



MPC745/755 Microprocessor
MOS-13 HiP4DP
Rev. 2.8
Qualification Report

| | | |
|-------------------------------------|---|-------------------------|
| Device No./Rev.: MPC745/755 Rev 2.8 | | Report Rev.: A |
| Description: MPC745/755 | | Revision date: 06/15/04 |
| Technology: MOS13 HiP4DP | Package: 255PBGA / 360PBGA / 360CBGA | Page 1 of 7 |

MPC745/755 Product Information:

| Product / Technology / Fab / Package Description | |
|--|--|
| Package | MPC745: 255 PBGA (PX), 21 x 21 mm MPC755: 360 PBGA (PX), 25 x 25 mm, 360 CBGA (RX), 25 x 25 mm |
| Device | MPC745/755 |
| Mask Set | K76D |
| Die Size | 6.79 x 7.92 mm |
| Substrate | CBGA – Ceramic / PBGA – Organic |
| Bump Technology | SMD Electroplate |
| Die Technology | .18 ± .05 micron |
| Process Technology | HiP4DP |
| Name/Location of Die Fab Facility | MOS-13 / Austin TX |
| Bump Diameter | 4.0 mils |
| Poly / Metal layers | 1P / 5M |
| Assembly Location | Freescale, Kuala Lumpur, Malaysia |
| Final Metal Technology | Aluminum |
| Moisture Sensitivity Level | CBGA – MSL 1 / PBGA – MSL 3 |

MPC745/755 Product Reliability Data Summary:

| HTOL / 2.5V, 90°C | | | | | |
|-------------------|------------------------------|--|------------|--|--|
| Lot / Mask Set | 168 Hours | 504 Hours | 1008 Hours | | |
| 0K76D | 0 / 232 | 0 / 136 | 0 / 136 | | |
| 5K76D | 0 / 93 | 0 / 93 | 0 / 93 | | |
| 38105 / 8K76D | 0 / 77 | 0 / 77 | 0 / 77 | | |
| 38396 / 8K76D | 1 ⁽¹⁾ / 77 | 0 ⁽²⁾ / 76 | 0 / 73 | | |
| 39044 / 8K76D | 0 / 77 | 0 / 77 | 0 / 77 | | |
| 41394 / 9K76D | 0 / 77 | | | | |
| 42901 / 9K76D | 0 / 77 | | | | |
| 40862 / 9K76D | 0 / 77 | | | | |
| Totals | 1 / 787 | 0 / 459 | 0 / 456 | | |
| Failure Comments | ⁽¹⁾ 1- ABIST fail | ⁽²⁾ 3 - ESD fails - Confirmed | | | |

| ESD / Latch-up | | | | | |
|----------------|-----------|-----------|----------------------|---------------------------|------------------|
| Lot / Mask Set | HBM @ 2KV | MM @ 200V | CDM (socketed) @ 1KV | CDM (field induced) @ 1KV | Latch-up @ 200mA |
| 0K76D | 0 / 3 | 0 / 3 | 0 / 3 | 0 / 3 | 0 / 3 |
| 5K76D | 0 / 3 | 0 / 3 | | | 0 / 3 |
| 39044 / 8K76D | 0 / 3 | 0 / 3 | | | 0 / 3 |
| 38105 / 8K76D | 0 / 3 | 0 / 3 | | | 0 / 3 |
| 38396 / 8K76D | 0 / 3 | 0 / 3 | | | 0 / 3 |
| Totals | 0 / 15 | 0 / 15 | 0 / 3 | 0 / 3 | 0 / 15 |

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360 CBGA Package Reliability Data (by similarity):

| Assembly Die Pull | | | | |
|---------------------------|---------|--------------------------|--|--|
| Lot / Mask Set | Results | Strength | | |
| D55283B/ L64M | 0 / 84 | Avg = 24.64 Stdev = 3.07 | | |
| D55285C/ L64M | 0 / 80 | Avg = 30.95 Stdev = 2.44 | | |
| D55213A1 & D55285C1/ L64M | 0 / 84 | Avg = 25.22 Stdev =4.02 | | |
| Totals | 0 / 248 | | | |
| Failure Comments | | | | |

| Moisture Sensitivity Level Characterization | | | | |
|---|----------------|--|--|--|
| Lot / Mask Set | MSL1 @ 245degC | | | |
| D55283B/ L64M | 0 / 77 | | | |
| D56764F/ L64M / | 0 / 77 | | | |
| D55213A1 & D55285C1/ L64M / | 0 / 77 | | | |
| Totals | 0 / 231 | | | |
| Failure Comments | | | | |

| Temperature Cycle / -55°C +125°C Air-to-Air, with MSL1 Preconditioning | | | | | |
|--|------------|------------|------------|-------------------|--|
| Lot / Mask Set | 100 Cycles | 400 Cycles | 800 Cycles | 1000 Cycles - FYI | |
| D55283B/ L64M | 0 / 77 | 0 / 77 | 0 / 77 | 0 / 77 | |
| D55285C/ L64M | 0 / 77 | 0 / 77 | 0 / 77 | 0 / 77 | |
| D55213A1 & D55285C1/ L64M | 0 / 77 | 0 / 77 | 0 / 77 | 0 / 77 | |
| Totals | 0 / 231 | 0 / 231 | 0 / 231 | 0 / 231 | |
| Failure Comments | | | | | |

