

RELIABILITY REPORT
FOR
MAX17542GATB+T
PLASTIC ENCAPSULATED DEVICES

July 12, 2015

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX17542GATB+T successfully met 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.

Table of Contents

I.Device Description	IV.Die Information
II.Manufacturing Information	V.Quality Assurance Information
III.Packaging Information	VI.Reliability Evaluation
.....Attachments	

I. Device Description

A. General

The MAX17542G high-efficiency, high-voltage, synchronous step-down DC-DC converter with integrated MOSFETs operates over 4.5V to 42V input. The converter can deliver up to 1A and generates output voltages from 0.9V up to $0.92 \times V_{IN}$. The feedback (FB) voltage is accurate to within $\pm 1.7\%$ over -40°C to $+125^{\circ}\text{C}$. The MAX17542G uses peak-current-mode control with pulse-width modulation (PWM) and operates with fixed 600kHz switching frequency at any load. The device is available in a 10-pin (3mm x 2mm) TDFN package. Simulation models are available.

II. Manufacturing Information

A. Description/Function:	42V, 1A, Ultra-Small, High-Efficiency, Synchronous Step-Down DC-DC Converter
B. Process:	S18
C. Number of Device Transistors:	14609
D. Fabrication Location:	Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	March 27, 2015

III. Packaging Information

A. Package Type:	10-pin TDFN
B. Lead Frame:	Copper
C. Lead Finish:	NiPd
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4358
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:	87.5°C/W
K. Single Layer Theta Jc:	18.2°C/W
L. Multi Layer Theta Ja:	67.3°C/W
M. Multi Layer Theta Jc:	18.2°C/W

IV. Die Information

A. Dimensions:	40.9449 X 103.937 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:	0.23 microns (as drawn)
F. Minimum Metal Spacing:	0.23 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: Eric Wright (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:

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

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

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

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

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 0.40 @ 25°C and 6.96 @ 55°C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The PI01-0 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM: +/- 2500V per JEDEC JESD22-A114
ESD-CDM: +/- 750V per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX17542GATB+T

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

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