4/14/2017

RELIABILITY MONITOR REPORT
FOR

# uMAX Package

## MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

This Report was prepared by
MAXIM INTEGRATED Reliability Engineering

**Summary:**

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

| ASSY SITE | PINS | PACKAGE | | | |
|---|---|---|---|---|---|
| ASE Kunshan | 10 | uSOP (Pb-Free) | ATP (Amkor, PI) | 10 | uSOP (Pb-Free) |
| UTL (NSEB) UTAC | 10 | uMax (Pb-Free) | UTL (NSEB) UTAC | 8 | uSOP (Pb-Free) |
| UTL (NSEB) UTAC | 10 | uSOP (Pb-Free) | | | |

The calculated failure rate for this assembly is:

**FAILURE RATE: MTTF (YRS): 186631 FITS: 0.6**

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

**Cf: 60% Ea: 0.7 Tu: 25 °C**

The reliability data follows. A 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 1/1/2017 and 3/31/2017 .

**Assembly Information:**

Package Type: uMax (Pb-Free)

Date Code Range: 1636 to 1636

**OPERATING LIFE**

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | | QUANTITY | FAILS | FA NO |
|---|---|---|---|---|---|---|---|---|
| HIGH TEMP OP LIFE | 1636 | MAX3747AEUB+ | 135°C | 1000 | HRS | 80 | 0 | |
| | | | | | **Total:** | | **0** | |

**STORAGE LIFE**

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | | QUANTITY | FAILS | FA NO |
|---|---|---|---|---|---|---|---|---|
| STORAGE LIFE | 1636 | MAX3747AEUB+ | 150°C | 1000 | HRS | 80 | 0 | |
| | | | | | **Total:** | | **0** | |

**TEMPERATURE CYCLE**

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | | QUANTITY | FAILS | FA NO |
|---|---|---|---|---|---|---|---|---|
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1636 | MAX3747AEUB+ | -65C TO +150C (Condition C) | 1000 | CYS | 80 | 0 | |
| | | | | | **Total:** | | **0** | |

**TEMPERATURE HUMIDITY BIAS**

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | | QUANTITY | FAILS | FA NO |
|---|---|---|---|---|---|---|---|---|
| BIASED MOISTURE | 1636 | MAX3747AEUB+ | 130C, 85% R.H. | 96 | HRS | 79 | 0 | |
| | | | | | **Total:** | | **0** | |

**Assembly Information:**

Package Type: uSOP (Pb-Free)

Date Code Range: 1548 to 1645

## OPERATING LIFE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|---|---|---|---|---|---|---|---|
| HIGH TEMP OP LIFE | 1548 | MAX17551AUB+ | 135°C | 1000 HRS | 75 | 0 | |
| HIGH TEMP OP LIFE | 1548 | MAX17551AUB+ | 135°C | 1000 HRS | 75 | 0 | |
| HIGH TEMP OP LIFE | 1613 | MAX9921AUB/V+ | 135°C | 1000 HRS | 80 | 0 | |
| HIGH TEMP OP LIFE | 1613 | MAX9921AUB/V+ | 135°C | 1000 HRS | 80 | 0 | |
| HIGH TEMP OP LIFE | 1613 | MAX9921AUB/V+ | 135°C | 1000 HRS | 79 | 0 | |
| HIGH TEMP OP LIFE | 1619 | MAX11606EUA/V+ | 135°C | 1000 HRS | 80 | 0 | |
| HIGH TEMP OP LIFE | 1631 | MAX14710EUB+ | 135°C | 500 HRS | 79 | 0 | |
| HIGH TEMP OP LIFE | 1632 | 87-1086U+L00 | 135°C | 500 HRS | 26 | 0 | |
| HIGH TEMP OP LIFE | 1632 | 87-1086U+L00 | 135°C | 500 HRS | 26 | 0 | |
| HIGH TEMP OP LIFE | 1632 | 87-1086U+L00 | 135°C | 500 HRS | 28 | 0 | |
| HIGH TEMP OP LIFE | 1634 | MAX9933EUA+ | 135°C | 1000 HRS | 80 | 0 | |
| HIGH TEMP OP LIFE | 1637 | MAX5431AEUB+ | 135°C | 1000 HRS | 44 | 0 | |
| HIGH TEMP OP LIFE | 1637 | 87-1L91U+33V | 135°C | 1000 HRS | 79 | 0 | |
| HIGH TEMP OP LIFE | 1641 | MAX4003EUA+ | 135°C | 1000 HRS | 80 | 0 | |
| HIGH TEMP OP LIFE | 1644 | MAX4475AUA+ | 135°C | 1000 HRS | 80 | 0 | |
| HIGH TEMP OP LIFE | 1645 | MAX1954AEUB+ | 135°C | 1000 HRS | 45 | 0 | |
| | | | | **Total:** | | **0** | |

