RELIABILITY REPORT
FOR

DS21354, Rev C1

Dallas Semiconductor

4401 South Beltwood Parkway
Dallas, TX 75244-3292

Prepared by:

Don Lipps
Staff Reliability Engineer
Dallas Semiconductor
4401 South Beltwood Pkwy.
Dallas, TX 75244-3292
Email : don.lipps@dalsemi.com
ph: 972-371-3739
fax: 972-371-6016
Conclusion:
The following qualification successfully meets the quality and reliability standards required of all Dallas Semiconductor products and processes:

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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.

Device Description:
A description of this device 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:
The Arrhenius model will be used to determine the acceleration factor for failure mechanisms that are temperature accelerated.

\[ Af_T = \exp\left(\frac{E_a}{k}\left(\frac{1}{T_u} - \frac{1}{T_s}\right)\right) = \frac{t_u}{t_s} \]

\( Af_T \) = Acceleration factor due to Temperature  
\( t_u \) = Time at use temperature (e.g. 55°C)  
\( t_s \) = Time at stress temperature (e.g. 125°C)  
\( k \) = Boltzmann's Constant (8.617 x 10-5 eV/°K)  
\( T_u \) = Temperature at Use (°K)  
\( T_s \) = Temperature at Stress (°K)  
\( E_a \) = Activation Energy (e.g. 0.7 ev)

The activation energy of the failure mechanism is derived from either internal studies or industry accepted standards, or activation energy of 0.7ev will be used whenever actual failure mechanisms or their activation energies are unknown. All deratings will be done from the stress ambient temperature to the use ambient temperature.

An exponential model will be used to determine the acceleration factor for failure mechanisms, which are voltage accelerated.

\[ Af_V = \exp(B(V_s - V_u)) \]

\( Af_V \) = Acceleration factor due to Voltage  
\( V_s \) = Stress Voltage (e.g. 7.0 volts)  
\( V_u \) = Maximum Operating Voltage (e.g. 5.5 volts)  
\( B \) = Constant related to failure mechanism type (e.g. 1.0, 2.4, 2.7, etc.)

The Constant, B, related to the failure mechanism is derived from either internal studies or industry accepted standards, or a B of 1.0 will be used whenever actual failure mechanisms or their B are unknown. All deratings will be done from the stress voltage to the maximum operating voltage. Failure rate data from the operating life test is reported using a Chi-Squared statistical model at the 60% or 90% confidence level (\( Cf \)).

\[ Fr = \frac{X}{t_s \cdot Af_V \cdot Af_T \cdot N \cdot 2} \]

\( X \) = Chi-Sq statistical upper limit  
\( N \) = Life test sample size
The calculated failure rate for this device/process is:

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

NOTE: MTTF is frequently used interchangeably with MTBF.

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

- \( C_f = 60\% \)
- \( E_a = 0.7 \)
- \( B = 0 \)
- \( T_u = 25 \degree C \)
- \( V_u = 3.5 \text{ Volts} \)

The reliability data follows. At the start of this data is the device information. The next section is the detailed reliability data for each stress. The reliability data section includes the latest data available.

### Device Information:

- **Process:** E6H-2P2M, HPVt, TCZ ALCONS: GOI
- **Passivation:** Passivation w/OxyNitride-Nov. 4% PSG
- **Die Size:** 293 x 311
- **Number of Transistors:** 172615
- **Interconnect:** Aluminum / 1% Silicon / 0.5% Copper
- **Gate Oxide Thickness:** 150 Å

### Electrical Characterization

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>DATE CODE</th>
<th>CONDITION</th>
<th>READPOINT</th>
<th>QUANTITY</th>
<th>FAILS</th>
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<tbody>
<tr>
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<td>0420</td>
<td>EOS/ESD S5.1 HBM 500 VOLTS</td>
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### Operating Life

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<tbody>
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<td><strong>Total:</strong></td>
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**Failure Rate:**  FITS: 3.1  MTTF (YRS): 37273