

RELIABILITY REPORT  
FOR  
MAX3845UCQ+  
PLASTIC ENCAPSULATED DEVICES

July 28, 2009

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX3845UCQ+ 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 MAX3845 is a TMDS® 2-to-4 fanout switch and cable driver for multimonitor distribution of DVI(tm) or HDMI(tm) signaling up to 1.65Gbps. Both inputs and outputs are standard TMDS signaling as per DVI and HDMI standards. Because TMDS links are "point-to-point", buffering is required for fanout applications. Four DVI/HDMI TMDS outputs are provided for fanout distribution. Each TMDS output can be independently sourced from either input or can be turned off. Each TMDS input or output is composed of four differential channels that can be arbitrarily assigned to the three data signals and the 1/10th-rate clock. The data rate depends on resolution, but it can vary from 250Mbps (VGA) to 1.65Gbps (UXGA or 1080p/60). Typical applications include multiroom display of the same video source or industrial/commercial signage applications such as airport monitors or trading room floor displays. The MAX3845 includes selectable output preemphasis that extends output cable reach up to an additional 7m. For DDC switching, use the companion MAX4814E 2:4 low-resistance CMOS crosspoint switch. DDC switching is not required for applications that connect DDC to one reference monitor only. The MAX3845 can be configured to create a 2 x 8 or 4 x 4 switch (see the Typical Operating Circuit diagrams located in the full data sheet). The MAX3845 is available in a 14mm  $\bar{A}$ — 14mm, 100-pin TQFP-EP package and operates over the -10°C to +85°C temperature range.

**II. Manufacturing Information**

A. Description/Function:	DVI/HDMI 2:4 TMD5 Fanout Switch and Cable Driver
B. Process:	G4
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Korea
F. Date of Initial Production:	April 21, 2007

**III. Packaging Information**

A. Package Type:	100-pin TQFP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-2368
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
J. Multi Layer Theta Ja:	22°C/W
K. Multi Layer Theta Jc:	2°C/W

**IV. Die Information**

A. Dimensions:	207 X 204 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub>
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	1.2 microns (as drawn) Metal 1, 2 & 3 5.6 microns (as drawn) Metal 4
F. Minimum Metal Spacing:	1.6 microns (as drawn) Metal 1, 2 & 3, 4.2 microns (as drawn) Metal 4
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO <sub>2</sub>
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 150°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 0 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

(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 G4 Process results in a FIT Rate of 0.32 @ 25C and 8.53 @ 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 HD85 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.

**Table 1**  
Reliability Evaluation Test Results

**MAX3845UCQ+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)	Ta = 150°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0
<b>Moisture Testing</b> (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
<b>Mechanical Stress</b> (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