



RELIABILITY REPORT
FOR
MAX19005CCS+
PLASTIC ENCAPSULATED DEVICES

January 16, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX19005CCS+ successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

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I. Device Description

A. General

The MAX19005 four-channel, ultra-low-power, pin-electronics IC includes a two-level pin driver, a window comparator, a passive load, and force-and-sense Kelvin-switched parametric measurement unit (PMU) connections for each channel. The driver features a -1V to +5.2V voltage range, includes high-impedance modes, and is highly linear even at low voltage swings. The window comparator features 240MHz equivalent input bandwidth and programmable output voltage levels. The passive load provides pullup and pulldown voltages to the device-under-test (DUT). Low leakage and high impedance are operational configurations that are programmed through a 3-wire, low-voltage, CMOS-compatible serial interface. High-speed PMU switching is realized through dedicated digital control inputs. This device is available in an 80-pin, 12mm x 12mm body, 0.5mm pitch TQFP with an exposed 6mm x 6mm die pad on the bottom of the package for efficient heat removal. The device is specified to operate over the 0°C to +70°C commercial temperature range and features a die temperature monitor output.

II. Manufacturing Information

A. Description/Function:	Quad, Ultra-Low-Power, 200Mbps ATE Drivers/Comparators
B. Process:	CB40
C. Number of Device Transistors:	12727
D. Fabrication Location:	USA
E. Assembly Location:	Korea
F. Date of Initial Production:	December 8, 2011

III. Packaging Information

A. Package Type:	80-lead TQFP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.2 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4271
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
J. Single Layer Theta Ja:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	28°C/W
M. Multi Layer Theta Jc:	2°C/W

IV. Die Information

A. Dimensions:	193.31 X 215.75 mils
B. Passivation:	Si ₃ N ₄ (Silicon nitride)
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1-2 = 1.2 / Metal3 = 2.8 microns as drawn
F. Minimum Metal Spacing:	Metal1-2 = 1.6 / Metal3 = 2.8 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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 2454 \times 76 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

(where 2454 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 25.6 \times 10^{-9}$$

$$\lambda = 25.6 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maxim-ic.com/qa/reliability/monitor>. Cumulative monitor data for the CB40 Process results in a FIT Rate of 0.42 @ 25C and 7.21 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NS6ZCQ002B, D/C 1140)

The AT31 die type has been found to have all pins able to withstand a 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

MAX19005CCS+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Tj ~ 150C Biased Time = 192 hrs.	DC Parameters & functionality	76	0	NS6ZCQ002B, D/C 1140

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