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Continuity of document content
The fact that Infineon offers the following product as part of the Infineon product portfolio does not lead to any changes to this document. Future revisions will occur when appropriate, and any changes will be set out on the document history page.

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Cypress Semiconductor
Product Qualification Report

QTP# 082506 VERSION*B
September 2014

PCI-E Clock Family R52T-3 Technology, Fab 4	
CY28437	**CLOCK GENERATOR FOR INTEL® GRANTSDALE CHIPSET**
CY24291 **CY24292** **CY24293**	**PCI-E GENERAL CLOCKS**

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

Qual Report	Description of Qualification Purpose	Date Comp
024604	R52T-3 Technology Process Derivative Qual	May 03
040903	New Device B30M (CY28437) Base Die in R52T-3 Technology	Feb 05
082506	Qualification of new PCI-E Clock devices 7C8B049A and 7C8B050A - a 6-layer mask option from previously qualified B30M die	Dec 08

PCIe Clock Devices			
Mkt Part#	BE Part#	Package	Device
CY24291	7C8B3091A	48TSSOP / ZZ48	7C8B049AC
CY24292	7C8B3092A	32QFN / LQ32	7C8B049AC
CY24293	7C8B3093A	16TSSOP / ZZ16	7C8B050AC

PRODUCT DESCRIPTION (for qualification)		
Qualification Purpose: Qualification of new PCI-E Clock devices 7C8B049A and 7C8B050A - a 6-layer mask option from previously qualified B30M 6C8B001AC die – R52T-3 technology fabricated at CMI (Fab4)		
Marketing Part #	CY24291, CY24292, CY24293	
Device Description:	PCI-E General Clock, 3.3V available in 48-TSSOP, 16-TSSOP, 32-QFN	
Cypress Division:	Cypress Semiconductor Corporation – Memory Product Division	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. A
What ID markings on Die:	CY7C8B049A/50A	

TECHNOLOGY/FAB PROCESS DESCRIPTION R52D-3			
Number of Metal Layers:	3	Metal Composition:	Metal 1: 500Å TiW / 6000Å Al / 500Å TiW Metal 2: 500Å TiW / 6000Å Al / 500Å TiW Metal 3: 300Å Ti / 8000Å Al / 300Å TiW
Passivation Type and Materials:			1000Å SiO2 / 9000Å Si3N4
Generic Process Technology/Design Rule (µ-drawn):			CMOS – Triple Metal, 0.25µm
Gate Oxide Material/Thickness (MOS):			SiO2, 55Å
Name/Location of Die Fab (prime) Facility:			Cypress Semiconductor - Bloomington, MN
Die Fab Line ID/Wafer Process ID:			Fab4/R52T-3

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
48-Lead TSSOP	**APPI-ANAM Manila, Philippines**
16-Lead TSSOP	**Cypress CML Autoline, Philippines**
32-Lead QFN	**Amkor Technology, Philippines**

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	Various
Package Outline, Type, or Name:	48-TSSOP/ZZ48, 32-QFN/LQ32, 16-TSSOP/ZZ16
Mold Compound Name/Manufacturer:	48TSSOP : G700K 32 QFN : Nitto 7470-LA 16TSSOP : CEL9200CYR
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	20-80u NiPdAu lead finish
Die Attach Material:	48TSSOP : Abelstik 8290 32QFN : AMK-06 16TSSOP : QMI-509
Wire Material/Size:	48TSSOP & 32QFN: Au/ Diam: 0.8, 16TSSOP: Au / Diam : 0.9
Name/Location of Assembly (prime) facility:	48 TSSOP @M , 16TSSOP @RA , 32QFN @MB
MSL:	3
Solder Reflow Temp:	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	48 TSSOP and 32 QFN – Cypress CML-R, KYEC 16 TSSOP – Cypress CML-RA, KYEC, KYEC

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max = 3.8V, 125°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max = 3.8V, 125°C	P
High Accelerated Saturation Test (HAST)	130°C, 3.63V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 235°C+0, -5°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85C/85%RH+3IR-Reflow, 235°C+0, -5°C 168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C	P
Pressure Cooker	121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85C/85%RH+3IR-Reflow, 235°C+0, -5°C 168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	3,300V JESD22, Method A114-B	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V JESD22-C101	P
Electrostatic Discharge Machine Model (ESD-MM)	200V	P
Acoustic Microscopy, MSL 3	J-STD-020	P
Static Latch-up	6.5V,± 240mA, 125°C, EIA/JESD78	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[4]	Failure Rate[5]
High Temperature Operating Life Early Failure Rate[1]	1,000 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[2,3] Long Term Failure Rate	547,000 DHRs	0	0.7	55	30 FIT

[1] A production burn-in of 24 Hrs at 150°C, 4.5V is required for the product.
[2] Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.
[3] Chi-squared 60% estimations used to calculate the failure rate.
[4] 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 #: 024604

