RELIABILITY REPORT

FOR

MAX3535EEWI+

PLASTIC ENCAPSULATED DEVICES

October 23, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX3535EEWI+ 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 MAX3535E/MXL1535E isolated RS-485/RS-422 full-duplex transceivers provide 2500VRMS of galvanic isolation between the RS-485/RS-422 side and the processor or control logic side. These devices allow fast, 1000kbps communication across an isolation barrier when the common-mode voltages (i.e., the ground potentials) on either side of the barrier are subject to large differences. Isolation is achieved through integrated high-voltage capacitors. The MAX3535E/MXL1535E also feature a 420kHz transformer driver that allows power transfer to the RS-485 side using an external transformer. The MAX3535E/MXL1535E include one differential driver, one receiver, and internal circuitry to send the RS-485 signals and control signals across the isolation barrier (including the isolation capacitors). The MAX3535E/MXL1535E RS-485 receivers are 1/8 unit load, allowing up to 256 devices on the same bus. The MAX3535E/MXL1535E feature true fail-safe circuitry. The driver outputs and the receiver inputs are protected from ±15kV electrostatic discharge (ESD) on the interface side, as specified in the Human Body Model (HBM). The MAX3535E/MXL1535E feature driver slew-rate select that minimizes electromagnetic interference (EMI) and reduces reflections. The driver outputs are short-circuit and overvoltage protected. Other features are hot-swap capability and isolation-barrier fault detection. The MAX3535E operates with a single +3V to +5.5V power supply. The improved secondary supply range of the MAX3535E allows the use of step-down transformers for +5V operation, resulting in considerable power savings. The MXL1535E operates with a single +4.5V to +5.5V power supply. The MXL1535E is a function-/pin-compatible improvement of the LTC1535. The MAX3535E/MXL1535E are available over the commercial 0°C to +70°C and extended -40°C to +85°C temperature ranges.

II. Manufacturing Information

A. Description/Function:	+3V to +5V, 2500V_{RMS} Isolated RS-485/RS-422 Transceivers with ±15kV ESD Protection
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Philippines
F. Date of Initial Production:	4/24/2004

III. Packaging Information

A. Package Type:	28-pin SOIC (W)
B. Lead Frame:	
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#31-4793
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1

IV. Die Information

A. Dimensions:	N/A mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Al/0.5% Cu
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:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 180 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 1.15 \times 10^{-9}$

λ = 1.15 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 @ 25C and @ 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 RT47 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 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

MAX3535EEWI+

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	180	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