

Reverse Engineering of SRAMs Selected for the TDM

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Motivation

- Five SRAMs SEL evaluated at RADEF Feb 2008
- Four will be flown in the TDM on PROBA-II
- This construction analysis is intended to establish basic technology information, process geometry, cell type and dimensions.

Manufacturer	Part number	Memory Size	Die size
ISSI	IS61LV5128AL	4M: 512K x 8	36.74mm ²
ISSI	IS62WV20488B LL	16M: 2M x 8	53.57mm ²
Alliance	AS7C34096A	4M: 512K x 8	27.90mm ²
Brilliance	BS62LV8001	8M: 1M x 8	69.16mm ²
Samsung	K6R4008V1D	4M: 512K x 8	22.50mm ²

Part number	Technology	SRAM type	SRAM cell size	Cell efficiency
IS61LV5128AL	180nm node 3 Al, 1 Poly	6T CMOS cell	4.18µm ²	47.7%
IS62WV20488 BLL	130nm node 4 Cu, 1 Poly	6T CMOS cell	1.96µm ²	61.4%
AS7C34096A	180nm node 4 Al, 1 Poly	6T CMOS cell	4.28µm ²	64.3%
BS62LV8001	180nm node 2 Al, 1 Poly	6T CMOS cell	5.40µm ²	65.5%
K6R4008V1D	180nm node 2 Al, 1 W, 1 Poly	6T CMOS cell	3.36µm ²	62.6%

Standard processes

All parts on bulk CMOS:

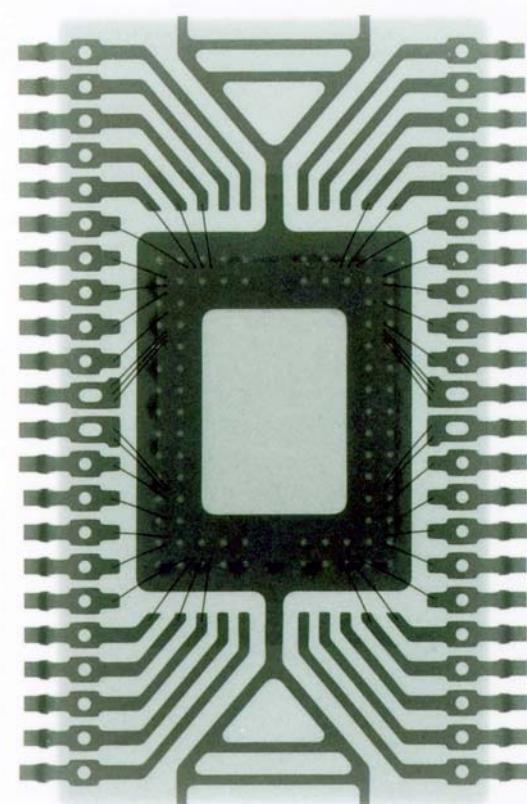
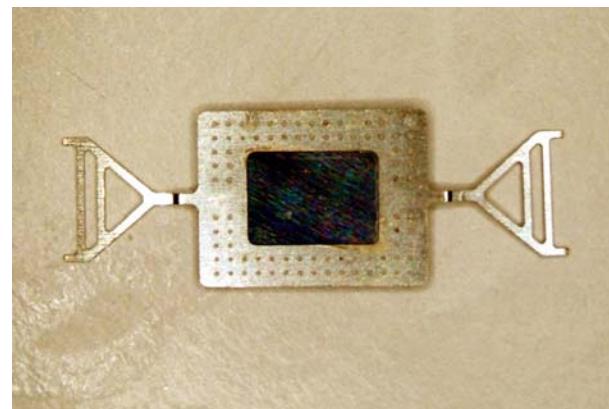
- no epitaxial layer
- all p substrates with concentration of 1.5e15 (AS7C34096A is 6.5e15)

