

RELIABILITY REPORT
FOR
ICL7665CPA
PLASTIC ENCAPSULATED DEVICES

February 4, 2014

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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| Approved by |
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| Quality Assurance |
| Reliability Engineer |

Conclusion

The ICL7665CPA 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 ICL7665 warns microprocessors (μ Ps) of overvoltage and undervoltage conditions. It draws a typical operating current of only 3μ A. The trip points and hysteresis of the two voltage detectors are individually programmed via external resistors to any voltage greater than 1.3V. The ICL7665 will operate from any supply voltage in the 1.6V to 16V range, while monitoring voltages from 1.3V to several hundred volts. The Maxim ICL7665A is an improved version with a 2%-accurate VSET1 threshold and guaranteed performance over temperature. The 3μ A quiescent current of the ICL7665 makes it ideal for voltage monitoring in battery-powered systems. In both battery- and line-powered systems, the unique combination of a reference, two comparators, and hysteresis outputs reduces the size and component count of many circuits.

II. Manufacturing Information

| | |
|----------------------------------|--|
| A. Description/Function: | µP Voltage Monitor with Dual Over/Undervoltage Detection |
| B. Process: | M6 |
| C. Number of Device Transistors: | |
| D. Fabrication Location: | Oregon |
| E. Assembly Location: | Thailand, Philippines, Malaysia |
| F. Date of Initial Production: | Pre 1997 |

III. Packaging Information

| | |
|--|--------------------------|
| A. Package Type: | 8-pin PDIP |
| B. Lead Frame: | Copper |
| C. Lead Finish: | 85Sn/15Pb |
| D. Die Attach: | Conductive |
| E. Bondwire: | Au (1.3 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | #05-0701-0324 |
| 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: | 110°C/W |
| K. Single Layer Theta Jc: | 40°C/W |
| L. Multi Layer Theta Ja: | N/A |
| M. Multi Layer Theta Jc: | N/A |

IV. Die Information

| | |
|----------------------------|---|
| A. Dimensions: | 57X69 mils |
| B. Passivation: | Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide) |
| C. Interconnect: | Al/1.0%Si |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | Metal1 = 0.5 microns (as drawn) |
| F. Minimum Metal Spacing: | Metal1 = 0.45 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: | 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:

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

(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 M6 Process results in a FIT Rate of 0.38 @ 25C and 6.48 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot XYUABQ001A, D/C 9340)

The PS47 die type has been found to have all pins able to withstand a HBM transient pulse of +/-600V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-50mA.

Table 1
Reliability Evaluation Test Results

ICL7665CPA

| 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 | XYUABQ001A, D/C 9348 |

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