RELIABILITY REPORT

FOR

MAX9205EAI

PLASTIC ENCAPSULATED DEVICES

August 15, 2005

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

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Conclusion

The MAX9205 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.

Table of Contents

I. Device Description

A. General

The MAX9205 serializer transforms 10-bit-wide parallel LVCMOS/LVTTL data into a serial high-speed bus low-voltage differential signaling (LVDS) data stream. The serializer typically pairs with a deserializer like the MAX9206, which receive the serial output and transform it back to 10-bit-wide parallel data.

The MAX9205 transmits serial data at speeds up to 400Mbps and 660Mbps over PC board traces or twisted-pair cables. Since the clock is recovered from the serial data stream, clock-to-data and data-to-data skew that would be present with a parallel bus are eliminated.

The serializer requires no external components and few control signals. The input data strobe edge is selected by TCLK_R/F. PWRDN-bar is used to save power when the devices are not in use. Upon power-up, a synchronization mode is activated, which is controlled by two SYNC inputs, SYNC1 and SYNC2.

The MAX9205 can lock to a 16MHz to 40MHz system clock. The serializer output is held in high impedance until the device is fully locked to the local system clock, or when the device is in power-down mode.

The device operates from a single +3.3V supply, is specified for operation from -40°C to +85°C, and is available in 28-pin SSOP packages.

B. Absolute Maximum Ratings

Item	Rating
VCC to GND	-0.3V to +4.0V
IN_, SYNC1, SYNC2, EN, TCLK_R/F, TCLK, PWRDN to GND	-0.3V to (VCC + 0.3V)
OUT+, OUT- to GND	-0.3V to +4.0V
Output Short-Circuit Duration	Continuous
Storage Temperature Range	-65°C to +150°C
Junction Temperature	+150°C
Operating Temperature Range	-40°C to +85°C
Lead Temperature (soldering, 10s)	+300°C
ESD Protection (Human Body Model, OUT+, OUT-)	±8kV
Continuous Power Dissipation (TA = +70°C)	
28-Pin SSOP	762mW
Derates above +70°C	
28-Pin SSOP	9.5mW/°C

II. Manufacturing Information

A. Description/Function:	10-Bit Bus LVDS Serializers
B. Process:	TC35
C. Number of Device Transistors:	3036
D. Fabrication Location:	Taiwan
E. Assembly Location:	Philippines or Malaysia
F. Date of Initial Production:	April, 2001

III. Packaging Information

A. Package Type:	2**8-Pin SSOP**
B. Lead Frame:	Copper
C. Lead Finish:	Solder Plate or 100% Matte Tin
D. Die Attach:	Silver-filled Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	# 05-2801-0009
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C:	Level 1

IV. Die Information

A. Dimensions:	58 x 77 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	M1 = 0.5 / M2 = 0.6 / M3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	M1 = 0.45 / M2 = 0.5 / M3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts: Jim Pedicord (Manager, Reliability Operations)
Bryan Preeshl (Managing Director**)**

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:

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

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 13.74 \times 10^{-9}$

$\lambda = 13.74$ F.I.T. (60% confidence level @ 25°C)

This low failure rate represents data collected from Maxim's reliability monitor program. In addition to routine production Burn-In, Maxim pulls a sample from every fabrication process three times per week and subjects it to an extended Burn-In prior to shipment to ensure its reliability. The reliability control level for each lot to be shipped as standard product is 59 F.I.T. at a 60% confidence level, which equates to 3 failures in an 80 piece sample. Maxim performs failure analysis on any lot that exceeds this reliability control level. Attached Burn-In Schematic (Spec. # 06-5820) shows the static Burn-In circuit. Maxim also performs quarterly 1000 hour life test monitors. This data is published in the Product Reliability Report (**RR-1N**).
Current monitor data for the TC35 Process results in a FIT Rate of 0.28 @ 25C and 4.76 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

Maxim pulls pressure pot samples from every assembly process three times per week. Each lot sample must meet an LTPD = 20 or less before shipment as standard product. Additionally, the industry standard 85°C/85%RH testing is done per generic device/package family once a quarter.

