RELIABILITY REPORT

FOR

MAX16029TG+

PLASTIC ENCAPSULATED DEVICES

June 9, 2015

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
Sokhom Chum
Quality Assurance
Reliability Engineer

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Conclusion

The MAX16029TG+ 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 MAX16025-MAX16030 are dual-/triple-/quad-voltage monitors and sequencers that are offered in a small TQFN package. These devices offer enormous design flexibility as they allow fixed and adjustable thresholds to be selected through logic inputs and provide sequence timing through small external capacitors. These versatile devices are ideal for use in a wide variety of multivoltage applications. As the voltage at each monitored input exceeds its respective threshold, its corresponding output goes high after a propagation delay or a capacitor-set time delay. When a voltage falls below its threshold, its respective output goes low after a propagation delay. Each detector circuit also includes its own enable input, allowing the power-good outputs to be shut off independently. The independent output for each detector is available with push-pull or open-drain configuration with the open-drain version capable of supporting voltages up to 28V, thereby allowing them to interface to shutdown and enable inputs of various DC-DC regulators. Each detector can operate independently as four separate supervisory circuits or can be daisy-chained to provide controlled power-supply sequencing. The MAX16025-MAX16030 also include a reset function that deasserts only after all of the independently monitored voltages exceed their threshold. The reset timeout is internally fixed or can be adjusted externally. These devices are offered in a 4mm x 4mm TQFN package and are fully specified from -40°C to +125°C.

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II. Manufacturing Information

A. Description/Function:	Dual-/Triple-/Quad-Voltage, Capacitor-Adjustable, Sequencing/Supervisory Circuits
B. Process:	B8
C. Number of Device Transistors:	3653
D. Fabrication Location:	California or Texas
E. Assembly Location:	China, Thailand, Malaysia, Philippines
F. Date of Initial Production:	April 22, 2006

III. Packaging Information

A. Package Type:	24-pin TQFN 4x4
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:	#05-9000-2283
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:	48°C/W
K. Single Layer Theta Jc:	2.7°C/W
L. Multi Layer Theta Ja:	36°C/W
M. Multi Layer Theta Jc:	2.7°C/W

IV. Die Information

A. Dimensions:	80X88 mils
B. Passivation:	Si_3N_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:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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V. Quality Assurance Information

A. Quality Assurance Contacts: 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.9 \times 10^{-9}$

λ = 22.9 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 B8 Process results in a FIT Rate of 0.01 @ 25C and 0.26 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot TV30AQ001F, D/C 0626)

The MT01 die type has been found to have all pins able to withstand a HBM transient pulse of < +/-500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

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Table 1
Reliability Evaluation Test Results

MAX16029TG+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	TV32AQ001H, 0626

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

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