

RELIABILITY REPORT
FOR
MAX13256ATB+T
PLASTIC ENCAPSULATED DEVICES

August 30, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

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Conclusion

The MAX13256ATB+T 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 MAX13256 H-bridge transformer driver provides a simple solution for making isolated power supplies up to 10W. The device drives a transformer's primary coil with up to 300mA of current from a wide 8V to 36V DC supply. The transformer's secondary-to-primary winding ratio defines the output voltage, allowing selection of virtually any isolated output voltage. The device features adjustable current limiting, allowing indirect limiting of secondary-side load currents. The current limit of the MAX13256 is set by an external resistor. An active-low FAULT output asserts when the device detects an overtemperature or overcurrent condition. In addition, the device features a low-power mode to reduce the overall supply current to 0.65mA (typ) when the driver is not in use. The device features an internal oscillator for autonomous operation and an external clock source input to synchronize multiple MAX13256 devices and precisely set the switching frequency. Internal circuitry guarantees a fixed 50% duty cycle to prevent DC current flow through the transformer, regardless of which clock source is used. The device is available in a small 10-pin (3mm x 3mm) TDFN package and is specified over the -40°C to +125°C automotive temperature range.

II. Manufacturing Information

A. Description/Function:	36V H-Bridge Transformer Driver for Isolated Supplies
B. Process:	S18
C. Number of Device Transistors:	2504
D. Fabrication Location:	USA
E. Assembly Location:	China, Taiwan and Thailand
F. Date of Initial Production:	May 9, 2011

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 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4452
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:	9°C/W
L. Multi Layer Theta Ja:	41°C/W
M. Multi Layer Theta Jc:	9°C/W

IV. Die Information

A. Dimensions:	54.33 X 84.25 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 2.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 3.0 microns (as drawn)
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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 78 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 14.1 \times 10^{-9}$$

$$\lambda = 14.1 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 S18 Process results in a FIT Rate of 0.06 @ 25C and 1.04 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot S0CZAQ001D, D/C 1112)

The RU54 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 +/- 100mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX13256ATB+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	78	0	S0CZAQ001D, D/C 1112

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