RELIABILITY REPORT

FOR

MAX17552BATB+
MAX17552BATB+T

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MAXIM INTEGRATED

160 RIO ROBLES

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Conclusion

The MAX17552 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.

Table of Contents

I. Device Description

A. General

The Himalaya series of voltage regulator ICs, Power Modules, and Chargers enable cooler, smaller, and simpler power supply solutions. The MAX17552/MAX17552A/MAX17552B high-efficiency, high-voltage, Himalaya synchronous step-down DC-DC converters with the integrated MOSFETs operate over a 4V to 60V input voltage range. The converters can deliver output current up to 100mA at output voltages of 0.8V to 0.9 x VIN. The output voltage is accurate to within ±1.75% over the -40°C to +125°C temperature range.

The devices employ a peak-current-mode control architecture with a MODE pin that can be used to operate the device in pulse-width modulation (PWM) or pulse frequency modulation (PFM) control schemes. PWM operation provides constant frequency operation at all loads and is useful in applications sensitive to variable switching frequency. PFM operation disables negative inductor current and additionally skips pulses at light loads for high efficiency. The converters consume only 22µA of no-load supply current in PFM mode. The low resistance, on-chip MOSFETs ensure high efficiency at full load and simplify PCB layout.

The devices offer programmable switching frequency to optimize solution size and efficiency. Programmable soft start allows the user to reduce the inrush currents. During overload, the MAX17552A/MAX17552B implements a hysteretic cycle by-cycle peak-current-limit protection scheme, while the MAX17552A implements a HICCUP-type overload protection scheme to protect the inductor and the internal FETs. An EN/UVLO pin allows the user to turn on/off the device at the desired input-voltage level. An open-drain RESET pin allows output-voltage monitoring. The devices operate over the -40°C to +125°C industrial temperature range and is available in a compact 10-pin (3mm x 2mm) TDFN/TDFN-CU and 10-pin (3mm x 3mm) µMAX® packages. Simulation models are available.

II. Manufacturing Information

A. Description/Function:	60V, 100mA, Ultra-Small, High-Efficiency, Synchronous Step-Down DC-DC Converter with 22µA No-Load Supply Current
B. Process:	S18
C. Device Count:	22441
D. Fabrication Location:	Japan
E. Assembly Location:	Thailand, Taiwan
F. Date of Initial Production:	September 23, 2020

III. Packaging Information

A. Package Type:	TDFN-CU
B. Lead Frame:	Cu194
C. Lead Finish:	Matte Tin
D. Die Attach:	HR-5104/ATB-125
E. Bondwire:	0.8 mil CuPd
F. Mold Material:	G700LTD/G700LA
G. Assembly Diagram:	05-101500
H. Flammability Rating:	UL-94 (V-0 Rating)
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	63.80 °C/W
M. Multi Layer Theta Jc:	11.70 °C/W

IV. Die Information

A. Dimensions:	40.9449X87.7953 mils
B. Passivation:	SiN/ SiO2

V. Quality Assurance Information

A. Quality Assurance Contacts:	Ryan Wall (Manager, Reliability) Michael Cairnes (Executive Director, Reliability) Bryan Preeshl (SVP 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 125C biased (static) life test are shown in Table 1. Using these results, the Failure Rate λ is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000\ x\ 2454\ x\ 225\ x\ 2}$$ (Chi square value for MTTF upper limit)

(where 2454 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 1.65\ x\ 10^{-9}$$

$$\lambda = 1.65\ FITs\ (60\%\ confidence\ level\ @25°C)$$

Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at https://www.maximintegrated.com/en/support/qa-reliability/reliability/reliability-monitor-program.html.

S18 cumulative process Fit

$$\lambda = 0.02\ FITs\ (60\%\ confidence\ level\ @25°C)$$

$$\lambda = 0.24\ FITs\ (60\%\ confidence\ level\ @55°C)$$

B. ESD and Latch-Up Testing

The MAX17552B has been found to have all pins able to withstand an HBM transient pulse of ±2500 V per JEDEC / ESDA JS-001.

Latch-Up testing has shown that this device withstands ±100 mA current injection and supply overvoltage per JEDEC JESD78 with the following exceptions:

RESETB pin passes +100mA / -60mA

Table 1

Reliability Evaluation Test Results

MAX17551AUB+ (Note 1)

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 2)	Ta = 125°C Biased Time = 1000 hrs.	DC parameters & functionality	75	0	R27750AL1
Static Life Test (Note 2)	Ta = 125°C Biased Time = 1000 hrs.	DC parameters & functionality	75	0	R27750BL1
Static Life Test (Note 2)	Ta = 125°C Biased Time = 1000 hrs.	DC parameters & functionality	75	0	R27750CL1

Note 1: MAX17551 and MAX17552B are the same silicon.

Note 2: Life Test Data may represent plastic DIP qualification lots.