

Cypress Semiconductor Product Qualification Report

**QTP#I0000007 ICW Acquisition Summary
TTD
Samsung Fab 3 Foundry**

**Qualification of CSP4HS Process at Samsung
Fab 3 Foundry
Kiheung, Korea**

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

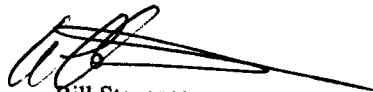
Bill Stevenson
Reliability Engineer
(408) 456-1926

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PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
I000007	Qualification Summary for TTD Cypress Acquisition (ICW) Devices processed at Samsung Fab 3 Foundry using the CSP4HS process	Nov, 2003

The data summarized in this report was collected by ICW prior to acquisition by Cypress Semiconductor

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify New Technology	
Marketing Part #:	See List
Device Description:	Clock Chips (Spread Spectrum)
Cypress Division:	TTD
Overall Die (or Mask) REV Level (prerequisite for qualification):	N/A
What ID markings on Die:	SW42Cxxxx, SX48Cxxxx SY40Cxxxx SZ42Cxxxx SZ50Cxxxx

TECHNOLOGY/FAB PROCESS DESCRIPTION – CSP4HS	
Number of Metal Layers:	M1: Ti 300 / TiN 900 / Al(0.2%Si+0.5%Cu) 6000 / TiN 250 M2: Ti 300 / TiN 500 / Al(0.2%Si+0.5%Cu) 8000 / TiN 250
Passivation Type and Materials:	1000Å PEOX / PSG 3500 Å / SiN 6,000Å
Free Phosphorus contents in top glass layer (%):	4.0%
Number of Transistors in Device	Maximum Available in Base: 16,000 Transistors Average Design: N/A (varies)
Number of Gates in Device:	Maximum Available: 8,000 / Average design: N/A (varies)
Generic Process Technology / Design Rule (-drawn)	CMOS (NMOS : 0.65um, PMOS : 0.75um)
Gate Oxide Material/Thickness (MOS):	SiO ₂ , 140Å
Name/Location of Die Fab (prime) Facility:	Kiheung, Korea
Die Fab Line ID/ Wafer Process ID:	Samsung Fab 3/ CSP4HS

Note: ICW/TTD devices exercise a 2LM option of the Standard 3LM 0.65um Samsung Process.

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Electrostatic Discharge Human Body Model (ESD-HBM)	2,000 V MIL-STD-883, Method 3015.7	P
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max = 4.5V (3.3V Devices) Vcc Max = 5.7V (5.5V Devices), 150°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max = 4.5V (3.3V Devices) Vcc Max = 5.7V (5.5V Devices), 150°C	P
High Accelerated Saturation Test (HAST)	130°C, 5.7V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs., 85°C/85%RH+3IR-Reflow, 260°C+5, -0°C	P
High Temperature Storage	150 °C ± 5 °C, no bias	P
Pressure Cooker	121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs., 85°C/85%RH+3IR-Reflow, 260°C+5, -0°C	P
Acoustic Microscopy	Cypress Spec. 25-00104	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65 °C to 150 °C Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs., 85°C/85%RH+3IR-Reflow, 260°C+5, -0°C	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal ³ A.F	Failure Rate ⁴
High Temperature Operating Life Early Failure Rate	10,600	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	769,705 Dhhrs	0	0.7	170	5 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.

SZ42C3181	Z	W18101	C
Die	Rev	Mkt Dev	Rev
SZ42C3181	Z	W18101	C
SZ42C3103	Z	W42C311	A
SZ42C3103	Z	W42C311	A
SZ42C3109	Z	W42C312	A
SZ42C3109	Z	W42C312	A
SZ42C3109	Z	W42C312	A
SZ42C3109	Z	W42C312	A
SZ42C3109	Z	W42C312	A
SX48C5505	Z	W48C541	A
SX48C5505	Z	W48C541	A
SX48C5509	Z	W48C543	A
SX48C5509	Z	W48C543	A
SX48C5559	Z	W48C549	A
SX48C5559	Z	W48C549	A
SX48C5561	Z	W48C551	A
SX48C5561	Z	W48C551	A
SZ42C3120	B	W49C314	A
SZ42C3120	B	W49C314	A
SZ50C6501	Z	W49C651	A
SZ50C6501	Z	W49C651	A
SZ42C3151	Z	W1855	A
SW42C2622	Z	W42C2722	A
SZ42C3181	Z	W18101	C
SZ42C3151	Z	W1855	A
SY40C0614	Z	W40C061	A

