

Qualification Report

September 1996,
QTP# 96182/96354, Version 2.0

Dual Port SRAM - R28 Technology	
CY7C0241	4K x 18 Dual Port SRAM
CY7C024	4K x 16 Dual Port SRAM
CY7C145	8K x 9 Dual Port SRAM
CY7C144	8K x 8 Dual Port SRAM
CY7C139	4K x 9 Dual Port SRAM
CY7C134	4K x 8 Dual Port SRAM
CY7C1342	4K x 8 Dual Port SRAM
CY7C135	4K x 8 Dual Port SRAM
CY7C138	4K x 8 Dual Port SRAM
CY7C133	2K x 16 Dual Port SRAM
CY7C143	2K x 16 Dual Port SRAM
CY7C136	2K x 8 Dual Port SRAM
CY7C146	2K x 8 Dual Port SRAM
CY7C131	1K x 8 Dual Port SRAM
CY7C141	1K x 8 Dual Port SRAM

PRODUCT DESCRIPTION (for qualification)

Information provided in this document is intended for generic qualification and technically describes the Cypress part supplied:

Marketing Part #:	CY7C024		
Package:	84-Lead Plastic Lead Chip Carrier (CY7C024)		
Device Description:	4K x 16 Dual Port SRAM		
Cypress Division:	Cypress Semiconductor Corporation - DCD Division		
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. C		
Die Size (stepping):	190.5 mils x 190 mils	What ID markings on Die:	Metal Opt. 1: 7C0241A (CY7C024/0241) Metal Opt. 2: 7C1451A (CY7C138/139/144/145) Metal Opt. 3: 7C1431A (CY7C133/143) Metal Opt. 4: 7C1341A (CY131/134/1342/135/136/146)

TECHNOLOGY/FAB PROCESS DESCRIPTION - R28

Number of Metal Layers:	2	Metal Composition:	Metal 1: Ti/TiW/AL-Si/TiW, 500A/1200A/6000A/1200A Metal 2: TiW/Al-Si/Ti 1200A/10000A/150A
Passivation Type and Materials:	7000A TEOS + 6000A Oxynitride		
Free Phosphorus contents in top glass layer(%):	n/a		
Generic Process Technology/Design Rule (μ -drawn):	CMOS, Double Poly, Double Metal /0.65 μ m		
Gate Oxide Material/Thickness (MOS):	SiO ₂ / 165 A		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor, Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab3/R28		



PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:		84-Lead Plastic Lead Chip Carrier (CY7C024)	
Mold Compound Name/Manufacturer:		Sumitomo EME-6300	
Lead Frame material:	Copper		
Die coating(s), if used		None	
Lead Finish, composition:		Solder Plated, 85%Sn, 15%Pb	
Die Attach Area Plating:		Silver Spot	
Die Attach Method:	Paste	Die Attach Material:	Silver Epoxy
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.3 mil
JESD22-A112 Moisture Sensitivity Level:		Level 5 (Being upgraded to Level 3)	
Name/Location of Assembly (prime) facility:		Anam, Korea (KOREA-A)	

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



RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal ³ A.F	Failure Rate ⁴
High Temperature Operating Life Early Failure Rate	1951 Devices	0	n/a	n/a	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	297,500 DHRs	0	0.6	82	38 FITs

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 was based on Dual Port SRAM, R28 technology qualification (QTP 95226, 96091, 96182).



RELIABILITY TESTS PERFORMED

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life	Dynamic Operating Condition, Vcc = 5.75V, 150°C	P
High Temperature Steady State Life	Static Operating condition, Vcc = 5.75V, 150°C	P
Read & Record Life Test	Dynamic Operating Condition, Vcc = 5.75V, 150°C	P
High Accelerated Saturation Test (HAST)	140°C, 5.5V Precondition: JESD22 Moisture Sensitivity Level 3 (192 Hrs., 85°C/85%RH, 3 cys Solder Reflow)	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: Dry Bake, 3 Cys Solder Reflow	P
Electrostatic Discharge Human Body Model (ESD-HBM)	MIL-STD-883, Method 3015.7	P 2,200V
Electrostatic Discharge Charge Device Model (ESD-CDM)	Cypress Spec. 25-00020	P 1,000V
Latchup Sensitivity	In accordance with JEDEC 17, Cypress Spec. 01-00081	P
Alpha Particle Sensitivity	Cypress Spec. 25-00055	P



RELIABILITY TEST DATA

QTP#: 96182¹/96354²

EVAL #	DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE	====	===
=====	=====	=====	=====	=====	=====			=====		
=====	=====	=====	=====	=====	=====			=====		
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)										
96354	CY7C145-JC	KOREA-A	3620707	349609215L2	48	230	0			
96354	CY7C024-JC	KOREA-A	3625410	349610074L1	48	175	0			
96354	CY7C024-JI	KOREA-A	3625410	349610075L2	48	175	0			
96354	CY7C145-JC	KOREA-A	3620707	349610349L1	48	120	0			
96354	CY7C024-JC	KOREA-A	3626534	349610354L2	48	345	0			

STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 192 HRS 30C/60%RH										
96182	CY7C024-JC	KOREA-A	3617352	349606928	128	45	0			

STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)										
96182	CY7C024-JC	KOREA-A	3617352	349606928	80	78	0			
96182	CY7C024-JC	KOREA-A	3617352	349606928	168	78	0			

STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)										
96182	CY7C024-JC	KOREA-A	3617352	349606928	80	116	0			
96182	CY7C024-JC	KOREA-A	3617352	349606928	500	116	0			
96182	CY7C024-JC	KOREA-A	3617352	349606929	80	120	0			
96182	CY7C024-JC	KOREA-A	3617352	349606929	500	119	0			

STRESS: READ & RECORD LIFE TEST (150C, 5.75V)										
96182	CY7C024-JC	KOREA-A	3617352	349606928	80	10	0			
96182	CY7C024-JC	KOREA-A	3617352	349606928	500	10	0			

STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%RH										
96182	CY7C024-JC	KOREA-A	3617352	349606928	300	45	0			

¹ R28 Technology, Dual Port SRAM, Rev. C (7C025B chop). Technology conversion from BiCMOS to CMOS for CY7C13* and CY7C14* products.

² Production burn-in elimination for R28 Technology Dual Port SRAM (Rev. C) family.



DEVICE RELATED RELIABILITY TEST DATA

QTP#: 96091³

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7C025-AC	KOREA-Q	3604479	349602347	48	434	0	
CY7C025-JC	KOREA-A	3604479	349602348	48	493	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRECONDITION DRY BAKE + 3 CYS SOLDER REFLOW							
CY7C016-AC	KOREA-Q	3604479	349602669	128	48	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 85%RH, 5.5V), PRECONDITION DRY BAKE + 72 HRS 30C/85%RH							
CY7C025-JC	KOREA-Q	3604479	349602348	128	51	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)							
CY7C025-AC	KOREA-Q	3604479	349602347	80	80	0	
CY7C025-AC	KOREA-Q	3604479	349602347	168	55	0	
CY7C025-AC	KOREA-Q	3604479	349602347	168	79	0	1 EOS
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7C025-AC	KOREA-Q	3604479	349602347	80	120	0	
CY7C025-AC	KOREA-Q	3604479	349602347	500	120	0	
STRESS: READ & RECORD LIFE TEST (150C, 5.75V)							
CY7C025-AC	KOREA-Q	3604479	349602347	48	10	0	
CY7C025-AC	KOREA-Q	3604479	349602347	80	10	0	
CY7C025-AC	KOREA-Q	3604479	349602347	500	10	0	
STRESS: TEMP CYCLE, COND. C, -65 TO 150C, PRECONDITION DRY-BAKE							
CY7C025-AC	KOREA-Q	3604479	349602347	300	48	0	
CY7C025-AC	KOREA-Q	3604479	349602347	1000	48	0	

³ R28 Technology, Dual Port SRAM, Rev B (6% shrink)



DEVICE RELATED RELIABILITY TEST DATA

QTP#: 95226⁴

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7C025-JC	KOREA-A	3531005	349522865	48	512	0	
CY7C025-JC	KOREA-A	3543592	349524484	48	512	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 85%RH, 5.5V), PRECONDITION DRY BAKE							
CY7C025-JC	KOREA-A	3531005	349522865	128	48	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)							
CY7C025-JC	KOREA-A	3531005	349522865	80	76	0	
CY7C025-JC	KOREA-A	3531005	349522865	168	76	0	
CY7C025-JC	KOREA-A	3543592	349524484	80	80	0	
CY7C025-JC	KOREA-A	3543592	349524484	168	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7C025-JC	KOREA-A	3531005	349522865	80	120	0	
CY7C025-JC	KOREA-A	3531005	349522865	500	120	0	
CY7C025-JC	KOREA-A	3543592	349524484	80	120	0	
CY7C025-JC	KOREA-A	3543592	349524484	500	120	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH)							
CY7C025-JC	KOREA-A	3531005	349522865	168	45	0	
STRESS: READ & RECORD LIFE TEST (150C, 5.75V)							
CY7C025-JC	KOREA-A	3531005	349522865	48	10	0	
CY7C025-JC	KOREA-A	3531005	349522865	80	10	0	
CY7C025-JC	KOREA-A	3531005	349522865	500	10	0	
STRESS: TEMP CYCLE, COND. C, -65 TO 150C, PRECONDITION DRY-BAKE							
CY7C025-JC	KOREA-A	3543592	349524484	300	48	0	
CY7C025-AC	KOREA-Q	3544800	349525183	300	50	0	

⁴ R28 technology, Dual Port SRAM (Rev. A).