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ECN #: 6208325

Cypress Semiconductor
Qualification Report

QTP# 160812, 160813, 161105, 161310, 161309 VERSION **
June, 2018

Power Management IC, 180nm Technology, Towerjazz- MH (Israel) Fab.	
S6AE101A/2A/3A	Energy Harvesting
S6BP401A	Six-channel Advanced Driver Assistance System
S6BP201A/2A/3A	SYNCHRONOUS BUCK-BOOST DC/DC CONVERTER
S6AP111	2CH DC/DC CONVERTER IC WITH PWM SYNCHRONOUS RECTIFICATION

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

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PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
160812	Qualification of 180nm Technology S6AE102A/3A at Towerjazz-MH with QFN Package	February, 2016
160813	Qualification of 180nm Technology S6AE101A at Towerjazz-MH with SON Package	February, 2016
161105	Qualification of 180nm Technology Product S6BP401 at Towerjazz-MH with QFN Package	March, 2016
161310	Qualification of 180nm Technology Product S6AP111A at Towerjazz-MH with TSSOP Package	April, 2016
161309	Qualification of 180nm Technology Product S6BP201A at Towerjazz-MH with TSSOP Package	April, 2016

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualification of 180nm Technology S6AE102A/3A at Towerjazz-MH with QFN Package	
Marketing Part #:	S6AE103A0DGN1B000
Device Description:	Power Management IC
Cypress Division:	Cypress Semiconductor Corporation – Microcontroller and Connectivity Division

PACKAGE	ASSEMBLY FACILITY SITE
24-QFN	J-Devices Fukuoka

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	VNF024
Package Outline, Type, or Name:	24-QFN
Mold Compound Name/Manufacturer:	EME-G770 / SUMITOMO
Mold Compound Flammability Rating:	V-0
Oxygen Rating Index: >28%	N/A
Lead Frame Designation:	Full Metal Pad
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	PPF
Die Separation Method:	Sawing
Die Attach Material:	CRM-1076WA / SUMITOMO
Wire Bond Method:	Ultrasonic & Force
Wire Material/Size:	CuPdAu / 25um (1.0mil)
MSL Level	3
Reflow Profile	260°C

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

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualification of 180nm Technology S6AE101A at Towerjazz-MH with SON Package	
Marketing Part #:	S6AE101A0DENAB000
Device Description:	Power Management IC
Cypress Division:	Cypress Semiconductor Corporation – Microcontroller and Connectivity Division

PACKAGE	ASSEMBLY FACILITY SITE
10-SON	**J-Devices Fukuoka**

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	VNE010
Package Outline, Type, or Name:	10-SON
Mold Compound Name/Manufacturer:	EME-G770 / SUMITOMO
Mold Compound Flammability Rating:	V-0
Oxygen Rating Index: >28%	N/A
Lead Frame Designation:	Full Metal Pad
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	PPF
Die Separation Method:	Sawing
Die Attach Material:	CRM-1076WA / SUMITOMO
Wire Bond Method:	Ultrasonic & Force
Wire Material/Size:	CuPdAu / 25um (1.0mil)
MSL Level	3
Reflow Profile	260°C

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

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualification of 180nm Technology Product S6BP401 at Towerjazz-MH with QFN Package	
Marketing Part #:	S6BP401A
Device Description:	Power Management IC
Cypress Division:	Cypress Semiconductor Corporation – Microcontroller and Connectivity Division

PACKAGE	ASSEMBLY FACILITY SITE
40-QFN	**J-Devices Fukuoka**

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	VND040
Package Outline, Type, or Name:	40-QFN
Mold Compound Name/Manufacturer:	EME-G770 / SUMITOMO
Mold Compound Flammability Rating:	V-0
Oxygen Rating Index: >28%	N/A
Lead Frame Designation:	Full Metal Pad
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	PPF
Die Separation Method:	Sawing
Die Attach Material:	DF-18C1 / HITACHI
Wire Bond Method:	Ultrasonic & Force
Wire Material/Size:	CuPdAu / 25um (1.0mil)
MSL Level	3
Reflow Profile	260°C

