RELIABILITY REPORT
FOR

DS9490, Rev A, Fastech

Dallas Semiconductor

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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:

DS9490, Rev A, Fastech

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:

\[ Fr\text{ (module)} = Fr\text{ (1)} + Fr\text{ (2)} + Fr\text{ (3)} + \ldots + Fr\text{ (n)} \]

\[ Fr(n) = \text{Failure rate of the } n\text{th component} \]

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

\[ MTTF = \frac{1}{Fr} \]

NOTE: MTTF is frequently used interchangeably with MTBF.

The calculated failure rate for this module/assembly is:

<table>
<thead>
<tr>
<th>Module Device</th>
<th>Quantity</th>
<th>MTTF (Yrs)</th>
<th>FITs</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS2490</td>
<td>1</td>
<td>9400</td>
<td>12.1</td>
</tr>
<tr>
<td>CRYSTAL</td>
<td>1</td>
<td>12458</td>
<td>9.2</td>
</tr>
<tr>
<td>DS2401</td>
<td>1</td>
<td>22756</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td></td>
<td><strong>4337</strong></td>
<td><strong>26</strong></td>
</tr>
</tbody>
</table>

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

Cf: 60%      Ea: 0.7      B: 0      Tu: 25 °C      Vu: 5.5 Volts
The reliability data follows. A 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 proprietary products may be excepted from this requirement.

### Assembly Information:

<table>
<thead>
<tr>
<th>Assembly Site:</th>
<th>Fastech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package Type:</td>
<td>Dongle/Fob</td>
</tr>
<tr>
<td>Flammability:</td>
<td>UL 94-V0</td>
</tr>
<tr>
<td>Date Code Range:</td>
<td>0131 to 0304</td>
</tr>
</tbody>
</table>

### MECHANICAL LIFE

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>DATE CODE</th>
<th>CONDITION</th>
<th>READPOINT</th>
<th>QUANTITY</th>
<th>FAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECHANICAL SHOCK</td>
<td>0132</td>
<td>200G, 1/2 SINE, 6 MS</td>
<td>30</td>
<td>CYS</td>
<td>50</td>
</tr>
<tr>
<td>VIBRATION, VARIABLE F</td>
<td>0132</td>
<td>10g or 0.06&quot;, 5Hz-2KHz, X Y Z axis</td>
<td>9</td>
<td>HRS</td>
<td>50</td>
</tr>
<tr>
<td>MECHANICAL SHOCK</td>
<td>0132</td>
<td>200G, 1/2 SINE, 6 MS</td>
<td>30</td>
<td>CYS</td>
<td>50</td>
</tr>
<tr>
<td>VIBRATION, VARIABLE F</td>
<td>0132</td>
<td>10g or 0.06&quot;, 5Hz-2KHz, X Y Z axis</td>
<td>9</td>
<td>HRS</td>
<td>50</td>
</tr>
<tr>
<td>MECHANICAL SHOCK</td>
<td>0140</td>
<td>200G, 1/2 SINE, 6 MS</td>
<td>30</td>
<td>CYS</td>
<td>50</td>
</tr>
<tr>
<td>VIBRATION, VARIABLE F</td>
<td>0140</td>
<td>10g or 0.06&quot;, 5Hz-2KHz, X Y Z axis</td>
<td>9</td>
<td>HRS</td>
<td>50</td>
</tr>
</tbody>
</table>

**Total:** 0

### STORAGE LIFE

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>DATE CODE</th>
<th>CONDITION</th>
<th>READPOINT</th>
<th>QUANTITY</th>
<th>FAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STORAGE LIFE</td>
<td>0132</td>
<td>85 C</td>
<td>1000</td>
<td>HRS</td>
<td>77</td>
</tr>
<tr>
<td>STORAGE LIFE</td>
<td>0132</td>
<td>85 C</td>
<td>1000</td>
<td>HRS</td>
<td>77</td>
</tr>
<tr>
<td>STORAGE LIFE</td>
<td>0140</td>
<td>85 C</td>
<td>1000</td>
<td>HRS</td>
<td>77</td>
</tr>
<tr>
<td>STORAGE LIFE</td>
<td>0211</td>
<td>70 C</td>
<td>1000</td>
<td>HRS</td>
<td>77</td>
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<tr>
<td>STORAGE LIFE</td>
<td>0238</td>
<td>70 C</td>
<td>1000</td>
<td>HRS</td>
<td>77</td>
</tr>
<tr>
<td>STORAGE LIFE</td>
<td>0301</td>
<td>70 C</td>
<td>1000</td>
<td>HRS</td>
<td>77</td>
</tr>
<tr>
<td>STORAGE LIFE</td>
<td>0304</td>
<td>70 C</td>
<td>1000</td>
<td>HRS</td>
<td>77</td>
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</table>

