

1.1. S34ML-1 Product 48 nm

SLC NAND

48 nm SLC NAND was introduced in July 2012 and utilize tunnel Oxide, Polysilicon floating gate and interconnections are three metal layers with contact plugs and barrier metals. The 1st Metal layer for 48 nm SLC NAND is using Tungsten.

Data Summary and Failure Rate Estimation using Exponential Model HTOL Stress Temperature - 125°C

| Failure Mechanisms | Read Point / Test Result | | Modeling Parameters @ 55°C | | | | | Average Failure Rate | |
|-----------------------------------|--------------------------|---------------------|----------------------------|-----|-----|-----|------------|----------------------|----------------------|
| | Early Life (hrs) | Inherent Life (hrs) | Ea eV | TAF | VAF | OAF | MTTF (yrs) | Early Life (PPM) | Inherent Life (FITS) |
| | 96 | 1000 | | | | | | | |
| Sample Size | 2810 | 900 | | | | | | | |
| 125C, Zero fails, Process ave. Ea | 0 | 0 | 0.7 | 74 | 1 | 74 | | 0 | 14 |
| | | | | | | | 8317 | | |

Data Retention Bake - 150°C

| Reliability Stress | Sample Size | Reject | PPM | FITS |
|--------------------|-------------|--------|-----|------|
| 500 | 77 | 0 | 0 | 2 |
| 1000 | 693 | 0 | 0 | |

1.2. S34ML-1 Product Families

41 nm SLC NAND

41 nm SLC NAND were introduced in Jun 2012 and utilize tunnel Oxide, Polysilicon floating gate and interconnections are three metal layers with contact plugs and barrier metals. The 1st Metal layer for 41 nm SLC NAND is using Copper.

Data Summary and Failure Rate Estimation using Exponential Model HTOL Stress Temperature - 125°C

| Failure Mechanisms | Read Point / Test Result | | Modeling Parameters @ 55°C | | | | | Average Failure Rate | |
|-----------------------------------|--------------------------|---------------------|----------------------------|-----|-----|-----|------------|----------------------|----------------------|
| | Early Life (hrs) | Inherent Life (hrs) | Ea eV | TAF | VAF | OAF | MTTF (yrs) | Early Life (PPM) | Inherent Life (FITS) |
| | 96 | 1000 | | | | | | | |
| Sample Size | 3000 | 1002 | | | | | | | |
| 125C, Zero fails, Process ave. Ea | 0 | 0 | 0.7 | 74 | 1 | 74 | | 0 | 12 |
| | | | | | | | 9259 | | |

Data Retention Bake - 150°C

| Reliability Stress | Sample Size | Reject | PPM | FITS |
|--------------------|-------------|--------|-----|------|
| 500 | 154 | 0 | 0 | 1 |
| 1000 | 692 | 0 | 0 | |
| 2000 | 77 | 0 | 0 | |

1.3. S34ML-2 Product

Families 32 nm SLC

NAND

32 nm SLC NAND were introduced in October 2012 and utilize tunnel Oxide, Polysilicon floating gate and interconnections are three metal layers with contact plugs and barrier metals. The 1st Metal layer for 32 nm SLC NAND is using Copper

Data Summary and Failure Rate Estimation using Exponential Model HTOL Stress Temperature - 125°C

| Failure Mechanisms | Read Point / Test Result | | Modeling Parameters @ 55°C | | | | | Average Failure Rate | |
|-----------------------------------|--------------------------|---------------------|----------------------------|-----|-----|-----|------------|----------------------|----------------------|
| | Early Life (hrs) | Inherent Life (hrs) | Ea eV | TAF | VAF | OAF | MTTF (yrs) | Early Life (PPM) | Inherent Life (FITS) |
| | 96 | 1000 | | | | | | | |
| Sample Size | 3000 | 1320 | | | | | | | |
| 125C, Zero fails, Process ave. Ea | 0 | 0 | 0.7 | 74 | 1 | 74 | 12198 | 0 | 9 |

Data Retention Bake - 150°C

| Reliability Stress | Sample Size | Reject | PPM | FITS |
|--------------------|-------------|--------|-----|------|
| 500 | 231 | 0 | 0 | <1 |
| 1000 | 923 | 0 | 0 | |

2. Data Summaries by Package Family

2.1. BGA (Ball Grid Array)

| Reliability Stress | | Sample Size | Reject | Failure Rate PPM |
|--------------------|-----------|-------------|--------|------------------|
| HAST | 96hrs | 1666 | 0 | 0 |
| | 264hrs | 2577 | 0 | 0 |
| HIGH TEMP STORAGE | 1000hrs | 5435 | 0 | 0 |
| TEMP CYCLE | 500cycle | 3072 | 0 | 0 |
| | 1000cycle | 3586 | 0 | 0 |
| UNBIASED HAST TEST | 96hrs | 4723 | 0 | 0 |
| | 264hrs | 635 | 0 | 0 |

2.2. TSOP (Thin Small Outline Package)

| Reliability Stress | | Sample Size | Reject | Failure Rate PPM |
|----------------------|-----------|-------------|--------|------------------|
| HAST | 96hrs | 4211 | 0 | 0 |
| | 264hrs | 100 | 0 | 0 |
| HIGH TEMP STORAGE | 1000hrs | 5025 | 0 | 0 |
| PRESSURE COOKER TEST | 96hrs | 480 | 0 | 0 |
| | 168hrs | 2507 | 0 | 0 |
| TEMP CYCLE | 500cycle | 6161 | 0 | 0 |
| | 1000cycle | 316 | 0 | 0 |
| UNBIASED HAST TEST | 96hrs | 2688 | 0 | 0 |

SkyHigh Memory