

Cypress Semiconductor Automotive Product Qualification Report

**QTP# 134001 VERSION *C
February 2017**

Automotive Generation4 TouchScreen Device Family S8PM-10P Technology, Fab4	
CY8CTMA1036 CY8TMA460 CY8CTMA768 CY8CTMA461	Automotive TrueTouch® Multi-Touch All-Points Touchscreen Controller

**FOR ANY QUESTIONS ON THIS REPORT PLEASE CONTACT reliability@cypress.com :
OR VIA LINK A CYLINK CRM CASE**

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PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
134001	Qualification of Automotive Generation4 TouchScreen Device S8PM-10P Technology in Fab4 using 8A20400FC device	Apr 14

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualification of Automotive Generation4 S8PM-10P Technology in Fab4 using 8A20400FC device	
Marketing Part #:	CY8CTMA1036 , CY8TMA460 CY8CTMA768, CY8CTMA461
Device Description:	Automotive PSOC Programmable System – On – Chip
Cypress Division:	Cypress Semiconductor Corporation – Programmable Systems Division(PSD)

TECHNOLOGY/FAB PROCESS DESCRIPTION – S8DIN-5RP			
Number of Metal Layers:	5	Metal Composition:	Metal 1: 100A Ti / 3200Al-0.5%Cu / 300A TiW Metal 2: 100A Ti / 3200Al-0.5%Cu / 350A TiW Metal 3: 150A Ti / 7200Al-0.5%Cu / 350A TiW Metal 4: 150A Ti / 7200Al-0.5%Cu / 350A TiW Metal 5: 300A CoTi/12000A Al-0.5% Cu/300A TiW
Passivation Type and Materials:	NFUSOX/ Nitride		
Generic Process Technology/Design Rule (□-drawn):	S8 / 130 nm		
Gate Oxide Material/Thickness (MOS):	SiO2 / 32A/110A		
Name/Location of Die Fab (prime) Facility:	CMI / Minnesota		
Die Fab Line ID/Wafer Process ID:	Fab4, S8PM-10P		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE	QTP NUMBER
100L TQFP	CML-RA	134503
56L QFN	Amkor-Philippines (M)	162902

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	AZ100
Package Outline, Type, or Name:	100L- Thin Quad Flatpack Package (TQFP) (14x14x1.4mm)
Mold Compound Name/Manufacturer:	KEG6000 / Kyocera
Mold Compound Flammability Rating:	V-O per UL94
Mold Compound Alpha Emission Rate:	0.002 cph/m2
Oxygen Rating Index:	N/A
Lead Frame Designation:	Full Metal Pad – slotted
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	NiPdAuAg (Roughened)
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Wafer saw
Die Attach Supplier:	Henkel
Die Attach Material:	QMI 509
Die Attach Method:	Epoxy
Bond Diagram Designation:	001-88210
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au / 0.8mil
Thermal Resistance Theta JA °C/W:	35.44 C/W
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	11-21099
Name/Location of Assembly (prime) facility:	CML-RA
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R

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

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 = 5.75V	P
High Temperature Operating Life Latent Failure Rate	JESD22-A108, 150°C Dynamic Operating Condition, Vcc Max = 5.75V	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/1500V/2000V	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	AEC-Q100-011 250V/500V	P
Wire Ball Shear	AEC-Q100-001	P
Wire Bond Pull	Mil-Std 883, Method 2011	P
Electrical Distribution	AEC-Q100-009	P
NVM Endurance/Data Retention	AEC-Q100-005, 150C, non-biased	P
Final Visual	JESD22-B101B	P
Physical Dimensions	JESD22-B100/108	P
Solderability	JESD22-B102	P
Acoustic Microscopy	JEDEC JSTD-020	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

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	11,418 Devices	0	N/A	N/A	0 PPM
NVM Endurance / High Temperature Operating Life ^{1,2} Long Term Failure Rate	64,872 Device Hours	0	0.7	170	28 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 = 8.62x10⁻⁵ eV/Kelvin.

