

Cypress Semiconductor Qualification Report

QTP# 98296 VERSION 1.0
September, 1998

64K Static RAM – R28 Technology – Fab 2	
CY7C185/186/6264	8K x 8 SRAM
CY7C164/166	16K x 4 SRAM
CY7C187	64K x 1 SRAM

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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Reliability Manager
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PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify Fab 2 for 64K SRAM, R28 process (Rev N)	
Marketing Part #:	CY7C185/186/6264/164/166/187
Package:	28 pins, 300 mil SOJ
Device Description:	64K Static RAM
Cypress Division:	Cypress Semiconductor Corporation - MPD Division
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev N
What ID markings on Die:	7C185C

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 ₂ N 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:		24/28-pin, 300 mil SOJ	
Mold Compound Name/Manufacturer:		Sumitomo 9300 (Omedata) Hitachi CEL-9200(CSPI)	
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 8361H
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.0 /1.3 mil
JESD22-A112 Moisture Sensitivity Level		Level 1	
Assembly Line ID and Process ID:		Omedata, Indonesia (INDNS-O) 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
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 (PCT)	121C/100%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 Static Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	P 11.0V

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy ³	Thermal AF ³	Failure Rate ⁴
High Temperature Operating Life Early Failure Rate ³	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 = 8.62x10⁻⁵ eV/Kelvin.

T₁ is the junction temperature of the device under stress and T₂ is the junction temperature of the device at use conditions.

⁴ Failure rate is based on 256K SRAM, R28 Technology, Fab2 qualification (QTP 97476)

RELIABILITY TEST DATA

QTP#: 98296

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7C185-VC	CSPI-R	2826304	619810123	48	1512	0	
STRESS: ESD-CHARGE DEVICE MODEL							
CY7C164-VC	INDNS-O	2822023	519808652	1000V	3	0	
CY7C187-VC	INDNS-O	2822023	519808654	1000V	3	0	
CY7C166-VC	INDNS-O	2822023	519808807	1000V	3	0	
CY7C185-VC	CSPI-R	2821998	619807754	1000V	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015							
CY7C164-VC	INDNS-O	2822023	519808652	2200V	3	0	
CY7C187-VC	INDNS-O	2822023	519808654	2200V	3	0	
CY7C166-VC	INDNS-O	2822023	519808807	2200V	3	0	
CY7C185-VC	CSPI-R	2821998	619807754	2200V	3	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH)							
CY7C185-VC	CSPI-R	2821998	619807754	168	50	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH (MSL 1)							
CY7C185-VC	CSPI-R	2821998	619807754	300	48	0	

DEVICIE RELATED RELIABILITY TEST DATA

QTP#: 97476¹

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	2 EOS
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, 256K SRAM, R28 Technology, Fab 2 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	