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Cypress Semiconductor
Product Qualification Report

QTP# 125101 VERSION*B
April 2014

Timing Technology – PC Product TSMC Fab 2B – TSMC 0.5 Technology	
W320-03	**200 – MHz Spread Spectrum Clock Synthesizer/ Driver with Differential CPU Outputs**
CY2304NZ*	**3.3V Zero Delay Buffer**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
005201	New device TT105 - W305B, Frequency Controller with Sys Recovery for Intel Integrated Core Logic in TSMC 0.5um Technology, TSMC fab 2B	Jul 2001
012003	New device, TT113 - W320-03, 200 - MHz Spread Spectrum Clock Synthesizer/ Driver with Differential CPU Outputs	Sep 2001
125101	To qualify Device CY2304NZ* (Die part TTZ402304*) in TSMC	Apr 2013

PRODUCT DESCRIPTION (for qualification)			
Purpose: Qualify TT113 - W320 - 03 in TSMC 0.5um Technology, TSMC fab 2B			
Marketing Part #:	W320 – 03, CY2304NZ*		
Device Description:	3.3V, Commercial available in 56-pin SSOP and 56-lead TSSOP package		
Cypress Division:	Cypress Semiconductor Corporation - Timing Technology Division (SJ)		
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. Z	
What ID markings on Die:	TT113 - 320 - 03AA		

TECHNOLOGY/FAB PROCESS DESCRIPTION – R9T-3R			
Number of Metal Layers:	2	Metal Composition:	Metal 1: Al-Cu/ /TiN Metal 2: Al-Cu//TiN
Passivation Type and Materials:		PE SiO_2 / PESIN	
Free Phosphorus contents in top glass layer (%):		0%	
Number of Transistors in Device:		30,134	
Number of Gates in Device:		17,658	
Generic Process Technology/Design Rule (□-drawn):		CMOS, Single Poly, Double Metal, TSMC 0.50 ∝m Logic	
Gate Oxide Material/Thickness (MOS):		SiO_2 / 85Å	
Name/Location of Die Fab (prime) Facility:		TSMC fab 2B, Hsinchu - Taiwan	
Die Fab Line ID/Wafer Process ID:		TSMC Fab 2B / 05UTW 15LD5	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
56-lead TSSOP / 56-lead SSOP	**OSE-Taiwan, CML-RA**

Note: **Package Qualification details upon request.**

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	05615
Package Outline, Type, or Name:	56-lead Shrunk Small Outline Package (SSOP)
Mold Compound Name/Manufacturer:	Sumitomo EME6300HR
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	>28%
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Solder Plate, 85%Sn - 15% Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Method:	Epoxy
Die Attach Supplier:	Ablestik
Die Attach Material:	84-1 LMISA
Wire Bond Method:	Thermosonic
Wire Material/Size:	Gold, 1.2mil
Thermal Resistance Theta JA °C/W:	91.87°C/W
Package Cross Section Yes/No:	N/A
Name/Location of Assembly (prime) facility:	OSE Taiwan

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	OSE Taiwan
Fault Coverage:	100%

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

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	AEC-Q100-008 and JESD22-A108 Dynamic Operating Condition, Vcc = 4.8V, 150°C	P
High Temperature Operating Life Latent Failure Rate	JESD22-A108 Dynamic Operating Condition, Vcc = 4.8V, 150°C	P
Long Life Verification	JESD22-A108 Dynamic Operating Condition, Vcc = 4.8V, 150°C	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, - 65ºC to 150ºC Precondition: JESD22 Moisture Sensitivity MSL 168 hrs, 85ºC, 85%RH+ Reflow, 220°C+5, -0°C	P
High Accelerated Saturation Test (HAST)	JESD22-A110 130ºC, 85%RH, 3.63V Precondition: JESD22 Moisture Sensitivity MSL 1 168 hrs, 85ºC, 85%RH + Reflow, 220°C+5, -0°C	P
Pressure Cooker	JESD22-A102 121C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 1 168 hrs, 85ºC, 85%RH + Reflow, 220°C+5, -0°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	JESD22-A114E	1700V
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V, JESD22-C101C	P
Acoustic Microscopy MSL1	JEDEC JSTD-020	P
Latch-up Sensitivity	125ºC, 10V, ± 140mA In accordance with JEDEC 17	P

RELIABILITY FAILURE RATE SUMMARY

Stress/ Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal[3] A.F	Failure Rate[4]
High Temperature Operating Life Early Failure Rate	2,332 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	298,000 DHRs	0	0.7	170	18 FIT

[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.

* Fit rate data based from the Technology Qual

Reliability Test Data

QTP #: 00521

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 4.8V, Vcc Max)							
W305B-OC (W3052A)	BP6873	*BP6873-11*	TAIWN-G	48	1320	0	
W305B-OC (W3052A)	B64523	*B64523*	TAIWN-G	48	1012	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 4.8V, Vcc Max)							
W305B-OC (W3052A)	BP6873	*BP6873-11*	TAIWN-G	80	119	0	
W305B-OC (W3052A)	BP6873	*BP6873-11*	TAIWN-G	500	119	0	
W305B-OC (W3052A)	BP6873	*BP6873-11*	TAIWN-G	1000	119	0	
W305B-OC (W3052A)	B64523	*B64523*	AIWN-G	80	120	0	
W305B-OC (W3052A)	B64523	*B64523*	TAIWN-G	500	120	0	
STRESS: LONG LIFE VERIFICATION (150C, 4.8V)							
W305B-OC (W3052A)	BP6873	*BP6873-11*	TAIWN-G	1000	119	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,000V)							
W305B-OC (W3052A)	BR7138	BR7138-8000	TAIWN-G	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING (125C, 10V, +/300mA)							
W305B-OC (W3052A)	BR0022	BR0022-90100	TAIWN-G	COMP	3	0	
STRESS: ACOUSTIC-MSL1							
W305B-OC (W3052A)	BP6873	*BP6873-11*	TAIWN-G	COMP	15	0	
W305B-OC (W3052A)	BP6870	*BP6870-81*	TAIWN-G	COMP	15	0	
W305B-OC (W3052A)	BR7109	BR7109-21	TAIWN-G	COMP	15	0	
W305B-OC (W3052A)	BR7138	BR7138-8000	TAIWN-G	COMP	15	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 168 HR 85C/85%RH,MSL1)							
W305B-OC (W3052A)	B64523	B64523	TAIWN-G	168	48	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.63V, PRE COND 168 HR 85C/85%RH,MSL1)							
W305B-OC (W3052A)	B64523	B64523	TAIWN-G	128	48	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 168 HRS 85C/85%RH (MSL1)							
W305B-OC (W3052A)	BP6873	*BP6873-11*	TAIWN-G	300	50	0	
W305B-OC (W3052A)	BP6873	*BP6873-11*	TAIWN-G	500	50	0	
W305B-OC (W3052A)	BP6873	*BP6873-11*	TAIWN-G	1000	50	0	
W305B-OC (W3052A)	BP6870	BP6870-81	TAIWN-G	300	50	0	
W305B-OC (W3052A)	BP6870	BP6870-81	TAIWN-G	500	50	0	
W305B-OC (W3052A)	BP6870	BP6870-81	TAIWN-G	1000	50	0	
W305B-OC (W3052A)	B64523	B64523	TAIWN-G	300	48	0	
W305B-OC (W3052A)	B64523	B64523	TAIWN-G	500	48	0	
W305B-OC (W3052A)	B64523	B64523	TAIWN-G	1000	48	0	

Reliability Test Data

QTP #: 012003

Device	*Fab Lot #*	*Assy Lot #*	*Ass Loc*	*Duration*	*Samp*	*Rej*	*Failure Mechanism*
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
W320-03-OC (W32003Z)	9118396	*610116265*	TAIWN-T	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING (125C, 10V, +/300mA)							
W320-03-OC (W32003Z)	B64904	*B64904*	TAIWN-T	COMP	3	0	

Reliability Test Data

QTP #: 125101

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (1,700V)							
CY2304NZZXC-1	*8210000*	*611226597*	TAIWN-T	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY2304NZZXC-1	*8210000*	*611226597*	TAIWN-T	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING (125C,+/-140mA)							
CY2304NZZXC-1	*8210000*	*611226597*	TAIWN-T	COMP	10	0	

Document History Page

Document Title: QTP#125101: TT113-W320-03,200-MHZ SPREAD SPECTRUM CLOCK SYNTHESIZER/DRIVER WITH DIFFERENTIAL CPU OUTPUTS DEVICE QUALIFICATION REPORT
Document Number: 001-87163

Rev.	ECN No.	Orig. of Change	Description of Change
**	3980045	HSTO	Initial Spec Release.
*A	4350133	HSTO	Align qualification report based on the new template in the front page
*B	4701030	HSTO	Update reference for Reliability Director

Distribution: WEB

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