

Cypress Semiconductor Qualification Report

**QTP# 94047/95196/95481/96223 VERSION 1.0
September, 1999**

**HOTLink Transmitter - Fab2
CY7B923**

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT DESCRIPTION (for qualification)			
Information provided in this document is intended for generic qualification and technically describes the Cypress part supplied:			
Marketing Part #:	CYB923		
Package:	Plastic Lead Chip Carrier/Leadless Chip Carrier		
Device Description:	HOTlink Transmitter		
Cypress Division:	Cypress Semiconductor Corporation - DCD Division		
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. A		
Die Size (stepping):	126 mils x 131 mils	What ID markings on Die:	7B923A

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	2	Metal Composition:	Metal 1: Ti/TiW/Al Metal 2: Ti/Al
Passivation Type and Materials:	3,000A TEOS + 15,000A Oxynitride		
Free Phosphorus contents in top glass layer(%):	3%		
Die Coating(s), if used:	N/A		
Generic Process Technology/Design Rule (μ -drawn):	BiCMOS, Single Poly, Double Metal /0.8 μ m		
Gate Oxide Material/Thickness (MOS):	SiO ₂ / 195A°		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX		
Die Fab Line ID/Wafer Process ID:	Fab2/SM13		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	28-pins Plastic Lead Chip Carrier (JC)		
Mold Compound Name/Manufacturer:	Sumitomo EME-6000H		
Lead Frame material:	Copper Olin 151		
Lead Finish, composition:	Solder Plated, 85%Sn, 15%Pb		
Die Attach Area Plating:	Silver Spot		
Die Attach Method:	Paste	Die Attach Material:	Ablestik 84-1LMI
Wire Bond Method:	Thermosonic	Wire Material/Size:	Gold / 1.3 mil
JESD22-A112 Moisture Sensitivity Level	Level 1		
Assembly Line ID and Process ID:	Anam, Korea		

HERMETIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:	28-pin Square Leadless Chip Carrier (LC/LM)		
Lead Frame material:	Alloy 42		
Lead Finish, composition:	Solder Dipped, 63%Sn, 37%Pb		
Seal Material:	Glass		
Die Attach Method:	Paste	Die Attach Material:	Silver Glass
Wire Bond Method:	Ultrasonic	Wire Material/Size:	Aluminum / 1.25 mil
Name/Location of Assembly (prime) facility:	Cypress Bangkok, Thailand		
Assembly Line ID and Process ID:	ALPHA-X/49-15047		

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
Group C, subgroup 1 Life Test	Dynamic Operating Condition, Vcc = 5.75V, 150°C	P
Read and Record Life Test	Dynamic Operating Condition, Vcc = 5.75V, 150°C	P
High Temperature Steady State Life	Static Operating Condition, Vcc = 5.75V, 150°C	P
High Accelerated Saturation Test (HAST)	140°C, 85%RH, 5.5V Precondition: JESD22 Moisture Sensitivity Level 1 (168 Hrs , 85°C /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°C /85%RH)	P
Temperature Cycle - Hermetic Device	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	MIL-STD-883, Method 3015.7	4,400V (QTP 95481)
Electrostatic Discharge Charge Device Model (ESD-CDM)	Cypress Spec. 25-00020	2,000V (QTP 95481)
Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	P 11V (QTP 95481)

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Devive Hours	# Fails	Activation Energy	Thermal AF³	Failure Rate
High Temperature Operating Life Early Failure Rate	2,081 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	119,500 DHRs	1	1.0	170	100 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.

RELIABILITY TEST DATA

QTP#: 94047¹/95196²/95481³/96223⁴

EVAL #	DEVICE	ASSY-LOC	ASSYLOT#	FABLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)								
94047	CY7B923-LM	ALPHA-X	219409342	2419097	48	99	0	
94047	CY7B923-LM	ALPHA-X	219409342	2419097	48	408	0	
95196	CY7B923-JC	KOREA-A	349504850	2450975	48	1067	0	
94047	CY7B923-JC	KOREA-A	49404074	2406969	48	507	0	

STRESS: GROUP C, SUBGROUP 1, LIFE TEST (150C, 5.75V)								
94047	CY7B923-LMB	ALPHA-X	219407764	2406969	184	50	0	

STRESS: HI-ACCEL SATURATION TEST (140C, 85%RH, 5.5V), PRECONDITION 24 HRS PCT								
95481	CY7B923-JC	KOREA-A	349525476/7	2542409	128	50	0	

STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 168 HRS 85C/85%RH								
96223	CY7B923-JC	KOREA-A	349601976	2549388	128	50	0	
96223	CY7B923-JC	KOREA-A	349606225	2611204	128	50	0	
96223	CY7B923-JC	KOREA-A	349607225	2611204	128	42	0	

STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)								
94047	CY7B923-LM	ALPHA-X	219409342	2419097	168	80	0	
94047	CY7B923-JC	KOREA-A	49404074	2406969	168	78	0	

STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)								
94047	CY7B923-LM	ALPHA-X	219409342	2419097	80	120	0	
94047	CY7B923-LM	ALPHA-X	219409342	2419097	500	120	0	
94047	CY7B923-JC	KOREA-A	49404074	2406969	80	120	1 1	IONIC CONTAMINATION
94047	CY7B923-JC	KOREA-A	49404074	2406969	500	119	0	

STRESS: PRESSURE COOKER TEST (121C, 100%RH)								
94047	CY7B923-JC	KOREA-A	49404074	2406969	168	48	0	

STRESS: READ & RECORD LIFE TEST (150C, 5.75V)								
94047	CY7B923-JC	KOREA-A	49404074	2406969	48	10	0	
94047	CY7B923-JC	KOREA-A	49404074	2406969	80	10	0	
94047	CY7B923-JC	KOREA-A	49404074	2406969	500	10	0	

¹ QTP 94047, CY7B923, SM13 Technology fabricated in FAB 2.

² QTP 95196, CY7B923, SM13 Technology, FAB 2, Burn-in Elimination.

³ QTP 95481, CY7B923 FAB 2, Single Logic Gate fixed and Layout changed.

⁴ QTP 96223, CY7B923 FAB 2, Moisture Sensitivity Level upgraded to Level 1. (Dry bake and dry pack elimination).

RELIABILITY TEST DATA

QTP#: 94047/95196/95481/96223

EVAL #	DEVICE	ASSY-LOC	ASSYLOT#	FABLOT#	DURATION	S/S	REJ	FAIL	MODE

STRESS: TC COND. C, -65 TO 150C, HERMETIC DEVICES									
94047	CY7B923-LM	ALPHA-X	219409342	2419097	100	50	0		
94047	CY7B923-LM	ALPHA-X	219409342	2419097	1000	50	0		

STRESS: TEMP CYCLE, COND. C, -65 TO 150C, PRECONDITION 48 HRS PCT									
95481	CY7B923AT-JC	KOREA-A	349525476/7	2542409	300	50	0		

STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH									
96223	CY7B923-JC	KOREA-A	349601845/6/7	2549388	300	78	0		
96223	CY7B923-JC	KOREA-A	349607225	2611204	300	50	0		
96223	CY7B923-JC	KOREA-A	349525476/7	2542409	300	50	0		
