RELIABILITY REPORT

FOR

MAX5486EUG+

PLASTIC ENCAPSULATED DEVICES

March 3, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX5486EUG+ 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 MAX5486 dual 40k logarithmic taper volume control features a debounced pushbutton up/down interface that controls volume and balance in audio applications. Each potentiometer has 32 log-spaced tap points with a buffered wiper output to replace mechanical potentiometers. An integrated bias generator provides the required ((VDD + VSS) / 2) bias voltage, eliminating the need for costly external op-amp circuits in unipolar audio applications. A mode-indicator LED output indicates volume or balance control. Five integrated LED drivers indicate volume level or balance settings, depending on the status of the mode indicator. Use the MAX5486 digital inputs with momentary contact single-pole/single-throw (SPST) pushbutton switches. Each input includes internal debounced circuitry and a pullup resistor to VLOGIC. The MAX5486 advances the wiper setting once per button push. Maxim's proprietary SmartWiper(tm) control eliminates the need for a microcomputer to increase the wiper transition rate. The accelerated auto-advance feature provides a wiper-changing rate at 4Hz for holding the control input low for more than 250ms and at 8Hz after 500ms and then at 11Hz after 1000ms (see Table 2 in the full data sheet.) All of the MAX5486's pushbutton inputs are debounced. The mute input allows a single pushbutton to change between volume control and the -90dB (typ) mute setting. The mode input toggles between volume and balance control. The click-and-pop suppression feature minimizes the audible noise generated by wiper transitions. The typical total harmonic distortion plus noise (THD+N) for the device is 0.003%. The MAX5486 provides a nominal temperature coefficient of 35ppm/°C end-to-end and 5ppm/°C ratiometrically and a nominal resistance of 40k per potentiometer. The MAX5486 is available in a 24-pin TSSOP package and is specified for operation over the -40°C to +85°C extended temperature range.

II. Manufacturing Information

A. Description/Function:	Stereo Volume Control with Pushbutton Interface
B. Process:	C6Y
C. Number of Device Transistors:	15640
D. Fabrication Location:	Japan
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	October 21, 2006

III. Packaging Information

A. Package Type:	24-pin TSSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-2447
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:	82°C/W
K. Single Layer Theta Jc:	15°C/W
L. Multi Layer Theta Ja:	72°C/W
M. Multi Layer Theta Jc:	13°C/W

IV. Die Information

A. Dimensions:	100 X 88 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	0.6 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:	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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 47 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 23.4 \times 10^{-9}$

$\lambda = 23.4$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maxim-ic.com/qa/reliability/monitor. Cumulative monitor data for the C6Y Process results in a FIT Rate of 0.90 @ 25C and 15.55 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot S760BQ001C D/C 0634)

The DP34 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX5486EUG+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	47	0	S760BQ001C, D/C 0634

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