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Cypress Semiconductor
Product Qualification Report

QTP# 112502 VERSION*B
September, 2014

EPROM Programmable Clock Generator Family L28 Technology, TSMC	
CY2292 CY2292A CY2291	**Three-PLL General Purpose EPROM Programmable Clock Generator**

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

QTP Number	Description of Qualification Purpose	Date Comp
99285	To qualify L28-TSMC Technology in TMSC-2A	May 2003
112502	CY229x L28 Process Transfer from CTI Fab2 to TSMC-2A	Aug 2011

PRODUCT DESCRIPTION (for qualification)		
Qualification Purpose:	Qualify CY229x Device, L28 Technology in TSMC-2A Fab	
Marketing Part #:	CY2292, CY2292A, CY2291	
Device Description:	3.3V & 5V Commercial and Industrial available in 16 SOIC, 20 SOIC and 16 TSSOP	
Cypress Division:	Cypress Semiconductor Corporation –Memory Products Division	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. F
What ID markings on Die:	7C83000A, 7C83003A	

TECHNOLOGY/FAB PROCESS DESCRIPTION – LL65P-18R			
Number of Metal Layers:	2	Metal Composition:	Metal 1: Ti 400Å / TiN1000Å / AlSiCu4,700 Å / TiN375Å Metal 2: Ti 1,500 Å / AlSiCu 8,000 Å / TiN 375 Å
Passivation Type and Materials:		3,000Å SiN, 3,150ÅSOG, 2,000Å SiN	
Generic Process Technology/Design Rule (□-drawn):		CMOS, Single Poly, Double Metal / 0.65um	
Gate Oxide Material/Thickness (MOS):		SiO2 / 125Å	
Name/Location of Die Fab (prime) Facility:		TSMC-2A, Taiwan	
Die Fab Line ID/Wafer Process ID:		L28-TSMC	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
16-Lead SOIC	**Taiwan-T, CML-RA, Phil-M**
20-Lead SOIC	**CML-R**
16L TSSOP	**Taiwan-T**

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	SZ20
Package Outline, Type, or Name:	20-Lead SOIC
Mold Compound Name/Manufacturer:	KEG6000DA-CY / Kyocera
Mold Compound Flammability Rating:	UL94, V-0
Oxygen Rating Index:	N/A
Leadframe:	Copper
Lead Finish, Composition / Thickness:	NiPdAu
Die Backside Preparation Method/Metallization:	Grinding
Die Separation Method:	Saw
Die Attach Supplier:	Henkel
Die Attach Material:	QMI-509
Die Attach Method:	Epoxy
Bond Diagram Designation:	001-48062
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.0 mil
Thermal Resistance Theta JA °C/W:	132 C/W
Package Cross Section Yes/No:	Yes
Name/Location of Assembly (prime) facility:	CML-R
MSL Level	3
Reflow Temperature	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R

Note: Please contact a Cypress Representative for other packages availability

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 = 3.8V / 5.5V, 150°C JESD22-A108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc = 3.8V, 150°C JESD22-A108	P
High Temperature Steady State Life	Static Operating Condition, Vcc Max= 3.63V, 150°C JESD22-A108	P
Low Temperature Operating Life	Dynamic Operating Condition, 8 MHz, -30°C JESD22-A108	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85°C /85%RH+ Reflow, 260°C +0, -5°C	P
Pressure Cooker	JESD22-A102: 121°C, 100%RH, 15 Psig Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85°C /85%RH+ Reflow, 260°C +0, -5°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JEDEC EIA/JESD22-A114	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V, JESD22-C101	P
Data Retention	150°C, non-biased JESD22-A117 and JESD22-A103	P
Static Latch-up	± 200mA JESD78	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[3]	Failure Rate
High Temperature Operating Life Early Failure Rate	1,864 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate (150□C)	181,660 DHRs	0	0.7	170	30 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 Qualification QTP#99285