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

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualification of 180nm Technology Product S6AP111A at Towerjazz-MH with TSSOP Package	
Marketing Part #:	S6AP111A28GT1B000
Device Description:	Power Management IC
Cypress Division:	Cypress Semiconductor Corporation – Microcontroller and Connectivity Division

PACKAGE	ASSEMBLY FACILITY SITE
24-TSSOP	**TongFu Microelectronics**

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	STI024
Package Outline, Type, or Name:	24-TSSOP
Mold Compound Name/Manufacturer:	EME-G770 / SUMITOMO
Mold Compound Flammability Rating:	V-0
Oxygen Rating Index: >28%	N/A
Lead Frame Designation:	Full Metal Pad
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	Sn/Bi
Die Separation Method:	Sawing
Die Attach Material:	EN4600B / HITACHI
Wire Bond Method:	Ultrasonic & Force
Wire Material/Size:	Au / 20um (0.8mil)
MSL Level	3
Reflow Profile	260°C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	**TongFu Microelectronics**

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualification of 180nm Technology Product S6BP201A at Towerjazz-MH with TSSOP Package	
Marketing Part #:	S6BP201A1AST2B000
Device Description:	Power Management IC
Cypress Division:	Cypress Semiconductor Corporation – Microcontroller and Connectivity Division

PACKAGE	ASSEMBLY FACILITY SITE
16-TSSOP	**Amkor - Philippine**

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	SEC016
Package Outline, Type, or Name:	16-TSSOP
Mold Compound Name/Manufacturer:	EME-G770 / SUMITOMO
Mold Compound Flammability Rating:	V-0
Oxygen Rating Index: >28%	N/A
Lead Frame Designation:	Full Metal Pad
Substrate Material:	N/A
Lead Finish, Composition / Thickness:	Pure-Sn
Die Separation Method:	Sawing
Die Attach Material:	8290 / Ablebond
Wire Bond Method:	Ultrasonic & Force
Wire Material/Size:	Au / 30um (1.2mil)
MSL Level	3
Reflow Profile	260°C

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

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	S6BP401A : 125℃, PVCC=5.5V S6BP201A : 125℃, VIN=27.5V	P
High Temperature Operating Life Latent Failure Rate	S6AE103A : 125℃, VDD=5.5V, VIN_LCD=5.3V S6BP401A : 125℃, PVCC=5.5V S6BP201A : 125℃, VIN=27.5V S6AP111A : 125℃, VIN=28V	P
Low Temperature Operating Life	S6AP111A : -55℃, VIN=28V	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: S6AE103A : 110℃, 85%RH, VDD=5.5V, VIN_LDO=5.3V S6BP401A : 110℃, 85%RH, PVCC=5.5V S6BP201A : 110℃, 85%RH, VIN=42V S6AP111A : 110℃, 85%RH, VIN=28V Precondition: JESD22 Moisture Sensitivity Level3	P
Unbiased High Accelerated Saturation Test (UHST)	JEDEC STD 22-A110: 130C, 85%RH, Precondition: JESD22 Moisture Sensitivity Level3	P
Temperature Cycle	JESD22-A104, Condition C, -65℃ to 150℃ Precondition: JESD22 Moisture Sensitivity Level3	P
High Temperature Storage	JESD22-A103: 150℃, no bias	P
Power Temperature Cycling	-40℃ to 150℃ Precondition: JESD22 Moisture Sensitivity Level3	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 (+/-750V for Corner pin)	P
Static Latch up	JESD78B +/-100mA	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	5,207 Devices	0	N/A	N.A	0 PPM (1)
High Temperature Operating Life Latent Failure Rate	801,000DHRs	0	0.7	78	6.7FIT (2)

HTOL data is from the same technology product (S6BP401AB1SN1B000).

