Cypress Semiconductor Automotive Product Qualification Report

QTP# 161908 VERSION *A
April 2017

Automotive TrueTouch® Gen6XL Touchscreen Controller S8SPF-10P Technology, Fab25	
CYAT8168X **CYAT8268X**	**Automotive TrueTouch ® Multi-Touch All-Points Touchscreen Controller**

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

Qual Report	Description of Qualification Purpose	Date Comp
161908	Qualification of Automotive 6th Generation TouchSreen TSG6_XL Device (8A20680BB) S8SPF-10P Technology, Fab25	Feb 17

PRODUCT DESCRIPTION (for qualification)	
Qualification of Automotive 6th Generation TouchSreen TSG6_XL Device (8A20680BB) S8SPF-10P Technology, Fab25	
Marketing Part #:	CYAT8168X (61, 71, 77, 88 I/OS)/ CYAT8268X (54, 46, 39, 31 RX CHANNELS)
Device Description:	AUTOMOTIVE TRUETOUCH(R) MULTI-TOUCH ALL-POINTS TOUCHSCREEN CONTROLLER
Cypress Division:	Cypress Semiconductor Corporation – MCU and Connectivity Division(MCD)

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	5	Metal Composition:	Metal 1: 150A Ti/ 250 Ti/TiN Graded / 3200Al 0.5%Cu / 650A Ti/TiN Graded Metal 2: 150A Ti/ 250 Ti/TiN Graded / 3200Al- 0.5%Cu / 650A Ti/TiN Graded Metal 3: 150A Ti/ 250 Ti/TiN Graded / 7200Al- 0.5%Cu / 650A Ti/TiN Graded Metal 4: 150A Ti/ 250 Ti/TiN Graded / 7200Al- 0.5%Cu / 650A Ti/TiN Graded Metal 5: 150A Ti/ 250 Ti/TiN Graded / 12000Al- 0.5%Cu /650A Ti/Ti N Graded
Passivation Type and Materials:			1K Oxide / 6K Nitride
Generic Process Technology/Design Rule (□-drawn):			S8SPF-10R
Gate Oxide Material/Thickness (MOS):			SiO2 / 32A / 120A
Name/Location of Die Fab (prime) Facility:			Fab25, Austin Texas
Die Fab Line ID/Wafer Process ID:			S8SPF-10P

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE	QTP NUMBER
100-Lead TQFP	ASEK-Taiwan (G)	163803
128-Lead TQFP	ASEK-Taiwan (G)	164506

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	AZ0AB
Package Outline, Type, or Name:	100-Lead TQFP 14x14x1.4mm
Mold Compound Name/Manufacturer:	EME-G631 / Sumitomo
Mold Compound Flammability Rating:	UL-94 V-0
Mold Compound Alpha Emission Rate:	N/A (Not low alpha mold compound)
Oxygen Rating Index: >28%	54%
Lead Frame Designation:	Full Metal Pad
Lead Frame Material:	Copper
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	Pure Sn
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Sumitomo
Die Attach Material:	CRM-1076
Bond Diagram Designation	002-15599
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au / 0.8mil
Thermal Resistance Theta JA °C/W:	38
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	49-41999M
Name/Location of Assembly (prime) facility:	ASEK-Taiwan (G)
MSL LEVEL	3
REFLOW PROFILE	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	AEC-Q100-008 and JESD22-A108, 150°C Dynamic Operating Condition, Vcc Max = 2.07V	P
High Temperature Operating Life Latent Failure Rate	JESD22-A108, 150°C Dynamic Operating Condition, Vcc Max = 2.07V	P
NVM Endurance /High Temperature Operating Life Latent Failure Rate	AEC-Q100-005 and JESD22-A108, 150°C Dynamic Operating Condition, Vcc Max = 2.07V	P
High Accelerated Saturation Test (HAST)	JESD22-A110, 130C, 5.5V, 85%RH Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260°C+0, -5°C	P
Temperature Cycle	JESD22-A104, -65°C to 150°C Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260°C+0, -5°C	P
Pressure Cooker	JESD22-A102, 121C, 100%RH, 15 Psig Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260°C+0, -5°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	AEC-Q100-002 500V/1000V/2000V/4000V/6000V	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	AEC-Q100-011 250V/500V/750V (Corner Pins)	P
Wire Ball Shear	AEC-Q100-001	P
Electrical Distribution	AEC-Q100-009	P
Final Visual	JESD22-B101B	P
Endurance/Data Retention	AEC-Q100-005, 150C, non-biased	P
Constructional Analysis	Criteria: Meet external and internal characteristics of Cypress package	P
Acoustic Microscopy	JEDEC JSTD-020 Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260°C+0, -5°C	P
Static Latch-up	AEC-Q100-004, 125C,± 100mA	P
Post Temperature Cycle Wire Bond Pull	Mil-Std 883, Method 2011	P
Dye Penetrant Test	Criteria: No Package Crack	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	13,506 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	199,920 Device Hours	0	0.7	170	27 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 #: 161908