| Thermal Shock / -55°C +125°C Liquid-to-Liquid, with MSL1 Preconditioning | | | | |
|--|------------|------------|-------------------|--|
| Lot | 400 Cycles | 800 Cycles | 1000 Cycles - FYI | |
| WED417468800 | 0 / 77 | 0 / 77 | 0 / 77 | |
| WED442189600 | 0 / 77 | 0 / 77 | 0 / 77 | |
| WED403628500 | 0 / 77 | 0 / 77 | 0 / 77 | |
| Totals | 0 / 231 | 0 / 231 | 0 / 231 | |
| Failure Comments | | | | |

| Autoclave / 121°C, 100% RH, 2 atm, with MSL1 Preconditioning | | | | |
|--|---------|---------|---------|--|
| Lot / Mask Set | 48 hrs | 96 hrs | 144 hrs | |
| D55283B/ L64M | 0 / 77 | 0 / 77 | 0 / 77 | |
| D56764F / L64M | 0 / 77 | 0 / 77 | 0 / 77 | |
| D55213A1 & D55285C1/ L64M | 0 / 77 | 0 / 77 | 0 / 77 | |
| Totals | 0 / 231 | 0 / 231 | 0 / 231 | |
| Failure Comments | | | | |

| High Temperature Bake / 150°C - FYI | | | | |
|-------------------------------------|---------|----------|--|--|
| Lot / Mask Set | 504 hrs | 1008 hrs | | |
| D55283B & D55285C/ L64M | 0 / 77 | 0/76 | | |
| D56764F/ L64M | 0 / 77 | --- | | |
| D55213A1 & D55285C1/ L64M | 0 / 77 | 0/77 | | |
| Totals | 0 / 231 | 0/153 | | |
| Failure Comments | | | | |

360 pin 25x25mm PBGA Package Reliability Data:

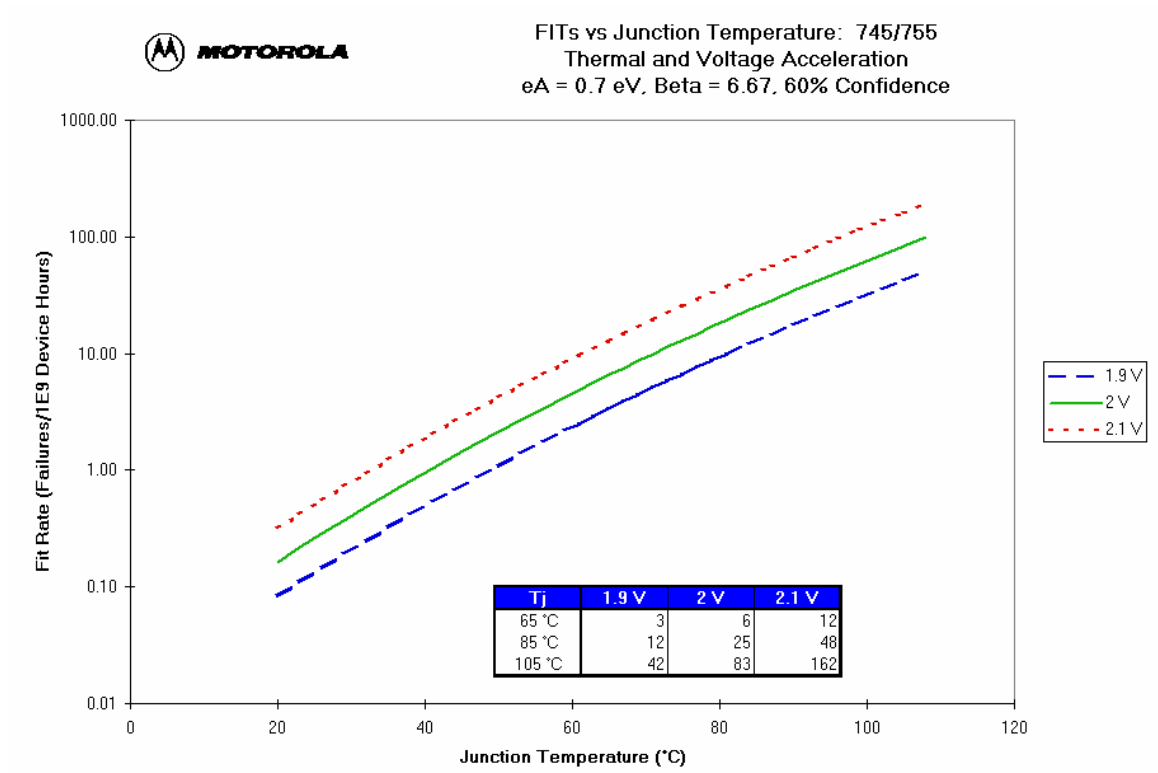
| Moisture Sensitivity Level 3 Preconditioning / 85C, 85% RH, 168 Hours + IR Reflow (245C, 3 Passes) | | | | |
|--|-------|--------------------------|-------|-------------------|
| Lot | MSL3 | Electrical Test Room/Hot | CSAM | Die Pull Non-wets |
| D36045021 | 0/77 | 0/77 | 0/77 | 0/77 |
| D36045022 | 0/77 | 0/77 | 0/77 | 0/77 |
| D36045023 | 0/77 | 0/77 | 0/77 | 0/77 |
| Totals | 0/231 | 0/231 | 0/231 | 0/231 |
| Failure Comments | | | | |

