Please note that Cypress is an Infineon Technologies Company.
The document following this cover page is marked as “Cypress” document as this is the company that originally developed the product. Please note that Infineon will continue to offer the product to new and existing customers as part of the Infineon product portfolio.

Continuity of document content
The fact that Infineon offers the following product as part of the Infineon product portfolio does not lead to any changes to this document. Future revisions will occur when appropriate, and any changes will be set out on the document history page.

Continuity of ordering part numbers
Infineon continues to support existing part numbers. Please continue to use the ordering part numbers listed in the datasheet for ordering.

Cypress Semiconductor
Product Qualification Report

QTP# 170609 VERSION *B
September, 2019

Microcontrollers with Flash, 90nm Technology (CU100F_UL), SMIC	
CY9B520TA Series, CY9B420TA Series, CY9B320TA Series, CY9B120TA Series, CY9B520M Series, CY9B320M Series, CY9B120M Series, CY9A140NB Series, CY9A340NB Series, CY9AA40NB Series, CY9AB40NB Series S6E1004 Series	**32-bit Microcontroller**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
reliability@cypress.com or via a CYLINK CRM CASE

Prepared By:
Kunihiro Miyazono
Reliability Engineer

Reviewed By:
Yusaku Ohta
Reliability Manager

Approved By:
David Hoffman
Reliability Director

PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
170609	Qualification of 90nm Technology (CU100F_UL) Microcontroller product family at SMIC	September, 2018 June, 2019
170609	Qualification of additional 90nm Technology (CU100F_UL) Microcontroller product at SMIC (CY9A140NB Series, CY9A340NB Series, CY9AA40NB Series, CY9AB40NB Series)	September, 2019

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: 90nm (CU100F_UL) product transfer from Mie Fujitsu Semiconductor to SMIC	
Marketing Part #:	CY9BF529TAPMC-G-MJE2
Device Description:	32-bit general purpose single-chip products with Flash
Cypress Division:	Microcontroller and Connectivity Division

PACKAGE	ASSEMBLY FACILITY SITE
LQFP176	J-Devices Miyagi / Fukuoka

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	LQP176
Package Outline, Type, or Name:	176-Low Profile Quad Flat Package (LQFP)
Mold Compound Name/Manufacturer:	EME-G660B / Sumitomo
Mold Compound Flammability Rating:	V-0
Lead Frame Material:	Cu Alloy
Lead Finish, Composition / Thickness:	Pure-Sn / 7 – 20um
Die Backside Preparation Method/Metallization:	Si Back Grind
Die Separation Method:	Dicing
Die Attach Supplier:	Hitachi
Die Attach Material:	EN4600B
Wire Bond Method:	Ultrasonic & Force
Wire Material/Size:	CuPdAu / 20um (0.8mil)
Name/Location of Assembly (prime) facility:	J-Devices Miyagi / Fukuoka
MSL LEVEL	3
REFLOW PROFILE	260 degreeC

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	J-Devices Aizu / Fukuoka

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: 90nm (CU100F_UL) product transfer from Mie Fujitsu Semiconductor to SMIC	
Marketing Part #:	S6E1004E0BGV2000M
Device Description:	32-bit general purpose single-chip products with Flash
Cypress Division:	Microcontroller and Connectivity Division

PACKAGE	ASSEMBLY FACILITY SITE
LQFP80	J-Devices Usuki

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	LQH080
Package Outline, Type, or Name:	80-Low Profile Quad Flat Package
Mold Compound Name/Manufacturer:	EME-G660B / Sumitomo
Mold Compound Flammability Rating:	V-0
Lead Frame Material:	Cu Alloy
Lead Finish, Composition / Thickness:	Pure-Sn / 7 – 20um
Die Backside Preparation Method/Metallization:	Si Back Grind
Die Separation Method:	Dicing
Die Attach Supplier:	Hitachi
Die Attach Material:	EN4600B
Wire Bond Method:	Ultrasonic & Force
Wire Material/Size:	CuPdAu / 20um (0.8mil)
Name/Location of Assembly (prime) facility:	J-Devices Usuki
MSL LEVEL	3
REFLOW PROFILE	260 degreeC

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	J-Devices Usuki

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: 90nm (CU100F_UL) product transfer from Mie Fujitsu Semiconductor to SMIC	
Marketing Part #:	S6E1004E0BGV2000N
Device Description:	32-bit general purpose single-chip products with Flash
Cypress Division:	Microcontroller and Connectivity Division

PACKAGE	ASSEMBLY FACILITY SITE
LQFP80	TongFu Microelectronics

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	LQH080
Package Outline, Type, or Name:	80-Low Profile Quad Flat Package (LQFP)
Mold Compound Name/Manufacturer:	CEL-8240HF10-CWK / Hitachi
Mold Compound Flammability Rating:	V-0
Lead Frame Material:	Cu Alloy
Lead Finish, Composition / Thickness:	Pure-Sn / 7 – 20um
Die Backside Preparation Method/Metallization:	Si Back Grind
Die Separation Method:	Dicing
Die Attach Supplier:	Hitachi
Die Attach Material:	EN4600B
Wire Bond Method:	Ultrasonic & Force
Wire Material/Size:	CuPdAu / 18um (0.7mil)
Name/Location of Assembly (prime) facility:	TongFu Microelectronics
MSL LEVEL	3
REFLOW PROFILE	260 degreeC

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	TongFu Microelectronics

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: 90nm (CU100F_UL) product transfer from Mie Fujitsu Semiconductor to SMIC	
Marketing Part #:	CY9AFB44NAPMC-G-MNE2
Device Description:	32-bit general purpose single-chip products with Flash
Cypress Division:	Microcontroller and Connectivity Division

PACKAGE	ASSEMBLY FACILITY SITE
LQFP100	TongFu Microelectronics

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	LQI100
Package Outline, Type, or Name:	100-Low Profile Quad Flat Package (LQFP)
Mold Compound Name/Manufacturer:	CEL-8240HF10-CWK / Hitachi
Mold Compound Flammability Rating:	V-0
Lead Frame Material:	Cu Alloy
Lead Finish, Composition / Thickness:	Pure-Sn / 7 – 20um
Die Backside Preparation Method/Metallization:	Si Back Grind
Die Separation Method:	Dicing
Die Attach Supplier:	Hitachi
Die Attach Material:	EN4600B
Wire Bond Method:	Ultrasonic & Force
Wire Material/Size:	CuPdAu / 18um (0.7mil)
Name/Location of Assembly (prime) facility:	TongFu Microelectronics
MSL LEVEL	3
REFLOW PROFILE	260 degreeC

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	TongFu Microelectronics

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, Max. rating Voltage, 125 degreeC, JESD22-A108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Max. rating Voltage, 125 degreeC, JESD22-A108	P
High Accelerated Saturation Test (HAST)	130 degreeC, 85%RH, Max. Rating Voltage, Precondition: JESD22 Moisture Sensitivity Level3 JEDEC STD 22-A110	P
Unbiased High Accelerated Saturation Test (UHST)	130 degreeC, 85%RH, Precondition: JESD22 Moisture Sensitivity Level3 JEDEC STD 22-A118	P
Temperature Cycle	JESD22-A104, Condition C, -60 to 150 degreeC	P
High Temperature Storage	JESD22-A103: 150 degreeC,	P
Electrostatic Discharge Human Body Model (ESD-HBM)	JEDEC EIA/JESD22-A114-B +/- 2000V	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	JESD22-C101 +/- 500V	P
Static Latch up	125 degreeC, 100mA	P
Endurance + Data Retention	JESD22-A117, Cycling temp :125 degreeC 10Kcycling + Bake (150 degreeC)	P
Endurance + Operation Life	JESD22-A117, Cycling temp : 125 degreeC 10Kcycling + Operation Life (125 degreeC)	P
Endurance + Data Retention	JESD22-A117, Cycling temp :25 degreeC 10Kcycling + Bake (25 degreeC)	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tsted/ Device Hours	# Fails	Activation Energy	Thermal A.F (3)	Failure Rate
High Temperature Operating Life Early Failure Rate	3,027 Devices	0	N/A	N.A	0 PPM (1)
High Temperature Operating Life Latent Failure Rate	534,000DHRs	0	0.7	78	22FIT (2)