**Total:** 0

### TEMPERATURE CYCLE

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>DATE CODE</th>
<th>CONDITION</th>
<th>READPOINT</th>
<th>QUANTITY</th>
<th>FAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMP CYCLE</td>
<td>0131</td>
<td>-40 TO 85C</td>
<td>1000</td>
<td>CYS</td>
<td>77</td>
</tr>
<tr>
<td>TEMP CYCLE</td>
<td>0131</td>
<td>-40 TO 85C</td>
<td>1000</td>
<td>CYS</td>
<td>77</td>
</tr>
<tr>
<td>TEMP CYCLE</td>
<td>0132</td>
<td>-40 TO 85C</td>
<td>1000</td>
<td>CYS</td>
<td>77</td>
</tr>
<tr>
<td>TEMP CYCLE</td>
<td>0132</td>
<td>-40 TO 85C</td>
<td>1000</td>
<td>CYS</td>
<td>77</td>
</tr>
<tr>
<td>TEMP CYCLE</td>
<td>0140</td>
<td>-40 TO 85C</td>
<td>1000 CYS</td>
<td>77 0</td>
<td></td>
</tr>
<tr>
<td>TEMP CYCLE</td>
<td>0211</td>
<td>-40 TO 85C</td>
<td>500 CYS</td>
<td>77 2</td>
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<tr>
<td>TEMP CYCLE</td>
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<td>-40 TO 85C</td>
<td>200 CYS</td>
<td>250 0</td>
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<tr>
<td>TEMP CYCLE</td>
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<td>-40 TO 85C</td>
<td>500 CYS</td>
<td>77 0</td>
<td></td>
</tr>
<tr>
<td>TEMP CYCLE</td>
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<td>-40 TO 85C</td>
<td>500 CYS</td>
<td>77 0</td>
<td></td>
</tr>
<tr>
<td>TEMP CYCLE</td>
<td>0304</td>
<td>-40 TO 85C</td>
<td>500 CYS</td>
<td>77 0</td>
<td></td>
</tr>
</tbody>
</table>

**Total:** 2

**UNBIASED MOISTURE RESISTANCE**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>DATE CODE</th>
<th>CONDITION</th>
<th>READPOINT</th>
<th>QUANTITY</th>
<th>FAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOISTURE SOAK</td>
<td>0131</td>
<td>60C/90% R.H.</td>
<td>960 HRS</td>
<td>77 0</td>
<td></td>
</tr>
<tr>
<td>MOISTURE SOAK</td>
<td>0131</td>
<td>60C/90% R.H.</td>
<td>960 HRS</td>
<td>77 0</td>
<td></td>
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<tr>
<td>MOISTURE SOAK</td>
<td>0132</td>
<td>60C/90% R.H.</td>
<td>960 HRS</td>
<td>77 0</td>
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<tr>
<td>MOISTURE SOAK</td>
<td>0132</td>
<td>60C/90% R.H.</td>
<td>960 HRS</td>
<td>77 0</td>
<td></td>
</tr>
<tr>
<td>MOISTURE SOAK</td>
<td>0140</td>
<td>60C/90% R.H.</td>
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<td>77 0</td>
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<td>0211</td>
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<td>76 0</td>
<td></td>
</tr>
<tr>
<td>MOISTURE SOAK</td>
<td>0238</td>
<td>60C/90% R.H.</td>
<td>1000 HRS</td>
<td>77 0</td>
<td></td>
</tr>
<tr>
<td>MOISTURE SOAK</td>
<td>0301</td>
<td>60C/90% R.H.</td>
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<td>77 0</td>
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<td>MOISTURE SOAK</td>
<td>0304</td>
<td>60C/90% R.H.</td>
<td>1000 HRS</td>
<td>77 0</td>
<td></td>
</tr>
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**Total:** 0