

RELIABILITY REPORT
FOR
DG201ADJ+
PLASTIC ENCAPSULATED DEVICES

March 23, 2010

MAXIM INTEGRATED PRODUCTS

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Approved by
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Conclusion

The DG201ADJ+ 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 DG201A and DG211 are normally closed, quad single-pole single-throw (SPST) analog switches. These CMOS switches can be continuously operated with power supplies ranging from $\pm 4.5V$ to $\pm 18V$. Maxim guarantees that these switches will not latch up if the power supplies are disconnected with input signals still connected. Both devices have guaranteed break-before-make switching. The DG201A differs from the DG211 primarily in switching speeds. The DG201A has a maximum turn-off time of 450ns and a maximum turn-on time of 600ns. The DG211 has a maximum turn-off time of 500ns and a maximum turn-on time of 1000ns. Compared to the original manufacturer's products, Maxim's DG201A and DG211 consume significantly lower power making them better suited for portable applications. Maxim has also eliminated the need for the third (VL) power supply that is required for the operation of the original manufacturer's DG211.

II. Manufacturing Information

A. Description/Function:	Quad SPST CMOS Analog Switches
B. Process:	M6H
C. Number of Device Transistors:	891
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	16-pin PDIP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0301-0326
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:	95°C/W
K. Single Layer Theta Jc:	35°C/W
L. Multi Layer Theta Ja:	n/a
M. Multi Layer Theta Jc:	n/a

IV. Die Information

A. Dimensions:	68 X 90 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/1.0%Si
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. 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 (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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 313 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 0.67 \times 10^{-9}$$

$$\lambda = 0.67 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 M6H Process results in a FIT Rate of 0.30 @ 25C and 5.17 @ 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 AG29 die type has been found to have all pins able to withstand a HBM transient pulse of +/-400V 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

DG201ADJ+

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	313	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	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