

RELIABILITY REPORT
FOR
MAX13253ATB+
PLASTIC ENCAPSULATED DEVICES

August 5, 2013

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX13253ATB+T successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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I. Device Description

A. General

The MAX13253 is a 1A push-pull transformer driver designed to provide a simple solution for low-EMI isolated power supplies. The MAX13253 has an internal oscillator and operates from a single +3.0V to +5.5V supply. The transformer's secondary-to-primary winding ratio defines the output voltage, allowing selection of virtually any isolated output voltage with galvanic isolation. The MAX13253 features an integrated oscillator driving a pair of N-channel power switches. The driver includes pin-selectable spread-spectrum oscillation and a well-controlled slew rate to reduce EMI. The MAX13253 can optionally be driven by an external clock to further manage EMI. Internal circuitry guarantees a fixed 50% duty cycle to prevent DC current flow through the transformer, regardless of which clock source is used. The MAX13253 operates with up to 1A of continuous current and features integrated protection including fault detection, overcurrent protection, and thermal shutdown. The MAX13253 includes a low-current shutdown mode to reduce the overall supply current to less than 5 μ A (max) when the driver is disabled. The MAX13253 is available in a small, 10-pin, (3mm x 3mm) TDFN package and is specified over the -40°C to +125°C temperature range.

II. Manufacturing Information

A. Description/Function:	1A Spread-Spectrum Push-Pull Transformer Driver for Isolated Power Supplies
B. Process:	S18
C. Number of Device Transistors:	7500
D. Fabrication Location:	California
E. Assembly Location:	Taiwan, China, or Thailand
F. Date of Initial Production:	March 26, 2013

III. Packaging Information

A. Package Type:	10-pin TDFN 3x3
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:	#05-9000-5214
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:	54°C/W
K. Single Layer Theta Jc:	8.5°C/W
L. Multi Layer Theta Ja:	41°C/W
M. Multi Layer Theta Jc:	8.5°C/W

IV. Die Information

A. Dimensions:	58.6614X48.8189 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18um
F. Minimum Metal Spacing:	0.18um
G. Bondpad Dimensions:	
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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.7 \times 10^{-9}$$

$$\lambda = 13.7 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maximintegrated.com/qa/reliability/monitor>. Cumulative monitor data for the S18 Process results in a FIT Rate of 0.05 @ 25C and 0.93 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot EALE0Q002B D/C 1303)

The RU76-0 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX13253ATB+T

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	80	0	EALE0Q002B, D/C 1303

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