

RELIABILITY MONITOR REPORT
FOR

MQFP Package

Dallas Semiconductor

4401 South Beltwood Parkway
Dallas, TX 75244-3292

This Report was prepared by
Dallas Semiconductor Reliability Engineering

Summary:

The data in the tables that follow was generated as the result of an on-going Package Reliability Monitor. The assemblies covered by this package monitor are:

| ASSY SITE | PINS | PACKAGE | | |
|----------------------|------|----------------|----------------------|--------------------|
| ATK (Amkor, K) | 100 | MQFP | ATK (Amkor, K) | 80 MQFP |
| ATP (Amkor, PI) | 100 | MQFP | ATP (Amkor, PI) | 44 MQFP |
| ATP (Amkor, PI) | 80 | MQFP | ATP (Amkor, PI) | 100 MQFP (Pb-Free) |
| ATP (Amkor, PI) | 44 | MQFP (Pb-Free) | ATP (Amkor, PI) | 80 MQFP (Pb-Free) |
| Carsem | 80 | MQFP | Carsem | 80 MQFP (Pb-Free) |
| SCS (Stats Chippac S | 100 | MQFP | SCS (Stats Chippac S | 80 MQFP |
| SCS (Stats Chippac S | 100 | MQFP (Pb-Free) | SCS (Stats Chippac S | 80 MQFP (Pb-Free) |

The calculated failure rate for this assembly is:

FAILURE RATE: MTTF (YRS): 39246 FITS: 2.9

The parameters used to calculate this failure rate are as follows:

Cf: 60% Ea: 0.7 B: 0 Tu: 25 °C Vu: 5.5 Volts

The reliability data follows. At the start of this data is a description of the assembly vehicle used to generate this reliability data. The next section is the detailed reliability data for each stress. The reliability data section includes the latest data available. This report covers data between 1/1/2006 and 12/31/2006.

Assembly Information:

Package Type: MQFP 14x20x2.7
 Flammability: UL 94-V0
 Moisture Sensitivity Level 4
 (JEDEC J-STD20A)
 Date Code Range: 0614 to 0614

OPERATING LIFE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-------------------|-----------|--------------|-----------------|-----------|----------|----------|-------|
| HIGH TEMP OP LIFE | 0614 | DS5250 | 125C, 5.5 VOLTS | 1000 HRS | 77 | 0 | |
| Total: | | | | | | 0 | |

TEMPERATURE CYCLE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|---------------|-----------|--------------|--------------|-----------|----------|----------|-------|
| TEMP CYCLE | 0614 | DS5250 | -55C TO 125C | 1000 CYS | 77 | 0 | |
| Total: | | | | | | 0 | |

UNBIASED MOISTURE RESISTANCE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|---------------|-----------|--------------|-----------------------------|-----------|----------|----------|-------|
| AUTOCLAVE | 0614 | DS5250 | 121C, 2 ATM STEAM, UNBIASED | 168 HRS | 77 | 0 | |
| Total: | | | | | | 0 | |

Assembly Information:

Package Type: MQFP (Pb-Free) 14x20x2.7
Flammability: UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A) Level 4
Date Code Range: 0622 to 0642

MOISTURE SENSITIVITY LEVEL 3

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-------------------|-----------|--------------|-----------------|-----------|----------|----------|-------|
| ULTRASOUND | 0622 | DS5002 | J-STD-020 | | 8 | 0 | |
| STORAGE LIFE | | | 125C | 48 HRS | 8 | | |
| MOISTURE SOAK | | | 30C/60% R.H. | 192 HRS | 8 | | |
| CONVECTION REFLOW | | | 260C +/-5C | 3 PASS | 8 | 0 | |
| EXTERNAL VISUAL | | | J-STD-020, 6.1a | | 8 | 0 | |
| PRECONDITION U/S | | | J-STD-020 | | 8 | 0 | |
| ULTRASOUND | 0622 | DS5002 | J-STD-020 | | 8 | 0 | |
| STORAGE LIFE | | | 125C | 48 HRS | 8 | | |
| MOISTURE SOAK | | | 30C/60% R.H. | 192 HRS | 8 | | |
| CONVECTION REFLOW | | | 260C +/-5C | 3 PASS | 8 | 0 | |
| EXTERNAL VISUAL | | | J-STD-020, 6.1a | | 8 | 0 | |
| PRECONDITION U/S | | | J-STD-020 | | 8 | 0 | |
| ULTRASOUND | 0622 | DS5002 | J-STD-020 | | 8 | 0 | |
| STORAGE LIFE | | | 125C | 48 HRS | 8 | | |
| MOISTURE SOAK | | | 30C/60% R.H. | 192 HRS | 8 | | |
| CONVECTION REFLOW | | | 260C +/-5C | 3 PASS | 8 | 0 | |
| EXTERNAL VISUAL | | | J-STD-020, 6.1a | | 8 | 0 | |
| PRECONDITION U/S | | | J-STD-020 | | 8 | 0 | |
| ULTRASOUND | 0627 | DS5002 | J-STD-020 | | 8 | 0 | |
| STORAGE LIFE | | | 125C | 48 HRS | 8 | | |
| MOISTURE SOAK | | | 30C/60% R.H. | 192 HRS | 8 | | |
| CONVECTION REFLOW | | | 260C +/-5C | 3 PASS | 8 | 0 | |
| EXTERNAL VISUAL | | | J-STD-020, 6.1a | | 8 | 0 | |
| PRECONDITION U/S | | | J-STD-020 | | 8 | 0 | |
| Total: | | | | | | 0 | |

