

RELIABILITY REPORT
FOR
MAX2634AXT+
PLASTIC ENCAPSULATED DEVICES

July 31, 2009

MAXIM INTEGRATED PRODUCTS

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Approved by
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Conclusion

The MAX2634AXT+ 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 MAX2634 low-noise amplifier (LNA) with low-power shutdown mode is optimized for 315MHz and 433.92MHz automotive remote keyless entry (RKE) applications. At 315MHz, the LNA achieves 15.5dB power gain and a 1.25dB noise figure while only consuming 2.5mA of supply current from a 2.2V to 5.5V power supply. An integrated logic-controlled low-power shutdown mode reduces power consumption to 0.1 μ A and replaces the two transistors typically required to implement the shutdown function in discrete-based RKE LNA solutions. The device further reduces component count by integrating the output matching and DC-blocking components, and only requires a single inductor to match the input for best noise figure and input return loss. The device is available in a small 6-pin (2.0mm x 2.2mm x 0.9mm) lead-free SC70 package for automotive applications that require visual inspection of PCB solder connections.

II. Manufacturing Information

A. Description/Function:	315MHz/433MHz Low-Noise Amplifier for Automotive RKE
B. Process:	MB3
C. Number of Device Transistors:	205
D. Fabrication Location:	California
E. Assembly Location:	Malaysia, Thailand
F. Date of Initial Production:	December 16, 2008

III. Packaging Information

A. Package Type:	6-pin SC70
B. Lead Frame:	Copper Alloy
C. Lead Finish:	100% matte Tin
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3385
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:	326°C/W
K. Single Layer Theta Jc:	115°C/W

IV. Die Information

A. Dimensions:	28 X 24.4 mils
B. Passivation:	BCB
C. Interconnect:	Al with top layer 100% Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.35µm
F. Minimum Metal Spacing:	0.35µm
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Ken Wendel (Director, Reliability Engineering) 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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

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

$$\lambda = 22.4 \times 10^{-9}$$

$$\lambda = 22.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at <http://www.maxim-ic.com/>. Current monitor data for the MB3H Process results in a FIT Rate of 1.84 @ 25C and 22.3 @ 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 WD39 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA, 1.5x VCCMax Overvoltage per JESD78.

Table 1
Reliability Evaluation Test Results

MAX2634AXT+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = 135°C 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	77	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