RELIABILITY REPORT

FOR

MAX2986CXE+

PLASTIC ENCAPSULATED DEVICES

December 15, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX2986CXE+ 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 MAX2986 powerline transceiver utilizes state-of-theart CMOS design techniques to deliver the highest level of performance and flexibility. This highly integrated design combines the media access control layer (MAC) and the physical layer (PHY) in a single chip. The MAX2986 digital baseband and its companion device, the MAX2980 analog front-end (AFE), offer a complete high-speed powerline communication solution that is fully compatible with third-party HomePlug® 1.0 devices. The MAX2986 digital transceiver utilizes Maxim's advanced OFDM powerline engine with adaptive data rates up to 14Mbps. The MAX2986's open architecture allows extensive programmability, feature enhancement capability, and improved testability in the MAC for optimum performance. Hence, this device is aimed at applications such as local area networks (LANs), audio, voice, home automation, industrial automation, and broadband-over-powerline (BPL), as well as spectral shaping and tone notching capability, providing an unparalleled level of flexibility to conform to the disparate local regulatory bodies. Maxim's modified OFDM technique allows shaping of power spectral density of the transmitted signal arbitrarily to accommodate any desired subcarrier set and to place spectral nulls at any unwanted frequency location. The automatic channel adaptation and interference rejection features of the MAX2986 guarantee outstanding performance. Privacy is provided by a 56-bit DES encryption with key management. The MAX2986 operates with IEEE® 802.03 standard media independent interface (MII), reduced media independent interface (rMII), buffered FIFO data communication, IEEE 802.03 compatible 10/100 Ethernet MAC, or USB 1.1 interfaces. These interfaces allow the MAX2986 to be paired with almost any data communication devices to use in a variety of information appliances.

II. Manufacturing Information

A. Description/Function:	Integrated Powerline Digital Transceiver
B. Process:	TS18
C. Number of Device Transistors:	
D. Fabrication Location:	Taiwan
E. Assembly Location:	China
F. Date of Initial Production:	October 23, 2004

III. Packaging Information

A. Package Type:	144-pin CSBGA
B. Lead Frame:	Substrate
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:	#05-9000-1477
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
J. Multi Layer Theta Ja:	30°C/W
K. Multi Layer Theta Jc:	13°C/W

IV. Die Information

A. Dimensions:	277 X 277 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18µm
F. Minimum Metal Spacing:	0.18µm
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Ken Wendel (Director, Reliability Engineering) Bryan Preeshl (Managing Director 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°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 135 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 7.96 \times 10^{-9}$

λ = 7.96 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 TS18 Process results in a FIT Rate of 0.24 @ 25C and 4.14 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

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

The WV05 die type has been found to have all pins able to withstand a HBM transient pulse of +/-800 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1

Reliability Evaluation Test Results

MAX2986CXE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	135	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2)				
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

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

Note 2: Generic Package/Process data