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Cypress Semiconductor
Product Qualification Report

QTP # 112111 VERSION*A
April, 2014

1.5GHz High Performance Buffer Device Derivative S8TMA-5P, Fab 4 CMI	
CY2DL15110	**1:10 Differential LVDS Fanout Buffer With Selectable Clock Input**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
083401	Qualify SONOS S8DI-5R Technology in Fab 4	Jan 09
095107	Qualify 1.5GHz High Performance Buffer (7C85500/10/30/40) device on S8TMA-5P Technology in Fab 4 CMI	Jan 11
112111	Qualify 1.5GHz High Performance Buffer, 7C85550 on S8TMA-5R, Derivative Device	Feb 12

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualification of 1.5GHz High Performance Buffer 7C85550, derivative device on S8TMA-5P Technology in Fab 4 CMI	
Marketing Part #:	CY2DL15110
Device Description:	2.5V & 3.3V Industrial in 32-TQFP Package
Cypress Division:	Cypress Semiconductor Corporation – Memory Product Division (MPD)

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	3	Metal Composition:	Metal 1: 100A Ti/3200Al-0.5%Cu/300A TiW Metal 2: 100A Ti/ 3200Al-0.5%Cu/350ATiW Metal 3: 500A TiW/ 21,250A Al- 0.5%Cu/300A TiW
Passivation Type and Thickness:			7000A +/-2000A Nitride
Generic Process Technology/Design Rule (µ-drawn):			S8 / 0.13u
Gate Oxide Material/Thickness (MOS):			SiO_2 / 40A & SiO_2 / 110A
Name/Location of Die Fab (prime) Facility:			Fab 4, CMI-Minnesota
Die Fab Line ID/Wafer Process ID:			S8TMA-5P

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE
32-Lead TQFP	Amkor Korea – Q (K3)

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	AZ32
Package Outline, Type, or Name:	32-Lead Thin Quad Flatpack (TQFP)
Mold Compound Name/Manufacturer:	G700L / Sumitomo
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	None
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Pure Sn
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	100% Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	3230
Die Attach Method:	Epoxy
Bond Diagram Designation:	001-69724
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au / 1.0 mil
Thermal Resistance Theta JA °C/W:	69 °C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	001-04159
Name/Location of Assembly (prime) facility:	Q – Amkor K3 (Korea)
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max=2.1V/2.53V, 150°C JESD22-A108	P
High Temperature Operating Life Early Failure Rate (Regulator On)	Dynamic Operating Condition, Vcc Max=5V, 125°C /150°C Dynamic Operating Condition, Vcc Max=3.96V, 125°C JESD22-A108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=2.1V/2.53V, 150°C JESD22-A108	P
High Temperature Steady State life	Static Operating Condition, Vcc Max=2.1V,150°C/3.63V, 125°C JESD22-A108	P
Low Temperature Operating Life	Dynamic Operating Condition, Vcc Max= -30°C, 2.1V JESD22-A108	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110:130°C, 85%RH, 5.25V, Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, -65 °C to 150 °C Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
Pressure Cooker	JESD22-A102, 121 °C, 100%RH, 15 PSIG Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
Acoustic Microscopy	J-STD-020 Precondition: JESD22 Moisture Sensitivity Level (192 Hrs., 30 °C, 60% RH, 260°C Reflow)	P
Age Bond Strength	200C, 4hrs MIL-STD-883, Method 883-2011	P
Constructional Analysis	Criteria: Meet external and internal characteristics of Cypress package	P
Data Retention	150 C, non-biased JESD22-A117 and JESD22-A103	P
Dynamic Latch-up	150C, 8.5V JESD 78	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JEDEC EIA/JESD22-A114	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V JESD22-C101	P
Endurance Test	MIL-STD-883, Method 883-1033	P
Static Latch-up	85C, ± 200mA, 125C, ±140mA JESD 78	P
SEM Cross Section	MIL-STD-883, Method 2018	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[3]	Failure Rate
High Temperature Operating Life Early Failure Rate	1,532 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	646, 000 DHRs	0	0.7	170	8 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 #: 083401

