



RELIABILITY REPORT  
FOR  
MAX234EWE+  
PLASTIC ENCAPSULATED DEVICES

July 5, 2012

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
SUNNYVALE, CA 94086

|                      |
|----------------------|
| <b>Approved by</b>   |
| Sokhom Chum          |
| Quality Assurance    |
| Reliability Engineer |

## Conclusion

The MAX234EWE+ 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 MAX220-MAX249 family of line drivers/receivers is intended for all EIA/TIA-232E and V.28/V.24 communications interfaces, particularly applications where  $\pm 12V$  is not available. These parts are especially useful in battery-powered systems, since their low-power shutdown mode reduces power dissipation to less than  $5\mu W$ . The MAX225, MAX233, MAX235, and MAX245/MAX246/MAX247 use no external components and are recommended for applications where printed circuit board space is critical.

## II. Manufacturing Information

|                                  |  |
|----------------------------------|--|
| A. Description/Function:         | +5V-Powered, Multichannel RS-232 Drivers/Receivers |
| B. Process:                      | M6   |
| C. Number of Device Transistors: |  |
| D. Fabrication Location:         | Oregon   |
| E. Assembly Location:            | Malaysia   |
| F. Date of Initial Production:   | Pre 1997   |

## III. Packaging Information

|  |                          |
|--|--------------------------|
| A. Package Type:   | 300 mil 16L SOIC         |
| B. Lead Frame:   | Copper                   |
| C. Lead Finish:  | 100% matte Tin           |
| D. Die Attach:   | Conductive               |
| E. Bondwire:   | Au (1.3 mil dia.)        |
| F. Mold Material:  | Epoxy with silica filler |
| G. Assembly Diagram:   | #05-0701-0442 / C        |
| H. Flammability Rating:  | Class UL94-V0            |
| I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C | 1                        |
| J. Single Layer Theta Ja:  | 105°C/W                  |
| K. Single Layer Theta Jc:  | 22°C/W                   |
| L. Multi Layer Theta Ja:   | 69.1°C/W                 |
| M. Multi Layer Theta Jc:   | 22°C/W                   |

## IV. Die Information

|                            |   |
|----------------------------|---|
| A. Dimensions:             | 138 X 155 mils  |
| B. Passivation:            | Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide) |
| C. Interconnect:           | Al/1.0%Si   |
| D. Backside Metallization: | None  |
| E. Minimum Metal Width:    | Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)                       |
| F. Minimum Metal Spacing:  | Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)                      |
| G. Bondpad Dimensions:     |   |
| H. Isolation Dielectric:   | SiO <sub>2</sub>  |
| I. Die Separation Method:  | Wafer Saw   |

## V. Quality Assurance Information

- A. Quality Assurance Contacts: Richard Aburano (Manager, Reliability Engineering)  
Don Lipps (Manager, Reliability Engineering)  
Bryan Preeshl (Vice President of QA)
- 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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 480 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 2.3 \times 10^{-9}$$

$$\lambda = 2.3 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maxim-ic.com/qa/reliability/monitor>. Cumulative monitor data for the M6 Process results in a FIT Rate of 0.22 @ 25C and 3.73 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot NYCCGB059C D/C 9737)

The PS29-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-200mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX234EWE+**

| TEST ITEM                        | TEST CONDITION                          | FAILURE IDENTIFICATION           | SAMPLE SIZE | NUMBER OF FAILURES | COMMENTS              |
|----------------------------------|---|----------------------------------|-------------|--------------------|-----------------------|
| <b>Static Life Test</b> (Note 1) | Ta = 135°C<br>Biased<br>Time = 192 hrs. | DC Parameters<br>& functionality | 80          | 0                  | NYCCHZ012A, D/C 9737  |
|                                  |   |                                  | 80          | 0                  | XYCCSZ115A, D/C 9527  |
|                                  |   |                                  | 80          | 0                  | XYCCSA909A, D/C 9352  |
|                                  |   |                                  | 80          | 0                  | XYCCSA736A, D/C N/A   |
|                                  |   |                                  | 80          | 0                  | XYCCCSE003Q, D/C 9222 |
|                                  |   |                                  | 80          | 0                  | XYCCCY326A, D/C N/A   |

Note 1: Life Test Data may represent plastic DIP qualification lots. Note 1: Life Test Data may represent plastic DIP qualification lots.