ESD-HBM

<i>Device</i>	<i>Base Die</i>	<i>Voltage Level</i>	<i>Qty SS</i>	<i>Qty Pass</i>	<i>Lot Number</i>
W48S101-04	SX48C5561Z	2000	5	5	JV598X-6
W48S101-04	SX48C5561Z	2000	5	5	JV599X-9

HAST +130C, 85% R.H., Vcc = 5.5V, 96 hours

<i>Device</i>	<i>Base Die</i>	<i>Pkg</i>	<i>Qty SS</i>	<i>Qty Pass</i>	<i>Sample #</i>
W42C31-02G	SW42C2622Z	8 PIN SOIC 150MIL	45	45	1
W42C31-03G	SW42C2622Z	8 Pin SOIC	97	97	1
W42C31-03G	SW42C2622Z	8 Pin SOIC	45	45	2
W42C31-03G	SW42C2622Z	8 Pin SOIC	46	46	3
W42C31-03G	SW42C2622Z	8 PIN SOIC 150MIL	45	45	1
W42C31-03G	SW42C2622Z	8 PIN SOIC 150MIL	45	45	2
W42C31-03G	SW42C2622Z	8 PIN SOIC 150MIL	45	45	3
W42C31-03G	SW42C2622Z	8 PIN SOIC 150MIL	97	97	4
W42C31-03G	SW42C2622Z	8 PIN SOIC 150MIL	97	97	5
W42C31-03G	SW42C2622Z	8 PIN SOIC 150MIL	45	45	6
W42C31-09	SW42C2622Z	8 Pin SOIC	97	97	1
W42C31-09	SW42C2622Z	8 PIN SOIC 150MIL	77	77	1
W42C31-09	SW42C2622Z	8 PIN SOIC 150MIL	77	77	2
W42C31-09	SW42C2622Z	8 PIN SOIC 150MIL	77	77	3
W42C31-09	SW42C2622Z	8 PIN SOIC 150MIL	77	77	4
W48C101-01	SZ42C3109Z	48 Pin SSOP	111	111	1
W48C101-01H	SZ42C3109Z	48 Pin SSOP	48	48	1
W48C101-01H	SZ42C3109Z	48 Pin SSOP	50	50	2
W48C101-01H	SZ42C3109Z	48 Pin SSOP	50	50	3
W48C101-01H	SZ42C3109Z	48 Pin SSOP	50	50	4
W48C101-01H	SZ42C3109Z	48 Pin SSOP	50	50	5
W48C101-01H	SZ42C3109Z	48 Pin SSOP	50	50	6
W49C65-03H	SZ42C3120B	48 Pin SSOP	48	48	1
W49C65-03H	SZ42C3120B	48 Pin SSOP	48	48	2

