

Cypress Semiconductor Qualification Report

QTP# 96295 VERSION 1.0

May, 1997

SST™ SONET/SDH Serial Transceiver

CY7B952

SST™ is a trademark of Cypress Semiconductor Corporation

PRODUCT DESCRIPTION (for qualification)			
Information provided in this document is intended for generic qualification and technically describes the Cypress part supplied:			
Marketing Part #:	CY7B952		
Package:	24 pins SOIC		
Device Description:	SST™ SONET/SDH Serial Transceiver		
Cypress Division:	Cypress Semiconductor Corporation - DCD Division		
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. A		
Die Size (stepping):	92 mils x 126 mils	What ID markings on Die:	7B952A

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500 Å Ti/1,200 Å TiW/6,000Å Al, 500 Å Ti Metal 2: 1,500K ÅTi/10,000 Å Al
Passivation Type and Materials:	3,000 Å TEOS + 15,000 Å Oxynitride		
Free Phosphorus contents in top glass layer(%):	0% PSG		
Die Coating(s), if used:	Polyimide		
Number of Transistors in device:	5,044		
Number of Gates in device:	2,522		
Generic Process Technology/Design Rule (μ-drawn):	BiCMOS, Single Poly, Double Metal /0.8 μm		
Gate Oxide Material/Thickness (MOS):	SiO ₂ / 195 Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX		
Die Fab Line ID/Wafer Process ID:	Fab 2/SM1		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	24-pin SOIC		
Mold Compound Name/Manufacturer:	Sumitomo EME-6300		
Lead Frame material:	Copper Alloy		
Lead Finish, composition:	Solder Plated, 85%Sn, 15%Pb		
Die Attach Area Plating:	Silver Spot		
Die Attach Method:	Epoxy	Die Attach Material:	Ablestik 84-1MISR4
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.3 mil
JESD22-A112 Moisture Sensitivity Level	Level 1		
Assembly Line ID and Process ID:	Cypress Bangkok, Thailand		

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 = 6.0V, 140°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc = 6.0V, 140°/150°C	P
Read and Record Life Test	Dynamic Operating Condition, Vcc = 6.0V, 140°C	P
High Temperature Steady State Life	Static Operating Condition, Vcc = 6.0V, 140°C	P
High Accelerated Saturation Test (HAST)	130°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
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	2,000V
Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF⁴	Failure Rate
High Temperature Operating Life Early Failure Rate	2,924 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2,3} Long Term Failure Rate	143,060 DHRs	0	0.6	82	79 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 Failure Rate is based on Sonet/SDH Serial Transceiver, SM1 technology (QTP #94112 and 96295).

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.

RELIABILITY TEST DATA

QTP#: 96295¹

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7B952-SC	ALPHA-X	2614689	219609418	48	92	0	
CY7B952-SC	ALPHA-X	2614689	219609418	48	916	0	
CY7B952-SC	ALPHA-X	2632033	219613230/1	48	1018	0	
STRESS: ESD-CHARGE DEVICE MODEL (2,000V)							
CY7B952-SC	ALPHA-X	2614689	219609418	COMP	3	0	
CY7B952-SC	ALPHA-X	2632033	219613230/1	COMP	3	0	
CY7B952-SC	ALPHA-X	2704576	219702881	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
CY7B952-SC	ALPHA-X	2614689	219609418	COMP	3	0	
CY7B952-SC	ALPHA-X	2632033	219613230/1	COMP	3	0	
CY7B952-SC	ALPHA-X	2704576	219702881	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 168 HRS 85C/85%RH							
CY7B952-SC	ALPHA-X	2614689	219609418	128	48	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)							
CY7B952-SC	ALPHA-X	2614689	219609418	80	80	0	
CY7B952-SC	ALPHA-X	2614689	219609418	168	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7B952-SC	ALPHA-X	2614689	219609418	80	130	0	
CY7B952-SC	ALPHA-X	2614689	219609418	500	130	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH							
CY7B952-SC	ALPHA-X	2614689	219609418	300	48	0	
CY7B952-SC	ALPHA-X	2614689	219609418	1000	48	0	

¹ SST (tm) SONET/SDH Serial Transceiver, CY7B951 with Receive Phase-Locked-Loop changed.

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 94112²

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7B951-SC	INDNS-O	2404788	49403198	48	116	0	
CY7B951-SC	INDNS-O	2404788	49404692	48	167	0	
CY7B951-SC	INDNS-O	2415730	49405533	48	615	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 85%RH, 5.5V), PRECONDITION 48 Hrs. PCT + Solder Reflow							
CY7B951-SC	INDNS-O	2404788	49403198	128	46	0	1 EOS
CY7B951-SC	INDNS-O	2415730	49405533	128	47	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)							
CY7B951-SC	INDNS-O	2404788	49403198	80	80	0	
CY7B951-SC	INDNS-O	2404788	49403198	168	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7B951-SC	INDNS-O	2404788	49403198	80	116	0	
CY7B951-SC	INDNS-O	2404788	49404692	80	116	0	
CY7B951-SC	INDNS-O	2415730	49405533	80	119	0	
CY7B951-SC	INDNS-O	2415730	49405533	500	119	0	1 EOS
STRESS: PRESSURE COOKER TEST (121C, 100%RH)							
CY7B951-SC	INDNS-O	2404788	49403198	168	47	0	
STRESS: TC COND. C, -65 TO 150C, Precondition 48 Hrs. PCT + Solder Reflow							
CY7B951-SC	INDNS-O	2404788	49403198	300	47	0	
CY7B951-SC	INDNS-O	2349133	10470	300	51	0	

² SST (tm) SONET/SDH Serial Transceiver, CY7B951 qualified in Fab2, SM1 Technology.