RELIABILITY REPORT

FOR MAX20745EPL+T

PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED
160 RIO ROBLES
SAN JOSE, CA 95134

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Conclusion

The MAX20745EPL+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 MAX20745 is a fully integrated, highly efficient switching regulator for applications operating from 4.5V to 16V and requiring up to 25A maximum load. This singlechip regulator provides extremely compact, high-efficiency power-delivery solutions with high-precision output voltages and excellent transient response for networking, datacom, and telecom equipment. The IC offers a broad range of programmable features through capacitors and resistors connected to dedicated programming pins. Using this feature, the operation can be optimized for a specific application, reducing the component count- and/or setting-appropriate trade-offs between the regulator's performance and system cost. Ease of programming enables using the same design for multiple applications. The MAX20745 includes protection capabilities. Positive and negative cycle-by-cycle overcurrent protection and overtemperature protection ensure a rugged design. Input undervoltage lockout shuts down the device to prevent operation when the input voltage is out of specification. A status pin provides an output signal to show that the output voltage is within range and the system is regulating.

II. Manufacturing Information

A. Description/Function:	Integrated, Step-Down Switching Regulator
B. Process:	TS18
C. Fabrication Location:	Taiwan
D. Assembly Location:	Thailand
E. Date of Initial Production:	December 22, 2016

III. Packaging Information

A. Package Type:	15-pin FCQFN
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	SAC105 (9.8 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0787
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:	N/A°C/W
K. Single Layer Theta Jc:	N/A°C/W
L. Multi Layer Theta Ja:	16.3°C/W
M. Multi Layer Theta Jc:	0.62°C/W

IV. Die Information

A. Dimensions:	88.5827X185.0393 mils
B. Passivation:	Si_3N_4/SiO_2
C. Interconnect:	Al/0.5%Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.23 microns (as drawn)
F. Minimum Metal Spacing:	0.23 microns (as drawn)
G. Isolation Dielectric:	SiO_2
H. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Eric Wright (Reliability Engineering) Brian Standley (Manager, Reliability) 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:

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

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

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

λ = 13.7 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 TS18 Process results in a FIT Rate of 0.1@ 25C and 1.9@ 55C (0.8 eV, 60% UCL)

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

The VT34-0 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 +/-100mA and overvoltage per JEDEC JESD78.

Table 1

Reliability Evaluation Test Results

MAX20745EPL+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.