CYPRESS SEMICONDUCTOR

PRODUCT CHANGE NOTIFICATION

PCN:020022 **DATE:** July 11, 2002

Subject: CYP15G0401DX silicon replacement with CYP15G0401DXA silicon.

To:

Description of change:
The die has been revised from "A" to "B" to improve the performance of the device.

The part number will be revised to contain the letter "A" (i.e. CYP15G0401DXA) in the part number. New datasheets have been issued to reflect the part number change and improvements.

Datasheets for both the old and new part numbers can be downloaded from the Cypress web site.
http://www.cypress.com/design/datasheets/index.html

Changes in the parameters between old and the new device is listed below along with other differences.

Parameter	CYP15G0401DXA Specifications	CYP15G0401DX Performance
V_{ODIF} (100ohm diff load)	450mV	300mV
V_{ODIF} (150ohm diff load)	560mV	300mV
TXCLKO duty cycle	60%	80%
t_{TXDS}	1.7 ns	1.5 ns
t_{TREFDS}	1.7 ns	1.5 ns
t_{TREFDH}	0.8 ns	2.5 ns
D21.5 Fail to Lock above 1.3Gb	Lock on all characters within clock range	D21.5 fails to lock above 1.3Gb

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Subject: CYP15G0401DX silicon replacement with CYP15G0401DXA silicon.

Additional changes:

1. TXCLKO remains active during reset.
2. All serial output buffers and channel B, C and D RXPLL/TXPLLs are powered down during reset.
3. RXCLKBn and RXCLKDn are tri-stated when their complements RXCLKBp and RXCLKDp are tri-stated
4. E/B will not overrun during bonding when the serial skew among any two bonding channels is greater than 30 bit times.
5. The generation of the BIST sequence will have priority over a Phase Align Buffer error and will no longer transmit a C0.7 character if BIST is active.
6. During tristate the outputs are set to a high-impedance state instead of LOW
7. Line Fault Indication (LFI) now asserts according to datasheet specifications, no matter which path (primary or redundant) is being used on any channel.
8. RXCLKA+/- and RXCLKC+/- now output channel A, B, C, or D recovered clocks dependant upon the inputs on RXCLKB+ and RXCLKD+. (See table 16 in CYP15G0401DXA datasheet.)

CYPRESS SEMICONDUCTOR

PRODUCT CHANGE NOTIFICATION

PCN:020022 **DATE:** July 11, 2002

Subject: CYP15G0401DX silicon replacement with CYP15G0401DXA silicon.

Cypress part numbers affected:
CYP15G0401DX-BGC, CYP15G0401DX-BGI

Customer part numbers affected:

Benefit of change:
The changes will result in improved performance of the device.

Qualification status:
Complete. Qualification Report # 012603 is attached.

Sample status:
Samples are available by contacting our local sales office.

Approximate Implementation Date:
We have been in communication with you to make you aware of these changes. This document represents our confirmation of the changes.
Production release of the new material was WW23 2002.

Response required:
Response not required. Cypress is providing this PCN for information only.

Fax signed approval to Al Laxman at 408-943-2165 or reply by E-mail.
For any additional information regarding this change, contact your local sales representative.

Sincerely,

Mike Burke
Director of QA

Al Laxman
QA Manager

Cypress Semiconductor
Product Qualification Report

QTP# 012603 VERSION 1.0
February, 2002

Quad HotLink II Family **B53D-3 Technology, Fab 4**
CYP15G0401DXA Quad HotLink II™ Transceiver

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

Ed Russell
Reliability Director
(408) 432–7069

Al Laxman
Quality Engineering
(408) 545–7120

PRODUCT QUALIFICATION HISTORY

Qual Report		Description of Qualification Purpose		Date Comp
99256		New Technology, B53D-3, Fab 4, CY7B993V / CY7B994V		Aug 00
011406		New Product, Quad HOTLink II family, CYP15G0401DX/ CYP15G0402DX		Oct 01
012603		Seven layer mask change to enhance functionality.		Feb 02

