

RELIABILITY REPORT
FOR
MAX5435MEZT+
(MAX5432-MAX5435)
PLASTIC ENCAPSULATED DEVICES

December 2, 2008

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX5435MEZT+ 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.

Table of Contents

I.Device Description	V.Quality Assurance Information
II.Manufacturing Information	VI.Reliability Evaluation
III.Packaging Information	IV.Die Information
.....Attachments	

I. Device Description

A. General

The MAX5432-MAX5435 nonvolatile, linear-taper, digital potentiometers perform the function of a mechanical potentiometer, but replace the mechanics with a simple 2-wire serial interface. Each device performs the same function as a discrete potentiometer or a variable resistor and has 32 tap points. The MAX5432-MAX5435 feature an internal, nonvolatile, electrically erasable programmable read-only memory (EEPROM) that returns the wiper to its previously stored position at power-up. The fast-mode I²C-compatible serial interface allows communication at data rates up to 400kbps, minimizing board space and reducing interconnection complexity. Each device is available with multiple factory-preset I²C addresses (see the Ordering Information/Selector Guide in the full data sheet). Use the MAX5432-MAX5435 in applications requiring digitally controlled resistors. Two resistance values are available (50k and 100k) in a voltage-divider or variable resistor configuration. The nominal resistor temperature coefficient is 35ppm/°C end-to-end, and only 5ppm/°C ratiometric, making the devices ideal for applications requiring a low-temperature-coefficient variable resistor such as low-drift, programmable-gain amplifier circuit configurations. The MAX5432/MAX5433 are available in a 3mm x 3mm 8-pin TDFN package and the MAX5434/MAX5435 are available in a 6-pin thin SOT23 package. The MAX5432-MAX5435 are specified over the extended (-40°C to +85°C) temperature range.

II. Manufacturing Information

A. Description/Function:	32-Tap, Nonvolatile, I ² C, Linear, Digital Potentiometers
B. Process:	0.35 um CMOS
C. Number of Device Transistors:	
D. Fabrication Location:	Dallas
E. Assembly Location:	ISPL Philippines, ATP Philippines, Unisem Malaysia
F. Date of Initial Production:	October 23, 2004

III. Packaging Information

A. Package Type:	6-pin TSOT
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Au (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
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:	365.1°C/W
K. Single Layer Theta Jc:	75°C/W

IV. Die Information

A. Dimensions:	35 X 59 mils
B. Passivation:	TEOS Ox-Nit 2-Mask Laser/Pass
C. Interconnect:	Al/Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.4 um
F. Minimum Metal Spacing:	0.35um
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	Silicon Dioxide
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

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|-----------------------------------|---|
| 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 125 biased (static) life test are pending. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 46 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 23.3 \times 10^{-9}$$

$$\lambda = 23.3 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 E35X Process results in a FIT Rate of 0.28 @ 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 DP23-2 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

MAX5435MEZT+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = 125 Biased Time = 192 hrs.	DC Parameters & functionality	46	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