Cypress Semiconductor
Technology Qualification Report

QTP# 012415 VERSION 1.2
November, 2002

TSMC 0.15um Technology, Fab TSMC **18Meg Synchronous SRAM**	
CY7C1371B/CY7C1373B **CY7C1381B/CY7C1383B** **CY7C1381BV25/CY7C1383BV25** **CY7C1371BV25/CY7C1373BV25** **CY7C1370B/CY7C1372B** **CY7C1380B/CY7C1382B** **CY7C1386B/CY7C1387B** **CY7C1380BV25/CY7C1382BV25** **CY7C1386BV25/CY7C1387BV25** **CY7C1370BV25/CY7C1372BV25**	512K x 36 / 1M x 18

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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TECHNOLOGY QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
012415	New Technology TSMC 0.15um / 1 8Meg Synchronous SRAM Device, CY7C1380B and Device family.	Jun 01

PRODUCT DESCRIPTION (for qualification)		
Qualification Purpose: Qualify New Technology, TSMC 0.15um, TSMC Fab and CY7C1380B and device family.		
Marketing Part #:	CY7C1380B	
Device Description:	2.5V, 3.3V, Industrial and Commercial available in 119-ball BGA and 100-pin TQFP package.	
Cypress Division:	Cypress Semiconductor Corporation –Memory Product Division (MPD)	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. B
What ID markings on Die:	GVT71512C36Y	

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	8	Metal Composition:	Metal 1: 3,000Å - TiN / Al Metal 2: 4,000Å - TiN / Al Metal 3: 8,000Å - TiN / Al
Passivation Type and Materials:		6,000Å Sn / 10,000Å Oxide	
Free Phosphorus contents in top glass layer(%):		0%	
Number of Transistors in Device		120 million	
Number of Gates in Device		40 million	
Generic Process Technology/Design Rule (µ-drawn):		CMOS, 1P3M, 6T, 0.15 µm	
Gate Oxide Material/Thickness (MOS):		SiO_2, 26Å ± 2Å	
Name/Location of Die Fab (prime) Facility:		TSMC, Taiwan	
Die Fab Line ID/Wafer Process ID:		TSMC, 015um Technology	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
119-ball FBGA	**ASE**
100-pin TQFP	**SPIL**

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	A100
Package Outline, Type, or Name:	100-pin, Thin Quad Flat Pack (TQFP)
Mold Compound Name/Manufacturer:	Hitachi CEL9200
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	>28%
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 Method:	Epoxy
Die Attach Supplier:	Ablebond
Die Attach Material:	8355F
Bond Diagram Designation	10-04119
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.2um
Thermal Resistance Theta JA °C/W:	45°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-78002 (FL-2800 / 64-04-000-224)
Name/Location of Assembly (prime) facility:	SPIL

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	Cypress, USA / CHIPMOS
Fault Coverage:	100%

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, 150°C	P
High Temperature Steady State Life	Static Operating Condition, Vcc Max=3.63V, 150°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+5, 0°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 235°C+5, 0°C	P
Pressure Cooker	121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 235°C+5, 0°C	P
High Temperature Storage	150°C ± 5°C no bias	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1,500V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	200V Cypress Spec. 25-00020	P
Age Bond Strength	200C, 4HRS MIL-STD-883, Method 883-2011	P
SEM Analysis	MIL-STD-883, Method 883-2018-2 / Cypress Spec. 22-00009	P
Low Temperature Operating Life	-30°C, 4.3V, 8MHZ	P
Acoustic Microscopy, MSL 3	Cypress Spec. 25-00104	P
Current Density	Cypress Spec 22-00029	P
Static Latchup	125°C, 10V, ± 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 AF[4]	Failure Rate
High Temperature Operating Life Early Failure Rate[1]	3,007	1	N/A	N/A	333 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	583,320 DHRs	2	0.7	170	31 FIT

[1] A production burn-in of 15 Hrs at 125°C, 3.8V 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 #: 012415

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.8V, Vcc Max)							
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	96	1007	1	METAL2 DEFECT
CY7C1380B-AC (7C1380B)	C80457	*C80453CA*	SPIL	96	1006	0	
CY7C1380B-AC (7C1380B)	C80476	*C80476AA*	SPIL	96	993	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 3.8V, Vcc Max)							
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	80	390	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	500	387	1	VIA/CONTAC SPIKING
CY7C1380B-AC (7C1380B)	C80457	*C80453CA*	SPIL	80	390	0	
CY7C1380B-AC (7C1380B)	C80457	*C80453CA*	SPIL	500	389	1	METAL RESIDUE
CY7C1380B-AC (7C1380B)	C80476	*C80476AA*	SPIL	80	390	0	
CY7C1380B-AC (7C1380B)	C80476	*C80476AA*	SPIL	500	388	0	
STRESS: ESD-CHARGE DEVICE MODEL (200V)							
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	COMP	9	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	COMP	9	0	
CY7C1380B-AC (7C1380B)	C80457	*C80457CA*	SPIL	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (1,500V)							
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	COMP	9	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	COMP	9	0	
CY7C1380B-AC (7C1380B)	C80457	*C80457CA*	SPIL	COMP	9	0	
STRESS: DYNAMIC LATCH-UP TESTING (2.65V)							
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING (125C, 10V, +/300mA)							
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	COMP	3	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	COMP	3	0	
CY7C1380B-AC (7C1380B)	C80457	*C80457CA*	SPIL	C0MP	3	0	
STRESS: ACOUSTIC-MSL3							
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	COMP	15	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	COMP	15	0	
CY7C1380B-AC (7C1380B)	C80457	*C80457CA*	SPIL	COMP	15	0	
STRESS: AGE BOND STRENGTH							
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	COMP	3	0	
CY7C1380B-AC (7C1380B)	C80453	*C80458AB*	SPIL	COMP	3	0	
CY7C1380B-AC (7C1380B)	C80457	*C80457CA*	SPIL	COMP	3	0	

Reliability Test Data

QTP #: 012415

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMPERATURE STORAGE, PLASTIC, 150C							
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	500	48	0	
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	1000	48	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 3.63V, Vcc MAX)							
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	80	80	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	168	80	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192 HR 30C/60%RH							
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	168	48	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	168	48	0	
CY7C1380B-AC (7C1380B)	C80457	*C80457CA*	SPIL	168	48	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.63V), PRE COND 192 HR 30C/60%RH							
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	128	48	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	128	48	0	
CY7C1380B-AC (7C1380B)	C80457	*C80457CA*	SPIL	128	47	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH (MSL3)							
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	300	48	0	
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	500	48	0	
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	1000	48	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	430	48	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453AB*	SPIL	1000	48	0	
CY7C1380B-AC (7C1380B)	C80457	*C80457CA*	SPIL	300	48	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453CA*	SPIL	500	48	0	
CY7C1380B-AC (7C1380B)	C80453	*C80453CA*	SPIL	1000	48	0	
STRESS: LOW TEMPERATURE OPERATING LIFE (-30C, 4.3V)							
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	500	45	0	
CY7C1380B-AC (7C1380B)	C80458	*C80458AA*	SPIL	1000	48	0	