PRODUCT DESCRIPTION (for qualification)			
Qualification Purpose: Qualify 7 layer mask change to CYP15G0401DXA in technology B53D-3, Fab4			
Marketing Part #:	CYP15G0401DXA		
Device Description:	3.3V, Commercial and Industrial, available in 256-balls L2BGA package.		
Cypress Division:	Cypress Semiconductor Corporation – Data Com Division (DCD)		
Overall Die (or Mask) REV:		Rev. B	
Die Size:	318.0 mils x 258.3 mils	What ID markings on Die:	7B9294A

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500A TiW+6,000A Al/0.5%Cu/300A TiW Metal 2: 300A TiW+8,000A Al/0.5%Cu/300A TiW
Passivation Type and Materials:	1,000A TEOS + 9,000A SiN		
Free Phosphorus contents in top glass layer(%):	0%		
Number of Transistors:	362,417		
Number of Gates:	90,604		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Double Metal/0.25 μm		
Gate Oxide Material/Thickness (MOS):	SiO_2 55Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor – Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab4/B53D-3		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE
256-ball L2BGA	**TAIWN-G**

Note: Package Qualification details upon request.

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	BG256L2
Package Outline, Type, or Name:	Cavity down 256-ball, Ball Grid Array (L2BGA) with heat sink
Mold Compound Name/Manufacturer:	Hysol 4450/4451
Mold Compound Flammability Rating:	V-O per UL 94
Oxygen Rating Index:	>28%
Substrate Material:	BT with copper stiffner and heat sink
Lead Finish, Composition / Thickness:	Solder Ball, 63%Sn, 37%Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	QMI
Die Attach Material:	QMI 505MT
Die Attach Method:	Epoxy
Bond Diagram Designation	10-04074
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au,1.0um
Thermal Resistance Theta JA °C:	14.1°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-41017
Name/Location of Assembly (prime) facility:	ASE Taiwan (TAIWN-G)

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	Cypress USA
Fault Coverage:	100%

Note: Please contact a Cypress Representative for other packages availability.

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure	1) QTP #012603 Dynamic Operating Condition, Vcc = 3.65V, 125° 2) QTP #011406 Dynamic Operating Condition, Vcc = 3.8V, 125° 3) QTP #99256 Dynamic Operating Condition, Vcc = 4.0V, 125°	P
High Temperature Operating Life Latent Failure Rate	1) QTP 012603 Dynamic Operating Condition, Vcc = 3.65V, 125° 2) QTP #011406 Dynamic Operating Condition, Vcc = 3.8V, 125° 3) QTP #99256 Dynamic Operating Condition, Vcc = 4.0V, 125°C	P
Long Life Verification	1) QTP #99256 Dynamic Operating Condition, Vcc = 4.0V, 125°C	P
High Temp Steady State Life Test	1) QTP #99256 1) Static Operating Condition, Vcc = 3.63V, 125°C	P
Temperature Cycle	2) QTP #011406 Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, -0°C 3) QTP #99256 Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs., 30°C/60%RH+3IR-Reflow, 235°C+5, -0°C MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C	P
Pressure Cooker	1) QTP #011406 Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, -0°C 2) QTP #99256 Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs., 30°C/60%RH+3IR-Reflow, 235°C+5, -0°C 121°C, 100%RH MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C	P

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS (continuation)

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Accelerated Saturation Test (HAST)	1) QTP #011406 Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, -0°C 2) QTP #99256 Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs., 30°C/60%RH+3IR-Reflow, 235°C+5, -0°C 130°C, 85%RH, 3.63V MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C	P
Current Density	1) QTP #99256 Cypress Spec. 22-00029	P
Low Temperature Operating Life	1) QTP #99256 -30°C, 4.3V	P
High Temperature Storage	1) QTP #99256 150°C, no bias	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1) QTP #012603, QTP #011406, 2,200V 2) QTP #99256, 1,100V MIL-STD-883, Method 3015	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	1) QTP #012603, QTP #011406, QTP #99256, 500V Cypress Spec. 25-00020	P
Age Bond Strength	1) QTP 99256 MIL-STD-883C, Method 2011	P
SEM X-Section	1) QTP #99256 MIL-STD-883C, Method 2018.2	P
Acoustic Microscopy, MSL 3	1) QTP #011406, QTP #99256 Cypress Spec. 25-00104	P
Dynamic Latchup Sensitivity	1) QTP #011406 Cypress Spec. 25-00020	P
Static Latchup Sensitivity	1) QTP #012603, QTP #011406, QTP #99256 125C, 10V, ± 300mA In accordance with JEDEC 17. Cypress Spec. 01-00081	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	1,007	0	N/A	N/A	0 PPM
High Temperature Operating Life Long Term Failure Rate[1,,2]	1,697,590 HRs	0	0.7	55	10FIT

[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.

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[4] EFR failure rate based on QTP #012603
[4] LFR failure rate based on QTP #012603, QTP #011406 and QTP #99256.

Reliability Test Data

QTP #: 012603

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERTING LIFE - EARLY FAILURE RATE, 125C, 3.65V, >VCC MAX							
CYP15G0401DXA -BGC (7B9294A)	4140699	*610141195*	TAIWN-G	96	1007	0	
STRESS: HIGH TEMP DYNAMIC OPERTING LIFE-LATENT FAILURE RATE, 125C, 3.65, >Vcc Max							
CYP15G0401DXA -BGC (7B9294A)	4140699	*610141195*	TAIWN-G	168	1004	0	
STRESS: ESD-CDM, 500V							
CYP15G0401DXA -BGC (7B9294A)	4140699	*610141195*	TAIWN-G	COMP	9	0	
STRESS: ESD-HBM DONE, 2,200V							
CYP15G0401DXA -BGC (7B9294A)	4140699	*610141195*	TAIWN-G	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/-300mA							
CYP15G0401DXA -BGC (7B9294A)	4140699	*610141195*	TAIWN-G	COMP	3	0	

Reliability Test Data

QTP #: 011406

Device Mechanism	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure
STRESS: ACOUSTIC, MSL3							
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	COMP	15	0	
CYP15G0401DX -BGC (7B9294A)	4106284	*610113332*	TAIWN-G	COMP	15	0	
CYP15G0401DX -BGC (7B9294A)	4107603	*610113544L1*	TAIWN-G	COMP	15	0	
STRESS: HIGH TEMP DYNAMIC OPERTING LIFE - EARLY FAILURE RATE, 125C, 3.8V, >VCC MAX							
CYP15G0401DX -BGC (7B9294A)	4106284	*610113332*	TAIWN-G	96	199	0	
CYP15G0401DX -BGC (7B9294A)	4106284	*610122108S1*	TAIWN-G	96	507	0	
CYP15G0401DX BGC (7B9294A) TRANSISTOR BREAKDOWN	4107603	*610122107*	TAIWN-G	96	508	1	BIPOLAR
STRESS: HIGH TEMP DYNAMIC OPERTING LIFE-LATENT FAILURE RATE, 125C, 3.8, >Vcc Max							
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	168	189	0	
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	2097	146	0	
CYP15G0401DX -BGC (7B9294A)	4106284	*610113332*	TAIWN-G	168	199	0	
CYP15G0401DX -BGC (7B9294A)	4106284	*610113332*	TAIWN-G	2016	167	0	
STRESS: ESD-CDM, 500V							
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	COMP	9	0	
STRESS: ESD-HBM DONE, 2,200V							
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/-300mA							
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V, PRE COND 192 HR 30C/60%RH, MSL3							
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	128	49	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192HRS 30C/60%RH, MSL3							
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	168	50	0	

Reliability Test Data

QTP #: 011406

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	ReJ	Failure Mechanism
STRESS: TC CONDITION C, -65C TO 150C, PRE COND. 192 HRS 30C/60% RH, MSL3							
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	300	50	0	
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	500	50	0	
CYP15G0401DX -BGC (7B9294A)	4048678	*610111566L2*	TAIWN-G	1000	50	0	
CYP15G0401DX -BGC (7B9294A)	4106284	*610113332*	TAIWN-G	300	50	0	
CYP15G0401DX BGC (7B9294A)	4106284	*610113332*	TAIWN-G	500	50	0	
CYP15G0401DX -BGC (7B9294A)	4106284	*610113332*	TAIWN-G	1000	48	0	
CYP15G0401DX -BGC (7B9294A)	40107603	*610113544L1*	TAIWN-G	300	50	0	

