

RELIABILITY REPORT
FOR
MAX1621EEE+
PLASTIC ENCAPSULATED DEVICES

August 10, 2009

MAXIM INTEGRATED PRODUCTS

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Approved by
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Quality Assurance
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Conclusion

The MAX1621EEE+ 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 MAX1620/MAX1621 convert a 1.8V to 20V battery voltage to a positive or negative LCD backplane bias voltage. Backplane bias voltage can be automatically disabled when the display logic voltage is removed, protecting the display. These devices use very little PC board area, come in ultra-small QSOP packages, and require only small, low-profile external components. Output voltage can be set to a desired positive or negative voltage range with external resistors, and adjusted over that range with the on-board digital-to-analog converter (DAC) or with a potentiometer. The MAX1620/ MAX1621 include a 5-bit DAC, allowing digital software control of the bias voltage. The MAX1620 uses up/down digital signaling to adjust the DAC, and the MAX1621 uses the System Management Bus (SMBus(tm)) 2-wire serial interface. These devices use a low-cost, external, N-channel MOSFET power switch or NPN transistor, and can be configured for positive or negative output voltages. Operating current is a low 150 μ A, typically provided from a display's logic supply of 3.0V to 5.5V. The MAX1620/MAX1621 are available in a 16-pin QSOP package.

II. Manufacturing Information

A. Description/Function:	Digitally Adjustable LCD Bias Supplies
B. Process:	S12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon, California or Texas
E. Assembly Location:	Malaysia, Thailand, Philippines
F. Date of Initial Production:	July 26, 1997

III. Packaging Information

A. Package Type:	16-pin QSOP
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:	#05-1701-0314
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:	120°C/W
K. Single Layer Theta Jc:	37°C/W
L. Multi Layer Theta Ja:	103.7°C/W
M. Multi Layer Theta Jc:	37°C/W

IV. Die Information

A. Dimensions:	58 X 81 mils
B. Passivation:	Si ₃ N 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:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO ₂
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 shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.4 \times 10^{-9}$$

$\lambda = 13.4$ 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 S12 Process results in a FIT Rate of 0.09 @ 25C and 1.48 @ 55C, data limited (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 PW55-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 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

MAX1621EEE+

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	80	0
Moisture Testing (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	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