[1] Assuming an ambient temperature of 55C and a junction temperature rise of 15C.
[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 #: 170609

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS : High Temperature Operation Life (Early Failure Rate)							
CY9BF529	EL5699.05	1828-873	FUKUOKA	96	1006	0	
CY9BF529	EL5699.22	1830-875	FUKUOKA	96	965	0	
CY9BF529	EL5699.21	1830-876	FUKUOKA	96	52	0	
CY9BF529	EL5699.13	1831-886	FUKUOKA	96	1004	0	
STRESS : High Temperature Operation Life (Latent Failure Rate)							
CY9BF529	EP4256	1638Z02	MIYAGI	1000	178	0	
CY9BF529	EP4257	1644Z01	MIYAGI	1000	178	0	
CY9BF529	EP4258	1646Z01	MIYAGI	1000	178	0	
STRESS : High Accelerated Saturation Test							
CY9BF529	EP4256	1638Z02	MIYAGI	96	45	0	
CY9BF529	EP4257	1644Z01	MIYAGI	96	45	0	
CY9BF529	EP4258	1646Z01	MIYAGI	96	45	0	
STRESS : Unbiased High Accelerated Saturation Test							
CY9BF529	EP4256	1638Z02	MIYAGI	96	78	0	
CY9BF529	EP4257	1644Z01	MIYAGI	96	78	0	
CY9BF529	EP4258	1646Z01	MIYAGI	96	78	0	
STRESS ; Temperature Cycle							
CY9BF529	EP4256	1638Z02	MIYAGI	500	78	0	
CY9BF529	EP4257	1644Z01	MIYAGI	500	78	0	
CY9BF529	EP4258	1646Z01	MIYAGI	500	78	0	
STRESS ; High Temperature Storage							
CY9BF529	EP4257	1644Z01	MIYAGI	500	78	0	
CY9BF529	EP4257	1644Z01	MIYAGI	1000	78	0	
STRESS ; Endurance + Data Retention Test							
CY9BF529	EP4256	1638Z02	MIYAGI	366	40	0	
CY9BF529	EP4257	1644Z01	MIYAGI	366	40	0	
CY9BF529	EP4258	1646Z01	MIYAGI	366	40	0	

Reliability Test Data

QTP #: 170609

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS ; Endurance + Operatin Lige Test							
CY9BF529	EP4256	1638Z02	MIYAGI	1000	40	0	
CY9BF529	EP4257	1644Z01	MIYAGI	1000	40	0	
CY9BF529	EP4258	1646Z01	MIYAGI	1000	40	0	
STRESS ; Endurance + Data Retention (Low Temp)							
CY9BF529	EP4256	1638Z02	MIYAGI	1000	26	0	
CY9BF529	EP4257	1644Z01	MIYAGI	1000	24	0	
CY9BF529	EP4258	1646Z01	MIYAGI	1000	26	0	
STRESS ; ESD (HBM)							
CY9BF529	EP4257	1644Z01	MIYAGI	-	8	0	
CY9BF529	EP4258	1646Z01	MIYAGI	-	8	0	
STRESS ; ESD-CDM							
CY9BF529	EP4257	1644Z01	MIYAGI	-	9	0	
CY9BF529	EP4258	1646Z01	MIYAGI	-	9	0	
S6E1004	EP6673	1644034	Usuki	-	9	0	
S6E1004	EP6673	92266001	TongFu	-	9	0	
CY9AFB44N	EP6674	1933D11	TongFu	-	9	0	
STRESS ; Latch-up Test							
CY9BF529	EP4257	1644Z01	MIYAGI	-	3	0	
CY9BF529	EP4258	1646Z01	MIYAGI	-	3	0	

Document History Page

Document Title: QTP#170609 Microcontroller with Flash, 90nm Technology (CU100F_UL), SMIC
Document Number: 002-25271

Rev.	ECN No.	Orig. of Change	Description of Change
**	6322491	KUMI	Initial release.
*A	6605566	KUMI	Added S6E1004 Series
*B	6686092	KUMI	Added CY9A140NB Series, CY9A340NB Series, CY9AA40NB Series, CY9AB40NB Series