



RELIABILITY REPORT
FOR
MAX13174ECAG+
PLASTIC ENCAPSULATED DEVICES

September 2, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX13174ECAG+ 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 MAX13174E contains six pin-selectable, multiprotocol cable termination networks. Each network is capable of terminating V.11 (RS-422, RS-530, RS-530A, RS-449, V.36, and X.21) with a 100 differential load, V.35 with a T-network load, or V.28 (RS-232) and V.10 (RS-423) with an open-circuit load for use with transceivers having on-chip termination. The termination protocol can be selected by the serial interface cable wiring or by pin control. The MAX13174E replaces discrete resistor termination networks and expensive relays required for multiprotocol termination, saving space and cost. The MAX13174E terminator is ideal to form a complete +5V cable- or pin-selectable multiprotocol DCE/DTE interface port when used with the MAX13170E and MAX13172E transceiver ICs. The MAX13174E terminator can use the VEE power generated by the MAX13170E charge pump, simplifying system design. The MAX13174E/MAX13170E/MAX13172E are pin-for-pin compatible with the MXL1344A/MXL1543/MXL1544/MAX3175. The MAX13174E is available in a 24-pin SSOP package and is specified for the 0°C to +70°C commercial temperature range.

II. Manufacturing Information

A. Description/Function:	+5V Multiprotocol, Pin-Selectable Cable Terminator
B. Process:	B8
C. Number of Device Transistors:	5741
D. Fabrication Location:	USA
E. Assembly Location:	Malaysia and Philippines
F. Date of Initial Production:	July 25, 2009

III. Packaging Information

A. Package Type:	24-pin SSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3322
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	125°C/W
K. Single Layer Theta Jc:	26°C/W
L. Multi Layer Theta Ja:	66.9°C/W
M. Multi Layer Theta Jc:	24.6°C/W

IV. Die Information

A. Dimensions:	123 X 195 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO ₂
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 135 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 22.9 \times 10^{-9}$$

$$\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 then B8 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot TPVZEQ001C, D/C 1038)

The RU27 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM:	+/- 2500V per JEDEC JESD22-A114
ESD-CDM:	+/- 750V per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX13174ECAG+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135 Biased Time = 192 hrs.	DC Parameters & functionality	48	0	TPVZCQ002G, D/C 0927

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