

Cypress Semiconductor Qualification Report

**QTP# 97461, VERSION 1.0
April, 1998**

3.3V, Light Device 16-Bit FCT Family

CY74FCT163LD*/CY74FCT163LDH*

PRODUCT/TECHNOLOGY/FAB DESCRIPTION

PRODUCT DESCRIPTION (for qualification)			
Information provided in this document is intended for generic qualification and technically describes the Cypress part supplied: All CY74FCT163LD* and CY74FCT163LDH* in commercial, plastic package.			
Marketing Part #:	CY74FCT163LD*		
Package:	56-pin SSOP		
Device Description:	FCT 16-Bit, 3.3V, L31 Technology		
Cypress Division:	Cypress Semiconductor Corporation - CPD Division		
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. B		
Die Size (stepping):	59 mils x 89 mils	What ID markings on Die:	7C73590B7C73690B

TECHNOLOGY/FAB PROCESS DESCRIPTION - L31			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500Å TiW, 6,000Å Al/0.5%Cu 1,200Å TiW Metal 2: 500Å TiW, 9,000Å Al/0.5%Cu 1,200Å TiW
Passivation Type and Materials:	7,000Å TEOS + 6,000Å Si ₂ N ₄		
Free Phosphorus contents in top glass layer(%):	4-5%		
Die Coating(s), if used:	n/a		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Single Poly, Double Metal /0.5 μm		
Gate Oxide Material/Thickness (MOS):	SiO ₂ / 145 Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab4/L31		

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION

Package Outline, Type, or Name:	56-pin TSSOP		
Mold Compound Name/Manufacturer:	Shinetsu KMC-184VA		
Lead Frame material:	Copper		
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:	OSE, Taiwan		

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

RELIABILITY TESTS PERFORMED

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Electrostatic Discharge Human Body Model (ESD-HBM)	MIL-STD-883, Method 3015.7	P @ 1,100V ¹
Electrostatic Discharge Charge Device Model (ESD-CDM)	Cypress Spec. 25-00020	P 2,000V
Latchup Sensitivity	In accordance with JEDEC 17. Cypress Spec. 01-00081	8V

¹ The device does not meet Cypress Standard of 2,200V ESD HBM. Permanent corrective action has been implemented, the product family will be transferred to R42 technology in Q298.

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Deve Hours	# Fails	Activation Energy	Thermal AF³	Failure Rate⁴
High Temperature Operating Life Early Failure Rate	2051	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	128,000	0	0.7	170	42 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.

⁴ Failure rate is based on 16-bit FCT product family qualified in R30 technology (L31 technolgy is a subset of R30 technology)

DEVICE RELATED RELIABILITY TEST DATA

QTP #: 96494²

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.6V)							
CY74FCT163952TPVC	MALAY-U	4648487	349701564	48	762	0	
STRESS: ESD-CHARGE DEVICE MODEL (1,500V)							
CY74FCT163952TPVC	MALAY-U	4648487	349701564	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
CY74FCT163952TPVC	MALAY-U	4648487	349701564	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 3.6V), PRECOND. 168 HRS 85C/85%RH							
CY74FCT163952TPVC	MALAY-U	4648487	349701564	128	40	0	1 EOS
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 3.6V)							
CY74FCT163952TPVC	MALAY-U	4648487	349701564	80	78	0	
CY74FCT163952TPVC	MALAY-U	4648487	349701564	168	78	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 3.6V)							
CY74FCT163952TPVC	MALAY-U	4648487	349701564	80	128	0	
CY74FCT163952TPVC	MALAY-U	4648487	349701564	500	128	0	
STRESS: READ & RECORD LIFE TEST (150C, 3.6V)							
CY74FCT163952TPVC	MALAY-U	4648487	349701564	500	10	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH							
CY74FCT163952TPVC	MALAY-U	4648487	349701564	300	48	0	
CY74FCT163952TPVC	MALAY-U	4648487	349701564	1000	48	0	

² 3.3V, 16-bit FCT family qualified in R30 technology.

DEVICE RELATED RELIABILITY TEST DATA

QTP #: 96475³

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	48	63	0	
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	48	96	0	
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	48	128	0	
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	48	186	0	
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	48	192	0	
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	48	192	0	
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	48	192	0	
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	48	240	0	
STRESS: ESD-CHARGE DEVICE MODEL, 2000V							
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2200V							
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 5.5V), PRECOND. 168 HRS 85C/85%RH							
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	128	45	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)							
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	80	78	0	
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	168	78	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	80	128	0	
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	500	128	0	
STRESS: READ & RECORD LIFE TEST (150C, 5.75V)							
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	80	10	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH							
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	300	45	0	
CY74FCT16827TPVC	MALAY-U	4647440	4647440 (SWR)	1000	45	0	

³ 3.3V, 16-bit FCT family qualified in R30 technology