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CY8C20466 (8C20466AC)	4810486	*610828990*	Malaysia-CA	COMP	15	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	COMP	15	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	COMP	15	0	
STRESS: AGE BOND STRENGTH							
CY8C20566 (8C20566AC)	4827949	*610844164*	CML-R	COMP	3	0	
CY8C20466 (8C20466AC)	4804681	*610822808*	Malaysia-CA	COMP	3	0	
CY8C20666 (8C20666AC)	4836589	*610852813*	Malaysia-CA	COMP	3	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	500	77	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	1000	77	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	500	78	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	1000	78	0	
CY8C20566 (8C20566AC)	4836589	*610851914*	CML-R	500	78	0	
CY8C20566 (8C20566AC)	4836589	*610851914*	CML-R	1000	78	0	
STRESS: ENDURANCE							
CY8C20566 (8C20566AC)	4810486	*610830786*	CML-R	168	77	0	
CY8C20566 (8C20566AC)	4815537	*610835437*	CML-R	168	77	0	
CY8C20566 (8C20566AC)	4827949	*610844164*	CML-R	168	79	0	
CY8C20566 (8C20566AC)	4835945	*610848270*	CML-R	168	78	0	
CY8C20566 (8C20566AC)	4836589	*610851914*	CML-R	168	76	0	
STRESS: ESD-CHARGE DEVICE MODEL, (500V)							
CY8C20566 (8C20566AC)	4810486	*610830371*	CML-R	500	9	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	500	9	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	500	9	0	
STRESS: SEM CROSS SECTION							
CY8C20066 (8C20066AC)	4810486	*N/A*	N/A	COMP	1	0	

Reliability Test Data

QTP #: 083401

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: STATIC LATCH-UP (85C, 8.25V)							
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	COMP	6	0	
CY8C20666 (8C20666AC)	4836589	*610852813*	Malaysia-CA	COMP	6	0	
CY8C20666 (8C20666AC)	4837410	*410.23.02*	Promex	COMP	6	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114, (2,200V)							
CY8C20566 (8C20566AC)	4810486	*610830371*	CML-R	2200	8	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	2200	8	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	2200	8	0	
STRESS: DYNAMIC LATCH-UP (125C, 8.5V)							
CY8C20466 (8C20466AC)	4810486	*610828990*	Malaysia-CA	COMP	5	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	COMP	5	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	COMP	5	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150, 2.1V, Vcc Max)							
CY8C20566 (8C20566AC)	4827949	*610844164*	CML-R	48	1002	0	
CY8C20566 (8C20566AC)	4815537	*610835437*	CML-R	48	1008	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	48	1004	1	Read NV Latch (1)
CY8C20466 (8C20466AC)	4836589	*610851747*	Malaysia-CA	48	1004	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE REGULATOR ON (150, 5V, Vcc Max)							
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	48	45	0	
CY8C20566 (8C20566AC)	4835945	*610848270*	CML-R	48	45	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE REGULATOR ON (125C, 5V, Vcc Max)							
CY8C20466 (8C20466AC)	4810486	*610828990*	Malaysia-CA	96	45	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.1V, Vcc Max)							
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	80	390	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	500	390	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	80	390	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	500	390	0	
CY8C20466 (8C20466AC)	4836589	*610851747*	Malaysia-CA	80	390	0	
CY8C20466 (8C20466AC)	4836589	*610851747*	Malaysia-CA	500	390	0	

(1) Destroyed during failure analysis

Reliability Test Data

QTP #: 083401

Device	Fab Lot #	Assy Lot #	Assy Lot	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 2.1V)							
CY8C20466 (8C20466AC)	4810486	*610828990*	Malaysia-CA	80	77	0	
CY8C20466 (8C20466AC)	4810486	*610828990*	Malaysia-CA	168	77	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	80	77	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	168	77	0	
CY8C20566 (8C20566AC)	4835945	*610848270*	CML-R	80	77	0	
CY8C20566 (8C20566AC)	4835945	*610848270*	CML-R	168	77	0	
STRESS: LOW TEMPERATURE DYNAMIC OPERATING LIFE, -30C, 2.1V							
CY8C20566 (8C20566AC)	4815537	*610835437*	CML-R	500	77	0	
CY8C20566 (8C20566AC)	4835945	*610848270*	CML-R	500	77	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.25V), PRE COND 192 HR 30C/60%RH (MSL3)							
CY8C20466 (8C20466AC)	4810486	*610828990*	Malaysia-CA	128	77	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	128	77	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	256	77	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	128	77	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY8C20466 (8C20466AC)	4810486	*610828990*	Malaysia-CA	168	77	0	
CY8C20466 (8C20466AC)	4810486	*610828990*	Malaysia-CA	333	77	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	168	77	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	288	77	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	168	77	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	288	77	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY8C20466 (8C20466AC)	4810486	*610828990*	Malaysia-CA	500	77	0	
CY8C20466 (8C20466AC)	4810486	*610828990*	Malaysia-CA	1000	77	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	500	77	0	
CY8C20466 (8C20466AC)	4815537	*610834184*	Malaysia-CA	1000	77	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	500	77	0	
CY8C20466 (8C20466AC)	4835945	*610847274*	Malaysia-CA	1000	77	0	

