

Cypress Semiconductor Qualification Report

QTP# 99464 VERSION 1.1
May, 2003

Low Speed, 1.5 Mbps USB Controller

CY7C63411/63511	256 Bytes of RAM with 4Kbytes EPROM (High I/O)
CY7C63412/63512/63612	256 Bytes of RAM with 6Kbytes EPROM (High I/O)
CY7C63413/63513/63613	256 Bytes of RAM with 8Kbytes EPROM (High I/O)

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: To qualify Low Speed, 1.5 Mbps USB Controller family (Rev B) with a single layer (Metal1) circuit fix to simplify the USB receiver block and make the circuit less susceptible to Vcc noise. This product family was originally qualified by QTPs 98365 and 97219	
Marketing Part #:	CY7C6341*/CY7C6351*/CY7C6361*
Package:	40 pins PDIP (CY7C6341*) 48 pins SSOP (CY7C6351*) & (CY7C6341*) 24 pins SOIC (CY7C6361*)
Device Description:	Low Speed, High I/O 1.5 Mbps USB Controller
Cypress Division:	Cypress Semiconductor Corporation - CPD Division
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. C
What ID markings on Die:	7C6341A

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 6000Å Al, 1200 Å TiW Metal 2: 1500Å TiW, 9000Å Al, 320Å TiW
Passivation Type and Materials:	Oxynitride		
Free Phosphorus contents in top glass layer(%):	None		
Die Coating(s), if used:	N/A		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Double Poly, Double Metal / 0.65μm		
Gate Oxide Material/Thickness (MOS):	SiO ₂ / 165 Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX (Fab2)		
Die Fab Line ID/Wafer Process ID:	Fab 2/ P26		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION			
Package Outline, Type, or Name:		48 Pins SSOP 40 Pins PDIP 24 Pins SOIC	
Mold Compound Name/Manufacturer:		Hitachi CEL-9200 Sumitomo EME-6300	
Lead Frame material:	Copper		
Lead Finish, composition:	Solder Plated, 85%Sn, 15%Pb		
Die Attach Area Plating:	Solder Plate		
Die Attach Method:	Epoxy	Die Attach Material:	Ablestik 8361
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 Philippines (SSOP/SOIC) Omedata, Indonesia (PDIP)		

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

RELIABILITY TESTS PERFORMED

This change is qualified based on comparison of parametric data and sort yields

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	1042 Devices	0	n/a	n/a	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	67,600 DHRs	0	0.7	170	80 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 = 8.62×10^{-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 Long Term Failure Rate was based on Low Speed High I/O USB Controller qualification, Qtp #97219.

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 98365¹

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7C63413-PC	INDNS-O	2842561	519815333/4/5	48	1042	0	
STRESS: ESD-CHARGE DEVICE MODEL (1,100V)							
CY7C63513-PVC	CSPI-R	2842561	619815466	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
CY7C63513-PVC	CSPI-R	2842561	619815466	COMP	3	0	

¹ QTP 98365, Low-Speed, High I/O 1.5 Mbps USB Controller, Rev A, P26 Technology qualification.

DEVICE RELATED RELIABILITY TEST DATA

QTP#: 97219²

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: DATA BAKE-PLASTIC (165C, NO BIAS)							
CY7C63413-PC	INDNS-O	2725106	519707719/20/21	552	76	0	
CY7C63413-PC	INDNS-O	2725106	519707719/20/21	168	76	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7C63413-PC	INDNS-O	2725106	519707719/20/21	48	410	0	
CY7C63413-PC	INDNS-O	2725106	519707719/20/21	48	614	0	
CY7C63413-PC	INDNS-O	2725152	519707928/929/9	48	510	0	
CY7C63413-PC	INDNS-O	2725152	519707928/929/9	48	510	0	
STRESS: ESD-CHARGE DEVICE MODEL (1000V)							
CY7C63513-PVC	CSPI-R	2725106	619705203/4/5	COMP	3	0	
CY7C63513-PVC	CSPI-R	2725152A	619708276	COMP	3	0	
CY7C63513-PVC	CSPI-R	2725152A	619708309	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (4400V)							
CY7C63513-PVC	CSPI-R	2725106	619705203/4/5	COMP	3	0	
CY7C63513-PVC	CSPI-R	2725152A	619708309	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 168 HRS 85C/85%RH							
CY7C63513-PVC	CSPI-R	2725106	619705203/4/5	128	45	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.25V)							
CY7C63413-PC	INDNS-O	2725106	519707719/20/21	80	76	0	
CY7C63413-PC	INDNS-O	2725106	519707719/20/21	168	76	0	
CY7C63413-PC	INDNS-O	2725152	519707928/929/9	80	76	0	
CY7C63413-PC	INDNS-O	2725152	519707928/929/9	168	76	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7C63413-PC	INDNS-O	2725106	519707719/20/21	80	116	0	
CY7C63413-PC	INDNS-O	2725106	519707719/20/21	500	116	0	
CY7C63413-PC	INDNS-O	2725152	519707928/929/9	80	120	0	
STRESS: READ & RECORD LIFE TEST (150C, 5.75V)							
CY7C63413-PC	INDNS-O	2725106	519707719/20/21	500	10	0	
CY7C63413-PC	INDNS-O	2725152	519707928/929/9	500	10	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH							
CY7C63513-PVC	CSPI-R	2725106	619705203/4/5	300	46	0	
CY7C63513-PVC	CSPI-R	2725106	619705203/4/5	1000	46	0	
CY7C63513-PVC	CSPI-R	2725152	619705383	300	45	0	
CY7C63513-PVC	CSPI-R	2725152	619705383	1000	45	0	

² QTP 97219, Low Speed High I/O USB Controller in P26 technology.