

# Cypress Semiconductor Automotive Product Qualification Report

QTP# 161503 VERSION \*\*  
February 2018

<b>Automotive ATLAS Device Family S8PR3-10 Technology, Skywater</b>	
<b>CY27430</b>	<b>4-PLL Spread-Spectrum Clock Generator</b>

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT  
[reliability@cypress.com](mailto:reliability@cypress.com) or via a CYLINK CRM CASE

**Prepared By:**  
Honesto Sintos  
Reliability Engineer

**Reviewed By:**  
Sandhya Chandrashekhar  
Reliability Manager

**Approved By:**  
David Hoffman  
Reliability Director

**PRODUCT QUALIFICATION HISTORY**

<b>Qual Report</b>	<b>Description of Qualification Purpose</b>	<b>Date Comp</b>
161503	Qualification of Automotive ATLAS Device in S8PR3-10 Technology at Skywater	January 18

PRODUCT DESCRIPTION	
Qualification of Automotive ATLAS Device in S8PR3-10 Technology at Skywater	
Marketing Part #:	CY27430
Device Description:	4-PLL Spread-Spectrum Clock Generator
Cypress Division:	Cypress Semiconductor – Memory Products Division (MPD)

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:	Skwater		
Die Fab Line ID/Wafer Process ID:	S8PR3-10		

### PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE	QTP NUMBER
48-Pin QFN (7x7x1.0mm)	CML-Philippines (RA)	161501

<b>MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION</b>	
Package Designation:	LT48D
Package Outline, Type, or Name:	48Pin – Saw QFN (7x7x1.0mm)
Mold Compound Name/Manufacturer:	EME-G700 / Sumitomo
Mold Compound Flammability Rating:	V-0/UL94
Mold Compound Alpha Emission Rate:	Standard Non-Low Alpha
Oxygen Rating Index: >28%	54% (Typical)
Lead Frame Designation:	Full Metal Pad with U-Groove
Lead Frame Material:	Copper
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	NiPdAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Saw
Die Attach Supplier:	Henkel
Die Attach Material:	QMI-519
Bond Diagram Designation	002-11595
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au / 0.8mil (20mil)
Thermal Resistance Theta JA °C/W:	15.22 C/W
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	002-22300
Name/Location of Assembly (prime) facility:	CML-Philippines (RA)
MSL LEVEL	3
REFLOW PROFILE	260C

<b>ELECTRICAL TEST / FINISH DESCRIPTION</b>	
<b>Test Location:</b>	CML-R

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

**RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT**

<b>Stress/Test</b>	<b>Test Condition (Temp/Bias)</b>	<b>Result P/F</b>
High Temperature Operating Life Early Failure Rate	AEC-Q100-008 and JESD22-A108, 125°C Dynamic Operating Condition, Vcc Max = 2.07V	P
Endurance /High Temperature Operating Life Latent Failure Rate	JESD22-A108, 125°C Dynamic Operating Condition, Vcc Max = 2.07V	P
High Accelerated Saturation Test (HAST)	JESD22-A110, 130C, 3.63V, 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
Acoustic	J-STD-020 Precondition: JESD22-A113 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 260C+0, -5C	P
Endurance/Data Retention	AEC-Q100-005, 150C, non-biased	P
Wire Bond Pull	Mil-Std 883, Method 2011	P
Post Temperature Cycle Wire Bond Pull	Mil-Std 883, Method 2011	P
Dye Penetrant Test	Criteria: No Package Crack	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	AEC-Q100-011 250V/500V/ 750V (corner pins)	P
Electrostatic Discharge Human Body Model (ESD-HBM)	AEC-Q100-002 500V/1000V/2000V	P
Static Latch-up	AEC-Q100-004, 125C, 100mA	P
Electrical Distribution	AEC-Q100-009	P
Wire Ball Shear	AEC-Q100-001	P
Final Visual	JESD22-B101B	P
Physical Dimensions	JESD22B100 and B108	P
Constructional Analysis	Criteria: Meet external and internal characteristics of Cypress package	P
Solderability	JESD22-B102	P

### 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	2,413 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	238,000 Device Hours	0	0.7	170	** 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:

$E_A$  =The Activation Energy of the defect mechanism.