Reliability Test Data

QTP #: 99285

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: DATA RETENTION, PLASTIC, 150C							
CY2280-OC	2937109	619927291/2/3	CSPI-R	500	85	0	
CY2280-OC	2937109	619927291	CSPI-R	500	85	0	
CY2280-OC	2937109	619927291	CSPI-R	1000	85	0	
CY2280-OC	2937190	619928659	CSPI-R	500	50	0	
CY2280-OC	2937190	619928659	CSPI-R	1000	50	0	
CY2280-OC	2942829	619933793	CSPI-R	500	50	0	
CY2280-OC	2942829	619933793	CSPI-R	1000	50	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER PER MIL STD 883, METHOD 3015, 2,200V							
CY2280-OC	2937109	619927291/2/3	CSPI-R	COMP	3	0	
CY2280-OC	2937190	619928659/60/61	CSPI-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 1000V							
CY2280-OC	2937109	619927291/2/3	CSPI-R	COMP	3	0	
CY2280-OC	2937190	619928659/60/61	CSPI-R	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST, 110C, 85%RH, 2.05V/1.64V/3.6V, PRE COND 192 HR 30C/60%RH, MSL3							
CY2280-OC	2937109	619927291/2/3	CSPI-R	128	50	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 3.63V)							
CY2280-OC	2937109	619927291/2/3	CSPI-R	80	77	0	
CY2280-OC	2937109	619927291/2/3	CSPI-R	168	77	0	
STRESS: LOW TEMPERATURE OPERATING LIFE (-30C/8MHZ)							
CY2280-OC	2937190	619928659/60/61	CSPI-R	500	50	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 3.8V							
CY2280-OC	2937109	619927291/2/3	CSPI-R	48	335	0	
CY2280-OC	2937190	619928659/60/61	CSPI-R	48	235	0	
CY2280-OC	2937190	619928659/60/61	CSPI-R	48	101	0	
CY2280-OC	2942829	619933793/4/5	CSPI-R	48	349	0	

Reliability Test Data

QTP #: 99285

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 3.8V							
CY2280-OC	2937109	619927291/2/3	CSPI-R	80	120	0	
CY2280-OC	2937109	619927291/2/3	CSPI-R	500	120	0	
CY2280-OC	2937190	619928659/60/61	CSPI-R	80	120	0	
CY2280-OC	2937190	619928659/60/61	CSPI-R	500	120	0	
CY2280-OC	2942829	619933793/4/5	CSPI-R	80	125	0	
CY2280-OC	2942829	619933793/4/5	CSPI-R	500	123	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 168 HR 85C/85%RH, MSL1							
CY2280-OC	2937109	619927291/2/3	CSPI-R	168	53	0	
STRESS: TEMPERATURE CYCLE COND. C -65C TO 150C, PRE COND 168 HRS 85C/85%RH, MSL1							
CY2280-OC	2937109	619927291/2/3	CSPI-R	300	50	0	

Reliability Test Data

QTP #: 112502

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: DATA RETENTION, PLASTIC, 150C							
CY2292EFXI	4914044	610914187/8/9	PHIL-M	500	80	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JEDEC EIA/JESD22-A114, 2,200V							
CY2291EFX	4845993	610852100	CML-R	COMP	8	0	
CY2292EFZXI	4845993	610855268	TAIWAN-T	COMP	8	0	
CY2292AESXL	4845993	610855262	TAIWAN-T	COMP	8	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY2291EFX	4845993	610852100	CML-R	COMP	9	0	
CY2292EFZXI	4845993	610855268	TAIWAN-T	COMP	9	0	
CY2292AESXL	4845993	610855262	TAIWAN-T	COMP	9	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 5.75V							
CY2292EFXI	4914044	610914187/8/9	PHIL-M	48	1864	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 8.25V, +/-200mA							
CY2291EFX	4845993	610852100	CML-R	COMP	8	0	
CY2292AESXL	4845993	610855262	TAIWAN-T	COMP	8	0	

Document History Page

Document Title: QTP 112502: EPROM PROGRAMMABLE CLOCK GENERATOR FAMILY, (CY2292F/CY2292AF/CY2291F) L28 TECHNOLOGY, TSMC
Document Number: 001-72371

Rev.	ECN No.	Orig. of Change	Description of Change
**	3352132	NSR	Initial spec release.
*A	4131769	JYF	Sunset spec review: Changed title of QA Engineering Director to Reliability Director in QTP title page; Deleted obsolete spec 11-20049 in Major Package Information table; Complete re-write of Reliability Tests Performed table to align with current spec template.
*B	4518042	JYF	Sunset review: Updated QTP title page for template alignment.

Distribution: WEB

Posting: None