Cypress Semiconductor
Qualification Report

QTP# 98252 VERSION 1.0
November, 1998

CY7C188
32K x 9 Static RAM – R28 Technology – Fab2

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: CY7C188, Low Cost 256K SRAM, R28 Technology, Fab2	
Marketing Part #:	CY7C188
Package:	32 pins, 300 mil SOJ
Device Description:	32K x 9 Static RAM
Cypress Division:	Cypress Semiconductor Corporation - MPD Division
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. B
What ID markings on Die:	7C188A

TECHNOLOGY/FAB PROCESS DESCRIPTION - R28			
Number of Metal Layers:	2	Metal Composition:	Metal 1: Ti/TiW/Al-Si/TiW, 500Å/1.2KÅ/6KÅ/1.2K Å Metal 2: TiW/Al-Si/TiW, 1.2KÅ/10KÅ/150Å
Passivation Type and Materials:	7000A TEOS + 6000A Si_2N_4		
Free Phosphorus contents in top glass layer(%):	N/A		
Die Coating(s), if used:	None		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Double Poly, Double Metal /0.65 μm		
Gate Oxide Material/Thickness (MOS):	SiO_2 / 165 Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX		
Die Fab Line ID/Wafer Process ID:	Fab2/R28		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	32-pin, 300 mil SOJ		
Mold Compound Name/Manufacturer:	Hitachi 9200		
Lead Frame material:	Copper Alloy 194		
Lead Finish, composition:	Solder Plated, 85%Sn, 15%Pb		
Die Attach Area Plating:	Silver Spot		
Die Attach Method:	Paste	Die Attach Material:	Ablestik 8361
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.0 mil
JESD22-A112 Moisture Sensitivity Level	Level 1		
Assembly Line ID and Process ID:	Cypress Philippines (CSPI-R)		

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

RELIABILITY TESTS PERFORMED

Stress/Test	**Test Condition (Temp/Bias)**	**Result P/F**
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc = 5.75V, 150°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc = 5.75V, 150°C	P
High Temperature Steady State Life	Static Operating Condition, Vcc = 5.5V, 150°C	P
High Accelerated Saturation Test (HAST)	140°C, 85%RH, 5.5V Precondition: JESD22 Moisture Sensitivity Level 1 (168 Hrs, 85/85% RH)	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 1 (168 Hrs, 85/85% RH)	P
Pressure Cooker Test	No bias, 121°C, 100%RH, 30 PSIA	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	P 12.0V

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[3]	Failure Rate[4]
High Temperature Operating Life Early Failure Rate	1610 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	633,360 DHRs	0	0.7	170	9 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.

[4] Failure Rate is based on 256K SRAM, R28 Technology qualified in Fab2, QTP #97476.

RELIABILITY TEST DATA

QTP#: 98252

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7C188-VC	CSPI-R	2821999	619807917	48	1500	0	
STRESS: ESD-CHARGE DEVICE MODEL (1000V)							
CY7C188-VC	CSPI-R	2821999	619807917	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2000V)							
CY7C188-VC	CSPI-R	2821999	619807917	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 168 HRS 85C/85%RH							
CY7C188-VC	CSPI-R	2821999	619807917	128	48	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)							
CY7C188-VC	CSPI-R	2821999	619807917	80	81	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7C188-VC	CSPI-R	2821999	619807917	80	120	0	
CY7C188-VC	CSPI-R	2821999	619807917	500	120	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH)							
CY7C188-VC	CSPI-R	2821999	619807917	96	50	0	
CY7C188-VC	CSPI-R	2821999	619807917	168	50	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH (MSL 1)							
CY7C188-VC	CSPI-R	2821999	619807917	300	52	0	

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 97476[1]

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7C199-VC	INDNS-O	2734322	519711442D	48	540	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	48	535	0	
CY7C199-VC	CSPI-R	2733162	619707989	48	535	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CY7C199-VC	INDNS-O	2734322	519711442D	COMP	3	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015							
CY7C199-VC	INDNS-O	2734322	519711442D	COMP	3	0	
CY7C199-VC	CSPI-R	2736541	619708989	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 168 HRS 85C/85%RH							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	128	48	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	256	48	0	
CY7C199-VC	CSPI-R	2733162	619707989	128	45	0	
CY7C199-VC	CSPI-R	2733162	619707989	128	50	0	
CY7C199-VC	CSPI-R	2735410	619708288	128	45	0	
CY7C199-VC	CSPI-R	2735410	619708288	128	48	0	
CY7C199-VC	CSPI-R	2736541	619708989	128	47	0	
STRESS: HIGH TEMPERATURE STORAGE (165C, NO BIAS)							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	336	48	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	500	48	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	1000	48	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.50V)							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	80	81	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	168	81	0	
CY7C199-VC	CSPI-R	2733162	619707989	80	80	0	
CY7C199-VC	CSPI-R	2733162	619707989	168	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7C199-VC	INDNS-O	2734322	519711442D	80	540	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	80	535	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	500	533	0	
CY7C199-VC	CSPI-R	2733162	619707989	80	527	0	
CY7C199-VC	CSPI-R	2733162	619707989	500	527	0	
STRESS: LONG LIFE VERIFICATION (150C, 5.75V)							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	1000	120	0	

[1] QTP 97476, 32K x 8 SRAM, R28 Technology, Fab2 qualification.

RELIABILITY TEST DATA

QTP#: 97476

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: COLD LIFE TEST (-30C, 6.5V)							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	500	45	0	
STRESS: READ & RECORD LIFE TEST (150C, 5.75V)							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	48	10	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	80	10	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	500	10	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH							
CY7C199-VC	CSPI-R	2733142	619707330/7/8	300	48	0	
CY7C199-VC	CSPI-R	2733142	619707330/7/8	1000	48	0	
CY7C199-VC	CSPI-R	2733162	619707989	300	50	0	
CY7C199-VC	CSPI-R	2733162	619707989	1000	50	0	