Reliability Test Data

QTP #: 99256

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CY7B993V-AC	1937245	*619937409*	TAIWN-G	COMP	15	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	COMP	15	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	COMP	15	0	
STRESS: HIGH TEMP DYNAMIC OPERTING LIFE - EARLY FAILURE RATE, 125C, 4.0V, >VCC MAX							
CY7B994V-AC	1009007	*610021056*	TAIWN-G	96	672	0	
CY7B993V-AC	1937245	*619937409*	TAIWN-G	96	665	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	96	664	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	96	681	0	
STRESS: HIGH TEMP DYNAMIC OPERTING LIFE-LATENT FAILURE RATE, 125C, 4.0, >Vcc Max							
CY7B993V-AC	1937245	*619937409*	TAIWN-G	168	235	0	
CY7B994V-ACB	1937245	*619937409*	TAIWN-G	770	234	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	168	232	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	770	232	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	168	236	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	770	224	0	
STRESS: AGE BOND STRENGTH							
CY7B993V-AC	1937245	*619937409*	TAIWN-G	COMP	3	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	COMP	6	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	COMP	6	0	

Reliability Test Data

QTP #: 99256

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 750V							
CY7B994V-AC	1937245	*619936456S*	TAIWN-G	COMP	3	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	COMP	3	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 1,100V							
CY7B994V-AC	1937245	*619936456S*	TAIWN-G	COMP	3	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	COMP	3	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	COMP	3	0	
STRESS: DYNAMIC LATCH-UP TESTING, 6.5V							
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.3.63V, PRE COND 192 HR 30C/60%RH, MSL3							
CY7B993V-AC	1937245	*619937409*	TAIWN-G	128	46	0	
CY7B993V-AC	1937245	*619937409*	TAIWN-G	256	46	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	128	46	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	128	48	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192HRS 30C/60%RH, MSL3							
CY7B993V-AC	1937245	*619937409*	TAIWN-G	168	50	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	168	46	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	168	48	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST, 125C, 3.63V,>Vcc Max							
CY7B993V-AC	1937245	*619937409*	TAIWN-G	168	78	0	
CY7B993V-AC	1937245	*619937409*	TAIWN-G	336	76	0	
STRESS: LOW TEMPERATURE OPERATING LIKE, -30C,4.3V, 8MHZ							
CY7B993V-AC	1937245	*619937409*	TAIWN-G	500	50	0	
CY7B993V-AC	1937245	*619937409*	TAIWN-G	1000	50	0	

Reliability Test Data

QTP #: 99256

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: LONG LIFE VERIFICATION 125C, 4.0V,>Vcc Max							
CY7B993V-AC	1937245	*619937409*	TAIWN-G	2000	170	0	
STRESS: HIGH TEMP STORGAE, PLASTIC, 150C							
CY7B993V-AC	1937245	*619937409*	TAIWN-G	500	50	0	
CY7B993V-AC	1937245	*619937409*	TAIWN-G	1000	50	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	500	48	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	1000	48	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	500	48	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	1000	48	0	
STRESS: TC CONDITION C, -65C TO 150C, PRE COND. 192 HRS 30C/60% RH, MSL							
CY7B993V-AC	1937245	*619937409*	TAIWN-G	300	50	0	
CY7B993V-AC	1937245	*619937409*	TAIWN-G	500	50	0	
CY7B993V-AC	1937245	*619937409*	TAIWN-G	1000	50	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	300	46	0	
CY7B994V-ACB	1942384	*610003953*	TAIWN-G	500	46	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	300	48	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	500	48	0	
CY7B994V-AC	1949608	*340000124*	TAIWN-G	1000	48	0	