

RELIABILITY REPORT FOR MAX3420EECJ+

PLASTIC ENCAPSULATED DEVICES

November 30, 2008

## MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR. SUNNYVALE, CA 94086

Approved by				
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Quality Assurance				
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#### Conclusion

The MAX3420EECJ+ 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 MAX3420E contains the digital logic and analog circuitry necessary to implement a full-speed USB peripheral compliant to USB specification rev 2.0. A built-in full-speed transceiver features ±15kV ESD protection and programmable USB connect and disconnect. An internal serial-interface engine (SIE) handles low-level USB protocol details such as error checking and bus retries. The MAX3420E operates using a register set accessed by an SPI(tm) interface that operates up to 26MHz. Any SPI master (microprocessor, ASIC, DSP, etc.) can add USB functionality using the simple 3- or 4-wire SPI interface. Internal level translators allow the SPI interface to run at a system voltage between 1.71V and 3.6V. USB timed operations are done inside the MAX3420E with interrupts provided at completion so an SPI master does not need timers to meet USB timing requirements. The MAX3420E includes four general-purpose inputs and outputs so any microprocessor that uses I/O pins to implement the SPI interface can reclaim the I/O pins and gain additional ones. The MAX3420E operates over the extended -40°C to +85°C temperature range and is available in a 32-pin LQFP package (7mm x 7mm) and a space-saving 24-pin TQFN package (4mm x 4mm).



II. Manufacturing Information

A. Description/Function: USB Peripheral Controller with SPI Interface
B. Process: S4
C. Number of Device Transistors: 0
D. Fabrication Location: Texas
E. Assembly Location: Anam Korea, Carsem Malaysia
F. Date of Initial Production: July 23, 2005

### III. Packaging Information

A. Package Type:	32-pin LQFP
B. Lead Frame:	Copper
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:	#05-9000-1669
H. Flammability Rating:	Class UL94-V0
<ol> <li>Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C</li> </ol>	Level 1
L. Multi Layer Theta Ja:	48.4°C/W
M. Multi Layer Theta Jc:	12°C/W

## IV. Die Information

A. Dimensions:	95 X 90 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO <sub>2</sub>
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)	
В.	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 pending. Using these results, the Failure Rate  $(\lambda)$  is calculated as follows:

 $\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$  (Chi square value for MTTF upper limit) (where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)  $\lambda = 22.4 \times 10^{-9}$  $\lambda = 22.4 \text{ F.I.T.}$  (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the S4 Process results in a FIT Rate of 0.28 @ 25C and 4.85 @ 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 RT86 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500 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

## MAX3420EECJ+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES				
Static Life Test (Note 1)								
	Ta = 135°C	DC Parameters	48	0				
	Biased	& functionality						
	Time = 192 hrs.	-						
Moisture Testing (Note 2)								
85/85	Ta = 85°C	DC Parameters	77	0				
	RH = 85%	& functionality						
	Biased							
	Time = 1000hrs.							
Mechanical Stress (Note 2)								
Temperature	-65°C/150°C	DC Parameters	77	0				
Cycle	1000 Cycles	& functionality						
	Method 1010							

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

Note 2: Generic Package/Process data