[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

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Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS : High Temperature Operation Life							
S6AE103A	T504128.1	ZZ004	J-Devices	1000	27	0	
S6AE103A	T504128.1	ZZ005	J-Devices	1000	27	0	
S6AE103A	T504128.1	ZZ006	J-Devices	1000	27	0	
S6BP401A	T503304	526ZZ103	J-Devices	2000	80	0	
S6BP401A	T503402	526ZZ212	J-Devices	2000	80	0	
S6BP401A	T503403	526ZZ212X	J-Devices	2000	80	0	
S6BP201A	T507483	538MM205	Amkor	2000	80	0	
S6BP201A	T508344	545MM206	Amkor	2000	80	0	
S6BP201A	T508431	546MM207	Amkor	2000	80	0	
S6AP111A	T411469	505EE007	TongFu	1000	80	0	
S6AP111A	T412509	505EE010	TongFu	1000	80	0	
S6AP111A	T412628	505EE011	TongFu	1000	80	0	
STRESS : High Temperature Operating Life – Early Failure Rate							
S6BP401A	T503304	526ZZ103	J-Devices	48	904	0	
S6BP401A	T503402	526ZZ212	J-Devices	48	907	0	
S6BP401A	T503403	526ZZ212X	J-Devices	48	906	0	
S6BP201A	T507483	538MM205	Amkor	48	830	0	
S6BP201A	T508344	545MM206	Amkor	48	830	0	
S6BP201A	T508431	546MM207	Amkor	48	830	0	
STRESS : Low Temperature Operation Life							
S6AP111A	T411469	505EE007	TongFu	1000	26	0	
S6AP111A	T412509	505EE010	TongFu	1000	26	0	
S6AP111A	T412628	505EE011	TongFu	1000	26	0	

Reliability Test Data

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Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS : High Accelerated Saturation Test (HAST)							
S6AE103A	T504128.1	ZZ004	J-Devices	264	26	0	
S6AE103A	T504128.1	ZZ005	J-Devices	264	26	0	
S6AE103A	T504128.1	ZZ006	J-Devices	264	26	0	
S6BP401A	T503304	526ZZ103	J-Devices	528	80	0	
S6BP401A	T503402	526ZZ212	J-Devices	528	80	0	
S6BP401A	T503403	526ZZ212X	J-Devices	528	80	0	
S6BP201A	T507483	538MM205	Amkor	264	80	0	
S6BP201A	T508344	545MM206	Amkor	264	80	0	
S6BP201A	T508431	546MM207	Amkor	264	80	0	
S6AP111A	T411469	505EE007	TongFu	264	80	0	
S6AP111A	T412509	505EE010	TongFu	264	78	0	
S6AP111A	T412628	505EE011	TongFu	264	77	0	
STRESS : Unbiased High Accelerated Saturation Test (UHST)							
S6AE103A	T504128.1	ZZ004	J-Devices	96	27	0	
S6AE103A	T504128.1	ZZ005	J-Devices	96	27	0	
S6AE103A	T504128.1	ZZ006	J-Devices	96	27	0	
S6AE101A	T501012.1	521Z001	J-Devices	96	26	0	
S6AE101A	T501012.1	521Z002	J-Devices	96	26	0	
S6AE101A	T501012.1	521Z003	J-Devices	96	26	0	
S6BP401A	T503304	526ZZ103	J-Devices	96	80	0	
S6BP401A	T503402	526ZZ212	J-Devices	96	80	0	
S6BP401A	T503403	526ZZ212X	J-Devices	96	80	0	
S6BP201A	T507483	538MM205	Amkor	96	80	0	
S6BP201A	T508344	545MM206	Amkor	96	80	0	
S6BP201A	T508431	546MM207	Amkor	96	80	0	
S6AP111A	T411469	505EE007	TongFu	96	80	0	
S6AP111A	T412509	505EE010	TongFu	96	80	0	
S6AP111A	T412628	505EE011	TongFu	96	80	0	
STRESS ; Temperature Cycle							
S6AE103A	T504128.1	ZZ004	J-Devices	500	27	0	
S6AE103A	T504128.1	ZZ005	J-Devices	500	27	0	
S6AE103A	T504128.1	ZZ006	J-Devices	500	27	0	
S6AE101A	T501012.1	521Z001	J-Devices	500	26	0	
S6AE101A	T501012.1	521Z002	J-Devices	500	26	0	
S6AE101A	T501012.1	521Z003	J-Devices	500	26	0	
S6BP401A	T503304	526ZZ103	J-Devices	1000	80	0	
S6BP401A	T503402	526ZZ212	J-Devices	1000	80	0	
S6BP401A	T503403	526ZZ212X	J-Devices	1000	80	0	
S6BP201A	T507483	538MM205	Amkor	1000	80	0	
S6BP201A	T508344	545MM206	Amkor	1000	80	0	
S6BP201A	T508431	546MM207	Amkor	1000	80	0	
S6AP111A	T411469	505EE007	TongFu	1000	80	0	
S6AP111A	T412509	505EE010	TongFu	1000	79	0	
S6AP111A	T412628	505EE011	TongFu	1000	80	0	

