RELIABILITY REPORT

FOR

MAX4025ExP

PLASTIC ENCAPSULATED DEVICES

January 21, 2004

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by

Jim Pedicord
Quality Assurance
Reliability Lab Manager

Reviewed by

Bryan J. Preeshl
Quality Assurance
Executive Director

Conclusion

The MAX4025 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 MAX4025 is a voltage feedback, multiplexer-amplifier combining low-glitch switching and excellent video specifications with fixed or settable gain. The MAX4025 is a quad 2:1 multiplexerswith adjustable gain amplifiers optimized for unity-gain stability. The device has 25ns channel switching time and low $10mV_{P-P}$ switching transients, making it ideal for high-speed video-switching applications. This device operates from a single +4.5V to +11V supply or from dual supplies of ±2.25V to ±5.5V, and features an input common-mode voltage range that extends to the negative supply rail. A low-power disable mode places the output in a high-impedance state.

The MAX4025 has -3dB bandwidths of 260MHz and up to 330V/µs slew rates with a settable gain to equalize long cable runs. The MAX4025 internal amplifiers maintain an open-loop output impedance of only 18Ω over the full output voltage range, and minimize the gain error and bandwidth changes under loads typical of most Rail-to-Rail® amplifiers. This device is ideal for broadcast video applications with differential gain and phase errors of 0.07% and 0.07°, respectively.

B. Absolute Maximum Ratings

Item	Rating
Supply Voltage (VCC to VEE)	12V
IN_A, IN_B, FB_	(VEE - 0.3V) to (VCC + 0.3V)
REF, EN, A/B	(VEE - 0.3V) to (VCC + 0.3V)
Current Into IN_A, IN_B, FB_	±20mA
Short-Circuit Duration (OUT_ to GND or VEE)	Continuous
Short-Circuit Duration (OUT_ to VCC)	(Note 1)
Operating Temperature Range	-40°C to +85°C
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10s)	+300°C
Continuous Power Dissipation (TA = +70°C)	
20-Pin TSSOP	879mW
20-Pin WSO	800mW
Derates above +70°C	
20-Pin TSSOP	10.9mW/°C
20-Pin WSO	10.0mW/°C

Note 1: Do not short OUT_ to VCC.

II. Manufacturing Information

A. Description/Function:	Quad, 2:1 Video Multiplexer-Amplifiers with Settable Gain
B. Process:	CB2 (Complementary Bipolar Process)
C. Number of Device Transistors:	655
D. Fabrication Location:	Oregon, USA
E. Assembly Location:	Philippines, Malaysia,or Thailand
F. Date of Initial Production:	January, 2003

III. Packaging Information

A. Package Type:	**20-Lead WSO**	**20-Lead TSSOP**
B. Lead Frame:	Copper	Copper
C. Lead Finish:	Solder Plate	Solder Plate
D. Die Attach:	Silver-filled Epoxy	Silver-filled Epoxy
E. Bondwire:	Gold (1.0 mil dia.)	Gold (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	# 05-9000-0052	# 05-9000-0054
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard JESD22-A112:	Level 1	Level 1

IV. Die Information

A. Dimensions:	79 x 111 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:	2 microns (as drawn)
F. Minimum Metal Spacing:	2 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, Rel Operations)
Bryan Preeshl (Executive Director**)**
Kenneth Huening (Vice President)

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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4389 \times 45 \times 2}$$

(Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 24.13 \times 10^{-9}$

$\lambda = 24.13$ 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. Attached Burn-In Schematic (Spec. # 06-6045) shows the static Burn-In circuit. Maxim performs failure analysis on any lot that exceeds this reliability control level. Maxim also performs quarterly 1000 hour life test monitors. This data is published in the Product Reliability Report (**RR-1M**).

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 VA19 die type has been found to have all pins able to withstand a transient pulse of ±2500V, 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

MAX4025ExP

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		45	0
Moisture Testing (Note 2)					
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	WSO TSSOP	77 77	0 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

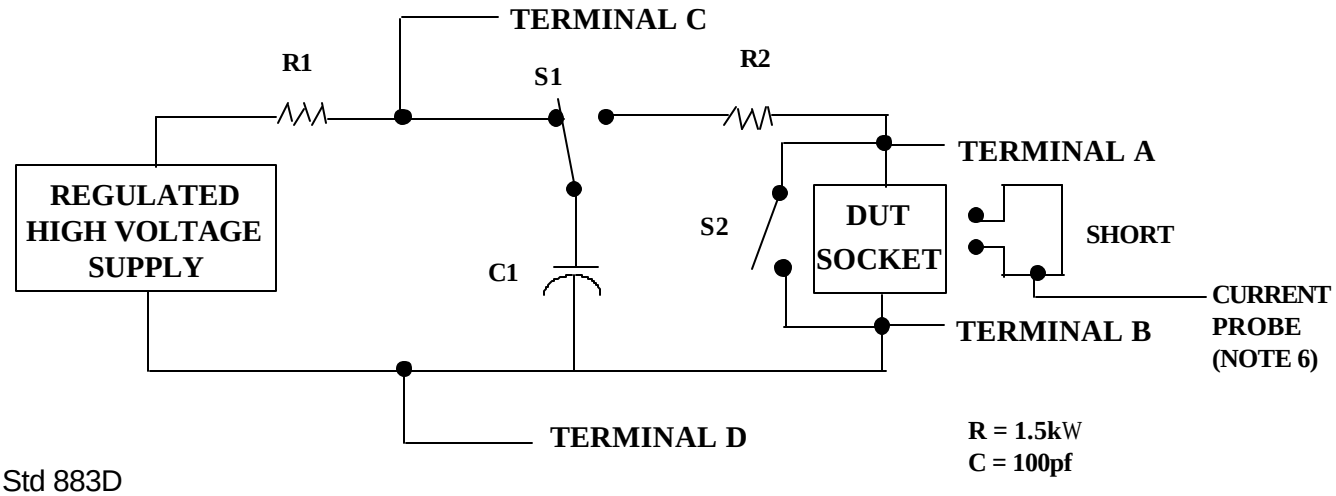
(e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

3.4 Pin combinations to be tested.

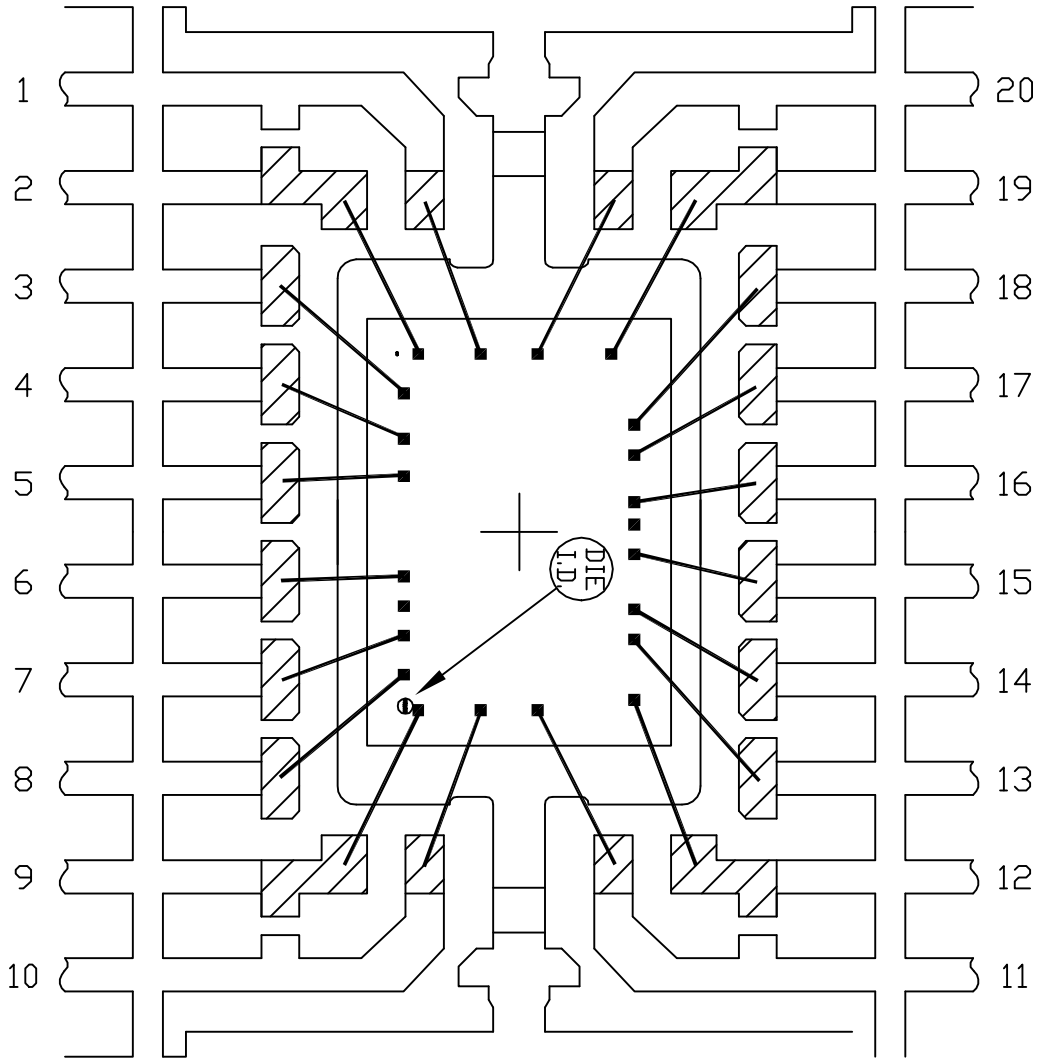
a. Each pin individually connected to terminal A with respect to the device ground pin(s) connected to terminal B. All pins except the one being tested and the ground pin(s) shall be open.

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.

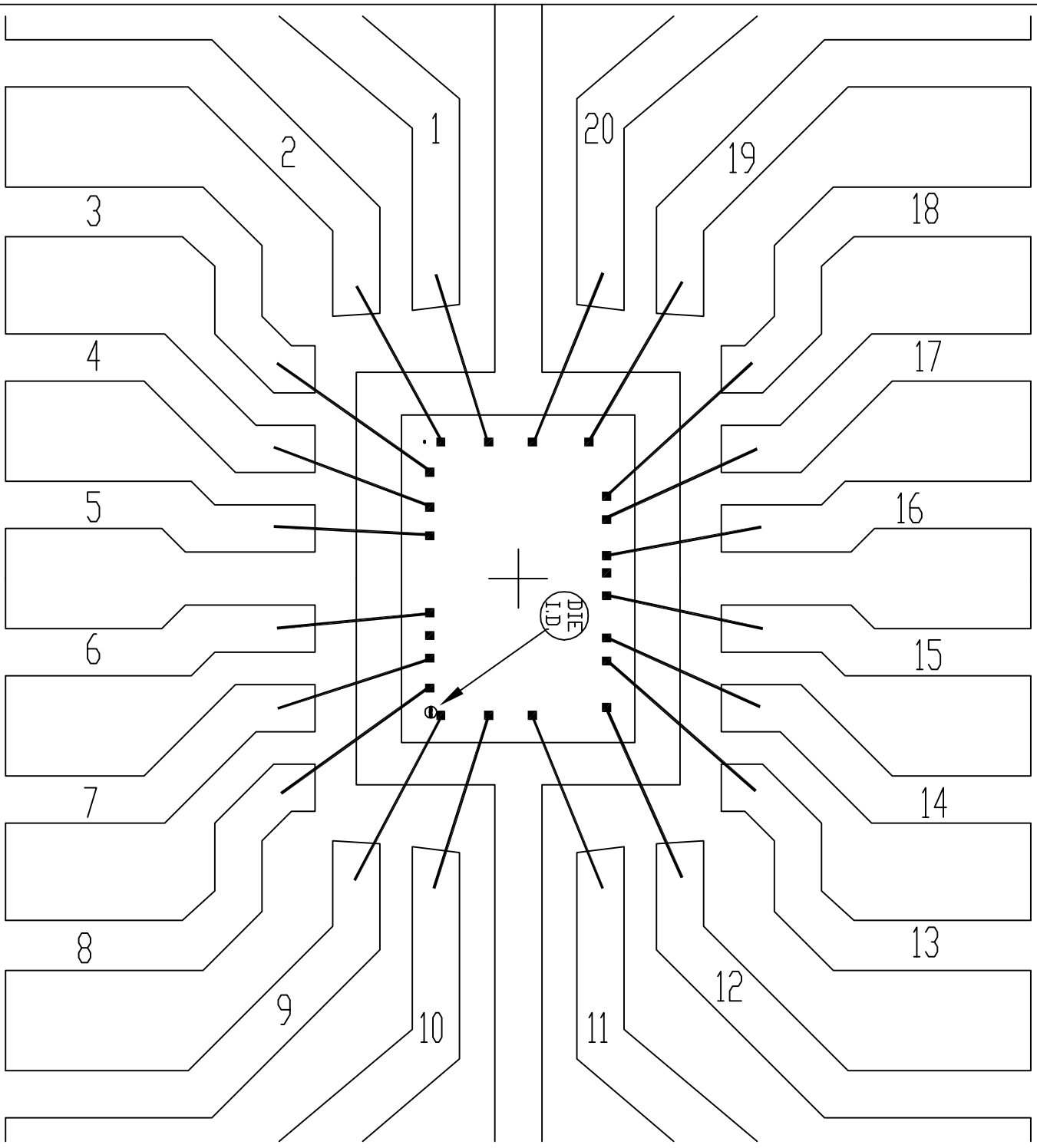


Mil Std 883D
Method 3015.7
Notice 8



BONDABLE AREA

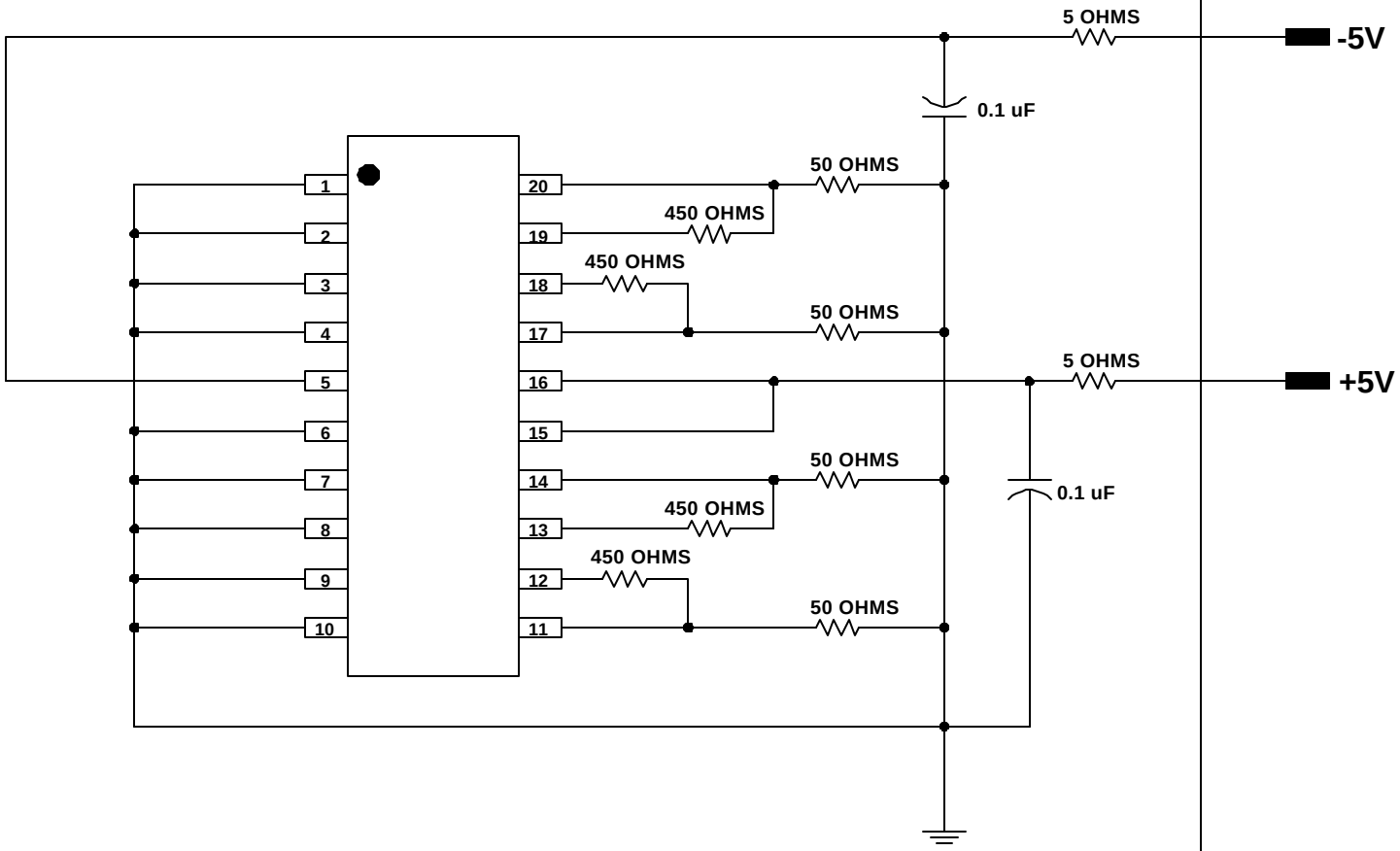
PKG. CODE: U20-3		SIGNATURES	DATE	MAXIM CONFIDENTIAL & PROPRIETARY	
CAV./PAD SIZE: 95x142	PKG.			BOND DIAGRAM #: 05-9000-0054	REV: A
	DESIGN				



PKG. CODE: W20-1		SIGNATURES	DATE	MAXIM CONFIDENTIAL & PROPRIETARY	
CAV./PAD SIZE: 110 X 140	PKG.			BOND DIAGRAM #: 05-9000-0052	REV: A
	DESIGN				

ONCE PER SOCKET

ONCE PER BOARD



DEVICES: MAX 4025 (VA19Z)
PACKAGE: 20-TSSOP
MAX. EXPECTED CURRENT = 36mA (+/-5V).

DRAWN BY : TEK TAN
NOTES: