

# Cypress Semiconductor Product Qualification Report

QTP# 054004 VERSION 1.2  
March 2008

<b>7C064 Product Family</b> <b>CMOS2AN Technology, Magnachip</b>	
<b>VIC64</b> <b>VIC068A</b>	<b>VMEbus Interface Controller</b>

## **CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:**

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**PRODUCT QUALIFICATION HISTORY**

<b>QUAL REPORT</b>	<b>DESCRIPTION OF QUALIFICATION PURPOSE</b>	<b>DATE COMP.</b>
003201	Military Qualification for CY7C964A, MSL1	Sep 01
003301	Technology CMOS2AN / Bus Interface Logic Circuit CY7C964A, MSL3	Sept 01
054004	7C064 CMOS2AN Technology New Device Qual at MAGNACHIP Foundry	Mar 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.**

<b>PRODUCT DESCRIPTION (for qualification)</b>	
Qualification Purpose:	7C064 CMOS2AN Technology New Device Qual at MAGNACHIP Foundry
Marketing Part #:	VIC64,VIC068A,
Device Description:	5V Bus Interface Products
Cypress Division:	Cypress Semiconductor Corporation – Data Communication Division

<b>TECHNOLOGY/FAB PROCESS DESCRIPTION</b>			
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 ( $\mu$ -drawn):	CMOS2AN, 1.2 $\mu$ m		
Gate Oxide Material/Thickness (MOS):	SiO <sub>2</sub> 250Å		
Name/Location of Die Fab (prime) Facility:	Magnachip Fab		
Die Fab Line ID/Wafer Process ID:	Magnachip Fab / CMOS, Single Poly, Double Metal, 1.2 $\mu$		

**PACKAGE AVAILABILITY**

<b>PACKAGE</b>	<b>ASSEMBLY FACILITY SITE</b>
<b>144-Lead PGA 160-Lead CQFP</b>	<b>MMT-Thailand</b>
<b>144 Lead TQFP 160 Lead PQFP</b>	<b>ASE-Taiwan</b>

Note: Package Qualification details upon request.

<b>MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION</b>	
<b>Package Designation:</b>	U160
<b>Package Outline, Type, or Name:</b>	160-lead Ceramic Quad Flatpack (CQFP)
<b>Lead Seal Method / Material:</b>	Heat Seal / Alloy 42
<b>Mold Compound Flammability Rating:</b>	N/A
<b>Oxygen Rating Index:</b>	N/A
<b>Lead Frame Material:</b>	Copper
<b>Lead Finish, Composition / Thickness:</b>	NiAu
<b>DieBackside Preparation Method/Metallization:</b>	N/A
<b>Die Separation Method:</b>	100% Saw
<b>Die Attach Supplier:</b>	Henkel
<b>Die Attach Material:</b>	QMI 2419MG
<b>Die Attach Method:</b>	Silver Glass
<b>Bond Diagram Designation</b>	10-02418
<b>Wire Bond Method:</b>	Ultrasonic bond
<b>Wire Material/Size:</b>	Al / 1.25mil
<b>Thermal Resistance Theta JA °C/W:</b>	15.6°C/W
<b>Package Cross Section Yes/No:</b>	N/A
<b>Assembly Process Flow:</b>	49-15095
<b>Name/Location of Assembly (prime) facility:</b>	Millenium Microtech Thailand

<b>ELECTRICAL TEST / FINISH DESCRIPTION</b>	
<b>Test Location:</b>	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 = 5.75V, 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, ± 240mA 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 <sup>3</sup>	Failure Rate <sup>4</sup>
High Temperature Operating Life Early Failure Rate	2,703	1	N/A	N/A	370 PPM
High Temperature Operating Life Long Term Failure Rate <sup>1,2</sup>	1,082,284 HRs	1	0.7	55	34 FITs *

<sup>1</sup> Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

<sup>2</sup> Chi-squared 60% estimations used to calculate the failure rate.

<sup>3</sup> 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 =  $8.62 \times 10^{-5}$  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 #: 003201

<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>
<b>STRESS: MILITARY LIFETEST GROUP C (150C, 5.75V)</b>							
CY7C964A-GM (7C964B)	9115182	610114999	ALPHA-X	184	47	0	
<b>STRESS: TC COND. C -65C TO 150C</b>							
CY7C964A-GM (7C964B)	9115182	610114999	ALPHA-X	100	48	0	
CY7C964A-GM (7C964B)	9115182	610114999	ALPHA-X	1000	47	0	



## Reliability Test Data

QTP #: 003301

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 5.75V, Vcc Max)</b>							
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	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 5.75V, Vcc Max)</b>							
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	
<b>STRESS: ESD-CHARGE DEVICE MODEL (500V)</b>							
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	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (700V)</b>							
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	
<b>STRESS: STATIC LATCH-UP TESTING (125C, 12V, +/300mA)</b>							
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	
<b>STRESS: DYNAMIC LATCH-UP TESTING</b>							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	COMP	3	0	
<b>STRESS: LOW TEMPERATURE OPERATING LIFE (-30C, 6.5V)</b>							
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>
<b>STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V)</b>							
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	
<b>STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192 HR 30C/60%RH</b>							
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	
<b>STRESS: ACOUSTIC</b>							
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	
<b>STRESS: HIGH TEMP STEADY STATE LIFE TEST (125C, 5.5V, Vcc MAX)</b>							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	168	80	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	336	80	0	
<b>STRESS: LONG LIFE VERIFICATION (125C, 5.75V, Vcc MAX)</b>							
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	
<b>STRESS: HIGH TEMP STORAGE (150C)</b>							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	500	48	0	
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	1000	48	0	
<b>STRESS: AGE BOND STRENGTH</b>							
CY7C964A-NC (7C964B)	9104539	610104147/9/52	ASAT-B	COMP	15	0	
CY7C964A-NC (7C964B)	9106614	610110257/8/9	ASAT-B	COMP	15	0	
<b>STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH (MSL3)</b>							
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 #: 054004

<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>
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (600V)</b>							
VIC64 (7C064CU)	9607692	610639920	TWN-G	COMP	3	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL (500V)</b>							
VIC068B (7C068FU)	9627719	610640945	MMT-X	COMP	9	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V, Vcc Max)</b>							
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
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V, Vcc Max)</b>							
VIC068B (7C068FU)	9627719	610640945	MMT-X	80	76	0	
VIC068B (7C068FU)	9627719	610640945	MMT-X	500	75	0	
<b>STRESS: MILITARY LIFETEST GROUP C (150C, 5.75V)</b>							
VIC068B (7C068FU)	9627719	610640945	MMT-X	184	45	0	
<b>STRESS: MILITARY INPUT/OUTPUT CAPACITANCE</b>							
VIC068B (7C068FU)	9627719	610640945	MMT-X	COMP	3	0	
<b>STRESS: STATIC LATCH-UP TESTING (125C, +/-240mA)</b>							
VIC64 (7C064CU)	9607692	610639920	TWN-G	COMP	3	0	
<b>STRESS: TC HERMETIC COND. C -65C TO 150C</b>							
VIC068B (7C068FU)	9627719	610640945	MMT-X	100	45	0	
VIC068B (7C068FU)	9627719	610640945	MMT-X	1000	45	0	