Cypress Semiconductor
Qualification Report

QTP# 96411 VERSION 1.1
May, 1997

256K/512K PROM - P26 Technology	
CY7C271A	32K x 8 Bit CMOS EPROM
CY27H256	32K x 8 High Speed Power Switched and Reprogramable PROM
CY27C256A	32K x 8 Power Switched and Reprogramable PROM
CY27C512	64K x 8 CMOS EPROM
CY27H512	64K x 8 High Speed CMOS EPROM

PRODUCT DESCRIPTION (for qualification)			
Information provided in this document is intended for generic qualification and technically describes the Cypress part supplied:			
Marketing Part #:	CY27C256A/CY7C271A		
Device Description:	256K PROM(CY27C/H256A/CY7C271A) 512K PROM(CY27C/H512)		
Cypress Division:	Cypress Semiconductor Corporation		
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. D		
Die Size (stepping):	82 mils x 229 mils	What ID markings on Die:	7C274B/7C286B

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 6K Al, 1200A TiW Metal 2: 1,500A TiW, 9K Al, 320A TiW
Passivation Type and Materials:	Oxynitride		
Free Phosphorus contents in top glass layer(%):	None		
Die Coating(s), if used:	N/A		
Number of Transistor in device:	557,694 (512K EPROM) 29,635 (256K EPROM)		
Number of Gate in device	557,694 (512K EPROM) 29,635 (256K EPROM)		
Generic Process Technology/Design Rule (µ-drawn):	CMOS, Double Metal / 0.65µm		
Gate Oxide Material/Thickness (MOS):	SiO_2 / 165A		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX (Fab2)		
Die Fab Line ID/Wafer Process ID:	Fab 2/ P26		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	32-pin PLCC		
Mold Compound Name/Manufacturer:	Nitto-8000		
Lead Frame material:	Copper		
Lead Finish, composition:	Solder Plated, 85%Sn, 15%Pb		
Die Attach Area Plating:	Silver Spot		
Die Attach Method:	Epoxy	Die Attach Material:	Ablestik 84-1MISR4
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.3 mil
JESD22-A112 Moisture Sensitivity Level	Level 1		
Assembly Line ID and Process ID:	Anam, Manilla		

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

RELIABILITY TESTS PERFORMED

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Data Retension, Plastic	165°C, no bias	P
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc = 5.50V, 150°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc = 5.50V, 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	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	P
Electrostatic Discharge Human Body Model (ESD-HBM)	MIL-STD-883, Method 3015.7	2,200V
Electrostatic Discharge Charge Device Model (ESD-CDM)	Cypress Spec. 25-00020	1,000V
Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	11.5V

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Acceleration Factor[4]	Failure Rate[3]
High Temperature Operating Life Early Failure Rate	3291 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	224,000 DHRs	0	0.6	82	50 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] Failure Rate is based on P26 technology (QTP #96411, 95517 and 95075).
[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#: 96411[1]

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: DATA BAKE-PLASTIC (165C, NO BIAS)							
CY27H512-JC	PHIL-M	2618165	349608382	168	76	0	
CY27H512-JC	PHIL-M	2618165	349608382	552	76	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.50V)							
CY27C256A-JC	PHIL-M	2626244	349612417	48	116	0	
CY27C256A-JC	PHIL-M	2626244	349612417	48	884	0	
STRESS: ESD-CHARGE DEVICE MODEL (1,000V)							
CY27C256A-JC	PHIL-M	2626244	349612417	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
CY27C256A-JC	PHIL-M	2626244	349612417	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 168 HRS 85C/85%RH							
CY27H512-JC	PHIL-M	2618165	349608382	128	48	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.5V)							
CY27C256A-JC	PHIL-M	2626244	349612417	80	115	0	
CY27C256A-JC	PHIL-M	2626244	349612417	500	102	0	13 EOS
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH							
CY27H512-JC	PHIL-M	2618165	349608382	300	48	0	
CY27H512-JC	PHIL-M	2618165	349608382	1000	48	0	

[1] 256 K/512K PROM with 4 layer mask change, ESD-CDM and Latch-up improved.

