

**RELIABILITY REPORT
FOR**

DS1922L

Dallas Semiconductor

**4401 South Beltwood Parkway
Dallas, TX 75244-3292**

Prepared by:

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Conclusion:

The following qualification successfully meets the quality and reliability standards required of all Dallas Semiconductor products and processes:

DS1922L

In addition, Dallas Semiconductor's continuous reliability monitor program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards. The current status of the reliability monitor program can be viewed at <http://www.maxim-ic.com/TechSupport/dsreliability.html>.*

Module Description:

A description of this Module can be found in the product data sheet. You can find the product data sheet at http://dbserv.maxim-ic.com/l_datasheet3.cfm.*

Reliability Derating:

A module device consists of one or more IC's in a single, upward integrated, package. This package is assembled to include batteries, crystals, and other piece parts that make up the configuration of the Module. Because of either the complexity of the package or the included piece parts, standard high temperature reliability testing is not possible. Therefore, in order to determine the reliability of module products, the reliability of each of the piece parts is individually determined, then summed to determine the reliability of the integrated module product. If there are "n" significant components in the module then:

$$Fr(\text{module}) = Fr(1) + Fr(2) + Fr(3) + \dots + Fr(n)$$

Fr (module) = Failure rate of module
 Fr(n) = Failure rate of the nth component

Failure Rates are reported in FITs (Failures in Time) or MTTF (Mean Time To Failure). The FIT rate is related to MTTF by:

$$MTTF = 1/Fr$$

NOTE: MTTF is frequently used interchangeably with MTBF.

The calculated failure rate for this module/assembly is:

| Module Device: | Module Units: | Quantity: | Fails: | Ea: | MTTF (Yrs): | FITs: |
|-----------------------|----------------------|------------------|---------------|------------|--------------------|--------------|
| BR1225 | 1 | 100 | 1 | 1.0 | 175984 | 0.6 |
| CRYSTAL | 1 | 100 | 0 | 0.7 | 12463 | 9.2 |
| DS2422 | 1 | 231 | 0 | 0.7 | 19833 | 5.8 |
| DS9503 | 1 | 152 | 0 | 0.7 | 17861 | 6.4 |
| Totals: | | | | | 5199 | 22.0 |

The parameters used to calculate the module failure rate are as follows:

Cf: 60% **Tu: 25 °C**

The reliability data follows. At the start of this data is the module assembly information. This is a description of the module. The next section is the detailed reliability data for each stress found in the qualification / monitor. If there are additional processes or assemblies used as part of this report, a description of each will follow which includes the respective reliability data for that process/ assembly. The reliability data section includes the latest data available. Some of this data may be generic with other packages or products.

* Some proprietary products may be excepted from this requirement.

Assembly Information:

Assembly Site: Dallas
 Pin Count: 2
 Package Type: Puk Can F50 Insert Mold w/Bump Humidity
 Body Size: 17.35
 Mold Compound: FP4323, Dexter Hysol
 Lead Frame: PCB; FR4
 Lead Finish: SnPb Ball
 Die Attach: Underfill FP4527, Dexter Hysol
 Bond Wire / Size: /
 Flammability: UL 94-V0
 Moisture Sensitivity (JEDEC J-STD20A)
 Date Code Range: 0427 to 0431

CONSTRUCTION ANALYSIS

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|-----------------------|---------|-------------------|-----------|-----|----------|----------|
| CONSTRUCTION ANALYSIS | 0427 | TO BE DONE BY F/A | 2 | 5 | 0 | 30030440 |
| Total: | | | | | 0 | |

MECHANICAL LIFE

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|-------------------------------|---------|------------------------------------|-----------|-----|----------|-----|
| MECHANICAL SHOCK | 0427 | 200G, 1/2 SINE, 6 MS | 30 CYS | 50 | 0 | |
| VIBRATION, VARIABLE FREQUENCY | 0427 | 10g or 0.06", 5Hz-2KHz, X Y Z axis | 9 HRS | 50 | 0 | |
| Total: | | | | | 0 | |

STORAGE LIFE

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|---------------|---------|-----------|-----------|-----|----------|-----|
| STORAGE LIFE | 0427 | 85 C | 1000 HRS | 77 | 0 | |
| STORAGE LIFE | 0430 | 85 C | 1000 HRS | 77 | 0 | |
| STORAGE LIFE | 0431 | 85 C | 1000 HRS | 50 | 0 | |
| Total: | | | | | 0 | |

TEMPERATURE CYCLE

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|---------------|---------|------------|-----------|-----|----------|-----|
| TEMP CYCLE | 0427 | -40 TO 85C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0430 | -40 TO 85C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0431 | -40 TO 85C | 1000 CYS | 50 | 0 | |
| Total: | | | | | 0 | |

UNBIASED MOISTURE RESISTANCE

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|---------------|---------|--------------|-----------|-----|----------|-----|
| MOISTURE SOAK | 0427 | 60C/90% R.H. | 1000 HRS | 77 | 0 | |
| MOISTURE SOAK | 0430 | 60C/90% R.H. | 1000 HRS | 77 | 0 | |
| MOISTURE SOAK | 0431 | 60C/90% R.H. | 1000 HRS | 50 | 0 | |
| Total: | | | | | 0 | |

Assembly Information:

Assembly Site: Dallas
Pin Count: 2
Package Type: Puk Can F50 Insert Mold w/Bump/Battery
Body Size: 17.35
Mold Compound: BCB
Lead Frame: PCB; FR4
Lead Finsh: SnPb Ball
Die Attach: Underfill FP4549, Dexter Hysol
Bond Wire / Size: /
Flammability: UL 94-V0
Moisture Sensitivity
(JEDEC J-STD20A)
Date Code Range: 0232 to 0505

CONSTRUCTION ANALYSIS

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|-----------------------|---------|-------------------|-----------|-----|----------|----------|
| CONSTRUCTION ANALYSIS | 0343 | TO BE DONE BY F/A | 2 | 5 | 0 | 30016201 |
| Total: | | | | | 0 | |

ELECTRICAL CHARACTERIZATION

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|-----------------|---------|----------------------------------|-----------|-----|-------|-----|
| ESD SENSITIVITY | 0328 | IEC 61000-4-2 CONTACT 2000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0328 | IEC 61000-4-2 CONTACT 4000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0328 | IEC 61000-4-2 CONTACT 6000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0328 | IEC 61000-4-2 CONTACT 8000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0328 | IEC 61000-4-2 AIR 2000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0328 | IEC 61000-4-2 AIR 4000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0328 | IEC 61000-4-2 AIR 8000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0328 | IEC 61000-4-2 AIR 15000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0328 | IEC 61000-4-2 AIR 20000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0343 | IEC 61000-4-2 CONTACT 2000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0343 | IEC 61000-4-2 CONTACT 4000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0343 | IEC 61000-4-2 CONTACT 6000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0343 | IEC 61000-4-2 CONTACT 8000 VOLTS | 10 PUL'S | 3 | 0 | |
| ESD SENSITIVITY | 0343 | IEC 61000-4-2 AIR 2000 VOLTS | 10 PUL'S | 3 | 0 | |

| | | | | | | |
|-----------------|------|-------------------------------|----|-------|---|---|
| ESD SENSITIVITY | 0343 | IEC 61000-4-2 AIR 4000 VOLTS | 10 | PUL'S | 3 | 0 |
| ESD SENSITIVITY | 0343 | IEC 61000-4-2 AIR 8000 VOLTS | 10 | PUL'S | 3 | 0 |
| ESD SENSITIVITY | 0343 | IEC 61000-4-2 AIR 15000 VOLTS | 10 | PUL'S | 3 | 0 |
| ESD SENSITIVITY | 0343 | IEC 61000-4-2 AIR 20000 VOLTS | 10 | PUL'S | 3 | 0 |

Total: 0

MECHANICAL LIFE

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|-------------------------------|---------|------------------------------------|-----------|-----|-------|-----|
| MECHANICAL SHOCK | 0232 | 200G, 1/2 SINE, 6 MS | 30 CYS | 50 | 0 | |
| VIBRATION, VARIABLE FREQUENCY | 0232 | 10g or 0.06", 5Hz-2KHz, X Y Z axis | 9 HRS | 50 | 0 | |
| MECHANICAL SHOCK | 0234 | 200G, 1/2 SINE, 6 MS | 30 CYS | 50 | 0 | |
| VIBRATION, VARIABLE FREQUENCY | 0234 | 10g or 0.06", 5Hz-2KHz, X Y Z axis | 9 HRS | 50 | 0 | |
| MECHANICAL SHOCK | 0234 | 200G, 1/2 SINE, 6 MS | 30 CYS | 50 | 0 | |
| VIBRATION, VARIABLE FREQUENCY | 0234 | 10g or 0.06", 5Hz-2KHz, X Y Z axis | 9 HRS | 50 | 0 | |
| MECHANICAL SHOCK | 0334 | 200G, 1/2 SINE, 6 MS | 30 CYS | 50 | 0 | |
| VIBRATION, VARIABLE FREQUENCY | 0334 | 10g or 0.06", 5Hz-2KHz, X Y Z axis | 9 HRS | 50 | 0 | |
| MECHANICAL SHOCK | 0343 | 200G, 1/2 SINE, 6 MS | 30 CYS | 50 | 0 | |
| VIBRATION, VARIABLE FREQUENCY | 0343 | 10g or 0.06", 5Hz-2KHz, X Y Z axis | 9 HRS | 50 | 0 | |