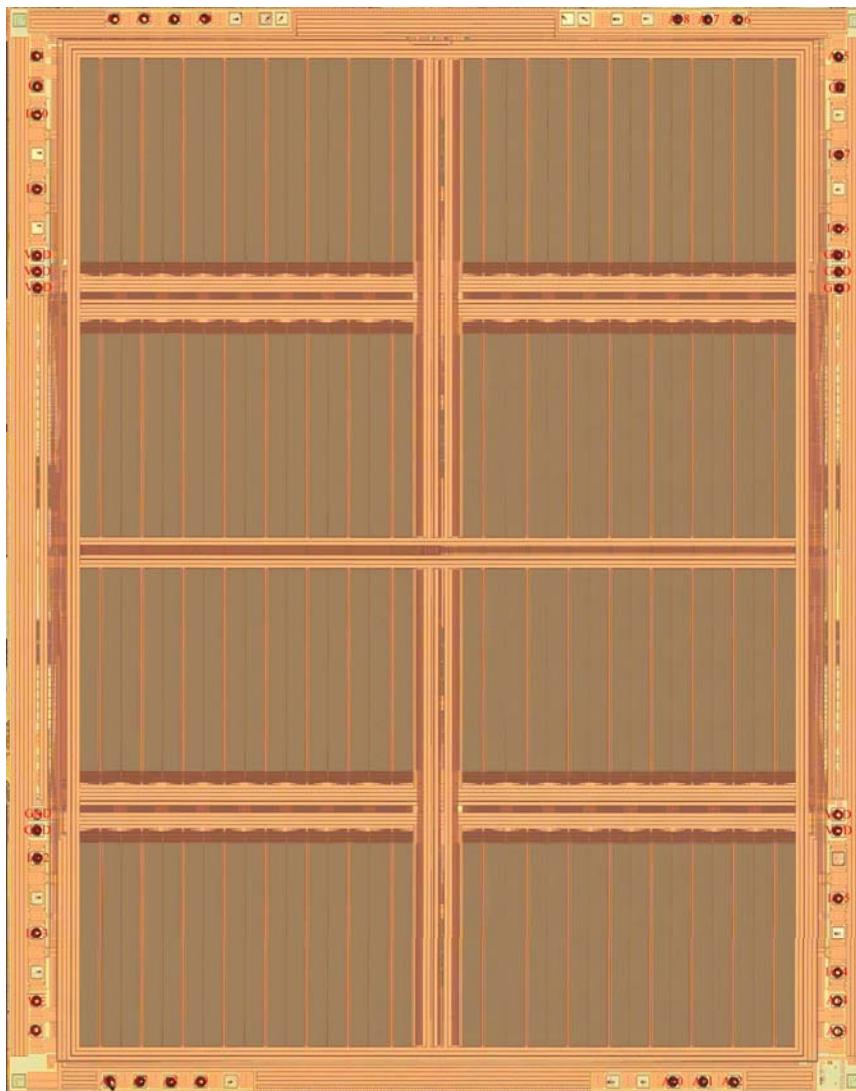
Standard packaging

- Only BS62LV8001 and K6R4008V1D have polyimide overcoat
- Some hollow lead frames

Example of construction analysis:

IS61LV5128AL

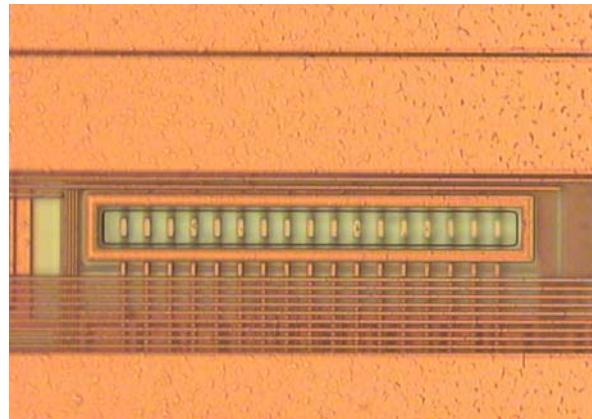




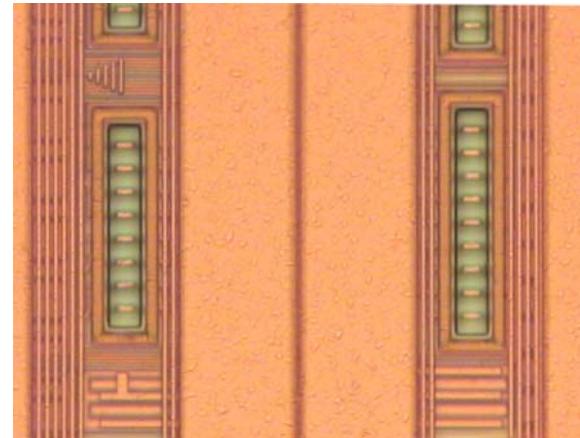
IS61LV5128AL

Die size = 6.83mm x 5.38mm

Die copyright 2001

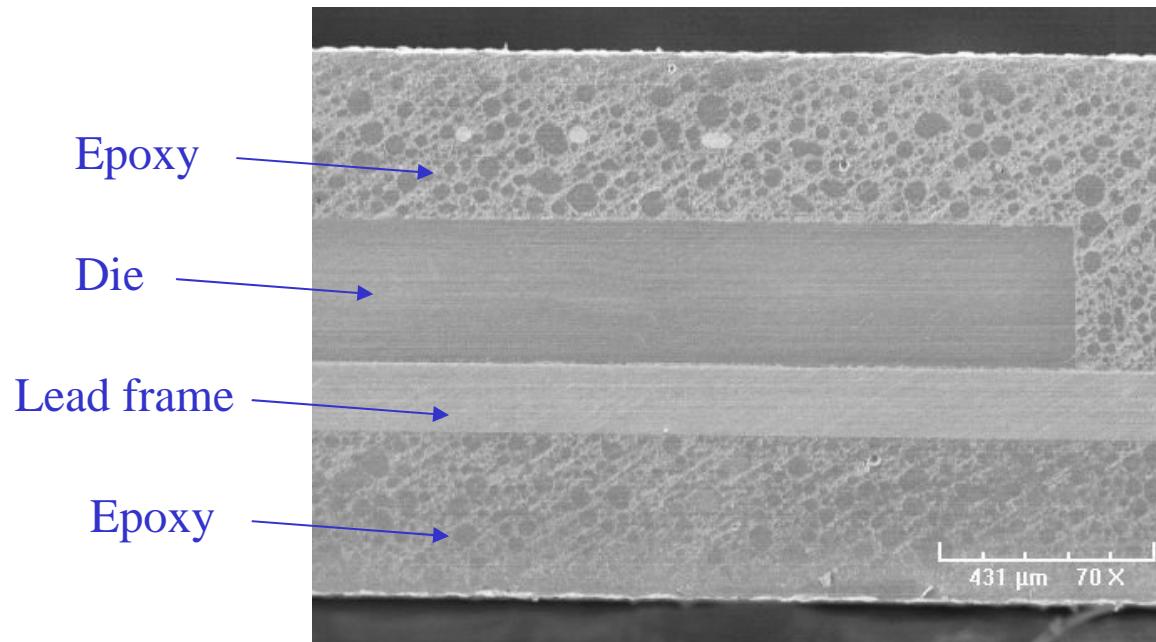


