Cypress Semiconductor
Product Qualification Report

QTP #011910 VERSION 1.0
October, 2001

Dual I/O Dual Address Synchronous SRAM WaferTech 0.25um 3P2M Process TechnologWA USA	
CY7C1299A	32K x 36
CY7C1300A	128K x 36
CY7C1301A	256K x 36

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
011104	8Meg, GVT71256D36 (7C1360D) device and its bond and metal options, WaferTech .25um Technology. **Production Qualification not a Full Qualification**.	Mar 01
011405	8Meg, GVT71256D36 (7C1360D) device and its bond and metal options, WaferTech .25um Technology. **Full Qualification**	Jun 01
011910	New 8Meg, NETRAM Device, CY7C1301A and bond option	Aug 01

Cypress products are manufactured using qualified processes. The technology qualification for this product is referenced above and must be considered to get a complete and thorough evaluation of the reliability of the product.

PRODUCT DESCRIPTION (for qualification)		
Qualification Purpose: Qualify 8Meg, NETRAM, CY7C1301A and bond option in WaferTech .25um Technology		
Marketing Part #:	CY7C1301A/CY7C1300A/CY7C1299A (GVT81256/128/32P36T-A)	
Device description:	3.3V, Commercial available in 176-pin TQFP package	
Cypress Division:	Cypress Semiconductor Corporation – Synchronous Memory Product Division (SMPD)	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. A
What ID markings on Die:	GVT81256P36T	

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 4,000Å AlCu/.700Å TiN Metal 2: 1,000Å TiN/6,000Å AlCu/250Å TiN
Passivation Type and Materials:	1,500Å SiON / 5,000Å SOG/10,000Å PESN		
Free Phosphorus contents in top glass layer(%):	0		
Generic Process Technology/Design Rule (μ-drawn):	TM8981 / 0.25um		
Gate Oxide Material/Thickness (MOS):	SiO_2 / 70Å		
Name/Location of Die Fab (prime) Facility:	WaferTech, WA USA		
Die Fab Line ID/Wafer Process ID:	WaferTech, CMOS, 0.25um 3P2M Process Technology		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
176-pin TQFP	**SPIL**

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	A176
Package Outline, Type, or Name:	176-pin, Thin Quad Flat Pack (TQFP)
Mold Compound Name/Manufacturer:	Sumitomo EME- 7325L
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	＞28%
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Solder Plate, 85%Sn, 15%Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Ablebond
Die Attach Material:	8355F
Die Attach Method:	Epoxy
Bond Diagram Designation	10-04277
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.2um
Thermal Resistance Theta JA °C/W:	40.9°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-78002M
Name/Location of Assembly (prime) facility:	SPIL

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

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RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	1) QTP #011910, QTP #011405 Dynamic Operating Condition, Vcc Max=3.8V, 125°C	P
High Temperature Operating Life Latent Failure Rate	1) QTP #011910, QTP #011405 Dynamic Operating Condition, Vcc Max=3.8V, 125°C	P
High Accelerated Saturation Test (HAST)	1) QTP #011910, QTP #011104 130°C, 3.63V,85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
Temperature Cycle	1) QTP #011910, QTP #011104 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, 220°C+5, 0°C	P
Pressure Cooker	1) QTP #011910, QTP #011104 121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
High Temperature Steady State life	1) QTP #011104 150°C, 3.63V, Vcc Max	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1) QTP #011910, 1,600V 2) QTP #011104, 2,200V MIL-STD-883, Method 3015.7	R
Electrostatic Discharge Charge Device Model (ESD-CDM)	1) QTP #011910, QTP #011104 200V Cypress Spec. 25-00020	P
Low Temperature Operating Life	1) QTP #011104 -30C, 3.3V, 8MHZ	P

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT (continuation)

Stress/Test	Test Condition (Temp/Bias)	Result P/F
SEM X-Section	1) QTP #011104 MIL-STD-883, Method 883-2018-2	P
Age Bond Strength	1) QTP #011104 200°C, 4hrs MIL-STD-883, Method 2011	P
Acoustic Microscopy, Level 3	1) QTP #011910, QTP #011104 Cypress Spec. 25-00104	P
Latchup Sensitivity	1) QTP #011910, QTP #011104 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[5]
High Temperature Operating Life Early Failure Rate[1]	4,944	0	N/A	N/A	0 PPM
High Temperature Operating Life[2,3] Long Term Failure Rate	1,043,500 DHRs	0	0.7	150	16 FIT

[1] A production burn-in of 6 Hrs at 125°C, 4.2V 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.