Total: 0

OPERATING LIFE

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|-------------------|---------|------------------|-----------|-----|-------|-----|
| HIGH TEMP OP LIFE | 0425 | 85 C, 5.25 VOLTS | 1000 HRS | 77 | 0 | |
| HIGH TEMP OP LIFE | 0440 | 85 C, 5.25 VOLTS | 1000 HRS | 77 | 0 | |
| HIGH TEMP OP LIFE | 0451 | 85 C, 5.25 VOLTS | 500 HRS | 77 | 0 | |

Total: 0

STORAGE LIFE

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|--------------|---------|-----------|-----------|-----|-------|-----|
| STORAGE LIFE | 0232 | 85 C | 1000 HRS | 77 | 0 | |
| STORAGE LIFE | 0234 | 85 C | 1000 HRS | 77 | 0 | |
| STORAGE LIFE | 0234 | 85 C | 1000 HRS | 77 | 0 | |
| STORAGE LIFE | 0343 | 85 C | 4000 HRS | 77 | 0 | |
| STORAGE LIFE | 0343 | -20C | 1000 HRS | 77 | 0 | |
| STORAGE LIFE | 0351 | 85 C | 2000 HRS | 240 | 0 | |
| STORAGE LIFE | 0422 | 85 C | 1000 HRS | 77 | 0 | |
| STORAGE LIFE | 0425 | 85 C | 1000 HRS | 77 | 0 | |

| | | | | | |
|---------------|------|------|----------|----------|----------|
| STORAGE LIFE | 0440 | 85 C | 1000 HRS | 77 | 0 |
| STORAGE LIFE | 0441 | 125C | 1000 HRS | 77 | 0 |
| STORAGE LIFE | 0451 | 85 C | 1000 HRS | 77 | 0 |
| Total: | | | | 0 | 0 |

TEMPERATURE CYCLE

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|---------------|---------|------------|-----------|----------|----------|-----|
| TEMP CYCLE | 0232 | -40 TO 85C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0234 | -40 TO 85C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0234 | -40 TO 85C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0343 | 0C TO 70C | 2000 CYS | 77 | 0 | |
| TEMP CYCLE | 0425 | -40 TO 85C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0431 | -40 TO 85C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0431 | -40 TO 85C | 450 CYS | 77 | 0 | |
| TEMP CYCLE | 0440 | -40 TO 85C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0451 | -40 TO 85C | 1000 CYS | 77 | 0 | |
| TEMP CYCLE | 0505 | -40 TO 85C | 1000 CYS | 74 | 0 | |
| Total: | | | | 0 | 0 | |

UNBIASED MOISTURE RESISTANCE

| DESCRIPTION | DATE CD | CONDITION | READPOINT | QTY | FAILS | FA# |
|------------------|---------|---------------|-----------|----------|----------|-----|
| MOISTURE SOAK | 0232 | 60C/90% R.H. | 1000 HRS | 77 | 0 | |
| MOISTURE SOAK | 0234 | 60C/90% R.H. | 1000 HRS | 77 | 0 | |
| MOISTURE SOAK | 0234 | 60C/90% R.H. | 1000 HRS | 77 | 0 | |
| MOISTURE SOAK | 0343 | 85 C/85% R.H. | 1000 HRS | 75 | 0 | |
| MOISTURE SOAK | 0343 | 60C/90% R.H. | 2000 HRS | 77 | 0 | |
| MOISTURE CYCLING | 0422 | 85 C/85% R.H. | 1000 CYS | 77 | 0 | |
| MOISTURE SOAK | | 85 C/85% R.H. | 1000 HRS | 77 | 0 | |
| MOISTURE SOAK | 0425 | 60C/90% R.H. | 1000 HRS | 77 | 0 | |
| MOISTURE SOAK | 0440 | 60C/90% R.H. | 1000 HRS | 77 | 0 | |
| MOISTURE SOAK | 0441 | 60C/90% R.H. | 1000 HRS | 77 | 0 | |
| MOISTURE SOAK | 0451 | 60C/90% R.H. | 1000 HRS | 77 | 0 | |
| Total: | | | | 0 | 0 | |