Cypress Semiconductor
Product Qualification Report

QTP# 001406 VERSION 1.1
March, 2001

enCoRe™ USB Family P26TLM Technology, Fab 2-CTI	
CY7C63221/CY7C63231	Low Speed USB Peripheral Controller
CY7C63722/CY7C63723 CY7C63742/CY7C63743	Combination Low Speed USB & PS/2 Peripheral Controller

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
99273	New P26 with TML Technology, Fab 2 Qualification	Oct 99
99385	New Product CY7C6374*	Apr 00
001406	Mask Change to Enhance Functionality	Apr 00

PRODUCT DESCRIPTION (for qualification)			
Qualification Purpose: To qualify CY7C63221/31 and its enCoRe™ USB product family.			
Marketing Part #:	CY7C63221/CY7C63231/CY7C63722/CY7C63723/CY7C63742/CY7C63743		
Device Description:	Low Speed Microcontrollers, 5V, available in 16/18/24-pin PDIP and 18/24-pin SOIC Package.		
Cypress Division:	Cypress Semiconductor Corporation – Programmable Logic Division (PLD)		
Overall Die (or Mask) REV:		Rev. B	
Die Size:	75.1 mils x 118.5 mils	What ID markings on Die:	7C6370A

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	3	Metal Composition:	Metal 1: 6000Å Al, 1200 Å TiW Metal 2: 1500Å TiW, 9000Å Al, 320Å TiW Metal 3: 320 ÅTiW/10000 ÅAl/1500Å TiW
Generic Process Technology/Design Rule (µ-drawn):	Triple Metal / 0.65µm		
Gate Oxide Material/Thickness (MOS):	SiO_2 / 65 Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX (Fab2)		
Die Fab Line ID/Wafer Process ID:	Fab 2/ P26TLM		

PACKAGE AVAILABILITY

PACKAGE TYPE	ASSEMBLY SITE FACILITY
18-lead/24-lead PDIP	**INDNS-O**
24-lead SOIC	**CSPI-R**

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	S24312
Package Outline, Type, or Name:	24-lead, Plastic Small Outline IC (SOIC)
Mold Compound Name/Manufacturer:	Sumitomo EME-6300H
Mold Compound Flammability Rating:	V-O per UL 94
Oxygen Rating Index:	> 28%
Lead Frame Designation:	Copper
Lead Frame Material:	Copper Alloy
Lead Finish, Composition / Thickness:	Solder Plated, 90%Sn, 10%Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	84-1MISR4
Bond Diagram Designation	10-03753
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.3um
Thermal Resistance Theta JA °C/W:	68°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	11-20008M
Name/Location of Assembly (prime) facility:	Cypress Philippines (CSPI-R)

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	Cypress Philippines (CSPI-R)
Fault Coverage:	100%

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	1) QTP #99273, QTP #99385 Dynamic Operating Condition, Vcc = 5.75V, 150°C	P
High Temperature Operating Life Latent Failure Rate	1) QTP #99273 Dynamic Operating Condition, Vcc = 5.75V, 150°	P
High Accelerated Saturation Test (HAST)	1) QTP #99273 130°C/140°/5.5V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85°C/85%RH+ 3IR-Reflow, 220°C+ 5, -0°C	P
Temperature Cycle	1) QTP #99273, QTP #99385 MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 1 168 hrs, 85°C/85%RH+ 3IR-Reflow, 220°C+ 5, -0°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1) QTP #001406, QTP #99273, QTP #99385 2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	1) QTP #001406, QTP #99273, QTP #99385 500V Cypress Spec. 25-00020	P
Extended Dynamic Burn-in	1) QTP #99273 Dynamic Operating Condition 150°C, 5.75V	P
Long Life Verification	1) QTP #99273 150°C, 5.75V Cypress Spec. 29-00020	P
Pressure Cooker	1) QTP #99273, QTP #99385 121°C/100%RH Precondition: JESD22 Moisture Sensitivity MSL 1 168 hrs, 85°C/85%RH+ 3IR-Reflow, 220°C+ 5, -0°C	P

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS (continuation)

