RELIABILITY REPORT

FOR

MAX13172ECAI+

PLASTIC ENCAPSULATED DEVICES

September 2, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX13172ECAI+ 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 MAX13172E is a four-driver/four-receiver multiprotocol transceiver that operates from a single +5V supply in conjunction with the MAX13170E and MAX13174E. The MAX13172E, along with the MAX13170E and the MAX13174E, form a complete software-selectable data terminal equipment (DTE) or data communication equipment (DCE) interface port that supports the V.28 (RS-232), V.10/V.11 (RS-449/V.36, EIA-530, EIA-530A, X.21, RS-423), and V.35 protocols. The MAX13172E transceiver carries serial-interface control signaling, while the MAX13170E carries the high-speed clock and data signals. Typically, the MAX13170E is terminated using the MAX13174E. The MAX13172E is available in a 5.3mm x 10.2mm, 28-pin SSOP package and operates over the 0°C to +70°C commercial temperature range.

II. Manufacturing Information

A. Description/Function:	+5V Multiprotocol, Software-Selectable Clock Transceiver
B. Process:	B8
C. Number of Device Transistors:	4606
D. Fabrication Location:	USA
E. Assembly Location:	Malaysia and Philippines
F. Date of Initial Production:	April 26, 2008

III. Packaging Information

A. Package Type:	28-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:	#05-9000-2997
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:	105°C/W
K. Single Layer Theta Jc:	24°C/W
L. Multi Layer Theta Ja:	67°C/W
M. Multi Layer Theta Jc:	25°C/W

IV. Die Information

A. Dimensions:	124 X 215 mils
B. Passivation:	Si_3N_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:

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

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

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

λ = 22.9 F.I.T. (60% confidence level @ 25°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 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 JIEYEQ002B, D/C 1109)

The RU26 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

MAX13172ECAI+

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	TIEYBQ001C, D/C 0819

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