

Cypress Semiconductor Product Qualification Report

QTP# 051101 VERSION 1.0
May 2005

FastEdge™ Series	
B55SGT Technology, Fab 4	
CY2DP3110	1 of 2:10 Differential Clock/Data Fanout Buffer
CY2DP314	1 of 2:4 Differential Clock/Data Fanout Buffer

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

Sabbas Daniel
Quality Engineering Director
(408) 943-2685

Fredrick Whitwer
Principal Reliability Engineer
(408) 943-2722

PACKAGE QUALIFICATION HISTORY

QUAL REPORT	DESCRIPTION OF QUALIFICATION PURPOSE	DATE COMP.
015104	New Technology B55SGT18A using New Device, CY2DP3110A1 HF Buffer Family	May 03
024307	7B8P3110AC HF Buffer Family, 55SGT18A , Fab4	Nov 03
051101	7B83110BC Mask Option using B55SG Technology	Apr 05

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify 7B83110BC HF Buffer Family, B55SGT Technology @Fab4	
Marketing Part #:	CY2DP3110, CY2DP314
Device Description:	3.3V, Industrial available in 32-Pin TQFP and 20-Pin SSOP
Cypress Division:	Timing Technology Division
Overall Die (or Mask) REV Level (prerequisite for qualification):	REV. A
What ID markings on Die:	7B83110A

TECHNOLOGY/FAB PROCESS DESCRIPTION – B55STG		
Number of Metal Layers: 3	Metal Composition	M1: 500Å TiW / 6000Å Al / 500Å TiW M2: 500Å TiW / 8000Å Al / 500Å TiW M3: 500Å TiW / 40,000Å Al / 300Å TiW
Passivation Type and Materials:	4000Å TEOS / 9000Å Si3N4	
Free Phosphorus contents in top glass layer (%):	0%	
Number of Transistors in Device	Maximum Available in Base: 100,000 Transistors Average Design: 60,000 transistors	
Number of Gates in Device:	Maximum Available: 25,000 Average design: 15,000	
Generic Process Technology/Design Rule (μ-drawn)	CMOS (0.21 – 0.35 μm), SiGe Bipolar	
Gate Oxide Material/Thickness (MOS):	SiO2, 45Å	
Bipolar Isolation	STI	
Base/Emitter	SiGe / N+ Poly	
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor – Bloomington, MN (CMI)	
Die Fab Line ID/ Wafer Process ID:	Fab 4/ B55SGT	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
32-Pin TQFP	Anam - Korea (Q), ASE- Taiwan (G)
20-Pin SSOP	Amkor-Phil (M)

Note: Package Qualification details are available upon request.

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	AZ32
Package Outline, Type, or Name:	32-Lead Thin Quad Flat Package (TQFP)
Mold Compound Name/Manufacturer:	G700L Sumitomo
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	>28%
Lead Frame Material:	Copper Alloy
Lead Finish, Composition / Thickness:	Pure Sn (Tin)
Die Backside Preparation Method/Metallization:	Grinding
Die Separation Method:	Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	3230
Die Attach Method:	Epoxy
Bond Diagram Designation	10-05979
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au 1.2 mil
Thermal Resistance Theta JA °C/W:	88°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-10011
Name/Location of Assembly (prime) facility:	Seoul - KOREA (Q)

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	Cypress Philippines (CML-R)
Fault Coverage:	99.8%

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

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Acoustic Microscopy	Cypress Spec. 25-00104	P
Aged Bond Strength	200 °C, 4 Hrs MIL-STD-833, Method 883-2011	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JESD22, Method A114-B	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V Cypress Spec. 25-00020	P
High Accelerated Saturation Test (HAST)	130 °C, 2.75V, 3.08V 85%RH Precondition: JESD22 Moisture Sensitivity MSL 5 72 Hrs., 30°C/60%RH+3IR-Reflow, 220 °C+0, -5 °C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65 °C to 150 °C Precondition: JESD22 Moisture Sensitivity MSL-5 72 Hrs., 30°C/60%RH+3IR-Reflow, 220 °C+0, -5 °C Precondition: JESD22 Moisture Sensitivity MSL-3 192 Hrs., 30°C/60%RH+3IR-Reflow, 260 °C+0, -5 °C	P
Pressure Cooker	121 °C, 100 %RH Precondition: JESD22 Moisture Sensitivity MSL 5 72 Hrs, 30C/60 %RH+3IR-Reflow, 220 °C+0, -5 °C Precondition: JESD22 Moisture Sensitivity MSL-3 192 Hrs., 30°C/60 %RH+3IR-Reflow, 260 °C+0, -5 °C	P
High Temperature Storage	150 °C ± 5 °C, No Bias	P
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max = 3.8V, 125°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max = 3.8V, 125°C	P
High Temperature Steady State Life	Static Operating Condition, Vcc Max = 2.75 V, 125°C	P
Low Temperature Operating Life	-30 °C, 2.8 V, 8 MHZ	P
Static Latchup	121 °C, ± 300 mA In accordance with JEDEC 17. Cypress Spec. 01-00081	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF ⁴	Failure Rate
High Temperature Operating Life Early Failure Rate ¹	2,853 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	655,872 DHRs	0	0.70	55	25 FITs

¹ The product does not require a production burn-in.

² An ambient temperature of 55 °C and a junction temperature rise of 15 °C are assumed.

³ Chi-squared 60% estimations are used to calculate the failure rate.

