

10/23/2014



RELIABILITY MONITOR REPORT
FOR

WLP 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 specific assemblies included in this package monitor are:

| ASSY SITE | PINS | PACKAGE | | |
|---------------|------|--|---------------|--|
| Dallas-8 | 6 | Flip Chip with Underfill (Pb-Free) | Dallas-8 | 4 Flip Chip without Encapsulant (Pb-Free) |
| Dallas-8 | 6 | Flip Chip without Encapsulant (Pb-Free) | Dallas-8 | 36 WLP (Pb-Free) |
| DALLAS-MAXFIL | 9 | WLP (Pb-Free) | DALLAS-MAXFIL | 42 WLP (Pb-Free) |
| TERAPROBE | 16 | WLP-HC (Pb-Free) | | |

The calculated failure rate for this assembly is:

FAILURE RATE: MTTF (YRS): 95146 FITS: 1.2

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

Cf: 60% Ea: 0.7 Tu: 25 °C

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 10/1/2013 and 9/30/2014.

Assembly Information:

Package Type: Flip Chip with Underfill (Pb-Free)
Date Code Range: 1346 to 1346

TEMPERATURE CYCLE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|--------------------------------|-----------|--------------|-----------------------------|-----------|----------|----------|-------|
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1500 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1500 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1500 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1500 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1500 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1500 CYS | 80 | 0 | |
| Total: | | | | | | 0 | |

Assembly Information:

Package Type: Flip Chip without Encapsulant (Pb-Free)
Date Code Range: 1346 to 1403

OPERATING LIFE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-------------------|-----------|--------------|-----------------|-----------|----------|-------|-------|
| HIGH TEMP OP LIFE | 1346 | DS2433 | 125C, 6.0 VOLTS | 1000 HRS | 80 | 0 | |
| HIGH TEMP OP LIFE | 1346 | DS2433 | 125C, 6.0 VOLTS | 1000 HRS | 80 | 0 | |

| | | | | | | |
|-------------------|------|--------|-----------------|----------|----|----------|
| HIGH TEMP OP LIFE | 1346 | DS2433 | 125C, 6.0 VOLTS | 1000 HRS | 80 | 0 |
| HIGH TEMP OP LIFE | 1346 | DS2433 | 125C, 6.0 VOLTS | 1000 HRS | 80 | 0 |
| HIGH TEMP OP LIFE | 1346 | DS2433 | 125C, 6.0 VOLTS | 1000 HRS | 80 | 0 |
| HIGH TEMP OP LIFE | 1346 | DS2433 | 125C, 6.0 VOLTS | 1000 HRS | 80 | 0 |
| Total: | | | | | | 0 |

STORAGE LIFE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|---------------|-----------|--------------|-----------|-----------|----------|----------|-------|
| STORAGE LIFE | 1346 | DS2433 | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1346 | DS2433 | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1346 | DS2433 | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1346 | DS2433 | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1346 | DS2433 | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1346 | DS2433 | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1403 | DS2502 | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1403 | DS2502 | 150°C | 1000 HRS | 80 | 0 | |
| STORAGE LIFE | 1403 | DS2502 | 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 | 1346 | DS2433 | -40C TO +125C (Condition G) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1346 | DS2433 | -40C TO +125C (Condition G) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1403 | DS2502 | -40C TO +85C (Condition N) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1403 | DS2502 | -40C TO +85C (Condition N) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1403 | DS2502 | -40C TO +85C (Condition N) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1403 | DS2502 | -40C TO +125C (Condition G) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1403 | DS2502 | -40C TO +125C (Condition G) | 1000 CYS | 80 | 0 | |
| TEMP CYCLE, 5' RAMP, 10' DWELL | 1403 | DS2502 | -40C TO +125C (Condition G) | 1000 CYS | 80 | 0 | |
| Total: | | | | | | 0 | |

TEMPERATURE HUMIDITY BIAS

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-----------------|-----------|--------------|------------------|-----------|----------|----------|-------|
| BIASED MOISTURE | 1346 | DS2433 | 85/85, 5.5 VOLTS | 1000 HRS | 80 | 0 | |
| BIASED MOISTURE | 1346 | DS2433 | 85/85, 5.5 VOLTS | 1000 HRS | 80 | 0 | |
| BIASED MOISTURE | 1346 | DS2433 | 85/85, 5.5 VOLTS | 1000 HRS | 80 | 0 | |
| BIASED MOISTURE | 1346 | DS2433 | 85/85, 5.5 VOLTS | 1000 HRS | 80 | 0 | |
| BIASED MOISTURE | 1346 | DS2433 | 85/85, 5.5 VOLTS | 1000 HRS | 80 | 0 | |
| BIASED MOISTURE | 1346 | DS2433 | 85/85, 5.5 VOLTS | 1000 HRS | 80 | 0 | |
| BIASED MOISTURE | 1403 | DS2502 | 85/85, 5.5 VOLTS | 1000 HRS | 80 | 0 | |
| BIASED MOISTURE | 1403 | DS2502 | 85/85, 5.5 VOLTS | 1000 HRS | 80 | 0 | |
| BIASED MOISTURE | 1403 | DS2502 | 85/85, 5.5 VOLTS | 1000 HRS | 80 | 0 | |
| Total: | | | | | | 0 | |