HAST +130C, 85% R.H., Vcc = 5.5V, 96 - 240 hrs

<i>Device</i>	<i>Base Die</i>	<i>Pkg</i>	<i>Qty SS</i>	<i>96 Hours</i>	<i>192 Hours</i>	<i>240 hrs</i>	<i>Sample #</i>
W42C31-09	SW42C2622Z	8 Pin SOIC	97	97			1
W42C31-09	SW42C2622Z	8 Pin SOIC	77	77			2
W42C31-09	SW42C2622Z	8 Pin SOIC	77	77			3
W42C31-09	SW42C2622Z	8 Pin SOIC	77	77			4
W42C31-09	SW42C2622Z	8 Pin SOIC	77	77			5
W42C31-02G	SW42C2622Z	8 Pin SOIC	45	45	45	45	1
W42C31-03G	SW42C2622Z	8 Pin SOIC	97	97			1
W42C31-03G	SW42C2622Z	8 Pin SOIC	97	97	97		2
W42C31-03G	SW42C2622Z	8 Pin SOIC	97	97	97		3
W42C31-03G	SW42C2622Z	8 Pin SOIC	45	45	45	45	4
W42C31-03G	SW42C2622Z	8 Pin SOIC	45	45	45	45	5
W42C31-03G	SW42C2622Z	8 Pin SOIC	45	45	45	45	6
W42C31-03G	SW42C2622Z	8 Pin SOIC	45	45	45	45	7
W42C31-03G	SW42C2622Z	8 Pin SOIC	45	45	45	45	8
W42C31-03G	SW42C2622Z	8 Pin SOIC	46	45			9

High Temp Storage

HTS Condition: +150 degree c., 1000 hours

<i>Device</i>	<i>Base Die</i>	<i>Pkg</i>	<i>Qty SS</i>	<i>Qty pass</i>	<i>Sample #</i>
W42C31-03G	SW42C2622Z	8 Pin Pin SOIC	48	48	1
W42C31-03G	SW42C2622Z	8 Pin Pin SOIC	48	48	2
W42C31-03G	SW42C2622Z	8 Pin Pin SOIC	78	77	3
W42C31-09G	SW42C2622Z	8 Pin Pin SOIC	50	50	4
W48C101-01H	SZ42C3109Z	48 Pin SSOP	37	37	1
W48C101-01H	SZ42C3109Z	48 Pin SSOP	37	37	2
W48C101-01H	SZ42C3109Z	48 Pin SSOP	37	37	3
W48C101-01H	SZ42C3109Z	48 Pin SSOP	32	32	4
W48C101-01H	SZ42C3109Z	48 Pin SSOP	48	48	5
W48C101-01H	SZ42C3109Z	48 Pin SSOP	78	78	6
W48C101-01H	SZ42C3109Z	48 Pin SSOP	50	50	7
W49C65-03H	SZ42C3120B	48 Pin SSOP	48	48	1

Acoustic & Precondition Test

<i>Device</i>	<i>Base Die</i>	<i>Pkg</i>	<i>Qty SS</i>	<i>Qty Pass</i>	<i>C-SAM pass SS</i>	<i>Sample #</i>
W40C11-23GD	SY40C0602Z	28 Pin SSOP	96	96	20	1
W40S01-04HD	SY40C0602Z	28 Pin SSOP	96	96	20	1
W40S01-04HD	SY40C0602Z	48 Pin SSOP	96	96	20	2
W40S01-04HD	SY40C0602Z	48 Pin SSOP	96	96	20	3
W42C31-09G	SW42C2622Z	8 Pin SOIC	97	97	20	1
W48C101-01H	SZ42C3109Z	48 Pin SSOP	48	48	20	1
W48C101-01H	SZ42C3109Z	48 Pin SSOP	48	48	20	2
W48C101-01H	SZ42C3109Z	48 Pin SSOP	48	48	20	3
W48C101-01H	SZ42C3109Z	48 Pin SSOP	96	96	20	4
W48C101-01H	SZ42C3109Z	48 Pin SSOP	96	96	20	5
W48C101-01H	SZ42C3109Z	48 Pin SSOP	96	96	20	6
W48S101-01H	SX48C5561Z	48 Pin SSOP	96	96	20	7
W48S101-04H	SX48C5561Z	48 Pin SSOP	90	90	20	8
W48S101-04H	SX48C5561Z	48 Pin SSOP	90	90	20	9
W48S101-04H	SX48C5561Z	48 Pin SSOP	96	96	20	10