Reliability Test Data

QTP #: 095107

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, (500V)							
CY2DP1510AX	4035631	611049586/88/90	L-KOREA	COMP	9	0	
CY2DL1510AZ	4035631	611051554	L-KOREA	COMP	9	0	
CY2CP1504ZX	4035631	611052307	T-TAIWAN	COMP	9	0	
STRESS: STATIC LATCH-UP (125C, 5.19V, +/-140mA)							
CY2DP1510AX	4035631	611049586/88/90	L-KOREA	COMP	6	0	
CY2DL1510AZ	4035631	611051554	L-KOREA	COMP	6	0	
CY2CP1504ZX	4035631	611052307	T-TAIWAN	COMP	6	0	
CY2DL1504ZX	4035631	611052935	T-TAIWAN	COMP	6	0	
CY2DM1502ZX	4035631	611052755	M-PHIL	COMP	6	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114, (2,200V)							
CY2DP1510AX	4035631	611049586/88/90	L-KOREA	COMP	8	0	
CY2DL1510AZ	4035631	611051554	L-KOREA	COMP	8	0	
CY2CP1504ZX	4035631	611052307	T-TAIWAN	COMP	8	0	
CY2DL1504ZX	4035631	611052935	T-TAIWAN	COMP	8	0	
CY2DM1502ZX	4035631	611052755	M-PHIL	COMP	8	0	
STRESS: ELECTRICAL PARAMETER ASSESSMENT							
CY2DP1510AX	4035601	611049587/89/91	L-KOREA	COMP	30	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150, 2.53V, Vcc Max)							
CY2DP1510AX	4035601	611049587/89/91	L-KOREA	48	1532	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE REGULATOR ON (125, 3.96V, Vcc Max)							
CY2DP1510AX	4035631	611049586/88/90	L-KOREA	96	51	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 2.53V, Vcc Max)							
CY2DP1510AX	4035601	611049587/89/91	L-KOREA	80	122	0	
CY2DP1510AX	4035601	611049587/89/91	L-KOREA	500	122	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (125C, 3.63V)							
CY2DP1510AX	4035601	611049587/89/91	L-KOREA	168	80	0	
CY2DP1510AX	4035601	611049587/89/91	L-KOREA	336	80	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 192 HR 30C/60%RH (MSL3)							
CY2DP1510AX	4035631	611049586/88/90	L-KOREA	168	80	0	

Reliability Test Data

QTP #: 095107

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH (MSL3)							
CY2DP1510AX	4035631	611049586/88/90	L-KOREA	500	80	0	
CY2DP1510AX	4035631	611049586/88/90	L-KOREA	1000	80	0	

Reliability Test Data

QTP #: 112111

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: STATIC LATCH-UP (125C, 5.19V, +/-140mA)							
CY2DL15110AZI	4125758	611155101	Q-KOREA	COMP	6	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114, (2,200V)							
CY2DL15110AZI	4125758	611155101	Q-KOREA	COMP	8	0	
STRESS: E-TEST YIELD							
CY2DL15110AZI	4125758	611155101	Q-KOREA	COMP	COMPARABLE		
STRESS: SORT YIELD							
CY2DL15110AZI	4125758	611155101	Q-KOREA	COMP	COMPARABLE		

Document History Page

Document Title: QTP 112111: 1.5GHZ HIGH PERFORMANCE BUFFER DEVICE DERIVATIVE (CY2DL15110), S8TMA-5P, FAB 4 CMI
Document Number: 001-78239

Rev.	ECN No.	Orig. of Change	Description of Change
**	3570812	NSR	Initial Spec Release
*A	4344495	JYF	Sunset review: Updated QTP title page and device division from MID to MPD; Updated Reliability Tests Performed table: - Deleted specs 25-00104, 25-20035, 22-00029, 25-00020 and 01-00081 and replaced with industry standards; - Deleted current density - Added industry standard of HTOL, HTSSL, LTOL, PCT, HAST - Updated industry standard of Endurance Test

Distribution: WEB

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