



RELIABILITY REPORT
FOR
MAX5433LETA+T
PLASTIC ENCAPSULATED DEVICES

October 26, 2017

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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Conclusion

The MAX5433LETA+T 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 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:	E35
C. Fabrication Location:	USA
D. Assembly Location:	China, Taiwan, Thailand
E. Date of Initial Production:	October 23, 2004

III. Packaging Information

A. Package Type:	8-pin TDFN 3x3
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:	#05-9000-1484
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:	54°C/W
K. Single Layer Theta Jc:	8.3°C/W
L. Multi Layer Theta Ja:	41°C/W
M. Multi Layer Theta Jc:	8.3°C/W

IV. Quality Assurance Information

- A. Quality Assurance Contacts: Eric Wright (Reliability Engineering)
Brian Standley (Manager, Reliability)
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

V. Reliability Evaluation

A. Accelerated Life Test

The results of the 125C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

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

$$\lambda = 23.9 \times 10^{-9}$$

$$\lambda = 23.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 E35 Process results in a FIT Rate of 0.68 @ 25C and 11.68 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The DP23 die type has been found to have all pins able to withstand an HBM transient pulse of +/-1000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX5433LETA+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 125C Biased Time = 192 hrs.	DC Parameters & functionality	46	0	

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