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

The HS05 die type has been found to have all pins able to withstand a transient pulse of ±2000V per Mil-Std-883 Method 3015 (reference attached ESD Test Circuit). Latch-Up testing has shown that this device withstands a current of ±250mA.

Table 1
Reliability Evaluation Test Results

MAX9205EAI

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	PACKAGE	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)					
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality		80	0
Moisture Testing (Note 2)					
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	SSOP	77	0
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality		77	0
Mechanical Stress (Note 2)					
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality		77	0

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data

Attachment #1

TABLE II. Pin combination to be tested. 1/ 2/

	Terminal A (Each pin individually connected to terminal A with the other floating)	Terminal B (The common combination of all like-named pins connected to terminal B)
1.	All pins except V_{PS1} 3/	All V_{PS1} pins
2.	All input and output pins	All other input-output pins

1/ Table II is restated in narrative form in 3.4 below.
2/ No connects are not to be tested.
3/ Repeat pin combination I for each named Power supply and for ground

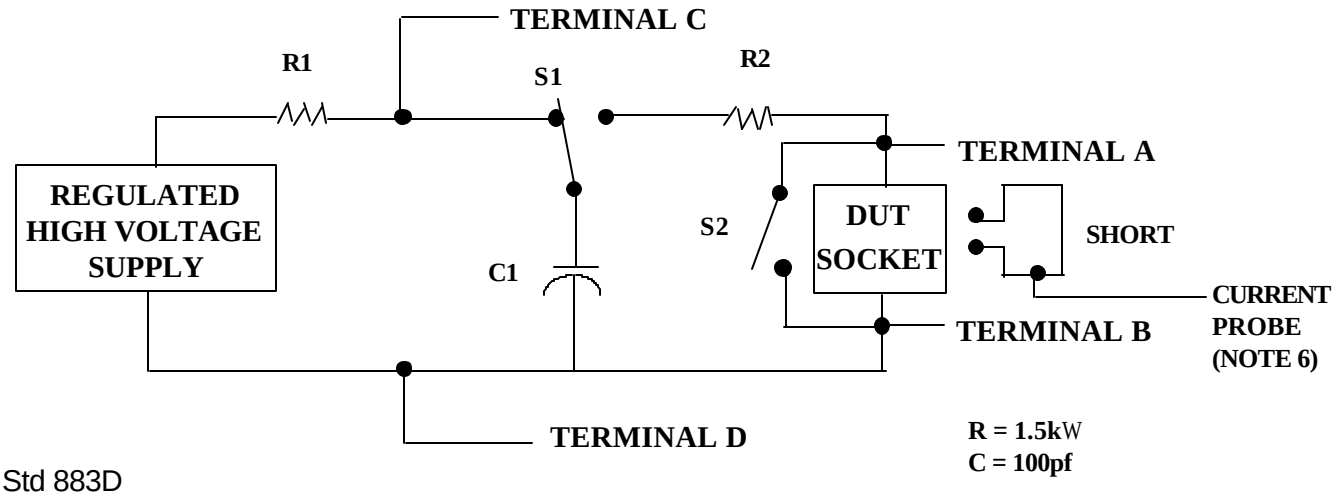
(e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