OPERATING LIFE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-------------------|-----------|--------------|-----------------|-----------|----------|----------|-------|
| HIGH VOLTAGE LIFE | 0622 | DS5002 | 125C, 5.5 VOLTS | 1000 HRS | 45 | 0 | |
| HIGH VOLTAGE LIFE | 0622 | DS5002 | 125C, 5.5 VOLTS | 1000 HRS | 45 | 0 | |
| HIGH VOLTAGE LIFE | 0622 | DS5002 | 125C, 5.5 VOLTS | 1000 HRS | 45 | 0 | |
| HIGH VOLTAGE LIFE | 0627 | DS5002 | 125C, 5.5 VOLTS | 1000 HRS | 45 | 0 | |
| HIGH TEMP OP LIFE | 0642 | DS5250 | 125C, 5.5 VOLTS | 1000 HRS | 77 | 0 | |
| Total: | | | | | | 0 | |

PACKAGE TESTS

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-----------------------|-----------|--------------|---------------------|-----------|----------|-------|-------|
| SOLDERABILITY (Sn/Pb) | 0622 | DS5002 | JESD22-B102, COND C | | 3 | 0 | |

| | | | | | |
|-------------------------|------|--------|------------------------------------|---------------|----------|
| SOLDERABILITY (Pb-Free) | 0622 | DS5002 | JESD22-B102, COND C | 3 | 0 |
| X-RAY | 0622 | DS5002 | MIL-STD-883-2012 : TOP & SIDE VIEW | 6 | 0 |
| PHYSICAL DIMENSIONS | | | JESD22-B100 | 6 | 0 |
| MARK PERMANENCY | | | JESD22-B107 | 6 | 0 |
| LEAD INTEGRITY | | | JESD22-B105, COND B | 6 | 0 |
| SOLDERABILITY (Sn/Pb) | 0622 | DS5002 | JESD22-B102, COND C | 3 | 0 |
| SOLDERABILITY (Pb-Free) | | | JESD22-B102, COND C | 3 | 0 |
| X-RAY | 0622 | DS5002 | MIL-STD-883-2012 : TOP & SIDE VIEW | 6 | 0 |
| PHYSICAL DIMENSIONS | | | JESD22-B100 | 6 | 0 |
| MARK PERMANENCY | | | JESD22-B107 | 6 | 0 |
| LEAD INTEGRITY | | | JESD22-B105, COND B | 6 | 0 |
| SOLDERABILITY (Sn/Pb) | 0622 | DS5002 | JESD22-B102, COND C | 3 | 0 |
| SOLDERABILITY (Pb-Free) | | | JESD22-B102, COND C | 3 | 0 |
| X-RAY | 0622 | DS5002 | MIL-STD-883-2012 : TOP & SIDE VIEW | 6 | 0 |
| PHYSICAL DIMENSIONS | | | JESD22-B100 | 6 | 0 |
| MARK PERMANENCY | | | JESD22-B107 | 6 | 0 |
| LEAD INTEGRITY | | | JESD22-B105, COND B | 6 | 0 |
| SOLDERABILITY (Sn/Pb) | 0627 | DS5002 | JESD22-B102, COND C | 3 | 0 |
| SOLDERABILITY (Pb-Free) | | | JESD22-B102, COND C | 3 | 0 |
| X-RAY | 0627 | DS5002 | MIL-STD-883-2012 : TOP & SIDE VIEW | 6 | 0 |
| PHYSICAL DIMENSIONS | | | JESD22-B100 | 6 | 0 |
| MARK PERMANENCY | | | JESD22-B107 | 6 | 0 |
| LEAD INTEGRITY | | | JESD22-B105, COND B | 6 | 0 |
| | | | | Total: | 0 |