DEVICE RELATED RELIABILITY TEST DATA

QTP #: 95517[2]

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: DATA BAKE (250C, NO BIAS)							
CY27H512-WC	ALPHA-X	2533277	219515923	96	76	0	
STRESS: DATA BAKE (165C, NO BIAS)							
CY27H512-WC	ALPHA-X	2516985	219510327	552	76	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY27H512-WC	ALPHA-X	2533277	219515923	48	901	0	51 EOS
CY27H512-WC	ALPHA-X	2511421	219518532	48	388	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)							
CY27H512-WC	ALPHA-X	2533277	219515923	80	76	0	
CY27H512-WC	ALPHA-X	2533277	219515923	168	75	0	1 EOS
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY27H512-WC	ALPHA-X	2516985	219510326	500	114	0	2 EOS
STRESS: READ & RECORD LIFE TEST (150C, 5.75V)							
CY27H512-WC	ALPHA-X	2516985	219510326	48	10	0	
CY27H512-WC	ALPHA-X	2516985	219510326	500	10	0	
STRESS: TEMP CYCLE, COND. C, -65C TO 150C							
CY27H512-WC	ALPHA-X	2533277	219515923	100	45	0	
CY27H512-WC	ALPHA-X	2533277	219515923	1000	45	0	
CY27H512-WC	ALPHA-X	2511421	219518532	100	45	0	
CY27H512-WC	ALPHA-X	2511421	219518532	1000	45	0	

[2] 512K CMOS EPROM (1-megabit CMOS EPROM chop, CY27H010).

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 95075[3]

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: DATA BAKE (250C, NO BIAS)							
CY27H010-WC	ALPHA-X	2437708	219414274	168	76	0	
CY27H010-WC	ALPHA-X	2437708	219414421	96	76	0	
CY27H010-WC	ALPHA-X	2437708	219414421	168	76	0	
STRESS: DATA BAKE (165C, NO BIAS)							
CY27H010-PC	KOREA-H	2447661	349500299	168	76	0	
CY27H010-PC	KOREA-H	2447661	349500299	552	76	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY27H010-WC	ALPHA-X	2437708	219414274	48	334	0	
CY27H010-WC	ALPHA-X	2437708	219414421	48	334	0	
CY27H010-PC	KOREA-H	2447661	349500299	48	334	0	
STRESS: GROUP C, SUBGROUP 1, LIFE TEST (150C, 5.75V)							
CY27H010-WMB	ALPHA-X	2447661	219502193	184	50	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECONDITION 40 T/C							
CY27H010-PC	KOREA-H	2447661	349500299	128	45	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)							
CY27H010-WC	ALPHA-X	2437708	219414274	80	76	0	
CY27H010-WC	ALPHA-X	2437708	219414274	168	76	0	
CY27H010-WC	ALPHA-X	2437708	219414421	80	76	0	
CY27H010-WC	ALPHA-X	2437708	219414421	168	76	0	
CY27H010-PC	KOREA-H	2447661	349500299	80	76	0	
CY27H010-PC	KOREA-H	2447661	349500299	168	76	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY27H010-WC	ALPHA-X	2437708	219414274	80	116	0	
CY27H010-WC	ALPHA-X	2437708	219414274	500	116	0	
CY27H010-WC	ALPHA-X	2437708	219414421	80	116	0	
CY27H010-WC	ALPHA-X	2437708	219414421	500	116	0	
CY27H010-PC	KOREA-H	2447661	349500299	80	116	0	
CY27H010-PC	KOREA-H	2447661	349500299	500	116	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH)							
CY27H010-PC	KOREA-H	2447661	349500299	168	45	0	
STRESS: TEMP CYCLE, COND. C, -65C TO 150C							
CY27H010-WC	ALPHA-X	2437708	219414274	100	45	0	
CY27H010-WC	ALPHA-X	2437708	219414274	1000	45	0	
CY27H010-WC	ALPHA-X	2437708	219414421	100	45	0	
CY27H010-WC	ALPHA-X	2437708	219414421	1000	45	0	
CY27H010-PC	KOREA-H	2447661	349500299	300	45	0	

[3] 128K x 8 High Speed CMOS EPROM qualifiled in P26 technology.