Cypress Semiconductor
Product Qualification Report

QTP # 031101 VERSION 1.0
January 2005

High Accuracy EPROM Programmable Device Family L28 Technology, Fab 2	
CY2037	**High-Accuracy EPROM Programmable Single-PLL Clock Generator**
CY2077	**High-Accuracy EPROM Programmable PLL Die for Crystal Oscillator**
CY5037B	**High-Accuracy EPROM Programmable PLL Die for Crystal Oscillator**

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

Qual Report		Description of Qualification Purpose		Date Comp
97403		Qualified Technology L28 transfer from Fab 3 to Fab 2 / New CY227* Product		Apr 98
98314		Qualified CY5037 product transfer from Fab 3 to Fab 2, L28 Technology		Sep 98
98225		Redesign of CY5037 Product, L28 Technology, Fab 2		Oct 98
031101		CY5037/CY2077 Device qual, L28 Technology, Fab2		May 03

PRODUCT DESCRIPTION (for qualification)		
Qualification Purpose: CY5037/CY2077 and its product family in qualified, L28 Technology, Fab 2.		
Marketing Part #:	CY2077, CY2037, CY2037B	
Device Description:	3.3V, or 5V, Commercial/Industrial, available in 8-Lead SOIC/TSSOP	
Cypress Division:	Cypress Semiconductor Corporation – Timing Technology Division (TTD)	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. A
What ID markings on Die:	7C80383A	

TECHNOLOGY/FAB PROCESS DESCRIPTION - L28			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500A Ti/1,200A TiW/6,000A Al/1,200A TiW Metal 2: 1,500A TiW//10,000A Al/150A Ti
Passivation Type and Materials:	3,000A TEOS + 15,000A Si_2N_4		
Free Phosphorus contents in top glass layer (%):	N/A		
Die Coating(s), if used:	N/A		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Single Poly, Double Metal /0.65 μm		
Gate Oxide Material/Thickness (MOS):	SiO_2 / 145 A		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab2/L28		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
8-pin SOIC/TSSOP	**CML-RA, INDS-O, ANAM-PHIL (M)**

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	S08
Package Outline, Type, or Name:	8-Lead Plastic Small Outline Ic's (SOIC)
Mold Compound Name/Manufacturer:	MP8000CH/Nitto
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	>28%
Lead Frame Designation:	LFS08B
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Solder Plated 85%Sn, 15%Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	8361
Bond Diagram Designation	10-05080
Wire Bond Method:	Thermosonic
Wire Material/Size:	1.0mil
Thermal Resistance Theta JA °C/W:	190.35°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-70032
Name/Location of Assembly (prime) facility:	INDNS-O

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CSPI-R
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 Rate	Dynamic Operating Condition, Vcc = 5.75V, 150C Dynamic Operating Condition, Vcc = 3.65V, 150C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc = 5.75V, 150°C Dynamic Operating Condition, Vcc = 3.65V, 150°C	P
Read and Record Life Test	Dynamic Operating Condition, Vcc = 3.65V, 150°C	P
High Accelerated Saturation Test (HAST)	140°C, 85%RH, 5.5V Precondition: JESD22 Moisture Sensitivity Level 1 168 Hrs., 85°C/85%RH+3IR-Reflow, 220°C+5, -0°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 1 168 Hrs., 85°C/85%RH+3IR-Reflow, 220°C+5, -0°C	P
Cold Life Test	-30°C, 6.5V	P
Age Bond Strength	MIL-STD-883, Method 2011	P
Data Retention-Plastic	165°C, no bias	P
High Temperature Storage	165°C, no bias	
Electrostatic Discharge Human Body Model (ESD-HBM)	MIL-STD-883, Method 3015.7 (2,200V) MIL-STD-883, Method 3015.7 (2,000V)	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JEDEC EIA/JESD22-A114-B	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	Cypress Spec. 25-00020 (500V)	P
Static Latch up Sensitivity	125C, 12V, ± 300mA In accordance with JEDEC 17. Cypress Spec. 01-00081	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	1,850 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	231,900 DHRs	0	0 .7	170	23 FITs

[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.

[4] **EFR and LFR FIT Rate based on QTP #98225 and QTP #97403.**

Reliability Test Data

QTP # : 97403

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 2000V							
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 4,000V							
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	COMP	3	0	
STRESS: DATA RETENTION, 165c, no bias							
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	168	78	0	
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	552	78	0	
CY2273APVC (7C82731A)	2735423	619709731	CSPI-R	168	78	0	
CY2273APVC (7C82731A)	2735423	619709731	CSPI-R	552	78	0	
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	168	78	0	
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	552	78	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V, PRE COND 168 HR 85C/85%RH, MSL1							
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	128	44	0	
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	256	44	0	
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	128	45	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 3.65V							
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	48	180	0	
CY2273APVC (7C82731A)	2735423	619709731	CSPI-R	48	340	0	
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	48	330	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 3.65V							
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	80	116	0	
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	500	116	0	
CY2273APVC (7C82731A)	2735423	619709731	CSPI-R	80	120	0	
CY2273APVC (7C82731A)	2735423	619709731	CSPI-R	500	116	0	
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	80	116	0	
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	500	115	0	
STRESS: HIGH TEMPERATURE STORAGE, 165c, no bias							
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	336	45	0	
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	500	45	0	
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	1000	45	0	

Reliability Test Data

QTP #: 97403

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: LOW TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.45 Vcc							
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	500	45	0	
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	1000	44	0	
STRESS: READ & RECORD LIFE TEST (150C, 3.65V)							
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	48	78	0	
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	80	78	0	
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	500	78	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/200mA							
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	COMP	9	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 168 HR 85C/85%RH, MSL1							
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	300	45	0	
CY2273APVC (7C82731A)	2732995	619708289/319	CSPI-R	1000	45	0	
CY2273APVC (7C82731A)	2735423	619709731	CSPI-R	300	48	0	
CY2273APVC (7C82731A)	2735423	619709731	CSPI-R	1000	48	0	
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	300	47	0	
CY2273APVC (7C82731A)	2734307	619709732	CSPI-R	1000	47	0	

Reliability Test Data

QTP #: 98314

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 200V							
CY5037ES-SC (7C80370A)	2827384	619809267	CSPI-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY5037ES-SC (7C80370A)	2827384	619809267	CSPI-R	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/200mA							
CY5037ES-SC (7C80370A)	2827384	619809267	CSPI-R	COMP	3	0	

Reliability Test Data

QTP #: 98225

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 200V							
CY5037ES-SC (7C80370A)	2825234	619808136	CSPI-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY5037ES-SC (7C80370A)	2825234	619808136	CSPI-R	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 12V, +/200mA							
CY5037ES-SC (7C80370A)	2825234	619808136	CSPI-R	COMP	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 5.75V							
CY5037ES-SC (7C80370A)	2825234	619808136	CSPI-R	48	1000	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 5.75V							
CY5037ES-SC (7C80370A)	2825234	619808136	CSPI-R	500	116	0	

Reliability Test Data

QTP #: 031101

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 200V							
CY2077AFS (7C80383A)	2307752	510302576	INDNS-O	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY2077AFS (7C80383A)	2307752	510302576	INDNS-O	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 12V, +/300mA							
CY2077AFS (7C80383A)	2307752	510302576	INDNS-O	COMP	3	0	