$K$  = Boltzmann's constant =  $8.62 \times 10^{-5}$  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.

\*\*Insufficient samples to calculate FIT Rate.

\*\*Based on Automotive qualification samples size.

## Reliability Test Data

**QTP #: 161503**

<i>Device</i>	<i>Package</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: ACOUSTIC, MSL3</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	22	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	22	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	22	0	
<b>STRESS: BALL SHEAR</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	100	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	100	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	100	0	
<b>STRESS: BOND PULL</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	100	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	100	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	100	0	
<b>STRESS: CONSTRUCTIONAL ANALYSIS</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	5	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	5	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	5	0	
<b>STRESS: DIE SHEAR</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	30	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	30	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	30	0	
<b>STRESS: DYE PENETRANT</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	15	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	15	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	15	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 2.07V, Vcc Max</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	96	809	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	96	810	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	96	794	0	

## Reliability Test Data

**QTP #: 161503**

<i>Device</i>	<i>Package</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: ELECTRICAL DISTRIBUTION</b>								
CY27430FLTxA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	30	0	
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	30	0	
CY27430FLTxA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	30	0	
<b>STRESS: ENDURANCE / DATA RETENTION</b>								
CY27430FLTxA (7A85410AC)	LT48	4533802	611623248	CML-RA	1000	80	0	
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	1000	80	0	
CY27430FLTxA (7A85410AC)	LT48	4613440	611717580	CML-RA	1000	79	0	
<b>STRESS: ENDURANCE / HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.07V, Vcc Max</b>								
CY27430FLTxA (7A85410AC)	LT48	4533802	611623248	CML-RA	1000	80	0	
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	1000	78	0	
CY27430FLTxA (7A85410AC)	LT48	4613440	611717580	CML-RA	1000	80	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL</b>								
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	250	3	0	
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	500	3	0	
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	750	3	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22-A114-B</b>								
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	500	3	0	
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	1000	3	0	
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	2000	3	0	
<b>STRESS: FINAL VISUAL INSPECTION</b>								
CY27430FLTxA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	8161	0	
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	8771	0	
CY27430FLTxA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	8384	0	
<b>STRESS: HI-ACCEL SATURATION TEST, 130C, 3.63V, 85%RH, PRE COND 192 HR 30C/60%RH, MSL3</b>								
CY27430FLTxA (7A85410AC)	LT48	4533802	611623248	CML-RA	96	80	0	
CY27430FLTxA (7A85410AC)	LT48	4612016	611647084	CML-RA	96	80	0	
CY27430FLTxA (7A85410AC)	LT48	4613440	611717580	CML-RA	96	80	0	



## Reliability Test Data

**QTP #: 161503**

<i>Device</i>	<i>Package</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</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	96	80	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	96	79	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	168	79	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	96	80	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	168	80	0	
<b>STRESS: PHYSICAL DIMENSION</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	30	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	30	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	30	0	
<b>STRESS: POST TCT BOND PULL</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	500	5	0	
<b>STRESS: PRE/POST LFR CRITICAL PARAMETERS</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	30	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	30	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	30	0	
<b>STRESS: STATIC LATCH-UP (+/-100mA 125C)</b>								
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	6	0	
<b>STRESS: SOLDERABILITY</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	15	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	15	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	15	0	
<b>STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	500	85	0	
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	1000	80	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	500	80	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	1000	80	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	500	80	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	1000	80	0	



## Reliability Test Data

**QTP #: 161503**

<i>Device</i>	<i>Package</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: X-RAY</b>								
CY27430FLTXA (7A85410AC)	LT48	4533802	611623248	CML-RA	COMP	15	0	
CY27430FLTXA (7A85410AC)	LT48	4612016	611647084	CML-RA	COMP	15	0	
CY27430FLTXA (7A85410AC)	LT48	4613440	611717580	CML-RA	COMP	15	0	



## Document History Page

Document Title: QTP#161503: Automotive ATLAS Device Family S8PR3-10 Technology, Skywater  
Document Number: 002-23101

Rev.	ECN No.	Orig. of Change	Description of Change
**	6074372	HSTO	Initial spec release