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CY6981-BA (7C6981A)	4223346	*610243127/3004*	TAIWN-G	COMP	18	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125, 3.8V, Vcc Max)							
CY6981-BA (7C6981A)	4147861	610221501/2/27521	TAIWN-G	96	1342	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	96	1020	0	
CY6981-BA (7C6981A)	4223346	610243127/3004/7	TAIWN-G	96	1015	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.8V, Vcc Max)							
CY6981-BA (7C6981A)	4147861	610221501/2	TAIWN-G	168	182	0	
CY6981-BA (7C6981A)	4147861	610221501/2	TAIWN-G	500	182	0	
CY6981-BA (7C6981A)	4147861	610221501/2	TAIWN-G	1000	182	0	
CY6981-BA (7C6981A)	4223346	610243127/3004/7	TAIWN-G	168	82	0	
CY6981-BA (7C6981A)	4223346	610243127/3004/7	TAIWN-G	500	82	0	
CY6981-BA (7C6981A)	4223346	610243127/3004/7	TAIWN-G	1000	80	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	168	368	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	500	368	0	
STRESS: ESD-CHARGE DEVICE MODEL, (500V)							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	COMP	9	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	COMP	9	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	COMP	9	0	
STRESS: STATIC LATCH-UP (125C, 10V, +/-300mA)							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	COMP	3	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	COMP	3	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	168	50	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	168	48	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	288	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	168	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	288	48	0	

Reliability Test Data

QTP #: 024604

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.63V), PRE COND 192 HR 30C/60%RH (MSL3)							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	128	50	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	128	47	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	300	50	0	
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	500	50	0	
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	1000	50	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	300	48	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	500	48	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	1000	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	300	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	500	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	1000	48	0	

Reliability Test Data

QTP #: 040903

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, (500V)							
CY28437OXCT(7C828437A)	4444247	610463705	CML-R	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2200V							
CY28437OXCT(7C828437A)	4444247	610463705	CML-R	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
CY28437OXCT(7C828437A)	4444247	610463705	CML-R	COMP	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125, 3.8V, Vcc Max)							
CY28437OXCT(7C828437A)	4444247	610463705	CML-R	96	442	0	
CY28437OXCT(7C828437A)	4444247	610463737	CML-R	96	260	0	
CY28437OXCT(7C828437A)	4444247	610463736	CML-R	96	298	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY28437OXCT(7C828437A)	4444247	610463705	CML-R	168	45	0	
STRESS: STATIC LATCH-UP (125C, 8.48V, +/-300mA)							
CY28437OXCT(7C828437A)	4444247	610463705	CML-R	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY28437OXCT(7C828437A)	4444247	610463705	CML-R	300	45	0	

Reliability Test Data

QTP #: 082506

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2200V							
CY24291ZXI	4820920	610847319	M	COMP	8	0	
CY24292ZXI	4820920	610849226	MB	COMP	8	0	
CY24293ZXI	4820920	610848451	RA	COMP	8	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 3300V							
CY24291ZXI	4820920	610847319	M	COMP	3	0	
CY24292ZXI	4820920	610849226	MB	COMP	3	0	
CY24293ZXI	4820920	610848451	RA	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING , 125C, 5.4V, ±200mA							
CY24291ZXI	4820920	610847319	M	COMP	6	0	
CY24292ZXI	4820920	610849226	MB	COMP	6	0	
CY24293ZXI	4820920	610848451	RA	COMP	6	0	
STRESS: STATIC LATCH-UP TESTING , 125C, 6.5V, ±240mA							
CY24291ZXI	4820920	610847319	M	COMP	3	0	
CY24292ZXI	4820920	610849226	MB	COMP	3	0	
CY24293ZXI	4820920	610848451	RA	COMP	3	0	
STRESS: ESD-MACHINE MODEL, 200V							
CY24293ZXI	4134252	611212494	CML-RA	COMP	5	0	

Document History Page

Document Title: QTP 082506: PCI-E CLOCK FAMILY, R52T-3 TECHNOLOGY, FAB 4
Document Number: 001-82813

Rev.	ECN No.	Orig. of Change	Description of Change
**	3742756	NSR	Initial Spec Release. The previous version of this qual report is posted in memo ZIJ-67. Changes to ZIJ-67: - Update Version 1.0 to 2.0 in the Title page. - Re-arrange the Title in the front page. - Change product Division from DCD to MPD - Removed the reference Cypress specs in the reliability tests performed table and replaced with industry standards. - Added ESD Machine Model (MM) data.
*A	4127178	HSTO	Sunset Review Deleted “Version 2.0” in the Title page. Updated test location facility based on current qualified test site
*B	4507404	HSTO	Align qualification report based on the new template in the front page

Distribution: WEB

Posting: None