[5] **EFR and LFR Failure Rate based on QTP #011910, QTP #011405.**

Reliability Test Data

QTP #: 011910

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.8V, Vcc Max)							
GVT81256P36T-A (7C1301A)	W3216102	W32161CA	SPIL	96	1519	0	
GVT81256P36T-A (7C1301A)	W32160AA	W32160AA	SPIL	96	1518	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.8V, Vcc Max)							
GVT81256P36T-A (7C1301A)	W3216102	W32161CA	SPIL	168	180	0	
GVT81256P36T-A (7C1301A)	W3216102	W32161CA	SPIL	500	180	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.63V)PRE COND 192 HR 30C/60%RH							
GVT81256P36T-A (7C1301A)	W60546EA	W6054604	SPIL	128	46	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192HRS 30C/60%RH							
GVT81256P36T-A (7C1301A)	W60546EA	W6054604	SPIL	168	50	0	
STRESS: ESD-CHARGE DEVICE MODEL (200V)							
GVT81256P36T-A (7C1301A)	W60546EA	W6054604	SPIL	COMP	9	0	
GVT81256P36T-A (7C1301A)	W32160AA	W32160AA	SPIL	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (1,600V)							
GVT81256P36T-A (7C1301A)	W60546EA	W6054604	SPIL	COMP	9	0	
GVT81256P36T-A (7C1301A)	W32160AA	W32160AA	SPIL	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING (125C, 10V, +/300mA)							
GVT81256P36T-A (7C1301A)	W60546EA	W6054604	SPIL	COMP	3	0	
GVT81256P36T-A (7C1301A)	W32160AA	W32160AA	SPIL	COMP	3	0	
STRESS: ACOUSTIC-MSL3							
GVT81256P36T-A (7C1301A)	W3216102	W32161CA	SPIL	COMP	15	0	
GVT81256P36T-A (7C1301A)	W60546EA	W6054604	SPIL	COMP	15	0	
GVT81256P36T-A (7C1301A)	W60546HA	W6054607	SPIL	COMP	15	0	
STRESS: TC CONDITION C, -65C TO 150C, PRE COND. 192 HRS 30C/60% RH (MSL3)							
GVT81256P36T-A (7C1301A)	W3216102	W32161CA	SPIL	300	50	0	
GVT81256P36T-A (7C1301A)	W3216102	W32161CA	SPIL	500	50	0	
GVT81256P36T-A (7C1301A)	W3216102	W32161CA	SPIL	1000	50	0	
GVT81256P36T-A (7C1301A)	W60546EA	W6054604	SPIL	300	50	0	
GVT81256P36T-A (7C1301A)	W60546EA	W6054604	SPIL	500	50	0	
GVT81256P36T-A (7C1301A)	W60546EA	W6054604	SPIL	1000	50	0	
GVT81256P36T-A (7C1301A)	W60546HA	W6054607	SPIL	300	50	0	
GVT81256P36T-A (7C1301A)	W60546HA	W6054607	SPIL	500	50	0	
GVT81256P36T-A (7C1301A)	W60546HA	W6054607	SPIL	1000	50	0	

Reliability Test Data

QTP #: 011405

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.8V, Vcc Max)							
GVT171256B36*(7C1361A)	W27397	*WW27397AA*	ASE	96	350	0	
GVT171256B36*(7C1361A)	W31078	*WW31078DA*	ASE	96	116	0	
GVT171256B36*(7C1361A)	W30841	*WW30841AD*	ASE	96	990	0	
GVT171256B36*(7C1361A)	W30840	*WW30840AF*	ASE	96	451	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.8V, Vcc Max)							
GVT171256B36*(7C1361A)	W27397	*WW27397AA*	ASE	168	350	0	
GVT171256B36*(7C1361A)	W27397	*WW27397AA*	ASE	500	350	0	
GVT171256B36*(7C1361A)	W31078	*WW31078DA*	ASE	168	116	0	
GVT171256B36*(7C1361A)	W31078	*WW31078DA*	ASE	500	116	0	
GVT171256B36*(7C1361A)	W30841	*WW30841AD*	ASE	168	990	0	
GVT171256B36*(7C1361A)	W30841	*WW30841AD*	ASE	500	990	0	
GVT171256B36*(7C1361A)	W30840	*WW30840AF*	ASE	168	451	0	
GVT171256B36*(7C1361A)	W30840	*WW30840AF*	ASE	500	451	0	
STRESS: ESD-CHARGE DEVICE MODEL (450V)							
GVT171256B36*(7C1361A)	W27397	*WW27397AA*	ASE	COMP	9	0	

Reliability Test Data

QTP #: 011104

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.63V)PRE COND 192 HR 30C/60%RH, MSL3							
GVT71256D36*(7C1360A)	W90760	*W90760.02*	ASE	128	48	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192HRS 30C/60%RH							
GVT71256D36*(7C1360A)	W90760	*W90760.02*	ASE	168	47	0	
STRESS: ESD-CHARGE DEVICE MODEL (200V)							
GVT71256D36*(7C1360A)	W90760	*W90760.02*	ASE	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
GVT71256D36*(7C1360A)	W90760	*W90760.02*	ASE	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING (125C, 10V, +/300mA)							
GVT71256D36*(7C1360A)	W90760	*W90760.02*	ASE	COMP	3	0	
STRESS: ACOUSTIC-MSL3							
GVT71256D36*(7C1360A)	W18746	*W18746.02*	ASE	COMP	15	0	
GVT71256D36*(7C1360A)	W18916	*W18916.02*	ASE	COMP	15	0	
STRESS: AGE BOND STRENGTH TEST							
GVT71256D36*(7C1360A)	W90760	*W90760.02*	ASE	COMP	15	0	
GVT71256D36*(7C1360A)	W18916	*W18916.02*	ASE	COMP	15	0	
STRESS: TC CONDITION C, -65C TO 150C, PRE COND. 192 HRS 30C/60% RH (MSL3)							
GVT71256D36*(7C1360A)	W90760	*W90760.2*	ASE	300	50	0	
GVT71256D36*(7C1360A)	W90760	*W90760.2*	ASE	500	50	0	
GVT71256D36*(7C1360A)	W18916	*W18916.02*	ASE	300	49	0	
GVT71256D36*(7C1360A)	W18916	*W18916.02*	ASE	500	48	0	
GVT71256D36*(7C1360A)	W18746	*W18746.02*	ASE	1000	48	0	
GVT71256D36*(7C1360A)	W18746	*W18746.02*	ASE	300	48	0	
GVT71256D36*(7C1360A)	W18746	*W18746.02*	ASE	500	47	0	
GVT71256D36*(7C1360A)	W18746	*W18746.02*	ASE	1000	47	0	
STRESS: LOW TEMPERATURE OPERATING LIFE (-30C, 3.3V)							
GVT71256D36*(7C1360A)	W18916	*W18916.02*	ASE	500	48	0	