

RELIABILITY REPORT
FOR
MAX8515AEXK+
PLASTIC ENCAPSULATED DEVICES

February 20, 2009

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX8515AEXK+ 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 MAX8515A/MAX8515 shunt regulators simplify the design of voltage regulation and overvoltage protection (OVP) functions in high-accuracy isolated DC-to-DC converters with output voltages as low as 0.6V. The devices have supply voltage and feedback inputs separated from the output shunt stage, and can operate directly from the DC-to-DC converter output stage when the output voltage is 1.8V to 18V. Alternately, the MAX8515A/MAX8515 input stage can be biased from an unregulated 1.7V to 28V supply, independent of DC-to-DC converter output voltage. The MAX8515A/MAX8515 shunts 20mA when the output voltage is as low as 0.2V. The MAX8515A features an initial output accuracy of 0.5% at +25°C and 1% from -40°C to +85°C and provides the output voltage regulation function for isolated DC-to-DC converters. The MAX8515 features initial output accuracy of 1% at +25°C and 1.8% from -40°C to +85°C and can provide an output OVP function for isolated DC-to-DC converters. High open-loop bandwidth allows design of high-bandwidth DC-to-DC converters. Low-cost, low-dropout linear regulators can be designed with the MAX8515A/MAX8515 and an external NPN transistor for cost-conscious applications that do not require overcurrent, short-circuit, or overtemperature protection. The MAX8515/MAX8515A are available in space-saving 5-pin SC70 and SOT23 packages and are specified over the -40°C to +85°C extended temperature range. An evaluation kit is available to speed designs.

II. Manufacturing Information

A. Description/Function:	Wide-Input 0.6V Shunt Regulators for Isolated DC-DC Converters
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	California
E. Assembly Location:	Malaysia, Thailand
F. Date of Initial Production:	July 27, 2002

III. Packaging Information

A. Package Type:	5-pin SC70
B. Lead Frame:	Alloy42
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:	#05-9000-0039
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:	324°C/W
K. Single Layer Theta Jc:	115°C/W

IV. Die Information

A. Dimensions:	31 X 30 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
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:	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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 45 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 52.7 \times 10^{-9}$$

$\lambda = 52.7$ 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 B8 Process results in a FIT Rate of 2.71 @ 25C and 17.30 @ 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 PM82 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000 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

MAX8515AEXK+

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	45	1
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