Cypress Semiconductor
Qualification Report

QTP# 97114, VERSION 1.0
August, 1997

Peripheral Controller with USB Support
CY82C693U in 208 Pins PQFP

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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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:		
Marketing Part #:	CY82693U	
Package:	208-pin PQFP	
Device Description:	Peripheral Controller with USB Support	
Cypress Division:	Cypress Semiconductor Corporation - CPD Division	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. U
What ID markings on Die:	82C693U	

TECHNOLOGY/FAB PROCESS DESCRIPTION - L27			
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:		7,000A TEOS + 6,000A Si_2N_4	
Free Phosphorus contents in top glass layer(%):		N/A	
Die Coating(s), if used:		N/A	
Number of Transistors in device:		11,264	
Number of Gates in device:		2,816	
Generic Process Technology/Design Rule (μ-drawn):		CMOS, Single Poly, Double Metal /0.65 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:		Fab3/L27	

PLASTIC PACKAGE/ASSEMBLY DESCRIPTION

Package Outline, Type, or Name:	208-pin Plastic Quad Flat Pack (PQFP)		
Mold Compound Name/Manufacturer:	NITO MP-7100		
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 5		
Assembly Line ID and Process ID:	ASE, Malaysia		

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
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)	130°C, 85%RH, 5.5V Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs. 30°C/60%RH	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs. 30°C/60%RH	See Note
Thermal Shock	Cypress Spec. 25-00014	P
X-Ray	MIL-STD-883 - 2012; Cypress Spec 12-000149	P
High Temp Storage	165°C, no bias	P
Die Shear	Cypress Spec 24-00004	P
Ball Shear	Cypress Spec 24-00018	P
Bond Pull	Cypress Spec 24-00002	P
Physical Dimension	Cypress Spec. 25-00031	P
Resistance to Solvents	Cypress Spec. 25-00016	P
Solderability, Steam Aged	Cypress Spec. 25-00018	P
Internal Visual	Cypress Spec 25-00017	P
External Visual	Cypress Spec 12-00102/12-00103	P

Note: Two out of 3 lots passed Level 3 preconditioning and electrical test after 1000 Condition C Temperature Cycles. However, the qual does not meet Cypress's requirement to ship with Level 3 (3 lots pass electrical test after 1000 cyles and C-SAM must be completed on samples from 3 lots through 1000 cycles). The CY82693U in 208 pins PQFP is shipping with Level 5 Moisture Sensitivity.

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Devive Hours	# Fails	Activation Energy	Thermal AF[3]	Failure Rate
High Temperature Operating Life Early Failure Rate	246	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	78,000	0	0.7	170	69 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.

RELIABILITY TEST DATA

QTP #: 97114[1]/97135[2]

EVAL #	DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)								
97114	CY82C693U-NC	ASE-J	3708092	619701790	48	122	0	3 EOS
97114	CY82C693U-NC	ASE-J	3708057	619701791	48	124	0	1 EOS
STRESS: HI-ACCEL SATURATION TEST (130C, 5.5V), PRECOND. 192 HRS 30C/60%RH								
97114	CY82C693U-NC	ASE-J	3708092	619701790	128	48	0	
97114	CY82C693U-NC	ASE-J	3708092	619701790	256	48	0	
STRESS: HIGH TEMPERATURE STORAGE (165C, NO BIAS)								
97135	CY82C693U-NC	ASE-J	3711379	349703236	336	45	0	
97135	CY82C693U-NC	ASE-J	3711379	349703236	500	45	0	
97135	CY82C693U-NC	ASE-J	3711379	349703236	1000	44	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.75V)								
97114	CY82C693U-NC	ASE-J	3708092	619701790	80	122	0	2 EOS
97114	CY82C693U-NC	ASE-J	3708092	619701790	168	152	0	
97114	CY82C693U-NC	ASE-J	3708057	619701791	80	76	0	
97114	CY82C693U-NC	ASE-J	3708057	619701791	168	76	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)								
97114	CY82C693U-NC	ASE-J	3708092	619701790	80	78	0	
97114	CY82C693U-NC	ASE-J	3708092	619701790	500	78	0	
97114	CY82C693U-NC	ASE-J	3708057	619701791	80	78	0	
97114	CY82C693U-NC	ASE-J	3708057	619701791	500	78	0	
STRESS: READ & RECORD LIFE TEST (150C, 5.75V)								
97114	CY82C693U-NC	ASE-J	3708092	619701790	48	9	0	
97114	CY82C693U-NC	ASE-J	3708092	619701790	80	9	0	
97114	CY82C693U-NC	ASE-J	3708092	619701790	500	9	0	
STRESS: TC COND. C, -65 TO 150C, PRECOND. 192 HRS 30C/60%RH								
97114	CY82C693U-NC	ASE-J	3711379	349703236	300	48	0	
97114	CY82C693U-NC	ASE-J	3708092	619701790	300	47	0	
97114	CY82C693U-NC	ASE-J	3708092	619701790	1000	47	0	
97114	CY82C693U-NC	ASE-J	3708057	619701791	300	48	0	
97114	CY82C693U-NC	ASE-J	3708057	619701791	1000	48	0	
STRESS: THERMAL SHOCK, CONDITION B								
97135	CY82C693U-NC	ASE-J	3708092	619701790	100	48	0	
97135	CY82C693U-NC	ASE-J	3708092	619701790	200	48	0	

[1] QTP 97114, CY82693U, L27 Technology qualified in Fab 3

[2] QTP 97135, 208 Pins PQFP qualified in level 3 at ASE, Malaysia.