UNBIASED MOISTURE RESISTANCE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|---------------|-----------|--------------|----------------|-----------|----------|----------|-------|
| HAST, NO BIAS | 1346 | DS2433 | 110C, 85% R.H. | 264 HRS | 80 | 0 | |
| HAST, NO BIAS | 1346 | DS2433 | 110C, 85% R.H. | 264 HRS | 80 | 0 | |
| HAST, NO BIAS | 1346 | DS2433 | 110C, 85% R.H. | 264 HRS | 80 | 0 | |
| HAST, NO BIAS | 1346 | DS2433 | 110C, 85% R.H. | 264 HRS | 80 | 0 | |
| HAST, NO BIAS | 1346 | DS2433 | 110C, 85% R.H. | 264 HRS | 80 | 0 | |
| HAST, NO BIAS | 1346 | DS2433 | 110C, 85% R.H. | 264 HRS | 80 | 0 | |
| HAST, NO BIAS | 1403 | DS2502 | 110C, 85% R.H. | 264 HRS | 80 | 0 | |
| HAST, NO BIAS | 1403 | DS2502 | 110C, 85% R.H. | 264 HRS | 80 | 0 | |
| HAST, NO BIAS | 1403 | DS2502 | 110C, 85% R.H. | 264 HRS | 80 | 0 | |
| Total: | | | | | | 0 | |

Assembly Information:

Package Type: WLP (Pb-Free)

Date Code Range: 1321 to N/A

OPERATING LIFE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-------------------|-----------|---------------|------------------|-----------|----------|----------|-------|
| HIGH TEMP OP LIFE | 1335 | MAX98358EWL+T | 135°C | 192 HRS | 80 | 0 | |
| HIGH TEMP OP LIFE | 1345 | MAX14676AEWO+ | 135°C | 192 HRS | 48 | 0 | |
| HIGH TEMP OP LIFE | 1402 | MAX5394L | 135C, 6.0V (PSA) | 1000 HRS | 80 | 0 | |
| HIGH TEMP OP LIFE | N/A | MAX98357BEWL+ | 135°C | 1000 HRS | 80 | 0 | |
| Total: | | | | | | 0 | |

STORAGE LIFE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|--------------|-----------|----------------|-----------|-----------|----------|-------|-------|
| STORAGE LIFE | 1322 | MAX98357AEETE+ | 150°C | 1000 HRS | 80 | 0 | |

| | | | | | | | |
|---------------|------|---------------|-------|------|-----|----|----------|
| STORAGE LIFE | 1343 | MAX98357AETE+ | 150°C | 1000 | HRS | 80 | 0 |
| STORAGE LIFE | 1402 | MAX5394L | 150°C | 1000 | HRS | 80 | 0 |
| STORAGE LIFE | 1402 | MAX5394L | 150°C | 1000 | HRS | 80 | 0 |
| STORAGE LIFE | 1402 | MAX5394L | 150°C | 1000 | HRS | 80 | 0 |
| STORAGE LIFE | N/A | MAX98357BEWL+ | 150°C | 1000 | HRS | 80 | 0 |
| Total: | | | | | | | 0 |

TEMPERATURE CYCLE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|---------------------------------|-----------|---------------|----------------------------|-----------|----------|-------|----------|
| TEMP CYCLE, 15' RAMP, 15' DWELL | 1321 | MAX98357AETE+ | -40C TO +125C (Condtion G) | 850 | CYS | 77 | 0 |
| TEMP CYCLE, 15' RAMP, 15' DWELL | 1321 | MAX98357AEWE+ | -40C TO +125C (Condtion G) | 850 | CYS | 80 | 0 |
| TEMP CYCLE, 15' RAMP, 15' DWELL | 1410 | MAX5394L | -40C TO +125C (Condtion G) | 1000 | CYS | 80 | 0 |
| TEMP CYCLE, 15' RAMP, 15' DWELL | 1410 | MAX5394L | -40C TO +125C (Condtion G) | 1000 | CYS | 80 | 0 |
| TEMP CYCLE, 15' RAMP, 15' DWELL | 1411 | MAX5394L | -40C TO +125C (Condtion G) | 1000 | CYS | 80 | 0 |
| Total: | | | | | | | 0 |

TEMPERATURE HUMIDITY BIAS

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-----------------|-----------|--------------|------------------|-----------|----------|-------|----------|
| BIASED MOISTURE | 1410 | MAX5394L | 85/85, 5.5 VOLTS | 1000 | HRS | 80 | 0 |
| BIASED MOISTURE | 1410 | MAX5394L | 85/85, 5.5 VOLTS | 1000 | HRS | 80 | 0 |
| BIASED MOISTURE | 1411 | MAX5394L | 85/85, 5.5 VOLTS | 1000 | HRS | 80 | 0 |
| Total: | | | | | | | 0 |

UNBIASED MOISTURE RESISTANCE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|---------------|-----------|---------------|----------------|-----------|----------|-------|----------|
| MOISTURE SOAK | 1321 | MAX98357AETE+ | 85 C/85% R.H. | 1000 | HRS | 80 | 0 |
| MOISTURE SOAK | 1321 | MAX98357AETE+ | 130C, 85% R.H. | 1000 | HRS | 80 | 0 |
| HAST, NO BIAS | 1410 | MAX5394L | 130C, 85% R.H. | 264 | HRS | 80 | 0 |
| HAST, NO BIAS | 1410 | MAX5394L | 130C, 85% R.H. | 264 | HRS | 80 | 0 |
| HAST, NO BIAS | 1411 | MAX5394L | 130C, 85% R.H. | 264 | HRS | 80 | 0 |
| Total: | | | | | | | 0 |

Assembly Information:

Package Type: WLP-HC (Pb-Free)
Date Code Range: 1408 to 1408

OPERATING LIFE

| DESCRIPTION | DATE CODE | TEST VEHICLE | CONDITION | READPOINT | QUANTITY | FAILS | FA NO |
|-------------------|-----------|--------------|-----------|-----------|----------|-------|----------|
| HIGH TEMP OP LIFE | 1408 | MAX15096GWE+ | 135°C | 192 | HRS | 80 | 0 |
| Total: | | | | | | | 0 |

FAILURE RATE: MTTF (YRS): 95146 FITS: 1.2