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Storage	1) QTP #99273 165°C, No Bias	P
Data Retention	1) QTP #99273 165°C	P
Age Bond Strength	1) QTP #99273 MIL-STD-883, Method 2011	P
Acoustic Microscopy, MSL1	1) QTP #99273 Cypress Spec 25-000104	P
SEM X-Section	1) QTP #99273 MIL-STD-883, Method 2018-2	P
Static Latch-up Sensitivity	1) QTP #001406, QTP #99273, QTP #99385 In accordance with JEDEC 17. Cypress Spec. 01-00081, 125C,± 300mA	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Acceleration Factor[3]	Failure Rate[4]
High Temperature Operating Life Early Failure Rate	4,158	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	189,600 DHRs	0	0.7	170	28 FIT

[1] Assuming an ambient temperature of 150°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] **EFR based on QTP 99273/99385**
LFR based on QTP 99273, P26 with TML Technology Qualification

Reliability Test Data

QTP #: 001406

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 1,000V							
CY7C6374*-SC	2003621	*610011927*	CSPI-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015							
CY7C6374*-SC	2003621	*610011927*	CSPI-R	2200V	4	0	
CY7C6374*-SC	2003621	*610011927*	CSPI-R	3300V	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 9.5V, +/-300mA							
CY7C6374*-SC	2003621	*610011927*	CSPI-R	COMP	3	0	

Reliability Test Data

QTP #: 99385

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RAT, 150C, 5.75V, Vcc Max							
CY7C6323*-PC	2952160	*510001694/5/6*	INDNS-O	48	551	0	
CY7C6374*-SC	2952160	*610004113*	CSPI-R	48	529	0	
STRESS: ESD-CHARGE DEVICE MODEL, 1,00V							
CY7C6323*-PC	2952160	*510001694/5/6*	INDNS-O	COMP	3	0	
CY7C6374*-SC	2952160	*610004113*	CSPI-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 3,300V							
CY7C6374*-SC	2952160	*610004113*	CSPI-R	COMP	3	0	
STRESS: PRESSURE COOKER TEST, (121C, 100%RH), PRE COND 168 HR 85C/85%RH, MSL1							
CY7C6323*-PC	2952160	*510001694/5/6*	INDNS-O	168	50	0	
CY7C6374*-SC	2952160	*610004113*	CSPI-R	168	50	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 12V, +/-300mA							
CY7C6374*-SC	2952160	*610004113*	CSPI-R	COMP	3	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 168 HRS 85C/85%RH, MSL1							
CY7C6323*-PC	2952160	*510001694/5/6*	INDNS-O	300	50	0	
CY7C6323*-PC	2952160	*510001694/5/6*	INDNS-O	500	50	0	
CY7C6374*-SC	2952160	*610004113*	CSPI-R	300	50	0	
CY7C6374*-SC	2952160	*610004113*	CSPI-R	500	50	0	
CY7C6374*-SC	2952160	*610004113*	CSPI-R	1000	50	0	

RELIABILITY TEST DATA

QTP#: 99273

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: DATA RETENTION, 165C							
7C6399AT	CSPI-R	2920309	619918583	168	78	0	
7C6399AT	CSPI-R	2920309	619918583	552	78	0	
7C6399AT	CSPI-R	2931408	619927766	168	81	0	
7C6399AT	CSPI-R	2931408	619927766	552	81	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 5.75V							
7C6399AT	INDNS-O	2920309	519911818/19/20	48HRS	978	0	
7C6399AT	CSPI-R	2931408	519915664/5756/	48	1000	0	
7C6399AT	CSPI-R	2920309	619918583	48	1100	0	
STRESS: ESD-CHARGE DEVICE MODEL, 1000V							
7C6399AT	CSPI-R	2920309	619918583	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2200V							
7C6399AT	CSPI-R	2920309	619918583	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C/85%RH/5.5V), PRECOND. 168 HRS 85C/85%RH, MSL1							
7C6399AT	CSPI-R	2920309	619918583	128	50	0	
7C6399AT	CSPI-R	2931408	619927766	128	49	0	
STRESS: HIGH TEMPERATURE STORAGE, 165C, NO BIAS							
7C6399AT	CSPI-R	2920309	619918583	336	46	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 5.75V							
7C6399AT	INDNS-O	2920309	519911818/19/20	80	120	0	
7C6399AT	INDNS-O	2920309	519911818/19/20	500	120	0	
7C6399AT	CSPI-R	2931408	519915664/5756/	80	120	0	
STRESS: EXTENDED DYNAMIC BURN-IN, 150C, 5.75V							
7C6399AT	CSPI-R	2920309	619918583	1000	120	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, MSL1							
7C6399AT	CSPI-R	2920309	619918583	168	47	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH, MSL 1							
7C6399AT	CSPI-R	2920309	619918583	300	45	0	