

# Cypress Semiconductor Qualification Report

QTP# 99353 VERSION 1.0  
January, 2000

<b>CY7C199 Military Qualification</b> <b>R28 Technology, in Fab 2</b>	
CY7C199	32K x 8 Static RAM

**CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:**

Ed Russell  
Reliability Director  
(408)432-7069

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: To qualify Military CY7C199 Rev. H, R28 Technology in Fab 2,	
Marketing Part #:	CY7C199*DMB, CY7C199*LMB
Package:	28 pins, CDip
Device Description:	32K x 8 256K SRAM
Cypress Division:	Cypress Semiconductor Corporation - MPD Division
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. H
What ID markings on Die:	7C198/9

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 <sub>2</sub> N <sub>4</sub>		
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 <sub>2</sub> / 165 Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX		
Die Fab Line ID/Wafer Process ID:	Fab2/R28		

HERMETIC/ PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	28-pin, Cdip/28 pin, PLCC		
Lead Frame material:	Aluminum		
Lead Finish, composition:	LMB-Gold Plate / DMB-Aluminum		
Die Attach Method:	Silver Glass	Die Attach Material:	QMI-2419MA
Wire Bond Method:	Ultrasonic Wedge Bond	Wire Material/Size:	Aluminum / 1.25ml.
Thermal Resistance Theta JA	51.20		
JESD22-A112 Moisture Sensitivity Level	Level 1 (previously qualified)		
Assembly Line ID and Process ID:	Alphatec, Thailand (ALPHA-X)		

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

**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 = 5.75V, 150°C	P
High Temperature Operating Life Long Term Failure Rate	Dynamic Operating Condition, Vcc = 5.75V, 150°C	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	750V
Temperature Cycle, Hermetic	MIL-STD-883C, Method 3015.7, (-65°C - 150°C) Sensitivity Level 1	P
Internal Water Vapor	MIL-STD-883, Method 1018	P
Military Input/Output Capacitance	Cypress Spec. 01-00123	P
Group C –Military Life Test	MIL-STD-883, Method 1005.4. (150C, 5.75V)	P
Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	11.33V ±300mA

### RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF <sup>4</sup>	Failure Rate <sup>5</sup>
High Temperature Operating Life Early Failure Rate <sup>1</sup>	2999	1	N/A	N/A	333 PPM
High Temperature Operating Life <sup>2,3</sup> Long Term Failure Rate	128,000 DHRs	0	0.7	170	44 FIT

<sup>1</sup> Production burn-in of 80 hrs. at 150C, 5.75V is required for the product.

<sup>2</sup> Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

<sup>3</sup> Chi-squared 60% estimations used to calculate the failure rate.

<sup>4</sup> 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<sub>A</sub> = The Activation Energy of the defect mechanism.

k = Boltzmann's constant = 8.62x10<sup>-5</sup> eV/Kelvin.

T<sub>1</sub> = is the junction temperature of the device under stress and T<sub>2</sub> is the junction temperature of the device at use conditions.

<sup>5</sup>The 256 SRAM, [R28](#) Technology was qualified in fab 2 with a FIT rate of 9 FITs (QTP#97476)

**DEVICE RELIABILITY TEST DATA**

**QTP#:99353**

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
7C199HT-XDMB	ALPHA-X	2925841	619923231	48	1499	1	Poly defect
7C199HT-XDMB	ALPHA-X	2925838	619923882	48	1500	0	
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STRESS: ESD-CHARGE DEVICE MODEL (750V)							
7C199HT-XDMB	ALPHA-X	2925841	619923231	COMP	3	0	
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STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2200V)							
7C199HT-XDMB	ALPHA-X	2925841	619923231	COMP	3	0	
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STRESS: Group C, MIL-STD-883, METHOD 1005.4 (150C, 5.75V)							
7C199HT-XDMB	ALPHA-X	2925841	619923231	184	48	0	
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STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
7C199HT-XDMB	ALPHA-X	2925841	619923231	80	256	0	
7C199HT-XDMB	ALPHA-X	2925841	619923231	500	256	0	
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STRESS: TC COND. C, -65 TO 150C, HERMETIC DEVICES							
7C199HT-XDMB	ALPHA-X	2925841	619923231	100	56	0	
7C199HT-XDMB	ALPHA-X	2925841	619923231	F/G LEAK	56	0	
7C199HT-XDMB	ALPHA-X	2925841	619923231	1000	56	0	
7C199HT-XDMB	ALPHA-X	2925841	619923231	F/G LEAK	56	0	
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