3.4 Pin combinations to be tested.

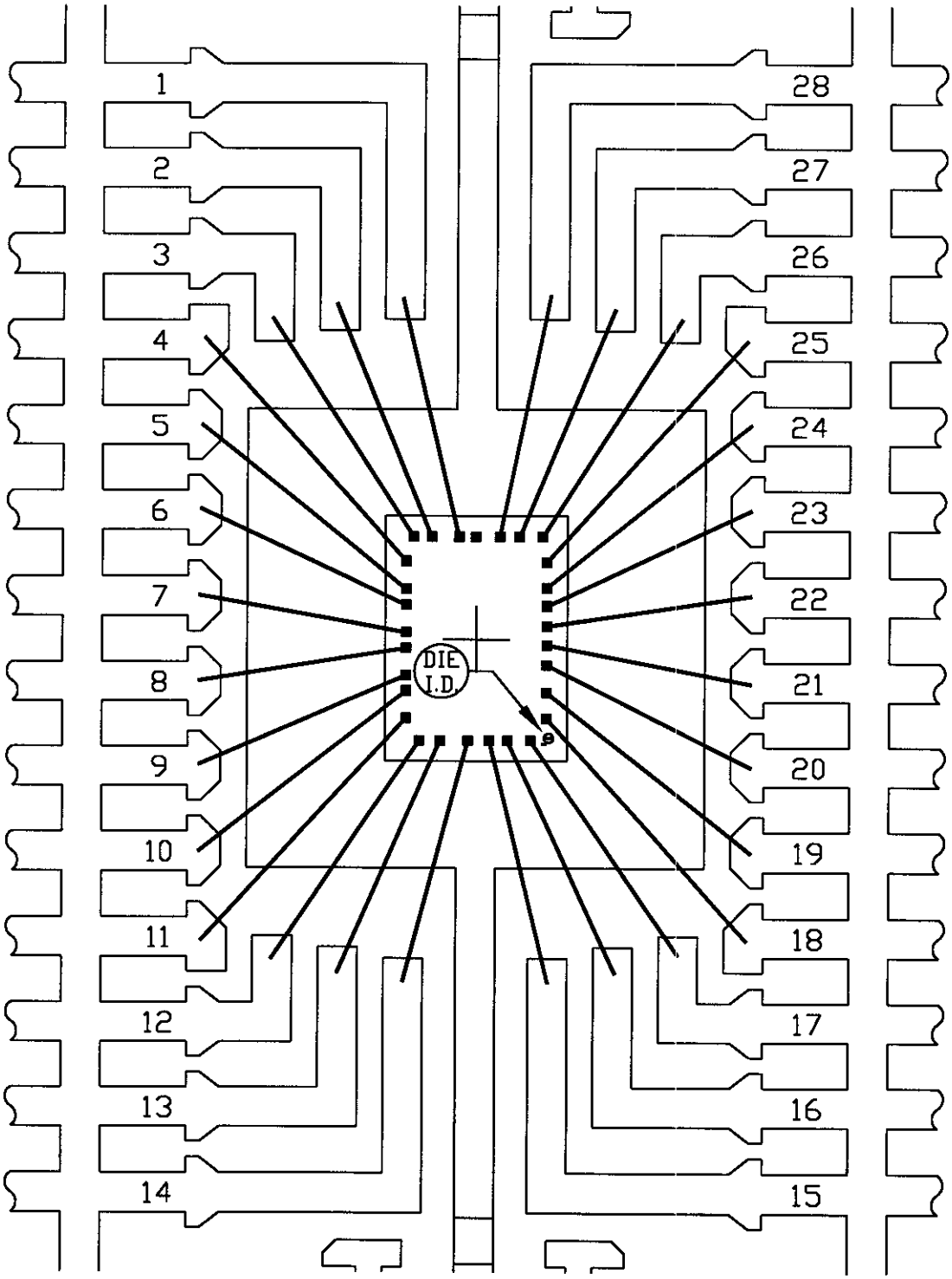
a. Each pin individually connected to terminal A with respect to the device ground pin(s) connected to terminal B. All pins except the one being tested and the ground pin(s) shall be open.

b. Each pin individually connected to terminal A with respect to each different set of a combination of all named power supply pins (e.g., V_{SS1}, or V_{SS2} or V_{SS3} or V_{CC1}, or V_{CC2}) connected to terminal B. All pins except the one being tested and the power supply pin or set of pins shall be open.

c. Each input and each output individually connected to terminal A with respect to a combination of all the other input and output pins connected to terminal B. All pins except the input or output pin being tested and the combination of all the other input and output pins shall be open.