T₁ is the junction temperature of the device under stress and T₂ is the junction temperature of the device at use conditions.



Reliability Test Data

QTP #: 134001

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTICS							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	22	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	COMP	22	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	COMP	22	0	
STRESS: BALL SHEAR							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	30	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	COMP	90	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	COMP	30	0	
STRESS: BOND PULL							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	30	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	COMP	90	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	COMP	30	0	
STRESS: ELECTRICAL DISTRIBUTION							
CY8CTMA1036AA(8A20412FC)	4325759	611341681	CML-R	COMP	30	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	COMP	30	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	COMP	30	0	
STRESS: ENDURANCE / DATA RETENTION TEST							
CY8CTMA884AE (8A38661CC)	4202010	611223247	JCET-JT	1000	79	0	
CY8CTMA616AA (8A38661CC)	4207553	611223278	JCET-JT	1000	77	0	
CY8CTMA616AA (8A38661CC)	4208826	611223245	JCET-JT	1000	73	0	
STRESS: ENDURANCE / HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.07V, Vcc Max							
CY8CTMA884AE (8A38661CC)	4202010	611223247	JCET-JT	408	75	0	
CY8CTMA616AA (8A38661CC)	4207553	611223278	JCET-JT	408	80	0	
CY8CTMA616AA (8A38661CC)	4208826	611223245	JCET-JT	408	78	0	
STRESS: ESD-CHARGE DEVICE MODEL, 250V							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	3	0	



Reliability Test Data

QTP #: 134001

<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-HUMAN BODY CIRCUIT PER JESD22-A114-B, 1,000V							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22-A114-B, 1,500V							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22-A114-B, 2,000V							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	3	0	
STRESS: FINAL VISUAL							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	4656	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	COMP	4817	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	COMP	4819	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5.5V, PRE COND 192 HR 30C/60%RH, MSL3							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-RA	96	80	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-RA	96	80	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-RA	96	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 5.75V, Vcc Max							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	48	3721	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	48	3714	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	48	3983	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 5.75V, Vcc Max							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-RA	408	79	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-RA	408	80	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-RA	408	81	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-RA	96	80	0	
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-RA	168	80	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-RA	96	80	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-RA	168	80	0	
CY8CTMA768AA (8A20412FC)	4325760	611346408	CML-RA	96	79	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-RA	168	79	0	



Reliability Test Data

QTP #: 134001

<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: PHYSICAL DIMENSION							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	30	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	COMP	30	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	COMP	30	0	
STRESS: POST TEMPERATURE CYCLE WIRE BOND PULL							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	5	0	
STRESS: PRE /POST LFR CRITICAL PARAMETER							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	30+2	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	COMP	30+2	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	COMP	30+2	0	
STRESS: STATIC LATCH-UP TESTING, +/-140mA							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	6	0	
STRESS: SOLDERABILITY							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	COMP	15	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	COMP	15	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	COMP	15	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3							
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	500	85	0	
CY8CTMA1036AA (8A20412FC)	4325759	611341681	CML-R	1000	80	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	500	80	0	
CY8CTMA460AA (8A20412FC)	4325760	611343786	CML-R	1000	80	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	500	79	0	
CY8CTMA768AA (8A20412FC)	4335145	611346408	CML-R	1000	79	0	



Document History Page

Document Title: QTP#134001: AUTOMOTIVE GENERATION4 TOUCHSCREEN DEVICE FAMILY S8PM-10P
TECHNOLOGY, FAB4

Document Number: 001-92362

Rev.	ECN No.	Orig. of Change	Description of Change
**	4368151	HSTO	Initial spec release
*A	4751547	HSTO	Update reference for Reliability Director
*B	4894151	HSTO	Added device MPN CY8CTMA461AA/AS in marketing part# table Added reference QTP# in package availability table
		DCON	Removed Distribution and Posting in the document history page.
*C	5626578	HSTO	Updated contact person for Reliability Director Deleted package code in cover page and page#2 Added 56L QFN in Package Availability Table Replaced CY logo with the new tagline