

RELIABILITY REPORT
FOR
MAX16125WTxxx+T
PLASTIC ENCAPSULATED DEVICES

January 29, 2013

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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Conclusion

The MAX16125WTxxx+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 MAX16122-MAX16125 pushbutton controllers with single-supply monitors monitor one or two pushbuttons and generate a hard reset signal if the buttons are pushed and held for a setup delay. The devices make it easy to "hide" the hard reset function in an existing pushbutton, such as a soft power switch. These devices operate from 1.6V to 5.5V and consume a quiescent current of only 5μA at 3V. The MAX16122-MAX16125 have pin programmable or resistor-adjustable setup delay. Connect the SEL pin to GND, VCC, or leave it unconnected to select the different setup delays (depending on part suffix, see Table 1a in the full data sheet) or connect an external resistor from SEL to GND to set the setup delays (E suffix only, see Table 1b in the full data sheet). The MAX16124/MAX16125 have one manual reset input (active-low MR), a reset output (active-low RESET), and a soft reset output (active-low SRESET) which mirrors the state of the input. The MAX16122/MAX16123 have two identical manual reset inputs (active-low MR1 and active-low MR2) and one reset output (active-low RESET). A deglitch block is connected to each input to add a delay to the falling edge with a fixed deglitch period of 20ms (t_{DB}). The MAX16122-MAX16125 feature a comparator that monitors the input supply voltage. A variety of factory-trimmed threshold options accommodate different supply voltages and tolerances, eliminating external components. The factory-set reset thresholds range from 1.58V to 4.63V to monitor 5V, 3.3V, 2.5V, and 1.8V supplies. The MAX16122-MAX16125 are offered in a tiny 0.86mm x 1.27mm, 6-bump WLP package and are specified over the automotive temperature range (-40°C to +125°C).

II. Manufacturing Information

A. Description/Function:	Dual Pushbutton Controllers in Tiny 6-Bump WLP Package
B. Process:	S18
C. Number of Device Transistors:	9900
D. Fabrication Location:	USA
E. Assembly Location:	USA
F. Date of Initial Production:	June 29, 2012

III. Packaging Information

A. Package Type:	6-bump WLP
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	None
E. Bondwire:	N/A (N/A mil dia.)
F. Mold Material:	None
G. Assembly Diagram:	#05-9000-4646
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:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	95°C/W
M. Multi Layer Theta Jc:	°C/W

IV. Die Information

A. Dimensions:	50X34.252 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:	Richard Aburano (Manager, Reliability Engineering) 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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

(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 0.06 @ 25C and 1.05 @ 55C (0.8 eV, 60% UCL)

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

The MT24 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM:	+/- 2500V per JEDEC JESD22-A114 (lot SAFE5Q002B, D/C 1213)
ESD-CDM:	+/- 750V per JEDEC JESD22-C101 (lot SAFE5Q002E, D/C 1238)

Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78 (lot SAFE5Q002B, D/C 1213).

Table 1
Reliability Evaluation Test Results

MAX16125WTxxxx+T

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	80	0	SAFE5Q002B, D/C 1213

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