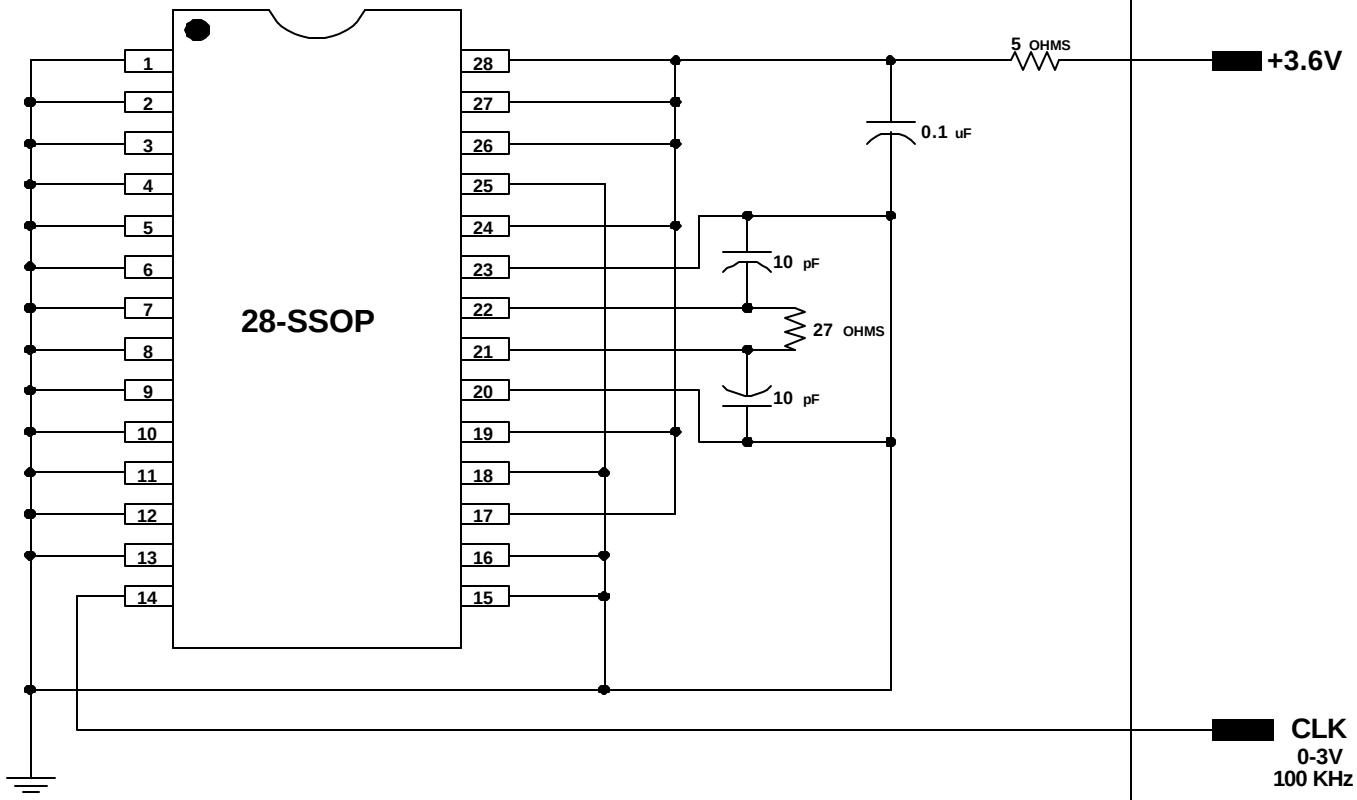
Mil Std 883D
Method 3015.7
Notice 8



PKG. CODE: A28-4		SIGNATURES	DATE	MAXIM CONFIDENTIAL & PROPRIETARY
CAV./PAD SIZE: 138X138	PKG. DESIGN			BOND DIAGRAM #: 05-2801-0009 / REV: A

ONCE PER SOCKET

ONCE PER BOARD



DEVICES: MAX9205/9207

MAX. EXPECTED CURRENT = 45mA