged in order to minimize sample charging. The results of this analysis are presented in this section.

Results of Analysis

General Structure Analysis: The related information is shown through Figure 2.1 to Figure 2.3.

2.1 Metal Layers Measurement Table

Items	Thickness	Material
Metal 9		
Metal 8		
Metal 7		
Metal 6		
Metal 5		
Metal 4		
Metal 3		
Metal 2		
Metal 1		

2.2 Via Measurement Table

Items	Thickness	Material
Via 8		
Via 7		
Via 6		
Via 5		
Via 4		
Via 3		
Via 2		
Via 1		
Contact		

2.3 Structure Analysis of Metal Layers

Figure 2.1 Structure of Metal Layers SEM 5,000X

2.4 Thickness of Metal 8-9 Layers

	Thickness
Metal 9	
Metal 8	
Via 8	
Via 7	

Figure 2.2 Thickness of Metal8-9 Layers_SEM 5,000X

2.5 Thickness of Metal1-7 Layers

	Thickness
Metal 7	
Metal 6	
Metal 5	
Metal 4	
Metal 3	
Metal 2	
Metal 1	
Via 6	
Via 5	
Via 4	
Via 3	
Via 2	
Via 1	
Contact	

Figure 2.3 Thickness of Metal1-7 Layers_SEM 18.28KX

3.0 SRAM Cell Structure Analysis

Description

3.1 Structure Analysis of 6T SRAM Cell

3.2 Structure Analysis of 8T SRAM Cell

Description

Imaging

An optical microscope is used to image overview of the device. And a Scanning Electron Microscope (SEM) is used to image cross section of the device.

Sample Preparation

High precision cross-section technique is used in this part. Prior to SEM analysis, the sample is chemically treated to either delineate different dielectric layers or to delineate P-type and N-type regions within the silicon substrate. After a specimen is delayered to the desired layer, a thin layer of Pt is sputter coated on the surface to be imaged in order to minimize sample charging. The results of this analysis are presented in this section.

Results of Analysis

Cross Section of 6T SRAM Cell : The related information is shown in Figure 3.1.1 to Figure 3.1.4.

Cross Section of 8T SRAM Cell : The related information is shown in Figure 3.2.1 to Figure 3.2.2.