PCT

<i>Device</i>	<i>Base Die</i>	<i>Pkg</i>	<i>Qty SS</i>	<i>Qty pass</i>	<i>Sample #</i>
W40S01-04HC	SY40C0602Z	48 Pin SSOP	32	32	1
W40S01-04HD	SY40C0602Z	48 Pin SSOP	32	32	1
W40S01-04HD	SY40C0602Z	48 Pin SSOP	32	32	2
W40S01-04HD	SY40C0602Z	48 Pin SSOP	32	32	3
W40S01-04HD	SY40C0602Z	48 Pin SSOP	32	32	4
W42C31-03G	SW42C2622Z	8 Pin SOIC	50	50	1
W42C31-03G	SW42C2622Z	8 Pin SOIC	48	48	2
W42C31-03G	SW42C2622Z	8 Pin SOIC	48	48	3
W42C31-03G	SW42C2622Z	8 Pin SOIC	46	46	4
W42C31-09G	SW42C2622Z	8 Pin SOIC	50	49	5
W48C101-01H	SZ42C3109Z	48 Pin SSOP	48	48	1
W48C101-01H	SZ42C3109Z	48 Pin SSOP	48	48	2
W48C101-01H	SZ42C3109Z	48 Pin SSOP	32	32	3
W48C101-01H	SZ42C3109Z	48 Pin SSOP	32	32	4
W48C101-01H	SZ42C3109Z	48 Pin SSOP	165	165	5
W48C101-01H	SZ42C3109Z	48 Pin SSOP	50	50	6

W48C101-01H	SZ42C3109Z	48 Pin SSOP	48	48	7
W48C101-01H	SZ42C3109Z	48 Pin SSOP	48	48	8
W48C101-01H	SZ42C3109Z	48 Pin SSOP	48	48	9
W48C67-01H	SX48C5561Z	48 Pin SSOP	32	32	1
W48S101-01H	SX48C5561Z	48 Pin SSOP	32	32	1
W48S101-01H	SX48C5561Z	48 Pin SSOP	32	32	2
W48S101-04H	SX48C5561Z	48 Pin SSOP	32	32	1
W48S101-04H	SX48C5561Z	48 Pin SSOP	32	32	2
W49C65-04	SZ42C3120B	48 Pin SSOP	32	32	1

PCT

<i>Device</i>	<i>Base Die</i>	<i>Lot Number</i>	<i>Qty SS</i>	<i>Qty fail</i>	<i>Stop Date</i>	<i>Sample #</i>
W42C31-03G	SW42C2622Z	I3D32-12000	50	0	08/24/1999	1
W42C31-03G	SW42C2622Z	I7D04-12000	46	0	03/09/2000	2
W42C31-03G	SW42C2622Z	SD07-11000	48	0	06/02/1999	3
W42C31-03G	SW42C2622Z	SD10-11000	48	0	06/02/1999	4
W42C31-09G	SW42C2622Z	IB010-12000	50	1 unconfirmed	06/28/2000	1

Temp Cycle

<i>Device</i>	<i>Base Die</i>	<i>Package Type</i>	<i>Qty SS</i>	<i>200 Cycles</i>	<i>Sample #</i>
W48C101-01H	SZ42C3109Z	48 Pin SSOP	37	0/37	1
W48C101-01H	SZ42C3109Z	48 Pin SSOP	37	0/37	2
W48C101-01H	SZ42C3109Z	48 Pin SSOP	37	0/37	3
W48S101-01H	SX48C5561Z	48 Pin SSOP	32	0/32	4
W48S101-04H	SX48C5561Z	48 Pin SSOP	32	0/32	1
W48S101-04H	SX48C5561Z	48 Pin SSOP	32	0/32	2

HTOL EFR 150C, VccMax

PPM = 0

<i>Device</i>	<i>Lot Number</i>	<i>Base Die</i>	<i>Pkg</i>	<i>Qty SS</i>	<i>Hours</i>	<i>Fails</i>	<i>Date</i>
W48C21-02G	IUD06-11	SZ48C20-32	8 Pin SOIC	200	36	0	19-Nov-98
W48C21-01AG	IWV09-10	SZ48C20-31	8 Pin SOIC	200	36	0	03-Dec-98
W48C21-01G	IRW07-11	SZ48C20-31	8 Pin SOIC	200	36	0	30-Nov-98
W48C21-02G	IYD02-1	SZ48C20-32	8 Pin SOIC	200	36	0	26-Jan-99
W48C21-02G	IYD03-11	SZ48C20-32	8 Pin SOIC	200	36	0	28-Jan-99
W48C21-02G	IZD04-11	SZ48C20-32	8 Pin SOIC	200	36	0	10-Feb-99
W48C21-02G	IZD05-11	SZ48C20-32	8 Pin SOIC	200	36	0	11-Mar-99
W48C21-02G	izd06-1	SZ48C20-32	8 Pin SOIC	200	36	0	31-Mar-99
W48C21-02G	11D05	SZ48c20-32	8 Pin SOIC	200	36	0	23-Apr-99
W48C21-02G	i2d06-12	SZ48C20-32	8 Pin SOIC	200	36	0	26-Apr-99
W48C21-02G	i2d08-13	SZ48C20-32	8 Pin SOIC	200	36	0	28-Apr-99
W48C21-02G	i2d10	SZ48C20-32	8 Pin SOIC	200	36	0	30-Apr-99
W48C21-02G	i1d06	SZ48C20-32	8 Pin SOIC	200	36	0	12-May-99
W48C21-02G	i3d03	SZ48C20-32	8 Pin SOIC	200	36	0	20-May-99
W48C21-02G	i3d02	SZ48C20-32	8 Pin SOIC	200	36	0	21-May-99
W48C21-02G	I3D04	SZ48C20-32	8 Pin SOIC	200	36	0	27-May-99
W48C21-01G	IXD07	SZ48C20-31	8 Pin SOIC	200	36	0	01-Jun-99
W48C21-02G	I3D17	SZ48C20-32	8 Pin SOIC	200	36	0	03-Jun-99
W48C21-02G	I4D05	SZ48C20-32	8 Pin SOIC	200	36	0	08-Jun-99
W48C21-02G	I5D01	SZ48C20-32	8 Pin SOIC	200	36	0	25-Jun-99
W48C21-02G	I5D02	SZ48C20-32	8 Pin SOIC	200	36	0	28-Jun-99
W48C21-02G	I5D03	SZ48C20-32	8 Pin SOIC	200	36	0	28-Jun-99
W48C21-02G	I5D04	SZ48C20-32	8 Pin SOIC	200	36	0	13-Jul-99
W48C21-02G	I5D06	SZ48C20-32	8 Pin SOIC	200	36	0	21-Jul-99
W48C21-02G	I6D04	SZ48C20-32	8 Pin SOIC	200	36	0	21-Jul-99
W48C21-02G	I5D05	SZ48C20-32	8 Pin SOIC	200	36	0	02-Aug-99