Row

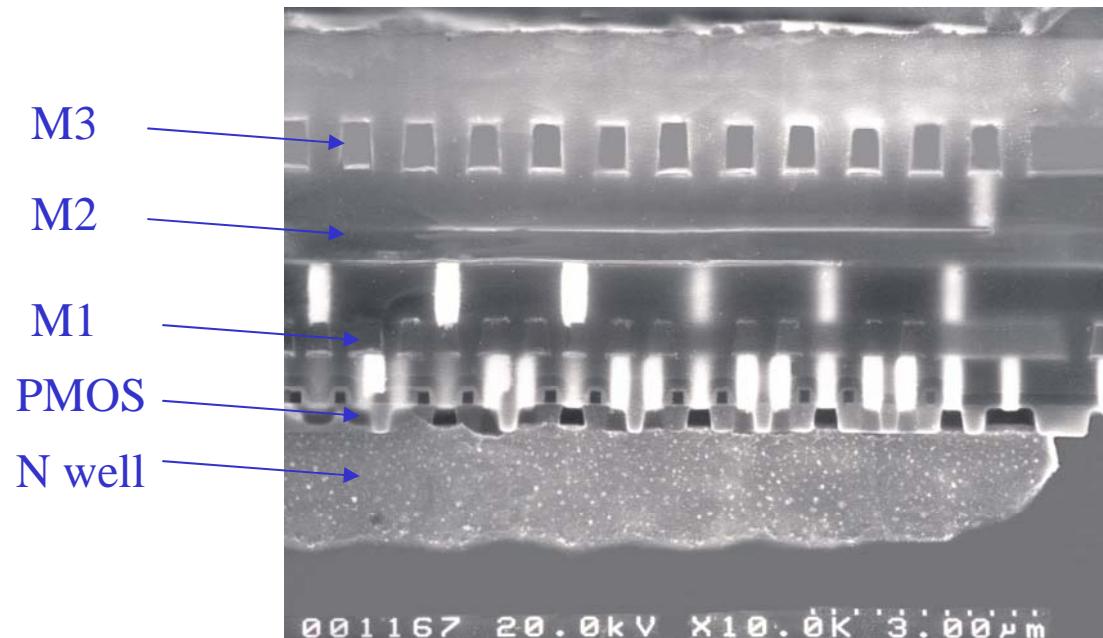


Column

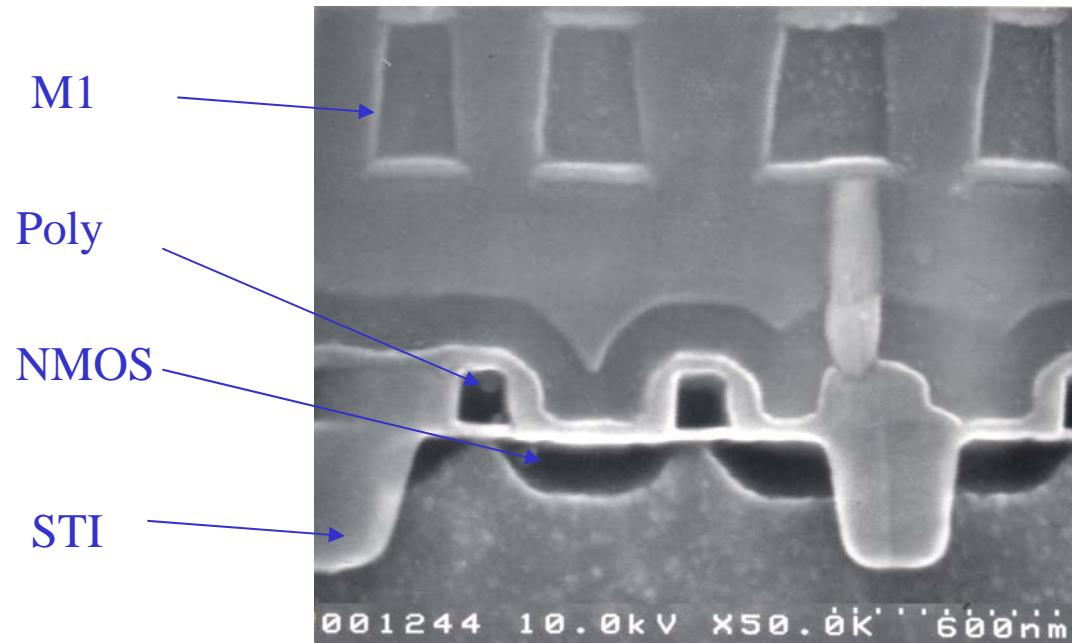
IS61LV5128AL redundancy fuses



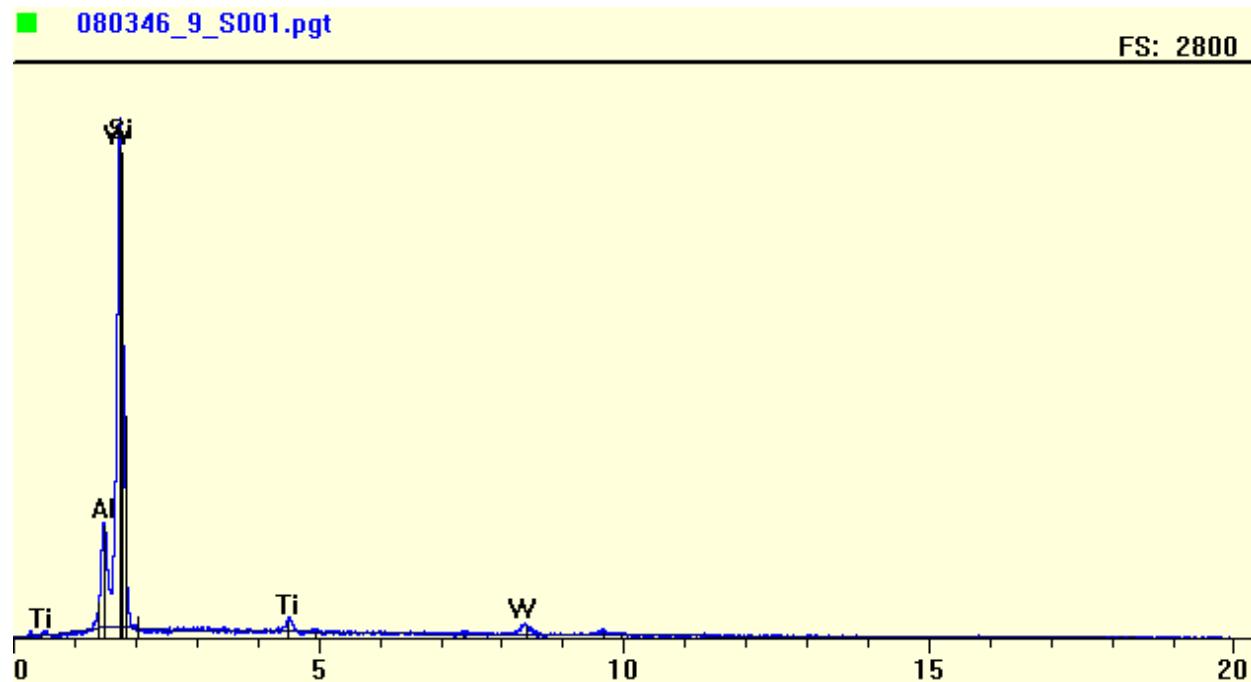