3.1 Structure Analysis of 6T SRAM Cell

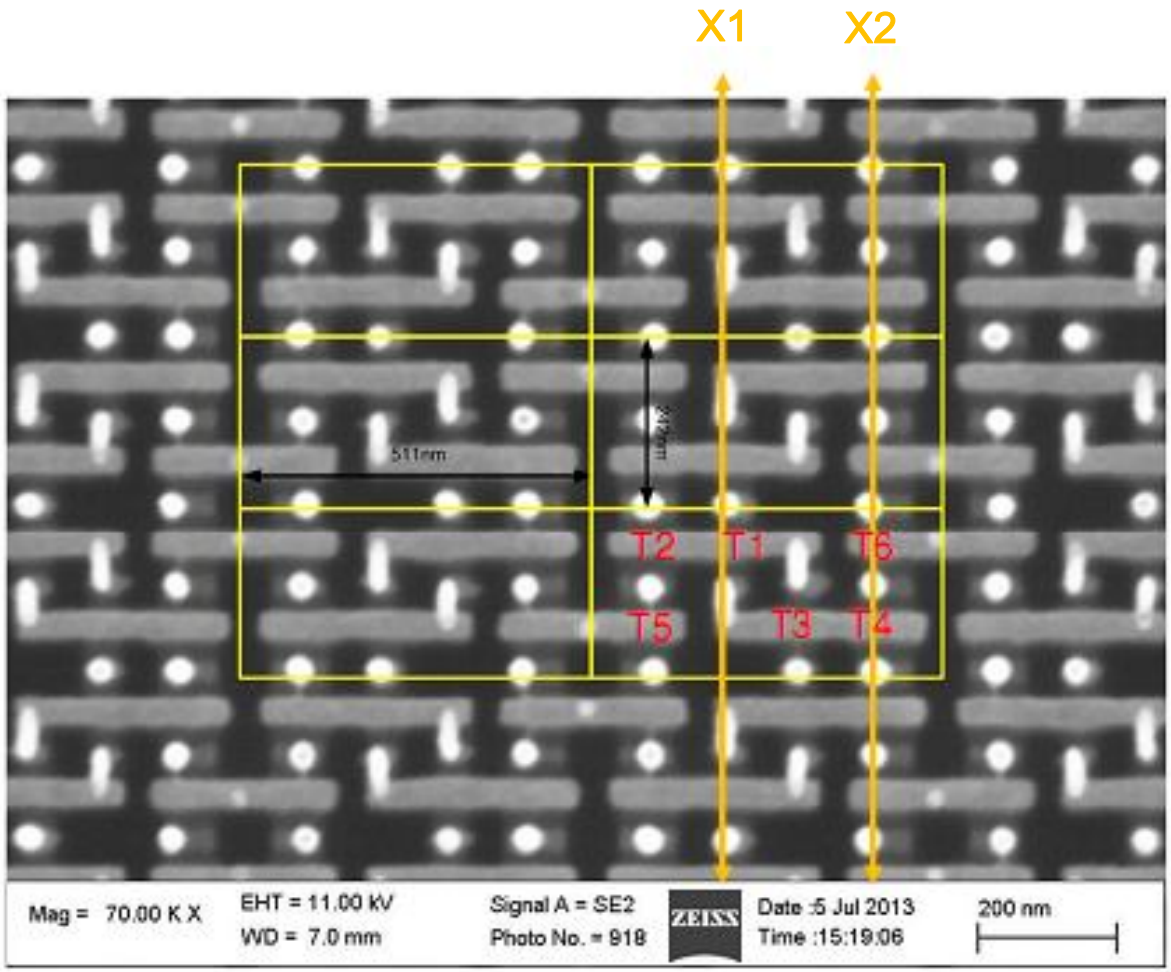

Figure 3.1 Position of 6T SRAM Cell Cross Section Analysis

3.1.1 Vertical Structure of X1

Figure 3.1.1 Vertical Structure of X1_SEM 45.0KX

3.1.2 Size of X1 Position

Figure 3.1.2 Size of X1 Position_SEM 45.0KX

3.1.3 Vertical Structure of X2

Figure 3.1.3 Vertical Structure of X2_SEM 60.0KX

3.1.4 Size of X2 Position

Figure 3.1.4 Size of X2 Position 60.0KX

3.2 Structure Analysis of 8T SRAM Cell

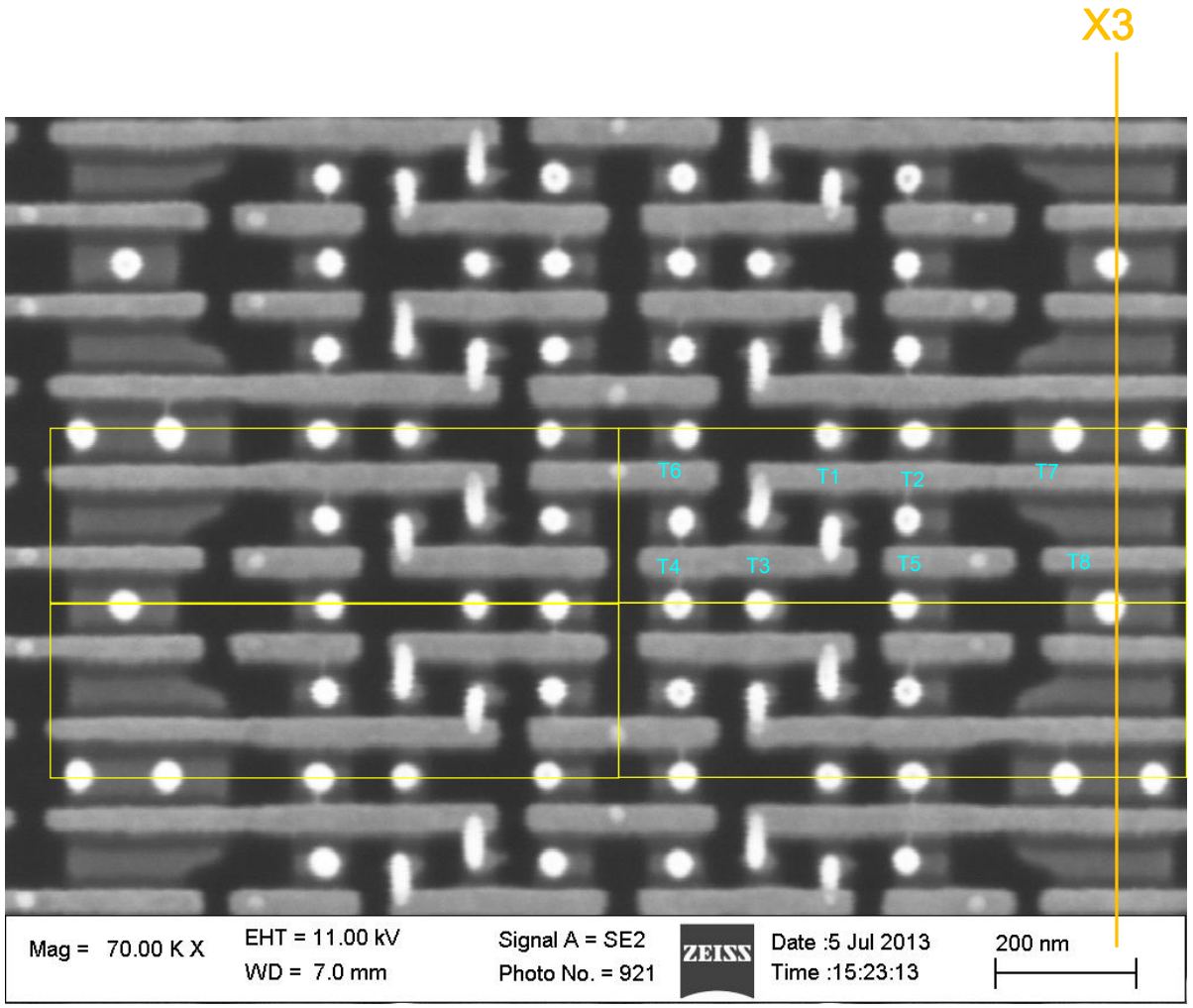

Figure 3.2 Position of 8T SRAM Cell Cross Section Analysis

3.2.1 Vertical Structure of X3

Figure 3.2.1 Vertical Structure of X3_SEM 32.0KX

3.2.2 Size of X3 Position

Figure 3.2.2 Size of X3 Position_SEM 32.0KX