



RELIABILITY REPORT
FOR
MAX4454E_D+T
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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Conclusion

The MAX4454E_D+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 MAX4452/MAX4352 single, MAX4453/MAX4353 dual, and MAX4454/MAX4354 quad amplifiers combine high-speed performance with ultra-low power consumption. The MAX4452/MAX4453/MAX4454 are unity-gain stable and achieve a -3dB bandwidth of 200MHz, while the MAX4352/MAX4353/MAX4354 are compensated for a minimum closed-loop gain of +5V/V and achieve a 80MHz -3dB bandwidth. These devices consume only 620μA of supply current per amplifier. These amplifiers operate from a +2.7V to +5.25V single supply and feature rail-to-rail outputs. Along with an excellent speed/power ratio of 323MHz/mA, these devices feature a slew rate of 95V/μs and fast 20ns rise and fall times. These devices are ideal for low-power/low-voltage systems that require wide bandwidth such as cell phones and keyless entry systems. The MAX4452/MAX4352 are available in miniature 5-pin SC70 and SOT23 packages, while the MAX4453/MAX4353 are available in tiny 8-pin SOT23, thin SOT23, and SO packages. The MAX4454/MAX4354 are available in space-saving 14-pin TSSOP and SO packages.

II. Manufacturing Information

A. Description/Function:	Low-Cost, +3V/+5V, 620μA, 200MHz, Single-Supply Op Amps with Rail-to-Rail Outputs	
B. Process:	CB3	
C. Fabrication Location:	USA	
D. Assembly Location:	Philippines, Malaysia	Philippines, Malaysia, Thailand
E. Date of Initial Production:	January 27, 2001	

III. Packaging Information

A. Package Type:	14-pin SOIC (N)	14-pin TSSOP
B. Lead Frame:	Copper	Copper
C. Lead Finish:	100% matte Tin	100% matte Tin
D. Die Attach:	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:	#05-2501-0045	#05-2501-0046
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:	120°C/W	110°C/W
K. Single Layer Theta Jc:	37°C/W	30°C/W
L. Multi Layer Theta Ja:	84°C/W	100.4°C/W
M. Multi Layer Theta Jc:	34°C/W	30°C/W

IV. Die Information

A. Dimensions:	51X72 mils
B. Passivation:	Si ₃ N ₄ (Silicon nitride)
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Isolation Dielectric:	SiO ₂
H. Die Separation Method:	Wafer Saw

V. 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

VI. Reliability Evaluation

A. Accelerated Life Test

The results of the 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 160 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 6.9 \times 10^{-9}$$

$$\lambda = 6.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 CB3 Process results in a FIT Rate of 0.25 @ 25C and 4.38 @ 55C (0.8 eV, 60% UCL)

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

The OX17 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

MAX4454ESD+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C	DC Parameters & functionality	160	0	
	Biased Time = 192 hrs.				

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