

RELIABILITY REPORT
FOR
MAX5853ETL+
PLASTIC ENCAPSULATED DEVICES

December 16, 2008

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX5853ETL+ 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 MAX5853 dual, 10-bit, 80Msps digital-to-analog converter (DAC) provides superior dynamic performance in wideband communication systems. The device integrates two 10-bit DAC cores, and a 1.24V reference. The converter supports single-ended and differential modes of operation. The MAX5853 dynamic performance is maintained over the entire 2.7V to 3.6V power-supply operating range. The analog outputs support a -1.0V to +1.25V compliance voltage. The MAX5853 can also operate in interleave data mode to reduce the I/O pin count. This allows the converter to be updated on a single, 10-bit bus. The MAX5853 features digital control of channel gain matching to within ± 0.4 dB in sixteen 0.05dB steps. Channel matching improves sideband suppression in analog quadrature modulation applications. The on-chip 1.24V bandgap reference includes a control amplifier that allows external full-scale adjustments of both channels through a single resistor. The internal reference can be disabled and an external reference may be applied for high-accuracy applications. The MAX5853 features full-scale current outputs of 2mA to 20mA and operates from a 2.7V to 3.6V single supply. The DAC supports three modes of power-control operation: normal, low-power standby, and complete power-down. In power-down mode, the operating current is reduced to 1 μ A. The MAX5853 is packaged in a 40-pin thin QFN with exposed paddle (EP) and is specified for the extended (-40°C to +85°C) temperature range. Pin-compatible, higher speed, and lower resolution versions are also available. Refer to the MAX5854 (10-bit, 165Msps), the MAX5852 (8-bit, 165Msps), and the MAX5851 (8-bit, 80Msps) data sheets for more information. See Table 4 at the end of the data sheet.

II. Manufacturing Information

A. Description/Function:	Dual, 10-Bit, 80Msps, Current-Output DAC
B. Process:	0.35UM 2 Poly 4 Metal CMOS (TS352P4M)
C. Number of Device Transistors:	
D. Fabrication Location:	Taiwan
E. Assembly Location:	ASAT China, UTL Thailand
F. Date of Initial Production:	January 23, 2004

III. Packaging Information

A. Package Type:	40-pin TQFN 6x6
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0844
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:	39°C/W
K. Single Layer Theta Jc:	1.5°C/W
L. Multi Layer Theta Ja:	28°C/W
M. Multi Layer Theta Jc:	1.5°C/W

IV. Die Information

A. Dimensions:	103 X 103 mils
B. Passivation:	Silicon Dioxide/Silicon Nitride
C. Interconnect:	Al/Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.35 um
F. Minimum Metal Spacing:	0.35 um
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	Silicon Dioxide
I. Die Separation Method:	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 dd biased (static) life test are complete. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 90 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 11.9 \times 10^{-9}$$

$$\lambda = 11.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 TS352P4M Process results in a FIT Rate of 0.43 @ 25C and 7.50 @ 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 CD09 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX5853ETL+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = dd Biased Time = 192 hrs.	DC Parameters & functionality	90	0
Moisture Testing (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	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