RELIABILITY REPORT

FOR

MAX4525xUB

PLASTIC ENCAPSULATED DEVICES

June 25, 2001

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

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Executive Director
Conclusion

The MAX4525 successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim’s continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim’s quality and reliability standards.

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I. Device Description

A. General

The MAX4525 are low-voltage, single-supply CMOS analog switches configured as double-pole-double-throw (DPDT) switch. The device has an inhibit input to simultaneously open all signal paths.

This device operates from a single supply of +2V to +12V and is optimized for operation with +3V or +5V supplies. On-resistance is 200Ω with a +5V supply and 500Ω with a +3V supply. Each switch can handle Rail-to-Rail® analog signals. The off-leakage current is only 2nA at +25°C or 20nA at +85°C.

All digital inputs have 0.8V to 2.4V logic thresholds, ensuring TTL/CMOS-logic compatibility when using a single +5V supply.

B. Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Item</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage into any terminal (Note 1)</td>
<td>-0.3V to (V+ + 0.3V)</td>
</tr>
<tr>
<td>Continuous Current into any Terminal</td>
<td>±20mA</td>
</tr>
<tr>
<td>Peak Current, NO, NC or COM_ (pulsed at 1ms, 10% duty cycle)</td>
<td>±40mA</td>
</tr>
<tr>
<td>ESD per Method 3015.7</td>
<td>&gt;2000V</td>
</tr>
<tr>
<td>Storage Temp.</td>
<td>-65°C to +150°C</td>
</tr>
<tr>
<td>Lead Temp. (10 sec.)</td>
<td>+300°C</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>330mW</td>
</tr>
<tr>
<td>Derates above +70°C</td>
<td>4.10mW/°C</td>
</tr>
</tbody>
</table>
II. Manufacturing Information

A. Description/Function: Low-Voltage, Single-Supply Multiplexer

B. Process: S3 (Standard 3 micron silicon gate CMOS)

C. Number of Device Transistors: 219

D. Fabrication Location: Oregon, USA

E. Assembly Location: Malaysia, Philippines

F. Date of Initial Production: January, 1998

III. Packaging Information

A. Package Type: 10 Lead uMAX

B. Lead Frame: Copper

C. Lead Finish: Solder Plate

D. Die Attach: Silver-filled Epoxy

E. Bondwire: Gold (1.0 mil dia.)

F. Mold Material: Epoxy with silica filler

G. Assembly Diagram: Buildsheet # 05-1201-0047

H. Flammability Rating: Class UL94-V0

I. Classification of Moisture Sensitivity per JEDEC standard JESD22-A112: Level 1

IV. Die Information

A. Dimensions: 53 X 69 mils

B. Passivation: Si₃N₄/SiO₂ (Silicon nitride/ Silicon dioxide)

C. Interconnect: Aluminum/Si (Si = 1%)  

D. Backside Metallization: None

E. Minimum Metal Width: 3 microns (as drawn)

F. Minimum Metal Spacing: 3 microns (as drawn)

G. Bondpad Dimensions: 5 mil. Sq.

H. Isolation Dielectric: SiO₂

I. Die Separation Method: Wafer Saw
V. Quality Assurance Information

A. Quality Assurance Contacts: Jim Pedicord (Reliability Lab Manager)
   Bryan Preeshl (Executive Director)
   Kenneth Huening (Vice President)

B. Outgoing Inspection Level: 0.1% for all electrical parameters guaranteed by the Datasheet.
   0.1% For all Visual Defects.

C. Observed Outgoing Defect Rate: < 50 ppm

D. Sampling Plan: Mil-Std-105D

VI. Reliability Evaluation

A. Accelerated Life Test

   The results of the 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

   \[
   \lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4389 \times 80 \times 2} = \text{(Chi square value for MTTF upper limit)}
   \]

   Temperature Acceleration factor assuming an activation energy of 0.8eV

   \[
   \lambda = 13.57 \times 10^{-9}
   \]

   $\lambda = 13.57$ F.I.T. (60% confidence level @ 25°C)

   This low failure rate represents data collected from Maxim’s reliability monitor program. In addition to routine production Burn-In, Maxim pulls a sample from every fabrication process three times per week and subjects it to an extended Burn-In prior to shipment to ensure its reliability. The reliability control level for each lot to be shipped as standard product is 59 F.I.T. at a 60% confidence level, which equates to 3 failures in an 80 piece sample. Maxim performs failure analysis on any lot that exceeds this reliability control level. Attached Burn-In Schematic (Spec. # 06-5325) shows the static Burn-In circuit. Maxim also performs quarterly 1000 hour life test monitors. This data is published in the Product Reliability Report (RR-1L).

B. Moisture Resistance Tests

   Maxim pulls pressure pot samples from every assembly process three times per week. Each lot sample must meet an LTPD = 20 or less before shipment as standard product. Additionally, the industry standard 85°C/85%RH testing is done per generic device/package family once a quarter.

C. E.S.D. and Latch-Up Testing

   The AH14-4 die type has been found to have all pins able to withstand a transient pulse of ±2000V, per Mil-Std-883 Method 3015 (reference attached ESD Test Circuit). Latch-Up testing has shown that this device withstands a current of ±250mA and/or ±20V.
## Table 1
Reliability Evaluation Test Results
MAX4525xUB

<table>
<thead>
<tr>
<th>TEST ITEM</th>
<th>TEST CONDITION</th>
<th>FAILURE IDENTIFICATION</th>
<th>SAMPLE SIZE</th>
<th>NUMBER OF FAILURES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Static Life Test</strong> (Note 1)</td>
<td>Ta = 135°C</td>
<td>DC Parameters &amp; functionality</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time = 192 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Moisture Testing</strong></td>
<td>Ta = 121°C</td>
<td>DC Parameters &amp; functionality</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>P = 15 psi.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RH = 100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time = 96 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>85/85</td>
<td>Ta = 85°C</td>
<td>DC Parameters &amp; functionality (generic test vehicle)</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>RH = 85%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time = 1000 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mechanical Stress</strong></td>
<td>-65°C/150°C</td>
<td>DC Parameters (generic test vehicle)</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>1000 Cycles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Method 1010</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1: Life Test Data may represent plastic D.I.P. qualification lots for the Micro Max package.
NOTES:
1. TEMPERATURE: 125ºC OR EQUIVALENT
2. TIME: 160 HOURS MIN. OR EQUIVALENT
3. ALL COMPONENTS AND MATERIAL MUST STAND
   150ºC CONTINUOUS
4. APPROVED FOR EX3 COMMERCIAL
   (X3) HR/883

SPEC. NO. 06-5325 REV: A
DATE: 12/24/97
DRAWN BY: R. TARTICA

MAXIM BURN-IN SCHEMATIC

DEVICE TYPE(S): MAX4524/4525