



RELIABILITY REPORT
FOR
MX7538JCWG+
PLASTIC ENCAPSULATED DEVICES

March 30, 2011

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MX7538JCWG+ 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 Maxim MX7538 is a high performance monolithic 14-bit multiplying digital-to-analog converter (DAC). The MX7538 operate with a 14-bit data bus using standard chip select and memory write logic. A Load DAC (LDAC) signal is provided where double buffering is required, such as in systems with multiple DACs. If the LDAC signal is kept low, the DAC register becomes transparent. The MX7538 is optimized for unipolar applications, but can be operated as a bipolar DAC with additional external components. Full accuracy is maintained over the operating temperature range through the use of wafer-level laser-trimmed, thin-film resistors and temperature compensated NMOS switches. In addition, all digital inputs are compatible with both TTL, 74HC and 5V CMOS logic levels. The MX7538 is available in the narrow (0.3") 24-lead DIP and Wide SO (0.3") packages.

II. Manufacturing Information

A. Description/Function:	CMOS, μ P-Compatible, 14-Bit DAC
B. Process:	SG5
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Philippines
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	24-pin SOIC (W)
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:	#05-0401-0191
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:	85°C/W
K. Single Layer Theta Jc:	18°C/W
L. Multi Layer Theta Ja:	60.4°C/W
M. Multi Layer Theta Jc:	21°C/W

IV. Die Information

A. Dimensions:	141 X 168 mils
B. Passivation:	$\text{Si}_3\text{N}_4/\text{SiO}_2$ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	5.0 microns (as drawn)
F. Minimum Metal Spacing:	5.0 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:	Richard Aburano (Manager, Reliability Engineering) 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 160 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 6.9 \times 10^{-9}$$

$$\lambda = 6.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 SG5 Process results in a FIT Rate of 0.12 @ 25C and 2.04 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NDWDEA010B D/C 9938)

The DA24-3 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-200mA.

Table 1
Reliability Evaluation Test Results

MX7538JCWG+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	80	0	XDWCDA016A, D/C 9627
	Biased	& functionality	80	0	XDWBCA007A, D/C 9606
	Time = 192 hrs.				

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