



RELIABILITY REPORT
FOR
MAX5464EXT+T /
MAX5464ESA+T
PLASTIC ENCAPSULATED DEVICES

December 8, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
Richard Aburano
Quality Assurance
Manager, Reliability Engineering

Conclusion

The MAX5464EXT+T / MAX5464ESA+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 MAX5460-MAX5468 linear-taper digital potentiometers perform the same function as a mechanical potentiometer or a variable resistor. These devices consist of a fixed resistor and a wiper contact with 32-tap points that are digitally controlled through a 2-wire serial interface. The MAX5462/MAX5465/MAX5468 are configured as potentiometers. The rest of the devices in this family are configured as variable resistors. See *Pin Configurations* for part functionality. Three resistance values are available: 10k Ω (MAX5466/MAX5467/MAX5468), 50k Ω (MAX5463/MAX5464/MAX5465), and 100k Ω (MAX5460/MAX5461/MAX5462). The MAX5460-MAX5465 (100k Ω and 50k Ω) are available in space-saving 5-pin and 6-pin SC70 packages. The MAX5466/MAX5467/MAX5468 (10k Ω) are available in 5-pin and 6-pin SOT23 packages.

II. Manufacturing Information

A. Description/Function:	32-Tap FleaPoT(tm), 2-Wire Digital Potentiometers	
B. Process:	C6	
C. Number of Device Transistors:	1191	
D. Fabrication Location:	USA or Japan	
E. Assembly Location:	Malaysia and Thailand	Malaysia, Philippines and Thailand
F. Date of Initial Production:	April 27, 2001	

III. Packaging Information

A. Package Type:	6-pin SC70	8-pin SOIC
B. Lead Frame:	Copper/Alloy42	Copper
C. Lead Finish:	NiPdAu	100% matte Tin
D. Die Attach:	Non-conductive	Conductive
E. Bondwire:	Au (1 mil dia.)	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	#05-3401-0002	#05-3401-0003
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
J. Single Layer Theta Ja:	326°C/W	170°C/W
K. Single Layer Theta Jc:	115°C/W	40°C/W
L. Multi Layer Theta Ja:	326.5°C/W	136°C/W
M. Multi Layer Theta Jc:	115°C/W	38°C/W

IV. Die Information

A. Dimensions:	30 X 31 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.9 microns (as drawn)
F. Minimum Metal Spacing:	0.9 microns (as drawn)
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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.7 \times 10^{-9}$$

$$\lambda = 13.7 \text{ F.I.T. (60\% confidence level @ } 25^{\circ}\text{C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 C6 Process results in a FIT Rate of 0.19 @ 25C and 3.34 @ 55C (0.8 eV, 60% UCL)

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

The DP06-4 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM:	+/- 2500V per JEDEC JESD22-A114 (lot E0M4DA005A, D/C 1012)
ESD-MM:	+/- 200V per JEDEC JESD22-A115 (lot S0M4CA015D, D/C 0908)
ESD-CDM:	+/- 750V per JEDEC JESD22-C101 (lot S0M4CA015D, D/C 0908)

Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78 (lot E0M4DA005A, D/C 1012).

Table 1
Reliability Evaluation Test Results
MAX5464EXT+T / MAX5464ESA+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	I0M4AA018C, D/C 0406

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