W48C21-02G	I6D06	SZ48C20-32	8 Pin SOIC	200	36	0	30-Jul-99
W48C21-02G	I6D05	SZ48C20-32	8 Pin SOIC	200	36	0	11-Aug-99
W48C21-02G	I6D20	SZ48C20-32	8 Pin SOIC	200	36	0	27-Aug-99
W42C31-03G	I4D03	SZ42C31-03	8 Pin SOIC	200	36	0	13-Sep-99
W42C31-03G	I6D14	SZ42C31-03	8 Pin SOIC	200	36	0	13-Sep-99
W48C21-02G	I6D21	SZ48C20-32	8 Pin SOIC	200	36	0	25-Aug-99
W166	I3D25	SZ42C31-66	8 Pin SOIC	200	36	0	09-Sep-99
W42C31-03G	I7D17	SZ42C31-03	8 Pin SOIC	200	36	0	13-Sep-99
W48C21-02G	I7D10	SZ48C20-32	8 Pin SOIC	200	36	0	17-Sep-99
W48C21-02G	I7D09	SZ48C20-32	8 Pin SOIC	200	36	0	17-Sep-99
W48C21-02G	I6D10	SZ40C20-32	8 Pin SOIC	200	36	0	28-Sep-99
W48C21-02G	I6D11	SZ40C20-32	8 Pin SOIC	200	36	0	28-Sep-99
W42C31-03G	I7D03	SZ42C31-03	8 Pin SOIC	200	36	0	29-Sep-99
W42C31-03G	I7D05	SZ42C31-03	8 Pin SOIC	200	36	0	29-Sep-99
W48C21-02G	I6D12	SZ48C20-32	8 Pin SOIC	200	36	0	30-Sep-99
W48C21-03G	I7D18	SZ42C31-03	8 Pin SOIC	200	36	0	04-Oct-99
W42C31-03G	I8D02	SZ42C31-03	8 Pin SOIC	200	36	0	06-Oct-99
W48C21-02G	I8D07	SZ48C20-32	8 Pin SOIC	200	36	0	08-Oct-99
W48C21-02G	I8D08	SZ48C20-32	8 Pin SOIC	200	36	0	08-Oct-99
W48C21-03G	I7D16	SZ42C31-03	8 Pin SOIC	200	36	0	15-Oct-99
W42C31-03G	I7D19	SZ42C31-03	8 Pin SOIC	200	36	0	20-Oct-99
W42C31-03G	I8D01	SZ42C31-03	8 Pin SOIC	200	36	0	20-Oct-99
W48C21-02G	I8D08	SZ48C20-32	8 Pin SOIC	200	36	0	28-Oct-99
W48C21-02G	I7D11	SZ48C20-32	8 Pin SOIC	200	36	0	28-Oct-99
W42C31-03G	I7D04	SZ42C31-03	8 Pin SOIC	200	36	0	08-Nov-99
W48C21-02G	I8D20	SZ48C20-32	8 Pin SOIC	200	36	0	08-Nov-99
W42C31-03G	I8D06	SZ42C31-03	8 Pin SOIC	200	36	0	08-Nov-99

HTOL LFR 150C, VccMax

FIT Rate = 5 Dhrs = 769,705

Device	Lot Number	Base Die	Pkg	Qty SS	Hours	Fails	Date
W42C32-05G	IAWZ2	SZ42C31	8 Pin SIOC	80	385	0	29-Apr-98
W42C27-36G	IOW02	SZ42C27	8 Pin SOIC	80	385	0	21-May-98
W42C32-05G	IAWZ2-9	SZ42C31	8 Pin SOIC	96	385	0	02-Sep-98
W42C32-05G	IRD16-9	SZ42C31	8 Pin SOIC	97	385	0	02-Sep-98
W42C32-05G	ITW02-11	SZ42C31	8 Pin SOIC	96	385	0	14-Sep-98
W42C32-05G	IUW08-1	SZ42C31	8 Pin SOIC	96	385	0	14-Sep-98
W42C32-05G	IUW08-1	SZ42C31-09	8 Pin SOIC	97	385	0	06-Oct-98
W49C31-18G	izd07-9	SZ42C31	16 Pin SOIC	77	385	0	06-May-99
W42C31-03G	i3d14	SZ42C31-03	8 Pin SOIC	77	385	0	20-May-99
W48C21-02G	I2D08	SZ48C20-32	8 Pin SOIC	80	385	0	24-Jun-99
W48C21-02G	I5D04	SZ48C20-32	8 Pin SOIC	80	385	0	27-Aug-99
W42C31-03G	I8D15	SZ42C31-03	8 Pin SOIC	200	500	0	08-Jan-00
W48C21-02G	I8D13	SZ48C20-32	8 Pin SOIC	200	385	0	24-Nov-99
W42C31-03G	I7D04	SZ42C31-03	8 Pin SOIC	120	1000	0	03-May-00
W42C31-09G	IBD10-12000	SZ42C31-09	8 Pin SOIC	150	500	0	10-Jul-00