PRECONDITIONING LEVEL 3

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-------------------|-----------|--------------|--------------|-----------|----------|---------------|----------|
| STORAGE LIFE | 0622 | DS5002 | 125C | 48 HRS | 321 | | |
| MOISTURE SOAK | | | 30C/60% R.H. | 192 HRS | 321 | | |
| CONVECTION REFLOW | | | 260C +0/-5C | 3 PASS | 321 | 0 | |
| STORAGE LIFE | 0622 | DS5002 | 125C | 48 HRS | 321 | | |
| MOISTURE SOAK | | | 30C/60% R.H. | 192 HRS | 321 | | |
| CONVECTION REFLOW | | | 260C +0/-5C | 3 PASS | 321 | 0 | |
| STORAGE LIFE | 0622 | DS5002 | 125C | 48 HRS | 321 | | |
| MOISTURE SOAK | | | 30C/60% R.H. | 192 HRS | 321 | | |
| CONVECTION REFLOW | | | 260C +0/-5C | 3 PASS | 321 | 0 | |
| STORAGE LIFE | 0627 | DS5002 | 125C | 48 HRS | 321 | | |
| MOISTURE SOAK | | | 30C/60% R.H. | 192 HRS | 321 | | |
| CONVECTION REFLOW | | | 260C +0/-5C | 3 PASS | 321 | 0 | |
| | | | | | | Total: | 0 |

STORAGE LIFE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|--------------|-----------|--------------|-----------|-----------|----------|-------|-------|
| STORAGE LIFE | 0622 | DS5002 | 150C | 1000 HRS | 77 | 0 | |
| STORAGE LIFE | 0622 | DS5002 | 150C | 1000 HRS | 77 | 0 | |
| STORAGE LIFE | 0622 | DS5002 | 150C | 1000 HRS | 77 | 0 | |

| | | | | | | |
|---------------|------|--------|------|----------|----|----------|
| STORAGE LIFE | 0627 | DS5002 | 150C | 1000 HRS | 77 | 0 |
| Total: | | | | | | 0 |

TEMPERATURE CYCLE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|---------------|-----------|--------------|--------------|-----------|----------|----------|-------|
| TEMP CYCLE | 0622 | DS5002 | -55C TO 125C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0622 | DS5002 | -55C TO 125C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0622 | DS5002 | -55C TO 125C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0627 | DS5002 | -55C TO 125C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0642 | DS5250 | -55C TO 125C | 1000 CYS | 77 | 0 | |
| Total: | | | | | | 0 | |

TEMPERATURE HUMIDITY BIAS

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-----------------|-----------|--------------|------------------|-----------|----------|----------|-------|
| BIASED MOISTURE | 0622 | DS5002 | 85/85, 5.5 VOLTS | 1000 HRS | 45 | 0 | |
| BIASED MOISTURE | 0622 | DS5002 | 85/85, 5.5 VOLTS | 1000 HRS | 45 | 0 | |
| BIASED MOISTURE | 0622 | DS5002 | 85/85, 5.5 VOLTS | 1000 HRS | 454 | 0 | |
| BIASED MOISTURE | 0627 | DS5002 | 85/85, 5.5 VOLTS | 1000 HRS | 45 | 0 | |
| BIASED MOISTURE | 0642 | DS5250 | 85/85, 5.5 VOLTS | 1000 HRS | 45 | 0 | |
| Total: | | | | | | 0 | |

UNBIASED MOISTURE RESISTANCE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|---------------|-----------|--------------|-----------------------------|-----------|----------|----------|-------|
| AUTOCLAVE | 0622 | DS5002 | 121C, 2 ATM STEAM, UNBIASED | 168 HRS | 75 | 0 | |
| AUTOCLAVE | 0622 | DS5002 | 121C, 2 ATM STEAM, UNBIASED | 168 HRS | 75 | 0 | |
| AUTOCLAVE | 0622 | DS5002 | 121C, 2 ATM STEAM, UNBIASED | 168 HRS | 77 | 0 | |
| AUTOCLAVE | 0627 | DS5002 | 121C, 2 ATM STEAM, UNBIASED | 168 HRS | 77 | 0 | |
| AUTOCLAVE | 0642 | DS5250 | 121C, 2 ATM STEAM, UNBIASED | 168 HRS | 77 | 0 | |
| Total: | | | | | | 0 | |

FAILURE RATE: **MTTF (YRS): 39246** **FITS: 2.9**