Device	Package	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTICS								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	COMP	22	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	COMP	22	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	COMP	22	0	
STRESS: BALL SHEAR								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	COMP	150	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	COMP	150	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	COMP	150	0	
STRESS: CONSTRUCTIONAL ANALYSIS								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	COMP	5	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	COMP	5	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	COMP	5	0	
STRESS: DYE PENETRANT								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	COMP	15	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	COMP	15	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	COMP	15	0	
STRESS: ELECTRICAL DISTRIBUTION								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	COMP	80	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	COMP	80	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	COMP	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 2.07V, Vcc Max								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	48	3333	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	48	3379	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	48	3395	0	
CYAT81688 (8A206802BB)	AZ0A	3636050	611644750	ASEK-G	48	3399	0	
STRESS: ENDURANCE / HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.07V, Vcc Max								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	408	80	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	408	90	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	408	80	0	

Reliability Test Data

QTP #: 161908

Device	Package	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ENDURANCE / DATA RETENTION TEST								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	1000	77	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	1000	77	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	1000	77	0	
STRESS: ESD-CHARGE DEVICE MODEL								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	250	3	0	
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	500	3	0	
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	750	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22-A114-B								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	500	3	0	
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	1000	3	0	
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	2000	3	0	
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	4000	3	0	
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	6000	3	0	
STRESS: FINAL VISUAL								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	COMP	4520	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	COMP	7228	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	COMP	6993	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5.5V, PRE COND 192 HR 30C/60%RH, MSL3								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	96	77	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	96	79	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	96	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.07V, Vcc Max								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	408	80	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	408	80	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	408	80	0	

Reliability Test Data

QTP #: 161908

Device	Package	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	96	80	0	
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	168	80	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	96	80	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	168	80	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	96	80	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	168	80	0	
STRESS: POST TEMPERATURE CYCLE WIRE BOND PULL								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	500	5	0	
STRESS: PRE /POST LFR CRITICAL PARAMETER								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	COMP	82	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	COMP	82	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	COMP	82	0	
STRESS: STATIC LATCH-UP TESTING, +/-100mA 125C								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	COMP	6	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3								
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	500	85	0	
CYAT81688 (8A206802BB)	AZ0A	3629023	611627389	ASEK-G	1000	80	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	500	95	0	
CYAT81688 (8A206802BB)	AZ0A	3632047	611630353	ASEK-G	1000	95	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	500	83	0	
CYAT81688 (8A206802BB)	AZ0A	3634008	611631857	ASEK-G	1000	83	0	

Document History Page

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Rev.	ECN No.	Orig. of Change	Description of Change
**	5630954	HSTO	Initial spec release
*A	5691718	HSTO	Update Cypress logo Update Reliability Manager Contact Person Deleted Alternate Fab Site Table Re-computed Device Hours and FIT rate result Corrected typo error on page7