RELIABILITY REPORT

FOR

MAX3223ECAP+

PLASTIC ENCAPSULATED DEVICES

December 10, 2014

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX3223ECAP+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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I. Device Description

A. General

The MAX3221E/MAX3223E/MAX3243E are 3V-powered EIA/TIA-232 and V.28/V.24 communications interfaces with automatic shutdown/wakeup features, high data-rate capabilities, and enhanced electrostatic discharge (ESD) protection. All transmitter outputs and receiver inputs are protected to ±15kV using IEC 1000-4-2 Air-Gap Discharge, to ±8kV using IEC 1000-4-2 Contact Discharge, and to ±15kV using the Human Body Model. The MAX3221E/MAX3223E/MAX3243E achieve a 1µA supply current with Maxim's revolutionary AutoShutdown(tm) feature. They save power without changes to the existing BIOS or operating system by entering low-power shutdown mode when the RS-232 cable is disconnected, or when the transmitters of the connected peripherals are off. The transceivers have a proprietary low-dropout transmitter output stage, delivering true RS-232 performance from a +3.0V to +5.5V supply with a dual charge pump. The charge pump requires only four small 0.1µF capacitors for operation from a +3.3V supply. Each device is guaranteed to run at data rates of 250kbps while maintaining RS-232 output levels. The MAX3221E contains just one driver and one receiver, making it the smallest single-supply RS-232 transceiver. The MAX3223E has two drivers and two receivers. The MAX3243E is a complete 3-driver/5-receiver serial port ideal for notebook or subnotebook computers. It also includes two noninverting receiver outputs that are always active, allowing external devices to be monitored without forward biasing the protection diodes in circuitry that may be powered down. The MAX3221E, MAX3223E, and MAX3243E are available in space-saving TQFN, SSOP, and TSSOP packages.

II. Manufacturing Information

A. Description/Function:	±15kV ESD-Protected, 1µA, 3.0V to 5.5V, 250kbps, RS-232 Transceivers with AutoShutdown
B. Process:	B3
C. Number of Device Transistors:	2445
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	January 24, 1998

III. Packaging Information

A. Package Type:	20-pin SSOP
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:	#05-1901-0189
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:	33°C/W
L. Multi Layer Theta Ja:	83°C/W
M. Multi Layer Theta Jc:	33°C/W

IV. Die Information

A. Dimensions:	61.811X109.8425 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:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 4340 \times 240 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 0.88 \times 10^{-9}$

$\lambda = 0.88$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maximintegrated.com/qa/reliability/monitor. Cumulative monitor data for the B3 Process results in a FIT Rate of 0.25 @ 25C and 4.22 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot JO3BMA782C, D/C 1108)

The RS60-1 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 +/- 100mA and overvoltage per JEDEC JESD78.

Table 1

Reliability Evaluation Test Results

MAX3223ECAP+

Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	80	0	JAES7A6A4C, D/C 1226
	Biased	& functionality	80	0	JO3AM2550B, D/C 1023
	Time = 1000 hrs.		80	0	JO3AL2003A, D/C 0701

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