## STORAGE LIFE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|---|---|---|---|---|---|---|---|
| STORAGE LIFE | 1603 | MAX4091AUA+ | 150°C | 1000 HRS | 89 | 0 | |
| STORAGE LIFE | 1613 | MAX9921AUB/V+ | 150°C | 1000 HRS | 90 | 0 | |
| STORAGE LIFE | 1613 | MAX9921AUB/V+ | 150°C | 1000 HRS | 88 | 0 | |
| STORAGE LIFE | 1613 | MAX9921AUB/V+ | 150°C | 1000 HRS | 90 | 0 | |
| STORAGE LIFE | 1613 | MAX4091AUA+ | 150°C | 1000 HRS | 79 | 0 | |
| STORAGE LIFE | 1613 | MAX4091AUA+ | 150°C | 1000 HRS | 79 | 0 | |
| STORAGE LIFE | 1616 | MAX44251AUA+ | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1619 | MAX11606EUA/V+ | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1631 | MAX14710EUB+ | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1632 | 87-1086U+L00 | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1632 | 87-1086U+L00 | 150°C | 1000 HRS | 90 | 0 | |
| STORAGE LIFE | 1634 | MAX9933EUA+ | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1637 | 87-1L91U+33V | 150°C | 1000 HRS | 86 | 0 | |
| STORAGE LIFE | 1641 | MAX4003EUA+ | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1644 | MAX4475AUA+ | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1645 | MAX1954AEUB+ | 150°C | 1000 HRS | 80 | 0 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | **Total:** | **0** | |

## TEMPERATURE CYCLE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | | QUANTITY | FAILS | FA NO |
|---|---|---|---|---|---|---|---|---|
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1603 | MAX4091AUA+ | -65C TO +150C (Condition C) | 1000 | CYS | 90 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1613 | MAX9921AUB/V+ | -65C TO +150C (Condition C) | 500 | CYS | 120 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1613 | MAX9921AUB/V+ | -65C TO +150C (Condition C) | 500 | CYS | 120 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1613 | MAX9921AUB/V+ | -65C TO +150C (Condition C) | 500 | CYS | 120 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1613 | MAX4091AUA+ | -65C TO +150C (Condition C) | 500 | CYS | 120 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1613 | MAX4091AUA+ | -65C TO +150C (Condition C) | 500 | CYS | 120 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1616 | MAX44251AUA+ | -65C TO +150C (Condition C) | 1000 | CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1619 | MAX11606EUA/V+ | -65C TO +150C (Condition C) | 1000 | CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1625 | MAX16916GUB/V+ | -65C TO +150C (Condition C) | 500 | CYS | 2174 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1631 | MAX14710EUB+ | -65C TO +150C (Condition C) | 500 | CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1632 | 87-1086U+L00 | -65C TO +150C (Condition C) | 1000 | CYS | 118 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1632 | 87-1086U+L00 | -65C TO +150C (Condition C) | 1000 | CYS | 116 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1634 | MAX9933EUA+ | -65C TO +150C (Condition C) | 1000 | CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1637 | 87-1L91U+33V | -65C TO +150C (Condition C) | 1000 | CYS | 95 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1641 | MAX4003EUA+ | -65C TO +150C (Condition C) | 1000 | CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1644 | MAX4475AUA+ | -65C TO +150C (Condition C) | 1000 | CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1645 | MAX1954AEUB+ | -65C TO +150C (Condition C) | 1000 | CYS | 80 | 0 | |
| | | | | | **Total:** | | **0** | |

