

# Cypress Semiconductor Automotive Product Qualification Report

QTP# 152604 VERSION \*B  
July 2020

<b>Automotive Generation6 TouchScreen (TSG6_XL) Product Family S8SPF-10P Technology, HHGrace1</b>	
<b>CYAT8168X</b>	<b>Automotive TrueTouch® Multi-Touch All-Points Touchscreen Controller</b>

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

<b>Qual Report</b>	<b>Description of Qualification Purpose</b>	<b>Date Comp</b>
152604	Qualification of Automotive 6 <sup>th</sup> Generation TouchScreen TSG6_XL Device (8A20680AH) S8SPF-10P Technology, HHGrace1	Mar 16

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PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualification of Automotive 6 <sup>th</sup> Generation TouchScreen TSG6_XL Device (8A20680AH) S8SPF-10P Technology, HHGrace1	
Marketing Part #:	CYAT8168X (61, 71, 77, 88 I/OS)
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:	Proprietary	Metal Composition:	Proprietary
Passivation Type and Materials:		Proprietary	
Generic Process Technology/Design Rule (□-drawn):		Proprietary	
Gate Oxide Material/Thickness (MOS):		Proprietary	
Name/Location of Die Fab (prime) Facility:		HHNEC / China	
Die Fab Line ID/Wafer Process ID:		HHGrace Fab1 / S8SPF-10P	

### PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE	QTP NUMBER
100-Lead TQFP	CML-Autoline (RA)	152607
128-Lead TQFP	ASEK-Taiwan (G)	152603

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MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	AZ128
Package Outline, Type, or Name:	128L TQFP 14x20x1.4mm
Mold Compound Name/Manufacturer:	EME-G631 / Sumitomo
Mold Compound Flammability Rating:	Class V-0
Mold Compound Alpha Emission Rate:	N/A, not low alpha
Oxygen Rating Index:	54%
Lead Frame Designation:	FMP
Lead Frame Material:	Copper with Ag plating
Lead Finish, Composition / Thickness:	Pure Sn
Die Backside Preparation Method/Metallization:	Wafer backgrid
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Sumitomo
Die Attach Material:	CRM-1076
Die Attach Method:	Epoxy
Bond Diagram Designation:	001-97920
Wire Bond Method:	Thermosonic
Package Cross Section Yes/No:	No
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

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

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**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, 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	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	AEC-Q100-011 250V/500V/750V	P
Wire Ball Shear	AEC-Q100-001	P
Wire Bond Pull	Mil-Std 883, Method 2011	P
Electrical Distribution	AEC-Q100-009	P
Final Visual	JESD22-B101B	P
Physical Dimensions	JESD22-B100/108	P
Solderability	JESD22-B102	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, 85C, ± 140mA	P
Post Temperature Cycle Wire Bond Pull	Mil-Std 883, Method 2011	P
Dye Penetrant Test	Criteria: No Package Crack	P

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### RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF <sup>3</sup>	Failure Rate
High Temperature Operating Life Early Failure Rate	10,301 Devices	0	N/A	N/A	0 PPM
NVM Endurance / High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	202,012 Device Hours	0	0.7	170	27 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.



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## Reliability Test Data

**QTP #: 152604**

<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>
<b>STRESS: ACOUSTICS</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	COMP	22	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	21	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	COMP	22	0	
<b>STRESS: BALL SHEAR</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	COMP	150	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	150	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	COMP	150	0	
<b>STRESS: BOND PULL</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	COMP	150	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	150	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	COMP	150	0	
<b>STRESS: CONSTRUCTIONAL ANALYSIS</b>							
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	5	0	
<b>STRESS: DYE PENETRANT</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	COMP	15	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	15	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	COMP	15	0	
<b>STRESS: ELECTRICAL DISTRIBUTION</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	COMP	45	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	45	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	COMP	45	0	
CYAT81688 (8A206802AH)	5527015	611528216	CML-R	COMP	130	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 2.07V, Vcc Max</b>							
CYAT81688 (8A206803AH)	5527015	611534013	ASEK-G	48	3232	0	
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	48	207	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	48	3424	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	48	3438	0	



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<b>STRESS: LOW TEMP ENDURANCE / DATA RETENTION TEST</b>							
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	1000	45	0	
<b>STRESS: HIGH TEMP ENDURANCE / DATA RETENTION TEST</b>							
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	1000	45	0	
<b>STRESS: ENDURANCE / HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.07V, Vcc Max</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	408	80	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	408	80	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	408	79	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL</b>							
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	250	3	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	500	3	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	750	3	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22-A114-B</b>							
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	500	3	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	1000	3	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	2000	3	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	4000	3	0	
<b>STRESS: FINAL VISUAL</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	COMP	1637	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	7761	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	COMP	7193	0	
<b>STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5V, PRE COND 192 HR 30C/60%RH, MSL3</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	96	80	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	96	80	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	96	79	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.07V, Vcc Max</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	408	80	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	408	80	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	408	79	0	
CYAT81688 (8A206802AH)	5527015	611528216	CML-R	500	130	0	





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**Reliability Test Data**

**QTP #: 152604**

<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>
<b>STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	96	80	0	
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	168	80	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	96	80	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	168	79	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	96	80	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	168	80	0	
<b>STRESS: PHYSICAL DIMENSION</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	COMP	10	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	10	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	COMP	10	0	
<b>STRESS: POST TEMPERATURE CYCLE WIRE BOND PULL</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	500	5	0	
<b>STRESS: PRE /POST LFR CRITICAL PARAMETER</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	COMP	80+2	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	80+2	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	COMP	80+2	0	
CYAT81688 (8A206802AH)	5527015	611528216	CML-R	COMP	130+2	0	
<b>STRESS: STATIC LATCH-UP TESTING, +/-140mA 125C</b>							
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	6	0	
<b>STRESS: SOLDERABILITY</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	COMP	15	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	COMP	15	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	COMP	15	0	



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**Reliability Test Data**

**QTP #: 152604**

<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>
<b>STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3</b>							
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	500	84	0	
CYAT81688 (8A206803AH)	5532014	611534015	ASEK-G	1000	79	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	500	82	0	
CYAT81688 (8A206803AH)	5532014	611534014	ASEK-G	1000	81	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	500	85	0	
CYAT81688 (8A206803AH)	5527014	611536506	ASEK-G	1000	85	0	



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**Reliability Test Data**

**QTP #: 184101**

<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>
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**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.07V, Vcc Max**

CYAT81688 (8A206802AH)	8818311	611842968	CML-RA	408	79	0	
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## Document History Page

Document Title: QTP#152604: Automotive Generation6 TouchScreen (TSG6\_XL) Product Family S8SPF-10P  
Technology, HHGrace1  
Document Number: 002-12007

Rev.	ECN No.	Orig. of Change	Description of Change
**	5200006	HSTO	Initial spec release
*A	5876961	HSTO	Update Cypress Logo Update Contact person for Reliability Manager / Director Revise MPN on cover page Update Technology/Fab Process Description
*B	6934635	HSTO	Update Logo and remove footnotes Added LFR result of QTP#184101 and re-compute Fit rate Remove wire material and Theta value