



RELIABILITY REPORT
FOR
MAX7326ATG+
PLASTIC ENCAPSULATED DEVICES

January 25, 2011

MAXIM INTEGRATED PRODUCTS

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Approved by
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Quality Assurance
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Conclusion

The MAX7326ATG+ 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 MAX7326, a 2-wire serial-interfaced peripheral, features 12 push-pull outputs and four input ports with selectable internal pullups and transition detection. Ports are overvoltage protected to +6V, independent of supply voltage. The inputs are continuously monitored for state changes (transition detection). State changes are indicated by the open-drain, +6V-tolerant active-low INT output. The interrupt is latched, detecting transient changes. When the MAX7326 is subsequently accessed through the serial interface, any pending interrupt is cleared. The 12 push-pull outputs are rated to sink 20mA and are capable of driving LEDs. The active-low RST input clears the serial interface, terminating any I²C communication to or from the MAX7326. The MAX7326 uses two address inputs with four-level logic to allow 16 I²C slave addresses. The slave address also enables or disables internal 40k pullups in groups of two ports. The MAX7326 is one device in a family of pin-compatible port expanders with a choice of input ports, open-drain I/O ports, and push-pull output ports. The MAX7326 is available in 24-pin QSOP and TQFN packages, and it is specified over the -40°C to +125°C automotive temperature range.

II. Manufacturing Information

A. Description/Function:	I ² C Port Expander with 12 Push-Pull Outputs and Four Inputs
B. Process:	C6
C. Number of Device Transistors:	9207
D. Fabrication Location:	California
E. Assembly Location:	China, Malaysia, Philippines, Thailand
F. Date of Initial Production:	July 23, 2005

III. Packaging Information

A. Package Type:	24-pin TQFN 4x4
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:	#05-9000-1879
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:	48°C/W
K. Single Layer Theta Jc:	2.7°C/W
L. Multi Layer Theta Ja:	36°C/W
M. Multi Layer Theta Jc:	2.7°C/W

IV. Die Information

A. Dimensions:	64 X 64 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:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	0.6 microns (as drawn)
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:	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 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)

$$\lambda = 22.9 \times 10^{-9}$$

$$\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 0.43 @ 25C and 7.50 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SYDBAQ001C D/C 0522)

The DW91-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX7326ATG+

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	48	0	SYDBAQ001G, D/C N/A

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