| Temperature Cycle / -40°C +125°C Air-to-Air, with MSL3 245°C Preconditioning | | | | |
|--|------------|-------------|--|--|
| Lot | 500 Cycles | 1000 Cycles | | |
| D36045021 | 0/77 | 0/77 | | |
| D36045022 | 0/77 | 0/77 | | |
| D36045023 | 0/77 | 0/77 | | |
| Totals | 0/231 | 0/231 | | |
| Failure Comments | | | | |

| Temperature Cycle / -0°C +125°C Air-to-Air, with MSL3 245°C Preconditioning | | | | |
|---|-------------|-------------|--|--|
| Lot | 1000 Cycles | 2000 Cycles | | |
| D36045021 | 0/77 | 0/77 | | |
| D36045022 | 0/75 | 0/75 | | |
| D36045023 | 0/80 | 0/80 | | |
| Totals | 0/232 | 0/232 | | |
| Failure Comments | | | | |

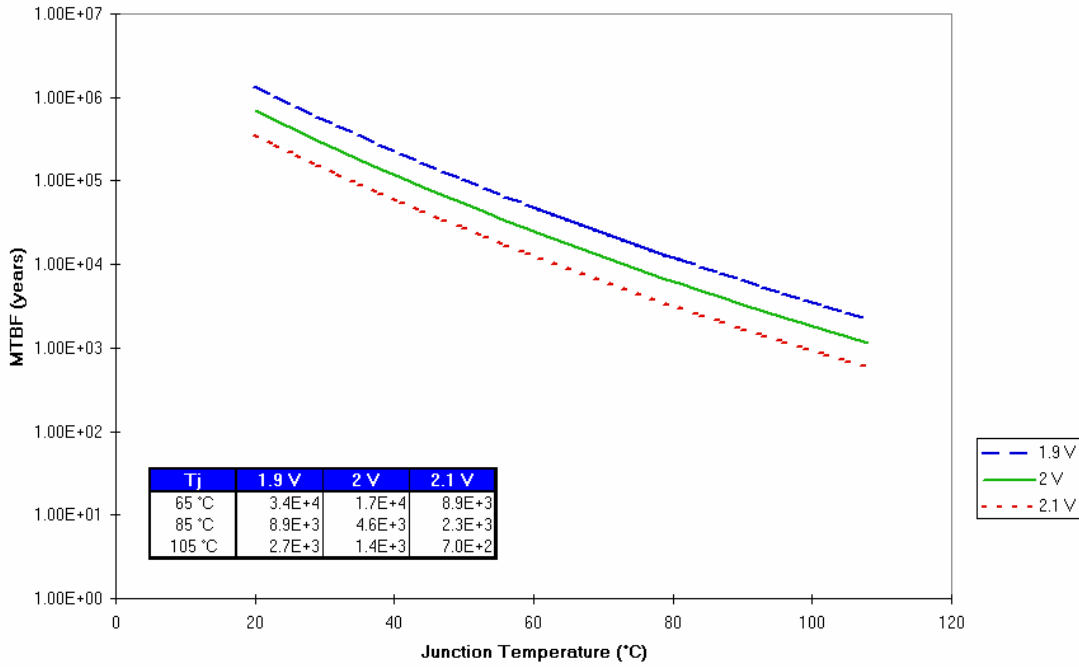
| Temperature Humidity & Bias 85°C/85%RH/Nominal Bias (w/MSL3 245C PC) | | | | |
|--|-----------|-----------|------------|--|
| Lot | 504 Hours | 761 Hours | 1008 Hours | |
| D36045021 | 0/76 | 0/76 | 0/76 | |
| D36045022 | 0/77 | 0/77 | 0/77 | |
| D36045023 | 0/77 | 0/77 | 0/77 | |
| Totals | 0/230 | 0/230 | 0/230 | |
| Failure Comments | | | | |

MPC745/755 Product FIT Rate and MTBF Derated Curves:





MTBF vs Junction Temperature: 745/755
 Thermal and Voltage Acceleration
 eA = 0.7 eV, Beta = 6.67, 60% Confidence



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Revision History:

| Revision History | | | |
|------------------|----------|--|---------------|
| Revision | Date* | Comment | Author |
| Original | 11/26/02 | | Leo Loc |
| A | 06/15/04 | Added CBGA and PBGA Electroplate Results | John Alvarado |
| | | | |

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