



RELIABILITY REPORT
FOR
MAX5475EKA+
PLASTIC ENCAPSULATED DEVICES

October 8, 2008

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX5475EKA+ 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:	0
D. Fabrication Location:	Dallas
E. Assembly Location:	UTL (NSEB) Thailand
F. Date of Initial Production:	October 25, 2003

III. Packaging Information

A. Package Type:	8-pin SOT23
B. Lead Frame:	CDA194
C. Lead Finish:	100% matte Tin
D. Die Attach:	Ag Filled Conductive Epoxy
E. Bondwire:	Au (1.0mil 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 Jb:	112°C/W
K. Single Layer Theta Jc:	80°C/W

IV. Die Information

A. Dimensions:	32 X 57 mils
B. Passivation:	Oxide/Nitride
C. Interconnect:	Al/0.5%Cu
D. Backside Metallization:	None
E. Bondpad Dimensions:	5 mil. Sq.
F. Isolation Dielectric:	SiO ₂
G. Die Separation Method:	Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Jim Pedicord (Manager, Rel Operations) 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 135C biased (static) life test are pending. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 22.37 \times 10^{-9}$$

$$\lambda = 22.37 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

This low failure rate represents data collected from Maxim's reliability monitor program. In addition to routine production Burn-In, Maxim pulls a sample from every fabrication process three times per week and subjects it to an extended Burn-In prior to shipment to ensure its reliability. The reliability control level for each lot to be shipped as standard product is 59 F.I.T. at a 60% confidence level, which equates to 3 failures in an 80 piece sample. Maxim performs failure analysis on any lot that exceeds this reliability control level. Maxim also performs quarterly reliability testing through 1000 hour life test. This data is published in the Reliability Monitor Report which can be found on the web at http://www.maxim-ic.com/cgi-bin/reliability?go=dallas_monitor. Current monitor data for the E35 process results in a FIT Rate of 0.8 @ 25C and 13.83 @ 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 DP13 die type has been found to have all pins able to withstand a HBM transient pulse of 2000 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

MAX5475EKA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	48	0
Moisture Testing (Note 2)				
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	45	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