IS61LV5128AL package cross-section



IS61LV5128AL die cross-section

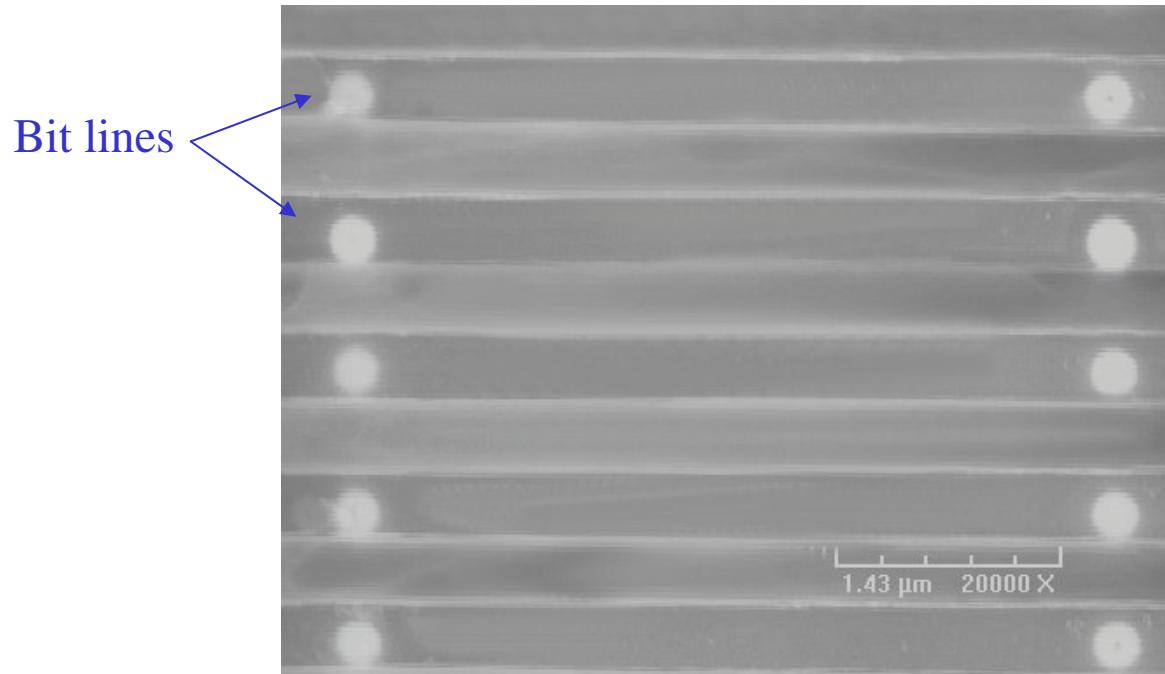


IS61LV5128AL die cross-section

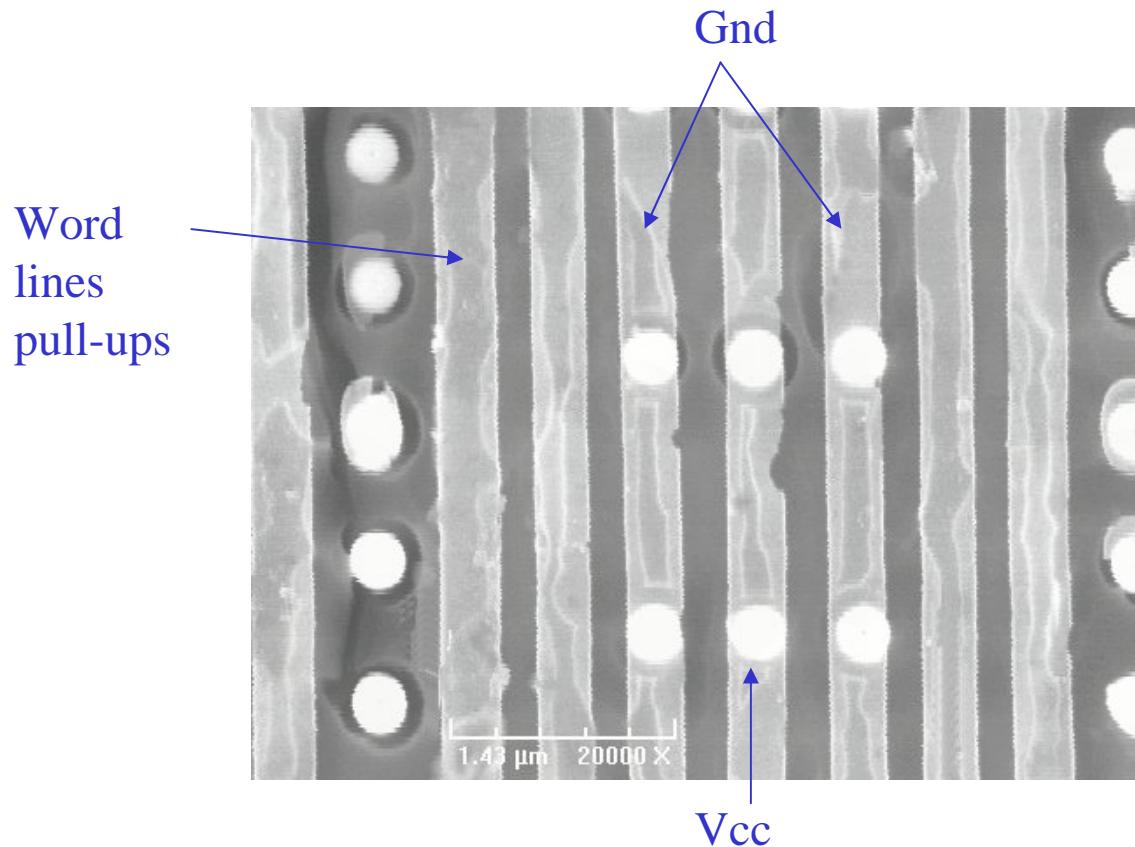


IS61LV5128AL EDX:

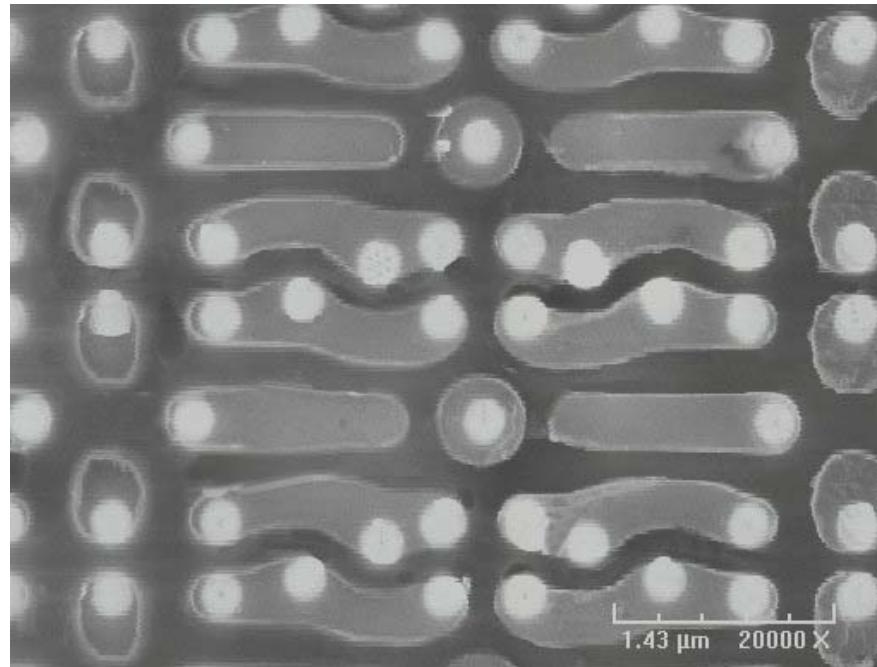
Standard aluminium metallisation system



IS61LV5128AL cell at metal 3

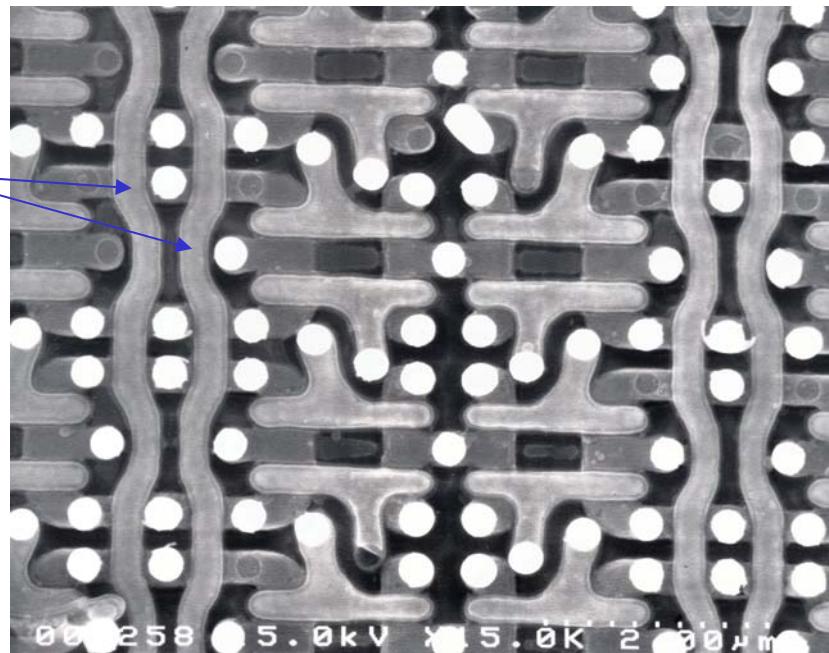


IS61LV5128AL cell at metal 2

