

# Cypress Semiconductor Qualification Report

QTP #99141 VERSION 1.1  
May, 2003

**Direct Rambus® Clock Generator (Lite)**  
**CY2212**

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**CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:**

Ed Russell  
Reliability Director  
(408) 432-7069

Bill Stevenson  
Reliability Engineer  
(408) 456-1926

<b>PRODUCT DESCRIPTION (for qualification)</b>	
Purpose: To qualify Direct Rambus Clock Generator, CY2212, R42D (Logic) technology with Hot Al. The R42D technology with Hot AL was qualified by QTP 98357, using the 4Meg SRAM with NoBl Architecture (385 mils x 375 mils die size)	
Marketing Part #:	CY2212
Package:	16-pin SOIC/TSSOP
Device Description:	Direct Rambus Clock Generator
Cypress Division:	Cypress Semiconductor, TTD Division
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. A
What ID markings on Die:	7C80800A

<b>TECHNOLOGY/FAB PROCESS DESCRIPTION - R42LDHA</b>			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500Å TiW/6000Å Al/.5%Cu/1200Å TiW Metal 2: 500Å TiW/8000Å Al/.5%Cu/300Å TiW
Passivation Type and Materials:	3000 TEOS + 6000Å Si <sub>3</sub> N <sub>4</sub>		
Free Phosphorus contents in top glass layer(%):	0%		
Die Coating(s), if used:	N/A		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Double Metal /0.35 μm		
Gate Oxide Material/Thickness (MOS):	SiO <sub>2</sub> / 70Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab4/R42LDHA		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	16-pins TSSOP 16-pins SOIC		
Mold Compound Name/Manufacturer:	Sumitomo 7351		
Lead Frame material:	Copper		
Lead Finish, composition:	Solder Plated, 85%Sn, 15%Pb		
Die Attach Area Plating:	Silver		
Die Attach Method:	Epoxy	Die Attach Material:	Ablestik 8361H (SOIC) 84-1LMIS (TSSOP)
Wire Bond Method:	Gold wire bonding	Wire Material/Size:	Gold / 1.0 mil
JESD22-A112 Moisture Sensitivity Level:	Level 1		
Name/Location of Assembly (prime) facility:	Anam, Philippines (PHIL-M) Anam, Korea (KOREA-A)		

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

**RELIABILITY TESTS PERFORMED**

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc = 3.8 V, 150°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 1 (168 Hrs, 85C/85%RH)	P
Latchup Sensitivity	8V , ±200mA In accordance with JEDEC 17. Cypress Spec. 01-00081	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	1,000V Cypress Spec. 25-00020	P
Pressure Cooker Test	No Bias, 121°C, 100%RH	P
Acoustic Microscopy	Cypress Spec. 25-00104	P

### RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF <sup>3</sup>	Failure Rate <sup>4</sup>
High Temperature Operating Life Early Failure Rate	1000	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	412,168 DHRs	1	0.7	170	29 FIT

<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.

<sup>4</sup> Long Term Failure Rate was based on R42D Technology with hot AL qualification, QTP 98357.

**RELIABILITY TEST DATA**

**QTP#: 99141<sup>1</sup>/99305<sup>2</sup>**

<b>EVAL #</b>	<b>DEVICE</b>	<b>ASSY-LOC</b>	<b>ASSYLOT#</b>	<b>FABLOT#</b>	<b>TEMP /VOLT</b>	<b>POINT</b>	<b>S/S</b>	<b>REJ</b>	<b>FA #</b>
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.8V)</b>									
99141	CY2212-ZC	PHIL-M	619912991	4915013	150C /3.8V	48	1000	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL</b>									
99305	CY2212-SC	KOREA-A	4916159-20	4916159	N/A /1000V	COMP	3	0	
99141	CY2212-ZC	PHIL-M	619912994	4915013	N/A /1000V	COMP	3	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015</b>									
99141	CY2212-ZC	PHIL-M	619912994	4915013	N/A /2200V	COMP	3	0	
99305	CY2212-SC	KOREA-A	4916159-20	4916159	N/A /2200V	COMP	3	0	
<b>STRESS: HIGH TEMPERATURE STORAGE (165C, NO BIAS)</b>									
M99309*	CY2212-SC	KOREA-A	4916159-20	4916159	165C /N/A	336	262	0	
<b>STRESS: PRESSURE COOKER TEST (121C, 100%RH)</b>									
99141	CY2212-ZC	PHIL-M	619912994	4915013	121C /100%RH	168	50	0	
M99307*	CY2212-SC	KOREA-A	4916159-20	4916159	121C /100%RH	168	100	0	
<b>STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH (MSL 1)</b>									
99141	CY2212-ZC	PHIL-M	619912994	4915013	150C /-65C	300	50	0	
99141	CY2212-ZC	PHIL-M	619912994	4915013	150C /-65C	500	50	0	
99141	CY2212-ZC	PHIL-M	619912994	4915013	150C /-65C	1000	50	0	
M99306*	CY2212-SC	KOREA-A	4916159-20	4916159	150C /-65C	300	254	0	
M99306*	CY2212-SC	KOREA-A	4916159-20	4916159	150C /-65C	500	254	0	
M99306*	CY2212-SC	KOREA-A	4916159-20	4916159	150C /-65C	1000	254	0	

\* Reliability Monitor data.

<sup>1</sup> Direct Rambus Clock Generator, CY2212, R42LDHA technology, Fab4 (7C82121A).

<sup>2</sup> Direct Rambus Clock Generator, CY2212, R42LDHA technology, Fab4 with 3 layer mask change (7C80800A)

**DEVICE RELATED RELIABILITY TEST DATA**

**QTP#: 98357<sup>3</sup>**

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.8V)</b>							
CY7C1350-AC	CSPI-R	4812418	619805770	48	750	0	
CY7C1350-AC		4815594	619807192	48	288	0	
CY7C1350-AC		4815594	619807192	48	396	0	
CY7C1352-AC	CSPI-R	4824383	619809153	48	66	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL (500V)</b>							
CY7C1352-AC	CSPI-R	4824383	619809153	COMP	3	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (4,400V)</b>							
CY7C1352-AC	CSPI-R	4824383	619809153	COMP	3	0	
<b>STRESS: HI-ACCEL SATURATION TEST (130C, 3.63V), PRECOND. 192 HRS 30C/60%RH</b>							
CY7C1350-AC	CSPI-R	4816713	619808643	128	48	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 3.8V)</b>							
CY7C1350-AC	CSPI-R	4812418	619805770	80	392	1	1 UNKNOWN CAUSE
CY7C1350-AC	CSPI-R	4812418	619805770	500	390	0	
CY7C1350-AC	CSPI-R	4815594	619807192	80	396	0	
CY7C1350-AC	CSPI-R	4815594	619807192	548	396	0	
<b>STRESS: PRESSURE COOKER TEST (121C, 100%RH)</b>							
CY7C1352-AC	CSPI-R	4816713	619808642	168	45	0	
CY7C1352-AC	CSPI-R	4816713	619808642	288	45	0	
<b>STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%RH (MSL 3)</b>							
CY7C1350-AC	CSPI-R	4812418	619805769	300	45	0	
CY7C1350-AC	CSPI-R	4812418	619805770	300	45	0	
CY7C1350-AC	CSPI-R	4815594	619807192	300	45	0	

<sup>3</sup> R42D technology Fab 4 qualification.