

RELIABILITY REPORT
FOR
MAX17690ATE+T
PLASTIC ENCAPSULATED DEVICES

July 28, 2016

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX17690ATE+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 MAX17690 is a peak current mode, fixed-frequency switching controller specifically designed for the isolated flyback topology operating in Discontinuous Conduction Mode (DCM). The device senses the isolated output voltage directly from the primary-side flyback waveform during the off time of the primary switch. No auxiliary winding or optocoupler is required for output-voltage regulation. The MAX17690 is designed to operate over a wide supply range from 4.5V to 60V. The switching frequency is programmable from 50kHz to 250kHz. A EN/UVLO pin allows the user to turn on/off the power supply precisely at the desired input voltage. The MAX17690 provides an input overvoltage protection through the OVI pin. The 7V internal LDO output of the MAX17690 makes it suitable for switching both logic-level and standard MOSFETs used in flyback converters. With 2A/4A source/sink currents, the MAX17690 is ideal for driving low RDS(ON) power MOSFETs with fast gate transition times. The MAX17690 provides an adjustable soft-start feature to limit the inrush current during startup. The MAX17690 provides temperature compensation for the output diode forward voltage drop. The MAX17690 has robust hiccup-protection and thermal protection schemes, and is available in a space-saving 16-pin 3mm x 3mm TQFN package with a temperature range from -40°C to 125°C.

II. Manufacturing Information

A. Description/Function:	60V, No-Opto Isolated Flyback Controller
B. Process:	S18
C. Number of Device Transistors:	18146
D. Fabrication Location:	USA
E. Assembly Location:	Taiwan
F. Date of Initial Production:	March 15, 2016

III. Packaging Information

A. Package Type:	16-pin TQFN-Cu
B. Lead Frame:	Copper
C. Lead Finish:	100% Matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Cu (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-100128
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:	64°C/W
K. Single Layer Theta Jc:	7°C/W
L. Multi Layer Theta Ja:	48°C/W
M. Multi Layer Theta Jc:	7°C/W

IV. Die Information

A. Dimensions:	61.0236X61.0236 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 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 0.40 @ 25C and 6.96 @ 55C (0.8 eV, 60% UCL)

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

The PI36-0 die type has been found to have all pins able to withstand an 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

MAX17690ATE+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	80	0	

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