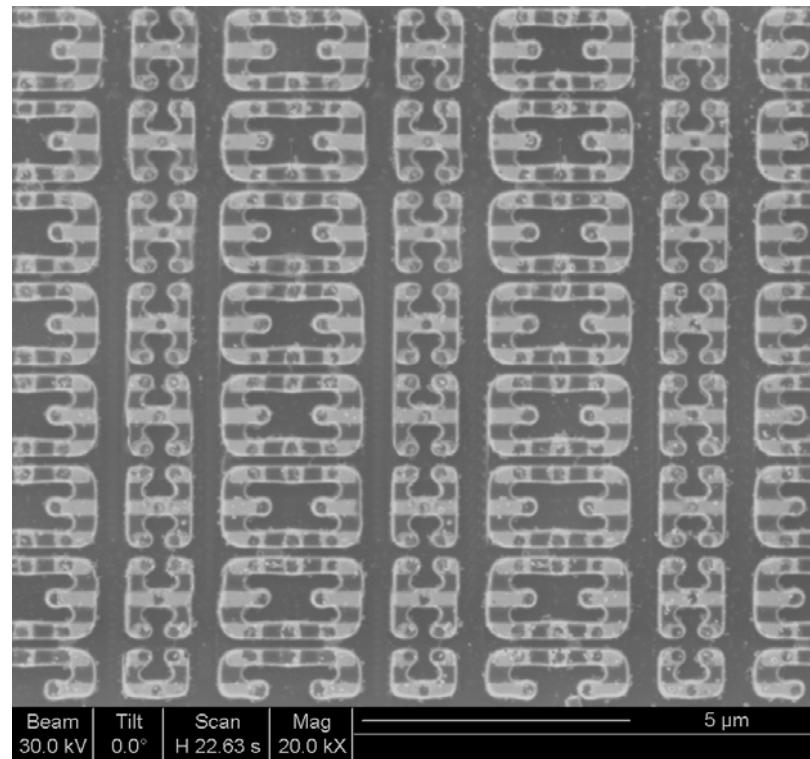


IS61LV5128AL cell at metal 1

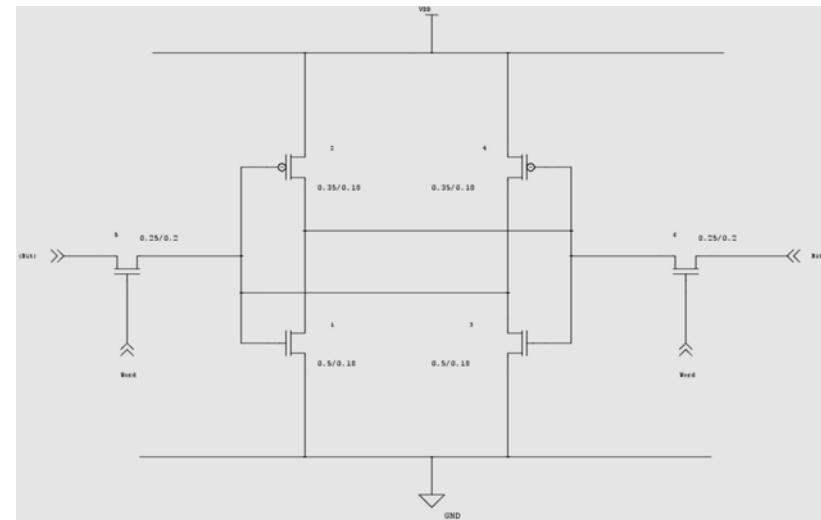
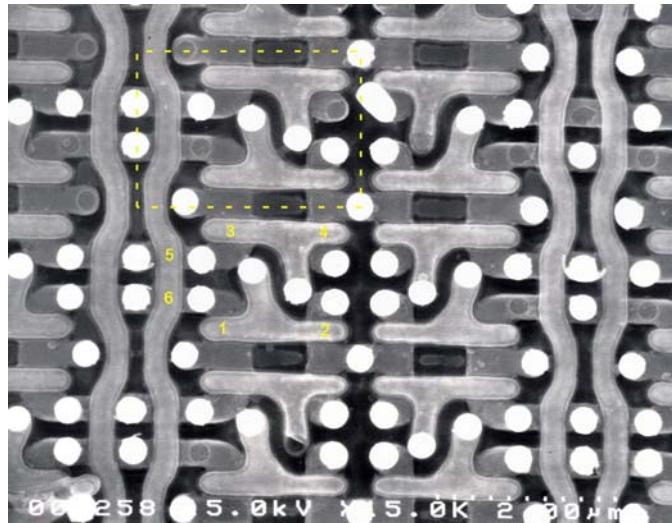
Word
lines



