

Cypress Semiconductor Product Qualification Report

**QTP# 073707 VERSION 1.0
January 2008**

7C069B	
CMOS2AN Technology, Magnachip	
VAC068A	VMEbus Address Controller

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

QUAL REPORT	DESCRIPTION OF QUALIFICATION PURPOSE	DATE COMP.
003301	Technology CMOS2AN / Bus Interface Logic Circuit CY7C964A	Sept 01
073707	7C069B Device CMOS2AN Technology, Magnachip	Dec 07

Cypress products are manufactured using qualified processes. The technology qualification for this product is referenced above and must be considered to get a complete and thorough evaluation of the reliability of the product.

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose:	7C069B Device CMOS2AN Technology, Magnachip
Marketing Part #:	VAC068A
Device Description:	5V VMEBus Address Controller
Cypress Division:	Cypress Semiconductor Corporation – Data Communication Division

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	2	Metal Composition:	Metal 1: Al, 1.0%Si Metal 2: Al, 1.0%Si
Passivation Type and Materials:	7K TEOS +6K Nitride		
Generic Process Technology/Design Rule (μ -drawn):	CMOS2AN, 1.2um		
Gate Oxide Material/Thickness (MOS):	SiO ₂ 250Å		
Name/Location of Die Fab (prime) Facility:	Magnachip Fab (U)		
Die Fab Line ID/Wafer Process ID:	Magnachip Fab / CMOS, Single Poly, Double Metal, 1.2um		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE
160 Lead CQFP	MMT-Thailand

Note: Package Qualification details upon request.

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	U160
Package Outline, Type, or Name:	160-lead Ceramic Quad Flatpack (CQFP)
Lead Seal Method / Material:	Heat Seal / Alloy 42
Mold Compound Flammability Rating:	N/A
Oxygen Rating Index:	N/A
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	NiAu
DieBackside Preparation Method/Metallization:	N/A
Die Separation Method:	100% Saw
Die Attach Supplier:	Henkel
Die Attach Material:	QMI 2416MG
Bond Diagram Designation	10-01657
Wire Bond Method:	Ultrasonic bond
Wire Material/Size:	Al / 1.25mil
Thermal Resistance Theta JA °C/W:	15.6°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-15095
Name/Location of Assembly (prime) facility:	Millenium Microtech Thailand (X)

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure	Dynamic Operating Condition, Vcc = 5.75V, 125°C Dynamic Operating Condition, Vcc = 5.75V, 150°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc = 5.75V, 125°C Dynamic Operating Condition, Vcc = 5.75V, 150°C	P
High Temperature Steady State Life	Static Operating Condition, Vcc Max=5.5V, 125°C	P
Long Life Verification	Dynamic Operating Condition, Vcc = 5.75V, 125°C	P
Military Life test Group C	MIL-STD-883C, Method 1005.4 Dynamic Operating Condition, Vcc = 5.75V, 125°C Dynamic Operating Condition, Vcc = 5.5V, 150°C	P
High Accelerated Saturation Test (HAST)	130°C, 5.5V, 85%RH Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30°C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
Pressure Cooker	121°C, 100%RH Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs, 30°C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C, MSL 1 MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C, MSL 3 Precondition: JESD22 Moisture Sensitivity 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, -0°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	600V MIL-STD-883, Method 3015	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V Cypress Spec. 25-00020	P

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS (continuation)

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Storage	150°C No Bias	P
Low Temperature Operating Life	-30°C, 6.5V	P
Acoustic Microscopy, Level 3	Cypress Spec. 25-00104	P
Age Bond Strength	200°C, 4hrs MIL-STD-883, Method 2011	P
Current Density	Cypress Spec. 22-00029	P
Dynamic Latch-up	Cypress Spec. 25-00020	P
Input/Output Capacitance	Cypress Spec. 01-00123	P
Static Latch-up Sensitivity	125°C, 12V, ± 300mA 125°C, ± 200mA In accordance with JEDEC 17. Cypress Spec. 01-00081	P
SEM X-Section	MIL-STD-883C, Method 2018.2	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Acceleration Factor ³	Failure Rate ⁴
High Temperature Operating Life Early Failure Rate	2703	1	N/A	N/A	370 PPM
High Temperature Operating Life Long Term Failure Rate ^{1,2}	314,447 DHRS	1	0.7	170	39 FITs *

¹ Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

² Chi-squared 60% estimations used to calculate the failure rate.

³ Thermal Acceleration Factor is calculated from the Arrhenius equation

$$AF = \exp \left[\frac{E_A}{k} \left[\frac{1}{T_2} - \frac{1}{T_1} \right] \right]$$

where:

E_A = The Activation Energy of the defect mechanism.

k = Boltzmann's constant = 8.62×10^{-5} eV/Kelvin.

T_1 is the junction temperature of the device under stress and T_2 is the junction temperature of the device at use conditions.

Reliability Test Data

QTP #: 003301

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 5.75V, Vcc Max)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	96	446	0	
CY7C964A-NC (7C964B)	9106614	610110262/4/437	ASAT-B	96	529	0	
CY7C964A-NC (7C964B)	9115182	340100110/12/14	ASAT-B	96	288	0	
CY7C964A-NC (7C964B)	9106611	610107294/5/6	ASAT-B	96	332	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 5.75V, Vcc Max)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	168	135	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	500	135	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	1000	135	0	
CY7C964A-NC (7C964B)	9106614	610110262/4/437	ASAT-B	168	134	0	
CY7C964A-NC (7C964B)	9106614	610110262/4/437	ASAT-B	500	133	1	Non-visual
CY7C964A-NC (7C964B)	9106614	610110262/4/437	ASAT-B	1000	133	0	
CY7C964A-NC (7C964B)	9115182	340100110/12/14	ASAT-B	168	135	0	
CY7C964A-NC (7C964B)	9115182	340100110/12/14	ASAT-B	500	135	0	
CY7C964A-NC (7C964B)	9115182	340100110/12/14	ASAT-B	1000	135	0	
CY7C964A-NC (7C964B)	9106611	610107294/5/6	ASAT-B	1000	135	0	
STRESS: ESD-CHARGE DEVICE MODEL (500V)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	COMP	9	0	
CY7C964A-NC (7C964B)	9106614	610110257/8/9	ASAT-B	COMP	9	0	
CY7C964A-NC (7C964B)	9115182	340100109/11/13	ASAT-B	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (700V)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	COMP	9	0	
CY7C964A-NC (7C964B)	9106614	610110262/4/437	ASAT-B	COMP	9	0	
CY7C964A-NC (7C964B)	9115182	340100109/11/13	ASAT-B	COMP	9	0	
CY7C964A-NC (7C964B)	9106611	610107294/5/6	ASAT-B	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING (125C, 12V, +/300mA)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	COMP	3	0	
CY7C964A-NC (7C964B)	9106614	610110257/8/9	ASAT-B	COMP	3	0	
CY7C964A-NC (7C964B)	9115182	340100109/11/13	ASAT-B	COMP	3	0	
STRESS: DYNAMIC LATCH-UP TESTING							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	COMP	3	0	
STRESS: LOW TEMPERATURE OPERATING LIFE (-30C, 6.5V)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	500	48	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	1000	46	0	

Reliability Test Data

QTP #: 003301

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Ass Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	128	47	0	
CY7C964A-NC (7C964B)	9106614	610110257/8/9	ASAT-B	128	46	0	
CY7C964A-NC (7C964B)	9115182	340100109/11/13	ASAT-B	128	47	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192 HR 30C/60%RH							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	168	45	0	
CY7C964A-NC (7C964B)	9106614	610110257/8/9	ASAT-B	168	48	0	
CY7C964A-NC (7C964B)	9115182	340100109/11/13	ASAT-B	168	48	0	
STRESS: ACOUSTIC							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	COMP	15	0	
CY7C964A-NC (7C964B)	9106614	610110257/8/9	ASAT-B	COMP	15	0	
CY7C964A-NC (7C964B)	9115182	340100109/11/13	ASAT-B	COMP	15	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (125C, 5.5V, Vcc MAX)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	168	80	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	336	80	0	
STRESS: LONG LIFE VERIFICATION (125C, 5.75V, Vcc MAX)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	1256	134	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	2000	134	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	3000	134	0	
STRESS: HIGH TEMP STORAGE (150C)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	500	48	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	1000	48	0	
STRESS: AGE BOND STRENGTH							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	COMP	15	0	
CY7C964A-NC (7C964B)	9106614	610110257/8/9	ASAT-B	COMP	15	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH (MSL3)							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	300	48	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	500	48	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	1000	48	0	
CY7C964A-NC (7C964B)	9106614	610110257/8/9	ASAT-B	300	48	0	
CY7C964A-NC (7C964B)	9106614	610110257/8/9	ASAT-B	500	48	0	
CY7C964A-NC (7C964B)	9106614	610110257/8/9	ASAT-B	1000	48	0	
CY7C964A-NC (7C964B)	9115182	340100109/11/13	ASAT-B	300	48	0	
CY7C964A-NC (7C964B)	9115182	340100109/11/13	ASAT-B	500	48	0	
CY7C964A-NC (7C964B)	9115182	340100109/11/13	ASAT-B	1000	48	0	

Reliability Test Data

QTP #: 073707

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Ass Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (600V)							
VAC068A (7C069BU)	6736025	610758789	MMT-X	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL (500V)							
VAC068A (7C069BU)	6736025	610758789	MMT-X	COMP	9	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V, Vcc Max)							
VIC068B (7C068FU)	9627719	610649249	MMT-X	48	4	0	
VIC068B (7C068FU)	9627719	610649251	MMT-X	48	124	0	
VIC068B (7C068FU)	9627719	610640945	MMT-X	48	143	0	
VIC068B (7C068FU)	9627719	610649248	MMT-X	48	175	0	
VIC068B (7C068FU)	6642004	610663090	MMT-X	48	185	0	
VIC068B (7C068FU)	9627719	610649250	MMT-X	48	189	0	
VIC068B (7C068FU)	9607692	610640940	MMT-X	48	288	1	Non-Visual
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V, Vcc Max)							
VIC068B (7C068FU)	9627719	610640945	MMT-X	80	76	0	
VIC068B (7C068FU)	9627719	610640945	MMT-X	500	75	0	
STRESS: MILITARY LIFETEST GROUP C (150C, 5.5V)							
VAC068A (7C069BU)	6736025	610758789	MMT-X	184	45	0	
STRESS: MILITARY INPUT/OUTPUT CAPACITANCE							
VIC068B (7C068FU)	9627719	610640945	MMT-X	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING (125C, +240mA)							
VAC068A (7C069BU)	6736025	610758789	MMT-X	COMP	6	0	
STRESS: TC HERMETIC COND. C -65C TO 150C							
VIC068B (7C068FU)	9627719	610640945	MMT-X	100	45	0	
VIC068B (7C068FU)	9627719	610640945	MMT-X	1000	45	0	