



RELIABILITY REPORT  
FOR  
MAX8795AETJ+C7P  
PLASTIC ENCAPSULATED DEVICES

October 21, 2008

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX8795AETJ+C7P 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 MAX8795A includes a high-performance step-up regulator, two linear-regulator controllers, and five high-current operational amplifiers for active-matrix, thin-film transistor (TFT), liquid-crystal displays (LCDs). Also included is a logic-controlled, high-voltage switch with adjustable delay. The step-up DC-DC converter provides the regulated supply voltage for the panel source driver ICs. The converter is a high-frequency (1.2MHz) current-mode regulator with an integrated 20V n-channel MOSFET that allows the use of ultra-small inductors and ceramic capacitors. It provides fast transient response to pulsed loads while achieving efficiencies over 85%. The gate-on and gate-off linear-regulator controllers provide regulated TFT gate-on and gate-off supplies using external charge pumps attached to the switching node. The MAX8795A includes five high-performance operational amplifiers. These amplifiers are designed to drive the LCD backplane (VCOM) and/or the gamma-correction divider string. The device features high output current ( $\pm 130\text{mA}$ ), fast slew rate ( $45\text{V}/\mu\text{s}$ ), wide bandwidth (20MHz), and rail-to-rail inputs and outputs. The MAX8795A is available in a lead-free, 32-pin, thin QFN package with a maximum thickness of 0.8mm for ultra-thin LCD panels, as well as in a 32-pin LQFP package with 0.8mm pin pitch.

## II. Manufacturing Information

A. Description/Function:	TFT-LCD DC-DC Converter with Operational Amplifiers
B. Process:	S4
C. Number of Device Transistors:	0
D. Fabrication Location:	California
E. Assembly Location:	UTL (NSEB) Thailand
F. Date of Initial Production:	2008

## III. Packaging Information

A. Package Type:	32-pin TQFN 5x5
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	1.0 ( mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Flammability Rating:	Class UL94-V0
H. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
I. Single Layer Theta Ja:	47°C/W
J. Single Layer Theta Jc:	1.7°C/W
K. Multi Layer Theta Ja:	29°C/W
L. Multi Layer Theta Jc:	2.7°C/W

## IV. Die Information

A. Dimensions:	89 X 81 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)
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 pending. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 42 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 25.57 \times 10^{-9}$$

$$\lambda = 25.57 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 PE17Z-2Z die type has been found to have all pins able to withstand a HBM transient pulse of 500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of 250 mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX8795AETJ+C7P**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	42	0
<b>Moisture Testing</b> (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
<b>Mechanical Stress</b> (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