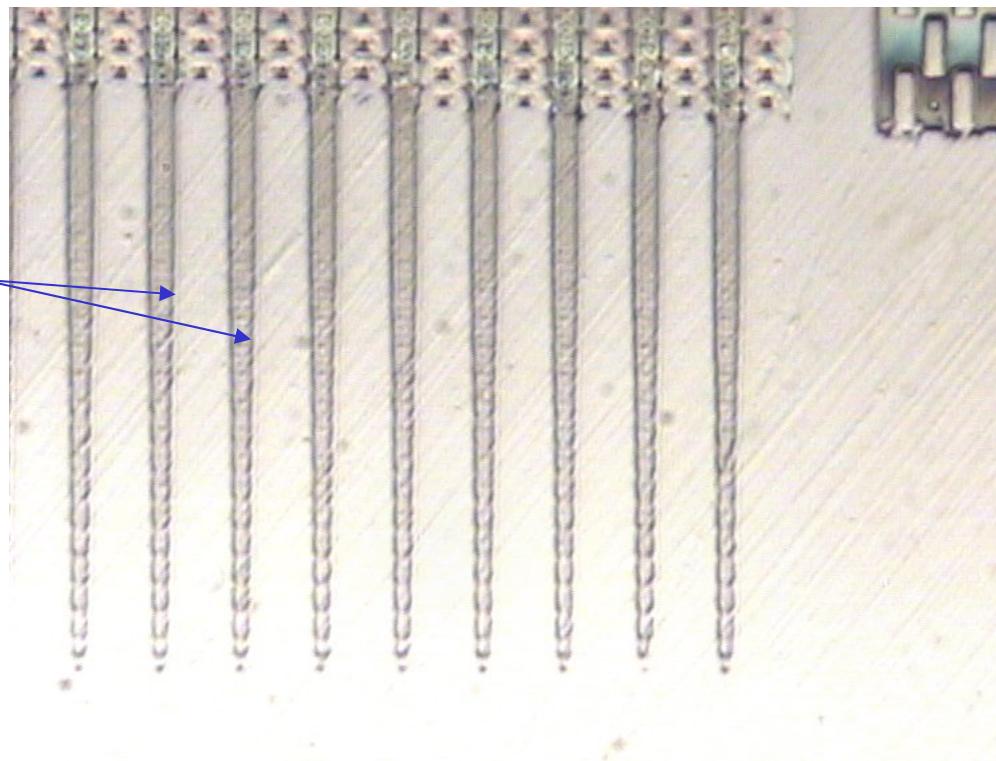
IS61LV5128AL cell at poly



IS61LV5128AL cell at diffusion



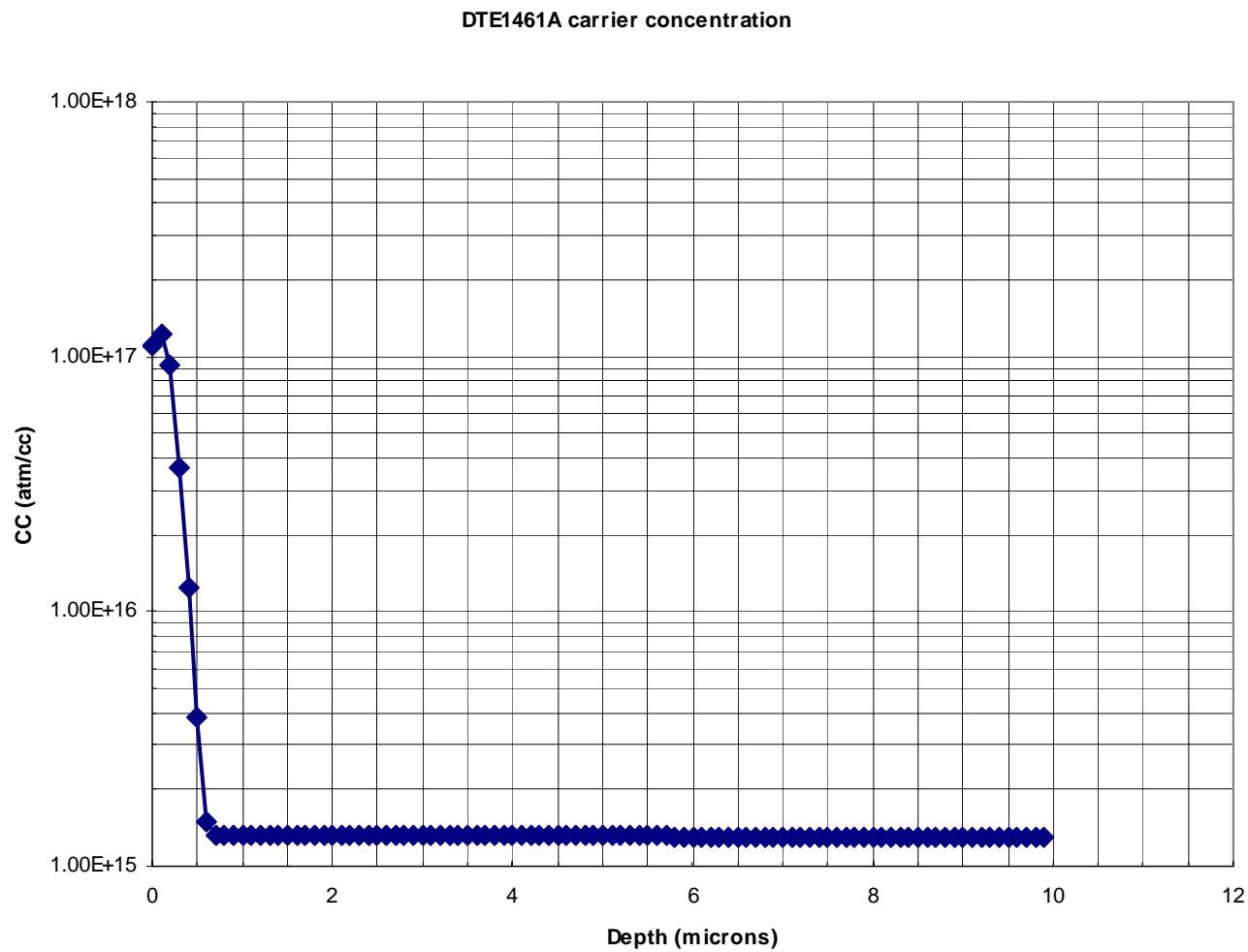
IS61LV5128AL cell schematic



N wells

A scanning electron micrograph showing a series of vertical, elongated, light-colored structures on a textured, yellowish-brown substrate. A blue arrow points to one of these structures, labeled 'N wells'.

IS61LV5128AL n-well separation





MTSL W05 COO25



Thank you



MTSL W05 COO25

