

RELIABILITY REPORT
FOR
MAX680CSA+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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Conclusion

The MAX680CSA+ 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 MAX680/MAX681 are monolithic, CMOS, dual charge-pump voltage converters that provide $\pm 10V$ outputs from a +5V input voltage. The MAX680/MAX681 provide both a positive step-up charge pump to develop +10V from +5V input and an inverting charge pump to generate the -10V output. Both parts have an on-chip, 8kHz oscillator. The MAX681 has the capacitors internal to the package, and the MAX680 requires four external capacitors to produce both positive and negative voltages from a single supply. The output source impedances are typically 150 Ω , providing useful output currents up to 10mA. The low quiescent current and high efficiency make this device suitable for a variety of applications that need both positive and negative voltages generated from a single supply. The MAX864/MAX865 are also recommended for new designs. The MAX864 operates at up to 200kHz and uses smaller capacitors. The MAX865 comes in the smaller μ MAX® package.

II. Manufacturing Information

A. Description/Function:	+5V to ±10V Voltage Converters
B. Process:	M6
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Thailand, Philippines
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	8-pin SOIC (N)
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:	#05-0701-0454
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:	170°C/W
K. Single Layer Theta Jc:	40°C/W
L. Multi Layer Theta Ja:	132°C/W
M. Multi Layer Theta Jc:	38°C/W

IV. Die Information

A. Dimensions:	116X72 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/1.0%Si
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 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: 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 160 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 6.87 \times 10^{-9}$$

$$\lambda = 6.87 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 M6 Process results in a FIT Rate of 0.14 @ 25C and 2.38 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot NEKADO001E D/C 9535)

The PS11 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-100mA.

Table 1
Reliability Evaluation Test Results

MAX680CSA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	80	0	NEKADO005E
	Biased	& functionality	80	0	WEKASW026Q
	Time = 192 hrs.				

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