

RELIABILITY REPORT
FOR
MAX3054ASD+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX3054ASD+ 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 MAX3054/MAX3055/MAX3056 are interfaces between the protocol controller and the physical wires of the bus lines in a controller area network (CAN). The devices provide differential transmit capability and switch to single-wire mode if certain fault conditions occur. The MAX3054/MAX3055/MAX3056 guarantee full wake-up capability during failure modes. The extended fault-protected voltage range of CANH and CANL bus lines of $\pm 80V$ allows for use in 42V high-voltage applications. Current-limiting and thermal-protection circuits protect the transmitter output stage against overcurrent faults to prevent destruction of the transmitter output stage. The CANH and CANL lines are also protected against electrical transients that may occur in a rugged environment. The transceiver provides three low-power modes that can be entered and exited through pins STB-bar and EN. An output INH pin can be used for deactivation of an external voltage regulator. The MAX3054/MAX3055/MAX3056 are designed to provide optimal operation for a specified data rate. The MAX3054 is ideal for high data rates of 250kbps. The MAX3055 is used for data rates of 125kbps and the MAX3056 is designed for 40kbps applications. For the 40kbps and 125kbps versions, a built-in slope-control feature allows the use of unshielded cables, and receiver input filters guarantee high noise immunity.

II. Manufacturing Information

A. Description/Function:	±80V Fault-Protected/Tolerant CAN Transceivers for In-Car Applications
B. Process:	BCD8
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Philippines, Thailand
F. Date of Initial Production:	October 26, 2002

III. Packaging Information

A. Package Type:	14-pin SOIC (N)
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:	#05-2601-0091
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:	120°C/W
K. Single Layer Theta Jc:	37°C/W
L. Multi Layer Theta Ja:	84°C/W
M. Multi Layer Theta Jc:	34°C/W

IV. Die Information

A. Dimensions:	170X80 mils
B. Passivation:	Si ₃ N 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:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 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:	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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 45 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 24.4 \times 10^{-9}$$

$$\lambda = 24.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 BCD8 Process results in a FIT Rate of 0.04 @ 25C and 0.69 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot IJ20BY002A, 0232)

The RT08 die type has been found to have all pins able to withstand a HBM transient pulse of +/-600V 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

MAX3054ASD+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	45	0	NJ21CA004A, D/C 0453

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