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Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS ; Power Temperature Cycling							
S6BP401A	T503304	526ZZ103	J-Devices	2000	45	0	
S6BP201A	T507483	538MM205	Amkor	1000	46		
STRESS ; High Temperature Storage							
S6AE103A	T504128.1	ZZ004	J-Devices	1000	15	0	
S6AE103A	T504128.1	ZZ005	J-Devices	1000	15	0	
S6AE103A	T504128.1	ZZ006	J-Devices	1000	15	0	
S6AE101A	T501012.1	521Z001	J-Devices	1000	26	0	
S6AE101A	T501012.1	521Z002	J-Devices	1000	26	0	
S6AE101A	T501012.1	521Z003	J-Devices	1000	26	0	
S6BP401A	T503304	526ZZ103	J-Devices	2000	45	0	
S6BP201A	T507483	538MM205	Amkor	1000	45	0	
STRESS ; ESD (HBM)							
S6AE103A	T504128.1	ZZ004	J-Devices	COMP	8	0	
S6AE101A	T501012.1	521Z001	J-Devices	COMP	8	0	
S6BP401A	T503304	526ZZ103	J-Devices	COMP	8	0	
S6BP201A	T507483	538MM205	Amkor	COMP	7	0	
S6AP111A	T412628	505EE011	TongFu	COMP	3	0	
STRESS ; ESD-CDM							
S6AE103A	T504128.1	ZZ004	J-Devices	COMP	9	0	
S6AE101A	T501012.1	521Z001	J-Devices	COMP	9	0	
S6BP401A	T503304	526ZZ103	J-Devices	COMP	9	0	
S6BP201A	T507483	538MM205	Amkor	COMP	4	0	
S6AP111A	T412628	505EE011	TongFu	COMP	3	0	
STRESS ; Latch-up Test							
S6AE103A	T504128.1	ZZ004	J-Devices	COMP	3	0	
S6AE101A	T501012.1	521Z001	J-Devices	COMP	6	0	
S6BP401A	T503304	526ZZ103	J-Devices	COMP	9	0	
S6BP201A	T507483	538MM205	Amkor	COMP	6	0	
S6AP111A	T412628	505EE011	TongFu	COMP	3	0	

Document History Page

Document Title: QTP#160812: Towerjazz-MH (Israel) Fab. 180nm Technology Product Qualification Report
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Rev.	ECN No.	Orig. of Change	Description of Change
**	5846293	KUMI	Initial Release
*A	6208325	KUMI	Added ESD-CDM spec. for Corner-pin in RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS