

# **Cypress Semiconductor Qualification Report**

**QTP# 99034, VERSION 1.0  
March, 1999**

**5V, 8/10 Bit FCT-T  
L28EPD Technology – Fab 2**

**CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:**

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**PRODUCT/TECHNOLOGY/FAB DESCRIPTION**

<b>PRODUCT DESCRIPTION (for qualification)</b>			
Purpose: To qualify 5V, 8/10 Bit FCT-T products in Fab2 with L28EPD Technology.			
Marketing Part #:	CY54/74FCT543T		
Package:	24-pin SOIC		
Device Description:	8-Bit Latched Registered Transceiver		
Cypress Division:	Cypress Semiconductor Corporation – CPD Division		
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. A		
Die Size (stepping):	72 mils x 74 mils	What ID markings on Die:	7C7112A

<b>TECHNOLOGY/FAB PROCESS DESCRIPTION - L28EPD</b>			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500A Ti/1,200A TiW/6,000A Al/1,200A TiW Metal 2: 1,500A TiW/10,000A Al/150A Ti
Passivation Type and Materials:	3,000A TEOS + 15,000A Si <sub>2</sub> N <sub>4</sub>		
Free Phosphorus contents in top glass layer(%):	n/a		
Die Coating(s), if used:	n/a		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Single Poly, Double Metal /0.65 μm		
Gate Oxide Material/Thickness (MOS):	SiO <sub>2</sub> / 145 Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor – Round Rock, Texas		
Die Fab Line ID/Wafer Process ID:	Fab2/L28EPD		

**PLASTIC PACKAGE/ASSEMBLY DESCRIPTION**

Package Outline, Type, or Name:	24-pin SOIC		
Mold Compound Name/Manufacturer:	Sumitomo EME 6300		
Lead Frame material:	Copper		
Lead Finish, composition:	Solder Plated, 90%Sn, 10%Pb		
Die Attach Area Plating:	Silver Spot		
Die Attach Method:	Epoxy	Die Attach Material:	Ablestik 8361H
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 (CSPI-R)		

**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
High Temperature Steady State Life	Static Operating Condition, Vcc = 5.5V, 150°C	P
High Accelerated Saturation Test (HAST)	140°C, 85%RH, 3.63V Precondition: JESD22 Moisture Sensitivity Level 1 (168 Hrs, 85C/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, 85C/85%RH)	P
Pressure Cooker Test	No bias, 121°C, 100%RH	P
High Temp Storage	165°C, no bias	P
Acoustic Microscopy	Cypress, 25-00104	P
Cold Life Test	-30C, 6.5V	P
Cross Section		P
Latchup Sensitivity - Static	In accordance with JEDEC 17. Cypress Spec. 01-00081	11V
Electrostatic Discharge Human Body Model (ESD-HBM)	MIL-STD-883, Method 3015.7	2200V
Electrostatic Discharge Charge Device Model (ESD-CDM)	Cypress Spec. 25-00020	1,000V

**RELIABILITY FAILURE RATE SUMMARY**

Stress/Test	Device Tested/ Devive Hours	# Fails	Activation Energy	Thermal AF <sup>3</sup>	Failure Rate
High Temperature Operating Life Early Failure Rate	1204	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	209,980 DHR	0	0.7	170	26 FIT

<sup>1</sup> Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

<sup>2</sup> Chi-squared 60% estimations used to calculate the failure rate.

<sup>3</sup> 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<sub>A</sub> =The Activation Energy of the defect mechanism.

k = Boltzmann's constant = 8.62x10<sup>-5</sup> eV/Kelvin.

T<sub>1</sub> is the junction temperature of the device under stress and T<sub>2</sub> is the junction temperature of the device at use conditions.

**RELIABILITY TEST DATA**

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DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
<b>STRESS: ACOUSTIC MICROSCOPY</b>							
CY74FCT543TSOC	CSPI-R	2817681	619806310/1	COMP	15	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)</b>							
CY74FCT543TSOC	CSPI-R	2843665	619815038	48	524	0	
CY74FCT543TSOC	CSPI-R	2844756	619817235/6/7	48	340	0	
CY74FCT543TSOC	CSPI-R	2845878	619817238/9	48	340	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL (1000V)</b>							
CY74FCT543TSOC	CSPI-R	2843665	619815038	COMP	3	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2200V)</b>							
CY74FCT543TSOC	CSPI-R	2843665	619815038	COMP	3	0	
<b>STRESS: HI-ACCEL SATURATION TEST (130C, 5.5V), PRECOND. 168 HRS 85C/85%RH</b>							
CY74FCT543TSOC	CSPI-R	2843665	619815038	128	48	0	
CY74FCT543TSOC	CSPI-R	2845878	619817238/9	128	50	0	
<b>STRESS: HIGH TEMPERATURE STORAGE (165C, NO BIAS)</b>							
CY74FCT543TSOC	CSPI-R	2843665	619815038	336	48	0	
<b>STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)</b>							
CY74FCT543TSOC	CSPI-R	2843665	619815038	80	80	0	
CY74FCT543TSOC	CSPI-R	2843665	619815038	168	80	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)</b>							
CY74FCT543TSOC	CSPI-R	2843665	619815038	80	524	0	
CY74FCT543TSOC	CSPI-R	2843665	619815038	500	118	0	
CY74FCT543TSOC	CSPI-R	2844756	619817235/6/7	80	118	0	
CY74FCT543TSOC	CSPI-R	2844756	619817235/6/7	500	118	0	
CY74FCT543TSOC	CSPI-R	2845878	619817238/9	80	119	0	
CY74FCT543TSOC	CSPI-R	2845878	619817238/9	500	119	0	
<b>STRESS: COLD LIFE TEST (-30C, 6.5V)</b>							
CY74FCT543TSOC	CSPI-R	2843665	619815038	500	47	0	
<b>STRESS: PRESSURE COOKER TEST (121C, 100%RH)</b>							
CY74FCT543TSOC	CSPI-R	2843665	619815038	168	48	0	
CY74FCT543TSOC	CSPI-R	2843665	619815038	288	48	0	

**RELIABILITY TEST DATA**

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<b>DEVICE</b>	<b>ASSY-LOC</b>	<b>FABLOT#</b>	<b>ASSYLOT#</b>	<b>DURATION</b>	<b>S/S</b>	<b>REJ</b>	<b>FAIL MODE</b>
<b>STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH (MSL 1)</b>							
CY74FCT543TSOC	CSPI-R	2816631	619805959/60/61	300	48	0	
CY74FCT543TSOC	CSPI-R	2816631	619805959/60/61	1000	48	0	
CY74FCT543TSOC	CSPI-R	2817681	619806310/1	300	47	0	
CY74FCT543TSOC	CSPI-R	2817681	619806310/1	1000	47	0	
CY74FCT543TSOC	CSPI-R	2843665	619815038	300	48	0	
CY74FCT543TSOC	CSPI-R	2845878	619817238/9	300	50	0	