⁴ 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 = Boltzman's Constant = 8.62×10^{-5} eV/Kelvin

T_1 = The junction temperature of the device under stress and T_2 = the junction temperature of the device at use conditions.

Reliability Test Data

QTP #: 015104

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL5							
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	COMP	15	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 2.8V, Vcc Max							
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	96	630	0	
CYS25G0102DX (7B95322A)	4222115	610243315/6/325	SEOL-L	96663	0		
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	96	558	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 2.8V, Vcc Max							
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	168	180	0	
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	500	179	0	
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	1000	177	0	
CYS25G0102DX (7B95322A)	4222115	610243315/6/325	SEOL-L	168	179	0	
CYS25G0102DX (7B95322A)	4222115	610243315/6/325	SEOL-L	500	178	0	
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	168	177	0	
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	500	175	0	
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	1000	173	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST, 150C, 2.75V, Vcc MAX							
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	8081	0		
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	168	80	0	
STRESS: LOW TEMPERATURE OPERATING LIFE, -30C, 2.80V							
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	500	48	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10.0V, +/-300mA							
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	COMP	3	0	
CYS25G0102DX (7B95322A)	4222115	610243315/6/325	SEOL-L	COMP	3	0	
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	COMP	3	0	
CYS25G0102DX (7B95322A)	4222115	610243315/6/325	SEOL-L	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	COMP	3	0	
CYS25G0102DX (7B95322A)	4222115	610243315/6/325	SEOL-L	COMP	3	0	
STRESS: AGE BOND STRENGTH							
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	COMP	6	0	
STRESS: SEM X-SECTION							
CYS25G0102DX (7B95322A)	4221876		SEOL-L	COMP			YXA-180

Reliability Test Data

QTP #: 015104

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: HIGH TEMPERATURE STORAGE, PLASTIC, 150C, No Bias							
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	500	48	0	
STRESS: HI-ACCEL SATURATION TEST. 130C, 2.75V, 85%RH, PRE COND 72 HR 30C/60%RH, MSL 5							
CYS25G0102DX (7B95322A)	4222115	610243315/6/325	SEOL-L	128	45	0	
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	128	48	0	
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	256	47	0	
STRESS: HI-ACCEL SATURATION TEST. 130C, 3.08V, 85%RH, PRE COND 72 HR 30C/60%RH, MSL 5							
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	128	48	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 72 HR 30C/60%RH, MSL5							
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	168	52	0	
CYS25G0102DX (7B95322A)	4222115	610243315/6/325	SEOL-L	168	48	0	
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	168	48	0	
CYS25G0102DX (7B95322A)	4225782	610248639/40/41	SEOL-L	288	48	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 72 HRS 30C/60%RH, MSL5							
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	300	54	0	
CYS25G0102DX (7B95322A)	4221876	340200102/3/4	SEOL-L	500	54	0	
CYS25G0102DX (7B95322A)	4222115	610243315/6/325	SEOL-L	300	50	0	
CYS25G0102DX (7B95322A)	4222115	610243315/6/325	SEOL-L	500	50	0	

Reliability Test Data

QTP #: 024307

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC – MICROSCOPE MSL3							
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	COMP	15	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 3.8V, Vcc Max							
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	96	1002	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 3.8V, Vcc Max							
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	168	180	0	
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	500	180	0	
CY2DP3140I (7B8314A)	4306669	610317907	PHIL-M	168	184	0	
CY2DP3140I (7B8314A)	4306669	610317907	PHIL-M	500	184	0	
CY2DP3140I (7B8314A)	4306669	610317907	PHIL-M	675	184	0	
STRESS: AGE BOND STRENGTH							
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	COMP	5	0	
CY2DP3140I (7B8314A)	4306669	610317907	PHIL-M	COMP	4	0	
CY2PP326A1 (7B8326A)	4306670	610324358	KOREA-Q	COMP	30	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10.0V, +/300mA							
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	COMP	3	0	
CY2PP326A1 (7B8326A)	4306670	610324358	KOREA-Q	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	COMP	9	0	
CY2DP3140I (7B8314A)	4306669	610317907	PHIL-M	COMP	9	0	
CY2PP326A1 (7B8326A)	4306670	610324358	KOREA-Q	COMP	9	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	COMP	9	0	
CY2DP3140I (7B8314A)	4306669	610317907	PHIL-M	COMP	9	0	
CY2PP326A1 (7B8326A)	4306670	610324358	KOREA-Q	COMP	9	0	
STRESS: HIGH TEMPERATURE STORAGE, PLASTIC, 150C, No Bias							
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	500	50	0	
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	1000	50	0	

Reliability Test Data

QTP #: 024307

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
---------------	------------------	-------------------	-----------------	-----------------	-------------	------------	--------------------------

STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192 HR 30C/60%RH, MSL3

CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	168	50	0	
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	288	50	0	

STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH, MSL3

CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	300	50	0	
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	500	49	0	
CY2DP3110AI (7B83110A)	4250487	610308689/90/1	KOREA-Q	1000	49	0	

Reliability Test Data

QTP #: 051101

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY2DP3110AXI (7B83110B)	4440208	610507779	KOREA-Q	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,200V							
CY2DP3110AXI (7B83110B)	4440208	610507779	KOREA-Q	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY2DP3110AXI (7B83110B)	4440208	610507779	KOREA-Q	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 8.5V, ±300mA							
CY2DP3110AXI (7B83110B)	4440208	610507779	KOREA-Q	COMP	3	0	