

RELIABILITY REPORT  
FOR  
MAX1531ETJ+  
PLASTIC ENCAPSULATED DEVICES

January 23, 2013

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

<b>Approved by</b>
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## Conclusion

The MAX1531ETJ+ 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 MAX1530/MAX1531 multiple-output power-supply controllers generate all the supply rails for thin-film transistor (TFT) liquid-crystal display (LCD) monitors. Both devices include a high-efficiency, fixed-frequency, step-down regulator. The low-cost, all N-channel, synchronous topology enables operation with efficiency as high as 93%. High-frequency operation allows the use of small inductors and capacitors, resulting in a compact solution. The MAX1530 includes three linear regulator controllers and the MAX1531 includes five linear regulator controllers for supplying logic and LCD bias voltages. A programmable startup sequence enables easy control of the regulators. The MAX1530/MAX1531 include soft-start functions to limit inrush current during startup. An internal step-down converter current-limit function and a versatile overcurrent shutdown protect the power supplies against fault conditions. The MAX1530/MAX1531 use a current-mode control architecture, providing fast load transient response and easy compensation. An internal linear regulator provides MOSFET gate drive and can be used to power small external loads. The MAX1530/MAX1531 can operate from inputs as high as 28V and are well suited for LCD monitor and TV applications running directly from AC/DC wall adapters. Both devices are available in a small (5mm x 5mm), ultra-thin (0.8mm), 32-pin QFN package and operate over the -40°C to +85°C temperature range.

## II. Manufacturing Information

A. Description/Function:	Multiple-Output Power-Supply Controllers for LCD Monitors
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	California or Texas
E. Assembly Location:	Taiwan, China, Thailand, or Malaysia
F. Date of Initial Production:	April 26, 2003

## III. Packaging Information

A. Package Type:	32-pin TQFN 5x5
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:	#05-9000-3870
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:	47°C/W
K. Single Layer Theta Jc:	1.7°C/W
L. Multi Layer Theta Ja:	29°C/W
M. Multi Layer Theta Jc:	1.7°C/W

## IV. Die Information

A. Dimensions:	96 X 104 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
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 <sub>2</sub>
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 ( $\lambda$ ) is calculated as follows:

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

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

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

$$\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 B8 Process results in a FIT Rate of 0.04 @ 25C and 0.73 @ 55C (0.8 eV, 60% UCL).

### B. E.S.D. and Latch-Up Testing (lot JBL0EQ001G, D/C 0940)

The PD20 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM:	+/- 200V per JEDEC JESD22-A114
ESD-CDM:	+/- 400V per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC ESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX1531ETJ+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	SBL0CQ002AQ, D/C 0314

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