RELIABILITY REPORT

FOR

MAX5471EZT+T

PLASTIC ENCAPSULATED DEVICES

July 9, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

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Approved by
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Quality Assurance
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Conclusion

The MAX5471EZT+T 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 MAX5471/MAX5472/MAX5474/MAX5475 linear-taper digital potentiometers function as mechanical potentiometers, but replace the mechanics with a simple 3-wire up/down digital interface. These digital potentiometers feature nonvolatile memory (EEPROM) to return the wiper to its previously stored position upon power-up. The MAX5471/MAX5472 are 2-terminal, variable resistors in 6-pin SOT23 packages. The MAX5474/MAX5475 are 3-terminal potentiometers in 8-pin SOT23 packages. The MAX5471/MAX5474 have an end-to-end resistance of 50k , and the MAX5472/MAX5475 have an end-to-end resistance of 100k . All of these devices have 32 wiper positions, a low ratiometric temperature coefficient (5ppm/°C), and all operate from a single +2.7V to +5.25V supply. Each device is guaranteed over the extended -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	32-Tap, Nonvolatile, Linear-Taper Digital Potentiometers in SOT23
B. Process:	E35
C. Number of Device Transistors:	
D. Fabrication Location:	Texas
E. Assembly Location:	Thailand, Malaysia
F. Date of Initial Production:	October 25, 2003

III. Packaging Information

A. Package Type:	6L THIN SOT
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:	#05-9000-0729 / A
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	365.1°C/W
K. Single Layer Theta Jc:	75°C/W
L. Multi Layer Theta Ja:	110°C/W
M. Multi Layer Theta Jc:	50°C/W

IV. Die Information

A. Dimensions:	32 X 57 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.5µm
F. Minimum Metal Spacing:	0.5µm
G. Bondpad Dimensions:	
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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 4340 \times 158 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 1.3 \times 10^{-9}$

$\lambda = 1.3$ 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 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 (lot CFT4BQ001A D/C 0342)

The DP13-4 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX5471EZT+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	80	0	CFT0AQ001A, DC 0312
	Biased	& functionality	78	0	CFT0BQ001A, DC 0339
	Time = 1000 hrs.				

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