## TEMPERATURE HUMIDITY BIAS

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | | QUANTITY | FAILS | FA NO |
|---|---|---|---|---|---|---|---|---|
| BIASED MOISTURE | 1613 | MAX9921AUB/V+ | 130C, 85% R.H. | 96 | HRS | 80 | 0 | |
| BIASED MOISTURE | 1613 | MAX4091AUA+ | 130C, 85% R.H. | 96 | HRS | 80 | 0 | |
| BIASED MOISTURE | 1613 | MAX4091AUA+ | 130C, 85% R.H. | 96 | HRS | 85 | 0 | |
| BIASED MOISTURE | 1616 | MAX44251AUA+ | 130C, 85% R.H. | 100 | HRS | 80 | 0 | |
| BIASED MOISTURE | 1619 | MAX11606EUA/V+ | 130C, 85% R.H. | 100 | HRS | 80 | 0 | |
| BIASED MOISTURE | 1631 | MAX14710EUB+ | 130C, 85% R.H. | 100 | HRS | 80 | 0 | |
| BIASED MOISTURE | 1631 | MAX14710EUB+ | 130C, 85% R.H. | 100 | HRS | 80 | 0 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BIASED MOISTURE | 1634 | MAX9933EUA+ | 130C, 85% R.H. | 96 | HRS | 80 | 0 |
| BIASED MOISTURE | 1641 | MAX4003EUA+ | 130C, 85% R.H. | 96 | HRS | 80 | 0 |
| BIASED MOISTURE | 1644 | MAX4475AUA+ | 130C, 85% R.H. | 96 | HRS | 80 | 0 |
| BIASED MOISTURE | 1645 | MAX1954AEUB+ | 130C, 85% R.H. | 96 | HRS | 80 | 0 |
| | | | | | **Total:** | | **0** |

**UNBIASED MOISTURE RESISTANCE**

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | | QUANTITY | FAILS | FA NO |
|---|---|---|---|---|---|---|---|---|
| MOISTURE SOAK | 1603 | MAX4091AUA+ | 130C, 85% R.H. | 96 | HRS | 90 | 0 | |
| MOISTURE SOAK | 1613 | MAX9921AUB/V+ | 130C, 85% R.H. | 96 | HRS | 90 | 0 | |
| MOISTURE SOAK | 1613 | MAX9921AUB/V+ | 130C, 85% R.H. | 96 | HRS | 90 | 0 | |
| MOISTURE SOAK | 1613 | MAX9921AUB/V+ | 130C, 85% R.H. | 96 | HRS | 90 | 0 | |
| MOISTURE SOAK | 1631 | MAX14710EUB+ | 130C, 85% R.H. | 96 | HRS | 80 | 0 | |
| MOISTURE SOAK | 1632 | 87-1086U+L00 | 130C, 85% R.H. | 96 | HRS | 80 | 0 | |
| MOISTURE SOAK | 1632 | 87-1086U+L00 | 130C, 85% R.H. | 96 | HRS | 80 | 0 | |
| MOISTURE SOAK | 1632 | 87-1086U+L00 | 130C, 85% R.H. | 96 | HRS | 80 | 0 | |
| MOISTURE SOAK | 1637 | 87-1L91U+33V | 130C, 85% R.H. | 96 | HRS | 80 | 0 | |
| | | | | | **Total:** | | **0** | |

**FAILURE RATE: MTTF (YRS): 186631 FITS: 0.6**